The International Seismological Summary for 1918.

FORMERLY THE BULLETIN OF THE BRITISH ASSOCIATION SEISMOLOGY COMMITTEE.

This Summary is the continuation of work done in recent years, first at Shide and then at Oxford, but is given a new title in consequence of a resolution of the Seismological Section of the International Union of Geodesy and Geophysics, at its meeting in Rome in May, 1922. At that meeting Professor Rothé, of Strasbourg, was appointed Secretary to the Section, Professor Oddone, of Rome, Vice-President, and Professor Turner, of Oxford, President. The Central Bureau of the Section was, on the motion of the President, placed at Strasbourg, under M. Rothé; but, in moving the resolution, the President expressed the hope that the work of collation of observations, which was already in full swing at Oxford, would not be interrupted, and the Section approved this course. It was, however, suggested by Professor Agamennone that after the completion of the work for the year 1917, already well advanced, the publication should be under the auspices of the Section, instead of, as before, under those of the Seismological Committee of the British Association, and this suggestion was approved. An annual sum of 10,000 francs was voted by the Section towards the expenses of computation and printing. It would only cover part of these expenses, but no more was available at the time.

This Summary may therefore be regarded as the lineal successor of the following publications :—

(*a*) The Shide circulars (Nos. 1-27) for the years 1899-1912, issued by John Milne from the Shide Observatory. These circulars give simply the records of each observatory without any attempt to collate one with another, except that records which had nothing corresponding at any other observatory were generally struck out. To ascertain this correspondence, or the failure of it, a large ledger was kept by Milne, and ultimately epicentres were determined for those shocks which this ledger shewed to be observed at several observatories. These determinations were published in (b).

(*b*) The Reports of the Seismological Committee to the British Association, of which Milne was Secretary, give epicentres and times as follows :—

16th Report (Portsmouth, 1911) gives details for 1899-1908.
17th Report (Dundee, 1912) gives details for 1904-1909.
18th Report (Birmingham, 1913) gives details for 1910.

Milne died in 1913. As Chairman of the B.A. Committee, I took provisional charge of the work at Shide, with the help of Mr. Burgess and Mr. Pring, who had been assisting Milne; and also of Mr. J. J. Shaw, who ultimately succeeded Milne as Secretary to the B.A. Committee. It was determined to replace the circulars by ——

(c) Bulletins giving determinations of epicentres and times, with the resulting distances and azimuths of observatories, and a comparison of their observations with adopted tables. The form of the publication has varied a little; but, up to the present, the following years have been dealt with in this way :—

1913. The whole year published in one volume as "The Large Earthquakes of 1913." (Also in bulletins unreduced.)

1914-1915. Published in separate bulletins, sometimes monthly, sometimes two or three months together.

1916. The whole year published in one volume as "The Large Earthquakes of 1916." At the end of the volume some details are given for smaller earthquakes.

1917. Published in separate bulletins. January and February, March and April, May, June and July, August and September, October to December. In this year, moreover, the smaller earthquakes were definitely included and discussed, and several separate investigations were made or mentioned incidentally (see below).

It will be seen that the years 1911 and 1912 have not yet appeared in any form,* and that a good deal of work might now be done on previous years to bring them up to modern standards. The first duty, however, would seem to be to catch up as soon as possible the arrears from 1918 to date consequent on the War. The postal service was, of course, seriously interrupted during the War, and we are only now receiving some results for 1918, and even 1917. Hence it was impossible to do justice to these years until recently, though several attempts were made, only to be found abortive as new records came in. It is hoped that the work can now go ahead more quickly.

It is not intended to ignore the lists of epicentres and times which have been published elsewhere—as, for instance, in Canada. But so far as we are aware they are not accompanied by a comparison of observations with tables such as will tend ultimately to improve the tables. Even the publications of the former International Seismological Association do not include such comparisons. Indeed they usually omit to define the time at origin, though they give precise epicentres.

* The publications of the former International Seismological Association extend from 1904-1908 only.

In the course of the work on the 1917 records several new departures were made, or points discussed, to which attention may be briefly called here :—

(α) It was formerly the custom to print the actual records of P, S, L, M, &c. For these have now been substituted the differences between the observations and the adopted T_0 = Time at origin. This allows of a readier comparison by inspection. The differences for L and M are given in minutes and tenths, because L in minutes is not far from $\Delta/2$, when Δ (distance from epicentre) is expressed in degrees. A discussion of this rough rule is nearly ready for printing.

(β) The time of arrival of the *average* earthquake at stations near the anticentre was found to be nearly according to the formula

$$[P] = 20\text{m.}\,17\text{s.} - (180 - \Delta)^2 \times 0^{s}\cdot 0235,$$

or according to the following table :—

Δ	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°
°	m. s.	s.	s.	s.	s.	s.	s,	s.	s.	s.
130	19·18	21	23	25	28	30	32	34	36	38
140	19·39	41	43	45	47	48	50	51	53	54
150	19·56	57	59	60	61	62	63	65	66	67
160	20· 8	9	9	10	11	12	12	13	14	14
170	20·15	15	16	16	16	16	17	17	17	17

It is open to question whether what arrives is a true P wave, and accordingly comparisons with the table are enclosed in square brackets.

But it is noticed that for some earthquakes the times for [P] differ systematically from the table ; and the difference may be positive or negative. It is assumed that in the latter case the focus lies deeper than usual, so that the waves reach the antipodes early ; in the former case it is less deep than usual. Consequently the average focus is at a sensible depth. Galitzin's last paper on angles of emergence (printed in 1919 by the Russian Acad. des Sciences, in the Comptes Rendus des Seances de la Commissien Sismique Permanente, tome 7, livr. 2, and received in Oxford in December, 1922) determines three layers of discontinuity at depths 106, 232, and 492 kilometres. In the *Geophysical Supplement to the Monthly Notices R. A.S.*, No. 2, p. 50, reasons are given for supposing that the average earthquake takes place at or near the second of these surfaces, but that occasionally we have a focus located in the uppermost. The residuals for P are then about +20s. [Such earthquakes are perhaps those which do most damage at the surface]. Occasionally, also, we have a focus at or near the lowest surface when the residuals for P may be as large as —40s. or —50s. The best authenticated cases lie in central S. America (see Geop. Sup. to MN, No. 1, pp. 10 to 13).

(γ) There seem to be some periodicities in the recurrence of earthquakes.

One of 21*min.* has been followed extensively, first as regards the earth generally (27th Report to B.A., Hull, 1922), next as regards shocks noted in Jamaica (G. Supt. to MN No. 2, p. 48), and at present under discussion are a long series of Italian earthquakes. As the work has progressed successive corrections to the period have been suggested, and since finality has not yet apparently been reached no precise figures need be given here. One reason for these corrections is that there is a swing of the maximum in a period close to four years at any one place. This four-year period seems also to affect the actual frequency of earthquakes in a given neighbourhood, apart from its effect on the epoch of the 21min. periodicity. The maximum frequency appears to travel round the earth from East to West in eight years, so that at any one time there are maxima on opposite sides of the earth ; but the investigation is not yet completed. The accumulation of more and better material will tend to elucidate these matters.

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University Observatory, Oxford,
February 27, 1923.

1918 JANUARY, FEBRUARY, & MARCH.

Jan. 1d. 15h. 2m. 10s. Epicentre 38°·0N. 23°·5E. (as on 1914 Oct. 17d. 6h.)

	Δ	P.	O−C.	L.	M.
	°	m. s.	s.	m.	m.
Athens	0·2	e 0 4	+1	0·6	0·8
Zagreb	9·6	e 2 32	+8	—	6·0
Helwan	10·4	8 50	?L	(8·8)	—
De Bilt	19·0	—	—	e 10·8	—

Jan. 1d. Records also at 0h. (San Fernando and Eskdalemuir), 7h. (Mizusawa), 12h. (La Paz).

Jan. 2d. Records at 3h. (Algiers), 4h. (De Bilt, Bidston, Rio Tinto, La Paz, and Helwan), 7h. (Helwan), 10h. (La Paz), 18h. and 19h. (Batavia), 20h. and 21h. (Monte Cassino), 23h. (Manila).

Jan. 3d. Records at 0h. (Lick and Eskdalemuir), 4h. (Port au Prince), 6h. and 8h. (Helwan), 13h. (Zi-ka-wei, Manila (3), Bombay, Edinburgh, and Colombo), 14h. (Eskdalemuir, Zagreb, Bidston, and Manila (2)), 15h. (Manila (2)), 16h. (Manila and Harvard), 17h. (Manila (2)), 18h. (Manila (2)), 19h. and 20h. (Manila), 22h. (Manila (3)).

1918. Jan. 4d. 4h. (I) **30m. 5s.** (II) **32m. 25s.** Epicentre **10°·5N. 91°·0W.**

A = −·017, B = −·983, C = +·183; D = −1·000, E = +·017; G = −·003, H = −·183, K = −·983.

		Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
II	Balboa Heights E.	11·4	97	3 11	+21	—	—	6·6	7·9
II	N.	11·4	97	3 19	+29	—	—	6·7	—
II	Tacubaya	11·9	319	e 2 33	−25	—	—	—	—
I	Vieques	25·9	70	e 6 48	?PR_1	—	—	—	—
I	Tucson	28·5	323	e 6 49	+36	12 15	+67	e 15·9	17·3
I	Cheltenham	30·9	22	—	—	12 53	+63	e 16·5	17·6
I	Georgetown	31·0	21	e 6 57	+19	12 26	+35	e 16·3	—
I	Washington	31·0	21	8 20?	?	13 0	+69	15·7	—
I	Ann Arbor	32·4	10	6 49	−45	13 7	+11	16·7	18·9
I	Ithaca	34·3	19	—	—	—	—	e 16·8	—
I	Toronto	34·7	15	—	—	—	—	e 17·5	—
II		34·7	15	—	—	—	—	e 17·0	18·3
II	La Paz	35·2	140	i 7 38	+23	i 13 34	+36	18·7	19·3
I	Harvard	36·3	25	7 9	−15	12 51	−23	e 16·9	19·6
I	Northfield	37·2	22	—	—	e 12 55	−32	e 18·9	—
I	Ottawa	37·3	18	—	—	e 13 39?	+11	18·9	—
II	Lick	38·3	319	e 7 55	+15	—	—	—	—
II	Berkeley	39·1	319	e 8 9	+22	—	—	—	21·3
I	Victoria	46·5	331	—	—	15 56?	+21	20·0	33·0
II	Honolulu	64·9	289	e 19 35	?S	(19 35)	+11	e 31·9	34·9
II	Coimbra	77·7	50	7 35?	?	21 35?	−22	41·3	43·5
II	Rio Tinto	79·2	53	24 35	?S	(24 35)	+141	—	53·6
II	San Fernando	79·6	55	24 5	?S	(24 5)	+106	43·6	50·1
II	Eskdalemuir	80·1	35	12 12	− 8	22 13	−11	36·6	46·6
I	Edinburgh	80·1	35	21 35	?S	(21 35)	−49	(33·3?)	51·9
II	Bidston	80·3	37	11 35	−46	22 47	+20	—	47·3
II	Granada	81·6	53	12 13	−15	22 5	−37	—	—
I	Kew	82·2	39	—	—	—	—	—	49·9
II	Paris	84·4	41	—	—	e 22 39	−33	39·6	47·6
II	De Bilt	84·9	38	—	—	e 22 47	−31	34·6	49·3
II	Uccle	85·2	39	e 12 29	−20	—	—	e 40·6	—
I	Barcelona	85·3	49	—	—	—	—	41·0	49·9
II	Rocca di Papa	93·0	47	—	—	(e23 53)	−52	23·9	56·2
II	Vienna	93·4	40	e 13 12	−22	—	—	—	—
II	Zagreb N.E.	94·0	42	e 13 14	−24	e 24 15	−41	45·6	56·6
II	N.W.	94·0	42	i 13 20	−18	e 24 11	−45	—	50·6
II	Helwan	111·4	52	28 35	?S	(28 35)	+54	—	—
II	Melbourne	123·2	231	—	—	—	—	e 62·6	68·5
I	Mauritius	148·6	112	—	—	—	—	70·5	78·7

For Notes see next page.

NOTES TO JAN. 4d. 4h. (I) 30m. 5s. (II) 32m. 25s.

Additional records: Tucson MN = +17·1m., LN = +10·4m. Vieques eLN = +12·2m., MN = +18·0m. Cheltenham LN = +15·9m., MN = +17·0m. Ann Arbor SN? = +13m.37s., MN = +19·9m., PE = +6m.7s., SE = +12m.25s., LE = +14·6m., M = +18·9m. Toronto (II) Li = +17·6m. La Paz RP = +9m.10s., M = +20·8m. Harvard T_o = 4h.29m.55s. Ottawa eLN = +16·4m., LN = +23·9m. Victoria L = +26·3m. Coimbra L = +38·6m. San Fernando S = +35m.5s., MN = +49·1m. De Bilt MN = +35·7m. Rocca di Papa MN = +90·4m. Zagreb T_o = 4h.32m.50s.

1918. Jan. 4d. 15h. 48m. 45s. Epicentre 6°·5S. 153°·5E.

(as on 1913 Sept. 3d. 20h.).

A = −·889, B = +·443, C = −·113 ; D = +·446, E = +·895 ; G = +·101, H = −·051, K = −·994.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Sydney	27·4	184	10 51	?S	(10 51)	+ 3	14·5	16·4
Riverview	27·4	184	i 6 8	+ 6	i 10 51	+ 3	e 14·6	16·2
Melbourne	32·3	193	—	—	12 3	−10	17·2	20·2
Manila	38·5	303	e 7 37	− 5	—	—	—	—
Batavia	46·4	268	e 8 15	−28	—	—	—	—
Zi-ka-wei	48·7	323	e 8 59	+ 1	—	—	—	—
Honolulu	55·1	58	e 15 3	?	e 20 9	?SR_1	e 23·0	32·4
Berkeley	89·4	52	—	—	e 30 19	?SR_1	—	—
Victoria	90·5	41	37 28	?	—	—	46·3	50·2
Mauritius	93·8	250	40 39	?L	—	—	(40·6)	48·8
Toronto	120·8	42	—	—	—	—	e 66·6	75·2
Helwan	121·0	301	31 15	?	—	—	—	—
Edinburgh	127·3	344	56 15	?L	—	—	(56·2)	87·2
De Bilt	127·5	336	—	—	—	—	59·2	62·3
Bidston	129·4	342	—	—	—	—	—	51·2
La Paz	132·8	120	e 19 37	[+12]	—	—	67·4	72·2

Additional records: Riverview PS = +11m.16s., MN = +16·1m., MZ = +24·0m., T_o = 15h.48m.56s. Perth (Δ = 43°·3) records merely 16h.3m.50·5s. to 17h.8m.58·2s. De Bilt MN = +65·3m. Eskdalemuir (Δ = 127°·8) records 16h.30m. to 17h.30m.

Jan. 4d. Records also at 0h. (Zagreb), 1h. (Manila (2)), 3h. (Manila), 4h. (Tacubaya), 5h. (La Paz), 6h. (Colombo and Manila (2)), 7h. (Manila (2)), 8h. (Helwan), 11h. (Manila), 13h. (Algiers), 14h. (Manila), 17h. (Manila and Paris), 19h. (Manila and La Paz).

Jan. 5d. Records at 1h. (La Paz), 5h. (Helwan), 7h. (La Paz), 8h. (Helwan), 13h. (Monte Cassino, Helwan, and Manila), 14h. (Manila), 19h. (Helwan, Zagreb, Pola, and La Paz), 21h. (Monte Cassino), 23h. (Manila).

Jan. 6d. Records at 1h. (Manila), 7h. and 14h. (Helwan), 16h. (La Paz and Simla), 21h. (Taihoku), 22h. (Zurich).

Jan. 7d. Records at 4h. (Colombo), 5h. (Edinburgh), 13h. (Algiers), 18h. (Manila and Melbourne), 22h. (Taihoku and Zi-ka-wei), 23h. (Helwan).

Jan. 8d. Records at 0h. (Taihoku), 9h. (Balboa Heights), 10h. (Monte Cassino), 13h. (Helwan), 14h. (Edinburgh), 18h. (La Paz).

Jan. 9d. Records at 3h. (Taihoku and Zi-ka-wei), 4h. (San Fernando and Helwan), 5h. (La Paz), 6h. (Athens), 7h. (Zi-ka-wei), 11h. (Batavia), 19h. (San Fernando).

Jan. 10d. Records at 6h. (Mizusawa), 7h. (Zagreb), 8h. (Algiers), 9h. (Athens, Manila, and Rocca di Papa), 13h. (Manila), 16h. (Colombo), 19h. (La Paz).

Jan. 11d. Records at 1h. (La Paz), 3h. (Colombo), 4h. (Helwan and Colombo), 6h. (Colombo), 7h. (La Paz), 12h. (Riverview and Marseilles), 15h. (Colombo), 17h. (La Paz).

Jan. 12d. 18h. 38m. 30s. At 11°·5N. 144°·0E. (as on 1917 May 9d. 15h.).
A = −·793, B = +·576, C = +·199; D = +·588, E = +·809;
G = −·161, H = +·181, K = −·980.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Manila	22·7	280	—	—	—	—	e 13·2	—
Zi-ka-wei	28·7	317	e 6 17	+ 2	e 10 37	−35	—	—
Batavia	41·0	247	—	—	e 13 54	−27	—	—
Riverview	45·8	172	e 9 0	+21	e 15 6	−19	e 17·3	25·1
Melbourne	49·3	180	16 36	?S	(16 36)	+26	23·5	26·0
Honolulu	56·2	72	—	—	e 15 54	−102	—	26·5
Helwan	103·2	304	26 30	?S	(26 30)	+ 4	—	—
Zagreb	106·2	325	e 21 48	?PR_1	i 21 56	?PR_1	—	—
Edinburgh	107·3	342	76 30	?L	—	—	(76·5)	85·5
Uccle	108·5	334	21 23	?PR_1	—	—	—	—
Bidston	109·3	340	56 32	?L	66 12	?	(56·5)	91·5
Rocca di Papa	110·5	323	e 20 24	?PR_1	—	—	—	22·6
Moncalieri	111·1	328	e 20 47	?PR_1	—	—	—	—

Additional records: Riverview eP? = +7m.18s., i = +10m.31s., +10m.37s., +11m.19s., MN = +18·5m. These records are given at 19h. instead of 18h.

Jan. 12d. Records also at 2h. (Colombo (2)), 3h. (Helwan and Colombo), 4h. and 6h. (Taihoku), 10h. (Manila), 12h. (Zi-ka-wei, La Paz, and Melbourne), 18h. (La Paz and Manila), 19h. (Manila), 22h. (Helwan), 23h. (La Paz, Georgetown, Victoria, Harvard, and Toronto).

Jan. 13d. 8h. 2m. 0s. Epicentre 27°·0S. 172°·0W. (as on 1917 May 4d.).
A = −·882, B = −·124, C = −·454.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Apia	13·2	0	e 3 31	+15	—	—	4·8	—
Riverview	32·3	248	e 6 42	− 9	e 12 18	+ 5	e 14·8	18·4
Sydney	32·3	248	11 48	—	(11 48)	−25	16·2	17·5
Melbourne	37·6	242	—	—	13 42	+10	20·5	22·4

Jan. 13d. Records also at 0h. (Ottawa, Toronto, Washington, and Northfield), 2h. (Colombo, Harvard, and Simla), 5h. (Mizusawa), 11h. (Moncalieri and Milan), 12h. (Zagreb, Milan, Zurich (2), and Moncalieri (2)), 21h. (Kobe), 23h. (Harvard, Georgetown, and Athens (2)).

Jan. 14d. 6h. 44m. 40s. Epicentre 43°·5N. 11°·8E.
A = +·710, B = +·148, C = +·688.

		Δ	P.	O−C.	S.	O−C.	L.	M.
		°	m. s.	s.	m. s.	s.	m.	m.
Rocca di Papa		1·9	e 1 4	?S	(e 1 4)	+11	—	2·8
Pola		2·0	i 1 4	?S	(i 1 4)	− 8	e 1·9	2·0
Zagreb		3·3	e 0 49	− 3	1 29	− 2	—	1·6
		—	i 0 54	+ 1	1 32	+ 1	—	2·3
Zurich	E.	4·5	e 2 10	?S	(2 10)	+ 6	(3·7)	—
	N.	4·5	e 2 8	?S	(2 8)	+ 4	(3·7)	—

Zagreb gives also iNW = +0m.58s. Zurich S taken as L.

Jan. 14d. 20h. 2m. 36s. At 44°·0N. 20°·0W. (as on 1917 June 16d. 12h.).
A = +·676, B = −·246, C = +·695; D = −·342, E = −·940;
G = +·653, H = −·238, K = −·719.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Coimbra	9·4	110	—	—	(e 4 24)	+11	—	—
San Fernando	13·0	121	1 54	?	—	—	11·6	13·4
Bidston	14·5	44	4 6	+33	10 36	?	—	15·9
Tortosa	14·8	95	6 28	?S	(6 28)	+ 1	14·0	21·0
Stonyhurst	15·1	43	—	—	—	—	—	16·2
Kew	15·1	54	—	—	—	—	—	25·4
Edinburgh	16·0	36	11 44	?L	—	—	(11·7)	—
De Bilt	18·5	55	e 5 13	+50	—	—	12·4	18·2
Moncalieri	19·7	78	e 4 33?	− 4	7 20?	?	11·5	—
Rocca di Papa	23·9	84	—	—	—	—	e 20·5	21·7
Helwan	42·6	91	11 24	?	—	—	—	—

Additional records: San Fernando MN = +13·9m. Tortosa S = +9m.46s.
Stonyhurst says that the phases are lost in tremors. De Bilt M = +25·3m.

Jan. 14d. Records also at 0h. (Helwan), 2h. (Athens), 3h. (Athens and Colombo), 4h. (La Paz and Harvard (2)), 7h. (Harvard), 13h. (Mizusawa), 14h. (Stonyhurst), 17h. and 19h. (La Paz), 21h. (San Fernando).

Jan. 15d. 15h. 29m. 6s. Epicentre 25°·0N. 119°·5E. (as on 1915 Jan. 5d. 23h.).

A = −·446, B = +·789, C = +·423; D = +·870, E = +·492; G = −·208, H = +·368, K = −·906.

	△	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Taihoku	1·9	89	0 29	0	—	—	0·8	0·9
Zi-ka-wei	6·4	15	e 1 37	− 1	—	—	—	—
Manila	10·5	172	e 2 44	+ 7	6 6	?L	(6·1)	9·3
Osaka	16·8	51	—	—	7 15	+ 2	—	11·8
Riverview	66·1	152	—	—	e 23 54	?SR$_1$	—	38·4
Honolulu	74·7	73	—	—	—	—	e 35·5	43·9
Helwan	76·3	297	47 54	?L	—	—	(47·9)	—
De Bilt	84·1	326	—	—	—	—	e 45·9	56·3
Edinburgh	85·7	332	47 54	?L	—	—	(47·9)	57·9
Eskdalemuir	86·0	331	—	—	—	—	44·9	—
Kew	87·1	327	—	—	—	—	—	57·9
Bidston	87·2	330	46 59	?L	—	—	(47·0)	58·0

The Osaka records are given as 16h. They are included in this table because they fit so well when corrected by −1 hour.

Additional records: Manila L = +8·3m., MN = +8·7m., T_0 = 15h.27m.9s. Osaka MN = +12·1m. Riverview MN = +37·2m. De Bilt M = +56·2m.

There appears to have been a subsequent shock at 57m.34s., felt and recorded at Taihoku and Zi-ka-wei: Taihoku P = +0m.29s., L = +0·8m., M = +0·9m. (O−C. = 0s.). Zi-ka-wei eS = +2m.21s. (O−C. = −33s.).

Jan. 15d. Records also at 4h. (La Paz), 5h. (Batavia), 8h. (Taihoku), 19h. (Manila), 23h. (La Paz and Harvard).

Jan. 16d. 2h. 33m. 5s. Epicentre at (roughly) 1°·5N. 110°·0E.

A = −·342, B = +·939, C = +·026; D = +·940, E = +·342; G = −·009, H = +·025, K = −1·000.

	△	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Batavia	8·3	202	e 2 4	− 2	—	—	—	5·9
Manila	17·0	39	e 4 3	− 2	—	—	—	—
Riverview	52·4	136	—	—	e 12 49	?PR$_1$	e 21·1	24·7
Melbourne	50·8	144	—	—	19 1	?	23·0	25·4
Helwan	79·4	300	50 55	?	—	—	—	—
La Paz	164·9	187	20 15	[+ 3]	—	—	—	—

Riverview MN = +25·9m. The Australian stations do not suit this epicentre, and are discordant; indeed the whole material is defective.

1918. Jan. 16d. 7h. 13m. 15s. Epicentre 37°·4N. 30°·5E.

A = +·684, B = +·403, C = +·607 ; D = +·508, E = −·862 ;
G = +·523, H = +·308, K = −·794.

	△	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Athens	5·4	278	e 1 23	0	2 24	− 4	2·9	4·0
Pompeii	12·8	290	3 1	− 9	—	—	—	9·4
Lemberg	13·2	342	e 5 21?	?S	(5 21)	−28	6·4	9·4
Monte Cassino	13·5	293	3 8	−12	—	—	—	8·3
Zagreb	13·7	313	i 3 12	−10	i 6 21	+20	—	8·4
Rocca di Papa	14·4	293	i 3 31	0	6 22?	+ 4	e 8·2	10·7
Pola	14·5	306	—	—	—	—	—	11·2
Graz	14·7	316	3 25	−10	—	—	—	—
Vienna	14·9	321	e 3 21	−17	—	—	—	—
Milan	17·8	304	4 37	+22	10 31	?L	(10·5)	11·6
Moncalieri	18·7	301	4 31	+ 6	8 0	+ 5	10·6	12·3
Zurich	18·9	309	e 4 10	−18	—	—	—	—
Algiers	21·8	277	4 59	− 4	8 59	− 2	12·7	15·3
Barcelona	22·2	289	e 4 58	− 9	9 2?	− 7	11·0	15·5
Uccle	22·9	314	e 5 3	−13	e 9 3	−20	e 12·3	—
De Bilt	23·0	318	—	—	9 13	−12	11·0	14·3
Tortosa	23·4	288	5 11	−10	9 5	−28	12·8	17·4
Shide	26·1	311	11 10	?S	(i 11 10)	+46	15·6	18·3
Bidston	28·1	316	8 45	?	14 39	?L	(14·6)	21·0
Eskdalemuir	28·9	319	—	—	10 39?	−36	15·8	17·4
Edinburgh	29·1	320	10 50	?S	(10 50)	−29	—	—
San Fernando	29·2	279	—	—	—	—	16·7	18·8
Rio Tinto	29·2	282	11 45	?S	(11 45)	+25	—	22·7
Coimbra	30·2	288	—	—	e 10 52	−42	18·1	—
Colombo	54·0	112	30 45	?L	—	—	(30·8)	36·8

Additional records: Athens MN = +4·8m. Pompeii M_S = +12·0m. Zagreb ePNE = +3m.6s., iNE = +5m.0s., i = +7m.4s., MNW = +9·3m. Pola MN = +12·3m. Moncalieri MN = +11·9m. De Bilt MN = +13·0m. Epicentre 38°·3N. 30°·8E. San Fernando MN = +18·2m. Coimbra LN = +17·1m.

1918. Jan. 16d. 13h. 27m. 25s. Epicentre 19°·0N. 80°·0W.

(as on 1917 Feb. 20d. 19h.).

A = +·164, B = −·931, C = +·326 ; D = −·985, E = −·174 ;
G = +·057, H = −·321, K = −·946.

		△	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Vieques		13·8	91	—	—	(5 35)	−28	5·6	9·8
Toronto		24·6	1	—	—	—	—	19·1	28·4
La Paz		37·4	161	i 6 34	−59	i 11 30	−120	16·2	17·6
Andalgala	N.	48·5	164	—	—	15 41	−19	—	18·9
	E.	48·5	164	—	—	15 47	−13	—	19·1
Pilar	N.	53·0	163	17 29	?S	(17 29)	+33	23·1	27·4
	E.	53·0	163	17 23	?S	(17 23)	+27	23·2	27·4
Chacarita		57·4	159	18 53	?S	(18 53)	+62	24·7	30·4
Rio Tinto		65·6	56	19 35	?S	(19 35)	+ 3	—	40·6
Eskdalemuir		67·0	37	—	—	i 19 45	− 5	37·6	—
Edinburgh		67·0	36	34 5	?L	38 0	?	(34·1)	44·6
Bidston		67·1	39	53 47	?	—	—	—	37·0
Kew		68·9	41	—	—	—	—	—	41·6
De Bilt		72·2	40	—	—	e 28 53	?	e 36·6	37·3
Rocca di Papa		79·4	49	e 12 4	−11	—	—	—	12·9
Pola		79·4	46	(e 12 5)	−10	—	—	e 12·1	16·7
Vienna		80·0	42	e 12 16	− 3	—	—	—	—
Pompeii		81·0	50	12 16	− 9	—	—	—	—
Helwan		97·8	55	25 35	?S	(25 35)	+ 1	—	—
Colombo		147·3	39	—	—	—	—	83·6	—

Additional records: Vieques gives MN = +7·9m. Toronto eL = +24·0. May not be seismic. De Bilt eN = +29m.47s., MN = +37·4m.

Jan. 16d. 16h. 32m. 6s. Epicentre 38°·8N. 32°·9E.

A = +·654, B = +·423, C = +·627 ; D = +·543, E = −·840 ; G = +·526, H = +·340, K = −·779.

	△	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Athens	7·2	266	e 1 49	0	3 16	+1	e 4·1	7·0
Lemberg	12·7	333	—	—	—	—	e 6·7	7·7
Pompeii	14·2	283	3 26	− 3	7 54	?L	(7·9)	12·2
Zagreb	14·3	304	e 3 34	+ 4	i 6 21	+6	—	8·4
Monte Cassino	14·7	286	3 54	+19	—	—	—	17·9
Moncalieri	19·6	296	e 4 49?	+13	—	—	11·3	16·2
De Bilt	23·3	314	—	—	e 9 33	+2	e 12·9	15·5
Paris	23·9	305	e 11 54	?L	—	—	(15·9)	—
Edinburgh	29·3	318	13 54	?L	—	—	(13·9)	—

Additional records : Lemberg +7m.30s. Zagreb MNW = +9·4m. Moncalieri MN = +14·9m. De Bilt MN = +13·3m. Rocca di Papa eP = 16h.30m.31s., eL = 16h.42m.18s., e = 16h.31m.18s., iL = 16h.40m.56s., M = 16h.43m.48s.

Jan. 16d. Records also at 1h. (Manila), 3h. (Colombo and La Paz (2)), 6h. (Manila), 8h. (Paris), 10h. (Manila and La Paz), 12h. (Zagreb), 13h. (Harvard), 15h. (Manila), 17h. (Pompeii), 22h. (Helwan), 23h. (Taihoku).

Jan. 17d. Records at 0h. (San Fernando), 1h. (Melbourne), 2h. (Athens and Helwan), 3h. (Zagreb), 6h. (Helwan), 7h. (Manila), 9h. (Athens), 12h. (Athens (2) and Osaka), 17h. (Athens), 18h. (Osaka), 23h. (San Fernando).

Jan. 18d. 10h. 35m. 5s. Epicentre 12°·0N. 95°·0E. (as on 1917 Jan. 20d. 23h.48m.).

A = −·085, B = +·974, C = +·208 ; D = +·996, E = +·087 ; G = −·018, H = +·207, K = −·978.

	△	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Colombo	15·8	252	13 25	?L	—	—	(13·4)	—
Manila	25·5	83	e 5 31	−12	—	—	7·8	—
Zi-ka-wei	31·0	48	e 6 42	+ 4	e 11 51	0	—	—
Kobe	42·8	51	e 7 6	−71	—	—	e 13·0	13·8
Perth	48·3	156	8 55	− 1	—	—	—	—
Mizusawa	48·9	48	12 55	?PR_1	14 21	−104	—	—
Helwan	61·3	298	21 55	?SR_1	—	—	—	—
Melbourne	68·3	139	(11 13)	+ 7	(14 13)	?SR_1	14·2	14·8
Riverview	70·4	133	i 11 23	+ 4	(14 13)	?SR_1	e 14·2	20·2
Edinburgh	84·6	326	—	—	—	—	—	37·9
La Paz	163·1	253	i 18 30	?	—	—	—	—

Additional records : Bombay (△ = 22°·4 Az. = 291°) 10h.55m. to 10h.59m. Kobe PSN = +6m.56s. Riverview i = +14m.39s., MN = +20·6m. Edinburgh M = +76·9m.

Jan. 18d. Records also at 6h. (Perth), 11h. (Osaka and Batavia), 12h. (Mizusawa), 15h. (Manila), 17h. or 18h., and 19h. (La Paz), 20h. (Manila), 21h. (San Fernando).

Jan. 19d. Records at 1h. (Rocca di Papa (2) and Monte Cassino), 2h. (Tacubaya), 3h. (Manila), 7h. (Rio Tinto and Bombay), 8h. (La Paz), 12h. (Lick), 14h. (Rocca di Papa and La Paz).

Jan. 20d. 2h. 36m. 45s. Epicentre 39°·0N. 23°·0E. (as on 1917 Jan. 13d.).

A = +·715, B = +·304, C = +·629 ; D = +·391, E = −·920 ; G = +·579, H = +·246, K = −·777.

	△	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Athens	1·2	147	i 0 19	+ 1	(0 32)	− 1	0·6	0·7
Pompeii	6·8	288	0 29	?	3 15	+10	—	—
Monte Cassino	7·4	292	1 45	− 7	—	—	—	—
Rocca di Papa	8·3	293	2 3	− 3	—	—	—	2·6
Zagreb	8·6	326	e 2 21	+11	i 3 22	−31	—	5·1
Pola	9·0	313	e 4 3?	?S	(e 4 3?)	0	e 5·2	5·5
Graz	9·8	328	—	—	—	—	e 5·2	—
Vienna	10·4	335	—	—	—	—	e 6·2	—
Helwan	11·4	141	12 15	?	—	—	—	—
Moncalieri	12·8	303	—	—	—	—	7·8	—
De Bilt	18·0	322	—	—	—	—	e 10·4	—
Edinburgh	24·2	323	—	—	—	—	—	18·2

Additional records: Athens records the same P L M for an earlier shock T_0 = 2h.36m.9s.. as well as for the above. Zagreb iNE = +4m.39s., iM = +5m.3s., MNW = +5·5m.

Jan. 20d. Records also at 6h. (San Fernando), 7h. (Athens), 19h. (Taihoku and Zi-ka-wei), 23h. (Mizusawa).

1918. Jan. 21d. 19h. 45m. 20s. Epicentre **2°·0S. 133°·0E.**

A = −·682, B = +·731, C = −·035; D = +·731, E = +·682; G = +·024, H = −·026, K = −·999.

	△	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Manila	20·5	325	e 4 40	− 7	8 17	−17	10·8	12·6
Batavia	26·4	260	e 5 57	+ 5	—	—	—	11·7
Adelaide	33·3	172	—	—	—	—	—	19·6
Perth	34·0	207	7 10	+ 5	—	—	—	—
Riverview	36·1	154	i 7 21	− 2	e 12 40	−31	e 18·3	22·4
Sydney	36·1	154	13 16	?S	(13 16)	+ 5	20·3	21·4
Kobe	36·7	3	—	—	—	—	—	19·0
Melbourne	37·4	165	13 40	?S	(13 40)	+10	(18·8)	21·6
Colombo	53·8	280	16 40	?S	(16 40)	−26	—	37·8
Honolulu	71·2	67	—	—	—	—	e 35·1	41·2
Mauritius	75·3	250	22 4	?S	(22 4)	+35	—	38·0
Victoria	100·6	41	—	—	—	—	45·0	62·0
Helwan	101·2	300	22 40	?	—	—	—	—
Berkeley	102·8	52	—	—	—	—	e 50·2	—
De Bilt	113·9	328	—	—	e 35 40	?SR_1	e 59·7	68·0
Moncalieri	115·7	320	—	—	e 62 28	?L	66·8	—
Edinburgh	115·8	334	35 40	?SR_1	—	—	—	73·7
Stonyhurst	116·7	332	36 40	?SR_1	i 58 40	?L	(i 58·7)	78·7
Kew	117·1	329	—	—	—	—	—	73·7
Paris	117·1	326	—	—	—	—	e 63·7	—
San Fernando	129·1	317	24 40	?	67 55	?L	83·2	89·7
Toronto	129·4	30	—	—	—	—	68·8	79·5
La Paz	152·1	132	i 20 17	[+18]	34 23	?	e 78·7	88·1

Additional records: Manila MN = +11·5m., T_e = 19h.45m.30s. Riverview PS = +13m.21s., i = +20m.28s., MN = +21·4m., MZ = +24·4m., T_e = 19h.45m.58s. Melbourne SR = +20m.34s., L = +21·3m. Colombo M = +24·1m. Victoria L? = +53·9m. De Bilt MN = +74·3m. Toronto L = +72·8m.

Jan. 21d. Records also at 0h. (Helwan), 21h. (Melbourne).

Jan. 22d. 1h. 28m. 44s. and 33m. 58s. Epicentre roughly 15°·0S. 121°·0E. A double shock recorded by Manila.

	△	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
I Batavia	16·5	301	e 4 16	+17	—	—	—	—
I Manila	29·6	0	e 6 22	− 2	—	—	—	—
II	29·6	0	e 6 22	− 2	—	—	—	—
II Melbourne	31·1	142	—	—	—	—	19·2	20·6
II Riverview	33·1	130	e 6 56	− 1	e 12 32	+ 6	e 17·9	20·9
II Colombo	46·3	295	21 2	?L	—	—	(21·0)	—
II Helwan	97·1	299	53 2	?L	—	—	(53·0)	—

Jan. 22d. Records also at 7h. (Colombo), 12h. (Tortosa and Barcelona).

Jan. 23d. Records at 3h. (San Fernando), 12h. (La Paz), 14h. (Marseilles), 17h. (Helwan and Moncalieri), 18h. (Manila), 19h. (Moncalieri), 21h. (San Fernando), 22h. (La Paz).

Jan. 24d. 14h. 52m. 36s. Epicentre 18°·0S. 173°·0W. (as on 1917 June 24d.).

A = −·944, B = −·116, C = −·309; D = −·122, E = +·993; G = +·307, H = +·038, K = −·951.

	△	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Apia	4·3	17	1 24	+17	—	—	3·4	—
Riverview	35·7	236	e 7 0	−19	e 12 56	−10	17·0	21·2
Sydney	35·7	236	6 12	−67	—	—	17·0	20·0
Honolulu	42·0	21	—	—	15 54	+79	—	20·4
Adelaide	46·0	239	20 48	?L	—	—	(20·8)	29·0
Victoria	79·8	31	47 36?	?L	—	—	(47·6)	51·0
La Paz	98·4	69	—	—	—	—	48·6	50·8
Toronto	104·8	48	—	—	—	—	50·2	56·6
Edinburgh	141·4	9	86 39	?	—	—	—	89·4
De Bilt	145·9	2	—	—	—	—	e 89·4	—
Zurich	150·6	357	—	—	—	—	58·2	—
Helwan	154·7	303	31 24	?	—	—	—	—
San Fernando	158·0	29	—	—	—	—	86·4	93·4

Additional records: Riverview MN = +20·6m., MZ = +21·4m. La Paz M = +55·8m. Toronto LE = +54·2m., eL = +57·6m. Zurich eE = +58·4m.

Jan. 24d. Records also at 1h. (Port au Prince), 3h. (Zi-ka-wei and Manila), 12h. (Zi-ka-wei, Osaka, Kobe, and Mizusawa), 23h. (Riverview and Rocca di Papa).

1918. Jan. 25d. 1h. 20m. 30s. Epicentre 12°·0N. 95°·5W.

A = −·094, B = −·974, C = +·208; D = −·995, E = +·096; G = −·020, H = −·207, K = −·978.

		△	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Balboa Heights	E.	16·0	99	3 26	−·26	—	—	7·2	3·5
	N.	16·0	99	3 30	−22	—	—	7·3	3·6
Tucson	N.	24·7	328	5 37	+ 2	—	—	—	18·5
	E.	24·7	328	5 8	−27	—	—	—	15·5
St. Louis		27·0	9	6 12	+14	(10 48)	+ 7	10·8	—
Vieques	N.	29·7	74	5 5	?	(11 50)	+21	11·8	15·7
	E.	29·7	74	4 50	?	(11 45)	+16	11·8	14·8
Cheltenham		31·5	29	11 40	?S	(11 40)	−20	e 16·5	17·8
Georgetown	E.	31·5	28	e 6 8	−35	13 1	+61	20·5	—
	N.	31·5	28	e 6 8	−35	13 5	+65	20·5	—
Washington		31·5	28	e 6 10	−33	10 42?	−78	13·8	—
Ann Arbor		32·0	17	6 18	−29	12 54	+46	16·3	16·5
Toronto		34·5	21	5 6?	?	—	—	e 16·7	21·4
		34·5	21	9 18	?PR_1	e 13 30	+42	i 20·4	—
Lick		34·5	322	—	—	13 40	+52	—	—
Ithaca		34·6	25	e 11 54	?S	(e 11 54)	−55	16·1	—
Fordham		34·6	30	—	—	—	—	e 9·5	—
Berkeley		35·3	322	11 27	?S	(e 11 27)	−93	—	—
Harvard		37·1	30	—	—	e 9 9	?PR_1	e 15·0	17·4
Ottawa		37·4	23	e 7 50	+17	e 15 18	+108	e 16·9	—
Northfield		37·7	27	e 8 30	?PR_1	—	—	—	—
La Paz		39·3	136	i 7 50	+ 1	12 37	−79	17·7	20·3
Victoria		43·2	333	—	—	15 5?	+14	25·0	28·0
Honolulu		60·3	288	—	—	e 19 24	+57	e 30·0	34·1
Coimbra		80·1	51	—	—	—	—	39·9	40·5
Edinburgh		81·4	34	44 30	?L	—	—	(44·5)	51·8
Bidston		81·8	37	35 54	?L	—	—	(35·9)	42·5
Rio Tinto		81·8	53	33 30	?L	—	—	(33·5)	49·5
Stonyhurst		82·1	36	e 24 30	?S	(e 24 30)	+103	i41·0	50·8
San Fernando		82·4	54	22 30	?S	(22 30)	−20	40·5	51·5
Kew		83·9	39	39 30	?L	—	—	(39·5)	48·5
Paris		86·2	41	—	—	—	—	e 44·5	49·5
Uccle		86·8	39	e 12 32	−26	—	—	e 41·5	—
De Bilt		87·0	37	—	—	e 23 37	− 4	e 35·5	50·7
Moncalieri		90·7	44	—	—	—	—	42·8	—
Graz		95·0	40	e 13 30	−13	—	—	—	—
Rocca di Papa		95·2	45	13 22	−22	—	—	—	—
Zagreb	N.W.	95·8	41	e 13 27	−21	i 24 24	−50	47·5	56·5
	N.E.	95·8	41	i 13 32	−16	i 24 24	−50	—	—
Helwan		113·9	49	29 30	?S	(29 30)	+89	—	—
Riverview		116·0	238	—	—	—	—	e 66·0	71·9
Melbourne		120·6	233	—	—	—	—	62·1	68·0

Additional records: Cheltenham PN = +11m.19s., MN = +18·7m. Georgetown eL = +16·7m. St. Louis S = +9m.54s., L = +15·1m. Harvard eSRN = +12m.45s., eLN = +14·9m., MN = +21·1m. Ann Arbor LN = +16·5m., MN = +19·5m., P = +6m.12s., S = +12m.48s., L = +16·3m., M = +21·4m. Toronto iL = +17·3m. Ottawa L = +20·5m., T_e = 1h.21m.32s. La Paz PR = +9m.17s. Victoria L? = +19·6m. Eskdalemuir from 1h.50m. to 2h.30m. San Fernando MN = +47·5m. Paris eLN = +38·5m. De Bilt MN = +35·9m. Vienna T_e = 1h.20m.22s. Tacubaya T_e = 1h.21m.0s.

Jan. 25d. Records also at 1h. (Mizusawa and Vieques), 3h. (Zagreb, Mauritius, Colombo, Athens, and Rocca di Papa), 15h. (Riverview), 20h. (Manila, San Fernando, and La Paz), 22h. (Melbourne, La Paz, and Riverview), 23h. (Helwan).

Jan. 26d. Records at 0h. (Taihoku (2), Zikawei, and Lick), 1h. (Tacubaya), 3h. (Melbourne and Riverview), 5h. (Helwan), 8h. (Lemberg), 13h. and 15h. (Monte Cassino), 18h. (La Paz and Balboa Heights), 20h. (San Fernando).

Jan. 27d. 2h. 51m. 2s. Epicentre 64°·8N. 35°·3E.

$A = +\cdot348$, $B = +\cdot246$, $C = +\cdot905$; $D = +\cdot578$, $E = -\cdot816$; $G = +\cdot738$, $H = +\cdot523$, $K = -\cdot426$.

	△	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Vienna	19·4	221	7 16	?S	(7 16)	−54	—	—
De Bilt	19·9	245	4 41	+ 1	e 8 23	+ 2	10·0	12·4
Edinburgh	20·6	263	6 58	?	—	—	—	9·2
Graz	20·7	221	e 5 40	?PR_1	e 10 40	?L	(e 10·7)	—
Eskdalemuir	21·0	261	—	—	(7 58)	−46	—	—
Hohenheim	21·2	233	e 5 13	+18	—	—	—	—
Uccle	21·2	244	e 4 46	− 9	—	—	e 12·0	—
Zagreb	21·7	219	e 5 49	+48	—	—	15·0	18·0
Stonyhurst	21·7	258	—	—	—	—	—	7·2
Moncalieri	24·9	231	e 6 58?	?PR_1	9 58?	− 3	13·5	—
Rocca di Papa	26·4	220	e 5 58	+ 6	—	—	e 19·1	21·1

Additional records: Hamburg (△ = 16°·9), Epicentre 73°·2N. 12°·2E., T_0 = 2h.51m.0s. De Bilt MN = +10·5m. Rocca di Papa M = +6·6m.

Jan. 27d. 12h. 56m. 35s. Epicentre 36°·2N. 21°·4E.

$A = +\cdot751$, $B = +\cdot294$, $C = +\cdot591$; $D = +\cdot365$, $E = -\cdot931$; $G = +\cdot550$, $H = +\cdot216$, $K = -\cdot807$.

	△	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Athens	2·5	47	0 39	0	—	—	1·0	1·2
Pompeii	7·0	312	1 37	− 9	—	—	—	—
Monte Cassino	7·8	314	2 10	+12	—	—	—	6·2
Rocca di Papa	8·7	311	2 11	− 1	3 54	− 2	—	5·4
Pola	10·3	328	e 2 14	−20	e 3 59	−39	e 5·3	5·9
Zagreb	10·4	339	e 2 29	− 7	i 4 23	−17	i 5·0	6·2
Milan	13·0	319	4 45	?	—	—	—	9·1
Moncalieri	13·5	315	4 6?	+46	6 22	+26	7·5	—
Zurich	14·6	324	e 3 35	+ 1	—	—	—	—
Uccle	19·0	325	e 7 25	?S	(e 7 25)	−37	10·5	—

Additional records: Zagreb i = +3m.57s., MNW = +6·0m.

Jan. 27d. Records also at 0h. (Manila, Andalgala, Pilar, La Paz, Cipolletti, and Chacarita), 1h. (Helwan), 2h. (Capetown), 3h. (Rocca di Papa (2), and Zagreb), 4h., 5h., and 8h. (Athens), 11h. (Rocca di Papa), 13h. (Helwan), 17h. (Athens), 20h. (Lick), 21h. (Stonyhurst, San Fernando, and Pa Paz).

Jan. 28d. Records at 3h. (Helwan and Port-au-Prince), 8h. (Helwan), 14h. (Batavia), 22h. (Batavia and San Fernando).

Jan. 29d. 11h. 16m. 20s. Repetition from 45°·6N. 16°·4E. as 1917 Jan. 29d. 8h.

	△	P.	O−C.	S.	O−C.	L.	M.
	°	m. s.	s.	m. s.	s.	m.	m.
Zagreb	0·3	i 0 5	0	i 0 9	+1	—	0·2
Pola	2·0	e 0 28	−3	—	—	e 0·8	0·9

Pola gives MN = +0·8.

Jan. 29d. Records also at 0h. (Balboa Heights), 3h. (Manila), 12h. (La Paz), 13h. (Manila), 15h. (Barcelona).

1918. Jan. 30d. 21h. 18m. 27s. Epicentre 47°·5N. 129°·0E.

A = −·425, B = +·525, C = +·737 ; D = +·777, E = +·629 ;
G = −·464, H = +·573, K = −·676.

		△	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Mizusawa		12·1	129	1 49	?	—	—	—	—
Kobe		13·6	158	i 2 35	−46	—	—	4·5	7·5
Osaka		13·7	157	2 38	−44	—	—	4·7	—
Nagasaki		14·8	177	1 46	?	—	—	—	—
Zi-ka-wei		17·3	202	i 4 1	− 8	e 6 33	−52	—	7·2
Taihoku		23·5	197	4 56	−27	5 58	−217	8·8	10·7
Manila		33·6	194	i 6 17	−44	11 17	−77	14·0	14·1
Calcutta	N.	40·9	247	8 3	+ 1	14 15	− 5	19·3	19·6
	E.	40·9	247	7 51	−11	13 57	−23	19·1	—
Dehra Dun		42·3	265	9 33	?PR_1	—	—	—	—
Simla		42·4	266	8 15	+ 1	14 39	− 1	—	20·9
Bombay		53·5	258	9 22	− 8	17 10	+ 7	—	19·6
		53·5	258	9 34	+ 4	17 9	+ 6	—	24·6
Kodaikanal		57·0	247	—	—	—	—	17·5	19·0
Batavia		57·1	210	i 9 29	−24	—	—	—	16·5
Colombo		58·2	242	(11 9)	+69	(18 15)	+14	18·2	19·4
Lemberg		63·0	316	i 10 43	+11	(i 19 18)	+17	i 19·3	19·4
Honolulu		63·1	86	e 9 45	−48	17 33	−89	e 24·3	25·5
Victoria		65·5	44	(10 5?)	−43	(15 32?)	−239	i 18·8	19·3
Dyce		67·7	334	i 11 9	+ 7	20 3	+ 5	30·2?	—
De Bilt		69·5	327	i 11 14	0	i 20 17	− 3	—	41·7
Eskdalemuir		69·6	333	11 10	− 5	20 17	− 4	34·5?	—
Zagreb	N.E.	69·8	317	11 15	− 1	e 20 19	− 5	—	44·6
	N.W.	69·8	317	i 11 20	+ 4	i 20 24	0	i 31·2	45·6
Uccle		70·8	327	i 11 17	− 5	i 20 27	− 9	30·6	—
Pola		71·5	317	i 11 25	− 2	i 20 43	− 1	e 31·1	42·7
Athens		71·8	307	i 11 28	0	i 20 48	0	32·3	—
Zurich		71·9	322	i 11 27	− 2	i 20 46	− 3	—	—
Kew		71·9	329	20 33	?S	(20 33)	−16	—	34·5
Bidston		72·4	332	11 39	+ 7	20 33	−22	—	32·0
Besancon		73·1	323	11 34	− 3	18 57	−126	—	—
Paris		73·1	326	i 11 33	− 4	i 20 54	− 9	29·6	32·6
Milan		73·3	320	11 26	−12	20 54	−12	—	22·0
Berkeley		73·6	51	i 10 51	−49	i 19 38	−91	—	—
Helwan		73·3	296	58 23	?L	—	—	(58·4)	82·3
Monte Cassino		74·2	315	11 42	− 1	—	—	—	21·5
Moncalieri		74·2	321	i 11 35	− 8	i 21 0	−16	30·9	35·4
Pompeii		74·3	314	i 11 37	− 7	i 21 16	− 2	32·5	41·5
Lick		74·4	51	e 10 56	−49	e 19 50	−89	—	—
Rocca di Papa		74·5	316	i 11 41	− 5	i 21 12	− 8	e 32·1	45·0
Marseilles		76·5	321	i 11 54	− 4	i 21 40	− 3	—	—
Barcelona		79·3	322	i 12 5	−10	i 21 55	−20	33·9	40·5
Perth		80·3	191	12 2	−19	—	—	—	—
Tortosa		80·6	323	12 1	−22	22 1	−29	35·6	41·7
Algiers		82·9	319	i 12 22	−13	22 21	−35	38·6	48·6
Adelaide		82·9	172	21 21	?S	(21 21)	−95	—	38·5
Riverview		83·7	162	i 11 43	−57	i 23 35	+29	e 33·3	36·0
Sydney		83·7	162	21 15	?S	(21 15)	−111	34·3	36·8
Coimbra		84·5	329	12 27	−18	i 22 46	−28	36·6	37·6
		84·5	329	—	—	i 23 23	+ 9	37·0	42·0
Ottawa		84·6	17	i 12 9	−37	i 21 57	−78	e 38·1	—
Toronto		85·5	20	—	—	i 23 9	−16	40·8	23·3
Ann Arbor		85·6	24	12 33	−18	22 3	−83	39·2	39·5
Rio Tinto		86·0	326	19 33	?	—	—	—	22·5
Northfield		86·4	15	12 25	−30	22 10	−84	—	—
St. Louis		87·0	30	22 3	?S	(22 3)	−98	25·6	—
San Fernando		87·0	325	12 45	−14	(22 33)	−68	22·6	46·6
Ithaca		87·3	18	e 16 33	?PR_1	i 22 27	−77	—	—
Harvard		88·4	15	(15 6)	+119	(i 23 52)	− 4	39·2	—
Fordham		89·3	17	e 17 57	?PR_1	(31 33)	?SR_1	31·6	—
Georgetown	E.	90·5	20	e 12 36	−43	i 22 33	−106	42·8	—
	N.	90·5	20	i 12 34	−45	i 22 33	−106	49·9	—
Washington		90·5	20	12 35	−44	22 33	−106	42·6	—
Cheltenham		90·7	20	e 12 39	−41	—	—	—	25·8
Mauritius		92·7	243	15 57	−146	(22 33)	−129	—	41·5
Capetown		127·4	258	23 3	?	—	—	—	—
La Paz		145·9	30	i 18 6	+31	32 14	+37	69·5	78·0
Andalgala		156·8	36	48 33	?SR_1	—	—	—	53·4
Pilar	E.	161·4	36	54 39	?	—	—	—	61·4
	N.	161·4	36	54 33	?	—	—	—	59·4
Cipolletti		164·9	62	30 9	?	—	—	—	44·2

For Notes see next page.

NOTES TO JAN. 30d. 21h. 18m. 27s.

Additional records: Zi-ka-wei gives MN = +7·5m. Kobe MN = +5·2m. Manila T_0 = 21h.18m.25s. Kodaikanal P = 21h.0m.18s. Colombo M = +32·2m. Lemberg eS = +15m.3s. Honolulu T_0 = 21h.18m.28s. Victoria P? = +5m.3s. De Bilt ePR_1 = +17m.2s., i_2 = +21m.50s., eE = +30m.22s., eN = +30m.30s., m = +30m.58s., eE = +33m.3s., MN = +41·6m., T_0 = 21h.18m.38s. Shide quake recorded but time shutter not working. Eskdalemuir PR_1 = +14m.17s., PR_2 = +15m.51s., T_0 = 21h.18m.30s., and two i's. Zagreb T_0 = 21h.18m.43s. Uccle i = +22·0m., T_0 = 21h.18m.34s. Pola MN = +32·0m., T_0 = 21h.18m.33s. Athens T_0 = 21h.18m.34s. Zurich T_0 = 21h.18m.34s. Paris PR_1 = +17m.32s., SR_1 = +22m.29s., T_0 = 21h.18m.38s. Moncalieri MN = +33·8m., T_0 = 21h.18m.36s. Marseilles T_0 = 21h.18m.36s. Riverview iS = +11m.15s., MN = +36·9m. Algiers T_0 = 21h.18m.48s. Coimbra SE? = +21m.46s., iSN = +22m.24s., L = +46·6m. Ottawa T_0 = 21h.18m.46s. Toronto L = +48·6m. Ann Arbor PN = +12m.9s., LN = +38·6m., MN = +39·6m. Harvard T_0 = 21h.18m.9s. Fordham LN = +36·6m. Georgetown iPZ = +12m.38s., iSZ = +22m.33s., LZ = +49·1m., T_0 = 21h.19m.0s. Cheltenham MN = +22·7m. Mauritius MN = +39·4m. Melbourne records "A considerable shock about 21h.40m." Vienna T_0 = 21h.18m.33s. Graz T_0 = 21h.18m.26s.

Jan. 30d. Records also at 2h. (Helwan), 3h. (Mizusawa), 16h. (Perth), 17h. (Perth and Rocca di Papa), 20h. (Colombo and Batavia), 21h. (Perth).

Jan. 31d. Records at 1h. (Perth), 4h. (Batavia), 11h. (Pompeii and Rocca di Papa), 13h. (La Paz), 18h. (Mauritius), 22h. (Melbourne), 23h. (Helwan).

Feb. 1d. 12h. 31m. 14s. Epicentre 39°·3N. 21°·0E. (as on 1917 May 23d. 5h.).

A = +·722, B = +·277, C = +·633; D = +·358, E = −·934; G = +·591, H = +·227, K = −·774.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Athens	2·6	120	i 0 27	−14	—	—	0·8	1·1
Monte Cassino	5·9	294	2 25	?S	(2 25)	−16	—	—
Rocca di Papa	6·8	294	e 1 59	+16	—	—	—	5·3
Zagreb	7·5	332	e 2 27	+33	e 2 58	−26	i 4·2	5·5
Pola	7·6	319	e 3 46	?S	(e 3 46)	+20	e 4·9	6·6

Additional records: Zagreb i = +4·8m. Pola MN = +5·7.

Feb. 1d. Records also at 2h. (La Paz, Colombo, and San Fernando), 8h. (La Paz and Harvard), 10h. (Helwan), 22h. (Helwan and Lick), 23h. (Lick).

Feb. 2d. Records at 0h. (San Fernando), 5h. (Manila), 7h. (Stonyhurst), 8h. (Helwan), 9h. (Riverview), 11h. (Algiers), 20h. (Batavia and San Fernando), 23h. (Zurich).

1918. Feb. 3d. 14h. 2m. 30s. Epicentre 18°·0S. 173°·0W.

(as on 1917 June 24d.).

A = −·944, B = −·116, C = −·309; D = −·122, E = +·993; G = +·307, H = +·038, K = −·951.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Apia	4·3	17	e 1 12	+ 5	—	—	2·7	3·7
Sydney	35·7	236	6 0	−79	—	—	15·0	18·1
Riverview	35·7	236	e 7 6	−13	e 11 12?	−114	14·5	18·0
Melbourne	41·6	233	e 8 30	+22	e 15 48	+79	—	23·9
Honolulu	42·0	21	e 14 24	?S	(e 14 24)	−11	e 17·3	19·0
Adelaide	46·0	239	18 42	?L	—	—	(18·7)	28·1
Perth	64·9	242	—	—	17 48	−96	—	—
Berkeley	73·4	40	—	—	e 22 30	+83	—	—
La Paz	98·4	69	17 4	?PR_1	—	—	47·0	51·4
Ann Arbor	101·5	47	—	—	—	—	53·5	65·5
Washington	105·7	54	—	—	—	—	e 56·0	—
Ottawa	107·7	47	—	—	—	—	e 59·5	—
Harvard	110·6	51	—	—	—	—	e 58·9	—

Continued on next page.

		△	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Eskdalemuir		141·8	9	—	—	—	—	75·5	—
Stonyhurst		143·5	9	i 41 36	?SR_1	—	—	—	87·5
De Bilt	E.	145·9	2	—	—	e 42 6	?SR_1	e 86·5	88·3
	N.	145·9	2	e 21 6	[+76]	—	—	e 87·5	94·0
Kew		146·0	8	—	—	—	—	—	92·5
Uccle		147·1	4	e 19 6	[−45]	—	—	—	92·5
Graz		150·1	348	—	—	—	—	e 78·5	—
Zagreb		151·2	347	e 19 8	[−49]	—	—	88·5	95·5
Moncalieri		153·1	359	—	—	—	—	e 82·9	—
Rocca di Papa		155·7	350	e 20 0?	[− 3]	—	—	94·6	45·2
Rio Tinto		156·9	28	34 30	?S	(34 30)	—	—	—
San Fernando	N.	158·0	29	35 30	—	(35 30)	—	84·0	94·5
	E.	158·0	29	—	—	—	—	85·5	94·5

Additional records: Melbourne $SR_1 = +19$m.6s., $L = +22·8$m. Ann Arbor $LN = +57·1$m. Washington gives long waves from 14h.48m. to 15h.14m. Harvard $L = +71·0$m. Stonyhurst gives M = 14h.1m.30s., possibly 1h. wrong. Moncalieri $L = +92·5$m.

Feb. 3d. 14h. 41m. 50s. Epicentre 3°·0S. 88°·0W.

$A = +·035$, $B = -·998$, $C = -·052$; $D = -·999$, $E = -·035$; $G = -·002$, $H = +·052$, $K = -·999$.

		△	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Andalgala	E.	32·2	142	—	—	8 58	?	—	21·6
Pilar	N.	36·6	144	7 22	− 5	—	—	—	29·0
	E.	36·6	144	7 28	+ 1	13 22	+ 4	—	30·7
Chacarita		41·9	142	9 58	?PR_1	—	—	—	—
Toronto		47·3	8	(e 19 4)	?SR_1	—	—	17·0?	23·8
Victoria		59·9	334	(9 40)	−31	—	—	—	13·6
Bidston		89·3	36	30 34	?SR_1	40 58	?L	(41·0)	48·9
Paris		92·6	41	—	—	—	—	e 48·2	52·2
Rocca di Papa		99·9	48	—	—	—	—	55·2	—

Additional records: Victoria P? = +3m.36s. Rocca di Papa, additional Ls at +58·1m., +86·9m., and +88·3m. The Victoria record is obviously out of place, and would be as well omitted from the table.

Feb. 3d. Records also at 3h. (Melbourne and La Paz), 9h. (La Paz), 11h. (Batavia) 13h. (Edinburgh and Helwan), 14h. (Colombo), 23h. (San Fernando).

Feb. 4d. 0h. Epicentre apparently close to Zagreb, which gives a record at 3m.24s. Taking Zagreb as epicentre and $T_0 = 0$h.3m.24s., we have, taking the mean of eN and eE for De Bilt:—

	△	P.	O−C.	L.
	°	m. s.	s.	m.
Moncalieri	5·9	e 1 29?	− 2	4·5
De Bilt	9·5	—	—	4·8

1918. Feb. 4d. 17h. 54m. 49s. Epicentre 29°·6N. 87°·8E.

$A = +·033$, $B = +·869$, $C = +·494$; $D = +·999$, $E = -·038$; $G = +·019$, $H = +·494$, $K = -·870$.

		△	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Calcutta		7·1	176	3 23	?S	8 59	?	—	—
Simla		9·3	282	—	—	—	—	e 6·7	10·7
Kodaikanal		21·7	209	16 41	?	—	—	—	19·3
Colombo		23·9	200	—	—	—	—	19·5	21·6
Manila		34·0	109	—	—	e 12 33	− 7	—	—
Batavia		40·2	150	—	—	—	—	e 23·2	—
Osaka		40·3	70	e 8 1	+ 4	14 0	−11	18·4	20·7
Helwan		48·5	285	9 11	+14	—	—	—	—
Budapest		54·8	310	—	—	—	—	e 23·6	—
Zagreb	N.E.	57·1	308	e 9 53	0	17 50	+ 3	31·2	33·7
Graz		57·2	310	e 9 46	− 7	—	—	—	—
Potsdam		58·0	316	—	—	—	—	e 28·7	—

Continued on next page.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Pola	58·7	307	e 9 59	− 4	e 18 11	+ 4	e 33·4	33·6
Monte Cassino	59·6	303	10 11	+ 2	—	—	—	—
Rocca di Papa	60·5	304	10 11	− 5	e 18 37	+ 7	e 34·5?	39·9
De Bilt	62·8	317	10 30	− 1	18 44	−14	e 29·2	33·9
Moncalieri	63·0	309	10 26?	− 6	18 58	− 3	33·4	35·4
Uccle	63·5	316	e 10 23	−12	—	—	32·3	—
Paris	65·3	314	e 19 15	?S	(19 15)	−14	e 33·2	40·2
Kew	66·1	318	—	—	—	—	—	41·2
Edinburgh	66·4	322	19 11	?S	(19 11)	−31	—	41·7
Eskdalemuir	66·6	322	19 23	?S	26 48	?SR_1	31·9	37·2
Stonyhurst	66·6	320	e 18 41	?S	(e 18 41)	−64	i 26·3	36·2
Bidston	67·1	320	20 17	?S	(20 17)	+26	—	38·2
Barcelona	67·9	306	—	—	—	—	e 36·6	43·6
Tortosa	69·3	306	11 13	0	—	—	36·4	38·9
San Fernando	75·8	304	27 11	?SR_1	—	—	42·7	44·2
Coimbra	75·8	309	—	—	e 20 11	−84	41·8	—
Melbourne	86·0	138	—	—	—	—	58·2	60·4
La Paz	154·4	296	19 58	[− 3]	—	—	—	86·5

Simla gives MN = +9·4m. Zagreb gives records in N.W. Azimuth iP = +9m.59s., S = +17m.56s., MN = +32·6m., also i = +12m.2s. and T_0 = 17h.54m.49s. Rocca di Papa gives M = +10·4m. De Bilt PN = +10m.31s., S = +18m.44s., ME = +39·0m. Moncalieri MN = +37·0m. San Fernando gives for the E.W. component L = +43·2m., M = +44·2m. Bidston S = +26m.29s. (?SR_1). Paris ePN = +19m.26s. De Bilt also gives an epicentre at 34°·0N. 88°·0E. (Tibet). Stonyhurst record is given three hours wrong.

Feb. 4d. 20h. 38m. 40s. Epicentre near Revelstoke, B.C. 51°·0N. 118°·0W.

A = −·295, B = −·556, C = +·777.

	Δ	P.	O−C.	S.	O−C.	L.	M.
	°	m. s.	s.	m. s.	s.	m.	m.
Victoria	4·3	1 6	− 1	—	—	2·1	2·2
Ann Arbor	24·8	—	—	12 20	?L	15·3	—
Ottawa	28·3	—	—	e 11 26?	+22	e 14·8	—
Washington	30·9	—	—	—	—	e 15·3?	—
Georgetown	30·9	—	—	—	—	e 15·3	—

Victoria M = +1·6m. Ottawa gives also i = +13m.27s. and L = +16·3m.

Feb. 4d. Records also at 4h. (Athens), 5h. (Victoria), 8h. (Helwan), 10h. (Athens), 11h. (Zagreb and Rocca di Papa), 17h. (Zi-ka-wei and Rio Tinto), 19h. (Pola, Zagreb, and Bombay), 23h. (Graz).

Feb. 5d. 9h. 10m.56s. Epicentre 44°·0N. 2°·5E.

A = +·719, B = +·031, C = +·695 ; D = +·044, E = −·999 ;
G = +·694, H = +·030, K = −·719.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Marseilles	2·2	113	i 0 54	?S	(i 0 54)	− 7	—	—
Barcelona	2·6	186	0 34	− 7	1 12	+ 0	1·4	2·6
Tortosa	3·5	193	0 52	− 3	1 33	− 4	2·0	3·2
Moncalieri	3·9	75	e 1 17?	+16	2 51?	?L	(2·9)	—
Algiers	7·2	176	0 54	?	2 4	?	6·6	—
Rocca di Papa	7·8	103	1 22	?	—	—	—	4·2

Marseilles gives e(S) = +3m.4s., eL = +7·1m. Moncalieri L = +3·8m. Algiers P = +1m.15s.

Feb. 5d. Records also at 0h. (San Fernando), 3h. (Batavia), 5h. (San Fernando, Colombo, and Edinburgh), 10h. (La Paz (2), Chacarita, Andalgala, and Cipolletti), 11h. (Pilar and Helwan), 21h. (Calcutta).

Feb. 6d. 3h. 10m. 30s. Epicentre 11°·0S. 176°·0W.

$A = -\cdot 979$, $B = -\cdot 068$, $C = -\cdot 191$; $D = -\cdot 070$, $E = +\cdot 997$; $G = +\cdot 190$, $H = +\cdot 013$, $K = -\cdot 982$.

	△	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Apia	5·0	125	e 1 18	+ 1	—	—	2·6	4·1
Honolulu	36·9	28	e 13 30	?S	(e 13 30)	+ 8	17·2	24·6
Riverview	37·7	228	—	—	13 36	+ 2	15·9	20·3
Melbourne	44·0	226	e 8 30	+ 4	—	—	20·8	22·6
Victoria	75·4	33	—	—	—	—	53·9	—
Andalgala	102·0	122	41 48	?L	—	—	(41·8)	56·0
Toronto	102·4	47	—	—	—	—	48·8	61·5
Pilar	102·4	126	50 12	?L	—	—	(50·2)	68·9
La Paz	103·6	110	17 23	?	—	—	49·6	56·3
Stonyhurst	136·8	5	54 30	?L	—	—	(54·5)	79·5
De Bilt	138·9	359	—	—	—	—	e 86·5	—
Helwan	148·3	311	38 30	?	—	—	—	—
Rocca di Papa ?	148·3	348	19 40	[−13]	—	—	—	20·2

Additional records: Riverview MN = +17·8m. Toronto L = +50·0m. eL = +59·0m. Stonyhurst M = +85·5m. The record for Rocca di Papa is almost certainly that of a local shock, since M closely follows P; but it has been included in the table as possibly a case where one shock may have started another.

Feb. 6d. 14h. 43m. 42s. Epicentre 11°·0S. 176°·0W., as at 3h.

	△	Az.	P.	O−C.	L.	M.
	°	°	m. s.	s.	m.	m.
Honolulu	36·9	28	—	—	e 15·3	20·2
Riverview	37·7	228	e 7 36?	0	e 17·9?	19·0
Melbourne	44·0	226	—	—	23·5	25·3
De Bilt	138·9	359	—	—	e 72·3	—
Kew	139·4	4	—	—	—	77·3
Helwan	148·3	311	45 18	?SR_1	—	—

Riverview gives MN = +21·8m. Eskdalemuir (△ = 135·4) records 15h.55m. to 16h.5m. Apia records P = 14h.41m.16s., M = 14h.41m.41s., which is probably a close and local shock. If not, the above solution is sensibly in error.

Feb. 6d. Records also at 0h. (Denver), 4h. (San Fernando and De Bilt), 9h. (Mizusawa), 15h. (De Bilt), 17h. (Manila), 21h. (Monte Cassino), 22h. (San Fernando).

1918. Feb. 7d. 5h. 20m. 15s. Epicentre 6°·5N. 127°·0E.

A = −·598, B = +·793, C = +·113; D = +·799, E = +·602; G = −·068, H = +·090, K = −·994.

A focal depth +·025 is assumed, in spite of the positive residuals to [P] for Pilar and La Paz, as it is not possible to make a satisfactory solution without some such assumption.

Station and Component.	Corr. for Focus	△	Az.	P.	O—C.	S.	O—C.	L.	M.
	°	°	°	M. S.	S.	M. S.	S.	M.	M.
Manila	−0·3	10·0	325	i 2 29	+ 3	—	—	i 4·2	5·1
Taihoku	−1·0	19·3	345	4 39	+18	—	—	8·0	8·6
Batavia	−1·2	23·8	238	i 5 13	+ 1	8 33	−44	—	9·6
Zi-ka-wei	−1·4	25·3	349	5 26	− 1	e 9 42	0	—	11·8
Kobe	−1·7	29·2	14	6 15	+12	(10 46)	− 4	10·8	13·2
Osaka	−1·7	29·2	14	6 12	+ 9	(10 50)	0	10·8	13·0
Mizusawa E.	−2·0	35·0	19	6 53	− 3	12 16	− 8	—	—
N.	−2·0	35·0	19	6 49	− 7	12 12	−12	—	—
Perth	−2·1	39·9	195	(7 37)	+ 1	13 28	− 7	22·6	—
Calcutta E.	−2·1	40·6	297	7 33 ?	− 9	13 27	−18	17·6	—
N.	−2·1	40·6	297	7 33	− 9	13 33	−12	19·4	—
Adelaide	−2·2	42·9	166	8 15	+14	14 27	+10	—	25·8
Riverview	−2·4	46·4	152	i 8 24	− 2	i 15 2	0	e 25·0	30·1
Sydney	−2·4	46·4	152	8 21	− 5	15 21	+19	25·0	30·4
Colombo	−2·4	46·8	273	(8 39)	+10	8 39	? P	15·6	20·7
Melbourne	−2·5	47·3	161	(10 45)	? PR_1	(15 9)	− 3	18·8	19·8
Kodaikanal	−2·6	49·1	278	11 51	? PR_1	—	—	28·0	34·4
Simla	−2·7	52·6	305	8 57	− 9	16 21	+ 3	—	27·4
Bombay	−2·7	54·1	289	9 20	+ 4	—	—	—	27·5
Mauritius N.	−3·2	72·9	247	20 33	? S	(20 33)	+11	—	31·2
E.	−3·2	72·9	247	11 9	− 6	(20 51)	+29	20·8	36·2
Honolulu	−3·2	73·6	70	11 15	− 4	20 45	+14	e 34·0	44·8
Helwan	−3·5	91·7	300	12 45	−21	—	—	—	61·2
Lemberg	−3·5	93·2	321	i 13 27	+13	i 17 16	? PR_1	—	24·7
Budapest	−3·6	97·1	320	i 13 29	− 6	17 21	? PR_1	—	—
Victoria	−3·6	97·9	39	15 7	?	(23 58)	−61	24·0	27·6
Potsdam	−3·6	99·0	326	e 12 45	−60	—	—	—	—
Graz	−3·6	99·5	320	e 12 43	−65	e 26 57 ?	+102	—	—
Zagreb	−3·6	99·6	319	i 13 45	− 4	i 24 13	−63	52·8	61·8
Pola	−3·6	101·3	318	e 17 38	? PR_1	e 24 22	−71	e 37·4	63·4
Berkeley	−3·6	101·9	49	—	—	23 45	?	—	—
Pompeii	−3·6	102·4	314	e 13 55	− 9	e 24 24	−80	e 49·8	59·8
Monte Cassino	−3·7	102·6	315	14 4	− 1	—	—	—	—
Hohenheim	−3·7	102·7	323	—	—	25 35	−11	—	—
Rocca di Papa	−3·7	103·3	316	i 13 59	−10	i 24 28	−84	e 55·6	63·6
De Bilt	−3·7	103·5	328	(18 19)	? PR_1	i 24 34	−80	49·8	51·6
Dyce	−3·7	104·2	334	—	—	—	—	—	56·2
Uccle	−3·7	104·5	327	e 14 3 ?	−11	—	—	e 42·8	—
Moncalieri	−3·7	105·3	320	e 14 27 ?	+ 9	19 2 ?	? PR_1	—	—
Eskdalemuir	−3·7	105·8	333	18 17	? PR_1	24 44	−92	31·0	—
Stonyhurst	−3·7	106·3	332	e 16 3	+100	i 25 27	−53	55·4 ?	68·2
Paris	−3·7	106·6	326	e 18 41	? PR_1	i 24 46	−97	52·8	53·8
Kew	−3·7	106·6	329	18 45	? PR_1	—	—	—	62·8
Bidston	−3·7	106·9	332	17 3	?	25 15	−71	—	43·5
Barcelona	−3·8	110·5	319	e 21 34	? PR_1	28 41 ?	+103	—	—
Tortosa	−3·8	111·9	319	19 20	? PR_1	28 57	?	—	60·2
Algiers	−3·8	112·1	314	e 19 15	? PR_1	28 56	?	48·8	63·8
Coimbra	—	117·9	323	20 2	? PR_1	i 29 26	+53	61·8	66·4
Rio Tinto	—	118·1	320	16 45	+71	—	—	—	27·8
San Fernando	—	118·7	318	19 15	? PR_1	29 15	+35	63·2	88·2
Toronto	—	124·4	23	(22 15)	? PR_1	(e 38 33)	? SR_1	e 38·6	80·0
Pilar	—	152·9	159	20 15	[+15]	43 45	—	—	45·6
La Paz	—	162·1	125	i 20 9	[0]	32 43	—	65·0	70·4

For Notes see next page.

NOTES TO FEB. 7d. 5h. 20m. 15s.

Additional records: Manila MN = +4·9. Zi-ka-wei gives SRN_1 = +10m.26s., SRE = +10m.30s., SRN_2 = +11m.3s. Kobe MN = +15·1m. Osaka MN = +15·1m. Perth record for PR_1 has been taken as P. Adelaide record for PR_1 has been taken as S. Riverview i = +9m.1s., PS = +15m.47s., eSR_1? = +18m.9s., i = +18m.16s., epicentre 19°·0N. 121°·0E. (approx.). Sydney SR = +19m.21s. Melbourne S = +10m.45s. (probably PR_1) and SR_1 = +15m.9s. (probably S), SR_2 = +15m.57s. Honolulu M = +22·0m. Lemberg i = +23m.52s. (?S). Zagreb ePN = +13m.42s. Pola MN = +60·0m. Uccle PR_1 = +18m.21s. De Bilt PR_1N = +18m.20s., e = +27m.36s., M = +55·1m. Coimbra MN = +64·1m. San Fernando MN = +87·2m. Toronto L = +22·2m. La Paz M = +99·0m. Andalgala ME = +43·0m. Pilar PN = +20m.3s., MN = +46·6m.

Feb. 7d. Records also at 0h. (Helwan), 1h. (La Paz), 2h. (Manila), 22h. (Manila and San Fernando).

Feb. 8d. 18h. 48m. 40s. Epicentre 44°·0N. 13°·0E.

A = +·701, B = +·162, C = +·695.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Pola	1·0	35	e 0 26	+11	—	—	e 0·7	0·6
Rocca di Papa	2·2	185	0 42	+ 8	1 10	+ 9	—	1·7
Monte Cassino	2·6	167	1 1	+20	—	—	—	2·5
Zagreb	2·8	50	1 2	+18	i 1 16	− 1	(1·9)	2·1
Milan	3·1	298	0 27	?	2 15	?L	(2·2)	2·6
Moncalieri	3·9	281	0 58	− 3	(1 33)	−14	1·6	—
Zurich	4·6	317	e 1 3	− 8	i 2 12	+ 6	i 2·3	—

Additional records: Pola MN = +1·1m. Zagreb S = +1m.55s. Zurich ePV = +1m.2s., iSN = +2m.11s. The record of Pola is given at 19h. instead of 18h.

Feb. 8d. Records also at 0h. (Batavia and Helwan), 4h. (Manila), 15h. (Batavia), 16h. and 20h. (Taihoku), 21h. (Taihoku and San Fernando).

1918. Feb. 9d. 12h. 28m. 5s. Epicentre **41°·5N. 28°·0E.**

A = +·661, B = +·352, C = +·662; D = +·470, E = −·883; G = +·585, H = +·311, K = −·749.

		Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Athens		4·9	224	e 1 0	−16	—	—	i 1·2	1·4
Budapest		8·7	316	e 2 34	+22	—	—	—	—
Zagreb		9·7	300	e 2 42	+16	i 4 28	+ 7	i 5·3	5·8
Pompeii	N.	10·2	271	i 2 27	− 6	e 4 31	− 4	—	—
	E.	10·2	271	i 2 27	− 6	e 4 38	+ 3	e 7·4	—
Graz		10·5	306	3 0	+23	—	—	—	—
Monte Cassino		10·6	274	2 32	− 6	—	—	—	6·7
Vienna		10·6	313	i 3 7	+29	—	—	—	—
Pola		10·8	293	e 3 13	+32	e 4 31?	−19	e 5·8	5·9
Rocca di Papa		11·4	276	i 2 38	−12	4 19?	−45	—	5·1
Helwan		12·0	166	5 43	?S	(5 43)	+24	(8·2)	12·4
Milan		14·2	293	e 4 8	+39	—	—	—	10·3
Potsdam		14·8	322	e 4 55	+79	—	—	—	—
Zurich		15·0	300	e 3 18	−21	—	—	—	—
Hohenheim		15·0	305	—	—	—	—	e 7·2	—
Moncalieri		15·1	290	e 4 4?	+24	7 16?	+42	8·6	11·2
Uccle		18·7	308	—	—	—	—	e 10·5	—
De Bilt		18·8	312	—	—	—	—	9·9	11·5
San Fernando		26·9	270	3 25	?	8 55	−104	13·2	14·9

Additional records: Rocca di Papa MN = +4·8m. Zagreb iPNW = +3m.23s., MNW = +6·5m., MNW = +8·8m., also four other i's. Helwan records L as S. Moncalieri MN = +9·5m. De Bilt MN = +11·7m. San Fernando MN = +17·4m.

Feb. 9d. 20h. 46m. 18s. Epicentre 25·6N. 134°·1E.

$A = -\cdot628$, $B = +\cdot648$, $C = +\cdot432$; $D = +\cdot718$, $E = +\cdot696$; $G = -\cdot301$, $H = +\cdot310$, $K = -\cdot902$.

		△	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Kobe		9·1	5	2 10	− 7	(3 42)	−24	3·7	3·8
Osaka		9·2	7	2 17	− 2	—	—	3·9	5·0
Zi-ka-wei		12·5	300	i 3 5	− 1	e 5 29	− 3	—	—
Mizusawa	N.	14·8	22	2 5	?	3 40	?P	—	—
	E.	14·8	22	2 5	?	3 30	?P	—	—
Manila		16·5	231	—	—	e 5 30	?	—	—
Batavia		41·4	224	—	—	e 14 42	+15	—	—
Honolulu		61·8	78	—	—	—	—	e 25·1	25·6
Helwan		87·6	302	19 42	?	—	—	—	—
Zagreb		89·3	322	10 58	?	—	—	—	—
Milan		93·1	325	11 9	—	—	—	—	21·4
Monte Cassino		93·2	320	11 24	?	—	—	—	20·7
Rocca di Papa		93·7	320	i 11 22	?	14 33?	?P	e 20·7	—
La Paz		157·4	71	19 1	[−64]	(33 54)	—	33·9	35·6

The La Paz record suggests that T_0 should be considerably diminished (it is taken above from Zi-ka-wei), and the epicentre moved further away from Japan.

Additional record: Osaka MN = +4·8m.

Feb. 9d. Records also at 2h. (Colombo), 3h. (Helwan and Monte Cassino), 5h. (Manila), 8h. (Helwan), 11h. (Mizusawa), 12h. (Pompeii), 13h. (Manila), 21h. (Mizusawa), 22h. (La Paz).

Feb. 10d. Records at 0h. (San Fernando), 2h. (Rocca di Papa), 5h. (Taihoku), 10h. (Zi-ka-wei and Manila), 11h. (Rocca di Papa), 12h. (Athens), 15h. (Helwan, La Paz, and Algiers), 18h. (Manila), 19h. (Taihoku), 20h. (San Fernando), 23h. (Zagreb and Mizusawa (2)).

Feb. 11d. 2h. 59m. 45s. Epicentre 39°·0N. 23°·0E. (as on 1918 Jan. 20).

$A = +\cdot715$, $B = +\cdot304$, $C = +\cdot629$; $D = +\cdot391$, $E = -\cdot920$; $G = +\cdot579$, $H = +\cdot246$, $K = -\cdot777$.

	△	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Athens	1·2	151	0 32	?S	(0 32)	− 1	0·8	1·0
Rocca di Papa	8·4	294	e 2 12	+ 5	—	—	—	5·2
Zagreb	8·5	325	e 2 27	+18	—	—	i 5·2	7·0
Pola	9·0	313	—	—	—	—	e 5·0	6·0
Moncalieri	12·8	303	e 2 37?	−33	—	—	8·9	—

No additional records.

Feb. 11d. Records also at 8h. (Taihoku), 10h. (Athens, Helwan, and Zagreb), 11h. (Pola), 12h. (Zagreb), 20h. (Zagreb), 21h. (San Fernando).

1918. Feb. 12d. { **1h. 25m. 11s.** (I) / **19h. 14m. 2s.** (II) / **20h. 4m. 0s.** (III) / **20h. 9m. 7s.** (IV) } Epicentre **32°·2N. 110°·1W.**

A = −·291, B = −·794, C = +·533 ; D = −·939, E = +·344, ; G = −·183, H = −·500, K = −·846.

			Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
			°	°	m. s.	s.	m. s.	s.	m.	m.
Tucson	N.	(I)	0·6	275	0 39	?L	—	—	1·0	1·1
	E.		0·6	275	0 13	+ 4	(0 25)	+ 8	0·4	1·0
	N.	(II)	0·6	275	—	—	—	—	5·1	5·3
	E.		0·6	275	—	—	—	—	5·0	5·7
	N.	(III)	0·6	275	1 19	?L	—	—	1·5	1·7
	E.		0·6	275	0 52	?L	—	—	1·3	1·7
Berkeley		(I)	11·5	302	e 2 49	− 3	—	—	—	—
		(II)	11·5	302	e 2 58	+ 6	—	—	—	—
		(III)	11·5	302	2 0	−52	—	—	—	—
St. Louis		(I)	17·4	63	—	—	i 5 35	?	6·3	—
		(IV)	17·4	63	—	—	—	—	10·2	—
Victoria		(II)	19·0	332	—	—	—	—	16·5	—
		(III)	19·0	332	4 38?	+ 9	—	—	8·6	11·1
Ann Arbor		(IV)	23·2	57	6 29	?PR$_1$	8 29	−60	9·2	9·4
Washington		(I)	27·5	66	5 49	−14	—	—	6·3	—
Georgetown		(I)	27·5	66	e 5 32	−31	—	—	16·2	—
		(IV)	27·5	66	e 6 3?	0	i 10 50	0	e 12·3	—
Fordham		(IV)	30·1	62	i 7 42	?PR$_1$	—	—	—	—
Edinburgh		(II)	72·4	34	43 58	?L	—	—	(44·0)	94·8
De Bilt		(IV)	78·6	34	—	—	—	—	e 31·7	44·0
Moncalieri		(IV)	84·4	39	—	—	—	—	e 46·3	—
Helwan		(IV)	107·9	34	63 53	?L	—	—	(63·9)	—

Additional records: Eskdalemuir (Δ = 72°·7) gives 20h.41m. to 20h.54m. Tucson (I) LN = +14·1m., LE = +14·1m., MN = +14·6m., ME = +14·4m., suggesting another movement. Tucson (II) LN = +16·6m., LE = +16·8m., MN = +17·5m., ME = +18·4m. Moncalieri (IV) e = +39·2m. Georgetown (IV) ePN? = +6m.5s., iSN = +10m.45s., eLN = +12·6m. Fordham iPN = +7m.37s.

1918. Feb. 12d. { **1h. 39m. 55s.** (I) / **19h. 33m. 0s.** (II) / **20h. 19m. 28s.** (III) } Epicentre **41°·0N. 80°·0W.**

A = +·131, B = −·743, C = +·656.

		Δ	P.	O−C.	S.	O−C.	L.	M.
		°	m. s.	s.	m. s.	s.	m.	m.
Toronto	(I)	2·7	—	—	—	—	1·4	—
	(II)	2·7	(0 42)	0	—	—	0·7	—
	(III)	2·7	—	—	(i 1 14)	− 1	i 1·2	4·0
Ithaca	(I)	2·9	—	—	(e 1 25)	+ 5	e 1·4	—
	(III)	2·9	e 0 53	+ 8	(e 1 30)	+10	e 3·6	—
Georgetown	(II)	3·0	e 0 37	−10	—	—	1·5	—
Washington	(II)	3·0	0 39	− 8	1 35	+12	—	—
	(III)	3·0	(0 47)	0	—	—	0·8	—
Cheltenham	(I)	3·3	0 44	− 8	—	—	—	1·9
	(II)	3·3	0 52	0	—	—	1·7	1·9
	(III)	3·3	0 37	−15	—	—	—	1·8
Ottawa	(I)	5·4	—	—	—	—	e 2·0	2·1
	(II)	5·4	e 1 41	+18	—	—	e 2·1	—
	(III)	5·4	e 1 14	− 9	—	—	e 1·8	2·5
Northfield	(III)	6·3	—	—	e 2 32	−20	—	—

Additional records: Ottawa eLN = 19h.47m. to 19h.50m. Ithaca (III) eLN = +1m.30s. taken as S, and eN = +1m.1s. Ann Arbor P? = 1h.38m.18s., L = 1h.38m.48s., M = 1h.39m.12s. Washington (III) gives P = 20h.18m.50s.—earlier than T$_e$.

Feb. 12d. 3h. 0m. 43s. Epicentre 4°·5N. 95°·5E.

A = −·096, B = +·992, C = +·079 ; D = +·995, E = +·096 ;
G = −·008, H = +·078, K = −·997.

	△	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Batavia	15·5	134	e 2 40	−66	—	—	—	7·3
Colombo	15·8	279	3 17	−32	—	—	—	12·3
Bombay	26·4	305	10 4	?S	(10 4)	−26	—	—
Manila	27·0	66	e 6 5	+ 7	—	—	—	—
Zi-ka-wei	36·1	39	e 7 15	− 8	—	—	—	—
Riverview	64·9	131	—	—	—	—	e 27·2	—
Helwan	65·5	301	25 17	?SR_1	—	—	—	—
Vienna	79·4	318	e 12 17	+ 2	—	—	—	—
Zagreb	79·4	316	e 12 22	+ 7	—	—	—	12·6
Graz	79·9	317	e 12 7	−11	—	—	—	—
Rocca di Papa	81·7	312	12 31	+ 2	—	—	—	—
De Bilt	86·7	322	—	—	e 23 46	+ 8	e 54·3	—
Bidston	91·4	324	52 23	?L	—	—	(52·4)	57·6
La Paz	160·0	232	20 8	[0]	—	—	—	—

Additional records: Eskdalemuir (△ = 91·2) gives from 3h.46m. to 4h.5m.

1918. Feb. 12d. 22h. 46m. 34s. Epicentre 2°·5S. 11°·1W.

A = +·980, B = −·192, C = −·044 ; D = −·192, E = −·981 ;
G = −·043, H = +·008, K = −·999.

	△	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
San Fernando	39·2	6	9 26	?PR_1	15 56	?	20·7	23·4
Coimbra	42·8	3	—	—	e 14 14	−31	22·0	—
Tortosa	44·6	12	9 5	+35	—	—	23·4	26·1
Barcelona	45·6	14	—	—	—	—	e 23·3	—
Pompeii	49·1	26	e 9 16	+15	—	—	—	—
Rocca di Papa	49·2	23	e 8 57	− 4	16 8	− 1	e 27·9	28·4
Moncalieri	50·4	17	e 4 16?	?	i 16 19	− 5	24·7	—
Helwan	51·8	48	17 26	?S	(17 26)	+45	—	—
Paris	52·7	11	—	—	—	—	e 31·4	—
Zagreb	53·9	23	e 9 30	− 2	—	—	28·4	34·4
Hohenheim	54·2	16	—	—	—	—	e 27·9	—
Kew	54·7	8	—	—	—	—	—	29·4
Uccle	54·9	12	—	—	e 16 50	−30	28·4	—
Vienna	56·1	22	e 9 44	− 3	—	—	—	—
De Bilt	56·3	12	9 58	+10	17 36	− 2	27·4	29·4
Bidston	56·3	6	17 38	?S	(17 38)	0	—	29·4
Stonyhurst	56·8	6	—	—	—	—	—	32·4
La Paz	57·8	252	9 57	−1	19 15	+79	25·8	28·6
Eskdalemuir	58·2	5	17 52	?S	(17 52)	− 9	27·6	—
Edinburgh	58·8	5	23 26	?L	—	—	(23·4)	35·9

Additional records: Rocca di Papa eL = +25·9m. Zagreb MNW = +32·4m. De Bilt MN = +34·0m., T_e = 22h.46m.59s., epicentre 1°·2N., 17°·3W. La Paz M = +31·4m. Perth (△ = 119°·1) records from 22h.40m.58·3s. to 7h.15m.24·2s. Graz T_e = 22h.46m.48s.

Feb. 12d. Records also at 2h. (Tucson), 6h. (Zagreb), 10h. (Harvard and Edinburgh), 11h. (Manila and Batavia), 19h. (Ann Arbor and Washington), 20h. (Taihoku).

1918. Feb. 13d. 2h. 31m. 26s. Epicentre 5°·6S. 102°·0E.

A = −·207, B = +·973, C = −·098; D = +·978, E = +·208;
G = +·020, H = −·095, K = −·995.

	△	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Batavia	4·8	98	i 1 17	+ 3	i 2 2	−10	—	2·4
Colombo	25·4	299	4 4	?	—	—	10·6	20·5
Manila	27·6	43	e 6 2	− 2	11 14	+22	15·3	17·3
Kodaikanal	29·1	303	12 10	?S	(12 10)	+51	17·1	18·2
Bombay	37·8	311	8 4	+28	—	—	—	25·2
Zi-ka-wei	41·2	26	7 52	−13	e 14 2	−22	—	26·9
Simla	43·7	329	14 40	?S	(14 40)	−18	—	27·4
Adelaide	44·6	136	7 46	−44	—	—	—	28·7
Mauritius	45·2	247	9 46	+72	15 34	+16	—	24·0
Melbourne	50·5	136	—	—	(17 10)	+45	28·6	32·7
Osaka	51·2	36	9 13	− 1	20 2	?SR_1	29·3	34·6
Riverview	53·5	129	i 16 55	?S	(i 16 55)	− 8	e 27·4	33·2
Sydney	53·5	129	6 10?	?	—	—	32·3	34·1
Helwan	76·3	303	11 58	+ 1	—	—	—	—
Zagreb	91·2	316	e 13 24	+ 2	i 24 23	− 3	57·6	—
Vienna	91·3	318	e 13 23	0	—	—	—	—
Pompeii	91·8	311	e 24 44	?S	(e 24 44)	+11	—	—
Pola	92·6	315	—	—	e 24 10	−31	e 54·6	59·1
Triest	92·8	316	e 17 34	?PR_1	—	—	—	—
Rocca di Papa	93·2	312	e 13 55	+22	(e 24 37)	−10	e 24·6	27·6
Hohenheim	96·0	319	—	—	—	—	e 57·1	—
Moncalieri	97·0	315	e 18 18?	?PR_1	38 33?	?	52·8	—
De Bilt	98·7	322	—	—	24 30	−73	47·6	69·5
Uccle	99·2	321	—	—	—	—	e 55·6	—
Paris	100·5	319	—	—	—	—	e 47·6	—
Honolulu	101·3	69	—	—	(25 34)	−34	e 25·6	—
Kew	102·0	321	—	—	—	—	—	73·6
Edinburgh	103·1	326	24 34	?S	(24 34)	−111	—	72·6
Eskdalemuir	103·2	326	e 24 58	?S	(24 58)	−88	44·9?	69·6
Bidston	103·5	324	26 34	?S	(26 34)	+ 5	—	61·7
San Fernando	108·0	306	e 59 4	?L	65 4	?L	(65·1)	78·6
Coimbra	109·2	311	—	—	—	—	e 65·6	—
Victoria	122·5	34	—	—	—	—	84·0	—
Ottawa	140·2	357	—	—	—	—	e 80·6	—
Toronto	142·0	2	—	—	—	—	82·0	107·2
Harvard	142·8	352	—	—	—	—	e 71·6	—
Ithaca	143·2	358	—	—	—	—	e 83·8	—
Washington	146·7	359	—	—	—	—	e 86·1	—
Georgetown	146·7	359	—	—	—	—	90·8	—
La Paz	155·8	204	17 40	−40	31 50	?	77·2	81·4

Additional records: Manila MN = +19·3m. Mauritius MN = +21·5m. Zi-ka-wei MN = +24·3m. Melbourne S = +21m.52s., SR_2 = +25m.52s. Osaka MN = +35·8m. Riverview eS? = +22m.15s. These records are given as 3h. De Bilt eE = +27m.10s., MN = +68·3m. Epicentre 5°·0S. 105°·0E. Edinburgh M = +78·8m. Eskdalemuir S = +33m.28s., M = +70·4m. Bidston S = +33m.58s., probably SR_1. Graz T_g = 2h.32m.0s. San Fernando MN = +82·6m. Toronto L = +88·6m. Harvard LN = +83·6m. and +93·0m.

1918. Feb. 13d. 6h. 7m. 10s. Epicentre 24°·0N. 116°·5E.

A = −·408, B = +·817, C = +·407; D = +·895, E = +·446;
G = −·181, H = +·364, K = −·914.

	△	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Taihoku	4·7	76	1 23	+10	—	—	2·7	—
Zi-ka-wei	8·4	30	2 2	− 5	e 3 42	− 5	—	—
Manila	10·3	155	e 2 19	−15	4 40	+ 2	—	—
Kobe	19·4	52	i 4 41	+ 7	(8 9)	− 1	8·2	13·9
Osaka	19·6	53	4 26	−10	—	—	8·2	12·2
Mizusawa	25·7	48	5 35	−10	10 3	−13	—	—
Calcutta	25·9	272	5 56	+ 9	11 38	?SR_1	15·6	21·1
Batavia	31·7	199	6 26	−18	—	—	—	17·8
Simla	35·4	291	6 44	−33	12 20	−41	18·8	22·9
Colombo	39·1	250	7 50	+ 3	—	—	14·1	34·1
Kodaikanal	39·7	256	7 26	−26	—	—	25·9	30·0

Continued on next page.

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Feb. 14d. Records at 0h. and 1h. (Zi-ka-wei), 2h. (La Paz and Manila), 5h. (Zi-ka-wei), 6h. (Dehra Dun), 7h. (Zi-ka-wei), 8h. (Zi-ka-wei (2) and Taihoku), 11h. (Manila and Zi-ka-wei), 15h. (Helwan and Edinburgh), 17h., 18h., and 19h. (Zi-ka-wei).

Feb. 15d. Records at 2h. (Manila), 6h. (Mizusawa), 7h. (Zi-ka-wei and Barcelona), 9h. (Riverview and Melbourne), 14h. (Zagreb), 15h. (La Paz), 19h. (Moncalieri).

Feb. 16d. Records at 0h. (Zurich), 2h. (Manila and San Fernando), 16h. (Denver), 17h. (Mizusawa), 20h. (Zi-ka-wei).

Feb. 17d. Records at 1h. (San Fernando), 7h. (Mizusawa), 8h. (Manila), 19h. (Zi-ka-wei and San Fernando).

Feb. 18d. Records at 8h. (Zi-ka-wei and Manila), 9h. (Zi-ka-wei and Manila), 11h. (Monte Cassino), 13h. (Zi-ka-wei), 15h. (Osaka), 16h. (Toronto, Georgetown, and Ottawa), 17h. (Helwan), 18h. (La Paz and Taihoku).

Feb. 19d. 11h. 3m. 5s. Epicentre 46°·5N. 13°·0E.

A = +·671, B = +·155, C = +·725.

	Δ	P.	O−C.	S.	O−C.	L.	M.
	°	m. s.	s.	m. s.	s.	m.	m.
Pola	1·7	i 0 20	− 6	—	—	i 0·5	0·6
Zagreb	2·2	i 0 24	−10	0 39	?	—	0·7
Zurich	3·2	e 1 17	?S	i 2 55	?L	(i 2·9)	—
Rocca di Papa	4·7	1 13	0	2 15	+ 6	—	2·8
Monte Cassino	5·1	1 22	+ 3	—	—	—	—

Zagreb gives iNE = +0m 25s. Zurich ePN = 1m.23s., ePV = +1m.21s., eSN = 2m.53s., iSV = 2m.54s. Pola gives its record under 12h. instead of 11h. Rocca di Papa MN = +2·4m.

Feb. 19d. 16h. 19m. 40s. Epicentre 18°·0S. 167°·0E. (as on 1917 May 14d.).

A = −·927, B = +·214, C = −·309; D = +·225, E = +·974; G = +·301, H = −·070, K = −·951.

	Machine.	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Apia	W.	20·8	82	4 37	−14	9 50	?L	(9·8)	11·3
Sydney	—	21·3	219	5 2	+ 5	9 2	+12	10·9	12·6
Riverview	—	21·3	219	i 4 57	0	e 8 55	+ 5	e 11·5	13·8
Melbourne	M.	27·7	220	5 38	−27	10 44	−11	16·2	17·3
Adelaide	M.	30·4	231	11 26	?S	(11 26)	−15	—	23·1
Perth	M.	48·0	243	6 50	?	14 38	−75	26·5	—
Honolulu	M.	52·2	43	e 16 44	?S	(16 44)	− 2	e 22·3	29·3
Manila	W.	55·9	303	e 10 20	+35	—	—	—	—
Batavia	W.	59·8	273	e 7 20	?	—	—	—	—
Zi-ka-wei	—	65·8	318	—	—	e 18 45	−50	—	—
Berkeley	—	86·6	48	—	—	—	—	e 42·3	—
Colombo	M.	89·4	278	24 20	?S	(24 20)	+13	—	—
Victoria	M.	90·7	39	—	—	—	—	45·9?	54·9
Kodaikanal	M.	92·8	280	25 44	?S	(25 44)	+61	—	—
Mauritius	M.	100·7	245	48 38	?L	—	—	(48·6)	—
Cipolletti	M.	103·2	139	63 14	?L	—	—	(63·2)	74·9
La Paz	Bi.	115·7	119	15 53	+25	29 43	+87	58·6	63·7
Toronto	M.	119·3	49	—	—	—	—	61·3	70·5
Ithaca	B.O.	121·4	51	—	—	—	—	e 61·3	—
Harvard	M.	125·4	50	—	—	—	—	63·3?	—
Helwan	M.	138·0	295	22 20	?PR_1	—	—	—	—
Vienna	—	141·5	328	e 19 32	[−10]	—	—	—	—
Graz	W.	142·7	328	e 20 44	[+60]	—	—	—	—
Zagreb	W.	143·3	326	e 19 42	[− 4]	—	—	—	—
Paris	—	146·7	341	i 19 51	[0]	—	—	84·3	—
Rocca di Papa	Ag.	147·7	323	19 53	[+ 1]	—	—	—	20·3
San Fernando	—	160·6	343	31 50	?S	49 20	?	92·3	111·3

Additional records: Riverview gives iPR_1 = +6m.4s., i = +9m.3s., PS = +10m.20s., MN = +12·1m. Melbourne SR_2 = +14m.2s., P is given as PR_1. Perth PR = +9m.13s., SR = +19m.36s. Mauritius PN = +51m.50s. La Paz M = +74·1m. Toronto eL = +66·4m. Harvard L? = +102·3m. Stonyhurst M = +93·8m. San Fernando MN = +110·3m.

Feb. 19d. 17h. 14m. 35s. At 27°·0N. 121°·0E. (as on 1917 July 5d. 0h.).

A = −·459, B = +·764, C = +·454.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Taihoku	2·0	167	0 31	0	—	—	1·0	—
De Bilt	83·2	326	e 13 19	+42	(21 25)	−94	21·4	45·0
Edinburgh	84·6	332	35 25	?L	—	—	(35·4)	40·9
Moncalieri	85·5	319	—	—	24 59	+94	31·9	—
Kew	86·1	328	—	—	—	—	—	43·4
Rio Tinto	98·7	321	22 25	—	—	—	—	42·4

Additional records: De Bilt MN = +24·1m. 17h.38m. to 18h.0m. Ithaca (Δ = 108°·8) eLN = 17h.21m. Eskdalemuir (Δ = 85°·0) Ottawa (Δ = 106°·0) 17h.22m. to 17h.51m.

Feb. 19d. Records also at 0h. (Zagreb), 11h. (Mizusawa and Zagreb), 12h. (Algiers), 14h. (Riverview and Melbourne), 15h. (Zi-ka-wei and Mizusawa), 17h. (Washington), 20h. (Zi-ka-wei), 21h. (Riverview, Melbourne, and La Paz (2)), 22h. (San Fernando, Mizusawa, and Helwan).

Feb. 20d. Records at 0h. and 1h. (Zagreb), 2h. (Zagreb and La Paz), 3h. (Riverview), 5h. (Harvard), 6h. (Harvard, Ottawa, Balboa Heights, Toronto, and La Paz), 9h. (Taihoku and Zi-ka-wei (2)), 15h. (Riverview), 17h. (La Paz and Helwan), 21h. (San Fernando), 22h. (Riverview, Sydney, and Melbourne), 23h. (Helwan).

Feb. 21d. Records at 2h. (Helwan and San Fernando), 4h. (Batavia), 7h. (Mizusawa and Helwan), 8h. (La Paz), 11h. and 15h. (Riverview), 19h. (La Paz), 21h. (Rio Tinto and San Fernando).

Feb. 22d. Records at 1h. (Barcelona and La Paz), 2h. (Taihoku), 16h. (Zurich, Bidston, Colombo, and Manila), 17h. (La Paz), 20h. (Tortosa, Riverview, and Barcelona), 23h. (Colombo).

Feb. 23d. 18h. 2m. 15s. Epicentre 21°·5S. 111°·5W.

A = −·920, B = −·138, C = −·366; D = −·148, E = +·989; G = +·362, H = +·054, K = −·930.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Apia	7·6	358	—	—	—	—	3·6	6·2
Riverview	35·1	242	5 27?	−107	e 12 57	0	17·6	21·8
Melbourne	40·8	236	—	—	e 17 45	?SR_1	22·8	24·2
Andalgala	92·6	121	—	—	46 51	?L	(46·8)	58·6
La Paz	95·8	110	—	—	—	—	51·4	54·4
Toronto	106·1	48	—	—	—	—	60·4	63·0
Ottawa	109·0	48	—	—	—	—	e 59·8	—
Eskdalemuir	145·1	12	—	—	—	—	67·8	—
Barcelona	159·4	13	i 64 27	?L	—	—	(i 64·4)	—

Riverview gives MN = +18·4m.

Feb. 23d. Records also at 0h. (Colombo and San Fernando), 1h. (La Paz), 6h. (Manila, Jamaica, and La Paz), 10h. (Monte Cassino), 15h. (La Paz), 20h. (Riverview), 22h. (Helwan and San Fernando).

1918. Feb. 24d. 23h. 0m. 16s. Epicentre **11°·0N. 62°·2W.**

A = +·458, B = −·868, C = +·191 ; D = −·885, E = −·466 ;
G = +·089, H = −·169, K = −·982.

		△	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Vieques		7·8	337	(e 2 9)	+11	—	—	e 2·2	5·1
Port au Prince		12·3	309	e 3 5	+ 2	5 22	− 5	—	—
La Paz		28·1	192	i 6 1	− 8	11 25	+24	14·4	14·6
Georgetown		30·9	337	e 6 24	−12	—	—	12·3	—
Washington		30·9	337	6 23	−14	11 27	−23	17·2	—
Harvard		32·3	348	—	—	e 12 20	+ 7	13·8	—
Toronto		35·9	339	—	—	—	—	e 17·2	20·2
Ottawa		36·3	344	—	—	—	—	e 9·7	—
Ann Arbor		36·5	333	—	—	(8 44)	?PR$_1$	8·7	18·3
Rio de Janerio	N.	38·7	151	e 7 50	+ 6	12 44	−64	16·9?	20·7
	E.	38·7	151	e 7 56	+12	13 32	−16	16·8	20·2
Andalgala		38·8	186	7 26	−18	—	—	—	42·0
Chacarita		45·7	176	14 44	?S	(14 44)	−40	(22·5)	28·3
Cipolletti		50·3	186	14 44	?S	(14 44)	−99	(26·1)	30·7
Rio Tinto		56·2	52	9 44	− 3	—	—	—	32·7
San Fernando		56·3	53	—	—	15 44	?	17·7	19·7
Bidston		63·0	35	10 20	−12	—	—	—	28·5
Eskdalemuir		63·5	33	—	—	19 44	+37	—	—
Edinburgh		63·8	32	19 59	?S	(19 59)	+48	—	40·7
Kew		64·1	38	—	—	—	—	—	38·7
Uccle		66·7	39	e 10 58	+ 2	—	—	—	—
De Bilt	N.	67·4	38	—	—	19 56	+ 1	27·7	30·5
	E.	67·4	38	—	—	20 3	+ 8	28·7	31·0
Rocca di Papa		71·4	50	11 30	+ 4	—	—	—	12·2
Graz		73·6	44	12 42	+62	—	—	—	—
Zagreb		73·9	45	e 11 38	− 3	21 6?	− 7	—	—
Vienna		74·2	43	e 11 47	+ 4	—	—	—	—
Helwan		87·5	60	23 44	?S	(23 44)	− 3	—	—
Capetown		88·5	125	23 2	?S	(23 2)	−56	—	—
Honolulu		91·3	292	—	—	(23 38)	−49	e 23·6	26·2

Additional records: La Paz M = +14·9m., T_0 = 22h.59m.29s. Harvard L = +14·3m. Georgetown record is given as 25d., ePN = +6m.25s., LN = +12·2m. Toronto L = +14·2m. Andalgala PE = +7m.20s. Eskdalemuir 23h.20m. to 23h.35m. Zagreb ePNW = +12m.2s., T_0 = 23h.0m.24s.

Feb. 24d. Records also at 0h. (La Paz), 3h. (Helwan), 9h. (Manila and Rio Tinto), 15h. (Riverview and Batavia), 17h. (Helwan).

Feb. 25d. 6h. 3m. 17s. Epicentre 21°·5S. 171°·5W. (as on 1918 Feb. 23d.).

A = −·920, B = −·138, C = −·366 ; D = −·148, E = +·989 ;
G = +·362, H = +·054, K = −·930.

	△	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Apia	7·6	358	e 3 13	?S	(3 13)	−13	3·7	6·0
Riverview	35·1	242	e 7 13	− 1	e 12 55	− 2	e 14·7	17·2
Sydney	35·1	242	—	—	—	—	15·7	17·3
Melbourne	40·8	236	e 12 43	?	18 43	?SR$_1$	23·6	25·2
Honolulu	44·8	18	e 15 13	?S	(e 15 13)	+ 1	e 22·9	25·7
Adelaide	45·5	241	20 25	?L	—	—	(20·4)	—
La Paz	95·8	110	—	—	24 15	−59	49·7	52·6
Toronto	106·1	48	—	—	—	—	e 59·9	62·9
Edinburgh	144·5	11	85 13	?L	—	—	(85·2)	95·2
De Bilt	149·3	3	—	—	—	—	e 86·7	91·7
Helwan	157·9	297	40 43	?S	(40 43)	?	—	—
San Fernando	160·3	38	—	—	—	—	92·2	96·2

Additional records: Riverview gives MN = +15·9m. Ottawa (△ = 109°·0). Long waves began at 7h. De Bilt LN = +85·7m., MN = +90·4m. San Fernando MN = +95·7m.

Feb. 25d. Records also at 0h. (San Fernando and La Paz), 2h. (Zagreb, Lemberg, and Rocca di Papa), 3h. (La Paz and Colombo), 4h. (San Fernando), 11h. (Manila (2)), 18h. (La Paz).

Feb. 26d. 10h. 20m. 30s. At 14°·0S. 150°·0E. (as on 1918 Jan. 12d. 18h.).

	△	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Riverview	19·8	177	e 4 33	− 6	8 27	+ 8	e 10·5	12·6
Sydney	19·8	177	—	—	8 48	+29	10·9	11·8
Melbourne	24·2	190	—	—	e 9 30	−18	17·6	18·7

Riverview gives PS = +8m.45s., MN = +11·2m.

Feb. 26d. Records also at 0h. (Osaka), 2h. (Osaka and San Fernando), 5h. (Perth and La Paz), 10h. (Mizusawa), 12h. (Helwan and La Paz), 13h. (La Paz), 14h. (Helwan), 16h. (Denver), 19h. (San Fernando).

Feb. 27d. 3h. 12m. 15s. Epicentre 16°·0S. 164°·5E. (but see 1918 Feb. 19d. 16h.).

A = −·926, B = +·257, C = −·276; D = +·267, E = +·964; G = +·266, H = −·074, K = −·961.

	△	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Sydney	21·5	212	8 45?	?S	(8 45?)	−10	11·0	11·8
Riverview	21·5	212	e 5 2	+ 3	i 8 57	+ 2	e 11·2	13·1
Melbourne	27·8	215	—	—	11 15	+20	15·2	15·8
Honolulu	52·4	46	e 16 45	?S	(e 16 45)	− 4	e 26·8	29·8
Victoria	90·6	39	—	—	—	—	54·9	—
Toronto	119·8	49	—	—	—	—	64·2?	—
Ottawa	122·1	46	—	—	—	—	e 65·8	—
Helwan	135·0	297	25 45	?	—	—	—	—

Additional records: Riverview PS = +9m.15s., MN = +12·0m. Toronto L = +68·6m. Ottawa LE = +73·8m.

Feb. 27d. 9h. 51m. 45s. Epicentre 5°·6N. 126°·3E. (as on 1918 Feb. 7d. 5h.).

A = −·589, B = +·802, C = +·098; D = +·804, E = +·592; G = −·058, H = +·079, K = −·995.

	△	Az.	P.	O−C.	S.	O−C.	M.
	°	°	m. s.	s.	m. s.	s.	m.
Manila	10·4	330	e 2 57	+21	5 17	+37	7·9
Batavia	22·8	239	i 5 7	− 8	—	—	10·2
Zi-ka-wei	25·9	350	e 5 56	+ 9	10 34	+14	—
Helwan	91·5	300	23 15	?S	(23 15)	−74	—
La Paz	162·2	129	20 17	[+ 8]	—	—	—

Zi-ka-wei also gives SMN = +10m.32s. The residuals suggest moving the Epicentre to 4°·5S., 126°·0E.

Feb. 27d. Records also at 1h. and 8h. (La Paz), 9h. (Manila), 12h. (Zi-ka-wei), 15h. (Melbourne, Batavia, and Riverview), 22h. (Denver and San Fernando), 23h. (La Paz).

Feb. 28d. Records at 4h. (Monte Cassino), 7h. (Edinburgh), 21h. (Denver), 23h. (Taihoku).

March 1d. Records at 0h. (Melbourne), 3h. (San Fernando), 7h. (Rocca di Papa), 13h. (Manila), 20h. (Zi-ka-wei and San Fernando).

March 2d. Records at 2h. (Riverview and Manila), 5h. (Helwan), 10h. (Athens), 13h. (Manila), 16h. (San Fernando), 20h. (Capetown).

March 3d. Records at 0h. (San Fernando and Mizusawa), 4h. (Berkeley), 9h. (Helwan), 13h. (Mizusawa), 14h. (Batavia), 19h. and 20h. (Athens).

March 4d. Records at 4h. (Colombo and San Fernando), 14h. (Mizusawa).

March 5d. 21h. 20m. 25s. Epicentre near Taihoku, which gives P = +17s., S = +31s., L = +1·3m., M = +1·8m. Manila gives e = +3m.35s. Zi-ka-wei (after correcting its record by +1h.) gives eP = +3m.2s., eS = +4m.7s., eL = +4·6m., ME = +4·7m.

March 5d. Records also at 0h. (Helwan and Mizusawa), 1h. (Melbourne), 6h. and 23h. (San Fernando).

March 6d. Records at 0h. (Rocca di Papa), 6h. (Riverview), 8h. (Tacubaya), 17h. (Manila), 21h. (Monte Cassino and Helwan).

March 7d. Records at 8h. (Taihoku), 9h. (Mauritius, Kodaikanal, and Colombo), 12h. (Algiers), 21h. (San Fernando and Mizusawa), 23h. (Tortosa).

March 8d. Records at 5h. (Manila), 19h. (Helwan), 21h. (Taihoku).

March 9d. Records at 0h. (San Fernando), 8h. (Manila and Mizusawa), 9h. (Mizusawa (2)), 12h. (Rocca di Papa), 18h. (Athens).

March 10d. 14h. 16m. 15s. Epicentre 13°·0S. 136°·0E.

A = −·701, B = +·677, C = −·225 ; D = +·695, E = +·719 ;
G = +·162, H = −·156, K = −·974.

	△	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Riverview	25·0	149	i 5 27	−11	i 9 24	−39	e 10·0	10·6
Melbourne	26·0	164	(6 3)	+15	(10 57)	+35	11·0	17·0
Batavia	29·5	279	—	—	e 11 45	+19	—	—
Manila	31·4	331	e 11 53	?S	(e 11 53)	− 5	(e 20·8)	—
Helwan	109·1	297	28 45	?S	(28 45)	+85	—	—
Rocca di Papa	123·3	312	41 43	?SR_2	—	—	—	—

Additional records : Riverview +5m.31s., +6m.12s., +9m.40s. Melbourne records P as S and S as L. Manila gives a separate eP, apparently regarded as that of an independent quake, which may the L of this one. Rocca di Papa gives another P at 14h. 59m. 8s., which may similarly be connected with this quake.

March 10d. Records also at 0h. (San Fernando), 1h. (Taihoku), 4h. (La Paz).

March 11d. 16h. 25m. 0s. Epicentre 5°·0N. 75°·0W. (as on 1917 August 30d.).

A = +·258, B = −·962, C = +·087 ; D = −·966, E = −·259 ;
G = +·023, H = −·084, K = −·996.

	△	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Balboa Heights	6·0	312	(1 32)	0	—	—	1·5	1·7
La Paz	22·5	163	i 5 21	+10	i 9 32	+17	14·2	18·5
Toronto	38·8	354	—	—	(13 0)	−49	18·4	—
Ottawa	40·4	359	—	—	—	—	e 19·0?	—
Rocca di Papa	85·0	48	e 12 30	−18	—	—	—	73·4
Helwan	101·5	58	60 0	?L	—	—	(60·0)	—

Additional records : Toronto L = +23·6m. Rocca di Papa assumes the M given + one hour wrong, MN = +72·6m. ; also L? = +37·2m., M = +53·7m. and +59·2m. Balboa Heights gives P = +44s. ; also LE = +0·5m. and ME = +0·7m.

March 11d. 21h. 27m. 23s. Epicentre 44°·5N. 11°·5E. (as on 1916 August 16d.).

A = +·699, B = +·142, C = +·701 ; D = +·199, E = −·980 ; G = +·687, H = +·139, K = −·713.

	△	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Pola	1·7	78	0 21	− 5	—	—	0·6	0·7
Rocca di Papa	2·8	161	0 47	+ 3	1 21	+ 4	—	1·6
Zagreb	3·4	66	e 0 57	+ 4	1 35	+ 1	—	1·6
La Paz	94·4	251	i 37 13	?L	—	—	(37·2)	—

Additional record : Zagreb iNE = +1m.6s. and iNW = +1m.17s.

March 11d. Records also at 1h. (San Fernando), 2h. (Sydney), 6h. (Riverview and Manila), 9h. and 11h. (La Paz), 13h. (Zurich), 19h. (Rio Tinto), 22h. (Athens).

March 12d. Records at 0h. (San Fernando), 4h. (Helwan), 10h. (Taihoku and Zi-ka-wei), 11h. (Mizusawa), 12h. (Manila), 15h. (Moncalieri), 23h. (San Fernando).

March 13d. 10h. 19m. 55s. Epicentre close to Monte Cassino, which gives P = +2s., M = +5s. Rocca di Papa gives P = +13s., S = +23s., M = +29s.

March 13d. Records also at 5h. (Helwan), 12h. (Manila), 14h. (Vieques and Port au Prince), 15h. (Edinburgh), 22h. (Zagreb and Mizusawa).

March 14d. 9h. 29m. 15s. Epicentre 1°·0N. 143°·5E. (as on 1916 Dec. 26d. 20h.).

	△	P.	O−C.	S.	O−C.	L.	M.
	°	m. s.	s.	m. s.	s.	m.	m.
Riverview	35·6	e 7 6	−12	e 13 3?	− 1	e 20·4	24·4
Melbourne	38·9	—	—	15 45	?SR_1	18·8	24·2
Colombo	63·8	13 45	?PR_1	—	—	—	—

Riverview gives MN = +21·5m.

March 14d. 19h. 11m. 55s. Epicentre near Athens, which gives P = +4s., L = +24s., MN = +31s., ME = +33s. Rocca di Papa gives eP = +47s., +2m.17s., M = +4·4m. Zagreb eNE? = +1m.53s., MNE = +4·3m., MNW = +4·9m.

March 14d. Records also at 0h. (San Fernando), 9h. (Batavia and Colombo), 10h. (Helwan and Manila), 18h. (Lick).

March 15d. Records at 7h. (Rio Tinto), 15h. (La Paz), 19h. (Rocca di Papa).

1918. March 16d. 13h. 37m. 50s. Epicentre 1°·0N. 70°·0W.

A = +·342, B = −·940, C = +·018 ; D = −·940, E = −·342 ;
G = +·006, H = −·016, K = −1·000.

Station.	Machine.	Δ	Azimuth.	P.	O−C.	S.	O−C.	L.	M.
		°	°	M. S.	S.	M. S.	S.	M.	M.
Washington	Mar.	38·4	352	8 30	+49	16 43	?L	30·2	—
Harvard	B.O.	41·4	359	e 9 24	?PR_1	14 31	+ 4	e 17·4	—
Ann Arbor	—	43·1	345	17 34	?SR_1	18 22	?SR_1	19·6	—
Northfield	—	43·2	357	e 10 10	?PR_1	(17 46)	?SR_1	26·2	—
Toronto	M.	43·4	350	—	—	(15 16)	+22	i 18·0	18·9
Ottawa	—	44·7	354	9 12	+41	14 21	−50	18·0	—
Victoria	M.	65·8	324	—	—	—	—	—	22·2
Coimbra	W.	68·0	46	11 15	+11	i 21 3	+61	38·7	—
Rio Tinto	M.	68·6	49	20 10	?S	(20 10)	+ 1	—	31·2
San Fernando	M.	68·6	51	21 10	?S	(21 10)	+61	50·7	53·2
Tortosa	—	74·7	48	11 8	−39	21 32	+10	—	—
Bidston	M.S.	75·7	34	12 22	+29	21 10	−24	—	30·0
Algiers	B.M.	75·9	52	—	—	21 42	+ 6	—	(53·2)
Barcelona	—	76·0	47	—	—	i 21 43	+ 6	—	—
Eskdalemuir	G.	76·1	33	13 14	?	22 5	+27	35·2	—
Paris	—	76·3	40	e 15 10	?PR_1	i 22 2	+21	48·2	—
Edinburgh	M.	76·4	32	22 10	?S	(22 10)	+28	—	52·2
Kew	M.	76·7	37	—	—	—	—	—	61·2
Uccle	—	78·9	38	e 12 15	+ 3	22 17	+ 6	—	—
De Bilt	—	80·1	37	—	—	e 22 21	− 3	e 40·2	44·1
Moncalieri	S.	80·6	44	e 12 47?	+24	i 22 11	−19	39·9	59·5
Rocca di Papa	Ag.	83·9	48	e 17 1	?PR_1	22 23	−45	—	23·4
Triest	—	84·9	44	15 22	?	22 40	−38	—	—
Pola	W.	84·9	45	—	—	e 22 33	+15	46·4	61·8
Zagreb	W.	86·5	44	e 16 18	?PR_1	22 44	+ 8	34·2	54·2
Vienna	—	86·9	42	16 28	?PR_1	22 10	−30	—	—
Helwan	M.	99·3	60	17 10	?PR_1	—	—	—	68·4
Mauritius	M.	125·7	114	24 52	?	—	—	—	28·8
Mizusawa	O.	130·7	328	18 7	?	—	—	—	—
Melbourne	M.	131·2	217	27 10	?	—	—	—	34·2
Kodaikanal	M.	145·7	70	77 58	?L	—	—	(78·0)	—
Zi-ka-wei	—	146·0	18	e 19 27	[−23]	—	—	—	—
Colombo	M.	148·9	75	31 10	?S	(31 10)	−42	—	—
Manila	—	161·0	326	18 23	?	—	—	—	—
Batavia	W.	174·0	150	e 17 10	?	—	—	—	—

Additional records: Harvard gives L = +44·7m., T_0 = 13h.40m.54s. Ann Arbor PN = +17m.40s., LN = +19·7m. Ottawa PR_1 = +9m.55s., PR_2 = +10m.10s., L = +26·2m., T_0 = 13h.40m.31s. Pilar records e at 13h.38m.30s. Coimbra iN = +21m.59s., SR = +34m.7s. Algiers LM = +53·2m. San Fernando MN = +51·7m. De Bilt eN = +22m.27s. and +23m.6s., eE = +23m.9s., MN = +43·8m. Epicentre South America. Moncalieri MN = +42·4m. Zagreb iPNE = +16m.23s., iPNW = +16m.25s. Mizusawa NS = +18m.10s. Melbourne L = +57·7m., M = +60·8m.

March 16d. Records also at 0h. (Monte Cassino), 13h. and 17h. (La Paz), 18h. (Manila), 22h. (Zagreb).

1918. March 17d. 13h. 12m. 37s. (I)
17d. 13h. 45m. 5s. (II) } Epicentre **36°·0N. 28°·0E.**

(as on 1917 June 13d.).

A = +·714, B = +·380, C = +·588 ; D = +·470, E = −·883 ;
G = +·519, H = +·276, K = −·809.

Station.		Machine.	△	Azimuth.	P.	O−C.	S.	O−C.	L.	M.
			°	°	M. S.	S.	M. S.	S.	M.	M.
Athens	(I)	—	3·9	302	e 1 10	+ 9	e 1 49	+ 2	—	2·7
	(II)	—	3·9	302	e 1 6	+ 5	e 1 45	− 2	e 2·0	2·7
Helwan	(I)	M.	6·7	154	3 41	? L	—	—	(3·7)	—
	(II)	M.	6·7	154	—	—	—	—	—	9·7
Pompeii	(II)	—	11·6	298	e 3 25	+32	e 6 25	? L	(6·4)	8·5
Rocca di Papa	(I)	Ag.	13·2	301	e 3 40	+24	—	—	8·6	—
	(II)	Ag.	13·2	301	e 3 22	+ 6	e 5 36	−13	e 7·8	8·7
Zagreb	(I)	W.	13·3	321	e 3 26	+ 9	—	—	e 9·0	9·0
	(II)	W.	13·3	321	e 3 22	+ 5	—	—	—	9·0
Pola	(II)	W.	13·9	314	e 3 31	+ 6	e 6 7	+ 1	e 8·1	9·6
Lemberg	(II)	B.O.	14·1	350	e 4 7	+40	6 36	+26	7·9	11·5
Vienna	(II)	—	14·9	329	e 3 42	+ 4	—	—	—	—
Milan	(II)	—	17·0	309	5 42	?	7 23	+ 5	—	7·4
Moncalieri	(II)	S.	17·8	307	4 43	+28	7 58	+22	10·5	14·1
Zurich	(II)	—	18·3	314	e 4 23	+ 2	e 7 57 ?	+10	—	—
Hohenheim	(II)	—	18·7	319	e 4 31	+ 6	—	—	—	—
Marseilles	(II)	Ma.	18·8	300	i 4 25	− 2	e 8 15	+17	11·6	—
Algiers	(II)	B.M.	20·0	280	e 4 35	− 6	8 23	0	—	—
Tortosa	(II)	—	22·0	291	4 57	− 8	8 57	− 8	10·0	10·1
Uccle	(II)	—	22·5	318	e 5 6	− 5	e 9 16	+ 1	e 12·9	14·9
Paris	(II)	—	22·6	313	e 5 8	− 4	i 9 13	− 4	12·9	16·9
De Bilt	(I)	—	22·8	322	—	—	e 9 23	+ 2	—	15·9
	(II)	—	22·8	322	—	—	9 26	+ 5	11·7	15·8
Kew	(II)	M.	25·3	316	—	—	—	—	—	19·9
Bidston	(II)	M.S.	27·8	319	—	—	—	—	—	16·9
Edinburgh	(I)	M.	29·0	323	17 23	? L	—	—	(17·4)	—
	(II)	M.	29·0	323	—	—	—	—	—	18·1

Additional records: Athens (I) MN = +3·1m., T_0 = 13h.12m.57s., (II) T_0 = 13h.45m.21s. Rocca di Papa (II) ME = +14·4m. and +16·4m. Zagreb (I) MNW = +10·4m., (II) iP = 3m.31s., MNW = +9·7m. Pola MN = +9·4m., T_0 = 13h.45m.46s. Moncalieri MN = +14·2m., T_0 = 13h.45m.46s. Zurich T_0 = 13h.45m.2s. Algiers LM = +19·9m. De Bilt (I) MN = +16·8m., (II) MN = +13·7m. Epicentre Rhodes—S.W. Asia Minor. Eskdalemuir 13h.59m. to 14h.26m.

March 17d. Records also at 2h. (San Fernando), 14h. (Riverview and Kodaikanal), 15h. (Riverview (2)), 17h. (Batavia).

March 18d. Records at 3h. (Rocca di Papa), 4h. (Helwan), 7h. (Bidston).

1918. March 19d. 5h. 55m. 23s. Epicentre 11°·7S. 162°·5E.

A = −·934, B = +·294, C = −·203 ; D = +·301, E = +·954 ;
G = +·193, H = −·061, K = −·979.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Sydney	24·4	203	5 37	+ 5	9 55	+ 3	13·5	14·4
Riverview	24·4	203	e 5 30	− 2	i 9 46	− 6	e 13·1	14·5
Melbourne	30·5	208	—	—	i 11 19	−24	18·6	19·5
Adelaide	31·8	219	11 49	?S	(11 49)	−16	—	22·3
Perth	47·4	303	16 5	?S	(16 5)	+19	30·0	—
Manila	48·9	302	e 8 59	0	—	—	—	—
Osaka	53·0	332	9 34	+ 8	17 19	+23	24·7	28·4
Batavia	55·2	275	e 9 37	− 3	—	—	—	—
Colombo	84·3	278	45 37	?L	—	—	(45·6)	—
Berkeley	85·8	310	—	—	—	—	e 37·0	—
Lick	86·0	51	—	—	—	—	e 40·6	—
Kodaikanal	87·3	281	59 19	?L	—	—	(59·3)	—
Victoria	88·5	40	—	—	—	—	43·5	51·3
Cipolletti	110·7	140	—	—	—	—	e 57·4	—
Toronto	118·3	46	—	—	—	—	e 62·4	67·5
Ithaca	120·3	47	—	—	—	—	e 62·4	—
Ottawa	120·4	44	—	—	—	—	e 59·6	—
Georgetown	120·9	51	—	—	—	—	e 61·6	—
Washington	120·9	51	—	—	—	—	e 60·1	—
La Paz	122·5	118	—	—	30 10	+62	58·1	61·4
Harvard	124·4	46	—	—	—	—	62·0	—
Helwan	131·3	300	21 37	?PR_1	—	—	—	—
Eskdalemuir	135·0	348	—	—	—	—	81·6	—
Graz	135·1	328	—	—	—	—	e 67·6	—
Zagreb	135·6	327	e 22 7	?PR_1	—	—	68·6	84·6
De Bilt	135·7	340	—	—	—	—	e 66·3	82·3
Bidston	136·7	347	57 1	?L	—	—	(57·0)	74·3
Kew	137·9	344	—	—	—	—	—	100·6
Paris	139·3	340	—	—	—	—	e 79·6	—
Rocca di Papa	140·1	324	e 19 23	[+16]	—	—	—	—
Moncalieri	140·4	332	e 62 8	?L	73 35?	?L	84·2	—
Coimbra	150·4	346	—	—	—	—	e 85·6	—
Rio Tinto	152·2	321	75·37	?L	—	—	(75·6)	100·6
San Fernando	153·3	340	—	—	77 37	?L	87·6	95·6

Additional records: Riverview +5m.40s., PS = +10m.8s., T_o = 5h.55m.32s., MN = +13·9m. Melbourne SR_1 = +14m.55s. Osaka MN = +29·3m., T_o = 5h.55m.17s. Victoria eL = +44·0m., MZ = +46·1m. Toronto L = +124·3m., 130·5m., 142·2m. Ottawa gives eL from 6h.55m.0s. to 7h.5m.0s. and from 7h.9m.0s. to 7h.28m.0s. Harvard L = +64·0m., +80·4m. Zagreb MNW = +88·6m. De Bilt MN = +78·4m., +83·8m. Epicentre 13°·4S. 164°·5E. San Fernando MN = +94·6m.

March 19d. Records also at 0h. (Ann Arbor), 1h. (La Paz (2)), 2h. (La Paz), 5h. (Edinburgh and Taihoku), 11h. (Taihoku), 13h. (Eskdalemuir), 15h. (Uccle), 23h. (San Fernando).

March 20d. 1h. 11m. 15s. Epicentre 13°·0S. 166°·8E. (as on 1914 June 26d. 4h.).

A = −·949, B = +·222, C = −·225 ; D = +·228, E = +·974 ;
G = +·219, H = −·051, K = −·974.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Riverview	24·8	213	e 5 22	−14	e 10 1	+ 2	e 12·9	18·6
Melbourne	32·1	214	—	—	e 13 45	?SR_1	16·2	19·7
Adelaide	33·6	224	13 3	?S	(13 3)	+29	—	18·6
Perth	50·3	239	—	—	—	—	25·1	—
Manila	53·2	300	e 9 1	−26	—	—	16·1	16·6
Victoria	86·9	36	—	—	—	—	45·3	49·2
Toronto	116·1	47	—	—	—	—	37·0	—
Helwan	135·6	300	32 45	?	—	—	—	—
De Bilt	138·2	343	—	—	—	—	e 65·2	78·8

Additional records: Riverview PS = +10m.20s., MN = +17·2m. Eskdalemuir 2h.33m. to 2h.42m. De Bilt eN = +67·6m., eLN = +73·8m.

March 20d. Records also at 0h. (Kodaikanal), 1h. (La Paz), 2h. (Manila, Toronto, and Bidston), 6h. (Pa Paz), 10h. (Manila), 11h. (Helwan), 15h. (Edinburgh), 22h. (La Paz), 23h. (La Paz and Zagreb).

Mar. 21d. 15h. 50m. 53s. Epicentre 18°·0S. 167°·0E. (as on 1918 Feb. 19d.).

A = −·927, B = +·214, C = −·309 ; D = +·225, E = +·974 ;
G = +·301, H = −·070, K = −·951.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Apia	20·8	82	e 4 48	− 3	—	—	8·4	—
Riverview	21·3	219	i 4 56	− 1	9 8	+18	11·0	13·8
Sydney	21·3	219	4 49	− 8	9 7	+17	11·4	12·2
Melbourne	27·7	220	—	—	11 1	+ 7	16·8	18·2
Perth	48·0	243	19 27	?SR_1	—	—	27·4	—
Toronto	119·3	49	—	—	—	—	65·0	95·8
Ottawa	121·7	48	—	—	48 37	?	56·2	—
Helwan	138·0	295	41 7	?SR_1	—	—	—	—
De Bilt	143·1	342	—	—	46 7	?	75·2	—

Additional records: Riverview gives iS = +9m.3s. Melbourne SR_1 = +13m.55s. Toronto L = +87·8m. and +89·8m.

Mar. 21d. 16h. 9m. 20s. Local European shock 47°·0N. 10°·0E. (as on 1917 Sept. 6d.21h.). Graz (△ =3°·8) gives eP = +1m.4s. Zagreb (△ =4°·3), eP = +1m.6s. Vienna (△ =4°·5), eP = +1m.4s. Rocca di Papa (△ =5°·6) P = +1m.20s., M = +1·6m.

March 21d. 16h. 58m. 22s. Epicentre 7°·5N. 79°·0W. (as on 1913 Oct. 2d. 4h.).

A = +·189, B = −·973, C = +·130 ; D = −·982, E = −·191 ;
G = +·025, H = −·128, K = −·991.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
La Paz	26·3	156	—	—	10 33	+ 5	22·2	29·8
Georgetown	31·5	3	e 6 59	+16	12 29?	+29	e 15·8?	—
Washington	31·5	3	e 7 38	?PR_1	(e 12 3)	+ 3	e 12·0	—
Ithaca	35·0	3	—	—	e 12 51	− 4	—	—
Ann Arbor	35·1	354	7 20?	+ 6	—	—	23·1	23·1
Toronto	36·1	0	—	—	—	—	20·2	28·3
Ottawa	38·0	4	e 8 21	+43	e 13 42	+ 4	e 21·6	—
Cipolletti	47·5	169	—	—	—	—	e 32·5	—
Edinburgh	75·9	34	17 38	?	—	—	—	—
De Bilt	80·5	38	—	—	—	—	e 43·6	51·3
Helwan	103·6	57	26 38	?S	(26 38)	+ 9	—	—

Additional records: Georgetown gives eN = +6m.57s., eLN? = +15·7m., LN = +20·7m. Ann Arbor PE? = +6m.38s., PN? = +7m.38s., LE = +21·6m., M = +21·6m. Ottawa e = +18m.26s., L = +33·6m. Tacubaya T_0 = 16h.59m.12s.

March 21d. Records also at 0h. (Colombo and San Fernando), 1h. (Rocca di Papa, Toronto, Helwan, and La Paz), 3h. (La Paz, Georgetown, and Ottawa), 4h. (Toronto), 6h. (Bidston and Riverview), 16h. (Toronto), 22h. (Vieques), 23h. (San Fernando).

March 22d. 4h. 43m. 20s. Epicentre 41°·0N. 14°·0E. (as on 1917 April 26d.).

	Δ	P.	O−C.	S.	O−C.	L.	M.
	°	m. s.	s.	m. s.	s.	m.	m.
Rocca di Papa	1·3	i 0 37	?S	(i 0 37)	+ 1	(1·0)	1·2
Pola	3·9	0 58	− 3	—	—	—	1·3
Zagreb	5·0	e 1 21	+ 4	—	—	—	2·4

No additional records.

March 22d. 5h. 51m. 50s. Epicentre 19°·8N. 103°·3E.

A = −·216, B = +·916, C = +·339 ; D = +·973, E = +·230 ; G = −·078, H = +·330, K = −·941.

	△	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Osaka	32·0	56	6 47	0	(13 43)	?SR$_1$	13·7	16·8
Helwan	65·1	295	36 10	?L	—	—	(36·2)	—
Vienna	73·3	316	e 11 34	− 4	—	—	—	—
Zagreb	74·1	314	e 11 46	+ 3	21 22	+ 7	38·2	48·2
Rocca di Papa	77·4	310	12 4	+ 1	—	—	55·4	—
De Bilt	79·3	322	—	—	20 40	?	e 40·2	45·7
Moncalieri	79·9	314	—	—	22 13	− 9	42·2	—
Paris	82·0	319	—	—	—	—	e 43·2	—
Edinburgh	82·5	327	24 10	?S	(24 10)	+78	—	41·2
Eskdalemuir	82·7	327	—	—	—	—	34·2	—
Ottawa	114·7	359	—	—	—	—	48·2	—
Toronto	116·5	2	—	—	—	—	i 40·8	41·0
La Paz	171·2	291	—	—	—	—	e 73·2	—

Additional records : Osaka MN = +17·6m. Rocca di Papa M = +12·8m., L = +59·4m. De Bilt MN = +44·7m., N.E. Asia. Ottawa eL = +38·7m. Graz T_o = 5h.51m.42s.

March 22d. Records also at 1h. (Tortosa), 2h. (La Paz), 7h. (Batavia and Athens), 10h. (Mizusawa), 11h. (Riverview and Manila), 14h. (Batavia), 19h. (San Fernando and Manila), 20h. (La Paz).

March 23d. 0h. 11m. 50s. Epicentre 49°·0N. 144°·0E. (as on 1917 July 16d. 18h.).

A = −·531, B = +·386, C = +·755 ; D = +·588, E = +·809 ; G = −·611, H = +·444, K = −·656.

	△	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Mizusawa	10·1	193	2 27	− 4	4 21	−11	—	—
Osaka	15·6	207	4 13	+26	—	—	7·2	7·4
Manila	39·2	217	e 8 19	+31	(13 23)	−31	13·4	—
Vienna	72·8	327	i 11 35	0	—	—	—	—
De Bilt	73·1	335	—	—	e 21 58	+55	e 37·2	43·5
Graz	74·1	326	i 11 44	+ 1	—	—	—	—
Uccle	74·4	335	i 11 40	− 5	—	—	—	—
Zagreb	75·0	325	i 11 47	− 2	—	—	—	—
Moncalieri	78·6	330	e 12 12	+ 1	(19 34)	?	19·6	—
Helwan	81·0	306	22 10	?S	(22 10)	−25	—	—
La Paz	138·4	50	20 6	[+29]	—	—	—	—

Additional records : Osaka MN = +7·5m. De Bilt eLN = +40·2m. North Japan. Zagreb iPNW = +11m.55s.

March 23d. Records also at 17h. (Zi-ka-wei and Taihoku (2)), 21h. (San Fernando), 22h. (Helwan).

March 24d. 5h. 8m. 40s. Epicentre 18°·0S. 170°·1E.

A = −·937, B = +·164, C = −·309 ; D = +·172, E = +·985 ; G = +·304, H = −·053, K = −·951.

	△	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Riverview	23·2	223	i 5 14	− 5	i 9 21	− 8	e 12·2	12·8
Melbourne	29·6	223	—	—	—	—	i 14·5	14·8
Manila	58·4	301	e 10 2	+ 1	—	—	—	—
Osaka	62·1	328	10 23	− 3	—	—	—	20·0
Batavia	62·7	272	10 32	+ 2	—	—	—	—
La Paz	113·1	118	e 13 16	−116	(i 17 34)	+ ?	—	—
Helwan	140·7	295	28 20	?	—	—	—	—
Edinburgh	141·8	354	39 50	?SR$_1$	—	—	—	—
Zagreb	144·9	338	e 18 52	+81	—	—	—	—
Rocca di Papa	149·4	326	e 18 54	+65	19 33	[−22]	—	19·6

Additional record : Riverview gives PR_8 = +6m.50s., PS = +9m.35s., i = +12m.37s., 1 = +14m.52s., MN = +13·3m.

1918. Mar. 24d. 23h. 14m. 54s. Epicentre 34°·5N. 57°·1E.

A = +·448, B = +·692, C = +·566 ; D = +·840, E = −·543 ;
G = +·308, H = +·476, K = −·824.

The Indian residuals indicate an Epicentre further away (by about 1°·5), but this would make the European residuals wrong, unless we make the displacement vertically downwards into the earth. The only evidence as to the depth of focus however, viz., that of La Paz, is in the opposite direction.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Simla	17·2	96	6 24	?	8 36	+?L	10·2	10·6
Bombay	20·9	134	4 59	+ 7	—	—	—	13·6
Lemberg	28·5	312	e 7 18	+65	e 10 48?	−20	—	26·0
Calcutta	29·8	106	8 42	?	11 54	+23	16·3	—
Kodaikanal	30·6	138	16 6	?L	—	—	(16·1)	—
Budapest	31·1	306	6 36	− 3	13 6	?SR$_1$	—	—
Vienna	33·0	307	i 6 53	− 3	—	—	—	—
Zagreb	33·0	303	e 6 52	− 4	—	—	22·1	25·1
Graz	33·4	305	6 57	− 3	15 24	?L	(15·4)	—
Triest	34·5	302	e 7 12	+ 3	—	—	—	—
Rocca di Papa	35·3	296	e 7 15	− 1	13 5	+ 5	e 20·9	32·9
Hohenheim	37·8	307	7 33	− 3	—	—	—	—
Moncalieri	38·8	301	7 45	+ 1	16 51	?SR$_1$	23·7	29·7
De Bilt	40·6	312	8 0	0	e 14 18	+ 3	e 26·1	30·5
Uccle	41·0	310	e 7 54	− 9	e 17 24	?SR$_1$	—	32·1
Paris	42·2	307	e 7 51	−21	—	—	29·1	—
Tortosa	44·5	296	8 33	+ 3	15 18	+ 9	18·7	33·3
Bidston	45·5	314	9 11	+34	18 18	?SR$_1$	—	33·3
Edinburgh	45·7	317	14 36	?S	(14 36)	−48	—	30·1
Eskdalemuir	45·7	316	8 38	0	15 25	+ 1	22·8	30·5
Rio Tinto	50·5	293	18 6	?S	(18 6)	+101	—	33·1
Coimbra	51·2	297	e 8 28?	−46	16 56	+22	35·6	—
La Paz	128·1	276	19 25	[+12]	—	—	74·1	69·7

Additional records: Zagreb iPNE = +7m.3s., MNW = +28·1m. Rocca di Papa P = +7m.14s., M = +7·8m., +9·1m., eL = +25·0m. Moncalieri MN = +30·0m. De Bilt e = +9m.34s., +17m.15s., MN = +28·8m. Esdalemuir PR$_1$ = +10m.31s., SR = +18m.46s.

March 24d. Records also at 1h. (Manila), 2h. (La Paz), 3h. (Monte Cassino and Rocca di Papa), 4h. (Taihoku), 14h. (Riverview), 16h. (Manila), 17h. (Mizusawa and Osaka), 21h. (Batavia), 22h. (Helwan, Melbourne, Riverview, and San Fernando).

March 25d. Records at 0h. (Dehra Dun), 1h. (La Paz), 4h. (Kobe and Osaka), 5h. (De Bilt and Helwan), 13h. (Manila), 17h. (Helwan), 23h. (Helwan and Pompeii).

March 26d. 6h. 43m. 20s. Epicentre 41°·0N. 24°·6E. (as on 1917 Aug. 20d. 23h.).

A = +·686, B = +·314, C = +·656 ; D = +·416, E = −·909 ;
G = +·597, H = +·273, K = −·755.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Athens	3·2	346	e 0 50	0	(1 17)	−11	1·3	1·7
Pompeii	7·6	271	e 1 40	−15	e 3 10	−16	—	—
Zagreb	7·9	311	—	—	e 3 32	− 2	—	5·5
Graz	8·9	316	e 2 54?	+39	—	—	—	—
Rocca di Papa	9·0	279	—	—	e 4 7	+ 4	—	4·3
Vienna	9·3	324	e 3 22	+68	—	—	—	—
De Bilt	17·3	316	—	—	7 35	+10	e 9·9	11·9
Manila	85·1	75	e 37 33	?L	—	—	(e 37·6)	—

Additional records: Zagreb iMNE = +5·2m., MNW = +5·9m. Rocca di Papa MN = +4·9m. De Bilt epicentre at Ithaca, Greece.

March 26d. Records also at 1h. (Simla and San Fernando), 8h. (Batavia), 12h. (Taihoku), 19h. (Victoria).

1918. March 27d. 3h. 52m. 15s. Epicentre 25°·0N. 123°·0E.

(as on 1917 July 4d. 0h. and 5h.).

A = −·494, B = +·760, C = +·423; D = +·839, E = +·545; G = −·230, H = +·354, K = −·906.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Taihoku	1·3	274	0 15	− 5	—	—	0·4	—
Zi-ka-wei	6·3	347	1 35	− 1	2 46	− 6	—	3·8
Manila	10·6	191	e 2 45	+ 7	6 33	?L	8·2	8·8
Osaka	14·5	45	—	—	5 7	−73	—	12·1
Calcutta	31·8	273	9 27	?	18 33	?L	(18·6)	—
Kodaikanal	45·7	259	27 45	?L	—	—	(27·8)	—
Helwan	79·2	298	43 45	?L	—	—	(43·7)	—
De Bilt	85·8	327	—	—	e 22 56	−32	e 42·7	49·6
Uccle	87·0	326	—	—	—	—	e 45·7	56·7
Eskdalemuir	87·5	333	—	—	—	—	40·7	48·1
Moncalieri	88·6	320	—	—	—	—	49·1	—
Bidston	88·8	331	35 45	?	44 3	?L	(44·0)	58·7
Paris	89·2	325	—	—	—	—	e 47·8	56·8
Coimbra	100·8	324	(11 45?)	?	(21 45)	?	—	—
Rio Tinto	101·4	321	54 45	?L	—	—	(54·8)	57·8
San Fernando	102·0	320	—	—	—	—	56·0	62·8
La Paz	166·5	53	20 15 [+ 2]	—	—	—	—	—

Additional records: De Bilt MN = +49·0m. Osaka gives MN = +12·6m. Coimbra givos what appear to be records of an earlier shock, +e1m.15s. and +e2m.15s.; also eL = +29m.45s. San Fernando P = 2h.34m.0s. and MN = +63·8m.

Mar. 27d. 23h. 11m. 12s. Epicentre 18°·0S. 167°·0E. (as on 1918 Mar. 21d.).

A = −·927, B = +·214, C = −·309; D = +·225, E = +·974; G = +·301, H = −·070, K = −·951.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Apia	20·8	82	4 45	− 6	—	—	8·8	—
Riverview	21·3	219	i 4 56	− 1	i 8 51	+ 1	e 10·5	11·5
Melbourne	27·7	220	—	—	i 11 0	+ 6	14·9	16·7
Manila	55·9	303	e 10 30	+45	—	—	—	—
Paris	146·7	341	—	—	—	—	e 90·9	—
San Fernando	160·6	343	5 48	?	—	—	92·5	109·9

Additional records: Riverview gives P = +5m.7s., PR_1 = +6m.13s., PS = +9m.6s., MN = +12·2m. San Fernando MN = +101·8m.

March 27d. Records also at 8h. (Riverview), 12h. (Batavia), 21h. (Paris), 22h. (Sydney and De Bilt).

March 28d. 7h. 37m. 10s. Epicentre 41°·0N. 24°·6E. (as on 1917 Aug. 20d. 23h. and 1918 March 26d. 6h.).

A = +·686, B = +·314, C = +·656; D = +·416, E = −·909; G = +·597, H = +·273, K = −·755.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Athens	3·2	346	e 0 43	− 7	(1 16)	−12	1·3	1·6
Pompeii	7·6	271	e 2 50	?S	(e 2 50)	−36	—	—
Rocca di Papa	9·0	279	—	—	—	—	3·9	4·4
Moncalieri	12·9	294	—	—	4 41	−61	6·8	—
De Bilt	17·3	317	—	—	e 7 27	+ 2	e 9·8	11·8

Additional records: Athens MN = +1·8m. De Bilt gives Ithaca, Greece, as epicentre.

March 28d. Records also at 0h. (Bidston, Edinburgh, De Bilt, and Rio Tinto), 11h. (Edinburgh), 14h. (Paris), 17h. (Riverview), 22h. (Mizusawa).

March 29d. Records at 1h. (San Fernando), 9h. (Bidston), 12h. (Taihoku), 15h. (La Paz), 16h. (Manila), 21h. (La Paz).

March 30d. Records at 0h. (San Fernando), 1h. and 3h. (Helwan), 5h. (Taihoku and Helwan), 15h. (Manila), 17h. (Rio Tinto and Mizusawa), 19h. (La Paz)

March 31d. 0h. 2m. 53s. Epicentre 41°·0N. 24°·6E. (as on 1917 Aug. 20d. 23h., and 1918 Mar. 26d. 6h. and 28d. 7h.).

$A = +\cdot686$, $B = +\cdot314$, $C = +\cdot656$; $D = +\cdot416$, $E = -\cdot909$; $G = +\cdot597$, $H = +\cdot273$, $K = -\cdot755$.

	△	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Athens	3·2	192	e 1 7	+17	i 1 59	+31	e 2·5	2·7
Zagreb	7·9	311	—	—	—	—	8·1	—
Graz	8·9	316	—	—	—	—	e 10·2	—
Helwan	12·4	152	3 7	+ 2	—	—	—	—
Monalieri	12·9	293	—	—	e 7 16	?L	(e 7·3)	—
De Bilt	17·3	317	—	—	—	—	e 13·1	15·8

Additional records: Moncalieri gives L = +11·4m. De Bilt MN = +13·6m. Epicentre South-East Europe. A better determination would be obtained by moving the epicentre in a north-east direction so as to leave the distance from Helwan unchanged. The distance of Athens should be increased by one degree. Zagreb gives its record at 21d.

March 31d. Records also at 5h. (Helwan), 8h. (Bombay, Zi-ka-wei, and Calcutta), 10h. (Batavia, Kobe, and Osaka), 12h. (Zi-ka-wei and Monte Cassino), 15h. (Barcelona), 16h. (Tortosa), 18h. (Manila and Tortosa), 19h. (Monte Cassino).

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