

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

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The International Seismological Summary for 1919 October, November, December.

FORMERLY THE BULLETIN OF THE
BRITISH ASSOCIATION SEISMOLOGY COMMITTEE.

The present number concludes the second year of the Summary in its new official form.

Attention may be called to the cases of suspected exceptional focal depth on

Oct. 12d. 21h. 48m. 15s. Epicentre (given in the note at end) 2°OS . 102°5E . ; depth 0.020 *above* normal.

Oct. 27d. 3h. 40m. 48s. Epicentre 16°OS . 69°5W . ; depth 0.040 *below* normal.

Nov. 6d. 7h. 13m. 10s. Epicentre 13°5N . 59°0W . ; depth 0.010 *below* normal.

Nov. 20d. 14h. 11m. 38s. Epicentre 13°OS . 166°8E . ; depth 0.040 *below* normal, supported by similar observations on 1918 Dec. 14d.

The further discussion of the Italian Earthquakes for 1895—1914 has led to a new view of the 21 minute periodicity, so surprising that details are reserved until full confirmation is obtained. If this is realised in time something more may be said on the last pages of this number of the Summary.

H. H. TURNER.

University Observatory, Oxford.

1924 May 29.

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1919 OCTOBER, NOVEMBER, DECEMBER.

Oct. 1d. 19h. 31m. 2s. Epicentre 33°·6N. 116°·4W. (as on 1918 Dec. 23d.).

A = -·370, B = -·746, C = +·553; D = -·896, E = +·445;
G = -·246, H = -·496, K = -·833.

		Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Tucson	E.	4·8	104	1 14	0	(2 10)	- 1	2·2	2·9
Berkeley	N.	6·4	313	—	—	—	e 5·0	6·1	—
Denver		11·0	53	—	—	—	—	5·5	6·0
Victoria		15·7	343	9 23	?L	—	—	(9·4)	11·5
Chicago		24·0	62	—	—	—	e 13·1	14·0	—
Georgetown		31·9	69	—	—	—	e 17·4	—	—
Washington		31·9	69	—	—	e 17 10	?L	18·2	—
Ottawa		33·1	57	—	—	—	i 18·2	—	—
Azores		70·6	57	28 4	?SR ₁	—	—	—	—
De Bilt		80·3	32	—	—	—	e 44·0	—	—

Additional records: Berkeley gives eE = +5m.4s., eV = +5m.7s. Georgetown eN = +16m.58s.

Oct. 1d. Records also at 7h. (Rio Tinto), 11h. (Melbourne), 16h. (Helwan and near La Paz), 17h. (Kingston), 18h. and 21h. (Tucson).

Oct. 2d. Records at 1h., 3h., 9h., and 10h. (La Paz), 20h. (Taihoku), 23h. (Batavia).

1919. Oct. 3d. 9h. 37m. 20s. Epicentre 16°·5S. 180°·0

(Suggested by Apia).

A = -·959, B = -·000, C = -·284; D = ·000, E = +1·000;
G = +·284, H = -·000, K = -·959.

Station and Component.		Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Apia		8·4	73	2 3	- 4	3 39	- 8	4·1	—
Riverview		31·2	230	e 6 20	- 20	i 11 29	- 25	e 13·2	17·6
Sydney		31·2	230	7 10	+ 30	11 28	- 26	14·2	17·4
Melbourne		37·4	229	—	—	13 28	- 2	19·2	21·7
Adelaide		41·3	236	—	—	—	—	—	25·0
Honolulu		43·5	31	i 13 58	?S	(i 13 58)	- 57	e 22·9	29·2
Perth		59·7	242	13 52	—	20 19	+ 120	32·4	—
Tokyo		64·6	325	—	—	—	e 30·9	—	—
Manila		66·1	295	e 12 2	+ 70	—	—	30·8	—
Taihoku		70·5	307	—	—	—	—	30·8	—
Batavia		72·1	270	e 11 3	- 28	—	e 38·0	40·8	—
Zi-ka-wei		73·7	312	e 11 56	+ 16	e 21 26	+ 16	—	—
Berkeley		76·7	44	—	—	—	e 33·7	—	—
Lick		76·9	45	—	—	—	e 36·8	—	—
Victoria		82·1	35	23 9	?S	(23 9)	+ 22	41·4	50·2
Colombo		101·6	273	36 40	?	—	—	—	67·7
Chicago		102·6	50	24 48	?S	(24 48)	- 92	52·7	—
Kodalkanal		104·8	277	60 4	?	—	—	63·2	64·0
Ann Arbor	E.	105·6	50	—	—	—	—	—	62·7
Toronto		108·9	48	—	—	35 16	?SR ₁	e 56·3	62·4
Georgetown	E.	110·1	54	—	—	e 30 13	+ 164	56·9	—
Washington		110·1	54	—	—	e 52 40	?	55·2	—
Ithaca	E.	110·9	50	—	—	—	—	59·7	—
Ottawa	E.	111·7	47	—	—	e 29 10	+ 87	e 53·7	—
Mauritius	E.	112·4	240	34 52	?SR ₁	—	—	—	57·2
Capetown		126·9	200	76 16	?L	—	—	(76·3)	—
Edinburgh		140·5	2	40 50	?SR ₁	—	—	68·7	88·4
Eskdalemuir		141·1	2	e 24 17	?PR ₁	e 31 7	- 3	58·7	72·7
Hamburg		142·1	350	—	—	e 22 40	?PR ₁	e 67·7	83·8

Continued on next page.

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Station and Component.	Δ	Az.	P.		O-C.		S.		O-C.		L.	M.
			m. s.	s.	m. s.	s.	m. s.	s.	m.	m.		
Bidston		143-0	2	45 46	?		51 40	?				77-0
De Bilt	E.	144-2	354	—	—	e 41 34	?SR ₁	e 67-7				77-0
	N.	144-2	354	—	—	e 42 28	?SR ₁	—				74-6
Uccle		145-5	356	e 19 46	[- 3]	—	—	e 47-7				77-8
Vienna		145-5	340	19 48	[- 1]	—	—	e 53-7				90-7
Strasbourg		147-3	349	—	—	e 22 40	?PR ₁	e 47-7				86-2
Paris		147-6	357	e 19 53	[+ 1]	e 32 10	?	63-7				—
Helwan	E.	148-4	299	27 4	?	—	—	—				128-1
	N.	148-4	299	29 10	?	—	—	—				122-5
Pola		149-3	340	—	—	—	—	e 79-7				90-5
Moncalieri		150-8	349	35 6	?	51 40	?	70-9				95-0
Florence		151-1	343	43 6	?SR ₁	—	—	64-0				79-7
Rocca di Papa		152-5	339	19 22	[-37]	—	—	e 81-2				—
Coimbra		155-2	16	e 40 20	?SR ₁	e 48 40	?	61-7				81-2
San Fernando	E.	159-3	14	83 52	?L	—	—	87-7				91-7
Algiers		159-5	353	—	—	—	—	89-7				98-7

Additional records and notes: Riverview PS = +11m.49s., MN = +15-3m., MZ = +17-0m., T₁ = 9h.37m.10s. Melbourne gives PR₁ = +8m.46s., SR₂ = +16m.43s. Honolulu records IS as IP and gives IS = +17m.10s. Perth PR₁ = +17m.3s., SR₁ = +25m.52s., SR₂ = +18m.25s. This record is given at 8h. Victoria records S as P and gives S? = +36m.31s. Chicago PR₁ = +27m.18s., S = +32m.46s., L = +47-7m. Toronto L = +42-3m., +45-8m., and +54-9m. Georgetown eLN = +53-1m. Ottawa 1E = +35m.20s. and many L's. Eskdalemuir e = +41m.7s. Hamburg MN = +81-3m. De Bilt eE = +25m.40s. Uccle MN = +79-3m. Moncalieri MN = +87-3m. Coimbra LN = +66-7m. San Fernando PE = +84m.40s.

Oct. 3d. Records also at 7h. (Rio Tinto), 11h. (Toronto), 12h. (near Tokyo), 20h. (Zi-ka-wei and near Taihoku), 21h. (Taihoku).

Oct. 4d. 17h. 50m. 0s. Epicentre 2°-0N. 83°-0E.

A = +.122, B = +.992, C = +.035; D = +.993, E = -.122; G = +.004, H = +.035, K = -.999.

The origin is very uncertain.

Station	Δ	Az.	P.		O-C.		S.		O-C.		L.	M.
			m. s.	s.	m. s.	s.	m. s.	s.	m.	m.		
Colombo		5-8	327	1 30	0	(2 30)	- 9	2-5				4-0
Kodaikanal		9-9	326	—	—	—	—	5-2				7-7
Bombay		19-6	330	4 33	- 3	—	—	—				—
Batavia		25-2	109	4 41	-59	—	—	—				9-1
Simla		29-6	350	e 9 36	?S	(e 9 36)	-111	—				15-0
Manila		39-5	70	e 7 0	-51	—	—	—				—
Zi-ka-wei		46-5	49	e 10 30	?PR ₁	—	—	—				—
Helwan	E.	56-3	308	22 24	?SR ₁	—	—	—				36-9
	N.	56-3	308	17 36	?S	(17 36)	- 2	—				31-6
Riverview		73-2	128	—	—	e 20 12	—	e 32-4				35-7
Sydney		73-2	128	33 30	?L	—	—	(33-5)				41-0
Hamburg		78-4	325	—	—	—	—	e 48-0				51-0
De Bilt	E.	81-0	323	—	—	e 36 18	?	e 49-0				53-2
	N.	81-0	323	—	—	e 22 36	+ 1	e 42-0				46-4
Uccle		81-3	322	—	—	—	—	e 38-0				44-0
Eskdalemuir		86-2	326	—	—	—	—	42-0				—
San Fernando		88-2	309	36 0	?L	—	—	(36-0)				—

Riverview gives MN = +34-6m.

Oct. 4d. Records also at 1h. (San Fernando), 2h. (near Tortosa), 3h. (Barcelona), 4h. (San Fernando), 5h. (Florence), 6h. (Kodaikanal), 8h. (Azores), 10h. (Apia, La Paz, and Batavia), 11h. (Riverview), 12h. (Florence), 13h. and 14h. (Helwan), 19h. (Kodaikanal, Batavia, Zi-ka-wei, and Colombo), 22h. (Athens and near Rocca di Papa).

Oct. 5d. Records at 0h. (San Fernando), 1h. (Batavia, Colombo, and near Athens), 2h. (Helwan, La Paz, Chicago, and near Lick and Berkeley), 10h. (Apia), 13h. (Helwan), 21h. (San Fernando).

Oct. 6d. Records at 0h. (San Fernando), 2h. (Honolulu), 8h. (Mauritius), 10h. (Rocca-di Papa).

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Oct. 7d. 9h. 13m. 0s. Epicentre 44°-0N. 20°-0E. (as on 1918 Aug. 4d.).

A = +.676, B = +.246, C = +.695.

	Δ	P.	O-C.	S.	O-C.	L.	M.
	°	m. s.	s.	m. s.	s.	m.	m.
Pola	4.4	e 1 0	- 3	—	—	e 1.4	1.6
Vienna	4.9	e 2 48	?S	(e 2 48)	+34	—	3.2
Pompeii	5.2	e 1 46	+26	2 16	- 6	—	—
Rocca di Papa	5.8	e 1 8	-22	2 14	-25	—	2.4
Zurich	8.7	e 2 16	+ 4	3 53	- 3	—	—
N.	8.7	e 2 17	+ 5	3 53	- 3	—	—

Oct. 7d. Records also at 3h. (Riverview (3)), 10h. (close to Rocca di Papa and Pompeii), 23h. (close to Nagasaki).

1919. Oct. 8d. 4h. 40m. 30s. Epicentre 0°-0 145°-0E.

(as on 1918 Sept. 2d.).

A = -.819, B = +.574, C = .000; D = +.574, E = +.819;
G = .000, H = .000, K = -1.000.

Zi-ka-wei assigns epicentre 0°-2S. 144°-2E. The material seems scarcely good enough to decide the locality with great accuracy.

	Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
	°	m. s.	s.	m. s.	s.	s.	m.	m.
Manila	27.9	303	e 6 6	- 1	10 52	- 5	13.4	15.7
Taihoku	33.8	320	—	—	12 36	- 2	17.6	19.7
Riverview	34.3	171	e 6 15	-52	e 11 2	-102	13.6	19.7
Sydney	34.3	171	11 0	?S	13 30	+46	16.6	17.7
Adelaide	35.5	189	5 18	-120	—	—	15.8	18.3
Osaka	35.8	347	7 30	+10	—	—	—	16.2
Tokyo	36.0	354	e 5 47	-95	11 27	-103	17.8	—
Melbourne	37.8	180	12 0	?S	16 24	?SR ₁	18.2	21.7
Zi-ka-wei	38.3	327	e 7 44	+ 4	e 13 45	+ 3	—	—
Batavia	38.6	260	e 8 47	+64	—	—	—	9.1
Perth	42.2	218	7 31	-41	13 36	-62	21.4	22.6
Honolulu	59.5	65	e 9 48	-21	18 0	-17	e 28.9	41.5
Colombo	65.4	277	23 30	?SR ₁	—	—	—	—
Sims	71.2	305	e 21 12	?S	(21 12)	+32	—	—
Victoria	91.2	42	24 23	?S	(24 23)	- 3	43.1	54.9
Berkeley	92.1	52	—	—	—	—	e 42.5	—
Helwan	110.4	303	26 30	?S	(26 30)	-62	—	—
Vienna	114.5	326	—	—	—	—	55.9	—
Hamburg	114.9	332	—	—	—	—	e 58.5	68.5
Chicago	116.9	40	—	—	29 18	+53	56.5	—
De Bilt	118.0	333	—	—	23 6	? e	56.5	74.0
Edinburgh	118.5	340	—	—	—	—	53.5	74.9
Eskdalemuir	118.9	340	34 8	? e	41 21	? e	50.0	—
Strasbourg	119.0	329	—	—	e 28 30	-12	58.5	74.3
Uccle	119.3	333	—	—	e 30 18	+94	e 58.5	73.5
Florence	119.9	322	30 43	?S	(30 43)	+115	e 58.5	61.9
Rocca di Papa	120.1	320	122 43	?PR ₁	—	—	e 63.2	72.9
Bidston	120.4	339	58 42	?L	63 48	? e	(58.7)	68.5
Kew	120.8	336	—	—	—	—	—	78.5
Oxford	120.9	335	—	—	—	—	e 55.9	76.9
Toronto	121.1	36	—	—	1 50 12	—	e 63.3	78.1
Moncalieri	121.3	326	e 21 6	?PR ₁	31 39	+160	40.7	—
Paris	121.5	332	e 23 24	?PR ₁	e 37 38	?SR ₁	59.5	74.5
Ottawa	122.1	33	—	—	—	—	59.5	—
Tortosa	128.0	325	22 30	?PR ₁	—	—	59.5	77.5
Algiers	129.1	320	e 22 37	?PR ₁	—	—	76.5	81.5
Coimbra	133.1	331	44 19	?SR ₁	57 20	? e	69.5	82.3
San Fernando	134.8	327	76 30	?L	—	—	(76.5)	95.5
La Paz	143.4	120	e 19 51	[+ 5]	32 51	? e	68.5	77.1

Additional records and notes: Manila gives MN = +14.0m., T₁ = 4h.40m.36s.
Riverview MN = +18.9m., MZ = +18.7m., Adelaide SR₁ = +13m.0s.
Osaka MN = +18.3m., Melbourne SR₁ = +17m.0s., Helwan PN =
+36m.30s., Chicago L = +61.5m. and +72.5m., De Bilt e = +30m.6s.,
MN = +65.0m., Strasbourg MN = +71.0m., Uccle MN = +68.9m.,
Rocca di Papa eL = +71.6m., Toronto eL = +71.6m., L = +107.1m.,
and +134.6m., Coimbra ePN = +45m.19s., MN = +77.4m.,

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Oct. 8d. 22h. 35m. 20s. Epicentre 17°·5N. 47°·5W.

A = +·644, B = -·703, C = +·301; D = -·737, E = -·676;
G = +·203, H = -·222, K = -·954.

	Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
La Paz	39·6	212	1 7 51	0	1 14 4	+ 4	20·4	23·0
Coimbra	40·6	49	—	—	e 13 30	-45	18·1	20·1
Chicago	41·9	315	14 35	?S	(14 35)	+ 1	20·8	—
Paris	51·0	41	1 9 9	- 4	e 16 22	- 9	23·7	—
Uccle	52·7	40	e 9 22	- 2	e 16 28	-24	e 23·7	—
Moncalieri	53·3	46	—	—	1 17 4	+ 4	24·8	—
De Bilt	53·6	39	—	—	e 17 7	+ 3	e 23·7	25·4
Rocca di Papa	56·4	51	e 9 48	0	—	—	—	10·1
Helwan	71·9	64	38 40	?L	—	—	(38·7)	—

Additional records: Chicago records S as P and gives S? = +18m.5s. Moncalieri records S as I and gives S = +21m.1s. De Bilt MN = +36·9m. Helwan PN = +40m.40s.

Oct. 8d. Records also at 2h. (Riverview), 3h. (near Lick), 5h. (near Manila), 6h. (Perth), 7h. (Barcelona), 9h. (Helwan, Riverview, De Bilt, and Paris), 13h. (Apia and Helwan), 14h. (Colombo), 15h. (Helwan), 16h. (Rocca di Papa).

Oct. 9d. 6h. 51m. 20s. Epicentre 3°·5S. 102°·5E. (as on 1919 Jan. 18d.).

A = -·216, B = +·975, C = -·061; D = +·976, E = +·216,
G = +·013, H = -·060, K = -·998.

	Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Batavia	5·1	123	1 21	+ 2	2 21	+ 1	—	6·2
Colombo	24·9	294	10 40	?S	(10 40)	+39	—	18·7
Manila	25·7	45	e 10 40	?S	(e 10 40)	+24	—	—
Kodaikanal	28·5	299	—	—	—	—	14·8	18·4
Taihoku	34·0	33	19 40	?L	—	—	(19·7)	—
Zi-ka-wei	39·1	26	e 7 42	- 5	—	—	—	—
Simla	42·2	327	e 25 28	?L	—	—	(e 25·5)	—
Adelaide	45·9	138	19 22	?SR ₁	23 10	?L	26·1	28·2
Melbourne	51·8	137	—	—	—	—	e 26·7	31·2
Riverview	54·5	130	—	—	—	—	e 29·3	—
Helwan	75·5	302	26 40	?SR ₁	(22 40)	+68	—	—
De Bilt	97·3	322	—	—	—	—	e 61·7	—
Paris	99·2	319	—	—	—	—	59·7	—
La Paz	158·0	204	20 49	[+43]	—	—	61·7	63·1

Additional records: Batavia gives T₀ = 6h.51m.8s., 4°·0S. 101°·1E. Adelaide PR₁ = +21m.4s., SR₁ = +24m.58s.

Oct. 9d. 17h. 7m. 23s. (I) } Epicentre 41°·0N. 24°·6E. (as on 1919 Aug. 22d.).
21h. 38m. 18s. (II)

A = +·686, B = +·314, C = +·656; D = +·416, E = -·909;
G = +·596, H = +·273, K = -·755.

	Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
(I) Athens	3·2	192	e 0 48	- 2	e 1 30	+ 2	e 1·6	2·0
(II) Athens	3·2	192	0 51	+ 1	1 28	0	e 1·6	2·2
(I) Rocca di Papa	9·0	279	(e 1 25)	-51	e 1 25	?P	e 4·8	8·2
(II) Rocca di Papa	9·0	279	—	—	e 4 0	- 3	—	4·6
(I) Helwan	12·4	152	4 7	?I	—	—	—	—
(II) Helwan	12·4	152	3 42	+37	—	—	(6·7)	—
(I) Moncalieri	12·9	293	—	—	e 8 30	?L	10·7	—
(II) Moncalieri	12·9	293	e 4 36	+84	7 5	?L	9·7	—
(I) Strasbourg	14·1	308	—	—	—	—	10·6	—
(II) Strasbourg	14·1	308	e 4 22	+55	—	—	e 9·7	—
(I) Uccle	17·1	312	—	—	—	—	e 11·6	—
(II) Uccle	17·1	312	e 4 0	- 6	e 8 6	+46	(e 8·1)	—
(I) De Bilt	17·3	317	—	—	—	—	e 12·6	—
(II) De Bilt	17·3	317	—	—	—	—	e 11·9	—

Additional records: Rocca di Papa IPE = 17h.6m.24s., IPN = 17h.6m.36s., M = 17h.6m.48s. Helwan PE = 17h.3m. Strasbourg +17m.37s. Uccle (II) gives L as S and records L = +10·7m., T₀ = 21h.37m.12s.

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Oct. 9d. Records also at 1h. (near Batavia), 7h. and 8h. (near Athens), 9h. (Batavia, near Balboa Heights and near Athens (3)), 10h. (Rocca di Papa), 11h. (La Paz), 13h. (Helwan and Athens), 16h. (Florence, Batavia, and Paris).

1919. Oct. 10d. 1h. 7m. 20s. Epicentre 49°0N. 124°0W.
(as on 1918 Dec. 6d.).

A = -.367, B = -.544, C = +.755; D = -.829, E = +.559;
G = -.422, H = -.626, K = -.656.

		Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Victoria		0.8	141	0 41	+29			1.7	2.2
Berkeley	E.	11.2	173	e 2 56	+ 9	(5 3)	+ 4	5.0	6.9
	N.	11.2	173	e 2 42	- 5	(4 48)	-11	4.8	11.1
	Z.	11.2	173	e 2 50	+ 3	(4 39)	-20	4.6	
Lick		12.1	171	e 2 48	-12				
Denver		16.4	117					7.7	
Chicago		26.3	92	5 20	-31	10 18	-10	16.4	
Ann Arbor		28.6	88			12 22	+72	18.0	19.7
		28.6	88			12 28	+78	18.1	19.7
Toronto		30.8	82					e 18.6	20.7
Ottawa		32.5	78	8 0	?PR ₁	12 10	- 6	e 17.5	
Ithaca		33.2	82					19.8	
Georgetown		34.7	80	e 6 58	-13			21.1	
	Z.	34.7	89	e 7 3	- 8			23.2	
Cheltenham	E.	34.9	89	8 40	?PR ₁			21.5	26.5
	N.	34.9	89	12 25	?S	(12 25)	-29	20.8	21.8
Honolulu		38.6	236					11.0	19.7
Edinburgh		64.1	33			19 58	+44	31.7	40.5
Bidston		66.1	35	31 22	?L	35 10	?	(31.4)	41.5
Tokyo		67.5	299	27 50	?SR ₁	34 19	?L	(34.3)	
Oxford		68.1	35			20 41	+38	31.6	44.5
Kew		68.7	35						41.7
De Bilt	E.	70.1	29			20 44	+17	e 30.7	36.2
Hamburg		70.4	27					e 31.7	
Osaka		70.7	301	29 14	?L			(29.2)	36.4
Uccle		70.9	31			21 16	+39	e 31.7	35.7
Paris		71.9	34	e 11 33	+4			33.7	36.7
Strasbourg		74.0	30					e 32.7	37.7
Vienna		76.9	26	12 5	+ 5			e 35.7	
Moncalieri		77.0	32	e 22 15	?S	(e 22 15)	+26	40.8	
San Fernando	E.	78.4	47	46 40	?L			(46.7)	48.2
Florence		79.3	30	22 33	?S	(22 33)	+18	34.7	36.7
Zi-ka-wei		80.9	310			e 22 46	+12		
Rocca di Papa		81.6	30	112 46	+18	24 1	+79	e 48.0	54.1
La Paz		82.1	129	11 52	-39	22 54	+ 7	54.7	56.2
Taihoku		86.4	305	34 40	?L			(34.7)	
Simla		97.7	341	e 46 4	?L			(e 46.1)	55.5
Helwan		98.1	20	62 40	?L			(62.7)	
Riverview		111.8	244					e 49.4	62.5
Kodalkanal		117.9	337	62 58	?L			(63.0)	
Melbourne		118.2	245					e 60.7	62.7
Adelaide		120.1	250			55 58	?L	62.6	66.2

Additional records: Ann Arbor gives MN = +19.9m. and +19.2m., LN = +18.2m. Toronto iL = +20.1m. Ottawa L = +21.7m., 22.7m., and +67.7m., T₀ = 1h.10m.7s. De Bilt eLN = +31.7m., MN = +36.8m. Moncalieri S = +32m.12s. Osaka MN = +39.2m. San Fernando MN = +48.7m. Helwan PN = +86m.40s. Adelaide SR₁ = +58m.10s.

Oct. 10d. Records also at 2h. (Tucson), 3h. (Batavia), 6h. and 8h. (La Paz), 9h. (La Paz and Zi-ka-wei), 18h. (Taihoku), 20h. (Apia and La Paz), 21h. (Taihoku), 23h. (De Bilt, Edinburgh, and near Mizusawa).

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Oct. 11d. 13h. 17m. 25s. Epicentre 41°0N. 139°0E.

A = -570, B = +495, C = +656; D = +656, E = +755;
G = -495, H = +430, K = -755.

		Δ	Az.	P.		O-C.		S.	O-C.		L.	M.
				m.	s.	s.	m. s.		s.	m.		
Mizusawa	E.	2.5	139	0	43	+ 4	1	12	+ 3	—	—	—
Tokyo		5.3	174	1	48	+26	2	48	+23	—	—	—
Ootomari		6.2	24	1	33	- 2	(2	9)	-40	2.2	3.1	—
Zi-ka-wei		17.2	241	e 3	17	-50	—	—	—	—	—	—
Taihoku		21.6	228	8	35	?S	(8	35)	-22	—	—	—
Colombo		62.4	254	40	35	?L	—	—	—	(40.6)	—	—
Hamburg		75.8	332	e 11	57	+ 3	e 21	43	+ 8	e 43.1	47.6	—
Vienna		77.4	325	12	9	+ 6	(22	5)	+13	e 45.6	50.1	—
Edinburgh		78.0	339	22	5	?S	(22	5)	+ 5	37.6	45.9	—
Eskdalemuir		78.5	339	22	9	?S	(22	9)	+ 3	31.6	—	—
De Bilt		78.7	333	—	—	—	e 22	14	+ 6	e 39.6	46.9	—
Uccle		80.0	333	—	—	—	e 22	29	+ 6	e 38.6	50.8	—
Bidston		80.1	337	33	17	?	46	11	?L	(46.2)	55.1	—
Strasbourg		80.7	329	—	—	—	22	32	+ 1	42.4	49.2	—
Kew		81.0	336	—	—	—	—	—	—	—	50.6	—
Oxford		81.0	336	—	—	—	22	33	- 2	—	48.8	—
Pola		81.1	325	e 23	9'	?S	(e 23	9)	+33	e 46.8	53.0	—
Paris		82.4	333	i 12	32	0	e 22	51	+ 1	43.6	46.6	—
Helwan		82.7	305	—	—	—	22	35	-19	—	—	—
Moncalieri		83.6	329	—	—	—	e 22	44	-21	43.7	50.8	—
Rocca di Papa		84.1	323	e 12	23	-20	23	5	- 4	e 47.4	54.6	—
Coimbra		83.6	338	45	55	?L	52	35	?	(45.9)	60.9	—
Rio Tinto		85.2	334	52	35	?L	—	—	—	(52.6)	60.6	—
San Fernando	E.	86.3	332	57	5	?L	—	—	—	(57.5)	61.6	—
	N.	86.3	332	55	5	?L	—	—	—	63.1	64.6	—

Additional records : Mizusawa gives SN = +1m.9s. Hamburg i = +22m.13s.
T₀ = 13h.17m.34s. De Bilt eN = +22m.28s., iE = +22m.42s., MN =
+49.9m. Strasbourg MN = +52.7m. Helwan PN = +21m.35s.
Moncalieri MN = +51.5m. Rocca di Papa iP = +12m.36s. Coimbra
L = +59.4m.

Oct. 11d. Records also at 4h. (Colombo), 6h. (Helwan), 9h. (near Batavia), 14h. and 15h. (2) (Rio Tinto), 19h. (near Osaka), 23h. (Lick).

1919. Oct. 12d. 21h. 48m. 15s. Epicentre 4°0S. 101°0E.

A = -190, B = +979, C = -070; D = +982, E = +191;
G = +013, H = -069, K = -998.

But see note at end.

		Δ	Az.	P.		O-C.		S.	O-C.		L.	M.
				m.	s.	s.	m. s.		s.	m.		
Batavia		6.2	111	1	34	- 1	2	42	- 7	—	—	3.7
Colombo		23.7	297	(5	45)	+20	5	45	?P	11.8	12.8	—
Manila		27.2	46	e 5	59	- 1	9	51	-54	11.4	12.8	—
Kodalkanal		27.4	301	6	15	+13	(10	57)	+ 9	11.0	18.8	—
Calcutta	E.	29.3	336	5	57	-24	(10	57)	-25	11.0	—	—
	N.	29.3	336	5	51	-30	(10	51)	-31	10.8	—	—
Perth		31.2	154	10	55	?S	(10	55)	-59	(15.4)	—	—
Taihoku		35.1	35	5	45	-39	—	—	—	—	—	—
Bombay		36.0	311	7	30	+ 8	13	13	+ 3	—	23.6	—
Zi-ka-wei		40.2	28	e 7	45	-12	e 13	51	-19	—	25.1	—
Simla		41.8	339	8	15	+ 6	15	39	+67	22.6	25.8	—
Mauritius	N.	44.9	244	14	3	?S	(14	3)	-71	21.0	23.0	—
	E.	44.9	244	13	45	?	(14	51)	-23	14.8	22.0	—
Adelaide		46.5	138	15	10	?S	(15	10)	-25	25.6	29.8	—
Osaka		50.5	38	9	7	- 3	16	21	- 4	24.9	34.8	—
Melbourne		52.4	138	9	45	+23	16	45	- 4	28.6	32.8	—
Riverview		55.3	130	2	5?	?	7	21	?	e 24.8	31.4	—
Sydney		55.3	130	9	45	+ 4	17	33	+ 8	27.6	36.0	—
Mizusawa	E.	56.8	38	9	52	+ 1	17	41	- 3	—	—	—
Ootomari		62.6	31	e 10	41	+12	—	—	—	—	—	—
Helwan	E.	74.6	303	12	21	+35	—	—	—	—	46.8	—
	N.	74.6	303	13	21	+95	—	—	—	—	46.2	—
Cape Town		81.5	236	22	21	?S	(22	21)	-20	51.8	55.4	—

Continued on next page.

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	Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
	\circ	\circ	m. s.	s.	m. s.	s.	m.	m.
Athens	82.5	310	e 12 50	+17	23 35	+43	e 48.0	51.5
Vienna	89.4	320	i 14 16	+64	i 24 17	+10	e 39.0	64.0
Pompeii	89.9	311	13 38	+23	24 28	+15	—	—
Pola	90.8	316	e 13 28	+8	e 23 48	-34	e 37.8	60.2
Rocca di Papa	91.4	312	13 16	-7	e 24 26	-2	e 68.0	—
Hamburg	93.8	323	i 13 45	+8	e 24 18	-36	e 47.8	58.8
Zurich	94.6	318	e 13 42	+1	—	—	—	—
Moncalieri	95.2	315	5 59	?	24 52	-16	41.2	62.8
Strasbourg	95.2	319	e 12 45	-59	e 24 45	-23	e 54.8	61.6
De Bilt	96.7	322	—	—	e 25 22	-1	e 49.8	64.4
Uccle	97.3	321	e 17 45	?PR ₁	(e 24 15)	-74	—	63.6
Paris	98.6	319	e 14 7	+4	25 0	-42	53.8	61.8
Kew	100.1	321	—	—	—	—	—	70.8
Tortosa	100.5	311	14 45	+32	25 55	-6	43.0	62.7
Oxford	100.8	321	17 11	?PR ₁	27 34	+91	33.0	65.5
Edinburgh	101.2	326	18 33	?PR ₁	27 37	+90	42.8	66.0
Eskdalemuir	101.3	326	19 45	?PR ₁	—	—	—	—
Bidston	101.5	322	27 9	?S	(27 9)	+59	—	63.8
San Fernando	106.2	309	66 45	?L	—	—	73.8	83.8
Rio Tinto	106.3	310	59 45	?L	—	—	(59.8)	77.8
Coimbra	107.4	311	e 18 25	?PR ₁	28 48	+103	44.2	—
Victoria	121.7	33	—	—	—	—	81.6	83.0
Ottawa	138.5	355	—	—	i 22 40	?PR ₁	e 66.8	—
Toronto	140.4	0	—	—	—	—	82.0	86.4
Ann Arbor	141.5	5	—	—	—	—	71.8	—
Chicago	141.5	10	i 22 50	?PR ₁	32 10	?	e 65.8	—
Ithaca	141.5	356	22 57	?PR ₁	—	—	e 85.0	—
Georgetown	146.1	356	e 19 58	[+11]	23 19	?PR ₁	—	—
La Paz	156.8	207	e 20 19	[+14]	34 41	?	73.0	79.4

Additional records: Manila gives MN = +12.9m., T₀ = 21h.49m.24s. Zi-ka-wei MN = +26.6m., T₀ = 21h.48m.18s. Adelaide PR₁ = +16m.45s. Osaka MN = +37.4m., T₀ = 21h.48m.17s. Riverview MN = +33.4m., T₀ = 21h.50m.10s. There appears to be some error here. Mizusawa SN = +17m.39s., T₀ = 21h.48m.45s. Hamburg MN = +49.8m., T₀ = 21h.49m.25s. Moncalieri MN = 62.2m. De Bilt ePR₁E = +17m.45s., eE = 24m.13s., MN = +61.0m. Uccle MN = +64.6m. Bidston records S as P and gives S = +35m.21s. San Fernando MN = +75.2m. Coimbra PN = +19m.23s. Ottawa iE = +23m.31s., LE = +76.8m. Chicago L = +71.8m. +86.8m. +107.8m. and +123.8m. La Paz iP = +20m.24s.

NOTE TO 1919 Oct. 12d. 21h.

The above solution is about the best that can be given for normal depth of focus. But the Georgetown and La Paz residuals suggest a high focus. If we adopt 0.020 as the focal height and 2° 08' 102° 5E. (which was deduced by computation from a preliminary trial with 1° 0S, 104° 5E.), the principal stations within 90° of the epicentre show errors in Δ as follow:—

	Az.	Δ	Corr. for	Δ	O-C.
		observed	Height	calculated	\circ
Zi-ka-wei	27	38.9	+1.7	37.8	-0.6
Ootomari	30	64.4	+2.4	60.2	+1.8
Osaka	37	50.1	+2.0	48.0	+0.1
Mizusawa	37	58.8	+2.3	54.3	+0.2
Manila	47	27.1	+1.1	24.7	+1.3
Taihoku	33	25.7	+1.5	32.8	-8.6
Sydney	131	55.9	+2.3	55.5	-1.9
Batavia	134	6.0	0.0	6.1	-0.1
Melbourne	138	52.1	+2.2	52.8	-2.0
Adelaide	139	44.6	+2.0	47.0	-4.4
Perth	159	27.8	+1.5	32.5	-6.2
Colombo	292	25.7	+1.1	24.3	+0.3
Kodaikanal	297	28.3	+1.3	27.8	-0.8
Bombay	309	36.6	+1.6	35.9	-0.9
Simla	325	44.6	+1.7	41.0	+1.9
Calcutta	331	27.2	+1.3	28.1	-2.2
Helwan	301	80.4	+2.6	74.8	+3.0

It appears that an epicentre slightly further south would suit the Australian and Japanese records. The Indian stations, however, do not seem susceptible of further improvement.

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Oct. 12d. Records also at 5h. and 10h. (La Paz), 12h. (Helwan and near Taihoku), 17h. (Zi-ka-wei), 18h. (Helwan, Paris, and De Bilt), 21h. (near Athens, Pompeii, and Rocca di Papa), 23h. (Victoria).

Oct. 13d. 7h. 54m. 10s. Epicentre 41°·5N. 28°·0E. (as on 1918 Feb. 9d.).

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	E.	4·9	224	e 1 8	- 8	—	—	4·8	5·3
	N.	4·9	224	—	—	—	—	4·6	5·0
Pompeii		10·2	271	2 33	0	—	—	—	—
Vienna		10·6	313	2 51	+13	—	—	—	11·1
Rocca di Papa		11·4	276	e 2 57	+ 7	—	—	—	3·9
Helwan		12·0	166	3 50	+51	—	—	—	—
Moncalieri		15·1	290	4 44	+64	8 29	?L	11·2	12·8
Strasbourg		15·9	303	e 2 50	-61	e 8 10	?L	(8·2)	—
Hamburg		17·1	321	—	—	—	—	e 8·8	12·8
Uccle		18·7	308	—	—	—	—	—	13·8
De Bilt		18·8	312	—	—	—	—	e 10·8	17·3
Paris		19·3	301	—	—	—	—	e 5·8	—

Additional records: Moncalieri gives MN = +12·4m., T₀ = 7h.54m.13s.
Strasbourg e = +11m.56s. De Bilt MN = +13·8m.

Oct. 13d. 13h. 4m. 10s. Epicentre 41°·5N. 28°·0E. (as at 7h.).

		Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
				m. s.	s.	m. s.	s.	m.	m.
Athens		4·9	224	1 0 49	-27	—	—	1 0·9	1·0
Pompeii		10·2	271	2 33	0	9 3	?L	(9·0)	—
Vienna		10·6	313	3 22	+44	—	—	1 7·1	8·8
Rocca di Papa		11·4	276	2 51	+ 1	—	—	—	7·0
Helwan		12·0	166	7 50	?L	—	—	(7·8)	—
Moncalieri		15·1	290	e 5 2	+82	7 1	+27	10·0	—
Hamburg		17·1	321	—	—	—	—	e 9·8	15·4
Uccle		18·7	308	—	—	—	—	e 9·8	—
De Bilt		18·8	312	—	—	—	—	11·3	11·6
Paris		19·3	301	—	—	—	—	e 9·8	—

Additional records: Rocca di Papa gives MN = +5·2m. Helwan PN = +9m.50s.
Hamburg MN = +13·2m. De Bilt MN = +11·7m.

Oct. 13d. Records also at 5h. (Batavia and Manila), 6h. (Helwan), 13h. (near Athens), 14h. (near Athens (4)), 15h. (Helwan and near Athens), 16h. (Taihoku), 17h. and 18h. (near Athens), 20h. (San Fernando and Lick), 21h. (near Athens), 22h. (near Lick).

Oct. 14d. 16h. 55m. 40s. Epicentre 11°·0N. 88°·0W.

A = +·034, B = -·982, C = +·191; D = -·999, E = -·035;
G = +·007, H = -·190, K = -·982.

		Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
				m. s.	s.	m. s.	s.	m.	m.
Vieques	E.	23·0	67	—	—	—	—	7·6	9·9
Cheltenham	E.	29·4	18	6 18	- 4	(11 20)	- 4	11·3	21·8
	N.	29·4	18	6 21	- 1	(11 30)	+ 6	11·5	13·5
Chicago		30·8	0	6 28	- 8	(11 20)	-28	11·3	—
La Paz		33·8	144	34 37	?	—	—	—	—
Ottawa		35·9	16	—	—	—	—	e 17·3	—
San Fernando		77·0	55	32 20	?L	—	—	(32·3)	—
Bidston		78·2	38	37 50	?L	—	—	(37·8)	42·1
De Bilt	E.	83·3	39	—	—	—	—	e 38·3	44·8
	N.	83·3	39	—	—	e 37 20	?	e 42·3	43·2
Hamburg		85·9	37	—	—	—	—	e 46·3	—
Helwan		108·9	52	58 20	?L	—	—	(58·4)	—

Additional records: Chicago gives S₁ = +9m.32s. Bidston gives its record as at 16h. Helwan PN = +71m.20s.

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Oct. 14d. Records also at 0h. (San Fernando), 3h. (near Rocca di Papa), 6h. near Mizusawa and Tokyo), 8h. (near Tokyo), 9h. (Florence), 11h. (Apia and Riverview), 12h. (Colombo, Victoria, Helwan, and Chicago), 19h. (near Athens).

Oct. 15d. 15h. 45m. 40s. Epicentre 23°-3N. 122°-0E.

A = -487, B = +779, C = +396; D = +848, E = +530;
G = -209, H = +335, K = -918.

	Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Taihoku	1.8	345	0 29	+ 1	—	—	0.8	—
Hokoto	2.3	276	0 36	— 0	—	—	1.0	2.0
Zi-ka-wei	7.9	356	1 58	— 2	e 3 30	- 4	—	4.3
Manila	8.8	186	e 2 32	+19	—	—	—	—
Helwan	79.2	298	53 20	?L	—	—	(53.3)	—
Hamburg	83.5	326	e 43 20	—	—	—	e 51.3	53.3
De Bilt	86.7	326	—	—	—	—	e 46.3	55.2
Strasbourg	87.4	322	—	—	—	—	—	55.3
Uccle	87.8	325	—	—	—	—	e 43.3	57.3
Edinburgh	88.3	331	55 20	?L	—	—	(55.3)	56.8
Paris	90.0	324	—	—	—	—	53.3	—

Additional records : Zi-ka-wei gives MN = +4.7m., T₀ = 15h.45m.45s. Helwan
PN = +52m.20s. (1L). De Bilt MN = +56.5m.

Oct. 15d. Records also at 0h. (San Fernando), 2h. (La Paz), 8h. (Rio Tinto and Florence), 9h. (Azores), 12h. (Nagasaki), 22h. (near Taihoku), 23h. (near Athens).

Oct. 16d. Records at 1h. (Florence), 5h. (near La Paz), 19h. (Helwan and Taihoku), 21h. (Manila).

Oct. 17d. Records at 3h. (near Tokyo), 5h. (Florence), 8h. (San Fernando), 14h. (La Paz), 17h. (Apia and Tokyo), 22h. (Batavia).

Oct. 18d. Records at 4h. (Taihoku), 6h. (Manila), 10h. (near Athens), 13h. and 14h. (La Paz), 15h. (Simla and near Lick and Berkeley), 18h. (near Lick and Berkeley), 19h. (shock in Southern Europe recorded at Rocca di Papa, Tortosa, San Fernando, Barcelona, Strasbourg, and Paris, but the records do not seem to admit of a formal determination).

Oct. 19d. 1h. 32m. 28s. Epicentre 16°-5S. 180°-0 (as on Oct. 3d.).

A = -959, B = -000, C = -284; D = -000, E = +1-000;
G = +284, H = -000, K = -959.

	Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Sydney	31.2	230	11 32	?S	(11 32)	-22	14.0	16.0
Riverview	31.2	230	e 7 26	+46	e 12 9	+15	e 13.9	14.7
Melbourne	37.4	299	13 32	?S	(13 32)	+ 2	e 17.5	20.0
Adelaide	41.3	286	8 8	+ 3	14 20	- 5	19.8	23.1
De Bilt	E. 144.2	354	—	—	e 36 14	?	e 34.5	91.3
	N. 144.2	354	—	—	—	—	e 53.0	91.4
Uccle	145.5	356	—	—	—	—	e 78.5	91.5
Paris	147.6	357	—	—	—	—	e 88.5	—
Helwan	148.4	299	55 32	?	—	—	(90.5)	—
Rocca di Papa	152.5	339	—	—	—	—	e 94.8	—

Riverview gives MN = +15.0m. Adelaide PR₁ = +10m.8s.

Oct. 19d. Records also at 5h. (Batavia and Colombo), 6h. and 10h. (Helwan), 12h. (Manila), 21h. (San Fernando), 22h. (near Athens (2)).

Oct. 20d. Records at 1h. (Florence), 5h. (Batavia), 12h. (Apia), 13h. (Melbourne), 14h. (Perth and near Athens), 15h. (Berkeley), 21h. (San Fernando)

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Oct. 21d. 0h. 24m. 50s. Epicentre 41°1N. 14°0E. (as on 1918 Mar. 22d.).

A = +.732, B = +.183, C = +.656.

	Δ	P.	O-C.	S.	O-C.	L.	M.
	°	m. s.	s.	m. s.	s.	m.	m.
Pompeii	0.4	-0 2	- 8	—	—	—	0.3
Rocca di Papa	1.3	0 15	- 5	0 57	+19	(1.0)	1.0
Florence	3.5	-0 22	-77	—	—	—	—
Moncalleri	6.1	1 56	+23	3 24	+38	4.8	—
Vienna	7.4	1 30	-22	—	—	2.8	3.6
Zurich	7.4	e 1 31	-21	i 3 24	+ 3	—	4.4
Athens	8.1	e 1 26	-37	(e 3 46)	+ 6	e 3.8	—
Strasbourg	8.8	e 2 38	+25	4 35	+25	(4.4)	5.2
Paris	11.3	—	—	e 4 35	-27	e 6.1	8.2
Uccle	11.9	—	—	e 5 10	- 7	e 6.7	—
De Bilt	12.6	—	—	—	—	e 6.8	8.9
Hamburg	12.9	—	—	—	—	e 6.3	9.2

Additional records : Vienna gives PNZ = +1m.27s. Zurich eN = +1m.40s.,
MN = +4.6m. De Bilt MN = +8.5m.

Oct. 21d. 5h. 41m. 45s. Epicentre 26°0S. 38°0E. (as on 1915 May 8d.).

A = +.708, B = +.553, C = -.438 ; D = +.616, E = -.788 ;
G = -.345, H = -.270, K = -.899.

	Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Helwan	56.4	353	34 15	?L	—	—	(34.2)	—
Rocca di Papa	71.6	340	—	—	—	—	e 49.6	53.6
Strasbourg	79.3	341	—	—	—	—	58.2	—
Paris	80.4	337	—	—	—	—	e 52.2	—
Uccle	82.3	340	—	—	e 22 39	-10	e 42.2	49.2
De Bilt	83.2	341	—	—	e 23 5	+ 6	e 49.2	53.8
Hamburg	83.2	345	—	—	e 27 22	?SR ₁	—	34.2

Additional records : De Bilt gives MN = +54.6m. Hamburg e = +30m.45s.,
MZ = +33.4m.

Oct. 21d. 21h. 21m. 0s. Epicentre 7°0S. 148°0E. (as on 1913 Oct. 11d.).

A = -.842, B = +.526, C = -.122 ; D = +.530, E = +.848 ;
G = +.103, H = -.065, K = -.992.

	Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Sydney	27.0	174	11 24	?S	(11 24)	+43	14.8	17.4
Riverview	27.0	174	—	—	i 11 30	+49	e 15.1	16.7
Adelaide	29.3	196	—	—	—	—	19.3	20.8
Melbourne	30.9	185	12 0	?S	(12 0)	+10	22.7	24.0
Manila	34.4	309	e 7 42	+34	—	—	—	—
Batavia	40.9	269	e 8 0	- 2	—	—	—	—
Taihoku	41.1	322	—	—	—	—	e 18.0	—
Zi-ka-wei	45.9	328	e 8 54	+15	—	—	—	—
Honolulu	60.1	60	18 18	?S	(18 18)	- 6	23.4	38.5
Mauritius	87.7	250	45 6	?L	—	—	(44.1)	48.2
Victoria	94.4	42	—	—	—	—	48.3	54.2
Helwan	116.5	209	30 0	?S	(30 0)	+98	(55.0)	—
Chicago	119.9	45	—	—	—	—	e 60.0	—
Toronto	124.8	40	—	—	—	—	e 71.9	74.5
De Bilt	125.6	331	e 33 44	?SR ₁	—	—	e 65.0	67.9
Ottawa	126.1	37	—	—	—	—	e 64.0	—
Edinburgh	126.1	340	—	—	—	—	72.8	77.5
Eskdalemuir	126.5	340	—	—	—	—	65.0	—
Strasbourg	126.6	326	—	—	—	—	e 59.0	—
Uccle	126.8	330	—	—	—	—	e 59.0	77.0
Bidston	128.0	340	68 36	?L	73 0	? (68.6)	(68.6)	79.3
Kew	128.4	335	—	—	—	—	—	86.0
Paris	129.0	330	—	—	—	—	e 74.0	78.0

Additional records : Riverview gives ePR₁ = +8m.5s., MN = +17.5m., MZ =
+47.2m. Chicago L = +86.0m. Toronto E = +64m.48s. De Bilt
e = +54m.3s., MN = +74.4m.

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Oct. 21d. Records also at 0h. (San Fernando), 3h. (Lick and near Mizusawa), 4h. (near Athens), 5h. (Cape Town), 9h. (Rocca di Papa), 17h. (Apia).

Oct. 22d. 6h. 5m. 30s. Epicentre 40°-0N. 14°-0E.

A = +.743, B = +.185, C = +.643; D = +.242, E = -.970;
G = +.624, H = +.155, K = -.766.

	Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
			m. s.	s.	m. s.	s.	m.	m.
Pompeii	0.8	.29	0 56	+44	—	—	—	2.5
Rocca di Papa	2.0	331	10 34	+ 3	—	—	—	—
Florence	4.3	332	1 13	+ 6	—	—	1.8	2.5
Milan	6.5	328	2 24	+45	4 12	?L	(4.2)	5.2
Moncalieri	6.8	319	1 34	-10	2 39	-26	—	3.7
Marseilles	7.2	300	2 48	+59	3 41	+26	4.9	5.5
Zurich	E. 8.3	334	2 8	+ 2	13 50	+ 5	—	4.5
	N. 8.3	334	2 5	- 1	13 51	+ 6	—	5.6
Vienna	8.4	11	2 16	+ 9	(3 31)	-16	3.5	5.3
Algiers	9.1	253	—	—	—	—	e 4.5	7.0
Barcelona	9.1	283	e 2 16	- 2	—	—	—	5.5
Besancon	9.2	324	2 26	+ 7	5 25	?L	7.5	7.5
Strasbourg	9.6	334	2 23	- 1	e 3 45	-33	4.0	7.4
Tortosa	10.3	279	2 32	- 2	4 12	-25	4.4	7.9
Paris	12.0	321	e 3 0	+ 1	e 6 1	+42	7.1	6.5
Lemberg	12.1	32	—	—	e 5 36	+15	7.0	9.2
Uccle	12.7	331	e 3 5	- 4	—	—	—	6.1
De Bilt	13.5	336	e 3 16	- 4	—	—	e 6.1	10.1
Granada	14.0	264	3 34	+ 8	6 28	+20	—	—
Kew	15.1	324	—	—	—	—	—	8.5
Oxford	15.8	323	3 47	- 2	6 45	- 5	—	10.7
San Fernando	16.2	264	9 0	?L	—	—	(9.0)	10.0
Coimbra	17.1	278	7 22	?S	(7 22)	+ 2	(8.7)	11.2
Helwan	17.4	120	8 30	?L	—	—	—	(8.5)
Eskdalemuir	19.1	329	4 31	+ 1	8 9	+ 5	—	9.7
Taihoku	36.7	61	44 55	?L	—	—	(44.9)	—

Additional records: Zurich ePZ = +2m.6s., T_z = 6h.9m.20s. Vienna i = +3m.5s. Strasbourg MN = +6.7m., T_s = 6h.9m.15s. Paris MN = +7.5m., T_p = 6h.11m.31s. Lemberg +8m.6s. De Bilt MN = +9.7m. Coimbra records S as P and L as S?, also L = +10.6m., T_c = 6h.14m.12s.

Oct. 22d. Records also at 2h. (Batavia), 5h. (near Marseilles), 6h. (Rocca di Papa (3)), 11h. (Apia), 12h. (Manila), 21h. (near Athens), 22h. (Mauritius).

Oct. 23d. 16h. 3m. 5s. Epicentre 2°-1N. 127°-8E. (as on 1918 Oct. 22d.).

A = -.612, B = +.790, C = +.037; D = +.790, E = +.613;
G = -.022, H = +.029, K = -.999.

	Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
			m. s.	s.	m. s.	s.	m.	m.
Manila	14.2	332	e 3 25	- 4	—	—	—	—
Batavia	22.5	248	5 6	- 5	9 18	+ 3	—	—
Riverview	42.1	150	—	—	e 14 19	-17	—	27.4
Colombo	48.0	277	—	—	—	—	—	16.9
Honolulu	74.5	69	e 20 25	?S	(e 20 25)	-55	e 37.9	45.9
Helwan	94.5	300	30 55	?SR ₁	—	—	—	—
De Bilt	107.6	326	—	—	—	—	e 54.9	58.9
Uccle	108.6	325	—	—	—	—	e 54.9	—
Paris	110.6	325	—	—	—	—	e 67.9	—

De Bilt gives MN = +59.3m.

Oct. 23d. Records also at 0h. (Honolulu and near Lick), 1h. (near Berkeley), 4h. (near Tokyo, Pompeii, and Rocca di Papa), 6h. (Helwan and San Fernando), 8h. (Rocca di Papa), 10h. (Helwan), 15h. (De Bilt), 20h. (Tokyo, Andalgala, Mendoza, Cipolletti, and La Quiaca).

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Oct. 24d. 20h. 32m. 15s. Epicentre 27°·5N. 63°·6E.

A = +·394, B = +·794, C = +·462; D = +·896, E = -·445;
G = +·205, H = +·414, K = -·887.

	Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Bombay	12·1	133	2 53	- 7	—	—	—	10·1
Simla	12·3	70	e 5 27	?S	(e 5 27)	+ 1	(6·2)	8·8
Kodaikanal	21·7	140	15 9	?	—	—	—	—
Colombo	25·7	140	9 45	?S	(9 45)	- 31	15·8	17·8
Helwan	E. 28·3	283	10 45	?S	(10 45)	- 19	—	20·2
	N. 28·3	283	10 21	?S	(10 21)	- 43	—	16·8
Pompeii	42·1	301	7 58	- 14	—	—	—	—
Rocca di Papa	43·5	302	e 8 10	- 12	—	—	—	10·2
Moncalieri	47·3	309	e 9 7	+ 18	16 16	+ 31	25·8	—
De Bilt	E. 49·5	318	e 9 7	+ 3	16 10	- 3	e 27·8	30·3
	N. 49·5	318	—	—	—	—	e 24·8	29·0
Uccle	49·9	317	e 9 3	- 3	e 16 13	- 5	e 24·8	—
Paris	50·9	313	e 9 8	- 4	e 16 35	+ 5	31·8	—
Bidston	54·5	318	24 57	?L	30 27	?	(25·0)	37·0
Edinburgh	54·6	320	—	—	17 21	+ 5	34·8	39·4

De Bilt gives also ePR, E = + 11m.2s., eSR, E = + 19m.48s., T₀ = 20h.32m.30s.

Oct. 24d. Records also at 2h. (near Batavia), 3h. (Rocca di Papa), 5h. (Colombo, Batavia, and Helwan), 8h. (Rio Tinto), 11h. (Edinburgh), 14h. and 23h. (Apia).

Oct. 25d. 13h. 50m. 25s. Epicentre 40°·0N. 14°·0E. (as on Oct. 22d.).

A = +·743, B = +·185, C = +·643; D = +·242, E = -·970,
G = +·624, H = +·155, K = -·766.

The identity of the origin is not very clearly indicated, though it fits as well as any other. It would seem that several records are one minute in error. The interval from Oct. 22d. 6h. 5·5m. is 3d. 7h. 44·9m. = 228 x 21·0m. - 3·1m.

	Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Pompeii	0·8	29	2 5	+ 113	3 3	+ 161	—	3·6
Rocca di Papa	2·0	331	1 25	+ 54	1 57	+ 62	—	3·2
Florence	4·3	332	1 5	- 2	—	—	—	1·4
Milan	6·5	328	3 59	?L	4 47	?	(4·0)	6·0
Moncalieri	6·8	319	2 0	+ 16	2 45	- 20	—	4·0
Marselles	7·2	300	3 12	?S	(3 12)	- 3	(4·2)	—
Zurich	E. 8·3	334	2 9	+ 3	2 58	- 47	—	3·7
	N. 8·3	334	2 9	+ 3	2 57	- 48	—	3·7
Vienna	8·4	11	2 28	+ 21	(e 3 40)	- 7	e 3·7	4·2
Algiers	9·1	253	e 6 10	?L	—	—	(e 6·2)	—
Besancon	9·2	334	3 22	+ 63	4 5	- 3	4·6	—
Strasbourg	9·6	334	2 24	0	e 4 2	- 16	—	6·9
Paris	12·0	321	e 4 19	?S	(4 19)	- 60	7·0	—
Uccle	12·7	331	—	—	e 5 35	- 2	—	—
De Bilt	13·5	336	—	—	—	—	6·3	7·2
Hamburg	13·8	350	—	—	—	—	e 6·6	9·7
Edinburgh	19·5	330	—	—	—	—	10·6	—

Additional records: Florence gives P_f = + 55s. and P = + 1m.8s. Zurich ePZ = + 2m.10s., T₀ = 13h.53m.22s. Vienna P = + 2m.52s., MZ = + 4·3m. Paris eS = + 5m.53s., T₀ = 13h.56m.18s. De Bilt MN = + 7·0m. Hamburg MN = + 9·5m.

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Oct. 25d. 17h. 10m. 0s. (I) } Epicentre 37°-0N. 26°-0E. (as on 1919 April 5d.).
 17h. 53m. 20s. (II) }

A = +.718, B = +.350, C = +.602; D = +.438, E = -.899;
 G = +.541, H = +.263, K = -.799.

The interval is near 42-0m.

		Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
				m. s.	s.	m. s.	s.	m.	m.
I Athens		2.0	301	0 44	+13	—	—	1.1	1.5
II		2.0	301	0 45	+14	—	—	1.1	1.2
I Helwan	E.	8.3	146	2 36	+30	—	—	—	12.4
I	N.	8.3	146	2 54	+48	—	—	—	5.8
I Pompeii		9.7	296	2 27	+1	4 8	-13	6.0	7.0
II		9.7	296	3 38	?S	(3 38)	-43	(6.1)	—
I Rocca di Papa		11.3	299	2 47	-2	6 0	?L	(6.0)	—
II		11.3	299	2 48	-1	—	—	—	3.9
I Budapest		11.6	337	—	—	—	—	6.7	—
I Lemberg		12.9	355	e 3 6	-6	e 4 54	-48	e 7.0	8.3
II		12.9	355	—	—	e 5 4	-28	7.8	8.4
I Florence		13.1	306	3 23	+9	—	—	6.0	9.0
I Vienna		13.2	331	13 19	+3	i 5 5	-44	i 6.1	9.7
II		13.2	331	3 18	+2	—	—	—	9.3
I Milan		15.2	309	21 26	?	—	—	—	24.3
I Moncalieri		15.9	306	i 3 52	+1	7 0	+7	8.8	13.5
II		15.9	306	e 3 32	-19	—	—	11.9	—
I Zurich		16.5	315	e 4 0	+1	e 7 20	+13	—	—
I Algiers		16.9	298	4 12	+8	7 28	+12	11.0	—
I Strasbourg		17.6	317	i 4 20	+8	i 7 38	+7	9.0	12.6
II		17.6	317	e 5 18	+66	—	—	—	—
I Besancon		17.9	311	4 21	+5	7 47	+9	11.0	—
I Algiers		18.3	276	4 22	+1	7 46	-1	12.5	15.5
I Barcelona		18.9	291	4 28	0	7 56	-4	9.6	15.4
I Hamburg		19.9	332	e 4 42	-2	i 8 26	+5	—	16.3
II		19.9	332	i 4 43	-1	e 8 28	+7	—	16.3
I Tortosa		20.1	289	4 39	-3	8 24	-1	9.8	14.6
I Uccle		20.7	319	e 4 48	-1	8 38	0	e 11.0	13.9
II		20.7	319	e 4 50	+1	—	—	—	—
I Paris		20.7	312	e 4 51	+2	i 8 40	+2	11.0	15.0
II		20.7	312	e 6 56	+127	e 8 40	+2	13.7	—
I De Bilt		21.0	322	4 56	+3	8 48	+4	11.0	15.2
II		21.0	322	e 5 0	+7	—	—	—	15.1
I Kew		23.5	316	—	—	—	—	—	9.0
I Granada		23.5	280	5 31	+8	e 9 13	-22	—	—
I Oxford		24.2	316	5 24	-6	—	—	—	16.7
I San Fernando	N.	25.7	279	5 42	-3	10 12	-4	—	18.0
I Bidston		25.9	319	11 18	?S	(11 18)	+58	(15.5)	20.5
I Eskdalemuir		26.9	322	5 50	-7	10 45	+6	13.8	—
I Coimbra		26.9	288	6 10	+13	—	—	i 20.8	21.3
I Edinburgh		27.2	323	5 52	-8	10 48	+3	—	10.9
I Cape Town		71.3	186	37 48	?L	—	—	(37.8)	44.0

Additional records: Athens (I) gives iP = +47s., T₁ = 17h. 10m. 11s. Athens
 (II) iP = +47s., T₁ = 17h. 53m. 32s. Moncalieri (I) MN = +10.8m., T₁ =
 17h. 9m. 59s. Hamburg (I) iSE = +8m. 28s., MZ = +13.6m., MN =
 +13.7m., T₁ = 17h. 10m. 2s., (II) MN = +13.6m. Paris iP = +4m. 56s.,
 T₁ = 17h. 10m. 5s. De Bilt m = +8m. 52s., MN = +12.4m., T₁ = 17h. 10m. 6s.
 San Fernando SE = +10m. 0s., MN = +19.0m., T₁ = 17h. 10m. 18s. Coimbra
 has been corrected by +10m. Edinburgh SR₁ = +11m. 15s.

Oct. 25d. Records also at 3h. (San Fernando), 5h. (Helwan), 11h., 16h., 17h.
 (8), 18h. (3), and 19h. (Athens), 20h. (Athens (3) and San Fernando),
 21h. (Athens), 22h. (San Fernando).

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Oct. 26d. 18h. 4m. 32s. (I) | Epicentre 2°·1N. 127°·8E. (as on Oct. 23d.).
18h.50m.46s. (II)

A = -·612, B = +·790, C = +·037 ; D = +·790, E = +·613 ;
G = -·022, H = +·029, K = -·999.

The intervals from Oct. 23d. 16h. 3·1m. are 212 X 21·0m. -10·6m. and 214 X 21·0m. -6·3m.

	Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
	m.	s.	m.	s.	m.	s.	m.	m.
I Manila	14·2	332	e 3 26	- 3	—	—	—	7·4
II	14·2	332	e 3 26	- 3	6 14	+ 1	7·0	—
I Batavia	22·5	248	5 5	- 6	e 9 26	+11	—	10·8
II	22·5	248	i 5 10	- 1	9 25	+10	—	11·0
II Riverview	42·1	150	—	—	e 17 14	?SR ₁	—	27·4
II Honolulu	74·5	69	—	—	—	—	38·2	45·7
II Helwan	94·5	300	32 14	?SR ₁	—	—	(44·2)	—
II De Bilt	107·6	326	—	—	—	—	e 55·2	—
II Uccle	108·6	325	—	—	—	—	e 55·2	—

Additional records : Manila II gives MN = +8·9m, T₀ = 18h.50m.42s. Batavia gives T₀ = 18h.50m.37s., and Epicentre 2°·3N. 129°·0E. which would probably do as well or better for this earthquake and for that of Oct. 23d.

Oct. 26d. Records also at 3h. (Marseilles and near Florence and Rocca di Papa), 6h. and 7h. (2) (near Athens), 8h. (Helwan), 9h. (2) and 11h. (near Athens), 14h. (Riverview), 15h. (Helwan), 16h. (Bidston), 20h. (Lick), 21h. (San Fernando), 22h. (Berkeley).

Oct. 27d. 3h. 40m. 48s. Epicentre 16°·0S. 69°·5W.

A = +·337, B = -·900, C = -·276 ; D = -·937, E = -·350 ;
G = -·097, H = +·258, K = -·961.

A focal depth 0·040 is assumed, as suggested by the Osaka residual.

	Corr. for Focus	Δ	Az.	P.	O-C.	S.	O-C.	L.	M.	
		m.	s.	m.	s.	m.	s.	m.	m.	
Balboa Hts.	N.	-2·3	26·9	338	5 0	-34	9 37	-18	14·0	9·9
Washington		-4·4	55·4	353	11 42?	?PR ₁	19 12?	?	e 29·2	—
Ithaca		-4·6	58·8	355	9 42	+ 8	e 17 36	+25	27·5	—
Ann Arbor		-4·6	59·8	349	—	—	—	—	19·2	—
Chicago		-4·6	60·2	346	9 49	+ 6	17 34	+ 5	26·2	—
Toronto		-4·6	60·4	352	10 18	+33	18 30	+59	29·7	31·7
Ottawa		-4·6	61·7	356	10 2	+ 9	18 8	+21	e 27·2	—
Cape Town		-5·1	79·5	123	21 24	?S	(21 24)	+ 5	—	—
Victoria		-5·1	80·4	328	—	—	—	—	41·5	—
Algiers		-5·3	86·3	50	—	—	e 23 22	+47	48·2	24·7
Bidston		-5·4	89·5	34	8 42	?	20 36	?	—	41·8
Oxford		-5·4	89·8	35	—	—	23 20	+ 8	42·2	—
Paris		-5·4	90·7	39	e 13 31	+41	e 23 59	+37	41·2	49·2
Edinburgh		-5·4	90·7	31	—	—	23 30	+ 8	—	—
Moncalieri		-5·5	92·5	44	e 9 7	?	23 17	-24	45·1	57·2
Uccle		-5·5	92·6	38	—	—	23 38	- 4	e 44·2	—
De Bilt	E.	-5·5	93·5	37	—	—	e 23 47	- 5	e 45·2	48·8
	N.	-5·5	93·5	37	—	—	—	—	e 44·2	48·7
Honolulu		-5·5	94·5	291	24 6	?S	(24 6)	+ 3	—	26·4
Rocca di Papa		-5·5	94·9	48	—	—	e 27 42	?	—	—
Hamburg		-5·5	96·8	37	—	—	e 24 12	-15	e 49·2	56·2
Lemberg		-5·7	104·4	42	e 23 6	?	23 42	-121	—	24·1
Helwan		-5·7	107·1	63	—	—	25 12	-57	—	—
Osaka		—	150·9	314	19 14	[-44]	—	—	20·0	20·2
Manila		—	169·9	263	20 12	[- 3]	—	—	—	—

Additional records : Ithaca gives eE = +12m.11s, T₀ = 3h.40m.39s. Toronto i = +6m.42s., T₀ = 3h.40m.54s. Victoria L = +42·8m. Paris MN = +52·2m. De Bilt eSR₁ = +30m.36s. Lemberg +26m.24s.

Oct. 27d. Records also at 0h. (San Fernando and near Marseilles), 3h. (near Athens), 8h. (Helwan), 11h. (near Athens), 13h. (Port au Prince), 18h. (Lick), 19h. (near Athens), 21h. (San Fernando).

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Oct. 28d. 7h. 23m. 20s. Epicentre 13°-0N. 83°-0W. (as on 1919 July 22d.).

A = +.119, B = -.967, C = +.225.

	Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Washington	26.4	10	5 55?	+ 3	10 25?	- 5	—	—
Chicago	29.1	353	—	—	11 40	+21	—	—
Toronto	30.8	5	—	—	—	—	18.4	25.9
Ottawa	E. 33.0	9	—	—	e 13 4	+40	e 17.0	—
Paris	77.3	42	—	—	—	—	39.7	—
Uccle	78.3	41	—	—	e 22 28	+24	e 38.7	—
De Bilt	78.6	39	—	—	—	—	e 33.7	40.8

Additional records: Toronto gives L = +25.0m. De Bilt MN = +44.1m.

Oct. 28d. Records also at 1h. (Mendoza), 13h. (Nagasaki), 16h. (Cape Town), 17h. (Helwan and Batavia), 18h. (Batavia and Mendoza), 19h. (Athens), 23h. (San Fernando).

Oct. 29d. Records at 1h. (Apia, Taihoku, and Lick), 2h. (Kobe (4) and Lick), 12h. (Vienna and Manila), 14h. (Simla and Bombay), 16h., 18h., and 21h. (near Athens).

Oct. 30d. Records at 2h. (San Fernando), 14h. (Dehra Dun), 22h. (near Taihoku), 23h. (De Bilt).

Oct. 31d. 15h. 36m. 20s. Epicentre 27°-0S. 31°-5E.

A = +.760, B = +.466, C = -.454; D = +.522, E = -.853;

G = -.387, H = -.237, K = -.891.

	Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Cape Town	13.2	235	3 16	0	5 46	- 3	8.7	11.2
Mauritius	E. 25.1	80	13 10	?L	—	—	(13.2)	25.2
	N. 25.1	80	13 40	?L	—	—	25.2	26.5
Helwan	E. 56.9	0	18 58	?S	(18 58)	+73	—	48.5
	N. 56.9	0	16 58	?S	(16 58)	-47	—	61.6
Colombo	57.7	61	35 40	?L	42 10	?	46.0	52.7
Kodalkanal	58.0	56	42 22	?	—	—	46.0	49.1
Algiers	69.2	337	e 10 49	-23	17 34	?PR ₁	43.7	50.7
San Fernando	E. 72.8	330	17 28	?	—	—	45.2	52.7
	N. 72.8	330	17 28	?	—	—	46.7	49.2
Florence	73.2	347	25 40	?SR ₁	—	—	—	36.7
Rio Tinto	74.0	330	19 40	?S	(19 40)	-94	—	50.7
Batavia	74.2	89	e 12 4	+21	e 17 23	?	—	19.8
Moncalleri	75.2	343	e 14 50	?PR ₁	28 17	?SR ₁	44.8	57.9
Coimbra	76.8	330	e 18 38	?	35 2	?L	e 40.7	50.7
Strasbourg	78.6	346	e 12 7	- 4	e 22 0	- 7	e 43.7	58.8
Paris	80.2	341	e 12 21	+ 1	e 22 29	+ 4	e 38.7	61.7
Uccle	81.5	344	e 12 34	+ 6	—	—	e 38.7	43.8
De Bilt	82.4	345	e 16 4	?PR ₁	e 20 58	-112	e 41.7	44.0
Hamburg	82.8	349	e 12 58	+23	—	—	e 41.7	61.7
Kew	83.3	340	8 40	?	—	—	—	56.7
Oxford	83.9	340	—	—	20 40	-148	39.0	—
Bidston	85.9	340	26 40	?SR ₁	33 40	?L	(33.7)	55.2
Eskdalemuir	87.5	341	21 0	?S	29 13	?SR ₁	40.1	—
Edinburgh	88.0	341	21 10	?S	29 16	?SR ₁	40.7	42.7
Melbourne	90.1	134	16 4	?PR ₁	—	—	—	43.2
Manila	96.1	78	e 14 28	+38	—	—	—	—
Riverview	96.6	134	e 16 12	—	e 21 59	—	e 28.0	36.3
Sydney	96.6	134	16 22	?PR ₁	—	—	40.9	43.5
Lick	155.1	301	1 45 59	?SR ₁	—	—	—	—

Additional records: Moncalleri gives MN = +57.8m. Coimbra ePN = +17m.40s. (Milne), P = +19m.30s., I = +36m.26s. Uccle MN = +51.4m. De Bilt e = +28m.30s., eE = +33m.2s., eN = +33m.9s., MN = +50.2m. Hamburg MN = +53.7m. Edinburgh SR₁ = +33m.28s. Riverview MN = +42.6m., T₀ = 15h.45m.12s.

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Oct. 31d. 19h. 2m. 10s. Epicentre 24°0N. 116°5E. (as on 1918 Feb. 13d.).

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

	Δ	Az.	P.		O-C.		S.	O-C.		L.	M.
			m.	s.	s.	m. s.		s.	m.		
Hokoto	2.8	100	e	0 30	-14	—	—	—	—	1.0	—
Taihoku	4.7	76	1	9	4	—	—	—	—	1.6	2.3
Zi-ka-wei	8.4	30	e	2 37	+30	e	4 25	+38	(4.4)	—	—
Manila	10.3	155	e	2 29	-5	4	42	+5	5.2	6.6	—
Osaka	19.6	53	4	21	-15	—	—	—	—	—	15.9
Tokyo	23.2	54	5	1	-18	9	30	+1	—	—	—
Batavia	31.7	199	e	7 0	+16	—	—	—	e	23.0	—
Sydney	66.5	149	19	33	?S	(19 38)	—	-6	—	37.8	—
Riverview	66.5	149	—	—	—	e	18 44	-60	—	36.4	—
Mauritius	72.1	237	34	33	?L	—	—	—	(34.6)	—	—
Helwan	74.4	296	20	50	?S	(20 50)	-29	—	—	—	—
Honolulu	77.6	72	e	33 8	?	—	—	—	40.8	44.1	—
Vienna	78.7	320	12	56	+45	—	—	—	e	44.8	46.3
Hamburg	80.0	325	e	13 2	+43	—	—	—	e	43.8	46.7
De Bilt	83.3	325	—	—	—	—	—	—	e	42.8	49.2
Strasbourg	83.7	321	—	—	—	—	—	—	e	46.8	50.3
Florence	83.8	317	—	—	—	—	—	—	—	—	47.8
Uccle	84.4	324	—	—	—	—	—	—	e	44.8	49.2
Edinburgh	85.2	330	—	—	—	—	—	—	—	43.8	51.6
Eskdalemuir	85.6	330	—	—	—	—	—	—	—	42.5	48.8
Paris	86.5	323	—	—	—	—	—	—	—	47.8	49.8
Kew	86.5	326	46	50	?L	—	—	—	—	(46.8)	54.8
Bidston	86.7	329	25	20	?L	37 26	?L	—	(37.4)	52.5	—
Oxford	86.8	326	—	—	—	—	—	—	—	43.5	54.3
Barcelona	90.8	317	—	—	—	—	—	—	e	52.1	57.6
Coimbra	97.9	321	—	—	—	—	—	—	e	55.8	—
Rio Tinto	98.3	319	57	50	?L	—	—	—	(57.8)	65.8	—
San Fernando	E. 99.0	317	57	20	?L	—	—	—	—	59.2	60.8

Additional records: Manila gives MN = +6.0m., T₀ = 19h.1m.56s. Osaka
MN = +14.3m. Riverview MN = +37.5m. Helwan PE = +23m.50s.
(?SR). Hamburg MN = +46.9m., MZ = +51.6m. San Fernando PN
= +56m.50s., MN = +62.3m.

Oct. 31d. 23h. 34m. 0s. A shock near Kobe, for which the records (not easily reconciled) are: Kobe PSE = +23s., PSN = +28s., LEN = +50s., ME = +52s., MN = +53s. Osaka PS = +1m.39s., L = +2.1m., ME = +2.8m., MN = +3.0m. Tokyo P = +3m.12s., S = +4m.14s. Zi-ka-wei e = +5m.5s.

Oct. 31d. Records also at 0h. (Nagasaki), 1h. (near Kobe), 4h. (San Fernando), 14h. (near Mizusawa), 17h. (Azores and near Mizusawa), 18h. (Simla and Moncalieri), 21h. (near Athens (2)).

Nov. 1d. Records at 0h. (Helwan), 1h. (Athens (2) and San Fernando), 5h. (Berkeley, Toronto, and Taihoku), 6h. (San Fernando), 10h. (Helwan), 14h. (Athens), 16h. (Apia), 17h. (Athens), 20h. (San Fernando), 22h. (Tokyo), 23h. (Athens and Kobe).

Nov. 2d. 19h. 30m. 24s. Epicentre 65°0N. 41°0W.

A = +319, B = -277, C = +906; D = -656, E = -755;
G = +624, H = -594, K = -423.

	Δ	Az.	P.		O-C.		S.	O-C.		L.	M.
			m.	s.	s.	m. s.		s.	m.		
Edinburgh	20.3	98	4	48	+3	8	36	+7	9.6	11.1	—
Eskdalemuir	20.7	100	(4 48)	—	-1	4	48	+?P	9.0	—	—
Kew	24.7	103	—	—	—	—	—	—	—	—	11.6
De Bilt	26.4	97	—	—	—	—	—	—	e	12.1	14.7
Uccle	27.1	99	e	5 58	-1	—	—	—	e	11.6	—
Hamburg	27.5	90	e	6 0	-3	—	—	—	e	14.6	18.5
Paris	27.9	104	—	—	—	—	—	—	e	13.6	—
Coimbra	31.0	129	12	36	?S	(12 36)	+45	—	—	—	—
San Fernando	35.2	129	14	6	?L	—	—	—	(14.1)	17.6	—
Helwan	55.8	92	37	36	?L	—	—	—	—	(37.6)	—

De Bilt gives MN = +16.3m.

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Nov. 2d. Records also at 4h. (Rocca di Papa), 5h. (Athens (4)), 8h. (Helwan and Apia), 11h. (Athens and Manila), 13h. (Apia), 15h. (Rocca di Papa, Barcelona, Paris, Hamburg, Uccle, De Bilt, Kew, Bidston, Eskdalemuir, Edinburgh, and Helwan), 21h. (Helwan).

Nov. 3d. Records at 2h. (Helwan), 8h. (Taihoku), 10h. (Kobe and Osaka), 13h. (Apia), 14h. (Manila), 22h. (Lick (2) and Taihoku), 23h. (Helwan).

Nov. 4d. Records at 0h. (San Fernando), 3h. (Helwan), 5h. (Taihoku), 6h. and 8h. (Helwan), 13h. (Helwan, Batavia, Osaka, Manila, and Zi-ka-wei), 14h. (De Bilt), 15h. (Batavia, Manila (2) and Mizusawa), 17h. (Helwan), 19h. (Athens), 21h. (San Fernando).

Nov. 5d. Records at 0h. (Zi-ka-wei and Lick (2)), 5h. (Athens), 6h. (Kobe), 8h. (Edinburgh, Helwan and De Bilt), 9h. (Helwan), 14h. (Zi-ka-wei), 15h. (Helwan, Kobe, and Taihoku), 16h. (Taihoku), 20h. (Manila, Sydney, and Honolulu), 21h. (Uccle, De Bilt, and Bidston), 22h. (Simla).

Nov. 6d. 7h. 13m. 10s. Epicentre 13°·5N. 59°·0W.

$$A = +.501, B = -.834, C = +.233; \quad D = -.357, E = -.515; \\ G = +.120, H = -.200, K = -.972.$$

A focal depth of 0·010 radius has been assumed, since although there is no evidence from the Antipodes, that of other stations seems clear. Six stations (Vieques, La Paz, Coimbra, Uccle, De Bilt, Hamburg) give closely consistent determinations of T_0 . La Paz is in azimuth nearly opposite the mean of Vieques and European stations, and without an allowance for depth of focus all the values of Δ would be too large.

		Corr.		P.	O-C.		S.	O-C.		L.	M.	
		Focus	Δ		Az.	m.		s.	m.			s.
Vieques	N.	-0·1	7·8	308	1	50	-7	3	13	-16	4·2	4·9
Georgetown	E.	-0·7	30·0	331	6	19	-2	12	26	+64	—	—
	N.	-0·7	30·0	331	6	24	+3	12	15	+53	—	—
Washington		-0·7	30·0	331	—	—	—	e 10	50	-32	—	—
La Paz		-0·7	31·3	196	6	32	-2	i 11	42	-2	15·0	18·3
Ottawa		-0·8	34·9	340	—	—	—	—	—	—	13·8	—
Toronto		-0·8	34·9	334	—	—	—	—	—	—	14·6	—
Ann Arbor	N.	-0·8	35·9	329	2	38	?	—	—	—	13·8	15·4
Chicago		-0·8	37·6	323	8	15	+47	12	54	-27	15·3	—
Coimbra		-1·0	51·6	49	e 8	50	-21	15	50	-36	23·3	24·8
Rio Tinto		-1·0	52·3	51	18	50	?S	(18	50)	+15	—	23·8
San Fernando	E.	-1·0	52·3	54	18	50	?S	(18	50)	+15	—	26·3
	N.	-1·0	52·3	54	18	14*	?S	(16	14)	-21	—	28·8
Bidston		-1·2	59·2	37	18	50	?S	(18	50)	+51	—	29·8
Oxford		-1·2	59·7	38	—	—	—	—	—	—	—	30·4
Eskdalemuir		-1·2	59·8	33	—	—	—	(18	50)	+44	18·8	—
Kew		-1·2	60·2	38	25	50	?L	—	—	—	(25·8)	37·8
Paris		-1·2	61·3	41	—	—	—	e 17	50	-34	27·8	34·8
Uccle		-1·2	62·9	40	e 10	20	-3	18	41	-3	e 24·8	—
Victoria		-1·2	63·0	319	34	41	?L	—	—	—	(34·7)	38·6
De Bilt		-1·2	63·6	39	10	27	-1	18	53	0	e 25·8	33·0
Strasbourg		-1·2	64·6	42	—	—	—	e 18	50	-16	e 28·8	—
Hamburg		-1·2	66·8	38	e 10	50	+1	e 19	32	0	e 26·8	34·8

Additional records: Vieques gives LE = +4·3m., T_0 = 7h.13m.18s. Ottawa
 LE = +19·8m. Toronto eL = +25·9m. Chicago L = +20·8m., T_0
 = 7h.15m.34s. Paris MN = +27·8m. De Bilt MN = +28·1m., T_0 =
 7h.13m.13s. Hamburg MN = +36·8m., T_0 = 7h.13m.18s.

Nov. 6d. Records also at 1h. (Mizusawa), 5h. (Taihoku), 6h. (Mizusawa), 13h. (Kobe, Osaka, Mizusawa, Manila, and Zi-ka-wei), 16h. (Manila, Zi-ka-wei, Taihoku, and Osaka), 17h. (De Bilt, Honolulu, Helwan, Hamburg, and Uccle), 18h. (Zi-ka-wei).

Nov. 7d. Records at 7h. (Edinburgh), 10h. (Simla), 13h. (Florence), 15h. (Helwan), 17h. (Edinburgh), 22h. (San Fernando).

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Nov. 8d. Records at 3h. (Port au Prince, Vieques, and La Paz), 4h. (La Paz), 7h. (Manila), 8h. (Osaka), 12h. (Batavia), 17h. (Zi-ka-wei), 21h. (La Paz).

Nov. 9d. Records at 2h. (San Fernando), 7h. (Manila and Batavia), 8h. (Zi-ka-wei), 9h. and 11h. (La Paz).

Nov. 10d. Records at 3h. (San Fernando), 8h. (Kingston), 9h. (Helwan), 11h. (Manila and Florence), 12h. (La Paz), 18h. (Berkeley), 20h. (San Fernando).

Nov. 11d. Records at 7h. and 15h. (Helwan), 19h. (San Fernando), 20h. (La Paz).

Nov. 12d. Records at 0h. (Helwan and La Paz), 1h. (La Paz), 2h. (Rocca di Papa), 4h. (Zurich and Vienna), 8h. (Helwan), 10h. (Zi-ka-wei), 11h. (Florence, Mizusawa, and Osaka), 13h. (Florence, La Paz, and Helwan), 14h. (La Paz, Mizusawa, Osaka, and Tokyo), 16h. (Mizusawa, Ootomari, and San Fernando).

Nov. 13d. Records at 5h. (Taihoku), 6h. (San Fernando and Batavia), 7h. (Melbourne and La Paz), 8h. (Tokyo), 13h. (Paris), 14h. (Zi-ka-wei), 15h. (Apia and Taihoku), 16h. (Azores), 20h. (Lick), 21h. (Batavia).

Nov. 14d. 6h. 38m. 35s. Epicentre $11^{\circ}0'N$. $108^{\circ}0'W$.

$A = -.303$, $B = -.934$, $C = +.191$; $D = -.951$, $E = +.309$;
 $G = -.059$, $H = -.182$, $K = -.982$.

	Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
			m. s.	s.	m. s.	s.	m.	m.
Tucson	21.4	353	10 1	?L	—	—	(10.0)	10.8
Chicago	35.5	28	11 6	?	18 3	?L	(18.0)	—
Victoria	39.5	343	18 31	?L	—	—	20.0	24.0
La Paz	48.1	125	8 55	0	15 55	0	24.4	25.9
Apia	67.9	251	—	—	21 25	+84	—	—
De Bilt	95.0	35	—	—	—	—	e 47.4	53.4

Apia only gives its record as 7h.

Nov. 14d. Records also at 1h. (Helwan), 7h. (Helwan, Granada, San Fernando, Uccle, and De Bilt), 8h. (Rio Tinto, La Paz, (2), and Athens), 13h. (Batavia), 15h. (Tokyo), 17h. (Zi-ka-wei, Manila, and Taihoku), 18h. (De Bilt and Edinburgh).

Nov. 15d. Records at 4h. (Helwan), 6h. (Calcutta, Colombo, and Kodaikanal), 8h. (Taihoku), 11h. (Helwan), 13h. (Helwan and La Paz), 17h. (San Fernando), 22h. (Apia, Florence, and La Paz), 23h. (San Fernando).

Nov. 16d. 3h. 5m. 33s. Epicentre $15^{\circ}5'N$. $109^{\circ}0'E$.

$A = -.314$, $B = +.911$, $C = +.267$; $D = +.946$, $E = +.326$;
 $G = -.087$, $H = +.253$, $K = -.964$.

	Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
			m. s.	s.	m. s.	s.	m.	m.
Manila	11.6	92	e 2 51	- 2	—	—	—	—
Zi-ka-wei	19.4	34	—	—	e 8 11	+ 1	—	—
Batavia	21.8	186	15 5	+ 2	9 5	+ 4	—	12.1
Colombo	29.8	257	15 27	?L	—	—	(15.4)	18.4
Helwan	71.9	297	21 27	?S	(21 27)	+38	—	—
La Paz	177.1	250	20 12	[- 5]	—	—	58.9	64.6

Helwan gives PE = +25m.27s.

Nov. 16d. Records also at 4h. (Zurich), 6h. (Batavia), 7h. (La Paz), 10h. (Taihoku), 17h. (Tokyo and San Fernando), 20h. (San Fernando).

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Nov. 11c. Records at 0h. (La Paz), 4h. (Uccle), 19h. (Rocca di Papa and La Paz), 21h. (Helwan), 22h. (San Fernando and Manila).

Nov. 18a. 8m. 35s. Epicentre 4°58. 131°0E. (as on 1919-June 28d.).

1-654, B = +.752, C = -.078; D = +.755, E = +.656; G = +.051, H = -.059, K = -.997.

	Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
	m.	s.	m.	s.	m.	s.	m.	m.
Madrid	21.5	333	e 5 6	+ 7	8 25	-30	9.4	9.7
Barcelona	24.1	287	15 21	- 8	9 42	- 4	e 13.4	10.8
Torino	30.9	345	6 45	+ 8	(11 42)	- 8	11.7	—
Alcala	31.2	168	—	—	10 49	-65	14.1	16.2
Sydney	34.9	150	11 43	?S	(11 43)	-71	17.6	19.6
Melbourne	35.7	161	12 1	?S	(12 1)	-65	19.7	21.4
Zurich	36.9	346	e 7 23	- 1	e 13 54	+32	—	—
Uccle	39.3	6	7 42	- 7	—	—	13.9	15.3
Osaka	39.5	6	7 50	- 1	—	—	13.8	14.5
Tokyo	41.0	11	10 50	?	14 8	-13	—	—
Miyazaki	44.6	12	8 30	0	15 10	0	—	—
Cebu	49.7	306	9 13	+ 8	16 25	+10	—	—
Cebu	52.4	282	9 25	+ 3	16 25	-24	34.9	35.4
Sing	62.4	310	18 7	?S	(18 7)	-46	—	37.2
Manila	74.2	66	e 24 19	?SR ₁	—	—	34.0	51.7
Manila	100.6	298	18 25	?PR ₁	—	—	—	—
Manila	103.9	41	24 29	?S	(24 29)	-123	47.1	56.2
Manila	105.9	233	51 31	?L	—	—	(51.5)	—
Manila	109.6	320	e 19 25	?PR ₁	—	—	—	—
Manila	111.6	326	e 19 43	?PR ₁	e 29 7	+85	e 57.4	66.4
Rocca di Papa	113.9	314	—	—	—	—	e 59.6	63.2
De Bilt	E. 114.9	325	—	—	—	—	e 58.4	60.5
De Bilt	N. 114.9	325	—	—	—	—	e 54.4	59.2
Manila	117.3	331	22 25	?PR ₁	32 37	?	—	66.1
Paris	117.9	324	i 40 16	?	—	—	62.4	—
Alcala	122.5	310	20 35	?PR ₁	—	—	—	—
Chicago	129.3	36	22 32	?PR ₁	—	—	59.4	—
San Fernando	129.4	315	8 25	?	—	—	—	—
Manila	132.5	31	—	—	—	—	46.4	—
Osaka	132.9	26	i 22 52	?PR ₁	—	—	39.4	—
Osaka	137.2	31	e 23 9	?PR ₁	—	—	—	—
Washington	137.2	31	e 22 25	?PR ₁	—	—	—	—
La Paz	151.7	138	19 46	[-12]	34 1	?	71.6	74.7

Additional records : Manila gives MN = +10.0m., T₀ = 3h.59m.34s., Batavia
 1-18m. 28s., Epicentre 5°6S. 131°2E., Adelaide PR₁ = +8m.19s.
 Chicago S = +15m.31s., Melbourne S = +16m.49s., SR₁ = +18m.7s.
 Manila N = +17.0m., Mizusawa PN = +8m.37s., T₀ = 3h.58m.40s.
 Manila SN = +16m.31s., Helwan PN = +20m.25s., Victoria S =
 +18m.4. (FSR₁), De Bilt ePR₁E = +20m.10s., Chicago L = +41.4m.
 and +14.4m., Toronto L = +32.7m. and +47.7m., La Paz iP =
 +18m. (O-C = [-2]).

191a. Nov. 18d. 21h. 54m. 38s. Epicentre 39°6N. 27°7E.

1-682, B = +.358, C = +.637; D = +.465, E = -.885; G = +.564, H = +.296, K = -.770.

	Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
	m.	s.	m.	s.	m.	s.	m.	m.
Alcala	3.5	242	10 52	- 3	11 37	0	11.7	1.8
Batavia	10.0	324	2 34	+ 4	—	—	—	—
Paris	10.1	281	i 2 26	- 5	i 4 11	-21	e 6.2	7.4
De Bilt	10.2	162	2 46	+13	—	—	—	11.0
De Bilt	N. 10.2	162	3 4	+31	—	—	—	11.4
London	10.5	347	e 2 52	+15	e 5 4	+21	e 6.4	7.8
Paris	11.5	301	2 43	- 9	(e 5 4)	- 3	e 5.1	7.0
Rocca di Papa	11.6	285	2 50	- 3	5 8	- 1	7.0	8.3
Osaka	11.8	320	3 1	+ 5	5 4	-10	—	7.5
Osaka	12.9	294	3 23	+11	5 43	+ 1	—	7.5
Manila	15.7	296	13 43	- 5	16 53	+ 5	8.6	10.0
Manila	15.8	306	e 3 49	0	i 7 0	+10	—	—
Manila	16.8	309	4 1	- 1	7 24	+11	9.4	10.1

Continued on next page.

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	Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Marseilles	17.1	290	4 12	+ 6	7 29	+ 9	11.2	12.5
Besancon	17.4	303	4 10	+ 0	7 27	+ 0	10.4	—
Hamburg	18.4	325	e 4 29	+ 7	17 46	- 3	e 9.4	11.2
Barcelona	19.4	284	i 4 27	- 7	18 3	- 7	8.7	13.4
Algiers	19.5	269	i 4 33	- 2	8 13	0	9.5	13.4
Uccle	19.8	312	i 4 36	- 3	18 19	0	10.1	11.7
De Bilt	19.9	316	i 4 42	+ 2	18 23	+ 2	9.1	11.6
Paris	20.1	305	i 4 42	+ 0	18 26	+ 1	10.4	11.4
Tortosa	20.7	282	4 45	- 4	8 13	-57	9.2	14.1
Kew	22.7	310	8 22	?S	(8 22)	-57	—	16.4
Oxford	23.4	311	—	—	9 28?	- 5	—	20.1
Granada	24.5	274	i 4 9	-84	18 42	-72	—	—
Stonyhurst	24.8	315	—	—	(18 22)	+23	(12.4)	15.1
Bidston	25.0	314	12 46	?L	16 28	—	(12.8)	33.4
Edinburgh	26.0	319	10 12	?S	(10 12)	-10	(14.7)	15.8
Dyce	26.2	322	e 5 44	- 6	i 10 10	-16	12.2	16.2
San Fernando	26.7	274	5 52	- 3	9 58	- 37	15.9	19.4
Rio Tinto	26.7	277	6 22	+2	—	—	—	23.4
Colimbra	27.5	283	(6 1)	-27	(10 31)	-19	10.5	11.0
Azores	41.1	284	13 10	?S	(13 10)	-72	—	36.1
Bombay	43.8	104	9 31	+67	—	—	—	28.3
Kodaikanal	52.9	110	24 34	?L	—	—	—	40.7
Colombo	56.9	111	18 22	?S	(18 22)	+37	35.9	36.6
Ottawa	70.9	314	—	—	i 20 45	+ 8	e 31.8	—
Ithaca E.	73.1	312	—	—	e 19 12	-111	29.2	—
Zi-ka-wei	73.3	62	—	—	e 32 10	?L	(e 32.2)	—
Toronto	74.0	315	11 40	- 2	20 10	-64	e 29.9	47.0
Cape Town	74.0	189	35 46	?L	39 34	?	43.3	44.6
Georgetown	75.6	310	—	—	—	—	43.0	—
Washington	75.6	310	—	—	21 38	+ 5	34.1	—
Ann Arbor E.	77.2	316	—	—	—	—	35.4	—
Chicago	79.7	318	—	—	21 28	-52	39.4	—
Tokyo	82.1	50	—	—	—	—	e 47.9	—
Manila	83.2	79	—	—	—	—	e 50.7	—
Batavia	85.6	102	e 12 14	-37	22 43	-43	36.4	25.2
Victoria	88.4	341	34 54	?	39 49	?	46.2	53.6
Berkeley	97.8	338	49 24	?L	—	—	49.4	—
Lick	98.0	338	—	—	—	—	e 52.5	—
Honolulu	118.8	6	65 58	?L	—	—	70.4	76.4
Melbourne	132.0	110	e 73 22	?L	—	—	83.4	85.9
Sydney	135.0	101	67 46	?L	—	—	78.0	81.5

Additional records: Athens gives P = +1m.4s., i = +1m.28s., MN = +2.4m., T₀ = 21h.54m.33s. Moncaleri MN = +10.4m., T₀ = 21h.54m.26s. Strasbourg MN = +10.0m., T₀ = 21h.54m.27s. Marseilles MN = +11.7m., T₀ = 21h.54m.46s. Barcelona PR₁ = +4m.58s., T₀ = 21h.54m.36s. Algiers MN = +17.0m., T₀ = 21h.54m.36s. Uccle MN = +11.6m., T₀ = 21h.54m.36s. De Bilt iSN = +8m.25s., T₀ = 21h.54m.44s. Edinburgh gives S as P and L as S. San Fernando MN = +16.8m., T₀ = 21h.55m.24s. Colombo S = +21m.22s. Ottawa L = +35.4m. and +44.4m., LE = +63.4m. Toronto E = +17m.52s. (?PR₁), eL = +46.2m. Georgetown LN = +38.8m., eLZ = +46.0m., LZ = +49.4m. Washington L = +38.9m. and +45.4m. Chicago L = +45.4m., L = +50.4m. Berkeley PE = +47m.5s.

Nov. 18d. Records also at 0h. (Sydney), 11h. (Tokyo), 14h. (Mauritius), 15h. and 16h. (Stonyhurst), 22h. (La Paz).

Nov. 19d. Records at 1h. (Algiers), 2h. (Stonyhurst), 14h. (Helwan), 19h. (Berkeley and Lick), 21h. (San Fernando).

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1919. Nov. 20d. 14h. 11m. 38s. Epicentre 13°0S. 166°8E.

(as on 1918 Dec. 14d.).

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

A depth of focus 0·040 has been assumed from the evidence of the antipodal stations, but seems rather too great. Probably 0·030, as on 1918 Dec. 14d., would suffice.

	Corr. for Focus	Δ	Az.	P.		O-C.		S.	O-C.		L.	M.
				m.	s.	s.	m. s.		s.	m.		
Apia	-1·7	20·8	95	i 4	31	+ 1	8	25	+21	9·4	—	—
Sydney	E. -2·1	25·2	213	5	10	- 8	8	52	-35	11·0	11·6	—
Melbourne	-2·7	31·5	214	(6	26)	+10	10	52	-21	14·2	17·2	—
Adelaide	-2·9	33·6	224	7	16	+41	11	40	- 6	15·2	18·2	—
Honolulu	-3·9	48·6	46	i 8	10	-21	15	40	+29	27·0	31·0	—
Manila	-4·3	53·2	300	e 9	3	+ 4	13	45	-140	16·1	16·8	—
Tokyo	-4·4	55·0	334	9	14	+ 3	14	21	-125	16·5	—	—
Osaka	-4·4	56·2	329	9	25	+ 6	(16	54)	+13	16·9	18·6	—
Kobe	-4·5	56·4	330	9	20	+ 1	(16	55)	+12	16·9	18·2	—
Mizusawa	E. -4·5	57·4	339	9	28	+ 3	17	27	+32	—	—	—
	N. -4·5	57·4	339	9	29	+ 4	17	7	+12	—	—	—
Taihoku	-4·5	58·3	311	9	33	+ 1	(17	15)	+ 9	17·2	—	—
Batavia	-4·6	59·4	270	9	51	+13	17	45	+26	23·0	—	—
Zi-ka-wei	-4·6	62·1	316	e 9	2	-54	18	9	+16	—	—	—
Otomari	-4·7	63·4	343	9	15	-48	—	—	—	—	—	—
Berkeley	-5·2	83·5	49	i 12	10	+ 1	(e 22	20)	+16	34·6	—	—
	Z. -5·2	83·5	49	i 12	11	+ 2	(e 22	17)	+13	—	—	—
Lick	-5·3	83·8	50	e 12	54	+44	e 23	22	+76	—	—	—
Calcutta	E. -5·3	84·6	295	12	16	+ 1	(22	40)	+25	22·6	—	—
	N. -5·3	84·6	295	12	22	+ 7	(22	34)	+19	22·6	—	—
Victoria	-5·3	86·9	36	12	37	+ 9	(22	27)	-15	e 45·2	25·9	—
Colombo	-5·4	88·7	277	(11	22)	-76	11	22	? P	21·8	22·2	—
Kodaikanal	-5·4	91·6	280	23	10	? S	(23	10)	-22	55·2	57·2	—
Mauritius	—	102·7	246	17	10	?	22	4	?	—	52·4	—
Chicago	—	110·2	49	18	52	? PR ₁	28	27	+57	55·4	—	—
Ann Arbor	—	113·1	49	—	—	—	—	—	—	48·4	—	—
Toronto	—	116·1	47	—	—	—	25	34	-165	46·6	—	—
La Paz	—	118·1	117	18	41	? PR ₁	29	42	+67	—	—	—
Ithaca	—	118·3	48	—	—	—	—	—	—	64·2	—	—
Ottawa	—	118·4	45	—	—	—	e 29	31	+54	e 53·4	—	—
Washington	—	118·4	51	—	—	—	e 28	22	-15	63·4	—	—
Georgetown	—	118·4	51	—	—	—	e 29	22	+45	e 63·0	—	—
	Z. -	118·4	51	—	—	—	e 29	53	+76	65·4	—	—
		118·4	51	—	—	—	e 30	10	+93	63·3	—	—
Cape Town	—	124·2	212	36	34	? SR ₁	—	—	—	—	82·4	—
Hamburg	—	135·5	340	e 19	12	[-19]	i 22	37	? PR ₁	e 63·4	74·4	—
Vienna	—	137·1	331	i 19	6	[-26]	—	—	—	e 20·7	22·8	—
De Bilt	E. -	138·2	343	i 21	57	? PR ₁	40	0	? SR ₁	e 64·4	66·1	—
	N. -	138·2	343	i 22	44	? PR ₁	39	57	? SR ₁	—	85·6	—
Bidston	—	138·6	349	17	10	?	22	22	? PR ₁	—	73·2	—
Uccle	—	139·6	343	19	10	[-29]	—	—	—	—	—	—
Strasbourg	—	140·4	338	e 18	54	[-46]	22	52	? PR ₁	—	—	—
Zurich	—	141·1	336	e 19	4	[-37]	—	—	—	—	—	—
Paris	—	141·9	345	i 19	14	[-29]	e 22	55	? PR ₁	—	—	—
Besaçon	—	142·2	339	19	30?	[-13]	23	2	? PR ₁	—	—	—
Florence	—	142·8	330	19	13	[-32]	21	42	? PR ₁	—	40·4	—
Pompeii	—	143·2	324	19	11	[-34]	22	22	? PR ₁	—	—	—
Moncalieri	—	143·4	335	i 19	14	[-32]	34	53	?	57·7	—	—
Rocca di Papa	—	143·5	326	i 19	19	[-27]	—	—	—	—	19·4	—
Marseilles	—	145·8	336	19	27	[-23]	19	32	?	—	19·7	—
Barcelona	—	148·4	337	19	29	[-24]	—	—	—	19·8	—	—
Tortosa	—	149·7	339	19	28	[-27]	22	50	? PR ₁	23·8	28·5	—
Algiers	—	152·1	332	19	33	[-26]	23	34	? PR ₁	85·4	111·4	—
Coimbra	—	152·5	352	18	22	[-97]	30	22	?	41·4	76·4	—
Granada	—	154·3	342	19	42	[-19]	20	8	?	—	—	—
San Fernando	—	155·7	346	19	10	[-53]	23	22	? PR ₁	—	111·8	—

For Notes see next page.

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NOTES TO NOV. 20d. 14h. 11m. 38s.

Additional records and notes: Apia gives $PR_1 = +5m.11s.$, $T_0 = 14h.11m.10s.$
 Melbourne gives P as PR_1 , Honolulu $SR_1 = +20m.22s.$, Manila $MN = +16.7m.$, Berkeley $eSN = +28m.10s.$, $LN = +34.5m.$, $T_0 = 14h.25m.56s.$
 The P and S are given as Ps of two local shocks. Victoria $S = +16m.14s.$,
 $\{PR_1$. The true S is given as L. Mauritius $MN = +57.6m.$, Chicago
 $L = +35.2m.$, $+59.4m.$, and $+68.4m.$ Toronto $L = +29.6m.$ Ottawa
 $L = +62.4m.$ and $+66.4m.$ Washington $L = +66.4m.$ Uccle PR_1
 $= +22m.3s.$ Strasbourg $e_1 = +19m.14s.$, $e_2 = +22m.10s.$, $e_3 = +22m.32s.$,
 $S? = +23m.29s.$, $e = +26m.54s.$, and $+33m.57s.$ Rocca di Papa $eP =$
 $+18m.55s.$, $MN = +19.8m.$ Algiers $LM = +30.4m.$ San Fernando
 $MN = +107.8m.$

Nov. 20d. Records also at 4h. (Helwan), 5h. (Taihoku), 6h. (La Paz), 8h. (Bidston), 14h. (Moncalieri), 15h. (Rocca di Papa and Toronto), 16h. (Toronto, Victoria, and Taihoku), 20h. (Helwan), 21h. (Manila), 22h. (Manila, Helwan, and Lick).

Nov. 21d. 2h. 6m. 24s. Epicentre $22^\circ 08'. 114^\circ 7'E.$

$A = -.387$, $B = +.842$, $C = -.375$; $D = +.908$, $E = +.418$;
 $G = +.157$, $H = -.340$, $K = -.927$.

	Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
			m. s.	s.	m. s.	s.	m.	m.
Batavia	17.5	333	e 4	12	+ 1	—	—	12.6
Adelaide	24.5	127	5	33	0	9 54	0	14.0
Melbourne	30.4	128	—	—	—	—	e 15.6	15.8
Sydney	34.1	118	10	0	+174	—	—	21.6
La Paz	141.4	176	17	0	-17	—	—	16.8

No additional records.

Nov. 21d. Records also at 0h. (Helwan), 2h. and 4h. (Florence), 10h. (Batavia), 15h. (Manila), 16h. (La Paz), 18h. (Rocca di Papa), 19h. (Lick (2)), 20h. (Lick and Berkeley), 21h. (Lick, San Fernando, and Granada), 23h. (Helwan).

Nov. 22d. Records at 0h. (Helwan), 1h. (Vieques), 2h. (Rocca di Papa), 5h. (Helwan), 9h. (Zurich), 14h. (Florence), 18h. (La Paz), 21h. (San Fernando), 23h. (Granada and Berkeley).

Nov. 23d. 5h. 57m. 30s. Epicentre $0^\circ 0'. 135^\circ 0'E.$

$A = -.707$, $B = +.707$, $C = -.000$; $D = +.707$, $E = +.707$;
 $G = -.000$, $H = -.000$, $K = -.000$.

	Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
			m. s.	s.	m. s.	s.	m.	m.
Manila	20.1	317	—	—	—	—	e 8.1	—
Taihoku	28.2	334	—	—	—	—	e 12.9	—
Batavia	28.8	257	7 34	-11	—	—	—	9.0
Osaka	34.7	1	6 5	-66	—	—	—	16.0
Perth	36.7	209	7 30	+ 2	13 19	- 1	20.7	—
Sydney	37.1	159	9 42	+131	13 36	+11	15.6	16.7
Melbourne	38.9	168	—	—	16 24	?SR ₁	18.5	20.5
Colombo	55.4	280	35 30	?L	—	—	(35.5)	57.5
Honolulu	68.6	69	e 20 12	?S	(e 20 12)	+ 3	33.0	37.5
Victoria	97.8	41	26 1	?S	(26.1)	+27	40.7	49.1
Helwan	101.8	300	20 30	?PR ₁	—	—	—	—
Hamburg	109.9	329	—	—	—	—	e 59.5	73.5
Cape Town	111.8	232	57 6	?L	—	—	(57.1)	69.6
De Bilt	113.2	329	—	—	e 32 30	?SR ₁	e 64.5	68.3
Rocca di Papa	113.5	317	—	—	e 36 48	?SR ₁	e 53.7	54.7
Uccle	114.3	328	—	—	36 30	?SR ₁	e 58.5	—
Moncalieri	115.4	320	—	—	e 48 20	?	71.4	—
Bidston	116.3	333	35 12	?SR ₁	40 24	?	—	122.5
Chicago	123.3	37	—	—	—	—	58.5	—
Toronto	126.7	30	—	—	e 66 0	?L	e 74.2	30.8
Ottawa	127.1	25	—	—	—	—	60.5	—
Coimbra	127.8	324	—	—	e 42 10	?SR ₁	64.5	66.0
La Paz	151.8	127	i 19 33	[-26]	—	—	71.1	98.9

Additional records: Osaka gives $MN = +16.9m.$, Honolulu $eS = +26m.18s.$
 Victoria $S = +32m.54s.$, Helwan $ePN = -7m.30s.$, De Bilt $MN =$
 $+68.8m.$, Chicago $L = +62.5m.$ and $+127.5m.$, Ottawa $L = +75.5m.$
 and $+85.5m.$

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Nov. 23d. Records also at 1h. (Zurich), 4h. (La Paz), 7h. (Zi-ka-wei), 8h. (Sydney, Batavia, and Adelaide), 16h. (La Paz), 20h. (Mizusawa), 22h. (Helwan).

Nov. 24d. Records at 0h. (Osaka and Tokyo), 1h. (San Fernando), 2h. (Helwan), 5h. (La Paz), 6h. (Helwan), 11h. (Batavia and Colombo), 18h. (La Paz and Lick), 19h. (Lick and Helwan), 20h. (Rocca di Papa), 21h. (Helwan).

Nov. 25d. Records at 1h. (Tokyo), 11h. (Lick and Berkeley), 12h. (Colombo), 19h. (Lick), 21h. (La Paz).

Nov. 26d. Records at 2h. and 3h. (Helwan), 4h. (Colombo), 8h. (Honolulu), 14h. (Manila), 20h. (La Paz).

Nov. 27d. Records at 1h. (San Fernando), 4h. (Batavia), 7h. (Barcelona and Tortosa), 10h. (La Paz), 19h. (San Fernando), 22h. (Apia).

Nov. 28d. 14h. 8m. 0s. Epicentre 55°-0N. 35°-0W. (as on 1919 July 12d.).
 A = +.470, B = -.329, C = +.819; D = +.574, E = -.819;
 G = +.671, H = -.470, K = -.574.

	Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Edinburgh	17.9	75	4 12	- 4	7 50	+12	—	11.4
Dyce	18.2	69	4 26	+ 7	7 52	+ 8	—	10.0
Azores	18.4	156	—	—	—	—	—	12.0
Bidston	18.6	82	4 12	-12	9 0	?L	(9.0)	22.0
Oxford	20.2	85	4 49	+ 6	8 48	+21	—	11.4
Paris	23.6	89	e 5 26	+ 2	e 9 47	+11	12.0	14.0
De Bilt	23.7	80	e 5 29	+ 4	e 9 44	+ 6	—	13.8
Uccle	23.8	83	e 5 25	- 1	e 9 23	- 7	e 11.5	—
Hamburg	25.8	74	1 5 44	- 2	10 12	- 6	14.2	17.9
Besancon	26.5	90	e 6 0	+ 4	10 22	-10	14.0	—
Strasbourg	26.8	86	e 6 0	+ 4	e 10 39	+ 2	e 15.0	18.2
San Fernando	27.0	122	6 24	+26	—	—	13.5	15.0
Tortosa	27.3	106	6 9	+ 8	10 44	- 2	12.6	18.9
Ottawa	27.3	266	—	—	1 10 18	-28	e 15.7	—
Barcelona	27.7	104	—	—	e 10 52	- 2	e 16.0	18.7
Moncalieri	28.7	94	e 6 21	+ 6	11 28	+16	15.9	17.8
Toronto	30.5	266	e 4 30	-123	—	—	14.5	21.7
Washington	32.2	258	—	—	e 14 0	+109	19.8	—
Georgetown	32.2	258	—	—	e 12 0	-11	19.8	—
Rocca di Papa	33.5	92	—	—	1 11 18	-74	e 17.5	21.0
Chicago	36.3	271	13 0	?S	(13 0)	-14	(19.1)	21.8
Victoria	51.4	302	—	—	—	—	—	27.4
Helwan	E. 52.6	90	18 0	?S	(18 0)	+69	—	—

Additional records: Azores gives P=14h.3m.18s. De Bilt MN = +14.2m.,
 T₀ = 14h.8m.10s. Epicentre 56°-7N. 34°-6W. Hamburg MN = +15.8m.,
 MZ = +16.0m., T₀ = 14h.8m.7s. San Fernando MN = +16.5m. Ottawa
 ?S?E = +11m.24s., LE = +20.0m. Moncalieri MN = +17.1m., T₀ =
 14h.7m.54s. Toronto L = +17.7m. Georgetown eN? = +15m.0s.
 Victoria P? = 14h.4m.28s. Helwan PN = +15m.0s.

Nov. 28d. 21h. 33m. 10s. Epicentre 43°-5N. 7°-5E.
 A = +.719, B = +.095, C = +.688.

	Δ	P.	O-C.	S.	O-C.	L.	M.
	°	m. s.	s.	m. s.	s.	m.	m.
Moncalieri	1.5	10 25	+ 2	0 40	- 2	—	2.0
Z. 1.5	10 25	+ 2	0 39	- 3	—	—	—
Marseilles	1.6	-0 13	-37	0 6	-39	—	—
Florence	2.7	1 50	?L	—	—	(1.8)	—
Besancon	3.9	1 17	+16	2 11	+24	—	—
Zurich	3.9	e 1 3	+ 2	1 46	- 1	—	—
Barcelona	4.5	e 2 11	+61	2 58	+54	3.1	3.9
Strasbourg	5.1	1 20	+ 1	e 2 17	- 3	—	3.8
Tortosa	5.8	2 4	?L	—	—	3.0	3.9
Paris	6.4	1 44	+ 6	1 3 12	+17	3.8	3.8
Algiers	7.5	—	—	e 5 56	?L	6.3	—
Uccle	7.6	e 1 50	- 5	—	—	—	—
Vienna	7.8	e 2 50	+52	—	—	—	—
De Bilt	8.7	—	—	e 4 38	?L	e 5.0	5.2
Hamburg	10.4	—	—	—	—	e 5.8	8.6
Coimbra	12.3	3 29	+26	6 18	+52	8.2	—

Additional records: Moncalieri gives MN = +1.9m. Paris e = +2m.36s.
 De Bilt MN = +5.4m. Hamburg MN = +7.5m. Coimbra LN = +7.8m.

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Nov. 23d. Records also at 14h. (Coimbra), 22h. (De Bilt).

Nov. 29d. 0h. 25m. 20s. (I) } Epicentre 40°-8N. 0°-5E. (near Tortosa).
 0h. 26m. 30s. (II) }

A = +.757, B = +.007, C = +.654; D = +.009, E = -1.000;
 G = +.654, H = +.006, K = -.757.

There appears to have been two shocks at the times given above.

	Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
I Tortosa	0.0	—	0 30	+30	—	—	0.8	—
I Barcelona	1.4	64	10 25	+4	10 43	+4	—	0.8
II	1.4	64	10 26	+5	—	—	11.1	—
I Marseilles	4.4	56	1 12	+4	1 51	-10	—	2.0
II Algiers	4.5	152	e 0 49	-21	2 25	+21	3.0	—
I Moncalieri	6.7	49	1 46	+4	2 36	-26	3.2	—
II Coimbra	6.8	269	e 1 39	-5	2 41	-24	3.5	3.7
I Besancon	7.5	30	1 56	+2	3 13	-11	—	—
I Paris	8.1	10	e 1 52	-11	e 3 17	-23	4.0	4.7
I Florence	8.5	66	—	—	—	—	—	4.7
I Zurich	8.7	38	e 2 10	-2	—	—	—	—
I Strasbourg	9.3	31	2 15	-5	e 4 1	-9	—	—
I Uccle	10.3	14	e 2 10	-24	—	—	—	—
I De Bilt	11.5	14	—	—	—	—	e 5.1	6.7
I Vienna	13.5	51	e 6 40	?L	—	—	e (6.7)	—
I Hamburg	14.3	24	—	—	—	—	e 5.7	8.3
I Edinburgh	15.2	352	—	—	6 40	+3	—	7.9

Additional records: Coimbra gives LN = +3.7m., MN = +3.8m. Paris ME = +3.7m. De Bilt eN = +5m.13s.

Nov. 29d. Records also at 4h. (Athens), 8h. (San Fernando), 11h. and 14h. (Helwan), 17h. (Tokyo).

Nov. 30d. Records at 4h. (San Fernando), 5h. (Manila), 6h. (Tokyo), 10h. (Rio Tinto), 12h. (Azores), 14h. (Helwan and Colombo), 15h. (Taihoku), 20h. (San Fernando), 21h. (Manila).

Dec. 1d. Records at 0h. (Manila), 16h. (Osaka), 18h. (Manila), 22h. (Tokyo).

Dec. 2d. Records at 0h. (San Fernando), 6h. (Tokyo), 12h. (Bidston), 13h. (Florence, Rocca di Papa, and Pompeii), 14h. (Florence and Denver), 15h. (La Paz), 18h. (Taihoku), 20h. (Tortosa and Barcelona), 21h. (San Fernando).

Dec. 3d. Records at 2h. (Victoria), 9h. (Apia and La Paz), 10h. (Cape Town and Helwan), 13h. (La Paz), 14h. (Manila), 22h. (San Fernando).

Dec. 4d. Records at 0h. (Cape Town), 1h. (San Fernando and Helwan), 4h. (La Paz), 6h. (Mizusawa), 13h. and 15h. (Rocca di Papa), 19h. (Tokyo), 20h. (Rocca di Papa), 23h. (San Fernando).

Dec. 5d. 0h. 15m. 26s. Epicentre 13°-0N. 85°-4W.

A = +.078, B = -.971, C = +.225; D = -.997, E = -.080;
 G = +.108, H = -.224, K = -.974.

	Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Mobile	17.8	352	13 56	-19	(7 20)	-16	7.3	—
Vieques	19.9	72	5 33	+53	9 13	+52	10.4	10.6
	19.9	72	10 9	?S	(10 9)	+108	17.6	18.1
Georgetown	26.9	14	e 5 57	0	e 10 34	-5	e 13.4	—
Washington	26.9	14	5 59	+2	10 39	0	—	—
Chicago	28.8	355	6 44	+28	10 43	-30	14.6	—
Ann Arbor	29.3	3	—	—	13 10	?	17.9	—
Ithaca	30.4	13	e 8 19	?PR ₁	12 32	+51	—	—
Toronto	31.1	9	—	—	—	—	32.3	—
Ottawa	33.4	13	6 54	-6	13 4	+34	18.8	—
La Paz	34.1	150	17 6	0	i 12 42	0	17.2	20.0
Victoria	47.3	326	17 2	?S	(17 2)	+77	26.0	28.5
Bidston	75.0	40	—	—	19 46	-100	—	38.9
De Bilt	80.1	40	—	—	—	—	e 38.6	41.7
Helwan	105.6	53	24 34	?S	(24 34)	-134	—	—

For Notes see next page.

NOTES TO DEC. 5d. 0h. 15m. 26s.

Additional records: Mobile gives S? = +5m.6s. (?PR₁). Ann Arbor (Wiechert) SE = +12m.34s., LE = +18.1m. Ithaca eN = +12m.30s. Ottawa PR₁N = +8m.12s., T₀ = 0h.14m.33s. La. Paz T₀ = 0h.15m.30s. Victoria S = +21m.37s. De Bilt MN = +49.3m. Helwan PN = +39m.34s.

- Dec. 5d. Records also at 4h. and 6h. (Helwan), 10h. (Berkeley), 15h. (Colombo), 23h. (Helwan).
- Dec. 6d. Records at 0h. (San Fernando), 6h. (Apia and Algiers), 11h. (Bidston), 19h. (La Paz), 21h. (San Fernando).
- Dec. 7d. Records at 0h. and 1h. (La Paz), 3h. (Athens), 6h. (La Paz), 9h. (Rio Tinto), 10h. and 22h. (Helwan).
- Dec. 8d. Records at 3h. (San Fernando and Taihoku), 5h. (Colombo), 10h. (La Paz), 15h. (Apia), 17h. (La Paz and Florence), 20h. (San Fernando).
- Dec. 9d. 20h. 23m. 15s. Epicentre 19°·8N. 103°·3E. (as on 1918 Mar. 22d.).

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

		Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Calcutta	E.	14·2	234	3 33	+ 4	6 3	-10	8·5	—
	N.	14·2	234	3 39	+10	6 9	- 4	8·8	—
Simla		26·0	301	8 9	?	—	—	—	12·8
Colombo		26·1	244	19 45	?	—	—	(37·8)	—
Helwan		65·1	295	37 45	?L	—	—	e 39·8	42·6
De Bilt		79·3	322	—	—	—	—	e 39·8	—
Uccle		80·2	321	—	—	—	—	e 39·8	—
Eskdalemuir		82·7	327	—	—	—	—	43·8	—

Additional records: Helwan gives PN = +36m.45s. De Bilt MN = +42.2m.

- Dec. 9d. 20h. 28m. 6s. Epicentre 26°·0N. 114°·0E. (as on 1917 Jan. 27d.).

A = -·366, B = +·821, C = +·438.

		Δ	P.	O-C.	S.	O-C.	L.	M.
		°	m. s.	s.	m. s.	s.	m.	m.
Taihoku		6·9	—	—	3 24	+17	3·9	4·2
Zi-ka-wei		8·4	e 2 6	- 1	e 3 50	+ 3	—	5·5
Manila		13·2	e 2 44	-32	—	—	—	—

Zi-ka-wei gives also MN = +4.6m., T₀ = 20h.28m.5s.

- Dec. 9d. Records also at 0h. (San Fernando), 4h. (Mizusawa), 7h. (Athens (2)), 10h. (Tokyo), 18h. (Taihoku), 19h. (Kew), 23h. (San Fernando).
- Dec. 10d. Records at 3h. and 5h. (Tokyo), 7h. (Sydney), 14h. (Nagasaki), 21h. and 22h. (San Fernando), 23h. (Helwan).
- Dec. 11d. Records at 2h. (La Paz and Azores), 6h. (Mizusawa), 14h. (Zurich), 16h. (Osaka), 22h. (Helwan), 23h. (Berkeley, LioK, and Honolulu).
- Dec. 12d. Records at 0h. (San Fernando, Uccle, De Bilt, Tokyo, Rocca di Papa, Helwan, Eskdalemuir, and Bidston), 3h. (Batavia, Manila, Melbourne, and Perth), 4h. (Toronto, Victoria, and Honolulu), 8h. (Rio Tinto), 11h. (La Paz), 12h. (La Paz, Pompeii, and Rocca di Papa), 14h. (Denver), 18h. (Batavia), 23h. (Apia).

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Dec. 13d. Records at 0h. (San Fernando), 3h. (Taihoku), 9h. (Helwan).

Dec. 14d. 1h. 10m. 5s. Epicentre 29°-2S. 177°-0W. (as on 1917 May 9d.).

A = -872, B = -046, C = -488; D = -052, E = +999;
G = +487, H = +026, K = -873.

	Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Apia	16.1	18	e 4 19	+26	—	—	8.9	—
Sydney	27.5	251	(6 1)	- 2	6 1	?P	12.5	14.6
Melbourne	32.7	244	—	—	12 19	0	16.8	18.9
Honolulu	53.8	22	16 13	?S	(16 13)	-53	e 28.4	41.0
Perth	57.0	249	—	—	17 36	-10	—	—
Batavia	74.9	271	e 11 46	- 2	i 21 30	+ 5	e 40.0	44.2
Taihoku	80.2	306	—	—	—	—	35.9	—
Berkeley	84.3	40	—	—	e 40 51	?L	48.6	—
Victoria	91.3	32	21 57	?	29 19	?SR ₁	—	50.0
La Paz	97.6	114	e 14 39	+41	—	—	47.0	48.5
Mauritius	107.7	234	50 25	?L	—	—	(50.4)	65.2
Chicago	108.5	51	—	—	—	—	e 49.9	—
Ann Arbor	111.4	52	—	—	—	—	65.9	—
Toronto	114.8	52	—	—	(27 31)	-37	63.4	67.3
Georgetown	115.0	58	—	—	—	—	64.9	—
Capetown	115.2	194	63 13	?L	—	—	(63.2)	72.2
Ithaca	116.5	54	—	—	—	—	e 68.4	—
Ottawa	117.8	51	—	—	—	—	66.9	—
Eskdalemuir	153.5	8	—	—	—	—	79.9	—
Hamburg	155.1	350	—	—	—	—	e 80.9	—
Bidston	155.4	9	37 13	?	45 19	?SR ₁	—	56.7
Helwan	155.4	279	26 55	?PR ₁	—	—	—	—
De Bilt	157.1	357	—	—	—	—	e 88.9	91.9
Kew	157.6	6	—	—	—	—	—	93.9
Uccle	158.4	358	—	—	—	—	49.9	—
Paris	160.4	1	—	—	—	—	e 90.9	—
Zurich	161.3	348	—	—	e 85 38	?L	(e 85.6)	—
Coimbra	165.5	37	e 35 55	?	47 10	?SR ₁	59.9	94.9

Additional records : Apia gives e? = 1h.4m.18s. Sydney gives P = 1h.9m.48s.
Honolulu gives S as P and S = +23m.43s. Chicago L = +62.9m. and
+65.9m. Toronto eL = +65.6m. and +69.4m. Helwan PN =
+28m.55s. Zurich eSN = +85m.37s. (1eLN). Florence gives a record
from 2h. to 3h.

Dec. 14d. Records also at 0h. (Toronto), 1h. (San Fernando), 2h. (Kodaikanal),
3h. (Toronto and Victoria), 6h. (Taihoku), 9h. (Algiers), 19h. (San
Fernando).

Dec. 15d. Records at 1h. (Sitka), 3h. (Bidston), 6h. (Helwan), 8h. (Mizusawa),
9h. (Osaka), 16h. (La Paz, Batavia, and Manila), 17h. (Helwan), 19h.
(Helwan and Sydney), 20h. (Toronto, Helwan, De Bilt, and Victoria),
21h. (Uccle).

Dec. 16d. 11h. 41m. 25s. Epicentre 24°-0N. 124°-0E. (as on 1916 Mar. 25d.).

A = -511, B = +757, C = +407; D = +829, E = +559;
G = -228, H = +337, K = -914.

	Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Taihoku	2.5	294	0 32	- 7	—	—	0.8	1.1
Hokoto	4.1	275	e 1 31	+27	1 38	-15	1.9	—
Zi-ka-wei	7.5	343	e 2 2	+ 8	—	—	—	4.3
Manila	9.8	197	—	—	e 4 19	- 4	—	—
Helwan	80.4	298	33 35	?L	—	—	(33.6)	—
Hamburg	83.9	327	—	—	—	—	e 50.6	53.6
De Bilt	87.2	327	—	—	—	—	e 45.6	55.3
Uccle	88.3	327	—	—	—	—	e 42.6	—
Eskdalemuir	88.8	333	—	—	—	—	48.6	—
Kew	90.1	329	—	—	—	—	—	58.6
Bidston	90.1	332	—	—	49 35	?L	(49.6)	57.3

Additional records : Zi-ka-wei gives MN = +4.4m. Helwan PE = +54m.35s.
De Bilt MN = +56.5m.

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Dec. 16d. Records also at 0h. (San Fernando and Manila), 10h. (Helwan), 16h. (Apia), 17h. (Algiers).

Dec. 17d. Records at 0h. (Toronto), 2h. (Tokyo), 4h. (Helwan), 18h. (San Fernando), 20h. (Mizusawa), 23h. (Manila, Melbourne, Batavia, Honolulu, and Perth).

Dec. 18d. 1h. 20m. 35s. Epicentre 20°0N. 99°0W. (as on 1918 Aug. 22d.).

A = -·147, B = -·928, C = +·342; D = -·988, E = +·156;
G = -·053, H = -·338, K = -·940.

An origin half a degree further south would fit the observation better, but the old epicentre is retained, as the whole material is so scanty.

		Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Tucson	E.	16·2	322	4 8	+13'	—	—	8·6	9·2
	N.	16·2	322	4 5	+10	—	—	8·6	9·1
Denver	E.	20·4	347	8 25	?S	(8 25)	- 7	—	10·4
Chicago		23·8	21	5 31	+ 5	9 55	+15	12·4	—
Georgetown		26·7	40	e 6 2	+ 7	11 25	+50	—	—
Victoria		34·5	331	14 23	?S	(14 23)	+95	18·3	20·8
La Paz		47·4	138	i 8 41	- 9	15 42	- 4	23·0	23·0

Helwan ($\Delta = 110^\circ 9'$) records PE = +9m.25s. and PN = +5m.25s., perhaps intended for L, but given an hour too soon by mistake.

Dec. 18d. Records also at 0h. (Victoria and San Fernando), 19h. (San Fernando), 20h. (Perth), 23h. (De Bilt).

Dec. 19d. Records at 7h. (Algiers), 13h. (Berkeley and Lick), 15h. (La Paz), 19h. (San Fernando).

Dec. 20d. 0h. 28m. 15s. Epicentre 37°0N. 133°5E. (as on 1919 Mar. 28d.).

A = -·599, B = +·529, C = +·602; D = +·663, E = +·749;
G = -·451, H = +·399, K = -·799.

		Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Tokyo		1·6	142	0 23	- 1	0 37	- 8	0·9	—
Mizusawa		2·9	44	0 20	-25	0 48	-32	—	—
Osaka		3·5	227	—	—	1 18	-19	2·8	3·5
Kobe		3·6	230	—	—	2 0	+21	3·7	5·6
Zi-ka-wei		15·3	253	e 3 46	+ 3	—	—	—	—
De Bilt		82·1	331	—	—	—	—	e 49·8	—
Uccle		83·5	331	—	—	—	—	—	47·8
Helwan		84·6	302	—	—	—	—	55·8	—
La Paz		148·8	55	19 25	[-29]	—	—	—	—

Additional records: Mizusawa gives SN = +0m.47s. Kobe MN = +5·3m.

1919. Dec. 20d. 19h. 34m. 0s. Epicentre 23°0N. 121°7E.

A = -·484, B = +·783, C = +·391; D = +·851, E = +·526;
G = -·205, H = +·332, K = -·920.

		Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Taihoku		1·9	359	0 38	+ 9	—	—	1·5	1·6
Hokoto		2·1	284	0 49	+16	—	—	1·3	1·6
Zi-ka-wei		8·2	358	2 3	- 1	e 4 15	+33	—	—
Manila		8·4	185	e 2 41	+34	4 26	+39	4·9	5·1
Kobe		16·5	42	4 3	+ 4	(7 36)	+29	7·6	13·4
Osaka		16·7	43	4 22	+21	(7 17)	+ 6	7·3	12·8
Mizusawa	E.	23·0	41	5 12	- 5	9 22	- 3	—	—
	N.	23·0	41	5 10	- 7	9 20	- 5	—	—

Continued on next page.

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		Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Calcutta	E.	30.7	276	6 18	-17	12 18	+32	19.3	—
Batavia		32.6	207	16 32	-21	e 12 32	+14	e 18.6	—
Dehra Dun		39.5	289	—	—	15 0	+61	—	—
Simla		40.2	290	14 30	?S	(14 30)	+20	21.8	22.2
Colombo		43.3	256	16 0	?S	(16 0)	+68	27.8	28.9
Kodaikanal		44.1	260	24 42	?L	—	—	28.8	34.0
Bombay		45.6	275	8 37	0	—	—	—	34.4
Sydney	E.	63.4	151	19 0	?S	(19 0)	-6	30.7	37.8
Honolulu		73.3	73	e 27 12	?SR ₁	—	—	42.9	49.5
Helwan	E.	79.2	298	22 30	?S	(22 30)	+16	—	54.4
	N.	79.2	298	23 30	?S	(23 30)	+76	—	51.7
Vienna		32.6	320	i 12 38	+4	—	e 43.0	53.5	—
Hamburg		33.6	326	—	—	—	e 42.0	46.4	—
Polá		35.7	317	—	—	—	—	—	46.0
De Bilt		36.8	326	—	—	e 23 36	-3	40.0	48.8
Dyce	E.	37.1	332	i 31 16	?SR ₁	—	—	43.6	48.0
Strasbourg		37.4	321	—	—	—	—	46.0	—
Florence		37.8	319	31 28	?SR ₁	—	—	45.1	48.6
Rocca di Papa		37.9	315	e 12 48	-16	20 42	-9	e 47.7	54.7
Uccle		38.0	325	e 13 0	-5	—	—	e 40.0	48.8
Edinburgh		38.4	331	—	—	—	—	44.0	51.1
Eskdalemuir		38.8	331	—	—	—	—	38.0	—
Moncalieri		38.9	320	16 8	?PR ₁	31 8	?SR ₁	46.1	52.6
Besancon		39.2	321	—	—	—	—	48.0	—
Kew		39.9	328	44 0	?L	—	—	(44.0)	55.0
Paris		90.1	325	—	—	—	e 46.0	49.0	—
Oxford		90.2	328	—	—	—	—	45.1	52.5
Barcelona		94.7	320	—	—	—	e 51.6	57.3	—
Colmbra	E.	101.7	323	27 12	?	—	—	53.7	56.6
	N.	101.7	323	e 28 43	?	39 15	?	52.2	63.8
San Fernando		102.9	320	—	—	—	—	56.5	61.0
Chicago		109.8	22	—	—	—	e 55.0	—	—
Capetown		113.1	241	58 12	?L	—	—	70.7	74.2
La Paz		168.7	57	20 31	[+17]	29 45	?	43.9	46.7

Additional records: Manila gives MN = +5.0m., T₀ = 19h.34m.33s. Kobe
 MN = +20.0m. Osaka MN = +14.1m. Nagasaki ($\Delta = 12^\circ.1$) gives
 P at 19h.4m.23s., L at 19h.6m.40s. Colombo S = +26m.0s. Vienna
 MN = +46.0m. Hamburg MZ = +50.9m. De Bilt MN = +48.9m.
 Dyce LN = +44.0m., MN = ME. Moncalieri MN = +50.9m. San
 Fernando MN = +67.2m. Chicago L = +61.0m. and +70.0m.

1919. Dec. 20d. 20h. 37m. 24s. Epicentre 23°ON. 121°7E.
 (as at 19h.).

A = -484, B = +783, C = +391; D = +851, E = +526.
 G = -205, H = +332, K = -920.

		Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Taihoku		1.9	359	0 38	+9	—	—	1.6	1.7
Hokoto		2.1	284	1 12	+39	(1 12)	+14	1.6	2.0
Zi-ka-wei		8.2	358	e 2 17	+13	e 3 43	+1	—	—
Manila		8.4	185	e 2 15	+8	4 0	+13	4.4	4.9
Kobe		16.5	42	4 3	+4	(7 30)	+23	7.5	10.8
Osaka		16.7	43	4 9	+8	(7 13)	+2	7.2	9.4
Mizusawa	E.	23.0	41	5 16	-1	9 24	—	—	—
	N.	23.0	41	5 16	-1	9 15	-10	—	—
Ootomari		29.1	30	6 16	-3	(11 10)	-9	11.2	15.6
Calcutta	E.	30.7	276	6 24	-11	13 18	+92	17.9	19.9
	N.	30.7	276	6 24	-11	13 12	+86	17.6	19.9
Batavia		32.6	207	6 32	-21	11 51	-27	e 18.6	26.6
Dehra Dun		39.5	289	8 36	+45	—	—	—	—
Simla		40.2	290	13 30	?S	(13 30)	-40	21.3	22.1
Colombo		43.3	256	8 36	+16	15 18	+26	18.2	19.1
Kodaikanal		44.1	260	8 30	+3	(14 36)	+27	14.6	28.5
Bombay		45.6	275	8 33	-4	15 10	-12	—	28.8
Adelajde		60.1	163	10 54	+41	18 18	-6	28.1	40.8
Sydney	E.	63.4	151	18 42	?S	(18 42)	-26	30.6	38.8
Melbourne		64.6	160	19 36	?S	(19 36)	+16	35.0	38.1
Honolulu		73.3	73	e 21 24	?S	(e 21 24)	+18	45.1	50.1
Helwan	E.	79.2	298	—	—	—	—	—	51.0

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	Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Budapest	81.3	320	8 42	?	—	—	—	—
Vienna	82.6	320	1 12 30	- 4	24 14	+81	e 38.6	43.6
Hamburg	83.6	326	e 12 43	+ 3	—	—	e 39.6	46.6
De Bilt	86.8	326	—	—	23 41	+ 2	e 39.6	48.9
Dyce	87.1	332	—	—	—	—	—	40.9
Strasbourg	87.4	321	—	—	—	—	—	41.6
Zurich	87.6	320	e 13 1	- 2	—	—	e 45.6	—
Florence	87.8	319	22 59	?S	(22 59)	-51	e 41.7	—
Rocca di Papa	87.9	315	e 13 2	- 2	—	—	e 47.3	54.3
Uccle	88.0	325	e 13 3	- 2	23 50	- 2	e 40.6	48.9
Victoria	88.0	36	23 26	?S	(23 26)	-26	38.3	52.3
Edinburgh	88.4	331	—	—	—	—	—	40.6
Moncalieri	88.9	320	4 41	?	24 46	+44	43.7	52.5
Besancon	89.2	321	—	—	—	—	—	45.6
Stonyhurst	89.4	330	43 36	?L	—	—	(43.6)	50.1
Bidston	89.9	330	26 36	?S	(26 36)	-143	(37.8)	48.2
Kew	89.9	328	40 36	?L	—	—	(40.6)	54.6
Paris	90.1	325	e 13 25	+ 8	—	—	e 42.6	47.6
Oxford	90.2	328	—	—	—	—	—	41.2
Marseilles	91.7	320	e 32 36	?SR ₁	—	—	—	47.6
Barcelona	94.7	320	—	—	—	—	e 44.8	52.6
Algiers	96.9	315	—	—	—	—	e 54.6	64.9
Coimbra	101.7	323	22 6	?	32 49	?SR ₁	48.8	56.5
San Fernando	102.9	320	—	—	—	—	55.6	59.6
Chicago	109.8	22	—	—	—	—	e 39.6	—
Ottawa	109.8	12	—	—	—	—	e 50.6	—
Toronto	110.6	16	e 28 18	?S	38 42	?	52.4	66.7
Ithaca	112.5	13	—	—	—	—	57.1	—
Georgetown	115.6	16	—	—	—	—	e 57.6	—
Washington	115.6	16	—	—	—	—	e 57.6	—
La Paz	168.7	57	i 20 24	[+10]	34 42	?	81.6	100.2

Additional records: Manila gives MN = +5.0m., T₀ = 20h.37m.31s. Kobe MN = +13.2m. Osaka MN = +10.0m. Nagasaki ($\Delta = 12^\circ.1$) gives P at 20h.7m.46s., L at 20h.10m.30s. Sydney gives S as P and S = 25m.42s. Melbourne gives S as P and S = +26m.18s., SR₁ = +31m.36s. Helwan MN = +48.3m. Hamburg MZ = +51.2m. De Bilt eSR₁ = +29m.24s., MN = +49.0m. Dyce i = +26m.36s. and +33m.18s., LN = +40.6m., MN = +50.3m. Florence gives records also at +46m.36s. and +55m.36s. Uccle SR₁ = +29m.37s., MN = +48.7m., T₀ = 20h.37m.37s. Victoria gives S as P and S = +28m.54s., L = +61.4m. Moncalieri MN = +53.0m. Coimbra eN = +22m.36s., MN = +57.1m. San Fernando MN = +59.1m. Chicago L = +43.1m., +57.6m., +62.6m., and +69.6m. Ottawa LE = +64.6m., +72.6m., and +81.6m. Toronto e? = +26m.8s., eL = +63.6m., +73.7m., and +89.3m. Ithaca LE = +66.0m. Georgetown L = +66.9m. Washington L = +67.6m., and +72.6m.

Dec. 20d. 21h. 33m. 55s. Epicentre 23°-0N. 121°-7E. (as at 19h. and 20h.).

	Δ	Az.	P.	O-C.	L.	M.
	°	°	m. s.	s.	m.	m.
Taihoku	1.9	359	5 54	?	—	—
Zi-ka-wei	8.2	358	—	—	e 6.4	—
Kobe	16.5	42	3 57	- 2	5.0	5.6
Osaka	16.7	43	4 1	0	5.5	8.2
Mizusawa	N. 23.0	41	5 23	+ 6	—	—
Hamburg	83.6	326	—	—	e 48.1	54.1
De Bilt	86.8	326	—	—	e 49.1	56.9
Uccle	88.0	325	—	—	e 48.1	—

Additional records: Kobe gives MN = +5.9m. Osaka MN = +8.1m. Mizusawa PE = +5m.29s. De Bilt MN = +56.4m.

Dec. 20d. Records also at 8h. (Helwan), 13h., 14h., and 15h. (Tokyo), 17h. (Apia), 23h. (Taihoku).

Dec. 21d. Records at 5h. and 6h. (Taihoku), 7h. (Tokyo), 9h. (Batavia), 18h. (Victoria and Toronto), 19h. (Nagasaki (2)), 22h. (Simla).

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Dec. 22h. 23h. 40m. 48s. Epicentre 39°3N. 21°0E. (as on 1918 Feb. 1d.).

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	11 8	+27	11 12	0	(1.3)	2.4
Rocca di Papa	6.8	294	1 46	+2	3 14	+9	4.2	6.1
Pola	7.6	319	e 1 36	-19	—	—	e 3.6	4.2
Florence	8.5	305	1 18	-51	3 28	-22	4.6	—
Vienna	9.4	341	2 22	0	4 29	+16	—	6.6
Lemberg	10.7	11	e 2 18	-22	4 6	-42	—	5.8
Moncalieri	11.3	305	e 2 42	-7	4 45	-17	6.6	9.7
Zurich	12.1	316	e 2 58	-2	i 5 16	-5	—	7.3
Marselles	12.4	294	e 3 18	+13	7 22	?L	(7.4)	—
Helwan	E. 12.7	135	6 0	?L	—	—	(6.0)	14.8
	N. 12.7	135	3 18	+9	—	—	—	14.3
Strasbourg	13.3	319	3 20	+3	e 6 0	+9	6.8	7.8
Besancon	13.4	311	3 19	+1	7 29	?L	(7.5)	—
Algiers	14.3	266	3 25	-5	6 19	+4	8.2	12.7
Barcelona	14.5	285	2 43	-50	i 4 13	-127	e 6.8	10.2
Tortosa	15.7	283	3 50	+2	(6 12)	-36	6.2	12.4
Hamburg	16.1	336	e 3 52	-1	e 6 45	-12	e 8.7	12.4
Paris	16.2	312	e 3 58	+3	e 7 3	+3	9.2	13.2
Uccle	16.4	320	3 55	-2	7 0	-4	8.0	—
De Bilt	16.8	325	4 3	+1	7 12	-1	7.8	10.3
Kew	19.1	315	—	—	—	—	—	12.2
Oxford	19.8	316	i 3 57	-42	(8 15)	-4	8.2	12.0
San Fernando	21.6	271	7 24	?S	(7 24)	-93	12.0	14.2
Bidston	21.6	319	5 18	+18	8 48	-9	—	13.7
Coimbra	E. 22.5	281	5 15	+4	i 9 23	+8	12.6	14.4
	N. 22.5	281	5 26	+15	9.19	+4	12.2	14.7
Eskdalemuir	22.7	323	—	—	(9 11)	-8	9.2	12.2
Edinburgh	23.0	324	—	—	9 49	+24	12.2	13.8
Dyce	E. 23.4	328	15 19	-2	i 9 31	-2	12.6	14.2
	N. 23.4	328	15 19	-2	i 9 25	-8	11.6	14.2
Simla	45.9	82	27 36	?L	—	—	(27.6)	—
Toronto	70.3	311	—	—	—	—	e 41.8	—
Cape Town	73.2	183	40 12	?L	—	—	(40.2)	41.9
Victoria	86.8	339	42 50	?L	—	—	(42.8)	52.2
La Paz	99.7	258	—	—	—	—	54.8	61.2

Additional records: Athens gives L as a second iP and S as i, also mE = +1m.34s., mN = +1m.31s., S = +1m.48s., iL = +1.9m., MN = +2.6m., T₀ = 23h.41m.5s., Pola MN = +3.2m. All these records are given for 23d. Florence +6m.12s. Moncalieri MN = +9.3m., T₀ = 23h.40m.59s. Zurich MN = +7.4m., T₀ = 23h.40m.57s. Hamburg MN = +10.8m., MZ = +12.6m., T₀ = 23h.41m.6s. Paris MN = +9.2m., T₀ = 23h.40m.57s. De Bilt MN = +10.0m., T₀ = 23h.40m.57s. Toronto L = +46.0m.

Dec. 22d. Records also at 2h. (Denver), 4h. (Athens), 7h. (La Paz and Helwan), 10h. (Helwan), 12h. (Athens), 21h. (Helwan), 23h. (Athens (2)).

Dec. 23d. Records at 4h. (Athens and Zurich), 9h. (La Paz and Apia), 10h. and 11h. (Taihoku), 13h. (La Paz), 15h. (La Paz, Batavia, Helwan, and Manila), 16h. (De Bilt), 19h. (Rocca di Papa), 20h. (Helwan, Cipolletti, Andalgala, La Quiaca, Mendoza, and La Paz), 22h. (Apia).

Dec. 24d. Records at 1h. (Helwan), 4h. (La Paz), 11h. (Helwan and San Fernando), 13h. (Helwan), 17h. (Rocca di Papa), 19h. (Athens), 20h. (Taihoku), 23h. (Pompeii and Tokyo).

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Dec. 25d. 21h. 42m. 20s. Epicentre 45°-0N. 36°-0E.

A = +.572, B = +.416, C = +.707 ; D = +.588, E = -.809 ;
G = +.572, H = +.416, K = -.707.

	Δ	Az.	P.	O-C.	S.	O-C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Lemberg	9.4	305	e 3 28	+66	—	—	e 5.4	5.6
Vienna	13.8	291	e 3 22	- 1	7 21	?L	(7.4)	10.7
Pola	15.6	277	e 7 45	?S	(7 45)	+59	e 9.9	10.4
Helwan	15.6	196	6 40	?S	(6 40)	- 6	(9.7)	—
Rocca di Papa	17.2	287	—	—	—	—	e 5.8	11.8
Hamburg	18.9	306	e 4 19	- 9	—	—	e 10.2	13.1
Besancon	20.8	287	—	—	—	—	13.7	—
De Bilt	E. 21.4	300	4 55	- 3	8 46	- 7	e 13.6	14.1
	N. 21.4	300	—	—	—	—	e 11.3	12.8
Uccle	21.8	297	e 4 57	- 6	e 8 51	-10	e 11.2	—
Paris	23.0	292	—	—	—	—	e 13.7	15.7
Algiers	26.0	263	—	—	—	—	15.2	—
Edinburgh	26.8	308	—	—	—	—	—	19.2
Rio Tinto	32.4	271	21 10	?L	—	—	(21.2)	22.7
Coimbra	32.7	278	21 40	?L	—	—	27.5	28.1

Additional records: Helwan gives its two readings as PN and PE. Ham-
burg gives MN = +14.7m. De Bilt T₀ = 21h.42m.16s. Besancon
gives its record one hour late.

Dec. 25d. Records also at 14h. (Batavia and Helwan), 16h. (La Paz), 18h. and 21h. (Taihoku).

Dec. 26d. Records at 0h. (San Fernando), 2h. (Helwan), 5h. (La Paz), 7h. (Taihoku), 14h. (La Paz), 16h. (Apia, Sydney, Victoria, and Adelaide), 17h. (Helwan, San Fernando, Toronto, Uccle, De Bilt, and Chicago), 20h. (La Paz), 21h. (Helwan).

Dec. 27d. Records at 8h. (Bidston), 15h. (Tokyo), 19h. (Taihoku, Manila, and La Paz), 20h. (La Paz, Apia, Sydney, and Helwan), 21h. (Chicago), 23h. (Tokyo).

Dec. 28d. Records at 0h. (San Fernando), 1h. (Mendoza), 2h. (Tokyo), 7h. (Manila), 13h. (Helwan), 14h. (Azores), 18h. (La Paz and Mendoza), 19h. (Helwan), 21h. (La Paz).

Dec. 29d. Records at 0h. (La Paz), 5h. (De Bilt), 9h. (Batavia), 13h. (Manila), 16h. (Moncalieri), 18h. (Manila).

Dec. 30d. Records at 0h. (Algiers), 1h. (Manila), 2h. (Rocca di Papa and La Paz), 3h. (La Paz), 10h. (Melbourne), 11h. (Helwan), 13h. (La Paz).

Dec. 31d. Records at 14h. (La Paz), 18h. (Mizusawa), 21h. (La Paz), 22h. (Taihoku).