

The scanned images of the bulletins of the International Seismological Summary (ISS) have been obtained thanks to funding provided by the US National Science Foundation through grant EAR-9725140 (Villaseñor et al., 1997) and collected by SGA Storia Geofisica Ambiente (Bologna) on behalf of the Istituto Nazionale di Geofisica e Vulcanologia (Rome), in the frame of the EUROSEISMOS project.

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The International Seismological Summary.

1944 October, November, December.

INTERNATIONAL GEODETIC AND GEOPHYSICAL UNION.
ASSOCIATION OF SEISMOLOGY.
FORMERLY THE BULLETIN OF
THE BRITISH ASSOCIATION SEISMOLOGY COMMITTEE.

The Director of the I.S.S. wishes to express his thanks to U.N.E.S.C.O. and H.M. Treasury for financial support, which has covered the cost of preparation of this volume.

The last quarter of 1944 contains 92 epicentres, 38 of which are repetitions from previous determinations.

Cases of abnormal focal depth are noted below :—

Oct.	2d. 17h.	14·0N.	90·1W.	0·020
	2d. 20h.	41·1N.	142·3E.	0·005
	5d. 16h.	4·6S.	153·6E.	0·005
	5d. 17h.	22·0S.	171·7E.	0·010
	7d. 18h.	Undetermined shock.		Suggested Deep.
	11d. 9h.	15·3S.	172·5W.	0·005
	14d. 2h.	6·3S.	148·2E.	0·025
	14d. 15h.	46·5N.	136·0E.	0·060
	17d. 21h.	39·5N.	71·1E.	Suggested Deep.
	18d. 12h.	40·8N.	33·4E.	Suggested Deep.
	22d. 18h.	Undetermined Shock.		Suggested Deep.
	25d. 22h.	37·7N.	141·8E.	0·010
	29d. 0h.	40·8S.	175·5E.	Base of Superficial Layers.
	30d. 5h.	8·1N.	42·9W.	Base of Superficial Layers.
Nov.	5d. 14h.	Undetermined Shock.		Suggested Deep.
	7d. 9h.	Undetermined Shock.		Suggested Deep.
	13d. 19h.	25·1S.	178·3E.	0·090
	14d. 23h.	36·3N.	71·0E.	0·025
	20d. 21h.	Undetermined Shock.		Suggested Deep.
	24d. 4h.	19·0S.	169·0E.	0·015
	25d. 23h.	Undetermined Shock.		Suggested Deep.

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	29d. 18h.	19°0S.	169°2E.	0·005
	30d. 1h.	Undetermined Shock.		Suggested Deep.
	30d. 14h.	38·7N.	142·1E.	0·010
Dec.	1d. 4h.	20·5S.	179·0W.	0·080
	1d. 14h.	39·1N.	141·1E.	0·010
	4d. 20h.	15·0N.	146·4E.	Base of Superficial Layers.
	5d. 0h.	32·5S.	70·0W.	0·010
	8d. 7h.	21·6S.	169·7E.	0·010
	8d. 12h.	21·6S.	169·7E.	0·010
	17d. 7h.	27·6N.	128·4E.	Suggested Deep.
	19d. 20h.	42·7N.	147·3E.	0·030
	22d. 22h.	26·0S.	70·2W.	Base of Superficial Layers.
	27d. 15h.	6·2S.	151·5E.	0·005
	28d. 1h.	5·9S.	149·9E.	0·010

Thanks are also due to the Director of the Meteorological Office, and the Superintendent of Kew Observatory for hospitality extended to the staff, and assistance with administration.

January, 1954.

KEW OBSERVATORY,
RICHMOND, SURREY.

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1944 OCTOBER, NOVEMBER, DECEMBER.

Oct. 1d. Readings at 2h. (near Andijan), 6h. (near Andijan, Frunse, and Almata), 7h. (near Andijan and Tashkent), 8h. (Palomar, Tinemaha, Riverside, Mount Wilson, Pasadena, St. Louis, Kew, Uccle, Bombay, Vladivostok, and near Andijan), 9h. (Cheb and near Andijan (3)), 12h. and 14h. (near Andijan), 15h. (Ukiah), 18h. and 19h. (near Andijan), 20h. (Sverdlovsk), 21h. (Pasadena, Mount Wilson, Riverside, Tinemaha, Palomar, and Tucson), 22h. (Tacubaya).

Oct. 2d. 17h. 21m. 58s. Epicentre 14°·0N, 90°·1W. Depth of focus 0·020.

A = -·0003, B = -·9707, C = +·2404; $\delta = +5$; $h = +6$;
D = -1·000, E = ·000; G = ·000, H = -·240, K = -·971.

		Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Tacubaya	N.	10·3	303	2 27	+ 3	—	—	—	—
Balboa Heights		11·4	115	e 2 48	+ 9	—	—	—	—
Bogota		18·3	119	i 4 12	+ 8	—	—	i 4 22	pP e 11·9
Columbia		21·5	20	i 4 40	+ 3	e 8 27	+ 7	e 5 8	pP e 12·0
Cape Girardeau	E.	23·2	2	e 4 55	+ 2	e 8 49	- 1	e 5 58	pP —
San Juan		23·3	76	e 4 57	+ 3	e 9 10	+19	e 5 46	PP e 14·5
St. Louis		24·5	0	i 5 6	0	i 9 16	+ 4	i 5 38	pP —
Tucson		26·3	318	i 5 22	0	e 9 32	- 9	i 5 55	pP e 10·6
Georgetown		27·3	23	i 5 34	+ 2	i 10 6	+ 8	i 6 7	pP —
Chicago		27·8	3	i 5 35	- 1	e 10 13	+ 7	i 6 11	pP e 11·1
New Kensington		28·0	17	e 6 7	pP	i 10 4	- 5	—	—
Philadelphia		29·0	24	i 5 47	0	i 10 25	0	e 6 21	pP e 11·5
Bermuda		29·5	48	e 5 50	- 1	—	—	—	e 12·5
Huancayo		29·7	150	i 6 2	+ 9	i 10 49	+13	e 6 34	pP e 13·3
Fordham		30·2	25	i 5 58	0	i 10 52	+ 8	i 6 48	sP —
La Jolla		31·1	312	i 6 5 _a	0	—	—	e 8 58	P _c P —
Palomar		31·1	313	i 6 5 _a	0	e 11 2	+ 4	i 8 59	P _c P —
Boulder City		31·2	320	i 6 6	0	—	—	i 6 38	pP —
Riverside		31·8	313	i 6 10	- 1	e 16 28	S _c S	i 7 10	PP —
Rapid City		32·0	342	e 6 14	+ 1	e 11 4	- 8	e 7 6	sP e 13·0
Mount Wilson		32·4	313	i 6 17 _a	0	e 11 13	- 5	i 6 52	pP —
Pasadena		32·4	313	i 6 17 _a	0	e 11 21	+ 3	e 6 49	pP e 13·9
Harvard		32·6	27	i 6 19	+ 1	—	—	i 6 52	pP —
Weston		32·6	27	i 6 20	+ 2	e 11 27	+ 6	7 8	PP 12·5
Salt Lake City		32·8	329	e 6 5	-15	e 11 11	-13	—	— e 14·4
Logan		33·5	331	i 6 28	+ 2	e 11 36	+ 1	—	— e 13·9
Ottawa		33·6	18	6 27	0	11 40	+ 3	7 16	PP e 14·7
Santa Barbara		33·7	312	i 6 28	0	—	—	i 9 6	P _c P —
Tinemaha		34·1	318	i 6 31	0	e 11 41	- 3	i 7 1	pP —
Shawinigan Falls		35·5	21	6 44	+ 1	12 10	+ 4	8 10	PP —
Seven Falls		36·7	22	6 56	+ 3	12 28	+ 4	—	—
Santa Clara		36·7	316	i 6 54	+ 1	e 12 29	+ 5	—	—
Butte		37·1	335	e 4 34 _?	?	e 13 26 _?	sS	10 8 _?	?
La Paz		37·2	143	7 20	+23	i 13 22	sS	—	17·5
Ukiah		38·5	317	—	—	e 12 50	- 1	e 13 55	sS e 16·4
Saskatoon		40·3	344	—	—	e 13 20	+ 2	—	— 19·0
Victoria		44·1	328	e 7 14	-40	e 13 32	-42	—	—
Sitka		55·2	332	—	—	e 16 52	+ 5	i 17 50	sS e 28·3
Malaga		78·3	55	i 11 47 _a	+ 3	e 21 25	+ 1	i 12 23	pP —
Granada		78·9	54	i 12 39 _k	pP	i 21 30	0	i 15 22	PP e 37·2
Kew	z.	79·0	40	e 12 39	pP	e 22 39	sS	15 34 _?	PP e 39·0
De Bilt		82·2	38	i 12 7	+ 3	—	—	12 44	pP —
Copenhagen		85·4	34	e 12 23	+ 3	22 43	+ 7	13 1	pP —
Cheb		87·2	39	e 18 2 _?	PPP	—	—	—	—
Sverdlovsk		105·3	16	e 18 14	PP	24 17	[+ 2]	19 2	sPP —
Ksara		109·9	46	e 20 4	PP	e 28 12	PS	—	—
Riverview		121·5	238	i 30 4	PS	—	—	—	—
Tashkent		121·7	18	e 20 11	PP	30 2	PS	e 20 46	pPP —

For Notes see next page.

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NOTES TO OCTOBER 2d. 17h. 21m. 58s.

Additional readings:—

Cape Girardeau esS?E = 9m.32s.
 San Juan e = 6m.32s., iS = 9m.59s.
 St. Louis isSE = 10m.17s.
 Tucson i = 6m.7s., iP_cP = 8m.46s., e = 9m.56s.
 Chicago i = 6m.24s., e = 6m.48s.
 Philadelphia e = 6m.36s. and 9m.46s.
 Fordham i = 11m.45s. and 12m.36s.
 Palomar iZ = 9m.17s., iS_cPZ = 12m.28s., iS_cSN = 16m.27s.
 Riverside iZ = 6m.28s., iP_cPZ = 9m.0s., iZ = 9m.20s., iP_cPZ = 9m.34s., iS_cPZ = 12m.28s.
 Mount Wilson ePPN = 7m.37s., eP_cPZ = 9m.2s., eS_cPZ = 12m.33s.
 Pasadena esPZ = 6m.59s., ePPZ = 7m.19s., iP_cPZ = 9m.2s., eZ = 9m.29s., iP_cPZ = 9m.43s., esP_cPZ = 10m.0s., esSEN = 12m.20s., eS_cPZ = 12m.32s., iS_cSN = 16m.32s.
 Weston e = 7m.18s., iS = 11m.30s.
 Ottawa PPP = 7m.44s.
 Tinemaha iPPNZ = 7m.4s., iS_cP = 12m.37s., eS_cSE = 16m.32s.
 Butte e = 6m.6s.?
 Sitka e = 22m.38s.
 Malaga PP = 14m.53s., PPP = 16m.23s., sS = 21m.59s., iPS = 22m.39s., SS = 26m.37s., iPKP, PKP = 38m.35s.
 Granada ePPP = 17m.23s., iS = 22m.28s., PS = 23m.17s., SS = 27m.35s.
 Kew eQN = 34m.2s.
 Copenhagen 13m.19s. and 23m.47s.
 Sverdlovsk PS = 27m.31s., PPS = 28m.22s.
 Tashkent sPP = 21m.2s.

Oct. 2d. 20h. 29m. 45s. Epicentre 41°·1N. 142°·3E. Depth of focus 0·005.

Intensity VII at Montbetsu, Hokkaido; V at Hatinohe, Mori, and Morioka; IV at Miyako, Tokyo, and Muroran.

Epicentre 41°·0N. 142°·5E. Shallow. Macroseismic radius greater than 300km. Seismological Bulletin of the Central Meteorological Observatory, Japan, for the year 1944, Tokyo, 1951, p. 20, with isoseismic chart.

$$A = -\cdot5980, B = +\cdot4622, C = +\cdot6548; \quad \delta = 0; \quad h = -2;$$

$$D = +\cdot612, E = +\cdot791; \quad G = -\cdot518, H = +\cdot400, K = -\cdot756.$$

	Δ	Az.	P.		O - C.	S.		O - C.	Supp.		L.
			m.	s.		m.	s.		m.	s.	
Hatinohe	0·8	227	0	13k	- 4	0	25	- 4	—	—	—
Aomori	1·2	259	0	23k	+ 1	—	—	—	—	—	—
Miyako	1·5	189	0	22 _a	- 4	0	37	- 8	—	—	—
Mori	1·6	307	0	26k	- 1	0	48	+ 1	—	—	—
Morioka	1·7	211	0	26k	- 2	0	45	- 5	—	—	—
Sapporo	2·1	340	0	35k	+ 1	1	1	+ 2	—	—	—
Mizusawa	2·2	204	i 0	35	0	i 0	59	- 3	—	—	—
Akita	2·2	233	0	22k	- 13	—	—	—	—	—	—
Sendai	3·0	200	0	45k	- 2	1	23	+ 1	—	—	—
Nemuro	3·3	46	0	47k	- 4	1	21	- 8	—	—	—
Hokusima	3·6	203	0	55k	0	1	47	+ 10	—	—	—
Onahama	4·3	195	0	46	- 19	1	43	- 11	—	—	—
Aikawa	4·4	227	1	6 _a	0	1	57	0	—	—	—
Utunomiya	4·9	203	1	15	+ 2	2	19	+ 10	—	—	—
Mito	4·9	197	1	17	+ 4	2	27	+ 18	—	—	—
Kakioka	5·1	198	1	13	- 3	2	31	+ 17	—	—	—
Tukubasan	5·2	201	1	14	- 3	2	24	+ 7	—	—	—
Maebasi	5·3	209	1	18	- 1	2	28	+ 9	—	—	—
Kumagaya	5·4	206	1	21	+ 1	2	29	+ 7	—	—	—
Nagano	5·4	217	1	23	+ 3	2	50	+ 28	—	—	—
Wazima	5·6	230	1	14 _a	- 9	2	24	- 3	—	—	—
Tokyo	5·8	201	1	25	0	2	51	+ 19	—	—	—
Toyama	5·9	224	1	27 _a	0	2	57	+ 23	—	—	—
Yokohama	6·0	201	1	36	+ 8	3	1	+ 26	—	—	—
Hunatu	6·2	208	1	31	0	2	47	+ 6	—	—	—
Misima	6·5	205	1	34	- 1	2	46	- 3	—	—	—
Mera	6·5	198	1	38	+ 3	3	16	+ 27	—	—	—
Shizuoka	6·9	208	1	38	- 3	3	4	+ 5	—	—	—
Nagoya	7·2	217	1	45	0	3	5	- 1	—	—	—
Omaesaki	7·3	208	1	52	+ 6	3	14	+ 5	—	—	—

Continued on next page.

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	Δ °	Az. °	P. m. s.		O - C. s.	S. m. s.		O - C. s.	Supp. m. s.		L. m.
Hikone	7.5	221	1	51	+ 2	3	25	+11	—	—	—
Kameyama	7.7	218	1	57	+ 5	3	32	+13	—	—	—
Vladivostok	8.0	288	i 1	54	- 2	i 3	37	+11	—	—	—
Toyooka	8.1	227	1	58	+ 1	—	—	—	—	—	—
Owase	8.5	217	2	1	- 2	3	47	+ 9	—	—	—
Kobe	8.5	224	2	2	- 1	3	27	-11	—	—	—
Sumoto	9.0	223	2	9	- 1	3	35	-16	—	—	—
Slomisaki	9.3	216	3	12	+58	5	53	?	—	—	—
Koti	10.3	226	2	26	0	4	27	+ 5	—	—	—
Izuka	11.8	235	2	52	+ 4	5	15	+17	—	—	—
Hukuoka	12.1	235	2	51	- 1	5	21	+15	—	—	—
Miyazaki	12.6	227	3	21	PPP	6	21	SSS	—	—	—
Tomie	13.7	236	3	15	+ 2	—	—	—	—	—	—
Irkutsk	28.0	307	i 5	53	+ 6	i 10	33	+ 8	—	—	—
College	45.3	34	e 8	17	+ 4	i 14	42	- 6	e 8	57	pP e 20.4
Almata	47.4	296	8	31?	+ 1	16	3	+45	—	—	—
Calcutta	48.7	265	e 8	37	- 3	i 15	40	+ 4	—	—	—
Frunse	49.1	296	e 8	44	+ 1	—	—	—	—	—	—
Andijan	51.5	295	i 9	3	+ 2	e 16	21	+ 6	9	53	P _c P
Sverdlovsk	52.6	318	i 9	9	0	i 16	32	+ 2	i 9	23	pP
Sitka	52.7	43	e 9	33	pP	i 16	45	+14	i 17	18	sS e 25.9
Tashkent	53.3	297	i 9	15?	0	16	44?	+ 4	—	—	—
New Delhi	53.7	279	i 9	16	- 2	e 16	42	- 3	i 21	19	SS
Honolulu	53.8	92	e 9	32	pP	e 16	49	+ 3	e 11	59	PP e 24.2
Bombay	62.5	272	i 10	19	0	i 18	43	+ 3	10	30	pP e 34.2
Victoria	63.2	48	9	58	-26	18	14	-35	—	—	29.2
Moscow	64.4	324	10	30	- 2	19	4	+ 1	10	43	pP
Colombo	64.8	256	10	15?	-19	19	15?	+ 7	—	—	—
Baku	66.5	304	10	47	+ 2	19	33	+ 4	11	2	pP
Ukiah	68.6	57	e 11	15	pP	e 19	59	+ 5	13	22	PP e 28.7
Brisbane	69.0	170	—	—	—	i 19	59	0	—	—	—
Upsala	69.6	334	i 11	19	pP	e 20	5	- 1	i 13	37	PP e 33.2
Sasktoon	69.6	38	—	—	—	e 20	4	- 2	—	—	31.2
Berkeley	69.8	57	e 11	3	- 2	e 20	8	0	11	21	pP e 32.4
Santa Clara	70.4	57	i 11	27	+18	e 20	22	+ 7	i 11	55	pP
Butte	70.6	45	e 11	50?	pP	e 21	1?	+43	e 21	37?	PPS e 31.3
Tinemaha	72.9	56	i 11	25	+ 1	i 20	50	+ 6	i 11	44	pP
Bergen	72.9	340	11	25	+ 1	20	48	+ 4	21	15?	PS 31.2
Santa Barbara	73.6	59	e 11	31	+ 3	e 20	58	+ 6	e 11	52	pP
Logan	73.8	48	i 11	30	+ 1	e 21	0	+ 6	e 17	53	? e 39.6
Salt Lake City	74.4	49	e 11	22	-11	e 20	52	- 9	e 11	41	pP e 32.0
Copenhagen	74.6	334	i 11	34	0	21	4	+ 1	i 11	50	pP
Mount Wilson	74.8	58	i 11	36	+ 1	e 21	10	+ 5	i 11	52	pP
Pasadena	74.8	58	i 11	34	- 1	i 21	7	+ 2	i 11	51	pP e 29.4
Riverview	75.0	173	e 11	50	+14	i 21	11	+ 3	i 21	48	PS e 32.5
Riverside	75.4	58	i 11	38	0	e 21	13	+ 1	i 11	55	pP
Boulder City	75.7	55	i 11	41	+ 1	i 21	20	+ 5	i 12	1	pP
La Jolla	76.2	59	e 11	58	pP	i 21	25	+ 4	—	—	—
Palomar	76.2	58	i 11	43	0	i 21	22	+ 1	i 12	2	pP
Rapid City	76.8	43	i 11	48	+ 2	i 21	31	+ 4	e 12	15	pP e 32.5
Potsdam	77.0	331	e 11	51	+ 3	i 21	34	+ 5	e 14	44?	PP e 39.2
Bucharest	77.4	319	e 11	20	-30	e 21	37	+ 3	e 22	4	PS e 35.2
Aberdeen	77.6	341	—	—	—	i 21	45	+ 9	—	—	e 37.4
Prague	78.4	329	i 11	55	0	21	48	+ 4	e 22	12	PS e 35.2
Jena	78.8	331	e 11	57	0	e 21	48	+ 1	—	—	—
Cheb	79.1	331	e 11	59	0	e 22	15	+23	e 15	15	PP e 43.2
Ksara	79.3	306	e 11	47	-13	e 22	1	+ 7	—	—	—
Belgrade	79.9	322	i 12	5	+ 2	—	—	—	i 12	21	pP
De Bilt	80.0	335	i 12	5 _a	+ 1	i 22	6	+ 5	i 15	8	PP e 37.2
Tucson	80.7	55	i 12	9	+ 1	e 22	13	+ 4	i 12	25	pP e 37.9
Stonyhurst	80.7	340	—	—	—	e 22	15	+ 6	—	—	e 41.4
Uccle	81.4	335	i 12	11 _a	0	e 22	17?	+ 1	i 12	27	pP e 38.2
Strasbourg	82.1	332	12	15	0	—	—	—	12	34	pP
Triest	82.2	327	e 12	16	+ 1	i 23	20	PS	—	—	—
Kew	82.2	337	i 12	17 _a	+ 2	e 22	28	+ 4	12	33?	pP 38.8

Continued on next page.

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	Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Zürich	82.8	331	e 12 19 _a	+ 1	e 21 33	-57	e 12 34	pP
Basle	83.0	332	e 12 20 _a	0	e 22 34	+ 2	i 12 36	pP
Paris	83.7	335	12 19?	- 4	e 23 10	PS	e 15 38	PP
Neuchatel	83.7	332	e 12 23	0	—	—	—	—
Milan	84.2	329	12 28	+ 2	e 22 44	0	i 23 11	PS
Helwan	84.9	306	i 12 30 _k	+ 1	22 45	- 6	16 0	PP
Chicago	85.9	36	—	—	e 22 52	[+ 1]	e 23 37	sS
Clermont-Ferrand	86.2	333	i 12 37	+ 2	e 23 43	PS	i 12 53	pP
St. Louis	87.3	39	e 12 41	0	i 23 17	+ 3	i 12 57	pP
Seven Falls	87.4	22	—	—	e 23 15	0	e 29 3	SS
Ottawa	87.4	26	12 40	- 1	22 3	[-57]	—	—
Christchurch	88.6	158	—	—	29 16	SS	36 26	Q
Cape Girardeau	88.7	39	—	—	e 23 10	[+ 1]	e 24 1	sS
New Kensington	90.2	31	e 16 1	PP	i 23 43	+ 2	—	—
Harvard	91.3	24	i 13 0	0	—	—	i 13 17	pP
Weston	91.5	24	i 12 31	?	e 23 55	+ 3	13 35	pP
Fordham	92.1	26	i 13 2	- 1	e 23 33	[+ 5]	i 24 2	S
Philadelphia	92.4	28	e 21 29	?	e 23 27	[- 3]	e 23 47	S
Granada	96.1	333	i 13 20 _k	- 2	e 23 46	[- 5]	13 56	pP
Malaga	96.8	333	i 13 22 _a	- 3	23 46	[- 9]	i 17 16	PP
San Fernando	97.6	335	17 31	PP	24 33	-12	25 3	S
Bermuda	102.8	23	e 26 9	?	—	—	e 32 29	SS
San Juan	115.2	30	e 19 33	PP	e 27 14	S	e 35 30	SS
Huancayo	136.2	60	—	—	—	—	e 39 29	SS
La Paz	144.1	56	e 19 30	[+ 2]	—	—	i 23 10	SKP

Additional readings :—

College esS = 15m.25s., eS_cS = 17m.53s., e = 18m.28s.
 Sverdlovsk isS = 16m.59s.
 Sitka ePP = 11m.31s., eSS = 20m.22s.
 New Delhi iN = 19m.26s.
 Bombay iN = 18m.51s., PSE = 19m.0s., S_cSN = 20m.22s., S_cSE = 20m.25s., SSN = 22m.45s., SSE = 22m.50s.
 Ukiah e = 20m.23s. and 24m.3s.
 Upsala ipS?E = 20m.37s., eN = 21m.21s., eSSE = 24m.26s., eSS?N = 24m.39s., eSSSN = 27m.48s.
 Berkeley eQ = 28m.7s.
 Tinemaha iZ = 11m.33s. and 11m.53s., ePPN = 13m.23s.
 Santa Barbara eN = 21m.28s.
 Logan e = 36m.9s.
 Salt Lake City e = 11m.57s., isS = 21m.25s., eSS = 25m.38s.
 Copenhagen i = 14m.22s., 21m.36s., 21m.58s., and 25m.54s.
 Mount Wilson eE = 21m.40s.
 Pasadena i = 11m.37s., isPZ = 12m.11s., ePPZ = 14m.35s., eZ = 16m.29s., iE = 21m.35s.
 Riverside eN = 11m.54s., eN = 26m.11s.
 Riverview iZ = 12m.45s., iPPZ = 14m.25s.
 Rapid City e = 12m.49s., ePP = 14m.51s., e = 16m.56s., isS = 22m.1s., e = 26m.38s.
 Prague eSS = 26m.3s.
 Bucharest eN = 13m.21s., eE = 14m.19s., eS?N = 21m.40s.
 Cheb e = 34m.14s.
 Belgrade ePP = 15m.12s
 Tucson e = 15m.5s. and 25m.59s., ePKP, PKP = 38m.43s.
 Uccle iPPN = 15m.17s., e = 18m.44s., eN = 29m.10s.
 Strasbourg PP = 15m.37s., e = 24m.40s.
 Kew eN = 13m.53s., iPPNZ = 15m.25s., iNZ = 15m.41s., iZ = 21m.45s., eE = 22m.55s., ePSN = 23m.13s., iPPSZ = 23m.27s., eN = 23m.57s., eSSEN = 27m.53s., eSSS = 30m.45s., eQ = 33m.45s.
 Zürich ePP = 15m.41s.
 Helwan i = 12m.48s., eZ = 13m.48s. and 15m.36s., PPPZ = 17m.54s., SN = 23m.15s., PPSN = 24m.36s.
 Chicago e = 28m.31s.
 Clermont-Ferrand iPP = 15m.59s.
 St. Louis eSKSE = 23m.3s., isSE = 23m.47s., ePSE = 24m.9s.
 Cape Girardeau eSE = 23m.28s.
 Fordham e = 13m.28s.
 Philadelphia eSS = 29m.44s.
 Granada iPP = 16m.52s., ipPP = 17m.19s., PPP = 18m.55s., eSKS = 23m.4s., sS = 25m.11s., eSS = 30m.1s., sSS = 31m.13s.
 Malaga iPPP = 19m.22s.
 San Fernando PPPE = 18m.59s.
 San Juan e = 27m.24s., ePS = 29m.20s., e = 35m.27s.
 Long waves were also recorded at Wellington and Tortosa.

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Oct. 2d. Readings also at 12h. (near Andijan, Frunse, and Tashkent), 17h. (near Ksara), 18h. (Zi-ka-wei), 21h. (La Paz and near Mizusawa).

Oct. 3d. 16h. 6m. 48s. Epicentre $8^{\circ}0'N$, $121^{\circ}5'E$.

$$A = -0.5175, B = +0.8445, C = +0.1383; \quad \delta = +11; \quad h = +7;$$

$$D = +0.853, E = +0.522; \quad G = -0.072, H = +0.119, K = -0.990.$$

		Δ	Az.	P.		O-C.		S.		O-C.		Supp.		L.
		$^{\circ}$	$^{\circ}$	m.	s.	s.		m.	s.	s.		m.	s.	m.
Calcutta	N.	35.0	298	8	12	PP		i 12	29	+ 1		—	—	—
Vladivostok		36.2	13	i 7	7	+ 1		i 12	34	- 13		—	—	—
Colombo	E.	41.3	272	7	26	- 23		14	11	+ 7		—	—	—
Kodaikanal	E.	43.5	277	i 8	17	+ 10		i 14	54	+ 18		10	1	PP
Irkutsk		46.3	346	8	24	- 5		e 18	0	SS		10	32	PP
New Delhi	N.	46.4	302	e 8	30	0		i 15	16	- 2		—	—	—
Brisbane		46.6	141	i 8	30	- 2		e 15	18	- 3		—	—	—
Bombay		48.4	289	8	12?	- 34		i 15	48	+ 2		10	49	PP
Riverview		50.2	148	i 9	4a	+ 4		i 16	14	+ 3		i 10	7	?
Sydney		50.2	148	—	—	—		e 15	54	- 17		—	—	—
Almata		52.4	321	e 9	18	+ 2		—	—	—		—	—	—
Andijan		54.4	315	9	32	+ 1		17	11	+ 2		—	—	—
Tashkent		56.8	315	9	46	- 2		17	42	+ 1		—	—	—
Sverdlovsk		67.6	330	i 10	57	- 4		19	51	- 6		—	—	—
Baku		70.8	310	11	23	+ 3		20	39	+ 4		—	—	—
Moscow		80.0	325	e 12	10	- 3		e 22	11	- 6		—	—	—
Ksara		82.0	303	e 12	10?	- 13		e 22	31	- 6		—	—	—
Helwan		86.5	299	i 12	44a	- 2		23	22	0		12	52	PcP
Cheb		95.9	322	—	—	—		e 26	12?	PS		e 43	12?	Q
Kew		102.6	327	(e 18	12?)	PP		—	—	—		—	—	e 56.2
Tinemaha	z.	108.4	47	e 19	1	PP		—	—	—		—	—	—
Pasadena		109.7	49	e 18	34	[+ 1]		i 28	24	PS		e 19	0	PP
Riverside	z.	110.4	49	e 18	33	[- 1]		—	—	—		—	—	—
Palomar	z.	111.0	50	i 19	21	PP		—	—	—		—	—	—
Malaga		112.6	315	—	—	—		e 28	41	PS		—	—	—
Tucson		116.1	48	i 18	46	[+ 1]		e 29	20	PS		i 19	54	PP
La Paz	z.	167.4	134	i 19	12	[- 56]		—	—	—		—	—	e 53.2

Additional readings :—

Kodaikanal $S_eSE = 18m.16s.$

Brisbane $iZ = 8m.40s., eSN = 15m.21s., iN = 18m.58s.$

Bombay $SPE = 15m.57s., SSN = 19m.15s., SSE = 19m.18s.$

Riverview $iNZ = 16m.20s., iE = 16m.47s., eZ = 20m.23s., iN = 20m.29s., iE = 21m.23s.,$

$iSSN = 22m.9s.$

Pasadena $eZ = 19m.30s.$

Malaga $S? = 29m.8s., e = 31m.9s.$

La Paz $iZ = 20m.20s.$

Long waves were also recorded at Mizusawa and other European stations.

Oct. 3d. Readings also at 0h. (Palomar and Tucson), 1h. (Bucharest (2)), 2h. (Haiwee, La Jolla, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Tucson, near Butte, Logan, Salt Lake City, Rapid City, St. Louis, and Chicago), 3h. (Tacubaya and near Andijan), 8h. (Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, and near Mizusawa), 9h. (near Andijan), 12h. (Zürich), 18h. (Pasadena, Palomar, Riverside, Tinemaha, and near Tucson), 21h. (Apia and Auckland), 22h. (Mount Wilson, Palomar, Riverside, Tucson, and Tinemaha), 23h. (near La Paz).

Oct. 4d. Readings at 0h. (near Ottawa), 1h. (Riverview), 5h. (near Almata, Frunse, and Andijan (2)), 6h. (near Mizusawa), 7h. (near Andijan), 17h. (near Mizusawa), 20h. (near Bogota), 23h. (near Istanbul).

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Oct. 5d. 16h. 57m. 5s. Epicentre 4°·6S. 153°·6E. Depth of focus 0·005.

Felt at Bougainville.

Epicentre 4°S. 154°E. Depth 200km. (Strasbourg), 4°·5S. 152°·5E. Depth 110km.

Magnitude 6·9 (Gutenberg).

Annales de l'Institut de Physique du Globe de Strasbourg, 2ème partie, Séismologie, tome IX 1944, p.15, Strasbourg 1951.

$$A = -\cdot8928, B = +\cdot4432, C = -\cdot0796; \quad \delta = -15; \quad h = +7;$$

$$D = +\cdot445, E = +\cdot896; \quad G = +\cdot071, H = -\cdot035, K = -\cdot997.$$

	Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.	
	°	°	m. s.	s.	m. s.	s.	m. s.	m.	
Brisbane	22·8	182	i 4 57 _a	- 1	i 8 59	+ 1	i 5 12	pP	—
Riverview	29·2	185	i 5 58 _a	0	i 10 47	+ 3	i 6 27	pP	e 14·1
Sydney	29·2	185	e 7 31	pPP	e 10 31	-13	—	—	—
Apia	35·3	108	c 7 15	pP	c 15 13	SSS	—	—	—
Auckland	37·5	152	7 30	pP	13 35	sS	9 21	pPP	21·2
Arapuni	39·0	152	—	—	13 49	sS	16 55?	SSS	—
Wellington	z. 41·2	156	7 38	- 2	14 24	sS	8 15	pP	22·9
Christchurch	42·3	159	7 47	- 2	14 2	- 3	9 22	PP	20·3
Perth	44·6	228	i 8 3	- 5	i 14 44	+ 6	i 17 57	SS	—
Mizusawa	E. 45·0	346	c 8 37	pP	11 47	?	—	—	—
	N. 45·0	346	8 41	pP	12 3	?	—	—	—
Vladivostok	51·4	340	i 9 2	+ 2	i 16 12	- 2	—	—	—
Honolulu	54·1	59	c 9 48	pP	i 16 56	+ 6	i 17 51	sS	e 22·2
Calcutta	N. 69·2	296	c 12 23	?	c 20 18	+17	—	—	—
Colombo	E. 74·5	278	11 33	0	21 2	0	—	—	36·8
New Delhi	N. 80·3	299	c 12 15	+10	22 6	+ 2	i 22 35	sS	—
Bombay	82·8	289	c 12 20	+ 2	c 22 28	- 2	12 27	P _e P	—
Frunse	85·1	313	e 12 33	+ 3	—	—	—	—	—
Ukiah	87·6	51	—	—	c 23 1	[- 1]	c 29 1	SS	e 36·9
Berkeley	88·2	52	—	—	e 23 20	- 2	c 33 26	?	39·3
Tashkent	88·7	311	12 49	+ 2	i 23 30	+ 3	—	—	—
Santa Barbara	z. 89·8	56	c 13 13	pP	—	—	—	—	—
Pasadena	91·1	56	c 12 56	- 3	e 23 52	+ 3	e 13 21	pP	e 38·0
Mount Wilson	91·2	56	e 12 58	- 1	—	—	i 13 25	pP	—
Tinemaha	91·3	53	e 13 2	+ 2	—	—	c 13 25	pP	—
La Jolla	z. 91·7	57	c 13 26	pP	—	—	—	—	—
Riverside	z. 91·7	56	e 12 59	- 3	—	—	i 13 28	pP	—
Palomar	z. 92·1	56	i 13 5	+ 2	—	—	i 13 30	pP	—
Boulder City	93·9	54	i 13 39	pP	—	—	i 17 33	pPP	—
Sverdlovsk	95·4	326	c 13 23	+ 5	i 24 21	- 5	i 23 45	SKS	—
Bozeman	97·0	44	—	—	e 23 32	[-24]	e 29 54	?	e 44·3
Tucson	97·1	58	c 13 52	pP	e 26 7	PS	i 17 58	pPP	e 42·0
Tananarive	103·6	249	—	—	e 27 51	PPS	33 15	SSP	38·1
Moscow	108·2	328	14 20	P	—	—	—	—	—
St. Louis	113·2	50	e 19 10	PP	e 25 17	[+ 8]	e 28 53	PS	—
Helwan	z. 120·1	301	e 19 16	pPKP	—	—	c 20 13	PP	—
Copenhagen	120·3	336	19 10	pPKP	—	—	—	—	—
Seven Falls	123·0	34	—	—	e 30 43	PS	(36 55?)	SS	36·9
Cheb	124·2	331	—	—	c 30 55?	PS	—	—	—
Fordham	124·2	42	e 21 34	?	e 37 18	SS	—	—	—
Harvard	125·0	39	e 19 25	pPKP	c 21 14	pPP	—	—	—
Weston	125·2	39	19 24	pPKP	21 7	pPP	37 49	SSP	53·3
De Bilt	125·9	336	e 20 55	PP	—	—	—	—	—
Chur	127·7	330	e 19 5	[+ 7]	—	—	—	—	—
Kew	128·5	339	e 19 25?	pPKP	—	—	e 22 25	SKP	—
La Plata	130·8	145	22 13	pPP	38 19	SS	—	—	—
Clermont-Ferrand	131·6	332	22 55?	?	—	—	—	—	—
La Paz	133·7	118	19 44	pPKP	23 6	SKP	—	—	—
Bermuda	134·8	47	c 22 28	pPP	c 32 30	PS	e 39 26	SS	—
San Juan	138·8	67	e 22 58	pPP	c 32 35	PS	e 40 53	SSP	—
Rio de Janeiro	N. 148·1	150	e 19 40	[+ 5]	—	—	—	—	—

For Notes see next page.

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NOTES TO OCTOBER 5d. 16h. 57m. 5s.

Additional readings :—

Brisbane ipPN = 5m.15s., iSS?N = 9m.36s.
 Riverview iZ = 6m.41s., iPPP?NZ = 7m.19s., iZ = 8m.43s., 9m.39s., and 11m.1s., i = 11m.20s., iSS?N = 11m.39s., iE = 13m.8s.
 Auckland P_cS = 12m.50s., sS = 15m.11s., Q = 18m.37s.
 Wellington iZ = 7m.45s., sP?Z = 8m.33s., PPZ = 9m.45s., PPP = 10m.45s., i = 17m.5s., pS_cS = 17m.30s., SS = 19m.7s., QZ = 20.9m.
 Christchurch iN = 14m.38s., SS = 17m.15s., QEN = 18m.9s.
 Perth i = 22m.58s. and 37m.25s.
 Bombay S_cSE = 22m.42s., SPN = 23m.24s., SSE = 27m.56s.
 Pasadena i = 13m.25s., ePPZ = 16m.49s., cSKSE = 23m.36s., cPSE = 24m.46s.
 Mount Wilson i = 13m.32s.
 Tinemaha iZ = 13m.58s. and 17m.5s.
 Riverside i = 13m.34s., ePKP,PKPZ = 39m.4s.
 Palomar iZ = 14m.58s. and 17m.11s.
 Boulder City i = 13m.45s.
 Tucson e = 20m.40s., ePS = 27m.27s., i = 30m.40s., e = 34m.42s., oPKP,PKP = 38m.56s.
 St. Louis eSKKSE = 26m.21s., eZ = 29m.25s. and 29m.50s., iZ = 29m.56s., iE = 35m.14s. and 39m.58s.
 Helwan eZ = 21m.4s.
 La Plata PKPN = 22m.19s., N = 22m.55s.
 Bermuda e = 34m.57s.
 San Juan i = 23m.32s., e = 35m.19s.
 Long waves were also recorded at Rapid City, Salt Lake City, and College.

Oct. 5d. 17h. 28m. 31s. Epicentre 22°·0S. 171°·7E. Depth of focus 0·010.
 (as on 1942 September 14d.).

A = -·9184, B = +·1340, C = -·3724; δ = +10; h = +4;
 D = +·144, E = +·990; G = +·368, H = -·054, K = -·928.

	Δ	Az.	P.	O - C.	S.	O - C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Auckland	15·1	170	3 25	- 4	6 17	+ 3	7 3 sS	—
Arapuni	16·4	169	3 47	+ 1	6 53	+ 9	—	—
New Plymouth	17·1	175	3 56	+ 2	7 10	+10	—	—
Tuai	17·4	166	3 57	- 1	7 7	+ 1	—	—
Apia	17·7	66	i 4 1	- 1	i 7 14	+ 1	i 4 27 pP	—
Brisbane	17·8	248	i 4 2	- 1	i 7 19	+ 4	i 15 40 S _c S	—
Wellington	z. 19·4	174	4 19	- 2	7 59	+ 9	5 9 PPP	9·0
Kaimata	20·5	181	4 33	+ 1	8 19	+ 8	—	10·6
Christchurch	21·5	179	4 36	- 6	8 28	- 2	—	—
Riverview	21·6	232	i 4 42k	- 1	i 8 34	+ 3	i 5 11 pP	—
Sydney	21·6	232	e 4 32	-11	i 8 32	+ 1	—	c 10·8
Perth	50·3	246	i 10 9	PP	i 15 49	- 3	i 18 29 S _c S	—
Honolulu	52·3	37	i 9 5	+ 1	e 16 22	+ 2	i 16 56 sS	c 21·9
Omaesaki	64·7	331	10 31	+ 1	19 2	+ 1	—	—
Yokohama	64·7	332	10 31	+ 1	—	—	—	—
Shizuoka	64·9	331	10 32	+ 1	19 5	+ 2	—	—
Tokyo	64·9	332	e 10 33	+ 2	—	—	—	—
Hunatu	65·1	331	10 35	+ 3	—	—	—	—
Mito	65·1	333	10 37	+ 5	—	—	—	—
Owase	65·2	328	e 10 33	0	—	—	—	—
Utunomiya	65·5	332	10 36	+ 1	—	—	—	—
Muroto	65·6	326	e 10 35	- 1	19 16	+ 4	—	—
Nagoya	65·7	330	10 39	+ 3	19 21	+ 8	—	—
Maebasi	65·8	331	e 10 39	+ 2	—	—	—	—
Kōti	66·1	325	10 39	0	19 21	+ 3	—	—
Sumoto	66·1	328	10 39	0	—	—	—	—
Kobe	66·2	328	10 40	0	19 17	- 2	—	—
Hokusima	66·3	334	10 41	+ 1	—	—	—	—
Nagano	66·4	331	10 42	+ 1	19 19	- 3	—	—
Sendai	66·5	335	10 43	+ 2	19 16	- 7	—	—
Toyama	66·8	330	10 45	+ 2	—	—	—	—
Kumamoto	67·1	323	10 45	0	19 34	+ 4	—	—
Mizusawa	67·2	335	10 49	+ 3	(19 37)	+ 6	(15 4) PPP	19·6
Wazima	67·5	330	10 40	- 8	—	—	—	—
Hukuoka	67·8	323	10 52	+ 2	19 42	+ 4	—	28·9

Continued on next page.

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	Δ	Az.	P.		O-C.	S.		O-C.	Supp.		L.
	$^{\circ}$	$^{\circ}$	m.	s.	s.	m.	s.	s.	m.	s.	m.
Hamada	67.9	325	10	50	0	19	41	+ 1	—	—	—
Hatinohe	68.3	337	10	52	- 1	—	—	—	—	—	—
Sapporo	70.5	338	e 11	10	+ 4	e 20	11	+ 1	—	—	—
Vladivostok	74.4	331	i 11	29	0	i 20	55	+ 1	i 11	59	pP
Santa Clara	85.9	47	i 12	32	+ 2	i 23	1	+ 7	—	—	e 35.9
Berkeley	86.0	47	i 12	31	0	i 22	58	+ 3	e 13	14	pP
Santa Barbara	86.0	50	i 12	31	0	i 22	59	+ 4	i 13	2	pP
Ukiah	86.0	45	e 12	33	+ 2	i 22	59	+ 4	e 23	29	sS
Pasadena	86.9	51	e 12	34	- 1	i 23	9	+ 6	i 13	6	pP
La Jolla	87.0	53	i 12	36 _a	0	e 22	51	[0]	e 23	11	S
Mount Wilson	87.1	51	i 12	36	0	e 23	11	+ 6	i 13	5	pP
Riverside	87.4	51	i 12	36	- 1	i 23	14	+ 6	i 13	5	pP
Palomar	87.5	53	i 12	37 _a	- 1	i 23	16	+ 7	i 13	8	pP
Tinemaha	88.3	49	e 12	41	- 1	i 23	25	+ 8	i 13	13	pP
Boulder City	90.2	51	i 12	50	- 1	e 23	40	+ 6	i 13	37	sP
Victoria	90.9	37	—	—	—	e 23	13	[- 2]	i 23	43	S
Tucson	91.6	56	e 12	56	- 1	i 23	58	+12	i 13	14	pP
College	92.0	15	e 13	10	+11	e 23	29	[+ 8]	e 16	48	PP
Calcutta	N. 92.5	293	e 13	16	+15	i 24	12	+18	e 16	50	PP
Colombo	E. 94.2	275	13	10	+ 1	23	33	[+ 1]	—	—	—
Irkutsk	94.3	325	13	20	+10	—	—	—	—	—	—
Salt Lake City	94.4	48	e 12	55	-15	i 23	5	[-28]	i 23	48	sSKS
Logan	94.9	47	e 13	14	+ 2	i 23	36	[- 1]	i 25	10	PS
Butte	96.2	42	—	—	—	e 23	50?	[+ 5]	—	—	e 40.8
Bozeman	97.0	43	—	—	—	e 23	24	[-25]	i 24	12	S
Hyderabad	N. 99.2	285	e 17	29	PP	23	59	[- 11]	(30 33)	SS	30.5
Rapid City	101.6	46	e 18	9	PP	i 24	11	[- 1]	i 18	29	?
Saskatoon	102.1	38	—	—	—	e 24	5	[- 9]	e 32	29	SS
New Delhi	104.0	294	i 17	19	?	i 24	17	[- 6]	i 18	13	PP
Bombay	104.8	284	e 17	3	?	i 24	25	[- 2]	e 18	15	PP
Huancayo	106.1	110	e 18	51	PP	i 24	32	[0]	i 25	57	S
La Plata	106.4	139	17	29?	?	24	22	[-12]	26	17	S
St. Louis	109.5	55	i 19	26	pPP	i 26	27	S	i 27	21	sS
La Paz	110.0	118	i 19	3 _k	PP	i 29	30	PPS	i 19	27	pPP
Tananarive	111.9	237	—	—	—	e 26	39	S	28	39	PS
Chicago	112.1	52	—	—	—	e 26	45	S	e 27	33	sS
Tashkent	113.3	306	e 14	34	P	e 25	4	[+ 2]	i 19	11	PP
Sverdlovsk	119.6	323	i 22	15	PKS	i 29	59	PS	—	—	—
Georgetown	119.7	56	i 19	49	PP	—	—	—	—	—	—
Ottawa	121.0	49	18	39	[- 3]	28	4	S	30	3	PS
Philadelphia	121.2	55	—	—	—	e 27	54	S	e 31	53	PPS
Fordham	122.3	54	e 22	52	PPP	—	—	—	i 36	56	SS
Harvard	124.0	52	e 18	45	[- 3]	—	—	—	—	—	—
Seven Falls	124.4	46	—	—	—	e 27	17	SKKS	e 38	29	?
San Juan	125.9	82	e 21	56	?	e 28	47	?	—	—	e 52.8
Bermuda	129.3	65	e 20	33	?	e 27	47	SKKS	e 31	15	PS
Moscow	132.2	326	i 19	2	[- 1]	26	7	[+ 4]	i 21	20	PP
Upsala	138.0	341	e 22	0	PP	28	39	SKKS	e 32	30	PS
Ksara	139.5	296	e 19	6	[-11]	—	—	—	e 22	6	PP
Bergen	140.5	348	19	10	[- 9]	29	0	SKKS	22	17	PP
Copenhagen	143.0	340	19	18	[- 5]	—	—	—	22	33	PP
Helwan	143.7	291	i 19	20	[- 4]	29	20	SKKS	e 19	47	pPKP
Bucharest	144.0	316	e 19	22	[- 2]	—	—	—	(41 29?)	SS	41.5
Aberdeen	144.6	353	i 19	27	[+ 2]	i 41	25	SS	i 22	44	PP
Potsdam	145.5	338	i 19	28	[+ 1]	—	—	—	i 19	52?	pPKP
Edinburgh	145.9	354	e 19	36	[+ 8]	—	—	—	—	—	—
Sofia	146.5	315	i 19	34	[+ 5]	i 29	35	SKKS	i 22	56	PP
Prague	146.8	333	e 19	11	?	e 26	35	[+ 8]	e 19	29	PKP
Jena	N. 147.2	335	e 19	32	[+ 2]	e 22	52	SKP	e 26	14	PPP
Belgrade	147.2	320	e 19	30	[0]	—	—	—	i 20	19	sPKP
Cheb	147.6	335	e 19	36	[+ 5]	e 26	29?	[+ 1]	e 29	47	SKKS
Stonyhurst	147.9	353	e 18	20	?	e 22	42	SKP	i 19	38	PKP
De Bilt	148.2	344	i 19	30 _a	[- 1]	—	—	—	i 23	6	PP
Uccle	149.6	345	i 19	33 _a	[- 1]	e 23	6	SKP	e 19	39	PKP
Kew	149.9	350	i 19	31	[- 3]	e 23	14	SKP	e 26	31?	PPP

Continued on next page.

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	Δ	Az.	P.	O - C.	S.	O - C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Triest	150.3	328	i 19 37	[+ 2]	i 29 7	?	i 23 40	PP e 66.6
Strasbourg	150.5	337	e 19 33	[- 2]	—	—	e 23 21	PP —
Chur	151.3	335	e 19 33	[- 3]	—	—	e 23 24	PP —
Zürich	151.3	336	e 19 35 _a	[- 1]	—	—	e 23 20	PP —
Basle	151.5	337	e 19 35	[- 2]	e 26 45	[+ 12]	e 23 23	PP —
Paris	151.9	344	i 19 35?	[- 2]	i 26 48	[+ 15]	i 23 24	PP e 77.5
Neuchatel	152.2	337	e 19 36	[- 1]	—	—	e 23 29	PP —
Milan	152.6	332	19 41	[+ 3]	23 17	PP	—	—
Clermont-Ferrand	154.6	342	i 19 40	[- 1]	e 36 48	PPS	i 20 6	pPKP —
Tortosa	159.8	339	20 49	[+ 61]	34 36	SKSP	24 10	PP e 64.5
Lisbon	163.3	3	19 53?	[+ 2]	35 18	SKSP	i 20 45	PKP ₂ 65.6
Granada	164.3	346	i 20 2 _a	[+ 10]	26 41	[- 3]	i 24 43	PP 81.1
Malaga	164.9	347	i 19 50 _a	[- 3]	i 26 28	[- 17]	i 20 52	PKP ₂ 75.5
San Fernando	165.5	354	19 50	[- 4]	23 24	SKP	20 53	PKP ₂ —

Additional readings :—

Auckland i = 4m.36s. and 4m.54s., P_cP = 8m.14s., i = 10m.17s. and 12m.41s., S_cS? = 15m.29s.
 Apia eS = 6m.47s.
 Brisbane ePE = 4m.10s., iSN = 7m.24s., iSZ = 7m.27s., iN = 16m.24s.
 Wellington iZ = 5m.59s., S_cS = 15m.44s.
 Riverview i = 4m.45s., iPPEZ = 5m.18s., iN = 6m.49s., iZ = 8m.43s., iN = 9m.3s., isSE = 9m.25s., iS_cSZ = 15m.45s., iS_cSN = 15m.52s.
 Honolulu i = 16m.58s., eSS = 19m.54s., e = 20m.30s.
 Mizusawa eSE = 15m.22s., S given as L, PP given as S.
 Vladivostok sS = 21m.47s.
 Berkeley iPP = 16m.20s., Q = 36m.38s.
 Ukiah e = 24m.53s., eSSS = 32m.6s.
 Pasadena iZ = 13m.10s., ePPZ = 16m.0s., ipPP = 16m.25s., iPPPZ = 18m.15s., iSKSEN = 22m.50s., iSPN = 23m.57s., ePSZ = 24m.10s., isSSN = 29m.44s., ePKP,PKPZ = 38m.32s.
 Mount Wilson ipPPZ = 16m.32s., eSKSEN = 22m.53s., ePKP,PKPZ = 38m.32s.
 Riverside iPPZ = 16m.4s., i = 16m.33s., iSKS = 22m.53s., iPKP,PKPZ = 38m.33s.
 Palomar iZ = 12m.58s. and 13m.18s., iPPZ = 16m.6s., ipPPNZ = 16m.32s., iSKSN = 22m.56s., iPKP,PKPZ = 38m.32s.
 Tinemaha i = 12m.45s., iZ = 13m.22s., eSKSE = 22m.59s., iPKP,PKPZ = 38m.33s.
 Boulder City iP = 12m.53s., iS? = 23m.11s.
 Tucson i = 13m.27s. and 30m.17s., ePKP,PKP = 38m.23s.
 College e = 23m.48s., ePS = 24m.56s.
 Calcutta ePPN = 18m.54s., iSKSN = 23m.35s., iPPSN = 25m.42s., iSSN = 34m.2s.
 Salt Lake City e = 25m.4s. and 30m.45s.
 Logan iS = 24m.17s., e = 26m.31s., 29m.38s., and 31m.33s.
 Bozeman i = 25m.10s., e = 30m.27s.
 New Delhi iE = 25m.37s., iPSN = 27m.24s., PPSN = 28m.31s., iN = 29m.18s.
 Bombay iPE = 18m.18s., PPE = 20m.32s., PPN = 20m.38s., iE = 25m.11s. and 25m.36s., PSN = 27m.35s., iE = 27m.45s., PPSN = 28m.36s., SSE = 32m.57s.
 Huancayo e = 28m.24s., iSS = 33m.25s., e = 41m.44s.
 La Plata E = 25m.11s., SSSE = 26m.59s., E = 33m.47s., N = 37m.35s.?
 St. Louis iSSN = 34m.53s., iSSN = 38m.24s.
 La Paz SKKS = 30m.32s., PPSZ = 33m.19s.
 Tananarive E = 29m.7s., SS = 34m.39s.
 Chicago e = 32m.31s.
 Tashkent iPS = 28m.52s., iSS = 34m.58s.
 Ottawa SS = 36m.34s., e = 39m.47s.
 Philadelphia eSS = 36m.31s., e = 39m.55s.
 Fordham i = 22m.58s.
 San Juan e = 33m.10s.
 Bermuda e = 22m.13s. and 36m.57s., iSS = 37m.40s.
 Moscow isPP = 22m.5s., PPP = 24m.13s.
 Upsala eN = 22m.42s., eE = 22m.45s., ePPN = 24m.57s., eSKKS = 28m.43s., eSKSPE = 32m.8s., eN = 34m.8s., eE = 34m.23s., eN = 37m.34s., eE = 40m.29s.?, eSSS?N = 43m.29s.?
 Ksara pPP = 22m.35s.
 Bergen PPN = 25m.18s., PPSN = 34m.18s.
 Copenhagen 23m.0s.
 Helwan eZ = 21m.1s., PPZ = 22m.40s., iZ = 27m.8s., PSKS = 32m.53s., PPSN = 35m.34s., iEN = 41m.11s.
 Bucharest iN = 19m.25s., iE = 20m.32s., iN = 20m.48s.
 Aberdeen iN = 32m.52s. and 41m.31s.
 Potsdam isPKPE = 20m.7s.?
 Sofia iN = 19m.47s., iE = 20m.48s. and 21m.34s., eN = 35m.37s.
 Prague ePP = 22m.41s., ePPP = 25m.47s., eSKKS = 29m.29s., eSKSP = 32m.29s., ePPS = 35m.41s., eSS = 41m.47s., eSSS = 47m.5s.
 Jena eS?NZ = 22m.55s.

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Uccle iPP = 23m.13s., iSKKSN = 29m.53s.
 Kew eEN = 29m.51s.?, eZ = 33m.21s.?
 Belgrade iP = 19m.33s., iPP = 23m.0s., iPPP = 25m.59s.
 Cheb ePP = 25m.29s.?, eSKKS = 33m.19s., c = 41m.29s.?
 Stonyhurst i = 42m.2s. and 47m.55s.
 De Bilt iPPP = 26m.25s., eSS = 41m.59s.
 Trieste iPKP? = 21m.37s., iPP? = 23m.40s., iPPP? = 26m.30s., iPPS? = 34m.47s., iSS = 39m.31s., iSSS = 44m.41s.
 Strasbourg ePPP = 26m.41s.
 Paris ePPS? = 36m.16s.
 Clermont-Ferrand iPP = 23m.39s., c = 24m.27s., iPPP = 27m.6s., c = 29m.32s. and 34m.0s.?
 Tortosa PPN = 24m.26s., PPSE = 39m.4s., SSPE = 45m.1s., SSSE? = 50m.24s.
 Lisbon iPP?N = 24m.31s., iPP?E = 24m.37s., SKSP?N = 33m.41s., PPS?N = 37m.25s., E = 38m.43s.?, SSE = 44m.19s., Z = 44m.45s., N = 44m.59s.
 Granada PPP = 28m.35s., SKSP = 30m.49s., SS = 40m.9s., SSS = 46m.19s.
 Malaga iPP = 24m.32s., P_cP, PKP = 28m.16s., iPPP = 28m.28s., iPPS = 38m.6s., i = 38m.56s. and 40m.4s., SS = 44m.12s., i = 46m.18s. and 51m.8s., Q = 70.5m.?
 San Fernando PPEZ = 24m.43s., PPPEZ = 28m.40s., SKSN = 35m.23s., SSE = 45m.21s., SSSN = 52m.7s.
 Long waves were also recorded at Seattle.

Oct. 5d. Readings also at 7h. (near Bogota), 8h. (Kodaikanal, Bombay, and near Andijan), 9h. (Calcutta), 10h. (Riverview, near Andijan, Frunse, Almata, and near Bogota), 13h. (near Almata, Frunse, Tashkent, and Andijan), 15h. (Tinemaha, Mount Wilson, Pasadena, Riverside, Palomar, Tucson, St. Louis, Stalinabad, La Paz, Balboa Heights, near Bogota, and near Tortosa), 19h. (Tucson, Palomar, Riverside, Mount Wilson, near Malaga, and Granada), 20h. (Tinemaha), 21h. (Brisbane), 22h. (near Stalinabad).

Oct. 6d. 2h. 34m. 41s. Epicentre 39°4N. 26°7E.

Damage at Smyrna. Epicentre as adopted.
 Intensity IX-X at Ayvalik.

“ Renseignements de l'Observatoire de Kandilli.”

A = +.6922, B = +.3482, C = +.6322; $\delta = +6$; $h = -1$;
 D = +.449, E = -.893; G = +.565, H = +.284, K = -.775.

	Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Istanbul	2.5	47	0 55	P _r	1 32	S _r	—	—
Sofia	4.2	323	c 1 8	+ 1	i 1 53	- 4	i 2 18	S _r
Bucharest	5.0	355	e 1 18	0	i 2 18	0	i 1 41	P _r
Belgrade	7.1	321	e 1 47	- 1	i 3 7	- 3	i 3 35	S _r *
Ksara	9.2	124	c 2 5	-11	4 4	+ 1	—	—
Helwan	10.2	157	i 2 29k	- 2	4 39	+12	5 1	SS
Triest	11.4	307	i 2 46	- 1	i 5 8	+12	i 5 29	SS
Erevan	13.7	81	3 24	+ 6	—	—	—	i 5.9
Prague	13.7	325	i 3 18	0	c 5 48	- 4	—	—
Milan	14.3	301	i 3 26	0	7 18	L	—	c 6.4
Chur	14.5	306	e 3 28	0	c 7 16	L	—	—
Cheb	14.7	321	e 3 32	+ 1	i 6 25	+ 9	—	—
Zürich	15.4	307	e 3 38k	- 2	e 6 37	+ 5	—	—
Jena	15.7	322	e 3 39	- 5	i 6 48	+ 9	—	—
Potsdam	16.0	328	i 3 51	+ 3	i 6 53?	+ 7	—	—
Basle	16.1	307	e 3 45k	- 4	c 7 10	+21	—	—
Neuchatel	16.2	304	e 3 50	0	c 7 40	+49	—	—
Strasbourg	16.4	310	i 3 51	- 2	i 7 7	+11	—	—
Moscow	17.9	20	4 8	- 4	7 25	- 5	—	—
Clermont-Ferrand	18.5	298	i 4 20	+ 1	c 7 59	+15	—	—
Barcelona	18.8	285	i 4 23	0	e 8 3	+13	—	—
Copenhagen	18.8	335	e 4 23	0	7 47	- 3	—	—
Uccle	19.4	314	i 4 30k	0	i 8 2	- 2	—	—
De Bilt	19.6	320	i 4 33k	+ 1	i 8 13	+ 5	—	—
Tortosa	20.1	282	i 4 37	- 1	8 21	+ 2	4 45	pP
Upsala	21.3	347	4 51	+ 1	8 35	- 8	—	—
Kew	22.3	313	i 5 0k	- 1	i 9 11	+ 9	i 5 28	PP
Granada	23.8	275	i 5 18k	+ 3	i 9 40	+12	i 5 30	pP
Stonyhurst	24.5	317	i 5 22	0	i 9 50	+10	—	—
Malaga	24.6	274	i 5 21a	- 2	i 9 31	-11	5 39	pP

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	Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.	
			m. s.	s.	m. s.	s.	m. s.	m.	
Bergen	24.9	335	i 5 31	+ 5	9 55	+ 8	6 5	PP	11.9
Aberdeen	25.8	324	i 5 33	- 1	i 10 10	+ 8	i 11 11	SS	12.5
Edinburgh	25.8	320	5 31	- 3	10 1	- 1	5 57	PP	—
San Fernando	26.0	274	i 5 38	+ 2	9 58	- 8	6 14	PP	—
Lisbon	27.7	281	5 51 _a	- 1	10 37	+ 4	—	—	15.2
Sverdlovsk	28.2	41	i 5 55	- 1	i 10 47	+ 6	—	—	—
Tashkent	32.3	72	i 6 35	+ 2	11 49	+ 3	—	—	—
Andijan	34.7	73	e 6 58	+ 4	—	—	—	—	—
Frunse	35.8	69	e 7 2	- 1	—	—	—	—	—
Ahnata	37.5	67	7 26	+ 9	13 17	+10	—	—	—
Reykjavik	37.6	328	e 6 55	-23	c 13 9	+ 1	e 8 31	PP	e 17.3
Dehra Dun	42.6	85	—	—	14 40	+17	—	—	21.6
New Delhi	42.7	88	e 8 4	+ 4	i 14 24	0	9 34	PP	20.8
Bombay	44.6	104	i 8 18	+ 2	i 14 57	+ 5	i 10 25	PP	23.4
Hyderabad	49.7	100	8 58	+ 2	16 4	0	—	—	—
Irkutsk	53.1	48	9 18	- 3	16 38	-13	—	—	—
Kodaikanal	53.6	108	i 11 9	PP	i 18 51	+113	13 14	PPP	27.9
Calcutta	54.5	88	e 9 49	+17	i 17 16	+ 6	i 21 38	SS	e 24.6
Colombo	57.5	109	9 55	+ 2	17 54	+ 4	—	—	35.3
Tananarive	61.2	157	e 10 30	+11	18 49	+11	12 39	PP	28.4
Seven Falls	66.9	313	10 54	- 2	19 49	0	24 19?	SS	28.3
Shawinigan Falls	68.3	313	e 11 4	- 1	—	—	—	—	32.3
Harvard	69.9	308	i 11 14	- 1	—	—	—	—	e 43.3
Weston	69.9	308	i 11 14	- 1	e 20 25	+ 1	13 58	PP	29.3
Ottawa	70.7	313	11 19	- 1	20 37	+ 3	25 19	SS	32.3
Bermuda	71.3	297	e 11 18	- 5	e 20 35	- 6	e 14 4	PP	e 31.2
Fordham	72.3	308	e 11 28	- 1	i 20 55	+ 3	—	—	e 32.6
Philadelphia	73.6	308	i 11 40	+ 3	21 7	0	e 29 43	SSS	32.1
Georgetown	75.4	308	e 11 43	- 4	i 21 29	+ 2	—	—	32.3
New Kensington	75.9	311	—	—	i 21 40	+ 8	—	—	e 35.9
College	76.0	358	e 12 7	+16	e 21 43	+ 9	e 26 36	SS	e 32.5
Chicago	79.6	317	—	—	e 22 9	- 3	e 27 17	SS	e 33.1
Saskatoon	80.2	333	—	—	e 22 25	+ 6	—	—	36.3
San Juan	80.7	286	e 12 14	- 2	e 22 19	- 5	e 27 44	SS	e 34.6
Columbia	81.0	307	e 12 19	+ 1	e 22 27	0	—	—	e 35.8
Mizusawa	81.5	46	12 25	+ 4	22 43	+11	—	—	—
Sitka	82.2	350	e 12 31	+ 7	i 22 47	+ 8	e 15 26	PP	e 34.0
Florissant	83.2	315	e 12 30	+ 1	e 22 56	+ 7	—	—	—
St. Louis	83.2	315	e 12 28	- 1	i 22 47	- 2	—	—	—
Rapid City	85.4	326	e 12 42	+ 2	e 23 2	- 9	e 15 59	PP	e 37.0
Bozeman	87.2	332	e 12 33	-16	e 23 4	[-11]	e 15 54	PP	e 37.4
Butte	87.5	333	—	—	e 20 39?	?	e 26 40	?	e 35.2
Victoria	88.5	340	12 55	- 1	23 30	-11	—	—	40.3
Rio de Janeiro	90.0	239	e 12 19	-44	—	—	—	—	—
Logan	90.9	330	e 13 11	+ 4	e 24 27	+24	e 16 45	PP	e 37.0
Salt Lake City	91.7	330	—	—	e 23 30	[-13]	e 16 37	PP	e 38.5
Boulder City	97.0	329	i 13 35	0	—	—	—	—	—
Tinemaha	97.3	332	e 13 37	+ 1	—	—	e 30 18	PKKP	—
Berkeley	98.0	335	17 43	PP	31 43	SS	44 20	Q	48.3
Tucson	98.6	325	e 13 42	0	e 25 57	+48	e 17 46	PP	e 40.1
Riverside	99.8	331	e 13 46	- 1	i 17 55	PP	e 30 7	PKKP	—
Mount Wilson	99.8	331	e 13 48	+ 1	i 17 57	PP	i 30 10	PKKP	—
Pasadena	99.9	331	e 13 47	- 1	e 17 50	PP	e 30 3	PKKP	e 39.4
Palomar	100.1	329	e 13 52	+ 3	e 17 43	PP	i 30 9	PKKP	—
Santa Barbara	100.2	332	e 13 53	+ 4	e 17 58	PP	—	—	—
La Paz	104.0	261	e 17 59	PP	—	—	—	—	53.3
Huancayo	106.8	269	—	—	e 28 19	PS	e 33 51	SS	e 45.5
Riverview	135.7	101	i 19 33	[+10]	i 26 30	[- 2]	i 22 57	PKS	e 58.5
Auckland	154.9	94	19 59	[+ 5]	—	—	—	—	67.3
Wellington	155.7	104	20 6	[+11]	—	—	35 19?	PS	70.3

Additional readings :—

Istanbul $P_g = 59s.$

Sofia $iEN = 1m.13s., 1m.19s.,$ and $1m.39s., iE = 2m.13s., iN = 2m.27s.$

Bucharest $ePE = 1m.21s., iP^*EN = 1m.31s.$

Belgrade $i = 1m.51s., 1m.59s.,$ and $2m.48s.$

Continued on next page.

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Helwan PPPZ = 2m.36s.
 Triest iPPSE = 2m.51s.
 Prague i = 3m.21s., e = 4m.35s.
 Cheb e = 5m.11s.
 Jena iPEN = 3m.45s., iN = 3m.53s., iSN = 6m.52s.
 Copenhagen 4m.28s. and 5m.9s.
 Tortosa PPE = 5m.3s., pPPE = 5m.16s., iN = 6m.22s., iE = 6m.26s., sSE = 8m.38s., SSN = 9m.18s.
 Upsala iN = 8m.9s., iE = 8m.28s., SN = 8m.47s.
 Kew iPPP = 5m.37s., iP_cP?E = 8m.56s., eSSN = 9m.52s., eSSS = 10m.28s.
 Granada iPP = 6m.3s., sS = 10m.4s., SS = 10m.44s., sSS = 11m.7s.
 Stonyhurst 5m.31s., 5m.36s., 9m.58s., 10m.17s., and 10m.22s.
 Malaga PP = 6m.11s., P_cP = 8m.43s., iS = 10m.3s., S_cP = 12m.9s., S_cS = 16m.11s.
 Bergen eN = 7m.25s., eE = 7m.48s., eN = 8m.15s.
 Edinburgh P_cP = 9m.0s., S_cS = 16m.28s.
 San Fernando SSN = 11m.5s.
 Lisbon PN = 5m.57s.?, SE = 10m.51s., iSEZ = 11m.2s., N = 12m.21s., E = 12m.33s.
 Reykjavik ePSEN = 14m.4s.
 New Delhi PPPN = 10m.6s., SSSN = 17m.50s., S_cSN = 18m.14s.
 Bombay (second shock about 9s. later), iPN = 8m.26s., iSEN = 15m.7s., SSN = 18m.23s.
 Calcutta iN = 20m.26s.
 Tananarive E = 20m.0s., N = 21m.49s. and 23m.29s.
 Weston SS = 25m.18s.
 Ottawa SSS = 27m.49s.
 Bermuda e = 26m.4s.
 Georgetown iP = 11m.47s., e = 11m.50s.
 College e = 14m.6s., eSSS = 29m.57s.
 San Juan iP = 12m.19s., e = 15m.35s., iS = 22m.28s.
 Mizusawa PN = 12m.40s.
 Sitka e = 23m.38s., i = 23m.43s., e = 28m.25s. and 32m.19s.
 St. Louis iPZ = 12m.32s., iZ = 12m.36s.
 Rapid City e = 26m.42s.
 Logan e = 15m.44s. and 34m.43s.
 Salt Lake City e = 26m.46s. and 29m.49s.
 Tucson e = 30m.34s., ePKP, PKP = 38m.33s.
 Riverside ePKP, PKPZ = 38m.21s.
 Mount Wilson ePKP, PKPZ = 38m.23s.
 Pasadena eZ = 17m.11s., eSSN = 27m.7s., ePKP, PKPZ = 38m.26s.
 Palomar eZ = 30m.37s., iPKP, PKPZ = 38m.32s.
 Long waves were also recorded at Christchurch, Ukiah, and Honolulu.

Oct. 6d. 7h. 28m. 16s. Epicentre 39°·4N. 26°·7E. (as at 2h.).

	Δ	Az.	P.	O - C.	S.	O - C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Istanbul	2·5	47	0 59	P _r	1 36	S _r	—	—
Sofia	4·2	323	e 1 7	0	i 1 50	- 7	i 1 22	P _r
Bucharest	5·0	355	1 25	+ 7	i 2 22	+ 4	1 33	P _r
Belgrade	7·1	321	e 1 45	- 3	e 3 45	S _r	i 2 27	P _r
Ksara	9·2	124	e 2 25	+ 9	e 5 1	S _r	—	—
Helwan	z. 10·2	157	e 2 38	+ 7	e 5 7	S*	—	—
Prague	13·7	325	e 3 6	-12	e 5 44?	- 8	—	e 7·0
Chur	14·5	306	e 3 28	0	—	—	—	—
Cheb	14·7	321	—	—	e 6 44?	+28	—	e 7·7
Clermont-Ferrand	18·5	298	e 4 19	0	—	—	—	—
Uccle	19·4	314	e 4 29	- 1	—	—	—	e 9·7
Upsala	21·3	347	—	—	e 9 44?	SSS	—	e 11·7
Kew	22·3	313	(e 4 44?)	-17	—	—	—	e 4·7
Malaga	24·6	274	i 5 20 _a	- 3	—	—	—	—

Additional readings:—

Sofia iEN = 2m.3s., iS_rEN = 2m.13s.

Bucharest iN = 2m.42s.

Belgrade e = 1m.53s., i = 4m.5s.

Helwan eZ = 6m.35s. and 7m.2s.

Long waves were also recorded at De Bilt.

Oct. 6d. Readings also at 3h. (Bucharest (2)), 4h. (Almata and near Andijan), 5h. (Bucharest), 7h. (near Trieste, near Frunse, Tashkent, Andijan, and Stalinabad), 8h. (Brisbane, Riverview, Sydney, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, and Sofia (2)), 9h. (Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, St. Louis, Paris, and Sofia (2)), 10h., 11h., and 12h. (2) (Sofia), 19h. (Bucharest and Sofia), 21h. (Fort de France), 23h. (near Sofia, Bucharest, Istanbul, and Belgrade).

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Oct. 7d. 15h. 36m. 0s. Epicentre $47^{\circ}6'N$. $16^{\circ}0'E$. (as on 1939 Sept. 18d.).

Strongly felt at Berndorf and Sauerbrunn. Macroseismic area over 20,000 sq. km. Epicentre south of Berndorf.

E. Trapp.

"Makros Beobachtungen in den Jahren 1941-1945." Anhang 8 zum Jahrbuch für 1947 der Zentralanstalt für Meteorolog und Geodyn, Vienna. Macro seismic chart p. D-51.

A = +.6506, B = +.1865, C = +.7362; $\delta = +5$; $h = -4$;
D = +.276, E = -.961; G = +.708, H = +.203, K = -.677.

	Δ	Az.	P.		O-C.		S.		O-C.		Supp.		L. m.
			m.	s.	s.		m.	s.	s.	m.	s.		
Triest	2.5	218	e 0	45	+ 2	i 1	19	+ 5	i 0	52	P _g	—	
Prague	2.7	337	e 0	48	+ 3	e 1	19	0	—	—	—	—	
Cheb	3.5	316	e 1	0	+ 3	e 1	33	- 7	e 1	12	P _g	—	
Belgrade	4.2	130	e 1	4	- 3	e 2	28	S _g	e 1	26	P _g	—	
Jena	4.4	321	e 1	7	- 3	i 1	59	- 3	—	—	—	i 2.2	
Zürich	5.0	270	e 1	17	- 1	e 2	13	- 5	—	—	—	—	
Milan	5.1	249	1	46	P _g	2	58	S _g	—	—	—	—	
Potsdam	5.2	339	—	—	—	e 2	21	- 1	i 2	36	S*	—	
Strasbourg	5.6	283	e 1	27	0	e 2	24	- 9	e 1	47	P _g	—	
Basle	5.7	273	e 1	26	- 2	e 2	26	- 9	e 1	53	P _g	—	
Neuchatel	6.2	268	e 1	32	- 3	—	—	—	e 2	0	P _g	—	
Sofia	7.1	130	—	—	—	e 3	0?	-10	—	—	—	—	
Uccle	8.3	297	e 3	47	S	(e 3	47)	+ 7	e 4	37	S _g	—	
Copenhagen	8.4	346	2	26	PPP	—	—	—	—	—	—	—	
Clermont-Ferrand	9.0	264	e 2	38?	+25	—	—	—	—	—	—	e 5.0	

Additional readings and notes :—

Triest eP* = 0m.48s., iS_g = 1m.30s.

Prague i = 1m.11s.

Cheb e = 1m.46s. and 1m.49s.

Belgrade i = 1m.8s., e = 2m.43s.

Jena ePEN = 1m.14s., ePZ = 1m.18s., iN = 1m.23s. and 1m.40s.

Strasbourg eS_g = 3m.0s.

Uccle eP*N = 4m.18s., iP_gN = 4m.26s., eSN = 5m.9s. ; phases wrongly identified.

Long waves were also recorded at De Bilt.

Oct. 7d. 18h. Undetermined shock. Pasadena suggests deep focus.

Brisbane iPNZ = 56m.9s., ePE = 56m.17s., iSN = 60m.21s., iSZ = 60m.26s., iSSN = 60m.57s.

Sydney eP = 57m.0s., eS = 61m.42s., eL = 65.9m.

Riverview iPNZ = 57m.18s., ipPZ = 57m.49s., iN = 57m.54s., iPPPZ = 58m.32s., iNZ = 58m.41s., iSN = 61m.56s., iN = 62m.33s., iE = 62m.36s., iSN = 62m.55s., eLE = 63.9m.

Auckland P? = 60m.48s., S = 64m.7s., eS = 64m.51s., i = 67m.0s. and 67m.17s., S_cS = 72m.30s.

Wellington P = 61m.5s., S = 64m.55s., P_cP = 65m.45s., L = 66.3m., S_cP? = 68m.17s., P_cS = 68m.45s., S_cS = 72m.30s., sS_cS = 73m.11s.

Bombay iPN = 63m.30s., ePE = 63m.33s., eE = 64m.22s., SEN = 73m.37s., PSE = 74m.33s., eN = 75m.23s., eE = 79m.29s.

Almata eP = 63m.45s.

Tashkent P = 64m.2s., S = 74m.44s.

Pasadena ePZ = 64m.13s., iZ = 64m.43s., eLZ = 61.8.

Mount Wilson ePZ = 64m.14s., iZ = 64m.39s.

Riverside ePZ = 64m.17s., eZ = 64m.40s.

Tinemaha ePZ = 64m.17s., eZ = 64m.40s., iZ = 64m.46s.

Palomar iPZ = 64m.25s., iZ = 64m.43s.

Tucson e = 65m.8s., eL = 95m.40s.

Christchurch S = 65m.13s., iN = 65m.54s., SS = 68m.32s., QN = 69m.26s., LZ = 71m.23s.

Arapuni e = 67m.

St. Louis ePP?E = 70m.44s., eE = 71m.16s., ePPP?E = 72m.35s., eE = 73m.48s., eN = 74m.11s., eSKS?E = 76m.17s., eSKKS?E = 77m.29s., eSE = 78m.9s., ePS?E = 80m.3s.

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Oct. 7d. 21h. 31m. 22s. Epicentre 39°4N, 26°7E. (as on 6d.).

	Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Istanbul	2.5	47	0 51	P_e	—	—	—	—
Sofia	4.2	323	e 1 4	- 3	i 2 6	S*	i 1 19	P_s
Bucharest	5.0	355	e 1 19	+ 1	i 2 29	S*	i 2 57	S_s
Belgrade	7.1	321	e 1 44	- 4	e 3 9	- 1	i 3 50	S_s
Ksara	9.2	124	e 2 7	- 9	—	—	e 5 4	S_s
Helwan	10.2	157	2 30	- 1	e 4 18	- 9	—	i 5.0
Triest	11.4	307	i 2 43	- 4	i 5 11	+15	i 2 48	PP
Prague	13.7	325	e 3 26	+ 8	e 6 10	+18	—	e 6.9
Zürich	15.4	307	e 3 38	- 2	—	—	—	—
Jena	N. 15.7	322	e 3 45	+ 1	e 8 38	L	—	(e 8.6)
Basle	16.1	307	e 3 47	- 2	—	—	—	—
Neuchatel	16.2	304	e 3 49	- 1	—	—	—	—
Strasbourg	16.4	310	e 3 56	+ 3	—	—	—	—
Baku	17.8	79	4 15	+ 4	e 7 31	+ 3	—	—
Moscow	17.9	20	4 14	+ 2	7 35	+ 5	—	—
Clermont-Ferrand	18.5	298	e 4 24	+ 5	—	—	—	e 12.1
Copenhagen	18.8	335	e 4 21	- 2	7 50	0	—	9.6
Uccle	19.4	314	e 4 30	0	e 8 7	+ 3	—	e 9.6
De Bilt	19.6	320	i 4 32	0	e 8 8	0	—	e 9.6
Paris	19.7	306	e 4 30	- 4	—	—	—	e 12.0
Upsala	21.3	347	e 4 53	+ 3	—	—	—	e 11.6
Kew	22.3	313	—	—	e 9 4	+ 2	e 10 48?	SS
Granada	23.8	275	i 5 17 _a	+ 2	9 45	+17	5 31	pP
Stonyhurst	24.5	317	—	—	i 9 42	+ 2	—	e 12.6
Malaga	24.6	274	i 5 24 _k	+ 1	e 9 44	+ 2	6 10	PP
Bergen	24.9	335	e 2 16	?	—	—	—	e 15.2
San Fernando	E. 26.0	274	—	—	e 10 38	+32	—	e 15.6
Sverdlovsk	28.2	41	e 6 18	+22	—	—	—	—
Tashkent	32.3	72	e 6 34?	+ 1	—	—	—	—
Andijan	34.7	73	e 6 56	+ 2	—	—	—	—
Almata	37.5	67	e 7 22	+ 5	—	—	—	—
St. Louis	83.2	315	e 12 26	- 3	e 21 9	?	—	—

Additional readings:—

Sofia iE = 2m.9s., iS_gN = 2m.13s.

Bucharest iP*N = 1m.37s., iN = 2m.1s., iS_gEN = 3m.12s.

Belgrade i = 1m.52s. and 2m.9s., e = 2m.40s., iS = 3m.43s.

Triest iSS = 5m.36s., i = 6m.11s.

Upsala ePE = 4m.59s.

Kew eZ = 11m.27s.

Granada PP = 5m.53s.

St. Louis iPZ = 12m.30s.

Long waves were also recorded at Cheb, Milan, and Potsdam.

Oct. 7d. Readings also at 3h. (Almata and near Andijan), 6h. (Palomar, Riverview, and near Tananarive), 7h. (Bogota and Wellington), 8h. (Bogota, Huancayo, La Paz, and Tinemaha), 9h. (near Andijan), 10h. (Auckland, Christchurch, New Plymouth, Wellington, near Tuai, Helwan, and near Ksara), 11h. (near La Paz, near Tashkent, Frunse, and Almata), 15h. (Zürich), 16h. (near Basle), 18h. (Bucharest, Istanbul, Sofia (2), and Triest), 19h. (Uccle and Almata).

Oct. 8d. Readings at 0h. (Sofia), 1h. (Bucharest, Sofia, and near Grozny), 4h. (Basle and near Zürich), 7h. (Bucharest, La Paz, Tucson, Palomar, and Riverside), 10h. (Logan), 19h. (Tinemaha), 22h. (Helwan).

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Oct. 9d. 2h. 11m. 19s. Epicentre $10^{\circ}48'S$, $77^{\circ}2'W$. (as on 1942, Aug. 13d.).

$$A = +.2180, B = -.9594, C = -.1794; \quad \delta = +16; \quad h = +6;$$

$$D = -.975, E = -.222; \quad G = -.040, H = +.175, K = -.984.$$

		Δ	Az.	P.		O-C.	S.		O-C.	Supp.		L.
				m.	s.		m.	s.		m.	s.	
Huancayo		2.4	132	e 0	24	-17	1 0	38	P*	1 0	33	? 1 1.7
La Paz		10.7	126	2	42	+ 4	4	44	+ 5	—	—	5.3
Bogota		15.2	12	e 3	34	- 4	c 8	4	L	1 3	55	PP (e 8.1)
St. Louis	z.	50.3	347	e 8	57	- 3	—	—	—	—	—	—
Tucson		53.2	324	i 9	24	+ 2	—	—	—	—	—	—
Palomar	z.	57.6	321	i 10	8	+14	—	—	—	—	—	—
Riverside	z.	58.4	321	e 10	2	+ 2	—	—	—	—	—	—
Mount Wilson	z.	58.9	321	e 10	3	0	—	—	—	—	—	—
Tinemaha	z.	61.0	323	e 10	18	0	—	—	—	—	—	—

Additional readings:—

Bogota i = 9m.34s.
 Tucson i = 9m.35s.
 Riverside eZ = 10m.16s.
 Mount Wilson iZ = 10m.17s.
 Tinemaha iZ = 10m.29s., eZ = 10m.36s.
 Long waves were also recorded at Uccle.

Oct. 9d. Readings also at 1h. (near Malaga and near Ottawa), 2h. (Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Tucson, and St. Louis), 3h. (La Paz), 7h. (Riverside, Tucson, and Tinemaha), 14h. (near Bogota), 19h. (Palomar, Tucson (2), Riverside, Tinemaha (2), and near La Paz), 20h. (Brisbane, Riverview, Sydney, Arapuni, Auckland, Wellington, Christchurch, Mount Wilson, Palomar, Riverside, Tinemaha, Tucson, Triest, near Tashkent, Almata, Frunse, Andijan, and near Harvard), 21h. (St. Louis, Pasadena, Chev, and near Andijan), 22h. (Triest).

Oct. 10d. Readings at 0h. (Palomar, Riverside, Tinemaha, Sofia, and near Almata), 1h. (Basle, Neuchatel, Zürich, Strasbourg, Jena, Potsdam, Sofia, and near Triest), 2h. (Mount Wilson, Tucson, Palomar, Riverside, and Tinemaha), 6h. (near La Paz), 7h. (Almeria, near Tucson (2), La Jolla, Pasadena, Palomar, and Riverside), 9h. (Palomar, Riverside, Tucson, and Tinemaha), 11h. (Balboa Heights and Bogota), 15h. (Triest), 18h. (Jena, Strasbourg, near Basle, Zürich, near Triest, and near Andijan).

Oct. 11d 9h. 45m. 14s. Epicentre $15^{\circ}3'S$, $172^{\circ}5'W$. Depth of focus 0.005.

$$A = -.9567, B = -.1260, C = -.2622; \quad \delta = -10; \quad h = +6;$$

$$D = -.131, E = +.991; \quad G = +.260, H = +.034, K = -.965.$$

		Δ	Az.	P.		O-C.	S.		O-C.	Supp.		L.
				m.	s.		m.	s.		m.	s.	
Apia		1.6	19	i 0	28	+ 1	e 0	45	- 2	—	—	—
Auckland		24.3	206	5	7	- 5	9	23	- 1	9	46	sS 12.8
Arapuni		25.0	203	—	—	—	9	46?	+10	—	—	—
Wellington		28.2	202	5	56	+ 7	10	43	+15	6	13	pP 14.8
Christchurch		30.9	202	—	—	—	e 11	11	0	13	48	Q 15.6
Brisbane	E.	34.2	244	6	43 _a	+ 2	i 12	6	+ 4	—	—	—
Riverview		37.6	234	i 7	11 _k	+ 1	i 13	3	+ 9	1 13	20	sS e 17.8
Sydney		37.6	234	e 7	7	- 3	e 12	46	- 8	—	—	e 16.7
Santa Clara		70.7	41	i 11	11	0	—	—	—	—	—	e 32.6
Berkeley		70.8	41	11	12	0	20	22	+ 2	—	—	32.0
Ukiah		71.0	39	—	—	—	e 21	21	PPS	—	—	e 28.9
La Jolla		71.3	47	i 11	13 _a	- 2	—	—	—	e 11	30	pP —
Pasadena		71.3	46	i 11	14 _a	- 1	e 20	28	+ 2	i 11	31	pP e 31.9
Mount Wilson		71.4	46	i 11	15 _a	0	—	—	—	i 11	28	pP —
Palomar		71.8	47	i 11	17 _a	- 1	—	—	—	i 11	31	pP —
Riverside		71.8	46	i 11	16 _a	- 2	—	—	—	e 13	52	PP —
Halwee		72.6	44	i 11	22	0	—	—	—	—	—	—
Tinemaha		72.9	43	i 11	25 _a	+ 1	—	—	—	i 11	45	pP —
Tucson		75.6	50	i 11	39	- 1	e 22	10	PS	i 12	17	pP e 30.1
Victoria		77.0	31	—	—	—	e 21	45	+16	—	—	36.8

Continued on next page.

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	Δ °	Az. °	P. m. s.	O-C. s.	S. m. s.	O-C. s.	Supp. m. s.	L. m.
Salt Lake City	79.1	42	e 11 49	-10	e 21 52	0	e 22 6	pS e 36.7
Logan	79.7	42	i 12 3	+ 1	e 22 7	+ 9	—	e 37.7
College	82.1	10	—	—	e 22 36	+13	e 22 55	sS e 35.4
Rapid City	86.3	41	e 12 37	+ 1	e 23 4	0	e 23 32	sS e 40.7
Saskatoon	87.9	34	—	—	e 23 46	sS	—	41.8
Florissant	93.5	51	i 13 7	- 3	i 23 38	[+ 1]	i 24 4	sSKS —
St. Louis	93.5	51	i 13 6	- 4	i 23 40	[+ 3]	i 13 19	pP —
Chicago	96.3	48	—	—	e 23 56	[+ 3]	e 24 16	S e 45.8
Philadelphia	105.2	52	—	—	e 25 1	[+26]	i 27 37	PS e 47.1
Fordham	106.3	51	e 18 31	PP	e 24 49	[+ 9]	e 27 47	PS e 47.8
Seven Falls	109.0	45	—	—	e 24 58	[+ 6]	e 28 16	PS 51.8
San Juan	109.9	76	e 18 11	[-13]	e 25 23	[+27]	e 28 14	PS e 50.2
Bermuda	112.9	61	e 19 42	pPP	e 25 10	[+ 2]	e 28 47	PS e 51.9
Bombay	117.8	283	e 20 1	PP	29 30	SP	e 27 58	? —
Stonyhurst	140.8	9	—	—	i 25 58	[-27]	—	—
Kew	143.4	7	—	—	(e 46 46?)	SSS	—	e 46.8
Uccle	144.5	4	e 19 30 _a	[+ 1]	—	—	—	e 72.8
Paris	146.3	6	i 19 33	[0]	—	—	—	e 77.8
Strasbourg	146.8	358	e 19 38	[+ 4]	—	—	—	—
Basle	147.8	0	e 19 39	[+ 4]	—	—	—	—
Zürich	148.0	359	e 19 42 _a	[+ 7]	—	—	—	—
Ksara	148.4	311	e 19 30	[- 6]	—	—	e 23 14?	PP —
Neuchatel	148.4	1	e 19 42	[+ 6]	—	—	—	—
Triest	149.3	351	e 19 45	[+ 8]	—	—	—	—
Clermont-Ferrand	149.4	6	19 45	[+ 8]	—	—	—	e 74.8
Helwan	153.7	308	i 19 46 _k	[+ 2]	e 34 13	PS	e 19 59	pPKP —
Tortosa	N. 153.8	11	20 5	[+21]	26 4	?	i 20 44	pPKP —
Malaga	156.1	24	i 19 47 _a	[0]	26 58	[+13]	i 20 18	pPKP 74.8

Additional readings :—

Auckland i = 10m.7s., S_cP? = 11m.32s.
 Wellington sP?Z = 6m.38s., sS? = 11m.12s., S_cP?Z = 12m.9s., P_cS = 12m.38s.
 Brisbane iS?N = 12m.13s.
 Riverview iPPZ = 8m.42s., iPPPZ = 9m.12s., iP_cPZ = 9m.23s., cSSN = 15m.50s., iEZ = 16m.0s., iS_cS?N = 17m.16s.
 Pasadena i = 11m.36s., iPPZ = 13m.52s., ipPPZ = 14m.6s.
 Mount Wilson iZ = 11m.39s. and 12m.17s., iPPZ = 13m.52s.
 Palomar iZ = 11m.40s. and 12m.27s.
 Tinemaha iZ = 12m.3s., iPPZ = 14m.7s.
 Tucson i = 11m.54s., iPP = 14m.26s., i = 14m.40s., ePPP = 16m.34s.
 Rapid City e = 15m.58s.
 St. Louis i = 24m.2s.
 Philadelphia e = 33m.31s.
 San Juan e = 24m.22s.
 Helwan PKP,Z = 20m.22s., PP?Z = 23m.56s., PPP?Z = 27m.38s., eZ = 32m.54s.
 Malaga iPP = 23m.58s., PPP = 27m.23s., SKKS = 30m.40s.
 Long waves were also recorded at La Paz, New Kensington, Butte, De Bilt, and Cheb.

Oct. 11d. Readings also at 4h. (near Alicante), 5h. (Riverview, Christchurch, and near Brisbane), 11h. and 13h. (near Triest), 14h. (Helwan and Ksara), 15h. (near Tortosa, and near Triest), 16h. (Pasadena, Mount Wilson, Riverside, Tinemaha, Tucson, and Palomar), 17h. (near Triest).

Oct. 12d. Readings at 0h. (near Andijan, Frunse, and Tashkent), 1h. (near Tashkent, Tchinkent, Frunse, and Andijan), 3h. (near Tchinkent and Andijan), 4h. (near Grozny), 6h. (near Andijan and Tashkent), 8h. (Bogota), 9h. (near Toledo), 10h. (near Tortosa), 12h. (near Triest), 14h. (Tucson, Mount Wilson (2), Pasadena, Riverside, Palomar (2), Tinemaha, Auckland, Wellington, Christchurch, Riverview, and Brisbane), 15h. (near Tucson), 16h. (Clermont-Ferrand, Tucson, Haiwee, La Jolla, Mount Wilson, Pasadena, Riverside, Palomar, Tinemaha, Riverview, and Brisbane).

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Oct. 13d. 11h. Undetermined shock.

Auckland P = 22m.20s., i = 23m.22s. and 24m.5s., S? = 24m.25s., L? = 24m.36s.
 Wellington P? = 23m.20s., PP? = 23m.38s., i = 24m.34s., iZ = 25m.0s., S = 26m.9s., iZ = 26m.30s., L = 27m.
 Christchurch eN = 23m.42s., eNZ = 24m.30s., QE = 26m.12s., RZ = 28m.30s.
 Arapuni e = 24m.?, i = 25m.0s.?, S? = 25m.48s.
 Sydney eP = 25m.33s., eS = 30m.9s.
 Brisbane ePN = 25m.41s., iPE = 25m.44s., eSE = 30m.12s., iN = 30m.28s. and 32m.38s.
 Riverview eP?E = 25m.46s., eN = 26m.16s., iS?E = 30m.37s., eLN = 32.8m.
 Pasadena iPZ = 32m.58s., eL = 59m.0s.
 Mount Wilson ePZ = 32m.59s.
 Riverside ePZ = 32m.59s.
 Palomar iPNZ = 33m.2s.
 Tinemaha ePEZ = 33m.6s.
 Tucson eP = 33m.14s., eL = 61m.7s.
 Colombo eE = 38m.30s.
 Florissant ePP?Z = 39m.10s., eSKKSE = 46m.9s., eSN = 46m.45s.
 La Paz eZ = 39m.29s., iZ = 46m.39s.
 Ksara e = 39m.50s. and 43m.28s.
 Bombay PPE = 40m.2s., SPE = 49m.32s., eN = 51m.32s.
 Helwan PZ = 40m.8s., eZ = 44m.0s.
 Kodaikanal eE = 42m.40s., e = 43m.30s. and 48m.45s., LE = 50m.50s.
 St. Louis eE = 45m.43s., eSN = 46m.44s., ePSE = 48m.24s., eSSS?E = 58m.2s.
 Seven Falls e = 50m.18s., L = 82m.

Oct. 13d. Readings also at 1h. (Pasadena, Tucson, and Apia), 2h. (Perth and near Ottawa), 3h. (Potsdam (2), Strasbourg (2), Clermont-Ferrand, near Basle (2), Neuchatel (2), Zürich (2), Triest, and Milan (2)), 5h. (Tucson, Tinemaha, Pasadena, Riverside, and Palomar), 6h. (near Apia), 10h. (near Triest), 13h. (Tucson), 18h. (near Andijan), 20h. (Colombo, Bombay, Kodaikanal, Strasbourg, near Chur, Basle, Zürich, and near Triest), 21h. (Pasadena, Riverside, Mount Wilson, Palomar, Tucson, and La Jolla).

Oct. 14d. 2h. 18m. 35s. Epicentre 6°·3S. 148°·2E. Depth of focus 0·025.
 (as on 1944, May 4d.).

A = -·8449, B = +·5238, C = -·1090; $\delta = +10$; $h = +7$;
 D = +·527, E = +·850; G = +·093, H = -·057, K = -·994.

	Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Brisbane	21·5	170	i 4 28k	- 6	i 8 21	+ 5	i 4 43	pP
Riverview	27·5	175	i 5 31a	0	i 10 8	+12	i 5 41	pP
Sydney	27·6	175	—	—	e 10 13	+16	—	—
Auckland	38·9	145	i 8 5	PP	13 4	+12	16 0	SeS
Arapuni	40·2	146	—	—	13 13	+ 2	—	—
Wellington	42·1	150	7 44	+ 9	13 40	+ 1	9 4	PP
Shizuoka	42·1	349	7 26	- 9	—	—	—	—
Kumamoto	42·3	338	7 39	+ 3	—	—	—	—
Kobe	42·6	346	7 39	0	—	—	—	—
Nagoya	42·6	348	7 35	- 4	—	—	—	—
Christchurch	42·8	154	7 45	+ 5	13 55	+ 6	13 19	PeS
Hukuoka	43·1	338	7 46	+ 3	13 52	- 2	—	—
Mizusawa	E. 45·7	353	8 7	+ 4	14 32	+ 1	—	—
Sapporo	49·5	354	e 8 29	- 4	—	—	—	—
Vladivostok	51·4	345	i 8 47	0	i 16 7	+17	—	—
Calcutta	N. 65·2	299	—	—	e 17 13	?	—	—
Irkutsk	69·3	333	10 49	+ 1	e 19 55?	+17	—	—
Kodaikanal	E. 72·3	283	e 11 15	+ 9	—	—	—	—
Bombay	78·3	291	—	—	21 52	SP	25 49	SS
Andijan	83·5	312	c 12 21	+13	22 34	+23	—	—
College	85·0	23	—	—	e 23 51	PS	—	e 37·6
Tashkent	85·9	312	12 22?	+ 3	22 42?	+ 7	—	—
Sitka	88·1	32	—	—	e 23 30	+35	e 24 22	PS
Victoria	93·6	42	—	—	e 23 25	[+14]	—	e 42·4
Sverdlovsk	93·9	326	12 58	+ 1	24 4	+17	e 16 47	PP

Continued on next page.

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		Δ °	Az. °	P. m. s.	O-C. s.	S. m. s.	O-C. s.	Supp. m. s.	L. m.
Pasadena		96.5	56	e 13 8	- 1	—	—	—	c 39.1
Mount Wilson	z.	96.6	56	i 13 8	- 1	—	—	i 13 23	pP
Tinemaha		96.6	53	i 13 9	0	—	—	—	—
Haiwee	E.	96.8	54	e 13 12	+ 2	—	—	—	—
Riverside	z.	97.1	56	i 13 10	- 1	—	—	—	—
Palomar	z.	97.5	57	i 13 9	- 4	—	—	i 13 22	pP
Tucson		102.6	58	e 13 33	- 3	—	—	—	c 76.6
Saskatoon		104.2	38	—	—	e 27 25?	PS	—	50.4
Moscow		106.7	327	e 18 11	[+10]	24 29	[+15]	27 39	PS
Rapid City		107.7	46	—	—	e 25 27	S	—	c 52.4
Upsala		114.9	335	—	—	e 29 25?	PS	e 39 46	SS
Helwan	z.	116.4	299	e 19 40	PP	e 32 52	PPS	e 20 31	?
Florissant		118.2	49	e 19 34	PP	e 25 16	+16	e 29 37	PS
St. Louis		118.4	49	e 18 25	[0]	i 29 27	PS	e 19 29	PP
Chicago		119.3	45	e 18 45	[+18]	—	—	—	c 54.1
Copenhagen		119.6	333	—	—	29 30	PS	—	56.4
Ottawa		125.6	36	e 18 39	[0]	e 22 7	PPS	e 21 25	PP
Seven Falls		127.4	32	—	—	e 30 43	PS	e 38 19	SS
Philadelphia		128.7	42	e 21 55	PP	e 33 31	PPS	e 38 49	SS
La Plata		132.2	149	22 16	PP	—	—	—	c 55.0
Huancayo		133.0	113	i 22 27	PP	—	—	e 39 14	SS
La Paz	z.	137.5	123	i 19 12 _a	[+11]	—	—	i 22 12	PP
Bermuda		139.9	45	—	—	—	—	e 42 16	SSS
San Juan		144.5	67	e 19 8	[- 5]	e 41 40	SS	e 22 33	PP
Fort de France		150.0	71	e 21 25?	PP	—	—	—	c 65.0

Additional readings :—

Brisbane iSS?N = 8m.30s.

Riverview iPP?NZ = 6m.9s., iZ = 6m.19s., iEN = 10m.25s., iZ = 10m.30s., iSS?N = 11m.19s., iE = 11m.57s.

Wellington sPPZ = 9m.49s., SS = 16m.35s., sSS? = 17m.1s., Q = 18.4m.

Christchurch eE = 14m.45s., SSE = 16m.43s., QN = 17m.9s., S_cSEN = 17m.22s.

Mizusawa SN = 14m.49s.

Sverdlovsk SKS = 23m.27s., PS = 25m.27s.

Tinemaha eZ = 14m.41s.

Riverside iZ = 14m.15s.

Tucson e = 16m.3s.

Upsala eN = 47m.25s.?

San Juan e = 23m.41s., 29m.34s., and 32m.2s.

Long waves were also recorded at Honolulu, Rio de Janeiro, Tananarive, and other American and European stations.

Oct. 14d. 5h. 50m. 20s. Epicentre 44°·3N. 83°·7E.

A = +·0788, B = +·7137, C = +·6960 ; $\delta = -1$; $h = -3$;

D = +·994, E = -·110 ; G = +·076, H = +·692, K = -·718.

		Δ °	Az. °	P. m. s.	O-C. s.	S. m. s.	O-C. s.	Supp. m. s.	L. m.
Frunse		6.8	259	e 1 42	- 2	—	—	—	—
Andijan		9.1	251	e 2 22	+ 8	4 29	S*	—	—
Tchinkent		10.5	263	3 29	+54	—	—	—	—
Tashkent		11.0	259	e 2 40	- 2	e 5 1	SS	—	—
New Delhi	n.	16.5	200	—	—	e 6 55	- 3	—	—
Sverdlovsk		19.2	320	i 4 33	+ 5	8 10	+11	—	—
Bombay		26.9	203	e 5 45	0	e 10 25	+ 5	—	14.5
Moscow		31.2	308	6 20	- 3	11 35	+ 6	—	—

Long waves were also recorded at European stations,

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Oct. 14d. 11h. 20m. 25s. Epicentre 31°·0N. 101°·0E.

A = -·1638, B = +·8429, C = +·5125; $\delta = -3$; $h = -2$;
D = +·982, E = +·191; G = -·098, H = +·503, K = -·859.

	Δ	Az.	P.	O-C.	S.	O-C.	L.
	°	°	m. s.	s.	m. s.	s.	m.
Pehpei	4·8	101	—	—	e 2 5	- 7	—
Calcutta	N. 14·1	236	—	—	e 6 34	SSS	—
New Delhi	N. 20·8	271	e 8 18	S	(e 8 18)	-15	(i 11·3)
Irkutsk	21·4	6	e 4 51	0	8 48	+ 3	—
Andijan	25·1	302	e 5 28	0	e 9 57	+ 6	—
Tashkent	27·5	303	e 5 49	- 1	—	—	—
Bombay	N. 28·2	253	—	—	e 10 49	+ 8	i 14·8
Sverdlovsk	38·0	327	7 21	0	13 9	- 5	—
Moscow	50·2	221	e 8 59	- 1	—	—	—

New Delhi L given as S, S given as PP.
Bombay iN = 11m.53s.

Oct. 14d. 15h. 15m. 28s. Epicentre 46°·5N. 136°·0E. Depth of focus 0·060.

Intensity II-III at Urakawa and Hatinohe. Macro seismic radius greater than 300 km.

Seismo. Bull. Cent. Met. Obs., Japan, 1944. Tokyo, 1951, p. 21 with chart.

A = -·4969, B = +·4799, C = +·7231; $\delta = +9$; $h = -4$;
D = +·695, E = +·719; G = -·520, H = +·502, K = -·691.

	Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Vladivostok	4·5	222	i 1 21	+ 3	i 2 15	- 5	—	—
Sapporo	5·1	130	1 27k	+ 3	2 34	+ 4	—	—
Mori	5·5	142	1 29	+ 1	2 38	0	—	—
Hatinohe	7·2	144	1 43	- 4	3 3	- 9	—	—
Akita	7·4	155	1 45k	- 4	3 11	- 5	—	—
Nemuro	7·5	111	1 51	+ 1	—	—	—	—
Morioka	7·8	149	1 53k	- 1	3 20	- 4	—	—
Miyako	8·1	145	1 57	0	—	—	—	—
Mizusawa	N. 8·3	151	1 57	- 3	3 33	- 1	—	—
Aikawa	8·6	168	2 10	+ 7	3 41	+ 1	—	—
Sendai	9·0	154	2 7k	- 1	3 43	- 5	—	—
Wazima	9·1	175	2 14	+ 5	3 52	+ 2	—	—
Hokusima	9·4	157	2 12k	0	3 54	- 3	—	—
Toyama	9·9	174	2 17	- 1	4 6	- 1	—	—
Nagano	10·0	170	2 20	+ 1	4 34	+ 25	—	—
Onahama	10·2	157	2 20	- 1	4 8	- 5	—	—
Maebasi	10·4	166	2 23	- 1	4 17	- 1	—	—
Utunomiya	10·4	162	2 24	0	4 17	- 1	—	—
Kumagaya	10·7	165	2 40	+ 13	4 34	+ 10	—	—
Mito	10·7	160	2 24	- 3	4 17	- 7	—	—
Tukubasan	10·7	162	2 13	- 14	4 4	- 20	—	—
Tokyo	11·1	164	2 34k	+ 2	4 33	+ 1	—	—
Hikone	11·2	179	2 36	+ 3	4 36	+ 2	—	—
Nagoya	11·3	176	2 33	- 1	4 35	- 1	—	—
Misima	11·6	168	2 34	- 3	4 39	- 3	—	—
Kobe	11·8	183	2 38	- 2	4 44	- 3	—	—
Hukuoka	13·6	200	3 0	+ 1	5 21	- 2	—	—
Kumamoto	14·2	198	3 1	- 5	—	—	—	—
Miyazaki	15·0	195	3 6	- 8	—	—	—	—
Irkutsk	21·3	298	e 4 32?	+ 16	7 46	+ 3	—	—
Andijan	45·3	287	e 7 42	+ 2	e 13 52	+ 3	—	—
Sverdlovsk	45·6	313	i 7 46	+ 3	—	—	—	—
Tashkent	47·0	289	e 7 56?	+ 2	14 16	+ 3	—	—
Moscow	57·4	319	i 9 8	- 1	—	—	—	—
Baku	59·8	299	—	—	e 17 6	+ 3	—	—

Continued on next page.

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		Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Jena	E.	71.8	326	e 10 36	- 5	—	—	—	—
Tinemaha		73.5	54	e 10 52	+ 2	—	—	—	—
Haiwee		74.3	54	i 10 55	0	—	—	—	—
Mount Wilson		75.7	55	i 11 3	0	—	—	c 12 39	pP
Pasadena		75.7	55	i 11 2	- 1	—	—	c 12 41	pP
Riverside	Z.	76.2	55	i 11 4	- 2	—	—	—	—
Palomar		77.0	55	i 11 9	- 1	e 20 28	+ 5	—	—
La Jolla	Z.	77.1	55	i 10 52	-18	—	—	—	—
Helwan		78.1	301	i 11 17	+ 1	i 20 37	+ 2	—	—
Tucson		81.2	51	i 11 34	+ 2	—	—	—	—
Florissant		85.5	35	—	—	e 21 48	- 1	c 23 51	pS
St. Louis		85.7	35	i 11 56	+ 1	e 21 49	- 2	c 13 40	pP

Additional readings :—

Mizusawa SE = 3m.29s.

Tucson i = 12m.1s.

St. Louis eE = 23m.36s.

Long waves were recorded at Riverview.

Oct. 14d. 16h. 20m. 42s. Epicentre 12°·5S. 175°·0E.

A = -·9729, B = +·0851, C = -·2151; δ = +4; h = +6;
D = +·087, E = +·996; G = +·214, H = -·019, K = -·977.

		Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Apia		13.0	97	i 3 7	- 2	c 6 55	L	—	c 7.8
Auckland		24.3	183	5 18	- 2	9 43	+ 6	—	11.3
Brisbane	Z.	25.4	232	e 5 32	+ 1	—	—	—	—
Arapuni		25.5	179	—	—	11 0	SS	—	—
Wellington		28.7	182	6 43	+42	10 18?	-32	12 18?	Q 14.0
Riverview		30.4	222	i 6 15	- 1	i 11 20	+ 4	—	c 14.3
Christchurch		31.0	184	e 7 44	PP	i 11 19	- 7	—	14.7
Vladivostok		67.9	328	e 11 12	+10	e 20 18	+17	—	—
Pasadena		78.5	51	e 12 35	+31	—	—	—	c 35.6
Mount Wilson	Z.	78.7	51	i 12 7	+ 1	—	—	—	—
Palomar		79.2	52	i 12 12	+ 4	—	—	—	—
Riverside	Z.	79.2	51	e 12 10	+ 2	—	—	—	—
Tinemaha	E.	79.7	48	e 12 24	+13	—	—	—	—
Sitka		80.8	25	—	—	e 22 38	+13	—	c 36.7
Irkutsk		88.4	324	e 13 21	+26	23 54	+14	e 16 54	PP
Florissant	E.	101.3	52	—	—	e 24 43	[+10]	c 25 50	SKKS
St. Louis		101.4	52	—	—	e 24 45	[+11]	c 25 50	SKKS
Tashkent		109.9	310	e 19 23	PP	e 28 52	PS	—	—
Philadelphia		113.1	51	—	—	e 29 13	PS	—	c 57.4
Sverdlovsk		113.7	327	e 19 48	PP	e 29 28	PS	—	—
Helwan	Z.	142.2	303	19 42	[+ 8]	e 25 33	PPP	22 55	PP

Additional readings :—

Riverview iN = 9m.30s. and 11m.24s.

Christchurch Q?EN = 11m.36s., eEN = 13m.12s., iE = 13m.40s.

St. Louis eN = 27m.15s., eE = 32m.33s.

Long waves were also recorded at College, Ukiah, Bozeman, Salt Lake City, Clermont-Ferrand, and Upsala.

Oct. 14d. 20h. 16m. 8s. Epicentre 1°·0N. 128°·0E.

A = -·6155, B = +·7879, C = +·0173; δ = -7; h = +7;
D = +·788, E = +·616; G = -·011, H = +·014, K = -1.000.

		Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Miyazaki		30.9	6	6 48	+26	—	—	—	—
Kumamoto		31.8	5	6 22	- 6	—	—	—	—
Hukuoka		32.5	5	6 30	- 4	—	—	—	—
Muroto		32.6	9	5 32	-63	—	—	—	—
Kōti		32.8	8	e 6 38	+ 1	—	—	—	—

Continued on next page.

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	Δ	Az.	P.		O-C.	S.		O-C.	Supp.		L.
	°	°	m.	s.	s.	m.	s.	s.	m.	s.	m.
Siomisaki	33.1	12	e 6	43	+ 2	—	—	—	—	—	—
Sumoto	33.8	11	6	43	- 3	—	—	—	—	—	—
Kobe	34.2	11	7	22	+33	12	47	+31	—	—	—
Perth	34.7	198	—	—	—	i 12	37	+13	—	—	i 15.9
Hikone	35.0	12	6	56	0	12	29	+ 1	—	—	—
Nagoya	35.0	13	6	54	- 2	12	12	-16	—	—	—
Shizuoka	35.2	15	7	1	+ 3	—	—	—	—	—	—
Misima	35.4	15	e 7	6	+ 6	—	—	—	—	—	—
Kohu	35.8	15	e 7	5	+ 2	—	—	—	—	—	—
Yokohama	35.9	16	7	42	+38	16	25	?	—	—	—
Toyama	36.5	12	e 7	5	- 4	—	—	—	—	—	—
Nagano	36.7	13	e 7	5	- 5	—	—	—	—	—	—
Wazima	37.1	12	e 7	18	+ 4	11	57	-64	—	—	—
Brisbane	37.2	142	i 7	13 _a	- 2	i 13	6	+ 4	i 7	21	pP i 19.9
Sendai	38.9	17	7	25	- 4	13	28	0	—	—	—
Mizusawa	39.8	17	e 7	36	0	13	38	- 4	—	—	—
Riverview	40.9	150	i 8	51 _k	+65	i 14	8	+10	i 16	56	SS c 20.9
Sydney	41.0	150	e 7	52	+ 6	e 13	55	- 4	—	—	—
Vladivostok	42.1	4	e 7	55	0	i 14	14	- 2	—	—	—
Sapporo	43.6	13	e 8	10	+ 2	e 14	34	- 4	—	—	e 20.9
Calcutta	N. 44.1	302	—	—	—	i 14	47	+ 2	18	15	SSS
Colombo	E. 48.3	278	8	39	- 6	15	39	- 6	—	—	—
Kodaikanal	E. 51.0	283	i 9	16	+10	i 16	46	+24	11	6	PP 23.5
Irkutsk	54.8	342	e 9	29	- 5	17	12	- 2	—	—	—
New Delhi	N. 55.7	303	i 9	41 _k	+ 1	i 17	16	-10	—	—	—
Bombay	56.9	292	e 9	48	- 1	i 17	38	- 4	12	1	PP
Auckland	57.4	136	—	—	—	17	57	+ 8	24	4	Q
Arapuni	58.6	137	—	—	—	e 17	4	-60	23	52	SS 31.9
Christchurch	59.6	144	12	0	PP	18	24	+ 7	21	22	Q
Wellington	59.7	141	11	7	+58	19	57	?	24	12	SS 31.9
Almata	61.9	320	e 10	28	+ 4	—	—	—	—	—	—
Frunse	63.3	318	10	34	+ 1	—	—	—	—	—	—
Andijan	63.9	315	e 10	35	- 2	—	—	—	—	—	—
Tashkent	66.3	315	10	49	- 3	19	46	+ 4	—	—	—
Tchimkent	66.4	317	e 10	53	0	19	43	0	—	—	—
Sverdlovsk	76.9	329	e 11	54	- 2	21	41	- 2	—	—	—
Baku	80.3	311	e 12	21	+ 7	22	29	+ 9	—	—	—
College	86.6	25	—	—	—	e 23	21	- 2	e 28	37	SS e 36.7
Moscow	89.4	325	i 12	54	- 6	e 23	24	[- 5]	—	—	—
Ksara	91.2	303	e 13	6	- 2	e 24	1	- 4	—	—	—
Sitka	92.8	33	—	—	—	e 24	22	+ 3	e 25	2	PS c 38.2
Helwan	95.3	300	e 13	25	- 2	e 24	42	+ 1	17	16	PP
Bucharest	97.8	315	e 16	58	PP	—	—	—	—	—	46.9
Upsala	99.2	331	—	—	—	e 27	52?	PPS	e 30	52?	SS c 43.9
Victoria	101.5	40	—	—	—	e 24	22	[-12]	e 33	22	SS 46.9
Copenhagen	103.3	328	—	—	—	24	42	[- 1]	—	—	49.9
Prague	104.1	322	e 18	29	PP	e 28	22	PPS	e 22	52	PKS e 49.9
Cheb	105.4	323	—	—	—	e 23	52?	[-60]	—	—	e 53.9
Triest	106.0	318	e 19	47	?	e 26	30	?	e 27	48	PS c 46.4
Tinemaha	z. 108.2	50	e 18	54	PP	—	—	—	—	—	—
Haiwee	E. 108.6	51	e 19	2	PP	—	—	—	—	—	—
Pasadena	109.0	53	e 18	42	[+11]	e 34	16	SS	i 19	10	PP e 45.2
Mount Wilson	z. 109.1	53	e 18	16	[-15]	—	—	—	—	—	—
Riverside	z. 109.7	53	e 14	35	P	—	—	—	e 18	56	PP
Palomar	z. 110.2	53	e 14	55	P	—	—	—	i 18	45	PP
Stonyhurst	111.7	331	—	—	—	—	—	—	e 49	16	Q e 56.4
Paris	111.8	325	—	—	—	e 28	22	PS	—	—	—
Kew	112.0	328	e 19	24	PP	e 30	10	PPS	e 35	52?	SS e 58.9
Tucson	115.4	53	i 19	49	PP	i 29	34	PS	e 30	54	PPS e 49.2
Granada	121.3	316	—	—	—	—	—	—	i 50	29	Q 62.8

Continued on next page.

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	Δ °	Az. °	P. m. s.	O-C. s.	S. m. s.	O-C. s.	Supp. m. s.	L. m.
Florissant	127.0	37	e 21 4	PP	e 28 15	{+15}	e 22 34	PKS
St. Louis	127.2	37	e 19 11	[+ 4]	e 22 33	PKS	e 21 7	PP
Ottawa	129.3	21	e 19 10	[- 1]	e 37 52?	SS	e 22 40	PKS
Seven Falls	129.3	16	—	—	—	—	e 22 10	PKS
Philadelphia	134.1	24	—	—	e 32 37	PS	e 22 53	PKS
Bermuda	144.7	18	e 19 12	[-27]	e 26 52	[+ 6]	e 47 12	SSS
La Plata	E. 145.8	171	19 52	[+11]	—	—	—	—
	N. 145.8	171	19 34	[- 7]	—	—	—	—
	Z. 145.8	171	19 44	[+ 3]	—	—	—	—
Huancayo	154.4	116	e 20 24	PKP ₂	e 28 9	PPP	e 43 22	SS
San Juan	156.2	34	e 20 13	PKP ₂	e 24 23	PP	e 43 35	SS
La Paz	157.9	135	16 31	?	26 43	[-20]	i 20 11	PKP ₂

Additional readings :—

Brisbane iE = 10m.4s., iSSE = 15m.44s.

Riverview iN = 14m.15s., iZ = 17m.8s., iN = 17m.12s., iE = 17m.22s. and 18m.6s., iN = 19m.24s.

Calcutta iN = 15m.13s.

Kodaikanal SSE = 19m.36s.; readings decreased by 10m.

New Delhi iN = 17m.39s.

Bombay ePN = 9m.53s., iN = 17m.46s. and 20m.4s.

Christchurch eEN = 19m.15s.

Wellington Q = 29m.22s.?

Helwan eZ = 14m.37s. and 16m.46s., SKS?E = 24m.1s.

Prague e = 21m.28s.

Triest ePPE = 20m.54s., eSE = 28m.26s., ePSE = 30m.21s.; phases wrongly interpreted.

Riverside ePKKPZ = 29m.54s.

Palomar eZ = 16m.4s., iPKKPZ = 30m.30s.

Kew ePPP?Z = 25m.40s.?, eZ = 29m.2s., ePS?Z = 32m.30s.?, eSSS?Z = 42m.52s.?, eQN = 47.9m.

Florissant eE = 30m.2s.

St. Louis ePSN = 31m.23s., ePPSN = 32m.48s., eSS?N = 38m.51s.

La Plata P?Z = 19m.44s., PE = 19m.52s.

Huancayo e = 34m.36s.

San Juan e = 28m.18s. and 38m.24s.

La Paz PPS = 33m.6s.; phases wrongly identified.

Long waves were also recorded at Salt Lake City, Ukiah, and other European stations.

Oct. 14d. 22h. 6m. 21s. Epicentre 12°·5S. 175°·0E. (as at 16h.).

	Δ °	Az. °	P. m. s.	O-C. s.	S. m. s.	O-C. s.	Supp. m. s.	L. m.
Apia	13.0	97	e 3 9	0	—	—	—	c 6.8
Auckland	24.3	183	4 49	-31	9 15?	-22	—	10.6
Brisbane	25.4	232	i 5 31	0	i 10 6	+10	—	—
Arapuni	25.5	179	e 4 39?	-53	(9 39?)	-18	—	9.6
Wellington	28.7	182	4 1?	?	10 39?	-11	—	13.6
Riverview	30.4	222	i 6 11k	- 5	i 11 17	+ 1	—	c 14.2
Christchurch	31.0	184	—	—	11 14	-12	—	14.6
Pasadena	78.5	51	e 12 5	+ 1	—	—	—	c 32.6
Mount Wilson	z. 78.7	51	e 12 7	+ 1	—	—	—	—
Palomar	z. 79.2	52	i 12 12	+ 4	—	—	—	—
Riverside	z. 79.2	51	e 12 11	+ 3	—	—	—	—
Halwee	E. 79.5	49	e 12 25	+15	—	—	—	—
Tinemaha	79.7	48	i 12 14	+ 3	—	—	—	—
Sitka	80.8	25	—	—	e 22 37	+12	—	e 36.3
Tucson	83.6	54	i 12 33	+ 2	—	—	(e 27 51)	SS
Helwan	z. 142.2	303	19 36	[+ 2]	—	—	e 22 43	PP
Clermont-Ferrand	146.2	351	e 19 51	[+10]	—	—	—	c 69.6

Additional readings :—

Brisbane iPE = 5m.37s., iZ = 10m.30s.

Christchurch QN = 11m.19s.

Pasadena eZ = 12m.16s.

Mount Wilson iEZ = 12m.18s.

Palomar iZ = 12m.23s.

Tinemaha e = 12m.23s., eE = 18m.51s.

Helwan eZ = 19m.51s. and 24m.0s.

Long waves were also recorded at College, Bozeman, Salt Lake City, Philadelphia, and other European stations.

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Oct. 14d. Readings also at 0h. (near Trieste), 2h. (Fort de France and Paris), 4h. (Kodai-kanal), 6h. (Bogota), 7h. (Auckland, Christchurch, Wellington, Mount Wilson, Palomar, Riverside, Tucson, and Bogota), 9h. (Auckland, Christchurch, Wellington, Brisbane, Riverview, Mount Wilson, Riverside, Palomar (2), Tucson (2), St. Louis, and Helwan), 12h. (Wellington and near Apia), 13h. (Palomar and Tucson), 15h. (Brisbane), 17h. (near Andijan), 19h. (Auckland, Riverview, Wellington, Mount Wilson, Tucson, Pasadena, Palomar, Riverside, Tinemaha, Florissant, Vladivostok, Helwan, and near Ottawa), 21h. (Palomar and Tucson).

Oct. 15d. 1h. 1m. 59s. Epicentre $41^{\circ}6'N$. $142^{\circ}0'E$. (as on 1944 Feb. 1d.).

Intensity V at Gonnohe, Shichinnohe, Aomori Pref.; IV at Hatinohe and Hakodate. Epicentre $41^{\circ}5'N$. $142^{\circ}0'E$. Shallow. Macroseismic radius between 200 and 300km. Seismological Bulletin of the Central Meteorological Observatory, Japan, for the year 1944, Tokyo, 1951, p. 22. Isoseismic chart p. 22.

$$\begin{aligned} \Delta &= -0.5910, B = +0.4617, C = +0.6614; & \delta &= -10; & h &= -0.2; \\ D &= +0.616, E = +0.788; & G &= -0.521, H = +0.407, K = -0.750. \end{aligned}$$

	Δ	Az.	P.	O—C.	S.	O—C.
	$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.
Hatinohe	1.1	198	0 20 _a	- 2	0 32	- 7
Aomori	1.2	229	0 22	- 2	0 35	- 6
Mori	1.2	295	0 23 _a	- 1	0 38	- 3
Sapporo	1.6	342	0 34	+ 4	0 55	+ 4
Miyako	1.8	180	0 33	+ 1	0 52	- 4
Morioka	2.0	198	0 33 _k	- 2	0 54	- 8
Mizusawa	E. 2.6	195	0 41	- 3	1 7	-10
Nemuro	3.2	57	0 53	+ 1	1 35	+ 3
Sendai	3.4	194	0 54	- 1	1 26	-11
Onahama	4.8	192	1 23	+ 8	2 16	+ 4
Mito	5.4	195	1 32	+ 8	—	—
Kakioka	5.5	194	1 21	- 4	—	—
Tukubasan	5.6	196	1 23	- 4	2 17	-16
Maebasi	5.7	205	1 21	- 7	—	—
Kumagaya	5.8	201	1 31	+ 2	—	—
Nagano	5.8	213	1 19	-10	—	—
Wazima	5.8	225	1 24	- 5	2 25	-13
Nagoya	7.5	213	2 8	+15	—	—

Mizusawa gives also PN = 0m.48s.

Oct. 15d. 4h. 4m. 0s. Epicentre $10^{\circ}7'S$. $78^{\circ}8'W$.

$$\begin{aligned} A &= +0.1909, B = -0.9641, C = -0.1845; & \delta &= -3; & h &= +6; \\ D &= -0.981, E = -0.194; & G &= -0.036, H = +0.181, K = -0.983. \end{aligned}$$

	Δ	Az.	P.	O—C.	S.	O—C.	Supp.	L.
	$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.
Huancayo	3.6	111	i 0 53	- 5	i 1 34	- 8	—	—
La Paz	11.9	120	e 2 57	+ 3	5 9	0	—	6.0
Bogota	15.9	17	e 3 49	+ 2	e 6 48	+ 4	i 4 4	PPP c 7.2
St. Louis	50.2	348	e 8 58	- 2	e 16 7	- 4	e 18 41	S _c S
Florissant	E. 50.4	348	e 15 36	?	e 16 5	- 9	—	—
Tucson	52.5	326	i 9 16	- 1	—	—	i 9 27	? e 29.6
Palomar	56.9	322	i 9 48	- 1	—	—	i 10 4	? —
Riverside	z. 57.6	322	e 9 54	0	—	—	—	—
Mount Wilson	58.2	322	e 9 58	0	—	—	i 10 7	? —
Pasadena	z. 58.2	322	e 9 59	+ 1	—	—	e 10 8	? —
Tinemaha	60.3	324	i 10 12	- 1	—	—	i 10 21	? —
Malaga	84.1	50	i 12 30 _a	- 4	—	—	i 12 42	P _c P —

St. Louis gives also eZ = 9m.9s., ePSE = 16m.41s., and eSS?E = 19m.40s. Long waves were also recorded at Kew, Granada, and San Juan.

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Oct. 15d. 7h. 57m. 36s. Epicentre $5^{\circ}58.132^{\circ}5E$.

A = -0.6725, B = +0.7340, C = -0.0952; $\delta = +8$; $h = +7$;
D = +0.737, E = +0.676; G = +0.064, H = -0.070, K = -0.995.

	Δ	Az.	P.	O—C.	S.	O—C.	Supp.	L.
	$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.
Brisbane	N. 29.3	141	e 5 34	-32	—	—	—	i 15.5
Riverview	33.1	151	i 6 41	+1	(c 12 42)	+43	—	e 12.7
Vladivostok	48.4	359	e 8 25	-21	c 15 5	-41	—	—
Auckland	49.7	135	9 24	+28	—	—	—	28.4
Irkutsk	62.3	341	—	—	18 37	-15	—	—
Almata	69.7	321	e 11 19	+5	—	—	—	—
Frunse	71.1	319	11 22	0	—	—	11 42	P _c P
Andijan	71.7	316	e 11 25	-1	c 20 49	+4	—	—
Tashkent	74.0	315	e 11 40?	+1	21 15?	+4	—	—
Sverdlovsk	84.8	328	i 12 34	-3	22 53	-12	—	—
Baku	87.9	311	—	—	23 45	+10	—	—
Triest	113.8	317	—	—	c 30 50	PPS	—	—
St. Louis	E. 129.2	43	—	—	c 31 4	PS	—	e 51.5

Long waves were also recorded at Perth, Sydney, Arapuni, Wellington, Christchurch, and Kew.

Oct. 15d. Readings also at 2h. (Rio de Janeiro), 5h. (Palomar), 6h. (Riverside, Tucson, and Palomar), 7h. (near Triest and near Andijan), 8h. (Tucson, Pasadena, Mount Wilson, Palomar, and Riverside), 9h. (Helwan, Paris, Kew, Bozeman, College, Tucson, Pasadena, Mount Wilson, Palomar, Riverside, Tinemaha, Christchurch, Tucson, Auckland (2), and Riverview), 10h. (Riverside, Palomar, Mount Wilson, Pasadena, Bozeman, Tucson, Upsala, Wellington, and Christchurch), 12h. (Riverview), 15h. (Helwan and near Ksara), 16h. (near Andijan and Frunse), 17h. (Sverdlovsk, near Tashkent, Tchinkent, Andijan, and Frunse), 19h. (Stalinabad, Mount Wilson, Pasadena, Palomar, Tucson, and Riverside), 20h. (St. Louis, Honolulu, and near Apia), 22h. (Honolulu), 23h. (near Malaga).

Oct. 16d. Readings at 0h. (Fort de France), 1h. (Palomar, Tinemaha (2), Tucson (2), Riverside, New Delhi (2), and near Apia), 3h. (Tchinkent, Andijan, near Tashkent and Stalinabad), 7h. (Bogota), 9h. (Palomar), 13h. (near Tchinkent and Tashkent), 14h. (near Tchinkent, Andijan, and Tashkent), 18h. (near Andijan), 20h. (Ksara and Helwan (2)), 21h. (near Mizusawa), 23h. (near Andijan).

Oct. 17d. 18h. 36m. 51s. Epicentre $31^{\circ}3N. 83^{\circ}4E$.

A = +0.0984, B = +0.8503, C = +0.5170; $\delta = -2$; $h = +1$;
D = +0.993, E = -0.115; G = +0.059, H = +0.514, K = -0.856.

	Δ	Az.	P.	O—C.	S.	O—C.	Supp.	L.
	$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.
Dehra Dun	4.7	259	1 41	P _r	2 59	S _r	2 11	P _r
New Delhi	N. 6.0	245	i 1 35k	+3	2 41	-2	2 4	P _r
Calcutta	N. 9.8	152	i 2 29k	+5	—	—	—	—
Andijan	13.0	319	e 3 4	-5	i 5 32	-3	—	—
Almata	13.0	338	i 3 6	-3	—	—	—	—
Frunse	13.5	331	e 3 14	-1	—	—	—	—
Stalinabad	14.0	306	e 3 34?	+12	—	—	—	—
Hyderabad	N. 14.5	199	3 26	-2	e 6 3	-8	6 22	SS
Tashkent	15.1	315	3 33	-3	6 12	-13	—	—
Bombay	15.6	220	i 3 41	-2	i 6 26	-11	6 43	SS
Tchinkent	15.6	319	e 3 39	-4	—	—	—	—
Pchpei	19.9	89	5 22	PPP	—	—	9 7	P _c P
Kodaikanal	E. 21.7	196	(i 5 19)	+24	(i 8 59)	+8	—	(10.9)
Colombo	24.5	188	5 34	+12	9 57	+17	—	—
Irkutsk	26.0	30	5 35	-1	10 8?	+2	—	—
Sverdlovsk	30.0	330	i 6 13	+1	i 11 5	-5	i 6 23	pP
Hukuoka	39.5	74	7 36	+2	13 35	-2	9 13	PP
Kumamoto	39.9	75	7 40	+3	—	—	—	c 23.2
Vladivostok	39.9	59	i 7 34	-3	i 13 33	-10	—	—
Ksara	39.9	286	e 7 40	+3	e 13 53	+10	—	—

Continued on next page.

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		Δ	Az.	P.		O - C.	S.		O - C.	Supp.		L.	
		°	°	m.	s.	s.	m.	s.	s.	m.	s.	m.	
Moscow		40.2	322	7	38	- 2	13	36	-12	7	49	pP	—
Miyazaki		40.6	77	9	11	PP	14	2	+ 8	—	—	—	—
Kobe		43.2	71	7	52	-12	14	30	- 2	—	—	—	—
Hikone		43.9	70	8	9	- 1	—	—	—	—	—	—	—
Wazima		44.1	67	e 8	15	+ 3	14	51	+ 6	—	—	—	—
Nagoya		44.5	70	e 8	19	+ 4	—	—	—	—	—	—	—
Helwan		44.5	282	i 8	15 ^a	0	14	52	+ 1	9	57	PP	—
Nagano		45.2	68	e 8	24	+ 4	15	18	+17	—	—	—	—
Shizuoka		45.7	70	8	24	0	15	16	+ 8	—	—	—	—
Hunatu		45.9	69	e 8	27	+ 1	15	15	+ 4	—	—	—	—
Bucharest	E.	46.2	304	e 8	29	+ 1	e 15	18	+ 3	—	—	—	23.2
	N.	46.2	304	e 8	39	+11	e 15	18	+ 3	e 18	21	SS	23.2
Yokohama		46.6	69	8	33	+ 1	15	21	0	—	—	—	—
Hokusima		46.8	66	8	33	0	15	30	+ 6	—	—	—	—
Sapporo		46.8	58	e 8	31	- 2	15	29	+ 5	—	—	—	e 22.6
Kakioka		46.9	68	e 8	29	- 5	—	—	—	—	—	—	—
Morioka		47.1	63	e 8	36	+ 1	15	16	-12	—	—	—	—
Sendai		47.1	65	e 8	30	- 5	15	15	-13	—	—	—	—
Mizusawa		47.1	64	e 8	39	+ 4	15	25	- 3	—	—	—	19.6
Hatinohe		47.2	62	e 8	31	- 5	15	34	+ 5	—	—	—	—
Sofia		48.4	301	e 8	45	- 1	e 15	50	+ 4	e 10	41	PP	26.6
Belgrade		50.2	305	e 8	59	- 1	—	—	—	i 10	59	PP	e 31.9
Upsala		51.4	325	i 9	10	+ 1	i 16	23	- 5	e 11	4	PP	e 24.2
Prague		53.6	313	9	25	0	e 16	55	- 3	e 11	20	PP	e 24.6
Potsdam		54.2	315	i 9	31	+ 2	i 17	3	- 3	i 9	40	pP	e 25.2
Copenhagen		54.2	319	e 9	29 ^k	0	17	2	- 4	11	23	PP	25.2
Triest		54.7	307	i 9	29	- 4	i 17	11	- 2	i 9	42	pP	e 26.0
Cheb		54.9	313	e 9	36	+ 1	e 17	16	0	e 11	40	PP	e 26.2
Jena		55.3	313	i 9	37	- 1	e 17	19	- 2	e 12	44	PPP	e 26.5
Chur		57.4	309	e 9	49 ^k	- 4	—	—	—	e 13	15	PPP	e 31.6
Bergen		57.6	326	9	52	- 2	17	48	- 3	e 13	26	PPP	26.5
Zürich		57.9	310	e 9	52	- 4	—	—	—	e 12	7	PP	—
Milan	E.	57.9	308	10	11	+15	19	56	S _c S	—	—	—	32.8
Strasbourg		58.2	312	e 9	59	+ 1	—	—	—	—	—	—	30.2
Basle		58.5	310	e 9	54	- 6	e 19	27	?	—	—	—	—
Neuchatel		59.1	310	e 10	1	- 3	—	—	—	—	—	—	—
Uccle		59.8	315	e 10	9	0	18	18	- 2	—	—	—	e 28.2
Tananarive		60.6	220	e 10	12	- 3	e 18	30	0	22	31	SS	25.4
Paris		61.5	312	e 10	17 [?]	- 4	e 18	9	PS	—	—	—	e 31.2
Aberdeen		62.0	323	i 10	25	+ 1	i 18	43	- 5	—	—	—	28.4
Clermont-Ferrand		62.0	309	e 10	26	+ 2	e 18	47	- 1	e 23	8	SS	e 29.2
Kew		62.5	316	i 10	23	- 5	i 18	46	- 8	i 12	45	PP	30.2
Edinburgh		62.9	321	10	26	- 4	18	47	-13	20	15	S _c S	—
Stonyhurst		63.1	319	i 10	31	- 1	i 19	2	0	i 12	56	PP	e 28.2
Barcelona		64.0	305	e 10	33	- 5	e 19	9	- 4	—	—	—	e 30.9
Tortosa		65.4	304	e 10	39	- 8	e 19	29	- 1	11	23	P _c P	e 30.2
Granada		69.7	302	i 11	19 ^k	+ 5	i 20	17	- 5	20	47	PS	34.0
Malaga		70.5	302	i 11	18 ^k	0	i 20	26	- 6	i 13	43	PP	36.2
San Fernando		71.9	302	11	31	+ 4	20	42	- 6	11	54	pP	37.2
Lisbon		73.0	305	11	34 ^k	+ 1	20	58	- 2	29	9 [?]	SSS	34.5
College		76.2	20	11	57	+ 5	e 21	37	+ 1	e 26	30	SS	e 30.9
Sitka		85.7	20	e 12	41	- 1	e 23	16	+ 2	e 28	58	SS	e 36.6
Brisbane	E.	88.4	124	—	—	—	i 23	45	+ 5	—	—	—	—
Riverview		91.0	130	i 13	10 ^a	+ 3	i 24	14	+11	i 16	50	PP	e 44.2
Saskatoon		96.5	7	—	—	—	e 24	15	[+ 6]	e 32	9	SSP	50.2
Victoria		97.0	18	e 19	44	PPP	e 24	57	+ 2	—	—	—	46.2
Seven Falls		98.6	342	—	—	—	e 24	27	[+ 7]	e 31	53	SS	41.2
Ottawa		101.3	345	—	—	—	e 24	39	[+ 6]	e 32	27	SS	43.2
Butte		101.8	11	e 28	41 [?]	?	—	—	—	—	—	—	e 49.7
Bozeman		102.3	10	e 32	12	SS	—	—	—	—	—	—	e 46.8

Continued on next page.

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		Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Rapid City		104.7	5	e 18 50	PP	24 49	[- 0]	e 25 55	S e 45.0
Philadelphia		106.4	343	—	—	c 24 54	[- 3]	e 27 46	PS e 43.5
Chicago		106.8	354	—	—	c 25 7	[+ 8]	e 33 34	SS e 49.1
Tinemaha	E.	109.0	18	e 19 2	PP	—	—	—	—
Auckland		109.0	122	—	—	38 39?	SSS	48 9?	Q —
Bermuda		109.8	332	19 12	PP	25 15	[+ 4]	e 28 33	PS e 47.7
Florissant		110.0	355	e 19 15	PP	c 25 17	[+ 5]	e 26 17	SKKS —
Arapuni		110.1	123	—	—	48 9?	Q	50 9?	? 57.2
Christchurch		110.3	130	e 28 39	PS	c 34 41	SS	e 38 39?	SSS 54.1
Wellington	Z.	110.8	127	—	—	—	—	e 45 9?	? 58.2
Mount Wilson	Z.	111.8	19	e 18 40	[+ 3]	—	—	i 19 20	PP —
Pasadena		111.8	19	e 18 36	[- 1]	e 40 21	SSS	i 19 24	PP e 52.4
Riverside	Z.	112.2	19	e 18 37	[0]	—	—	—	—
Palomar		112.9	18	e 18 44	[+ 5]	i 29 39	?	i 19 36	PP —
Tucson		115.4	13	e 18 43	[- 1]	c 25 46	[+ 13]	i 29 23	PS e 46.7
San Juan		122.6	325	—	—	27 33	[+ 2]	e 30 33	PS e 50.2
Rio de Janciro	N.	132.1	267	e 40 9	?	—	—	—	—
La Plata	E.	147.5	254	19 45	[+ 2]	—	—	—	—
	Z.	147.5	254	19 51	[+ 8]	—	—	—	—
La Paz		150.2	293	i 19 51k	[+ 3]	26 50	[- 4]	30 26	SKKS 72.8
Huancayo		152.6	310	e 19 57	[+ 6]	e 30 10	[- 22]	e 49 33	SSS e 58.1

Additional readings :—

Dchra Dun $S_e N = 3m.44s.$
 New Delhi $iS_e = 3m.21s., i = 3m.51s.$ and $4m.26s.$
 Kodaikanal readings decreased by 8m.
 Hukuoka SSS = 16m.24s. and Q = 21m.38s.
 Helwan $iZ = 9m.13s., PPPZ = 10m.44s.$
 Sofia $eN = 14m.52s.?, eSEN = 19m.28s., eE = 19m.38s.$
 Belgrade $i = 9m.29s., e = 12m.50s.$
 Upsala $ePN = 9m.14s., PPP?N = 11m.44s., eE = 17m.57s., eSS?N = 20m.9s.?, eSS?E = 20m.24s., eSSSE = 21m.44s., eSSS?N = 22m.4s.$
 Prague $ePPP = 12m.18s., eSS? = 20m.39s., e = 21m.27s.$
 Potsdam $ePPE = 11m.31s., ipPPE = 11m.45s., ePPPN = 12m.39s., iSN = 17m.7s.?, eSSE = 20m.39s.$
 Copenhagen 18m.9s. and 20m.51s.
 Trieste $ipPE = 11m.21s., ipPPE = 12m.24s., isSE = 17m.28s., ipSE = 17m.45s., isSE = 21m.14s.$
 Cheb $e = 14m.34s., eSS = 21m.0s.$
 Jena $ipN = 9m.41s., ipN = 9m.45s., iN = 10m.19s., eSN = 17m.23s.$
 Bergen $P_e SE = 14m.39s.$
 Kew $ip_e PZ = 10m.38s., ePPPEZ = 14m.9s., ePS = 18m.53s., eS_e S = 20m.25s.?, eSS = 23m.5s.?, eSSSEZ = 25m.37s., eQE = 26m.9s.$
 Stonyhurst $ip_e P? = 11m.20s., i = 14m.24s., eS = 18m.47s., ipPS? = 19m.9s., iS_e S? = 20m.16s., iSSS? = 24m.38s.$
 Tortosa $S_e SN = 20m.28s., SKSN = 20m.50s., SKKSE = 21m.9s., SSSN = 26m.44s.$
 Granada SS = 25m.16s.
 Malaga $ipP? = 12m.1s., i = 12m.58s., PPP = 15m.48s., PS = 21m.24s., Q = 30m.6s.$
 San Fernando $sS?EZ = 21m.48s., SSE = 26m.5s.$
 Lisbon PE = 11m.42s., PPZ = 14m.33s.
 Sitka $iS = 23m.34s., e = 24m.39s., e = 33m.54s.$
 Brisbane $iS?N = 23m.52s.$
 Riverview $iSKSE = 23m.46s., iSKSN = 23m.50s., ePSNZ = 25m.26s., iSSN = 30m.30s., iSSE = 30m.35s., eSSSN = 34m.40s., eQN = 39m.21s.$
 Philadelphia $e = 28m.57s., eSS = 32m.42s.$
 Christchurch $eEN = 46m.35s., QEN = 48m.39s.$
 Bermuda $eSS = 34m.32s.$
 Florissant $ispZ = 28m.30s., ipSN = 28m.40s.$
 Mount Wilson $ipKKPZ = 29m.37s.$
 Pasadena $eZ = 19m.14s., ipSNZ = 28m.56s., ePKKP = 29m.34s., ePPSZ = 29m.39s.$
 Tucson $e = 19m.52s., 33m.15s.,$ and $35m.55s.$
 Palomar $ipKKPZ = 29m.30s.$
 San Juan $eS = 28m.21s.$
 La Paz $iZ = 19m.58s., PPZ = 23m.6s., SSZ = 43m.48s., SSS = 48m.44s.$
 Huancayo $e = 24m.8s., 33m.13s., 38m.8s.,$ and $38m.48s.$
 Long waves were also recorded at Salt Lake City, New Kensington, Ukiah, Columbia, and Logan.

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Oct. 17d. 19h. 39m. 30s. Epicentre $39^{\circ}5N$. $71^{\circ}1E$. (as given by stations of U.S.S.R.).

$$A = +.2506, B = +.7320, C = +.6335; \quad \delta = -5; \quad h = -1;$$

$$D = +.946, E = -.324; \quad G = +.205, H = +.599, K = -.774.$$

	Δ	Az.	P.	O-C.	S.	O-C.
	$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.
Andijan	1.6	38	i 0 32	+ 2	i 0 55	+ 4
Stalinabad	2.0	243	i 0 44	P_g	i 1 17	S_g
Tashkent	2.3	323	0 48	P_g	1 25	S_g
Tchimkent	3.0	335	i 0 49?	- 1	i 1 43	S_g
Frunse	4.3	37	e 1 10	+ 2	e 1 29	P_g
Almata	5.8	48	i 1 28	- 1	2 38	0
Sverdlovsk	18.7	342	i 4 25	+ 3	8 5	SS
Chur	44.5	301	e 8 14	- 1	—	—
Zürich	45.0	301	e 8 17	- 2	—	—

Long waves were recorded at Bombay.

Oct. 17d. 21h. 17m. 40s. Epicentre $39^{\circ}5N$. $71^{\circ}1E$. (as at 19h.).

Stations of U.S.S.R. suggest a depth of about 20kms.

	Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.
Andijan	1.6	38	e 0 31	+ 1	i 0 53	+ 2	—	—
Stalinabad	2.0	243	i 0 44	P_g	i 1 12	S_g	—	—
Tashkent	2.3	323	0 47?	P_g	1 27	S_g	—	—
Tchimkent	3.0	335	i 0 49	- 1	i 1 41	S_g	—	—
Frunse	4.3	37	e 1 8	0	1 58	- 2	1 18	P^*
Almata	5.8	48	1 28	- 1	i 2 36	- 2	i 2 56	S^*
Sverdlovsk	18.7	342	i 4 25	+ 3	8 5	SS	—	—
Calcutta	N. 22.4	135	—	—	e 9 7	+ 3	—	—

Frunse gives also $S^* = 2m.5s$.

Long waves were recorded at New Delhi and Bombay.

Oct. 17d. 21h. 38m. 0s. Epicentre $40^{\circ}9N$. $76^{\circ}5E$. (as given by the stations of the U.S.S.R.).

$$A = +.1770, B = +.7371, C = +.6522; \quad \delta = +1; \quad h = -2;$$

$$D = +.972, E = -.233; \quad G = +.152, H = +.634, K = -.758.$$

	Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.
Almata	2.4	8	i 0 43	+ 2	i 1 23	S_g	0 48	P_g
Frunse	2.4	324	e 0 45	+ 4	e 1 13	+ 1	e 0 51	P_g
Andijan	3.1	267	e 0 51	0	i 1 47	S_g	i 0 57	P_g^*
Tchimkent	5.3	286	e 1 22	0	—	—	—	—
Sverdlovsk	19.0	333	4 24	- 2	—	—	—	—
Kodaikanal	E. 30.6	178	(6 40)	+22	(11 30)	+10	—	— (14.3)

Additional readings:—

Frunse $S_g = 1m.25s$.

Andijan $eP_g = 1m.1s$.

Kodaikanal readings reduced by 2m.

Long waves were also recorded at New Delhi, Bombay, Calcutta, Prague, and Cheb.

Oct. 17d. Readings also at 0h. (Palomar, Riverside, Mount Wilson, Tucson, Christchurch, Wellington, and Auckland), 1h. (Palomar, Riverside, Mount Wilson, Pasadena, Tinemaha, Tucson, Helwan, Tashkent, Sverdlovsk, Calcutta, and Bogota), 2h. (Ksara, Helwan, and near Alicante), 3h. (Wellington, Christchurch, Auckland, Brisbane, and Riverview), 4h. (Palomar (2), Riverside, Mount Wilson (2), Pasadena (2), Tucson (2), and Granada), 9h. (Upsala and near Apia), 10h. (Pasadena, Riverside, Tucson, and Palomar), 14h. (near Andijan), 15h. (Riverview), 19h. (Tchimkent and near Stalinabad), 20h. (Bombay), 22h. (Bombay, Calcutta, New Delhi, Palomar, Riverside, Mount Wilson, Pasadena, Tucson, La Paz, and near Frunse, Tchimkent, Stalinabad (2), and Andijan), 23h. (Bombay),

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Oct. 18d. 12h. 54m. 0s. Epicentre $40^{\circ}8'N$. $33^{\circ}4'E$.

Felt at Ankara and Kastomonide.

Epicentre $40^{\circ}5'N$. $33^{\circ}5'E$. (Strasbourg). Depth slightly greater than normal.

Bulletin Météorologique, Séismique, et Magnétique de L'Observatoire d'Istanbul-Kandilli 1944, Istanbul 1949, p.44.

$$A = +.6338, B = +.4179, C = +.6509; \quad \delta = +1; \quad h = -2;$$

$$D = +.550, E = -.835; \quad G = +.543, H = +.358, K = -.759.$$

		Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.	
		$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.	
Istanbul		3.3	275	0 59	+ 6	1 39	+ 4	1 9	P _g	—
Bucharest		6.5	306	e 1 37	- 2	i 2 49	- 6	i 1 52	P*	—
Ksara		7.2	164	e 2 52?	+ 63	e 3 13	0	4 0	S _g	—
Sofia		7.8	288	e 2 5	+ 7	e 3 36	+ 8	e 2 12	P*	—
Belgrade		10.3	297	e 2 32	0	—	—	e 5 33	S _g	i 5.9
Helwan	z.	11.0	188	2 40	- 2	6 17	L	3 8	PPP	(6.3)
Triest	E.	15.1	295	i 3 33	- 3	i 8 46	P _c P	i 3 52	pP	—
Moscow		15.2	9	i 3 32	- 6	—	—	—	—	—
Prague		16.2	311	3 49	- 1	e 7 3	+12	e 4 34	PPP	e 10.0
Potsdam		18.1	317	e 4 12?	- 2	e 7 32	- 3	e 4 30?	PP	e 10.0
Chur		18.2	298	e 4 14 _a	- 2	—	—	—	—	—
Jena		18.2	314	e 4 14	- 2	e 8 22	SSS	—	—	—
Zürich		19.0	300	e 4 22	- 4	—	—	e 4 26	P	—
Basle		19.7	300	e 4 33	- 1	—	—	e 4 53	PPP	—
Strasbourg		19.8	304	e 4 37	+ 2	—	—	—	—	—
Neuchatel		20.0	299	e 4 38	+ 1	—	—	—	—	—
Copenhagen		20.3	326	e 4 41	+ 1	—	—	—	—	—
Upsala		21.5	339	i 4 57	+ 5	e 8 49?	+ 2	i 5 17	PP	e 10.4
Clermont-Ferrand		22.5	296	e 5 9	+ 7	—	—	—	—	—
Tashkent		26.9	77	5 46	+ 1	10 36	+16	—	—	—
Andijan		29.3	78	e 6 10	+ 4	—	—	—	—	—
Almata		32.2	72	e 6 47	+15	—	—	—	—	—
Bombay	N.	40.1	111	e 7 39	0	—	—	e 9 17	PP	—
Irkutsk		48.2	51	9 11	+27	—	—	—	—	—

Additional readings:—

Istanbul S_g = 1m.58s.

Bucharest eN = 1m.48s., iEN = 3m.10s., iE = 3m.24s.

Sofia eE = 4m.19s.

Belgrade e = 2m.39s. and 3m.29s.

Triest iPPE = 4m.36s., isSE = 9m.22s., iSSE = 10m.10s.

Prague eS? = 7m.48s.

Potsdam eSSN = 7m.48s.?

Upsala eN = 5m.8s., iS = 8m.31s.

Long waves were also recorded at Bergen, Cheb, and Calcutta.

Oct. 18d. Readings also at 0h. (Tchimkent, near Andijan, Frunse, Almata, near Bogota, and near Harvard), 1h. (Almata, New Delhi, and near Mizusawa), 2h. (near Almata and near Mizusawa), 3h. (Riverview, Tucson, Pasadena, Mount Wilson, Riverside, and Palomar), 4h. (Palomar, Mount Wilson, Tucson, and Riverview), 12h. (Palomar, Tucson, Mount Wilson, Riverside, and Pasadena), 14h. (near Triest), 20h. (near La Paz), 22h. (near Erevan), 23h. (Mount Wilson, Palomar, and Tucson).

Oct. 19d. Readings at 4h. (Andijan, La Paz, Pasadena, Mount Wilson, Palomar, Tinemaha, Riverside, Tucson, and St. Louis), 6h. (Vladivostok, Andijan, Tashkent, Sverdlovsk, Palomar, Tucson, Mount Wilson, and Riverview), 7h. (Pasadena), 12h. (Bombay, Calcutta, and near Yalta), 13h. (Pasadena (2), Palomar (2), Mount Wilson, Tucson (2), Riverside, Tinemaha, Haiwee, and La Jolla), 14h. (La Paz, near Belgrade, and near Andijan), 15h. (La Paz, Riverside, Mount Wilson, Palomar, Pasadena, and Tucson (2)), 16h. (St. Louis, and near La Paz), 18h. (near Malaga), 20h. (Tucson, Pasadena, Palomar, Mount Wilson, and Riverside), 23h. (Riverview, Mount Wilson, Tucson, and Palomar).

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Oct. 20d. 2h. 7m. 51s. Epicentre $45^{\circ}6N$, $20^{\circ}6E$.

$$A = +.6571, B = +.2470, C = +.7121; \quad \delta = -12; \quad h = -4;$$

$$D = +.352, E = -.936; \quad G = +.667, H = +.251, K = -.702.$$

	Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.
Sofia	3.5	145	e 0 57	0	i 1 41	+ 1	—	—
Bucharest	4.1	107	1 9?	+ 4	—	—	—	—
Triest	E. 4.8	274	e 1 15	0	i 2 9?	- 3	i 1 27	P*
Chur	7.8	283	e 1 57	- 1	e 3 23	- 5	—	—
Jena	E. 8.0	315	—	—	e 4 17	S _g	—	e 5.3
Zürich	8.5	285	e 2 5	- 2	e 3 40	- 5	—	—
Basle	9.2	287	e 2 18	+ 2	e 4 29	S*	—	—
Strasbourg	9.2	296	—	—	e 4 9	+ 6	e 4 53	S _g e 5.5
Neuchatel	9.5	283	e 2 19	- 1	—	—	—	—

Additional readings :—

Triest $iP_sE = 1m.31s.$, $iP_sP_sE = 1m.35s.$, $iSN = 2m.28s.$, $iS_sN = 2m.37s.$

Jena $eN = 4m.25s.$

Long waves were also recorded at Potsdam.

Oct. 20d. Readings also at 0h. (La Plata and near La Paz), 1h. (Tucson), 3h. (near Mizusawa), 5h. (Riverside, Mount Wilson, Palomar, Tucson, Bogota, and Bombay), 9h. (Tucson, Palomar, Mount Wilson, Riverside, Pasadena, La Jolla, and Tinemaha), 11h. (Almata, Tashkent, Andijan, near Stalinabad, and near La Paz), 12h. (near Andijan), 15h. (Bucharest and near Sofia (2)), 23h. (Haiwee, Tinemaha, Pasadena, Riverside, Mount Wilson, Palomar, Tucson, St. Louis, and Florissant).

Oct. 21d. Readings at 0h. and 4h. (near Andijan), 10h. (St. Louis, Mount Wilson, Riverside, Palomar, Tucson (3), Riverview, and Brisbane), 12h. (near Balboa Heights), 20h. (St. Louis, Pasadena, Tinemaha, Riverside, Tucson, Merida, and Tacubaya), 21h. (Tucson, Riverside, Tinemaha, Pasadena, Palomar, Mount Wilson, Honolulu, Riverview, Brisbane, Christchurch, Wellington, Auckland, Apia, and near Mizusawa).

Oct. 22d. 18h. Undetermined shock.

Pasadena suggests deep focus.

Mizusawa $PE = 49m.52s.$, $SE = 50m.24s.$

Calcutta $eN = 56m.49s.$

Riverview $iPZ = 57m.2s.k.$, $iSN = 65m.35s.$, $eLE = 67.5m.$

Copenhagen $iP = 58m.27s.$

Potsdam $eN = 58m.30s.$, $eE = 59m.0s.?$, $eLN = 94m.$

Jena $eN = 58m.44s.$

Zürich $e = 58m.58s.$

Santa Barbara $ePNZ = 59m.13s.$, $eEZ = 59m.29s.$

Tinemaha $iP = 59m.14s.$, $iEZ = 59m.28s.$, $iZ = 60m.28s.$, $eE = 63m.13s.$

Uccle $eP = 59m.15s.?$, $eSEN = 69m.42s.$, $eL = 93m.$

Haiwee $iPZ = 59m.19s.$

Mount Wilson $iP = 59m.21s.a.$, $iZ = 59m.34s.$ and $59m.41s.$

Pasadena $iPZ = 59m.21s.a.$, $iZ = 59m.33s.$, $eZ = 61m.27s.$, $eLZ = 91.2m.$

Riverside $iPZ = 59m.23s.a.$, $iNZ = 59m.36s.$, $eN = 62m.59s.$

La Jolla $iP = 59m.28s.$, $iZ = 59m.41s.$

Palomar $iP = 59m.29s.a.$, $i = 59m.42s.$, $iZ = 62m.51s.$ and $63m.10s.$

Tucson $iP = 59m.49s.$, $e = 63m.45s.$

Bombay $eE = 62m.41s.$

Long waves were also recorded at other European stations.

Oct. 22d. Readings also at 6h. (near La Paz, near Andijan, Frunse, and Tashkent), 10h. (near Zürich), 22h. (Kew).

Oct. 23d. 22h. Undetermined shock, South-West Pacific.

Riverview $ePEZ = 18m.31s.$, $eSZ? = 22m.43s.$, $eS?E = 23m.31s.$, $eLEZ = 24.7m.$

Wellington $P?Z = 18m.38s.?$, $S = 20m.30s.$, $L = 22m.0s.$

Pasadena $iPZ = 23m.19s.$

Palomar $iPZ = 23m.21s.$

Riverside $iPZ = 23m.21s.$

Mount Wilson $iPZ = 23m.21s.$

Haiwee $ePE = 23m.28s.$

Tinemaha $iP = 23m.28s.$

Tucson $iP = 23m.40s.$, $i = 23m.52s.$, $eL = 53m.21s.$

Long waves were also recorded at Arapuni, Auckland, and Christchurch.

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Oct. 23d. 23h. 40m. 5s. Epicentre 0°·8N. 79°·5W.

Felt at Guayaquil. Epicentre 0°·5N. 80°·0W. Magnitude 6·9 (Gutenberg).
 Mapa sísmico y tectónico de Colombia (Banco de la República, Bol. grafico 7, febrero de 1947).

$$A = +\cdot1822, B = -\cdot9832, C = +\cdot0138; \quad \delta = +7; \quad h = +7;$$

$$D = -\cdot983, E = -\cdot182; \quad G = +\cdot003, H = -\cdot014, K = -1\cdot000.$$

		Δ	Az.	P.	O-C.	S.	O-C.	Supp.	I.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Bogota		6·6	55	i 1 55	P*	i 3 11	+13	i 3 37	—
Balboa Heights		8·1	0	i 2 3	+ 1	i 3 28	- 7	—	e 4·1
Huancayo		13·4	162	i 3 18	+ 4	i 5 36	- 9	—	i 6·1
Port au Prince		19·0	22	i 4 36	+10	i 8 16	SS	4 56	e 11·5
La Paz		20·5	147	i 4 42	0	i 8 38	+11	—	11·5
San Juan		21·9	36	i 4 57	0	i 9 1	+ 7	i 10 5	SS (i 10·1)
Merida	N.	22·3	335	i 5 7	+ 6	—	—	—	—
Fort de France		22·8	53	e 4 55?	-10	i 8 10?	-61	—	e 10·7
Vera Cruz	Z.	24·5	320	i 5 28	+ 6	—	—	—	—
Tacubaya	E.	26·7	315	e 5 47	+ 4	—	—	—	—
Columbia		33·1	358	e 6 40	0	i 11 58	- 1	—	e 14·2
Bermuda		34·4	24	i 6 50	- 1	i 12 1	-18	i 8 1	PP i 14·1
St. Louis		38·9	347	e 7 25	- 4	i 13 40	+12	9 2	PP
Florissant		39·1	347	e 7 28	- 3	i 13 26	- 5	i 9 5	PP
New Kensington		39·6	359	e 8 18	?	i 13 22	-16	—	i 26·7
Fordham		40·2	8	i 7 44	+ 4	i 13 51	+ 3	i 16 58	SSS e 20·0
La Plata	E.	40·9	153	7 40	- 6	13 48	-10	17 1	SSS 21·7
Chicago	Z.	40·9	153	7 43	- 3	14 7	+ 9	—	24·6
Buffalo		41·5	350	e 7 53	+ 3	i 13 58	- 9	(e 16 55)	SS e 16·9
		41·9	1	i 7 44	-10	—	—	9 35	PP
Harvard		42·1	9	i 7 55	0	—	—	—	e 25·4
Rio de Janeiro	E.	42·4	126	7 55	- 3	i 14 31	+11	i 17 36	SS 21·5
	N.	42·4	126	7 55	- 3	i 14 36	+16	i 17 33	SS 21·7
Lincoln		42·8	341	—	—	e 14 21	- 5	—	e 26·9
Tucson		43·0	320	i 8 1	- 2	i 14 31	+ 2	e 9 49	PP e 19·0
Ottawa		44·5	4	8 13	- 2	14 49	- 2	10 0	PP 22·9
Halifax		45·9	16	—	—	e 15 2	- 9	—	23·9
Shawinigan Falls		46·0	8	8 24	- 3	15 1	-11	18 37	SS 23·9
Seven Falls		46·8	9	8 31	- 2	15 23	- 1	18 37	SS 23·9
La Jolla		47·7	316	e 8 44	+ 4	—	—	—	—
Palomar		47·7	317	i 8 39	- 1	e 15 41	+ 5	i 8 44	? —
Rapid City		48·0	338	i 8 41	- 2	i 15 42	+ 1	e 10 28	PP e 20·0
Riverside		48·4	317	e 8 44	- 2	e 15 48	+ 2	e 10 46	PP —
Mount Wilson		49·0	317	i 8 48	- 2	e 16 1	+ 6	i 8 53	? —
Pasadena		49·1	317	e 8 49	- 2	i 15 58	+ 2	e 10 51	PP e 23·6
Salt Lake City		49·4	328	e 9 0	+ 7	i 16 1	+ 1	10 52	PP e 19·7
Haiwee		50·1	320	e 9 3	+ 4	—	—	—	—
Logan		50·1	330	e 8 58	- 1	e 16 1	- 9	e 10 57	PP e 24·7
Santa Barbara		50·3	317	e 9 1	+ 1	e 16 16	+ 3	—	—
Tinemaha		50·8	320	e 9 2	- 2	e 16 25	+ 5	i 11 2	PP —
Bozeman		52·6	333	e 9 19	+ 1	i 16 45	+ 1	e 11 20	PP e 26·1
Santa Clara		53·4	318	e 9 33	+ 9	i 16 59	+ 4	—	e 26·6
Berkeley		53·9	318	e 9 28	+ 1	e 17 2	0	e 20 58	SS e 27·0
Ukiah		55·2	319	e 9 31	- 6	21 25	SS	11 58	PP e 23·8
Saskatoon		56·0	340	9 50	+ 7	17 31	+ 1	e 19 25	SeS 23·9
Victoria		60·7	329	10 23	+ 8	18 34	+ 2	—	— 26·9
Sitka		71·7	332	e 11 22	- 4	i 20 44	- 1	e 14 3	PP e 34·0
Lisbon		74·2	50	11 41 _a	+ 1	21 31	+17	14 21	PP 34·9
San Fernando	E.	76·1	53	11 56	+ 5	21 56	+21	16 52	PPP 35·9
Malaga		77·6	52	i 11 59 _k	- 1	22 6	+15	i 14 58	PP 37·0
Granada		78·3	52	i 12 4 _k	+ 1	i 22 4	+ 5	15 15	PP 35·1
Honolulu		78·7	292	—	—	e 22 6	+ 3	e 27 42	SS 34·3
College		80·2	337	13 6	?	e 23 12	+53	e 27 43	SS 32·2
Edinburgh		81·7	34	e 12 25	+ 3	—	—	—	—
Stonyhurst		81·7	36	i 12 24	+ 2	e 22 39	+ 5	i 15 36	PP 38·8

Continued on next page.

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		Δ	Az.	P.		O-C.	S.		O-C.	Supp.		L.
				m.	s.		m.	s.		m.	s.	
Tortosa	E.	81.9	49	e 12	23	0	i 22	55	+19	12 43	PcP	—
	N.	81.9	49	—	—	—	22	43	[+ 3]	23 9	SKKS	34.2
Kew		82.6	38	i 12	28 _a	+ 2	i 23	1	+18	e 15 38?	PP	e 39.9
Barcelona		83.2	48	e 12	28	- 1	e 22	58	+ 9	—	—	—
Paris		84.1	41	i 12	36	+ 2	e 23	15	+17	15 5?	PP	e 38.9
Clermont-Ferrand		84.3	44	i 12	36	+ 1	e 23	5	+ 5	—	—	e 41.6
Uccle		85.5	39	i 12	42 _a	+ 1	i 23	14	+ 2	16 18	PP	e 39.9
Bergen		86.7	29	12	47	0	23	22	- 2	e 16 5	PP	e 39.9
Neuchatel		87.0	43	e 12	48	0	e 23	28	+ 1	—	—	—
Basle		87.4	42	12	47	- 2	e 23	27	- 3	12 55	?	—
Strasbourg		87.6	41	e 13	2	+11	e 23	35	+ 3	—	—	42.9
Zürich		88.1	43	e 12	52	- 2	e 23	42	+ 5	—	—	—
Milan	E.	88.5	45	13	17	+21	23	26	[+ 2]	—	—	—
Chur		88.8	43	e 12	57	0	e 23	46	+ 2	—	—	—
Jena		90.1	39	13	7	+ 4	e 23	55	0	—	?	e 44.9
Copenhagen		90.5	34	13	6	+ 1	24	3	+ 4	16 40	PP	—
Potsdam		90.9	37	e 13	10	+ 3	e 23	40	[+ 2]	e 16 39	PP	e 39.9
Prague		91.9	40	e 13	2	- 9	e 23	37	[- 7]	16 21	PP	38.9
Upsala	E.	92.9	30	e 16	55?	PP	e 24	3	{ 0}	25 55?	PS	—
	N.	92.9	30	—	—	—	24	13	- 7	e 27 32	?	—
Sofia		98.9	47	16	55	?	e 24	25	[+ 3]	e 17 55	PP	—
Bucharest		100.6	44	17	55?	PP	—	—	—	—	—	49.9
Wellington		102.3	228	18	3	PKP	24	45	[+ 7]	18 40	PP	46.9
Auckland		103.0	232	17	55?	PP	25	55?	{+39}	—	—	44.9
Christchurch		103.5	225	e 22	5	PPP	e 24	47	[+ 3]	32 52	SS	47.6
Helwan		107.6	58	e 14	29	P	e 28	13	PS	16 49	PP	—
Ksara		110.4	53	e 19	26	PP	e 29	10	PS	—	—	—
Sydney		122.3	229	23	55	PPP	—	—	—	—	—	—
Riverview		122.4	229	i 20	42	PP	e 28	48	{+78}	e 30 29	PS	57.0
New Delhi	N.	143.2	35	e 19	32	[- 4]	29	36	{- 4}	22 48	PP	—
Bombay		146.5	53	19	47	[+ 5]	29	55?	{- 4}	23 10	PP	—
Calcutta	N.	154.0	26	e 20	19	[+26]	i 30	59	{+19}	i 34 15	SKSP	—
Kodaikanal	E.	154.6	63	e 24	48	?	35	48	PPS	i 32 8	PcSSKP	—
Colombo		158.1	70	e 51	55	SSS	—	—	—	—	—	72.9

Additional readings :—

Bogota i = 1m.59s., iS_g = 3m.57s.
 Port au Prince PPP = 5m.7s., SS = 8m.36s.
 San Juan i = 5m.6s. and 6m.1s.
 St. Louis iZ = 9m.14s., iSSE = 16m.3s.
 Florissant iPZ = 7m.31s., iScP?E = 13m.12s.
 La Plata SN = 13m.44s., PS?E = 15m.5s., SSSN = 16m.58s., EN = 19m.19s.
 Chicago eS = 13m.36s.
 Tucson i = 8m.6s., and 9m.8s., iScS = 17m.55s.
 Ottawa SS = 18m.7s.
 Palomar iEZ = 8m.48s.
 Rapid City e = 10m.55s., eS = 15m.30s., e = 19m.22s.
 Riverside i = 8m.53s.
 Pasadena i = 8m.54s., i = 8m.58s., ePcSZ = 14m.4s., eZ = 15m.26s., eSSEN = 19m.34s.
 Logan i = 9m.29s., e = 19m.27s.
 Tinemaha iNZ = 9m.7s., i = 9m.11s.
 Bozeman e = 20m.29s.
 Berkeley eQ = 23m.40s.
 Ukiah e = 18m.0s.
 Sitka eSS = 25m.21s.
 Lisbon PEZ = 11m.46s., E = 21m.58s.
 San Fernando PSE = 23m.7s.
 Malaga PcP = 12m.3s., PPP = 16m.54s., PS = 22m.50s., SS = 27m.18s.
 Granada PcP = 12m.18s., pP = 12m.47s., pPP = 15m.47s., PS = 22m.49s., SS = 23m.42s.
 Stonyhurst eSKS = 22m.49s., iPS = 23m.25s.
 Kew ePPPZ = 17m.48s., eSKSN = 22m.44s., ePSE = 24m.9s., ePPSZ = 24m.28s., eSSE = 29m.8s., eSSSZ = 32m.25s.?, eQEN = 35.9m.
 Bergen SE = 23m.27s.
 Jena eN = 13m.10s., eS?E = 23m.47s.
 Copenhagen 23m.38s. and 25m.16s.
 Potsdam eSKSN = 24m.11s., iSN = 24m.22s., iSE = 24m.27s.
 Prague eSKS = 23m.19s., ePS = 24m.21s., eSS = 30m.13s., eSSS = 34m.7s.
 Upsala eN = 31m.55s.?, eE = 34m.55s.?
 Sofia eN = 25m.25s., eE = 26m.55s.

Continued on next page.

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Wellington SPZ = 27m.5s., Q = 42.9m.
 Christchurch c = 27m.37s., cEN = 29m.29s., SSZ = 36m.59s., SSSZ = 40m.38s., Q = 42m.43s.
 Helwan PPPZ = 21m.16s.
 Riverview iE = 20m.58s., iPKSZ = 22m.8s., eE = 24m.16s., eN = 24m.23s., and 28m.42s.
 New Delhi SKSN = 26m.23s., PSKN = 32m.48s., PPSN = 35m.20s., SSN = 41m.34s.
 Bombay PPN = 23m.15s., iN = 30m.11s., SKSPE = 33m.25s., SSE = 42m.2s., SSSE = 47m.53s.
 Long waves were also recorded at Tananarive and Arapuni.

Oct. 23d. Readings also at 1h. (near Andijan), 4h. (Riverview, Auckland, Pasadena, Palomar, Riverside, Mount Wilson, Tinemaha, and Tucson), 5h. (Pasadena, Palomar, Mount Wilson, Riverside, Tinemaha, Tucson, Riverview, Arapuni, Auckland, and Wellington), 6h. (Bogota and Calcutta), 7h. (Palomar, Mount Wilson, Tinemaha, Riverside Tucson, and near Apia), 8h. (near Bogota), 10h. (New Delhi, Stalinabad, Tashkent, Almata, near Tchimbent, Frunse, and Andijan), 12h. and 15h. (Riverview), 17h. (Christchurch, Wellington, Auckland, and Riverview), 18h. (near Harvard), 22h. (Helwan (2), Ksara (2), Palomar, Tinemaha, and Tucson), 23h. (Riverview, Auckland, Andijan, and near Stalinabad).

Oct. 24d. 0h. 27m. 42s. Epicentre 0°·8N. 79°·5W. (as on 23d.).

A = +·1822, B = -·9832, C = +·0138; $\delta = +7$; $h = +7$;

	Δ	Az.	P.	O—C.	S.	O—C.	Supp.	L.
	m.	s.	m. s.	s.	m. s.	s.	m. s.	m.
Bogota	6.6	55	i 1 46	+ 5	i 3 13	S*	i 3 40	—
Balboa Heights	8.1	0	i 2 1	- 1	i 3 26	- 9	—	—
Huancayo	13.4	162	3 18	+ 4	i 5 18	- 27	—	i 6.2
La Paz	z. 20.5	147	i 4 45 _a	+ 3	—	—	—	11.8
San Juan	21.9	36	i 4 55	- 2	i 8 55	+ 1	—	11.9
Fort de France	22.8	53	e 4 18	- 47	e 8 33	- 38	—	—
Tacubaya	E. 26.7	315	e 5 42	- 1	—	—	—	—
La Plata	z. 40.9	153	12 28	PS	—	—	—	26.3
Harvard	42.1	9	i 7 53	- 2	—	—	—	—
Tucson	43.0	320	i 8 2	- 1	—	—	i 8 9	?
Palomar	47.7	317	i 8 40	0	—	—	i 8 48	?
Riverside	z. 48.4	317	i 8 44	- 2	—	—	—	—
Mount Wilson	49.0	317	i 8 50	0	—	—	i 10 21	PP
Pasadena	49.1	317	e 8 47	- 4	—	—	i 8 50	?
Haiwee	50.1	320	e 9 2	+ 3	—	—	—	—
Santa Barbara	50.3	317	e 9 4	+ 4	—	—	—	—
Tinemaha	50.8	320	9 3 _a	- 1	—	—	9 11	?
Malaga	77.6	52	12 1 _k	+ 1	—	—	i 14 57	PP
Granada	78.3	52	i 12 4 _a	+ 1	—	—	e 15 1	PP
Clermont-Ferrand	84.3	44	i 12 36	+ 1	—	—	—	—
Neuchatel	87.0	43	e 12 53	+ 5	—	—	—	—
Basle	87.4	42	e 12 50	0	—	—	—	—
Zürich	88.1	43	e 12 49 _a	- 5	—	—	—	—

Additional readings:—

Pasadena iZ = 8m.56s.

Tinemaha iZ = 10m.22s.

Malaga P_cP = 12m.10s.

Granada P_cP = 12m.14s., pP = 12m.45s.

Long waves were also recorded at Wellington and Arapuni.

Oct. 24d. Readings also at 2h. (near Malaga), 3h. (Riverview), 4h. (Bogota and La Paz), 5h. (Bombay and Calcutta), 7h. (Tucson, Palomar, Riverside, Mount Wilson, Tinemaha, Pasadena, and near Apia), 9h. (Bogota and near Andijan), 10h. (Tacubaya (2)), 12h. (Mount Wilson, and Palomar), 15h. (La Paz), 17h. (Copenhagen and Kew),

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Oct. 25d. 22h. 13m. 50s. Epicentre $37^{\circ}7'N$, $141^{\circ}8'E$. Depth of focus 0.010
(as on 1942 Feb. 21d.).

Intensity VI at Tsushima, Hukusima; IV at Utunomiya, Onahama, Sendai, Mito, Kakioka, Miyako; III at Titibu, Hatinohe.
Epicentre $37^{\circ}7'N$, $141^{\circ}9'E$. Shallow. Macroseismic radius greater than 300km.
Seismological Bulletin of the Central Meteorological Observatory, Japan, for the year 1944.
Tokyo 1951, p. 23, Macroseismic chart p. 23.

A = -0.6234, B = +0.4905, C = +0.6090; $\delta = +10$; $h = -1$;
D = +0.618, E = +0.786; G = -0.479, H = +0.377, K = -0.793.

	Δ	Az.	P.	O—C.	S.	O—C.
	$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.
Sendai	0.9	309	0 18k	- 1	0 30	- 4
Hukusima	1.1	273	0 14k	- 8	0 28	-10
Onahama	1.1	223	0 14	- 8	0 27	-11
Mizusawa	E. 1.5	343	0 26	- 1	0 45	- 2
Mito	1.7	219	0 28	- 1	0 47	- 4
Kakioka	1.9	221	0 30k	- 2	0 52	- 3
Miyako	1.9	4	0 32	0	0 54	- 1
Morioka	2.0	347	0 33a	0	0 57	0
Tukubasan	2.0	222	0 33	0	0 55	- 2
Akita	2.4	326	0 40	+ 2	1 7	0
Kumagaya	2.5	231	0 39	- 1	1 7	- 3
Tokyo	2.6	219	0 39	- 2	1 7	- 5
Maebasi	2.6	239	0 40	- 1	1 10	- 2
Yokohama	2.8	217	0 45	+ 1	1 15	- 2
Hatinohe	2.8	356	0 47	+ 3	1 19	+ 2
Aikawa	2.8	276	0 38	- 6	1 9	- 8
Nagano	3.0	247	0 48	+ 1	1 23	+ 1
Aomori	3.2	346	0 50	0	1 28	+ 1
Mera	3.2	210	1 6	+16	2 10	SSS
Hunatu	3.3	228	0 50	- 1	1 30	- 1
Misima	3.5	223	0 52	- 2	1 27	- 7
Toyama	3.8	258	1 0	+ 2	1 54	+12
Shizuoka	3.9	226	0 55	- 4	1 36	- 8
Wazima	3.9	267	1 0	+ 1	1 42	- 2
Omaesaki	4.2	224	0 55	- 8	1 38	-13
Mori	4.5	348	1 7	0	—	—
Nagoya	4.7	237	1 10	0	1 58	- 6
Hikone	5.1	243	1 20	+ 4	2 22	+ 8
Sapporo	5.3	356	2 19	S	(2 19)	+ 1
Kyoto	5.6	243	1 30	+ 8	—	—
Kobe	6.2	243	1 50	+20	2 57	+16
Sumoto	6.5	241	1 31	- 4	2 40	- 8
Hukuoka	10.1	250	2 39	+15	—	—
Tinemaha	z. 75.1	54	i 11 36	+ 3	—	—
Pasadena	z. 77.0	56	i 11 45	+ 1	—	—
Mount Wilson	z. 77.0	56	i 11 47	+ 3	—	—
Riverside	z. 77.6	56	i 11 47	0	—	—
Palomar	z. 78.3	57	i 11 53	+ 2	—	—
Tucson	82.9	54	i 12 19	+ 4	—	—

Tinemaha also gives $iZ = 11m.47s$.

Oct. 25d. Readings also at 3h. (near La Paz), 4h. (near Andijan), 6h. (Tinemaha, Palomar, Tucson, and Mount Wilson), 7h. (Tucson, Tinemaha, Riverside, and Tacubaya), 13h. (near Basle), 19h. (Fort de France).

Oct. 26d. Readings at 1h. (Mount Wilson, Riverside, Tinemaha, Palomar, Tucson, and St. Louis), 2h. (Pasadena, Mount Wilson, Riverside, Tucson, Tinemaha, and Palomar), 3h. (Bogota), 5h. and 6h. (Riverview), 8h. (near Mizusawa and near Andijan (2)), 18h. (Riverview and Christchurch), 19h. (Kew, Tashkent, and near Ksara), 20h. (near Zürich, Basle, and near Stalinabad), 22h. (Tucson),

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Oct. 27d. Readings at 0h. (Balboa Heights and near Stalinabad (2)), 1h. (near Stalinabad), 6h. (Tucson (2)), 8h. (Pasadena, Mount Wilson, Riverside, Palomar, Tucson, and Bogota), 9h. (Palomar, Riverside, Mount Wilson, Pasadena, Tucson, Tinemaha, and near Balboa Heights), 10h. (near Alicante), 11h. (Bucharest and Sofia), 12h. (Tucson), 13h. (Basle, Tinemaha, Palomar, Tucson, near Fort de France (2), and near Alicante), 16h. (near Ksara), 19h. (Riverview, Auckland, and Ottawa), 20h. (near Ksara).

Oct. 28d. 4h. 1m. 33s. Epicentre $31^{\circ}0'N$, $116^{\circ}0'W$. (as given by Pasadena).

A = -0.3764, B = -0.7718, C = +0.5125; $\delta = +1$; $h = +2$;
D = -0.899, E = +0.438; G = -0.225, H = -0.460, K = -0.859.

	Δ °	Az. °	P. m. s.	O—C. s.	S. m. s.	O—C. s.	Supp. m. s.	L. m.
La Jolla	2.1	330	i 0 37	0	i 1 4	0	—	—
Palomar	2.5	342	i 0 39	- 4	i 1 9	- 5	—	—
Riverside	3.2	339	i 0 54	+ 2	i 1 31	- 1	—	—
Pasadena	3.6	331	i 0 59	+ 1	i 1 46	+ 4	—	—
Mount Wilson	3.8	331	e 1 0	- 1	i 1 55	+ 8	—	—
Tucson	4.6	72	i 1 5	- 7	i 2 3	- 4	i 1 25	P* i 2.4
Haiwee	5.4	343	e 1 26	+ 2	i 2 37	+ 9	—	—
Tinemaha	6.4	343	e 1 34	- 4	i 3 10	S*	—	—

Tucson gives also $l = 1m.16s$.

Oct. 28d. 18h. 30m. 13s. Epicentre $33^{\circ}9'N$, $116^{\circ}7'W$. (as on June 12d.).

Felt at Riverside, Thermal, and Lake Arrowhead.
Epicentre $33^{\circ}58'N$, $116^{\circ}45'W$. (Pasadena).

A = -0.3737, B = -0.7431, C = +0.5552; $\delta = +10$; $h = +1$;
D = -0.893, E = +0.449; G = -0.249, H = -0.496, K = -0.832.

	Δ °	Az. °	P. m. s.	O—C. s.	S. m. s.	O—C. s.	Supp. m. s.	L. m.
Riverside	0.5	280	i 0 14 _a	0	i 0 21	- 2	—	—
Palomar	0.6	194	i 0 17 _k	+ 2	—	—	—	—
La Jolla	1.1	204	i 0 26 _k	+ 4	i 0 41	+ 2	—	—
Mount Wilson	1.2	287	i 0 24 _a	0	i 0 39	- 2	—	—
Pasadena	1.3	282	i 0 25 _a	0	i 0 40	- 4	—	—
Haiwee	2.5	335	e 0 41	- 2	i 1 19	+ 5	—	—
Santa Barbara	2.6	282	i 0 44	0	—	—	—	—
Tinemaha	3.4	339	i 0 56	+ 1	i 1 48	S*	—	—
Tucson	5.2	107	i 1 21	0	i 2 42	S*	i 1 45	P ₂ e 2.8

Oct. 28d. Readings also at 1h. (near Malaga), 4h. (Tinemaha, Haiwee, Mount Wilson, Pasadena, Riverside, Palomar, Tucson, La Paz and La Plata), 7h. (near Mizusawa and near Andijan), 9h. (near Bogota), 10h. (Christchurch, Brisbane, Sydney, Riverview, Auckland, and near La Paz), 12h. (Almata and near Andijan), 14h. (near La Paz), 17h. (near Andijan), 20h. (Bombay, Calcutta, and New Delhi), 22h. (La Plata), 23h. (Bombay, Calcutta, New Delhi, Tashkent, and Almata).

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Oct. 29d. 0h. 11m. 30s. Epicentre 31°·3N. 83°·4E. (as on 17d.).

A = +·0984, B = +·8503, C = +·5170; $\delta = -2$; $h = +1$;

		Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Dehra Dun	N.	4·7	259	1 45	P _r	2 52	S _r	2 5	—
New Delhi	N.	6·0	245	i 1 35 _a	+ 3	2 52	+ 9	1 57	—
Calcutta	N.	9·8	152	i 2 35 _a	+11	i 4 17	0	—	—
Andijan		13·0	319	e 3 8	- 1	5 32	- 3	—	—
Hyderabad	N.	14·5	199	3 23	- 5	5 57	-14	—	—
Tashkent		15·1	315	e 3 32	- 4	6 22	- 3	—	—
Bombay		15·6	220	e 3 36	- 7	i 6 20	-17	3 57	PP
Irkutsk		26·0	30	—	—	e 6 55?	PPP	—	—
Hukuoka		39·5	47	7 35	+ 1	13 32	- 5	—	—
Kumamoto		39·9	75	e 7 45	+ 8	—	—	—	—
Ksara		39·9	286	e 7 43?	+ 6	e 13 52	+ 9	—	—
Moscow		40·2	322	i 7 41	+ 1	i 13 35	-13	—	—
Kôti		42·0	74	e 7 59	+ 5	14 15	+ 1	—	—
Kobe		43·2	71	e 8 7	+ 3	14 29	- 3	—	—
Nagoya		44·5	70	e 8 30?	+15	—	—	—	—
Helwan		44·5	282	8 15	0	14 50	- 1	8 48	pP
Nagano		45·2	68	e 8 23	+ 3	—	—	—	—
Misima		46·1	70	8 31	+ 3	15 16	+ 2	—	—
Bucharest		46·2	304	e 8 34?	+ 6	e 15 20	+ 5	e 10 19	PP
Kumagaya		46·3	69	e 8 49	+20	15 12	- 4	—	—
Kakioka		46·9	68	e 8 32	- 2	—	—	—	—
Sofia		48·4	301	e 8 38	- 8	e 15 50	+ 4	e 10 44	PP
Upsala		51·4	325	i 9 9	0	e 16 25?	- 3	e 11 2	PP
Potsdam		54·2	315	e 9 30	+ 1	e 19 0?	S _c S	e 12 17	PPP
Copenhagen		54·2	319	e 9 29	0	17 2	- 4	11 33	PP
Cheb		54·9	313	e 9 36	+ 1	e 17 23	+ 7	e 11 40	PP
Jena		55·3	313	e 9 36	- 2	e 17 20	- 1	e 10 42	P _c P
Chur		57·4	309	e 9 47	- 6	e 19 44	S _c S	—	—
Bergen		57·6	326	e 9 53	- 1	e 18 13	PPS	—	—
Zürich		57·9	310	e 9 54	- 2	e 19 39	S _c S	—	—
Strasbourg		58·2	312	e 10 0	+ 2	—	—	—	—
Basle		58·5	310	e 9 58	- 2	e 20 4	S _c S	—	—
Neuchatel		59·1	310	e 11 44	PP	—	—	—	—
Uccle		59·8	315	e 9 30?	-39	e 18 28	+ 8	—	—
Tananarive	E.	60·6	220	—	—	e 24 45	SSS	—	—
Paris		61·5	312	e 10 19	- 2	e 19 15?	PPS	e 14 11	PPP
Clermont-Ferrand		62·0	309	e 10 23	- 1	e 19 25	PPS	—	—
Kew		62·5	316	e 10 27?	- 1	e 26 0	SSS	e 24 30?	?
Edinburgh		62·9	321	e 24 30	?	—	—	—	—
Stonyhurst		63·1	319	—	—	i 19 24	PS	—	—
Barcelona		64·0	305	e 10 33	- 5	e 19 10	- 3	—	—
Tortosa	N.	65·4	304	—	—	(e 23 30?)	SS	—	—
Granada		69·7	302	i 11 12 _a	- 2	e 20 10	-12	i 20 52	sS
Malaga		70·5	302	i 11 17 _k	- 1	20 33	+ 1	11 37	pP
San Fernando		71·9	302	—	—	20 41	- 7	21 18	PS
College		76·2	20	—	—	e 22 9	PS	—	—
Sitka		85·7	20	e 16 45	?	e 23 20	+ 6	—	—
Riverview		91·0	130	i 13 10	+ 3	i 24 6	+ 3	i 16 52	PP
Victoria		97·0	18	—	—	e 23 54	[-18]	—	—
Seven Falls		98·6	342	—	—	e 32 6	SSP	—	—
Ottawa		101·3	345	—	—	e 24 30	[- 3]	—	—
Fordham		105·2	342	—	—	e 24 52	[+ 1]	e 27 56	PS
Philadelphia		106·4	343	—	—	e 24 56	[- 1]	—	—
Tinemaha		109·0	18	e 18 32	[+ 1]	e 33 44	SKKP	e 18 55	PP
Florissant		110·0	355	e 19 9	PP	e 25 14	[+ 2]	e 28 35	PS
St. Louis		110·2	355	—	—	i 25 14	[+ 1]	i 28 37	PS
Mount Wilson	z.	111·8	19	e 18 38	[+ 1]	—	—	e 29 57	PKKP
Pasadena		111·8	19	e 18 42	[+ 5]	e 28 24	PS	e 19 0	PP
Riverside	z.	112·2	19	e 18 36	[- 2]	—	—	e 29 28	PKKP
Palomar	z.	112·9	18	i 18 39	[0]	—	—	i 29 31	PKKP

Continued on next page.

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	Δ	Az.	P.	O-C.	S.	O-C.	Supp.	I.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Tucson	115.4	13	1 18 43	[- 1]	—	—	e 29 18 PS	c 64.2
San Juan	122.6	325	e 20 22	PP	e 26 3	[+ 5]	e 30 23 PS	c 50.3
La Paz	150.2	293	1 19 56a	[+ 8]	—	—	43 39 SSP	73.5

Additional readings :

Dehra Dun $S_e N = 3m.11s.$

New Delhi $P_e = 2m.14s., S^* = 3m.12s., S_e = 3m.34s.$

Bombay SSE = 6m.35s., SSN = 6m.39s., SSSE = 6m.51s., SSSN = 6m.54s.

Helwan $P_e PZ = 9m.54s., PPZ = 10m.0s., PPPZ = 11m.2s., SS?Z = 16m.0s., SSN = 18m.24s.$

Bucharest eN = 8m.47s., 10m.0s., and 11m.5s., eEN = 18m.24s.

Sofia eE = 14m.7s., eSE = 18m.39s.

Upsala $P?N = 9m.18s., PPPE = 11m.54s., ePPPN = 11m.59s., eE = 19m.2s., iN = 19m.8s., eSS = 20m.25s.?, eSSSN = 21m.55s.$

Copenhagen 12m.40s., 17m.30s., 19m.23s., and 21m.22s.

Cheb eSS = 21m.0s.

Jena eP?N = 9m.40s.

Kew eZ = 3m.25s.?, eN = 28m.30s.?

Malaga iPP = 13m.50s., PPP = 15m.51s.

San Fernando SSE = 26m.7s.

Riverview iSKSEN = 23m.38s., iPSEZ = 25m.11s., iPSN = 25m.15s., iSS?N = 30m.10s., iSSE = 30m.20s., eN = 35m.0s.

Fordham e = 26m.32s., 29m.8s., and 52m.50s.

Tinemaha ePKKPEZ = 29m.49s.

Florissant eN = 24m.51s., eSKKSE = 26m.8s., eS?E = 26m.45s.,

St. Louis eSKKSN = 26m.12s., eSE = 26m.43s., eN = 28m.20s., eE = 28m.59s., ePPSN = 29m.37s., ePKKP?Z = 29m.44s., eN = 29m.58s., ePPSN = 30m.25s.

Palomar iZ = 19m.9s.

San Juan e = 30m.6s.

Long waves were also recorded at Christchurch, Auckland, Wellington, La Plata, Huancayo, and at other American stations.

Oct. 29d. 0h. 40m. 14s. Epicentre $40^{\circ}8S, 175^{\circ}5E$. Focus at base of Superficial Layers. (as given by Wellington).

Intensity V at the epicentre. Depth greater than 40kms.

R. C. Hayes

"Earthquakes in New Zealand during the year 1944," Dominion Observatory Bulletin S-77, New Zealand Journal of Science and Technology, vol. 27 No. 1, (Sec. B), 1945, p. 35, map of epicentres p. 33.

$$A = -.7569, B = +.0596, C = -.6509; \quad \delta = +12; \quad h = -2;$$

$$D = +.078, E = +.997; \quad G = +.649, H = -.051, K = -.759$$

	Δ	Az.	P.	O-C.	S.	O-C.
	°	°	m. s.	s.	m. s.	s.
Bunnythorpe	0.5	9	0 9	- 1	0 16	- 2
Wellington	0.7	229	0 21	+ 8	0 36	+13
New Plymouth	2.0	328	0 32	0	0 55	- 1
Tuai	2.4	32	0 31	- 7	0 54	-12
Christchurch	3.5	217	—	—	1 39	+ 5
Kaimata	3.5	240	—	—	1 43	+ 9
Auckland	4.0	352	—	—	1 29	-18

Oct. 29d. Readings also at 0h. (Calcutta, New Delhi, Bucharest, Sofia, and near Istanbul), 1h. (Bombay and Tashkent), 3h. (Bombay and Calcutta), 4h. (Tashkent, Almata, Bombay, New Delhi, and near Calcutta (2)), 6h. (Calcutta), 7h. (Bombay, Mount Wilson, Tinemaha Pasadena, Riverside, Palomar, and Tucson), 8h. (Calcutta, Auckland, Riverview, and Mizusawa), 13h. (Bombay), 14h. (Basle, Bombay, and Riverview), 15h. (Prague, Uccle, Bergen, Upsala, Helwan, Bombay, Hyderabad, Calcutta, and New Delhi), 17h. (Uccle, Prague, Irkutsk, Tashkent, Andijan, Bombay (2), and New Delhi), 18h. (Riverview and near Apia), 21h. (Bombay and New Delhi).

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Oct. 30d. 5h. 32m. 57s. Epicentre 8°·1N. 42°·9W. Focus at base of Superficial Layers

A = +·7254, B = -·6740, C = +·1400; $\delta = +8$; $h = +7$;
D = -·681, E = -·733; G = +·103, H = -·095, K = -·990.

		Δ	Az.	P.	O—C.	S.	O—C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Fort de France		19·0	291	e 3 3?	-79	—	—	—	—
Rio de Janeiro	N.	30·8	180	c 13 3	SS	—	—	—	—
La Paz	Z.	34·9	225	i 7 17k	pP	12 28	+ 9	i 9 0	PPP
San Fernando	E.	43·7	44	—	—	14 29	- 2	—	—
Malaga		45·1	45	i 8 13	- 2	14 51	0	9 39	PcP
St. Louis		52·2	313	e 9 3	- 7	e 16 19	-12	i 9 15	pP
Florissant		52·4	313	—	—	e 16 22	-11	—	—
Stonyhurst		56·0	28	—	—	c 17 17	- 5	e 22 48	Q
Neuchatel		57·4	38	e 9 47	- 1	—	—	—	—
Zürich		58·5	38	e 9 56	+ 1	—	—	—	—
Cheb		61·9	36	22 3?	?	—	—	—	—
Tucson		67·1	301	i 10 51	- 1	—	—	i 11 0	pP
Palomar		72·2	302	c 11 24	+ 1	—	—	i 11 35	pP
Helwan	Z.	72·4	61	e 11 36	pP	—	—	e 14 16	PP
Riverside	Z.	72·7	303	i 11 26	0	—	—	11 37	pP
Haiwee	Z.	73·2	305	e 11 43	pP	—	—	—	—
Mount Wilson	Z.	73·2	303	i 11 30	+ 1	—	—	i 11 40	pP
Pasadena	Z.	73·3	303	i 11 30	0	—	—	i 11 41	pP
Tinemaha	Z.	73·5	306	e 11 30	- 1	—	—	e 11 41	pP

Additional readings:—

St. Louis eSSE = 19m.59s.

Tucson i = 11m.12s.

Palomar eZ = 11m.45s.

Riverside eZ = 12m.27s.

Mount Wilson iZ = 11m.50s.

Long waves were also recorded at San Juan, Bermuda, Huancayo, Kew, and Uccle.

Oct. 30d. Readings also at 4h. (Bombay and New Delhi), 6h. (Riverview), 10h. (near Mizusawa), 11h. (near Andijan), 18h. (Upsala, Bergen, Copenhagen, and Stonyhurst), 19h. (Almata, near Frunse, Tashkent, Stalinabad, and Andijan (2)).

Oct. 31d. 14h. Undetermined shock.

Helwan PZ = 44m.51s., P*Z = 45m.11s., S = 46m.15s., eE = 46m.27s., S₂N = 47m.4s.

Sofia ePEN = 45m.1s., eEN = 47m.12s.

Ksara eP = 45m.22s., eS? = 47m.4s.

Bucharest eEN = 45m.30s., eE = 47m.13s., eN = 47m.37s., eE = 48m.11s., eN = 48m.29s.

Belgrade eP? = 45m.53s., e = 47m.20s., 48m.48s., 49m.14s., and 50m.6s.

Chur eP = 46m.40s.

Zürich eP = 46m.46s., e = 50m.2s.

Basle eP = 46m.56s., e = 48m.59s.

Copenhagen iP = 47m.48s., S = 51m.50s., 52m.10s., L = 55m.

Kew eE = 52m.26s., 52m.35s., and 54m.4s., eLEN = 57m.

Long waves were also recorded at Potsdam and Upsala.

Oct. 31d. Readings also at 0h. (Bombay), 2h. (Fort de France), 5h. (Clermont-Ferrand), 6h. (Calcutta), 7h. (Potsdam, Belgrade, near Bucharest, Istanbul, and Sofia), 8h. (near Seven Falls, Shawinigan Falls, and Ottawa), 9h. (Palomar, Riverside, Tinemaha, Mount Wilson, Pasadena, Riverview, and Brisbane), 11h. (Bombay and Calcutta), 12h. (Bucharest and Sofia), 13h. (Cheb, La Paz, Tucson, Haiwee, Palomar, Riverside, Tinemaha, Mount Wilson, Pasadena, Riverview, Auckland, Christchurch, Wellington, and Apia), 17h. (near Ksara), 20h. (Kew, Pasadena (2), Mount Wilson, Tinemaha (2), Riverside (2), Palomar (2), and Tucson (2)).

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Nov. 1d. 12h. 1m. 19s. Epicentre 3°0S. 105°0E.

$$A = -.2585, B = +.9646, C = -.0520; \quad \delta = -2; \quad h = +7;$$

$$D = +.966, E = +.259; \quad G = +.013, H = -.050, K = -.999.$$

		Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Colombo		26.9	291	5 58	+13	10 48	+28	—	13.0
Calcutta	N.	30.2	329	e 7 14	PP	i 11 17	+ 4	i 12 8	—
Kodaikanal	E.	30.4	297	(e 6 11)	— 5	(e 11 11)	— 5	(12 41)	SS (14.9)
Bombay	E.	38.4	306	8 41	PP	15 49	SS	9 0	PPP
	N.	38.4	306	e 7 17	— 8	13 8	-12	16 17	SSS
Brisbane		51.9	124	i 9 12 _a	0	e 16 34	- 1	i 9 45	pP
Almata		52.5	335	e 9 20	+ 3	—	—	—	—
Andijan		52.8	329	e 9 19	0	i 16 49	+ 2	10 7	P _c P
Riverview		52.8	132	i 9 27 _a	+ 8	i 16 45	- 2	i 16 55	PS c 27.6
Sydney		52.8	132	—	—	c 15 23	?	—	—
Frunse		53.3	333	9 29	+ 6	17 3	+ 9	—	—
Tashkent		54.8	328	e 9 34?	0	i 17 14?	0	—	—
Irkutsk		55.1	359	e 9 36	0	i 17 39	PPS	—	—
Sverdlovsk		69.6	336	i 11 16	+ 3	i 20 26	+ 5	—	—
Ksara		74.5	306	e 11 29	-13	c 21 11	- 6	—	—
Helwan		77.4	301	e 11 51	- 7	21 33	-16	c 22 31	PS
Moscow		79.9	328	c 12 11	- 1	22 11	- 5	—	—
Bucharest		84.2	315	19 41?	?	28 41?	SS	—	—
Sofia		85.9	313	e 12 52?	+ 9	e 23 0	[- 7]	—	—
Tinemaha		127.8	43	i 19 11	[+ 3]	i 22 31	SKP	i 24 4	PPP
Santa Barbara		128.0	47	—	—	e 22 28	SKP	—	—
Haiwee		128.5	44	e 19 13	[+ 4]	i 22 34	SKP	—	—
Mount Wilson		129.3	47	i 19 14	[+ 3]	i 22 37	SKP	e 21 31	PP
Pasadena		129.3	47	e 19 13	[+ 2]	i 22 38	SKP	e 21 33	PP c 62.5
Riverside		129.9	47	i 19 15	[+ 3]	i 22 36	SKP	—	—
La Jolla	z.	130.6	48	—	—	e 22 38	SKP	—	—
Palomar		130.6	46	e 19 17	[+ 4]	i 22 41	SKP	—	—
Tucson		135.5	45	i 19 15	[- 7]	22 57	SKP	e 22 8	PP
St. Louis		141.1	19	i 19 32	[0]	e 41 28	SSP	i 19 49	pPKP e 64.2
La Paz	z.	159.5	200	20 0	[0]	—	—	24 20	PP 75.7
Bogota		178.1	330	c 20 20	[+ 8]	—	—	c 26 8	PP

Additional readings :—

Kodaikanal readings decreased by 3m.

Brisbane ePN = 9m.31s.

Riverview eSSE = 20m.17s., iE = 21m.7s., iN = 24m.41s.

Helwan PS?N = 22m.1s.

Tinemaha iEZ = 22m.50s.

Santa Barbara iZ = 22m.32s. and 22m.53s.

Haiwee iEZ = 22m.56s. and 23m.1s.

Mount Wilson iZ = 19m.26s., iEZ = 22m.59s.

Pasadena iZ = 19m.28s., eZ = 22m.32s., iEZ = 22m.57s.

Riverside iZ = 19m.30s., i = 22m.58s.

Tucson i = 23m.25s.

St. Louis iZ = 19m.44s., 19m.53s., and 20m.8s., ePPSSE = 42m.42s.

La Paz eZ = 40m.41s.

Long waves were also recorded at Auckland, Christchurch, Huancayo, and at other European stations.

Nov. 1d. Readings also at 3h. (Sofia), 11h. (New Delhi (2)), 12h. (near Irkutsk), 14h. (near Almeria, Alicante, and Malaga), 15h. (near Mizusawa), 19h. (near Malaga, Alicante, Almeria, and Toledo), 20h. (Brisbane), 22h. (Bucharest and near Andijan), 23h. (Bucharest and near Irkutsk).

Nov. 2d. Readings at 4h. (Riverview, La Paz, and Huancayo), 5h. (near Santa Clara), 9h. (Riverview, Auckland, Tinemaha, Riverside, Tucson, and Palomar), 10h. (Montezuma and near La Paz), 11h. (Harvard, Tucson, Pasadena, Mount Wilson, Riverside, Haiwee, Tinemaha, Palomar, Huancayo, and La Paz), 13h. (near Almata), 14h. (near Granada and near Andijan), 15h. (near Malaga), 18h. (Mount Wilson, Tucson, and Riverside), 20h. (near Apla).

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Nov. 3d. Readings at 5h. (Sitka), 6h. (St. Louis, Tucson, Palomar, Haiwee, Tinemaha, Riverside, Mount Wilson, Pasadena, Arapuni, Christchurch, Wellington, Auckland, and Riverview), 7h. (Huancayo), 8h. (Chur, Zürich, Bucharest, Sofia, and Ksara), 12h. (La Paz), 15h. (near Mizusawa), 18h. (near Ottawa), 22h. (Harvard).

Nov. 4d. Readings at 2h. (Bombay, Calcutta, and New Delhi), 4h. (Palomar and near La Paz), 7h. (Fort de France), 8h. (Tucson), 10h. (Clermont-Ferrand), 15h. (Tucson), 19h. (near Andijan).

Nov. 5d. 16h. Undetermined shock. Pasadena suggests deep focus.

Auckland P = 19m.0s., S = 20m.29s.
 Tuai P = 19m.5s., i = 19m.10s. and 19m.18s., S = 20m.38s., i = 20m.42s. and 20m.59s.
 New Plymouth P = 19m.26s. and S = 21m.15s.
 Wellington PZ = 19m.41s., SZ = 21m.40s., i = 22m.46s.
 Arapuni e = 20m.?
 Christchurch P = 20m.12s., S = 22m.34s., i = 22m.53s.
 Kaimata P? = 20m.12s., S = 22m.28s., i = 22m.47s.
 Brisbane eN = 23m.11s. and 25m.41s., cS?N = 27m.42s.
 Riverview eZ = 23m.3s., iE = 23m.6s., 24m.32s., and 25m.56s., iN = 26m.0s., iEN = 28m.1s., iZ = 28m.9s., iN = 28m.16s.
 Pasadena iP = 29m.14s.k.
 Mount Wilson iPZ = 29m.14s.k, iZ = 29m.29s., cZ = 31m.3s.
 Riverside iP = 29m.16s.k, iZ = 30m.44s.
 Palomar iP = 29m.16s.k.
 Haiwee iPEZ = 29m.22s.
 Tinemaha iPZ = 29m.24s.
 Tucson iP = 29m.32s., i = 30m.58s., c = 31m.34s.

Nov. 5d. Readings also at 0h. (Bogota), 6h. (St. Louis, Pasadena, La Jolla, Palomar, Haiwee, Mount Wilson, Riverside, Tinemaha, and Tucson), 8h. (Upsala, Alicante, and near Tucson), 10h. (near Mizusawa), 11h. (Tinemaha and Tucson), 12h. (near San Juan, Fort de France, Almata, near Tashkent, and Andijan), 19h. (Kodaikanal, New Delhi, Calcutta, and Bombay, Seven Falls, near Shawinigan Falls, and Ottawa).

Nov. 6d. 5h. 49m. 5s. Epicentre 31°·3N. 83°·4E. (as on October 29d.).

A = +·0984, B = +·8503, C = +·5170; $\delta = -2$; $h = +1$;
 D = +·993, E = -·115; G = +·059, H = +·514, K = -·856.

		Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.	
		°	°	m. s.	s.	m. s.	s.	m. s.	m.	
Dehra Dun	N.	4·7	259	1 33	+19	2 58	S _r	1 52	P _r	—
New Delhi	N.	6·0	245	i 1 34k	+ 2	i 3 17	S _r	2 0	P _r	—
Calcutta	N.	9·8	152	i 2 32	+ 8	i 4 21	+ 4	i 4 49	S _r	—
Andijan		13·0	319	e 3 3	- 6	—	—	—	—	—
Tashkent		15·1	315	3 28	- 8	i 6 10	-15	—	—	—
Bombay		15·6	220	i 3 42	- 1	6 37	0	4 5	PPP	—
Kodaikanal	E.	21·7	196	(i 4 55)	0	(i 8 55)	+ 4	—	—	(10·8)
Colombo		24·5	188	5 31	+ 9	—	—	—	—	—
Sverdlovsk		30·0	330	i 6 12	0	i 11 3	- 7	—	—	—
Ksara		39·9	286	e 7 37	0	c 13 47	+ 4	—	—	—
Vladivostok		39·9	59	i 7 35	- 2	e 13 29	-14	—	—	—
Moscow		40·2	322	i 7 42	+ 2	13 44	- 4	—	—	—
Helwan		44·5	282	8 13	- 2	14 49	- 2	e 10 2	PP	—
Upsala		51·4	325	—	—	e 19 55?	SS	e 21 55?	SSS	e 24·4
Prague		53·6	313	e 9 5	-20	e 16 49	- 9	e 20 37	SS	e 25·9
Potsdam	E.	54·2	315	—	—	c 21 19	SS	—	—	e 27·9
Copenhagen		54·2	319	e 9 27	- 2	17 6	0	—	—	—
Triest		54·7	307	i 16 11	?	i 21 33	?	i 16 33	?	—
Cheb		54·9	313	e 11 35	PP	c 17 14	- 2	c 20 53	SS	e 28·9
Uccle		59·8	315	—	—	c 18 14	- 6	—	—	e 29·9
Kew		62·5	316	e 18 51?	S	(e 18 51?)	- 3	e 25 33?	SSS	e 32·4
Granada		69·7	302	11 14k	0	20 53	PS	e 25 8	SS	36·1
Malaga		70·5	302	i 11 12k	- 6	—	—	—	—	36·9
Florissant		110·0	355	—	—	e 26 44	{ +39}	—	—	—
St. Louis		110·2	355	e 19 57	?	e 24 43	{ -30}	e 26 45	?	e 37·9
La Paz		150·2	293	i 19 49a	{ + 1}	—	—	20 43	PKP ₂	75·9

Continued on next page.

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NOTES TO NOVEMBER 6d. 5h. 49m. 5s.

Additional readings:—

New Delhi $P_g = 2m.26s.$, $S_g = 4m.22s.$, $P_cP = 8m.3s.$
 Calcutta $iP^*N = 3m.0s.$, $iP_gN = 3m.30s.$, $iS_gN = 5m.22s.$, $P_cPN = 8m.52s.$, $S_cSN = 16m.2s.$
 Bombay $iSEN = 6m.24s.$, $SSSN = 6m.46s.$, $SSSE = 6m.50s.$
 Kodaikanal readings increased by 4.5m.
 Helwan $eN = 18m.7s.$
 Granada $P_cP = 13m.1s.$, $PS = 21m.47s.$
 Long waves were also recorded at Aberdeen, Paris, Bergen, Chicago, Bermuda, and Huancayo.

Nov. 6d. Readings also at 3h. (near Mizusawa), 4h. (near San Juan), 5h. (New Delhi, Calcutta, and Bombay), 10h. (Bombay (2), Calcutta, and near Alicante), 11h. (Wellington and Arapuni), 12h. (near Alicante), 13h. (Calcutta, Colombo, Bombay, Tashkent, Almata, and Andijan), 17h. (Riverside, Mount Wilson, Tucson, Pasadena, St. Louis, Andijan, Riverview, and Brisbane), 22h. (near Andijan), 23h. (Calcutta, near Sofia, and near Bogota).

Nov. 7d. 9h. Undetermined shock. Pasadena suggests deep focus.

Brisbane $iPEZ = 42m.1s.a.$
 Auckland $P = 42m.30s.$, $S = 46m.10s.$, $L = 48m.$
 Riverview $iEN = 43m.11s.$, $eEN = 46m.58s.$, $eLE = 49.2m.$
 Sydney $e = 44.5m.$
 Wellington $S? = 47m.30s.$, $i = 47m.55s.$, $LE = 51m.?$
 Christchurch $SEN = 48m.15s.$, $cN = 50m.31s.$, $cE = 51m.19s.$, $eZ = 51m.55s.$, $L = 54m.3s.$
 Santa Barbara $iPZ = 51m.2s.$
 Pasadena $iPZ = 51m.4s.$
 Mount Wilson $iP = 51m.6s.a.$
 La Jolla $iPEZ = 51m.7s.$
 Riverside $iPZ = 51m.8s.a.$
 Palomar $iPEZ = 51m.10s.a.$, $iZ = 51m.28s.$
 Tinemaha $iP = 51m.12s.a.$
 Tucson $iP = 51m.30s.a.$
 Basle $eP = 57m.59s.$
 Chur $iP = 58m.0s.k.$
 Zürich $iP = 58m.1s.a.$

Nov. 7d. Readings also at 5h. (Pasadena, Mount Wilson, Riverside, Tinemaha, Palomar, Tucson, St. Louis, Cape Girardeau, Tacubaya, near Almata, and near Apia), 8h. (Clermont-Ferrant and near Alicante), 9h. (near Mizusawa), 10h. (near Bucharest and Sofia), 13h. (near Alicante (3)), 15h. (Sydney, Riverview, Auckland, near Apia, and near Alicante), 16h. (Wellington, Christchurch, Pasadena, Mount Wilson, Riverside, Palomar, Haiwee, Tinemaha, Tucson, Huancayo, La Paz, and near Johannesburg).

Nov. 8d. 20h. 30m. 25s. Epicentre $38^{\circ}9'N$. $112^{\circ}8'W$.

Epicentre $38^{\circ}52'N$. $112^{\circ}45'W$. (Lake Mead stations).

$A = -.3024$, $B = -.7193$, $C = +.6254$; $\delta = -4$; $h = -1$;
 $D = -.922$, $E = +.388$; $G = -.242$, $H = -.577$, $K = -.780$.

	Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Salt Lake City	2.0	21	e 0 36	+ 1	i 1 1	- 1	—	c 1.2
Tinemaha	4.7	248	i 1 25	P*	c 2 29	S*	—	—
Haiwee	5.0	237	—	—	c 2 35	S*	—	—
Riverside	z. 6.1	218	e 1 41	+ 7	i 3 11	S*	i 1 53	P*
Palomar	6.4	211	i 1 39	+ 1	i 3 17	S*	—	—
Pasadena	6.4	224	e 1 37	- 1	i 3 19	S*	—	—
Tucson	6.8	167	e 1 44	0	c 3 8	+ 5	i 2 14	P _e
Santa Barbara	7.1	233	—	—	e 3 24	+14	—	—

Tucson gives also $i = 1m.53s.$, $iS = 3m.11s.$

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Nov. 8d. Readings also at 1h. (near Erevan), 4h. (St. Louis, Palomar, Tucson, Huancayo, and near Bogota), 5h. (La Paz (2)), 6h. (St. Louis, Tucson, Palomar, Pasadena, Mount Wilson, Riverside, Haiwee, and College), 11h. (Bombay, Calcutta, and New Delhi), 12h. (near Basle, Neuchatel, Zürich, Chur, Triest, and Milan), 13h. (Mizusawa), 16h. (near Harvard), 18h. (near Andijan).

Nov. 9d. 19h. 39m. 40s. Epicentre $38^{\circ}0'N$. $48^{\circ}4'E$.

A = +.5245, B = +.5908, C = +.6131; $\delta = +4$; $h = -1$;
D = +.748, E = -.664; G = +.407, H = +.458, K = -790.

	Δ °	Az. °	P. m. s.	O-C. s.	S. m. s.	O-C. s.	L. m.
Erevan	3.7	307	e 1 3	+ 3	e 2 0	S _r	—
Ksara	11.0	251	e 2 42?	0	5 51	S _r	—
Helwan	16.3	245	e 3 50	- 2	e 6 54	+ 1	e 8.1
Tashkent	16.4	72	e 3 53	0	—	—	—
Andijan	18.7	75	e 4 22	0	—	—	—
Moscow	19.2	341	e 4 27	- 1	e 8 6	+ 7	—
Frunse	20.5	68	e 4 50	+ 8	—	—	—
Sverdlovsk	20.5	19	4 42	0	8 23	- 4	—
New Delhi	N. 25.7	102	—	—	i 10 14	+13	—

Nov. 9d. Readings also at 0h. (Strasbourg, near Zürich, Basle, and Neuchatel), 9h. (Palomar, Mount Wilson, Pasadena, Tucson, Christchurch, Wellington, Auckland, Bucharest, and Sofia), 11h. (Tucson and near Erevan (2)), 13h. (La Paz, near Alicante (3), Almeria, and Malaga), 15h. (La Paz), 17h. (near Andijan), 18h. (Istanbul), 21h. (Ksara), 23h. (La Paz).

Nov. 10d. 13h. 16m. 45s. Epicentre $55^{\circ}7'N$. $155^{\circ}6'W$.

A = -.5155, B = -.2339, C = +.8243; $\delta = -8$; $h = -7$;
D = -.413, E = +.911; G = -.751, H = -.341, K = -.566.

	Δ °	Az. °	P. m. s.	O-C. s.	S. m. s.	O-C. s.	Supp. m. s.	L. m.
College	10.0	20	e 2 25	- 2	(e 4 26)	+ 4	e 3 26	? e 4.4
Sitka	11.3	72	e 2 46	0	e 4 47	- 7	e 3 59	? i 5.3
Victoria	20.9	96	—	—	e 8 55	+20	—	—
Haiwee	32.1	110	i 6 33	+ 2	—	—	—	—
Salt Lake City	32.1	98	—	—	e 11 46	+ 3	—	e 15.1
Mount Wilson	z. 33.5	113	i 6 42	- 1	—	—	i 6 52	? —
Pasadena	33.5	113	i 6 44	+ 1	e 12 21	+16	—	e 15.5
Riverside	34.1	113	e 6 46	- 2	—	—	—	—
Palomar	34.8	113	i 6 54	0	—	—	i 8 7	PP —
Rapid City	34.9	87	e 6 53	- 2	i 12 26	- 1	e 8 39	PPP e 18.9
La Jolla	35.0	114	e 6 57	+ 1	—	—	—	—
Tucson	38.9	107	e 7 27	- 2	e 13 55	+27	e 8 51	PP e 18.9
St. Louis	45.8	83	e 8 35	+10	i 15 11	+ 2	i 15 23	PS —
Vladivostok	46.7	286	i 8 39	+ 7	—	—	—	—
Ottawa	49.1	66	e 8 55	+ 4	—	—	—	26.3
Seven Falls	50.4	62	—	—	e 16 9	- 5	—	26.3
Sverdlovsk	64.1	339	—	—	19 15	+ 1	—	—
Upsala	N. 64.7	5	—	—	e 19 15?	- 7	—	e 35.3
Moscow	68.4	352	11 5	- 1	20 5	- 2	—	—
Copenhagen	68.5	8	—	—	20 12	+ 4	—	—
Frunse	73.0	324	e 11 37	+ 4	—	—	—	—
Andijan	75.6	325	e 11 49	+ 1	21 33	+ 4	12 23	P _c P —
Tashkent	76.1	327	11 54	+ 3	e 21 40	+ 5	—	—
Zürich	76.4	13	e 11 53	0	—	—	—	—
Chur	77.1	10	e 11 56	- 1	—	—	—	—
Calcutta	N. 85.2	303	—	—	e 23 6	- 3	—	—
Bombay	95.2	314	i 17 17	PP	e 24 3	[+ 1]	—	—

Additional readings:—

Palomar iZ = 7m.4s.

Rapid City i = 12m.40s.

Tucson e = 8m.24s.

St. Louis isSN = 15m.47s., ipPS?E = 15m.56s., eSSN = 18m.45s.

Long waves were also recorded at Riverview, Christchurch, Honolulu, New Delhi, San Juan, and at other American and European stations.

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Nov. 10d. Readings also at 3h. (near La Paz), 4h. (Mount Wilson, Pasadena, Tucson, Riverside, and Palomar), 8h. (Palomar, Riverside, Pasadena, Mount Wilson, Haiwee, Tinemaha, Tucson, and Bombay), 11h. (near Andijan), 13h. (Haiwee, Mount Wilson, Riverside, Tucson, and Palomar), 14h. (near La Paz), 16h. (near Malaga), 19h. (Tucson).

Nov. 11d. Readings at 3h. (La Paz, Dehra Dun, Bombay, Calcutta, New Delhi, and Hyderabad), 5h. (Palomar, Tinemaha, Tucson, and Riverside), 12h. (near Apia), 13h. (Bucharest (2), Sofia (2), and Istanbul), 17h. (near Apia), 18h. (near Andijan), 21h. (near La Paz).

Nov. 12d. 13h. 39m. 45s. Epicentre $40^{\circ}3N$. $74^{\circ}5E$. (as on 1941 September 5d.).

Epicentre $40^{\circ}3N$. $74^{\circ}6E$. (stations of the U.S.S.R.).

$$A = +.2044, B = +.7370, C = +.6443; \quad \delta = +7; \quad h = -2;$$

$$D = +.964, E = -.267; \quad G = +.172, H = +.621, K = -.765.$$

	Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Andijan	1.7	286	c 0 29	- 2	i 0 55	+ 1	0 31	P
Frunse	2.6	4	c 0 51	+ 7	c 1 22	+ 5	c 0 56	P _g
Almata	3.5	31	1 1	+ 4	1 58	S _g	1 8	P _g
Tashkent	4.1	288	c 1 4	- 1	1 59	+ 4	—	—
Stalinabad	4.8	250	c 0 55?	-20	i 1 59?	-13	—	—
Bombay	N. 21.4	186	—	—	c 8 37	- 8	—	e 11.0

Frunse gives also $eP_g = 0m.59s.$, $cS^* = 1m.27s.$, $cS_g = 1m.37s.$

Nov. 12d. Readings also at 4h. (near Tananarive), 7h. (near Frunse, Tashkent, Andijan, and near Triest), 12h. (Zürich, Basle, and near Triest), 13h. (Palomar, Riverside, Tucson, Mount Wilson, Pasadena, and Bombay), 15h. (near Honolulu), 16h. (Tacubaya), 22h. (near Frunse (2)).

Nov. 13d. 19h. 23m. 30s. Epicentre $25^{\circ}1S$. $178^{\circ}3E$. Depth of focus 0.090.

$$A = -.9063, B = +.0269, C = -.4219; \quad \delta = +10; \quad h = +3;$$

$$D = +.030, E = +1.000; \quad G = +.422, H = -.013, K = -.907.$$

	Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Auckland	12.1	194	3 30?	+50	4 50	+ 2	—	—
Tual	13.7	184	2 59	+ 4	5 10	- 6	—	—
New Plymouth	14.4	193	3 2	0	5 34	+ 6	i 13 46	S _c S
Wellington	16.4	189	3 19	- 2	6 1	- 2	i 3 32	PP
Christchurch	19.0	193	—	—	6 50	+ 3	—	—
Brisbane	22.8	259	i 4 21	+ 1	c 7 50	+ 1	i 6 59	?
Pasadena	84.3	48	i 11 30	0	—	—	—	—
Mount Wilson	z. 84.4	48	i 11 32	+ 1	—	—	i 13 36	pP
Palomar	84.7	50	i 11 33 _a	+ 1	i 21 3	- 7	i 13 39	pP
Riverside	84.7	48	i 11 32 _a	0	c 21 2	- 8	i 13 42	pP
Haiwee	85.6	47	i 11 36	- 1	c 21 26	+ 8	e 13 45	pP
Tinemaha	85.9	46	i 11 39	+ 1	c 21 8	-13	e 13 45	pP
Tucson	88.4	53	i 11 50	0	—	—	i 13 58	pP
St. Louis	106.3	55	—	—	e 23 44	[+51]	e 24 23	S
Ksara	146.3	294	e 18 37	[+ 4]	—	—	c 22 18	PP

Additional readings:—

New Plymouth $S_cS?$ = 13m.28s.

Wellington i = 3m.23s. and 6m.34s., S_cS = 13m.53s.

Haiwee iEZ = 11m.45s.

Tucson eSP = 15m.20s.

Nov. 13d. Readings also at 0h. (La Plata, near Toledo, Almeria, Granada, and Malaga), 2h. (Riverview and near Andijan), 4h. (Riverview and near Almata), 5h. and 6h. (Riverview), 8h. (Palomar and Tucson), 11h. (St. Louis, Florissant, Cape Girardeau, Shawinigan Falls, near Ottawa, and Fordham), 12h. (near Bogota), 16h. (Irkutsk and near Mizusawa), 18h. (Bucharest), 23h. (Riverside, Tinemaha, Tucson, Huan-cayo, and La Paz).

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Nov. 14d. 23h. 18m. 10s. Epicentre 36°·3N. 71°·0E. Depth of focus 0·025.
(as on 1914 April 29d.).

A = +·2630, B = +·7638, C = +·5894; $\delta = -5$; $h = 0$;
D = +·946, E = -·326; G = +·192, H = +·557, K = -·808.

	Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Andijan	4·6	14	e 1 4	- 6	—	—	—	—
Tashkent	5·2	347	i 1 12	- 6	2 7	-11	—	—
Frunse	7·1	22	i 1 36	- 5	—	—	—	—
Almata	8·3	32	i 1 56	- 2	—	—	—	—
New Delhi	9·3	144	i 2 11	0	i 3 51	- 3	—	—
Bombay	17·4	174	i 3 51	- 1	e 6 53	- 5	i 7 19	SS
Hyderabad	N. 19·9	159	—	—	7 53	+ 6	—	—
Calcutta	N. 20·4	127	e 4 31	+ 8	i 8 3	+ 7	—	—
Sverdlovsk	21·7	345	i 4 32	- 4	i 8 2	-17	i 5 5	pP
Irkutsk	28·4	44	—	—	e 9 59	-11	—	—
Ksara	28·8	275	e 5 48?	+ 6	i 10 15	- 1	—	—
Moscow	29·8	321	5 44	- 7	10 23	- 9	6 17	pP
Helwan	33·7	270	—	—	i 11 26	- 7	—	—
Upsala	E. 41·2	322	—	—	e 13 18	- 8	e 16 31	SS
	N. 41·2	322	—	—	e 13 16	-10	i 16 25	SS e 17·8
Potsdam	N. 43·2	311	—	—	i 13 48	- 7	e 17 4	SS
Copenhagen	43·6	315	e 7 40	- 7	13 53	- 8	10 24	PPP
Uccle	48·8	310	e 8 27	0	e 15 7	- 8	—	—
St. Louis	103·4	345	e 8 40	?	e 23 55	[- 4]	e 24 34	sSKS

Additional readings :—

Bombay iEN = 7m.5s., iE = 9m.22s.

Potsdam eE = 17m.17s.?

Sverdlovsk isP = 5m.29s.

Moscow sP = 6m.42s., sS = 11m.31s.

Helwan iN = 24m.4s.

Copenhagen 15m.8s. and 17m.10s.

St. Louis eSKKSE = 25m.5s., esSKKS?E = 25m.28s., iPSN = 26m.35s., eN = 28m.35s.

Nov. 14d. Readings also at 0h. (Wellington (2), Christchurch, Arapuni, San Juan (2) Montezuma, Huancayo, La Paz, La Plata, Pasadena, Tucson, St. Louis (2), Florissant (2), Granada, and near Malaga), 1h. (Salt Lake City and Pasadena), 9h. (Almata, near Tashkent, and Andijan), 11h. (Andijan), 13h. (Calcutta), 16h. (Tucson), 19h. (Tucson, Pasadena, Mount Wilson, Palomar, Riverside, Halwee, and near Apia), 23h. (Riverside, Tucson, Palomar, and Mount Wilson).

Nov. 15d. 20h. 46m. 57s. Epicentre 4°·5N. 127°·5E.

A = -·6069, B = +·7910, C = +·0779; $\delta = +8$; $h = +7$;
D = +·793, E = +·609; G = -·047, H = +·062, K = -·997.

	Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Miyazaki	27·5	8	e 6 30	PP	—	—	—	—
Kumamoto	28·3	7	5 56	- 1	—	—	—	—
Hukuoka	29·1	6	6 1	- 3	10 47	- 9	6 50	PP 13·5
Kōti	29·5	11	e 6 8	0	10 51	-11	—	—
Siomisaki	29·8	14	6 17	+ 6	—	—	—	—
Owase	30·5	14	e 6 17	0	—	—	—	—
Hamada	30·5	8	6 20	+ 3	—	—	—	—
Kobe	30·9	13	6 15	- 5	—	—	—	—
Kameyama	31·3	14	6 27	+ 3	—	—	—	—
Kyoto	31·3	13	e 6 28	+ 4	—	—	—	—
Toyooka	31·6	11	6 28	+ 2	—	—	—	—
Hikone	31·7	13	e 6 23	- 4	11 26	-11	—	—
Shizuoka	31·9	18	e 6 25	- 4	11 27	-13	—	—
Mera	32·3	19	(6 39)	+ 6	—	—	—	—
Kohu	32·6	17	e 6 35	0	11 8	-43	—	—
Yokohama	32·8	19	e 6 34	- 3	e 14 8	SS	—	18·0
Tokyo	33·0	19	e 6 5	-34	—	—	7 49	PP 13·1
Toyama	33·2	14	e 6 47	+ 7	—	—	—	—
Kumagaya	33·3	17	6 42	+ 1	—	—	—	—
Maebasi	33·5	16	6 44	+ 1	—	—	—	—

Continued on next page.

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	Δ	Az.	P.		O-C.	S.		O-C.	Supp.		L.
	°	°	m.	s.	s.	m.	s.	s.	m.	s.	m.
Nagano	33.5	15	6	43	0	12	8	+ 3	—	—	—
Tukubasan	33.6	19	e 6	42	- 2	—	—	—	—	—	—
Kakioka	33.7	19	e 6	36	- 9	—	—	—	—	—	—
Wazima	33.8	14	e 6	23	-23	—	—	—	—	—	—
Mito	33.9	19	e 6	49	+ 2	—	—	—	—	—	—
Aikawa	34.8	15	e 7	7	+13	—	—	—	—	—	—
Hokusima	35.1	18	6	55	- 2	12	21	- 9	—	—	—
Sendai	35.8	18	e 6	57	- 6	12	28	-13	—	—	—
Mizusawa	E. 36.6	18	7	10	0	e 12	39	-14	—	—	e 17.3
Akita	36.9	17	e 7	4	- 8	—	—	—	—	—	—
Miyako	37.4	19	e 7	11	- 5	12	51	-14	—	—	—
Perth	37.9	196	7	26	+ 6	13	13	0	8	26	PP
Hatinohe	38.0	18	e 7	17	- 4	13	14	0	—	—	—
Vladivostok	38.7	6	e 7	24	- 3	i 13	14	-11	e 7	49	pP
Mori	39.2	16	7	34	+ 3	—	—	—	i 9	22	PPP
Brisbane	40.2	144	i 7	39 _a	- 1	i 13	44	- 4	9	31	PPP
Sapporo	40.3	16	7	49	+ 9	13	40	- 9	—	—	e 20.0
Calcutta	N. 41.9	299	e 7	52	- 2	i 14	20	+ 7	9	52	PPP
Sydney	44.2	212	7	3	-69	12	33	?	—	—	e 16.0
Riverview	44.2	212	i 8	13 _a	+ 1	i 14	47	+ 1	i 8	30	pP
Colombo	47.4	275	8	37	- 1	i 15	27	- 5	—	—	e 29.0
Hyderabad	N. 49.7	289	e 8	54	- 2	e 16	3	- 1	20	1	SS
Irkutsk	51.3	342	e 9	5	- 3	i 16	14	-12	—	—	25.1
Dehra Dun	N. 53.2	306	12	9	PPP	19	32	ScS	22	11	SSS
New Delhi	53.3	303	e 9	17 _k	- 6	i 16	55	+ 1	19	5	sS
Bombay	E. 55.2	289	i 9	34	- 3	i 17	10	-10	12	46	PPP
Almata	58.9	319	i 10	5	+ 2	—	—	—	—	—	—
Auckland	60.3	138	10	13	0	18	23	- 3	i 18	43	PPS
Frunse	60.3	317	10	13	0	—	—	—	—	—	25.1
Andijan	61.1	314	10	16	- 2	—	—	—	—	—	—
Arapuni	61.5	139	—	—	—	19	3	PPS	26	3?	?
Christchurch	62.7	145	10	27	- 2	18	57	0	10	46	pP
Wellington	62.7	142	10	26	- 3	18	48	- 9	11	13	pP
Apia	63.0	108	e 17	33	?	e 19	1	0	i 19	29	PPS
Tashkent	63.5	315	i 10	33?	- 1	i 18	59?	- 8	13	3?	PP
Sverdlovsk	73.7	329	i 11	34	- 4	20	49	-19	12	3	pP
Honolulu	74.1	69	e 11	39	- 1	i 21	15	+ 3	e 14	27	PP
Baku	77.6	310	12	6	+ 6	21	48	- 3	12	33	pP
Erevan	81.8	310	12	21	- 1	—	—	—	—	—	—
Tananarive	82.0	251	e 12	24	+ 1	22	34	- 3	i 12	37	pP
College	83.7	25	e 12	32	0	e 22	52	- 2	e 12	49	P _c P
Moscow	86.2	326	12	41	- 3	i 23	7	-12	13	7	pP
Ksara	88.9	304	e 13	1?	+ 3	i 23	57	+13	—	—	—
Sitka	90.1	33	e 13	21	+18	e 23	34	[+ 1]	i 25	15	PS
Helwan	93.1	300	e 13	15	- 2	24	30	+ 8	26	9	PPS
Bucharest	95.0	315	e 13	29	+ 3	i 24	35	- 3	e 17	18	PP
Upsala	96.0	331	e 13	32	+ 2	e 24	49	+ 2	17	35	PP
Sofia	97.3	314	e 13	40	+ 4	25	3	+ 5	i 24	20	SKS
Victoria	99.1	40	18	3	PP	24	35	[+12]	20	20	PPP
Copenhagen	100.0	329	i 13	56	+ 8	25	26	+ 6	17	57	PP
Seattle	100.1	40	e 23	11	?	e 25	37	+16	e 30	4	?
Potsdam	101.0	326	e 18	8	PP	i 25	45	+16	e 20	36	PPP
Prague	101.1	323	e 14	0	+ 7	e 25	45	+15	e 18	6	PP
Bergen	101.3	335	17	43	?	24	39	[+ 6]	e 18	6	PP
Ukiah	102.0	49	—	—	—	e 24	31	[- 6]	e 24	51	SKKS
Cheb	102.3	324	e 14	7	+ 8	e 24	47	[+ 9]	e 18	18	PP
Jena	102.4	324	e 14	8	+ 9	e 25	31	- 9	e 18	13	PP
Santa Clara	103.4	50	e 14	12	+ 8	e 24	53	[+10]	—	—	e 47.7
Chur	105.3	321	e 14	20	+ 8	e 24	43	[- 9]	e 18	17	PP
Strasbourg	105.7	323	e 18	46	PP	26	21	+13	—	—	52.1
Santa Barbara	E. 106.0	53	—	—	—	e 24	52	[- 3]	e 25	11	SKKS
Milan	N. 106.1	320	18	46?	PP	25	6	[+11]	—	—	53.1
Basle	106.2	321	e 14	27	P	e 25	6	[+10]	e 18	41	PP
Tinemaha	106.3	50	i 18	46	PP	i 24	53	[- 3]	i 30	27	PKKP
Aberdeen	106.3	334	i 18	23	[- 3]	i 25	8	[+12]	i 18	54	PP

Continued on next page.

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	Δ	Az.	P.	O-C.	S.	O-C.	Supp.	I.
	^c	^c	m. s.	s.	m. s.	s.	fl. s.	m.
Uccle	106.6	327	e 14 26	P	e 25 9	[+11]	i 19 5	PP e 52.1
Haiwee	106.8	50	e 18 40	PP	e 24 56	[- 3]	i 30 24	PKKP —
Butte	106.9	39	—	—	e 24 51	[- 8]	i 25 10	SKKS e 51.5
Neuchatel	106.9	322	e 17 45	?	—	—	—	—
Pasadena	107.3	53	i 14 30	P	i 24 55	[- 6]	e 18 50	PP i 48.7
Mount Wilson	107.4	53	e 14 28	P	e 24 58	[- 3]	i 30 20	PKKP —
Edinburgh	107.4	333	18 59	PP	25 6	[+ 5]	34 10	SS —
Saskatoon	107.4	32	18 15	[-13]	24 57	[- 4]	28 27	PS 46.1
Riverside	108.0	53	i 19 6	PP	e 25 0	[- 4]	e 25 17	? —
Bozeman	108.0	39	e 18 58	PP	i 24 59	[- 5]	e 20 59	PPP c 44.2
La Jolla	108.4	54	—	—	e 25 4	[- 1]	e 25 23	? —
Palomar	108.5	53	i 14 37	P	e 24 58	[- 8]	i 18 44	PP —
Stonyhurst	108.5	331	i 19 3	PP	i 25 16	[+10]	i 26 13	SKKS e 52.7
Paris	108.6	325	14 35	P	25 18	[+12]	18 43	PP e 53.1
Kew	108.8	328	e 19 9	PP	e 25 1?	[- 6]	e 21 33	PPP e 46.1
Boulder City	109.3	50	i 17 49	?	—	—	e 31 12	? —
Salt Lake City	109.6	44	e 17 56	?	e 25 13	[+ 3]	e 19 31	PP e 43.6
Clermont-Ferrand	109.8	322	14 35	P	e 26 36	{+32}	21 27	PPP e 49.0
Tortosa	113.5	318	e 19 31	PP	26 20	[- 9]	—	— 53.1
Tucson	113.7	52	e 18 12	?	e 25 25	[- 2]	e 18 34	PKP c 46.2
Rapid City	113.7	38	e 19 18	?	e 25 21	[- 6]	i 19 41	PP e 48.9
Granada	118.5	317	19 55k	PP	—	—	—	— 71.7
Malaga	119.2	317	i 20 22k	PP	26 4	[+17]	i 30 6	PKKP 70.1
San Fernando	120.6	317	20 34	PP	26 13	[+21]	22 57	PPP 63.1
Lisbon	121.2	321	20 22	PP	26 33	[+39]	30 3	PS 46.1
Chicago	123.9	32	e 20 42	PP	e 26 13	[+10]	e 27 28	SKKS c 50.6
Floris-ant	124.5	36	e 19 2	[+ 1]	e 25 58	[- 6]	i 20 53	PP —
St. Louis	124.7	36	e 19 4	[+ 2]	e 25 59	[- 6]	i 20 54	PP —
Seven Falls	126.1	15	19 17	[+12]	26 9	[0]	21 8	PP 53.1
Shawinigan Falls	126.1	17	19 3	[- 2]	30 57	PS	20 57	PP 68.1
Ottawa	126.2	20	19 3	[- 2]	26 3	[- 6]	21 3	PP e 61.1
Tacubaya	128.3	61	e 19 8	[- 1]	—	—	—	—
New Kensington	128.7	27	e 21 17	PP	e 28 9	[- 2]	e 31 29	PS e 50.8
Pennsylvania	129.3	25	e 19 19	[+ 8]	i 33 8	PPS	e 24 12	PPP 68.6
Weston	130.3	18	19 11	[- 2]	31 46	PS	21 32	PP 50.9
Fordham	130.8	21	e 19 12	[- 1]	e 28 34	{+ 9}	e 21 28	PP —
Vera Cruz	131.0	59	e 20 55	?	—	—	—	—
Philadelphia	131.1	22	e 21 28	PP	e 28 15	[-12]	e 31 32	PS e 54.2
Georgetown	131.2	25	e 19 23	[+ 9]	26 28	[+ 5]	i 21 39	PP —
Columbia	133.2	32	e 21 48	PP	e 28 20	[-19]	—	— e 58.1
Bermuda	141.5	16	e 19 39	[+ 6]	e 26 36	[- 6]	e 22 36	PP e 63.9
La Plata	149.3	171	19 47	[+ 1]	30 25	{+10}	33 33	SKSP 72.1
Balboa Heights	149.9	63	e 19 53	[+ 6]	—	—	—	—
San Juan	153.6	30	e 20 8	[+15]	e 43 18	SS	i 23 58	PP e 63.2
Huancayo	156.2	110	e 20 5	[+ 9]	e 27 7	[+ 6]	e 43 53	SS e 71.6
Bogota	156.6	67	e 19 56	[- 1]	—	—	e 24 7	PP —
Fort de France	159.1	23	e 20 3?	[+ 3]	—	—	e 24 32?	PP —
Rio de Janeiro	159.6	206	e 20 3	[+ 3]	e 31 3	[- 7]	i 24 24	PP 46.1
La Paz	160.6	130	20 5	[+ 4]	31 15	[- 1]	20 52	PKP, 72.2

Additional readings :—

Hukuoka PPP = 7m.1s.

The reading of Mera increased by one minute.

Mizusawa eSN = 12m.45s.

Perth PPP = 8m.50s., SS = 15m.20s.

Brisbane iNZ = 7m.57s., iSN = 13m.42s.?, iN = 14m.0s., iSSN = 16m.42s.

Calcutta iSSN = 15m.52s., iSSS = 18m.10s.

Riverview iNZ = 9m.5s., iPcPN = 9m.50s., iPP = 10m.1s., iN = 10m.24s., iE = 10m.36s.,

iPSNZ = 15m.6s., iSE = 15m.12s., iSSN = 18m.6s., iE = 18m.14s., iN = 18m.19s.,

iE = 18m.45s., iN = 18m.49s., iZ = 18m.58s.

Hyderabad iPN = 9m.5s., PcPN = 9m.48s., PPN = 11m.18s., iSN = 16m.10s., ScSN =

18m.18s.

New Delhi iPN = 9m.20s., PcPEN = 9m.54s., SPN = 17m.39s., ScS = 18m.33s., SSN =

20m.55s., SSE = 21m.0s., sSSN = 23m.5s., SSS = 23m.41s.,

Bombay ePN = 9m.37s., iE = 9m.47s., iSPPEN = 17m.28s., SSE = 21m.0s.

Auckland PcP? = 10m.49s., ScS = 19m.18s., i = 20m.8s., sScS? = 20m.26s., i = 22m.8s.

Continued on next page.

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Christchurch sS = 19m.13s., S_cS?Z = 20m.15s., SSEN = 23m.4s., SSS = 26m.41s.
 Wellington iZ = 10m.43s., P_cP?Z = 10m.57s., sP_cPZ = 12m.13s., PP?Z = 12m.48s.,
 PPPZ = 14m.48s., iZ = 15m.25s., and 15m.46s., i = 19m.3s., S_cS? = 19m.38s., i =
 20m.23s., sS_cS? = 20m.54s., sS?Z = 22m.48s., SS? = 23m.48s., sSS? = 24m.41s.,
 SSS = 26m.33s., Q = 28.1m.
 Apia i = 18m.36s., iS = 23m.27s., eSS = 25m.47s.; readings wrongly identified.
 Honolulu eS = 21m.4s., i = 21m.30s., e = 26m.14s., and 29m.34s.
 Tananarive PP = 15m.17s., epPP? = 15m.49s., isS? = 22m.52s., PS = 23m.13s., e =
 23m.40s., SS = 27m.46s.
 College e = 15m.21s., eS = 22m.27s., e = 23m.38s., eSS? = 27m.53s.
 Moscow SKS = 23m.0s.
 Sitka e = 16m.3s., iS = 23m.43s., i = 24m.8s., eSS = 29m.34s.
 Helwan SKSN = 23m.41s., SKKSE = 24m.15s.
 Bucharest eN = 13m.37s., ePP?N = 16m.53s., iPPPE = 19m.28s., iSKSE = 24m.7s.,
 iSKKSE = 24m.22s., iSE = 24m.47s., ePSN = 25m.53s., iPSE = 25m.57s., iSSE =
 30m.57s., eSSN = 31m.8s.
 Upsala eN = 17m.3s., PPP?E = 19m.34s., eN = 23m.35s., iSKSE = 23m.55s., eE = 24m.8s.?,
 iS?E = 24m.59s., PS?E = 26m.8s.?, eSS = 31m.3s.?, eSSSN = 35m.3s.?, eE = 38m.3s.?
 Sofia iE = 17m.14s., eE = 23m.52s.
 Victoria SS = 31m.33s.
 Potsdam eSKSEN = 24m.42s.
 Copenhagen 24m.32s. and 26m.44s.
 Prague ePPP = 20m.3s., eSKS = 23m.39s., eSS = 31m.33s., eSSS = 35m.33s.
 Bergen eE = 21m.52s., SSE = 31m.51s., eN = 37m.42s., eE = 38m.3s.?
 Ukiah e = 32m.3s.
 Cheb ePS = 27m.23s.
 Jena eP?N = 14m.12s., eP?Z = 17m.27s., eP?N = 17m.31s., eZ = 18m.19s., eS?N =
 24m.8s., eE = 25m.53s., eS?Z = 27m.15s., eS?E = 27m.18s., eE = 49m.57s., eN =
 50m.3s. and 50m.15s., eE = 53m.3s.,
 Basle e = 36m.26s.
 Tinemaha iEN = 25m.14s.
 Aberdeen iEN = 27m.55s., iN = 33m.25s., iE = 33m.54s.
 Haiwee iEN = 25m.16s.
 Pasadena eZ = 17m.34s., iEN = 25m.15s., iSEN = 26m.31s., iPSEZ = 27m.56s., iSSEN =
 34m.11s., eSSSE = 37m.57s.
 Mount Wilson iZ = 17m.39s., eEN = 25m.17s.
 Saskatoon SS = 33m.36s.
 Bozeman i = 25m.19s., eS = 26m.38s., iPS = 28m.2s., i = 28m.18s., eSS = 34m.16s.,
 e = 39m.18s.
 Palomar iEZ = 17m.57s., eE = 25m.21s., iPKKPZ = 30m.18s.
 Stonyhurst e = 19m.15s., and 28m.23s., i = 28m.43s., iSKKS = 28m.50s., i = 29m.49s.,
 iPS = 32m.3s., i = 34m.27s.
 Paris S = 26m.48s., PS? = 28m.11s.
 Kew e = 19m.21s., eSKKSE = 26m.5s.?, iPKKPEZ = 28m.18s., ePS = 28m.45s.?,
 ePPS = 29m.29s., eSSNZ = 34m.21s., eSSS = 40m.3s.
 Salt Lake City iSKS = 25m.34s., ePS = 28m.25s., e = 32m.51s., and 39m.56s.
 Clermont-Ferrand e = 15m.12s. and 30m.6s.
 Tortosa iEN = 19m.45s., PPN = 20m.55s., SKKSEN = 27m.30s., PSN = 29m.26s.,
 iEN = 29m.42s., PPSN = 30m.25s., SSN = 35m.29s.
 Tucson iPP = 19m.33s., e = 26m.31s., iPS = 28m.57s., i = 29m.23s., eSS = 35m.25s.,
 e = 38m.51s., eSSS = 39m.34s., e = 43m.11s.
 Rapid City i = 22m.47s., and 25m.40s., ePS = 28m.56s., e = 32m.59s., eSSS = 39m.35s.
 Granada PP = 21m.18s., SS = 38m.15s.
 Malaga PP = 23m.14s., iPS = 33m.0s., SS = 42m.20s., Q = 59m.16s.
 San Fernando SKSE = 31m.2s., SKKSE = 32m.48s., SSE = 44m.34s.; readings wrongly
 identified.
 Lisbon PPE = 20m.26s., PP = 20m.34s., PPZ = 20m.45s., PPE = 20m.51s., PSN =
 30m.7s.?, PSE = 30m.13s., Z = 33m.2s., SSN = 36m.59s., SSE = 37m.11s.
 Chicago ePS = 30m.35s., eSS = 37m.32s., e = 42m.58s.
 Florissant ePS?E = 31m.17s.,
 St. Louis ePSE = 31m.9s., ePPSE = 32m.29s.
 Seven Falls PS = 30m.38s., SS = 37m.55s.
 Ottawa PS = 31m.3s., SS = 38m.15s.
 New Kensington eSS = 38m.31s.
 Pennsylvania i = 36m.25s. and 38m.30s., iSS = 39m.3s.
 Weston 19m.29s., SS = 38m.44s.
 Fordham i = 22m.32s., iSKP = 22m.48s., ePS? = 31m.38s., e = 41m.9s.
 Philadelphia i = 22m.31s., ePPS = 33m.18s., eSS = 38m.38s., e = 47m.0s.
 Georgetown iSKP = 22m.33s., e = 23m.33s., SKKS = 28m.13s., iPS = 31m.44s., e =
 34m.9s.
 Columbia e = 22m.51s., 33m.40s., and 51m.19s.
 Bermuda i = 23m.22s., e = 28m.59s., 34m.42s., 40m.46s., 42m.54s. and 53m.52s.
 La Plata PKPN = 19m.50s., SKSPE = 39m.3s.?, PSSN = 43m.21s., SSS = 48m.21s.
 San Juan e = 32m.6s., eSSS = 49m.12s.
 Huancayo i = 20m.20s., e = 34m.40s., 50m.3s., and 54m.46s., eSS = 59m.3s.
 Bogota i = 20m.27s.
 Rio de Janeiro eSSN = 34m.43s.
 La Paz PPN = 24m.50s., PPP = 28m.16s., SSN = 43m.42s., SSSN = 49m.10s.
 Long waves were also recorded at Lincoln

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Nov. 15d. Readings also at 3h. (Bombay and Calcutta), 4h. (near Andijan, Almata, and near La Paz), 10h. (near Bucharest), 12h. (Bucharest and Sofia), 16h. (Wellington, Palomar, Tucson, St. Louis, and Huancayo), 19h. (near Tucson), 20h. (Bombay), 22h. (Mount Wilson, Palomar, Tucson, St. Louis, and Tacabaya), 23h. (Fort de France).

Nov. 16d. 12h. 10m. 55s. Epicentre 12°·0S. 165°·9E.

A = -·9489, B = +·2384, C = -·2066; $\delta = -7$; $h = +6$;
D = +·244, E = +·970; G = +·200, H = -·050, K = -·978.

	Δ °	Az. °	P.		O—C. s.	S.		O—C. s.	Supp.		L. m.	
			m.	s.		m.	s.		m.	s.		
Brisbane	19·6	216	i 4	31	- 1	i 8	20	+12	i 4	36	pP	e 11·0
Apia	21·8	98	i 5	10	+14	e 9	7	+15	i 9	27	?	—
Sydney	25·6	209	i 5	32	0	i 10	2	+ 3	—	—	—	—
Riverview	25·6	209	i 5	34 _k	+ 2	i 10	7	+ 8	i 5	45	pP	e 12·4
Auckland	26·0	164	5	38 _?	+ 2	10	52	+46	i 8	50	P _c P	15·1
Arapuni	27·4	164	6	35	PP	10	41	+13	i 14	47	?	16·8
New Plymouth	27·9	166	6	2	+ 8	10	43	+ 6	6	6	?	15·9
Wellington	30·3	167	6	13	- 2	11	40	+25	7	25	PP	16·1
Christchurch	31·9	171	6	28	- 1	11	25	-15	8	12	PPP	19·6
Honolulu	48·6	48	e 8	47	0	i 16	9	+20	i 20	12	SSS	e 22·3
Perth	50·0	238	e 9	10	+12	e 16	8	- 1	—	—	—	—
Yokohama	53·3	333	9	36	+13	—	—	—	—	—	—	—
Shizuoka	53·5	332	9	33	+ 9	16	57	0	—	—	—	—
Tukubasan	53·8	334	e 9	23	- 3	—	—	—	—	—	—	—
Kumagaya	54·0	334	9	32	+ 4	17	12	+ 9	—	—	—	—
Kameyama	54·3	331	e 9	23	- 7	—	—	—	—	—	—	—
Maebasi	54·4	334	9	29	- 2	17	3	- 6	—	—	—	—
Sumoto	54·7	329	e 9	24	- 9	17	12	- 1	—	—	—	—
Kobe	54·8	329	9	43	+ 9	17	15	+ 1	—	—	—	—
Kōti	54·8	327	e 9	32	- 2	17	2	-12	—	—	—	—
Hikone	54·8	330	e 9	39	+ 5	—	—	—	—	—	—	—
Hukusima	54·9	336	e 9	43	+ 8	17	20	+ 4	—	—	—	—
Nagano	55·0	333	9	27	- 8	17	27	+10	—	—	—	—
Sendai	55·2	337	e 9	43	+ 6	17	17	- 3	—	—	—	—
Toyama	55·5	332	e 9	34	- 5	—	—	—	—	—	—	—
Kumamoto	55·8	324	e 9	43	+ 2	17	43	+15	—	—	—	—
Mizusawa	N. 55·9	338	9	43	+ 1	17	23	- 6	—	—	—	e 24·3
Miyako	56·0	338	e 9	48	+ 5	17	42	+12	—	—	—	—
Morioka	56·3	337	e 9	42	- 3	17	46	+12	—	—	—	—
Izuka	56·4	324	e 9	18	-27	—	—	—	—	—	—	—
Hamada	56·6	327	e 9	25	-22	17	30	- 8	—	—	—	—
Hatinohe	56·9	339	e 9	45	- 4	—	—	—	—	—	—	—
Vladivostok	63·1	333	i 10	26	- 6	19	3	+ 1	—	—	—	—
Ukiah	83·1	48	e 12	11	-18	23	45	PS	15	23	PP	e 34·0
Calcutta	83·3	294	e 12	35	+ 5	i 22	52	+ 2	e 13	2	pP	—
Berkeley	83·4	50	e 12	52	+22	e 23	12	+21	—	—	—	e 38·0
Santa Clara	83·4	50	e 12	28	- 2	e 24	23	PPS	—	—	—	e 39·6
College	84·1	18	e 12	26	- 8	e 22	42	-16	e 28	29	SS	e 34·6
Pasadena	85·3	54	i 12	37 _a	- 3	e 23	6	- 4	i 16	53	PP	e 34·9
Mount Wilson	85·4	54	e 12	37	- 3	—	—	—	—	—	—	—
La Jolla	85·7	56	e 12	38	- 4	—	—	—	—	—	—	—
Riverside	z. 85·8	54	e 12	39	- 3	—	—	—	—	—	—	—
Palomar	z. 86·1	55	i 12	41 _a	- 3	—	—	—	—	—	—	—
Haiwee	z. 86·1	52	i 12	47	+ 3	—	—	—	—	—	—	—
Tinemaha	z. 86·1	51	i 12	47	+ 3	—	—	—	—	—	—	—
Victoria	86·5	39	e 13	37	+51	e 23	28	+ 6	e 28	53	SS	42·1
Seattle	86·9	41	e 21	56	?	—	—	—	—	—	—	e 38·5
Colombo	E. 87·6	277	12	52	+ 1	23	24	{ 0 }	16	42	PP	53·2
Boulder City	88·5	53	e 12	52	- 4	25	1	PPS	e 26	17	?	e 44·3
Grand Coulee	89·1	42	12	55	- 3	—	—	—	13	0	P	—

Continued on next page.

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		Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Kodaikanal	E.	90.6	281	i 12 45	-20	i 23 25	[-11]	—	40.2
Tucson		90.7	57	i 13 4	-2	23 29	[-8]	e 16 37	e 36.3
Hyderabad	N.	91.6	287	13 10	0	24 18	+9	16 54	43.2
Salt Lake City		92.0	49	13 40	+28	e 24 16	+4	e 33 36	e 42.3
Bozeman		93.7	44	e 13 20	0	e 23 53	[-1]	e 30 20	e 41.0
Dehra Dun		94.1	300	—	—	e 23 54	[-2]	35 31	SSS
New Delhi	N.	94.5	297	e 14 7	+44	i 24 15	-19	i 19 48	PPP
Bombay	N.	96.7	288	e 14 4	+31	i 24 10	[0]	17 7	PP
Almata		97.4	313	e 13 49	+12	—	—	—	—
Saskatoon		97.8	38	17 5?	PP	24 21	[+5]	31 47	SS
Tacubaya	E.	98.5	72	e 18 23	PKP	—	—	—	—
Rapid City		98.9	47	—	—	24 18	[-4]	e 30 52	?
Tashkent		102.8	310	14 2	+1	i 24 43	[+3]	i 18 33	PP
Lincoln		103.3	51	—	—	24 49	[+6]	e 32 49	SS
Florissant	E.	108.1	53	—	—	i 25 7	[+3]	28 13	PS
St. Louis	E.	108.2	53	e 18 55	PP	i 25 8	[+3]	i 28 11	PS
Sverdlovsk		108.3	326	e 14 23	P	—	—	—	—
Chicago		110.2	50	e 19 17	PP	e 25 15	[+2]	e 28 14	PS
Tananarive		111.9	243	—	—	e 25 23	[+3]	28 51	PS
Huancayo		114.7	109	e 19 34	PP	e 25 52	[+21]	e 29 17	PS
Columbia		115.7	57	e 19 55	PP	e 25 43	[+8]	e 29 28	PS
Hamilton		115.8	47	19 5?	[+20]	25 53	[+18]	29 34	PS
New Kensington		116.2	50	e 15 17?	P	e 25 45	[+9]	e 29 16	PS
Baku		117.4	310	e 15 8	P	36 35	SSP	20 5	PP
La Plata		117.5	140	20 59	PP	29 41	PS	50 5	Q
Pennsylvania		117.6	50	e 29 16	PS	e 36 7	SS	e 30 44	PPS
Georgetown		118.4	52	19 9	[+19]	25 24	[-20]	20 1	PP
La Paz		119.5	117	e 15 24	P	25 30	[-18]	e 20 18	PP
Philadelphia		119.7	51	e 20 9	PP	e 25 48	[-1]	e 29 58	PS
Fordham		120.5	49	e 19 57	PP	i 25 47	[-5]	i 30 27	PS
Moscow		120.9	329	20 21	PP	e 28 1	S	30 23	PS
Seven Falls		121.2	41	20 21	PP	e 25 59	[+5]	30 18	PS
Upsala		126.8	341	e 21 1	PP	e 25 57	[-14]	e 38 5	SS
Bermuda		129.5	58	e 19 52	[+41]	i 39 21	SSP	e 21 20	PP
San Juan		129.5	75	e 19 18	[+7]	e 38 47	SS	i 31 20	PS
Bergen		129.6	347	18 42	[-29]	26 15	[-4]	21 37	PP
Ksara		129.7	303	e 19 36	[+25]	—	—	e 21 52	PP
Copenhagen		131.8	340	e 19 18	[+3]	26 42	[+18]	21 40	PP
Bucharest		132.8	321	e 19 17	[0]	—	—	e 21 56	PP
Aberdeen		134.0	351	e 19 5	[-15]	39 35	SS	21 35	PP
Potsdam		134.2	338	e 21 56	PP	29 5	[+19]	25 5	PPP
Fort de France		134.2	81	e 19 5?	[-15]	—	—	—	—
Helwan		134.3	300	e 19 23	[+3]	29 5	[+19]	22 5	PP
Rio de Janeiro	N.	135.1	140	e 22 5	PP	—	—	—	—
Edinburgh		135.4	351	e 22 18	PP	40 5	SS	e 25 19	PPP
Prague		135.4	334	e 19 39	[+17]	39 47	SS	22 5?	PP
Sofia		135.4	320	e 19 29	[+7]	—	—	e 22 5	PP
Jena		135.9	336	e 19 23	[0]	e 40 25	SS	e 22 11	PP
Cheb		136.2	336	e 21 54	PP	e 28 52	[-5]	e 34 28	PPS
Stonyhurst		137.2	350	e 22 26	PP	i 27 0	[+25]	i 32 38	PS
Uccle		138.5	343	e 19 21?	[-7]	i 22 56	SKP	—	e 60.1
Triest		138.9	330	e 19 53?	[+25]	e 40 45	SS	i 23 5	PP
Kew		139.1	346	e 19 33 _a	[+4]	e 40 47?	SS	e 23 3	PP
Strasbourg		139.2	338	19 34	[+5]	40 35	SS	22 30	PP
Chur		140.0	335	e 19 35	[+4]	—	—	33 35	PP
Basle		140.2	337	e 19 27	[-4]	—	—	e 22 35	PP
Paris		140.8	343	19 24	[-8]	32 35	PS	22 33	PP
Neuchatel		140.9	337	e 19 25	[-7]	—	—	—	e 64.1
Milan	N.	141.2	333	i 19 52	[+19]	—	—	—	—
Clermont-Ferrand		143.3	339	19 33	[-3]	—	—	—	69.1
Tortosa		148.6	338	e 19 49	[+4]	26 53	[+1]	22 57	PP
Lisbon		153.0	351	19 56 _a	[+4]	43 23	SS	23 37	PP
Granada		153.2	342	i 18 59 _k	[-53]	—	—	i 23 59	PP
Malaga		153.9	342	i 19 53 _k	[0]	i 26 31	[-27]	i 24 38	PP
San Fernando		154.6	346	20 45	[+51]	25 33	[-86]	23 58	PP

For Notes see next page.

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NOTES TO NOVEMBER 16d. 12h. 10m. 55s.

Additional readings :—

Riverview iEN = 6m.8s., iN = 6m.42s., iE = 7m.6s., iN = 7m.32s., iE = 7m.37s., 8m.47s., 9m.6s., and 10m.13s., iN = 10m.21s., 10m.52s., 11m.8s., and 11m.25s., iE = 11m.44s.
Auckland P_cS? = 11m.12s., SS = 12m.40s., S_cS = 15m.25s.
New Plymouth Q = 13m.46s.
Wellington iZ = 6m.25s., 6m.40s., 7m.2s., and 7m.55s., P_cPZ = 8m.45s., sS? = 12m.10s., SS? = 12m.55s., Q = 14m.5s.?
Christchurch PEN = 6m.32s., PEZ = 6m.35s., S = 13m.5s.?, iN = 13m.30s., SSZ = 15m.47s., QEN = 16m.5s.
Mizusawa ePE = 9m.39s.
Ukiah e = 28m.41s.
Calcutta PPN = 16m.4s., isSN = 23m.37s., SSN = 28m.50s.
College e = 15m.25s.
Pasadena eEN = 24m.23s.
Victoria eN = 35m.23s.
Colombo SSE = 29m.24s.
Tucson i = 13m.22s., ePPP? = 18m.47s., iS? = 24m.23s., i = 25m.55s., iSS = 30m.9s., eSSS = 33m.49s.
Hyderabad SKSN = 24m.2s., SSN = 30m.10s.,
Salt Lake City eSKS = 23m.49s., e = 30m.55s. and 37m.30s.
Bozeman iS = 24m.17s., eSSS = 34m.13s.
Dehra Dun e = 27m.46s., and 32m.29s.
New Delhi iE = 25m.55s., iN = 30m.53s. and 36m.58s.,
Bombay SKKSN = 24m.27s., SN = 24m.48s., iN = 30m.18s. and 30m.50s., SSN = 31m.32s.
Saskatoon PPS = 26m.29s.
Tashkent iS = 25m.41s., PS = 27m.21s.
St. Louis eS = 26m.49s., iE = 27m.57s.
Chicago eSS = 34m.20s., i = 34m.57s., eSSS = 39m.2s.
Tananarive e = 25m.45s., eSSE = 35m.24s., N = 35m.35s., SSSN = 38m.52s., E = 40m.6s.
Huancayo eSS = 35m.44s., e = 42m.37s.
Columbia eSS? = 36m.0s., eSSS = 40m.5s.
Hamilton SS = 35m.35s.
New Kensington e = 24m.54s. and 40m.48s.
Baku PKP = 18m.38s., PPS = 31m.9s.
La Plata N = 22m.11s., and 29m.53s.
Georgetown SKP? = 22m.16s., 27m.25s., PS = 29m.46s., 30m.21s.
La Paz iPPZ = 20m.32s., PPP = 23m.0s., PSZ = 30m.5s., iZ = 30m.28s., PPSZ = 31m.30s., iZ = 33m.0s., SSZ = 36m.28s., iZ = 38m.37s., SSS = 40m.52s.
Philadelphia eSS = 36m.35s., e = 40m.6s.
Fordham ePP = 22m.45s., i = 38m.17s.
Moscow SS = 36m.17s.
Seven Falls SS = 37m.25s., SSS = 40m.41s.
Upsala eE = 21m.5s., 31m.11s.?, 36m.59s., and 41m.5s.?. eN = 43m.5s.?.
Bernuda e = 22m.11s., and 32m.52s., eSSS = 43m.15s.
San Juan i = 22m.34s.
Bergen PKSE = 22m.43s., eN = 26m.51s., PSN = 31m.17s., eE = 37m.34s., 41m.5s.?, and 42m.49s.,
Copenhagen 22m.50s., 24m.47s., 31m.50s., and 33m.27s.
Bucharest eN = 22m.26s., eE = 22m.48s., eS?E = 32m.44s.
Aberdeen iN = 22m.49s., eE = 56m.5s.
Potsdam ePPN = 21m.59s., eEN = 22m.47s.
Helwan eEN = 22m.29s., PP?EN = 24m.47s., eEN = 27m.5s., and 28m.23s., eE = 32m.5s., PSKS?N = 34m.47s., and iN = 39m.53s.
Prague eSKP = 22m.59s., ePPP = 24m.59s., ePPS = 33m.53s., eSKSP = 34m.5s., eSSS = 44m.35s.,
Jena eN = 19m.52s., 22m.15s., 23m.9s., 40m.17s., 40m.20s., and 42m.38s., eE = 63m.21s.
Cheb eSKP = 22m.58s., e = 23m.53s.
Stonyhurst iPKS = 23m.5s., ePPP = 25m.22s., i = 29m.58s., and 35m.9s., eSS = 40m.28s., i = 42m.20s., e = 44m.52s.,
Triest iPP = 24m.40s., iPPP = 27m.13s., iPS = 34m.33s., iSSS = 45m.51s.
Kew ePPEN = 25m.25s., ePPP = 28m.12s., ePKKPN = 33m.15s.?, ePS? = 34m.55s.?, ePPSE = 37m.5s., eS_cS, PKP?E = 38m.29s., eE = 41m.42s.?, eSS = 42m.45s.?, eSSSEN = 45m.45s.
Paris SS? = 41m.53s.
Milan iPE = 19m.59s.
Tortosa iN = 20m.18s., PKKS? = 23m.28s., PPPN = 26m.33s., SKKSN = 29m.51s.
Lisbon PKPZ = 20m.6s., PKP,E = 20m.13s., iPKP,N = 20m.20s., PKP,Z = 20m.24s., E = 22m.16s., PP?E = 24m.2s., N = 24m.23s.?, E = 24m.51s.?, N = 24m.54s., SSN = 43m.47s., SSSN = 49m.41s., E = 61m.53s.
Malaga PP = 21m.51s., PKKP = 29m.41s., PS = 31m.47s., PPS = 33m.23s.
Long waves were also recorded at Johannesburg, Sitka, Harvard, Vera Cruz, and Montezuma,

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Nov. 16d. 12h. 24m. 19s. Epicentre $12^{\circ}0S$. $165^{\circ}9E$. (as at 12h. 10m.).

$$A = -.9489, B = +.2384, C = -.2066; \quad \delta = -7; \quad h = +6;$$

	Δ	Az.	P.	O—C.	Supp.	L.
	°	°	m. s.	s.	m. s.	m.
Brisbane	19.6	216	i 4 36 _a	+ 4	—	—
Pasadena	z. 85.3	54	e 12 38	- 2	—	—
Mount Wilson	z. 85.4	54	e 12 40	0	—	—
Riverside	z. 85.8	54	e 12 42	0	—	—
Palomar	z. 86.1	55	i 12 47	+ 3	—	—
Tucson	90.7	57	i 13 12	+ 6	—	—
La Paz	119.5	117	19 48	PP	—	—
Tortosa	N. 148.6	338	e 19 51	[+ 6]	—	61.7
Granada	153.2	342	(i 19 50)	[- 2]	(i 24 21) PP	—

The readings of Granada increased by three minutes.

Nov. 16d. Readings also at 3h. (La Paz), 7h. (La Paz and Balboa Heights), 9h. (Uccle), 15h. (Brisbane), 16h. (Auckland, Arapuni, Brisbane, Riverview, Christchurch, and Wellington), 17h. (Tucson), 18h. (Brisbane, Riverview, Sydney, Auckland, Wellington, Christchurch Palomar, and Mount Wilson), 19h. (Brisbane, Wellington, Auckland, Arapuni, Pasadena, and Tucson), 20h. (Wellington, Tucson, Palomar, and San Fernando), 22h. (Riverside, Palomar, Christchurch, Wellington, and Riverview), 23h. (Riverside and Mount Wilson).

Nov. 17d. 18h. 38m. 9s. Epicentre $29^{\circ}0N$. $142^{\circ}0E$. (as on 1939 April 15d.).

$$A = -.6903, B = +.5393, C = +.4823; \quad \delta = -3; \quad h = +2;$$

$$D = +.616, E = +.788; \quad G = -.380, H = +.297, K = -.876.$$

	Δ	Az.	P.	O—C.	S.	O—C.	Supp.
	°	°	m. s.	s.	m. s.	s.	m. s.
Mizusawa	10.1	357	2 27	- 1	e 4 4	-21	—
Vladivostok	16.3	333	i 3 52	0	e 7 1	+ 8	—
Irkutsk	36.3	320	e 7 9	+ 2	—	—	—
Andijan	57.0	302	e 9 51	+ 1	—	—	10 25 P _c P
Tashkent	59.1	303	10 2	- 2	—	—	—
Sverdlovsk	61.6	323	i 10 19	- 3	e 18 37	- 6	—
Tinemaha	80.1	54	i 12 12	- 1	—	—	i 12 17 P _c P
Santa Barbara	z. 80.4	56	e 12 18	+ 3	—	—	—
Haiwee	80.8	54	i 12 19	+ 2	—	—	—
Pasadena	z. 81.6	56	e 12 19	- 2	—	—	i 12 23 P _c P
Mount Wilson	z. 81.7	56	e 12 20	- 2	—	—	—
Palomar	z. 83.0	56	e 12 26	- 2	—	—	—
Tucson	87.9	54	i 12 56	+ 3	—	—	—

Mizusawa gives also eSN = 4m.1s.

Nov. 17d. 22h. Undetermined shock.

Brisbane iP = 14m.54s.k, iSN = 18m.36s., eSE = 18m.44s., iLN = 20m.22s
 Riverview iPZ = 15m.54s.k, iSN = 20m.23s., iN = 20m.41s., iSSN = 21m.17s., eLE = 22.9m.
 Wellington S? = 18m.26s.?, L = 26m.?
 Sydney e = 19.3m.
 Christchurch SEN = 22m.0s., QEN = 24m.12s., R = 26m.25s.
 Pasadena ePZ = 22m.55s., eLZ = 49.3m.
 Mount Wilson iPZ = 22m.56s.
 Palomar iPEZ = 23m.1s.
 Tinemaha iPZ = 23m.1s.
 Tucson iP = 23m.23s., eL = 51m.57s.
 Long waves were also recorded at Bermuda, Granada, Malaga, and Auckland.

Nov. 17d. Readings also at 0h. (Granada and Tucson), 1h. (Sverdlovsk, Brisbane (2), and Riverview), 2h. (Tucson, Pasadena, Riverside, Tinemaha, Palomar, Auckland, Wellington (2), Christchurch (2), Brisbane, and Riverview), 4h. (Mount Wilson, Riverside, Palomar, Tucson, Christchurch, Wellington, Brisbane, Auckland, Riverview, and Sydney), 5h. (Pasadena), 6h. (Tucson and La Paz), 7h. (Tucson, Pasadena, Palomar, Riverside, Mount Wilson, Tinemaha, Haiwee, Riverview (2), Wellington, Christchurch, Auckland, and Brisbane (2)), 15h. (near Andijan), 17h. (Almeria and Alicante), 22h. (Tashkent), 23h. (Mount Wilson and Palomar).

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Nov. 18d. 7h. 53m. 14s. Epicentre 28°·5S. 113°·5W. (as on 1943 Sept. 19d.).

A = -·3510, B = -·8072, C = -·4747; $\delta = +11$; $h = +2$;
D = -·917, E = +·399; G = +·189, H = +·435, K = -·880.

		Δ	Az.	P.	O—C.	S.	O—C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Huancayo		39·2	73	e 7 29	- 2	e 13 29	- 3	e 8 58	PP e 16·4
La Paz	z.	43·4	84	7 58	- 8	i 14 5	-30	—	20·5
La Plata	E.	47·2	112	—	—	15 4	-25	15 10	PS 23·4
	N.	47·2	112	—	—	15 10	-19	—	20·3
Christchurch		59·8	233	—	—	e 18 15	- 5	25 39	Q 27·3
Tucson		60·5	2	e 10 12	- 2	—	—	i 10 25	? e 30·0
Palomar	z.	61·6	357	e 10 21	- 1	—	—	i 10 32	? —
Mount Wilson	z.	62·5	356	e 10 29	+ 1	—	—	—	—
Pasadena		62·5	356	i 10 30	+ 2	—	—	i 10 38	? e 29·7
Rio de Janeiro		62·8	102	e 18 46	S	(e 18 46)	-12	—	— e 28·3
Haiwee	z.	64·4	355	e 10 40	0	—	—	—	—
San Juan		65·3	50	e 11 10	+24	—	—	—	e 30·6
Tinemaha	z.	65·4	355	e 10 45	- 2	—	—	—	—
St. Louis		70·2	19	e 11 19	+ 2	i 20 32	+ 4	—	—
Bermuda		76·1	41	—	—	e 21 43	+ 8	—	e 36·6
Riverview		78·8	237	e 13 38	?	e 22 9	+ 5	e 15 25	PP e 35·8

Riverview gives also eE = 22m.35s. and 27m.24s.

Long waves were also recorded at Montezuma and Ukiah.

Nov. 18d. Readings also at 2h. (Granada), 4h. (Malaga), 5h. (Tucson, Palomar, Mount Wilson, Pasadena, Tinemaha, and near Apia), 7h. (Riverview), 10h. (near Andijan), 11h. (Brisbane), 12h. (Riverview, Tinemaha, Mount Wilson, Palomar, Tucson, and Ksara), 13h. (Sofia, Bucharest, and near Istanbul), 18h. (near Hamilton and near Andijan), 22h. (near Ksara).

Nov. 19d. Readings at 0h. (near Andijan), 3h. (Tucson, Pasadena, Tinemaha, Palomar, Christchurch, Auckland, Wellington, and Riverview), 4h. (St. Louis, Huancayo, and Malaga), 5h. (Granada, Mount Wilson, Tucson, Christchurch, Wellington, Arapuni, and Riverview), 6h. (Huancayo, Auckland, Christchurch, Wellington, Arapuni, Sydney, and Riverview), 7h. (Huancayo, Tucson, Mount Wilson, Palomar, Tinemaha, Pasadena, Haiwee, and St. Louis), 8h. (Bogota), 12h. (Moscow, Belgrade, Sofia, near Bucharest, and Istanbul), 14h. (Fort de France), 19h. (St. Louis, Palomar, Mount Wilson, Riverside, Tucson, and La Paz), 21h. (Riverside, Mount Wilson, Palomar, Pasadena, Tucson, Huancayo, Tashkent, near Andijan, and Almata).

Nov. 20d. 4h. Undetermined shock.

Auckland S? = 47m.15s.?, L = 50·6m.

Christchurch PZ = 47m.28s., SEN = 51m.49s., QEN = 53m.6s., RZ = 54m.58s.

Riverview eZ = 48m.51s., eLE = 57m.0s.

Brisbane ePE = 49m.20s., eSE = 53m.27s., eSN = 53m.31s., eLN = 55m.36s.

Wellington e = 50m., i = 52m.45s., LZ = 53m.

Sydney e = 53m.36s.

Pasadena ePZ = 53m.58s., eZ = 54m.9s.

Riverside eZ = 53m.59s.

Mount Wilson iPZ = 54m.3s.

Palomar iPZ = 54m.4s.

Haiwee iPZ = 54m.10s.

Tinemaha iPEZ = 54m.12s., iZ = 54m.22s.

Tucson iP = 54m.24s., eL = 83m.40s.

Granada ePKP = 60m.13s., iPP = 63m.7s., L = 122·5m.

Malaga e = 63m.8s., L = 103m.

Huancayo eS = 66m.11s., e = 73m.12s., eL = 85m.39s.

St. Louis eSKKSE? = 67m.27s., eLE = 95m.

Long waves were also recorded at La Paz.

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Nov. 20d. 21h. Kurile Islands. Suggested deep.

Vladivostok eP = 34m.17s., iS = 38m.21s.
 Irkutsk eP = 36m.29s., eS = 42m.21s.
 Almata eP = 39m.16s.
 Tashkent eP = 39m.49s.
 Tinemaha iPEZ = 40m.14s., ipPEZ = 40m.43s.
 Haiwee iP = 40m.19s., ipPZ = 40m.47s.
 Mount Wilson iPNZ = 40m.27s. a, ipPEZ = 40m.56s., isPZ = 41m.8s.
 Pasadena iP = 40m.27s. a, ipPEZ = 40m.55s., isPZ = 41m.5s.
 Riverside iPZ = 40m.31s. a, ipPZ = 40m.59s., iZ = 41m.12s.
 La Jolla ePZ = 40m.36s.
 Tucson iP = 41m.4s., ipP = 41m.33s.
 St. Louis ePZ = 41m.41s., ipPZ = 42m.9s., iSE = 51m.0s.
 Zürich eP = 42m.3s.
 Chur eP = 42m.6s.
 Helwan iZ = 42m.45s.
 Long waves were also recorded at Bombay, Calcutta, Hyderabad, and Arapuni.

Nov. 20d. Readings also at 3h. (Riverview, Haiwee, Mount Wilson, Pasadena, Palomar, Riverside, Tucson, St. Louis, and Harvard), 6h. (Bogota), 7h. and 8h. (near Fort de France), 10h. (near Balboa Heights), 11h. (Balboa Heights and near Irkutsk), 12h. (Auckland and near Balboa Heights (2)), 15h. (near Trieste), 17h. (Bombay (2), Calcutta (2), Hyderabad (2), New Delhi (2), Andijan, and Tashkent), 18h. (Helwan and Ksara), 19h. (near Mizusawa), 20h. (Mount Wilson, Pasadena, Tucson, and Tinemaha), 21h. (Istanbul).

Nov. 21d. 10h. 2m. 17s. Epicentre 57°0S. 63°0W.

Rough.

A = +.2484, B = -.4876, C = -.8370; $\delta = +3$; $h = -8$;
 D = -.891, E = -.454; G = -.380, H = +.746, K = -.547.

		Δ	Az.	P.	O - C.	S.	O - C.	Supp.	L.
		o	o	m. s.	s.	m. s.	s.	m. s.	m.
La Plata		22.3	12	5 8	+ 7	9 21	+19	—	12.3
Rio de Janeiro	N.	37.0	32	e 7 43	+30	e 15 53	SS	—	e 26.0
La Paz	Z.	40.6	353	i 7 43	0	14 0	+ 6	9 24	PP 21.8
Huancayo		45.9	343	e 8 24	- 2	e 15 15	+ 4	e 10 45	PP e 21.4
Bogota		62.1	348	e 10 24	- 1	—	—	e 12 45	PP e 39.7
Christchurch		69.5	219	11 12	0	20 5	-15	24 6	SS 31.1
Wellington		70.7	222	20 28	S	(20 28)	- 6	—	31.7
Fort de France		71.5	3	e 10 43?	-41	e 20 6?	-37	—	—
Auckland		74.7	225	20 48?	S	(20 48?)	-30	—	33.7
Riverview		85.0	208	e 12 38	0	i 22 59	- 8	e 16 6	PP e 39.3
Tucson		97.6	320	e 13 37	- 1	—	—	—	e 49.1
St. Louis		98.0	338	e 13 46	+ 7	i 24 21	[+ 4]	i 26 36	PS
Florissant	N.	98.2	338	—	—	e 24 26	[+ 8]	—	—
Riverside	Z.	101.6	316	e 17 55	PP	—	—	—	—
Pasadena	Z.	102.0	316	e 18 9	PP	—	—	—	e 48.3
Mount Wilson	Z.	102.1	316	e 18 9	PP	—	—	—	—
Helwan	Z.	116.8	76	e 20 7	PP	e 30 5	PPS	—	—
Paris		118.6	44	—	—	e 30 6?	PS	—	e 60.7
Kew		119.7	40	e 33 56	?	—	—	—	—
Colombo	E.	122.2	135	—	—	e 47 43	?	—	e 62.7
Calcutta	N.	139.7	137	e 22 30	PP	—	—	—	—

Additional readings:—

La Plata PE = 6m.10s., SZ = 9m.26s., SE = 10m.21s.
 La Paz SSZ = 16m.58s., iZ = 20m.58s.,
 Huancayo eS_cS = 18m.22s.
 Christchurch SSSE = 26m.11s., QE = 27m.5s.
 Wellington S? = 26m.28s.?, SS? = 27m.43s.?.
 Riverview iSKSE = 22m.53s., iE = 23m.3s., iSS?N = 29m.11s., eQEN = 35m.25s.
 St. Louis eSSE = 31m.47s.
 Helwan eZ = 20m.23s.
 Kew ePKS?Z = 35m.43s., eSKS?Z = 39m.13s., eSSS?NZ = 54m.43s.?, record wrongly interpreted.
 Long waves were also recorded at Montezuma, San Juan, Chicago, Bozeman, College, Clermont-Ferrand, Uccle, Upsala, and Bergen.

Nov. 21d. Readings also at 1h. (Bucharest, near Istanbul, near Granada, and Malaga), 8h. (Riverview), 9h. (Auckland, Christchurch, and Wellington), 13h. (near Andijan), 15h. (Almata (2), Andijan, Haiwee, La Jolla, Mount Wilson, Pasadena, Riverside, Santa Barbara, Tinemaha, Tucson, St. Louis, Brisbane, and Riverview).

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Nov. 22d. Readings at 5h. (Tucson and near La Paz), 6h. (Bombay), 11h. (Kew and near Malaga), 12h. (Kew), 16h. (La Paz).

Nov. 23d. Readings at 4h. (near Mizusawa), 5h. (Haiwee, Mount Wilson, Riverside, Tucson, Tinemaha, Pasadena, and St. Louis), 11h. (Bombay, Calcutta, New Delhi, Hyderabad, Kodaikanal, Sitka, Mount Wilson, Pasadena, Tucson, Riverside, and St. Louis), 16h. (near Andijan).

Nov. 24d. 4h. 49m. 3s. Epinentre 19°·0S. 169°·0E. Depth of focus 0·015.

A = -·9288, B = +·1805, C = -·3236; δ = -3; h = +5;
D = +·191, E = +·982; G = +·318, H = -·062, K = -·946.

	Δ °	Az. °	P.		O-C.	S.		O-C.	Supp		L. m.
			m.	s.	s.	m.	s.	m.	s.		
Brisbane	16·9	237	i 3	51k	+ 1	i 7	2	+10	—	—	—
Auckland	18·5	166	4	7	- 2	7	32	+ 5	8	7	—
Apia	19·1	79	i 4	10	- 5	e 7	32	- 8	i 4	38	—
Arapuni	19·9	165	4	27	+ 4	7	57?	+ 2	—	—	—
New Plymouth	20·5	168	4	34	+ 4	8	13	+ 6	—	—	—
Tuai	21·0	163	4	37	+ 2	8	19	+ 3	—	—	—
Riverview	21·7	223	i 4	42k	0	i 8	34	+ 6	i 5	11	pP e 10·5
Sydney	21·7	223	i 4	39	- 3	i 8	39	+11	—	—	—
Wellington	22·8	169	4	49	- 3	8	44	- 4	5	19	sP
Kaimata	23·6	176	5	4	+ 4	9	4	+ 2	i 5	18	pP
Christchurch	24·6	174	5	10	0	9	18	0	5	43	pP
Perth	49·3	244	8	39	+ 1	15	32	- 1	i 16	32	sS e 21·3
Honolulu	51·6	41	e 8	55	0	e 16	5	0	i 17	12	sS e 21·1
Mera	60·4	333	10	1	+ 3	—	—	—	—	—	—
Yokohama	60·9	333	10	7	+ 6	18	16	+ 9	—	—	—
Shizuoka	61·0	332	10	1	- 1	18	9	0	—	—	—
Siomisaki	61·0	330	e 9	58	- 4	—	—	—	—	—	—
Kakioka	61·3	335	e 10	5	+ 1	—	—	—	—	—	—
Kobu	61·5	333	e 10	6	+ 1	—	—	—	—	—	—
Kumagaya	61·6	334	i 10	5	- 1	—	—	—	—	—	—
Kameyama	61·8	331	10	7	0	—	—	—	—	—	—
Maebasi	61·9	334	e 10	7	- 1	—	—	—	—	—	—
Miyazaki	62·1	325	9	27	-42	17	33	-50	—	—	—
Hikone	62·3	332	e 10	10	- 1	—	—	—	—	—	—
Kobe	62·3	330	e 10	9	- 2	18	20	- 5	—	—	—
Kōti	62·3	327	e 10	10	- 1	—	—	—	—	—	—
Nagano	62·5	333	e 10	13	+ 1	18	33	+ 5	—	—	—
Sendai	62·8	337	10	13	- 1	18	30	- 1	—	—	—
Toyama	63·0	332	e 11	16	+60	—	—	—	—	—	—
Kumamoto	63·2	325	e 10	15	- 2	—	—	—	—	—	—
Mizusawa	E. 63·4	337	10	23	+ 3	18	40	+ 1	—	—	—
	N. 63·4	337	10	19	+ 1	18	44	+ 5	—	—	—
Morioka	63·9	338	e 10	19	- 2	18	42	- 3	—	—	—
Hamada	64·1	327	e 10	23	0	18	47	0	—	—	—
Akita	64·3	337	10	28	+ 4	—	—	—	—	—	—
Vladivostok	70·6	333	i 11	0	- 3	i 19	40	-25	i 11	39	pP
Santa Clara	85·7	49	i 12	26	0	i 24	6	PS	—	—	—
Ukiah	85·7	47	e 12	25	- 1	e 22	28	[- 8]	e 15	24	PP e 39·1
Berkeley	85·8	49	12	25	- 1	22	31	[- 6]	24	7	PS
Santa Barbara	86·1	52	i 12	26 _a	- 2	e 24	5	PS	—	—	—
Pasadena	87·1	53	i 12	31 _a	- 1	i 23	0	+ 1	i 13	14	pP e 35·5
La Jolla	87·2	55	i 12	33	0	i 22	44	[- 11]	e 23	52	sS
Mount Wilson	87·2	53	i 12	31 _a	- 2	e 22	41	[- 4]	i 13	14	pP
Riverside	87·6	53	i 12	33 _a	- 2	e 23	2	- 2	i 13	15	pP
Haiwee	88·1	51	i 12	37 _a	0	e 22	49	[- 3]	e 24	26	PS
Tinemaha	88·3	51	i 12	37 _a	- 1	e 22	39	[-14]	i 13	18	pP
Calcutta	N. 88·9	294	e 13	16	pP	i 22	49	[- 7]	i 23	11	S
Sitka	89·1	28	i 12	38	- 4	i 23	12	- 5	i 13	13	pP e 40·6
College	89·9	18	e 12	44	- 2	i 23	18	- 7	e 24	39	sS e 36·0
Victoria	90·1	39	e 13	55	pP	e 23	9	[+ 5]	—	—	38·0

Continued on next page.

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	Δ	Az.	P.		O-C.	S.		O-C.	Supp.		L.	
	°	°	m.	s.	s.	m.	s.	s.	m.	s.	m.	
Boulder City	90.3	53	i 12	47	- 1	i 23	30	+ 2	i 13	31	pP	—
Irkutsk	90.4	326	e 12	42	- 6	i 23	4	[- 1]	24	0	sSKS	—
Colombo	91.4	277	e 23	27	S	(23 27?)		-11			—	—
Tucson	92.0	57	i 12	55	0	e 23	44	+ 1	i 13	40	pP	e 39.4
Salt Lake City	94.3	49	e 13	20?	+14	i 23	40?	[+12]	e 24	55	sS	e 39.7
Kodaikanal	E. 94.7	280	i 15	0	?	i 24	50	SP			—	39.4
Hyderabad	N. 96.0	287	13	52	pP	23	33	[- 4]	24	19	S	38.4
Bozeman	96.6	44	e 13	13	- 3	i 24	24	+ 1	i 25	41	sS	e 39.2
New Delhi	100.4	297	e 14	11	pP	i 24	52	- 3	i 23	54	SKS	—
Rapid City	101.4	47	e 13	38	0	e 25	14	+11	i 24	1	SKS	e 43.0
Bombay	N. 101.6	286	e 14	17	pP	i 25	5	0	i 24	3	SKS	—
Frunse	105.8	311			—	24	23	[- 1]			—	—
Andijan	107.1	307			—	24	30	[0]			—	—
Huancayo	109.5	111	e 14	10	P	e 24	10	[-30]	i 18	52	PP	e 45.5
Tashkent	109.5	308	e 14	16	P	24	41	[+ 1]	e 14	52	pP	—
Florissant	109.8	55	e 14	12	P	i 24	33	[- 9]	i 25	33	sSKS	—
St. Louis	109.9	55	e 14	15	P	i 24	37	[- 5]	i 25	34	sSKS	—
La Plata	110.3	140	18	42	PP	24	45	[+ 2]	28	9	PS	—
Tananarive	111.3	240	19	52	sPP	24	50	[+ 3]	25	47	sSKS	e 57.5
Chicago	112.2	52	e 19	0	PP	e 25	49	sSKS	e 29	32	SPP	e 46.4
La Paz	113.7	119	i 14	32	P	24	57	[0]	15	19	pP	53.2
Sverdlovsk	115.7	325	e 19	32	PP	25	3	[- 2]	20	4	pPP	—
Columbia	116.6	60			—	e 25	1	[- 7]	e 29	16	PS	e 51.0
Bogota	116.9	95	e 18	29	[- 1]	e 24	54	[-15]	e 19	42	PP	—
New Kensington	118.1	53	e 20	45	pPP	e 29	28	PS	i 30	39	PPS	e 49.1
Pennsylvania	119.5	53			—	i 25	13	[- 6]	i 28	55	SP	—
Georgetown	120.1	56	e 15	27	?	29	50	PS	i 19	58	PP	56.0
Ottawa	121.0	48	18	35	[- 2]	25	17	[- 6]	20	4	PP	e 51.0
Philadelphia	121.6	55	i 20	18	PP	i 25	30	[+ 5]	e 26	35	sSKS	e 49.9
Fordham	122.5	53	e 18	39	[- 1]	i 31	11	SPP	i 20	17	PP	e 61.3
Seven Falls	124.1	46	e 20	28	PP	e 26	49	sSKS	e 31	25	SPP	63.0
Harvard	124.2	51	i 18	41	[- 2]			—	i 20	27	PP	—
Weston	124.4	51	18	42	[- 2]	31	0	sSP	20	28	PP	51.3
Rio de Janeiro	N. 127.8	141	20	54	PP	e 30	53	PS			—	—
San Juan	128.0	81	i 20	54	PP	e 30	7	SP	i 21	54	pPP	e 53.1
Bermuda	130.3	64	e 21	4	PP			—	e 39	29	SSP	e 49.9
Fort de France	131.9	88	e 14	8?	?			—			—	—
Upsala	134.3	341	i 22	30?	pPP	e 39	17	SS	e 39	47	sSP	e 55.0
Ksara	135.9	299	e 19	8	[+ 2]			—	e 22	28	pPP	—
Copenhagen	139.3	340	e 19	5	[- 7]	34	50	PPS	i 19	50	pPKP	—
Istanbul	139.4	312	19	13	[+ 1]	28	7	?	22	36	pPP	—
Bucharest	140.0	318	e 19	45	pPKP			—	e 22	47	pPP	36.0
Helwan	z. 140.2	294	19	7	[- 6]			—	e 19	49	pPKP	—
Potsdam	141.7	337	e 19	21	[+ 5]			—	i 22	56?	pPP	e 56.0
Sofia	142.6	317	e 19	13	[- 5]			—	i 23	5	pPP	—
Prague	143.0	333	e 19	51?	pPKP	e 25	57	[-17]	e 22	9	PP	e 60.2
Belgrade	143.3	321	i 19	21	[+ 2]			—	e 20	3	pPKP	—
Jena	143.5	335	e 19	16	[- 4]			—	e 20	7	pPKP	—
Cheb	143.8	335	e 19	27	[+ 7]			—			—	—
Uccle	146.0	344	e 19	23	[- 1]	e 41	57?	SS	i 20	5	pPKP	—
Triest	146.4	329	i 19	25	[0]	i 33	34	PS	i 22	29	PP	—
Kew	146.5	348	i 19	24	[- 1]	i 41	42	SS	i 19	53	pPKP	—
Strasbourg	146.8	337	e 19	28	[+ 2]			—	i 20	9	pPKP	—
Chur	147.5	334	e 19	26	[- 1]			—			—	—
Zürich	147.5	335	i 19	24 _a	[- 3]			—	e 20	7	pPKP	—
Basle	147.7	336	e 19	25	[- 2]			—	e 20	10	pPKP	—
Milan	148.7	332	i 19	31	[+ 3]			—	20	25?	pPKP	—
Clermont-Ferrand	150.9	340	e 19	27	[- 5]			—			—	—
Tortosa	156.1	338			—	23	14	SKP	24	24	pPP	e 79.0
Lisbon	160.3	355	i 19	43 _k	[- 2]	43	45	SS	i 19	59 _a	pPKP	79.0
Granada	160.7	343	i 19	43 _k	[- 3]	26	54	[+18]	20	5	pPKP	77.3
Malaga	161.4	344	i 19	45 _k	[- 1]	26	32	[- 4]	i 20	28	PKP ₁	e 73.5
San Fernando	162.1	348	19	45	[- 2]	30	34	SKKP	20	26	PKP ₁	77.0

For Notes see next page.

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NOTES TO NOVEMBER 24d. 4h. 49m. 3s.

Additional readings:—

Auckland PP = 4m.52s., i = 5m.18s., and 6m.23s., SS = 8m.37s., i = 10m.12s., S_cP = 11m.33s., P_cS = 11m.57s.
 Riverview iPP?N = 5m.22s., iPPPEZ = 5m.28s., iE = 5m.45s., and 5m.56s., iQ?N = 9m.12s., isSE = 9m.19s.
 Wellington PPZ = 5m.28s., Z = 5m.59s., and 7m.14s., pP_cP? = 9m.29s., i = 10m.14s., S_cSZ = 15m.43s.
 Kaimata i = 5m.7s., and 10m.1s., S_cS = 15m.48s.
 Christchurch sPZ = 5m.56s., sSE = 10m.23s., S_cSE = 15m.57s.
 Perth PPP = 10m.52s., sS = 18m.2s., SSS = 19m.7s.
 Honolulu i = 12m.0s., e = 20m.39s.
 Ukiah eS? = 23m.35s., e = 28m.50s.
 Berkeley PP = 13m.9s., e = 25m.55s.
 Pasadena iZ = 13m.5s., iPPNZ = 15m.50s., ipPPZ = 16m.40s., iSKSE = 22m.40s., isSE = 23m.55s., iNZ = 24m.13s., iZ = 25m.6s., iPKP,PKPZ = 38m.35s., ipPKP,PKPZ = 39m.15s.
 Mount Wilson iPPZ = 15m.57s., ipPPZ = 16m.39s., esSE = 23m.53s., eZ = 24m.0s., ePKKPKZ = 30m.58s., iPKP,PKPZ = 38m.35s., epPKP,PKPZ = 39m.9s., iZ = 39m.17s., eSKP,PKPZ = 41m.36s.
 Riverside isPZ = 13m.36s., eSKSE = 22m.45s., esSEN = 23m.55s., ePKP,PKPZ = 38m.30s.
 Tinemaha eE = 24m.7s., eZ = 25m.14s., ePKP,PKPZ = 38m.52s.
 Calcutta iN = 27m.31s.
 Sitka e = 16m.18s., and 22m.47s., isS = 24m.21s., i = 25m.15s., and 25m.31s., e = 30m.10s., i = 36m.57s.,
 College ePP = 16m.18s., eSKS = 22m.56s., c = 24m.17s., and 25m.22s., eSS = 29m.25s.
 Boulder City i = 23m.5s., 23m.34s., and 38m.19s.
 Tucson i = 13m.10s., and 16m.14s., iPP? = 16m.35s., ipPP = 17m.30s., e = 17m.50s., iSKS = 23m.12s., e = 24m.16s., iPS = 25m.5s., i = 26m.2s., and 30m.15s., e = 34m.35s., ePKP,PKP = 38m.14s., ipPKP,PKP = 39m.5s.
 Salt Lake City e = 16m.39s.?, 18m.2s.?, and 26m.45s.?
 Hyderabad eN = 16m.42s.
 Bozeman ePP = 17m.9s., iSKS = 23m.38s., eSS = 30m.39s., eSSS = 35m.7s.
 New Delhi iEN = 18m.18s., iN = 25m.7s., iE = 25m.10s., eN = 28m.56s., SSN = 32m.6s.
 Rapid City e = 16m.9s., ePS = 26m.48s., e = 33m.25s.,
 Bombay iEN = 17m.23s., iSKKSN = 24m.38s., iSE = 25m.2s., SSE = 32m.13s., SSN = 32m.16s.
 Huancayo ipPP = 19m.38s., e = 25m.38s., iPS = 28m.15s., i = 28m.21s., eSS = 33m.33s., 34m.33s.
 Florissant iPPZ = 18m.46s., iZ = 19m.46s., iSKKSE = 25m.57s., iSE = 26m.49s., iPSE = 28m.6s., iPPSE = 29m.5s., iE = 33m.32s., isSE = 34m.14s., isSSE = 25m.18s., iE = 36m.0s., and 37m.2s., isSSE = 38m.21s.
 St. Louis eE = 17m.35s., iPPZ = 18m.45s., iE = 19m.44s., iSKKSE = 25m.54s., iSE = 26m.51s., iPSE = 28m.13s., iPPSE = 29m.11s., iE = 30m.36s., isSE = 34m.12s., isSSE = 35m.18s., isSSE = 38m.23s.
 La Plata PZ = 18m.45s., S?E = 24m.39s., N = 28m.16s.
 Tananarive SP = 28m.14s., SS = 34m.20s.
 Chicago e = 23m.13s., eS = 26m.36s., e = 27m.53s., eSS = 34m.28s., e = 35m.26s., 38m.35s., and 41m.49s.
 La Paz iPPZ = 19m.17s., ipPP = 20m.14s., SKKS = 26m.53s., PSZ = 28m.15s., PPS = 29m.59s., iZ = 30m.19s., and 31m.13s., SS = 34m.51s., iZ = 37m.39s.
 Sverdlovsk iS = 27m.4s.?, iPPS = 29m.40s.
 Columbia e = 26m.18s., eS = 27m.22s., e = 28m.34s., eSS = 35m.26s.
 New Kensington e = 26m.32s., and 36m.35s.
 Pennsylvania i = 30m.42s., e = 32m.19s., i = 37m.24s., e = 42m.25s., e = 54m.35s.
 Georgetown SS = 35m.53s., 36m.1s., SSS = 40m.59s.
 Ottawa SKKS = 26m.43s., S = 27m.45s., PS = 30m.51s., SS = 36m.27s., SSS = 42m.21s.
 Philadelphia e = 21m.28s., and 29m.13s., ePS = 30m.4s., eSS = 36m.32s., esSS = 38m.7s., e = 39m.43s., and 40m.46s.
 Fordham i = 21m.16s., iSKKS = 28m.17s., iSS = 36m.50s.
 Seven Falls e = 38m.4s.
 Weston e = 21m.27s., SS = 37m.12s.
 San Juan i = 22m.9s., and 31m.50s., eSS = 38m.50s.
 Bermuda i = 22m.18s., e = 29m.1s., 33m.47s., and 34m.57s.
 Upsala e = 23m.7s.?, eE = 28m.29s., eN = 34m.57s.?
 Copenhagen 19m.11s., i = 22m.32s., 22m.47s., 23m.32s., and 40m.21s.?
 Istanbul SS? = 35m.17s., e = 46m.21s.
 Bucharest eE = 23m.32s.
 Helwan eZ = 22m.20s., eE = 22m.41s., eZ = 23m.52s., and 27m.12s.
 Potsdam esPPE = 23m.40s.
 Sofia iN = 20m.57s. and 21m.35s., iE = 21m.45s.
 Prague eSKP = 23m.39s., ePPP = 25m.33s., e = 26m.51s., eSKKS = 29m.15s., eSKSP = 32m.51s., ePPS = 34m.51s., eSS = 41m.9s., eSSS = 45m.57s.
 Belgrade i = 21m.25s., iPKS = 23m.53s., ePPP = 25m.30s.
 Jena eZ = 20m.46s., eE = 21m.3s., eZ = 23m.16s.
 Uccle ePPN = 22m.48s., epPPE = 23m.7s.

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Triest $iPP_1 = 21m.50s.$
 Kew $iEN = 19m.43s., i = 20m.8s., iE = 20m.20s., eE = 20m.53s., iZ = 22m.51s., iNZ = 23m.40s., eE = 34m.47s., iE = 36m.9s., iEN = 42m.58s., eE = 44m.11s., iE = 48m.7s.,$ and $61m.22s.$
 Clermont-Ferrand $i = 19m.38s., e = 22m.56s.?,$ and $40m.21s.$
 Tortosa $PPN = 34m.7s., SSE = 43m.29s., PSSE = 44m.40s.,$
 Lisbon $PKP_2N = 20m.49s., pPKP_2N = 21m.5s.?, PPN = 24m.4s.?, iPPZ = 24m.8s.,$
 $pPPZ = 24m.46s., E = 30m.7s., N = 33m.13s., SSN = 44m.57s., SSSE = 49m.51s.,$
 $E = 58m.9s., Q = 65.4m.$
 Granada $iPKP_2 = 20m.27s., pPKP_2 = 20m.53s., iPP = 24m.3s., pPP = 24m.31s.,$
 $sPP = 24m.49s., sSKKS = 31m.47s., PPS = 38m.21s., iSS = 44m.11s.$
 Malaga $iPP = 24m.16s., PPP = 28m.4s., P_2S, PKP = 30m.48s., PPP (\Delta > 180^\circ) = 32m.24s.,$
 $PPS = 37m.32s., SS = 43m.56s.$
 San Fernando $PPEZ = 24m.21s., iEZ = 25m.16s., PSKSE = 34m.36s., SSE = 44m.32s.,$
 $SSSE = 49m.40s.$

Nov. 24d. Readings also at 0h. (near Bogota), 6h. (near Trieste), 19h. (St. Louis), 18h. (Santa Clara).

Nov. 25d. 23h. Undetermined Shock.

Epicentre: in the sea off the coast of Galicia (North-west Spain) approximately $43^\circ N, 10^\circ W.$
 Depth 20km. Intensity V at Corunna and Moncao (Portugal).

Boletín del Observatorio del Ebro, Resumen de las Observaciones solares, meteorológicas y sismológicas efectuadas durante el año 1944, Tortosa 1945, p. 191.

Lisbon $Z = 54m.10s., N = 54m.36s., Z = 54m.56s., P^*E = 55m.2s., E = 55m.31s., SE = 55m.37s.,$
 $E = 55m.40s., QE = 55m.55s., RN = 56m.12s.$

Toledo $P = 54m.18s.$

Malaga $eP = 54m.51s.k, P_2S_2 = 56m.19s., PS_{22} = 56m.59s., S_{22} = 57m.9s., S_{23} = 57m.21s.,$
 $i = 57m.49s.$

Tortosa $ePE = 54m.46s., P_{22}E = 55m.29s., P_{22}S_{22}EN = 56m.17s., S_{22}E = 57m.9s., S_{22}N = 57m.13s.,$
 $S_{22}N = 57m.17s.$

Alicante $P = 56m.2s.,$

Zürich $e = 56m.8s.$

Granada $eP_{22} = 56m.33s.a, iP_{22} = 56m.59s., P_{22}S_{22} = 57m.13s., P_{22}S_{22} = 57m.24s., PS_{22} = 57m.53s.,$
 $iS_{22} = 58m.3s.$

San Fernando $eP^*E = 56m.40s.$

Almeria $P = 57m.3s.$

Basle $e = 58m.17s.$

Clermont-Ferrand $e = 55m.7s., i = 56m.49s.$

Nov. 25d. Readings also at 16h. (near Almata, Andijan, and Tashkent), 19h. (Mizusawa and near Ottawa), 23h. (La Paz).

Nov. 26d. 8h. 15m. 39s. Epicentre $18^\circ 1S, 170^\circ 6W.$

$A = -.9384, B = -.1554, C = -.3088; \delta = +10; h = +5;$
 $D = -.163, E = +.987; G = +.305, H = +.050, K = -.951.$

		Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		$^\circ$	$^\circ$	m. s.	s.	m. s.	s.	m. s.	m.
Apia		4.4	345	i 1 9	- 1	e 2 9	+ 7	—	—
Auckland		22.7	212	5 1	- 3	9 1	- 8	5 32	PP 10.8
Arapuni		23.2	208	—	—	8 51?	-27	—	—
Wellington		26.3	205	5 10?	-29	i 10 3	- 8	6 11	PP 11.4
Christchurch		29.0	205	10 40	S	(10 40)	-14	13 6	SSS 14.0
Brisbane	N.	34.7	248	e 6 58	+ 3	i 10 59	-85	—	—
Riverview		37.5	238	i 6 44	-33	i 12 1	-66	i 8 58	PPP e 15.8
Sydney		37.5	238	e 7 39	+22	e 11 48	-79	—	e 15.4
Pasadena		72.0	44	e 11 27	- 1	—	—	i 21 49	PPS e 30.8
Mount Wilson	Z.	72.2	44	e 11 29	0	—	—	—	—
Riverside	Z.	72.5	44	e 11 27	- 3	—	—	—	—
Haiwee	Z.	73.4	43	e 11 37	+ 1	—	—	—	—
Tinemaha	Z.	73.8	42	i 11 37	- 1	—	—	—	—
Tucson		76.0	49	e 11 53	+ 2	—	—	i 12 10	? e 36.0
St. Louis		93.9	51	—	—	e 31 25	SSS	—	—

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	Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Chur	151.3	0	e 19 37	[-12]	—	—	—	—
Ksara	151.6	308	e 19 34?	[-16]	—	—	e 22 10	?
Triest	152.3	354	e 17 31	?	—	—	—	—
Helwan	Z. 156.8	303	19 43	[-14]	—	—	20 21	PKP ₁
Granada	157.8	28	i 40 50	?	—	—	—	61.6
Malaga	157.8	29	i 19 15 _a	[-43]	26 12	[-50]	i 24 12	PP 81.7

Additional readings:—

Auckland i = 9m.43s.

Wellington SZ = 9m.37s., Q?Z = 11m.13s.

Christchurch SE = 12m.44s.,

Riverview iSSN = 14m.28s.

Helwan iZ = 19m.53s., eZ = 21m.5s.

Malaga iPKP₁ = 20m.35s.

Long waves were also recorded at Honolulu, Huancayo, La Paz, Bozeman, College, Sitka, Uccle, Kew, Paris, and Clermont-Ferrand.

Nov. 26d. Readings also at 0h. (Christchurch, Riverview, Colombo, New Delhi, Granada, and St. Louis), 1h. (Ksara), 3h. (near Santa Clara), 6h. (near Stalinabad (3)), 7h. (Riverview, Tucson, Tinemaha, Haiwee, Riverside (2), Mount Wilson (2), Pasadena, Santa Barbara, La Jolla,) 8h. (La Paz), 9h. (Lisbon, New Delhi, Hyderabad, Calcutta, and Bombay), 15h. (Riverview), 17h. (Tucson), 18h. (Pasadena, Mount Wilson, Tucson, and Tinemaha).

Nov. 27d. 10h.

Explosion at Burton-on-Trent, Staffordshire, England, was recorded as local earthquake throughout Northern Europe.

H. Jeffreys.

"On the Burton-on-Trent explosion of November 27th, 1944."

Monthly Notices of the Royal Astronomical Society, Geophys. Supp. vol. V, No. 5, London, 1947, pp. 99-104.

Locality 52°51'N. 1°44'W., estimated time 10h. 10m. 39s.

Kew i = 11m.12s.

Clermont-Ferrand eP = 12m.35s., P₂ = 13m.8s. or 13m.13s., S₂ = 14m.54s.

Basle eP = 12m.39s., e = 14m.57s.

Neuchatel eP = 12m.40s.

Zürich eP = 12m.47s._a, e = 14m.26s.

Jena eN = 13m.23s., eE = 13m.28s. and 15m.42s.

Strasbourg i = 14m.0s., e = 14m.40s. and 15m.40s.

Nov. 27d. 16h. Undetermined shock.

Oaxaca PN = 33m.27s.

Puebla PN = 33m.42s.

Tacubaya PN = 33m.50s.

Tucson iP = 37m.28s., e = 38m.20s., eS? = 43m.20s., eL? = 43m.24s.

St. Louis ePZ = 38m.6s., iZ = 38m.16s., eS?N = 42m.31s., eLN = 47.4m.

Florissant ePZ = 38m.7s.

La Jolla ePZ = 38m.16s.

Riverside iPZ = 38m.21s.

Mount Wilson iPZ = 38m.27s.

Pasadena iPZ = 38m.27s.

Haiwee eP = 38m.40s.

Tinemaha iPEZ = 38m.45s.

Nov. 27d. Readings also at 2h. (near Andijan), 5h. (near Triest, Strasbourg, Jena, Basle (2), Neuchatel, Zürich (2), and Clermont-Ferrand), 13h. (Brisbane, Riverview, Mount Wilson, Pasadena, Riverside, and Tinemaha), 21h. (Fort de France), 23h. (near Tucson).

Nov. 28d. Readings at 0h. (Kew), 3h. (Haiwee, Mount Wilson, Pasadena, Tucson, Riverside, Tinemaha, and La Paz), 4h. (near Alicante), 14h. (near Balboa Heights and near Sofia), 15h. (near Andijan), 16h. (Haiwee, Mount Wilson, Pasadena, Riverside, Tinemaha, Tucson, Salt Lake City, St. Louis, Chicago, and near Balboa Heights), 18h. (Vladivostok and near Mizusawa), 19h. (Andijan, Tashkent, Helwan, Uccle, Riverview, St. Louis, Tucson, Mount Wilson, Haiwee, Pasadena, Riverside, and Tinemaha).

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Nov. 29d. 18h. 51m. 14s. Epicentre 19°·0S. 169°·2E. Depth of focus 0·005.

A = -·9294, B = +·1773, C = -·3236; $\delta = -6$; $h = +5$;
D = +·187, E = +·982; G = +·318, H = -·061, K = -·946.

	Δ °	Az. °	P.		O-C. s.	S.		O-C. s.	Supp.		L. m.	
			m.	s.		m.	s.		m.	s.		
Brisbane	17·1	237	i 3	58k	+ 2	i 7	8	+ 5	i 7	23	SS	—
Auckland	18·5	166	4	11	- 2	7	39	+ 5	4	37	pP	—
Apia	19·0	79	i 4	20	+ 1	—	—	—	e 4	44	pP	—
Arapuni	19·8	165	—	—	—	7	52	-10	—	—	—	—
New Plymouth	20·4	168	4	38	+ 4	8	24	+10	—	—	—	—
Riverview	21·8	223	i 4	49k	+ 1	i 8	40	0	i 5	19	pP	e 10·7
Sydney	21·8	223	e 4	49	+ 1	e 9	16	+36	—	—	—	—
Wellington	22·7	169	4	57	0	8	51	- 5	5	18	pP	—
Kaimata	23·5	176	5	15	+10	9	10	0	16	1	S _c S	—
Christchurch	24·6	174	5	14	- 1	9	20	- 9	5	48	pP	—
Perth	49·4	244	i 11	36	PPP	i 15	46	0	i 19	36	SS	—
Santa Barbara	85·9	52	i 12	36	+ 2	—	—	—	—	—	—	—
Pasadena	86·9	53	i 12	38 _a	- 1	i 22	53	[- 5]	—	—	—	e 39·8
Mount Wilson	87·1	53	i 12	40 _a	0	—	—	—	—	—	—	—
La Jolla	z. 87·1	55	e 12	40	0	—	—	—	—	—	—	—
Riverside	z. 87·5	53	i 12	41 _a	- 1	—	—	—	e 38	43	P'P'	—
Haiwee	87·9	51	e 12	44	0	—	—	—	—	—	—	—
Tinemaha	88·1	51	i 12	43 _a	- 2	—	—	—	—	—	—	—
Calcutta	N. 89·1	294	—	—	—	e 23	0	[- 11]	—	—	—	—
Colombo	E. 91·6	277	23	19	SKS	(23	19)	[- 7]	—	—	—	—
Tucson	91·8	57	i 13	2	0	e 24	43	PS	i 13	52	pP	e 41·3
Hyderabad	N. 96·2	287	—	—	—	23	40	[- 12]	—	—	—	—
Bozeman	96·5	44	—	—	—	e 23	47	[- 6]	e 25	6	PS	e 46·9
New Delhi	N. 100·6	297	—	—	—	i 25	8	PS	—	—	—	—
Bombay	E. 101·8	286	e 14	25	pP	i 24	8	[- 12]	e 17	30	PP	—
Andijan	107·2	307	e 18	56	PP	24	41	[- 3]	—	—	—	—
Huancayo	109·3	111	e 18	53	PP	e 24	37	[- 16]	e 34	2	SS	e 39·0
Florissant	E. 109·6	55	—	—	—	e 26	9	SKKS	i 29	19	PPS	—
St. Louis	109·7	55	e 18	44	PP	e 24	48	[- 7]	i 35	31	SS	—
La Paz	z. 113·5	119	i 19	23	PP	29	51	PPS	—	—	—	53·2
Ottawa	120·8	48	e 18	43	[- 1]	e 26	46	SKKS	e 31	4	PPS	57·8
Fordham	122·4	53	e 21	28	?	e 36	22	SS	—	—	—	—
Seven Falls	124·0	46	—	—	—	e 30	34	PS	—	—	—	38·8
San Juan	127·8	81	e 21	58	PP	i 31	53	PPS	e 39	15	SS	e 48·9
Ksara	136·0	299	e 19	22	[+ 8]	—	—	—	e 22	36	PP	—
Helwan	z. 140·3	294	e 19	22	[0]	i 22	25	PKS	e 20	5	sPKP	—
Jena	143·5	335	e 19	25	[- 3]	—	—	—	—	—	—	—
Strasbourg	146·9	337	e 19	38	[+ 4]	—	—	—	—	—	—	—
Chur	147·6	334	e 19	33	[- 2]	—	—	—	e 20	11	sPKP	—
Zürich	147·6	335	e 19	34 _a	[- 1]	—	—	—	i 19	41	pPKP	—
Basle	147·8	336	e 19	34	[- 1]	—	—	—	—	—	—	—
Clermont-Ferrand	150·9	340	e 19	45	[+ 5]	—	—	—	—	—	—	—
Granada	160·8	343	i 19	54 _a	[+ 1]	30	4	SKKS	i 20	23	pPKP	93·3
Malaga	161·5	344	i 19	53 _a	[0]	33	52	PS	i 20	34	pPKP	—

Additional readings :—

Auckland i = 5m.3s., SS = 8m.46s., i = 9m.18s., S_cP = 11m.41s., P_cS = 12m.4s.
Riverview iEN = 5m.31s., iE = 6m.4s., iN = 6m.7s., and 6m.43s., iE = 8m.17s., and 8m.47s., iN = 9m.8s., isSE = 9m.30s., iSSN = 9m.39s.
Wellington sPZ = 5m.36s., PPZ = 5m.47s., iZ = 6m.17s., P_cPZ = 9m.16s., sS = 9m.39s., i = 10m.13s., S_cS = 15m.52s.
Christchurch sP = 6m.6s., sS = 10m.29s.
Perth i = 18m.31s. and 20m.13s.
Pasadena iZ = 12m.44s., iN = 13m.59s., eSN = 23m.5s., esSE = 23m.59s., iZ = 25m.20s.
Mount Wilson iZ = 13m.29s.
La Jolla iZ = 12m.46s.
Riverside iZ = 12m.48s., and 13m.28s., eZ = 39m.22s.
Tinemaha iZ = 12m.47s. and 12m.51s.
Calcutta iN = 23m.26s.
Tucson i = 13m.9s., e = 16m.39s., ePS = 25m.15s.
Bozeman e = 25m.48s., and 32m.5s.
Bombay iSN = 25m.15s., iE = 25m.28s.

Continued on next page.

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Florissant $iE = 26m.59s.$, $eE = 28m.33s.$ and $35m.29s.$, $iE = 40m.3s.$
 St. Louis $eE = 19m.53s.$, $eSKS?E = 26m.3s.$, $eSN = 26m.35s.$, $iE = 27m.1s.$, $iSN = 27m.45s.$
 $eE = 28m.34s.$, $ePPS?EN = 29m.21s.$, $eSSS?N = 39m.31s.$
 La Paz $SKKS = 31m.29s.$, $S = 32m.2s.$
 San Juan $i = 22m.17s.$, $eSS = 34m.54s.$
 Helwan $PKP = 22m.43s.$ (PP), $iZ = 23m.36s.$, $SP?Z = 34m.38s.$, $PS?Z = 34m.55s.$
 Jena $eE = 19m.30s.$
 Basle $e = 21m.9s.$
 Granada $pPKP_2 = 21m.6s.$, $iPP = 24m.22s.$, $pPP = 25m.1s.$
 Malaga $iPP = 24m.31s.$, $P_cP, PKP = 30m.7s.$

Nov. 29d. Readings also at 0h. (Mount Wilson, Pasadena, Riverside, Tinemaha, Tucson, St. Louis, Bogota, La Paz, La Plata, and near Huancayo), 1h. (San Juan), 7h. (near Bogota), 14h. (near Andijan), 16h. (Granada and La Paz), 17h. (Almata and near Andijan), 19h. and 21h. (near Mizusawa).

Nov. 30d. 1h. Undetermined shock. Pasadena suggests deep focus.

Auckland $P = 48m.42s.$, $i = 49m.4s.$, $S = 51m.1s.$, $i = 52m.5s.$, and $53m.0s.$
 Apia $iP = 48m.44s.$, $iS = 50m.57s.$
 Tuai $P = 49m.13s.$, $S = 51m.10s.$
 Wellington $P = 50m.5s.$, $S = 52m.12s.$, $P_cPZ = 55m.0s?$, $S_cPZ = 57m.5s.$, $S_cSZ = 61m.3s.$
 Christchurch $PNZ = 50m.45s.$, $QEN = 54m.7s.$, $eZ = 54m.20s.$, $R?Z = 55m.14s.$
 Brisbane $ePZ = 51m.4s.$, $iE = 51m.43s.$, $iN = 51m.48s.$, $eSN = 56m.35s.$
 Riverview $iPEZ = 51m.24s.$, $ipPEZ = 52m.2s.$, $iEZ = 52m.24s.$, $eE = 52m.51s.$, $iP_cP?N = 54m.5s.$, $iSE = 56m.19s.$, $iN = 57m.11s.$, $iE = 57m.27s.$, $iN = 58m.13s.$, $eLZ = 58.5m.$
 Sydney $e = 52m.27s.$
 Arapuni $iS = 51m.30s.$
 Kaimata $S = 53m.6s.$, $i = 53m.14s.$
 Santa Barbara $iPZ = 57m.47s.$
 Pasadena $iP = 57m.49s.$, $iZ = 58m.33s.$, $eSEZ = 67m.14s.$, $iEN = 67m.52s.$, $eLN = 79.4m.$
 La Jolla $eP = 57m.50s.$
 Riverside $iPZ = 57m.52s.$, $eZ = 58m.35s.$
 Haiwee $iP = 57m.57s.$
 Tinemaha $iP = 57m.59s.$
 Tucson $iP = 58m.8s.$, $e = 58m.52s.$, $i = 58m.55s.$, $ipP = 59m.5s.$, $eSKS = 68m.36s.$, $eL = 78m.43s.$
 La Paz $P = 61m.9s.$, $LZ = 72m.0s.$
 Bombay $eE = 65m.7s.$, $68m.4s.$, $68m.28s.$, and $72m.5s.$, $eN = 72m.9s.$
 Copenhagen $P = 65m.14s.$
 Ksara $e = 65m.18s.$, and $68m.38s.$
 Helwan $PZ = 65m.26s.$, $iZ = 65m.39s.$, $66m.27s.$, $66m.42s.$, $69m.12s.$, and $70m.9s.$, $eZ = 80m.45s.$
 Chur $eP = 65m.29s.$, $e = 65m.47s.$
 Zürich $eP = 65m.54s.$
 Basle $eP = 65m.55s.$
 Malaga $iP = 66m.15s.$, $iPP? = 70m.27s.$, $iPPP = 71m.19s.$, $iS = 76m.35s.$, $SS = 81m.15s.$, $SSS = 85m.13s.$
 Granada $iPKP_2 = 66m.40s.$, $a pPKP_2 = 67m.48s.$, $iPP = 70m.30s.$, $pPP = 71m.25s.$
 Huancayo $eSKS = 69m.18s.$, $eS = 70m.2s.$, $e = 75m.42s.$, $eSS = 76m.16s.$, $eL = 86m.42s.$
 Florissant $eSKSE = 69m.50s.$, $eE = 70m.34s.$, $eSE = 71m.12s.$
 St. Louis $eSKSE = 69m.54s.$, $eE = 70m.36s.$, $SN = 71m.8s.$, $ePS?N = 72m.30s.$, $epPS?E = 74m.8s.$, $eE = 77m.11s.$
 San Juan $iSKS = 70m.47s.$, $ePS = 74m.50s.$, $eL = 96m.40s.$

Nov. 30d. 14h. 55m. 15s. Epicentre $38^{\circ}7'N$. $142^{\circ}1'E$. Depth of focus 0.010.

Intensity VII at Wakayanagi, Matsuo, Iwate Pref.; VI at Miyako; V at Yamagata, Hatinohe; IV at Akita, Onahama, and Sakata.
 Epicentre $38^{\circ}6'N$. $142^{\circ}1'E$. focal depth 60km. Macroseismic radius greater than 300km.
 Seismological Bulletin of the Central Meteorological Observatory, Japan, for the year 1944, Tokyo 1951, p. 24, isoseismic chart p. 24.

$$A = -0.6174, B = +0.4806, C = +0.6227; \quad \delta = -9; \quad h = -1; \\ D = +0.614, E = +0.789; \quad G = -0.491, H = +0.383, K = -0.782.$$

	Δ	Az.	P.	O-C.	S.	O-C.
	°	°	m. s.	s.	m. s.	s.
Miyako	0.9	355	0 21 _a	+ 2	0 34	0
Hatinohe	1.8	346	0 30	0	0 50	- 3
Akita	1.8	306	0 30 _k	0	0 49	- 4
Mito	2.7	209	0 43 _a	0	1 9	- 5
Utunomiya	2.8	219	0 46 _a	+ 2	1 17	0

Continued on next page.

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	Δ	Az.	P.		O - C.	S.		O - C.
	°	°	m.	s.	s.	m.	s.	s.
Tukubasan	2.9	211	0	45	0	1	22	+ 3
Maebasi	3.3	227	0	48 _a	- 3	1	28	- 1
Tokyo	3.5	212	0	55 _a	+ 1	1	52	+18
Mera	4.2	206	1	5	+ 2	—	—	—
Sapporo	4.4	353	1	3 _a	- 3	—	—	—
Toyama	4.4	243	1	5	- 1	1	50	- 6
Misima	4.4	216	1	6	0	—	—	—
Nagoya	5.4	231	1	15	- 5	—	—	—
Gihu	5.4	234	1	18	- 2	2	9	-12
Hikone	5.8	236	1	27	+ 2	2	23	- 8
Kobe	6.9	236	1	39	- 1	2	50	- 8
Kōti	8.7	236	2	2	- 3	—	—	—

Nov. 30d. Readings also at 6h. (near Almata), 13h. (near Zürich (2)), 18h. (Istanbul and Tucson), 19h. (Brisbane, Riverview, Wellington, Auckland, and Christchurch).

Dec. 1d. 4h. 0m. 23s. Epicentre 20°·5S, 179°·0W. Depth of focus 0·080.
(as on 1941, Dec. 31d.).

A = -·9373, B = -·0164, C = -·3481; δ = -3; h = +5;
D = -·017, E = +1·000; G = +·348, H = +·006, K = -·937.

	Δ	Az.	P.		O - C.	S.		O - C.	Supp.		L.
	°	°	m.	s.	s.	m.	s.	s.	m.	s.	m.
Apia	9.6	47	i 2	19	+ 4	i 3	59	- 3	—	—	—
Arapuni	18.1	195	3	37 _?	- 2	6	37	+ 1	—	—	—
Tuai	18.6	190	3	39	- 5	6	29	-16	—	—	—
New Plymouth	19.5	195	3	53	0	6	55	- 5	—	—	—
Wellington	21.4	193	4	7	- 3	7	20	-11	—	—	—
Kaimata	23.4	198	—	—	—	7	53	-11	11	32	S _c S
Christchurch	24.0	195	7	1	?	10	44	?	—	—	—
Brisbane	26.4	250	i 4	55 _k	0	i 8	51	0	—	—	—
Riverview	29.6	237	i 5	23 _k	0	i 9	39	- 2	i 6	59	pP
Sydney	29.6	237	e 7	25	PP	—	—	—	—	—	—
Santa Barbara	z. 78.5	47	e 11	5	- 1	—	—	—	—	—	—
Pasadena	79.4	47	i 11	9	- 2	—	—	—	i 13	11	pP
Mount Wilson	z. 79.5	47	i 11	11	- 1	—	—	—	e 13	15	pP
Riverside	z. 79.8	47	e 11	12	- 1	—	—	—	e 13	17	pP
Haiwee	80.6	46	e 11	17	0	e 20	43	+ 3	i 13	22	pP
Tinemaha	80.9	48	i 11	19 _k	0	—	—	—	e 13	20	pP
Tucson	83.6	52	i 11	32	0	—	—	—	i 13	36	pP
Huancayo	98.2	106	e 15	18	pP	i 22	21	?	e 16	50	PP
Irkutsk	98.2	322	e 15	37 _?	pP	e 20	37 _?	?	—	—	e 35.7
Florissant	101.5	53	—	—	—	e 22	37	[- 5]	e 23	55	S
St. Louis	101.6	53	—	—	—	i 22	39	[- 3]	i 23	55	S
La Paz	z. 102.8	113	i 15	4	pP	e 23	7	+11	i 24	37	pS
Bombay	E. 112.9	282	e 18	37	PP	—	—	—	20	34	pPP
San Juan	117.1	79	—	—	—	i 23	43	[- 1]	—	—	—
Copenhagen	143.8	351	i 18	33	[- 2]	—	—	—	—	—	—
Ksara	146.4	301	e 18	45	[+ 6]	—	—	—	e 21	56	PP
Jena	N. 148.5	347	e 18	44	[+ 2]	—	—	—	—	—	—
Helwan	z. 151.1	295	18	45	[0]	—	—	—	i 21	1	pPKP
Zürich	152.5	351	e 18	54	[+ 7]	—	—	—	—	—	—
Chur	152.8	350	e 18	47	[- 1]	—	—	—	—	—	—
Granada	162.9	13	15	58 _a	?	—	—	—	—	—	43.7
Malaga	163.1	16	e 10	56	?	e 15	24	?	i 23	46	PP e 44.6

For Notes see next page.

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NOTES TO DECEMBER 1d. 4h. 0m. 23s.

Additional readings :—

Wellington $i = 6m.32s.$, $sP = 6m.57s.$, $i = 7m.7s.$, $P_cS = 11m.26s.$, $S_cS = 14m.17s.$
 Christchurch $i = 7m.28s.$, $iEN = 9m.12s.$, $SEN = 10m.59s.$, $iN = 12m.16s.$, $iEN = 14m.28s.$
 Brisbane $iN = 7m.34s.$, $iE = 8m.54s.$, $iN = 11m.32s.$
 Riverview $iP_cPEZ = 8m.4s.$, $isSN = 12m.40s.$, $iEN = 13m.19s.$, $iS_cS = 14m.59s.$, $isS_cS?E = 19m.2s.$
 Mount Wilson $iZ = 11m.15s.$
 Tinemaha $i = 11m.23s.$
 Tucson $i = 29m.46s.$, $iPKP, PKP = 37m.56s.$, $ipPKP, PKP = 40m.24s.$
 Huancayo $e = 23m.0s.$ and $27m.47s.$
 Florissant $eE = 23m.22s.$, $eSSN = 31m.3s.$
 St. Louis $iE = 23m.22s.$, $eSN = 27m.43s.$, $eSSN = 31m.4s.$
 Bombay $iE = 22m.56s.$
 Jena $eEN = 18m.49s.$
 Helwan $iZ = 18m.55s.$, $19m.6s.$, and $21m.10s.$, $eZ = 22m.7s.$ and $29m.16s.$
 Long waves were also recorded at Auckland.

Dec. 1d. 14h. 55m. 18s. Epicentre $39^{\circ}1N$. $141^{\circ}1E$. Depth of focus 0.010.

$A = -.6056$, $B = +.4886$, $C = +.6281$; $\delta = -1$; $h = -1$;
 $D = +.628$, $E = +.778$; $G = -.489$, $H = +.394$, $K = -.778$.

		Δ	Az.	P.	O-C.	S.	O-C.	Supp.	
		$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m.	s.
Mizusawa	E.	0.0	—	0 12	- 1	0 22	- 2	—	—
Irkutsk		28.5	310	5 49	+ 1	e 10 24	- 3	—	—
Almata		47.4	297	8 32	+ 6	15 19	+ 7	—	—
Calcutta	N.	47.6	266	—	—	e 15 22	+ 7	—	—
Andijan		51.5	295	8 57	- 1	16 12	+ 3	11 2	PP
Sverdlovsk		53.5	318	—	—	16 39	+ 3	—	—
Bombay	E.	61.7	272	—	—	e 18 22	- 1	—	—
Riverview	E.	73.2	171	—	—	c 20 43	+ 2	21 13	PS
Tinemaha		74.8	55	e 11 32 _a	+ 1	—	—	i 11 58	pP
Santa Barbara	z.	75.5	58	i 11 34	- 1	—	—	i 12 8	pP
Haiwee		75.6	55	i 11 36	0	—	—	i 12 3	pP
Pasadena		76.6	57	i 11 40	- 2	—	—	i 12 12	pP
Mount Wilson		76.7	57	i 11 42	0	—	—	i 12 15	pP
Riverside	z.	77.3	57	i 11 44	- 2	—	—	i 12 16	pP
Tucson		82.6	54	e 12 12	- 2	—	—	i 12 36	pP
Basle		84.3	330	e 12 23	+ 1	—	—	—	—
La Paz		146.0	56	19 34	[+ 6]	—	—	—	—

Additional readings :—

Andijan $P_cP = 10m.0s.$
 Bombay $iE = 19m.1s.$
 Tinemaha $eZ = 11m.53s.$
 Haiwee $iZ = 11m.43s.$

Dec. 1d. Readings also at 4h. (Fordham and San Juan), 10h. (Riverview), 12h. (Riverview, Barcelona, and near Tortosa), 13h. (Haiwee, Mount Wilson, Riverside, Tucson, and Tinemaha), 14h. (Tucson), 17h. (near Mizusawa).

Dec. 2d. Readings at 2h. (Huancayo and Bogota), 3h. (La Paz, St. Louis, Tucson, Mount Wilson, Pasadena, and Riverside), 9h. (Riverview and Christchurch), 11h. (Colombo and near Grozny), 13h. (Riverview and near Sofia), 14h. (Christchurch, Wellington, Auckland, Haiwee, Mount Wilson, Riverside, Tinemaha, Tucson, and Malaga), 18h. (near Alicante), 20h. (Riverview and Wellington).

Dec. 3d. Readings at 1h. (near Andijan), 2h. (near Frunse), 3h. (Basle and Zürich), 6h. (near Tashkent and near Andijan), 7h. (Pasadena, Tucson, Riverside, and Tinemaha), 9h. (Pasadena and Riverside), 10h. (Helwan), 17h. (near Almata, Andijan, and Frunse), 21h. (Tucson, near Bogota, and near Mizusawa).

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Dec. 4d. 20h. 34m. 37s. Epicentre 15°·0N. 146°·4E. Focus at base of superficial layers.

A = -·8049, B = +·5348, C = +·2572; $\delta = +3$; $h = +6$;
D = +·554, E = +·833; G = -·214, H = +·142, K = -·966.

		Δ °	Az. °	P.		O-C.	S.		O-C.	Supp.		L.
				m.	s.	s.	m.	s.	m.	s.	m.	
Mera		20·7	344	e 4	41	+ 1	8	40	+16	—	—	—
Tokyo		21·4	345	e 4	50	+ 3	8	31	- 7	—	—	—
Kotl		21·8	330	e 4	50	- 1	8	46	+ 1	—	—	—
Nagoya		21·8	340	e 4	45	- 6	—	—	—	—	—	—
Mito		21·9	347	e 4	56	+ 4	8	35	-12	—	—	—
Mizusawa	E.	24·5	351	e 5	35	+18	e 9	57	+24	—	—	—
	N.	24·5	351	e 5	31	+14	e 9	37	+ 4	—	—	—
Brisbane		42·7	171	i 7	55	0	e 14	13	- 3	i 17	35	SS
Riverview		48·8	175	i 8	47 _a	+ 3	i 15	45	+ 1	9	1	pP
Sydney		48·8	175	—	—	—	e 15	47	+ 3	—	—	e 21·9
Irkutsk		49·9	328	e 8	47	- 5	i 15	53	- 6	—	—	—
Calcutta	N.	55·2	287	e 9	40	+ 8	i 17	5	- 6	—	—	—
Christchurch		63·0	159	—	—	—	18	45	PPS	23	11	SS
New Delhi	N.	64·9	295	—	—	—	19	9	- 7	e 26	34	SSS
Almata		65·0	312	10	38	- 1	19	16	- 1	—	—	—
Andijan		68·3	308	e 10	57	- 3	19	57	0	11	25	P _c P
Bombay		70·0	285	i 11	10	0	20	15	- 2	13	51	PP
Tashkent		70·6	309	11	13	- 1	i 20	21	- 3	—	—	—
Sverdlovsk		75·3	326	11	41	- 1	i 21	11	- 6	—	—	—
Santa Barbara		84·8	56	e 12	32	0	—	—	—	i 12	54	pP
Tinemaha		85·3	54	i 12	34 _a	- 1	e 22	54	- 7	—	—	—
Haiwee	Z.	85·7	54	i 12	36	- 1	—	—	—	i 12	50	pP
Pasadena		86·1	56	i 12	38 _a	- 1	e 22	59	-10	i 12	51	pP
Mount Wilson		86·2	56	i 12	39 _a	0	e 23	8	- 2	i 12	52	pP
Riverside		86·8	56	e 12	41	- 1	e 23	13	- 3	i 13	1	sP
La Jolla		87·2	57	i 12	44	0	—	—	—	—	—	—
Palomar		87·4	56	i 12	44 _a	- 1	e 23	7	[0]	i 12	59	pP
Tucson		92·5	56	e 13	9	0	e 24	4	- 4	e 25	20	PS
Rapid City		93·7	43	i 13	16	+ 2	i 23	43	[- 1]	e 17	5	PP
Florissant		104·7	44	e 18	41	pPP	i 24	38	[- 2]	e 33	27	SS
St. Louis		104·9	44	e 17	45	?	i 24	37	[- 4]	e 18	23	PP
La Paz		146·8	97	20	42 _k	[+64]	—	—	—	24	17	PP

Additional readings :—

Brisbane iPN = 7m.58s., ePE = 8m.1s., iE = 14m.38s.
Riverview ePPN = 10m.43s., iZ = 10m.49s., iPSE = 16m.3s., iN = 16m.6s., iS_cSE = 18m.38s., iN = 19m.45s.
Christchurch SSSN = 26m.41s., QEN = 28m.17s.
Bombay PSE = 20m.48s., PPSEN = 21m.6s.
Tinimaha iZ = 13m.24s.
Haiwee esPZ = 13m.17s.
Pasadena isPZ = 12m.58s., iEN = 23m.8s.
Mount Wilson isPZ = 13m.0s., iZ = 14m.52s.
Riverside eN = 23m.36s.
Palomar iN = 13m.11s., iE = 23m.21s.
Tucson i = 13m.30s., e = 13m.43s.
Rapid City e = 28m.43s.
St. Louis epPPZ = 18m.36s., eE = 24m.48s., eSE = 26m.5s., eSN = 26m.11s., ePS?E = 27m.33s., eN = 33m.14s., iSSE = 33m.28s., eN = 33m.33s.
Long waves were also recorded at Wellington, Auckland, Arapuni, Kew, Uccle, and Huancayo.

Dec. 4d. Readings also at 2h. (Tinimaha), 3h. (Mount Wilson, Tucson, Tinimaha, St. Louis, and near Triest), 6h. (near Bucharest, Sofia, and Triest), 10h. (Riverview, Mount Wilson, Palomar, Riverside, Tinimaha, Tucson, and near Triest), 11h. (Mount Wilson, Palomar, Riverside, Tinimaha, Tucson, and St. Louis), 12h. (Kew), 14h. and 16h. (near Balboa Heights), 23h. (Calcutta).

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Dec. 5d. 0h. 51m. 2s. Epicentre $32^{\circ}5S$, $70^{\circ}0W$. Depth of focus 0.010.
(as on 1941 Aug. 10d.).

A = +.2890, B = -.7940, C = -.5347; $\delta = -14$; $h = +1$;
D = -.940, E = -.342; G = -.183, H = +.502, K = -.845.

	Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
La Plata	10.3	106	2 27	+ 1	4 28	+ 8	—	5.0
La Paz	16.0	6	i 3 37k	- 3	i 6 35	0	—	8.8
Huancayo	21.0	346	4 32	- 5	e 7 48	- 32	—	c 8.3
Bogota	37.0	354	i 7 2	0	—	—	e 7 21	pP
St. Louis	73.2	344	i 11 21	- 1	e 20 35	- 6	e 11 53	pP
Tucson	75.1	326	i 11 34	+ 1	—	—	i 12 6	pP
Palomar	79.0	322	i 11 57k	+ 2	—	—	i 12 29	pP
Riverside	z. 79.8	322	i 12 1	+ 2	—	—	i 12 32	pP
Mount Wilson	80.3	322	i 12 13	+11	—	—	i 12 35	pP
Pasadena	80.3	322	i 12 4k	+ 2	—	—	i 12 35	pP
Santa Barbara	z. 81.3	320	e 12 10	+ 3	—	—	i 12 40	pP
Haiwee	z. 81.7	323	e 12 11	+ 2	—	—	i 12 45	pP
Tinemaha	z. 82.6	323	i 12 15	+ 1	—	—	e 12 47	pP

Additional readings :—

La Plata SEZ = 4m.51s.
Huancayo e = 5m.14s.
Bogota e = 7m.39s.
St. Louis esPZ = 12m.3s., eN = 21m.12s.
Tucson isP = 12m.18s.
Palomar iZ = 12m.23s., isPZ = 12m.41s.
Riverside isPZ = 12m.44s.
Mount Wilson iZ = 13m.0s.
Pasadena isPZ = 12m.47s.
Haiwee iZ = 12m.59s.
Tinemaha iZ = 13m.0s.

Dec. 5d. 14h. 25m. 33s. Epicentre $28^{\circ}2S$, $177^{\circ}7W$. (as on 1941, Nov. 24d.).

A = -.8819, B = -.0354, C = -.4701; $\delta = -1$; $h = +2$;
D = -.040, E = +.999; G = +.470, H = +.019, K = -.883.

	Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Auckland	10.7	215	2 41	+ 3	4 47	+ 8	—	5.2
Arapuni	11.3	208	—	—	4 57	+ 3	—	—
Wellington	14.3	203	3 32	+ 6	6 30	+24	i 4 1	PP
Apia	15.3	22	e 4 33	+54	e 7 17	+47	—	—
Christchurch	17.0	204	5 2	+61	7 47	+37	7 59	Q
Brisbane	25.9	265	e 5 32	- 3	i 10 5	+ 1	—	e 12.6
Riverview	27.1	250	i 5 52a	+ 6	e 10 25	+ 1	i 6 0	pP
Sydney	27.1	250	e 6 9	+23	e 10 12	-12	—	e 12.2
Pasadena	83.8	46	i 12 31	- 1	—	—	—	—
Mount Wilson	z. 83.9	46	i 12 31	- 2	—	—	—	—
Palomar	84.1	47	i 12 33k	- 1	—	—	i 12 41	pP
Riverside	z. 84.2	46	i 12 32	- 2	—	—	—	—
Haiwee	85.2	45	i 12 37	- 2	—	—	—	—
Tinemaha	z. 85.6	44	i 12 40	- 1	—	—	—	—
Tucson	87.5	51	i 12 49	- 2	—	—	i 12 59	pP
Helwan	z. 154.7	281	e 20 29	[+35]	—	—	—	e 40.3

Additional readings :—

Christchurch eEN = 6m.42s.
Brisbane eN = 5m.52s.
Riverview iPP?Z = 6m.26s., iN = 10m.51s. and 11m.47s.
Long waves were also recorded at New Delhi, Kew, Huancayo, and other American stations,

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Dec. 5d. 14h. 43m. 6s. Epicentre 28°·2S. 177°·7W. (as at 14h. 25m.).

		Δ	Az.	P.	O - C.	S.	O - C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Auckland		10·7	215	2 37	- 1	4 59?	+ 20	---	5·3
Arapuni		11·3	208	---	---	4 54	0	---	---
Brisbane		25·9	265	e 5 31	- 4	i 10 4	0	---	i 13·0
Riverview		27·1	250	5 52	+ 6	10 27	+ 3	i 10 53	e 12·3
Pasadena	z.	83·8	46	i 12 39	+ 7	---	---	---	e 20·6
Mount Wilson	z.	83·9	46	e 12 33	0	---	---	---	---
Palomar	z.	84·1	47	i 12 34	0	---	---	---	---
Riverside	z.	84·2	46	e 12 31	- 3	---	---	---	---
Haiwee	z.	85·2	45	i 12 46	+ 7	---	---	---	---
Tinemaha	z.	85·6	44	e 12 41	0	---	---	---	---
Tucson		87·5	51	i 12 45	- 6	---	---	---	---

Additional readings :—

Brisbane iN = 5m.49s., iE = 12m.46s.

Mount Wilson eZ = 12m.38s., iZ = 12m.47s.

Palomar iZ = 12m.42s. and 12m.58s.

Riverside iZ = 12m.43s.

Tucson i = 13m.0s.

Long waves were also recorded at Sydney.

Dec. 5d. Readings also at 1h. (Mizusawa), 9h. (Tacubaya, St. Louis, Vera Cruz, Tucson, Palomar, and Tinemaha), 11h. (near Almeria), 14h. (Wellington, Tacubaya, Vera Cruz, Haiwee, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Rapid City, New Kensington, Chicago, Philadelphia, Bozeman, Ukiah, Salt Lake City, St. Louis, and near Tucson), 15h. (Huancayo and La Paz), 17h. (Tacubaya, Vera Cruz, Salt Lake City, Bozeman, Butte, Haiwee, La Jolla, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Tucson (2), Rapid City, St. Louis (2), Chicago, Philadelphia, New Kensington, Columbia, near Almata, and Andijan).

Dec. 6d. 16h. 26m. 59s. Epicentre 38°·3N. 140°·5E. (as on 1944 August 18d.).

Intensity V at Yamagata ; III at Sendai, Onahama, and Utunomiya.

Epicentre 38°·3N. 140°·2E. Macro seismic radius 200-300km. Very shallow.

Seismological Bulletin of the Central Meteorological Observatory, Japan, for the year 1944,

Tokyo 1951, p. 25, isoseismic chart p. 25.

	Δ	Az.	P.	O - C.	S.	O - C.
	°	°	m. s.	s.	m. s.	s.
Sendai	0·3	96	0 9 _k	- 2	---	---
Mizusawa	1·0	31	i 0 18	- 3	0 44	+ 8
Onahama	1·4	167	0 20	- 7	0 39	- 7
Akita	1·4	348	0 31	+ 4	0 45	- 1
Morioka	1·5	20	0 27 _a	- 1	0 50	+ 1
Utunomiya	1·8	196	1 6	S _r	---	---
Miyako	1·8	41	0 30 _a	- 2	0 54	- 2
Mito	1·9	181	0 37	+ 3	1 3	+ 4
Tukubasan	2·1	189	0 35	- 2	1 6	+ 2
Maebasi	2·2	211	0 36	- 2	1 10	+ 4
Hatinohe	2·4	21	0 15	?	1 12	0
Nagano	2·4	228	0 41	0	1 25	+ 13
Aomori	2·5	5	0 40	- 3	1 42	+ 28
Yokohama	2·9	193	0 45	- 3	1 27	+ 3
Wazima	3·0	252	2 3	?	---	---
Hunatu	3·1	206	0 55	+ 4	1 37	+ 8
Mera	3·4	189	1 0	+ 5	---	---
Misima	3·4	202	0 59	+ 4	1 42	+ 5
Shizuoka	3·8	208	1 1	0	1 52	+ 5
Omaesaki	4·1	206	1 2 _k	- 3	1 56	+ 1
Nagoya	4·2	223	1 8	+ 1	1 43	- 14
Gihu	4·2	227	1 5	- 2	2 4	+ 7
Hamamatu	4·2	213	1 14	+ 7	2 19	S _r
Hikone	4·6	230	1 12	0	---	---
Kameyama	4·7	225	1 22	+ 8	---	---

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	Δ	Az.	P.	O-C.	S.	O-C.
	°	°	m. s.	s.	m. s.	s.
Sapporo	4.8	8	1 20	+ 5	2 10	- 2
Kyoto	5.0	231	1 10	- 8	—	—
Owase	5.5	221	1 39	P*	—	—
Kobe	5.6	232	1 23	- 4	2 54	S*
Siomisaki	6.2	220	2 56	S	(2 56)	+ 8
Nemuro	6.3	36	2 44	S	(2 44)	- 6
Kōti	7.4	232	1 50	- 2	—	—
Tinemaha	z. 75.6	55	i 11 46	- 2	—	—
Pasadena	z. 77.5	56	i 11 54	- 5	—	—
Mount Wilson	z. 77.5	56	i 11 55	- 4	—	—
Riverside	z. 78.1	56	e 12 0	- 2	—	—
Palomar	z. 78.8	56	i 12 5	- 1	—	—

Dec. 6d. Readings also at 4h. (near Apia), 5h. (Palomar, Riverside, Mount Wilson, Tucson, Pasadena, Tinemaha, and Haiwee), 12h. (Tacubaya), 19h. (Apia), 20h. (Wellington, Christchurch, Riverview, and Auckland), 22h. (near Andijan).

Dec. 7d. 4h. 35m. 39s. Epicentre 33°·7N. 136°·2E.

Felt over a wide area extending from Sendai and Akita in the North to Kumamoto and Miyazaki in South-West. Heavy losses and many casualties in the meizoseismal district of Kinki and southern part of Tyubu. A large tsunami occurred along the Pacific coast from Tyosi to Tosa, Simidu. This reached a height of 6 metres off the coast of the Kii peninsula, causing additional damage by flooding.

Intensity IX at Tu and Omaesaki; VII at Owase, Kohu, Nagoya, Gihu, and Hukui; VI at Sumoto, Kyoto, Kobe, and Kōti; V at Osima, Ito, and Mera; IV at Kakioka, Saga, and Sakata. Macroseismic radius 620km.

H. Kawasumi.

Seismology in Japan, 1939-1947.

Bulletin of the Seismological Society of America, July, 1949, vol. 39, No. 3, pp. 161-162. Epicentre quoted from the Seismo. Bull. of Cent. Met. Obs., Japan, p. 28.

A = -·6017, B = +·5770, C = +·5523; $\delta = +1$; $h = +1$;
D = +·692, E = +·722; G = -·399, H = +·382, K = -·834.

	Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Owase	0.3	0	0 11k	0	0 17	- 1	—	—
Siomisaki	0.4	235	0 10k	- 3	0 19	- 2	—	—
Wakayama	1.0	302	0 20k	- 1	0 36	0	—	—
Osaka	1.1	330	0 21	- 1	0 45	+ 6	—	—
Tu	1.1	14	0 7	-15	0 17	-22	—	—
Kameyama	1.2	11	0 25	+ 1	0 43	+ 2	—	—
Kobe	1.3	319	0 28k	+ 3	0 46	+ 2	—	—
Sumoto	1.3	301	0 22k	- 3	0 43	- 1	—	—
Kyoto	1.4	344	0 26k	- 1	0 46	0	—	—
Hamamatu	1.5	51	0 30k	+ 2	0 43	- 6	—	—
Hikone	1.6	2	0 30a	0	0 51	0	—	—
Nagoya	1.6	23	0 30a	0	0 51	0	—	—
Muroto	1.7	255	0 30a	- 1	0 48	- 6	—	—
Gihu	1.8	15	0 32a	0	0 44	-12	—	—
Omaesaki	1.9	62	0 25k	- 9	0 42	-17	—	—
Kōti	2.2	266	0 38a	0	1 15	+ 9	—	—
Shizuoka	2.2	55	0 37	- 1	0 54	-12	—	—
Toyooka	2.2	328	0 37a	- 1	1 2	- 4	—	—
Misima	2.7	58	0 42k	- 3	0 58	-21	—	—
Hunatu	2.8	50	0 47k	0	1 12	-10	—	—
Osima	2.8	68	0 47	0	1 0	-22	—	—
Simidu	2.9	251	0 52a	+ 4	1 26	+ 2	—	—
Toyama	3.1	15	1 4a	P _r	1 30	+ 1	—	—
Hirosima	3.2	282	0 51a	- 1	1 51	S _r	—	—
Mera	3.3	68	0 51k	- 2	1 35	0	—	—

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	Δ	Az.	P.		O - C.	S.		O - C.	Supp.		L. m.
			m.	s.		m.	s.		m.	s.	
Yokohama	3.3	58	0	56k	+ 3	1	31	- 4	—	—	—
Nagano	3.4	28	0	57a	+ 2	1	29	- 8	—	—	—
Tokyo	3.5	55	0	56k	- 1	1	36	- 4	—	—	—
Hamada	3.6	291	0	58	0	1	56	S _r	—	—	—
Kumagaya	3.6	46	0	59	+ 1	1	29	-13	—	—	—
Maebasi	3.6	40	1	5	P*	—	—	—	—	—	—
Wazima	3.7	8	1	52	+52	2	55	+70	—	—	—
Kakioka	4.1	39	1	6k	+ 1	1	51	- 4	—	—	—
Tukubasan	4.1	51	1	4k	- 1	1	34	-21	—	—	—
Utunomiya	4.1	45	1	10	+ 5	1	49	- 6	—	—	—
Tyosi	4.3	60	1	38a	P _r	—	—	—	—	—	—
Mito	4.4	51	1	10	0	1	56	- 6	—	—	—
Miyazaki	4.4	248	1	35k	P _r	2	24	S _r	—	—	—
Aikawa	4.6	20	1	13	+ 1	1	56	-11	—	—	—
Izuka	4.6	271	1	11a	- 1	2	14	+ 7	—	—	—
Kumamoto	4.7	261	1	18a	+ 4	2	29	S*	—	—	—
Hukuoka	4.8	270	1	15a	0	2	27	+10	—	—	—
Onahama	5.0	48	1	22a	+ 4	2	13	- 5	—	—	—
Kagosima	5.2	248	1	24a	+ 3	—	—	—	—	—	—
Hukushima	5.3	39	1	36k	P*	2	33	+ 8	—	—	—
Sendai	5.9	39	1	36k	+ 5	2	35	- 5	—	—	—
Mizusawa	6.7	35	1	51	+ 9	—	—	—	—	—	—
Morioka	7.2	32	1	56a	+ 7	3	12	- 1	—	—	—
Miyako	7.5	36	1	56	+ 3	3	18	- 2	—	—	—
Aomori	8.0	26	2	10	+10	3	37	+ 4	—	—	—
Hatinohe	8.0	30	2	2	+ 2	3	35	+ 2	—	—	—
Sapporo	10.2	22	2	33	+ 2	4	37	+10	—	—	—
Nemuro	12.1	35	3	5	+ 8	5	25	+11	—	—	—
Zi-ka-wei	12.7	263	e 3	3	- 2	i 5	33	+ 5	6 43	S _r	—
Pehpei	25.6	270	5	27	- 5	9	14	-45	5 46	PP	—
Calcutta	43.3	268	i 8	10	+ 5	i 14	57	+24	—	—	—
Almata	46.5	301	i 8	28	- 3	15	32	+13	—	—	—
Frunse	48.3	300	e 8	43	- 2	e 16	1	+16	—	—	—
Dehra Dun	48.9	283	e 8	24	-26	e 15	17	-36	18 44	SS	e 23.0
New Delhi	50.2	281	i 9	0	0	20	2	SS	11 7	PP	24.4
Andijan	50.3	298	i 9	4	+ 4	16	36	+23	e 11 4	PP	—
Tashkent	52.4	299	i 9	15	- 1	—	—	—	—	—	—
Hyderabad	53.9	268	e 9	22	- 5	17	17	+15	11 36	PP	—
College	54.2	31	e 9	28	- 1	i 16	56	-10	i 11 18	PP	i 22.8
Sverdlovsk	54.9	320	i 9	31	- 4	—	—	—	—	—	—
Bombay	57.9	272	e 9	53	- 3	21	57	SS	18 13	PS	—
Colombo	58.4	256	9	21?	-39	17	51	-11	—	—	29.4
Honolulu	58.9	84	i 10	13	+10	i 18	18	+10	i 12 17	PP	i 26.0
Sitka	61.5	39	i 10	24	+ 3	i 18	51	+ 9	i 12 23	PP	i 26.0
Brisbane	62.9	163	i 10	29	- 1	i 19	2	+ 2	—	—	—
Baku	66.6	304	10	41	-13	19	44	- 1	—	—	—
Moscow	67.3	323	10	54	- 5	20	16	+22	—	—	—
Perth	68.1	199	11	26	+22	19	54	- 9	14 41	PP	—
Riverview	68.6	167	i 11	4k	- 3	i 20	19	+10	i 11 27	pP	e 29.4
Sydney	68.6	167	e 11	9	+ 2	i 20	18	+ 9	—	—	—
Erevan	70.4	306	e 11	17	- 1	e 20	42	+12	—	—	—
Victoria	71.8	44	11	31	+ 5	20	53	+ 7	24 39	SS	34.4
Seattle	72.9	44	e 11	26	- 7	i 20	55	- 4	e 14 14	PP	e 29.4
Upsala	74.0	332	e 11	32?	- 7	i 21	23	+12	14 30	PP	e 34.4
	74.0	332	11	34	- 5	21	11	0	i 14 36	PP	35.4
Ukiah	76.8	52	e 12	3	+ 8	i 21	49	+ 7	e 15 3	PP	i 31.8
Bergen	78.0	337	i 11	56	- 6	22	16	+21	15 23	PP	36.7
Berkeley	78.1	53	e 12	5	+ 3	e 22	0	+ 4	27 16	SS	35.7
Saskatoon	78.5	35	12	28	+24	22	3	+ 2	15 21	PP	33.4
Santa Clara	78.6	53	e 12	22	+17	i 22	20	+18	—	—	e 33.4

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	Δ °	Az. °	P.		O-C. s.	S.		O-C. s.	Supp.		L. m.	
			m.	s.		m.	s.		m.	s.		
Auckland	78.9	150	12	8	+ 1	22	4	- 1	15	24	PP	37.4
Copenhagen	78.9	331	e 12	2 _a	- 5	i 22	20	+15	15	20	PP	—
Butte	79.3	41	e 12	6	- 3	e 22	5	- 4	i 27	29	SS	i 33.5
Ksara	79.5	303	e 12	15	+ 5	i 22	38	+27	28	14	SS	40.4
Bucharest	79.6	317	e 12	13	+ 3	i 22	30	+18	i 15	35	PP	38.4
Campulung	79.7	318	e 12	18	+ 7	e 22	43	+30	e 15	23	PP	39.4
Istanbul	79.9	313	e 11	48	-24	22	10	- 6	15	10	PP	47.2
Bozeman	80.3	41	e 12	13	- 1	i 22	26	+ 6	e 15	22	PP	e 34.0
New Plymouth	80.5	151	12	31	+16	22	37	+15	—	—	—	—
Potsdam	81.0	329	i 12	21?	+ 3	i 22	45	+18	i 15	39	PP	e 37.4
Reykjavik	81.0	350	i 12	31	+13	e 22	46	+19	e 15	18	PP	e 39.2
Tinemaha	81.2	51	i 12	18	- 1	e 22	33	+ 4	e 39	9	P'P'	—
Santa Barbara	81.8	54	e 12	21	- 1	—	—	—	—	—	—	—
Haiwee	81.9	52	e 12	21	- 2	i 31	25	PKKP	i 39	6	P'P'	—
Arapuni	82.0	150	12	51	+28	22	57	+20	15	57	PP	—
Prague	82.0	327	e 12	23 _k	0	e 22	50	+13	e 15	33	PP	e 36.4
Sofia	82.3	317	e 12	36	+11	—	—	—	—	—	—	—
Kaimata	82.4	155	13	11	+46	23	1	+20	—	—	—	—
Logan	82.4	44	i 12	25	0	i 22	46	+ 5	e 31	13	SSS	e 34.4
Belgrade	82.5	320	e 12	22 _k	- 4	23	55	PPS	i 16	1	PP	e 34.9
Jena	82.6	327	e 12	24	- 2	i 22	57	+14	e 15	49	PP	e 39.8
Wellington	82.6	152	e 12	28	+ 2	22	46	+ 3	15	39	PP	40.0
Aberdeen	82.9	339	e 12	37	+ 9	i 23	17	+31	i 15	59	PP	i 38.6
Cheb	82.9	328	e 12	31	+ 3	e 23	11?	+25	e 16	8	PP	e 43.4
Mount Wilson	83.0	54	i 12	27	- 1	e 22	48	+ 1	e 39	4	P'P'	—
Pasadena	83.0	54	i 12	26 _a	- 2	e 22	43	- 4	i 15	51	PP	e 34.6
Salt Lake City	83.0	45	e 12	30	+ 2	i 22	54	+ 7	i 15	38	PP	e 34.5
Riverside	83.6	54	e 12	30	- 1	e 31	9	PKKP	e 39	4	P'P'	—
Christchurch	83.7	155	12	30	- 2	22	55	+ 1	15	56	PP	40.5
Boulder City	84.1	51	e 12	32	- 2	e 22	57	- 1	—	—	—	—
Edinburgh	84.2	338	12	41	+ 7	23	10	+11	16	0	PP	—
La Jolla	84.3	54	e 12	37	+ 2	—	—	—	—	—	—	—
Palomar	84.3	53	i 12	34 _a	- 1	e 23	5	+ 5	i 38	38	P'P'	—
Helwan	85.0	303	i 12	34 _k	- 4	23	21	+14	16	3	PP	—
Triest	85.4	323	i 12	45	+ 5	i 23	27	+16	i 16	10	PP	—
Rapid City	85.6	38	e 12	41	0	e 23	14	+ 1	e 15	59	PP	i 35.8
Stonyhurst	85.8	337	i 13	0	+18	i 23	30	+15	i 16	21	PP	e 36.0
Uccle	85.8	332	e 12	38 _a	- 4	i 23	17	+ 2	i 12	53	pP	e 45.4
Strasbourg	86.1	329	e 12	42	- 2	i 23	28	+10	i 16	12	PP	42.4
Chur	86.6	326	e 12	43	- 3	e 23	33	+10	—	—	—	—
Zürich	86.6	327	e 12	37 _a	- 9	e 23	19	- 4	e 16	35	PP	—
Basle	86.9	328	e 12	45 _a	- 3	e 23	27	+ 1	e 16	26	PP	—
Kew	87.0	334	e 12	44	- 4	i 23	32	+ 5	e 16	28	PP	—
Neuchatel	87.6	327	e 12	49	- 2	e 23	29	- 3	—	—	—	—
Milan	87.7	325	12	48	- 4	23	48	+15	—	—	—	42.2
Paris	88.1	331	e 12	49	- 5	i 23	37	0	i 24	59	PPS	e 45.4
Tucson	89.0	51	e 12	56	- 2	i 23	38	- 7	i 16	46	PP	i 36.6
Clermont-Ferrand	90.2	329	e 13	3	- 1	i 25	7	PS	e 16	37	PP	e 43.4
Lincoln	91.3	37	e 13	35	+26	e 24	8	+ 2	e 16	51	PP	e 41.0
Barcelona	94.1	327	13	33	+11	24	6	[+10]	—	—	—	—
Chicago J.S.A.	94.7	32	e 13	48	+24	i 24	49	+13	e 17	10	PP	—
Chicago U.S.C.G.S.	94.8	32	e 13	22	- 3	i 24	41	+ 5	i 17	25	PP	e 38.6
Tortosa	95.3	327	13	27	0	24	36	- 5	17	33	PP	45.7
Florissant	95.9	35	e 13	30	0	i 24	42	- 4	i 17	40	PP	—
Shawinigan Falls	95.9	19	13	45	+15	24	34	-12	25	45	PS	46.4
Seven Falls	96.0	18	13	50	+20	24	16	[+10]	17	44	PP	45.4
Ottawa	96.1	22	13	41	+10	24	59	+11	17	39	PP	e 44.4
St. Louis	96.1	35	e 13	30	- 1	i 24	41	- 7	i 17	38	PP	—
Hamilton	96.6	25	13	46	+13	24	51	- 1	17	46	PP	40.4
Buffalo	97.3	25	i 13	49	+13	e 25	26	+28	i 17	27	PP	—
Cape Girardeau	97.5	35	e 14	9	+32	e 25	14	+15	—	—	—	—
New Kensington	99.0	27	e 13	50	+ 6	—	—	—	i 18	6	PP	—
Tananarive	99.2	253	13	58	+13	25	28	+14	18	2	PP	e 49.3
Pennsylvania	99.5	25	e 19	54	PPP	—	—	—	—	—	—	e 48.8
Halifax	100.0	13	18	15	PP	25	32	+12	32	9	SS	40.4

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	Δ	Az.	P.	O - C.	S.	O - C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Harvard	100.0	20	i 14 2	+14	e 25 43	+14	i 17 58	PP c 44.4
Granada	100.1	328	i 14 15 _a	+26	27 18	PS	i 18 22	PP 58.8
Weston	100.2	20	e 14 7	+18	e 25 36	+14	18 20	PP —
Fordham	100.8	23	e 13 53	+1	—	—	i 18 10	PP 58.8
Malaga	100.9	328	i 13 53 _a	+1	i 25 19	-9	i 14 12	pP 47.4
Lisbon	101.1	333	13 56 _k	+3	i 25 19	-11	i 18 17	PP 46.4
Philadelphia	101.2	24	e 13 57	+3	i 25 33	+3	e 18 3	PP c 40.7
Georgetown	101.4	26	e 13 57	+2	i 24 29	[-5]	i 18 8	PP —
Guadalajara	N. 101.6	55	e 19 28	?	—	—	—	—
San Fernando	101.9	329	e 14 0	+3	i 24 58	-38	18 9	PP —
Mobile	103.5	38	18 11	PP	25 5	[-14]	20 9	PPP —
Columbia	104.1	31	e 14 10	+3	e 25 5	[+19]	e 18 32	PP c 45.5
Tacubaya	N. 105.3	54	e 14 33	+20	—	—	—	—
Vera Cruz	E. 107.5	52	e 14 27	P	—	—	—	—
Bermuda	111.4	19	e 15 0	P	i 25 7	[-11]	i 19 25	PP c 44.2
Johannesburg	118.4	256	e 20 21?	PP	e 25 21?	[-24]	e 27 33	SKKS 54.4
San Juan	124.0	25	e 20 56	PP	i 25 27	[-36]	i 31 7	PS c 50.6
Balboa Heights	125.7	44	e 20 21?	PP	e 32 21?	PPS	—	c 54.4
Bogota	132.3	43	e 19 24	[+8]	(38 21)	SS	i 24 5	PPP 38.4
Huancayo	144.1	60	e 19 34	[-4]	29 36	[-9]	i 23 15	PP i 58.3
La Paz	152.2	56	i 19 41 _a	[-10]	e 30 12	[-18]	i 23 5	PP 70.4
Montezuma	155.4	69	e 20 51	?	e 44 15	SS	e 24 46	PP c 60.2
La Plata	168.3	100	20 15	[+7]	27 21	[+10]	25 15	PP 78.0
Rio de Janeiro	E. 169.2	357	e 20 21	[+12]	i 32 48	[+49]	i 25 59	PP i 46.2
	N. 169.2	357	i 20 17	[+8]	i 35 52	PS	i 25 21	PP 46.1

Additional readings :-

Nagoya S = 42s.
 Zi-ka-wei iE = 4m.35s., 7m.23s., 8m.33s., 9m.23s., and 10m.41s.
 Pehpei e = 5m.7s., i = 6m.11s., 8m.22s., and 8m.26s.
 New Delhi PPN = 11m.12s., PPP = 12m.57s., PPSEN = 16m.27s., S_cSN = 18m.52s.
 Hyderabad i = 9m.33s., SS?N = 20m.54s.
 College i = 9m.37s., 18m.51s., and 19m.31s.
 Bombay iN = 10m.7s., PPSE = 18m.23s.
 Honolulu ePP = 13m.56s., i = 14m.29s., and 15m.13s., e = 22m.57s.
 Sitka iPPP = 14m.3s., iSS = 22m.41s.
 Brisbane ePN = 10m.32s.
 Riverview iPNZ = 11m.9s., ePE = 11m.15s., iP_cPZ = 11m.37s., i = 12m.7s., iZ = 13m.33s., iNZ = 14m.6s. and 14m.46s., iSN = 20m.38s., iPSN = 20m.54s., iZ = 20m.58s., iPPSN = 21m.6s. iE = 21m.34s., eN = 21m.50s., iSSN = 25m.2s., iZ = 25m.23s., iN = 25m.36s. and 26m.2s., eQ?N = 27m.9s.
 Victoria SSS = 28m.45s.
 Seattle e = 13m.9s., eSS = 25m.32s.
 Upsala iN = 11m.48s., PPPN = 16m.29s., PPPE = 16m.32s., iN = 17m.15s., eSSE = 26m.9s., eN = 28m.30s., SSS?E = 30m.5s., eE = 32m.29s.
 Ukiah e = 13m.55s., iPPP = 16m.53s., i = 22m.40s., iSS = 26m.51s.
 Bergen iZ = 12m.5s., PPN = 15m.28s., PPPZ = 17m.10s., eEZ = 18m.25s., SEZ = 22m.21s.?, SSNZ = 27m.29s., eZ = 23m.31s.
 Berkeley Q = 32m.16s.
 Saskatoon SS = 27m.9s., SSS = 30m.21s.
 Auckland i = 12m.21s., 12m.51s., 13m.6s., 14m.16s., and 14m.42s., PPP = 16m.56s., S_cS = 22m.28s., PPS = 23m.6s., i = 24m.41s., SS = 27m.15s., SSS = 30m.21s., Q? = 35.4m.
 Copenhagen i = 12m.19s., 17m.21s., and 18m.32s.
 Butte e = 13m.40s., i = 14m.13s., iS = 22m.21s., i = 24m.23s.
 Bucharest iPSN = 23m.14s., iSSN = 27m.40s.
 Campulung ePS?N = 23m.22s.
 Istanbul PPP = 17m.10s., SS = 27m.44s.
 Bozeman ePPP = 17m.8s., i = 27m.5s., iSSS = 31m.4s.
 Potsdam iEN = 19m.0s., iSKSEN = 22m.51s., iN = 26m.55s., eE = 27m.0s.?, eSSEN = 28m.15s., eSSSE = 31m.51s., eN = 32m.33s.
 Reykjavik eN = 20m.40s., ePSE = 23m.28s., eSSEN = 27m.57s., eSSS?EN = 30m.57s., Tinemaha iZ = 12m.35s., and 12m.50s., iPKKPZ = 31m.21s.
 Arapuni iZ = 21m.3s.
 Prague i = 12m.32s., ePPP = 17m.33s., ePPPP = 19m.9s., ePS = 23m.21s., eSS = 28m.21s., eSSS = 31m.33s.
 Sofia eEN = 12m.59s.
 Logan e = 12m.55s., eS = 22m.56s., i = 23m.32s., e = 26m.23s.
 Belgrade i = 12m.35s., and 13m.29s., iPPP = 17m.45s.
 Jena ePN = 12m.28s., iPZ = 12m.31s., iPE = 12m.37s., ePPN = 15m.55s., eN = 19m.15s., iSN = 23m.0s., iSSE = 28m.27s., iSSN = 28m.48s.

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Wellington $P_cP?Z = 12m.35s.$, $iZ = 13m.23s.$, $14m.46s.$, and $16m.46s.$, $PPPZ = 17m.21s.$, $i = 22m.21s.$, $S_cS = 23m.6s.$, $PSZ = 23m.37s.$, $SS = 28m.18s.$, $i = 32m.51s.$, $Q? = 35m.57s.$, $i = 38m.56s.$
 Aberdeen $iE = 19m.7s.$, $iN = 19m.12s.$, $iSSEN = 28m.53s.$, $iE = 34m.7s.$
 Cheb $ePE = 12m.34s.$, $e = 19m.21s.$, $ePPS = 24m.33s.$, $e = 26m.23s.$, $eSS = 29m.4s.$, $e = 34m.32s.$
 Mount Wilson $iPKKPZ = 31m.32s.$, $iZ = 39m.15s.$
 Pasadena $iZ = 12m.40s.$ and $12m.58s.$, $iSEN = 22m.52s.$, $iSSEN = 28m.32s.$
 Salt Lake City $i = 12m.58s.$, $e = 16m.43s.$, $iSS = 28m.17s.$, $i = 28m.33s.$, and $31m.26s.$,
 Christchurch $P = 12m.41s.$, $PPPEZ = 17m.47s.$, $iE = 18m.48s.$, $iZ = 26m.29s.$, $SS = 28m.21s.$, $SSSE = 32m.46s.$, $QN = 35m.21s.$
 Boulder City $iP = 12m.46s.$, $e = 23m.29s.$
 Edinburgh $P_cP = 12m.45s.$, $S_cS = 23m.19s.$, $SS = 28m.46s.$
 Palomar $iEZ = 12m.41s.$, $i = 12m.49s.$, $iE = 14m.22s.$, $iPKKP = 31m.19s.$
 Trieste $iPPP = 18m.13s.$, $iPS = 24m.19s.$, $iSS = 29m.30s.$
 Rapid City $i = 13m.11s.$, $ePPP = 17m.53s.$, $eS = 22m.48s.$, $i = 23m.37s.$ and $26m.23s.$, $iSS = 28m.53s.$
 Stonyhurst $i = 17m.16s.$, $iPPP = 18m.32s.$, $PS = 24m.18s.$, $iSS = 29m.13s.$, $i = 33m.1s.$ and $35m.21s.$
 Uccle $PP = 16m.5s.$, $ipPPE = 16m.19s.$, $ePPP = 18m.5s.$, $eSS = 29m.27s.$
 Strasbourg $i = 25m.12s.$
 Zürich $eSKS = 22m.51s.$
 Kew $eE = 13m.6s.$, $eZ = 21m.24s.$
 Paris $i = 26m.21s.$, $SS? = 30m.6s.$
 Tucson $i = 13m.5s.$, $13m.45s.$, and $17m.56s.$, $ePS = 25m.10s.$, $i = 25m.31s.$, $iSS = 29m.47s.$, $iPKP, PKP = 39m.11s.$
 Clermont-Ferrand $i = 13m.7s.$, $ePPP = 18m.40s.$, $eSS = 30m.29s.$
 Lincoln $ePPP = 18m.39s.$, $iPS = 25m.1s.$, $eSS = 30m.18s.$, $e = 37m.2s.$
 Chicago J.S.A. $i = 25m.33s.$, $e = 26m.5s.$, $iSS = 31m.18s.$
 Chicago U.S.C.G.S. $e = 13m.35s.$, $iPPP = 19m.6s.$, $e = 19m.43s.$, $i = 24m.16s.$ and $30m.27s.$, $iSS = 31m.10s.$, $iSSS = 34m.31s.$
 Tortosa, $P_cPN = 13m.34s.$, $PPPN = 19m.38s.$, $SKKSE = 24m.23s.$, $PSN = 26m.22s.$, $PPSN = 27m.21s.$, $SSE = 31m.15s.$, $PSSN? = 31m.51s.$, $SSSN? = 36m.1s.$, $QN = 39m.40s.$
 Florissant $iZ = 13m.46s.$
 Shawinigan Falls $SKS = 23m.51s.$, $SS = 31m.40s.$
 Seven Falls $SKKS = 24m.44s.$, $SS = 31m.29s.$, $SSS = 34m.46s.$
 Ottawa $PPP = 19m.33s.$, $SKS = 24m.5s.$, $PS = 26m.21s.$, $SS = 31m.26s.$, $SSS = 35m.21s.$
 St. Louis $iZ = 13m.59s.$, $iSKSN = 23m.57s.$
 Hamilton $SKS = 24m.4s.$, $SS = 31m.40s.$
 Buffalo $21m.25s.$, $23m.6s.$, and $27m.1s.$
 Mobile $SKKS = 25m.43s.$
 Tananarive $PPP = 20m.1s.$, $iSKS = 24m.40s.$, $SKKS = 25m.19s.$, $iPS = 27m.1s.$, $SSE = 32m.19s.$, $iN = 32m.28s.$
 Pennsylvania $i = 23m.43s.$ and $30m.6s.$, $e = 30m.36s.$, $31m.3s.$, $37m.14s.$, and $41m.28s.$
 Halifax $SSS = 36m.33s.$
 Harvard $i = 14m.15s.$, $ePS = 27m.10s.$
 Granada $PPS = 28m.16s.$, $SS = 33m.0s.$, $SSS = 36m.33s.$, $Q = 52.0m.$
 Weston $SS = 32m.47s.$
 Fordham $i = 14m.2s.$, $15m.32s.$, $19m.47s.$, and $23m.19s.$
 Malaga $iSP = 14m.54s.$, $iPP = 17m.49s.$, $iSKS = 23m.59s.$, $iS = 25m.7s.$
 Lisbon $PZ = 14m.5s.$, $14m.14s.$, and $14m.23s.$, $PKPZ = 17m.51s.$, $iPPEN = 18m.20s.$, $N = 19m.8s.$, $E = 19m.18s.$, $iSKSEN = 24m.46s.$, $SE = 25m.55s.$, $PS?E = 26m.37s.$, $PS?N = 27m.4s.$, $SSN = 32m.39s.$, $SSE = 33m.21s.$, $SSZ = 34m.9s.$
 Philadelphia $e = 14m.6s.$, $i = 18m.17s.$, $iSKS = 24m.29s.$, $iSS = 32m.40s.$
 Georgetown $iP = 14m.8s.$, $iPP = 18m.18s.$, $i = 22m.37s.$, $iSKS = 24m.43s.$, $iPS = 26m.38s.$ and $27m.17s.$
 San Fernando $eZ = 14m.31s.$ and $15m.0s.$, $PPPE = 20m.35s.$
 Columbia $e = 14m.23s.$, $i = 26m.53s.$, $iSS = 33m.25s.$, $eSSS? = 37m.34s.$
 Bermuda $e = 21m.44s.$, $iS = 27m.15s.$, $iSS = 35m.2s.$, $iSSS = 39m.0s.$
 Johannesburg $eSKKS?E = 27m.51s.$, $ePSN? = 29m.45s.$, $iSSN? = 36m.33s.$, $eSSE = 36m.51s.$, $e?N = 40m.3s.$, $Q? = 50.4m.$
 San Juan $i = 35m.37s.$ and $40m.57s.$
 Bogota $i = 19m.44s.$, $20m.23s.$, and $23m.46s.$
 Huancayo $i = 20m.13s.$, $e = 21m.57s.$, $i = 24m.2s.$, $e = 30m.39s.$ and $33m.53s.$, $iSS = 41m.21s.$
 La Paz $iPKP_2 = 20m.5s.$, $iSKPN = 23m.33s.$, $PPPN = 26m.58s.$, $iSKKSN = 30m.28s.$, $PPSN = 36m.49s.$, $SSN = 43m.18s.$, $SSSN = 48m.40s.$, $SSSS = 53m.25s.$, $QN = 64m.35s.$
 La Plata $PKPN = 20m.39s.$, $PKP?E = 20m.45s.$, $E = 21m.45s.$, $Z = 21m.51s.$, $N = 22m.15s.$, $PPE = 25m.21s.$, $PPPE = 28m.51s.$, $Z = 29m.51s.$, $PPP?N = 30m.27s.$, $SKKSE = 31m.57s.$, $SKKSN = 32m.51s.$, $Z = 35m.27s.$, $SKSPE = 35m.39s.$ and $38m.39s.$, $SKSPN = 38m.51s.$, $Z = 39m.3s.$, $PPSE = 41m.27s.$, $Z = 44m.33s.$, $SSN = 45m.57s.$, $SSE = 46m.27s.$, $PSSN = 47m.51s.$, $N = 50m.27s.$, $SSSE = 53m.3s.$, $SSSN = 56m.57s.$, $E = 58m.33s.$, $N = 58m.51s.$, $QN = 69.4m.$, $QE = 70.4m.$
 Long waves were also recorded at Port au Prince.

The scanned images of the bulletins of the International Seismological Summary (ISS) have been obtained thanks to funding provided by the US National Science Foundation through grant EAR-9725140 (Villaseñor et al., 1997) and collected by SGA Storia Geofisica Ambiente (Bologna) on behalf of the Istituto Nazionale di Geofisica e Vulcanologia (Rome), in the frame of the EUROSEISMOS project.

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Dec. 7d. 6h. 25m. 32s. Epicentre 33°·7N. 136°·2E. (as at 4h.).

Intensity V at Gihu; IV at Siomisaki, Sumoto, Hikone, Kyoto, and Tsugara; II-III Kishiwara, Kobe, Okayama, Saigo, and Hukui. Epicentre 33°·5N. 136°·5E. Shallow.

Seismo. Bull. Cent. Met. Obs., Japan, 1944. Tokyo, 1951, p. 27, with chart.

	Δ	Az.	P.		O-C.	S.		O-C.	Supp.	
			m.	s.		m.	s.		m.	s.
Owase	0·3	0	0	12 _a	+ 1	0	22	+ 4	—	—
Siomisaki	0·4	235	0	11	- 2	0	21	0	—	—
Kobe	1·3	319	0	32 _a	+ 7	1	6	?	—	—
Sumoto	1·3	301	0	22 _a	- 3	0	46	+ 2	—	—
Kyoto	1·4	344	0	35 _a	+ 8	0	56	+10	—	—
Hikone	1·6	2	0	24 _a	- 6	—	—	—	—	—
Gihu	1·8	15	0	31 _a	- 1	—	—	—	—	—
Kōti	2·2	266	0	38 _a	0	1	20	S _g	—	—
Toyooka	2·2	328	0	41	+ 3	1	26	S _g	—	—
Hunatu	2·8	50	0	45	- 2	1	8	-14	—	—
Toyama	3·1	15	0	55	+ 4	1	44	S _g	—	—
Nagano	3·4	28	0	55	0	1	37	0	—	—
Tokyo	3·5	55	0	49	- 8	1	46	+ 6	—	—
Hamada	3·6	291	0	58 _a	0	2	7	S _g	—	—
Kumagaya	3·6	46	0	58	0	—	—	—	—	—
Mito	4·4	51	1	20	+10	2	12	S*	—	—
Aikawa	4·6	20	1	11	- 1	2	39	S _g *	—	—
Izuka	4·6	271	1	12	0	2	22	S _g *	—	—
Kumamoto	4·7	261	0	56 _a	-18	2	8	- 2	—	—
Sendai	5·9	39	1	24	- 7	2	24	-16	—	—
Mizusawa	6·7	35	1	42	0	3	35	S _g	—	—
Tinemaha	z. 81·2	51	i	12 15	- 4	—	—	—	—	—
Santa Barbara	z. 81·8	54	i	12 18	- 4	—	—	—	—	—
Halwee	z. 81·9	52	i	12 19	- 4	—	—	—	—	—
Belgrade	82·5	320	i	12 23	- 3	e	23 30	PS	e 15 20	PP
Mount Wilson	83·0	54	i	12 24	- 4	—	—	—	—	—
Pasadena	83·0	54	i	12 24	- 4	i	22 32	-15	—	—
Riverside	z. 83·6	54	i	12 27	- 4	—	—	—	—	—
Palomar	84·3	53	i	12 31 _a	- 4	e	22 58	- 2	—	—
Tucson	89·0	51	e	12 52	- 6	—	—	—	—	—
St. Louis	z. 96·1	35	e	13 28	- 3	—	—	—	e 17 34	PP
La Paz	152·2	56	19	52	[+ 1]	—	—	—	—	—

Additional readings :—
Mizusawa iPE = 1m.45s.
Belgrade e = 18m.56s.

Dec. 7d. 6h. 48m. 43s. Epicentre 33°·7N. 136°·2E. (as at 6h. 25m.).

Intensity V at Gihu; IV at Nagoya and Hikone; III at Sumoto, Kyoto, and Okayama. Epicentre 33°·7N. 136°·5E. Shallow. Macroseismic radius 200-300km.

Seismo. Bull. Cent. Met. Obs., Japan, Tokyo, 1944, p. 28.

	Δ	Az.	P.		O-C.	S.		O-C.
			m.	s.		m.	s.	
Siomisaki	0·4	235	0	14 _a	+ 1	0	33	+12
Kobe	1·3	319	0	27 _a	+ 2	0	53	+ 9
Sumoto	1·3	301	0	23	- 2	0	42	- 2
Kyoto	1·4	344	0	33 _a	+ 6	0	54	+ 8
Hikone	1·6	2	0	22 _a	- 8	—	—	—
Nagoya	1·6	23	0	22 _a	- 8	0	54	+ 3
Kōti	2·2	266	0	41	+ 3	1	32	?
Shizuoka	2·2	55	0	49	P _g	1	49	?
Toyooka	2·2	328	0	40	+ 2	1	15	S _g
Misima	2·7	58	0	45	0	—	—	—
Hunatu	2·8	50	0	46	- 1	—	—	—
Toyama	3·1	15	0	59	+ 8	1	42	S _g
Tokyo	3·5	55	1	2	P*	1	44	+ 4
Hamada	3·6	291	1	2	P*	2	14	S _g
Kumagaya	3·6	46	1	4	P*	—	—	—

Continued on next page.

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		Δ °	Az. °	P. m. s.	O-C. s.	S. m. s.	O-C. s.
Mito		4.4	51	1 19	P*	—	—
Izuka		4.6	271	0 33	?	—	—
Kumamoto		4.7	261	1 17	+ 3	2 27	S*
Hukuoka		4.8	270	1 29	P*	2 31	S*
Sendai		5.9	39	2 19	P _g	—	—
Mizusawa		6.7	35	e 1 43	+ 1	c 3 32	S*
Tinemaha	z.	81.2	51	c 12 17	- 2	—	—
Haiwee	z.	81.9	52	i 12 23	0	—	—
Mount Wilson		83.0	54	e 12 28	0	—	—
Pasadena	z.	83.0	54	e 12 28	0	—	—
Riverside	z.	83.6	54	e 12 32	+ 1	—	—
Palomar	z.	84.3	53	c 12 34	- 1	—	—

Kobe gives also 1m.4s.

Dec. 7d. 20h. 57m. 50s. Epicentre 34°·4N. 139°·5E.

Intensity V at Osima and Yokohama; IV at Mera, Ito, Tokyo, and Karuizawa; III at Katsuura. Epicentre as adopted. Shallow. Macroseismic radius 200-300km. Seismo. Bull. Cent. Met. Obs., Japan, for 1944, Tokyo, 1951, p. 29, with chart.

A = -·6287, B = +·5370, C = +·5624; $\delta = -7$; $h = 0$;
D = +·649, E = +·760; G = -·428, H = +·365, K = -·827.

		Δ °	Az. °	P. m. s.	O-C. s.	S. m. s.	O-C. s.	Supp. m. s.	L. m.
Osima		0.4	345	0 8	- 5	—	—	—	—
Mera		0.6	28	0 15 _a	0	0 23	- 3	—	—
Misima		0.9	328	0 18 _k	- 2	0 29	- 5	—	—
Yokohama		1.1	7	0 20	- 2	0 36	- 3	—	—
Tokyo		1.3	9	0 26 _a	+ 1	0 42	- 2	—	—
Tukubasan		1.9	15	0 33 _a	- 1	0 54	- 5	—	—
Maebasi		2.0	350	0 38	+ 3	1 2	0	—	—
Nagoya		2.2	290	0 36	- 2	1 4	- 2	—	—
Utunomiya		2.2	8	0 38	0	1 4	- 2	—	—
Gihu		2.5	294	0 43	0	—	—	—	—
Onahama		2.8	24	0 39	- 8	1 10	-12	—	—
Wazima		3.6	325	1 12	P _g	1 57	S _g	—	—
Mizusawa		4.9	15	c 0 35	?	i 2 14	?	—	—
Aomori		6.5	8	1 55	P*	2 57	+ 2	—	—
Irkutsk		30.8	316	(e 6 57)	+37	c 6 57	P	—	—
Calcutta	N.	46.1	269	—	—	c 15 41	+27	—	—
New Delhi	N.	52.7	282	—	—	c 16 45	- 1	—	i 27.9
Tinemaha	z.	78.6	53	i 12 6	+ 1	—	—	—	—
Haiwee	z.	79.3	54	i 12 11	+ 2	—	—	—	—
Pasadena		80.3	55	e 12 14	0	—	—	—	c 33.9
Mount Wilson	z.	80.4	55	i 12 15	0	—	—	—	—
Riverside	z.	81.0	55	i 12 17	- 1	—	—	—	—
Palomar	z.	81.7	55	i 12 22	0	—	—	—	—
Tucson		86.4	53	i 12 46	+ 1	—	—	—	e 40.6
La Paz		149.5	60	20 7	[+20]	—	—	—	—

Irkutsk gives eP = 1m.42s.

Long waves were also recorded at Riverview and European stations.

Dec. 7d. Readings also at 3h. (near Mizusawa), 4h. (Haiwee, Mount Wilson, Tucson, Pasadena, Palomar, and Tinemaha), 5h. (Mizusawa, Haiwee, Palomar, Riverside, and Tinemaha), 6h. (Haiwee (2), Mount Wilson (2), Palomar, Riverside, and Tinemaha (2)), 12h. (near Mizusawa), 15h. (Mount Wilson, Pasadena, Tucson, Palomar, Riverside, and Tinemaha), 18h. (Riverside, Christchurch, Wellington, and near Mizusawa), 21h. (Mount Wilson, Pasadena, Palomar, Tucson, Riverside, and near Mizusawa), 22h. (Arapuni, Christchurch, Auckland, Wellington, Riverview, Haiwee, Mount Wilson, Palomar, Tucson, Riverside, Tinemaha, St. Louis, and near Mizusawa), 23h. (Haiwee, Mount Wilson, Pasadena, Palomar, Tucson, Riverside, Tinemaha, and near Balboa Heights).

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Dec. 8d. 1h. 10m. 32s. Epicentre 18°·4S. 177°·7W.

A = -·9487, B = -·0381, C = -·3137; δ = -11; h = +5;
D = -·040, E = +·999; G = +·313, H = +·013, K = -·950.

	Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Apia	7·3	52	i 1 50	0	e 3 6	- 9	—	—
Auckland	19·6	198	—	—	9 18	?	—	9·7
Wellington	23·7	195	i 5 13	- 1	9 28	+ 1	5 40	PP 11·1
Christchurch	z. 26·4	196	—	—	11 19	SS	—	13·0
Riverview	31·8	234	e 6 47	+19	e 12 24	+46	e 14 9	SSS e 15·9
Pasadena	z. 77·1	47	i 11 56	- 1	—	—	—	—
Riverside	z. 77·5	47	i 11 58	- 1	—	—	—	e 38·0
Palomar	77·5	48	i 11 59 _a	0	—	—	—	—
Haiwee	78·3	45	e 12 4	+ 1	—	—	—	—
Tinemaha	z. 78·6	45	i 12 6	+ 1	—	—	—	—
Tucson	81·4	52	i 12 18	- 2	—	—	—	e 40·6
St. Louis	N. 99·3	52	—	—	e 25 6	- 8	e 25 24	S e 40·5

Additional readings:—

Wellington P_cP? = 9m.1s.

Riverview ISS? = 14m.36s., iN = 14m.51s.

Long waves were also recorded at Huancayo, La Paz, and Arapuni.

Dec. 8d. 6h. Undetermined shock.

Epicentre 38°·6N. 75°·1E., given by stations of U.S.S.R.

Frunse eP = 45m.59s., eP* = 46m.8s., eP_r = 46m.15s., iS_r = 47m.15s.

Andijan iP = 45m.28s., iS_r = 46m.19s.

Almata P = 46m.15s., eS = 47m.12s.

Tashkent iS = 46m.29s.?

New Delhi iEN = 46m.31s., iN = 46m.43s., i = 46m.56s. and 48m.2s., iE = 48m.7s.

Bombay iN = 48m.14s., iEN = 51m.26s., iN = 53m.17s.

Hyderabad PN = 48m.41s., SN = 52m.13s.

Calcutta ePN = 49m.0s., i = 50m.1s., iS = 52m.22s., iN = 53m.5s.

Moscow P = 50m.6s., S = 55m.3s.

Baku S = 51m.0s.

Sverdlovsk iS = 52m.33s.

Colombo eE = 56m.20s.

Copenhagen 58m.10s. and 61m.32s.

Dec. 8d. 7h. 17m. 12s. Epicentre 21°·6S. 169°·7E. Depth of focus 0·010.

A = -·9156, B = +·1664, C = -·3660; δ = -3; h = +4;
D = +·179, E = +·984; G = +·360, H = -·065, K = -·931.

	Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Auckland	15·8	165	3 38	0	6 44	+14	—	7·5
Brisbane	16·3	246	i 3 42 _k	- 2	—	—	—	—
Arapuni	17·2	164	—	—	6 48?	-14	—	—
Apia	19·3	71	e 4 20	0	e 7 48	0	—	—
Wellington	20·1	170	4 28	0	8 22	+18	4 45	pP 9·8
Sydney	20·4	229	—	—	e 8 12	+ 3	—	—
Riverview	20·4	229	4 33 _k	+ 2	e 8 22	+13	4 55	pP e 9·9
Christchurch	22·0	175	4 43	- 4	8 50	+11	9 21	SS 10·8
Pasadena	z. 88·1	53	i 12 42	+ 1	—	—	e 13 4	pP e 40·3
Riverside	z. 88·7	53	e 12 44	0	—	—	13 6	pP —
Palomar	z. 88·7	54	i 12 44	0	—	—	—	—
Tinemaha	z. 89·4	50	e 12 48	+ 1	—	—	13 11	pP —
Calcutta	N. 90·6	294	e 18 38	PPP	i 24 0	+22	—	—
Tucson	92·9	57	e 13 4	+ 1	e 25 39	PS	i 13 34	pP e 43·1
St. Louis	E. 110·8	55	e 26 16	SKKS	e 28 33	PS	e 30 7	PPS —
Jena	N. 146·1	333	e 19 32	[+ 4]	—	—	—	—
Chur	150·1	332	19 42	[+ 8]	—	—	—	—
Zürich	150·1	334	19 41	[+ 7]	—	—	—	—

For Notes see next page.

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NOTES TO DECEMBER 8d. 7h. 17m. 12s.

Additional readings:—

Wellington PPZ = 5m.2s., iZ = 5m.58s., P_cP = 8m.32s.
 Riverview iZ = 4m.36s., iPPPZ = 5m.10s., iEZ = 5m.15s., iNZ = 5m.43s., iP_cPN = 8m.30s., iE = 8m.47s., iSSN = 9m.8s., Q?N = 9m.18s.
 Christchurch P_cP = 8m.15s.
 St. Louis eE = 32m.46s.
 Long waves were also recorded at San Fernando, Kew, Upsala, Uccle, Bozeman, Ukiah, and College.

Dec. 8d. 12h. 59m. 32s. Epicentre 21°·6S. 169°·7E. Depth of focus 0·010 (as at 7h.).

	△	Az.	P.	O - C.	S.	O - C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Auckland	15·8	165	3 47	+ 9	6 41	+11	—	7·5
Brisbane	E. 16·3	246	e 3 38	- 6	i 6 55	+14	—	8·0
Arapuni	17·2	164	5 28?	?	—	—	—	10·2
Apia	19·3	71	4 19	- 1	e 7 48	0	—	—
Wellington	Z. 20·1	170	4 31	+ 3	i 8 1	- 3	4 50 pP	10·0
Sydney	20·4	229	e 4 28	- 3	e 8 16	+ 7	—	—
Riverview	20·4	229	i 4 31k	0	i 8 23	+14	i 4 55 pP	e 9·8
Christchurch	22·0	175	4 51	+ 4	8 50	+11	9 23 SS	10·8
Ukiah	87·0	46	c 25 7	PS	—	—	—	e 40·6
Pasadena	88·1	53	i 12 41	0	—	—	e 24 58 PS	e 40·3
Riverside	Z. 88·7	53	e 12 44	0	—	—	i 12 59 pP	—
Palomar	88·7	54	i 12 44 _a	0	—	—	—	—
Haiwee	Z. 89·2	51	c 12 47	+ 1	—	—	—	—
Tinemaha	Z. 89·4	50	e 12 48	+ 1	—	—	—	—
Calcutta	N. 90·6	294	—	—	i 23 34	- 4	i 24 0 SKKS	—
Tucson	92·9	57	13 4	+ 1	e 30 40	SS	e 16 54 PP	e 42·6
Huancayo	108·0	111	e 29 10	PPS	—	—	—	e 51·0
St. Louis	E. 110·8	55	e 28 9	PS	e 34 46	SS	e 28 35 PS	—
Columbia	117·3	62	—	—	—	—	e 38 4 ?	e 45·7
Bermuda	130·8	66	e 22 29	PP	e 32 54	PPS	—	e 62·4
Zürich	150·1	334	e 19 45	[+11]	—	—	—	—
Neuchatel	151·1	335	c 19 44	[+ 8]	—	—	—	—

Additional readings:—

Brisbane iPEZ = 3m.41s.
 Wellington PPZ = 5m.4s., iZ = 8m.20s., P_cPZ = 8m.32s.
 Riverview iZ = 4m.34s., iE = 5m.4s., iZ = 5m.9s., iE = 5m.14s., iN = 5m.40s., iP_cP = 8m.30s., iE = 8m.47s., iSSN = 9m.9s., Q?N = 9m.22s.
 Christchurch P_cP = 8m.15s.
 Tucson ePS = 25m.12s.
 Long waves were also recorded at Colombo, Honolulu, and other American and European stations.

Dec. 8d. 18h. 20m. 55s. Epicentre 34°·5N. 139°·1E.

Intensity V at Osima, Yokohama, Gihu, and Takayama; IV at Mera, Tokyo, Nagano, and Hikone; III at Oiwake, Mito, and Kobe.
 Epicentre 34°·1N. 138°·5E. Very shallow. Macroseismic radius greater than 300km.
 Seismological Bulletin of the Central Meteorological Observatory, Japan, for the year 1944, Tokyo, 1951, p. 29. Isoseismic chart, p. 29.

$$A = -·6243, B = +·5408, C = +·5638; \quad \delta = +9; \quad h = 0;$$

$$D = +·655, E = +·756; \quad G = -·426, H = +·369, K = -·826.$$

	△	Az.	P.	O - C.	S.	O - C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Osima	0·4	41	-0 12k	?	0 3	?	—	—
Misima	0·6	35	-0 2	?	0 13	?	—	—
Mera	0·7	56	0 17	0	—	—	—	—
Yokohama	1·0	26	0 1 _a	?	0 21	?	—	—
Tokyo	1·3	25	0 21	- 4	0 38	- 6	—	—
Tukubasan	1·9	26	0 34	0	0 57	- 2	—	—
Maebasi	1·9	359	0 35k	+ 1	1 0	+ 1	—	—
Nagoya	1·9	291	0 35 _a	+ 1	0 55	- 4	—	—
Utsunomiya	2·1	17	0 39	+ 2	1 0	- 4	—	—
Gihu	2·1	32	0 31	- 6	—	—	—	—

Continued on next page.

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		Δ	Az.	P.		O - C.		S.		O - C.		Supp.		L. m.		
				m.	s.	s.	s.	m.	s.	m.	s.					
Mito		2.2	31	0	39	+	1	1	9	+	3	—	—	—		
Nagano		2.3	341	0	41 _k	+	1	1	11	+	2	—	—	—		
Hikone		2.5	288	0	43 _a	+	0	1	16	+	2	—	—	—		
Onahama		2.9	31	0	54 _a	+	6	1	30	+	6	—	—	—		
Kobe		3.2	274	0	50 _a	-	2	1	16	-	16	—	—	—		
Wakayama		3.2	266	0	53	+	1	—	—	—	—	—	—	—		
Hokusima		3.4	18	0	54 _a	-	1	1	35	-	2	—	—	—		
Kôti		4.7	260	1	14	—	0	2	13	-	3	—	—	—		
Mizusawa	E.	4.9	19	1	17	—	0	2	46	S _g	—	—	—	—		
Akita		5.3	8	1	24	+	2	2	43	S*	—	—	—	—		
Miyako		5.6	23	1	31	+	4	—	—	—	—	—	—	—		
Hamada		5.8	264	1	26	-	3	2	39	+	1	—	—	—		
Hatinohe		6.3	17	1	37	+	1	2	42	-	8	—	—	—		
Aomori		6.4	11	1	25	-	13	3	0	+	7	—	—	—		
Kumamoto		7.2	260	1	44	-	5	—	—	—	—	—	—	—		
Hukuoka		7.3	265	1	51	+	1	3	36	S*	—	—	—	—		
Kagosima		7.7	250	1	57	+	1	—	—	—	—	—	—	—		
Sapporo		8.7	11	2	13	+	3	3	58	+	8	—	—	—		
Irkutsk		30.5	316	c	6 24	+	7	—	—	—	—	13 27	SS	—		
Calcutta	N.	45.7	269	c	8 50	+	26	15	16	+	8	10 30	PP	—		
Almata		48.2	300	8	47	+	3	—	—	—	—	—	—	—		
Andijan		52.1	297	9	17	+	3	16	39	+	1	10 23	P _c P	—		
New Delhi	N.	52.4	282	—	—	—	—	i	16 46	+	4	—	—	—		
Tashkent		54.2	299	9	31	+	2	c	17 4	-	2	—	—	—		
Sverdlovsk		55.8	319	9	41	—	0	17	22	-	6	—	—	—		
Bombay		60.9	274	10	13	-	4	18	39	+	5	13 53	PPP	—		
Colombo	E.	60.9	257	—	—	—	—	18	37	+	3	—	—	34.6		
Brisbane		63.0	167	10	30	-	1	e	19 8	+	7	23 15	SSS	—		
Baku		68.1	305	c	11 1	-	3	19	58	-	5	—	—	—		
Moscow		68.2	323	11	7	+	3	20	2	-	2	—	—	—		
Riverview		68.9	170	c	11 11	+	2	c	20 20	+	7	c	24 48	SS	c	30.9
Auckland		78.4	152	—	—	—	—	c	21 5?	-	55	—	—	—	40.1	
Tinemaha	Z.	78.7	53	i	12 6	—	0	—	—	—	—	—	—	—	—	
Copenhagen		79.3	333	—	—	—	—	22	15	+	6	22 27	SKS	41.1	—	
Haiwee		79.6	54	c	12 9	-	1	—	—	—	—	—	—	—	—	
Pasadena		80.6	55	12	13 _a	-	3	22	20	-	3	—	—	—	33.9	
Riverside	Z.	81.2	55	12	17	-	2	—	—	—	—	—	—	—	—	
Palomar		81.9	55	12	22	-	1	—	—	—	—	—	—	—	—	
Prague		82.6	328	11	46	-	40	21	53	-	50	15 29	PP	34.1	—	
Aberdeen		83.0	340	—	—	—	—	c	27 5?	SS	—	—	—	c	39.1	
Jena		83.2	330	c	12 25	-	4	—	—	—	—	12 43	P _c P	c	46.2	
Cheb		83.5	330	—	—	—	—	c	23 5?	+	13	—	—	—	45.1	
Christchurch		83.5	156	9	56	?	?	22	51	-	1	28 0	SS	41.6	—	
Stonyhurst		85.9	338	—	—	—	—	c	28 19	SS	—	c	31 12	?	c	44.6
Helwan	N.	86.5	304	—	—	—	—	23	23	+	1	c	29 11	SS	—	—
Tucson		86.6	53	12	46	—	0	c	23 23	—	0	15 31	PP	c	39.8	
Kew		87.3	336	—	—	—	—	c	23 50	+	21	—	—	—	47.1	
St. Louis		94.1	37	i	13 25	+	3	e	24 38	+	7	c	30 53	SS	41.6	—

Additional readings :—

Calcutta SSN = 18m.47s.

Bombay SPEN = 18m.28s., SSN = 22m.9s.

Riverview IN = 20m.42s.

Prague eSS = 25m.35s.

Christchurch SSSE = 31m.45s., QEN = 35m.38s.

Long waves were also recorded at Wellington, Arapuni, Huancayo, and other American and European stations.

Dec. 8d. Readings also at 2h. (Mizusawa), 3h. (College), 4h. (near Andijan and Frunse), 8h. (Pasadena, near Andijan, Tashkent, and Almata), 9h. (Tucson), 10h. (Jena), 11h. (near Trieste and near Apia), 13h. (Tinemaha, Palomar (2), Brisbane, and Tucson), 14h. (Neuchatel, Jena, Cheb, Prague, Helwan, Ksara, Palomar, Sofia, and Bucharest), 16h. (Palomar, Tinemaha, Tucson, Pasadena, Haiwee, Riverside, and near Apia), 20h. (Dehra Dun and near Mizusawa), 21h. (near Mizusawa), 22h. (Palomar, Haiwee, Tinemaha, Almata, Andijan, Tashkent, Mizusawa, Calcutta, New Delhi, and Bogota).

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Dec. 9d. 7h. Probably region of Tonga. Pasadena suggests deep focus.

Apia iP = 48m.56s., eS = 50m.0s.
 Christchurch eEN = 50m.20s. and 58m.0s.
 Auckland P = 51m.30s., S = 55m.0s., L? = 56m.20s.
 Wellington P = 52m.9s., S = 56m.23s., S_cS = 62m.41s.
 Riverview iPEZ = 54m.55s.k, iE = 58m.20s., iS?N = 61m.2s.
 Tinemaha iP = 58m.42s.k.
 Mount Wilson iP = 58m.43s.k, iZ = 59m.55s.
 Pasadena iP = 58m.43s.k, iZ = 59m.26s. and 59m.47s.
 Riverside iPZ = 58m.45s.k, eZ = 59m.59s.
 Palomar iP = 58m.47s.k, iNZ = 59m.58s.
 Haiwee iP = 58m.51s.k.
 Tucson iP = 59m.7s., i = 59m.44s.
 Jena eN = 66m.33s.
 Chur eP = 66m.38s., e = 66m.44s.

Dec. 9d. Readings also at 0h. (Haiwee, Mount Wilson, Pasadena, Palomar, Tucson, Riverside, Tinemaha, and near Mizusawa), 2h. (Haiwee, Mount Wilson, Palomar, Tinemaha, Tucson, and La Plata), 5h. (Andijan), 6h. (Bombay and near Mizusawa), 8h. (Sofia), 9h. (Bucharest), 11h. (Auckland, Christchurch, Wellington, Riverview, Tucson, Haiwee, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, and La Paz), 14h. (near Balboa Heights), 15h. (near Trieste and near Mizusawa), 16h. and 17h. (near Mizusawa), 18h. (Mount Wilson, Pasadena, Palomar, Riverside, Tucson, and Tinemaha), 20h. (Upsala, near Mizusawa, and near Balboa Heights), 21h. (Upsala (2) and near Mizusawa), 22h. (Upsala).

Dec. 10d. 5h. 11m. 29s. Epicentre 23°·5S. 65°·2E.

A = +·3851, B = +·8333, C = -·3965; δ = -10; h = +4;
 D = +·908, E = -·419; G = -·166, H = -·360, K = -·918.

	△	Az.		P.		O-C.		S.		O-C.		Supp.		L. m.
		°	°	m.	s.	s.	m.	s.	s.	m.	s.			
Tananarive	17·1	282	e 3	58	- 4	e 6	58	-14	i 4	4	PP		—	
Colombo	33·4	27	6	43	+ 1	11	13	-50	13	59	SS		19·1	
Johannesburg	33·7	257	2	43	P	7	55	S	12	7	Q		13·9	
Kodaikanal	E. 35·6	21	i 7	27	+26	i 13	9	+31	15	39	SS		18·1	
Hyderabad	N. 42·7	19	8	3	+ 3	14	27	+ 3	9	48	PP		20·8	
Bombay	42·8	11	i 8	4	+ 3	14	31	+ 5	9	54	PP		—	
Calcutta	N. 51·0	28	i 8	59?	- 7	i 16	17?	- 5					—	
New Delhi	N. 53·1	13	i 9	19	- 2	i 16	46	- 5	11	25	PP		24·2	
Helwan	62·2	326	10	25	- 1	18	55	+ 4	12	49	PP		—	
Ksara	63·5	333	e 10	35	+ 1	e 19	9	+ 2					—	
Andijan	64·3	6	e 10	41	+ 2				11	1	P _c P		—	
Tashkent	64·6	4	i 10	43	+ 2	19	24	+ 3					—	
Baku	65·1	347	e 10	45	0	19	29	+ 2					—	
Frunse	66·6	8	10	58	+ 4				11	13	P _c P		—	
Almata	67·3	10	e 11	0	+ 1								—	
Riverview	74·1	121	i 11	40k	0	e 21	2	-10	i 21	38	PS		e 31·1	
Bucharest	76·5	333	e 11	55	+ 1	e 21	40	+ 1					—	
Brisbane	N. 77·7	115				i 21	54	+ 2					—	
Sverdlovsk	80·1	358	12	13	0	i 22	15	- 3					—	
Moscow	82·3	344	i 12	25	0	i 22	41	+ 1	e 12	49	pP		—	
Triest	83·2	326	i 12	27	- 2	i 22	48	- 1	e 15	39	PP		—	
Christchurch	85·9	136	12	42	- 1	23	14	- 2	16	4	PP		41·1	
Prague	85·9	330	12	42	- 1	e 23	6	-10	e 16	14	PP		e 42·5	
Chur	86·2	325	i 12	44	0	e 23	8	-11					—	
Cheb	86·9	329	e 12	51	+ 3	e 23	18	- 8	e 29	22	SS		e 49·5	
Zürich	87·0	325	e 12	47k	- 1	e 23	16	-11					—	
Basle	87·6	325	e 12	50	- 1	e 23	23	- 9					—	
Strasbourg	88·2	326	e 12	55	+ 1	i 23	43	+ 5	e 23	27	SKS		—	
Wellington	88·3	135	12	53	- 2	23	39	0	16	13	PP		43·1	
Granada	88·5	311	e 12	55a	- 1	24	44	PS					46·4	
Malaga	88·8	311	i 12	59k	+ 2	i 23	29	[+ 3]					48·5	
Clermont-Ferrand	89·0	322	i 12	59	+ 1	e 23	28	[+ 1]					e 45·5	
San Fernando	E. 89·9	310	13	4	+ 2	23	0	[-32]	15	49	PP		41·5	
Vladivostok	90·2	43	e 12	57	- 7	i 23	58	+ 2	i 13	22	pP		—	
Arapuní	90·6	133				24	31?	PS	29	31?	SS		—	

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	Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Auckland	90.6	132	13 6?	+ 1	24 1	+ 1	25 6 PS	38.5
Copenhagen	90.7	334	i 13 6	0	24 4	+ 3	16 49 PP	—
Uccle	91.3	326	e 13 8	- 1	e 23 39	[- 1]	e 16 31 PP	e 41.5
Upsala	91.7	338	e 16 55	PP	e 24 9	- 1	e 23 34 SKS	e 49.5
Lisbon	93.1	312	13 15	- 2	24 31	+ 9	23 46 SKS	49.3
Kew	94.1	326	e 13 58	+36	e 24 39	+ 8	e 18 27 PPP	e 47.0
Stonyhurst	96.5	327	e 16 52	PP	e 23 42	[- 27]	i 30 31 SS	—
Bergen	96.6	335	—	—	e 26 54	PPS	e 31 44 SSP	—
Aberdeen	98.0	330	—	—	i 26 25	PS	i 27 15 PPS	—
La Plata	100.7	225	24 25	SKS	(24 25)	[- 5]	—	46.4
La Paz	119.5	234	i 19 0	[+ 8]	—	—	i 20 10k PP	58.5
Huancayo	127.7	232	e 21 0	PP	e 31 20	PS	e 42 42 SSS	e 58.8
San Juan	134.4	273	e 19 56	[+36]	e 31 50	PS	e 21 51 PP	e 63.8
Bermuda	135.2	293	e 22 56	PP	e 28 4	[- 48]	e 39 21 SS	e 54.9
Bogota	136.5	251	e 19 24	[0]	—	—	e 22 9 PP	—
Seven Falls	137.8	316	e 22 25	PP	e 32 25	PS	—	70.5
Ottawa	141.6	315	e 19 31	[- 2]	e 32 55	PS	e 23 11 PP	67.5
Fordham	141.7	307	i 19 31	[- 2]	i 23 12	PKS	e 22 45 PP	—
Philadelphia	142.8	306	—	—	—	—	e 46 13 SSS	e 75.2
Saskatoon	150.7	350	e 23 31	PP	e 38 43	PPS	—	96.5
Chicago	150.9	316	—	—	e 33 31	PS	e 43 26 SS	e 79.2
St. Louis	154.2	312	i 19 54	[+ 1]	e 30 35	[- 6]	i 23 52 PP	—
Florissant	154.7	312	i 19 55	[+ 1]	e 30 42	[- 2]	i 23 57 PP	—
Rapid City	157.4	338	e 20 6	[+ 8]	—	—	e 24 4 PP	e 86.1
Bozeman	157.7	353	e 20 7	[+ 9]	e 37 11	PPS	e 24 12 PP	e 71.2
Logan	161.6	353	e 20 30	[+28]	—	—	—	e 91.1
Ukiah	162.8	23	e 23 38	PKS	e 35 14	?	e 39 56 PPS	e 94.8
Berkeley	164.3	23	e 20 9	[+ 4]	—	—	e 24 40 PP	e 92.5
Santa Clara	z. 164.9	22	i 20 10	[+ 4]	—	—	i 24 51 PP	—
Tinemaha	z. 166.1	12	e 20 8	[+ 1]	—	—	i 24 59 PP	—
Haiwee	z. 167.1	12	e 20 9	[+ 2]	—	—	e 25 4 PP	—
Santa Barbara	z. 168.3	20	e 19 59	[- 9]	—	—	e 25 10 PP	—
Mount Wilson	168.9	14	i 20 10k	[+ 1]	—	—	i 25 8 PP	—
Pasadena	169.0	15	i 20 10k	[+ 1]	e 31 57	[- 1]	i 25 10 PP	e 77.5
Riverside	z. 169.3	12	e 20 10	[+ 1]	—	—	e 25 5 PP	—
Palomar	170.0	10	i 20 12k	[+ 3]	i 31 50	[- 13]	i 25 21 PP	—
La Jolla	z. 170.4	13	e 20 10	[+ 1]	—	—	—	—
Tucson	170.6	339	i 20 11	[+ 1]	e 25 16	PP	e 28 47 PPP	e 88.6

Additional readings and notes:—

Tananarive i = 4m.1s. and 4m.17s., ISS = 7m.11s., i = 7m.26s. and 8m.21s., iP_cP = 8m.58s., iP_cS = 12m.30s.
 Johannesburg E = 7m.1s., the timing appears wrong.
 Hyderabad S_cSN = 17m.53s.
 Bombay iN = 8m.11s., iE = 14m.47s., SSE = 17m.45s., iN = 18m.2s., SSS?E = 18m.47s.
 New Delhi PSN = 17m.17s., iN = 19m.49s., SSN = 20m.34s.
 Helwan eN = 14m.13s. and 20m.19s., eN = 21m.49s.
 Riverview iE = 11m.43s., iP_cPZ = 11m.55s., iEN = 21m.17s., iPPSE = 21m.49s., eE = 22m.49s., iE = 26m.7s., eN = 26m.17s.
 Trieste iPS = 23m.28s., ISS = 28m.51s.
 Christchurch eZ = 15m.2s., PPPNZ = 18m.14s., SKSEN = 22m.50s., PS = 24m.13s., SSEN = 28m.49s., SSSNZ = 32m.27s., QEN = 35m.51s.
 Prague eSS = 28m.31s.?
 Cheb e = 25m.11s.
 Wellington iZ = 14m.58s., 17m.46s. and 22m.4s., SKSZ = 23m.21s., PPSZ = 24m.46s., iZ = 25m.4s., SSZ = 29m.26s., iZ = 36m.37s.
 San Fernando PSE = 24m.53s., SSE = 29m.0s.
 Auckland e = 29m.43s.?
 Copenhagen 23m.34s., 25m.16s., and 30m.1s.
 Uccle eP_cPEN = 13m.13s., eSKSN = 23m.20s.
 Upsala eE = 23m.38s. and 29m.55s., eN = 30m.13s.
 Lisbon iPE = 13m.18s., SSEN = 30m.49s.
 Kew, eEN = 14m.31s., e = 15m.48s., ePPP?E = 20m.38s., ePSZ = 28m.9s., eSSS = 39m.1s., all readings have been diminished by 10m.
 Stonyhurst i = 24m.19s., ePS = 24m.57s., i = 31m.51s.
 La Plata PN = 24m.31s.
 Huancayo e = 23m.28s., ePS = 31m.33s., e = 36m.53s., 42m.17s., and 50m.12s.
 San Juan i = 22m.53s., eSS = 39m.47s.
 Ottawa eE = 42m.31s.?

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Fordham ePPS = 36m.34s.
 Chicago e = 36m.32s.
 St. Louis iZ = 20m.3s., iPKP₂Z = 20m.15s., iZ = 20m.18s. and 24m.1s., eN = 33m.50s.,
 iPSKSN = 34m.22s., eE = 35m.5s., iE = 37m.10s. and 39m.6s., iSSE = 43m.2s., eE =
 48m.17s.
 Florissant iPKP₂Z = 20m.21s., eE = 28m.10s., eE = 33m.44s., iE = 37m.17s., eE =
 38m.36s., iE = 39m.7s., eSSE = 43m.3s.
 Rapid City i = 20m.33s.
 Bozeman e = 43m.44s., 54m.8s., and 57m.27s.
 Berkeley e = 28m.16s. and 29m.34s.
 Haiwee ePKP₂Z = 21m.14s.
 Santa Barbara eZ = 21m.18s.
 Mount Wilson iPKP₂Z = 21m.22s., eZ = 22m.54s.
 Pasadena iZ = 20m.39s., iPKP₂Z = 21m.20s., i = 21m.34s., eN = 28m.46s., eP_cP, PKPZ =
 29m.15s., iZ = 29m.33s., eZ = 33m.20s., eSSN = 46m.25s.
 Palomar iPKP₂Z = 21m.28s., eP_cP, PKPZ = 29m.18s.
 Tucson i = 21m.32s. and 25m.19s., e = 38m.45s., 44m.57s., 51m.40s., and 57m.11s.
 Long waves were also recorded at New Kensington and Salt Lake City.

Dec. 10d. 16h. 24m. 55s. Epicentre 18°·0S. 167°·7E. (as on 1941 Oct. 16d.)

A = -·9299, B = +·2027, C = -·3071; δ = +11; h = +5;
 D = +·213, E = +·977; G = +·300, H = -·065, K = -·952.

		Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.	
		°	°	m. s.	s.	m. s.	s.	m. s.	m.	
Brisbane	N.	16·5	232	i 3 58	+ 4	i 7 6	+ 8	i 4 15	PP	—
Auckland		19·8	162	4 32	- 3	8 20	+ 7	4 55	pP	9·6
Apia		20·2	82	e 4 44	+ 5	i 8 27	+ 6	—	—	—
Arapuni		21·2	164	4 53?	+ 4	8 29?	- 12	—	—	—
Riverview		21·6	219	i 4 51k	- 3	i 8 51	+ 2	i 5 31	pP	10·6
Sydney		21·6	219	i 4 53	- 1	i 8 47	- 2	—	—	—
New Plymouth		21·7	166	5 2	+ 7	8 57	+ 6	—	—	—
Wellington		24·0	167	5 15	- 2	9 30	- 2	5 40	pP	16·4
Kaimata		24·6	174	—	—	10 20	SS	—	—	e 14·7
Christchurch		25·8	171	5 33	- 1	9 38	- 24	5 46	pP	i 14·1
Perth		48·6	242	9 15	+ 28	15 50	+ 1	10 41	PP	—
Honolulu		51·6	43	e 9 2	- 8	e 16 31	0	e 18 51	S _c S	e 21·4
Yokohama	Z.	59·4	333	e 10 11	+ 5	—	—	—	—	—
Shizuoka		59·6	332	e 10 5	- 3	—	—	—	—	—
Kobe		60·8	330	10 15	- 1	—	—	—	—	—
Kōti		60·8	327	e 10 15	- 1	18 25	- 8	—	—	—
Nagano		61·1	334	e 10 15	- 3	—	—	—	—	—
Sendai		61·4	337	10 17	- 3	18 38	- 2	—	—	—
Mizusawa		62·0	337	e 10 27	+ 3	e 18 50	+ 2	—	—	—
Hukuoka		62·4	325	i 10 26 _a	- 1	18 51	- 2	—	—	25·6
Hamada		62·6	327	10 30	+ 2	19 16	+ 20	—	—	—
Sapporo		65·4	340	e 10 45	- 2	(19 29)	- 1	—	—	19·5
Vladivostok		69·2	332	i 11 20	+ 10	—	—	14 8	PP	—
Ukiah		85·9	47	e 12 43	0	i 23 5	[- 2]	e 15 40	PP	e 35·7
Berkeley		86·0	48	e 12 41	- 2	e 23 6	[- 1]	e 25 4	PPS	e 39·4
Santa Clara		86·0	48	i 12 42	- 1	i 23 7	[0]	—	—	e 40·1
Santa Barbara		86·4	53	i 12 45	0	e 23 9	[- 1]	—	—	—
Calcutta	N.	87·4	294	i 12 55	+ 5	23 19	[+ 2]	i 23 55	PS	—
Pasadena		87·5	53	i 12 50 _a	- 1	i 23 16	[- 1]	e 22 54	SKS	e 35·7
Mount Wilson		87·6	53	i 12 51 _a	0	i 23 16	[- 2]	—	—	—
La Jolla		87·7	54	i 12 51	- 1	i 23 16	[- 3]	—	—	—
Riverside		88·0	53	i 12 52 _a	- 1	e 23 18	[- 2]	e 38 48	P'P'	—
Palomar		88·1	54	i 12 54 _a	0	i 23 22	[+ 1]	—	—	—
Haiwee		88·4	51	i 12 55	0	e 23 23	[0]	—	—	—
Tinemaha		88·6	50	e 12 55	- 1	i 23 23	[- 1]	e 38 47	P'P'	—
Sitka		88·8	27	—	—	e 23 14	[- 12]	e 30 8	SS	e 37·8
Irkutsk		88·9	326	—	—	i 23 23	[- 3]	—	—	—
Colombo		90·1	277	13 1	- 2	23 31	[- 2]	—	—	50·1
Victoria		90·1	38	13 5	+ 2	23 31	[- 2]	—	—	39·1
Boulder City		90·7	52	i 13 5	- 1	e 23 39	[+ 2]	—	—	—

Continued on next page.

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		Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.	
				m. s.	s.	m. s.	s.	m. s.	m.	
Tucson		92.5	56	i 13 14	0	c 23 40	[- 7]	i 17 5	PP	e 37.4
Kodaikanal	E.	93.3	279	i 20 3	?	i 30 18	SS	e 35 18	?	e 46.6
Salt Lake City		94.6	48	e 13 43	+19	i 24 0	[+ 1]	e 17 4	PP	e 39.6
Logan		94.9	47	e 13 40	+15	i 24 34	- 3	i 24 1	SKS	e 43.8
Butte		95.9	43	—	—	i 24 2	[- 4]	e 30 25	SS	e 39.9
Bozeman		96.8	44	e 17 48	PP	e 24 7	[- 4]	e 25 50	PS	e 35.1
Tacubaya	E.	98.6	73	—	—	e 24 17	[- 3]	—	—	—
New Delhi	N.	98.8	297	e 13 40	- 3	25 3	- 7	17 43	PP	—
Bombay		100.1	286	i 13 46	- 3	24 24	[- 3]	17 56	PP	—
Saskatoon		101.4	39	e 17 27	PP	e 24 30	[- 3]	e 27 23	PS	48.1
Rapid City		101.7	47	—	—	e 24 33	[- 2]	e 27 25	PS	e 47.3
Almata		102.7	312	e 18 13	PP	—	—	—	—	—
Andijan		105.5	308	e 13 54	-19	c 25 9	[+16]	—	—	—
Tashkent		107.9	308	e 14 23	P	25 7	[+ 4]	i 18 50	PP	—
Florissant		110.2	54	e 19 9	PP	i 25 14	[+ 1]	i 28 47	PS	—
St. Louis		110.3	54	e 19 6	PP	e 25 2	[-11]	i 28 31	PS	—
Tananarive		110.7	241	—	—	e 34 51	SS	—	—	e 55.4
La Plata	E.	111.8	141	25 17	SKS	(25 17)	[- 2]	34 59	SS	50.0
Chicago		112.6	51	—	—	e 26 22	[- 1]	e 29 0	PS	e 50.4
Sverdlovsk		114.2	325	e 14 51	P	e 27 16	[+42]	e 19 26	PP	—
La Paz	Z.	115.2	119	e 14 56	P	24 20	?	i 19 44	PP	54.6
Columbia		117.2	60	—	—	e 40 28	SSS	—	—	e 51.6
New Kensington		118.5	53	—	—	e 25 45	[0]	e 40 7	SSS	e 59.2
Pennsylvania		119.9	52	—	—	e 27 6	[- 7]	e 30 10	PS	47.8
Ottawa		121.2	46	18 51	[- 4]	25 48	[- 6]	20 29	PP	56.1
Philadelphia		122.0	53	e 20 26	PP	e 25 46	[-11]	e 30 6	PS	e 55.9
Baku		122.5	307	19 8	[+10]	26 11	[+13]	e 20 40	PP	—
Fordham		122.9	52	i 18 57	[- 1]	i 26 0	[+ 1]	e 20 34	PP	e 59.5
Seven Falls		124.3	45	20 59	PP	27 39	[- 4]	30 46	PS	55.1
Moscow		126.9	327	19 4	[- 2]	25 48	[-23]	20 59	PP	—
San Juan		129.0	80	i 19 12	[+ 2]	c 32 36	PPS	i 23 49	PPP	e 54.8
Rio de Janeiro	N.	129.4	142	e 21 5	PP	—	—	—	—	—
Halifax		129.8	46	e 22 36	PKS	—	—	—	—	67.1
Bermuda		130.8	62	e 21 41	PP	e 27 46	[-39]	e 32 5	PS	e 54.3
Upsala		133.0	340	21 39	PP	e 26 35	[+ 8]	i 22 44	PKS	e 58.1
Ksara		134.3	299	e 19 24	[+ 4]	—	—	e 22 0	PP	—
Bergen		135.8	347	18 17	[-66]	21 5?	PP	32 30	PS	e 57.1
Copenhagen		138.0	340	e 19 25	[- 2]	40 26	SS	22 10	PP	—
Bucharest		138.5	318	e 19 53	[+25]	i 23 3	PKS	—	—	80.1
Helwan		138.6	295	19 23	[- 5]	e 26 50	[+13]	e 23 3	PKS	—
Aberdeen		140.2	251	i 19 29	[- 2]	i 29 19	[- 3]	i 23 9	PKS	58.6
Potsdam		140.3	336	e 19 38	[+ 7]	i 23 7	PKS	e 22 52	PP	e 63.1
Sofia		141.1	317	e 19 33	[+ 1]	e 23 13	PKS	e 22 5?	PP	—
Prague		141.5	332	e 19 35	[+ 2]	e 27 5	[+23]	e 22 47	PKS	e 59.1
Jena		142.0	334	e 19 28	[- 6]	—	—	e 22 33	PP	e 70.1
Cheb		142.4	334	e 19 39	[+ 4]	—	—	—	—	e 72.1
Stonyhurst		143.4	350	i 21 40	?	e 41 35	SS	i 23 5	PP	e 60.3
Uccle		144.7	343	i 19 36	[- 3]	e 29 49	[+ 1]	e 22 57	PP	e 68.1
Triest		145.0	328	i 19 37	[- 2]	i 29 49	[- 1]	i 23 20	PP	e 67.4
Kew		145.3	347	e 19 25	[-15]	e 28 47	[-65]	i 23 26	PP	—
Zürich		146.0	335	e 19 40 ^a	[- 1]	—	—	—	—	—
Chur		146.1	334	e 19 41	[0]	—	—	—	—	—
Basle		146.3	335	e 19 40	[- 1]	—	—	—	—	—
Strasbourg		146.4	337	i 19 39	[- 3]	—	—	i 22 57	PP	—
Neuchatel		147.0	335	e 19 42	[- 1]	—	—	—	—	—
Paris		147.0	342	i 19 38	[- 5]	—	—	i 39 23	P'P'	71.1
Clermont-Ferrand		149.5	338	e 19 45	[- 2]	—	—	e 22 21	PP	e 71.1
Tortosa	N.	154.7	336	19 59	[+ 5]	44 15	SS	23 58	PP	e 84.1
Lisbon		159.2	353	i 20 0 ^k	[0]	—	—	i 24 14	PP	76.1
Granada		159.4	340	i 20 7 ^a	[+ 7]	i 45 19	SS	i 24 25	PP	83.9
Malaga		160.1	341	i 20 2 ^a	[+ 1]	44 3	SS	i 20 15	pPKP	e 73.1
San Fernando		160.8	345	20 5	[+ 3]	32 29	[+72]	24 29	PP	—

For Notes see next page.

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NOTES TO DECEMBER 10d. 16h. 24m. 55s.

Additional readings :—

Auckland i = 4m.43s., 5m.5s., 6m.15s., 8m.30s., and 8m.46s.
 Arapuni i = 9m.5s.
 Riverview 1N = 5m.34s., iPP?N = 5m.41s., iE = 6m.9s., iSZ = 8m.55s., QE = 9m.23s.
 Wellington PPZ = 6m.5s., iZ = 6m.31s. and 7m.8s., i = 9m.50s., sSZ = 10m.11s., SS?Z = 10m.50s., S_cP = 12m.5s., i = 12m.55s.
 Christchurch iEN = 6m.45s., iEZ = 7m.3s., iEN = 7m.30s., sS = 10m.2s., i = 10m.32s., 11m.19s., and 12m.37s.
 Perth PPP = 11m.25s., SSS = 19m.53s.
 Honolulu e = 12m.9s.
 Mizusawa eSE = 18m.56s.
 Vladivostok PPP = 15m.40s.
 Ukiah e = 27m.37s.
 Berkeley e = 32m.23s., eQ = 35m.22s.
 Calcutta SKKS = 23m.36s., PPSN = 25m.10s.
 Pasadena IPPSE = 24m.49s., iPKP,PKPZ = 38m.49s.
 Palomar iZ = 12m.58s. and 13m.9s.
 Sitka iSKS = 23m.24s.
 Colombo SS = 23m.43s.
 Boulder City i = 13m.9s., e = 23m.31s.
 Tucson i = 13m.18s. and 13m.28s., e = 16m.47s. and 29m.5s., iPKP,PKP = 38m.39s.
 Salt Lake City iS = 24m.37s., ePS = 25m.49s., e = 29m.12s.
 Logan ePS = 26m.5s., eSSS = 34m.53s.
 Butte e = 24m.46s.
 Bozeman iSKS = 24m.10s., eS = 24m.58s., e = 29m.23s.
 New Delhi SKSN = 24m.18s., SSN = 31m.46s., SSSN = 35m.38s.
 Bombay iE = 16m.51s., SKSN = 24m.27s., iSKKSE = 24m.40s., iSEN = 25m.21s., iEN = 25m.43s.
 Rapid City eS? = 25m.36s., e = 33m.22s.
 Tashkent ePKP = 18m.1s., iPS = 28m.17s.
 Florissant iZ = 19m.23s., iSKKSE = 26m.9s.
 St. Louis iSKKSE = 26m.8s., iE = 26m.28s., iSSE = 34m.6s.
 Chicago eSS? = 35m.2s.
 Sverdlovsk iPS = 29m.14s., eSS = 35m.35s.
 La Paz iSKKS = 23m.12s., SSZ = 36m.32s.
 New Kensington e = 31m.8s.
 Ottawa SKKS = 27m.19s., PS = 30m.18s., PPS = 32m.5s.?, SS = 37m.5s.?
 Philadelphia e = 27m.17s., eSS = 37m.1s., e = 47m.5s.
 Baku PS = 30m.34s.
 Fordham iSKKS = 27m.34s., ePS = 30m.28s., iSS = 37m.16s.
 Seven Falls SS = 37m.35s.
 Moscow P = 15m.45s., PKS = 22m.23s., SKKS = 27m.58s.
 San Juan eP = 15m.31s., e = 19m.56s., 39m.13s., and 44m.19s.
 Bermuda iPP = 22m.49s., ePPS = 33m.36s., eSS = 38m.35s.
 Upsala PPN = 21m.42s., iN = 24m.1s., eSKSN = 26m.39s., SKKSN = 28m.34s., eE = 31m.27s., PPS?N = 33m.38s., eSSN = 38m.46s., eSSE = 39m.5s.?, eE = 41m.38s., eSSS = 44m.5s.?, eN = 55m.2s.
 Bergen SKSN = 24m.0s., eE = 40m.7s., eN = 40m.53s., eE = 45m.5s.?
 Copenhagen 23m.3s. and 35m.47s.
 Helwan eEN = 19m.30s., eE = 19m.45s., eZ = 21m.44s., eEZ = 22m.14s., eE = 24m.53s., eZ = 25m.35s. and 28m.17s., eEZ = 32m.35s., eN = 40m.41s.
 Aberdeen iE = 19m.59s., iN = 46m.20s.
 Potsdam ePKPE = 19m.41s., iPKSN = 23m.12s., eN = 27m.14s.
 Sofia eEN = 21m.25s.
 Prague eP? = 17m.29s., eSKP = 23m.23s., ePPP = 26m.17s., eSKKS = 29m.35s., eSKSP = 32m.59s., ePS = 34m.35s., eSS = 50m.35s.
 Jena eNZ = 22m.15s., eE = 22m.22s.
 Stonyhurst i = 22m.29s., 25m.32s., and 32m.45s., eSSS = 47m.5s.
 Uccle iSKP = 23m.20s., ePPSN = 35m.54s.
 Trieste iPKP₁ = 19m.52s., ePPP = 26m.28s., iPSKS = 33m.11s., iSS = 42m.37s., iSSS = 47m.34s.
 Kew iNZ = 19m.37s., iEZ = 19m.50s., i = 19m.56s., iE = 20m.4s. and 20m.17s., eN = 23m.7s. and 32m.35s.?, e = 41m.57s., eN = 47m.5s.?
 Basle e = 19m.46s.
 Tortosa PKP₁N? = 20m.47s., iN = 21m.57s.
 Lisbon PKP₁E = 20m.3s.?, PKPN = 20m.11s., iPKP₁Z = 20m.37s.?, PKP₁E = 20m.45s., iPKP₁Z = 20m.48s.?, iPKP₁N = 20m.51s.
 Malaga iPKP₁ = 20m.45s., i = 20m.57s., iPP = 24m.25s., PPP = 28m.3s.
 San Fernando eEZ = 20m.16s., PKP₁Z = 20m.48s., SSE = 42m.48s.

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Dec. 10d. 19h. Indian Ocean ? Not an after-shock to 5h.

Tananarive P = 27m.44s., PP = 27m.59s., SS = 30m.56s., eL = 31m.35s.
 Colombo PE = 28m.18s., S?E = 33m.57s.
 Bombay iPN = 29m.39s., eSN = 34m.58s.
 New Delhi ePN = 31m.5s., e = 37m.25s.
 Kodaikanal iPE = 31m.16s., iSE = 36m.1s., SSE = 37m.26s., L = 39m.26s.
 Chur eP = 34m.53s.
 Zürich eP = 35m.18s. a.
 Jena eEN = 35m.21s.
 Basle eP = 35m.22s.
 Neuchatel eP = 35m.23s.
 Strasbourg e = 35m.31s.
 Clermont-Ferrand e = 35m.32s.
 Calcutta iN = 37m.12s. and 43m.51s.
 College e = 38m.7s., eS = 48m.19s., e = 49m.2s., 49m.46s., and 54m.25s., eL = 61m.10s.
 Florissant ePZ = 42m.52s.
 St. Louis iPZ = 42m.52s., eLE = 86m.
 Tinemaha ePZ = 43m.6s., iZ = 43m.32s. and 47m.5s.
 Riverside ePZ = 43m.7s., iZ = 43m.42s., eZ = 47m.24s.
 Haiwee ePZ = 43m.8s., iZ = 43m.35s., eZ = 47m.10s.
 Mount Wilson iPZ = 43m.9s., iZ = 43m.39s., iNZ = 43m.43s.
 Pasadena iPNZ = 43m.9s., iZ = 43m.42s., eZ = 47m.17s. and 51m.22s.
 Palomar iPZ = 43m.11s., iNZ = 43m.47s., iEZ = 47m.28s.
 Tucson iP = 43m.11s., i = 43m.53s., e = 45m.25s. and 47m.31s., eL = 84m.40s.
 La Jolla eZ = 43m.47s.
 Long waves were recorded at Huancayo and Fordham.

Dec. 10d. Readings also at 5h. (Tananarive, near Almeria, Alicante, Toledo, Granada, and Malaga), 7h. (Uccle), 9h. (Haiwee, Mount Wilson, Pasadena, Palomar, Riverside, Santa Barbara, Tinemaha, Tucson, St. Louis, and Huancayo), 13h. (near Grozny), 15h. (near Ottawa), 16h. (Haiwee, La Jolla, Mount Wilson, Pasadena, Palomar, Riverside, Santa Barbara, Tinemaha, and Tucson), 17h. (Basle, Neuchatel, Zürich, Uccle, Strasbourg, and Clermont-Ferrand), 18h. (Salt Lake City), 19h. (near Malaga and near Mizusawa), 21h. (Bogota).

Dec. 11d. Readings at 0h. (Almata, Andijan, near Alicante, and Balboa Heights), 1h. (2) and 2h. (near Balboa Heights), 5h. (Haiwee, Mount Wilson, Pasadena, Palomar, Tucson, and Riverside), 7h. (Brisbane), 12h. (near Bogota).

Dec. 12d. 4h. 17m. 7s. Epicentre 51°·4N. 179°·2W. (as on 1943, Jan. 27d.).

A = -·6264, B = -·0087, C = +·7795 ; $\delta = +7$; $h = -6$;
 D = -·014, E = +1·000 ; G = -·779, H = -·011, K = -·626.

	Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
College	21·1	38	e 5 9	+21	c 9 3	+24	—	i 10·1
Nemuro	25·0	266	5 26	- 1	—	—	—	—
Sitka	25·9	60	e 6 28	PP	e 9 44	-20	—	e 12·3
Sapporo	27·8	270	e 5 43	-10	(10 55)	+20	—	10·9
Mori	28·8	268	e 7 28	?	—	—	—	—
Mizusawa	N. 30·1	262	e 6 10	- 3	11 11	- 1	—	—
Sendai	30·8	260	i 6 18	- 2	11 6	-17	—	—
Hokusima	31·4	259	6 24	- 1	11 28	- 4	—	—
Mito	32·2	259	e 6 33	+ 1	—	—	—	—
Tokyo	33·1	258	6 47	+ 7	—	—	—	—
Nagano	33·5	262	e 6 44	+ 1	—	—	—	—
Vladivostok	33·7	276	i 6 32	-13	i 11 51	-17	—	—
Honolulu	34·4	143	e 7 25	+34	c 12 19	0	e 8 13	PP e 14·2
Shizuoka	34·4	258	6 50	- 1	12 19	0	—	—
Nagoya	35·2	260	6 58	0	—	—	—	—
Victoria	35·3	73	7 1	+ 2	i 12 35	+ 2	8 30	PP 14·9
Kobe	36·6	261	7 10	0	12 51	- 2	—	—
Hamada	38·4	264	7 23	- 2	13 19	- 1	—	—
Koti	38·4	262	i 7 25	0	13 19	- 1	—	—
Hukuoka	40·3	264	7 41 _a	+ 1	13 48	- 1	8 50	PP 18·4

Continued on next page.

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	Δ	Az.	P.		O-C.	S.		O-C.	Supp.		L.	
	°	°	m.	s.	s.	m.	s.	s.	m.	s.	m.	
Ukiah	40.3	86	e 7	45	+ 5	i 13	52	+ 3	i 9	28	PP	e 16.9
Berkeley	41.7	87	e 7	56	+ 4	i 14	12	+ 2	—	—	—	e 19.0
Santa Clara	42.2	87	i 8	7	+11	e 14	21	+ 4	—	—	—	e 19.9
Butte	42.9	70	e 8	1	- 1	e 14	25	- 2	e 10	18	PP	e 20.8
Saskatoon	43.2	60	8	19	+15	14	29	- 3	18	2	SS	19.9
Bozeman	44.0	70	e 8	11	0	i 14	41	- 2	e 10	10	PP	e 19.9
Tinemaha	44.7	85	i 8	16 _a	0	e 14	56	+ 2	e 18	7	ScS	—
Irkutsk	45.2	303	i 8	24	+ 4	18	29	SS	10	25	PP	—
Haiwee	45.4	85	e 8	23	+ 1	e 15	2	- 2	i 10	1	PcP	—
Logan	45.8	75	i 8	26	+ 1	i 15	10	+ 1	e 18	28	SS	e 20.6
Salt Lake City	46.3	76	e 8	31	+ 2	i 15	15	- 1	e 10	40	PP	e 20.8
Mount Wilson	46.6	88	i 8	33	+ 1	e 15	19	- 2	—	—	—	—
Pasadena	46.6	88	i 8	31	- 1	i 15	20	- 1	i 8	38	pP	e 19.0
Riverside	47.2	88	i 8	37	+ 1	e 15	28	- 1	—	—	—	—
Boulder City	47.5	83	i 8	40	+ 2	e 15	34	0	—	—	—	—
Palomar	47.9	88	i 8	43	+ 1	i 15	43	+ 4	—	—	—	—
La Jolla	48.0	89	e 8	43	0	e 15	41	0	—	—	—	—
Rapid City	49.5	68	i 7	56	-58	i 15	0	-62	—	—	—	e 21.8
Tucson	52.4	84	i 9	17	+ 1	i 16	41	- 1	i 11	44	PP	e 22.0
Lincoln	55.3	66	e 9	37	- 1	e 17	17	- 4	e 11	55	PP	e 26.0
Chicago	59.7	61	e 10	3	- 6	e 18	12	- 7	—	—	—	e 24.9
Florissant	60.2	65	i 10	11	- 1	i 18	21	- 4	—	—	—	—
St. Louis	60.4	65	i 10	13	0	i 18	25	- 3	i 22	17	SS	—
Sverdlovsk	61.4	328	i 10	20	0	i 18	37	- 3	—	—	—	—
Ottawa	63.2	50	10	30	- 2	18	59	- 4	23	59	SS	29.9
Buffalo	63.5	54	i 10	33	- 1	—	—	—	—	—	—	—
Shawinigan Falls	63.8	47	10	33	- 3	—	—	—	—	—	—	32.9
Seven Falls	64.2	47	10	37	- 2	19	10	- 6	23	59	SS	29.9
New Kensington	64.8	57	e 10	45	+ 2	e 19	20	- 3	e 15	9	PPP	e 27.6
Apia	65.3	172	e 11	3	+17	i 19	28	- 1	—	—	—	e 29.9
Pennsylvania	65.6	56	—	—	—	i 19	33	0	i 20	36	ScS	30.4
Georgetown	67.4	56	i 10	58	- 1	i 19	44	-11	i 14	9	PP	32.9
Harvard	67.4	50	i 10	59	0	—	—	—	—	—	—	—
Fordham	67.5	53	i 10	58	- 2	i 19	53	- 3	—	—	—	e 31.7
Philadelphia	67.6	55	e 10	59	- 2	e 19	49	- 8	e 27	44	SSS	e 29.4
Upsala	68.3	352	11	3?	- 2	19	56	-10	i 13	58	PP	e 33.9
Bergen	68.5	358	11	6	0	20	20	+12	24	35	SS	e 30.9
Columbia	68.9	62	—	—	—	e 20	7	- 6	e 24	53	SS	e 31.7
Moscow	69.0	339	11	7	- 2	20	9	- 5	—	—	—	—
Andijan	69.1	310	e 11	11?	+ 1	20	28	PS	—	—	—	—
Halifax	69.4	44	—	—	—	e 20	11	- 7	—	—	—	35.9
Tashkent	70.1	312	i 11	16	0	i 20	24	- 3	—	—	—	—
Aberdeen	71.8	2	i 11	24	- 2	i 20	41	- 5	i 25	11	SS	e 30.6
Copenhagen	72.8	354	i 11	32 _a	0	20	56	- 2	15	58	PP	—
Edinburgh	73.0	3	—	—	—	e 20	53	- 7	—	—	—	—
Calcutta	74.2	285	i 11	39	- 1	i 21	5	- 9	—	—	—	—
Stonyhurst	75.1	3	e 12	2	+16	e 21	27	+ 3	e 26	14	SS	e 31.4
New Delhi	76.0	298	e 11	50	- 1	e 21	32	- 2	e 16	12	PPP	—
Potsdam	76.1	353	e 11	53?	+ 2	e 21	48	+13	e 12	17	PcP	e 34.9
Kew	77.5	1	i 12	0 _a	+ 1	e 22	35	PS	e 15	5?	PP	e 37.9
Jena	77.6	353	i 12	0	0	e 22	2	+11	e 15	46	PP	e 39.2
Uccle	78.1	358	i 12	2 _a	0	i 21	53	- 3	—	—	—	e 37.9
Prague	78.2	351	e 12	28	+25	e 22	14	+17	e 22	53	PS	e 35.9
Cheb	78.4	335	e 12	7?	+ 3	e 22	26?	+26	—	—	—	e 40.9
Bermuda	78.7	53	e 12	12	+ 6	e 22	4	+ 1	e 15	30	PP	e 32.0
Baku	79.1	325	12	8	0	22	7	0	—	—	—	—
Paris	80.2	359	i 12	14	0	e 22	22	+ 3	—	—	—	e 39.9
Strasbourg	80.2	355	i 12	16	+ 2	e 22	33	+14	e 15	28	PP	—
Basle	81.3	356	e 12	19	- 1	e 22	18	-12	—	—	—	—
Zürich	81.4	356	e 12	19 _a	- 1	e 22	26	- 5	e 15	22	PP	—

Continued on next page.

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	Δ	Az.	P.	O - C.	S.	O - C.	Supp.	L.
	^c	^c	m. s.	s.	m. s.	s.	m. s.	m.
Neuchatel	81.8	356	e 12 23	+ 1	—	—	—	—
Chur	81.8	355	e 12 23	+ 1	e 22 33	- 2	—	—
Bucharest	82.1	342	e 12 23	- 1	e 22 36	- 2	—	38.9
Brisbane	82.3	205	i 12 23	- 2	i 22 40	0	—	—
Triest	82.7	351	i 22 39	S	(i 22 39)	- 5	—	—
Clermont-Ferrand	83.2	358	i 12 30	+ 1	e 22 50	+ 1	—	e 42.5
Hyderabad N.	84.0	291	12 35	+ 2	23 8	+11	23 31	PS
Istanbul	84.7	339	i 12 19	-18	22 46	-18	15 29	PP
Bombay	86.1	294	i 12 50	+ 6	i 23 19	+ 1	12 57	P _c P
Auckland	88.1	185	12 49?	- 5	23 30	- 7	24 28	PS
Riverview	88.8	204	i 12 58a	+ 1	i 23 44	0	i 13 6	pP
Sydney	88.8	204	—	—	—	—	e 17 11	PP
Arapuni	89.2	184	—	—	22 53?	-54	—	—
San Juan	89.4	62	i 13 0	0	e 23 25	-24	e 29 31	SS
Ksara	89.7	332	e 13 2?	+ 1	e 23 47	- 5	—	—
Lisbon	89.8	8	—	—	24 6	+13	30 5?	SS
Kodaikanal E.	90.3	287	i 11 54	?	23 24	[-11]	15 39	PP
Colombo E.	91.4	283	e 11 53?	?	23 54	[+13]	—	—
Granada	91.7	4	i 13 4k	- 6	i 24 6	- 4	i 16 36	PP
Malaga	92.1	5	i 13 13k	+ 1	e 24 53	+40	17 19	PP
Wellington	92.5	185	13 13	- 1	23 38	[- 9]	13 18	pP
Helwan	94.7	333	i 13 24k	0	24 31	- 5	17 16	PP
Christchurch	94.8	186	13 22	- 3	24 37	+ 1	16 33	PP
Bogota	95.8	76	e 13 33	- 6	e 24 14	[+ 8]	e 17 23	PP
Huancayo	108.0	86	e 18 6	[-23]	e 24 58	[- 6]	e 19 3	PP
La Paz	115.9	83	15 2	P	29 34	PS	i 19 53	PP
La Plata E.	135.3	91	22 47	PKS	—	—	—	—

Additional readings :—

College i = 5m.32s. and 6m.0s., iS = 9m.13s.
 Sitka e = 6m.58s. and 9m.32s.
 Mizusawa PE = 6m.14s.
 Honolulu e = 8m.43s.
 Hukuoka e = 8m.3s., PPP = 9m.46s., SS = 16m.40s.
 Ukiah iP = 7m.52s., e = 16m.44s.
 Berkeley e = 9m.36s., 9m.52s., and 13m.32s.
 Butte e = 17m.57s.
 Bozeman e = 9m.11s. and 18m.0s.
 Tinemaha i = 8m.24s., iNZ = 8m.29s., iZ = 13m.53s., ePKP, PKPZ = 39m.24s.
 Haiwee i = 8m.28s.
 Logan i = 8m.35s., e = 11m.50s., i = 18m.38s.
 Salt Lake City iP = 8m.39s., iS_cS = 18m.23s.
 Pasadena iZ = 8m.45s., iP_cPZ = 10m.11s., ePPE = 10m.45s., iP_cSZ = 14m.39s., iS_cSN = 18m.25s., isSN = 18m.43s., ePKP, PKPZ? = 39m.39s.
 Rapid City i = 8m.40s., and 10m.7s., e = 17m.46s.
 Tucson i = 9m.22s., iP_cP = 10m.31s., iPPP = 12m.44s., iP_cS = 14m.29s., eSSS = 20m.26s.
 Lincoln e = 17m.53s., and 20m.44s.
 Chicago i = 10m.10s., 11m.11s., and 19m.1s., e = 19m.35s.
 Florissant iZ = 10m.20s.
 St. Louis iE = 10m.23s., 10m.44s., and 11m.49s., eN = 13m.13s., iE = 18m.40s., eN = 19m.55s., iN = 20m.1s., and 20m.18s.
 Ottawa SSS = 26m.0s.
 Pennsylvania i = 21m.0s.
 Fordham i = 12m.1s., and 20m.57s.
 Philadelphia i = 20m.33s.
 Upsala eN = 14m.52s., SE = 19m.59s., iPS?E = 20m.14s., eE = 23m.40s., eN = 23m.52s., eSSE = 24m.31s., eSSS?E = 27m.41s., eN = 28m.34s., eE = 31m.39s.
 Columbia e = 26m.55s.
 Aberdeen iE = 12m.41s.
 Calcutta iN = 21m.28s.
 New Delhi iN = 21m.49s., SSN = 26m.26s.
 Potsdam eSN = 21m.53s.
 Kew eSSNZ = 27m.40s., eSSSE = 32m.23s.
 Jena eN = 27m.30s.
 Prague eSS = 27m.29s., eSSS = 30m.53s.
 Bermuda i = 14m.41s., iS = 22m.11s., e = 26m.52s.
 Paris e = 33m.48s.
 Strasbourg eSS = 27m.47s.
 Brisbane ePN = 12m.30s.
 Triest iPP? = 25m.19s., iPPP? = 26m.49s.
 Hyderabad SKSN = 22m.55s., SSN = 29m.1s.
 Istanbul PPP = 18m.55s.

Continued on next page.

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Bombay PPN = 16m.10s., SKSE = 23m.9s., iEN = 23m.37s., iN = 23m.57s., SSE = 29m.3s.
 Auckland SKS = 23m.13s., SS = 29m.5s., Q? = 38.9m.
 Riverview iSKSEN = 23m.23s., iPSN = 24m.48s., iSSE = 29m.30s., iN = 29m.53s., eQE = 36.4m.
 San Juan e = 15m.48s.,
 Kodaikanal SKSE = 22m.24s., SSE = 29m.56s.
 Granada SS = 30m.54s.
 Malaga PKP? = 16m.27s., SKS? = 23m.43s.
 Wellington iZ = 14m.0s., 14m.43s., and 16m.3s., SKKS = 24m.0s., PPSZ = 25m.18s., SSZ = 30m.33s., SSS = 33m.53s.?, Q = 37.9m.
 Helwan eZ = 13m.38s., SKSN = 23m.53s., SN = 25m.59s.
 Christchurch PPPNZ = 18m.27s., eNZ = 21m.53s.?, SKS = 23m.41s., SEN = 23m.57s., PPS = 25m.33s., SS = 30m.59s., SSEN = 34m.1s.
 Huancayo eS = 26m.26s., ePS = 28m.4s., eSS = 33m.39s., e = 38m.37s.
 La Paz SKP = 21m.42s., iPPP = 22m.20s., PPS = 30m.53s., SSZ = 36m.23s.
 Long waves were also recorded at Dehra Dun, Tananarive, San Fernando, and Tortosa.

Dec. 12d. 10h. 25m. 10s. Epicentre 34°·0N. 137°·1E.

Intensity scale VII at Kojindake, Nara prefecture, VI at Tu, V at Hikone and Ibukiyama, IV at Tokyo, Hukui, and Owase. Macro seismic radius over 300km. Shallow.

Epicentre as adopted.

Seismological Bulletin of Cent. Met. Obs., Japan, for 1944. Tokyo 1951, p. 30, with chart.

A = -·6086, B = +·5655, C = +·5566; $\delta = -1$; $h = 0$;
 D = +·681, E = +·732; G = -·408, H = +·379, K = -·831.

	Δ °	Az. °	P.		O - C. s.	S.		O - C. s.	Supp.		L. m.
			m.	s.		m.	s.		m.	s.	
Owase	0.8	275	0	16k	- 2	0	27	- 4	—	—	—
Hamamatu	0.9	35	0	20	0	0	36	+ 2	—	—	—
Omaesaki	1.1	57	0	7a	-15	0	16	-23	—	—	—
Nagoya	1.2	355	0	24	0	0	41	0	—	—	—
Gihu	1.4	349	0	26k	- 1	0	39	- 7	—	—	—
Hikone	1.4	331	0	28k	+ 1	0	47	+ 1	—	—	—
Shizuoka	1.4	48	0	27a	0	1	0	+14	—	—	—
Wakayama	1.6	278	0	27k	- 3	0	46	- 5	—	—	—
Kobe	1.7	293	0	28k	- 3	0	52	- 2	—	—	—
Misima	1.9	54	0	33a	- 1	1	16	+17	—	—	—
Hunatu	2.0	42	0	36	+ 1	1	15	+13	—	—	—
Osima	2.0	68	0	36a	+ 1	0	55	- 7	—	—	—
Mera	2.4	68	0	46	+ 5	—	—	—	—	—	—
Yokohama	2.5	56	0	35a	- 8	—	—	—	—	—	—
Toyama	2.7	2	0	47	+ 2	1	15	- 4	—	—	—
Nagano	2.8	19	0	49a	+ 2	1	35	S _g	—	—	—
Tokyo	2.8	52	0	47a	0	1	40	S _g	—	—	—
Maebasi	2.9	34	1	1	P _g	1	45	S _g	—	—	—
Kōti	3.0	261	0	45k	- 5	1	31	+ S _g ⁴	—	—	—
Utunomiya	3.4	41	0	58	+ 3	1	52	S _g	—	—	—
Mito	3.6	48	1	0	+ 2	1	39	- 3	—	—	—
Hamada	4.3	284	1	4	- 4	2	9	S _g *	—	—	—
Hukusima	4.6	35	1	14	+ 2	2	20	S _g *	—	—	—
Miyazaki	5.2	248	1	28	P*	2	40	S _g *	—	—	—
Sendai	5.2	35	1	22a	+ 1	2	28	+ 6	—	—	—
Kumamoto	5.5	260	1	26	+ 1	2	56	S _g	—	—	—
Hukuoka	5.6	268	1	27a	0	2	36	+ S _g ³	—	—	—
Mizusawa	6.1	31	1	34	0	3	11	S _g *	—	—	—
Akita	6.2	19	2	33	?	4	28	?	—	—	—
Miyako	6.8	33	1	46	+ 2	3	44	S _g	—	—	—
Aomori	7.4	22	1	57	+ 5	—	—	—	—	—	—
Hatinohe	7.4	27	1	51	- 1	3	32	+14	—	—	—
Sapporo	9.6	19	2	26	+ 5	4	31	+19	—	—	—
Vladivostok	10.0	338	e 2	30	+ 3	e 4	24	+ 2	—	—	—
Irkutsk	29.7	318	e 6	4	- 6	11	2	- 4	—	—	—
Calcutta	N. 44.1	268	8	18	+ 6	14	43	- 2	17	38	SS
Almata	47.0	301	e 6	50	?	—	—	—	—	—	—
Andijan	50.9	298	e 8	59	- 6	e 16	20	- 1	—	—	—
New Delhi	N. 50.9	281	—	—	—	i 20	9	SS	—	—	—
Tashkent	53.0	299	9	18	- 3	16	49	- 1	—	—	—

Continued on next page.

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	Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.	
	$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.	
College	53.5	31	—	—	e 17 25	+28	e 23 11	Q	e 28.0
Hyderabad	54.7	268	e 9 37	+ 4	17 10	- 3	—	—	—
Sverdlovsk	55.1	319	9 31	- 5	17 8	-10	—	—	—
Bombay	58.6	272	e 9 57	- 4	i 18 3	- 1	—	—	—
Colombo	59.1	256	e 12 50?	PP	—	—	—	—	—
Kodaikanal	59.2	261	i 17 1	S	(i 17 1)	-71	—	—	36.8
Baku	67.0	303	e 11 3?	+ 6	19 51?	+ 1	—	—	—
Moscow	67.6	322	10 56	- 5	e 19 49	- 8	—	—	—
Grozny	68.5	308	e 11 2	- 4	—	—	—	—	—
Riverview	68.8	168	i 11 6k	- 2	i 20 12	+ 1	i 20 40	PS	e 30.5
Upsala	74.1	331	—	—	e 20 55	-17	e 25 36	SS	e 36.8
Bergen	78.0	336	e 11 57	- 5	—	—	e 29 33	SSS	e 40.8
Auckland	78.8	151	12 15?	+ 9	21 35	-29	—	—	36.8
Copenhagen	79.0	330	e 12 4	- 3	22 4	- 2	—	—	40.8
Bucharest	79.9	316	e 11 38	-34	e 22 14	- 2	—	—	—
Ksara	80.0	302	e 12 18?	+ 5	e 22 14?	- 3	—	—	—
Istanbul	80.2	312	12 12	- 2	22 14	- 5	—	—	45.5
Tinemaha	80.4	51	i 12 14	- 1	—	—	—	—	—
Santa Barbara	81.0	54	i 12 17	- 1	—	—	—	—	—
Potsdam	81.1	328	—	—	e 22 28	0	—	—	e 43.8
Haiwee	81.2	52	i 12 18	- 1	—	—	—	—	—
Prague	82.1	326	e 12 35	+11	e 22 37	- 1	e 27 50	SS	—
Mount Wilson	82.2	54	i 12 23 _a	- 1	—	—	—	—	—
Pasadena	82.2	54	i 12 22 _a	- 2	i 22 38	- 1	—	—	e 35.8
Wellington	82.5	153	12 21	- 5	22 40	- 2	12 49	pP	—
Sofia	82.6	316	e 12 27	+ 1	e 22 43	0	24 47	PS	—
Riverside	82.8	54	i 12 25 _a	- 2	—	—	—	—	—
Jena	82.8	326	e 12 21	- 6	e 22 55	+10	—	—	e 45.4
Aberdeen	82.9	338	—	—	i 23 43	+57	—	—	i 35.5
Cheb	83.1	327	—	—	e 22 31	-17	—	—	e 44.8
Palomar	83.5	53	i 12 30 _a	- 1	e 22 43	- 9	—	—	—
La Jolla	83.6	54	e 12 31	0	—	—	—	—	—
Christchurch	83.7	156	12 22	-10	22 50	- 4	28 37	SS	40.3
Helwan	85.4	302	i 12 38 _a	- 2	i 23 10	- 1	e 16 25	PP	—
Triest	85.6	322	e 23 1	S	(e 23 1)	-12	—	—	e 45.5
Uccle	85.9	331	e 11 50?	-53	—	—	e 34 50?	Q	e 41.8
Strasbourg	86.2	328	e 13 20	+36	—	—	—	—	—
Chur	86.7	325	e 12 45	- 2	—	—	—	—	—
Zürich	86.8	328	e 12 45	- 2	—	—	—	—	—
Basle	87.1	329	e 12 46	- 3	—	—	—	—	—
Tucson	88.2	51	i 12 53	- 1	—	—	e 16 18	PP	e 41.3
Florissant	95.2	35	e 13 30	+ 3	e 24 48	+ 8	e 26 28	PPS	—
St. Louis	95.4	35	—	—	e 24 42	0	24 0	SKS	e 42.7
Granada	100.3	327	e 32 12 _a	SS	—	—	—	—	52.6
La Paz	151.4	56	i 19 51k	[+ 1]	—	—	i 23 35	PKS	76.8

Additional readings :—

- Mizusawa SE = 3m.14s.
 - Bombay iEN = 10m.5s., iN = 19m.9s., iE = 19m.42s., and 21m.13s.
 - Kodaikanal SE = 25m.26s., SSE = 29m.26s.
 - Riverview iN = 20m.19s., eE = 21m.16s.
 - Upsala iE = 21m.8s., eE = 25m.41s., eN = 32m.34s.
 - Bucharest eSE = 22m.10s.
 - Tinemaha iZ = 12m.22s.
 - Pasadena iZ = 12m.49s., eZ = 14m.49s.
 - Wellington iZ = 13m.35s., PPZ = 16m.0s.
 - Jena eZ = 12m.25s., eN = 20m.31s., 25m.55s., and 27m.19s.
 - Palomar iZ = 12m.38s., and 12m.54s., iNZ = 15m.42s.
 - Christchurch SSSE = 31m.54s., QEN = 35m.42s.
 - Helwan eN = 12m.48s., eZ = 12m.55s. and 13m.56s.
 - Triest iPP = 24m.36s., wrongly identified for PS or PPS.
 - Tucson e = 17m.27s.
 - Florissant eE = 28m.27s.
 - St. Louis ePPSN = 26m.18s., iE = 27m.42s., eSSN = 31m.10s.
 - Granada eP_cP? = 32m.50s., S = 41m.12s.
- Long waves were also recorded at Bermuda, San Juan and other European stations.

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Dec. 12d. Readings also at 1h. (Helwan, Ksara, Wellington, Christchurch, Auckland, St. Louis, Mount Wilson, Tucson, Palomar, Riverside, Tinemaha, and near Bogota), 2h. (Huancayo), 6h. (Wellington, Auckland, and near Trieste (2)), 7h. (Tashkent, near Stalinabad, and Andijan), 9h. (Mount Wilson, Palomar, Tucson, and Tinemaha), 10h. (Uccle, Mount Wilson, Palomar, Tinemaha, Tucson, and near Bogota), 15h. (near Tortosa), 17h. (Mount Wilson, Tucson, and Palomar), 20h. (San Juan, Huancayo, La Paz, Tucson, Mount Wilson, Pasadena, Palomar, and Tinemaha), 23h. (Arapuni, Auckland, Christchurch, and Wellington).

Dec. 13d. Readings at 4h. (Christchurch, Auckland, Wellington, and Riverview), 6h. (Riverview, Wellington, Haiwee, Mount Wilson, Pasadena, Tucson, Riverside, and Tinemaha), 7h. (Wellington and Christchurch), 10h. (near Bogota), 11h. (Andijan, Tashkent, near Almata, Frunse, and near Mizusawa), 16h. (near Andijan), 17h. (La Plata), 18h. (near Erevan and Grozny), 21h. (Riverview, and near Andijan), 22h. (Almata, Frunse, near Tashkent, and Andijan (2)), 23h. (near Andijan).

Dec. 14d. Readings at 0h. (near Trieste), 3h. (near Harvard), 5h. (Granada), 13h. (near Zürich and Basle), 14h. (La Paz), 18h. (near Malaga), 20h. (Mount Wilson, Tucson, Palomar, Riverside, and Tinemaha).

Dec. 15d. Readings at 1h. (Granada), 2h. (Tacubaya), 4h. (Guadalajara, Tacubaya, St. Louis, Mount Wilson, Pasadena, Tucson, Palomar, Riverside, and Tinemaha), 5h. (Andijan, Guadalajara, Tacubaya, St. Louis, Tucson, and Tinemaha), 6h. (Bucharest), 8h. (Haiwee, Tucson, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, St. Louis, and Irkutsk), 13h. (Helwan and Ksara), 14h. (Palomar, Pasadena, Riverside, Tinemaha, Tucson, St. Louis, and San Juan), 18h. (New Delhi, Grozny, Frunse, near Stalinabad, and Tashkent), 19h. (New Delhi, Frunse, near Stalinabad, and Tashkent), 22h. (Guadalajara).

Dec. 16d. 15h. 30m. 59s. Epicentre $33^{\circ}7'N$. $135^{\circ}8'E$.

Intensity VI at Gojo, Kojindake, Nara Pref.; V at Owase, Wakayama; IV at Sumoto Kashiwara, Kobe; II-III at Okayama, Tsuruga, Kyoto, Kohu, Tokyo.

Epicentre $33^{\circ}7'N$. $136^{\circ}1'E$. Shallow. Macroseismic radius greater than 300km.

Seismological Bulletin of the Central Meteorological Observatory, Japan, for the year 1944, Tokyo 1951, p. 31, isoseismic chart p. 31.

$$A = -0.5977, B = +0.5812, C = +0.5523; \quad \delta = +7; \quad h = +1; \\ D = +0.697, E = +0.717; \quad G = -0.396, H = +0.385, K = -0.834.$$

	Δ	Az.	P.	O-C.	S_p	O-C.
	°	°	m. s.	s.	m. s.	s.
Owase	0.5	36	0 4	-10	0 10	-13
Wakayama	0.7	310	0 16 _a	-1	0 27	-1
Osaka	1.0	344	0 17	-4	0 31	-5
Sumoto	1.0	310	0 20	-1	0 35	-1
Kobe	1.1	328	0 22 _a	0	0 37	-2
Kameyama	1.3	26	0 19	-6	0 40	-4
Kyoto	1.3	357	0 24	-1	0 41	-3
Hikone	1.6	13	0 30	0	0 53	+2
Nagoya	1.8	33	0 32	0	0 54	-2
Kōti	1.9	268	0 31	-3	1 3	+4
Gihu	1.9	24	0 31	-3	0 55	-4
Omaesaki	2.2	66	0 47	+9	1 18	+12
Shizuoka	2.5	57	0 39	-4	1 23	+9
Misima	3.0	61	0 47	-3	—	—
Kohu	3.0	49	0 54	+4	1 30	+3
Hunatu	3.0	53	0 51	+1	1 31	+4
Osima	3.1	69	0 46	-5	1 7	-22
Toyama	3.2	21	1 0	+8	1 43	+11
Hamada	3.3	298	0 57	+4	1 48	+13
Nagano	3.6	33	1 10	+12	1 54	+12
Tokyo	3.8	58	1 8	+7	2 2	+15
Miyazaki	4.1	245	1 10	+5	1 49	-6
Tukubasan	4.3	53	1 11	+3	2 15	+15
Kumamoto	4.4	260	1 16	+6	2 21	+19
Hukuoka	4.5	272	1 10	-1	2 28	+23

Continued on next page.

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	Δ	Az.	P.	O-C.	S.	O-C.
	°	°	m. s.	s.	m. s.	s.
Mito	4.7	54	1 25	+ 9	2 27	+17
Onahama	5.2	51	1 46	+25	—	—
Hokusima	5.5	42	1 44	+19	2 55	+25
Sendai	6.1	41	1 42	+ 8	2 43	- 2
Mizusawa	6.9	37	e 1 49	+ 4	3 34	+38
Tinemaha	81.5	51	i 12 19	- 2	—	—
Mount Wilson	z. 83.3	54	i 12 26	- 4	—	—
Riverside	83.9	54	i 12 30	- 3	—	—
Palomar	84.6	53	i 12 34	- 2	—	—
Tucson	89.2	51	e 12 55	- 4	—	—

Dec. 16d. Readings also at 1h. (Belgrade and near Sofia), 3h. (near Mizusawa), 4h. (Bombay, Helwan, and Ksara), 6h. (Riverview), 7h. (near Mizusawa), 8h. (near Apia), 14h. (Pasadena, Tucson, Riverside, Mount Wilson, Tinemaha, Palomar, and near Apia), 16h. (Cheb), 19h. (Mount Wilson, Palomar, Pasadena, Tucson, and Riverside), 20h. (Sofia and near Bogota), 22h. (near Alicante and near Stalinabad).

Dec. 17d. 7h. 18m. 32s. Epicentre $27^{\circ}6N$. $128^{\circ}4E$. Pasadena suggests deep focus.

A = -0.5512, B = +0.6955, C = +0.4609; $\delta = -3$; $h = +3$;
D = +0.784, E = +0.621; G = -0.286, H = +0.361, K = -0.887.

	Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Mizusawa	N. 15.7	40	e 3 43	- 1	e 6 58	+19	—	—
Calcutta	N. 36.5	270	e 7 6	- 3	i 12 47	- 4	—	i 17.8
New Delhi	N. 44.9	284	—	—	i 18 16	SS	—	e 25.3
Tashkent	49.7	302	8 58?	+ 2	—	—	—	—
Bombay	N. 51.4	273	i 9 11	+ 2	e 16 27	- 1	—	—
Sverdlovsk	55.3	322	9 36	- 2	17 14	- 7	—	—
Riverview	64.8	159	—	—	i 19 15	- 8	—	e 31.7
Copenhagen	80.8	329	—	—	22 22	- 3	—	41.5
Christchurch	81.6	150	22 23	S	(22 23)	-10	39 26	Q 48.5
Helwan	z. 82.3	299	i 12 25	0	—	—	—	—
Jena	84.1	325	e 12 35	+ 1	—	—	—	—
Cheb	84.2	325	—	—	e 22 56	- 3	—	e 46.5
Chur	87.6	323	e 12 51	0	—	—	—	—
Tinemaha	90.3	47	i 13 5a	+ 1	—	—	i 13 19	pP
Santa Barbara	z. 90.8	50	e 13 6	0	—	—	—	—
Haiwee	91.0	48	e 13 8	+ 1	—	—	—	—
Mount Wilson	92.0	49	i 13 13	+ 1	—	—	i 13 26	pP
Pasadena	92.0	49	i 13 12a	0	—	—	i 13 26	pP
Riverside	92.6	49	i 13 15a	0	—	—	i 13 29	pP
La Jolla	z. 93.4	50	i 13 19	+ 1	—	—	—	—
Palomar	93.4	49	i 13 18a	0	—	—	i 13 33	pP
Tucson	98.0	47	i 13 40	+ 1	—	—	e 13 54	pP e 29.3
St. Louis	104.9	30	i 23 10	?	e 25 9	[+19]	e 27 36	PS e 33.0
Tacubaya	z. 114.4	50	18 56	[+14]	—	—	—	—
Vera Cruz	N. 116.6	47	19 6	[+20]	—	—	—	—
Oaxaca	N. 117.7	48	18 43	[- 5]	—	—	—	—
Bogota	141.3	37	e 19 28	[- 5]	—	—	e 19 35	PKP

Additional readings :—

Mizusawa ePE = 3m.47s.

Bombay eN = 18m.28s.

Riverview eE = 27m.11s.

Christchurch SEN = 31m.32s., SSEN = 35m.48s.

Helwan iZ = 12m.43s.

Jena eN = 12m.54s.

Long waves were also recorded at Kew, Upsala, Granada, and San Fernando.

Dec. 17d. Readings also at 4h. (Neuchatel), 5h. (Irkutsk), 6h. (La Paz), 7h. (Tacubaya, Pasadena, Riverside, Tinemaha, Palomar, and Tucson), 9h. (Oaxaca and Tacubaya), 12h. (near Bucharest), 13h. (Christchurch and near Apia), 14h. (Riverview, Wellington, Haiwee, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, Tucson, Helwan, and Ksara), 20h. (near Mizusawa), 21h. (Brisbane, Riverview, Christchurch, Mount Wilson, Riverside, and Tinemaha).

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Dec. 18d. Readings at 1h. (Kew), 3h. (Bombay, Calcutta, Colombo, Hyderabad (2), Kodai-kanal, and New Delhi (2)), 5h. (Oaxaca and Tacubaya), 8h. (Bucharest), 10h. (Mount Wilson, Palomar (2), Riverside, Tucson (2), and Tinemaha), 11h. (near Mizusawa (2)), 13h. (Auckland, Christchurch, Wellington, and Riverview), 17h. (Palomar, Tucson, and Tinemaha).

Dec. 19d. 14h. 8m. 56s. Epicentre 40°·0N. 124°·0E.

Intensity II-III at Kagosima, Okayama, and Omaesaki.
Epicentre as adopted. Shallow. Macroseismic radius over 300 km.
Seismo, Bull. Cent. Met. Obs., Japan, for 1944, Tokyo 1951.

A = -·4296, B = +·6369, C = +·6402; $\delta = +5$; $h = -2$;
D = +·829, E = +·559; G = -·358, H = +·531, K = -·768.

	Δ		P.		O - C.	S.		O - C.	Supp.		L.
	m.	s.	m.	s.	s.	m.	s.	s.	m.	s.	m.
Vladivostok	6·7	60	1 1	53	P*	1 2	43	S _g	—	—	—
Hamada	8·2	126	2 2	23	P*	3 3	50	+12	—	—	—
Hukuoka	8·2	140	1 1	58	- 5	3 3	39	+ 1	—	—	—
Kumamoto	9·0	141	2 2	14	+ 1	4 4	2	+ 4	—	—	—
Kagosima	10·0	146	2 2	24 _a	- 3	—	—	—	—	—	—
Miyazaki	10·0	141	e 2 2	14	-13	4 4	56	S*	—	—	—
Kôti	10·0	127	2 2	32	+ 5	4 4	23	+ 1	—	—	—
Sumoto	10·4	120	2 2	30	- 4	3 3	46	-46	—	—	—
Kyoto	10·6	115	2 2	33	- 3	—	—	—	—	—	—
Wakayama	10·6	119	2 2	32	- 4	4 4	51	+14	—	—	—
Toyama	10·9	103	2 2	35	- 5	5 5	9	+24	—	—	—
Kameyama	11·2	113	2 2	24	-20	—	—	—	—	—	—
Owase	11·4	118	2 2	43	- 4	—	—	—	—	—	—
Hamamatu	12·1	112	2 2	54	- 3	—	—	—	—	—	—
Kohu	12·3	106	2 2	59	0	—	—	—	—	—	—
Maebasi	12·4	102	3 3	1	0	—	—	—	—	—	—
Hunatu	12·5	106	3 3	0	- 2	—	—	—	—	—	—
Shizuoka	12·5	109	3 3	2	0	—	—	—	—	—	—
Kumagaya	12·7	103	3 3	2	- 3	—	—	—	—	—	—
Mori	12·7	75	2 2	55	-10	5 5	26	- 2	—	—	—
Misima	12·8	108	3 3	9	+ 3	—	—	—	—	—	—
Utunomiya	12·9	100	3 3	7	0	—	—	—	—	—	—
Hokusima	13·0	95	3 3	6	- 3	—	—	—	—	—	—
Mizusawa	13·2	89	3 3	11	0	5 5	54	+14	—	—	—
Sendai	13·2	92	3 3	10	- 1	5 5	49	+ 9	—	—	—
Tukubasan	13·2	102	3 3	8	- 3	5 5	44	+ 4	—	—	—
Yokohama	13·2	105	2 2	57	-14	7 7	29	?	—	—	—
Osima	13·3	108	3 3	16	+ 3	—	—	—	—	—	—
Hatinohe	13·4	82	3 3	11	- 3	—	—	—	—	—	—
Mito	13·4	100	3 3	16	+ 2	—	—	—	—	—	—
Sapporo	13·4	71	3 3	14	0	6 6	55	+70	—	—	8·3
Pehpei	17·6	240	e 4 4	12	+ 4	—	—	—	—	—	i 9·4
Irkutsk	18·3	319	1 1	4 20	+ 3	7 7	38	- 1	—	—	—
Calcutta	N. 34·8	251	6 6	58	+ 4	i 12 12	20	- 5	1 8	21	PP
Almata	35·0	292	e 6 6	59	+ 3	—	—	—	—	—	—
Frunse	36·7	291	e 7 7	16	+ 6	—	—	—	—	—	—
New Delhi	N. 39·9	268	e 7 7	51	+14	i 13 13	34	- 9	16 16	22	SS
Sverdlovsk	43·6	315	8 8	14	+ 6	i 14 14	39	+ 1	—	—	—
Hyderabad	N. 45·2	254	8 8	21	+ 1	14 14	55	- 6	18 18	29	S _e S
Bombay	N. 48·5	260	e 8 8	43	- 3	e 15 15	40	- 8	10 10	39	PP
College	53·9	32	—	—	—	e 16 16	58	- 4	e 20 20	28	SS
Baku	55·0	297	e 9 9	47	+12	e 17 17	26	+ 9	—	—	e 22·8
Moscow	56·3	318	9 9	43	- 2	—	—	—	—	—	—
Erevan	58·8	299	e 10 10	1	- 1	—	—	—	—	—	—
Upsala	63·7	328	—	—	—	i 19 19	8	- 2	e 23 23	18	SS
Ksara	67·9	296	e 11 11	7?	+ 5	e 20 20	5	+ 4	—	—	—
Bergen	68·1	333	e 15 15	20	PPP	e 20 20	13	+10	—	—	e 35·1
Bucharest	68·2	311	—	—	—	e 20 20	7	+ 3	—	—	34·1
Copenhagen	68·4	326	e 11 11	7	+ 1	20 20	9	+ 2	27 27	52	SSS
Potsdam	70·3	323	—	—	—	e 20 20	39	+10	—	—	e 35·1

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		Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Sofia		70.9	310	e 11 33?	+12	e 20 36	0	—	—
Prague		71.1	320	e 13 58	PP	e 20 40	+ 2	—	e 33.1
Belgrade		71.2	313	e 12 24	?	—	—	e 14 32	PP e 36.8
Jena		71.9	321	e 11 27	0	e 20 47	- 1	e 14 17	PP e 37.5
Cheb		72.1	321	—	—	e 22 4?	?	e 27 4?	? e 39.1
Brisbane	z.	72.4	153	e 11 23	- 7	—	—	—	—
Helwan		73.4	295	i 11 33k	- 3	21 2	- 3	14 16	PP
Triest		74.4	318	e 12 2	+20	i 21 20	+ 4	e 14 37	PP e 36.5
Strasbourg		75.3	322	11 54	+ 7	—	—	—	—
Uccle		75.3	326	—	—	e 27 4?	?	e 30 4?	SSS e 37.1
Chur		75.7	320	e 11 49	0	—	—	—	—
Zürich		75.8	321	e 11 45a	- 5	—	—	—	—
Basle		76.2	321	e 11 56	+ 4	—	—	—	—
Neuchatel		76.8	321	e 11 59	+ 4	—	—	—	—
Kew		76.8	328	—	—	e 30 40?	SSS	e 37 34	Q e 40.1
Riverview		77.6	157	—	—	i 21 47	- 4	e 30 40	SSS e 34.7
Tinemaha		84.3	46	i 12 35	0	—	—	—	—
Haiwee		85.2	46	e 12 41	+ 2	—	—	—	—
Santa Barbara	z.	85.5	48	e 12 39	- 2	—	—	—	—
Pasadena		86.5	47	e 12 45	- 1	—	—	—	e 40.7
Mount Wilson	z.	86.5	47	i 12 45	- 1	—	—	—	—
Riverside	z.	87.1	47	i 12 46	- 3	—	—	—	—
Palomar		87.9	47	i 13 2	+ 9	e 23 32	- 3	—	—
Tucson		92.0	44	i 13 12	0	—	—	—	e 47.3
Christchurch		94.0	147	22 35	?	33 1	?	44 35	Q 49.6
Florissant		95.5	27	—	—	e 22 46	?	e 33 3	?
St. Louis		95.7	27	—	—	e 35 1	SSS	—	e 38.8
La Paz	z.	154.3	27	20 4	[+10]	—	—	—	82.1

Additional readings :—

Mizusawa PN = 3m.17s.
 New Delhi iN = 14m.34s. and 14m.51s.
 Bombay PPPN = 11m.13s., SSN = 19m.13s.
 Upsala eE = 19m.12s.?, eN = 22m.24s. and 23m.26s., eSS?N = 26m.50s., eSS?E = 26m.58s., eSSS?N = 29m.4s.?, eSSS?E = 29m.27s., eE = 30m.3s., eN = 31m.36s., eE = 32m.34s.
 Copenhagen i = 11m.10s.
 Belgrade e = 18m.13s. and 23m.2s.
 Jena eP?N = 11m.30s.
 Helwan eZ = 11m.46s. and 12m.7s., PPP?Z = 15m.55s., eZ = 17m.48s. and 20m.0s., eN = 21m.56s.
 Triest ePPP = 16m.14s., iPS = 22m.11s.
 Riverview eZ = 31m.4s.
 Pasadena iZ = 13m.12s.
 Long waves were also recorded at Auckland, Ottawa, San Juan, Huancayo, and other American and European stations.

Dec. 19d. 20h. 37m. 32s. Epicentre 42°·7N. 147°·3E. Depth of focus 0·030.
 (as on 1938, Feb. 11d.).

Intensity V at Keinebetsu ; IV at Attoko ; II-III at Urakawa and Kusiro.
 Seismo. Bull. Cent. Met. Obs., Tokyo 1944 (Supplement). Epicentre 42°N. 147°E.

A = -·6204, B = +·3982, C = +·6757 ; δ = +3 ; h = -3 ;
 D = +·540, E = +·842 ; G = -·569, H = +·365, K = -·737.

	Δ	Az.	P.	O-C.	S.	O-C.
	°	°	m. s.	s.	m. s.	s.
Kusiro	2.1	278	i 0 38	- 4	—	—
Obihiro	3.0	274	i 0 50	- 1	1 24	- 7
Urakawa	3.4	262	e 0 56	0	1 33	- 6
Asahigawa	3.8	288	e 1 3	+ 2	—	—
Sapporo	4.4	277	e 1 8	0	e 1 58	- 3

Continued on next page.

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		Δ	Az.	P.	O - C.	S.	O - C.
		°	°	m. s.	s.	m. s.	s.
Muroran		4.7	268	e 1 11	- 1	e 2 8	0
Hakodate		5.0	262	e 1 7	- 9	e 1 40	-34
Mizusawa		5.8	237	1 27	+ 1	2 26	- 6
Sendai		6.6	230	e 1 35	- 1	e 2 46	- 5
Yamagata		6.9	232	—	—	e 2 52	- 6
Hokusima		7.2	229	e 1 41	- 3	e 3 2	- 3
Onahama		7.6	223	e 2 3	+14	—	—
Shirakawa		7.8	225	e 2 53	+62	—	—
Mito		8.2	222	—	—	e 3 18	-10
Oiwake		9.3	230	e 2 44	+33	—	—
Kohu		9.8	227	e 3 44	?	—	—
Tinemaha	E.	68.9	59	e 11 2	+20	—	—
Mount Wilson	Z.	70.8	61	e 10 57	+ 3	—	—
Pasadena	Z.	70.8	61	e 10 57	+ 3	—	—
Riverside	Z.	71.4	61	e 11 16	+18	—	—
Palomar	Z.	72.1	61	e 11 6	+ 4	—	—
Copenhagen		74.8	336	11 16	- 1	—	—
Tucson		76.7	59	i 11 32	+ 4	—	—

Additional readings :—
 Mizusawa SN = 2m.30s.
 Mount Wilson iZ = 11m.13s.
 Pasadena eZ = 11m.10s., iZ = 11m.17s.
 Palomar iZ = 11m.15s., eNZ = 11m.22s.
 Tucson i = 11m.43s.

Dec. 19d. Readings also at 3h. (Bombay, New Delhi, Frunse, and near Stalinabad), 8h. (Bucharest and Mizusawa), 9h. (Bombay, Calcutta, New Delhi, and Pehpei), 14h. (near Milan and near Barcelona), 15h. (Palomar, Tucson, and Riverside), 19h. (near Lisbon).

Dec. 20d. 0h. Undetermined shock.

Belgrade eP = 32m.38s., i = 32m.41s., e = 32m.51s., i = 33m.8s., 33m.46s., and 34m.33s.
 Sofia ePEN = 32m.47s., iSN = 34m.29s.?
 Trieste eP? = 32m.50s., iS = 33m.47s., iS_g? = 34m.9s.
 Bucharest EN = 33m.0s. and 34m.0s.
 Zürich eP = 33m.32s.
 Helwan PZ = 34m.51s., PPPZ = 35m.10s., SN = 37m.40s., eN = 38m.8s.
 Clermont-Ferrand 35m.0s.?
 Ksara e = 35m.1s. and 37m.42s.
 Prague eS? = 35m.10s., eL = 46.9m.
 Strasbourg e = 35m.57s., 37m.38s., and 38m.18s.
 Istanbul eP = 37m.0s.
 Potsdam eE = 37m.31s., LEN = 38m.0s.
 Cheb e = 37m.0s.
 Upsala eN = 39m.0s.?, eE = 42m.0s.?
 Long waves were recorded at Copenhagen, Paris, and Kew.

Dec. 20d. 14h. Undetermined shock.

Wellington P?Z = 21m.11s., Q = 31.5m., LZ = 32m.0s.
 Apia eP? = 23m.22s., e = 30m.35s.
 Auckland S? = 27m.36s., Q = 28.5m.
 Mount Wilson ePZ = 31m.49s.
 Pasadena ePZ = 31m.53s., eLZ = 57.5m.
 Palomar iPZ = 31m.51s.
 Riverside ePZ = 31m.54s.
 Haiwee ePE = 32m.1s.
 Tinemaha ePZ = 32m.4s.
 Tucson eP = 32m.14s., eL = 60m.47s.
 Long waves were also recorded at Riverview, Christchurch, La Paz, St. Louis, and Florissant.

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Dec. 20d. 20h. 45m. 1s. Epicentre 28°·2S. 177°·7W. (as on 5d.).

Intensity VI in the Kermadec Islands. Epicentre 27°·5S. 177°·5W.
Annales de l'Institut de Physique du Globe de Strasbourg, 2ème partie, Séismologie, tome IX, p. 18 (1944). Strasbourg, 1951.

A = -·8819, B = -·0354, C = -·4701; $\delta = -1$; $h = +2$.

	Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Auckland	10·7	215	2 42	+ 4	4 29	-10	i 3 29	5·1
Arapuni	11·3	208	—	—	5 11	SS	—	—
Tuai	11·4	201	—	—	4 29?	-27	—	—
New Plymouth	12·8	210	—	—	4 59?	-31	—	—
Wellington	14·3	203	3 25	- 1	5 36	-30	—	6·2
Apia	15·3	22	e 3 49	+10	e 6 29	- 1	—	—
Christchurch	17·0	204	4 45	+44	7 32	+22	7 53	9·0
Brisbane	25·9	265	e 5 36	+ 1	e 10 29	+25	i 6 9	13·2
Riverview	27·1	250	i 5 49 _a	+ 3	i 11 4	+40	i 5 57	e 12·7
Sydney	27·1	250	e 5 47	+ 1	e 10 41	+17	—	e 13·9
Pasadena	z. 83·8	46	i 12 32	0	—	—	—	e 38·2
Mount Wilson	z. 83·9	46	i 12 33	0	—	—	—	—
Palomar	z. 84·1	47	e 12 33	- 1	—	—	—	—
Riverside	z. 84·2	46	i 12 34	0	—	—	—	—
Haiwee	E. 85·2	45	e 12 41	+ 2	—	—	—	—
Tinemaha	z. 85·6	44	12 41	0	—	—	i 12 53	?
Tucson	87·5	51	i 12 51	0	i 13 27	?	i 13 6	e 40·2
Victoria	90·5	33	—	—	e 24 5	+ 6	—	47·0
Florissant	E. 105·2	54	—	—	e 37 5	SSS	—	e 50·3
St. Louis	105·2	54	—	—	e 26 8	+ 4	e 27 49	PS e 50·4
New Delhi	N. 115·2	290	—	—	e 25 44	[+11]	i 29 35	PS
Copenhagen	151·7	349	e 19 57	[+ 7]	—	—	—	—
Helwan	z. 154·7	281	e 19 53	[- 1]	—	—	20 8	PKP ₂

Additional readings:—

Brisbane iPZ = 5m.40s.

Riverview iPPZ = 6m.29s., iPPPEZ = 6m.39s., iE = 6m.54s., iZ = 7m.12s.

St. Louis eSSE = 33m.32s., eE = 36m.29s.

Helwan iZ = 20m.35s.

Long waves were also recorded at Rapid City, Ukiah, La Paz, Huancayo, Kew, Uccle, and Paris.

Dec. 20d. Readings also at 0h. (Zürich, Bucharest, and near Trieste), 10h. (near Ksara), 20h. (Mizusawa, La Jolla, Palomar, Tucson, Mount Wilson, Pasadena, Riverside, Haiwee, and Tinemaha), 22h. (Kew and near Bogota), 23h. (Wellington, Christchurch, Riverview, Auckland, Tinemaha, Riverside, Pasadena, Mount Wilson, Tucson, and Palomar).

Dec. 21d. 4h. Spanish shock.

Intensity VI at Huelma; IV at Carchal and Linares. Epicentre 37°·6N. 3°·4W.
Boletín del Observatorio del Ebro—Resumen de las observaciones solares, meteorológicas y sismológicas efectuadas durante el año 1944, Tortosa, 1945, p. 191.

Alicante P = 35m.8s.

Granada iP_g = 35m.41s., iS_g = 35m.46s., P_g = 35m.49s., S_g = 36m.13s.

Almeria P = 35m.56s.

Malaga iP_g = 35m.52s. and 35m.55s., P_gN = 36m.2s., iS_gE = 36m.10s.

Toledo P = 36m.13s.

Tortosa PN = 36m.50s., P_gN = 37m.3s. and 37m.14s., P_gS_gE = 37m.35s., 37m.43s., and

37m.55s., S_gE = 37m.59s., P_gS_gE = 38m.1s., S_gE = 38m.3s.

San Fernando eE = 37m.12s.

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Dec. 21d. 5h. 19m. 12s. Epicentre 41°·5N. 125°·5W.

A = -·4362, B = -·6116, C = +·6601; $\delta = +6$; $h = -2$;
D = -·814, E = +·581; G = -·383, H = -·537, K = -·751.

		Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Santa Clara	E.	4·9	146	—	—	e 2 28	S*	—	—
Tinemaha		7·1	125	e 1 50	+ 2	e 3 26	+16	—	—
Haiwee		7·9	130	e 2 4	+ 5	—	—	—	—
Pasadena		9·4	139	i 2 13	- 5	i 3 55	-12	—	e 4·3
Mount Wilson	z.	9·4	139	e 2 14	- 4	—	—	—	—
Palomar	N.	10·6	137	e 2 39	+ 3	—	—	—	—
Tucson		14·9	123	i 3 31	- 3	—	—	—	e 9·5
St. Louis		27·0	85	e 5 45	0	e 10 23	+ 1	—	e 14·9

Tucson gives also e = 4m.50s.

Long waves were also recorded at other American stations.

Dec. 21d. 9h. 1m. 25s. Epicentre 23°·2S. 172°·7E.

A = -·9126, B = +·1169, C = -·3917; $\delta = -7$; $h = +4$;
D = +·127, E = +·992; G = +·389, H = -·050, K = -·920.

		Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Auckland		13·7	173	3 35	+17	6 35	+43	—	7·6
Wellington		18·1	175	4 16	+ 2	8 11	+36	4 47	pP 9·6
Brisbane		18·3	252	i 4 15	- 2	i 7 43	+ 4	i 4 42	pP —
Christchurch		20·3	180	4 39	- 1	8 43	+20	—	—
Riverview		21·7	235	i 4 54 _a	- 1	i 8 53	+ 2	i 5 28	pP —
Santa Barbara	z.	86·0	51	e 12 44	+ 1	—	—	—	—
Pasadena	z.	87·0	51	i 12 47	- 1	—	—	e 13 17	pP —
Mount Wilson		87·1	51	i 12 48	- 1	—	—	—	—
Palomar	N.	87·5	53	e 12 51	0	—	—	—	—
Riverside	z.	87·5	51	i 12 51	0	—	—	e 13 18	pP —
Haiwee		88·1	49	e 12 55	+ 1	—	—	—	—
Tinemaha		88·4	48	i 12 55 _a	0	—	—	—	—
Tucson		91·5	55	i 13 8	- 2	—	—	i 13 37	pP —

Additional readings :—

Wellington iZ = 4m.30s., sP?Z = 5m.15s.

Brisbane iPN = 4m.18s.

Riverview iSZ = 8m.57s.

Dec. 21d. 20h. 13m. 46s. Epicentre 28°·2S. 177°·7W. (as on 20d.).

A = -·8819, B = -·0354, C = -·4701; $\delta = -1$; $h = +2$;

		Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Auckland		10·7	215	3 4	PPP	4 44	+ 5	(5 8)	SSS 5·1
Arapuni		11·3	208	—	—	4 20	-34	—	—
Tual		11·4	201	—	—	4 31	-25	—	—
New Plymouth		12·8	210	3 11?	+ 5	5 27	- 3	—	—
Wellington		14·3	203	3 29	+ 3	5 34	-32	(6 14?)	SS 6·2
Apia		15·3	22	e 3 55	PPP	i 6 39	+ 9	—	—
Christchurch		17·0	204	3 57	- 4	6 50	-20	7 8	O 8·4
Brisbane	E.	25·9	265	i 5 35	0	i 10 23	+19	i 6 27	PPP i 13·1
Riverview		27·1	250	i 5 47 _a	+ 1	e 10 30	+ 6	6 37	PP e 12·5
Sydney		27·1	250	e 5 44	- 2	e 10 44	+20	e 6 32	PP e 13·6
La Jolla		83·6	47	e 12 35	+ 4	—	—	—	—
Santa Clara		83·6	42	e 12 33	+ 2	e 22 56	+ 3	—	—
Berkeley		83·8	42	i 11 29	-63	i 22 57	+ 2	e 28 13	SS e 38·4
Pasadena		83·8	46	i 12 29	- 3	e 22 54	- 1	—	e 38·1
Mount Wilson		83·9	46	e 12 31	- 2	e 22 58	+ 2	—	—

Continued on next page.

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		Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Palomar	N.	84.1	47	e 12 33	- 1	—	—	i 12 46	?
Ukiah		84.1	40	—	—	e 23 3	+ 5	e 27 53	SS
Riverside		84.2	46	e 12 33	- 1	e 22 58	- 1	—	—
Vladivostok		84.8	326	(e 12 31)	- 6	(i 23 20)	+15	(24 24)	PPS
Tinemaha		85.6	44	i 12 40	- 1	—	—	i 12 48	?
Tucson		87.5	51	e 12 47	- 4	i 23 20	[+ 3]	e 24 32	PS
Victoria		90.5	33	—	—	e 23 32	[- 4]	—	—
Huancayo		95.0	106	—	—	e 24 0	[- 1]	e 24 35	S
Bozeman		95.2	40	—	—	e 24 7	[+ 5]	e 24 44	S
La Paz		98.7	114	—	—	e 24 14	[- 7]	i 26 25	PS
Rapid City		99.0	44	—	—	e 24 22	[0]	—	—
Calcutta	N.	103.6	289	—	—	i 24 47	[+ 3]	e 27 54	PPS
Colombo	E.	104.2	270	—	—	e 29 14?	PPS	—	—
Florissant	E.	105.2	54	—	—	e 24 50	[- 1]	e 25 33	sSKS
St. Louis		105.2	54	—	—	e 24 47	[- 4]	e 25 34	sSKS
Hyderabad	N.	110.0	280	e 17 53	[-40]	28 46	PS	—	—
Rio de Janeiro	N.	112.8	134	e 28 44	PS	—	—	—	—
New Delhi	N.	115.2	290	—	—	e 26 57	{+16}	i 29 28	PS
Bombay		115.5	279	—	—	e 25 31	[- 3]	e 30 53	PPS
San Juan		117.1	82	—	—	e 25 31	[- 9]	e 29 40	PS
Ottawa		117.6	50	—	—	e 29 56	PS	—	—
Fordham		117.8	56	—	—	e 36 24	SSP	—	—
Bermuda		122.7	68	—	—	e 37 23	SS	—	—
Ksara		150.8	289	e 19 51	[+ 2]	—	—	—	—
Copenhagen		151.7	349	e 19 49	[- 1]	44 14	SSP	—	—
Helwan	z.	154.7	281	19 52	[- 2]	—	—	20 18	PKP ₂
Cheb		156.8	344	e 34 14?	?	—	—	—	—

Additional readings :—

Brisbane iN = 6m.21s.
 Riverview iPPP?E = 6m.49s., iE = 11m.3s.
 Berkeley eS = 22m.41s., iS = 22m.51s., e = 34m.47s. and 36m.59s.
 Pasadena iEZ = 12m.42s., iZ = 12m.47s.
 Riverside eZ = 12m.40s., iZ = 12m.46s.
 Vladivostok SKS = (20m.53s.), readings have been increased by 2 m.
 Tucson e = 17m.15s.
 Huancayo ePS = 25m.24s.
 Bozeman e = 29m.36s.
 Florissant eSS?E = 33m.7s., eSSSE = 37m.44s.
 St. Louis ePSE = 27m.48s., eE = 28m.5s., ePPSE = 28m.55s., eSSN = 33m.27s., eN = 33m.45s., eSSSE = 37m.32s.
 Bombay eN = 25m.36s.
 San Juan e = 34m.55s.
 Helwan eZ = 22m.32s., PPZ = 23m.53s., eZ = 25m.34s.
 Long waves were also recorded at Honolulu and other American and European stations.

Dec. 21d. 22h. 27m. 40s. Epicentre 28°2S. 177°7W. (as at 20h.).

		Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Auckland		10.7	215	3 20?	+42	4 47	+ 8	—	—
Arapuni		11.3	208	—	—	5 8	SS	—	—
Tuai		11.4	201	—	—	4 27	-29	—	—
New Plymouth		12.8	210	3 20?	PPP	5 8	-22	—	—
Wellington		14.3	203	3 22	- 4	5 34	-32	—	—
Apia		15.3	22	e 3 42	+ 3	e 6 27	- 3	—	—
Christchurch		17.0	204	(3 40)	-21	3 40	P	5 24	Q
Brisbane		25.9	265	i 5 35	0	i 10 20	+16	i 6 29	PPP
Riverview		27.1	250	i 5 48 _a	+ 2	e 10 31	+ 7	i 6 39	PPP
Sydney		27.1	250	—	—	e 10 32	+ 8	—	—
Santa Clara		83.6	42	e 12 42	+11	e 22 59	+ 6	—	—
Pasadena		83.8	46	i 12 33	+ 1	i 22 59	+ 4	i 12 45	P _c P
Mount Wilson		83.9	46	e 12 34	+ 1	—	—	—	—
Palomar	N.	84.1	47	e 12 47	+13	—	—	—	—
Ukiah		84.1	40	—	—	e 22 59	+ 1	e 28 31	SS

Continued on next page.

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	Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Vladivostok	84.8	326	e 11 3	?	i 21 38	?	e 31 23	SSS
Tinemaha	z. 85.6	44	e 12 40	- 1	i 23 0	[- 5]	i 12 56	P _c P
Tucson	87.5	51	i 12 48	- 3	e 23 10	[- 7]	e 16 23	PP
Victoria	90.5	33	—	—	e 24 8	+ 9	—	e 40.0
Sitka	92.6	22	—	—	e 24 23	+ 5	—	47.3
Huancayo	95.0	106	e 17 27	PP	e 24 37	- 1	e 23 56	SKS
La Paz	98.7	114	e 9 49	?	—	—	—	e 43.4
Rapid City	99.0	44	—	—	e 25 23	+11	—	48.4
Calcutta	N. 103.6	289	—	—	e 23 50	[-54]	—	e 48.3
Florissant	E. 105.2	54	—	—	e 24 50	[- 1]	e 28 57	PPS
St. Louis	E. 105.2	54	—	—	e 24 49	[- 2]	e 25 33	sSKS
Rio de Janeiro	N. 112.8	134	e 28 48	PS	—	—	—	e 44.7
New Delhi	N. 115.2	290	—	—	e 26 58	{+17}	i 28 28	?
San Juan	117.1	82	—	—	i 25 35	[- 5]	e 29 45	PS
Copenhagen	151.7	349	e 19 59	[+ 9]	—	—	—	e 55.9
Helwan	z. 154.7	281	19 56	[+ 2]	—	—	20 22	PKP ₁
Cheb	156.8	344	e 39 20?	?	—	—	—	e 84.3

Additional readings :—

Christchurch PZ = 25m.51s.

Brisbane ePN = 5m.39s.

Riverview iE = 5m.53s. and 11m.1s.

Tucson e = 35m.45s.

Huancayo eSS = 30m.36s.

St. Louis iSN = 26m.14s., esSN = 27m.0s., ePSE = 27m.45s., ePPSE = 28m.57s., eN = 32m.23s., and 32m.34s., eSSSE = 37m.45s.

San Juan e = 45m.20s.

Helwan PPZ = 23m.59s.

Long waves were also recorded at Bermuda and at other American and European stations.

Dec. 21d. Readings also at 4h. (Pasadena, Mount Wilson, Palomar, Tucson, Tinemaha, and Riverside), 9h. (Tinemaha (2), Haiwee, Riverside, Tucson, Palomar, Mount Wilson (2), and Pasadena (2)), 10h. (Tucson), 15h. (Ksara), 17h. (Pasadena, Mount Wilson Haiwee, Palomar, Riverside, Tinemaha, Tucson, and near Apia), 23h. (Ksara).

Dec. 22d. 5h. Kermadec Is? Suggested that the origin be near that of the shocks on 20d. and 22d. 28°-2S, 177°-7W. The readings are not consistent.

Auckland P = 38m.5s., S = 39m.56s., L = 40.4m.

New Plymouth P? = 38m.35s.?, S = 40m.12s.

Wellington P?Z = 38m.52s.?, SZ = 40m.55s., L = 42m.?

Apia eP = 39m.30s., eS = 41m.52s.

Christchurch P = 39m.34s., S = 42m.5s., Q = 42m.25s., R = 43m.25s.

Tuai S = 39m.50s.

Arapuni S = 40m.?

Sydney e = 40m.48s.

Brisbane iPEZ = 41m.1s., ePN = 41m.10s., eSN = 46m.13s.,

Riverview iPEZ = 41m.14s.k, iE = 42m.10s., eN = 45m.55s., eLE = 47.9m.

Pasadena ePZ = 47m.52s., iZ = 48m.7s., eLZ = 73.7m.

Berkeley iP? = 47m.55s., e = 55m.47s., eS = 58m.19s., eL = 74.5m.

Mount Wilson iPZ = 47m.55s.

Riverside ePZ = 47m.56s., iZ = 48m.6s.

Santa Barbara eZ = 47m.56s.

Palomar eE = 47m.57s.

La Jolla eZ = 48m.5s.

Tinemaha ePZ = 48m.5s., iZ = 48m.21s.

Haiwee ePE = 48m.11s., eEN = 48m.24s., iEN = 48m.37s.

Tucson iP = 48m.11s., i = 48m.20s., eL = 76m.12s.

Vladivostok iP = 48m.26s., eS = 59m.32s.

Helwan PZ = 55m.18s., eZ = 55m.27s., and 55m.39s.

Huancayo eSKS = 59m.14s., eSS = 66m.14s., eL = 79m.33s.

Victoria e = 60m., L = 78m.

St. Louis eSKSN = 61m.37s., eSE = 63m.16s., eE = 68m.51s., and 73m.7s., eLE = 85.5m.

La Paz iZ = 61m.47s., LZ = 90.0m.

Long waves were recorded at Rapid City, Salt Lake City, Ukiah, and Florissant.

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Dec. 22d. 10h. 36m. 1s. 11°·5S. 165°·4E.

A = -·9485, B = +·2471, C = -·1981; δ = -5; h = +6;
D = +·252, E = +·968; G = +·192, H = -·050, K = -·980.

		Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Brisbane	E.	19·7	214	14 37	+ 3	18 25	+15	—	—
	N.	19·7	214	14 34	0	18 22	+12	—	—
Riverview		25·8	208	15 42	+ 8	e 10 9	+ 7	i 11 32	SS i 12·5
Auckland		26·6	163	5 44	+ 2	11 44	SS	13 7	? 16·0
Wellington		30·8	166	6 19	- 1	11 35?	+12	7 24	PP 16·0
Christchurch		32·5	170	6 36	+ 2	11 55	+ 6	—	—
Vladivostok		62·4	333	(1 10 28)	+ 1	(18 55)	+ 2	—	—
Pasadena	z.	85·4	54	1 12 40	0	—	—	—	e 53·2
Mount Wilson	z.	85·5	54	e 12 41	0	—	—	—	—
Riverside	z.	86·0	54	e 12 44	+ 1	—	—	—	—
Palomar		86·2	56	1 12 49	+ 5	—	—	—	—
Tinemaha	z.	86·2	51	e 12 44	0	—	—	i 13 4	? 16·0
Tucson		90·9	57	1 13 8	+ 1	—	—	i 13 32	? e 45·1
Tashkent		102·1	310	e 18 14	PP	i 24 44	[+ 7]	—	—
Helwan	z.	133·6	300	1 21 53	PP	—	—	i 22 3	? 16·0

Additional readings :—

Riverview iZ = 6m.55s., iN = 12m.24s.
Wellington iZ = 8m.15s.
Vladivostok readings decreased by 10 mins.
Tinemaha iZ = 13m.14s.
Helwan iZ = 22m.56s.
Long waves were also recorded at Arapuni

Dec. 22d. 15h. Undetermined shock.

Apia eS? = 50m.30s.
Christchurch P = 53m.54s., S = 58m.24s., Q = 59m.42s., L = 61m.59s.
Wellington S? = 56m.35s., L = 60m.0s.
Auckland S? = 56m.12s.?, L = 57·4m.
Pasadena iPZ = 60m.37s.
Mount Wilson ePZ = 60m.39s.
Riverside ePZ = 60m.39s.
Tinemaha ePEZ = 60m.46s.
Haiwee ePE = 60m.48s.
Palomar eE = 60m.48s.
Tucson iP = 61m.2s., eL = 88m.39s.
Riverview eE = 61m.24s., eN = 63m.15s., eE = 63m.23s., eLEZ = 64·6m.
Copenhagen eP = 68m.23s.
Long waves were also recorded at Arapuni, Huancayo, and La Paz.

Dec. 22d. 22h. 31m. 40s. Epicentre 26°·0S. 70°·2W. Focus at the base of superficial layers.

A = +·3049, B = -·8468, C = -·4360; δ = +13; h = +3;
D = -·941, E = -·339; G = -·148, H = +·410, K = -·900.

		Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Montezuma		3·6	21	1 0 55	0	—	—	i 1 7	PP i 1·6
La Paz		9·6	12	2 16 _a	- 3	(i 3 51)	-16	3 26	? 3·8
La Plata		13·8	133	3 19	+ 3	5 56	+ 8	—	6·6
Huancayo		14·7	340	e 3 26	- 1	1 6 4	- 6	i 3 34	pP i 7·4
Rio de Janeiro	N.	24·7	89	1 5 20	+ 1	i 9 42	+ 6	—	i 12·8
Bogota		30·5	353	e 6 11	- 1	e 12 1	sS	i 6 25	pP 20·3
San Juan		44·3	7	e 8 51	?	i 14 28	-12	i 17 58	SS e 21·7
Bermuda		58·3	6	e 9 52	- 2	e 17 36	-16	e 12 11	PP e 26·3
Columbia		60·5	350	e 10 10	+ 1	e 17 58	-23	e 14 4	PPP e 32·2
Philadelphia		65·8	357	e 10 43	- 1	e 19 16	-11	e 15 31	PPP e 27·6
Fordham		66·6	358	e 10 49	0	e 19 34	- 2	—	— e 33·2
St. Louis		67·0	343	e 10 50	- 2	e 19 34	- 7	—	—
Harvard		68·2	359	1 10 57	- 2	—	—	i 11 32	pP 16·0
Chicago		69·3	346	e 11 5	- 1	e 19 59	-10	e 13 19	PP e 30·4
Tucson		69·7	324	1 11 7	- 1	e 20 2	-12	i 11 30	PcP i 31·6

Continued on next page.

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	Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Ottawa	71.2	356	11 17	- 1	20 29	- 2	—	33.3
Seven Falls	72.8	0	11 29	+ 2	20 46	- 3	—	29.3
La Jolla	73.7	320	e 11 34	+ 2	—	—	i 11 46	—
Palomar	73.8	321	i 11 35	+ 2	e 21 4	+ 3	i 11 48	—
Riverside	74.6	321	i 11 37	- 1	e 21 12	+ 2	i 12 0	—
Pasadena	75.2	321	i 11 41k	0	i 21 19	+ 3	i 12 10	e 31.6
Mount Wilson	75.2	321	i 11 41	0	e 21 15	- 1	i 11 55	—
Santa Barbara	z. 76.3	320	e 11 46	- 1	—	—	i 12 1	—
Haiwee	76.5	322	e 11 45	- 3	e 21 32	+ 1	i 12 20	—
Salt Lake City	76.9	329	e 11 53	+ 2	e 21 36	+ 1	e 12 32	e 34.8
Tinemaha	77.3	322	i 11 53a	0	e 21 42	+ 3	i 12 25	—
Berkeley	80.1	321	i 12 10	+ 2	e 22 8	- 1	—	i 38.3
Saskatoon	84.1	338	—	—	c 22 49	- 1	—	45.3
San Fernando	86.6	47	i 12 52	+11	23 33	+19	—	42.3
Lisbon	87.0	44	12 40a	- 3	23 20	+ 2	16 0	PP 35.3
Malaga	87.9	48	i 12 49	+ 2	i 23 35	+ 8	13 5	DP 43.7
Granada	88.7	48	i 12 54k	+ 3	e 23 32	- 2	13 39	DP 43.0
Wellington	90.0	224	13 15	+18	23 35	-11	24 50?	PS —
Christchurch	90.0	220	13 3	+ 6	23 21	[- 3]	24 0	PS —
Arapuni	91.3	226	—	—	25 20?	PS	—	—
Auckland	92.6	227	22 21	?	24 10	+ 1	(24 26)	PS 24.4
Tortosa	93.3	47	e 12 45	-28	—	—	—	e 52.3
Sitka	99.4	330	e 31 39	SS	—	—	—	e 42.0
Cheb	105.0	41	—	—	e 24 48	[+ 7]	e 33 23	SS e 51.3
Bergen	z. 105.4	30	e 19 47	?	e 24 50	[+ 7]	e 21 47	?
Potsdam	106.2	39	e 27 57	PS	—	—	—	e 53.3
Prague	106.2	42	e 27 56	PS	—	—	—	50.3
Copenhagen	107.1	36	—	—	25 21	SKKS	28 3	PS —
Riverview	108.7	216	—	—	i 25 9	[+11]	i 25 57	SKKS 32.4
Sydney	108.7	216	—	—	e 25 20	S	—	e 33.3
Upsala	111.0	33	e 19 8	PP	e 34 39	SS	e 28 43	PS 49.3
Helwan	111.9	67	19 3	PP	29 30	PS	e 22 1	PPP —
Brisbane	112.5	221	—	—	i 24 59	[-14]	e 32 32	? —
Ksara	116.7	64	e 18 18	[-23]	—	—	e 19 25	PP —
Bombay	N. 145.2	95	i 19 42	[+ 8]	—	—	e 23 25	PP —
Mizusawa	N. 150.7	304	e 20 6	PKP ₂	—	—	—	—
New Delhi	N. 151.0	77	e 22 24	PP	—	—	—	—
Calcutta	N. 160.7	96	20 56	PKP ₂	—	—	i 25 34	PP —

Additional readings :—

Huancayo i = 3m.40s. and 5m.9s., iS? = 5m.48s.
 Bogota i = 10m.7s., e = 14m.17s.
 San Juan e = 9m.41s.
 Bermuda e = 11m.40s., i = 20m.2s., e = 23m.14s. and 24m.7s.
 Columbia e = 19m.55s. and 24m.20s.
 Philadelphia i = 19m.25s., e = 24m.52s.
 Chicago esS = 21m.2s.
 Tucson i = 11m.10s., e = 11m.53s. and 14m.35s., eSS = 25m.24s., ePKP,PKP = 39m.12s.
 Palomar ePKKPEN = 32m.4s.
 Riverside iPcPZ = 11m.52s., ePKKPZ = 31m.59s., ePKP,PKPZ = 39m.20s.
 Pasadena iPcPZ = 11m.53s., iZ = 13m.20s., iPPZ = 14m.49s., iPKKPZ = 32m.13s.,
 iPKP,PKPZ = 39m.12s.
 Mount Wilson iZ = 12m.7s., ePKKPZ = 31m.59s., ePKP,PKPZ = 39m.10s.
 Haiwee iZ = 12m.3s., iZ = 13m.32s.
 Salt Lake City ePP = 14m.43s., esS = 22m.1s., eSS = 26m.38s.
 Tinemaha iPcPZ = 12m.7s., iZ = 13m.21s. and 14m.47s., ePKKPZ = 31m.35s.,
 ePKP,PKPZ = 39m.3s.
 Lisbon P = 12m.44s., PZ = 12m.57s., iSN = 23m.40s.
 Malaga iPcP = 12m.51s., iPP = 16m.15s., PPP = 18m.24s.
 Granada iPP = 16m.21s., S = 24m.14s., SS = 29m.48s.
 Wellington i = 26m.57s., QZ = 27m.50s.
 Copenhagen 26m.10s. and 28m.22s.
 Upsala ePPN = 22m.27s.?
 Helwan iZ = 19m.19s., eZ = 20m.41s. and 23m.47s., eEN = 29m.10s., S?Z = 30m.16s.
 Brisbane ePE = 25m.2s.
 Bombay iN = 20m.47s.
 Long waves were recorded at Honolulu, Colombo, Tananarive, and other European stations.

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Dec. 22d. Readings also at 1h. (Riverview, Auckland, Wellington, Christchurch, Tinemaha, Pasadena, Palomar, Tucson, Riverside, and Mount Wilson), 2h. (Mount Wilson, Pasadena, Tucson, Riverside, and Tinemaha), 3h. (Tinemaha, Tucson, and Riverside), 4h. (Auckland), 8h. (Riverview), 9h. (Mount Wilson, Tucson (2), Tinemaha (2), Riverside, Istanbul, Riverview (2), Auckland (2)), 11h. (New Delhi), 15h. (Arapuni, Auckland, Wellington, Riverview, Christchurch, Tucson, Pasadena, and Tinemaha), 19h. (near Mizusawa).

Dec. 23d. 16h. South Atlantic, probably between Tristan da Cunha and South Georgia.

Rio de Janeiro ePN = 48m.0s., eSN = 53m.18s., eLN = 55m.32s.
 La Plata PEN = 48m.24s., E = 49m.36s., S1N = 53m.48s., S1E = 53m.55s., LN = 57m.0s.
 Huancayo eP = 51m.4s., e = 55m.1s., eS = 60m.14s., eL = 70m.17s.
 La Paz iPZ = 51m.4s., iSZ = 58m.39s., LZ = 68m.30s.
 Malaga eP? = 54m.8s.
 Helwan ePZ = 54m.36s., iZ = 54m.57s.
 Riverside ePZ = 60m.47s.
 Pasadena ePZ = 60m.48s., iZ = 60m.53s. and 62m.18s., eLZ = 101.6m.
 Mount Wilson eZ = 60m.53s.
 Tinemaha iPZ = 60m.55s., eZ = 62m.31s.
 Tucson e = 61m.33s., eL = 101m.34s.
 San Juan e = 63m.31s., eL = 89m.3s.
 Tananarive e = 68m.57s.
 Bombay eE = 69m.4s.
 Long waves were also recorded at New Delhi, Riverview, and Christchurch.

Dec. 23d. Readings also at 0h. (Riverview, Auckland, and Wellington), 2h. (Fort de France), 3h. (Auckland, Riverview, and Wellington), 7h. (near St. Louis), 8h. (Tucson, near Haiwee, La Jolla, Mount Wilson, Pasadena, Palomar, Riverside, Santa Barbara, Tinemaha, and Santa Clara), 9h. (Auckland, Riverview, Wellington, and Christchurch), 21h. (Mount Wilson, Pasadena, Riverside, Tinemaha, and Riverview).

Dec. 24d. 14h. 46m. 40s. Epicentre 24°·7N. 92°·2E.

A = -·0349, B = +·9089, C = +·4155; $\delta = -4$; $h = +3$;
 D = +·999, E = +·038; G = -·016, H = +·415, K = -·910.

		Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Calcutta	N.	4·1	240	i 1 8	+ 3	i 1 58	+ 3	—	—
Dehra Dun		13·7	297	—	—	e 5 20	-32	—	—
New Delhi	N.	14·0	289	i 3 37	PP	6 0	+ 1	—	6·3
Hyderabad	N.	14·7	243	3 31	0	6 6	-10	—	—
Bombay		18·9	256	e 4 26	+ 2	i 8 3	+10	4 33	PP
Kodaikanal	E.	20·1	228	e 7 0	?	e 10 40	L	—	12·2
Colombo		21·3	216	4 51	+ 1	8 44	+ 1	—	—
Almata		22·2	330	5 3	+ 3	9 8	+ 8	—	—
Andijan		23·0	318	e 5 12	+ 5	—	—	—	—
Frunse		23·2	325	5 12	+ 3	—	—	—	—
Tashkent		25·3	316	5 34	+ 4	9 51	- 3	—	—
Irkutsk		29·0	15	5 59	- 5	i 10 49	- 5	—	—
Vladivostok		37·3	51	e 6 52	-24	e 12 46	-18	—	—
Sverdlovsk		39·4	333	7 31	- 2	i 13 29	- 6	—	—
Ksara		49·4	294	e 8 46	- 7	e 16 23	+23	—	—
Helwan		53·8	290	9 28	+ 2	17 20	+19	12 54	PPP
Copenhagen		64·3	322	10 38	- 1	—	—	—	—
Cheb		65·1	316	—	—	19 20?	- 7	—	e 36·3
Chur		67·6	312	e 10 57	- 4	—	—	—	—
Zürich		68·1	313	e 11 1a	- 3	—	—	—	—
Riverview		80·8	134	—	—	e 22 8	-17	—	e 39·3
Tinemaha	z.	111·2	26	e 18 37	[+ 1]	—	—	—	—
Mount Wilson	z.	114·7	27	i 18 37	[- 5]	—	—	—	—
Riverside	z.	115·2	27	i 18 42	[- 1]	—	—	—	—
St. Louis		117·0	3	—	—	e 27 38	{+44}	e 31 6	PPS
Tucson		119·3	23	i 18 50	[- 1]	—	—	—	—

Additional readings :—

New Delhi iN = 5m.45s.
 Bombay PPN = 4m.36s., PPPEN = 4m.49s., SSE = 8m.24s., PcPE = 8m.46s.
 Helwan iZ = 9m.40s. and 9m.48s., eZ = 10m.45s., eN = 18m.6s.
 Mount Wilson eZ = 19m.40s.
 St. Louis eN = 30m.0s., eE = 47m.52s.
 Long waves were also recorded at Kew, Uccle, La Paz, and Wellington,

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Dec. 24d. 22h. Undetermined shock.

New Delhi ePN = 16m.58s., iSN = 18m.19s., S_cN = 19m.15s.
 Almata eP = 17m.3s., eS = 18m.54s.
 Frunse eP = 17m.8s., S = 19m.10s.
 Andijan eP = 17m.9s.
 Tashkent eP = 17m.46s.
 Calcutta eN = 19m.32s., iN = 22m.12s. and 24m.15s.
 Vladivostok eP = 19m.36s.
 Bombay eE = 22m.12s., eN = 22m.37s.
 Hyderabad eSN = 24m.38s.
 Kodaikanal iPE = 25m.52s., SE = 29m.42s.

Dec. 24d. Readings also at 1h. (near La Paz and near Mizusawa), 2h. (Auckland and Wellington), 3h. (Mount Wilson, Tucson, Pasadena, Riverside, Bogota, La Paz, and near Huancayo), 10h. (Fort de France), 13h. (Mount Wilson, Palomar, Riverside, Tinemaha, Tucson, and Wellington), 17h. (Kew), 21h. (Riverview, near Almeria, Granada, and near Malaga).

Dec. 25d. Readings at 2h. (Istanbul), 5h. (Istanbul and near La Paz), 10h. (Haiwee, Tucson, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, and near Vladivostok), 12h. (Bogota), 13h. (Mount Wilson, Pasadena, Palomar Riverside, Tinemaha, Tucson, and near Mizusawa), 16h. (Kew), 18h. (Arapuni, Auckland, Christchurch, Wellington, and Riverview), 19h. (Bucharest and Sofia), 23h. (Uccle).

Dec. 26d. Readings at 2h. (Palomar and Tucson), 3h. (Tinemaha), 4h. (Brisbane Christchurch, Riverview, Calcutta, Mount Wilson, Pasadena, and Riverside), 5h. (Haiwee, Mount Wilson, Pasadena, Palomar, Tucson, Riverside, and Tinemaha), 9h. (near Frunse), 17h. (Bombay and Calcutta), 21h. (Almata and near Frunse).

Dec. 27d. 15h. 25m. 47s. Epicentre 6°·2S. 151°·5E. Depth of focus 0·005.

A = -·8738, B = +·4744, C = -·1073; δ = +10; h = +7;
 D = +·477, E = +·879; G = +·094, H = -·051, K = -·994.

	Δ	Az.	P.		O-C.	S.		O-C.	Supp.		L. m.	
			m.	s.		m.	s.		m.	s.		
Brisbane	21·2	176	i 4	36	- 6	i 8	36	+ 7	i 5	5	PP	—
Riverview	27·4	180	e 5	41	- 1	i 10	14	- 3	i 6	23	PP	e 11·8
Sydney	27·5	180	e 5	58	+16	e 10	16	- 1	—	—	—	—
Auckland	37·2	148	7	6	- 1	12	54	+ 6	8	37	PP	18·7
Arapuni	38·6	149	—	—	—	14	13	+63	—	—	—	18·5
Wellington	40·6	153	7	34	- 1	13	39	- 1	9	22	PP	18·5
Christchurch	41·6	157	7	45	+ 2	13	53	- 1	9	39	PP	19·8
Perth	42·0	228	7	53	+ 7	14	4	+ 4	9	48	PPP	20·4
Kagosima	42·6	333	7	53	+ 2	—	—	—	—	—	—	—
Kōti	43·1	338	e 7	53	- 2	13	33	-43	—	—	—	—
Hukuoka	44·3	335	8	8	+ 3	—	—	—	—	—	—	—
Nagano	44·4	345	8	18	+12	—	—	—	—	—	—	—
Hamada	44·8	337	8	47	+38	14	9	-32	—	—	—	—
Sendai	45·3	349	8	8	- 5	14	7	-41	—	—	—	—
Mizusawa	E. 46·1	350	e 8	21	+ 2	e 10	27	PP	—	—	—	—
	N. 46·1	350	8	18	- 1	10	30	PP	—	—	—	—
Vladivostok	52·2	342	e 9	0	- 6	i 16	11	-14	—	—	—	—
Honolulu	56·7	60	e 9	41	+ 2	e 17	29	+ 4	e 11	14	PP	e 23·4
Calcutta	N. 68·0	297	i 10	56	+ 2	20	1	+14	i 20	44	PPS	31·2
Irkutsk	70·7	332	i 11	8	- 3	i 20	18	- 1	13	43	PP	—
Colombo	72·6	279	11	22	0	20	48	+ 7	—	—	—	—
Kodaikanal	E. 75·5	282	e 17	18	?	e 26	48	SS	19	48	?	40·8
Hyderabad	N. 75·8	290	11	42	+ 1	21	20	+ 4	14	13	PP	36·2
New Delhi	N. 79·3	301	e 11	57	- 3	i 21	56	+ 2	26	58	SS	35·9
Bombay	N. 81·4	290	e 12	12	+ 1	22	21	+ 5	12	46	sP	—
Andijan	85·8	311	e 12	36	+ 2	i 22	57	- 3	—	—	—	—

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	Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	°	°	m. s.	s.	m. s.	s.	m. s.	m.
Sitka	86.3	32	e 12 31	- 5	e 22 44	[-10]	e 15 23	PP e 35.4
Tashkent	88.2	312	i 12 45	0	23 12	[+ 6]	16 24	PP
Ukiah	90.2	51	(e 12 53)	- 2	e 12 53	P	23 27	SKS e 41.2
Berkeley	90.8	52	e 12 55	- 2	e 24 12	+26	e 22 37	? e 44.2
Santa Clara	z. 91.0	52	i 13 10	+12	—	—	—	e 46.1
Victoria	91.3	42	—	—	e 23 25	[+ 1]	—	44.2
Seattle	92.0	43	—	—	e 22 26	?	—	e 43.2
Santa Barbara	z. 92.5	56	i 13 7	+ 2	—	—	—	—
Pasadena	93.7	56	i 12 50 _a	-21	i 24 20	+ 9	13 29	pP
Mount Wilson	93.8	56	i 13 11 _a	0	e 23 34	[+ 4]	i 13 30	pP
Tinemaha	E. 93.9	53	e 13 11	- 1	—	—	—	—
Haiwee	94.0	54	e 13 14	+ 2	—	—	—	—
La Jolla	94.4	57	e 13 14	0	—	—	—	—
Riverside	94.4	56	i 13 12 _a	- 2	e 23 47	[+ 6]	i 13 30	pP
Palomar	94.7	57	i 13 14	- 1	e 23 50	[+ 8]	i 13 32	pP
Salt Lake City	99.0	49	—	—	e 24 14	[+ 8]	e 29 37	SS e 41.8
Tucson	99.7	58	i 13 37	- 1	i 26 35	PS	e 17 37	PP e 44.3
Rapid City	105.3	46	e 14 20	P	e 24 45	[+10]	e 18 0	PP e 51.3
Ksara	114.7	304	e 18 40	[+ 7]	e 29 19	PS	—	—
Florissant	115.7	49	i 19 35	PP	i 26 41	SKKS	i 29 23	PS i 59.2
Upsala	116.1	336	—	—	e 34 13?	SS	—	e 60.2
Chicago	116.9	46	e 29 27	?	e 29 39	PS	e 35 23	SS e 57.6
Istanbul	118.3	313	e 20 13?	PP	—	—	—	—
Helwan	z. 119.2	300	18 43	[+ 2]	e 36 43	SSP	19 13	pPKP
Prague	123.4	328	—	—	e 40 31	?	—	e 58.2
Ottawa	123.5	38	18 50	[0]	27 13?	SKKS	20 29	PP 51.2
Cheb	124.5	329	e 20 25	PP	e 31 2	PS	—	e 59.2
Seven Falls	125.5	34	e 18 55	[+ 1]	e 27 29	SKKS	e 20 55	PP 53.2
Fordham	126.8	42	e 18 56	[0]	i 37 56	SS	i 20 52	PP
Strasbourg	127.8	330	e 19 2	[+ 4]	e 25 20	[-38]	e 23 18	PPP
Uccle	127.8	334	e 19 2	[+ 4]	e 30 13?	PS	e 38 13?	SS e 59.2
Chur	128.0	327	e 18 59	[0]	e 22 15	PKS	—	—
Stonyhurst	128.0	340	i 22 23	PKS	e 32 3	PPS	—	—
Zürich	128.2	328	e 18 57 _a	[- 2]	—	—	—	—
Basle	128.6	329	e 19 5	[+ 5]	—	—	—	—
Kew	129.2	337	e 22 25	PKS	(e 28 13?)	SKKS	—	e 28.2
Huancayo	130.0	111	e 19 15	[+12]	e 31 26	PS	i 22 29	PKS e 53.2
La Plata	N. 130.6	148	22 25	PKS	—	—	—	66.9
Clermont-Ferrand	132.0	330	e 19 8	[+ 2]	e 22 33	PKS	—	e 69.2
La Paz	134.8	120	i 19 14	[+ 3]	i 22 42	PKS	21 50	PP 64.2
Bermuda	137.4	47	e 22 0	PP	e 25 58	[-21]	e 39 42	SS e 56.2
San Juan	141.4	68	i 19 26	[+ 2]	e 26 29	[+ 4]	i 23 5	PKS e 65.7
Granada	141.7	327	19 35 _a	[+11]	40 47	SS	23 0	PKS
Malaga	142.5	327	i 19 19 _a	[- 7]	26 13	[-14]	19 31	pPKP 68.2
Lisbon	143.2	333	19 20	[- 7]	—	—	23 10	PKS 76.0
San Fernando	143.6	328	19 28	[0]	22 55	PKS	22 23	PP
Río de Janeiro	N. 147.7	154	e 19 35	[0]	—	—	—	—

Additional readings :—

Brisbane iPNZ = 4m.39s., iE = 5m.41s. and 6m.2s.
 Riverview iPNZ = 5m.47s. a, iNZ = 7m.18s., iE = 10m.20s., iEN = 10m.42s., iZ = 10m.45s., iN = 11m.7s.
 Auckland P_cP = 8m.54s., i = 15m.19s., SS = 16m.16s., S_cS = 17m.13s., i = 18m.3s.
 Wellington iZ = 7m.39s., pPPZ = 9m.50s., sPPZ = 10m.19s., iZ = 11m.7s., pP_cSZ = 13m.49s., sP_cS?Z = 14m.28s., SS = 16m.56s., sSSZ = 17m. 58s.
 Christchurch S_cS = 17m.17s.
 Perth SS = 16m.31s., SSS = 17m.6s.
 Honolulu eS_cS = 19m.54s., eSS = 21m.44s.
 Irkutsk ePPP = 15m.22s.
 Kodaikanal phases wrongly identified.
 Hyderabad SSN = 26m.7s.
 New Delhi PS = 22m.23s.
 Bombay eN = 23m.46s.
 Sitka i = 24m.8s., e = 27m.3s., and 27m.16s.
 Tashkent PPS = 25m.19s.
 Berkeley e = 12m.25s., and 41m.49s.
 Pasadena iE = 23m.45s.

Continued on next page.

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Mount Wilson iZ = 13m.35s.
 Palomar iZ = 13m.22s., eZ = 15m.58s.
 Salt Lake City e = 24m.46s.
 Tucson i = 30m.26s., e = 35m.5s., ePKP,PKP = 46m.17s.
 Florissant ipPPZ = 20m.0s.
 Helwan PKKPZ = 19m.1s., sPKKPZ = 19m.34s., eZ = 21m.19s., PPZ = 22m.31s.,
 sPPZ = 23m.7s., PSKSZ = 32m.25s., pPSZ = 33m.46s., eN = 40m.55s.
 Ottawa, PPS = 31m.35s., SS = 37m.19s.
 Huancayo e = 32m.39s., eSS = 38m.21s.
 La Plata PE = 22m.31s.
 La Paz eP?Z = 16m.36s., ipPKP = 20m.16s., PPP = 24m.43s., SKS? = 26m.2s.
 Bermuda e = 32m.13s.
 San Juan e = 35m.34s. and 52m.30s.
 Malaga iPP = 22m.35s., PPS = 35m.15s., Q = 58.2m.
 Lisbon PKPZ = 19m.23s.k, PKPE = 19m.28s., PKP₂N = 19m.38s., E = 21m.7s., N =
 21m.16s., Z = 21m.23s., E = 21m.57s.
 Long waves were also recorded at Bozeman, Philadelphia, New Kensington, Columbia,
 Potsdam, and Edinburgh.

Dec. 27d. Readings also at 3h. (Auckland, Christchurch, Wellington, Riverview, La Paz, Haiwee, Mount Wilson, Pasadena, Palomar, Riverside, Tinemaha, and Tucson), 4h. (near Apia), 5h. (Fort de France), 6h. (Auckland, Wellington, Christchurch, Riverview, Mount Wilson, Palomar, and Tucson), 7h. (near Apia), 11h. (Andijan and near Frunse), 13h. (near Apia), 14h. (Chicago, La Jolla, Mount Wilson, Pasadena, Palomar, Riverside, Santa Barbara, Tinemaha, and near Honolulu), 15h. (near Mizusawa), 19h. (Mount Wilson, Tucson, Pasadena, Palomar, Tacubaya, Huancayo, and La Paz), 21h. (Riverview and Wellington), 23h. (near Basle (2), Chur (2), Zürich (2), Strasbourg (2), Trieste (4), and Jena (2)).

Dec. 28d. 1h. 5m. 40s. Epicentre 5°.9S. 149°.9E. Depth of focus 0.010.

A = -0.8606, B = +0.4989, C = -0.1021; $\delta = -4$; $h = +7$;
 D = +0.501, E = +0.865; G = +0.088, H = -0.051, K = -0.995.

	Δ	Az.	P.		O-C.	S.		O-C.	Supp.		L.	
			m.	s.		m.	s.		m.	s.		m.
Riverview	27.8	177	i 5	43k	+ 1	i 10	17	+ 1	i 6	1	pP	e 13.0
Sydney	27.9	177	e 5	59	+16	e 9	56	-22	—	—	—	—
Auckland	38.3	147	7	13	+ 1	13	20	+21	14	5	sS	18.3
Apia	38.5	105	i 7	19	+ 5	e 13	50	sS	i 7	47	pP	i 16.9
Arapuni	39.7	148	8	14	+50	13	56	sS	i 15	20?	?	17.3
Wellington	41.6	151	7	36	- 4	13	54	+ 6	7	57	pP	19.1
Christchurch	42.5	156	7	46	- 1	13	57	- 5	9	39	P _e P	19.6
Vladivostok	51.5	343	e 8	55	- 3	i 16	9	0	—	—	—	—
Honolulu	58.0	60	—	—	—	e 18	20	sS	—	—	—	e 27.3
Calcutta	N. 66.5	298	e 10	48	+ 7	i 19	33	+10	—	—	—	—
Irkutsk	69.7	332	e 10	56	- 5	i 20	27	SP	e 13	51	PP	—
Colombo	71.0	279	11	3	- 6	20	5	-11	—	—	—	34.3
Hyderabad	N. 74.2	290	e 11	2	-26	e 21	10	+18	13	36	PP	39.1
Bombay	N. 79.8	290	—	—	—	e 23	9	PPS	—	—	—	—
College	84.0	22	—	—	—	e 22	51	+16	e 24	2	PPS	e 33.5
Andijan	84.5	311	—	—	—	22	49	+ 9	—	—	—	—
Tashkent	86.8	312	e 12	38	+ 3	i 23	22	+20	—	—	—	—
Sitka	86.9	31	—	—	—	e 23	23	+20	—	—	—	e 35.8
Pasadena	94.9	56	i 13	12	- 0	e 23	50	[+13]	i 13	50	pP	e 38.7
Mount Wilson	95.0	56	e 13	10	- 3	e 23	51	[+13]	i 14	4	pP	—
Tinemaha	95.0	53	e 13	15	+ 2	—	—	—	—	—	—	—
Riverside	z. 95.5	56	i 13	16	+ 1	—	—	—	—	—	—	—
Sverdlovsk	95.5	326	e 13	16?	+ 1	23	29	[-12]	25	55	PS	—
Palomar	95.9	57	e 13	16	- 1	e 23	58	[+15]	—	—	—	—
Tucson	101.0	58	14	18	pP	e 26	40	PS	e 18	44	pPP	e 45.8
Upsala	115.2	335	—	—	—	e 35	20?	SS	—	—	—	e 58.3
Helwan	117.6	300	e 19	50	PP	e 25	18	[0]	e 29	53	PS	—
Ottawa	124.2	37	e 18	48	[0]	—	—	—	e 33	20	?	51.3
Uccle	126.8	334	e 19	20?	pPKP	—	—	—	—	—	—	—
Chur	126.9	327	e 18	56	[+ 3]	—	—	—	—	—	—	—

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	Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
	$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	fl. s.	m.
Zürich	127.1	328	e 18 58	[+ 5]	—	—	—	—
Stonyhurst	127.2	339	—	—	e 38 40	SSP	e 41 21	? e 50.7
Fordham	127.7	41	e 34 5	?	e 38 25	SS	e 54 26	? e 60.9
Clermont-Ferrand	131.0	329	e 20 24?	?	—	—	—	e 54.3
Huancayo	131.6	112	e 20 18	?	e 32 0	PS	e 39 12	SS e 58.6
La Plata	131.7	149	22 26	pPP	—	—	22 44	? 54.3
Bogota	136.2	89	e 19 8	[- 2]	e 22 46	SKP	e 19 50	pPKP
La Paz	136.3	121	19 14k	[+ 3]	26 5	[- 5]	21 59	PP 65.1
Bermuda	138.4	46	e 22 59	SKP	—	—	—	e 57.5
Granada	140.6	326	(19 20 _a)	[+ 1]	(40 14)	SS	(22 26)	PP (56.4)
Malaga	141.4	326	e 19 54	pPKP	—	—	—	21.3
Sam Jan	142.8	67	e 19 50	pPKP	e 33 5	PS	e 23 9	pPP e 55.6
Rio de Janeiro	N. 148.6	157	e 19 42	[+ 10]	—	—	—	—

Additional readings:—

Riverview iN = 5m.58s., iZ = 6m.15s., iN = 6m.24s., and 10m.40s.

Auckland PP = 8m.56s., P_cP? = 9m.12s., SS = 15m.55s.?, Q = 16.3m.

Apia ePP = 9m.10s., iSS = 16m.8s.

Wellington sPZ = 8m.20s., P_cP?Z = 9m.24s., pPPZ = 9m.45s., iZ = 10m.45s. and 11m.36s., sS_cP = 14m.10s., QZ = 17.1m.

Christchurch S_cS = 17m.20s.

Hyderabad SN = 21m.24s.

Pasadena eZ = 16m.22s.

Tucson e = 34m.23s.

Helwan eZ = 20m.50s.

Uccle e = 20m.20s.?, and 30m.20s.?

Huancayo i = 22m.37s.

La Paz iPKP = 19m.17s., iSKP = 22m.31s., PPSZ = 32m.29s., SSZ = 40m.9s.

Granada SKKS = (30m.20s.), readings decreased by 4 minutes.

San Juan eSS = 41m.33s.

Long waves were also recorded at New Delhi and at other European and American stations.

Dec. 28d. 20h. Undetermined shock.

Stalinabad P = 11m.21s.?, iS_g = 12m.5s.?

Frunse eP = 11m.28s., eS = 12m.20s.

Tashkent eP = 11m.28s.?, S_g = 12m.20s.?

Almata P = 11m.39s., S = 12m.43s.

New Delhi ePN = 12m.39s., eSN = 14m.3s., S*N = 14m.27s., S_gN = 14m.54s.

Bombay iN = 14m.34s., and 17m.56s., eN = 18m.10s.

Calcutta eN = 18m.8s., i = 20m.28s.

Dec. 28d. Readings also at 1h. (near Mizusawa and near Triest), 7h. (Tacubaya), 9h. (River-view), 10h. (near Toledo, Almeria, Malaga, and Granada), 13h. (Riverview), 19h. (near Toledo and near Triest), 20h. (near Ottawa), 23h. (Port au Prince).

Dec. 29d. 11h. 2m. 37s. Epicentre 35°·6N. 140°·0E. (as on 1939 May 18d.).

Scale VI at Kamogawa; V at Tokyo, Yokohama, Mito, and Karuizawa; IV at Titibu, Hukusima, Misima, and Ajiro.

Epicentre as adopted. Shallow. Macroseismic radius 200-300km.

$$A = -.6243, B = +.5239, C = +.5795; \quad \delta = +4; \quad h = 0;$$

$$D = +.643, E = +.766; \quad G = -.444, H = +.373, K = -.815,$$

	Δ	Az.	P.	O-C.	S.	O-C.
	$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.
Tokyo	0.2	298	0 13	+ 3	0 17	+ 1
Yokohama	0.3	240	0 14	+ 3	0 24	+ 6
Tukubasan	0.6	7	0 14	- 1	0 24	- 2
Mera	0.7	191	0 18	+ 1	0 29	+ 1
Kumagaya	0.8	318	0 21	+ 3	0 33	+ 2
Mito	0.9	26	0 17 _a	- 3	0 29	- 5
Misima	1.0	241	0 22 _k	+ 1	0 37	+ 1
Osima	1.0	211	0 22	+ 1	0 32	- 4
Utunomiya	1.0	354	0 23	+ 2	—	—
Maebasi	1.1	317	0 25	+ 3	0 42	+ 3

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		Δ	Az.	P.		O-C.	S.		O-C.
		°	°	m.	s.	s.	m.	s.	s.
Shizuoka		1.5	244	0	31	+ 3	0	49	0
Nagano		1.8	306	0	34	+ 2	1	1	+ 5
Humamatu		2.1	245	0	39	+ 2	—	—	—
Hokusima		2.2	10	0	38	0	1	3	- 3
Toyama		2.5	296	0	49	+ 6	1	22	+ 8
Aikawa		2.8	330	0	45	- 2	1	27	+ 5
Sendai		2.8	15	0	44 ^k	- 3	1	16	- 6
Kyoto		3.5	261	1	0	+ 3	1	43	+ 3
Mizusawa	E.	3.7	14	0	58	- 2	1	38	- 7
Akita		4.1	1	1	24	P _s	2	10	S _r
Siomisaki		4.1	241	1	7	+ 2	—	—	—
Wakayama		4.2	252	1	7 ^k	0	—	—	—
Miyako		4.3	21	1	7	- 1	1	51	- 9
Sumoto		4.4	255	1	12	+ 2	2	0	- 2
Hatinohe		5.1	14	1	16	- 4	—	—	—
Sapporo		7.5	8	2	13	P [*]	—	—	—
Hukuoka		8.1	258	2	7	+ 5	—	—	—
Kumamoto		8.2	253	1	56	- 7	—	—	—
Vladivostok		9.8	323	e 2	25	+ 1	e 4	11	- 6
Copenhagen		78.7	333	11	59	- 7	—	—	—
Pasadena	z.	79.3	56	i 12	2	- 7	—	—	—
Mount Wilson	z.	79.4	56	i 12	2	- 7	—	—	—
Riverside	z.	80.0	56	i 12	5	- 8	—	—	—
Palomar	z.	80.7	56	i 12	9	- 7	—	—	—
Tucson		85.4	53	i 12	33	- 7	—	—	—
La Paz		148.5	59	19	46	[+ 1]	—	—	—

Additional readings :—
Sendai 1m.10s.
Mizusawa PN = 1m.1s.

Dec. 29d. 22h. 56m.1s. Epicentre 8°·5N. 102°·8W.

A = -·2192, B = -·9646, C = +·1468; $\delta = +5$; $h = +7$;
D = -·975, E = +·222; G = -·033, H = -·143, K = -·989.

		Δ	Az.	P.		O-C.	S.		O-C.	Supp.	L.
		°	°	m.	s.	s.	m.	s.	s.	m.	s.
Tacubaya	N.	11.4	18	e 2	43	- 4	—	—	—	—	—
Vera Cruz	N.	12.5	31	e 3	16	+14	—	—	—	—	—
Tucson		24.8	344	e 5	22	- 3	—	—	e 6	14	PP
Palomar		27.9	334	i 5	53	- 1	—	—	—	—	—
Riverside	z.	28.7	334	i 6	0	- 1	—	—	—	—	—
Mount Wilson		29.2	334	i 6	5	0	—	—	—	—	—
Pasadena		29.2	334	i 6	4	- 1	—	—	—	—	e 13.1
Haiwee		30.8	336	e 6	22	+ 2	—	—	—	—	—
Tinemaha		31.7	336	e 6	28	+ 1	—	—	—	—	—
St. Louis		32.1	18	e 6	31	0	i 11	43	0	—	—
Florissant	N.	32.2	18	—	—	—	e 11	38	- 7	—	e 15.0
Huancayo		34.1	126	e 6	46	- 2	e 12	18	+ 4	—	e 15.0
Chicago		35.8	19	—	—	—	e 12	43	+ 2	—	e 18.8
San Juan		36.7	70	e 9	51	f	e 12	59	+ 5	—	e 16.8
La Paz	z.	42.4	125	i 8	0	+ 2	14	22	+ 2	—	21.0

Additional readings :—
Tucson i = 5m.35s., e = 6m.54s., and 8m.53s.
St. Louis iSN = 11m.52s.
San Juan e = 13m.51s.
Long waves were also recorded at Honolulu, Uccle, Riverview, and other American stations.

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Dec. 29d. 23h. 3m. 34s. I) Epicentre 8°·5N. 102°·8W.
23h. 45m. 17s. II ((as at 22h.).

		Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
II Tacubaya	N.	11·4	18	e 2 36	-11	—	—	—	—
II Vera Cruz	N.	12·5	31	e 3 9	+ 7	—	—	—	—
II Tucson		24·8	344	i 5 24	- 1	—	—	—	e 11·0
I Palomar	Z.	27·9	334	i 5 53	- 1	—	—	—	—
II		27·9	334	i 5 53	- 1	—	—	—	—
I Riverside	Z.	28·7	334	e 6 0	- 1	—	—	—	—
II	Z.	28·7	334	i 5 59	- 2	—	—	—	—
II Bogota		28·8	95	e 6 9	+ 7	—	—	—	—
I Mount Wilson	Z.	29·2	334	i 6 7	+ 2	—	—	—	—
II	Z.	29·2	334	i 6 4	- 1	—	—	—	—
I Pasadena	Z.	29·2	334	i 6 6	+ 1	—	—	—	—
II		29·2	334	i 6 3	- 2	—	—	—	e 13·3
I Haiwee		30·8	336	e 6 26	+ 6	—	—	—	—
II		30·8	336	e 6 22	+ 2	—	—	—	—
I Tinemaha	E.	31·7	336	e 6 31	+ 4	—	—	—	—
II		31·7	336	e 6 30	+ 3	—	—	—	—
I St. Louis		32·1	18	e 6 34	+ 3	i 11 30	-13	—	—
II		32·1	18	i 6 31	0	i 11 29	-14	—	i 16·6
I Florissant	N.	32·2	18	—	—	i 12 29	+44	—	—
II	N.	32·2	18	—	—	e 11 43	- 2	—	—
II Huancayo		34·1	126	c 8 6	PP	e 12 32	+18	—	e 15·1
II Logan		34·1	348	e 6 43	- 5	—	—	—	e 15·0
II Chicago		35·8	18	—	—	e 12 45	+ 4	—	e 19·1
II San Juan		36·7	70	e 8 47	PP	e 14 5	+71	—	e 15·2
II La Paz	Z.	42·4	125	8 0 _a	+ 2	14 31	+11	—	21·7
II Bermuda		42·5	50	—	—	e 14 28	+ 6	—	e 21·1
I Ottawa		43·6	28	e 8 8	0	—	—	—	16·4
II Wellington		89·9	228	—	—	—	—	i 34 18	Q 40·7

Additional readings to shock II:—

Tucson II, i=5m.37s. and 7m.34s.

Pasadena II, iZ=6m.12s. and 9m.15s.

St. Louis II, iN=7m.31s., eE=11m.7s., iSN=11m.54s.

La Paz II, iPZ=8m.3s.

Long waves were also recorded at Honolulu II, Wellington I, Riverview II, Christchurch I and II, Auckland I, and other American stations II.

Dec. 29d. Readings also at 1h. (Auckland, Arapuni, Wellington, and Christchurch), 5h. (near Andijan), 9h. (Sofia and near Trieste), 12h. (Riverview), 13h. (Calcutta, Vladivostok, and near Mizusawa), 14h. (Pasadena, Tucson, Palomar, Riverside, Tinemaha, New Delhi, Riverview, Cheb, Uccle, and La Paz), 16h. (Stalinabad), 20h. (La Paz, La Plata, Bogota, Christchurch, Brisbane, and Riverview).

Dec. 30d. 0h. English Earthquake.

Intensity V-VI in Yorkshire. Felt at Leeds, Newcastle, Derby, and in Norfolk. Radius of macroseismic area 100 miles.

"Earthquake in England." "Nature," London, Jan. 6th, 1945.

"Earthquake in Great Britian of 1944, Dec. 30th." "Nature," London, Jan. 27th, 1945.

Epicentre approximately 54°·5N. 1°·0W. but the observational data are not numerous enough to give greater refinement to these figures.

Stonyhurst (1·1) iP=35m.41s.

Kew (3·1) iZ=36m.16s. and 36m.20s., i=36m.23s., e=36m.58s.

Edinburgh (1·9) eP=36m.26s., eP_g=36m.39s., e=36m.42s. and 36m.49s., eS=36m.56s., eS_g=37m.4s.

Uccle (4·9) eP_g=37m.8s., e=37m.14s., eS*=37m.54s., e=38m.8s., iS_g=38m.10s., iEN=38m.22s.

Aberdeen (2·8) iEN=37m.16s.

Copenhagen (7·8) P=37m.35s.

Zürich (9·4) e=37m.46s.

Jena (8·4) eN=38m.23s., eE=38m.26s. and 39m.11s., eN=40m.31s., eE=40m.36s.,

Chur (10·2) e=39m.0s.

The figures in brackets are distances in degrees from the approximate epicentre.

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1944

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Dec. 30d. 22h. 2m. 51s. Epicentre 42°·0N. 130°·5W. (as on 1944 July 21d.).

Pasadena suggests off coast of Oregon. Identification with the shock of 1944 July 21d. is doubtful.

$$A = -.4841, B = -.5668, C = +.6666; \quad \delta = -3; \quad h = -2;$$

$$D = -.760, E = +.649; \quad G = -.433, H = -.507, K = -.745.$$

		Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		°	°	m. s.	s.	m. s.	s.	m. s.	m.
Ukiah		6.2	115	e 1 33	- 2	e 2 35	-13	—	e 3.4
Santa Clara	E.	8.1	123	e 2 46	P _g	—	—	—	e 5.3
Seattle		8.1	43	e 1 27	?	e 2 14	P	(e 2 23)	e 2.4
Victoria		8.2	35	e 1 36	?	—	—	(2 45)	2.8
Tinemaha	Z.	10.6	114	e 2 35	- 1	—	—	—	—
Haiwee		11.4	117	i 2 56	+ 9	—	—	—	—
Mount Wilson		12.5	125	i 3 8	+ 6	—	—	—	—
Pasadena		12.5	125	i 3 11	+ 9	(e 5 15)	- 8	—	e 5.2
Riverside	Z.	13.1	124	e 3 14	+ 4	—	—	—	—
Palomar	Z.	13.8	124	e 3 27	+ 8	—	—	—	—
Salt Lake City		14.1	82	e 4 24	?	—	—	—	e 7.9
Sitka		15.9	350	e 3 38	- 9	i 6 39	- 5	—	i 6.9
Tucson		18.4	115	e 4 20	+ 2	e 7 47	+ 6	—	e 9.2
Saskatoon		19.1	51	e 4 21	- 6	—	—	—	9.2
Rapid City		20.0	75	e 4 23	-14	—	—	—	e 9.2
College		24.5	343	e 5 49	+27	e 6 15	?	—	e 10.1
Florissant	E.	30.5	83	i 6 28	+11	i 11 23	+ 5	—	—
St. Louis		30.7	83	e 6 17	- 2	i 11 24	+ 3	—	i 13.3
Ottawa		39.1	66	7 24	- 7	13 33	+ 2	—	18.2
Fordham		41.8	72	e 7 59	+ 6	—	—	—	—
Bermuda		52.1	78	—	—	e 16 44	+ 6	—	e 24.0
San Juan		59.0	93	—	—	e 18 21	+11	—	e 25.4
Bogota		62.3	110	e 10 32	+ 6	—	—	—	—
La Paz		81.7	120	11 52	-30	—	—	—	42.2
Granada		87.5	41	i 12 46	- 5	—	—	16 1	PP
Malaga		87.5	41	e 12 44	- 7	—	—	—	60.9
Riverview		104.1	240	—	—	e 29 15	?	e 34 9	SSP
New Delhi	N.	105.3	335	—	—	e 24 41	[-11]	e 33 16	SS
Calcutta	N.	106.4	323	—	—	i 34 22	SSP	—	53.2

Additional readings :

Ukiah e = 1m.42s. and 1m.58s.
 Tinemaha iNZ = 2m.43s.
 Pasadena iZ = 3m.20s., 3m.42s., and 4m.48s.
 Sitka iP = 3m.44s., i = 4m.12s., iS = 6m.24s.
 Tucson, i = 4m.38s.
 Rapid City i = 4m.39s. and 4m.50s., e = 6m.45s.
 St. Louis iPZ = 6m.24s., iZ = 6m.33s.
 Riverview eQN = 44.8m.

Long waves were also recorded at Christchurch, Wellington, Auckland, Honolulu, Helwan, and other American and European stations.

Dec. 30d. Readings also at 0h. (near Trieste), 2h. (Riverview, Christchurch, Wellington, Auckland, and near Apia), 4h. (Tacubaya, Vera Cruz, Tucson, and Riverside), 5h. (Tacubaya, Tucson, Mount Wilson, Palomar (2), and Riverside (2)), 7h. (Frunse, Tashkent, and near Andijan), 8h. (Brisbane, Riverview, Auckland, Mount Wilson, Pasadena, Palomar, and Riverside), 9h. (Wellington and Christchurch), 11h. (Oaxaca, Tacubaya, and Vera Cruz), 13h. (Helwan, Istanbul, Bucharest, Sofia, Trieste, Cheb, Prague, Uccle, and Kew), 16h. (La Paz), 17h. (near Sofia and near Trieste), 18h. (near La Paz), 19h. (Honolulu, Mount Wilson, Pasadena, Palomar, Riverside, Tucson, Tinemaha, and Mizusawa), 20h. (Cheb and New Delhi), 22h. (Malaga), 23h. (Prague).

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Dec. 31d. 21h. 55m. 27s. Epicentre $12^{\circ}0'N$, $91^{\circ}9'W$. (as on 1941 March 19d.).

A = -0.0324, B = -0.9779, C = +0.2066; $\delta = +2$; $\lambda = +6$;
D = -0.999, E = +0.033; G = -0.007, H = -0.206, K = -0.978.

		Δ	Az.	P.	O-C.	S.	O-C.	Supp.	L.
		$^{\circ}$	$^{\circ}$	m. s.	s.	m. s.	s.	m. s.	m.
Vera Cruz	N.	8.3	331	e 2 22	+18	—	—	—	—
Merida	N.	9.2	13	e 2 40	+24	—	—	—	—
Tacubaya	N.	10.2	317	e 2 22	-9	—	—	—	—
Bogota		19.1	111	e 5 13	+46	—	—	—	—
San Juan		25.7	73	—	—	e 11 21	SS	—	e 16.0
Tucson		26.6	323	i 5 41	-1	e 10 13	-3	e 6 27	PP e 13.0
St. Louis		26.6	3	e 5 45	+3	e 10 13	-3	—	—
Florissant	N.	26.7	3	—	—	e 10 11	-6	—	—
Palomar	Z.	31.2	318	e 6 20	-3	—	—	—	—
Riverside	Z.	31.9	317	e 6 28	-1	—	—	—	—
Mount Wilson	Z.	32.5	318	e 6 34	0	—	—	—	—
Pasadena		32.5	318	e 6 33	-1	—	—	—	e 14.8
Tinemaha		34.4	321	e 6 51	0	—	—	—	—

Additional readings:—

Tucson e = 6m.50s.

St. Louis eE = 10m.40s. and 11m.1s.

Dec. 31d. Readings also at 1h. (Triest, Bucharest, and near Istanbul), 2h. (La Paz), 3h. (Almata, Riverside, Tucson, and Tinemaha), 4h. (Bogota and La Paz), 6h. (near Andijan), 10h. (near Mizusawa), 12h. (Riverview, Sofia, near Mizusawa, and near Andijan (2)), 13h. (Haiwee, Mount Wilson Palomar, Riverside, Tucson, and Tinemaha), 19h. (near Apia), 20h. (Kew), 21h. (Honolulu, Mount Wilson, Pasadena, Palomar, Tucson, Riverside, and Tinemaha).

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The scanned images of the bulletins of the International Seismological Summary (ISS) have been obtained as part of a global earthquake relocation project (Villaseñor et al., 1997) initiated with funding from the US National Science Foundation through grant EAR-9725140 and collected by SGA [Storia Geofisica Ambiente](#) (Bologna) on behalf of the [Istituto Nazionale di Geofisica e Vulcanologia](#) (Rome), in the frame of [Euroseismos](#) project.

A digital hypocenter file of the ISS (Villaseñor and Engdahl, 2005) can be obtained from the USGS web site: <http://earthquake.usgs.gov/scitech/iss/>

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