The International Seismological Summary.

1938 October, November, December.

FORMERLY THE BULLETIN OF THE BRITISH ASSOCIATION SEISMOLOGY COMMITTEE.

Thanks are due to U.N.E.S.C.O. for financial support. Also to the Director of the Meteorological Office and the Superintendent of Kew Observatory for hospitality extended to the staff.

The last quarterly number for 1938 contains 167 determinations of epicentre, 116 being repetitions from origins determined since the introduction of the use of geocentric co-ordinates.

Cases of abnormal focal depth are noticed as below :—

	Date	Epicentre		Depth
		°	°	
Oct.	10d. 20h.	2·2N.	126·9E.	Base of Superficial Layers.
	11d. 0h.	2·2N.	126·9E.	,,
	13d. 15h.	23·9N.	121·7E.	,,
	17d. 15h.	44·4N.	140·0E.	0·030
	20d. 2h.	9·2S.	123·0E.	0·010
	21d. 6h.	43·7N.	131·5E.	0·070
	29d. 22h.	8·9S.	115·8E.	0·020
Nov.	13d. 13h.	44·6N.	149·4E.	0·010
	15d. 9h.	54·3N.	161·5W.	0·005
	18d. 14h.	13·3S.	167·0E.	0·040
	18d. 15h.	15·3N.	119·9E.	0·005
	21d. 1h.	20·5S.	177·5W.	0·030
	23d. 8h.	46·5N.	150·7E.	0·015
	25d. 21h.	2·5S.	122·0E.	0·040
Dec.	7d. 13h.	6·2S.	154·8E.	0·005
	16d. 17h.	45·0S.	167·0E.	0·005
	16d. 23h.	45·0S.	167·0E.	0·005
	21d. 12h.	9·8S.	119·1E.	Base of Superficial Layers.

The excessive size of the current quarterly number is due to the abnormal activity in the neighbourhood of Japan. Many of these shocks have only been recorded at one or two stations, but others have been extensively observed. For most of these shocks a single epicentre has been worked, though it appears that slight variations were noticed by the Central Meteorological Observatory at Tokyo.

KEW OBSERVATORY,
RICHMOND,
SURREY.

February, 1950.

Oct. 1d. Readings at 0h. (near Copiapo), 2h. (Ksara), 4h. (Nagoya), 5h. (Agra, Ksara, Tiflis, Baku, Helwan, and Sverdlovsk), 6h. (near Apia), 7h. (Tacubaya, Nagoya, and near Mizusawa), 8h. (Helwan, Ksara, Tucson (3), Mount Wilson, Tinemaha, near Pasadena, and Riverside), 10h. (Mizusawa, Tucson, and near Santiago), 11h. (Santiago), 12h. (Fort de France), 13h. (Tucson, Mount Wilson, Pasadena, and Tinemaha), 17h. (Agra), 19h. (Balboa Heights), 20h. (Tiflis, La Paz, Tucson, Mount Wilson, Pasadena, and Tinemaha), 21h. (near Copiapo), 22h. (Riverview, De Bilt, Uccle, Strasbourg, Stuttgart, Williamstown, Cape Girardeau, St. Louis (2), Florissant, Little Rock, Mount Wilson, Pasadena, Riverside, Tucson (2), Ksara, Frunse, Tchimkent, Semipalatinsk, Samarkand, near Almata, Andijan, and near Apia), 23h. (Sverdlovsk and Tashkent).

Oct. 2d. 16h. 37m. 30s. Epicentre 0°·0 25°·0W.

$A = +\cdot9063$, $B = -\cdot4226$, $C = \cdot0000$; $\delta = -3$; $h = +3$;
$D = -\cdot423$, $E = -\cdot906$; $G = \cdot000$, $H = \cdot000$, $K = -1\cdot000$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Averroes	37·0	25	—	—	e 12 24	−35	—	—	e 17·5
Malaga	41·2	24	e 7 9	−39	—	—	—	—	16·0
Granada	42·0	25	i 7 55	+ 1	—	—	i 9 38	PP	20·6
Toledo	44·1	23	e 8 4	− 8	e 15 3	+18	e 17 56	SS	—
San Juan	44·3	297	e 9 50	PP	—	—	—	—	—
La Paz	45·6	246	8 30	+ 6	—	—	—	—	20·5
Huancayo	51·4	254	—	—	e 16 28	0	—	—	—
Puy de Dôme	51·8	25	—	—	e 15 53	−40	—	—	e 30·9
Rome	53·7	34	9 29	+ 3	16 53	− 6	20 17	SS	e 25·5
Oxford	55·3	18	—	—	e 17 13	− 8	—	—	e 22·5
Strasbourg	56·1	25	e 11 33	PP	—	—	—	—	e 28·0
Uccle	56·4	21	—	—	e 16 30?	?	—	—	e 23·5
Stuttgart	56·8	26	—	—	e 17 38	− 3	—	—	e 24·5
Triest	56·8	31	e 9 46	− 2	e 18 0	+19	—	—	—
De Bilt	57·8	21	—	—	e 17 55	+ 1	—	—	e 24·5
Weston	59·2	322	—	—	e 18 0	−12	—	—	—
Potsdam	61·1	25	e 16 30?	?	—	—	—	—	e 28·5
Helwan	61·2	56	e 10 24	+ 5	e 18 36	− 2	e 14 3	PPP	—
Copenhagen	63·3	22	—	—	19 0	− 4	—	—	28·5
Istanbul	63·6	42	19 3	S	(19 3)	− 5	—	—	—
Ksara	66·1	53	e 10 49	− 2	e 19 44	+ 5	e 13 23	PP	—
Upsala	68·2	21	—	—	e 22 30?	?	—	—	—
Pulkovo	73·3	26	—	—	e 20 55	− 9	—	—	38·0
Moscow	74·9	32	e 11 47	+ 3	—	—	—	—	39·0
Tiflis	75·0	47	e 11 42	− 3	e 21 23	0	e 21 39	PS	e 37·5
Grozny	76·1	45	e 11 48	− 3	—	—	—	—	—
Baku	78·5	48	e 12 6	+ 2	22 41	PPS	27 2	SS	38·5
Sverdlovsk	87·3	33	e 12 51	+ 1	e 23 30	+ 1	28 58	SS	40·5
Tashkent	93·2	49	e 14 19	+62	24 26	+ 3	24 49	PS	e 48·5
Agra	E. 101·6	62	—	—	e 32 28	SS	—	—	—

Additional readings:
Averroes e = +16h.34m.
Toledo iP = +8m.12s.
Huancayo i = +30m.21s. and +31m.17s.
Rome SSS = +21m.54s.
Strasbourg e = +17m.17s.
Istanbul PS = +34m.12s., PPS = +37m.39s.
Ksara ePS = +20m.15s., eSS = +24m.14s.
Moscow e = +12m.21s.
Tiflis eZ = +21m.48s.
Baku e = +22m.4s. and +30m.42s.
Sverdlovsk e = +24m.22s.
Tashkent e = +18m.26s., +33m.39s., and +37m.42s.
Long waves were also recorded at Rio de Janeiro, Algiers, Irkutsk, and other European stations.

Oct. 2d. Readings also at 0h. (Tiflis and San Javier), 5h. (Tucson, Mount Wilson, La Paz, and Huancayo), 8h. (Tucson, Mount Wilson, La Jolla, Haiwee, Riverside, Pasadena, Fort de France, Strasbourg, Ksara, Uccle, Apia, Christchurch, and Brisbane), 9h. (Vladivostok and Sverdlovsk), 10h. (Weston (2), San Juan, Agra, Fordham, Williamstown (2), Riverside, and Fort de France), 11h. (Vladivostok, Sverdlovsk, Agra, Ksara (2), Calcutta, Tchimkent, Andijan, Bombay, and near Balboa Heights), 12h. (Tucson), 13h. (near Wellington), 14h. (Huancayo, La Paz, Andijan, Frunse, and Samarkand), 17h. (Strasbourg, Calcutta, Upsala, Stuttgart, Triest, Puy de Dôme, Toledo, Zurich, Bagnères, Neuchatel, and Basle), 18h. (Fresno, Tinemaha, Santa Barbara, Tucson, Tchimkent, Andijan, Samarkand, Frunse, Agra, Riverside, Mount Wilson, Grozny, La Jolla, Haiwee, and Pasadena), 19h. (Grozny), 20h. (Huancayo and La Paz), 21h. (Copiapo).

Oct. 3d. Readings at 0h. (Tiflis), 3h. (Riverside, Mount Wilson, and near Wellington), 4h. (La Paz), 5h. (Oaxaca, Puebla, Tacubaya, and Tucson), 7h. (Christchurch, Wellington, Brisbane, Mount Wilson, Tucson, and Ksara), 8h. (Erevan, near Santiago, and San Javier), 9h. (Mizusawa and Nagoya), 10h. (near Wellington), 13h. (near Florence, Triest, and Rome), 15h. (Tucson), 17h. (Huancayo, La Paz, Mizusawa, and near Nagoya), 20h. (Balboa Heights), 21h. (Mount Wilson, Pasadena, and Riverside), 22h. (Cape Girardeau and Tucson), 23h. (Fort de France).

Oct. 4d. 8h. 25m. 14s. Epicentre 6°·1S. 150°·5E. (as on 1938 Sept. 27d.).

$A = -\cdot8655$, $B = +\cdot4897$, $C = -\cdot1055$; $\delta = +3$; $h = +7$;
$D = +\cdot492$, $E = +\cdot870$; $G = +\cdot092$, $H = -\cdot052$, $K = -\cdot994$

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Brisbane		21·4	174	i 4 58	+ 7	i 8 58	+13	—	—	—
Riverview		27·6	178	e 6 19	PP	e 10 38	+ 6	6 39	PPP	e 14·7
Sydney		27·6	178	e 5 26	−25	e 10 44	+12	—	—	—
Adelaide		30·7	199	e 6 49	+30	i 11 27	+ 6	—	—	15·5
Melbourne		32·0	189	—	—	i 11 46	+ 4	e 17 38	SSS	16·1
Manila		35·8	306	i 7 5	+ 2	12 44	+ 3	—	—	17·4
Wellington		41·2	152	e 7 34	−14	(14 0)	− 2	17 21	SSS	20·5
Perth		41·3	227	—	—	i 17 11	SSS	—	—	i 24·3
Christchurch		42·1	156	e 1 9	?	9 56	PPP	e 17 33	L_Q	21·0
Batavia		43·4	268	7 46?	−20	—	—	—	—	—
Hong Kong		45·4	309	15 32	S	(15 32)	+28	(18 42)	SS	—
Husan		45·7	335	e 8 25	+ 1	e 15 34	+26	—	—	—
Mizusawa		45·8	350	(e 8 43)	+18	8 43	P	—	—	—
Taikyu		46·5	336	e 8 26	− 5	—	—	—	—	—
Keizyo		48·7	335	e 8 32	−16	e 16 5	+15	—	—	—
Zinsen	N.	48·7	334	e 8 42	− 6	e 16 0	+10	—	—	—
Vladivostok		51·8	343	i 9 9	− 3	e 16 39	+ 6	e 11 10	PP	e 23·7
Calcutta	N.	67·1	297	e 14 21	PPP	—	—	—	—	—
Irkutsk		70·1	332	e 11 17	+ 1	e 19 45	−42	—	—	34·8
Agra	E.	77·4	300	i 11 55	− 3	21 41	− 8	27 15	SS	—
Bombay	N.	80·4	290	e 12 1	−14	e 22 11	−10	22 41	PS	—
College		83·9	32	—	—	e 23 1	+ 5	e 23 49	PS	34·9
Andijan		85·0	312	e 12 38	0	—	—	e 16 36	PP	—
Tashkent		87·4	312	e 13 29	+39	e 23 13	[− 3]	e 24 8	PS	e 43·8
Pasadena		94·5	56	i 13 19$_s$	− 4	—	—	—	—	e 38·9
Mount Wilson		94·6	56	i 13 20	− 4	—	—	—	—	—
Tinemaha		94·6	54	e 13 22	− 2	—	—	—	—	—
Haiwee		94·8	54	e 13 22	− 3	—	—	—	—	—
Sverdlovsk		95·0	326	i 17 15	PP	e 26 15	PS	e 31 19	SS	41·8
Riverside		95·1	56	i 13 22$_a$	− 4	—	—	—	—	—
La Jolla		95·2	57	e 13 23	− 4	—	—	—	—	—
Tucson		100·6	58	i 13 48	− 3	26 54	PS	i 17 48	PP	40·3
Baku		102·0	310	e 16 41	?	e 26 53	PS	e 32 9	SS	49·8
Tiflis		105·8	312	e 18 34	PP	e 25 8	[+14]	e 26 58	PS	e 48·8
Moscow		107·8	327	e 18 51	PP	e 29 6	PPS	—	—	e 54·8

Continued on next page.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Pulkovo	110·1	332	—	—	e 28 18	PS	—	—	56·3
Ksara	113·8	303	i 19 26	PP	e 25 18	[−9]	e 29 12	PS	—
Ottawa	124·0	37	—	—	e 25 46?	[−17]	—	—	e 52·8
Seven Falls	126·0	33	—	—	e 32 46?	PPP	—	—	e 53·8
Weston	128·3	38	—	—	e 40 8	?	—	—	e 54·8
Huancayo	131·0	111	e 20 16	?	e 38 55	SS	i 22 42	PKS	e 59·7
La Paz	135·7	121	i 19 26a	[+3]	23 0	PP	—	—	64·8
Fort de France	147·7	72	i 19 58	[+14]	—	—	e 23 26	PP	—

Additional readings:
Riverview eN = +10m.59s.
Wellington S = +9m.34s., L_q = +17m.26s.
Perth iPS = +17m.34s.
Christchurch SS = +14m.14s., eZ = +17m.54s.
Vladivostok i = +9m.23s., +10m.12s., and +12m.20s., e = +16m.15s., i = +17m.1s., +18m.10s., and +19m.16s., e = +20m.46s.
Agra SSS = +30m.41s.
Bombay SSN = +26m.58s.
Andijan e = +22m.25s.
Tashkent e = +23m.4s. and +23m.27s.
Pasadena iZ = +13m.32s.
Baku e = +27m.27s. and +36m.15s.
Ksara ePPS = +30m.18s.
Ottawa e = +36m.46s.?
Huancayo ePPP = +24m.0s., ePPS = +33m.20s.
Fort de France e = +20m.42s.
Long waves were also recorded at Potsdam, Copenhagen, Berkeley, Ukiah, Seattle, San Juan, Philadelphia, Phu-Lien, and Fordham.

Oct. 4d. Readings also at 1h. (Ksara), 3h. (Tucson, La Paz, Nagoya, and La Plata), 5h. (Nagoya, Ksara, Santiago, Tiflis, Baku, Sverdlovsk, Tashkent, Vladivostok, Mizusawa, Irkutsk, and San Javier), 6h. (Nagoya (2), Mizusawa (2), and Santiago), 7h. (Fort de France), 8h. (Almata, Frunse, and Andijan (2)), 9h. (Sebastopol), 13h. (Ksara, La Paz, and Huancayo), 14h. (Mizusawa, Tiflis, and Wellington), 15h. (Wellington), 17h. (Tucson), 19h. (Riverside, Christchurch, and Wellington), 20h. (Averroes, Helwan, Tucson (2), Berkeley, Baku, Wellington, Tiflis, Christchurch, Ksara, Huancayo, La Paz, Fort de France, La Plata, Tashkent, Sverdlovsk, Mount Wilson, and Pasadena), 21h. (Tucson, Riverside, Frunse, Vladivostok, Pasadena, Mount Wilson, and Tiflis (2)), 22h. (Tiflis, Pasadena, Mount Wilson, Tucson, Frunse, Sverdlovsk, Tashkent, Grozny, Almata, Andijan, Batavia, Malabar, and Medan), 23h. (Medan, Malabar, Batavia, Brisbane, Sydney, and Adelaide).

Oct. 5d. Readings at 0h. (Christchurch, La Paz, Wellington (2), Melbourne, Riverview, College, Tucson (2), Ukiah, Haiwee, Mount Wilson, Pasadena, Riverside, Tinemaha, Berkeley, Vermont, Vladivostok, Andijan, Tashkent, Tiflis, Sverdlovsk, Ksara, and near Averroes), 1h. (Tucson and Fort de France), 4h. (Semipalatinsk and Tiflis), 7h. (Christchurch and Wellington), 8h. (Tiflis and Tucson), 9h. (La Paz), 10h. (near Mizusawa), 11h. (Copenhagen, Mizusawa, and Nagoya), 12h. (Tucson), 13h. (near Sebastopol), 14h. (near Apia), 15h. (Fort de France), 16h. (near Hukuoka B, near Mizusawa, and Nagoya), 18h. (Merida, Oaxaca, Tucson, and near Fort de France), 19h. (Tucson), 20h. (Samarkand), 22h. (Oaxaca, Merida, and Tucson).

Oct. 6d. Readings at 0h. (near Wellington), 1h. (Florence, Triest, and near Rome), 2h. (Bombay and Jena), 3h. (Ksara), 5h. (Nagoya and near Mizusawa), 8h. (near Mizusawa), 10h. (Samarkand (2)), 15h. (near Mizusawa), 17h. (Fordham), 18h. (near Malabar), 20h. (Christchurch, Wellington, Brisbane, Melbourne, Tucson, Vladivostok, Irkutsk, and Tashkent), 21h. (Ksara), 23h. (near Santiago and near San Javier).

Oct. 7d. 0h. 51m. 37s. Epicentre 0°·5N. 126°·0E.

Force III at Menado and Halmaheita.

Epicentre: 1°·0N. 126°·0E. (Batavia).
0°·0 127°·0E. (U.S.C.G.S.).

H. P. Berlage.

" Aardbevingen in der Oost Indischer Archipel Waargenomen gedurende het Jaar, 1938.

Naturkundig Tijdschrift voor Nederlandsch-Indie Afl. 1 Van Deel. XCX'40 blz 38-75, p.68.

$A = -\cdot5878$, $B = +\cdot8090$, $C = +\cdot0087$; $\delta = +7$; $h = +7$;
$D = +\cdot809$, $E = +\cdot588$; $G = -\cdot005$, $H = +\cdot007$, $K = -1\cdot000$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Manila		14·8	341	i 3 36	+ 4	i 4 33	?	—	—	—
Batavia		20·2	252	e 4 46	+ 7	i 8 42	+21	—	—	e 15·4
Kosyun		22·0	346	4 58	0	—	—	—	—	—
Miyakozima		24·1	358	5 15	− 3	9 1	−33	—	—	—
Hong Kong		24·6	333	5 34	+11	9 34	− 8	10 9	SS	11·2
Medan		27·5	277	e 5 48	− 2	i 10 30	0	—	—	—
Phu-Lien		27·7	318	e 5 52	0	—	—	—	—	—
Yakusima		30·1	7	6 14	+ 1	—	—	—	—	—
~~Perth~~		~~33·7~~	~~196~~	~~4 48~~	?	i 12 15	+ 7	—	—	—
Hirosima		34·2	8	6 47	− 2	12 17	+ 1	—	—	—
Osaka		35·1	13	7 1	+ 4	—	—	7 58	PP	—
Taikyu		35·3	3	e 7 11	+12	e 11 57	−36	—	—	—
Nagoya		36·0	15	e 7 4	− 1	—	—	—	—	—
Gihu		36·1	15	7 6	+ 1	12 44	− 1	—	—	—
Zinsen		36·8	1	e 7 12	+ 1	e 12 55	− 1	—	—	—
Keizyo		36·9	1	7 13	+ 1	12 56	− 2	—	—	—
Maebasi		37·7	16	7 21	+ 2	—	—	—	—	—
Brisbane		38·1	139	e 6 53	−29	i 13 5	−11	—	—	—
Mizusawa		40·9	18	7 41	− 5	13 54	− 4	—	—	—
Riverview		41·5	148	e 7 52	+ 2	e 17 12	SS	e 9 39	PP	e 24·5
Sydney		41·6	148	e 6 53	−58	e 13 38	−30	e 17 6	SS	—
Melbourne		42·0	158	i 8 27	+33	i 14 10	− 4	i 10 16	PPP	—
Vladivostok		42·8	6	i 8 13	+12	i 14 34	+ 8	—	—	20·3
Colombo	E.	46·5	279	5 16	?	—	—	—	—	—
Kodaikanal	E.	49·1	284	e 8 47	− 4	i 15 48	− 8	—	—	22·9
Hyderabad	E.	49·7	293	e 8 55	− 1	15 54	−10	—	—	23·1
Agra	E.	53·1	305	9 19	− 2	16 38	−13	9 34	pP	—
Irkutsk		54·7	344	9 32	− 1	17 8	− 5	—	—	28·4
Bombay	E.	55·2	293	e 9 36	− 1	i 17 14	− 6	i 11 45	PP	27·6
Christchurch		60·4	143	18 15	S	(18 15)	−13	24 57	SSS	e 32·0
Wellington		60·6	140	—	—	i 18 48	+18	—	—	e 27·4
Almata		61·0	322	e 10 22	+ 4	—	—	—	—	—
Frunse		62·3	320	e 10 40	+14	—	—	—	—	—
Andijan		62·9	316	e 10 33	+ 3	e 18 59	− 1	—	—	—
Tashkent		65·2	316	i 10 40	− 5	19 16	−12	—	—	e 30·4
Tchimkent		65·4	318	e 10 49	+ 2	e 19 26	− 4	—	—	—
Sverdlovsk		76·3	330	i 11 49	− 3	21 27	−10	—	—	37·4
Baku		79·1	311	i 12 9	+ 1	i 22 3	− 4	—	—	41·4
Grozny		82·6	314	12 28	+ 2	22 39	− 4	—	—	—
Erevan		82·8	310	e 13 35	+68	—	—	—	—	—
Tiflis		83·1	312	i 12 29	0	22 45	− 3	i 23 2	PS	e 34·4
Sotchi		87·0	314	12 48	0	—	—	—	—	—
College		87·9	25	—	—	e 23 5	[−15]	e 29 27	SS	e 37·7
Moscow		88·7	326	12 53	− 4	23 20	[− 5]	16 25	PP	48·9
Ksara		89·8	304	i 13 3a	+ 1	i 24 1	+ 8	e 16 36	PP	46·4
Theodosia		90·1	315	13 0	− 3	23 50	− 5	—	—	—
Simferopol		91·0	315	e 13 8	+ 1	e 23 59	− 4	—	—	—
Sebastopol		91·4	315	13 6	− 3	—	—	—	—	—
Pulkovo		92·4	330	e 13 25	+11	23 43	[− 3]	—	—	48·9
Helwan		93·8	300	i 13 20	0	—	—	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Istanbul		94·9	312	23 50	?	(23 50)	[−11]	—	—	—
Bucharest		96·7	315	—	—	i 24 13	[+ 3]	—	—	—
Potsdam		103·4	325	—	—	e 27 23?	PS	—	—	e 56·4
Cheb		104·6	323	—	—	e 24 43	[− 6]	—	—	e 60·4
Rome		107·0	313	e 18 59	PP	i 24 59	[0]	i 28 0	PS	e 50·4
Stuttgart		107·0	322	—	—	e 28 40	PS	—	—	e 60·4
Strasbourg		107·9	322	—	—	e 30 23?	?	—	—	e 63·4
Uccle		109·0	326	—	—	e 29 21	PS	—	—	e 54·6
Pasadena	z.	110·9	53	i 18 38	[+ 3]	—	—	e 19 30	PP	—
Mount Wilson	z.	111·0	53	i 18 37	[+ 2]	—	—	—	—	—
Riverside	z.	111·5	53	e 19 32	PP	—	—	—	—	—
Tucson		117·3	53	18 49a	[+ 2]	29 11	PS	19 47	PP	54·2
Williamstown		133·6	17	e 19 21	[+ 5]	—	—	i 22 46	PP	—
Huancayo		155·9	120	e 20 1	[+ 6]	49 22	SSS	e 25 9	PP	e 70·4
San Juan		157·8	30	—	—	e 34 52	SKSP	—	—	(e 80·3)
La Paz		158·9	141	20 5k	[+ 6[	43 53	SS	24 17	PP	80·1
Fort de France		163·3	25	e 20 3	[− 1]	e 24 43	PP	—	—	—

Additional readings :—
Batavia iE = +8m.30s.
Medan iE = +10m.44s.
Perth i = +15m.23s. and +18m.3s.
Brisbane iE = +7m.17s.
Mizusawa SE = +14m.3s.
Melbourne e = +16m.59s. and +18m.43s.
Agra PPPE = +12m.31s., sSE = +17m.2s., S_cS = +19m.2s., sSS = +21m.3s.
Bombay eE = +10m.27s., iE = +10m.42s., +13m.7s., and +17m.39s., eE = +18m.6s., eE = +21m.56s.
Christchurch L_qE = +28m.30s.
Andijan e = +11m.15s.
Tiflis eP_cPE = +12m.56s., eP_cPN = +12m.59s., eN = +22m.56s., ePPSE = +23m.23s., eSSN = +27m.1s., eSSSN = +32m.34s.
Moscow eS = +23m.33s., eSS = +29m.29s.
Pulkovo S = +24m.13s.
Ksara ePPS = +25m.23s., eSS = +30m.13s.
Istanbul PPP = +28m.18s., SKPS = +32m.21s., SSS = +50m.52s.
Bucharest iE = +24m.49s., eN = +24m.57s.
Rome e = +21m.19s., i = +29m.9s. and +31m.36s., eSS? = +37m.30s.
Mount Wilson ePZ = +14m.42s.
Tucson PPP = +22m.35s.
Huancayo ePSPS = +44m.42s.
La Paz $iPKP_3$ = +20m.41s.

Long waves were also recorded at De Bilt, Berkeley, Copenhagen, Upsala, Bidston, Kew, Stonyhurst, Jersey, Paris, Ukiah, and Edinburgh.

Oct. 7d. 6h. 11m. 33s. Epicentre 9°·5N. 93°·7E.

A = −·0637, B = +·9844, C = +·1640 ; δ = 0 ; h = +7 ;
D = +·998, E = +·065 ; G = −·011, H = +·164, K = −·987.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Medan		7·7	139	1 52	− 4	i 3 16	− 9	i 2 47	P_g	—
Calcutta	N.	13·9	339	e 3 31	+10	i 6 20	SSS	—	—	—
Colombo	E.	13·9	262	3 19	− 2	—	—	—	—	—
Kodaikanal	E.	16·0	273	i 3 43a	− 5	e 6 45	− 1	—	—	7·9
Hyderabad		16·8	300	3 58	0	7 17	SS	—	—	9·4
Phu-Lien		16·8	46	e 3 56	− 2	—	—	—	—	—
Batavia		20·3	138	4 45	+ 5	i 8 33	+10	i 8 51	SS	—
Bombay		22·3	297	e 5 3	+ 2	i 9 15	+13	i 5 31	PP	11·5
Agra	E.	23·0	323	i 5 5k	− 2	9 17	+ 3	5 41	PPP	—
Hong Kong		23·4	53	9 29	S	(9 29)	+ 8	—	—	14·7

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Dehra Dun	N.	25·4	328	e 6 3?	PP	e 10 5	+ 9	—	—	e 13·8
Manila		27·1	76	e 5 38	− 8	11 24	SS	—	—	—
Andijan		36·4	332	e 7 4	− 3	e 12 56	+ 6	—	—	—
Almata		36·7	340	e 7 14	+ 4	—	—	—	—	—
Frunse		37·2	336	e 6 42	−33	—	—	—	—	—
Samarkand		38·3	325	7 20	− 4	—	—	—	—	—
Tashkent		38·3	329	i 7 23	− 1	13 14	− 5	—	—	e 20·9
Tchimkent		38·9	331	e 7 28	− 1	—	—	—	—	—
Vladivostok		47·2	38	i 8 43	+ 7	e 15 23	− 6	—	—	e 24·4
Baku		49·5	316	e 8 54	0	16 7	+ 5	—	—	26·0
Grozny		53·5	318	e 8 16	−68	13 56	?	—	—	—
Tiflis		53·5	315	9 22	− 2	16 57	0	e 11 36	PP	e 30·4
Sverdlovsk		53·7	338	i 9 23	− 3	e 16 56	− 3	—	—	26·4
Ksara		58·1	303	i 9 56	− 2	e 18 5	+ 7	i 10 11	pP	—
Theodosia		61·1	316	10 11	− 7	18 32	− 5	—	—	—
Helwan		61·4	298	e 10 20	0	18 48	+ 8	—	—	—
Simferopol		62·0	316	e 9 13	?	—	—	—	—	—
Sebastopol		62·3	315	e 10 33	+ 7	—	—	—	—	—
Moscow		63·5	329	10 32	− 2	19 0	− 7	—	—	38·0
Pulkovo		68·6	331	e 11 7	0	—	—	—	—	39·0
Chur		79·2	316	e 12 5	− 3	—	—	—	—	—
Zurich		79·8	316	e 12 7	− 5	—	—	—	—	—
Tucson		132·3	28	19 13	[− 3]	i 22 52	PKS	22 21	PP	—

Additional readings :—
Medan iEN = +2m.55s., iS?EN = +4m.6s., iN = +4m.33s.
Batavia iE = +11m.30s., iEN = +14m.5s.
Bombay iEN = +5m.18s. and +9m.38s.
Hong Kong S? = +12m.58s.
Tiflis eS$_c$SE = +19m.16s.
Ksara isP = +10m.19s., ePP = +12m.19s., eSS = +22m.11s.
Tucson PKP = +19m.23s.
Long waves were also recorded at Copenhagen.

Oct. 7d. 10h. 53m. 40s. Epicentre 9°·5N. 93°·7E. (as at 6h.).

A = −·0637, B = +·9844, C = +·1640 ; δ = 0 ; h = +7.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Medan		7·7	139	1 53	− 3	i 3 56	S*	i 4 7	S_g	—
Kodaikanal	E.	16·0	273	e 3 46	− 2	e 6 40	− 6	—	—	7·8
Bombay		22·3	297	e 5 3	+ 2	e 9 19	+17	—	—	—
Agra	E.	23·0	323	i 5 7k	0	9 23	+ 9	5 39	PP	—
Andijan		36·4	332	e 7 14	+ 6	e 12 49	− 1	e 9 10	PPP	—
Frunse		37·2	336	e 7 19	+ 4	—	—	—	—	—
Tashkent		38·3	329	e 7 31	+ 7	e 13 13	− 6	e 8 23	PP	e 21·3
Tchimkent		38·9	331	e 7 28	− 1	—	—	e 8 29	PP	—
Baku		49·5	316	e 8 53	− 1	e 16 30	+28	—	—	26·3
Tiflis		53·5	315	e 9 23	− 1	e 16 56	− 1	e 19 10	S_cS	e 26·3
Sverdlovsk		53·7	338	—	—	e 16 0	−59	—	—	e 27·3
Ksara		58·1	303	e 9 57	− 1	e 18 6	+ 8	e 10 12	pP	30·3
Theodosia		61·1	316	e 10 2	−16	—	—	—	—	—
Simferopol		62·0	316	e 10 18	− 6	—	—	—	—	—

Additional readings :—
Medan iPN = +1m.58s., iE = +3m.16s.
Bombay eN = +8m.59s., iE = +10m.18s.
Tashkent e = +16m.0s. and +16m.34s.
Tiflis eSE = +17m.0s.
Ksara esP = +10m.19s.
Long waves were also recorded at Vladivostok, Batavia, and Calcutta.

Oct. 7d. 16h. 23m. 42s. Epicentre 9°·5N. 93°·7E. (as at 10h.).

$A = -\cdot0637$, $B = +\cdot9844$, $C = +\cdot1640$; $\delta = 0$; $h = +7$;
$D = +\cdot998$, $E = +\cdot065$; $G = -\cdot011$, $H = +\cdot164$, $K = -\cdot987$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Medan		7·7	139	1 55	− 1	i 3 26	+ 1	—	—	—
Calcutta	N.	13·9	339	e 3 17	− 4	i 6 5	+ 8	i 3 26	PP	e 7·0
Colombo	E.	13·9	262	3 21	0	7 13	L	—	—	(7·2)
Kodaikanal	E.	16·0	273	i 3 48a	0	i 6 58	+12	i 3 58	PP	—
Hyderabad		16·8	300	3 56	− 2	7 16	SS	—	—	8·2
Phu-Lien		16·8	46	e 3 55	− 3	e 7 18	SS	—	—	8·4
Batavia		20·3	138	e 4 42	+ 2	i 7 22	−61	—	—	e 11·3
Bombay		22·3	297	e 5 2	+ 1	9 14	+12	i 5 25	PP	11·5
Agra		23·0	323	i 5 8a	+ 1	i 9 18	+ 4	—	—	11·5
Hong Kong		23·4	53	5 9	− 2	9 29	+ 8	5 32	PP	12·1
Dehra Dun	N.	25·4	328	e 5 36?	+ 5	e 9 45	−11	—	—	e 13·6
Manila		27·1	76	i 5 46	0	i 10 29	+ 5	—	—	—
Arisan		29·4	57	4 18	?	—	—	—	—	—
Zi-ka-wei	E.	33·6	45	e 6 41	− 3	—	—	—	—	—
Andijan		36·4	332	e 7 13	+ 5	e 12 52	+ 2	e 7 54	PP	—
Almata		36·7	340	e 7 13	+ 3	—	—	e 8 45	PPP	—
Frunse		37·2	336	e 7 13	− 2	—	—	—	—	—
Samarkand		38·3	325	7 25	+ 1	13 10	− 9	—	—	21·5
Tashkent		38·3	329	i 7 12	−12	13 7	−12	7 35	pP	e 18·3
Tchimkent		38·9	331	i 7 30	+ 1	13 25	− 3	i 8 31	PP	—
Zinsen	E.	40·7	41	e 7 42	− 2	e 13 57	+ 2	—	—	20·6
Keizyo		41·0	41	7 46	0	e 13 56	− 3	—	—	—
Husan		41·1	45	e 6 19	?	—	—	—	—	—
Kumamoto		41·2	49	6 48	−60	—	—	—	—	—
Taikyu		41·2	44	e 7 42	− 6	e 13 58	− 4	—	—	e 23·7
Semipalatinsk		42·3	347	e 7 55	− 2	—	—	—	—	—
Irkutsk		43·5	9	8 7	0	e 14 32	− 4	e 8 39	pP	24·3
Muroto		44·1	51	8 11	− 1	14 35	−10	—	—	i 23·3
Osaka		45·7	50	8 0	−24	—	—	9 44	PP	—
Gihu		46·9	50	8 34	0	15 15	−10	—	—	i 23·7
Nagoya		47·0	50	e 8 7	−28	—	—	—	—	—
Vladivostok		47·2	38	i 8 41	+ 5	i 15 38	+ 9	—	—	e 22·4
Baku		49·5	316	i 8 57	+ 3	i 16 7	+ 5	—	—	24·3
Mizusawa	E.	51·5	46	9 10	+ 1	12 46	?	—	—	—
	N.	51·5	46	9 5	− 4	12 43	?	—	—	—
Erevan		53·2	313	e 9 32	+10	—	—	—	—	—
Grozny		53·5	318	e 9 23	− 1	e 16 59	+ 2	—	—	—
Tananarive		53·5	238	—	—	16 49	− 8	17 4	PS	27·8
Tiflis		53·5	315	9 24	0	16 58	+ 1	e 9 55	pP	e 23·3
Sverdlovsk		53·7	338	i 9 27	+ 1	16 57	− 2	9 56	pP	29·3
Ksara		58·1	303	i 9 58a	0	i 18 10	+12	e 12 14	PP	28·3
Theodosia		61·1	316	10 17	− 1	18 32	− 5	—	—	—
Helwan		61·4	298	i 10 18k	− 2	18 38	− 2	12 39	PP	—
Yalta		61·8	315	—	—	e 18 36	−10	—	—	—
Simferopol		62·0	316	10 24	0	18 44	− 4	—	—	—
Sebastopol		62·3	315	e 10 10	−16	—	—	—	—	—
Moscow		63·5	329	10 32	− 2	19 3	− 4	11 1	pP	31·8
Melbourne		67·1	137	—	—	i 19 18	−33	21 5	PPS	35·5
Bucharest		67·4	314	e 11 2	+ 3	19 52	− 3	20 46	PS	35·3
Brisbane		68·2	124	—	—	e 19 48	−16	—	—	—
Pulkovo		68·6	331	e 11 17	+10	20 7	− 2	11 43	pP	34·8
Sofia		69·2	312	e 11 14	+ 4	e 20 13	− 3	e 21 11	PPS	—
Riverview	N.	69·5	132	—	—	e 31 36	?	—	—	e 36·9
Prague		75·9	319	e 13 48	?	—	—	—	—	e 43·3
Triest		76·2	315	e 12 6	+14	e 22 4	PS	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Potsdam		76·8	322	e 11 48	− 7	e 21 42	0	—	—	e 42·3
Cheb		77·2	320	—	—	e 22 26	PS	—	—	—
Rome		77·2	310	e 11 53	− 4	21 47	0	i 15 25	PP	e 41·3
Copenhagen		77·3	325	—	—	21 54	+ 6	—	—	48·3
Jena		77·7	320	e 12 3	+ 3	—	—	e 15 4	PP	—
Florence		78·1	313	e 12 2	0	—	—	—	—	—
Hamburg		78·7	323	e 12 4	− 2	—	—	—	—	46·3
Chur		79·2	316	e 12 6	− 2	—	—	—	—	—
Stuttgart		79·3	318	e 12 8	− 1	e 22 6	− 3	e 23 1	PS	e 45·3
Strasbourg		80·3	318	—	—	e 21 28	−52	—	—	e 48·8
Neuchatel		80·9	317	e 12 15	− 2	—	—	—	—	—
Christchurch		88·5	134	—	—	e 23 34	− 7	e 29 24	SS	45·7
College		93·0	22	e 16 53	PP	e 24 19	− 2	—	—	e 38·5
Weston		126·6	346	e 23 18	PPP	e 38 20	SSP	—	—	e 56·3
Mount Wilson	z.	127·1	33	i 19 9	[+ 3]	—	—	21 7	PP	—
Pasadena	z.	127·1	33	i 19 8	[+ 2]	—	—	—	—	—
Riverside	z.	127·6	33	i 19 7	[0]	—	—	—	—	—
St. Louis		132·0	4	e 22 41	?	—	—	—	—	—
Tucson		132·3	28	e 19 18	[+ 2]	i 22 53	PKS	21 29	PP	71·9
Fort de France		145·3	313	i 20 7	[+27]	—	—	—	—	—
San Juan		145·9	325	e 19 40	[− 1]	—	—	e 22 47	PP	66·3
La Paz		161·0	248	e 19 53	[− 9]	—	—	24 44	PP	80·3
Huancayo		169·0	257	e 20 18	[+ 9]	e 46 21	SS	e 24 58	PP	67·4

Additional readings :—
Bombay P_cPEN = +8m.39s., SSEN = +9m.52s., iS_cSN = +16m.24s.
Agra eN = +5m.14s. and +9m.8s.?
Hong Kong SS = +10m.26s.
Tashkent sS = +13m.30s.
Irkutsk PP = +9m.51s., esS = +15m.57s.
Tiflis PPZ = +11m.30s., PPPZ = +11m.58s., eZ = +16m.53s., sSE = +17m.53s., eE = +19m.7s., iZ = +19m.11s.
Sverdlovsk L_q = +22·3m.
Helwan e = +13m.0s. and +14m.33s.
Sebastopol e = +10m.26s.
Moscow sS = +19m.31s.
Melbourne i = +29m.46s., e = +31m.41s.
Bucharest eE = +9m.30s., iN = +20m.57s.
Brisbane iN = +20m.6s.
Rome iPP = +15m.49s. and +16m.8s., i = +16m.25s., iPS = +22m.27s., i = +22m.35s. iSS = +27m.8s., i = +31m.18s., eL_q = +37m.58s.
Jena eZ = +12m.10s., eN = +13m.36s.
Christchurch eN = +36m.56s., L_qN = +39m.0s., eZ = +43m.18s.
St. Louis iE = +22m.58s.
Tucson iPKP = +19m.21s., iPPP = +24m.8s.
La Paz ePKP = +19m.58s., $iPKP_2$? = +20m.33s., PPZ = +25m.0s.
Huancayo ePPS = +39m.21s.
Long waves were also recorded at Wellington, Göttingen, Philadelphia, Fordham, Averroes, Moncalieri, Stonyhurst, Kew, Bidston, Upsala, and De Bilt.

Oct. 7d. Readings also at 2h. (Chur, Helwan, Ksara, Zurich, Basle, Brisbane, Haiwee, Wellington, Riverview, Pasadena, Mount Wilson, Riverside, Tucson, and Christchurch), 3h. (Medan), 5h. (Frunse, Tchimkent, Andijan, and Almata). 6h. (Medan), 7h. (Medan, Sverdlovsk, Tashkent, and Kodaikanal), 8h. (Tucson), 9h. (College, Mount Wilson, Pasadena, Riverside, and Tucson), 10h. (Frunse), 11h. (Tiflis), 12h. (Granada), 15h. (Granada), 16h. (Tiflis and Williamstown), 17h. (Florissant), 18h. (Tiflis), 20h. (Apia), 21h. (Ksara, New Plymouth, Tucson, Riverview, Riverside, Pasadena, Mount Wilson, Christchurch, and Wellington), 22h. (Riverview).

Oct. 8d. Readings at 0h. (Perth, Istanbul, near Granada, and near Hukuoka B), 1h. (near Granada (3)), 4h. (near Balboa Heights), 5h. (Frunse, Tchimkent, near Andijan, and Samarkand), 8h. (Nagoya, Hukuoka B, near Koti, Tucson, Pasadena, and Riverside), 9h. (Ksara, Tiflis, La Paz, and near Balboa Heights), 10h. (Medan, Ksara, Tashkent, Sverdlovsk, and near Nagoya), 11h. (Sverdlovsk and Tashkent), 12h. (Tucson), 13h. (College and Huancayo), 14h. (La Paz), 15h. (near Balboa Heights), 17h. (near Istanbul), 20h. (Medan), 22h. (Tucson and near Mizusawa).

Oct. 9d. 16h. 36m. 40s. Epicentre 60°·5S. 160°·0E.

$A = -\cdot4651$, $B = +\cdot1693$, $C = -\cdot8689$; $\delta = -3$; $h = -9$;
$D = +\cdot342$, $E = +\cdot940$; $G = +\cdot816$, $H = -\cdot297$, $K = -\cdot495$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Christchurch		18·6	30	i 4 21	0	i 7 53	+ 7	8 24	L_q	9·0
Wellington		21·3	32	e 4 53	+ 3	8 50	+ 7	5 18	PP	10·4
Melbourne		24·6	332	5 23	0	9 30	−12	i 9 50	SS	11·0
Riverview		27·3	345	i 5 49	+ 1	i 11 11	SS	i 6 54	PPP	e 12·8
Sydney		27·3	345	e 4 51	−57	e 10 18	− 9	i 11 4	SS	—
Adelaide		29·1	322	i 6 3	− 1	—	—	—	—	i 12·9
Brisbane	N.	33·4	349	i 6 38	− 4	e 11 32	−31	—	—	e 13·7
Perth		40·6	295	—	—	i 12 20	?	—	—	e 17·5
Batavia		67·2	301	11 4	+ 6	20 1	+ 9	—	—	—
Medan		79·4	297	12 15	+ 6	e 22 23	+13	—	—	—
Manila		81·1	322	12 17	− 1	i 22 29	+ 1	—	—	38·8
La Paz		94·1	134	13 41	+19	—	—	—	—	—
Pasadena	z.	115·3	65	e 18 52	[+ 8]	—	—	i 19 50	PP	—
Mount Wilson	z.	115·4	65	i 18 53	[+ 9]	—	—	e 19 57	PP	—
Riverside	z.	115·5	65	i 18 53	[+ 9]	—	—	—	—	—
Tucson		117·1	72	i 18 57	[+10]	i 26 2	[+23]	i 20 24	PP	—
Irkutsk		120·9	323	e 19 21	[+27]	e 25 57	[+ 4]	e 22 38	PPP	e 53·3
Andijan		123·3	294	e 19 17	[+18]	—	—	—	—	—
Frunse		124·1	298	e 19 7	[+ 6]	—	—	—	—	—
Samarkand		124·9	290	e 19 30	[+28]	—	—	—	—	—
Tashkent		125·2	293	e 20 47	PP	e 30 24	PS	e 37 32	SS	e 53·5
Fort de France		125·5	129	e 22 31	PPP	—	—	—	—	—
Cape Girardeau		131·5	86	e 19 24	[+ 9]	e 22 46	?	—	—	—
St. Louis	E.	132·2	83	—	—	e 22 49	?	24 6	PPP	—
Baku		133·7	278	e 21 58	PP	e 26 38	[+10]	e 39 32	SS	62·3
Helwan		134·3	252	19 30k	[+10]	—	—	e 21 56	PP	—
Ksara		135·4	259	i 19 39a	[+17]	e 34 27	PPS	i 22 13	PP	65·0
Tiflis		137·2	274	e 19 33	[+ 8]	e 40 20	SS	e 23 3	PP	e 63·3
Sverdlovsk		140·4	302	e 19 33	[+ 2]	e 32 36	PS	e 22 23	PP	61·3
Williamstown		143·7	96	i 19 41	[+ 4]	—	—	—	—	—
Harvard		144·3	97	i 19 41a	[+ 3]	—	—	—	—	e 78·8
Ottawa		144·4	89	e 19 45	[+ 7]	—	—	—	—	e 45·3
Weston		144·4	97	e 19 42a	[+ 4]	i 42 1	SS	—	—	—
Istanbul		144·5	260	19 42	[+ 4]	26 22	[−24]	33 11	PS	—
Sofia		148·5	256	e 19 56	[+11]	—	—	—	—	—
Moscow		150·1	287	i 18 58	[−49]	e 27 22	[+28]	e 21 34	PP	68·3
Averroes		151·6	203	e 20 11	[+22]	—	—	—	—	e 82·8
Rome		152·8	241	e 20 6	[+15]	e 43 48	SS	e 49 21	SSS	e 81·1
Granada		154·4	211	i 20 17k	[+23]	—	—	—	—	e 83·3
Triest		155·2	249	20 38	[+44]	—	—	24 4	PP	—
Pulkovo		155·4	291	e 20 8	[+13]	—	—	e 24 3	PP	78·8
Toledo		157·1	213	e 20 8	[+11]	—	—	—	—	26·5
Stuttgart		159·6	248	e 20 7	[+ 7]	e 44 50	SS	e 24 31	PP	e 89·3
Strasbourg		160·1	246	e 20 18	[+17]	—	—	e 24 40	PP	e 85·3
Copenhagen		162·3	268	20 8	[+ 5]	—	—	24 46	PP	89·3
Hamburg		162·4	260	e 20 13	[+10]	—	—	—	—	e 95·3
Scoresby Sund		169·9	6	25 17	PP	—	—	—	—	81·3

Additional readings:
Christchurch i = +4m.32s., eNZ = +8m.0s.
Wellington i = +5m.3s., i = +8m.58s., L_q = +9m.57s.
Adelaide e = +1m.8s.
Tucson i = +20m.55s., +21m.2s., +21m.30s., +23m.30s., +29m.18s., +30m.2s., +32m.46s., +33m.41s., +54m.0s., +54m.8s., and +54m.59s.
Irkutsk e = +24m.47s. and +29m.44s.
Andijan e = +21m.38s.
Tashkent e = +20m.54s., +21m.10s., +22m.8s., and +30m.48s.
Cape Girardeau esSE = +22m.58s.
St. Louis esSE = +22m.59s.
Baku e = +32m.20s.
Helwan i = +19m.44s., e = +23m.2s.

Continued on next page.

Sverdlovsk i = +22m.36s., e = +23m.17s. and +40m.58s.
Weston iPKP?EZ = +19m.47s., iSSN = +50m.39s.
Rome iPKP$_3$ = +20m.33s., i = +21m.14s. and +24m.41s., eSS = +44m.27s., e = +53m.32s.
Pulkovo i = +20m.32s.
Toledo e = +20m.37s.
Stuttgart e = +29m.52s.
Strasbourg ePKP$_3$ = +22m.33s.
Long waves were also recorded at Almeria, Puy de Dôme, Jersey, Paris, Cheb, Uccle, Agra, Prague, Bombay, Chatham Ils., Göttingen, Kew, De Bilt, Malaga, Bidston, College, Arapuni, Vladivostok, Stonyhurst, Edinburgh, and San Fernando.

Oct. 9d. 20h. 39m. 9s. Epicentre 9°·5N. 93°·7E. (as on 1938 Oct. 7d.).

A = −·0637, B = +·9844, C = +·1640 ; δ = 0 ; h = +7.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Medan		7·7	139	1 53	− 3	i 3 9	−16	—	—	—
Colombo	E.	13·9	262	e 4 21	+60	—	—	—	—	—
Kodaikanal	E.	16·0	273	e 3 51?	+ 3	e 6 30	−16	—	—	7·7
Hyderbad	E.	16·8	300	4 5	+ 7	7 14	+ 9	—	—	9·4
Batavia		20·3	138	e 4 48	+ 8	—	—	—	—	—
Bombay		22·3	297	e 5 3	+ 2	i 9 17	+15	—	—	—
Agra	E.	23·0	323	5 4	− 3	9 19	+ 5	10 16	SSS	—
Hong Kong		23·4	53	5 7	− 4	9 31	+10	—	—	12·2
Manila		27·1	76	5 41	− 5	11 24	SS	—	—	15·3
Andijan		36·4	332	e 7 27	+19	e 12 55	+ 5	—	—	e 17·7
Almata		36·7	340	e 7 9	− 1	—	—	—	—	—
Frunse		37·2	336	e 7 7	− 8	—	—	—	—	—
Tashkent		38·3	329	i 7 20	− 4	13 12	− 7	—	—	21·0
Tchimkent		38·9	331	e 7 31	+ 2	—	—	e 8 44	PP	—
Irkutsk		43·5	9	e 8 4	− 3	e 17 48	SS	e 9 34	PP	—
Vladivostok		47·2	38	e 8 31	− 5	e 19 21	SSS	e 10 27	PP	e 28·7
Baku		49·5	316	e 8 55	+ 1	e 16 15	+13	—	—	26·3
Mizusawa	E.	51·5	46	—	—	e 19 17	SS	—	—	—
Tiflis		53·5	315	e 9 23	− 1	e 16 56	− 1	e 11 43	PP	e 26·9
Sverdlovsk		53·7	338	9 27	+ 1	16 56	− 3	—	—	26·9
Ksara		58·1	303	e 10 1	+ 3	e 18 6	+ 8	e 12 14	PP	—
Helwan		61·4	298	10 24	+ 4	—	—	—	—	—
Moscow		63·5	329	e 9 43	−51	—	—	—	—	36·4
Pulkovo		68·6	331	—	—	e 20 9	0	—	—	39·4
Zurich		79·8	316	e 11 4	−68	—	—	—	—	—
Fort de France		145·3	313	e 21 1	?	—	—	—	—	—

Additional readings :—
Medan iS?E = +3m.14s.
Batavia iEN = +13m.30s.
Bombay eEN = +13m.26s.
Tchimkent e = +7m.53s.
Irkutsk e = +10m.8s., +12m.2s., +13m.27s., +20m.30s., +22m.14s., and +25m.40s.
Vladivostok e = +11m.32s.
Baku e = +18m.59s.
Tiflis eE = +17m.1s.
Ksara ePcP = +10m.56s.
Mowcow e = +17m.57s.
Pulkovo e = +19m.11s.
Long waves were also recorded at Rome and Calcutta.

Oct. 9d. Readings also at 0h. (Andijan, Frunse, Samarkand, Agra, Almata, Tashkent, and Tchimkent), 1h. (Irkutsk, Baku, Grozny, Sverdlovsk, and Tiflis), 2h. (New Plymouth, Ksara, Helwan, Tiflis, Wellington, Tacubaya, and Tucson), 4h. (Vladivostok), 5h. (Sverdlovsk, Tucson, Andijan, Frunse, Samarkand, Mizusawa, and Pasadena), 6h. (Branner and Lick), 7h. (Erevan, Sotchi, Piatigorsk, Tiflis, and Grozny), 8h. (Wellington, New Plymouth, and Christchurch), 9h. (Sebastopol), 10h. (Mount Wilson, Riverside, Pasadena, Mizusawa, and Tucson), 13h. (Sofia), 14h. (Tacubaya), 15h. (Tiflis), 16h. (Tananarive), 19h. (Harvard and Granada).

Oct. 10d. 2h. 56m. 11s. Epicentre 5°·5S. 106°·0W. (Rough).

$A = -\cdot2744$, $B = -\cdot9569$, $C = -\cdot0952$; $\delta = +2$; $h = +7$;
$D = -\cdot961$, $E = +\cdot276$; $G = +\cdot026$, $H = +\cdot092$, $K = -\cdot996$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tacubaya	N.	25·6	15	e 5 26	− 6	—	—	—	—	—
Huancayo		31·0	105	e 6 37	+16	i 11 49	+23	i 7 36	PP	e 13·4
Tucson		37·8	355	i 7 21k	+ 1	i 13 9	− 2	8 19	PP	15·9
La Paz		38·3	109	i 7 42k	+18	i 13 42	+23	i 9 14	PPP	i 16·7
La Jolla	Z.	39·6	347	e 7 36	+ 1	—	—	—	—	—
Riverside		40·7	346	i 7 41	− 3	—	—	—	—	—
Mount Wilson		41·1	346	i 7 46	− 1	—	—	—	—	—
Pasadena		41·1	346	e 7 50	+ 3	—	—	—	—	e 17·1
Santa Barbara		41·8	344	e 7 56	+ 3	—	—	—	—	—
Haiwee	N.	42·9	347	e 8 12	+10	—	—	—	—	—
Tinemaha		43·9	347	e 8 12	+ 2	—	—	—	—	—
Berkeley		45·7	343	—	—	e 15 5	− 3	e 19 35	SSS	—
Columbia		45·8	30	—	—	e 15 7	− 2	—	—	e 18·4
San Juan		45·9	58	e 8 27	+ 3	—	—	e 10 14	PPP	19·0
St. Louis	E.	46·3	17	—	—	e 15 6	−10	i 15 14	PS	e 27·0
Ukiah		47·2	343	e 8 32	− 4	e 15 26	− 3	e 18 0	SS	e 18·9
Fort de France		48·8	66	e 9 59	+70	e 17 5	+73	—	—	—
Chicago		50·1	17	—	—	e 15 59	−11	—	—	e 20·1
Bozeman		51·2	357	—	—	e 16 26	+ 1	—	—	e 25·4
Philadelphia		53·4	30	—	—	e 16 50	− 5	—	—	e 20·5
Fordham	N.	54·7	30	—	—	e 17 13	0	—	—	—
Weston		57·1	30	—	—	e 17 33	−12	—	—	e 26·8
Ottawa		57·4	25	9 53	0	17 49	0	23 49?	SSS	29·8
Rio de Janeiro		62·8	113	e 19 18	S	(e 19 18)	+20	—	—	e 29·3
Moscow		122·1	22	—	—	—	—	41 29	SSS	64·3
Irkutsk		127·1	337	e 20 49?	PP	e 27 49?	{−12}	e 23 49?	PPP	e 59·8
Sverdlovsk		127·7	9	—	—	e 38 16	SS	—	—	e 54·8
Ksara		134·8	48	e 22 4	PP	e 32 5	PS	e 45 1	SSS	—
Tiflis		135·5	31	—	—	e 34 10	PPS	e 39 12	SS	e 66·8
Baku		139·1	28	—	—	27 3	[+25]	40 49	SS	60·8
Tashkent		144·1	6	e 22 35	PP	e 42 19	SSP	—	—	e 72·0
Andijan		144·9	2	e 20 56	?	—	—	—	—	—

Additional readings :—
Tucson i = +7m.26s. and +7m.35s., iPPP = +8m.51s.
La Paz iPPPN = +9m.38s., iN = +10m.46s.
Berkeley eEZ = +20m.35s.
Moscow e = +39m.8s.
Irkutsk e = +32m.49s.?, +37m.49s.?, and +42m.49s.?
Ksara i = +23m.2s., e = +31m.31s.
Tiflis eZ = +21m.43s.
Baku e = +37m.25s. and +46m.13s.
Tashkent e = +21m.28s., +21m.55s., +25m.8s., and +54m.31s.
Andijan e = +24m.53s.
Long waves were also recorded at Christchurch, Guadalajara, Vladivostok, College, Pulkovo, Copenhagen, Stuttgart, Rome, De Bilt, Strasbourg, Uccle, Butte, Kew, Puy de Dôme, Granada, Harvard, and La Plata.

Oct. 10d. 20h. 48m. 7s. Epicentre 2°·2N. 126°·9E. (as on 1937 Oct. 27d.).

Force III at Menado and Halmaheira.

Epicentre : 2°·5N. 127°·0E. (Batavia).
2°·2N. 127°·3E. (U.S.C.G.S.).

H. P. Berlage.
Aardbevingen in der Oost Indischer Archipel Waargenomen gedurende het Jaar, 1938.

Naturkundig Tijdschrift voor Nederlandsch-Indie, Afl. 1 var Deel XCX′ 40-blz. 38-75, p. 68.

$A = -\cdot6000$, $B = +\cdot7991$, $C = +\cdot0382$; $\delta = +2$; $h = +7$;
$D = +\cdot800$, $E = +\cdot600$; $G = -\cdot023$, $H = +\cdot031$, $K = -\cdot999$.

A focus at the base of the superficial layers has been assumed.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Manila	13·6	335	i 3 13k	0	i 5 57	+13	—	—	—
Taito	21·2	345	4 39	− 6	8 36	+ 2	—	—	—
Malabar	21·4	244	i 5 0	+13	i 8 49	+11	i 9 3	SS	—
Batavia	21·7	248	e 4 56	+ 6	i 8 57	+14	—	—	12·9
Isigakizima	22·1	354	4 20	−34	8 13	−37	—	—	—
Giran	23·0	349	5 34	PP	—	—	—	—	—
Taihoku	23·3	349	e 4 53?	−13	8 47	−25	5 21	PP	—
Hong Kong	23·5	329	5 7k	− 1	9 14	− 2	5 28	PP	11·4
Medan	28·2	274	5 51	− 1	10 39	+ 5	—	—	—
Yakusima	28·3	8	5 53	0	10 35	0	12 21	SSS	—
Zi-ka-wei	29·3	352	e 5 59	− 3	10 29	−22	i 6 57	PP	18·8
Miyazaki	29·9	8	6 7	0	10 56	− 5	—	—	—
Kumamoto	30·7	7	6 11	− 3	11 8	− 5	—	—	—
Simidu	31·0	10	6 17	0	11 20	+ 2	—	—	15·0
Hukuoka B	31·4	6	6 20	0	11 26	+ 2	—	—	14·8
Koti	31·8	11	6 25	+ 1	e 11 17	−13	—	—	e 15·3
Siomisaki	32·2	15	6 21	− 6	11 36	− 1	—	—	15·6
Husan	32·8	4	6 28	− 4	e 11 24	−22	—	—	—
Sumoto	32·8	13	6 31	− 1	11 46	0	—	—	15·7
Wakayama	32·8	14	6 33	+ 1	11 52	+ 6	—	—	—
Hamada	32·9	8	6 34	+ 1	11 47	− 1	—	—	16·1
Osaka	33·3	14	6 40	+ 3	11 45	− 9	13 51	SS	—
Taikyu	33·5	3	6 45	+ 7	i 12 0	+ 3	—	—	15·2
Syuhurei	33·8	2	6 45	+ 4	12 15	+13	—	—	—
Hamamatu	33·9	17	6 42	0	12 2	− 1	—	—	—
Nagoya	34·1	15	e 6 43	− 1	12 8	+ 2	—	—	14·5
Kohu	35·0	17	6 52	+ 1	12 20	0	—	—	17·3
Zinsen	35·1	359	e 6 52	0	e 12 22	0	i 8 19	PP	e 18·1
Keizyo	35·2	1	6 55	+ 2	12 26	+ 3	—	—	15·6
Tokyo, Cen. Met. Ob.	35·4	19	6 56	+ 1	—	—	—	—	—
Perth	35·6	195	i 6 58	+ 2	i 12 34	+ 4	7 48	pP	i 17·6
Nagano	35·8	15	6 57	− 1	12 30	− 2	—	—	—
Tyosi	35·8	21	7 3	+ 5	12 29	− 3	—	—	—
Mito	36·2	17	6 59	− 3	13 36	+57	—	—	17·9
Heizyo	36·7	357	i 7 12a	+ 6	i 12 52	+ 6	—	—	17·0
Dairen	36·8	353	7 4	− 2	12 49	+ 1	—	—	17·4
Adelaide	38·5	165	7 26	+ 5	i 13 15	+ 1	i 8 41	PP	i 17·5
Brisbane	38·8	141	i 7 23	0	i 8 53	PP	—	—	—
Mizusawa	39·0	19	i 7 25	0	i 13 23	+ 2	—	—	18·5
Morioka	39·5	18	7 35	+ 6	13 33	+ 4	—	—	—
Hatinohe	40·4	18	7 31	− 5	13 44	+ 2	—	—	—
Vladivostok	41·0	6	i 7 41	− 1	i 13 49	− 2	—	—	19·1
Mori	41·6	15	7 49	+ 3	14 4	+ 4	—	—	—
Calcutta N.	42·5	301	i 8 1a	+ 7	i 14 19	+ 6	i 9 26	PP	i 20·2
Riverview	42·5	149	i 8 0	+ 6	e 14 12	− 1	i 9 41	PP	e 20·2

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Sydney		42·5	149	i 7 51	− 3	i 17 37	SS	—	—	—
Sapporo		42·7	16	7 57	+ 2	14 20	+ 4	17 42	SS	—
Melbourne		43·2	159	i 8 4	+ 4	14 28	+ 4	9 53	PP	17·3
Colombo	E.	47·1	277	8 31	0	15 14	− 6	—	—	25·7
Kodaikanal	E.	49·7	282	9 21a	+30	i 16 9	+13	i 19 8	SS	—
Hyderabad	E.	49·9	291	8 57	+ 5	15 52	− 7	10 43	PP	23·2
Agra	N.	52·9	303	9 15	0	i 16 35	− 5	—	—	—
Irkutsk		53·3	343	e 9 16	− 2	i 16 46	0	—	—	24·9
Dehra Dun	N.	54·0	307	e 9 10	−13	i 16 57	+ 2	—	—	i 28·1
Bombay		55·4	291	e 9 30k	− 3	i 16 58	−16	11 36	PP	25·9
Arapuni		60·2	137	—	—	e 18 5	−12	21 41	SS	26·9
Almata		60·3	321	10 8	0	e 18 1	−17	—	—	e 30·5
Christchurch		61·2	144	i 10 18a	+ 4	i 18 41	+12	i 19 29	PPS	29·8
Wellington		61·3	141	i 10 15	+ 1	i 18 33	+ 2	12 49	PP	29·9
Frunse		61·6	318	10 18	+ 2	18 32	− 3	—	—	36·5
Semipalatinsk		62·1	329	10 19	− 1	18 33	− 8	—	—	—
Andijan		62·3	316	10 21	0	18 42	− 2	—	—	30·9
Apia		62·8	106	i 10 28a	+ 4	i 19 2	+13	i 11 6	P_cP	—
Tashkent		64·4	315	i 10 32	− 3	i 19 6	− 4	—	—	30·1
Tchimkent		64·8	317	10 33	− 5	19 9	− 5	—	—	—
Samarkand		65·7	313	10 38	− 5	e 19 25	− 1	—	—	—
Sverdlovsk		75·3	329	e 11 38	− 4	i 21 9	− 8	—	—	33·8
Honolulu		75·5	69	11 49	+ 6	21 21	+ 1	15 5	PP	e 31·1
Baku		78·7	311	i 12 4	+ 4	i 21 58	+ 4	—	—	36·9
Tananarive		80·6	251	e 12 11	0	i 22 18	+ 4	e 23 41	PPS	e 39·1
Grozny		82·0	313	12 41	+23	i 23 26	PS	—	—	—
Tiflis		82·6	311	e 12 20	− 1	i 22 32	− 3	e 15 54	PP	e 36·2
Piatigorsk		84·0	314	12 26	− 2	i 22 36	−13	—	—	—
College		86·0	25	e 12 35	− 3	22 45	[−14]	16 3	PP	i 34·9
Sotchi		86·5	314	12 43	+ 2	e 23 3	[+ 1]	—	—	—
Moscow		87·8	326	12 48	+ 1	23 12	[+ 3]	16 23	PP	40·4
Theodosia		89·5	315	12 57	+ 2	23 32	− 9	—	—	41·9
Ksara		89·6	304	i 12 56	0	i 23 48	+ 6	e 16 28	PP	43·9
Simferopol		90·4	315	13 1	+ 2	e 23 26	[0]	—	—	34·9
Yalta		90·4	314	12 54	− 5	i 23 28	[+ 2]	—	—	35·4
Sebastopol		90·9	315	13 5	+ 3	e 23 34	[+ 5]	—	—	50·4
Pulkovo		91·4	330	e 13 4	0	23 30	[− 2]	e 17 5	PP	41·4
Sitka		92·4	33	13 17	+ 8	23 47	[+10]	16 32	PP	38·4
Helwan		93·7	300	i 13 15	+ 1	23 47	[+ 3]	17 13	PP	—
Istanbul		94·5	313	13 17	− 1	23 46	[− 3]	25 41	PS	—
Bucharest		96·2	315	e 13 28a	+ 2	24 4	[+ 5]	—	—	—
Upsala		97·7	332	e 13 22	−11	e 24 3	[− 3]	e 31 53	SS	e 43·9
Sofia		98·5	314	e 13 39	+ 3	i 24 13	[+ 3]	e 18 7	PP	32·3
Johannesburg	E.	98·9	245	—	—	e 24 20	[+ 8]	e 26 31	PPS	—
Belgrade		100·1	316	e 13 42k	− 2	i 24 18	[0]	i 17 55	PP	e 42·0
Budapest		100·3	318	13 51	+ 7	24 23	[+ 4]	i 26 50	PS	48·4
Copenhagen		101·7	328	13 56	+ 5	24 30	[+ 4]	17 53	PP	41·9
Prague		102·5	323	e 14 28	+34	e 24 33	[+ 3]	e 18 23	PP	e 42·9
Potsdam		102·6	326	e 13 53	− 2	i 24 32	[+ 2]	i 18 15	PP	47·9
Bergen		103·1	334	e 24 40	SKS	(e 24 40)	[+ 8]	—	—	e 43·9
Cheb		103·8	323	e 14 4	+ 4	e 24 37	[+ 1]	e 18 17	PP	e 49·9
Hamburg		103·8	327	e 13 57	− 3	e 24 26	[−10]	e 18 25	PP	e 41·9
Jena		103·9	324	e 14 5	+ 5	e 24 29	[− 7]	e 27 8	PS	e 39·9
Ukiah		103·9	49	e 18 20	PP	e 24 37	[+ 1]	27 26	PS	42·4
Triest		104·4	318	e 13 3	−60	i 24 40	[+ 2]	e 17 49	PP	e 48·9
Göttingen	z.	104·6	326	e 14 3	− 1	—	—	e 17 40	PP	e 56·9
Scoresby Sund		104·6	351	14 9	+ 5	24 42	[+ 3]	18 28	PP	—
Berkeley		105·0	50	e 13 11	−54	e 24 41	[0]	e 18 41	PP	e 43·7
Branner		105·1	50	e 14 45	P?	—	—	e 18 54	PP	33·0
Padova		105·7	319	e 14 48	P?	i 25 48	−11	—	—	e 62·9
Stuttgart		106·2	322	e 14 13a	P	e 24 47	[+ 1]	e 18 43	PP	e 48·9
Rome		106·4	315	e 14 11k	P	i 24 43	[− 4]	18 33	PP	i 50·1
Karlsruhe		106·6	323	e 17 21	?	e 28 15	PS	—	—	e 53·9
Florence		106·7	318	e 14 19	P	i 25 53	−14	i 18 53	PP	35·9
Chur		106·7	321	e 14 14	P	e 24 52	[+ 3]	e 17 45	PP	—

Continued on next page.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
De Bilt	107·1	327	14 19	P	e 24 55	[+ 5]	e 18 53	PP	e 48·9
Strasbourg	107·1	323	i 14 16a	P	i 24 53	[+ 3]	i 18 45	PP	e 50·9
Zurich	107·1	322	e 14 20	P	e 26 15	SKKS	e 18 47	PP	—
Basle	107·7	322	e 14 18	P	—	—	—	—	—
Santa Barbara	107·8	54	e 18 46	PP	—	—	—	—	—
Aberdeen	108·1	333	—	—	i 25 50	[+55]	i 34 37	SS	40·5
Tinemaha	108·2	50	e 14 33	P	—	—	e 18 35	PP	—
Uccle	108·2	327	e 14 19	P	i 24 58	[+ 2]	i 19 2	PP	e 51·9
Neuchatel	108·3	322	e 14 19	P	e 24 55	[− 1]	—	—	—
Moncalieri	108·6	320	e 14 28	P	26 38	?	—	—	e 44·3
Butte	109·1	39	e 18 21	PKP	—	—	—	—	44·9
Pasadena	109·1	53	e 14 27	P	e 25 16	[+17]	e 28 20	PS	e 44·7
Durham	109·2	331	—	—	i 25 6	[+ 6]	i 28 13	PS	—
Mount Wilson	109·2	53	e 14 28	P	e 33 39	SKKP	e 37 31	P'P'	—
Edinburgh	109·3	333	e 19 10	PP	i 25 6	[+ 6]	28 12	PS	39·4
Grenoble	109·8	320	e 14 17	P	e 24 50	[−12]	18 44	PP	e 52·9
Riverside	109·8	53	i 14 30	P	—	—	i 19 3	PP	—
Bozeman	110·2	39	19 7	PP	25 31	[+27]	i 28 59	PS	e 45·7
Paris	110·2	325	e 19 11	PP	25 4	[0]	28 16	PS	49·9
Stonyhurst	110·2	331	i 19 18	PP	i 25 3	[− 1]	22 13	PPP	e 42·9
La Jolla	110·3	54	e 18 39	[+11]	—	—	e 19 5	PP	—
Kew	110·4	328	i 14 36	P	i 25 9	[+ 5]	i 19 19	PP	e 46·9
Bidston	110·7	331	e 14 33	P	i 25 6	[0]	i 28 23	PS	e 40·9
Marseilles	110·8	318	—	—	e 24 53?	[−13]	e 32 23	?	e 56·9
Puy de Dôme	111·9	321	e 18 16	[−15]	e 25 13	[+ 3]	e 22 2	PPP	e 45·4
Rathfarnham Castle	112·3	332	i 27 32	?	—	—	—	—	e 51·4
Jersey	112·6	326	e 13 43	?	i 25 21	[+ 8]	e 19 49	PP	e 52·1
Bagnères	114·4	320	e 19 34	PP	e 25 18	[− 2]	29 2	PS	e 54·2
Algiers	115·1	313	e 14 53?	P	25 29	[+ 6]	i 19 47	PP	e 51·9
Tucson	115·6	52	i 14 57	P	i 27 26	SKKS	i 19 43	PP	46·1
Ivigtut	116·7	357	18 45	[+ 4]	29 23	PS	19 39	PP	—
Toledo	118·7	319	e 18 48	[+ 3]	i 29 39	PS	i 20 5	PP	—
Almeria	119·0	315	e 17 36	?	e 27 0	SKKS	37 8	SSP	e 61·0
Granada	119·7	316	i 15 19k	P	i 29 56	PS	i 19 2	PP	64·9
Malaga	120·5	316	15 3	P	27 16	SKKS	—	—	56·9
San Fernando	121·9	317	e 21 26	PP	28 17	?	30 17	PS	57·9
Averroes	124·3	313	e 18 48	[− 8]	e 25 48	[− 7]	20 25	PP	e 57·9
Chicago	126·1	32	e 21 0	PP	37 56	SS	23 41	PPP	—
St. Louis	126·9	36	e 19 5	[+ 5]	e 28 59	?	—	—	—
Little Rock	128·0	42	e 19 3	[0]	e 25 48	[−18]	e 21 38	PP	61·0
Cape Girardeau N.	128·2	38	e 19 7	[+ 4]	—	—	e 21 8	PP	—
Ottawa	128·5	20	19 5	[+ 1]	31 11	PS	21 9	PP	58·9
Seven Falls	128·5	15	21 14	PP	38 23	SS	—	—	58·9
Cincinnati	129·7	31	e 19 7	[+ 1]	e 26 29	[+19]	e 21 16	PP	e 64·9
Tacubaya N.	129·9	63	e 19 13	[+ 7]	i 22 40	SKP	—	—	—
Vermont	130·2	19	e 21 17	PP	e 38 35	SS	—	—	e 57·2
East Machias	131·5	13	e 21 25	PP	38 57	SS	i 23 0	PKS	e 57·3
Williamstown	131·7	18	i 19 13	[+ 3]	i 32 19	PS	i 21 53	PP	e 65·1
Harvard	132·5	17	i 19 14	[+ 2]	e 39 14	SS	e 21 26	PP	e 64·9
Fordham	133·1	21	i 19 15	[+ 2]	i 25 7	PPP	i 19 38	pPKP	—
Philadelphia	133·4	22	e 19 21	[+ 8]	e 26 47	[+28]	e 39 26	SS	e 56·8
Georgetown	133·5	25	i 19 18	[+ 4]	33 38	PPS	i 21 43	PP	—
Weston	133·5	17	e 19 11k	[− 3]	i 23 2	PKS	i 20 27	pPKP	—
Columbia	135·4	33	21 55	PP	i 22 59	PKS	i 35 18	PPPS	66·3
Merida E.	137·5	55	—	—	i 22 47	SKP	—	—	—
La Plata	147·2	173	19 45	[+ 7]	23 45	PKS	42 23	SS	60·9
Balboa Heights	151·4	66	e 19 57	[+13]	—	—	—	—	—
Huancayo	155·9	115	e 19 54	[+ 4]	i 26 41	[−10]	i 23 37	PP	i 64·8
San Juan	155·9	30	e 19 52	[+ 2]	i 28 7	?	i 23 44	PP	i 61·0
Rio de Janeiro	157·3	206	e 20 7	[+15]	e 28 59	PPP	—	—	e 43·7
La Paz	159·5	135	20 2	[+ 7]	i 26 52	[− 3]	i 24 20	PP	75·9
Fort de France	161·4	25	i 20 1	[+ 4]	i 24 33	PP	—	—	27·3

For Notes see next page.

NOTES TO OCTOBER 10d. 20h. 48m. 7s.

Additional readings :—
Batavia iPEZ = +4m.59s., iN = +9m.8s.
Hong Kong SS = +10m.17s.
Medan ePN = +5m.55s., iPN = +6m.0s., iE = +8m.17s., iN = +9m.38s., iE = +10m.17s.
Malabar iN = +5m.21s., iE = +9m.12s.
Zi-ka-wei iN = +6m.25s., +7m.25s., and +10m.49s., iE = +13m.49s.
Nagoya iP = +6m.46s.
Perth i = +8m.5s., +8m.41s., and +13m.1s., sS = +14m.1s., i = +14m.28s., +14m.51s., +15m.46s., and +16m.5s.
Adelaide iPPP = +8m.53s., i = +10m.10s., +14m.13s., and +15m.34s.
Brisbane iPN = +7m.29s., iSN = +8m.59s.
Calcutta ePPPN = +9m.58s., iSSN = +16m.53s., eSSSN = +17m.38s.
Riverview iEN = +8m.21s., i = +10m.3s., +10m.21s., +11m.22s., and +14m.26s., iN = +17m.29s., iE = +17m.33s., iN = +18m.31s.
Sydney e = +24m.6s.
Melbourne i = +11m.26s. and +13m.53s.
Kodaikanal iSSSE = +20m.28s.
Hyderabad S_cSE = +18m.43s., SSE = +19m.25s.
Bombay iEN = +9m.59s. and +13m.22s., iSN = +17m.9s., S_cSEN = +19m.14s., SSE = +20m.36s., iEN = +22m.43s.
Arapuni i = +18m.23s. and +24m.17s.
Christchurch iEN = +23m.38s., L_qN = +25m.53s., L_qE = +27m.23s.
Wellington P_cP = +10m.33s., eZ = +10m.50s., i = +13m.2s., PS? = +19m.1s., S_cS = +20m.11s., i = +20m.50s., SS = +22m.33s. and +25m.53s., L_q = +27m.23s.
Andijan e = +11m.4s. and +11m.30s.
Apia i = +11m.1s., iPP = +12m.41s., i = +23m.11s.
Honolulu iS = +21m.30s., iPS = +21m.59s., iSS = +26m.33s.
Tananarive iEN = +12m.19s., E = +12m.41s., EN = +22m.41s.
Tiflis iN = +12m.28s., eP_cPE = +12m.49s., ePPPZ = +17m.30s., iSN = +22m.35s., iZ = +22m.38s., eSSE = +27m.53s., SSSE = +30m.45s.
College P = +12m.59s., iS = +23m.10s., iSS = +28m.42s.
Moscow S = +23m.21s., PPS = +24m.55s.
Ksara ePS = +24m.46s.
Pulkovo eS = +24m.1s., S_cS = +24m.32s., PS = +25m.9s.
Sitka iSS = +30m.37s.
Helwan i = +13m.58s. and +17m.27s., PPP = +19m.5s., i = +21m.8s., PS = +26m.3s.
Bucharest SKKSEN = +24m.41s., SN = +25m.25s.
Upsala SKKSE = +24m.50s., eSSE = +32m.23s.
Sofia eE = +26m.26s.
Belgrade iP = +14m.2s., e = +19m.4s., and +22m.10s., i = +27m.13s.
Budapest P_cPE = +13m.53s., eN = +14m.25s. and +23m.38s., eE = +24m.59s., PSE = +25m.15s. and +25m.21s., eSS = +29m.43s. and +29m.53s., iN = +32m.31s.
Copenhagen PPP = +20m.23s., eEZ = +23m.5s., S = +25m.28s., PS = +26m.53s.' PPS = +27m.59s., e = +29m.29s., +30m.20s., and +31m.17s., SS = +32m.5s.' and +32m.53s., SSS = +36m.11s.
Prague eSKKS = +25m.35s., ePS = +27m.3s., eSS = +32m.29s.
Potsdam eN = +14m.5s., eZ = +14m.17s., eEZ = +18m.35s., iSE = +25m.38s., eE = +26m.59s., ePSZ = +27m.1s., eEZ = +27m.41s., ePPSE = +27m.53s., eEZ = +28m.11s., eZ = +31m.47s., eSSE = +32m.53s. ?
Bergen i = +25m.40s.
Cheb eSS ? = +33m.11s.
Hamburg iPSZ = +27m.17s., ePPSZ = +28m.7s., eSSZ = +33m.17s., eSSSZ = +37m.57s.
Jena eZ = +17m.5s., i = +17m.28s., iZ = +19m.48s., iE = +24m.37s., e = +25m.51s., eN = +27m.16s. and +32m.53s.
Ukiah eSS = +32m.45s., SS = +33m.18s.
Triest iS = +25m.50s., PS = +27m.15s., e = +27m.53s.
Scoresby Sund +14m.26s., +17m.35s., and +20m.51s., S = +25m.58s., ? = +27m.38s., +28m.23s., and +28m.59s.
Berkeley eN = +17m.51s., eEZ = +18m.8s., eE = +18m.21s., eN = +25m.41s., eEZ = +26m.55s., eZ = +30m.13s., eN = +36m.51s.
Branner eE = +17m.53s.
Padova eS = +27m.0s.
Stuttgart ePKPEZ = +17m.27s., e = +19m.5s., eZ = +20m.18s., ePPP = +21m.11s., eEZ = +22m.19s., e = +23m.17s., iSEN = +26m.11s., ePS = +27m.23s., iPS = +27m.44s., ePPS = +28m.43s., e = +37m.5s.
Rome i = +20m.17s.?, iPPP = +21m.2s. and +21m.13s., i = +27m.18s., iPS = +27m.49s., iPPS = +28m.42s. ?, iSS = +33m.50s., i = +38m.55s.
De Bilt eZ = +18m.9s., iZ = +20m.23s., eEN = +25m.46s.
Strasbourg ePPPE = +20m.59s., iS = +26m.14s., iPSE = +27m.51s., iPPSE = +28m.41s., iSSE = +33m.53s.
Zurich ePKP = +18m.5s.
Aberdeen i = +26m.25s.
Uccle eZ = +18m.9s., iPS = +28m.3s., SS = +33m.53s.
Pasadena ePKPNZ = +18m.30s., ePKKPZ = +29m.38s.
Durham i = +26m.33s.

Continued on next page.

Mount Wilson iPKP$_3$ = +18m.30s., ePKKPZ = +29m.39s.
Edinburgh i = +20m.2s., +26m.1s., +26m.34s., +29m.27s., and +35m.45s.
Grenoble i = +19m.20s., e = +24m.59s., eSKKS = +25m.52s., iS = +26m.30s., iPS = +28m.8s., i = +29m.28s., eSS = +34m.9s., eSSS = +39m.24s.
Riverside ePKP$_3$Z = +18m.17s., ePKKPZ = +29m.39s.
Paris S = +26m.41s., PPS = +29m.27s.
Stonyhurst i = +26m.43s., iPS = +28m.27s., i = +29m.13s.
Kew iPPPZ = +21m.55s., iSKKSEN = +26m.7s., iPS = +28m.25s., iPPS = +29m.34s., iSKKPZ = +33m.48s., eSSEN = +34m.36s., iPPPZ = +38m.15s., eSSSEN = +38m.42s.
Bidston iSKKS = +26m.3s., iPPS = +29m.29s., eSS = +34m.27s., eSSS = +38m.28s.
Rathfarnham Castle e = +33m.39s. and +41m.12s.
Jersey e = +17m.26s., eS = +28m.8s., e = +30m.2s., iSS = +34m.55s.
Bagnères e = +16m.25s., ePPPE = +22m.0s., SSE = +35m.16s., SSSE = +39m.46s.
Algiers iSKKS = +26m.32s., eSE = +29m.13s., ePSN = +30m.12s., ePPSN = +31m.53s.?, SS = +35m.53s. ?
Tucson iPKP = +18m.44s., i = +19m.4s., +19m.59s., +20m.21s., and +20m.57s., iPPP = +22m.14s., iPS = +29m.23s., iSS = +35m.55s., iSSS = +40m.4s.
Ivigtut +19m.51s., SKKS = +26m.45s., S = +27m.39s., SS = +35m.29s.
Toledo i = +20m.21s.
Granada i = +21m.5s., +22m.40s., +32m.32s., and +32m.57s.
San Fernando PPSN = +33m.14s.
Averroes iSKP = +21m.49s., SKKSE = +27m.39s., SE = +28m.15s., ePSE = +30m.33s., eSSN = +37m.11s., SSSN = +41m.53s.
Chicago eSSS = +43m.0s.
St. Louis eE = +20m.32s., eN = +29m.59s.
Little Rock eSKPN = +22m.26s., i = +25m.28s.
Cape Girardeau eN = +22m.47s., ePSN = +31m.29s.
Ottawa SS = +37m.53s. ?
Cincinnati i = +21m.44s., eSKP = +22m.34s., e = +23m.29s. and +31m.22s.
Vermont iPP = +21m.44s., iPKS = +22m.37s.
Williamstown iSKSP = +31m.51s., iPPS = +33m.20s., eSS = +39m.5s.
Harvard ePKSE = +22m.2s., eZ = +35m.12s.
Fordham iPP = +21m.46s., iSKPZ = +22m.42s., ipPKSEN = +23m.6s., iSKSPN = +32m.7s.
Philadelphia i = +21m.38s., iPKS = +22m.39s., i = +23m.4s., ePPP = +24m.29s., eSSS = +44m.2s.
Georgetown +33m.48s.
Weston iPKPZ = +19m.18s., iZ = +19m.35s., ipPKPZ = +20m.27s., isPKPZ = +20m.47s., iNZ = +21m.17s., iPPNZ = +21m.32s. and +21m.38s., iNZ = +22m.4s., iSKPNZ = +22m.42s., eSKKSN = +28m.10s., iSKKPZ = +31m.47s., eSPNZ = +31m.59s., ePSE = +32m.32s., eSPPN = +33m.31s., eSSE = +39m.7s., eSSE = +45m.7s.
Columbia iSKSP = +32m.2s.
La Plata SKSP = +33m.17s., SSS = +48m.5s.
Huancayo iPKP = +20m.0s., i = +20m.24s., +20m.38s., +20m.55s., +21m.13s., +23m.53s., and +24m.31s., iSKKS = +30m.21s., iSKKKS = +31m.1s., i = +31m.16s., +31m.57s., +34m.34s., +34m.38s., +37m.18s., and +45m.40s., iSSS = +48m.36s., i = +52m.44s., and +53m.16s.
San Juan PKP = +20m.18s., iPKP = +20m.24s., i = +21m.54s., eSS = +43m.42s.
Rio de Janeiro eS = +29m.15s.
La Paz iZ = +20m.30s., iPKP$_3$N = +20m.42s., iZ = +22m.38s., iSKKSN = +31m.14s., PSKSN = +35m.2s., PPSN = +38m.18s., iN = +40m.14s., iSSE = +44m.46s., iSSN = +44m.53s.
Fort de France PP = +20m.41s., PPP = +20m.57s., SS = +25m.26s., SSS = +25m.33s.
Long waves were also recorded at Santiago and Laibach.

Oct. 10d. Readings also at 0h. (Platigorsk), 1h. (Agra), 3h. (Santiago and Tucson), 4h. (Bombay and Agra (2)), 5h. (Mizusawa), 6h. (Tiflis, Erevan, and Tananarive (2)), 12h. (Grozny), 14h. (Ksara), 16h. (Ksara), 17h. (Nagoya), 19h. (Samarkand, Tashkent, and Andijan), 20h. (New Plymouth and Fort de France), 21h. (Batavia and Andijan), 22h. (Andijan, Weston, near Algiers, and Frunse), 23h. (Colombo).

Oct. 11d. 0h. 7m. 58s. Epicentre 2°·2N. 126°·9E. (as on 1938 Oct. 10d.).

$A = -\cdot6000$, $B = +\cdot7991$, $C = +\cdot0382$; $\delta = +2$; $h = +7$.

Tables for a focus at the base of the superficial layers have been used.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Manila	13·6	335	i 3 12k	− 1	5 58	+14	—	—	—
Kosyun	20·6	344	4 45	+ 6	—	—	—	—	—
Batavia	21·7	248	e 4 54	+ 4	i 8 41	− 2	—	—	13·0
Isigakizima	22·1	354	4 30	−24	8 28	−22	—	—	—
Hong Kong	23·5	329	5 11	+ 3	9 11	− 5	5 30	PP	11·2

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Medan		28·2	274	5 53	+ 1	10 33	− 1	—	—	—
Yakusima		28·3	8	5 54	+ 1	9 49	−46	—	—	12·7
Miyazaki		29·9	8	6 10	+ 3	10 4	−57	—	—	—
Hirosima		32·4	9	6 28	− 1	11 37	− 3	—	—	—
Sumoto		32·8	13	6 31	− 1	11 52	+ 6	—	—	—
Nagoya		34·1	15	(e 6 51)	+ 7	e 6 51	P	—	—	—
Gihu		34·3	15	6 46	+ 1	12 9	0	—	—	16·3
Keizyo		35·2	1	5 41	−72	—	—	—	—	—
Nagano		35·8	15	6 57	− 1	12 32	0	—	—	—
Brisbane		38·8	141	e 7 20	− 3	i 13 20	+ 2	i 16 20	SSS	—
Mizusawa	E.	39·0	19	7 15	−10	—	—	—	—	—
Vladivostok		41·0	6	e 7 41	− 1	e 13 49	− 2	—	—	e 20·1
Mori		41·6	15	7 53	+ 7	14 4	+ 4	—	—	—
Calcutta	N.	42·5	301	—	—	i 12 59	−74	—	—	—
Riverview		42·5	149	e 14 23	?	e 18 13	SSS	—	—	e 23·9
Melbourne		43·2	159	—	—	i 14 35	+11	i 17 44	SS	24·5
Colombo	E.	47·1	277	e 12 22	?	—	—	—	—	—
Kodaikanal	E.	49·7	282	e 8 38	−13	—	—	—	—	—
Irkutsk		53·3	343	9 15	− 3	16 43	− 3	—	—	28·0
Bombay		55·4	291	—	—	e 17 2	−12	—	—	e 29·1
Almata		60·3	321	e 10 14	+ 6	—	—	—	—	—
Christchurch		61·2	144	—	—	e 25 43	SSS	—	—	e 31·3
Wellington		61·3	141	—	—	(e 22 2?)	SS	—	—	e 22·0
Frunse		61·6	318	e 10 38	+22	—	—	—	—	—
Semipalatinsk		62·1	329	—	—	e 18 29	−12	—	—	—
Andijan		62·3	316	e 10 29	+ 8	e 18 42	− 2	—	—	—
Tashkent		64·4	315	i 10 34	− 1	i 19 16	+ 6	—	—	e 29·8
Tchimkent		64·8	317	e 10 54	+16	—	—	—	—	—
Sverdlovsk		75·3	329	i 11 39	− 3	i 21 12	− 5	—	—	34·0
Baku		78·7	311	12 2	+ 2	21 57	+ 3	—	—	37·5
Tiflis		82·6	311	12 21	0	e 22 35	0	e 23 17	PS	e 39·0
Erevan		82·8	310	e 12 26	+ 4	—	—	—	—	—
Piatigorsk		84·0	314	e 12 29	+ 1	e 22 52	+ 3	—	—	—
Moscow		87·8	326	e 12 47	0	e 23 11	[+ 2]	—	—	37·5
Ksara		89·6	304	i 12 57	+ 1	i 23 50	+ 8	e 24 49	PS	—
Pulkovo		91·4	330	e 13 9	+ 5	23 33	[+ 1]	—	—	42·5
Helwan		93·7	300	13 17	+ 3	e 23 45	[+ 1]	—	—	—
Istanbul		94·5	313	23 48	SKS	(23 48)	[− 1]	—	—	—
Bucharest		96·2	315	—	—	e 24 6	[+ 7]	—	—	54·0
Cheb		103·8	323	—	—	e 27 2?	PS	—	—	—
Triest		104·4	318	—	—	24 38	[0]	—	—	—
Stuttgart		106·2	322	e 19 2	PP	e 27 41	PS	e 33 20	SS	e 57·0
Rome		106·4	315	19 55	?	25 51	−14	—	—	—
De Bilt		107·1	327	—	—	e 28 2?	PS	—	—	e 50·0
Strasbourg		107·1	323	e 19 10	PP	e 24 48	[− 2]	e 27 52	PS	e 59·5
Uccle		108·2	327	—	—	e 27 2?	?	—	—	e 55·0
Mount Wilson	Z.	109·2	53	e 18 33	PKP	—	—	—	—	—
Kew		110·4	328	—	—	e 28 27	PS	—	—	e 54·0
Bidston		110·7	331	—	—	e 28 22	PS	—	—	e 54·0
Tucson		115·6	52	18 43	[+ 4]	—	—	i 19 51	PP	—
Averroes		124·3	313	e 22 44	PPP	—	—	—	—	—
Balboa Heights		151·4	66	e 20 2?	[+18]	—	—	—	—	—
Huancayo		155·9	115	—	—	e 44 43	SS	—	—	e 64·4
La Paz		159·5	135	20 9	[+14]	—	—	—	—	78·0
Fort de France		161·4	25	e 20 4	[+ 7]	e 24 32	PP	—	—	—

Additional readings :—
Batavia P = +4m.58s., iS?N = +8m.58s.
Hong Kong SS = +10m.15s.
Medan iEN = +8m.56s., S?E = +10m.18s., iE = +11m.1s., iN = +14m.48s.
Nagoya eP = +6m.0s.
Riverview eE = +19m.51s.
Andijan e = +11m.5s.
Tiflis ePcPZ = +12m.41s., eSSSZ = +32m.2s.
Pulkovo S = +24m.1s.
Bucharest eEN = +24m.42s.
Stuttgart e = +29m.2s.
Long waves were also recorded at Sydney, Stonyhurst, Upsala, Granada, Copenhagen, San Fernando, Edinburgh, Puy de Dôme, Potsdam, Prague, Marseilles, and Hamburg.

Oct. 11d. Readings also at 0h. (Erevan), 1h. (Sverdlovsk), 2h. (Sverdlovsk and Tacubaya), 3h. (Medan), 4h. (Mount Wilson, Pasadena, Riverside, near Bagnères, and Adelaide), 7h. (New Plymouth), 8h. (Medan, Mount Wilson, Tucson, Huancayo, La Paz, and Malabar), 9h. (Williamstown, Weston, Harvard, Tucson, Triest, and Tananarive), 11h. (Huancayo, La Paz, and Tacubaya), 12h. (Copenhagen), 14h. (Tucson), 15h. (Tananarive), 16h. (Ksara (2), Helwan, and Averroes), 17h. (Tananarive, near Nagoya, Mizusawa, Sverdlovsk, and Tashkent), 18h. (Tucson, Tacubaya, Huancayo, Mount Wilson, Riverside, Pasadena, Guadalajara, Puebla, Oaxaca, La Jolla, Tinemaha, Haiwee, and Fort de France), 19h. (Sverdlovsk, Tashkent, Ksara, Helwan, and Averroes), 21h. (Butte), 22h. (Grozny, Piatigorsk, Sotchi, Tiflis, Baku, Sverdlovsk, Tashkent, and Erevan), 23h. (New Plymouth, Santiago, Wellington, and Christchurch).

Oct. 12d. 0h. 34m. 24s. Epicentre 39°·8N. 144°·3E.

Strong at Aomori, Hakodate, slight at Mizusawa, Miyako, and Hatinohe.

Epicentre. Pacific, East of Japan, in the area of Miyako. Depth slight. Macroseismic radius greater than 300kms.

See Seismological Bulletin of the Central Met. Obs., Japan, for the year 1938, Tokyo, 1940, pp. 60-63, Macroseismic Chart p. 61.

$A = -\cdot6256$, $B = +\cdot4495$, $C = +\cdot6376$; $\delta = -4$; $h = -2$;
$D = +\cdot584$, $E = +\cdot812$; $G = -\cdot518$, $H = +\cdot372$, $K = -\cdot770$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Miyako	1·8	265	0 35$_a$	+ 3	—	—	—	—	—
Hatinohe	2·3	289	0 36$_a$	− 4	1 9	0	—	—	—
Morioka	2·4	268	0 43$_a$	+ 2	1 12	0	—	—	—
Mizusawa	2·6	255	i 0 48	+ 4	i 1 21	+ 4	—	—	—
Urakawa	2·6	334	0 56	P$_g$	1 35	S$_g$	—	—	—
Aomori	2·9	291	0 44	− 4	1 24	0	—	—	—
Akita	3·2	269	0 58	P*	1 55	S$_g$	—	—	—
Kusiro	3·2	1	1 19	P$_g$	—	—	—	—	—
Obihiro	3·2	345	0 46	− 6	1 45	S$_g$	—	—	—
Hakodate	3·4	308	0 49	− 6	—	—	—	—	—
Yamagata	3·4	243	1 8$_a$	P$_g$	1 50	S$_g$	—	—	—
Mori	3·6	311	0 51	− 7	—	—	—	—	—
Muroran	3·6	316	1 12	P$_g$	—	—	—	—	—
Nemuro	3·7	15	0 53	− 7	1 35	−10	—	—	—
Sapporo	3·9	326	0 56	− 6	1 47	− 3	—	—	—
Niigata	4·5	246	1 22	P*	2 12	S*	—	—	—
Utunomiya	4·8	228	1 13	− 2	2 39	S$_g$	—	—	—
Tukubasan	4·9	224	1 22$_a$	+ 5	2 22	+ 7	—	—	—
Tyosi	4·9	215	1 29	P*	2 41	S$_g$	—	—	—
Haboro	5·0	339	1 12	− 6	2 1	−17	—	—	—
Kumagaya	5·3	228	1 29$_a$	P*	2 35	+10	—	—	—
Maebasi	5·3	232	1 34$_a$	P*	—	—	—	—	—
Tokyo Cent. Met. Obs.	5·4	223	1 31$_k$	+ 7	2 51	S$_g$	—	—	—
Takada	5·5	242	1 28	+ 3	2 59	S$_g$	—	—	—
Nagano	5·7	239	1 28	0	2 44	+ 9	—	—	—
Yokohama	5·7	222	1 45	P*	2 50	S*	—	—	—
Hunatu	6·1	227	1 43	P*	2 59	S*	—	—	—
Mera	6·1	217	1 43	P*	3 40	?	—	—	—
Kohu	6·2	229	1 40	+ 5	3 19	S$_g$	—	—	—
Matumoto	6·2	237	1 41	+ 6	3 6	S*	—	—	—
Ito	6·3	222	1 57$_k$	P*	3 23	S$_g$	—	—	—
Misima	6·3	224	1 48	P*	3 24	S$_g$	—	—	—
Wazima	6·3	249	1 40$_a$	+ 4	2 48	− 2	—	—	—
Husiki	6·4	243	1 46	P*	4 9	?	—	—	—
Numadu	6·4	224	1 52	P*	3 23	S*	—	—	—
Toyama	6·4	243	1 43	P*	3 32	S$_g$	—	—	—
Iida	6·6	232	1 49	P*	3 16	S*	—	—	—
Takayama	6·6	239	1 51$_k$	P*	3 13	S*	—	—	—
Kanazawa	6·8	244	1 53	P*	3 45	S$_g$	—	—	—
Omaesaki	7·1	225	1 58	P*	3 33	S*	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Hamamatu		7·3	227	2 3	P*	3 33	S*	—	—	—
Gihu		7·4	236	1 58a	+ 6	3 38	S*	—	—	—
Nagoya		7·4	234	e 2 6	P*	i 3 51	S*	i 2 16	P_g	—
Hatidyozima		7·6	210	2 9	P*	3 19	− 4	—	—	—
Ibukisan		7·7	237	2 7	P*	4 2	S*	—	—	—
Hikone		7·8	237	2 1	+ 3	3 59	S*	—	—	—
Kameyama		8·0	234	2 6	+ 6	3 57	S*	—	—	—
Tu		8·0	233	2 1	+ 1	4 28	S_g	—	—	—
Kyoto		8·3	237	1 58	− 6	4 3	S*	—	—	—
Miyadu		8·4	242	2 0	− 6	4 2	S*	—	—	—
Toyooka		8·6	243	2 14	+ 5	4 42	S_g	—	—	—
Yagi		8·6	235	2 26a	P*	4 15	S*	—	—	—
Osaka		8·7	236	2 16	+ 6	3 40	−10	—	—	—
Kobe		8·9	238	2 17	+ 5	4 13	S*	—	—	—
Wakayama		9·2	235	2 33	+17	4 32	S*	—	—	—
Sumoto		9·3	237	2 4	−13	4 16	+11	—	—	—
Siomisaki		9·4	230	2 22	+ 4	4 41	S*	—	—	—
Tokusima		9·6	236	2 33	+12	4 39	S*	—	—	—
Sakai		9·8	248	2 33	+ 9	—	—	—	—	—
Vladivostok		9·9	294	i 2 20	− 5	i 4 18	− 2	—	—	4·6
Tadotu		10·0	240	2 10	−17	5 35	S_g	—	—	—
Muroto		10·4	234	2 44	+10	4 58	SSS	—	—	—
Koti		10·5	237	e 2 41	+ 6	e 4 50	SS	5 7	SSS	e 5·4
Hamada		10·9	247	2 44	+ 4	5 1	SS	—	—	—
Hirosima		10·9	244	2 43	+ 3	4 58	SS	—	—	—
Matuyama		11·0	240	2 45a	+ 3	5 55	L	—	—	(5·9)
Simidu		11·5	236	2 54	+ 6	5 40	L	—	—	(5·7)
Uwazima		11·5	239	2 54a	+ 6	6 43	?	—	—	—
Ooita		12·1	241	3 0	+ 3	6 5	L	—	—	(6·1)
Izuka		12·5	245	3 1	− 1	6 10	L	—	—	(6·2)
Hukuoka B		12·8	245	e 3 8	+ 2	e 6 36	L	—	—	(e6·6)
Titizima		12·8	189	3 21	PP	—	—	—	—	—
Husan		13·0	253	3 11	+ 2	e 5 40	+ 5	—	—	—
Kumamoto		13·0	242	3 12	+ 3	5 3	−32	—	—	—
Taikyu		13·0	257	3 12	+ 3	6 34	L	—	—	(6·6)
Miyazaki		13·0	237	3 13a	+ 4	5 40	+ 5	—	—	—
Saga		13·0	244	3 32	PPP	—	—	—	—	—
Ituhara		13·3	250	3 15	+ 2	—	—	—	—	—
Syuhurei		13·4	259	3 9	− 5	7 14	L	—	—	(7·2)
Unzendake		13·4	242	3 19a	+ 5	6 34	L	—	—	(6·5)
Keizyo		13·7	266	3 8	−10	5 55	+ 3	—	—	6·7
Kagosima		13·9	238	3 27	+ 6	—	—	—	—	—
Zinsen		14·0	266	e 3 21	− 1	e 6 6	+ 7	—	—	e 7·1
Heizyo		14·4	273	i 3 26k	− 1	i 6 23	+14	—	—	9·1
Tomie		14·4	245	3 31	+ 4	7 50	L	—	—	(7·8)
Yakusima		14·6	235	3 34	+ 4	6 18	+ 5	—	—	—
Nake		16·7	231	3 59	+ 2	7 25	SS	—	—	—
Zi-ka-wei		20·5	253	e 4 40	− 2	8 40	+13	i 8 52	SS	—
Taihoku		24·1	240	5 25	+ 7	9 48	+14	—	—	13·5
Karenko		24·8	240	3 38	?	—	—	—	—	—
Taityu		25·3	239	3 55	?	8 21	?	—	—	—
Taito		25·9	237	3 42	?	6 19	?	—	—	—
Irkutsk		30·0	310	6 9	− 3	11 3	− 7	—	—	15·6
Hong Kong		31·0	245	6 25k	+ 4	11 31	+ 5	7 28	PP	15·3
Manila		32·4	226	5 41a	−53	13 26	SS	—	—	23·0
Phu-Lien		37·3	251	—	—	e 13 5	+ 1	—	—	20·3
Semipalatinsk		45·1	307	e 8 15	− 5	e 14 59	0	—	—	24·4
College		45·5	33	e 8 25	+ 2	i 15 1	− 4	—	—	i 18·3
Almata		49·3	298	8 47	− 6	—	—	—	—	27·1
Calcutta	N.	50·1	268	i 9 3	+ 4	i 16 15	+ 5	e 10 53	PP	i 24·2
Frunse		51·1	298	e 9 4	− 2	e 16 28	+ 4	—	—	31·4
Honolulu		52·2	92	—	—	e 16 51	+12	—	—	26·4
Sitka		52·8	42	—	—	16 52	+ 5	—	—	21·1
Andijan		53·4	296	9 22	− 2	e 17 41	?	—	—	30·0
Sverdlovsk		54·6	319	i 9 29	− 3	i 17 4	− 7	30 0	L_q	34·6

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Medan		54·7	242	—	—	i 17 21	+ 8	—	—	28·6
Tchimkent		54·7	299	9 30	− 3	—	—	—	—	30·6
Tashkent		55·3	298	i 9 33	− 5	i 17 9	−12	—	—	29·8
Agra	E.	55·6	279	i 9 36a	− 4	17 17	−12	11 39	PP	—
Batavia		57·3	226	i 10 4	+12	i 18 0	+13	—	—	e 37·6
Samarkand		57·6	297	9 51	− 3	e 17 47	− 4	—	—	—
Hyderabad		60·6	269	10 11	− 4	18 27	− 3	12 16	PP	28·8
Bombay		64·1	274	i 10 36	− 2	i 19 14	0	23 19	SS	—
Kodaikanal	E.	65·7	264	i 10 42	− 6	i 19 31	− 3	—	—	—
Colombo	E.	66·0	259	—	—	20 21	PPS	—	—	—
Moscow		66·4	324	i 10 49	− 4	19 32	−11	—	—	36·1
Pulkovo		66·9	330	i 10 54	− 2	19 41	− 8	—	—	e 32·2
Ukiah		68·0	57	e 11 26	+23	20 6	+ 4	e 13 59	PP	e 26·3
Baku		68·5	306	11 6	0	i 20 7	− 1	—	—	37·1
Berkeley		69·3	57	—	—	e 20 17	0	—	—	e 32·4
Grozny		69·4	310	e 11 18	+ 6	20 10	− 8	—	—	—
Scoresby Sund		69·6	356	11 10	− 3	20 16	− 5	13 47	PP	—
Tiflis		70·9	309	i 11 19	− 2	20 27	− 9	e 13 53	PP	e 38·6
Upsala		71·4	336	e 11 20	− 4	20 31	−11	e 13 59	PP	35·6
Bozeman		71·5	45	—	—	20 44	+ 1	—	—	38·0
Tinemaha	E.	72·4	57	e 11 35	+ 5	—	—	—	—	—
Sotchi		72·7	313	e 11 16	−16	—	—	—	—	—
Santa Barbara	Z.	73·0	59	i 11 40	+ 7	—	—	—	—	—
Riverview		73·5	174	—	—	e 21 24	PS	—	—	e 36·9
Sydney		73·6	174	e 7 36	?	—	—	—	—	—
Mount Wilson		74·2	58	e 11 55	+15	—	—	—	—	—
Pasadena		74·2	58	e 11 43	+ 3	i 21 15	+ 1	—	—	e 31·1
Theodosia		74·2	316	11 40	0	21 6	− 8	—	—	41·6
Adelaide		74·6	185	e 8 57	?	e 21 25	+ 7	—	—	—
Bergen		74·6	341	11 44	+ 1	21 11	− 7	—	—	e 39·6
Riverside	Z.	74·8	58	e 11 47	+ 3	—	—	—	—	—
Simferopol		74·9	317	e 11 44	0	—	—	—	—	38·6
Yalta		75·2	316	e 12 44	+58	—	—	—	—	42·1
La Jolla	Z.	75·6	59	e 11 54	+ 6	—	—	—	—	—
Copenhagen		76·4	335	11 51	− 2	21 30	− 8	i 14 42	PP	37·6
Melbourne		77·3	180	e 8 26	?	i 21 58	+10	i 29 41	SSS	—
Ivigtut		78·8	7	12 5	− 1	21 57	− 7	—	—	37·6
Potsdam		78·9	333	e 12 0	− 7	i 21 58	− 7	e 14 54	PP	e 38·6
Aberdeen		79·3	343	—	—	i 21 59	−10	i 27 4	SS	e 43·1
Bucharest		79·4	320	e 12 10	+ 1	22 5	− 5	15 12	PP	—
Tucson		80·1	56	e 12 17	+ 4	i 22 21	+ 3	i 15 16	PP	33·1
Istanbul		80·3	317	12 6	− 8	22 20	0	15 7	PP	e 44·9
Prague		80·3	331	e 12 12	− 2	e 22 10	−10	—	—	e 39·6
Budapest		80·4	326	12 16	+ 1	22 19	− 2	12 28	P_cP	e 43·6
Kecskemet	Z.	80·5	325	e 12 15	0	e 22 36?	+14	e 15 8	PP	e 43·1
Jena		80·6	332	i 12 14	− 2	e 22 6	−17	—	—	e 35·6
Edinburgh		80·7	343	e 12 17	+ 1	i 22 18	− 6	i 23 36	PS	e 37·6
Göttingen	Z.	80·7	334	e 12 15	− 1	—	—	—	—	e 44·6
Cheb		81·0	332	e 12 17	− 1	e 22 22	− 5	—	—	e 44·6
Ksara		81·3	307	i 12 20a	0	i 22 34	+ 4	i 17 16	PPP	—
Durham	N.	81·4	341	i 12 21	+ 1	i 22 33	+ 2	—	—	45·0
Belgrade		81·8	323	e 12 20k	− 2	i 22 39	+ 4	—	—	e 46·4
De Bilt		81·8	336	12 20	− 2	22 30	− 5	15 27	PP	e 39·6
Sofia		82·0	320	e 12 25	+ 2	i 22 30	− 7	14 30	PP	—
Stonyhurst		82·4	342	15 51	PP	i 22 38	− 3	i 27 51	SS	e 39·6
Bidston		83·0	342	i 12 31	+ 3	i 22 45	− 2	i 15 23	PP	e 40·6
Uccle		83·2	337	i 12 28a	− 1	i 22 41	− 8	i 15 37	PP	e 69·6
Stuttgart		83·3	332	i 12 30a	0	e 22 43	− 7	e 15 41	PP	e 43·6
Karlsruhe		83·4	333	e 12 29	− 1	e 22 45	− 6	—	—	e 44·6
Strasbourg		83·9	333	i 12 31a	− 2	i 22 51	− 5	i 15 46	PP	e 43·1

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Kew		84·0	340	i 12 33a	− 1	i 22 52	− 5	i 15 45	PP	e 40·6
Triest		84·1	328	e 12 31	− 3	22 50	− 8	e 15 46	PP	e 44·1
Zurich		84·7	333	e 12 35	− 2	e 23 13	+ 9	e 15 52	PP	—
Chur		84·8	332	e 12 36	− 1	e 22 53	−12	—	—	—
Basle		84·9	333	e 12 36	− 2	e 22 58	− 8	—	—	—
Wellington		85·3	157	i 12 53	+13	(23 8)	− 2	—	—	e 23·1
Paris		85·5	336	e 12 54	+13	23 6	[+ 2]	e 16 24	PP	41·6
Neuchatel		85·6	333	e 12 40	− 1	e 23 3	[− 2]	—	—	—
Chicago		86·0	37	—	—	i 23 11	[+ 3]	28 46	SS	e 40·5
Jersey		86·5	340	e 9 39	?	e 22 52	[−19]	e 23 38	PPS	e 41·1
Florence		86·6	328	12 36	−10	23 22	− 1	—	—	46·6
Christchurch		86·8	159	—	—	i 23 21	− 4	i 23 55	PS	45·8
Helwan		86·9	307	i 12 47k	− 1	23 14	[+ 1]	16 7	PP	—
Moncalieri		87·0	332	e 12 36?	−12	—	—	—	—	—
St. Louis	E.	87·3	40	e 13 17	+27	e 23 17	[+ 1]	e 24 29	PS	e 29·7
Grenoble		87·6	333	e 12 49	− 2	i 23 27	− 5	e 18 7	PPP	—
Rome		87·7	326	12 50	− 2	i 23 17	[− 1]	i 12 55	pP	—
Ottawa		87·9	27	e 12 56	+ 3	e 23 30	− 5	e 32 36	SSS	39·6
Puy de Dôme		88·0	334	e 12 54	+ 1	e 23 26	[+ 6]	—	—	e 40·2
Seven Falls		88·0	23	—	—	i 23 28	[+ 8]	e 32 36?	SSS	e 42·6
Cape Girardeau	N.	88·7	41	e 13 9	+12	e 23 41	− 2	e 23 53	sS	—
East Machias		91·1	22	—	—	e 23 54	−10	—	—	e 44·3
Williamstown		91·1	26	e 13 9	+ 1	—	—	—	—	e 48·1
Bagnères		91·4	335	e 13 31	+22	e 30 10	SS	e 16 46	PP	e 45·6
Harvard	Z.	91·9	26	e 13 16	+ 5	—	—	—	—	—
Weston		92·0	26	e 13 17k	+ 5	e 23 50	[+ 6]	i 25 34	PS	e 41·6
Fordham		92·5	29	i 13 17	+ 3	i 24 13	− 4	e 26 9	PPS	—
Philadelphia		92·8	30	—	—	i 24 8	−11	—	—	e 37·3
Columbia		95·5	37	—	—	e 24 43	+ 1	34 56	SSS	e 44·8
Toledo		95·6	337	e 13 32	+ 4	e 24 3	[− 1]	e 17 18	PP	—
Algiers	N.	95·9	330	e 16 25	?	—	—	—	—	—
Granada		97·9	335	i 13 41a	+ 2	25 6	+ 3	14 5	pP	e 52·8
Malaga		98·6	336	17 54	PP	—	—	—	—	51·6
San Fernando	E.	99·4	337	e 17 55	PP	e 28 37	?	—	—	50·6
Averroes		102·7	336	e 12 37	−83	e 24 46	[+ 6]	e 18 12	PP	e 54·6
San Juan		115·5	32	—	—	e 34 36?	SS	—	—	e 62·6
Fort de France		120·8	29	e 20 20	PP	—	—	—	—	—
La Paz		143·5	60	e 19 52	[+15]	i 26 45	[0]	i 23 37	PP	70·6
Rio de Janeiro		162·0	24	e 26 6	?	—	—	—	—	—

Additional readings :—

Koti eZ = +5m.25s., eEZ = +5m.53s.
Keizyo eEN = +3m.21s.
Zi-ka-wei iN = +6m.2s.
Hong Kong SS = +13m.6s.
Calcutta ePSN = +16m.50s., eSSN = +19m.37s., eSSSN = +20m.59s.
Tchimkent e = +10m.44s.
Agra SSE = +21m.7s.
Hyderabad S_cSN = +19m.48s., SSN = +22m.24s.
Ukiah ePPP = +15m.54s.
Berkeley eN = +29m.25s.
Grozny i = +11m.33s.
Scoresby Sund +11m.30s.
Tiflis eP_cPEN = +11m.43s., ePPE = +13m.56s., ePPPN = +15m.32s., eSN = +20m.30s., eN = +21m.23s., eE = +21m.36s., eSSN = +25m.36s., eSSSN = +28m.30s.
Upsala eSSE = +25m.36s.?
Pasadena iNEZ = +12m.3s.
Copenhagen PS = +22m.1s., eN = +22m.36s., eE = +23m.6s., SS = +26m.30s.
Melbourne i = +26m.54s., e = +33m.36s.
Potsdam iPZ = +12m.6s., iPE = +12m.9s., eNZ = +12m.24s., eZ = +15m.24s., eN = +16m.48s., eZ = +17m.54s., eE = +21m.42s., eN = +22m.0s., eNZ = +22m.12s., +23m.0s., eSSN = +27m.0s.
Aberdeen i = +25m.4s., e = +36m.59s.
Bucharest iN = +22m.31s. and +22m.45s., SSEN = +27m.21s.
Tucson i = +12m.28s., +12m.47s., and +13m.35s.
Istanbul PPP = +16m.56s.
Budapest eE = +12m.20s., SKSN = +22m.27s.

Continued on next page.

Jena iP = +12m.18s.
Edinburgh i = +22m.25s., +25m.2s., +27m.29s., and +27m.42s.
Ksara iPS = +23m.19s.
Durham iSN = +22m.54s.
Bidston iS = +22m.58s.
Uccle eN = +18m.57s., ePS = +23m.46s., SSN = +28m.20s.
Stuttgart P_cP = +12m.49s., ePPP = +17m.40s., ePS = +23m.53s., eSS = +28m.1s., eSSS = +32m.52s.
Strasbourg iZ = +12m.53s.k, iPPPZ = +18m.30s., eN = +22m.57s., iPSE = +23m.31s., SSZ = +28m.27s.
Kew iSEN = +23m.4s., eSPZ = +23m.54s., iSSE = +28m.18s.
Triest ePPP = +17m.48s., S = +23m.2s.
Wellington i = +23m.48s.
Jersey e = +27m.37s.
Churstchurch eZ = +23m.29s., eEZ = +28m.55s., iN = +29m.23s., e = +32m.52s., L_qEN = +36m.3s.
Helwan i = +12m.58s. and +13m.52s., PPP = +18m.3s.
St. Louis iSE = +23m.13s.
Grenoble SS = +29m.24s.
Rome ipP = +12m.55s., iP_cP = +13m.31s., iPP = +16m.12s., i = +17m.16s. and +17m.58s.?, e? = +19m.57s.?, iSKS = +22m.47s., iN = +23m.23s., i = +23m.59s.? and +24m.56s., e = +33m.40s. ?
East Machias eS = +24m.8s.
Bagnères eE = +14m.10s.
Weston iZ = +13m.21s., +13m.51s., and +13m.56s., iSKKSE = +24m.13s., eS?Z = +25m.19s., iE = +33m.35s., eSSEN = +34m.20s.
Philadelphia iS = +24m.15s.
Toledo eS = +24m.46s., eSS = +31m.12s.
Granada iPP = +17m.18s., PPP = +19m.41s., PPPP = +22m.24s., SKKS = +24m.46s.
Averroes ePP = +15m.48s., eS = +22m.43s., PS = +23m.29s.
La Paz SSN = +41m.45s.
Long waves were also recorded at Butte, La Plata, Almeria, Padova, Laibach, and Rathfarnham Castle.

Oct. 12d. Readings also at 0h. (Christchurch and Mizusawa), 1h. (Mizusawa (4) and Nagoya), 3h. (Nagoya, Sverdlovsk, and Mizusawa), 5h. (Huancayo, La Paz, and Mizusawa), 6h. (Mizusawa, Averroes, Rome, Ksara, and Helwan), 7h. (Nagoya, Mount Wilson, La Paz, Riverside, and Tucson), 8h. (Mizusawa (2)), 10h. (Tucson), 11h. (Chur, Jena, and Mizusawa), 12h. (Tucson (2)), 13h. (Tucson and Mount Wilson), 14h. (Riverside, Mizusawa, Pasadena, and Mount Wilson), 15h. (Nagoya, La Paz, and near Koti), 16h. (Fordham, Williamstown, and Tucson), 17h. (Chicago, Tiflis, Baku, Tashkent, Andijan (2), Frunse, Almata, Irkutsk, Ksara, Helwan, and Sverdlovsk), 18h. (La Plata, La Paz ,Copiapo, Tucson, and Mount Wilson), 20h. (Ksara), 21h. (Samarkand), 22h. (Tucson and Mizusawa).

Oct. 13d. 15h. 26m. 23s. Epicentre 23°·9N. 121°·7E. (as on 1938 Sept. 7d.).

Strong at Karenko, moderate at Taityu, Sintiku, and Giran. Epicentre near Karenko 23°·9N. 121°·7E., slightly deep. Macroseismic radius between 200 and 300kms.

See Seismological Bulletin of the Central Met. Obs. Japan, for the year 1938, Tokyo, 1940, pp. 63 and 64. Macroseismic chart p. 63.

A = −·4809, B = +·7787, C = +·4029; δ = −3; h = +4;
D = +·851, E = +·525; G = −·212, H = +·343, K = −·915.

A focus at the base of the superficial layers has been assumed.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Karenko		0·1	—	0 6a	0	0 12	+ 1	—	—	—
Arisan		0·9	245	−0 2k	−18	0 7	−21	—	—	—
Giran		0·9	3	0 22k	+ 6	0 35	+ 7	—	—	—
Taityu		1·0	285	0 17k	− 1	0 27	− 4	—	—	—
Sintiku		1·1	325	0 20k	+ 1	0 31	− 2	—	—	—
Taihoku	N.	1·1	352	e 0 20k	+ 1	i 0 35	+ 2	—	—	—
Taito		1·3	204	0 17	− 5	0 32	− 6	—	—	—
Tainan		1·6	237	0 27k	+ 1	0 47	+ 1	—	—	—
Hokoto		2·0	259	0 32	0	0 54	− 2	—	—	—
Kosyun		2·1	205	0 31a	− 2	1 0	+ 1	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Isigakizima		2·3	79	0 27	− 9	1 3	− 1	—	—	—
Miyakozima		3·4	75	0 52k	0	1 29	− 3	—	—	—
Hong Kong		7·1	258	1 39k	− 5	3 9	+ 4	—	—	3·8
Zi-ka-wei	N.	7·2	358	e 1 45	− 1	3 35	+28	—	—	—
Nake		8·3	56	1 58	− 3	4 59	?	—	—	—
Manila		9·3	184	2 11	− 4	4 17	SS	—	—	—
Yakusima		10·2	49	2 28	+ 1	4 50	SS	—	—	—
Unzendake		11·6	39	2 48	+ 2	6 9	L	—	—	(6·1)
Miyazaki		11·7	45	2 51	+ 3	5 13	SS	—	—	—
Kumamoto		11·9	40	2 54	+ 4	—	—	—	—	—
Hukuoka B		12·3	36	e 2 59	+ 3	e 5 23	+11	—	—	—
Izuka		12·5	37	2 59	+ 1	6 19	L	—	—	(6·3)
Husan		12·9	28	e 3 1	− 3	e 5 3	−24	—	—	e 7·1
Taikyu		13·3	25	3 14	+ 5	5 51	+14	—	—	—
Syuhurei		13·4	23	3 20	+10	6 5	SS	—	—	—
Hirosima		14·0	40	3 23	+ 5	6 7	+14	—	—	—
Koti		14·1	44	e 3 37	PP	e 6 18	SS	—	—	—
Hamada		14·2	37	3 25	+ 4	6 9	+11	—	—	—
Zinsen		14·2	16	e 3 23	+ 2	e 6 16	SS	—	—	e 7·7
Phu-Lien		14·3	260	e 3 18	− 4	e 6 5	+ 5	—	—	6·8
Keizyo		14·4	17	3 26	+ 3	e 6 10	+ 7	—	—	—
Muroto		14·4	47	3 52	PP	6 56	SSS	—	—	—
Heizyo		15·5	12	e 3 48	+10	e 6 45	SS	—	—	8·0
Sumoto		15·5	45	3 46	+ 8	7 21	L	—	—	(7·3)
Siomisaki		15·6	49	4 21	?	8 39	?	—	—	—
Osaka		16·1	45	4 18	PP	7 8	SS	—	—	—
Kameyama		16·9	46	4 4	+ 9	—	—	—	—	—
Hikone		17·0	45	4 10	PP	—	—	—	—	—
Gihu		17·4	45	4 14	+12	6 52	−20	—	—	—
Nagoya		17·4	46	e 3 59	− 3	—	—	—	—	—
Hamamatu		17·6	49	5 0	PPP	—	—	—	—	—
Misima		18·7	48	4 28	+10	—	—	—	—	—
Titizima		18·8	75	4 24	+ 5	—	—	—	—	—
Nagano		19·1	43	4 27	+ 4	—	—	—	—	—
Oiwake		19·1	44	4 42	PP	—	—	—	—	—
Yokohama		19·3	47	4 32	+ 7	—	—	—	—	—
Tokyo Cent. Met. Obs.		19·6	48	4 33	+ 5	8 15	+13	—	—	—
Palau		20·6	142	5 37	?	9 29	?	—	—	—
Mizusawa		22·4	42	5 9	+12	9 21	+25	9 34	SS	—
Medan		30·0	233	6 7	− 1	11 23	+21	—	—	—
Calcutta	N.	30·7	275	e 6 15	+ 1	i 11 38	+25	e 6 56	PP	e 18·6
Irkutsk		31·3	340	e 6 17	− 2	11 23	0	—	—	15·6
Batavia		33·2	208	i 6 42	+ 6	—	—	—	—	—
Agra	E.	39·4	285	7 23	− 5	13 46	+19	7 47	pP	—
Hyderabad		40·9	270	7 38	− 3	14 4	+14	—	—	19·7
Almata		41·4	310	e 7 49	+ 4	—	—	—	—	—
Semipalatinsk		41·5	321	e 7 43	− 3	—	—	—	—	—
Colombo	E.	43·5	255	7 59	− 3	—	—	—	—	—
Andijan		44·4	305	e 8 9	0	—	—	—	—	—
Bombay		45·6	274	i 8 17	− 2	e 15 17	+19	i 10 4	PP	—
Tchimkent		46·6	307	8 23	− 4	—	—	e 10 4	PP	—
Tashkent		46·7	305	i 8 25	− 2	15 28	+14	—	—	e 23·8
Samarkand		48·4	303	8 35	− 6	15 30	− 8	—	—	22·1
Sverdlovsk		54·6	324	i 9 23	− 5	i 17 0	− 3	—	—	26·7
Baku		61·4	305	i 10 14	− 1	18 41	+ 9	—	—	32·1
Riverview	E.	63·9	153	—	—	e 28 13	?	—	—	e 36·0
Grozny		64·0	309	i 10 30	− 2	e 19 12	+ 7	—	—	—
Tiflis		65·0	307	10 36	− 3	19 20	+ 3	19 37	PS	e 31·6
Moscow		67·3	323	10 50	− 3	19 41	− 4	—	—	34·1
College		68·8	27	e 11 14	+11	e 20 4	+ 1	e 24 14	SS	e 28·7

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Pulkovo		70·3	328	e 11 10	− 2	e 20 19	− 1	—	—	e 34·6
Ksara		73·8	300	i 11 31a	− 2	e 21 25	PS	i 14 19	PP	—
Upsala	N.	76·4	331	e 12 57	+69	e 21 38	+ 9	—	—	e 39·6
Istanbul		76·6	310	11 37	−12	20 25	−67	—	—	e 43·6
Bucharest		77·5	313	—	—	e 21 45	+ 4	—	—	43·6
Helwan		78·8	298	i 11 58	− 3	e 21 52	− 3	—	—	—
Budapest		80·8	318	e 12 7	− 5	e 22 37?	PS	—	—	e 43·6
Wellington		81·4	143	—	—	e 22 17	− 5	(e 23 37)	PS	e 23·6
Christchurch		81·8	146	—	—	e 22 37?	PS	e 27 37	SS	e 40·9
Potsdam		82·0	325	e 12 37?	+19	e 22 37?	+ 8	—	—	e 45·6
Prague		82·1	322	—	—	e 22 43	+13	—	—	e 42·6
Hamburg		83·0	327	—	—	e 40 37?	?	—	—	e 43·6
Triest		84·9	318	12 51	+18	e 23 31	+33	—	—	—
Stuttgart		86·0	323	e 12 47	+ 9	e 23 5	− 3	e 29 2	SS	44·6
Strasbourg		86·9	323	e 12 42	− 1	e 23 3	[− 1]	—	—	e 51·4
Zurich		87·1	322	e 13 40	+56	—	—	—	—	—
Florence		87·4	317	e 11 57	−48	—	—	—	—	—
Uccle		87·4	327	e 12 46	+ 1	—	—	—	—	e 46·6
Rome		87·5	314	e 12 42	− 4	e 23 18	− 5	i 24 33	PS	e 45·1
Moncalieri		88·9	321	(e 12 52)	0	—	—	—	—	e 12·9
Rathfarnham Castle		90·9	332	e 26 19	?	—	—	—	—	e 47·0
Toledo		98·9	320	e 17 55	PP	—	—	—	—	—
Mount Wilson	z.	99·0	47	e 13 36	− 2	—	—	—	—	—
Tucson		104·9	44	i 14 51	+46	—	—	e 18 23	PP	50·6
Ottawa		109·2	13	—	—	e 25 52	[+52]	—	—	e 49·6
Weston		113·0	10	—	—	e 28 37	PS	—	—	e 54·6
Fort de France		141·5	4	e 22 34	PP	—	—	—	—	—
Huancayo		160·0	57	e 20 19	[+23]	—	—	—	—	e 69·0
La Paz	N.	168·2	53	20 14	[+11]	—	—	—	—	83·6

Additional readings :—
Zi-ka-wei iE = +4m.3s., +4m.19s., and +4m.53s., iN = +5m.19s.
Keizyo SEN = +8m.7s.
Mizusawa PE = +5m.25s.
Medan iE = +10m.47s., +16m.4s., and +22m.43s.
Calcutta eN = +8m.17s., iSSN = +13m.24s., iN = +16m.10s.
Agra PPE = +8m.57s., iE = +9m.14s., sSE = +14m.30s., iE = +15m.14s., SSE = +16m.34s., SSSE = +17m.43s.
Andijan e = +20m.18s.
Bombay iE = +8m.32s., eE = +19m.7s.
Tchimkent e = +8m.43s.
Grozny e = +15m.50s.
Tiflis eSSN = +24m.15s., eSSSNZ = +27m.19s.
College eSSS = +28m.2s.
Ksara PPP = +16m.7s., ePS = +22m.3s., eSS = +26m.31s.
Christchurch eEN = +35m.26s.
Potsdam eEZ = +43m.37s.?
Stuttgart ePPS = +34m.37s.
Strasbourg e = +47m.7s.
Rome eE = +12m.48s., i = +14m.55s. and +23m.36s., e = +28m.52s., eGN = +41m.35s.
Rathfarnham Castle e = +37m.3s. and +41m.58s.
Toledo e = +21m.2s.
Tucson PP = +18m.31s., iPP = +18m.40s.
Huancayo ePKP = +20m.57s.
Long waves were also recorded at Harvard, Philadelphia, and other European stations.

Oct. 13d. Readings also at 0h. (Mizusawa, Sverdlovsk, Baku, Tiflis, Mount Wilson, Frunse, Pasadena, Riverside, Almata, Semipalatinsk, Grozny, Tashkent, and Andijan), 1h. (Copiapo and Mizusawa), 2h. (Helwan, Tashkent, Sverdlovsk, and Ksara), 3h. (Mizusawa, Tiflis, New Plymouth, and Wellington), 4h. (Tucson), 6h. (Mizusawa), 7h. (Mizusawa, Erevan, Wellington, Tiflis, Grozny, Irkutsk, Vladivostok, Christchurch, and Nagoya), 8h. (Tucson, Sverdlovsk, New Plymouth, Riverside, Mount Wilson, Wellington, and Christchurch), 10h. (Riverview, Brisbane, Melbourne, Ksara, Christchurch, Wellington, Mizusawa, Nagoya, Vladivostok, Irkutsk, Sverdlovsk, Tashkent, Baku, and Williamstown), 11h. (Mizusawa and Tiflis), 12h. (Haiwee, Tinemaha, La Jolla, Ksara, Mount Wilson, Riverside, Tucson, Grozny, and Pasadena), 13h. (Kodaikanal), 14h. (Riverside, Mount Wilson, and Nagoya), 16h. (Tananarive, Tchimkent, Grozny, Irkutsk, Andijan, Semipalatinsk (2), Almata, Frunse, and Fort de France), 17h. (Williamstown, Tashkent, and Grozny, Weston, Harvard, Fordham, and Cheb), 18h. (Manila and Fort de France), 19h. (St. Louis and Tucson), 20h. (Mizusawa), 21h. (Branner and Tacubaya), 22h. (Tashkent, Frunse, Almata, Andijan, Irkutsk, Sverdlovsk, and Baku), 23h. (Tiflis and Tucson).

Oct. 14d. Readings at 2h. (Andijan, Frunse, and Tacubaya), 3h. (Calcutta, Tashkent, Sverdlovsk, Agra, Helwan, Ksara, and Tucson), 4h. (Baku, Tashkent, and Tiflis (3)), 6h. (Mount Wilson, Riverside, Pasadena, Tucson, Irkutsk, Vladivostok, near Mizusawa, and Nagoya), 7h. (Baku, Sverdlovsk, Harvard, and Tiflis), 8h. (Ksara, Mount Wilson, Pasadena, Riverside, Tucson, Christchurch, and near Apia), 10h. (Ksara, Tucson (2), Mount Wilson, Pasadena, Riverside (2), Haiwee, La Jolla, Santa Barbara, Tinemaha, Tananarive, and near Apia), 12h. (Riverview), 13h. (Christchurch and Fresno), 14h. (Chicago and Tananarive), 15h. (Shawinigan Falls, Ottawa, Tucson, Haiwee, Mount Wilson, Pasadena, Riverside, Tinemaha, College, and near Sitka ; near Berkeley, Branner, Lick, San Francisco, and Fresno), 16h. (Williamstown, Weston, Philadelphia, Harvard (2), Fordham, Baku, Sverdlovsk, Tashkent, Tiflis, and Irkutsk), 17h. (Williamstown and Tucson), 18h. (Copenhagen and Huancayo), 22h. (near Batavia, Malabar, and near Santiago).

Oct. 15d. Readings at 1h. (Mizusawa), 2h. (Tiflis), 3h. (Nagoya), 4h. (Nagoya and near Mizusawa (2)), 8h. (Tananarive), 10h. (Mizusawa, New Plymouth, and Wellington), 11h. (Mount Wilson, Riverside, Baku, Sverdlovsk, and near Mizusawa), 12h. (La Paz), 13h. (Oaxaca, Tacubaya, Tucson, New Plymouth, and Mount Wilson), 19h. (Helwan, Ksara, and near Tananarive), 21h. (Mount Wilson, Riverside, Tucson, Williamstown, and Christchurch), 22h. (Tucson and near Lick), 23h. (Florence).

Oct. 16d. 2h. 19m. 37s. Epicentre 43°·6N. 4°·2W.

Force VI at Santander, Bilbao, and in the Asturias. Damage at Santander.

Epicentre North Spain 43°·3N. 3°·0W. (Strasbourg).
43°·2N. 3°·6W. (Toledo).

Annales de l'Institut de Physique du Globe de Strasbourg, 1938, Tome III, 2e partie Sismologie, Mende 1941, p. 84 and 170.

$A = +\cdot7245$, $B = -\cdot0532$, $C = +\cdot6872$; $\delta = -3$; $h = -3$;
$D = -\cdot073$, $E = -\cdot997$; $G = +\cdot685$, $H = -\cdot050$, $K = -\cdot726$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Toledo		3·7	178	e 0 59	− 1	i 1 53	S*	i 1 9	P*	—
Puy de Dôme		5·5	65	i 1 27	+ 2	i 2 29	−1	—	—	—
Jersey		5·8	14	i 2 4	P*	i 2 39	+ 1	3 7	S_g	—
Granada		6·4	176	1 34	− 4	i 2 41	−12	3 10	S_g	—
Malaga		6·8	182	e 1 51	+ 7	e 3 10	+ 7	—	—	4·2
Almeria		6·9	169	e 1 51	+ 6	i 3 24	S*	—	—	—
Paris		7·0	40	e 1 47	+ 1	e 3 19	+11	—	—	3·4
Grenoble		7·2	74	e 3 3	S	(e 3 3)	−10	e 3 48	S*	—
Besançon		8·0	60	—	—	e 3 23	−10	—	—	—
Kew		8·3	17	—	—	i 3 35	− 5	—	—	—
Neuchatel		8·6	63	e 2 5	− 4	e 3 38	−10	e 4 24	S*	—
Algiers		8·8	138	e 2 4	− 7	e 4 9	+16	—	—	5·4
Basle		9·2	60	e 2 15	− 1	e 4 7	+ 4	—	—	—
Uccle		9·3	36	2 19	+ 2	i 4 49	S*	—	—	—
Strasbourg		9·7	55	e 2 25	+ 3	e 5 1	S*	i 5 21	S_g	—
Zurich		9·7	63	e 2 23	+ 1	e 4 11	− 4	—	—	—
Bidston		9·8	4	—	—	i 6 13	?	—	—	—
Chur		10·2	67	e 2 31	0	—	—	—	—	—
Karlsruhe		10·2	54	e 3 28	+57	e 4 30	+ 3	—	—	—
Stonyhurst		10·3	6	i 3 3	+31	i 5 23	L	—	—	(i5·4)
De Bilt		10·6	33	—	—	e 4 53	SS	—	—	e 6·9
Stuttgart		10·6	56	e 2 33	− 3	e 4 25	−12	—	—	e 6·2
Rome		12·4	92	e 2 55	− 6	i 4 58	−23	—	—	e 5·4
Jena		13·0	50	e 3 8	− 1	e 4 39	−56	—	—	e 5·9
Hamburg	N.	13·7	38	—	—	e 5 49	− 3	—	—	e 7·6
Weston		47·9	293	i 8 48	+ 6	—	—	e 11 11	PPP	—
Williamstown		49·0	294	i 8 56	+ 6	—	—	—	—	—
Fordham		50·3	292	i 9 3	+ 3	—	—	—	—	—
Tucson		79·1	304	i 12 13a	+ 5	—	—	—	—	—

For Notes see next page.

NOTES TO OCTOBER 16d. 2h. 19m. 37s.

Additional readings:
Toledo $iP_g = +1m.15s.$
Jersey ? = +2m.12s., +2m.35s., and +3m.39s.
Granada i = +2m.2s., $iP_g = +2m.10s.$
Grenoble i = +4m.0s., iSS = +4m.4s.
Kew iEN = +5m.16s., iZ = +5m.49s.
Neuchatel i = +2m.8s.
Uccle iN = +6m.16s.
Strasbourg e = +2m.37s., e = +3m.3s., iSS = +5m.10s.
Bidston i = +6m.38s.
Stuttgart e = +5m.15s. and +5m.49s.
Weston iZ = +8m.52s., $iP_cPN = +10m.12s.$
Fordham i = +9m.8s.
Long waves were also recorded at Copenhagen, Moscow, Tashkent, Prague, Edinburgh, Göttingen, Cheb, Potsdam, Triest, and Sverdlovsk.

Oct. 16d. Readings also at 0h. (Grozny), 1h. (near Santiago), 2h. (Toledo (2)), 4h. (Frunse and Samarkand), 5h. (Tucson), 6h. (near Tananarive), 11h. (Tucson), 13h. (Tiflis, Tucson (2), and near Mizusawa), 14h. (Andijan), 17h. (Berkeley, near Branner, and Lick), 18h. (Fresno), 20h. (Tucson, La Paz, and near Malabar).

Oct. 17d. 15h. 26m. 59s. Epicentre 44°·4N. 140°·0E.

Moderate at Hatinohe, Miyako, slight at Haboro, Nemuro, and Morioka. Epicentre north part of Japanese sea 44°·4N., 140°·0E. Macroseismic radius greater than 300kms. Depth 200kms.

See Seismological Bulletin of the Central Met. Obs. Japan, for the year 1938, Tokyo, 1940. pp. 64-66, Macroseismic Chart p. 66.

$A = -·5491$, $B = +·4608$, $C = +·6972$; $\delta = -6$; $h = -3$;
$D = +·643$, $E = +·766$; $G = -·534$, $H = +·448$, $K = -·717$.

A depth of focus 0·030 has been assumed.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Haboro	1·2	90	0 27	− 7	0 54	− 6	—	—	—
Sapporo	1·6	144	0 39	+ 2	1 6	0	—	—	—
Muroran	2·2	161	0 45k	+ 2	1 16	0	—	—	—
Mori	2·3	170	0 48a	+ 4	1 22	+ 5	—	—	—
Hakodate	2·7	169	0 48a	0	1 26	+ 1	—	—	—
Ootomari	3·0	41	0 16	−35	0 51	−40	—	—	—
Urakawa	3·0	138	0 57	+ 6	1 32	+ 1	—	—	—
Kusiro	3·5	113	1 6	+ 9	1 44	+ 3	—	—	—
Otiai	3·5	32	0 28	−29	1 13	−28	—	—	—
Aomori	3·6	170	0 57a	− 1	1 40	− 4	—	—	—
Hatinohe	4·0	163	1 1a	− 2	1 47	− 5	—	—	—
Nemuro	4·2	102	0 56	−10	1 45	−12	—	—	—
Akita	4·7	179	1 11a	− 1	2 6	− 2	—	—	—
Morioka	4·8	169	1 10a	− 3	2 5	− 6	—	—	—
Miyako	5·0	163	1 10a	− 6	2 4	−10	—	—	—
Mizusawa	5·3	170	i 1 16	− 3	i 2 15	− 6	—	—	—
Sikka	5·3	23	1 29	+10	2 37	+16	—	—	—
Vladivostok	6·0	260	i 1 36	+ 8	i 2 50	+13	—	—	—
Yamagata	6·2	177	1 30	− 1	2 29	−13	—	—	—
Niigata	6·5	187	1 41	+ 6	2 19	−30	—	—	—
Takada	7·4	190	1 53	+ 7	3 18	+ 9	—	—	—
Wazima	7·4	199	1 49a	+ 3	3 14	+ 5	—	—	—
Nagano	7·8	191	1 53	+ 2	3 19	+ 1	—	—	—
Utunomiya	7·8	180	1 50	− 1	3 12	− 6	—	—	—
Husiki	7·9	197	1 58	+ 5	3 27	+ 6	—	—	—
Maebasi	8·0	185	1 57	+ 3	3 20	− 3	—	—	—
Mito	8·0	177	1 49	− 5	—	—	—	—	—
Toyama	8·0	196	1 55	+ 1	3 24	+ 1	—	—	—
Kakioka	8·2	179	1 50	− 7	3 13	−15	—	—	—
Tukubasan	8·2	179	1 51	− 6	2 51	−37	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Kumagaya		8·3	183	1 55	− 3	3 26	− 4	—	—	—
Matumoto		8·3	192	1 55	− 3	3 27	− 3	—	—	—
Tokyo Cent. Met. Obs.		8·7	181	2 4	+ 1	3 9	−30	—	—	—
Tyosi		8·7	175	1 59	− 4	—	—	—	—	—
Hukui		8·8	200	1 52	−12	—	—	—	—	—
Kohu		8·8	187	2 4	0	3 7	−35	—	—	—
Hunatu		8·9	186	2 4	− 2	3 41	− 3	—	—	—
Yokohama		8·9	182	2 14	+ 8	3 34	−10	—	—	—
Gihu		9·3	197	2 9a	− 2	3 53	0	—	—	—
Misima		9·3	185	2 13	+ 2	3 45	− 8	—	—	—
Numadu		9·3	186	2 12	+ 1	3 51	− 2	—	—	—
Ibukisan		9·4	198	2 15	+ 3	4 5	+10	—	—	—
Mera		9·4	181	2 12	0	3 51	− 4	—	—	—
Hikone		9·5	199	2 13	0	—	—	—	—	—
Nagoya		9·5	195	e 2 14	+ 1	i 3 59	+ 1	—	—	—
Toyooka		9·7	206	2 18a	+ 2	4 5	+ 3	—	—	—
Hamamatu		9·8	191	2 37	+20	3 55	−10	—	—	—
Kameyama		9·9	197	2 32	+14	4 8	+ 1	—	—	—
Kyoto		9·9	201	2 21	+ 3	4 9	+ 2	—	—	—
Tu		10·0	196	2 34	+14	—	—	—	—	—
Osaka		10·3	201	2 26	+ 2	4 20	+ 4	—	—	—
Kobe		10·4	202	2 26	+ 1	4 16	− 2	—	—	—
Yagi		10·4	200	2 25k	0	4 17	− 1	—	—	—
Sumoto		10·8	203	2 29	− 1	4 29	+ 1	—	—	—
Wakayama		10·8	202	2 30	0	4 27	− 1	—	—	—
Tokusima		11·1	204	2 31	− 3	4 40	+ 5	—	—	—
Hamada		11·3	215	2 44	+ 8	4 49	+10	—	—	—
Hatidyozima		11·3	181	2 34	− 2	4 0	−39	—	—	—
Siomisaki		11·4	198	2 36	− 2	4 40	− 2	—	—	—
Hirosima		11·6	213	2 42a	+ 2	4 51	+ 5	—	—	—
Heizyo		11·9	248	i 2 50a	+ 6	i 5 7	+14	—	—	—
Koti	N.	11·9	207	2 45	+ 1	e 5 9	+16	i 6 9	sS	—
Matuyama		11·9	210	2 45a	+ 1	4 57	+ 4	—	—	—
Keizyo		12·0	240	2 48	+ 3	5 7	+12	—	—	—
Muroto		12·0	204	2 46	+ 1	5 12	+17	—	—	—
Taikyu		12·2	229	i 2 50	+ 2	i 5 10	+10	—	—	—
Zinsen		12·2	240	e 2 53	+ 5	e 5 15	+15	—	—	—
Izuka		13·0	217	2 59	+ 1	5 23	+ 5	—	—	—
Hukuoka B		13·1	218	3 2	+ 3	5 30	+10	—	—	—
Saga		13·4	217	3 12	+ 9	5 42	+15	—	—	—
Kumamoto		13·7	215	3 8	+ 2	5 39	+ 5	—	—	—
Unzendake		13·9	216	2 46	−23	5 17	−21	—	—	—
Miyazaki		14·2	211	3 16k	+ 4	5 51	+ 6	—	—	—
Tomie		14·7	221	3 21k	+ 2	6 0	+ 4	—	—	—
Yakusima		15·8	212	3 34	+ 2	6 24	+ 4	—	—	—
Nake		18·0	211	4 1	+ 4	—	—	—	—	—
Irkutsk		24·8	302	e 5 5	+ 2	e 9 14	+ 7	e 5 53	pP	12·0
Hong Kong		30·6	233	7 13	PP	10 42	+ 2	11 15	SS	12·9
Phu-Lien		36·3	241	e 6 45	+ 1	e 12 6	− 2	—	—	—
Semipalatinsk		39·9	301	i 7 16	+ 2	13 2	0	—	—	—
Almata		44·5	293	7 53	+ 2	e 14 13	+ 5	—	—	—
Frunse		46·2	293	e 8 6	+ 2	e 14 38	+ 6	—	—	—
Calcutta	N.	47·4	260	—	—	e 14 41	− 9	—	—	—
Andijan		48·7	291	e 8 36	+12	e 15 13	+ 5	—	—	—
Sverdlovsk		49·1	315	i 8 29	+ 3	i 15 16	+ 3	i 9 24	pP	27·3
Tashkent		50·4	293	e 8 35	− 1	i 15 33	+ 2	—	—	e 28·7
Agra	E.	52·0	273	i 8 44	− 4	i 15 51	− 2	10 4	pP	—
Moscow		60·8	321	9 48	− 3	17 45	− 3	10 45	pP	28·5
Pulkovo		61·4	328	9 55	+ 1	17 52	− 4	10 49	pP	29·5
Baku		63·3	302	e 10 10	+ 3	e 18 31	+11	—	—	—
Grozny		64·0	307	e 10 11	− 1	e 18 30	+ 2	—	—	—
Tiflis		65·6	305	i 10 21	− 1	18 51	+ 3	e 11 15	pP	—
Copenhagen		70·9	332	i 10 52	− 2	19 50	0	—	—	—
Tinemaha		72·4	55	i 10 59	− 4	i 20 2	− 5	i 11 58	pP	—
Halwee		73·2	56	i 11 2	− 6	i 20 9	− 7	e 12 2	pP	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Potsdam		73·3	330	e 12 7	+58	e 20 14	− 3	—	—	e 45·0
Ivigtut		74·5	5	—	—	20 18	−13	—	—	—
Pasadena		74·5	57	i 11 9	− 7	i 20 23	− 8	i 12 8	pP	—
Mount Wilson		74·5	57	i 11 10a	− 6	i 20 23	− 8	i 12 7	pP	—
Riverside		75·1	57	i 11 12a	− 7	i 20 5	−32	i 12 9	pP	—
Ksara		76·1	304	i 11 24k	− 1	i 20 51	+ 3	e 12 22	pP	—
De Bilt		76·3	334	e 12 16	pP	i 20 49	− 1	e 21 18	sS	e 42·0
Sofia		76·5	317	e 11 25	− 2	e 20 53	0	—	—	—
Stuttgart		77·7	329	11 32k	− 1	e 21 4	− 1	e 12 26	pP	e 38·0
Uccle		77·7	334	e 11 32	− 1	21 1	− 4	—	—	—
Strasbourg		78·4	330	e 11 35	− 2	e 21 16	+ 3	—	—	e 51·0
Triest		78·5	325	12 32	pP	i 21 12	− 2	—	—	—
Basle		79·3	330	e 11 41	− 1	—	—	—	—	—
Tucson		80·2	54	i 11 42a	− 5	i 21 25	− 7	i 12 42	pP	—
Florence		81·0	325	11 56	+ 5	21 31	− 9	—	—	—
Helwan		81·6	304	i 11 52	− 2	21 46	0	e 12 54	pP	—
Rome		82·1	323	i 11 56	− 1	i 21 50	− 1	22 30	PS	34·9
Ottawa		85·1	25	i 12 7	− 5	e 22 7	[− 4]	e 13 7	pP	—
Harvard		89·0	23	i 12 27	− 3	e 22 31	[− 6]	i 13 26	pP	—
Weston		89·2	23	i 12 28	− 3	i 22 33	[− 5]	i 13 16	pP	—
Fordham		89·8	25	i 13 29	+55	i 22 34	[− 8]	e 24 2	PS	—
Toledo		90·1	334	i 12 35	− 1	i 23 10	+ 3	—	—	—
Christchurch		92·3	157	—	—	21 44	?	—	—	—
La Paz	z.	143·4	49	19 11	[+ 3]	—	—	—	—	—

Additional readings :—
Vladivostok i = +1m.47s. and +2m.13s.
Agra SS?E = +19m.31s.
Potsdam eN = +20m.7s.
Pasadena iPPZ = +13m.42s.
Mount Wilson ePPZ = +13m.42s.
Ksara ePP = +14m.23s., esS = +22m.24s.
Tucson iP_cP = +11m.48s., i = +12m.5s., iPP = +14m.46s., PPP = +16m.39s., iS_cS = +21m.37s., iSP = +22m.15s.
Helwan i = +23m.29s.
Rome SS = +26m.58s.
Weston iZ = +12m.54s. and +13m.40s., iS = +22m.54s., iNZ = +23m.58s.

Oct. 17d. 22h. Undetermined shock.
Apia i = 33m.2s., e = 36m.21s., i = 37m.39s., 38m.4s. and 38m.31s.
Wellington eP? = 37m.7s., eS = 42m.6s., iL = 43·3m.
Christchurch eP = 38m.48s., S = 43m.22s., L_qE = 44·3m., L_rNZ = 46·0m.
Brisbane eN = 41m.54s., eE = 42m.0s.
Pasadena ePNZ = 43m.31s.
Mount Wilson iPEZ = 43m.32s., eZ = 46m.50s.
Riverside ePZ = 43m.34s.
Tinemaha eP = 43m.42s.
Haiwee ePZ = 43m.43s.
Tucson iP = 43m.58s.k, i = 44m.1s., 44m.4s., and 70m.34s.
Honolulu e = 50m.44s.
Ksara ePKP = 51m.6s., ePP = 54m.13s., SKKP = 63m.5s., ePPS = 66m.47s.
Helwan iP = 51m.11s., e = 51m.21s. and 52m.15s.
Rome $ePKP_2$ = 51m.11s.? PP = 54m.38s., SKS = 57m.17s., SKKS = 61m.22s., L = 104m.
Uccle ePKPZ = 51m.11s., eL = 110·0m.
Stuttgart ePKPZ = 51m.12s., iPKP = 51m.18s., eL = 112·0m.
Strasbourg iPKPZ = 51m.14s., i = 51m.20s., e = 92m.0s., eL = 111·0m.
Tiflis eN = 54m.13s., LN = 94·0m.
De Bilt eZ = 54m.24s., eL = 102·0m.
Sverdlovsk e = 58m.51s., 61m.34s., and 68m.35s., L = 82·0m.
Huancayo e = 59m.15s.
Tashkent e = 63m.7s. and 71m.54s., eL = 80m.36s.
Berkeley eN = 66m.53s., eE = 67m.54s., eZ = 68m.53s.
Long waves were also recorded at Frunse, Kew, Granada, Potsdam, Copenhagen, Baku, Irkutsk, and Vladivostok.

Oct. 17d. Readings also at 0h. (Tchimkent), 3h. (Malabar), 4h. (Nagoya and Tacubaya), 5h. (Samarkand), 7h. (Tiflis), 10h. (Apia), 11h. (Grozny, Balboa Heights, Lick, Fresno, and Tiflis), 13h. (Tucson (2), Oaxaca, and Tacubaya), 14h. (Oaxaca and Tacubaya), 16h. (Sebastopol, Tiflis, and Tucson), 17h. (Tucson, La Paz, Mount Wilson, and Andijan), 18h. (Lick, Fresno, and Branner), 20h. (Harvard, Weston, San Juan, Williamstown, and Fort de France), 23h. (Andijan).

Oct. 18d. 5h. 5m. 1s. Epicentre 40°·4N. 125°·1W. (as on 1938, Sept. 12d.).

$A = -\cdot4391$, $B = -\cdot6248$, $C = +\cdot6456$; $\delta = -2$; $h = -2$;
$D = -\cdot818$, $E = +\cdot575$; $G = -\cdot371$, $H = -\cdot528$, $K = -\cdot764$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Ferndale		0·6	75	i 0 13	− 2	i 0 24	− 2	—	—
Ukiah		1·9	131	e 0 47	+13	i 1 5	+ 6	—	—
Berkeley		3·4	138	e 0 50	− 5	i 1 32	− 5	e 1 12	P_g
San Francisco		3·4	140	e 0 54	− 1	e 1 33	− 4	—	—
Branner		3·8	141	e 0 58	− 3	i 1 44	− 3	—	—
Lick		4·1	137	e 1 5	0	e 1 53	− 2	—	—
Fresno	N.	5·5	129	e 1 28	+ 3	e 2 42	S*	—	—
Tinemaha		6·3	120	i 1 41	+ 5	i 3 7	S*	—	—
Haiwee		7·0	125	i 1 46	0	i 3 22	S*	—	—
Mount Wilson	Z.	8·4	134	i 2 3	− 3	—	—	—	—
Pasadena	Z.	8·4	136	i 2 4	− 2	—	—	—	—
Riverside	Z.	8·9	133	i 2 11	− 1	—	—	—	—
Tucson		14·1	121	i 3 25a	+ 2	—	—	3 34	PP

Additional readings :—
Ukiah i = +1m.16s. and +1m.26s.
Berkeley iZ = +53s., iN = +2m.0s., eEZ = +2m.4s., iE = +2m.24s.
Tucson +3m.42s., +4m.12s., +4m.41s., and +8m.21s.

Oct. 18d. Readings also at 2h. (Fresno), 3h. (near Santiago), 4h. (Mount Wilson, Pasadena, Riverside, Tucson, and near Mizusawa), 5h. (Butte), 6h. (Apia, Christchurch, Wellington, Huancayo, Ksara, Tucson, Haiwee, Mount Wilson, Pasadena, and Riverside), 7h. (Harvard, Tucson, and near Nagoya), 8h. (near Mizusawa (2) and Nagoya), 9h. (Medan, Triest, Sofia, and near Mizusawa), 12h. (near Berkeley), 13h. (Fresno (2), Branner, Berkeley, Lick (2), San Francisco, and near Malabar), 20h. (Fort de France), 21h. (Mizusawa), 22h. (near San Javier), 23h. (near Mizusawa).

Oct. 19d. 4h. 13m. 24s. Epicentre 49°·0N. 90°·0E. (as on 1938, Sept. 20d. 22h.).

$A = \cdot0000$, $B = +\cdot6586$, $C = +\cdot7525$; $\delta = +1$; $h = -5$;
$D = +1\cdot000$, $E = \cdot000$; $G = \cdot000$, $H = +\cdot753$, $K = -\cdot659$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Semipalatinsk		6·5	288	i 1 33	− 6	i 2 50	− 5	1 53	P*	—
Irkutsk		9·7	65	i 2 29	+ 7	4 20	+ 5	—	—	4·9
Almata		10·7	243	2 37	− 1	4 49	SS	—	—	—
Frunse		12·3	246	e 2 56	− 3	i 5 21	+ 3	i 3 47	PPP	—
Andijan		14·9	243	e 3 33	− 1	e 6 25	+ 5	i 3 37	PP	—
Tchimkent		15·7	253	3 9	−35	e 5 47	−52	—	—	—
Samarkand		18·8	249	4 20	− 3	7 57	+ 7	e 4 50	PPP	—
Sverdlovsk		19·2	307	i 4 27	− 1	i 7 48	−11	—	—	—
,,		19·2	307	i 4 30	+ 2	i 8 0	+ 1	—	—	9·2
Dehra Dun	N.	20·7	212	e 5 24	PPP	i 9 14	SSS	—	—	e 12·3
Agra		23·7	206	5 12k	− 2	9 17	−10	5 21	pP	—
Calcutta	N.	26·4	183	i 5 42a	+ 2	i 10 25	+13	e 11 39	SS	i 13·3
Heizyo		27·3	97	e 5 53	+ 5	e 11 1	+34	—	—	14·7
Zinsen		28·8	99	e 6 6	+ 4	e 11 2	+11	—	—	e 15·6
Keizyo		29·0	99	6 7	+ 3	e 10 52	− 2	—	—	15·4
Zi-ka-wei		29·3	114	e 6 12	+ 6	—	—	—	—	16·4
Vladivostok		29·4	85	e 6 9	+ 2	e 11 13	+12	—	—	—
Baku		29·5	270	i 6 12	+ 4	i 11 35	+33	—	—	16·1
Grozny		30·8	277	6 21	+ 1	i 12 26	+63	i 7 36	PPP	—
Taikyu		31·0	100	6 26	+ 5	e 11 24	− 2	—	—	—
Phu-Lien		31·1	148	e 6 26	+ 4	e 11 32	+ 4	—	—	—

Continued on next page.

		Δ °	Az. °	P. m. s.	O−C. s.	S. m. s.	O−C. s.	Supp. m. s.		L. m.
Husan		31·8	101	—	—	e 10 50	?	—	—	—
Moscow		32·0	304	e 6 27	− 3	e 11 36	− 6	—	—	—
		32·0	304	i 6 31	+ 1	i 11 42	0	—	—	13·1
Tiflis	,,	32·2	275	i 6 32k	0	e 11 46	+ 1	7 38	PP	i 12·6
Platigorsk		32·3	280	6 31	− 2	e 13 53	SSS	—	—	—
Hong Kong		32·8	134	12 0	S	(12 0)	+ 6	—	—	16·8
Hyderabad		32·8	201	6 23	−14	11 51	− 3	7 46	PP	16·3
Bombay		33·1	210	6 36	− 4	e 11 59	0	13 36	SS	17·1
Erevan		33·1	273	6 39	− 1	e 12 2	+ 3	e 14 12	SSS	—
Hukuoka B		33·6	102	e 15 34	?	18 23	?	—	—	e 19·8
Hirosima		34·4	99	6 53	+ 2	—	—	—	—	—
Sotchi		34·6	281	e 6 54	+ 1	e 14 52	SSS	—	—	—
Matuyama		35·0	99	6 57	+ 1	—	—	—	—	—
Pulkovo		35·3	312	e 6 54	− 5	e 12 26	− 7	—	—	—
	,,	35·3	312	i 6 58	− 1	i 12 32	− 1	—	—	14·1
Koti		35·6	99	7 3	+ 2	e 12 44	+ 6	e 16 42	?	20·0
Sapporo		35·6	79	7 4	+ 3	—	—	—	—	—
Taito		35·9	125	7 10	+ 6	—	—	—	—	—
Kobe		36·0	96	7 3	− 2	—	—	—	—	—
Muroto		36·2	100	7 9	+ 3	12 49	+ 2	—	—	—
Aomori		36·3	83	7 9	+ 2	—	—	—	—	—
Kosyun		36·3	126	7 14	+ 7	—	—	—	—	—
Osaka		36·3	95	7 6	− 1	12 48	0	8 41	PPP	—
Hikone		36·4	93	7 7	− 1	—	—	—	—	—
Gihu		36·6	93	7 12	+ 2	12 49	− 4	8 33	PP	—
Nagano		36·8	91	7 20	+ 9	—	—	—	—	—
Theodosia		36·8	286	7 12	+ 1	e 12 53	− 3	—	—	—
Hatinohe		36·9	83	7 17	+ 5	—	—	—	—	—
Nagoya		36·9	93	e 7 13	+ 1	—	—	—	—	21·4
Mizusawa		37·4	85	e 7 17	+ 1	14 6	+61	—	—	19·9
Simferopol		37·6	287	7 19	+ 1	i 15 57	SS	—	—	—
Yalta		37·8	285	7 22	+ 2	e 16 7	SS	—	—	—
Tukubasan		38·4	89	7 26	+ 1	—	—	—	—	—
Kodaikanal	E.	40·0	200	e 7 36	− 2	i 13 55	+11	i 16 41	SS	i 20·0
Upsala		41·4	314	i 7 51	+ 1	e 13 58	− 7	e 9 29	PP	—
Ksara		42·4	270	i 8 0k	+ 2	14 27	+ 7	9 31	PP	—
Colombo	E.	42·8	195	8 11	+10	14 31	+ 5	—	—	29·7
Istanbul		42·8	285	8 0	− 1	14 24	− 2	9 36	PP	28·4
Bucharest		42·9	289	i 8 8a	+ 6	i 14 33	+ 6	9 43	PP	—
Copenhagen		45·5	310	8 23	0	14 59	− 6	10 8	PP	—
Sofia		45·5	289	e 8 25	+ 2	e 15 9	+ 4	e 18 27	SS	i 25·1
Medan		45·8	167	8 26	+ 1	15 16	+ 7	—	—	—
Budapest		45·9	297	8 26	0	15 13	+ 2	10 12	PP	23·1
Belgrade		46·2	292	e 8 28a	0	i 15 19	+ 4	i 10 55	PPP	e 22·2
Potsdam		46·7	306	e 8 30	− 2	e 15 24	+ 2	i 10 23	PP	—
Bergen		46·9	319	7 36?	−58	15 19	− 6	—	—	21·6
Prague		47·1	302	e 8 39	+ 4	e 15 18	−10	e 11 25	PPP	e 21·6
Hamburg		47·8	308	i 8 43k	+ 2	i 15 40	+ 2	i 10 32	PP	22·6
Helwan		47·9	269	e 8 41	− 1	15 52	+13	10 34	PP	—
Cheb		48·2	304	e 8 46	+ 2	e 15 46	+ 3	e 10 42	PP	e 25·6
Jena		48·2	304	e 8 36	− 8	e 15 36	− 7	e 10 31	PP	e 20·6
Hof		48·4	304	e 9 2	+16	e 15 48	+ 2	e 10 36	PP	e 21·6
Göttingen		48·8	306	e 8 50	+ 1	i 15 55	+ 3	e 10 45	PP	e 24·6
Laibach		49·1	298	e 8 45a	− 6	—	—	i 11 29	PPP	e 25·4
Triest		49·8	298	e 8 55	− 1	16 3	− 3	10 49	PP	—
Stuttgart		50·7	303	e 9 2	− 1	e 16 15	− 3	e 11 0	PP	e 24·6
De Bilt		51·0	308	i 9 10a	+ 4	16 22	0	e 19 52	SS	e 23·6
Karlsruhe		51·0	304	i 9 4	− 2,	e 16 36?	+14	—	—	—
Padova		51·0	298	e 9 47	+41	i 16 20	− 2	i 19 8	SS	e 26·6
Scoresby Sund		51·2	337	9 11	+ 4	16 24	− 1	11 14	PP	—
Chur		51·5	301	e 9 9	0	e 19 36	SS	—	—	—
Strasbourg		51·6	303	i 9 11	+ 1	16 38	+ 7	i 11 14	PP	e 25·6
Aberdeen		51·8	316	i 9 17	+ 5	i 16 38	+ 5	i 21 7	SSS	25·3
Zurich		51·8	302	e 9 9	− 3	e 20 29	SS	—	—	—
Uccle		52·1	307	e 9 14	0	16 36	− 2	i 20 8	SS	23·6

Continued on next page.

	Δ °	Az. °	P. m. s.	O−C. s.	S. m. s.	O−C. s.	Supp. m. s.		L. m.
Basle	52·2	302	9 12	− 3	—	—	—	—	—
Florence	52·3	296	9 16	+ 1	i 16 47	+ 7	—	—	20·6
Rome	52·6	293	e 9 14k	− 4	e 16 40	− 4	11 14	PP	—
Durham	52·9	314	e 9 25	+ 5	i 16 46	− 2	i 20 51	SS	—
Neuchatel	52·9	302	e 9 16	− 4	e 20 49	SS	—	—	—
Edinburgh	53·0	316	e 7 36	?	i 16 52	+ 2	i 21 0	SS	27·6
Moncalieri	53·6	300	e 9 11	−14	16 38	−20	—	—	26·9
Stonyhurst	53·9	314	9 21	− 6	i 17 6	PS	—	—	25·6
Kew	54·2	311	i 9 35	+ 6	i 17 1	− 5	i 21 11	SS	25·6
Paris	54·3	306	e 9 29	− 1	e 17 3	− 4	—	—	25·6
Bidston	54·4	314	—	—	i 17 4	− 5	i 19 28	?	25·6
Grenoble	54·7	300	e 9 37	+ 4	e 17 8	− 5	e 11 31	PP	29·1
Puy de Dôme	55·9	302	e 9 41	− 1	i 17 29	0	—	—	e 25·8
Marseilles	56·0	298	e 12 26	PPP	e 19 26	?	—	—	e 24·6
Jersey	56·4	310	e 10 17	+31	i 19 38	?	e 21 16	SS	e 28·6
Batavia	56·9	159	i 9 57	+ 8	18 1	+19	—	—	31·6
College	58·0	25	e 10 2	+ 5	i 17 56	− 1	e 12 4	PP	e 26·6
Bagnères	59·1	301	e 10 9	+ 5	18 14	+ 3	e 12 10	PP	e 28·6
Algiers	61·5	294	i 10 20	− 1	i 18 45	+ 3	—	—	31·6
Toledo	63·6	301	e 10 31	− 4	e 19 7	− 1	e 12 59	PP	e 26·0
Almeria	64·7	298	e 10 55	+13	—	—	—	—	e 35·5
Ivigtut	65·1	339	10 45	0	19 23	− 4	19 34	PS	—
Granada	65·2	299	i 10 45a	0	19 39	+11	14 45	PPP	36·6
Malaga	66·0	299	e 10 33	−17	e 19 24	−14	—	—	31·1
San Fernando	67·2	300	e 11 2	+ 4	i 19 58	+ 6	e 24 34	SS	33·6
Averroes	70·1	299	e 11 29	+13	20 33	+ 6	15 33	PPP	e 35·6
Seven Falls	82·8	348	12 28	+ 1	22 40	− 5	—	—	e 36·6
Butte	83·3	15	—	—	e 22 45	− 5	—	—	—
Shawinigan Falls	83·7	349	e 12 36	+ 4	—	—	—	—	58·6
Bozeman	83·9	15	—	—	e 22 55	− 1	—	—	e 38·5
East Machias	84·5	344	—	—	e 22 50	−12	—	—	e 35·5
Ottawa	85·2	351	12 37	− 2	e 23 0	[− 2]	29 6	SS	e 40·6
Vermont	85·8	348	—	—	e 23 6	[0]	e 29 7	SS	e 37·6
Harvard	87·4	347	e 12 49	− 1	i 23 30	0	e 37 36	L_g	e 46·6
Weston	87·5	347	i 12 49k	− 2	i 23 30	− 1	e 16 18	PP	e 40·3
Williamstown	87·5	348	i 12 48	− 3	—	—	—	—	e 44·1
Fordham	89·4	348	e 13 5	+ 5	e 23 47	− 2	—	—	—
Chicago	89·5	358	—	—	23 30	[0]	—	—	48·6
Philadelphia	90·5	349	—	—	e 23 26	[−10]	e 30 12	SS	e 36·8
Tinemaha	90·7	23	e 13 6	0	—	—	—	—	—
Haiwee	91·7	23	e 13 12	+ 2	—	—	—	—	—
Florissant	92·6	0	—	—	i 23 52	[+ 4]	i 25 29	PS	—
St. Louis	92·7	0	—	—	i 24 25	+ 7	e 25 25	PS	—
Santa Barbara Z.	92·8	24	e 13 10	− 6	—	—	—	—	—
Pasadena	93·5	23	i 13 19	0	e 31 24	SSP	e 16 15	PP	e 42·9
Mount Wilson	93·5	23	i 13 18	− 1	—	—	e—	—	—
Riverside	93·8	23	i 13 19	− 1	—	—	—	—	—
Cape Girardeau E.	94·1	0	—	—	e 24 1	[+ 5]	—	—	e 49·5
La Jolla	95·0	23	e 13 24	− 2	—	—	—	—	—
Little Rock	96·5	3	e 31 22	SS	—	—	—	—	46·6
Columbia	97·0	352	—	—	e 24 7	[− 5]	e 31 48	SS	e 47·1
Tucson	97·0	18	13 34a	− 1	26 14	PS	i 17 32	PP	39·0
San Juan	109·6	336	e 19 39	PP	e 27 2	{+60}	e 28 40	PS	e 47·7
Fort de France	111·6	330	e 19 17	PP	e 28 37	PS	—	—	—
Huancayo	141·2	337	e 19 44	[+11]	i 41 3	SS	e 22 23	PP	e 57·4
La Paz	143·0	324	e 19 44	[+ 8]	—	—	—	—	72·6

Additional readings :—
Semipalatinsk i = +2m.6s., +3m.9s., and +3m.37s.
Irkutsk i = +3m.0s.
Almata e = +4m.8s.
Frunse i = +4m.17s. and +6m.21s.
Andijan e = +4m.9s., +5m.17s., +6m.49s., and +7m.52s.
Tchimkent i = +3m.58s., +4m.28s., +4m.58s., and +6m.24s.
Sverdlovsk, Moscow and Pulkovo give two sets of readings, both of which have been entered.

Continued on next page.

Agra, sP? = +5m.33s., sSEN = +9m.35s. SSE = +10m.23s.
Grozny i = +9m.11s.
Hong Kong PP = +12m.8s., S = +15m.7s.
Hyderabad SSN = +13m.41s.
Bombay iSE = +12m.6s.
Koti iN = +19m.33s.
Mizusawa ePN = +7m.20s.
Upsala ePE = +7m.55s., iPSE = +14m.7s., eSSN = +16m.48s.
Ksara PPP = +10m.3s., iSS = +17m.21s.
Istanbul SS = +17m.29s.
Bucharest iE = +9m.52s., iSSE = +17m.24s., iS_cS = +18m.2s., SSSEN = +18m.47s., iEN = +22m.37s., iE = +23m.10s.
Copenhagen PPP = +10m.57s., SE = +15m.4s., e = +16m.16s. and +16m.57s., SS = +18m.17s. and +18m.37s.
Sofia iN = +18m.39s., +20m.43s., +22m.31s., and +24m.18s.
Medan iEN = +27m.11s.
Budapest SN = +15m.20s., SSN = +18m.25s., SSE = +18m.30s., iN = +18m.55s., iE = +18m.59s. and +19m.55s., iN = +20m.48s.
Belgrade iZ = +9m.5s., iNW = +20m.0s.
Potsdam iPEN = +8m.35s., iE = +9m.14s., eN = +9m.18s., eNZ = +9m.36s., iP_cPN = +9m.53s., eEZ = +10m.18s., iPPE = +10m.27s., iE = +11m.14s., iN = +11m.31s., eZ = +11m.54s., iE = +13m.54s., eN = +14m.24s. and +14m.54s., iE = +16m.6s., +17m.49s., and +18m.45s., iSSEN = +18m.53s., eE = +19m.6s., iSSSEN = +19m.18s.
Prague eSS = +18m.41s.
Hamburg ePPPN = +11m.11s., eSSN = +19m.7s., eSSE = +19m.24s.
Helwan i = +8m.48s., e = +9m.38s., i = +15m.32s., SS = +19m.21s.
Cheb eSS = +19m.19s.
Jena iPN = +8m.45s., iPZ = +8m.48s., ePP = +10m.36s., eZ = +11m.5s., eSSN = +19m.6s., eSSE = +19m.16s.
Hof eSSNW = +20m.8s., eSSNE = +20m.19s.
Laibach e = +9m.48s.
Triest P = +9m.2s., PS = +16m.42s., SS = +19m.36s.
Stuttgart iP = +9m.6s.a, eSS = +19m.42s., eSSS = +21m.49s.
De Bilt iE = +16m.27s.
Scoresby Sund +19m.48s.
Strasbourg iSSE = +20m.25s.
Aberdeen i = +14m.57s.
Uccle i = +9m.18s.a, iSE = +16m.41s.
Florence i = +9m.22s.
Rome iZ = +9m.17s., PPPN = +12m.5s., PS = +17m.20s., iSS = +20m.14s., iN = +20m.46s., iSSSN = +21m.42s., iSSSE = +21m.57s.
Durham iPS = +16m.51s., iN = +19m.4s. and +20m.51s.
Kew iEN = +17m.7s., iSSEN = +19m.24s.
Grenoble e = +21m.6s.
Jersey eSSS = +23m.8s., e = +24m.17s.
Batavia PZ = +10m.0s.
College ePPP = +13m.35s., eSS = +21m.44s.
Bagnères ePPPE = +13m.18s., iSN = +18m.17s., ePSE = +18m.41s., eSSN = +22m.22s., eSSSE = +24m.20s., iSSN = +24m.31s.
Toledo i = +20m.35s.
Granada PS = +18m.5s., SS = +22m.27s.
San Fernando eSSS = +28m.33s.
Aveiroes iN = +12m.39s., ePS = +21m.20s.
Vermont eSSS = +32m.7s.
Weston eP_cPZ = +12m.52s., iZ = +13m.37s. and +14m.26s., iPPSN = +24m.26s., eSSEN = +29m.40s., eGE = +38m.0s.
Fordham iP = +12m.58s.
Philadelphia eS = +23m.56s., eSSS = +33m.36s.
Florissant eSN = +24m.16s., iSE = +24m.19s.
Cape Girardeau eE = +28m.14s., eN = +38m.0s.
Little Rock e = +41m.24s., +41m.46s., and +45m.52s.
Tucson iP = +14m.10s., iPP = +17m.43s.
San Juan ePPP = +22m.5s., eSS = +34m.35s., eSSS = +38m.40s.
Huancayo ePPP = +26m.0s.
Long waves were also recorded at Seattle, Ukiah, La Plata, Rio de Janeiro, Besançon, Riverview, and Berkeley.

Oct. 19d. Readings also at 0h. (Ksara, Mizusawa, Vladivostok, Sverdlovsk, Baku, Tiflis, Nagoya, and Irkutsk), 1h. (San Juan, Weston, Rome, and Copenhagen), 2h. (Tucson), 3h. (Agra, Nagoya, San Javier, Santiago, Baku, Sverdlovsk, Andijan, Malabar, and Batavia), 4h. (Tiflis and Semipalatinsk), 5h. (Andijan), 6h. (Pasadena and Berkeley), 10h. (Andijan and Tchimkent), 11h. (Huancayo), 13h. (Grozny), 14h. (Almata (2), Frunse, Samarkand, Tchimkent (2), Semipalatinsk (2), Andijan, Batavia, Malabar, Irkutsk, and Tashkent), 19h. (Tashkent, Taihoku, Sverdlovsk, and Tiflis), 20h. (Nagoya), 21h. (Fordham, Nagoya, and Harvard), 22h. (Fort de France), 23h. (Tchimkent, Tashkent, Sverdlovsk, and Nagoya (2)).

Oct. 20d. 2h. 19m. 29s. Epicentre 9°·2S. 123°·0E.

Force VII on the Isle of Flores at Timor and Soembawa.

Epicentre 9°·2S. 123°·2E. (Batavia).
8°·5S. 123°·5E. (Strasbourg).

Depth 100kms. (Batavia).

H. P. Berlage.

Aardbevingen in der Oost Indischer Archipel. Waargenomen gedurende het Jaar., 1938. Natuurkundig Tijdschrift voor Nederlandsch-Indie, Afl. 1, van deel XCX'40 blz. 38-75, pp. 40-41 and 69.

$A = -\cdot5377$, $B = +\cdot8280$, $C = -\cdot1589$; $\delta = -5$; $h = +7$;
$D = +\cdot839$, $E = +\cdot545$; $G = +\cdot087$, $H = -\cdot133$, $K = -\cdot987$.

A depth of focus 0·010 has been assumed.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Malabar		15·4	276	3 31	− 2	6 31	+10	—	—	—
Batavia		16·3	280	i 3 49	+ 5	6 53	+12	—	—	—
Perth		23·6	194	i 5 4	+ 1	9 14	+ 7	i 5 36	PP	10·7
Manila		23·7	356	i 5 5a	+ 1	i 9 25	+17	—	—	—
Medan		27·4	297	e 5 36	− 2	i 10 15	+ 5	i 5 40	pP	—
Adelaide		29·3	153	i 5 54	− 1	i 11 25	+45	i 6 27	PP	i 14·4
Kosyun		31·1	357	6 10	− 1	11 15	+ 7	—	—	—
Tainan		32·1	356	6 13	− 7	—	—	6 57	pP	—
Hong Kong		32·5	345	6 22	− 1	11 30	0	7 40	PP	—
Isigakizima		33·3	3	6 31	+ 1	—	—	—	—	—
Brisbane		33·7	125	i 6 31	− 3	e 12 31?	+42	—	—	—
Phu-Lien		33·9	332	i 6 36	0	e 11 48	− 4	7 56	PP	—
Melbourne		34·7	148	i 6 43	+ 1	12 36	+32	—	—	15·8
Riverview		35·7	137	i 6 52k	+ 1	i 12 51	+31	8 15	PP	16·9
Sydney		35·7	137	i 6 58	+ 7	i 12 52	+32	—	—	15·2
Nake		37·9	10	7 10	+ 1	—	—	—	—	—
Zi-ka-wei	N.	40·2	359	e 7 26	− 2	13 23	− 5	8 49	PP	20·4
Titizima		40·6	27	7 32	0	—	—	—	—	—
Miyazaki		41·7	11	7 43	+ 2	13 20	−30	—	—	—
Kumamoto		42·4	10	7 50	+ 4	13 38	−22	—	—	—
Hukuoka B		43·1	9	7 51	− 1	e 13 57	−13	—	—	20·8
Muroto		43·5	13	7 57	+ 2	14 13	− 3	—	—	—
Koti		43·7	12	7 57	0	14 18	− 1	10 10	PPP	e 21·1
Siomisaki		44·1	15	7 59	− 1	15 24	+59	—	—	21·9
Hirosima		44·2	11	8 0	− 1	14 22	− 4	17 47	SSS	—
Husan		44·4	6	e 8 4	+ 1	e 13 43	−46	—	—	—
Hamada		44·7	10	8 6	+ 1	14 35	+ 1	9 14	PP	21·1
Wakayama		44·7	14	8 6	+ 1	14 31	− 3	—	—	—
Taikyu		45·1	6	e 8 9	+ 1	e 14 47	+ 8	—	—	—
Kobe		45·2	14	8 7	− 2	14 38	− 3	—	—	—
Osaka		45·2	14	8 3	− 6	14 50	+ 9	10 6	PP	—
Kyoto		45·6	14	8 15	+ 3	14 47	0	—	—	—
Colombo	E.	45·9	289	8 13	− 1	14 47	− 4	—	—	26·2
Hamamatu		45·9	17	8 15	+ 1	14 59	+ 8	—	—	—
Nagoya		46·1	16	8 18	+ 2	i 14 54	0	—	—	—
Gihu		46·2	16	8 17	0	14 48	− 7	19 4	SSS	22·1
Calcutta	N.	46·4	314	i 8 21a	+ 3	i 15 6	+ 8	i 9 58	PP	i 22·0
Zinsen		46·6	3	e 8 19	− 1	e 14 53	− 8	—	—	22·3
Keisyo		46·7	4	8 19	− 2	14 59	− 3	i 8 59	pP	20·0
Hunatu		46·9	18	8 23	+ 1	15 1	− 4	19 29	SSS	—
Tokyo Cent. Met. Obs.		47·4	18	8 31	+ 5	15 9	− 3	10 12	PP	—
Oiwake		47·6	17	8 28	0	15 15	0	—	—	—
Toyama		47·6	15	8 30	+ 2	15 9	− 6	—	—	—
Dairen		47·9	358	8 34	+ 4	15 30	+11	—	—	—
Tukubasan		48·0	18	8 28	− 3	15 12	− 8	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Heizyo		48·1	2	8 33	+ 1	—	—	—	—	—
Wazima		48·1	15	8 33	+ 1	15 26	+ 4	—	—	—
Mito		48·2	18	8 32	0	15 22	− 1	—	—	—
Onahama		48·9	18	8 40	+ 2	15 33	0	—	—	—
Kodaikanal	E.	49·3	293	i 8 41a	0	i 15 31	− 8	i 18 31	SS	—
Mizusawa		51·0	18	i 8 54	0	i 16 2	0	—	—	—
Hyderabad		51·4	301	8 53	− 4	16 8	0	10 56	PP	23·8
Morioka		51·5	18	8 58	0	16 11	+ 2	—	—	—
Hatinohe		52·4	18	9 4	0	16 17	− 4	—	—	—
Mori		53·5	17	9 14	+ 1	16 39	+ 3	—	—	—
Sapporo		54·7	16	9 30	+ 9	17 1	+ 9	—	—	—
Christchurch		55·0	138	i 9 21k	− 3	i 17 7	+11	i 9 43	pP	25·9
Arapuni		55·2	130	9 31	+ 6	17 19	+20	i 17 37	PS	27·0
Wellington		55·6	134	i 9 28	0	i 16 48	−16	i 9 57	pP	26·5
Nemuro		56·2	19	9 33	+ 1	17 13	+ 1	—	—	—
Agra		56·6	312	9 30a	− 5	17 7	−11	9 56	pP	—
Bombay		56·8	299	i 9 34k	− 2	17 17	− 3	9 58	pP	28·0
Ootomari		58·3	15	9 36	−11	17 40	0	—	—	—
Dehra Dun	N.	58·4	315	e 9 59	+11	i 18 10	+29	—	—	e 26·5
Irkutsk		63·3	347	i 10 21	0	23 1	SS	i 10 46	pP	29·5
Apia		63·9	100	i 10 24k	− 1	i 18 57	+ 6	i 10 47	pP	—
Almata		66·9	325	10 46	+ 2	—	—	—	—	—
Frunse		68·0	323	i 10 50	− 1	i 19 38	− 3	—	—	40·2
Andijan		68·1	320	10 51	0	19 44	+ 2	—	—	39·0
Semipalatinsk		70·0	333	i 11 4	+ 1	20 5	+ 1	e 14 36	PPP	—
Tashkent		70·4	320	i 11 2	− 4	i 20 7	− 2	—	—	32·3
Tchimkent		70·7	322	11 8	+ 1	i 20 15	+ 3	i 13 46	PP	32·5
Samarkand		71·0	317	e 11 10	+ 1	20 20	+ 4	14 0	PP	—
Tananarive		73·4	253	e 11 24	+ 1	i 20 51	+ 8	i 11 53	pP	29·0
Sverdlovsk		83·2	331	i 12 19	+ 2	22 26	− 1	i 12 45	pP	33·5
Baku		83·3	313	i 12 21	+ 4	i 22 33	+ 5	—	—	37·5
Honolulu		83·4	67	e 12 12	− 6	22 17	−12	i 22 35	pS	e 34·4
Grozny		87·1	314	i 12 38	+ 2	i 22 52	[+ 1]	i 13 23	pP	—
Erevan		87·2	311	12 34	− 2	i 22 52	[0]	—	—	—
Tiflis		87·4	312	i 12 39a	+ 2	i 22 57	[+ 4]	13 4	pP	i 38·5
Piatigorsk		89·2	315	12 48	+ 2	e 23 5	[0]	—	—	—
Johannesburg		90·4	243	i 12 56	+ 4	e 23 20	[+ 8]	i 16 36	PP	—
Sotchi		91·4	314	13 3	+ 7	e 23 28	[+10]	—	—	—
Ksara		92·7	303	i 13 4a	+ 2	i 23 32	[+ 7]	i 13 30	pP	40·5
Theodosia		94·7	315	13 13	+ 2	23 38	[+ 3]	—	—	49·5
Moscow		95·0	326	13 12	− 1	23 40	[+ 2]	13 37	pP	44·0
Yalta		95·5	314	13 17	+ 2	23 46	[+ 5]	—	—	50·5
Simferopol		95·6	315	13 17	+ 1	i 23 44	[+ 3]	—	—	50·5
Helwan		95·9	299	i 13 18	+ 1	23 46	[+ 3]	e 13 46	pP	—
College		97·9	25	e 13 37	+11	e 23 52	[− 1]	e 17 34	PP	37·5
Istanbul		98·9	311	13 43	+13	23 2	[−57]	17 29	PP	41·4
Pulkovo		99·2	330	13 34	+ 2	24 2	[+ 2]	13 59	pP	46·0
Bucharest		101·3	313	e 14 2a	+21	i 24 15	[+ 5]	17 39	PP	46·5
Sofia		103·3	311	e 13 52	+ 2	e 24 23	[+ 4]	e 18 7	PP	43·5
Sitka		104·0	33	—	—	i 24 25	[+ 2]	i 33 1	SS	e 42·9
Belgrade		105·3	314	e 14 0a	P	i 24 27	[− 2]	i 18 21	PP	e 56·7
Upsala		105·6	330	e 18 13	PP	i 24 32	[+ 2]	i 27 25	PS	e 44·5
Kecskemet	Z.	105·7	316	i 14 3	P	e 24 31?	[0]	e 18 28	PP	e 38·9
Budapest		106·1	317	e 17 49	PKP	24 37	[+ 5]	i 27 19	PS	e 44·5
Prague		108·9	320	e 14 23	P	e 24 48	[+ 4]	e 18 49	PP	e 47·5
Copenhagen		109·1	327	14 23	P	i 24 50	[+ 5]	18 50	PP	—
Potsdam		109·4	323	e 14 19	P	e 24 49	[+ 3]	i 18 55	PP	e 50·5
Triest		110·0	316	e 18 24	[+ 4]	24 52	[+ 3]	e 19 0	PP	e 50·5
Cheb		110·2	321	e 14 28	P	e 24 56	[+ 6]	e 19 4	PP	e 55·5
Hof		110·5	321	e 19 43	PP	e 25 1	[+10]	e 27 37	PS	e 48·5

Continued on next page.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Jena	110·6	321	e 14 49	P	e 24 53	[+ 2]	e 19 21	PP	e 45·5
Padova	111·3	316	16 31?	?	—	—	—	—	—
Rome	111·3	311	e 14 23	P	i 24 58	[+ 4]	19 2	PP	i 49·0
Göttingen	111·4	323	e 17 1	?	i 29 10	PPS	e 19 11	PP	e 49·5
Bergen	111·5	333	19 5	PP	27 45	PS	—	—	43·5
Florence	112·0	314	18 6	[−18]	25 1	[+ 4]	—	—	—
Stuttgart	112·5	320	e 14 48	P	e 25 2	[+ 3]	e 19 24	PP	e 53·5
Chur	112·7	318	e 18 12	[−13]	e 25 2	[+ 2]	—	—	—
Karlsruhe	113·0	320	e 18 31?	[+ 5]	—	—	—	—	e 57·5
Zurich	113·2	318	e 15 1	P	e 25 6	[+ 4]	e 19 40	PP	—
Seattle	113·3	42	e 21 7	sPP	e 26 22	SKKS	e 21 43	PPP	e 49·3
Strasbourg	113·5	320	e 14 49	P	34 56	SS	i 19 20	PP	e 54·1
Basle	113·8	318	e 14 57	P	e 25 7	[+ 3]	e 18 30	PKP	—
De Bilt	114·2	324	e 14 43	P	i 25 11	[+ 5]	i 19 31	PP	e 52·5
Ukiah	114·2	52	—	—	e 24 58	[− 8]	35 1	SS	45·3
Moncalieri	114·3	316	i 18 44	[+16]	25 8	[+ 2]	—	—	53·0
Neuchatel	114·4	318	e 18 31	[+ 3]	e 25 9	[+ 3]	—	—	—
Lick	114·8	54	—	—	e 25 17	[+ 9]	—	—	—
Scoresby Sund	114·9	349	19 33	PP	i 25 9	[+ 1]	22 19	PPP	—
San Francisco	115·0	54	—	—	e 25 13	[+ 4]	—	—	—
Uccle	115·0	323	e 15 1	P	i 25 12	[+ 3]	i 19 34	PP	e 52·5
Berkeley	115·1	54	e 18 35	PP	e 25 7	[− 2]	i 28 41	PS	—
Branner	115·2	54	e 19 12	PP	e 25 15	[+ 5]	—	—	—
Grenoble	115·6	316	e 14 51	P	e 25 16	[+ 5]	i 19 37	PP	—
Aberdeen	116·3	331	i 19 27	PP	i 25 16	[+ 2]	i 29 7	PS	e 53·8
Marseilles	116·3	316	e 18 52	[+20]	i 25 28	[+14]	21 37	PPP	e 43·5
Paris	116·8	321	e 19 47	PP	i 25 13	[− 2]	28 49	PS	52·5
Durham	117·0	328	i 19 49	PP	i 25 20	[+ 4]	i 29 16	PS	—
Fresno N.	117·2	54	e 18 41	[+ 7]	25 26	[+10]	e 29 6	PS	—
Puy de Dôme	117·3	317	e 18 38	[+ 4]	—	—	e 29 14	PS	e 79·7
Edinburgh	117·4	329	e 19 56	PP	i 25 26	[+ 9]	i 29 21	PS	53·5
Kew	117·6	324	i 19 52	PP	i 25 22	[+ 4]	i 29 34	PS	e 56·5
Santa Barbara	117·6	56	i 18 39	[+ 4]	e 25 21	[+ 3]	e 22 6	SKP	—
Stonyhurst	117·9	327	i 19 56	PP	i 25 25	[+ 6]	i 29 27	PS	55·5
Oxford	118·0	325	e 19 43	PP	—	—	i 20 21	pPP	e 41·7
Bidston	118·4	327	i 19 58	PP	i 25 28	[+ 7]	i 29 45	PS	e 56·5
Tinemaha	118·4	54	i 18 40	[+ 4]	e 25 27	[+ 6]	e 22 9	SKP	—
Haiwee	118·8	54	i 18 41	[+ 4]	i 25 31	[+ 9]	i 22 11	SKP	—
Pasadena	118·9	56	e 15 26	P	i 25 31	[+ 9]	e 20 7	PP	e 47·7
Mount Wilson	119·0	56	e 15 15	P	i 25 31	[+ 8]	i 15 30	pP	—
Algiers	119·4	307	i 18 43	[+ 5]	25 29	[+ 4]	20 29	pP	49·5
Jersey	119·5	323	e 20 8	PP	i 25 25	[0]	e 29 48	PS	e 52·8
Riverside	119·6	56	e 15 16	P	e 25 29	[+ 4]	i 22 10	SKP	—
La Jolla	119·9	57	i 18 43	[+ 4]	i 25 35	[+ 9]	i 22 13	SKP	—
Bagnères	120·0	315	e 18 49	[+ 9]	i 25 35	[+ 8]	e 20 12	PP	e 56·5
Butte	120·2	40	—	—	e 25 29	[+ 2]	e 30 25	PS	e 49·7
Rathfarnham Castle	120·2	328	i 20 7	PP	i 30 31	PS	23 22	PPP	49·0
Bozeman	121·3	41	e 20 34	PP	e 25 34	[+ 3]	e 30 25	PS	48·9
Saskatoon	121·3	33	19 51	?	25 34	[+ 3]	36 44	SS	e 53·5
Almeria	123·7	309	e 18 48	[+ 1]	(e 25 40)	[+ 1]	—	—	e 61·2
Toledo	124·0	313	i 18 51a	[+ 3]	i 25 45	[+ 5]	i 20 23	PP	e 47·5
Granada	124·4	309	e 18 52	[+ 4]	(25 16)	[−25]	22 52	PPP	68·5
Malaga	125·2	309	19 7	[+18]	29 25	PS	—	—	68·5
Tucson	125·3	56	e 16 2	pP	i 25 30	[−14]	i 20 51	PP	i 51·5
San Fernando	126·7	309	e 19 17	[+25]	29 55	PS	33 9	SS	63·0
Ivigtut	127·7	356	19 0	[+ 6]	25 53	[0]	21 1	PP	—
Averroes	128·5	306	i 19 2	[+ 6]	26 4	[+ 8]	31 8	PS	e 57·5
Mazatlan Z.	130·8	67	i 19 4	[+ 4]	—	—	—	—	—
Guadalajara N.	133·9	70	19 13?	[+ 7]	—	—	—	—	—
La Plata	136·1	179	19 7	[− 3]	26 43	[+33]	21 49	PP	56·5

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Chicago		137·7	35	e 19 25	[+ 2]	e 31 42	SKSP	e 22 0	PP	e 57·5
Florissant		138·0	40	e 19 16	[+12]	i 28 44	SKKS	i 19 43	pPKP	—
Tacubaya	N.	138·0	71	i 19 21	[+ 7]	—	—	—	—	—
St. Louis	E.	138·2	40	e 19 13	[− 1]	e 26 21	[+ 8]	i 22 46	SKP	—
Little Rock		138·9	47	e 19 17	[+ 2]	i 25 16	[−58]	i 19 25	pPKP	41·0
Cape Girardeau		139·4	43	e 19 26	[+10]	e 29 1	SKKS	i 19 29	pP	—
Seven Falls		140·4	14	19 19	[+ 1]	28 58	SKKS	22 21	PP	61·5
Shawinigan Falls		140·4	16	19 23	[+ 5]	29 2	SKKS	22 50	SKP	—
Ottawa		140·5	20	19 12	[− 6]	29 1	SKKS	22 46	SKP	67·5
Vermont		142·2	18	i 19 31	[+10]	i 29 11	SKKS	e 20 6	pPKP	e 56·7
East Machias		143·4	12	19 42	[+19]	e 29 4	SKKS	i 23 1	PP	e 61·8
Williamstown		143·7	18	i 19 24	[+ 1]	i 31 2	?	i 20 2	pPKP	69·5
Harvard		144·4	17	i 19 25	[+ 1]	i 29 19	SKKS	i 22 55	PP	e 74·5
Weston		144·6	17	e 19 26k	[+ 1]	e 26 33	[+10]	i 19 36	pPKP	—
Fordham		145·1	21	i 19 27	[+ 1]	i 29 29	SKKS	i 19 54	pPKP	—
Georgetown		145·4	27	e 19 29	[+ 3]	—	—	i 23 0	SKP	—
Philadelphia		145·4	24	i 19 29	[+ 3]	e 29 12	SKKS	e 23 2	PP	e 55·8
Rio de Janeiro		145·4	204	i 19 31	[+ 5]	i 29 31	SKKS	—	—	i 41·0
Merida	N.	146·5	65	i 19 32	[+ 3]	—	—	—	—	—
Columbia		146·9	38	19 32	[+ 3]	i 29 38	SKKS	23 0	PP	e 60·0
Huancayo		152·1	140	i 19 43	[+ 6]	i 26 44	[+11]	i 20 10	pP	i 63·3
La Paz		152·2	158	i 19 43k	[+ 6]	i 30 13	SKKS	i 21 13	pPKP	72·7
Balboa Heights		157·7	88	e 19 46	[+ 2]	—	—	—	—	—
San Juan		167·3	43	e 19 58	[+ 4]	45 20	SS	e 20 34	pPKP	49·6
Fort de France		173·2	36	i 20 1	[+ 3]	e 31 47	SKKS	—	—	e 54·8

Additional readings :—
Batavia iS = +7m.1s.
Perth i = +5m.13s., +5m.21s., +5m.27s., +6m.11s., +6m.36s., +6m.58s., and +7m.28s., S? = +8m.6s., i = +9m.35s. and +10m.9s.
Medan iEN = +8m.20s., iN = +10m.7s.
Adelaide i = +6m.37s., +8m.13s., +8m.53s., and +10m.40s.
Hong Kong SS = +13m.7s.
Riverview P_cP?E = +9m.8s., i = +12m.23s., iE = +12m.38s., iN = +13m.9s., iZ = +15m.1s., SS? = +15m.13s., S_cS?E = +16m.50s.
Sydney i = +12m.33s.
Zi-ka-wei PPPN = +9m.25s., iN = +13m.31s.
Koti SSN = +17m.49s.
Hamada SSS = +17m.48s.
Calcutta iPPPN = +10m.39s., iSSN = +18m.6s., iSSSN = +19m.12s.
Kodaikanal iSSSE = +19m.38s.
Hyderabad P_cPN = +10m.18s., S_cSN = +18m.35s., SSN = +19m.41s.
Christchurch iZ = +9m.50s. and +10m.3s., i = +11m.27s., isSNZ = +17m.47s., SS = +20m.56s., iN = +22m.20s., iNZ = +22m.27s., iZ = +23m.6s., L_qN = +23m.9s.
Wellington iP_cP = +10m.30s., PP = +11m.28s., PPP = +12m.43s., i = +13m.43s., P_cS = +14m.23s., i = +17m.0s. and +17m.42s., S_cS = +19m.8s., SS = +20m.18s., L_q = +23m.8s.
Agra sP? = +10m.12s., PP = +11m.18s., pPP? = +12m.8s., ? = +13m.24s., PSE = +17m.40s., sS = +18m.1s., S_cSEN = +19m.13s., SSSE = +22m.11s.
Bombay iEN = +9m.45s., +10m.31s., and +11m.24s., iN = +12m.1s., iEN = +17m.42s., +18m.18s., +18m.46s., and +21m.9s.
Dehra Dun iN? = +22m.56s.
Irkutsk PP = +12m.43s., PPP = +14m.16s., SSS = +26m.19s.
Apia isP = +10m.55s., ePP = +12m.53s., isS = +19m.39s., iS_cS = +19m.51s., eSS = +23m.19s.
Tchimkent i = +11m.54s., e = +14m.45s.
Samarkand PPP = +15m.15s., SS = +24m.59s., SSS = +27m.58s.
Tananarive iE = +11m.27s., iEN = +11m.33s., ePPE = +14m.36s., ePPPE = +16m.24s., pSE = +21m.25s., SPE = +21m.48s., EN = +22m.9s., eN = +25m.11s., SS = +25m.15s.
Honolulu P_cP = +12m.20s., sP = +13m.15s., eSS = +27m.57s.
Grozny i = +22m.53s.
Tiflis PPZ = +16m.3s., iE = +24m.2s.
Johannesburg iSEN = +23m.32s., iSKKSEN = +23m.47s., ePSN = +24m.27s., eSSEN = +29m.3s.
Ksara PP = +16m.37s., pPP = +17m.0s., isS = +24m.12s.
Moscow S = +24m.7s.
Simferopol i = +23m.54s.
Helwan e = +14m.46s., +16m.10s., and +17m.41s., PS = +24m.37s.
College epPP = +17m.57s., eS = +25m.10s., sS = +26m.5s., iSS = +31m.21s., isSS = +31m.32s., SSS = +34m.57s.

Continued on next page.

Istanbul SS = +31m.31s.
Pulkovo PP = +17m.40s., eS = +24m.54s., PS = +26m.20s.
Bucharest PPP = +20m.31s., iEN = +25m.15s., SN = +25m.22s., iPS = +27m.12s., SSE = +32m.0s., SSSEN = +32m.6s.
Sofia eN = +18m.51s., +21m.31s., and +25m.29s., eE = +27m.8s.
Sitka S = +25m.33s.
Belgrade i = +19m.15s.
Upsala eE = +17m.4s., PPE = +18m.29s., ePPPE = +20m.43s., eN = +24m.29s., eSKKSN = +25m.29s., iPPSE = +28m.21s., eSSE = +33m.31s. ?
Kecskemet ePPZ = +17m.19s., eZ = +18m.52s., and +28m.27s., eSSZ = +30m.5s., ePKKS = +37m.35s.
Budapest iE = +18m.50s., iN = +18m.59s., iE = +24m.53s. and +25m.21s., iN = +25m.25s. and +25m.53s., i = +26m.52s. and +28m.33s., iN = +29m.29s., eE = +29m.35s., iN = +30m.33s., eN = +31m.29s., eE = +31m.39s., iE = +32m.10s., iN = +33m.33s.
Prague ePKP = +18m.1s., eSKKS = +25m.19s., ePS = +28m.5s., ePPS = +29m.5s., eSS = +34m.7s.
Copenhagen pPPEZ = +19m.16s., PPP = +21m.13s., e = +21m.55s. and +23m.13s., SKKSE = +25m.29s., e = +25m.48s., S = +26m.21s., eN = +26m.59s., iPS = +27m.59s., PPS = +28m.49s., iE = +29m.2s., eN = +33m.15s., SS = +34m.13s., SSS = +38m.25s., eE = +39m.31s.
Potsdam ePKPZ = +17m.31s., eZ = +18m.43s., eEZ = +19m.43s., eN = +20m.25s., eZ = +20m.49s., eE = +21m.13s., eN = +24m.49s., iPSE = +28m.4s., eZ = +28m.7s., +28m.37s., and +28m.55s., eE = +29m.19s., iPPSN = +29m.26s., eN = +29m.43s., eEZ = +30m.1s. and +30m.55s., eN = +31m.49s., eEN = +33m.43s. and +34m.31s., eN = +38m.37s.
Triest PS = +28m.40s., SS = +34m.3s.
Cheb eSS = +28m.12s.
Hof e = +28m.49s.
Jena eN = +17m.7s. and +17m.48s., eZ = +18m.25s., eE = +18m.31s., eN = +19m.40s., eN = +25m.31s., eEN = +25m.47s., eN = +27m.1s. and +28m.1s., eEZ = +28m.11s.
Rome PPP? = +21m.2s., i = +25m.52s., iPS = +28m.23s.
Göttingen iE = +25m.1s., iN = +35m.36s.
Stuttgart ePKP = +18m.45s., e = +20m.11s., ePPP = +22m.9s., eSKKS = +26m.0s., eS = +26m.48s., ePS = +28m.43s., ePPS = +29m.38s., e = +30m.19s., eSS = +34m.13s., eSSS = +38m.31s., eSSSS = +43m.7s.
Zurich ePKP = +18m.28s.
Seattle ePPS = +30m.44s.
Strasbourg ePE = +14m.52s., iZ = +19m.31s., PPPZ = +21m.44s., iPSE = +28m.46s., iPSZ = +28m.52s., iPPSZ = +29m.40s., iPPSE = +29m.46s.
De Bilt i = +28m.51s.
Ukiah eSKKS = +26m.14s., eS = +27m.4s.
Scoresby Sund +21m.9s. and +26m.23s., iPS = +28m.56s., SS = +35m.49s.
Uccle iSN = +27m.9s., iPSE = +29m.0s., iSS = +35m.14s.
Berkeley eN = +18m.47s., eEN = +25m.15s.
Grenoble ePKP = +18m.40s., iSKP = +21m.8s., i = +26m.24s., iSKKS = +26m.38s., ePS = +29m.29s., e = +29m.50s., ePPS = +30m.44s., eSSS = +40m.1s.
Aberdeen i = +19m.51s., +22m.39s., +23m.54s., +29m.51s., and +30m.37s.
Marseilles iE = +26m.40s., eE = +29m.31s. and +36m.49s.
Paris PPS = +29m.49s.
Durham iEN = +26m.36s., +30m.48s., and +35m.52s.
Fresno eSKSN = +20m.30s.
Puy de Dôme e = +19m.6s.
Edinburgh i = +20m.18s.
Kew iEN = +20m.20s. and +20m.44s., iSSE = +35m.34s., iE = +41m.42s.
Santa Barbara iZ = +25m.32s., e = +26m.10s., ePKKPZ = +29m.0s.
Stonyhurst i = +36m.31s.
Tinemaha ePKKPZ = +29m.2s.
Haiwee iPKKPZ = +28m.57s., eSKKPZ = +32m.9s.
Pasadena iPKP = +18m.41s., iZ = +20m.45s., iSKPZ = +22m.8s., iE = +26m.44s., eSN = +27m.46s., eE = +28m.39s., iPKKPNZ = +28m.59s., eSKKPZ = +32m.6s., iSKPPKPZ = +41m.8s.
Mount Wilson iPKP = +18m.41s., iSKP = +22m.9s., iPKKP = +28m.56s., eSKKPZ = +32m.5s., iZ = +32m.53s., iSKPPKPZ = +41m.8s.
Algiers PPP? = +23m.18s., SKKSE = +26m.52s., SE = +28m.15s., PSN = +30m.3s.
Jersey i = +25m.56s., iPPS = +31m.0s., i = +31m.52s.
Riverside ePKP = +18m.42s., eZ = +32m.36s.
La Jolla iPKKPZ = +28m.52s.
Bagnères ePPP = +22m.36s., iSKKS = +26m.54s., ePS = +28m.12s., eSS = +36m.1s., iSS = +36m.40s., eSSS = +40m.41s.
Rathfarnham Castle PPP = +25m.26s., i = +29m.46s., iPS = +31m.7s., i = +32m.6s., iSS = +36m.31s.
Bozeman eSS = +36m.32s.
Saskatoon SKKS = +27m.0s., PPS = +30m.28s.
Toledo iSKP = +21m.37s., i = +22m.26s., +24m.29s., and +27m.19s., iPS = +31m.4s., i = +32m.17s.
Granada PPPP = +26m.59s.; reading given as PPP is SKS.

Continued on next page.

Tucson iPKP = +18m.53s., iPPKP = +19m.16s., iSPP = +21m.34s., i = +22m.23s., iPPP = +23m.38s., ipPPP = +24m.21s., i = +24m.51s., +24m.55s., and +26m.27s., iSKKS = +27m.15s., i = +27m.37s., ipS = +28m.40s., isS = +29m.11s., iSKSP = +30m.38s., PSKS = +30m.43s., iPPS = +32m.24s., i = +32m.55s., iSS = +37m.33s., iSSS = +41m.22s., iSKP,PKP = +42m.19s.
San Fernando PPN = +25m.1s., PPPN = +27m.39s., PSN = +35m.25s.
Ivigtut +21m.25s., +22m.0s., and +22m.23s., SKKS = +27m.43s., PS = +30m.57s., SS = +37m.49s., SSS = +42m.13s.
Averroes eSKPE = +22m.19s., ePPPE = +23m.20s., eSKKSE = +27m.51s., iE = +31m.26s., iPPSE = +32m.35s., e = +39m.7s., SSS = +42m.46s.
La Plata SKKS = +28m.31s., SS = +41m.1s., SSS = +46m.19s.
Chicago epPKS = +23m.13s., eSP = +32m.12s., eSS = +40m.0s.
Florissant ePKPEN = +19m.21s., iN = +19m.55s., iE = +22m.17s., epPPN = +22m.23s., iSKPZ = +22m.43s., isSKPE = +23m.6s.
St. Louis eSKKSE = +28m.41s., ePPSE = +30m.31s.
Little Rock iSKPN = +22m.44s., iPPPEN = +25m.6s., iSKKSEN = +28m.49s., iS? = +29m.10s., i? = +31m.41s.
Cape Girardeau ipPKPNE = +19m.29s., ipPPEN = +22m.34s., iSKPE = +22m.54s., esSKPE = +23m.3s., esSE = +31m.42s., ePPSE = +34m.31s.
Seven Falls SKP = +23m.3s., PPS = +35m.13s., SS = +40m.31s.?
Ottawa PPS = +34m.49s., SSS = +40m.23s.
Vermont iPP = +22m.45s., ipPP = +22m.53s., iPSKS = +33m.2s., eSS = +40m.51s., eSSS = +45m.41s.
East Machias isPP = +23m.33s., iSKKS = +29m.18s., eSS = +40m.59s.
Williamstown isPKP = +20m.14s., i = +21m.9s., iPP = +22m.53s., i = +23m.39s.
Harvard iPKP$_3$N = +19m.35s., ePKSE = +23m.25s.
Weston ipPKPNZ = +19m.36s., iNZ = +20m.19s., iZ = +20m.59s., +21m.17s., and +22m.15s., iPPZ = +23m.3s., iE = +23m.13s., iPPPZ = +26m.25s., eSKKSEN = +29m.13s., eSPPZ = +35m.15s., ePSPZ = +35m.45s., eSSN = +41m.29s., eZ = +41m.45s. and +42m.32s., eSSSN = +47m.7s.
Fordham iPP = +23m.0s., iZ = +26m.44s., +27m.15s., +31m.0s., and +37m.11s., iE = +41m.31s., iZ = +41m.55s., iN = +42m.5s.
Philadelphia i = +19m.44s. and +19m.48s., eSS = +41m.47s., eSSS = +46m.47s.
Columbia pPP = +23m.13s., iSS = +41m.40s.
Huancayo i = +19m.50s. and +19m.53s., iSP = +20m.35s., i = +22m.23s., ipPP = +23m.52s., iPP = +23m.28s., isPP = +24m.15s., i = +24m.35s., +25m.23s., and +29m.23s., SKKS = +29m.36s., i = +30m.18s., +30m.48s., and +31m.28s., SKSP = +33m.2s., iPSKS = +33m.23s., ipPS = +35m.5s., sPS = +35m.15s., i = +35m.31s., iSPP = +36m.4s., iPPS = +36m.35s., i = +37m.1s., +39m.0s., +39m.13s., and +39m.20s., iSS = +42m.13s., isSS = +43m.53s., i = +46m.23s. and +47m.33s., SSS = +48m.1s., i = +57m.14s.
Balboa Heights eE = +21m.48s., eN = +22m.1s.
San Juan epPP = +25m.33s., PPP = +29m.10s., i = +31m.25s. and +32m.28s., iPSKS = +35m.34s.
La Paz PKP$_3$ = +20m.9s., isPKP = +21m.56s., iSKPZ = +23m.27s., iPPN = +23m.53s., PPPN = +27m.21s., iN = +30m.53s., PSKSN = +33m.52s., PSKSZ = +33m.57s., iSSN = +43m.51s., iSSSN = +50m.1s.
Long waves were also recorded at Besançon.

Oct. 20d. 13h. 14m. 55s. Epicentre 9°·5N. 40°·3E. (as on 1938 Sept. 27d.).

A = +·7524, B = +·6381, C = +·1640; δ = +17; h = +7; D = +·647, E = −·763; G = +·125, H = +·106, K = −·987.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Helwan		21·9	339	1 4 53	− 4	8 55	+ 1	e 5 44	PPP	—
Ksara		24·5	351	1 5 22$_a$	0	e 9 58	+18	e 11 10	SSS	—
Baku		31·9	14	e 7 25	+56	e 12 38	+58	—	—	17·1
Tiflis		32·3	7	e 6 29	− 4	e 11 43	− 3	e 7 29	PP	15·1
Bombay		32·8	70	1 6 42	+ 5	i 12 8	+14	—	—	15·3
Istanbul		33·0	345	11 51	S	(11 51)	− 6	—	—	—
Sotchi		33·9	359	e 6 51	+ 4	—	—	—	—	20·1
Kodaikanal	E.	36·6	85	e 7 17	+ 7	i 13 9	+16	—	—	17·5
Hyderabad	E.	37·9	74	8 51	PP	13 25	+12	—	—	—
Colombo	E.	39·2	91	e 7 35	+ 4	—	—	—	—	—
Agra	E.	39·7	58	e 7 34	− 2	13 41	+ 1	9 5	PP	—
Rome		40·5	329	e 7 32	−10	13 31	−21	8 52	PP	—
Tashkent		40·7	34	e 7 41	− 3	e 13 54	− 1	—	—	20·7
Tchimkent		41·6	33	e 9 9	PP	—	—	—	—	23·1
Andijan		42·1	37	e 8 3	+ 8	e 14 53	+37	—	—	24·6

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Triest		42·6	333	—	—	e 14 29	+ 6	—	—	e 24·2
Frunse		44·7	36	e 8 20	+ 4	—	—	—	—	—
Moscow		46·2	358	e 8 30	+ 2	e 15 28	+13	e 10 9	PP	e 36·6
Zurich		46·3	331	e 8 4	−25	—	—	—	—	—
Basle		46·9	331	e 8 33	− 1	—	—	—	—	—
Stuttgart		47·0	333	—	—	e 15 29	+ 3	—	—	e 27·1
Strasbourg		47·6	332	—	—	e 19 5	SS	—	—	e 26·1
Calcutta	N.	47·7	68	—	—	e 15 50	+14	e 19 33	SS	e 22·2
Potsdam		48·1	338	—	—	e 15 5?	−37	—	—	—
Toledo		49·6	315	e 9 3	+ 8	—	—	—	—	23·1
Averroes		49·8	307	—	—	e 13 30	?	—	—	e 27·6
Sverdlovsk		49·8	14	e 9 3	+ 7	e 16 11	+ 5	—	—	24·1
Pulkovo		50·7	354	e 9 5	+ 2	—	—	—	—	e 30·6
Uccle		50·7	332	—	—	e 16 5?	−13	—	—	e 27·1
De Bilt		51·2	333	—	—	e 21 5?	SSS	—	—	e 30·1

Additional readings :—
Istanbul S = +19m.47s., SS = +26m.25s.
Agra SSE = +16m.19s.
Rome i = +15m.2s., SSS = +16m.32s.
Moscow e = +28m.46s.
Grenoble e = +27m.35s. and +31m.7s.
Long waves were also recorded at Cheb, Huancayo, Fort de France, Rio de Janeiro, La Paz, San Fernando, Malaga, Granada, Almeria, Algiers, Kew, Puy de Dôme, Copenhagen, Bucharest, and Irkutsk.

Oct. 20d. Readings also at 1h. (Tucson, Mount Wilson, Pasadena, Haiwee, Simferopol, Yalta, Theodosia, Sverdlovsk, and Tashkent), 2h. (Batavia, Semipalatinsk, Nagoya, and Malabar), 3h. (Tucson), 4h. (Helwan and Averroes), 7h. (Tananarive), 8h. (Helwan (3), La Paz, Averroes, Almeria, Malaga, Tashkent, Tiflis, Sverdlovsk, Ksara, Baku, Irkutsk, and Granada), 9h. (Helwan, Granada, Batavia, Perth, and Medan), 10h. (Frunse, Mount Wilson, Pasadena, Riverside, Fordham, Riverview, Weston, Harvard, Williamstown, Ottawa, Tchimkent, Andijan, Tananarive, La Paz, Batavia, Tiflis, Sverdlovsk, and Tucson (2)), 11h. (Tucson, Tacubaya, Sverdlovsk, Andijan, Tchimkent, Ottawa, Williamstown, Fordham, Harvard, La Paz, San Juan, Haiwee, Tinemaha, Riverside, Mount Wilson, Pasadena, La Jolla, Balboa Heights, Columbia, Huancayo, Philadelphia, Guadalajara, Samarkand, Ukiah, and Rio de Janeiro), 12h. (Copenhagen, De Bilt, Uccle, Strasbourg, Christchurch, Pulkovo, Tiflis, Baku, Irkutsk, and Tashkent), 15h. (Mount Wilson, Branner, Lick, Helwan, Mizusawa, and Tucson), 17h. (Tashkent, Ksara, Averroes, Helwan, Harvard, and Sverdlovsk), 19h. (Mount Wilson, Pasadena, Riverside, Tacubaya, and Tucson (2)), 20h. (Toledo), 21h. (Harvard, Williamstown, La Paz, Tananarive, and Weston), 22h. (Mizusawa, Helwan, and Ksara), 23h. (Mizusawa).

Oct. 21d. 6h. 46m. 18s. Epicentre 43°·7N. 131°·5E.

A = −·4806, B = +·5432, C = +·6884 ; δ = −6 ; h = −3 ;
D = +·749, E = +·663 ; G = −·456, H = +·516, K = −·725.

A depth of focus 0·070 has been assumed.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Vladivostok	0·6	154	i 1 11	+12	i 1 53	+ 8	—	—	—
Heisyo	6·4	223	i 1 42a	+ 2	i 2 58	− 2	—	—	—
Keisyo	7·0	211	i 1 46a	− 1	i 3 11	0	—	—	—
Zinsen	7·2	212	i 1 48a	− 1	i 3 13	− 2	—	—	—
Syuhurei	7·9	200	1 55	− 1	3 27	− 1	—	—	—
Taikyu	8·1	195	i 1 57k	− 1	i 3 31	− 1	—	—	—
Mizusawa	8·6	118	i 2 6	+ 2	i 3 41	− 1	—	—	—
Husan	8·8	194	2 5a	− 1	3 38	− 8	—	—	—
Nagoya	9·5	152	2 14	+ 1	i 4 7	+ 8	—	—	—
Irkutsk	20·0	306	4 3	+ 3	7 17	+ 3	6 28	sP	—
Hong Kong	25·7	220	4 47	− 5	8 50	+ 3	—	—	10·9
Phu-Lien	30·8	230	e 5 29	− 8	e 12 35	SS	—	—	—
Semipalatinsk	35·0	301	i 6 13	+ 1	—	—	—	—	—
Almata	39·0	290	6 44	− 1	—	—	—	—	—
Frunse	40·7	290	6 57	− 2	e 12 27	− 8	—	—	—

Continued on next page.

		△ °	Az. °	P. m. s.	O−C. s.	S. m. s.	O−C. s.	Supp. m. s.		L. m.
Calcutta	N.	41·3	254	e 7 13	+ 9	i 12 41	− 3	i 9 5	PP	—
Andijan		43·1	288	7 18	0	e 13 3	− 6	—	—	—
Tchimkent		44·4	292	7 30	+ 2	13 19	− 9	e 9 26	PP	—
Tashkent		45·0	290	i 7 32	− 1	i 13 28	− 8	9 18	pP	—
Sverdlovsk		45·1	314	i 7 38	+ 4	i 13 38	0	9 21	pP	—
Agra	E.	45·8	268	i 7 33k	− 6	—	—	—	—	—
Samarkand		47·3	289	e 7 50	− 1	e 14 0	− 8	—	—	—
Medan		49·4	227	7 59	− 8	i 14 23	−14	—	—	—
Batavia		54·4	211	8 36	− 7	15 33	−11	—	—	—
Bombay	N.	54·7	264	i 10 29	PP	e 18 44	SS	—	—	—
Moscow		57·3	319	9 3	0	16 17	− 5	10 52	pP	—
Baku		58·3	298	i 9 9	− 1	16 30	− 4	—	—	e 23·7
Pulkovo		58·5	325	9 11	0	16 32	− 5	e 11 0	pP	—
Grozny		59·3	303	9 15	− 1	16 39	− 8	—	—	—
Tiflis		60·8	302	9 24	− 2	i 16 58	− 8	i 11 14	pP	e 22·7
Sotchi		62·8	306	e 9 38	− 2	—	—	—	—	—
Theodosia		64·5	310	9 48	− 2	i 17 43	− 8	—	—	—
Simferopol		65·3	310	9 54	− 2	i 17 54	− 7	—	—	—
Copenhagen		68·4	329	i 10 15	+ 1	18 33	− 4	—	—	—
Ksara		71·2	300	i 10 30k	− 1	19 9	0	i 12 24	pP	—
Berkeley		74·9	53	i 10 55	+ 3	—	—	i 12 52	pP	—
Helwan		76·7	300	i 12 57	pP	—	—	i 14 3	PP	—
Tinemaha		77·7	51	i 11 11	+ 3	—	—	i 13 8	pP	—
Haiwee		78·6	51	i 11 14	+ 2	—	—	i 13 13	pP	—
Santa Barbara		78·8	53	i 11 15	+ 1	—	—	i 13 14	pP	—
Mount Wilson		79·9	53	i 11 20	+ 1	—	—	i 13 18	pP	—
Pasadena		79·9	53	i 11 20a	+ 1	—	—	i 13 19	pP	—
Riverside		80·5	53	i 11 23	+ 1	—	—	i 13 22	pP	—
La Jolla		81·3	53	i 11 28	+ 1	—	—	i 13 28	pP	—
Tucson		85·4	49	i 11 48a	+ 1	—	—	13 49	pP	—
St. Louis	E.	89·8	31	—	—	e 6 42	?	e 8 12	?	—
Harvard		91·7	18	i 12 17a	+ 1	—	—	—	—	—
Weston	Z.	91·9	18	i 12 18	+ 1	—	—	i 14 19	pP	—
Averroes		94·7	328	e 18 9	PPP	e 22 9	−50	—	—	—
La Paz	Z.	148·2	38	i 18 52	[+ 7]	—	—	—	—	—

Additional readings :—
Vladivostok i = +1m.33s. and +2m.3s.
Tchimkent e = +8m.11s. and +8m.29s.
Batavia iZ = +8m.42s.
Bombay eN = +14m.42s.
Pulkovo S_gS = +17m.56s.
Tiflis esSEN = +20m.24s.
Ksara isP = +13m.19s., PP = +13m.41s., ipPP = +15m.15s., SS = +22m.31s.
Berkeley iZ = +10m.58s.
Helwan i = +20m.0s.
Pasadena iZ = +14m.13s.
Tucson iP_cP = +11m.53s., i = +12m.11s., +12m.16s., and +12m.26s., isP = +14m.45s., i = +15m.20s., iPP = +15m.39s.

Oct. 21d. 20h. 24m. 8s. Epicentre 1°·5N. 66°·5E.

A = +·3986, B = +·9168, C = +·0260; δ = +8; h = +7;
D = +·917, E = −·399; G = +·010, H = +·024, K = −1·000.

		△ °	Az. °	P. m. s.	O−C. s.	S. m. s.	O−C. s.	Supp. m. s.		L. m.
Kodaikanal	E.	13·9	51	i 3 15k	− 6	i 5 49	− 8	i 6 14	SS	i 6·7
Colombo	E.	14·4	67	3 22	− 5	—	—	—	—	6·9
Bombay		18·4	18	i 4 12	− 6	i 7 35	− 6	4 31	PP	—
Hyderabad		19·7	35	4 27	− 7	8 6	− 3	4 42	PP	9·3
Tananarive		27·5	222	5 58	+ 8	12 11	SSS	—	—	12·9
Agra		27·8	23	i 5 46k	− 7	10 38	+ 3	i 7 29	PPP	—
Calcutta	N.	29·8	44	i 6 16k	+ 5	i 11 20	+13	e 7 4	PP	i 14·8
Dehra Dun	N.	30·7	19	e 6 17	− 2	e 13 43	SSS	—	—	e 15·0
Medan		32·2	84	i 6 39	+ 7	i 12 4	+19	—	—	e 15·9
Samarkand		38·0	0	e 7 19	− 2	e 13 2	−12	e 8 49	PP	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Andijan		39·4	8	e 7 33	0	e 13 41	+ 6	—	—	—
Tashkent		39·7	4	i 7 36	0	e 13 22	−18	—	—	20·9
Tchimkent		40·7	4	7 42	− 2	e 13 43	−12	e 9 20	PP	—
Batavia		41·0	100	7 57	+11	i 14 17	+18	—	—	—
Baku		41·5	341	i 7 54	+ 4	i 14 12	+ 5	—	—	e 22·3
Frunse		41·8	10	e 7 53	0	e 14 11	0	—	—	—
Almata		42·6	12	e 8 6	+ 7	e 14 15	− 8	—	—	—
Ksara		43·1	321	i 8 6k	+ 2	14 40	+10	i 9 39	PP	—
Erevan		43·4	335	e 8 8	+ 2	e 14 29	− 6	—	—	—
Phu-Lien		43·6	60	e 8 7	− 1	—	—	—	—	—
Helwan		43·7	313	i 8 9	+ 1	14 38	− 1	10 8	PPP	—
Tiflis		44·6	336	e 8 16	0	i 14 51	− 1	e 10 0	PP	22·3
Grozny		45·6	339	8 29	+ 5	14 44	−22	—	—	—
Semipalatinsk		50·1	12	e 8 59	0	—	—	—	—	—
Hong Kong		50·7	62	9 2	− 1	16 15	− 3	—	—	23·7
Theodosia		51·3	332	e 9 3	− 5	16 22	− 4	—	—	—
Yalta		51·5	330	e 9 10	+ 1	16 25	− 4	—	—	—
Istanbul		51·9	324	9 24	+12	16 33	− 2	11 16	PP	—
Simferopol		51·9	330	e 9 11	− 1	16 31	− 4	—	—	—
Bucharest		55·3	326	9 48a	+10	i 17 28	+ 7	i 11 42	PP	—
Manila		55·3	73	i 9 40	+ 2	14 14	?	—	—	—
Sverdlovsk		55·4	357	i 9 37	− 1	i 17 21	− 1	—	—	26·9
Sofia	N.	56·3	323	e 8 45	−60	i 17 33	− 1	—	—	—
Perth		57·3	129	10 45	+53	18 5	PS	11 50	PcP	26·4
Moscow		58·9	342	10 3	0	18 4	− 4	—	—	32·4
Belgrade		59·2	323	e 10 3a	− 2	i 18 12	0	e 12 25	PP	e 36·4
Irkutsk		59·6	26	10 6	− 2	i 18 14	− 3	—	—	30·9
Rome		62·9	317	i 10 27	− 3	i 19 0	0	12 55	PP	—
Triest		63·7	322	e 10 33	− 3	i 19 6	− 4	12 0	pP	—
Florence		64·5	319	10 35	− 6	20 22	+63	—	—	—
Pulkovo		64·5	342	e 10 38	− 3	e 19 13	− 6	—	—	e 28·6
Padova		64·6	321	11 52?	+71	—	—	—	—	—
Prague		65·4	327	e 11 4	+17	e 19 27	− 3	—	—	—
Cheb		66·6	326	e 10 56	+ 2	e 19 44	− 1	—	—	—
Chur		66·9	322	e 10 54	− 2	—	—	—	—	—
Moncalieri		67·3	319	e 10 50	− 9	i 20 0	+ 6	—	—	—
Jena		67·4	326	e 10 52	− 7	e 19 52	− 3	—	—	—
Potsdam		67·5	328	e 10 58	− 2	e 19 52	− 4	e 20 40	PPS	e 35·9
Zurich		67·7	322	e 10 58a	− 3	e 19 53	− 5	—	—	—
Stuttgart		67·9	323	e 11 1	− 1	e 19 55	− 6	e 24 3	SS	e 38·9
Basle		68·4	322	e 11 4	− 2	e 20 1	− 6	—	—	—
Neuchatel		68·5	321	e 11 4	− 2	e 20 2	− 6	—	—	—
Göttingen		68·6	327	e 11 6	− 1	i 20 6	− 3	—	—	—
Strasbourg		68·7	323	i 11 4	− 3	i 20 4	− 6	i 13 39	PP	e 34·9
Copenhagen		69·3	331	11 9	− 2	20 15	− 2	21 12	PPS	41·9
Upsala	E.	69·3	336	—	—	i 20 10	− 7	—	—	—
Hamburg		69·5	328	e 11 12	0	e 20 12	− 8	—	—	e 40·9
Puy de Dôme		70·7	318	e 11 14	− 6	—	—	e 14 37	PP	e 45·6
De Bilt		71·5	326	i 11 55	+31	20 45	+ 2	—	—	i 41·9
Uccle		71·5	324	e 11 13	−11	20 39	− 4	—	—	e 37·9
Almeria		72·3	308	e 11 25	− 4	—	—	e 14 26	PP	e 41·8
Granada		73·4	308	i 11 39	+ 3	—	—	i 14 27	PP	e 43·1
Malaga		73·9	308	e 11 53	+14	e 21 27	+17	14 30	PP	39·9
Toledo		74·2	311	e 11 40	0	i 21 13	− 1	i 14 31	PP	—
Kew		74·5	324	—	—	i 21 15	− 2	—	—	40·9
San Fernando		75·2	306	e 11 46	0	i 21 26	+ 1	26 12	SS	39·9
Averroes		75·8	304	e 11 52?	+ 2	20 4	?	14 42	PP	39·9
Melbourne		81·8	128	—	—	i 22 55	+20	—	—	—
Fort de France		125·8	289	e 20 57	PP	—	—	—	—	—
San Juan		129·4	296	e 21 26	PP	e 31 27	PS	e 39 2	SS	e 55·0

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
La Paz		132·9	249	i 19 25k	[+ 8]	i 26 22	[− 5]	i 22 58	PP	65·9
St. Louis	E.	134·7	334	e 22 50	pPP	e 25 44	[−46]	—	—	—
Huancayo		140·8	253	e 19 30	[− 2]	26 38	[− 2]	e 22 29	PP	e 57·4
Haiwee		142·3	4	e 19 43	[+ 8]	—	—	—	—	—
Pasadena	Z.	144·1	5	i 19 40	[+ 3]	—	—	e 22 25	PP	—
Mount Wilson		144·2	5	i 19 40	[+ 3]	—	—	e 22 25	PP	—
Riverside		144·5	5	i 19 41	[+ 3]	—	—	—	—	—
La Jolla		145·6	5	i 19 44	[+ 4]	—	—	—	—	—
Tucson		146·4	356	i 19 46	[+ 5]	i 26 59	[+10]	i 24 4	PP	i 82·2

Additional readings :—
Bombay iN = +5m.2s., +5m.36s., and +6m.30s., SSN = +8m.0s., iN = +8m.25s.
Hyderabad SSN = +8m.24s.
Tananarive N = +8m.6s.
Agra SSE = +11m.48s.
Calcutta ePPPN = +7m.22s., eSSN = +12m.49s.
Dehra Dun eN = +10m.18s.?
Medan iN = +6m.52s. and +15m.19s.
Tchimkent e = +8m.6s. and +10m.56s.
Batavia ePN = +7m.59s.
Ksara eSS = +17m.31s.
Helwan e = +9m.4s. and +10m.32s., i = +18m.12s.
Tiflis PPPZ = +10m.32s., S_cSEN = +18m.18s.
Istanbul SS = +15m.57s.
Bucharest P_cPEN = +10m.59s., iEN = +11m.20s., PPPEN = +11m.55s., PSEN = +18m.22s., iS_cSEN = +19m.30s., iSSEN = +20m.57s., SSSEN = +22m.46s.
Perth i = +13m.35s., PS = +18m.17s., SS = +22m.4s.
Belgrade iZ = +10m.24s., eNW = +20m.46s.
Rome i = +13m.54s. and +14m.51s., PPP = +15m.4s., iS_cS = +19m.39s., i = +20m.32s., SS = +23m.8s., SSS = +25m.22s.
Triest iPP = +13m.22s., iPPP = +14m.11s.
Jena ePZ = +10m.58s., ePE = +11m.52s., e = +18m.52s.
Potsdam eZ = +12m.58s. and +16m.16s.
Zurich i = +11m.28s.
Stuttgart e = +21m.0s.
Strasbourg iSN = +20m.19s., eSS = +24m.25s.
Upsala eN = +20m.14s.
Hamburg eE = +20m.15s.
Granada i = +16m.22s.
Toledo i = +12m.9s.
Averroes PPN = +13m.15s., PPE = +13m.19s.
Melbourne i = +20m.56s. and +24m.54s.
Huancayo PP = +22m.40s., ePPP = +25m.9s.
Pasadena iZ = +22m.55s.
Mount Wilson iZ = +22m.55s.
Tucson i = +19m.57s., +20m.9s., +20m.24s., +20m.54s., +21m.2s., and +21m.15s., iPPP = +26m.9s.
Long waves were also recorded at Harvard, College, Philadelphia, La Plata, and Fordham.

Oct. 21d. 23h. 35m. 38s. Epicentre 35°·0S. 179°·5W.

A = −·8210, B = −·0071, C = −·5710 ; δ = +13 ; h = 0 ;
D = −·009. E = +1·000 ; G = +·571, H = +·005, K = −·821.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Arapuni		5·0	230	1 22	+ 4	—	—	—	—	3·1
Hastings		5·4	211	e 1 22	− 2	2 20	− 8	—	—	—
New Plymouth		6·6	230	1 46	+ 5	3 0	+ 2	—	—	—
Wellington		7·7	214	1 50	− 6	3 16	− 9	—	—	—
Christchurch		10·5	213	e 2 44	+ 9	4 18	−17	—	—	—
Riverview		24·2	266	i 5 24a	+ 5	i 9 46	+11	i 6 18	PPP	e 12·2
Sydney		24·2	266	e 5 16	− 3	e 10 4	+29	—	—	e 13·7
Brisbane	E.	24·6	280	i 5 28	+ 5	i 9 58	+16	—	—	—
Melbourne		28·6	254	e 5 16	−44	i 10 50	+ 2	i 6 51	PP	13·9
Adelaide		34·2	258	e 3 20	!	i 10 56	!	e 7 50	PP	—
Perth		53·2	254	—	—	i 16 50	− 2	—	—	i 32·1
Santa Barbara		88·9	46	e 12 58	0	—	—	—	—	—
La Jolla		89·2	48	e 13 1	+ 2	—	—	—	—	—
Pasadena		89·6	47	i 13 0	− 1	—	—	—	—	e 46·0
Mount Wilson		89·7	47	i 13 1	0	—	—	i 16 37	PP	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Riverside		89·9	47	i 13 2	0	—	—	—	—	—
Halwee	z.	91·1	46	e 13 9	+ 1	—	—	—	—	—
Tinemaha	z.	91·6	45	e 13 9	− 1	—	—	—	—	—
Tucson		92·9	52	i 13 16	0	—	—	i 13 29	pP	52·0
Huancayo		94·5	108	e 13 26	+ 3	e 24 40	+ 6	e 14 3	pP	38·2
La Paz	z.	96·4	116	e 13 36	+ 4	—	—	i 17 50	PP	52·4
Kodaikanal	E.	106·4	271	e 18 47	PP	—	—	—	—	—
Irkutsk		109·3	321	—	—	e 24 22?	[−47]	e 28 22?	PS	66·4
Agra	E.	114·7	287	e 19 39	PP	i 25 27	[− 4]	—	—	—
San Juan		119·2	87	e 20 17	PP	e 25 46	[− 1]	e 29 47	PS	e 50·0
Ottawa		122·9	54	e 18 57	[− 1]	e 37 22?	SS	—	—	e 61·4
Andijan		124·4	299	e 22 10	?	—	—	e 23 26	PPP	—
Weston		125·0	59	e 19 16	[+14]	e 31 56	PPS	—	—	—
Seven Falls		126·2	53	—	—	e 33 22?	?	e 38 22?	SS	e 59·4
Tashkent		126·8	299	e 20 0	[+54]	—	—	—	—	e 58·5
Sverdlovsk		134·6	318	i 19 24	[+ 4]	—	—	i 22 56	PP	72·4
Grozny		144·3	297	e 19 39	[+ 1]	—	—	—	—	—
Tiflis		144·9	294	i 19 39	[0]	—	—	e 23 2	PP	77·4
Erevan		145·0	292	e 19 41	[+ 2]	—	—	—	—	—
Moscow		147·3	320	19 46	[+ 3]	30 6	{+ 3}	e 23 10	PP	—
Pulkovo		148·5	331	19 47	[+ 2]	—	—	25 4	PP	—
Ksara		150·9	276	i 19 52a	[+ 4]	30 17	{− 6}	i 23 36	PP	73·9
Theodosia		151·7	301	e 19 47	[− 3]	—	—	—	—	—
Yalta		152·6	300	e 19 50	[− 1]	—	—	—	—	—
Helwan		153·5	267	i 19 54	[+ 2]	e 30 34	{− 3}	—	—	—
Copenhagen		157·7	342	19 56	[− 2]	—	—	—	—	84·4
Potsdam		160·5	338	e 19 34	[−27]	—	—	—	—	e 84·4
Uccle		164·0	353	i 20 59	PKP_3	—	—	—	—	e 89·4
Stuttgart		164·8	338	e 20 5	[0]	—	—	—	—	e 94·4
Strasbourg		165·4	341	e 20 5	[− 1]	—	—	—	—	96·4
Averroes		173·3	100	e 19 44	[−27]	—	—	—	—	e 91·4
Toledo		174·0	34	e 20 13	[+ 2]	—	—	i 25 36	PP	—
Malaga		175·7	66	e 24 52	PP	—	—	—	—	—

Additional readings :—
Riverview iSE = +9m.49s.
Melbourne i = +6m.4s.
Adelaide e = +14m.50s.
Tucson iSP = +14m.8s., i = +15m.28s., PP = +16m.28s.
Huancayo ePP = +17m.7s., epPP = +17m.31s., epS = +25m.10s., esS = +25m.39s., ePS = +25m.56s., esPS = +26m.35s., iSS = +31m.11s., esSS = +31m.31s.
Irkutsk e = +53m.22s.?
San Juan eSKKS = +25m.57s., ePPS = +30m.48s., eSSS = +36m.40s., eSSS = +39m.40s.
Tashkent e = +22m.28s. and +51m.4s.
Tiflis iZ = +20m.24s.
Pulkovo e = +20m.27s.
Ksara PPS = +36m.55s., eSS = +38m.8s.
Helwan e = +31m.22s.
Copenhagen +20m.33s.
Potsdam eZ = +20m.46s.
Stuttgart eZ = +20m.47s., iZ = +21m.4s., e = +35m.45s.
Strasbourg eZ = +20m.40s. and +21m.10s., e = +32m.26s.
Toledo i = +21m.42s.
Averroes i = +25m.28s., e = +34m.22s.? and +37m.22s.?
Long waves were also recorded at Ukiah, Colombo, and other European stations.

Oct. 21d. Readings also at 0h. (Tiflis near Piatigorsk and Grozny), 1h. (near Berkeley and Lick), 2h. (Strasbourg, near Basle, Chur, Neuchatel, Sion, and Zurich), 5h. (near San Francisco), 6h. (Weston and Hukuoka B), 7h. (near Fordham, Harvard, Weston, Williamstown, and Tiflis), 9h. (Andijan), 10h. (Andijan and near Medan), 15h. (Jena), 16h. (near Nagoya), 17h. (Tucson, San Juan, Sverdlovsk, La Paz, Tashkent, Ottawa, Riverside, Mount Wilson, Pasadena, and near Fort de France), 18h. (New Plymouth), 19h. (Tucson, Berkeley, Branner, Ferndale, Lick, and near Balboa Heights, Tinemaha, Pasadena, Riverside, Mount Wilson, and Haiwee), 20h. (Ottawa (2)), 22h. (Agra), 23h. (Tashkent, Sverdlovsk, Andijan, Almata, Frunse, near Samarkand, and Tchimkent).

Oct. 22d. Readings at 0h. (Fordham, Almeria, Philadelphia, San Juan, and Harvard), 1h. (Fresno, Lick, Branner, and Berkeley), 2h. (Andijan and Bucharest), 3h. (Rathfarnham Castle), 4h. (Florence), 7h. (Lick and Ksara), 8h. (La Paz), 9h. (Ksara, Tiflis, Helwan (2), Averroes, and Tananarive), 11h. (Williamstown, Tinemaha, Copiapo, Pasadena, Mount Wilson, Riverside, La Paz, and Tucson), 13h. (Fordham), 16h. (Fordham, La Paz, Weston, Mount Wilson, Riverside, and Tucson), 17h. (Almeria), 18h. (La Paz), 19h. (Andijan), 23h. (Zurich, Chur, and Stuttgart).

Oct. 23d. 2h. 25m. 12s. Epicentre 9°·5N. 40°·3E. (as on 1938 Oct. 20d.).

$A = +\cdot7524$, $B = +\cdot6381$, $C = +\cdot1640$; $\delta = +17$; $h = +7$;
$D = +\cdot647$, $E = -\cdot763$; $G = +\cdot125$, $H = +\cdot106$, $K = -\cdot987$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Helwan		21·9	339	e 4 56	− 1	i 8 27	−27	9 2	SS	—
Ksara		24·5	351	i 5 25a	+ 3	e 10 3	+23	i 8 55	P_cP	—
Baku		31·9	14	e 7 24	PP	—	—	—	—	—
Tiflis		32·3	7	e 6 32	− 1	—	—	—	—	—
Bombay	E.	32·8	70	6 45	+ 8	—	—	e 7 48	PP	17·0
Grozny		34·0	8	e 6 48	0	—	—	—	—	—
Kodaikanal	E.	36·6	85	e 7 13	+ 3	i 13 4	+11	i 16 26?	SSS	—
Hyderabad	E.	37·9	74	e 7 29	+ 9	13 25	+12	8 58	PP	20·3
Samarkand		38·3	35	e 8 48	PP	e 16 38	SS	—	—	21·8
Colombo	E.	39·2	91	7 38	+ 7	17 11	SSS	—	—	22·6
Agra	E.	39·7	58	7 33	− 3	13 44	+ 4	9 3	PP	—
Tashkent		40·7	34	7 46	+ 2	i 12 45	?	—	—	—
Tchimkent		41·6	33	e 7 53	+ 2	—	—	—	—	—
Andijan		42·1	37	e 8 36	+41	—	—	—	—	e 21·1
Frunse		44·7	36	e 10 3	PP	—	—	—	—	—
Moscow		46·2	358	e 8 43	+15	—	—	—	—	—
Calcutta	N.	47·7	68	e 8 0	−40	e 15 20	−16	e 10 15	PP	—
Hamburg		50·2	338	e 9 43	+43	—	—	—	—	e 25·8
Irkutsk		66·3	37	e 10 58	+ 6	—	—	—	—	—
Vladivostok		84·7	48	e 12 54	+17	—	—	—	—	—

Additional readings:—
Helwan e = +8m.42s.
Ksara S_eS = +16m.16s.
Bombay iE = +10m.15s.
Agra eE = +8m.6s., iE = +11m.7s. and +12m.37s., eE = +14m.52s., SSSE = +17m.9s.
Andijan e = +11m.33s.
Calcutta eN = +17m.12s., iN = +21m.43s., eN = +23m.40s., iN = +26m.5s.
Hamburg eZ = +12m.32s.

Oct. 23d. 2h. 28m. 47s. Epicentre 9°·5N. 40°·3E. (as at 2h. 25m.).

$A = +\cdot7524$, $B = +\cdot6381$, $C = +\cdot1640$; $\delta = +17$; $h = +7$;
$D = +\cdot647$, $E = -\cdot763$; $G = +\cdot125$, $H = +\cdot106$, $K = -\cdot987$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Erevan	30·8	6	e 6 18	− 2	—	—	—	—	—
Baku	31·9	14	—	—	e 11 15	−25	—	—	18·7
Tiflis	32·3	7	e 6 30	− 3	i 11 43	− 3	7 25	PP	e 14·7
Grozny	34·0	8	e 6 49	+ 1	—	—	—	—	—
Sofia	36·3	339	—	—	e 12 43	− 5	—	—	—
Belgrade	39·1	338	—	—	e 13 25	− 6	—	—	e 23·8
Rome	40·5	329	e 7 42	+ 2	13 50	− 2	e 9 13	PP	21·6
Tashkent	40·7	34	i 7 41	− 3	13 47	− 8	—	—	17·3
Triest	42·6	333	e 8 5	+ 6	i 14 18	− 5	—	—	—
Algiers	43·3	315	—	—	e 14 13?	−20	—	—	e 24·2
Moncalieri	45·2	328	9 31	PP	14 50	−11	—	—	—
Chur	45·5	331	e 8 22	− 1	e 14 52	−13	e 10 5	PP	—
Prague	45·8	338	—	—	e 15 2	− 7	e 18 19	SS	—
Moscow	46·2	358	e 8 25	− 3	e 15 13	− 2	—	—	24·7
Zurich	46·3	331	e 8 27	− 2	—	—	e 10 14	PP	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Cheb		46·6	336	—	—	e 18 13?	SS	—	—	—
Stuttgart		47·0	333	e 8 32	− 3	e 15 25	− 1	e 10 24	PP	e 26·2
Almeria		47·2	312	—	—	e 14 59	−30	—	—	e 26·3
Strasbourg		47·6	332	i 8 38a	− 1	e 15 31	− 4	10 28	PP	25·2
Potsdam		48·1	338	e 8 31	−12	e 15 31	−11	e 10 49	PP	—
Granada		48·2	313	i 8 57k	+13	i 15 54	+11	i 10 56	PP	i 27·3
Puy de Dôme		48·2	325	—	—	e 15 45	+ 2	—	—	e 24·9
Bagnères		48·4	322	—	e —	e 15 49	+ 3	e 19 45	SS	e 26·2
Malaga		48·6	312	e 10 17	PP	—	—	—	—	25·2
Toledo		49·6	315	i 8 57a	+ 2	e 16 4	+ 1	i 10 51	PP	—
Averroes		49·8	307	—	—	e 19 43	SS	—	—	e 24·0
Sverdlovsk		49·8	14	i 8 57	+ 1	16 5	− 1	—	—	23·2
San Fernando	N.	49·9	310	e 13 4	PP	—	—	—	—	26·7
Pulkovo		50·7	354	e 9 2	− 1	e 16 17	− 1	—	—	—
Uccle		50·7	332	e 9 3	0	e 16 15	− 3	e 19 44	SS	28·2
Copenhagen		51·0	341	—	—	16 7	−15	—	—	25·2
De Bilt		51·2	333	e 9 3	− 4	e 16 24	− 1	—	—	e 27·2
Upsala		53·1	347	e 13 13?	PPP	—	—	—	—	—
Oxford		54·0	330	—	—	e 16 50	−13	—	—	e 20·5
Bidston		55·9	330	—	—	e 17 13?	−16	—	—	e 23·2
Irkutsk		66·3	37	e 10 55	+ 3	e 19 41	− 1	—	—	31·2
Vladivostok		84·7	48	—	—	e 23 9	+ 5	32 13	SSS	47·2
San Juan		102·3	291	e 18 19	PP	—	—	—	—	—
Huancayo		116·9	262	—	—	e 40 18	SSS	—	—	—

Additional readings :—
Tiflis eSSE = +13m.26s.
Sofia eEN = +18m.43s.
Belgrade eNW = +12m.26s. and +16m.39s.
Rome i = +11m.23s., SS = +16m.23s., i = +19m.48s.
Stuttgart e = +11m.54s., +18m.44s., and +19m.29s.
Strasbourg iSS = +18m.52s.
Bagnères e = +20m.13s.
San Fernando eSSN = +32m.13s.
Vladivostok e = +27m.10s.
Long waves were also recorded at Christchurch, Perth, Riverview, Wellington, Philadelphia, East Machias, Vermont, Columbia, Harvard, Fort de France, La Paz, Paris, Jersey, Jena, Budapest, Edinburgh, and Stonyhurst.

Oct. 23d. 5h. Readings for an undetermined shock :—

Weston ePZ = 7m.26s., ePPZ = 9m.12s., eSNZ = 14m.8s., eSSE = 18m.55s., eL = 21m.
Fort de France iP = 12m.28s.
San Juan iP = 12m.57s., iPP = 13m.24s., iS = 16m.48s. and 16m.51s., iL = 17m.27s.
East Machias ePP = 14m.3s., eS = 18m.7s.
Harvard iZ = 14m.13s. and 14m.43s., eLZ = 21m.
Fordham eZ = 14m.21s., iZ = 14m.53s., eN = 19m.11s., eE = 20m.19s.
Williamstown e = 14m.22s.
Ottawa eZ = 14m.47s., e = 20m., eL = 22m.
Philadelphia eP = 14m.49s., eS = 19m.11s., eL = 21m.29s.
La Paz iPZ = 16m.52s.k, iSN = 23m.50s., LN = 30·0m.
Seven Falls e = 15m., eL = 21m.
Cape Girardeau eSE = 15m.51s., eeSE = 15m.59s., eLE = 17m.22s.
Florissant eSEZ = 15m.58s., eZ = 17m.26s., iE = 22m.8s.
St. Louis e = 15m.58s., iE = 22m.8s., eLE = 26m.18s.
Averroes ePP = 16m.30s., eS = 20m.36s., eL = 25m.
Huancayo eP = 16m.44s., ePP = 18m.39s., ePPP = 19m.22s., eS = 23m.35s., eSS = 26m.27s., eL = 27m.11s.
Zurich eP = 17m.3s.
Chur eP = 17m.10s.
Stuttgart e = 17m.10s. and 24m.22s., eL = 30m.30s.
Hamburg eZ = 17m.26s.
Rome e = 17m.27s., 23m.3s., and 24m.49s.
Potsdam e = 18m.
Tucson iP = 18m.9s. and 18m.16s., iP$_c$P = 19m.5s., iPP = 20m.8s., iPPP = 21m.54s., L = 35m.53s.
Haiwee eP = 18m.46s.
Mount Wilson iP = 18m.49s.
Pasadena iPEZ = 18m.49s., eL = 40m.
Moscow i = 19m.15s., e = 20m.0s.

Continued on next page.

Helwan iP = 19m.32s., i = 19m.36s.
Vermont eS = 19m.28s., eL = 22m.0s.
Ksara iP = 19m.39s., ePP = 22m.32s., eS = 29m.24s.
Columbia eS = 20m.0s., eL = 23m.
Tiflis iEZ = 20m.5s., eZ = 21m.31s., eE = 30m.1s.
Grozny eP = 20m.8s.
Sverdlovsk e = 20m.28s., i = 21m.33s., e = 30m.33s., L = 43m.
Tashkent e = 20m.36s., 21m.24s., 23m.21s., 27m.36s., 35m.37s., 38m.48s., and 45m.30s., eL = 51m.
De Bilt eS = 23m.54s., eL = 29m.
Long waves were also recorded at College, Stonyhurst, Copenhagen, Uccle, Kew, Puy de Dôme, and Baku.

Oct. 23d. 15h. 1m. 19s. Epicentre 17°·6S. 41°·3E.

$A = +\cdot7165$, $B = +\cdot6295$, $C = -\cdot3005$; $\delta = -6$; $h = +5$;
$D = +\cdot660$, $E = -\cdot751$; $G = -\cdot226$, $H = -\cdot198$, $K = -\cdot954$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tananarive		6·1	103	i 1 30	− 4	i 2 49	+ 4	1 49	P*	4·0
Johannesburg		14·9	233	e 3 36	+ 2	i 6 57	+37	1 3 52	PP	9·3
Colombo	E.	45·2	61	8 20	0	14 54	− 7	—	—	21·8
Kodaikanal	E.	45·2	55	e 8 19	− 1	i 14 53	− 8	e 9 41	PP	i 20·7
Bombay		47·7	42	e 8 39	− 1	i 15 28	− 8	i 10 37	PP	22·0
Helwan		48·2	349	i 8 41	− 3	15 49	+ 6	18 47	SS	—
Hyderabad		50·9	49	9 10	+ 5	16 2	−19	—	—	23·8
Ksara		51·4	355	i 9 5k	− 4	e 16 29	+ 1	e 10 28	P_cP	25·7
Agra		57·0	40	e 9 42	− 8	i 17 31	−12	—	—	—
Baku		58·2	9	e 9 56	− 2	e 18 12	+13	—	—	28·7
Tiflis		59·1	4	10 1	− 3	18 8	− 3	e 12 25	PP	26·7
Istanbul		59·5	350	10 6	− 1	18 18	+ 2	12 26	PP	—
Medan	E.	60·4	75	i 10 13	0	i 18 26	− 2	—	—	e 31·7
	N.	60·4	75	i 10 15	+ 2	18 28	0	—	—	e 31·7
Grozny		60·8	5	e 10 15	− 1	e 18 25	− 8	—	—	—
Calcutta	N.	60·9	52	e 10 27	+10	i 18 45	+11	e 12 11	PP	i 24·9
Samarkand		61·9	23	e 10 19	− 5	—	—	—	—	—
Sofia		62·2	346	e 10 24	− 2	e 19 6	+15	—	—	—
Bucharest		63·2	349	10 23	− 9	18 59	− 4	i 19 16	pS	—
Andijan		64·8	26	e 10 44	+ 1	e 19 30	+ 7	—	—	—
Batavia		64·8	89	i 10 47k	+ 4	19 29	+ 6	—	—	e 33·7
Rome		64·9	337	i 10 41k	− 2	i 19 25	+ 1	i 10 50	pP	e 33·6
Belgrade		65·0	345	i 10 41k	− 3	e 19 20	− 6	e 20 10	PPS	e 32·0
Algiers		65·1	327	i 10 51	+ 6	e 19 41	+14	—	—	e 32·9
Tchimkent		65·1	23	10 39	− 6	e 20 34	PPS	—	—	—
Florence		67·0	338	e 10 43	−14	—	—	—	—	—
Frunse		67·5	27	e 10 59	− 1	—	—	—	—	—
Triest		67·7	341	11 11	+10	20 8	+10	—	—	—
Budapest		67·8	345	11 8	+ 6	i 20 7	+ 7	—	—	e 40·7
Perth		68·0	118	i 16 19	?	i 20 3	+ 1	—	—	—
Almeria		68·1	324	e 11 8	+ 4	—	—	—	—	e 36·4
Padova		68·2	339	12 41?	?	—	—	—	—	—
Averroes		68·7	318	e 11 7	0	e 20 28	+18	e 13 51	PP	e 33·7
Granada		69·0	325	i 11 12k	+ 3	i 20 21	+ 7	—	—	e 42·9
Malaga		69·1	323	e 11 20	+10	—	—	—	—	35·7
Moncalieri		69·4	336	e 10 58	−14	20 20	+ 2	—	—	—
San Fernando	E.	70·0	321	e 11 16	+ 1	20 38	+12	—	—	39·2
	N.	70·0	321	e 11 30	+15	i 20 28	+ 2	—	—	39·2
Zurich		71·0	338	e 11 19	− 3	—	—	—	—	—
Toledo		71·1	325	i 11 21a	− 1	—	—	e 13 49	PP	e 35·1
Bagnères		71·2	330	e 11 25	+ 2	e 20 57	+17	e 14 12	PP	e 37·7
Prague		71·4	344	—	—	e 29 56	SSS	—	—	e 40·7
Basle		71·5	337	e 11 20	− 4	—	—	—	—	—
Puy de Dôme		72·0	333	e 11 26	− 2	—	—	—	—	e 37·1
Stuttgart		72·0	340	e 11 24	− 4	e 20 45	− 4	—	—	e 39·7

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Strasbourg		72·3	338	i 11 27k	− 2	i 21 2	+10	e 21 10	PS	e 33·7
Jena	N.	73·1	342	e 11 26	− 8	—	—	—	—	—
Moscow		73·1	359	e 11 42	+ 8	e 21 8	+ 7	—	—	e 34·2
Potsdam		73·9	343	i 11 35	− 4	e 21 5	− 5	i 21 18	PS	e 40·7
Göttingen		74·1	341	e 11 38	− 2	—	—	—	—	e 43·7
Phu-Lien		74·5	63	e 11 43	+ 1	—	—	—	—	—
Uccle		75·4	337	e 11 45	− 2	21 26	− 1	i 21 41	PS	e 36·7
Hamburg		75·9	342	e 11 41	− 9	—	—	—	—	e 41·7
Sverdlovsk		75·9	12	i 11 50	0	21 26	− 6	—	—	33·7
De Bilt		76·2	339	e 11 51	− 1	e 21 33	− 3	—	—	e 37·7
Copenhagen		77·0	345	11 53	− 3	21 39	− 6	—	—	40·7
Pulkovo		77·6	356	e 11 56	− 4	e 21 47	− 4	—	—	e 37·5
Kew		77·8	336	i 11 58k	− 3	i 21 47	− 6	i 22 5	PS	40·7
Oxford		78·4	336	—	—	i 21 53	− 7	—	—	e 39·7
Upsala		79·5	349	e 16 41?	PPP	—	—	—	—	—
Bidston		80·4	336	—	—	i 22 21	0	i 22 38	PS	40·7
Rathfarnham Castle		81·6	334	—	—	e 22 41	+ 8	—	—	e 45·0
Manila		84·8	74	12 27	−10	19 51	?	—	—	—
Irkutsk		88·3	34	e 12 49	− 6	23 17	[− 5]	—	—	e 38·7
Melbourne		89·7	130	—	—	e 23 51	− 1	i 24 14	PS	e 42·3
La Paz		102·7	249	e 16 51	?	i 27 17	PS	17 47	PP	48·7
Christchurch		104·6	147	e 18 25	PP	28 51	PPS	44 19	L_Q	50·8
Huancayo		110·9	250	e 19 11	PP	e 25 1	[−15]	e 29 10	PS	e 46·0
San Juan		110·9	284	—	—	e 28 41?	PS	—	—	—
Harvard	z.	118·5	310	e 20 17	PP	—	—	—	—	e 63·7
Fordham		120·2	308	e 20 21	PP	—	—	—	—	60·2
Florissant		133·1	307	i 22 42	PP	e 31 40	PS	—	—	e 73·9
Tucson		150·9	306	i 19 53k	[+ 4]	i 27 11	[+16]	i 23 58	PP	78·8
Haiwee		153·2	319	e 19 58	[+ 6]	—	—	—	—	—
Tinemaha	z.	153·5	321	i 20 3	[+11]	—	—	—	—	—
Mount Wilson		155·2	315	e 19 59	[+ 4]	—	—	e 24 4	PP	—
Pasadena		155·3	315	e 19 57	[+ 2]	—	—	—	—	e 82·7
La Jolla	z.	155·4	312	e 19 59	[+ 4]	—	—	—	—	—

Additional readings :—
Tananarive P* = +1m.41s., iSEN = +2m.33s., S_gEN = +2m.58s., iSS = +3m.3s. and +3m.19s.
Johannesburg iPPPEN = +4m.5s., iSSN = +8m.5s.
Kodaikanal iPPPE = +10m.21s., iSSSE = +18m.19s.
Bombay iPEN = +8m.46s.
Tiflis eE = +20m.3s.
Calcutta iN = +17m.27s.
Bucharest S_gEN = +20m.38s., SSN = +22m.41s.
Rome i = +12m.15s. and +19m.40s., iPS = +19m.55s., i = +20m.11s. and +22m.52s.
Belgrade i = +10m.52s.
Tchimkent e = +11m.10s.
Perth i = +29m.53s.
Averroes ePN = +11m.14s., ePPPN = +15m.28s.
Bagnères e = +11m.31s., ePPPE = +15m.13s., iE = +18m.54s., ePSN = +21m.31s., eSSSN = +29m.4s.
Stuttgart eS = +21m.0s.
Strasbourg iZ = +11m.37s.
Potsdam iZ = +11m.46s.
De Bilt iZ = +12m.0s.
Huancayo eS = +27m.1s., eSS = +34m.38s.
Fordham iZ = +20m.29s.
Florissant iE = +22m.45s.
Tucson iP = +20m.2s., i = +20m.9s. and +21m.15s.
Mount Wilson iZ = +20m.21s.
Long waves were also recorded at Cheb, Chicago, Paris, Philadelphia, East Machias, Jersey, La Plata, Rio de Janeiro, Weston, Fort de France, Edinburgh, Stonyhurst, and Wellington.

Oct. 23d. Readings also at 3h. (Kew, Tucson, Grozny, and near Tiflis), 4h. (Helwan), 5h. (Haiwee, Mount Wilson (2), Pasadena (2), Riverside (2), Tinemaha, Tucson, and Andijan), 6h. and 9h. (Tucson), 12h. (Nagoya), 13h. (Tucson, Mount Wilson (2), Pasadena (2), and Riverside), 16h. (Huancayo, La Paz, and La Plata), 18h. (Andijan), 20h. (near Nagoya), 23h. (near Berkeley and near Balboa Heights).

Oct. 24d. Readings at 7h. (Samarkand (2)), 10h. (Samarkand, Tiflis (3), Tucson, Baku, Sotchi (2), Grozny (2), Erevan (2) and Piatigorsk), 11h. (Tiflis), 12h. (Lick and Nagoya), 13h (Mizusawa, Fresno, Berkeley, Lick (4), Helwan (2), and Ksara), 14h. (Fort de France), 15h. (Fort de France), 16h. (Nagoya and Ksara), 18h. (Ksara, Tucson, Riverside, and Pasadena), 19h. (Weston and Helwan), 22h. (Andijan, Frunse, Batavia, and Malabar), 23h. (Wellington).

Oct. 25d. Readings also at 0h. (Nagoya, Fordham, Bagnères, Malabar, Batavia, and Medan), 1h. (Moncalieri, Andijan, and Frunse), 2h. (Batavia), 4h. (Taihoku), 5h. (New Plymouth), 10h. (Copiapo), 11h. (Santiago, Berkeley, Lick, Branner, and Fresno), 13h. (Fort de France, Irkutsk, Baku, Medan, and Sebastopol), 14h. (near Ferndale), 15h. (Wellington, Mizusawa, Christchurch, Sebastopol, and New Plymouth), 16h. (Basle), 17h. (La Paz), 21h. (Manila and Husan).

Oct. 26d. 3h. 27m. 36s. Epicentre 25°·0N. 102°·0E.
(approximate epicentre suggested by Bombay).

$A = -\cdot1887$, $B = +\cdot8876$, $C = +\cdot4203$; $\delta = +9$; $h = +3$;
$D = +\cdot978$, $E = +\cdot208$; $G = -\cdot087$, $H = +\cdot411$, $K = -\cdot907$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Phu-Lien		6·0	134	1 29	− 3	e 2 43	0	—	—	3·0
Hong Kong		11·5	102	3 2	PP	5 17	SS	5 33	SSS	6·2
Calcutta	N.	12·7	262	e 4 6	+61	6 19	+51	—	—	i 7·7
Manila		20·8	115	4 52	+ 7	8 52	SS	—	—	—
Medan		21·5	189	e 4 37	−15	i 9 2	+15	i 10 4	SSS	—
Agra	E.	21·6	281	5 0	+ 6	9 1	+12	—	—	—
Hyderabad		23·2	256	—	—	9 12	− 6	—	—	—
Irkutsk		27·3	3	—	—	e 11 22	SS	—	—	e 16·3
Kodaikanal	E.	27·4	242	e 7 24?	?	—	—	—	—	—
Bombay		27·7	264	e 5 47	− 5	i 10 53	+20	—	—	—
Colombo	E.	27·8	233	—	—	e 10 24?	−11	—	—	—
Andijan		29·2	310	e 6 30	+25	—	—	—	—	e 14·4
Batavia		31·3	170	i 6 21	− 3	—	—	—	—	i 15·9
Tchimkent		31·8	311	e 7 21	PP	—	—	—	—	—
Samarkand		32·8	305	e 6 22	−15	—	—	—	—	—
Sverdlovsk		43·5	328	—	—	e 19 18	?	—	—	23·4
Grozny		49·1	306	e 9 12	+21	—	—	—	—	—

Additional readings:
Calcutta iN = +6m.49s., eSSN = +7m.14s.
Medan iPEN = +4m.44s., iEN = +11m.3s.
Agra iE = +5m.6s.
Samarkand e = +6m.47s.
Taikyu gives eP = 38m.36s., S = 42m.14s.; Husan gives eP = 38m.28s., eS = 41m.44s.; Keizyo gives eSEN = 42m.26s. and Zinsen gives eN? = 39m.8s., eL? = 42·4m.
The above readings do not fit the suggested epicentre. Long waves were also recorded at Zi-ka-wei, Baku, Tiflis, San Fernando, Granada, Uccle, De Bilt, and Kew.

Oct. 26d. Readings also at 0h. (Nagoya (2) and Mizusawa), 2h. (Tucson and La Paz), 3h. (Helwan, Neuchatel, Ksara, Averroes, and Tiflis), 9h. (Tucson, New Plymouth, Riverside, Mount Wilson, Pasadena, Wellington, and Christchurch), 10h. (Andijan), 15h. (La Plata and Santiago), 16h. (Basle, Nagoya, Manila, Hong Kong, and Phu-Lien), 17h. (Copenhagen, Kew, De Bilt, Kodaikanal, and Calcutta).

Oct. 27d. Readings at 2h. (Mount Wilson, La Paz, Pasadena, and Tucson), 4h. (Stonyhurst and Mizusawa), 5h. (Medan), 7h. (Frunse and Andijan), 15h. (Samarkand), 16h. (Mizusawa), 17h. (Fordham and Santiago), 18h. (Balboa Heights (2), Tchimkent, Samarkand, Frunse, and Andijan), 21h. (Tucson), 22h. (Medan, Ksara, and Rome).

Oct. 28d. Readings at 0h. (Tiflis, Sverdlovsk, and Baku), 1h. (Tucson and Tiflis), 5h. (Andijan (2), Tiflis, Sverdlovsk, Baku, Calcutta (2), Bombay (2), Agra (2), Kodaikanal, Frunse, Samarkand, Ksara, Semipalatinsk, Phu-Lien, Moscow, Pulkovo, Irkutsk, Copenhagen, and De Bilt), 8h. (near Santiago), 13h. (Andijan), 15h. (Copenhagen), 17h. (Andijan and Frunse), 19h. (Tacubaya and Oaxaca), 20h. (Tucson and Tacubaya), 21h. (Tucson and Tacubaya), 22h. (Batavia and Medan (2),

Oct. 29d. 13h. 8m. 25s. Epicentre 35°·5N. 141°·0E. (as on 1937 Nov. 26d.).

Rather strong at Tyosi, Kakioka, moderate at Mito, Tukubasan, Tokyo, Yokohama, Hukusima, and Katuura, slight at Tomisake, Oiwake, and Miyako.

Epicentre Pacific, in the area Cape Inubo, 35°·4N. 141°·0E. Macroseismic radius greater than 300kms. Shallow.

See Seismological Bulletin of the Central Met. Obs., Japan, for the year 1938, Tokyo, 1940.

$A = -\cdot6342$, $B = +\cdot5135$, $C = +\cdot5781$; $\delta = +9$; $h = 0$;
$D = +\cdot629$, $E = +\cdot777$; $G = -\cdot449$, $H = +\cdot364$, $K = -\cdot816$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m.	s.	m.
Tyosi	0·2	335	0 10	0	0 15	− 1	—	—	—
Kiyosumi	0·7	242	0 18	+ 1	0 33	+ 5	—	—	—
Kakioka	1·0	318	0 19	− 2	0 26	S_g	—	—	—
Mito	1·0	334	0 20a	− 1	0 35	− 1	—	—	—
Tokyo Cent. Met. Obs.	1·0	281	e 0 25k	+ 4	0 41	+ 5	—	—	—
Tokyo Imp. Univ.	1·0	281	0 23	+ 2	0 39	+ 3	—	—	—
Tukubasan	1·0	315	0 24k	+ 3	0 36	0	—	—	—
Komaba	1·1	278	0 24	+ 2	0 42	+ 3	—	—	—
Mera	1·1	239	0 22a	0	0 41	+ 2	—	—	—
Yokohama	1·1	267	0 25a	+ 3	0 41	+ 2	—	—	—
Mitaka	1·2	278	0 24	0	0 43	+ 2	—	—	—
Onahama	1·4	357	0 26a	− 1	0 44	− 2	—	—	—
Utunomiya	1·4	320	0 27	0	0 44	− 2	—	—	—
Kumagaya	1·5	296	0 29k	+ 1	0 50	+ 1	—	—	—
Ito	1·6	251	0 33k	+ 3	1 4	+13	—	—	—
Koyama	1·6	265	0 18	−12	0 39?	−12	—	—	—
Titibu	1·6	287	0 18	−12	0 41	−10	—	—	—
Misima	1·7	257	0 32a	+ 1	0 54	0	—	—	—
Maebasi	1·8	300	0 36	+ 4	1 10	+14	—	—	—
Numadu	1·8	257	0 35a	+ 3	1 5	S_g	—	—	—
Susaki	1·8	243	0 33	+ 1	1 1	+ 5	—	—	—
Hunatu	1·9	270	0 35	+ 1	1 5	S_g	—	—	—
Yosiwara	1·9	260	0 18	−16	0 44	−15	—	—	—
Kohu	2·0	274	0 37	+ 2	0 57	− 5	—	—	—
Oiwake	2·2	293	0 40	+ 2	1 13	+ 7	—	—	—
Omaesaki	2·4	248	0 43a	+ 2	1 26	S_g	—	—	—
Hatidyozima	2·6	202	0 43	− 1	1 13	− 4	—	—	—
Iida	2·6	270	0 48a	P*	1 27	+10	—	—	—
Matumoto	2·6	287	0 45a	+ 1	1 25	S_g	—	—	—
Nagano	2·6	297	0 46a	+ 2	1 28	S_g	—	—	—
Takada	2·7	306	0 46	+ 1	1 27	S_g	—	—	—
Hamamatu	2·8	254	0 47	0	1 29	S_g	—	—	—
Yamagata	2·8	349	0 45	− 2	1 19	− 3	—	—	—
Niigata	2·9	327	0 54	+ 6	1 28	+ 4	—	—	—
Nagoya	3·3	264	i 0 55a	+ 2	1 50	S_g	—	—	—
Toyama	3·3	291	0 52	− 1	1 58	S_g	—	—	—
Gihu	3·5	269	0 57a	0	1 55	S_g	—	—	—
Husiki	3·5	294	1 2	+ 5	2 5	S_g	—	—	—
Kanazawa	3·6	286	1 12	P_g	2 6	S_g	—	—	—
Mizusawa	3·7	4	i 0 57	− 3	i 1 40	− 5	—	—	—
Ibukisan	3·8	269	1 5	+ 4	1 47	0	—	—	—
Kameyama	3·8	263	1 3	+ 2	2 5	S_g	—	—	—
Tu	3·8	259	1 1	0	2 2	S_g	—	—	—
Wazima	3·8	301	0 55a	− 6	1 41	− 6	—	—	—
Hikone	3·9	269	1 3a	+ 1	2 8	S_g	—	—	—
Akita	4·2	350	1 8a	+ 1	1 56	− 1	—	—	—
Miyako	4·2	10	1 5	− 2	1 50	− 7	—	—	—
Morioka	4·2	2	1 6a	− 1	1 53	− 4	—	—	—
Kyoto	4·3	265	1 10	+ 2	2 11	S*	—	—	—
Yagi	4·4	259	1 10a	0	2 14	S*	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Osaka		4·6	261	1 13	+ 1	2 18	S*	—	—	—
Miyadu		4·7	271	1 17	+ 3	2 23	S*	—	—	—
Kobe		4·8	262	1 15	0	2 26	S*	—	—	—
Siomisaki		4·8	247	1 14a	− 1	2 59	S_g	—	—	—
Hatinohe		5·0	4	1 16a	− 2	2 11	− 7	—	—	—
Toyooka		5·0	273	1 24	+ 6	2 37	S*	—	—	—
Wakayama		5·0	257	1 19a	+ 1	2 25	+ 7	—	—	—
Sumoto		5·2	258	1 21a	0	2 32	S*	—	—	—
Aomori		5·3	358	1 21	− 1	2 22	− 3	—	—	—
Tokusima		5·4	258	1 34	P*	3 4	S_g	—	—	—
Tadotu		6·1	260	1 33	− 1	2 55	S*	—	—	—
Muroto		6·1	250	1 33a	− 1	3 25	S_g	—	—	—
Hakodate		6·3	357	1 35	− 1	3 6	S*	—	—	—
Sakai		6·4	275	1 47	P*	3 23	S_g	—	—	—
Koti		6·5	254	e 1 38a	− 1	e 2 54	− 1	e 3 52	S_g	4·0
Mori		6·6	358	1 40	− 1	3 13	S*	—	—	—
Muroran		6·8	359	1 40a	− 4	3 3	0	—	—	—
Urakawa		6·8	11	1 47	+ 3	3 1	− 2	—	—	—
Matuyama		7·0	259	1 53	+ 7	3 44	S_g	—	—	—
Hirosima		7·1	266	1 50k	+ 2	3 16	+ 6	—	—	—
Hamada		7·3	269	1 34	−16	2 56	−19	—	—	—
Uwazima		7·3	255	1 49	− 1	4 5	S_g	—	—	—
Sapporo		7·5	2	1 53	0	3 10	−10	—	—	—
Obihiro		7·6	12	1 49	− 6	3 0	−23	—	—	—
Kusiro		7·9	19	1 53	− 6	3 18	−12	—	—	—
Ooita		8·1	256	2 15a	P*	4 18	S_g	—	—	—
Simonoseki		8·4	263	1 59	− 7	4 17	S_g	—	—	—
Titizima		8·4	174	2 2	− 4	—	—	—	—	—
Nemuro		8·6	23	2 1k	− 8	3 31	−17	—	—	—
Izuka		8·7	261	2 1	− 9	4 34	S_g	—	—	—
Miyazaki		8·7	249	2 11a	+ 1	4 51	S_g	—	—	—
Haboro		8·9	4	1 44	−28	2 47	−68	—	—	—
Hukuoka B		8·9	261	1 38	−34	4 20	S*	—	—	—
Kumamoto		8·9	255	2 15	+ 3	4 14	+19	—	—	—
Saga		9·1	259	2 44	+30	5 28	S_g	—	—	—
Unzendake		9·4	256	2 21	+ 3	5 6	S_g	—	—	—
Husan		9·8	272	e 3 21	+57	4 58	S*	—	—	—
Taikyu		10·1	276	2 28	0	5 37	L	—	—	(5·6)
Yakusima		10·1	253	2 31	+ 3	4 27	+ 3	—	—	—
Syuhurei		10·6	278	3 41	+65	6 56	?	—	—	—
Tomie		10·6	257	2 36	0	5 31	L	—	—	(5·5)
Keizyo		11·4	284	2 50	+ 3	e 5 25	SSS	—	—	6·6
Zinsen		11·8	281	e 2 53	0	e 5 33	SSS	—	—	e 6·4
Nake		12·1	237	2 59	+ 2	5 21	+ 7	—	—	—
Zi-ka-wei	E.	16·9	260	e 3 49	−10	—	—	i 4 5	PP	—
Miyakozima		17·3	236	4 1	− 3	7 17	+ 1	—	—	—
Isigakizima		18·3	239	4 8	− 9	—	—	—	—	—
Karenko		20·3	241	4 42	+ 2	—	—	—	—	—
Taityu		20·9	242	4 52	+ 6	—	—	—	—	—
Arisan		21·2	242	5 6	PP	—	—	—	—	—
Taito		21·5	239	4 45	− 7	8 40	− 7	—	—	—
Tainan		21·9	242	5 15	PP	—	—	—	—	—
Hong Kong		26·8	248	6 20	PP	11 6	SS	—	—	14·1
Manila		27·5	227	e 5 46	− 4	i 12 4	SSS	—	—	17·6
Phu-Lien		33·5	253	e 6 46	+ 3	—	—	—	—	—
Semipalatinsk		45·6	309	8 15	− 9	15 1	− 5	—	—	23·6
Calcutta	N.	47·3	269	e 8 40	+ 3	e 15 26	− 5	e 11 18	PPP	e 23·7
Almata		49·0	301	8 49	− 1	—	—	—	—	—
Medan		50·4	241	e 9 2	+ 1	e 16 7	− 7	—	—	—
College		50·6	32	e 8 59	− 3	16 12	− 5	e 12 1	PPP	e 20·7

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Frunse		50·8	301	9 2	− 2	16 19	− 1	—	—	—
Batavia		52·5	225	e 9 15	− 2	i 16 39	− 4	—	—	—
Andijan		53·0	298	9 15	− 6	e 16 47	− 3	e 11 15	PP	—
Agra	E.	53·7	280	e 9 21	− 5	i 16 50	− 9	11 30	PP	—
Tchimkent		54·5	300	9 27	− 5	17 4	− 6	—	—	—
Tashkent		55·0	299	e 9 35	0	i 17 11	− 6	—	—	e 27·6
Sverdlovsk		56·1	320	i 9 43	0	e 17 31	− 1	—	—	25·6
Samarkand		57·2	298	e 9 51	0	17 27	−19	—	—	—
Hyderabad	E.	57·9	269	e 10 4	+ 8	17 48	− 7	—	—	27·3
Bombay		61·8	274	e 10 24	+ 1	i 18 42	− 4	—	—	—
Colombo	E.	62·6	258	—	—	e 18 35?	−21	—	—	—
Kodaikanal	E.	62·6	263	10 35	+ 7	i 18 47	− 9	—	—	e 30·2
Moscow		68·3	324	11 1	− 4	19 59	− 7	—	—	37·1
Baku		68·8	305	i 11 13	+ 5	i 20 11	0	—	—	34·2
Pulkovo		69·3	330	e 11 7	− 4	e 20 12	− 5	—	—	e 34·1
Adelaide		70·1	183	—	—	i 20 19	− 8	e 24 38	SS	—
Grozny		70·1	309	e 11 14	− 2	e 20 20	− 7	—	—	29·6
Tiflis		71·5	308	11 17	− 7	20 35	− 8	e 13 59	PP	36·3
Scoresby Sund		73·6	356	11 38	+ 1	21 4	− 3	25 59	SS	—
Upsala		74·2	335	—	—	e 29 35?	SSS	—	—	—
Theodosia		75·4	315	e 11 43	− 4	—	—	—	—	—
Simferopol		76·2	316	e 11 49	− 3	20 38	−58	—	—	—
Tinemaha		77·0	53	e 11 54	− 2	—	—	—	—	—
Santa Barbara	E.	77·5	57	e 12 3	+ 4	—	—	—	—	—
Haiwee		77·7	55	e 11 55	− 5	—	—	—	—	—
Bergen		77·8	341	—	—	21 51	− 2	—	—	e 42·6
Mount Wilson		78·7	56	i 12 4	− 2	—	—	—	—	—
Pasadena		78·7	56	i 12 3	− 3	—	—	—	—	e 36·7
Copenhagen		79·1	333	i 12 4	− 4	22 3	− 4	22 30	PS	39·6
Riverside		79·3	56	i 12 5	− 4	—	—	—	—	—
La Jolla		80·1	56	i 12 12	− 1	—	—	—	—	—
Bucharest		81·0	320	12 17	− 1	22 22	− 5	—	—	—
Potsdam		81·4	332	e 12 11	− 9	e 22 23	− 8	—	—	e 45·6
Istanbul		81·5	316	12 24	+ 3	22 35	+ 3	15 35	PP	51·0
Hamburg		81·7	334	e 12 18	− 4	e 22 35	+ 1	—	—	e 40·6
Ksara		81·8	305	i 12 20k	− 2	e 22 31	− 4	e 15 32	PP	38·6
Prague		82·6	329	e 12 35	+ 9	e 22 35	− 8	—	—	e 43·6
Göttingen		83·3	332	—	—	e 22 35?	−15	—	—	e 44·6
Cheb		83·5	330	—	—	e 25 35?	?	—	—	—
Edinburgh		84·0	342	—	—	e 22 35?	−22	—	—	e 40·6
De Bilt		84·6	334	12 38	+ 2	22 54	− 9	—	—	e 42·6
Tucson		84·8	53	i 12 34	− 3	—	—	15 42	PP	e 39·0
Stuttgart		85·8	330	e 12 39k	− 3	e 23 1	[− 5]	e 12 44	PcP	e 44·6
Uccle		86·0	335	12 40	− 3	23 3	[− 5]	—	—	e 43·6
Triest		86·2	326	e 12 37	− 7	23 3	[− 6]	16 11	PP	—
Strasbourg		86·5	331	e 12 43	− 3	e 23 7	[− 4]	—	—	e 39·6
Kew		87·0	337	i 12 46	− 2	e 23 22	− 5	—	—	e 41·6
Oxford		87·0	338	—	—	e 23 5	[− 9]	—	—	e 39·1
Helwan		87·3	305	i 12 47k	− 3	23 15	[− 1]	16 5	PP	—
Basle		87·4	330	e 12 47	− 3	e 23 26	− 4	—	—	—
Rome		89·7	325	e 13 19	+18	23 52	0	e 16 56	PP	44·4
Florissant		92·1	37	—	—	e 24 6	[−39]	e 25 31	PS	e 47·1
Weston	N.	97·0	23	—	—	e 26 47	PS	e 32 43	SSP	—
Malaga		101·3	333	e 14 0	+ 6	—	—	—	—	47·6
Balboa Heights		121·5	48	e 8 2	?	—	—	—	—	—
Fort de France		125·8	27	e 20 54	PP	—	—	—	—	—
La Paz	Z.	147·9	60	19 47	[+ 3]	—	—	—	—	—

Additional readings:
Zi-ka-wei iE = +4m.31s.
Calcutta eSSN = +19m.9s., iSSSN = +20m.25s.
Medan iE = +17m.18s.
College eSS = +20m.7s.
Andijan e = +10m.27s.

For Notes see next page.

Agra SSE = +20m.25s.
Tchimkent e = +10m.0s. and +10m.15s.
Adelaide e = +33m.22s.
Tiflis eE = +21m.48s.
Copenhagen +23m.55s.
Bucharest eEN = +13m.35s.
Potsdam iPZ = +12m.16s., eE = +22m.35s.
Hamburg iE = +22m.49s.
Ksara ePS = +23m.16s.
Cheb e = +34m.35s.
Tucson iP = +12m.36s., i = +12m.44s. and +13m.43s.
Stuttgart eS = +23m.26s.
Triest e = +23m.30s.
Kew eN = +21m.29s., eE = +22m.42s., eN = +23m.32s.
Oxford i = +23m.16s. and +23m.45s.
Helwan e = +16m.20s. and +23m.5s.
Rome S = +24m.22s., e = +29m.25s.
Florissant eSE = +24m.32s., eSSE = +30m.21s.
La Paz iZ = +20m.29s.
Long waves were also recorded at Christchurch, Philadelphia, Huancayo, and European stations.

Oct. 29d. 15h. 37m. 52s. Epicentre 35°·5N. 141°·0E. (as at 13h.).

A = −·6342, B = +·5135, C = +·5781; δ = +9; h = 0.

	Δ	Az.	P.	O−C.	S.	O−C.
	°	°	m. s.	s.	m. s.	s.
Kiyosumi	0·7	242	0 24	+ 7	0 42	+14
Tokyo Imp. Univ.	1·0	281	0 24	+ 3	0 40	+ 4
Tukubasan	1·0	315	0 24	+ 3	0 37	+ 1
Komaba	1·1	278	0 24	+ 2	0 41	+ 2
Kamakura	1·2	262	0 24	0	0 42	+ 1
Mitaka	1·2	278	0 24	0	0 44	+ 3
Koyama	1·6	265	0 24	− 6	0 49	− 2
Titibu	1·6	287	0 24	− 6	0 46	− 5
Susaki	1·8	243	0 30	− 2	0 58	+ 2
Yosiwara	1·9	260	0 24	−10	0 52	− 7
Nagoya	3·3	264	1 1	P*	1 53	S_g
Mizusawa	3·7	4	1 1	+ 1	i 1 42	− 3
Koti	6·5	254	e 3 17	S*	—	—
Tucson	84·8	53	13 5	+28	—	—

Oct. 29d. 22h. 53m. 6s. Epicentre 8°·9S. 115°·8.E.

Force VII on the Isle of Lombok. Epicentre 8°·9S. 115°·8E. Lombok. Depth 100km.

Bulletin Mensual de Bureau Central Seismoloque de Strasbourg, Mois d'Octobre, p. 187.

A = −·4301, B = +·8896, C = −·1537; δ = 0; h = +7;
D = +·900, E = +·435; G = +·067, H = −·138, K = −·988.

A depth of focus 0·020 has been assumed.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Malabar	8·3	281	1 53	− 5	i 3 18	−13	—	—	—
Batavia	9·3	286	i 2 9k	− 3	3 44	−10	i 3 12	PP	—
Medan	21·1	306	i 4 35	+ 2	i 8 14	+ 1	—	—	—
Perth	22·9	178	4 53	+ 3	8 56	+11	5 8	pP	11·8
Manila	23·9	12	i 5 1k	+ 1	i 9 50	SS	—	—	—
Phu-Lien	30·9	343	e 6 29	pP	11 2	+ 7	—	—	—
Hong Kong	31·1	357	6 28	pP	11 2	+ 4	7 20	PP	15·1
Taito	31·9	9	6 2	−10	11 16	+ 6	—	—	—
Karenko	33·2	9	6 23	− 1	—	—	—	—	—
Adelaide	33·3	144	i 6 24	0	i 13 6	?	i 13 43	SS	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Melbourne		39·0	142	i 7 13	+ 1	i 13 6	+ 7	i 8 45	PP	—
Colombo	E.	39·1	292	e 7 24	+11	—	—	—	—	—
Brisbane	E.	39·7	122	i 7 18	0	i 13 18	+ 9	16 12	SS	—
Riverview		40·9	133	—	—	i 17 23	SSS	—	—	e 21·1
Sydney		40·9	133	e 7 4	−24	e 16 25	SS	—	—	—
Calcutta	N.	41·2	321	e 8 14	pP	i 13 36	+ 5	—	—	i 17·5
Kodaikanal	E.	42·6	296	e 7 54?	+12	—	—	—	—	—
Kobe		47·1	22	8 18	+ 1	14 42	−14	—	—	—
Nagoya		48·2	24	e 8 33	+ 7	—	—	—	—	—
Gihu		48·3	24	8 27	0	15 15	+ 2	—	—	—
Nagano		50·0	23	8 40	0	—	—	—	—	—
Bombay		50·6	303	e 8 36	− 8	i 15 45	0	i 19 4	SS	—
Agra	E.	51·2	316	8 45	− 4	15 48	− 5	9 6	pP	—
Mizusawa	E.	53·3	25	9 33	pP	16 26	+ 4	—	—	—
	N.	53·3	25	9 27	pP	16 21	− 1	—	—	—
Christchurch		60·1	135	i 9 51a	− 2	18 0	+ 9	24 45	L_q	e 29·3
Wellington		61·0	132	e 20 33	?	(22 39)	SS	—	—	e 23·9
Almata		62·8	330	e 10 12	+ 1	e 18 30	+ 5	—	—	—
Andijan		63·6	324	e 10 15	− 1	e 18 37	+ 2	—	—	—
Frunse		63·7	327	e 10 18	+ 1	i 18 41	+ 5	—	—	—
Tashkent		65·7	324	i 10 26	− 4	i 19 0	− 1	—	—	e 34·7
Samarkand		66·1	320	e 10 33	+ 1	—	—	—	—	—
Tchimkent		66·1	326	e 10 28	− 4	i 19 8	+ 2	e 14 3	PPP	—
Semipalatinsk		66·7	337	e 10 34	− 2	—	—	—	—	—
Baku		77·9	315	e 12 4	pP	i 21 27	+ 7	—	—	e 37·9
Sverdlovsk		79·5	333	i 11 55	+ 5	i 21 43	+ 6	—	—	—
Erevan		81·7	313	e 12 24	pP	e 22 22	sS	—	—	—
Grozny		81·9	316	e 12 6	+ 3	i 22 5	+ 4	—	—	—
Tiflis		82·0	314	12 1	− 2	i 22 3	+ 1	e 12 24	pP	e 34·4
Ksara		86·6	304	i 12 30k	+ 4	e 22 46	− 2	i 12 53	pP	—
Theodosia		89·5	316	—	—	e 22 59	[+ 7]	i 23 19	S	—
Helwan		89·6	300	12 43	+ 2	23 1	[+ 8]	13 30	pP	—
Yalta		90·3	315	—	—	e 23 5	[+ 8]	—	—	—
Simferopol		90·4	316	—	—	e 23 5	[+ 8	—	—	—
Moscow		90·7	327	e 13 26	pP	i 23 8	[+ 9]	i 23 30	S	—
Sebastopol		90·7	315	—	—	e 23 9	[+10]	—	—	—
Pulkovo		95·4	330	e 13 26	+19	24 5	− 1	17 31	PP	45·4
Bucharest		95·9	314	—	—	23 37	[+ 8]	e 24 16	S	—
Triest		104·7	315	—	—	e 24 17	[+ 5]	e 24 59	S	—
Copenhagen		104·8	326	—	—	24 22	[+10]	—	—	54·9
Edinburgh		113·4	327	—	—	e 23 54?	[−54]	—	—	—
Tinemaha	z.	123·8	51	e 30 1	PKKP	—	—	—	—	—
Pasadena	z.	124·6	54	i 18 44	[+ 4]	i 30 9	PS	i 19 10	pPKP	—
Haiwee		124·7	51	e 29 56	PKKP	—	—	—	—	—
Mount Wilson	z.	124·7	54	i 18 45	[+ 5]	i 30 14	PS	e 19 10	pPKP	—
Riverside		125·3	54	i 18 45	[+ 4]	—	—	i 29 53	PKKP	—
Tucson		131·0	54	18 57	[+ 4]	—	—	i 19 39	pPKP	—
Williamstown		145·4	8	i 19 21	[+ 3]	—	—	i 22 50	PP	—
Harvard		145·9	7	i 19 24	[+ 5]	—	—	i 22 53	PP	e 82·9
Weston		146·1	7	i 19 24	[+ 4]	—	—	i 19 51	pPKP	—
Fordham		147·0	11	i 19 27	[+ 5]	—	—	—	—	—
La Paz	z.	154·5	174	19 44	[+11]	—	—	—	—	—
San Juan		170·3	12	e 25 21	PP	e 35 13	SKSP	e 30 31	PPP	e 65·1
Fort de France		173·5	333	e 19 55	[+ 5]	—	—	—	—	—

Additional readings :—
Batavia i = +4m.41s.
Medan iSE = +8m.22s.
Perth i = +5m.1s., i = +5m.19s., +9m.4s., and +9m.14s., sS? = +9m.27s., i = +9m.46s., +10m.6s., +10m.17s., and +10m.59s.
Adelaide i = +16m.3s.
Melbourne i = +16m.8s., +17m.11s., and +22m.31s.
Calcutta ePPPN = +8m.30s.
Bombay iEN = +18m.24s.
Agra sSE = +16m.30s., SSE = +19m.6s.

Continued on next page.

Tiflis isSN = +22m.46s.
Ksara eSS = +28m.24s.
Helwan i = +13m.6s., S = +23m.21s., sS = +24m.2s.
Moscow e = +24m.29s.
Bucharest eEN = +25m.36s.
Pasadena ePKKPZ = +29m.51s.
Mount Wilson iPKKPZ = +29m.53s.
Weston ePPNZ = +22m.54s.
Fordham i = +19m.33s.
San Juan eSS = +45m.55s.
Long waves were also recorded at Uccle and De Bilt.

Oct. 29d. Readings also at 0h. (Toledo, Medan, and Fort de France), 1h. (Medan), 3h. (Almata and Tacubaya), 6h. (Nagoya and Medan), 7h. (Fort de France), 8h. (Cape Girardeau, Nagoya, and Mizusawa), 10h. (Tacubaya and Mizusawa), 11h. (Riverside, Mount Wilson, Pasadena, and Tucson), 13h. (Nagoya), 14h. (Nagoya (2) and Mizusawa (2)), 15h. (Ksara), 17h. (Tucson (2)), 18h. (Tacubaya, Nagoya, Mizusawa, Tucson, Wellington, New Plymouth, and Guadalajara), 20h. (Tacubaya and Tucson), 21h. (Nagoya and Mizusawa), 23h. (Ksara, Tucson (2), Copenhagen, Pulkovo, Moscow, Simferopol, Tiflis, Grozny, and Sverdlovsk).

Oct. 30d. Readings at 0h. (Baku, Sverdlovsk, Tiflis, De Bilt, Uccle, Rome, and Kew), 4h. (Mizusawa and near Santiago), 5h. (La Paz and near Nagoya), 7h. (Sverdlovsk and near San Javier), 8h. (Medan, Manila, Sverdlovsk, Sotchi, Tiflis, Grozny, Harvard, Williamstown, Fordham, Mount Wilson, Weston, Tinemaha, Riverside, Pasadena, Tucson, near Batavia, Malabar, and near Santiago), 9h. (Tucson), 10h. (near Santiago and San Javier), 12h. (Arapuni, Tuai, Christchurch, near Bunnythorp, Hastings, New Plymouth, and Wellington), 14h. (near Santiago and San Javier), 17h. (near Nagoya), 20h. (Christchurch and near Wellington), 22h. (Pasadena, Riverside, and Tucson), 23h. (Andijan, Frunse, near Santiago, and San Javier).

Oct. 31d. 5h. 27m. 16s. Epicentre 37°·1N. 71°·2E.

A = +·2577, B = +·7569, C = +·6006; δ = +3; h = −1;
D = +·947, E = −·322; G = +·194, H = +·569, K = −·800.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Andijan		3·8	13	1 4	+ 3	1 52	+ 5	i 1 16	P_g	—
Samarkand		4·2	309	e 1 8	+ 1	1 58	+ 1	i 1 26	P_g	—
Tashkent		4·5	341	i 1 9	− 2	e 2 20	S*	—	—	2·6
Tchimkent		5·3	347	e 1 22	0	e 2 25	0	—	—	—
Almata		7·5	34	e 1 56	+ 3	3 26	+ 6	—	—	e 4·2
Agra	E.	11·5	148	e 2 50	+ 2	4 19	−40	—	—	—
Semipalatinsk		14·8	23	e 3 33	+ 1	—	—	—	—	—
Bombay	E.	18·2	176	—	—	e 7 15	−22	—	—	—
Grozny		20·3	296	e 4 34	− 6	e 8 50	+27	—	—	—
Calcutta	N.	20·7	130	—	—	e 8 17	−14	—	—	—
Sverdlovsk		21·0	345	e 4 45	− 2	e 8 45	+ 8	—	—	e 11·6

Additional readings:—
Andijan iPP = +1m.21s., i = +1m.31s., e = +1m.48s., eS* = +1m.58s., S_g = +2m.12s.
Samarkand i = +1m.31s., e = +1m.34s., +1m.44s., +2m.26s., and +2m.58s.
Tchimkent e = +1m.33s., +2m.4s., +2m.40s., and +2m.57s.

Oct. 31d. Readings also at 2h. (La Paz), 3h. (Tucson), 5h. (Pasadena, Riverside, Tinemaha, and Tucson), 7h. (Tacubaya), 9h. (near Berkeley, Branner, Lick, and Fresno), 12h. (near Nagoya), 16h. (Grozny (2) and Ksara), 17h. and 18h. (Tacubaya), 20h. (Fordham, Bucharest, and Sofia), 21h. (Fordham (2)), 23h. (Sofia).

Nov. 1d. 0h. 47m. 13s. Epicentre 37°·0N. 70°·5E. (as on 1938 Jan. 18d.)

$A = +\cdot2672$, $B = +\cdot7547$, $C = +\cdot5992$; $\delta = +1$; $h = +1$;
$D = +\cdot943$, $E = -\cdot334$; $G = +\cdot200$, $H = +\cdot565$, $K = -\cdot801$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Samarkand		3·8	315	i 1 8	S*	e 1 49	+ 2	i 2 22	S_g	—
Andijan		4·0	20	e 1 3	− 1	1 49	− 3	e 1 19	P_g	—
Tashkent		4·4	351	i 1 11	+ 1	i 2 5	+ 3	i 1 19	P*	i 2·6
Tchimkent		5·3	354	i 1 24	+ 2	2 29	+ 4	1 49	P_g	—
Frunse		6·7	27	1 38	− 4	2 56	− 4	—	—	—
Almata		8·0	36	e 1 57	− 3	e 3 27	− 6	—	—	—
Agra		11·7	145	e 2 18	−33	4 8	−56	—	—	—
Bombay		18·2	174	e 3 47	−29	e 7 3	−34	—	—	—
Grozny		19·9	296	4 34	− 2	e 8 31	+16	—	—	—
Sverdlovsk		20·9	345	4 47	+ 1	i 8 48	+13	—	—	11·6
Calcutta	N.	21·1	128	e 4 55	+ 7	i 8 8	?	—	—	—
Ksara		28·3	273	e 7 32	?	e 10 13	?	—	—	e 12·6
Moscow		29·0	321	e 6 28	+24	e 12 7	?	—	—	e 17·1
Pulkovo		34·3	325	6 43	− 7	e 12 22	+ 5	—	—	e 15·2

Additional readings :—
Samarkand e = +1m.42s.
Andijan e = +1m.10s., +1m.12s., +1m.22s., and +1m.25s., S_g = +1m.59s., i = +2m.10s.
Tchimkent e = +1m.34s., e = +2m.7s. and +2m.19s. and +2m.43s.
Frunse e = +2m.17s. and +2m.44s.
Pulkovo e = +9m.36s. and +11m.28s.

Nov. 1d. Readings also at 1h. (Tucson), 3h. (Berkeley, Bucharest, Sofia, and near Basle), 5h. (New Plymouth), 7h. (Ivigtut, Tucson, and Mount Wilson), 8h. (Mount Wilson, Pasadena, Riverside, Tucson, Baku, Tiflis, Tashkent, and Sverdlovsk), 9h. and 10h. (near Santiago), 11h. (La Paz), 12h. (Malabar), 13h. (Fresno, Haiwee, Mount Wilson, Pasadena, Riverside, and Tinemaha), 14h. (near Manila), 16h. (Andijan (2), Samarkand, near Tiflis, and near Nagoya), 18h. (Fordham, La Paz, and Harvard), 19h. (Malabar), 20h. (near Malabar and near Santiago), 21h. (near Nagoya and near Santiago), 23h. (near Christchurch, Hastings, New Plymouth, Tuai, and Wellington).

Nov. 2d. 5h. 42m. 1s. Epicentre 17°·5N. 94°·1W.

$A = -\cdot0682$, $B = -\cdot9519$, $C = +\cdot2989$; $\delta = +11$; $h = +5$;
$D = -\cdot997$, $E = +\cdot071$; $G = -\cdot021$, $H = -\cdot298$, $K = -\cdot954$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tacubaya	E.	5·2	292	1 24	+ 3	—	—	—	—	—
Merida	N.	5·4	50	1 16	− 8	—	—	—	—	—
Balboa Heights		16·5	119	e 3 54	0	—	—	—	—	—
Cape Girardeau	N.	20·1	10	e 4 37	− 1	e 8 28	+ 9	i 4 49	pP	—
Columbia		20·2	22	e 4 37	− 2	e 8 25	+ 4	—	—	e 12·9
Tucson		21·1	319	i 4 49k	+ 1	8 49	+10	i 5 17	PP	i 9·3
St. Louis		21·3	9	e 4 54	+ 4	e 8 42	− 1	i 5 14	PP	—
Florissant		21·5	9	e 4 55	+ 3	e 8 54	+ 7	—	—	—
Chicago		24·9	10	e 5 29	+ 3	e 9 49	+ 2	e 5 50	PP	10·7
Riverside		26·5	314	i 5 40	− 1	—	—	i 6 5	PP	—
San Juan		26·6	83	e 5 42	0	e 10 2	−14	e 6 20	PP	11·0
Mount Wilson	Z.	27·1	314	i 5 47	+ 1	—	—	i 6 11	PP	—
Pasadena		27·2	314	e 5 45	− 2	—	—	i 6 11	PP	e 13·0
Philadelphia		27·7	33	e 6 33	PP	e 10 18	−15	—	—	—
Haiwee	E.	28·1	317	e 5 57	+ 2	—	—	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tinemaha	z.	28·9	318	e 5 58	− 5	—	—	—	—	—
Fordham		29·1	33	i 6 39	PP	e 12 21	SSS	e 7 13	PPP	—
Williamstown		30·8	32	e 6 17	− 3	e 13 24	SSS	i 7 15	PP	—
Harvard		31·5	33	e 6 52	+26	e 12 3	+29	i 7 59	PP	e 18·0
Fort de France		31·7	90	e 7 5	PP	—	—	—	—	—
Ottawa		31·8	24	i 6 28	0	e 11 29	− 9	—	—	14·0
Huancayo		34·7	146	e 6 45	− 9	i 12 11	−13	e 7 56	PP	e 13·8
East Machias		35·2	34	i 8 24	PPP	—	—	—	—	e 16·3
Seven Falls		35·2	28	e 7 29	PP	—	—	—	—	12·0
La Paz		42·4	140	e 7 55	− 3	14 6	−14	—	—	17·7
Sverdlovsk		103·0	13	—	—	e 24 41	[0]	—	—	50·0
Ksara		110·2	43	e 19 0	PP	26 6	{ 0}	e 21 29	PPP	53·0
Baku		113·4	29	—	—	e 26 18	{−11}	—	—	e 51·4
Andijan		120·7	13	e 19 40	PP	—	—	—	—	—

Additional readings :—
Cape Girardeau iN = +5m.16s.
Columbia eP = +4m.41s.
Tucson i = +4m.51s. and +5m.12s., iPPP = +5m.37s., i = +6m.30s., iS = +8m.53s.
St. Louis iSN = +8m.45s., iE = +9m.10s. and +9m.46s.
Chicago ePPP = +6m.21s., eS = +10m.38s.
Riverside iZ = +9m.0s.
San Juan iPPP = +6m.29s.
Philadelphia eS = +10m.24s.
Fordham iZ = +6m.54s. and +6m.58s., eZ = +7m.46s., iZ = +12m.27s. and +13m.29s.
Williamstown i = +6m.48s., +7m.1s., and +14m.41s.
Ottawa eZ = +6m.54s., e = +12m.20s.
Huancayo iP = +6m.49s., ePPP = +8m.17s., P_cP = +8m.46s., iS = +12m.16s., i = +12m.22s.
Ksara ePS = +28m.33s., eSS = +34m.43s.
Baku e = +29m.36s., +33m.1s., +36m.12s., and +40m.12s.
Long waves were also recorded at Tashkent and San Fernando.

Nov. 2d. Readings also at 1h. (Sofia), 2h. (Mizusawa), 3h. (Chur and near Nagoya), 5h. (Tucson), 7h. (Fordham), 9h. (Fordham, Williamstown, Weston, Cape Girardeau, Mount Wilson, Pasadena, Riverside, Tinemaha, near Tucson, and near Andijan), 13h. (Jena), 17h. (near Zurich), 18h. (Keizyo and near Santiago), 20h. (near Balboa Heights), 21h. (College, Ottawa, Harvard, and Weston).

Nov. 3d. Readings at 0h. (Triest and near Taihoku), 2h. (Tucson), 3h. (Istanbul, Rome, and Samarkand), 4h. (near Nagoya), 6h. (Moncalieri), 7h. (Medan), 9h. (Frunse, Samarkand, near Andijan, and near Tananarive), 14h. (Samarkand and near Andijan), 17h. (Calcutta, Almata, Andijan, Samarkand, Frunse, Tashkent, Tchimkent, Baku, Sverdlovsk, Grozny, Tiflis, and Ksara), 20h. (Almata, Andijan, and Frunse), 21h. (Tucson), 23h. (near Christchurch and Wellington).

Nov. 4d. 3h. Eastern Europe :—
Kew e = 50m. (very slight).
Sofia ePEN = 51m.45s., eE = 53m.53s., eLE = 54m.23s.
Belgrade ePZ = 52m.3s.a, eZ = 52m.11s. and 53m.54s., iNW = 55m.24s. and 55m.34s.
Helwan iP = 52m.6s., e = 53m.50s.
Bucharest eN = 52m.31s., eE = 53m.47s., L = 55m.21s.
Ksara e = 52m.31s., 55m.39s., 56m.37s.
Triest eP = 52m.57s., PP = 53m.42s., eS = 54m.57s.
Strasbourg eP = 54m.6s.
Tiflis eP = 54m.9s., eNZ = 58m.44s., eLN = 59m.16s.
Grozny P = 54m.27s., e = 55m.20s. and 58m.32s.
Almeria e = 54m.33s.
Copenhagen iP = 54m.39s., L = 62m.
Toledo e? = 54m.41s., iP = 54m.44s., e = 54m.49s.
Cheb e = 56m.
Long waves also recorded at De Bilt.

Nov. 4d. 14h. Two shocks, Scale IV, at Sion (Valais).

Dr. E. Wanner.

Jahresbericht des Erdbebendienstes der Schweiz, Zurich 1, 1939, pp. 2 and 6, plate 1, map 6. Epicentre 46°·3N. 7°·3E. (Strasbourg).

Shock I :—
Sion iP_g =41m.1s., iS_g =41m.2s.
Neuchatel iP_g =41m.16s., iS_g =41m.32s.
Basle eP_g =41m.25s., eS_g =41m.45s.
Zurich eP_g =41m.27s., eS_g =41m.48s.
Chur eP_g =41m.30s., iS_g =41m.56s.
Strasbourg eP_gE =41m.39s. and 41m.50s., iS_gE =42m.19s., iSSE =42m.26s., 42m.33s., and 42m.46s.
Stuttgart eZ =41m.44s., e =42m.22s., iS_g =42m.33s., i =42m.38s. and 42m.42s.
Besançon iSSE =41m.48s.
Göttingen e =44m.7s.

Shock II :—
Sion eP_g =46m.55s., eS_g =46m.56s.
Neuchatel eP_g? =47m.12s., iS_g =47m.26s.
Zurich iS_g =47m.42s.

Nov. 4d. Readings also at 0h. (Berkeley), 7h. (near Tananarive), 15h. (Malabar and near Batavia and near Branner), 20h. and 22h. (near Santiago).

Nov. 5d. 8h. 43m. 17s. Epicentre 37°·1N. 141°·8E. (as on 1938 Aug. 3d.).

Damage caused to buildings at Hukusima, Miyagi, and Ibakari. After the earthquake numerous after-shocks occurred, the total number of which amounting to about 1600 in November and 150 in December. Violent at Onahama, Hukusima, Sendai, Tukubasan, Mito, Iidu, and Isinomaki ; strongly felt at Kakioka, Tokyo, Yokohama, Hunatu, Kohu, Yamagata, and Oiwake ; moderate at Tyosi, Tomisaki, Miyako, Hatinohe, and Misima.

Epicentre Kasima Bay 37°10′N. 141°65′E.

Macroseismic radius greater than 300kms. Shallow (20-60kms.). See Seismological Bulletin of the Central Met. Obs., Japan ,for the year 1938, Tokyo, 1940, pp. 68-71. Macroseismic chart and one chart giving the disposition of the initial movement of the P waves, p. 69.

Yosiokato : Investigation of the changes in the earth's magnetic field accompanying earthquakes or volcanic eruptions. On the strong earthquake of Nov. 5th, 1938, occurring in the sea bottom near Iwaki (Hukusima district) in The Science Reports of the Tohoku University. First series, Sendai, Japan, Vol. XXIX, No. 3. Marizen Co., Ltd., Tokyo and Sendai, November, 1940, 1 chart, 8 graphs, 2 seismograms, and 8 figures.

One of the most remarkable phenomenon of this quake is that the damage caused is only important in the area between Nami and Sinzan, and that the local anomaly of the vertical componant of the earth's magnetic field corresponds closely to this area. The tidal waves are not associated with the initial quake, but only with the following important movements.

$A = -·6283$, $B = +·4944$, $C = +·6006$; $\delta = -9$; $h = -1$;
$D = +·618$, $E = +·786$; $G = -·471$, $H = +·371$, $K = -·800$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Onahama	0·8	257	0 18k	0	0 26	− 5	—	—	—
Hukusima	1·2	302	0 26k	+ 2	—	—	—	—	—
Mito	1·3	236	0 23k	− 2	0 43	− 1	—	—	—
Sendai	1·3	329	0 28k	+ 3	0 44	0	—	—	—
Kakioka	1·5	236	0 27k	− 1	0 48	− 1	—	—	—
Tyosi	1·5	209	0 39k	+11	1 0	+11	—	—	—
Tukubasan	1·6	237	0 28k	− 2	0 54	+ 3	—	—	—
Yamagata	1·6	315	0 29k	− 1	0 46	− 5	—	—	—
Utunomiya	1·7	250	0 31k	0	0 53	− 1	—	—	—
Kumagaya	2·1	244	0 36s	− 1	1 11	S_g	—	—	—

Continued on next page.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mizusawa	2·1	346	0 39k	+ 2	1 3	− 1	—	—	—
Tokyo Cen. Met. Ob.	2·1	229	i 0 36	− 1	1 6	+ 2	1 15	S_g	—
Tokyo Imp Univ.	2·1	229	0 38	+ 1	1 13	S_g	—	—	—
Komaba	2·2	230	0 37	− 1	1 11	+ 5	—	—	—
Katuura	2·3	214	0 45k	+ 5	1 17	S_g	—	—	—
Kiyosumi	2·3	214	0 27	−13	0 55	−14	—	—	—
Maebasi	2·3	252	0 40	0	1 14	+ 5	—	—	—
Mitaka	2·3	232	0 40	0	1 17	+ 8	—	—	—
Niigata	2·4	291	0 48	P_g	1 20	S_g	—	—	—
Yokohama	2·4	226	0 42a	+ 1	1 18	+ 6	—	—	—
Kamakura	2·5	226	0 40	− 3	1 20	S*	—	—	—
Titibu	2·5	243	0 27	−16	1 1?	?	—	—	—
Miyako	2·6	3	0 47a	+ 3	1 27	S_g	—	—	—
Morioka	2·7	349	0 46a	+ 1	1 24	S*	—	—	—
Mera	2·7	216	0 46	+ 1	1 20	+ 1	—	—	—
Oiwake	2·7	254	0 46	+ 1	—	—	—	—	—
Takada	2·8	270	1 3	P_g	1 46	S_g	—	—	—
Hunatu	2·9	237	0 48	0	1 39	S_g	—	—	—
Koyama	2·9	232	0 27	−21	1 5	−19	—	—	—
Nagano	2·9	261	0 55k	P_g	1 36	S_g	—	—	—
Akita	3·0	334	0 54k	+ 4	1 38	S_g	—	—	—
Ito	3·0	225	0 52k	+ 2	1 33	S*	—	—	—
Kohu	3·0	241	0 49k	− 1	1 34	S*	—	—	—
Misima	3·0	229	0 48a	− 2	1 34	S*	—	—	—
Numadu	3·1	230	0 53a	+ 2	1 43	S_g	—	—	—
Osima	3·1	220	0 48a	− 3	1 25	− 4	—	—	—
Matumoto	3·2	254	0 53a	+ 1	1 35	+ 3	—	—	—
Yosiwara	3·2	232	0 27	−25	1 12	−20	—	—	—
Susaki	3·3	225	0 52	− 1	1 42	S*	—	—	—
Toyama	3·4	266	1 0k	+ 5	1 56	S_g	—	—	—
Hatinohe	3·5	356	0 58k	+ 1	1 36	− 4	—	—	—
Iida	3·6	245	1 4a	+ 6	1 44	+ 2	—	—	—
Aomori	3·8	348	1 5a	P*	1 59	S_g	—	—	—
Omaesaki	3·8	231	1 2k	+ 1	1 54	S*	—	—	—
Takayama	3·8	257	1 6k	P*	1 59	S_g	—	—	—
Wazima	3·9	277	1 5a	+ 3	2 4	S_g	—	—	—
Hamamatu	4·1	235	1 8a	+ 3	2 7	S*	—	—	—
Kanazawa	4·2	264	1 10k	+ 3	2 8	S*	—	—	—
Hatidyozima	4·3	203	1 7k	− 1	1 54	− 6	—	—	—
Gihu	4·4	250	1 10	0	2 0	− 2	—	—	—
Nagoya	4·4	245	i 1 11	+ 1	2 13	S*	—	—	—
Hukui	4·6	257	1 35a	P_g	2 45	S_g	—	—	—
Hakodate	4·7	350	1 21k	P*	—	—	—	—	—
Ibukisan	4·7	251	1 14	0	2 22	+12	—	—	—
Hikone	4·8	250	1 16a	+ 1	2 18	+ 6	—	—	—
Kameyama	4·9	245	1 16a	− 1	2 22	+ 7	—	—	—
Tu	4·9	243	1 15	− 2	2 28	S*	—	—	—
Mori	5·1	349	1 22	+ 2	2 20	0	—	—	—
Urakawa	5·1	8	1 27	+ 7	2 29	S*	—	—	—
Muroran	5·2	353	1 23a	+ 2	3 16	?	—	—	—
Kyoto	5·3	249	1 22	0	2 30	+ 5	—	—	—
Yagi	5·5	245	1 24a	− 1	2 34	+ 4	—	—	—
Miyadu	5·6	257	1 27a	0	2 38	+ 5	—	—	—
Osaka	5·6	247	1 30	+ 3	2 47	S*	—	—	—
Toyooka	5·8	257	1 30	+ 1	2 37	− 1	—	—	—
Kobe	5·9	249	1 31a	0	2 46	+ 6	—	—	—
Obihiro	5·9	10	1 31	0	2 38	− 2	—	—	—
Sapporo	6·0	356	1 34a	+ 2	2 39	− 4	—	—	—
Siomisaki	6·1	236	1 32a	− 2	3 15	S_g	—	—	—
Kusiro	6·2	18	1 54a	P*	3 1	S*	—	—	—
Sumoto	6·2	247	1 35a	0	3 11	S*	—	—	—
Wakayama	6·2	244	1 34a	− 1	3 10	S*	—	—	—
Tokusima	6·6	246	1 41a	0	3 27	S*	—	—	—
Okayama	6·8	252	1 52	P*	3 46	S_g	—	—	—
Nemuro	6·8	24	1 44	0	—	—	—	—	—

continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Sakai		7·1	260	1 50	+ 2	3 57	S_g	—	—	—
Tadotu		7·1	250	1 50a	+ 2	3 26	S*	—	—	—
Haboro		7·3	359	1 57	+ 7	3 24	+ 9	—	—	—
Muroto		7·3	241	1 50a	0	3 25	+10	—	—	—
Koti		7·6	245	e 1 53	− 2	e 3 14	− 9	i 2 37	P_g	3·7
Hirosima		8·1	254	1 58	− 4	3 43	+ 8	—	—	—
Matuyama		8·1	249	2 0a	− 2	3 56	S*	—	—	—
Hamada		8·2	256	2 5	+ 2	3 40	+ 2	—	—	—
Simidu		8·4	242	2 13	+ 7	3 56	+13	—	—	—
Uwazima		8·5	246	2 9	+ 2	3 51	+ 6	—	—	—
Ooita		9·2	249	2 21	+ 5	4 49	S*	—	—	—
Simonosiki		9·4	254	2 15	− 3	5 2	S_g	—	—	—
Ootomari		9·6	4	2 21	0	3 46	−26	—	—	—
Izuka		9·7	254	2 24	+ 2	4 48	S*	—	—	—
Asosan		9·8	248	2 23a	− 1	4 35	+18	—	—	—
Hukuoka B		9·9	253	2 29	+ 4	4 6	−14	—	—	—
Kumamoto		10·0	248	2 28a	+ 1	4 31	+ 9	—	—	—
Miyazaki		10·0	242	2 27a	0	4 28	+ 6	—	—	—
Titizima		10·0	179	2 27	0	—	—	—	—	—
Otiai		10·2	4	2 17	−14	4 53	S_g	—	—	—
Saga		10·2	252	2 41	+10	—	—	—	—	—
Unzendake		10·4	249	2 23a	−11	5 3	S*	—	—	—
Husan		10·5	263	i 2 51a	+16	4 38	+ 3	—	—	—
Ituhara		10·6	258	2 27a	− 9	4 46	+ 9	—	—	—
Taikyu		10·7	267	2 38	0	5 17	S*	—	—	5·7
Kagosima		10·8	243	2 42	+ 3	5 40	S*	—	—	—
Syuhyrei		11·1	270	2 44	+ 1	5 7	SS	—	—	—
Yakusima		11·5	238	2 47	− 1	5 11	SS	—	—	—
Tomie		11·6	251	2 50a	0	5 32	SSS	—	—	—
Keizyo		11·8	277	2 53	0	e 5 14	+ 8	2 59	PP	6·1
Zinsen		12·1	277	i 2 56	− 1	i 5 23	+ 9	2 59	PP	i 6·2
Sikka		12·2	4	2 49a	− 9	5 33	SS	—	—	—
Heizyo		12·8	284	i 3 8a	+ 2	5 53	SSS	—	—	—
Nake		13·5	234	3 14k	− 1	5 54	+ 7	—	—	—
Dairen		16·0	283	3 49	+ 1	7 7	SS	—	—	—
Naha		16·1	234	3 29	−20	6 38	−11	—	—	—
Zi-ka-wei	E.	17·9	258	e 4 6	− 6	7 37	+ 7	4 27	PP	9·0
Miyakozima		18·7	234	4 18	− 4	7 50	+ 2	—	—	—
Isigakizima		19·8	237	4 27	− 8	7 58	−15	—	—	—
Giran		21·1	240	4 54	+ 6	—	—	—	—	—
Taihoku		21·1	240	e 4 54	+ 6	8 34	− 5	—	—	—
Sintiku		21·6	241	4 48	− 6	—	—	—	—	—
Karenko		21·7	241	4 50	− 5	6 52	?	—	—	—
Arisan		22·6	241	5 4	+ 1	—	—	—	—	—
Taito		22·9	239	5 2a	− 4	9 10	− 3	—	—	—
Tainan		23·3	240	5 17	+ 7	—	—	—	—	—
Takao		23·5	240	5 15	+ 3	—	—	—	—	—
Kosyun		23·6	238	5 14	+ 1	9 35	+10	—	—	—
Hong Kong		28·0	246	5 52k	− 3	10 55	+17	6 39	PP	13·6
Manila		29·1	225	e 6 1	− 3	10 50	− 6	—	—	—
Irkutsk		30·2	312	i 5 43?	−31	10 49	−24	—	—	14·7
Palau		30·4	195	5 27	+11	10 20	−56	—	—	—
Phu-Lien		34·6	253	6 48	− 5	12 14	− 8	8 5	PP	16·3
Semipalatinsk		45·1	308	8 20	0	15 0	+ 1	—	—	—
Calcutta	N.	48·0	268	i 8 41a	− 2	i 15 42	+ 1	i 10 25	PP	i 23·2
Almata		48·8	300	e 8 49	0	—	—	—	—	24·4
College		48·9	32	e 8 50	0	15 52	− 1	10 54	PP	i 21·6
Frunse		50·6	300	i 9 3	+ 1	16 19	+ 2	10 59	PP	—
Medan		51·7	241	9 16	+ 5	i 16 40	+ 8	i 10 39	PP	e 21·7
Dehra Dun	N.	52·6	283	e 9 7	−11	i 16 54	+10	i 20 48	SS	e 26·7
Andijan		52·8	297	e 9 19	0	e 16 56	+ 9	—	—	28·2
Agra		54·0	279	i 9 31a	+ 3	17 17	+14	9 50	pP	26·4
Batavia		54·1	225	i 9 30k	+ 1	i 17 10	+ 5	—	—	e 25·7
Honolulu		54·2	88	e 9 31	+ 2	i 17 12	+ 6	19 36	S_cS	e 22·1
Tchimkent		54·3	300	9 30	0	17 14	+ 7	—	—	—

continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Malabar		54·6	224	9 45	+13	e 17 12	+ 1	—	—	e 26·7
Tashkent		54·8	299	i 9 35	+ 1	e 17 3	−11	17 59	PPS	—
Sverdlovsk		55·3	319	i 9 16	−22	i 17 1	−20	i 9 51	sP	24·7
Sitka		56·1	40	e 10 7	+24	e 17 48	+16	12 22	PP	e 23·9
Samarkand		57·1	298	9 45	− 5	17 52	+ 7	—	—	—
Hyderabad		58·6	269	9 57	− 4	18 7	+ 3	12 15	PP	27·7
Bombay		62·3	274	e 10 24k	− 2	i 18 59	+ 7	12 58	PP	30·3
Kodaikanal	E.	63·5	263	i 10 29a	− 5	i 19 3	− 4	i 12 53	PP	i 30·3
Colombo	E.	63·6	258	10 32	− 3	19 11	+ 3	—	—	31·5
Brisbane	E.	65·1	169	e 10 49	+ 4	i 19 19	− 8	i 20 43	S_cS	—
Victoria		66·3	46	10 44	− 8	19 29	−13	23 37	SS	e 30·7
Apia		66·9	129	e 11 4	+ 8	e 19 53	+ 4	i 13 24	PP	—
Seattle		67·2	46	e 11 14	+16	e 19 55	+ 3	26 37	SSS	e 27·8
Moscow		67·4	323	10 56	− 3	19 52	− 3	11 17	pP	e 27·2
Pulkovo		68·3	330	i 11 3	− 2	20 1	− 5	11 25	pP	e 33·2
Baku		68·4	305	i 11 7	+ 1	i 20 34	PS	14 7	PP	—
Grozny		69·6	309	11 12	− 1	20 28	+ 7	—	—	23·7
Ferndale		69·7	53	e 11 28	+14	e 20 23	+ 1	—	—	e 28·7
Piatigorsk		70·8	312	11 20	0	20 43	+ 8	—	—	34·7
Tiflis		71·0	308	11 20	− 2	i 20 44	+ 7	e 11 43	pP	e 32·7
Riverview		71·1	172	i 11 32a	+10	e 20 30	− 8	20 58	PS	e 34·1
Sydney		71·1	172	e 10 57	−25	i 20 31	− 7	—	—	e 25·7
Ukiah		71·1	55	e 11 33	+11	i 20 41	+ 3	e 14 8	PP	e 29·7
Adelaide		71·7	183	i 11 41	+15	i 20 53	+ 8	i 25 22	SS	28·9
Scoresby Sund		71·8	355	i 11 27	+ 1	i 20 48	+ 2	i 14 10	PP	—
Berkeley		72·4	56	i 11 30	0	e 20 52	− 1	—	—	e 30·9
San Francisco		72·4	56	e 12 40	+70	e 21 51	+58	—	—	—
Branner	E.	72·7	56	e 11 39	+ 7	e 20 55	− 2	—	—	e 29·5
	N.	72·7	56	e 11 42	+10	e 20 58	+ 1	—	—	e 30·8
Perth		72·9	203	11 43	+10	21 13	+14	12 5	P_cP	i 22·8
Saskatoon		73·0	37	e 11 36	+ 3	i 20 57	− 3	—	—	e 31·7
Upsala		73·0	335	11 33	0	e 20 51	− 9	e 16 1	PPP	e 32·7
Lick	E.	73·1	56	e 11 45	+11	e 21 2	+ 1	—	—	—
	N.	73·1	56	e 11 41	+ 7	e 21 5	+ 4	—	—	—
Sotchi		73·1	313	11 35	+ 1	20 57	− 4	—	—	—
Butte		73·7	43	e 11 41	+ 3	e 21 5	− 3	e 29 32	SSS	e 31·8
Melbourne		74·6	177	e 12 12	+29	e 21 8	−10	26 3	SS	32·0
Fresno	N.	74·7	55	e 11 48	+ 5	e 21 21	+ 2	—	—	—
Theodosia		74·7	315	i 11 43	0	21 20	+ 1	—	—	e 38·7
Bozeman		74·8	43	e 11 44	0	i 21 17	− 3	26 43	SS	i 32·1
Simferopol		75·5	316	i 11 48	0	21 29	+ 1	—	—	37·7
Tinemaha		75·5	54	e 11 46	− 2	e 21 27	− 1	—	—	—
Yalta		75·8	315	i 11 51	+ 1	21 38	+ 7	—	—	32·7
Sebastopol		76·0	316	i 11 52	+ 1	21 38	+ 4	—	—	26·7
Santa Barbara		76·1	57	i 11 54	+ 3	e 21 33	− 2	—	—	—
Haiwee		76·3	54	i 11 51	− 1	e 21 32	− 5	—	—	—
Bergen		76·5	340	11 54	0	21 35	− 4	—	—	26·7
Mount Wilson		77·3	57	e 11 57	− 1	e 21 45	− 3	i 15 4	PP	—
Pasadena		77·3	57	e 11 58	0	e 21 44	− 4	i 15 4	PP	e 30·1
Riverside		77·9	57	i 12 1	0	e 21 54	0	—	—	—
Copenhagen		78·0	334	12 0a	− 2	21 56	+ 1	14 54	PP	—
Bucharest		80·2	319	e 12 15a	+ 1	22 18	− 1	15 21	PP	37·7
Potsdam		80·3	332	e 12 13	− 1	e 22 13	− 7	e 15 13	PP	e 36·7
Hamburg		80·6	334	i 12 17a	+ 1	e 22 39	+16	e 15 21	PP	e 36·7
Istanbul		80·8	316	e 12 35	+18	22 43	+18	15 41	PP	e 47·7
Arapuni		81·1	154	—	—	23 13	PS	27 49	SS	38·7
Aberdeen		81·3	341	i 12 14	− 6	i 22 29	− 1	i 15 29	PP	35·8
New Plymouth		81·4	155	e 11 43?	−37	22 44	+13	28 1	SS	38·7
Ksara		81·4	305	i 12 19a	− 1	i 22 39	+ 8	i 15 26	PP	—
Budapest		81·5	325	12 21	0	i 22 34	+ 2	23 12	PS	44·7
Kecskemet	Z.	81·6	324	i 12 20	− 1	i 22 35	+ 2	i 15 22	PP	e 43·0
Prague		81·6	329	12 23a	+ 2	22 30	− 3	e 15 33	PP	e 31·7
Ivigtut		81·7	5	i 12 21a	− 1	22 27	− 7	15 43	PP	—
Denver		82·0	46	e 12 27	+ 4	i 22 32	− 5	—	—	—
Jena		82·0	331	e 12 22	− 1	e 22 38	+ 1	e 15 34	PP	e 35·2

Continued on next page.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Göttingen	82·2	332	i 12 26	+ 2	i 22 57	+18	—	—	e 36·7
Cheb	82·4	331	e 12 27	+ 2	e 22 45	+ 4	e 28 55	SS	e 42·7
Hof	82·4	330	e 12 27	+ 2	e 23 8	+27	e 15 30	PP	e 36·7
Edinburgh	82·7	341	e 12 25	− 2	i 22 39	− 5	i 15 33	PP	31·7
Belgrade	82·8	321	i 12 28	+ 1	i 22 58	+13	i 15 52	PP	e 29·6
Sofia	82·8	319	e 12 31	+ 4	e 23 2	+17	i 15 50	PP	e 28·9
Durham	83·2	340	i 12 33	+ 4	i 22 49	0	i 16 0	PP	—
Tucson	83·3	54	12 30	0	i 22 50	0	i 15 46	PP	34·2
De Bilt	83·4	335	12 30a	0	22 49	− 2	—	—	e 39·7
Wellington	83·6	156	e 12 32	0	22 46	− 7	i 12 47	pP	39·0
Stonyhurst	84·3	340	i 12 37	+ 2	i 23 15	+15	i 12 48	pP	36·1
Laibach	84·6	326	e 12 43	+ 7	i 23 30	+27	i 16 33	PP	47·0
Stuttgart	84·7	330	i 12 36a	− 1	i 23 1	− 3	i 13 2	pP	e 41·7
Karlsruhe	84·8	332	i 12 37	0	e 23 6	+ 1	—	—	e 40·7
Uccle	84·8	335	e 12 35a	− 2	i 23 10	+ 5	i 15 45	PP	e 39·7
Christchurch	85·0	158	i 12 41a	+ 3	i 23 14	+ 7	35 33	L_g	40·0
Triest	85·3	327	e 12 39a	− 1	23 7	− 3	16 2	PP	—
Strasbourg	85·4	331	i 12 39a	− 1	i 23 10	− 2	i 13 3	pP	e 43·7
Rathfarnham Castle	85·8	342	i 12 44	+ 2	i 23 18	+ 3	i 16 20	PP	e 44·3
Kew	85·9	337	i 12 42a	− 1	i 23 11	− 5	i 13 1	pP	40·7
Chur	86·1	330	e 12 44	0	e 23 15	− 3	—	—	—
Zurich	86·1	330	e 12 43a	− 1	e 23 21	+ 3	e 16 5	PP	—
Basle	86·3	330	e 12 43	− 1	e 23 18	− 2	e 16 7	PP	—
Padova	86·3	327	i 12 51k	+ 6	e 23 27	+ 7	e 16 24	PP	e 42·7
Helwan	86·9	305	i 12 45k	− 3	i 23 28	+ 2	16 13	PP	—
Neuchatel	87·0	330	e 12 48	0	e 23 14	[0]	—	—	—
Paris	87·1	335	i 12 50	+ 1	i 23 42	+14	15 50	PP	36·7
Besançon	87·2	332	e 11 1	?	e 23 43?	+15	—	—	44·7
Florence	87·8	327	12 55	+ 3	23 29	− 5	16 57	PP	40·7
Jersey	88·3	338	e 11 56	−59	i 23 34	− 6	i 24 11	sS	e 39·7
Moncalieri	88·4	330	i 12 45	−10	23 55	+14	—	—	30·0
Rome	88·8	323	i 12 53a	− 4	e 23 38	− 6	16 40	PP	43·0
Grenoble	89·0	330	e 12 58	0	e 23 50	+ 5	e 16 35	PP	e 36·7
Chatham Ils.	89·1	152	—	—	22 43?	−63	—	—	38·7
Chicago (Loyola)	89·3	35	—	—	i 23 45	− 3	e 29 52	SS	—
Chicago	89·3	35	e 12 58	− 1	23 42	− 6	i 29 56	SS	e 36·6
Puy de Dôme	89·6	332	e 13 1	0	e 22 56	[−34]	—	—	e 40·7
Marseilles	90·7	329	—	—	e 23 52	− 9	e 30 5	SS	e 44·5
St. Louis	90·7	38	e 13 9	+ 3	e 23 35	[− 2]	i 16 58	PP	—
Ann Arbor	90·8	32	e 13 19	+13	i 23 49	[+11]	16 55	PP	—
Shawinigan Falls	91·1	23	13 10	+ 2	e 23 43	[+ 4]	—	—	e 46·7
Ottawa	91·2	25	13 6	− 2	24 7	+ 2	17 1	PP	e 47·7
Seven Falls	91·2	21	13 2	− 6	i 23 51	[+11]	e 17 1	PP	e 43·7
Cape Girardeau	92·1	39	e 13 19	+ 7	i 24 14	+ 1	e 26 14	PPS	e 37·7
Little Rock	92·5	42	e 13 17	+ 3	i 24 19	+ 2	e 30 22	SS	40·7
Vermont	92·8	24	i 13 8	− 8	e 23 49	[0]	e 16 45	PP	e 41·1
Bagnères	92·9	333	e 13 16	0	e 23 37	[−12]	e 19 4	PPP	e 41·7
Cincinnati	93·0	34	i 13 15	− 2	e 24 19	− 2	i 17 9	PP	—
East Machias	94·3	20	e 13 21	− 2	24 8	[+11]	i 17 37	PP	e 38·2
Williamstown	94·4	24	i 13 25	+ 2	e 25 53	PS	i 17 12	PP	—
Harvard	95·1	23	e 13 24	− 2	e 24 10	[+ 9]	e 17 22	PP	e 51·7
Weston	95·3	23	e 13 29a	+ 2	i 23 55	[− 7]	e 17 18	PP	e 44·6
Fordham	95·8	26	i 13 32	+ 3	i 24 17	[+12]	i 14 1	pP	—
Philadelphia	96·1	28	e 13 31	0	i 24 4	[− 3]	i 17 26	PP	e 41·1
Georgetown	96·3	29	e 13 35	+ 3	i 24 7	[− 1]	i 17 25	PP	41·7
Algiers	97·1	327	e 13 42	+ 7	24 9	[− 3]	e 17 35	PP	46·7
Toledo	97·2	334	e 13 36	0	e 25 21	+24	e 17 30	PP	—
Columbia	98·8	35	e 13 45	+ 2	24 33	[+12]	e 17 52	PP	e 44·4
Almeria	99·3	332	e 14 9	+24	e 27 31	PPS	e 17 59	PP	e 48·9
Granada	99·4	333	i 14 0	+14	—	—	i 18 6	PP	e 45·7
Tacubaya N.	99·7	57	e 14 1	+14	e 26 56	?	—	—	—
Malaga	100·2	333	e 13 53	+ 4	—	—	i 18 8	PP	47·2
San Fernando	101·0	334	e 13 55	+ 2	24 48	[+16]	e 17 37	PP	—
Tananarive	104·5	258	e 18 29	PP	25 0	[+12]	27 49	PS	e 50·0
San Juan	118·8	30	e 19 26	PP	e 28 2	{+57}	e 29 59	PS	48·0

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		Δ °	Az. °	P. m. s.	O−C. s.	S. m. s.	O−C. s.	Supp. m. s.		L. m.
Balboa Heights		120·0	49	e 19 43	PP	—	—	—	—	—
Cape Town		134·4	256	i 21 54	PP	i 32 10	PS	i 39 51	SS	54·7
Huancayo		138·4	63	e 19 25	[− 2]	i 26 34	[− 2]	i 22 34	PP	e 56·1
La Paz		146·5	60	19 46	[+ 4]	i 30 13	{+14}	i 23 18	SKP	68·7
La Plata		163·9	87	19 55	[− 9]	45 55	SS	24 31	PP	72·8
Rio de Janeiro	E.	165·2	18	e 20 21	[+15]	i 29 43	PPP	e 24 48	PP	i 43·8
	N.	165·2	18	e 20 17	[+11]	i 29 52	PPP	e 24 49	PP	i 43·9

Additional readings :—

Koti i = +2m.0s., iZ = +3m.31s., S*NZ = +3m.55s.
Miyazaki +5m.13s.
Zi-ka-wei PPE = +4m.33s., iE = +4m.49s., SSE = +8m.9s., SSE = +8m.17s.
Hong Kong ? = +10m.42s., SS = +12m.19s.
Calcutta iPPPN = +11m.12s., eSSN = +18m.55s.
College P = +9m.4s., iS = +16m.7s., i = +16m.19s., iS_cS = +18m.40s., iSS = +18m.52s.
Medan iE = +9m.24s., iN = +9m.28s., iEN = +15m.19s., SN = +16m.43s.
Agra eN = +9m.36s., PPE = +11m.53s., iEN = +12m.4s. and +17m.37s., SSE = +20m.52s., SSN = +20m.57s., iE = +21m.17s.
Honolulu eP = +9m.48s.
Malabar iE = +9m.51s.
Sitka P = +10m.22s., ePPP = +13m.16s., iS = +17m.55s., SS = +21m.41s.
Hyderabad PSN = +18m.19s., S_cSN = +19m.58s., SSN = +22m.9s.
Bombay iEN = +10m.43s., iE = +10m.57s., eN = +11m.15s., iE = +18m.49s., iEN = +19m.25s., +19m.33s., and +20m.6s., iN = +20m.20s., SSEN = +22m.43s.
Kodaikanal iPSE = +19m.36s., iSSE = +23m.57s., iSSE = +25m.19s.
Brisbane iSSE = +23m.49s.
Victoria SSS = +26m.43s.?
Apia $ePcP$ = +11m.34s.
Seattle P = +11m.44s., S = +20m.13s.
Grozny i = +11m.23s.
Ferndale ePN = +11m.43s.
Tiflis eEN = +11m.30s., iSPN = +21m.18s., eSSN = +25m.30s.
Riverview eE = +11m.39s., iN = +11m.42s., iSEN = +20m.39s., eSSN = +25m.37s., eE = +26m.1s., eL_qE = +30m.7s.
Ukiah SS = +24m.58s., eSSS = +28m.25s.
Adelaide i = +12m.3s., +14m.24s., +16m.0s., and +21m.43s., iSSS = +27m.55s.
Scoresby Sund ? = +16m.6s., +21m.15s., and +21m.40s.
Berkeley iPE = +11m.36s., eN = +11m.40s., eGN = +28m.12s.
Perth i = +12m.36s., +15m.45s., +21m.2s., and +21m.26s., PS = +21m.40s., i = +22m.6s. and +22m.38s., SS = +25m.43s., i = +27m.13s., SSS = +28m.55s., SSSS = +30m.11s.
Upsala iPSN = +21m.22s., SSN = +25m.43s., SSE = +26m.1s., eSSSN = +29m.19s.
Butte S = +21m.38s.
Melbourne i = +21m.27s., SSS = +29m.40s.
Fresno eN = +11m.53s.
Bozeman P = +12m.14s.
Bergen P = +12m.47s.
Mount Wilson i = +12m.9s.
Copenhagen PPP = +16m.58s., eN = +21m.32s., SE = +22m.0s., eE = +22m.55s., SS = +26m.43s.
Bucharest eN = +15m.37s., iE = +22m.37s., iN = +22m.43s., SSEN = +27m.43s., SSSN = +31m.1s.
Potsdam iPEN = +12m.17s., iSN = +22m.18s., eEN = +22m.37s., ePSN = +23m.19s., eN = +28m.7s., eE = +28m.43s.?, eN = +31m.43s.?
Hamburg eSSN = +28m.0s.
Arapuni L_q = +33m.49s.
Aberdeen i = +12m.40s. and +19m.36s., iS = +22m.39s., iPS = +23m.11s., i = +27m.15s. and +29m.10s.
New Plymouth S_cS = +23m.12s.
Budapest iN = +12m.34s. and +12m.44s., PPE = +15m.32s., iS_cSN = +22m.55s., S_cSE = +23m.3s., SSN = +27m.53s., SSE = +28m.3s., iE = +28m.41s., iN = +28m.51s., eN = +31m.22s., iE = +31m.28s., iN = +31m.55s., eE = +32m.55s., iN = +33m.3s., iE = +35m.18s., SKKS? = +37m.23s., eE = +39m.53s. and +42m.51s.
Kecskemet z. $iPcP$ = +12m.28s., i = +15m.42s., e = +18m.12s., iS_cS = +23m.4s., iPS = +23m.25s., i = +25m.38s. and +26m.22s., iSS = +27m.19s., ePKKS = +34m.34s., eSKKS? = +37m.59s., e = +39m.50s. and +42m.32s.
Prague PS = +23m.13s., eSS = +28m.37s.
Ivigtut +19m.7s., iS = +22m.32s.
Denver ePE = +12m.31s., iEN = +12m.35s., iE = +12m.46s., iN = +13m.19s., iE = +13m.25s. and +14m.1s., eSKSN = +22m.37s., iSE = +22m.51s., eSN = +22m.53s.
Jena iP = +12m.26s., ePPE = +15m.43s., iSSE = +28m.2s., iSSN = +28m.6s., iSS = +28m.43s.
Hof ePNW = +12m.43s., eSNE = +23m.16s., eSSNE = +28m.43s.

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Edinburgh i = +12m.28s., +12m.47s., +16m.13s., +17m.37s., +23m.12s., +24m.0s., +28m.18s., +29m.11s., +29m.31s., and +30m.23s.
Belgrade i = +23m.17s.
Sofia iE = +23m.15s. and +24m.52s.
Durham iE = +13m.7s., iEN = +23m.25s., +23m.43s., +24m.3s., +25m.39s., and +28m.26s.
Tucson iP = +12m.33s., i = +12m.40s., +12m.57s., and +13m.5s., iPPP = +17m.7s., iS = +23m.3s., iPS = +23m.28s., SS = +28m.28s., iSS = +28m.32s., iSSS = +32m.2s., iPKP,PKP = +38m.59s.
De Bilt iE = +22m.57s.
Wellington PP = +15m.32s., ipPP = +15m.49s., isPP? = +16m.5s., isS = +22m.59s., S_cS = +23m.15s., PS = +23m.45s., iEN = +25m.18s., SS = +28m.5s., SSS = +31m.38s., L_q = +34m.37s.
Stonyhurst isP = +12m.55s., i = +13m.10s., iPP = +15m.58s., i = +16m.20s., iPPP = +18m.13s., i = +23m.25s., +23m.30s., +23m.35s., and +28m.46s.
Stuttgart iPP = +16m.6s., iPPP = +18m.15s., iS = +23m.16s., iSS = +29m.3s., iSSS = +32m.43s.
Uccle i = +12m.38s., iN = +12m.51s. and +16m.12s., iPPPZ = +18m.10s., PS = +24m.16s., iSSE = +28m.37s.
Triest SS = +29m.12s.
Christchurch NZ = +12m.46s., i = +12m.57s., SKS = +23m.0s.
Strasbourg isPZ = +13m.17s., iPPZ = +16m.3s., e = +23m.16s., i = +23m.20s., isSZ = +13m.49s., eSSN = +29m.14s.
Rathfarnham Castle iPPP = +18m.25s., SKKS = +23m.39s., iS = +23m.49s., e = +29m.53s.
Kew isP = +13m.14s., iZE = +13m.45s., iZ = +14m.32s., iPPZ = +16m.7s., ipPP = +16m.30s., isPPEN = +16m.39s., iPPP = +18m.23s., iZ = +20m.2s., iEN = +23m.23s., ipSEN = +23m.35s., isSE = +23m.43s., iSP = +24m.3s., isPS = +24m.39s., iZ = +25m.7s., iN = +28m.41s., iSSE = +29m.3s., iE = +29m.23s., isSSEN = +29m.51s., i = +30m.20s., iSSS = +32m.32s., iZ = +34m.31s., iE = +34m.55s., iEN = +36m.35s.
Zurich ePPP = +16m.1s.
Helwan i = +13m.28s., e = +15m.13s., PPS = +24m.48s., e = +25m.52s., SS = +29m.25s.
Florence PS = +24m.9s., i = +25m.43s. and +34m.3s.
Rome P_cP = +13m.6s., i = +14m.36s., PPP = +18m.40s., S = +23m.58s., PS = +24m.49s., i = +25m.8s., SS = +30m.4s., i = +30m.17s. and +30m.31s.
Grenoble iPPP? = +18m.21s., ePPP = +18m.56s., e = +23m.43s., esS = +24m.24s., ePPS = +25m.26s., e = +26m.16s., SS = +29m.46s.
Chatham Ils. PS = +23m.43s., SS = +27m.55s.
Chicago (Loyola) e = +36m.55s.
Chicago eP = +13m.3s.
Marseilles iS = +24m.2s.
St. Louis eE = +17m.56s., iSKKSE = +23m.59s., iSE = +24m.14s., eSPN = +25m.23s., ePPSN = +26m.9s., eN = +29m.56s., iSSN = +30m.16s., eN = +35m.43s.
Ann Arbor SP = +25m.25s., ? = +29m.55s. and +37m.5s.
Ottawa iZ = +13m.17s., SS = +30m.43s.?, e = +37m.43s.?
Seven Falls SS = +29m.44s., e = +36m.41s. and +39m.1s.
Cape Girardeau eEN = +13m.49s., eE = +18m.6s., iSE = +24m.21s., eSSE = +30m.28s.
Little Rock iSKKSEN = +24m.57s., eSEN = +25m.7s., ePSEN = +26m.7s.
Vermont eSKS = +24m.1s., iPS = +25m.33s., eSS = +30m.49s.
Bagnères eE = +24m.7s., eSKKSN = +24m.16s., eSN = +24m.26s., ePPS = +26m.2s., SSN = +29m.39s., eSSS = +34m.13s.
Cincinnati i = +14m.11s., ePPS = +26m.1s.
East Machias P = +13m.54s., PP = +17m.16s., iS = +24m.36s. and +25m.7s., PS = +25m.31s. and +25m.59s., SS = +30m.44s., iSS = +30m.58s.
Williamstown i = +13m.56s., e = +32m.0s.
Harvard eSKKSE = +24m.37s., iSE = +24m.46s., ePSN = +25m.52s., eL_qE = +46m.43s.
Weston iPZ = +13m.37s., iZ = +13m.53s., ePPPN = +19m.41s., ePPPPN = +21m.6s., eSKKSE = +24m.17s., eSEN = +24m.45s. and +24m.51s., ePPSEN = +26m.11s., iSSEN = +31m.11s., eSSSE = +34m.51s.
Fordham iSP = +14m.16s., iPP = +17m.24s., iE = +24m.45s. and +25m.2s., iEN = +25m.17s., iSP = +26m.8s., iN = +26m.18s. and +26m.30s., iZ = +28m.4s., iN = +38m.59s., eN = +48m.48s.
Philadelphia iP = +13m.34s., iSKS = +24m.12s., i = +24m.20s., iSS = +31m.24s. and +31m.32s., eSSS = +36m.24s.
Georgetown e = +18m.18s., eSS = +31m.10s.
Algiers pPP = +18m.0s., PPP = +19m.33s., pPPP = +19m.58s., ePS = +26m.44s., SS = +32m.5s., SSS = +35m.56s.
Toledo iP = +13m.49s., i = +17m.37s., ePPP = +19m.26s., ePS = +26m.39s.
Columbia eSS = +31m.49s., eSSS = +35m.18s.
San Fernando iSN = +25m.7s., iPS = +27m.37s., iSSN = +32m.13s.
Tananarive ipPPEN = +18m.41s., sPPEN = +18m.53s., E = +24m.50s., EN = +25m.20s., iPPSE = +28m.44s., SSEN = +33m.35s., N = +44m.6s.
San Juan iPS = +30m.22s., SS = +36m.27s., iSS = +36m.30s., eSSS = +40m.6s.

Continued on next page.

Cape Town i = +22m.7s. and +23m.5s., iPKP = +25m.10s., iPP = +26m.47s., iE = +28m.59s., iSKSN = +32m.25s., iSKKS = +34m.13s., ePSE = +37m.58s., iN = +39m.46s., iN = +41m.14s., iSSE = +45m.17s., iSSN = +45m.23s., iSSE = +48m.40s., iSSSN = +49m.35s.
Huancayo ePKP = +19m.34s., iPKP = +20m.8s., i = +20m.38s. and +22m.23s., iPP = +22m.56s., iPKS = +23m.13s. and +23m.33s., i = +23m.58s. and +24m.29s., iPPP = +25m.18s., i = +28m.13s., iSKKS = +29m.2s., iSKSP = +33m.3s., iPPS = +34m.31s., i = +35m.18s., iPKP,PKP = +36m.56s., i = +39m.46s., iSS = +40m.37s. and +40m.50s., i = +41m.3s. and +41m.20s., iSSS = +45m.58s., i = +46m.11s., +46m.23s., +49m.37s., +53m.37s., and +54m.53s.
La Paz PSKS = +34m.5s., SSE = +43m.16s., SSSE = +48m.18s. and SSS = +52m.8s.
La Plata PPP = +28m.31s., SKSP = +35m.19s., PPS = +39m.31s., PSS = +46m.49s.
Rio de Janeiro iSS = +35m.53s., iSSS = +37m.57s.
Long waves were also recorded at Balboa Heights.

Nov. 5d. 10h. 50m. 13s. Epicentre 37°·1N. 141°·8E. (as at 8h.).

Violent at Hukusima, Onahama, Sendai, Isinomaki, Aidu; strong at Kohu, Kakioka, Kumagaya, Miyako, Tukubasan, Yamagata, and Mito; less strong at Tokyo, Yokohama, Hatinohe, and Osima.

Epicentre 37°·1N. 141°·70E. Macroseismic radius greater than 300kms. Shallow (20-60kms.).

See Seismological Bulletin of the Central Met. Obs., Japan, for the year 1938, Tokyo, 1940, pp. 71-74. One macroseismic chart and a chart giving the disposition of the initial movement of the P waves, p. 72.

$A = -\cdot6283$. $B = +\cdot4944$, $C = +\cdot6006$; $\delta = -9$; $h = -1$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Onahama		0·8	257	0 15k	− 3	0 24	− 7	—	—	—
Hukusima		1·2	302	0 7k	−17	0 19	−22	—	—	—
Mito		1·3	236	0 25k	0	0 43	− 1	—	—	—
Sendai		1·3	329	0 38k	+13	0 56	+12	—	—	—
Kakioka		1·5	236	0 29	+ 1	0 47	− 2	—	—	—
Tukubasan		1·6	237	0 29k	− 1	0 51	0	—	—	—
Yamagata		1·6	315	0 22	− 8	0 40	−11	—	—	—
Utunomiya		1·7	250	0 37a	P_g	0 58	+ 4	—	—	—
Kumagaya		2·1	244	0 36k	− 1	1 13	S_g	—	—	—
Mizusawa	E.	2·1	346	i 0 31	− 6	0 53	−11	—	—	—
	N.	2·1	346	i 0 34	− 3	1 2	− 2	—	—	—
Tokyo Cen. Met. Ob.		2·1	229	i 0 38k	+ 1	1 11	S_g	—	—	—
Tokyo Imp. Univ.		2·1	229	0 37	0	1 11	S_g	—	—	—
Komaba		2·2	230	0 22	−16	—	—	—	—	—
Kiyosumi		2·3	214	0 20	−20	0 52	−17	—	—	—
Maebasi		2·3	252	0 50k	P_g	1 24	S_g	—	—	—
Niigata		2·4	291	0 37a	− 4	1 14	+ 2	—	—	—
Yokohama		2·4	226	0 43k	+ 2	1 24	S_g	—	—	—
Kamakura		2·5	226	0 22	−21	0 59	−15	—	—	—
Miyako		2·6	3	0 40a	− 4	1 8	− 9	—	—	—
Mera		2·7	216	1 1k	P_g	1 35	S_g	—	—	—
Morioka		2·7	349	0 42k	− 3	1 11	− 8	—	—	—
Hunatu		2·9	237	0 47	− 1	1 28	+ 4	—	—	—
Koyama		2·9	232	0 20	−28	1 0	−24	—	—	—
Nagano		2·9	261	0 52k	P*	1 33	S*	—	—	—
Akita		3·0	334	0 53k	+ 3	1 28	+ 1	—	—	—
Ito		3·0	225	0 56a	P*	1 37	S_g	—	—	—
Misima		3·0	229	0 53a	+ 3	1 38	S_g	—	—	—
Numadu		3·1	230	0 53a	+ 2	1 43	S_g	—	—	—
Matumoto		3·2	254	0 52	0	1 31	− 1	—	—	—
Yosiwara		3·2	232	0 20	−32	1 5	−27	—	—	—
Toyama		3·4	266	1 5k	P_g	2 2	S_g	—	—	—
Hatinohe		3·5	356	0 54a	− 3	1 31	− 9	—	—	—
Iida		3·6	245	1 2	+ 4	1 42	0	—	—	—
Aomori		3·8	348	0 54a	− 7	1 45	− 2	—	—	—
Husiki		3·8	267	1 5a	P*	1 42	− 5	—	—	—

Continued on next page,

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Omaesaki	3·8	231	1 3	+ 2	1 58	S*	—	—	—
Takayama	3·8	257	1 7	P*	—	—	—	—	—
Wazima	3·9	277	1 2	0	2 1	S*	—	—	—
Hamamatu	4·1	235	1 8$_a$	+ 3	2 8	S*	—	—	—
Kanazawa	4·2	264	1 9	+ 2	2 8	S*	—	—	—
Hatidyozima	4·3	203	1 10	+ 2	1 56	− 4	—	—	—
Gihu	4·4	250	1 9$_k$	− 1	2 3	+ 1	—	—	—
Nagoya	4·4	245	i 1 10$_a$	0	2 12	S*	—	—	—
Hukui	4·6	257	1 16$_a$	+ 4	2 17	S*	—	—	—
Hakodate	4·7	350	1 18	+ 4	2 5	− 5	—	—	—
Ibukisan	4·7	251	1 15	+ 1	2 29	S*	—	—	—
Hikone	4·8	250	1 18$_a$	+ 3	2 19	+ 7	—	—	—
Kameyama	4·9	245	1 19$_a$	+ 2	2 37	S$_g$	—	—	—
Mori	5·1	349	1 20$_k$	0	2 18	− 2	—	—	—
Urakawa	5·1	8	1 25	+ 5	—	—	—	—	—
Muroran	5·2	353	1 18	− 3	2 26	+ 4	—	—	—
Kyoto	5·3	249	1 22	0	3 7	S$_g$	—	—	—
Yagi	5·5	245	1 26$_a$	+ 1	2 43	S*	—	—	—
Miyadu	5·6	257	1 26	− 1	2 43	S*	—	—	—
Osaka	5·6	247	1 29	+ 2	2 59	S$_g$	—	—	—
Toyooka	5·8	257	1 30	+ 1	3 7	S$_g$	—	—	—
Kobe	5·9	249	1 31$_a$	0	3 10	S$_g$	—	—	—
Obihiro	5·9	10	1 33	+ 2	2 41	+ 1	—	—	—
Sapporo	6·0	356	1 31	− 1	2 42	− 1	—	—	—
Siomisaki	6·1	236	1 34$_a$	0	3 20	S$_g$	—	—	—
Kusiro	6·2	18	1 49	P*	2 58	+10	—	—	—
Sumoto	6·2	247	1 35$_a$	0	3 6	S*	—	—	—
Wakayama	6·2	244	1 34$_a$	− 1	3 10	S*	—	—	—
Tokusima	6·6	246	1 43	+ 2	3 36	S$_g$	—	—	—
Okayama	6·8	252	1 51	+ 7	4 7	+64	—	—	—
Nemuro	6·8	24	1 37	− 7	2 46	−17	—	—	—
Sakai	7·1	260	1 48	0	3 27	S*	—	—	—
Tadotu	7·1	250	1 49$_k$	+ 1	3 34	S*	—	—	—
Haboro	7·3	359	1 53	+ 3	—	—	—	—	—
Muroto	7·3	241	1 50$_a$	0	3 43	S*	—	—	—
Koti	7·6	245	i 1 54	− 1	3 24	+ 1	i 2 22	P*	5·2
Hirosima	8·1	254	2 0	− 2	4 8	S*	—	—	—
Matuyama	8·1	249	2 1$_a$	− 1	3 45	+10	—	—	—
Hamada	8·2	256	2 5	+ 2	4 5	S*	—	—	—
Simidu	8·4	242	2 19$_a$	+13	4 16	S*	—	—	—
Ooita	9·2	249	2 18	+ 2	4 46	S$_g$	—	—	—
Simonoseki	9·4	254	2 24	+ 6	5 21	S$_g$	—	—	—
Izuka	9·7	253	2 24	+ 2	5 7	S*	—	—	—
Asosan	9·8	248	2 20	− 4	4 36	SSS	—	—	—
Hukuoka B	9·9	253	e 2 33	PP	4 53	S*	—	—	—
Kumamoto	10·0	248	2 28$_a$	+ 1	4 46	SSS	—	—	—
Miyazaki	10·0	242	2 28$_a$	+ 1	4 33	SS	—	—	—
Titizima	10·0	179	2 27	0	—	—	—	—	—
Otiai	10·2	4	3 4	+33	5 43	S$_g$	—	—	—
Unzendake	10·4	249	2 53	PP	5 21	S*	—	—	—
Husan	10·5	263	i 2 46	PP	4 42	+ 7	—	—	—
Ituhara	10·6	258	2 39	+ 3	5 36	+59	—	—	—
Taikyu	10·7	267	i 2 40	+ 2	5 12	+33	—	—	5·8
Kagosima	10·8	243	2 43	+ 4	5 40	+58	—	—	—
Syuhurei	11·1	270	2 39	− 4	5 13	SSS	—	—	—
Yakusima	11·5	238	2 49$_a$	+ 1	5 6	+ 7	—	—	—
Tomie	11·6	251	2 49$_k$	− 1	5 43	+42	—	—	—
Keizyo	11·8	277	2 51$_a$	− 2	e 5 9	+ 3	—	—	6·5
Zinsen	12·1	277	i 2 55	− 2	i 5 41	SSS	—	—	6·6
Sikka	12·2	4	3 1$_k$	+ 3	5 17	+ 1	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Heizyo		12·8	284	i 3 6a	0	e 5 57	SSS	—	—	7·6
Nake		13·5	234	3 15	0	6 1	SS	—	—	—
Dairen		16·0	283	3 49	+ 1	7 8	SS	—	—	—
Naha		16·1	234	3 23	−26	6 35	−14	—	—	—
Zi-ka-wei		17·9	258	e 4 15	+ 3	7 57	SS	i 4 45	PPP	10·8
Miyakozima		18·7	234	4 17	− 5	8 10	SS	—	—	—
Isigakizima		19·8	237	4 23	−12	8 18	SS	—	—	—
Taihoku		21·1	240	e 4 51	+ 3	i 9 51	?	—	—	—
Sintiku		21·6	241	4 53	− 1	—	—	—	—	—
Karenko		21·7	241	5 2	+ 7	9 2	+11	—	—	—
Taityu		22·2	241	5 5	+ 5	9 29	SS	—	—	—
Arisan		22·6	241	5 2	− 1	—	—	—	—	—
Taito		22·9	239	5 4	− 2	9 30	+17	—	—	—
Tainan		23·3	240	5 12	+ 2	9 47	+27	—	—	—
Takao		23·5	240	5 16	+ 4	—	—	—	—	—
Hong Kong		28·0	246	5 53k	− 2	11 1	+23	6 16	PP	14·5
Manila		29·1	225	5 52	−12	10 39	−17	—	—	14·0
Palau		30·4	195	6 15	− 1	11 19	+ 3	—	—	—
Phu-Lien		34·6	253	6 49	− 4	12 16	− 6	i 8 25	PPP	16·7
Semipalatinsk		45·1	308	8 15	− 5	14 55	− 4	—	—	—
Calcutta	N.	48·0	268	i 8 42k	− 1	i 15 49	+ 8	i 10 29	PP	i 23·5
Almata		48·8	300	8 49	0	—	—	—	—	23·8
College		48·9	32	e 8 46	− 4	15 27	−26	e 9 8	pP	i 24·0
Frunse		50·6	300	e 9 1	− 1	16 15	− 2	—	—	26·0
Medan		51·7	241	i 9 18	+ 7	16 47	+15	—	—	—
Dehra Dun	N.	52·6	283	e 9 18?	0	i 17 15	+31	i 21 24	SSS	i 27·6
Andijan		52·8	297	9 15	− 4	16 44	− 3	—	—	27·8
Agra		54·0	279	e 9 32a	+ 4	17 26	+23	9 52	pP	—
Batavia		54·1	225	9 32	+ 3	17 10	+ 5	—	—	32·8
Honolulu		54·2	88	e 9 43	+14	17 12	+ 6	e 9 55	pP	e 22·4
Tchimkent		54·3	300	e 9 26	− 4	e 17 23	+16	—	—	—
Sverdlovsk		55·3	319	i 9 34	− 4	i 17 19	− 2	i 9 55	pP	25·8
Sitka		56·1	40	e 9 49	+ 6	i 17 35	+ 3	e 10 10	pP	22·5
Samarkand		57·1	298	e 10 1	+11	e 17 33	−12	—	—	—
Hyderabad		58·6	269	9 56	− 5	18 3	− 1	12 26	PP	29·0
Bombay		62·3	274	i 10 20k	− 6	i 19 14	+22	10 43	pP	31·3
Kodaikanal	E.	63·5	263	i 10 30a	− 4	i 19 30	+23	i 13 4	PP	i 32·8
Colombo	E.	63·6	258	10 30	− 5	19 26	+18	—	—	31·8
Brisbane		65·1	169	e 10 59	+14	i 19 29	+ 2	i 11 47	PcP	—
Victoria		66·3	46	10 41	−11	19 28	−14	e 20 37	PS	28·8
Apia		66·9	129	e 11 9	+13	e 19 57	+ 8	e 11 36	PcP	—
Seattle		67·2	46	e 11 29	pP	20 19	PS	e 11 41	sP	28·2
Moscow		67·4	323	10 53	− 6	19 48	− 7	11 14	pP	27·3
Pulkovo		68·3	330	11 0	− 5	20 0	− 6	11 22	pP	30·3
Grozny		69·6	309	11 5	− 8	20 17	− 4	—	—	—
Ferndale		69·7	53	e 11 37	+23	e 20 27	+ 5	—	—	—
Piatigorsk		70·8	312	11 24	+ 4	20 41	+ 6	—	—	28·2
Tiflis		71·0	308	11 16	− 6	20 38	+ 1	e 11 34	pP	e 33·8
Riverview		71·1	172	e 11 41	+19	i 20 37	− 1	15 36	PPP	e 34·1
Sydney		71·1	172	—	—	i 20 27	− 1	—	—	e 27·8
Ukiah		71·1	55	e 11 39	PcP	e 20 26	−12	28 31	SSS	28·7
Adelaide		71·7	183	i 11 25	− 1	i 20 57	+12	i 16 17	PPP	—
Scoresby Sund		71·8	355	i 11 24	− 2	20 46	0	—	—	—
Berkeley		72·4	56	i 11 28	− 2	e 20 48	− 5	—	—	e 29·9
San Francisco	N.	72·4	56	e 12 36	+66	e 21 49	+56	—	—	—
Branner		72·7	56	e 11 33	+ 1	e 20 45	−12	—	—	e 35·0
Perth		72·9	203	11 47	+14	21 22	+23	21 45	PS	33·7
Saskatoon		73·0	37	e 11 32	− 1	i 20 52	− 8	28 50	SSS	32·8
Upsala		73·0	335	11 28	− 5	20 47	−13	e 14 16	PP	e 35·8
Lick		73·1	56	e 11 30	− 4	e 20 59	− 2	—	—	—
Sotchi		73·1	313	11 32	− 2	20 44	−17	—	—	—
Butte		73·7	43	e 11 36	− 2	e 21 1	− 7	e 25 19	SS	31·9
Melbourne		74·6	177	i 12 21	+38	e 21 16	− 2	26 12	SS	32·5
Fresno	N.	74·7	55	e 11 47	+ 4	e 21 18	− 1	e 21 55	PS	—
Theodosia		74·7	315	11 36	− 7	21 18	− 1	—	—	38·8

Continued on next page.

		Δ °	Az. °	P. m. s.	O−C. s.	S. m. s.	O−C. s.	Supp. m. s.		L. m.
Bozeman		74·8	43	e 11 48	+ 4	e 21 21	+ 1	—	—	e 32·1
Simferopol		75·5	316	11 43	− 5	21 35	+ 7	—	—	39·8
Tinemaha		75·5	54	i 11 47	− 1	e 21 22	− 6	—	—	—
Yalta		75·8	315	11 45	− 5	21 46	+15	—	—	35·8
Sebastopol		76·0	316	11 47	− 4	21 47	+13	—	—	39·8
Santa Barbara		76·1	57	i 11 50	− 1	e 21 30	− 5	—	—	—
Haiwee		76·3	54	i 11 46	− 6	e 21 19	−18	—	—	—
Bergen		76·5	340	11 47	− 7	21 36	− 3	—	—	25·8
Mount Wilson		77·3	57	i 11 56	− 2	e 21 42	− 6	—	—	—
Pasadena		77·3	57	e 11 56	− 2	e 21 41	− 7	—	—	e 25·2
Riverside		77·9	57	i 12 0	− 1	e 21 47	− 7	—	—	—
Copenhagen		78·0	334	i 11 57a	− 5	e 21 49	− 6	15 17	PP	—
Bucharest		80·2	319	e 12 11a	− 3	i 22 17	− 2	15 12	PP	—
Potsdam		80·3	332	e 12 17	+ 3	e 22 17	− 3	i 15 33	PP	e 38·8
Hamburg		80·6	334	i 12 11a	− 5	e 22 35	+12	e 15 33	PP	e 38·8
Istanbul		80·8	316	12 31	+14	22 39	+14	15 42	PP	—
Arapuni		81·1	154	—	—	22 47	+19	27 47	SS	34·2
Aberdeen		81·3	341	i 12 17	− 3	i 22 27	− 3	i 15 39	PP	—
New Plymouth		81·4	155	e 11 47?	−33	22 45	+14	—	—	38·8
Ksara		81·4	305	i 12 17a	− 3	i 22 36	+ 5	i 22 58	PS	—
Budapest	E.	81·5	325	12 18	− 3	22 26	− 6	23 7	PS	43·8
	N.	81·5	325	12 18	− 3	22 28	− 4	23 10	PS	43·8
Kecskemet	Z.	81·6	324	e 12 16	− 5	i 22 40	+ 7	i 15 27	PP	e 43·8
Prague		81·6	329	12 19	− 2	e 22 27	− 6	e 15 47	PP	e 33·8
Ivigtut		81·7	5	12 17	− 5	22 30	− 4	27 53	SS	—
Denver		82·0	46	e 12 27	+ 4	i 22 31	− 6	e 15 33	PP	—
Jena		82·0	331	i 12 19	− 4	e 22 38	+ 1	e 15 47	PP	e 33·8
Göttingen		82·2	332	i 12 19	− 5	i 22 54	+15	—	—	e 41·8
Cheb		82·4	331	e 12 23	− 2	e 22 51	+10	—	—	e 42·8
Hof		82·4	330	e 12 18	− 7	e 22 47	+ 6	e 15 47	PP	e 37·8
Edinburgh		82·7	341	i 12 45	+18	i 23 5	+21	i 16 12	PP	34·8
Belgrade		82·8	321	i 12 21k	− 6	i 22 43	− 2	i 16 1	PP	e 43·4
Sofia	E.	82·8	319	i 12 26	− 1	i 23 5	+20	i 16 4	PP	e 40·8
Durham		83·2	340	e 12 34	+ 5	i 23 7	+18	i 15 58	PP	—
Tucson		83·3	54	i 12 28	− 2	22 37	−13	i 12 58	pP	i 34·7
De Bilt		83·4	335	12 26	− 4	22 47	− 4	—	—	e 39·8
Wellington		83·6	156	12 35	+ 3	22 50	− 3	27 50	SS	39·8
Stonyhurst		84·3	340	i 12 35	0	i 23 18	+18	i 12 59	pP	39·8
Laibach		84·6	326	e 12 32	− 4	i 23 22	+19	i 16 18	PP	47·0
Stuttgart		84·7	330	i 12 33a	− 4	i 22 57	− 7	i 13 7	pP	e 42·8
Karlsruhe		84·8	332	i 12 32a	− 5	e 23 18	+13	—	—	—
Uccle		84·8	335	12 33a	− 4	i 23 5	0	i 16 11	PP	38·8
Christchurch		85·0	158	i 12 49a	+11	23 9	+ 2	—	—	40·1
Triest		85·3	327	e 12 34a	+ 6	e 22 57	[− 6]	16 17	PP	—
Strasbourg		85·4	331	i 12 36a	− 4	i 23 9	− 3	i 12 59	pP	e 29·4
Oxford		85·8	337	i 12 40k	− 2	i 23 10	[+ 4]	i 16 14	PP	e 38·8
Rathfarnham Castle		85·8	342	i 13 10	+28	i 23 25	+10	i 16 26	PP	44·0
Kew		85·9	337	i 12 41k	− 2	i 23 7	[0]	i 13 2	pP	e 37·8
Chur		86·1	330	e 12 39	− 5	e 23 17	− 1	—	—	—
Zurich		86·1	330	e 12 39a	− 5	e 23 21	+ 3	e 16 20	PP	—
Basle		86·3	330	e 12 41	− 4	e 23 13	− 7	e 15 53	PP	—
Padova		86·3	327	e 12 45	0	e 23 22	+ 2	e 13 16	pP	e 43·8
Helwan		86·9	305	i 12 42k	− 6	i 23 32	+ 6	16 32	PP	—
Neuchatel		87·0	330	e 12 44	− 4	e 23 15	[+ 1]	—	—	—
Paris		87·1	335	12 54	+ 5	e 23 38	+10	i 23 59	PS	39·8
Besançon		87·2	332	16 47?	PP	e 23 17	[+ 2]	—	—	42·8
Florence		87·8	327	12 47	− 5	23 29	− 5	16 9	PP	40·8
Jersey		88·3	338	e 12 49	− 6	i 23 32	− 7	i 13 30	pP	43·8
Moncalieri		88·4	330	i 12 47?	− 8	23 23	[+ 1]	—	—	33·3
Rome		88·8	323	12 52a	− 5	23 43	− 1	16 31	PP	52·8
Grenoble		89·0	330	e 12 59	+ 1	i 24 5	+20	e 16 38	PP	e 40·9
Chatham Ils.		89·1	152	—	—	22 47	[−40]	e 29 41	SS	39·8
Chicago		89·3	35	e 12 58	− 1	23 32	[+ 4]	29 33	SS	e 39·0
Chicago (Loyola)		89·3	35	—	—	i 23 39	− 8	e 29 52	SS	—
Puy de Dôme		89·6	332	e 12 59	− 2	e 21 50	?	—	—	e 40·8

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Marseilles		90·7	329	e 13 3	− 3	23 57	− 4	i 13 28	pP	e 43·8
St. Louis		90·7	38	e 13 6	0	e 23 51	−10	e 16 54	PP	e 39·0
Ann Arbor		90·8	32	e 13 23	+17	i 23 59	− 3	16 53	PP	37·6
Shawinigan Falls		91·1	23	13 5	− 3	e 23 59	− 5	—	—	e 43·8
Ottawa		91·2	25	13 5	− 3	24 0	− 5	16 47	PP	45·8
Seven Falls		91·2	21	e 13 5	− 3	i 23 45	[+ 5]	29 45	SS	e 39·1
Cape Girardeau		92·1	39	e 13 13	+ 1	e 24 8	− 5	e 25 22	PS	—
Vermont		92·8	24	i 13 18	+ 2	i 23 47	[− 2]	e 25 37	PS	e 37·4
Bagnères		92·9	333	e 13 14	− 2	e 23 37	[−12]	e 13 36	pP	e 44·8
Cincinnati		93·0	34	i 13 10	− 7	e 24 33	+12	e 16 50	PP	e 47·8
East Machias		94·3	20	13 30	+ 7	e 24 4	[+ 7]	e 17 8	PP	e 37·5
Williamstown		94·4	24	i 13 21	− 2	i 25 52	PS	i 17 28	PP	—
Harvard		95·1	23	e 13 23	− 3	e 24 16	[+15]	e 17 32	PP	e 46·8
Weston		95·3	23	e 13 24a	− 3	i 23 45	[−17]	i 17 15	PP	e 42·8
Fordham		95·8	26	i 13 27	− 2	i 24 27	−18	i 17 20	PP	e 45·6
Philadelphia		96·1	28	i 17 32	PP	i 24 2	[− 5]	e 31 15	SS	e 37·2
Algiers		97·1	327	e 13 40	+ 5	24 17	[+ 5]	i 17 39	PP	e 49·8
Toledo		97·2	334	e 13 31	− 5	i 24 36	−21	i 17 31	PP	—
Almeria		99·3	332	e 14 15	+30	e 24 51	−23	e 17 53	PP	37·5
Granada		99·4	333	i 13 55	+ 9	25 6	− 9	i 17 48	PP	—
Tacubaya	N.	99·7	57	e 13 55	+ 8	—	—	e 27 40	PPS	—
Malaga		100·2	333	e 13 23	−26	—	—	i 17 42	PP	46·8
San Fernando	N.	101·0	334	e 18 27	PP	i 27 17	PS	—	—	—
Tananarive		104·5	258	14 47	+39	24 45	[− 3]	18 44	PP	e 52·0
Cape Town	E.	134·4	256	i 22 9	PP	i 32 31	PS	i 24 41	PPP	65·2
	N.	134·4	256	i 22 2	PP	32 38	PS	i 40 9	SS	62·2
Huancayo		138·4	63	e 19 22	[− 5]	—	—	—	—	—
La Paz		146·5	60	i 18 54	[−48]	30 0	{+ 1}	i 21 8	pPKP	68·8
Rio de Janeiro		165·2	18	i 21 7	[+61]	i 30 20	?	i 24 55	PP	i 45·0

Additional readings :—
Hukusima S = +25s.
Koti eNZ = +3m.42s., iS_E = +4m.14s.
Zi-ka-wei i = +6m.3s.
Hong Kong PPP? = +7m.15s., SS = +12m.14s.
Phu-Lien i = +7m.13s., SS = +13m.19s.
Calcutta iPPPN = +11m.18s., iSSN = +19m.7s., iSSSN = +20m.26s.
College $ePcP$ = +9m.57s., sPP = +11m.28s., sS = +16m.9s.
Andijan e = +9m.26s.
Agra eE = +9m.40s., PPE = +11m.39s., iEN = +17m.44s., SSE = +21m.14s., SSSN = +22m.7s.
Batavia iEN = +9m.54s., iSEN = +17m.32s.
Honolulu esS = +17m.19s., SS = +20m.59s., esSS = +21m.42s.
Sverdlovsk i = +9m.48s.
Sitka PPP = +13m.24s., isS = +17m.45s., iSS = +20m.34s., sSS = +21m.57s., eSSS = +23m.49s.
Hyderabad PSN = +18m.38s., SSN = +22m.8s.
Bombay iPN = +10m.23s., pPNE = +10m.43s., iEN = +10m.47s., sPE = +10m.57s., iPPEN = +12m.17s., iSSEN = +23m.17s.
Kodaikanal iPPPE = +14m.31s., iPSE = +19m.56s., iSSE = +24m.0s., iSSSE = +26m.47s.
Brisbane iE = +11m.23s., iS_cSE = +20m.59s., iSSE = +23m.53s.
Apia iPP = +13m.27s., iPS = +20m.11s.
Seattle sP = +11m.49s.
Tiflis eN = +11m.30s., esSN = +21m.9s., eSSN = +25m.0s.
Riverview eE = +11m.50s., iN = +11m.53s., iPSN = +20m.58s., iSSN = +25m.20s., eL_qE = +30m.35s.
Ukiah esPP = +14m.46s., sS = +20m.43s.
Adelaide i = +20m.42s.
Berkeley iP = +11m.33s., eZ = +11m.47s., eN = +20m.46s.
San Francisco eSE = +21m.52s.
Branner eN = +11m.57s., eSE = +20m.53s., eEN = +30m.33s.
Perth i = +12m.0s., +12m.14s., +12m.25s., +21m.17s., +21m.57s., and +23m.59s., SS = +25m.52s., i = +26m.32s. and +27m.12s., SSS = +28m.35s.
Upsala ePPE = +14m.31s., ePPPN = +16m.13s., ePPPE = +16m.16s., iPSE = +21m.11s., eSSN = +25m.26s., eSSE = +25m.47s., eSSSE = +29m.17s.
Lick eE = +11m.38s. and +21m.5s.
Butte eS = +20m.54s., esS = +21m.40s.
Melbourne i = +21m.27s., SSS = +29m.44s.
Copenhagen e = +12m.20s., eZ = +14m.35s., eE = +16m.35s., eZ = +16m.52s., eEN = +17m.7s., e = +22m.11s., SS = +26m.53s., SSS = +30m.41s.

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Bucharest iN = +15m.40s., iEN = +22m.37s., iE = +22m.52s., iPSN = +23m.2s., SSEN = +27m.44s., iEN = +28m.15s.
Potsdam eN = +16m.53s.
Hamburg iZ = +12m.33s., eSSE = +27m.41s.
Istanbul PS = +23m.23s.
Arapuni i = +28m.17s.
Aberdeen iP_cP = +12m.35s., iPPP = +17m.39s., iS = +22m.45s., PS = +23m.45s., i = +26m.57s.
Budapest E P_cP = +12m.22s., i = +17m.33s., e = +24m.9s., SS = +28m.7s.
Budapest N. i = +12m.34s., PP = +15m.20s., i = +17m.50s., e = +19m.5s., S_cS = +22m.47s., SS = +28m.1s.
Kecskemet Z i = +12m.37s., i = +16m.23s., e = +19m.52s., iS_cS = +23m.2s., iSS = +27m.22s., e = +32m.2s.
Prague ePE = +12m.24s., eSS = +28m.41s.
Ivigtut i = +12m.39s.
Denver eE = +12m.45s., iE = +12m.53s., iN = +13m.33s., eN = +22m.29s., iSE = +22m.38s., iE = +22m.49s., iN = +22m.55s.
Jena iPE = +12m.24s., iSE = +22m.46s., iSN = +22m.52s., eN = +27m.26s., eE = +27m.41s.
Hof eNE = +17m.42s., +28m.31s., and +32m.25s.
Rathfarnham Castle iPPP = +18m.53s., iS = +24m.15s., iPS = +25m.15s., i = +26m.15s. and +29m.0s., SS = +30m.41s.
Edinburgh i = +13m.4s., +17m.59s., +19m.18s., +26m.59s., +28m.30s., and +31m.52s.
Belgrade iZ = +12m.58s., iNE = +19m.26s., +23m.19s., and +28m.26s.
Sofia iE = +12m.47s., eE = +28m.36s.
Durham iPEN = +12m.46s., iN = +12m.51s., +13m.3s., and +17m.52s., iEN = +24m.9s.
Tucson iP_cP = +12m.39s., isP = +13m.3s., i = +13m.25s., +13m.50s., +15m.7s., iPP = +15m.41s., ipPP = +16m.12s., ipS = +22m.58s., SS = +28m.23s., sSS = +28m.31s., SSS = +31m.30s., iSSS = +32m.4s.
De Bilt i = +23m.6s.
Wellington iZ = +12m.56s., PP = +15m.29s., i = +23m.10s., PS = +23m.30s., SSS = +31m.10s., L_q = +34·8m.
Stonyhurst iPP = +16m.9s., iPPP = +17m.49s., i = +23m.24s., iSS = +28m.41s., iSSS = +32m.12s.
Laibach iNE = +13m.10s.
Stuttgart iPP = +15m.59s., iPPP = +17m.57s., iS = +23m.20s., i = +25m.27s., iSS = +28m.57s., iSSS = +32m.27s.
Uccle iNZ = +12m.57s., iPPPZ = +18m.2s., iEN = +23m.20s., iSSE = +28m.23s.
Christchurch iS = +23m.19s.
Strasbourg isPE = +13m.11s., iPPE = +16m.6s., E = +23m.46s., SSE = +29m.14s.
Kew isP = +13m.14s., iPP = +16m.22s., iPPPEN = +18m.9s., i = +18m.25s., +19m.50s. and +20m.3s., ipSEN = +23m.32s., isSNZ = +23m.45s., iSPE = +24m.5s., isPSEN = +24m.27s., iZ = +24m.59s., iEN = +25m.27s., iSSZE = +29m.22s., iSSSEN = +32m.19s.
Zurich ePPP = +18m.12s.
Padova eP = +12m.49s., iPP = +16m.55s., iS = +23m.55s.
Helwan i = +19m.49s., SS = +29m.27s.
Paris PP = +13m.19s.
Florence PS = +24m.8s., SS = +33m.47s.
Jersey iPP = +16m.27s., esS = +24m.9s., iSS = +29m.38s.
Rome i = +16m.16s., iZ = +16m.49s., PPP = +18m.31s., iEN = +19m.36s., S = +23m.59s., PS = +24m.56s., SS = +30m.0s.
Grenoble i = +13m.19s. and +13m.31s., ePPP = +19m.5s., i = +23m.46s., eSS = +29m.48s.
Chatham Ils. i = +24m.17s., SS = +27m.47s.
Chicago iS = +23m.45s., isS = +29m.58s., SSS = +32m.35s.
Chicago, Loyola e = +36m.29s.
Marseilles PPSE = +25m.34s., eSSS = +33m.47s. ?
St. Louis iSE = +24m.1s., eSSN = +30m.12s.
Ann Arbor SS = +30m.11s., eSSS = +34m.5s.
Ottawa SS = +30m.17s., e = +36m.47s. ?
Seven Falls SSS = +33m.47s., e = +36m.20s.
Cape Girardeau eSSE = +30m.20s.
Vermont eS = +24m.12s., eSS = +30m.47s., esSS = +30m.57s.
Bagnères ePPN = +16m.58s., ePPPN = +19m.2s., eSKKSN = +24m.10s., eSE = +24m.27s., iPPSN = +26m.9s., eSSN = +30m.55s., SSSE = +34m.25s.
Cincinnati i = +14m.18s.
East Machias epPP = +17m.22s., eSKS = +23m.52s., iS = +24m.16s., isS = +24m.38s., ipS = +24m.49s., ePS = +25m.54s., pPS = +25m.58s., sPS = +26m.9s., eSS = +30m.45s., sSS = +31m.15s.
Williamstown i = +14m.47s.
Harvard iSE = +24m.42s., iN = +26m.12s., eL_qE = +41m.47s.
Weston iPZ = +13m.30s., eSKKSN = +24m.23s., iSE = +24m.41s., ePSEZ = +26m.13s., eSSE = +31m.15s., eSSSE = +34m.35s., eEN = +37m.27s., eSSSSE = +38m.25s.

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Fordham iE = +24m.54s. and +25m.24s., iEN = +38m.22s.
Algiers pPP = +18m.4s., PPP = +19m.27s., PS = +26m.33s., SS = +31m.47s. ?, SSS = +35m.14s.
Toledo iP = +13m.35s. a, i = +25m.16s., eSS = +32m.12s.
Granada i = +20m.14s. and +25m.47s.
Tananarive eN = +18m.58s. and +25m.9s., SKKSEN = +25m.30s., PSE = +27m.44s., PSN = +27m.49s., PSEN = +29m.9s., SSE = +33m.25s., SSN = +33m.45s.
Cape Town E i = +22m.58s., iPP = +26m.58s., iS = +40m.59s., i = +42m.33s.
Cape Town N i = +22m.21s. and +25m.17s., iS = +35m.24s.
La Paz iPKPE = +19m.47s., iE = +20m.27s., ipPKP = +21m.19s., isSPE = +22m.7s., SKPE = +22m.17s., SS = +42m.37s., L_qE = +61m.20s.
Rio de Janeiro iPN = +21m.10s., iSN = +30m.28s., iSSN = +35m.58s., iSSSN = +38m.58s.

Nov. 5d. 11h. 9m. 53s. Epicentre 37°·1N. 141°·8E. (as at 10h.).

Intensity III at Hukusima, II at Onahama and Tukubasan, I at Sendai, Mizusawa, Kakioka, Morioka, Mito, Utunomiya, and Yamagata.

Epicentre 37°·4N. 141°·8E. Shallow.

See Seismological Bulletin of the Central Met. Obs., Japan, for the year 1938, Tokyo, 1940, pp. 74-75.

A = −·6283, B = +·4944, C = +·6006; $\delta = -9$; $h = -1$.

	Δ	Az.	P.	O−C.	S.	O−C.
	°	°	m. s.	s.	m. s.	s.
Onahama	0·8	257	0 17	− 1	—	—
Hukusima	1·2	302	−0 3k	−27	0 13	−28
Sendai	1·3	329	0 25k	0	0 39	− 5
Kakioka	1·5	236	0 29	+ 1	0 49	0
Tyosi	1·5	209	0 31	+ 3	—	—
Tukubasan	1·6	237	0 28	− 2	0 52	+ 1
Yamagata	1·6	315	0 32	+ 2	—	—
Utunomiya	1·7	250	0 27	− 4	—	—
Mizusawa	2·1	346	0 26	−11	0 44	−20
Tokyo Cen. Met. Ob.	2·1	229	0 41	+ 4	—	—
Maebasi	2·3	252	0 27	−13	0 58	−11
Yokohama	2·4	226	0 38	− 3	—	—
Mera	2·7	216	0 35	−10	—	—
Morioka	2·7	349	0 44	− 1	1 12	− 7
Takada	2·8	270	1 18	S	(1 18)	− 4
Hunatu	2·9	237	0 49	+ 1	1 35	S_g
Numadu	3·1	230	0 53	+ 2	1 37	S*
Matumoto	3·2	254	0 59	P*	1 38	S*
Toyama	3·4	266	1 10	P_g	—	—
Hatinohe	3·5	356	0 47	−10	1 23	−17
Iida	3·6	245	1 18	P_g	2 35	?
Aomori	3·8	348	0 42	−19	1 37	−10
Wazima	3·9	277	1 10	P*	—	—
Hatidyozima	4·3	203	1 6	− 2	1 52	− 8
Gihu	4·4	250	1 56	S	(1 56)	− 6
Nagoya	4·4	245	—	—	2 11	S*
Hakodate	4·7	350	1 21	P*	—	—
Ibukisan	4·7	251	0 56	−18	2 7	− 3
Hikone	4·8	250	1 34	P_g	2 34	S_g
Muroran	5·2	353	2 8	?	—	—
Kyoto	5·3	249	1 0	−22	—	—
Miyadu	5·6	257	1 25	− 2	2 30	−3
Toyooka	5·8	257	1 32	+ 3	—	—
Kobe	5·9	249	1 8	−23	—	—
Kusiro	6·2	18	2 42	S	(2 42)	− 6
Sumoto	6·2	247	2 39	S	(2 39)	− 9
Wakayama	6·2	244	2 37	S	(2 37)	−11
Tokusima	6·6	246	1 42	+ 1	3 30	S*
Koti	7·6	245	—	—	e 4 7?	S_g
Hirosima	8·1	254	1 58	− 4	4 8	S_g

Additional reading :—
Mizusawa SN = +48s.

Nov. 5d. 18h. 9m. 47s. Epicentre 37°·1N. 141°·8E. (as at 11h.).

Intensity III Onahama, II Hukusima, Utunomiya, and Tukubasan, I Sendai, Kakioka, Mito, Morioka, and Hatinohe.

Epicentre 37°·2N. 141°·6E. Shallow.

$A = -\cdot6283$, $B = +\cdot4944$, $C = +\cdot6006$; $\delta = -9$; $h = -1$.

		△	Az.	P.	O−C.	S.	O−C.
		°	°	m. s.	s.	m. s.	s.
Onahama		0·8	257	0 17	− 1	0 25	− 6
Hukusima		1·2	302	−0 28k	−52	−0 25	−66
Mito		1·3	236	0 23a	− 2	0 37	− 7
Sendai		1·3	329	0 24	− 1	0 38	− 6
Kakioka		1·5	236	0 26	− 2	0 47	− 2
Tyosi		1·5	209	0 27	− 1	0 38	−11
Tukubasan		1·6	237	0 27	− 3	0 44	− 7
Yamagata		1·6	315	0 28	− 2	0 46	− 5
Utunomiya		1·7	250	0 28	− 3	0 46	− 8
Kumagaya		2·1	244	0 24	−13	0 58	− 6
Mizusawa		2·1	346	0 36	− 1	0 59	− 5
Tokyo Cen. Met. Ob.		2·1	229	0 37	0	0 58	− 6
Katuura		2·3	214	0 36	− 4	1 3	− 6
Maebasi		2·3	252	0 37k	− 3	1 5	− 4
Niigata		2·4	291	0 47	P_g	1 16	S*
Yokohama		2·4	226	0 41	0	1 8	− 4
Mera		2·7	216	0 51	P*	1 27	S_g
Morioka		2·7	349	0 43k	− 2	1 11	− 8
Takada		2·8	270	0 48	+ 1	1 21	− 1
Hunatu		2·9	237	0 47	− 1	1 22	− 2
Nagano		2·9	261	0 49	+ 1	1 22	− 2
Akita		3·0	334	1 4	P_g	—	—
Ito		3·0	225	0 58	P_g	—	—
Kohu		3·0	241	0 49	− 1	1 29	+ 2
Misima		3·0	229	0 51	+ 1	—	—
Numadu		3·1	230	0 54	+ 3	1 41	S_g
Osima		3·1	220	0 51	0	1 25	− 4
Matumoto		3·2	254	1 17	S	(1 17)	−15
Toyama		3·4	266	0 58	+ 3	1 42	S*
Hatinohe		3·5	356	0 56	− 1	1 33	− 7
Iida		3·6	245	1 15	P_g	1 55	S_g
Aomori		3·8	348	1 6	P*	1 51	+ 4
Husiki		3·8	267	1 8	P*	2 14	S_g
Omaesaki		3·8	231	1 6	P*	1 55	S*
Wazima		3·9	277	0 58	− 4	2 0	S*
Hatidyozima		4·3	203	1 11	+ 3	1 54	− 6
Gihu		4·4	250	1 8	− 2	1 55	− 7
Nagoya		4·4	245	c 1 10	0	2 11	S*
Hakodate		4·7	350	1 18	+ 4	—	—
Ibukisan		4·7	251	1 14	0	—	—
Hikone		4·8	250	1 20	+ 5	—	—
Kameyama		4·9	245	1 26	+ 9	—	—
Mori		5·1	349	1 23	+ 3	2 24	+ 4
Urakawa		5·1	8	2 11	S	(2 11)	− 9
Kyoto		5·3	249	1 13	− 9	—	—
Miyadu		5·6	257	1 24	− 3	—	—
Osaka		5·6	247	1 32	+ 5	2 55	S*
Toyooka		5·8	257	1 29	0	—	—
Kobe		5·9	249	1 39	P*	—	—
Obihiro		5·9	10	1 33	+ 2	2 31	− 9
Sapporo		6·0	356	1 50	P*	2 45	+ 2
Siomisaki		6·1	236	1 49	P*	—	—
Kusiro		6·2	18	1 57	P_g	—	—
Sumoto		6·2	247	2 3	P_g	—	—
Wakayama		6·2	244	1 32	− 3	2 57	+ 9
Tokusima		6·6	246	1 42	+ 1	3 28	P*
Koti		7·6	245	—	—	e 4 13?	S_g
Keizyo	E.	11·8	277	e 2 51	− 2	e 3 45	?

Nov. 5d. 21h. 23m. 31s. Epicentre 37°·1N. 141°·8E. (as at 18h.).

Intensity II at Sendai, Kakioka, Tukubasan, Mito, and Oiwake.

Epicentre 37°·0N. 142°·3E. Macroseismic radius 200-300kms. Shallow.

See Seismological Bulletin of the Central Met. Obs., Japan, for the year 1938, Tokyo, 1940, pp. 76-78.

$A = -\cdot6283$, $B = +\cdot4944$, $C = +\cdot6006$; $\delta = -9$; $h = -1$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m.	s.	m.
Onahama	0·8	257	0 23k	+ 5	0 40	+ 9	—	—	—
Hukusima	1·2	302	0 16a	− 8	0 38	− 3	—	—	—
Mito	1·3	236	0 28a	+ 3	0 47	+ 3	—	—	—
Sendai	1·3	329	0 30a	+ 5	0 51	+ 7	—	—	—
Kakioka	1·5	236	0 31	+ 3	0 55	+ 6	—	—	—
Yamagata	1·6	315	0 34a	+ 4	1 1	+10	—	—	—
Tukubasan	1·6	237	0 31a	+ 1	0 53	+ 2	—	—	—
Utunomiya	1·7	250	0 34a	P_g	0 59	S_g	—	—	—
Kumagaya	2·1	244	0 40a	P*	1 10	S_g	—	—	—
Mizusawa	2·1	346	i 0 37	0	i 1 5	S*	1 8	S_g	—
Tokyo Cen. Met. Ob.	2·1	229	0 39	P*	1 18	S_g	—	—	—
Katuura	2·3	214	0 45	P_g	1 13	S*	—	—	—
Maebasi	2·3	252	0 41	+ 1	1 13	S*	—	—	—
Niigata	2·4	291	0 51	P_g	1 29	+17	—	—	—
Yokohama	2·4	226	0 43a	+ 2	1 29	+17	—	—	—
Miyako	2·6	3	0 43	− 1	1 7	−10	—	—	—
Morioka	2·7	349	0 45a	0	1 19	0	—	—	—
Oiwake	2·7	254	0 48	P*	1 32	S_g	—	—	—
Mera	2·7	216	0 49	P*	1 39	S_g	—	—	—
Takada	2·8	270	0 52	P*	1 35	S_g	—	—	—
Hunatu	2·9	237	0 50	+ 2	1 29	S*	—	—	—
Nagano	2·9	261	0 55a	P*	1 36	S_g	—	—	—
Akita	3·0	334	0 58	P_g	1 50	S_g	—	—	—
Ito	3·0	225	0 52a	+ 2	1 40	S_g	—	—	—
Kohu	3·0	241	0 52	+ 2	1 38	S_g	—	—	—
Misima	3·0	229	0 52	+ 2	1 38	S_g	—	—	—
Numadu	3·1	230	0 56	P*	1 41	S_g	—	—	—
Osima	3·1	220	0 46	− 5	1 28	− 1	—	—	—
Matumoto	3·2	254	0 52	0	1 29	− 3	—	—	—
Toyama	3·4	266	1 4	P*	2 5	S_g	—	—	—
Hatinohe	3·5	356	0 57	0	1 35	− 5	—	—	—
Iida	3·6	245	1 1	+ 3	1 43	+ 1	—	—	—
Aomori	3·8	348	1 7	P*	2 1	S*	—	—	—
Husiki	3·8	267	1 10	P*	2 12	S_g	—	—	—
Omaesaki	3·8	231	1 8	P*	2 7	S_g	—	—	—
Wazima	3·9	277	1 5a	+ 3	2 8	S_g	—	—	—
Hamamatu	4·1	235	1 8k	+ 3	1 51	− 4	—	—	—
Hatidyozima	4·3	203	1 6	− 2	1 52	− 8	—	—	—
Gihu	4·4	250	1 14a	+ 4	2 7	+ 5	—	—	—
Nagoya	4·4	245	1 15	P*	2 18	S*	—	—	—
Hukui	4·6	257	1 9	− 3	2 7	0	—	—	—
Hakodate	4·7	350	1 12	− 2	—	—	—	—	—
Ibukisan	4·7	251	1 21	P*	2 18	+ 8	—	—	—
Hikone	4·8	250	1 20	+ 5	2 23	S*	—	—	—
Kameyama	4·9	245	1 20	+ 3	2 44	S_g	—	—	—
Tu	4·9	243	1 19	+ 2	2 43	S_g	—	—	—
Mori	5·1	349	1 29	P*	1 45	P_g	—	—	—
Urakawa	5·1	8	1 20	0	2 24	+ 4	—	—	—
Kyoto	5·3	249	1 22	0	2 55	S_g	—	—	—
Yagi	5·5	245	1 27	+ 2	1 46	P_g	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Miyadu		5·6	257	1 30	+ 3	2 36	+ 3	—	—	—
Osaka		5·6	247	1 33	+ 6	2 17	−16	—	—	—
Toyooka		5·8	257	1 33	+ 4	2 47	+ 9	—	—	—
Kobe		5·9	249	1 35k	+ 4	3 6	S*	—	—	—
Obihiro		5·9	10	1 25	− 6	2 44	+ 4	—	—	—
Sapporo		6·0	356	1 51	P*	2 59	S*	—	—	—
Kusiro		6·2	18	2 51	S	(2 51)	+ 3	—	—	—
Sumoto		6·2	247	1 39k	+ 4	3 25	S_g	—	—	—
Wakayama		6·2	244	1 35a	0	3 13	S*	—	—	—
Tokusima		6·6	246	1 42	+ 1	3 30	S_g	—	—	—
Okayama		6·8	252	1 52	P*	—	—	—	—	—
Nemuro		6·8	24	1 49	+ 5	2 49	−14	—	—	—
Sakai		7·1	260	1 48	0	—	—	—	—	—
Koti		7·6	245	1 56	+ 1	3 35	S*	4 8	S_g	5·0
Hirosima		8·1	254	2 2	0	4 12	S*	—	—	—
Matuyama		8·1	249	2 4	+ 2	—	—	—	—	—
Hamada		8·2	256	2 10	+ 7	3 43	+ 5	—	—	—
Ooita		9·2	249	2 37	PPP	—	—	—	—	—
Hukuoka B		9·9	253	—	—	e 4 42	SSS	—	—	—
Kumamoto		10·0	248	2 30	+ 3	5 2	S*	—	—	—
Miyazaki		10·0	242	2 27	0	4 29	+ 7	—	—	—
Titizima		10·0	179	2 59	PPP	—	—	—	—	—
Husan		10·5	263	e 4 59	S	(e 4 59)	SSS	—	—	8·3
Yakusima		11·5	238	2 49a	+ 1	4 59	0	—	—	—
Keizyo		11·8	277	2 56	+ 3	5 16	SS	—	—	7·0
Zinsen	E.	12·1	277	e 2 58	+ 1	e 5 32	SS	—	—	7·3
Giran		21·1	240	1 35	?	2 35	?	—	—	—
Irkutsk		30·2	312	e 6 13	− 1	e 11 11	− 2	e 12 29	SS	15·5
Calcutta	N.	48·0	268	e 5 33	?	e 15 38	− 3	—	—	—
Almata		48·8	300	e 8 47	− 2	—	—	—	—	—
Frunse		50·6	300	e 9 24	+22	e 17 2	PPS	—	—	—
Andijan		52·8	297	e 9 30	+11	e 17 5	PS	—	—	—
Agra	E.	54·0	279	i 9 31	+ 3	17 4	+ 1	20 45	SS	—
Sverdlovsk		55·3	319	i 9 37	− 1	i 17 22	+ 1	—	—	25·0
Samarkand		57·1	298	e 10 1	+11	—	—	—	—	—
Moscow		67·4	323	e 10 55	− 4	e 19 51	− 4	11 17	pP	37·0
Baku		68·4	305	e 11 9	+ 3	e 20 17	+10	—	—	36·0
Tiflis		71·0	308	e 11 17	− 5	—	—	—	—	e 38·5
Tinemaha		75·5	54	e 11 43	− 5	—	—	—	—	—
Mount Wilson	z.	77·3	57	i 11 52a	− 6	—	—	—	—	—
Pasadena	z.	77·3	57	i 11 52a	− 6	—	—	—	—	—
Riverside	z.	77·9	57	e 11 55	− 6	—	—	—	—	—
Ksara		81·4	305	i 12 20	0	e 22 38	+ 7	—	—	—
Tucson		83·3	54	i 12 25a	− 5	—	—	—	—	—
Stuttgart		84·7	330	e 12 47	+10	—	—	—	—	e 46·5
Helwan		86·9	305	e 12 56	+ 8	e 23 23	− 3	e 16 32	PP	—
Rome		88·8	323	—	—	e 23 47	+ 3	e 28 39	SS	e 49·2
La Paz	z.	146·5	60	19 42	[0]	—	—	—	—	—

Additional readings :—
Keizyo eN = +4m.34s.
Almata e = +9m.1s.
Tucson iP = +12m.40s.
Long waves were also recorded at other European stations.

Nov. 5d. Further shocks were recorded locally from the neighbourhood of the Epicentre of 8h. 43m. The first recorded phase from Mizusawa and Nagoya in each case is given and is usually a P. Where it is S the fact is noted.

Mizusawa :—

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
9	29	15	12	47	54 (S)	14	38	2 (S)	18	22	53 (S)
9	53	57	12	48	50	14	43	10	18	58	24
10	8	58	12	53	29 (S)	14	45	35 (S)	19	27	7
10	16	43 (S)	12	55	27 (S)	14	52	25	19	48	33
11	5	57	12	59	55	15	5	2	20	11	2
11	13	4	13	6	38 (S)	15	10	28 (S)	20	16	13 (S)
11	14	54	13	9	54	15	14	55	20	28	41 (S)
11	19	25 (S)	13	14	7 (S)	15	23	34 (S)	20	55	28 (S)
11	25	44	13	17	26	15	53	1	21	4	33
11	31	59	13	20	10	16	0	37	21	6	22 (S)
11	38	5	13	28	15	16	18	16	21	10	43
11	42	44 (S)	13	34	59 (S)	16	22	31 (S)	21	35	43
11	44	53	13	37	45	16	31	25 (S)	21	41	46 (S)
11	48	39	13	40	19	16	45	2 (S)	21	56	16
11	51	33 (S)	13	48	24	16	49	38	22	16	52
11	55	33 (S)	13	55	23 (S)	17	9	6	22	32	5
11	58	46	14	2	2	17	24	7	22	50	41 (S)
12	12	2	14	6	57	17	33	33	23	10	28
12	15	36 (S)	14	10	52 (S)	17	41	22 (S)	23	16	59 (S)
12	22	15	14	12	27 (S)	17	54	18	23	29	11
12	28	30 (S)	14	23	12 (S)	17	58	57 (S)	23	41	39 (S)
12	41	17	14	34	0 (S)	18	7	1 (S)	23	53	3 (S)

Nagoya :—

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
9	3	34	11	42	57	14	8	51	17	54	51
9	30	21	11	45	42	14	23	46	18	14	20 (S)
9	54	32	11	49	16	14	43	42	18	59	27
10	9	33	11	58	49	14	53	19	20	11	57
10	17	0	12	22	43	14	55	54 (S)	20	29	21
10	57	24	12	42	14	15	10	17	20	56	22
11	14	36 (S)	12	49	35	15	15	33	21	11	20
11	16	28 (S)	13	0	21	15	53	38	21	36	13
11	20	37 (S)	13	18	8	16	1	11	21	41	53
11	26	16	13	20	45	16	19	15	21	56	52
11	31	59	13	28	57	17	24	37	22	17	28
11	38	16	14	2	30	17	33	53	23	11	16
									23	29	48

Nov. 5d. Readings also at 0h. (near Medan), 3h. (Yalta and near Manila and near Nagoya), 8h. (Tiflis and near Santiago), 9h. (Tiflis, near Santiago (2), and San Javier), 10h. (La Plata, Keizyo, Koti, near Tukubasan, Tokyo Imp. Univ., and Koyama), 11h. (Tiflis, Koti, near Tokyo Imp. Univ., Tokyo Cen. Met. Obs. (2), and Tukubasan), 12h. (Piatigorsk and Fordham), 14h. (Keizyo and Koti), 15h. (Koti), 16h. (Agra, Almata, Frunse, Tchimkent, near Andijan, Samarkand, Tashkent, and Koti), 17h. (Harvard), 19h. (Koti (2)), 20h. (Baku and Sverdlovsk), 21h. (Phu-Lien, Koti and near Manila), 22h. (Baku, Tiflis, Sverdlovsk, Irkutsk, Tucson, Hukuoka B, and Koti), 23h. (Agra, Hukuoka B, Koti, Zinsen, Sverdlovsk, Copenhagen, De Bilt, Strasbourg, Cheb, and Denver).

Nov. 6d. 8h. 53m. 52s. Epicentre 37°·1N. 141°·8E. (as on Nov. 5d.).

Violent at Hukusima, Onahama, and Aidu ; strong at Sendai and Kakioka ; rather strong at Tyosi, Tokyo, and Yokohama ; moderate at Tomisaki, Katuura, and Osima.

Epicentre 37°·55N. 141°·75E. Macroseismic radius greater than 300kms. Shallow.

See Seismological Bulletin of the Central Met. Obs., Japan, for the year 1938, Tokyo, 1940, pp. 78-91. One macroseismic chart and chart giving the disposition of the initial movements of the P waves, p. 78.

$A = -\cdot6283$, $B = +\cdot4944$, $C = +\cdot6006$; $\delta = -9$; $h = -1$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m.	s.	m.
Onahama	0·8	257	0 23$_a$	+ 5	0 38	+ 7	—	—	—
Hukusima	1·2	302	0 22$_k$	− 2	0 37	− 4	—	—	—
Sendai	1·3	329	0 24$_a$	− 1	0 38	− 6	—	—	—
Kakioka	1·5	236	0 28$_a$	0	0 41	− 8	—	—	—
Tyosi	1·5	209	0 32	P$_g$	0 59	+10	—	—	—

Continued on next page.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tukubasan	1·6	237	0 32a	+ 2	0 56	+ 5	—	—	—
Yamagata	1·6	315	0 27a	− 3	0 45	− 6	—	—	—
Utunomiya	1·7	250	0 33a	+ 2	0 54	0	—	—	—
Kumagaya	2·1	244	0 41a	+ 4	1 15	Sg	—	—	—
Mizusawa	2·1	346	i 0 33a	− 4	—	—	—	—	—
Tokyo Cen. Met. Ob.	2·1	229	i 0 40a	+ 3	1 11	Sg	—	—	—
Tokyo Imp. Univ.	2·1	229	0 40	+ 3	1 11	Sg	—	—	—
Komaba	2·2	230	0 41	+ 3	1 13	Sg	—	—	—
Kiyosumi	2·3	214	0 49	Pg	—	—	—	—	—
Maebasi	2·3	252	0 45a	Pg	1 16	Sg	—	—	—
Mitaka	2·3	232	0 41	+ 1	1 14	S*	—	—	—
Niigata	2·4	291	0 44a	+ 3	1 24	Sg	—	—	—
Yokohama	2·4	226	0 43a	+ 2	1 19	Sg	—	—	—
Kamakura	2·5	226	0 41	− 2	1 18	S*	—	—	—
Titibu	2·5	243	0 49	Pg	1 24	Sg	—	—	—
Miyako	2·6	3	0 35a	− 9	1 6	−11	—	—	—
Mera	2·7	216	0 50a	P*	1 23	S*	—	—	—
Morioka	2·7	349	0 40a	− 5	1 9	−10	—	—	—
Oiwake	2·7	254	0 48	+ 3	1 43	+24	—	—	—
Takada	2·8	270	0 49	+ 2	1 47	+25	—	—	—
Hunatu	2·9	237	0 51a	+ 3	1 37	Sg	—	—	—
Koyama	2·9	232	0 49	+ 1	1 22	− 2	—	—	—
Nagano	2·9	261	0 54a	Pg	1 50	+26	—	—	—
Akita	3·0	334	0 47a	− 3	1 28	+ 1	—	—	—
Ito	3·0	225	0 55a	P*	1 29	+ 2	—	—	—
Kohu	3·0	241	0 53a	+ 3	1 43	Sg	—	—	—
Misima	3·0	229	0 54a	P*	1 37	S*	—	—	—
Numadu	3·1	230	0 53a	+ 2	2 5	+36	—	—	—
Matumoto	3·2	254	0 55a	+ 3	1 39	S*	—	—	—
Yosiwara	3·2	232	0 49	− 3	1 39	S*	—	—	—
Susaki	3·3	225	0 56	+ 3	1 46	Sg	—	—	—
Toyama	3·4	266	1 4a	P*	—	—	—	—	—
Hatinohe	3·5	356	0 50a	− 7	1 27	−13	—	—	—
Iida	3·6	245	1 2a	P*	1 53	S*	—	—	—
Aomori	3·8	348	0 58	− 3	1 47	0	—	—	—
Husiki	3·8	267	1 4a	+ 3	1 53	S*	—	—	—
Omaesaki	3·8	231	1 5a	P*	1 56	S*	—	—	—
Takayama	3·8	257	1 5a	P*	2 22	?	—	—	—
Wazima	3·9	277	1 4a	+ 2	2 9	Sg	—	—	—
Hamamatu	4·1	235	1 10a	P*	2 8	S*	—	—	—
Kanazawa	4·2	264	1 12a	P*	2 3	+ 6	—	—	—
Hatidyozima	4·3	203	1 7a	− 1	1 59	− 1	—	—	—
Gihu	4·4	250	1 13a	+ 3	2 15	S*	—	—	—
Nagoya	4·4	245	i 1 14a	+ 4	2 15	S*	—	—	—
Hukui	4·6	257	1 27a	Pg	2 32	Sg	—	—	—
Hakodate	4·7	350	1 12a	− 2	—	—	—	—	—
Ibukisan	4·7	251	1 17a	+ 3	2 36	Sg	—	—	—
Hikone	4·8	250	1 20a	+ 5	2 35	Sg	—	—	—
Kameyama	4·9	245	1 20a	+ 3	2 35	Sg	—	—	—
Tu	4·9	243	1 21a	+ 4	1 42	Sg	—	—	—
Mori	5·1	349	1 16a	− 4	2 16	− 4	—	—	—
Urakawa	5·1	8	1 17	− 3	2 2	−18	—	—	—
Muroran	5·2	353	1 16a	− 5	2 18	− 4	—	—	—
Kyoto	5·3	249	1 25a	+ 3	2 49	Sg	—	—	—
Yagi	5·5	245	1 28a	+ 3	2 48	S*	—	—	—
Miyadu	5·6	257	1 30a	+ 3	2 40	+ 7	—	—	—
Osaka	5·6	247	1 31	+ 4	2 59	Sg	—	—	—
Toyooka	5·8	257	1 34a	+ 5	3 8	Sg	—	—	—
Kobe	5·9	249	1 33a	+ 2	3 6	Sg	—	—	—
Obihiro	5·9	10	1 26k	− 5	3 32	Sg	—	—	—

Continued on next page.

	△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Sapporo	6·0	356	1 25a	− 7	2 40	− 3	—	—	—
Siomisaki	6·1	236	1 36a	+ 2	3 22	Sg	—	—	—
Kusiro	6·2	18	1 39k	+ 4	2 40	− 8	—	—	—
Sumoto	6·2	247	1 38a	+ 3	3 11	S*	—	—	—
Wakayama	6·2	244	1 36a	+ 1	3 8	S*	—	—	—
Tokusima	6·6	246	1 44a	+ 3	3 33	Sg	—	—	—
Nemuro	6·8	24	1 35a	− 9	2 39	−24	—	—	—
Tadotu	7·1	250	1 52a	+ 4	3 25	+15	—	—	—
Muroto	7·3	241	1 53a	+ 3	3 26	+11	—	—	—
Koti	7·6	245	i 1 57a	+ 2	3 10	−13	i 2 20	P*	5·1
Hirosima	8·1	254	2 4a	+ 2	4 0	S*	—	—	—
Matuyama	8·1	249	2 4a	+ 2	4 10	S*	—	—	—
Hamada	8·2	256	2 6a	+ 3	3 38	0	—	—	—
Simidu	8·4	242	2 8a	+ 2	3 59	+16	—	—	—
Uwazima	8·5	246	2 9	+ 2	3 59	+14	—	—	—
Ooita	9·2	249	2 20	+ 4	5 9	Sg	—	—	—
Simonoseki	9·4	254	2 23	+ 5	5 2	Sg	—	—	—
Ootomari	9·6	4	2 12	− 9	3 53	−19	—	—	—
Izuka	9·7	254	2 27	+ 5	5 17	Sg	—	—	—
Asosan	9·8	248	2 25a	+ 1	4 43	S*	—	—	—
Hukuoka B	9·9	253	2 29	+ 4	4 46	S*	—	—	—
Kumamoto	10·0	248	2 32	+ 5	4 59	S*	—	—	—
Miyazaki	10·0	242	2 31a	+ 4	4 27	+ 5	—	—	—
Titizima	10·0	179	2 26	− 1	—	—	—	—	—
Otiai	10·2	4	1 54	−37	4 26	− 1	—	—	—
Unzendake	10·4	249	2 31a	− 3	5 3	+31	—	—	—
Husan	10·5	263	i 2 39a	+ 4	4 42	+ 7	—	—	—
Ituhara	10·6	258	2 41a	+ 5	5 46	L	—	—	(5·8)
Taikyu	10·7	267	e 4 42	S	(4 42)	+ 3	6 57	?	—
Kagosima	10·8	243	2 44	+ 5	5 39	L	—	—	(5·6)
Syuhurei	11·1	270	2 44	+ 1	5 12	SSS	—	—	—
Yakusima	11·5	238	2 51a	+ 3	5 4	+ 5	—	—	—
Tomie	11·6	251	2 53a	+ 3	5 27	SSS	—	—	—
Keizyo	11·8	277	i 2 56a	+ 3	5 11	+ 5	—	—	6·2
Zinsen	12·1	277	i 2 59a	+ 2	i 5 23	+ 9	5 30	SS	6·2
Sikka	12·2	4	2 52	− 6	5 5	−11	—	—	—
Heizyo	12·8	284	i 3 7a	+ 1	i 6 24	L	—	—	(i 6·4)
Nake	13·5	234	3 18a	+ 3	5 58	+11	—	—	—
Dairen	16·0	283	3 50	+ 2	6 50	+ 4	—	—	—
Naha	16·1	234	3 26a	−23	6 40	− 9	—	—	—
Zi-ka-wei	17·9	258	e 4 12	0	8 8	SSS	i 4 52	PPP	—
Miyakozima	18·7	234	4 19	− 3	7 51	+ 3	—	—	—
Isigakizima	19·8	237	3 49	−46	7 31	−42	—	—	—
Giran	21·1	240	4 53	+ 5	—	—	—	—	—
Taihoku	21·1	240	i 4 48	0	e 8 34	− 5	—	—	—
Karenko	21·7	241	4 55	0	8 59	+ 8	—	—	—
Taityu	22·2	241	5 6	+ 6	9 29	SS	—	—	—
Arisan	22·6	241	5 8	+ 5	—	—	—	—	—
Taito	22·9	239	5 2a	− 4	9 25	+12	—	—	—
Tainan	23·3	240	5 14	+ 4	9 32	+12	—	—	—
Hokoto	23·4	242	5 7	− 4	9 28	+ 7	—	—	—
Takao	23·5	240	5 16	+ 4	7 41	?	—	—	—
Kosyun	23·6	238	5 10	− 3	9 58	SS	10 21	SSS	—
Hong Kong	28·0	246	5 55k	0	11 1	+23	6 41	PP	14·0
Manila	29·1	225	i 6 6a	+ 2	i 11 11	+15	—	—	15·0
Irkutsk	30·2	312	i 6 12	− 2	i 11 7	− 6	6 48	PP	—
Palau	30·4	195	6 22	+ 6	11 21	+ 5	—	—	—
Phu-Lien	34·6	253	i 6 52a	− 1	i 12 25	+ 3	8 10	PP	16·1
Semipalatinsk	45·1	308	i 8 17	− 3	i 14 56	− 3	—	—	23·1
Calcutta N.	48·0	268	i 8 37a	− 6	i 15 42	+ 1	i 10 24	PP	e 23·4

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Almata		48·8	300	e 8 53	+ 4	—	—	—	—	24·1
College		48·9	32	8 44	− 6	i 15 42	−11	e 10 49	PP	i 21·9
Frunse		50·6	300	e 9 1	− 1	—	—	10 15	PP	21·0
Medan		51·7	241	e 9 0	−11	16 53	+21	—	—	—
Dehra Dun	N.	52·6	283	e 9 14	− 4	i 16 53	+ 9	i 20 58	PP	i 26·6
Andijan		52·8	297	e 9 16	− 3	e 16 51	+ 4	—	—	27·1
Agra		54·0	279	9 23a	− 5	16 59	− 4	9 44	pP	—
Batavia		54·1	225	i 9 31	+ 2	i 17 7	+ 2	—	—	28·1
Honolulu		54·2	88	e 9 23	− 6	16 51	−15	e 12 40	PPP	e 22·0
Tchimkent		54·3	300	e 9 25	− 5	i 17 3	− 4	—	—	—
Malabar		54·6	224	e 9 37	+ 5	e 17 12	+ 1	—	—	—
Sverdlovsk		55·3	319	i 9 36	− 2	—	—	i 10 0	pP	—
Sitka		56·1	40	9 47k	+ 4	i 17 35	+ 3	e 11 55	PP	i 23·0
Samarkand		57·1	298	e 9 52	+ 2	e 17 47	+ 2	—	—	28·9
Hyderabad		58·6	269	9 59	− 2	18 4	0	12 11	PP	29·0
Bombay		62·3	274	i 10 24k	− 2	i 18 50	− 2	i 10 46	pP	30·6
Kodaikanal	E.	63·5	263	i 10 33a	− 1	i 19 13	+ 6	i 19 35	PS	—
Colombo	E.	63·6	258	10 33	− 2	19 5	− 3	—	—	34·8
Brisbane	N.	65·1	169	i 10 38	− 7	i 19 26	− 1	i 13 2	PP	—
Apia		66·9	129	e 10 54	− 2	e 19 49	0	e 13 15	PP	—
Seattle		67·2	46	e 11 20	+22	e 20 13	PS	—	—	—
Moscow		67·4	323	10 55	− 4	19 50	− 5	e 11 22	pP	32·6
Pulkovo		68·3	330	e 11 1	− 4	20 0	− 6	11 24	pP	e 33·1
Baku		68·4	305	i 11 2	− 4	i 20 31	PS	—	—	—
Grozny		69·6	309	11 8	− 5	e 20 20	− 1	—	—	—
Ferndale		69·7	53	e 11 11	− 3	i 20 12	−10	—	—	e 28·1
Piatigorsk		70·8	312	11 16	− 4	e 20 33	− 2	—	—	29·1
Tiflis		71·0	308	i 11 18	− 4	20 27	−10	i 11 38	pP	e 33·1
Riverview		71·1	172	i 11 21a	− 1	i 20 38	0	20 53	PS	e 31·8
Sydney		71·1	172	e 8 31	?	i 20 41	+ 3	—	—	e 27·1
Ukiah		71·1	55	e 11 15	− 7	20 34	− 4	e 14 4	PP	e 29·0
Adelaide		71·7	183	i 11 25	− 1	i 20 50	+ 5	i 14 11	PP	i 29·2
Scoresby Sund		71·8	355	11 21	− 5	20 56	+10	14 8	PP	—
Erevan		72·0	307	11 29	+ 1	e 20 30	−19	—	—	—
Berkeley		72·4	56	i 11 21	− 9	e 20 38	−15	e 20 57	PS	e 28·3
San Francisco		72·4	56	e 11 27	− 3	e 20 45	− 8	e 15 54	PPP	—
Branner		72·7	56	e 11 30	− 2	e 20 46	−11	e 21 19	PS	e 29·9
Perth		72·9	203	11 35	+ 2	21 8	+ 9	14 30	PP	36·4
Saskatoon		73·0	37	i 11 27	− 6	i 20 47	−13	25 8	SS	e 33·1
Upsala		73·0	335	i 11 29	− 4	i 20 53	− 7	e 14 20	PP	e 35·1
Lick		73·1	56	e 11 33	− 1	e 20 53	− 8	—	—	—
Sotchi		73·1	313	11 31	− 3	e 20 56	− 5	—	—	—
Butte		73·7	43	11 35	− 3	e 20 59	− 9	e 21 45	ScS	e 31·4
Melbourne		74·6	177	e 11 52	+ 9	21 17	− 1	21 50	PS	33·0
Fresno	N.	74·7	55	e 11 41	− 2	e 21 14	− 5	—	—	—
Theodosia		74·7	315	11 41	− 2	21 14	− 5	—	—	41·1
Bozeman		74·8	43	e 11 40	− 4	21 12	− 8	e 25 23	SS	33·0
Simferopol		75·5	316	11 44	− 4	21 22	− 6	—	—	33·1
Tinemaha		75·5	54	i 11 43	− 5	e 21 14	−14	—	—	—
Yalta		75·8	315	11 45	− 5	21 26	− 5	—	—	39·1
Sebastopol		76·0	316	11 47	− 4	21 34	0	—	—	31·6
Santa Barbara		76·1	57	i 11 46	− 5	e 21 24	−11	—	—	—
Haiwee		76·3	54	i 11 51	− 1	e 21 31	− 6	—	—	—
Bergen		76·5	340	11 48	− 6	21 42	+ 3	—	—	37·1
Mount Wilson		77·3	57	i 11 53	− 5	e 21 30	−18	i 14 49	PP	—
Pasadena		77·3	57	e 11 51	− 7	e 21 32	−16	i 14 48	PP	e 30·5
Riverside		77·9	57	e 11 59	− 2	e 21 42	−12	—	—	—
Copenhagen		78·0	334	i 11 58a	− 4	21 49	− 6	15 0	PP	37·1
Bucharest		80·2	319	e 12 12a	− 2	22 19	0	i 15 8	PP	39·1
Potsdam		80·3	332	e 12 8	− 6	e 22 8	−12	e 22 56	PS	e 41·1

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		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Hamburg		80·6	334	12 8	− 8	i 22 18	− 5	e 27 31	SS	e 38·1
Istanbul		80·8	316	i 12 31	+14	22 44	+19	15 37	PP	e 47·1
Arapuni		81·1	154	—	—	22 26	− 2	33 56	L_g	38·6
Aberdeen		81·3	341	i 12 21	+ 1	i 22 21	− 9	i 16 16	PP	39·7
Ksara		81·4	305	i 12 17a	− 3	22 30	− 1	—	—	—
New Plymouth		81·4	155	e 12 8?	−12	e 22 8?	−23	—	—	e 39·1
Budapest	E.	81·5	325	12 21	0	22 29	− 3	23 37	PS	44·1
	N.	81·5	325	12 17	− 4	i 22 30	− 2	23 25	PS	44·1
Kecskemet		81·6	324	i 12 17	− 4	i 22 32	− 1	e 15 48	PP	e 46·1
Prague		81·6	329	i 12 16	− 5	i 22 27	− 6	e 15 38	PP	e 41·1
Denver		82·0	46	e 12 7	−16	e 22 5	−32	e 14 54	PP	e 36·1
Jena		82·0	331	e 12 19	− 4	e 22 27	−10	e 16 37	PPP	e 36·1
Göttingen		82·2	332	i 12 19	− 5	i 22 34	− 5	—	—	e 42·1
Cheb		82·4	331	e 12 26	+ 1	e 22 47	+ 6	—	—	e 44·1
Hof		82·4	330	e 12 24	− 1	e 22 41	0	e 31 44	SSS	e 36·1
Edinburgh		82·7	341	i 12 39	+12	i 22 39	− 5	i 18 20	PPP	—
Belgrade		82·8	321	i 12 23k	− 4	i 22 37	− 8	i 24 28	PPS	41·2
Sofia		82·8	319	e 12 26	− 1	e 22 46	+ 1	—	—	e 43·4
Durham	N.	83·2	340	e 12 23	− 6	i 22 45	− 4	—	—	—
Tucson		83·3	54	i 12 24k	− 6	i 22 35	−15	i 15 50	PP	34·4
De Bilt		83·4	335	12 27a	− 3	22 48	− 3	15 39	PP	e 42·1
Wellington		83·6	156	12 28	− 4	22 47	− 6	15 43	PP	39·1
Stonyhurst		84·3	340	e 12 35	0	i 22 56	− 4	i 16 16	PP	41·1
Laibach		84·6	326	e 12 36a	0	i 23 13	+10	i 24 49	PPS	e 48·1
Stuttgart		84·7	330	i 12 33a	− 4	i 22 57	− 7	i 12 50	pP	42·1
Karlsruhe		84·8	332	i 12 34	− 3	e 23 0	− 5	—	—	e 43·1
Uccle		84·8	335	i 12 34a	− 3	i 22 57	− 8	i 15 57	PP	40·1
Christchurch		85·0	158	i 12 34k	− 4	22 34	[−27]	i 15 56	PP	39·9
Triest		85·3	327	12 35a	− 5	22 55	[− 8]	16 19	PP	e 41·1
Strasbourg		85·4	331	i 12 37a	− 3	e 22 38	[−25]	i 15 57	PP	44·6
Oxford		85·8	337	i 12 38	− 4	i 22 57	[− 9]	—	—	e 37·1
Rathfarnham Castle		85·8	342	i 13 22	+40	i 23 45	+30	i 17 1	PP	44·1
Kew		85·9	337	e 12 38	− 5	i 23 8	[+ 1]	i 16 3	PP	—
Chur		86·1	330	e 12 40	− 4	e 23 1	[− 7]	—	—	—
Zurich		86·1	330	e 12 39	− 5	e 23 4	[− 4]	e 29 4	SS	—
Basle		86·3	330	e 12 40	− 5	e 23 13	[+ 3]	—	—	—
Padova		86·3	327	e 13 1	+16	e 23 19	[+ 9]	e 13 28	pP	e 47·1
Helwan		86·9	305	i 12 44k	− 4	i 23 20	− 6	16 6	PP	—
Neuchatel		87·0	330	e 12 44	− 4	e 23 9	[− 5]	—	—	—
Paris		87·1	335	12 53	+ 4	i 23 10	[− 2]	24 33	PS	43·1
Florence		87·8	327	12 49	− 3	23 22	−12	—	—	40·1
Moncalieri		88·4	330	12 50	− 5	23 38	− 2	—	—	36·1
Rome		88·8	323	i 12 52	− 5	23 24	[− 1]	16 24	PP	36·2
Grenoble		89·0	330	e 12 57	− 1	e 23 30	[+ 3]	i 13 25	pP	e 42·1
Chatham Ils.		89·1	152	—	—	22 8	?	i 32 32	SSS	39·3
Chicago		89·3	35	e 12 58	− 1	e 23 19	[−10]	e 29 35	SS	i 36·1
Chicago (Loyola)		89·3	35	e 12 56	− 3	i 23 36	[+ 7]	i 29 30	SKKS	—
Puy de Dôme		89·6	332	e 13 0	− 1	e 22 43	[−47]	—	—	e 44·1
Florissant		90·5	38	e 12 59	− 6	e 23 21	[−15]	i 16 34	PP	—
Marseilles		90·7	329	e 13 0	− 6	e 23 30	[− 7]	i 13 34	pP	e 49·1
St. Louis	E.	90·7	38	e 13 5	− 1	e 23 30	[− 7]	e 16 39	PP	—
Shawinigan Falls		91·1	23	e 13 4	− 4	e 23 8	[−31]	e 29 20	SS	e 45·9
Ottawa		91·2	25	13 2	− 6	e 23 40	[0]	16 53	PP	46·1
Seven Falls		91·2	21	e 13 4	− 4	23 56	− 9	29 26	SS	e 36·1
Cape Girardeau		92·1	39	i 13 7	− 5	e 24 6	− 7	e 25 28	PPS	—
Mazatlan	N.	92·2	58	—	—	e 24 8	− 6	—	—	—
Little Rock		92·5	42	e 13 8	− 6	e 24 3	−14	i 16 45	PP	43·8
Vermont		92·8	24	e 13 18	+ 2	i 23 50	[+ 1]	e 16 49	PP	e 47·2
Bagnères		92·9	333	e 13 13	− 3	e 23 44	[− 5]	i 13 48	pP	e 44·1
East Machias		94·3	20	e 13 19	− 4	e 23 40	[−17]	e 17 9	PP	e 42·6

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		Δ °	Az. °	P. m.	s.	O−C. s.	S. m.	s.	O−C. s.	Supp. m.	s.		L. m.
Williamstown		94·4	24	e 13	19	− 4	i 25	32	PS	i 17	9	PP	e 52·1
Harvard		95·1	23	e 13	19	− 7	i 23	53	[− 8]	e 33	8?	L_g	e 44·1
Weston		95·3	23	e 13	24k	− 3	i 24	0	[− 2]	i 17	21	PP	—
Halifax		95·5	18	e 13	27	− 1	e 23	56	[− 8]	e 16	32	PP	—
Fordham		95·8	26	i 13	28k	− 1	i 24	5	[0]	i 17	28	PP	—
Philadelphia		96·1	28	i 13	29	− 2	i 24	8	[+ 1]	i 17	20	PP	i 49·5
Georgetown		96·3	29	i 13	7	−25	24	9	[+ 1]	17	4	PP	—
Algiers		97·1	327	i 13	37	+ 2	24	21	[+ 9]	17	23	PP	e 49·1
Toledo		97·2	334	i 13	32	− 4	i 25	8	+11	i 17	28	PP	—
Almeria		99·3	332	e 13	45	0	e 24	19	[− 4]	e 17	43	PP	e 48·0
Granada		99·4	333	i 13	54	+ 8	—		—	i 17	55	PP	—
Tacubaya	N.	99·7	57	e 13	42	− 5	—		—	i 17	22	PP	—
Malaga		100·2	333	e 13	48	− 1	—		—	i 17	57	PP	44·1
San Fernando	N.	101·0	334	e 13	18	−35	i 24	30	[− 2]	i 17	52	PP	—
Tananarive		104·5	258	e 18	6	PP	24	49	[+ 1]	18	30	PP	e 44·4
Merida		104·6	49	e 18	41	PP	—		—	—		—	—
San Juan		118·8	30	e 20	17	PPP	25	31	[−15]	e 30	9	PS	i 47·9
Fort de France		124·1	25	e 18	58	[− 3]	e 28	34	{+53}	—		—	—
Cape Town	E.	134·4	256	i 21	50	PP	i 40	45	SSP	—		—	67·5
	N.	134·4	256	i 21	55	PP	i 40	1	SS	—		—	63·5
Huancayo		138·4	63	e 19	18	[− 9]	i 26	24	[−12]	e 22	6	PP	55·0
La Paz		146·5	60	i 19	39	[− 3]	26	26	[−23]	20	34	pPKP	69·1
La Plata		163·9	87	20	13	[+ 9]	30	50	{−42}	24	44	PP	67·1
Rio de Janeiro		165·2	18	e 20	8	[+ 2]	i 30	8	?	—		—	i 45·1

Additional readings :—
Morioka S = +1m.16s.
Koti eZ = +3m.37s., iS* = +3m.55s., iS_e = +4m.10s.
Zinsen SE? = +5m.42s.
Zi-ka-wei i = +5m.12s. and +6m.4s.
Hong Kong SS = +12m.5s.
Phu-Lien SS = +14m.16s.
Calcutta iPPPN = +11m.11s., eSSN = +18m.58s., iSSSN = +20m.16s.
College eP = +9m.1s., ePPP = +11m.35s., iS = +15m.47s., iSS = +18m.37s.
Frunse e = +14m.41s.
Medan ePN = +9m.7s., iPEN = +9m.24s., iE = +9m.31s.
Agra PPE = +11m.17s., iN = +17m.11s., SSE = +20m.45s.
Honolulu eP = +9m.29s., S = +17m.1s.
Malabar iN = +10m.6s.
Sverdlovsk i = +10m.6s., PP = +13m.0s.
Sitka iPPP = +13m.27s., iS = +17m.40s., iSS = +21m.28s.
Hyderabad PSN = +18m.20s., S_cSN = +19m.51s., SSN = +22m.5s.
Bombay sP?EN = +11m.1s., ePPEN = +12m.38s., iE = +19m.43s., SSEN = +22m.36s., iE = +25m.23s.
Apia SS? = +23m.52s.
Seattle eP = +11m.24s.
Grozny i = +11m.34s.
Tiflis PPPE = +16m.36s., iSN = +20m.31s., iE = +20m.41s., iZ = +20m.51s., iSE = +20m.54s., eSSE = +25m.31s., SSSE = +27m.54s.
Riverview PSE = +20m.57s., iE = +21m.30s.
Ukiah P = +11m.23s., SS = +25m.12s.
Sydney e = +13m.15s.
Adelaide i = +11m.32s., +11m.43s., +15m.53s., +16m.21s., and +21m.15s.
Scoresby Sund ? = +12m.54s., +16m.14s., and +19m.50s.
Berkeley ePE = +11m.25s., iE = +11m.40s.
Branner eGE = +27m.56s.
Perth P_cP = +12m.1s., PPP = +16m.50s., PPPP = +18m.33s., PS = +21m.26s., i = +22m.5s., +22m.53s., and +24m.58s., SS = +25m.56s., i = +32m.43s. and +35m.15s.
Saskatoon SSSE = +29m.2s.
Upsala ePPPN = +16m.26s., eSSE = +25m.32s., eSSN = +25m.56s., eSSSN = +29m.8s., eSSSE = +29m.26s.
Lick eE = +30m.28s.
Melbourne SS = +25m.30s.
Fresno eN = +31m.28s.
Bergen P = +11m.57s.
Copenhagen iZ = +12m.7s. and +14m.49s., PPP = +16m.44s., eE = +22m.21s. and +23m.36s., eEN = +24m.12s., SS = +26m.32s., SSS = +30m.26s. and +30m.44s.
Bucharest iEN = +12m.24s., iN = +15m.26s., iE = +15m.29s., PPPE = +16m.47s., PPPN = +16m.51s., iE = +22m.33s. and +27m.11s., SSEN = +27m.47s., SSSN = +30m.42s.

Continued on next page.

Potsdam iPE = +12m.12s., iPN = +12m.17s., iEZ = +17m.30s., eEN = +22m.32s.
Hamburg iZ = +12m.25s., eSSSN = +31m.24s.
Arapuni SS = +27m.56s.
Aberdeen iS = +22m.41s., i = +29m.15s. and +34m.56s.
Ksara i = +22m.47s.
Budapest E P_cP = +12m.29s., PP = +15m.31s., i = +25m.56s., SS = +27m.53s., i = +31m.17s.
Budapest N PP = +15m.32s., i = +16m.23s. and +17m.21s., S_cS = +22m.49s., i = +24m.29s., +25m.9s., and +26m.1s., SS = +27m.51s., i = +31m.17s. and +33m.17s.
Kecskemet Z iP_cP = +12m.31s., i = +13m.34s. and +16m.47s., e = +20m.31s. and +21m.39s., iPS = +23m.8s., iSS = +27m.29s., e = +29m.22s., ePKKS = +34m.27s., eSKKS? = +37m.32s., e = +38m.52s. and +43m.52s.
Prague ePPP = +17m.20s., ePPPP = +19m.2s., eSS = +27m.8s., eSSS = +31m.8s.
Denver eN = +12m.22s., iE = +12m.26s., iN = +12m.35s., +12m.42s., +13m.38s., +13m.48s., and +14m.11s., ePSEN = +22m.38s., iN = +22m.44s., iE = +22m.51s., iN = +23m.12s.
Jena iP = +12m.25s., eE = +15m.24s., eSN = +22m.32s., eSSN = +31m.8s.
Hof eSNW = +22m.44s.
Edinburgh i = +12m.54s., +20m.47s., +23m.22s., and +28m.8s.
Belgrade ePNW = +12m.25s., iZ = +12m.31s. and +12m.38s., iNW = +13m.25s., +17m.27s., and +24m.28s.
Sofia iEN = +12m.38s., eE = +35m.37s.
Tucson iP = +12m.29s., i = +12m.38s., +12m.59s., +13m.43s., +14m.30s., and +16m.16s., iPPP = +17m.31s., i = +18m.5s., iS = +22m.44s., iPS = +23m.37s., i = +25m.38s. and +27m.17s., iSS = +28m.10s., iSSS = +31m.46s., iPKP,PKP = +39m.57s.

Wellington iZ = +12m.40s. and +13m.10s., PPP = +17m.42s., PS = +23m.38s., i = +24m.32s., SS = +28m.22s., SSS = +32m.13s., iEN = +33m.28s., L_q? = +35m.39s.
Stonyhurst iP = +12m.42s., i = +23m.26s. and +28m.31s.
Laibach i = +12m.46s. and +13m.9s.
Stuttgart iPP = +15m.58s., i = +17m.40s., +28m.14s., and +32m.8s.
Uccle iZ = +12m.43s. and +13m.6s., iSE = +23m.0s.
Christchurch i = +12m.48s., iS = +23m.5s., iNZ = +24m.12s., L_qE = +35m.50s.
Triest eSS = +28m.36s.
Strasbourg iZ = +12m.38s., +12m.45s., +12m.53s., +13m.4s., and +13m.10s., iSE = +23m.2s., sSSE = +28m.58s., SSSZ = +32m.28s.
Rathfarnham Castle iPPP = +19m.5s., iS = +24m.28s., iPS = +25m.29s., iPPS = +27m.2s., iSS = +30m.49s., iSSS = +34m.32s.
Kew iEN = +12m.45s., isPEN = +13m.9s., isPPE = +16m.29s., iEN = +20m.7s., iPSN = +23m.9s., iE = +24m.29s.
Zurich e = +13m.31s., eSS = +26m.3s.
Padova PP = +17m.37s., PPP = +18m.43s., S = +24m.10s.
Florence PS = +23m.50s., i = +27m.3s.
Rome i = +13m.58s. and +17m.19s., PPP = +18m.31s., iNZ = +20m.0s., S = +23m.58s. i = +24m.38s. and +27m.15s., SS = +30m.19s.
Grenoble i = +13m.13s., ePP = +16m.25s., iPPP = +18m.29s., i = +23m.45s., isS = +24m.14s., iPPS = +25m.11s.
Chatham Ils. L_q = +34m.8s.
Chicago iS = +23m.39s.
Chicago, Loyola eSSSS = +36m.35s.
Puy de Dôme iS = +23m.3s.
Florissant iP = +13m.2s., iN = +23m.30s., eSE = +23m.48s.
Marseilles PP = +16m.36s., iS = +23m.44s., eSSS = +35m.32s.
St. Louis iE = +14m.24s., ePPPE = +17m.17s., iSE = +23m.51s.
Shawinigan Falls eS = +23m.41s., e = +37m.26s.
Ottawa iS = +23m.53s., SS = +30m.8s., SSS = +37m.8s. ?
Cape Girardeau iP_cPEN = +13m.15s., eE = +26m.53s., eSSE = +40m.30s.
Little Rock iPN = +13m.12s., ePPP = +18m.47s., iPPS = +20m.53s., iPSN = +24m.8s., iPSN = +25m.8s., iPPS = +25m.53s., iS_cS = +28m.1s., SSEN = +30m.18s., SSSEN = +33m.48s., i = +42m.48s.
Vermont iS = +24m.14s. and +24m.18s., iPS = +25m.30s., eSS = +30m.9s.
Bagnères ePPN = +16m.59s., pPPE = +17m.20s., PPP = +19m.3s., eSKKSN = +24m.3s., iSE = +24m.17s., eN = +25m.12s., isSE = +25m.19s., iPSN = +25m.36s., SS = +30m.38s., iSSSN = +34m.8s.
East Machias PP = +17m.13s., S = +24m.21s., iS = +24m.37s., iPS = +25m.54s., SS = +30m.38s.
Williamstown iP = +13m.22s., i = +13m.54s., e = +14m.39s., i = +34m.41s.
Harvard iZ = +13m.25s., iSE = +24m.29s.
Weston iP = +13m.28s., iZ = +13m.36s., ePPPZ = +19m.39s., eSEN = +24m.32s., iSN = +24m.47s., iPSN = +25m.28s., eSSSE = +34m.36s., eSSSSE = +37m.18s., ePKP,PKPZ = +38m.33s.
Halifax e = +25m.56s.
Fordham iZ = +19m.19s. and +21m.17s., iSKKSEN = +24m.34s., iN = +25m.46s., iSPZ = +26m.47s.
Philadelphia i = +24m.46s., +25m.42s., +31m.20s., and +44m.25s.
Georgetown S = +24m.49s.
Algiers PPP = +19m.23s., PS = +26m.18s., i = +28m.46s., SSS = +35m.4s.

Continued on next page.

Toledo iPPP = +19m.50s., iPS = +26m.31s., iSS = +31m.49s.
Chicago, Loyola eSSSS = +36m.35s.
Granada i = +18m.14s. and +19m.59s.
San Fernando PPPN = +20m.1s.
Tananarive N = +18m.40s., SKKSN = +25m.32s., PSN = +27m.40s., N = +33m.19s., SSE = +33m.34s.
San Juan iPS = +30m.26s., ePPS = +31m.8s., i = +34m.33s., iSS = +36m.14s., eSSS = +40m.34s.
Cape Town E. i = +22m.57s.
Cape Town N. i = +22m.59s.
Huancayo iPKP = +19m.55s., iPP = +22m.16s. and +22m.37s., iPKS = +23m.3s. and +23m.12s., i = +23m.17s. and +23m.45s., iPPP = +25m.37s., i = +26m.48s., iSKKS = +28m.48s., iSKKKS = +29m.19s., i = +29m.52s., iSKSP = +32m.25s. and +32m.34s., i = +32m.45s., iPS = +33m.16s., iPPS = +34m.30s., i = +34m.43s., iPPPS = +35m.48s., i = +35m.58s. and +36m.10s., iPKP,PKP = +37m.15s., i = +38m.57s. and +39m.40s., iSS = +40m.27s., iPSPS = +41m.21s., i = +41m.34s., and +42m.17s., +42m.57s., +43m.53s., and +45m.13s., iSSS = +45m.37s. i = +46m.33s., +48m.31s., and +53m.21s.
La Plata PPS = +39m.14s., SS = +44m.50s., PSS = +45m.56s.
Rio de Janeiro iSE = +30m.37s.
La Paz iPKPZ = +19m.43s., isPKPE = +21m.28s., iPPZ = +23m.2s., SKPE = +23m.26s., SKKS = +29m.54s., iSSE = +41m.58s., iSSSE = +47m.28s.

Nov. 6d. 10h. 45m. 17s. Epicentre 37°·1N. 141°·8E. (as at 8h.).

	Δ	Az.	P.	O−C.	S.	O−C.	L.
	°	°	m. s.	s.	m. s.	s.	m.
Tukubasan	1·6	237	0 37	+ 7	0 58	+ 7	—
Mizusawa E.	2·1	346	i 0 35	− 2	i 1 1	− 3	—
Tokyo, Cen. Met. Ob.	2·1	229	i 0 38	+ 1	1 13	+ 9	—
Tokyo, Imp. Univ.	2·1	229	0 37	0	1 9	+ 5	—
Titibu	2·5	243	0 37	− 6	1 15	+ 1	—
Koyama	2·9	232	0 37	−11	1 20	− 4	—
Susaki	3·3	225	0 53	0	1 40	+ 5	—
Nagoya	4·4	245	e 1 9	− 1	2 4	+ 2	—
Koti	7·6	245	e 1 55	0	—	—	e 4·1

Nov. 6d. 13h. 41m. 8s. Epicentre 37°·1N. 141°·8E. (as at 10h.).

A = −·6283, B = +·4944, C = +·6006; $\delta = -9$; $h = -1$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m.	s.	m.
Tukubasan		1·6	237	−0 22	−52	0 5	−46	—	—	—
Mizusawa		2·1	346	0 34	− 3	1 2	− 2	—	—	—
Tokyo, Cen. Met. Ob.		2·1	229	0 46	P_g	1 22	S_g	—	—	—
Tokyo, Imp. Univ.		2·1	229	−0 22	−59	0 13	−51	—	—	—
Kamakura		2·5	226	−0 22	−65	—	—	—	—	—
Koyama		2·9	232	−0 22	−70	0 31?	−53	—	—	—
Yosiwara		3·2	232	−0 22	?	0 22	−70	—	—	—
Susaki		3·3	225	0 19	−34	1 6	P_g	—	—	—
Nagoya		4·4	245	−e 0 12	−82	1 17	−45	—	—	—
Koti		7·6	245	1 51	− 4	4 16	S_g	—	—	5·4
Hukuoka B		9·9	253	e 2 27	+ 2	i 5 33	S_g	—	—	—
Husan		10·5	263	4 43	S	(4 43)	+ 8	7 34	?	—
Keizyo		11·8	277	2 52	− 1	e 5 36	SSS	—	—	—
Zinsen	E.	12·1	277	3 2	+ 5	—	—	—	—	7·2
Irkutsk		30·2	312	5 52?	−22	e 10 52	−21	—	—	14·9
Calcutta	N.	48·0	268	e 11 4	PPP	—	—	—	—	—
Sverdlovsk		55·3	319	e 9 24	−14	—	—	—	—	25·9
Moscow		67·4	323	i 10 56	− 3	—	—	—	—	—
Tiflis		71·0	308	i 11 13	− 9	—	—	—	—	e 32·9
Ksara		81·4	305	i 12 13	− 7	e 22 24	− 7	—	—	—
Rome		88·8	323	e 15 47	PP	—	—	—	—	49·3
La Paz	Z	146·5	60	19 34	[− 8]	—	—	—	—	—

Koti also give ePE = +1m.54s.
Long waves were also recorded at De Bilt, Strasbourg, Uccle, Budapest, Cheb, Stuttgart, Baku, and Copenhagen.

Nov. 6d. 17h. 19m. 17s. Epicentre 37°·1N. 141°·8E. (as at 10h.).

Strong at Sendai, moderate at Utunomiya, Mito, Mizusawa, slight at Hukusima, Miyako, and Kumagaya.

Epicentre 37°·4N. 141°·8E. Macroseismic radius 200-300kms. Shallow.

See Seismological Bulletin of the Central Met. Obs. Japan, for the year 1938, Tokyo, 1940, pp. 81-82.

$A = -\cdot6283$, $B = +\cdot4944$, $C = +\cdot6006$; $\delta = -9$; $h = -1$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Onahama	0·8	257	0 23k	+ 5	0 31	0	—	—	—
Hukusima	1·2	302	0 0	−24	0 14	−27	—	—	—
Mito	1·3	236	0 19k	− 6	0 32	−12	—	—	—
Sendai	1·3	329	0 22k	− 3	0 44	0	—	—	—
Kakioka	1·5	236	0 43	+15	1 24	+35	—	—	—
Tyosi	1·5	209	0 26	− 2	1 0	+11	—	—	—
Tukubasan	1·6	237	0 29k	− 1	0 57	+ 6	—	—	—
Yamagata	1·6	315	0 29	− 1	0 57	+ 6	—	—	—
Utunomiya	1·7	250	0 35	P_g	1 0	S_g	—	—	—
Kumagaya	2·1	244	0 38k	+ 1	1 10	S_g	—	—	—
Mizusawa	2·1	346	i 0 30k	− 7	i 0 52	−12	—	—	—
Tokyo Cen. Met. Ob.	2·1	229	0 39	+ 2	1 11	S_g	—	—	—
Tokyo Imp. Univ.	2·1	229	0 34	− 3	1 4	0	—	—	—
Maebasi	2·3	252	0 41	+ 1	1 13	+ 4	—	—	—
Niigata	2·4	291	0 44	+ 3	—	—	—	—	—
Yokohama	2·4	226	0 45	+ 4	1 23	S_g	—	—	—
Kamakura	2·5	226	0 34	− 9	—	—	—	—	—
Miyako	2·6	3	0 29a	−15	0 58	−19	—	—	—
Mera	2·7	216	0 48	+ 3	1 41	+22	—	—	—
Morioka	2·7	349	0 39a	− 6	1 14	− 5	—	—	—
Oiwake	2·7	254	0 45	0	1 31	S_g	—	—	—
Takada	2·8	270	0 47	0	1 30	S_g	—	—	—
Hunatu	2·9	237	0 51	+ 3	1 36	S_g	—	—	—
Nagano	2·9	261	0 53a	P*	1 38	S_g	—	—	—
Koyama	2·9	232	0 34	−14	1 15	− 9	—	—	—
Ito	3·0	225	0 54	P*	1 43	S_g	—	—	—
Kohu	3·0	241	0 52k	+ 2	1 34	S*	—	—	—
Misima	3·0	229	0 49	− 1	—	—	—	—	—
Numadu	3·1	230	0 57	P*	1 47	S_g	—	—	—
Matumoto	3·2	254	0 53	+ 1	1 39	S*	—	—	—
Yosiwara	3·2	232	0 34	−18	1 25	− 7	—	—	—
Susaki	3·3	225	0 53	+ 1	1 42	S*	—	—	—
Toyama	3·4	266	1 1	P*	2 2	S_g	—	—	—
Hatinohe	3·5	356	0 48a	− 9	1 27	−13	—	—	—
Iida	3·6	245	1 0	+ 2	1 50	S*	—	—	—
Aomori	3·8	348	0 58	− 3	1 47	0	—	—	—
Husiki	3·8	267	1 9	P*	1 58	S*	—	—	—
Omaesaki	3·8	231	1 11	P*	2 13	S_g	—	—	—
Takayama	3·8	257	1 6	+ 5	2 23	+36	—	—	—
Wazima	3·9	277	1 7	+ 5	—	—	—	—	—
Hamamatu	4·1	235	1 8k	+ 3	2 9	S*	—	—	—
Kanazawa	4·2	264	1 24	P_g	2 23	S*	—	—	—
Hatidyozima	4·3	203	1 5	− 3	1 57	− 3	—	—	—
Gihu	4·4	250	1 10	0	2 6	+ 4	—	—	—
Nagoya	4·4	245	1 12	+ 2	2 23	S_g	—	—	—
Hukui	4·6	257	1 9	− 3	2 36	S_g	—	—	—
Hikone	4·8	250	1 21	P*	2 25	S*	—	—	—
Tu	4·9	243	1 17	0	2 40	S_g	—	—	—
Mori	5·1	349	1 19k	− 1	2 28	+ 8	—	—	—
Urakawa	5·1	8	1 13	− 7	2 8	−12	—	—	—
Muroran	5·2	353	1 24	+ 3	2 23	+ 1	—	—	—
Kyoto	5·3	249	1 22	0	2 50	S_g	—	—	—
Yagi	5·5	245	1 25	0	2 37	+ 7	—	—	—
Miyadu	5·6	257	1 28	+ 1	2 43	S*	—	—	—
Osaka	5·6	247	1 28	+ 1	3 3	S_g	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Toyooka		5·8	257	1 31	+ 2	2 47	+ 9	—	—	—
Kobe		5·9	249	1 32	+ 1	2 54	S*	—	—	—
Obihiro		5·9	10	1 25	− 6	2 39	− 1	—	—	—
Sapporo		6·0	356	1 38	+ 6	2 54	S*	—	—	—
Siomisaki		6·1	236	1 35	+ 1	3 21	S_g	—	—	—
Kusiro		6·2	18	1 51	P*	2 51	+ 3	—	—	—
Sumoto		6·2	247	1 37a	+ 2	3 14	S*	—	—	—
Wakayama		6·2	244	1 35	0	3 7	S*	—	—	—
Tokusima		6·6	246	1 44	+ 3	3 33	S_g	—	—	—
Nemuro		6·8	24	1 14	−30	2 40	−23	—	—	—
Okayama		6·8	252	1 41	− 3	—	—	—	—	—
Muroto		7·3	241	1 51	+ 1	3 27	+12	—	—	—
Koti		7·6	245	i 1 54k	− 1	3 43	S*	4 13	S_g	5·2
Hirosima		8·1	254	2 0	− 2	3 53	S*	—	—	—
Matuyama		8·1	249	2 1	− 1	4 31	S_g	—	—	—
Hamada		8·2	256	1 52	−11	3 7	−31	—	—	—
Ooita		9·2	249	2 17	+ 1	—	—	—	—	—
Izuka		9·7	254	2 24	PP	4 50	S*	—	—	—
Vladivostok		9·7	312	i 2 16	− 6	e 4 32	SS	—	—	5·0
Hukuoka B		9·9	253	e 2 29	+ 4	—	—	—	—	—
Kumamoto		10·0	248	2 28	+ 1	4 42	SS	—	—	—
Miyazaki		10·0	242	2 28a	+ 1	4 31	+ 9	—	—	—
Unzendake		10·4	249	2 34	0	5 12	L	—	—	(5·2)
Husan		10·5	263	—	—	e 4 53	SSS	—	—	—
Taikyu		10·7	267	2 42	+ 4	—	—	—	—	—
Yakusima		11·5	238	2 47	− 1	5 1	+ 2	—	—	—
Tomie		11·6	251	2 52	+ 2	—	—	—	—	—
Keizyo		11·8	277	2 54	+ 1	e 5 36	SS	—	—	6·7
Zinsen	E.	12·1	277	e 2 54	− 3	e 5 35	SS	—	—	e 6·9
Irkutsk		30·2	312	6 8	− 6	e 11 13	0	e 6 32	PP	15·1
Phu-Lien		34·6	253	e 6 50	− 3	—	—	—	—	—
Semipalatinsk		45·1	308	—	—	e 14 54	− 5	—	—	—
Calcutta	N.	48·0	268	e 8 43	0	i 15 47	+ 6	—	—	—
Andijan		52·8	297	e 9 14	− 5	e 16 59	+12	—	—	—
Agra	E.	54·0	279	e 9 38	+10	16 59	− 4	11 23	PP	—
Batavia		54·1	225	9 24	− 5	e 17 2	− 3	—	—	—
Tchimkent		54·3	300	e 9 26	− 4	e 16 49	−18	—	—	—
Sverdlovsk		55·3	319	9 26	−12	i 17 16	− 5	—	—	25·7
Bombay		62·3	274	e 10 32	+ 6	e 19 2	+10	—	—	—
Colombo	E.	63·6	258	—	—	e 16 33	?	—	—	—
Moscow		67·4	323	e 10 54	− 5	e 19 51	− 4	—	—	39·2
Pulkovo		68·3	330	e 10 58	− 7	e 19 56	−10	—	—	36·2
Baku		68·4	305	e 11 6	0	e 20 11	+ 4	—	—	34·2
Grozny		69·6	309	11 7	− 6	—	—	—	—	—
Tiflis		71·0	308	e 11 15	− 7	e 20 27	−10	e 24 46	SS	e 35·7
Tinemaha		75·5	54	e 11 39	− 9	—	—	—	—	—
Haiwee	N.	76·3	54	e 11 44	− 8	—	—	—	—	—
Pasadena		77·3	57	i 11 45	−13	—	—	—	—	e 37·7
Riverside	Z.	77·9	57	e 11 51	−10	—	—	—	—	—
Copenhagen		78·0	334	i 11 54	− 8	21 49	− 6	—	—	40·7
Ksara		81·4	305	i 12 15a	− 5	e 22 33	+ 2	—	—	—
Prague		81·6	329	—	—	e 29 31	?	—	—	44·7
Jena	N.	82·0	331	e 12 13	−10	—	—	—	—	—
Cheb		82·4	331	—	—	e 22 43↑	+ 2	—	—	e 43·7
Belgrade		82·8	321	e 12 18a	− 9	e 22 48	+ 3	—	—	e 46·0
Tucson		83·3	54	12 21	− 9	—	—	—	—	—
Stuttgart		84·7	330	e 12 25	−12	—	—	—	—	e 45·7
Uccle		84·8	335	e 12 31	− 6	—	—	—	—	e 43·7
Triest		85·3	327	—	—	e 23 0	[− 3]	e 25 25	PPS	—
Strasbourg		85·4	331	e 12 35	− 5	—	—	—	—	e 45·7
Helwan		86·9	305	e 12 37	−11	e 23 13	[0]	—	—	—
Rome		88·8	323	18 12	PPP	22 43	[−42]	29 29	SS	i 47·5
La Paz		146·5	60	i 19 38	[− 4]	—	—	—	—	—

For Notes see next page.

NOTES TO NOV. 6d. 17h. 19m. 17s.

Additional readings :—
Koti eE = +4m.41s.
Irkutsk PP = +7m.15s.
Agra iE = +17m.18s., SSE = +20m.38s.
Tiflis eSKSN = +21m.20s., eSSSZ = +28m.25s., eSSSN = +28m.35s.
Tucson i = +13m.23s.
Rome S = +23m.27s.
Long waves were also recorded at Tashkent, San Fernando, Toledo, Bagnères, Budapest, Potsdam, Puy de Dôme, Paris, Kew, Stonyhurst, De Bilt, Edinburgh, Göttingen, Hamburg, and Kodaikanal.

Nov. 6d. 18h. 20m. 22s. Epicentre 37°·1N. 141°·8E. (as at 17h.).

Moderate at Hukusima and Tukubasan, slight at Utunomiya, Kakioka, Mito, Sendai, Kumagaya, and Miyako.

Epicentre 36°·9N. 141°·8E. Shallow.

See Seismological Bulletin of the Central Met. Obs., Japan, Tokyo, 1940, pp. 83-84.

$A = -\cdot6283$, $B = +\cdot4944$, $C = +\cdot6006$,; $\delta = -9$; $h = -1$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Onahama	0·8	257	0 25k	+ 7	0 33	+ 2	—	—	—
Hukusima	1·2	302	−0 15k	−39	0 6	−35	—	—	—
Mito	1·3	236	0 18k	− 7	0 34	−10	—	—	—
Sendai	1·3	329	0 32	+ 7	0 49	+ 5	—	—	—
Tyosi	1·5	209	0 25	− 3	0 42	− 7	—	—	—
Tukubasan	1·6	237	0 28	− 2	0 47	− 4	—	—	—
Yamagata	1·6	315	0 38	+ 8	1 1	S_g	—	—	—
Utunomiya	1·7	250	0 35	+ 4	—	—	—	—	—
Kumagaya	2·1	244	0 37	0	1 3	− 1	—	—	—
Mizusawa	2·1	346	i 0 43	P_g	1 11	S_g	—	—	—
Tokyo Cen. Met. Ob.	2·1	229	0 36	− 1	1 1	− 3	—	—	—
Tokyo Imp. Univ.	2·1	229	0 32	− 5	1 4	0	—	—	—
Maebasi	2·3	252	0 41	+ 1	1 12	S*	—	—	—
Yokohama	2·4	226	0 43	+ 2	1 20	S_g	—	—	—
Kamakura	2·5	226	0 32	−11	—	—	—	—	—
Titibu	2·5	243	0 32	−11	1 2	−12	—	—	—
Miyako	2·6	3	0 48	P*	1 15	− 2	—	—	—
Mera	2·7	216	0 49	P*	1 26	S*	—	—	—
Morioka	2·7	349	0 52a	P_g	1 29	S_g	—	—	—
Oiwake	2·7	254	0 51	P*	1 36	S_g	—	—	—
Takada	2·8	270	0 47	0	1 31	S_g	—	—	—
Hunatu	2·9	237	0 49	+ 1	1 32	S_g	—	—	—
Nagano	2·9	261	0 51	P*	1 32	S_g	—	—	—
Koyama	2·9	232	0 32	−16	1 11	−13	—	—	—
Ito	3·0	225	0 54	P*	—	—	—	—	—
Kohu	3·0	241	0 50	0	1 33	S*	—	—	—
Misima	3·0	229	0 51	+ 1	—	—	—	—	—
Matumoto	3·2	254	0 51	− 1	1 42	S*	—	—	—
Susaki	3·3	225	0 50	− 3	1 32	− 3	—	—	—
Toyama	3·4	266	1 3	P*	1 55	S_g	—	—	—
Hatinohe	3·5	356	1 5	P*	1 46	S*	—	—	—
Aomori	3·8	348	1 11	P*	2 1	S*	—	—	—
Husiki	3·8	267	1 10	P*	2 1	S*	—	—	—
Omaesaki	3·8	231	1 10	P*	2 1	S*	—	—	—
Takayama	3·8	257	1 6	P*	—	—	—	—	—
Wazima	3·9	277	1 8	P*	—	—	—	—	—
Hamamatu	4·1	235	1 3	− 2	1 59	+ 4	—	—	—
Kanazawa	4·2	264	1 28	P_g	2 30	S_g	—	—	—
Hatidyozima	4·3	203	1 2	− 6	1 47	−13	—	—	—
Gihu	4·4	250	1 10a	0	2 8	+ 6	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Nagoya		4·4	245	1 12	+ 2	2 17	S*	—	—	—
Hukui		4·6	257	1 3	− 9	2 8	+ 1	—	—	—
Hakodate		4·7	350	1 29	P_g	2 28	S*	—	—	—
Ibukisan		4·7	251	1 17	+ 3	2 18	+ 8	—	—	—
Hikone		4·8	250	1 20	+ 5	2 22	+10	—	—	—
Kameyama		4·9	245	1 20	+ 3	2 35	S*	—	—	—
Tu		4·9	243	1 17	0	2 32	S*	—	—	—
Mori		5·1	349	1 36	P*	2 33	S*	—	—	—
Urakawa		5·1	8	1 43	P_g	—	—	—	—	—
Muroran		5·2	353	1 35	P*	2 42	S*	—	—	—
Kyoto		5·3	249	1 24	+ 2	2 36	S*	—	—	—
Yagi		5·5	245	1 47	P_g	—	—	—	—	—
Miyadu		5·6	257	1 27	0	—	—	—	—	—
Osaka		5·6	247	1 23	− 4	2 56	S*	—	—	—
Toyooka		5·8	257	1 31	+ 2	2 44	+ 6	—	—	—
Kobe		5·9	249	1 33	+ 2	3 0	S*	—	—	—
Obihiro		5·9	10	1 53	P_g	3 0	S*	—	—	—
Sapporo		6·0	356	2 6	P_g	3 14	S_g	—	—	—
Siomisaki		6·1	236	1 33	− 1	—	—	—	—	—
Kusiro		6·2	18	2 11	P_g	—	—	—	—	—
Sumoto		6·2	247	1 35	0	3 12	S*	—	—	—
Wakayama		6·2	244	1 34 a	− 1	3 5	S*	—	—	—
Tokusima		6·6	246	1 44	+ 3	3 28	S*	—	—	—
Nemuro		6·8	24	1 46	+ 2	3 1	− 2	—	—	—
Okayama		6·8	252	1 51	+ 7	—	—	—	—	—
Muroto		7·3	241	1 52	+ 2	3 21	+ 6	—	—	—
Koti		7·6	245	e 1 52	− 3	e 3 53	S*	—	—	—
Hirosima		8·1	254	2 0	− 2	4 7	S*	—	—	—
Matuyama		8·1	249	2 2	0	4 15	S_g	—	—	—
Vladivostok		9·7	312	e 2 24	PP	e 4 32	SS	—	—	5·0
Hukuoka		9·9	253	2 34	+ 9	—	—	—	—	—
Hukuoka B		9·9	253	—	—	e 4 34	SS	5 28	S_g	—
Kumamoto		10·0	248	2 34	+ 7	—	—	—	—	—
Miyazaki		10·0	242	2 24	− 3	4 28	+ 6	—	—	—
Husan		10·5	263	—	—	e 5 4	SSS	—	—	—
Keizyo		11·8	277	2 56	+ 3	—	—	—	—	—
Calcutta	N.	48·0	268	e 13 52	?	—	—	—	—	—
Sverdlovsk		55·3	319	9 44	+ 6	e 17 44	+23	—	—	26·6

Long waves were also recorded at De Bilt, Cheb, Tiflis, Copenhagen, Baku, and Pulkovo.

Nov. 6d. 19h. 20m. 34s. Epicentre 37°·1N. 141°·8E. (as at 18h.).

A = − ·6283, B = + ·4944, C = + ·6006; $\delta = -9$; $h = -1$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tukubasan		1·6	237	0 31	+ 1	1 0	+ 9	—	—	—
Mizusawa	E.	2·1	346	i 0 40	P*	i 1 9	S_g	—	—	—
	N.	2·1	346	i 0 38	+ 1	1 6	S*	—	—	—
Tokyo Cen. Met. Ob.		2·1	229	i 0 35	− 2	1 10	S_g	—	—	—
Tokyo Imp. Univ.		2·1	229	0 31	− 6	1 6	S*	—	—	—
Kamakura		2·5	226	0 31	−12	—	—	—	—	—
Koyama		2·9	232	0 31	−17	1 13	−11	—	—	—
Susaki		3·3	225	0 47	− 6	1 36	+ 1	—	—	—
Nagoya		4·4	245	1 10	0	2 8	+ 6	—	—	—
Koti		7·6	245	1 2	−53	i 3 4	−19	e 2 32	P_g	—
Vladivostok		9·7	312	e 2 23	+ 1	e 4 34	SSS	—	—	4·9
Hukuoka B		9·9	253	—	—	e 4 17	− 3	e 5 26	S_g	—
Keizyo		11·8	277	2 13	−40	—	—	—	—	7·4
Irkutsk		30·2	312	—	—	e 11 26?	+13	—	—	15·4
Calcutta	N.	48·0	268	—	—	e 13 57	?	—	—	—
Sverdlovsk		55·3	319	9 34	− 4	—	—	—	—	27·4

Koti also gives LN = +2m.20s.
Long waves were also recorded at Agra, Copenhagen, Tiflis, Baku, Stuttgart, Cheb, and De Bilt.

Nov. 6d. 21h. 3m. 53s. Epicentre 37°·1N. 141°·8E. (as at 19h.).

Intensity III at Mito and Onahama; II at Utunomiya, Hukusima, Kakioka, Sendai, Mizusawa, and Tukubasan; I at Miyako, Morioka, Tokyo, Kumagaya, and Hatinohe.

Epicentre 36°·9N. 141°·8E. Shallow.

See Seismological Bulletin of the Central Met. Obs. Japan for the year 1938, Tokyo, 1940.

$A = -\cdot6283$, $B = +\cdot4944$, $C = +\cdot6006$; $\delta = -9$; $h = -1$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
			m. s.	s.	m. s.	s.	m. s.		m.
Onahama	0°·8	257°	0 22k	+ 4	0 30	− 1	—	—	—
Hukusima	1·2	302	0 27	+ 3	—	—	—	—	—
Mito	1·3	236	0 20k	− 5	0 35	− 9	—	—	—
Sendai	1·3	329	0 32a	+ 7	0 52	+ 8	—	—	—
Kakioka	1·5	236	0 29	+ 1	0 48	− 1	—	—	—
Tukubasan	1·6	237	0 29	− 1	0 50	− 1	—	—	—
Yamagata	1·6	315	0 36	Pg	1 1	Sg	—	—	—
Utunomiya	1·7	250	0 40	Pg	1 3	Sg	—	—	—
Kumagaya	2·1	244	0 40	P*	1 9	Sg	—	—	—
Mizusawa	2·1	346	i 0 41	Pg	i 1 13	Sg	—	—	—
Tokyo Cen. Met. Ob.	2·1	229	i 0 37a	0	1 16	Sg	—	—	—
Tokyo Imp. Univ.	2·1	229	0 34	− 3	1 6	+2	—	—	—
Maebasi	2·3	252	0 42k	P*	1 14	S*	—	—	—
Niigata	2·4	291	0 53	Pg	1 30	+18	—	—	—
Yokohama	2·4	226	0 43	+ 2	1 18	Sg	—	—	—
Kamakura	2·5	226	0 34	− 9	1 14	0	—	—	—
Miyako	2·6	3	0 48	+ 4	1 16	− 1	—	—	—
Mera	2·7	216	0 45	0	1 25	+ 6	—	—	—
Morioka	2·7	349	0 50	P*	1 23	+ 4	—	—	—
Oiwake	2·7	254	0 49	+ 4	1 48	+29	—	—	—
Takada	2·8	270	0 51	+ 4	1 35	S*	—	—	—
Hunatu	2·9	237	0 49	+ 1	—	—	—	—	—
Nagano	2·9	261	0 52	+ 4	1 33	S*	—	—	—
Koyama	2·9	232	0 34	−14	1 15	− 9	—	—	—
Akita	3·0	334	0 46	− 4	1 28	+ 1	—	—	—
Ito	3·0	225	0 52	+ 2	1 51	+24	—	—	—
Kohu	3·0	241	0 50	0	1 36	S*	—	—	—
Misima	3·0	229	0 51a	+ 1	—	—	—	—	—
Numadu	3·0	230	0 49	− 1	1 42	Sg	—	—	—
Matumoto	3·2	254	0 52a	0	1 33	+ 1	—	—	—
Yosiwara	3·2	232	0 34	−18	1 21	−11	—	—	—
Susaki	3·3	225	0 52	− 1	1 40	S*	—	—	—
Toyama	3·4	266	1 4	P*	1 55	Sg	—	—	—
Hatinohe	3·5	356	1 3a	P*	1 43	+ 3	—	—	—
Iida	3·6	245	1 1a	+ 3	1 41	− 1	—	—	—
Aomori	3·8	348	1 10	P*	2 1	S*	—	—	—
Husiki	3·8	267	1 8	P*	1 49	+ 2	—	—	—
Omaesaki	3·8	231	1 4	+ 3	1 54	+ 7	—	—	—
Takayama	3·8	257	1 9	P*	—	—	—	—	—
Wazima	3·9	277	1 7	+ 5	2 7	Sg	—	—	—
Hamamatu	4·1	235	1 4	− 1	2 4	S*	—	—	—
Kanazawa	4·2	264	1 22	Pg	2 24	Sg	—	—	—
Hatidyozima	4·3	203	1 4k	− 4	1 48	−12	—	—	—
Gihu	4·4	250	1 12a	+ 2	2 15	S*	—	—	—
Nagoya	4·4	245	1 11	+ 1	2 14	S*	—	—	—
Hukui	4·6	257	1 7	− 5	2 1	− 6	—	—	—
Ibukisan	4·7	251	1 15	+ 1	2 15	+ 5	—	—	—
Hikone	4·8	250	1 18	+ 3	2 21	S*	—	—	—
Kameyama	4·9	245	1 18	+ 1	2 37	Sg	—	—	—
Tu	4·9	243	1 16	− 1	2 30	S*	—	—	—
Mori	5·1	349	1 32a	P*	2 32	S*	—	—	—
Urakawa	5·1	8	1 27	+ 7	—	—	—	—	—
Muroran	5·2	353	1 36	P*	2 29	+ 7	—	—	—
Kyoto	5·3	249	1 23	+ 1	2 28	+ 3	—	—	—
Yagi	5·5	245	1 14	−11	2 40	S*	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Miyadu		5·6	257	1 23	− 4	2 35	+ 2	—	—	—
Osaka		5·6	247	1 31	+ 4	2 57	S*	—	—	—
Toyooka		5·8	257	1 33	+ 4	2 47	+ 9	—	—	—
Kobe		5·9	249	1 32	+ 1	2 56	S*	—	—	—
Obihiro		5·9	10	1 24	− 7	2 48	+ 8	—	—	—
Sapporo		6·0	356	1 40	P*	2 52	+ 9	—	—	—
Siomisaki		6·1	236	1 33	− 1	3 20	S_g	—	—	—
Kusiro		6·2	18	2 3	P_g	3 19	S_g	—	—	—
Sumoto		6·2	247	1 36a	+ 1	3 10	S*	—	—	—
Wakayama		6·2	244	1 33a	− 2	3 7	S*	—	—	—
Tokusima		6·6	246	1 26	−15	3 2	+ 4	—	—	—
Nemuro		6·8	24	1 45	+ 1	3 1	− 2	—	—	—
Okayama		6·8	252	2 5	P*	—	—	—	—	—
Tadotu		7·1	250	1 54	+ 6	—	—	—	—	—
Muroto		7·3	241	1 28	−22	—	—	—	—	—
Koti		7·6	245	1 53a	− 2	4 10	S_g	—	—	4·8
Hirosima		8·1	254	2 1	− 1	3 55	S*	—	—	—
Matuyama		8·1	249	2 2a	0	4 7	S*	—	—	—
Hamada		8·2	256	2 6	+ 3	3 45	+ 7	—	—	—
Simidu		8·4	242	2 4	− 2	3 54	+11	—	—	—
Uwazima		8·5	246	2 11	+ 4	4 11	S*	—	—	—
Ooita		9·2	249	2 23	+ 7	—	—	—	—	—
Izuka		9·7	254	2 25	+ 3	5 14	S_g	—	—	—
Vladivostok		9·7	312	i 2 25	+ 3	e 4 26	+11	—	—	5·0
Hukuoka B		9·9	253	e 2 29	+ 4	5 22	S_g	—	—	—
Kumamoto		10·0	248	2 30	+ 3	4 56	S*	—	—	—
Miyazaki		10·0	242	2 27a	0	4 24	+ 2	—	—	—
Titizima		10·0	179	2 31	+ 4	—	—	—	—	—
Unzendake		10·4	249	2 34	0	5 6	S*	—	—	—
Husan		10·5	263	e 2 43	+ 8	e 5 31	L	—	—	(e 5·5)
Taikyu		10·7	267	2 40	+ 2	e 4 48	+ 9	—	—	—
Yakusima		11·5	238	2 48k	0	5 2	+ 3	—	—	—
Tomie		11·6	251	2 53	+ 3	6 5	L	—	—	(6·1)
Keizyo		11·8	277	2 57	+ 4	5 25	SS	—	—	e 7·1
Zinsen		12·1	277	e 2 59	+ 2	e 5 30	SS	—	—	e 6·8
Miyakozima		18·7	234	4 18	− 4	—	—	—	—	—
Taito		22·9	239	5 6	0	—	—	—	—	—
Irkutsk		30·2	312	e 6 16	+ 2	e 11 19	+ 6	—	—	15·1
Phu-Lien		34·6	253	e 6 51	− 2	—	—	—	—	—
Semipalatinsk		45·1	308	e 8 18	− 2	—	—	—	—	—
Calcutta	N.	48·0	268	i 8 49	+ 6	e 15 39	− 2	e 18 43	SS	e 22·7
Almata		48·8	300	e 8 19	−30	—	—	—	—	—
Medan		51·7	241	9 36	+25	i 17 35	+63	—	—	—
Andijan		52·8	297	e 9 21	+ 2	e 16 56	+ 9	—	—	—
Agra	E.	54·0	279	i 9 26a	− 2	i 17 8	+ 5	17 27	PS	—
Batavia		54·1	225	9 28	− 1	17 4	− 1	—	—	—
Tchimkent		54·3	300	e 9 29	− 1	—	—	—	—	—
Tashkent		54·8	299	e 9 32	− 2	e 17 13	− 1	—	—	e 29·4
Sverdlovsk		55·3	319	i 9 39	+ 1	17 25	+ 4	—	—	26·1
Samarkand		57·1	298	e 9 51	+ 1	—	—	—	—	—
Bombay		62·3	274	e 10 26	0	e 18 52	0	—	—	—
Colombo	E.	63·6	258	e 9 27	−68	—	—	—	—	39·0
Moscow		67·4	323	e 10 59	0	19 57	+ 2	—	—	—
Pulkovo		68·3	330	e 11 4	− 1	e 20 7	+ 1	—	—	33·6
Baku		68·4	305	e 11 8	+ 2	e 20 14	+ 7	—	—	34·1
Grozny		69·6	309	e 11 13	0	—	—	—	—	—
Tiflis		71·0	308	e 11 21	− 1	e 20 37	0	e 30 23	SSS	37·1
Tinemaha		75·5	54	e 11 47	− 1	—	—	—	—	—
Haiwee		76·3	54	e 11 53	+ 1	—	—	—	—	—
Mount Wilson	Z.	77·3	57	e 12 0	+ 2	—	—	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Pasadena	z.	77·3	57	i 11 57	− 1	—	—	—	—	—
Copenhagen		78·0	334	12 2	0	—	—	—	—	38·1
Prague		81·6	329	e 13 27	+66	e 22 34	+ 1	—	—	e 41·1
Tucson		83·3	54	12 30a	0	—	—	—	—	—
De Bilt		83·4	335	—	—	e 22 59	+ 8	—	—	e 43·1
Stuttgart		84·7	330	e 12 37a	0	e 23 7	+ 3	—	—	e 43·1
Uccle		84·8	335	—	—	e 23 9	+ 4	—	—	e 43·1
Basle		86·3	330	e 12 45	0	—	—	—	—	—
Rome		88·8	323	e 12 27?	−30	23 37	− 7	16 19	PP	45·3
La Paz	z.	146·5	60	19 34	[− 8]	—	—	—	—	—

Additional readings :—
Calcutta eSSN = +19m.53s.
Agra iE = +16m.53s., SSE = +20m.43s.
Batavia PN = +9m.32s.
Tucson iP = +12m.41s., i = +13m.17s.
Stuttgart eS = +23m.33s.
Long waves were also recorded at Potsdam, Upsala, Besançon, Hamburg, and Cheb.

Nov. 6d. 21h. 38m. 45s. Epicentre 37°·1N. 141°·8E. (as at 21h. 3m.).

Strong at Hukusima, Kakioka, Onahama, and Tukubasan, moderate at Miyako, Tokyo, Yokohama, and Katuura, slight at Misima and Tomisaki.

Epicentre 37°·15N. 141°·85E. Kosima Bay. Macroseismic radius greater than 300kms. Shallow.

See Seismological Bulletin of the Central Met. Obs. Japan for the year 1938, Tokyo, 1940. pp. 86-88. One macroseismic chart and one chart giving the initial movements of the P waves, p. 86.

$A = -\cdot6283$, $B = +\cdot4944$, $C = +\cdot6006$; $\delta = -9$; $h = -1$.

	△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Onahama	0·8	257	0 26a	+ 8	0 33	+ 2	—	—	—
Hukusima	1·2	302	0 26k	+ 2	0 44	+ 3	—	—	—
Mito	1·3	236	0 26a	+ 1	0 49	+ 5	—	—	—
Sendai	1·3	329	0 28a	+ 3	0 42	− 2	—	—	—
Kakioka	1·5	236	0 30	P_g	0 47	− 2	—	—	—
Tyosi	1·5	209	0 28	0	1 3	+14	—	—	—
Tukubasan	1·6	237	0 32k	+ 2	1 2	+11	—	—	—
Yamagata	1·6	315	0 36a	+ 6	1 0	S_g	—	—	—
Utunomiya	1·7	250	0 41a	P_g	1 2	S_g	—	—	—
Kumagaya	2·1	244	0 38a	+ 1	1 11	S_g	—	—	—
Mizusawa	2·1	346	i 0 36a	− 1	—	—	—	—	—
Tokyo Cen. Met. Ob.	2·1	229	i 0 40a	P*	1 17	+13	—	—	—
Tokyo Imp. Univ.	2·1	229	0 38	+ 1	1 15	+11	—	—	—
Kiyosumi	2·3	214	0 38	− 2	1 9	0	—	—	—
Maebasi	2·3	252	0 44	P*	1 15	S_g	—	—	—
Niigata	2·4	291	0 51	P_g	1 32	+20	—	—	—
Yokohama	2·4	226	0 43a	+ 2	1 26	S_g	—	—	—
Kamakura	2·5	226	0 38	− 5	1 17	S*	—	—	—
Titibu	2·5	243	0 38	− 5	1 21	S_g	—	—	—
Miyako	2·6	3	0 37a	− 7	1 9	− 8	—	—	—
Mera	2·7	216	0 46a	+ 1	1 26	S*	—	—	—
Morioka	2·7	349	0 44	− 1	1 23	S*	—	—	—
Takada	2·8	270	0 47	0	1 25	+ 3	—	—	—
Hunatu	2·9	237	0 55	P_g	1 38	S_g	—	—	—
Nagano	2·9	261	0 55k	P_g	1 41	S_g	—	—	—
Koyama	2·9	232	0 38	−10	1 18	− 6	—	—	—
Akita	3·0	334	0 39	−11	—	—	—	—	—
Ito	3·0	225	0 50a	0	1 46	S_g	—	—	—
Misima	3·0	229	0 52	+ 2	1 34	S*	—	—	—
Kohu	3·0	241	0 51	+ 1	1 45	S_g	—	—	—

Continued on next page.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Numadu	3·1	230	0 52	+ 1	1 59	S_g	—	—	—
Yosiwara	3·2	232	0 38	−14	1 31	− 1	—	—	—
Matumoto	3·2	254	0 54a	+ 2	1 35	+ 3	—	—	—
Susaki	3·3	225	0 52	− 1	1 35	0	—	—	—
Toyama	3·4	266	1 6	P_g	—	—	—	—	—
Hatinohe	3·5	356	0 43a	−14	1 25	−15	—	—	—
Iida	3·6	245	1 2a	P*	1 37	− 5	—	—	—
Aomori	3·8	348	1 1	0	1 49	+ 2	—	—	—
Husiki	3·8	267	1 11a	P*	2 13	S_g	—	—	—
Omaesaki	3·8	231	1 3	+ 2	2 1	S*	—	—	—
Takayama	3·8	257	1 9a	P*	2 38	+51	—	—	—
Wazima	3·9	277	1 8a	P*	2 13	S_g	—	—	—
Hamamatu	4·1	235	1 4	− 1	2 1	+ 6	—	—	—
Kanazawa	4·2	264	1 16	P*	2 22	S_g	—	—	—
Hatidyozima	4·3	203	1 4	− 4	1 56	− 4	—	—	—
Gihu	4·4	250	1 13k	+ 3	2 30	S_g	—	—	—
Nagoya	4·4	245	1 14	+ 4	2 18	S*	—	—	—
Hukui	4·6	257	1 11	− 1	2 30	S_g	—	—	—
Hakodate	4·7	350	1 15	+ 1	—	—	—	—	—
Ibukisan	4·7	251	1 20	P*	2 32	S_g	—	—	—
Hikone	4·8	250	1 19	+ 4	2 31	S*	—	—	—
Kameyama	4·9	245	1 19	+ 2	2 35	S_g	—	—	—
Tu	4·9	243	1 15	− 2	2 33	S*	—	—	—
Mori	5·1	349	1 19	− 1	2 32	S*	—	—	—
Urakawa	5·1	8	1 25	+ 5	—	—	—	—	—
Muroran	5·2	353	1 25a	+ 4	2 18	− 4	—	—	—
Kyoto	5·3	249	1 28	+ 6	3 4	S_g	—	—	—
Yagi	5·5	245	1 27a	+ 2	2 58	S_g	—	—	—
Miyadu	5·6	257	1 27	0	2 57	S*	—	—	—
Osaka	5·6	247	1 35	P*	3 3	S_g	—	—	—
Toyooka	5·8	257	1 32a	+ 3	2 51	S*	—	—	—
Kobe	5·9	249	1 33	+ 2	3 16	S_g	—	—	—
Obihiro	5·9	10	1 24k	− 7	2 49	+ 9	—	—	—
Sapporo	6·0	356	1 30	− 2	2 44	+ 1	—	—	—
Siomisaki	6·1	236	1 34a	0	3 38	S_g	—	—	—
Kusiro	6·2	18	1 57	P_g	3 3	S*	—	—	—
Sumoto	6·2	247	1 38a	+ 3	3 5	S*	—	—	—
Wakayama	6·2	244	1 35a	0	3 8	S*	—	—	—
Tokusima	6·6	246	1 47	+ 6	3 44	S_g	—	—	—
Nemuro	6·8	24	1 44	0	2 53	−10	—	—	—
Okayama	6·8	252	1 47	+ 3	4 0	S_g	—	—	—
Tadotu	7·1	250	1 54	+ 6	4 11	S_g	—	—	—
Muroto	7·3	241	1 52a	+ 2	3 37	S*	—	—	—
Koti	7·6	245	e 1 57a	+ 2	3 29	+ 6	i 2 10	P*	e 3·6
Hirosima	8·1	254	2 8	+ 6	—	—	—	—	—
Matuyama	8·1	249	2 4	+ 2	4 30	S_g	—	—	—
Hamada	8·2	256	2 7	+ 4	3 41	+ 3	—	—	—
Simidu	8·4	242	2 8	+ 2	4 0	SS	—	—	—
Uwazima	8·5	246	2 10a	+ 3	3 59	+14	—	—	—
Simonoseki	9·4	254	2 25	+ 7	5 8	S_g	—	—	—
Ootomari	9·6	4	2 21	0	4 11	− 1	—	—	—
Izuka	9·7	254	2 25	+ 3	5 31	S_g	—	—	—
Asosan	9·8	248	2 23a	− 1	4 59	S*	—	—	—
Hukuoka B	9·9	253	2 31	+ 6	5 37	S_g	—	—	—
Kumamoto	10·0	248	2 31a	+ 4	4 52	SSS	—	—	—
Miyazaki	10·0	242	2 28a	+ 1	4 33	SS	—	—	—
Titizima	10·0	179	2 15	−12	—	—	—	—	—
Unzendake	10·4	249	2 41	+ 7	4 59	SSS	—	—	—
Husan	10·5	263	i 2 43a	+ 8	4 39	+ 4	—	—	—
Ituhara	10·6	258	2 42	+ 6	5 30	L	—	—	(5·5)
Taikyu	10·7	267	1 41	−57	3 54	−45	—	—	—
Kagosima	10·8	243	2 44	+ 5	5 44	L	—	—	(5·7)
Syuhurei	11·1	270	2 50	+ 7	5 16	SSS	—	—	—
Yakusima	11·5	238	2 49a	+ 1	5 7	+ 8	—	—	—
Tomie	11·6	251	2 53	+ 3	5 7	+ 6	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Keizyo	N.	11·8	277	3 8	PPP	5 26	SSS	—	—	6·6
Zinsen		12·1	277	e 3 1	+ 4	e 5 32	SS	e 7 11	L_q	i 8·1
Sikka		12·2	4	2 51	− 7	5 34	SS	—	—	—
Heizyo		12·8	284	i 3 9a	+ 3	i 6 24	L	—	—	(6·4)
Nake		13·5	234	3 14	− 1	5 50	+ 3	—	—	—
Dairen		16·0	283	3 52	+ 4	6 56	+10	—	—	—
Zi-ka-wei		17·9	258	—	—	e 7 53	SS	—	—	—
Miyakozima		18·7	234	4 18	− 4	8 19	SS	—	—	—
Isigakizima		19·8	237	4 27	− 8	8 16	+ 3	—	—	—
Giran		21·1	240	4 58	+10	—	—	—	—	—
Taihoku		21·1	240	e 4 33	−15	8 19	−20	—	—	11·2
Sintiku		21·6	241	4 55	+ 1	—	—	—	—	—
Karenko		21·7	241	5 4	+ 9	9 5	+14	—	—	—
Arisan		22·6	241	5 15	+12	—	—	—	—	—
Taito		22·9	239	5 6	0	9 24	+11	—	—	—
Tainan		23·3	240	5 7	− 3	9 42	+22	—	—	—
Takao		23·5	240	5 26	PP	9 26	+ 3	—	—	—
Hong Kong		28·0	246	5 53	− 2	10 47	+ 9	12 22	SS	13·9
Manila		29·1	225	6 1	− 3	10 56	0	—	—	—
Irkutsk		30·2	312	e 6 15	+ 1	e 11 15	+ 2	e 7 15	PP	15·2
Palau		30·4	195	6 19	+ 3	11 10	− 6	—	—	—
Phu-Lien		34·6	253	e 6 53	0	i 12 33	+11	—	—	17·0
Semipalatinsk		45·1	308	8 17	− 3	i 14 56	− 3	—	—	23·6
Calcutta	N.	48·0	268	i 8 43k	0	i 15 48	+ 7	i 10 30	PP	e 23·5
Almata		48·8	300	e 8 20	−29	—	—	—	—	—
College		48·9	32	e 8 49	− 1	15 37	−16	e 11 49	PPP	e 20·8
Frunse		50·6	300	—	—	e 16 24	+ 7	—	—	16·7
Medan		51·7	241	9 21	+10	i 16 34	+ 2	i 16 45	PS	—
Dehra Dun	N.	52·6	283	e 9 3?	−15	i 16 42	− 2	i 20 30	SS	i 26·7
Andijan		52·8	297	e 9 19	0	e 17 0	+13	—	—	28·2
Agra	E.	54·0	279	i 9 25a	− 3	i 17 8	+ 5	11 15	PP	—
Batavia		54·1	225	e 9 24	− 5	17 1	− 4	—	—	—
Honolulu		54·2	88	e 9 29	0	17 6	0	—	—	23·4
Tchimkent		54·3	300	e 9 29	− 1	e 17 16	+ 9	—	—	—
Tashkent		54·8	299	i 9 35	+ 1	17 19	+ 5	—	—	29·0
Sverdlovsk		55·3	319	i 9 37	− 1	i 17 24	+ 3	—	—	—
Sitka		56·1	40	e 9 52	+ 9	e 17 48	+16	12 6	PP	23·3
Samarkand		57·1	298	e 9 56	+ 6	e 17 53	+ 8	—	—	23·2
Hyderabad		58·6	269	10 4	+ 3	18 11	+ 7	12 21	PP	29·7
Bombay		62·3	274	i 10 26k	0	i 18 57	+ 5	10 46	pP	32·7
Kodaikanal	E.	63·5	263	i 10 29a	− 5	i 19 15	+ 8	i 13 50	PP	i 30·2
Colombo	E.	63·6	258	10 35	0	19 18	+10	—	—	34·9
Victoria		66·3	46	10 57	+ 5	19 35	− 7	23 33	SS	35·2
Apia		66·9	129	e 10 51	− 5	e 19 45	− 4	—	—	—
Seattle		67·2	46	e 10 55	− 3	e 19 52	0	—	—	—
Moscow		67·4	323	10 58	− 1	19 55	0	—	—	31·8
Pulkovo		68·3	330	e 11 3	− 2	e 20 6	0	—	—	33·7
Baku		68·4	305	—	—	e 20 26	+19	—	—	—
Grozny		69·6	309	11 11	− 2	20 26	+ 5	—	—	—
Ferndale		69·7	53	i 11 15	+ 1	e 20 15	− 7	—	—	e 30·2
Piatigorsk		70·8	312	11 17	− 3	e 20 43	+ 8	—	—	25·2
Tiflis		71·0	308	11 19	− 3	e 20 37	0	i 14 31	PP	e 39·2
Riverview		71·1	172	e 11 16	− 6	i 20 36	− 2	i 21 39	PS	e 30·0
Sydney		71·1	172	e 12 12	+50	e 20 42	+ 4	e 24 47	SS	e 32·2
Ukiah		71·1	55	e 11 24	+ 2	20 30	− 8	e 14 38	PP	29·6
Erevan		72·0	307	11 31	+ 3	e 20 53	+ 4	—	—	—
Berkeley		72·4	56	e 11 22	− 8	e 20 38	−15	—	—	e 32·4
San Francisco	N.	72·4	56	e 11 30	0	e 20 45	− 8	—	—	—
Branner		72·7	56	e 11 24	− 8	—	—	—	—	e 32·4
Perth		72·9	203	12 8	+35	21 9	+10	14 47	PP	34·2
Saskatoon		73·0	37	e 11 32	− 1	e 20 51	− 9	—	—	e 33·2
Upsala		73·0	335	e 11 34	+ 1	20 59	− 1	e 14 21	PP	e 35·2
Lick		73·1	56	e 11 32	− 2	e 20 54	− 7	—	—	—
Sotchi		73·1	313	11 33	− 1	e 21 13	+12	—	—	—
Butte		73·7	43	e 11 34	− 4	e 20 58	−10	e 21 45	S_cS	e 34·3

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Melbourne		74·6	177	i 12 35	+52	e 21 11	− 7	21 45	PS	32·0
Theodosia		74·7	315	11 47	+ 4	21 17	− 2	—	—	42·2
Bozeman		74·8	43	e 11 43	− 1	e 21 17	− 3	—	—	e 37·3
Simferopol		75·5	316	11 51	+ 3	21 27	− 1	—	—	42·2
Tinemaha		75·5	54	i 11 39	− 9	e 21 19	− 9	—	—	—
Yalta		75·8	315	e 11 54	+ 4	e 21 35	+ 4	—	—	44·2
Sebastopol		76·0	316	—	—	e 21 37	+ 3	—	—	—
Santa Barbara	z.	76·1	57	i 11 43	− 8	—	—	—	—	—
Haiwee		76·3	54	e 11 46	− 6	e 21 27	−10	—	—	—
Bergen		76·5	340	11 49	− 5	21 57	+18	—	—	30·7
Mount Wilson		77·3	57	i 11 48	−10	e 21 33	−15	—	—	—
Pasadena		77·3	57	i 11 50	− 8	i 21 35	−13	—	—	31·6
Riverside		77·9	57	i 11 54	− 7	e 21 49	− 5	—	—	—
Copenhagen		78·0	334	e 11 59	− 3	21 53	− 2	14 52	PP	—
Bucharest		80·2	319	e 12 15	+ 1	22 22	+ 3	15 23	PP	40·2
Potsdam		80·3	332	i 12 12	+ 2	e 22 21	+ 1	e 15 15	PP	e 45·2
Hamburg		80·6	334	e 12 12a	− 4	e 22 21	− 2	e 15 50	PP	e 39·2
Istanbul		80·8	316	13 7	+50	22 50	+25	—	—	e 47·2
Arapuni		81·1	154	—	—	22 39	+11	27 51	SS	i 38·0
Aberdeen		81·3	341	i 12 36	+16	i 22 31	+ 1	i 16 47	PPP	43·8
Ksara		81·4	305	i 12 19a	− 1	22 37	+ 6	—	—	40·2
Budapest	E.	81·5	325	12 27	+ 6	22 38	+ 6	i 17 23	PPP	44·8
Kecskemet	z.	81·6	324	i 12 17	− 4	e 23 19	PS	27 58	SS	e 44·2
Prague		81·6	329	e 12 21	0	e 22 36	+ 3	—	—	e 40·2
Ivigtut		81·7	5	12 25	+ 3	22 29	− 5	23 48	PS	38·2
Jena		82·0	331	e 12 21	− 2	e 22 15	−22	—	—	e 35·2
Göttingen		82·2	332	e 12 21	− 3	e 22 44	+ 5	—	—	e 44·2
Cheb		82·4	331	e 12 31	+ 6	e 22 35	− 6	—	—	e 45·2
Hof		82·4	330	e 12 27	+ 2	e 22 51	+10	—	—	e 41·2
Edinburgh		82·7	341	i 12 34	+ 7	i 22 46	+ 2	i 15 15	PP	e 37·2
Belgrade		82·8	321	e 12 23	− 4	i 22 45	0	i 15 44	PP	46·4
Sofia		82·8	319	e 12 30	+ 3	e 22 52	+ 7	—	—	46·9
Durham		83·2	340	i 12 35	+ 6	i 22 54	+ 5	—	—	—
Tucson		83·3	54	i 12 24a	− 6	i 22 43	− 7	i 15 38	PP	34·5
De Bilt		83·4	335	12 30	0	22 51	0	—	—	e 41·2
Wellington		83·6	156	e 12 25	− 7	22 51	− 2	28 20	SS	39·2
Stonyhurst		84·3	340	i 12 32	− 3	i 22 58	− 2	i 23 16	PS	42·2
Stuttgart		84·7	330	12 33a	− 4	i 23 1	− 3	i 12 49	pP	e 45·2
Karlsruhe		84·8	332	e 12 34	− 3	e 23 4	− 1	—	—	e 46·2
Uccle		84·8	335	i 12 34a	− 3	i 23 8	+ 3	—	—	e 40·2
Christchurch		85·0	158	e 12 25a	−13	22 43	[−18]	i 28 25	SS	—
Triest		85·3	327	e 12 51a	+11	23 3	[0]	16 29	PP	e 51·2
Strasbourg		85·4	331	i 12 37a	− 3	i 23 11	0	i 13 11	pP	e 44·2
Oxford		85·8	337	i 12 49	+ 7	23 19	+ 4	—	—	e 37·4
Rathfarnham Castle		85·8	342	i 13 14	+32	i 23 36	+21	i 25 19	PPS	43·2
Kew		85·9	337	e 12 36	− 7	i 23 13	− 3	i 23 27	PS	e 38·2
Zurich		86·1	330	e 12 40	− 4	e 23 15	− 3	—	—	—
Basle		86·3	330	e 12 49	+ 4	e 23 16	− 4	—	—	—
Padova		86·3	327	e 12 48	+ 3	i 23 15	− 5	—	—	e 49·2
Helwan		86·9	305	12 45k	− 3	i 23 28	+ 2	16 20	PP	—
Neuchatel		87·0	330	e 12 44	− 4	e 23 10	[− 4]	—	—	—
Paris		87·1	335	e 13 0	+11	i 23 21	− 7	—	—	43·2
Florence		87·8	327	13 3	+11	23 15	[− 3]	—	—	42·2
Jersey		88·3	338	e 13 18	+23	i 23 41	+ 2	e 14 27	pP	e 48·9
Moncalieri		88·4	330	13 15?	+20	23 23	[+ 1]	—	—	e 32·4
Rome		88·8	323	i 12 49a	− 8	23 7	[−18]	i 16 42	PP	41·2
Chicago		89·3	35	e 13 0	+ 1	23 28	[− 1]	e 16 35	PP	36·3
Puy de Dôme		89·6	332	i 13 5	+ 4	e 23 38	[+ 8]	—	—	e 48·6
Florissant		90·5	38	e 13 1	− 4	i 23 51	− 8	i 16 40	PP	—
Marseilles		90·7	329	e 13 11	+ 5	e 23 46	[+ 9]	—	—	e 48·2

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
St. Louis		90·7	38	e 13 6	0	i 22 54	?	—	—	—
Shawinigan Falls		91·1	23	e 13 0	− 8	e 23 42	[+ 3]	—	—	49·2
Ottawa		91·2	25	13 2	− 6	23 39	[− 1]	16 45	PP	e 40·2
Seven Falls		91·2	21	i 13 3	− 5	23 45	[+ 5]	—	—	e 46·5
Cape Girardeau		92·1	39	e 12 11	−61	e 24 8	− 5	—	—	—
Little Rock		92·5	42	e 13 16	+ 2	i 24 10	− 7	e 16 44	PP	43·8
Vermont		92·8	24	e 13 15	− 1	e 23 45	[− 4]	e 16 55	PP	e 50·8
Bagnères		92·9	333	e 13 22	+ 6	e 23 42	[− 7]	i 13 58	pP	e 45·2
East Machias		94·3	20	e 13 30	+ 7	23 58	[+ 1]	e 17 3	PP	e 44·6
Williamstown		94·4	24	e 13 21	− 2	—	—	i 17 12	PP	—
Harvard		95·1	23	e 13 19	− 7	e 24 6	[+ 5]	e 17 18	PP	e 58·2
Weston		95·3	23	e 13 26k	− 1	e 24 3	[+ 1]	e 17 23	PP	—
Fordham		95·8	26	i 13 34	+ 5	i 24 3	[− 2]	i 17 26	PP	i 41·1
Philadelphia		96·1	28	e 13 36	+ 5	i 24 10	[+ 3]	i 17 28	PP	e 42·7
Algiers		97·1	327	e 12 15?	−80	e 21 36	?	e 17 15?	PP	50·2
Toledo		97·2	334	e 13 31	− 5	e 23 57	[−16]	e 17 29	PP	—
Columbia		98·8	35	e 13 39	− 4	e 24 13	[− 7]	e 17 40	PP	e 44·7
Almeria		99·3	332	e 18 4	PP	—	—	—	—	e 52·3
Granada		99·4	333	i 13 51	+ 5	27 13	PPS	i 17 59	PP	e 44·2
Malaga		100·2	333	e 17 57	PP	—	—	—	—	56·2
San Fernando		101·0	334	e 14 9	+16	24 2	[−30]	e 18 9	PP	—
Tananarive		104·5	258	18 32	PP	25 41	−13	33 35	SS	e 51·0
San Juan		118·8	30	e 20 27	PP	e 26 25	[+39]	29 39	PS	e 49·5
Fort de France		124·1	25	e 20 45	PP	—	—	—	—	—
Cape Town	E.	134·4	256	e 21 58	PP	—	—	—	—	48·2
	N.	134·4	256	e 22 8	PP	i 39 46	SS	—	—	56·2
Huancayo		138·4	63	e 19 21	[− 6]	e 26 38	[+ 2]	e 22 7	PP	56·0
La Paz		146·5	60	19 37	[− 5]	26 21	[−28]	42 13	SS	69·2
La Plata		163·9	87	24 45	PP	45 15	SS	29 33	PPP	75·6
Rio de Janeiro		165·2	18	e 20 15	[+ 9]	e 31 35	{− 4}	—	—	—

Additional readings :—

Koti iS_KEN = +4m.12s.
Zi-ka-wei S? = +10m.8s., i = +10m.53s.
Irkutsk e = +6m.50s. and +12m.57s.
Calcutta ePPPN = +11m.17s., eSSN = +19m.4s., eSSSN = +20m.22s.
College eS_CS = +18m.33s.
Medan iPN = +9m.26s., iPE = +9m.29s.
Agra eN = +9m.30s., iE = +9m.34s., iEN = +17m.25s., SSE = +20m.54s.
Batavia PNZ = +9m.27s., iPE = +9m.32s.
Honolulu eP = +9m.35s., S = +17m.11s.
Sitka eP = +10m.9s., eSS = +21m.42s.
Hyderabad PSN = +18m.32s., S_CSN = +19m.40s., SSN = +22m.2s.
Bombay iN = +10m.58s., PPEN = +12m.45s., iEN = +19m.5s., and +19m.56s., iN = +27m.12s.
Kodaikanal iPSE = +19m.45s., iSSE = +23m.30s.
Victoria e = +20m.21s., SSS = +28m.15s.
Seattle eP = +11m.33s.
Tiflis iZ = +11m.22s., PPPZ = +15m.57s., SSSE = +27m.58s.
Riverview eN = +11m.26s., iN = +11m.36s., iSN = +20m.40s., iN = +22m.6s. and +23m.15s.
Ukiah ePPP = +15m.46s., SS = +25m.13s., eSSS = +28m.33s.
Erevan e = +20m.34s.
Berkeley ePN = +11m.25s., eSEZ = +21m.5s., eGE = +29m.25s., eN = +30m.21s.
Perth PPP = +16m.5s., PS = +21m.32s., i = +21m.58s. and +25m.57s., SS = +26m.10s., i = +26m.25s., +27m.6s., and +29m.40s.
Upsala ePSN = +21m.18s., eSSN = +26m.3s., eSSSE = +29m.15s.
Lick eN = +24m.14s.
Butte eSSS = +29m.25s.
Melbourne i = +12m.55s., SSS = +29m.37s.
Copenhagen iZ = +12m.6s. and +12m.19s., eZ = +14m.11s., e = +15m.39s., eNZ = +22m.15s.
Bucharest iN = +22m.32s., PSEN = +22m.58s.
Potsdam ePEN = +12m.15s. and +12m.27s., ePPZ = +15m.27s.
Hamburg iN = +22m.41s. and +23m.18s.
Arapuni i = +33m.39s.
Aberdeen iPS = +23m.5s.
Budapest +28m.19s. and iE = +30m.55s.
Kecskemet z. eP_CP = +12m.30s., e = +13m.12s., +15m.19s., and +17m.36s., eS_CS = +22m.56s., i = +23m.48s. and +31m.13s., iPKKS? = +34m.35s., eSKKS = +37m.59s.

Continued on next page.

Ivigtut +14m.39s., +24m.15s., and +27m.21s.
Jena iPE = +12m.26s., eN = +22m.38s. and +22m.41s., eZ = +22m.51s., eE = +23m.9s.
Edinburgh i = +12m.43s., +23m.14s., and +30m.31s.
Belgrade iPZ = +12m.31s., iNE = +15m.56s. and +23m.5s.
Tucson iP = +12m.33s., i = +12m.48s., +12m.54s., +15m.17s., +15m.57s., and +16m.31s., iPPP = +17m.30s., iS = +22m.50s., SS = +27m.59s. and +28m.40s.
Wellington SSS = +31m.42s., L_q = +35m.42s.
Stonyhurst e = +12m.44s.
Stuttgart ePP = +16m.5s., ePPP = +17m.49s., iS = +23m.16s.
Uccle iZ = +13m.10s. and +23m.14s., iSS = +29m.17s.
Christchurch iS = +22m.56s., SSSE = +32m.3s.
Triest S = +23m.9s.
Strasbourg iZ = +14m.42s., iPPZ = +15m.59s., iPPPZ = +18m.6s., iZ = +18m.9s., eZ = +23m.4s., e = +23m.43s., isSN = +24m.6s., eSSE = +29m.6s.
Rathfarnham Castle iS = +24m.18s.
Kew iEN = +13m.1s.
Helwan i = +23m.13s., +23m.39s., and +24m.15s., PS = +24m.27s.
Rome iPPP = +18m.23s., S = +23m.44s., PS = +24m.42s., PPS = +25m.18s., i = +30m.1s.
Chicago S = +23m.39s., eSS = +29m.50s.
Florissant iPZ = +13m.7s., iZ = +27m.40s.
St. Louis eE = +13m.45s., ePPE = +16m.34s.
Ottawa iE = +23m.57s., iN = +24m.19s., SSSZ = +32m.33s.
Little Rock ePPPN = +18m.16s., ePSN = +25m.9s., ePPSN = +25m.34s., iPPPSN = +26m.11s., SSEN = +30m.15s.
Vermont eS = +24m.21s., ePPS = +26m.35s.
Bagnères iN = +17m.8s., epPPE = +17m.44s., esPPE = +17m.57s., PPPE = +19m.14s., eSKSN = +23m.56s., eSKKSN = +24m.5s., SSE = +24m.23s., iPSN = +25m.55s., eE = +28m.26s., eSSN = +30m.36s., SSSN = +34m.23s.
East Machias PP = +17m.21s., PPP = +19m.31s., SKKS = +24m.31s., S = +24m.40s., ePS = +25m.55s.
Williamstown i = +13m.42s.
Harvard iZ = +13m.28s. and +13m.43s., eN = +25m.42s., eL_qE = +51m.45s.
Weston iPZ = +13m.33s., iZ = +13m.50s., ePSN = +36m.23s.
Fordham iZ = +18m.24s.
Algiers i = +20m.8s., e = +39m.15s.?
Toledo i = +27m.5s.
Columbia ePS = +26m.35s.
Granada iPS = +25m.31s. and +33m.14s., SSS = +40m.7s.
San Fernando SN = +25m.9s.
Tananarive N = +24m.2s., E = +25m.50s.
San Juan ePP = +21m.16s., S = +28m.7s., iPPS = +31m.6s., SS = +36m.27s., SSS = +40m.33s.
Cape Town iN = +22m.55s., iE = +23m.4s.
Huancayo ePKP = +19m.38s., iPP = +22m.57s., iPKS = +23m.20s. and +24m.5s., ePPP = +24m.52s., eSKKKS = +29m.28s., ePPS = +34m.27s., iPKP,PKP = +38m.6s., SS = +40m.28s., iSS = +40m.37s., i = +41m.30s., iSSS = +45m.59s.
La Paz iE = +20m.20s., SSSE = +47m.38s.
Long waves were also recorded at Denver.

Nov. 6d. 23h. 15m. 22s. Epicentre 37°·1N. 141°·8E. (as at 21h.).

Intensity II at Kakioka, Mito, Tukubasan, I at Utunomiya, Onahama, Sendai, Hukusima, Kohu, and Morioka.

Epicentre 36°·9N. 142°·0E. Shallow.

See Seismological Bulletin of the Central Met. Obs. Japan for the year 1939, Tokyo, 1940, pp. 89-90.

A = −·6283, B = +·4944, C = +·6006; $\delta = -9$; $h = -1$.

	Δ	Az.	P.	O−C.	S.	O−C.	L.
	°	°	m. s.	s.	m. s.	s.	m.
Onahama	0·8	257	0 26k	+ 8	1 34	+63	—
Hukusima	1·2	302	0 32	+ 8	0 55	+14	—
Mito	1·3	236	0 19a	− 6	0 40	S*	—
Sendai	1·3	329	0 30k	+ 5	0 51	+ 7	—
Kakioka	1·5	236	0 26	− 2	0 53	S_g	—
Tukubasan	1·6	237	0 26a	− 4	0 49	− 2	—
Yamagata	1·6	315	0 38	+ 8	1 3	S_g	—
Utunomiya	1·7	250	0 25a	− 6	1 1	S_g	—
Kumagaya	2·1	244	0 39	P*	—	—	—
Mizusawa	2·1	346	0 40	P*	1 9	S_g	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tokyo Cen. Met. Ob.		2·1	229	0 37	0	1 15	S_g	—	—
Yokohama		2·4	226	0 45	+ 4	—	—	—	—
Miyako		2·6	3	0 43	− 1	1 11	− 6	—	—
Mera		2·7	216	0 48	P*	1 25	S*	—	—
Morioka		2·7	349	0 49	P*	1 27	S_g	—	—
Takada		2·8	270	0 40	− 7	1 35	S_g	—	—
Hunatu		2·9	237	0 46	− 2	1 25	+ 1	—	—
Akita		3·0	334	0 48	− 2	1 38	S_g	—	—
Kohu		3·0	241	0 49	− 1	1 36	S*	—	—
Numadu		3·1	230	0 46	− 5	1 44	S_g	—	—
Matumoto		3·2	254	0 53	+ 1	1 37	S*	—	—
Toyama		3·4	266	1 5	P_g	1 55	S_g	—	—
Hatinohe		3·5	356	0 57	0	1 46	S*	—	—
Iida		3·6	245	0 59	+ 1	1 44	+ 2	—	—
Omaesaki		3·8	231	1 2	+ 1	2 6	S_g	—	—
Wazima		3·9	277	1 4	+ 2	2 4	S*	—	—
Hamamatu		4·1	235	1 2	− 3	2 2	S*	—	—
Hatidyozima		4·3	203	1 2	− 6	1 43	−17	—	—
Gihu		4·4	250	1 12	+ 2	3 11	?	—	—
Nagoya		4·4	245	e 1 17	P*	2 22	S_g	—	—
Hukui		4·6	257	1 10	− 2	2 31	S_g	—	—
Hakodate		4·7	350	1 27	P*	—	—	—	—
Ibukisan		4·7	251	1 15	+ 1	2 25	S*	—	—
Hikone		4·8	250	1 17	+ 2	2 19	+ 7	—	—
Kameyama		4·9	245	1 22	+ 5	2 41	S_g	—	—
Mori		5·1	349	1 32	P*	2 39	S*	—	—
Urakawa		5·1	8	1 39	P_g	—	—	—	—
Muroran		5·2	353	1 24	+ 3	2 51	S_g	—	—
Yagi		5·5	245	1 32	+ 7	2 50	S*	—	—
Miyadu		5·6	257	1 25	− 2	—	—	—	—
Osaka		5·6	247	1 17	−10	2 54	S*	—	—
Toyooka		5·8	257	1 32	+ 3	2 47	+ 9	—	—
Kobe		5·9	249	1 9	−22	2 39	− 1	—	—
Obihiro		5·9	10	1 33	+ 2	2 56	S*	—	—
Sapporo		6·0	356	1 47	P*	3 4	S*	—	—
Siomisaki		6·1	236	1 22	−12	3 13	S_g	—	—
Sumoto		6·2	247	1 13	−22	3 0	S*	—	—
Wakayama		6·2	244	1 34	− 1	3 7	S*	—	—
Tokusima		6·6	246	1 40	− 1	3 34	S_g	—	—
Nemuro		6·8	24	1 47	+ 3	2 46	−17	—	—
Okayama		6·8	252	1 40	− 4	—	—	—	—
Muroto		7·3	241	1 44	− 6	2 57	−18	—	—
Koti		7·6	245	e 1 53	− 2	e 3 56	S*	4·9	—
Hirosima		8·1	254	1 58	− 4	3 58	S*	—	—
Matuyama		8·1	249	1 56	− 6	4 13	S_g	—	—
Hukuoka		9·9	253	e 2 28	+ 3	—	—	—	—
Kumamoto		10·0	248	2 29	+ 2	5 5	S*	—	—
Titizima		10·0	179	3 55	?	—	—	—	—
Taikyu		10·7	267	2 41	+ 3	e 4 52	+13	—	—
Yakusima		11·5	238	2 45	− 3	—	—	—	—
Keizyo		11·8	277	e 2 54	+ 1	e 5 14	+ 8	—	—
Zinsen	E.	12·1	277	e 3 9	+12	e 5 53	SSS	7·0	—
Almata		48·8	300	e 8 20	−29	—	—	—	—
Frunse		50·6	300	e 10 11	PP	—	—	—	—
Andijan		52·8	297	e 9 19	0	e 16 55	+ 8	—	—
Tchimkent		54·3	300	e 9 28	− 2	e 17 10	+ 3	—	—
Grozny		69·6	309	e 11 10	− 3	—	—	—	—
Tiflis		71·0	308	e 11 24	+ 2	—	—	—	—
Mount Wilson	Z.	77·3	57	e 12 2	+ 4	—	—	—	—
Tucson		83·3	54	i 12 28k	− 2	—	—	—	—
La Paz	Z.	146·5	60	19 56	[+14]	—	—	—	—

Tucson also gives i = +12m.43s. and +13m.12s.
Long waves were also recorded at De Bilt and Laibach.

Nov. 6d. Further shocks from the neighbourhood of the Epicentre of 21h. were recorded at Mizusawa and Nagoya.

Mizusawa.

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
0	16	9(S)	7	10	28(S)	12	52	45	17	11	42
0	28	1(S)	7	36	20	13	1	35	17	29	42
0	37	46	7	50	41	13	7	45(S)	17	47	25
0	46	17	8	8	4(S)	13	20	31	17	50	0
1	7	28	9	24	37	13	25	5(S)	18	4	12
1	10	35(S)	9	35	46	13	29	55(S)	18	10	35
1	13	21	9	39	7	13	32	5	18	37	32
1	18	13	9	59	38	13	40	14	18	47	18(S)
1	21	59	10	9	2	13	55	59	19	4	56(S)
1	34	0	10	24	45	14	0	37(S)	19	19	8(S)
1	47	42(S)	10	26	51	14	3	53	19	35	44
1	51	21	10	39	0	14	7	41	19	43	6
2	2	23	10	48	38	14	12	14	19	44	56(S)
2	7	53	10	57	52	14	20	22(S)	19	48	46(S)
2	14	54(S)	11	1	52	14	21	40	19	54	18
2	30	40	11	7	41	14	24	34	20	4	28
2	40	38	11	13	4	14	27	48	20	6	23
3	4	26	11	17	2	14	33	42(S)	20	15	23(S)
3	23	29	11	20	36	14	44	27(S)	20	21	48
3	28	58	11	23	10(S)	14	51	47	21	17	23(S)
3	43	37(S)	11	29	25	15	16	47	21	20	19(S)
3	47	8	11	39	32	15	23	58(S)	21	22	41
3	52	11	11	41	21	15	27	12	21	25	52
3	59	12	11	46	22	15	44	32(S)	21	34	30(S)
4	8	37	11	49	46	15	50	38	22	0	28
4	36	30(S)	11	52	37(S)	15	56	7	22	19	55
5	3	17	11	56	1(S)	16	18	27	22	33	26(S)
5	8	33	12	5	35(S)	16	26	9	22	38	44
5	11	28	12	8	56	16	29	6	22	39	51
5	50	36	12	17	3	16	32	2(S)	22	48	15
5	58	27	12	19	58	16	45	52(S)	22	49	49
6	6	10(S)	12	24	53	16	49	14	22	57	17
6	17	40	12	30	17(S)	16	58	39(S)	23	6	47(S)
6	52	32	12	34	16	17	5	32	23	8	29
7	1	41	12	47	54(S)	17	8	23	23	14	26(S)

Nagoya.

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
0	38	25	9	48	47	13	56	49	18	42	28
1	14	52	9	51	51	14	1	27	19	35	42
1	18	36	10	0	50	14	5	24	19	45	27
1	52	9	10	8	33	14	9	25(S)	19	49	55(S)
2	3	19	10	18	54	14	21	56	19	55	19
2	8	30	10	25	31	14	25	22	20	6	55
2	31	21	10	27	27	14	28	40	20	22	26
2	41	50	10	58	40	14	34	30	21	17	35
3	5	26	11	3	34	14	52	27	21	21	38(S)
5	4	46	11	8	31	15	18	29	21	23	20
5	9	28	11	14	31(S)	15	27	57	21	27	6
5	12	19	11	17	57	16	19	18	21	29	30(S)
7	51	59	11	21	22	16	29	57	22	1	11
8	8	1	11	30	20	16	33	44(S)	22	5	22
9	14	21	12	9	34	16	50	42	22	20	6
9	16	52	12	35	0	16	58	40	22	34	1
9	19	37	12	53	27	17	8	41	22	40	0
9	22	50	13	2	25	17	12	43	22	49	47
9	26	37	13	21	30	17	30	34	22	57	50
9	37	53	13	25	24(S)	17	50	43	23	8	5
9	46	34	13	32	48	18	11	25	23	12	43(S)

Nov. 6d. Readings also at 0h. (De Bilt, Cheb, Tiflis, Pulkovo, Baku, Ksara, and Copenhagen), 1h. (Prague, Tacubaya, Tucson, and Koti (2)), 2h. (Baku, Sverdlovsk, Koti, Irkutsk, and Tiflis), 4h. (La Paz), 7h. (Tucson (2)), 9h. (Mount Wilson, Pasadena, Santa Barbara, Tinemaha, San Javier, Tucson, and Koti), 10h. (Koti and Keizyo), 11h. (Keizyo and Koti (2)), 12h. (Koti), 13h. (Koti and Rome), 14h. (Koti and Rome), 15h. (Koti, Melbourne, Riverview, Adelaide, Brisbane, Tiflis, Helwan, Baku, Sverdlovsk, Irkutsk, and Vladivostok), 16h. (Koti, Tiflis, Baku, Sverdlovsk, Vladivostok, and Helwan (2)), 17h. (Helwan and Koti (3)), 20h. (Tucson, Sofia, Jena, and near Bucharest), 21h. (Hukuoka B and Koti (2)), 22h. (Koti), 23h. (Koti (2), Bucharest, La Paz, and Sofia).

Nov. 7d. 0h. 47m.58s. Epicentre 37°·1N. 141°·8E. (as on 6d.).

The Seismological Bulletin of Cent. Met. Obs., Japan, gives epicentre 37°·1N. 141°·9E. Focus shallow.

$A = -\cdot6283$, $B = +\cdot4944$, $C = +\cdot6006$; $\delta = -9$; $h = -1$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Onahama		0·8	257	0 24	+ 6	0 34	+ 3	—	—	—
Hukusima		1·2	302	0 24$_a$	0	0 48	+ 7	—	—	—
Sendai		1·3	329	0 25$_a$	0	0 45	+ 1	—	—	—
Mito		1·3	236	0 24$_a$	− 1	0 45	+ 1	—	—	—
Kakioka		1·5	236	0 27	− 1	0 51	+ 2	—	—	—
Tyosi		1·5	209	0 25$_a$	− 3	—	—	—	—	—
Utunomiya		1·7	250	0 30	− 1	0 55	+ 1	—	—	—
Kumagaya		2·1	244	0 37$_a$	0	1 3	− 1	—	—	—
Tokyo, Cen. Met. Ob.		2·1	229	0 37	0	1 15	S_g	—	—	—
Mizusawa	E.	2·1	346	i 0 36	− 1	i 1 4	0	—	—	—
Maebasi		2·3	252	0 42	+ 2	1 13	+ 4	—	—	—
Niigata		2·4	291	0 51	+10	1 31	S_g	—	—	—
Yokohama		2·4	226	0 42$_a$	+ 1	1 23	S_g	—	—	—
Miyako		2·6	3	0 41$_a$	− 3	1 11	− 6	—	—	—
Morioka		2·7	349	0 42	− 3	1 16	− 3	—	—	—
Mera		2·7	216	0 49	P*	1 30	S_g	—	—	—
Oiwake		2·7	254	0 45	0	1 29	S_g	—	—	—
Takada		2·8	270	0 53	P*	1 39	S_g	—	—	—
Hunatu		2·9	237	0 46	− 2	1 26	+ 2	—	—	—
Ito		3·0	225	0 49	− 1	1 34	+ 7	—	—	—
Misima		3·0	229	0 49	− 1	1 31	+ 4	—	—	—
Akita		3·0	334	1 1	P_g	1 44	S_g	—	—	—
Kohu		3·0	241	0 49$_a$	− 1	1 48	S_g	—	—	—
Numadu		3·1	230	0 53	+ 2	1 45	S_g	—	—	—
Matumoto		3·2	254	0 51$_a$	− 1	1 33	S*	—	—	—
Hatinohe		3·5	356	0 53	− 4	—	—	—	—	—
Iida		3·6	245	0 59	+ 1	1 46	+ 4	—	—	—
Takayama		3·8	257	1 2$_k$	+ 1	2 15	S_g	—	—	—
Omaesaki		3·8	231	0 59	− 2	2 0	S*	—	—	—
Aomori		3·8	348	1 2$_a$	+ 1	1 54	S*	—	—	—
Wazima		3·9	277	1 5$_a$	+ 3	—	—	—	—	—
Hamamatu		4·1	235	0 59	− 6	1 57	+ 2	—	—	—
Kanazawa		4·2	264	1 11	+ 4	1 57	0	—	—	—
Hatidyozima		4·3	203	1 3	− 5	1 32	?	—	—	—
Nagoya	Z.	4·4	245	e 1 10	0	e 2 5	+ 3	—	—	—
Gihu		4·4	250	1 10$_a$	0	2 5	+ 3	—	—	—
Hukui		4·6	257	1 11	− 1	2 18	S*	—	—	—
Hakodate		4·7	350	1 18	+ 4	—	—	—	—	—
Hikone		4·8	250	1 15	0	2 26	S*	—	—	—
Tu		4·9	243	1 14	− 3	2 25	S*	—	—	—
Urakawa		5·1	8	1 23	+ 3	2 20	0	—	—	—
Mori		5·1	349	1 23$_a$	+ 3	2 31	S*	—	—	—
Muroran		5·2	353	1 17	− 4	2 22	0	—	—	—
Kyoto		5·3	249	1 23	+ 1	2 38	S*	—	—	—
Yagi		5·5	245	1 24	− 1	2 32	+ 2	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Miyadu		5·6	257	1 27	0	2 44	+11	—	—	—
Osaka		5·6	247	1 28	− 1	2 44	+11	—	—	—
Toyooka		5·8	257	1 32	+ 3	2 43	+ 5	—	—	—
Obihiro		5·9	10	1 33k	+ 2	2 51	+11	—	—	—
Kobe		5·9	249	1 29	− 2	2 59	S*	—	—	—
Sapporo		6·0	356	1 32	0	3 3	S*	—	—	—
Siomisaki		6·1	236	1 31	− 3	3 12	S*	—	—	—
Kusiro		6·2	18	1 41	+ 6	2 41	− 7	—	—	—
Sumoto		6·2	247	1 31a	− 4	3 12	S*	—	—	—
Wakayama		6·2	244	1 33a	− 2	3 7	S*	—	—	—
Tokusima		6·6	246	1 41k	0	3 26	S*	—	—	—
Nemuro		6·8	24	1 39	− 5	2 53	−10	—	—	—
Okayama		6·8	252	1 43	− 1	—	—	—	—	—
Tadotu		7·1	250	1 47	− 1	4 5	S_g	—	—	—
Muroto		7·3	241	1 50	0	3 39	S*	—	—	—
Koti		7·6	245	1 53a	− 2	e 3 27	+ 4	i 2 2	P*	e 3·6
Hirosima		8·1	254	2 0	− 2	3 55	S*	—	—	—
Matuyama		8·1	249	2 1	− 1	4 19	S_g	—	—	—
Simidu		8·4	242	2 6	0	4 0	+17	—	—	—
Ootomari		9·6	4	2 23	+ 2	4 7	− 5	—	—	—
Izuka		9·7	254	2 22	0	4 8	− 7	—	—	—
Hukuoka B		9·9	253	e 2 28	+ 3	e 5 25	S_g	—	—	—
Kumamoto		10·0	248	2 28a	+ 1	4 54	S*	—	—	—
Miyazaki		10·0	242	2 27a	0	4 30	+ 8	—	—	—
Titizima		10·0	179	2 21	− 6	—	—	—	—	—
Unzendake		10·4	249	2 50	+16	5 31	S_g	—	—	—
Husan		10·5	263	2 39	+ 4	4 28	− 7	—	—	—
Taikyu		10·7	267	2 42	+ 4	4 49	+10	—	—	—
Kagosima		10·8	243	2 42	+ 3	—	—	—	—	—
Yakusima		11·5	238	2 47k	− 1	4 58	− 1	—	—	—
Tomie		11·6	251	2 51	+ 1	5 10	+ 9	—	—	—
Keizyo		11·8	277	2 55	+ 2	5 28	+22	e 4 16	?	6·9
Zinsen		12·1	277	2 57	0	e 5 54	?	—	—	6·9
Heizyo		12·8	284	e 3 3	− 3	—	—	—	—	—
Nake		13·5	234	3 11	− 4	—	—	—	—	—
Dairen		16·0	283	3 44	− 4	—	—	—	—	—
Miyakozima		18·7	234	4 11	−11	7 51	+ 3	—	—	—
Karenko		21·7	241	4 54	− 1	—	—	—	—	—
Taito		22·9	239	5 3	− 3	9 18	+ 5	—	—	—
Phu-Lien		34·6	253	e 6 49	− 4	—	—	—	—	—
Semipalatinsk		45·1	308	e 8 20	0	—	—	—	—	—
Almata		48·8	300	e 8 20	−29	—	—	—	—	—
Frunse		50·6	300	e 9 1	− 1	—	—	—	—	—
Medan	E.	51·7	241	i 8 52	−19	16 49	+17	—	—	35·0
Andijan		52·8	297	e 9 17	− 2	—	—	—	—	32·2
Agra	E.	54·0	279	9 24	− 4	17 0	− 3	—	—	—
Batavia		54·1	225	9 26	− 3	17 2	− 3	—	—	—
Tchimkent		54·3	300	9 29	− 1	e 13 13	?	—	—	—
Tashkent		54·8	299	i 9 31	− 3	i 17 11	− 3	—	—	29·6
Sverdlovsk		55·3	319	i 9 36	− 2	i 17 21	0	—	—	26·0
Samarkand		57·1	298	e 9 48	− 2	17 47	+ 2	—	—	—
Bombay	E.	62·3	274	i 10 21	− 5	—	—	—	—	—
Colombo	E.	63·6	258	9 52	−43	—	—	—	—	—
Moscow		67·4	323	10 56	− 3	19 52	− 3	—	—	36·5
Pulkovo		68·3	330	11 1	− 4	20 0	− 6	—	—	37·5
Grozny		69·6	309	e 11 10	− 3	—	—	—	—	—
Tiflis		71·0	308	11 18	− 4	—	—	e 13 58	PP	—
Erevan		72·0	307	e 11 27	− 1	—	—	—	—	—
Tinemaha		75·5	54	i 11 42	− 6	—	—	—	—	—
Haiwee	E.	76·3	54	e 11 48	− 4	—	—	—	—	—
Mount Wilson		77·3	57	i 11 51	− 7	—	—	—	—	—
Pasadena		77·3	57	i 11 51	− 7	—	—	—	—	—
Riverside		77·9	57	i 11 55	− 6	—	—	—	—	—
Copenhagen		78·0	334	i 11 58	− 4	21 50	− 5	—	—	42·0
Hamburg		80·6	334	e 12 20k	+ 4	—	—	—	—	e 45·0

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Ksara		81·4	305	i 12 18a	− 2	22 36	+ 5	i 15 29	PP	—
Budapest		81·5	325	e 12 18	− 3	—	—	—	—	e 46·0
Kecskemet	Z.	81·6	324	i 12 14	− 7	e 22 59	S_0S	e 15 17	PP	e 42·0
Jena	E.	82·0	331	e 12 18	− 5	—	—	—	—	—
Cheb		82·4	331	e 10 2?	?	—	—	—	—	e 46·0
Belgrade		82·8	321	e 12 24k	− 3	e 22 40	− 5	e 15 45	PP	e 45·3
Tucson		83·3	54	12 24k	− 6	—	—	—	—	—
De Bilt		83·4	335	—	—	e 22 54	+ 3	—	—	e 45·0
Stuttgart		84·7	330	i 12 34a	− 3	e 23 2	− 2	—	—	e 46·0
Uccle		84·8	335	e 12 32	− 5	e 23 2	− 3	—	—	e 45·0
Triest		85·3	327	e 12 37	− 3	22 57	[− 6]	—	—	—
Strasbourg		85·4	331	e 12 38	− 2	23 13	+ 2	—	—	e 45·0
Zurich		86·1	330	e 12 34	−10	—	—	—	—	—
Helwan		86·9	305	i 12 28	−20	e 23 8	[− 5]	i 16 17	PP	—
Jersey		88·3	338	e 14 6	?	—	—	—	—	e 44·7
Rome		88·8	323	e 12 40?	−17	23 24	[− 2]	16 19	PP	43·6
Weston	Z.	95·3	23	i 13 27	0	—	—	—	—	—
Toledo		97·2	334	e 13 32	− 4	—	—	e 17 31	PP	—
Granada		99·4	333	i 13 3	−43	—	—	—	—	e 53·0
La Paz	Z.	146·5	60	19 39	[− 3]	—	—	—	—	—

Additional readings :—
Medan PE = +9m.20s.
Andijan e = +15m.15s.
Copenhagen +12m.7s.
Jena ePN = +12m.21s., e = +12m.28s.
Belgrade iP_cPZ = +12m.33s.
Tucson iP = +12m.32s. and +12m.58s., i = +13m.12s.
Triest e = +13m.49s.
Helwan i = +12m.38s.
Rome iPPP = +18m.2s., SKS = +22m.53s., PS = +24m.24s., SS = +30m.15s.
Long waves were also recorded at La Plata and other European stations.

Nov. 7d. 1h. 38m. 22s. Epicentre 37°·1N. 141°·8E. (as at 0h.).

Seismological Bulletin of Central Meteorological Observatory, Tokyo, gives 37°·0N. 141°·9E.; shallow focus.

A = −·6283, B = +·4944, C = +·6006; $\delta = -9$; $h = -1$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Onahama		0·8	257	0 17k	− 1	0 26	− 5	—	—	—
Hukusima		1·2	302	0 19a	− 5	0 46	+ 5	—	—	—
Mito		1·3	236	0 20	− 5	0 40	− 4	—	—	—
Sendai		1·3	329	0 14	−11	0 33	−11	—	—	—
Kakioka		1·5	236	0 24	− 4	0 53	+ 4	—	—	—
Tyosi		1·5	209	0 23	− 5	1 14	?	—	—	—
Tukubasan		1·6	237	0 25	− 5	0 54	+ 3	—	—	—
Yamagata		1·6	315	0 33	+ 3	1 1	+10	—	—	—
Utunomiya		1·7	250	0 27	− 4	0 36	−18	—	—	—
Kumagaya		2·1	244	0 35	− 2	1 2	− 2	—	—	—
Mizusawa	N.	2·1	346	e 0 35	− 2	i 1 5	+ 1	—	—	—
Tokyo, Cen. Met. Ob.		2·1	229	i 0 35	− 2	1 12	+ 8	—	—	—
Tokyo, Imp. Univ.		2·1	229	0 35	− 2	1 12	+ 8	—	—	—
Maebasi		2·3	252	0 42	+ 2	1 15	+ 6	—	—	—
Kiyosumi		2·3	214	0 29	−11	1 1	− 8	—	—	—
Niigata		2·4	291	0 51	P_g	1 27	S_g	—	—	—
Yokohama		2·4	226	0 42	+ 1	1 22	S_g	—	—	—
Titibu		2·5	243	0 29	−14	1 8	− 6	—	—	—
Kamakura		2·5	226	0 35	− 8	1 14	0	—	—	—
Miyako		2·6	3	0 31	−13	1 11	− 6	—	—	—
Morioka		2·7	349	0 47a	+ 2	1 28	S_g	—	—	—
Mera		2·7	216	0 47	+ 2	1 30	S_g	—	—	—
Takada		2·8	270	0 52	P*	1 26	S*	—	—	—
Hunatu		2·9	237	0 47	− 1	1 37	S_g	—	—	—
Koyama		2·9	232	0 29	−19	1 11	−13	—	—	—

Continued on next page.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m.	s.	m.
Nagano	2·9	261	0 50a	+ 2	1 44	Sg	—	—	—
Ito	3·0	225	0 52k	+ 2	1 48	Sg	—	—	—
Misima	3·0	229	0 50a	0	1 36	S*	—	—	—
Akita	3·0	334	0 50a	0	1 34	S*	—	—	—
Kohu	3·0	241	0 46	− 4	1 37	S*	—	—	—
Numadu	3·1	230	0 50	− 1	1 39	S*	—	—	—
Matumoto	3·2	254	0 50a	− 2	1 34	+ 2	—	—	—
Susaki	3·3	225	0 49	− 4	1 39	+ 4	—	—	—
Toyama	3·4	266	1 1	P*	2 8	Sg	—	—	—
Hatinohe	3·5	356	0 54	− 3	1 37	− 3	—	—	—
Iida	3·6	245	1 1	+ 3	1 39	− 3	—	—	—
Husiki	3·8	267	1 7	P*	1 53	S*	—	—	—
Takayama	3·8	257	0 59a	− 2	1 59	S*	—	—	—
Omaesaki	3·8	231	1 0	− 1	1 56	S*	—	—	—
Aomori	3·8	348	1 3	+ 2	2 3	Sg	—	—	—
Wazima	3·9	277	1 6a	+ 4	2 11	Sg	—	—	—
Hamamatu	4·1	235	1 0a	− 5	1 58	+ 3	—	—	—
Kanazawa	4·2	264	1 10	+ 3	2 4	+ 7	—	—	—
Hatidyozima	4·3	203	1 3	− 5	1 55	− 5	—	—	—
Nagoya	4·4	245	i 1 10a	0	2 16	S*	—	—	—
Gihu	4·4	250	1 9	− 1	2 13	S*	—	—	—
Hukui	4·6	257	1 14	+ 2	2 19	S*	—	—	—
Hakodate	4·7	350	1 21	P*	2 26	S*	—	—	—
Ibukisan	4·7	251	1 12	− 2	2 39	Sg	—	—	—
Hikone	4·8	250	1 20	+ 5	—	—	—	—	—
Kameyama	4·9	245	1 17a	0	2 32	S*	—	—	—
Tu	4·9	243	1 16	− 1	2 47	Sg	—	—	—
Urakawa	5·1	8	1 25	+ 5	2 36	S*	—	—	—
Mori	5·1	349	1 22k	+ 2	2 30	S*	—	—	—
Muroran	5·2	353	1 25a	+ 4	2 30	+ 8	—	—	—
Kyoto	5·3	249	1 23	+ 1	2 50	Sg	—	—	—
Yagi	5·5	245	1 25a	0	2 44	S*	—	—	—
Miyadu	5·6	257	1 25	− 2	2 45	S*	—	—	—
Osaka	5·6	247	1 31a	+ 4	3 19	Sg	—	—	—
Toyooka	5·8	257	1 27	− 2	2 50	S*	—	—	—
Obihiro	5·9	10	1 25	− 6	2 48	+ 8	—	—	—
Kobe	5·9	249	1 30a	− 1	—	—	—	—	—
Sapporo	6·0	356	1 31	− 1	2 49	+ 6	—	—	—
Siomisaki	6·1	236	1 29a	− 5	3 21	Sg	—	—	—
Kusiro	6·2	18	1 47	P*	2 54	+ 6	—	—	—
Sumoto	6·2	247	1 32	− 3	3 13	S*	—	—	—
Wakayama	6·2	244	1 31	− 4	3 9	S*	—	—	—
Tokusima	6·6	246	1 43	+ 2	3 31	Sg	—	—	—
Nemuro	6·8	24	1 39	− 5	2 43	−20	—	—	—
Okayama	6·8	252	1 45	+ 1	3 52	Sg	—	—	—
Sakai	7·1	260	1 47	− 1	—	—	—	—	—
Tadotu	7·1	250	1 49	+ 1	—	—	—	—	—
Muroto	7·3	241	1 49a	− 1	3 26	+11	—	—	—
Koti	7·6	245	i 2 1a	+ 6	3 26	+ 3	4 9	Sg	4·9
Hirosima	8·1	254	2 0	− 2	4 10	S*	—	—	—
Matuyama	8·1	249	2 1a	− 1	4 19	Sg	—	—	—
Simidu	8·4	242	2 6	0	4 11	S*	—	—	—
Ootomari	9·6	4	2 23	+ 2	4 11	− 1	—	—	—
Izuka	9·7	254	2 21	− 1	4 56	S*	—	—	—
Hukuoka B	9·9	253	e 2 28	+ 3	e 5 24	Sg	—	—	—
Kumamoto	10·0	248	2 28a	+ 1	4 48	+26	—	—	—
Miyazaki	10·0	242	2 27a	0	4 30	+ 8	—	—	—
Titizima	10·0	179	2 18	− 9	—	—	—	—	—
Otiai	10·2	4	1 58	−33	4 40	+13	—	—	—
Saga	10·2	252	2 20	−11	5 51	?	—	—	—
Unzendake	10·4	249	2 38	+ 4	6 19	?	—	—	—
Husan	10·5	263	2 45	+10	4 58	+23	—	—	—
Ituhara	10·6	258	3 3	+27	—	—	—	—	—
Taikyu	10·7	267	2 42	+ 4	e 4 50	+11	—	—	—
Kagosima	10·8	243	2 41	+ 2	5 54	?	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Syuhurei		11·1	270	2 46	+ 3	5 9	S_g	—	—	—
Yakusima		11·5	238	2 47a	− 1	4 58	− 1	—	—	—
Tomie		11·6	251	2 49	− 1	5 13	+12	—	—	—
Keizyo		11·8	277	2 55	+ 2	5 21	+15	2 59	PP	6·2
Zinsen		12·1	277	i 2 58	+ 1	e 5 37	+23	—	—	6·5
Sikka		12·2	4	2 53	− 5	5 5	−11	—	—	—
Heizyo		12·8	284	e 2 49	−17	6 1	+31	—	—	7·5
Nake		13·5	234	3 12	− 3	5 42	− 5	—	—	—
Dairen		16·0	283	3 49	+ 1	—	—	—	—	—
Zi-ka-wei	E.	17·9	258	e 4 16	+ 4	—	—	—	—	10·8
Miyakozima		18·7	234	4 29	+ 7	8 0	+12	—	—	—
Taihoku		21·1	240	4 56	+ 8	—	—	—	—	—
Karenko		21·7	241	4 51	− 4	—	—	—	—	—
Taityu		22·2	241	5 2	+ 2	—	—	—	—	—
Taito		22·9	239	5 4	− 2	9 15	+ 2	—	—	—
Tainan		23·3	240	4 2	−68	—	—	—	—	—
Kosyun		23·6	238	5 25	+12	—	—	—	—	—
Hong Kong		28·0	246	5 54	− 1	10 46	+ 8	12 36	SS	—
Manila		29·1	225	6 5	+ 1	11 9	+13	—	—	14·8
Irkutsk		30·2	312	6 13	− 1	11 14	+ 1	—	—	14·6
Phu-Lien		34·6	253	e 6 51	− 2	e 12 22	0	—	—	—
Calcutta	N.	48·0	268	e 9 1	+18	i 16 8	+27	e 19 26	SS	e 23·8
Almata		48·8	300	e 8 38	−11	—	—	—	—	—
Frunse		50·6	300	e 9 1	− 1	—	—	—	—	27·7
Medan		51·7	241	i 9 21	+10	i 16 48	+16	—	—	28·6
Andijan		52·8	297	e 9 16	− 3	e 16 57	+10	—	—	28·6
Agra	E.	54·0	279	9 24	− 4	i 17 1	− 2	11 36	PP	—
Batavia		54·1	225	e 9 29	0	17 6	+ 1	—	—	—
Tchimkent		54·3	300	e 9 26	− 4	e 15 4	?	—	—	—
Tashkent		54·8	299	9 34	0	e 17 6	− 8	—	—	28·6
Sverdlovsk		55·3	319	i 9 35	− 3	i 17 20	− 1	—	—	—
Samarkand		57·1	298	e 9 48	− 2	e 15 41	?	—	—	—
Hyderabad		58·6	269	10 5	+ 4	18 5	+ 1	—	—	30·7
Bombay		62·3	274	i 10 24	− 2	i 18 53	+ 1	—	—	—
Kodaikanal	E.	63·5	263	i 11 8a?	+34	i 19 38	+31	i 14 3	PP	—
Colombo	E.	63·6	258	e 10 21	−14	19 6	− 2	—	—	38·6
Victoria		66·3	46	e 19 38	S	(e 19 38)	− 4	e 28 6	SS	e 30·8
Moscow		67·4	323	e 10 55	− 4	e 19 52	− 3	—	—	37·1
Pulkovo		68·3	330	11 2	− 3	20 4	− 2	—	—	38·1
Grozny		69·6	309	e 11 11	− 2	e 20 14	− 7	—	—	—
Tiflis		71·0	308	11 18	− 4	e 20 34	− 3	14 8	PP	e 36·6
Riverview	N.	71·1	172	—	—	(e 21 2)	+24	—	—	e 21·0
Ukiah		71·1	55	—	—	e 20 35	− 3	—	—	—
Erevan		72·0	307	e 11 30	+ 2	—	—	—	—	—
Upsala		73·0	335	e 11 34	+ 1	e 20 56	− 4	—	—	e 35·6
Theodosia		74·7	315	11 41	− 2	21 20	+ 1	—	—	43·6
Simferopol		75·5	316	11 43	− 5	21 24	− 4	—	—	41·6
Tinemaha		75·5	54	e 11 49	+ 1	—	—	—	—	—
Santa Barbara	Z.	76·1	57	e 11 44	− 7	—	—	—	—	—
Haiwee		76·3	54	11 47	− 5	—	—	—	—	—
Mount Wilson	Z.	77·3	57	e 11 48	−10	—	—	—	—	—
Pasadena		77·3	57	i 11 48	−10	e 21 40	− 8	—	—	—
Riverside	Z.	77·9	57	e 11 53	− 8	—	—	—	—	—
Copenhagen		78·0	334	11 59	− 3	21 52	− 3	—	—	39·6
Potsdam		80·3	332	e 12 14	0	e 22 32	+12	15 22	PP	e 39·6
Hamburg		80·6	334	e 12 16	0	e 22 20	− 3	—	—	e 39·6
Aberdeen		81·3	341	i 15 37	PP	—	—	i 26 18	SS	51·1
Ksara		81·4	305	i 12 23k	+ 3	e 22 42	+11	15 34	PP	40·6
Budapest	E.	81·5	325	12 26	+ 5	—	—	—	—	e 40·6
Prague		81·6	329	e 12 23	+ 2	e 22 34	+ 1	—	—	—
Kecskemet	Z.	81·6	324	i 12 18	− 3	i 22 25	− 8	i 15 5	PP	e 46·6
Ivigtut		81·7	5	—	—	22 29	− 5	—	—	—
Jena		82·0	331	e 12 27	+ 4	22 38	+ 1	—	—	e 37·6
Göttingen		82·2	332	e 12 24	0	e 22 38?	− 1	—	—	e 43·6
Cheb		82·4	331	e 11 38?	−47	e 22 38	− 3	—	—	e 45·1

Continued on next page.

		△ °	Az. °	P. m. s.	O−C. s.	S. m. s.	O−C. s.	Supp. m. s.		L. m.
Edinburgh		82·7	341	—	—	i 22 44	0	—	—	e 40·6
Belgrade		82·8	321	e 12 21	− 6	e 22 41	− 4	i 12 36	PcP	e 43·7
Sofia		82·8	319	e 12 32	+ 5	e 22 49	+ 4	—	—	—
Durham	E.	83·2	340	—	—	i 22 53	+ 4	—	—	—
Tucson		83·3	54	i 12 24k	− 6	—	—	i 15 54	PP	—
De Bilt		83·4	335	i 12 33	+ 3	e 22 48	− 3	i 15 46	PP	e 39·6
Wellington		83·6	156	e 12 18	−14	22 45	− 8	28 17	SS	34·6
Stonyhurst		84·3	340	e 13 38?	+63	22 57	− 3	—	—	e 42·6
Stuttgart		84·7	330	i 12 34a	− 3	e 23 14	+10	i 12 52	pP	e 44·6
Karlsruhe	Z.	84·8	332	e 12 38?	+ 1	—	—	—	—	e 47·6
Uccle		84·8	335	12 40	+ 3	i 22 59	− 6	15 51	PP	e 41·6
Christchurch		85·0	158	i 12 33a	− 5	i 23 2	− 5	28 50	SS	e 40·5
Triest		85·3	327	e 12 47	+ 7	23 0	−10	16 25	PP	—
Strasbourg		85·4	331	i 12 40	0	e 23 4	[+ 1]	15 54	PP	e 42·6
Rathfarnham Castle		85·8	342	i 13 32	+50	i 23 8	[+ 2]	—	—	51·6
Oxford		85·8	337	—	—	i 23 6	[0]	—	—	e 34·6
Kew		85·9	337	e 12 47	+ 4	i 22 56	[−11]	i 23 16	S	e 40·6
Zurich		86·1	330	e 12 45	+ 1	e 24 14	PS	—	—	—
Basle		86·3	330	e 12 38	− 7	e 23 19	− 1	—	—	—
Padova		86·3	327	e 12 38	− 7	—	—	—	—	e 49·6
Helwan		86·9	305	12 47	− 1	23 24	− 2	16 11	PP	—
Neuchatel		87·0	330	e 12 47	− 1	—	—	—	—	—
Paris		87·1	335	12 15	−34	—	—	—	—	44·6
Florence		87·8	327	13 12	+20	23 22	−12	—	—	—
Jersey		88·3	338	e 13 38	+43	i 23 41	+ 2	e 18 20	PPP	e 42·9
Moncalieri		88·4	330	e 13 10	+15	e 24 9	+29	—	—	—
Rome		88·8	323	e 12 49	− 8	23 37	− 7	i 16 33	PP	i 44·3
Chicago		89·3	35	—	—	e 23 21	[− 7]	e 29 37	SS	e 35·8
Puy de Dôme		89·6	332	—	—	e 23 38?	[+ 8]	—	—	—
Florissant		90·5	38	—	—	e 23 55	− 4	e 29 57	SS	—
Ottawa		91·2	25	e 13 3	− 5	e 23 56	− 9	e 35 56	SSS	e 44·6
Seven Falls		91·2	21	e 13 8	0	e 24 2	− 3	—	—	e 44·6
Vermont		92·8	24	—	—	e 24 15	− 4	e 30 29	SS	e 37·0
Bagnères		92·9	333	e 14 26	?	e 24 18	− 2	—	—	e 49·6
East Machias		94·3	20	e 13 38	+15	e 24 19	−13	e 16 53	PP	e 38·7
Harvard		95·1	23	e 13 27	+ 1	e 24 33	− 6	e 34 38	SSS	e 59·6
Weston		95·3	23	i 13 32a	+ 5	e 24 15	[+12]	e 31 17	SS	e 47·6
Fordham	E.	95·8	26	—	—	i 24 45	0	—	—	—
Philadelphia		96·1	28	e 19 20	PPP	—	—	e 31 24	SS	e 48·2
Algiers		91·7	327	—	—	e 31 38?	SS	—	—	e 50·6
Toledo		97·2	334	e 13 41	+ 5	—	—	e 17 38	PP	—
Almeria		99·3	332	e 13 29	−16	—	—	—	—	e 55·0
San Fernando	N.	101·0	334	e 9 44	?	—	—	—	—	53·6
Cape Town	E.	134·4	256	e 22 8	PP	e 23 1	?	—	—	71·6
Huancayo		138·4	63	e 19 41	[+14]	e 33 20	PS	e 40 25	SS	e 57·9
La Paz		146·5	60	19 39	[− 3]	—	—	—	—	70·6

Additional readings :—
Koti P* = +2m.8s., eN = +3m.38s., eZ = +3m.44s.
Keizyo PPPE = +3m.6s.
Calcutta iSSSN = +20m.45s.
Medan iE = +17m.52s.
Agra iE =eN = +9m.30s., iE = +9m.35s., eN = +17m.14s., PSE = +17m.32s., SSE = +20m.40s., SSS = +22m.30s.
Kodaikanal iPSE = +20m.11s., iSSE = +23m.43s.
Victoria PPP? = +23m.44s.
Tiflis eN = +11m.41s.
Tinemaha e = +12m.43s.
Santa Barbara iZ = +11m.57s.
Mount Wilson i = +12m.4s.
Pasadena iZ = +12m.48s.
Copenhagen +12m.2s., +12m.8s., and +18m.59s., i = +19m.9s.
Ksara ePS = +23m.26s.
Kecskemet z. e = +14m.0s., eS? = +21m.55s., e = +28m.13s., ePKKS = +34m.17s.
Jena eSN = +22m.45s. and +22m.50s.
Belgrade iNE = +23m.41s.
Tucson iP = +12m.27s., i = +12m.32s., +14m.47s., and +16m.28s., iPPP = +18m.10s
Wellington iZ = +12m.35s.

Continued on next page.

Stuttgart, eSKS = +22m.58s.
Strasbourg iPPPZ = +17m.55s., eZ = +23m.10s., iN = +23m.25s.
Kew eEN = +29m.10s.
Helwan i = +12m.59s., +13m.53s., and +14m.8s., e = +23m.9s.
Rome PS = +24m.36s., i = +29m.39s.
Florissant iSZ = +23m.58s., eZ = +30m.25s.
Vermont eSKKS = +24m.19s.
East Machias SKKS = +24m.31s., eS = +24m.46s., eSS = +31m.7s.
Harvard eL_qE = +51m.38s.
Weston iN = +27m.37s., eE = +34m.58s.
Philadelphia eSSS = +36m.23s.
Huancayo ePSPS = +41m.50s., eSSS = +46m.0s.
La Paz $iPKP_2$ = +19m.56s.
Long waves were also recorded at Dehra Dun, Sebastopol, Yalta, Bucharest, Hof, Granada, Malaga, and Bozeman.

Nov. 7d. 1h. 54m. 25s. Epicentre 37°·1N. 141°·8E. (as at 1h.38m.).

The Seismological Bulletin of Japanese Central Meteorological Bulletin gives Epicentre 36°·9N. 142°·0E.

$A = -·6283$, $B = +·4944$, $C = +·6006$; $\delta = -9$; $h = -1$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Onahawa	0·8	257	0 18	0	0 30	− 1	—	—	—
Hukusima	1·2	302	−0 4a	?	—	—	—	—	—
Mito	1·3	236	0 24	− 1	0 43	− 1	—	—	—
Sendai	1·3	329	0 25a	0	0 47	+ 3	—	—	—
Tukubasan	1·6	237	0 39	+ 9	1 2	+11	—	—	—
Yamagata	1·6	315	0 7	?	0 37	−14	—	—	—
Mizusawa	2·1	346	(0 38)	+ 1	0 38	P	—	—	—
Tokyo Cen. Met. Ob.	2·1	229	0 34	− 3	1 16	S*	—	—	—
Tokyo Imp. Univ.	2·1	229	0 39	+ 2	1 14	S_g	—	—	—
Kiyosumi	2·3	214	0 39	− 1	1 18	S_g	—	—	—
Maebasi	2·3	252	0 34	− 6	1 11	+ 2	—	—	—
Niigata	2·4	291	0 50	+ 9	1 32	S_g	—	—	—
Yokohama	2·4	226	0 46	+ 5	1 25	S_g	—	—	—
Kamakura	2·5	226	0 39	− 4	1 18	S*	—	—	—
Titibu	2·5	243	0 39	− 4	1 18	S*	—	—	—
Miyako	2·6	3	1 12	S	(1 12)	− 5	—	—	—
Morioka	2·7	349	0 41	− 4	1 12	− 7	—	—	—
Hunatu	2·9	237	0 40	− 8	1 4	−20	—	—	—
Koyama	2·9	232	0 39	− 9	1 21	− 3	—	—	—
Nagano	2·9	261	0 42	− 6	1 24	0	—	—	—
Ito	3·0	225	0 40	−10	1 39	+12	—	—	—
Kohu	3·0	241	0 41	− 9	1 34	+ 7	—	—	—
Numadu	3·1	230	0 48	− 3	1 39	+10	—	—	—
Matumoto	3·2	254	0 55	+ 3	1 36	+ 4	—	—	—
Susaki	3·3	225	0 44	− 9	1 36	+ 1	—	—	—
Toyama	3·4	266	1 2	+ 7	2 5	S_g	—	—	—
Hatinohe	3·5	356	0 45	−12	1 30	−10	—	—	—
Aomori	3·8	348	1 0	− 1	2 8	S_g	—	—	—
Omaesaki	3·8	231	1 11	+10	2 6	S_g	—	—	—
Takayama	3·8	257	1 5	+ 4	2 30	?	—	—	—
Wazima	3·9	277	1 2	0	—	—	—	—	—
Hamamatu	4·1	235	0 52	−13	1 46	− 9	—	—	—
Kanazawa	4·2	264	0 44	−23	—	—	—	—	—
Gihu	4·4	250	1 9	− 1	2 22	S_g	—	—	—
Nagoya	4·4	245	e 1 20	P*	2 13	S*	—	—	—
Hukui	4·6	257	1 15	+ 3	2 26	S_g	—	—	—
Hikone	4·8	250	1 22	+ 7	2 34	S_g	—	—	—
Kameyama	4·9	245	1 16	− 1	2 30	S*	—	—	—
Mori	5·1	349	1 26a	+ 6	2 33	S*	—	—	—
Urakawa	5·1	8	1 25	+ 5	2 30	S_g	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Muroran		5·2	353	1 13	− 8	2 10	−12	—	—	—
Kyoto		5·3	249	1 24	+ 2	2 48	S_g	—	—	—
Yagi		5·5	245	1 26k	+ 1	2 56	S_g	—	—	—
Miyadu		5·6	257	1 26	− 1	2 44	S*	—	—	—
Toyooka		5·8	257	1 30	+ 1	2 40	+ 2	—	—	—
Kobe		5·9	249	1 31	0	3 13	S_g	—	—	—
Obihiro		5·9	10	1 41	+10	2 56	S*	—	—	—
Sapporo		6·0	356	1 8	−24	2 12	−31	—	—	—
Siomisaki		6·1	236	1 33	− 1	3 22	S_g	—	—	—
Kusiro		6·2	18	1 40	+ 5	2 49	+ 1	—	—	—
Sumoto		6·2	247	1 34	− 1	3 1	+13	—	—	—
Wakayama		6·2	244	1 34	− 1	3 8	S*	—	—	—
Tokusima		6·6	246	1 40	− 1	3 31	S_g	—	—	—
Nemuro		6·8	24	1 35	− 9	2 40	−23	—	—	—
Sakai		7·1	260	1 49	+ 1	—	—	—	—	—
Tadotu		7·1	250	2 8	P*	—	—	—	—	—
Muroto		7·3	241	1 51	+ 1	3 33	S*	—	—	—
Koti		7·6	245	e 1 57	+ 2	e 3 20	− 3	4 2	S_g	5·0
Hirosima		8·1	254	1 59	− 3	4 1	S*	—	—	—
Matuyama		8·1	249	2 1	− 1	4 31	S_g	—	—	—
Simidu		8·4	242	2 7	+ 1	3 51	+ 8	—	—	—
Ootomari		9·6	4	2 16	− 5	4 0	−12	—	—	—
Izuka		9·7	254	2 22	0	4 40	S*	—	—	—
Hukuoka B		9·9	253	e 2 29	+ 4	e 5 5	S*	—	—	—
Kumamoto		10·0	248	2 29	+ 2	4 38	+16	—	—	—
Miyazaki		10·0	242	2 26a	− 1	4 31	+ 9	—	—	—
Titizima		10·0	179	2 19	− 8	—	—	—	—	—
Saga		10·2	252	2 37	+ 6	5 25	S_g	—	—	—
Unzendake		10·4	249	2 42	+ 8	5 20	S_g	—	—	—
Husan		10·5	263	2 41	+ 6	4 42	+ 7	—	—	—
Taikyu		10·7	267	2 37	− 1	e 4 40	+ 1	—	—	—
Kagosima		10·8	243	2 43	+ 4	—	—	—	—	—
Yakusima		11·5	238	2 45	− 3	4 58	− 1	—	—	—
Tomie		11·6	251	2 43	− 7	6 1	S*	—	—	—
Keizyo		11·8	277	2 54	+ 1	5 36	+30	—	—	7·0
Zinsen		12·1	277	e 2 57	0	e 5 56	+42	—	—	7·2
Heizyo		12·8	284	i 3 12	+ 6	e 5 40	+10	—	—	7·2
Nake		13·5	234	3 19	+ 4	—	—	—	—	—
Zi-ka-wei	N.	17·9	258	e 4 20	+ 8	—	—	—	—	—
Miyakozima		18·7	234	4 26	+ 4	7 45	− 3	—	—	—
Taito		22·9	239	5 1	− 5	—	—	—	—	—
Irkutsk		30·2	312	—	—	e 11 21	+ 8	—	—	—
Andijan		52·8	297	e 9 18	− 1	e 16 54	+ 7	—	—	—
Tchimkent		54·3	300	e 9 35	+ 5	—	—	—	—	—
Sverdlovsk		55·3	319	i 9 40	+ 2	—	—	—	—	—
Moscow		67·4	323	—	—	e 19 51	− 4	—	—	—
Pulkovo		68·3	330	e 11 1	− 4	—	—	—	—	—
Tiflis	Z.	71·0	308	e 11 20	− 2	—	—	—	—	—
Tinemaha		75·5	54	e 11 40	− 8	—	—	—	—	—
Haiwee		76·3	54	e 11 44	− 8	—	—	—	—	—
Bergen		76·5	340	—	—	e 24 35	?	e 26 35?	?	e 31·6
Mount Wilson		77·3	57	i 11 49	− 9	—	—	—	—	—
Pasadena		77·3	57	i 11 48	−10	e 18 59	?	—	—	—
Riverside	Z.	77·9	57	e 11 52	− 9	—	—	—	—	—
Copenhagen		78·0	334	11 56	− 6	—	—	—	—	—
Ksara		81·4	305	12 18	− 2	—	—	—	—	—
Kecskemet		81·6	324	e 12 10	−11	e 18 14	?	—	—	e 30·6
Jena	N.	82·0	331	e 11 35	−48	—	—	—	—	—
Tucson		83·3	54	i 12 22k	− 8	i 22 44	− 6	—	—	—
Stuttgart		84·7	330	e 12 33	− 4	e 22 55	− 9	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Uccle		84·8	335	e 12 35	− 2	22 59	− 6	—	—	—
Karlsruhe		84·8	332	e 12 35?	− 2	—	—	—	—	—
Strasbourg		85·4	331	e 12 40	0	22 55	[− 9]	—	—	—
Basle		86·3	330	e 12 53	+ 8	—	—	—	—	—
Weston	z.	95·3	23	i 13 27	0	—	—	—	—	—
Toledo		97·2	334	e 13 31	− 5	—	—	e 17 41	PP	—

Additional readings :—
Mizusawa gives P at 1h.54m.15s.
Copenhagen e = +12m.0s. and +12m.8s.
Tiflis e = +11m.23s., eN = +11m.43s.
Tucson i = +12m.33s., +12m.43s., +13m.7s., +13m.11s., +13m.46s., +13m.50s., +18m.44s., and +22m.39s.
Long waves were also recorded at La Plata, Prague, and Malaga.

Nov. 7d. 2h. 14m. 20s. (I)
2h. 28m. 50s. (II)
3h. 39m. 18s. (III)
Epicentre 37°·1N. 141°·8E. (as at 1h.).

			△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
			°	°	m. s.	s.	m. s.	s.	m. s.		m.
I	Mizusawa		2·1	346	0 36	− 1	1 1	− 3	—	—	—
II			2·1	346	—	—	1 2	− 2	—	—	—
III		E.	2·1	346	0 44	P*	1 5	+ 1	—	—	—
I	Nagoya		4·4	245	e 1 9	− 1	2 7	+ 5	—	—	—
II			4·4	245	(e 1 11)	+ 1	(2 16)	S*	—	—	—
III			4·4	245	(e 1 7)	− 3	(2 11)	S*	—	—	—
I	Koti		7·6	245	e 1 59	+ 4	4 42	?	—	—	—
II			7·6	245	e 1 48	− 7	e 3 12	−11	4 2	S_g	4·9
III			7·6	245	1 52	− 3	i 4 16	S_g	—	—	—
I	Hukuoka B		9·9	253	e 2 24	− 1	—	—	—	—	—
II			9·9	253	e 0 27	?	—	—	i 5 29	S_g	—
III			9·9	253	e 2 27	+ 2	—	—	—	—	—
I	Husan		10·5	263	e 3 40	+65	e 6 11	S_g	—	—	—
II			10·5	263	2 14	−21	e 4 17	−18	—	—	6·3
I	Taikyu		10·7	267	3 17	+39	—	—	—	—	—
II			10·7	267	i 2 33	− 5	e 4 30	− 9	—	—	—
III			10·7	267	i 2 38	0	—	—	—	—	—
I	Keizyo		11·8	277	e 2 52	− 1	e 5 47	+41	—	—	e 8·2
II			11·8	277	2 47	− 6	e 5 17	+11	—	—	e 6·4
III			11·8	277	e 2 56	+ 3	—	—	—	—	—
I	Zinsen	E.	12·1	277	e 3 12	PPP	e 5 40	SSS	—	—	7·5
II		E.	12·1	277	e 2 57	0	e 5 33	SSS	—	—	7·0
III		E.	12·1	277	e 2 56	− 1	—	—	—	—	7·5
II	Irkutsk		30·2	312	6 23	+ 9	11 22	+ 9	—	—	15·2
I	Frunse		50·6	300	e 10 38	PP	—	—	—	—	—
I	Andijan		52·8	297	e 9 17	− 2	e 17 32	+45	—	—	—
I	Tchimkent		54·3	300	e 9 57	+27	—	—	—	—	—
I	Tiflis		71·0	308	e 11 13	− 9	—	—	—	—	—
II			71·0	308	e 11 22	0	—	—	—	—	—
III			71·0	308	—	—	e 21 0	+23	—	—	—
I	Tinemaha	z.	75·5	54	e 11 38	−10	—	—	—	—	—
I	Haiwee		76·3	54	e 12 17	+25	—	—	—	—	—
I	Mount Wilson	z.	77·3	57	e 12 16	+18	—	—	—	—	—
III		z.	77·3	57	i 11 50	− 8	—	—	—	—	—
I	Pasadena	z.	77·3	57	e 12 15	+17	—	—	—	—	—
II			77·3	57	e 11 45	−13	e 22 16	+28	—	—	—
I	Riverside	z.	77·9	57	e 12 20	+19	—	—	—	—	—
III		z.	77·9	57	i 11 52	− 9	—	—	—	—	—
I	Jena	N.	82·0	331	e 12 53	+30	—	—	—	—	—
I	Tucson		83·3	54	i 12 49	+19	—	—	—	—	—
II			83·3	54	i 12 18	−12	—	—	—	—	—
III			83·3	54	12 23	− 7	—	—	—	—	—
I	Stuttgart		84·7	330	e 13 10	+33	—	—	—	—	—
I	Strasbourg	z.	85·4	331	e 13 16	+36	—	—	—	—	—
I	Basle		86·3	330	e 13 12	+27	—	—	—	—	—
II	La Paz		146·5	60	e 17 56	?	—	—	—	—	68·2
III	La Paz	z.	146·5	60	19 38	[− 4]	—	—	—	—	—

For Notes see next page.

NOTES TO Nov. 7d. (I) 2h. 14m. 20s.
(II) 2h. 28m. 50s.
(III) 3h. 39m. 18s.

Additional readings and notes :—
Nagoya II, III headings have been increased by 2m. and 1m. respectively.
Keizyo II eEN = +4m.19s., eSE = +5m.37s.
Tiflis I e = +11m.46s., II e = +9m.30s.
Tinemaha eZ = +12m.12s.
Mount Wilson iZ = +12m.22s.
Tucson I i = +12m.55s., II iP = +10m.23s., i = +11m.36s., III i = +12m.29s.
Long waves to shock I were recorded at Agra, and to shock III at Theodosia, Simferopol, Yalta, Copenhagen, Cheb, and De Bilt.

Nov. 7d. 4h. 15m. 31s. Epicentre 37°·1N. 141°·8E. (as at 1h.).

Seismological Bulletin of the Central Meteorological Observatory, Tokyo, gives epicentre 37°·2N. 141°·8E. ; focus shallow.

$A = -\cdot6283$, $B = +\cdot4944$, $C = +\cdot6006$; $\delta = -9$; $h = -1$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Onahama	0·8	257	0 17	− 1	—	—	—	—	—
Hukusima	1·2	302	0 15	− 9	0 38	− 3	—	—	—
Mito	1·3	236	0 27	+ 2	0 42	− 2	—	—	—
Sendai	1·3	329	0 30	+ 5	0 50	+ 6	—	—	—
Kakioka	1·5	236	0 27	− 1	0 51	+ 2	—	—	—
Tukubasan	1·6	237	0 31	+ 1	0 54	+ 3	—	—	—
Mizusawa	2·1	346	e 0 26	−11	0 57	− 7	—	—	—
Tokyo, Cen. Met. Ob.	2·1	229	0 37	0	1 17	S_g	—	—	—
Tokyo, Imp. Univ.	2·1	229	0 41	+ 4	1 18	S_g	—	—	—
Katuura	2·3	214	0 57	+17	1 43	?	—	—	—
Maebasi	2·3	252	0 40	0	1 17	S_g	—	—	—
Yokohama	2·4	226	0 43	+ 2	1 22	S_g	—	—	—
Kamakura	2·5	226	0 41	− 2	1 21	S_g	—	—	—
Titibu	2·5	243	0 41	− 2	1 19	S*	—	—	—
Miyako	2·6	3	0 34	−10	2 9	?	—	—	—
Morioka	2·7	349	0 47	+ 2	1 22	+ 3	—	—	—
Takada	2·8	270	1 10	?	2 6	?	—	—	—
Hunatu	2·9	237	0 50	+ 2	1 28	+ 4	—	—	—
Koyama	2·9	232	0 41	− 7	1 23	− 1	—	—	—
Nagano	2·9	261	0 55	+ 7	2 8	?	—	—	—
Akita	3·0	334	0 49	− 1	—	—	—	—	—
Kohu	3·0	241	0 36	−14	1 16	−11	—	—	—
Numadu	3·1	230	0 54	+ 3	1 47	S_g	—	—	—
Matumoto	3·2	254	1 14	P_g	1 55	S_g	—	—	—
Susaki	3·3	225	0 51	− 2	1 41	+ 6	—	—	—
Toyama	3·4	266	1 5	P_g	1 41	+ 4	—	—	—
Hatinohe	3·5	356	0 36	−21	1 20	−20	—	—	—
Aomori	3·8	348	1 4	+ 3	1 50	+ 3	—	—	—
Husiki	3·8	267	1 14	P_g	2 8	S_g	—	—	—
Omaesaki	3·8	231	0 54	− 7	2 3	P_g	—	—	—
Kanazawa	4·2	264	0 44	−23	1 37	−20	—	—	—
Hatidyozima	4·3	203	0 54	−14	1 50	−10	—	—	—
Gihu	4·4	250	1 4	− 6	2 4	+ 2	—	—	—
Nagoya	4·4	245	e 1 11	+ 1	2 16	S*	—	—	—
Hukui	4·6	257	1 11	− 1	2 23	S*	—	—	—
Hakodate	4·7	350	1 2	−12	—	—	—	—	—
Ibukisan	4·7	251	1 24	+10	2 19	+ 9	—	—	—
Hikone	4·8	250	1 8	− 7	2 15	+ 3	—	—	—
Kameyama	4·9	245	1 21	+ 4	2 41	S_g	—	—	—
Tu	4·9	243	1 21	+ 4	2 49	S_g	—	—	—
Mori	5·1	349	1 22k	+ 2	2 54	S_g	—	—	—
Urakawa	5·1	8	1 25	+ 5	2 21	+ 1	—	—	—
Muroran	5·2	353	1 23	+ 2	—	—	—	—	—
Kyoto	5·3	249	1 28	+ 6	2 38	+13	—	—	—
Yagi	5·5	245	1 27	+ 2	2 48	S*	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	° ′	m. s.	s.	m. s.	s.	m. s.		m.
Miyadu		5·6	257	1 27	0	2 44	+11	—	—	—
Osaka		5·6	247	1 11	−16	2 44	+11	—	—	—
Toyooka		5·8	257	1 20	− 9	2 35	− 3	—	—	—
Kobe		5·9	249	1 34	+ 3	3 7	S_g	—	—	—
Obihiro		5·9	10	1 37	+ 6	3 4	+24	—	—	—
Sapporo		6·0	356	1 30	− 2	2 48	+ 5	—	—	—
Siomisaki		6·1	236	1 35	+ 1	3 34	S_g	—	—	—
Sumoto		6·2	247	1 38k	+ 3	3 27	S_g	—	—	—
Wakayama		6·2	244	1 34	− 1	2 56	+ 8	—	—	—
Tokusima		6·6	246	1 44	+ 3	3 32	S_g	—	—	—
Okayama		6·8	252	1 48	+ 4	3 42	S_g	—	—	—
Nemuro		6·8	24	1 37	− 7	2 49	−14	—	—	—
Sakai		7·1	260	1 54	+ 6	—	—	—	—	—
Tadotu		7·1	250	2 4	P*	4 26	?	—	—	—
Haboro		7·3	359	2 41	?	3 54	S_g	—	—	—
Muroto		7·3	241	1 55	+ 5	3 41	S*	—	—	—
Koti		7·6	245	i 1 57k	+ 2	3 37	S*	4 18	S_g	4·7
Hirosima		8·1	254	2 2	0	4 12	S*	—	—	—
Matuyama		8·1	249	2 3	+ 1	4 6	S*	—	—	—
Hamada		8·2	256	2 6	+ 3	4 2	S*	—	—	—
Simidu		8·4	242	2 9	+ 3	4 2	S*	—	—	—
Uwazima		8·5	246	2 11	+ 4	—	—	—	—	—
Ooita		9·2	249	2 4	−12	4 39	S*	—	—	—
Ootomari		9·6	4	2 22	+ 1	4 2	−10	—	—	—
Izuka		9·7	254	2 16	− 6	4 50	S*	—	—	—
Hukuoka B		9·9	253	2 33	+ 8	4 54	S*	—	—	—
Kumamoto		10·0	248	2 30	+ 3	4 45	S*	—	—	—
Miyazaki		10·0	242	2 28	+ 1	—	—	—	—	—
Titizima		10·0	179	2 19	− 8	—	—	—	—	—
Saga		10·2	252	2 47	+16	5 45	S_g	—	—	—
Unzendake		10·4	249	2 39	+ 5	5 55	S_g	—	—	—
Husan		10·5	263	e 2 43	+ 8	e 5 11	S*	—	—	—
Taikyu		10·7	267	i 2 41	+ 3	4 43	+ 4	—	—	—
Kagosima		10·8	243	2 46	+ 7	5 54	S_g	—	—	—
Syuhurei		11·1	270	3 0	+17	5 27	S*	—	—	—
Yakusima		11·5	238	2 48a	0	5 4	+ 5	—	—	—
Tomie		11·6	251	2 41k	− 9	5 40	?	—	—	—
Keizyo		11·8	277	2 57	+ 4	5 35	+29	—	—	7·7
Zinsen		12·1	277	e 2 59	+ 2	e 5 44	+30	—	—	7·7
Sikka		12·2	4	2 56	− 2	—	—	—	—	—
Heizyo		12·8	284	e 3 8	+ 2	e 6 1	?	—	—	8·4
Nake		13·5	234	3 15	0	—	—	—	—	—
Dairen		16·0	283	3 46	− 2	—	—	—	—	—
Zi-ka-wei	E.	17·9	258	e 4 13	+ 1	—	—	—	—	—
Miyakozima		18·7	234	4 23	+ 1	7 54	+ 6	—	—	—
Taityu		22·2	241	6 1	+61	—	—	—	—	—
Taito		22·9	239	4 43	−23	9 36	+23	—	—	—
Hong Kong		28·0	246	10 38	S	(10 38)	0	16 30	?	17·7
Manila		29·1	225	e 6 14	+10	11 58	+62	—	—	—
Irkutsk		30·2	312	e 6 13	− 1	11 16	+ 3	—	—	15·5
Phu-Lien		34·6	253	e 6 46	− 7	—	—	—	—	—
Semipalatinsk		45·1	308	—	—	e 15 11	+12	—	—	—
Calcutta	N.	48·0	268	e 9 1	+18	i 16 14	+33	e 19 37	SS	e 24·2
Almata		48·8	300	e 8 21	−28	—	—	—	—	—
Frunse		50·6	300	e 9 2	0	—	—	—	—	30·8
Medan		51·7	241	9 35	+24	17 4	+32	i 19 13	SS	—
Andijan		52·8	297	e 9 19	0	e 17 27	+40	e 11 22	PP	—
Agra	E.	54·0	279	e 9 24	− 4	e 17 0	− 3	20 34	SS	—
Batavia	N.	54·1	225	9 40	+11	17 18	+13	—	—	—
Tchimkent		54·3	300	e 10 9	+39	e 17 33	+26	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tashkent		54·8	299	9 30	− 4	i 16 59	−15	—	—	e 39·7
Sverdlovsk		55·3	319	i 9 36	− 2	i 17 19	− 2	—	—	26·5
Hyderabad	N.	58·6	269	—	—	18 3	− 1	—	—	—
Bombay		62·3	274	e 10 33	+ 7	e 19 4	+12	—	—	—
Kodaikanal	E.	63·5	263	e 10 29	− 5	—	—	—	—	—
Colombo	E.	63·6	258	e 12 9	PP	19 6	− 2	—	—	39·9
Moscow		67·4	323	e 10 55	− 4	e 19 53	− 2	—	—	35·0
Pulkovo		68·3	330	e 11 1	− 4	e 20 3	− 3	—	—	35·0
Baku		68·4	305	—	—	e 20 35	+28	—	—	35·5
Grozny		69·6	309	e 11 9	− 4	—	—	—	—	—
Tiflis		71·0	308	e 11 17	− 5	e 21 1	+24	e 14 11	PP	36·5
Theodosia		74·7	315	e 11 40	− 3	21 42	+23	—	—	—
Simferopol		75·5	316	e 11 52	+ 4	—	—	—	—	—
Tinemaha		75·5	54	i 11 40	− 8	—	—	—	—	—
Santa Barbara	Z.	76·1	57	e 11 45	− 6	—	—	—	—	—
Haiwee		76·3	54	e 11 46	− 6	—	—	—	—	—
Mount Wilson	Z.	77·3	57	i 11 50	− 8	—	—	—	—	—
Pasadena		77·3	57	i 11 49	− 9	e 21 53	+ 5	—	—	e 32·9
Riverside		77·9	57	i 11 53	− 8	—	—	—	—	—
Copenhagen		78·0	334	i 11 58	− 4	22 17	+22	—	—	41·5
Potsdam		80·3	332	e 12 11	− 3	e 14 29?	?	—	—	e 38·5
Hamburg		80·6	334	e 12 35	+19	—	—	—	—	e 43·5
Ksara		81·4	305	12 25	+ 5	—	—	15 37	PP	—
Budapest		81·5	325	12 18	− 3	—	—	—	—	e 45·5
Kecskemet	Z.	81·6	324	e 12 15	− 6	—	—	e 12 52	?	e 44·5
Prague		81·6	329	e 12 17	− 4	e 22 50	+17	—	—	—
Jena		82·0	331	e 12 23	0	22 59	+22	—	—	e 44·5
Belgrade		82·8	321	e 12 24k	− 3	e 23 5	+20	—	—	e 46·4
Tucson		83·3	54	i 12 23	− 7	—	—	—	—	e 35·2
De Bilt		83·4	335	i 12 53	+23	—	—	—	—	e 41·5
Wellington		83·6	156	e 12 29?	− 3	24 4	PS	—	—	—
Stuttgart		84·7	330	e 12 33k	− 4	e 23 3	[+ 4]	e 13 9	pP	e 46·5
Uccle		84·8	335	e 12 32	− 5	e 23 14	+ 9	—	—	e 41·5
Christchurch		85·0	158	12 33a	− 5	e 23 2	− 5	—	—	e 40·7
Triest		85·3	327	e 13 10	+30	23 23	+13	16 37	PP	—
Strasbourg		85·4	331	e 12 37	− 3	e 23 41	+30	—	—	44·5
Kew		85·9	337	—	—	e 24 29?	?	—	—	e 42·5
Basel		86·3	330	—	—	e 27 41	?	—	—	—
Helwan		86·9	305	i 12 44	− 4	e 23 23	− 3	—	—	—
Jersey		88·3	338	e 15 14	?	e 23 23	[+ 1]	—	—	e 49·1
Rome		88·8	323	e 12 51	− 6	e 23 42	− 2	—	—	e 44·8
Ottawa		91·2	25	e 13 1	− 7	e 24 29?	+24	—	—	e 52·5
Seven Falls		91·2	21	e 13 17	+ 9	—	—	—	—	e 45·8
Williamstown		94·4	24	i 13 18	− 5	—	—	i·17 7	PP	—
Weston	Z.	95·3	23	e 13 27	0	—	—	—	—	—
Philadelphia		96·1	28	—	—	e 25 2	+14	—	—	e 50·8
Toledo		97·2	334	e 13 37	+ 1	e 17 31	PP	—	—	—
La Paz		146·5	60	i 19 39	[− 3]	—	—	i 23 38	PP	—

Additional readings and note:—
Mizusawa readings have been increased by 1m.
Koti P*E = +2m.26s.
Calcutta eSSSN = +20m.59s.
Tiflis eEZ = +11m.57s., ePSE = +21m.59s., eSSSN = +27m.29s.?
Mount Wilson iZ = +12m.0s. and +12m.17s.
Riverside iZ = +12m.4s., +12m.15s., +12m.20s., and +12m.30s.
Copenhagen i = +12m.8s. and +12m.30s., iZ = +12m.33s.
Budapest PN = +12m.21s.
Jena eN = +12m.42s., eZ = +12m.57s., eN = +14m.12s.
Belgrade iZ = +12m.59s., iS_cSNE = +23m.29s.
Tucson iP = +12m.50s., i = +13m.0s. and +13m.10s.
Christchurch eL_qE = +35·6m.
Strasbourg eZ = +12m.59s.
Helwan e = +23m.41s.
Weston iZ = +13m.27s.
Philadelphia ePSPS = +31m.56s., eSSS = +35m.11s.
La Paz i = +20m.13s.
Long waves were also recorded at Honolulu and other American and European stations.

Nov. 7d. 19h. 12m. 27s. Epicentre 37°·1N. 141°·8E. (as at 4h.).

$A = -\cdot 6283$, $B = +\cdot 4944$, $C = +\cdot 6006$; $D = -9$; $h = -1$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mizusawa		2·1	346	(0 48)	P_g	(1 34)	?	—	—	—
Nagoya		4·4	245	(1 24)	P_g	(2 28)	S_g	—	—	—
Koti		7·6	245	i 2 0a	+ 5	i 3 39	+16	4 39	S_g	—
Hukuoka B		9·9	253	e 2 36	+11	e 5 53	S_g	—	—	—
Husan		10·5	263	2 46	+11	e 6 12	?	—	—	—
Taikyu		10·7	267	i 2 45	+ 7	e 4 54	+15	—	—	—
Keizyo		11·8	277	2 59	+ 6	e 5 43	?	—	—	8·0
Zinsen	E.	12·1	277	3 3	+ 6	e 6 2	?	—	—	8·3
Heizyo		12·8	284	3 11	+ 5	—	—	—	—	—
Phu-Lien		34·6	253	—	—	e 12 33	+11	—	—	—
Semipalatinsk		45·1	308	8 17	− 3	14 57	− 2	—	—	—
Calcutta		48·0	268	e 7 25	?	i 15 58	+17	—	—	—
Almata		48·8	300	8 4	−45	—	—	—	—	—
College		48·9	32	—	—	e 15 40	−13	e 19 33	SS	e 22·3
Frunse		50·6	300	e 9 2	0	—	—	—	—	—
Andijan		52·8	297	e 9 20	+ 1	e 16 57	+10	—	—	—
Agra	E.	54·0	279	e 9 27a	− 1	17 10	+ 7	11 28	PP	—
Batavia		54·1	225	9 29	0	17 11	+ 6	—	—	—
Tashkent		54·8	299	9 33	− 1	17 16	+ 2	—	—	e 29·6
Sverdlovsk		55·3	319	i 9 36	− 2	i 17 23	+ 2	—	—	—
Samarkand		57·1	298	e 9 45	− 5	e 17 45	0	—	—	—
Bombay		62·3	274	e 10 33	+ 7	e 18 58	+ 6	—	—	—
Colombo	E.	63·6	258	—	—	e 19 21	+13	—	—	—
Victoria		66·3	46	—	—	e 19 27	−15	—	—	—
Moscow		67·4	323	e 10 56	− 3	e 19 53	− 2	—	—	40·0
Pulkovo		68·3	330	11 2	− 3	20 3	− 3	—	—	36·0
Baku		68·4	305	10 55	−11	e 20 10	+ 3	—	—	35·6
Grozny		69·6	309	e 11 3	−10	—	—	—	—	—
Tiflis		71·0	308	e 11 19	− 3	e 20 39	+ 2	e 14 12	PP	e 37·6
Adelaide		71·7	183	—	—	e 18 36	?	—	—	—
Melbourne		74·6	177	—	—	e 21 21	+ 3	—	—	—
Theodosia		74·7	315	e 11 46	+ 3	—	—	—	—	—
Simferopol		75·5	316	e 11 50	+ 2	—	—	—	—	—
Tinemaha	z.	75·5	54	e 11 53	+ 5	—	—	—	—	—
Haiwee		76·3	54	i 11 53	+ 1	—	—	—	—	—
Mount Wilson	z.	77·3	57	e 11 51	− 7	—	—	—	—	—
Pasadena	z.	77·3	57	e 11 53	− 5	—	—	—	—	—
Riverside	z.	77·9	57	e 11 53	− 8	—	—	—	—	—
Copenhagen		78·0	334	i 12 9	+ 7	21 58	+ 3	26 51	SS	41·6
Potsdam		80·3	332	i 12 5	− 9	—	—	—	—	e 41·6
Hamburg	z.	80·6	334	e 12 10	− 6	—	—	—	—	—
Ksara		81·4	305	e 12 19	− 1	—	—	15 29	PP	—
Prague		81·6	329	—	—	e 24 33?	?	—	—	—
Jena	N.	82·0	331	e 12 22	− 1	—	—	e 17 29	PP	e 39·6
Cheb		82·4	331	e 22 43	S	(e 22 43)	+ 2	—	—	—
Tucson		83·3	54	i 12 33	+ 3	—	—	—	—	—
De Bilt		83·4	335	—	—	e 22 53	+ 2	—	—	—
Stuttgart		84·7	330	e 12 38	+ 1	e 22 59	− 5	—	—	e 46·6
Uccle		84·8	335	e 12 34	− 3	e 23 3	− 2	—	—	—
Chur		86·1	330	e 12 40	− 4	—	—	—	—	—
Zurich		86·1	330	e 13 1	+17	—	—	—	—	—
Basle		86·3	330	e 11 51	−54	—	—	—	—	—
Rome		88·8	323	e 13 34	+37	e 23 9	[−17]	e 17 10	PP	—
Seven Falls		91·2	21	—	—	e 23 53	−12	—	—	—
La Paz	z.	146·5	60	e 19 33	[− 9]	—	—	—	—	—

Additional readings and notes :—
Mizusawa and Nagoya readings have been increased by 1m.
Agra SSE = +20m.48s.
Bombay eSE = +19m.5s., eEN = +23m.33s.
Tiflis ePPPZ = +15m.43s.
Mount Wilson iZ = +11m.59s.
Riverside iZ = +12m.2s.
Tucson iP = +13m.9s.
Rome eS = +23m.42s., SS = +29m.59s.

Nov. 7d. 19h. 33m. 35s. Epicentre 37°·1N. 141°·8E. (as at 19h. 12m.).

Seismological Bulletin of Tokyo Central Meteorological Observatory gives epicentre 37°·0N. 141°·8E., focus shallow.

$A = -\cdot6283$, $B = +\cdot4944$, $C = +\cdot6006$; $\delta = -9$; $h = -1$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m.	s.	m.
Onahama	0·8	257	0 20a	+ 2	0 29	− 2	—	—	—
Mito	1·3	236	0 37	+12	0 54	+10	—	—	—
Sendai	1·3	329	0 32	+ 7	0 42	− 2	—	—	—
Tyosi	1·5	209	0 24	− 4	0 57	+ 8	—	—	—
Kakioka	1·5	236	0 28	0	0 55	+ 6	—	—	—
Tukubasan	1·5	237	0 28	0	0 53	+ 4	—	—	—
Yamagata	1·6	315	0 36	+ 6	1 9	+18	—	—	—
Utunomiya	1·7	250	0 30a	− 1	0 54	0	—	—	—
Kumagaya	2·1	244	0 38k	+ 1	1 10	S_g	—	—	—
Mizusawa N.	2·1	346	i 0 39k	+ 2	i 1 12	S_g	—	—	—
Tokyo Cen. Met. Ob.	2·1	229	i 0 36	− 1	1 15	S_g	—	—	—
Tokyo Imp. Univ.	2·1	229	0 38	+ 1	1 15	S_g	—	—	—
Komaba	2·2	230	0 35	− 3	1 13	S_g	—	—	—
Kiyosumi	2·3	214	0 35	− 5	—	—	—	—	—
Maebasi	2·3	252	0 41	+ 1	1 13	+ 4	—	—	—
Yokohama	2·4	226	0 38k	− 3	1 15	+ 3	—	—	—
Niigata	2·4	291	0 50	P_g	1 41	?	—	—	—
Titibu	2·5	243	0 35	− 8	1 15	+ 1	—	—	—
Kamakura	2·5	226	0 35	− 8	0 49?	?	—	—	—
Miyako	2·6	3	0 45	+ 1	1 16	− 1	—	—	—
Mera	2·7	216	0 42a	− 3	1 30	S_g	—	—	—
Morioka	2·7	349	0 47a	+ 2	1 28	S_g	—	—	—
Hunatu	2·9	237	0 48	0	1 38	S_g	—	—	—
Koyama	2·9	232	0 35	−13	1 17	− 7	—	—	—
Nagano	2·9	261	0 53	+ 5	1 34	S_g	—	—	—
Kohu	3·0	241	0 50	0	1 37	S_g	—	—	—
Misima	3·0	229	0 49k	− 1	1 35	S_g	—	—	—
Ito	3·0	225	0 48a	− 2	1 43	S_g	—	—	—
Akita	3·0	334	1 5	P_g	1 48	S_g	—	—	—
Numadu	3·1	230	0 52	+ 1	1 53	S_g	—	—	—
Osima	3·1	220	0 44	− 7	1 17	−12	—	—	—
Yosiwara	3·2	232	0 35	−17	1 22	−10	—	—	—
Matumoto	3·2	254	0 52	0	1 43	+11	—	—	—
Susaki	3·3	225	0 49	− 4	1 38	+ 3	—	—	—
Toyama	3·4	266	1 4	P*	1 26	−11	—	—	—
Hatinohe	3·5	356	0 57a	0	1 40	0	—	—	—
Iida	3·6	245	0 58	0	1 50	+ 8	—	—	—
Takayama	3·8	257	1 4a	+ 3	2 24	?	—	—	—
Omaesaki	3·8	231	1 1	0	2 5	S_g	—	—	—
Husiki	3·8	267	1 9a	P*	1 59	S*	—	—	—
Aomori	3·8	348	1 7	P*	2 4	S_g	—	—	—
Wazima	3·9	277	1 7a	P*	2 7	S_g	—	—	—
Hamamatu	4·1	235	1 6a	+ 1	2 4	S*	—	—	—
Kanazawa	4·2	264	1 6	− 1	1 48	− 9	—	—	—
Hatidyozima	4·3	203	1 1	− 7	1 53	− 7	—	—	—
Gihu	4·4	250	1 9k	− 1	2 14	S*	—	—	—
Nagoya	4·4	245	i 1 11a	+ 1	2 17	S*	—	—	—
Hukui	4·6	257	1 7	− 5	2 13	+ 6	—	—	—
Hakodate	4·7	350	1 25k	P*	3 32	?	—	—	—
Hikone	4·8	250	1 18	+ 3	2 22	S*	—	—	—
Kameyama	4·9	245	1 18	+ 1	2 36	S_g	—	—	—
Tu	4·9	243	1 18	+ 1	2 33	S*	—	—	—
Mori	5·1	349	1 25	+ 5	2 40	S*	—	—	—
Urakawa	5·1	8	1 54	P_g	3 12	S_g	—	—	—
Muroran	5·2	353	1 32	P*	2 43	S*	—	—	—
Kyoto	5·3	249	1 24	+ 2	2 37	+12	—	—	—
Miyadu	5·6	257	1 21	− 6	2 41	+ 8	—	—	—
Osaka	5·6	247	1 30	+ 3	2 42	+ 9	—	—	—
Toyooka	5·8	257	1 32	+ 3	2 52	S*	—	—	—
Kobe	5·9	249	1 33a	+ 2	2 56	S*	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Obihiro		5·9	10	1 34	+ 3	—	—	—	—	—
Sapporo		6·0	356	1 33	+ 1	2 57	S*	—	—	—
Siomisaki		6·1	236	1 26	− 8	3 14	S_g	—	—	—
Wakayama		6·2	244	1 31	− 4	3 5	S*	—	—	—
Sumoto		6·2	247	1 32k	− 3	3 11	S*	—	—	—
Tokusima		6·6	246	1 43	+ 2	3 27	S*	—	—	—
Okayama		6·8	252	1 47	+ 3	3 28	S*	—	—	—
Nemuro		6·8	24	1 40	− 4	2 54	− 9	—	—	—
Sakai		7·1	260	1 50	+ 2	—	—	—	—	—
Tadotu		7·1	250	1 52	+ 4	3 36	S*	—	—	—
Haboro		7·3	359	2 17	P*	3 36	S*	—	—	—
Muroto		7·3	241	1 49	− 1	3 38	S*	—	—	—
Koti		7·6	245	1 54a	− 1	3 33	+10	4 27	S_g	5·0
Hirosima		8·1	254	2 4	+ 2	4 9	S*	—	—	—
Matuyama		8·1	249	2 2a	0	4 5	S*	—	—	—
Hamada		8·2	256	2 5	+ 2	3 37	− 1	—	—	—
Simidu		8·4	242	2 7	+ 1	4 1	S*	—	—	—
Uwazima		8·5	246	2 9	+ 2	4 18	S*	—	—	—
Ootomari		9·6	4	2 26	+ 5	4 26	+14	—	—	—
Izuka		9·7	254	2 23	+ 1	5 14	?	—	—	—
Hukuoka B		9·9	253	e 2 28	+ 3	5 20	?	—	—	6·2
~~Titizima~~		~~10·0~~	~~179~~	~~2 15~~	~~−12~~	—	—	—	—	—
Miyazaki		10·0	242	2 28a	+ 1	4 35	+13	—	—	—
Kumamoto		10·0	248	2 30a	+ 3	4 41	+19	—	—	—
Saga		10·2	252	2 24	− 7	—	—	—	—	—
Husan		10·5	263	e 2 29	− 6	e 4 42	+ 7	—	—	—
Ituhara		10·6	258	2 26	−10	—	—	—	—	—
Taikyu		10·7	267	2 39	+ 1	i 5 45	P_g	—	—	—
Kagosima		10·8	243	2 45	+ 6	—	—	—	—	—
Syuhurei		11·1	270	2 51	+ 8	5 33	S*	—	—	—
Yakusima		11·5	238	2 46	− 2	4 59	0	—	—	—
Tomie		11·6	251	2 50	0	5 18	+17	—	—	—
Keizyo		11·8	277	i 2 57	+ 4	i 5 20	+14	—	—	7·1
Zinsen	E.	12·1	277	2 58	+ 1	e 5 34	+20	—	—	7·4
Sikka		12·2	4	2 42	−16	5 27	+11	—	—	—
Heizyo		12·8	284	e 3 10	+ 4	i 6 1	+31	—	—	7·6
Nake		13·5	234	3 12	− 3	5 37	−10	—	—	—
Naha		16·1	234	4 22	+33	7 34	+45	—	—	—
Miyakozima		18·7	234	4 8	−14	7 58	+10	—	—	—
Isigakizima		19·8	237	3 33	−62	—	—	—	—	—
Karenko		21·7	241	5 21	+26	—	—	—	—	—
Taityu		22·2	241	5 50	+50	—	—	—	—	—
Arisan		22·6	241	5 7	+ 4	—	—	—	—	—
Taito		22·9	239	5 3	− 3	—	—	—	—	—
Semipalatinsk		45·1	308	e 8 18	− 2	15 0	+ 1	—	—	—
Calcutta	N.	48·0	268	e 8 27	−16	i 15 40	− 1	e 19 3	SS	e 23·6
Frunse		50·6	300	e 9 6	+ 4	—	—	—	—	—
Medan		51·7	241	e 9 15	+ 4	—	—	—	—	—
Andijan		52·8	297	e 9 21	+ 2	e 16 54	+ 7	—	—	—
Agra	E.	54·0	279	9 22	− 6	—	—	11 28	—	—
Batavia		54·1	225	9 19	−10	i 17 7	+ 2	—	—	—
Honolulu		54·2	88	e 9 40	+11	e 16 59	− 7	—	—	e 22·6
Tchimkent		54·3	300	9 28	− 2	e 17 9	+ 2	—	—	—
Tashkent		54·8	299	i 9 34	0	i 17 48	+34	—	—	26·1
Sverdlovsk		55·3	319	i 9 35	− 3	i 17 46	+25	—	—	27·4
Bombay		62·3	274	i 10 26	0	i 18 57	+ 5	—	—	—
Kodaikanal	E.	63·5	263	e 10 30	− 4	—	—	—	—	—
Colombo	E.	63·6	258	e 10 20	−15	e 19 55	+47	—	—	e 38·3
Brisbane		65·1	169	—	—	e 19 13	−14	—	—	e 33·8
Victoria		66·3	46	e 11 55	+63	e 19 25	−17	—	—	—
Moscow		67·4	323	e 10 59	0	e 19 56	+ 1	—	—	34·9
Pulkovo		68·3	330	e 11 5	0	e 20 8	+ 2	—	—	e 32·7
Grozny		69·6	309	e 11 13	0	—	—	—	—	—
Tiflis		71·0	308	e 11 18	− 4	e 20 38	+ 1	e 14 0	PP	e 36·4
Riverview	N.	71·1	172	e 16 13	PP	—	—	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Ukiah		71·1	55	e 11 26	+ 4	e 20 37	− 1	e 25 33	SS	e 29·5
Adelaide		71·7	183	i 11 19	− 7	i 20 35	−10	—	—	34·8
Berkeley		72·4	56	e 11 21	− 9	e 20 55	+ 2	—	—	e 35·5
Upsala		73·0	335	e 12 2?	+28	e 21 0	0	—	—	—
Melbourne		74·6	177	i 13 42	?	i 21 6	−12	—	—	—
Tinemaha		75·5	54	e 11 43	− 5	—	—	—	—	—
Santa Barbara	z.	76·1	57	e 11 46	− 5	—	—	—	—	—
Haiwee	z.	76·3	54	e 11 48	− 4	—	—	—	—	—
Mount Wilson	z.	77·3	57	i 11 52	− 6	—	—	—	—	—
Pasadena		77·3	57	i 11 52	− 6	i 21 41	− 7	—	—	e 32·4
Riverside		77·9	57	i 11 53	− 8	—	—	—	—	—
Copenhagen		78·0	334	11 59	− 3	—	—	—	—	—
Bucharest		80·2	319	e 21 5	?	e 22 25	+ 6	—	—	—
Potsdam		80·3	332	i 11 58	−16	e 21 55	−25	i 15 1	PP	e 44·4
Hamburg		80·6	334	e 12 14	− 2	e 22 25	+ 2	—	—	e 29·5
Istanbul		80·8	316	i 12 33	+16	—	—	15 34	PP	—
Ksara		81·4	305	i 12 20k	0	22 39	+ 8	i 15 31	PP	—
Budapest		81·5	325	12 20	− 1	i 22 50	+18	—	—	30·4
Kecskemet	z.	81·6	324	e 12 15	− 6	e 22 12	−21	e 15 24	PP	e 36·4
Prague		81·6	329	e 12 25?	+ 4	e 22 36	+ 3	—	—	e 42·4
Ivigtut		81·7	5	—	—	22 32	− 2	—	—	41·4
Jena		82·0	331	e 12 23	0	e 23 13	+36	—	—	—
Göttingen		82·2	332	e 12 21	− 3	e 22 41	+ 2	e 27 25?	SS	e 45·4
Cheb		82·4	331	e 11 25?	?	e 22 43	+ 2	—	—	e 45·4
Edinburgh		82·7	341	—	—	i 22 48	+ 4	—	—	e 44·4
Belgrade		82·8	321	e 12 23a	− 4	e 22 46	+ 1	e 12 33	P_cP	e 29·5
Sofia		82·8	319	e 12 25	− 2	e 22 48	+ 3	—	—	—
Tucson		83·3	54	i 12 26a	− 4	i 22 49	− 1	i 15 38	PP	e 36·2
De Bilt		83·4	335	12 29	− 1	22 53	+ 2	15 45	PP	e 43·4
Wellington		83·6	156	e 12 23	− 9	22 36	−17	28 0	SS	39·4
Stonyhurst		84·3	340	—	—	i 23 2	+ 2	30 55	?	e 43·4
Stuttgart		84·7	330	i 12 34k	− 3	e 23 6	+ 2	i 12 53	pP	e 46·4
Uccle		84·8	335	i 12 36	− 1	e 23 6	+ 1	—	—	e 42·4
Christchurch		85·0	158	i 12 14a	−24	22 49	[−12]	—	—	e 39·7
Triest		85·3	327	e 12 52	+12	23 15	+ 5	24 2	pS	—
Strasbourg		85·4	331	i 12 40a	0	i 23 12	+ 1	i 12 55	pP	e 42·4
Oxford		85·8	337	—	—	i 23 22	+ 7	—	—	e 41·7
Kew		85·9	337	i 12 45a	+ 2	i 23 16	0	e 28 38	SS	e 41·4
Chur		86·1	330	e 12 40	− 4	e 23 18	0	—	—	—
Basle		86·3	330	e 12 41	− 4	—	—	—	—	—
Padova		86·3	327	e 11 25	?	—	—	—	—	e 26·4
Helwan		86·9	305	i 12 46	− 2	e 23 25	− 1	16 13	PP	—
Paris		87·1	335	—	—	e 23 25?	− 3	e 34 25?	?	45·4
Florence		87·8	327	e 13 15	+23	23 25	− 9	—	—	—
Jersey		88·3	338	e 11 50	?	e 23 37	− 2	e 35 25?	?	e 43·4
Moncalieri		88·4	330	e 12 52	− 3	i 23 50	+10	—	—	36·4
Rome		88·8	323	i 12 54a	− 3	24 1	+17	16 27	PP	i 45·0
Chicago		89·3	35	—	—	23 40	− 8	e 35 23	SSS	41·6
Puy de Dôme		89·6	332	—	—	e 23 19	[−11]	—	—	e 50·1
Florissant		90·5	38	e 13 0	− 5	e 23 27	[− 9]	e 23 54	S	—
Ottawa		91·2	25	—	—	e 23 31	[− 9]	e 33 43	SSS	e 49·4
Seven Falls		91·2	21	—	—	e 24 3	− 2	—	—	e 46·4
Vermont		92·8	24	—	—	e 23 46	[− 3]	e 30 36	SS	51·9
Bagnères		92·9	333	—	—	e 24 13	− 7	—	—	e 31·4
East Machias		94·3	20	e 14 1	+38	e 23 53	[− 4]	e 24 33	S	e 46·1
Harvard		95·1	23	e 13 20	− 6	e 24 0	[− 2]	e 24 36	S	e 62·4
Weston		95·3	23	i 13 26	− 1	e 24 1	[− 1]	e 25 51	PS	—
Fordham		95·8	26	—	—	i 24 4	[− 1]	—	—	—
Philadelphia		96·1	28	e 17 36	PP	e 24 2	[− 5]	e 30 36	SS	e 48·7
Algiers		97·1	327	e 14 25?	+50	e 19 25?	PPP	—	—	e 54·4
Toledo		97·2	334	e 17 33	PP	—	—	—	—	42·4
Almeria		99·3	332	e 17 56	PP	—	—	—	—	e 55·1
Granada		99·4	333	i 21 53	?	i 39 11	?	—	—	54·5
Malaga		100·2	333	e 17 35	PP	—	—	—	—	45·4
San Fernando	N.	101·0	334	e 17 34	PP	e 32 32	PS	—	—	—
Cape Town		134·4	256	i 22 55	PP	—	—	—	—	—
La Paz		146·5	60	e 19 42	[0]	—	—	—	—	—

For Notes see next page.

NOTES TO Nov. 7d. 19h. 33m. 35s.

Additional readings :—
Morioka +1m.36s.
Koti eN = +3m.38s.
Calcutta eSSSN = +20m.25s.
Agra SS?E = +21m.6s.
Batavia +9m.26s.
Honolulu S = +17m.3s.
Tashkent e = +24m.35s.
Brisbane eE = +20m.37s.
Victoria e = +20m.31s.
Tiflis ePPPZ = +15m.44s.
Ukiah eP = +11m.44s.
Berkeley eE = +11m.35s. and +33m.35s., iN = +34m.35s.
Pasadena iZ = +12m.37s.
Hamburg iE = +23m.1s.
Budapest iE = +23m.20s.
Jena eN = +12m.35s.
Edinburgh i = +23m.21s.
Belgrade eNW = +24m.37s.
Tucson iP = +12m.32s., i = +13m.26s. and +13m.39s., S = +22m.43s., iPS = +23m.37s.
Stuttgart ePP = +16m.13s., e = +26m.55s.
Christchurch eL$_q$E = +36m.15s.
Strasbourg iPPN = +15m.59s., SSE = +29m.25s.
Kew iSSSE = +32m.27s., iZ = +35m.22s.
Helwan e = +14m.55s. and +16m.25s.
Rome i = +19m.43s. and +22m.38s., SKS = +23m.29s., i = +28m.5s., SS = +29m.27s.
Florissant iPPSZ = +25m.10s.
East Machias eS = +25m.52s., eSS = +31m.12s., eSSS = +35m.54s.
Harvard eL$_q$E = +51·4m.
Philadelphia ePP = +17m.44s., eSSS = +35m.55s.
Long waves were also recorded at Baku, Simferopol, Theodosia, Yalta, Aberdeen, Karlsruhe, and La Plata.

Nov. 7d. Further shocks from the neighbourhood of the Epicentre of 19h. 33m. were recorded at Mizusawa and Nagoya.

Mizusawa. :—

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
0	2	52(S)	5	12	3	9	3	45	15	49	22(S)
0	9	32(S)	5	17	28	9	8	8(S)	15	57	0
0	15	16(S)	5	25	24(S)	9	10	51	16	9	18(S)
0	17	19	5	29	21	9	17	7(S)	16	30	9(S)
0	33	40(S)	5	31	19(S)	9	21	57	17	24	22(S)
0	38	49(S)	5	33	48(S)	9	27	48	17	29	4
0	45	59	5	38	56(S)	9	34	15(S)	17	35	58(S)
1	3	7(S)	5	42	10(S)	9	38	54(S)	17	52	2(S)
1	10	59	5	46	50(S)	9	49	55	18	9	48(S)
1	34	54	5	51	41(S)	10	5	18	18	28	36
2	4	56	5	57	35	10	17	15(S)	19	26	16(S)
2	27	27	6	6	26(S)	10	21	19(S)	19	42	19
2	42	48	6	30	25	10	34	13(S)	19	48	50
2	53	44	6	49	50	10	38	32	19	56	6
2	57	19(S)	6	54	2	10	43	23	20	10	14(S)
3	5	54(S)	6	59	56	11	2	27	20	15	28(S)
3	12	44(S)	7	2	19(S)	12	9	3	20	25	13(S)
3	13	35	7	4	34(S)	12	17	6(S)	20	40	3(S)
3	17	49(S)	7	11	50(S)	12	24	35	20	41	49(S)
3	34	44(S)	7	19	27	12	31	18	21	4	54(S)
3	37	39	7	24	27	13	2	45(S)	21	11	56
3	47	33(S)	7	26	23	13	35	41(S)	21	15	20
3	49	36(S)	7	32	48	13	44	40	21	19	28(S)
3	53	31(S)	7	45	1(S)	14	0	0(S)	21	49	27(S)
4	12	14	7	49	33	14	1	56(S)	21	53	36
4	36	5	8	1	38	14	19	1	21	55	1
4	40	41	8	5	43	14	27	12(S)	22	27	0
4	49	40	8	21	26(S)	14	43	46(S)	22	41	2
4	52	35(S)	8	28	15	14	53	37	22	46	15
4	56	51	8	31	32	15	0	34	22	57	41(S)
5	0	9	8	41	17	15	2	9	23	18	23
5	6	23	9	1	40(S)	15	45	19(S)	23	22	47
									23	46	32(S)

Nagoya :—

h.	m.	s.
0	1	49
0	10	19
0	18	33
0	46	50
1	11	34
1	19	38
1	35	27
1	47	28(S)
2	6	31(S)
2	43	12
2	54	12
3	14	55
4	42	20(S)
4	44	4(S)
4	52	49
4	57	23
5	1	21
5	7	31
5	12	30
5	18	50
5	30	28
5	32	40(S)
5	35	20(S)
5	42	32
5	46	56
5	58	8
6	7	25
6	31	15
6	51	2
6	54	42
7	0	52
7	5	24
7	27	0
7	34	50(S)
7	50	21
8	2	43
8	6	37
8	29	33
8	41	49
9	11	59
9	22	42
9	28	43
9	51	33
10	5	51
10	44	21
11	3	9
12	10	12
12	16	42
12	25	45
12	31	52
13	45	32
14	19	56
15	20	17
15	49	55
15	57	26
17	24	32
17	29	45
19	26	37
19	49	16
19	56	36
20	2	57(S)
20	10	5
20	15	52
20	25	21
20	40	55
21	14	0
21	17	12
21	20	40
21	55	36
22	27	47
22	41	45
22	46	47
23	23	47

Nov. 7d. **Readings also at 0h. (Sofia), 1h. (Basle, Husan, Hukuoka B, Keizyo, Koti, Haiwee, Mount Wilson, Pasadena, Riverside, Tinemaha, and Tucson), 2h. (Tiflis, Keizyo, Hukuoka B, Taikyu, Koti, and La Paz), 3h. (near Laibach and near Keizyo), 4h. (Moscow, Sverdlovsk, and Pulkovo), 5h. (Zurich, near New Plymouth, Wellington, and near Manila), 6h. (near New Plymouth and Wellington), 7h. (Hukuoka B (2) and Koti (2)), 8h. (Koti, Irkutsk (2), Sverdlovsk (2), Tiflis (2), and Baku), 9h. (Sverdlovsk and Moscow), 10h. (Andijan), 11h. (Koti), 12h. (Koti, Hukuoka B, Calcutta, Sverdlovsk, and near Zurich), 13h. (Copenhagen, De Bilt, Cheb, Baku, and Tiflis), 14h. (Christchurch, near Zurich, and near Tiflis), 15h. (Irkutsk, Sverdlovsk, and Tucson (2)), 17h. (La Paz), 18h. (Santiago), 19h. (Triest), 20h. (Koti, Stuttgart, Triest, Tchimkent, Samarkand, near Andijan, and Santiago (3)), 21h. (Bergen, Harvard, and near Weston), 22h. (near Helwan).**

Nov. 8d. 3h. 11m. 34s. Epicentre 47°·8N. 16°·4E.

Damage at Ebreichsdorf and Brodersdorf. Felt in Austria, Bohemia, Moravia, Slovakia, and in Hungary in the districts of Sapron and Gyor.

Epicentre Ebreichsdorf 47°51′N. 16°25′E. (Strasbourg).

See Annales de l'Institut de Physique du Globe de Strasbourg, 1938, Tome III, 2e partie Seismologie, Mende, 1941, p. 98.

$A = +\cdot6468$, $B = +\cdot1904$, $C = +\cdot7385$; $\delta = -2$; $h = -5$;
$D = +\cdot282$, $E = -\cdot959$; $G = +\cdot708$, $H = +\cdot209$, $K = -\cdot674$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L
		°	°	m. s.	s.	m. s.	s.	m. s.		m
Budapest		1·8	100	0 36	P_g	1 8	S_g	—	—	—
Zagreb		2·0	188	i 0 38	+ 3	—	—	—	—	—
Kecskemet	z.	2·4	112	i 0 39	− 2	e 1 10	− 2	i 0 44	P*	—
Prague		2·6	330	e 0 41	− 3	1 21	S*	i 0 47	P*	—
Triest		3·0	220	0 47	− 3	1 31	S*	i 0 54	P*	—
Cheb		3·5	312	e 0 59	+ 2	e 1 41	+ 1	—	—	e 1·8
Hof		3·9	311	e 1 14	P_g	e 1 47	− 3	—	—	i 1·9
Padova		4·0	234	e 1 4	0	i 2 1	S*	i 1 17	P_g	—
Belgrade		4·1	135	i 1 5k	0	e 2 8	S*	1 9	P*	—
Jena		4·4	316	e 1 10	0	e 2 4	+ 2	i 1 22	P*	e 2·3
Ravensburg	N.	4·6	272	e 1 16	+ 4	i 2 0	− 7	e 1 29	P_g	—
Chur		4·8	261	e 1 14	− 1	e 2 8	− 4	—	—	—
Stuttgart		4·9	284	1 15a	− 2	i 2 10	− 5	i 1 38	P_g	—
Ebingen		5·0	277	e 1 16	− 2	e 2 10	− 8	e 1 38	P_g	—
Potsdam		5·1	336	e 1 44	P_g	i 2 25	+ 5	e 2 38	S*	—
Zurich		5·3	268	e 1 20	− 2	e 2 18	− 7	e 1 44	P_g	—
Florence		5·4	224	e 1 29	+ 5	2 59	S_g	—	—	—
Karlsruhe		5·4	286	i 1 22	− 2	—	—	—	—	e 2·8
Göttingen		5·6	314	e 1 34	+ 7	i 2 32	− 1	e 2 55	S*	—
Strasbourg		5·8	281	e 1 30	+ 1	e 3 7	S_g	i 1 51	P_g	—

Continued on next page.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Basle	6·0	270	e 1 28	− 4	e 2 35	− 8	e 1 58	P_g	—
Neuchatel	6·4	266	e 1 32	− 6	e 3 25	S_g	i 2 4	P_g	—
Rome	6·5	207	e 1 42	+ 3	e 2 48	− 7	i 3 43	S_g	—
Moncalieri	6·6	248	1 36	− 5	3 16	S*	—	—	—
Besançon	7·1	269	e 2 20	P_g	i 4 2	S_g	—	—	—
Hamburg	7·1	327	—	—	e 3 20	+10	e 3 41	S*	—
Sofia	7·1	133	e 1 53	+ 5	—	—	—	—	—
Bucharest	7·5	114	—	—	e 3 19	− 1	e 3 38	S*	4·9
Grenoble	7·8	254	e 3 0	P_g	i 3 44	S*	i 4 23	S_g	—
Copenhagen	8·3	344	2 8	+ 4	—	—	—	—	4·4
De Bilt	8·4	305	—	—	e 4 2	S*	i 4 29	S_g	—
Uccle	8·4	295	e 2 26?	PPP	e 3 57	+14	4 29	S_g	—
Paris	9·3	281	—	—	e 4 3	− 2	e 5 8	S_g	6·4
Puy de Dôme	9·5	262	e 2 28	+ 8	e 4 48	S*	—	—	—
Kew	11·4	295	—	—	e 5 26	SSS	—	—	—
Bagnères	12·3	253	—	—	i 5 56	SSS	—	—	i 7·8
Pulkovo	14·5	29	e 3 24	− 4	—	—	—	—	7·9
Toledo	16·7	249	i 3 58	+ 1	—	—	—	—	—
Granada	18·1	243	—	—	e 7 51	SS	—	—	—
Tiflis	21·0	97	e 4 45	− 2	e 8 41	+ 4	—	—	—
Baku	25·0	95	e 5 36	+ 9	e 10 18	+29	—	—	—
Sverdlovsk	28·0	54	5 56	+ 1	—	—	—	—	—
Tashkent	37·6	80	—	—	e 10 41	?	—	—	e 22·4

Additional readings :—
Kecskemet z. i$P_gS_gS_g$ = +58s., ePS = +1m.3s., iS_g = +1m.15s., e = +1m.32s.
Prague ePS = +1m.12s.
Belgrade i = +1m.17s., iNW = +2m.34s. and +2m.50s.
Jena eP = +1m.14s., i = +1m.26s., +2m.8s., and +2m.15s.
Ravensburg iS_gN = +2m.32s.
Stuttgart iP* = +1m.19s., i = +1m.46s., iSN = +2m.5s., i = +2m.24s., iN = +2m.30s., i = +2m.36s., iS_g = +2m.44s.
Ebingen eN = +2m.40s., eS_gN = +2m.45s.
Potsdam eEZ = +1m.56s., eZ = +2m.2s., iE = +2m.6s., iZ = +2m.40s.
Zurich eS_g = +2m.45s.
Göttingen e = +2m.18s.
Strasbourg iE = +2m.31s., i = +3m.14s. and +3m.21s.
Hamburg eN = +3m.52s., eZ = +3m.56s.
Bucharest eE = +3m.33s.
Grenoble i = +4m.51s., +5m.26s., and +5m.49s., e = +6m.13s.
De Bilt i = +4m.11s.
Uccle eE = +4m.4s., iE = +5m.11s.
Paris e = +4m.57s.
Kew iEN = +5m.52s., iN = +6m.4s., iEN = +6m.21s.
Bagnères e = +6m.47s., +7m.7s., and +7m.23s., i = +7m.27s.
Toledo i = +9m.38s. and +11m.0s.
Granada i = +12m.53s. and +14m.46s.
Tiflis ePNZ = +4m.49s., eSE = +14m.5s.
Tashkent e = +20m.9s.
Long waves were also recorded at Irkutsk, Moscow, Malaga, San Fernando, Edinburgh, and Upsala.

Nov. 8d. 3h. 23m. 15s. Epicentre 47°·8N. 16°·4E. (as at 3h.11m.).

A = +·6468, B = +·1904, C = +·7385 ; $\delta = -2$; $h = -5$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.	
		°	°	m. s.	s.	m. s.	s.	m. s.	
Budapest		1·8	100	0 37	P_g	1 7	S_g	—	—
Prague		2·6	330	e 0 53	P_g	e 1 17	0	e 1 22	S*
Triest		3·0	220	e 1 0	P_g	e 1 28	+ 1	i 1 31	S*
Jena	N.	4·4	316	—	—	e 1 57	− 5	—	—
Chur		4·8	261	e 1 13	− 2	e 2 6	− 6	—	—
Stuttgart		4·9	284	e 1 13	− 4	e 2 35	S*	e 1 34	P_g
Zurich		5·3	268	e 1 17	− 5	—	—	—	—
Karlsruhe		5·4	286	—	—	e 2 57	S_g	—	—
Göttingen		5·6	314	e 1 51	P_g	e 2 54	S*	—	—
Strasbourg		5·8	281	—	—	e 2 48	+10	3 15	S_g
Basle		6·0	270	e 1 54	P_g	—	—	—	—
Neuchatel		6·4	266	e 1 35	− 3	—	—	—	—

For Notes see next page.

NOTES TO NOV. 8d. 3h. 23m. 15s.

Additional readings :—
Budapest iE = +1m.13s.
Stuttgart iS_g = +2m.43s.
Long waves were also recorded at Sverdlovsk and Baku.

Nov. 8d. 3h. 31m. 35s. Epicentre 47°·8N. 16°·4E. (as at 3h.23m.).

A = +·6468, B = +·1904, C = +·7385; δ = −2; h = −5.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.	
	°	°	m. s.	s.	m. s.	s.	m. s.	
Budapest	1·8	100	0 41	P_g	1 9	S_g	—	—
Prague	2·6	330	e 1 4	P_g	e 1 21	S*	—	—
Triest	3·0	220	—	—	e 1 31	S*	i 1 36	S_g
Chur	4·8	261	e 1 15	0	e 2 9	− 3	—	—
Stuttgart	4·9	284	—	—	e 2 7	− 8	e 2 37	S_g
Zurich	5·3	268	e 1 20	− 2	—	—	—	—
Göttingen	5·6	314	—	—	e 2 31	− 2	e 3 1	S_g

Stuttgart also gives eS_g = +2m.46s.
Long waves were also recorded at Jena.

Nov. 8d. 13h. 14m. 1s. Epicentre 37°·1N. 141°·8E. (as on 7d.).

Intensity II at Sendai, Kakioka, Mito ; I at Onahama, Hukusima, Miyako, Morioka, and Utunomiya.

Epicentre 37°·2N. 142°·1E. Shallow.

See Seismological Bulletin of the Central Met. Obs., Japan, for the year 1938, Tokyo, 1940, pp. 100-101.

A = −·6283, B = +·4944, C = +·6006; δ = −9; h = −1.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Onahama	0·8	257	0 17a	− 1	0 26	S_g	—	—	—
Hukusima	1·2	302	0 22a	− 2	0 44	+ 3	—	—	—
Mito	1·3	236	0 27k	P_g	0 52	+ 8	—	—	—
Sendai	1·3	329	0 24k	− 1	0 44	0	—	—	—
Kakioka	1·5	236	0 31	P_g	1 5	+16	—	—	—
Tyosi	1·5	209	0 31	P_g	0 58	+ 9	—	—	—
Tukubasan	1·6	237	0 32k	+ 2	1 0	S_g	—	—	—
Yamagata	1·6	315	0 31	+ 1	0 54	S_g	—	—	—
Utunomiya	1·7	250	0 31k	0	0 57	S_g	—	—	—
Kumagaya	2·1	244	0 40	P*	1 11	S_g	—	—	—
Mizusawa	2·1	346	i 0 32	− 5	0 57	−17	—	—	—
Tokyo Cen. Met. Ob.	2·1	229	0 41	P_g	1 9	S_g	—	—	—
Maebasi	2·3	252	0 45	P_g	1 16	S_g	—	—	—
Niigata	2·4	291	0 55	+14	1 25	S_g	—	—	—
Yokohama	2·4	226	0 45	P*	1 25	S_g	—	—	—
Miyako	2·6	3	0 35k	− 9	1 4	−13	—	—	—
Morioka	2·7	349	0 45k	0	1 17	− 2	—	—	—
Oiwake	2·7	254	0 51	P*	1 36	S_g	—	—	—
Takada	2·8	270	1 0	P_g	1 50	+28	—	—	—
Hunatu	2·9	237	0 53	P*	1 47	S_g	—	—	—
Nagano	2·9	261	0 54	P*	1 39	S_g	—	—	—
Akita	3·0	334	0 56	P*	1 38	S_g	—	—	—
Ito	3·0	225	0 56	P*	—	—	—	—	—
Kohu	3·0	241	0 52	+ 2	1 44	S_g	—	—	—
Misima	3·0	229	0 56	P*	1 44	S_g	—	—	—
Numadu	3·1	230	0 54	+ 3	1 37	S*	—	—	—
Osima	3·1	220	0 51	0	1 37	S*	—	—	—
Matumoto	3·2	254	0 54	+ 2	1 34	+ 2	—	—	—
Toyama	3·4	266	1 6	P*	2 0	S_g	—	—	—
Hatinohe	3·5	356	0 51	− 6	1 30	−10	—	—	—

Continued on next page.

		△ °	Az. °	P. m. s.	O−C. s.	S. m. s.	O−C. s.	Supp. m. s.		L. m.
Iida		3·6	245	1 5	+ 7	1 53	S*	—	—	—
Husiki		3·8	267	1 14	P_g	2 10	S_g	—	—	—
Omaesaki		3·8	231	1 13	P_g	2 12	S_g	—	—	—
Takayama		3·8	257	1 8	+ 7	2 36	+49	—	—	—
Wazima		3·9	277	1 15	P_g	2 18	S_g	—	—	—
Hamamatu		4·1	235	1 9	+ 4	1 59	+ 4	—	—	—
Kanazawa		4·2	264	1 22	P_g	—	—	—	—	—
Hatidyozima		4·3	203	1 13	P*	2 1	+ 1	—	—	—
Gihu		4·4	250	1 12a	+ 2	2 13	S*	—	—	—
Nagoya		4·4	245	1 16	P*	2 21	S_g	—	—	—
Hukui		4·6	257	1 21	P*	2 33	S_g	—	—	—
Hakodate		4·7	350	1 14	0	—	—	—	—	—
Ibukisan		4·7	251	1 18	+ 4	2 33	S_g	—	—	—
Hikone		4·8	250	1 19	+ 4	2 21	S*	—	—	—
Kameyama		4·9	245	1 20	+ 3	2 37	S_g	—	—	—
Tu		4·9	243	1 26	P*	3 21	?	—	—	—
Mori		5·1	349	1 23	+ 3	2 17	− 3	—	—	—
Urakawa		5·1	8	1 27	P*	—	—	—	—	—
Muroran		5·2	353	1 26	+ 5	2 20	− 2	—	—	—
Kyoto		5·3	249	1 24	+ 2	2 49	S*	—	—	—
Yagi		5·5	245	1 27	+ 2	2 41	S*	—	—	—
Miyadu		5·6	257	1 17	−10	2 43	+10	—	—	—
Osaka		5·6	247	1 32	P*	3 7	S_g	—	—	—
Kobe		5·9	249	1 32	+ 1	3 14	S_g	—	—	—
Obihiro		5·9	10	1 32	+ 1	2 43	+ 3	—	—	—
Sapporo		6·0	356	1 31	− 1	2 29	−14	—	—	—
Siomisaki		6·1	236	1 25	− 9	3 15	S_g	—	—	—
Sumoto		6·2	247	1 38	+ 3	2 56	+ 8	—	—	—
Wakayama		6·2	244	1 36	+ 1	2 58	S*	—	—	—
Tokusima		6·6	246	1 46	+ 5	3 46	S_g	—	—	—
Nemuro		6·8	24	1 30	−14	2 43	−20	—	—	—
Haboro		7·3	359	3 34	S	(3 34)	S*	—	—	—
Muroto		7·3	241	1 56	+ 6	3 32	S*	—	—	—
Koti		7·6	245	2 1	+ 6	e 3 53	S*	—	—	—
Hirosima		8·1	254	2 3	+ 1	4 8	S*	—	—	—
Matuyama		8·1	249	2 20	P*	4 48	S_g	—	—	—
Hamada		8·2	256	2 7	+ 4	4 1	S*	—	—	—
Vladivostok		9·7	312	e 2 31	+ 9	e 4 35	S*	—	—	e 5·1
Hukuoka B		9·9	253	—	—	e 4 32	+12	—	—	—
Miyazaki		10·0	242	2 52a	PPP	4 56	S*	—	—	—
Unzendake		10·4	249	2 36	+ 2	5 45	L	—	—	(5·7)
Zinsen	E.	12·1	277	e 2 59	PP	—	—	—	—	9·9
Heizyo		12·8	284	e 3 6	0	—	—	—	—	—
Irkutsk		30·2	312	e 6 12	− 2	e 11 14	+ 1	e 13 29	SSS	16·0
Agra	E.	54·0	279	e 9 25	− 3	—	—	—	—	—
Sverdlovsk		55·3	319	i 9 30	− 8	i 17 18	− 3	—	—	28·0
Moscow		67·4	323	e 10 53	− 6	—	—	—	—	e 36·5
Pulkovo		68·3	330	e 11 7	+ 2	—	—	—	—	e 36·5
Baku		68·4	305	e 11 12	+ 6	e 20 42	PS	—	—	36·0
Grozny		69·6	309	11 6	− 7	—	—	—	—	—
Tiflis		71·0	308	e 11 15	− 7	—	—	—	—	e 33·0
Tinemaha		75·5	54	i 11 39	− 9	—	—	—	—	—
Santa Barbara	Z.	76·1	57	e 11 40	−11	—	—	—	—	—
Mount Wilson		77·3	57	i 11 48k	−10	—	—	—	—	—
Pasadena		77·3	57	i 11 48k	−10	—	—	—	—	—
Riverside	Z.	77·9	57	i 11 51	−10	—	—	—	—	—
Potsdam		80·3	332	e 15 59?	PP	—	—	—	—	e 40·0
Tucson		83·3	54	i 12 21k	− 9	—	—	—	—	—
Stuttgart		84·7	330	e 12 35k	− 2	e 22 59	− 5	—	—	e 47·0
Uccle		84·8	335	e 12 35	− 2	—	—	—	—	e 46·0
Strasbourg		85·4	331	e 12 53	+13	—	—	—	—	e 44·0
Jersey		88·3	338	e 14 18	+83	—	—	—	—	—
La Paz	Z.	146·5	60	19 40	[− 2]	—	—	—	—	—

For Notes see next page.

NOTES TO Nov. 8d 13h. 14m. 1s.

Additional readings :—
Tucson iP = +12m.36s., i = +13m.25s. and +13m.33s.
Long waves were also recorded at Husan, Rome, Kew, De Bilt, Prague, and Copenhagen.

Nov. 8d. Further shocks from the neighbourhood of the epicentre of 13h. were recorded at Mizusawa and Nagoya.

Mizusawa.

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
0	26	17(S)	5	27	24	8	46	36(S)	12	19	50
1	5	19	5	32	5(S)	8	57	21	12	28	31(S)
1	19	54(S)	5	37	22	9	30	53(S)	13	6	14(S)
1	21	45(S)	5	50	11	9	39	49(S)	14	0	34
1	25	34	5	53	50(S)	9	53	49	15	29	7
1	39	20(S)	6	31	43	10	33	50(S)	16	35	27
2	31	9(S)	6	42	14(S)	10	35	19	17	32	3
2	57	57	7	9	53	10	46	9	17	49	56(S)
3	40	10	7	21	24(S)	10	52	26(S)	18	11	30(S)
3	46	7	7	35	55(S)	11	2	41	19	14	32
4	44	23(S)	7	52	29	11	14	34	19	41	51(S)
4	52	3(S)	8	25	14	11	42	59	22	26	47
									23	5	55

Nagoya

h.	m.	s.	h.	m.	s.	h.	m	s.	h.	m.	s.
1	6	15	5	27	56	8	57	57	11	43	42
1	26	15	5	31	59	9	39	58	12	21	25
1	40	6	5	37	55	9	54	44	12	29	31
2	17	43	6	32	30	10	34	35	14	1	31
2	32	37	6	42	25	10	36	59	15	30	0
2	58	52	7	11	25	10	52	30	17	32	58
3	41	21	7	53	20	11	3	22	19	15	35
3	46	59	8	26	40	11	15	23	22	27	42
									23	7	47

Nov. 8d. Readings also at 1h. (Bucharest, Sofia, Wellington, Sverdlovsk, and Baku), 2h. (Grozny and near Santiago), 3h. (Cheb), 4h. (Frunse), 5h. (Neuchatel, Koti, Mount Wilson, Riverside, Pasadena, and Tucson), 6h. (Sverdlovsk, Baku, and Vladivostok), 7h. (Sverdlovsk, Baku, and Tiflis), 9h. (Philadelphia and Riverview), 10h. (Christchurch, Baku, Sverdlovsk, Frunse, Tashkent, Andijan, Almata, and Tacubaya), 11h. (Keizyo (2), Tinemaha, Kew, Baku, Sverdlovsk, Tacubaya, Tashkent, Tiflis, Tucson (2), Pasadena (2), Koti (3), Riverside (2), Mount Wilson (2), Moscow, Irkutsk (2), De Bilt, Strasbourg, Copenhagen, Pulkovo, and Hukuoka B), 12h. (De Bilt, Grozny, Almata, Andijan, Frunse, Copenhagen, Tiflis, Tashkent, Sverdlovsk, Baku (2), Tchimkent, and Samarkand), 14h. (Vladivostok, Tiflis, Strasbourg, Irkutsk, Koti, Tucson, and Sverdlovsk), 18h. (Sverdlovsk and Tashkent), 19h. (Huancayo), 20h. (Moscow, Scoresby Sund, Edinburgh, and Harvard), 21h. (Scoresby Sund, Pulkovo, Baku, Strasbourg, Copenhagen, De Bilt, Sverdlovsk, and Tashkent), 22h. (Huancayo and San Juan), 23h. (Tucson).

Nov. 9d. 2h. 22m. 20s. Epicentre 37°·1N. 141°·8E. (as on 1938, Nov. 8d.).

Intensity III at Sendai, II at Hukusima, Onahama, Mizusawa, Tukubasan, and Mito, I at Kakioka, Miyako, Morioka, Hatinohe, and Utunomiya.

Epicentre 37°·5N. 141°·5E.; shallow.

$A = -\cdot6283$, $B = +\cdot4944$, $C = +6006$; $\delta = -9$; $h = -1$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Onahama	0·8	257	0 18	0	0 27	−4	—	—	—
Hukusima	1·2	302	0 18k	− 6	0 30	−11	—	—	—
Mito	1·3	236	0 26k	+ 1	0 42	− 2	—	—	—
Sendai	1·3	329	0 20k	− 5	0 32	−12	—	—	—
Kakioka	1·5	236	0 29	+ 1	0 52	+ 3	—	—	—
Tyosi	1·5	209	0 38	+10	0 52	+ 3	—	—	—
Tukubasan	1·6	237	0 30	0	0 49	− 2	—	—	—
Yamagata	1·6	315	0 24	− 6	0 38	−13	—	—	—
Utunomiya	1·7	250	0 29	− 2	0 48	− 6	—	—	—
Kumagaya	2·1	244	0 39	P*	1 5	S*	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mizusawa		2·1	346	i 0 31	− 6	i 0 51	−13	—	—	—
Tokyo, Cen. Met. Ob.		2·1	229	0 41	P_g	1 6	S*	—	—	—
Yokohama		2·4	226	0 45	P*	1 16	S*	—	—	—
Miyako		2·6	3	0 34a	−10	0 56	−21	—	—	—
Mera		2·7	216	0 52	P_g	1 26	S*	—	—	—
Morioka		2·7	349	0 38k	− 7	1 3	−16	—	—	—
Oiwake		2·7	254	0 42	− 3	1 24	+ 5	—	—	—
Hunatu		2·9	237	0 46	− 2	1 34	S_g	—	—	—
Nagano		2·9	261	0 42	− 6	1 25	+ 1	—	—	—
Akita		3·0	334	0 43	− 7	—	—	—	—	—
Kohu		3·0	241	0 51	+ 1	1 32	+ 5	—	—	—
Misima		3·0	229	0 54k	P*	1 34	S*	—	—	—
Numadu		3·1	230	0 54	P*	1 35	S*	—	—	—
Osima		3·1	220	0 54	P*	1 30	+ 1	—	—	—
Matumoto		3·2	254	0 54	+ 2	1 31	− 1	—	—	—
Toyama		3·4	266	1 0	P*	1 39	+ 2	—	—	—
Hatinohe		3·5	356	0 45	−12	1 26	−14	—	—	—
Iida		3·6	245	1 1	+ 3	1 43	+ 1	—	—	—
Aomori		3·8	348	0 55	− 6	1 42	− 5	—	—	—
Husiki		3·8	267	1 18	P_g	—	—	—	—	—
Omaesaki		3·8	231	1 4	+ 3	2 7	S_g	—	—	—
Takayama		3·8	257	1 2	+ 1	—	—	—	—	—
Wazima		3·9	277	1 2	0	—	—	—	—	—
Hamamatu		4·1	235	1 9	+ 4	1 52	− 3	—	—	—
Kanazawa		4·2	264	1 14	P*	2 27	S_g	—	—	—
Hatidyozima		4·3	203	1 16	P*	2 3	+ 3	—	—	—
Nagoya		4·4	245	1 11	+ 1	2 3	+ 1	—	—	—
Hakodate		4·7	350	1 11	− 3	—	—	—	—	—
Ibukisan		4·7	251	1 15	+ 1	2 14	+ 4	—	—	—
Hikone		4·8	250	1 18	+ 3	2 21	S*	—	—	—
Kameyama		4·9	245	1 24	P*	—	—	—	—	—
Mori		5·1	349	1 16	− 4	2 15	− 5	—	—	—
Urakawa		5·1	8	1 29	P*	2 16	− 4	—	—	—
Muroran		5·2	353	1 20	− 1	2 21	− 1	—	—	—
Kyoto		5·3	249	1 22	0	—	—	—	—	—
Miyadu		5·6	257	1 25	− 2	2 27	− 6	—	—	—
Osaka		5·6	247	1 33	+ 6	2 51	S*	—	—	—
Toyooka		5·8	257	1 31	+ 2	2 43	+ 5	—	—	—
Kobe		5·9	249	1 42	P*	3 0	S*	—	—	—
Obihiro		5·9	10	1 34	+ 3	2 34	− 6	—	—	—
Sapporo		6·0	356	1 33	+ 1	2 41	− 2	—	—	—
Sumoto		6·2	247	2 3	P_g	—	—	—	—	—
Wakayama		6·2	244	1 39	+ 4	3 1	S*	—	—	—
Tokusima		6·6	246	2 18	P_g	3 58	S_g	—	—	—
Nemuro		6·8	24	1 51	+ 7	2 45	−18	—	—	—
Koti		7·6	245	e 2 39	P_g	—	—	—	—	—
Hirosima		8·1	254	1 55	− 7	3 49	+14	—	—	—
Sverdlovsk		55·3	319	i 10 19	+41	—	—	—	—	26·7
Mount Wilson	z.	77·3	57	e 11 54	− 4	—	—	—	—	—
Pasadena	z.	77·3	57	e 11 59	+ 1	—	—	—	—	—
Riverside	z.	77·9	57	e 12 10	+ 9	—	—	—	—	—
Tucson		83·3	54	12 25	− 5	—	—	—	—	—

Additional readings :—
Mount Wilson iZ = +12m.8s.
Pasadena iZ = +12m.6s.
Tucson i = +12m.41s.
Long waves were also recorded at Tashkent, Baku, and Irkutsk.

Nov. 9d. 9h. 15m. 56s. Epicentre 37°·1N. 141°·8E. (as at 2h.).

Intensity III at Sendai and Mito, II at Tukubasan, I at Onahama, Hukusima, Utunomiya, Yamagata, and Kumagaya.

Epicentre 36°·75N. 141°·85E.; shallow.

See Seismological Bulletin of the Central Met. Obs., Japan., for the year 1938. Tokyo, 1940; pp. 102-104.

$A = -\cdot6283$, $B = +\cdot4944$, $C = +\cdot6006$; $\delta = -9$; $h = -1$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Onahama	0·8	257	0 23	+ 5	0 38	+ 7	—	—	—
Mito	1·3	236	0 25a	0	0 46	+ 2	—	—	—
Sendai	1·3	329	0 35a	+10	0 56	+12	—	—	—
Kakioka	1·5	236	0 28	0	1 7	Sg	—	—	—
Tyosi	1·5	209	0 32	+ 4	0 51	+ 2	—	—	—
Tukubasan	1·6	237	0 29a	− 1	0 51	0	—	—	—
Yamagata	1·6	315	0 37a	Pg	1 13	+22	—	—	—
Utunomiya	1·7	250	0 35	Pg	0 58	Sg	—	—	—
Kumagaya	2·1	244	0 40	P*	1 12	Sg	—	—	—
Mizusawa	2·1	346	i 0 42	Pg	i 1 16	Sg	—	—	—
Tokyo, Cen. Met. Ob.	2·1	229	0 38	+ 1	1 6	+ 2	—	—	—
Yokohama	2·4	226	0 39	− 2	1 17	Sg	—	—	—
Miyako	2·6	3	0 46	P*	1 22	Sg	—	—	—
Mera	2·7	216	0 41k	− 4	1 13	− 6	—	—	—
Morioka	2·7	349	0 50a	P*	1 30	Sg	—	—	—
Oiwake	2·7	254	0 49	P*	1 36	Sg	—	—	—
Takada	2·8	270	0 51	P*	1 37	Sg	—	—	—
Hunatu	2·9	237	0 48	0	1 40	Sg	—	—	—
Nagano	2·9	261	0 54a	P*	1 43	Sg	—	—	—
Akita	3·0	334	1 17	+27	2 1	?	—	—	—
Kohu	3·0	241	0 50	0	1 34	S*	—	—	—
Ito	3·0	225	0 48k	− 2	1 26	− 1	—	—	—
Misima	3·0	229	0 48a	− 2	1 32	+ 5	—	—	—
Numadu	3·1	230	0 50	− 1	1 56	Sg	—	—	—
Osima	3·1	220	0 45	− 6	1 22	− 7	—	—	—
Matumoto	3·2	254	0 57	P*	1 37	S*	—	—	—
Toyama	3·4	266	1 6	Pg	2 9	Sg	—	—	—
Hatinohe	3·5	356	0 59	+ 2	2 0	Sg	—	—	—
Iida	3·6	245	1 5	P*	1 54	S*	—	—	—
Aomori	3·8	348	1 17	Pg	2 40	?	—	—	—
Husiki	3·8	267	1 5	P*	2 17	Sg	—	—	—
Omaesaki	3·8	231	0 58	− 3	2 18	Sg	—	—	—
Wazima	3·9	277	1 10a	P*	2 13	Sg	—	—	—
Hamamatu	4·1	235	1 5k	0	—	—	—	—	—
Kanazawa	4·2	264	1 20	Pg	2 15	Sg	—	—	—
Gihu	4·4	250	1 11	+ 1	2 20	S*	—	—	—
Nagoya	4·4	245	1 9	− 1	2 18	S*	—	—	—
Hukui	4·6	257	1 25	P*	2 46	?	—	—	—
Hakodate	4·7	350	1 36	Pg	3 10	?	—	—	—
Ibukisan	4·7	251	1 20	P*	2 29	S*	—	—	—
Hikone	4·8	250	1 24	P*	—	—	—	—	—
Kameyama	4·9	245	1 17	0	2 40	Sg	—	—	—
Tu	4·9	243	1 15	− 2	—	—	—	—	—
Mori	5·1	349	1 24k	+ 4	2 32	S*	—	—	—
Urakawa	5·1	8	1 28	P*	2 55	Sg	—	—	—
Muroran	5·2	353	1 31	P*	2 57	Sg	—	—	—
Kyoto	5·3	249	1 25	+ 3	2 49	Sg	—	—	—
Yagi	5·5	245	1 24a	− 1	2 48	Sg	—	—	—
Miyadu	5·6	257	1 25	− 2	3 31	+58	—	—	—
Osaka	5·6	247	1 30	+ 3	2 44	S*	—	—	—
Toyooka	5·8	257	1 35	+ 6	3 12	Sg	—	—	—
Kobe	5·9	249	1 28a	− 3	3 2	S*	—	—	—
Obihiro	5·9	10	1 31	0	3 17	Sg	—	—	—
Sapporo	6·0	356	1 36k	+ 4	2 48	+ 5	—	—	—
Siomisaki	6·1	236	1 29a	− 5	3 22	Sg	—	—	—

Continued on next page.

		Δ °	Az. °	P. m. s.	O−C. s.	S. m. s.	O−C. s.	Supp. m. s.		L. m.
Kusiro		6·2	18	1 45	P*	3 3	S*	—	—	—
Sumoto		6·2	247	1 35	0	3 11	S*	—	—	—
Wakayama		6·2	244	1 32a	− 3	3 0	+12	—	—	—
Tokusima		6·6	246	1 43	+ 2	3 34	S_g	—	—	—
Nemuro		6·8	24	1 44	0	3 0	− 3	—	—	—
Okayama		6·8	252	1 42	− 2	3 41	S_g	—	—	—
Tadotu		7·1	250	1 50	+ 2	3 41	S*	—	—	—
Haboro		7·3	359	2 56	+66	4 18	+63	—	—	—
Muroto		7·3	241	1 47	− 3	3 25	+10	—	—	—
Koti		7·6	245	i 1 53a	− 2	e 3 28	+ 5	—	—	e 4·0
Hirosima		8·1	254	2 1	− 1	3 49	+14	—	—	—
Matuyama		8·1	249	2 3a	+ 1	5 6	?	—	—	—
Hamada		8·2	256	1 56	− 7	—	—	—	—	—
Simidu		8·4	242	2 4	− 2	3 46	+ 3	—	—	—
Uwazima		8·5	246	2 4	− 3	4 21	S*	—	—	—
Ooita		9·2	249	2 19k	+ 3	4 52	S_g	—	—	—
Ootomari		9·6	4	2 14	− 7	3 57	−15	—	—	—
Izuka		9·7	254	2 24	+ 2	4 44	S*	—	—	—
Hukuoka B		9·9	253	2 27	+ 2	e 5 44	L	—	—	(e 5·7)
Kumamoto		10·0	248	2 27a	0	4 25	+ 3	—	—	—
Miyazaki		10·0	242	2 26a	− 1	4 28	+ 6	—	—	—
Titizima		10·0	179	2 13	−14	—	—	—	—	—
Otiai		10·2	4	2 30	− 1	4 51	SSS	—	—	—
Husan		10·5	263	e 2 47	PPP	e 5 3	SSS	—	—	—
Nagasaki		10·7	250	2 32	− 6	4 51	SS	—	—	—
Taikyu		10·7	267	i 2 42k	+ 4	5 8	SSS	—	—	—
Syuhurei		11·1	270	e 2 45	+ 2	e 5 7	SS	—	—	—
Yakusima		11·5	238	2 47	− 1	5 1	+ 2	—	—	—
Tomie		11·6	251	2 49a	− 1	5 10	+ 9	—	—	—
Keizyo		11·8	277	2 57	+ 4	e 5 29	SSS	—	—	e 7·1
Zinsen		12·1	277	i 3 1a	+ 4	e 6 1	L	—	—	(e 6·0)
Sikka		12·2	4	3 1	+ 3	—	—	—	—	—
Heizyo		12·8	284	i 3 12a	+ 6	i 6 2	SSS	—	—	8·4
Nake		13·5	234	3 11	− 4	5 46	− 1	—	—	—
Dairen		16·0	283	4 17	+29	7 20	SSS	—	—	—
Miyakozima		18·7	234	3 49	−33	7 43	− 5	—	—	—
Taihoku		21·1	240	e 5 35	PPP	e 9 19	SS	—	—	14·4
Karenko		21·7	241	5 16	PP	—	—	—	—	—
Taityu		22·2	241	5 34	PPP	—	—	—	—	—
Arisan		22·6	241	4 52	−11	—	—	—	—	—
Taito		22·9	239	5 4	− 2	9 21	+ 8	—	—	—
Tainan		23·3	240	6 29	?	10 49	SSS	—	—	—
Hong Kong		28·0	246	5 52	− 3	10 43	+ 5	7 12	PPP	14·4
Manila		29·1	225	5 56	− 8	13 23	?	—	—	—
Irkutsk		30·2	312	i 6 17	+ 3	i 11 27	+14	i 6 34	pP	16·1
Phu-Lien		34·6	253	e 6 48	− 5	—	—	—	—	—
Semipalatinsk		45·1	308	e 8 25	+ 5	15 7	+ 8	—	—	—
Calcutta	N.	48·0	268	i 8 37k	− 6	i 15 34	− 7	e 10 20	PP	i 22·9
Almata		48·8	300	e 8 50	+ 1	—	—	—	—	—
College		48·9	32	e 8 55	+ 5	15 49	− 4	e 11 15	PP	e 22·5
Frunse		50·6	300	e 9 6	+ 4	—	—	—	—	—
Medan		51·7	241	9 9	− 2	i 16 31	− 1	—	—	—
Dehra Dun	N.	52·6	283	e 9 32?	+14	e 17 0	+16	e 20 34	SS	e 26·9
Andijan		52·8	297	e 9 23	+ 4	16 59	+12	—	—	—
Agra		54·0	279	e 9 23a	− 5	17 5	+ 2	i 11 28	PP	—
Batavia		54·1	225	i 9 25k	− 4	16 58	− 7	—	—	—
Honolulu		54·2	88	—	—	e 17 1	− 5	—	—	e 23·3
Tchimkent		54·3	300	e 9 29	− 1	17 15	+ 8	—	—	31·1
Tashkent		54·8	299	i 9 35	+ 1	i 17 19	+ 5	e 21 4	SS	30·1
Sverdlovsk		55·3	319	i 9 36	− 2	i 17 29	+ 8	i 9 58	pP	28·6
Sitka		56·1	40	e 10 26	?	17 28	− 2	12 17	PP	e 22·5
Samarkand		57·1	298	e 9 53	+ 3	17 45	0	—	—	—
Hyderabad		58·6	269	9 56	− 5	18 4	0	21 54	SS	30·3
Bombay		62·3	274	i 10 24k	− 2	i 18 56	+ 4	e 13 10	PP	32·1
Kodaikanal	E.	63·5	263	e 10 29	− 5	i 19 24	+17	i 13 10	PP	i 31·9

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Colombo	E.	63·6	258	11 0	+25	19 20	+12	—	—	38·5
Brisbane	N.	65·1	169	e 10 34	−11	e 18 58	−29	—	—	—
Victoria		66·3	46	e 11 4?	+12	i 19 23	−19	20 28	PPS	—
Seattle		67·2	46	12 0	+62	e 19 59	+ 7	—	—	e 27·9
Moscow		67·4	323	i 10 58	− 1	i 20 0	+ 5	11 20	pP	39·6
Pulkovo		68·3	330	11 3	− 2	20 9	+ 3	11 25	pP	e 33·8
Baku		68·4	305	i 11 6	0	i 20 18	+11	—	—	35·1
Tiflis		71·0	308	11 20	− 2	20 42	+ 5	11 56	pP	e 37·1
Riverview	N.	71·1	172	e 11 10	−12	i 20 26	−12	—	—	e 38·3
Sydney		71·1	172	e 9 57	?	e 19 34	−64	—	—	—
Ukiah		71·1	55	e 11 16	− 6	e 20 32	− 6	e 14 31	PP	e 29·6
Scoresby Sund		71·8	355	11 25	− 1	i 20 53	+ 7	21 37	PS	—
Berkeley		72·4	56	e 19 15	?	e 20 45	− 8	e 21 29	PS	—
Saskatoon		73·0	37	—	—	e 21 4	+ 4	—	—	e 35·1
Upsala		73·0	335	e 11 33	0	i 21 5	+ 5	e 16 4	PPP	—
Butte		73·7	43	—	—	21 1	− 7	—	—	e 33·4
Melbourne		74·6	177	—	—	21 4	−14	i 21 48	PS	—
Theodosia		74·7	315	11 42	− ?	21 23	+ 4	—	—	42·1
Bozeman		74·8	43	—	—	e 21 16	− 4	—	—	e 32·4
Simferopol		75·5	316	—	—	e 21 30	+ 2	—	—	34·1
Tinemaha		75·5	54	e 11 41	− 7	e 21 18	−10	—	—	—
Santa Barbara	Z.	76·1	57	e 11 40	−11	—	—	—	—	—
Haiwee	E.	76·3	54	e 11 45	− 7	e 21 31	− 6	—	—	—
Bergen		76·5	340	11 47	− 7	21 48	+ 9	—	—	41·1
Mount Wilson		77·3	57	i 11 50	− 8	e 21 38	−10	—	—	—
Pasadena		77·3	57	e 11 50	− 8	e 21 16	−32	—	—	e 32·0
Riverside		77·9	57	e 11 54	− 7	e 21 44	−10	—	—	—
Copenhagen		78·0	334	11 59	− 3	21 59	+ 4	e 14 59	PP	—
Bucharest		80·2	319	e 12 13a	− 1	i 22 27	+ 8	15 23	PP	38·1
Potsdam		80·3	332	e 12 40	+26	e 22 16	− 4	e 22 58	PS	e 43·1
Hamburg		80·6	334	i 12 15k	− 1	i 22 27	+ 4	e 15 22	PP	e 43·8
Istanbul		80·8	316	12 47	+30	22 50	+25	15 44	PP	—
Ksara		81·4	305	i 12 19a	− 1	e 22 21	−10	i 12 47	pP	—
Budapest		81·5	325	12 27	+ 6	22 37	+ 5	23 19	PS	46·1
Kecskemet	Z.	81·6	324	e 12 22	+ 1	e 22 30	− 3	e 15 31	PP	e 49·1
Prague		81·6	329	e 12 22	+ 1	22 36	+ 3	—	—	e 43·1
Ivigtut		81·7	5	—	—	22 34	0	—	—	38·1
Jena		82·0	331	e 12 23	0	e 22 39	+ 2	—	—	e 37·1
Göttingen		82·2	332	e 12 21	− 3	e 22 39	0	—	—	e 46·1
Cheb		82·4	331	e 12 25	0	e 22 46	+ 5	e 17 35	PPP	e 46·1
Edinburgh		82·7	341	e 12 4?	−23	i 22 44	0	—	—	e 40·1
Belgrade		82·8	321	e 12 24k	− 3	i 22 49	+ 4	e 17 30	PPP	45·1
Sofia		82·8	319	e 12 29	+ 2	e 22 51	+ 6	—	—	—
Durham		83·2	340	i 13 24	+55	i 22 56	+ 7	—	—	—
Tucson		83·3	54	i 12 23a	− 7	22 41	− 9	e 15 44	PP	e 34·9
De Bilt		83·4	335	12 28	− 2	i 22 55	+ 4	e 15 46	PP	e 42·1
Wellington		83·6	156	e 12 11	−21	i 22 36	−17	15 26	PP	35·1
Stonyhurst		84·3	340	e 13 4	+29	i 23 4	+ 4	i 23 40	PS	e 44·1
Stuttgart		84·7	330	12 36a	− 1	i 23 2	− 2	i 13 6	pP	e 46·6
Karlsruhe		84·8	332	—	—	e 23 4?	− 1	—	—	e 49·1
Uccle		84·8	335	e 12 36	− 1	i 23 2	− 3	—	—	e 42·1
Christchurch		85·0	158	i 12 29a	− 9	i 22 48	[−13]	i 15 47	PP	38·9
Triest		85·3	327	e 12 57	+17	i 23 3	[0]	23 49	PS	—
Strasbourg		85·4	331	i 12 39a	− 1	i 23 4	[+ 1]	13 10	pP	e 47·1
Oxford		85·8	337	13 9	+27	23 8	[+ 2]	—	—	e 39·2
Rathfarnham Castle		85·8	342	i 13 14	+32	i 24 9	PS	i 25 20	PPS	44·1
Kew		85·9	337	12 41a	− 2	—	—	—	—	e 41·1
Chur		86·1	330	e 12 41	− 3	e 23 4	[− 4]	—	—	—
Zurich		86·1	330	e 12 42	− 2	e 23 8	[0]	—	—	—
Basle		86·3	330	e 12 45	0	e 23 14	[+ 4]	—	—	—
Padova		86·3	327	e 12 34	−11	22 4	[−66]	—	—	e 49·1
Helwan		86·9	305	i 12 47a	− 1	23 34	+ 8	16 16	PP	—
Neuchatel		87·0	330	e 12 48	0	e 23 26	− 1	—	—	—
Paris		87·1	335	e 13 15	+26	e 23 15	[+ 1]	24 29	PS	47·1
Florence		87·8	327	e 12 34	−18	23 34	0	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Jersey		88·3	338	—	—	e 24 24	PS	—	—	e 49·1
Moncalieri		88·4	330	e 13 4?	+ 9	23 23	[+ 1]	—	—	36·4
Rome		88·8	323	12 51a	− 6	i 23 23	[− 2]	i 16 32	PP	e 46·1
Chicago		89·3	35	—	—	e 23 22	[− 6]	—	—	37·1
Florissant		90·5	38	e 12 56	− 9	e 23 45	[+ 9]	i 16 6	PP	—
Ottawa		91·2	25	e 13 4?	− 4	e 23 58	− 7	—	—	e 38·1
Seven Falls		91·2	21	—	—	e 24 2	− 3	—	—	44·1
Bagnères		92·9	333	e 12 34	−42	e 23 51	[+ 2]	e 25 39	PS	e 50·1
East Machias		94·3	20	e 13 26	+ 3	e 23 55	[− 2]	26 8	PS	e 39·1
Harvard		95·1	23	—	—	e 24 34	− 5	e 51 4?	L_q	e 57·1
Weston	N.	95·3	23	—	—	e 24 44	+ 3	—	—	—
Fordham		95·8	26	e 18 5	PP	i 24 46	+ 1	—	—	—
Algiers		97·1	327	e 17 4?	PP	e 24 4?	[− 8]	e 28 4?	?	e 49·1
Toledo		97·2	334	e 16 47	?	—	—	—	—	47·6
Almeria		99·3	332	e 17 52	PP	—	—	—	—	e 56·3
Granada		99·4	333	i 17 26	PP	i 24 24	[0]	e 28 6	PPS	—
Malaga		100·2	333	18 16	PP	—	—	—	—	56·1
San Fernando	N.	101·0	334	—	—	36 35	SSS	—	—	57·6
Tananarive		104·5	258	22 32	?	33 27	SS	—	—	—
San Juan		118·8	30	e 18 54	[+ 4]	26 32	{−34}	e 20 40	PP	48·4
Cape Town		134·4	256	i 22 53	PP	—	—	—	—	—
Huancayo		138·4	63	e 19 26	[− 1]	e 26 38	[+ 2]	e 22 46	PP	e 54·3
La Paz	E.	146·5	60	19 41	[− 1]	42 6	SS	23 29	PP	74·1

Additional readings :—
Hong Kong SS = +12m.11s.
Irkutsk PP = +7m.39s.
Calcutta ePPPN = +11m.5s., eSSN = +18m.44s., eSSSN = +19m.59s.
College eP = +9m.27s., eSS = +19m.38s.
Agra SSE = +20m.37s.
Tashkent i = +9m.47s., iSP = +10m.15s., esS = +18m.9s.
Sverdlovsk iPP = +11m.47s., iPPP = +13m.2s., isS = +18m.3s.
Sitka S_cS = +19m.21s.
Bombay eEN = +10m.50s., iE = +11m.2s., iEN = +20m.16s. and +23m.17s., iN = +24m.17s.
Kodaikanal iPSE = +20m.4s., iSSE = +23m.49s.
Brisbane eSE = +19m.4s.
Moscow iPP = +13m.29s., pPP = +13m.50s., pS = +20m.22s.
Pulkovo ePP = +13m.33s., pPP = +13m.58s., sS = +20m.44s.
Tiflis ePPZ = +14m.6s., ePPPZ = +15m.49s., eSSN = +25m.38s., eSSSN = +28m.41s.
Ukiah PS = +21m.9s., eSS = +25m.6s., SSS = +28m.42s.
Scoresby Sund ? = +11m.52s., +12m.53s., +22m.27s., and +25m.46s.
Berkeley eN = +21m.45s., eE = +25m.15s., eN = +31m.14s., eEN = +32m.10s., eZ = +34m.10s.
Upsala ePSN = +21m.41s., eSSN = +25m.55s., eSSSN = +29m.4s.
Lick eE = +32m.46s.
Melbourne i = +32m.59s.
Pasadena iEN = +21m.40s.
Copenhagen iZ = +12m.14s., e = +21m.4s., SS = +26m.58s.
Bucharest eEN = +14m.51s., PSEN = +23m.1s., SSEN = +27m.51s.
Potsdam eN = +13m.4s.?, iN = +22m.24s., eE = +24m.4s.
Hamburg ePPZ = +15m.44s., iPSE = +23m.42s.
Ksara PP = +15m.34s., pPP = +15m.53s., sS = +22m.53s., SS = +28m.21s.
Budapest eN = +12m.38s., SN = +22m.40s., S_cSE = +22m.54s., SS = +28m.5s.
Kecskemet Z. e = +17m.22s., eSS = +27m.43s., eSKKS? = +37m.30s.
Jena eP = +12m.34s., eN = +33m.4s.
Cheb e = +29m.22s.
Belgrade iP_cP = +12m.33s.
Tucson iP = +12m.36s., i = +12m.47s. and +16m.11s., iS = +22m.44s., iSS = +28m.20s.
De Bilt eZ = +12m.56s.
Wellington iZ = +12m.26s., SS = +27m.54s.
Stuttgart ePP = +15m.49s., epPP = +16m.20s., ePPP = +17m.49s., eZ = +21m.40s., eSPN = +24m.30s., eSS = +29m.6s., eSSS = +32m.34s.
Christchurch iSS = +28m.17s., L_qE = +34m.54s.
Strasbourg isPZ = +13m.20s., PPZ = +16m.10s., pPPZ = +16m.28s., isSZ = +23m.58s.
Kew i = +13m.8s.
Helwan i = +13m.29s., +16m.34s., and +23m.11s., PS = +24m.40s.
Rome eS = +24m.5s., PS = +25m.4s., SS = +30m.10s., i = +33m.31s.
Chicago SKS = +23m.43s.
Florissant iPZ = +13m.6s., iSEN = +23m.54s.
East Machias ePP = +18m.0s., eSKKS = +24m.29s., eS = +25m.33s., SS = +31m.2s.

Continued on next page.

Bagnères e = +24m.28s., iN = +25m.45s., eE = +26m.14s. and +28m.49s.
Granada i = +23m.2s.
San Juan ePPP = +22m.53s., PPP = +23m.12s., eS = +28m.10s., PS = +30m.36s., SS = +36m.27s., eSSS = +42m.29s.
Cape Town iN = +23m.27s.
Huancayo eSKSP = +32m.59s., eSS = +40m.32s., eSSS = +45m.45s.
Long waves were also recorded at La Plata, Branner, Lick, Marseilles, Grenoble, Besançon, and Sebastopol.

Nov. 9d. 16h. 8m. 50s. Epicentre 37°·1N. 141°·8E. (as at 9h.).

A = −·6283, B = +·4944, C = +·6006; δ = −9; h = −1.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mizusawa		2·1	346	i 0 42	+ 5	i 1 17	S_g	—	—	—
Nagoya		4·4	245	e 1 11	+ 1	i 2 18	S*	—	—	—
Kotī		7·6	245	1 55	0	e 3 40	S*	4 9	S_g	4·8
Hukuoka B		9·9	253	i 2 28	+ 3	e 5 12	S*	—	—	—
Husan		10·5	263	e 3 6	+31	e 5 24	+49	—	—	—
Keizyo		11·8	277	2 55	+ 2	e 5 17	SS	—	—	7·5
Zinsen	E.	12·1	277	e 2 59	+ 2	—	—	—	—	7·2
Irkutsk		30·2	312	e 6 15	+ 1	e 11 20	+ 7	—	—	15·2
Frunse		50·6	300	e 10 16	PP	—	—	—	—	e 32·7
Andijan		52·8	297	e 9 15	− 4	e 17 50	+63	—	—	—
Agra	E.	54·0	279	9 24	− 4	17 30	+27	—	—	—
Tashkent		54·8	299	i 9 29	− 5	e 21 52	SS	e 12 22	PPP	e 29·6
Sverdlovsk		55·3	319	i 9 37	−'1	e 17 5	−16	—	—	28·2
Moscow		67·4	323	e 10 59	0	—	—	—	—	—
Pulkovo		68·3	330	e 11 7	+ 2	e 20 8	+ 2	—	—	e 34·7
Baku		68·4	305	e 11 40	+34	e 21 14	PPS	—	—	36·2
Tiflis		71·0	308	e 11 18	− 4	—	—	—	—	37·2
Copenhagen		78·0	334	12 0	− 2	—	—	—	—	41·2
Stuttgart		84·7	330	e 12 45	+ 8	—	—	—	—	e 47·2
Rome		88·8	323	e 13 32?	+35	—	—	—	—	e 46·2

Additional readings :—
Tashkent e = +15m.9s.
Sverdlovsk e = +16m.19s.
Long waves were also recorded at Calcutta, Phu-Lien, Puy de Dôme, Kew, Strasbourg, Uccle, De Bilt, Cheb, Hamburg, Potsdam, and Granada.

Nov. 9d. 19h. 39m. 55s. Epicentre 16°·3N. 98°·6W. (as on 1938 June 10d.).

Intensity III in Mexico and particularly at Ometepec (VI), (State of Guerroro).

Epicentre 16°18′N. 98°33′W. (Tacubaya).

See Bulletin Mensuel du Bureau Central Seismologique de Strasbourg, Nov., p. 204.

A = −·1436, B = −·9496, C = +·2789; δ = +15; h = +5;
D = −·989, E = +·150; G = −·042, H = −·276, K = −·960.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Oaxaca	N.	1·9	68	0 45	+11	—	—	—	—	—
Puebla	N.	2·8	8	0 49	+ 2	—	—	—	—	—
Tacubaya	E.	3·1	350	0 54	+ 3	—	—	—	—	—
Vera Cruz	N.	3·7	39	1 6	P*	—	—	—	—	—
Guadalajara	N.	6·3	315	1 32	− 4	—	—	—	—	—
Tucson		19·4	328	i 4 29	− 1	i 8 8	+ 4	i 4 38	PP	i 9·4
Riverside		24·4	321	i 5 23	+ 2	—	—	—	—	—
Mount Wilson		25·0	321	i 5 26	− 1	—	—	—	—	—
Pasadena		25·0	321	e 5 28	+ 1	—	—	—	—	—
Haiwee	E.	26·2	324	e 5 41	+ 3	—	—	—	—	—
Tinemaha		27·1	324	i 5 45	− 1	—	—	—	—	—
Williamstown		34·1	35	i 6 45	− 3	—	—	—	—	—
Ottawa		34·8	28	e 6 50	− 4	—	—	—	—	21·1
Harvard	Z.	34·9	36	i 7 0	+ 5	—	—	—	—	—
Weston	Z.	34·9	36	i 7 4	+ 9	—	—	—	—	—

For Notes see next page.

NOTES ON NOV. 9d. 19h. 39s. 55s.

Additional readings :—
Tucson i = +4m.30s., iPPP = +5m.2s., iS = +8m.32s.
Riverside i = +5m.31s.
Mount Wilson iZ = +5m.37s.
Pasadena iNZ = +5m.36s.
Tinemaha iZ = +5m.58s.
Ottawa eZ = +7m.0s.
Long waves were also recorded at Tashkent, Baku, Tiflis, and Sverdlovsk.

Nov. 9d. Further shocks from the neighbourhood of the epicentre of 9h. were recorded at Mizusawa and Nagoya.

Mizusawa.

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
0	27	0(S)	7	49	13	11	42	2	18	20	16
1	1	39(S)	8	16	5	12	5	58	19	42	50
2	32	46	8	30	51	12	37	52	19	46	56(S)
4	2	36	8	35	29(S)	13	57	12(S)	20	25	39
4	35	37(S)	9	9	9	14	39	8	20	51	12
4	54	33(S)	9	35	14	14	55	0(S)	21	36	19
5	17	18(S)	9	40	53	15	1	43(S)	21	50	52
6	5	59	9	48	38	15	26	36	22	10	45(S)
6	20	41(S)	9	54	43(S)	15	50	15	23	8	46
6	35	20	10	12	25(S)	16	1	34	23	23	10(S)
7	36	2	10	26	45(S)	17	2	1(S)	23	26	9
7	42	34	11	0	35(S)	17	41	0(S)			

Nagoya

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
2	33	36	7	43	29	9	46	27	15	50	54
4	3	12	7	49	54	9	54	39	15	54	58
5	18	32	8	16	29	11	42	37	16	2	33
6	6	22	8	31	33	12	27	46	18	20	32
6	20	36	9	9	43	12	38	17	19	43	30
6	35	39	9	35	22	13	39	57	20	51	48
7	36	34	9	41	38	14	55	23	22	51	47
									23	9	26

Nov. 9d. Readings also at 0h. (Koti), 2h. (Tiflis), 3h. (Taihoku), 4h. (Koti, Tiflis, Tashkent (2), Sverdlovsk, Irkutsk (2), Baku, De Bilt, Copenhagen, and Pulkovo), 6h. (Christchurch and Wellington), 7h. (Irkutsk, Sverdlovsk, and Tashkent), 8h. (Sverdlovsk (2), Tashkent (2), St. Louis, Agra (2), Baku, Andijan, and Frunse), 9h. (Mount Wilson, Riverside, Tucson, Andijan (2), Tashkent, and Koti), 10h. (Neuchatel, Chur, and Basle), 11h. (Berkeley), 12h. (Hukuoka B, Koti, and Sverdlovsk), 13h. (Baku, Andijan, and Frunse), 14h. (Copenhagen and Zurich), 16h. (near Tananarive), 18h. (Malabar, near Algiers, and Santiago), 19h. (Erevan, Grozny, and Husan), 20h. (Fordham), 22h. (Fordham and Santiago).

Nov. 10d. 10h. 46m. 29s. Epicentre 32°·0N. 141°·5E. (as on 1937 July 17d.).

$A = -\cdot6649$, $B = +\cdot5289$, $C = +\cdot5273$; $\delta = -13$; $h = +1$;
$D = +\cdot623$, $E = +\cdot783$; $G = -\cdot413$, $H = +\cdot328$, $K = -\cdot850$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Nagoya	4·9	311	1 18	+ 1	2 19	+ 4	—	—	—
Koti	6·9	285	1 48	+ 3	—	—	—	—	e 3·8
Mizusawa	7·1	358	e 1 47	− 1	i 2 48	−22	—	—	—
Hukuoka B	9·5	283	2 27	+ 7	6 1	?	—	—	—
Husan	10·9	290	2 47	+ 7	4 55	SS	—	—	6·3
Taikyu	11·4	294	2 52	+ 5	6 1	L	—	—	(6·0)
Syuhurei	12·0	294	e 2 54	− 1	e 5 51	SSS	—	—	—
Keizyo	13·2	299	3 10	− 1	5 43	+ 3	—	—	7·3
Zinsen	13·4	298	e 3 16	+ 2	e 5 50	+ 5	—	—	7·6
Heizyo	14·6	304	i 3 30	0	e 6 28	SS	—	—	9·2

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Manila		25·5	232	5 38	+ 6	10 11	+14	—	—	13·2
Hong Kong		26·1	255	5 39	+ 2	10 35	+28	6 31	PP	16·4
Phu-Lien		33·0	259	e 7 48	PP	e 12 9	+12	—	—	—
Irkutsk		33·7	318	6 44	− 1	i 12 6	− 2	—	—	17·5
Calcutta	N.	47·8	273	e 8 35	− 6	i 15 35	− 3	e 20 3	SSS	e 23·7
Semipalatinsk		48·2	312	e 8 43	− 1	—	—	—	—	—
Medan		49·1	244	8 45	− 6	15 46	−10	—	—	—
Batavia		50·3	228	9 0	0	i 16 21	+ 8	—	—	—
Frunse		53·0	302	e 9 18	− 3	e 16 48	− 2	—	—	—
College		53·4	30	e 9 27	+ 3	e 16 53	− 2	—	—	e 24·0
Dehra Dun		53·6	288	e 13 38	PPP	—	—	—	—	e 27·7
Agra	E.	54·7	283	i 9 29a	− 4	17 8	− 5	11 29	PP	—
Honolulu		54·7	85	e 9 35	+ 2	e 17 12	− 1	—	—	e 24·5
Andijan		55·1	300	e 9 38	+ 2	e 17 20	+ 2	—	—	—
Tchimkent		56·7	303	9 36	−12	17 22	−18	—	—	—
Tashkent		57·2	302	i 9 51	0	i 17 45	− 1	—	—	27·5
Hyderabad		58·4	272	9 59	− 1	18 8	+ 6	22 22	SS	—
Sverdlovsk		59·0	321	i 10 2	− 2	i 18 5	− 5	—	—	28·5
Brisbane		60·2	169	—	—	e 18 31	+ 6	e 23 7	SSS	—
Sitka		60·2	39	e 10 12	0	e 18 20	− 5	e 22 18	SS	e 23·9
Colombo	E.	62·4	261	—	—	19 1	+ 8	—	—	41·1
Bombay		62·5	276	i 10 28	0	i 18 59	+ 5	—	—	—
Sydney		66·1	172	—	—	e 23 51	SS	—	—	—
Perth		68·7	203	—	—	i 20 14	+ 4	—	—	—
Melbourne		69·5	177	—	—	i 20 31	+11	i 28 26	SSS	—
Victoria		70·0	45	e 11 1	−14	—	—	—	—	e 33·5
Baku		71·2	307	11 25	+ 2	i 20 41	+ 1	—	—	34·5
Moscow		71·4	325	11 25	+ 1	20 37	− 5	—	—	38·0
Grozny		72·6	310	e 11 47	+16	e 20 50	− 6	—	—	—
Pulkovo		72·6	330	11 31	0	20 51	− 5	—	—	37·0
Tiflis		74·0	309	11 39	0	i 21 7	− 4	e 15 59	PPP	40·4
Ukiah		74·3	54	e 11 51	+10	e 21 10	− 5	—	—	i 31·0
Erevan		74·9	309	e 11 49	+ 5	e 21 23	+ 1	—	—	—
Scoresby Sund		77·1	355	12 11	+14	21 43	− 3	—	—	—
Upsala		77·5	355	—	—	e 21 34	−16	—	—	e 39·5
Butte		77·6	43	—	—	e 21 42	− 9	—	—	e 34·0
Theodosia		78·2	316	12 8	+ 5	21 54	− 3	—	—	46·5
Tinemaha		78·7	54	i 12 5	− 1	—	—	—	—	—
Simferopol		79·0	317	12 13	+ 6	22 2	− 4	—	—	44·2
Santa Barbara	Z.	79·1	57	e 12 7	− 1	—	—	—	—	—
Wellington		79·1	155	e 11 58	−10	i 22 8	+ 1	e 27 28	SS	35·5
Haiwee		79·4	54	e 12 7	− 2	—	—	—	—	—
Pasadena		80·3	55	e 12 11	− 3	e 22 13	− 7	—	—	e 34·5
Christchurch		80·4	158	e 11 49a	−26	i 22 21	0	e 34 35	Lq	e 39·7
Mount Wilson		80·4	55	e 12 12	− 3	—	—	—	—	—
Riverside	Z.	81·0	55	e 12 16	− 2	—	—	—	—	—
Copenhagen		82·4	334	—	—	22 37	− 4	—	—	43·5
Bucharest		83·9	319	e 12 37	+ 4	22 55	− 1	23 34	PS	25·0
Ksara		84·2	306	i 12 35a	+ 1	i 23 4	+ 5	i 15 54	PP	43·0
Istanbul		84·3	317	12 55	+20	23 19	+19	16 13	PP	—
Potsdam		84·7	332	e 12 31	− 6	e 22 55	− 9	e 24 1	PS	e 43·5
Hamburg		85·0	334	e 12 40	+ 2	—	—	—	—	e 44·5
Budapest	E.	85·5	325	e 12 43	+ 2	e 22 55	[− 9]	—	—	45·5
	N.	85·5	325	e 12 50	+ 9	e 23 0	[− 4]	—	—	45·5
Prague		85·8	329	e 12 42	0	e 23 16	+ 1	—	—	e 41·5
Jena		86·4	331	e 12 46	+ 1	e 23 4	[− 6]	—	—	e 44·5
Sofia		86·5	320	e 12 51	+ 5	e 23 11	[0]	—	—	—
Tucson		86·5	54	i 12 45	− 1	i 23 11	[0]	15 50	PP	i 40·8
Belgrade		86·6	323	e 12 46k	0	i 23 20	− 3	—	—	e 46·1
Göttingen		86·6	333	e 12 51	+ 5	e 23 21	− 2	—	—	e 39·5
Cheb		86·7	330	e 12 31?	−16	e 23 11	[− 1]	—	—	e 46·5
Ivigtut		86·8	6	—	—	23 21	[+ 9]	—	—	—
Edinburgh		87·4	341	—	—	i 23 27	− 3	i 29 18	SS	e 43·5
Durham		87·9	340	—	—	i 23 34	− 1	—	—	—
Stonyhurst		89·0	340	—	—	i 23 43	− 2	—	—	e 45·5

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Stuttgart		89·0	331	e 12 57	− 1	e 23 24	[− 3]	e 16 27	PP	e 46·5
Uccle		89·3	335	e 12 59	0	23 29	[+ 1]	—	—	e 45·5
Triest		89·4	326	e 13 24	+24	e 23 27	[− 2]	—	—	—
Helwan		89·6	305	13 1k	0	23 56	+ 5	16 34	PP	—
Strasbourg		89·8	331	i 13 3k	+ 1	e 23 29	[− 2]	18 37	PPP	e 41·5
Kew		90·4	337	i 14 32	?	i 23 54	− 4	e 18 34	PPP	e 43·5
Padova		90·4	327	e 13 21	+17	—	—	—	—	—
Paris		91·6	334	—	—	e 23 43	[0]	e 25 19	PS	47·5
Florence		92·0	326	e 13 1	−11	23 16	[−28]	—	—	—
Rome		92·8	324	i 13 10	− 6	23 49	[0]	i 16 57	PP	46·3
Jersey		92·9	337	—	—	e 24 12	− 8	—	—	e 49·5
Chicago		93·4	35	—	—	e 23 49	[− 3]	e 30 14	SS	e 42·3
Puy de Dôme		94·0	332	—	—	e 24 31	+ 1	—	—	e 49·0
Florissant		94·6	38	—	—	i 23 55	[− 4]	—	—	45·5
Ottawa		95·9	26	e 24 1	SKS	(e 24 1)	[− 5]	e 31 13	SS	48·5
Seven Falls		96·0	22	—	—	e 23 55	[−12]	e 31 13	SS	46·5
Bagnères		97·3	333	—	—	e 23 31?	[−42]	e 24 57	S	e 50·5
East Machias		99·2	20	—	—	e 24 24	[+ 1]	e 31 51	SS	e 43·7
Weston		100·1	23	—	—	e 24 31	[+ 4]	e 32 3	SS	—
Fordham		100·5	26	—	—	e 24 26	[− 3]	e 32 8	SS	—
Philadelphia		100·7	29	—	—	e 24 20	[−10]	e 27 23	PS	e 45·6
~~Algiers~~		~~101·3~~	~~327~~	~~e 21 31?~~	~~PPP~~	—	—	—	—	~~e 51·5~~
Toledo		101·7	334	—	—	e 25 32	− 3	—	—	e 47·5
San Fernando		105·5	334	—	—	e 24 57	[+ 4]	e 34 4	SS	56·0
San Juan		123·3	31	—	—	e 28 57	?	37 24	SS	i 60·6
Fort de France		128·7	28	e 20 32	PP	—	—	—	—	—
Cape Town	E.	132·6	252	i 22 59	PPP	i 26 38	[+13]	—	—	—
Huancayo		140·8	68	e 22 40	PP	e 27 12	[+32]	i 23 16	PKS	e 61·5
La Paz		149·0	66	19 55	[+ 9]	30 13	{ 0}	—	—	74·0
Rio de Janeiro	E.	170·0	26	e 28 31	?	—	—	—	—	—

Additional readings :—
Hong Kong SS = +12m.29s.
Calcutta eN = +21m.5s.
Medan iE = +14m.7s., S?N = +15m.50s.
Agra eN = +17m.14s., SSE = +21m.14s.
Honolulu eS = +17m.19s.
Hyderabad S_cSN = +19m.48s.
Sitka eP = +20m.35s., eP_cP = +11m.30s.
Bombay iE = +20m.12s.
Melbourne i = +37m.9s.
Tiflis eZ = +12m.9s., ePPPE = +16m.7s., eSN = +21m.12s., ePPSZ = +22m.3s., ePPSE = +22m.11s., eZ = +33m.31s., eE = +34m.38s.
Ukiah eP = +12m.15s., eS = +21m.14s.
Tinemaha iNEZ = +20m.33s.
Wellington eZ = +12m.23s., eSSS = +31m.41s.
Ksara PS = +23m.54s.
Istanbul SS = +28m.43s.
Potsdam eEN = +16m.31s.?, eEN = +24m.43s., eN = +28m.19s., eE = +34m.31s.?
Jena ePN = +12m.50s.
Tucson iP = +12m.47s., i = +12m.56s., iPPP = +18m.6s., iPPS = +24m.35s., PKP, PKP = +39m.39s.
Belgrade iZ = +12m.51s.
Edinburgh i = +23m.35s.
Stuttgart ePPP = +18m.4s., eS = +23m.43s., ePS = +24m.23s., e = +27m.31s.
Triest iS = +23m.42s.
Helwan i = +13m.13s. and +23m.30s., PS = +24m.56s.
Strasbourg PPZ = +15m.32s., i = +23m.48s., eSSE = +29m.50s., SSS = +33m.31s.
Kew iSKKSN = +24m.7s., iPSEN = +25m.0s.
Rome eS = +24m.14s., PS = +25m.14s., PPS = +25m.46s., SS = +34m.13s.
Chicago eSKKS = +24m.24s.
Florissant iE = +24m.33s.
East Machias eSKKS = +25m.11s.
Fordham eE = +25m.20s. and +41m.4s.
Philadelphia eS = +25m.23s., eSS = +32m.10s., ePSPS = +33m.20s., eSSS = +35m.53s.
San Juan ePSPS = +38m.16s., eSSS = +42m.18s.
Huancayo ePPP = +26m.9s., iSKKS = +28m.26s., eSKKKS = +29m.42s., SKSP = +33m.5s., ePPS = +34m.34s., eSS = +41m.10s., PSPS = +42m.22s., eSSS = +46m.13s.
Long waves were also recorded at Harvard, Karlsruhe, De Bilt, Malaga, La Plata, Marseilles, Rathfarnham Castle, Bergen, Riverview, and Almeria.

Nov. 10d. 15h. 23m. 27s. Epicentre 20°·8N. 74°·1W.

$A = +\cdot2563$, $B = -\cdot8998$, $C = +\cdot3531$; $\delta = +1$; $h = +4$;
$D = -\cdot962$, $E = -\cdot274$; $G = +\cdot097$, $H = -\cdot340$, $K = -\cdot936$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
San Juan		7·9	106	1 59	0	3 10	−20	e 2 32	PP	e 3·5
Balboa Heights		12·9	205	e 3 7	0	—	—	—	—	—
Fort de France		13·7	114	—	—	e 5 39	−13	—	—	—
Philadelphia		19·1	359	e 4 27	0	e 8 13	+16	—	—	e 16·2
Fordham		20·0	3	i 4 37	0	i 8 12	− 5	—	—	e 11·0
Weston		21·6	7	i 4 53a	− 1	e 8 49	0	i 5 15	PP	—
Harvard	z.	21·7	7	i 4 53	− 2	e 8 45	− 6	—	—	—
Williamstown		21·9	5	i 5 0	+ 3	i 8 54	0	i 5 49	PP	—
Chicago		23·9	334	—	—	e 9 48	+18	—	—	e 10·0
Ottawa		24·6	358	e 5 20	− 3	e 9 57	+15	—	—	11·6
Tucson		34·6	297	6 52	− 1	—	—	—	—	i 21·2
La Paz		37·5	169	7 5	−12	i 12 50	−17	—	—	20·6
Riverside	z.	40·3	299	i 7 39	− 1	—	—	—	—	—
Mount Wilson	z.	40·9	299	e 7 45	− 1	—	—	—	—	—
Pasadena		41·0	299	e 7 45	− 1	—	—	—	—	e 23·8
Tinemaha		41·5	303	i 7 50	0	—	—	—	—	—

Additional readings:—
San Juan PPP = +2m.47s., iPPP = +2m.53s., iS = +3m.21s.
Fordham eEN = +8m.39s.
Weston iZ = +5m.25s.
Tucson P = +7m.9s.
Long waves were also recorded at Sitka, De Bilt, Strasbourg, Uccle, Sverdlovsk, and Tashkent.

Nov. 10d. 20h. 18m. 41s. Epicentre 55°·6N. 157°·7W.

Felt in the Bay of Bristol and at Anchorage (Alaska). Tidal wave in the Sandwich Islands. Four subsequent shocks within 20 seconds. Maximum intensity VI at False Pass. (Unimak Island).

Epicentre to South of Alaska.
55°·5N. 157°·3W. (U.S.C.G.S.).
55°·6N. 157°·7W. (De Lisle).

J. F. De Lisle. On the Epicentre of the North Pacific Earthquake of Nov. 10. N.Z. Journal of Science and Technology 22, 47B-49B (1940).

$A = -\cdot5251$, $B = -\cdot2154$, $C = +\cdot8233$; $\delta = -5$; $h = -7$;
$D = -\cdot379$, $E = +\cdot925$; $G = -\cdot762$, $H = -\cdot312$, $K = -\cdot568$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
College		10·5	24	2 37a	+ 2	—	—	—	—	—
Sitka		12·5	74	i 3 5	+ 3	—	—	i 3 18	PP	—
Victoria		22·2	94	i 3 54	−66	—	—	—	—	—
Ferndale	E.	26·6	101	e 5 59	+17	e 11 19	+63	—	—	—
Ukiah		28·2	111	e 5 59	+ 3	—	—	6 46	PP	—
Butte		29·6	89	e 6 20	+11	—	—	—	—	—
Berkeley		29·6	113	e 6 11	+ 2	i 12 24	SS	—	—	e 14·4
San Francisco	N.	29·6	113	e 6 18	+ 9	e 11 19	+15	e 7 18	PP	e 14·6
Saskatoon		29·8	75	i 6 17	+ 6	i 11 19	+12	7 26	PP	e 15·3
Branner	E.	30·0	114	e 6 15	+ 3	—	—	—	—	—
Lick	E.	30·3	113	e 6 25	+10	e 11 44	SS	—	—	e 14·9
Bozeman		30·7	89	e 6 20	+ 1	11 28	+ 7	7 21	PP	—
Fresno	N.	31·8	111	e 6 28	0	—	—	e 7 46	PP	—
Tinemaha		32·3	109	e 6 35	+ 2	e 12 13	+27	—	—	—
Haiwee	z.	33·2	109	i 6 44	+ 4	—	—	—	—	—
Santa Barbara		33·6	112	e 6 49	+ 5	—	—	—	—	—
Honolulu		34·3	180	6 54	+ 4	e 12 25	+ 8	—	—	e 16·0
Mount Wilson		34·6	111	i 6 54k	+ 1	—	—	—	—	—
Pasadena		34·6	111	i 6 53k	0	i 12 29	+ 7	i 12 46	SS	i 15·1
Riverside	z.	35·1	111	e 6 57	0	—	—	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Ootomari		37·3	286	7 11	− 5	—	—	—	—	—
Nemuro		37·8	277	7 14	− 6	—	—	8 50	PP	—
Denver		37·9	92	7 25	+ 5	i 13 24	+11	i 8 53	PP	e 16·8
Tucson		40·0	105	i 7 40k	+ 2	—	—	—	—	—
Sapporo		40·4	281	7 36	− 5	12 37	−73	—	—	18·1
Mori		41·4	279	7 46	− 4	—	—	9 11	PP	—
Hatinohe		41·9	277	7 46	− 8	—	—	—	—	—
Morioka		42·7	275	7 53	− 7	14 29	+ 5	16 47	SS	—
Mizusawa	E.	43·1	275	e 7 57	− 7	i 14 33	+ 3	—	—	—
	N.	43·1	275	e 7 54	−10	14 28	− 2	—	—	18·9
Sendai		43·8	274	8 14	+ 5	15 14	+34	—	—	—
Tyosi		45·6	272	8 24	0	15 49	+43	—	—	—
Tukubasan		45·7	274	8 20	− 4	14 20	−48	—	—	—
Chicago		46·2	77	8 36	+ 8	i 15 23	+ 8	11 7	PP	i 22·9
Chicago (Loyola)		46·2	77	e 8 32	+ 4	i 15 18	+ 3	i 11 38	PPP	—
Tokyo		46·3	274	8 29	0	15 17	+ 1	10 27	PP	22·5
Florissant		46·8	82	i 8 35	+ 2	i 15 38	+14	—	—	—
St. Louis		47·0	82	i 8 36	+ 1	i 15 34	+ 8	—	—	—
Hunatu		47·0	274	8 31	− 4	15 17	− 9	—	—	22·4
Kohu		47·0	274	8 33	− 2	15 28	+ 2	—	—	—
Toyama		47·0	277	8 31	− 4	15 27	+ 1	—	—	21·2
Numadu		47·2	273	8 40	+ 4	15 29	0	10 4	PP	22·3
Ann Arbor		48·1	73	e 8 39	− 4	i 15 49	+ 7	10 55	PP	i 23·3
Nagoya		48·2	274	8 42	− 2	(15 50)	+ 7	—	—	15·8
Cape Girardeau		48·3	83	e 8 47	+ 2	i 15 51	+ 6	—	—	—
Little Rock		48·5	88	e 8 53	+ 7	i 15 59	+11	i 10 46	PP	23·3
Osaka		49·4	276	8 47	− 6	16 0	0	11 1	PP	—
Mazatlan	N.	49·5	110	i 8 55	+ 1	—	—	—	—	—
Kobe		49·6	276	8 50	− 5	16 8	+ 5	21 15	SSS	—
Siomisaki		50·2	275	8 56	− 4	16 15	+ 4	21 56	SSS	—
Ottawa		50·2	66	e 9 0	0	16 22	+11	11 37	PP	24·3
Scoresby Sund		50·3	20	9 2	+ 2	—	—	—	—	—
Shawinigan Falls		50·9	62	9 2	− 3	16 16	− 5	e 20 13	SS	e 24·5
Ivigtut		51·1	37	e 9 7	+ 1	16 34	+10	—	—	—
Koti		51·3	276	e 9 2	− 6	16 25	− 1	10 39	PP	e 21·3
Hirosima		51·4	277	9 3	− 6	16 22	− 6	22 27	?	—
Seven Falls		51·5	61	9 10	+ 1	16 36	+ 7	21 19	SSS	e 25·3
Matuyama		51·6	277	9 1	− 9	16 29	− 2	21 27	SSS	—
Heizyo		51·7	288	i 9 7a	− 4	i 16 38	+ 6	—	—	24·2
Vermont		52·1	65	i 9 29	+15	—	—	—	—	—
Keizyo		52·1	285	9 8	− 6	16 43	+ 5	e 10 40	PP	22·5
Taikyu		52·4	282	e 9 13	− 3	(16 49)	+ 7	11 48	PP	16·8
Zinsen		52·4	285	e 9 10	− 6	e 16 42	0	—	—	22·3
Syuhurei		52·5	283	9 15	− 2	12 12	PP	—	—	—
Husan		52·7	281	i 9 16k	− 2	(16 51)	+ 5	e 11 56	—	16·8
Hukuoka B		53·1	278	e 9 25	+ 4	17 20	+29	—	—	22·6
Irkutsk		53·1	312	i 9 17	− 4	e 16 36	−15	—	—	—
Guadalajara	N.	53·2	108	e 9 14	− 8	—	—	—	—	—
Williamstown		53·4	66	e 9 24	0	i 17 15	+20	i 11 28	PP	—
Miyazaki		53·7	276	9 22	− 4	16 55	− 4	23 0	SSS	—
Georgetown		54·0	72	e 9 31	+ 3	i 17 10	+ 7	—	—	—
Manzanillo	N.	54·0	111	i 9 13	−15	—	—	—	—	—
Dairen		54·1	290	9 29	0	18 3	+58	—	—	—
Philadelphia		54·3	70	i 9 33	+ 3	i 17 7	0	i 11 22	PP	—
Harvard		54·4	66	i 9 31a	0	i 17 14	+ 5	—	—	e 59·3
Fordham		54·4	68	i 9 31a	0	i 17 16	+ 7	i 11 48	PP	—
Weston		54·6	66	e 9 33	+ 1	e 17 13	+ 2	i 11 49	PP	i 25·5
East Machias		54·9	61	9 43	+ 8	—	—	—	—	—
Yakusima		55·4	276	9 35	− 3	17 22	0	—	—	26·1
Columbia		55·5	79	9 46	+ 7	i 17 32	+ 8	—	—	25·2
Tacubaya	N.	56·5	106	e 9 50	+ 4	—	—	—	—	—
Halifax		56·8	59	e 9 22	−26	i 17 2	−39	—	—	28·3
Puebla	N.	57·4	105	e 9 47	− 6	—	—	—	—	—
Nake		57·5	275	9 48	− 5	17 56	+ 6	—	—	—
Vera Cruz	N.	58·4	103	i 10 9	+ 9	—	—	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Oaxaca	N.	59·8	104	e 10 22	+13	—	—	—	—	—
Merida	N.	60·6	96	i 10 15	0	—	—	—	—	—
Miyakozima		62·7	276	10 27	− 2	19 11	+14	—	—	27·4
Bergen		63·6	11	10 36	+ 1	19 19?	+11	11 48	PP	27·3
Isigakizima		63·7	277	11 45	+69	20 23	?	—	—	—
Sverdlovsk		63·7	339	e 10 35	− 1	i 19 19	+ 9	—	—	—
Semipalatinsk		63·9	324	10 35	− 2	19 23	+11	—	—	25·7
Taihoku		64·6	279	e 10 46	+ 5	e 19 32	+11	12 0	PP	27·8
Pulkovo		64·8	357	10 41	− 2	19 29	+ 6	—	—	e 31·8
Upsala		64·8	4	i 10 46	+ 3	19 26	+ 3	e 13 33	PPP	e 26·3
Karenko		65·4	278	10 57	+10	19 49	+19	—	—	28·2
Taityu		65·8	279	10 49	0	19 46	+11	—	—	—
Aberdeen		65·9	15	i 10 57	+ 7	i 19 44	+ 7	i 26 38	SSS	28·6
Edinburgh		66·9	16	i 11 6	+10	i 19 38	−11	—	—	—
Durham		68·3	15	i 11 14	+ 9	—	—	—	—	—
Moscow		68·3	352	11 7	+ 2	20 16	+10	—	—	e 31·8
Copenhagen		68·8	7	11 6a	− 2	20 19	+ 8	—	—	—
Rathfarnham Castle		68·9	18	i 11 13	+ 4	20 29	+16	13 51	PP	33·2
Stonyhurst		69·0	16	i 11 17	+ 8	i 20 25	+11	i 25 50	SS	29·3
Apia		70·1	194	e 11 20	+ 4	i 20 33	+ 6	—	—	—
Hamburg		70·7	8	11 19	− 1	e 20 56	+22	e 27 1	SS	e 31·9
Hong Kong		70·9	283	11 23	+ 2	20 50	+14	25 23	SS	37·2
Almata		71·2	323	e 11 19	− 4	—	—	—	—	—
Oxford		71·2	16	e 11 22	− 1	i 20 54	+14	—	—	—
Palau		71·5	257	11 34	+10	20 51	+ 8	—	—	—
De Bilt		71·7	11	i 11 27a	+ 1	e 20 19	−26	—	—	e 35·3
Kew		71·7	15	i 11 25a	− 1	i 20 54	+ 9	i 14 10	—	i 37·6
Potsdam		72·1	7	i 11 27	− 1	i 20 59	+ 9	—	—	e 28·3
Frunse		72·4	324	e 11 29	− 1	e 21 37	+44	—	—	—
Göttingen		72·7	9	i 11 32	0	i 21 6	+ 9	—	—	e 31·3
Uccle		72·9	13	i 11 33a	0	i 21 7	+ 8	—	—	32·3
Manila		73·2	272	i 11 28	− 7	21 11	+ 9	—	—	35·3
Jena		73·5	7	e 11 35	− 1	e 21 10	+4	i 14 36	PP	e 29·3
Jersey		73·6	17	i 11 44	+ 7	i 21 22	+15	i 15 31	PPP	41·3
Hof		74·1	8	i 11 44	+ 4	e 21 19	+ 7	e 14 19	PP	e 29·3
Cheb		74·4	8	e 11 51	+ 9	e 21 35	+19	—	—	e 36·3
Prague		74·5	6	i 11 42a	0	e 21 31	+14	e 26 49	SS	e 32·3
Tchimkent		74·5	327	e 11 24	−18	e 21 18	+ 1	—	—	—
Paris		74·7	14	e 11 43	0	21 31	+12	—	—	33·3
Andijan		75·0	324	e 11 43	− 2	e 22 24	+61	—	—	—
Karlsruhe		75·1	10	i 11 46	0	e 21 19?	− 5	—	—	e 33·3
Stuttgart		75·4	9	i 11 49a	+ 2	i 21 36	+ 9	i 15 1	PP	e 33·3
Strasbourg		75·5	10	i 11 48a	0	21 19	− 9	i 14 57	PP	—
Tashkent		75·5	327	i 11 46	− 2	e 19 44	?	—	—	—
San Juan		75·9	79	e 11 51	+ 1	—	—	—	—	—
Balboa Heights	E.	76·0	95	e 12 8	+17	e 21 35	+ 1	e 15 39	PP	31·9
	N.	76·0	95	e 12 11	+20	e 21 34	0	e 15 29	PP	31·8
Phu-Lien		76·2	288	e 11 51	− 1	i 21 48	+12	—	—	33·4
Basle		76·5	11	e 11 54	0	e 21 56	+17	—	—	—
Besançon		76·6	12	i 12 7	+13	e 22 19?	+39	—	—	34·3
Zurich		76·8	11	i 11 55a	0	e 21 56	+14	—	—	—
Neuchatel		77·0	12	e 11 56	0	e 21 57	+12	—	—	—
Budapest		77·2	4	11 57	0	i 23 6	PPS	12 3	P_GP	34·3
Chur		77·4	10	e 11 58	0	e 21 56	+ 7	—	—	—
Puy de Dôme		77·7	15	e 12 4	+ 4	e 22 18	PS	—	—	—
Kecskemet	Z.	77·8	4	i 11 59	− 2	i 22 35	PS	i 14 35	PP	e 38·1
Samarkand		77·8	328	e 12 3	+ 2	e 21 57	+ 4	—	—	—
Laibach		78·5	6	e 12 12	+ 8	i 22 24	+23	i 14 43	PP	34·1
Grenoble		78·6	13	e 12 13	+ 8	i 22 17	+15	i 15 15	PP	e 36·3
Triest		78·9	7	e 12 7a	0	e 22 41	PS	15 27	PP	e 33·8
Padova		79·0	8	e 12 18k	+11	i 22 48	PS	i 16 30	PP	i 38·8
Moncalieri		79·0	12	i 12 21	+14	22 36	PS	—	—	34·7
Theodosia		79·2	352	12 11	+ 3	e 22 34	PS	—	—	—
Simferopol		79·3	353	12 7	− 2	22 16	+ 7	—	—	43·3
Grozny		79·5	344	12 14	+ 4	e 21 28	−43	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Sebastopol		79·7	354	12 19	+ 8	—	—	—	—	—
Belgrade		79·9	2	i 12 12k	0	i 23 8	PS	—	—	i 29·5
Bagnères		79·9	17	12 14	+ 2	e 22 22	+ 6	i 15 18	PP	37·3
Sotchi		80·1	349	12 19	+ 6	—	—	—	—	—
Bucharest		80·3	358	e 12 15a	+ 1	i 22 44	+24	i 17 3	PP	—
Marseilles		80·4	14	e 12 15	0	e 22 25	+ 4	i 15 5	PP	e 34·3
Florence		80·6	9	12 19	+ 3	22 39	+16	15 19	PP	33·3
Tiflis		81·2	345	i 12 19	0	—	—	—	—	—
Baku		81·5	340	i 12 21	0	—	—	—	—	—
Fort de France		81·6	77	i 12 22	+ 1	e 23 14	PS	—	—	e 42·3
Sofia	N.	82·1	0	e 12 25	+ 1	i 23 9	PS	—	—	—
Dehra Dun	N.	82·1	314	e 12 43	+19	i 23 1	+23	i 15 55	PP	i 33·3?
Toledo		82·3	21	i 12 26k	+ 1	e 22 50	+10	—	—	—
Rome		82·5	7	i 12 25a	− 1	22 50	+ 8	15 52	PP	40·3
Erevan		82·7	344	12 22	− 5	e 21 49	−55	—	—	—
Istanbul		83·5	356	13 4	+33	23 39	PS	16 17	PP	—
Calcutta	E.	84·2	302	e 12 40	+ 6	i 23 3	[+ 8]	i 24 49	PS	i 43·8?
	N.	84·2	302	e 12 31	− 3	i 23 1	[+ 6]	i 24 47	PS	i 43·8
Agra		84·9	312	i 12 32a	− 6	23 13	+ 7	16 12	PP	—
Granada		85·0	22	i 12 46	+ 8	i 23 22	+15	—	—	—
San Fernando		85·1	24	i 12 50	+11	i 22 59	[− 2]	—	—	—
Malaga		85·2	23	i 12 49	+10	i 23 31	+22	i 16 4	PP	—
Almeria		85·5	21	i 12 46	+ 5	e 23 20	+ 8	i 14 21	?	e 35·5
Algiers		86·5	16	i 12 54	+ 8	23 28	+ 6	i 16 13	PP	e 34·3
Ksara		90·2	349	i 13 4a	0	24 2	+ 6	16 37	PP	—
Brisbane		92·8	223	i 13 19	+ 3	i 24 1	−18	i 17 7	PP	—
Hyderabad		93·2	307	13 19	+ 2	23 55	[+ 4]	—	—	41·2
Bombay		94·4	313	e 13 23	0	25 10	+37	i 17 26	PP	43·5
Helwan		94·5	353	i 13 23k	0	—	—	—	—	—
Medan		94·7	283	13 36	+12	i 25 13	+37	i 18 20	PP	—
Huancayo		95·6	103	e 13 32	+ 4	—	—	i 17 12	PP	—
Arapuni		96·0	201	—	—	24 7	[0]	31 25	SS	41·1
Batavia		98·2	271	e 13 37	− 3	—	—	—	—	41·3
Riverview		99·2	221	e 14 10	+25	i 24 34	[+11]	i 25 33	PS	e 39·3
Sydney		99·2	221	i 13 58	+13	i 25 36	+22	i 33 31	SS	41·0
Wellington		99·3	201	e 13 54	+ 9	25 24	+10	17 31	PP	46·3
Kodaikanal	E.	100·0	305	i 13 52k	+ 4	—	—	i 17 33	PP	i 45·5
Chatham Ils.		100·5	194	—	—	24 31	[+ 2]	17 31	PP	46·3
Colombo	E.	101·8	301	14 13	+17	25 51	+16	—	—	54·1
Christchurch		101·9	201	e 13 56a	− 1	i 25 51	+15	i 18 25	PP	—
La Paz		103·2	100	e 14 24	+21	24 52	[+10]	18 55	PP	46·3
Melbourne		105·1	224	e 14 32	+20	i 26 2	− 1	i 18 59	PP	40·3
Adelaide		105·2	230	e 12 55	?	i 26 31	+27	—	—	36·0
Montezuma		107·7	104	—	—	e 26 24	+ 1	e 18 38	PP	e 45·6
Perth		113·8	248	19 10	PP	29 32	PS	19 51	pPP	46·1
Santiago		116·0	113	19 46	PP	30 59	PPS	—	—	—
Rio de Janeiro		122·4	83	e 19 19	PP	i 26 38	[+40]	i 31 4	PS	i 47·0
La Plata		123·2	104	19 10	[+11]	31 1	PS	21 13	PPP	53·3
Tananarive		138·7	322	19 32	[+ 4]	30 57	?	22 38	PP	e 71·6
Johannesburg		150·3	350	i 20 2	[+14]	27 14	[+20]	e 23 9	PP	73·2
Cape Town	E.	158·2	9	i 20 9	[+10]	i 24 42	PP	i 35 14	PS	44·3
	N.	158·2	9	i 20 2	[+ 3]	i 24 14	PP	i 34 41	PS	44·3

Additional readings :—
College iP = +2m.46s., i = +3m.22s. and +3m.27s.
Sitka ePPP = +3m.26s.
Ferndale ePN = +6m.7s.
Ukiah P = +6m.12s., i = +6m.40s.
Butte eP = +6m.26s.
Berkeley eN = +6m.16s., eE = +6m.24s., iZ = +6m.28s., iNZ = +7m.29s., eGN = +13m.29s.
San Francisco iN = +6m.24s.
Saskatoon SSE = +13m.35s.
Branner ePN = +6m.18s.
Bozeman eP = +6m.34s., P = +6m.38s., S = +12m.0s.

Continued on next page.

Fresno eN = +6m.34s.
Honolulu eS = +12m.29s.
Denver iPEN = +7m.29s., iE = +8m.5s., iN = +8m.13s., iPPPEN = +9m.21s., iP_cPN = +10m.29s., e = +13m.18s., iN = +13m.53s., iS_cPE = +13m.59s., iSSE = +14m.46s.
Tucson iP = +7m.42s. and +7m.56s., i = +8m.21s. and +8m.53s.
Chicago eP = +8m.41s. and +8m.59s.
Chicago (Loyola) i = +10m.4s., iSS = +18m.47s., iSSSS = +21m.18s.
Numadu PPP = +11m.2s.
Ann Arbor iPPP? = +11m.37s., SS = +19m.31s.
Cape Girardeau iN = +9m.0s., iSN = +15m.56s.
Little Rock i = +9m.1s., iPPP = +11m.26s., iS_cPN = +13m.23s., iS = +16m.2s., iS_cSE = +18m.46s., iSS = +19m.1s.
Osaka PPP = +11m.29s.
Kobe i = +10m.20s.
Ottawa eZ = +9m.6s., i = +9m.12s.
Scoresby Sund i = +9m.9s.
Ivigtut iPZ = +9m.14s., +10m.28s., +11m.55s., and +12m.23s., e = +16m.48s., iN = +16m.57s.
Koti P_s = +9m.9s., eZ = +18m.25s.
Keizyo eSN = +16m.48s.
Zinsen i = +9m.41s., iN = +10m.42s., iE = +10m.47s.
Irkutsk i = +9m.24s., e = +11m.3s.
Williamstown iP = +9m.31s., iPPP = +12m.34s.
Philadelphia iP = +9m.41s. and +10m.1s., iS = +17m.23s.
Fordham iP = +9m.38s.a
Weston iPZ = +9m.37s., i = +9m.41s., iS_cS = +14m.23s., eSE = +17m.20s., iSSSN = +22m.14s.
Columbia iP = +10m.15s.
Bergen P = +10m.39s.
Taihoku S = +20m.15s., esSE = +21m.58s.
Upsala eSSE = +23m.55s., eSSSN = +25m.47s.
Edinburgh i = +11m.17s., +12m.38s., +15m.8s., +15m.52s., and +17m.51s.
Copenhagen iZ = +11m.14s., i = +11m.17s.
Rathfarnham Castle PPP = +15m.16s., PS = +20m.52s., SS = +24m.59s., SSS = +27m.34s.
Hamburg iPNZ = +11m.27s.k, iE = +21m.51s.
Hong Kong P_cP? = +11m.33s., ? = +12m.49s.
Almata e = +13m.1s.
Oxford iPE = +11m.32s.
De Bilt iZ = +11m.33s., iN = +11m.36s., eE = +21m.13s.
Kew i = +11m.34s., iPPP = +15m.48s., iEZ = +18m.20s., iPSNZ = +21m.28s., iPPS = +22m.2s., iSSN = +26m.12s., iEN = +27m.32s., iSSSSN = +30m.16s., iZ = +36m.9s.
Potsdam eE = +11m.31s. and +11m.37s., iN = +12m.22s., +15m.43s., and +18m.2s., iN = +22m.1s., iE = +22m.5s.
Uccle iZ = +11m.41s., iE = +21m.29s. and +22m.23s.
Jena ePE = +11m.38s., iP = +11m.42s., iPE = +11m.58s., eE = +15m.23s., eSN = +21m.13s., iSZ = +21m.43s., iS = +22m.19s., eSS = +26m.19s.
Jersey iPPP = +17m.7s., iSS = +26m.17s., iSSS = +34m.19s.?
Hof iPNW = +11m.47s. and +12m.5s., eNE = +12m.19s., eNW = +12m.49s., eSNE = +21m.33s., iSNE = +22m.10s., iSNW = +22m.15s., e = +27m.1s.
Cheb eSN = +22m.8s.
Prague i = +11m.49s., ePS = +22m.13s., eSSS = +30m.19s.
Paris i = +11m.50s., iS = +22m.21s.
Andijan e = +12m.43s.
Stuttgart i = +11m.55s., +12m.38s., +13m.37s., and +16m.9s., iPS = +22m.24s., i = +22m.45s.
Strasbourg i = +11m.58s., iZ = +17m.6s., iSKSZ = +21m.3s.
Tashkent i = +11m.54s. and +12m.2s.
San Juan P = +11m.58s., iP = +12m.1s. and +12m.11s.
Balboa Heights eE = +17m.27s., eN = +17m.38s., eSSE = +27m.32s., eSSN = +27m.44s., eN = +30m.36s., eE = +30m.41s.
Basle e = +22m.53s.
Zurich i = +12m.3s.
Budapest iE = +20m.53s. and +21m.39s., S? = +22m.2s., iN = +23m.16s., iE = +23m.40s., iN = +27m.16s. and +28m.54s., iE = +31m.6s.
Kecskemet z. iP_cP = +12m.10s., e = +13m.54s. and +16m.17s., i = +23m.33s., eSS = +26m.21s., e = +28m.52s. and +36m.6s.
Laibach iNE = +11m.27s., +13m.23s., and +23m.43s.
Grenoble i = +12m.17s. and +13m.46s., PPP = +17m.7s., iPS = +23m.3s., iSS = +28m.30s., iSSS = +30m.40s.
Triest PPP = +17m.12s., SS = +28m.31s.
Grozny i = +12m.22s., +12m.38s., and +13m.1s.
Belgrade iZ = +12m.20s., +12m.30s., and +13m.44s., iNW = +23m.54s. and +24m.34s.
Bagnères eE = +12m.19s., iN = +12m.22s., iPPPN = +17m.1s., iPSN = +22m.53s., iSSE = +26m.49s., SSSE = +30m.49s.
Bucharest iPEN = +12m.23s.

Continued on next page.

Marseilles iN = +13m.50s., iPPN = +15m.8s., iN = +16m.51s., iPPPE = +17m.2s., iPPPN = +17m.9s., iPSE = +23m.11s., iN = +23m.59s., eSSSE = +31m.39s.
Florence PPP = +16m.49s., i = +21m.19s.
Tiflis i = +12m.28s., iE = +12m.42s.
Baku i = +12m.30s.
Sofia iN = +12m.33s., eN = +23m.55s.
Toledo i = +23m.20s.
Rome P_cP = +12m.35s., iEN = +13m.21s., PPP = +17m.49s., iNZ = +18m.42s., SKS = +22m.36s., SKKS = +23m.0s., iEZ = +23m.14s., PS = +23m.39s., i = +24m.29s., SS = +28m.43s., i = +31m.14s., L_q = +35m.48.
Erevan i = +12m.29s., +12m.50s., and +13m.5s.
Istanbul SS = +29m.21s., SSS = +31m.55s.
Calcutta iPN = +12m.38s., iSN = +23m.45s., eSSN = +30m.9s., eSSS = +33m.53s.
Agra iE = eN = +12m.42s., SSE = +29m.0s.?, SSN = +29m.17s.
San Fernando iN = +13m.27s., iS = +23m.42s.
Algiers i = +13m.28s., PPP = +17m.45s., S = +23m.43s., PS = +24m.30s., SS = +29m.2s., SSS = +33m.29s.
Brisbane ePE = +13m.25s., iSSE = +30m.31s., iN = +32m.37s.
Bombay iPEN = +13m.30s., iN = +24m.0s., iSKSE = +24m.15s., iEN = +25m.49s., SSEN = +30m.22s., SSSEN = +34m.36s., L_qEN = +38·3m.
Medan iE = +16m.32s.
Huancayo P = +13m.41s., iP = +13m.49s., i = +14m.40s., +14m.56s., +15m.36s., +16m.0s., +16m.22s., +16m.59s., +17m.57s., +18m.30s., and +19m.2s., iPPP = +19m.31s., i = +19m.55s.
Arapuni S = +25m.7s., e = +33m.25s.
Riverview eE = +16m.28s., iSEN = +24m.48s., iN = +25m.47s., +26m.50s., +27m.6s., and +28m.30s., eSSE = +31m.31s., eN = +32m.1s., SSS?N = +34m.27s.
Wellington iZ = +14m.44s., PPP = +20m.4s., SKS = +24m.19s., PS = +25m.55s., PPS = +26m.35s., i = +30m.14s., SS = +31m.39s., iSSS? = +35m.41s., L_q = +41·3m.
Chatham Ils. S = +25m.37s., PS = +26m.13s., i = +27m.19s., +28m.19s., +29m.49s., and +33m.31s., L_q = +41·3m.
Christchurch iNZ = +14m.18s., eE = +16m.3s., iNZ = +24m.39s., iEZ = +24m.56s.
La Paz SKKSE = +25m.37s.
Melbourne i = +19m.31s., +22m.7s., +26m.23s., +30m.17s., and +33m.7s.
Adelaide e = +21m.31s., i = +27m.37s. and +33m.25s.
Montezuma ePP = +18m.50s., ePS = +34m.52s., eSSS = +38m.7s.
Perth PP = +22m.54s., PPP = +24m.39s., PPPP = +26m.11s., i = +27m.49s., +28m.21s., and +28m.59s., sS = +30m.53s., SS = +35m.47s., i = +36m.14s. and +37m.38s., SSS = +39m.47s., SSSS = +42m.0s., i = +44m.39s.
Rio de Janeiro iPE = +20m.54s.
La Plata PPP = +24m.49s., PPS = +32m.19s., SS = +38m.25s., SSS = +42m.37s.
Tananarive PKPE = +19m.37s., iSKPN = +23m.29s., iE = +23m.33s., N = +24m.17s., E = +24m.55s., PSKSN = +32m.35s., N = +34m.29s., PPSN = +34m.56s., EN = +41m.42s., N = +42m.35s. and +43m.1s., EN = +43m.15s., N = +43m.47s., +51m.54s., and +55m.8s.
Johannesburg iPKP_2EN = +20m.26s., i?E = +21m.41s., i?N = +21m.48s., i?EN = +22m.36s., i?N = +24m.48s.
Cape Town iE = +21m.21s., iN = +21m.32s.

Nov. 10d. 21h. 50m. 57s. Epicentre 55°·6N. 157°·7W. (as at 20h.).

$A = -·5251$, $B = -·2154$, $C = +·8233$; $\delta = -5$; $h = -7$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tinemaha		32·3	109	e 6 31	− 2	—	—	—	—	—
Santa Barbara	z.	33·6	112	i 6 46	+ 2	—	—	—	—	—
Mount Wilson	z.	34·6	111	i 6 48	− 5	—	—	—	—	—
Pasadena		34·6	111	e 6 48	− 5	i 10 36	?	—	—	—
Riverside	z.	35·1	111	i 6 54	− 3	—	—	—	—	—
Tucson		40·0	105	i 7 35k	− 3	—	—	—	—	—
Nagoya		48·2	274	8 50	+ 6	—	—	—	—	—
Williamstown		53·4	66	e 9 20	− 4	—	—	—	—	—
Harvard		54·4	66	e 9 41	+10	—	—	—	—	—
Fordham		54·4	68	i 9 32	+ 1	—	—	—	—	—
Weston	z.	54·6	66	e 9 27	− 5	—	—	—	—	—
Copenhagen		68·8	7	11 12	+ 4	—	—	—	—	—
Frunse		72·4	324	e 12 4	+34	—	—	—	—	—
Tchimkent		74·5	327	e 11 34	− 8	—	—	—	—	—
Andijan		75·0	324	e 11 59	+14	—	—	—	—	—
Belgrade		79·9	2	e 12 17a	+ 5	—	—	i 17 8	PPP	—
Rome		82·5	7	e 12 29a	+ 3	22 41	− 1	15 55	PP	39·0
Granada		85·0	22	(i 12 47)	+ 9	—	—	—	—	—

For Notes see next page.

NOTES ON Nov. 10d. 21h. 50m. 57s.

Additional readings :—
Tucson i = +7m.40s.
Williamstown i = +14m.11s. and +14m.20s.
Rome i = +12m.37s., iEN = +17m.13s., SKS = +22m.18s., i = +27m.35s.
Granada reading was given as 23h.3m.44s.

Nov. 10d. 21h. 55m. 48s. Epicentre 55°·6N. 157°·7W. (as at 21h.50m.).

A = −·5251, B = −·2154, C = +·8233 ; $\delta = -5$; $h = -7$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tinemaha		32·3	109	e 6 33	0	—	—	—	—	—
Haiwee	N.	33·2	109	e 6 41	+ 1	—	—	—	—	—
Santa Barbara	Z.	33·6	112	e 6 52	+ 8	—	—	—	—	—
Mount Wilson		34·6	111	e 6 52	− 1	—	—	—	—	—
Pasadena		34·6	111	i 6 53	0	—	—	—	—	—
Riverside		35·1	111	i 6 56	− 1	—	—	—	—	—
Tucson		40·0	105	i 7 38k	0	—	—	—	—	—
Nagoya		48·2	274	e 9 13	+29	—	—	—	—	—
Ottawa	Z.	50·2	66	e 8 53	− 7	—	—	—	—	21·2
Shawinigan Falls		50·9	62	e 8 57	− 8	e 15 55	−26	e 19 36	SS	e 22·4
Fordham		54·4	68	i 9 25	− 6	—	—	—	—	e 29·0
Harvard	Z.	54·4	66	i 9 24	− 7	—	—	—	—	—
Copenhagen		68·8	7	11 10	+ 2	—	—	—	—	—
Kew	N.	71·7	15	e 11 19	− 7	i 20 40	− 5	i 20 51	PS	—
Frunse		72·4	324	e 11 43	+13	—	—	—	—	—
Uccle		72·9	13	e 11 34	+ 1	20 8	−51	—	—	—
Prague		74·5	6	e 12 54	+72	e 23 12	?	—	—	—
Tchimkent		74·5	327	e 11 38	− 4	e 21 12	− 5	—	—	—
Andijan		75·0	324	e 12 17	+32	—	—	—	—	—
Stuttgart		75·4	9	e 11 50	+ 3	e 21 27	0	—	—	—
Strasbourg		75·5	10	i 11 49	+ 1	21 54	PS	—	—	—
Zurich		76·8	11	e 11 55	0	—	—	—	—	—
Neuchatel		77·0	12	e 11 57	+ 1	—	—	—	—	—
Chur		77·4	10	e 12 0	+ 2	—	—	—	—	—
Bagnères		79·9	2	—	—	e 22 0	−16	e 22 34	PS	e 36·2
Florence		80·6	9	12 12	− 4	22 42	+19	—	—	—
Almeria		85·5	21	e 13 24	+43	—	—	—	—	—
Ksara		90·2	349	e 13 15	+11	e 24 8	+12	—	—	—
Riverview	N.	99·2	221	—	—	(e 26 42)	PS	—	—	e 26·7

Additional readings :—
Tucson iP = +7m.42s.
Ottawa eZ = +9m.3s.
Fordham i = +9m.34s.
Bagnères eN = +19m.12s. and +24m.6s.
Long waves were also recorded at Upsala.

Nov. 10d. 22h. 22m. 17s. Epicentre 37°·5N. 143°·0E.

A = −·6352, B = +·4786, C = +·6062 ; $\delta = +2$; $h = -1$;
D = +·602, E = +·799 ; G = −·484, H = +·365, K = −·795.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mizusawa	E.	2·2	318	i 0 39	+ 1	i 1 12	S_g	—	—	—
Nagoya		5·4	246	1 22	− 2	2 30	+ 2	—	—	—
Koti		8·7	246	e 2 2	− 8	4 34	S*	—	—	5·8
Hukuoka B		11·0	253	e 2 49	+ 7	e 6 2	?	—	—	—
Husan		11·5	262	2 51	+ 3	5 11	SS	—	—	—
Taikyu		11·7	266	2 51	0	5 12	+ 8	—	—	—
Syuhurei		12·1	268	e 2 58	+ 1	e 5 48	SSS	—	—	—
Keizyo		12·7	275	3 7	+ 2	e 5 21	+ 7	—	—	6·5
Zinsen		12·8	275	e 3 11	+ 5	e 5 45	SS	—	—	6·8
Heizyo		13·7	281	e 3 25	PP	—	—	—	—	8·7

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Almata		49·5	299	e 7 55	−59	—	—	—	—	—
Frunse		51·2	299	e 9 8	+ 1	—	—	—	—	—
Andijan		53·5	297	e 9 17	− 7	—	—	—	—	—
Tchimkent		54·9	300	e 9 17	−18	—	—	—	—	—
Tinemaha		74·5	55	i 11 41	− 1	—	—	—	—	—
Santa Barbara		75·0	58	i 11 46	+ 1	—	—	—	—	—
Haiwee	z.	75·2	56	i 11 47	+ 1	—	—	—	—	—
Mount Wilson		76·3	57	i 11 52	0	—	—	—	—	—
Pasadena		76·3	57	e 11 50	− 2	—	—	—	—	—
Riverside		76·9	57	i 11 55	− 1	—	—	—	—	—
Copenhagen		78·1	334	12 2	0	—	—	—	—	—
Tucson		82·3	55	12 23k	− 2	—	—	—	—	—
Belgrade		83·0	323	12 29a	+ 1	—	—	e 15 41	PP	—
Stuttgart		84·8	331	e 12 37	0	—	—	—	—	—
Uccle	z.	84·9	336	e 12 34	− 4	—	—	—	—	—
Strasbourg	z.	85·5	332	i 12 39	− 2	22 18	−54	—	—	—
Fordham		95·0	27	i 19 29	PP	—	—	—	—	—
La Paz	z.	145·5	61	e 19 46	[+ 6]	—	—	—	—	—

Additional readings :—
Tucson i = +12m.27s., +12m.38s., and +13m.59s.
Strasbourg i = +12m.53s.

Nov. 10d. Further shocks from the neighbourhood of the epicentre of 9d. 16h. were recorded at Mizusawa and Nagoya.

Mizusawa

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
1	4	9	4	44	15(S)	8	42	23	13	3	4
1	18	18	5	54	8	8	49	20	13	20	53
1	46	22(S)	6	3	12	9	7	47	16	51	5
2	11	15(S)	6	45	32	9	18	24	17	43	10 (S)
2	24	24	7	29	45	9	36	7	18	11	14
3	5	41(S)	7	53	37(S)	11	4	10	23	51	12
3	41	22(S)	8	16	11	12	20	45(S)			

Nagoya

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
1	3	53	6	3	50	9	19	17	17	43	41
2	18	24	6	45	42	9	36	35	17	51	57
2	25	7	8	16	32	12	11	35	23	51	46
3	54	43?	8	42	48	13	3	36	23	56	19
5	54	51	8	50	6	13	21	35			

Nov. 10d. Readings also at 2h. (Baku, Sverdlovsk, Tashkent, Agra, Irkutsk, Koti, Mount Wilson, Pasadena, Riverside, and Moscow), 3h. (Pulkovo, Tucson, De Bilt, Rome, Potsdam, Cheb, Tiflis, Uccle, Copenhagen, Oaxaca, Vera Cruz, and Tacubaya), 4h. (Keizyo), 5h. (Tacubaya, Vera Cruz, Oaxaca, and Ferndale), 6h. (Hukuoka B, Keizyo, Irkutsk, Agra, Tashkent, Sverdlovsk, and Husan), 7h. (Huancayo, Strasbourg, Edinburgh, Puy de Dôme, Kew, San Fernando, Copenhagen, Uccle, Tiflis, Cheb, Potsdam, Rome, De Bilt, Pulkovo, Moscow, Baku, Hamburg, and Ksara), 8h. (Pulkovo, Tiflis, Sverdlovsk, Tashkent, Irkutsk, and Koti), 9h. (Santiago (2)), 10h. (Puebla, Guadalajara, Frunse, Williamstown, Haiwee, Ksara, Hamburg, Oaxaca, Vera Cruz, Tacubaya, Tucson, Riverside, Pasadena, Mount Wilson, Tinemaha, and Andijan (2)), 12h. (Tinemaha, Mount Wilson, Pasadena, Riverside, and Tucson), 14h. (Tacubaya), 16h. (Andijan and Frunse), 18h. (Rome and Triest), 21h. (Fordham, Weston, and La Paz), 22h. (Husan, Tucson (2), and Wellington).

Nov. 11d. 0h. 57m. 43s. Epicentre 55°·6N. 157°·7W. (as on Nov. 10d.).

$A = -\cdot5251$, $B = -\cdot2154$, $C = +\cdot8233$; $\delta = -5$; $h = -7$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
College		10·5	24	e 2 46	PP	4 27	− 8	i 4 58	SSS	i 5·3
Sitka		12·5	74	i 3 9	+ 7	i 5 45	SSS	i 3 18	PP	i 6·0
Seattle		23·1	95	e 5 55	PPP	—	—	—	—	10·0
Ukiah		28·2	111	—	—	e 10 53	+12	—	—	e 12·3
Butte		29·6	89	e 6 1	− 8	e 10 58	− 6	—	—	e 13·2
San Francisco	N.	29·6	113	e 6 18	+ 9	—	—	—	—	—
Saskatoon		29·8	75	e 6 26	+15	e 10 59	− 8	—	—	13·3
Lick	E.	30·3	113	e 6 18	+ 3	—	—	—	—	—
Bozeman		30·7	89	e 6 25	+ 6	11 24	+ 3	—	—	12·3
Fresno	N.	31·8	111	e 6 35	+ 7	—	—	—	—	—
Tinemaha		32·3	109	e 6 36	+ 3	e 11 58	+12	—	—	—
Haiwee		33·2	109	e 6 42	+ 2	e 12 6	+ 6	—	—	—
Salt Lake City		33·3	97	e 7 6	+25	12 22	+20	e 8 22	PPP	i 15·2
Santa Barbara		33·6	112	e 6 48	+ 4	i 12 14	+ 8	—	—	—
Honolulu		34·3	180	e 7 16	+26	e 12 0	−17	—	—	e 14·1
Mount Wilson		34·6	111	i 6 54k	+ 1	e 12 27	+ 5	—	—	—
Pasadena		34·6	111	i 6 54k	+ 1	i 12 24	+ 2	i 8 7	PP	e 14·8
Riverside		35·1	111	i 6 58k	+ 1	e 12 31	+ 1	—	—	—
Tucson		40·0	105	i 7 40k	+ 2	13 30	−14	i 9 10	PP	i 17·1
Sapporo		40·4	281	6 35	−66	—	—	—	—	—
Mizusawa	E.	43·1	275	(7 57)	− 7	7 57	P	—	—	—
Chicago		46·2	77	e 8 40	+12	15 20	+ 5	18 20	SS	22·9
Chicago (Loyola)		46·2	77	—	—	i 15 15	0	—	—	—
Florissant		46·8	82	e 8 32	− 1	i 15 27	+ 3	i 10 30	PP	24·3
Kohu		47·0	274	8 27	− 8	—	—	—	—	—
St. Louis		47·0	82	e 8 38	+ 3	i 15 30	+ 4	e 10 41	PP	—
Nagoya		48·2	274	e 8 35	− 9	—	—	—	—	—
Cape Girardeau		48·3	83	e 8 46	+ 1	i 15 46	+ 1	i 8 53	pP	e 22·2
Little Rock		48·5	88	i 8 52	+ 6	i 15 51	+ 3	e 10 31	PP	21·8
Osaka		49·4	276	8 36	−17	—	—	9 41	PP	—.
Ottawa		50·2	66	9 1	+ 1	16 15	+ 4	e 11 17	PPP	25·3
Scoresby Sund		50·3	20	9 2	+ 2	16 35	PS	—	—	—
Shawinigan Falls		50·9	62	e 9 5	0	e 16 26	+ 5	e 18 57	SS	e 24·3
Muroto		51·2	275	8 58	− 9	15 48	−37	10 34	PP	32·5
Koti		51·3	276	e 8 17?	−51	—	—	—	—	—
Seven Falls		51·5	61	e 9 11	+ 2	16 35	+ 6	i 21 18	SSS	25·3
Keizyo		52·1	285	9 8	− 6	16 29	− 9	—	—	25·9
Vermont		52·1	65	—	—	i 16 42	+ 4	e 20 27	SS	22·9
Taikyu		52·4	282	e 9 12	− 4	e 16 33	− 9	—	—	—
Zinsen		52·4	285	e 9 7	− 9	e 16 33	− 9	e 11 42	PP	21·2
Husan		52·7	281	e 8 47	−31	e 16 34	−12	—	—	e 26·5
Irkutsk		53·1	312	9 16	− 5	e 16 15	−36	11 18	PP	25·3
Williamstown		53·4	66	i 9 25	+ 1	i 16 59	+ 4	—	—	—
Miyazaki		53·7	276	9 17	− 9	16 53	− 6	—	—	—
Manzanillo		54·0	111	e 11 8	PP	—	—	—	—	—
Philadelphia		54·3	70	—	—	i 17 10	+ 3	e 20 58	SS	—
Fordham		54·4	68	e 9 29a	− 2	i 17 14	+ 5	—	—	—
Harvard		54·4	66	i 9 32	+ 1	i 17 15	+ 6	—	—	e 26·3
Weston		54·6	66	i 9 35k	+ 3	i 17 18	+ 7	e 11 41	PP	e 26·3
East Machias		54·9	61	—	—	17 20	+ 4	21 8	SS	26·2
Columbia		55·5	79	—	—	i 17 26	+ 2	e 19 27	ScS	27·3
Tacubaya	N.	56·5	106	e 9 49	+ 3	—	—	—	—	—
Vera Cruz	N.	58·4	103	—	—	i 18 5	+ 3	—	—	—
Merida	N.	60·6	96	e 10 19	+ 4	—	—	—	—	—
Sverdlovsk		63·7	339	i 10 35	− 1	—	—	—	—	—
Semipalatinsk		63·9	324	e 10 39	+ 2	—	—	—	—	—
Pulkovo		64·8	357	i 10 44	+ 1	19 25	+ 2	—	—	30·8
Upsala		64·8	4	i 10 41	− 2	19 24	+ 1	14 35	PPP	e 30·3
Aberdeen		65·9	15	—	—	i 19 39	+ 2	—	—	e 34·8
Edinburgh		66·9	16	—	—	i 19 55	+ 6	—	—	e 29·3

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Durham		68·3	15	i 11 8	+ 3	i 20 10	+ 4	i 20 27	PS	—
Moscow		68·3	352	11 5	0	20 5	− 1	—	—	34·8
Copenhagen		68·8	7	i 11 8	0	20 16	+ 5	—	—	32·3
Rathfarnham Castle		68·9	18	—	—	i 20 39	PS	—	—	e 39·3
Stonyhurst		69·0	16	e 11 23	+14	i 20 21	+ 7	—	—	34·3
Hamburg		70·7	8	11 17	− 3	e 20 40	+ 6	—	—	e 34·3
Almata		71·2	323	e 11 17	− 6	—	—	—	—	—
De Bilt		71·7	11	i 11 28a	+ 2	i 20 53	+ 8	—	—	e 36·3
Kew		71·7	15	i 11 27a	+ 1	i 20 48	+ 3	i 21 6	PS	e 35·3
Potsdam		72·1	7	e 11 29	+ 1	i 20 55	+ 5	e 13 53	PP	e 35·3
Frunse		72·4	324	e 11 28	− 2	—	—	—	—	—
Göttingen		72·7	9	e 11 32	0	e 21 4	+ 7	—	—	e 39·3
Uccle		72·9	13	i 11 34a	+ 1	i 21 4	+ 5	—	—	35·3
Manila		73·2	272	11 30a	− 5	20 56	− 6	—	—	—
Jena		73·5	7	i 11 37	+ 1	e 21 8	+ 2	—	—	e 32·3
Jersey		73·6	17	—	—	e 21 11	+ 4	—	—	e 31·8
Cheb		74·4	8	e 11 44	+ 2	e 21 20	+ 4	—	—	e 41·3
Prague		74·5	6	e 11 52	+10	e 21 21	+ 4	—	—	e 32·3
Tchimkent		74·5	327	e 11 20	−22	—	—	—	—	—
Paris		74·7	14	e 11 32	−11	e 21 21	+ 2	—	—	33·3
Andijan		75·0	324	e 11 43	− 2	—	—	—	—	—
Karlsruhe		75·1	10	e 11 49	+ 3	e 21 44	PS	—	—	e 47·3
Stuttgart		75·4	9	i 11 48a	+ 1	e 21 34	+ 7	e 14 50	PP	e 39·3
Strasbourg		75·5	10	i 11 50a	+ 2	i 21 35	+ 7	i 12 3	pP	e 34·3
Tashkent		75·5	327	i 11 46	− 2	e 22 12	PS	e 14 28	PP	—
San Juan		75·9	79	e 11 55	+ 5	i 21 36	+ 4	e 16 42	PPP	30·8
Balboa Heights		76·0	95	—	—	e 21 17	−17	—	—	—
Phu-Lien		76·2	288	e 11 40	−12	e 21 27	− 9	—	—	—
Basle		76·5	11	e 11 54	0	e 21 53	+14	—	—	—
Zurich		76·8	11	e 11 56a	+ 1	e 21 44	+ 2	—	—	—
Neuchatel		77·0	12	e 11 57	+ 1	e 21 52	+ 7	—	—	—
Budapest		77·2	4	11 57	0	e 21 53	+ 6	12 3	PcP	e 37·3
Chur		77·4	10	e 11 59	+ 1	e 21 52	+ 3	—	—	—
Samarkand		77·8	328	e 12 0	− 1	e 21 55	+ 2	—	—	—
Triest		78·9	7	e 12 6	− 1	22 6	+ 1	—	—	—
Padova		79·0	8	11 57?	−10	—	—	—	—	—
Theodosia		79·2	352	12 8	0	22 8	0	—	—	45·3
Simferopol		79·3	353	12 10	+ 1	22 11	+ 2	—	—	38·3
Bagnères		79·9	17	e 12 20	+ 8	e 22 21	+ 5	e 12 35	pP	35·1
Belgrade		79·9	2	i 12 14a	+ 2	i 22 20	+ 4	i 12 28	PcP	e 41·7
Bucharest		80·3	358	e 12 17	+ 3	e 22 20	0	—	—	37·3
Marseilles		80·4	14	—	—	e 22 20	− 1	—	—	e 47·3
Florence		80·6	9	12 20	+ 4	22 37	+14	—	—	—
Tiflis		81·2	345	12 22	+ 3	22 30	+ 1	—	—	e 38·8
Sofia	N.	82·1	0	e 12 27	+ 3	e 22 41	+ 3	—	—	—
Toledo		82·3	21	e 12 25a	0	i 24 51	PPS	—	—	—
Rome		82·5	7	i 12 23a	− 3	22 38	− 4	16 4	PP	e 44·3
Agra		84·9	312	i 12 32a	− 6	e 22 52	−14	23 38	PS	—
Granada		85·0	22	i 12 24	−14	22 39	[−22]	—	—	e 44·3
Malaga		85·2	23	e 12 43	+ 4	22 57	[− 5]	15 53	PP	47·3
Almeria		85·5	21	e 17 13	PPP	e 23 7	[+ 3]	—	—	e 50·1
Algiers		86·5	16	12 47	+ 1	e 23 7	[− 4]	e 18 56	PPP	e 43·3
Ksara		90·2	349	i 13 4a	0	24 4	+ 8	16 40	PP	—
Bombay		94·4	313	e 13 23	0	i 23 55	[− 3]	i 17 13	PP	45·6
Helwan		94·5	353	i 13 23k	0	24 35	+ 1	17 8	PP	—
Medan		94·7	283	—	—	i 23 54	[− 5]	—	—	e 54·3
Huancayo		95·6	103	e 11 38	?	23 55	[− 9]	17 33	PP	37·3
Batavia		98·2	271	e 16 17?	?	—	—	—	—	—
Colombo	E.	101·8	301	—	—	24 34	[− 2]	—	—	50·6
Melbourne		105·1	224	—	—	i 25 57	− 6	e 33 24	SS	51·2
Adelaide		105·2	230	—	—	i 43 13	?	—	—	e 51·3
La Plata		123·2	104	25 53	?	(27 29)	{− 6}	37 29	SS	61·0

For Notes see next page.

NOTES TO Nov. 11d. 0h. 57m. 43s.

Additional readings :—
Sitka iPPP = +3m.27s.
Seattle ePPP = +6m.13s.
Butte eS = +11m.12s.
Riverside eSE = +12m.36s.
Tucson iP = +7m.43s., i = +7m.48s., +8m.0s., and +8m.30s., iP_cP = +9m.31s., iPPP = +9m.55s., i = +10m.1s., +10m.56s., and = +13m.22s., iS = +13m.54s., i = +14m.9s., iS_cS = +17m.49s.
Chicago S = +15m.38s.
Chicago (Loyola) e = +22m.50s.
Florissant iPZ = +8m.41s., iSSEN = +18m.23s., iN = +19m.18s.
St. Louis iPN = +9m.44s., $ePcPEN$ = +10m.33s., eSSEN = +18m.24s.
Cape Girardeau eE = +11m.2s., isSN = +16m.9s., iN = +18m.37s., iEN = +18m.51s., eE = +21m.25s.
Little Rock iSPN = +16m.3s., iS_cSN? = +18m.38s., SSEN = +18m.53s.
Ottawa e = +18m.47s., SS = +20m.5s.
Vermont iS = +16m.48s., iS_cS = +19m.7s.
Zinsen eSE? = +19m.2s.
Irkutsk PPP = +12m.6s.
Williamstown i = +9m.35s., +26m.9s., +28m.6s., and +32m.8s.
Philadelphia iS = +17m.16s., iS_cS = +19m.20s.
Fordham iP = +9m.40s.
Weston iP = +9m.45s., i = +10m.1s., iP_cPZ = +10m.23s., ePPPZ = +12m.27s., iPSEN = +17m.32s., iS_cSEN = +19m.21s., eSSN = +21m.3s.
East Machias iS_cS = +19m.25s.
Upsala eE = +22m.58s., eSSN = +23m.47s.
Aberdeen e = +28m.43s.
Copenhagen +21m.27s.
Rathfarnham Castle i = +29m.17s.
Kew iN = +11m.36s., iEN = +21m.31s.
Potsdam iN = +11m.34s., eEN = +11m.41s., eN = +20m.47s., eSZ = +20m.59s., eZ = +29m.17s.?
Jena iPE = +11m.45s.
Stuttgart e = +12m.32s., eSS = +26m.31s., eE = +35m.17s.
Strasbourg isS = +21m.50s., iPSE = +22m.20s., eSS = +26m.37s.
Tashkent e = +11m.56s., i = +17m.52s.
San Juan eP = +12m.0s., PS = +22m.18s., iPPS = +22m.43s., eSS = +26m.28s.
Budapest iN = +22m.17s.?
Triest S = +22m.22s.
Bagnères ePPP = +17m.13s., e = +22m.8s., esS = +22m.55s., e = +23m.21s., eSS = +26m.34s.
Bucharest eN = +21m.55s., eSE = +22m.23s.
Rome i = +12m.27s.
Granada i = +13m.1s.
Algiers iS = +23m.27s.
Bombay iE = +24m.12s., iPSE = +25m.59s., iSSE = +30m.55s.
Helwan i = +13m.35s. and +23m.57s., PS = +25m.30s.
Huancayo eP = +13m.53s., ePP = +17m.22s., iPP = +17m.37s., ePPP = +19m.30s., iSKS = +24m.3s., iS = +24m.43s., PS = +25m.49s., PPS = +26m.38s., iSS = +31m.15s.
La Plata PPP = +30m.29s.
Long waves were also recorded at Rio de Janeiro, Calcutta, and Dehra Dun.

Nov. 11d. 2h. 57m. 12s. Epicentre 32°·0N. 141°·5E. (as on Nov. 10d.10h.).

A = −·6649, B = +·5289, C = +·5273; δ = −13; h = +1.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Nagoya		4·9	311	e 1 20	+ 3	2 47	S_g	—	—	—
Koti		6·9	285	1 47	+ 2	—	—	—	—	3·4
Mizusawa		7·1	358	e 1 27	−21	e 2 44	−26	—	—	—
Hukuoka B		9·5	283	e 2 23	+ 3	4 46	S*	—	—	—
Husan		10·9	290	e 3 6	PPP	e 4 53	+ 9	—	—	—
Taikyu		11·4	294	e 2 46	− 1	e 4 48?	− 8	—	—	—
Keizyo		13·2	299	3 12	+ 1	e 5 44	+ 4	—	—	e 7·9
Zinsen	E.	13·4	298	3 12	− 2	—	—	—	—	7·8
Heizyo		14·6	304	3 30	0	—	—	—	—	—
Manila		25·5	232	e 5 33	+ 1	10 12	+15	—	—	13·0

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Hong Kong		26·1	255	5 37	0	10 17	+10	6 30	PPP	—
Phu-Lien		33·0	259	e 7 56	PPP	—	—	—	—	—
Irkutsk		33·7	318	e 6 40	− 5	e 11 55	−13	e 8 8	PP	17·3
Frunse		53·0	302	i 9 19	− 2	—	—	—	—	—
College		53·4	30	—	—	e 16 41	−14	—	—	e 25·7
Agra	E.	54·7	283	9 27	− 6	17 12	− 1	21 7	SS	—
Tashkent		57·2	302	—	—	i 17 44	− 2	e 22 10	SS	e 33·1
Sverdlovsk		59·0	321	10 0	− 4	18 6	− 4	—	—	—
Colombo	E.	62·4	261	—	—	e 16 48	?	—	—	—
Bombay		62·5	276	i 10 27	− 1	i 18 53	− 1	23 0	SS	—
Moscow		71·4	325	e 11 20	− 4	e 20 35	− 7	—	—	35·3
Pulkovo		72·6	330	11 28	− 3	20 52	− 4	—	—	38·3
Tiflis	E.	74·0	309	—	—	i 21 8	− 3	—	—	e 36·8
Tinemaha		78·7	54	e 12 11	+ 5	—	—	—	—	—
Haiwee	E.	79·4	54	e 12 11	+ 2	—	—	—	—	—
Pasadena	Z.	80·3	55	e 12 13	− 1	—	—	—	—	—
Mount Wilson	Z.	80·4	55	e 12 12	− 3	—	—	—	—	—
Copenhagen		82·4	334	—	—	22 35	− 6	—	—	38·8
Ksara		84·2	306	i 12 33a	− 1	e 22 55	− 4	—	—	—
Potsdam		84·7	332	e 12 30	− 7	e 22 48?	−16	—	—	e 32·8
Prague		85·8	329	e 17 0	PP	e 23 10	− 5	—	—	—
Tucson		86·5	54	12 44	− 2	—	—	—	—	41·6
Belgrade		86·6	323	e 12 57a	+11	e 23 15	− 8	—	—	e 48·0
Cheb		86·7	330	—	—	e 22 48?	[−24]	—	—	e 32·8
De Bilt		87·9	335	—	—	e 23 24	−11	—	—	e 39·8
Stuttgart		89·0	331	e 12 54	− 4	e 23 38	− 7	—	—	e 40·8
Uccle		89·3	335	—	—	e 23 41	− 7	—	—	e 46·8
Triest		89·4	326	—	—	e 23 21	[− 8]	—	—	—
Helwan		89·6	305	i 13 12	+11	—	—	e 17 42	PP	—
Strasbourg		89·8	331	—	—	e 23 48	− 5	e 18 0	PP	e 46·8
Kew		90·4	337	—	—	e 23 49	− 9	—	—	e 37·8
Bagnères		97·3	333	e 15 36	?	—	—	—	—	e 34·8

Additional readings :—
Hong Kong SS = +12m.4s.
Irkutsk e = +9m.7s., +14m.37s., and +17m.0s.
Tashkent e = +18m.13s.
Tucson iP = +12m.49s. and +13m.8s.
Long waves were also recorded at Calcutta and other European stations.

Nov. 11d. 8h. 30m. 49s. Epicentre 55°·5N. 155°·0W.

A = −·5157, B = −·2405, C = +·8223 ; δ = −4 ; h = −7 ;
D = −·423, E = +·906 ; G = −·745, H = −·348, K = −·569.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
College		10·0	18	e 2 20	− 7	e 3 55	−27	—	—	5·2
Sitka		11·0	74	e 2 44	+ 2	—	—	—	—	5·3
Victoria		20·6	96	e 4 39	− 4	e 8 35	+ 6	9 17	SSS	e 10·7
Ukiah		26·7	114	e 5 46	+ 3	e 10 25	+ 8	e 7 10	PPP	e 12·5
Butte		28·1	61	—	—	e 9 57	−43	—	—	e 16·3
Bozeman		29·1	61	—	—	i 11 35	+39	—	—	e 13·4
Tinemaha		30·9	111	i 6 23	+ 3	—	—	—	—	—
Haiwee		31·7	111	i 6 31	+ 4	—	—	—	—	—
Santa Barbara	Z.	32·1	115	e 6 34	+ 3	—	—	—	—	—
Mount Wilson		33·2	113	i 6 43	+ 3	—	—	—	—	—
Pasadena		33·2	113	i 6 42	+ 2	e 15 50	?	—	—	37·5
Riverside		33·7	113	i 6 46	+ 1	—	—	—	—	—
Tucson		38·5	108	i 7 28k	+ 2	13 26	+ 4	i 8 57	PP	e 17·0
Chicago		44·7	79	—	—	e 14 51	− 3	—	—	e 18·1
Ottawa		48·9	66	8 46	− 4	15 47	− 6	18 41	SS	24·2

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		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Shawinigan Falls		49·6	63	e 8 51	− 4	—	—	—	—	—
Seven Falls		50·2	62	—	—	e 16 35	PS	—	—	28·1
Vermont		50·8	66	—	—	e 16 26	+ 6	—	—	e 27·2
Williamstown		52·0	67	i 9 11	− 2	—	—	—	—	—
Philadelphia		52·9	71	—	—	e 16 42	− 6	e 20 49	SS	e 23·9
Harvard		53·0	66	i 9 19	− 2	—	—	e 29 41	L_g	e 30·5
Weston		53·2	66	e 9 20a	− 2	i 18 43	?	e 20 35	SS	—
East Machias		53·6	63	—	—	e 16 58	0	—	—	e 25·9
Irkutsk		54·3	313	e 9 26	− 4	e 16 11?	−56	—	—	28·2
Sverdlovsk		64·4	340	10 38	− 2	19 15	− 3	—	—	27·2
Pulkovo		65·0	357	e 10 42	− 2	e 19 39	+13	e 13 14	PP	39·7
Moscow		68·6	352	e 11 3	− 4	e 21 17	PPS	e 13 23	PP	e 41·7
Copenhagen		68·7	8	11 7	0	—	—	—	—	41·2
Kew		71·3	17	e 11 24	+ 1	—	—	—	—	e 34·2
Potsdam		72·0	8	e 11 29	+ 1	e 20 53	+ 4	—	—	e 41·2
Almata		72·2	324	e 9 54	?	—	—	—	—	—
Uccle		72·7	15	e 11 29	− 3	—	—	—	—	e 20·2
Frunse		73·4	324	e 11 45	+ 9	—	—	—	—	—
San Juan		74·4	80	—	—	e 21 11	− 5	—	—	e 31·0
Strasbourg		75·3	12	e 11 44	− 3	—	—	—	—	e 44·8
Stuttgart		75·3	11	e 11 45	− 2	e 21 23	− 3	—	—	e 44·2
Andijan		76·0	325	e 12 3	+12	e 21 56	+22	—	—	—
Belgrade		80·0	4	e 12 22k	+ 9	e 22 29	+12	—	—	e 55·3
Grozny		80·0	346	e 12 15	+ 2	—	—	—	—	—
Yalta		80·1	354	e 10 56	?	—	—	—	—	—
Tiflis	Z.	81·7	346	12 21	− 1	—	—	—	—	—
Toledo		81·8	23	e 12 22	0	—	—	—	—	e 45·2
Agra	E.	86·0	314	—	—	e 23 7	[− 1]	—	—	—
Ksara		90·6	349	i 13 8	+ 3	e 24 9	+ 9	e 16 44	PP	—
Helwan		94·8	353	e 13 20	− 5	—	—	e 17 13	PP	—

Additional readings :—
College eS = +4m.30s.
Tucson P = +7m.34s., iP = +7m.57s., i = +8m.15s., PPP = +9m.29s., iS = +13m.43s.
Philadelphia eS = +16m.45s.
Weston iPEZ = +19m.30s.
Pulkovo e = +11m.8s., +14m.22s., +20m.45s., and +24m.39s.
Moscow e = +11m.13s. and +19m.30s.
Long waves were also recorded at Honolulu, Hamburg, Edinburgh, Stonyhurst, De Bilt, Göttingen, Tashkent, Bucharest, Almeria, Baku, Puy de Dôme, Kodaikanal, Istanbul, Colombo, Bombay, Granada, Phu-Lien, and Fort de France.

Nov. 11d. 8h. 53m. 27s. Epicentre 55°·5N. 155°·0W. (as at 8h.30m.).

A = −·5157, B = −·2405, C = +·8223 ; $\delta = -4$; $h = -7$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
College	10·0	18	—	—	e 4 17	− 5	—	—	5·3
Sitka	11·0	74	e 2 41	− 1	4 26	−21	—	—	e 5·2
Victoria	20·6	96	(e 4 45)	+ 2	e 4 45	P	—	—	e 8·0
Tinemaha	30·9	111	e 6 19	− 1	—	—	—	—	—
Haiwee	31·7	111	i 6 28	+ 1	—	—	—	—	—
Mount Wilson	33·2	113	i 6 41	+ 1	—	—	—	—	—
Pasadena	33·2	113	i 6 40	0	—	—	—	—	—
Riverside	33·7	113	i 6 43	− 2	—	—	—	—	—
Tucson	38·5	108	i 7 25k	− 1	—	—	i 9 43	PcP	—
Ottawa	48·9	66	e 8 46	− 4	—	—	—	—	23·6

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		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Williamstown		52·0	67	i 9 11	− 2	—	—	—	—	—
Harvard	z.	53·0	66	e 9 17	− 4	—	—	—	—	—
Weston	z.	53·2	66	i 9 18	− 4	—	—	—	—	—
Irkutsk		54·3	313	—	—	e 15 33?	−94	—	—	28·5
Sverdlovsk		64·4	340	e 10 39	− 1	—	—	—	—	33·6
Pulkovo		65·0	357	e 8 33	?	e 17 3	?	—	—	e 29·2
Moscow		68·6	352	e 11 10	+ 3	e 18 42	?	—	—	37·0
Almata		72·2	324	e 11 39	+10	—	—	—	—	—
Frunse		73·4	324	e 11 44	+ 8	—	—	—	—	—
Prague		74·2	7	—	—	e 25 33	SS	—	—	—
Cheb		74·3	9	—	—	e 21 33?	+18	—	—	—
Andijan		76·0	325	e 11 52	+ 1	e 21 42	+ 8	—	—	—
Tashkent		76·5	328	e 12 18	+24	21 21	−18	—	—	42·6
Grozny		80·0	346	e 12 17	+ 4	—	—	—	—	e 36·6
Tiflis	z.	81·7	346	e 12 8	−14	—	—	—	—	e 26·6
Rome		82·4	10	—	—	e 23 33	PS	—	—	e 51·4
Ksara		90·6	349	i 13 33	+28	e 24 28	+28	—	—	—
Christchurch		102·4	203	e 13 33?	−26	e 25 53	+13	e 20 33?	PPP	e 57·6

Additional readings :—
Tucson iP = +7m.31s. and +7m.34s.
~~Weston iZ = +9m.29s.~~
Rome e = +37m.1s., +40m.35s., and +42m.58s.
Christchurch eN = +37m.33s.?, eE = +45m.3s., L_gN = +49m.3s.
Long waves were also recorded at Shawinigan Falls, Ferndale, Granada, Baku, and De Bilt.

Nov. 11d. 14h. 3m. 49s. Epicentre 6°·7S. 153°·8E. (as on 1937 Oct. 6d.).

A = −·8912, B = +·4385, C = −·1159 ; δ = −5 ; h = +7 ;
D = +·442, E = +·897 ; G = +·104, H = −·051, K = −·993.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Brisbane	N.	20·7	182	e 4 47	+ 3	i 8 35	+ 4	—	—	—
Riverview	N.	27·1	184	—	—	e 10 47	+23	—	—	e 14·2
Sydney		27·1	184	e 6 7	+21	e 9 54	−30	—	—	e 13·3
Adelaide		31·4	204	—	—	i 11 35	+ 3	—	—	16·7
Melbourne		32·0	193	—	—	i 12 41	+59	i 14 50	?	16·0
Manila		38·8	303	i 7 25	− 3	13 25	− 1	—	—	—
Wellington		39·2	155	e 7 16	−15	—	—	—	—	e 19·2
Perth		43·4	230	i 4 6	?	i 14 16	−19	i 17 56	SS	i 23·4
Hong Kong		48·3	308	8 39	− 6	15 56	+11	—	—	—
Andijan		87·9	311	e 13 28	+35	e 23 34	− 1	—	—	—
Tashkent		90·3	312	e 15 53	PP	e 23 51	− 6	e 16 45	PP	e 41·2
Pasadena		92·1	56	i 13 3	− 9	—	—	—	—	—
Mount Wilson		92·2	56	i 13 2	−11	—	—	—	—	—
Tinemaha		92·4	54	i 13 1	−13	—	—	—	—	—
Riverside	z.	92·7	56	i 13 6	− 9	—	—	—	—	—
Sverdlovsk		97·3	327	e 17 31	PP	e 26 40	PS	—	—	45·2
Ksara		116·8	303	e 19 45	PP	e 30 55	PPS	32 18	SKKP	—

Additional readings :—
Tashkent i = +24m.19s., e = +35m.55s.
Long waves were also recorded at Pulkovo, Irkutsk, Moscow, Copenhagen, Bergen, De Bilt, Uccle, Strasbourg, Harvard, Philadelphia, and College.

Nov. 11d. 22h. 33m. 45s. Epicentre 55°·6N. 157°·7W. (as at 0h.).

$A = -\cdot5251$, $B = -\cdot2154$, $C = +\cdot8233$; $\delta = -5$; $h = -7$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m.	s.	m.
College		10·5	24	e 2 28	− 7	—	—	—	—	—
Tinemaha		32·3	109	i 6 47	+14	—	—	—	—	—
Haiwee		33·2	109	e 6 52	+12	—	—	—	—	—
Mount Wilson	z.	34·6	111	i 7 4k	+11	—	—	—	—	—
Pasadena		34·6	111	i 7 2k	+ 9	—	—	—	—	—
Riverside		35·1	111	i 7 9k	+12	—	—	—	—	—
Tucson		40·0	105	i 7 40	+ 2	—	—	—	—	—
Ottawa		50·2	66	e 8 57	− 3	—	—	—	—	29·2
Williamstown		53·4	66	i 9 23	− 1	—	—	—	—	—
Harvard	z.	54·4	66	i 9 29a	− 2	—	—	—	—	—
Weston	z.	54·6	66	i 9 30a	− 2	—	—	—	—	e 32·2
Sverdlovsk		63·7	339	i 10 27	− 9	—	—	—	—	29·2
Pulkovo		64·8	357	e 10 36	− 7	—	—	—	—	33·7
Moscow		68·3	352	e 10 58	− 7	e 19 41	−25	—	—	40·8
Copenhagen		68·8	7	i 11 3	− 5	—	—	—	—	—
Frunse		72·4	324	e 11 31	+ 1	—	—	—	—	—
Jena		73·5	7	e 11 32	− 4	—	—	—	—	—
Andijan		75·0	324	e 11 36	− 9	—	—	—	—	—
Tashkent		75·5	327	i 11 40	− 8	e 21 33	+ 5	—	—	e 37·7
Grozny		79·5	344	e 12 5	− 5	—	—	—	—	—
Tiflis		81·2	345	e 12 12	− 7	—	—	—	—	e 40·2
Toledo		82·3	21	i 12 21	− 4	—	—	—	—	—
Ksara		90·2	349	i 13 16	+12	e 24 18	+22	—	—	—

Additional readings :—
Tucson i = +7m.50s., +7m.55s., and +8m.27s.
Weston iZ = +9m.39s.
Sverdlovsk i = +10m.44s.
Long waves were also recorded at Baku and Philadelphia.

Nov. 11d. Further shocks from the neighbourhood of the epicentre of 9d. 16h. were recorded at Mizusawa and Nagoya.

Mizusawa

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
0	26	28	8	18	49	14	18	1	18	27	47(S)
2	26	30(S)	8	22	48	17	14	10	18	34	38
2	48	58(S)	8	48	2	17	18	4	20	37	1
5	39	59(S)	14	10	7	18	1	55	23	25	48

Nagoya

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
0	27	26	8	23	26	14	10	45	17	19	25
4	39	41	8	48	36	14	18	45	23	25	55
8	19	38									

Nov. 11d. Readings also at 0h. (Chur, Tucson, Weston (2), Belgrade, Strasbourg, Zurich, Uccle, Mount Wilson, College, Tinemaha, Riverside (2), Husan, Fordham, Tchimkent, Andijan, Frunse, Copenhagen, Harvard, Williamstown, Pasadena, and Haiwee), 1h. (Tucson and Mount Wilson), 2h. (Mount Wilson, Riverside, Tinemaha, Tucson, Wellington, Granada, and Weston (2)), 4h. (Manila, Mizusawa, Koti, Fordham, Phu-Lien, Husan, Ksara, Tucson, Irkutsk, Agra, Keizyo, and Taikyu), 5h. (Moscow, Tacubaya, Cheb, Tucson, Tashkent, College, Weston, Granada, Tinemaha, Riverside, Mount Wilson, Uccle, Strasbourg, Potsdam, Copenhagen, Andijan, Sverdlovsk, Pulkovo, De Bilt, Bombay, Edinburgh, Kew, Baku, and Tiflis), 6h. (Ottawa, Victoria, Vermont, East Machias, Butte, San Juan, Kew, Philadelphia, Tiflis, Baku, Harvard, Edinburgh, Sitka, Bombay, De Bilt, Pulkovo, Sverdlovsk, Uccle, Strasbourg, Mount Wilson, Granada, Weston, College, Tashkent, Tucson, Taikyu, Agra, Irkutsk, and Ksara), 7h. (Ksara, Irkutsk, Taikyu, Tashkent, College, Tucson (2), Weston (2), Mount Wilson (2), Sverdlovsk, Harvard (2), Andijan, Haiwee, Riverside (2), Tinemaha (2), Fordham, Williamstown, and Pasadena (2)), 8h. (Tucson, Tiflis, Keizyo, Weston, Riverside, Mount Wilson, College, and Taikyu), 9h. (Chur, Triest, Mount Wilson, Riverside, Weston, Tinemaha, and Tucson), 10h. (Tucson (5), Tinemaha (2), Weston, Riverside (2), Mount Wilson (2), Pasadena, De Bilt, and College), 12h. (Weston), 13h. (Weston and Tucson), 15h. (Riverside, Tucson, Haiwee, Andijan, Sverdlovsk, Baku, Frunse, Tiflis, Weston, Ksara, Mount

Continued on next page.

Wilson, Tinemaha, Irkutsk, Grozny, and Tashkent), 16h. (Istanbul, Ksara, and Tiflis), 17h. (Tashkent, Frunse, Andijan, Almata, Tchimkent, and Christchurch), 18h. (Rome and New Plymouth), 19h. (Medan, Batavia, Frunse, Tinemaha, Tchimkent, Almata, Andijan, Tashkent, Ksara, Grozny, Irkutsk, Pasadena, Sverdlovsk, and Tacubaya), 20h. (Lick, Sverdlovsk, Weston, Tucson, Sitka, and College), 21h. (New Plymouth, Monowai, Irkutsk, Tashkent, Christchurch, Baku, and Wellington), 23h. (near Tananarive).

Nov. 12d. 6h. 6m. 44s. Epicentre 9°·1S. 124°·5E.

$A = -\cdot5594$, $B = +\cdot8139$, $C = -\cdot1571$; $\delta = +4$; $h = +7$;
$D = +\cdot824$, $E = +\cdot566$; $G = +\cdot089$, $H = -\cdot130$, $K = -\cdot988$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Malabar	E.	16·8	275	e 4 5	PP	i 7 15	+10	i 7 36	SS	—
Batavia		17·7	278	4 9	− 1	i 7 28	+ 2	i 7 44	SS	—
Manila		23·8	352	e 5 27	+12	10 3	SS	—	—	—
Perth		24·1	198	5 18	0	10 3	+29	5 56	PP	13·8
Medan		28·7	295	6 23	PP	i 10 53	+ 3	i 12 27	SSS	—
Adelaide		28·8	156	i 6 4	+ 2	i 11 13	+22	—	—	i 15·2
Brisbane	E.	32·5	127	e 6 40	+ 6	i 11 52	+ 3	i 7 34	PP	—
Melbourne		34·1	150	—	—	i 12 36	+22	i 14 29	SS	—
Riverview		34·7	139	—	—	e 12 28	+ 4	—	—	—
Calcutta	N.	47·4	312	e 11 57	PPP	—	—	—	—	—
Kodaiknal	E.	50·6	293	e 11 36	PP	—	—	—	—	—
Agra	E.	57·7	311	e 9 44	−11	17 37	−16	—	—	—
Bombay		58·1	299	—	—	e 17 41	−17	—	—	—
Frunse		68·8	323	e 11 12	+ 4	—	—	—	—	—
Andijan		69·0	321	e 11 11	+ 2	e 20 6	− 8	—	—	—
Tashkent		71·3	320	i 11 18	− 5	i 20 29	−12	—	—	e 35·3
Tchimkent		71·6	321	e 11 19	− 6	i 20 27	−17	—	—	—
Samarkand		72·0	317	e 11 27	− 1	20 38	−11	—	—	—
Sverdlovsk		83·8	331	i 12 33	+ 1	e 22 52	− 3	—	—	35·3
Tiflis		88·4	313	12 54	− 1	e 23 18	[− 4]	e 23 34	S	45·3
Ksara		93·9	303	11 26	?	e 24 36	+ 7	—	—	—
Pasadena		117·6	56	i 18 53	[+ 5]	—	—	—	—	—
Tucson		124·0	57	i 19 5a	[+ 4]	—	—	—	—	—
Harvard	Z.	143·9	20	e 19 38	[+ 2]	—	—	i 23 15	PP	—
Fordham		144·4	24	i 19 40	[+ 3]	—	—	—	—	—
Weston	Z.	144·9	20	i 19 50	[+12]	—	—	i 23 12	PP	—

Additional readings :—
Perth SS = +11m.26s.
Melbourne i = +15m.18s.
Riverview iN = +19m.2s., iEN = +19m.49s., iE = +20m.2s.
Ksara e = +12m.56s. and +22m.26s.
Pasadena iZ = +19m.9s.
Long waves were also recorded at Baku and Wellington.

Nov. 12d. 14h. 49m. 59s. Epicentre 47°·5N. 153°·5E.

A further revision gives Epicentre 47°·4N. 153°·7E.

$A = -\cdot6069$, $B = +\cdot3026$, $C = +\cdot7350$; $\delta = +12$; $h = -4$;
$D = +\cdot446$, $E = +\cdot895$; $G = -\cdot658$, $H = +\cdot328$, $K = -\cdot678$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mizusawa	E.	12·2	232	e 3 0	+ 2	i 5 5	−11	—	—	—
	N.	12·2	232	e 3 2	+ 4	5 3	−13	—	—	—
Vladivostok		15·8	262	e 1 59	?	i 6 35	− 7	i 3 37	PP	i 8·3
Koti		20·5	234	4 42	0	i 8 42	+15	—	—	10·6
Keizyo		21·8	252	e 4 57	+ 1	8 51	− 1	—	—	e 10·7
Taikyu		21·8	247	e 5 9	+13	—	—	—	—	—
Husan		22·1	245	—	—	e 8 52	− 6	—	—	—
Zinsen		22·1	254	e 5 0	+ 1	e 9 1	+ 3	—	—	12·4
Hong Kong		40·3	245	7 46	+ 6	13 49	0	8 54	PP	20·0
Sitka		42·7	49	e 8 1	+ 1	14 27	+ 3	—	—	e 17·6

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Phû-Lien		46·1	251	e 8 30	+ 2	—	—	—	—	—
Semipalatinsk		46·4	303	e 8 31	+ 1	—	—	—	—	—
Honolulu		46·9	105	—	—	e 15 14	−11	—	—	e 22·2
Almata		51·9	295	e 9 25	+12	—	—	—	—	—
Victoria		53·0	55	e 9 1	−20	e 16 31	−19	—	—	e 25·0
Frunse		53·5	296	e 9 24	0	—	—	—	—	—
Sverdlovsk		53·5	317	i 9 24	0	e 16 56	− 1	—	—	26·0
Andijan		56·1	295	e 9 45	+ 2	e 17 48	PS	—	—	—
Tchimkent		56·9	298	e 10 3	+14	—	—	—	—	—
Calcutta	N.	57·1	268	e 9 47	− 3	i 17 50	+ 5	e 21 48	SS	e 27·8
Ukiah		58·4	65	e 10 16	+16	e 18 1	− 1	—	—	e 24·6
Berkeley		59·8	66	i 10 11	+ 2	e 18 11	− 9	e 24 31	SSS	—
Samarkand		60·0	297	10 12	+ 1	e 18 20	− 3	—	—	—
Agra	E.	61·0	279	10 17	− 1	18 24	−11	10 27	pP	—
Tinemaha	E.	62·7	64	e 10 30	+ 1	—	—	—	—	—
Pulkovo		63·5	332	e 10 35	+ 1	e 19 5	− 2	—	—	e 31·2
Moscow		64·0	325	i 10 38	0	e 19 14	+ 1	—	—	35·5
Medan		64·2	245	11 15	+36	20 33	?	—	—	e 36·0
Mount Wilson		64·7	66	e 10 42	0	—	—	—	—	—
Pasadena		64·7	66	e 10 40	− 2	i 19 20	− 2	—	—	e 26·8
Riverside	Z.	65·3	66	i 10 44	− 2	—	—	—	—	—
La Jolla	Z.	66·1	66	e 10 50	− 1	—	—	—	—	—
Upsala		67·1	338	i 10 57	0	i 19 54	+ 3	e 24 42	SS	e 32·0
Batavia		67·4	231	e 10 57	− 2	i 19 56	+ 1	e 20 7	PS	—
Hyderabad		67·4	271	10 56	− 3	19 52	− 3	—	—	32·0
Baku		69·4	307	i 11 14	+ 2	e 20 25	+ 7	—	—	35·0
Bergen		69·4	344	11 17	+ 5	—	—	—	—	44·0
Grozny		69·4	312	e 11 15	+ 3	e 21 21	PPS	—	—	—
Bombay		70·1	276	i 11 18	+ 2	i 20 29	+ 2	i 21 14	PS	—
Piatigorsk		70·2	314	e 11 11	− 6	—	—	—	—	—
Tucson		70·5	63	11 17k	− 1	i 20 28	− 4	—	—	i 28·8
Tiflis		71·1	312	i 11 24	+ 2	e 20 35	− 3	e 21 20	pS	e 36·0
Copenhagen		72·1	338	11 29	+ 1	20 49	− 1	—	—	34·0
Erevan		72·8	310	e 11 37	+ 5	—	—	—	—	—
Kodaikanal	E.	72·9	267	e 11 33	0	—	—	—	—	—
Theodosia		73·1	319	11 35	+ 1	21 8	+ 7	—	—	50·0
Simferopol		73·7	320	11 39	+ 1	e 20 57	−11	—	—	42·0
Colombo	E.	73·9	262	—	—	e 21 1	− 9	—	—	—
Yalta		74·0	320	11 43	+ 4	—	—	—	—	47·0
Sebastopol		74·2	321	11 48	+ 8	—	—	—	—	—
Hamburg		74·7	339	i 11 44a	+ 1	—	—	—	—	e 36·0
Potsdam		74·9	337	i 11 46	+ 2	e 21 25	+ 3	e 14 55	PP	e 40·0
Edinburgh		75·1	347	—	—	i 21 36	+12	—	—	e 45·0
Göttingen		76·5	338	e 11 55	+ 1	e 21 42	+ 3	—	—	e 41·0
Jena		76·6	336	i 11 54	0	e 21 37	− 3	e 24 21	?	e 32·0
Prague		76·6	335	e 11 54	0	e 21 42	+ 2	—	—	e 36·0
Florissant		77·0	46	e 11 52	− 4	e 21 45	0	—	—	41·0
De Bilt		77·1	341	i 11 59	+ 2	21 48	+ 2	e 27 31	SS	e 40·0
Cheb		77·2	336	e 12 1?	+ 4	e 22 1?	+14	—	—	e 39·0
Bucharest		77·4	324	e 12 1	+ 3	—	—	—	—	42·0
Budapest		77·4	330	12 0	+ 2	21 50	+ 1	—	—	e 44·0
Ottawa		77·9	33	e 21 47	S	(e 21 47)	− 7	(e 31 1)	SSS	43·0
Seven Falls		78·1	29	21 52	S	(21 52)	− 4	e 30 52	SSS	40·0
Uccle		78·6	341	i 12 6a	+ 1	22 2	0	e 27 54	SS	e 36·0
Kew		78·9	344	e 11 46	−21	e 22 6	− 1	—	—	e 40·0
Istanbul		79·0	322	e 11 43	−24	22 37	PS	18 16	PP	e 49·7
Belgrade		79·2	328	i 12 9k	+ 1	—	—	—	—	e 42·3
Stuttgart		79·2	337	i 12 10a	+ 2	e 22 7	− 1	e 23 8	PS	e 39·0
Strasbourg		79·8	338	i 12 13a	+ 1	e 22 19	+ 5	—	—	e 37·5
Sofia		80·0	325	e 12 14	+ 1	e 22 19	+ 2	—	—	—
Paris		80·8	341	e 12 15	− 2	e 22 30	+ 5	—	—	45·0
Triest		80·8	333	12 15	− 2	e 22 26	+ 1	22 58	PS	—
Chur		80·9	337	e 12 19	+ 2	—	—	—	—	—
Williamstown		81·0	32	i 12 16	− 2	—	—	—	—	—
East Machias		81·3	28	e 12 27	+ 7	e 22 32	+ 2	e 23 38	PS	e 41·0

Continued on next page.

		△ °	Az. °	P. m. s.	O−C. s.	S. m. s.	O−C. s.	Supp. m. s.		L. m.
Jersey		81·3	345	e 12 39	+19	e 23 35	PS	—	—	e 42·7
Neuchatel		81·5	337	e 12 22	+ 1	—	—	—	—	—
Ksara		81·6	311	i 12 23a	+ 2	i 22 39	+ 6	i 15 35	PP	38·4
Padova		81·6	334	e 12 27	+ 6	—	—	—	—	—
Harvard		81·9	31	i 12 22	− 1	e 22 33	− 3	—	—	e 45·0
Weston		82·1	31	12 21a	− 3	e 22 23	−15	i 15 37	PP	—
Fordham		82·5	33	e 12 23	− 3	i 22 35	− 7	e 15 35	PP	—
Philadelphia		82·8	36	—	—	e 22 39	− 6	e 28 14	SS	e 38·7
Florence		83·2	333	e 12 42	+13	22 47	− 2	—	—	—
Rome		84·5	331	i 12 37a	+ 1	22 58	− 4	24 13	PS	—
Helwan		87·1	312	i 12 51k	+ 2	23 24	− 4	24 8	PS	—
Wellington		90·4	165	e 13 7	+ 3	i 23 56	− 2	—	—	e 38·0
Toledo		90·7	343	e 13 6	0	—	—	—	—	47·0
Christchurch		92·2	166	e 18 12	PP	e 23 41	[− 4]	—	—	e 48·3
Granada		93·2	342	i 19 34	PPP	i 26 3	PS	—	—	e 51·0
Fort de France		110·7	36	e 19 12	PP	—	—	—	—	—
Huancayo		126·1	65	—	—	e 27 34	{−20}	e 31 39	PS	e 49·8
La Paz	E.	133·9	62	e 19 55	[+36]	—	—	i 22 55	PP	—

Additional readings :—
Vladivostok i = +2m.27s., +2m.51s., +7m.15s., and +7m.31s.
Hong Kong SS = +16m.31s.
Victoria eN = +11m.13s.
Calcutta eSSSN = +23m.42s.
Ukiah eP = +10m.21s.
Berkeley eE = +25m.11s.
Agra SSE = +18m.44s. and +22m.34s.
Medan iE = +17m.40s.
Bombay SSEN = +25m.23s.
Tucson iP = +11m.23s. and +11m.29s., i = +11m.53s. and +12m.7s., iS = +20m.32s., iPKP,PKP = +39m.11s.
Tiflis eSSSZ = +28m.50s., eE = +29m.57s.
Potsdam ePEN = +11m.49s.
Florissant eE = +21m.40s., iN = +25m.17s.
De Bilt iZ = +12m.6s.
Ottawa SS = +35m.37s.
Belgrade iZ = +12m.18s., eNW = +13m.7s.
Stuttgart iZ = +12m.18s.
Ksara PS = +23m.27s.
Weston iP_cPZ = +12m.30s., eSSN = +28m.2s.
Philadelphia eSSS = +31m.36s.
Rome eS = +23m.22s., SS = +28m.37s.
Helwan S = +24m.36s.
Christchurch eEN = +43m.35s., eZ = +44m.51s., eNZ = +48m.19s.
Huancayo eSS = +37m.39s.
Long waves were also recorded at Puy de Dôme, Almeria, Riverview, San Fernando, Bidston, Stonyhurst, San Juan, and Seattle.

Nov. 12d. Further shocks from the neighbourhood of the Epicentre of 9d.16h. were recorded at Mizusawa and Nagoya.

Mizusawa

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
1	32	56	5	21	2(S)	7	46	28	14	35	43
2	3	41(S)	5	49	36(S)	8	3	57	17	6	56
2	31	19	5	57	5	9	3	7	18	50	20(S)
4	13	21	6	9	38	9	15	51(S)	19	35	15
4	46	23(S)	7	13	56	14	16	34(S)	20	32	25(S)

Nagoya

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
4	14	24	8	4	27	14	36	31	19	35	48
5	21	47									

Nov. 12d. Readings also at 1h. (Weston), 3h. (San Javier, Santiago, Irkutsk, Sitka, Tashkent, Sverdlovsk, and Tucson), 4h. (Sverdlovsk, Tashkent, and Baku), 5h. (Mizusawa), 6h. (Batavia), 7h. (Santiago (2) and San Javier), 8h. (Ukiah, Moscow, Victoria, Koti, Rome, Tinemaha, Ottawa, Uccle, Berkeley, San Juan, Pulkovo, Potsdam, Chicago, Kew, Strasbourg, Phu-Lien, Andijan, Pasadena, Riverside (2), Baku, Tashkent (2), Sverdlovsk (2), Weston (2), Tucson (4), Sitka (2), De Bilt, Calcutta, Butte, College (2), East Machias, Prague, Granada, Triest, Philadelphia,

Continued on next page.

Seattle, Copenhagen, Cheb, Agra (2), Tiflis, Ksara (2), and Harvard), 9h. (Tiflis, Calcutta, De Bilt, Baku, Fort de France, Budapest, Edinburgh, Bombay, and Wellington), 10h. (Baku, Tiflis (2), Ksara, Sverdlovsk, near Santiago, Erevan, and Grozny), 11h. (College), 12h. (College and Sitka), 13h. (Erevan, Sverdlovsk, Ksara, Tiflis, Baku, Harvard, Philadelphia, Granada, Tucson, and Weston), 14h. (Piatigorsk, Grozny, and Tiflis), 15h. (Mizusawa, near Zurich, Weston, Tucson, College, Copenhagen, and Tiflis), 16h. (Agra, Tiflis, Cheb, Ksara, Tucson, Sverdlovsk, Mizusawa, Vladivostok, and La Paz), 17h. (Sitka, Sverdlovsk, Tucson, Weston, Philadelphia, Harvard, Seattle, East Machias, and Butte), 18h. (Samarkand, Tiflis, and Tashkent), 19h. (Granada), 20h. (Nagoya, Tashkent, Sverdlovsk, Mizusawa, Copenhagen, and Irkutsk), 21h. (Baku, Tiflis, Granada, and Ksara).

Nov. 13d. 4h. 53m. 13s. Epicentre 10°·3N. 126°·0E.

Intensity VI at Butuan, Dapa, and in the Islands of Mindanao, Samar, and Leyte.

Epicentre 9°·3N. 126°·0E. (U.S.C.G.S.).
10°·0N. 125°·0E. (Bombay).
10°·0N. 126°·0E. (Strasbourg).

See W. C. Repetti.

Manila Central Observatory, Seismological Bulletin for 1938, July-December, Manila, 1939, p. 45.

$A = -\cdot5784$, $B = +\cdot7962$, $C = +\cdot1776$; $\delta = +2$; $h = +6$;
$D = +\cdot809$, $E = +\cdot588$; $G = -\cdot104$, $H = +\cdot144$, $K = -\cdot984$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Manila		6·5	311	i 1 43	+ 4	3 17	+22	—	—	—
Palau		8·9	108	2 43	P*	—	—	—	—	—
Karenko		14·2	343	3 36	PP	—	—	—	—	—
Hong Kong		16·5	318	3 53	− 1	6 42	−16	—	—	8·0
Nake		18·3	10	4 20	+ 3	7 48	+ 9	—	—	—
Phu-Lien		21·4	302	i 4 50	− 1	8 50	+ 5	—	—	—
Kumamoto		22·8	11	5 8	+ 3	—	—	—	—	—
Koti		24·2	15	5 19	0	i 9 30	− 5	—	—	—
Hirosima		24·7	13	5 23	− 1	9 42	− 2	—	—	—
Batavia		25·1	230	5 32	+ 4	i 10 3	+12	—	—	—
Medan		27·9	259	i 5 57	+ 3	i 11 40	+63	i 11 52	SS	—
Vladivostok		33·1	9	i 6 39	− 1	e 11 59	0	—	—	e 14·4
Calcutta	N.	38·0	294	i 7 29	+ 8	i 13 20	+ 6	i 8 41	PP	e 18·2
Perth		43·1	192	i 8 9	+ 5	i 14 31	+ 1	—	—	i 22·9
Irkutsk		45·4	342	i 8 22	0	e 15 1	− 3	10 10	PP	22·8
Colombo	E.	45·7	269	8 23	− 1	15 17	+ 9	—	—	23·1
Brisbane		45·8	145	—	—	e 14 59	−10	e 18 17	SS	—
Adelaide		46·5	166	i 8 31	0	i 15 17	− 2	e 10 54	PPP	21·2
Hyderabad		46·6	285	8 33	+ 1	15 31	+10	10 23	PP	23·9
Kodaikanal	E.	47·4	275	i 8 41a	+ 3	i 15 35	+ 3	i 10 33	PP	24·6
Agra	E.	48·1	298	i 8 40a	− 3	15 33	− 9	8 51	pP	24·4
Riverview		50·0	152	e 9 1	+ 3	e 16 8	− 1	—	—	e 19·8
Melbourne		51·1	161	—	—	i 16 20	− 4	e 20 3	SS	28·1
Bombay		52·0	285	i 9 13k	0	i 16 32	− 4	i 11 13	PP	—
Frunse		55·1	316	e 10 23	+47	—	—	—	—	—
Tashkent		58·4	313	i 9 56	− 4	e 18 0	− 2	—	—	31·8
Tchimkent		58·5	314	9 59	− 1	i 17 59	− 4	—	—	—
Samarkand		59·7	310	10 6	− 3	18 15	− 4	—	—	—
Sverdlovsk		68·0	328	—	—	e 23 25	SS	—	—	30·8
Wellington		68·2	143	—	—	i 19 56	− 8	—	—	e 24·8
Christchurch		68·3	146	i 11 13	+ 8	i 20 4	− 2	24 47	SS	35·1
Baku		72·8	310	i 11 31	− 1	e 20 51	− 7	—	—	36·8
Grozny		75·9	312	e 11 50	0	—	—	—	—	—
Tiflis		76·7	311	i 11 53	− 2	e 21 37	− 4	14 47	PP	e 41·8
Moscow		80·7	325	e 12 14	− 2	e 22 14	−10	—	—	37·3

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Theodosia		83·2	315	e 12 4	−25	—	—	—	—	—
Pulkovo		84·0	330	12 32	− 1	22 48	− 9	—	—	39·3
Simferopol		84·1	315	e 12 26	− 8	—	—	—	—	—
Yalta		84·2	314	e 12 1	−33	—	—	—	—	—
Ksara		84·4	303	i 12 37a	+ 1	e 23 17	+16	i 15 57	PP	—
Helwan		88·9	300	i 12 56	− 2	e 23 37	− 7	e 24 53	PS	—
Cheb		96·8	324	—	—	e 23 47?	[−24]	—	—	e 55·8
Rome		100·1	314	e 13 47?	− 2	e 25 35	+14	17 51	PP	54·8
Pasadena		104·9	50	—	—	e 30 10	?	—	—	e 48·8
Tucson		111·3	49	18 38	[+ 3]	—	—	19 14	PP	49·1
Harvard	z.	125·0	15	i 21 4	PP	—	—	e 22 47	PPP	—
Weston		125·2	15	e 19 2	[0]	i 30 59	PS	i 20 51	PP	e 37·7
Fordham	z.	125·9	17	i 19 6	[+ 2]	—	—	i 20 56	PP	—
Balboa Heights		148·2	53	e 20 2	[+18]	—	—	—	—	—
San Juan		149·1	22	19 47?	[+ 1]	—	—	—	—	—
Fort de France		154·1	16	i 19 56	[+ 3]	e 23 52	PP	—	—	—

Additional readings :—
Batavia PEN = +5m.35s., iS?N = +10m.15s.
Calcutta iSSN = +15m.30s., iSSSN = +15m.57s.
Irkutsk e = +18m.34s.
Hyderabad SSE = +18m.46s.
Kodaikanal ePSE = +16m.44s., eSSE = +19m.36s.
Agra SP = +10m.9s., PPE = +10m.29s., S_cPE = +14m.2s., sSE = +15m.54s., SSE = +18m.45s., sSS = +19m.16s.
Bombay iE = +9m.39s., iEN = +16m.50s., eSSEN = +20m.6s.
Frunse e = +10m.42s. and +18m.54s.
Christchurch iE = +21m.4s., L_qN = +28m.23s.
Tiflis PPE = +14m.50s., eNZ = +22m.52s.
Ksara ePS = +24m.9s.
Helwan i = +13m.7s.
Rome PPP = +20m.4s., SS = +32m.30s.
Tucson iPKP = +18m.47s., iPP = +19m.31s.
Weston eN = +37m.33s.
Long waves were also recorded at Strasbourg, De Bilt, Potsdam, San Fernando, Puy de Dôme, Florence, Paris, Kew, Uccle, Stonyhurst, Belgrade, Edinburgh, Copenhagen, Kelzyo, and Upsala.

Nov. 13d. 13h. 13m. 45s. Epicentre 44°·6N. 149°·4E. (as on 1938 April 2d.).

Strong at Nemuro, Syara; moderate at Kusiro, Hatinohe, Kakioka; slight at Obihiro and Mizusawa.

Epicentre 44°·7N. 149°·4E. Macroseismic radius greater than 300kms. Depth 100kms.

See Seismological Bulletin of the Central Met. Obs., Japan, for the year 1938, Tokyo, 1940, pp. 105-106, Macroseismic Chart p. 105.

$A = -·6149$, $B = +·3637$, $C = +·6998$; $\delta = +10$; $h = -3$;
$D = +·509$, $E = +·861$; $G = -·603$, $H = +·356$, $K = -·714$.

A depth of focus 0·010 has been assumed.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Nemuro	3·0	246	0 45k	− 2	1 18	− 4	—	—	—
Kusiro	4·0	246	1 9k	+ 9	1 14	−32	—	—	—
Ibihiro	4·8	256	1 13	+ 2	2 32	+26	—	—	—
Ootomari	5·1	297	1 11	− 5	2 2	−12	—	—	—
Urakawa	5·4	245	1 28	+ 8	2 34	+13	—	—	—
Haboro	5·5	271	2 16	S	(2 16)	− 7	3 53	?	—
Sapporo	6·0	258	1 30	+ 2	2 36	0	—	—	—
Sikka	6·3	319	1 25a	− 7	2 23	−20	—	—	—
Muroran	6·5	252	1 36a	+ 1	2 47	− 1	—	—	—
Hakodate	6·9	249	1 40	0	3 4	+ 6	—	—	—
Mori	6·9	252	1 40	0	3 2	+ 4	—	—	—
Hatinohe	7·0	237	1 40	− 2	2 55	− 5	—	—	—
Aomori	7·4	242	1 46	− 1	3 6	− 4	—	—	—
Miyako	7·4	230	1 49	+ 2	3 2	− 8	—	—	—
Morioka	7·8	234	1 50	− 2	3 9	−11	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mizusawa		8·2	231	1 58	0	i 3 19	−11	—	—	—
Sendai		9·0	228	2 11	+ 2	—	—	—	—	—
Onahama		10·0	223	2 27	+ 5	4 5	− 8	—	—	—
Utunomiya		10·8	225	2 37	+ 4	4 29	− 3	—	—	—
Kakioka		10·9	223	2 33	− 1	4 27	− 8	—	—	—
Tukubasan		11·0	223	2 35	− 1	4 26	−11	—	—	—
Maebasi		11·3	227	2 43	+ 3	4 41	− 3	—	—	—
Kumagaya		11·4	225	2 39	− 2	4 35	−12	—	—	—
Nagano		11·6	231	2 45	+ 1	5 3	+11	—	—	—
Tokyo		11·6	223	2 41	− 3	4 43	− 9	—	—	—
Wazima		11·8	237	2 36	−10	—	—	—	—	—
Yokohama		11·8	222	2 49	+ 3	4 51	− 5	—	—	—
Matumoto		12·0	230	3 11	PPP	4 58	− 3	—	—	—
Hunatu		12·2	225	2 53	+ 1	4 2	−64	—	—	—
Kohu		12·2	227	2 55	+ 3	—	—	—	—	—
Misima		12·4	224	2 54	0	4 49	−22	—	—	—
Numadu		12·4	224	2 59	+ 5	5 14	+ 3	—	—	—
Osima		12·5	221	2 51	− 5	5 1	−12	—	—	—
Vladivostok		12·7	269	i 2 54	− 4	i 5 31	+13	—	—	5·8
Omaesaki		13·2	224	3 9	+ 4	—	—	—	—	—
Gihu		13·3	231	3 6	0	5 28	− 4	—	—	—
Nagoya		13·4	229	e 4 11	+64	5 44	+10	—	—	—
Ibukisan		13·5	231	3 10	+ 1	—	—	—	—	—
Hikone		13·7	231	3 15	+ 4	—	—	—	—	—
Kameyama		13·9	230	3 20	+ 6	—	—	—	—	—
Kyoto		14·2	232	3 17	− 1	—	—	—	—	—
Toyooka		14·3	236	3 22	+ 3	—	—	—	—	—
Yagi		14·5	231	3 24	+ 2	—	—	—	—	—
Osaka		14·6	232	3 41	PP	6 8	+ 6	—	—	—
Kobe		14·7	233	3 31	+ 7	6 47	SSS	—	—	—
Wakayama		15·1	232	3 31	+ 2	5 50	−24	—	—	—
Sumoto		15·2	232	3 30	0	6 30	+14	—	—	—
Siomisaki		15·4	228	3 42	+ 9	7 0	SS	—	—	—
Tokusima		15·5	232	3 34	0	—	—	—	—	—
Muroto		16·3	231	3 46	+ 2	7 2	+21	—	—	—
Hamada		16·4	240	4 20	PPP	7 33	SS	—	—	—
Koti		16·5	233	e 3 50	+ 3	e 6 15	−31	—	—	—
Hirosima		16·6	238	3 47	− 1	7 4	+16	—	—	—
Ooita		17·8	237	4 11	+ 8	6 45	−30	—	—	—
Taikyu		18·1	248	4 6	0	6 50	−32	—	—	9·3
Izuka		18·2	238	3 57	−11	7 34	+10	—	—	—
Hukuoka B		18·3	238	4 13	+ 4	—	—	—	—	—
Husan		18·3	246	e 4 13	+ 4	e 5 43	?	—	—	—
Keizyo		18·3	254	—	—	e 7 15?	−11	—	—	—
Titizima		18·4	199	4 13	+ 3	7 17	−11	—	—	—
Zinsen		18·5	256	e 4 12	+ 1	—	—	—	—	7·7
Kumamoto		18·7	233	4 16	+ 3	—	—	—	—	—
Miyazaki		18·9	234	4 21a	+ 6	7 44	+ 5	—	—	—
Unzendake		19·0	235	4 18	+ 2	7 51	+10	—	—	—
Tomie		20·0	235	4 29	+ 2	8 2	0	—	—	—
Yakusima		20·5	233	4 41	+ 9	8 28	SS	—	—	—
Dairen		21·4	266	5 28	PP	8 35	+ 7	—	—	—
Nake		22·6	231	5 0	+ 7	9 7	+18	—	—	—
Irkutsk		30·5	301	e 5 4	−62	e 10 52	− 7	i 6 58	PP	16·2
Hong Kong		36·4	244	7 4	+ 7	12 34	+ 4	8 5	PP	—
Manila		38·4	227	7 17	+ 4	13 37	+36	—	—	—
College		39·4	36	7 22	0	e 13 21	+ 5	e 8 55	PP	16·1
Phu-Lien		42·5	250	e 7 48	+ 1	e 14 5	+ 3	—	—	—
Semipalatinsk		45·5	303	e 8 11	0	e 13 40	−65	—	—	—
Sitka		46·7	46	e 8 20	− 1	i 15 10	+ 8	10 10	PP	e 22·4
Honolulu		49·0	100	—	—	e 15 36	+ 2	—	—	e 19·2
Almata		50·6	296	e 8 50	− 1	—	—	—	—	—
Frunse		52·3	296	e 9 4	0	e 15 55	−25	—	—	—
Sverdlovsk		53·6	317	i 9 11	− 2	i 16 33	− 5	—	—	24·2
Calcutta	N.	54·1	267	i 9 26a	+ 9	i 16 55	+11	i 17 20	PS	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Andijan		54·8	295	e 9 22	0	16 58	+ 4	—	—	—
Tchimkent		55·7	298	9 26	− 3	17 7	+ 1	—	—	—
Dehra Dun	N.	56·7	281	—	—	i 17 18	− 1	—	—	e 29·3
Victoria		57·0	53	i 9 31	− 7	i 17 23	0	e 21 51	SS	i 26·5
Agra	E.	58·6	277	i 9 47a	− 2	i 17 43	− 1	18 24	PS	—
Samarkand		58·8	296	e 9 49	− 1	e 17 49	+ 3	—	—	—
Medan		60·3	243	10 13	+12	18 40	PS	—	—	—
Ukiah		62·3	61	e 10 14	0	18 40	+ 9	e 12 46	PP	e 25·9
Batavia		63·4	228	10 23	+ 1	e 18 54	+ 9	—	—	—
Berkeley		63·6	62	i 10 24	+ 1	i 18 55	+ 8	i 26 25	SSS	—
San Francisco	N.	63·6	62	e 10 24	+ 1	e 19 55	PS	—	—	—
Saskatoon		63·6	42	i 10 21	− 2	i 18 51	+ 4	e 19 21	PS	e 31·2
Branner		64·0	62	e 10 29	+ 4	e 19 1	+ 9	—	—	—
Lick		64·3	62	e 10 30	+ 3	e 19 4	+ 8	—	—	—
Butte		64·4	49	e 10 26	− 2	e 19 0	+ 3	—	—	e 26·4
Hyderabad		64·5	269	10 31	+ 2	19 0	+ 2	19 26	PS	31·4
Moscow		64·7	324	e 10 28	− 2	18 56	− 5	—	—	31·7
Pulkovo		64·7	331	10 26	− 4	18 57	− 4	—	—	—
Bozeman		65·4	49	e 10 36	+ 2	e 19 18	+ 9	e 19 43	PS	e 28·1
Fresno		65·9	62	e 10 40	+ 2	e 19 25	+ 9	—	—	—
Tinemaha		66·6	61	i 10 45	+ 3	e 19 35	+11	e 20 24	PS	—
Haiwee		67·4	61	i 10 47	0	i 19 40	+ 6	—	—	—
Santa Barbara		67·4	64	e 10 48	+ 1	e 19 40	+ 6	—	—	—
Bombay		67·5	274	i 10 49	+ 1	i 19 41	+ 6	i 20 31	PS	e 32·8
Pasadena		68·5	63	i 10 55a	+ 1	i 19 53	+ 6	i 20 48	PS	e 28·2
Mount Wilson		68·6	63	i 10 55a	+ 1	e 19 50	+ 2	e 20 53	PS	—
Upsala		68·7	336	i 10 55	0	e 19 43	− 6	e 20 37	PS	e 34·2
Baku		68·8	306	i 10 57	+ 1	i 19 55	+ 5	—	—	33·2
Riverside		69·1	63	i 10 59a	+ 1	e 20 0	+ 6	i 14 14	PP	—
Grozny		69·2	310	11 0	+ 2	e 19 59	+ 4	—	—	—
Kodaikanal	E.	70·0	265	e 11 5	+ 2	i 20 7	+ 3	i 20 38	PS	33·2
La Jolla		70·0	63	i 11 5	+ 2	e 20 12	+ 8	—	—	—
Piatigorsk		70·1	312	e 11 7	+ 3	—	—	—	—	36·1
Colombo	E.	70·6	260	—	—	20 14	+ 3	—	—	39·2
Tiflis		70·8	310	i 11 9	+ 1	20 14	0	15 47	PPP	e 34·2
Bergen		71·3	342	20 15	S	(20 15)	− 4	—	—	41·5
Brisbane	N.	71·8	175	e 11 21	+ 7	i 20 39	+14	—	—	—
Sotchi		72·2	314	e 11 12	− 4	—	—	—	—	—
Theodosia		73·3	317	11 23	0	20 44	+ 2	—	—	43·2
Ivigtut		73·6	9	11 23a	− 1	20 46	+ 1	21 27	PS	34·2
Copenhagen		73·7	336	i 11 24	− 1	20 46	0	16 10	PPP	34·2
Simferopol		74·0	318	11 28	+ 1	20 53	+ 3	—	—	29·2
Yalta		74·3	317	11 31	+ 3	20 57	+ 4	—	—	38·2
Tucson		74·4	60	i 11 31a	+ 2	i 21 2	+ 8	i 14 29	PP	31·2
Sebastopol		74·5	318	11 33	+ 3	21 0	+ 5	—	—	—
Hamburg		76·2	337	i 11 39	0	e 21 19	+ 5	—	—	e 37·2
Potsdam		76·3	335	i 11 39	− 1	i 21 20	+ 5	e 11 57	pP	e 40·2
Edinburgh		77·2	344	—	—	i 21 24	− 1	—	—	e 33·2
Prague		77·9	332	i 11 48a	− 1	e 21 30	− 3	—	—	e 37·2
Durham		78·0	343	i 11 51	+ 2	i 21 38	+ 4	—	—	—
Göttingen		78·0	335	i 11 50	+ 1	e 21 33	− 1	—	—	e 42·2
Bucharest		78·1	322	e 11 51	+ 1	i 21 38	+ 3	14 21	PP	41·2
Jena		78·1	333	e 11 47	− 3	e 21 35	0	e 22 21	PS	e 29·2
Riverview		78·1	178	e 12 15	+25	i 21 50	+15	i 22 22	PS	e 38·1
Sydney		78·1	178	—	—	e 22 15	PS	—	—	—
Budapest		78·4	328	11 51	− 1	21 40	+ 2	—	—	e 36·2
Cheb		78·6	333	e 11 53	0	e 21 42	+ 2	—	—	e 42·2
Kecskemet	Z.	78·7	328	i 11 54	+ 1	i 21 40	− 1	i 14 34	PP	e 46·2
De Bilt		78·9	338	i 11 54a	0	21 44	+ 1	—	—	e 36·2
Stonyhurst		79·0	343	—	—	i 21 45	+ 1	—	—	e 39·2
Istanbul		79·3	319	11 22	−34	22 15	+28	17 15	PPP	50·7
Bidston		79·6	344	i 12 2	+ 4	i 21 55	+ 4	i 22 40	PS	41·2
Belgrade		80·1	325	i 12 1k	0	i 21 57	+ 1	—	—	e 33·3
Uccle		80·3	339	i 12 2a	0	i 21 57	− 1	—	—	e 35·2
Sofia		80·6	322	e 12 3	0	e 22 5	+ 4	—	—	—

Continued on next page.

	Δ °	Az. °	P. m. s.	O−C. s.	S. m. s.	O−C. s.	Supp. m. s.		L. m.
Oxford	80·7	341	11 53	−11	22 41	PS	—	—	e 36·2
Stuttgart	80·7	335	i 12 5a	+ 1	e 22 2	0	e 12 28	PcP	e 40·2
Kew	80·8	341	i 12 5a	+ 1	i 22 6	+ 3	i 12 28	PcP	42·2
Florissant	81·0	43	i 12 5	− 1	i 22 7	+ 2	i 12 29	pP	37·2
St. Louis	81·2	43	e 12 7	+ 1	i 22 10	+ 3	e 12 25	pP	—
Ksara	81·3	309	i 12 9a	+ 2	e 22 16	+ 8	i 15 17	PP	38·6
Strasbourg	81·3	335	i 12 8a	+ 1	i 22 9	+ 1	15 10	PP	e 36·2
Seven Falls	81·6	26	e 12 9	0	i 22 23	+12	—	—	39·2
Ottawa	81·9	30	12 9	− 1	22 15	+ 1	15 17	PP	38·2
Shawinigan Falls	81·9	28	e 12 9	− 1	e 22 19	+ 5	—	—	—
Triest	81·9	331	e 12 9a	− 1	22 12	− 2	27 24	SS	—
Perth	82·1	208	i 8 57	?	i 22 30	+14	i 22 55	PS	—
Zurich	82·1	335	e 12 12a	+ 1	e 22 16	0	—	—	—
Melbourne	82·2	183	—	—	e 22 31	+14	e 23 0	PS	38·4
Basle	82·3	335	e 12 12	0	e 22 30	+12	—	—	—
Chur	82·3	334	e 12 13	+ 1	e 22 18	0	—	—	—
Cape Girardeau	82·6	44	i 12 14	0	e 22 26	+ 5	i 15 29	PP	—
Paris	82·6	339	i 12 12	− 2	e 22 22	+ 1	—	—	37·2
Padova	82·8	331	e 12 21	+ 6	—	—	—	—	—
Neuchatel	82·9	335	e 12 24	+ 9	e 22 24	0	—	—	—
Little Rock	83·2	47	e 12 17	0	i 22 30	+ 3	i 12 27	pP	—
Florence	84·4	331	12 18	− 5	22 38	− 1	—	—	—
Williamstown	85·1	29	i 12 28	+ 2	—	—	—	—	—
East Machias	85·2	25	i 12 28	+ 1	i 22 46	− 1	15 41	PP	e 41·2
Puy de Dôme	85·2	337	e 12 30	+ 3	e 22 40	− 7	—	—	e 38·2
Rome	85·6	329	i 12 29	0	i 23 15	+24	i 29 10	SS	i 43·2
Harvard	85·9	28	i 12 31	+ 1	i 22 47	− 7	i 12 50	pP	e 42·2
Weston	86·1	28	i 12 31a	0	e 22 51	[+ 6]	i 12 40	pP	e 38·0
Fordham	86·5	30	i 12 32a	− 1	i 22 51	[+ 4]	i 12 57	pP	—
Marseilles	86·8	334	12 45	+10	i 23 18	+16	—	—	e 44·2
Philadelphia	86·8	33	i 12 33	− 2	i 22 55	[+ 6]	e 15 58	PP	e 37·5
Georgetown	86·9	33	i 12 26	− 9	e 22 48	[− 2]	e 15 52	PP	—
Helwan	86·9	309	i 12 35	0	23 7	+ 4	13 0	pP	—
Bagnères	88·5	338	e 12 43	0	e 23 23	+ 4	e 24 11	PS	e 41·2
Wellington	88·5	161	e 12 48	+ 5	23 3	[+ 2]	e 13 18	pP	41·2
Columbia	89·3	40	e 12 46	0	e 23 10	[+ 2]	e 16 21	PP	e 36·9
Christchurch	90·2	163	12 29a	−22	23 19	[+ 8]	29 29	SS	42·1
Toledo	92·6	340	e 13 2a	0	e 24 1	+ 6	e 16 28	PP	e 43·1
Algiers	93·4	333	e 13 8	+ 2	e 23 59	− 3	—	—	40·2
Almeria	95·0	337	e 20 0	PPP	e 23 4	[−34]	—	—	e 49·7
Granada	95·0	338	—	—	i 23 52	[+14]	—	—	46·5
San Fernando	96·3	340	e 17 8	PP	i 23 54	[+ 8]	i 26 12	PS	49·7
San Juan	109·4	35	e 18 27	PKP	34 16	SS	e 19 14	PP	e 44·3
Fort de France	114·7	32	i 19 28	PP	e 29 8	PS	e 21 56	PPP	—
Huancayo	129·9	63	e 20 3	[+65]	e 25 47	[−11]	e 21 22	PP	e 51·9
La Paz	137·8	59	e 18 26	[−46]	—	—	i 23 0	PP	66·2
Rio de Janeiro E.	156·1	28	—	—	e 40 15	?	—	—	e 70·7

Additional readings :—
Mizusawa iSN = +3m.22s.
Irkutsk i = +12m.8s. and +13m.18s.
College eS = +13m.49s.
Sitka P = +8m.54s., ePPP = +10m.59s., SS = +18m.42s., iSS = +18m.51s.
Calcutta iN = +19m.2s.
Victoria eE = +19m.45s.
Agra sSE = +18m.4s., ScSE = +19m.56s., SSE = +21m.33s.
Ukiah ePPP = +14m.17s., eSS = +22m.46s.
Berkeley ePEN = +10m.30s., eZ = +29m.25s.
Butte eS = +19m.3s.
Hyderabad SSE = +23m.4s.
Tinemaha eE = +20m.33s.
Bombay iEN = +20m.5s., eSSEN = +24m.34s.
Pasadena iZ = +11m.10s. and +11m.40s., ePKP,PKPZ = +39m.10s., eZ = +40m.24s.
Mount Wilson ePKP,PKPZ = +39m.10s., eZ = +39m.40s.
Riverside ePKP, PKPZ = +39m.10s.
Tiflis iSN = +20m.18s., ePSE = +20m.54s., eSSE = +24m.42s., eSSSN = +28m.51s.
Bergen S = +30m.41s.
Copenhagen +22m.3s.

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Tucson iP = +11m.49s., i = +12m.1s., +12m.43s., +14m.17s., +14m.57s., +15m.4s., +15m.25s., and +15m.47s., iPPP = +15m.59s., iPS = +21m.44s., iPPS = +22m.0s. i = +22m.52s., eSSS = +28m.50s., PKP,PKP = +38m.54s.
Potsdam iZ = +12m.35s., ePPPZ = +16m.9s., eEN = +21m.3s., eE = +21m.33s., iN = +21m.38s., eN = +33m.15s. ?
Durham iSN = +22m.2s.
Bucharest PP?E = +14m.25s., eE = +21m.26s., iPS = +22m.2s., iN = +22m.30s. and +23m.19s., SSN = +26m.25s.
Jena iPN = +11m.50s., eSE = +21m.39s., eE = +22m.31s.
Riverview eE = +12m.43s.
Budapest SE = +21m.43s.
Kecskemet z iP_cP = +12m.4s., e = +13m.27s., iSS = +26m.45s., i = +43m.59s.
De Bilt iZ = +12m.17s.
Bidston i = +12m.26s.
Belgrade iNW = +13m.26s.
Uccle iZ = +12m.24s.
Stuttgart eS_cS = +22m.35s., eSSSS = +32m.3s.
Kew iSEN = +22m.44s.
Florissant iPP = +15m.12s., ipPPZ = +15m.35s., iE = +22m.18s., isSE = +22m.36s., iE = +23m.3s. and +23m.27s.
St. Louis ePPE = +15m.16s., iEN = +22m.45s.
Ksara i = +12m.32s.
Strasbourg e = +22m.36s.
Ottawa SSSN = +30m.51s.
Perth i = +14m.25s.
Melbourne e = +33m.27s.
Cape Girardeau iN = +12m.29s., eN = +23m.7s.
Paris e = +22m.42s.
Little Rock iPP = +15m.32s., isSEN = +22m.55s., iSPEN = +23m.25s.
East Machias ePPP = +17m.33s., S = +23m.13s.
Rome i = +12m.56s., +22m.52s., +24m.27s., i = +33m.8s.
Weston iZ = +12m.46s. and +12m.52s., iN = +13m.12s., iNZ = +15m.26s., iPPN = +15m.55s., ePPPNZ = +17m.42s., eSEN = +23m.8s.
Fordham iZ = +13m.3s., iPP = +15m.45s., iPPP = +17m.47s., iSEN = +23m.24s.
Philadelphia iP = +12m.36s., ePPP = +17m.50s., eSS = +28m.40s., eSSS = +32m.34s.
Georgetown iSN = +22m.55s.
Helwan i = +13m.25s, +14m.30s., and +23m.57s., S = +24m.7s., sS = +24m.57s., i = +26m.5s.
Bagnères e = +23m.38s.
Wellington eZ = +16m.43s., PS = +23m.33s., eSS = +29m.28s., L_q = +36m.33s.
Columbia eS = +23m.31s., ePPS = +25m.3s.
Christchurch i = +23m.49s., iPS = +24m.19s., iNZ = +25m.4s., SSSN = +33m.25s.
Algiers ePP = +14m.54s.
San Fernando SSN = +31m.16s.
San Juan eSSS = +39m.0s.
Fort de France e = +23m.48s.
Huancayo ePP = +21m.45s., PKS = +22m.18s., iPKS = +22m.42s., ePPP = +23m.58s., eSKKS = +28m.2s., SKSP = +31m.36s., ePS = +31m.54s., ePPS = +32m.52s., eSS = +38m.24s., eSS = +39m.6s., ePSPS = +39m.44s., eSSS = +43m.46s.
La Paz ePKP = +19m.12s.
Long waves were also recorded at Cape Town, Malaga, Apia, and Moncalieri.

Nov. 13d. 22h. 31m. 30s. Epicentre 37°·1N. 141°·8E. (as on 1938 Nov. 9d.).

A = −·6283, B = +·4944, C = +·6006; δ = −9; h = −1.

	△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mizusawa	2·1	346	0 37	0	i 1 9	S_g	—	—	—
Nagoya	4·4	245	1 10	0	2 39	S_g	—	—	—
Koti	7·6	245	e 1 46	− 9	e 3 45	S*	4 33	S_g	3·7
Vladivostok	9·7	312	e 2 15	− 7	e 4 35	S*	—	—	5·0
Hukuoka B	9·9	253	e 2 17	− 8	e 5 9	S*	—	—	6·4
Husan	10·5	263	e 3 2	+27	5 8	SSS	—	—	—
Taikyu	10·7	267	2 33	− 5	4 54	SS	—	—	8·4
Syuhurei	11·1	270	e 2 44	+ 1	e 5 25	L	—	—	(5·4)
Keizyo	11·8	277	3 18?	PPP	5 46?	L	—	—	(5·8)
Zinsen	12·1	277	e 3 1	+ 4	5 33	SS	—	—	7·5
Heizyo	12·8	284	i 3 7a	+ 1	e 6 46	L	—	—	(6·8)
Hong Kong	28·0	246	5 50	− 5	10 41	+ 3	6 50	PP	—
Manila	29·1	225	6 5a	+ 1	12 45	SSS	—	—	—
Irkutsk	30·2	312	6 18	+ 4	e 11 19	+ 6	e 7 0	PP	15·5
Phu-Lien	34·7	253	e 6 52	− 1	e 12 21	− 1	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Semipalatinsk		45·1	308	8 22	+ 2	15 4	+ 5	—	—	—
Calcutta	N.	48·0	268	e 8 48	+ 5	i 16 3	+22	i 19 27	SS	e 25·1
Almata		48·8	300	8 48	− 1	—	—	—	—	—
College		48·9	32	e 9 3	+13	e 15 50	− 3	e 19 14	SS	e 20·1
Frunse		50·6	300	e 9 3	+ 1	e 16 27	+10	—	—	30·9
Medan		51·7	241	9 16	+ 5	i 16 40	+ 8	i 17 35	PPS	30·5
Dehra Dun	N.	52·6	283	—	—	e 16 58	+14	—	—	e 28·0
Andijan		52·8	297	e 9 21	+ 2	e 17 4	+17	e 10 11	PP	—
Agra	E.	54·0	279	9 28	0	17 10	+ 7	11 21	PP	—
Batavia		54·1	225	9 24	− 5	e 17 1	− 4	—	—	37·5
Honolulu		54·2	88	e 9 3	−26	—	—	—	—	—
Tchimkent		54·3	300	9 31	+ 1	e 17 24	+17	—	—	—
Tashkent		54·8	299	e 9 23	−11	i 17 23	+ 9	—	—	29·5
Sverdlovsk		55·3	319	i 9 39	+ 1	i 17 29	+ 8	—	—	27·6
Sitka		56·1	40	e 9 43	0	17 45	+13	10 23	P_cP	23·4
Hyderabad		58·6	269	10 0	− 1	18 10	+ 6	12 12	PP	29·5
Bombay		62·3	274	e 10 28	+ 2	i 18 58	+ 6	e 12 58	PP	—
Kodaikanal	E.	63·5	263	e 10 32	− 2	e 19 30	+23	e 20 7	PS	31·5
Colombo	E.	63·6	258	e 10 34	− 1	19 27	+19	—	—	39·0
Brisbane	N.	65·1	169	e 10 36	− 9	e 19 6	−21	—	—	—
Victoria		66·3	46	i 11 3	+11	i 19 45	+ 3	23 36	SS	e 28·5
Apia		66·9	129	—	—	20 0	+11	—	—	—
Moscow		67·4	323	e 10 58	− 1	20 3	+ 8	—	—	36·0
Pulkovo		68·3	330	e 11 6	+ 1	e 20 13	+ 7	—	—	e 33·0
Baku		68·4	305	11 7	+ 1	e 20 7	0	—	—	34·5
Grozny		69·6	309	e 11 7	− 6	e 21 7	PPS	—	—	—
Piatigorsk		70·8	312	e 11 36	+16	—	—	—	—	—
Tiflis		71·0	308	11 20	− 2	20 42	+ 5	e 14 32	PP	e 31·5
Riverview		71·1	172	e 11 48	+26	e 20 27	−11	—	—	e 35·7
Sydney		71·1	172	e 18 30?	?	—	—	—	—	—
Ukiah		71·1	55	e 11 38	+16	e 20 45	+ 7	—	—	e 29·7
Erevan		72·0	307	e 11 30	+ 2	—	—	—	—	—
Berkeley		72·4	56	i 11 14	−16	e 20 40	−13	—	—	—
Perth		72·9	203	—	—	i 20 47	−12	i 21 17	PS	i 42·0
Saskatoon		73·0	37	e 11 30?	− 3	e 20 52	− 8	e 29 30?	SSS	31·5
Upsala		73·0	335	e 12 10	+37	e 20 50	−10	e 16 30	PPP	e 33·5
Butte		73·7	43	e 12 5	+27	e 20 43	−25	—	—	e 31·6
Melbourne		74·6	177	—	—	i 21 5	−13	i 21 38	PS	31·6
Theodosia		74·7	315	11 36	− 7	21 26	+ 7	—	—	44·5
Simferopol		75·5	316	e 11 51	+ 3	—	—	—	—	37·5
Tinemaha		75·5	54	e 11 46	− 2	e 21 35	+ 7	—	—	—
Sebastopol		76·0	316	—	—	e 21 38	+ 4	—	—	42·0
Haiwee		76·3	54	e 11 49	− 3	—	—	—	—	—
Mount Wilson		77·3	57	e 11 43	−15	—	—	—	—	—
Pasadena		77·3	57	e 11 47	−11	e 21 38	−10	—	—	e 31·7
Copenhagen		78·0	334	12 1	− 1	22 0	+ 5	15 24	PP	—
La Jolla		78·7	57	e 12 7	+ 1	—	—	—	—	—
Bucharest		80·2	319	e 13 2	+48	22 19	0	15 40	PP	45·0
Potsdam		80·3	332	e 12 6	− 8	e 22 18	− 2	e 15 6	PP	—
Hamburg		80·6	334	e 12 15	− 1	e 22 22	− 1	e 22 49	PS	e 37·5
Istanbul		80·8	316	12 42	+25	24 10	?	16 23	PP	55·5
Aberdeen		81·3	341	—	—	i 23 3	PS	—	—	e 38·2
Ksara		81·4	305	e 12 22	+ 2	e 22 40	+ 9	e 15 32	PP	38·5
Budapest		81·5	325	e 12 10	−11	e 22 40	+ 8	23 18	S_cS	46·5
Kecskemet	Z.	81·6	324	i 11 59	−22	i 22 14	−19	i 15 39	PP	e 54·5
Prague		81·6	329	e 12 0	−21	e 22 34	+ 1	—	—	e 41·5
Ivigtut		81·7	5	—	—	22 51	+17	—	—	36·5
Jena		82·0	331	e 12 22	− 1	e 22 30	− 7	23 30	PS	e 35·5
Göttingen		82·2	332	e 12 20	− 4	e 23 6	+27	—	—	e 43·5
Cheb		82·4	331	e 12 30	+ 5	e 23 7	+26	—	—	e 43·5
Edinburgh		82·7	341	—	—	i 22 49	+ 5	i 23 11	PS	38·5
Belgrade		82·8	321	e 12 19a	− 8	i 21 50	−55	—	—	e 42·5
Sofia		82·8	319	e 12 29	+ 2	e 22 50	+ 5	e 18 6	PPP	—
Tucson		83·3	54	e 12 20	−10	e 22 30	−20	i 16 5	PP	i 34·2
De Bilt		83·4	335	e 12 43	+13	e 22 49	− 2	—	—	e 37·5

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Wellington		83·6	156	e 12 16	−16	e 22 33	−20	e 15 30	PP	41·0
Stonyhurst		84·3	340	—	—	i 23 0	0	i 23 25	PS	39·5
Stuttgart		84·7	330	e 12 42	+ 5	e 22 59	− 5	e 13 19	pP	e 44·5
Uccle		84·8	335	e 12 32	− 5	23 8	+ 3	—	—	e 38·5
Bidston		84·9	340	—	—	i 23 34	PS	—	—	e 36·5
Christchurch	z.	85·0	158	i 12 25a	−13	—	—	—	—	—
Triest		85·3	327	e 12 39	− 1	23 4	[+ 1]	—	—	e 42·0
Strasbourg		85·4	331	e 12 51	+11	e 23 5	[+ 2]	e 16 30	PP	e 39·0
Oxford		85·8	337	i 13 32a	+50	23 6	[0]	—	—	e 35·5
Kew		85·9	337	e 12 41	− 2	i 23 42	PS	e 29 21	SS	e 36·5
Chur		86·1	330	e 12 43	− 1	—	—	—	—	e 46·1
Zurich		86·1	330	e 12 43	− 1	e 23 8	[0]	—	—	—
Basle		86·3	330	e 12 41	− 4	e 23 18	[+ 9]	—	—	—
Helwan		86·9	305	i 12 48a	0	23 26	0	17 1	PP	—
Neuchatel		87·0	330	e 12 47	− 1	—	—	—	—	—
Paris		87·1	335	—	—	e 23 14	[0]	e 24 7	PS	43·5
Florence		87·8	327	12 0	−52	23 18	[0]	—	—	—
Jersey		88·3	338	—	—	e 23 45	+ 6	—	—	e 79·2
Moncalieri		88·4	330	e 13 30?	+35	23 13	[− 9]	—	—	—
Rome		88·8	323	e 12 30	−27	i 23 48	+ 4	i 16 36	PP	e 43·6
Puy de Dôme		89·6	332	—	—	e 23 53	+ 2	—	—	e 44·0
Florissant		90·5	38	e 13 0	− 5	i 23 52	− 6	i 16 12	PP	70·5
St. Louis	E.	90·7	38	—	—	e 23 56	− 5	—	—	e 37·9
Ottawa		91·2	25	c 13 54	+46	e 24 0	− 5	e 17 0	PP	37·5
Seven Falls		91·2	21	—	—	e 24 0	− 5	—	—	e 36·5
Vermont		92·8	24	—	—	e 24 0	[+11]	—	—	e 37·8
Bagnères		92·9	333	—	—	e 23 49	[0]	e 24 52	PS	e 42·5
East Machias		94·3	20	e 19 17	PPP	e 24 22	−10	e 26 15	PS	e 44·6
Harvard		95·1	23	—	—	e 24 50	+11	e 53 30?	L_q	62·5
Weston		95·3	23	—	—	e 24 53	+12	e 30 37	SS	e 50·5
Fordham		95·8	26	e 14 7	+38	i 24 54	+ 9	e 18 14	PP	—
Philadelphia		96·1	28	e 17 51	PP	(e 24 33)	−15	—	—	e 36·8
Algiers		97·1	327	e 13 30?	− 5	e 26 30?	PS	—	—	45·5
Columbia		98·8	35	e 17 58	PP	e 24 30	[+ 9]	e 19 46	PPP	e 45·0
Almeria		99·3	332	e 18 11	PP	—	—	—	—	e 57·7
Granada		99·4	333	e 20 0	PPP	i 27 2	PS	i 27 59	PPS	e 51·5
San Fernando		101·0	334	—	—	24 35	[+ 3]	e 32 2	SS	49·0
San Juan		118·8	30	—	—	e 30 17	PPS	—	—	36·6
Fort de France		124·1	25	e 20 55	PP	—	—	—	—	—
Cape Town		134·4	256	e 21 45	PP	—	—	—	—	—
Huancayo		138·4	63	e 18 52	[−35]	26 14	[−22]	e 21 36	PP	c 52·9
La Paz		146·5	60	19 38	[− 4]	41 55	SS	—	—	69·5
La Plata		163·9	87	24 30	PP	32 18	{+46}	29 48	SKP	84·7
Rio de Janeiro	E.	165·2	18	e 24 50	PP	—	—	—	—	e 45·7

Additional readings :—
Koti eE = +3m.49s., eEN = +4m.53s.
Hong Kong SS = +12m.20s.
Irkutsk e = +12m.45s.
Calcutta iSSSN = +20m.51s.
Agra pPPE = +11m.43s., SSE = +20m.51s., sSSE = +21m.30s.
Batavia SE = +17m.10s.
Sitka S_cS = +19m.39s.
Hyderabad PSE = +18m.36s., SSN = +21m.42s.
Bombay P_cPEN = +11m.6s., iEN = +20m.0s. and +20m.10s., eSSE = +22m.55s.
Kodaikanal iSSE = +24m.9s., iSSSE = +26m.30s.
Victoria eE = +20m.48s., eN = +21m.36s.
Tiflis eSN = +21m.6s., eSSSN = +26m.12s.
Riverview S?E = +20m.36s.
Berkeley eEN = +30m.40s., eZ = +32m.40s.
Perth i = +27m.28s.
Upsala eN = +21m.30s.
Pasadena eN = +12m.5s.
Copenhagen PPP = +17m.18s., e = +22m.24s., SS = +27m.6s.
Bucharest eE = +14m.16s., eEN = +15m.0s., eE = +16m.27s., SKKSEN = +22m.49s., SEN = +23m.9s., PSE = +24m.10s., eE = +28m.0s. and +28m.26s.
Potsdam e = +17m.30s.?, eZ = +20m.30s.?, eE = +21m.30s.?, eNZ = +27m.30s.?
Istanbul PPP = +18m.44s.

Continued on next page.

Budapest PE = +12m.43s., eE = +16m.2s., S_cSN = +23m.18s., PSN = +23m.56s., eE = +24m.2s., iN = +24m.56s.
Kecskemet z. iP_cP = +12m.10s., i = +15m.18s., e = +21m.18s., e = +26m.17s. and +29m.39s.
Jena eZ = +12m.42s., eN = +13m.10s., eE = +16m.12s., eN = +24m.6s.
Edinburgh i = +23m.1s.
Belgrade iZ = +12m.46s. and +13m.2s., iNE = +16m.14s.
Tucson P = +12m.23s., iP = +12m.28s. and +12m.43s., iPPP = +17m.10s., S = +22m.34s., S_cS = +22m.49s., iPS = +23m.4s., iSS = +27m.56s., iSSS = +31m.30s.
De Bilt iZ = +12m.52s.
Wellington iZ = +12m.57s., eZ = +13m.15s., e = +22m.59s. and +23m.29s., SS = +28m.1s.
Stonyhurst i = +23m.10s., e = +29m.3s.
Stuttgart ePP = +16m.24s., eS = +23m.23s., eSS = +28m.43s.
Uccle e = +29m.41s.
Bidston eSSS = +33m.9s.
Strasbourg eZ = +13m.32s., iE = +23m.40s., SS = +29m.30s.
Oxford i = +20m.6s.
Kew eSSSEN = +32m.59s., eE = +33m.23s.
Zurich eS = +23m.35s.
Helwan i = +13m.21s., +13m.30s., +16m.18s., and +16m.36s., e = +18m.5s. and +22m.15s., S = +24m.55s., PS = +26m.10s., PPS = +27m.20s.
Rome iZ = +18m.44s., +22m.53s., +25m.14s., and +26m.46s., iSS = +29m.46s., i = +30m.27s., SSS = +34m.7s.
Florissant eZ = +13m.38s., iPPPZ = +17m.15s., iN = +24m.9s.
Ottawa eE = +24m.16s. and +30m.30s.
Vermont eS = +24m.10s.
Bagnères eSSS = +33m.27s.
East Machias S = +24m.52s., ePPS = +27m.4s.
Weston eSSSE = +35m.7s.
Fordham eZ = +21m.51s., eN = +24m.16s.
Philadelphia S is given as PPS.
Columbia eSSS = +36m.31s.
Cape Town iE = +22m.43s., iN = +23m.15s.
Huancayo ePP = +21m.53s., ePKS = +22m.42s., PKS = +23m.20s., iPPP = +23m.58s., eSKKS = +27m.45s., SKSP = +31m.10s., ePS = +31m.55s., PPS = +32m.54s., i = +35m.59s., eSS = +39m.19s., ePSPS = +40m.2s. , i = +41m.37s., SSS = +43m.11s.
La Paz iZ = +20m.35s.
Long waves were also recorded at Bergen, Toledo, Marseilles, Padova, Durham, Karlsruhe, Yalta, Bozeman, San Francisco, Branner, and Lick.

Nov. 13d. Further shocks from the neighbourhood of the epicentre of 22h. were recorded at Mizusawa and Nagoya.

Mizusawa

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
2	4	6	8	17	19(S)	14	56	5	22	59	59
5	11	48	9	40	34	18	8	1	23	14	57
5	41	10	10	8	14	20	51	15	23	21	59
6	37	12	11	31	35	21	37	21	23	33	19
7	0	12	12	32	40	22	14	33			

Nagoya

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
1	20	12	14	57	39	23	0	18	23	22	40
11	32	14	20	51	50	23	15	38	23	33	42

Nov. 13d. Readings also at 0h. (Sverdlovsk, Tashkent, and Fordham), 1h. (Nagoya, Keizyo, and Granada), 2h. (Samarkand), 3h. (Vladivostok, Mizusawa, Irkutsk, Agra, Baku, Tiflis, Pulkovo, Cheb, Rome, Potsdam, Copenhagen, Granada, Sverdlovsk, Ksara, Tashkent, and Malabar), 4h. (Tashkent), 5h. (Riverview, Tucson, and Wellington), 7h. (Brisbane, Harvard, College, Tinemaha, Haiwee, Philadelphia, Tucson, Tashkent, Sitka, Sverdlovsk, Riverside, Mount Wilson (2) and Pasadena (2)), 8h. (Sitka), 10h. (Ksara), 11h. (Neuchatel and La Paz), 12h. (Santiago), 15h. (Phu-Lien and Sydney), 16h. (Mizusawa, Fort de France, Ksara, Pasadena, Mount Wilson, Riverside, Malabar, Granada, and Tucson), 17h. (Huancayo, La Paz, and Wellington), 21h. (Mount Wilson and Tucson), 23h. (near Malabar).

Nov. 14d. 2h. 36m. 16s. Epicentre 37°·5N. 143°·0E. (as on 1938 Nov. 10d.).

$A = -\cdot6352$, $B = +\cdot4786$, $C = +\cdot6062$; $\delta = +2$; $h = -1$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mizusawa	E.	2·2	318	i 0 43	P_g	i 1 31	+25	—	—	—
	N.	2·2	318	i 0 45	P_g	i 1 33	+27	—	—	—
Nagoya		5·4	246	1 22	− 2	2 37	+ 9	—	—	—
Koti		8·7	246	2 4	− 6	4 57	S_g	—	—	—
Vladivostok		10·2	307	i 2 31	0	e 4 40	+13	—	—	i 5·3
Hukuoka B		11·0	253	e 2 39	− 3	—	—	—	—	—
Husan		11·5	262	e 3 4	PPP	e 5 6	+ 7	—	—	—
Taikyu		11·7	266	2 49	− 2	e 5 17	+13	—	—	7·8
Keizyo	E.	12·7	275	3 3	− 2	e 5 30	+ 2	—	—	7·1
Zinsen		12·8	275	e 3 7	+ 1	—	—	—	—	8·1
Heizyo		13·7	281	e 3 18	0	6 39	−13	—	—	—
Zi-ka-wei	N.	18·9	256	e 4 22	− 2	—	—	—	—	—
Hong Kong		29·1	248	5 59	− 5	10 50	− 6	12 51	SS	16·0
Irkutsk		30·7	312	e 6 20	+ 1	e 11 24	+ 3	e 7 0	PP	15·7
Phu-Lien		35·6	253	e 6 58	− 3	e 12 35	− 3	—	—	—
Calcutta	N.	49·0	269	e 8 39	−11	i 16 9	+14	e 19 44	SS	e 24·8
Frunse		51·2	299	e 9 1	− 6	—	—	—	—	—
Andijan		53·5	297	e 9 24	0	e 17 26	PPS	—	—	—
Agra	E.	54·9	279	9 30	− 5	17 7	− 9	11 27	PP	—
Tashkent		55·5	299	i 9 41	+ 2	i 17 25	+ 1	—	—	27·9
Sverdlovsk		55·6	319	i 9 41	+ 1	i 17 29	+ 4	—	—	26·7
Samarkand		57·7	298	e 8 27	?	—	—	—	—	—
Bombay		63·2	274	e 10 31	− 1	e 19 4	+ 1	e 19 11	PS	—
Moscow		67·6	324	11 1	0	19 59	+ 2	—	—	37·2
Pulkovo		68·4	330	e 11 6	0	e 20 8	+ 1	—	—	36·2
Baku		69·0	305	e 11 14	+ 5	e 20 20	+ 6	—	—	34·7
Grozny		70·0	309	e 11 27	+12	—	—	—	—	—
Tiflis		71·5	308	e 11 24	0	e 20 44	+ 1	—	—	e 37·7
Erevan		72·6	308	e 11 33	+ 2	—	—	—	—	—
Yalta		76·1	316	e 11 9	−42	—	—	—	—	—
Mount Wilson	Z.	76·3	57	e 11 55	+ 3	—	—	—	—	—
Pasadena		76·3	57	e 12 3	+11	—	—	—	—	e 32·2
Copenhagen		78·1	334	—	—	22 3	+ 7	—	—	43·7
Potsdam		80·4	332	e 12 14	− 1	e 22 32	+11	—	—	e 41·7
Bucharest		80·5	320	—	—	22 25	+ 3	—	—	e 47·7
Ksara		81·9	306	e 12 25a	+ 2	e 22 46	+10	e 15 33	PP	37·7
Tucson		82·3	55	12 28	+ 3	—	—	e 15 40	PP	40·4
Cheb		82·5	331	e 13 44?	?	e 22 44?	+ 2	—	—	e 44·7
De Bilt		83·5	336	—	—	e 22 58	+ 6	—	—	e 42·7
Stuttgart		84·8	331	e 12 49	+12	e 23 4	− 1	—	—	e 45·7
Triest		85·5	327	e 12 43	+ 2	e 23 4	[0]	—	—	—
Strasbourg		85·5	332	e 13 20	+39	e 23 14	+ 2	—	—	e 45·7
Helwan		87·4	306	e 16 20	PP	e 23 32	+ 2	—	—	—
Rome		89·0	324	12 53	− 5	24 11	+26	i 16 49	PP	48·1
Ottawa		90·4	27	—	—	e 24 2	+ 4	—	—	e 46·7
Seven Falls		90·5	23	—	—	e 23 56	− 3	—	—	44·7
La Paz	Z.	145·5	61	19 47	[+ 7]	—	—	—	—	—

Additional readings :—
Irkutsk e = +6m.36s. and +13m.26s.
Calcutta eSSSN = +21m.16s.
Agra SSE = +20m.55s.
Tiflis eN = +33m.49s.
Ksara ePS = +23m.33s.
Tucson iP = +12m.39s.
Helwan i = +16m.50s.
Rome i = +19m.58s.
Long waves were also recorded at Kew, Kecskemet, Budapest, Paris, Granada, Stonyhurst, Göttingen, Hamburg, Florence, Edinburgh, Belgrade, Toledo, San Fernando, Uccle, Prague, and Huancayo.

Nov. 14d. 11h. 54m. 47s. Epicentre 40°·5N. 43°·0E.

$A = +·5577$, $B = +·5201$, $C = +·6469$; $\delta = +1$; $h = -2$;
$D = +·682$, $E = -·731$; $G = +·473$, $H = +·441$, $K = -·763$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Erevan	1°·2	105	0 12	−12	0 23	−18	—	—	—
Tiflis	1·8	48	i 0 29	− 3	—	—	—	—	0·9
Grozny	3·4	36	e 1 1	P*	—	—	—	—	—
Piatigorsk	3·6	1	e 1 9	P_g	i 1 41	− 1	i 1 51	S*	—
Sotchi	3·9	322	1 19	P_g	e 2 5	S*	e 2 10	S_g	—
Baku	5·3	89	e 1 27	+ 5	i 2 15	−10	i 3 4	S_g	3·7
Theodosia	7·2	312	e 1 53	+ 4	—	—	—	—	—
Yalta	7·6	304	e 1 53	− 2	—	—	—	—	—
Simferopol	7·9	307	2 5	+ 6	4 6	S*	—	—	—
Sebastopol	8·1	304	e 2 21	P*	—	—	—	—	—
Ksara	8·8	223	e 2 55	+44	e 4 7	+ 9	4 42	S*	—
Moscow	15·7	349	e 3 47	+ 3	—	—	—	—	8·8
Samarkand	18·4	85	e 4 5	−13	—	—	—	—	—
Tashkent	19·8	77	e 5 13	PPP	e 8 13	0	—	—	e 10·2
Sverdlovsk	19·9	30	i 4 31	− 5	8 15	0	—	—	10·7
Tchimkent	20·0	76	e 4 32	− 5	—	—	—	—	—
Andijan	22·2	80	e 4 58	− 2	e 9 8	+ 8	—	—	—
Frunse	23·6	74	e 5 10	− 3	—	—	—	—	—
Cape Town	77·5	201	—	—	e 24 13?	?	—	—	—

Additional readings:—
Erevan i = +15s.
Grozny iP* = +1m.7s., i = +1m.12s.
Simferopol e = +3m.1s.
Moscow e = +3m.58s.
Andijan e = +8m.12s.
Long waves were also recorded at Copenhagen, Pulkovo, De Bilt, Helwan, and Cheb.

Nov. 14d. 12h. 6m. 7s. Epicentre 6°·1S. 150°·5E. (as on 1938 Oct. 4d.).

Intensity V at Rabaul and Kokopo (New Guinea, New Britain).

Epicentre 4°·5S. 150°·5E. (Strasbourg).
7°·5S. 148°·0E. (Wellington).

See "Annales de l'Institut de Physique du Globe de Strasbourg, 1938," Tome III, 2e partie Seismologie Mende, 1941, p. 106.

$A = -·8655$, $B = +·4897$, $C = -·1055$; $\delta = +3$; $h = +7$;
$D = +·492$, $E = +·870$; $G = +·092$, $H = -·052$, $K = -·994$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Brisbane	21·4	174	i 4 53	+ 2	i 8 53	+ 8	—	—	—
Riverview	27·6	178	e 6 3	+12	e 10 38	+ 6	6 50	PP	e 14·6
Sydney	27·6	178	e 5 53	+ 2	e 10 51	+19	—	—	—
Melbourne	32·0	189	e 7 5	+35	11 48	+ 6	i 13 48	SS	16·2
Manila	35·8	306	e 6 46	−17	10 44	?	—	—	13·2
Apia	37·9	103	—	—	12 53?	−20	—	—	—
Karenko	41·1	317	7 50	+ 3	—	—	—	—	—
Yakusima	41·1	334	7 49	+ 2	—	—	—	—	—
Wellington	41·2	152	e 7 50	+ 2	i 13 59	− 3	9 15	PP	19·8
Perth	41·3	227	14 11	S	(14 11)	+ 7	i 17 0	SS	18·7
Taityu	41·8	316	7 57	+ 4	—	—	—	—	—
Miyazaki	41·9	336	7 55	+ 1	14 7	− 6	—	—	—
Christchurch	42·1	156	i 8 10a	+15	14 26	+10	i 9 54	P_cP	20·4
Koti	42·6	338	e 8 0	+ 1	e 14 23	0	—	—	—
Nagoya	43·0	345	e 7 41	−22	—	—	—	—	—
Kobe	43·1	342	8 1	− 3	15 3	+33	—	—	—
Gihu	43·3	345	8 5	0	—	—	—	—	—
Batavia	43·4	268	8 58	+52	i 14 26	− 9	—	—	25·9
Hirosima	43·7	338	8 2	− 6	—	—	—	—	—
Hong Kong	45·4	309	8 31	+ 9	15 23	+19	18 23	SS	20·9

Continued on next page.

		Δ °	Az. °	P. m. s.	O−C. s.	S. m. s.	O−C. s.	Supp. m. s.		L. m.
Husan		45·7	335	8 26	+ 2	10 20	PP	—	—	—
Mizusawa		45·8	350	(8 56)	+31	8 56	P	—	—	—
Zinsen		48·7	334	8 48	0	e 15 48	− 2	—	—	19·8
Phu-Lien		50·7	303	e 9 7	+ 4	—	—	—	—	—
Vladivostok		51·8	343	i 9 8	− 4	e 16 17	−16	i 16 44	PS	25·1
Medan		52·6	280	e 9 55	+37	17 41	+57	10 57	PP	e 31·9
Calcutta	N.	67·1	297	e 13 17	PP	e 20 32	PPS	e 15 8	PPP	28·6
Irkutsk		70·1	332	11 15	− 1	e 20 29	+ 2	—	—	30·9
Colombo	E.	71·6	279	e 11 14	−11	20 49	+ 5	—	—	34·7
Agra	E.	77·4	300	11 53	− 5	21 38	−11	12 4	pP	35·5
Bombay		80·4	290	e 12 13	− 2	e 22 35	+14	—	—	—
College		83·9	32	e 12 12	−21	e 22 50	− 6	e 23 4	S_cS	39·9
Tashkent		87·4	312	—	—	e 23 25	− 5	e 24 46	PS	e 33·2
Tchimkent		87·4	313	—	—	e 24 35	PS	—	—	—
Ukiah		90·9	51	—	—	e 24 0	− 3	—	—	e 41·2
Berkeley		91·5	52	i 13 5	− 5	e 23 23	[−19]	—	—	e 42·0
Victoria		92·0	42	—	—	e 24 53	PS	e 30 23	SS	e 41·9
Pasadena		94·5	56	i 13 21a	− 2	e 24 0	[+ 2]	e 25 45	PS	e 38·6
Mount Wilson		94·6	56	i 13 22a	− 2	—	—	e 17 4	PP	—
Tinemaha		94·6	54	e 13 21	− 3	—	—	—	—	—
Haiwee		94·8	54	e 13 21	− 4	—	—	—	—	—
Sverdlovsk		95·0	326	13 23	− 3	i 24 11	[+10]	e 17 14	PP	37·9
Riverside		95·1	56	i 13 24a	− 2	—	—	e 17 6	PP	—
La Jolla		95·2	57	i 13 25a	− 2	—	—	—	—	—
Tucson		100·6	58	i 13 49a	− 2	i 24 32	[+ 2]	i 17 52	PP	i 41·7
Baku		102·0	310	—	—	e 27 28	PS	—	—	47·4
Tiflis		105·8	312	—	—	e 26 53	+44	—	—	e 40·9
Moscow		107·8	327	i 18 50	PP	e 25 16	[+13]	e 28 16	PS	53·9
Pulkovo		110·1	332	19 9	PP	28 53	PS	—	—	52·4
Ksara		113·8	303	e 18 22	[−18]	e 26 42	{+11}	i 19 41	PP	57·9
Upsala		115·6	335	—	—	e 29 53?	PS	—	—	—
Helwan		118·2	300	—	—	e 32 2	?	e 35 56	SS	—
Cape Town		119·6	226	—	—	e 36 53?	SS	—	—	58·9
Copenhagen		120·4	334	20 23	PP	30 5	PS	—	—	53·9
Potsdam		122·2	331	e 20 29	PP	—	—	e 23 53?	PPP	e 65·9
Ottawa		124·0	37	—	—	e 30 21	PS	—	—	e 36·9
De Bilt		126·0	334	e 20 53?	PP	—	—	—	—	e 52·9
Edinburgh		126·1	342	—	—	e 41 53?	SSS	—	—	e 69·9
Stuttgart		126·4	329	e 19 5	[+ 1]	—	—	e 21 3	PP	e 64·9
Strasbourg		127·2	329	e 20 47	?	e 31 23	PS	i 20 58	PP	e 61·9
Uccle		127·3	333	e 19 8	[+ 2]	e 32 53?	PPS	e 38 53?	SS	e 58·9
Fordham		127·4	41	i 19 4	[− 2]	—	—	—	—	—
Weston		128·3	38	—	—	e 38 37	SS	—	—	e 53·3
East Machias		129·3	34	—	—	e 38 11	SS	—	—	e 53·7
Huancayo		131·0	111	e 19 30	[+16]	e 27 22	[+60]	e 21 47	PP	—
Jersey		131·2	338	e 19 56	[+42]	e 28 8	{−18}	e 25 3	PPP	e 50·9
La Paz		135·7	121	22 54	PP	—	—	—	—	66·9
Toledo		139·4	329	e 19 34	[+ 5]	—	—	—	—	69·9
Granada		141·1	326	23 2	PP	i 29 3	{−24}	—	—	—
San Juan		142·3	67	e 19 23	[−11]	—	—	e 23 15	PKS	63·1
San Fernando		143·0	328	—	—	e 42 26	SSP	—	—	77·4
Fort de France		147·7	72	i 19 46	[+ 3]	—	—	—	—	—
Rio de Janeiro	E.	148·2	155	—	—	e 47 53	SSS	—	—	e 75·9

Additional readings :—
Brisbane ePE = +4m.59s.
Riverview eE = +6m.20s., eSE = +10m.41s.
Melbourne i = +9m.38s. and +12m.4s.
Wellington iZ = +8m.1s., i = +9m.35s. and +14m.12s., SS = +17m.20s., L_q = +17m.24s., S_cS? = +18m.15s.
Perth PP = +14m.21s., S = +17m.10s., iS = +17m.20s., i = +17m.45s.
Christchurch iP_cS = +14m.14s., L_qE = +17m.16s., iS_cS = +17m.45s.
Vladivostok iSS = +20m.13s.
Medan PEN = +10m.30s., iE = +18m.2s.
Calcutta eSSN = +23m.56s., eSSSN = +25m.19s.
Agra sSE = +21m.59s., PS?E = +22m.29s., SSE = +26m.59s.
Tashkent eSS = +29m.29s.
Ukiah eS = +24m.21s.

Continued on next page.

Berkeley eE = +24m.3s.
Victoria eE = +33m.59s.
Sverdlovsk iPS = +26m.23s., iPPS = +26m.49s., iSS = +31m.17s., eSSS = +34m.53s.
Tucson iPP = +17m.55s., S = +24m.55s., iPS = +26m.18s., and +26m.45s., SS = +31m.43s., iSSS = +36m.39s.
Helwan e = +32m.58s.
Ksara ePS = +29m.36s., eSKKP = +32m.28s.
Strasbourg i = +21m.25s.
Huancayo iPKS = +22m.44s., ePPP = +24m.30s., ePPS = +33m.35s., eSS = +38m.55s., ePSPS = +39m.50s.
Jersey eS = +29m.58s.
Granada i = +28m.35s.
San Fernando ePSN = +51m.2s.
Fort de France e = +22m.6s.
Long waves were also recorded at Harvard, Philadelphia, Vermont, and other European stations.

Nov. 14d. 12h. 6m. 34s. Epicentre 40°·5N. 43°·0E. (as at 11h.).

$A = +\cdot5577$, $B = +\cdot5201$, $C = +\cdot6469$; $\delta = +1$; $h = -2$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Erevan	1·2	105	0 23	− 1	0 33	− 8	i 0 25	P_g	—
Tiflis	1·8	48	e 0 38	P_g	—	—	—	—	i 1·0
Grozny	3·4	36	e 1 8	P_g	i 1 48	S_g	—	—	—
Piatigorsk	3·6	1	e 1 20	P_g	i 1 58	S_g	—	—	—
Sotchi	3·9	322	e 1 22	P_g	e 2 13	S_g	—	—	—
Baku	5·3	89	e 2 12	+50	i 3 12	+47	—	—	3·9
Theodosia	7·2	312	2 7	P*	—	—	—	—	—
Yalta	7·6	304	2 9	P*	—	—	—	—	—
Simferopol	7·9	307	e 2 24	P*	e 4 21	S_g	—	—	—
Moscow	15·7	349	e 3 57	+13	—	—	e 4 14	PPP	7·9
Samarkand	18·4	85	e 4 21	+ 3	—	—	—	—	—
Sverdlovsk	19·9	30	4 41	+ 5	8 26	+11	—	—	11·4
Tchimkent	20·0	76	e 4 41	+ 4	—	—	—	—	—
Pulkovo	20·9	340	e 4 58	+12	—	—	—	—	9·9

Additional readings :—
Tiflis iPNZ = +41s.
Sotchi e = +2m.19s.
Grozny iP* = +1m.14s., i = +1m.19s.
Long waves were also recorded at Copenhagen.

Nov. 14d. Further shocks from the neighbourhood of the epicentre of 13d. 22h. were recorded at Mizusawa and Nagoya.

Mizusawa

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
0	25	56	2	25	41	5	19	35	7	29	55(S)
0	31	55	2	51	7	5	46	57	7	56	31
0	44	28	3	13	2	6	36	44	8	58	17
1	0	20	4	15	47	6	51	56	13	35	35
1	17	34	4	30	6(S)	6	56	3(S)	14	24	59
1	58	43	4	39	38 (S)	6	59	55	17	34	47

Nagoya

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
1	1	35	4	16	33	7	0	40	8	58	50
2	51	34	5	47	41	7	56	57	17	35	30
3	13	35									

Nov. 14d. Readings also at 1h. (Colombo and Malaga), 2h. (Tacubaya), 4h. (Frunse Andijan, Koti, Sverdlovsk, and Tashkent), 5h. (Granada, Sverdlovsk (2), Tashkent, Baku, Tiflis (2), Vladivostok, Irkutsk, Fort de France, Ksara, and Helwan), 6h. (Tashkent, Moscow, Copenhagen, Pulkovo, Baku, and Ksara), 7h. (Irkutsk, Tiflis, Tashkent, Sverdlovsk, Mount Wilson, Riverside, Tucson, College, and Baku), 8h. (Apia, Ksara, Mount Wilson, Tucson, Helwan, and Pasadena), 9h. (Fort de France), 11h. (Cheb, Sofia, and Bucharest), 12h. (Medan, Batavia, Malabar, Sofia, and Ksara), 13h. (Ksara, Nagoya, Sotchi (2), Erevan (2), Tiflis (2), Grozny, and Sebastopol), 14h. (Nagoya, Sverdlovsk, Vladivostok, Erevan, and Irkutsk), 15h. (near Basle), 16h. (Ksara), 18h. (Ferndale), 19h. (La Paz, Tucson, Huancayo, Riverside, Tinemaha, La Plata, San Javier (3), Erevan, Mount Wilson, Ksara, Pasadena, and Santiago (3)), 20h. (Tiflis, Grozny, Tashkent, and Sverdlovsk), 22h. (Rathfarnham Castle, Fresno, Branner, Lick, Santiago, Tashkent, and Sverdlovsk).

Nov. 15d. 9h. 51m. 59s. Epicentre 54°·3N. 161°·5W. (as on 1937 May 7d.).

$A = -\cdot5559$, $B = -\cdot1860$, $C = +\cdot8102$; $\delta = +4$; $h = -7$;
$D = -\cdot317$, $E = +\cdot948$; $G = -\cdot768$, $H = -\cdot257$, $K = -\cdot586$.

A depth of focus 0·005 has been assumed.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
College		12·6	28	e 2 52	− 6	e 5 5	−13	—	—	5·3
Victoria		24·3	88	i 5 13	+ 1	i 9 17	− 7	—	—	e 11·0
Seattle		25·3	89	e 6 38	PPP	e 10 19	SS	—	—	e 11·8
Berkeley		31·3	105	e 5 13	−63	—	—	8 13	PPP	—
Branner		31·6	106	e 6 31	+12	—	—	—	—	—
Fresno		33·5	104	e 6 50	+15	—	—	—	—	—
Tinemaha		34·1	102	e 6 44	+ 4	i 12 8	+ 7	i 6 54	pP	—
Haiwee		35·0	102	e 6 54	+ 6	e 12 21	+ 6	—	—	—
Santa Barbara		35·2	106	e 7 2	+12	e 12 12	− 6	—	—	—
Mount Wilson		36·3	104	i 7 0	+ 1	e 12 39	+ 4	i 7 12	pP	—
Pasadena		36·3	104	i 7 0	+ 1	i 12 34	− 1	i 7 11	pP	e 16·6
Riverside		36·8	104	e 7 5	+ 2	e 12 44	+ 2	i 7 17	pP	—
La Jolla		37·7	106	e 7 14	+ 3	e 13 2	+ 6	i 7 27	pP	—
Tucson		41·8	100	i 7 46	+ 1	13 58	+ 1	i 9 17	PP	e 16·6
Vladivostok		43·8	283	e 8 5	+ 4	e 14 37	+10	—	—	21·1
Chicago		48·7	73	—	—	e 15 22	−14	—	—	e 22·9
Florissant		49·2	78	—	—	i 12 39	?	—	—	22·0
Koti		49·2	273	e 8 51	+ 7	—	—	e 9 10	pP	—
St. Louis		49·4	77	e 8 46	+ 1	i 15 39	− 7	—	—	e 27·2
Irkutsk		52·2	310	e 9 7	+ 1	20 45	SS	e 10 59	PP	29·0
Ottawa		52·8	62	9 5	− 6	16 21	−12	—	—	24·0
Seven Falls		54·1	57	e 9 25	+ 5	e 16 37	−13	—	—	28·9
Williamstown		55·9	63	i 9 30	− 4	—	—	i 9 42	pP	—
Fordham		56·9	65	i 9 35k	− 6	i 17 26	− 2	i 9 49	pP	—
Harvard		56·9	62	i 9 37	− 4	—	—	—	—	e 31·0
Weston		57·1	62	i 9 37k	− 5	e 17 11	−19	i 9 49	P_cP	—
East Machias		57·4	58	—	—	e 17 30	− 4	—	—	e 26·2
Columbia		57·9	75	e 10 31	P_cP	e 17 48	+ 7	—	—	e 24·6
Sverdlovsk		64·0	336	i 10 23	− 6	18 58	− 1	—	—	30·0
Pulkovo		65·9	354	e 10 45	+ 4	e 19 30	+ 8	—	—	33·5
Moscow		69·2	348	e 11 0	− 2	20 4	+ 3	—	—	33·5
Copenhagen		70·3	3	11 6	− 3	20 13	− 1	21 25	PS	33·0
Almata		70·8	319	e 11 12	0	—	—	—	—	—
Frunse		72·0	320	e 11 20	+ 1	—	—	—	—	—
Hamburg		72·3	5	e 11 18	− 2	e 37 1	L	—	—	(e 37·0)
De Bilt		73·4	8	11 25	− 2	e 20 48	− 2	e 21 45	PS	e 36·0
Potsdam		73·6	4	e 11 31	+ 3	e 20 55	+ 3	e 11 49	pP	e 32·0
Tchimkent		74·3	323	e 11 27	− 5	—	—	—	—	—
Uccle		74·6	11	e 11 32	− 2	21 1	− 2	i 21 58	PS	e 36·0
Andijan		74·7	321	e 11 37	+ 3	e 20 48	−16	—	—	—
Jena		75·0	5	e 11 33	− 3	—	—	i 11 51	pP	—
Tashkent		75·3	323	11 38	0	e 21 31	+20	e 12 2	pP	e 38·7
Stuttgart		77·0	7	e 11 46a	− 2	e 21 50	+21	e 12 6	P_cP	e 42·0
Strasbourg		77·1	8	i 11 47a	− 1	e 21 50	+20	e 27 5	SS	e 33·0
Basle		78·1	9	e 11 52	− 2	—	—	—	—	—
San Juan		78·4	75	e 12 8	+13	i 21 39	− 5	e 26 42	SS	e 39·8
Zurich		78·4	8	e 11 55	0	—	—	—	—	—
Neuchatel		78·6	9	e 11 55	− 1	—	—	—	—	—
Chur		78·9	8	e 11 57	− 1	—	—	—	—	—
Kecskemet	z.	79·2	0	i 7 59	?	e 23 12	PS	—	—	e 40·1
Grozny		80·0	340	e 12 6	+ 2	—	—	—	—	—
Simferopol		80·2	350	e 12 7	+ 2	—	—	—	—	—
Bucharest		81·5	355	12 13	+ 1	—	—	—	—	—
Tiflis		81·7	341	e 12 17	+ 4	e 22 38	+19	—	—	e 39·0
Baku		81·9	337	12 17	+ 3	e 22 32	+11	—	—	e 41·0

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Calcutta	N.	83·0	299	—	—	e 22 47	+15	—	—	—
Erevan		83·3	341	e 12 20	− 1	—	—	—	—	—
Sofia		83·3	356	e 12 31	+10	—	—	—	—	—
Rome		84·0	4	e 12 22	− 3	22 41	− 1	15 44	PP	40·2
Agra	E.	84·1	309	e 12 28	+ 3	22 48	+ 5	i 12 44	pP	—
Istanbul		84·6	353	e 11 1	?	—	—	—	—	—
San Fernando	N.	87·1	20	—	—	e 23 15	+ 3	—	—	45·5
Ksara		91·0	346	i 13 0	+ 2	e 23 56	+ 8	e 16 34	PP	45·0
Helwan		95·5	348	e 13 19	0	—	—	i 13 40	pP	—
Huancayo		97·4	100	—	—	e 24 1	[+ 3]	e 31 34	SS	e 47·1
Wellington		97·4	198	—	—	e 36 1?	SSS	—	—	e 46·0

Additional readings :—
Berkeley eNZ = +6m.28s.
Pasadena iZ = +13m.5s.
Tucson iP = +7m.56s., i = +7m.59s., +8m.14s., +9m.3s., +9m.43s., and +9m.56s., PPP = +10m.16s., i = +10m.24s., +10m.59s., and +11m.56s., iS = +14m.1s.
Irkutsk e = +12m.26s., +18m.40s., and +24m.47s.
Williamstown i = +10m.39s.
Fordham iZ = +9m.44s. and +10m.2s., iE = +17m.44s., +30m.14s., and +32m.36s.
Weston iZ = +9m.42s. and +10m.56s.
East Machias eS = +17m.44s.
Copenhagen +11m.25s.
De Bilt iZ = +11m.28s.
Potsdam eZ = +14m.1s.
Jena iPE = +11m.55s.
Tashkent e = +16m.23s., eSS = +26m.1s., eSSS = +29m.43s.
Stuttgart eSSS = +31m.1s.
Kecskemet eZ = +8m.16s.
Rome SS = +28m.5s.
Agra iE = +23m.5s.
Ksara ePS = +24m.57s.
Huancayo eS = +24m.50s. and +25m.8s.
Long waves were also recorded at Edinburgh, Puy de Dôme, Melbourne, Bidston, Kew, Perth, Riverview, Honolulu, Granada, and Christchurch.

Nov. 15d. 15h. 21m. 55s. Epicentre 32°·0N. 141°·5E. (as on Nov. 11d.).

A = −·6649, B = +·5289, C = +·5273; $\delta = -13$; $h = +1$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Nagoya		4·9	311	1 22	+ 5	2 40	S_g	—	—	—
Koti		6·9	285	1 55	+10	e 3 30	S*	—	—	—
Mizusawa		7·1	358	e 1 44	− 4	e 2 50	−20	—	—	—
Hukuoka B		9·5	283	e 2 38	+18	—	—	—	—	—
Husan		10·9	290	—	—	e 5 2	S*	—	—	—
Keizyo	E.	13·2	299	3 15	+ 4	—	—	—	—	e 8·3
Zinsen		13·4	298	e 3 17	+ 3	e 6 17	+32	—	—	8·0
Vladivostok		13·5	329	e 3 7	− 8	i 5 38	− 9	—	—	6·3
Manila		25·5	232	e 6 48	PP	11 5	SS	—	—	13·8
Hong Kong		26·1	255	5 52	+15	10 37	+30	—	—	—
Irkutsk		33·7	318	e 6 43	− 2	12 7	− 1	—	—	17·1
Calcutta	N.	47·8	273	e 10 51	PP	—	—	—	—	—
Agra	E.	54·7	283	e 9 23	−10	e 17 4	− 9	20 56	SS	—
Tchimkent		56·7	303	e 9 43	− 5	—	—	—	—	—
Tashkent		57·2	302	i 9 49	− 2	i 17 37	− 9	—	—	e 27·6
Sverdlovsk		59·0	321	10 2	− 2	18 7	− 3	—	—	29·1
Bombay		62·5	276	e 10 29	+ 1	e 19 0	+ 6	—	—	—
Baku		71·2	307	11 27	+ 4	20 39	− 1	—	—	37·1
Moscow		71·4	325	e 11 23	− 1	e 20 37	− 5	—	—	e 38·6
Pulkovo		72·6	330	e 11 39	+ 8	e 20 55	− 1	—	—	36·6
Tiflis		74·0	309	e 11 35	− 4	21 8	− 3	e 21 48	PS	e 36·1
Tinemaha		78·7	54	e 12 7	+ 1	—	—	—	—	—
Haiwee	E.	79·4	54	e 12 16	+ 7	—	—	—	—	—
Pasadena	Z.	80·3	55	i 12 14	0	—	—	—	—	—
Mount Wilson		80·4	55	i 12 14	− 1	—	—	—	—	—

Continued on next page.

		△ °	Az. °	P. m. s.	O−C. s.	S. m. s.	O−C. s.	Supp. m. s.		L. m.
Riverside	z.	81·0	55	i 12 17	− 1	—	—	—	—	—
La Jolla		81·6	57	e 12 21	0	—	—	—	—	—
Copenhagen		82·4	334	—	—	22 37	− 4	—	—	44·1
Ksara		84·2	306	e 12 35	+ 1	e 23 5	+ 6	15 53	PP	—
Istanbul		84·3	317	—	—	23 5?	+ 5	—	—	—
Tucson		86·5	54	i 12 46a	0	—	—	—	—	41·5
Edinburgh		87·4	341	—	—	e 23 29	− 1	—	—	—
De Bilt		87·9	335	—	—	e 23 35	0	—	—	e 46·1
Stuttgart		89·0	331	e 13 35	+37	e 23 41	− 4	—	—	e 49·1
Uccle		89·3	335	—	—	e 23 35	−13	—	—	e 47·1
Strasbourg	z.	89·8	331	e 16 17	PP	—	—	e 24 53	PS	e 52·9
Rome		92·8	324	18 5?	PP	—	—	—	—	49·0
La Paz	z.	149·0	66	19 58	[+12]	—	—	—	—	76·1

Additional readings :—
Agra SSSE = +22m.22s.
Bombay eE = +20m.14s.
Pasadena iZ = +12m.39s.
Ksara eSS = +28m.50s.
Tucson iP = +13m.0s.
Long waves were also recorded at Phu-Lien and other European stations.

Nov. 15d. 19h. Undetermined shock off the coast of Alaska.

Honolulu eP = 20m.22s., eS = 25m.18s., eL = 27·0m.
College S = 20m.43s., iS = 21m.9s., eL = 21·3m.
Tinemaha ePEN = 21m.12s.
Mount Wilson ePZ = 21m.31s.
Pasadena iPZ = 21m.31s., eLZ = 31m.36s.
Riverside iPZ = 21m.35s.
La Jolla eP = 21m.41s.
Bozeman eP = 22m.6s., eL = 29·1m.
Tucson iP = 22m.16s.a, 22m.29s., and 22m.33s., iPcP = 23m.40s.
Butte ePPP = 23m.3s., eS = 27m.30s., eL = 32·3m.
Weston iPZ = 24m.7s., iZ = 24m.15m., eL = 45·0m.
Sverdlovsk iP = 25m.26s., S = 34m.4s., L = 39·0m.
Tashkent e = 26m.20s. and 45m.35s., eL = 56·0m.
Ksara e = 28m.55s. and 39m.16s.
Vladivostok e = 30m.20s. and 30m.30s., L = 42·3m.
Irkutsk e = 36m.0s., L = 42·0m.
Agra eE = 38m.0s.
Long waves were also recorded at Baku, Tiflis, Moscow, and other European and American stations.

Nov. 15d. 21h. 0m. 16s. Epicentre 4°·8S. 98°·9E.

Intensity IV in Central and South Sumatra. Epicentre 4°·8S. 98°·9E. (Batavia).

H. P. Berlage.

Aardbevingen in den Oost Indischer Archipel Waargenomen gedurende het jaar 1938. Natuurkundig Tijdschrift voor Nederlandsch-Indie, Afl. 1 van Deel XCX′ 40 blz. 38-75, p. 71.

$A = -\cdot1549$, $B = +\cdot9845$, $C = -\cdot0831$,; $\delta = +14$; $h = +7$;
$D = +\cdot988$, $E = +\cdot155$; $G = +\cdot013$, $H = -\cdot082$, $K = -\cdot997$.

		△ °	Az. °	P. m. s.	O−C. s.	S. m. s.	O−C. s.	Supp. m. s.		L. m.
Batavia		8·0	100	i 2 5k	+ 5	i 3 34	+ 1	i 3 28	P*	—
Medan		8·3	359	e 2 1	− 3	i 3 37	− 3	3 47	SS	—
Malabar		8·9	106	i 2 20	+ 8	i 3 58	+ 3	—	—	—
Colombo	E.	22·3	301	4 58	− 3	9 3	+ 1	—	—	9·8
Kodaikanal	E.	26·1	305	i 5 36	− 1	i 11 4	+57	—	—	i 13·7
Phu-Lien		26·5	16	e 5 47	+ 6	i 10 15	+ 1	—	—	12·4
Calcutta	N.	29·1	340	i 6 8a	+ 4	i 10 59	+ 3	e 6 50	PP	i 14·0
Manila		29·1	48	e 6 7	+ 3	10 58	+ 2	—	—	14·4
Hyderabad		29·9	318	6 15	+ 3	11 6	− 3	6 57	PP	14·1
Hong Kong		30·8	28	6 24	+ 4	11 26	+ 3	7 14	PP	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Perth		31·3	152	6 29	+ 5	10 48	−43	6 59	PP	13·9
Bombay		34·9	313	i 7 2a	+ 7	i 12 25	− 2	8 18	PP	—
Taito		34·9	37	6 57	+ 2	12 22	− 5	—	—	—
Taityu		35·7	35	7 6	+ 4	—	—	—	—	—
Agra		37·6	329	e 7 17k	− 1	i 12 59	− 9	8 35	PP	—
Dehra Dun	N.	40·2	332	e 7 38?	− 2	e 13 36	−12	i 9 15	PP	e 19·9
Zi-ka-wei	E.	41·7	29	e 6 54	−58	13 14	−56	—	—	—
Nake		44·2	40	7 15	−57	—	—	—	—	—
Yakusima		46·3	38	8 35	+ 6	—	—	—	—	—
Unzendake		47·7	37	8 52	+12	—	—	11 34	PPP	—
Miyazaki		47·8	38	8 42	+ 1	15 33	− 5	—	—	—
Husan		48·7	32	e 8 50	+ 2	e 10 48	PP	—	—	—
Taikyu		49·1	31	e 8 36	−15	e 15 14	−42	—	—	—
Zinsen		49·3	28	e 8 54	+ 1	e 15 58	− 1	10 51	PP	e 23·6
Keizyo		49·6	29	9 2	+ 7	e 16 2	− 1	—	—	29·9
Heizyo		50·2	27	i 8 59a	− 1	e 16 18	+ 7	—	—	24·2
Koti		50·3	38	9 2	+ 2	16 16	+ 3	—	—	—
Muroto		50·4	39	9 2	+ 1	16 17	+ 3	11 9	PP	25·0
Almata		51·8	340	e 9 14	+ 2	—	—	—	—	—
Kobe		52·0	38	9 12	− 1	16 34	− 2	—	—	—
Tananarive		52·0	250	i 9 12	− 1	e 16 39	+ 3	—	—	24·2
Frunse		52·3	338	9 13	− 2	i 16 36	− 4	—	—	32·6
Melbourne		53·2	134	i 9 29	+ 7	17 1	+ 9	21 27	SS	32·4
Tashkent		53·3	332	i 9 19	− 4	e 16 44	−10	—	—	26·7
Gihu		53·5	38	9 25	+ 1	16 46	−11	—	—	—
Tchimkent		53·9	333	9 24	− 3	i 16 54	− 8	e 11 13	PP	29·7
Hatidyozima		54·0	42	9 33	+ 5	—	—	—	—	—
Misima		54·7	40	9 30	− 3	—	—	—	—	—
Wazima		54·8	36	9 30	− 4	—	—	12 5	PPP	—
Nagano		55·2	38	9 40	+ 3	—	—	—	—	—
Tokyo		55·6	40	9 50	+10	—	—	—	—	—
Brisbane		56·1	120	i 9 44	+ 1	i 17 38	+ 6	i 11 56	PP	—
Vladivostok		56·2	29	i 9 44	0	i 17 36	+ 3	—	—	25·3
Riverview		56·3	128	e 9 47	+ 2	e 17 46	+12	e 10 46	PP	e 25·5
Sydney		56·3	128	e 9 44	− 1	e 17 56	+22	—	—	e 24·7
Irkutsk		57·0	4	e 9 49	− 1	i 17 43	0	—	—	27·7
Semipalatinsk		57·3	346	9 48	− 4	17 40	− 7	—	—	—
Morioka		58·9	37	10 3	0	—	—	—	—	—
Sapporo		61·1	33	10 22	+ 4	—	—	—	—	—
Baku		63·6	320	e 10 35	0	18 51	−17	—	—	30·2
Erevan		67·0	317	e 10 58	+ 1	e 19 50	0	—	—	—
Tiflis		67·5	319	10 57	− 3	i 19 51	− 5	13 37	PP	e 34·7
Grozny		67·7	321	11 3	+ 2	e 19 56	− 2	—	—	—
Sverdlovsk		68·9	339	i 11 4	− 5	i 20 3	−10	31 56	L_g	36·9
Ksara		70·7	308	i 11 20	0	20 28	− 6	14 58	PP	34·2
Helwan		73·2	303	i 11 34k	− 1	20 59	− 3	14 52	PP	—
Christchurch		74·9	134	e 11 49k	+ 5	i 21 30	+ 8	i 22 14	PPS	35·7
Theodosia		75·1	319	11 44	− 2	21 16	− 8	—	—	40·7
Yalta		75·8	318	11 48	− 2	21 26	− 5	—	—	—
Simferopol		76·0	318	11 50	− 1	21 27	− 7	—	—	40·2
Sebastopol		76·2	318	11 52	0	21 30	− 6	—	—	—
Wellington		76·2	131	e 11 53	+ 1	21 35	− 1	26 30	SS	37·7
Arapuni		76·6	128	—	—	e 21 44?	+ 4	e 26 44?	SS	37·7
Istanbul		78·2	314	12 29	+26	23 17	PPS	15 27	PP	—
Moscow		78·4	330	e 12 1	− 3	e 21 51	− 9	—	—	42·2
Cape Town		79·4	236	—	—	i 22 17	+ 7	—	—	36·9
Bucharest		81·2	316	e 12 20	+ 1	e 22 26	− 3	15 36	PP	38·7
Sofia		82·7	314	e 12 26	− 1	e 22 38	− 6	e 15 46	PP	—
Pulkovo		83·6	332	e 12 30	− 2	e 22 46	− 7	—	—	e 40·1
Belgrade		85·2	315	e 12 40a	+ 1	i 23 6	− 3	—	—	e 29·0
Kecskemet	Z.	86·2	318	i 12 43	− 1	e 23 20	+ 1	—	—	e 39·7
Budapest		86·7	318	12 47	0	e 22 58	[−14]	—	—	e 41·7
Upsala		89·8	330	e 12 44?	−18	e 23 30	[− 1]	e 24 54	PS	e 47·7
Triest		90·0	316	e 13 3a	0	23 43	[+10]	24 38	PS	—
Prague		90·1	320	e 13 14	+11	e 23 27	[− 6]	—	—	e 43·7

Continued on next page,

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Rome	90·5	311	i 13 4a	− 1	23 33	[− 3]	16 56	PP	42·0
Potsdam	91·2	323	i 13 7	− 1	e 23 26	[−14]	e 16 26	PP	e 47·7
Padova	91·3	315	e 13 6	− 3	23 57	[+17]	—	—	—
Cheb	91·4	320	e 13 21	+12	e 23 42	[+ 1]	e 16 36	PP	e 52·7
Florence	91·6	313	13 27	+17	23 44?	[+ 2]	—	—	—
Copenhagen	91·9	326	13 10a	− 1	23 44	[0]	16 50	PP	47·7
Jena	92·0	321	e 13 11	− 1	—	—	—	—	e 35·7
Chur	93·1	317	e 13 16	− 1	e 23 56	[+ 6]	—	—	—
Göttingen	93·1	321	e 13 15	− 2	e 24 14	− 8	—	—	e 48·7
Hamburg	93·2	324	e 13 16a	− 1	e 23 50	[− 1]	i 24 28	S	e 41·7
Stuttgart	93·4	318	13 18a	0	e 23 49	[− 3]	e 16 49	PP	e 44·7
Zurich	93·7	317	e 13 23	+ 3	24 2	[+ 8]	—	—	—
Moncalieri	94·2	315	e 13 9	−13	24 12	[+15]	—	—	—
Strasbourg	94·3	318	13 33	+10	e 23 59	[+ 2]	i 16 55	PP	42·7
Basle	94·4	317	e 13 22	− 1	e 25 54	PS	—	—	—
Neuchatel	94·8	317	e 13 24	− 1	—	—	—	—	—
Bergen	95·9	330	24 5	S	(24 5)	[− 1]	e 28 44	?	e 50·7
De Bilt	96·1	321	i 13 42	+11	e 24 13	[+ 6]	i 17 33	PP	e 44·7
Uccle	96·6	320	e 13 44	+11	e 24 10	[0]	17 10	PP	e 44·7
Algiers	97·6	306	e 12 44?	−54	i 24 27	[+12]	i 17 30	PP	44·7
Puy de Dôme	97·6	315	e 16 45	?	e 24 15	[0]	—	—	—
Paris	97·8	318	—	—	e 24 26	[+10]	e 27 17	PPS	58·7
Kew	99·5	321	e 13 42	− 4	i 24 35	[+11]	e 17 58	PP	e 46·7
Durham	100·0	324	e 17 55	PP	i 24 40	[+13]	26 54	PS	—
Oxford	100·1	321	e 18 19	PP	i 24 37	[+10]	i 32 24	SS	e 40·7
Stonyhurst	100·6	323	e 17 34	PP	i 24 41	[+11]	—	—	e 49·7
Edinburgh	100·8	325	e 17 44?	PP	i 24 28	[− 3]	i 27 0	PS	e 52·7
Jersey	100·8	319	—	—	e 27 46	PPS	—	—	e 50·4
Bidston	101·0	323	—	—	e 25 14	−15	e 32 19	SS	e 46·7
Almeria	102·0	306	—	—	e 31 5	?	—	—	—
Rathfarnham Castle	102·9	323	—	—	i 37 7	SSS	—	—	i 56·0
Toledo	103·0	309	e 17 29	?	—	—	i 18 24	PP	e 33·0
College	104·1	23	—	—	e 25 58	+ 3	e 27 14	PS	e 44·7
San Fernando	105·0	306	e 18 39	PP	26 2	0	e 33 19	SS	50·7
Victoria	123·6	32	—	—	e 26 44?	[+42]	—	—	37·7
Ukiah	128·8	41	—	—	e 38 47	SS	—	—	e 63·7
Berkeley	130·1	42	e 19 5	[− 7]	—	—	e 21 13	PP	—
Lick N.	130·8	42	e 21 26	PP	—	—	—	—	—
Fresno N.	132·4	42	—	—	e 36 57	?	—	—	—
Tinemaha	133·2	41	e 19 23	[+ 5]	—	—	—	—	—
Santa Barbara	133·6	45	e 19 23	[+ 4]	—	—	e 21 48	PP	—
Rio de Janeiro E.	133·9	232	e 21 44	PP	—	—	—	—	e 39·7
Mount Wilson	134·4	44	i 16 34	P	i 23 0	SKP	19 12	PKP	—
Pasadena	134·9	44	i 16 33	P	e 39 50	SS	e 19 12	PKP	e 64·7
Riverside	135·5	44	i 16 35	P	i 23 5	SKP	e 19 14	PKP	—
La Jolla	136·2	45	e 19 18	[− 5]	—	—	e 22 0	PP	—
Seven Falls	136·9	348	e 23 50	SKP	i 40 22	SS	—	—	e 54·7
Ottawa	139·3	354	e 19 26	[− 3]	e 40 44?	SS	e 23 44?	SKP	e 53·7
Tucson	141·0	40	i 19 29	[− 3]	i 23 31	PKS	i 22 10	PP	61·0
Harvard	141·5	346	e 19 35	[+ 2]	—	—	e 22 36	PP	e 79·7
Weston	141·6	346	i 19 30	[− 3]	e 41 17	SS	—	—	e 65·9
Williamstown	141·6	348	e 19 37	[+ 4]	—	—	e 22 39	PP	—
Fordham Z.	143·5	348	i 19 37	[+ 1]	—	—	—	—	—
Florissant	145·1	12	e 19 43	[+ 4]	i 41 51	SS	—	—	63·7
Cape Girardeau	146·7	12	i 19 44	[+ 2]	—	—	—	—	—
La Paz	155·3	212	i 20 4	[+10]	43 53	SS	i 24 4	PP	76·7
Fort de France	158·1	297	e 20 1	[+ 3]	—	—	—	—	—
San Juan	160·1	314	e 20 10	[+ 9]	31 22	{+10}	24 31	PP	65·0
Huancayo	162·3	200	e 19 51	[−12]	e 44 40	SS	e 25 15	PP	59·2

Additional readings :—
Medan iPEN = +2m.9s.
Kodaikanal iPPE = +7m.6s., iSSE = +12m.24s.
Calcutta ePPPN = +7m.6s., iSSN = +12m.19s., iS_cSN = +12m.47s.
Hyderabad P_cPN = +9m.24s., SSN = +12m.28s.
Hong Kong SS = +13m.1s.

Continued on next page.

Perth i = +7m.44s., +8m.44s., +11m.24s., and +11m.44s., SS = +12m.1s., i = +12m.44s.
Bombay eEN = +7m.35s., iEN = +8m.1s., iS_cPEN = +12m.50s., sSEN = +13m.29s., SSEN = +14m.55s., iS_cSE = +16m.41s.
Agra iP = +7m.23s., PPPE = +9m.0s., SS = +15m.12s., SSS = +15m.47s.
Dehra Dun iN? = +16m.43s.
Frunse e = +9m.43s.
Melbourne i = +25m.13s. and +28m.20s.
Brisbane ePN = +9m.50s., iE = +13m.2s.
Tiflis iEN = +11m.5s., PPPE = +15m.9s., ePPPN = +15m.12s., ePSN = +20m.5s., iE = +20m.23s., SSE = +24m.22s., eSSN = +24m.37s., eSSSN = +26m.59s.
Ksara PS = +21m.0s.
Helwan i = +11m.44s. and +14m.19s., PPP = +16m.13s., e = +17m.15s., PS = +21m.33s., SS = +25m.54s.
Christchurch iPPEZ = +14m.40s., L_qN = +31m.10s.
Wellington iZ = +11m.55s., eZ = +14m.29s., SSS = +30m.50s., L_q = +31m.47s.
Istanbul SS = +26m.44s.
Bucharest PPPN = +17m.16s., PSE = +23m.12s., SSEN = +27m.54s., SSSE = +31m.19s.
Sofia SSE = +28m.14s.
Belgrade e = +11m.50s.
Kenskemet iZ = +12m.59s.
Budapest PN = +12m.55s.
Upsala eE = +23m.4s. and +23m.24s., eN = +23m.58s.
Rome PPP = +18m.49s., S = +23m.56s., PS = +24m.45s., i = +25m.23s., SS = +30m.1s., SSS = +33m.41s.
Potsdam eZ = +13m.14s., +13m.44s.?, and +18m.8s., eE = +23m.50s., iSN = +24m.0s., eE = +24m.8s., eN = +24m.14s., ePSEZ = +25m.2s., eEN = +25m.44s.?, eN = +27m.14s., eNZ = +29m.44s.?, eE = +36m.44s. ?
Cheb e = +25m.30s. and +30m.3s.
Copenhagen PPP = +19m.1s., S = +24m.8s., PS = +25m.20s., e = +25m.44s., +25m.56s., +27m.8s., SS = +30m.14s.
Jena eZ = +13m.35s., eN = +13m.56s.
Hamburg iE = +25m.28s.
Stuttgart iP_ePZ = +13m.30s., eEZ = +17m.11s., ePPP = +19m.9s., eSN = +24m.21s., eSSEN = +30m.44s., eEN = +38m.38s.
Strasbourg iPPPZ = +19m.20s., ePSE = +25m.9s.
De Bilt eN = +24m.49s., eSS = +31m.33s.
Uccle eZ = +19m.42s. and +21m.31s., SN = +24m.49s., eSSE = +31m.39s.
Kew eSEN = +25m.11s., ePSZE = +27m.38s., eSSEN = +32m.14s.
Durham ?N = +28m.14s., ?E = +28m.35s., iSSE = +32m.31s.
College eSS = +33m.9s. and +33m.30s.
Berkeley eN = +21m.7s., iZ = +21m.11s., eZ = +21m.26s., eE = +21m.44s., eN = +22m.40s.
Mount Wilson iPKP = +19m.24s., ePPZ = +21m.42s., eSKKPZ = +30m.48s.
Pasadena iPKP = +19m.23s., ePP = +21m.55s., iSKPZ = +23m.4s., iE = +23m.39s., eSKKPZ = +31m.32s.
Riverside iPKP = +19m.24s., iPP = +21m.59s., iZ = +22m.50s., eSKKPZ = +31m.37s.
La Jolla iPKPZ = +19m.39s.
Seven Falls e = +49m.8s.
Tucson iPKP = +19m.35s., i = +19m.39s. and +20m.11s., iPP = +22m.35s., i = +22m.39s., iPKS = +23m.0s., iPPP = +24m.40s., iPSPS = +41m.7s.
Harvard eL_qE = +67m.44s.
Cape Girardeau iN = +19m.57s., eE = +20m.15s.
San Juan ePKP = +20m.46s., SS = +45m.30s.
Huancayo ePKP = +20m.7s., eSKSP = +34m.48s., ePPS = +38m.16s., iSS = +45m.10s. SSS = +51m.27s.
Long waves were also recorded at East Machias, Butte, Philadelphia, Karlsruhe, La Plata, and Samarkand.

Nov. 15d. Further shocks from the neighbourhood of the epicentre of 13d. 22h. were recorded at Mizusawa and Nagoya.

Mizusawa

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
0	39	3	3	30	27(S)	8	38	56	17	44	5(S)
0	57	59(S)	4	2	4	9	59	36	18	1	13
1	59	7	4	19	36(S)	10	38	2	21	10	15
2	16	19	6	21	28(S)	17	25	50	21	18	23(S)
2	20	46	6	26	18	17	40	48			

Nagoya

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
0	39	32	4	2	48	17	26	31	20	24	40
1	59	49	6	26	46	17	41	39	21	9	42
2	16	55	10	0	24	17	44	2	21	12	34(S)
2	20	56	10	38	42	18	1	6			

Nov. 15d Readings also at 1h. (Sverdlovsk, Tashkent, Lick, Branner, and Erevan), 2h. (Sverdlovsk, Tashkent, Tiflis, Koti, Baku, Irkutsk, and Vladivostok), 3h. (Ksara and De Bilt), 4h. (Nagoya), 5h. (Tananarive), 7h. (La Paz, near Keizyo, and Zinsen), 10h. (Medan, La Jolla, Granada, Tiflis, Sverdlovsk, Erevan, Mount Wilson, Pasadena, Riverside, Tanarive, and Andijan), 1h. (Moncalieri, Andijan, Irkutsk, and Sverdlovsk), 12h. (Kew, De Bilt, and Tananarive), 13h. (Riverside, Pasadena, Mount Wilson, Branner, Lick, Berkeley, Fresno, Ukiah, Ferndale, San Francisco, and Tinemaha), 14h. (Branner, Lick, Berkeley, and Fresno), 15h. (Taikyu, Frunse, Samarkand, and Tchimkent), 16h. (Tashkent and La Paz), 18h. (Koti, Tchimkent, and Samarkand), 19h. (Harvard and Santiago).

Nov. 16d. 5h. 36m. 12s. Epicentre 55°·5N. 155°·0W. (as on 1938 Nov. 11d.).

$A = -\cdot5157$, $B = -\cdot2405$, $C = +\cdot8223$; $\delta = -4$; $h = -7$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
College		10·0	18	e 2 57	+30	e 4 47	SSS	—	—	e 5·4
Victoria		20·6	96	i 4 51	+ 8	i 8 51	+22	5 24	PP	e 9·8
Ukiah		26·7	104	—	—	e 10 30	+13	—	—	e 11·9
Tinemaha		30·9	111	e 6 26	+ 6	—	—	—	—	—
Haiwee		31·7	111	e 6 30	+ 3	—	—	—	—	—
Santa Barbara		32·1	115	e 6 35	+ 4	—	—	—	—	—
Mount Wilson		33·2	113	i 6 44k	+ 4	—	—	—	—	—
Pasadena		33·2	113	i 6 43k	+ 3	—	—	—	—	e 16·5
Riverside		33·7	113	i 6 48k	+ 3	—	—	—	—	—
La Jolla		34·6	114	e 6 55	+ 2	—	—	—	—	—
Tucson		38·5	108	i 7 30k	+ 4	i 13 25	+ 3	i 9 0	PP	15·9
Vladivostok		47·1	287	e 8 42	+ 7	i 15 16	−12	—	—	22·6
Ottawa		48·9	66	e 8 52	+ 2	e 15 48?	− 5	—	—	25·8
Seven Falls		50·2	62	—	—	e 15 48?	−23	—	—	26·8
Williamstown		52·0	67	e 9 24	+11	—	—	—	—	—
Philadelphia		52·9	71	—	—	e 21 2	SSS	—	—	e 28·6
Harvard		53·0	66	e 9 31	+10	—	—	e 28 48	L_q	e 30·8
Weston		53·2	66	i 9 23	+ 1	—	—	—	—	e 28·4
Columbia		54·0	80	e 10 1	+33	e 17 11	+ 8	—	—	e 28·4
Irkutsk		54·3	313	9 24	− 6	e 16 55	−12	—	—	26·8
Sverdlovsk		64·4	340	i 10 36	− 4	i 19 26	+ 8	—	—	33·8
Pulkovo		65·0	350	e 10 42	− 2	i 19 42	PS	—	—	—
Edinburgh		66·6	17	—	—	e 19 51	PS	—	—	32·8
Moscow		68·6	352	e 11 6	− 1	i 20 27	PS	—	—	e 41·3
Copenhagen		68·7	8	i 11 8	+ 1	20 30	PS	—	—	37·8
Bidston		69·0	18	—	—	e 20 33	PS	—	—	e 33·8
Hamburg	Z.	70·6	9	e 11 19	0	—	—	—	—	—
Oxford		70·9	17	—	—	i 20 52	PS	—	—	—
Kew		71·3	17	—	—	e 20 45	+ 4	—	—	e 35·8
De Bilt		71·5	12	i 11 25a	+ 1	e 20 53	+10	e 21 5	PS	e 35·8
Potsdam		72·0	8	e 11 24	− 4	e 20 48?	− 1	e 21 30	PPS	e 41·8
Uccle		72·7	15	i 11 32a	0	e 21 19	PS	e 25 48	SS	e 35·8
Frunse		73·4	324	e 11 30	− 6	—	—	—	—	—
San Juan		74·4	80	—	—	e 21 18	+ 2	—	—	e 30·8
Strasbourg		75·3	12	i 11 48	+ 1	21 40	+14	—	—	42·8
Stuttgart		75·3	11	e 11 47	0	—	—	—	—	e 42·8
Tchimkent		75·5	327	e 11 42	− 6	i 21 23	− 5	—	—	—
Basle		76·3	12	e 11 52	0	—	—	—	—	—
Tashkent		76·5	327	i 11 48	− 6	i 21 33	− 6	—	—	43·2
Zurich		76·6	12	e 11 53	− 1	—	—	—	—	—
Neuchatel		76·8	12	e 11 56	+ 1	—	—	—	—	—
Chur		77·2	11	e 11 57	0	—	—	—	—	—
Tiflis		81·7	346	e 12 19	− 3	e 22 35	+ 1	—	—	e 43·8
Toledo		81·8	23	i 12 24	+ 2	—	—	—	—	e 48·8
Baku		82·2	341	i 12 23	− 1	e 22 44	+ 5	—	—	40·8
Rome		82·4	8	12 16	− 9	e 22 44	+ 3	16 2	PP	e 44·8
Granada		84·5	23	—	—	i 23 11	+ 9	—	—	e 45·8
San Fernando	N.	84·6	25	—	—	e 23 45	PS	—	—	48·3
Calcutta	N.	85·6	304	—	—	i 22 56	[− 9]	—	—	—
Agra	E.	86·0	314	12 39	− 4	23 1	[− 7]	12 47	pP	—
Ksara		90·6	349	i 13 7k	+ 2	e 24 55	PS	16 41	PP	42·1

For Notes see next page.

NOTES TO Nov. 16d. 5h. 36m. 12s.

Additional readings :—
Victoria SS = +8m.56s.
Tucson iP = +7m.56s. and +8m.3s.
San Juan S = +21m.21s.
Tiflis eS = +22m.52s.
Rome S = +23m.4s., PS = +23m.49s., SS = +28m.14s.
Agra sS = +23m.17s.
Ksara ePPS = +25m.27s.

Long waves were also recorded at Fort de France, Sitka, Seattle, East Machias, Chicago, Butte, La Paz, Puy de Dôme, Stonyhurst, Wellington, Cheb, Prague, Kodaikanal, and Bombay.

Nov. 16d. 11h. 8m. 3s. Epicentre 37°·1N. 141°·8E. (as on 1938 Nov. 13d.).

Strong at Sendai, Onahama, Hukusima, Kakioka, Mito; moderate at Tokyo, Kumagaya, Tukubasan, and Yamagata.

Epicentre 37°·35N. 141°·8E.

Macroseismic radius greater than 300km. Shallow.

See " Seismological Bulletin of the Central Met. Obs., Japan, " for the year 1938, Tokyo, 1940.

~~A = −·6283, B = +·4944, C = +·6006; δ = −9; h = −1.~~

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m.	s.	m.
Onahama	0·8	257	0 20k	+ 2	0 27	S_g	—	—	—
Hukusima	1·2	302	0 25a	+ 1	0 39	S_g	—	—	—
Mito	1·3	236	0 27k	P_g	0 46	+ 2	—	—	—
Sendai	1·3	329	0 24a	− 1	0 38	− 6	—	—	—
Kakioka	1·5	236	0 32k	P_g	0 53	S_g	—	—	—
Tukubasan	1·6	237	0 32	+ 2	0 52	+ 1	—	—	—
Yamagata	1·6	315	0 23	− 7a	0 41	−10	—	—	—
Utunomiya	1·7	250	0 34k	P_g	0 56	S_g	—	—	—
Kumagaya	2·1	244	0 39k	P*	1 8	S_g	—	—	—
Mizusawa	2·1	346	i 0 34	− 3	i 0 54	−10	—	—	—
Tokyo, Cen. Met. Ob.	2·1	229	0 37	0	1 5	+ 1	—	—	—
Tokyo, Imp. Univ.	2·1	229	0 37	0	1 4	0	—	—	—
Komaba	2·2	230	0 39	+ 1	1 7	+ 1	—	—	—
Kiyosumi	2·3	214	0 27	−13	0 55	−14	—	—	—
Maebasi	2·3	252	0 43k	P*	1 13	S*	—	—	—
Mitaka	2·3	232	0 40	0	1 9	0	—	—	—
Niigata	2·4	291	0 47	P_g	1 24	S_g	—	—	—
Yokohama	2·4	226	0 46	P*	1 24	S_g	—	—	—
Kamakura	2·5	226	0 40	− 3	1 9	− 5	—	—	—
Titibu	2·5	243	0 27	−16	0 56	−18	—	—	—
Miyako	2·6	3	0 37	− 7	1 14	− 3	—	—	—
Morioka	2·7	349	0 40a	− 5	1 11	− 8	—	—	—
Takada	2·8	270	0 50	P*	1 34	S_g	—	—	—
Hunatu	2·9	237	0 52	P*	1 26	+ 2	—	—	—
Nagano	2·9	261	0 53k	P*	1 31	S*	—	—	—
Akita	3·0	334	0 47a	− 3	1 27	0	—	—	—
Ito	3·0	225	0 55a	P*	1 51	S_g	—	—	—
Kohu	3·0	241	0 55	P*	1 42	S_g	—	—	—
Misima	3·0	229	0 54	P*	1 38	S_g	—	—	—
Numadu	3·1	230	0 53	+ 2	1 49	S_g	—	—	—
Osima	3·1	220	0 53k	+ 2	1 35	S*	—	—	—
Matumoto	3·2	254	0 54a	+ 2	1 44	S_g	—	—	—
Yosiwara	3·2	232	0 27	−25	1 5	−27	—	—	—
Susaki	3·3	225	0 56	+ 3	1 43	S*	—	—	—
Toyama	3·4	266	1 3	P*	1 57	S_g	—	—	—
Hatinohe	3·5	356	0 51a	− 6	1 38	− 2	—	—	—
Iida	3·6	245	1 1a	+ 3	1 49	S*	—	—	—
Aomori	3·8	348	0 59	− 2	1 54	+ 7	—	—	—
Husiki	3·8	267	1 8	P*	2 10	S_g	—	—	—
Omaesaki	3·8	231	1 3	+ 2	2 15	S_g	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Wazima		3·9	277	1 5	+ 3	1 58	S*	—	—	—
Hamamatu		4·1	235	1 12$_a$	P*	1 57	+ 2	—	—	—
Hatidyozima		4·3	203	1 14	P*	2 3	+ 3	—	—	—
Gihu		4·4	250	1 13	+ 3	2 8	+ 6	—	—	—
Nagoya		4·4	245	1 13?	+ 3	i 2 7	+ 5	—	—	—
Hukui		4·6	257	1 18	P*	2 23	S*	—	—	—
Hakodate		4·7	350	1 15	+ 1	2 18	+ 8	—	—	—
Hikone		4·8	250	1 21$_a$	P*	2 25	S*	—	—	—
Kameyama		4·9	245	1 21	+ 4	2 38	S_g	—	—	—
Tu		4·9	243	1 21	+ 4	2 40	S_g	—	—	—
Mori		5·1	349	1 19$_a$	− 1	2 22	+ 2	—	—	—
Urakawa		5·1	8	1 23	+ 3	2 14	− 6	—	—	—
Muroran		5·2	353	1 17$_a$	− 4	2 39	S*	—	—	—
Kyoto		5·3	249	1 28	P*	2 54	S_g	—	—	—
Yagi		5·5	245	1 27	+ 2	3 11	S_g	—	—	—
Miyadu		5·6	257	1 29	+ 2	2 37	+ 4	—	—	—
Osaka		5·6	247	1 30	+ 3	2 53	S*	—	—	—
Toyooka		5·8	257	1 33	+ 4	3 4	S*	—	—	—
Kobe		5·9	249	1 34	+ 3	3 8	S_g	—	—	—
Obihiro		5·9	10	2 6	P_g	2 58	S*	—	—	—
Sapporo		6·0	356	1 28	− 4	2 34	− 9	—	—	—
Siomisaki		6·1	236	1 38	+ 4	3 23	S_g	—	—	—
Kusiro		6·2	18	1 28	− 7	2 31	−17	—	—	—
Sumoto		6·2	247	1 38	+ 3	3 12	S*	—	—	—
Wakayama		6·2	244	1 35$_a$	0	3 6	S*	—	—	—
Tokusima		6·6	246	1 51	P*	3 31	S_g	—	—	—
Asahigawa		6·7	3	1 30	−12	2 42	−18	—	—	—
Okayama		6·8	252	1 46	+ 2	3 52	S_g	—	—	—
Nemuro		6·8	24	1 41	− 3	2 49	−14	—	—	—
Tadotu		7·1	250	1 39	− 9	3 47	S_g	—	—	—
Muroto		7·3	241	1 56$_a$	+ 6	3 24	+ 9	—	—	—
Koti		7·6	245	1 57	+ 2	3 28	+ 5	i 4 7	S_g	—
Hirosima		8·1	254	2 7	+ 5	4 8	S*	—	—	—
Hamada		8·2	256	1 55	− 8	3 17	−21	—	—	—
Simidu		8·4	242	2 12	+ 6	4 15	S*	—	—	—
Uwazima		8·5	246	2 13	+ 6	4 17	S*	—	—	—
Ooita		9·2	249	2 28	PP	4 57	S_g	—	—	—
Simonoseki		9·4	254	2 43	PPP	—	—	—	—	—
Ootomari		9·6	4	2 17	− 4	3 56	−16	—	—	—
Izuka		9·7	254	2 29	PP	5 0	S*	—	—	—
Vladivostok		9·7	312	i 2 17	− 5	e 6 30	?	—	—	8·0
Hukuoka B		9·9	253	e 2 45	PPP	5 14	S_g	—	—	—
Kumamoto		10·0	248	2 38	PP	4 51	SSS	—	—	—
Miyazaki		10·0	242	2 31	+ 4	3 27	?	—	—	—
Titizima		10·0	179	2 33	+ 6	—	—	—	—	—
Saga		10·2	252	2 48	PPP	5 41	S_g	—	—	—
Unzendake		10·4	249	2 39	+ 5	5 34	L	—	—	(5·6)
Husan		10·5	263	e 2 43	PP	4 37	+ 2	—	—	—
Taikyu		10·7	267	i 2 42	+ 4	4 49	SS	—	—	—
Syuhurei		11·1	270	e 2 49	+ 6	e 6 7	L	—	—	(e 6·1)
Yakusima		11·5	238	2 53	+ 5	4 56	− 3	—	—	—
Tomie		11·6	251	2 55	+ 5	6 17	L	—	—	(6·3)
Keizyo		11·8	277	2 55	+ 2	e 5 13	+ 7	—	—	6·7
Zinsen		12·1	277	2 59	+ 2	e 5 18	+ 4	—	—	6·3
Heizyo		12·8	284	i 3 7$_a$	+ 1	i 5 51	SSS	—	—	8·5
Zi-ka-wei	E.	17·9	258	e 3 5	−67	6 55	−35	—	—	—
Hong Kong		28·0	246	5 56	+ 1	10 45	+ 7	6 49	PP	14·3
Manila		29·1	225	e 6 6	+ 2	12 47	SSS	—	—	19·8
Irkutsk		30·2	312	6 17	+ 3	e 11 7	− 6	7 15	PPP	15·0
Phu-Lien		34·6	253	e 6 53	0	i 12 23	+ 1	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Semipalatinsk		45·1	308	e 8 27	+ 7	—	—	—	—	—
Calcutta	N.	48·0	268	i 8 41k	− 2	i 15 38	− 3	e 18 48	SS	e 23·0
Almata		48·8	300	e 8 50	+ 1	e 14 52	−60	—	—	—
Medan	N.	51·7	241	e 9 8	− 3	e 16 31	− 1	—	—	—
Agra	E.	54·0	279	9 25	− 3	i 16 57	− 6	17 37	PS	—
Batavia		54·1	225	i 9 31	+ 2	e 17 28	+25	—	—	—
Tchimkent		54·3	300	e 9 29	− 1	i 17 0	− 7	—	—	—
Tashkent		54·8	299	i 9 32	− 2	i 17 8	− 6	—	—	e 26·1
Sverdlovsk		55·3	319	i 9 34	− 4	i 17 15	− 6	26 15	L_q	30·5
Samarkand		57·1	298	e 9 45	− 5	e 17 40	− 5	—	—	—
Hyderabad		58·6	269	9 55	− 6	18 1	− 3	—	—	—
Bombay		62·3	274	i 10 25	− 1	i 18 50	− 2	12 38	PP	—
Kodaikanal		63·5	263	e 10 41	+ 7	e 19 12	+ 5	—	—	e 30·7
Colombo	E.	63·6	258	—	—	19 7	− 1	—	—	36·3
Moscow		67·4	323	10 59	0	19 49	− 6	—	—	37·4
Pulkovo		68·3	330	11 3	− 2	20 0	− 6	—	—	34·5
Baku		68·4	305	11 10	+ 4	20 6	− 1	—	—	34·0
Grozny		69·6	309	11 12	− 1	20 14	− 7	—	—	—
Tiflis		71·0	308	e 11 18	− 4	e 20 27	−10	—	—	37·0
Berkeley	Z.	72·4	56	i 11 28	− 2	—	—	—	—	—
Upsala		73·0	335	—	—	e 20 53	− 7	—	—	e 42·0
Theodosia		74·7	315	11 42	− 1	21 14	− 5	—	—	—
Simferopol		75·5	316	11 47	− 1	21 23	− 5	—	—	33·2
Tinemaha		75·5	54	i 11 48	0	—	—	—	—	—
Yalta		75·8	315	11 42	− 8	—	—	—	—	—
Santa Barbara		76·1	57	i 11 51k	0	—	—	—	—	—
Haiwee		76·3	54	e 11 51	− 1	—	—	—	—	—
Mount Wilson		77·3	57	i 11 57k	− 1	—	—	—	—	—
Pasadena		77·3	57	i 11 57k	− 1	—	—	i 15 55	PPP	—
Riverside		77·9	57	i 11 59k	− 2	—	—	i 15 58	PPP	—
Copenhagen		78·0	334	11 59	− 3	21 52	− 3	—	—	38·0
La Jolla		78·7	57	i 12 5	− 1	—	—	—	—	—
Bucharest		80·2	319	e 12 1	−13	i 22 16	− 3	22 50	PS	39·0
Potsdam		80·3	332	e 12 9	− 5	e 22 9	−11	e 14 57?	PP	e 46·0
Hamburg		80·6	334	e 12 13k	− 3	e 22 19	− 4	—	—	e 40·0
Ksara		81·4	305	i 12 20k	0	i 22 31	0	15 28	PP	—
Budapest		81·5	325	12 19	− 2	—	—	—	—	e 45·0
Prague		81·6	329	e 12 19	− 2	22 28	− 5	—	—	e 40·0
Jena		82·0	331	e 12 21	− 2	e 22 33	− 4	—	—	e 42·0
Göttingen		82·2	332	e 12 20	− 4	e 22 27	−12	—	—	e 47·0
Cheb		82·4	331	—	—	e 22 57	+16	—	—	e 45·0
Edinburgh		82·7	341	—	—	e 22 40	− 4	—	—	e 47·0
Belgrade		82·8	321	e 12 21a	− 6	e 22 42	− 3	e 15 42	PP	e 48·0
Sofia		82·8	319	e 12 28	+ 1	e 22 44	− 1	—	—	—
Durham	E.	83·2	340	—	—	e 22 44	− 5	—	—	—
Tucson		83·3	54	i 12 29k	− 1	—	—	i 15 42	PP	—
De Bilt		83·4	335	12 30	0	22 49	− 2	—	—	e 41·0
Wellington		83·6	156	—	—	e 23 57?	PS	—	—	e 28·0
Stonyhurst		84·3	340	—	—	i 23 7	+ 7	i 23 32	PS	e 45·0
Stuttgart		84·7	330	i 12 36k	− 1	e 23 0	− 4	e 15 57	PP	e 46·0
Uccle		84·8	335	i 12 37	0	22 58	− 7	e 28 57?	SS	e 42·0
Bidston		84·9	340	—	—	i 23 7	+ 1	—	—	e 41·0
Christchurch		85·0	158	i 12 41k	+ 3	e 23 14	+ 7	28 57	SS	e 40·6
Triest		85·3	327	e 12 37	− 3	22 58	[− 5]	23 40	PS	—
Strasbourg		85·4	331	i 12 40	0	i 23 7	− 4	—	—	e 47·0
Rathfarnham Castle		85·8	342	—	—	i 24 12	PS	—	—	e 52·2
Oxford		85·8	337	—	—	23 4	[− 2]	—	—	e 44·0
Kew		85·9	337	i 12 44	+ 1	i 23 10	[+ 3]	i 23 16	S	e 41·0
Chur		86·1	330	e 12 42	− 2	e 22 59	[− 9]	—	—	—
Zurich		86·1	330	e 12 42k	− 2	e 23 5	[− 3]	e 16 0	PP	—

Continued on next page.

		Δ	Az.	P.	O − C.	S.	O − C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Basle		86·3	330	e 12 45	0	e 22 57?	[−12]	—	—	—
Padova		86·3	327	e 11 57	−48	—	—	—	—	—
Helwan		86·9	305	i 12 48k	0	23 12	[− 1]	16 15	PP	
Neuchatel		87·0	330	e 12 47	− 1	—	—	—	—	—
Paris		87·1	335	—	—	e 22 57?	[−17]	—	—	48·0
Moncalieri		88·4	330	e 12 57?	+ 2	23 8	[−14]	—	—	e 14·0
Rome		88·8	323	e 12 53	− 4	i 23 25	[0]	i 23 41	S	—
Puy de Dôme		89·6	332	e 13 14	+13	e 23 28	[− 2]	—	—	e 46·0
Toledo		97·2	334	e 13 35	− 1	—	—	—	—	e 50·4
La Paz	z.	146·5	60	i 19 41k	[− 1]	—	—	23 59	PP	80·0

Additional readings :—
Koti eEN = +3m.49s., S_gN = +4m.21s., eZ = +4m.33s., eEN = +4m.37s.
Hong Kong SS = +12m.0s.
Irkutsk SS = +12m.39s., SSS = +13m.15s.
Agra iE = +17m.15s., SSE = +20m.42s.
Tiflis eS = +20m.30s., e = +31m.58s., eZ = +33m.14s.
Berkeley eN = +11m.34s.
Mount Wilson iZ = +12m.29s.
Riverside iZ = +12m.45s.
Bucharest iPE = +12m.26s.
Potsdam eZ = +13m.9s., iSN = +22m.16s., eZ = +25m.57s. ?
Budapest PN = +12m.23s.
Tucson iP = +12m.38s., i = +13m.1s., iSSS = +61m.28s.
Stuttgart iZ = +12m.41s., ePS = +23m.49s., eSSS = +32m.17s., e = +37m.27s.
Christchurch eL_qE = +37m.33s.
Rathfarnham Castle i = +44m.48s.
Helwan S = +23m.39s.
Rome i = +23m.58s.
Long waves were also recorded at Bergen, Huancayo, San Fernando, and Granada.

Nov. 16d. 15h. Undetermined epicentre in the South Pacific.

Wellington eP = 18m.42s., S = 20m.44s., iEN = 20m.49s., eL = 22·0m., S_cS = 29m.32s.
New Plymouth P = 18m.40s., S = 20m.43s.
Brisbane iE = 20m.12s., 25m.12s.
Riverview eE = 20m.24s., eN = 21m.38s., eE = 24m.15s., eN = 25m.46s., eLN = 28·0m.
Christchurch iP = 21m.43s.a, eZ = 22m.58s., iE = 23m.24s., eN = 24m.6s.
Santa Barbara iPZ = 26m.13s.
La Jolla iPNZ = 26m.17s.
Pasadena iP = 26m.17s., iZ = 27m.6s., eSE? = 36m.16s.
Mount Wilson iP = 26m.19s., iZ = 27m.7s., eZ = 29m.29s.
Riverside iPZ = 26m.20s.
Haiwee ePEN = 26m.27s.
Tinemaha ePEN = 26m.28s.
Tucson iP = 26m.39s.a, i = 26m.51s., 26m.56s., 27m.4s., 27m.27s., 28m.13s., and 30m.13s.
Andijan e = 27m.10s. and 35m.14s.
Tiflis eZ = 33m.19s. and 36m.47s.
Yalta e = 33m.35s.
Theodosia e = 33m.39s.
Ksara ePKP = 33m.41s., epPKP = 34m.40s., esPKP = 35m.4s., ePP = 37m.20s., epPP = 38m.12s., eSS = 55m.36s.
Copenhagen iZ = 33m.43s.
Simferopol e = 33m.56s.
Helwan i = 34m.9s.
Sverdlovsk i = 35m.6s., e = 36m.6s., 39m.51s., 53m.26s., L = 67·0m.
Vladivostok e = 36m.22s.
Baku e = 36m.37s. and 44m.50s.
Tashkent e = 39m.1s.
Long waves were also recorded at Irkutsk.

Nov. 16d. Further shocks from the neighbourhood of the epicentre of 11h. were recorded at Mizusawa and Nagoya.

Mizusawa

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
0	13	30	11	5	20	13	32	54	19	51	52
7	20	30	11	50	46	14	46	54	23	18	45
8	7	35	12	59	38	16	19	17	23	21	18(S)

Nagoya

h.	m.	s.
5	2	17
13	34	0

Nov. 16d. Readings also at 2h. (Balboa Heights, Cape Town, and Hukuoka B), 3h. (Huancayo, Tiflis, Ksara, and Tucson), 4h. (Rome, Andijan, and La Paz), 6h. (Oaxaca), 7h. (near Branner and Lick), 8h. (Andijan), 10h. (Branner, Fresno, San Francisco, Lick, and Berkeley), 14h. (Fort de France, Tashkent, Baku, Vladivostok, Tiflis, and Irkutsk), 16h. (Andijan), 17h. (Andijan), 18h. (Santiago), 21h. (Sverdlovsk, Tinemaha, Riverside, Mount Wilson, Pasadena, Santa Barbara, Riverview, La Paz, Brisbane, Andijan, Tiflis, and Irkutsk), 23h. (Wellington).

Nov. 17d. 3h. 54m. 34s. Epicentre 55°·6N. 157°·7W(as on 1938 Nov. 11d.).

$A = -\cdot5251$, $B = -\cdot2154$, $C = +\cdot8233$; $\delta = -5$; $h = -7$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
College		10·5	24	i 2 34	− 1	i 4 39	+ 4	—	—	i 4·8
Sitka		12·5	74	i 3 9	PP	i 5 6	−17	e 3 21	PPP	—
Victoria		22·2	94	i 4 52	− 8	i 8 56	− 4	5 38	PPP	i 10·4
Seattle		23·1	95	e 5 36	PP	10 6	SS	e 5 52	PPP	i 10·6
Ferndale		26·6	110	e 5 31	−11	e 8 30	?	—	—	—
Ukiah		28·2	111	i 5 56	0	i 10 44	+ 3	e 7 11	PPP	11·8
Berkeley		29·6	113	e 6 5	− 4	i 11 4	0	—	—	—
Butte		29·6	89	e 6 8	− 1	11 3	− 1	—	—	e 12·8
San Francisco		29·6	113	e 6 8	− 1	e 10 59	− 5	—	—	e 13·7
Saskatoon		29·8	75	e 5 58	−13	i 11 1	− 6	13 9	SS	e 14·4
Branner		30·0	114	i 6 13	+ 1	e 13 34	SSS	—	—	—
Lick		30·3	113	e 6 14	− 1	e 11 15	0	—	—	e 14·4
Bozeman		30·7	89	e 6 19	0	11 24	+ 3	—	—	e 13·4
Fresno	N.	31·8	111	e 6 26	− 2	e 12 8	+30	e 7 32	PP	e 15·8
Tinemaha		32·3	109	e 6 32	− 1	e 11 47	+ 1	—	—	—
Haiwee		33·2	109	i 6 41	+ 1	—	—	—	—	—
Salt Lake City		33·3	97	e 6 51	+10	12 5	+ 3	—	—	e 14·4
Santa Barbara		33·6	112	i 6 43	− 1	i 12 5	− 1	—	—	—
Honolulu		34·3	180	e 6 49	− 1	12 18	+ 1	—	—	15·7
Mount Wilson		34·6	111	i 6 51	− 2	i 12 23	+ 1	—	—	—
Pasadena		34·6	111	i 6 50k	− 3	i 12 21	− 1	i 8 3	PP	i 14·9
Riverside		35·1	111	e 6 55	− 2	e 12 26	− 4	—	—	—
La Jolla		36·1	111	i 7 4k	− 1	e 12 41	− 4	—	—	—
Nemuro		37·8	277	7 17	− 3	13 4	− 7	—	—	—
Denver		37·9	92	e 7 18	− 2	e 13 14	+ 1	e 7 26	pP	—
Tucson		40·0	105	i 7 38k	0	i 13 35	− 9	i 9 11	PP	i 16·7
Sapporo		40·4	281	7 41	0	13 45	− 5	—	—	19·0
Mori		41·4	279	7 53	+ 3	14 8	+ 3	—	—	—
Morioka		42·7	275	8 0	0	14 22	− 2	—	—	—
Mizusawa		43·1	275	8 4	0	14 27	− 3	—	—	—
Hukusima		44·4	273	8 15	+ 1	14 46	− 3	—	—	—
Vladivostok		45·6	286	—	—	i 15 2	− 4	i 18 11	SS	19·8
Chicago		46·2	77	e 8 35	+ 7	i 15 11	− 4	e 10 15	PP	19·6
Chicago, Loyola		46·2	77	—	—	i 15 10	− 5	i 18 18	SS	—
Kumagaya		46·2	273	8 26	− 2	15 14	− 1	—	—	—
Nagano		46·3	275	8 31	+ 2	15 18	+ 2	—	—	—
Tokyo, Cen. Met. Ob.		46·3	274	8 32	+ 3	15 15	− 1	19 28	SS	—
Florissant		46·8	82	e 8 30	− 3	i 15 18	− 6	i 8 38	pP	22·4
Hunatu		47·0	273	8 37	+ 2	15 25	− 1	18 24	SS	—
St. Louis		47·0	82	e 8 33	− 2	i 15 22	− 4	i 8 43	pP	—
Ann Arbor		48·1	73	e 8 50	+ 7	i 15 38	− 4	10 44	PP	—
Gihu		48·2	274	8 45	+ 1	15 29	−14	—	—	20·5
Nagoya		48·2	274	e 9 8	+24	—	—	—	—	—
Cape Girardeau		48·3	83	e 8 41	− 4	i 15 40	− 5	i 8 51	pP	—
Little Rock		48·5	88	e 8 43	− 3	i 15 53	+ 5	i 18 52	SS	23·3
Kyoto		49·0	275	8 47	− 3	15 52	− 3	—	—	—
Toyooka		49·2	276	8 55	+ 3	15 59	+ 1	—	—	22·5
Osaka		49·4	276	8 53	0	16 3	+ 3	10 58	PP	—
Mazatlan	N.	49·5	110	e 8 43	−11	—	—	—	—	—
Wakayama		49·9	272	8 57	0	16 6	− 1	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Ottawa		50·2	66	8 57	− 3	16 8	− 3	19 35	SS	23·4
Siomisaki		50·2	275	9 0	0	16 9	− 2	20 51	SS	—
Scoresby Sund		50·3	20	i 9 0	0	16 4	− 9	10 58	PP	—
Shawinigan Falls		50·9	62	e 9 5	0	e 16 18	− 3	20 9	SS	29·4
Ivigtut		51·1	37	9 19	+13	16 23	− 1	20 21	SS	23·4
Muroto		51·2	275	9 5	− 2	16 23	− 2	18 58	S_cS	22·8
Koti		51·3	276	9 7	− 1	16 26	0	e 18 59	S_cS	22·6
Hirosima		51·4	277	8 58	−11	16 24	− 4	—	—	22·1
Seven Falls		51·5	61	9 9	0	i 16 26	− 3	19 56	SS	24·4
Heizyo		51·7	288	i 9 9a	− 2	i 16 34	+ 2	—	—	25·4
Keizyo	E.	52·1	285	9 13	− 1	16 41	+ 3	—	—	e 26·2
Vermont		52·1	65	i 9 13	− 1	i 16 39	+ 1	i 19 2	S_cS	e 23·1
Taikyu		52·4	282	9 16	0	e 12 59	PPP	—	—	—
Zinsen		52·4	285	e 9 14	− 2	e 16 41	− 1	e 11 18	PP	21·3
Syuhurei		52·5	283	e 16 34	S	(e 16 34)	− 9	—	—	—
Husan		52·7	281	9 20	+ 2	e 16 48	+ 2	—	—	—
Hukuoka B		53·1	278	e 9 16	− 5	—	—	—	—	—
Irkutsk		53·1	312	i 9 21	0	16 49	− 2	—	—	25·4
Guadalajara	N.	53·2	108	e 9 12	−10	—	—	—	—	—
Williamstown		53·4	66	i 9 21	− 3	16 58	+ 3	i 11 20	PP	e 25·3
Miyazaki		53·7	276	9 26	0	16 59	0	22 14	SSS	—
Georgetown		54·0	72	i 9 26	− 2	i 17 1	− 2	—	—	—
Philadelphia		54·3	70	i 9 26	− 4	i 16 55	−12	e 11 22	PP	e 25·1
Fordham		54·4	68	i 9 32	+ 1	i 17 9	0	i 19 18	S_cS	—
Harvard		54·4	66	i 9 30a	− 1	e 16 59	−10	—	—	e 28·4
Weston		54·6	66	i 9 31a	− 1	i 17 10	− 1	i 10 34	P_cP	—
East Machias		54·9	61	9 40	+ 5	i 17 11	− 5	10 32	P_cP	—
Yakusima		55·4	276	9 39	+ 1	17 15	− 7	22 28	SSS	—
Columbia		55·5	79	e 9 38	− 1	17 19	− 5	e 21 7	SS	e 27·2
Tacubaya	N.	56·5	106	i 9 41	− 5	—	—	—	—	—
Halifax		56·8	59	—	—	e 19 26?	?	—	—	28·4
Oaxaca	N.	59·8	104	e 9 59	−10	—	—	—	—	—
Zi-ka-wei	N.	59·9	283	e 10 6	− 4	18 20	− 1	i 18 32	PS	—
Merida	N.	60·6	96	e 10 18	+ 3	—	—	—	—	—
Bergen		63·6	11	10 31	− 4	18 41	−27	—	—	32·4
Semipalatinsk		63·9	324	e 10 34	− 3	e 18 13	−59	—	—	26·7
Pulkovo		64·8	357	i 10 44	+ 1	e 19 24	+ 1	—	—	e 31·7
Upsala		64·8	4	i 10 42	− 1	i 19 24	+ 1	e 14 50	PPP	e 28·4
Aberdeen		65·9	15	i 10 57	+ 7	i 19 39	+ 2	i 23 9	SS	31·1
Taito		66·6	277	11 1	+ 7	19 43	− 2	—	—	—
Edinburgh		66·9	16	i 10 56	0	i 19 53	+ 4	i 14 14	PPP	28·4
Durham		68·3	15	i 11 6	+ 1	e 20 6	0	i 13 38	PP	—
Moscow		68·3	352	11 7	+ 2	20 7	+ 1	—	—	33·9
Copenhagen		68·8	7	i 11 9	+ 1	20 13	+ 2	13 48	PP	—
Rathfarnham Castle		68·9	18	i 11 6	− 3	i 20 33	+20	i 13 51	PP	i 34·4
Stonyhurst		69·0	16	i 11 9	0	i 20 16	+ 2	i 20 26	PS	29·4
Bidston		69·4	17	i 11 13	+ 1	i 20 36	+18	i 11 28	P_cP	33·4
Apia		70·1	194	e 11 31	P_cP	i 20 22	− 5	e 13 34	PP	e 31·6
Hamburg		70·7	8	i 11 22a	+ 2	e 20 27	− 7	e 13 58	PP	e 31·4
Hong Kong		70·9	283	11 21a	0	20 36	0	13 52	PP	—
Almata		71·2	323	e 11 24	+ 1	—	—	—	—	20·7
Oxford		71·2	16	i 11 23a	0	i 20 43	+ 3	—	—	e 33·2
Palau		71·5	257	11 38	+14	20 38	− 5	—	—	—
De Bilt		71·7	11	i 11 27a	+ 1	i 20 51	+ 6	i 14 1	PP	e 35·4
Kew		71·7	15	i 11 26a	0	i 20 49	+ 4	i 14 11	PP	34·4
Potsdam		72·1	7	e 11 26	− 2	i 20 51	+ 1	i 11 40	pP	e 35·4
Frunse		72·4	324	e 11 32	+ 2	i 21 2	+ 9	—	—	36·3
Göttingen		72·7	9	i 11 31	− 1	i 20 59	+ 2	—	—	e 36·4
Uccle		72·9	13	i 11 33a	0	i 21 2	+ 3	i 14 12	PP	e 35·4
Manila		73·2	272	11 33a	− 2	21 3	+ 1	—	—	34·8
Jena		73·5	7	i 11 35	− 1	e 21 7	+ 1	e 26 27	SS	e 28·4
Jersey		73·6	17	e 11 40	+ 3	i 21 7	0	e 14 21	PP	e 34·9
Cheb		74·4	8	e 11 42	0	e 21 19	+ 3	—	—	e 37·4
Prague		74·5	6	i 11 42a	0	22 20	PPS	e 26 38	SS	e 32·4
Tchimkent		74·5	327	e 11 38	− 4	i 21 18	+ 1	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Paris		74·7	14	i 11 42	− 1	i 21 19	0	22 11	PS	35·4
Karlsruhe		75·1	10	i 11 45	− 1	i 21 26	+ 2	—	—	e 38·4
Stuttgart		75·4	9	11 48a	+ 1	i 21 30	+ 3	i 14 54	PP	e 38·4
Strasbourg		75·5	10	i 11 49a	+ 1	i 21 32	+ 4	i 14 40	PP	e 35·4
Tashkent		75·5	327	i 11 45	− 3	i 21 28	0	—	—	37·7
San Juan		75·9	79	—	—	i 21 29	− 3	i 26 19	SS	i 31·3
Balboa Heights		76·0	95	e 11 55	+ 4	—	—	—	—	—
Phu-Lien		76·2	288	11 51	− 1	i 21 34	− 2	—	—	—
Basle		76·5	11	e 11 54	0	e 21 39	0	—	—	—
Zurich		76·8	11	e 11 56a	+ 1	e 21 44	+ 2	—	—	—
Neuchatel		77·0	12	e 11 57	+ 1	e 21 41	− 4	—	—	—
Budapest		77·2	4	e 12 0	+ 3	i 21 50	+ 3	22 22	ScS	e 36·4
Chur		77·4	10	e 11 59	+ 1	e 21 50	+ 1	—	—	—
Puy de Dôme		77·7	15	e 12 0	0	i 21 54	+ 2	—	—	e 36·4
Kecskemet	Z.	77·8	4	i 12 6	+ 5	e 22 22	PS	i 12 18	PcP	e 35·4
Triest		78·9	7	12 6a	− 1	22 3	− 2	14 43	PP	e 38·4
Moncalieri		79·0	12	i 12 6	− 1	22 25	+19	—	—	31·1
Padova		79·0	8	e 12 15	+ 8	22 22	+16	i 15 30	PP	e 41·4
Piatigorsk		79·2	346	12 14	+ 6	e 22 19	+11	—	—	—
Theodosia		79·2	352	12 8	0	22 7	− 1	—	—	36·4
Simferopol		79·3	353	12 11	+ 2	22 10	+ 1	—	—	33·9
Grozny		79·5	344	12 15	+ 5	i 22 24	+13	—	—	—
Sebastopol		79·7	354	12 11	0	—	—	—	—	—
Yalta		79·8	352	12 13	+ 1	—	—	—	—	—
Bagnères		79·9	17	i 12 16	+ 4	22 20	+ 4	i 15 18	PP	37·4
Belgrade		79·9	2	i 12 13k	+ 1	i 22 18	+ 2	i 22 29	PS	e 32·1
Bucharest		80·3	358	i 12 16a	+ 2	i 22 20	0	i 15 20	PP	38·4
Marseilles		80·4	14	12 7	− 8	e 22 14	− 7	e 15 1	PP	e 37·4
Florence		80·6	9	12 16	0	22 25	+ 2	—	—	38·4
Tiflis		81·2	345	12 19	0	i 22 31	+ 2	i 15 43	PP	—
Baku		81·5	340	12 23	+ 2	i 23 0	+28	—	—	—
Fort de France		81·6	77	i 12 20	− 1	i 22 30	− 3	15 24	PP	38·9
Dehra Dun	N.	82·1	314	—	—	e 34 42?	?	—	—	e 46·7
Sofia		82·1	0	e 12 25	+ 1	e 22 38	0	—	—	28·8
Toledo		82·3	21	i 12 26k	+ 1	i 22 41	+ 1	e 15 36	PP	e 31·4
Rome		82·5	7	i 12 27a	+ 1	i 22 43	+ 1	i 15 45	PP	i 31·7
Erevan		82·7	344	e 12 23	− 4	e 22 58	+14	—	—	—
Calcutta	N.	84·2	302	i 12 35a	+ 1	i 22 59	0	i 15 50	PP	e 40·2
Agra		84·9	312	12 37a	− 1	i 22 57	− 9	15 56	PP	—
Granada		85·0	22	i 12 45	+ 7	i 23 18	+11	i 15 55	PP	e 36·4
San Fernando		85·1	24	i 12 39	0	i 23 15	+ 7	15 56	PP	40·9
Almeria		85·5	21	e 12 46	+ 5	i 23 16	+ 4	—	—	e 36·4
Algiers		86·5	16	i 12 46	0	23 22	0	16 5	PP	e 40·4
Ksara		90·2	349	i 13 0a	− 4	e 23 52	− 4	i 13 13	pP	—
Brisbane		92·8	223	—	—	i 23 44	[− 5]	i 30 26	SS	—
Hyderabad		93·2	307	13 15	− 2	23 49	[− 2]	17 2	PP	41·2
Bombay		94·4	313	e 13 24	+ 1	i 23 54	[− 4]	i 17 9	PP	46·2
Helwan		94·5	353	i 13 25k	+ 2	24 1	[+ 3]	17 11	PP	—
Medan		94·7	283	e 13 43	+19	e 25 16	+40	i 25 27	PS	e 40·4
Huancayo		95·6	103	e 13 37	+ 9	i 24 0	[− 4]	e 17 28	PP	37·6
Arapuni		96·0	201	—	—	e 25 2	+15	31 32	SS	46·4
Batavia		98·2	271	e 13 50	+10	25 32	+27	i 17 28	PP	42·4
Riverview		99·2	221	e 17 49	PP	24 21	[− 2]	i 32 4	SS	e 41·2
Sydney		99·2	221	—	—	e 24 1	[−22]	—	—	e 38·4
Wellington		99·3	201	e 13 26?	−19	i 24 11	[−12]	17 28	PP	46·9
Kodaikanal	E.	100·0	305	e 14 1	+12	i 24 24	[− 3]	i 17 57	PP	i 48·2
Colombo	E.	101·8	301	e 14 1	+ 5	24 34	[− 2]	—	—	56·2
Christchurch		101·9	201	i 14 3a	+ 6	25 38	+ 2	e 18 6	PP	47·2
La Paz		103·2	100	i 14 10a	+ 7	i 24 38	[− 4]	i 18 18	PP	46·4
Melbourne		105·1	224	i 19 51	?	i 24 54	[+ 3]	i 33 22	SS	50·1
Perth		113·8	248	—	—	i 24 35	[−52]	29 13	PS	i 59·1
Rio de Janeiro		122·4	83	i 20 44	PP	—	—	—	—	i 36·9
La Plata		123·2	104	21 20	?	26 26	[+26]	45 14	SSS	55·4
Cape Town		158·2	9	e 19 30	[−28]	i 44 7	SS	i 24 17	PP	e 75·4
	N.	158·2	9	i 20 15	[+17]	i 44 7	SS	24 15	PP	e 77·4

For Notes see next page.

NOTES TO NOV. 17d. 3h. 54m. 34s.

Additional readings
Sitka i = +4m.34s.
Seattle ePPP = +6m.5s.
Ferndale eE = +11m.30s.
Berkeley eZ = +6m.13s., eGN = +12m.58s., eE = +13m.38s.
San Francisco eE = +6m.14s.
Branner iE = +6m.19s., eE = +14m.34s.
Haiwee iEN = +6m.49s.
Salt Lake City S = +12m.15s.
Santa Barbara iEN = +12m.24s.
Mount Wilson iZ = +6m.59s., iE = +12m.38s.
Pasadena iZ = +6m.58s., iN = +11m.53s., iE = +12m.39s.
La Jolla i = +7m.12s.
Denver ipPEN = +7m.34s., iN = +7m.40s., eN = +12m.30s., iN = +13m.6s., isSE = +13m.30s.
Tucson iP = +7m.45s., i = +8m.0s., iP_cP = +9m.33s., iPPP = +9m.42s., i = +9m.51s. and +11m.14s., iS = +13m.46s., i = +15m.4s.
Florissant iPE = +8m.34s., isSE = +15m.35s., iPSN = +16m.12s., eSSE = +18m.21s.
St. Louis iPE = +8m.37s., iE = +9m.33s. and +9m.46s., iPPE = +10m.34s., isSE = +15m.40s.
Ann Arbor SS = +18m.32s., i = +19m.32s.
Cape Girardeau iPE = +8m.45s., isSN = +15m.56s., iN = +18m.31s., iE = +18m.36s.
Little Rock iPE = +8m.52s., iPP = +10m.29s., iSSEN = +16m.3s., isPEN = +16m.29s., iPSN = +16m.50s., i = +17m.50s., iS_cSN = +18m.34s., ? = +19m.17s., iSSS? = +19m.38s., iS_cPP_cS = +25m.53s.
Ottawa PPZ = +10m.50s., i = +18m.45s.
Scoresby Sund ? = +16m.15s.
Shawinigan Falls e = +26m.26s.
Ivigtut = +18m.57s.
Vermont iSS = +20m.0s.
Philadelphia iS = +17m.4s., iS_cS = +19m.13s., iSS = +20m.42s.
Weston iP = +9m.35s.k, eN = +16m.37s., iPS?E = +17m.29s., iE = +18m.9s., iS_cSN = +19m.18s., eSSEN = +20m.51s., $ePKP_1PKPZ$ = +39m.51s.
East Machias ePP = +11m.34s., iSS = +20m.53s.
Halifax eS = +24m.26s. ?
Zi-ka-wei iN = +18m.50s.
Upsala iN = +19m.34s., iPS = +19m.43s., eN = +20m.5s., SSE = +23m.47s.
Aberdeen i = +27m.7s.
Edinburgh i = +11m.10s., +20m.54s., and +23m.57s.
Durham iSE = +20m.10s., iEN = +20m.16s.
Copenhagen PPP = +15m.41s., eN = +20m.26s., S_cSN = +21m.21s., e = +23m.26s., SS = +24m.56s., SSS = +27m.44s.
Rathfarnham Castle i = +12m.27s., iPPP = +15m.24s., iPS = +21m.5s., iSS = +25m.16s.
Stonyhurst i = +20m.33s.
Bidston iPPP = +13m.56s., ePPP = +15m.41s., i = +20m.51s.
Apia eS_cS = +21m.8s., eSS = +24m.40s.
Hamburg ePPPZ = +15m.50s., iN = +20m.40s. and +21m.13s.
Hong Kong SS = +20m.55s., SSS = +25m.12s.
Kew iP_cP = +11m.40s., ePPP = +15m.49s., iEN = +20m.57s., iE = +21m.1s.
Potsdam iPNZ = +11m.29s., ePP = +14m.2s., eZ = +14m.26s., iSE = +20m.54s., eZ = +21m.2s. and +21m.26s., iPSE = +21m.38s., eSSEN = +25m.26s.?, eE = +27m.26s. ?, eSSS = +28m.26s. ?
Uccle SSE = +25m.38s.
Jena iPEZ = +11m.39s., iS = +21m.14s., eE = +21m.43s., eN = +21m.47s.
Jersey eSS = +26m.1s., e = +31m.26s. ?
Paris i = +12m.23s.
Stuttgart i = +12m.0s., eNZ = +13m.4s., e = +14m.9s., +17m.54s., and +20m.18s., iSZ = +21m.42s., eEN = +23m.39s., eSS = +26m.26s., eSSS = +30m.20s.
Strasbourg eN = +14m.44s., iPPPZ = +16m.11s., iSSE = +26m.32s.
Budapest SKKS?N = +22m.2s., i = +22m.44s., iE = +23m.36s. and +24m.23s., iN = +24m.40s.
Triest PPP = +16m.32s., SS = +27m.1s., SSS = +29m.45s.
Grozny i = +12m.30s. and +22m.13s.
Bagnères SSN = +27m.39s., eSSSN = +30m.51s.
Belgrade iZ = +12m.24s., iNE = +14m.31s.
Bucharest iEN = +12m.28s., iPPPN = +17m.6s., iPS = +22m.48s., iSSN = +28m.23s.
Marseilles i = +22m.29s., SSE = +27m.29s.
Tiflis ePPE = +15m.55s., PPPZ = +17m.25s., eSSN = +27m.31s., eSSSN = +31m.30s., eSSSZ = +31m.37s., iN = +33m.19s., iE = +33m.24s.
Baku i = +19m.43s.
Fort de France PPP = +17m.25s., PS = +23m.16s., SS = +27m.26s., SSS = +30m.34s.
Dehra Dun eN = +43m.3s.
Sofia eE = +25m.42s.
Toledo iSS = +28m.6s.
Rome i = +12m.43s. and +23m.6s., iPS? = +23m.43s., iSS = +28m.7s.
Erevan i = +12m.29s.
Calcutta ePPPN = +17m.43s., ePSN = +23m.47s., eSSN = +28m.39s., eSSSN = +32m.3s.

Continued on next page.

Agra PPPE = +17m.25s., eN = +23m.2s., sS?EN = +23m.6s., iN = +23m.18s., SSE = +28m.19s., SSSE = +31m.24s.
Granada iSE = +23m.23s.
San Fernando iE = +13m.52s.
Algiers PS = +24m.28s., SS = +30m.7s.
Ksara PP = +16m.28s., i = +24m.14s.
Brisbane iS?E = +23m.50s., iE = +24m.14s.
Hyderabad PSN = +24m.32s., SSN = +29m.8s.
Bombay SEN = +24m.54s., iPSEN = +26m.2s., SSN = +31m.2s.
Helwan S = +24m.44s., PS = +25m.47s.
Medan iEN = +24m.7s.
Arapuni L_q = +40m.32s.
Huancayo eP = +13m.42s., PP = +17m.52s. and +17m.58s., PPP = +19m.19s., iSKS = +24m.16s., iS = +24m.42s. and +24m.51s., iPS = +25m.57s., iPPS = +27m.0s., i = +28m.16s., eSS = +30m.56s., iSS = +31m.14s. and +31m.19s., i = +31m.35s., +31m.41s., +32m.28s., +32m.54s., and +34m.13s., eSSS = +35m.2s., SSS = +35m.28s., i = +35m.52s.
Batavia iN = +24m.24s., iSE = +25m.36s.
Riverview iSE = +25m.18s.
Wellington eS = +24m.27s., PS = +26m.30s., SS = +31m.53s., SSS? = +37m.3s., L_q = +41m.4s.
Kodaikanal iSKKSE = +24m.57s., iSE = +25m.32s., iPPSE = +27m.8s., iSSE = +32m.13s., iSSSE = +36m.21s.
Christchurch SKS = +24m.29s., SN = +25m.45s., iPSNZ = +27m.1s., SS = +32m.26s., SSSEN = +36m.20s., L_q = +42m.13s.
La Paz iPS? = +27m.23s., SSE = +33m.11s., SSSE = +37m.53s.
Melbourne i = +26m.9s., e = +38m.1s., i = +44m.59s.
Perth i = +26m.9s., +29m.43s., +35m.33s., +36m.21s., +42m.21s., +46m.11s., +50m.8s., and +50m.34s.
Cape Town E i = +29m.15s., iPSKS = +35m.7s.
Cape Town N. iPPP = +28m.10s., i = +34m.35s.
Long waves were also recorded at Laibach, Johannesburg, Sverdlovsk, and Besançon.

Nov. 17d. Further shocks from the neighbourhood of the epicentre of 16d. 11h. were recorded at Mizusawa and Nagoya.

Mizusawa

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
3	0	20	6	43	8	9	54	52	22	55	15(S)
3	16	43(S)	7	9	14	12	36	25			
4	17	53(S)	8	59	7	13	48	30			

Nagoya h. 3 m. 0 s. 43

Nov. 17d. Readings also at 0h. (Branner, Stuttgart (2), Chur (2), Basle, and Zurich (3)), 1h. (Wellington, Christchurch, and New Plymouth), 2h. (Zurich (2), Malabar, and New Plymouth (2)), 3h. (Wellington, Zurich (3), Sverdlovsk, and Vladivostok), 5h. (Perth and Andijan), 6h. (near Tananarive), 7h. (Tiflis), 8h. (Tiflis), 9h. (Tucson), 10h. (Tucson, Yalta, Sebastopol, Simferopol, and Theodosia), 11h. (Andijan), 13h. (Copenhagen), 16h. (Tucson), 17h. (Koti), 18h. (Fort de France), 19h. (Tashkent, Ksara, La Paz, Rio de Janeiro, and Cape Town), 20h. (Irkutsk, Sverdlovsk, Tiflis, De Bilt, Baku, Rome, Kodaikanal, and Huancayo), 21h. (Cape Town, Rio de Janeiro, La Paz, Ksara, near Tananarive, Kew, Huancayo, Kodaikanal, Rome, Baku, De Bilt, Tiflis, and Sverdlovsk), 22h. (Tiflis, Ksara, Irkutsk, and Tashkent).

Nov. 18d. 7h. 18m. 8s. Epicentre 38°·0N. 123°·6E. (as given by Weather Bureau of Tyosen).

A = −·4372, B = +·6580, C = +·6131; δ = 0; h = −1;
D = +·833, E = +·553; G = −·339, H = +·511, K = −·790.

		△	Az.	P.	O−C.	S.	O−C.
		°	°	m. s.	s.	m. s.	s.
Heizyo		2·0	58	e 0 41	P_g	i 1 8	S_g
Zinsen		2·4	102	e 0 41	0	1 12	0
Keizyo		2·7	99	0 45	0	1 23	S*
Syuhurei		4·0	116	1 3	− 1	1 51	− 1
Taikyu		4·5	117	1 13	+ 2	2 4	− 1
Husan		5·2	122	e 1 30	P*	2 29	+ 7
Vladivostok		8·1	48	—	—	e 4 26	S_g
Koti	N.	9·1	115	—	—	e 4 37	S*

Additional readings :—
Vladivostok i = +4m.32s., +4m.40s., and +4m.46s.
Koti eN = +4m.42s.
Long waves were also recorded at Tashkent, Irkutsk, and Sverdlovsk.

Nov. 18d. 14h. 12m. 28s. Epicentre 13°·3S. 167°·0E. (as on 1937 Aug. 31d.).

$A = -\cdot 9485$, $B = +\cdot 2190$, $C = -\cdot 2285$; $\delta = -17$; $h = +6$;
$D = +\cdot 225$, $E = +\cdot 974$; $G = +\cdot 223$, $H = -\cdot 051$, $K = -\cdot 974$.

A depth of focus 0·040 has been assumed.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Brisbane		19·2	221	i 4 14	+10	i 7 38	+16	i 5 2	PPP	—
Apia		20·7	93	i 4 11	− 8	i 7 36	−12	—	—	—
Riverview		25·0	213	e 6 8	PP	—	—	i 6 14	pP	e 12·1
Sydney		25·0	213	e 4 14	−46	e 8 40	−21	—	—	e 10·5
Wellington		28·7	168	e 5 32?	− 1	9 57	− 3	i 6 46	PP	e 11·5
Christchurch		30·5	171	e 6 18a	+29	10 29	+ 1	e 10 50	L_g	12·6
Melbourne		31·4	215	i 7 22	PP	i 10 54	+12	i 13 30	SS	16·4
Perth		50·3	240	14 32	?	(15 27)	+ 7	e 19 32	SS	31·0
Manila		53·3	300	8 58	+ 6	16 6	+ 6	—	—	—
Koti		56·5	327	—	—	e 14 41	?	—	—	—
Batavia		59·6	271	9 45	+ 9	17 28	+ 6	—	—	—
Husan		60·1	324	—	—	e 17 30	+ 2	—	—	—
Keizyo	E.	63·0	325	—	—	e 17 56	− 9	—	—	—
Zinsen		63·2	325	—	—	e 18 7	0	—	—	—
Vladivostok		64·7	333	i 10 11	+ 2	e 18 26	+ 1	—	—	24·9
~~Phu-Lien~~		~~68·5~~	~~300~~	—	—	e 18 43	−28	—	—	—
Medan		69·8	280	10 40	− 1	19 32	+ 6	i 21 21	PPS	—
Santa Barbara	Z.	84·1	53	i 11 58	− 2	—	—	13 33	pP	—
Irkutsk		84·6	327	e 11 32?	−30	i 21 54	− 9	e 15 32?	PP	e 34·5
Calcutta	N.	84·8	295	e 15 11	PP	i 22 6	+ 1	22 21	sS	—
College		85·0	18	e 12 1	− 3	e 21 50	[− 8]	e 23 30	sS	e 34·1
Pasadena		85·2	54	i 12 2k	− 3	—	—	i 13 27	pP	—
Mount Wilson		85·3	54	i 12 2k	− 4	—	—	i 13 26	pP	—
La Jolla		85·5	55	i 12 3	− 4	—	—	e 13 28	pP	—
Riverside		85·8	54	e 12 3	− 5	—	—	e 13 39	pP	—
Haiwee		86·0	51	i 12 5k	− 4	—	—	i 13 29	pP	—
Tinemaha		86·1	51	e 12 7	− 3	—	—	e 13 42	pP	—
Colombo	E.	88·8	277	e 14 6	pP	22 23	[0]	—	—	—
Tucson		90·5	57	i 12 28	− 2	i 22 52	− 6	i 16 8	PP	46·7
Kodaikanal	E.	91·9	280	e 16 2	PP	i 22 44	[+ 4]	i 25 25	PS	29·7
Agra	E.	93·7	297	e 16 22	PP	i 22 56	[+ 5]	25 32	PS	—
Bombay		97·6	287	—	—	i 23 12	[+ 1]	i 24 4	S	—
Andijan		102·0	310	e 16 36	?	e 23 34	[+ 1]	—	—	—
Tchimkent		104·3	311	—	—	e 23 40	[− 4]	—	—	—
Tashkent		104·4	310	17 58	PP	24 27	−29	i 26 45	PS	—
Sverdlovsk		110·0	326	e 20 17	PPP	e 24 4	[− 4]	e 33 34	SS	44·5
Huancayo		113·3	110	e 14 54	pP	e 25 8	SKKS	e 19 2	PP	—
Columbia		115·5	58	e 13 59	P	e 23 50	[−39]	e 21 44	PPP	e 43·2
Baku		119·1	310	—	—	e 24 46	[+ 4]	—	—	e 43·5
Williamstown		120·5	47	i 18 16	[− 2]	—	—	i 19 41	PP	—
Fordham		120·6	49	i 19 42	PP	e 24 40	[− 7]	e 29 16	PS	—
Seven Falls		121·4	42	—	—	e 29 44	PS	—	—	51·5
Weston	Z.	122·2	48	i 18 14	[− 7]	—	—	—	—	—
Moscow		122·6	328	19 55	PP	e 27 32	SKKS	e 36 20	SS	—
Tiflis		122·9	311	e 18 29	[+ 7]	e 29 32	PS	e 19 53	PP	59·5
Pulkovo		123·7	335	e 20 26	PP	e 27 35	SKKS	36 20	SS	—
San Juan		128·8	76	e 14 47	P	—	—	20 57	PP	—
Ksara		131·3	303	e 20 11	PP	—	—	i 21 34	pPKP	—
Copenhagen		133·3	341	22 13	?	—	—	—	—	—
Potsdam		135·8	338	e 18 50	[+ 4]	e 38 32?	SS	e 21 32	PP	59·5
Helwan		135·9	299	e 18 52	[+ 6]	i 27 55	SKKS	e 21 49	PP	—
De Bilt		138·6	343	e 21 32?	PP	e 39 35	SS	e 44 44	SSS	e 56·5
Uccle		140·0	344	e 21 56	PP	e 39 44	SS	—	—	—
Stuttgart		140·1	338	e 18 50	[− 5]	e 39 54	SS	e 21 56	PP	—
Zurich		141·5	337	e 18 32?	[−25]	—	—	—	—	—
Chur		141·6	335	e 18 54	[− 3]	—	—	e 22 1	PP	—
Strasbourg		141·8	338	e 20 19	?	e 39 57	SS	e 22 0	PP	—
Rome		144·9	326	i 19 1k	[− 1]	i 28 43	SKKS	—	—	—
Toledo		152·4	345	e 19 18	[+ 4]	—	—	—	—	20·9

For Notes see next page.

NOTES TO NOV. 18d. 14h. 12m. 28s.

Additional readings :—
Brisbane iN = +5m.14s and +5m.56s., iE = +6m.2s.
Apia iS = +5m.52s., eS* = +6m.28s., eS_E = +6m.51s.
Wellington iP_cP? = +10m.2s., iS_cS = +15m.36s.
Melbourne i = +15m.27s.
Perth PP = +16m.40s., PPP = +17m.30s., PPPP = +17m.59s., P_cS = +19m.17s., S = +21m.27s., PS = +21m.40s., i = +23m.32s., SS = +25m.55s., SSS = +27m.11s., i = +29m.47s. and +30m.32s.
Medan eEN = +11m.54s.
Irkutsk e = +26m.32s. ?
Pasadena iEZ = +13m.33s., iPPEZ = +15m.21s., eZ = +41m.8s.
Mount Wilson iNZ = +13m.36s., iPPZ = +15m.22s., eZ = +41m.1s.
La Jolla iPPZ = +15m.23s.
Haiwee iZ = +13m.42s.
Tucson isP = +14m.13s., PPP = +18m.7s., iS = +22m.58s., SPS = +26m.23s.
Agra SSS = +26m.37s.
Tashkent e = +18m.44s., i = +23m.36s., eSKKS = +24m.56s.
Sverdlovsk e = +25m.38s. and +29m.58s.
Huancayo esPP = +19m.38s. and +20m.24s., ePPP = +21m.2s., epPPP = +22m.13s., esS = +27m.36s., eSP = +28m.8s., epPS = +28m.56s., ePPS = +29m.55s., eSS = +33m.56s., esSS = +37m.1s.
Columbia esP = +15m.29s., eSKKS = +25m.39s., eSP = +28m.33s., eSS = +33m.28s., esSS = +36m.22s., eSSS = +38m.0s.
Fordham eE = +26m.4s.
Moscow e = +20m.52s. and +26m.29s., PPS = +31m.5s.
Tiflis iSKKSEN = +26m.30s.
Pulkovo e = +21m.32s.
San Juan sPP = +21m.56s.
Ksara i = +21m.11s., PP = +24m.16s.
Potsdam eN = +19m.26s., eEN = +22m.26s., eZ = +22m.50s., eNZ = +23m.26s.
Stuttgart e = +23m.57s.
Strasbourg eE = +41m.37s., eSSS = +45m.16s.
Rome e = +40m.31s.
Toledo iP = +19m.24s.

Nov. 18d. 15h. 31m. 42s. Epicentre 15°·3N. 119°·9E. (as on 1937 April 3d.).

A = −·4811, B = +·8365, C = +·2622 ; δ = −6 ; h = +6 ;
D = +·867, E = +·498 ; G = −·131, H = +·227, K = −·965.

A depth of focus 0·005 has been assumed.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Manila		1·2	124	i 0 26$_a$	+ 4	0 46	+ 8	—	—	—
Hong Kong		8·9	323	2 25	PPP	4 28	SSS	—	—	4·8
Phu-Lien		13·8	295	3 28	PP	6 20	SSS	—	—	—
Koti		22·0	32	e 4 51	+ 1	e 8 52	+ 8	—	—	—
Medan		23·9	244	4 59	−10	8 48	−29	—	—	—
Batavia		25·0	212	5 9	−10	—	—	—	—	—
Vladivostok		29·6	18	—	—	e 10 0	−50	—	—	—
Calcutta	N.	30·7	289	e 6 40	+29	—	—	—	—	—
Irkutsk		38·9	345	—	—	e 13 18?	+ 4	—	—	e 15·3
Agra	E.	40·6	294	6 36	−59	e 14 37	+57	—	—	—
Frunse		47·4	315	e 8 28	− 2	—	—	—	—	—
Andijan		48·3	312	e 8 40	+ 3	e 15 37	+ 6	—	—	—
Tashkent		50·7	311	i 8 53	− 2	e 17 4	+60	e 20 3	SS	e 27·9
Tchimkent		50·7	313	e 8 56	+ 1	e 16 8	+ 4	i 10 39	PP	—
Samarkand		52·0	308	e 9 5	0	—	—	e 12 34	PPP	—
Sverdlovsk		60·7	327	i 10 4	− 3	i 18 16	− 1	—	—	29·3
Grozny		68·2	311	e 9 53	−63	—	—	—	—	—
Tiflis	Z.	68·9	309	e 10 57	− 3	—	—	—	—	—
Moscow		73·2	324	i 11 24	− 2	—	—	e 14 15	PP	—
Pulkovo		76·7	329	e 11 43	− 3	—	—	e 17 10	PPP	—
Helwan		81·3	298	i 12 9$_k$	− 2	—	—	—	—	—
Chur		92·3	321	e 13 0	− 4	—	—	—	—	—
Zurich		92·7	321	e 12 54	−12	—	—	—	—	—
Tucson		112·2	45	i 19 8	PP	—	—	—	—	—

Additional readings :—
Medan iPEN = +5m.3s.
Vladivostok e = +11m.54s.
Moscow e = +12m.6s.
Pulkovo e = +12m.20s. and +19m.35s.

Nov. 18d. 18h. 29m. 59s. Epicentre 47°·5N. 153°·5E. (as on 1938 Nov. 12d.).

$A = -\cdot6069$, $B = +\cdot3026$, $C = +\cdot7350$; $\delta = +12$; $h = -4$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Vladivostok		15·8	262	e 3 51	+ 6	e 6 43	+ 1	—	—	e 7·4
Nagoya		17·4	231	e 3 52	−14	—	—	—	—	—
Koti		20·5	234	e 4 46	+ 4	8 43	+16	—	—	—
Keizyo	E.	21·8	252	e 4 57	+ 1	e 9 49	SSS	—	—	—
Husan		22·1	245	e 5 7	+ 8	9 17	+19	—	—	—
Zinsen		22·1	254	e 5 10	+11	e 9 19	+21	—	—	e 14·1
Irkutsk		31·5	298	e 6 30	+ 4	e 11 42	+ 8	—	—	18·0
College		35·4	39	—	—	12 39	+ 5	—	—	e 15·4
Sverdlovsk		53·5	317	i 9 29	+ 5	e 17 0	+ 3	—	—	26·0
Andijan		56·1	295	e 10 0	+17	e 19 46	?	e 11 39	PP	—
Calcutta	N.	57·1	268	e 10 0	+10	e 17 54	+ 9	—	—	—
Tashkent		57·7	297	9 56	+ 1	e 22 13	SS	—	—	33·4
Agra	E.	61·0	279	10 23	+ 5	e 18 41	+ 6	—	—	—
Pulkovo		63·5	332	e 11 33	?	e 19 14	+ 7	—	—	—
Moscow		64·0	325	e 10 48	+10	—	—	e 13 29	PP	36·5
Mount Wilson	Z.	64·7	66	i 10 42	0	—	—	—	—	—
Pasadena	Z.	64·7	66	i 10 45	+ 3	—	—	—	—	—
Baku		69·4	307	i 11 20	+ 8	e 21 13	PPS	—	—	36·5
Grozny		69·4	312	e 11 11	− 1	—	—	—	—	—
Bombay		70·1	276	11 21	+ 5	—	—	—	—	—
Tiflis		71·1	312	11 27	+ 5	e 20 26	−12	21 20	PS	e 36·0
Kodaikanal	E.	72·9	267	—	—	e 21 1?	+ 2	—	—	—
Potsdam		74·9	337	e 11 55	+11	—	—	—	—	e 42·0
Jena		76·6	336	e 12 1	+ 7	—	—	—	—	—
Stuttgart		79·2	337	e 12 14	+ 6	—	—	—	—	e 42·0
Ksara		81·6	311	i 12 29	+ 8	e 22 39	+ 6	e 15 31	PP	—
Rome		84·5	331	12 31a	− 5	e 23 13?	+11	—	—	—
Helwan		87·1	312	i 12 56a	+ 7	—	—	—	—	—

Additional readings :—
Zinsen ePE = +5m.15s.
Tashkent e = +19m.55s.
Moscow e = +14m.52s., +17m.31s., and +17m.58s.
Bombay eEN = +4m.56s.
Tiflis eE = +20m.41s.
Long waves were also recorded at Strasbourg, Uccle, De Bilt, Bucharest, Copenhagen, Phu-Lien, Cheb, Hamburg, Prague, Puy de Dôme, and Kew.

Nov. 18d. 23h. 24m. 45s. Epicentre 55°·6N. 157·7W. (as on Nov. 17d.).

$A = -\cdot5251$, $B = -\cdot2154$, $C = +\cdot8233$; $\delta = -5$; $h = -7$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
College		10·5	24	e 2 40	PP	e 4 6	−29	—	—	e 4·5
Victoria		22·2	94	i 4 57	− 3	i 8 53	− 7	—	—	e 10·4
Tinemaha	E.	32·3	109	e 6 32	− 1	—	—	—	—	—
Haiwee		33·2	109	e 6 39	− 1	—	—	—	—	—
Pasadena		34·6	111	i 6 50	− 3	—	—	8 17	PPP	e 16·1
Mount Wilson	Z.	34·6	111	i 6 57	+ 4	—	—	—	—	—
La Jolla	Z.	36·1	111	e 6 56	− 9	—	—	—	—	—
Tucson		40·0	105	i 7 36a	− 2	—	—	i 10 4	PP	20·7
Seven Falls		51·5	61	—	—	e 16 21	− 8	e 20 15	SS	26·2
Irkutsk		53·1	312	—	—	e 21 15?	SS	—	—	30·2
Philadelphia		54·3	70	—	—	e 16 54	−13	—	—	e 26·0
Fordham		54·4	68	e 9 28	− 3	e 16 58	−11	—	—	—
Weston	Z.	54·6	66	i 9 26	− 6	—	—	—	—	—
Sverdlovsk		63·7	339	i 10 39	+ 3	19 28	PS	—	—	31·2
Pulkovo		64·8	357	e 10 45	+ 2	e 19 42	PS	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Moscow		68·3	352	e 11 9	+ 4	e 20 24	PS	—	—	40·7
Frunse		72·4	324	e 11 37	+ 7	—	—	—	—	—
Jena	N.	73·5	7	e 11 37	+ 1	—	—	—	—	—
Tchimkent		74·5	327	11 47	+ 5	21 22	+ 5	—	—	—
Andijan		75·0	324	e 11 51	+ 6	—	—	—	—	—
Tashkent		75·5	327	i 11 42	− 6	i 21 34	+ 6	—	—	e 38·2
Tiflis		81·2	345	e 12 22	+ 3	—	—	—	—	e 43·2
Toledo		82·3	21	i 12 26	+ 1	—	—	—	—	e 75·2
Ksara		90·2	349	e 13 9	+ 5	e 24 20	+24	e 25 17	PS	49·7

Additional readings :—
College eS = +4m.14s.
Tinemaha eE = +6m.52s.
Pasadena iNZ = +6m.56s.
Mount Wilson iZ = +7m.28s.
La Jolla iNZ = +7m.10s.
Tucson iP = +7m.43s. and +8m.0s., PP = +9m.6s.
Weston iZ = +10m.15s., eZ = +10m.41s.
Andijan e = +19m.0s.
Long waves were also recorded at Kodaikanal, Baku, Harvard, Vladivostok, Copenhagen, San Fernando, and East Machias.

Nov. 18d. Further shocks from the neighbourhood of the epicentre of 16d. 11h. were recorded at Mizusawa and Nagoya.

Mizusawa

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
6	55	25	9	48	31	14	57	38	17	50	28
7	26	13	11	10	4(S)	15	30	15	23	50	44
7	53	5									

Nagoya

h.	m.	s.	h.	m.	s.
5	56	0	17	51	3
14	58	13	19	58	53
15	30	52	23	51	57

Nov. 18d. Readings also at 0h. (Irkutsk), 1h. (Sverdlovsk, Tiflis, Tashkent, and Baku), 2h. (Sitka), 3h. (Istanbul), 5h. (Grozny and Nagoya), 8h. (Tucson, Irkutsk, Sverdlovsk, Mount Wilson, Pasadena, Vladivostok, Lick, and Fresno), 9h. (Samarkand, Helwan, Tchimkent, Frunse, Tashkent, Ksara, and Andijan), 10h. (Calcutta), 11h. (Grozny and Tiflis), 12h. (Malabar) 13h. (Hong Kong, Branner, Berkeley, Lick, and Fresno), 15h. (Nagoya and La Paz), 16h. (Harvard, Weston, and Fordham), 17h. (Vladivostok and Koti), 18h. (near Apia, Tiflis, Mizusawa (2), Irkutsk, and Sverdlovsk), 19h. (Irkutsk, Vladivostok, Pasadena, and Mount Wilson), 20h. (Vladivostok, Irkutsk, Mizusawa, Sverdlovsk, Tiflis, Baku, and Tashkent), 21h. (Tiflis, Baku, Tashkent, Copenhagen, Sverdlovsk, Ksara, and Andijan), 22h. (Santiago, La Plata, near Ottawa, San Javier, Williamstown, La Paz, Fordham, Weston, and Harvard).

Nov. 19d. 5h. 39m. 40s. Epicentre 47°·5N. 153°·5E. (as on 1938, Nov. 18d.).

$A = -\cdot6069$, $B = +\cdot3026$, $C = +\cdot7350$; $\delta = +12$; $h = -4$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mizusawa	12·2	232	e 2 56	− 2	5 4	−12	—	—	—
Vladivostok	15·8	262	e 3 34	−11	i 6 32	−10	—	—	8·2
Koti	20·5	234	4 43	+ 1	8 34	+ 7	—	—	10·4
Keizyo	21·8	252	4 52	− 4	9 1	+ 9	—	—	14·0
Husan	22·1	245	e 4 56	− 3	e 9 4	+ 6	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Zinsen		22·1	254	e 5 2	+ 3	e 9 35	SS	—	—	e 11·3
Irkutsk		31·5	298	e 6 29	+ 3	11 53	+19	—	—	17·3
College		35·4	39	e 7 2	+ 2	e 12 27	− 7	—	—	e 15·2
Hong Kong		40·3	245	7 37	− 3	13 50	+ 1	—	—	—
Manila		42·5	230	e 8 1	+ 2	14 39	+17	—	—	—
Victoria		53·0	55	—	—	e 16 20	−30	e 18 56	?	25·3
Sverdlovsk		53·5	317	i 9 24	0	e 17 17	+20	27 8	L_q	33·4
Andijan		56·1	295	e 9 42	− 1	—	—	—	—	33·3
Calcutta		57·1	268	e 9 33	−17	i 17 39	− 6	—	—	—
Tashkent		57·7	297	i 9 52	− 3	i 17 58	+ 5	—	—	e 29·6
Agra		61·0	279	10 15	− 3	18 34	− 1	—	—	—
Scoresby Sund		62·4	359	—	—	19 2	+ 9	—	—	32·3
Tinemaha		62·7	64	e 10 34	+ 5	—	—	—	—	—
Haiwee		63·5	64	e 10 39	+ 5	—	—	—	—	—
Pulkovo		63·5	332	—	—	e 19 7	0	—	—	—
Santa Barbara	Z.	63·6	67	e 10 32	− 3	—	—	—	—	—
Moscow		64·0	325	e 10 38	0	e 19 31	PS	—	—	36·8
Mount Wilson		64·7	66	i 10 37	− 5	—	—	—	—	—
Pasadena		64·7	66	i 10 37	− 5	—	—	—	—	e 27·4
Baku		69·4	307	11 15	+ 3	e 20 54	PS	—	—	36·3
Grozny		69·4	312	e 11 15	+ 3	—	—	—	—	—
Bombay		70·1	276	e 11 20	+ 4	e 20 29	+ 2	e 21 22	PPS	—
Tucson		70·5	63	i 11 14	− 4	—	—	—	—	—
Tiflis		71·1	312	i 11 21	− 1	e 20 50	+12	e 15 42	PPP	e 34·3
Copenhagen		72·1	338	i 11 28	0	21 7	+17	—	—	35·3
Kodaikanal	E.	72·9	267	e 11 20?	−13	—	—	—	—	—
Theodosia		73·1	319	e 11 25	− 9	—	—	—	—	48·3
Simferopol		73·7	320	e 11 36	− 2	—	—	—	—	45·3
Colombo	E.	73·9	262	e 18 50	?	—	—	—	—	—
Jena		76·6	336	e 11 55	+ 1	—	—	—	—	—
Florissant		77·0	46	i 11 58	+ 2	e 21 36	− 9	—	—	—
Cheb		77·2	336	—	—	e 20 20?	?	—	—	—
Ottawa		77·9	33	e 11 56	− 5	e 21 50	− 4	—	—	38·3
Seven Falls		78·1	29	—	—	e 21 50	− 6	—	—	e 35·3
Uccle		78·6	341	12 8	+ 3	—	—	—	—	e 42·3
Istanbul		79·0	322	11 50	−17	—	—	28 8	SS	—
Strasbourg		79·8	338	e 12 17	+ 5	—	—	—	—	e 37·3
Zurich		80·7	337	e 12 12	− 4	—	—	—	—	—
Triest		80·8	333	—	—	e 23 23	PS	—	—	—
Chur		80·9	337	e 12 17	0	—	—	—	—	—
Neuchatel		81·5	337	e 12 20	− 1	—	—	—	—	—
Ksara		81·6	311	i 12 22a	+ 1	e 22 40	+ 7	e 15 32	PP	—
Harvard		81·9	31	—	—	e 22 34	− 2	—	—	e 47·3
Weston		82·1	31	e 12 33	+ 9	e 22 37	− 1	—	—	—
Fordham		82·5	33	e 12 28	+ 2	e 22 45	+ 3	—	—	—
Philadelphia		82·8	36	—	—	e 22 40	− 5	e 28 32	SS	e 34·1
Rome		84·5	331	e 12 15?	−21	i 23 10	+ 8	—	—	e 43·5
Helwan		87·1	312	e 12 50	+ 1	e 23 25	− 3	—	—	—
Toledo		90·7	343	e 13 6	0	—	—	—	—	e 49·3
San Fernando		94·5	344	—	—	e 23 57	[− 1]	—	—	54·8
La Paz	Z.	133·9	62	19 18	[− 1]	—	—	22 51	PP	74·3

Additional readings :—
Mount Wilson iEZ = +10m.47s.
Pasadena iZ = +10m.48s.
Tucson iP = +11m.25s., i = +11m.33s. and +12m.5s.
Tiflis eSE = +20m.55s.
Florissant eSN = +21m.40s.
Istanbul SSS = +38m.20s.
Ksara ePS = +23m.24s.
Long waves were also recorded at Puy de Dôme, Paris, Hamburg, De Bilt, Bucharest, Potsdam, Kew, Prague, and East Machias.

Nov. 19d. 5h. 54m. 24s. Epicentre 37°·1N. 141°·8E. (as on 1938, Nov. 16d.).

Intensity III at Hukusima and Mito ; II at Onahama, Kakioka, Tokyo, Isinomaki, Mito, Tukubasan, and Asio ; I at Sendai, Miyako, Morioka, Kohu, and Yokohama.

Epicentre 37°·0N. 141°·75E. Shallow.

See " Seismological Bulletin of the Cent. Met. Obs., Japan," for the year 1938, Tokyo, 1940, p. 108-109.

$A = -\cdot6283$, $B = +\cdot4944$, $C = +\cdot6006$; $\delta = -9$; $h = -1$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Onahama		0·8	257	0 19k	+ 1	0 29	− 2	—	—	—
Hukusima		1·2	302	0 18	− 6	0 38	− 3	—	—	—
Mito		1·3	236	0 22k	− 3	0 38	− 6	—	—	—
Sendai		1·3	329	0 25k	0	0 42	− 2	—	—	—
Kakioka		1·5	236	0 26k	− 2	0 47	− 2	—	—	—
Tyosi		1·5	209	0 27	− 1	0 43	− 6	—	—	—
Tukubasan		1·6	237	0 27	− 3	0 48	− 3	—	—	—
Yamagata		1·6	315	0 18	−12	0 41	−10	—	—	—
Kumagaya		2·1	244	0 38a	+ 1	1 3	− 1	—	—	—
Mizusawa		2·1	346	e 0 35a	− 2	i 1 3	− 1	—	—	—
Tokyo, Imp. Univ.		2·1	229	0 36	− 1	1 2	− 2	—	—	—
Tokyo, Cen. Met. Ob.		2·1	229	0 36a	− 1	1 0	− 4	—	—	—
Komaba		2·2	230	0 36	− 2	1 3	− 3	—	—	—
Katuura		2·3	214	0 41	+ 1	1 7	− 2	—	—	—
Kiyosumi		2·3	214	0 19	−21	0 44	−25	—	—	—
Maebasi		2·3	252	0 40	0	1 10	+ 1	—	—	—
Mitaka		2·3	232	0 36	− 4	1 5	− 4	—	—	—
Niigata		2·4	291	0 47	P_g	1 19	S_g	—	—	—
Yokohama		2·4	226	0 40	− 1	1 7	− 5	—	—	—
Kamakura		2·5	226	0 36	− 7	0 58	−16	—	—	—
Titibu		2·5	243	0 19	−24	0 47	−27	—	—	—
Miyako		2·6	3	0 40a	− 4	1 9	− 8	—	—	—
Morioka		2·7	349	0 45a	0	1 17	− 2	—	—	—
Mera		2·7	216	0 44	− 1	1 16	− 3	—	—	—
Oiwake		2·7	254	0 45	0	1 22	+ 3	—	—	—
Takada		2·8	270	0 56	P_g	1 34	S_g	—	—	—
Hunatu		2·9	237	0 48	0	1 25	+ 1	—	—	—
Koyama		2·9	232	0 19	−29	0 50	−34	—	—	—
Nagano		2·9	261	0 50	+ 2	1 27	+ 3	—	—	—
Akita		3·0	334	0 50a	0	1 39	S_g	—	—	—
Ito		3·0	225	0 51	+ 1	1 35	S*	—	—	—
Kohu		3·0	241	0 50k	0	1 26	− 1	—	—	—
Misima		3·0	229	0 49	− 1	1 32	S*	—	—	—
Numadu		3·1	230	0 50	− 1	1 44	S_g	—	—	—
Osima		3·1	220	0 47	− 4	1 24	− 5	—	—	—
Matumoto		3·2	254	0 53	+ 1	1 30	− 2	—	—	—
Yosiwara		3·2	232	0 19	−33	1 2	−30	—	—	—
Susaki		3·3	225	0 51	− 2	1 32	− 3	—	—	—
Toyama		3·4	266	1 1	P*	1 48	S*	—	—	—
Hatinohe		3·5	356	0 56	− 1	1 36	− 4	—	—	—
Aomori		3·8	348	1 5	+ 4	1 59	S*	—	—	—
Husiki		3·8	267	1 6	P*	2 11	S_g	—	—	—
Omaesaki		3·8	231	1 6	P*	2 11	S_g	—	—	—
Takayama		3·8	257	1 6	P*	—	—	—	—	—
Wazima		3·9	277	1 5	+ 3	2 2	S*	—	—	—
Hamamatu		4·1	235	1 10	P*	1 54	− 1	—	—	—
Kanazawa		4·2	264	1 9	+ 2	2 9	S*	—	—	—
Hatidyozima		4·3	203	1 4	− 4	1 53	− 7	—	—	—
Gihu		4·4	250	1 9a	− 1	2 2	0	—	—	—
Nagoya	z.	4·4	245	e 1 6	− 4	1 59	− 3	—	—	—
Hukui		4·6	257	1 1	−11	2 10	+ 3	—	—	—
Ibukisan		4·7	251	1 12	− 2	2 17	+ 7	—	—	—
Hikone		4·8	250	1 15	0	2 17	+ 5	—	—	—
Kameyama		4·9	245	1 17	0	2 30	S*	—	—	—
Tu		4·9	243	1 18	+ 1	2 28	+13	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mori		5·1	349	1 36a	P*	2 39	S*	—	—	—
Urakawa		5·1	8	1 29	P*	2 24	+ 4	—	—	—
Muroran		5·2	353	1 5a	−16	2 38	S*	—	—	—
Kyoto		5·3	249	1 23	+ 1	2 30	+ 5	—	—	—
Yagi		5·5	245	1 37	P*	2 42	S*	—	—	—
Toyooka		5·8	257	1 29	0	2 42	+ 4	—	—	—
Kobe		5·9	249	1 30	− 1	2 59	S*	—	—	—
Obihiro		5·9	10	2 17	+46	3 36	+56	—	—	—
Sapporo		6·0	356	1 43	P*	3 4	S*	—	—	—
Siomisaki		6·1	236	1 35	+ 1	3 17	S_g	—	—	—
Sumoto		6·2	247	1 35a	0	3 12	S*	—	—	—
Wakayama		6·2	244	1 34k	− 1	3 3	S*	—	—	—
Tokusima		6·6	246	1 40	− 1	3 20	S*	—	—	—
Asahigawa		6·7	3	2 35	+53	—	—	—	—	—
Nemuro		6·8	24	1 38	− 6	2 52	−11	—	—	—
Sakai		7·1	260	2 0	P*	—	—	—	—	—
Haboro		7·3	359	3 8	P*	—	—	—	—	—
Muroto		7·3	241	1 50	0	3 18	+ 3	—	—	—
Koti		7·6	245	e 1 59	+ 4	4 2	S_g	—	—	—
Hirosima		8·1	254	2 6	+ 4	3 58	S*	—	—	—
Izuka		9·7	254	2 25	+ 3	4 54	S*	—	—	—
Hukuoka B		9·9	253	—	—	e 4 50	S*	—	—	—
Kumamoto		10·0	248	2 27k	0	—	—	—	—	—
Miyazaki		10·0	242	2 27	0	4 31	+ 9	—	—	—
Titizima		10·0	179	4 0	S	(4 0)	−22	—	—	—
Saga		10·2	252	3 3	+32	—	—	—	—	—
Unzendake		10·4	249	2 29	− 5	4 38	+ 6	—	—	—
Husan		10·5	263	e 3 20	+45	5 17	S*	—	—	—
Yakusima		11·5	238	2 49	+ 1	—	—	—	—	—
Keizyo	E.	11·8	277	2 52	− 1	e 5 41	+35	—	—	6·8
Semipalatinsk		45·1	308	—	—	e 11 1	PPP	—	—	—
Frunse		50·6	300	e 8 26	−36	—	—	—	—	—
Andijan		52·8	297	e 9 25	+ 6	e 16 51	+ 4	—	—	—
Tchimkent		54·3	300	e 9 52	+22	—	—	—	—	—
Samarkand		57·1	298	e 10 0	+10	—	—	—	—	—
Tinemaha		75·5	54	e 11 47	− 1	—	—	—	—	—
Santa Barbara	Z.	76·1	57	e 11 47	− 4	—	—	—	—	—
Haiwee		76·3	54	e 11 50	− 2	—	—	—	—	—
Mount Wilson	Z.	77·3	57	i 11 53	− 5	—	—	—	—	—
Pasadena	Z.	77·3	57	i 11 54	− 4	—	—	—	—	—
La Jolla	Z.	78·7	57	e 11 59	− 7	—	—	—	—	—
Budapest		81·5	325	—	—	e 25 36?	?	—	—	e 34·6
Tucson		83·3	54	i 12 27	− 3	—	—	i 16 3	PP	—
La Paz	Z.	146·5	60	19 42	[0]	—	—	—	—	—

Additional readings :—
Mount Wilson iZ = +12m.5s.
Pasadena iZ = +12m.5s.
Tucson i = +13m.0s., +13m.13s., and +13m.20s.
Long waves were also recorded at Phu-Lien.

Nov. 19d. Further shocks from the neighbourhood of the epicentre of 5h. 54m. were recorded at Mizusawa and Nagoya.

Mizusawa

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
0	21	43(S)	10	37	21	15	39	33	17	34	7(S)
2	54	14	10	41	51	17	22	42(S)	19	52	31
2	55	25(S)	12	57	41	17	25	25(S)	20	54	16
4	36	37	15	26	38						

Nagoya

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
2	54	53	15	40	43	19	53	10	20	54	58
15	27	41									

Nov. 19d. Readings also at 2h. (Hong Kong, Husan, Zinsen, Calcutta, Rome, Keizyo, Taihoku, Phu-Lien, Zi-ka-wei, Samarkand (2), Agra, Tashkent, Vladivostok, and Irkutsk), 3h. (Sverdlovsk and Tiflis), 5h. (Oaxaca, Tacubaya, and Nagoya), 6h. (Wellington and Christchurch), 8h. (Belgrade), 9h. (Cape Town, Agra, Ksara, Tashkent, and near Tananarive), 10h. (Pasadena, Santa Barbara, Tinemaha, Haiwee, La Paz, Huancayo, Williamstown, Harvard, Sverdlovsk, Mount Wilson, and Tucson), 15h. (Almata, Frunse, Samarkand, Tashkent, Andijan, and Tchimkent), 16h. (Tucson), 17h. (Mount Wilson, Ksara, Vladivostok, and Irkutsk), 18h. (Baku, Sverdlovsk, Tiflis, and Tashkent), 19h. (Tchimkent, Frunse, Andijan (2), and Samarkand), 20h. (near Tananarive).

Nov. 20d. Further shocks from the neighbourhood of the epicentre of 19d. 5h. were recorded at Mizusawa and Nagoya.

Mizusawa

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
0	13	57(S)	8	7	29(S)	15	19	11	19	39	7
2	0	4	10	31	36(S)	16	41	4	21	22	12
4	25	4	12	18	50	17	23	20	21	27	46
6	37	25(S)	12	45	58	18	2	14	22	12	51(S)
6	42	27(S)	13	41	42	19	13	14(S)	23	31	11(S)
8	2	41									

Nagoya

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
2	1	33	12	19	25	13	43	20	19	12	36
4	25	28	12	46	30	15	20	2			

Nov. 20d. Readings also at 0h. (Samarkand, Tchimkent, Tashkent, Andijan, and Frunse), 1h. (Sverdlovsk and Lick), 2h. (near Andijan), 4h. (Santiago, Mount Wilson, and Tucson), 5h. (Sverdlovsk, Tashkent, Irkutsk, and Tacubaya), 8h. (Haiwee (2), Tinemaha (2), La Jolla (2), Oaxaca, Guadalajara, Tacubaya, Andijan, Mount Wilson (2), Tucson (2), and Pasadena (2)), 10h. (Pasadena, Mount Wilson, and Tiflis), 11h. (La Paz, Pasadena, Mount Wilson, and Tucson), 12h. (Sebastopol), 13h. (Mizusawa), 15h. (Frunse and Andijan), 16h. (Andijan, Mount Wilson, Tucson, and Apia), 17h. (Kodaikanal, Mizusawa, Nagoya, and Manila), 18h. (Ksara, Vladivostok, Hong Kong, Baku, Colombo, Calcutta, Medan, Batavia, Sverdlovsk, Irkutsk, Tashkent, and Tiflis), 19h. (Erevan, Grozny, and Tiflis), 21h. (Medan), 22h. (Medan, Riverside, near Malabar and Batavia, Manzanillo, Sverdlovsk, Mount Wilson, Tucson, Andijan (2), and Lick).

Nov. 21d. 1h. 11m. 28s. Epicentre 29°·8N. 95°·3E.

Intensity VI at Dibrugarth.

Epicentre Eastern Tibet 34°·0N. 95°·6E. (Bombay); depth 100km. (Bombay).

See " Government of India Seismological Bulletin," Oct.-Dec., 1938, Delhi, 1939; p.91.

$A = -\cdot0878$, $B = +\cdot8648$, $C = +\cdot4945$; $\delta = +12$; $h = +2$;
$D = +\cdot995$, $E = +\cdot101$; $G = -\cdot050$, $H = +\cdot492$, $K = -\cdot869$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Calcutta	N.	9·8	225	i 2 26a.	+ 2	i 4 28	+11	i 5 13	S_g	—
Phu-Lien		13·3	130	e 3 13	0	e 5 52	+10	—	—	7·3
Dehra Dun	N.	15·4	276	—	—	e 5 55	−37	—	—	e 7·8
Agra		15·9	265	3 35	−12	6 43	− 1	3 49	pP	—
Hong Kong		18·1	109	4 19	+ 5	7 49	+14	—	—	9·5
Hyderabad		20·1	236	4 29	− 9	8 20	+ 1	—	—	10·2
Almata		20·2	319	4 37	− 2	8 14	− 7	—	—	—
Frunse		21·4	314	e 4 48	− 3	e 8 54	+ 9	—	—	—
Andijan		22·0	307	e 4 54	− 4	e 9 11	+15	—	—	—
Zi-ka-wei	N.	22·1	79	e 4 58	− 1	9 10	+12	—	—	—
Dairen		23·1	61	5 19	+11	9 35	+19	—	—	—
Irkutsk		23·3	14	5 8	− 2	i 9 30	+10	—	—	12·5
Taihoku		23·3	95	e 5 22	+12	9 59	SS	—	—	12·1
Bombay		23·5	248	e 5 6a	− 6	i 9 31	+ 8	5 40	PP	—
Karenko		23·7	98	5 21	+ 7	9 47	+20	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Semipalatinsk		23·7	337	e 5 8	− 6	e 9 29	+ 2	—	—	—
Taito		23·8	100	5 19	+ 4	9 56	SS	—	—	—
Tashkent		24·3	307	i 5 15	− 5	i 9 31	− 6	—	—	13·7
Samarkand		25·5	300	5 29	− 3	9 50	− 7	6 6	PP	—
Kodaikanal	E.	25·7	226	i 5 32k	− 1	i 10 12	+11	i 11 17	SS	i 12·4
Medan		26·2	174	5 40	+ 2	i 10 15	+ 6	i 11 36	SSS	—
Heizyo		26·3	61	e 5 47	+ 8	e 10 33	+22	—	—	16·4
Zinsen		26·7	65	e 5 40	− 3	e 10 24	+ 7	e 6 25	PP	14·9
Keizyo		27·0	65	5 43	− 2	10 43	+21	—	—	15·5
Colombo	E.	27·3	216	e 5 58	+10	10 25	− 2	—	—	23·1
Manila		27·7	116	e 5 56	+ 4	11 7	+34	—	—	15·0
Taikyu		28·1	69	e 6 0	+ 5	e 10 29	−11	—	—	18·0
Husan		28·4	70	e 5 18	−40	—	—	—	—	11·3
Yakusima		30·0	79	5 48	−24	—	—	—	—	—
Miyazaki		30·6	77	6 19	+ 1	13 1	SS	—	—	—
Vladivostok		31·7	55	e 6 24	− 3	i 11 54	+17	—	—	16·7
Wakayama		33·5	71	6 48	+ 5	e 14 15	SS	—	—	—
Sverdlovsk		36·5	329	7 4	− 5	12 42	− 9	18 56	L_g	22·6
Batavia		37·3	160	7 19	+ 3	13 8	+ 4	—	—	—
Baku		38·6	300	7 31	+ 5	e 14 8	+45	—	—	22·0
Grozny		41·8	304	7 54	+ 1	e 14 4	− 7	—	—	—
Tiflis		42·5	301	e 7 52	− 7	i 14 17	− 5	i 17 38	SS	20·0
Moscow		48·2	321	e 8 41	− 3	e 15 34	− 9	—	—	24·0
Theodosia		49·2	306	8 47	− 5	15 47	−11	—	—	—
Yalta		50·1	305	e 8 57	− 2	—	—	—	—	—
Ksara		50·4	291	e 8 59	− 2	e 16 27	+13	e 10 57	PP	—
Sebastopol		50·6	306	e 9 5	+ 3	e 16 13	− 4	—	—	—
Simferopol		50·6	306	e 8 55	− 7	—	—	—	—	—
Pulkovo		52·5	325	e 9 15	− 2	e 16 34	− 9	—	—	e 25·9
Helwan		55·2	288	e 9 35	− 2	e 17 17	− 3	e 17 46	PS	—
Bucharest		55·9	306	—	—	e 18 10	PPS	—	—	36·5
Upsala		58·9	326	—	—	i 18 7	PS	—	—	—
Belgrade		59·7	308	e 10 4k	− 5	e 19 55	?	—	—	e 39·8
Copenhagen		62·3	322	—	—	18 50	− 2	—	—	36·5
Prague		62·5	315	—	—	e 18 53	− 1	—	—	—
Potsdam		62·7	318	e 10 26	− 3	e 18 56	− 1	—	—	e 33·5
Jena		64·0	316	e 10 32	− 6	—	—	—	—	—
Triest		64·1	310	e 10 46	+ 8	e 19 11	− 3	—	—	—
Hamburg	Z.	64·2	320	e 10 37	− 2	—	—	—	—	—
Stuttgart		66·1	315	e 10 48	− 3	e 20 50	+71	—	—	e 36·5
Chur		66·5	313	e 10 47	− 7	e 20 40	+56	—	—	—
Strasbourg		67·1	315	e 11 1	+ 4	e 19 38	−13	—	—	e 35·5
Neuchatel		68·1	313	e 11 0	− 4	—	—	—	—	—
Uccle		68·4	318	e 11 4	− 2	—	—	—	—	e 36·5
Kew		70·9	320	—	—	e 21 34	PPS	—	—	e 37·5
College		73·6	24	e 11 35	− 2	e 21 1	− 6	—	—	34·4
Toledo		78·4	310	e 12 2	− 2	—	—	—	—	—
Brisbane		79·0	130	i 17 14	PPP	—	—	—	—	—
Granada		79·4	307	—	—	i 22 22	+12	—	—	e 47·4
Melbourne		81·5	143	e 19 24	?	i 22 36	+ 4	28 20	SS	—
Riverview		82·1	137	e 14 44	PP	—	—	e 17 44	PP	e 22·6
Victoria		94·6	25	—	—	e 24 2	[+ 3]	e 33 40	SSS	51·5
Tinemaha		106·2	28	e 18 40	PP	—	—	—	—	—
Pasadena	Z.	108·8	30	e 18 54	PP	—	—	—	—	—
La Paz	Z.	160·2	308	i 20 18	[+17]	—	—	—	—	84·5

Additional readings :—
Calcutta $iS_g = +5m.46s.$
Agra sP?E = +3m.59s., iN = +6m.33s., sSE = +7m.5s.
Andijan e = +5m.6s.
Bombay iEN = +5m.16s., iE = +5m.58s., iN = +6m.3s., iEN = +6m.18s., iE = +7m.14s., iEN = +10m.15s.
Semipalatinsk e = +7m.27s.
Zinsen ePPPE = +6m.40s., eP_cPE = +8m.13s., eSSN = +12m.23s.
Colombo ? = +15m.34s.

Continued on next page.

Batavia iE = +13m.49s.
Tiflis ePcPZ = +9m.48s.
Ksara i = +9m.15s., ePcP = +10m.19s., ePS = +17m.4s.
Helwan S = +19m.7s., e = +19m.26s. and +22m.2s.
Potsdam eZ = +10m.56s.
Jena eN = +10m.36s.
Kew eEN = +22m.30s.
Toledo i = +12m.14s.
Brisbane iE = +18m.2s., eN = +18m.56s.
Granada i = +25m.15s.
Riverview eN = +18m.26s., iE = +19m.0s.
Long waves were also recorded at Koti, Hukuoka B, Philadelphia, Bidston, San Fernando, Cheb, Paris, De Bilt, Stonyhurst, Edinburgh, and Puy de Dôme.

Nov. 21d. 1h. 22m. 56s. Epicentre 20°·5S. 177°·5W. (as on 1937, April 16d.).

$A = -\cdot 9365$, $B = -\cdot 0409$, $C = -\cdot 3481$; $\delta = -12$; $h = +5$;
$D = -\cdot 044$, $E = +\cdot 999$; $G = +\cdot 348$, $H = +\cdot 015$, $K = -\cdot 937$.

The few stations within 80° of the epicentre indicate a deep focus shock with epicentre near that of the large shock of 1937, April 16d. Although the PKP readings at 140° contradict this, a determination on these lines seems to be the best compromise.

A depth of focus 0·030 has been assumed.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Apia		8·6	40	i 1 55	− 7	i 3 15	−22	—	—	—
Wellington		21·7	197	e 4 41	+ 7	8 29	+14	15 34	S_cS	e 9·1
Christchurch		24·4	198	e 4 52a	− 7	i 9 19	+19	9 10	P_cS	10·6
Santa Barbara		77·5	46	i 11 36	+ 4	e 21 6	+ 3	—	—	—
La Jolla		78·3	48	i 11 38	+ 1	—	—	e 12 29	pP	—
Pasadena		78·3	47	i 11 39	+ 2	—	—	e 12 29	pP	—
Mount Wilson		78·5	47	e 11 40	+ 2	—	—	—	—	—
Riverside		78·8	47	e 11 42	+ 3	—	—	—	—	—
Haiwee		79·6	45	e 11 48	+ 4	i 21 21	− 4	—	—	—
Tinemaha		80·0	44	i 11 49	+ 3	—	—	—	—	—
Tucson		82·5	52	i 12 2	+ 3	i 21 58	+ 3	i 12 56	pP	39·7
Sitka		84·9	22	i 12 8	− 3	e 22 23	+ 4	e 12 46	pP	e 33·8
Huancayo		97·0	105	e 12 58	− 9	23 26	[+ 4]	e 17 13	PP	—
Frunse		116·6	307	e 14 16	P	—	—	—	—	—
Andijan		118·1	305	e 14 25	P	—	—	—	—	—
Samarkand		120·2	303	e 14 58	P	—	—	e 19 59	PP	—
Bergen		140·1	358	28 41	S	(28 41)	SKKS	—	—	—
Simferopol		144·3	320	e 19 20	[+11]	—	—	—	—	—
Hamburg		146·5	352	e 20 19	[+65]	e 27 4?	[+66]	i 24 30	PP	—
Ksara		147·6	300	i 19 29a	[+14]	—	—	i 20 33	pPKP	—
Jena		148·8	348	e 19 28	[+11]	—	—	—	—	—
Uccle	z.	149·7	359	e 19 31	[+13]	—	—	i 20 33	pPKP	—
Stuttgart		151·3	350	e 20 32	[+72]	e 29 58	SKKS	—	—	—
Strasbourg	z.	151·7	352	e 20 23	[+63]	e 30 23	SKKS	—	—	—
Helwan		152·3	294	i 19 52	[+31]	—	—	i 20 51	pPKP	—
Chur		153·1	350	e 19 39	[+16]	—	—	—	—	—
Toledo		159·9	15	e 20 20	[+49]	—	—	—	—	—

Additional readings :—
Wellington i = +4m.46s., +4m.51s., and +8m.35s.
Christchurch i = +5m.8s., iS_cS = +14m.49s.
Pasadena isPZ = +13m.4s.
Tucson iP_cP = +12m.19s., iSP = +13m.19s., i = +13m.27s., PP = +15m.15s., pPP = +15m.56s., pPPP = +17m.43s., iS = +22m.19s., iSP = +21m.49s.
Sitka eSSS = +31m.10s.
Huancayo eP = +13m.13s., ePP = +17m.18s., epPP = +17m.35s., esPP = +18m.20s., ePPP = +19m.10s., eS = +24m.16s. and +24m.37s.
Ksara PP = +21m.25s.

Nov. 21d. 6h. 58m. 55s. Epicentre 23°·9N. 121°·7E. (as on 1938 Oct. 13d.).

Strong at Karenko, rather strong at Arisan, Giran, and Sintiku, moderate at Isigakizima.

Epicentre 23°·9N. 121°·7E.

Macroseismic radius 200-300km. Shallow.

See " Seismological Bulletin " of the Central Met. Obs., Japan, for the year 1938, Tokyo, 1940, pp. 110-111. Macroseismic Chart p. 111.

$A = -\cdot4809$, $B = +\cdot7787$, $C = +\cdot4029$; $\delta = -3$; $h = +4$;
$D = +\cdot851$, $E = +\cdot525$; $G = -\cdot212$, $H = +\cdot343$, $K = -\cdot915$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Karenko		0·1	—	0 14a	+ 6	0 20	+ 7	—	—	—
Arisan		0·9	245	0 21k	+ 1	0 33	− 1	—	—	—
Giran		0·9	3	0 23k	+ 3	0 34	0	—	—	—
Taityu		1·0	285	0 23k	+ 2	0 32	− 4	—	—	—
Sintiku		1·1	325	0 26	+ 4	0 40	+ 1	—	—	—
Taihoku		1·1	352	i 0 25	+ 3	0 32	− 7	—	—	—
Taito		1·3	204	0 25	0	0 41	− 3	—	—	—
Tainan		1·6	237	0 35	P_g	0 55	S_g	—	—	—
Takao		1·8	226	0 36	P_g	1 0	S_g	—	—	—
Isigakizima		2·3	79	0 46k	P_g	1 13	S_g	—	—	—
Miyakozima		3·4	75	0 58	+ 3	1 35	− 2	—	—	—
Hong Kong		7·1	258	1 45	− 3	3 3	− 7	—	—	3·6
Zi-ka-wei		7·2	358	e 1 51	+ 2	i 4 9	S_g	—	—	—
Nake		8·3	56	2 1	− 3	3 34	− 6	—	—	—
Manila		9·3	184	2 27	+10	4 15	+10	—	—	—
Tomie		10·7	34	2 45a	+ 7	6 14	?	—	—	—
Unzendake		11·6	39	2 54	+ 4	6 4	+63	—	—	—
Miyazaki		11·7	45	2 55	+ 4	5 19	SS	—	—	—
Kumamoto		11·9	40	2 57	+ 3	—	—	—	—	—
Saga		12·0	37	3 2	+ 7	—	—	—	—	—
Hukuoka B		12·3	36	e 2 55	− 4	—	—	—	—	—
Izuka		12·5	37	3 3	+ 1	5 26	+ 3	—	—	—
Ooita		12·7	41	3 8	+ 3	—	—	—	—	—
Husan		12·9	28	3 16	PP	e 5 1	−32	—	—	—
Taikyu		13·3	25	e 2 1	−72	e 5 50	+ 8	—	—	—
Koti		14·1	44	e 3 53	PPP	—	—	—	—	—
Hamada		14·2	37	3 23	− 1	6 14	+10	—	—	—
Zinsen	N.	14·2	16	e 3 25	+ 1	e 6 13	+ 9	e 3 35	PP	e 7·8
Phu-Lien		14·3	260	e 3 23	− 3	e 6 31	SSS	—	—	7·4
Keizyo		14·4	17	3 27	0	e 6 15	+ 6	—	—	—
Muroto		14·4	47	3 25	− 2	—	—	—	—	—
Kobe		15·9	45	4 0	PP	—	—	—	—	—
Osaka		16·1	45	4 4	PP	—	—	—	—	—
Kameyama		16·9	46	4 6	+ 7	—	—	—	—	—
Gihu		17·4	45	4 4	− 2	7 49	SS	—	—	—
Hunatu		18·6	48	4 23	+ 2	—	—	—	—	—
Humadu		18·6	48	4 13	− 8	—	—	—	—	—
Kohu		18·7	47	4 9	−13	—	—	—	—	—
Titizima		18·8	75	4 21	− 2	—	—	—	—	—
Nagano		19·1	43	4 32	+ 5	—	—	—	—	—
Tokyo Imp. Univ.		19·6	48	4 38	+ 6	—	—	—	—	—
Vladivostok		21·0	22	e 4 44	− 3	e 8 47	+10	e 4 57	PP	10·6
Mizusawa	E.	22·4	43	4 58	− 4	8 44	−20	—	—	—
	N.	22·4	43	4 51	−11	8 50	−14	—	—	—
Medan	N.	30·0	233	e 6 8	− 4	—	—	—	—	—
Calcutta	N.	30·7	275	e 6 31	+12	i 11 28	+ 7	i 13 20	SS	e 15·7
Irkutsk		31·3	340	e 6 22	− 2	11 23	− 8	—	—	15·1
Agra	E.	39·4	285	7 27	− 6	i 17 14	SSS	e 9 7	PP	—
Almata		41·4	310	e 7 51	+ 1	—	—	—	—	—
Semipalatinsk		41·5	321	e 7 48	− 2	—	—	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Frunse		43·0	309	e 8 3	0	—	—	—	—	—
Bombay		45·6	274	i 8 22	− 2	e 15 1	− 5	10 15	PP	—
Tashkent		46·7	306	e 8 32	0	i 15 18	− 4	—	—	25·7
Samarkand		48·4	303	e 8 44	− 2	—	—	e 12 34	PPP	—
Sverdlovsk		54·6	324	i 9 29	− 3	i 17 4	− 7	27 53	L_q	31·3
Baku		61·4	305	e 10 19	− 1	18 44	+ 4	—	—	34·1
Grozny		64·0	309	e 10 38	0	—	—	—	—	—
Tiflis		65·0	307	10 41	− 3	e 19 25	− 1	—	—	e 33·6
Ksara		73·8	300	i 11 36a	− 2	e 21 44	PS	e 14 24	PP	—
Helwan		78·8	298	i 12 4k	− 2	e 21 57	− 7	—	—	—
Rome		87·5	314	e 12 38	−13	i 23 27	− 4	e 29 33	SSS	i 48·4
Tinemaha		97·2	44	e 13 33	− 3	—	—	—	—	—
Haiwee		97·9	45	e 13 34	− 5	—	—	—	—	—
Mount Wilson	z.	99·0	47	e 13 39	− 5	—	—	—	—	—
Pasadena	z.	99·0	47	i 13 50	+ 6	—	—	—	—	—
Tucson		104·9	44	i 18 28	PP	—	—	—	—	i 52·0
La Paz	z.	168·2	53	e 20 11	[+ 3]	—	—	—	—	

Additional readings :—
Zi-ka-wei iE = +4m.19s., +5m.19s., and +6m.47s.
Vladivostok iPPP = +5m.3s., i = +5m.23s., +7m.33s., and +9m.7s.
Bombay iE = +15m.26s., SSEN = +18m.31s.
Ksara eSS = +26m.0s.
Helwan e = +12m.21s.
Tucson iPP = +18m.39s. and +19m.1s.
Long waves were also recorded at Uccle, Edinburgh, Stonyhurst, Kew, Granada, Strasbourg, De Bilt, Potsdam, and Copenhagen.

Nov. 21d. 14h. 55m. 28s. Epicentre 55°·6N. 157°·7W. (as on 1938 Nov. 18d.).

A = −·5251, B = −·2154, C = +·8233 ; $\delta = -5$; $h = -7$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
College		10·5	24	e 2 35	0	e 4 17	−18	e 4 35	SS	5·1
Sitka		12·5	74	e 3 1	− 1	e 5 32?	+ 9	—	—	—
Victoria		22·2	94	e 4 50	−10	e 8 32?	−28	—	—	9·5
Tinemaha	N.	32·3	109	e 6 34	+ 1	—	—	—	—	—
Haiwee		33·2	109	e 6 38	− 2	—	—	—	—	—
Santa Barbara	N.	33·6	112	e 6 54	+10	—	—	—	—	—
Mount Wilson		34·6	111	i 6 49	− 4	—	—	—	—	—
Pasadena		34·6	111	i 6 50	− 3	—	—	—	—	e 16·9
Riverside	z.	35·1	111	i 6 54	− 3	—	—	—	—	—
La Jolla		36·1	111	e 7 3	− 2	—	—	—	—	—
Tucson		40·0	105	i 7 36k	− 2	i 13 42	− 2	9 36	PPP	i 19·2
Vladivostok		45·6	286	—	—	e 15 19	PS	e 18 27	SS	e 23·3
Irkutsk		53·1	312	i 9 32?	+11	e 16 32?	−19	e 21 32?	SSS	30·5
Weston		54·6	66	i 9 26	− 6	—	—	—	—	i 31·3
Tashkent		75·5	327	i 11 49	+ 1	i 21 33	+ 5	—	—	e 40·1
Tiflis		81·2	345	12 24	+ 5	—	—	—	—	e 44·5
Ksara		90·2	349	13 10	+ 6	e 25 0	PS	—	—	e 48·5
La Paz	z.	103·2	100	24 40	S	(24 40)	[− 2]	—	—	—

Additional readings :—
College eP = +2m.42s.
Mount Wilson iZ = +6m.57s.
Pasadena iEZ = +6m.58s.
Riverside iZ = +7m.2s.
La Jolla iZ = +7m.11s.
Tucson iP = +7m.44s., iPPP = +9m.44s., i = +9m.52s., iS = +13m.47s.
Vladivostok e = +18m.43s.
Irkutsk e = +27m.32s.?
Long waves were also recorded at Sverdlovsk, Baku, Kew, Philadelphia, De Bilt, and Harvard.

Nov. 21d. 21h. Undetermined shock.
Victoria e = 39m.12s., eL = 45·0m.
Sitka eP = 40m.39s., ePPP = 41m.46s.
College ePP = 40m.47s., ePPP = 41m.14s.
Pasadena iPZ = 43m.8s.
Mount Wilson iPZ = 43m.9s.
Riverside iPZ = 43m.13s.
Tucson iP = 43m.55s.k and 44m.1s., i = 44m.5s.
Weston iPZ = 45m.56s.
Sverdlovsk iP = 47m.4s., L = 74·0m.
Tiflis P = 48m.48s., eLN = 86·0m.
Tashkent e = 51m.0s., 58m.0s., 66m.48s., eL = 74·5m.
Ksara e = 60m.40s., L = 95·2m.
Long waves were also recorded at Harvard, Baku, Philadelphia, and Irkutsk.

Nov. 21d. Further shocks from the neighbourhood of the epicentre of 19d. 5h. 54m. were recorded at Mizusawa and Nagoya.

Mizusawa

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
4	55	28	9	57	33	19	24	49(S)	22	53	42(S)
6	47	0	15	20	26	22	41	16	23	59	57

Nagoya

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
4	56	26	6	47	33	7	2	28	9	58	49

Nov. 21d. Readings also at 0h. (Andijan), 2h. (Ksara), 3h. (Ferndale), 5h. (Kodaikanal), 6h. (Manzanillo, Granada, Triest, and Nagoya), 7h. (Irkutsk, Keizyo, Agra, Vladivostok, Samarkand, Sverdlovsk, and Calcutta), 9h. (near Tananarive, Koti (2), Batavia, and Malabar (2)), 10h. (Malabar), 11h. (Tucson), 12h. (Samarkand), 15h. (Calcutta), 17h. (La Paz (2), Huancayo, and Fort de France), 18h. (Tashkent and Sverdlovsk), 20h. (Tucson, Fort de France, Huancayo, and La Paz), 22h. (La Paz), 23h. (Mount Wilson and Tucson).

Nov. 22d. 1h. 14m. 4s. Epicentre 37°·1N. 141°·8E. (as on 1938 Nov. 19d.).

Strong at Onahama, Kakioka, and Sendai; moderate at Hukusima, Tokyo, and Tukubasan; slight at Kumagaya and Yokohama.

Epicentre 37°·0N. 141°·8E. Shallow. Macroseismic radius greater than 300kms.

See Seismological Bulletin of the Central Met. Obs. Japan for the year 1938, Tokyo, 1940, pp. 111-113, macroseismic chart p. 111.

$A = -·6283$, $B = +·4944$, $C = +·6006$; $\delta = -9$; $h = -1$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m.	s.	m.
Onahama	0·8	257	0 17$_a$	− 1	—	—	—	—	—
Hukusima	1·2	302	0 29$_a$	+ 5	0 46	+ 5	—	—	—
Mito	1·3	236	0 23$_a$	− 2	0 41	− 3	—	—	—
Sendai	1·3	329	0 31$_k$	P$_g$	0 56	+12	—	—	—
Kakioka	1·5	236	0 25	− 3	0 48	− 1	—	—	—
Tyosi	1·5	209	0 24	− 4	0 41	− 8	—	—	—
Tukubasan	1·6	237	0 39	+ 9	0 57	S$_g$	—	—	—
Yamagata	1·6	315	0 32$_k$	+ 2	0 55	+ 4	—	—	—
Utunomiya	1·7	250	0 32$_k$	+ 1	1 0	S$_g$	—	—	—
Kumagaya	2·1	244	0 37$_k$	0	0 59	− 5	—	—	—
Mizusawa	2·1	346	i 0 38	+ 1	1 12	S$_g$	—	—	—
Tokyo Cen. Met. Ob.	2·1	229	0 36$_a$	− 1	1 5	+ 1	—	—	—
Tokyo Imp. Univ.	2·1	229	0 36	− 1	1 4	0	—	—	—
Komaba	2·2	230	0 37	− 1	1 10	+ 4	—	—	—
Maebasi	2·3	252	0 42$_a$	+ 2	1 19	S$_g$	—	—	—
Mitaka	2·3	232	0 39	− 1	1 12	+ 3	—	—	—
Niigata	2·4	291	0 53	P$_g$	1 30	S$_g$	—	—	—
Yokohama	2·4	226	0 41$_k$	0	1 20	S$_g$	—	—	—
Kamakura	2·5	226	0 39	− 4	1 1	−13	—	—	—
Titibu	2·5	243	0 39	− 4	1 15	+ 1	—	—	—

Continued on next page.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Miyako	2·6	3	0 45	+ 1	1 15	−2	—	—	—
Mera	2·7	216	0 42	− 3	1 14	− 5	—	—	—
Morioka	2·7	349	0 47k	+ 2	1 24	+ 5	—	—	—
Takada	2·8	270	0 57	P_g	1 32	S_g	—	—	—
Hunatu	2·9	237	0 47	− 1	1 33	S_g	—	—	—
Koyama	2·9	232	0 39	− 9	1 13?	−11	—	—	—
Nagano	2·9	261	0 52k	P*	1 45	S_g	—	—	—
Akita	3·0	334	0 53k	+ 3	1 38	S_g	—	—	—
Ito	3·0	225	0 52	+ 2	1 29	+ 2	—	—	—
Kohu	3·0	241	0 51k	+ 1	1 45	S_g	—	—	—
Misima	3·0	229	0 49	− 1	1 36	S*	—	—	—
Numadu	3·1	230	0 53k	+ 2	1 51	S_g	—	—	—
Osima	3·1	220	0 45k	− 6	1 19	−10	—	—	—
Matumoto	3·2	254	0 53	+ 1	1 43	S_g	—	—	—
Susaki	3·3	225	0 50	− 3	1 32	− 3	—	—	—
Toyama	3·4	266	1 3	P*	2 58	?	—	—	—
Hatinohe	3·5	356	0 54	− 3	1 44	+ 4	—	—	—
Iida	3·6	245	1 28	+30	2 19	+37	—	—	—
Aomori	3·8	348	1 6	P*	2 26	+39	—	—	—
Omaesaki	3·8	231	0 58	− 3	2 0	S*	—	—	—
Takayama	3·8	257	1 4a	+ 3	2 26	+39	—	—	—
Wazima	3·9	277	1 5	+ 3	2 12	S_g	—	—	—
Hamamatu	4·1	235	1 6k	+ 1	2 21	S_g	—	—	—
Kanazawa	4·2	264	1 12	P*	2 9	S*	—	—	—
Hatidyozima	4·3	203	1 0	− 8	1 50	−10	—	—	—
Gihu	4·4	250	1 10k	0	2 28	S_g	—	—	—
Nagoya	4·4	245	i 1 11k	+ 1	2 17	S*	—	—	—
Hukui	4·6	257	1 9	− 3	2 28	S_g	—	—	—
Hakodate	4·7	350	1 24	P*	2 16	+ 6	—	—	—
Ibukisan	4·7	251	1 14	0	—	—	—	—	—
Hikone	4·8	250	1 17	+ 2	2 35	S_g	—	—	—
Kameyama	4·9	245	1 18	+ 1	2 31	S*	—	—	—
Tu	4·9	243	1 16a	− 1	2 40	S_g	—	—	—
Mori	5·1	349	1 24a	+ 4	2 51	S_g	—	—	—
Muroran	5·2	353	1 57	P_g	3 2	S_g	—	—	—
Kyoto	5·3	249	1 25	+ 3	2 52	S_g	—	—	—
Yagi	5·5	245	1 25k	0	2 26	− 4	—	—	—
Miyadu	5·6	257	1 14	−13	1 53	P_g	—	—	—
Osaka	5·6	247	1 33	+ 6	2 46	S*	—	—	—
Toyooka	5·8	257	1 32k	+ 3	2 52	S*	—	—	—
Obihiro	5·9	10	1 56k	P_g	3 46	+66	—	—	—
Sapporo	6·0	356	1 32	0	2 48	+ 5	—	—	—
Simisaki	6·1	236	1 32k	− 2	3 20	S_g	—	—	—
Kusiro	6·2	18	2 11	P_g	4 0	?	—	—	—
Sumoto	6·2	247	1 34k	− 1	3 13	S*	—	—	—
Wakayama	6·2	244	1 32k	− 3	3 6	S*	—	—	—
Tokusima	6·6	246	1 58	P*	3 34	S_g	—	—	—
Asahigawa	6·7	3	1 51	+ 9	3 30	S*	—	—	—
Okayama	6·8	252	1 45	+ 1	3 38	S*	—	—	—
Nemuro	6·8	24	1 40	− 4	2 53	−10	—	—	—
Tadotu	7·1	250	1 53	+ 5	3 48	S_g	—	—	—
Haboro	?·3	359	2 2	P*	3 45	S*	—	—	—
Muroto	7·3	241	1 50k	0	3 21	+ 6	—	—	—
Koti	7·6	245	e 1 52k	− 3	3 42	S*	2 11	P*	4·6
Hirosima	8·1	254	1 59	− 3	4 15	S*	—	—	—
Matuyama	8·1	249	2 3	+ 1	4 25	S_g	—	—	—
Hamada	8·2	256	2 7	+ 4	3 49	+11	—	—	—
Simidu	8·4	242	2 7	+ 1	3 59	+16	—	—	—
Uwazima	8·5	246	2 7a	0	4 5	S*	—	—	—
Ooita	9·2	249	2 22	+ 6	4 58	S_g	—	—	—
Simonoseki	9·4	254	2 26k	+ 8	4 39	S*	—	—	—
Ootomari	9·6	4	2 25	+ 4	4 13	+ 1	—	—	—
Izuka	9·7	254	2 22	0	5 4	S*	—	—	—
Vladivostok	9·7	312	i 2 26	+ 4	i 4 10	− 5	—	—	4·4
Asosan	9·8	248	2 35	PP	4 57	S*	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Hukuoka B		9·9	253	2 27	+ 2	5 26	S_g	—	—	—
Kumamoto		10·0	248	2 29	+ 2	—	—	—	—	—
Miyazaki		10·0	242	2 25	− 2	—	—	—	—	—
Titizima		10·0	179	2 15	−12	—	—	—	—	—
Saga		10·2	252	2 33	+ 2	5 25	S_g	—	—	—
Unzendake		10·4	249	2 23k	−12	4 58	S*	—	—	—
Husan		10·5	263	2 45	PP	4 38	+ 3	—	—	—
Ituhara		10·6	258	2 39	+ 3	5 15	SSS	—	—	—
Taikyu		10·7	267	i 2 38a	0	4 54	SS	—	—	6·2
Syuhurei		11·1	270	2 50	+ 7	5 13	SSS	—	—	—
Yakusima		11·5	238	2 46a	− 2	5 2	+ 3	—	—	—
Tomie		11·6	251	2 50k	0	5 28	SSS	—	—	—
Keizyo		11·8	277	2 48	− 5	5 16	+10	2 52	PP	5·8
Zinsen		12·1	277	i 2 58	+ 1	5 32	SS	9 12	P_cP	6·2
Sikka		12·2	4	2 57	− 1	—	—	—	—	—
Heizyo		12·8	284	i 3 9	+ 3	e 6 15	+45	—	—	7·4
Nake		13·5	234	3 9	− 6	6 0	SS	—	—	—
Dairen		16·0	283	3 47	− 1	7 19	SSS	—	—	—
Naha		16·1	234	3 35	−14	6 45	− 4	—	—	—
Zi-ka-wei		17·9	258	e 4 7	− 5	7 51	SS	4 33	PPP	—
Miyakozima		18·7	234	4 18a	− 4	7 50	+ 2	—	—	—
Karenko		21·7	241	4 50	− 5	—	—	—	—	—
Taityu		22·2	241	5 26	PP	9 50	SSS	—	—	—
Arisan		22·6	241	4 52	−11	—	—	—	—	—
Taito		22·9	239	5 9	+ 3	9 23	+10	—	—	—
Tainan		23·3	240	5 11	+ 1	9 7	−13	—	—	—
Takao		23·5	240	5 12	0	9 56	+33	—	—	—
Hong Kong		28·0	246	5 53a	− 2	10 45	+ 7	—	—	13·9
Manila		29·1	225	i 5 59k	− 5	10 53	− 3	—	—	—
Irkutsk		30·2	312	6 14	0	11 27	+14	—	—	14·9
Palau		30·4	195	6 9	− 7	11 9	− 7	—	—	—
Phu-Lien		34·6	253	e 6 49	− 4	i 12 28	+ 6	—	—	17·1
Semipalatinsk		45·1	308	8 17	− 3	14 59	0	—	—	—
Calcutta	N.	48·0	268	i 8 42	− 1	i 15 51	+10	e 19 11	SS	i 23·7
Almata		48·8	300	8 50	+ 1	—	—	—	—	16·7
College		48·9	32	8 46	− 4	15 44	− 9	—	—	e 22·7
Frunse		50·6	300	e 9 2	0	e 16 16	− 1	—	—	—
Medan		51·7	241	i 9 11	0	i 16 37	+ 5	—	—	—
Dehra Dun	N.	52·6	283	—	—	i 16 46	+ 2	e 20 33	SS	e 26·7
Andijan		52·8	297	e 9 17	− 2	17 1	+14	—	—	—
Agra		54·0	279	e 9 23k	− 5	17 9	+ 6	11 26	PP	—
Batavia		54·1	225	i 9 22	− 7	i 16 56	− 9	—	—	—
Honolulu		54·2	88	e 9 34	+ 5	e 17 2	− 4	—	—	e 22·3
Tchimkent		54·3	300	e 9 32	+ 2	e 17 14	+ 7	—	—	27·9
Malabar	N.	54·6	224	i 12 38	PPP	i 18 3	PPS	—	—	—
Tashkent		54·8	299	i 9 28	− 6	i 17 24	+10	e 9 36	pP	e 28·9
Sverdlovsk		55·3	319	i 9 37	− 1	i 17 25	+ 4	i 9 55	pP	32·6
Sitka		56·1	40	e 9 38	− 5	17 31	− 1	12 8	PP	e 23·1
Samarkand		57·1	298	e 9 47	− 3	e 17 55	+10	—	—	—
Hyderabad		58·6	269	9 58	− 3	18 12	+ 8	12 12	PP	29·3
Bombay		62·3	274	e 10 22a	− 4	i 18 58	+ 6	23 6	SS	—
Kodaikanal	E.	63·5	263	i 10 31k	− 3	i 19 11	+ 4	i 19 35	PS	i 30·6
Colombo	E.	63·6	258	10 34	− 1	19 10	+ 2	—	—	38·7
Brisbane		65·1	169	e 10 38	− 7	i 19 14	−13	—	—	—
Victoria		66·3	46	e 10 48	− 4	e 19 34	− 8	12 44	PP	e 30·9
Apia		66·9	129	e 13 7	PP	i 19 47	PS	e 13 18	P_cP	—
Seattle		67·2	46	e 12 6	+68	e 20 38	PPS	26 5	SSS	32·7
Moscow		67·4	323	10 57	− 2	19 57	+ 2	e 11 14	pP	36·4
Pulkovo		68·3	330	11 1	− 4	20 3	− 3	e 11 20	pP	34·5
Baku		68·4	305	11 7	+ 1	i 20 22	PS	—	—	33·9
Grozny		69·6	309	11 13	0	20 29	+ 8	—	—	—
Piatigorsk		70·8	312	11 15	− 5	e 20 38	+ 3	—	—	—
Tiflis		71·0	308	i 11 18	− 4	e 20 38	+ 1	e 11 34	pP	34·9
Riverview		71·1	172	i 11 17a	− 5	i 20 32	− 6	—	—	—
Sydney		71·1	172	e 10 57	−25	i 20 34	− 4	—	—	e 30·2

Continued on next page.

	△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Ukiah	71·1	55	e 11 24	+ 2	e 20 36	− 2	21 16	PS	e 29·4
Scoresby Sund	71·8	355	11 28	+ 2	20 55	+ 9	13 27	PP	—
Erevan	72·0	307	11 28	0	e 20 50	+ 1	—	—	—
Berkeley	72·4	56	e 11 23	− 7	e 20 43	−10	—	—	e 28·2
San Francisco	72·4	56	—	—	e 20 51	− 2	—	—	—
Branner	72·7	56	e 11 32	0	e 20 54	− 3	—	—	e 34·7
Perth	72·9	203	11 38	+ 5	20 56	− 3	12 11	P_cP	35·0
Saskatoon	73·0	37	i 11 33	0	i 20 56	− 4	—	—	e 34·4
Upsala	73·0	335	i 11 33	0	i 21 2	+ 2	e 14 32	PP	e 34·9
Lick	73·1	56	e 11 33	− 1	e 20 59	− 2	—	—	—
Sotchi	73·1	313	11 29	− 5	e 20 56	− 5	—	—	—
Butte	73·7	43	e 11 26	−12	e 20 58	−10	—	—	e 31·8
Melbourne	74·6	177	i 13 16	PP	e 21 8	−10	—	—	34·4
Fresno N.	74·7	55	e 11 47	+ 4	e 21 25	+ 6	—	—	—
Theodosia	74·7	315	11 40	− 3	21 20	+ 1	—	—	41·9
Bozeman	74·8	43	e 11 40	− 4	e 21 12	− 8	—	—	e 31·8
Simferopol	75·5	316	11 46	− 2	21 29	+ 1	—	—	41·9
Tinemaha	75·5	54	e 11 44	− 4	e 21 22	− 6	—	—	—
Yalta	75·8	315	11 46	− 4	—	—	—	—	42·4
Sebastopol	76·0	316	11 50	− 1	21 35	+ 1	—	—	39·9
Santa Barbara	76·1	57	e 11 45	− 6	e 21 15	−20	—	—	—
Haiwee E.	76·3	54	e 11 46	− 6	e 21 27	−10	—	—	—
Bergen	76·5	340	21 40	S	(21 40)	+ 1	—	—	48·9
Mount Wilson	77·3	57	i 11 51	− 7	e 21 43	− 5	—	—	—
Pasadena	77·3	57	i 11 51	− 7	i 21 42	− 6	i 14 54	PP	e 34·6
Salt Lake City	77·3	49	e 12 7	+ 9	e 21 31	−17	e 26 34	SS	35·5
Riverside	77·9	57	i 12 4	+ 3	e 21 53	− 1	—	—	—
Copenhagen	78·0	334	i 11 59	− 3	21 56	+ 1	e 15 2	PP	39·9
La Jolla	78·7	57	e 12 0	− 6	e 22 1	− 2	e 15 27	PP	—
Bucharest	80·2	319	i 12 26a	+12	e 22 22	+ 3	—	—	37·9
Potsdam	80·3	332	e 12 14	0	e 22 14	− 6	e 12 32	pP	e 42·9
Hamburg	80·6	334	e 12 13	− 3	e 22 24	+ 1	i 15 30	PP	e 39·9
Aberdeen	81·3	341	i 11 56	−24	i 22 27	− 3	i 23 26	PS	46·7
Ksara	81·4	305	i 12 20k	0	22 38	+ 7	15 30	PP	39·9
Budapest	81·5	325	12 18	− 3	e 22 36	+ 4	e 15 28	PP	45·9
Kecskemet	81·6	324	i 12 17	− 4	i 22 31	− 2	i 15 31	PP	e 45·9
Prague	81·6	329	i 12 21a	0	22 35	+ 2	—	—	e 41·9
Jena	82·0	331	e 12 20	− 3	e 22 42	+ 5	e 31 20	SSS	e 39·9
Göttingen	82·2	332	i 12 22	− 2	e 22 44	+ 5	—	—	e 44·9
Cheb	82·4	331	e 12 27	+ 2	e 22 46	+ 5	—	—	e 47·9
Edinburgh	82·7	341	e 12 36	+ 9	i 22 44	0	i 23 51	PS	e 39·9
Belgrade	82·8	321	i 12 24a	− 3	i 22 50	+ 5	i 24 7	PPS	43·2
Sofia	82·8	319	e 12 28	+ 1	e 22 56	+11	—	—	42·9
Durham	83·2	340	e 12 33	+ 4	i 22 50	+ 1	—	—	—
Tucson	83·3	54	i 12 24k	− 6	i 22 42	− 8	i 13 0	pP	34·6
De Bilt	83·4	335	i 12 30	0	e 22 53	+ 2	—	—	e 40·9
Wellington	83·6	156	12 26a	− 6	22 41	−12	15 40	PP	37·9
Stonyhurst	84·3	340	—	—	i 23 5	+ 5	—	—	e 42·9
Stuttgart	84·7	330	e 12 34k	− 3	e 23 6	+ 2	e 17 47	PPP	e 44·9
Karlsruhe	84·8	332	i 12 37	0	e 23 8	+ 3	—	—	e 47·9
Uccle	84·8	335	e 12 35	− 2	i 23 4	− 1	15 41	PP	e 41·9
Bidston	84·9	340	11 30	−68	i 22 7	−59	—	—	e 38·9
Christchurch	85·0	158	i 12 40a	+ 2	i 23 0	[− 1]	i 28 44	SS	38·7
Triest	85·3	327	12 39	− 1	i 23 4	[+ 1]	16 6	PP	—
Strasbourg	85·4	331	e 12 34k	− 6	e 23 6	[+ 3]	i 12 56	pP	e 45·9
Oxford	85·8	337	i 12 53	+11	i 23 6	[0]	—	—	e 39·9
Rathfarnham Castle	85·8	342	i 16 15	PP	i 25 21	?	i 18 47	PPP	i 54·2
Kew	85·9	337	i 12 40	− 3	i 23 11	[+ 4]	i 24 13	PS	e 39·9
Chur	86·1	330	e 12 40	− 4	e 23 6	[− 2]	—	—	—
Zurich	86·1	330	e 12 40k	− 4	e 23 13	[+ 5]	e 16 24	PP	—
Basle	86·3	330	e 12 42	− 3	e 23 15	[+ 6]	—	—	—
Padova	86·3	327	i 12 49	+ 4	i 23 7	[− 2]	i 15 37	?	e 52·9
Helwan	86·9	305	i 12 46k	− 2	23 38	+12	16 11	PP	—
Neuchatel	87·0	330	e 12 44	− 4	e 23 18	[+ 4]	—	—	—
Paris	87·1	335	i 12 49	0	23 14	[0]	16 6	PP	46·9

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Florence		87·8	327	13 26	+34	23 36	+ 2	—	—	—
Jersey		88·3	338	e 13 14	+19	i 23 41	+ 2	e 25 26	PPS	e 46·9
Moncalieri		88·4	330	e 13 14	+19	23 28	[+ 6]	—	—	—
Rome		88·8	323	12 55$_a$	− 2	i 23 43	− 1	i 16 28	PP	43·9
Chicago		89·3	35	—	—	e 23 19	[− 9]	e 29 49	SS	e 36·0
Puy de Dôme		89·6	332	e 12 56	− 5	e 23 57	+ 6	—	—	e 48·9
Florissant		90·5	38	e 12 58	− 7	e 23 27	[− 9]	e 13 17	pP	—
Marseilles		90·7	329	—	—	e 23 14	[−23]	—	—	e 50·9
St. Louis	E.	90·7	38	e 13 1	− 5	e 23 33	[− 4]	e 13 21	pP	—
Shawinigan Falls		91·1	23	e 12 57	−11	e 23 34	[− 5]	—	—	—
Ottawa		91·2	25	13 3	− 5	23 37	[− 3]	—	—	e 41·9
Seven Falls		91·2	21	e 13 8	0	i 23 42	[+ 2]	e 29 26	SS	e 38·9
Cape Girardeau	E.	92·1	39	e 13 8	− 4	e 24 8	− 5	—	—	—
Little Rock		92·5	42	e 13 8	− 6	e 24 10	− 7	e 13 18	pP	—
Bagnères		92·9	333	e 13 44	+28	e 23 54	[+ 5]	e 25 13	PS	e 50·9
East Machias		94·3	20	e 13 19	− 4	e 23 55	[− 2]	e 17 14	PP	e 46·5
Williamstown		94·4	24	e 13 18	− 5	e 23 38	[−20]	i 17 0	PP	—
Harvard		95·1	23	i 13 25	− 1	e 23 56	[− 5]	i 17 13	PP	e 62·9
Weston		95·3	23	i 13 23	− 4	e 24 0	[− 2]	e 17 12	PP	e 42·8
Fordham		95·8	26	i 13 29	0	i 24 9	[+ 4]	i 17 19	PP	—
Philadelphia		96·1	28	e 13 44	+13	e 24 1	[− 6]	e 16 55	PP	e 46·2
Georgetown		96·3	29	e 13 27	− 5	—	—	—	—	—
Algiers		97·1	327	e 16 59	PP	e 24 11	[− 1]	—	—	e 51·9
Toledo		97·2	334	e 13 31	− 5	e 26 56	PPS	e 17 34	PP	e 46·6
Columbia		98·8	35	—	—	e 24 8	[−13]	e 26 28	PS	e 41·1
Granada		99·4	333	i 17 34	PP	32 41	SS	—	—	50·9
San Fernando		101·0	334	e 18 5	PP	i 24 35	[+ 3]	27 5	PS	50·9
San Juan		118·8	30	e 20 28	PP	25 33	[−13]	36 10	SS	49·6
Cape Town		134·4	256	i 21 52	PP	i 32 2	PS	—	—	68·9
Huancayo		138·4	63	e 19 25	[− 2]	e 26 33	[− 3]	e 22 29	PP	e 55·8
La Paz		146·5	60	i 19 41	[− 1]	26 33	[−16]	i 21 9	pPKP	69·9
La Plata		163·9	87	24 26	PP	31 20	{−12}	—	—	75·9
Rio de Janeiro	E.	165·2	18	e 23 56	PP	e 34 24	?	—	—	—

Additional readings :—
Koti iP = +1m.55s., eS*Z = +3m.49s., S_s = +4m.13s.
Keizyo eE = +4m.2s.
Zi-ka-wei PPE = +4m.37s., PPPP = +4m.43s., iE = +4m.51s., SSN = +8m.39s., SSS = +8m.51s., iN = +10m.7s. and +10m.47s.
Calcutta eSSSN = +20m.31s.
College S = +15m.54s.
Agra eN = +9m.30s., iE = +9m.41s., PPPE = +12m.26s., SSE = +20m.58s., iE = +27m.40s.
Batavia iPEN = +9m.26s., SE = +16m.59s.
Honolulu eP = +9m.46s.
Tashkent isS = +18m.2s.
Sverdlovsk isS = +18m.1s., L_s = +27·0m.
Sitka eP = +10m.2s., ePPP = +13m.20s.
Hyderabad S_gSE = +19m.45s., SSE = +22m.14s.
Bombay iPEN = +10m.28s., iE = +12m.29s. and +20m.6s.
Kodaikanal iSSE = +23m.29s., iSSSE = +25m.41s.
Victoria e = +15m.32s., PS? = +20m.38s., SSE = +24m.8s., SSSE = +27m.14s.
Ukiah S = +20m.44s., eSSS = +28m.21s.
Scoresby Sund +25m.44s.
Berkeley eN = +11m.28s.
Branner ePN = +11m.35s.
Perth i = +14m.6s., +15m.41s., +17m.46s., +21m.31s., +21m.56s., and +23m.6s.
Upsala ePPN = +14m.39s., ePPPN = +16m.25s., eE = +27m.21s., eSSSN = +29m.2s.
Butte eS = +21m.6s., S = +21m.11s.
Bergen e = +43m.28s.
Pasadena iSN = +21m.48s.
Salt Lake City S = +21m.59s.
Copenhagen +15m.14s., eN = +23m.8s., eE = +24m.18s.
Bucharest iE = +13m.58s., iN = +14m.40s., iE = +18m.36s., iPSEN = +22m.57s.
Potsdam eE = +14m.56s.
Hamburg eN = +21m.57s.?, iN = +24m.15s.
Aberdeen iS = +22m.52s., i = +29m.34s., e = +40m.54s.
Ksara PS = +23m.22s., SS = +28m.12s.
Budapest P_gP = +12m.22s., PP?N = +15m.44s., S_gS = +23m.6s., ePS = +23m.36s., iN = +31m.40s.

Continued on next page.

Kecskemet eZ = +20m.53s., ePSZ = +23m.16s.
Jena iP = +12m.24s.
Edinburgh i = +29m.1s.
Belgrade iZ = +12m.26s. and +12m.49s.
Durham iSEN = +23m.0s.
Tucson iP$_c$P = +12m.28s., iSP = +13m.14s., i = +14m.33s., iPPP = +15m.39s., ipPP = +16m.3s., isPP = +16m.20s., i = +16m.27s., iPPP = +17m.50s., ipPPP = +18m.10s., iS = +22m.51s., pS = +23m.4s., PS = +23m.42s., SPS = +24m.7s., SS = +28m.14s., iPKP,PKP = +38m.34s.
Wellington eZ = +12m.46s., PPP = +17m.43s., S$_c$S = +23m.1s., PS = +23m.24s., i = +23m.45s., SS = +28m.14s.
Stuttgart iP = +12m.38s., iP$_c$P = +12m.54s., i = +13m.6s., eZ = +19m.24s., iS = +23m.14s., ePS = +24m.7s., eSSS = +32m.26s.
Uccle iZ = +12m.56s., iSE = +23m.8s.
Bidston i = +11m.50s., iS = +22m.35s.
Christchurch SSSEN = +31m.46s., L$_q$N = +34m.18s.
Triest SS = +28m.36s.
Strasbourg iPZ = +12m.38s., iPP = +15m.49s., i = +23m.10s., isS = +23m.45s.
Rathfarnham Castle e = +51m.45s.
Kew i = +12m.58s., iS = +23m.24s., iE = +23m.49s.
Helwan i = +13m.17s., +13m.56s., +16m.26s., +17m.2s., +19m.38s., and +23m.26s., PS = +24m.31s., i = +24m.56s.
Paris PPP = +18m.6s., SS = +27m.2s.
Rome i = +23m.25s., iN = +23m.53s. and +29m.8s., i = +29m.44s. and +33m.31s.
Chicago eSKS = +23m.24s.
Florissant iPZ = +13m.1s., eSKSN = +23m.30s., eSN = +23m.52s., isSN = +24m.28s., iSSE = +30m.3s.
Marseilles e = +23m.24s.
St. Louis eSE = +23m.52s., eSPE = +24m.12s.
Seven Falls e = +26m.56s.
Little Rock iSN = +24m.18s.
Bagnères ePP = +15m.49s., i? = +24m.53s.
East Machias S = +24m.34s., eSS = +30m.49s.
Williamstown iPS = +25m.39s.
Harvard iSN = +24m.42s., eL$_q$E = +51m.56s.
Weston iZ = +20m.12s., eSN = +24m.45s., ePSNZ = +26m.10s., eSSEN = +31m.28s.
Fordham iNZ = +17m.51s., iSN = +24m.51s., iSPZ = +26m.17s.
Philadelphia iSKS = +24m.8s., S = +24m.48s., +24m.55s., SP = +25m.51s., SSS = +34m.31s.
Columbia eSKS = +24m.16s., eSS = +32m.15s.
Granada PPP = +22m.10s., PS = +29m.16s.
San Fernando SSE = +32m.25s.
San Juan ePPP = +22m.57s., iPPS = +31m.16s., SS = +36m.10s., iSS = +36m.27s., eSSS = +41m.0s.
Cape Town iE = +22m.54s., iE = +32m.8s., iN = +39m.49s., and +42m.5s.
Huancayo ePKP = +19m.27s., ePP = +22m.10s. ePKS = +23m.0s., PKS = +23m.12s., ipPKS = +23m.23s., ePPP = +25m.20s., eSKKS = +28m.32s., eSKKKS = +29m.17s., eSKSP = +32m.13s., PPS = +34m.23s., iSSS = +45m.48s.
La Paz sPKPZ = +21m.47s., iPPZ = +22m.53s., SKSE = +26m.37s., SSE = +42m.47s., SSS = +48m.7s.
Long waves were also recorded at Fort de France, Besançon, Ferndale, Malaga, and Almeria.

Nov. 22d. 2h. 51m. 13s. Epicentre 37°·1N. 141°·8E. (as at 1h.).

A = −·6283, B = +·4944, C = +·6006; $\delta = -9$; $h = -1$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Koti		7·6	245	1 54	− 1	4 20	S_g	—	—	—
Hukuoka B		9·9	253	—	—	e 5 16	S_g	—	—	—
Taikyu		10·7	267	2 37	− 1	e 5 12	SSS	—	—	7·7
Keizyo		11·8	277	3 2	+ 9	e 5 22	SSS	—	—	7·7
Zinsen	E.	12·1	277	e 3 6	+ 9	—	—	—	—	—
Andijan		52·8	297	e 9 19	0	e 16 41	− 6	—	—	—
Samarkand		57·1	298	e 9 51	+ 1	—	—	—	—	—
Tiflis	N.	71·0	308	e 11 21	− 1	—	—	—	—	—
Mount Wilson	Z.	77·3	57	e 11 52	− 6	—	—	—	—	—
Pasadena	Z.	77·3	57	i 11 52	− 6	—	—	—	—	—
Tucson		83·3	54	i 12 24	− 6	—	—	—	—	—
La Paz	Z.	146·5	60	19 44	[+ 2]	—	—	—	—	—

Additional readings :—
Tucson i = +12m.32s., +12m.50s., and +13m.3s.

Continued on next page.

Nov. 22d. 3h. 23m. 38s. Epicentre 37°·1N. 141°·8E. (as at 2h.).

$A = -\cdot6283$, $B = +\cdot4944$, $C = +\cdot6006$; $\delta = -9$; $h = -1$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mizusawa		2·1	346	0 43	P_g	i 1 26	+22	—	—	—
Nagoya		4·4	245	e 1 13	+ 3	2 22	S_g	—	—	—
Koti		7·6	245	e 1 55	0	4 27	S_g	2 13	P*	3·8
Vladivostok		9·7	312	i 2 33	PP	i 4 28	+13	i 2 40	PPP	4·6
Hukuoka B		9·9	253	e 1 29	−56	—	—	—	—	—
Husan		10·5	263	—	—	e 5 52	S_g	—	—	—
Taikyu		10·7	267	2 35	− 3	e 5 4	SSS	—	—	7·6
Keizyo		11·8	277	2 55	+ 2	5 29	SSS	—	—	6·4
Zinsen		12·1	277	e 2 58	+ 1	e 5 30	SS	—	—	e 6·5
Andijan		52·8	297	e 9 21	+ 2	e 17 16	+29	—	—	—
Agra	E.	54·0	279	—	—	i 17 8	+ 5	—	—	—
Sverdlovsk		55·3	319	i 9 39	+ 1	i 17 26	+ 5	—	—	28·9
Samarkand		57·1	298	e 9 51	+ 1	e 18 1	PS	—	—	—
Grozny		69·6	309	e 11 15	+ 2	—	—	—	—	—
Tiflis	N.	71·0	308	e 11 21	− 1	—	—	—	—	34·4
Tinemaha		75·5	54	e 11 45	− 3	—	—	—	—	—
Santa Barbara	Z.	76·1	57	e 11 48	− 3	—	—	—	—	—
Haiwee	E.	76·3	54	e 11 54	+ 2	—	—	—	—	—
Mount Wilson	Z.	77·3	57	e 11 53	− 5	—	—	—	—	—
Pasadena		77·3	57	i 11 54a	− 4	—	—	—	—	—
Ksara		81·4	305	12 22	+ 2	e 22 52	+21	—	—	—
Belgrade		82·8	321	e 12 28k	+ 1	—	—	—	—	e 34·8
Tucson		83·3	54	e 12 25	− 5	—	—	—	—	—
La Paz	Z.	146·5	60	19 45	[+ 3]	—	—	—	—	—

Additional readings :—
Belgrade eZ = +12m.38s.
Tucson +12m.34s., +12m.47s., +12m.58s., +13m.12s., +13m.28s., and +16m.25s.
Long waves were also recorded at Baku and Stuttgart.

Nov. 22d. 8h. 13m. 27s. Epicentre 37°·1N. 141°·8E. (as at 3h.).

$A = -\cdot6283$, $B = +\cdot4944$, $C = +\cdot6006$; $\delta = -9$; $h = -1$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mizusawa		2·1	346	0 41	+ 4	i 1 12	S_g	—	—	—
Nagoya		4·4	245	e 1 15	+ 5	2 14	S*	—	—	—
Koti		7·6	245	1 55	0	4 6	S_g	—	—	5·1
Vladivostok		9·7	312	e 2 53	+31	—	—	—	—	e 5·0
Hukuoka B		9·9	253	—	—	e 4 58	S*	—	—	—
Husan		10·5	263	e 3 12	+37	e 5 31	S*	—	—	—
Taikyu		10·7	267	i 2 40	+ 2	—	—	—	—	—
Keizyo		11·8	277	2 54	+ 1	5 28	SSS	—	—	7·6
Zinsen	E.	12·1	277	e 2 36	−21	e 4 38	−36	—	—	5·7
Irkutsk		30·2	312	e 6 29	+15	e 11 19	+ 6	—	—	e 15·6
Phu-Lien		34·6	253	e 6 50	− 3	—	—	—	—	—
Semipalatinsk		45·1	308	—	—	e 14 56	− 3	—	—	—
Calcutta	N.	48·0	268	—	—	e 14 55	−46	—	—	—
Andijan		52·8	297	e 9 21	+ 2	e 16 58	PPS	—	—	—
Agra	E.	54·0	279	e 9 42	+14	17 21	PPS	—	—	—
Tchimkent		54·3	300	e 9 33	+ 3	—	—	—	—	—
Tashkent		54·8	299	e 9 46	+12	i 17 15	+ 1	—	—	e 29·8
Sverdlovsk		55·3	319	e 9 39	+ 1	17 25	+ 4	—	—	25·6
Moscow		67·4	323	10 55	− 4	e 19 53	− 2	—	—	35·1
Pulkovo		68·3	330	e 12 25	?	e 19 38	−28	—	—	34·1
Baku		68·4	305	—	—	e 20 15	+ 8	—	—	35·6
Tiflis	N.	71·0	308	e 11 19	− 3	—	—	—	—	e 33·6
Tinemaha		75·5	54	e 11 45	− 3	—	—	—	—	—
Santa Barbara		76·1	57	e 11 47	− 4	—	—	—	—	—
Haiwee	E.	76·3	54	e 11 48	− 4	—	—	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mount Wilson	z.	77·3	57	i 11 54	− 4	—	—	—	—	—
Pasadena		77·3	57	i 11 53	− 5	—	—	—	—	—
Copenhagen		78·0	334	—	—	e 22 3	+ 8	—	—	40·6
La Jolla		78·7	57	e 12 1	− 5	—	—	—	—	—
Ksara		81·4	305	e 12 27	+ 7	e 22 58	+27	e 15 45	PP	—
Tucson		83·3	54	12 26k	− 4	—	—	—	—	—
La Paz	z.	146·5	60	19 41	[− 1]	—	—	—	—	—

Additional readings :—
Keizyo SN = +5m.31s.
Pulkovo e = +33m.37s.
Ksara ePS = +23m.47s.
Tucson i = +12m.32s., +12m.39s., +13m.42s., and +13m.55s.
Long waves were also recorded at Granada, Paris, Kew, Uccle, Jena, and Prague.

Nov. 22d. Further shocks from the neighbourhood of the epicentre of 8h. were recorded at Mizusawa and Nagoya.

Mizusawa

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
1	11	36	3	57	32	10	13	57(S)	17	31	25(S)
1	40	31	4	38	43	10	55	50	17	37	23
1	56	13	4	47	47	11	39	2	18	29	15
2	18	3(S)	4	58	10(S)	13	0	58	18	34	43
2	41	26	6	45	31(S)	14	45	2	20	15	4
2	50	8	9	21	7	15	42	11	23	52	43(S)
3	45	8	9	33	35						

Nagoya

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
1	22	21	2	51	32	9	22	20	15	42	30
1	41	6	3	46	31	9	34	11	17	31	29
1	57	38	4	39	44	10	14	14	17	37	47
2	18	31	4	48	27	11	39	39	18	30	6
2	42	9	8	37	16	13	2	8	18	35	24

Nov. 22d. Readings also at 1h. (Tucson, Keizyo, Koti (2), La Jolla, Husan, Tinemaha, Santa Barbara, Haiwee, Riverside, Tiflis, Mount Wilson, Pasadena, and La Paz), 6h. (La Paz), 7h. (Santiago), 8h. (Andijan and Mizusawa), 9h. (Irkutsk, Agra, Koti, Sverdlovsk, and Tashkent), 10h. (Baku), 12h. (Tiflis), 14h. (Ottawa), 15h. (Fresno, Lick, Branner, San Francisco, Berkeley, Tucson (2), Pasadena, Mount Wilson, Riverside, Haiwee, Santa Barbara, and Tinemaha), 16h. (Ottawa (2) and Malabar), 17h. (Wellington, Hastings, New Plymouth, and Ottawa), 18h. (Vladivostok, Tucson, and Koti), 19h. (Ottawa (2), Tashkent, and Sverdlovsk), 20h. (near Tanarive and Ottawa), 22h. (Tucson), 23h. (Tucson and Mount Wilson).

Nov. 23d. 0h. 16m. 6s. Epicentre 37°·1N. 141°·8E. (as on Nov. 22d.).

A = −·6283, B = +·4944, C = +·6006 ; $\delta = -9$; $h = -1$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mizusawa		2·1	346	0 40	+ 3	1 6	+ 2	i 1 9	S_g	—
Nagoya		4·4	245	e 1 11	+ 1	2 5	+ 3	—	—	—
Koti		7·6	245	e 1 53	− 2	e 3 59	S*	e 4 21	S_g	5·1
Vladivostok		9·7	312	e 2 27	+ 5	e 4 27	SS	—	—	4·5
Husan		10·5	263	e 5 19	?	e 6 47	?	—	—	—
Taikyu		10·7	267	i 2 40	+ 2	—	—	—	—	—
Zinsen	E.	12·1	277	—	—	e 5 0	−14	—	—	—
Irkutsk		30·2	312	—	—	e 10 54?	−19	—	—	15·9
Andijan		52·8	297	e 9 17	− 2	e 16 54	+ 7	—	—	—
Tchimkent		54·3	300	e 9 30	0	e 17 12	+ 5	—	—	—
Tashkent		54·8	299	i 9 31	− 3	i 17 19	+ 5	—	—	29·9
Sverdlovsk		55·3	319	9 37	− 1	17 25	+ 4	—	—	26·9
Tiflis		71·0	308	e 11 19	− 3	—	—	—	—	e 34·6
Mount Wilson	z.	77·3	57	e 11 51	− 7	—	—	—	—	—
Ksara		81·4	305	e 12 20	0	e 23 48	PPS	—	—	—
Tucson		83·3	54	i 12 24k	− 6	—	—	—	—	—
La Paz	z.	146·5	60	19 35	[− 7]	—	—	—	—	—

Additional readings :—
Tucson i = +13m.24s. and +14m.1s.
Long waves were also recorded at Copenhagen, De Bilt, Pulkovo, Moscow, and Baku.

Nov. 23d. 8h. 17m. 29s. Epicentre 46°·5N. 150°·7E. (as on 1938, May 3d.).

$A = -\cdot6024$, $B = +\cdot3381$, $C = +\cdot7231$; $\delta = +7$; $h = -4$;
$D = +\cdot489$, $E = +\cdot872$; $G = -\cdot631$, $H = +\cdot354$, $K = -\cdot691$.

A depth of focus 0·015 has been assumed.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mizusawa		10·2	227	e 2 23	− 1	i 4 11	− 6	—	—	—
Nagoya		15·3	227	e 3 32	+ 2	—	—	—	—	—
Kotī		18·4	230	e 4 10	+ 3	7 48	+23	—	—	—
Irkutsk		30·3	299	—	—	e 7 31?	?	—	—	11·5
Sverdlovsk		52·9	317	9 6	+ 1	e 16 22	0	—	—	24·5
Tashkent		56·4	297	i 9 30	0	e 17 12	+ 3	—	—	e 27·5
Tinemaha		64·9	62	i 10 23	− 5	—	—	—	—	—
Santa Barbara		65·7	65	e 10 28	− 5	—	—	—	—	—
Mount Wilson	z.	66·9	64	i 10 35	− 6	—	—	—	—	—
Pasadena	z.	66·9	64	i 10 35	− 6	—	—	—	—	—
Baku		68·4	306	10 55	+ 5	e 19 48	+ 9	—	—	24·5
Tiflis		70·3	311	e 11 3	+ 2	e 20 48	PS	—	—	e 31·5
Tucson		72·7	61	i 11 11$_a$	− 5	—	—	—	—	—
Ksara		80·8	310	e 11 44	−17	e 22 13	+16	—	—	44·5

Additional readings:—
Tucson i = +11m.40s.
Ksara e = +12m.3s.
Long waves were also recorded at Cheb and Granada.

Nov. 23d. 13h. 59m. 28s. Epicentre 37°·1N. 141°·8E. (as at 0h.).

$A = -\cdot6283$, $B = +\cdot4944$, $C = +\cdot6006$; $\delta = -9$; $h = -1$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mizusawa		2·1	346	0 44	P_g	i 1 19	S_g	—	—	—
Nagoya		4·4	245	e 1 17	P*	2 5	+ 3	—	—	—
Kotī		7·5	245	e 2 0	+ 5	4 14	S_g	—	—	5·1
Vladivostok		9·7	312	e 2 22	0	i 5 2	S*	—	—	5·2
Hukuoka B		9·9	253	—	—	e 4 47	SSS	—	—	—
Tashkent		54·8	299	e 15 32	?	—	—	—	—	e 30·6
Sverdlovsk		55·3	319	e 9 55	+17	e 17 49	PPS	—	—	26·5
Moscow		67·4	323	e 10 58	− 1	—	—	—	—	—
Tinemaha	z.	75·5	54	i 11 48	0	—	—	—	—	—
Santa Barbara	z.	76·1	57	e 11 50	− 1	—	—	—	—	—
Pasadena	z.	77·3	57	i 11 57	− 1	—	—	—	—	—
Mount Wilson	z.	77·3	57	i 11 58	0	—	—	—	—	—
La Jolla	z.	78·7	57	i 11 59	− 7	—	—	—	—	—
Ksara		81·4	305	e 15 47	PP	e 26 12	?	—	—	50·0
Tucson		83·3	54	i 12 30$_a$	0	—	—	—	—	—

Additional readings:—
Mount Wilson iZ = +12m.8s.
Tucson i = +12m.40s.
Long waves were also recorded at Pulkovo, Agra, Baku, Copenhagen, Irkutsk, Tiflis, and Cheb.

Nov. 23d. 13h. 18h. and 19h.

Local Japanese shocks attributed by Tokyo to the following :—

epicentres I 13h. 35°·7 N. 139°·75E.
II 18h. 35°·65N. 140°·29E.
III 19h. 35°·68N. 140°·13E.

Tokyo, Cent. Met. Obs.	I	iP = 17m.45s., S = 17m.53s.
	II	iP = 3m.23s., S = 3m.31s.
	III	iP = 27m.10s., S = 27m.18s.
Komaba	I	P = 17m.49s., S = 17m.58s.
	II	P = 3m.23s., S = 3m.33s.
	III	P = 27m.12s., S = 27m.20s.
Tokyo, Imp. Univ.	I	P = 17m.50s., S = 17m.58s.
	II	P = 3m.24s., S = 3m.32s.
	III	P = 27m.10s., S = 27m.18s.
Kamakura	I	P = 17m.56s., S = 18m.7s.
	II	P = 3m.29s., S = 3m.42s.
	III	P = 27m.14s., S = 27m.24s.
Mitaka	I	P = 17m.56s., S = 18m.7s.
	II	P = 3m.29s., S = 3m.40s.
	III	P = 27m.14s., S = 27m.25s.
Tukubasan	I	P = 17m.56s., S = 18m.6s.
	II	P = 3m.29s., S = 3m.38s.
	III	P = 27m.14s., S = 27m.23s.
Kiyosumi	I	P = 18m.1s., S = 18m.14s.
	II	P = 3m.27s., S = 3m.37s.
	III	P = 27m.15s., S = 27m.26s.
Koyama	I	P = 18m.1s., S = 18m.17s.
	II	P = 3m.27s., S = 3m.45s.
	III	P = 27m.15s., S = 27m.32s.
Titibu	I	P = 18m.1s., S = 18m.16s.
	II	P = 3m.27s., S = 3m.43s.
	III	P = 27m.15s., S = 27m.32s.
Susaki	I	P = 18m.3s., S = 18m.18s.
	II	P = 3m.37s., S = 3m.53s.
	III	P = 27m.19s., S = 27m.39s.
Nagoya	II	eP = 4m.5s., S = 4m.41s.
	III	eP = 27m.39s., S = 28m.37s.
Mizusawa	II	ePE = 4m.15s., eSE = 4m.55s.
	III	ePE = 28m.37s., eSE = 29m.4s.

Nov. 23d. Further shocks from the neighbourhood of the epicentre of 13h. were recorded at Mizusawa and Nagoya.

Mizusawa

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
1	15	3(S)	3	43	38(S)	8	12	25	19	41	37
1	46	27(S)	3	57	35	12	4	53	19	48	6
2	18	50	3	59	26	13	18	47	20	52	55
2	34	2(S)	5	14	52	14	24	20	20	58	22(S)
3	30	38	5	58	34(S)	16	45	3	22	26	5(S)

Nagoya

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
2	35	18	4	0	56(S)	13	18	25	19	42	59
3	32	16	5	15	25	14	24	57	20	53	28
3	58	16									

Nov. 23d. Readings also at 1h. (Bunnythorpe, Hastings, Stratford, Arapuni, Takaka, Williamstown, New Plymouth, Christchurch, and Wellington), 2h. (Samarkand and Andijan), 3h. (Wellington, New Plymouth, Samarkand, and Andijan), 4h. (Vladivostock, Mizusawa, Irkutsk, and Ksara), 5h. (Sofia, Tashkent, Baku, and Sverdlovsk), 7h. (Tucson), 8h. (Wellington, New Plymouth, Christchurch, and Nagoya) 9h. (Granada, New Plymouth, and Wellington), 10h. (Hukuoka B), 11h. (New Plymouth (3), and Wellington (3)), 12h. (Nagoya), 13h. (Nagoya, Tucson, and College), 15h. (Ottawa (2) and Platigorsk), 17h. (Fordham), 18h. (Tiflis, Ksara, De Bilt, and Fort de France), 19h. (Nagoya and Moncalieri), 22h. (Fort de France, Harvard, and Weston).

Nov. 24d. 0h. 21m. 23s. Epicentre 40°·5N. 76°·3E. (as given by U.S.S.R.).

$A = +\cdot1806$, $B = +\cdot7409$, $C = +\cdot6469$; $\delta = +3$; $h = -2$;
$D = +\cdot972$, $E = -\cdot237$; $G = +\cdot153$, $H = +\cdot628$, $K = -\cdot763$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Frunse		2·7	332	i 0 44	− 1	i 1 31	S_g	i 0 49	P*	—
Almata		2·8	10	i 0 45	− 2	1 29	S*	0 51	P*	—
Andijan		3·0	275	0 52	+ 2	1 30	+ 3	0 56	P*	—
Tchimkent		5·3	292	e 1 22	0	i 2 26	+ 1	e 1 37	P*	—
Tashkent		5·4	283	e 1 23	− 1	i 2 22	− 6	—	—	i 3·0
Samarkand		7·2	268	e 1 55	+ 6	e 3 52	S_g	—	—	—
Semipalatinsk		10·3	14	—	—	e 4 0	−30	—	—	—
Agra	E.	13·4	172	—	—	e 5 34	−11	—	—	i 7·3
Sverdlovsk		19·3	334	4 24	− 5	e 8 16	+14	10 7	L_q	11·4
Baku		20·1	280	—	—	e 8 30	+11	—	—	e 13·0
Irkutsk		22·5	49	—	—	e 8 37	−28	—	—	12·6
Moscow		29·5	314	e 6 0	− 8	—	—	e 6 58	PP	e 15·7
Ksara		32·7	272	—	—	e 10 57	−55	—	—	—

Additional readings :—
Frunse iPP = +0m.56s., i = +1m.8s., +1m.25s., and +1m.29s.
Almata e = +1m.5s.
Andijan P_g = +59s., e = +1m.13s., iS_g = +1m.42s.
Tchimkent e = +1m.40s., ePg = +1m.46s., e = +1m.50s., and +2m.3s.
Samarkand e = +2m.37s. and +4m.4s.
Baku e = +11m.27s.
Irkutsk e = +11m.37s.
Long waves were also recorded at Tiflis.

Nov. 24d. 13h. 47m. 36s. Epicentre 37°·1N. 141°·8E. (as on 1938, Nov. 23d.).

$A = -\cdot6283$, $B = +\cdot4944$, $C = +\cdot6006$; $\delta = -9$; $h = -1$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tukubasan		1·6	237	0 43	+13	1 2	+11	—	—	—
Mizusawa	E.	2·1	346	e 0 31	− 6	i 0 55	− 9	—	—	—
Tokyo, Cen. Met. Ob.		2·1	229	i 0 37	0	1 4	0	—	—	—
Tokyo, Imp. Univ.		2·1	229	0 37	0	1 5	+ 1	—	—	—
Komaba		2·2	230	0 38	0	1 6	0	—	—	—
Kiyosumi		2·3	214	1 0	+20	1 33	S_g	—	—	—
Mitaka		2·3	232	0 43	+ 3	1 13	S*	—	—	—
Kamakura		2·5	226	0 43	0	1 12	− 2	—	—	—
Titibu		2·5	243	1 0	+17	1 36	S_g	—	—	—
Koyama		2·9	232	1 0	P_g	1 37	S_g	—	—	—
Susaki		3·3	225	0 52	− 1	1 34	− 1	—	—	—
Nagoya		4·4	245	1 13	+ 3	2 1	− 1	—	—	—
Koti		7·6	245	e 2 24?	P_g	—	—	—	—	—
Vladivostok		9·7	312	e 2 12	−10	—	—	i2 39	PPP	e 4·2

Vladivostok also gives i = +2m.18s., e = +3m.10s. and +3m.28s.

Nov. 24d. Further shocks from the neighbourhood of the Epicentre of 13h. were recorded at Mizusawa.

Mizusawa

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
1	27	18(S)	2	42	40(S)	10	11	31(S)	18	1	31(S)
1	48	34(S)	3	38	48(S)	10	20	20(S)	19	55	58
2	40	14	7	50	45	13	44	25(S)			

Nov. 24d. Readings also at 0h. (Christchurch, Philadelphia, Nagoya (2), Wellington (3), and New Plymouth (3)), 1h. (La Paz and Nagoya (2)), 2h. (Lick and Nagoya (2)), 4h. (Erevan, Grozny, Nagoya (2), Wellington, New Plymouth, Frunse, Almata, Andijan, Tashkent, Samarkand, and Sverdlovsk), 5h. (Nagoya), 7h. (Nagoya (2), New Plymouth, Wellington, and Tucson), 8h. (near Tananarive), 9h. (Samarkand, Andijan, and Frunse), 10h. (Huancayo), 11h. (Apia, La Paz, and Wellington), 12h. (Nagoya), 13h. (Mount Wilson, Sverdlovsk, Tashkent, College, and Tiflis), 14h. (Tashkent, Sverdlovsk, and Baku), 16h. (Andijan and Frunse), 18h. (near Tananarive), 19h. (Wellington and New Plymouth), 21h. (La Paz), 23h. (Rome, Santiago, Andijan, Frunse, Tashkent, Sverdlovsk, Almata, Edinburgh, Potsdam, and Tchimkent).

Nov. 25d. 0h. 7m. 0s. Epicentre 46°·0N. 33°·5W.

The more northerly locations for this epicentre are not consistent with La Paz P observation. This reading has been taken into account in arriving at the above.

$A = +\cdot5813$, $B = -\cdot3848$, $C = +\cdot7170$; $\delta = +7$; $h = -4$;
$D = -\cdot552$, $E = -\cdot834$; $G = +\cdot598$, $H = -\cdot396$, $K = -\cdot697$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Stonyhurst		21·3	57	i 4 49	− 1	—	—	—	—	e 10·0
Durham		22·0	55	—	—	i 9 11	+15	—	—	—
Toledo		22·3	95	e 5 46	PPP	—	—	—	—	e 12·6
Kew		22·4	63	i 5 8	+ 6	i 8 9	−55	—	—	11·0
East Machias		23·7	280	e 5 23	+ 9	e 9 31	+ 4	—	—	e 11·1
Uccle		25·4	64	e 5 39	+ 8	—	—	—	—	e 12·0
Seven Falls		25·5	287	e 5 30	− 2	e 10 42	SS	—	—	e 12·0
De Bilt		25·8	61	i 5 39	+ 5	e 10 12	+10	—	—	e 12·0
Weston	z.	27·2	277	i 6 1	+14	—	—	—	—	—
Strasbourg		27·9	68	e 6 7	+13	e 11 8	+31	—	—	e 14·5
Williamstown		28·4	278	i 6 7	+ 9	—	—	—	—	—
Triest		32·6	72	6 56	+21	e 12 5	+14	—	—	—
Rome		33·0	81	7 2	+23	12 55	+58	8 16	PP	i 16·8
Pulkovo		39·3	45	—	—	e 18 36	?	—	—	—
Ksara		53·0	78	e 9 3	−18	e 16 35	−15	e 17 12	PS	25·0
Tiflis		54·5	64	e 9 37	+ 5	—	—	—	—	e 27·0
Sverdlovsk		55·2	42	e 9 23	−14	16 40	−40	—	—	21·0
Tucson		59·3	286	e 10 7k	+ 1	—	—	—	—	29·1
Tinemaha		61·2	295	e 10 13	− 6	—	—	—	—	—
Haiwee	N.	61·6	294	e 10 19	− 3	—	—	—	—	—
Mount Wilson		62·8	292	i 10 27	− 3	—	—	—	—	—
Pasadena		63·0	292	i 10 27	− 4	—	—	—	—	e 31·9
Santa Barbara	z.	63·8	293	e 10 33	− 3	—	—	—	—	—
Tashkent		69·2	52	e 10 3	−67	i 17 58	?	—	—	e 29·5
La Paz	z.	69·6	216	11 12	− 1	—	—	—	—	—

Additional readings:—
Toledo iP = +5m.49s.
Kew iE = +5m.56s. and +8m.22s.
East Machias eS = +9m.38s.
Pulkovo e = +28m.36s.
Tucson iP = +10m.20s.
Pasadena iZ = +10m.41s.
Long waves were also recorded at Fort de France, Cheb, San Fernando, Stuttgart, Copenhagen, Baku, Edinburgh, Prague, Göttingen, Puy de Dôme, Paris, Fordham, Granada, Harvard, and Columbia.

Nov. 25d. 8h. 20m. 22s. Epicentre 37°·1N. 141°·8E. (as on 24d.).

Intensity III at Onahama, Sendai, Hukusima, Kakioka, and Mizusawa; II at Tokyo, Aomori, Isinomaki, Yamagata, Mito, Tukubasan, and Utunomiya; I at Kumagata, Maebasi, Miyako, Morioka, Katuura, Kohu, Iida, and Yokohama.

Epicentre 37°·0N. 141°·9E. Shallow.

See Seismological Bulletin of the Central Met. Obs. Japan, Tokyo, 1940, pp. 113-114.

$A = -\cdot6283$, $B = +\cdot4944$, $C = +\cdot6006$; $\delta = -9$; $h = -1$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Onahama	0·8	257	0 18k	0	0 28	− 3	—	—	—
Hukusima	1·2	302	0 27k	+ 3	0 45	+ 4	—	—	—
Mito	1·3	236	0 24k	− 1	0 35	− 9	—	—	—
Sendai	1·3	329	0 25k	0	0 43	− 1	—	—	—
Kakioka	1·5	236	0 28	0	0 46	− 3	—	—	—
Tyosi	1·5	209	0 29	+ 1	0 52	+ 3	—	—	—
Tukubasan	1·6	237	0 29k	− 1	1 2	+11	—	—	—
Yamagata	1·6	315	0 28k	− 2	0 53	+ 2	—	—	—
Utunomiya	1·7	250	0 29k	− 2	0 55	+ 1	—	—	—
Kumagaya	2·1	244	0 39a	+ 2	1 9	+ 5	—	—	—

Continued on next page.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mizusawa	2·1	346	i 0 37a	0	i 1 3	− 1	—	—	—
Tokyo Cen. Met. Ob.	2·1	229	0 37k	0	1 4	0	—	—	—
Tokyo Imp. Univ.	2·1	229	i 0 37	0	1 4	0	—	—	—
Komaba	2·2	230	0 34	− 4	1 2	− 4	—	—	—
Katuura	2·3	214	0 46	P_g	1 15	S_g	—	—	—
Kiyosumi	2·3	214	0 33	− 7	1 5	− 4	—	—	—
Mitaka	2·3	232	0 30	−10	1 0	− 9	—	—	—
Maebasi	2·3	252	0 42k	P*	1 14	S*	—	—	—
Niigata	2·4	291	0 47	P_g	1 15	S*	—	—	—
Yokohama	2·4	226	0 44	P*	1 22	S_g	—	—	—
Kamakura	2·5	226	0 30	−13	0 54	−20	—	—	—
Titibu	2·5	243	0 33	−10	1 6	− 8	—	—	—
Miyako	2·6	3	0 42	− 2	1 10	− 7	—	—	—
Mera	2·7	216	0 48k	+ 3	1 13	− 6	—	—	—
Morioka	2·7	349	0 45a	0	1 17	− 2	—	—	—
Oiwake	2·7	254	0 47	+ 2	1 28	S_g	—	—	—
Takada	2·8	270	0 51	P*	1 33	S_g	—	—	—
Hunatu	2·9	237	0 50	+ 2	1 28	S*	—	—	—
Koyama	2·9	232	0 33	−15	1 8	−16	—	—	—
Nagano	2·9	261	0 51	+ 3	1 31	S*	—	—	—
Akita	3·0	334	0 52	+ 2	1 29	+ 2	—	—	—
Ito	3·0	225	0 52k	+ 2	1 35	S*	—	—	—
Kohu	3·0	241	0 52k	+ 2	1 40	S_g	—	—	—
Misima	3·0	229	0 52a	+ 2	1 43	S_g	—	—	—
Numadu	3·1	230	0 53	+ 2	1 37	S*	—	—	—
Osima	3·1	220	0 50	− 1	1 30	+ 1	—	—	—
Matumoto	3·2	254	0 52	0	1 33	+ 1	—	—	—
Yosiwara	3·2	232	0 33	−19	1 16	−16	—	—	—
Susaki	3·3	225	0 55	+ 2	1 40	S*	—	—	—
Toyama	3·4	266	0 59	+ 4	2 0	S_g	—	—	—
Hatinohe	3·5	356	0 54k	− 3	1 35	− 5	—	—	—
Iida	3·6	245	1 5a	P*	1 43	+ 1	—	—	—
Aomori	3·8	348	1 5	+ 4	2 2	S_g	—	—	—
Husiki	3·8	267	1 3	+ 2	2 3	S_g	—	—	—
Omaesaki	3·8	231	1 6	P*	2 5	S_g	—	—	—
Takayama	3·8	257	1 4k	+ 3	2 0	S*	—	—	—
Wazima	3·9	277	1 4	+ 2	1 51	+ 1	—	—	—
Hamamatu	4·1	235	1 9k	+ 4	2 3	S*	—	—	—
Kanazawa	4·2	264	1 17	P*	2 27	S_g	—	—	—
Hatidyozima	4·3	203	1 7	− 1	2 1	+ 1	—	—	—
Gihu	4·4	250	1 11a	+ 1	2 7	+ 5	—	—	—
Nagoya	4·4	245	1 12	+ 2	i 2 12	S*	—	—	—
Hukui	4·6	257	1 4	− 8	2 2	− 5	—	—	—
Hakodate	4·7	350	1 24	P*	2 32	S_g	—	—	—
Ibukisan	4·7	251	1 17	+ 3	2 14	+ 4	—	—	—
Hikone	4·8	250	1 17	+ 2	2 11	− 1	—	—	—
Kameyama	4·9	245	1 20	+ 3	2 29	S*	—	—	—
Mori	5·1	349	1 28k	P*	2 33	S*	—	—	—
Urakawa	5·1	8	1 27	P*	2 36	S*	—	—	—
Muroran	5·2	353	1 19	− 2	2 27	+ 5	—	—	—
Kyoto	5·3	249	1 24	+ 2	2 37	S*	—	—	—
Yagi	5·5	245	1 35	P*	2 43	S*	—	—	—
Miyadu	5·6	257	1 27	0	2 38	+ 5	—	—	—
Osaka	5·6	247	1 28	+ 1	3 3	S_g	—	—	—
Toyooka	5·8	257	1 32	+ 3	2 43	+ 5	—	—	—
Kobe	5·9	249	1 29	− 2	2 45	+ 5	—	—	—
Sapporo	6·0	356	1 35	+ 3	2 37	− 6	—	—	—
Siomisaki	6·1	236	1 36	+ 2	3 13	S_g	—	—	—
Sumoto	6·2	247	2 2a	P_g	—	—	—	—	—
Wakayama	6·2	244	1 34	− 1	2 57	+ 9	—	—	—
Tokusima	6·6	246	1 44	+ 3	3 23	S*	—	—	—
Asahigawa	6·7	3	1 51	+ 9	3 5	+ 5	—	—	—
Nemuro	6·8	24	1 40k	− 4	2 50	−13	—	—	—
Okayama	6·8	252	1 47	+ 3	—	—	—	—	—
Haboro	7·3	359	1 58	+ 8	3 46	S*	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Muroto		7·3	241	1 53	+ 3	3 21	+ 6	—	—	—
Koti		7·6	245	1 59	+ 4	3 21	− 2	4 6	S_g	e 3·7
Hirosima		8·1	254	2 3	+ 1	3 57	S*	—	—	—
Matuyama		8·1	249	2 1	− 1	4 23	S_g	—	—	—
Hamada		8·2	256	2 7	+ 4	3 39	+ 1	—	—	—
Simidu		8·4	242	2 7	+ 1	3 56	+13	—	—	—
Uwazima		8·5	246	2 8	+ 1	4 9	S*	—	—	—
Oita		9·2	249	2 19	+ 3	4 49	S*	—	—	—
Izuka		9·7	254	2 24	+ 2	4 41	S*	—	—	—
Hukuoka B		9·9	253	—	—	e 4 44	S*	—	—	—
Kumamoto		10·0	248	2 35	PP	5 2	S*	—	—	—
Miyazaki		10·0	242	2 29	+ 2	4 24	+ 2	—	—	—
Titizima		10·0	179	2 21	− 6	—	—	—	—	—
Saga		10·2	252	2 33	+ 2	5 3	S*	—	—	—
Unzendake		10·4	249	2 32	− 2	4 49	SS	—	—	—
Husan		10·5	263	e 2 48	+13	e 4 54	SS	—	—	—
Taikyu		10·7	267	e 2 34	− 4	5 12	SSS	—	—	—
Yakusima		11·5	238	2 49	+ 1	5 2	+ 3	—	—	—
Tomie		11·6	251	2 35	−15	5 29	SSS	—	—	—
Keizyo		11·8	277	2 50	− 3	5 11	+ 5	—	—	6·5
Zinsen		12·1	277	e 2 57	0	5 17	+ 3	—	—	6·5
Sikka		12·2	4	3 21	PPP	6 39	L	—	—	(6·6)
Heizyo		12·8	284	e 3 0	− 6	5 54	SSS	—	—	7·2
Nake		13·5	234	3 31	PP	—	—	—	—	—
Hong Kong		28·0	246	5 50	− 5	10 49	+11	—	—	—
Irkutsk		30·2	312	6 10	− 4	i 11 13	0	—	—	15·6
Phu-Lien		34·6	253	—	—	e 12 22	0	—	—	—
Semipalatinsk		45·1	308	e 8 18	− 2	—	—	—	—	—
Calcutta	N.	48·0	268	e 8 52	+ 9	i 16 8	+27	e 19 31	SS	e 24·1
College		48·9	32	—	—	e 15 50	− 3	e 19 16	SS	e 19·8
Frunse		50·6	300	e 9 5	+ 3	—	—	—	—	—
Dehra Dun	N.	52·6	283	—	—	e 16 56	+12	—	—	e 28·0
Andijan		52·8	297	e 9 19	0	e 16 46	− 1	—	—	—
Agra	E.	54·0	279	i 9 24a	− 4	i 16 54	− 9	11 24	PP	—
Batavia	E.	54·1	225	i 9 35	+ 6	17 7	+ 2	—	—	—
Tchimkent		54·3	300	e 9 28	− 2	e 17 8	+ 1	—	—	—
Tashkent		54·8	299	i 9 29	− 5	i 17 8	− 6	—	—	e 27·6
Sverdlovsk		55·3	319	i 9 35	− 3	i 17 17	− 4	—	—	24·6
Samarkand		57·1	298	e 9 57	+ 7	—	—	—	—	—
Bombay		62·3	274	—	—	e 19 10	PS	—	—	—
Kodaikanal	E.	63·5	263	—	—	e 18 38?	−29	—	—	—
Colombo	E.	63·6	258	—	—	e 19 8	0	—	—	—
Brisbane		65·1	169	i 10 26	−19	—	—	i 14 26	PPP	—
Moscow		67·4	323	10 55	− 4	e 19 52	− 3	—	—	37·1
Pulkovo		68·3	330	e 11 2	− 3	19 59	− 7	—	—	34·9
Baku		68·4	305	11 7	+ 1	e 20 26	PS	—	—	33·6
Grozny		69·6	309	e 11 10	− 3	—	—	—	—	—
Tiflis		71·0	308	i 11 20a	− 2	e 20 11	−26	e 14 1	PP	28·0
Ukiah		71·1	55	—	—	e 28 38?	SSS	—	—	—
Berkeley		72·4	56	e 16 24	PPP	—	—	—	—	—
Simferopol		75·5	316	e 11 46	− 2	—	—	—	—	—
Tinemaha		75·5	54	e 11 42	− 6	—	—	—	—	—
Yalta		75·8	315	e 11 43	− 7	—	—	—	—	—
Santa Barbara		76·1	57	e 11 48	− 3	—	—	—	—	—
Haiwee		76·3	54	e 11 55	+ 3	—	—	—	—	—
Mount Wilson	Z.	77·3	57	e 11 54	− 4	—	—	—	—	—
Pasadena		77·3	57	i 11 54a	− 4	i 21 42	− 6	—	—	e 35·0
Riverside		77·9	57	i 11 57	− 4	—	—	—	—	—
Copenhagen		78·0	334	i 11 59	− 3	21 50	− 5	—	—	—
La Jolla		78·7	57	e 12 2	− 4	—	—	—	—	—
Potsdam		80·3	332	e 12 2	−12	—	—	e 15 2	PP	e 45·6
Hamburg		80·6	334	e 12 15	− 1	—	—	—	—	e 43·6
Ksara		81·4	305	i 12 18a	− 2	e 22 37	+ 6	e 15 28	PP	—
Jena	N.	82·0	331	e 12 26	+ 3	—	—	—	—	—
Tucson		83·3	54	12 28	− 2	—	—	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Stuttgart		84·7	330	e 12 36	− 1	e 22 58	− 6	—	—	e 44·6
Uccle		84·8	335	e 12 46	+ 9	—	—	—	—	e 43·6
Triest		85·3	327	12 13	−27	e 22 58	[− 5]	—	—	e 46·9
Strasbourg		85·4	331	e 12 40	0	e 23 24	+13	—	—	e 48·6
Helwan		86·9	305	i 12 47a	− 1	23 20	− 6	16 10	PP	—
Florence		87·8	327	—	—	e 22 8	[−70]	—	—	48·6
Rome		88·8	323	e 17 8?	PP	e 30 28?	SS	—	—	44·7
Ottawa		91·2	25	—	—	e 23 56	− 9	—	—	44·6
Huancayo		138·4	63	e 22 24	PP	e 26 44	[+ 8]	e 34 47	PPS	e 63·6
La Paz	z.	146·5	60	19 43	[+ 1]	—	—	—	—	69·6

Additional readings :—
Koti eZE = +3m.37s., eN = +4m.13s.
Calcutta iSSSN = +20m.54s.
Andijan e = +9m.38s.
Agra sSE = +17m.16s., SSE = +20m.35s., SSSE = +21m.38s.
Batavia iEN = +24m.44s.
Bombay eEN = +20m.57s.
Baku e = +25m.20s.
Tinemaha eNZ = +11m.52s.
Pasadena i = +12m.2s.
Ksara eSS = +28m.9s.
Tucson iP = +12m.37s. and +12m.44s.
Helwan e = +23m.6s. and +23m.38s., PS = +24m.13s.
Rome e = +22m.8s.?
Huancayo ePKS = +23m.3s. and +23m.18s., ePSPS = +41m.43s.
La Paz iZ = +20m.31s.
Long waves were also recorded at Medan, Prague, Cheb, Upsala, San Fernando, Stonyhurst, Toledo, Edinburgh, Kew, Wellington, Göttingen, Puy de Dôme, Paris, Belgrade, Durham, Rio de Janeiro, and Budapest.

Nov. 25d. 21h. 57m. 33s. Epicentre 2°·5S. 122°·0E. (as on 1938 May 8d.).

$A = -\cdot5294$, $B = +\cdot8473$, $C = -\cdot0433$; $\delta = +6$; $h = +7$;
$D = +\cdot848$, $E = +\cdot530$; $G = +\cdot023$, $H = -\cdot037$, $K = -\cdot999$.

A depth of focus 0·040 has been assumed.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Batavia		15·5	256	i 3 19	− 7	i 6 20	+10	—	—	—
Medan		24·1	285	5 7	+16	i 8 45	− 1	i 9 41	SS	—
Brisbane		38·7	132	—	—	e 15 51	SS	e 16 45	SSS	—
Melbourne		41·0	151	—	—	i 14 24	PS	—	—	23·3
Calcutta	N.	41·2	309	—	—	i 13 26	+16	—	—	—
Kodaikanal	E.	45·8	288	—	—	e 14 27?	+11	—	—	—
Agra	E.	51·6	308	e 8 25	−14	15 44	+ 7	e 19 22	SS	—
Irkutsk		56·6	348	e 9 27?	+12	e 17 7	PS	—	—	e 26·4
Andijan		62·4	319	e 9 37	−17	e 18 17	PS	—	—	—
Tashkent		64·7	319	i 10 7	− 2	i 18 42	PS	—	—	e 29·5
Sverdlovsk		76·9	331	11 27	+ 5	e 21 10	+25	—	—	33·5
Baku		78·1	312	e 12 36	+67	e 21 25	+27	—	—	38·5
Tiflis		82·1	313	11 58	+ 8	e 22 4	+25	—	—	36·9
Ksara		88·1	304	i 12 32k	+13	e 23 22	[+64]	e 15 58	PP	50·5
Helwan		91·8	300	—	—	e 23 57	+47	—	—	—
Tinemaha		115·0	51	e 20 6	PP	—	—	—	—	—
Mount Wilson		115·9	54	i 20 6	PP	—	—	—	—	—
Riverside	z.	116·6	54	i 20 9	PP	—	—	—	—	—

Additional readings :—
Medan iN = +8m.53s., +11m.17s., +14m.45s., and +16m.23s.
Long waves were also recorded at Vladivostok and Copenhagen

Nov. 25d. Further shocks from the neighbourhood of the epicentre at 8h. were recorded at Mizusawa and Nagoya.

Mizusawa

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
2	2	41	8	35	37	11	5	56	12	55	10(S)
2	8	50	10	4	26	11	31	19	16	37	55
2	29	41	10	32	23	11	55	35	21	38	23
4	11	15	10	49	11	12	52	27	23	0	13
5	49	28									

Nagoya

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
2	3	37	2	30	16	10	5	6	11	32	22
2	9	44	4	11	50						

Nov. 25d. Readings also at 0h. (Ksara, Tiflis, and Helwan), 3h. (Mizusawa, Wellington, and Rome), 4h. (Ksara, Tiflis, Helwan, Basle, Baku, Wellington, Sverdlovsk, and Tashkent), 5h. (Vladivostok), 6h. (Tashkent, Sverlovsk, Mount Wilson, Riverside, Irkutsk, and Istanbul), 7h. (Moncalieri), 8h. (Santa Barbara, Pasadena, Tinemaha, Haiwee, La Jolla, Berkeley, Mount Wilson, Riverside, Tucson, and Basle), 9h. (Malabar, New Plymouth, and Batavia), 10h. (New Plymouth), 12h., 14h., and 15h. (Sebastopol), 18h. (Sverdlovsk, Baku, Ksara, and Andijan), 22h. (Nagoya, Mizusawa, and Tucson), 23h. (Medan (2), Tucson, and Batavia).

Nov. 26d. 3h. 35m. 59s. Epicentre 37°·1N. 141°·8E. (as on 1938 Nov. 25d.).

$A = -\cdot6283$, $B = +\cdot4944$, $C = +\cdot6006$; $\delta = -9$; $h = -1$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mizusawa		2·1	346	i 0 40	+ 3	i 1 4	0	i 1 7	S*	—
Nagoya		4·4	245	e 1 16	P*	2 14	S*	—	—	—
Koti		7·6	245	e 1 33	−22	4 4	S_g	—	—	—
Vladivostok		9·7	312	e 2 24	+ 2	i 4 22	+ 7	—	—	4·9
Hukuoka B		9·9	253	—	—	e 4 37	SS	—	—	—
Keizyo	E.	11·8	277	e 3 23	+30	—	—	—	—	—
Tashkent		54·8	299	—	—	e 17 12	− 2	—	—	e 29·8
Sverdlovsk		55·3	319	9 41	+ 3	e 17 29	+ 8	—	—	27·0
Tiflis	N.	71·0	308	e 11 36	+14	—	—	—	—	38·0
Tinemaha		75·5	54	e 11 45	− 3	—	—	—	—	—
Santa Barbara		76·1	57	i 11 48	− 3	—	—	—	—	—
Haiwee		76·3	54	i 11 50	− 2	—	—	—	—	—
Mount Wilson	Z.	77·3	57	e 11 55	− 3	—	—	—	—	—
Pasadena	Z.	77·3	57	i 11 55	− 3	—	—	—	—	—
La Jolla		78·7	57	e 12 2	− 4	—	—	—	—	—
Ksara		81·4	305	e 15 37	PP	—	—	—	—	47·0
Tucson		83·3	54	12 27k	− 3	—	—	—	—	—
La Paz	Z.	146·5	60	19 39	[− 3]	—	—	—	—	—

Additional reading :—
Tucson i = +12m.43s.
Long waves were also recorded at Baku, Irkutsk, Moscow, Copenhagen, Rome, and De Bilt.

Nov. 26d. 10h. 1m. 0s. Epicentre 37°·1N. 141°·8E. (as at 3h.).

$A = -\cdot6283$, $B = +\cdot4944$, $C = +\cdot6006$; $\delta = -9$; $h = -1$.

		△	Az.	P.	O−C.	S.	O−C.	L.
		°	°	m. s.	s.	m. s.	s.	m.
Mizusawa	E.	2·1	346	i 0 39	+ 2	i 1 2	− 2	—
	N.	2·1	346	i 0 41	P_g	i 1 6	S_g	—
Nagoya		4·4	245	e 1 24	P_g	2 23	S_g	—
Koti		7·6	245	e 2 59	+64	4 28	+65	—
Zinsen		12·1	277	e 3 5	+ 8	e 4 58	−16	e 6·2

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	L.
		°	°	m. s.	s.	m. s.	s.	m.
Sverdlovsk		55·3	319	9 39	+ 1	17 22	+ 1	27·0
Tiflis		71·0	308	e 11 32	+10	—	—	e 33·5
Haiwee		76·3	54	e 11 51	− 1	—	—	—
Mount Wilson	z.	77·3	57	e 11 57	− 1	—	—	j—
Pasadena	z.	77·3	57	i 11 57	− 1	—	—	—
Riverside	z.	77·9	57	i 11 58	− 3	—	—	—
La Jolla	z.	78·7	57	e 11 54	−12	—	—	—
Ksara		81·4	305	—	—	e 25 11	?	48·5
Tucson		83·3	54	12 28k	− 2	—	—	—
La Paz	z.	146·5	60	19 58	[+16]	—	—	—

Long waves were also recorded at De Bilt, Rome, Copenhagen, Moscow, Tashkent, and Baku.

Nov. 26d. Further shocks from the neighbourhood of the epicentre of 10h. were recorded at Mizusawa and Nagoya.

Mizusawa

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
7	31	8	8	40	47	14	1	33	19	8	48
8	37	59	8	56	2(S)	16	1	56(S)	20	8	57

Nagoya

h.	m.	s.	h.	m.	s.	h.	m.	s.
7	32	15	8	39	24	8	41	29

Nov. 26d. Readings also at 1h. (Nagoya (2)), 5h. (Apia), 7h. (Harvard, Fordham, Ottawa, Weston, Williamstown, La Paz, and Shawinigan Falls), 12h. (Batavia), 15h. (near Tananarive), 17h. (near Tananarive), 18h. (Malabar), 20h. (near Tananarive (2)), 23h. (Tucson, Riverside, Pasadena, and Mount Wilson).

Nov. 27d. Shocks from the neighbourhood of the epicentre of 26d. were recorded at

Mizusawa

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
2	43	38	4	20	16	13	26	56	20	4	30

Nagoya

h.	m.	s.
20	5	35

Nov. 27d. Readings also at 0h. (Lick, Berkeley, Weston, Harvard, La Jolla, Santa Barbara, Branner, Tucson (2), Tinemaha, Riverside, Mount Wilson, and Pasadena), 2h. (Tucson), 3h. (Baku, Tiflis, Hukuoka B, Koti, Rome, Tashkent, Sverdlovsk, and Vladivostok), 4h. (Tucson (2)), 6h. (Mizusawa), 8h. (Tucson), 9h. (Tucson), 11h. (Nagoya, Wellington, and Mizusawa), 12h. (Apia and Tucson), 13h. (Haiwee, Tucson, Pasadena, Mount Wilson (2), Riverside (2), and Tinemaha), 14h. (Rome and Andijan), 17h. (Malabar), 19h. (Tucson), 20h. (Tucson, Mount Wilson, and Riverside), 22h. (Tucson, Huancayo, Calcutta, Colombo, Kodaikanal, Medan, Batavia, Ksara, La Paz, Melbourne, Andijan, Vladivostok, Sverdlovsk, and Tashkent), 23h. (Samarkand).

Nov. 28d. Further shocks from the neighbourhood of the epicentre of 26d. were recorded at Mizusawa and Nagoya.

Mizusawa

h.	m.	s.	h.	m.	s.	h.	m.	s.
2	3	53	4	27	37	17	59	5

Nagoya

h.	m.	s.	h.	m.	s.	h.	m.	s.
2	4	55	4	28	7	18	0	34

Nov. 28d. Readings also at 2h. (Hukuoka B), 5h. (College, Tashkent, Sverdlovsk, Irkutsk, Pasadena, Mount Wilson, La Jolla, Tinemaha, Haiwee, and Tucson), 6h. (Fordham, Baku, and Vladivostok), 7h. (Weston, Santa Barbara, Pasadena, Mount Wilson, La Jolla, Tinemaha, Haiwee, and Tucson), 10h. (Berkeley, Lick, and Branner), 14h. (Pasadena, Mount Wilson, Tinemaha, Tucson, Sofia, and Riverside), 16h. (Mizusawa), 18h. (Nagoya, Mizusawa, and Tucson), 19h. (Fort de France), 21h. (near Algiers), 22h. (Bombay, Calcutta, Samarkand, Andijan, Tchimkent, Wellington, New Plymouth, and Fordham).

Nov. 29d. 13h. 39m. 32s. Epicentre 37°·1N. 141°·8E. (as on Nov. 26d.).

Moderate intensity at Mito, Okayama, and Kakioka ; slight at Sendai, Hukusima, Miyako, Tukubasan.

Seismological Bulletin of the Central Meteorological Observatory, Japan, for the year 1938, Tokyo 1940, pp. 115-117.
Epicentre 36°·75N. 142°·0E. Macroseismic radius 200-300km. Shallow.

$A = -\cdot 6283$, $B = +\cdot 4944$, $C = +\cdot 6006$; $\delta = -9$; $h = -1$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Onahama	0·8	257	0 20	+ 2	0 31	0	—	—	—
Hukusima	1·2	302	0 29a	+ 5	0 56	+15	—	—	—
Mito	1·3	236	0 24k	− 1	0 37	− 7	—	—	—
Sendai	1·3	329	0 33k	+ 8	0 54	+10	—	—	—
Kakioka	1·5	236	0 26	− 2	0 44	− 5	—	—	—
Tyosi	1·5	209	0 23	− 5	0 47	− 2	—	—	—
Tukubasan	1·6	237	0 29	− 1	0 55	+ 4	—	—	—
Yamagata	1·6	315	0 31k	+ 1	1 1	+10	—	—	—
Utunomiya	1·7	250	0 31	0	1 9	+15	—	—	—
Kumagaya	2·1	244	0 39k	+ 2	1 10	S_g	—	—	—
Mizusawa E.	2·1	346	i 0 42k	+ 5	i 1 16	S_g	—	—	—
Tokyo, Cen. Met. Ob.	2·1	229	0 35	− 2	1 4	0	—	—	—
Maebasi	2·3	252	0 43	+ 3	1 15	+ 6	—	—	—
Niigata	2·4	291	0 51	P_g	1 29	S_g	—	—	—
Yokohama	2·4	226	0 39k	− 2	1 17	S_g	—	—	—
Miyako	2·6	3	0 45k	+ 1	1 20	+ 3	—	—	—
Mera	2·7	216	0 42k	− 3	1 12	− 7	—	—	—
Morioka	2·7	349	0 48k	+ 3	1 26	S*	—	—	—
Oiwake	2·7	254	0 50	+ 5	1 33	S_g	—	—	—
Takada	2·8	270	0 51	+ 4	1 44	S_g	—	—	—
Hunatu	2·9	237	0 47	− 1	1 45	S_g	—	—	—
Nagano	2·9	261	0 53	P*	1 38	S_g	—	—	—
Akita	3·0	334	0 58a	P_g	1 45	S_g	—	—	—
Ito	3·0	225	0 48	− 2	1 40	S_g	—	—	—
Kohu	3·0	241	0 50k	0	1 40	S_g	—	—	—
Misima	3·0	229	0 48k	− 2	1 34	S*	—	—	—
Numadu	3·1	230	0 52	+ 1	1 50	S_g	—	—	—
Osima	3·1	220	0 43k	− 8	1 26	− 3	—	—	—
Matumoto	3·2	254	0 54	+ 2	1 47	S_g	—	—	—
Toyama	3·4	266	1 4	P*	2 6	S_g	—	—	—
Hatinohe	3·5	356	0 57	0	1 41	+ 1	—	—	—
Aomori	3·8	348	1 10	P*	2 11	S_g	—	—	—
Husiki	3·8	267	1 7a	P*	2 10	S_g	—	—	—
Omaesaki	3·8	231	1 0	− 1	2 14	S_g	—	—	—
Takayama	3·8	257	1 6k	+ 5	2 37	?	—	—	—
Wazima	3·9	277	1 7	+ 5	2 2	S*	—	—	—
Hamamatu	4·1	235	1 4k	− 1	1 56	+ 1	—	—	—
Kanazawa	4·2	264	1 14	+ 7	2 10	S*	—	—	—
Hatidyozima	4·3	203	0 59	− 9	1 43	−17	—	—	—
Gihu	4·4	250	1 10k	0	2 19	S*	—	—	—
Nagoya	4·4	245	1 8	− 2	i 2 31	S_g	—	—	—
Hukui	4·6	257	1 19	+ 7	2 26	S_g	—	—	—
Hakodate	4·7	350	1 32	P_g	3 8	?	—	—	—
Hikone	4·8	250	1 20	+ 5	2 31	S*	—	—	—
Kameyama	4·9	245	1 19	+ 2	2 30	S*	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.			L.
		°	°	m. s.	s.	m. s.	s.	m. s.			m.
Tu		4·9	243	1 3$_a$	−14	2 14	− 1	—		—	—
Mori		5·1	349	1 34$_k$	P*	2 49	S$_g$	—		—	—
Urakawa		5·1	8	1 33	P*	2 28	+ 8	—		—	—
Muroran		5·2	353	1 35	P*	2 52	S$_g$	—		—	—
Kyoto		5·3	249	1 24	+ 2	2 55	S$_g$	—		—	—
Yagi		5·5	245	1 23$_k$	− 2	2 36	+ 6	—		—	—
Miyadu		5·6	257	1 29	+ 2	3 22	S$_g$	—		—	—
Toyooka		5·8	257	1 36	+ 7	3 5	S$_g$	—		—	—
Kobe		5·9	249	1 30$_a$	− 1	2 58	S*	—		—	—
Obihiro		5·9	10	1 48	P*	3 18	S$_g$	—		—	—
Sapporo		6·0	356	1 36	+ 4	2 51	+ 8	—		—	—
Siomisaki		6·1	236	1 30$_k$	− 4	3 12	S*	—		—	—
Sumoto		6·2	247	1 36$_a$	+ 1	3 7	S*	—		—	—
Wakayama		6·2	244	1 33	− 2	3 1	S*	—		—	—
Tokusima		6·6	246	1 42	+ 1	3 28	S*	—		—	—
Asahigawa		6·7	3	1 53	+11	3 7	+ 7	—		—	—
Nemuro		6·8	24	1 40	− 4	2 57	− 6	—		—	—
Tadotu		7·1	250	1 42	− 6	3 42	S$_g$	—		—	—
Muroto		7·3	241	1 50	0	3 13	− 2	—		—	—
Koti		7·6	245	e 1 51	− 4	3 18	− 5	2 4	P*		3·6
Hiroshima		8·1	254	2 2	0	4 5	S*	—		—	—
Matuyama		8·1	249	2 3	+ 1	4 28	S$_g$	—		—	—
Hamada		8·2	256	2 2	− 1	3 45	+ 7	—		—	—
Simidu		8·4	242	2 5	− 1	4 2	+19	—		—	—
Uwazima		8·5	246	2 7	0	4 16	S*	4 31	S$_g$		—
Ooita		9·2	249	2 24	+ 8	5 2	S$_g$	—		—	—
Ootomari		9·6	4	2 24	+ 3	4 15	+ 3	—		—	—
Vladivostok		9·7	312	i 2 27	+ 5	i 4 11	− 4	—		—	4·5
Izuka		9·7	254	2 24	+ 2	4 53	S*	—		—	—
Hukuoka B		9·9	253	2 27	+ 2	5 34	S$_g$	—		—	—
Kumamoto		10·0	248	2 40	+13	4 46	+24	—		—	—
Miyazaki		10·0	242	2 27	0	4 34	+12	—		—	—
Titizima		10·0	179	2 16	−11	—	—	—		—	—
Saga		10·2	252	2 31	0	5 52	S$_g$	—		—	—
Unzendake		10·4	249	2 24	−10	4 36	+ 4	—		—	—
Husan		10·5	263	e 2 42	+ 7	5 5	S*	—		—	—
Taikyu		10·7	267	2 41	+ 3	4 47	+ 8	—		—	6·2
Yakusima		11·5	238	2 46	− 2	5 15	+16	—		—	—
Tomie		11·6	251	2 49$_a$	− 1	5 36	+35	—		—	—
Keizyo		11·8	277	2 56	+ 3	5 19	+13	3 2	PP		7·2
Zinsen		12·1	277	i 3 2$_a$	+ 5	5 22	+ 8	—		—	e 6·8
Sikka		12·2	4	3 6	+ 8	5 45	+29	—		—	—
Heizyo		12·8	284	e 3 13	+ 7	e 6 4	+34	—		—	8·6
Nake		13·5	234	3 21	+ 6	5 21	−26	—		—	—
Dairen		16·0	283	5 5	?	8 33	L	—		—	8·6
Zi-ka-wei	E.	17·9	258	e 4 16	+ 4	8 8	+38	—		—	—
Miyakozima		18·7	234	4 19	− 3	7 58	+10	—		—	—
Isigakizima		19·8	237	3 42	−53	—	—	—		—	—
Taihoku		21·1	240	—	—	e 8 47	+ 8	—		—	—
Karenko		21·7	241	3 53	−62	—	—	—		—	—
Taito		22·9	239	5 12	+ 6	9 22	?	—		—	—
Hong Kong		28·0	246	5 52$_a$	− 3	10 43	+ 5	6 46	PP		15·8
Manila		29·1	225	5 59	− 5	12 35	PP	—		—	18·5
Irkutsk		30·2	312	6 17	+ 3	e 11 22	+ 9	e 7 26	PP		16·5
Phu-Lien		34·6	253	e 6 51	− 2	e 12 24	+ 2	—		—	—
Semipalatinsk		45·1	308	8 20	0	15 5	+ 6	—		—	—
Calcutta	N.	48·0	268	i 8 51	+ 8	i 16 1	+20	e 16 36	PS		e 23·9
Almata		48·8	300	9 0	+11	—	—	—		—	—
College		48·9	32	—	—	e 15 52	− 1	e 19 21	SS		e 23·4
Frunse		50·6	300	9 2	0	i 16 24	+ 7	—		—	28·4
Medan		51·7	241	e 9 14	+ 3	i 16 39	+ 7	—		—	31·5
Dehra Dun	N.	52·6	283	e 7 15?	?	e 16 57	+13	—		—	e 27·8
Andijan		52·8	297	9 20	+ 1	16 58	+11	—		—	28·5
Batavia		54·1	225	e 9 24	− 5	i 17 0	− 5	—		—	—
Honolulu		54·2	88	—	—	e 17 3	− 3	—		—	e 23·2

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tchimkent		54·3	300	9 31	+ 1	17 13	+ 6	—	—	—
Tashkent		54·8	299	9 33	− 1	i 17 23	+ 9	—	—	—
Sverdlovsk		55·3	319	i 9 38	0	i 17 27	+ 6	—	—	32·6
Samarkand		57·1	298	9 51	+ 1	17 51	+ 6	—	—	—
Hyderabad		58·6	269	9 59	− 2	18 5	+ 1	21 43	SS	29·2
Bombay		62·3	274	i 10 17	− 9	i 18 48	− 4	12 44	PP	—
Kodaikanal	E.	63·5	263	10 30	− 4	i 19 11	+ 4	19 32	PS	30·8
Colombo	E.	63·6	258	10 33	− 2	19 11	+ 3	—	—	38·9
Brisbane		65·1	169	—	—	e 19 10	−17	—	—	—
Victoria		66·3	46	e 14 4	PP	e 19 28?	−14	e 20 28	?	e 22·5
Moscow		67·4	323	e 11 0	+ 1	20 3	+ 8	—	—	36·0
Pulkovo		68·3	330	11 2	− 3	20 8	+ 2	—	—	36·0
Baku		68·4	305	11 8	+ 2	i 20 14	+ 7	—	—	34·0
Grozny		69·6	309	e 11 11	− 2	e 20 31	+10	—	—	—
Tiflis		71·0	308	i 11 21k	− 1	20 41	+ 4	—	—	36·5
Riverview		71·1	172	—	—	e 20 51	+13	—	—	e 37·1
Ukiah		71·1	55	—	—	e 20 41	+ 3	—	—	e 33·6
Melbourne		74·6	177	—	—	e 20 56	−22	—	—	—
Theodosia		74·7	315	11 42	− 1	21 22	+ 3	—	—	47·5
Simferopol		75·5	316	11 51	+ 3	21 32	+ 4	—	—	42·5
Tinemaha	z.	75·5	54	e 11 45	− 3	—	—	—	—	—
Yalta		75·8	315	11 47	− 3	—	—	—	—	42·5
Santa Barbara		76·1	57	e 11 47	− 4	e 21 31	− 4	—	—	—
Haiwee		76·3	54	i 11 47	− 5	—	—	—	—	—
Mount Wilson		77·3	57	i 11 52	− 6	e 21 37	−11	—	—	—
Pasadena		77·3	57	e 11 52	− 6	i 21 43	− 5	—	—	e 35·4
Riverside		77·9	57	i 12 6	+ 5	—	—	—	—	—
Copenhagen		78·0	334	i 12 0	− 2	21 56	+ 1	—	—	41·5
La Jolla	z.	78·7	57	e 12 0	− 6	—	—	—	—	—
Bucharest		80·2	319	15 14	PP	i 22 26	+ 7	23 8	PS	—
Hamburg	z.	80·6	334	i 12 22k	+ 6	—	—	—	—	—
Ksara		81·4	305	i 12 19k	− 1	i 22 40	+ 9	15 31	PP	—
Budapest		81·5	325	12 18	− 3	i 22 40	+ 8	—	—	e 46·0
Kecskemet	z.	81·6	324	i 12 20	− 1	i 22 46	+13	e 27 55	SS	e 50·5
Jena		82·0	331	e 12 21	− 2	—	—	—	—	e 43·5
Belgrade		82·8	321	i 12 26k	− 1	i 22 49	+ 4	—	—	e 46·5
Sofia		82·8	319	e 12 34	+ 7	e 22 50	+ 5	—	—	—
Tucson		83·3	54	i 12 24	− 6	—	—	—	—	35·6
De Bilt		83·4	335	—	—	e 22 52	+ 1	—	—	e 44·5
Wellington		83·9	156	e 12 26	− 7	i 22 40	−16	26 51	SS	33·2
Stuttgart		84·7	330	e 12 35k	− 2	e 23 10	+ 6	—	—	e 46·5
Christchurch		85·0	158	12 40a	+ 2	22 53	−14	28 7	SS	39·0
Triest		85·3	327	12 40	0	23 9	− 1	—	—	e 43·0
Chur		86·1	330	12 42	− 2	—	—	—	—	—
Zurich		86·1	330	e 12 38	− 6	e 23 22	+ 4	—	—	—
Basle		86·3	330	e 12 43	− 2	e 22 53	−26	—	—	—
Helwan		86·9	305	12 46a	− 2	i 23 26	0	23 4	SKS	—
Paris		87·1	335	—	—	e 34 28?	?	—	—	48·5
Rome		88·8	323	—	—	23 35	− 9	—	—	45·7
Seven Falls		91·2	21	—	—	e 24 28?	+23	e 30 28?	SS	e 44·5
Huancayo		138·4	63	e 23 25	PKS	e 28 54	{−17}	e 45 39	SSS	e 56·3

Additional readings :—
Hukusima +1m.1s.
Vladivostok i = +3m.12s., +3m.33s., and +3m.49s.
Hong Kong SS = +12m.35s.
Irkutsk e = +12m.48s. and +13m.39s.
Calcutta eSSN = +19m.21s., eSSSN = +20m.42s.
College eS_cS = +18m.39s.
Andijan e = +9m.33s., +10m.13s., and +10m.55s.
Honolulu eS = +17m.6s.
Sverdlovsk L_g = +26·7m.
Hyderabad S_cSN = +19m.48s.
Bombay P_cPEN = +10m.44s., S_cSEN = +20m.1s., eSSEN = +22m.53s.
Brisbane iE = +19m.16s., eEN = +20m.34s.
Riverview eN = +20m.55s.
Melbourne i = +21m.10s. and +21m.51s.

Continued on next page.

Bucharest PPE = +15m.20s., iE = +23m.0s., SSE = +27m.28s.
Ksara i = +12m.45s., ePS = +23m.27s.
Budapest PN = +12m.21s.
Jena eP = +12m.28s.
Belgrade iP_cPZ = +11m.36s.
Tucson iP = +12m.41s., i = +12m.55s. and +13m.18s.
Christchurch eL_g = +34m.58s.
Helwan PP = +16m.16s., i = +16m.22s., PS = +24m.38s., i = +24m.45s.
Huancayo ePKS = +23m.34s.
Long waves are also recorded at La Plata, Fort de France, Harvard, Philadelphia, and other European stations.

Nov. 29d. Further shocks from the neighbourhood of the above shock were recorded at Mizusawa and Nagoya as below :—

Mizusawa

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
13	58	32	14	12	30	15	6	34	15	28	57
14	10	4(S)	14	33	20	15	21	36(S)	16	17	49

Nagoya

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
13	58	43	14	12	53	15	21	27	16	18	5
14	10	49	14	34	6	15	29	26			

Nov. 29d. Readings also at 0h. (near Wellington), 1h. (Mount Wilson, Pasadena, Tinemaha, and Tucson), 2h. (Sofia), 3h. (Andijan), 4h. (La Paz), 5h. (near Balboa Heights), 8h. (La Paz), 9h. (Balboa Heights), 11h. (Huancayo), 12h. (Haiwee, La Jolla, Mount Wilson, Pasadena, Riverside, Tinemaha, Tucson, and near La Paz), 14h. (Ksara and near Santiago), 15h. (Koti, Fort de France, and Tucson (2)), 18h. (near Andijan), 19h. (Santiago, near La Jolla, Mount Wilson, Riverside, Santa Barbara, Tinemaha, and Tucson), 20h. (Riverside, Tinemaha, and Tucson), 22h. (near Rome), 23h. (Hastings, near Christchurch (2), New Plymouth, Stratford, and Wellington).

Nov. 30d. 2h. 29m. 47s. Epicentre 37°·1N. 141°·8E. (as on Nov. 29d.).

Intensity IV at Onahama, Kakioka, and Mito ; III at Sendai, Hukusima, Tyosi, Tokyo, Kumagaya, Maebasi, Kohu, Hunatu, Yokohama, Mizusawa, Aidu, Utunomiya, and Tukubasan ; II at Miyako, Katuura, Iida, Aomori, Misima, Isinomaki, Yamagata, and Asio ; I at Morioka, Tomisaki, Osima, Ito, Numadu, Hatinohe, and Sakata.

Epicentre 37°·0N. 141°·8E. Shallow.

See Seismological Bulletin of the Central Met. Obs. Japan, for the year 1938, Tokyo, 1940, pp. 117-120.

A = −·6283, B = +·4944, C = +·6006 ; $\delta = -9$; $h = -1$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Onahama	0·8	257	0 18k	0	0 28	− 3	—	—	—
Hukusima	1·2	302	0 26k	+ 2	0 45	+ 4	—	—	—
Mito	1·3	236	0 25k	0	0 43	− 1	—	—	—
Sendai	1·3	329	0 30k	+ 5	0 50	+ 6	—	—	—
Kakioka	1·5	236	0 30	P_g	0 40	− 9	—	—	—
Tyosi	1·5	209	0 29	+ 1	0 54	S_g	—	—	—
Tukubasan	1·6	237	0 29k	− 1	0 51	0	—	—	—
Yamagata	1·6	315	0 30k	0	0 52	+ 1	—	—	—
Utunomiya	1·7	250	0 30k	− 1	0 53	− 1	—	—	—
Kumagaya	2·1	244	0 39k	+ 2	1 6	+ 2	—	—	—
Mizusawa	2·1	346	i 0 37	0	i 1 2	− 2	—	—	—
Tokyo Cen. Met. Ob.	2·1	229	i 0 38k	+ 1	1 5	+ 1	—	—	—
Tokyo Imp. Univ.	2·1	229	0 38	+ 1	1 5	+ 1	—	—	—
Komaba	2·2	230	0 37	− 1	1 5	− 1	—	—	—
Katuura	2·3	214	0 48k	P_g	1 15	S_g	—	—	—

Continued on next page.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m.	s.	m.
Maebasi	2·3	252	0 39k	− 1	1 9	0	—	—	—
Mitaka	2·3	232	0 56	+16	1 26	+17	—	—	—
Niigata	2·4	291	0 45	P*	1 17	S*	—	—	—
Yokohama	2·4	226	0 42	+ 1	1 22	S_g	—	—	—
Kamakura	2·5	226	0 56	+13	—	—	—	—	—
Titibu	2·5	243	0 56	+13	1 27	S_g	—	—	—
Miyako	2·6	3	0 40a	− 4	1 9	− 8	—	—	—
Morioka	2·7	349	0 45a	0	1 19	0	—	—	—
Mera	2·7	216	0 46a	+ 1	1 21	+ 2	—	—	—
Oiwake	2·7	254	0 47	+ 2	1 24	S*	—	—	—
Takada	2·8	270	0 51	P*	1 29	S*	—	—	—
Hunatu	2·9	237	0 50k	+ 2	1 33	S_g	—	—	—
Koyama	2·9	232	0 56	P_g	1 29	S*	—	—	—
Nagano	2·9	261	0 51k	+ 3	1 27	+ 3	—	—	—
Akita	3·0	334	0 54k	+ 4	1 36	S_g	—	—	—
Ito	3·0	225	0 49a	− 1	1 33	S*	—	—	—
Kohu	3·0	241	0 48k	− 2	1 32	S*	—	—	—
Misima	3·0	229	1 9a	P_g	1 56	+29	—	—	—
Numadu	3·1	230	0 53	+ 2	1 38	S*	—	—	—
Osima	3·1	220	0 48a	− 3	1 23	− 6	—	—	—
Matumoto	3·2	254	0 52k	0	1 45	S_g	—	—	—
Susaki	3·3	225	0 54	+ 1	1 33	− 2	—	—	—
Toyama	3·4	266	1 2k	P*	2 3	S_g	—	—	—
Hatinohe	3·5	356	0 55a	− 2	1 37	− 3	—	—	—
Iida	3·6	245	1 1k	+ 3	1 41	− 1	—	—	—
Husiki	3·8	267	1 8a	P*	2 9	S_g	—	—	—
Aomori	3·8	348	1 3	+ 2	1 54	S*	—	—	—
Omaesaki	3·8	231	1 2	+ 1	2 2	S_g	—	—	—
Takayama	3·8	257	1 0k	− 1	1 56	S*	—	—	—
Wazima	3·9	277	1 3k	+ 1	2 1	S*	—	—	—
Hamamatu	4·1	235	1 7a	+ 2	2 1	+ 6	—	—	—
Kanazawa	4·2	264	1 8	+ 1	2 46	+49	—	—	—
Hatidyozima	4·3	203	1 7	− 1	1 53	− 7	—	—	—
Gihu	4·4	250	1 11k	+ 1	2 6	+ 4	—	—	—
Nagoya	4·4	245	1 10	0	2 10	S*	—	—	—
Hukui	4·6	257	1 11	− 1	2 24	S*	—	—	—
Hakodate	4·7	350	1 22a	P*	2 30	S_g	—	—	—
Ibukisan	4·7	251	1 16	+ 2	2 10	0	—	—	—
Hikone	4·8	250	1 18a	+ 3	2 32	S*	—	—	—
Kameyama	4·9	245	1 18a	+ 1	2 27	S*	—	—	—
Tu	4·9	243	1 16a	− 1	2 31	S*	—	—	—
Mori	5·1	349	1 25k	+ 5	2 38	S*	—	—	—
Urakawa	5·1	8	1 28	P*	2 21	+ 1	—	—	—
Muroran	5·2	353	1 12	− 9	2 19	− 3	—	—	—
Kyoto	5·3	249	1 25	+ 3	2 30	+ 5	—	—	—
Yagi	5·5	245	1 27	+ 2	2 44	S*	—	—	—
Miyadu	5·6	257	1 27k	0	2 35	+ 2	—	—	—
Kobe	5·9	249	1 32a	+ 1	3 10	S_g	—	—	—
Obihiro	5·9	10	1 33a	+ 2	2 53	S*	—	—	—
Sapporo	6·0	356	1 31	− 1	2 48	+ 5	—	—	—
Siomisaki	6·1	236	1 34a	0	3 17	S_g	—	—	—
Kusiro	6·2	18	1 33	− 2	2 38	−10	—	—	—
Sumoto	6·2	247	1 36a	+ 1	3 11	S*	—	—	—
Wakayama	6·2	244	1 34a	− 1	3 2	S*	—	—	—
Tokusima	6·6	246	1 45	+ 4	3 33	S_g	—	—	—
Asahigawa	6·7	3	1 39	− 3	2 58	− 2	—	—	—
Nemuro	6·8	•24	1 42	− 2	2 54	− 9	—	—	—
Sakai	7·1	260	1 51	+ 3	3 11	+ 1	—	—	—
Tadotu	7·1	250	1 49k	+ 1	3 41	S*	—	—	—
Haboro	7·3	359	1 48	− 2	3 9	− 6	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Muroto		7·3	241	1 51a	+ 1	3 17	+ 2	—	—	—
Koti		7·6	245	i 1 55a	0	3 29	+ 6	e 3 39	S*	4·6
Hirosima		8·1	254	2 2a	0	3 41	+ 6	—	—	—
Matuyama		8·1	249	2 4a	+ 2	4 15	S*	—	—	—
Hamada		8·2	256	2 6	+ 3	3 38	0	—	—	—
Simidu		8·4	242	2 6	0	3 52	+ 9	—	—	—
Uwazima		8·5	246	2 8	+ 1	4 5	S*	—	—	—
Ooita		9·2	249	2 20a	+ 4	4 55	S_g	—	—	—
Ootomari		9·6	4	2 24	+ 3	4 13	+ 1	—	—	—
Izuka		9·7	254	2 24	+ 2	4 52	S*	—	—	—
Asosan		9·8	248	2 13a	−11	4 29	+12	—	—	—
Hukuoka	B.	9·9	253	2 28	+ 3	4 53	S*	—	—	—
Kumamoto		10·0	248	2 30a	+ 3	5 1	S_g	—	—	—
Miyazaki		10·0	242	2 28	+ 1	4 16	− 6	—	—	—
Titizima		10·0	179	2 25	− 2	—	—	—	—	—
Saga		10·2	252	2 32	+ 1	5 25	S_g	—	—	—
Unzendake		10·4	249	2 25a	− 9	4 34	+ 2	—	—	—
Husan		10·5	263	2 40	+ 5	4 43	+ 8	—	—	—
Ituhara		10·6	258	2 35	− 1	5 36	L	—	—	(5·6)
Taikyu		10·7	267	2 38a	0	4 49	SS	—	—	—
Kagosima		10·8	243	2 11	−28	—	—	—	—	—
Syuhurei		11·1	270	i 2 49	+ 6	5 9	SS	—	—	—
Yakusima		11·5	238	2 49a	+ 1	5 12	SS	—	—	—
Tomie		11·6	251	2 50a	0	5 52	L	—	—	(5·9)
Keizyo		11·8	277	2 55a	+ 2	5 10	+ 4	2 58	PP	6·2
Zinsen		12·1	277	i 2 59	+ 2	5 19	+ 5	5 27	SS	6·3
Sikka		12·2	4	4 7	PP	5 47	SSS	—	—	—
Heizyo		12·8	284	i 4 7a	+61	5 52	SSS	—	—	7·2
Nake		13·5	234	3 14	− 1	5 58	SS	—	—	—
Dairen		16·0	283	3 47	− 1	7 11	SS	—	—	—
Naha		16·1	234	3 19	−30	6 28	−21	—	—	—
Zi-ka-wei		17·9	258	e 4 11	− 1	7 45	SS	i 8 1	SSS	—
Miyakozima		18·7	234	4 18	− 4	7 46	− 2	—	—	—
Isigakizima		19·8	237	4 31	− 4	—	—	—	—	—
Taihoku		21·1	240	e 4 40a	− 8	8 32	− 7	—	—	—
Karenko		21·7	241	4 53	− 2	—	—	—	—	—
Taityu		22·2	241	5 7	+ 7	—	—	—	—	—
Arisan		22·6	241	5 10	+ 7	—	—	—	—	—
Tainan		23·3	240	5 11	+ 1	9 30	+10	—	—	—
Takao		23·5	240	5 7	− 5	—	—	—	—	—
Kosyun		23·6	238	5 13	0	9 26	+ 1	—	—	—
Hong Kong		28·0	246	5 55k	0	10 31	− 7	6 41	PP	13·9
Manila		29·1	225	i 6 0a	− 4	11 3	+ 7	—	—	18·2
Irkutsk		30·2	312	i 6 14	0	i 11 13	0	—	—	14·2
Palau		30·4	195	6 13	− 3	11 17	+ 1	—	—	—
Phu-Lien		34·6	253	i 6 51	− 2	12 20	− 2	i 8 21	PPP	16·7
Semipalatinsk		45·1	308	8 13	− 7	e 14 56	− 3	—	—	—
Calcutta	N.	48·0	268	i 8 40a	− 3	i 15 43	+ 2	i 10 26	PP	e 23·4
Almata		48·8	300	e 8 37	−12	—	—	—	—	—
College		48·9	32	e 8 47	− 3	i 15 46	− 7	e 10 0	P_cP	i 22·1
Frunse		50·6	300	i 9 1	− 1	e 16 19	+ 2	—	—	27·8
Medan		51·7	241	i 9 17	+ 6	i 16 28	− 4	i 11 53	PPP	e 26·2
Dehra Dun	N.	52·6	283	—	—	e 17 14	PPS	20 57	SS	e 26·5
Andijan		52·8	297	e 9 19	0	e 16 55	+ 8	—	—	27·3
Agra		54·0	279	e 9 24a	− 4	i 16 54	− 9	9 33	pP	—
Batavia		54·1	225	i 9 23	− 6	i 17 4	− 1	—	—	e 26·2
Honolulu		54·2	88	e 9 28	− 1	i 17 3	− 3	—	—	e 22·1
Tchimkent		54·3	300	e 9 28	− 2	—	—	—	—	—
Tashkent		54·8	299	i 9 31	− 3	i 17 10	− 4	—	—	38·2
Sverdlovsk		55·3	319	i 9 36	− 2	i 17 18	− 3	25 31	L_q	31·8

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Sitka		56·1	40	e 9 43	0	17 34	+ 2	—	—	23·7
Samarkand		57·1	298	e 9 52	+ 2	e 17 41	− 4	e 12 2	PP	31·4
Hyderabad		58·6	269	9 59	− 2	18 5	+ 1	12 16	PP	28·4
Bombay	E.	62·3	274	i 9 57	−29	e 18 20	−32	e 12 33	PP	—
Kodaikanal	E.	63·5	263	—	—	i 19 6	− 1	i 19 49	PS	35·7
Colombo	E.	63·6	258	10 33	− 2	19 3	− 5	—	—	34·7
Brisbane		65·1	169	e 10 43	− 2	i 19 19	− 8	i 20 43	?	‹ —
Victoria		66·3	46	10 52	0	19 31	−11	20 31	PPS	e 31·2
Seattle		67·2	46	e 12 2	+64	e 20 28	PS	14 23	PPP	30·1
Moscow		67·4	323	i 10 58	− 1	19 51	− 4	—	—	35·7
Pulkovo		68·3	330	11 3	− 2	20 5	− 1	—	—	33·7
Baku		68·4	305	11 7	+ 1	e 20 13	+ 6	—	—	34·2
Grozny		69·6	309	e 11 12	− 1	e 20 32	+11	e 21 26	PPS	—
Piatigorsk		70·8	312	e 11 15	− 5	—	—	—	—	—
Tiflis		71·0	308	i 11 21a	− 1	e 20 39	+ 2	14 5	PP	31·2
Riverview		71·1	172	e 11 22	0	i 20 35	− 3	i 20 57	PS	e 33·3
Sydney		71·1	172	e 11 9	−13	i 20 33	− 5	—	—	e 28·2
Ukiah		71·1	55	e 11 24	+ 2	e 20 40	+ 2	—	—	29·9
Scoresby Sund		71·8	355	—	—	20 50	+ 4	—	—	36·2
Berkeley		72·4	56	e 11 35	+ 5	—	—	—	—	e 32·6
Perth		72·9	203	10 55	−38	20 53	− 6	21 13	PS	37·0
Saskatoon		73·0	37	e 11 37	+ 4	e 20 55	− 5	—	—	e 34·7
Upsala		73·0	335	e 11 12	−21	i 20 54	− 6	e 25 55	SS	e 34·2
Butte		73·7	43	e 11 32	− 6	e 21 5	− 3	—	—	e 31·4
Melbourne		74·6	177	—	—	21 13	− 5	i 25 44	SS	36·5
Theodosia		74·7	315	11 41	− 2	21 17	− 2	—	—	38·2
Bozeman		74·8	43	e 11 44	0	e 21 2	−18	e 26 23	SS	—
Simferopol		75·5	316	11 46	− 2	21 25	− 3	—	—	40·2
Tinemaha		75·5	54	i 11 46	− 2	e 21 13	−15	—	—	—
Santa Barbara		76·1	57	i 11 51	0	e 21 31	− 4	—	—	—
Haiwee		76·3	54	i 11 51	− 1	e 21 30	− 7	—	—	—
Bergen		76·5	340	12 54	+60	e 21 13?	−26	—	—	45·2
Mount Wilson		77·3	57	i 11 58	0	e 21 37	−11	—	—	—
Pasadena		77·3	57	i 11 58	0	i 21 45	− 3	—	—	e 31·8
Salt Lake City		77·3	49	e 12 20	+22	e 21 59	+11	22 23	ScS	34·0
Riverside		77·9	57	i 11 58	− 3	e 21 48	− 6	—	—	—
Copenhagen		78·0	334	12 0a	− 2	21 52	− 3	14 55	PP	36·2
La Jolla		78·7	57	i 12 9	+ 3	e 22 3	0	—	—	—
Bucharest		80·2	319	12 13a	− 1	i 22 19	0	15 16	PP	—
Potsdam		80·3	332	e 12 13	− 1	e 22 13?	− 7	e 23 13	PS	e 36·2
Hamburg		80·6	334	i 12 15	− 1	e 22 19	− 4	e 15 11	PP	e 37·2
Istanbul		80·8	316	13 7	+50	23 15	PS	16 11	PP	e 46·2
Ksara		81·4	305	i 12 18a	− 2	22 32	+ 1	15 26	PP	39·2
Budapest		81·5	325	12 20	− 1	e 22 32	0	e 15 27	PP	44·7
Kecskemet	z.	81·6	324	i 12 18	− 3	e 22 30	− 3	i 15 20	PP	e 51·7
Prague		81·6	329	e 12 20	− 1	22 30	− 3	—	—	e 34·2
Jena		82·0	331	i 12 19	− 4	e 22 33	− 4	—	—	e 36·2
Göttingen		82·2	332	e 12 26	+ 2	e 22 28	−11	—	—	e 42·2
Cheb		82·4	331	e 11 24	−61	e 22 42	+ 1	—	—	e 43·2
Edinburgh		82·7	341	—	—	i 22 46	+ 2	i 28 25	SS	38·2
Belgrade		82·8	321	e 12 25k	− 2	i 22 41	− 4	i 12 39	PcP	e 34·7
Sofia		82·8	319	e 12 28	+ 1	e 22 46	+ 1	e 15 46	PP	—
Durham		83·2	340	i 15 54	PP	i 22 50	+ 1	i 23 7	PS	—
Tucson		83·3	54	i 12 30k	0	i 22 49	− 1	i 15 42	PP	33·1
De Bilt		83·4	335	i 12 29	− 1	e 22 49	− 2	i 15 52	PP	e 39·2
Wellington		83·6	156	i 12 30	− 2	i 22 45	− 8	15 19	PP	39·5
Stonyhurst		84·3	340	—	—	i 22 59	− 1	—	—	42·2
Stuttgart		84·7	330	12 35a	− 2	e 23 0	− 4	e 16 3	PP	e 42·2
Uccle		84·8	335	12 36	− 1	i 23 6	+ 1	16 2	PP	e 40·2
Christchurch		85·0	158	e 12 34a	− 4	i 22 55	[− 6]	23 45	PS	e 40·5
Triest		85·3	327	12 38a	− 2	22 58	[− 5]	15 56	PP	—
Strasbourg		85·4	331	i 12 39a	− 1	e 22 59	[− 4]	i 16 9	PP	e 43·6
Oxford		85·8	337	—	—	i 23 8?	[+ 2]	—	—	e 38·2
Rathfarnham Castle		85·8	342	—	—	i 24 11	PS	—	—	i 45·3
Kew		85·9	337	e 12 52	+ 9	i 23 15	− 1	i 24 23	PS	e 39·2

Continued on next page,

		△ °	Az. °	P. m. s.	O−C. s.	S. m. s.	O−C. s.	Supp. m. s.		L. m.
Chur		86·1	330	e 12 42	− 2	e 23 2	[− 6]	—	—	—
Zurich		86·1	330	e 12 41	− 3	e 23 19	+ 1	—	—	—
Basle		86·3	330	e 12 43	− 2	e 23 20	0	—	—	—
Padova		86·3	327	e 12 44	− 1	i 23 5	[− 4]	—	—	e 48·2
Helwan		86·9	305	i 12 45a	− 3	23 38	+12	16 10	PP	—
Neuchatel		87·0	330	e 12 46	− 2	e 23 30	+ 3	—	—	—
Paris		87·1	335	e 13 13?	+24	e 23 24	− 4	e 24 18	PS	45·2
Florence		87·8	327	12 44	− 8	23 30	− 4	—	—	45·2
Jersey		88·3	338	—	—	e 23 35	− 4	—	—	e 43·6
Moncalieri		88·4	330	e 12 13?	−42	24 59	PS	—	—	—
Rome		88·8	323	i 12 54	− 3	i 23 19	[− 6]	i 16 23	PP	44·2
Chicago		89·3	35	e 13 4	+ 5	29 50	SS	e 16 44	PP	e 41·3
Florissant		90·5	38	i 13 6	+ 1	e 23 29	[− 7]	e 16 39	PP	—
St. Louis		90·7	38	e 13 18	+12	i 23 56	− 5	e 24 59	PPS	e 34·2
Ottawa		91·2	25	—	—	23 59	− 6	—	—	44·2
Seven Falls		91·2	21	13 22	+14	24 3	− 2	—	—	e 44·2
Little Rock		92·5	42	e 13 14	0	i 24 5	− 2	i 25 8	PS	43·6
Vermont		92·8	24	—	—	e 23 45	[− 4]	—	—	41·5
Bagnères		92·9	333	e 11 56	?	e 23 48	[− 1]	e 24 39	S	e 46·2
East Machias		94·3	20	e 13 37	+14	23 52	[− 5]	17 28	PP	e 36·9
~~Williamstown~~		~~94·4~~	~~24~~	~~e 13 25~~	~~+ 2~~	—	—	—	—	—
Harvard		95·1	23	e 13 29	+ 3	e 24 1	[0]	i 25 54	PS	e 57·2
Weston		95·3	23	i 13 31	+ 4	e 24 0	[− 2]	17 23	PP	e 45·9
Fordham		95·8	26	e 17 26	PP	i 24 6	[0]	i 24 46	S	—
Philadelphia		96·1	28	—	—	e 24 23	[+16]	e 31 38	SS	e 39·2
Algiers		97·1	327	e 17 13?	PP	—	—	i 19 52	PPP	e 50·2
Toledo		97·2	334	e 13 40	+ 4	—	—	—	—	e 43·2
Columbia		98·8	35	—	—	e 24 18	[− 3]	e 31 55	SS	e 45·4
San Juan		118·8	30	e 20 24	PP	e 26 26	[+40]	29 56	PS	e 47·8
Fort de France		124·1	25	e 20 44	PP	—	—	—	—	—
Cape Town	E.	134·4	256	i 22 7	PP	i 31 59	PS	i 24 34	PPP	52·4
	N.	134·4	256	i 22 59	?	i 32 21	PS	i 39 55	SS	52·2
Huancayo		138·4	63	e 19 28	[+ 1]	e 26 30	[− 6]	e 22 22	PP	e 49·2
La Paz	Z.	146·5	60	i 19 43a	[+ 1]	42 45	SS	i 22 47	PP	69·9
La Plata		163·9	87	20 49	[+45]	31 27	{− 5}	24 49	PP	75·8
Rio de Janeiro	E.	165·2	18	e 23 13	?	—	—	—	—	i 45·3

Additional readings :—
Koti eZ = +3m.10s., iS_gN = +4m.15s.
Zi-ka-wei iE = +4m.53s., iN = +9m.49s.
Hong Kong SS? = +11m.45s.
Calcutta iPPPN = +11m.13s., eSSN = +18m.58s., iSSSN = +20m.14s.
College eS_cS = +18m.35s.
Medan eSEN = +16m.45s.
Dehra Dun e?N = +25m.39s.?
Andijan e = +9m.27s.
Agra P_cPE = +10m.33s., PPE = +11m.25s., pPPE = +11m.38s., iN = +17m.3s., sSE = +17m.14s., S_cSE = +19m.4s., SSE = +20m.40s.
Sitka iP = +9m.58s.
Samarkand ePPP = +12m.58s., e = +21m.35s. and +22m.40s.
Hyderabad SSN = +21m.58s.
Kodaikanal iSSSE = +28m.3s.
Brisbane iSE = +19m.25s.
Victoria e = +22m.31s. and +28m.7s.
Seattle ePS = +20m.57s., S_cS = +21m.9s.
Tiflis eSSN = +25m.45s.
Riverview iS_cSEN = +21m.27s.
Perth ? = +10m.11s., i = +13m.23s. and +25m.25s., SS = +26m.13s.
Saskatoon eN = +30m.43s.
Upsala eSSSN = +26m.1s.
Melbourne i = +21m.31s.
Bozeman eSSS = +29m.50s.
Tinemaha eSE = +21m.22s.
Bergen S = +28m.36s.
Salt Lake City eSSS = +31m.7s.
Copenhagen eZ = +13m.29s., PPP = +16m.55s., SS = +26m.43s.
Bucharest PPE = +15m.19s., iEN = +22m.38s.
Hamburg iE = +22m.39s.
Istanbul PPP = +18m.7s.
Potsdam iZ = +12m.26s., iSN = +22m.18s., iN = +22m.31s.

Continued on next page.

Ksara PS = +23m.16s.
Budapest iN = +12m.32s., eE = +22m.22s. and +22m.46s., e = +23m.24s. and +23m.54s.
Kecskemet z. iP_cP = +12m.30s., i = +13m.17s., eSKS = +22m.42s., e = +23m.40s., iSS = +27m.43s., i = +29m.22s.
Jena iPN = +12m.25s., eSE = +22m.25s.
Edinburgh i = +22m.55s.
Belgrade iZ = +13m.43s.
Sofia iN = +13m.9s., PSN = +23m.30s.
Tucson iP = +12m.35s., i = +12m.38s., +13m.57s., and +14m.11s., iPP = +15m.47s., iS = +22m.55s., iPS + +23m.29s., i = +24m.50s., iSS = +28m.17s., SSS = +31m.36s.,
Wellington S_cS = +23m.9s., PS = +23m.40s., SS = +28m.7s., iEN = +29m.52s., SSS = +31m.11s., L_q = +32m.13s.
Stonyhurst i = +23m.16s.
Christchurch eNZ = +12m.38s., iP = +12m.46s., iNZ = +16m.0s., iSSN = +28m.38s., iSSSE = +32m.4s., L_q = +34m.50s.
Stuttgart ePPP = +17m.52s., eS = +23m.19s., e = +27m.7s., eSSS = +32m.13s.
Uccle e = +29m.49s.
Triest SS = +28m.22s.
Strasbourg iSN = +23m.25s., SSN = +29m.7s.
Kew iE = +23m.11s., iSKKSE = +23m.23s., iSN = +23m.35s., iSSE = +29m.1s.
Helwan i = +12m.58s. and +23m.23s.
Rome iZ = +13m.7s., iPPPZ = +18m.18s., i = +23m.30s., iS = +23m.45s., i = +25m.38s., iSS = +29m.44s.
Florissant iPE = +13m.13s., iSKKSE = +23m.55s., iSNZ = +23m.59s., iE = +24m.18s., iSPE = +24m.59s.
St. Louis eE = +23m.26s.
Seven Falls e = +36m.13s.?
Little Rock ePN = +13m.23s., iSE = +24m.27s., ePPPSN = +26m.8s.
Vermont eSSS = +37m.5s.
East Machias ePPP = +19m.25s., eSKKS = +24m.28s., S = +25m.5s., iPPS = +27m.25s., iSS = +31m.5s., SSS = +36m.38s.
Bagnères eN = +22m.11s. and +22m.37s.
Harvard iSE = +24m.34s., eL_qE = +52m.13s.
Weston eSKKSE = +24m.35s., ePSZ = +25m.57s., eSSEN = +31m.41s., eSSSSZ = +38m.13s.
Philadelphia eSKKS = +24m.29s., eSS = +31m.44s.
San Juan ePPP = +23m.19s., iPS = +30m.20s., eSS = +36m.19s., iSS = +36m.25s., eSSS = +40m.4s.
Cape Town iE = +22m.55s. and +36m.25s.
Huancayo ePKS = +23m.0s., iPKS = +23m.4s., ePPP = +25m.29s., eSKKS = +29m.0s., eSKKKS = +29m.37s., ePPS = +34m.48s., PPPS = +36m.4s., SS = +40m.37s. and +41m.0s., eSSS = +46m.1s.
La Paz iZ = +20m.41s.
La Plata SS = +45m.7s., SSS = +51m.13s.?
Long waves were also recorded at Sebastopol, Besançon, Puy de Dôme, San Fernando, Almeria, Yalta, Laibach, Malaga, and Karlsruhe.

Nov. 30d. 15h. 16m. 12s. Epicentre 37°·1N. 141°·8E. (as at 2h.).

Intensity III at Onahama and Hukusima; II at Sendai, Mito, Utunomiya, Kakioka, Mizusawa, and Tukubasan; I at Miyako, Morioka, Kohu, Yamagata, and Isinomaki.

Epicentre 36°·9N. 142°·0E. Shallow.

See Seismological Bulletin of the Central Met. Obs., Japan, for the year 1938, Tokyo 1940, 120-122.

A = −·6283, B = +·4944, C = +·6006; δ = −9; h = −1.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Onahama	0·8	257	0 18	0	0 29	− 2	—	—	—
Mito	1·3	236	0 22k	− 3	0 39	− 5	—	—	—
Sendai	1·3	329	0 29k	+ 4	0 46	+ 2	—	—	—
Kakioka	1·5	236	0 26	− 2	0 48	− 1	—	—	—
Tyosi	1·5	209	0 26	− 2	0 45	− 4	—	—	—
Tukubasan	1·6	237	0 27	− 3	0 49	− 2	—	—	—
Yamagata	1·6	315	0 29	− 1	0 54	+ 3	—	—	—
Utunomiya	1·7	250	0 30	− 1	0 55	+ 1	—	—	—
Kumagaya	2·1	244	0 37	0	1 1	− 3	—	—	—
Mizusawa	2·1	346	0 38	+ 1	i1 5	+ 1	—	—	—
Tokyo Cen. Met. Ob.	2·1	229	0 40	+ 3	1 7	+ 3	—	—	—
Maebasi	2·3	252	0 38k	− 2	1 10	+ 1	—	—	—
Niigata	2·4	291	0 55	P_g	1 27	S_g	—	—	—
Yokohama	2·4	226	0 40	− 1	1 15	+ 3	—	—	—

Continued on next page.

	△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Miyako	2·6	3	0 43	− 1	1 17	0	—	—	—
Morioka	2·7	349	0 47a	+ 2	1 25	S*	—	—	—
Mera	2·7	216	0 43a	− 2	1 20	+ 1	—	—	—
Oiwake	2·7	254	0 45	.0	1 22	+ 3	—	—	—
Takada	2·8	270	0 46	− 1	1 31	S_g	—	—	—
Hunatu	2·9	237	0 48	0	1 25	+ 1	—	—	—
Nagano	2·9	261	0 50	+ 2	1 27	+ 3	—	—	—
Akita	3·0	334	1 2	P_g	1 35	S*	—	—	—
Ito	3·0	225	0 48	− 2	1 45	S_g	—	—	—
Kohu	3·0	241	0 48	− 2	1 34	S*	—	—	—
Numadu	3·1	230	0 51	0	1 51	S_g	—	—	—
Osima	3·1	220	0 49	− 2	1 29	0	—	—	—
Matumoto	3·2	254	0 52	0	1 32	0	—	—	—
Toyama	3·4	266	1 3	P*	1 53	S_g	—	—	—
Hatinohe	3·5	356	0 58	+ 1	1 41	+ 1	—	—	—
Iida	3·6	245	1 1	+ 3	1 42	0	—	—	—
Aomori	3·8	348	1 10	P*	2 5	S_g	—	—	—
Omaesaki	3·8	231	0 59	− 2	2 4	S_g	—	—	—
Takayama	3·8	257	1 6	P*	2 26	+39	—	—	—
Wazima	3·9	277	1 3	+ 1	2 2	S_g	—	—	—
Hamamatu	4·1	235	1 5k	0	1 56	+ 1	—	—	—
Kanazawa	4·2	264	1 23	P_g	2 23	S_g	—	—	—
Hatidyozima	4·3	203	1 5	− 3	1 36	−24	—	—	—
Gihu	4·4	250	1 11a	+ 1	2 0	− 2	—	—	—
Nagoya	4·4	245	1 11	+ 1	2 10	S*	—	—	—
Hukui	4·6	257	1 11	− 1	2 12	+ 5	—	—	—
Hakodate	4·7	350	1 23	P*	2 42	S_g	—	—	—
Ibukisan	4·7	251	1 18	+ 4	2 20	S*	—	—	—
Hikone	4·8	250	1 12	− 3	2 22	S*	—	—	—
Kameyama	4·9	245	1 18	+ 1	2 33	S*	—	—	—
Tu	4·9	243	1 20	+ 3	2 25	S*	—	—	—
Mori	5·1	349	1 31	P*	2 28	+ 8	—	—	—
Urakawa	5·1	8	1 38	P_g	—	—	—	—	—
Muroran	5·2	353	1 24	+ 3	2 36	S*	—	—	—
Kyoto	5·3	249	1 26	+ 4	2 41	S*	—	—	—
Yagi	5·5	245	1 30	+ 5	2 44	S*	—	—	—
Miyadu	5·6	257	1 26	− 1	2 39	+ 6	—	—	—
Kobe	5·9	249	1 32	+ 1	2 57	S*	—	—	—
Sapporo	6·0	356	1 41	P*	2 58	S*	—	—	—
Siomisaki	6·1	236	1 36	+ 2	—	—	—	—	—
Sumoto	6·2	247	1 33	− 2	3 7	S*	—	—	—
Wakayama	6·2	244	1 53k	P*	3 21	S_g	—	—	—
Tokusima	6·6	246	1 49	+ 8	3 33	S_g	—	—	—
Asahigawa	6·7	3	1 50	+ 8	3 7	+ 7	—	—	—
Nemuro	6·8	24	1 41	− 3	2 55	− 8	—	—	—
Muroto	7·3	241	1 53	+ 3	3 29	+14	—	—	—
Koti	7·6	245	e 1 52	− 3	e 3 37	+14	e 3 56	S*	4·6
Hirosima	8·1	254	2 1	− 1	4 3	S*	—	—	—
Matuyama	8·1	249	1 59	− 3	4 14	S_g	—	—	—
Hamada	8·2	256	1 56	− 7	4 8	S*	—	—	—
Uwazima	8·6	246	2 5	− 2	4 13	S*	—	—	—
Izuka	9·7	254	2 23	+ 1	4 51	S*	—	—	—
Vladivostok	9·7	312	i 2 26	+ 4	i 4 21	+ 6	—	—	4·5
Hukuoka B	9·9	253	e 2 28	+ 3	—	—	—	—	—
Kumamoto	10·0	248	2 34	+ 7	4 34	+12	—	—	—
Miyazaki	10·0	242	2 28	+ 1	4 26	+ 4	—	—	—
Saga	10·2	252	2 33	+ 2	5 34	S_g	—	—	—
Unzendake	10·4	249	2 24	−10	5 16	S*	—	—	—
Husan	10·5	263	e 2 49	PPP	e 4 49	SS	—	—	—
Taikyu	10·7	267	2 21	−17	e 4 31	− 8	—	—	—
Yakusima	11·5	238	2 48	0	4 42	−17	—	—	—
Tomie	11·6	251	2 50	0	6 8	L	—	—	(6·1)
Keizyo	11·8	277	2 50	− 3	e 5 24	SS	—	—	e 7·5
Zinsen	12·1	277	e 2 56	− 1	e 5 49	SSS	—	—	7·5
Irkutsk	30·2	312	e 6 27	+13	e 11 11	− 2	—	—	14·8

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Phu-Lien		34·6	253	e 6 51	− 2	—	—	—	—	—
Calcutta	N.	48·0	268	e 11 31	PPP	i 15 34	− 7	—	—	—
Frunse		50·6	300	e 9 15	+13	—	—	—	—	—
Andijan		52·8	297	i 9 19	0	e 17 9	PPS	—	—	—
Tashkent		54·8	299	i 9 32	− 2	i 17 10	− 4	—	—	e 25·8
Sverdlovsk		55·3	319	i 9 35	− 3	i 17 19	− 2	—	—	25·8
Kodaikanal	E.	63·5	263	—	—	e 18 48?	−19	—	—	—
Baku		68·4	305	—	—	e 20 12	+ 6	e 24 20	SS	35·1
Tiflis		71·0	308	e 11 19	− 3	—	—	—	—	35·8
Tinemaha		75·5	54	e 11 46	− 2	—	—	—	—	—
Santa Barbara	Z.	76·1	57	i 11 49	− 2	—	—	—	—	—
Haiwee		76·3	54	i 11 49	− 3	—	—	—	—	—
Mount Wilson	Z.	77·3	57	i 11 55	− 3	—	—	—	—	—
Pasadena	Z.	77·3	57	i 11 55	− 3	—	—	—	—	—
Riverside	Z.	77·9	57	i 11 59	− 2	—	—	—	—	—
Ksara		81·4	305	—	—	e 21 54	−37	e 32 9	?	47·8
Tucson		83·3	54	i 12 29a	− 1	—	—	—	—	—

Additional readings :
Zinsen eSE? = +5m.52s.
Long waves were also recorded at De Bilt, Potsdam, Copenhagen, Batavia, and Moscow.

Nov. 30d. 15h. 30m. 47s. Epicentre 37°·1N. 141°·8E. (as at 15h.16m.).

$A = -\cdot 6283$, $B = +\cdot 4944$, $C = +\cdot 6006$; $\delta = -9$; $h = -1$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mizusawa		2·1	346	0 42	+ 5	i 1 10	+ 6	—	—	—
Nagoya		4·4	245	1 16	P*	2 14	S*	—	—	—
Koti	N.	7·6	245	—	—	e 3 58	S*	—	—	—
Keizyo		11·8	277	3 13	PPP	e 5 53	L	—	—	(e 5·9)
Andijan		52·8	297	e 9 36	+17	e 16 53	PS	—	—	—
Tiflis	E.	71·0	308	e 11 38	+16	—	—	—	—	—
Tinemaha		75·5	54	i 11 48	0	—	—	—	—	—
Santa Barbara	Z.	76·1	57	e 11 51	0	—	—	—	—	—
Haiwee		76·3	54	e 11 52	0	—	—	—	—	—
Mount Wilson	Z.	77·3	57	i 11 58	0	—	—	—	—	—
Pasadena	Z.	77·3	57	i 11 58	0	—	—	—	—	—
Riverside	Z.	77·9	57	i 12 1	0	—	—	—	—	—
Tucson		83·3	54	i 12 30k	0	—	—	—	—	—
La Paz	Z.	146·5	60	19 47	[+ 5]	—	—	—	—	—

Additional readings :—
Tucson i = +12m.37s. and +26m.15s.

Nov. 30d. Shocks from the neighbourhood of the epicentre of 15h. were recorded at Mizusawa and Nagoya.

Mizusawa

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
3	3	49	4	16	27(S)	5	15	45(S)	17	8	16
3	19	19(S)	4	40	3	7	27	43(S)	20	28	4
3	26	56	4	46	5(S)	10	22	5(S)	23	30	20
3	50	52(S)	5	8	53(S)	15	1	34			

Nagoya

h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
3	4	5	15	2	22	17	9	34	23	30	49

Nov. 30d. Readings also at 1h. (Malaga), 3h. (Santiago and near Tananarive), 4h. (Fort de France (2)), 5h. (Berkeley, Lick, Branner, and San Francisco), 7h. (Andijan), 8h. (Baku, Irkutsk, and College), 9h. (Wellington), 11h. (Tchimkent, Frunse, and Samarkand (2)), 12h. (near Fort de France), 13h. (Samarkand), 14h. (Wellington), 15h. (Vladivostok), 16h. (Tucson), 18h. (Samarkand), 19h. (near Tananarive), 20h. (Christchurch), 23h. (Koti and Fort de France).

Dec. 1d. 2h. 12m. 13s. Epicentre 17°·0N. 147°·0E.

A further revision of the Epicentre gives 17°·0N. 147°·3E.

$A = -\cdot8025$, $B = +\cdot5212$, $C = +\cdot2906$; $\delta = +10$; $h = +5$;
$D = +\cdot545$, $E = +\cdot839$; $G = -\cdot244$, $H = +\cdot158$, $K = -\cdot957$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Hatidyozima		17·3	339	4 8	+ 4	7 31	SS	—	—	—
Osima		19·0	340	4 25	− 1	7 58	+ 3	—	—	—
Omaesaki		19·2	317	4 22	− 6	8 7	+ 8	—	—	—
Siomisaki		19·2	330	4 27	− 1	8 3	+ 4	—	—	9·8
Numadu		19·4	339	4 33	+ 3	7 49	−15	—	—	—
Hamamatu		19·5	338	4 25	− 6	8 7	+ 1	—	—	—
Tokyo Cen. Met. Ob.		19·7	340	4 35	+ 1	8 2	− 8	—	—	—
Muroto		19·9	324	4 39	+ 3	8 9	− 6	—	—	—
Kameyama		20·1	334	4 39	+ 1	8 50	SS	—	—	—
Yakusima		20·1	314	4 48	+10	8 31	+12	—	—	—
Kumagaya		20·2	339	4 37	− 2	8 28	+ 7	—	—	—
Nagoya		20·2	336	4 41	+ 2	8 29	+ 8	—	—	—
Osaka		20·3	330	4 47	+ 7	8 49	+26	5 16	PP	10·7
Gihu		20·5	336	4 43	+ 1	8 27	0	—	—	—
Kobe		20·5	331	4 42	0	8 38	+11	—	—	10·3
Koti		20·5	324	4 41	− 1	e 8 15	−12	—	—	10·7
Miyazaki		20·5	317	4 48	+ 6	8 34	+ 7	—	—	—
Maebasi		20·6	339	4 45	+ 2	8 47	SS	—	—	—
Hirosima		21·7	323	4 51	− 4	8 51	0	—	—	10·8
Miyakozima		21·7	296	5 0	+ 5	9 1	SS	—	—	—
Sendai		21·8	346	5 2	+ 6	9 0	SS	—	—	—
Hukuoka B		22·2	320	6 17	?	—	—	—	—	—
Hamada		22·3	324	4 51	−10	8 59	− 3	—	—	11·2
Isigakizima		22·5	293	5 6	+ 4	9 16	+11	—	—	—
Mizusawa		22·6	347	e 5 4	+ 1	i 9 12	+ 5	—	—	—
Morioka		23·2	347	5 9	0	9 17	− 1	—	—	10·0
Husan		24·1	317	e 5 16	− 2	e 9 27	− 7	—	—	—
Taikyu		24·9	322	5 7	−19	e 7 22	?	—	—	—
Manila		25·1	267	i 5 28a	0	10 10	+19	—	—	12·8
Taihoku		25·1	292	e 5 51	+23	10 11	+20	—	—	—
Mori		25·7	348	5 40	+ 7	10 5	+ 4	—	—	—
Tainan		25·8	287	5 37	+ 3	10 20	+18	—	—	—
Sapporo		26·4	350	5 45	+ 5	10 7	− 5	—	—	—
Keizyo		27·0	322	e 5 47	+ 2	e 11 39	SS	—	—	e 14·7
Zi-ka-wei	E.	27·2	305	e 5 27	−20	9 37	−48	—	—	—
Zinsen		27·2	321	e 5 45	− 2	e 10 43	+18	e 6 36	PP	14·4
Heizyo		28·8	323	e 6 50	PP	e 11 11	+20	—	—	15·3
Vladivostok		29·0	336	e 5 59	− 5	i 10 49	− 5	—	—	12·8
Hong Kong		31·3	285	6 26k	+ 2	11 53	+22	7 32	PP	16·0
Phu-Lien		38·3	282	e 7 25	+ 1	e 13 37	+18	—	—	—
Brisbane		44·6	171	i 8 11	− 5	i 14 53	+ 1	e 9 17	PP	i 18·3
Batavia		45·9	243	i 8 27a	+ 1	i 15 8	− 3	—	—	e 25·7
Irkutsk		48·6	325	8 45	− 2	e 15 17	−32	10 40	PP	23·8
Medan		49·2	260	8 53	+ 1	i 16 2	+ 4	—	—	e 23·8
Riverview		50·7	175	e 9 11	+ 8	i 16 21	+ 3	e 16 54	PS	e 22·8
Sydney		50·7	175	e 8 41	−22	e 16 19	+ 1	—	—	e 22·3
Honolulu		52·1	74	9 18	+ 4	16 47	+ 9	—	—	22·8
Adelaide		52·3	188	e 8 52	−23	i 16 34	− 6	i 20 15	SS	28·6
Melbourne		54·6	181	e 12 12	PPP	17 12	+ 1	e 19 17	?	25·6
Calcutta	N.	55·2	285	e 9 39	+ 2	i 17 51	PS	e 21 56	SS	i 28·0
Perth		57·1	211	10 2	+12	18 15	PS	12 47	PP	27·4
Semipalatinsk		62·3	319	e 10 25	− 1	—	—	—	—	—
Wellington		63·4	156	e 10 34	0	19 4	− 2	12 44	PP	27·8
Agra	E.	64·0	292	—	—	i 19 24	+11	—	—	—
College		64·2	25	e 10 44	+ 5	19 13	− 3	—	—	26·6

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Christchurch		64·7	159	10 41k	− 1	i 19 21	− 1	i 11 30	pP	27·9
Hyderabad		65·1	281	10 45	0	19 29	+ 2	20 9	S_cS	30·8
Frunse		65·8	309	e 10 46	− 3	—	—	—	—	—
Colombo	E.	66·2	269	e 10 52	0	19 42	+ 2	—	—	32·3
Andijan		67·6	307	e 11 3	+ 2	i 19 59	+ 2	e 13 2	PP	—
Kodaikânal	E.	67·6	274	e 10 47?	−14	—	—	—	—	—
Sitka		69·2	33	11 21	+11	e 20 13	− 3	14 4	PP	29·1
Tchimkent		69·5	308	11 13	+ 1	i 20 15	− 5	—	—	—
Tashkent		69·8	307	i 11 13	− 1	i 20 21	− 2	—	—	33·3
Bombay		70·1	284	i 11 20	+ 4	i 20 28	+ 1	e 13 54	PP	—
Samarkand		71·8	306	e 11 17	− 9	20 24	−22	—	—	—
Sverdlovsk		74·0	325	i 11 37	− 2	21 6	− 5	31 35	L_q	42·7
Victoria		77·2	42	—	—	e 21 39	− 8	—	—	35·8
Seattle		78·1	43	—	—	e 23 6	PPS	—	—	e 35·9
Berkeley	Z.	80·3	53	i 12 15	+ 1	—	—	—	—	—
Santa Barbara		83·2	56	i 12 31	+ 2	—	—	—	—	—
Tinemaha		83·6	53	i 12 31	− 1	e 22 51	− 2	e 21 44	?	—
Haiwee		84·1	54	i 12 34	0	e 22 50	− 8	—	—	—
Baku		84·4	310	12 38	+ 2	23 2	+ 1	—	—	42·3
Pasadena		84·5	55	i 12 36k	0	i 22 59	− 3	e 15 54	PP	e 35·3
Mount Wilson		84·6	55	e 12 37	+ 1	e 22 57	− 6	—	—	—
Riverside		85·3	55	i 12 39	− 1	e 23 2	[− 1]	—	—	—
La Jolla	N.	85·6	56	e 12 42	+ 1	—	—	—	—	—
Bozeman		86·1	43	—	—	e 23 9	[+ 1]	—	—	e 34·9
Grozny		86·4	314	e 12 47	+ 2	e 23 22	+ 1	—	—	—
Saskatoon		86·4	36	e 12 47	+ 2	e 23 7	[− 3]	—	—	e 38·8
Moscow		86·6	327	e 12 44	− 2	23 15	[+ 3]	e 15 58	PP	43·3
Tiflis		87·6	312	e 12 50a	− 1	i 23 20	[+ 3]	—	—	42·8
Platigorsk		88·0	315	e 12 49	− 4	—	—	—	—	—
Pulkovo		88·1	333	e 12 57	+ 3	e 23 18	[− 3]	e 16 16	PP	e 42·4
Erevan		88·4	311	e 15 1	?	—	—	—	—	—
Tucson		91·0	56	e 13 9k	+ 2	23 44	[+ 5]	16 52	PP	37·2
Theodosia		92·6	318	13 16	+ 1	23 48	[0]	—	—	50·8
Upsala		93·2	336	—	—	e 22 47?	[−64]	—	—	e 48·8
Simferopol		93·4	319	13 22	+ 4	23 56	[+ 4]	—	—	54·8
Ksara		97·3	307	e 13 38k	+ 2	e 26 29	PS	e 17 33	PP	49·8
Copenhagen		98·1	335	—	—	31 53	SS	—	—	47·8
Potsdam		100·2	333	e 17 17	PP	—	—	—	—	e 47·8
Hamburg		100·6	335	e 18 0	PP	—	—	—	—	e 52·8
Prague		101·2	331	—	—	e 37 17	SSS	—	—	e 48·8
Jena		101·9	331	e 18 11	PP	—	—	—	—	e 47·8
Cheb		102·2	331	e 19 47?	PPP	e 29 47?	?	—	—	e 52·8
Helwan		102·5	306	e 14 0	0	24 32	[− 7]	21 2	PPP	—
Chicago		102·7	38	—	—	e 24 37	[− 3]	—	—	e 48·1
Florissant		102·8	42	e 18 2	PP	i 24 38	[− 2]	e 27 15	PS	51·8
St. Louis	E.	103·0	42	e 18 22	PP	e 24 11	[−30]	e 27 0	PS	—
De Bilt		103·6	336	—	—	e 37 47?	SSS	—	—	e 49·8
Stuttgart		104·5	332	e 18 29	PP	e 28 35	PPS	—	—	e 55·8
Triest		104·6	327	—	—	e 24 46	[− 3]	—	—	52·2
Strasbourg		105·3	333	i 18 33	PP	e 40 17	?	—	—	e 49·8
Chur		105·8	331	e 18 40	PP	—	—	—	—	—
Ottawa		106·8	29	—	—	e 24 53	[− 5]	e 37 47?	SSS	e 46·8
Florence		107·2	327	—	—	e 24 35	[−25]	—	—	—
Paris		107·3	336	—	—	e 36 47	?	—	—	59·8
Seven Falls		107·7	25	—	—	e 25 5	[+ 3]	e 34 11	SS	e 46·8
Rome		107·9	325	—	—	e 24 51	[−12]	e 34 59	SS	51·1
East Machias		111·0	24	e 18 49	[+14]	e 25 17	[+ 1]	e 28 37	PS	e 45·7
Fordham		111·1	31	e 19 46	PP	i 28 48	PS	i 30 0	PPS	—
Philadelphia		111·1	33	—	—	e 25 18	[+ 2]	e 28 42	PS	e 51·3
Weston		111·2	28	i 19 55	PP	i 28 39	PS	i 30 33	PPS	e 88·4

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Toledo	N.	117·3	334	e 20 3	PP	—	—	—	—	59·8
San Fernando	N.	121·1	334	e 28 13	SKKS	(e 28 13)	{+52}	e 37 7	SS	62·8
Cape Town		131·1	240	i 22 42	PP	—	—	—	—	39·8
San Juan		132·1	43	e 22 28	PP	e 39 15	SS	e 32 16	PS	e 63·2
Fort de France		138·0	42	e 19 28	[+ 1]	e 22 56	PP	—	—	—
Huancayo		138·8	88	19 33	[+ 5]	e 26 42	[+ 5]	e 22 33	PP	e 56·1
La Paz	Z.	146·4	93	19 48a	[+ 7]	42 12	SS	i 21 2	pP	70·2
Rio de Janeiro	E.	168·8	122	e 25 37	PP	—	—	—	—	—

Additional readings :—
Manila iN = +5m.43s.
Zinsen ePPE? = +6m.39s., ePPPEZ? = +7m.33s., eSN? = +10m.47s., eE = +11m.36s., SSE = +12m.20s.
Hong Kong SS = +13m.50s.
Batavia iPE = +8m.30s.
Irkutsk e = +10m.19s., SS = +19m.29s.
Riverview iE = +19m.2s., eN = +20m.23s.
Adelaide i = +15m.46s. and +26m.57s.
Calcutta iS_cS = +19m.28s., eSSS = +23m.54s.
Perth P_cP = +11m.10s., i = +13m.34s., +14m.2s., +14m.27s., and +16m.45s., S = +17m.54s., SS = +21m.59s., i = +22m.22s. and +23m.27s., SSS = +23m.54s.
Wellington iZ = +10m.42s. and +10m.54s., PPP = +14m.19s., i = +19m.37s., S_cS = +20m.21s., SS = +22m.24s., L_q = +26m.24s.
Christchurch PPNZ = +13m.16s., iS_cSNZ = +19m.55s., isSEN = +20m.43s., SSEN = +26m.29s.
Sitka ePPP = +15m.57s., S = +21m.10s., eSS = +26m.10s.
Bombay iEN = +20m.45s., PSEN = +21m.8s., SSE = +25m.8s.
Victoria e = +31m.14s.
Berkeley eN = +12m.40s.
Moscow S = +23m.20s., S_cS = +23m.44s.
Pulkovo eS = +23m.34s.
Tucson iP = +13m.15s. and +13m.23s., i = +13m.44s., +14m.2s., and +14m.29s., iPP = +16m.58s., PPP = +18m.50s., iPPP = +19m.18s., iS = +24m.7s. and +24m.29s., iPS = +25m.1s. and +25m.8s., i = +27m.47s., SS = +30m.6s., iSS = +30m.10s., ePKP,PKP = +38m.30s.
Ksara PKKP = +30m.12s.
Jena ePN = +18m.17s., ePE = +18m.23s.
Helwan e = +19m.57s. and +20m.17s., SKKS = +25m.32s., S = +26m.23s.
Chicago eS = +25m.42s.
Florissant eZ = +18m.7s., eE = +25m.39s. and +37m.53s.
St. Louis eE = +28m.50s.
East Machias eS = +27m.9s., eSS = +34m.41s., SS = +34m.47s., eSSS = +38m.47s.
Fordham eZ = +21m.4s.
Philadelphia eS = +26m.46s., eSS = +34m.44s.
Weston iZ = +20m.1s., iN = +29m.39s.
San Fernando eSSN = +44m.11s.
San Juan ePKS = +23m.18s., eSSS = +43m.48s., SSS = +45m.28s.
Huancayo PKS = +23m.9s., ePPP = +25m.23s., eSKKS = +28m.49s., SKSP = +32m.21s., ePPS = +34m.30s., ePKP,PKP = +37m.14s., eSS = +40m.29s., SS = +41m.1s., PSPS = +41m.36s., SSS = +46m.7s.
La Paz iPKPZ = +19m.54s., sPKPZ = +21m.38s., iPP = +22m.41s., SKKS? = +28m.28s., iZ = +30m.8s.
Long waves were also recorded at Bucharest, Bergen, Uccle, Göttingen, Kew, Stonyhurst, Edinburgh, Budapest, Dehra Dun, Ukiah, Harvard, La Plata, and Laibach.

Dec. 1d. 18h. 9m. 20s. Epicentre 30°·3N. 68°·3E.

A = +·3198, B = +·8036, C = +·5020 ; δ = +5 ; h = +2 ;
D = +·928, E = −·370 ; G = +·186, H = +·466, K = −·865.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Dehra Dun	N.	8·4	87	—	—	e 3 25?	−18	4 38	S_g	—
Agra		9·1	108	e 2 22	PP	e 4 1	+ 1	e 4 27	S*	—
Samarkand		9·4	354	e 2 26	PP	e 3 44	−23	—	—	—
Andijan		10·9	16	e 2 49	+ 9	—	—	—	—	—
Tashkent		11·0	4	i 1 43	−59	e 3 56	−51	—	—	i 4·6
Tchimkent		12·0	4	e 2 58	+ 3	e 5 14	+ 3	5 38	SSS	—
Bombay		12·1	159	e 2 57	0	e 5 47	SSS	—	—	i 7·0
Frunse		13·5	20	e 3 12	− 3	e 5 47	0	—	—	—
Baku		18·0	308	e 4 18	+ 5	e 7 53	SS	—	—	11·2
Calcutta	N.	19·5	109	e 4 5	−26	e 8 6	0	e 8 57	SSS	e 10·1

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Erevan		21·7	303	e 4 58	+ 3	—	—	—	—	—
Kodaikanal	E.	21·7	156	(i 4 58)	+ 3	(i 8 8)	−43	—	—	(9·5)
Semipalatinsk		22·0	21	4 58	0	9 6	+10	—	—	—
Tiflis		22·1	307	i 5 1a	+ 2	9 15	+17	10 15	SS	12·3
Grozny		22·2	311	e 5 5	+ 5	e 9 33	SS	—	—	—
Colombo	E.	25·7	154	—	—	e 10 10	+ 9	—	—	—
Sverdlovsk		27·1	350	e 5 45	− 1	e 10 31	+ 7	—	—	14·7
Ksara		27·6	285	5 40?	−11	—	—	—	—	—
Helwan		31·9	288	e 7 46	PPP	—	—	—	—	—
Moscow		33·4	328	e 6 44	+ 2	—	—	e 7 46	PP	—
Irkutsk		34·3	40	—	—	e 12 40?	+23	e 14 40?	SS	19·7
Pulkovo		38·9	330	e 7 19	−10	e 12 4	?	e 9 8	PP	—

Additional readings :—
Agra eE = +2m.48s., S*E = +4m.57s.
Samarkand e = +7m.48s., +10m.23s., and +13m.11s.
Andijan e = +5m.56s., +6m.28s., and +7m.34s.
Tchimkent e = +7m.9s.
Kodaikanal readings have been diminished by 4m.
Moscow e = +7m.54s. and +15m.5s.
Long waves were also recorded at Vladivostok and Hyderabad.

Dec. 1d. Readings also at 1h. (Columbia), 2h. (La Paz, Frunse, Pasadena, and Tinemaha), 3h. (Butte), 4h. (Erevan, Sebastopol, Yalta, Simferopol, Theodosia, Tiflis (3), and Grozny), 5h. (Zi-ka-wei, Keizyo, Hong Kong, and Phu-Lien), 7h. (Nagoya), 8h. (Frunse), 9h. (near Tananarive), 12h. (Fordham and Mizusawa), 13h. (Cape Town), 14h. (Ksara, Santiago, and Nagoya), 15h. (Irkutsk, Vladivostok, Sverdlovsk, Jersey, Tucson, College, and Riverside), 16h. (Baku, near Fresno; San Francisco, Branner, Lick, Berkeley, Tiflis, Pasadena, Tinemaha, and Haiwee), 18h. (Andijan), 20h. (Grozny), 23h. (Fort de France, near San Juan, Weston, near Ottawa, near Tucson, Williamstown (3), Tinemaha, Haiwee, Riverside, Fordham, Mizusawa (2), and Nagoya).

Dec. 2d. 14h. 13m. 20s. Epicentre 3°·0N. 97°·0E. (as on 1937 April 15d.).

$A = -\cdot1217$, $B = +\cdot9912$, $C = +\cdot0520$; $\delta = -1$; $h = +7$
$D = +\cdot993$, $E = +\cdot122$; $G = -\cdot006$, $H = +\cdot052$, $K = -\cdot999$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Medan	N.	1·8	71	0 26	− 6	0 42	−14	—	—	—
Batavia		13·4	134	3 1	−13	—	—	i 4 6	?	—
Calcutta	N.	21·2	338	e 4 17	−32	—	—	i 9 1	SS	—
Bombay		28·4	305	e 6 35	+37	10 56	+11	—	—	—
Agra	E.	30·1	326	6 14	+ 1	11 14	+ 2	—	—	—
Andijan		43·7	332	e 8 10	+ 2	—	—	—	—	—
Samarkand		45·5	327	8 25	+ 2	15 8	+ 3	—	—	—
Tashkent		45·6	331	e 8 32	+ 8	e 15 6	0	i 10 20	PP	e 22·8
Tchimkent		45·6	333	8 29	+ 5	15 13	+ 7	—	—	—
Vladivostok		50·6	34	—	—	—	—	e 19 18	SS	e 29·0
Baku		56·4	319	—	—	e 17 40?	+ 4	—	—	—
Grozny		60·5	320	e 10 15	+ 1	e 18 28	− 1	—	—	—
Ksara		64·5	306	e 10 4	−37	e 20 16	+57	e 13 7	PP	—
Moscow		70·7	330	e 11 6	− 4	—	—	—	—	—
Tucson		136·1	145	i 22 37k	PP	—	—	—	—	—

Additional readings :—
Bombay eN = +12m.56s., iE = +13m.10s.
Andijan e = +8m.48s. and +9m.45s.
Tashkent e = +7m.26s., +16m.8s., +17m.38s., and +18m.42s.
Long waves were also recorded at Sverdlovsk and Columbia.

Dec. 2d. 22h. 14m. 18s. Epicentre 33°·0N. 90°·1E.

$A = -\cdot0015$, $B = +\cdot8403$, $C = +\cdot5421$; $\delta = -2$; $h = +1$;
$D = +1\cdot000$, $E = +\cdot002$; $G = -\cdot001$, $H = +\cdot542$, $K = -\cdot840$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Calcutta	N.	10·5	187	i 2 37k	+ 2	i 5 49	L	i 2 51	PP	(i5·8)
Dehra Dun	N.	10·6	259	e 3 36?	+60	e 4 37	0	—	—	e 6·0
Agra		12·0	243	2 55	0	6 19	L	e 5 18	SS	(6·3)
Almata		14·6	319	e 3 22	− 8	e 6 32	SS	—	—	—
Frunse		15·7	314	3 43	− 1	e 6 55	SS	—	—	—
Andijan		16·2	304	e 3 52	+ 2	e 7 8	SS	e 4 9	PP	—
Tashkent		18·5	303	i 4 19	0	e 7 47	+ 3	—	—	i 10·7
Tchimkent		18·6	305	4 20	− 1	7 55	+ 9	—	—	10·9
Hyderabad		18·7	218	4 24	+ 2	8 10	SS	—	—	9·6
Semipalatinsk		18·9	341	e 4 18	− 6	e 7 46	− 7	—	—	—
Phu-Lien		19·1	127	e 4 23	− 4	e 7 56	− 1	—	—	—
Samarkand		19·7	295	4 34	0	8 17	+ 7	—	—	11·7
Bombay		20·9	233	e 4 27	−19	i 8 49	+14	—	—	—
Irkutsk		21·8	23	i 5 1	+ 5	8 51	− 1	—	—	11·1
Hong Kong		23·8	111	5 11	− 4	9 32	+ 4	5 47	PP	12·8
Kodaikanal	E.	25·5	212	e 5 2	−30	i 10 20	+23	—	—	i 14·0
Colombo	E.	27·7	203	—	—	e 10 12	−21	—	—	—
Zinsen		30·1	72	e 10 28	S	(e 10 28)	−44	—	—	e 14·8
Keizyo		30·3	71	—	—	e 12 20	+65	—	—	e 16·5
Sverdlovsk		31·2	329	—	—	11 24	− 5	e 13 15	SS	16·2
Taikyu		31·7	74	e 14 3	S	(e 14 3)	SSS	—	—	(e 16·4)
Husan		32·2	79	e 13 4	S	(e 13 4)	SS	—	—	17·3
Baku		32·8	295	e 6 43	+ 6	e 12 2	+ 8	—	—	16·2
Hukuoka B		33·5	78	—	—	e 13 58	SS	—	—	—
Vladivostok		34·1	61	i 7 57	+69	—	—	—	—	i 19·5
Grozny		36·0	300	e 7 4	− 1	—	—	—	—	—
Tiflis		36·7	297	7 12	+ 2	e 13 3	+ 9	—	—	e 16·7
Moscow		42·6	319	e 7 59	0	14 24	+ 1	—	—	e 23·2
Ksara		44·8	287	i 8 19	+ 2	e 15 21	+26	e 10 8	PP	—
Pulkovo		47·0	324	e 8 34	− 1	e 15 26	0	—	—	e 23·6
Helwan		49·7	284	e 8 58	+ 2	16 24	+20	10 57	PP	—
Upsala	N.	53·4	324	—	—	e 20 42?	SS	—	—	—
Copenhagen		56·7	320	—	—	17 48	+ 8	—	—	29·7
Prague		56·7	313	e 11 12	PP	—	—	—	—	e 29·7
Cheb		58·0	313	e 7 42?	?	e 17 59	+ 2	—	—	e 30·7
Triest		58·3	307	e 10 4	+ 5	e 18 9	+ 8	—	—	—
Rome		60·3	303	i 9 26	−47	i 18 27	+ 1	23 27	SS	e 32·2
Stuttgart		60·4	312	e 15 6	?	e 25 6	SSS	—	—	e 33·7
Strasbourg		61·3	312	i 16 4	?	e 25 18	SSS	—	—	e 31·7
De Bilt		61·8	317	—	—	e 23 42?	SS	—	—	e 31·7
Paris		64·5	314	—	—	e 26 42?	SSS	—	—	e 39·7
Kew		65·2	317	—	—	e 26 42	SSS	—	—	e 34·7
Bidston		65·8	320	—	—	e 26 21	SSS	—	—	e 34·7
Rathfarnham Castle		67·8	321	i 11 55	+53	i 17 58	?	—	—	e 38·4
Toledo		72·6	307	e 11 28	− 3	—	—	—	—	43·2
La Paz	Z.	154·4	304	19 59	[+ 6]	—	—	—	—	—

Additional readings :—
Calcutta iPPPN = +2m.54s., iSSN = +6m.20s.
Agra sSE? = +6m.51s.
Bombay e = +3m.44s., ePPEN = +4m.50s., iEN = +11m.35s.
Keizyo eSEN = +14m.42s.
Sverdlovsk e = +12m.8s.
Vladivostok i = +8m.28s., +14m.36s., +15m.4s., and +16m.53s.
Helwan e = +15m.57s., +18m.51s., and +20m.7s.
Rome i = +26m.26s.
Strasbourg eN = +25m.33s.
Long waves were also recorded at Tananarive, Cape Town, College, Philadelphia, Koti, and other European stations.

Dec. 2d. Readings also at 0h. (Andijan, Samarkand, and Tchimkent), 1h. (Budapest), 3h. (Nagoya), 4h. (Samarkand, Andijan, Grozny, and Tiflis), 6h. (near Tananarive), 7h. (San Juan, Huancayo, Tucson, Weston, Williamstown, La Paz, Mount Wilson, and Tinemaha), 8h. (Andijan, Frunse, Fort de France, Rio de Janeiro, Baku, Tchimkent, Sverdlovsk, and Ksara), 9h. (Agra, Medan, Williamstown, Batavia, and Malabar (2)), 10h. (Malabar, Weston, and Fordham), 11h. (Williamstown, Istanbul, and Mizusawa), 12h. (Manila, Mizusawa, and Budapest), 13h. (near Sebastopol), 14h. (Keizyo, Nagoya, and Mizusawa), 15h. (Zinsen, Williamstown, and Tucson), 16h. (Taihoku), 17h. (Tashkent, Fordham, Weston, Ksara, Sverdlovsk, Batavia, Grozny, and Samarkand), 18h. (Nagoya and Mizusawa), 19h. (La Paz, near Sebastopol, Theodosia, Yalta, and Simferopol), 20h. (Weston), 21h. (Chur and Nagoya), 22h. (Andijan).

Dec. 3d. 0h. 43m. 8s. Epicentre 37°·5N. 143°·0E. (as on 1938 Nov. 14d.).

$A = -\cdot6352$, $B = +\cdot4786$, $C = +\cdot6062$; $\delta = +2$; $h = -1$;
$D = +\cdot602$, $E = +\cdot799$; $G = -\cdot484$, $H = +\cdot365$, $K = -\cdot795$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mizusawa	E.	2·2	318	i 0 39	+ 1	i 1 8	+ 2	—	—	—
Nagoya		5·4	246	1 22	− 2	2 44	S*	—	—	—
Koti		8·7	246	e 2 13	+ 3	e 4 36	S_g	—	—	—
Vladivostok		10·2	307	e 2 28	− 3	i 4 37	+10	—	—	5·2
Hukuoka B		11·0	253	e 4 30	S	(e 4 30)	−17	—	—	—
Husan		11·5	262	e 2 51	+ 3	e 5 15	SS	—	—	—
Taikyu		11·7	266	e 2 47	− 4	e 4 56	− 8	—	—	—
Keizyo		12·7	275	e 3 3	− 2	e 6 28	L	—	—	(e 6·5)
Zinsen	E.	12·8	275	e 3 21	PPP	e 5 44	SS	—	—	e 7·8
Irkutsk		30·7	312	e 6 29	+10	e 11 23	+ 2	—	—	15·9
Semipalatinsk		45·7	309	—	—	e 15 4	− 4	—	—	—
Calcutta	N.	49·0	269	—	—	e 15 51	− 4	—	—	—
Almata		49·5	299	e 9 34	+40	—	—	—	—	—
Frunse		51·2	299	e 9 11	+ 4	—	—	—	—	—
Andijan		53·5	297	e 9 34	+10	—	—	e 13 53	PPP	—
Agra	E.	54·9	279	e 9 45	+10	e 17 16	0	e 11 47	PP	—
Tchimkent		54·9	300	9 43	+ 8	e 17 14	− 2	—	—	—
Tashkent		55·5	299	i 9 37	− 2	e 17 22	− 2	—	—	—
Sverdlovsk		55·6	319	e 9 36	− 4	17 24	− 1	—	—	25·9
Samarkand		57·7	298	e 10 0	+ 5	e 17 53	0	—	—	—
Bombay		63·2	274	—	—	e 19 2	PS	—	—	—
Moscow		67·6	324	e 11 0	− 1	e 19 58	+ 1	—	—	e 37·4
Baku		69·0	305	—	—	e 17 1	?	e 25 27	SS	36·2
Grozny		70·0	309	e 11 25	+10	—	—	—	—	—
Tiflis		71·5	308	e 11 22	− 2	—	—	—	—	36·9
Tinemaha		74·5	55	e 11 40	− 2	—	—	—	—	—
Haiwee		75·2	56	e 11 44	− 2	—	—	—	—	—
Mount Wilson		76·3	57	i 11 49	− 3	—	—	—	—	—
Riverside	Z.	76·9	57	i 11 43	−13	—	—	—	—	—
Ksara		81·9	307	e 12 23	0	e 22 43	+ 7	23 32	PS	—
Tucson		82·3	55	e 12 22	− 3	—	—	—	—	—
Cheb		82·5	331	—	—	e 28 52?	SS	—	—	e 44·9
Rome		89·0	324	22 2	?	23 28	[+ 1]	—	—	i 48·7
La Paz	Z.	145·5	61	19 40	[0]	—	—	—	—	—

Additional readings :—
Tiflis e = +11m.32s.
Tinemaha iZ = +11m.51s.
Ksara i = +12m.43s.
Tucson +12m.32s., +12m.50s., and +13m.10s.
Rome PP? = +24m.58s., i = +26m.32s., S? = +31m.56s., i = +32m.45s.
Long waves were also recorded at Budapest, Puy de Dôme, Paris, Kew, Strasbourg, Bidston, Uccle, De Bilt, Belgrade, Potsdam, Copenhagen, and Pulkovo.

Dec. 3d. 12h. 11m. 38s. Epicentre 37°·1N. 141°·8E. (as on 1938 Nov. 30d.).

Strong at Onahama, Hukusima, and Kakioka, moderate at Sendai, Tokyo, and Tukubasan, slight at Yamagata, Katuura, Yokohama, and Isinomaki.

Epicentre 36°·9N. 141°·9E. Macroseismic radius greater than 300kms. Shallow.

See Seismological Bulletin of the Central Met. Obs., Japan, for the year 1938, Tokyo, 1940., pp. 122-124. One macroseismic chart and one chart giving the disposition of the initial movements of the P waves, p. 123.

$A = -\cdot6283$, $B = +\cdot4944$, $C = +\cdot6006$; $\delta = -9$; $h = -1$;
$D = +\cdot618$, $E = +\cdot786$; $G = -\cdot471$, $H = +\cdot371$, $K = -\cdot800$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Onahama	0·8	257	0 20k	+ 2	0 30	− 1	—	—	—
Hukusima	1·2	302	0 28k	+ 4	0 51	+10	—	—	—
Mito	1·3	236	0 23k	− 2	0 40	− 4	—	—	—
Sendai	1·3	329	0 32a	+ 7	0 52	+ 8	—	—	—
Kakioka	1·5	236	0 27	− 1	0 48	− 1	—	—	—
Tyosi	1·5	209	0 28	0	0 44	− 5	—	—	—
Tukubasan	1·6	237	0 29k	− 1	0 50	− 1	—	—	—
Yamagata	1·6	315	0 33a	+ 3	1 2	+11	—	—	—
Utunomiya	1·7	250	0 30k	− 1	0 54	0	—	—	—
Kumagaya	2·1	244	0 38	+ 1	1 5	+ 1	—	—	—
Mizusawa	2·1	346	i 0 42	+ 5	i 1 11	+ 7	—	—	—
Tokyo Cen. Met. Ob.	2·1	229	i 0 37a	0	1 2	− 2	—	—	—
Tokyo Imp. Univ.	2·1	229	0 36	− 1	1 8	S_g	—	—	—
Komaba	2·2	230	0 36	− 2	1 8	S*	—	—	—
Katuura	2·3	214	0 42	+ 2	1 16	S_g	—	—	—
Kiyosumi	2·3	214	0 39	− 1	1 10	+ 1	—	—	—
Maebasi	2·3	252	0 43a	+ 3	1 16	S_g	—	—	—
Mitaka	2·3	232	0 36	− 4	1 9	0	—	—	—
Yokohama	2·4	226	0 42a	+ 1	1 12	0	—	—	—
Kamakura	2·5	226	0 36	− 7	0 58	−16	—	—	—
Titibu	2·5	243	0 39	− 4	1 5?	− 9	—	—	—
Miyako	2·6	3	0 47k	+ 3	1 18	+ 1	—	—	—
Morioka	2·7	349	0 49a	+ 4	1 27	S_g	—	—	—
Mera	2·7	216	0 43a	− 2	1 18	− 1	—	—	—
Oiwake	2·7	254	0 48a	+ 3	1 33	S_g	—	—	—
Takada	2·8	270	0 51	+ 4	1 44	+22	—	—	—
Hunatu	2·9	237	0 49	+ 1	1 31	S*	—	—	—
Koyama	2·9	232	0 39	− 9	1 19	− 5	—	—	—
Nagano	2·9	261	0 51a	+ 3	1 33	S*	—	—	—
Akita	3·0	334	0 57k	P_g	1 43	S_g	—	—	—
Ito	3·0	225	0 43a	− 7	1 41	S_g	—	—	—
Kohu	3·0	241	0 52a	+ 2	1 34	S*	—	—	—
Misima	3·0	229	0 49	− 1	1 34	S*	—	—	—
Numadu	3·1	230	0 50a	− 1	1 29	0	—	—	—
Osima	3·1	220	0 53a	+ 2	1 28	− 1	—	—	—
Matumoto	3·2	254	0 52a	0	1 39	S*	—	—	—
Yosiwara	3·2	232	0 39	−13	1 21	−11	—	—	—
Susaki	3·3	225	0 51	− 2	1 41	S*	—	—	—
Toyama	3·4	266	1 2	P*	1 52	S_g	—	—	—
Hatinohe	3·5	356	1 0	+ 3	1 41	+ 1	—	—	—
Iida	3·6	245	1 2a	+ 4	1 41	− 1	—	—	—
Aomori	3·8	348	1 10	P*	2 3	S_g	—	—	—
Omaesaki	3·8	231	1 0	− 1	2 16	S_g	—	—	—
Takayama	3·8	257	1 3	+ 2	2 39	+52	—	—	—
Wazima	3·9	277	1 6a	+ 4	2 5	S_g	—	—	—
Hamamatu	4·1	235	1 5a	0	1 59	+ 4	—	—	—
Kanazawa	4·2	264	1 10a	+ 3	2 2	+ 5	—	—	—
Hatidyozima	4·3	203	1 3	− 5	1 45	−15	—	—	—
Gihu	4·4	250	1 12a	+ 2	1 54	− 8	—	—	—
Nagoya	4·4	245	1 11k	+ 1	2 15	S*	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Hakodate		4·7	350	1 28a	P*	2 41	S_g	—	—	—
Ibukisan		4·7	251	1 15	+ 1	2 25	S*	—	—	—
Hikone		4·8	250	1 18a	+ 3	2 37	S_g	—	—	—
Kameyama		4·9	245	1 17	0	2 36	S_g	—	—	—
Tu		4·9	243	1 16	− 1	2 29	S*	—	—	—
Mori		5·1	349	1 32	P*	2 34	S*	—	—	—
Urakawa		5·1	8	1 38	P_g	2 36	S*	—	—	—
Muroran		5·2	353	1 29	P*	2 37	S*	—	—	—
Kyoto		5·3	249	1 24	+ 2	2 37	S*	—	—	—
Yagi		5·5	245	1 25a	0	2 48	S*	—	—	—
Miyadu		5·6	257	1 27a	0	2 57	S*	—	—	—
Osaka		5·6	247	1 29	+ 2	2 41	+ 8	—	—	—
Kobe		5·9	249	1 23	− 8	2 50	+10	—	—	—
Obihiro		5·9	10	1 33	+ 2	3 1	S*	—	—	—
Sapporo		6·0	356	1 39	+ 7	2 56	S*	—	—	—
Siomisaki		6·1	236	1 32a	− 2	3 12	S*	—	—	—
Kusiro		6·2	18	1 39	+ 4	—	—	—	—	—
Sumoto		6·2	247	1 35a	0	3 10	S*	—	—	—
Wakayama		6·2	244	1 34a	− 1	3 6	S*	—	—	—
Tokusima		6·6	246	1 40	− 1	3 2	+ 4	—	—	—
Asahigawa		6·7	3	1 54	P*	3 22	S*	—	—	—
Nemuro		6·8	24	1 45	+ 1	2 56	− 7	—	—	—
Sakai		7·1	260	1 53	+ 5	3 44	S*	—	—	—
Haboro		7·3	359	2 40	+50	3 35	S*	—	—	—
Muroto		7·3	241	1 51a	+ 1	3 28	+13	—	—	—
Koti		7·6	245	i 1 56a	+ 1	e 3 46	S*	i 4 9	S_g	—
Hirosima		8·1	254	2 0a	− 2	4 1	S*	—	—	—
Matuyama		8·1	249	2 1	− 1	4 10	S*	—	—	—
Hamada		8·2	256	2 8a	+ 5	—	—	—	—	—
Uwazima		8·5	246	2 4	− 3	4 6	+21	4 15	S*	—
Ooita		9·2	249	2 21k	+ 5	4 51	S_g	—	—	—
Simonoseki		9·4	254	2 15	− 3	—	—	—	—	—
Izuka		9·7	254	2 23	+ 1	5 4	S*	—	—	—
Hukuoka B		9·9	253	2 27	+ 2	5 20	S_g	—	—	—
Kumamoto		10·0	248	2 29a	+ 2	5 16	S_g	—	—	—
Miyazaki		10·0	242	2 28a	+ 1	4 46	S*	—	—	—
Saga		10·2	252	2 31	0	6 24	?	—	—	—
Unzendake		10·4	249	2 33a	− 1	5 7	S*	—	—	—
Husan		10·5	263	2 37	+ 2	4 59	SSS	—	—	—
Ituhara		10·6	258	2 50	PPP	—	—	—	—	—
Taikyu		10·7	267	i 2 38	0	4 54	SS	—	—	—
Kagosima		10·8	243	3 1	PPP	—	—	—	—	—
Syuhurei		11·1	270	2 50	PP	5 15	SSS	—	—	—
Yakusima		11·5	238	2 47	− 1	5 5	SS	—	—	—
Tomie		11·6	251	2 50	0	—	—	—	—	—
Keizyo		11·8	277	2 56	+ 3	5 13	+ 7	e 2 59	PP	6·6
Zinsen		12·1	277	2 59	+ 2	e 5 31	+17	3 6	PP	6·4
Sikka		12·2	4	3 3	+ 5	5 22	+ 6	—	—	—
Heizyo		12·8	284	e 3 9	+ 3	e 6 3	SSS	—	—	7·5
Nake		13·5	234	3 12a	− 3	5 52	+ 5	—	—	—
Zi-ka-wei	E.	17·9	258	e 2 32	?	7 48	SS	—	—	—
Miyakozima		18·7	234	4 19	− 3	7 50	+ 2	—	—	—
Karenko		21·7	241	4 54	− 1	—	—	—	—	—
Taityu		22·2	241	4 58	− 2	10 41	?	—	—	—
Arisan		22·6	241	4 59	− 4	—	—	—	—	—
Taito		22·9	239	5 6	0	9 41	SS	—	—	—
Tainan		23·3	240	4 35	−35	—	—	—	—	—
Takao		23·5	240	5 15	+ 3	—	—	—	—	—
Hong Kong		28·0	246	5 53k	− 2	10 40	+ 2	6 47	PP	14·0
Manila		29·1	225	i 6 0	− 4	13 29	?	—	—	—
Irkutsk		30·2	312	e 6 16	+ 2	e 11 19	+ 6	e 7 22	PPP	15·4
Phu-Lien		34·6	253	i 6 51	− 2	e 12 15	− 7	—	—	—
Semipalatinsk		45·1	308	8 20	0	15 0	+ 1	—	—	—
Calcutta	N.	48·0	268	i 8 42	− 1	i 16 0	+19	e 19 26	SS	e 24·1
Almata		48·8	300	8 59	+10	—	—	—	—	29·4

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
College		48·9	32	e 8 53	+ 3	e 15 52	− 1	e 18 33	S_eS	e 19·8
Frunse		50·6	300	e 8 58	− 4	e 16 15	− 2	—	—	29·4
Medan		51·7	241	e 9 11	0	16 22	−10	i 17 23	PPS	—
Dehra Dun	N.	52·6	283	—	—	e 16 27?	−17	e 21 17?	SSS	e 27·0
Andijan		52·8	297	9 20	+ 1	e 16 53	+ 6	e 11 27	PP	—
Agra	E.	54·0	279	i 9 26a	− 2	17 1	− 2	9 35	pP	—
Batavia		54·1	225	9 27	− 2	e 16 57	− 8	—	—	—
Tashkent		54·8	299	e 10 39	+65	e 20 52	SS	e 21 22	SSS	—
Sverdlovsk		55·3	319	i 9 36	− 2	i 17 22	+ 1	26 58	L_q	32·6
Samarkand		57·1	298	9 53	+ 3	e 17 52	+ 7	—	—	34·1
Hyderabad		58·6	269	10 0	− 1	18 2	− 2	12 10	PP	—
Bombay		62·3	274	i 10 26	0	i 18 56	+ 4	i 12 57	PP	—
Kodaikanal	E.	63·5	263	i 10 34a	0	19 22	+15	13 20	PP	34·1
Colombo	E.	63·6	259	—	—	19 15	+ 7	—	—	39·8
Brisbane	E.	65·1	169	—	—	i 19 22	− 5	e 20 40	?	—
Moscow		67·4	323	i 10 58	− 1	i 19 55	0	—	—	36·9
Pulkovo		68·3	330	e 11 6	+ 1	e 20 10	+ 4	—	—	e 32·8
Baku		68·4	305	i 11 6	0	20 10	+ 3	—	—	33·9
Grozny		69·6	309	11 16	+ 3	e 20 20	− 1	—	—	—
Tiflis		71·0	308	i 11 21a	− 1	20 37	0	13 59	PP	36·8
Riverview		71·1	172	—	—	e 20 31	− 7	i 21 28	PPS	e 29·3
Sydney		71·1	172	—	—	i 20 16	−22	—	—	—
Ukiah		71·1	55	—	—	e 20 31	− 7	—	—	e 31·4
Adelaide		71·7	183	—	—	i 20 38	− 7	i 21 52	PPS	—
Upsala	N.	73·0	335	e 16 22?	PP	—	—	—	—	e 38·4
Melbourne		74·6	177	—	—	i 21 12	− 6	i 21 52	PS	—
Theodosia		74·7	315	11 44	+ 1	21 18	− 1	—	—	48·4
Simferopol		75·5	316	11 49	+ 1	—	—	—	—	—
Tinemaha		75·5	54	e 11 47	− 1	e 21 24	− 4	—	—	—
Santa Barbara		76·1	057	e 11 47	− 4	—	—	—	—	—
Haiwee		76·3	54	e 11 50	− 2	—	—	—	—	—
Mount Wilson		77·3	57	i 11 57	− 1	—	—	—	—	—
Pasadena		77·3	57	i 11 58	0	e 21 47	− 1	—	—	e 35·2
Riverside		77·9	57	e 11 54	− 7	—	—	—	—	—
Copenhagen		78·0	334	i 12 2k	0	21 55	0	—	—	42·4
Bucharest		80·2	319	e 14 22	PP	—	—	—	—	e 19·4
Potsdam		80·3	332	e 12 15	+ 1	e 22 16	− 4	—	—	e 42·4
Hamburg		80·6	334	e 12 16	0	—	—	—	—	e 41·4
Istanbul		80·8	316	13 4	+47	23 9	PS	—	—	—
Ksara		81·4	305	i 12 19a	− 1	22 36	+ 5	15 29	PP	43·4
Budapest		81·5	325	e 12 22	+ 1	—	—	—	—	e 45·9
Kecskemet	Z.	81·6	324	e 12 20	− 1	e 22 53	+20	e 15 7	PP	e 38·4
Prague		81·6	329	e 12 32	+11	e 22 33	0	—	—	e 38·4
Jena		82·0	331	e 12 22	− 1	e 22 38	+ 1	—	—	e 39·4
Göttingen		82·2	332	—	—	e 22 37	− 2	—	—	e 45·4
Cheb		82·4	331	e 12 22?	− 3	e 22 46	+ 5	—	—	e 45·4
Edinburgh		82·7	341	—	—	e 22 45	+ 1	—	—	e 45·4
Belgrade		82·8	321	e 12 28k	+ 1	e 22 45	0	—	—	e 44·2
Sofia		82·8	319	e 12 22	− 5	e 22 38	− 7	—	—	—
Tucson		83·3	54	i 12 30k	0	i 22 50	0	i 15 33	PP	36·7
De Bilt		83·4	335	—	—	22 54	+ 3	—	—	e 41·4
Wellington		83·6	156	—	—	22 44	− 9	27 45	SS	—
Stuttgart		84·7	330	e 12 37	0	e 23 1	− 3	—	—	e 45·4
Uccle		84·8	335	e 12 36	− 1	e 23 7	+ 2	—	—	e 42·4
Bidston		84·9	340	—	—	i 23 4	− 2	—	—	e 40·4
Christchurch		85·0	158	—	—	22 59	[− 2]	36 34	L_q	42·6
Triest		85·3	327	e 12 45	+ 5	23 0	[− 3]	—	—	—
Strasbourg		85·4	331	i 12 41	+ 1	i 23 12	+ 1	15 34	PP	e 43·8
Oxford		85·8	337	—	—	i 23 15	0	—	—	e 42·0
Kew		85·9	337	—	—	i 23 16	0	—	—	e 41·4

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Chur		86·1	330	e 12 45	+ 1	e 23 8	[0]	—	—	—
Zurich		86·1	330	e 12 43	− 1	e 23 7	[− 1]	—	—	—
Basle		86·3	330	e 12 44	− 1	e 23 31	+11	—	—	—
Helwan		86·9	305	i 12 46k	− 2	23 11	[− 3]	16 24	PP	—
Paris		87·1	335	e 13 22?	+33	e 23 27	− 1	—	—	48·4
Florence		87·8	327	e 12 37	−15	—	—	—	—	51·4
Moncalieri		88·4	330	e 11 47	−68	—	—	—	—	—
Rome		88·8	323	12 53a	− 4	i 23 44	0	16 29	PP	43·6
Florissant	E.	90·5	38	—	—	i 24 36	+37	i 24 51	PS	—
Ottawa		91·2	25	13 8	0	23 58	− 7	—	—	44·4
East Machias		94·3	28	—	—	e 30 58	SS	—	—	e 47·5
Weston		95·3	23	e 13 31	+ 4	e 25 58	PS	—	—	—
Philadelphia		96·1	28	—	—	e 31 44	SS	—	—	e 38·8
Columbia		98·8	35	e 26 38	PS	e 31 53	SS	—	—	e 45·9
Huancayo		138·4	63	e 19 53	[+26]	e 40 56	SS	23 4	PP	64·7
La Paz	Z.	146·5	60	i 19 46	[+ 4]	—	—	23 28	PP	70·9

Additional readings :—
Koti eNZ = +4m.20s.
Keizyo eN = +3m.59s.
Zinsen PPPZ = +3m.33s.
Zi-ka-wei iE = +2m.50s.
Hong Kong SS = +12m.3s.
Irkutsk e = +12m.56s.
Calcutta eSSSN = +20m.50s.
Medan P?E = +9m.14s., P?N = +9m.17s.
Agra PPE = +11m.19s., sS = +17m.21s., PSE = +17m.30s., SSE = +20m.38s.
Batavia iSEN = +17m.0s.
Hyderabad PSE = +18m.24s., S_cSN = +19m.43s.
Bombay EN = +19m.12s., S_cSE = +20m.12s.
Kodaikanal iPS = +20m.28s.
Adelaide e = +29m.56s. and +34m.46s.
Melbourne e = +26m.12s., i = +32m.57s.
Potsdam iSN = +22m.22s.
Jena eSE = +22m.22s., eSN = +22m.34s.
Belgrade iZ = +12m.36s., eNW = +29m.52s.
Tucson iP = +12m.35s., i = +13m.9s., +13m.40s., and +14m.4s., PPP = +17m.38s., iPS = +23m.45s., iSS = +28m.29s.
Strasbourg eZ = +13m.31s. and +23m.14s., iPSZ = +24m.6s.
Helwan i = +13m.17s., e = +13m.37s., +16m.10s., +23m.22s., and +24m.28s., PS = +25m.7s.
Rome eSKS = +23m.3s., iPS = +24m.40s., eSS = +29m.2s., SSS = +29m.32s.
Ottawa eE = +36m.40s.
Huancayo ePKS = +23m.13s., ePPP = +25m.54s., eSSS = +46m.11s.
Long waves were also recorded at Sebastopol, Yalta, Algiers, Harvard, Toledo, Rathfarnham Castle, San Fernando, Stonyhurst, Puy de Dôme, Bergen, and Cape Town.

Dec. 3d. 17h. Shock felt in East and Central California, epicentre 37°·5N. 118°·8W., given by Pasadena.

Tinemaha iPNEZ = 43m.2s.
Fresno iP_gN = 43m.12s.
Haiwee iPZ = 43m.17s., iSEN = 43m.31s.
Berkeley iPZ = 43m.38s., iP*N = 43m.45s., iP_g = 43m.50s., iSN = 44m.15s., iS_gN = 44m.29s.
Lick iPN = 43m.31s., iSE = 44m.6s.
Branner ePN = 43m.37s., iP_gE = 43m.45s.
San Francisco ePE = 43m.41s., eP*E = 43m.47s., eSE = 44m.20s.
Santa Barbara iPNZ = 43m.43s., iN = 43m.54s., iSEN = 44m.31s.
Mount Wilson iP = 43m.44s., iSEN = 44m.35s.
Pasadena iPNZ = 43m.44s., iEN = 43m.55s., iSE = 44m.35s.
Riverside iPZ = 43m.49s., iSE = 44m.45s.
Tucson P = 44m.53s., iP_g = 45m.29s., i = 46m.17s., iS_g = 47m.20s., i = 47m.34s., 47m.42s., 47m.47s., 48m.7s., 48m.30s., 48m.40s., 48m.51s., 49m.39s., 49m.54s., 50m.55s., 51m.1s., 51m.38s., 52m.16s., and 52m.39s.
Ukiah eP = 44m.5s., S = 45m.8s., iS = 45m.22s., iL = 46·4m.
La Jolla iPZ = 44m.10s., iSN = 45m.19s.
Columbia eP_cP = 51m.36s., eS = 54m.14s., eL = 55·2m.
Florissant eN = 54m.58s., iE = 55m.24s., eZ = 56m.37s., iE = 56m.40s.
Vladivostok e = 65m.3s., 69m.23s., eL = 74·0m.
Long waves were also recorded at Tashkent, Baku, Sverdlovsk, Chicago, Butte, and Bozeman.

Dec. 3d. **Readings also at** 0h. (Mizusawa), 1h. (Mizusawa, Nagoya, Koti, and Tucson), 6h. (Mizusawa), 7h. (Andijan, Frunse, Bozeman, and Samarkand), 9h. (Tacubaya), 10h. (near Tananarive), 11h. (Malabar), 12h. (near Lick, Berkeley, and Branner), 13h. (Andijan), 15h. (Malabar, La Paz, and Columbia), 16h. (Piatigorsk (2), Malabar Nagoya, and Mizusawa), 17h. (Philadelphia, Lick, and Fresno), 18h. (Lick, Fresno (8), Andijan (2), Tucson (2), San Francisco, Nagoya, Mizusawa, Berkeley, Branner, and Samarkand), 19h. (Basle and Fresno (2)), 20h. (near Fresno), 21h. (Fresno Andijan, and Samarkand), 22h. (Fresno (2), Irkutsk, near Balboa Heights, Manila, Lick (2), Tucson, Tashkent (2), Berkeley, Nagoya, Baku, and Mizusawa), 23h. (Mizusawa, Tiflis, Copiapo, Sverdlovsk, Tucson, Nagoya, Baku, Andijan, and Samarkand).

Dec. 4d. 1h. **Two local shocks. Tokyo Imperial University gives Epicentre as 35°·4N. 138°·3E.**

Shock I
Kamakura P = 3m.37s., S = 3m.53s.
Komaba P = 3m.37s., S = 3m.54s.
Susaki P = 3m.42s., S = 3m.51s.
Kiyosumi P = 3m.50s., S = 4m.15s.
Koyama P = 3m.50s., S = 3m.57s.
Titibu P = 3m.50s., S = 4m.2s.
Yosiwara P = 3m.50s., S = 3m.56s.
Tokyo Imp. Univ. P = 3m.52s., S = 4m.8s.
Nagoya iP = 3m.53s.k, S = 4m.10s.
Mizusawa ePE = 4m.55s., eS = 5m.42s.
Koti eP = 5m.36s.

Shock II
Susaki P = 22m.45s., S = 22m.54s.
Kamakura P = 22m.54s., S = 23m.9s.
Komaba P = 22m.54s., S = 23m.12s.
Tokyo Imp. Univ. P = 22m.54s., S = 23m.9s.
Nagoya iP = 22m.55s.a, S = 23m.11s.
Kiyosumi P = 22m.57s., S = 23m.16s.
Titibu P = 22m.57s., S = 23m.10s.
Yosiwara P = 22m.57s., S = 23m.1s.
Mizusawa eP = 23m.44s., SE = 24m.36s., eSN = 24m.40s.
Vladivostok e = 24m.36s. and 26m.20s., eL = 26·9m.
Hukuoka B e = 25m.5s.
Tashkent e = 43m.24s., eL = 50·0m.
Long waves were also recorded at Irkutsk, Tiflis, and Sverdlovsk.

Dec. 4d. 6h. 12m. 2s. Epicentre 37°·1N. 141°·8E. (as on Dec. 3d.).

Seismological Bulletin of Cent. Met. Obs., Japan, p. 124. Epicentre 37°·1N. 141°·9E.

$A = -·6283$, $B = +·4944$, $C = +·6006$; $\delta = -9$; $h = -1$;
$D = +·618$, $E = +·786$; $G = -·471$, $H = +·371$, $K = -·800$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Onahama	0·8	257	0 26k	+ 8	0 34	+ 3	—	—	—
Hukusima	1·2	302	0 23k	− 1	0 41	0	—	—	—
Mito	1·3	236	0 22k	− 3	0 36	− 8	—	—	—
Sendai	1·3	329	0 26k	+ 1	0 40	S*	—	—	—
Kakioka	1·5	236	0 27	− 1	0 43	− 6	—	—	—
Tyosi	1·5	209	0 31	+ 3	0 48	− 1	—	—	—
Tukubasan	1·6	237	0 28k	− 2	0 42	− 9	—	—	—
Yamagata	1·6	315	0 28	− 2	0 48	− 3	—	—	—
Utunomiya	1·7	250	0 27k	− 4	0 45	− 9	—	—	—
Mizusawa	2·1	346	i 0 39	+ 2	i 1 2	− 2	—	—	—
Kumagaya	2·1	244	0 35k	− 2	1 11	S_g	—	—	—
Tokyo Cen. Met. Ob.	2·1	229	i 0 36k	− 1	1 4	0	—	—	—
Tokyo, Imp. Univ.	2·1	229	0 37	0	1 1	− 3	—	—	—
Komaba	2·2	230	0 36	− 2	1 0	− 6	—	—	—
Katuura	2·3	214	0 51	P_g	1 17	S_g	—	—	—
Kiyosumi	2·3	214	0 43	+ 3	1 9	0	—	—	—
Maebasi	2·3	252	0 41	+ 1	1 19	S_g	—	—	—
Mitaka	2·3	232	0 40	0	1 6	− 3	—	—	—
Niigata	2·4	291	0 43	+ 2	1 21	S_g	—	—	—
Yokohama	2·4	226	0 41	0	1 9	− 3	—	—	—

Continued on next page.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Titibu	2·5	243	0 43	0	1 10	− 4	—	—	—
Miyako	2·6	3	0 42a	− 2	1 10	− 7	—	—	—
Mera	2·7	216	0 47	+ 2	1 17	− 2	—	—	—
Morioka	2·7	349	0 44k	− 1	1 15	− 4	—	—	—
Oiwake	2·7	254	0 43	− 2	1 21	+ 2	—	—	—
Takada	2·8	270	0 52	+ 5	1 24	+ 2	—	—	—
Hunatu	2·9	237	0 47	− 1	1 29	+ 5	—	—	—
Koyama	2·9	232	0 43	− 5	1 20	− 4	—	—	—
Nagano	2·9	261	0 48	0	1 24	0	—	—	—
Misima	3·0	229	0 50	0	1 38	S_g	—	—	—
Kohu	3·0	241	0 49	− 1	1 31	+ 4	—	—	—
Ito	3·0	225	0 53	+ 3	1 48	S_g	—	—	—
Akita	3·0	334	0 53a	+ 3	1 33	+ 6	—	—	—
Numadu	3·1	230	0 53	+ 2	1 45	S_g	—	—	—
Osima	3·1	220	0 49	− 2	1 25	− 4	—	—	—
Matumoto	3·2	254	0 52	0	1 25	− 7	—	—	—
Susaki	3·3	225	0 55	+ 2	1 38	+ 3	—	—	—
Toyama	3·4	266	1 1	P*	1 45	S*	—	—	—
Hatinohe	3·5	356	0 56	− 1	1 37	− 3	—	—	—
Iida	3·6	345	0 58	0	1 37	− 5	—	—	—
Aomori	3·8	348	1 4	+ 3	1 52	S*	—	—	—
Husiki	3·8	267	0 59	− 2	1 58	S*	—	—	—
Omaesaki	3·8	231	1 3	+ 2	2 14	S_g	—	—	—
Takayama	3·8	257	1 1	0	2 16	S_g	—	—	—
Wazima	3·9	277	1 2	0	1 54	+ 4	—	—	—
Hamamatu	4·1	235	1 5	0	1 41	−14	—	—	—
Kanazawa	4·2	264	1 9	+ 2	2 5	S*	—	—	—
Hatidyozima	4·3	203	1 9	+ 1	1 52	− 8	—	—	—
Gihu	4·4	250	1 9k	− 1	1 58	− 4	—	—	—
Nagoya	4·4	245	1 10	0	1 58	− 4	—	—	—
Hakodate	4·7	350	1 11	− 3	2 21	S*	—	—	—
Ibukisan	4·7	251	1 15	+ 1	—	—	—	—	—
Hikone	4·8	250	1 18	+ 3	2 22	S*	—	—	—
Kameyama	4·9	245	1 15	− 2	2 32	S*	—	—	—
Mori	5·1	349	1 25k	+ 5	2 25	+ 5	—	—	—
Urakawa	5·1	8	1 38	P_g	2 31	S*	—	—	—
Muroran	5·2	353	1 25	+ 4	2 28	+ 6	—	—	—
Kyoto	5·3	249	1 24	+ 2	2 41	S*	—	—	—
Yagi	5·5	245	1 49	P_g	—	—	—	—	—
Miyadu	5·6	257	1 21	− 6	2 41	+ 8	—	—	—
Osaka	5·6	247	1 27	0	2 52	S*	—	—	—
Kobe	5·9	249	1 30	− 1	2 51	+11	—	—	—
Sapporo	6·0	356	1 45	P*	2 54	+11	—	—	—
Siomisaki	6·1	236	1 18	−16	2 40	− 5	—	—	—
Kusiro	6·2	18	1 40	+ 5	2 35	−13	—	—	—
Sumoto	6·2	247	1 35a	0	3 1	S*	—	—	—
Wakayama	6·2	244	1 31	− 4	2 59	+11	—	—	—
Tokusima	6·6	246	1 42	+ 1	3 24	S*	—	—	—
Asahigawa	6·7	3	2 15	P_g	—	—	—	—	—
Nemuro	6·8	24	1 46	+ 2	2 57	− 6	—	—	—
Sakai	7·1	260	1 49	+ 1	3 56	S_g	—	—	—
Haboro	7·3	359	2 25	P_g	—	—	—	—	—
Muroto	7·3	241	1 50	0	3 31	+16	—	—	—
Koti	7·6	245	e 1 56	+ 1	3 21	− 2	4 16	S_g	4·7
Hirosima	8·1	254	1 51	−11	4 8	S*	—	—	—
Matuyama	8·1	249	2 1	− 1	4 15	S*	—	—	—
Hamadu	8·2	256	2 3	0	3 49	+11	—	—	—
Simidu	8·4	242	2 2	− 4	4 4	S*	—	—	—
Vladivostok	9·7	312	i 2 22	0	i 4 18	+ 3	—	—	e 4·5
Hukuoka B	9·9	253	e 3 17	+52	e 5 5	S*	—	—	—
Kumamoto	10·0	248	2 28	+ 1	—	—	—	—	—
Miyazaki	10·0	242	2 28	+ 1	4 25	+ 3	—	—	—
Titizima	10·0	179	2 28	+ 1	—	—	—	—	—
Saga	10·2	252	2 38	+ 7	—	—	—	—	—
Unzendake	10·4	249	2 47	PP	5 2	S*	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Husan		10·5	263	e 2 23	−12	e 5 53	S_g	—	—	—
Taikyu		10·7	267	2 37	− 1	e 4 44	+ 5	—	—	—
Yakusima		11·5	238	2 44	− 4	5 2	+ 3	—	—	—
Tomie		11·6	251	2 50	0	—	—	—	—	—
Keizyo		11·8	277	e 2 51	− 2	e 5 7	+ 1	—	—	e 6·8
Zinsen		12·1	277	e 2 58	+ 1	e 5 55	SSS	—	—	e 6·9
Irkutsk		30·2	312	e 6 11	− 3	e 10 58?	−15	—	—	15·0
Phu-Lien		34·6	253	e 6 51	− 2	—	—	—	—	—
Calcutta	N.	48·0	268	e 9 48	+65	—	—	—	—	—
Frunse		50·6	300	e 9 7	+ 5	—	—	—	—	—
Andijan		52·8	297	e 9 11	− 8	e 16 6	−41	—	—	—
Tashkent		54·8	299	e 10 19	+45	i 19 33	?	—	—	e 29·0
Sverdlovsk		55·3	319	i 9 34	− 4	i 17 15	− 6	—	—	27·0
Samarkand		57·1	298	e 9 51	+ 1	e 15 36	?	—	—	—
Bombay	E.	62·3	274	—	—	e 18 48	− 4	—	—	—
Moscow		67·4	323	10 57	− 2	—	—	—	—	e 42·9
Pulkovo		68·3	330	e 11 1	− 4	e 20 1	− 5	—	—	35·5
Baku		68·4	305	e 11 4	− 2	e 20 50	PS	—	—	e 35·5
Tiflis		71·0	308	11 18	− 4	—	—	—	—	e 36·0
Tinemaha		75·5	54	e 11 49	+ 1	—	—	—	—	—
Mount Wilson	Z.	77·3	57	i 11 59	+ 1	—	—	—	—	—
Pasadena	Z.	77·3	57	i 11 57	− 1	—	—	—	—	—
Riverside	Z.	77·9	57	e 11 59	− 2	—	—	—	—	—
Copenhagen		78·0	334	i 12 0	− 2	—	—	—	—	42·0
Ksara		81·4	305	e 12 20	0	e 23 20	−11	e 15 32	PP	—
Tucson		83·3	54	i 12 31	+ 1	—	—	—	—	—
Uccle		84·8	335	e 12 37	0	—	—	—	—	e 44·0
Strasbourg		85·4	331	i 12 38	− 2	—	—	—	—	e 45·8
Rome		88·8	323	e 13 49	+52	e 23 51	+ 7	—	—	e 44·5?
La Paz	Z.	146·5	60	19 55	[+13]	—	—	—	—	—

Additional readings :—
Zinsen eSE = +6m.0s.
Tashkent e = +21m.42s.
Mount Wilson iZ = +12m.10s.
Pasadena iZ = +12m.7s.
Riverside eZ = +12m.11s.
Copenhagen i = +12m.13s.
Tucson iP = +12m.41s., i = +13m.13s.
Long waves were also recorded at **Kew, De Bilt, and Paris.**

Dec. 4d. 16h. 23m. 16s. Epicentre 10°·4S. 163°·9E.

A = −·9452, B = +·2728, C = −·1790; $\delta = -14$; $h = +6$;
D = +·277, E = +·961; G = +·172, H = −·050, K = −·984.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Brisbane	N.	19·9	210	i 4 32	− 4	i 8 20	+ 5	—	—	—
Riverview		26·1	205	e 5 39	+ 2	i 10 17	+10	e 10 58	SS	e 13·3
Sydney		26·2	205	e 5 44	+ 6	e 10 4	− 5	—	—	14·1
Melbourne		32·2	209	e 6 32?	0	11 44	− 1	i 13 44	SS	16·6
Wellington		32·2	165	e 6 44?	+12	11 46	+ 1	i 7 41	PP	i 15·8
Adelaide		33·6	220	e 6 43	− 1	e 12 2	− 4	e 13 51	SS	e 14·7
Christchurch		33·9	168	e 6 56	+ 9	i 12 8	− 3	i 8 1	PP	14·7
Perth		49·2	237	16 14	S	(16 14)	+16	(20 41)	SSS	24·7
Manila		49·3	300	i 8 51	− 2	—	—	—	—	i 26·1
Tokyo Cen. Met. Ob.		51·2	335	10 55	PP	i 18 1	?	—	—	—
Muroto		51·8	328	9 12	0	i 16 34	+ 1	—	—	—
Nagoya		52·0	332	e 8 59	−14	—	—	—	—	—
Osaka		52·2	331	8 42	−33	i 16 28	−11	—	—	—
Miyazaki		52·3	325	9 15	0	i 16 25	−15	—	—	—
Koti		52·4	328	e 9 15	− 1	e 16 42	0	—	—	24·5
Batavia		56·6	270	e 9 21	−26	i 20 22	SS	—	—	—
Hong Kong		58·6	304	—	—	18 10	+ 6	—	—	—
Vladivostok		60·7	334	i 10 15	0	i 18 38	+ 6	—	—	e 28·2
Phu-Lien		64·2	300	e 10 25	−14	e 19 25	+ 9	—	—	—
Medan	N.	66·4	279	i 11 26	+33	—	—	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Irkutsk		80·5	328	e 12 35	+20	e 22 24	+ 2	e 27 26	SS	38·7
Calcutta	N.	80·9	295	e 12 27	+10	i 22 29	+ 3	e 23 10	PS	e 38·3
College		83·2	19	e 12 40	+11	e 22 50	+ 1	e 30 30	SSS	e 35·2
Sitka		83·5	29	—	—	e 22 57	+ 5	e 30 33	SSS	e 38·6
Santa Barbara		84·6	54	e 12 42	+ 6	—	—	—	—	—
Pasadena		85·9	54	i 12 41	− 2	—	—	—	—	—
Mount Wilson		86·1	54	i 11 15	?	—	—	—	—	—
Riverside	Z.	86·5	54	i 12 46	0	—	—	—	—	—
Haiwee	E.	86·6	52	i 12 46	0	—	—	—	—	—
Tinemaha		86·7	52	e 12 48	+ 1	—	—	—	—	—
Kodaikanal	E.	88·0	281	e 12 54	+ 1	i 23 26	[+ 6]	i 31 28	?	—
Tucson		91·5	57	i 13 10k	0	23 58	−10	i 16 46	PP	42·0
Bombay		94·3	288	e 13 27	+ 4	—	—	e 32 18	SS	—
Andijan		97·8	310	i 17 33	PP	e 26 22	PS	—	—	—
Tashkent		100·2	310	e 13 48	− 1	24 32	[+ 4]	e 18 2	PP	e 45·7
Sverdlovsk		105·9	327	18 40	PP	e 24 56	[+ 2]	e 28 0	PS	49·7
Florissant	E.	108·6	53	—	—	e 28 19	PS	—	—	63·7
Baku		114·9	310	19 49	PP	26 50	{+11}	29 30	PS	57·7
Huancayo		117·1	109	e 19 20	[+33]	e 26 5	[+25]	e 19 55	PP	e 47·1
Moscow		118·5	328	—	—	e 28 11	?	e 29 29	PS	62·2
Tiflis		118·5	312	e 18 58	[+ 8]	e 29 12	PS	19 54	PP	56·7
Pulkovo		119·8	335	—	—	e 28 40	?	—	—	e 55·7
La Paz	Z.	122·0	118	20 58	PP	—	—	—	—	57·7
Ksara		127·1	304	e 19 16	[+10]	31 24	PS	21 11	PP	—
Copenhagen		129·6	340	21 38	PP	—	—	—	—	60·7
San Juan		130·7	75	e 22 48	PKS	e 26 30	[+ 9]	e 32 58	PPS	e 52·5
Helwan		131·8	300	e 19 17	[+ 2]	—	—	e 21 38	PP	—
Potsdam		131·9	337	e 20 44?	?	—	—	e 21 44?	PP	e 60·7
Cheb		133·9	336	e 21 44?	PP	—	—	—	—	e 66·7
De Bilt		134·9	341	e 22 8	PP	—	—	—	—	e 63·7
Fort de France		135·9	80	e 22 51	PP	—	—	—	—	—
Uccle		136·3	342	e 22 14	PP	e 45 44	SSS	—	—	e 64·7
Stuttgart		136·5	335	e 19 44	[+20]	e 34 48	PPS	e 22 15	PP	78·7
Triest		136·5	329	e 21 12	?	—	—	e 25 7	PPP	—
Strasbourg		137·0	337	e 19 44	[+19]	—	—	i 22 14	PP	e 64·7
Chur		137·6	334	e 19 28	[+ 2]	—	—	e 22 15	PP	—
Paris		138·6	341	e 21 59	PP	—	—	24 44?	PPP	—
Rome		139·8	325	19 29	[− 1]	i 26 18	[−20]	e 40 50	SS	e 64·7
Toledo		148·7	342	i 19 50	[+ 5]	e 27 33	[+41]	—	—	—
San Fernando		152·5	243	e 25 4	PP	e 34 15	?	—	—	87·2

Additional readings :—
Riverview iN = +10m.26s.
Adelaide e = +10m.38s.
Christchurch iZ = +8m.8s., eL$_g$N = +13m.7s.
Perth i = +16m.33s., PP = +16m.49s., i = +21m.6s., SS = +22m.34s., SSS = +22m.56s., the supplementary reading is given as S.
Irkutsk e = +13m.3s. and +13m.43s., ePP = +15m.31s., e = +30m.7s.
Calcutta iSSN = +27m.48s., eSSSN = +30m.59s., iN = +34m.24s.
Pasadena iPZ = +12m.44s.
Tucson iP = +13m.18s., i = +13m.44s., iS = +24m.16s.
Tashkent PKP = +17m.44s., SKKS = +24m.55s., S = +25m.22s., PS = +26m.54s., SS = +32m.33s.
Sverdlovsk eS = +26m.15s., PPS = +28m.50s., SS = +33m.38s.
Baku SS = +35m.56s., SSS = +40m.38s.
Huancayo ePS = +30m.1s., eSS = +36m.34s.
Moscow e = +34m.25s.
Pulkovo e = +38m.54s.
Ksara SS = +38m.20s.
San Juan PKS = +22m.54s.
Helwan i = +21m.46s.
Potsdam eEN = +22m.32s., eN = +24m.44s.?, eEN = +29m.44s.?, eZ = +29m.50s.
Uccle eE = +23m.2s.
Stuttgart eE = +31m.23s., eL$_g$ = +71m.44s.
Triest e = +22m.20s.
Strasbourg iZ = +30m.46s. and +42m.0s.

Continued on next page.

Rome i = +22m.7s., iSKP = +23m.2s., i = +23m.48s., +24m.46s., and +24m.56s., iPPP = +25m.21s., iSKSN = +26m.27s., SKKS = +28m.59s., e = +29m.7s., eS? = +30m.26s., iS = +30m.46s., i = +31m.28s., +38m.16s., +38m.30s., eSSS = +45m.54s., e = +50m.18s.
Long waves were also recorded at Belgrade, Puy de Dôme, Kew, Gottingen, Cape Town, Bidston, Prague, Harvard, Columbia, Hamburg, Chicago, and East Machias.

Dec. 4d. Readings also at 1h. (near Malabar), 2h. (Jersey), 3h. (Tucson, Riverside, Mizusawa (2), and Nagoya), 4h. (near San Javier), 6h. (La Paz), 7h. (near Tananarive), 9h. (Andijan), 12h. (near Tananarive, Nagoya, and Fresno), 13h. (Fresno (2), Baku, Samarkand, Frunse, Sverdlovsk, Andijan (2), Riverside, Tinemaha, and Tiflis), 14h. (Fort de France, Huancayo, Tacubaya, Williamstown, La Paz (2), and Tucson), 15h. (Tiflis and Victoria), 16h. (Haiwee, Mount Wilson, Pasadena, Koti, Santa Barbara, Philadelphia, Tucson, Tinemaha, Riverside, and Nagoya), 18h. (Lick, Mizusawa (2) and Fresno), 19h. (Nagoya and Mizusawa), 20h. (Mizusawa), 22h. (Rome (2)), 23h. (Wellington and Rome).

Dec. 5d. 15h. 33m. 47s. Epicentre 37°·1N. 141°·8E. (as on 4d.).

Intensity III at Hukusima, II at Onahama, Kakioka, Sendai, Tukubasan, I at Hatinohe, Tokyo, Yamagata, and Utunomiya.

Epicentre 37°·4N. 141°·8E. Shallow.

See " Seismological Bulletin " of the Central Met. Obs., Japan, for the year 1938, Tokyo, 1940, pp. 126-127.

$A = -\cdot6283$, $B = +\cdot4944$, $C = +\cdot6006$; $\delta = -9$; $h = -1$;
$D = +\cdot618$, $E = +\cdot786$; $G = -\cdot471$, $H = +\cdot371$, $K = -800$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Onahama	0·8	257	0 20k	+ 2	0 28	− 3	—	—	—
Hukusima	1·2	302	0 21k	− 3	0 33	− 8	—	—	—
Sendai	1·3	329	0 22	− 3	0 32	−12	—	—	—
Kakioka	1·5	236	0 31k	+ 3	0 49	0	—	—	—
Tyosi	1·5	209	0 34	P_g	0 56	S_g	—	—	—
Tukubasan	1·6	237	0 31	+ 1	0 50	− 1	—	—	—
Utunomiya	1·7	250	0 29	− 2	0 49	− 5	—	—	—
Kumagaya	2·1	244	0 38	+ 1	1 7	+ 3	—	—	—
Mizusawa	2·1	346	i 0 31	− 6	i 0 50	−14	—	—	—
Tokyo, Cen. Met. Ob.	2·1	229	0 39	+ 2	1 6	+ 2	—	—	—
Tokyo, Imp. Univ.	2·1	229	0 38	+ 1	1 5	+ 1	—	—	—
Komaba	2·2	230	0 46	P_g	1 13	S_g	—	—	—
Kiyosumi	2·3	214	0 49	P_g	1 23	S_g	—	—	—
Maebasi	2·3	252	0 40	0	—	—	—	—	—
Mitaka	2·3	232	0 46	P_g	1 13	+ 4	—	—	—
Niigata	2·4	291	0 47	P_g	—	—	—	—	—
Yokohama	2·4	226	0 47	P_g	1 14	+ 2	—	—	—
Titibu	2·5	243	0 49	P_g	1 17	+ 3	—	—	—
Kamakura	2·5	226	0 46	+ 3	1 18	+ 4	—	—	—
Miyako	2·6	3	0 37a	− 7	1 4	−13	—	—	—
Mera	2·7	216	0 52	P_g	1 37	S_g	—	—	—
Morioka	2·7	349	0 38k	− 7	1 4	−15	—	—	—
Oiwake	2·7	254	0 47	+ 2	1 26	S*	—	—	—
Hunatu	2·9	237	0 50	+ 2	1 25	+ 1	—	—	—
Koyama	2·9	232	0 49	+ 1	1 25	+ 1	—	—	—
Nagano	2·9	261	0 49	+ 1	1 29	+ 5	—	—	—
Akita	3·0	334	0 42k	− 8	1 17	−10	—	—	—
Ito	3·0	225	1 9	P_g	1 31	+ 4	—	—	—
Kohu	3·0	241	0 52k	+ 2	1 37	S_g	—	—	—
Misima	3·0	229	0 54	+ 4	1 29	+ 2	—	—	—
Numadu	3·1	230	0 56	P*	1 44	S_g	—	—	—
Osima	3·1	220	0 50	− 1	1 26	− 3	—	—	—
Matumoto	3·2	254	1 1	P_g	1 46	S_g	—	—	—
Susaki	3·3	225	1 0	P*	1 38	+ 3	—	—	—
Toyama	3·4	266	0 58	+ 3	1 46	S*	—	—	—

Continued on next page.

	△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Hatinohe	3·5	356	0 53	− 4	1 34	− 6	—	—	—
Iida	3·6	245	1 1	+ 3	1 44	+ 2	—	—	—
Aomori	3·8	348	0 57	− 4	1 41	− 6	—	—	—
Husiki	3·8	267	1 15	P_g	2 5	S_g	—	—	—
Omaesaki	3·8	231	1 6	+ 5	2 11	S_g	—	—	—
Wazima	3·9	277	0 58	− 4	—	—	—	—	—
Hamamatu	4·1	235	1 9	+ 4	1 56	+ 1	—	—	—
Kanazawa	4·2	264	1 14	P*	2 5	S*	—	—	—
Hatidyozima	4·3	203	1 16	P*	2 5	S*	—	—	—
Gihu	4·4	250	1 11	+ 1	1 58	− 4	—	—	—
Nagoya	4·4	245	1 13	+ 3	2 4	+ 2	—	—	—
Hukui	4·6	257	1 11	− 1	—	—	—	—	—
Hikone	4·8	250	1 17	+ 2	2 20	S*	—	—	—
Kameyama	4·9	245	1 25	P*	—	—	—	—	—
Tu	4·9	243	1 52	+35	—	—	—	—	—
Urakawa	5·1	8	1 19	− 1	—	—	—	—	—
Muroran	5·2	353	1 19	− 2	2 20	− 2	—	—	—
Kyoto	5·3	249	1 26	+ 4	—	—	—	—	—
Miyadu	5·6	257	1 25	− 2	2 30	− 3	—	—	—
Osaka	5·6	247	1 24	− 3	—	—	—	—	—
~~Kobe~~	~~5·9~~	~~249~~	~~1 31~~	~~0~~	—	—	—	—	—
Sapporo	6·0	356	1 33	+ 1	—	—	—	—	—
Sumoto	6·2	247	1 35	0	2 57	+ 9	—	—	—
Wakayama	6·2	244	1 27	− 8	—	—	—	—	—
Tokusima	6·6	246	2 2	P*	3 29	S_g	—	—	—
Koti	7·6	245	2 1	+ 6	4 2	S_g	—	—	—
Hirosima	8·1	254	2 12	+10	4 24	S_g	—	—	—
Vladivostok	9·7	312	i 2 34	PPP	i 4 11	− 4	—	—	e 4·3
Tucson	83·3	54	12 27a	− 3	—	—	i 12 42	?	—

Long waves were also recorded at Irkutsk, Tashkent, Baku, and Sverdlovsk.

Dec. 5d. 17h. 45m. 39s. Epicentre 7°·4S. 123°·5E.

$A = -·5474$, $B = +·8270$, $C = -·1280$; $\delta = -4$; $h = +7$;
$D = +·834$, $E = +·552$; $G = +·070$, $H = -·107$, $K = -·992$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Malabar		15·8	268	e 3 48	+ 3	e 6 34	− 8	i 6 49	SS	—
Batavia		16·6	274	e 3 50	− 6	i 6 17	−43	—	—	—
Manila		22·0	354	i 5 13	PP	9 45	SSS	—	—	—
Perth		25·4	195	5 13	−18	9 21	−35	5 31	PP	11·7
Medan		27·1	294	5 49	+ 3	i 10 46	+22	—	—	—
Adelaide		30·7	155	e 6 19	0	i 11 33	+12	—	—	i 13·7
Brisbane		34·4	128	—	—	e 11 57	−22	e 14 3	SS	17·2
Melbourne		36·0	149	—	—	e 12 49	+ 5	i 15 35	SSS	—
Riverview		36·7	140	—	—	e 12 30	−24	—	—	e 22·4
Calcutta	N.	45·5	312	e 10 51	PPP	—	—	—	—	—
Agra	E.	55·8	310	e 13 46	?	—	—	—	—	—
Christchurch		55·9	138	—	—	e 17 36	+ 7	e 22 52	SSS	—
Irkutsk		61·7	347	e 10 28	+ 6	18 52	+ 8	—	—	e 31·4
Frunse		66·9	324	e 10 54	− 2	—	—	—	—	—
Andijan		67·1	320	i 10 57	0	e 19 53	+ 2	—	—	—
Tashkent		69·4	320	i 11 12	0	e 20 14	− 4	—	—	—
Tchimkent		69·7	321	e 11 13	− 1	e 20 20	− 2	—	—	—
Samarkand		70·1	317	e 10 29	+13	e 20 24	− 3	—	—	—
Sverdlovsk		81·9	330	12 22	− 1	22 31	− 5	—	—	34·4
Baku		82·5	312	—	—	e 22 31	−11	—	—	—
Grozny		86·2	314	e 12 49	+ 5	—	—	—	—	—
Tiflis		86·5	313	e 12 45	− 1	e 23 5	[− 6]	—	—	—
Ksara		92·1	303	e 13 41	+29	e 24 52	+39	—	—	—
Tinemaha		116·9	53	e 18 51	[+ 5]	—	—	—	—	—
Haiwee		117·3	53	e 18 48	[+ 1]	—	—	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mount Wilson	z.	117·5	55	e 18 49	[+ 1]	—	—	i 22 17	SKP	—
Pasadena	z.	117·5	55	i 18 49	[+ 1]	—	—	—	—	—
Riverside	z.	118·2	55	e 18 50	[+ 1]	—	—	i 22 16	SKP	—
Tucson		123·9	56	e 19 1	[+ 1]	—	—	—	—	—
Harvard	z.	142·6	18	e 19 24	[−11]	—	—	—	—	—
Weston	z.	142·8	18	i 19 33a	[− 2]	—	—	i 23 7	PP	—
Fordham		143·3	21	i 19 33	[− 3]	—	—	—	—	—
La Paz	z.	153·6	154	e 19 44	[− 8]	—	—	—	—	—

Additional readings :—
Malabar iE = +6m.29s.
Batavia iPZ = +3m.54s.
Perth PP = +5m.43s., P_cP = +8m.53s., SS = +10m.16s.
Brisbane eN = +15m.57s.
Melbourne i = +16m.41s.
Riverview eE = +12m.34s., iN = +16m.25s., iE = +20m.1s.
Christchurch eEN = +26m.12s., eZ = +39m.21s.?
Andijan e = +11m.31s.
Tucson iPKP = +19m.19s.
Weston iZ = +19m.36s. and +19m.55s.

Dec. 5d. 18h. 53m. 52s. Epicentre 37°·1N. 141°·8E. (as at 15h.).

Intensity III at Hukusima and Mito ; II at Onahama, Kakioka, Mizusawa, Utunomiya, and Tukubasan ; I at Miyako, Yamagata, Morioka, Tokyo, and Kohu.

Epicentre 37°·2N. 141°·7E. Shallow.

See Seismological Bulletin of the Central Met. Obs., Japan, for the year 1938, Tokyo, 1940, pp. 127-129.
A = −·6283, B = +·4944, C = +·6006 ; $\delta = -9$; $h = -1$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Onahama	0·8	257	0 16k	− 2	0 23	− 8	—	—	—
Hukusima	1·2	302	0 22k	− 2	0 37	− 4	—	—	—
Mito	1·3	236	0 22	− 3	0 36	− 8	—	—	—
Sendai	1·3	329	0 26k	+ 1	0 39	− 5	—	—	—
Kakioka	1·5	236	0 24k	− 4	0 41	− 8	—	—	—
Tyosi	1·5	209	0 30	+ 2	0 44	− 5	—	—	—
Tukubasan	1·6	237	0 27k	− 3	0 41	−10	—	—	—
Yamagata	1·6	315	0 25k	− 5	0 44	− 7	—	—	—
Kumagaya	2·1	244	0 36	− 1	0 59	− 5	—	—	—
Mizusawa	2·1	346	i 0 36	− 1	1 0	− 4	—	—	—
Tokyo Cen. Met. Ob.	2·1	229	0 37	0	0 58	− 6	—	—	—
Tokyo Imp. Univ.	2·1	229	0 35	− 2	1 0	− 4	—	—	—
Komaba	2·2	230	0 36	− 2	1 2	− 4	—	—	—
Kiyosumi	2·3	214	0 36	− 4	1 8	− 1	—	—	—
Maebasi	2·3	252	0 38	− 2	1 2	− 7	—	—	—
Mitaka	2·3	232	0 36	− 4	1 4	− 5	—	—	—
Yokohama	2·4	226	0 42	+ 1	1 8	− 4	—	—	—
Kamakura	2·5	226	0 36	− 7	1 7	− 7	—	—	—
Titibu	2·5	243	0 36	− 7	1 3	−11	—	—	—
Miyako	2·6	3	0 42	− 2	1 9	− 8	—	—	—
Mera	2·7	216	0 46	+ 1	1 18	− 1	—	—	—
Morioka	2·7	349	0 43k	− 2	1 13	− 6	—	—	—
Oiwake	2·7	254	0 43	− 2	1 14	− 5	—	—	—
Takada	2·8	270	0 41	− 6	1 26	+ 4	—	—	—
Hunatu	2·9	237	0 47	− 1	1 21	− 3	—	—	—
Koyama	2·9	232	0 36	−12	1 8	−16	—	—	—
Nagano	2·9	261	0 49	+ 1	1 29	+ 5	—	—	—
Akita	3·0	334	0 49k	− 1	1 32	+ 5	—	—	—
Ito	3·0	225	0 54	+ 4	1 41	S_g	—	—	—
Kohu	3·0	241	0 51	+ 1	1 32	+ 5	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Misima		3·0	229	0 51	+ 1	1 37	S_g	—	—	—
Numadu		3·1	230	0 52	+ 1	1 27	− 2	—	—	—
Matumoto		3·2	254	1 2	P_g	1 36	+ 4	—	—	—
Susaki		3·3	225	0 56	+ 3	1 38	+ 3	—	—	—
Toyama		3·4	266	0 58	+ 3	1 46	+ 9	—	—	—
Hatinohe		3·5	356	0 57a	0	1 36	− 4	—	—	—
Iida		3·6	245	1 3	P*	1 42	0	—	—	—
Aomori		3·8	348	1 4	+ 3	1 50	+ 3	—	—	—
Husiki		3·8	267	1 1	0	2 0	S*	—	—	—
Omaesaki		3·8	231	1 3	+ 2	2 12	S_g	—	—	—
Takayama		3·8	257	0 57	− 4	1 54	+ 7	—	—	—
Wazima		3·9	277	1 11	P*	1 59	+ 9	—	—	—
Hamamatu		4·1	235	1 7	+ 2	1 52	− 3	—	—	—
Kanazawa		4·2	264	1 30	P_g	2 16	S_g	—	—	—
Hatidyozima		4·3	203	1 9	+ 1	1 58	− 2	—	—	—
Gihu		4·4	250	1 8k	− 2	1 58	− 4	—	—	—
Nagoya		4·4	245	1 13	+ 3	2 0	− 2	—	—	—
Hakodate		4·7	350	1 21	P*	2 22	S*	—	—	—
Hikone		4·8	250	1 17	+ 2	2 26	S*	—	—	—
Kameyama		4·9	245	1 16	− 1	2 29	S*	—	—	—
Tu		4·9	243	1 21	+ 4	2 9	− 6	—	—	—
Urakawa		5·1	8	1 39	P_g	2 31	S*	—	—	—
Muroran		5·2	353	1 26k	+ 5	2 27	+ 5	—	—	—
Kyoto		5·3	249	1 22	0	2 37	S*	—	—	—
Miyadu		5·6	257	1 25	− 2	2 26	− 7	—	—	—
Kobe		5·9	249	1 22	− 9	2 46	+ 6	—	—	—
Sapporo		6·0	356	1 40	P*	2 44	+ 1	—	—	—
Siomisaki		6·1	236	2 3	P_g	3 5	S*	—	—	—
Kusiro		6·2	18	1 40	+ 5	—	—	—	—	—
Sumoto		6·2	247	1 35	0	2 57	+ 9	—	—	—
Wakayama		6·2	244	1 33k	− 2	2 56	+ 8	—	—	—
Tokusima		6·6	246	1 47	+ 6	3 11	S*	—	—	—
Nemuro		6·8	24	1 55	+11	3 1	−*2	—	—	—
Tadotu		7·1	250	1 47	− 1	—	—	—	—	—
Muroto		7·3	241	1 57	+ 7	3 23	+ 8	—	—	—
Koti		7·6	245	e 2 30	P_g	e 3 27	+ 4	—	—	4·7
Hirosima		8·1	254	2 10	+ 8	3 48	+13	—	—	—
Hamada		8·2	256	3 39	S	(3 39)	+ 1	—	—	—
Izuka		9·7	254	4 12	S	(4 12)	− 3	—	—	—
Vladivostok		9·7	312	i 2 21	− 1	i 4 35	S*	—	—	4·7
Hukuoka B		9·9	253	e 4 49	S*	—	—	e 5 16	S_g	—
Kumamoto		10·0	248	2 43	PPP	—	—	—	—	—
Miyazaki		10·0	242	2 27	0	5 11	S*	—	—	—
Titizima		10·0	179	4 10	'S	(4 10)	−12	—	—	—
Unzendake		10·4	249	2 49	PPP	—	—	—	—	—
Taikyu		10·7	267	i 2 37	− 1	e 4 46	+ 7	—	—	—
Keizyo		11·8	277	2 53	0	e 5 9	+ 3	—	—	—
Zinsen	E.	12·1	277	e 2 59	+ 2	e 6 0	?	—	—	7·0
Irkutsk		30·2	312	e 6 11	− 3	e 11 5	− 8	e 7 15	PP	16·1
Calcutta	N.	48·0	268	e 11 40	PPP	—	—	—	—	—
Frunse		50·6	300	e 9 53	+51	—	—	—	—	—
Andijan		52·8	297	e 9 16	− 3	e 16 47	0	e 11 6	PP	—
Agra	E.	54·0	279	—	—	e 16 53	−10	—	—	—
Tchimkent		54·3	300	e 9 25	− 5	e 17 0	− 7	—	—	—
Tashkent		54·8	299	i 9 28	− 6	e 17 8	− 6	—	—	e 29·1
Sverdlovsk		55·3	319	e 9 32	− 6	17 28	+ 7	—	—	26·1
Samarkand		57·1	298	e 9 46	− 4	—	—	e 12 38	PP	—
Moscow		67·4	323	e 10 55	− 4	—	—	e 12 57	PP	—
Pulkovo		68·3	330	e 10 55	−10	e 19 28	−38	e 14 3	PP	e 31·6
Baku		68·4	305	e 11 5	− 1	e 21 2	PPS	—	—	35·6

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Grozny		69·6	309	11 11	− 2	—	—	—	—	—
Tiflis		71·0	308	e 11 18	− 4	—	—	—	—	31·6
Tinemaha		75·5	54	e 11 48	0	—	—	—	—	—
Mount Wilson	Z.	77·3	57	e 12 9	+11	—	—	—	—	—
Pasadena	Z.	77·3	57	e 12 8	+10	—	—	—	—	—
Riverside	Z.	77·9	57	e 12 3	+ 2	—	—	—	—	—
Ksara		81·4	305	i 12 20k	0	e 22 39	+ 8	15 29	PP	42·1
Tucson		83·3	54	e 12 32	+ 2	—	—	—	—	—
La Paz	Z.	146·5	60	e 19 49	[+ 7]	—	—	—	—	—

Additional readings :—
Moscow e = +14m.27s.
Pulkovo e = +11m.12s.
Ksara ePS = +23m.25s.
Tucson i = +12m.42s., +12m.50s., +13m.35s., and +13m.45s.
Long waves were also recorded at Rome, De Bilt, and Copenhagen.

Dec. 5d. Readings also at 0h. (Almata, Frunse, Andijan, Sverdlovsk, Baku, Ksara, Moscow, Dehra Dun, Tiflis, Tchimkent, Kodaikanal, Bombay, Vladivostok, Calcutta, Irkutsk, Tashkent, and Hong Kong), 1h. (De Bilt, Copenhagen, and Kew), 2h. (Wellington), 4h. (Andijan, Frunse, Almata, and Samarkand), 5h. (Sverdlovsk and Huancayo), 6h. (Ksara, Baku, Andijan, Fort de France, and La Paz (2)), 7h. (Frunse, Andijan, and Wellington), 8h. (La Paz), 9h. (La Paz and Balboa Heights), 11h. (Samarkand), 13h. (Bozeman), 15h. (Samarkand, Frunse, Andijan, and Grozny), 16h. (Williamstown, Fort de France, Samarkand, Frunse, and Andijan), 17h. (Fort de France (2)), 21h. (Rome, Tucson, Riverside, Mount Wilson, and Sebastopol), 23h. (Tucson and Medan).

Dec. 6d. 9h. 13m. 40s. Epicentre 71°·5N. 12°·0W.

A = +·3122, B = −·0664, C = +·9477 ; δ = +1 ; h = −12 ;
D = −·208, E = −·978 ; G = +·927, H = −·197, K = −·319.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Scoresby Sund		3·4	257	0 53	− 2	1 29	+ 2	—	—	—
Hamburg		20·4	141	e 4 40	− 1	—	—	—	—	13·3
Pulkovo		20·5	104	e 4 26	−16	—	—	—	—	—
Uccle	Z.	22·1	153	i 4 56	− 3	—	—	—	—	—
Strasbourg	E.	24·8	147	e 5 51	PP	—	—	e 6 45	PPP	—
Stuttgart		24·8	145	e 5 33	+ 8	e 10 8	+22	—	—	e 16·4
Basle		25·7	149	e 5 32	− 1	—	—	—	—	—
Moscow		26·0	102	e 5 47	+11	e 10 32	+26	e 6 16	PP	e 12·8
Sverdlovsk		32·4	78	e 7 32	PP	e 11 53	+ 5	—	—	15·8
Baku		43·4	102	—	—	e 17 8	SS	—	—	e 21·7
Ksara		45·3	120	e 10 2	PP	e 18 19	SS	—	—	27·3
Tashkent		48·7	82	—	—	e 21 0	SSS	—	—	e 27·3
Tinemaha	Z.	60·2	298	e 10 19	+ 7	—	—	—	—	—
Haiwee		61·0	297	e 10 17	− 1	—	—	—	—	—
Tucson		62·5	289	e 10 26	− 2	—	—	—	—	37·5
Pasadena	Z.	62·6	296	e 10 30	+ 2	—	—	—	—	—
Mount Wilson	Z.	62·8	296	e 10 27	− 3	—	—	—	—	—
Riverside	Z.	62·9	296	e 10 30	0	—	—	—	—	—

Additional readings :—
Haiwee eE = +10m.26s.
Tucson i = +10m.33s. and +10m.46s.
Mount Wilson iPZ = +10m.34s.
Long waves were also recorded at De Bilt, Cheb, Potsdam, Copenhagen, Irkutsk, and Tiflis.

Dec. 6d. 23h. 0m. 51s. Epicentre 22°·9N. 121°·5E. (as on 1937 Dec. 8d.).

Very strong at Taito, strong at Kosyun, Tainan, and Karenko, moderate at Taikyu and Takao, slight at Giran and Taihoku.

Epicentre 22°·9N. 121°·5E. Shallow.

Macroseismic radius greater than 300kms. See Seismological Bulletin of the Central Met. Obs., Japan, for the year 1938, Tokyo, 1940, pp. 129-131, macroseismic chart p. 131.

$A = -\cdot4818$, $B = +\cdot7862$, $C = +\cdot3869$; $\delta = -7$; $h = +4$;
$D = +\cdot853$, $E = +\cdot522$; $G = -\cdot202$, $H = +\cdot330$, $K = -\cdot922$.

	△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Taito	0·3	245	0 9k	− 2	0 14	− 4	—	—	—
Arisan	0·9	314	0 20	0	0 34	0	—	—	—
Karenko	1·1	5	0 23k	+ 1	0 37	− 2	—	—	—
Kosyun	1·1	218	0 21a	− 1	0 36	− 3	—	—	—
Tainan	1·2	275	0 26a	+ 2	0 43	+ 2	—	—	—
Takao	1·2	256	0 28a	+ 4	0 43	+ 2	—	—	—
Taityu	1·5	329	0 31k	+ 3	0 51	+ 2	—	—	—
Giran	1·9	7	0 41	P_g	1 6	+ 7	—	—	—
Sintiku	1·9	346	0 41	P_g	1 2	+ 3	—	—	—
Taihoku	2·1	0	0 46	P_g	1 0	− 4	i 1 13	S_g	—
Isigakizima	2·8	60	0 59k	P_g	1 33	S_g	—	—	—
Miyakozima	3·9	61	1 1k	− 1	1 43	− 7	—	—	—
Naha	6·5	59	2 15	P_g	3 58	S_g	—	—	—
Hong Kong	6·9	265	1 43a	− 2	3 21	S*	—	—	4·1
Manila	8·3	183	e 2 1	− 3	i 4 26	S_g	—	—	—
Zi-ka-wei	8·3	356	e 2 7	+ 3	3 55	+15	i 4 53	S_g	—
Nake	9·0	51	2 10a	− 3	3 58	0	—	—	—
Yakusima	11·0	45	2 43	+ 1	4 51	+ 4	—	—	—
Tomie	11·6	32	2 48	− 4	—	—	—	—	—
Unzendake	12·5	38	3 5	+ 3	5 40	SS	—	—	—
Miyazaki	12·6	43	3 8	+ 5	5 37	SS	—	—	—
Kumamoto	12·8	38	3 6	0	—	—	—	—	—
Hukuoka B	13·2	33	e 3 14	+ 3	e 5 47	+ 7	—	—	e 8·2
Ituhara	13·2	30	3 38	PPP	—	—	—	—	—
Izuka	13·4	35	3 12	− 2	—	—	—	—	—
Husan	13·8	27	i 3 20k	+ 1	e 5 30	−24	—	—	8·5
Simonoseki	13·8	35	3 14	− 5	—	—	—	—	—
Phu-Lien	14·0	264	e 3 20	− 2	6 42	?	—	—	7·8
Simidu	14·1	43	3 39	PP	5 54	− 8	—	—	—
Taikyu	14·3	24	i 3 26	0	5 17	−49	—	—	7·3
Matuyama	14·7	40	3 38	+ 7	6 11	− 5	—	—	—
Hirosima	14·9	38	3 36	+ 2	6 22	+ 2	—	—	—
Koti	15·0	42	3 44	+ 9	e 6 47	SS	e 3 56	PPP	6·9
Hamada	15·1	36	3 40	+ 4	6 28	+ 3	—	—	—
Muroto	15·2	45	3 44	+ 6	6 49	SS	—	—	—
Zinsen	15·2	16	i 3 37	− 1	6 36	+ 8	—	—	7·8
Keizyo	15·4	17	3 40	0	6 37	+ 5	—	—	8·3
Dairen	16·0	1	4 30	+42	7 31	+45	—	—	—
Tokusima	16·0	43	3 59	PP	7 27	+41	—	—	—
Siomisaki	16·4	47	3 58	+ 5	7 10	SS	—	—	—
Sumoto	16·4	43	3 53	0	7 12	+16	—	—	—
Heizyo	16·5	12	e 3 54	0	7 6	+ 8	—	—	9·3
Wakayama	16·5	44	3 58	+ 4	—	—	—	—	—
Kobe	16·8	43	4 1	+ 3	7 25	SS	—	—	—
Osaka	17·0	43	4 8	+ 7	7 40	SSS	—	—	—
Toyooka	17·1	40	5 16	PP	—	—	—	—	—
Yagi	17·1	44	4 7	+ 5	7 42	SS	—	—	—
Kyoto	17·3	43	4 3	− 1	7 45	SS	—	—	—
Miyadu	17·3	40	4 7	+ 3	—	—	—	—	—
Kameyama	17·7	44	4 14	+ 4	7 54	SS	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tu		17·7	45	4 12	+ 2	7 46	SS	—	—	—
Hikone		17·8	43	4 20	+ 9	8 0	SSS	—	—	—
Gihu		18·2	45	4 13	− 3	7 46	+ 9	—	—	—
Nagoya		18·2	45	4 23	+ 7	8 4	SS	—	—	—
Hamamatu		18·4	47	4 28	+10	8 9	SS	—	—	—
Omaesaki		18·7	47	4 18	− 4	8 8	+20	—	—	—
Kanazawa		18·9	40	4 14	−10	8 6	+13	—	—	—
Iida		19·0	44	4 23	− 3	—	—	—	—	—
Hatidyozima		19·1	52	4 27	0	8 6	+ 9	—	—	—
Titizima		19·2	75	4 28	0	—	—	—	—	—
Toyama		19·3	42	4 31	+ 2	8 10	+ 8	—	—	—
Numadu		19·4	46	4 29	− 1	8 17	+13	—	—	—
Ito		19·5	46	4 28	− 3	8 12	+ 6	—	—	—
Kohu		19·5	45	4 33	+ 2	—	—	—	—	—
Matumoto		19·5	44	4 27	− 4	8 14	+ 8	—	—	—
Misima		19·5	46	4 26	− 5	8 15	+ 9	—	—	—
Hunatu		19·6	46	4 33	+ 1	8 16	+ 8	—	—	—
Osima		19·6	49	4 31	− 1	8 14	+ 6	—	—	—
Wazima		19·6	39	4 33	+ 1	8 22	+14	—	—	—
Nagano		19·9	42	4 38	+ 2	8 26	+11	—	—	—
Palau		19·9	142	4 23	−13	7 58	−17	—	—	—
Mera		20·0	49	4 31	− 6	—	—	—	—	—
Utunomiya		20·1	45	4 37	− 1	—	—	—	—	—
Yokohama		20·1	48	4 35	− 3	—	—	—	—	—
Maebasi		20·3	43	4 43	+ 3	8 44	+21	—	—	—
Tokyo Cen. Met. Ob.		20·4	46	4 33	− 8	9 11	SSS	—	—	—
Tukubasan		20·9	45	4 40	− 6	8 37	+ 2	—	—	—
Kakioka		21·0	45	4 43	− 4	—	—	—	—	—
Onahama		21·8	47	5 6	+10	—	—	—	—	—
Hukusima		22·0	44	4 57	− 1	8 58	+ 2	—	—	—
Yamagata		22·2	43	4 55	− 5	9 3	+ 3	—	—	—
Sendai		22·6	43	5 2	− 1	—	—	—	—	—
Mizusawa		23·3	42	i 5 8	− 2	i 9 14	− 6	—	—	—
Morioka		23·6	42	5 12	− 1	9 24	− 1	—	—	—
Aomori		24·1	38	5 17	− 1	—	—	—	—	—
Hatinohe		24·4	40	5 18	− 3	9 37	− 2	—	—	—
Mori		24·9	34	5 29	+ 3	—	—	—	—	—
Sapporo		26·0	34	5 34	− 2	9 1	−65	—	—	—
Medan		29·3	232	6 3	− 3	i 11 58	+59	—	—	—
Calcutta	N.	30·6	276	i 6 23	+ 5	i 12 33	+73	—	—	i 18·0
Irkutsk		32·2	340	i 6 30	− 2	12 0	+15	—	—	16·1
Batavia		32·3	208	i 6 28	− 5	e 12 9	+23	—	—	e 19·1
Dehra Dun	N.	39·4	291	e 7 42?	+ 9	i 13 53	+18	—	—	i 21·6
Agra	E.	39·5	285	i 7 32a	− 2	13 23	−14	8 49	PP	—
Hyderabad		40·7	271	7 42	− 2	13 55	0	9 25	PP	20·2
Almata		41·9	311	e 7 53	− 1	e 14 6	− 7	—	—	—
Semipalatinsk		42·2	322	e 7 56	0	14 14	− 3	—	—	—
Colombo	E.	43·1	254	7 39	−25	14 9?	−21	17 39	SS	23·6
Frunse		43·5	308	e 8 4	− 3	—	—	—	—	—
Kodaikanal	E.	43·9	261	i 8 7a	− 3	i 14 47	+ 5	i 18 27	SSS	i 21·5
Andijan		44·8	305	e 8 17	0	e 14 59	+ 4	e 9 28	PP	—
Bombay		45·5	274	i 8 21k	− 2	i 15 1	− 4	10 21	PP	—
Tchimkent		47·0	307	8 34	− 1	i 15 25	− 1	—	—	25·4
Tashkent		47·2	306	i 8 37	+ 1	i 15 34	+ 5	—	—	24·3
Samarkand		48·8	303	e 8 47	− 2	—	—	e 12 23	PPP	—
Perth		54·8	186	i 9 34	0	i 17 24	+10	i 11 21	PP	i 27·7
Sverdlovsk		55·2	324	i 9 34	− 3	17 15	− 5	25 45	L_g	31·7
Brisbane		58·6	147	i 9 57	− 4	i 17 57	− 7	12 3	PP	—
Riverview		63·1	152	e 10 27	− 5	e 20 57	?	—	—	e 25·0
Melbourne		64·3	160	10 37	− 2	i 19 19	+ 2	—	—	—

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		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Grozny		64·5	308	i 10 42	+ 1	e 20 22	+63	—	—	—
Tiflis		65·5	307	i 10 45	− 2	e 19 27	− 5	—	—	35·1
Erevan		65·9	306	10 50	0	e 19 36	− 1	e 15 35	PPP	—
Moscow		68·0	323	10 58	− 5	e 19 52	−10	—	—	35·6
Sotchi		68·8	310	11 5	− 3	e 20 14	+ 3	—	—	—
College		69·8	27	e 11 10	− 4	20 22	− 1	e 13 45	PP	e 31·2
Pulkovo		71·1	328	i 11 19	− 3	e 20 33	− 5	—	—	e 33·1
Theodosia		71·5	312	11 19	− 5	20 40	− 3	—	—	43·1
Simferopol		72·4	312	11 28	− 2	20 53	0	—	—	38·8
Sebastopol		72·9	312	11 29	− 4	—	—	—	—	42·1
Ksara		74·2	300	i 11 39a	− 1	i 21 17	+ 3	i 14 27	PP	35·6
Istanbul		77·1	310	11 56	− 1	21 42	− 4	14 41	PP	—
Upsala		77·2	330	e 11 23	−34	e 21 37	−10	e 27 9?	SS	e 36·1
Bucharest		78·0	313	e 12 2	0	22 12	+17	15 20	PP	39·6
Helwan		79·1	297	12 4	− 4	22 6	− 1	14 59	PP.	—
Sofia		80·5	313	e 12 14	− 1	e 22 20	− 2	—	—	—
Wellington		80·7	142	12 11	− 5	22 18	− 6	i 27 31	SS	34·8
Christchurch		81·1	145	e 12 13a	− 5	22 22	− 6	i 14 59	PP	—
Kecskemet	z.	81·2	318	i 12 17	− 2	i 21 42	−47	i 15 25	PP	e 44·1
Budapest		81·4	317	12 18	− 2	—	—	—	—	e 43·6
Copenhagen		81·5	327	i 12 17	− 4	22 33	+ 1	22 55	PS	35·1
Belgrade		81·6	314	e 12 18k	− 3	—	—	e 15 27	PP	e 32·9
Potsdam		82·7	325	i 12 23	− 4	e 22 45	+ 1	e 23 9	PS	e 41·1
Prague		83·0	322	12 27	− 1	e 22 9	−38	—	—	e 41·1
Tananarive		83·3	247	12 30	0	e 23 9	+19	i 15 46	PP	—
Scoresby Sund		83·4	349	12 28	− 2	—	—	—	—	35·1
Hamburg		83·8	327	e 12 14a	−18	—	—	—	—	e 44·1
Cheb		84·2	323	e 12 32	− 2	e 22 56	− 3	—	—	e 47·1
Jena		84·2	323	i 12 31	− 3	e 22 55	− 4	e 15 45	PP	e 39·1
Göttingen	z.	84·8	325	i 12 34	− 3	—	—	—	—	e 49·1
Triest		85·5	318	12 38	− 3	23 9	− 3	15 57	PP	—
Stuttgart		86·6	322	i 12 44a	− 2	e 23 15	[+ 4]	23 51	S	e 45·1
Padova		86·8	319	e 12 39	− 8	e 23 22	− 3	i 14 46	PP	e 47·9
De Bilt		87·0	327	i 12 46	− 2	e 23 24	− 3	i 16 10	PP	e 41·1
Karlsruhe		87·0	323	i 12 45	− 3	—	—	—	—	e 47·2
Aberdeen		87·3	333	i 15 11	?	i 23 43	PS	i 24 13	PPS	42·4
Chur		87·4	322	e 12 47	− 3	e 23 19	[+ 3]	—	—	—
Strasbourg		87·6	323	i 12 48	− 3	i 23 34	+ 2	i 16 14	PP	e 47·7
Florence		88·0	318	12 27	−26	23 42	+ 6	—	—	48·9
Rome		88·1	315	i 12 50a	− 4	i 23 37	0	i 16 17	PP	—
Basle		88·2	321	e 12 51	− 3	—	—	e 16 18	PP	—
Uccle		88·2	326	12 51	− 3	23 33	− 5	16 16	PP	e 41·1
Victoria		88·4	37	e 12 45	−10	e 23 33	− 7	—	—	45·1
Durham		88·6	331	—	—	i 23 37	− 5	—	—	—
Edinburgh		88·6	333	—	—	e 34 9?	?	—	—	e 42·1
Neuchatel		88·9	321	e 12 54	− 4	—	—	—	—	—
Moncalieri		89·5	321	12 24	−36	23 49	− 1	—	—	45·5
Stonyhurst		89·6	331	—	—	23 39	[+ 9]	—	—	e 34·1
Kew		90·1	328	i 12 59	− 4	i 24 36	[+63]	i 16 50	PP	e 42·1
Bidston		90·2	331	—	—	i 24 49	PS	—	—	e 42·1
Paris		90·3	325	e 13 3	− 1	—	—	e 16 22	PP	46·1
Rathfarnham Castle		91·7	332	—	—	i 24 40	PS	—	—	e 44·2
Puy de Dôme		91·8	323	—	—	e 24 23	+12	—	—	e 49·1
Bagnères		95·1	321	—	—	e 25 39	PS	—	—	e 49·1
Bozeman		96·7	34	e 14 0	+27	e 24 19	[+ 9]	e 17 28	PP	—
Algiers		97·0	314	i 17 31	PP	e 22 59	?	—	—	e 55·1
Tinemaha		98·0	44	e 13 37	− 2	—	—	e 17 29	PP	—
Haiwee		98·7	44	e 13 41	− 1	—	—	—	—	—
Toledo		99·5	320	i 17 50	PP	—	—	—	—	e 49·1
Pasadena	z.	99·8	47	e 13 42	− 5	—	—	e 17 40	PP	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mount Wilson		99·8	47	e 13 42	− 5	—	—	e 17 41	PP	—
Riverside	z.	100·4	47	e 13 46	− 4	—	—	e 17 48	PP	—
Almeria		100·5	318	e 18 0	PP	—	—	—	—	e 56·1
Granada		101·0	318	i 18 23	PP	—	—	—	—	52·5
San Fernando		103·0	318	e 20 24	PPP	e 27 39	PS	e 28 25	PPS	51·1
Tucson		105·8	44	14 16	P	e 26 9	0	i 18 32	PP	49·8
Seven Falls		109·4	8	—	—	e 27 3	{+63}	e 36 39	SSS	e 47·1
Chicago		110·1	23	e 19 11	PP	e 25 13	[+ 1]	e 29 23	PPS	e 44·5
Ottawa		110·3	12	—	—	e 28 33	PS	—	—	51·1
Toronto		111·0	16	e 20 9?	PP	e 27 51	?	—	—	53·1
Florissant	z.	111·7	26	i 19 16	PP	—	—	—	—	57·1
Columbia		119·5	21	e 18 34	[−18]	e 29 53	PS	e 36 27	SS	e 43·5
San Juan		138·3	11	e 22 39	PP	e 29 7	{− 4}	e 40 28	SS	e 63·4
Fort de France		142·5	3	e 19 26	[− 9]	—	—	—	—	—
Huancayo		160·7	59	e 19 43	[−18]	e 34 32	SKSP	24 26	PP	—
Rio de Janeiro	E.	165·9	266	e 24 42	PP	—	—	—	—	e 51·5
La Paz	z.	168·9	56	i 20 8a	[0]	29 34	PPP	i 25 8	PP	80·6

Additional readings :—
Taihoku iN = +48s.
Zi-ka-wei iN = +2m.11s., +2m.45s., and +3m.3s., SN = +3m.29s. and +5m.11s.
Kéizyo eN = +5m.5s., eE = +5m.28s.
Mizusawa iPE = +5m.10s.
Medan iN = +15m.53s.
Calcutta eSSN = +14m.59s., eSSSN = +15m.37s.
Agra eN = +7m.36s., PPPE = +9m.14s., eN = +13m.31s., SSE = +13m.48s., SSSE = +16m.18s.
Hyderabad SSE = +16m.31s.
Bombay iEN = +9m.31s. and +16m.24s., SSEN = +18m.24s.
Brisbane eN = +13m.9s., iE = +13m.33s., eN = +14m.51s., eE = +15m.9s., eN = +17m.9s.
Melbourne i = +18m.19s.
Grozny i = +11m.32s.
College eP = +11m.20s.
Ksara PS = +21m.50s.
Bucharest SE = +22m.33s., SKKSEN = +22m.44s., PSEN = +23m.25s.
Helwan i = +12m.34s. and +13m.9s., PPP = +17m.1s., e = +18m.39s., PS = +22m.50s., e = +23m.9s.
Wellington L_q = +32m.9s.?
Christchurch iP = +12m.16s., sS? = +27m.34s., eZ = +39m.39s.
Kecskemet eZ = +16m.38s., +18m.42s., and +27m.11s.
Copenhagen SS = +28m.33s.
Belgrade iZ = +12m.29s.
Potsdam ePEN = +12m.27s., eZ = +33m.45s.
Tananarive N = +23m.17s., E = +25m.16s.
Hamburg iZ = +12m.29s., eZ = +39m.39s.
Jena eZ = +15m.49s., eN = +22m.49s.
Triest i = +12m.46s., PS = +23m.53s.
Stuttgart ePKKP = +29m.9s., eSSS = +35m.57s., e = +42m.21s.
Padova i = +13m.28s., iPP = +14m.49s., eS = +23m.28s.
Aberdeen i = +34m.9s.
Strasbourg eSS = +29m.34s.
Rome iP = +12m.54s., i = +13m.0s., iZ = +13m.20s. and +14m.0s., i = +14m.40s., iE = +23m.28s., iPS = +24m.29s., iSS = +29m.48s.
Uccle eE = +29m.39s.
Rathfarnham Castle i = +35m.13s.
Bozeman eSS = +31m.33s.
San Fernando eSSN = +35m.39s.
Tucson iPP = +18m.47s. and +18m.51s., iPPP = +20m.56s., eSKS = +24m.59s., S = +26m.50s., PS = +27m.41s., iPS = +28m.5s., iPPS = +28m.53s., iPKKP = +30m.1s., SS = +33m.38s., SSS = +37m.39s.
Columbia e = +29m.0s., ePSPS = +37m.13s., eSSS = +40m.39s.
San Juan ePKS = +23m.40s., eSKSP = +33m.4s.
Huancayo ePKP = +20m.6s., PKP = +20m.49s., iPP = +24m.43s., PPP = +28m.35s., ePPS = +37m.51s., eSS = +44m.25s.
Rio de Janeiro eN = +25m.9s.
La Paz iZ = +20m.44s., $iPKP_2$ = +21m.22s., SKSP = +32m.18s.
Long waves were also recorded at Bergen, Yalta, Weston, Fordham, Marseilles, La Plata, Philadelphia, Butte, Laibach, Cape Town, Malaga, and Besançon.

Dec. 6d. Readings also at 0h. (La Jolla, Tucson (2), Pasadena, and Riverside), 1h. (Mount Wilson, Haiwee, Tinemaha, Pasadena, Riverside, New Plymouth, Wellington, and La Paz), 2h. (Tucson, Baku, Tashkent, and Sverdlovsk), 5h. (Andijan and Tucson), 6h. (Andijan (2), Agra, Tchimkent (2), Frunse (2), Semipalatinsk, Almata, Baku, Tashkent (2), Grozny, and Tiflis), 7h. (near Granada and Medan), 9h. (Mizusawa), 10h. (Grozny), 11h. (Grozny, Tiflis, and Manila), 13h. (Stuttgart (2)), 14h. (Balboa Heights, Tucson, and Mizusawa), 15h. (Tucson and Jersey), 17h. (Calcutta), 19h. (Calcutta, La Paz, Fordham (2), and Huancayo), 20h. (Apia), 23h. (Sotchi).

Dec. 7d. 10h. 12m. 18s. Epicentre 22°·9N. 121°·5E. (as on Dec. 6d.).

$A = -\cdot4818$, $B = +\cdot7862$, $C = +\cdot3869$; $\delta = -7$; $h = +4$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Taihoku		2·1	0	e 0 37	0	e 1 7	+ 3	—	—	—
Hong Kong		6·9	265	1 45	0	3 17	+12	2 15	P_g	4·1
Calcutta	N.	30·6	276	—	—	e 10 6	?	—	—	—
Sverdlovsk		55·2	324	9 26	−11	—	—	—	—	26·2
Ksara		74·2	300	e 11 40	0	e 22 11	PS	e 14 56	PP	44·7

Additional readings :—
Calcutta e = +21m.9s.
Long waves were also recorded at Zinsen, Irkutsk, Tashkent, Copenhagen, De Bilt, Cheb, Uccle, Stonyhurst, Kew, Moscow, Baku, and Tiflis.

Dec. 7d. 13h. 4m. 14s. Epicentre 38°·6N. 143°·1E.

Moderate at Mizusawa, slight at Miyako, Hatinohe, Kakioka, and Hukusima.

Epicentre Pacific, Kinkwazan 38°·6N. 143°·1E. Macroseismic radius 200-300kms. Shallow.

See Seismological Bulletin of the Central Met. Obs., Japan, for the year 1938, Tokyo, 1940 pp. 131-133. Macroseismic chart p. 131.

$A = -\cdot6266$, $B = +\cdot4704$, $C = +\cdot6213$; $\delta = -8$; $h = -1$;
$D = +\cdot600$, $E = +\cdot800$; $G = -\cdot497$, $H = +\cdot373$, $K = -\cdot784$.

	△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Miyako	1·4	320	0 25k	− 2	0 42	− 4	—	—	—
Mizusawa	1·6	289	i 0 30a	0	i 0 55	+ 4	—	—	—
Sendai	1·8	259	0 32k	0	0 53	− 3	—	—	—
Morioka	1·9	306	0 33a	− 1	0 59	0	—	—	—
Yamagata	2·2	261	0 37a	− 1	1 3	− 3	—	—	—
Hatinohe	2·3	328	0 39a	− 1	1 10	+ 1	—	—	—
Hukusima	2·3	248	0 39a	− 1	1 19	S_g	—	—	—
Onahama	2·5	226	0 42a	− 1	0 56	−18	—	—	—
Aomori	2·8	321	0 46	− 1	1 36	S_g	—	—	—
Niigata	3·2	258	1 14	P_g	1 46	S_g	—	—	—
Utunomiya	3·3	231	0 53	0	1 55	S_g	—	—	—
Kakioka	3·3	224	0 55	+ 2	1 48	S_g	—	—	—
Tukubasan	3·4	227	0 53a	− 2	1 45	+ 8	—	—	—
Tyosi	3·4	214	0 56	+ 1	1 43	+ 6	—	—	—
Urakawa	3·6	356	1 13	P_g	1 59	S_g	—	—	—
Hakodate	3·7	331	0 59	− 1	2 9	S_g	—	—	—
Kumagaya	3·8	232	1 2	+ 1	1 38	− 9	—	—	—
Maebasi	3·9	237	1 4	+ 2	1 50	0	—	—	—
Tokyo Cen. Met. Ob.	3·9	225	1 6	+ 4	1 55	+ 5	—	—	—
Mori	4·1	332	1 16k	P*	2 9	S*	—	—	—

Continued on next page,

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Muroran	4·1	337	1 8$_a$	+ 3	2 8	S*	—	—	—
Yokohama	4·2	223	1 10	+ 3	1 58	+ 1	—	—	—
Nagano	4·3	246	1 12$_a$	+ 4	2 2	+ 2	—	—	—
Obihiro	4·3	0	1 0	− 8	2 20	S$_g$	—	—	—
Mera	4·4	217	1 13	+ 3	2 18	S*	—	—	—
Kusiro	4·5	12	1 14	+ 3	1 57	− 8	—	—	—
Hunatu	4·7	230	1 35	P$_g$	2 11	+ 1	—	—	—
Kohu	4·7	233	1 16	+ 2	2 9	− 1	—	—	—
Matumoto	4·7	242	1 10	− 4	2 17	+ 7	—	—	—
Ito	4·8	224	1 8	− 7	2 26	+14	—	—	—
Misima	4·8	226	1 16	+ 1	2 21	+9	—	—	—
Numadu	4·9	226	1 21	+ 4	2 31	S*	—	—	—
Osima	4·9	220	1 27	P*	2 27	S*	—	—	—
Toyama	5·0	250	1 22	+ 4	2 21	+ 3	—	—	—
Nemuro	5·1	21	1 19	− 1	2 13	− 7	—	—	—
Wazima	5·1	258	1 18	− 2	2 25	+ 5	—	—	—
Asahigawa	5·2	354	1 24	+ 3	2 32	+10	—	—	—
Iida	5·2	236	1 26	+ 5	2 30	+ 8	—	—	—
Takayama	5·3	244	1 27	+ 5	—	—	—	—	—
Kanazawa	5·5	250	1 39	P*	2 46	S*	—	—	—
Omaesaki	5·6	227	1 31	+ 4	3 10	S$_g$	—	—	—
Hamamatu	5·8	230	1 34	+ 5	2 16	−22	—	—	—
Haboro	5·9	350	1 27	− 4	—	—	—	—	—
Gihu	6·0	240	1 43$_a$	P*	2 59	S*	—	—	—
Nagoya	6·0	237	1 34	+ 2	2 46	+ 3	—	—	—
Hatidyozima	6·1	208	1 40	+ 6	2 37	− 8	—	—	—
Ibukisan	6·3	241	1 35	− 1	2 55	+ 5	—	—	—
Hikone	6·4	241	1 43	+ 5	3 5	+12	—	—	—
Kameyama	6·5	237	1 40	+ 1	3 30	S$_g$	—	—	—
Tu	6·6	236	1 41	0	3 16	S*	—	—	—
Kyoto	6·9	241	1 46	+ 1	3 15	+10	—	—	—
Miyadu	7·0	247	1 47$_a$	+ 1	3 24	S*	—	—	—
Yagi	7·2	238	1 50	+ 1	3 22	+ 9	—	—	—
Osaka	7·3	240	1 59	+ 9	3 36	S*	—	—	—
Toyooka	7·3	248	1 53	+ 3	3 32	S*	—	—	—
Kobe	7·5	241	1 53	0	3 47	S*	—	—	—
Wakayama	7·7	238	1 57	+ 1	3 26	+ 1	—	—	—
Siomisaki	7·9	232	1 49	−10	3 48	S*	—	—	—
Sumoto	7·9	240	1 59$_k$	0	3 47	S*	—	—	—
Tokusima	8·2	240	2 23	P*	3 42	+ 4	—	—	—
Muroto	9·0	237	2 35	PP	4 16	S*	—	—	—
Koti	9·2	240	e 2 30	P*	6 22	?	—	—	e 8·7
Hirosima	9·6	248	2 22	+ 1	4 23	SS	—	—	—
Hamada	9·6	251	2 24	+ 3	4 7	− 5	—	—	—
Matuyama	9·6	244	2 26	+ 5	5 0	S*	—	—	—
Vladivostok	9·7	302	i 2 22	0	i 4 20	+ 5	—	—	4·8
Uwazima	10·1	242	2 27	− 1	5 5	S*	—	—	—
Izuka	11·2	248	2 27	−17	5 18	SSS	—	—	—
Hukuoka B	11·4	248	e 3 1	PPP	—	—	—	—	—
Kumamoto	11·6	244	2 44	− 6	—	—	—	—	—
Miyazaki	11·6	239	2 47	− 3	5 17	SSS	—	—	—
Husan	11·8	257	e 2 55	+ 2	e 4 58	− 8	—	—	7·4
Taikyu	11·9	261	2 41	−13	4 49	−20	—	—	—
Unzendake	12·0	245	2 54	− 1	5 46	SSS	—	—	—
Keizyo	12·8	271	3 6	0	5 30	0	—	—	7·1
Zinsen	13·0	270	e 3 15	+ 6	e 5 39	+ 4	—	—	e 7·1
Tomie	13·1	247	3 10	0	—	—	—	—	—
Yakusima	13·2	236	3 10	− 1	5 36	− 4	—	—	—
Heizyo	13·6	277	e 3 14	− 3	5 56	+ 6	—	—	7·7
Nake	15·2	232	3 34	− 4	—	—	—	—	—

Continued on next page,

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Zi-ka-wei	E.	19·2	256	e 4 24	− 4	11 6	L	—	—	(11·1)
Hong Kong		29·6	247	6 8	− 1	11 4	0	—	—	14·3
Irkutsk		30·1	311	6 12	− 1	e 11 10	− 2	e 7 28	PP	15·8
College		47·1	33	e 8 40	+ 5	e 15 27	− 1	e 11 1	PP	e 21·6
Calcutta	N.	49·1	268	e 8 51	0	15 51	− 5	e 19 3	SS	e 23·3
Frunse		50·8	299	e 9 0	− 4	e 16 34	+14	—	—	—
Andijan		53·1	296	e 10 21	+60	e 17 13	PPS	—	—	—
Medan		53·3	242	9 17	− 6	—	—	i 10 47	PP	—
Tchimkent		54·4	300	e 9 29	− 2	—	—	—	—	—
Agra	E.	54·8	279	i 9 31a	− 3	17 7	− 7	9 41	pP	—
Sverdlovsk		54·9	319	i 9 32	− 3	e 17 15	− 1	—	—	24·8
Batavia		55·8	226	9 39	− 2	17 29	+ 1	—	—	—
Samarkand		57·3	297	e 10 4	+12	e 17 40	− 7	—	—	—
Bombay		63·2	274	i 10 32	0	i 19 23	+20	i 12 59	PP	—
Kodaikanal	E.	64·7	263	e 10 46?	+ 4	i 19 20	− 2	—	—	—
Colombo	E.	65·0	258	e 10 46?	+ 2	—	—	—	—	—
Brisbane		66·4	170	—	—	i 19 40	− 3	—	—	—
Moscow		66·8	324	10 53	− 3	19 45	− 3	—	—	36·3
Pulkovo		67·5	330	e 11 2	+ 2	—	—	—	—	—
Baku		68·4	306	11 7	+ 1	e 20 28	PS	e 25 20	SS	35·8
Grozny		69·4	310	e 11 11	− 1	—	—	—	—	—
Tiflis		70·9	309	i 11 19a	− 2	e 20 30	− 6	20 53	PS	38·3
Tinemaha		73·8	56	e 11 39	+ 1	—	—	—	—	—
Santa Barbara		74·4	59	e 11 49	+ 7	—	—	—	—	—
Theodosia		74·4	316	11 39	− 3	21 26	+10	—	—	47·8
Haiwee		74·6	56	e 11 50	+ 7	—	—	—	—	—
Mount Wilson	Z.	75·6	58	i 11 49	+ 1	—	—	—	—	—
Pasadena	Z.	75·6	58	e 11 49	+ 1	—	—	—	—	—
Riverside	Z.	76·2	58	i 11 52	0	—	—	—	—	—
Copenhagen		77·1	335	i 11 55	− 2	22 5	+19	—	—	37·8
Hamburg		79·7	339	—	—	i 28 36	?	—	—	e 41·8
Bucharest		79·7	320	—	—	e 20 46?	?	—	—	—
Prague		80·5	330	—	—	e 31 46?	SSS	—	—	41·8
Ksara		81·3	306	i 12 19	− 1	e 22 41	+11	e 15 29	PP	—
Tucson		81·6	55	i 12 22	+ 1	i 28 12	SS	i 15 17	PP	e 34·8
Belgrade		82·2	321	e 12 26a	+ 2	e 22 58	+19	e 15 47	PP	e 46·1
Stuttgart		83·9	332	e 12 32	− 1	e 22 58	+ 2	—	—	e 45·8
Uccle		83·9	336	—	—	e 22 52	− 4	—	—	e 43·8
Strasbourg		84·6	333	e 12 37	+ 1	e 23 8	+ 5	e 16 7	PP	e 46·3
Zurich		85·3	332	e 12 38a	− 2	—	—	—	—	—
Basle		85·5	332	e 12 40	− 1	e 21 40	?	—	—	—
Paris		86·2	336	—	—	e 27 46?	SS	—	—	48·8
Helwan		86·8	306	i 12 46k	− 1	e 23 11	[− 1]	—	—	—
Florence		87·1	327	e 23 16	S	(e 23 16)	[+ 2]	—	—	—
Jersey		87·3	339	—	—	(e 22 46?)	[− 29]	—	—	e 22·8
Rome		88·1	326	23 19	SKS	(23 19)	[− 1]	—	—	—
Florissant		88·7	39	—	—	i 23 39	− 4	—	—	—
Cape Girardeau		89·9	40	(e 14 8)	+66	—	—	—	—	e 14·1
Huancayo		136·8	63	e 20 32	[+68]	e 40 41	SS	e 22 32	PP	e 56·0
La Paz	Z.	144·9	60	19 47	[+ 9]	—	—	—	—	—

Additional readings :—
Irkutsk SS = +12m.46s.?
College eP_ePP = +10m.2s., ePPP = +11m.28s., eS_eS = +18m.25s., eSS = +19m.11s.
Calcutta eSSSN = +20m.19s.
Agra PPE = +11m.34s., sSE = +17m.27s., SSE = +21m.4s.
Bombay SSEN = +23m.24s.
Pasadena iZ = +11m.54s.
Ksara eSS = +28m.18s.
Tucson i = +12m.28s., +12m.32s., and +12m.55s.
Paris e = +41m.8s. and +42m.18s.
Rome i = +23m.55s.
Huancayo i = +42m.6s.
Long waves were also recorded at Moncalieri, De Bilt, and Simferopol.

Dec. 7d. 13h. 23m. 56s. Epicentre 6°·2S. 154°·8E. (as on 1938 Sept. 7d.)

$A = -\cdot8997$, $B = +\cdot4233$, $C = -\cdot1073$; $\delta = +16$; $h = +7$;
$D = +\cdot426$, $E = +\cdot905$; $G = +\cdot097$, $H = -\cdot046$, $K = -\cdot994$.

A depth of focus 0·005 has been assumed.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Brisbane		21·2	184	i 4 40	− 2	i 8 34	+ 5	i 5 10	PP	—
Palau		24·3	303	4 12	−60	i 8 31	−53	—	—	—
Riverview		27·7	187	i 5 47	+ 3	e 10 14	− 6	9 16	PcP	e 13·2
Sydney		27·7	187	e 5 40	− 4	i 10 31	+11	—	—	e 14·9
Adelaide		32·3	205	i 6 23	− 2	i 11 28	− 5	i 7 24	PP	13·8
Melbourne		32·7	194	i 6 30	+ 2	i 11 43	+ 4	i 13 26	SS	14·4
Apia		33·7	105	—	—	e 11 33	−21	e 14 21	SSS	—
Arapuni		36·9	152	—	—	12 58	+14	i 15 40	SSS	e 16·7
Wellington		39·2	156	i 7 26	+ 3	i 13 11	− 8	8 45	PP	18·8
Manila		39·4	303	i 7 23	− 2	13 21	− 1	—	—	17·1
Christchurch		40·3	160	i 7 31a	− 1	i 13 40	+ 5	9 17	PcP	19·3
Nake		42·2	327	7 49	+ 1	—	—	—	—	—
Yakusima		43·3	330	7 53	− 4	—	—	—	—	—
Siomisaki		43·4	338	7 57	− 1	—	—	—	—	—
Miyazaki		44·0	331	7 39	−24	i 14 19	−10	i 19 11	SSS	—
Karenko		44·1	314	8 3	− 1	—	—	—	—	—
Nagoya		44·4	340	e 7 48	−18	e 11 6	?	—	—	—
Perth		44·5	230	i 8 7	0	14 37	0	8 29	pP	21·7
Sumoto		44·5	339	8 7	0	i 19 35	SSS	—	—	—
Gihu		44·7	341	8 12	+ 4	—	—	—	—	—
Matuyama		45·0	335	8 5	− 6	—	—	—	—	—
Kumamoto		45·1	332	8 9	− 3	—	—	—	—	—
Toyama		45·7	341	8 15	− 1	—	—	—	—	—
Mizusawa	E.	46·8	346	8 27	+ 2	15 45	PS	—	—	—
	N.	46·8	346	8 32	+ 7	15 39	PPS	—	—	—
Batavia		47·7	268	8 28	− 4	15 17	− 5	—	—	e 21·1
Husan		47·7	332	8 44	+12	e 10 36	PP	—	—	—
Taikyu		48·5	333	—	—	e 14 54	−39	—	—	—
Hong Kong		48·8	308	8 42	+ 1	15 33	− 5	19 15	SS	21·1
Keizyo		50·7	332	8 55	0	11 26	PPP	(16 8)	PS	e 24·4
Zinsen	E.	50·8	331	e 8 50	− 6	e 15 58	− 7	—	—	—
Vladivostok		53·3	340	i 9 13	− 2	i 16 33	− 7	—	—	22·4
Honolulu		53·9	58	e 9 45	+26	e 16 48	0	e 10 58	PP	22·7
Medan		56·9	280	e 9 40	− 1	i 17 24	− 4	i 17 52	PS	34·1
Calcutta	N.	70·9	297	—	—	i 20 24	+ 3	e 21 0	PS	e 28·2
Irkutsk		72·3	330	e 12 7	+47	20 38	+ 1	e 25 11	SS	31·1
Colombo	E.	75·5	279	11 40	+ 1	21 15	+ 2	—	—	37·2
Kodaikanal		78·7	283	i 11 56a	− 1	i 21 46	− 2	i 14 56	PP	—
Hyderabad	E.	78·9	288	12 1	+ 3	21 47	− 3	—	—	35·9
Agra	E.	81·2	299	12 9	− 1	22 7	− 7	12 44	pP	37·3
College		82·4	21	—	—	e 22 8	−18	e 27 51	SS	34·4
Bombay		84·4	290	i 12 27	0	i 22 41	− 5	15 49	PP	40·4
Sitka		84·4	31	—	—	e 22 34	−12	e 23 35	PS	e 34·7
Frunse		87·1	314	e 13 37	+57	—	—	—	—	—
Ukiah		87·7	50	e 12 47	+ 4	e 22 59	[− 4]	e 29 17	SS	37·2
Berkeley		88·2	53	e 12 48	+ 3	—	—	—	—	e 44·5
Andijan		88·3	311	e 12 45	− 1	e 23 27	+ 4	—	—	—
Lick	E.	88·6	52	e 12 55	+ 8	—	—	—	—	—
Victoria		89·2	41	e 12 39	−11	e 23 11	[− 1]	24 46	PPS	e 38·1
Santa Barbara		89·8	56	e 12 52	− 1	—	—	—	—	—
Tchimkent		90·6	312	e 13 15	+19	—	—	—	—	—
Pasadena		91·0	56	i 12 57a	− 1	e 22 40	[−43]	e 16 18	PP	e 41·6
Mount Wilson		91·1	56	i 12 58a	− 1	—	—	—	—	—
Tinemaha		91·3	53	i 12 57	− 3	—	—	e 16 39	PP	—
Haiwee		91·4	54	e 13 2	+ 2	—	—	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
La Jolla		91·6	57	i 12 52	− 9	—	—	—	—	—
Riverside		91·6	56	i 13 0a	− 1	—	—	—	—	—
Samarkand		92·2	309	e 13 16	+12	—	—	—	—	—
Butte		96·3	43	—	—	e 34 39	SSS	—	—	e 40·1
Tucson		97·0	58	e 13 27	+ 1	24 2	[+ 6]	i 17 24	PP	i 40·5
Sverdlovsk		97·4	326	i 13 33	+ 5	e 26 16	PS	e 32 28	SS	41·1
Tananarive		104·2	248	e 22 56	?	i 24 53	[+ 6]	—	—	42·9
Florissant		113·1	51	e 19 19	PP	i 29 10	PS	—	—	—
St. Louis	E.	113·3	50	—	—	e 29 1	PS	—	—	—
Chicago		114·5	46	e 14 43	P	e 26 39	SKKS	e 35 28	SS	e 46·3
Ksara		117·4	304	e 18 36	PKP	31 6	PPS	19 44	PP	—
Upsala		117·4	337	20 4	PP	—	—	e 46 4?	?	e 54·1
Toronto		119·7	42	—	—	e 39 10	SSS	—	—	59·1
Ottawa		121·4	39	e 20 4?	PP	—	—	—	—	e 57·4
Columbia		121·6	53	e 20 16	PP	e 25 47	[+ 8]	e 29 58	PS	—
Cape Town	E.	122·6	223	e 20 22	PP	e 26 12	[+29]	e 29 59	PS	—
	N.	122·6	223	e 20 26	PP	e 25 56	[+13]	30 14	PS	—
Vermont		123·5	39	—	—	e 30 41	PS	e 37 21	SS	e 54·3
Seven Falls		123·6	34	e 20 28	PP	e 25 4?	[−42]	e 30 4?	PS	e 49·1
Philadelphia		124·1	45	e 32 4	PPS	e 37 37	SS	—	PS	e 49·2
Williamstown		124·2	40	i 18 52	PKP	—	—	—	—	e 64·4
Potsdam		124·3	333	e 18 4?	PKP	—	—	—	—	e 24·1
Fordham		124·6	43	e 20 46	PP	e 37 47	SS	e 38 5	SSP	—
Weston		125·6	40	i 20 49	PP	e 32 14	PPS	e 37 44	SS	—
Aberdeen		126·0	343	—	—	e 30 24	PS	e 55 14	?	e 65·1
Jena		126·0	331	e 23 28	PPP	e 26 4	[+11]	e 28 36	PS	e 56·1
Cheb		126·1	331	e 15 4?	P	—	—	e 21 4?	PP	e 58·1
Edinburgh		127·4	344	—	—	e 28 4?	SKKS	—	—	e 66·1
De Bilt		127·9	337	e 21 2	PP	—	—	—	—	e 57·1
Triest		128·2	326	e 18 57	PKP	e 27 18	?	e 38 39	SS	—
Stuttgart		128·6	332	e 20 15	pPKP	e 22 18	SKP	e 21 4	PP	72·0
La Plata		128·8	145	21 10	PP	—	—	—	—	62·1
Uccle		128·9	337	i 22 22	SKP	—	—	—	—	58·1
Stonyhurst		129·0	342	—	—	e 26 4?	[+ 3]	i 36 47	?	65·1
Strasbourg		129·4	332	i 21 9	PP	e 22 23	SKP	e 47 10	?	56·1
Bidston		129·6	342	i 22 26	SKP	i 38 43	SS	—	—	e 58·1
Zurich		129·8	331	e 18 58	PKP	—	—	e 22 17	PP	—
Kew		130·4	340	i 21 20	PP	i 31 7	PS	i 38 47	SS	e 58·1
Oxford		130·5	341	—	—	i 22 27	?	—	—	e 55·7
Rathfarnham Castle		130·6	346	—	—	i 39 52	SSP	—	—	e 67·7
Florence		130·8	325	20 34	?	31 29	PS	—	—	—
Rome		131·2	321	i 21 25	PP	28 34	SKKS	—	—	e 56·1
Paris		131·5	336	—	—	e 49 4?	?	—	—	66·1
La Paz	Z.	131·9	118	e 19 9k	PKP	22 32	SKP	i 21 31	PP	62·1
San Juan		138·3	68	e 16 26	P	e 39 45	SS	e 22 8	PP	—
Toledo		141·5	334	e 19 5	PKP	—	—	e 22 29	PP	33·1
Almeria		143·1	329	e 19 20	[− 7]	—	—	—	—	e 73·7
Fort de France		143·7	73	e 19 28	[+ 1]	e 22 44	PP	—	—	e 24·2
San Fernando		145·2	333	e 19 32	[+ 2]	41 19	SS	e 22 45	PP	70·1
Rio de Janeiro		146·2	149	i 20 34	[+62]	—	—	—	—	e 42·9

Additional readings :—
Brisbane iPE = +4m.46s.
Palau i = +10m.7s.
Riverview iE = +10m.26s., eSS?E = +11m.28s.
Adelaide i = +7m.34s. and +7m.43s.
Melbourne i = +9m.33s. and +11m.59s.
Apia e = +12m.26s. and +15m.8s.
Wellington iZ = +7m.38s. and +8m.12s., i = +13m.39s. and +14m.24s., iS_cS = +16m.34s.
Christchurch iP = +7m.34s., iP_cS = +13m.29s., L_cE = +15m.42s., iS_cSNZ = +17m.4s.
Perth pP = +10m.14s., sS = +18m.2s., i = +18m.12s. and +18m.52s.
Batavia iPE = +8m.31s.
Honolulu eP = +9m.57s., eP_cP = +10m.17s., ePPP = +12m.15s.
Calcutta eSSN = +23m.43s. ,eSSSN = +25m.3s.
Kodaikanal iPSE = +22m.30s., iSSE = +27m.4s.
Agra PSE = +22m.50s., sSE = +23m.10s., SSE = +27m.27s.

Continued on next page.

College SSS = +31m.20s.
Bombay eE = +12m.42s., iEN = +19m.34s. and +23m.5s., iE = +23m.25s. and +23m.43s., SEN = +28m.25s.
Sitka eS = +22m.55s., eSS = +28m.50s.
Ukiah S = +23m.28s.
Berkeley eEZ = +40m.30s.
Andijan e = +13m.6s.
Victoria SSE = +29m.52s.
Pasadena eSSEZ = +29m.22s.
Tucson iP = +13m.32s., iPPP = +19m.26s., eS = +24m.30s., S = +24m.54s., PS = +25m.33s., SS = +31m.9s., iSS = +31m.36s., SSS = +35m.6s., iSSS = +35m.12s.
Chicago eSS = +35m.38s., ePSPS = +35m.47s.
Vermont eSSS = +42m.11s.
Seven Falls e = +37m.4s.?
Philadelphia ePSPS = +37m.44s., eSSS = +41m.20s.
Weston eSSSEN = +42m.44s.
Jena eN = +29m.4s.
Triest i = +34m.38s.
Zurich ePP = +23m.9s., PS = +33m.51s.
Kew iEN = +22m.31s., iE = +28m.51s., eZ = +30m.27s., eE = +32m.35s.
Rome i = +22m.21s., +30m.38s., and +33m.44s., iSSS = +35m.48s.
La Paz ePKPZ = +19m.13s.
San Juan iPKS = +22m.56s., ePPP = +25m.33s., eSKSP = +32m.5s., eSS = +40m.26s., eSSS = +44m.41s.
Fort de France PP = +19m.46s.
San Fernando ePPSN = +35m.13s.
Long waves were also recorded at Istanbul, Prague, Hamburg, Copenhagen, Koti, Malaga, Branner, Algiers, Bergen, Puy de Dôme, Seattle, Bozeman, and Upsala.

Dec. 7d. 15h. 0m. 56s. Epicentre 22°·9N. 121°·5E. (as at 10h.).

$A = -\cdot4818$, $B = +\cdot7862$, $C = +\cdot3869$; $\delta = -7$; $h = +4$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Taihoku		2·1	0	0 40	+ 3	1 10	S_e	—	—	—
Hong Kong		6·9	265	1 42	− 3	3 13	+ 8	—	—	4·0
Manila		8·3	183	e 2 29	P*	6 27	?	—	—	—
Zi-ka-wei		8·3	356	1 58	− 6	i 4 46	S_g	—	—	—
Hukuoka B		13·2	33	—	—	e 5 15	−25	—	—	—
Husan		13·8	27	e 3 20	+ 1	e 8 44	?	—	—	—
Taikyu		14·3	24	3 30	+ 4	5 18	−48	—	—	—
Koti		15·0	42	e 5 4?	?	—	—	—	—	—
Zinsen		15·2	16	e 3 37	− 1	e 6 32	+ 4	—	—	—
Keizyo		15·4	17	3 38	− 2	e 6 38	+ 6	—	—	—
Heizyo		16·5	12	e 3 53	− 1	6 33	−25	—	—	9·5
Nagoya		18·2	45	e 4 24	+ 8	8 1	SS	—	—	—
Vladivostok		21·9	22	e 5 0	+ 3	i 8 59	+ 5	—	—	11·7
Mizusawa	E.	23·3	42	e 4 55	−15	8 46	−34	—	—	—
	N.	23·3	42	e 5 3	− 7	8 48	−32	—	—	—
Medan		29·3	232	e 6 5	− 1	i 11 9	+10	—	—	—
Calcutta	N.	30·6	276	e 6 31	+13	e 13 14	SSS	—	—	i 17·7
Irkutsk		32·2	340	6 34	+ 2	e 12 11	+26	—	—	17·1
Batavia		32·3	208	6 30	− 3	—	—	—	—	16·2
Agra	E.	39·5	285	i 7 33a	− 1	—	—	—	—	—
Colombo	E.	43·1	254	8 6	+ 2	—	—	—	—	25·5
Andijan		44·8	305	e 8 18	+ 1	e 15 18	+23	—	—	—
Bombay	E.	45·5	274	i 8 25	+ 2	i 18 56	SS	—	—	i 23·0
Tchimkent		47·0	307	e 8 36	+ 1	—	—	—	—	—
Tashkent		47·2	306	e 8 34	− 2	—	—	—	—	24·1
Samarkand		48·8	303	e 8 43	− 6	e 15 36	−16	e 12 3	PPP	—
Sverdlovsk		55·2	324	9 35	− 2	—	—	—	—	28·1
Grozny		64·5	308	i 10 43	+ 2	—	—	—	—	—
Ksara		74·2	300	i 11 40	0	21 36	PS	e 14 34	PP	—
Helwan		79·1	297	i 12 7k	− 1	—	—	—	—	—
Tananarive		83·3	247	—	—	33 4?	?	—	—	i 45·0
Tucson		105·8	44	e 18 26	PP	i 28 15	PS	i 20 24	PPP	—

For Notes see next page.

NOTES TO DEC. 7d. 15h. 0m. 56s.

Additional readings :—
Taihoku iN = +54s., SE = +1m.1s.
Zi-ka-wei iE = +4m.58s. and +5m.30s.
Zinsen eE = +8m.51s.
Keizyo eSE = +8m.41s., eSN = +9m.36s.
Calcutta ePPN = +8m.42s., ePPPN = +9m.4s., eSSN = +15m.12s.
Medan iPN = +6m.8s.
Tucson +18m.34s., +23m.19s., and +36m.20s.
Long waves were also recorded at Cheb, Copenhagen, De Bilt, Edinburgh, and Aberdeen.

Dec. 7d. Readings also at 0h. (Ksara and Mizusawa), 1h. (Helwan), 3h. (Haiwee, Pasadena, Santa Barbara, La Paz, Tucson, Riverside, and Mount Wilson), 4h. (Neuchatel and Zurich), 6h. (La Paz), 7h. (Tucson), 8h. (Mizusawa), 9h. (near Branner, Lick, Berkeley, Fresno, San Francisco, and Mizusawa), 12h. (Tucson, Helwan, and Tacubaya), 13h. (Ferndale and near Santiago), 14h. (Malabar, Tacubaya, and Istanbul), 16h. (Balboa Heights), 18h. (near Lick and Samarkand), 19h. (Andijan, Tucson, Oaxaca, Puebla, Guadalajara, Tacubaya, Riverside, Mizusawa, and Nagoya), 20h. (La Paz, Mount Wilson (2), Tinemaha (2), and Tucson), 22h. (Nagoya and Mizusawa (2)), 23h. (near Branner).

Dec. 8d. Readings at 0h. (Mizusawa, Tashkent, Baku, Vladivostok, Nagoya, Ksara, Sverdlovsk, and Irkutsk), 4h. (La Paz), 5h. (Wellington), 6h. (Balboa Heights and Nagoya), 7h. (near Zurich, Basle, Neuchatel, Grenoble, Puy de Dôme, and Strasbourg), 9h. (Zi-ka-wei), 11h. (Riverside, Pasadena, Mount Wilson, and Tucson) 12h. (Mount Wilson, Tucson, Sverdlovsk, and Irkutsk), 13h. (La Paz and Budapest), 14h. (Sofia and Tucson), 18h. (Wellington), 19h. (Helwan, Grozny, Tiflis, and Ksara), 21h. (Grozny and Medan).

Dec. 9d. 3h. 55m. 21s. Epicentre 57°·2N. 153°·7W.

$A = -\cdot4880$, $B = -\cdot2412$, $C = +\cdot8389$; $\delta = +7$; $h = -8$;
$D = -\cdot443$, $E = +\cdot896$; $G = -\cdot752$, $H = -\cdot372$, $K = -\cdot544$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
College		8·2	18	e 1 59	− 4	e 3 41	+ 3	—	—	e 4·0
Sitka		10·0	83	e 2 25	− 2	e 4 22	0	—	—	i 4·9
Victoria		20·2	103	i 4 32	− 7	i 8 21	0	9 9	SS	10·0
Seattle		21·2	103	e 6 32	?	e 10 25	?	—	—	e 11·6
Ferndale		25·2	118	—	—	e 9 51	− 1	e 11 39	SSS	—
Ukiah		26·8	119	e 5 48	+ 4	e 10 13	− 6	—	—	e 11·6
Saskatoon		27·2	81	e 5 51	+ 4	(e 10 39)	+14	—	—	e 10·6
Butte		27·5	95	e 5 53	+ 3	e 10 33	+ 3	e 8 49	P_cP	e 14·5
Berkeley		28·3	119	i 5 55	− 2	i 11 6	+23	—	—	e 13·1
Bozeman		28·5	95	e 6 12	+13	e 10 52	+ 6	—	—	e 12·7
Branner		28·7	120	e 6 11	+10	—	—	—	—	—
Lick	E.	29·0	119	e 6 13	+ 9	—	—	—	—	—
Tinemaha		30·9	115	i 6 19	− 1	e 11 24	0	e 12 55	S_cP	—
Haiwee		31·8	116	i 6 28	0	e 11 35	− 3	—	—	—
Santa Barbara		32·3	119	e 6 30	− 3	—	—	—	—	—
Mount Wilson		33·3	118	i 6 39k	− 2	—	—	i 13 3	S_cP	—
Pasadena		33·3	118	i 6 39k	− 2	i 12 0	− 2	i 13 2	S_cP	e 15·9
Riverside		33·8	118	i 6 43k	− 3	e 12 6	− 4	i 13 0	S_cP	—
La Jolla		34·8	118	e 6 54	0	e 12 28	+ 3	—	—	—
Honolulu		36·0	186	e 7 24	+19	e 13 28	+44	e 9 13	PPP	e 15·6
Tucson		38·4	111	i 7 23	− 2	i 13 23	+ 3	i 8 55	PP	i 16·4
Chicago		43·7	81	—	—	e 14 32	− 7	—	—	e 18·0
Florissant		44·4	86	—	—	i 14 44	− 5	e 18 6	SS	—
St. Louis	E.	44·6	86	e 8 13	− 3	e 14 45	− 7	e 10 7	PP	—
Cape Girardeau		45·9	87	e 8 25	− 1	e 15 5	− 6	e 18 15	SS	e 24·8
Little Rock	N.	46·3	92	e 8 35	+ 6	e 15 47	PS	—	—	27·0
Toronto		46·8	73	—	—	e 17 43	?	e 20 47	SSS	25·6
Vladivostok		47·3	286	i 8 30	− 7	i 15 28	− 3	—	—	21·3
Ottawa		47·5	69	e 8 39	+ 1	e 15 32	− 2	18 27	SS	22·6
Scoresby Sund		48·1	21	10 57	PP	15 43	+ 1	18 45	SS	21·6

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Shawinigan Falls		48·2	65	e 8 43	− 1	e 15 42	− 1	—	—	23·6
Seven Falls		48·5	64	8 48	+ 2	15 48	0	18 41	SS	22·6
Vermont		49·5	68	—	—	e 15 58	− 4	e 18 43	S_eS	e 19·9
Williamstown		50·5	69	9 1	− 1	e 16 11	− 5	i 11 4	PP	—
Fordham		51·7	72	i 9 13	+ 2	i 16 37	+ 5	i 16 53	PS	e 27·1
Philadelphia		51·7	74	—	—	e 16 27	− 5	e 18 52	S_eS	e 20·5
Weston		51·9	69	e 9 10	− 2	e 16 18	−17	e 10 33	P_eP	—
East Machias		52·1	64	—	—	e 16 36	− 2	e 20 2	SS	i 28·3
Columbia		53·0	83	e 9 28	+ 7	e 16 43	− 7	e 19 5	S_eS	25·5
Irkutsk		53·7	313	9 25	− 1	e 16 58	− 1	—	—	31·6
Tacubaya	N.	54·9	110	e 9 38	+ 3	e 17 43	PS	—	—	—
Sverdlovsk		63·0	340	i 10 30	− 1	19 0	− 1	—	—	33·6
Upsala	N.	63·1	7	10 31	− 1	e 19 1	− 1	—	—	e 30·6
Pulkovo		63·3	359	e 10 27	− 6	e 18 51	−13	—	—	e 31·1
Aberdeen		63·7	17	—	—	i 19 11	+ 1	—	—	—
Edinburgh		64·7	18	—	—	i 19 24	+ 2	19 34	PS	30·6
Durham	E.	66·1	17	—	—	i 19 41	+ 2	—	—	—
Rathfarnham Castle		66·7	21	i 15 39	?	i 22 59	?	—	—	e 34·4
Copenhagen		66·9	8	10 56	0	19 45	− 4	—	—	28·6
Stonyhurst		66·9	18	—	—	i 20 42	PS	i 21 1	PPS	e 33·6
Moscow		67·0	354	e 10 57	0	e 19 51	+ 1	—	—	33·1
Oxford		69·1	18	i 11 23a	+13	i 20 14	− 1	—	—	e 28·0
Kew		69·5	17	i 11 3	− 9	i 20 17	− 3	i 20 35	PS	e 34·6
De Bilt		69·7	13	i 11 15	+ 1	i 20 24	+ 2	—	—	e 34·6
Potsdam		70·2	9	e 11 9	− 8	i 20 27	− 1	e 13 51	PP	e 34·6
Göttingen		70·8	11	e 11 20	0	—	—	—	—	e 36·6
Uccle		70·9	16	e 11 21	0	i 20 36	0	13 47	PP	e 34·6
Jena		71·6	9	e 11 23	− 2	—	—	—	—	—
Frunse		72·4	326	e 11 26	− 4	—	—	—	—	—
Cheb		72·5	9	—	—	e 20 39?	−15	—	—	e 34·6
Paris		72·5	16	i 11 31	+ 1	—	—	—	—	38·6
Prague		72·6	8	e 11 33	+ 2	e 21 0	+ 4	—	—	e 40·6
Stuttgart		73·4	11	e 11 36	0	i 21 9	+ 4	e 14 22	PP	e 38·6
San Juan		73·5	82	—	—	20 58	− 8	—	—	e 29·9
Strasbourg		73·5	12	i 11 37a	+ 1	i 21 7	+ 1	i 11 46	pP	e 37·6
Tchimkent		74·4	329	11 42	0	21 14	− 2	—	—	—
Andijan		75·0	326	11 47	+ 2	21 25	+ 2	—	—	—
Tashkent		75·4	329	11 43	− 4	i 21 17	−10	—	—	e 37·6
Moncalieri		77·0	14	e 9 49	?	e 17 50	?	—	—	—
Triest		77·0	9	11 54	− 2	21 41	− 4	e 12 27	pP	—
Simferopol		78·0	355	12 3	+ 1	e 21 53	− 2	—	—	—
Grozny		78·5	347	12 5	+ 1	e 22 3	+ 2	—	—	—
Florence		78·6	11	12 0	− 5	22 16	+14	—	—	—
Tiflis		80·2	347	i 12 11a	− 3	22 19	0	—	—	39·1
Rome		80·6	10	i 12 14a	− 2	i 22 22	− 1	i 15 18	PP	40·1
Baku		80·8	343	12 21	+ 4	22 29	+ 4	—	—	39·6
Toledo		80·8	24	i 12 13	− 4	—	—	e 15 17	PP	—
Granada		82·6	24	i 12 29	+ 3	—	—	—	—	—
San Fernando		82·7	27	e 18 54	?	e 22 49	+ 5	—	—	43·6
Malaga		82·9	24	e 12 38	+10	e 23 3	+17	—	—	40·6
Calcutta	N.	85·2	305	i 12 45	+ 6	i 23 10	+ 1	—	—	—
Agra		85·4	316	e 12 40	0	e 22 58	[− 5]	—	—	—
Ksara		88·9	352	i 13 0k	+ 2	23 55	+11	16 30	PP	—
Helwan		93·2	356	i 13 18k	+ 1	24 24	+ 1	17 7	PP	—
Huancayo		93·8	106	e 17 0	PP	e 23 47	[− 7]	e 24 52	PPS	e 36·6
Bombay		94·9	317	e 17 12	PP	i 23 56	[− 4]	—	—	—
Kodaikanal	E.	100·7	309	—	—	e 23 40	[−50]	—	—	i 49·7
La Paz	Z.	101·3	102	24 29	S	(24 29)	[− 4]	—	—	—
Melbourne		107·8	227	—	—	i 24 9	[−54]	—	—	53·0

Additional readings :—
Sitka S = +4m.26s.
Victoria eN = +5m.39s.
Seattle eP = +6m.43s., S = +10m.31s.
Berkeley eN = +6m.14s.

Continued on next page.

Branner eN = +13m.36s. and +13m.51s.
Tinemaha i = +6m.28s.
Pasadena iZ = +6m.49s.
Riverside iZ = +6m.52s.
Tucson iP = +7m.26s., i = +7m.33s. and +7m.52s., iPPP = +9m.18s., iP_cP = +9m.26s., iS = +13m.48s.
Chicago S = +14m.37s.
Florissant iN = +18m.22s.
St. Louis eSSE = +15m.5s., eE = +16m.4s., iE = +18m.8s.
Cape Girardeau iN = +19m.9s., eN = +14m.57s., eE = +22m.47s.
Little Rock eN = +9m.36s., +13m.29s., +24m.45s., and +26m.7s.
Scoresby Sund ? = +15m.57s.
Seven Falls SSS = +19m.33s.
Williamstown i = +9m.12s. and +26m.47s.
Fordham eN = +16m.34s.
Weston iPZ = +9m.20s., iSN = +16m.38s., eS_cSN = +18m.58s.
Columbia eP = +9m.56s.
Edinburgh i = +19m.47s.
Kew iS_cSEN = +21m.3s.
Potsdam ePN = +11m.15s., eZ = +20m.15s., iSN = +20m.32s., iE = +20m.48s.
Uccle eSSN = +25m.7s.
Jena ePE = +11m.27s., iPZ = +11m.39s., eN = +12m.16s.
Stuttgart e = +16m.50s., esS = +21m.24s., eSS = +26m.6s.
Strasbourg iZ = +11m.50s., isPZ = +12m.0s., ePPZ = +14m.22s., isS = +21m.21s., iSS = +26m.0s.
Triest epP = +12m.27s.
Rome ePN = +12m.17s., i = +22m.25s. and +22m.37s., iSS = +27m.37s.
Granada i = +13m.3s.
San Fernando eSSN = +29m.46s.
Ksara iPS = +24m.50s.
Helwan S = +24m.41s.
Huancayo ePPP = +19m.35s., ePS = +26m.3s., eSS = +30m.45s.
Melbourne i = +30m.39s.
Long waves were also recorded at Fort de France, Sofia, Wellington, Bucharest, Puy de Dôme, Algiers, Belgrade, and Phu-Lien.

Dec. 9d. 5h. 2m. 45s. Epicentre 22°·9N. 121°·5E. (as on December 7d.).

A = −·4818, B = +·7862, C = +·3869; $\delta = -7$; $h = +4$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Taihoku		2·1	0	e 0 40	+ 3	0 57	− 7	—	—	—
Hong Kong		6·9	265	1 45	0	3 9	+ 4	1 52	P*	3·5
Manila		8·3	183	2 51	P_g	4 56	S_g	—	—	—
Zi-ka-wei	E.	8·3	356	—	—	e 3 45	+ 5	1 4 47	S_g	—
Phu-Lien		14·0	264	e 3 26	+ 4	e 6 56	L	—	—	(6·9)
Zinsen		15·2	16	(e 3 43)	+ 5	(e 6 43)	+15	—	—	(8·7)
Keizyo		15·4	17	3 41	+ 1	—	—	—	—	—
Nagoya		18·2	45	e 4 18	+ 2	—	—	—	—	—
Vladivostok		21·9	22	e 5 1	+ 4	i 9 6	+12	—	—	e 11·7
Mizusawa	E.	23·2	42	e 5 12	+ 3	e 9 24	+ 6	—	—	—
	N.	23·2	42	e 5 7	− 2	9 34	+16	—	—	—
Medan		29·3	232	6 3	− 3	—	—	—	—	—
Calcutta	N.	30·6	276	—	—	e 10 6	−74	—	—	—
Irkutsk		32·2	340	e 6 36	+ 4	e 12 14	+29	—	—	17·2
Batavia		32·3	208	6 28	− 5	—	—	—	—	—
Agra	E.	39·5	285	—	—	13 30	− 7	—	—	—
Frunse		43·5	308	e 8 7	0	—	—	—	—	—
Andijan		44·8	305	e 8 20	+ 3	e 15 23	PPS	—	—	—
Tchimkent		47·0	307	e 8 38	+ 3	—	—	—	—	—
Tashkent		47·2	306	e 8 52	+16	i 15 33	+ 4	e 9 56	PP	e 25·1
Sverdlovsk		55·2	324	e 9 37	0	—	—	—	—	26·2
Grozny		64·5	308	e 10 43	+ 2	—	—	—	—	—
Pulkovo		71·1	328	e 11 29	+ 7	—	—	—	—	—
Simferopol		72·4	312	e 11 29	− 1	—	—	—	—	—
Ksara		74·2	300	e 11 35	− 5	21 10	− 4	14 30	PP	—
Helwan		79·1	297	i 12 7k	− 1	—	—	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Strasbourg		87·6	323	—	—	e 31 45	SSS	—	—	e 47·6
Mount Wilson	z.	99·8	47	e 17 57	PP	—	—	—	—	—
Pasadena	z.	99·8	47	e 17 56	PP	—	—	—	—	—
Riverside	z.	100·4	47	e 17 47	PP	—	—	—	—	—
Cape Town		112·8	242	—	—	e 23 15?	?	—	—	—

Additional readings :—
Taihoku S? = +1m.1s.
Zinsen readings have been diminished by 2m.
Vladivostok e = +11m.31s.
Calcutta iN = +14m.29s., eN = +19m.29s.
Ksara i = +11m.42s.
Helwan i = +12m.15s.
Long waves were also recorded at Stuttgart, Tiflis, Prague, Paris, Edinburgh, Copenhagen, Aberdeen, Stonyhurst, Kew, De Bilt, Potsdam, and Uccle.

Dec. 9d. 9h. 35m. 17s. Epicentre 37°·1N. 141°·8E. (as on 1938 December 5d.).

A = −·6283, B = +·4944, C = +·6006 ; δ = −9 ; h = −1.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mizusawa		2·1	346	e 0 44	P_g	i 1 12	S_g	—	—	—
Nagoya	z.	4·4	245	e 1 15	P*	2 24	S_g	—	—	—
Koti		7·6	245	e 2 3	+ 8	4 33	S_g	—	—	5·2
Hukuoka B		9·9	253	e 5 5	S*	—	—	e 5 31	S_g	—
Husan		10·5	263	—	—	e 5 58	S_g	—	—	—
Taikyu		10·7	267	e 2 40	+ 2	e 4 51	SS	—	—	—
Keizyo	E.	11·8	277	3 2	PP	—	—	—	—	—
Zinsen	E.	12·1	277	e 2 54	− 3	—	—	—	—	e 7·4
Irkutsk		30·2	312	e 6 26	+12	e 11 27	+14	—	—	15·7
Calcutta	N.	48·0	268	—	—	e 14 26	?	—	—	—
Frunse		50·6	300	e 9 10	+ 8	—	—	—	—	—
Andijan		52·8	297	e 9 18	− 1	e 17 21	+34	e 10 10	PP	—
Tashkent		54·8	299	—	—	e 17 22	+ 8	—	—	e 29·2
Tchimkent		54·3	300	9 43	+13	—	—	—	—	—
Sverdlovsk		55·3	319	9 38	0	17 26	+ 5	—	—	26·7
Bombay		62·3	274	e 9 30	−56	e 18 9	−43	—	—	—
Pulkovo		68·3	330	e 9 23	?	—	—	e 13 5	PP	34·2
Tiflis		71·0	308	e 11 21	− 1	—	—	—	—	35·9
Tinemaha	z.	75·5	54	e 11 47	− 1	—	—	—	—	—
Santa Barbara	z.	76·1	57	e 11 47	− 4	—	—	—	—	—
Mount Wilson	z.	77·3	57	e 11 54	− 4	—	—	—	—	—
Pasadena	z.	77·3	57	e 11 55	− 3	—	—	—	—	—
Riverside	z.	77·9	57	e 12 5	+ 4	—	—	—	—	—
Copenhagen		78·0	334	12 19	+17	—	—	—	—	42·7
Ksara		81·4	305	i 12 22	+ 2	e 22 34	+ 3	e 15 32	PP	—
Tucson		83·3	54	12 28	− 2	—	—	—	—	—
Stuttgart		84·7	330	—	—	e 34 25	?	—	—	e 46·7
La Paz	z.	146·5	60	19 45	[+ 3]	—	—	—	—	—

Additional readings :—
Mizusawa iSE = +1m.15s.
Pulkovo e = +11m.23s.
Tucson i = +12m.31s., +12m.46s., +13m.3s., and +13m.17s.
Long waves were also recorded at Strasbourg, Cheb, Belgrade, Rome, Moscow, Uccle, Potsdam, De Bilt, Paris, Prague, and Baku.

Dec. 9d. Readings also at 0h. (Balboa Heights), 2h. (Mizusawa), 3h. (Erevan, Samarkand, Helwan, Grozny, Ksara, and Tiflis), 4h. (Samarkand, Mount Wilson, Riverside, and Tucson), 5h. (Keizyo, Husan, and Tucson), 6h. (Tiflis, Baku, and Sverdlovsk), 8h. (Almata, Tchimkent, Andijan, and Frunse), 10h. (Nagoya and Mizusawa), 11h. (Ukiah and Tucson), 13h. (near Sebastopol, Fort de France, Huancayo, San Juan (2), Williamstown, Riverside (2), Pasadena, Mount Wilson, Ksara, Tucson, Haiwee, Santa Barbara, and Tinemaha), 14h. (Oaxaca, Puebla, Tacubaya, Tucson, Mount Wilson, Riverside, Baku, Tashkent, Irkutsk, and Sverdlovsk), 15h. (Vladivostok, Sverdlovsk, Irkutsk, Riverside, Mount Wilson, Tucson, Tinemaha, Santa Barbara, and Pasadena), 16h. (Nagoya, Mizusawa, Andijan, Samarkand, Frunse, Tiflis, Tashkent (2), Baku, and Samarkand), 17h. (Mizusawa), 18h. (Mizusawa, Pasadena, Tucson, Mount Wilson, Riverside, and Haiwee), 19h. (Samarkand, Frunse, and Andijan), 20h. (College), 21h. (Samarkand (3), Frunse, Andijan (3), and Tchimkent), 22h. (Tucson), 23h. (Mount Wilson, Tucson ,and Apia)).

Dec. 10d. 16h. Local Japanese shock. Epicentre given as 35°·6N. 139°·9E. by Tokyo Imperial University.

Kamakura P = 3m.34s., S = 3m.46s.
Komaba P = 3m.34s., S = 3m.42s. ?
Mitaka P = 3m.34s., S = 3m.43s.
Tokyo, Cen. Met. Ob. P = 3m.34s., S = 3m.43s.
Tokyo, Imp. Univ. P = 3m.34s., S = 3m.43s.
Tukubasan P = 3m.34s., S = 3m.43s.
Kiyosumi P = 3m.35s., S = 3m.45s.
Koyama P = 3m.35s., S = 3m.49s.
Titibu P = 3m.35s., S = 3m.49s.
Susaki P = 3m.43s., S = 4m.0s.
Nagoya eP = 4m.11s., eS = 5m.9s.
Mizusawa ePE = 4m.17s., eSE = 4m.57s.

Dec. 10d. Readings also at 0h. (Ksara, Samarkand, Tchimkent, and Andijan), 1h. (near Tananarive), 3h. (Tucson), 4h. (Fresno and Huancayo), 10h. (near San Javier), 11h. (Christchurch, Wellington, Tacubaya, and Oaxaca), 12h. (Frunse, Baku, Sverdlovsk, Samarkand, Tchimkent, and Andijan (2)), 13h. (near San Javier), 17h. (near Copiapo, near Weston and Tiflis), 19h. (Ksara).

Dec. 11d. Readings at 1h. (near Zinsen), 2h. (Sverdlovsk, Vladivostok, Baku, Mizusawa, and Nagoya), 3h. (Nagoya, Mizusawa (2), Baku, Sverdlovsk (2), Vladivostok, Koti, Tashkent, and Hukuoka B), 4h. (Frunse, Tiflis, Samarkand, Batavia, Medan, and Andijan), 8h. (Sebastopol and Strasbourg), 11h. (Mizusawa), 12h. (Calcutta, Mizusawa, and Nagoya), 13h. (La Paz), 14h. (Andijan), 16h. (Tinemaha, Riverside, Mount Wilson, Pasadena, and Tucson), 19h. (Rome), 20h. (La Paz), 22h. (La Paz and Medan).

Dec. 12d. 2h. 42m. 17s. Epicentre 37°·1N. 141°·8E. (as on Dec. 9d.).

$A = -\cdot6283$, $B = +\cdot4944$, $C = +\cdot6006$; $\delta = -9$; $h = -1$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m.	s.	m.
Mizusawa		2·1	346	e 0 33	− 4	i 1 10	S_g	—	—	—
Nagoya		4·4	245	e 1 11	+ 1	2 7	+ 5	—	—	—
Koti		7·6	245	e 1 41	−14	—	—	—	—	—
Vladivostok		9·7	312	e 2 20	− 2	e 4 35	+20	—	—	5·2
Hukuoka B		9·9	253	—	—	e 5 7	S*	—	—	—
Keizyo	E.	11·8	277	2 48	− 5	e 3 57	?	—	—	—
Zinsen	E.	12·1	277	e 3 4	+ 7	—	—	—	—	7·6
Irkutsk		30·2	312	—	—	e 11 43?	+30	—	—	15·7
Calcutta	N.	48·0	268	—	—	e 15 54	+13	—	—	—
Andijan		52·8	297	e 9 27	+ 8	e 16 47	0	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tashkent		54·8	299	—	—	e 20 36	SS	—	—	e 30·0
Sverdlovsk		55·3	319	—	—	e 17 24	+ 3	—	—	28·7
Mount Wilson	z.	77·3	57	e 11 43	−15	—	—	—	—	—
Pasadena	z.	77·3	57	e 11 42	−16	—	—	—	—	—
Riverside	z.	77·9	57	e 11 44	−17	—	—	—	—	—
Tucson		83·3	54	i 12 16	−14	—	—	—	—	—

Additional readings :—
Tucson i = +12m.26s. and +13m.14s.
Long waves were also recorded at De Bilt, Rome, and Baku.

Dec. 12d. 19h. Mediterranean epicentre.

Felt scale IV at Alicante and Valencia.

"Boletin de las Observaiones Sismicas—Julio – Dec., 1938," p. 14, Estacion Sismologica y Climatologica de Malaga.

Epicentre 39°·0N. 3°·7E. Depth 25km.

Almeria eP = 46m.59s., iP_g = 47m.5s. and 47m.9s., eS_g = 47m.49s.
Toledo e = 47m.6s., iP = 47m.8s., iP_g = 47m.14s., eS_g = 47m.46s.
Granada iP_g = 47m.14s., i = 47m.21s., iPS_g = 47m.40s., iS_g = 47m.52s. and 47m.56s., SS = 48m.3s.
Malaga iP = 47m.21s., PP = 47m.36s., i = 48m.12s., iS_g = 48m.18s., i = 48m.33s.
Algiers eP = 47m.25s., i = 48m.9s., S_g = 48m.37s.
Bagnères eP_g = +48m.8s., iPP = +48m.16s., iPS = 48m.32s. and 48m.45s., i = 48m.55s., e = 49m.3s., iS_g = 49m.11s., iSS_g = 49m.19s., $iSSS_g$ = 49m.32s., i = 49m.59s., L = 50m.9s.
San Fernando eP_gN = +48m.20s., iS_gN = 49m.12s.
Puy de Dôme eP = 48m.30s., e = 50m.22s.
Chur eP = 49m.15s., eL = 52m.19s.
Zurich eP = 49m.30s., eS = 52m.11s., eL = 52m.43s.
Basle eP = 49m.36s., eS = 52m.15s.
Neuchatel eP = 49m.48s., eS = 50m.48s.
Paris e = 51m.47s.
Uccle eZ = 52m.0s., iNZ = 53m.14s., iEN = 53m.28s.
Jersey eS_g = 52m.14s., e = 52m.45s. and 53m.16s.
Strasbourg eE = 52m.25s., iSSE = 52m.58s., iE = 53m.2s., 53m.10s., and 53m.23s.
Stuutgart e = 52m.54s. and 53m.16s.
Jena ePN = 54m.45s.
Long waves were recorded at De Bilt and Copenhagen.

Dec. 12d. 22h. 2m. 46s. Epicentre 6°·5N. 78°·0W.

A = +·2066, B = −·9720, C = +·1125 ; δ = +12 ; h = +7 ;
D = −·978, E = −·208 ; G = +·023, H = −·110, K = −·994.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Balboa Heights		2·9	328	e 1 1	P_g	i 1 43	+29	—	—	—
San Juan		16·5	43	e 3 53	− 1	7 5	+ 7	e 4 26	PPP	e 8·6
Fort de France		18·4	65	e 4 14	− 4	8 8	SS	—	—	e 10·1
Huancayo		18·6	172	e 4 8	−13	e 7 44	− 2	—	—	8·2
La Paz	z.	24·8	156	5 25	0	i 10 41	SS	—	—	13·9
Weston	z.	36·2	8	i 7 4	− 2	—	—	—	—	—
Tucson		39·9	315	7 37k	0	—	—	i 9 22	PP	20·1
Riverside	z.	45·5	313	e 8 23	0	—	—	—	—	—
Pasadena		46·2	313	e 8 30	+ 2	—	—	—	—	—
Tinemaha		47·6	316	e 8 39	0	—	—	—	—	—
Ksara		105·8	53	e 18 18	PP	e 28 24	PPS	—	—	—
Sverdlovsk		108·4	23	—	—	e 25 14	[+ 9]	e 28 17	PS	46·2

Additional readings :—
Huancayo ePP = +4m.15s., iS = +7m.50s.
Tucson iP = +7m.41s. and +7m.45s., PPP = +10m.22s.
Long waves were also recorded at Philadelphia, De Bilt, Uccle, Rome, La Plata, and Tashkent.

Dec. 12d. 23h. 38m. 38s. Epicentre 37°·1N. 141°·8E. (as on Dec. 5d.).

Strong at Kakioka, moderate at Onahama, Yokohama, Hukusima, slight at Sendai, Tokyo, and Isinomaki.

Epicentre 36°·7N. 141°·9E. Shallow.

Macroseismic radius 200-300km.

See " Seismological Bulletin " of the Central Met. Obs., Japan, for the year 1938," Tokyo, 1940, pp. 133-135.

$A = -\cdot6283$, $B = +\cdot4944$, $C = +\cdot6006$; $\delta = -9$; $h = -1$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Onahama	0·8	257	0 17k	− 1	0 27	− 4	—	—	—
Hukusima	1·2	302	0 27k	+ 3	0 48	+ 7	—	—	—
Mito	1·3	236	0 21k	− 4	0 30	−14	—	—	—
Kakioka	1·5	236	0 25k	− 3	0 44	− 5	—	—	—
Tyosi	1·5	209	0 24	− 4	0 38	−11	—	—	—
Tukubasan	1·6	237	0 25k	− 5	0 42	− 9	—	—	—
Yamagata	1·6	315	0 37a	+ 7	1 2	+11	—	—	—
Kumagaya	2·1	244	0 35	− 2	1 2	− 2	—	—	—
Mizusawa	2·1	346	e 0 46	P_g	i 1 14	S_g	—	—	—
Tokyo, Cen. Met. Ob.	2·1	229	i 0 32k	− 5	0 59	− 5	—	—	—
Tokyo, Imp. Univ.	2·1	229	0 34	− 3	1 1	− 3	—	—	—
Komaba	2·2	230	0 26	−12	0 54	−12	—	—	—
Kiyosumi	2·3	214	0 36	− 4	1 6	− 3	—	—	—
Maebasi	2·3	252	0 39k	− 1	1 9	0	—	—	—
Mitaka	2·3	232	0 41	+ 1	1 9	0	—	—	—
Niigata	2·4	291	1 0	+19	1 29	S_g	—	—	—
Yokohama	2·4	226	0 41	0	1 11	− 1	—	—	—
Kamakura	2·5	226	0 41	− 2	1 15	+ 1	—	—	—
Titibu	2·5	243	0 36	− 7	1 2	−12	—	—	—
Miyako	2·6	3	0 49	P*	1 22	S*	—	—	—
Morioka	2·7	349	0 52	P_g	1 26	S*	—	—	
Mera	2·7	216	0 43	− 2	1 24	S*	—	—	—
Oiwake	2·7	254	0 45	0	1 21	+ 2	—	—	—
Takada	2·8	270	0 55	P_g	1 37	S_g	—	—	—
Hunatu	2·9	237	0 46	− 2	1 22	− 2	—	—	—
Koyama	2·9	232	0 36	−12	1 10	−14	—	—	—
Nagano	2·9	261	0 50	+ 2	1 25	+ 1	—	—	—
Akita	3·0	334	0 53	+ 3	1 59	+32	—	—	—
Ito	3·0	225	0 49	− 1	1 26	− 1	—	—	—
Misima	3·0	229	0 48a	− 2	1 37	S_g	—	—	—
Numadu	3·1	230	0 50	− 1	1 31	+ 2	—	—	—
Osima	3·1	220	0 49	− 2	1 27	− 2	—	—	—
Matumoto	3·2	254	0 49	− 3	1 27	− 5	—	—	—
Yosiwara	3·2	232	0 36	−16	1 15	−17	—	—	—
Susaki	3·3	225	0 49	− 4	1 33	− 2	—	—	—
Toyama	3·4	266	1 0	P*	1 38	+ 1	—	—	—
Hatinohe	3·5	356	1 5	P*	1 47	S*	—	—	—
Iida	3·6	245	0 55	− 3	1 37	− 5	—	—	—
Aomori	3·8	348	1 11	P*	2 2	S_g	—	—	—
Husiki	3·8	267	1 9	P*	1 42	− 5	—	—	—
Omaesaki	3·8	231	0 58	− 3	2 0	S*	—	—	—
Takayama	3·8	257	1 6	P*	2 2	S_g	—	—	—
Wazima	3·9	277	1 2	0	1 58	S*	—	—	—
Hamamatu	4·1	235	1 6	+ 1	1 50	− 5	—	—	—
Kanazawa	4·2	264	1 15	P*	2 2	S*	—	—	—
Hatidyozima	4·3	203	1 4	− 4	1 46	−14	—	—	—
Gihu	4·4	250	1 8	− 2	1 58	− 4	—	—	—
Nagoya	4·4	245	1 9	− 1	2 3	+ 1	—	—	—
Hukui	4·6	257	0 57	−15	1 58	− 9	—	—	—
Hakodate	4·7	350	1 36	P_g	2 38	S_g	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Ibukisan		4·7	251	1 13	− 1	2 8	− 2	—	—	—
Hikone		4·8	250	1 18k	+ 3	2 14	+ 2	—	—	—
Kameyama		4·9	245	1 14	− 3	2 24	S*	—	—	—
Mori		5·1	349	1 31	P*	2 26	S*	—	—	—
Urakawa		5·1	8	1 56	P_g	—	—	—	—	—
Muroran		5·2	353	1 36	P*	—	—	—	—	—
Kyoto		5·3	249	1 21	− 1	2 29	+ 4	—	—	—
Yagi		5·5	245	1 23	− 2	2 35	+ 5	—	—	—
Miyadu		5·6	257	1 27	0	2 29	− 4	—	—	—
Osaka		5·6	247	1 25	− 2	2 52	S*	—	—	—
Toyooka		5·8	257	1 29	0	2 39	+ 1	—	—	—
Kobe		5·9	249	1 28	− 3	2 48	+ 8	—	—	—
Obihiro		5·9	10	2 20	+49	3 58	+78	—	—	—
Sapporo		6·0	356	2 44	S	(2 44)	+ 1	—	—	—
Siomisaki		6·1	236	1 30	− 4	3 0	S*	—	—	—
Sumoto		6·2	247	1 33	− 2	3 2	S*	—	—	—
Wakayama		6·2	244	1 32_a	− 3	3 0	S*	—	—	—
Tokusima		6·6	246	1 39	− 2	3 16	S*	—	—	—
Asahigawa		6·7	3	2 34	+52	—	—	—	—	—
Nemuro		6·8	24	1 46	+ 2	3 1	− 2	—	—	—
Tadotu		7·1	250	1 54	+ 6	3 44	S*	—	—	—
Muroto		7·3	241	1 51	+ 1	3 19	+ 4	—	—	—
Koti		7·6	245	1 57	+ 2	e 3 19	− 4	i 4 3	S_g	3·4
Hirosima		8·1	254	1 59	− 3	3 56	S*	—	—	—
Matuyama		8·1	249	2 1	− 1	4 6	S*	—	—	—
Simidu		8·4	242	2 29	P*	4 23	S_g	—	—	—
Ooita		9·2	249	2 11	− 5	—	—	—	—	—
Izuka		9·7	254	2 17	− 5	4 41	S*	—	—	—
Vladivostok		9·7	312	i 2 30	+ 8	i 4 28	+13	—	—	4·8
Kumamoto		10·0	248	2 29	+ 2	—	—	—	—	—
Miyazaki		10·0	242	2 27k	0	4 21	− 1	—	—	—
Unzendake		10·4	249	2 32	− 2	5 0	SSS	—	—	—
Husan		10·5	263	e 4 43	S	(e 4 43)	+ 8	—	—	(e 5·8)
Taikyu		10·7	267	2 40	+ 2	e 5 2	SSS	—	—	—
Yakusima		11·5	238	2 45	− 3	—	—	—	—	—
Keizyo		11·8	277	2 56	+ 3	5 12	+ 6	—	—	—
Zinsen	E.	12·1	277	e 3 2	+ 5	e 4 51	−23	—	—	7·0
Irkutsk		30·2	312	e 6 22?	+ 8	11 22?	+ 9	—	—	15·4
Calcutta	N.	48·0	268	—	—	e 15 42	+ 1	—	—	—
Almata		48·8	300	e 9 4	+15	—	—	—	—	—
Frunse		50·6	300	e 8 35	−27	—	—	—	—	—
Andijan		52·8	297	e 9 21	+ 2	e 16 59	+12	—	—	—
Agra	E.	54·0	279	—	—	e 17 4	+ 1	—	—	—
Tashkent		54·8	299	e 9 23	−11	e 16 59	−15	—	—	29·4
Sverdlovsk		55·3	319	9 38	0	17 22	+ 1	—	—	25·4
Samarkand		57·1	298	e 10 3	+13	e 17 41	− 4	—	—	—
Bombay	E.	62·3	274	e 10 25	− 1	e 19 5	+13	—	—	—
Moscow		67·4	323	e 10 35	−24	—	—	—	—	31·9
Tinemaha		75·5	54	i 11 51	+ 3	—	—	—	—	—
Pasadena	Z.	77·3	57	i 12 1	+ 3	—	—	—	—	—
Riverside	Z.	77·9	57	e 12 3	+ 2	—	—	—	—	—
Ksara		81·4	305	e 12 22	+ 2	e 23 22	PS	—	—	—
Tucson		83·3	54	12 33k	+ 3	—	—	—	—	—
La Paz	Z.	146·5	60	19 55	[+13]	—	—	—	—	—

Additional readings :—
Koti eN = +3m.28s., eZ = +3m.43s.
Husan gives S as P and L as S.
Tucson P = +12m.44s.
Long waves were also recorded at De Bilt.

Dec. 12d. 23h. 59m. 9s. Epicentre 37°·1N. 141°·8E. (as at 23h. 38m.).

Intensity II at Utunomiya, Onahama, Kakioka, Hukusima, Tukubasan, I at Tyosi, Kumagaya, Tokyo, Yokohama, and Kohu.

Epicentre 36°·6N. 141°·7E. Shallow.

See " Seismological Bulletin " of the Central Met. Obs., Japan, for the year 1938, Tokyo, 1940, pp. 135-136.

$A = -\cdot6283$, $B = +\cdot4944$, $C = +\cdot6006$; $\delta = -9$; $h = -1$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m.	s.	m.
Onahama	0·8	257	0 17k	− 1	0 27	− 4	—	—	—
Hukusima	1·2	302	0 18k	− 6	0 39	− 2	—	—	—
Mito	1·3	236	0 20k	− 5	0 35	− 9	—	—	—
Sendai	1·3	329	0 32a	+ 7	0 53	+ 9	—	—	—
Kakioka	1·5	236	0 25a	− 3	0 32	−17	—	—	—
Tyosi	1·5	209	0 25	− 3	0 39	−10	—	—	—
Tukubasan	1·6	237	0 25	− 5	0 41	−10	—	—	—
Yamagata	1·6	315	0 39	+ 9	1 2	+11	—	—	—
Utunomiya	1·7	250	0 28	− 3	0 47	− 7	—	—	—
Kumagaya	2·1	244	0 35	− 2	1 0	− 4	—	—	—
Mizusawa	2·1	346	e 0 45	P_g	i 1 12	S_g	—	—	—
Tokyo, Cen. Met. Ob.	2·1	229	0 36	− 1	1 0	− 4	—	—	—
Tokyo, Imp. Univ.	2·1	229	0 33	− 4	0 56	− 8	—	—	—
Komaba	2·2	230	0 31	− 7	0 53	−13	—	—	—
Kiyosumi	2·3	214	0 39	− 1	1 2	− 7	—	—	—
Maebasi	2·3	252	0 41	+ 1	1 6	− 3	—	—	—
Mitaka	2·3	232	0 39	− 1	1 3	− 6	—	—	—
Yokohama	2·4	226	0 39	− 2	1 9	− 3	—	—	—
Kamakura	2·5	226	0 39	− 4	1 13	− 1	—	—	—
Titibu	2·5	243	0 39	− 4	1 5	− 9	—	—	—
Miyako	2·6	3	0 49	P*	1 23	S*	—	—	—
Morioka	2·7	349	0 51	P*	1 25	S*	—	—	—
Mera	2·7	216	0 43	− 2	1 20	+ 1	—	—	—
Oiwake	2·7	254	0 43	− 2	1 18	− 1	—	—	—
Takada	2·8	270	0 51	P*	1 29	S*	—	—	—
Hunatu	2·9	237	0 46	− 2	1 21	− 3	—	—	—
Koyama	2·9	232	0 39	− 9	1 12	−12	—	—	—
Nagano	2·9	261	0 49	+ 1	1 25	+ 1	—	—	—
Akita	3·0	334	0 58	P_g	1 44	S_g	—	—	—
Ito	3·0	225	0 50	0	1 27	0	—	—	—
Kohu	3·0	241	0 46	− 4	1 27	0	—	—	—
Misima	3·0	229	0 46	− 4	1 35	S_g	—	—	—
Numadu	3·1	230	0 49	− 2	1 35	S*	—	—	—
Osima	3·1	220	0 46	− 5	1 26	− 3	—	—	—
Matumoto	3·2	254	0 49	− 3	1 24	− 8	—	—	—
Yosiwara	3·2	232	0 39	−13	1 13	−19	—	—	—
Susaki	3·3	225	0 50	− 3	1 30	− 5	—	—	—
Toyama	3·4	266	1 1	P*	1 35	− 2	—	—	—
Hatinohe	3·5	356	1 7	P_g	1 49	S*	—	—	—
Iida	3·6	245	0 56	− 2	1 33	− 9	—	—	—
Aomori	3·8	348	1 9	P*	2 3	S_g	—	—	—
Husiki	3·8	267	1 13	P_g	1 57	S*	—	—	—
Omaesaki	3·8	231	1 8	P*	2 11	S_g	—	—	—
Takayama	3·8	257	1 6	P*	2 0	S*	—	—	—
Hamamatu	4·1	235	1 4	− 1	1 51	− 4	—	—	—
Kanazawa	4·2	264	1 27	P_g	2 17	S_g	—	—	—
Hatidyozima	4·3	203	1 4	− 4	—	—	—	—	—
Gihu	4·4	250	1 7k	− 3	1 59	− 3	—	—	—
Nagoya	4·4	245	1 9	− 1	2 1	− 1	—	—	—
Hukui	4·6	257	0 58	−14	1 59	− 8	—	—	—

Continued on next page.

	△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Hakodate	4·7	350	1 28	P*	—	—	—	—	—
Ibukisan	4·7	251	1 16	+ 2	2 22	S*	—	—	—
Hikone	4·8	250	1 15	0	2 15	+ 3	—	—	—
Kameyama	4·9	245	1 17	0	2 32	S*	—	—	—
Tu	4·9	243	1 18	+ 1	2 17	+ 2	—	—	—
Mori	5·1	349	1 31	P*	2 30	S*	—	—	—
Kyoto	5·3	249	1 22	0	2 30	+ 5	—	—	—
Yagi	5·5	245	1 50	P_g	—	—	—	—	—
Miyadu	5·6	257	1 27	0	2 35	+ 2	—	—	—
Osaka	5·6	247	1 25	− 2	2 44	S*	—	—	—
Toyooka	5·8	257	1 34	+ 5	2 39	+ 1	—	—	—
Kobe	5·9	249	1 28	− 3	2 45	+ 5	—	—	—
Obihiro	5·9	10	1 36	+ 5	2 51	S*	—	—	—
Sapporo	6·0	356	2 10	P_g	3 13	S_g	—	—	—
Siomisaki	6·1	236	1 30	− 4	2 59	S*	—	—	—
Sumoto	6·2	247	1 37	+ 2	3 0	S*	—	—	—
Wakayama	6·2	244	1 32	− 3	2 55	+ 7	—	—	—
Tokusima	6·6	246	1 42	+ 1	3 20	S*	—	—	—
Tadotu	7·1	250	1 52	+ 4	—	—	—	—	—
Muroto	7·3	241	1 53	+ 3	3 14	− 1	—	—	—
Koti	7·6	245	e 1 54	− 1	e 3 21	− 2	e 3 45	S*	—
Hirosima	8·1	254	2 0	− 2	3 59	S*	—	—	—
Matuyama	8·1	249	1 59	− 3	4 7	S*	—	—	—
Vladivostok	9·7	312	e 1 59	−23	i 4 27	+12	—	—	5·0
Hukuoka B	9·9	253	e 5 5	S*	—	—	—	—	—
Kumamoto	10·0	248	2 46	PPP	—	—	—	—	—
Miyazaki	10·0	242	2 9	−18	4 31	+ 9	—	—	—
Unzendake	10·4	249	2 32	− 2	4 41	+ 9	—	—	—
Husan	10·5	263	e 3 48	+73	e 5 33	S*	—	—	—
Taikyu	10·7	267	2 39	+ 1	—	—	—	—	—
Keizyo E.	11·8	277	3 55	+62	—	—	—	—	—
Andijan	52·8	297	e 9 28	+ 9	e 16 59	PS	—	—	—
Samarkand	57·1	298	e 9 54	+ 4	—	—	—	—	—
Baku	68·4	305	e 11 35	+29	—	—	—	—	16·3

Long waves were also recorded at De Bilt, Copenhagen, Tiflis, Stuttgart, Paris, Irkutsk, Sverdlovsk, and Moscow.

Dec. 12d. Readings also at 0h. (Manila, Mizusawa, Nagoya, Irkutsk, Vladivostok, Calcutta, Sverdlovsk, Andijan, Frunse, La Paz, and Riverview), 1h. (Frunse and Andijan), 3h. (Chicago, Little Rock, Cape Girardeau, Tucson, Florissant, St. Louis, Pasadena, Tinemaha, Riverside, Mount Wilson, Berkeley, Fresno, Haiwee, Weston, Ksara, Philadelphia, and La Jolla), 6h. (Berkeley, San Francisco, Vladivostok, Lick, and Branner), 7h. (Butte, Ukiah, Bozeman, Berkeley, Fordham, Irkutsk, Tinemaha, Haiwee, Riverside, Pasadena, Tucson, Sverdlovsk, Andijan, and Samarkand), 8h. (Mizusawa, Batavia, and Malabar), 9h. (Mizusawa, Samarkand, Andijan, Sverdlovsk, Pasadena (2), Riverside (3), Tinemaha, Irkutsk, La Jolla, Ksara, Mount Wilson (3), La Paz, Weston, Fort de France, Tucson (2), La Plata, and Huancayo), 10h. (De Bilt, Sverdlovsk, Samarkand, Tashkent, and Philadelphia), 11h. (Mizusawa and Nagoya), 12h. (Nagoya), 13h. (Mizusawa), 14h. (Andijan and Samarkand), 15h. (Malabar and Tiflis), 16h. (Andijan and Tiflis), 17h. (Berkeley, Riverview, Branner, Lick, San Francisco, Adelaide, and Brisbane), 18h. (Wellington, Perth, and Samarkand), 19h. (Almata, Chur, Zurich, Tchimkent, Samarkand, Mizusawa, Andijan, Nagoya, Frunse, and Rome), 20h. (Sotchi, Nagoya, Mizusawa, Weston, and San Juan), 21h. (near Copiapo, Mizusawa, Nagoya, La Paz, and Rome), 23h. (Mizusawa, Tucson, Riverside, La Paz, and near Copiapo).

Dec. 13d. 9h. Undetermined shock, probably in Baffin Bay.

Shawinigan Falls P = 17m.2s., S = 21m.57s., L = 25·0m.
Ottawa ePZ = 17m.11s., eSZ = 22m.24s., L = 26·0m.
East Machias e = 17m.22s.
Williamstown e = 17m.36s., 23m.39s., i = 26m.4s. and 26m.45s.
Tinemaha iP = 19m.23s.
Haiwee ePEN = 19m.37s.
Riverside iPZ = 19m.44s.a

Continued on next page.

Mount Wilson iP = 19m.45s.a, iPPZ = 21m.21s.
Pasadena iP = 19m.45s.a, ePPZ = 21m.36s.
Tucson iP = 19m.45s., i = 19m.54s., 19m.59s., 21m.6s., and 22m.6s.
Santa Barbara eP = 19m.47s.
La Jolla ePZ = 19m.48s.
Seven Falls e = 21m.38s., L = 25·0m.
Sverdlovsk P = 19m.51s., L = 37·5m.
Frunse eP = 21m.57s.
Cape Girardeau eE = 27m.1s., eSEN = 30m.26s., iE = 30m.41s., eN = 34m.6s.
Little Rock eEN = 27m.20s., 28m.22s., and 29m.43s., iEN = 30m.38s., 31m.47s., 31m.55s., and 32m.4s.
Fordham iZ = 27m.54s., 28m.24s., i = 30m.40s.
Bozeman e = 28m.2s.
Butte e = 28m.9s.
Philadelphia e = 28m.14s.
Florissant eE = 29m.43s., 29m.56s., 30m.15s., and 30m.47s., eZ = 32m.32s., eN = 32m.42s., eZ = 32m.45s.
Columbia e = 30m.18s.
Tashkent e = 47m.14s., eL = 51·0m.
Long waves were also recorded at Paris, De Bilt, Baku, and Weston.

Dec. 13d. 17h. 25m. 28s. Epicentre 38°·6N. 143°·1E. (as on 1938, Dec. 7d.).

Slight at Morioka, Sendai, Utunomiya, and Kakioka.

Epicentre, Pacific 38°·4N. 143°·1E.

Macroseismic radius 200-300km. Shallow.

See " Seismological Bulletin " of the Central Met. Obs., Japan, for the year 1938, Tokyo 1940, pp. 136-138. Macroseismic Chart p. 136.

$A = -\cdot6266$, $B = +\cdot4704$, $C = +\cdot6213$; $\delta = -8$; $h = -1$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m.	s.	m.
Mizusawa	1·6	289	i 0 33a	+ 3	i 0 53	+ 2	—	—	—
Sendai	1·8	259	0 36a	+ 4	0 56	0	—	—	—
Morioka	1·9	306	0 35a	+ 1	1 3	Sg	—	—	—
Yamagata	2·2	261	0 38a	0	1 5	− 1	—	—	—
Hukusima	2·3	248	0 40a	0	1 9	0	—	—	—
Aomori	2·8	231	0 50	+ 3	1 44	Sg	—	—	—
Niigata	3·2	258	1 16	+24	1 50	Sg	—	—	—
Kakioka	3·3	224	0 53	0	1 40	S*	—	—	—
Utunomiya	3·3	231	0 52	− 1	1 36	+ 5	—	—	—
Tyosi	3·4	214	0 56	+ 1	1 59	Sg	—	—	—
Tukubasan	3·4	227	0 54a	− 1	1 32	− 5	—	—	—
Urakawa	3·6	356	1 17	Pg	1 59	Sg	—	—	—
Hakodate	3·7	331	1 6	P*	1 55	S*	—	—	—
Kumagaya	3·8	232	1 2	+ 1	1 41	− 6	—	—	—
Maebasi	3·9	237	1 3a	+ 1	1 28	−22	—	—	—
Tokyo, Cen. Met. Ob.	3·9	225	1 5a	+ 3	2 4	S*	—	—	—
Mori	4·1	332	1 6k	+ 1	2 6	S*	—	—	—
Muroran	4·1	337	1 7	+ 2	2 12	Sg	—	—	—
Katuura	4·2	216	1 23	Pg	2 12	Sg	—	—	—
Yokohama	4·2	223	1 7	0	1 57	0	—	—	—
Nagano	4·3	246	1 11	+ 3	2 3	+ 3	—	—	—
Obihiro	4·3	0	1 9	+ 1	2 17	S*	—	—	—
Mera	4·4	217	1 16	P*	2 18	S*	—	—	—
Kusiro	4·5	12	1 13	+ 2	1 56	− 9	—	—	—
Hunatu	4·7	230	1 13	− 1	2 7	− 3	—	—	—
Kohu	4·7	233	1 19	P*	2 15	+ 5	—	—	—
Matumoto	4·7	242	1 14a	0	2 7	− 3	—	—	—
Sapporo	4·7	343	1 25	P*	2 19	S*	—	—	—
Ito	4·8	224	1 26	P*	2 15	+ 3	—	—	—
Misima	4·8	226	1 17	+ 2	2 16	+ 4	—	—	—
Numadu	4·9	226	1 21	+ 4	2 14	− 1	—	—	—
Osima	4·9	220	1 17	0	2 18	+ 3	—	—	—
Toyama	5·0	250	1 20	+ 2	2 25	+ 7	—	—	—
Nemuro	5·1	21	1 17	− 3	2 12	− 8	—	—	—
Wazima	5·1	258	1 21	+ 1	2 21	+ 1	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Asahigawa		5·2	354	1 29	P*	2 45	S_g	—	—	—
Iida		5·2	236	1 34	P*	2 41	S*	—	—	—
Takayama		5·3	244	1 22	0	2 40	S*	—	—	—
Kanazawa		5·5	250	1 16	− 9	2 36	+ 6	—	—	—
Omaesaki		5·6	227	1 27	0	2 43	S*	—	—	—
Hamamatu		5·8	230	1 30	+ 1	2 30	− 8	—	—	—
Gihu		6·0	240	1 32_a	0	2 50	+ 7	—	—	—
Hukui		6·0	248	1 28	− 4	2 54	S*	—	—	—
Nagoya		6·0	237	1 35	+ 3	2 47	+ 4	—	—	—
Hatidyozima		6·1	208	1 39	+ 5	2 35	−10	—	—	—
Hikone		6·4	241	1 40k	+ 2	3 2	+ 9	—	—	—
Kameyama		6·5	237	1 41	+ 2	3 9	S*	—	—	—
Tu		6·6	236	1 39	− 2	3 7	+ 9	—	—	—
Kyoto		6·9	241	1 48	+ 3	3 15	+10	—	—	—
Miyadu		7·0	247	1 46	0	3 17	+ 9	—	—	—
Yagi		7·2	238	1 49	0	3 41	S*	—	—	—
Osaka		7·3	240	2 3	P*	4 19	S_g	—	—	—
Toyooka		7·3	248	1 53k	+ 3	3 23	+ 8	—	—	—
Kobe		7·5	241	1 48	− 5	3 30	+10	—	—	—
Wakayama		7·7	238	1 58	+ 2	3 35	+10	—	—	—
Siomisaki		7·9	232	1 58	− 1	3 26	− 4	—	—	—
Sumoto		7·9	240	1 58k	− 1	3 55	S*	—	—	—
Ootomari		8·1	359	2 29	P*	4 5	S*	—	—	—
Tokusima		8·2	240	2 12	+ 9	4 11	S*	—	—	—
Tadotu		8·7	243	2 19	+ 9	4 49	S_g	—	—	—
Muroto		9·0	237	2 35	PPP	4 10	+12	—	—	—
Koti	Z.	9·2	240	2 18	+ 2	e 4 51	S*	—	—	—
Hirosima		9·6	248	2 21	0	4 32	S*	—	—	—
Matuyama		9·6	244	2 15	− 6	5 17	S_g	—	—	—
Vladivostok		9·7	302	i 2 23	+ 1	i 4 21	+ 6	—	—	5·0
Simidu		10·1	238	2 17	−11	4 0	−25	—	—	—
Uwazima		10·1	242	2 26	− 2	5 7	S*	—	—	—
Ootia		10·8	243	2 34	− 5	—	—	—	—	—
Izuka		11·2	248	2 44	0	5 27	SSS	—	—	—
Hukuoka B		11·4	248	e 3 34	+47	e 6 18	L	—	—	(e6·3)
Titizima		11·5	184	3 51	+63	—	—	—	—	—
Kumamoto		11·6	244	2 54	+ 4	5 33	SSS	—	—	—
Miyazaki		11·6	239	2 49	− 1	4 43	−18	—	—	—
Husan		11·8	257	e 2 50	− 3	e 4 58	− 8	—	—	—
Taikyu		11·9	261	i 2 54	0	5 8	− 1	—	—	—
Keizyo		12·8	271	3 6	0	e 5 50	SS	—	—	7·2
Zinsen		13·0	270	3 9	0	e 6 5	SSS	—	—	7·2
Tomie		13·1	247	3 12	+ 2	6 34	L	—	—	(6·6)
Yakusima		13·2	236	3 12	+ 1	5 41	+ 1	—	—	—
Heizyo		13·6	277	i 3 2_a	−15	5 54	+ 4	—	—	7·5
Zi-ka-wei	E.	19·2	256	e 4 28	0	—	—	—	—	—
Taito		24·5	237	5 21	− 1	9 49	+ 9	—	—	—
Hong Kong		29·6	247	6 11	+ 2	11 12	+ 8	7 3	PP	14·9
Irkutsk		30·1	311	6 13	0	e 11 15	+ 3	—	—	15·5
Manila		30·9	225	i 6 22	+ 2	i 11 37	+13	—	—	15·0
Phu-Lien		36·0	251	e 7 4	− 1	e 12 43	− 1	—	—	—
Semipalatinsk		45·1	308	8 18	− 2	—	—	—	—	—
College		47·1	33	—	—	e 15 22	− 6	e 18 50	SS	e 21·9
Almata		49·0	300	e 8 40	−10	—	—	—	—	29·0
Calcutta	N.	49·1	268	e 8 56	+ 5	e 16 7	+11	e 16 42	PS	e 24·0
Frunse		50·8	299	e 9 5	+ 1	e 16 30	+10	—	—	30·5
Andijan		53·1	296	e 9 23	+ 2	e 17 0	+ 9	—	—	31·5
Medan		53·3	242	8 32?	−51	16 52	− 2	—	—	31·5
Tchimkent		54·4	300	e 9 27	− 4	—	—	e 11 41	PP	—
Agra	E.	54·8	279	e 9 31_a	− 3	17 11	− 3	9 39	pP	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Sverdlovsk		54·9	319	i 9 32	− 3	17 14	− 2	—	—	24·5
Tashkent		55·0	299	9 33	− 2	e 17 15	− 2	—	—	29·5
Batavia		55·8	226	9 38	− 3	i 17 27	− 1	—	—	—
Samarkand		57·3	297	e 9 50	− 2	—	—	e 11 46	PP	—
Bombay		63·2	274	i 10 7	−25	e 19 4	+ 1	12 56	PP	—
Kodaikanal	E.	64·7	263	e 11 42	+60	—	—	—	—	—
Colombo	E.	65·0	258	e 10 2	−42	—	—	—	—	—
Moscow		66·8	324	10 56	0	19 47	− 1	—	—	32·0
Pulkovo		67·5	330	e 10 59	− 1	e 19 54	− 2	—	—	e 35·7
Baku		68·4	306	i 10 55	−11	e 19 49	−18	e 13 51	PP	36·0
Grozny		69·4	310	e 11 12	0	—	—	—	—	—
Tiflis		70·9	309	i 11 21a	0	e 20 31	− 5	13 58	PP	36·0
Tinemaha		73·8	56	e 11 43	+ 5	—	—	—	—	—
Mount Wilson	z.	75·6	58	e 11 49	+ 1	—	—	—	—	—
Pasadena	z.	75·6	58	i 11 53	+ 5	—	—	—	—	—
Riverside	z.	76·2	58	e 11 56	+ 4	—	—	—	—	—
Copenhagen		77·1	335	i 11 57	0	21 44	− 2	—	—	40·5
Potsdam		79·5	332	e 11 32	−38	—	—	e 14 32	PP	—
Hamburg		79·7	339	e 12 10	− 1	—	—	—	—	e 43·5
Bucharest		79·7	320	e 11 51	−20	—	—	—	—	e 46·9
Prague		80·5	330	—	—	e 22 23	+ 1	—	—	e 42·5
Budapest		80·8	326	e 12 2	−15	—	—	—	—	e 46·0
Kecskemet		81·0	324	e 11 16	−62	e 23 15	PS	e 17 10	PPP	e 34·5
Jena		81·2	332	e 12 20	+ 1	e 22 32	+ 3	—	—	e 38·5
Ksara		81·3	306	i 12 21a	+ 1	e 22 30	0	e 15 26	PP	—
Cheb		81·6	331	—	—	e 36 32?	?	—	—	44·5
Tucson		81·6	55	12 23	+ 2	—	—	i 16 12	PP	e 32·7
Belgrade		82·2	321	e 12 24a	0	e 22 33	− 6	e 15 36	PP	e 45·8
Sofia		82·4	320	e 12 26	+ 1	e 22 35	− 6	—	—	—
De Bilt		82·5	336	—	—	e 22 44	+ 2	—	—	e 40·5
Bidston		83·7	341	—	—	i 23 8	+14	—	—	e 42·5
Stuttgart		83·9	332	i 12 33a	0	e 22 48	− 8	e 12 46	P_cP	e 49·5
Uccle		83·9	336	e 12 33	0	e 22 57	+ 1	—	—	e 40·5
Strasbourg		84·6	333	i 12 36a	0	e 23 2	− 1	e 15 55	PP	e 43·0
Triest		84·6	327	e 12 35	− 1	22 59	− 4	—	—	—
Kew		84·8	338	—	—	i 23 4	− 1	—	—	e 42·5
Basle		85·5	332	e 12 41	0	—	—	—	—	—
Paris		86·2	336	—	—	e 23 32?	+13	—	—	48·5
Helwan		86·8	306	i 12 47k	0	23 24	− 1	16 10	PP	—
Florence		87·1	327	e 12 27	−22	—	—	—	—	—
Rome		88·1	326	e 13 22	+28	i 23 27	[+ 7]	e 16 30	PP	e 44·5
Florissant	E.	88·7	39	—	—	i 23 39	− 4	—	—	—
Seven Falls		89·4	23	—	—	e 23 56	+ 7	—	—	45·5
Toledo		96·3	335	—	—	e 39 48	?	—	—	53·0
Huancayo		136·8	63	e 23 4	PP	—	—	e 23 49	PKS	—
La Paz	z.	144·9	60	i 19 46	[+ 7]	—	—	—	—	79·5

Additional readings :—
Mizusawa iSE = +57s.
Kelzyo eEN = +4m.52s.
Hong Kong SS = +12m.49s.
Calcutta eSSN = +19m.28s., eSSS = +20m.50s.
Agra PPE = +11m.36s., sSE = +17m.26s., SSE = +20m.56s.
Bombay iEN = +19m.20s. and +23m.27s.
Baku SS = +25m.20s.
Tiflis PPPZ = +15m.41s., eN = +20m.45s., eZE = +20m.54s., eE = +21m.45s.
Mount Wilson iPZ = +11m.53s., iZ = +12m.43s.
Kecskemet iZ = +12m.17s., eZ = +14m.23s.
Ksara ePS = +23m.11s., eSS = +27m.51s.
Tucson iP = +12m.30s. and +12m.57s.
Sofia eE = +22m.48s.
Stuttgart eS_cS = +23m.6s., eL_g = +45·5m.
Helwan i = +13m.0s., +13m.26s., and +23m.12s., e = +24m.10s. and +25m.12s.
Long waves were also recorded at Istanbul, Aberdeen, Göttingen, Stonyhurst, Edinburgh, San Fernando, Fort de France, Jersey, Algiers, Puy de Dôme, Weston, and Upsala.

Dec. 13d. Readings also at 2h. (Sverdlovsk, Ksara, Andijan, Riverview, Irkutsk, Tucson, Riverside, Mount Wilson, Tashkent, Baku, Santiago, Vladivostok, Perth, Melbourne, Tiflis (2), Erevan, Medan, Batavia, and Manila), 3h. (Copenhagen, Mizusawa, Nagoya, and La Paz), 4h. (Zurich), 5h. (Christchurch, Wellington, and Monowai), 6h. (Monowai, La Paz, near Santiago, and San Javier), 7h. (Fort de France), 9h. (near Santiago and Tucson), 12h. (Baku, Irkutsk, Ksara, and Sverdlovsk), 14h. (Tucson, Philadelphia, Puebla, Oaxaca, Merida, Tacubaya, Fort de France, Mount Wilson, and Huancayo), 15h. (Columbia, Baku, Tashkent, and Mizusawa), 16h. (Tashkent, Baku, Sverdlovsk, Irkutsk, Wellington, Nagoya, and Vladivostok), 17h. (near San Javier), 18h. (Nagoya, Huancayo, Philadelphia, and Mizusawa), 20h. (Fordham), 21h. (Branner, Sydney, Brisbane, Tinemaha, Mount Wilson, Riverside, Riverview, and Andijan), 22h. (Sverdlovsk and Tashkent), 23h. (Sverdlovsk, Tashkent, Mizusawa, and Irkutsk).

Dec. 14d. 13h. Undetermined shock attributed by Pasadena to 21°·0S. 180° approximately.
Brisbane iE = 7m.48s., iN = 10m.42s., eE = 10m.48s., iN = 13m.24s.
Batavia iP = 9m.13s., SEN = 18m.1s.
La Jolla ePN = 9m.21s., eSN = 18m.27s.
Santa Barbara iPZ = 9m.28s.
Mount Wilson iP = 9m.33s.k, iZ = 9m.43s.
Pasadena iP = 9m.33s.k, iZ = 9m.43s.
Riverside iP = 9m.35s.k, eSEN = 18m.39s.
Hawiee iP = 9m.39s.k, eSN = 18m.53s.
Tinemaha iP = 9m.40s., eZ = 10m.6s., eSN = 18m.56s.
Tucson iP = 9m.56s., i = 10m.5s., 10m.46s., 11m.1s., 11m.6s., 11m.18s., 11m.46s., 12m.9s., 19m.26s., 19m.37s., 19m.48s., 20m.12s., 36m.34s., and 39m.4s.
Andijan e = 16m.10s., 18m.20s., and 22m.18s.
Sverdlovsk P = 16m.23s., e = 18m.3s., L = 45·0m.
Simferopol P = 17m.2s., e = 17m.24s.
Sebastopol e = 17m.4s.
Ksara iPKP = 17m.12s., ipPKP = 19m.28s., i = 20m.0s., PP = 20m.28s., e = 22m.20s.
Jena ePN = 17m.13s., ePE = 17m.16s.
Uccle ePKP = 17m.14s.
Zurich e = 17m.16s., i = 17m.24s.
Basle e = 17m.18s. and 17m.24s.
Chur e = 17m.18s.k, i = 17m.25s.
Helwan iP = 17m.18s.k, i = 17m.36s.
Neuchatel e = 17m.18s.
Strasbourg iPKPZ = 17m.24s.
Florence e = 17m.44s.
Grozny eP = 19m.35s.
Samarkand e = 23m.6s.

Dec. 14d. Readings also at 2h. (Tashkent, Baku, La Paz, Mizusawa, Tucson, and San Juan), 3h. (Mizusawa, Baku, Nagoya, Vladivostok, and Sverdlovsk), 4h. (La Plata, Nagoya, La Paz, Tiflis, and near Copiapo), 5h. (Helwan, Vladivostok, Mizusawa, and Tucson), 6h. (Mizusawa, Sverdlovsk, Baku, and Huancayo), 7h. (Mizusawa and Tiflis), 8h. (Zinsen, near Copiapo, and near Tananarive), 10h. (Samarkand, Tchimkent, Baku, Tashkent, Frunse, and Andijan), 11h. (Sebastopol, Mizusawa, and Nagoya), 12h. (near Batavia, Irkutsk, Baku, Sverdlovsk, and Malabar), 15h. (Mizusawa), 16h. (Malabar and Mizusawa), 21h. (near Tananarive), 22h. (near Santiago), 23h. (Andijan and Frunse).

Dec. 15d. 9h. 11m. 23s. Epicentre 40°·3S. 176°·4E.

$A = -\cdot7633$, $B = +\cdot0484$, $C = -\cdot6443$; $\delta = +9$; $h = -2$;
$D = +\cdot063$, $E = +\cdot998$; $G = +\cdot643$, $H = -\cdot040$, $K = -\cdot765$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Bunnythorpe	0·6	271	0 37	+22	0 44	+18	—	—	—
Hastings	0·8	29	0 37	+19	0 47	+16	—	—	—
Tuai	1·6	21	0 37?	+ 7	0 54	S_g	—	—	—
Wellington	1·6	232	0 28	− 2	0 47	− 4	—	—	—
New Plymouth	2·2	304	0 37	− 1	0 47	−19	0 42	P_g	—
Arapuni	2·3	345	0 43	+ 3	1 11	+ 2	1 1	P_g	—
Takaka	2·8	259	0 37?	−10	1 5	−17	0 57	P_g	—
Christchurch	4·3	220	1 10	+ 2	1 50	−10	1 28	P_g	—
Riverview	21·1	281	e 4 40	− 8	i 8 46	+ 7	i 5 2	PP	e 10·5
Sydney	21·1	281	i 5 4	+16	i 8 37	− 2	—	—	e 10·9

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		m.
		°	°	m. s.	s.	m. s.	s.	m. s.		L.
Brisbane		23·1	298	i 5 7	− 1	i 9 7	− 9	i 10 1	SS	—
Melbourne		24·4	267	e 5 23	+ 2	i 9 32	− 7	—	—	11·1
Batavia		70·3	280	11 13	− 4	i 20 23	− 6	—	—	—
Manila		75·0	305	11 47	+ 2	18 14	?	—	—	—
Medan		82·9	282	12 36	+ 8	22 38	− 8	—	—	—
Riverside	z.	95·9	50	e 13 25	− 5	—	—	—	—	—
Tucson		98·7	55	i 13 42	0	—	—	i 17 42	PP	45·5
Sverdlovsk		136·1	315	e 19 19	[− 4]	—	—	e 22 47	PP	63·6
Baku		139·7	288	e 22 27	PP	e 29 13	{− 6}	41 49	SSP	70·6
Tiflis		143·8	288	e 19 28	[− 8]	—	—	e 22 59	PP	76·1
Ksara		148·0	270	e 19 41	[− 3]	33 28	PS	23 15	PP	—
Moscow		149·0	314	e 19 57	[+11]	—	—	—	—	—
Helwan		149·7	261	e 19 44	[− 2]	—	—	—	—	—

Additional readings :—
Hastings +42s.
Wellington P_gEZ = +34s.
Christchurch P* = +1m.16s.
Riverview ePE = +4m.44s., iEN = +5m.19s., iSS = +8m.59s.
Batavia iP = +11m.25s.k.
Medan P?E = +12m.41s.
Tucson iPP = +17m.55s.
Baku e = +23m.0s., +45m.37s., +51m.49s., and +58m.7s.
Ksara $iPKP_2$ = +19m.51s., ePPS = +36m.24s.
Moscow e = +20m.31s.
Helwan i = +19m.49s. and +20m.2s.
Long waves were also recorded at Huancayo, Uccle, Pasadena, and Tashkent.

Dec. 15d. Readings also at 1h. (Rome), 4h. (near San Javier), 5h. (near Santiago, Tucson, Weston, and Apia), 8h. (Manzanillo, La Paz, and Huancayo), 9h. (La Paz and Tucson), 11h. (Florence, Andijan, and Williamstown), 13h. (Erevan, Tiflis, and Fort de France), 14h. (Andijan, near San Javier, Frunse, and Samarkand), 15h. (Mizusawa, Nagoya, Wellington, and New Plymouth), 16h. (Tiflis), 17h. (Mizusawa and Tiflis), 18h. (Mizusawa, Tucson, and Apia), 19h. (Malabar and Samarkand), 21h. (Frunse, Samarkand, Andijan, Williamstown, Weston, Tchimkent, Almata, and Tashkent), 22h. (Sebastopol, Huancayo, and La Paz), 23h. (La Plata, Andijan, and Frunse).

Dec. 16d. 11h. 2m. 59s. Epicentre 39°·5N. 33°·7E. (as on 1938 July 21d.).

A = +·6437, B = +·4293, C = +·6335 ; δ = −3 ; h = −2 ;
D = +·555, E = −·832 ; G = +·527, H = +·351, K = −·774.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Yalta		5·0	3	e 1 18	0	—	—	—	—	—
Simferopol		5·4	3	1 24	0	2 22	− 6	—	—	—
Theodosia		5·7	13	1 27	− 1	2 30	− 5	—	—	—
Ksara		6·0	161	i 1 31	− 1	2 50	+ 7	3 37	S_g	—
Sotchi		6·0	46	e 1 10	−22	—	—	—	—	—
Bucharest		7·5	313	e 2 25	P_g	e 3 56	S*	—	—	5·4
Erevan		8·3	83	e 2 4	0	e 4 35	S_g	—	—	—
Piatigorsk		8·3	54	e 1 1	−63	—	—	—	—	—
Sofia	E.	8·5	296	e 2 25	P*	e 4 38	S_g	—	—	—
Tiflis		8·7	72	2 6	− 4	e 4 1	+11	—	—	4·4
Grozny		9·8	63	e 2 38	+14	e 5 29	S_g	—	—	—
Helwan		9·8	192	i 2 25k	+ 1	—	—	—	—	i 5·2
Baku		12·4	80	3 0	− 1	5 30	+ 9	—	—	7·0
Moscow		16·5	8	e 3 54	0	e 7 8	+10	—	—	e 10·5
Florence		17·3	292	e 4 1	− 3	—	—	—	—	—

Continued on next page.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		m.
	°	°	m. s.	s.	m. s.	s.	m. s.		L.
Chur	19·0	302	e 4 30	+ 4	—	—	—	—	—
Zurich	19·8	303	e 4 38	+ 3	—	—	—	—	—
Moncalieri	20·0	295	e 4 1?	−36	—	—	—	—	—
Pulkovo	20·4	357	e 4 40	− 1	e 8 32	+ 7	—	—	—
Basle	20·5	303	4 45	+ 3	—	—	—	—	—
Neuchatel	20·8	302	e 4 47	+ 2	—	—	—	—	—
Copenhagen	21·5	328	4 56	+ 4	—	—	—	—	12·0
Sverdlovsk	24·7	37	5 22	− 2	9 46	+ 2	—	—	12·0
Samarkand	25·6	79	e 5 38	+ 6	—	—	—	—	—

Additional readings :—
Bucharest iN = +4m.3s., iE = +4m.31s., iN = +4m.55s.
Long waves were recorded at Belgrade and Triest.

Dec. 16d. 17h. 21m. 26s. Epicentre 45°·0S. 167°·0E.

Widely felt in the Southern Island of New Zealand. Force VI-VII at Queenstown ; IV at a number of points in the districts of Otago and Southland.

Epicentre 45°·0S. 167°·0E. (Wellington). Depth 100kms. approx. (Riverview).

J. Henderson and R. C. Hayes.

Dominion Observatory, Wellington W.I., New Zealand, Bulletin No. S. 56. Earthquakes in New Zealand (1938), Wellington, 1940, pp. 6-7.

$A = -\cdot6913$, $B = +\cdot1596$, $C = -\cdot7047$; $\delta = -3$; $h = -4$;
$D = +\cdot225$, $E = +\cdot974$; $G = +\cdot687$, $H = -\cdot159$, $K = -\cdot710$.

A depth of focus 0·005 has been assumed.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Monowai	0·9	151	0 34?	S	(0 34?)	+ 3	—	—	—
Christchurch	4·3	71	1 6	+ 1	1 53	− 1	1 29	P_g	—
Takaka	5·9	47	1 34?	+ 7	2 44	+10	—	—	—
Wellington	6·8	59	1 40	+ 1	2 57	+ 1	—	—	—
Arapuni	9·5	46	2 30	+13	4 10	+ 7	—	—	4·8
Chatham Ils.	11·8	81	2 34?	−14	4 58	0	3 4	PP	—
Riverview	16·5	307	i 3 50	+ 1	i 6 37	−12	4 7	pP	—
Melbourne	18·0	287	i 4 6	− 1	7 47?	+24	—	—	8·7
Brisbane	20·7	324	i 4 40	+ 3	i 8 46	+26	i 5 28	PP	—
Adelaide	23·9	285	i 5 14	+ 5	e 9 38	+21	i 5 50	PP	10·9
Apia	35·9	38	e 7 1	+ 5	e 12 42	+14	e 8 18	PP	—
Perth	41·5	271	7 52	+10	14 11	+18	9 33	PP	i 19·2
Palau	59·7	322	10 10	+10	14 25	PPP	—	—	—
Batavia	64·8	288	i 10 36a	+ 2	i 19 20	+12	—	—	29·6
Manila	72·5	314	i 11 24a	+ 2	20 48	+ 8	—	—	33·6
Honolulu	73·4	35	e 11 30	+ 3	e 20 47	− 3	e 25 36	SS	31·1
Medan	77·4	288	e 11 59	+ 9	i 21 41	+ 7	i 12 5	pP	38·6
Miyakozima	79·2	324	12 30	+30	22 14	+21	—	—	—
Taito	79·3	318	12 2	+ 2	22 19	+25	30 28	SSS	—
Hatidyozima	81·6	338	11 59	−13	22 38	+20	—	—	—
Hong Kong	82·5	312	12 28k	+11	22 52	+25	15 29	PP	—
Miyazaki	83·1	331	12 26	+ 6	22 39	+ 6	—	—	—
Muroto	83·4	334	12 24	+ 2	23 0	+24	16 26	PP	—
Koti	83·9	333	e 12 4	−20	—	—	—	—	22·6
Tokyo Cen. Met. Ob.	84·0	339	13 2	+37	23 8	+26	—	—	—
Gihu	84·6	337	12 29	+ 1	22 47	− 1	28 18	SS	—
Hukuoka B	85·0	331	e 13 22	+52	—	—	—	—	—
Nagano	85·4	338	12 36	+ 4	—	—	—	—	—
Phu-Lien	85·5	306	e 12 42	+10	e 23 1	+ 4	—	—	—
Hamada	85·6	332	12 46	+13	22 56	− 2	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mizusawa	E.	86·9	341	12 47	+ 8	23 18	+ 8	—	—	—
	N.	86·9	341	12 53	+14	22 53	[− 4]	—	—	—
Taikyu		87·7	330	—	—	e 23 16	− 2	—	—	—
Keizyo		89·8	330	e 16 44	PP	—	—	—	—	24·0
Zinsen		89·8	329	e 13 7	+14	—	—	—	—	e 23·7
La Plata		90·7	146	12 58	+ 1	22 4	?	23 16	S_eS	42·8
Colombo	E.	92·8	277	11 24?	?	23 38	[+ 5]	—	—	43·0
Vladivostok		93·2	336	e 13 11	+ 3	e 23 39	[+ 4]	i 17 3	PP	39·3
Tananarive		95·9	237	e 12 35	−46	24 1	[+12]	17 24	PP	43·6
Cape Town	E.	96·4	207	i 17 23	PP	e 24 3	[+10]	i 31 4	SS	—
	N.	96·4	207	i 17 27	PP	e 23 53	[0]	i 31 11	SS	—
Kodaikanal		96·8	278	e 13 24	− 1	i 24 0	[+ 5]	i 30 38	SS	i 44·8
Calcutta	N.	98·4	294	e 13 59	+27	i 24 19	[+16]	e 17 12	PP	47·2
Johannesburg		99·9	218	—	—	e 25 11	+ 7	—	—	48·6
Huancayo		100·2	119	e 13 54	+14	i 24 24	[+12]	17 58	PP	e 39·6
La Paz	Z.	101·0	128	i 13 50k	+ 6	i 24 20	[+ 4]	i 18 7	PP	47·0
Hyderabad		101·1	284	14 9	pP	24 24	[+ 8]	—	—	40·9
Pasadena		103·9	56	e 18 4	PP	—	—	—	—	e 49·6
Ukiah		104·6	49	e 18 10	PP	e 25 11	−32	27 14	PS	e 42·6
Bombay		106·0	281	e 14 9	P	i 24 45	[+ 6]	e 14 20	pP	49·6
Rio de Janeiro		107·0	152	e 18 44	PP	(e 24 48)	[+ 5]	e 33 54	SS	i 50·6
Tucson		107·0	62	e 14 17a	P	24 47	[+ 4]	i 18 28	PP	i 44·2
Agra		108·0	292	e 18 8	PKP	24 51	[+ 3]	28 22	PS	54·0
Dehra Dun	N.	110·0	294	—	—	24 50?	[− 6]	e 28 11	PS	55·1
Irkutsk		110·9	324	e 18 21	PKP	25 11	[+12]	i 19 31	PP	47·6
Victoria		111·2	42	18 58	PP	29 22	PPS	34 34?	SS	52·6
Sitka		112·5	30	e 19 37	PP	29 37	PPS	e 38 49	SSS	e 51·7
Butte		115·0	50	—	—	e 27 6	SKKS	e 29 24	PS	e 46·3
College		115·1	19	e 19 37	PP	e 25 36	[+20]	29 24	PS	e 43·7
Bozeman		115·4	51	e 20 11	PP	e 29 35	PS	—	—	e 46·7
Andijan		120·1	299	e 18 51	PKP	e 30 20	PS	e 20 39	PP	53·6
Tashkent		122·4	298	18 48	PKP	25 55	[+13]	20 40	PP	58·0
Tchimkent		122·7	299	e 18 42	PKP	—	—	—	—	—
Samarkand		122·9	295	e 19 6	PKP	—	—	—	—	—
Florissant	Z.	124·1	67	e 19 10	PKP	e 29 36	PS	e 20 53	PP	68·6
Chicago		127·5	65	e 15 49	P	—	—	e 21 37	PP	52·6
Columbia		127·8	77	e 15 57	P	31 37	PS	e 21 33	PP	e 49·9
San Juan		128·7	104	e 19 11	PKP	e 26 58	[+58]	e 21 25	PP	e 51·2
Fort de France		129·5	112	e 19 4	PKP	—	—	e 21 26	PP	e 22·4
Toronto		133·7	67	e 21 34?	PP	e 31 34?	PS	—	—	e 56·6
Sverdlovsk		134·3	313	i 19 12	PKP	40 10	SSP	i 21 37	PP	64·6
Baku		134·5	288	e 19 15	PKP	—	—	25 3	PPP	66·6
Philadelphia		134·9	74	e 21 50	PP	e 44 44	SSS	e 33 59	PPS	e 55·4
Fordham		136·1	73	i 19 18	PKP	—	—	e 21 58	PP	—
Ottawa		136·8	66	e 19 19	PKP	22 54	SKP	22 4	PP	e 56·6
Williamstown		137·2	71	e 19 17	PKP	e 31 25	PS	e 22 49	PP	—
Vermont		138·1	68	e 22 48	PKS	e 28 41	SKKS	—	—	e 57·6
Erevan		138·2	285	19 33	PKP	e 23 6	PKS	—	—	—
Weston		138·5	72	e 19 24	PKP	e 40 46	SS	e 22 24	PP	e 56·2
Grozny		138·6	290	19 25	PKP	—	—	e 22 43	PP	—
Tiflis		138·6	287	e 19 20	PKP	29 6	SKKS	23 7	PKS	65·6
Seven Falls		140·6	65	e 23 7	PKS	e 32 34	PS	—	—	e 57·6
Piatigorsk		140·7	290	e 19 14	PKP	—	—	—	—	—
Ksara		141·2	271	i 19 21	PKP	e 29 22	SKKS	—	—	66·6
East Machias		142·1	70	23 20	PKS	e 41 11	SS	—	—	65·4
Helwan		142·2	263	19 25	[0]	29 46	SKKS	—	—	—
Theodosia		146·2	288	19 38	[+ 6]	—	—	—	—	—
Moscow		146·7	308	e 19 34	[+ 1]	e 29 27	SKKS	e 23 1	PP	69·1
Yalta		146·9	286	19 41	[+ 8]	—	—	—	—	—
Simferopol		147·0	288	19 49	[+15]	—	—	i 23 35	PP	—
Pulkovo		150·4	315	e 19 46	[+ 8]	e 30 0	SKKS	37 10	?	e 44·2

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Bucharest		152·4	284	e 20 4	[+23]	—	—	—	—	e 88·6
Ivigtut		153·8	39	—	—	31 22	?	35 22	PPS	—
Sofia		153·8	278	e 19 55	[+12]	—	—	e 24 4	PP	—
Belgrade		156·4	282	e 19 55k	[+ 8]	i 30 58	?	i 20 3	P_gP	e 83·4
Kecskemet	z.	157·3	287	e 20 3	[+15]	e 29 31	SKKS	e 24 12	PP	e 77·6
Budapest		157·8	288	e 20 21	[+33]	—	—	i 24 37	PP	e 85·6
Copenhagen		160·7	313	20 4	[+12]	44 58	SS	24 29	PP	—
Triest		160·7	282	e 20 40	[+48]	31 9	SKKS	35 4	PSKS	82·8
Prague		160·8	296	e 20 22	[+30]	31 4	SKKS	e 24 34	PP	e 71·6
Potsdam		161·3	304	e 19 58	[+ 5]	e 31 52	SKKS	i 24 35	PP	e 80·6
Rome		161·3	269	i 19 54a	[+ 1]	i 44 3	SS	i 24 33	PP	e 81·6
Cheb		162·2	297	e 26 34?	S	(26 34)	[−16]	—	—	—
Padova		162·5	282	e 20 33	[+39]	—	—	i 31 22	SKKS	i 37·5
Florence		162·6	276	e 20 4	[+10]	29 34	S	—	—	86·6
Jena		162·6	297	e 19 46	[− 8]	—	—	e 24 34	PP	e 78·6
Hamburg		162·8	309	e 19 45	[−11]	e 50 34?	SSS	e 24 40	PP	77·6
Göttingen		163·4	303	e 20 22	[+27]	—	—	e 24 46	PP	e 78·6
Chur		164·2	287	e 19 56	[0]	—	—	—	—	e 33·6
Stuttgart		164·4	293	e 19 57	[+ 1]	e 31 15	SKKS	e 45 50	SS	e 84·6
Karlsruhe		164·9	295	e 19 57	[+ 1]	—	—	—	—	99·6
Zurich		164·9	288	e 19 57	[+ 1]	—	—	e 24 48	PP	—
Strasbourg	z.	165·3	292	i 20 4	[+ 7]	i 29 50	S	i 25 8	PP	e 80·6
Algiers		165·4	241	e 19 59	[+ 2]	e 31 34	SKKS	i 24 42	PP	e 78·6
Moncalieri		165·4	280	20 45	[+48]	—	—	—	—	—
Basle		165·5	288	e 19 57	[0]	—	—	e 25 1	PP	—
Neuchatel		166·0	287	e 19 58	[0]	—	—	—	—	—
De Bilt		166·1	307	e 20 10	[+12]	e 31 58	SKKS	e 24 58	PP	e 72·6
Marseilles		166·7	270	—	—	e 31 18	SKKS	—	—	e 86·6
Uccle		167·0	303	e 19 59	[+ 1]	i 31 56	SKKS	e 25 16	PP	72·6
Almeria		168·6	230	e 20 2	[+ 3]	e 33 8	?	e 25 20	PP	e 76·8
Paris		168·7	295	e 31 55	S	(31 55)	SKKS	—	—	88·6
Stonyhurst		168·8	324	—	—	30 34	?	—	—	e 55·6
Bidston		169·4	325	—	—	e 37 46	PPS	e 45 44	SS	e 87·6
Kew		169·4	311	—	—	e 37 39	PPS	e 45 35	SS	e 87·6
Granada		169·5	227	i 20 29	[+29]	—	—	e 24 57	PP	80·6
Malaga		169·5	225	e 20 16	[+16]	—	—	e 25 9	PP	77·1
San Fernando		170·0	214	e 20 19	[+19]	e 41 4	?	—	—	75·6
Bagnères		170·3	265	e 20 14	[+14]	e 32 18	SKKS	e 25 5	PP	e 81·6
Rathfarnham Castle		170·6	335	—	—	i 54 55	?	—	—	i 97·2
Jersey		171·4	304	—	—	e 35 34?	?	e 45 14	SS	e 91·1
Toledo		171·7	235	e 20 2	[+ 1]	e 26 44	[−12]	e 25 22	PP	—

Additional readings :—
Chatham Ils. +5m.16s.
Riverview pPE = +4m.11s., iSE = +7m.11s., iSSEN = +7m.29s.
Brisbane iE = +7m.10s., iSE = +8m.52s.
Adelaide i = +5m.30s., iPPP = +6m.0s., i = +6m.56s., +7m.41s., and +8m.30s., iSS = +10m.24s., iSSS = +10m.39s.
Perth i = +10m.37s., SS = +17m.17s. and +18m.34s.
Honolulu P = +12m.10s., eS = +20m.41s.
Hong Kong SS = +28m.10s., SSS? = +34m.14s.
La Plata PS = +22m.40s., SS = +27m.28s., SSS = +30m.16s.
Vladivostok iPPP = +19m.44s., iSKKS = +24m.0s., iS = +24m.22s., iPPS = +26m.16s., iSS = +30m.58s.
Tananarive EN = +13m.23s., PSN = +24m.46s., E = +24m.53s. and +28m.13s., N = +28m.19s. and +31m.32s.
Kodaikanal iPPE = +17m.32s., iSKKSE = +24m.34s., eE = +24m.46s., PSE = +25m.50s., PPSE = +26m.45s., iSSSE = +34m.57s.
Calcutta ePPPN = +19m.3s., ePSN = +25m.5s., eSSN = +31m.48s.
Huancayo i = +27m.6s. iSS = +31m.47s.
La Paz iSZ = +26m.6s., PPSZ = +27m.30s., SSZ = +33m.19s., SSSZ = +36m.22s.
Hyderabad eN = +16m.43s., EN? = +27m.3s., SSN = +29m.34s.
Ukiah eS = +26m.19s., eSS = +32m.58s., eSSS = +37m.18s.
Bombay iPKPEN = +17m.34s., iSKSEN = +25m.11s., iPSEN = +27m.36s., EN = +28m.15s., eEN = +32m.49s., iSSEN = +34m.4s., L_qEN = +43m.49s.
Rio de Janeiro eSN = +34m.0s.
Tucson iPP = +18m.44s., PPP = +21m.29s., iSKKS = +25m.15s., iS = +25m.50s., iPS = +27m.20s., iPPS = +28m.44s ., iSS = +33m.13s.

Continued on next page.

Agra eN = +19m.20s., SS = +34m.28s.
Dehra Dun eN = +34m.48s. and +38m.18s.
Irkutsk SKKS = +26m.19s., PS = +28m.41s., SS = +34m.46s.
College eS = +27m.32s.
Tashkent PPP = +23m.21s., eSS = +35m.10s., eSSS = +41m.34s.
Columbia ePKS = +22m.32s.
San Juan ePPS = +32m.59s.
Sverdlovsk iPKS = +22m.32s., iPPS = +34m.8s.
Baku iPKS = +22m.48s., e = +35m.38s.
Philadelphia ePSPS = +40m.16s.
Fordham iZ = +22m.16s., iPKSEN = +22m.51s.
Ottawa PPS = +34m.40s.
Weston eSKPE = +23m.4s., ePPPZ = +27m.10s., eZ = +31m.34s., eSKSPZ = +32m.54s., ePPSZ = +35m.10s., eSSSN = +45m.24s.
Grozny e = +22m.59s.
Seven Falls e = +36m.34s. and +42m.10s.
Ksara PP = +22m.43s., SKP = +22m.52s., SKKP = +30m.54s.
Helwan e = +19m.44s., PKP = +22m.49s., e = +32m.1s., SS = +41m.8s.
Simferopol i = +20m.5s.
Pulkovo eS = +29m.21s., SKSP = +33m.58s.
Belgrade iZ = +20m.22s., eZ = +22m.24s., iZ = +24m.8s., eNW = +26m.42s., iNW = +29m.0s. and +34m.35s.
Kecskemet eZ = +20m.35s. and +32m.1s.
Budapest iN = +24m.41s.
Copenhagen PKP_2 = +20m.47s., eE = +29m.4s., eN = +30m.46s. and +32m.16s., SKSPE = +35m.28s., PPS = +38m.16s.
Triest e = +22m.9s.
Prague e = +38m.34s.?, +45m.34s., and +50m.46s.
Potsdam eZ = +20m.52s., +21m.28s., +25m.34s., +26m.40s., and +34m.34s.?
Rome i = +20m.10s., $iPKP_2$ = +20m.47s., i = +22m.0s., +24m.59s., +25m.25s., and +26m.12s., iE = +28m.3s., iPPPE = +28m.23s., iPPPZ = +28m.32s., iE = +31m.14s., iPSKSZ = +35m.15s., iSSE = +44m.50s., iE = +51m.19s.
Cheb e = +30m.34s.? eS? = +35m.34s.?
Jena eZ = +19m.54s., eE = +39m.34s., eN = +40m.58s. and +65m.34s.
Stuttgart iZ = +21m.3s., iZE = +21m.8s., eE = +24m.52s., e = +32m.34s., +38m.34s., +41m.0s., +45m.52s., and +52m.22s.
Zurich e = +21m.9s.
Strasbourg iZ = +20m.21s., $iPKP_2Z$ = +21m.7s.
Algiers PSKS = +38m.34s.? SS = +47m.25s., iSSS? = +52m.34s.
De Bilt eE = +52m.37s.
Marseilles eN = +63m.34s.?
Uccle i = +35m.38s. and +52m.47s.
Paris e = +35m.51s.
San Fernando eSKSE = +21m.33s., ePSPSN = +31m.6s.
Bagnères eE = +24m.4s., eSS = +47m.34s., eSSS = +53m.34s., eN = +57m.34s.
Rathfarnham Castle i = +58m.44s.
Jersey e = +50m.59s.
Toledo iPKP = +20m.14s., $ePKP_2$ = +21m.25s.
Long waves were also recorded at Berkeley, Edinburgh, Besançon, and Upsala.

Dec. 16d. 23h. 14m. 54s. Epicentre 45°·0S. 167°·0E. (as at 17h.).

Felt intensity IV in the districts of Otago and Southland.

Epicentre 45°·5S. 166°·2E. (Wellington).

See Seismological Report from New Zealand stations, Dominion Observatory, Wellington, Bulletin E 81-1938, Dec., p.7.

$A = -\cdot6913$, $B = +\cdot1596$, $C = -\cdot7047$; $\delta = -3$; $h = -4$.

A depth of focus 0·005 has been assumed.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Monowai	0·9	151	0 36?	S	(0 36?)	+ 5	—	—	—
Christchurch	4·3	71	1 1	− 4	1 59	+ 5	—	—	—
Takaka	5·9	47	e 1 36?	+ 9	2 36	+ 2	—	—	—
Wellington	6·8	59	1 32	− 7	2 57	+ 1	—	—	—
Arapuni	9·5	46	2 6	−11	4 6	+ 3	—	—	—
Chatham Ils.	11·8	81	2 54	+ 6	5 18	SS	5 54	SSS	—
Riverview	16·5	307	e 3 39	−10	e 6 53	+ 4	—	—	—
Melbourne	18·0	287	i 3 54	−13	7 33	+10	i 4 26	PP	—
Brisbane	20·7	324	i 4 36	− 1	i 8 30	+10	—	—	—
Apia	35·9	38	6 35	−21	12 17	−11	i 7 46	PP	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Perth		41·5	271	8 1	+19	14 16	+23	9 48	PPP	20·4
Batavia		64·8	288	10 26	− 8	19 13	+ 5	—	—	e 26·1
Manila		72·5	314	e 11 26	+ 4	20 49	+ 9	—	—	33·1
Honolulu		73·4	35	i 16 46	PPP	20 37	−13	e 26 4	SS	e 29·2
Medan		77·4	288	e 11 54	+ 4	i 21 37	+ 3	i 22 18	PS	—
Hong Kong		82·5	312	12 19	+ 2	22 33	+ 6	—	—	—
Koti		83·9	333	—	—	e 22 6	−35	—	—	—
Phu-Lien		85·5	306	e 12 37	+ 5	—	—	—	—	—
La Plata		90·7	146	23 12	S	(23 12)	[− 9]	—	—	—
Colombo	E.	92·8	277	13 27	+20	23 29	[− 4]	—	—	44·0
Vladivostok		93·2	336	e 13 6	− 2	i 24 18	+11	e 17 16	PP	39·6
Tananarive		95·9	237	17 6?	PP	—	—	—	—	44·1
Cape Town		96·4	207	—	—	e 23 41	[−12]	e 30 45	SS	47·4
Kodaikanal		96·8	278	e 13 24	− 1	—	—	—	—	—
Calcutta	N.	98·4	294	e 13 29	− 3	e 23 43	[−20]	e 25 28	PS	47·7
Huancayo		100·2	119	e 17 36	PP	24 27	[+15]	31 59	SS	e 39·7
La Paz	Z.	101·0	128	i 18 2	PP	i 24 30	[+14]	—	—	46·0
Hyderabad		101·1	284	—	—	24 19	[+ 3]	—	—	—
Pasadena		103·9	56	—	—	e 43 6?	?	—	—	e 47·9
Berkeley		104·2	51	—	—	e 39 36	?	—	—	e 50·6
Ukiah		104·6	49	—	—	e 32 33	SS	e 37 47	SSS	e 43·3
Bombay		106·0	281	e 14 19	P	e 25 51	− 4	e 17 24	PP	—
Rio de Janeiro		107·0	152	—	—	e 27 6	PS	—	—	—
Tucson		107·0	62	e 13 40	P	27 21	PS	18 38	PP	44·2
Agra		108·0	292	e 18 32	PP	e 27 53	PS	i 37 45	SSS	—
Irkutsk		110·9	324	e 19 6?	PP	e 25 8	[+ 9]	e 28 37	PS	45·1
Victoria		111·2	42	—	—	e 26 6?	SKKS	46 6?	?	58·1
Butte		115·0	50	—	—	e 29 55	PS	e 35 7	SS	e 48·5
College		115·1	19	e 14 34	P	e 27 7	SKKS	e 29 16	PS	e 46·5
Andijan		120·1	299	e 18 56	PKP	e 30 9	PS	—	—	—
Samarkand		122·9	295	e 18 53	PKP	—	—	—	—	—
Columbia		127·8	77	e 22 30	PKS	e 38 15	SS	—	—	e 54·2
San Juan		128·7	104	e 20 51	PP	e 29 3	S	e 31 42	PS	e 50·4
Fort de France		129·5	112	e 19 7	PKP	—	—	e 22 27	PKS	—
Toronto		133·7	67	e 21 6?	PP	—	—	—	—	56·1
Sverdlovsk		134·3	313	e 19 16	PKP	i 39 24	SS	22 42	PP	59·6
Baku		134·5	288	e 19 17	PKP	40 48	SSP	22 48	PKS	56·1
Philadelphia		134·9	74	—	—	e 40 18	PSPS	—	—	e 63·8
Fordham		136·1	73	—	—	e 34 7	PPS	—	—	—
Ottawa		136·8	66	e 19 21	PKP	—	—	—	—	e 58·1
Weston		138·5	72	—	—	e 39 46	SS	—	—	e 62·8
Grozny		138·6	290	e 19 3	PKP	—	—	—	—	—
Tiflis		138·6	287	19 23	PKP	i 23 0	PKS	—	—	63·7
Seven Falls		140·6	65	e 23 42	PP	—	—	e 42 6?	SSP	68·1
Ksara		141·2	271	e 19 12	PKP	—	—	i 22 30	PP	66·1
Helwan		142·2	263	e 19 19	[− 6]	—	—	22 33	PP	—
Theodosia		146·2	288	e 19 39	[+ 7]	—	—	—	—	—
Moscow		146·7	308	e 19 28	[− 5]	e 23 9	PKS	e 22 52	PP	70·6
Yalta		146·9	286	e 19 42	[+ 9]	—	—	—	—	—
Simferopol		147·0	288	e 19 42	[+ 8]	—	—	—	—	—
Pulkovo		150·4	315	19 41	[+ 3]	42 42	SS	—	—	—
Bucharest		152·4	284	20 6?	[+25]	—	—	—	—	77·1
Sofia		153·8	278	e 20 6	[+23]	—	—	—	—	—
Belgrade		156·4	282	e 19 52k	[+ 5]	—	—	—	—	e 87·1
Upsala		156·4	319	—	—	e 40 6?	?	—	—	e 67·1
Copenhagen		160·7	313	—	—	31 6?	SKKS	—	—	69·1
Triest		160·7	282	—	—	44 26	SS	—	—	e 85·9
Prague		160·8	296	—	—	e 44 36	SS	—	—	e 84·1
Potsdam		161·3	304	e 21 6?	?	e 33 6?	?	—	—	e 75·1
Rome		161·3	269	19 51a	[− 2]	44 36	SS	—	—	85·3
Hamburg	Z.	162·8	309	e 20 47	[+53]	—	—	—	—	e 86·1
Stuttgart		164·4	293	—	—	e 29 12	S	45 12	SS	e 81·1
De Bilt		166·1	307	—	—	e 45 30	SS	—	—	e 74·1
Uccle		167·0	303	—	—	e 45 40	SS	—	—	e 75·1
Paris		168·7	295	—	—	e 39 6?	PPS	—	—	93·1
San Fernando	N.	170·0	214	e 35 12	?	e 45 48	PSPS	—	—	85·6

For Notes see next page.

NOTES TO DEC. 16d. 23h. 14m. 54s.

Additional readings :—
Monowai S? = +48s.
Chatham Ils. +7m.24s.
Riverview eE = +3m.46s., eSE = +5m.58s., iN = +6m.36s., iE = +6m.45s.
Apia eSS = +14m.24s.
Perth i = +8m.8s. and +13m.48s., SS = +17m.1s., SSS = +17m.56s., SSSS = +19m.6s.
Batavia iE = +10m.35s.
Honolulu S_cS = +21m.8s., eSSS = +27m.31s.
Medan eP?E = +12m.5s., iE = +12m.37s.
La Plata P_cP = +23m.48s., PPP = +27m.36s., S = +32m.18s., SS = +37m.54s., SSS = +40m.6s. ?
Colombo ? = +37m.23s.
Vladivostok iPS = +25m.32s., SS = +30m.24s.
Cape Town iE = +37m.53s.
Calcutta iN = +24m.9s., eN = +25m.3s., +30m.6s., and +33m.37s., eL_q = +42m.23s.
Huancayo ePPP = +19m.30s., S = +25m.21s., PS = +25m.59s., PPS = +27m.10s., PKKP = +29m.54s., PSPS = +32m.30s., SSS = +35m.40s.
Ukiah eSS = +32m.57s., ePSPS = +33m.36s.
Bombay eEN = +18m.43s.
Tucson iP = +14m.17s., iPS = +27m.34s., iPPS = +28m.34s., PKKP = +29m.12s., SS = +33m.17s., PSPS = +34m.25s., SSS = +38m.31s.
Agra iE = +28m.3s.
Irkutsk eS = +26m.6s.?, SS = +34m.36s., SSS = +39m.6s. ?
College eSS = +35m.25s., eSSS = +39m.19s.
San Juan ePKS = +22m.29s., ePPP = +23m.54s., eSS = +36m.59s., eSSS = +43m.18s.
Sverdlovsk PKS = +23m.25s., iSSS = +44m.24s.
Baku PPS = +34m.43s., SSS = +45m.36s.
Weston eEN = +58m.16s.
Grozny e = +20m.55s. and +23m.1s.
Ksara i = +19m.29s.
Helwan e = +19m.30s. and +23m.0s., i = +23m.18s.
Copenhagen = +35m.12s., SS = +44m.30s.
Prague e = +51m.6s. ?
Rome iPKP = +20m.38s., S = +50m.51s. ?
Stuttgart eEZ = +35m.25s.

Long waves were also recorded at Jena, Cheb, Bidston, Budapest, Kecskemet, Jersey, Kew, Toledo, Hamburg, Strasbourg, Algiers, Bagnères, Ferndale, Florissant, Göttingen, Vermont, Bozeman, Sitka, Zinsen, Almeria, Stonyhurst, Edinburgh, and Malaga.

Dec. 16d. Readings also at 0h. (Chicago and East Machias), 1h. (near Apia), 4h. (Agra, Calcutta, Irkutsk, Tiflis, Sverdlovsk, Vladivostok, Taikyu, Hukuoka, Koti, Nagoya, near Mizusawa, and near Santiago), 5h. (Baku, Tashkent, Copenhagen, Ksara, and Rome), 6h. (Mizusawa), 7h. (Frunse, Samarkand, and near Andijan), 10h. (Samarkand, Berkeley, Branner, near Fresno, and Lick), 11h. (Tucson), 13h. (Istanbul and Samarkand), 14h. (Tacubaya, Tiflis, and near Nagoya), 16h. (La Paz, Malabar, Taikyu, Samarkand, near Erevan, Tiflis, and near Mizusawa (2)), 17h. (Riverview Christchurch (2), Wellington (2), Monowai, and La Paz), 18h. (Belgrade, Istanbul, Sofia, Sotchi, Sebastopol, Simferopol, Theodosia, Yalta, Bergen, Neuchatel, Zurich, and Victoria), 19h. (Koti, Zinsen, Sitka, Mount Wilson, Ukiah, Pasadena, Riverside, Tucson (2), Fordham, Ottawa, Weston, Williamstown, Christchurch (2), Monowai (3), Wellington (2), and near Tananarive), 20h. (Christchurch, Monowai (2), and Wellington), 22h. (Andijan), 23h. (Riverview).

Dec. 17d. 16h. 35m. 26s. Epicentre 47°·9N. 92°·2E.

$A = -\cdot0258$, $B = +\cdot6724$, $C = +\cdot7397$; $\delta = -6$; $h = -5$;
$D = +\cdot999$, $E = +\cdot038$; $G = -\cdot028$, $H = +\cdot739$, $K = -\cdot673$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Irkutsk	9·0	56	2 12	− 1	—	—	i 2 40	PPP	i 4·6
Almata	11·6	252	2 51	+ 1	5 10	+ 9	—	—	—
Frunse	13·4	255	e 3 14	0	i 6 14	+29	—	—	i 7·1
Andijan	15·9	250	e 3 49	+ 2	6 52	+ 8	—	—	—
Tchimkent	16·9	259	e 3 57	− 2	—	—	—	—	—
Tashkent	17·6	256	i 4 5	− 3	i 7 21	− 2	—	—	e 8·5
Samarkand	19·9	255	e 4 35	− 1	e 8 43	SS	—	—	—
Dehra Dun	20·7	216	e 4 28	−16	i 8 8	−23	—	—	i 11·4
Sverdlovsk	21·1	307	i 4 49	+ 1	i 8 44	+ 5	—	—	12·9
Agra	23·5	211	e 5 10k	− 2	e 9 14	− 9	5 44	PP	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Calcutta	N.	25·5	187	e 5 32	0	i 10 2	+ 5	e 11 7	SS	e 12·5
Zi-ka-wei	N.	27·8	115	e 5 54	+ 1	—	—	—	—	i 15·2
Vladivostok		28·0	84	e 5 52	− 3	e 10 32	− 6	—	—	15·1
Phu-Lien		29·5	152	e 6 3	− 5	—	—	—	—	i 16·0
Baku		30·9	272	i 6 21	+ 1	e 11 28	+ 4	—	—	16·6
Hong Kong		31·0	137	8 55	?	13 5	SS	—	—	15·8
Grozny		32·4	279	6 38	+ 4	e 14 10	SSS	—	—	—
Hyderabad		32·4	204	6 33	− 1	11 42	− 6	7 34	PP	16·5
Bombay		33·0	214	i 6 41	+ 2	i 11 50	− 7	—	—	—
Tiflis		33·8	277	i 6 45a	− 1	e 12 11	+ 1	7 47	PP	14·5
Moscow		33·9	304	6 46	− 1	e 12 19	+ 8	—	—	18·1
Erevan		34·7	275	e 6 55	+ 1	—	—	—	—	—
Mizusawa		36·0	85	—	—	—	—	—	—	—
Sotchi		36·3	283	e 7 9	+ 2	—	—	—	—	—
Pulkovo		37·0	312	e 7 13	0	13 11	+12	—	—	15·1
Theodosia		38·5	287	7 27	+ 1	—	—	—	—	27·6
Simferopol		39·2	288	7 35	+ 3	—	—	—	—	28·6
Kodaikanal	E.	39·5	203	—	—	i 13 24	−13	—	—	i 21·1
Manila		40·9	134	7 46	0	17 8	SSS	—	—	20·8
Colombo	E.	42·2	198	3 54	?	14 12	− 5	—	—	25·6
Upsala		43·1	314	i 8 5	+ 1	e 17 34?	SS	e 9 50	PP	—
Ksara		43·9	272	i 8 10a	0	i 14 47	+ 5	i 8 20	pP	—
Medan	E.	44·5	171	e 8 20	+ 5	—	—	—	—	i 25·8
Bucharest		44·7	291	e 8 16	0	—	—	e 10 13	PP	e 24·5
Copenhagen		47·3	311	i 8 38	+ 1	15 34	+ 3	i 10 29	PP	21·6
Sofia		47·3	290	e 8 39	+ 2	e 21 34?	?	e 10 30	PP	—
Kecskemet	Z.	47·4	297	e 8 38	0	e 19 31	SSS	e 10 32	PP	e 24·6
Budapest		47·5	298	i 8 39	+ 1	e 19 23	SSS	i 10 33	PP	25·6
Belgrade		48·0	293	i 7 44a	−59	e 15 57	+16	e 10 10	PP	e 29·7
Potsdam		48·5	306	e 8 46	0	e 18 34?	SS	e 10 28	PP	—
Bergen		48·7	319	21 41	S	(21 41)	SSS	—	—	25·6
Prague		48·9	303	8 48	− 2	e 20 51	SSS	e 10 41	PP	e 26·3
Helwan		49·4	271	i 8 52k	− 1	16 16	+16	10 49	PP	—
Hamburg		49·6	309	e 8 53	− 2	—	—	—	—	i 23·4
Cheb		50·0	304	e 15 34?	?	e 19 58	SS	—	—	e 29·6
Jena		50·0	304	e 8 58	0	—	—	i 10 52	PP	e 23·6
Triest		51·6	298	e 9 10	0	16 44	+13	11 31	PP	e 26·1
Stuttgart		52·5	304	i 9 18a	+ 1	e 20 40	SS	e 11 21	PP	e 27·6
Karlsruhe		52·8	304	i 9 20	+ 1	—	—	—	—	e 27·8
Padova		52·8	299	e 9 56	+37	—	—	—	—	—
De Bilt		52·9	309	i 9 28	+ 8	—	—	—	—	e 26·6
Chur		53·3	301	e 9 23	0	—	—	e 11 23	PP	e 28·0
Strasbourg		53·4	304	i 9 23	− 1	—	—	i 10 53	PP	25·6
Zurich		53·6	303	e 9 24a	− 1	—	—	—	—	e 27·7
Uccle		54·0	308	i 9 28a	0	—	—	—	—	26·6
Basle		54·1	303	e 9 28	− 1	—	—	—	—	e 29·0
Florence		54·1	297	9 23	− 6	18 4	ScS	—	—	—
Rome		54·4	294	i 9 30a	− 1	17 26	+17	i 11 30	PP	29·5
Neuchatel		54·7	303	e 9 33	0	—	—	—	—	e 29·9
Batavia		55·4	162	9 37	− 1	i 18 49	ScS	—	—	e 28·6
Moncalieri		55·5	301	8 59	−40	e 17 52	+28	—	—	—
Kew		56·0	311	e 9 42	− 1	e 18 24	PPS	e 13 52	PPP	e 28·6
Paris		56·1	306	e 9 48	+ 5	—	—	—	—	29·6
Bidston		56·3	314	e 9 32	−13	e 18 14	PPS	e 13 59	PPP	e 28·6
College		58·3	26	—	—	e 17 59	− 2	—	—	e 24·6
Toledo		65·4	302	i 10 47	0	e 19 40	+10	e 13 7	PP	—
Seven Falls		84·2	348	e 12 37	+ 3	e 22 58	− 1	—	—	38·6
East Machias		86·0	345	—	—	23 16	− 1	—	—	48·2
Ottawa		86·5	351	e 12 45	− 1	—	—	—	—	40·6
Weston		88·9	348	e 12 57	− 1	e 30 35	SS	—	—	e 41·6

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mount Wilson		93·9	25	i 13 19	− 2	—	—	—	—	—
Pasadena	z.	93·9	25	i 13 19	− 2	—	—	—	—	—
Riverside	z.	94·3	25	i 13 21	− 2	—	—	—	—	—
Tucson		97·6	20	e 13 36	− 2	—	—	17 41	PP	54·5
San Juan		111·2	338	e 18 59	[+24]	e 26 14	{+ 1}	e 29 22	PS	e 57·2
Huancayo		142·6	339	—	—	e 41 18	SS	e 47 25	SSS	e 56·9
La Paz	z.	144·8	326	i 19 37a	[− 1]	i 23 0	SKP	—	—	75·1

Additional readings :—
Agra iPE = +5m.14s., sSE? = +9m.34s., SSE = +10m.18s.
Hyderabad SSE = +13m.30s., S_cSE = +17m.26s.
Bombay eSN = +11m.54s.
Tiflis PPPZ = +8m.3s., P_cPZ = +9m.11s., P_cSEN = +13m.11s., eSSE = +14m.3s.
Kodaikanal iE = +15m.30s.
Upsala eE = +8m.13s.
Ksara iPP = +9m.54s.
Copenhagen +19m.10s.
Budapest iE = +10m.43s., iN = +10m.51s.
Belgrade eNE = +22m.52s. and +24m.58s.
Potsdam iZ = +8m.57s., iEZ = +10m.40s. and +10m.48s.
Helwan i = +9m.2s., +10m.58s., and +18m.43s.
Jena iZ = +9m.7s.
Triest SS = +20m.37s.
Stuttgart e = +9m.26s.
Strasbourg iZ = +9m.33s., +9m.52s., +10m.5s., and +10m.13s.
Uccle i = +9m.38s.
Rome iZ = +9m.39s. and +10m.10s., SS = +21m.0s., i = +21m.31s.
College eS = +18m.8s.
Mount Wilson i = +13m.28s.
Pasadena iZ = +13m.29s.
Riverside iZ = +13m.27s.
Tucson iP = +13m.46s., iPP = +17m.51s., PPP = +19m.41s.
Long waves were also recorded at Jersey, Puy de Dôme, Fordham, Malaga, Edinburgh, Stonyhurst, Fort de France, San Fernando, Bozeman, Chicago, Columbia, Almeria, Besançon, Marseilles, Yalta, Nagoya, Hukuoka.

Dec. 17d. Readings also at 0h. (Monowai, Christchurch, and Wellington), 1h. (Mizusawa and Fort de France), 2h. (Monowai and Christchurch), 3h. (Monowai and Christchurch), 4h. (Monowai, Wellington, Christchurch, Medan, and Tacubaya), 5h. (Mizusawa, Wellington, Monowai, and Christchurch), 6h. (Stuttgart, Zurich, and Basle), 8h. (Riverside, Mount Wilson, Wellington, Monowai, Christchurch, and New Plymouth), 9h. (Fort de France, Tiflis, Grozny, and Tucson (2)), 10h. (Wellington, Monowai, and Christchurch), 11h. (Wellington, Christchurch, and Monowai), 12h. (Wellington, Christchurch, Monowai, New Plymouth, La Paz, and Riverview), 13h. (Monowai and Christchurch), 14h. (Wellington (2), Monowai, New Plymouth, and Christchurch), 15h. (Wellington, Monowai, New Plymouth, Christchurch, and Ottawa), 16h. (La Paz, Mizusawa, Keizyo, Taikyu, Zinsen, Heizyo, Husan, and Koti), 17h. (Keizyo, Heizyo, Taikyu, and Zinsen), 18h. (Andijan Frunse, and Ottawa), 19h. (Bucharest), 20h. (Mizusawa), 21h. (Rome), 23h. (Christ- and Monowai).

Dec. 18d. 20h. 55m. 31s. Epicentre 5°·0N. 82°·5W. (as on 1937 March 29d.).

$A = +·1300$ $B = -·9877$, $C = +·0866$; $\delta = -5$; $h = +7$;
$D = -·991$, $E = -·131$; $G = +·011$, $H = -·086$, $K = -·996$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Balboa Heights		4·9	35	e 0 43	−34	—	—	—	—	—
Huancayo		18·7	157	i 4 23	+ 1	i 8 3	SS	—	—	i 9·1
San Juan		20·8	48	4 47	+ 2	8 43	+10	—	—	e 12·6
Fort de France		23·1	65	e 5 14	+ 6	e 9 34	+18	—	—	e 11·8
La Paz	z.	25·7	146	5 36	+ 3	i 10 51	SS	—	—	15·1
Columbia		28·9	4	—	—	e 10 55	+ 2	—	—	e 13·8
Fordham	E.	36·5	13	—	—	e 15 36	SSS	—	—	—
Tucson		37·9	319	i 7 19a	− 1	13 19	+ 6	i 8 36	PP	15·2
Weston	N.	38·5	13	—	—	e 13 29	+ 7	—	—	—
Riverside	z.	43·3	316	i 8 4	− 1	—	—	—	—	—
Mount Wilson	z.	43·9	316	i 8 9a	− 1	—	—	—	—	—
Pasadena		44·0	316	i 8 8	− 3	—	—	—	—	e 22·2
Rio de Janeiro		47·3	127	—	—	e 18 29	SS	—	—	e 23·5

For Notes see next page.

NOTES TO DEC. 18d. 20h. 55m. 31s.

Additional readings :—
Huancayo iPP = +4m.28s., iPPP = +4m.30s.
La Paz iPZ = +5m.43s.
Columbia eS = +11m.19s.
Tucson iP = +7m.28s., iPPP = +9m.6s.
Long waves were also recorded at Philadelphia, La Plata, and Chicago.

Dec. 18d. 21h. 45m. 40s. Epicentre 38°·6N. 143°·1E. (as on 1938 Dec. 13d.).

Intensity I at Mizusawa, Morioka, Utunomiya, and Hukusima.

Epicentre 38°·3N. 142°·9E. Shallow.

See Seismological Bulletin of the Central Met. Obs., Japan, for the year 1938, Tokyo, 1940, pp. 138-140.

$A = -\cdot6266$, $B = +\cdot4704$, $C = +\cdot6213$; $\delta = -8$; $h = -1$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mizusawa	1·6	289	i 0 29	− 1	i 1 6	+15	—	—	—
Sendai	1·8	259	0 29$_a$	− 3	0 41	−15	—	—	—
Morioka	1·9	306	0 33$_a$	− 1	0 59	0	—	—	—
Yamagata	2·2	261	0 37	− 1	1 7	+ 1	—	—	—
Hatinohe	2·3	328	0 38	− 2	1 16	S$_g$	—	—	—
Hukusima	2·3	248	0 36$_a$	− 4	1 30	S$_g$	—	—	—
Onahama	2·5	226	0 42	− 1	1 2	−12	—	—	—
Aomori	2·8	321	0 49	+ 2	1 39	S$_g$	—	—	—
Utunomiya	3·3	231	0 53$_k$	0	1 46	S$_g$	—	—	—
Tyosi	3·4	214	0 52	− 3	1 35	− 2	—	—	—
Tukubasan	3·4	227	0 51	− 4	1 26	−11	—	—	—
Urakawa	3·6	356	1 10	P$_g$	1 59	S$_g$	—	—	—
Hakodate	3·7	331	1 7	P*	2 8	S$_g$	—	—	—
Kumagaya	3·8	232	1 2$_k$	+ 1	1 33	−14	—	—	—
Maebasi	3·9	237	1 2	0	1 28	−22	—	—	—
Tokyo Cen. Met. Ob.	3·9	225	1 1	− 1	1 54	+ 4	—	—	—
Mori	4·1	332	1 7	+ 2	2 5	S*	—	—	—
Muroran	4·1	337	1 4$_a$	− 1	2 32	S$_g$	—	—	—
Yokohama	4·2	223	1 5	− 2	1 45	−12	—	—	—
Nagano	4·3	246	1 9	+ 1	2 12	S*	—	—	—
Obihiro	4·3	0	1 14$_a$	P*	2 22	S$_g$	—	—	—
Mera	4·4	217	1 17	P*	2 24	S$_g$	—	—	—
Kusiro	4·5	12	1 12	+ 1	1 57	− 8	—	—	—
Hunatu	4·7	230	1 11	− 3	2 7	− 3	—	—	—
Matumoto	4·7	242	1 11	− 3	2 21	S*	—	—	—
Sapporo	4·7	343	1 24	P*	2 26	S*	—	—	—
Ito	4·8	224	1 24	P*	2 21	S*	—	—	—
Misima	4·8	226	1 14	− 1	2 35	S$_g$	—	—	—
Osima	4·9	220	1 13	− 4	2 18	+ 3	—	—	—
Toyama	5·0	250	1 18	0	2 25	+ 7	—	—	—
Nemuro	5·1	21	1 15	− 5	2 14	− 6	—	—	—
Wazima	5·1	258	1 20	0	2 21	+ 1	—	—	—
Asahigawa	5·2	354	1 20	− 1	2 34	S*	—	—	—
Iida	5·2	236	1 22	+ 1	2 19	− 3	—	—	—
Takayama	5·3	244	1 27	+ 5	—	—	—	—	—
Kanazawa	5·5	250	1 40	P*	2 50	S*	—	—	—
Omaesaki	5·6	227	1 30	+ 3	3 7	S$_g$	—	—	—
Hamamatu	5·8	230	1 33	+ 4	2 51	S*	—	—	—
Gihu	6·0	240	1 32$_k$	0	2 52	+ 9	—	—	—
Nagoya	6·0	237	1 32	0	3 4	S*	—	—	—
Hatidyozima	6·1	208	1 36	+ 2	2 33	−12	—	—	—
Ibukisan	6·3	241	1 38	+ 2	3 0	+10	—	—	—
Hikone	6·4	241	1 44	+ 6	3 6	S*	—	—	—
Kameyama	6·5	237	1 39	0	3 14	S*	—	—	—
Tu	6·6	236	1 42	+ 1	3 12	S*	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m.	s.	m.
Kyoto		6·9	241	1 44	− 1	3 22	S*	—	—	—
Miyadu		7·0	247	1 46	0	3 16	+ 8	—	—	—
Yagi		7·2	238	1 50	+ 1	3 20	+ 7	—	—	—
Osaka		7·3	240	1 58	+ 8	3 9	− 6	—	—	—
Toyooka		7·3	248	1 48	− 2	3 24	+ 9	—	—	—
Kobe		7·5	241	1 52	− 1	3 36	S*	—	—	—
Wakayama		7·7	238	1 54	− 2	3 30	+ 5	—	—	—
Siomisaki		7·9	232	1 56	− 3	3 51	S*	—	—	—
Sumoto		7·9	240	1 56a	− 3	4 8	S*	—	—	—
Tokusima		8·2	240	2 21	P*	4 34	S_g	—	—	—
Sakai		8·5	252	2 20	PP	—	—	—	—	—
Muroto		9·0	237	2 15	+ 2	—	—	—	—	—
Koti		9·2	240	2 16	0	e 5 6	S_g	—	—	—
Hamada		9·6	251	2 22	+ 1	4 22	SS	—	—	—
Hirosima		9·6	248	2 25	+ 4	4 26	SS	—	—	—
Matuyama		9·6	244	2 22	+ 1	5 12	S_g	—	—	—
Vladivostok		9·7	302	i 2 21	− 1	i 4 27	SS	—	—	4·9
Sikka		10·6	0	2 49	PPP	5 45	L	—	—	(5·7)
Izuka		11·2	248	2 38	− 6	5 15	SSS	—	—	—
Hukuoka B		11·4	248	e 3 44	+57	—	—	—	—	—
Titizima		11·5	184	4 31	S	(4 31)	−28	—	—	—
Miyazaki		11·6	239	2 43	− 7	5 2	+ 1	—	—	—
Husan		11·8	257	e 3 4	PP	—	—	—	—	7·3
Taikyu		11·9	261	2 54	0	6 10	L	—	—	(6·2)
Unzendake		12·0	245	2 58	+ 3	6 7	L	—	—	(6·1)
Keizyo		12·8	271	3 1	− 5	e 5 49	SS	—	—	7·2
Yakusima		13·2	236	3 18	+ 7	—	—	—	—	—
Heizyo		13·6	277	e 3 22	+ 5	e 6 14	SSS	—	—	7·4
Dairen		16·7	278	4 23	PPP	—	—	—	—	—
Miyakozima		20·4	235	4 44	+ 3	8 36	+11	—	—	—
Taito		24·5	237	5 23	+ 1	—	—	—	—	—
Hong Kong		29·6	247	6 9	0	11 0	− 4	—	—	—
Irkutsk		30·1	311	6 9	− 4	e 11 6	− 6	12 38	SS	15·3
Manila		30·9	225	e 6 20	0	10 47	−37	—	—	—
Phu-Lien		36·0	251	e 7 4	− 1	—	—	—	—	—
College		47·1	33	—	—	15 22	−6	—	—	e 20·9
Calcutta	N.	49·1	268	e 8 49	− 2	i 15 56	0	e 19 14	SS	e 23·7
Frunse		50·8	299	e 9 4	0	—	—	—	—	—
Andijan		53·1	296	e 9 21	0	—	—	—	—	—
Medan	E.	53·3	242	10 37	+74	—	—	—	—	29·3
Agra	E.	54·8	279	i 9 28a	− 6	17 10	− 4	9 36	pP	—
Sverdlovsk		54·9	319	i 9 30	− 5	17 13	− 3	—	—	25·8
Tashkent		55·0	299	i 9 31	− 4	17 19	+ 2	—	—	27·5
Samarkand		57·3	297	e 9 49	− 3	e 17 47	0	—	—	30·8
Bombay		63·2	274	i 10 30	− 2	i 19 7	+ 4	e 19 12	PS	—
Colombo	E.	65·0	258	—	—	e 19 20	− 6	—	—	—
Moscow		66·8	324	10 53	− 3	e 19 44	− 4	—	—	35·8
Pulkovo		67·5	330	10 55	− 5	19 56	PS	—	—	e 33·5
Baku		68·4	306	e 11 6	0	e 21 6	PPS	—	—	e 36·3
Grozny		69·4	310	—	—	e 21 30	PPS	—	—	—
Tiflis		70·9	309	i 11 17a	− 4	e 21 7	PS	—	—	38·3
Mount Wilson	Z.	75·6	58	11 47	− 1	—	—	—	—	—
Pasadena	Z.	75·6	58	e 11 51	+ 3	—	—	—	—	—
Riverside	Z.	76·2	58	e 11 49	− 3	—	—	—	—	—
Copenhagen		77·1	335	i 16 56	PPP	—	—	—	—	40·3
Ksara		81·3	306	i 12 17	− 3	e 22 33	+ 3	e 23 17	PS	38·3
Cheb		81·6	331	—	—	e 21 20?	?	—	—	e 44·3
Tucson		81·6	55	12 20a	− 1	—	—	i 12 48	pP	—
Triest		84·6	327	—	—	e 20 21	?	—	—	e 48·7
Helwan		86·8	306	i 12 47a	0	23 23	− 2	16 5	PP	—
Florence		87·1	327	19 15	PPP	—	—	—	—	—
Rome		88·1	326	—	—	e 23 23	[+ 3]	—	—	48·3
Florissant		88·7	39	—	—	i 23 37	− 6	—	—	—
Seven Falls		89·4	23	—	—	e 23 50	+ 1	—	—	43·3
La Paz		144·9	60	19 54	[+15]	—	—	—	—	75·3

For Notes see next page.

NOTES TO DEC. 18d. 21h. 45m. 40s.

Additional readings :—
Calcutta iSSSN = +20m.33s.
Agra PPE = +11m.31s., sSE = +17m.26s., SSE = +20m.48s., iE = +21m.29s.
Samarkand e = +15m.50s.
Copenhagen +33m.20s.?
Tucson P = +12m.23s., isP = +13m.13s.
Helwan i = +23m.8s.
Rome i = +31m.45s. and +36m.58s.
Long waves were also recorded at Toledo, Philadelphia, Uccle, Strasbourg, De Bilt, Stuttgart, Belgrade, Budapest, Prague, Potsdam, Kodaikanal, Zinsen, Fordham, and San Fernando.

Dec. 18d. Readings also at 0h. (Monowai and Christchurch), 1h. (Tucson), 2h. (Tucson), 3h. (Tucson, Wellington, Monowai, Christchurch, and New Plymouth), 4h. (Weston, Andijan, Samarkand, Tucson, Riverside, and Mount Wilson), 5h. (Batavia and Andijan), 6h. (La Paz), 7h. (La Plata, La Paz, Wellington, Baku, Tucson, Huancayo, Christchurch, San Fernando, Helwan, Ksara, Copenhagen, Tiflis, Calcutta, Irkutsk, Cape Town, San Juan, Fort de France, Rio de Janeiro, Sverdlovsk, Malabar, and Melbourne), 8h. (Fresno, San Francisco, Lick, Branner, Berkeley, De Bilt, Cheb, Colombo, and Pulkovo), 9h. (Pasadena, Tucson, Mount Wilson, and Riverside), 11h. (near Istanbul), 12h. (Huancayo and La Paz), 18h. (Riverside and Samarkand), 19h. (Samarkand), 20h. (Tucson), 21h. (Christchurch, Monowai, and Mizusawa), 22h. (Nagoya and Mizusawa).

Dec. 19d. 4h. 53m. 10s. Epicentre 18°·3N. 119°·0E.

$A = -\cdot4606$, $B = +\cdot8310$, $C = +\cdot3121$; $\delta = +12$; $h = +5$;
$D = +\cdot875$, $E = +\cdot485$; $G = -\cdot151$, $H = +\cdot273$, $K = -\cdot950$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Manila		4·2	153	i 1 9k	+ 2	1 57	0	—	—	—
Hong Kong		6·0	312	1 34	+ 2	2 52	+ 9	1 41	P*	3·4
Phu-Lien		11·9	284	e 2 55	+ 1	—	—	—	—	6·8
Nagoya		23·2	40	e 3 58	?	—	—	—	—	—
Vladivostok		27·0	21	e 5 46	+ 1	e 10 24	+ 2	—	—	e 11·5
Calcutta	N.	29·0	284	—	—	e 13 37	?	—	—	—
Irkutsk		35·8	344	e 7 3	0	e 14 50?	SS	—	—	18·8
Agra	E.	38·7	291	e 9 5	PP	—	—	—	—	—
Tashkent		48·1	310	i 8 44	+ 1	e 15 41	− 1	—	—	e 25·4
Sverdlovsk		57·7	326	9 56	+ 1	—	—	—	—	27·3
Moscow		70·3	323	e 11 16	− 1	—	—	—	—	—
Ksara		74·5	301	e 11 45	+ 3	e 21 57	PS	—	—	—

Additional readings :—
Hong Kong ? = +3m.7s.
Irkutsk e = +11m.50s.?
Moscow e = +12m.42s.
Long waves were also recorded at Pulkovo and Baku.

Dec. 19d. 18h. 4m. 53s. Epicentre 54°·5N. 158°·0W.

$A = -\cdot5408$, $B = -\cdot2185$, $C = +\cdot8123$; $\delta = +4$; $h = -7$;
$D = -\cdot375$, $E = +\cdot927$; $G = -\cdot753$, $H = -\cdot304$, $K = -\cdot583$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
College		11·6	22	e 3 14	PPP	e 5 35	SSS	—	—	e 6·1
Sitka		13·0	70	e 3 10	+ 1	—	—	—	—	—
Honolulu		33·1	179	6 41	+ 1	—	—	—	—	e 15·0
Mount Wilson	Z.	34·4	110	i 6 53	+ 2	—	—	—	—	—
Pasadena	Z.	34·4	110	i 6 52	+ 1	—	—	—	—	—
Riverside	Z.	34·9	110	i 6 56a	+ 1	—	—	—	—	—
Tucson		39·9	105	i 7 39a	+ 2	—	—	8 45	PP	e 16·8
Vladivostok		45·7	286	—	—	e 18 27	SS	—	—	—
Chicago		46·6	76	—	—	e 15 6	−15	e 15 20	PS	e 20·6
Cape Girardeau	N.	48·6	83	e 8 45	− 2	—	—	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Ottawa		50·8	65	i 9 2	− 2	—	—	— —	27·1
Seven Falls		52·2	60	e 11 7	PP	—	—	— —	28·1
Irkutsk		53·6	312	e 9 35	+10	e 17 11	+13	e 13 7? PPP	e 24·1
Williamstown		54·0	65	i 9 27	− 1	—	—	— —	—
Fordham	Z.	54·9	67	i 9 32	− 3	—	—	— —	—
Weston		55·2	65	i 9 35	− 2	—	—	— —	e 29·0
Philadelphia		55·6	70	—	—	e 17 27	+ 2	— —	e 21·8
Columbia		55·8	79	—	—	e 20 29	SS	— —	e 30·2
Bergen		64·7	10	e 4 7?	?	—	—	— —	—
Sverdlovsk		64·7	339	10 42	0	19 31	+ 9	— —	—
Andijan		75·8	324	e 11 41	− 9	e 21 50	+19	— —	—
Samarkand		78·6	327	e 12 4	− 1	—	—	— —	—
Toledo		83·4	21	e 12 32	+ 2	—	—	— —	—
Calcutta	N.	85·2	303	—	—	e 23 11	+ 2	— —	—
Agra	E.	85·5	312	i 23 11	S	(e 23 11)	− 1	— —	—
Colombo		102·2	301	—	—	e 28 7?	PPS	— —	—

Additional readings :—
College eS = +5m.41s.
Tucson iP = +7m.47s., iPPP = +9m.58s.
Irkutsk e = +19m.15s.
Weston iZ = +9m.42s.
Long waves were also recorded at Ukiah and Florissant.

Dec. 19d. 18h. 23m. 43s. Epicentre 43°·7N. 147°·6E. (as on 1938 Aug. 17d.).

Moderate at Nemuro and slight at Syana. Epicentre 42°·5N. 147°·7E. Macroseismic radius 200-300kms.

See Seismological Bulletin of the Central Met. Obs. Japan for the year, 1938, Tokyo, 1940, pp. 140-144.

$A = -·6124$, $B = +·3886$, $C = +·6884$; $\delta = -6$; $h = -3$;
$D = +·536$, $E = +·844$; $G = -·581$, $H = +·369$, $K = -·725$.

	△	Az.	P.	O−C.	S.	O−C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Nemuro	1·4	256	0 28	+ 1	0 47	+ 1	— —	—
Kusiro	2·5	253	0 56	P_g	1 28	S_g	— —	—
Obihiro	3·3	259	1 1k	P*	1 51	S_g	— —	—
Asahigawa	3·8	272	1 11	P*	2 10	S_g	— —	—
Urakawa	3·9	248	1 13	P*	2 4	S*	— —	—
Haboro	4·4	281	1 14	+ 4	2 17	S*	— —	—
Sapporo	4·6	264	1 15	+ 3	2 13	+ 6	— —	—
Muroran	5·0	256	1 21k	+ 3	2 22	+ 4	— —	—
Hakodate	5·4	252	1 27	+ 3	2 47	S*	— —	—
Mori	5·4	253	1 27k	+ 3	2 31	+ 3	— —	—
Hatinohe	5·6	236	1 23	− 4	2 26	− 7	— —	—
Aomori	5·8	242	1 29	0	2 40	+ 2	— —	—
Miyako	5·8	228	1 26	− 3	2 29	− 9	— —	—
Morioka	6·3	232	1 32	− 4	2 41	− 9	— —	—
Sikka	6·3	330	1 35	− 1	3 10	S*	— —	—
Mizusawa	6·7	229	i 1 42	0	i 2 52	− 8	— —	—
Sendai	7·4	225	2 3	P*	3 10	− 8	— —	—
Yamagata	7·7	228	2 3	+ 7	3 17	− 8	— —	—
Hukusima	8·0	225	2 3	+ 3	—	—	— —	—
Utunomiya	9·3	222	2 17	0	—	—	— —	—
Kakioka	9·4	220	2 14	− 4	4 0	− 7	— —	—
Tukubasan	9·4	220	2 15	− 3	3 56	−11	— —	—
Tyosi	9·5	215	2 22	+ 2	3 55	−15	— —	—
Kumagaya	9·8	223	2 22	− 2	4 8	− 9	— —	—
Maebasi	9·8	225	2 29	+ 5	3 17	−60	— —	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Nagano		10·0	229	2 33	+ 6	4 33	+11	—	—	—
Tokyo Cen. Met. Ob.		10·0	220	2 30	+ 3	4 9	−13	—	—	—
Wazima		10·3	236	2 32	0	4 27	− 3	—	—	—
Yokohama		10·3	219	2 37	+ 5	4 25	− 5	—	—	—
Matumoto		10·5	228	2 39	+ 4	—	—	—	—	—
Hunatu		10·6	223	2 36	0	4 34	− 3	—	—	—
Mera		10·6	217	2 57	PPP	4 26	−11	—	—	—
Kohu		10·7	224	2 48	PP	—	—	—	—	—
Toyama		10·7	232	2 39	+ 1	4 15	−24	—	—	—
Misima		10·9	221	2 50	PP	4 34	−10	—	—	—
Numadu		10·9	221	2 56	PPP	4 52	+ 8	—	—	—
Kanazawa		11·0	233	2 43	+ 1	—	—	—	—	6·0
Vladivostok		11·4	272	i 2 45	− 2	i 4 35	−21	—	—	6·0
Omaesaki		11·6	222	3 15	PPP	—	—	—	—	—
Gihu		11·8	229	2 49	− 4	4 57	− 9	—	—	—
Ibukisan		12·0	230	2 58	+ 3	—	—	—	—	—
Hikone		12·1	230	3 1	+ 4	—	—	—	—	—
Hatidyozima		12·2	212	3 3	+ 5	5 4	−12	—	—	—
Kameyama		12·4	228	3 5	+ 4	—	—	—	—	—
Toyooka		12·8	235	3 11	+ 5	5 22	− 8	—	—	—
Osaka		13·0	229	3 8	− 1	4 44	−51	—	—	—
Kobe		13·2	231	3 9	− 2	5 58	SS	—	—	—
Wakayama		13·5	230	3 11	− 4	4 40	−67	—	—	—
Sumoto		13·6	231	3 21	+ 4	7 1	L	—	—	(7·0)
Muroto		14·8	230	3 35	+ 3	6 36	SS	—	—	—
Hamada		14·9	239	3 33	− 1	6 17	− 3	—	—	—
Koti		14·9	232	3 33	− 1	6 59	SSS	3 40	PP	e 7·4
Hirosima		15·0	237	3 35	0	6 37	SS	—	—	—
Izuka		16·6	238	3 56	0	8 26	L	—	—	(8·4)
Taikyu		16·6	248	4 1	+ 5	6 16	−44	—	—	—
Husan		16·7	245	e 4 1	+ 4	—	—	—	—	8·0
Hukuoka B		16·8	239	e 5 2	+64	—	—	—	—	—
Keizyo		16·8	256	3 59	+ 1	7 14	+ 9	—	—	—
Kumamoto		17·1	236	3 59	− 3	—	—	—	—	—
Zinsen		17·1	255	e 3 54	− 8	e 7 19	+ 7	—	—	8·8
Miyazaki		17·3	253	4 3	− 1	7 17	+ 1	—	—	(9·0)
Unzendake		17·5	236	4 12	+ 5	7 53	SSS	—	—	—
Yakusima		19·0	230	4 28	+ 2	—	—	—	—	—
Dairen		20·0	264	6 3	?	9 51	?	—	—	—
Nake		21·1	228	4 47	− 1	8 45	+ 6	—	—	—
Irkutsk		29·8	303	6 20	+ 9	11 16	+ 9	—	—	15·3
Hong Kong		34·9	242	6 56	+ 1	12 21	− 6	—	—	16·6
Manila		36·9	225	i 7 12$_a$	0	12 59	+ 1	—	—	18·0
College		40·9	35	e 7 43	− 3	e 13 49	− 9	—	—	17·0
Phu-Lien		40·9	248	e 7 46	0	—	—	—	—	—
Almata		49·8	296	e 8 29	−27	—	—	—	—	35·3
Honolulu		50·2	97	—	—	i 16 14	+ 3	—	—	22·6
Calcutta	N.	52·8	266	i 9 22k	+ 3	i 16 50	+ 3	e 11 19	PP	e 25·4
Sverdlovsk		53·4	318	i 9 19	− 5	16 48	− 7	26 35	L_q	33·2
Andijan		54·0	295	e 9 27	− 1	—	—	—	—	32·3
Tchimkent		55·0	297	e 9 28	− 7	e 15 50	?	—	—	29·8
Tashkent		55·7	297	i 9 33	− 7	i 17 13	−13	—	—	e 28·3
Agra	E.	57·5	278	9 45	− 8	17 40	−10	21 54	SS	—
Samarkand		58·1	296	e 9 54	− 4	e 16 18	?	—	—	—
Medan		58·8	241	e 10 8	+ 6	—	—	—	—	—
Hyderabad		63·2	268	10 29	− 3	18 53	−10	—	—	—
Moscow		64·7	324	e 10 38	− 4	e 19 14	− 8	—	—	34·8
Pulkovo		64·8	331	e 10 40	− 3	e 19 17	− 6	—	—	e 26·5
Bombay		66·3	273	i 10 52	0	e 19 57	+15	13 18	PP	—
Bozeman		67·0	48	—	—	e 19 34	−16	—	—	e 28·7

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Baku		68·3	306	e 11 2	− 3	e 20 7	+ 1	25 17	SS	—
Kodaikanal	E.	68·7	263	e 11 7	0	—	—	—	—	—
Grozny		68·8	309	e 11 6	− 2	—	—	—	—	—
Mount Wilson		70·1	61	i 11 10	− 6	—	—	—	—	—
Pasadena		70·1	61	i 11 13	− 3	i 20 21	− 6	—	—	e 31·8
Tiflis		70·4	309	e 11 12	− 6	e 20 26	− 4	—	—	e 34·3
Riverside		70·7	61	i 11 31	+11	—	—	—	—	—
Brisbane	E.	71·0	174	—	—	e 20 29	− 8	—	—	—
Erevan		71·5	308	e 11 23	− 1	—	—	—	—	—
La Jolla		71·5	61	e 11 25	+ 1	—	—	—	—	—
Theodosia		73·1	317	11 30	− 4	—	—	—	—	—
Simferopol		73·7	318	11 36	− 2	—	—	e 13 19	PP	—
Copenhagen		74·0	335	i 11 35	− 4	21 2	− 9	—	—	36·3
Tucson		76·0	58	11 45a	− 6	i 21 28	− 6	e 14 35	PP	i 30·6
Hamburg		76·5	335	e 11 49	− 5	—	—	—	—	e 37·3
Potsdam		76·6	334	e 11 17?	−37	—	—	—	—	e 42·3
Jena		78·2	332	i 11 58	− 5	e 22 17	PS	—	—	e 38·3
Budapest		78·5	326	e 12 1	− 3	—	—	—	—	e 46·8
Cheb		78·8	332	—	—	e 21 17?	−47	—	—	e 40·3
De Bilt		79·2	337	i 12 7	− 1	—	—	—	—	e 37·3
Uccle		80·6	338	12 14	− 2	—	—	—	—	36·3
Ksara		80·9	307	i 12 14a	− 3	22 33	+ 7	e 15 22	PP	—
Stuttgart		80·9	333	e 12 13	− 4	e 22 43	+17	—	—	e 44·8
Melbourne		81·2	181	—	—	i 22 27	− 2	—	—	37·8
Strasbourg	Z.	81·6	334	e 12 17	− 4	—	—	—	—	e 40·3
Triest		82·1	330	11 52	−32	—	—	—	—	e 47·0
Florissant		82·6	41	i 12 19	− 7	i 22 32	−11	—	—	43·3
Ottawa		83·3	29	i 12 23	− 7	—	—	—	—	38·3
Seven Falls		83·4	25	—	—	e 22 42	− 9	—	—	e 41·3
Cape Girardeau		84·2	42	e 13 27	+53	e 22 47	−12	—	—	—
Rome		85·7	327	12 40	− 2	22 45	[−20]	16 21	PP	44·0
Helwan		86·4	309	12 43k	− 2	23 23	+ 2	24 27	PS	—
Williamstown		86·5	28	e 12 40	− 6	—	—	—	—	—
East Machias		86·6	23	e 16 8	PP	e 23 4	[− 7]	e 31 56	SSS	e 35·4
Weston		87·5	27	i 12 45a	− 6	i 23 22	[+ 5]	e 16 24	PP	e 43·3
Fordham		87·9	29	e 10 38	?	i 23 24	[+ 5]	—	—	—
Christchurch		89·7	162	e 12 59	− 2	e 23 21	[−10]	38 47	L	43·6
San Juan		110·9	33	e 18 25	[− 9]	e 25 57	{−14}	e 28 39	PS	—
Huancayo		131·5	62	e 19 45	[+30]	e 26 10	[−13]	e 21 32	PP	62·7
La Paz	Z.	139·4	59	e 19 30	[+ 1]	—	—	23 2	PP	68·3

Additional readings :—
Mizusawa iSN = +2m.55s.
Koti e = +6m.38s.
Calcutta ePPPN = +12m.12s., iPSN = +17m.25s., eSSN = +20m.24s., eSSSN = +21m.55s.
Mount Wilson iZ = +11m.21s.
Pasadena iEZ = +11m.23s.
Tucson iP = +11m.47s. and +11m.53s., i = +11m.58s., +12m.9s., and +13m.6s., iPPP = +16m.15s., iPS = +22m.1s., PPS = +22m.22s.
Florissant eE = +22m.48s.
Rome S = +23m.7s., PS = +23m.51s., SS = +28m.49s., eSSS = +29m.41s. ?
Helwan e = +12m.53s. and +15m.23s.
Weston iZ = +12m.57s., eS_cSE = +23m.42s., iPPSEZ = +24m.26s.
Fordham iEN = +11m.42s., eZ = +12m.45s., iZ = +12m.48s. and +12m.57s.
Christchurch S = +23m.52s.
San Juan ePPP = +21m.23s., ePPS = +30m.13s., eSS = +34m.57s., eSSS = +39m.23s.
Huancayo ePKS = +22m.36s., eSKKS = +28m.23s., ePKP,PKP = +37m.33s., eSS = +38m.48s., ePSPS = +40m.9s., eSSS = +44m.16s.
Long waves were also recorded at Piatigorsk, Stonyhurst, Cape Town, Belgrade, Florence, Malaga, Bidston, Chicago, San Fernando, Kew, Toledo, Paris, Prague, and Fort de France.

Dec. 19d. 18h. 56m. 48s. Epicentre 36°·2N. 58°·0E.

$A = +\cdot4286$, $B = +\cdot6860$, $C = +\cdot5880$; $\delta = +4$; $h = 0$;
$D = +\cdot848$, $E = -\cdot530$; $G = +\cdot312$, $H = +\cdot499$, $K = -\cdot809$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Baku		7·6	306	i 1 54	− 1	i 4 43	L	—	—	(i4·7)
Samarkand		7·9	61	1 59	0	—	—	2 14	P*	—
Tchimkent		10·9	52	e 2 36	− 4	e 3 13	?	—	—	—
Erevan		11·3	295	e 2 58	+12	—	—	—	—	—
Tiflis		11·6	302	e 2 41	− 9	e 5 5	+ 4	—	—	—
Grozny		11·8	311	e 2 51	− 2	e 5 17	+11	—	—	—
Andijan		12·1	64	e 2 56	− 1	e 5 10	− 4	e 3 25	PPP	—
Piatigorsk		13·8	309	—	—	5 27	−27	—	—	11·2
Almata		16·2	58	e 3 25	−25	e 6 43	− 8	—	—	—
Ksara		18·3	267	i 4 18k	+ 1	i 7 55	+16	—	—	—
Agra	E.	19·2	111	4 27	− 1	—	—	—	—	—
Theodosia		19·2	305	4 28	0	e 8 18	SS	—	—	—
Yalta		19·9	302	4 38	+ 2	—	—	—	—	—
Simferopol		20·1	303	4 36	− 2	e 8 21	+ 2	—	—	—
Sverdlovsk		20·7	5	4 42	− 2	e 8 35	+ 4	11 18	L_q	13·2
Bombay	N.	21·6	138	i 4 56	+ 2	e 9 12	SS	—	—	—
Helwan		23·2	261	i 5 9a	0	e 9 20	+ 2	5 48	PP	—
Moscow		24·0	332	5 18	+ 1	i 9 43	+11	e 10 16	SS	—
Calcutta	N.	29·6	108	—	—	11 17	+13	—	—	16·1
Columbia		100·4	326	—	—	e 24 23	[− 6]	—	—	—
San Jan		104·3	305	e 13 36	−32	e 25 14	[+27]	e 33 22	SS	—

Additional readings :—
Samarkand e = +2m.53s.
Tiflis eEN = +2m.46s.
Ksara i = +10m.32s.
Helwan i = +5m.24s., PPP = +6m.6s., e = +10m.53s.
Moscow e = +10m.5s.

Dec. 19d. Readings also at 0h. (Samarkand (2), Andijan (2), and Tucson), 1h. (Nagoya), 2h. (Tucson and Balboa Heights), 4h. (near Mizusawa), 5h. (Monowai and Christchurch), 6h. (Samarkand, Andijan, Tashkent, Almata, Moscow, Sverdlovsk, Vladivostok, Keizyo, Tchimkent, Irkutsk, and Frunse), 7h. (Calcutta and Baku), 9h. (Fort de France and Mizusawa), 10h. (Koti, Tucson, Huancayo, Mizusawa, Balboa Heights, and La Paz), 12h. (Mizusawa and Nagoya), 14h. (Malaga), 16h. (Mizusawa), 17h. (Mizusawa), 18h. (Samarkand, Andijan, and Tashkent), 21h. (Monowai and Christchurch), 22h. (La Paz), 23h. (Santiago).

Dec. 20d. 14h. 51m. 16s. Epicentre 38°·6N. 143°·1E. (as on 18d.).

$A = -\cdot6266$, $B = +\cdot4704$, $C = +\cdot6213$; $\delta = -8$; $h = -1$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Mizusawa		1·6	289	i 0 29	− 1	i 0 49	− 2	—	—	—
Nagoya		6·0	237	1 32	0	2 56	S*	—	—	—
Koti		9·2	240	2 51	P*	4 26	S*	—	—	—
Vladivostok		9·7	302	i 2 21	− 1	i 4 38	+23	—	—	4·9
Husan		11·8	257	e 2 53	0	—	—	—	—	—
Taikyu		11·9	261	3 53	+59	—	—	—	—	—
Keizyo		12·8	271	e 3 4	− 2	—	—	—	—	8·0
Zinsen		13·0	270	e 3 30	+21	e 5 21	−14	—	—	e 6·3
Irkutsk		30·1	311	—	—	e 11 12	0	e 12 34	SS	15·7
Calcutta	N.	49·1	268	e 9 4	+13	—	—	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Frunse		50·8	299	e 9 0	− 4	—	—	—	—	—
Andijan		53·1	296	e 9 20	− 1	e 16 56	+ 5	—	—	—
Tchimkent		54·4	300	e 9 24	− 7	—	—	—	—	—
Agra	E.	54·8	279	e 9 30	− 4	e 17 21	+ 7	—	—	—
Sverdlovsk		54·9	319	i 9 31	− 4	e 17 14	− 2	—	—	26·2
Samarkand		57·3	297	e 9 57	+ 5	e 19 4	?	—	—	—
Moscow		66·8	324	e 10 52	− 4	e 19 34	−14	—	—	34·2
Baku		68·4	306	e 11 43	+37	e 21 17	+70	—	—	e 36·7
Tiflis		70·9	309	11 18	− 3	—	—	—	—	35·7
Mount Wilson	z.	75·6	58	i 11 51	+ 3	—	—	—	—	—
Pasadena	z.	75·6	58	i 11 51	+ 3	—	—	—	—	—
Riverside	z.	76·2	58	i 11 58	+ 6	—	—	—	—	—
Ksara		81·3	306	e 12 18	− 2	e 22 55	+25	—	—	—
Tucson		81·6	55	12 22$_s$	+ 1	—	—	—	—	—
Stuttgart		83·9	332	e 18 19	PP	—	—	—	—	e 47·7
La Paz	z.	144·9	60	19 16	[−23]	—	—	—	—	—

Additional readings :—
Koti S*N = +5m.4s., S_gEN = +5m.33s.
Moscow e = +12m.10s. and +16m.24s.
Tucson iP = +12m.29s. and +12m.33s.
Long waves were also recorded at Pulkovo, Phu-Lien, and other European stations.

Dec. 20d. Readings also at 0h. (Erevan, Sverdlovsk, Vladivostok, Nagoya, near Mizusawa, and near Tiflis), 1h. (Husan), 2h. (Huancayo, Malaga (2), Tucson (2), La Paz, and near Mizusawa), 3h. (Tiflis, Tashkent, Tchimkent, and Samarkand), 4h. (Baku, Grozny, Ksara, Tchimkent, Andijan (2), Huancayo, and near La Paz), 7h. (La Paz, Huancayo, Santiago, Mount Wilson, Pasadena, Riverside, Vladivostok, Tucson, Nagoya, and near Mizusawa), 8h. (Baku, Irkutsk, and Sverdlovsk), 9h. (Baku, Tiflis, Ksara, Helwan, Sverdlovsk, and near Nagoya), 10h. (Nagoya and near Mizusawa), 11h. (Oaxaca), 12h. (Tiflis), 13h. (La Paz), 14h. (Christchurch and Monowai), 15h. (Nagoya, near Mizusawa, and near Andijan), 16h. (Nagoya (2)), 17h. (Berkeley, near Branner and Lick), 19h. and 20h. (near Nagoya), 21h. (Nagoya, Mizusawa, Andijan, and near Samarkand), 22h. (Balboa Heights), 23h. (Huancayo and near Mizusawa).

Dec. 21d. 12h. 23m. 57s. Epicentre 41°·1N. 47°·7E. (as on 1937 Oct. 2d.).

A = +·5086, B = +·5590, C = +·6548 ; δ = −8 ; h = −2 ;
D = +·740, E = −·673 ; G = +·441, H = +·484, K = −·756.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Baku	1·8	113	i 0 39	+ 7	1 12	+16	—	—	1·6
Tiflis	2·3	286	i 0 30k	−10	—	—	—	—	i 0·9
Erevan	2·6	249	i 0 29	−15	i 0 57	P_g	—	—	—
Grozny	2·6	327	i 0 46	P*	i 1 18	+ 1	i 0 50	P_g	—
Piatigorsk	4·5	313	e 1 11	0	e 2 1	− 4	e 1 21	P*	—
Sotchi	6·4	296	e 1 49	P*	e 3 9	S*	e 2 7	P_g	—
Ksara	11·9	236	e 2 39	−15	e 4 49	−20	—	—	i 6·2
Samarkand	14·8	89	e 3 43	+11	—	—	—	—	—
Moscow	16·1	339	e 3 48	− 1	e 6 57	SS	—	—	—
Tchimkent	16·4	78	e 3 56	+ 3	7 12	SS	—	—	—
Helwan	17·4	235	—	—	e 7 12	− 7	—	—	—
Sverdlovsk	17·8	23	4 11	0	i 7 37	+ 9	—	—	10·0
Andijan	18·6	84	e 4 24	+ 3	e 8 2	SS	—	—	—
Frunse	20·0	77	e 4 42	+ 5	—	—	—	—	—
Pulkovo	21·6	337	4 49	− 5	8 48	− 1	—	—	12·6
Almata	21·8	74	e 5 17	PP	—	—	—	—	—

Additional readings :—
Baku i = +51s.
Grozny i = +55s. and +1m.2s., iS* = +1m.26s., iS_g = +1m.36s.
Piatigorsk eP_g = +1m.30s., e = +1m.43s. and +1m.51s., iS* = +2m.11s.

Dec. 21d. 12h. 26m. 44s. Epicentre 9°·8S. 119°·1E.

Intensity III at Isle of Soemba.

Epicentre : 9°·8S. 119°·1E. (Batavia).
9°·5S. 118°·4E. (U.S.C.G.S.).

Depth 100km. (Perth).

H. P. Berlage.

Aardbevingen in den Oost Indischen Archipel waargenomen gedurende het jaar, 1938.e Natuurkundig Tijdschrift voor Nederlandsch-Indie, Apl. 1 van Deel XCX' 40 blz. 38-75, p.73.

$A = -\cdot4793$, $B = +\cdot8612$, $C = -\cdot1691$; $\delta = -1$; $h = +7$;
$D = +\cdot874$, $E = +\cdot486$; $G = +\cdot082$, $H = -\cdot148$, $K = -\cdot986$.

A focus at the base of the superficial layers has been assumed.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Malabar		11·7	282	2 46	− 2	i 4 46	−12	—	—	—
Batavia		12·7	286	3 0	− 1	i 5 27	+ 5	i 5 31	sS	e 8·3
Perth		22·3	187	4 58	+ 2	9 1	+ 7	5 21	pP	12·8
Manila		24·3	6	i 5 17a	+ 2	i 9 51	+22	—	—	13·3
Medan		24·3	303	5 16	+ 1	i 9 23	− 6	—	—	—
Adelaide		30·7	149	i 6 15	+ 1	i 13 26	SSS	i 7 21	PP	19·0
Hong Kong		32·3	353	6 26	− 2	11 41	+ 3	7 45	PP	16·3
Phu-Lien		32·8	339	e 6 32	0	e 11 48	+ 2	—	—	—
Melbourne		36·3	144	e 7 3	+ 1	12 42	+ 2	—	—	18·1
Brisbane		36·5	123	i 7 4	0	i 12 46	+ 3	i 8 16	PP	—
Riverview		37·9	135	i 7 19	+ 3	i 13 11	+ 6	8 45	PP	e 19·5
Sydney		37·9	135	e 5 48	?	i 13 15	+10	e 8 49	PP	19·3
Colombo	E.	42·5	292	7 47	− 7	14 6	− 7	—	—	21·7
Calcutta	N.	44·1	318	e 7 45	−22	i 14 29	− 8	e 17 19	SS	20·9
Kodaikanal	E.	45·9	295	i 8 19a	− 2	i 15 1	− 2	—	—	22·1
Zinsen		47·6	9	e 15 46	S	(e 15 46)	+19	e 18 43	pP	—
Nagoya		47·8	21	e 8 37	+ 1	—	—	—	—	—
Hyderabad		48·4	304	8 41	0	15 20	−18	18 35	SS	23·2
Mizusawa	E.	52·8	22	(e 9 28)	+14	e 9 28	P	—	—	—
Bombay		53·8	302	i 9 19	− 3	i 16 48	− 4	19 6	ScS	—
Agra		54·2	314	i 9 17a	− 7	e 16 45	−13	9 29	pP	25·6
Christchurch		57·2	137	9 50	+ 4	i 17 44	+ 6	21 37	SS	e 27·4
Wellington		58·0	133	9 51	− 1	i 17 48	0	11 48	PP	23·3
Irkutsk		63·1	350	10 27	+ 1	i 18 58	+ 4	—	—	30·3
Samarkand		68·9	319	11 2	− 1	20 2	− 2	—	—	—
Tananarive		69·5	253	e 11 13	+ 6	e 20 14	+ 3	—	—	e 32·3
Baku		80·9	314	i 12 16	+ 4	22 16	− 1	—	—	40·3
Sverdlovsk		81·8	333	i 12 16	− 1	i 22 24	− 2	—	—	37·3
Grozny		84·8	316	e 12 34	+ 2	—	—	—	—	—
Tiflis		85·0	314	i 12 34a	+ 1	22 56	− 2	—	—	43·3
Piatigorsk		86·9	316	e 12 38	− 5	—	—	—	—	—
Ksara		89·8	304	i 13 1k	+ 5	i 23 54	+10	15 34	PP	44·3
Helwan		92·9	300	i 13 13a	+ 2	23 41	[− 0]	25 19	PS	—
Cape Town		93·3	235	—	—	i 23 48	[+ 5]	—	—	44·8
Moscow		93·3	326	e 13 13	0	23 48	[+ 5]	—	—	50·8
Pulkovo		97·8	329	13 27	− 6	24 11	[+ 4]	—	—	47·8
Bucharest		98·9	313	—	—	e 24 16	[+ 3]	e 26 42	PS	e 61·3
Prague		106·9	319	—	—	e 28 16?	PS	—	—	e 59·3
Copenhagen		107·4	325	15 4	?	24 58	[+ 6]	e 27 52	PS	51·3
Potsdam		107·5	322	e 15 16?	?	—	—	—	—	e 45·3
Cheb		108·2	320	e 15 16?	?	e 25 4	[+ 9]	—	—	e 64·3
Rome		108·8	311	e 14 40	P	e 28 18	PS	e 18 51	PP	e 52·3
Hamburg		109·2	323	e 14 40	P	i 25 8	[+ 8]	—	—	e 59·3
Stuttgart		110·4	318	e 15 24	?	e 28 29	PS	e 19 2	PP	e 63·3
Strasbourg		111·4	318	e 18 58	PP	e 28 42	PS	e 29 48	PPS	e 60·8

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
De Bilt		112·3	322	e 19 16?	PP	—	—	—	—	e 58·3
Uccle		113·1	321	e 15 16?	?	e 25 21	[+ 5]	e 29 13	PS	e 54·3
Edinburgh		115·7	328	e 21 16	?	—	—	—	—	e 60·3
Bidston		116·7	326	—	—	e 29 16?	PS	—	—	e 57·3
Jersey		117·6	320	—	—	e 25 16?	[−16]	—	—	—
Pasadena	Z.	122·4	56	e 18 55	[+ 3]	—	—	i 19 5	pPKP	e 57·3
Riverside		123·1	56	i 18 58	[+ 5]	—	—	i 19 9	pPKP	—
Tucson		128·9	56	i 19 10	[+ 5]	31 38	PS	i 19 21	pPKP	e 59·2
Seven Falls		141·5	10	—	—	e 45 28	SSS	—	—	e 63·3
Rio de Janeiro	E.	143·2	209	—	—	e 26 16	[−19]	—	—	—
Williamstown		145·5	14	i 19 37	[+ 2]	—	—	—	—	—
Weston		146·3	13	i 19 37k	[+ 1]	—	—	—	—	—
Fordham		147·0	17	i 19 39a	[+ 2]	—	—	i 19 52	pPKP	e 83·3
Philadelphia		147·4	20	e 19 18	[−20]	—	—	—	—	e 65·5
La Paz		152·9	166	e 19 53	[+ 7]	43 28	SS	i 20 3	pPKP	73·7
Huancayo		154·0	146	e 20 9	[+21]	e 27 58	PPP	e 23 18	PP	e 56·7
San Juan		170·1	30	e 20 20	[+16]	e 46 3	SS	e 26 4	PP	—
Fort de France		175·2	3	e 20 13	[+ 6]	e 25 37	?	—	—	—

Additional readings :—
Perth i = +5m.51s. and +7m.16s., sS = +9m.38s., i = +12m.1s.
Medan iN = +10m.5s.
Adelaide i = +6m.45s., +11m.13s., and +12m.3s., iSS? = +16m.48s., i = +17m.9s., iSSS? = +18m.10s.
Brisbane eN = +8m.34s.
Riverview SS?N = +15m.57s., SSS?N = +16m.31s., iS_cS?N = +17m.42s.
Calcutta eSSSN = +18m.17s.
Bombay eEN = +23m.42s.
Agra PPE = +11m.34s., SSE = +20m.11s., SSSE = +21m.45s.
Christchurch L_qN = +24m.28s.
Wellington P_cP = +10m.48s., SS = +21m.6s.
Helwan i = +13m.25s., S = +24m.18s., PPS = +25m.52s.
Cape Town iN = +23m.54s.
Moscow eS = +24m.15s.
Stuttgart e = +21m.32s. and +29m.33s., eL_q = +61m.16s.
Tucson iPP = +21m.13s. and +21m.57s., iPKS = +22m.27s. and +23m.14s., iPPP = +24m.30s., SKKKS = +28m.3s.
Weston $iPKP_1Z$ = +19m.40s., iZ = +19m.48s. and +20m.1s.
La Paz SKP = +23m.23s.
Huancayo ePPP = +27m.12s., eSKKKS = +30m.43s., eSKSP = +34m.20s., PPS = +36m.45s., ePPPS = +38m.33s., SS = +42m.58s., SSS = +48m.29s.
San Juan ePPP = +29m.41s.
Long waves were also recorded at Puy de Dôme, Aberdeen, Kew, Göttingen, and San Fernando.

Dec. 21d. Readings also at 1h. (Andijan and Frunse), 2h. (Fort de France), 3h. (Tucson), 5h. (Tucson, Christchurch, Monowai, Adelaide, Melbourne, Riverview, and Wellington), 6h. (Fort de France), 7h. (Huancayo), 9h. (Christchurch and Monowai), 10h. (Almata, Tchimkent, Samarkand, Huancayo, Andijan, and Frunse), 12h. (Tucson, Mizusawa, and Nagoya), 13h. (Florissant and Tiflis), 14h. (Tiflis, Sverdlovsk, Moscow, Almata, Andijan, Frunse, Samarkand, Tchimkent, Jersey, and Uccle), 15h. (Tashkent, Vladivostok, and Irkutsk), 18h. (Ksara, Tiflis, and Mizusawa), 19h. (Mizusawa), 23h. (Nagoya).

Dec. 22d. 16h. 56m. 42s. Epicentre 24°·1N. 123°·1E. (as on 1938 Sept. 1d.).

A = −·4991, B = +·7656, C = +·4061; δ = +16; h = +4;
D = +·838, E = +·546; G = −·222, H = +·340, K = −·914.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Taihoku		1·6	303	i 0 34a	+ 4	0 55	+ 4	—	—	—
Zi-ka-wei	N.	7·1	352	1 48	0	3 48	S_g	—	—	—
Hong Kong		8·4	259	2 4	− 2	3 24	−19	2 22	PPP	4·3
Manila		9·7	193	2 22k	0	5 33	S_g	—	—	6·6
Hukuoka B		11·4	32	e 3 56	+69	—	—	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Husan		12·1	24	i 3 5k	PP	e 7 3	?	11 33	S_cS	—
Taikyu		12·6	21	4 14	+71	6 47	L	—	—	(6·8)
Koti		13·1	42	e 3 8	− 2	e 6 18	SSS	—	—	—
Zinsen		13·7	12	3 24	+ 6	e 6 4	SS	—	—	7·6
Keizyo		13·8	13	3 24	+ 5	e 6 7	SS	e 6 13	SSS	—
Heizyo		15·0	7	i 3 42	+ 7	6 45	SS	—	—	8·5
Phu-Lien		15·6	260	e 3 38	− 5	6 44	+ 7	—	—	8·0
Vladivostok		20·3	20	e 4 38	− 2	i 7 10	−13	—	—	10·4
Medan		31·2	234	4 42	?	i 11 23	− 6	—	—	—
Irkutsk		31·6	338	6 23	− 3	e 11 30	− 5	—	—	17·3
Calcutta	N.	31·9	275	e 6 30	+ 1	e 13 52	SS	9 31	P_cP	i 16·2
Batavia		34·0	210	e 7 46	+58	i 12 9	− 4	—	—	—
Agra	E.	40·6	285	e 7 37	− 6	—	—	9 15	PP	—
Hyderabad		42·1	270	—	—	17 53	SSS	—	—	—
Almata		42·3	310	e 9 42	PP	—	—	—	—	—
Colombo	E.	44·8	255	e 3 18?	?	—	—	—	—	—
Kodaikanal	E.	45·5	262	e 8 28	+ 5	i 15 3	− 2	—	—	—
Bombay		46·9	274	i 8 30	− 4	15 19	− 6	i 10 22	PP	—
Tashkent		47·7	305	i 8 37	− 3	i 15 47	+11	—	—	23·8
Samarkand		49·3	303	e 8 54	+ 1	15 55	− 4	—	—	—
Sverdlovsk		55·1	325	i 9 33	− 3	17 11	− 7	—	—	27·6
Baku		62·4	305	i 10 27	0	e 19 6	+13	—	—	33·8
Grozny		64·9	309	10 42	− 1	e 20 32	+68	—	—	35·3
Tiflis		65·9	307	i 10 48k	− 2	e 19 44	+ 7	—	—	e 35·3
Moscow		68·0	324	e 11 0	− 3	e 19 51	−11	—	—	31·8
Pulkovo		70·9	329	e 11 18	− 3	e 20 22	−14	—	—	e 32·1
Ksara		74·8	300	i 11 41a	− 3	e 21 32	+12	14 33	PP	—
Helwan		79·8	298	i 12 8	− 4	i 22 9	− 5	—	—	—
Potsdam		82·6	325	e 12 24	− 2	—	—	—	—	e 43·3
Cheb		84·1	324	—	—	e 22 46	−12	—	—	e 50·3
Triest		85·6	319	e 12 47	+ 6	—	—	—	—	—
Stuttgart		86·6	323	e 12 44a	− 2	e 23 30	+ 7	e 16 6	PP	e 49·3
De Bilt		86·8	328	12 47	0	e 23 24	− 1	—	—	e 42·3
Strasbourg		87·5	324	e 12 50	− 1	—	—	—	—	e 48·3
Zurich		87·7	323	e 12 49	− 3	—	—	—	—	—
Uccle		88·0	327	e 12 51	− 2	e 23 31	− 5	—	—	e 42·3
Edinburgh		88·2	333	—	—	e 25 55	PPS	—	—	e 49·3
Tucson		103·9	45	i 18 37	PP	—	—	—	—	—
La Paz	Z.	167·0	56	i 20 9	[+ 2]	—	—	—	—	—

Additional readings :—
Zi-ka-wei iN = +4m.10s., iE = +4m.14s.
Zinsen eSZ = +6m.9s.
Keizyo SN? = +7m.20s., SEN = +7m.44s.
Calcutta iN = +10m.11s., eN = +14m.52s.
Ksara eSS = +26m.45s.
Cheb e = +30m.46s.
Stuttgart ePSE = +24m.38s., eSSE = +28m.36s.
Edinburgh e = +46m.18s. ?
Tucson iPP = +18m.57s.
Long waves were also recorded at Kew, Bidston, San Fernando, Fordham, Aberdeen, Copenhagen, Jena, Paris, Prague, Bucharest, and Upsala.

Dec. 22d. Readings also at 3h. (Sotchi, Moscow, Manila, Pulkovo, Calcutta, Phu-Lien. Keizyo, Baku, Tiflis, Vladivostok, Sverdlovsk, and Irkutsk), 4h. (Cheb, Copenhagen, Uccle, La Paz, De Bilt, Huancayo, and Tucson (2)), 5h. (Baku, Tashkent, Ksara, and Malabar), 6h. (Sverdlovsk), 10h. (Malabar (2)), 12h. (Ksara, Andijan, and Tchimkent), 13h. (Upsala), 14h. (Copenhagen, Uccle, and De Bilt), 15h. (Mizusawa), 16h. (Guadalajara, Puebla, Tacubaya (2), Sverdlovsk, Tucson, and Irkutsk), 17h. (College, Batavia, and Malabar), 18h. (Apia, Irkutsk, Baku, Sverdlovsk, Mizusawa, Huancayo, La Paz, Tiflis (2), and Vladivostok), 21h. (Frunse, Samarkand, Almata, Baku, Tiflis, Sverdlovsk, Andijan, Tchimkent, and Tashkent), 23h. (New Plymouth, Wellington, Monowai, Christchurch, and Mizusawa).

Dec. 23d. 1h. 32m. 25s. Epicentre 39°·5N. 33°·7E. (as on 1938 July 21d.).

$A = +\cdot6437$, $B = +\cdot4293$, $C = +\cdot6335$; $\delta = -3$; $h = -2$;
$D = +\cdot555$, $E = -\cdot832$: $G = +\cdot527$, $H = +\cdot351$, $K = -\cdot774$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Istanbul	3·9	295	1 47	?	2 47	?	—	—	—
Yalta	5·0	3	e 1 9	− 9	—	—	—	—	—
Simferopol	5·4	3	e 1 29	+ 5	e 2 48	S*	—	—	—
Theodosia	5·7	13	e 1 30	+ 2	i 2 32	− 3	i 2 49	S*	—
Ksara	6·0	161	e 1 28	− 4	e 2 32	−11	e 3 6	S*	—
Sotchi	6·0	46	e 1 35	+ 3	—	—	—	—	—
Bucharest	7·5	313	—	—	4 17	S_g	—	—	—
Sofia	8·5	296	—	—	e 3 5	−40	—	—	—
Tiflis	8·7	72	e 2 21	+11	—	—	—	—	4·2
Moscow	16·5	8	e 3 54	0	—	—	—	—	e 11·1
Sverdlovsk	24·7	37	i 5 25	+ 1	e 9 35?	− 9	—	—	—
Calcutta N.	49·1	63	—	—	e 21 29	SSS	—	—	—

Istanbul PS = +3m.17s.
Long waves were also recorded at Copenhagen, Pulkovo, and Baku.

~~Dec. 23d. 1h. 51m. 35s. Epicentre 37°·1N. 141°·8E. (as on 1938 Dec. 12d.).~~

Strong at Onahama, Mito, moderate at Kakioka, Tokyo, Utunomiya, Hukusima, Tukubasan, slight at Sendai, Yamagata, and Yokohama.

Epicentre: Kasima Bay, 36°·9N. 141°·9E. Shallow.

Macroseismic radius greater than 300km.

See "Seismological Bulletin" of the Central Met. Obs., Japan, for the year 1938, Tokyo, 1940, pp. 141-143. Macroseismic Chart, p. 141.

$A = -\cdot6283$, $B = +\cdot4944$, $C = +\cdot6006$; $\delta = -9$; $h = -1$.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Onahama	0·8	257	0 16k	− 2	0 24	− 7	—	—	—
Hukusima	1·2	302	0 24k	0	0 39	− 2	—	—	—
Mito	1·3	236	0 23	− 2	0 37	− 7	—	—	—
Sendai	1·3	329	0 28k	+ 3	0 42	− 2	—	—	—
Kakioka	1·5	236	0 25a	− 3	0 42	− 7	—	—	—
Tyosi	1·5	209	0 31	+ 3	0 48	− 1	—	—	—
Tukubasan	1·6	237	0 28	− 2	0 43	− 8	—	—	—
Yamagata	1·6	315	0 27a	− 3	0 48	− 3	—	—	—
Utunomiya	1·7	250	0 26k	− 5	0 45	− 9	—	—	—
Kumagaya	2·1	244	0 37k	0	1 1	− 3	—	—	—
Mizusawa	2·1	346	0 38	+ 1	i 1 2	− 2	—	—	—
Tokyo, Cen. Met. Ob.	2·1	229	i 0 36k	− 1	0 58	− 6	—	—	—
Tokyo, Imp. Univ.	2·1	229	0 37	0	0 59	− 5	—	—	—
Komaba	2·2	230	0 37	− 1	0 59	− 7	—	—	—
Kiyosumi	2·3	214	0 41	+ 1	1 6	− 3	—	—	—
Maebasi	2·3	252	0 40k	0	1 3	− 6	—	—	—
Mitaka	2·3	232	0 42	+ 2	1 8	− 1	—	—	—
Niigata	2·4	291	0 51	P_g	1 25	S_g	—	—	—
Yokohama	2·4	226	0 40	− 1	1 6	− 6	—	—	—
Titibu	2·5	243	0 41	− 2	1 11	− 3	—	—	—
Miyako	2·6	3	0 47	+ 3	1 15	− 2	—	—	—
Morioka	2·7	349	0 46k	+ 1	1 17	− 2	—	—	—
Mera	2·7	216	0 46	+ 1	1 18	− 1	—	—	—
Oiwake	2·7	254	0 43a	− 2	1 21	+ 2	—	—	—
Takada	2·8	270	0 48	+ 1	1 27	+ 5	—	—	—
Hunatu	2·9	237	0 48	0	1 25	+ 1	—	—	—
Koyama	2·9	232	0 41	− 7	1 13	−11	—	—	—
Nagano	2·9	261	0 51k	+ 3	1 31	+ 7	—	—	—
Akita	3·0	334	0 52k	+ 2	1 38	S_g	—	—	—
Ito	3·0	225	0 51k	+ 1	1 28	+ 1	—	—	—

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Kohu		3·0	241	0 49	− 1	1 29	+ 2	—	—	—
Misima		3·0	229	0 51a	+ 1	1 37	S_g	—	—	—
Numadu		3·1	230	0 54	+ 3	1 28	− 1	—	—	—
Osima		3·1	220	0 49	− 2	1 22	− 7	—	—	—
Matumoto		3·2	254	0 50	− 2	1 25	− 7	—	—	—
Yosiwara		3·2	232	0 41	−11	1 19	−13	—	—	—
Susaki		3·3	225	0 53	0	1 25	−10	—	—	—
Toyama		3·4	266	0 59	+ 4	1 46	S*	—	—	—
Hatinohe		3·5	356	0 59	+ 2	1 40	0	—	—	—
Iida		3·6	245	0 59a	+ 1	1 37	− 5	—	—	—
Aomori		3·8	348	1 6	+ 5	1 50	+ 3	—	—	—
Husiki		3·8	267	1 8	P*	1 59	S*	—	—	—
Omaesaki		3·8	231	1 1	0	2 3	S_g	—	—	—
Takayama		3·8	257	1 20	P_g	2 19	+32	—	—	—
Wazima		3·9	277	1 2a	0	1 54	+ 4	—	—	—
Hamamatu		4·1	235	1 7k	+ 2	1 53	− 2	—	—	—
Kanazawa		4·2	264	1 23	P_g	2 12	S*	—	—	—
Hatidyozima		4·3	203	1 12	+ 4	1 52	− 8	—	—	—
Gihu		4·4	250	1 11a	+ 1	1 58	− 4	—	—	—
Nagoya		4·4	245	1 9	− 1	1 59	− 3	—	—	—
Hukui		4·6	257	1 17	+ 5	2 8	+ 1	—	—	—
Hakodate		4·7	350	1 21	P*	2 20	S*	—	—	—
Ibukisan		4·7	251	1 14	0	2 15	+ 5	—	—	—
Hikone		4·8	250	1 16	+ 1	2 12	0	—	—	—
Kameyama		4·9	245	1 17	0	2 27	S*	—	—	—
Tu		4·9	243	1 30	P*	2 19	+ 4	—	—	
Mori		5·1	349	1 23	+ 3	2 25	+ 5	—	—	—
Urakawa		5·1	8	1 38	P_g	2 29	S*	—	—	—
Kyoto		5·3	249	1 22	0	2 27	+ 2	—	—	—
Yagi		5·5	245	1 26k	+ 1	2 31	+ 1	—	—	—
Miyadu		5·6	257	1 26	− 1	2 28	− 5	—	—	—
Osaka		5·6	247	1 28	+ 1	2 42	+ 9	—	—	—
Toyooka		5·8	257	1 30a	+ 1	2 33	− 5	—	—	—
Kobe		5·9	249	1 27	− 4	2 42	+ 2	—	—	—
Sapporo		6·0	356	1 45	P*	2 56	S*	—	—	—
Siomisaki		6·1	236	1 35	+ 1	3 3	S*	—	—	—
Kusiro		6·2	18	1 36	+ 1	—	—	—	—	—
Sumoto		6·2	247	1 34a	− 1	3 3	S*	—	—	—
Wakayama		6·2	244	1 33k	− 2	2 54	+ 6	—	—	—
Tokusima		6·6	246	1 41	0	3 27	S*	—	—	—
Asahigawa		6·7	3	1 57	P*	3 4	+ 4	—	—	—
Nemuro		6·8	24	1 51	+ 7	2 56	− 7	—	—	—
Muroto		7·3	241	1 51	+ 1	3 6	− 9	—	—	—
Koti		7·6	245	i 1 56	+ 1	3 33	+10	4 19	S_g	—
Hirosima		8·1	254	1 59	− 3	4 3	S*	—	—	—
Matuyama		8·1	249	2 1	− 1	4 19	S_g	—	—	—
Hamada		8·2	256	2 2	− 1	3 32	− 6	—	—	—
Simidu		8·4	242	2 3	− 3	3 45	+ 2	—	—	—
Uwazima		8·5	246	2 7	0	4 7	S*	—	—	—
Izuka		9·7	254	2 14	− 8	4 27	+12	—	—	—
Vladivostok		9·7	312	i 2 23	+ 1	i 4 15	0	i 2 36	PPP	4·6
Hukuoka B		9·9	253	e 3 23	?	—	—	—	—	—
Kumamoto		10·0	248	2 29	+ 2	—	—	—	—	—
Miyazaki		10·0	242	2 28k	+ 1	4 19	− 3	—	—	—
Titizima		10·0	179	2 43	PPP	—	—	—	—	—
Husan		10·5	263	e 3 1	+26	e 4 37	+ 2	—	—	—
Taikyu		10·7	267	2 48	PPP	—	—	—	—	—
Yakusima		11·5	238	2 49	+ 1	—	—	—	—	—
Keizyo		11·8	277	2 51	− 2	5 8	+ 2	—	—	6·5
Zinsen	E.	12·1	277	e 2 53?	− 4	—	—	—	—	8·0

Continued on next page.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Nake		13·5	234	3 13	− 2	5 57	+10	—	—	—
Manila		29·1	225	e 6 4	0	11 28	+32	—	—	—
Irkutsk		30·2	312	e 6 13	− 1	e 11 4	− 9	7 17	PP	15·4
Phu-Lien		34·6	253	—	—	e 12 11	−11	—	—	—
Frunse		50·6	300	e 9 10	+ 8	—	—	—	—	—
Andijan		52·8	297	e 9 19	0	e 17 6	+19	e 10 54	PP	—
Agra	E.	54·0	279	—	—	e 16 46	−17	e 20 37	SS	—
Sverdlovsk		55·3	319	i 9 35	− 3	17 15	− 6	—	—	25·4
Moscow		67·4	323	10 58	− 1	e 19 48	− 7	—	—	33·9
Pulkovo		68·3	330	11 2	− 3	19 56	−10	—	—	e 35·4
Grozny		69·6	309	11 11	− 2	—	—	—	—	—
Tiflis		71·0	308	i 11 19a	− 3	—	—	—	—	e·35·9
Sotchi		73·1	313	e 11 35	+ 1	—	—	—	—	—
Pasadena	Z.	77·3	57	i 12 4	+ 6	—	—	—	—	—
Potsdam		80·3	332	e 12 13	− 1	e 22 25	+ 5	e 16 13	PP	e 44·4
Ksara		81·4	305	i 12 18a	− 2	e 22 34	+ 3	e 23 19	PS	—
Cheb		82·4	331	—	—	e 21 55	−46	—	—	e 43·4
Tucson		83·3	54	12 32k	+ 2	—	—	—	—	—
De Bilt		83·4	335	e 12 29	− 1	—	—	—	—	e 44·4
Stuttgart		84·7	330	e 12 35a	− 2	e 23 25	+21	—	—	e 44·4
Uccle		84·8	335	e 12 33	− 4	e 23 23	+18	—	—	e 42·4
Triest		85·3	327	—	—	e 23 22	+12	—	—	—
Strasbourg		85·4	331	e 12 36	− 4	—	—	—	—	e 51·4
Zurich		86·1	330	e 12 42	− 2	—	—	—	—	—
La Paz	Z.	146·5	60	19 38	[− 4]	—	—	—	—	—

Additional readings :—
Susaki +1m.40s.
Koti P*Z = +2m.9s.
Uwazima S = +4m.21s.
Vladivostok i = +4m.20s.
Irkutsk SSS = +13m.13s.
Potsdam eN = +26m.25s.?
Tucson iP = +12m.57s. and +13m.7s.
Long waves were also recorded at Baku, Copenhagen, and San Fernando.

Dec. 23d. 17h. 34m. 47s. Epicentre 45°·2N. 7°·3E.

Intensity VI at Locarno ; V at Cères, Usseglio, and Ceresole ; IV at Valparato.

J. P. Rothe.

Les Seismes des Alpes francaises et la Seismite des Alpes occidentales.

Annales de l'Institute de Physique du Globe de Strasbourg, 1938, Tome III, 3 partie Geophysique, Mende 1944, p. 71.

Pietro Caloi.

Attivita sismica in Italia nel decennio, 1930-39, Commissione italiana di studio per i problemi del soccorso alle popolazione, Vol. IX, Firenze, 1942-XX, carte des isoseistes carte No. 70.

$A = +\cdot7013$, $B = +\cdot0898$, $C = +\cdot7072$; $\delta = +2$; $h = -4$;
$D = +\cdot127$, $E = -\cdot992$,; $G = +\cdot701$, $H = +\cdot090$, $K = -\cdot707$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Moncalieri		0·4	125	i 0 12	− 1	0 21	0	—	—	—
Neuchatel		1·8	352	e 0 34	+ 2	e 0 57	+ 1	—	—	—
Besançon		2·3	336	—	—	i 1 13	+ 4	—	—	—
Chur		2·3	43	e 0 42	+ 2	e 1 12	+ 3	—	—	—
Zurich		2·3	22	e 0 42	+ 2	e 1 13	+ 4	—	—	—
Basle		2·4	5	e 0 42	+ 1	e 1 14	+ 2	—	—	—
Puy de Dôme		3·1	281	e 0 57	P*	e 1 44	S_g	—	—	—
Florence		3·2	117	—	—	e 1 43	S_g	—	—	—
Strasbourg	E.	3·4	6	e 0 9	−46	e 1 42	S*	1 49	S_g	—
Stuttgart		3·8	19	e 0 59	− 2	e 1 43	− 4	e 1 14	P_g	—

Continued on next page.

	Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
	°	°	m. s.	s.	m. s.	s.	m. s.		m.
Karlsruhe	3·9	11	e 1 13?	P*	—	—	—	—	—
Triest	4·6	82	—	—	e 2 4	− 3	e 2 13	S*	—
Uccle	6·0	342	—	—	e 2 38	− 5	—	—	—
Jena	6·4	25	e 2 1	P*	—	—	i 2 9	P_g	e 3·0
Göttingen	6·6	15	e 2 20	P_g	—	—	—	—	—
Bergen	15·3	356	3 49	+10	6 13	−17	—	—	13·2

Additional readings :—
Strasbourg $S_gS_gE = +1$m.58s.
Stuttgart e = +2m.0s., $iS_g = +2$m.9s.
Triest $S_g = +2$m.31s.
Bergen readings are given for Dec. 22d.

Dec. 23d. 18h. 14m. 34s. Epicentre 53°·9N. 158°·0W.

$A = -·5487$, $B = -·2217$, $C = +·8061$; $\delta = +2$; $h = -7$;
$D = -·375$, $E = +·927$; $G = -·947$, $H = -·302$, $K = -·592$.

		Δ	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
College		12·1	21	e 2 39	−18	e 4 46	−28	—	—	e 5·1
Sitka		13·2	67	e 3 8	− 3	—	—	e 3 16	PP	6·4
Victoria		22·3	90	e 4 56	− 5	e 9 2	0	—	—	e 10·4
Ukiah		27·8	108	—	—	e 10 52	+17	—	—	e 11·5
Berkeley		29·2	109	—	—	e 14 0	?	—	—	—
Haiwee	N.	32·8	107	e 6 53	+16	—	—	—	—	—
Mount Wilson		34·2	110	e 6 58	+ 9	—	—	—	—	—
Pasadena		34·2	110	i 7 0	+11	—	—	—	—	e 16·1
Riverside		34·7	110	e 7 9	+15	—	—	—	—	—
La Jolla		35·6	110	i 7 21	+20	—	—	—	—	—
Tucson		39·7	104	i 7 54	+18	13 36	− 4	i 9 8	PP	19·7
Vladivostok		45·8	288	—	—	e 17 6	SS	—	—	25·6
Florissant		47·2	81	—	—	e 15 22	− 7	e 18 26	SS	—
Scoresby Sund		52·0	19	9 14	+ 1	16 32	− 4	—	—	24·4
Irkutsk		54·0	313	e 9 30	+ 2	e 17 4	+ 1	—	—	26·4
Fordham		55·2	68	i 9 36k	− 1	e 17 26	+ 6	—	—	e 29·4
Weston		55·5	65	i 9 37a	− 2	—	—	—	—	e 32·0
Sverdlovsk		65·2	339	i 10 44	− 1	19 19	− 9	—	—	30·4
Pulkovo		66·5	357	e 10 49	− 5	e 19 31	−13	—	—	e 31·7
Edinburgh		68·6	17	—	—	e 22 26?	?	—	—	—
Moscow		70·0	352	e 11 14	− 1	20 22	− 4	—	—	35·4
Copenhagen		70·5	7	11 17	− 1	20 24	− 8	—	—	39·4
Almata		72·4	323	e 11 32	+ 2	—	—	—	—	38·4
Hamburg		72·4	9	e 11 40	+10	—	—	—	—	e 41·4
Oxford		73·0	16	—	—	20 50	−10	—	—	e 37·4
De Bilt		73·4	12	i 11 34	− 2	—	—	—	—	e 38·4
Frunse		73·6	325	e 11 48	+11	—	—	—	—	—
Potsdam		73·8	7	e 11 38	0	—	—	—	—	e 39·4
Uccle		74·6	13	e 11 41	− 2	—	—	—	—	e 37·4
Jena		75·2	8	e 11 46	0	—	—	—	—	—
Tchimkent		75·9	328	e 11 51	+ 1	21 26	− 6	—	—	—
Cheb		76·1	8	—	—	e 20 26?	−69	—	—	e 41·4
Andijan		76·2	325	e 11 53	+ 1	e 21 38	+ 2	—	—	—
San Juan		76·4	79	—	—	e 21 25	−13	—	—	e 39·2
Tashkent		76·8	327	i 11 56	+ 1	i 21 41	− 1	—	—	e 38·7
Stuttgart		77·1	9	e 11 56	− 1	e 21 45	− 1	—	—	e 43·4
Strasbourg		77·2	11	e 11 54	− 3	—	—	—	—	e 43·1
Samarkand		79·1	328	e 12 8	0	22 3	− 4	—	—	—
Triest		80·6	7	—	—	e 22 31	+ 8	—	—	—
Grozny		81·0	345	e 12 22	+ 4	—	—	—	—	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Sotchi		81·7	349	e 11 39	−43	—	—	—	—	—
Tiflis		82·8	345	i 12 29a	+ 2	e 22 40	− 5	—	—	e 40·4
Baku		83·1	341	12 35	+ 6	23 6	+18	—	—	40·9
Erevan		83·9	345	e 12 33	0	—	—	—	—	—
Toledo		83·9	21	e 12 33	0	—	—	—	—	—
Calcutta	N.	84·9	303	—	—	i 23 14	+ 8	—	—	—
Agra	E.	85·9	313	—	—	e 23 8	[+ 1]	—	—	—
Ksara		91·8	350	i 13 16	+ 5	e 24 38	+27	e 17 4	PP	44·9
Helwan		94·9	354	e 17 20	PP	e 24 6	[+ 5]	—	—	—
Bombay	N.	95·4	313	e 17 39	PP	e 24 27	−15	—	—	—

Additional readings :—
College ePP = +2m.53s.
Mount Wilson i = +7m.9s.
Pasadena i = +7m.8s.
Tucson P_cP = +9m.55s., S = +13m.48s., S_cS = +17m.54s.
Vladivostok i = +22m.30s.
Weston iZ = +9m.51s.
Jena eE = +11m.50s., eN = +11m.54s.
San Juan eS = +21m.34s.
Toledo e = +12m.47s.
Ksara ePPS = +26m.26s.
Long waves were also recorded at Rome, Jersey, Kew, Columbia, East Machias, Philadelphia, Chicago, Bidston, Kodaikanal, La Paz, and Bucharest.

Dec. 23d. Readings also at 0h. (Berkeley (2), Lick, Branner, and San Francisco), 3h. (Tucson, Berkeley (2), Lick, Branner, San Francisco (2), Samarkand, and Tchimkent), 4h. (Andijan), 6h. (Andijan), 14h. (Sverdlovsk), 15h. (Christchurch, La Paz, Toledo, Andijan, Mizusawa, and Huancayo), 16h. (Almeria, near Granada, Rio de Janeiro, Ksara, Tashkent, and Sverdlovsk), 20h. (Mizusawa and near Tananarive), 23h. (Almata, Baku, Frunse, Irkutsk, Tashkent, Sverdlovsk, Huancayo, Andijan, (2), Samarkand, and Tchimkent).

Dec. 24d. 20h. 4m. 12s. Epicentre 0°·8S. 133°·5E. (as on 1937 April 5d.).

$A = -·6883$, $B = +·7253$, $C = -·0138$; $\delta = +1$; $h = +7$;
$D = +·725$, $E = +·688$: $G = +·010$, $H = -·010$, $K = -1·000$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Manila		19·7	321	i 4 40a	+ 5	i 8 40	SS	—	—	—
Batavia		27·1	260	10 45	S	(10 45)	+21	i 11 42	SS	—
Perth		35·2	207	i 6 43	−15	i 12 53	+22	—	—	i 19·3
Melbourne		38·2	166	—	—	e 12 55	−22	i 15 35	SS	19·5
Vladivostok		43·7	358	—	—	e 14 52	+13	—	—	e 26·6
Calcutta	N.	49·5	302	—	—	e 14 19	?	—	—	—
Christchurch		55·0	147	—	—	e 20 37	SS	24 32	L_q	31·0
Frunse		68·3	318	e 11 10	+ 5	—	—	—	—	—
Andijan		69·0	315	e 11 9	0	—	—	e 15 9	PPP	—
Tashkent		71·4	315	i 11 21	− 3	i 20 42	0	—	—	e 36·2
Tchimkent		71·5	316	e 11 29	+ 5	—	—	—	—	—
Sverdlovsk		81·3	329	12 17	− 3	22 31	+ 1	—	—	36·3
Baku		85·6	311	e 12 48	+ 7	e 23 13	0	—	—	e 42·8
Tiflis		89·6	312	—	—	e 23 24	[− 6]	—	—	e 46·3
Ksara		96·8	303	e 14 15	+41	e 26 29	PS	—	—	50·8

Additional readings :—
Perth i = +16m.43s.
Melbourne e = +14m.58s., i = +17m.56s.
Long waves were also recorded at Sydney, Riverview, De Bilt, Adelaide, Pulkovo, Irkutsk, Copenhagen, and Wellington.

Dec. 24d. Readings also at 2h. (near Rome), 3h. (Tchimkent, Frunse, Samarkand, Almata, Andijan, Tashkent, and Sverdlovsk), 12h. (Frunse and Andijan), 13h. (Tiflis), 16h. (Tucson), 17h. (Christchurch and Monowai), 18h. (Tucson, Malabar, Mount Wilson, Pasadena, and Fresno), 19h. (Hong Kong), 20h. (Malabar and Andijan (2)), 21h. (Branner), 22h. (La Jolla, Tiflis, Pasadena, Mount Wilson, and Tucson), 23h. (Christchurch, Tashkent, La Plata, Sverdlovsk, Huancayo, Rio de Janeiro, La Paz, Wellington, and Ksara).

Dec. 25d. Readings at 0h. (Baku, Sverdlovsk, Tashkent, near Tananarive (3), and Rome), 2h. (Tiflis, Erevan, and Malabar), 4h. (Irkutsk and Vladivostok), 5h. (Tucson), 7h. (Weston, Williamstown, near Shawinigan Falls, Fordham, and Mizusawa), 8h. (Riverside, Tucson, La Plata, Mount Wilson, and Pasadena), 13h. (Mizusawa), 15h. (Mizusawa and Tucson), 18h. (Cape Town and Ksara), 19h. (Baku, Sverdlovsk, Tashkent, Andijan, Frunse, and Samarkand), 22h. (Tucson, near Ksara, Mount Wilson, Pasadena, and Tiflis), 23h. (Ksara, Tucson, Samarkand (2), Frunse, Andijan (2), La Plata, Sverdlovsk, Tashkent, Tchimkent, Ukiah, Huancayo, Helwan, Wellington, and La Paz).

Dec. 26d. 13h. Local Japanese shock. Tokyo Imp. Univ. gives Epicentre as 36°·15N. 139°·96E.

Kamakura P =47m.43s., S =47m.59s.
Mitaka P =47m.43s., S =47m.54s.
Tukubasan P =47m.43s., S =47m.52s.
Komaba P =47m.59s., S =48m.10s.
Kiyosumi P =47m.58s., S =48m.12s.
Koyama P =47m.58s., S =48m.12s.
Titibu P =47m.58s., S =48m.9s.
Tokyo Cen. Met. Obs. iP =47m.59s.a, S =47m.13s.
Tokyo Imp. Univ. P =48m.0s., S =48m.12s.
Susaki P =48m.11s., S =48m.30s.
Nagoya eP =48m.31s., S =49m.7s.
Mizusawa ePE =48m.35s., iSE =49m.13s.

Dec. 26d. 22h. 2m. 17s. Epicentre 37°·3N. 20°·6E.

The Press indicated damage at Kuriana (North of the Peloponese).

Epicentre about 37°·0N. 22°·0E.

See Annales de l'Institut de Physique du Globe de Strasbourg, 1938, Tome III, 2e partie, Seismologie, Mende, 1941, p. 118.

$A = +\cdot7465$, $B = +\cdot2806$, $C = +\cdot6034$; $\delta = +9$; $h = -1$;
$D = +\cdot352$, $E = -\cdot936$; $G = +\cdot565$, $H = +\cdot212$, $K = -\cdot797$.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Sofia		5·8	21	e 1 24	− 5	e 3 7	S_g	—	—	—
Belgrade		7·5	359	e 1 58k	+ 5	i 3 31	+11	i 3 46	S*	—
Istanbul		7·6	57	2 3	+ 8	6 20	?	3 55	S*	—
Rome		7·8	308	i 3 2	+64	4 1	S*	4 26	S_g	—
Bucharest		8·2	28	e 2 1k	− 1	4 6	S*	4 32	S_g	—
Florence		9·6	315	3 50	?	5 3	S_g	—	—	—
Kecskemet	z.	9·6	356	e 2 34	PP	e 4 39	S*	5 36	S_g	e 9·2
Triest		9·8	331	e 2 46	PPP	4 17	0	5 23	S_g	—
Budapest		10·2	354	2 46	PPP	e 5 12	S*	e 5 46	S_g	6·0
Padova		10·4	324	e 3 28	+54	6 1	?	—	—	—
Helwan		11·6	127	e 2 49	− 1	—	—	e 2 58	PP	—
Moncalieri		12·4	312	1 10	?	e 7 31	?	—	—	—
Yalta		12·5	51	e 2 43	−19	—	—	—	—	—
Chur		12·6	323	e 2 59	− 4	—	—	—	—	—
Simferopol		12·7	49	e 3 9	+ 4	—	—	—	—	—
Ksara		12·9	101	e 3 10	+ 3	e 5 43	+10	—	—	—
Zurich		13·4	322	e 3 18a	+ 4	e 5 46	+ 1	—	—	—
Prague		13·5	343	e 3 1	−14	e 3 43	?	—	—	—
Basle		14·0	321	e 3 26	+ 4	—	—	—	—	e 6·8
Neuchatel		14·0	318	e 3 21	− 1	—	—	—	—	—
Cheb		14·1	338	e 1 43?	?	—	—	—	—	e 5·7
Stuttgart		14·1	328	e 3 18	− 5	e 5 56	− 6	e 3 30	PP	i 7·2
Strasbourg		14·6	325	e 3 38	+ 8	e 6 21	+ 8	—	—	—
Karlsruhe		14·7	327	e 3 43?	+12	e 6 28	+12	—	—	—
Jena		15·1	337	e 3 42	+ 6	e 7 13	+48	—	—	e 7·7
Sotchi		15·8	60	e 2 56	−49	e 7 43	+61	—	—	—
Potsdam		16·0	343	e 3 49	+ 1	i 6 55	+ 9	—	—	e 8·7
Göttingen		16·1	335	e 4 0	PP	—	—	—	—	—
Paris		17·5	317	—	—	e 7 6	−15	—	—	9·6
Hamburg		17·8	338	e 4 12	+ 1	e 7 29	+ 1	—	—	i 9·7

Continued on next page.

		△	Az.	P.	O − C.	S.	O − C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Uccle		17·8	324	e 4 9	− 2	e 7 26	− 2	—	—	e 9·7
De Bilt		18·4	330	4 14	− 4	7 42	+ 1	—	—	e 9·7
Erevan		18·8	74	e 4 23	0	—	—	—	—	—
Copenhagen		19·2	347	i 4 23	− 5	7 54	− 5	8 30	SS	10·7
Tiflis		19·2	69	4 24	− 4	8 7	+ 8	—	—	10·9
Grozny		20·1	65	e 4 36	− 2	e 8 30	+11	—	—	—
Kew		20·5	321	—	—	i 8 21	− 6	—	—	12·7
Oxford		21·2	321	—	—	8 32	− 9	—	—	—
Moscow		21·7	28	e 4 48	− 7	8 45	− 6	—	—	12·2
Upsala		22·7	356	—	—	e 7 43?	?	—	—	—
Baku		23·0	73	e 5 12	+ 5	i 9 18	+ 4	—	—	14·7
Bidston		23·0	322	—	—	i 9 8	− 6	—	—	i 13·2
Pulkovo		23·3	13	e 5 4	− 6	e 9 11	− 9	—	—	e 10·2
Edinburgh		24·6	328	—	—	e 9 43?	+ 1	—	—	—
Sverdlovsk		32·9	41	6 33	− 5	e 11 47	− 9	—	—	17·7
Tashkent		37·5	68	e 7 10	− 7	e 13 0	− 7	e 8 46	PP	—
Andijan		39·9	69	e 7 50	+13	—	—	—	—	—
Frunse		41·1	65	e 8 1	+14	—	—	—	—	—
Weston	z.	67·3	307	e 10 55	− 4	—	—	—	—	—
Fordham		69·8	306	i 11 17	+ 3	—	—	—	—	—

Additional readings :—
Belgrade iPP$_g$Z = +2m.9s., iZ = +2m.20s., eNW = +2m.29s., iNW = +3m.7s.
Rome i = +3m.13s., iS = +4m.7s., i = +4m.30s. and +4m.47s.
Bucharest eP?EN = +2m.19s., eE = +2m.56s., +3m.4s., and +3m.14s., S = +3m.35s.
Kecskemet eZ = +3m.57s. and +8m.3s.
Triest P$_g$P$_g$ = +3m.28s., e = +3m.56s.
Potsdam iZ = +3m.55s., eSZ = +7m.1s.
Kew iE = +8m.28s., iN = +11m.49s. and +12m.18s., iEN = +12m.29s.
Baku e = +11m.10s.
Tashkent e = +16m.0s., +17m.41s., and +21m.56s.
Long waves were also recorded at Irkutsk and Puy de Dôme.

Dec. 26d. Readings also at 0h. (Sverdlovsk, Tashkent, Potsdam, Uccle, De Bilt, Tiflis, Baku, and Pulkovo), 1h. (Tiflis), 2h. (near Lick), 4h. (Andijan, Riverview, near Rome, Manila, and Samarkand), 5h. (Basle, Zurich, and Chur), 6h. (Vladivostok, Fort de France, Rio de Janeiro, Cape Town, Christchurch, Helwan, Riverview, Tashkent, Sverdlovsk, Mount Wilson, Melbourne, Tucson, Ukiah, Huancayo, Ksara, Wellington, La Paz, La Plata, and Pasadena), 7h. (Tiflis, Pulkovo, Baku, De Bilt, Uccle, Potsdam, Irkutsk, and Copenhagen), 9h. (Samarkand and Andijan), 11h. (Perth, La Jolla, Irkutsk, Pasadena, Wellington, Ksara, Ukiah, Tucson, Melbourne, Mount Wilson, Sverdlovsk, Tashkent, Riverview, and Haiwee), 12h. (Copenhagen), 15h. (Nagoya and Mizusawa), 17h. (Mizusawa), 18h. (Batavia, Malabar, La Plata, La Paz, and Huancayo), 19h. (Weston, Frunse, Haiwee, Mount Wilson, Tucson, Pasadena, and Andijan), 22h. (near Santiago), 23h. (Koti).

Dec. 27d. Readings at 2h. (Malabar), 3h. (Grozny, Tucson, Mount Wilson, Pasadena, and Nagoya), 4h. (Piatigorsk, Sverdlovsk, and Tashkent), 5h. (Tashkent), 9h. (Manzanillo), 10h. (Fresno, Haiwee, La Jolla, Santa Barbara, Riverside, Pasadena, Mount Wilson, Tucson, and Santiago), 11h. (near Santiago, Piatigorsk, and Samarkand), 12h. (Santiago), 14h. (Irkutsk, Almata, Frunse, Tchimkent, Andijan, Vladivostok, Sverdlovsk, and Samarkand (2)), 15h. (Mizusawa (2)), 16h. (Mizusawa, Nagoya, and near Tananarive), 17h. (Samarkand), 19h. (Mizusawa), 22h. (Nagoya), 23h. (Medan and Mizusawa).

Dec. 28d. Readings at 1h. (Wellington), 4h. (near Ottawa, Pasadena, Mount Wilson, Haiwee, and Tucson), 5h. (Batavia, Medan, Nagoya, Perth, Mizusawa (2), Sofia, Baku, Tashkent, Vladivostok, Calcutta, Frunse, Tchimkent, Andijan, Manila, and Sverdlovsk), 6h. (Fort de France, Andijan, Tchimkent, Frunse, and Samarkand), 7h. (Taikyu, Frunse, and Andijan), 8h. (Tucson), 9h. (Irkutsk, Ksara, Moncalieri, Andijan, Samarkand, Tchimkent, and Baku), 11h. (near Branner, Lick, and Berkeley), 13h. (near Tananarive), 14h. (Tucson, Tiflis, and Grozny), 15h. (Tiflis and Fordham), 16h. (Fordham, Tiflis, and Grozny), 18h. (Erevan), 19h. (near Tananarive), 20h. (Apia), 22h. (Tinemaha, Riverside, Butte, Tucson, near Tananarive, near Taikyu, Pasadena, Mount Wilson, and Haiwee), 23h. (Almeria, near Granada (2), Moscow, Phu-Lien, Sverdlovsk, Manila, Calcutta, Tashkent, and Vladivostok).

Dec. 29d. 20h. Undetermined Japanese quake.
Koti eP =57m.50s., P* =57m.58s., S =58m.28s., S_g =58m.56s.
Husan eP =58m.6s., S =59m.3s.
Taikyu eP =58m.9s., S =59m.34s.
Nagoya eP =58m.20s., S =59m.20s.
Hukuoka B eP =58m.29s., S =59m.2s.
Heizyo eP =59m.15s., S =61m.39s.
Keizyo ePE =60m.11s.
Zinsen eP? =60m.38s.
Baku e =64m.23s., L =66·9m.
Tashkent e =77m.1s. and 82m.29s., L =85·5m.
Long waves were also recorded at Pulkovo, Copenhagen, De Bilt, Sverdlovsk, Moscow, and Tiflis.

Dec. 29d. Readings also at 0h. (Pulkovo, Baku, Granada (3), De Bilt, Manzanillo, Copenhagen, Andijan, and Santiago (2)), 1h. (Melbourne, Tinemaha, and Mount Wilson), 4h. (Santiago), 5h. (Erevan, Grozny, Tiflis, and Santiago (2)), 7h. (Santiago, Nagoya, and Mizusawa), 9h. (Pasadena and Mount Wilson), 13h. (La Paz and Tacubaya), 14h. (Fort de France, San Juan, Huancayo, and La Paz), 16h. (Kodaikanal and Ksara), 17h. (La Paz (2) and Andijan), 18h. (Wellington and Santiago), 19h. (near Tananarive), 20h. (Santiago), 21h. (Calcutta and La Paz), 22h. (Frunse, Tchimkent, Almata, Samarkand, Andijan, and Tashkent), 23h. (Nagoya (2), Tashkent, Sverdlovsk, and Mizusawa (2)).

Dec. 30d. 2h. 20m. 48s. Epicentre 40°·3S. 176°·4E. (as on 1938, Dec. 15d.).

Felt in the Northern Island of New Zealand. Maximum intensity VIII in the district of Hawkes Bay, and in Wairarapa at Mangatoro.

Epicentre 40°·3S. 176°·4E. (Wellington).

J. Henderson and R. C. Hayes.

Dominion Observatory, Wellington, W.1., New Zealand, Bulletin No. S.56.

Earthquakes in New Zealand (including Earthquakes Summaries) for the year 1938, Wellington, 1938, p.7.

A = −·7633, B = +·0484, C = −·6443 ; δ = +9 ; h = −2.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Bunnythorpe		0·6	271	0 12?	− 3	—	—	—	—	—
Tuai		1·6	21	0 32	+ 2	—	—	—	—	—
Wellington		1·6	232	0 30	0	0 48	− 3	0 37	S_g	—
New Plymouth		2·2	304	0 40	+ 2	1 7	+ 1	—	—	—
Arapuni		2·3	345	0 42?	+ 2	1 10	+ 1	—	—	—
Takaka		2·8	259	e 0 42?	− 5	1 15	− 7	—	—	—
Christchurch		4·3	220	1 10	+ 2	1 54	− 6	—	—	—
Riverview		21·1	281	e 4 48	0	i 8 47	+ 8	9 4	SS	e 10·5
Sydney		21·1	281	e 4 42	− 6	8 38	− 1	—	—	11·2
Melbourne		24·4	267	e 5 25	+ 4	9 38	− 1	i 10 8	SS	12·1
Perth		48·8	260	i 10 52	PP	i 15 54	+ 2	i 16 10	PS	e 27·3
Medan		82·9	282	e 12 29	+ 1	22 40	− 6	—	—	—
La Plata		89·9	138	23 55	S	(23 55)	+ 1	—	—	45·2
Santa Barbara		94·9	49	e 13 26	+ 1	—	—	—	—	—
Huancayo		95·2	112	e 13 36	+ 9	e 24 28	−12	e 25 35	PS	e 40·4
Pasadena		95·5	50	i 13 29	+ 1	—	—	e 17 20	PP	e 45·2
Mount Wilson		95·7	50	i 13 29	0	—	—	e 17 14	PP	—
Riverside		95·9	50	i 13 31	+ 1	—	—	e 17 23	PP	—
Tinemaha	Z.	97·6	48	e 13 36	− 2	—	—	e 17 36	PP	—
La Paz	Z.	97·7	120	e 17 12	PP	—	—	—	—	46·2
Tucson		98·7	55	13 43	+ 1	—	—	i 17 44	PP	e 44·8
Colombo	E.	99·4	272	e 17 12	PP	—	—	—	—	—
Calcutta	N.	103·8	289	—	—	e 24 38	[− 7]	—	—	—
Frunse		123·5	301	e 19 4	[+ 4]	—	—	—	—	—
Andijan		124·0	298	e 18 59	[− 2]	—	—	e 23 29	PPP	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
Tashkent		126·4	297	i 19 3	[− 1]	e 38 43	SS	42 36	SSS	e 56·2
Ottawa		128·5	59	i 19 6	[− 3]	—	—	—	—	69·2
Williamstown		129·0	64	i 19 10	[0]	—	—	—	—	—
Weston		130·4	65	e 22 37	PKS	—	—	—	—	e 61·9
Seven Falls		131·8	58	e 22 41	PKS	—	—	—	—	e 59·2
Sverdlovsk		136·1	315	i 19 22	[− 1]	—	—	i 22 50	PKS	59·2
Tiflis		143·8	288	i 19 34	[− 2]	23 10	SKP	—	—	75·2
Ksara		148·0	270	i 19 44k	[0]	—	—	23 22	PP	70·7
Helwan		149·7	261	i 19 45a	[− 1]	e 30 8	{− 9}	—	—	—
Stuttgart		167·6	317	e 20 5	[− 2]	—	—	—	—	e 94·2
Strasbourg		168·4	319	e 20 2	[− 6]	—	—	e 24 44	PP	e 74·2
Chur		168·5	309	e 20 6	[− 2]	—	—	—	—	—
Toledo		179·5	—	e 20 25	[+13]	i 32 47	{− 1}	e 26 0	PP	—

Additional readings :—
Tuai $P_g = +42$s.
Riverview iPE = +5m.5s., iEN = +5m.21s.
Melbourne i = +5m.32s.
Perth i = +11m.47s., iPP = +13m.12s., iPPP = +14m.10s., i = +17m.15s., iS = +18m.35s., iPS = +18m.50s., i = +21m.42s., +24m.37s., and +25m.40s.
Medan iN = +22m.51s.
Huancayo eSS = +31m.13s., ePSPS = +31m.34s.
Tucson iP = +13m.49s. and +13m.56s., PPP = +19m.29s.
Tashkent e = +54m.12s.
Sverdlovsk i = +22m.12s., e = +42m.7s.
Helwan i = +20m.3s.
Chur e = +21m.51s. and +26m.8s.
Toledo e = +22m.8s.

Long waves were also recorded at Moscow, Pulkovo, Kodaikanal, Ukiah, Baku, Uccle, Copenhagen, Bidston, Kew, Cape Town, Triest, San Fernando, Rome, De Bilt, Puy de Dôme, and Paris.

Dec. 30d. 12h. 10m. 37s. Epicentre 59°·2N. 153°·8W. (as on 1937, May 4d.).

A = −·4617, B = −·2272, C = +·8574 ; $\delta = -8$; $h = -9$;
D = −·442, E = +·897 ; G = −·769, H = −·379, K = −·515.

		△	Az.	P.	O−C.	S.	O−C.	Supp.		L.
		°	°	m. s.	s.	m. s.	s.	m. s.		m.
College		6·3	23	e 1 36	0	e 2 36	−14	—	—	e 2·9
Sitka		10·0	94	e 2 29	+ 2	—	—	—	—	—
Tinemaha		31·8	118	e 6 25	− 3	—	—	—	—	—
Haiwee		32·7	117	e 6 37	+ 1	—	—	—	—	—
Santa Barbara	z.	33·4	121	i 7 7	+25	—	—	—	—	—
Mount Wilson	z.	34·3	120	i 6 50	0	—	—	—	—	—
Pasadena	z.	34·3	120	e 6 50	0	—	—	—	—	—
Riverside	z.	34·8	120	i 6 53	− 1	—	—	—	—	—
La Jolla	z.	35·8	121	i 7 25	+22	—	—	—	—	—
Tucson		39·2	114	i 7 31	0	—	—	9 19	PP	—
Ottawa		46·9	70	e 8 26	− 8	—	—	—	—	18·4
Fordham		51·2	73	i 9 3	− 4	—	—	—	—	—
Weston	z.	51·3	70	i 9 8	0	—	—	—	—	—
Sverdlovsk		61·1	340	e 10 24	+ 6	18 59	+22	—	—	29·4

Additional readings :—
Tinemaha e = +6m.47s.
Mount Wilson iNZ = +7m.11s.
Pasadena iZ = +7m.11s.
Riverside iZ = +7m.15s.
Tucson iP = +7m.49s., i = +8m.6s., PPP = +9m.32s., iPPP = +9m.44s.

Dec. 30d. Readings also at 2h. (Mizusawa), 3h. (Wellington), 7h. (Christchurch, Wellington, and Mizusawa), 9h. (Erevan), 10h. (Simferopol, Yalta, Tacubaya, and Medan), 11h. (Mizusawa), 12h. (Wellington and Santiago), 14h. (Santiago and Mizusawa), 15h. (Santiago and Medan), 16h. (Santiago and Christchurch), 17h. (Wellington, Mizusawa, Tucson, and Nagoya), 19h. (Williamstown), 20h. (Frunse and Andijan (2)), 21h. (Cheb and Andijan), 22h. (Tashkent, Samarkand, Tchimkent, Frunse, and Andijan), 23h. (Santiago),

Dec. 31d. 17h. Local Japanese shock.

Tokyo Imp. Univ. gives Epicentre 36°·59N. 141°·41E.

Komaba P =53m.56s., S =54m.16s.
Mitaka P =53m.56s., S =54m.17s.
Tokyo, Imp. Univ. P =53m.56s., S =54m.15s.
Tukubasan P =53m.56s., S =54m.8s.
Kiyosumi P =54m.0s., S =54m.20s.
Koyama P =54m.0s., S =54m.28s.
Titibu P =54m.0s., S =54m.22s.

Dec. 31d. Readings also at 0h. (Philadelphia, Rio de Janeiro, Christchurch, Ukiah, Berkeley, San Juan, Huancayo, Tucson, La Paz, La Plata, Pasadena, Tacubaya, Mount Wilson, Riverside, Sverdlovsk, and Tashkent), 1h. (Uccle, Stuttgart, Cape Town, De Bilt, Copenhagen, Paris, Strasbourg, Ksara, Tiflis, and Baku), 2h. (Wellington), 4h. (La Plata and Frunse), 5h. (La Plata), 6h. (Nagoya, La Plata, Tashkent, Baku, Sverdlovsk, and Mizusawa), 7h. (Bozeman and Butte), 12h. (Tacubaya), 16h. (College, Weston, Mizusawa, Sverdlovsk, Fordham, Riverside, Mount Wilson, Pasadena, and Tucson), 17h. (Andijan, Samarkand, Tashkent, Baku, and Frunse), 19h. (Mizusawa), 20h. (Mizusawa), 22h. (Tucson, Mount Wilson, Riverside, Guadalajara, and Tacubaya), 23h. (Santiago and La Plata).

ERRATA.

1938 Feb. 22d. 6h. for Epicentre 8°·5S. 156°·60E.
read Epicentre 8°·5S. 156°·0E.

1938 Sept. 25d. 20h. for Epicentre 14°·0S. 162°·0E.
read Epicentre 14°·0S. 167°·0E.