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The International Seismological Summary for 1920 October, November, December.

FORMERLY THE BULLETIN OF THE BRITISH ASSOCIATION SEISMOLOGY COMMITTEE.

At the meeting of the Geodetic and Geophysical Union in Madrid in October, 1924, the question was raised which were the most suitable tables to adopt; and whether a Committee should be appointed to report on the improvement of the tables. It was replied that the time was scarcely yet come, for if the estimates recently made for depth of focus are confirmed, drastic revision of the tables is necessary. Meanwhile the tables adopted in the Summary, which have been given many times in a brief, and recently in an expanded form, are good enough as provisional tables. M. Somville expressed the opinion that those of Dr. Klotz are, however, rather better. An opportunity of testing this statement is provided by the great Kansu earthquake of December 16, and in the full discussion of that shock is given an examination of the merits of Dr. Klotz's tables. They do not seem to bear out the statement of M. Somville, and it is claimed that our best course at present is to continue with the adopted (admittedly imperfect, but still fairly good) tables, to which already a great many observations have been referred.

In the present number 27 new epicentres are adopted, and 42 old ones.

There is but one case of abnormal focus, on Nov. 24, depth $=+0{\cdot}010$ (14°·3S. 64°·2W.). It is not possible to discuss directly the depth of focus for the great Kansu earthquake, since there are no observations very near the epicentre; but available evidence supports the hypothesis that the focal depth was normal.

H. H. TURNER.

University Observatory, Oxford.
1925 January 24.

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1920 OCTOBER, NOVEMBER, & DECEMBER.

Oct. 1d. 18h. 49m. 40s. Epicentre 17°·0N. 99°·0W.

A = −·150, B = −·945, C = +·292; D = −·988, E = +·156; G = −·046, H = −·289, K = −·956.

		Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Oaxaca		2·1	90	0 52	+19	(0 52)	− 6	1·5	1·7
Tacubaya		2·4	356	1 17	+40	(1 17)	+11	2·0	2·2
Mazatlan		9·3	313	4 28	?L	—	—	(4·5)	6·2
Tucson	E.	18·7	327	—	—	e 8 30	+35	10·5	11·6
	N.	18·7	327	e 4 45	+20	—	—	10·4	11·6
Chicago		26·7	19	5 54	− 1	10 39	+ 4	e 16·4	—
Lick	E.	28·5	320	—	—	—	—	e 17·6	—
Ann Arbor		28·5	24	—	—	(11 8)	0	11·1	—
Cheltenham	N.	29·1	37	e 11 25	?S	(e 11 25)	+ 6	22·4	24·8
Georgetown		29·1	37	—	—	e 11 29	+10	27·0	—
Washington		29·1	37	6 26	+ 7	11 26	+ 7	e 19·1	—
Berkeley		29·2	320	—	—	—	—	e 17·0	—
Ottawa		34·4	30	—	—	e 12 45	− 1	e 22·2	—
Victoria		37·2	333	20 30	?L	—	—	(20·5)	23·0
La Paz		45·2	136	8 34	0	17 4	+106	28·6	33·3
Honolulu		55·6	284	—	—	—	—	e 26·9	32·3
Edinburgh		79·2	36	—	—	—	—	52·3	—
Oxford		81·4	39	—	—	e 22 53	+14	—	—
Rio Tinto		81·5	53	32 20	?	—	—	—	33·8
Paris		84·7	40	—	—	—	—	48·3	—
Uccle		85·0	39	—	—	e 23 20	+ 1	e 43·3	—
De Bilt		85·1	37	—	—	e 23 37	+17	e 51·3	55·0
Strasbourg		88·0	40	—	—	e 23 50	− 2	e 51·3	—
Rocca di Papa		94·0	44	—	—	e 24 20	−36	—	34·3
Helwan		113·0	46	e 62 20	?L	—	—	(62·3)	—

Additional readings and notes: Oaxaca gives all its readings 3m. late, PZ = +0m.51s., MZ = +1·8m. Lick eLN = +17·7m. Cheltenham eN = +19m.55s. Berkeley eN = +17m.14s. The S phase of La Paz is uncertain, and is taken to be SR_1, T_0 = 18h.47m.2s. De Bilt eSR_1 = +29m.13s. Helwan PN = +66m.20s.

Oct. 1d. Readings also at 2h. (Helwan), 4h. (La Paz), 5h. (Helwan, Riverview, De Bilt, and Uccle); 15h. (Apia and near Kobe), 23h. (Tacubaya).

Oct. 2d. Readings at 0h. (Lick, San Fernando, and near Tacubaya (2)), 2h. (La Paz), 3h. (near Tacubaya (2)), 5h. (La Paz and near Tacubaya), 9h. (La Paz, Florence, and Manila), 12h. (near Mizusawa and near Tacubaya), 13h. (Batavia and Taihoku), 14h. (La Paz), 15h. (near Vieques), 17h. (Taihoku), 21h. (Apia).

Oct. 3d. Readings at 0h. (San Fernando), 3h. (near Pompeii), 5h. (Chicago and Honolulu), 10h. (Helwan), 13h. (Florence), 14h. (Riverview), 16h. (Taihoku and near Tokyo), 17h. (near Tokyo), 20h. (Rocca di Papa), 21h. (near Manila).

Oct. 4d. Readings at 2h. (San Fernando), 3h. (Manila and Zi-ka-wei), 4h. and 5h. (Tacubaya and Manila), 17h. (Riverview and Tacubaya), 22h. (near Batavia), 23h. (Apia).

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Oct. 5d. 19h. 4m. 25s. Epicentre 36°·5N. 122°·0W.

A = −·426, B = −·682, C = +·595 ; D = −·848, E = +·530 ;
G = −·315, H = −·504, K = −·804.

		Δ	Az.	P.	O−C.	L.	M.
		°	°	m. s.	s.	m.	m.
Lick		0·9	18	i 0 14	0	i 0·4	0·7
Berkeley		1·4	352	e 0 24	+ 3	—	1·5
	z.	1·4	352	e 0 23	+ 2	—	1·2
Victoria		11·9	355	—	—	6·4	8·4
Chicago		27·0	68	—	—	e 13·0	—
Ann Arbor		29·9	67	—	—	16·2	—
Georgetown		35·3	72	—	—	e 14·9	—
Ottawa		35·5	61	—	—	e 18·1	—

Additional Readings : Chicago gives also eL = +15·6m. Ann Arbor LN = +16·0m. Ottawa eL? = +18·6m., L = +19·9m.

Oct. 5d. Readings also at 1h. (La Paz). 6h. (San Fernando and near Tacubaya and Oaxaca), 12h. (La Paz), 14h. (Florence), 16h. and 19h. (near Tacubaya), 20h. (San Fernando), 21h. (Taihoku), 22h. (near Algiers).

Oct. 6d. Readings at 4h. (Lick), 7h. (Rio Tinto), 8h. (Helwan), 16h. (Tacubaya), 22h. (San Fernando and near Padova).

1920. Oct. 7d. 20h. 54m. 0s. Epicentre 12°·0S. 69°·0W.

(as on 1920 Feb. 28d.).

A = +·351, B = −·913, C = −·208 ; D = −·934, E = −·358 ;
G = −·075, H = +·194, K = −·978.

The values of T_0 inferred from S−P are curiously discordant from that assigned by La Paz. Half a dozen stations (including De Bilt) favour a value greater by about 40 sec. ; and another half dozen (including Uccle) favour a value less by 30 sec. Was there more than one shock ?

		Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
La Paz		4·6	169	i 1 17	+ 6	2 15	+ 9	2·5	3·1
Balboa Heights	E.	23·5	333	5 6	−17	9 4	−31	—	9·7
	N.	23·5	333	—	—	9 10	−25	—	10·2
Vieques	E.	30·4	8	—	—	—	—	14·1	15·0
Georgetown	E.	51·5	352	e 9 21	+ 4	i 17 13	+35	e 25·5	—
Washington		51·5	352	9 6	−11	16 26	−12	24·3	—
Ithaca		54·9	355	e 10 1	+23	e 17 18	− 2	24·2	—
Ann Arbor	E.	56·1	350	10 0	+13	17 36	+ 1	25·4	28·2
	N.	56·1	350	—	—	17 48	+13	25·7	—
Chicago		56·4	345	9 54	+ 6	17 12	−27	23·8	27·4
Toronto		56·5	351	—	—	15 0	?	23·4	24·8
Ottawa		57·7	355	10 31	+34	17 51	− 4	28·0	—
San Fernando		76·3	48	12 24	+27	21 54	+13	—	53·0
Coimbra	E.	76·5	43	e 12 31	+33	21 47	+ 4	e 38·7	45·1
	N.	76·5	43	e 12 15	+17	—	—	e 30·9	—
Rio Tinto		76·6	47	23 0	?S	(23 0)	+76	—	52·0
Victoria		77·1	328	12 18	+16	21 53	+ 3	35·2	40·1
Granada		78·5	49	i 12 16	+ 6	i 22 45	+39	—	—
Cape Town		81·2	124	22 48	?S	(22 48)	+11	—	23·8
Tortosa		82·9	46	12 29	− 6	23 8	+12	36·3	49·0
Algiers		83·6	51	—	—	(24 0)	+55	24·0	46·0
Barcelona		84·3	47	e 0 52	?	(22 35)	−36	e 22·6	37·6
Oxford		86·2	35	12 53	− 1	23 2	−30	—	52·2
Stonyhurst		86·5	34	e 22 48	?S	(e 22 48)	−48	—	54·0
Kew		86·6	35	25 0	?S	(25 0)	+83	—	55·0
Eskdalemuir		86·7	31	e 13 0	+ 3	24 45	+67	39·0	—
Edinburgh		87·0	31	—	—	23 0	−41	—	30·5

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.
Paris		87·3	40	—	—	e 23 44	0	50·0	—
Uccle		89·1	39	e 12 54	−17	23 58	− 6	e 38·0	52·4
Moncalieri		89·3	43	e 16 16	?PR_1	30 35	?SR_1	43·0	—
De Bilt		90·0	38	e 13 35	+19	e 24 14	0	e 38·0	e 49·9
Strasbourg		90·4	40	e 13 30	+12	i 25 40	+82	e 38·0	51·4
Florence		91·4	46	24 0	?S	(24 0)	−28	—	32·0
Rocca di Papa	N.	91·9	48	e 13 18	− 8	24 30	− 4	e 40·6	—
Hamburg		93·3	36	e 17 34	?PR_1	e 24 0	−48	e 41·0	55·0
Honolulu		93·5	292	e 9 18	?	23 24	−87	41·9	49·9
Vienna		95·9	42	e 13 35	−13	e 24 24	−51	e 44·0	57·5
Helwan		104·8	62	24 0	?S	(24 0)	−160	—	—
Colombo		148·8	98	42 0	?SR_1	—	—	(65·0)	—
Batavia		161·3	167	e 21 54	?	—	—	—	—

Additional readings: Toronto gives also i = +6m.54s. and +19m.42s., eL = +46·9m. Ottawa iE = +18m.33s. and +20m.11s., eLE = +25·3m., L = +36·0m. and +40·0m., T_o = 20h.55m.18s. Coimbra LN = +32·0m., T_o = 20h.54m.41s. Uccle PR_1 = +16m.42s., i = +26m.48s., T_o = 20h.53m.42s. De Bilt ePR_1 = +16m.45s., e = +26m.12s., MN = +51·8m., T_o = 20h.54m.53s. Rocca di Papa ePE = +13m.0s., PR_1 = +17m.36s., eLE = +31·6m. Hamburg MN = +42·8m. Honolulu PR_1 = +16m.30s. Colombo +83m.0s.

Oct. 7d. Readings also at 0h. (Batavia), 7h. (Rio Tinto, Uccle, and near Algiers and Tortosa), 8h. (near Florence, Zurich, and Rocca di Papa), 9h. (near Tokyo), 11h. (Zi-ka-wei), 18h. (Helwan, Nagasaki, and Algiers), 19h. (Taihoku), 23h. (Batavia).

Oct. 8d. 16h. 50m. 45s. Epicentre 16°·0N. 90°·0W.

A = ·000, B = −·961, C = +·276; D = −1·000, E = ·000; G = ·000, H = −·276, C = −·961.

		Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Oaxaca		6·6	280	2 20	+39	(2 50)	−10	2·8	2·9
Mobile	N.	14·7	6	2 58	−37	5 40	−45	6·5	6·7
Vieques	E.	23·4	81	e 6 36	+75	—	—	e 10·2	—
Tucson	E.	24·9	314	e 5 29	− 8	9 12	−49	12·1	12·6
	N.	24·9	314	5 29	− 8	9 14	−47	12·1	13·0
Georgetown	E.	25·5	24	e 6 2	+19	10 56	+43	20·6	—
Washington		25·5	24	5 39	− 4	10 47	+34	—	16·7
Cheltenham		25·5	24	6 3	+20	10 19	+ 6	—	17·8
Chicago		25·8	4	5 33	−13	10 33	+15	13·6	—
Ann Arbor	E.	26·8	10	6 9	+13	10 57	+20	15·2	17·4
	N.	26·8	10	6 21	+25	11 3	+26	15·4	18·0
Ithaca		28·8	21	e 6 45	+29	e 10 37	−36	—	—
Toronto		29·0	16	—	—	e 10 21	−56	e 18·0	19·2
Ottawa		31·7	20	6 31	−13	11 55	− 8	e 15·7	—
Northfield		31·7	25	—	—	—	—	e 15·2	—
Berkeley		35·8	316	e 6 52	−28	—	—	—	—
La Paz		39·0	145	7 45	− 1	e 13 49	− 3	19·0	20·4
Victoria		42·3	330	—	—	17 2	?SR_1	21·5	26·3
Honolulu		64·2	286	—	—	e 19 15	0	e 27·2	—
Edinburgh		75·0	37	e 11 48	− 1	21 40	+14	37·2	41·2
Eskdalemuir		75·0	37	e 11 54	+ 5	21 44	+18	36·2	—
Oxford		76·7	40	12 2	+ 3	21 50	+ 5	37·6	43·8
Paris		79·7	42	e 12 15	− 2	e 22 21	− 1	40·2	44·2
Uccle		80·3	40	e 12 19	− 2	e 22 30	+ 3	e 38·2	42·2
De Bilt		80·5	39	12 22	0	22 34	+ 5	e 38·2	42·7
Hamburg	E.	82·9	37	e 12 32	− 3	i 22 51	− 5	e 39·2	46·2
Algiers		82·9	54	—	—	e 24 49	+113	44·2	—
Strasbourg		83·0	42	i 12 35	− 1	22 52	− 5	38·2	46·8
Rocca di Papa		88·5	47	e 12 57	−11	—	—	—	—
Vienna		88·6	40	13 2	− 6	i 23 29	−30	e 42·2	50·8

Additional readings: Oaxaca gives also MZ = +3·1m. Georgetown eLE = +62·2m., T_o = 16h.50m.36s. Chicago L? = +15·2m., T_o = 16h.49m.59s. Ann Arbor LE = +15·0m. Toronto S? = +13m.45s. (?SR_1). Berkeley eZ = +6m.59s. Victoria L = +23·7m. Eskdalemuir e = +8m.57s. Paris iS = +22m.31s., T_o = 16h.50m.52s.. De Bilt MN = +43·7m., T_o = 16h.50m.53s. Rocca di Papa eN = +13m.21s. Vienna i = +13m.49s.

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Oct. 8d. Readings also at 1h. (Helwan), 4h. (Zi-ka-wei), 7h. (Zi-ka-wei, Manila (2), Taihoku, and Batavia), 8h. (Batavia, Zi-ka-wei, Helwan, Manila (2), Uccle (2), and De Bilt (2)), 9h. (2), 11h., and 13h. (Manila), 14h. (De Bilt and Manila (2)), 15h. (La Paz and Helwan), 16h. (De Bilt and Helwan), 19h. (Batavia), 20h. (Mauritius), 21h. (Taihoku and San Fernando).

Oct. 9d. Readings at 3h. (La Paz), 5h. (Manila), 6h. (Zi-ka-wei), 8h. (Manila), 11h. (Batavia, Manila, and La Paz), 12h. and 15h. (La Paz), 17h. (Algiers), 20h. (San Fernando), 21h. (Barcelona).

Oct. 10d. 19h. 43m. 0s. Epicentre 13°·0S. 60°·0W.

$A = +\cdot487$, $B = -\cdot844$, $C = -\cdot225$; $D = -\cdot866$, $E = -\cdot500$; $G = -\cdot113$, $H = +\cdot195$, $K = -\cdot974$.

This solution satisfies the La Paz and Tortosa observations, but the epicentre seems too near Europe to suit the L observations at Uccle and De Bilt. If we could ignore the Tortosa observations, an epicentre at 14°·0S. 76°·0W. would satisfy the European observations of L.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
La Paz	8·6	245	i 2 7	− 3	3 46	− 7	4·1	4·2
San Fernando	70·8	44	48 0	?L	—	—	(48·0)	—
Rio Tinto	71·2	42	49 0	?L	—	—	(49·0)	56·0
Tortosa	77·6	42	e 12 0	− 5	e 22 0	+ 4	e 37·0	53·9
Paris	82·8	36	—	—	—	—	53·0	—
Uccle	84·7	36	—	—	—	—	e 48·0	—
De Bilt	85·8	35	—	—	—	—	e 48·0	55·6
Rocca di Papa	86·2	46	—	—	—	—	e 62·0	—
Hamburg	89·1	34	—	—	—	—	54·0	59·0
Helwan	97·6	61	56 0	?L	—	—	(56·0)	—
Honolulu	102·1	290	—	—	—	—	e 45·8	52·0

Additional readings: La Paz gives i = +2m.22s. and +3m.31s., T_0 = 19h.43m.6s. De Bilt MN = +52·3m. Helwan PE = +60m.0s.

Oct. 10d. Readings also at 5h. (Helwan), 6h. (La Paz), 9h. (Batavia, Colombo, and Rio Tinto), 13h. (La Paz (2)), 14h. (Florence), 17h. (La Paz), 18h. (Manila and Moncalieri), 20h. (La Paz), 23h. (Florence).

Oct. 11d. Readings at 7h. (Stonyhurst (6)), 14h. (Barcelona), 22h. (Apia).

Oct. 12d. 6h. 54m. 40s. 35°·7N. 81°·0E.

$A = +\cdot127$, $B = +\cdot802$, $C = +\cdot584$; $D = +\cdot988$, $E = -\cdot156$; $G = +\cdot091$, $H = +\cdot576$, $K = -\cdot812$.

		Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Simla		5·6	216	1 32	+ 5	—	—	—	2·9
Calcutta	E.	14·7	152	3 38	+ 3	6 2	−23	8·0	8·8
	N.	14·7	152	3 44	+ 9	6 14	−11	8·2	9·0
Bombay		18·3	205	7 33	?S	(7 33)	−14	—	10·1
Kodaikanal		25·7	188	13 8	?L	—	—	22·8	26·4
Colombo		28·8	182	16 20	?L	—	—	(16·3)	21·3
Zi-ka-wei		33·8	85	—	—	e 13 14	+36	—	—
Taihoku		36·3	95	—	—	—	—	e 20·3	—
Manila		41·5	110	e 8 20	+13	—	—	—	—
Vienna		48·1	308	8 52	− 3	15 49	− 6	e 26·0	30·9
Hamburg		51·2	315	e 9 15	+ 1	e 16 34	0	e 28·5	32·6
Rocca di Papa		52·2	299	i 9 26	+ 5	e 16 44	− 2	e 32·0	35·0
	N.	52·2	299	e 9 20	− 1	i 16 44	− 2	e 28·8	34·6
Florence		52·6	302	15 45	?S	(15 45)	−66	—	30·3

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.
Strasbourg		53·7	309	9 31	0	—	—	29·3	—
De Bilt		54·4	314	17 15	?S	(17 15)	+ 1	27·3	30·9
Moncalieri		54·7	305	—	—	e 17 19	+ 2	28·6	35·8
Uccle		55·2	312	e 9 40	0	e 17 25	+ 1	e 27·3	31·5
Paris		56·9	310	e 17 45	?S	(e 17 45)	0	30·3	—
Kew		57·8	315	—	—	—	—	—	34·3
Edinburgh		58·0	320	—	—	e 18 8	+ 9	34·3	36·8
Eskdalemuir		58·2	320	—	—	i 18 8	+ 7	28·3	—
Stonyhurst		58·2	316	e 23 50	?SR_1	—	—	34·3	36·3
Oxford		58·3	315	—	—	18 7	+ 4	30·8	35·2
Barcelona		59·7	301	—	—	—	—	e 26·9	35·3
Tortosa		61·1	301	11 51	+91	18 47	+10	25·6	37·4
Granada		65·6	300	11 42	+53	20 2	+30	—	—
Rio Tinto		67·4	301	39 20	?L	—	—	(39·3)	42·3
Coimbra	E.	67·5	305	e 15 42	?	—	—	—	39·7
	N.	67·5	305	e 13 20	?	e 20 2	+ 6	e 34·4	39·8
San Fernando		67·8	300	29 0	?L	—	—	38·3	42·3
Victoria		93·2	15	49 16	?L	—	—	52·7	59·1
Toronto		98·6	346	—	—	—	—	e 59·2	—
Chicago		101·8	350	—	—	—	—	e 51·3	—
La Paz		146·5	297	19 55	[+ 4]	—	—	76·3	82·5

Additional readings: Hamburg gives also $eSR_1 = +21m.2s.$, $MZ = +34·8m.$, $T_o = 6h.54m.44s.$ Rocca di Papa $eLN = +30·9m.$ De Bilt $eSR_1 = +21m.27s.$, $eN = +21m.56s.$, $MN = +30·8m.$ Moncalieri S? = +22m.5s., $MN = +32·6m.$ Paris $eS = +23m.5s.$ Oxford $SR_1 = +24m.15s.$ San Fernando $MN = +43·3m.$ Chicago $L = +55·3m.$ and $+65·3m.$

Oct. 12d. Readings also at 0h. (Colombo and Algiers), 4h. (Taihoku), 7h. (Manila, near Athens, and near Calcutta), 8h. (Batavia, Barcelona, Tortosa, Stonyhurst (2), Manila, Taihoku (2), Zi-ka-wei (2), De Bilt, and La Paz, possibly from the origin of 6h., but the evidence for a repetition insufficient), 9h. (De Bilt, Uccle, Zi-ka-wei, Rocca di Papa, Riverview, and Strasbourg), 17h. (Point Loma, and near Berkeley), 19h. (near Tokyo), 23h. (San Fernando and near Mizusawa).

Oct. 13d. 23h. 11m. 55s. Epicentre 34°·7N. 19°·3E.

$A = +·776$, $B = +·272$, $C = +·569$; $D = +·330$, $E = -·944$; $G = +·537$, $H = +·188$, $K = -·822$.

		Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Athens		4·8	47	e 1 23	+ 9	e 2 1	−10	i 2·1	4·8
Pompeii		7·2	330	1 25	−24	2 45	−30	—	—
Rocca di Papa		8·8	326	i 2 5	− 8	i 4 5	+ 7	—	—
Helwan	N.	11·2	112	6 5	?L	—	—	(6·1)	—
Moncalieri		13·6	323	e 3 21	0	6 33	+35	9·2	—
Vienna		13·7	352	3 12	−10	—	—	—	8·1
Tortosa		16·0	299	4 0	+ 8	6 47	− 8	7·1	8·2
Strasbourg		16·3	332	e 3 50	− 6	e 6 20	−42	10·1	—
Granada		18·7	284	4 28	+ 3	8 1	+ 6	—	—
Uccle		19·4	331	e 4 27	− 7	e 8 7	− 3	10·1	—
Hamburg		20·1	344	e 4 37	− 5	—	—	—	14·1
De Bilt	E.	20·2	334	4 43	0	8 26	− 1	10·7	12·7
	N.	20·2	334	—	—	—	—	11·2	12·3
Oxford		22·6	325	—	—	e 9 15	− 2	—	—
Edinburgh		26·2	331	—	—	10 5	−21	—	—

Additional readings: Athens gives also $MN = +2·9m.$ Helwan $PE = +9m.5s.$

Oct. 13d. Readings also at 4h. (La Paz, Manila, and De Bilt), 5h. (near Tokyo), 11h. (Batavia), 15h. (La Paz and Manila), 18h. (Barcelona), 21h. (Uccle and De Bilt), 22h. (San Fernando, Manila, and Lick).

Oct. 14d. Readings at 1h. (Florence), 10h. (La Paz), 15h. (La Paz and near Mizusawa), 19h. (near Tokyo), 23h. (San Fernando).

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Oct. 15d. 11h. 9m. 50s. Epicentre 43°·8N. 11°·2E. (as on 1920 Sept. 16d.).

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Florence	0·0	—	0 0	0	—	—	—	0·3
Padova	1·7	17	0 27	+ 1	0 45	− 3	—	—
Rocca di Papa	2·3	152	e 1 4	?S	(e 1 4)	+ 1	e 4·2	5·2
Zurich	4·0	332	e 0 53	− 9	—	—	—	—
Vienna	5·7	37	2 38	?S	(2 38)	+ 2	—	4·2

Florence gives other readings at +12s. and +18s. Zurich eN = +0m.48s.

Oct. 15d. 14h. 7m. 37s. Epicentre 75°·5S. 150°·0E.

A = −·217, B = +·125, C = −·968 ; D = +·500, E = +·866 ;
G = +·838, H = −·484, K = −·250.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Adelaide	40·9	348	i 13 41	?S	(i 13 41)	−39	i 20·5	24·7
Riverview	41·7	2	e 8 9	0	e 14 32	+ 1	e 19·0	21·1
Sydney	41·7	2	14 41	?S	(14 41)	+10	19·4	20·4
La Paz	85·1	144	23 13	?S	(23 13)	− 7	—	—
Manila	91·8	333	e 15 23	+117	—	—	—	—
Honolulu	102·0	50	e 20 59	?	—	—	29·8	40·1
Helwan	125·9	250	79 23	?L	—	—	(79·4)	—
Victoria	135·6	71	—	—	—	—	48·6	51·0
Rio Tinto	140·8	209	90 23	?L	—	—	(90·4)	95·4
Rocca di Papa	141·5	232	—	—	e 59 23	?	82·2	—
Toronto	141·8	118	—	—	—	—	e 46·9	—
Tortosa	142·8	219	—	—	—	—	e 69·4	88·1
Moncalieri	145·5	228	—	—	e 66 35	?L	83·4	—
Strasbourg	149·0	230	—	—	—	—	e 71·4	—
Paris	150·2	225	—	—	e 26 18	—	78·4	83·4
Uccle	151·8	229	—	—	—	—	e 68·4	—
De Bilt	152·9	231	—	—	—	—	e 71·4	82·6

Additional readings: Riverview gives also PS = +14m.58s., MZ = +20·1m., MN = +20·4m. La Paz i = +26m.41s. De Bilt MN = +76·9m..

Oct. 15d. Readings also at 0h. (Lick), 6h. (La Paz), 8h. (Lick), 9h. (Helwan), 13h. (La Paz), 15h. (near Mizusawa), 17h. (Florence), 19h. (San Fernando), 22h. (Mauritius), 23h. (La Paz).

Oct. 16d. 11h. 36m. 30s. Epicentre 50°·4N. 31°·6W.

A = +·543, B = −·334, C = +·770 ; D = −·524, E = −·852 ;
G = +·656, H = −·404, K = −·637.

(The epicentre 51°·0N. 34°·0W. of 1919 August 18 is found to be definitely too far away).

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Edinburgh	17·8	61	4 15	0	—	—	—	12·0
Oxford	19·0	74	—	—	—	—	—	11·3
Paris	22·0	81	e 5 8	+ 3	e 9 7	+ 2	11·2	12·5
Uccle	22·6	75	e 5 5	− 7	e 9 16	− 1	e 10·5	12·4
De Bilt	22·8	72	5 15	0	9 21	0	10·5	14·8
Strasbourg	25·3	79	5 35	− 6	9 59	−10	13·6	14·5
Hamburg z.	25·4	67	e 5 24	−18	—	—	—	13·5
Moncalieri	26·7	86	—	—	e 10 34	− 1	13·9	—
Vienna	30·8	75	—	—	—	—	e 16·0	—
Rocca di Papa	31·4	89	—	—	—	—	e 14·0	18·6

Additional readings: De Bilt gives MN = +12·9m., T_o = 11h.36m.37s.

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Oct. 16d. Readings also at 2h. (near Tacubaya), 4h. (Rocca di Papa), 10h. (Manila), 22h. (San Fernando).

Oct. 17d. Readings at 5h. (La Paz), 7h. (San Fernando).

1920. Oct. 18d. 8h. 11m. 30s. Epicentre 46°·0N. 149°·0E.

(as on 1919 Feb. 12d.).

A = −·596, B = +·358, C = +·719; D = +·515, E = +·857; G = −·617, H = +·370, K = −·695.

		Δ	Az.	P.	O−C	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Ootomari		4·4	281	0 57	−11	—	—	2·5	3·3
Mizusawa	E.	8·9	223	2 17	+ 2	3 47	−14	—	—
	N.	8·9	223	2 18	+ 3	3 51	−10	—	—
Tokyo		12·4	218	3 5	0	4 1	?	4·5	7·1
Osaka		15·3	227	3 51	+ 8	(6 39)	0	6·6	9·6
Kobe	E.N.	15·4	228	3 48	+ 4	(6 45)	+ 4	6·8	7·1
Nagasaki		19·8	235	e 4 47	+ 8	(8 25)	+ 6	8·4	8·5
Zi-ka-wei		25·9	245	e 5 35	−12	9 39	−41	—	16·4
Taihoku		30·3	235	7 11	+40	(11 50)	+11	11·8	—
Manila		39·2	226	e 7 32	−16	13 28	−26	i 17·5	17·6
Honolulu		49·3	102	i 8 48	−14	i 15 48	−22	27·5	34·3
Calcutta	E.	53·8	267	9 36	+ 4	(17 12)	+ 6	17·2	—
Victoria		56·2	53	(9 32)	−15	9 32	?P	16·9	25·3
Simla		56·2	280	9 54	+ 7	17 30	− 6	—	31·7
Berkeley	E.	63·0	62	e 10 34	+ 2	i 19 0	− 1	—	19·0
	N.	63·0	62	e 10 32	0	i 18 59	− 2	—	19·1
Batavia		64·2	228	i 10 45	+ 6	i 19 11	− 4	e 37·5	41·4
Bombay		67·0	275	11 0	+ 2	—	—	—	20·0
Apia		69·4	139	11 0	−13	20 0	−19	30·8	—
Kodaikanal		69·9	266	13 54	?PR_1	(20 18)	− 7	20·3	22·1
Colombo		70·6	261	11 30	+ 9	(20 30)	− 3	20·5	21·5
Lemberg		73·0	325	i 11 38	+ 2	—	—	e 34·5	39·5
Tucson	E.	73·7	60	e 11 42	+ 2	21 10	0	—	—
	N.	73·7	60	11 41	+ 1	i 21 3	− 7	—	—
Dyce	E.	74·1	345	i 11 54	+11	21 20	+ 5	—	—
Hamburg		74·5	337	i 11 51	+ 5	i 21 22	+ 2	e 37·3	41·5
Edinburgh		75·5	345	11 54	+ 2	—	—	36·5	46·7
Vienna	E.	77·2	330	i 12 6	+ 4	i 21 49	− 2	e 38·2	48·0
	N.	77·2	330	i 12 4	+ 2	i 21 54	+ 3	—	52·8
De Bilt		77·2	335	i 12 5	+ 3	i 21 52	+ 1	37·5	43·1
Bidston		77·8	344	12 7	+ 1	22 1	+ 3	—	—
West Bromwich		78·4	343	12 12	+ 3	22 5	0	—	—
Uccle		78·5	335	i 12 11	+ 1	i 22 5	− 1	37·5	43·5
Chicago		78·8	40	12 8	− 4	21 59	−11	38·2	—
Oxford		79·0	342	i 12 16	+ 3	i 22 8	− 4	32·8	48·4
Kew		79·0	342	21 30	?S	(21 30)	−42	—	52·5
Strasbourg	E.	79·7	336	i 12 18	+ 1	i 22 12	− 8	40·5	46·0
	N.	79·7	336	i 12 16	− 1	i 22 14	− 6	40·5	46·2
Riverview		79·8	178	i 12 7	−11	i 22 0	−21	e 35·6	45·2
Sydney		79·8	178	21 54	?S	(21 54)	−27	43·8	46·5
Ann Arbor	N.	80·0	37	12 0	−19	21 54	−29	46·0	—
Ottawa	Z.	80·5	29	i 12 20	− 2	i 22 19	−10	e 40·9	—
Zurich		80·5	333	i 12 22	0	i 22 24	− 5	—	—
Toronto		80·6	33	14 54	+151	23 12	+42	31·3	54·4
Paris		80·8	335	i 12 23	− 1	i 22 26	− 7	39·5	42·5
Padova	E.N.	81·1	330	12 19	− 7	22 26	−10	38·7	53·4
Besançon		81·4	335	12 27	0	22 34	− 5	38·5	—
Adelaide		81·5	189	e 12 24	− 4	i 22 12	−29	—	42·0
Milan		82·0	332	12 22	− 8	22 33	−13	—	23·2
Northfield		82·6	28	12 30	− 4	22 40	−13	38·5	—
Florence		82·8	330	12 31	− 4	22 39	−16	—	22·9
		82·8	330	12 30	− 5	23 5	+10	—	—
Ithaca		82·8	31	12 35	0	22 45	−10	e 40·4	—
Athens		82·9	320	i 12 34	− 1	i 22 44	−12	40·0	45·9
Moncalieri		82·9	333	i 12 33	− 2	i 22 54	− 2	40·5	49·7
Perth		83·5	208	25 30	?	—	—	—	—
Rocca di Papa		84·1	327	i 12 49	+ 6	i 22 54	−15	e 41·0	46·0

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.
Pompeii		84·2	326	12 30	−13	22 45	−25	38·5	54·5
Halifax	N.	85·0	22	e 12 40	− 8	i 22 56	−23	e 41·4	—
Helwan	E.	85·6	310	12 0	−51	—	—	—	23·9
	N.	85·6	310	10 36	?	—	—	—	22·1
Georgetown	E.	85·6	34	i 11 44	−67	i 22 0	−86	e 37·0	—
Washington		85·6	34	12 39	−12	22 54	−32	40·7	—
Cheltenham	N.	85·8	34	i 12 51	− 1	i 23 19	− 9	e 51·2	58·0
Barcelona		87·7	336	i 12 59	− 4	i 23 18	−31	e 42·2	46·5
Tortosa		88·8	336	13 2	− 7	23 22	−39	42·5	52·0
Coimbra	E.	91·6	344	13 13	−12	23 42	−49	e 42·7	61·7
	N.	91·6	344	13 13	−12	23 38	−53	46·4	55·2
Algiers		91·8	332	i 13 16	−10	i 23 39	−54	41·5	52·5
Granada		93·3	338	i 13 18	−16	i 23 41	−67	—	—
Rio Tinto		93·4	341	25 30	?S	(25 30)	+41	—	66·5
San Fernando		94·6	340	13 22	−19	24 0	−62	51·8	56·5
Seychelles		95·7	270	84 30	?	—	—	—	86·0
La Paz		137·3	53	i 19 29	[− 6]	33 36	?	72·3	75·6
Cape Town		140·9	270	22 59	?PR_1	—	—	—	97·6

Additional readings: Ootomari gives also MN = +3·0m. Osaka MN = +7·3m. Zi-ka-wei PSN = +10m.24s., SR_1E = +11m.20s. Manila iN = +13m.51s., iE = +14m.16s., iN = +15m.2s., iE = +15m.39s., T_0 = 8h.11m.33s Calcutta PN = +9m.42s. Victoria P = +4m.28s. Berkeley iS?V = +19m.1s., T_0 = 8h.11m.37s. Batavia iE = +13m.45s., iN = +14m.19s., e = +40m.30s., T_0 = 8h.11m.51s. Apia L = +28·3m. Dyce SN = +21m.24s. Hamburg iPZ = +11m.50s., iSN = +21m.23s., T_0 = 8h.11m.46s.. Edinburgh PR_1 = +14m.53s., PR_2 = +17m.54s., SR_1 = +27m.40s., SR_2 = +31m.54s. De Bilt MN = +41·1m., T_0 = 8h.11m.46s. Uccle MN = +45·9m., epicentre 46°·3N. 148°·5E., T_0 = 8h.11m.45s. Chicago PR_1 = +15m.9s., L = +50·5m., T_0 = 8h.11m.45s. Riverview iP = +12m.9s., iPR_1 = +15m.11s., PS = +22m.48s., SR_1 = +27m.37s., MZ = +38·6m., MN = +46·1m., T_0 = 8h.11m.37s. Epicentre 46°·0N. 151°·0E, Sydney S = +31m.54s. (?SR_1). Ottawa LV = +43·5m., L rep. = +118·5m.. T_0 = 8h.11m.49s. Toronto i = +6m.6s. and +15m.54s., eL = +46·9m., L = +92·0m. Adelaide i = +23m.6s., e = +28m.18s. Ithaca PR_1 = +15m.49s. Athens PR_2E = +18m.12s., MN = +50·0m., T_0 = 8h.11m.51s. Moncalieri MN = +56·5m. Rocca di Papa L = +35·0m. Georgetown LE = +47·5m. Cheltenham SE = +23m.15s., T_0 = 8h.11m.54s. Barcelona i = +23m.41s. and +23m.59s. Coimbra SR_1N = +25m.26s., SR_1E = +25m.34s., iN = +25m.38s., SR_2E = +26m.57s., T_0 = 8h.12m.15s. San Fernando MN = +61·5m., T_0 = 8h.12m.12s. La Paz PR_1 = +23m.21s., SR_1 = +40m.23s., L = +68·1m. Cape Town (Milne-Shaw) P = +23m.4s.

Oct. 18d. Readings also at 0h. and 4h. (Apia), 5h. (near Mizusawa), 7h. (Florence), 12h. (Batavia, Chicago, Ithaca, Victoria (2), Washington, and Perth), 13h. (Bidston, Oxford, Toronto, Paris, Northfield, Edinburgh, Hamburg, Victoria, Washington, Ithaca, Chicago, La Paz, and De Bilt), 23h. (San Fernando and La Paz).

Oct. 19d. 18h. 24m. 18s. Epicentre 44°·5N. 140°·0E. (as on 1920 Aug. 17d.).

A = −·546, B = +·458, C = +·701.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Ootomari	2·9	42	0 59	+14	—	—	1·8	—
Mizusawa	5·5	170	1 25	0	2 29	− 2	—	—
Tokyo	8·9	181	2 13	− 2	2 40	−81	e 4·9	5·0

Mizusawa gives SN = +2m.30s.

Oct. 19d. Readings also at 0h. (Perth), 6h. (Helwan), 12h. (Zante), 14h. (La Paz), 17h. (Taihoku), 18h. (Manila), 21h. (Batavia and near Pompeii and Rocca di Papa).

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Oct. 20d. 10h. 2m. 16s. Epicentre 24°·0N. 120°·0E. (as on 1920 June 16d.).

A = −·457, B = +·792, C = +·407 ; D = +·866, E = +·500 ; G = −·204, H = +·352, K = −·914.

		Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Hokoto		0·6	222	0 43	+34	—	—	1·0	3·4
Taihoku		1·8	53	0 30	+ 2	—	—	0·8	—
Zi-ka-wei		7·3	10	e 1 44	− 7	e 3 25	+ 7	—	4·6
Manila		9·5	172	e 2 33	+10	6 2	?L	7·7	8·0
Nagasaki		12·3	42	e 3 44	+41	—	—	5·8	7·4
Osaka		17·2	48	4 8	+ 1	—	—	7·8	11·8
Tokyo		20·7	51	e 5 40	+51	e 6 52	−106	e 8·4	9·2
Mizusawa	E.	23·4	45	4 57	−24	8 53	−40	—	—
	N.	23·4	45	5 26	+ 5	8 54	−39	—	—
Ootomari		29·1	33	6 12	− 7	—	—	12·9	17·8
Calcutta	E.	29·1	273	6 8	−11	11 38	+19	17·9	20·0
Batavia		32·8	205	e 6 14	−41	—	—	e 19·7	—
Simla		38·4	290	e 13 44	?S	(e 13 44)	0	22·2	22·8
Colombo		42·1	252	8 44	+32	14 44	+ 8	27·7	29·7
Kodaikanal		42·8	260	19 2	?SR_1	—	—	27·2	28·2
Bombay		44·1	273	10 8	?PR_1	—	—	—	29·5
Riverview		65·0	152	i 11 27	+42	e 19 14	−11	e 30·3	38·4
Honolulu		74·6	75	e 11 8	−38	21 2	−19	e 36·1	56·8
Helwan		77·2	297	11 44	−18	—	—	—	—
Vienna		80·8	320	12 22	− 2	—	—	e 42·7	51·1
Hamburg		81·9	328	—	—	—	—	e 43·7	51·7
De Bilt		85·2	326	12 48	− 1	23 22	+ 1	e 41·7	54·9
Strasbourg		85·7	322	e 12 46	− 6	—	—	e 44·7	56·2
Florence		86·1	319	43 44	?L	—	—	(43·7)	54·7
Rocca di Papa	N.	86·1	314	e 13 14	+20	—	—	e 40·7	60·2
Uccle		86·3	327	e 12 46	− 9	e 23 16	−17	e 41·7	55·3
Edinburgh		86·8	332	—	—	—	—	44·7	56·6
Besançon		87·4	322	9 5	?	—	—	47·7	—
Moncalieri		87·6	319	e 13 0	− 3	23 14	−34	46·7	57·3
Victoria		88·2	37	40 56	?L	—	—	(40·9)	58·2
Kew		88·2	329	49 44	?L	—	—	(49·7)	59·7
Paris		88·4	326	—	—	—	—	e 45·7	55·7
Oxford		88·6	329	—	—	—	—	41·0	57·0
Barcelona		93·0	320	—	—	—	—	e 48·4	51·8
Tortosa		94·3	320	—	—	—	—	e 47·7	62·4
Algiers		95·1	315	—	—	—	—	e 58·7	61·7
Granada		99·1	319	27 2	?S	(27 2)	+75	(38·4)	—
Coimbra		99·8	323	e 24 11	?S	(e 24 11)	−103	51·2	65·8
Rio Tinto		100·5	320	33 44	?SR_1	—	—	—	69·7
San Fernando	E.	101·0	320	—	—	—	—	61·7	71·7
	N.	101·0	320	—	—	—	—	62·2	66·2
Ottawa		109·1	12	—	—	e 52 14	?L	e 61·2	—
Chicago		109·4	22	—	—	—	—	52·1	—
Toronto		110·0	14	—	—	—	—	e 65·3	68·2
Cape Town		112·2	240	58 20	?L	—	—	(58·3)	71·8
La Paz		169·3	47	20 16	[+ 2]	—	—	86·9	96·3

Additional readings: Zi-ka-wei gives also ePE = +1m.54s., MN = +5·2m. Manila iN = +6m.14s., MN = +9·6m. Osaka MN = +11·5m. Tokyo MN = +9·3m. Calcutta iN = +18·4m. Riverview MN = +37·4m. Helwan PN = +13m.44s. Hamburg e = +39m.44s., MN = +52·7m. De Bilt PR_1 = +16m.9s., SR_1 = +29m.19s., MN = +56·0m., T_o = 10h.2m.28s. Strasbourg MN = +57·1m. Rocca di Papa PR_1N = +15m.47s. Uccle ePR_1 = +16m.21s., eSR_1 = +30m.36s., MN = +57·0m. Moncalieri MN = +56·9m. Paris MN = +56·7m. Coimbra SN? = +34m.14s., MN = +65·8m. Also a set of readings ePN? = +8m.57s., S = +24m.21s. Chicago L = +64·2m. Toronto eL = +77·0m. and +83·1m.

Oct. 20d. 19h. 16m. 0s. Epicentre 24°·0N. 120°·0E. (as at 10h.).

		Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Hokoto		0·6	222	0 1	− 8	—	—	0·3	0·8
Taihoku		1·8	53	0 25	− 3	(0 43)	− 8	0·7	1·1
Zi-ka-wei		7·3	10	e 1 46	− 5	e 3 47	+29	(e 3·8)	4·2
Manila		9·5	172	e 2 35	+12	5 39	?L	6·4	9·0
Calcutta	E.	29·1	273	6 0	−19	13 30	?SR_1	19·0	—
Honolulu		74·6	75	—	—	—	—	e 52·0	58·8
Helwan		77·2	297	35 0	?L	—	—	(35·0)	—

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.
Vienna	80·8	320	e 12 24	0	—	—	54·0	—
De Bilt	85·2	326	—	—	23 24	+ 3	e 43·0	54·9
Strasbourg	85·7	322	—	—	—	—	e 46·0	55·0
Rocca di Papa	86·1	314	—	—	e 25 6	+95	e 51·7	58·1
Uccle	86·3	327	—	—	e 23 30	− 3	e 42·0	48·0
Edinburgh	86·8	332	—	—	—	—	55·0	57·0
Kew	88·2	329	—	—	—	—	—	59·0
Paris	88·4	326	—	—	—	—	e 48·0	—
Oxford	88·6	329	—	—	—	—	45·0	57·0
Tortosa	94·3	320	—	—	—	—	e 50·0	62·3
San Fernando E.	101·0	320	67 0	?L	—	—	(67·0)	69·0
N.	101·0	320	26 0	?S	(26 0)	− 5	—	72·0
La Paz	169·3	47	20 12	[− 2]	—	—	—	—

Additional readings: Hokoto readings are increased by 30s. Zi-ka-wei gives also ePE = +1m.48s., MN = +5·2m. Manila MN = +8·7m. Calcutta PN = +6m.18s. Honolulu e = +41m.6s. and +44m.0s. Helwan PN = +36m.0s. De Bilt MN = +56·0m.

Oct. 20d. Readings also at 2h. (La Paz), 6h. (Colombo), 10h. (near Kobe), 12h. (Washington), 13h. (Taihoku), 15h. and 16h. (La Paz), 20h. (Taihoku, De Bilt, and Zi-ka-wei), 21h. (Riverview and Taihoku), 23h. (near Tokyo).

Oct. 21d. 18h. 57m. 50s. Epicentre 40°·0N. 20°·0E. (as on 1919 Jan. 5d.).

A = +·720, B = +·262, C = +·643; D = +·342, E = −·940; G = +·604, H = +·220, K = −·766.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Athens	3·6	123	0 48	− 8	i 1 25	−14	1·6	1·8
Pompeii	4·2	281	1 4	− 1	—	—	—	—
Rocca di Papa	5·8	291	i 1 28	− 2	—	—	e 8·9	—
Florence	7·5	303	1 40	−14	3 10	−14	—	5·9
Padova	8·0	315	2 10	+ 9	5 10	?	—	—
Vienna	8·6	344	2 25	+15	—	—	i 4·8	6·3
Milan	9·6	308	5 44	?L	—	—	(5·7)	9·2
Lemberg	10·2	15	e 3 40	?	—	—	e 6·2	7·0
Moncalieri	10·3	303	e 2 59	+25	4 34	− 3	6·3	9·2
Zurich	11·0	316	e 2 45	+ 1	i 5 4	+10	—	—
Strasbourg	12·2	318	e 3 1	− 1	e 5 47	+23	e 6·5	9·2
Besançon	12·4	310	5 16	?S	(5 16)	−13	8·2	—
Barcelona	13·6	282	—	—	(e 5 43)	−15	e 5·7	9·2
Algiers	13·7	261	e 3 26	+ 4	—	—	—	10·9
Helwan	13·7	134	6 10	?S	(6 10)	+ 9	—	—
Tortosa	14·8	279	3 49	+13	(6 22)	− 5	6·4	11·0
Hamburg	15·2	337	e 3 41	− 1	e 6 44	+ 7	e 8·4	10·2
Paris	15·2	311	e 4 8	+26	i 6 53	+16	8·9	11·2
Uccle	15·3	320	e 3 46	+ 3	e 6 41	+ 2	e 8·2	—
De Bilt	15·8	325	4 4	+15	7 0	+10	e 8·2	11·1
Kew	18·1	316	—	—	—	—	—	15·2
Granada	18·6	269	i 4 26	+ 2	—	—	—	—
Oxford	18·8	316	—	—	8 4	+ 6	—	13·6
Bidston	20·6	318	8 40	?S	(8 40)	+ 4	(12·8)	—
San Fernando	20·8	269	8 22	?S	(8 22)	−18	—	14·2
Rio Tinto	20·8	272	16 10	?	—	—	—	17·7
Coimbra	21·7	280	—	—	8 43	−16	13·0	14·6
Edinburgh	22·0	324	—	—	—	—	15·2	—

Additional readings: Athens gives also P = +0m.58s., T_e = 18h.57m.51s. Pompeii reading is diminished by 1h. Rocca di Papa PR_1 = +3m.4s. Vienna iN = +3m.12s., +3m.48s., and +4m.33s., iLN = +5·0m. Moncalieri MN = +8·6m. Strasbourg eSE = +5m.56s., T_e = 18h.57m.25s. Besançon S = +7m.48s.?. Hamburg eLN = +8m.52s., MZ = +12·2m., T_e = 18h.57m.44s. De Bilt MN = +11·0m., T_e = 18h.58m.16s. San Fernando MN = +13·7m. Coimbra LN = +11·8m., MN = +14·2m. These readings are all given for 12h.-13h., and have been increased by 6h. to fit the table.

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Oct. 21d. Readings also at 1h. (San Fernando), 8h. (Dehra Dun), 9h. (Florence), 11h. (Helwan and La Paz), 17h. (La Paz), 21h. (Lick), 22h. (Manila).

Oct. 22d. 10h. 51m. 47s. Epicentre 7°·0S. 145°·0E. (as on 1918 Sept. 30d.).

A = −·813, B = +·569, C = −·122; D = +·574, E = +·819; G = +·100, H = −·070, K = −·993.

		Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Sydney		27·4	169	9 1	?	—	—	13·9	15·7
Riverview		27·4	169	i 5 46	−16	10 16	−32	e 13·8	17·1
Adelaide		28·5	191	—	—	i 11 1	− 7	i 13·9	18·0
Manila		32·2	312	e 6 49	− 1	(12 13)	+ 2	12·2	13·4
Perth		36·9	224	—	—	12 13	−69	—	—
Batavia		37·9	269	e 6 41	−56	e 8 43	?PR_1	—	13·0
Taihoku		39·5	325	e 7 50	− 1	—	—	—	—
Osaka		42·7	348	6 19	−117	—	—	—	11·9
Zi-ka-wei		44·3	331	e 8 22	− 6	e 14 57	− 9	—	—
Mizusawa	N.	46·3	356	8 43	+ 1	—	—	—	—
Honolulu		62·6	62	e 15 13	?	18 1	−55	26·9	38·2
Helwan	E.	114·0	300	26 49	?S	(26 49)	−73	—	—
Hamburg		121·0	331	e 20 27	?PR_1	—	—	—	32·2
De Bilt		124·2	331	e 21 7	?PR_1	e 31 24	?	e 59·2	64·1
Strasbourg		125·0	327	e 17 53	+107	—	—	—	—
Uccle		125·4	331	e 21 1	?PR_1	—	—	e 63·2	—
Toronto		126·6	39	—	—	—	—	73·9	—
La Paz		139·5	126	i 19 18	[−20]	23 12	?PR_1	24·4	25·8

Additional readings: Riverview gives also i = +6m.40s. and +12m.21s., MZ = +18·3m., MN = +19·3m., T_o = 10h.51m.54s. Adelaide i = +13m.13s. e = +16m.43s. Manila gives S as L, also S(?PR_1) = +10m.44s., MN = +13·2m., T_o = 10h.53m.43s. Mizusawa PE = +8m.13s. Helwan PN = +38m.7s. (?SR_1). De Bilt MN = +67·5m.

1920. Oct. 22d. 12h. 9m. 50s. Epicentre 21°·5S. 72°·0W.

A = +·288, B = −·885, C = −·366; D = −·951, E = −·309; G = −·113, H = +·348, K = −·930.

		Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
La Paz		6·2	37	i 1 36	+ 1	2 43	− 6	3·1	3·4
Balboa Heights	E.	31·4	346	6 36	− 6	11 45	−13	—	12·5
	N.	31·4	346	6 35	−7	11 58	0	—	12·0
Vieques	E.	40·2	10	—	—	e 13 45	−25	e 17·1	17·9
	N.	40·2	10	—	—	e 12 57	?	16·9	17·0
Tacubaya		48·8	325	9 2	+ 3	16 14	+10	20·1	—
Cheltenham	E.	60·4	358	e 10 14	− 1	e 18 28	0	—	—
	N.	60·4	358	i 10 12	− 3	18 20	− 8	e 29·8	—
Washington		60·6	357	10 15	− 1	18 30	− 1	29·5	—
Georgetown	Z.	60·6	357	i 9 56	−20	e 19 5	+34	e 32·1	—
Ithaca		64·1	358	10 43	+ 4	19 15	+ 1	e 31·4	—
Ann Arbor	E.	64·7	351	10 34	− 9	19 4	−17	26·7	—
	N.	64·7	351	10 40	− 3	19 16	− 5	26·7	—
		64·7	351	10 40	− 3	19 22	+ 1	26·7	—
Chicago		64·9	348	10 36	− 8	19 20	− 4	32·2	—
Tucson	E.	65·4	325	10 58	+11	19 46	+16	—	—
Toronto		65·5	355	—	—	i 19 40	+ 9	e 31·9	49·9
Ottawa		67·0	358	i 10 56	− 2	i 19 45	− 5	e 27·7	—
Azores		73·5	37	21 16	?S	(21 16)	+ 8	—	23·4
Berkeley		75·9	322	e 11 59	+ 5	(e 21 47)	+11	e 21·8	—
	Z.	75·9	322	e 11 58	+ 4	(e 21 59)	+23	e 22·0	—
Cape Town		78·6	122	21 15	?S	(21 15)	−52	—	21·4
		78·6	122	21 33	?S	(21 33)	−34	—	21·7
Victoria		83·6	329	—	—	23 10	+ 5	e 38·3	47·8
San Fernando		84·8	48	13 4	+17	(22 28)	−49	22·5	58·5
Rio Tinto		85·2	46	25 10	?S	(25 10)	+109	—	28·2
Coimbra		85·4	43	12 26	−24	i 22 42	−41	39·6	50·6

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	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Tortosa	91·6	46	13 10	−15	23 14	−77	35·2	62·0
Algiers	91·6	50	e 13 7	−18	23 15	−76	34·2	43·2
Barcelona	93·0	46	e 14 18	+46	23 27	−78	e 36·3	48·5
Honolulu	94·3	291	e 13 4	−36	24 10	−49	44·8	53·5
Bidston	95·4	35	23 46	?S	(23 46)	−84	—	—
Oxford	95·6	36	—	—	i 23 42	−90	38·2	50·9
Kew	96·0	36	—	—	—	—	—	57·2
Paris	96·4	40	—	—	i 23 46	−94	45·2	46·2
Edinburgh	96·6	31	23 48	?S	31 10	?	39·2	53·9
Besançon	97·8	43	—	—	23 16	−138	45·2	—
Moncalieri	98·1	45	e 11 19	?	23 34	−123	34·2	42·4
Uccle	98·3	39	13 29	−33	i 24 0	−99	41·2	52·2
De Bilt	99·3	38	e 14 10	+ 3	e 24 50	−59	e 48·2	50·3
Strasbourg	99·5	41	e 12 35	−93	e 24 5	−106	e 41·2	64·2
Florence	100·0	47	19 10	?PR_1	—	—	—	25·2
Rocca di Papa	100·3	49	i 13 40	−32	i 24 4	−115	e 27·5	—
Padova	101·0	45	20 10	?PR_1	24 21	−104	—	—
Hamburg	102·5	37	e 13 48	−35	i 24 23	−117	e 43·2	51·2
Vienna	104·8	43	14 58	+25	i 24 30	−130	e 49·3	55·7
Riverview	111·1	217	e 19 55	?PR_1	e 28 55	+77	e 47·4	49·1
Helwan E.	111·6	65	—	—	—	—	—	68·1
Mizusawa	146·7	309	19 52	[+ 1]	—	—	—	—
Kodaikanal	148·6	106	20 58	?	—	—	80·7	82·8
Colombo	149·1	113	17 10	?	—	—	—	45·2
Simla	150·8	64	—	—	e 35 52	?	—	42·8
Batavia	152·3	178	19 55	[− 4]	—	—	—	21·2
Osaka	152·5	305	22 33	?PR_1	—	—	—	28·0
Manila	165·9	243	e 20 8	[− 4]	—	—	—	87·2
Taihoku	167·1	288	e 25 0	?PR_1	—	—	—	—

Additional readings: Tacubaya gives PZ = +9m.3s., LN = +20·9m., LZ = +22·4m. Chicago L = +42·2m. Tucson iPN = +10m.57s. Toronto i = +20m.16s., eL = +45·6m. Ottawa iN = +15m.40s., iE = +20m.30s., iEN = +21m.32s., L = +50·2m., T_0 = 12h.9m.51s. San Fernando MN = +25·0m. Coimbra iN = +23m.34s., iE = +23m.42s., MN = +49·9m., T_0 = 12h.9m.58s. Barcelona MN = +43·5m. Bidston S = +30m.58s. Edinburgh PR_1 = +25m.55s., SR_1 = +35m.22s. Uccle SR_1 = +31m.19s. De Bilt eN = +17m.52s., eE = +18m.10s., e = +24m.6s. Strasbourg MN = +63·2m. Rocca di Papa PR_1 = +17m.34s., eLN = +39·7m. Hamburg iSN = 24m.24s., e = +32m.16s., MN = +47·2m., MZ = +65·2m. Vienna iSN = +24m.31s., iE = +27m.13s., SR_2 = +32m.51s. Helwan MN = +73·6m. Mizusawa PN = +19m.58s.

Oct. 22d. 21h. 35m. 3s. Epicentre 46°·0N. 9°·0E. (as on 1920 April 1d.).

A = +·686, B = +·109, C = +·719.

	Δ	P.	O−C.	S.	O−C.	L.	M.
	°	m. s.	s.	m. s.	s.	m.	m.
Chur	0·9	i 0 9	− 5	i 0 31	+ 6	—	—
Zurich E.	1·4	e 0 18	− 3	i 0 44	+ 5	—	0·8
N.	1·4	e 0 21	0	i 0 45	+ 6	—	0·8
Strasbourg	2·7	1 10	+28	(1 10)	− 4	—	—
Vienna	5·4	e 1 23	0	—	—	i 1·5	1·6

Additional readings: Vienna gives iP = +1m.28s. Munchen eP = +0s., iS = +8s.

Oct. 22d. Readings also at 2h. (Nagasaki and San Fernando), 3h. (Zi-ka-wei, Manila, and Taihoku), 4h. (Helwan and De Bilt), 12h. (Rocca di Papa), 14h. (near Tokyo, Mizusawa, and Osaka), 20h. (La Paz, Manila, near Osaka, and Mizusawa).

Oct. 23d. Readings at 0h. (San Fernando), 3h. (Rocca di Papa), 4h. (Riverview), 5h. (La Paz (3)), 6h. (De Bilt), 7h. (Manila), 10h. (La Paz), 13h. (Taihoku and Manila), 16h. (La Paz), 17h. (Apia).

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Oct. 24d. 1h. 38m. 25s. Epicentre 16°·2S. 165°·4E.

$A = -\cdot929$, $B = +\cdot242$, $C = -\cdot279$; $D = +\cdot252$, $E = +\cdot968$; $G = +\cdot270$, $H = -\cdot070$, $K = -\cdot960$.

This epicentre was deduced by comparison with 15°·0S. 165°·0E. of 1919 Aug. 31d.; the material is, however, somewhat meagre, and the departure from the former epicentre may not be real.

		Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Riverview		21·8	213	e 5 4	+ 1	i 9 3	+ 2	—	13·6
Sydney		21·8	213	5 11	+ 8	(9 29)	+28	9·5	10·9
Apia		22·2	87	4 27	−40	(9 35)	+26	9·6	—
Adelaide		30·4	227	e 6 35	+ 3	e 11 29	−12	i 16·1	20·9
Perth		47·4	241	6 35	−135	—	—	—	—
Honolulu		51·9	45	e 9 35	+16	16 5	−38	21·0	22·8
Manila		53·6	304	e 14 30	?PR_1	—	—	—	—
Batavia		58·1	273	e 10 0	0	18 1	+ 1	—	—
Zi-ka-wei		63·5	320	e 10 37	+ 2	—	—	—	—
Calcutta	E.	84·7	295	13 29	+43	(22 47)	−29	22·8	—
Chicago		113·3	51	—	—	—	—	e 57·8	—
La Paz		117·9	120	e 19 10	[+23]	—	—	60·6	67·9
Toronto		119·2	49	—	—	—	—	55·7	64·6
Ottawa		121·6	46	—	—	—	—	e 64·2	—
Helwan		135·9	296	24 35	?PR_1	—	—	—	—
Vienna	Z.	139·2	330	i 19 24	[−14]	i 22 24	?PR_1	—	—
De Bilt		140·9	340	(e 23 13)	—	—	—	—	—
Bidston		141·7	349	23 17	?PR_1	—	—	—	—
Uccle		142·2	340	e 20 11	[+28]	—	—	e 47·6	—
Strasbourg	E.	142·8	335	e 19 43	[− 2]	—	—	e 49·6	—
Padova		143·4	328	19 48	[+ 2]	—	—	—	—
Pompeii		144·8	320	19 25	[−23]	20 15	?	—	—
Rocca di Papa		145·3	322	19 41	[− 8]	—	—	—	20·7
Moncalieri		145·6	331	e 19 19	[−30]	—	—	20·4	—
San Fernando		158·4	341	30 5	?	—	—	—	—

Additional readings: Riverview gives also iPR_1? = +5m.40s., PS = +9m.13s., and +9m.30s., SR_1 = +10m.23s. and +10m.30s., MN = +17·5m., T_0 = 1h.38m.29s. Apia PR_1 = +4m.53s., i = +6m.35s. Adelaide i = +7m.47s., i = +14m.29s., +16m.5s. (taken as L), and +16m.17s., e = +19m.17s. Chicago L = +60·1m. Toronto eL = +63·8m. and +80·0m. Vienna iN = +23m.49s. and +28m.59s. De Bilt gives a single reading PR_1. Strasbourg ePVN = +19m.26s. Rocca di Papa PR_1 = +20m.29s.

Oct. 24d. Readings also at 3h. (Rio Tinto), 8h. (near Manila), 10h. (San Fernando), 11h. (Helwan), 12h. (near Mizusawa and Tokyo), 16h. (Taihoku (3) and Zi-ka-wei), 17h. (De Bilt), 22h. (Taihoku).

Oct. 25d. Readings at 2h. (La Paz), 5h. (Algiers), 6h. (near La Paz), 8h. (La Paz, Manila, Batavia, and Riverview), 12h. (near Tokyo), 13h. (Riverview), 20h. and 22h. (near La Paz), 23h. (San Fernando).

Oct. 26d. 0h. 3m. 2s. Epicentre 40°·0N. 20°·0E. (as on Oct. 21d.).

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Athens	3·6	123	e 1 0	+ 4	1 38	− 1	1·7	2·3
Strasbourg	12·2	318	e 3 6	+ 4	—	—	e 9·0	—
Helwan	13·7	134	8 58	?L	—	—	(9·0)	—
Uccle	15·3	320	e 3 37	− 6	—	—	e 10·5	—
De Bilt	15·8	325	—	—	—	—	e 10·5	11·0

Athens gives MN = +2·0m., all its readings having been increased by one minute.

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Oct. 26d. 19h. 4m. 20s. Epicentre 19°·4N. 122°·2W.

A = −·502, B = −·798, C = +·332; D = −·846, E = +·533; G = −·177, H = −·281, K = −·943.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Tacubaya	21·5	86	4 24	−35	—	—	6·3	6·8
Victoria	29·0	358	26 9	?	—	—	27·6	29·1
Toronto	43·1	45	—	—	—	—	21·5	—
Cheltenham N.	43·5	53	15 0	?S	(15 0)	+ 5	e 22·2	23·9
La Paz	64·1	120	e 10 39	0	19 14	0	30·2	32·3
Edinburgh	88·9	?9	—	—	—	—	—	49·7
De Bilt	95·1	29	—	—	—	—	e 45·7	—
Helwan	124·5	28	79 40	?L	—	—	(79·7)	—

Additional readings and notes: Tacubaya gives also MN = +6·6m. Victoria perhaps registers a different shock. La Paz iP = +20m.19s., T_o = 19h.4m.25s.

Oct. 26d. Readings also at 1h. (Tacubaya), 3h. (Batavia), 4h. (La Paz), 9h. (Apia), 11h. (Tacubaya), 15h. (Zi-ka-wei), 23h. (La Paz and San Fernando).

Oct. 27d. 11h. 44m. 21s. Epicentre 19°·0N. 70°·0W. (as on 1920 Jan. 26d.).

A = +·323, B = −·889, C = +·326; D = −·940, E = −·342; G = +·111, H = −·306, K = −·946.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Port au Prince	2·1	260	i 0 22	−11	0 45	−13	1·2	1·7
Vieques	4·4	99	i 1 0	− 8	—	—	1·5	2·0
Washington	20·8	344	4 23	−28	8 23	−17	—	—
Chicago	27·2	330	—	—	11 4	+19	14·1	—
La Paz	35·6	177	i 7 26	+ 8	—	—	21·2	25·4
Rio Tinto	57·7	57	36 39	?L	—	—	(36·6)	40·6
Granada	60·1	57	i 10 16	+ 3	i 19 10	+46	—	—
Bidston	61·2	39	—	—	—	—	27·4	—
Edinburgh	61·4	36	—	—	—	—	40·6	—
Tortosa	63·2	53	—	—	—	—	e 29·6	41·0
De Bilt	66·1	41	—	—	—	—	e 33·6	38·4
Zante	77·5	54	—	—	20 39	−76	—	—
Helwan	90·0	58	40 39	?L	(31 39)	?SR_1	(40·6)	—

Additional readings and notes: Port au Prince readings have been increased by 1h.2m. Vieques MN = +1·8m. De Bilt MN = +38·6m. Helwan gives its two readings as PE and PN respectively.

Oct. 27d. Readings also at 3h. (Zante), 4h. (Taihoku and Batavia), 5h. (Manila), 10h. (Port au Prince), 11h. (Vieques and Washington), 13h. (Simla).

Oct. 28d. 7h. 23m. 40s. Epicentre 51°·0N. 179°·5W. (as on 1918 Sept. 30d.).

A = −·629, B = −·005, C = +·777; D = −·009, E = +1·000; G = −·777, H = −·007, K = −·629.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Ootomari	24·9	275	4 23	−74	—	—	—	—
Tokyo	33·1	260	e 7 25	+28	—	—	—	—
Honolulu	34·1	142	e 8 20	?PR_1	—	—	14·5	15·9
Victoria	35·6	73	—	—	(12 51)	−13	12·8	20·7
Berkeley E.	41·7	86	—	—	—	—	e 22·8	—
Zi-ka-wei	47·2	270	8 42	− 6	e 15 32	−12	—	—
Taihoku	51·4	265	—	—	—	—	e 21·3	—

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		Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Manila		59·7	259	e 10 9	− 1	—	—	—	—
Chicago		60·0	60	10 10	− 2	18 15	− 8	28·6	—
Ann Arbor		61·6	57	—	—	—	—	33·0	—
Toronto		62·8	53	—	—	e 20 8	+70	e 35·5	37·4
Ottawa		63·4	50	—	—	e 19 20	+14	e 29·5	—
Ithaca		65·2	52	—	—	—	—	e 36·8	—
Georgetown	Z.	67·5	56	—	—	—	—	44·8	—
Washington		67·5	56	8 7	−174	17 5	−171	e 36·3	—
Edinburgh		73·0	3	—	—	—	—	40·3	—
Simla		73·9	300	—	—	—	—	e 37·9	—
Hamburg		75·1	355	e 11 52	+ 2	e 21 31	+ 4	e 38·3	49·3
De Bilt		76·8	357	11 58	− 2	21 49	+ 2	e 40·3	50·1
Uccle		78·1	358	e 12 4	− 4	e 22 2	+ 1	—	—
Paris		80·2	359	—	—	e 22 26	+ 1	47·3	51·3
Strasbourg	N.	80·2	356	e 12 19	− 1	22 26	+ 1	48·3	—
Moncalieri		83·8	355	e 10 8	−153	23 4	− 3	37·0	53·3
Rocca di Papa	N.	86·6	351	e 12 56	− 1	i 23 29	− 8	e 43·7	59·8
Tortosa		88·2	0	—	—	—	—	e 42·3	59·1
Riverview		88·7	204	—	—	e 23 47	−13	e 45·1	47·8
Kodaikanal		90·1	286	55 32	?L	—	—	61·7	67·1
Colombo		91·2	282	55 20	?L	—	—	(55·3)	—
San Fernando		92·4	5	—	—	—	—	—	70·3
Helwan		94·7	334	19 20	?PR_1	(25 20)	+17	—	—
La Paz		116·2	84	e 19 51	?PR_1	33 42	?	70·5	74·2

Additional readings: Berkeley gives eN = +18m.21s., eZ = +22m.4s. Chicago L = +34·3m. and +39·3m., T_o = 7h.23m.49s. Toronto eL = +53·9m. Ottawa L = +33·1m., L = +39·1m., and +55·3m. Simla gives its readings as on 27d. De Bilt eSR_1E = +27m.1s., eSR_1N = +27m.7s., MN = +54·7m., T_o = 7h.23m.45s. Uccle SR_1 = +27m.44s., T_o = 7h.23m.44s Rocca di Papa eN = +15m.44s. Riverview MN = +52·3m. Helwan readings are given as PE and PN respectively.

Oct. 28d. 12h. 50m. 6s. Epicentre 27°·0S. 74°·4W.

A = +·240, B = −·858, C = −·454; D = −·963, E = −·269; G = −·122, H = +·437, K = −·891.

		Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
La Paz		12·0	30	i 2 59	0	i 5 19	0	6·1	9·2
Balboa Heights	N.	36·3	352	7 14	−10	13 19	+ 5	—	—
Vieques		46·0	11	e 8 35	− 5	e 15 2	−26	—	19·6
Cheltenham	N.	65·8	359	i 10 49	− 1	19 57	+22	—	—
Georgetown	E.	65·9	358	e 9 54	−56	i 20 14	+38	e 32·0	—
	N.	65·9	358	i 9 49	−61	e 20 5	+29	e 32·0	—
Washington		65·9	358	i 9 53	−57	18 42	−54	e 32·9	—
Tucson	E.	68·7	327	e 11 16	+ 7	20 29	+19	e 34·8	—
Ithaca		69·5	359	11 16	+ 2	e 20 16	− 4	e 36·4	—
Chicago		69·8	350	11 12	− 4	20 39	+15	35·5	—
Ann Arbor	E.	69·8	354	11 18	+ 2	20 24	0	35·7	—
	N.	69·8	354	11 0	−16	20 30	+ 6	36·1	—
		69·8	354	—	—	20 18	− 6	36·7	—
Toronto		70·8	356	11 6	−16	i 20 54	+18	e 35·4	—
Northfield		71·8	2	e 11 44	+16	—	—	—	—
Ottawa	N.	72·4	0	11 30	− 2	20 54	− 1	e 35·0	—
Capetown		77·5	122	3 31	?	21 49	− 6	42·6	48·5
		77·5	122	11 42	−22	21 9	−46	—	21·8
Lick	N.	78·2	324	e 12 14	+ 6	—	—	—	—
Berkeley		78·9	324	12 17	+ 5	—	—	e 39·4	—
Victoria		87·2	330	41 33	?L	—	—	45·5	49·9
San Fernando		90·2	49	—	—	(23 24)	−52	23·4	61·4
Rio Tinto		90·6	48	25 54	?S	(25 54)	+94	—	65·9
Coimbra		90·9	45	12 51	−30	23 13	−70	e 41·6	47·3
Granada		92·3	50	i 13 28	− 1	i 23 35	−63	—	—
Honolulu		94·2	292	e 13 6	−33	23 48	−70	44·9	49·3
Algiers		96·8	52	e 13 43	−10	23 49	−95	45·9	49·9
Tortosa		96·9	47	13 41	−13	23 54	−91	36·4	49·8
Barcelona		98·3	48	e 17 6	?PR_1	i 23 56	−103	e 44·9	52·5

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		Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Bidston		101·2	36	16 24	?	23 54	−133	—	—
Oxford		101·3	38	—	—	24 15	−113	44·4	59·6
Kew		101·7	38	23 54	?S	(23 54)	−138	—	60·9
Paris		102·1	41	e 14 9	−12	i 25 16	−60	45·9	54·9
Edinburgh		102·4	33	24 20	?S	33 4	?SR$_1$	45·9	59·5
Besançon		103·4	44	13 45	−42	25 33?	−55	51·9	—
Moncalieri		103·5	46	e 14 24	− 4	24 23	−126	35·6	65·8
Uccle		104·0	40	e 13 54	−36	24 31	−122	e 44·9	55·9
Strasbourg		105·0	43	e 14 11	−23	—	—	e 49·9	55·9
De Bilt		105·0	40	—	—	e 25 43	−59	—	74·8
Melbourne		105·4	211	—	—	—	—	e 52·3	56·9
Florence		105·4	49	14 54	+18	—	—	—	32·9
Riverview		105·4	218	—	—	—	—	e 49·2	49·8
Rocca di Papa	N.	105·6	50	i 18 18	?PR$_1$	i 24 42	−126	e 50·3	60·8
Padova		106·4	46	18 21	?PR$_1$	25 17	−99	—	—
Pompeii		106·5	51	18 41	?PR$_1$	—	—	—	—
Hamburg		108·2	39	e 18 9	?PR$_1$	i 24 51	−141	e 50·9	58·9
Vienna		110·3	45	18 30	?PR$_1$	27 18	−13	e 48·9	61·4
Athens		112·2	58	e 19 4	?PR$_1$	e 31 24	?SR$_1$	51·9	59·4
Mauritius	E.	114·0	131	44 36	?L	—	—	(44·6)	56·1
	N.	114·0	131	45 36	?L	—	—	(45·6)	56·9
Helwan	E.	115·8	70	19 42	?PR$_1$	—	—	—	74·3
	N.	115·8	70	21 0	?	—	—	—	73·3
Perth		120·3	190	—	—	34 54	?SR$_1$	—	—
Batavia		146·8	182	i 19 44	[− 7]	—	—	e 72·4	—
Mizusawa	E.	148·1	301	19 48	[− 5]	—	—	—	—
Colombo		148·3	128	18 54	?	—	—	—	87·9
Kodaikanal		148·6	119	20 24	[+30]	—	—	33·2	36·3
Bombay		148·8	99	69 37	?L	—	—	(69·6)	77·3
Tokyo		149·9	296	e 20 6	[+10]	—	—	—	—
Manila		161·1	232	e 20 11	[+ 2]	—	—	—	—
Zi-ka-wei		165·6	291	e 21 14	[+62]	—	—	—	—
Taihoku		165·6	266	—	—	e 30 42	?	—	—

Additional readings: Vieques gives also eN = +10m.16s., iE = +18m.42s. Cheltenham ePN = +10m.54s., SE = +20m.12s. Tucson PN = +11m.23s. Ithaca PR$_1$ = +13m.44s. Chicago L = +69·9m. and +78·9m. Toronto e = +10m.30s., i = +23m.48s., iS = +25m.48s., iSR$_2$ = +29m.36s. Ottawa PR$_1$N = +14m.39s., PR$_2$N = +16m.15s., iN = +21m.18s., and +22m.6s., SR$_1$N = +26m.8s., SR$_2$N = +29m.4s., L = +36·6m. and +37·9m., T$_0$ = 12h.50m.11s. Lick eE = +12m.13s., eV = +12m.12s. Berkeley ePV = +12m.16s., eLN = +38·8m., eLV = +39·3m. San Fernando MN = +57·4m. Coimbra iN$_1$ = +23m.43s., iN$_2$ = +24m.14s., T$_0$ = 12h.50m.33s. Edinburgh PR$_1$ = +27m.8s. Moncalieri MN = +57·6m. Uccle MN +65·2m., T$_0$ = 12h.51m.18s. De Bilt ePR$_1$ = +18m.43s., e = +24m.35s., MN = +78·7m. Riverview ePR$_1$? = +18m.41s., ePS? = +28m.5s., e = +44m.40s., MN = +77·0m. Rocca di Papa eLN = +32·8m. Athens MN = +65·2m. Mizusawa readings at N +19m.54s. and E +20m.18s.

Oct. 28d. Readings also at 1h. (La Paz), 8h. (Bidston and Pompeii), 10h. (Zi-ka-wei), 11h. (Nagasaki, Manila, Taihoku, and Zi-ka-wei), 12h. (Uccle, Paris, Bidston, Hamburg, Strasbourg, De Bilt, and Helwan), 13h. (Riverview and Victoria), 14h. (Kodaikanal), 16h. (Batavia and La Paz).

Oct. 29d. Readings at 0h. (La Paz (2)), 4h. (Helwan, De Bilt, and near Athens), 5h. (Manila), 6h. (San Fernando), 12h. (Apia), 18h. (La Paz).

Oct. 30d. Readings at 6h. (Florence), 16h. (Apia), 21h. (San Fernando), 22h. (near Tacubaya), 23h. (near Tokyo).

Oct. 31d. Readings at 0h. and 6h. (San Fernando), 10h. (Helwan), 13h. (near Tacubaya), 18h. (Apia).

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Nov. 1d. 16h. 53m. 36s. Epicentre 8°·0S. 146°·5E. (as on 1918 July 6d.).

A = −·826, B = +·547, C = −·139 ; D = +·552, E = +·834 ;
G = +·116, H = −·077, K = −·990.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Riverview	26·2	171	e 5 58	+ 8	i 10 37	+11	e 13·1	16·6
Sydney	26·2	171	8 42	+172	12 54	+148	15·4	16·6
Adelaide	27·9	194	—	—	—	—	18·4	20·9
Melbourne	29·9	183	—	—	—	—	17·7	22·4
Manila	34·0	312	e 7 9	+ 4	—	—	—	—
Perth	37·2	226	9 24	?PR_1	—	—	—	—
Zi-ka-wei	45·9	330	e 8 26	−13	e 15 6	−21	—	—
Honolulu	61·8	61	—	—	e 17 36	−70	28·0	39·6
Helwan	115·7	299	71 24	?L	—	—	(71·4)	—
Chicago	121·7	45	—	—	—	—	e 62·2	—
De Bilt	125·8	332	—	—	—	—	e 64·4	72·9
Paris	129·2	330	—	—	—	—	72·4	—
La Paz	137·9	126	19 28	[− 8]	i 23 14	?PR_1	—	—

Additional readings : Riverview gives also iS = +12m.30s. and MN = +15·4m. Helwan PN = +70m.24s. De Bilt MN = +70·7m.

Nov. 1d. Readings also at 2h. (Colombo), 4h. (San Fernando), 8h. (Apia, Batavia, Zi-ka-wei, and Manila), 9h. (Helwan), 11h. (near Mizusawa), 14h. and 15h. (Taihoku), 21h. (San Fernando).

Nov. 2d. Readings at 2h. (Apia and Denver), 6h. (Colombo), 11h. (La Paz), 12h. (Cape Town), 19h. (La Paz), 21h. (La Paz and San Fernando), 22h. (Helwan).

Nov. 3d. 15h. 35m. 36s. Epicentre 6°·5N. 126°·0E. (as on 1920 May 7d.).

A = −·584, B = +·804, C = +·113 ; D = +·809, E = +·588 ;
G = −·066, H = +·092, K = −·994.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Manila	9·5	330	e 2 24	+ 1	4 22	+ 6	4·8	8·5
Taihoku	19·0	347	4 41	+12	—	—	7·4	—
Batavia	22·9	237	4 57	−19	i 9 4	−19	17·2	—
Zi-ka-wei	25·0	351	e 5 35	− 3	e 7 59	?PR_1	i 12·5	—
Perth	39·6	194	8 24	+33	—	—	—	—
Colombo	45·9	273	16 24	?S	(16 24)	+57	25·4	27·4
Kodaikanal	48·2	278	19 54	?SR_1	—	—	32·2	33·2
Helwan	90·8	300	25 24	?S	(25 24)	+62	—	—
Hamburg	99·7	327	—	—	—	—	e 51·4	66·4
Strasbourg	102·4	321	—	—	—	—	e 56·4	—
De Bilt	102·9	327	—	—	e 27 0	+37	e 52·4	59·9
Uccle	104·0	326	—	—	e 35 24	?SR_1	e 51·4	—
Edinburgh	105·0	333	—	—	—	—	—	69·4
Stonyhurst	105·9	331	42 6	?	—	—	62·8	65·4
Paris	106·1	324	—	—	—	—	e 57·5	—
Kew	106·1	328	—	—	—	—	—	67·4
Oxford	106·4	328	—	—	—	—	—	62·9
La Paz	162·9	127	20 39	[+29]	—	—	48·7	—

Additional readings and notes : The P's entered for Taihoku and Zi-ka-wei are given originally as e's. Batavia gives i = +7m.24s. and +11m.20s. Helwan PN = +24m.24s. Hamburg MN = +62·4m. De Bilt MN = +58·9m.

Nov. 3d. Readings also at 0h. (Lick), 2h. (Colombo), 7h. and 10h. (La Paz), 12h. (Helwan), 16h. (Riverview), 22h. (La Paz).

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Nov. 4d. 2h. 11m. 30s. Epicentre 19°·0N. 70°·0W. (as on 1920 Oct. 27d.).

A = +·323, B = −·889, C = +·326; D = −·940, E = −·342; G = +·111, H = −·306, K = −·946.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Port au Prince	2·1	260	i 0 46	+13	1 4	+ 6	1·3	1·6
Vieques	4·4	99	e 1 8	0	—	—	—	1·9
Georgetown	20·8	344	e 4 30	−21	8 35	− 5	16·7	—
Washington	20·8	344	3 40	?	7 30	−70	e 10·5	—
Ithaca	24·0	348	i 5 20	− 8	9 20	−24	—	—
Northfield	25·3	356	—	—	(e 9 50)	−19	e 9·8	—
Toronto	25·9	344	—	—	(10 48)	+28	16·1	—
Ann Arbor	26·0	336	10 48	?S	(10 48)	+26	—	—
Ottawa	26·8	351	—	—	e 10 10	−27	—	—
Chicago	27·2	330	6 17	+17	9 53	−52	15·0	—
La Paz	35·6	177	i 7 3	−15	13 3	− 1	18·2	20·8
San Fernando	58·0	58	18 30	?S	(18 30)	+31	—	—
Stonyhurst	61·6	38	e 30 0	?L	—	—	(e 30·0)	39·5
Uccle	65·6	42	e 10 48	− 1	—	—	e 26·5	—
De Bilt	66·1	41	—	—	e 19 24	−14	e 29·5	42·2
Helwan	90·0	58	52 30	?L	—	—	(52·5)	—

Additional readings: Port au Prince gives also SNW = +1m.5s. Vieques eN = +1m.36s., MN = +2·1m. Ithaca e = +5m.10s., T_e = 2h.11m.49s. Toronto records two L's. Ann Arbor PN = +11m.0s. Chicago L? = +11·7m., T_e = 2h.13m.18s. La Paz i = +12m.23s., T_e = 2h.11m.0s. De Bilt eLN = +27·5m. Helwan PN = +48m.30s.

Nov. 4d. Readings also at 2h. and 5h. (La Paz), 13h. (near Tokyo), 18h. (near Athens and near Batavia), 22h. (near Manila).

Nov. 5d. Readings at 0h. (San Fernando), 3h. (near Manila and near Tacubaya), 4h. (near Tokyo and Mizusawa), 6h. (La Paz and near Batavia), 7h. (near Tacubaya), 8h. (La Paz), 14h. (Taihoku), 15h. (Hokoto, Taihoku, Zi-ka-wei, and Zante), 23h. (La Paz).

Nov. 6d. 10h. 44m. 30s. Epicentre 19°·0N. 70°·0W. (as on 1920 Nov. 4d.).

A = +·323, B = −·889, C = +·326; D = −·940, E = −·342; G = +·111, H = −·306, K = −·946.

		Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Port au Prince		2·1	260	e 0 19	−14	0 40	−18	1·2	2·2
Vieques	E.	4·4	99	0 54	−14	—	—	—	1·7
	N.	4·4	99	0 56	−12	—	—	1·4	1·6
Georgetown	E.	20·8	344	—	—	e 9 10	+30	e 14·9	—
	N.	20·8	344	—	—	e 9 14	+34	e 15·2	—
Washington		20·8	344	4 14	−37	8 18	−22	e 12·5	—
Toronto		25·9	344	—	—	e 10 24	+ 4	13·9	17·8
Ann Arbor		26·0	336	—	—	—	—	9·8	—
Ottawa	E.	26·8	351	—	—	e 11 17	+40	e 15·8	—
Chicago		27·2	330	6 45	+45	11 26	+41	14·3	—
La Paz		35·6	177	7 21	+ 3	—	—	20·0	22·9
Stonyhurst		61·6	38	30 0	?L	—	—	(30·0)	37·0
De Bilt	E.	66·1	41	—	—	—	—	e 33·5	44·8
	N.	66·1	41	—	—	e 19 42	+ 4	e 28·5	29·6
Hamburg		69·0	39	—	—	—	—	e 38·5	—
Helwan		90·0	58	62 30	?	—	—	—	—

Additional readings and notes: Port au Prince readings have been diminished by 3m., also MNW = +1·8m. Washington L = +14·5m. Toronto eL = +16·1m. Ottawa LE = +24·0m. Chicago L = +17·2m. Helwan PN = +58m.30s.

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Nov. 6d. 21h. 11m. 12s. Epicentre 13°·5S. 162°·0E.

A = −·925, B = +·300, C = −·233 ; D = +·309, E = +·951 ;
G = +·222, H = −·072, K = −·972.

		Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Riverview		22·6	204	e 5 11	− 1	e 9 15	− 2	e 10·7	12·2
Sydney		22·6	204	4 54	−18	—	—	9·3	12·2
Melbourne		28·7	209	—	—	—	—	14·9	17·8
Adelaide		29·8	220	—	—	i 10 48	−43	e 16·6	19·8
Christchurch		31·4	165	11 54	?S	(11 54)	− 4	13·4	14·6
Honolulu		52·4	49	—	—	—	—	e 22·3	31·8
Chicago		114·1	50	—	—	—	—	e 59·8	—
Helwan		131·8	298	92 48	?	—	—	—	—
De Bilt	E.	137·2	339	—	—	—	—	e 77·8	80·3
Uccle		138·5	339	—	—	—	—	e 78·8	—
Rio Tinto		153·7	339	89 48	?L	—	—	(89·8)	103·8
San Fernando		154·7	337	81 48	?L	—	—	(81·8)	—

Additional readings: Riverview gives also PS = +9m.28s., MN = +12·9m. Adelaide e = +17m.36s. Chicago L = +65·3m. Helwan PN = +86m.48s. De Bilt eLN = +75·8m., MN = +79·1m.

Nov. 6d. Readings also at 0h. (San Fernando), 1h. (near Mizusawa), 6h. (Tortosa), 8h. (Zi-ka-wei), 9h. (Cape Town), 18h., 21h., and 23h. (near La Paz).

Nov. 7d. Readings at 8h. (Taihoku), 14h. (Rocca di Papa).

Nov. 8d. 17h. 37m. 25s. Epicentre 35°·0N. 143°·0E. (as on 1919 Aug. 3d.).

A = −·654, B = +·493, C = +·574 ; D = +·602, E = +·799 ;
G = −·458, H = +·345, K = −·819.

		Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Tokyo		2·8	285	0 44	0	(1 11)	− 6	1·2	1·2
Mizusawa	E.	4·4	340	1 10	+ 2	2 4	+ 3	—	—
	N.	4·4	340	1 9	+ 1	2 2	+ 1	—	—
Osaka		6·2	270	1 54	+19	—	—	3·2	4·1
Kobe		6·4	266	0 35	?	—	—	—	—
Zi-ka-wei		18·4	266	e 4 46	+24	—	—	—	—
Hamburg		82·6	335	—	—	—	—	e 41·0	—
De Bilt	E.	85·4	336	—	—	—	—	e 42·6	52·0
	N.	85·4	336	—	—	—	—	e 44·6	53·6
Uccle		86·7	336	—	—	—	—	e 44·6	—
Strasbourg		87·4	331	—	—	—	—	47·6	—
Helwan		88·6	306	56 35	?L	—	—	(56·6)	—
Paris		89·1	335	—	—	—	—	52·6	—
Rocca di Papa		90·7	326	—	—	e 34 5	?	e 51·5	60·2
Tortosa		96·6	332	—	—	—	—	e 52·6	59·2
Rio Tinto		101·9	336	58 35	?L	—	—	(58·6)	62·6

Nagasaki (Δ = 11°·1, Az. = 262°) gives P = 17h.32m.23s.

Nov. 8d. Readings also at 1h. (Taihoku and San Fernando), 2h. (La Paz), 9h. (near Tokyo and Mizusawa), 15h. (near Osaka), 16h. (Rio Tinto and Perth), 17h. (La Paz), 18h. (near Athens), 19h. (Ottawa), 22h. (San Fernando).

Nov. 9d. Readings at 4h. (La Paz), 5h. (La Paz and near Batavia), 6h. (near Athens), 10h. (Helwan), 18h. (La Paz), 20h. (San Fernando).

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Nov. 10d. Readings at 1h. (Apia), 3h. (Taihoku), 6h. (La Paz), 7h. (Taihoku), 8h. (Apia), 13h. (La Paz), 19h. (near Tokyo), 21h. (San Fernando and near Nagasaki).

Nov. 11d. Readings at 11h. (Tokyo, Sydney, and Christchurch), 12h. (Helwan and De Bilt), 20h. (La Paz), 21h. (Helwan), 23h. (Helwan).

Nov. 12d. 5h. 41m. 48s. Epicentre 0°·0 28°·2W.

$A = +\cdot881$, $B = -\cdot473$, $C = \cdot000$; $D = -\cdot473$, $E = -\cdot881$; $G = \cdot000$, $H = \cdot000$, $K = -1\cdot000$.

		△	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Azores		37·8	4	14 6	?S	(14 6)	+31	—	15·2
San Fernando		41·8	27	—	—	—	—	22·4	30·2
La Paz		42·7	244	i 8 16	0	14 44	0	20·4	24·2
Rio Tinto		42·7	26	9 12	+56	—	—	—	29·2
Granada		43·6	28	i 8 29	+ 6	i 14 59	+ 3	—	—
Coimbra		44·1	22	8 15	−12	i 14 48	−15	20·5	22·5
Algiers		46·8	35	8 36	−10	15 29	− 9	22·2	27·2
Tortosa		48·5	28	8 33	−24	15 48	−12	22·8	25·2
Barcelona		49·7	30	i 8 56	− 9	16 4	−11	22·6	26·5
Moncalieri		55·2	30	i 9 37	− 3	i 17 19	− 5	27·1	30·2
Cape Town		55·3	133	17 20	?S	(17 20)	− 5	—	33·5
Paris		55·6	25	e 9 43	0	i 17 27	− 2	24·2	26·2
Rocca di Papa		55·7	37	i 9 43	− 1	e 17 30	0	e 27·5	30·7
Besançon		55·8	28	9 44	− 1	17 32	+ 1	28·2	—
Florence		56·1	33	11 12	?PR_1	—	—	—	36·2
Pompeii	E.	56·2	39	9 48	+ 1	—	—	—	—
Oxford		56·5	20	9 43	− 6	i 17 41	+ 1	23·5	30·0
Kew		56·6	21	14 12	?PR_1	—	—	—	41·2
Zurich		57·2	29	e 9 54	+ 1	e 17 47	− 2	—	—
Bidston		57·4	20	8 32	−83	17 42	− 9	—	—
Padova		57·5	32	10 57	+61	18 50	+57	—	—
Strasbourg		57·6	28	e 9 57	+ 1	i 17 53	− 1	e 29·2	31·0
Uccle		57·8	25	9 58	0	i 17 55	− 1	e 27·2	29·8
Stonyhurst		57·9	20	13 48	?	18 0	+ 2	24·5	33·5
De Bilt	E.	59·1	25	10 9	+ 3	18 17	+ 5	e 27·6	30·1
	N.	59·1	25	10 9	+ 3	18 15	+ 3	e 27·6	30·6
Georgetown	E.	59·2	318	—	—	e 15 39	?	27·6	—
Washington		59·2	318	—	—	18 14	+ 1	—	—
Edinburgh		59·5	17	—	—	18 18	+ 1	25·2	29·7
Athens	E.	61·0	46	(i 10 22)	+ 3	i 10 22	?P	e 32·5	37·8
	N.	61·0	46	—	—	—	—	e 32·9	37·2
Vienna		61·7	31	i 10 26	+ 3	i 18 50	+ 6	e 29·9	35·0
Ottawa		61·7	325	—	—	e 18 45	+ 1	e 25·5	—
Hamburg		62·2	26	e 10 37	+11	e 18 53	+ 2	e 27·8	34·2
Toronto		63·0	321	—	—	e 20 12	+71	30·0	36·8
Helwan		63·9	58	—	—	—	—	—	40·1?
Ann Arbor		65·2	320	—	—	—	—	31·1	—
Chicago		67·7	317	—	—	21 12	+74	32·9	—
Victoria		93·4	320	24 22	?S	(24 22)	−27	43·5	50·9
Colombo		107·9	84	56 12	?L	—	—	(56·2)	71·2
Zi-ka-wei		137·6	40	—	—	—	—	e 69·8	—
Riverview		146·2	179	—	—	—	—	e 71·0	84·4

Additional readings and notes: San Fernando gives also MN = +25·6m. La Paz PR_1 = +10m.22s., SR_1 = +17m.52s., T_0 = 5h.41m.54s. Coimbra eLN = +18·2m., MN = +21·5m., T_0 = 5h.41m.46s. Moncalieri MN = +31·8m. Paris MN = +33·2m. Florence gives a P = 5h.0m.0s. Strasbourg MN = +32·8m., T_0 = 5h.41m.53s. Uccle iSR_1 = +24m.12s., MN = +35·2m., T_0 = 5h.41m.53s. De Bilt PR_1N = +13m.37s., PR_1E = +13m.44s., e = +25m.12s., T_0 = 5h.41m.54s. Athens readings have been increased by 1h. Ottawa L = +29·2m. Hamburg MN = +32·5m. Toronto eL = +32·1m. Ann Arbor LN = +31·0m. Chicago L = +38·2m. Victoria S = +31m.15s. Zi-ka-wei reading has been increased by 1h. Riverview e = +53m.24s. and +57m.18s., MN = +85·0m.

Nov. 12d. Readings also at 1h. (Perth), 7h. (near Tacubaya), 9h. (Edinburgh and Washington), 12h. (Tortosa), 14h. (La Paz and near Tacubaya), 16h. (Rio Tinto), 18h. (San Fernando), 19h. (Helwan), 21h. (La Paz), 22h. (near Tacubaya).

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Nov. 13d. 10h. 30m. 34s. Epicentre 43°·8N. 11°·2E. (Florence) (as on 1920 Sept. 16d.).

A = +·708, B = +·140, C = +·692; D = +·194, E = −·981; G = +·679, H = +·134, K = −·722.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Florence	0·0	—	0 13	+13	—	—	—	0·5
Padova	1·7	17	0 27	+ 1	0 44	− 4	—	—
Rocca di Papa	2·3	152	0 38	+ 2	—	—	—	1·6
Pompeii E.	3·9	142	1 58	?L	—	—	(2·0)	—
Vienna	5·7	37	e 1 26	− 2	i 2 26	−10	—	3·1

Padova readings have been decreased by 1m.

Nov. 13d. Readings also at 0h. (near Tacubaya), 1h. (La Paz, Denver, and near Balboa Heights), 2h. (La Paz), 5h. (La Paz and San Fernando), 6h. (near Tacubaya), 9h. (near Athens (2)), 11h. (Helwan), 18h. (Helwan and Simla), 19h. (San Fernando and Kodaikanal), 21h. (La Paz).

Nov. 14d. Readings at 3h. (Riverview, La Paz, and Helwan), 6h. (Calcutta), 7h. (San Fernando), 8h. (Helwan), 9h. (Apia), 13h. (near Athens), 15h. (La Paz), 20h. (San Fernando), 21h. (Florence), 23h. (near Batavia).

Nov. 15d. 9h. 20m. 43s. Epicentre 34°·5N. 25°·0E. (as on 1918 July 1d.).

A = +·747, B = +·348, C = +·566; D = +·423, E = −·906; G = +·513, H = +·239, K = −·824.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Athens	3·6	344	i 0 57	+ 1	—	—	i 1·5	1·5
Pompeii	10·3	310	2 32	− 2	4 24	−13	—	6·3
Rocca di Papa N.	12·1	310	e 2 59	− 1	5 23	+ 2	—	7·7
Padova	14·8	321	4 31	+55	—	—	—	—
Vienna	15·2	337	e 3 59	+17	—	—	i 7·8	9·3
Zurich	17·8	321	i 4 11	− 4	i 7 30	− 6	—	—
Strasbourg	19·0	323	4 21	− 8	7 48	−14	10·3	—
Besançon	19·1	318	4 28	− 2	7 40	−24	—	—
Tortosa	20·3	295	4 44	− 1	—	—	5·4?	—
De Bilt	22·6	327	—	—	—	—	e 11·2	—
Granada	23·2	285	4 46	−33	9 30	+ 1	—	—

Vienna readings have been increased by 1h. before entry in the table.

Nov. 15d. Readings also at 0h. (La Paz), 3h. and 7h. (Taihoku), 9h. (Nagasaki and Helwan), 11h. (Taihoku, Helwan, near Zi-ka-wei (2), and near Osaka), 13h. (Florence), 18h. (Zi-ka-wei (2) and Taihoku), 19h. (Riverview and Melbourne), 21h. (Athens (2)).

Nov. 16d. 5h. 52m. 30s. Epicentre 24°·5N. 126°·5E. (as on 1918 Feb. 13d.).

A = −·541, B = +·731, C = +·415; D = +·804, E = +·595; G = −·247, H = +·333, K = −·910.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Taihoku	4·6	280	1 23	+12	—	—	2·4	—
Zi-ka-wei	8·0	330	e 1 52	− 9	e 3 19	−18	—	4·0
Nagasaki	8·7	19	2 16	+ 4	—	—	—	—
Osaka	12·7	35	4 2	+53	—	—	—	23·1
Tokyo	15·9	43	e 4 4	+13	—	—	—	—
Colombo	47·9	257	—	—	—	—	—	25·5
De Bilt	87·9	328	—	—	—	—	e 48·5	—

Zi-ka-wei gives also MN = +4·1m.

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1920. Nov. 16d. 8h. 30m. 52s. Epicentre 71°·8N. 127°·0W.

A = −·188, B = −·249, C = +·950 ; D = −·799, E = +·602 ;
G = −·572, H = −·759, K = −·312.

		Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Sitka		15·2	198	e 3 40	− 2	e 6 48	+11	—	—
Saskatoon		22·0	143	e 4 16	+11	i 8 22	−43	10·1	—
Victoria		23·5	174	5 28	+ 5	9 21	−14	12·3	13·3
	Z.	23·5	174	5 28	+ 5	9 48	+13	13·4	16·4
Berkeley		34·0	175	e 6 56	− 9	e 12 27	−13	—	—
Lick	E.	34·6	175	—	—	—	—	e 19·0	—
Ottawa		35·5	107	i 7 17	− 1	13 2	− 1	e 17·7	—
Chicago		35·6	127	8 23	+65	13 49	+45	17·0	21·6
Toronto		36·1	116	—	—	13 20	+ 9	e 16·3	20·4
Ann Arbor	E.	36·2	119	7 20	− 4	13 14	+ 1	19·2	20·3
	N.	36·2	119	7 20	− 4	13 38	+25	19·5	—
Northfield		37·6	105	—	—	e 13 38	+ 6	—	20·8
Ithaca		38·1	111	i 7 33	− 6	13 18	−21	20·2	—
Tucson	E.	40·5	160	—	—	e 14 22	+ 8	e 21·7	23·2
Georgetown	E.	41·1	116	8 3	− 1	(e 15 44)	+82	e 15·7	—
Washington		41·1	116	8 3	− 1	13 45	−37	e 20·1	22·8
Cheltenham	E.	41·4	115	8 11	+ 5	16 59	+152	22·1	23·0
	N.	41·4	115	8 13	+ 7	—	—	22·8	22·9
Bidston		48·8	41	10 50	?PR_1	20 38	?SR_1	—	—
Oxford		50·7	41	—	—	—	—	—	25·2
Hamburg		51·0	31	e 9 8	− 5	—	—	e 27·1	—
Kew		51·2	40	—	—	—	—	—	32·1
De Bilt	E.	51·6	36	—	—	i 16 41	+ 2	e 24·6	34·0
	N.	51·6	36	—	—	i 16 39	0	e 26·6	29·4
Ucele		52·7	38	e 9 21	− 3	i 16 53	+ 1	—	—
Honolulu		53·5	218	17 38	?S	(17 38)	+35	e 22·8	41·6
Paris		54·3	39	—	—	e 17 8	− 5	—	—
Strasbourg		55·5	35	9 39	− 4	e 17 30	+ 2	31·1	—
Besançon		56·5	38	—	—	17 44?	+ 4	—	—
Moncalieri		58·3	36	10 14	+13	18 17	+14	27·8	40·1
Padova		59·3	33	11 18	+71	19 14	+59	—	—
Osaka		59·5	290	10 7	− 2	—	—	—	11·1
Coimbra		60·1	50	10 19	+ 6	18 29	+ 5	e 29·8	37·9
Florence		60·7	35	13 8	?PR_1	—	—	—	39·1
Barcelona		61·2	41	e 11 16	+56	18 50	+12	e 29·4	38·5
Tortosa		61·5	44	—	—	18 45	+ 3	29·8	40·7
Rio Tinto		62·8	50	20 8	?S	(20 8)	+70	—	51·1
Rocca di Papa		62·9	33	i 10 35	+ 4	i 19 2	+ 2	e 37·2	—
	N.	62·9	33	e 10 32	+ 1	i 19 2	+ 2	e 37·1	42·2
Granada		64·1	49	10 50	+11	19 29	+15	—	—
Pompeii	E.	64·2	30	10 57	+18	19 27	+12	—	—
San Fernando		64·2	50	—	—	19 38	+23	38·1	43·6
Algiers		65·9	42	e 10 51	+ 1	—	—	25·1	38·6
Zi-ka-wei		66·8	300	e 10 46	−11	—	—	—	—
Zante		67·9	29	—	—	17 8	?	—	—
Athens		68·4	25	18 38	?S	(18 38)	−89	19·1	19·3
Helwan		77·2	20	22 8	?S	(22 8)	+17	—	—
Manila		82·7	296	e 12 8	−26	—	—	—	—
La Paz		96·6	124	e 16 45	?PR_1	26 34	+72	46·5	50·8
Batavia		106·6	304	e 18 2	[− 9]	—	—	e 36·6	—

Additional readings: Victoria gives also eL = +14·6m. Lick eN = +18m.28s. Ottawa LN = +18·5m., T_s = 8h.30m.54s. Toronto iL = +19·6m. Ann Arbor gives East component for Bosch-Omori machine, also LN = +19·5m., and North component for the Wiechert. Ithaca e = +15m.48s. Washington PR_1 = +9m.38s. Moncalieri MN = +38·8m. Barcelona i = +19m.26s., MN = +36·9m. San Fernando MN = +44·1m. Athens MN = +19·2m. La Paz eP? = +16m.24s., i = +17m.44s., T_s = 8h.35m.3s.?

Nov. 16d. Readings also at 0h. (Apia), 6h. (Colombo), 9h. (Florence), 16h. (Lick and La Paz), 18h. and 19h. (San Fernando).

Nov. 17d. Readings at 2h. (Colombo), 7h. (Lick and near Manila), 8h. (Florence (2) and Taihoku), 12h. (Colombo), 13h. (Tortosa and Colombo), 16h. and 17h. (Lick), 18h. (Helwan), 19h. (La Paz), 21h. (San Fernando), 22h. (Rocca di Papa and Helwan).

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Nov. 18d. Readings at 2h. (Florence), 4h. (La Paz), 7h. (Florence), 10h. (Port au Prince), 11h. (3), 13h. and 14h. (Taihoku), 16h. (Florence), 19h. (San Fernando), 21h. (near Athens), 22h. (La Paz, near Tortosa, and near Zurich), 23h. (Tortosa and Port au Prince).

Nov. 19d. Readings at 1h. (near Mizusawa), 2h. (Zi-ka-wei, Taihoku, and Florence), 4h. and 7h. (near Tacubaya), 9h. (near Batavia), 10h. (near Tacubaya), 13h. (near Athens), 21h. (San Fernando), 22h. (La Paz).

Nov. 20d. Readings at 1h. (Zi-ka-wei and near Taihoku), 7h. (Chicago, La Paz, and near Kobe), 8h. (near Osaka), 9h. (Taihoku), 11h. (Manila), 13h. (Helwan, Manila, Taihoku, Zi-ka-wei, and De Bilt), 17h. (La Paz), 21h. (San Fernando).

Nov. 21d. 20h. 57m. 40s. Epicentre 34°·5N. 25°·0E. (as on 1920 Nov. 15d.).

A = +·747, B = +·348, C = +·566.

		Δ	P.	O−C.	S.	O−C.	L.	M.
		°	m. s.	s.	m. s.	s.	m.	m.
Athens		3·6	0 57	+ 1	e 1 36	− 3	1·7	1·8
Pompeii	E.	10·3	2 16	−18	—	—	—	—
Rocca di Papa		12·1	e 3 2	+ 2	—	—	—	4·0

Rocca di Papa also gives ePN = +2m.38s.

Nov. 21d. Readings also at 0h. (Denver), 2h. (La Paz and Denver), 6h. (Manila and La Paz), 7h. (near Tacubaya), 15h. (La Paz and near Taihoku), 16h. (Zi-ka-wei), 20h. (Apia), 23h. (San Fernando).

Nov. 22d. Readings at 1h. (near La Paz), 2h. (Helwan), 4h. (La Paz), 19h. (Taihoku), 20h. (San Fernando and Rio Tinto).

Nov. 23d. Readings at 0h. (near Athens), 5h. (La Paz), 6h. (Mizusawa, Manila, and near Batavia), 7h. (Helwan, La Paz, and Riverview), 13h. and 14h. near Athens), 19h. (La Paz), 20h. (Colombo and near Lick), 22h. (La Paz), 23h. (Rio Tinto).

Nov. 24d. 11h. 51m. 0s. Epicentre 14°·3S. 64°·2W.

A = +·422, B = −·872, C = −·247; D = −·900, E = −·435;
G = −·108, H = +·222, K = −·969.

A depth 0·010 of focus has been assumed, although the evidence is scanty. Perhaps 0·020 would be better.

	Corr. for Focus	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	°	m. s.	s.	m. s.	s.	m.	m.
La Paz	0·0	4·4	239	i 1 8	0	2 1	0	2·3	2·5
San Fernando	−1·3	74·5	47	21 0	?S	(21 0)	− 4	—	—
Coimbra	−1·3	75·1	42	21 4	?S	(21 4)	− 8	—	—
Berkeley	−1·3	75·4	318	11 12	−31	—	—	—	—
Granada	−1·3	76·7	47	i 11 23	−28	i 21 35	+ 5	—	—
Tortosa	−1·3	81·3	45	21 41	?S	(21 41)	−42	22·4	22·6
Algiers	−1·3	81·3	50	—	—	e 21 51	−32	—	22·4
De Bilt	−1·4	89·1	35	—	—	e 22 54	−55	—	—
Hamburg	−1·4	92·4	35	—	—	i 23 13	−71	—	—
Helwan	−1·5	101·7	64	24 0	?S	(24 0)	−118	—	—
Manila	—	175·0	274	e 20 0	[−16]	—	—	—	—

Additional readings: Coimbra gives also iN = +21m.32s. Berkeley eV = +11m.11s.

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Nov. 24d. Readings also at 1h., 2h., and 3h. (Rio Tinto), 4h. (Florence), 5h. (La Paz), 6h. (Florence), 11h. (Helwan), 14h. (Colombo), 15h. (Lick), 16h. (near Tokyo), 23h. (Lick and San Fernando).

Nov. 25d. 8h. 38m. 36s. Epicentre 40°·0N. 20°·0E. (as on 1920 Oct. 26d.).

A = +·720, B = +·262, C = +·643 ; D = +·342, E = −·940 ;
G = +·604, H = +·220, K = −·766.

		Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Athens		3·6	123	e 0 55	− 1	1 39	0	1·8	2·3
Pompeii	E.	4·2	281	1 2	− 3	2 12	+17	(2·2)	3·4
Rocca di Papa		5·8	291	i 1 23	− 7	3 6	?L	e 7·0	4·1
Florence		7·5	303	−0 21	?	—	—	—	6·4
Padova		8·0	315	2 51	+50	5 40	?L	(5·7)	—
Vienna	E.	8·6	344	e 2 13	+ 3	—	—	e 4·3	5·4
	N.	8·6	344	e 2 14	+ 4	4 14	+21	e 4·6	5·4
Moncalieri		10·3	303	0 38	?	4 44	+ 7	7·5	10·2
Zurich		11·0	316	e 2 30	−14	e 6 3	?L	(e 6·0)	—
Strasbourg		12·2	318	—	—	—	—	e 6·9	9·2
Besançon		12·4	310	5 20	?S	(5 20)	− 9	—	—
Puy de Dôme		13·7	300	7 44	?L	—	—	(7·7)	—
Hamburg		15·2	337	—	—	e 6 24	−13	e 8·6	10·5
Paris		15·2	311	—	—	—	—	e 8·4	10·4
Uccle		15·3	320	—	—	—	—	e 8·4	—
De Bilt		15·8	325	—	—	e 6 52	+ 2	8·4	9·4

Additional readings: Athens gives also iP = +1m.2s. Strasbourg MN = +9·1m. Hamburg MN = +11·3m.

Nov. 25d. Readings also at 5h. (La Paz), 8h. (San Fernando), 13h. (near Tacubaya), 21h. (near La Paz).

1920. Nov. 26d. 8h. 51m. 0s. Epicentre **40°·0N. 20°·0E.**
(As on Nov. 25d.).

A = +·720, B = +·262, C = +·643 ; D = +·342, E = −·940 ;
G = +·604, H = +·220, K = −·766.

		Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Athens		3·6	123	1 2	+ 6	1 48	+ 9	e 1·9	2·6
Pompeii		4·2	281	1 11	+ 6	4 46	?	—	5·0
Rocca di Papa	N.	5·8	291	i 1 29	− 1	(2 30)	− 9	(3·5)	3·8
Florence		7·5	303	1 16	−38	—	—	—	4·5
Padova		8·0	315	3 0	?	5 45	?L	(5·8)	—
Vienna	E.	8·6	344	—	—	3 59	+ 6	4·5	5·4
	N.	8·6	344	e 2 8	− 2	4 5	+12	4·6	6·9
Milan		9·6	308	3 30	?S	(3 30)	−48	(5·9)	7·2
Lemberg		10·2	15	—	—	e 4 0	−35	e 5·7	6·0
Moncalieri		10·3	303	(2 49)	+15	2 49	?P	4·9	9·1
Zurich		11·0	316	e 2 39	− 5	i 4 55	+ 1	—	—
Strasbourg		12·2	318	2 5	−57	6 53	?L	(6·9)	9·0
Besançon		12·4	310	3 0	− 5	6 58	?L	(7·0)	—
Barcelona		13·6	288	—	—	—	—	e 6·5	9·0
Algiers		13·7	261	3 21	− 1	6 —	− 1	7·5	13·0
Helwan	E.	13·7	134	4 42	+80	—	—	—	14·2
	N.	13·7	134	3 42	+20	—	—	—	13·8
Tortosa		14·8	279	3 20	−16	6 8	−19	7·2	9·2
Paris		15·2	311	e 3 58	+16	e 6 44	+ 7	8·4	10·0
Hamburg		15·2	337	e 3 34	− 8	e 6 28	− 9	e 8·4	11·6
Uccle		15·3	320	e 3 37	− 6	e 6 36	− 3	8·0	9·0
		15·3	320	i 3 46	+ 3	i 6 44	+ 5	—	—
De Bilt	E.	15·8	325	3 53	+ 4	6 53	+ 3	8·5	9·5
	N.	15·8	325	—	—	6 56	+ 6	8·2	9·5
Kew		18·1	316	4 0	−18	—	—	—	13·0
Granada		18·6	269	4 27	+ 3	8 9	+16	—	—
Oxford		18·8	316	i 4 20	− 7	7 51	− 7	10·9	12·8
Stonyhurst		20·5	320	e 4 42	− 5	8 36	+ 2	11·2	13·1
San Fernando		20·8	269	—	—	—	—	11·2	15·4
Rio Tinto		20·8	272	7 0	?S	(7 0)	−100	—	18·0

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.
Coimbra	E.	21·7	280	i 5 0	− 1	8 59	0	11·8	14·5
	N.	21·7	280	—	—	—	—	10·8	15·4
Edinburgh		22·0	324	e 5 0	− 5	9 2	− 3	—	13·7
Kodaikanal		58·7	104	35 54	?L	—	—	(35·9)	—
Colombo		62·7	106	36 0	?L	—	—	(36·0)	40·0
Ottawa		66·2	310	—	—	—	—	e 33·0	—
Toronto		69·3	311	—	—	—	—	e 42·5	43·6
Cape Town		73·9	181	35 46	?L	41 46	?	(35·8)	45·3
Chicago		74·9	313	—	—	—	—	e 34·8	—
Victoria		85·9	337	—	—	—	—	48·8	50·8
Tacubaya		98·1	304	44 46	?L	—	—	(44·8)	—
La Paz		99·2	256	e 17 59	?PR_1	—	—	53·3	60·9

Additional readings and notes: Athens gives also iP = +1m.14s., i = +1m.21s. +1m.26s. +1m.35s., MN = +2·9m., T_o = 8h.51m.6s. Rocca di Papa gives S and L as PR_1 and PR_2, also eL = +9·0m. Florence readings given as at 9h. Moncalieri gives P? = 9h.50m.25s., MN = +8·0m. Barcelona eLN = 8h.51m.30s. (? misprint for 57m.). Hamburg MZ = +10·7m., MN = +11·8m., T_o = 8h.50m.59s. San Fernando MN = +14·0m. Chicago L = +37·0m. and +46·0m.

Nov. 26d. 11h. 38m. 20s. Epicentre 41°·5N. 7°·0W. (as on 1919 Sept. 10d.).

A = +·744, B = −·091, C = +·663; D = −·122, E = −·992; G = +·658, H = −·081, K = −·749.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Coimbra	1·7	220	0 24	− 2	0 48	0	0·9	1·0
Granada	5·1	148	1 26	+ 7	2 41	+21	3·0	—
San Fernando	5·1	173	3 28	?L	—	—	(3·5)	4·7
Tortosa	5·7	94	1 24	− 4	—	—	2·8	—
Barcelona	6·8	87	1 44	0	(2 53)	−12	2·9	4·2
Paris	9·9	39	—	—	e 3 40	−46	4·9	—
Besançon	10·9	54	4 25	?S	(4 25)	−27	—	—
Oxford	11·0	19	—	—	—	—	4·4	5·8
Uccle	12·2	36	e 2 40	−22	—	—	e 5·7	—
Milan	12·4	66	6 4	?L	—	—	(6·1)	—
Strasbourg	12·5	50	—	—	e 4 47	−45	—	—
De Bilt	13·4	34	—	—	—	—	e 6·3	7·4
Edinburgh	14·6	8	—	—	—	—	6·7	—
Rocca di Papa	14·7	82	—	—	—	—	e 8·2	9·3
Vienna	17·8	60	—	—	—	—	e 8·4	12·7

Additional readings: Milan gives +6m.52s. De Bilt MN = +7·1m. Rocca di Papa eN = +8m.46s. Hamburg gives simply e = 11·7h.

Nov. 26d. Readings also at 1h. (La Paz), 5h. (La Paz and Lick), 9h. (Tacubaya and Vienna), 10h. (Pompeii, Apia, and Rocca di Papa), 12h. (near Zurich and Milan), 15h. (Milan), 17h. (Apia), 18h. (San Fernando), 19h. (Vienna, Pompeii, and near Tokyo), 21h. (Milan).

Nov. 27d. 16h. 26m. 20s. Epicentre 37°·5N. 27°·5E. (as on 1920 April 2d.).

A = +·704, B = +·366, C = +·609; D = +·462, E = −·887; G = +·540, H = +·281, K = −·793.

Apparently this is not a repetition from 40°·0N. 20°·0E., as on several occasions during October and November.

		Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Athens		3·0	278	e 0 51	+ 4	—	—	1·3	2·2
Helwan		8·3	156	7 40	?	—	—	—	—
Pompeii	E.	10·5	294	6 24	?L	—	—	(6·4)	—
Rocca di Papa		12·1	295	—	—	—	—	e 6·8	—
Vienna		13·4	326	—	—	e 4 46	−67	7·2	9·7
Padova		14·1	309	8 10	?L	—	—	(8·2)	—
Strasbourg		18·1	314	e 4 17	− 1	—	—	e 11·2	—
Hamburg		20·1	328	—	—	e 7 40	−45	—	—
Uccle		21·1	316	—	—	—	—	e 10·7	—
De Bilt		21·4	320	—	—	—	—	e 11·3	12·5

Additional readings: Athens gives also MN = +2·1m. Rocca di Papa ePN = +7m.46s. De Bilt MN = +11·9m.

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Nov. 27d. Readings also at 4h. (Helwan), 7h. (Rocca di Papa), 10h. (Helwan), 11h. (Taihoku), 18h. (San Fernando and La Paz), 23h. (Osaka and Kobe).

Nov. 28d. 8h. 1m. 40s. Epicentre 36°·5N. 19°·7E. (as on 1918 July 18d.).

$A = +\cdot757$, $B = +\cdot271$, $C = +\cdot595$; $D = +\cdot337$, $E = -\cdot942$; $G = +\cdot560$, $H = +\cdot200$, $K = -\cdot804$.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Athens	3·5	66	e 0 56	+ 1	—	—	e 1·4	1·9
Pompeii	5·9	318	0 32	−59	2 32	− 9	—	—
Rocca di Papa	7·5	317	i 2 8	+14	—	—	—	3·5
Padova	10·7	329	3 27	+47	5 59	+71	—	—
Vienna	12·0	349	e 2 50	− 9	—	—	i 3·9	4·0

Athens gives also MN = +2·2m. Rocca di Papa e = +0m.50s., MN = +2·2m.

Nov. 28d. 11h. 29m. 55s. Epicentre 50°·0N. 128°·0W. (as on 1919 July 10d.).

$A = -\cdot396$, $B = -\cdot507$, $C = +\cdot766$; $D = -\cdot788$, $E = +\cdot616$; $G = -\cdot472$, $H = -\cdot604$, $K = -\cdot643$.

		Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Victoria		3·4	114	0 53	0	—	—	′ 1·6	1·9
	Z.	3·4	114	0 58	+ 5	—	—	1·6	1·8
Berkeley		12·8	159	—	—	—	—	e 6·5	9·2
Lick		13·4	158	—	—	e 6 2	+ 9	e 6·6	—
Chicago		28·9	91	7 45	+88	12 9	+54	15·4	—
Toronto		33·4	81	—	—	—	—	17·0	—
Ottawa		34·8	77	—	—	—	—	e 17·0	—
Ithaca		35·7	82	—	—	—	—	e 17·1	—
Georgetown		37·2	88	—	—	e 12 41	−46	(19·0)	—
Washington		37·2	88	—	—	—	—	15·9	19·2
Northfield		37·3	77	—	—	—	—	e 18·1	—
De Bilt	E.	70·5	29	—	—	—	—	e 38·1	41·6
Helwan		98·1	18	30 5	?	—	—	—	—

Additional readings: Berkeley gives eNV = 11h.35m., MV = +8·3m., M = +8·2m. Lick gives its readings at 10h. De Bilt eLN = +37·1m.

Nov. 28d. Readings also at 1h. (Helwan), 5h. (Taihoku), 6h. (San Fernando), 8h. (Vienna), 13h. (La Paz and near Tokyo), 14h. (Taihoku), 21h. (San Fernando), 23h. (near Tortosa and Barcelona).

Nov. 29d. 8h. 2m. 45s. Epicentre 59°·0N. 149°·0W.

$A = -\cdot441$, $B = -\cdot265$, $C = +\cdot857$; $D = -\cdot515$, $E = +\cdot857$; $G = -\cdot735$, $H = -\cdot441$, $K = -\cdot515$.

		Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Victoria		18·4	114	4 1	−21	7 28	−21	9·9	11·2
	Z.	18·4	114	4 45	+23	8 35	+46	—	8·9
Berkeley		27·2	129	e 6 8	+ 8	e 10 16	−29	e 11·4	—
Honolulu		38·2	192	14 33	?S	(14 33)	+52	17·0	17·8
Chicago		41·0	88	9 42	+99	15 30	+69	18·4	—
Ann Arbor		42·6	84	9 15	+60	—	—	22·6	—
Toronto		43·8	79	—	—	15 15	+16	e 20·0	28·0
Ottawa		44·4	74	e 9 24	+55	14 56	−11	e 18·1	—
Ithaca		46·1	78	15 28	?S	(15 28)	− 1	24·5	—
Northfield		46·8	73	—	—	e 18 15	?	21·2	—
Georgetown	E.	48·5	82	8 59	+ 2	16 0	0	e 21·2	—
Washington		48·5	82	—	—	16 23	+23	e 20·2	26·8
Zi-ka-wei		63·4	286	e 19 0	?S	(e 19 0)	− 6	—	—
Hamburg		66·1	13	e 10 51	− 1	i 19 36	− 2	e 30·2	—

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.
De Bilt	E.	66·9	17	—	—	19 48	− 1	e 31·2	33·5
	N.	66·9	17	—	—	—	—	e 32·2	36·3
Uccle		68·0	18	e 11 5	+ 1	19 59	− 3	e 32·2	—
Paris		69·7	20	—	—	e 20 17	− 5	—	28·2
Strasbourg		70·7	16	e 11 22	+ 1	e 19 33	−61	20·2	—
Barcelona		76·7	21	—	—	e 21 21	−24	e 36·6	—
Manila		77·5	278	e 17 15	?	—	—	—	—
Pompeii		79·2	12	21 55	?S	(21 55)	−19	—	—
Algiers		81·4	21	e 12 23	− 4	22 19	−20	—	—
Helwan		91·1	359	24 15	?S	(24 15)	−10	—	—
La Paz		99·5	106	e 17 49	?PR_1	28 19	?	54·3	61·2

Additional readings: Berkeley gives also eN? = +6m.30s. Chicago PR_1 = +10m.39s. Toronto eL = +18·6m., +25·6m., and +27·4m. Ottawa L = +32·2m., T_o = 8h.5m.10s. Ithaca S = +21m.11s. Barcelona iS = +22m.22s. Helwan PN = +25m.15s.

Nov. 29d. 15h. 48m. 0s. Epicentre 40°·0N. 20°·0E. (as on Nov. 26d.).

A = +·720, B = +·262, C = +·643; D = +·342, E = −·940; G = +·604, H = +·220, K = −·766.

		Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Athens		3·6	123	e 0 55	− 1	1 41	+ 2	1·8	2·4
Pompeii	E.	4·2	281	1 32	+27	2 10	+15	—	3·0
Rocca di Papa		5·8	291	e 1 30	0	—	—	—	3·7
		5·8	291	e 1 32	+ 2	—	—	—	3·6
Florence		7·5	303	1 4	−50	—	—	(3·7)	6·5
Padova		8·0	315	2 24	+23	5 42	?L	(5·7)	—
Vienna	E.	8·6	344	2 25	+15	i 3 4	−49	i 4·7	5·5
	N.	8·6	344	2 22	+12	i 3 9	−44	—	6·0
Moncalieri		10·3	303	1 46	−48	5 22	?L	(5·4)	9·2
Zurich		11·0	316	e 2 40	− 4	i 6 35	?L	(i 6·6)	—
Strasbourg		12·2	318	e 2 57	− 5	6 49	+85	e 8·3	9·3
Besançon		12·4	310	5 9	?S	(5 9)	−20	(8·6)	11·0
Helwan		13·7	134	7 0	?L	—	—	(7·0)	—
Tortosa		14·8	279	—	—	—	—	7·2	13·0
Hamburg		15·2	337	e 3 27	−15	—	—	e 8·3	12·2
Paris		15·2	311	—	—	—	—	e 9·0	10·0
Uccle		15·3	320	e 3 48	+ 5	—	—	8·5	—
De Bilt		15·8	325	—	—	—	—	e 8·5	11·8
Oxford		18·8	316	—	—	7 55	− 3	—	13·2
Rio Tinto		20·8	272	15 0	?L	—	—	(15·0)	29·0
San Fernando	E.	20·8	269	12 0	?L	—	—	(12·0)	15·0
Coimbra		21·7	280	—	—	e 9 17	+18	e 13·2	—
Edinburgh		22·0	324	—	—	9 0	− 5	—	—

Additional readings: Athens gives MN = +2·0m. Rocca di Papa eN = +1m.36s., PR_1 = +3m.12s. Moncalieri MN = +8·2m. Hamburg MN = +11·5m., MZ = +10·6m. De Bilt MN = +9·5m.

Nov. 29d. Readings also at 4h. (Manila and Taihoku), 8h. (near Tokyo), 18h. (La Paz), 20h. (near Athens), 21h. (Taihoku, Denver, and San Fernando).

Nov. 30d. Readings at 1h. (La Paz and near Osaka and Kobe), 5h. (San Fernando), 7h. (Athens), 8h. (La Paz), 11h. (Helwan, Batavia, Manila, and near Osaka), 12h. (San Fernando), 13h. (La Paz), 15h. (La Paz), 16h. (Helwan), 23h. (Perth and Lick).

Dec. 1d. Readings at 4h. (Batavia), 5h. (Riverview), 7h. (Tacubaya), 9h. (near Manila), 13h. (Batavia), 14h. (Riverview, Apia, Wellington, and Honolulu), 16h. (La Paz), 17h. (Taihoku), 18h. (Rocca di Papa), 19h. (near Batavia).

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Dec. 2d. 23h. 40m. 5s. Epicentre 36°·5N. 140°·5E.

$A = -\cdot620$, $B = +\cdot511$, $C = +\cdot595$.

		Δ	P.	O−C.	S.	O−C.	L.	M.
		°	m s.	s.	m. s.	s.	m.	m.
Tokyo		1·1	0 19	+ 2	0 30	− 1	0·8	—
Mizusawa	E.	2·6	0 38	− 3	1 14	+ 2	—	—
Osaka		4·5	1 36	+26	—	—	2·7	3·2
Kobe		4·7	1 29	+16	—	—	2·7	3·0
La Paz		147·7	19 51	[− 1]	—	—	—	—

Additional readings: Mizusawa gives also SN = +1m.21s. Kobe MN = +2·1m.

Dec. 2d. Readings also at 0h. (Lick (2), Apia, and San Fernando), 4h. (near Tokyo), 5h. (Zi-ka-wei and Taihoku), 6h. (Zi-ka-wei, Manila, and De Bilt), 9h. (La Paz), 12h. and 18h. (Batavia), 22h. (San Fernando, La Paz, and near Lick), 23h. (near Mizusawa).

Dec. 3d. Readings at 0h. (De Bilt and Helwan), 6h. (near La Paz), 8h. (De Bilt), 9h. (near Strasbourg, Chur, and Zurich), 10h. and 17h. (La Paz), 18h. (La Paz, Tacubaya, Osaka, and Honolulu), 19h. (near Batavia), 21h. (near Apia), 23h. (San Fernando).

Dec. 4d. 5h. 51m. 30s. Epicentre 39°·0S. 23°·5E.

$A = +\cdot713$, $B = +\cdot310$, $C = -\cdot629$; $D = +\cdot399$, $E = -\cdot917$; $G = -\cdot577$, $H = -\cdot251$, $K = -\cdot777$.

		Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Cape Town		6·5	319	1 48	+ 9	2 42	−15	—	3·3
		6·5	319	1 42	+ 3	2 54	− 3	—	3·7
Colombo		69·4	62	31 30	?L	—	—	(31·5)	38·5
Algiers		78·1	346	e 11 41	−27	21 56	− 5	38·5	42·3
Granada		80·1	339	i 12 25	+ 5	i 22 38	+14	—	—
San Fernando	E.	80·2	337	11 30	−50	—	—	—	51·5
Batavia		80·9	90	e 12 43	+19	i 22 27	− 7	—	—
La Paz		81·0	258	12 23	− 2	22 31	− 4	36·1	39·1
Rocca di Papa	N.	81·3	353	—	—	—	—	e 43·8	47·2
Rio Tinto		81·6	337	45 30	?L	—	—	(45·5)	59·5
Tortosa		82·5	344	—	—	—	—	e 42·5	45·3
Coimbra		84·4	336	—	—	—	—	e 44·2	46·8
Moncalieri		85·2	350	—	—	e 37 49	?	42·1	48·9
Vienna		87·4	356	12 52	− 9	23 42	− 3	e 40·5	52·5
Besançon		87·6	349	—	—	—	—	45·5	—
Strasbourg		88·6	350	—	—	—	—	e 40·5	50·9
Paris		89·7	347	—	—	—	—	e 43·5	48·5
Uccle		91·4	349	—	—	—	—	e 40·5	49·4
De Bilt	E.	92·4	350	—	—	—	—	e 39·5	50·3
	N.	92·4	350	—	—	—	—	e 47·5	54·6
Kew		92·8	346	—	—	—	—	—	52·5
Oxford		93·3	345	—	—	—	—	e 37·7	52·4
Hamburg		93·3	352	—	—	—	—	e 48·5	51·5
Stonyhurst		95·5	345	e 44 18	?L	—	—	(e 44·3)	52·0
Edinburgh		97·5	346	—	—	—	—	50·5	—

Additional readings: San Fernando gives also MN = +49·5m. Batavia i_1 = +13m.36s.

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Dec. 4d. 23h. 8m. 33s. Epicentre 25°·0N. 119°·5E. (as on 1920 May 29d.).

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

	Δ	Az.	P.	O−C.	S.	O−O.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Hokoto	1·5	179	0 12	−11	—	—	0·7	—
Taihoku	1·9	89	0 20	− 9	—	—	0·6	0·7
Zi-ka-wei	6·4	15	e 1 38	0	e 3 6	+11	—	4·2
Manila	10·5	172	e 2 38	+ 1	6 6	?L	7·2	8·2
Colombo	42·0	281	27 27	?L	—	—	(27·4)	29·4
Kodaikanal	42·6	257	29 33	?L	—	—	(29·6)	—
Helwan	76·3	297	51 27	?	—	—	—	—
Vienna	79·7	320	e 15 27	?PR_1	—	—	—	—
Hamburg	80·8	325	—	—	—	—	e 44·4	51·4
De Bilt	84·1	326	—	—	—	—	e 43·4	54·7
Edinburgh	85·7	332	—	—	—	—	47·4	56·4
Stonyhurst	86·7	330	36 21	?	—	—	49·2	57·0
Kew	87·1	327	—	—	—	—	—	55·4
Paris	87·3	324	—	—	—	—	47·4	—
Oxford	87·4	328	—	—	—	—	47·6	57·0
Coimbra	98·8	322	—	—	—	—	e 49·6	—
Rio Tinto	99·3	320	57 27	?L	—	—	(57·4)	67·4
La Paz	168·9	42	20 7	[− 7]	—	—	—	—

Additional readings: Helwan gives also PN = +46m.27s. De Bilt MN = +55·8m. Coimbra eL = +54·3m.

Dec. 4d. Readings also at 1h. (near Tokyo), 2h. (Batavia), 4h. (Granada), 5h. (Kodaikanal), 7h. (Florence), 9h. (Helwan and La Paz), 10h. (Helwan), 18h. (La Paz, Batavia, and near Tokyo and Mizusawa), 19h. (near Tokyo), 20h. (San Fernando), 22h. (Vienna).

Dec. 5d. 10h. 1m. 0s. Epicentre 0°·0 18°·8W.

A = +·947, B = −·322, C = 000; D = −·322, E = −·947;
G = 000, H = 000, K = −1·000.

		Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
San Fernando		38·3	16	8 48	+68	15 30	+108	23·2	28·0
Granada		39·7	19	7 57	+ 5	14 3	+ 1	—	—
Coimbra	E.	41·3	11	9 27	?PR_1	14 9	−16	e 17·1	17·2
	N.	41·3	11	—	—	14 13	−12	e 18·3	17·2
Algiers		42·0	28	8 8	− 3	14 22	−13	20·5	24·5
Tortosa		44·4	20	—	—	—	—	e 23·0	32·1
Barcelona		45·6	23	—	—	e 15 33	+11	22·4	28·4
Cape Town		48·7	139	9 1	+ 3	15 58	− 4	(25·4)	39·0
Rocca di Papa	N.	50·5	30	i 9 6	− 4	i 16 18	− 7	e 25·8	34·8
Moncalieri		50·7	25	8 17	−54	16 22	− 5	24·8	31·7
Florence		51·3	28	6 30	?	—	—	—	32·5
La Paz		51·4	249	e 9 34	+18	16 21	−15	23·1	26·4
Besançon		51·9	21	15 25	?S	(15 25)	−78	25·0	—
Paris		52·2	18	—	—	e 16 46	0	26·0	27·0
Zurich		53·0	24	e 9 23	− 3	—	—	—	—
Strasbourg		53·7	22	e 9 32	+ 1	17 11	+ 6	e 25·0	33·2
Kew		53·8	13	22 0	?	—	—	—	36·0
Oxford		53·9	13	9 14	−18	17 6	− 2	22·7	36·2
Ucelé		54·5	19	e 9 42	+ 6	i 17 21	+ 6	e 23·0	28·5
Athens		54·5	41	9 21	−15	e 17 16	+ 1	e 27·3	32·8
Stonyhurst		55·6	12	17 30	?S	(17 30)	+ 1	—	37·0
De Bilt		55·8	19	e 10 6	+21	17 38	+ 7	24·0	27·8
Helwan	E.	56·2	54	13 36	?PR_1	—	—	—	31·2
	N.	56·2	54	13 0	?PR_1	—	—	—	29·6
Vienna		57·0	28	i 9 55	+ 3	17 53	+ 7	e 27·7	33·6

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.
Edinburgh		57·3	10	—	—	17 24	−26	24·0	38·4
Hamburg		58·7	19	e 10 6	+ 3	—	—	e 29·0	36·0
Ottawa		67·5	321	—	—	—	—	e 36·3	—
Toronto		69·2	319	—	—	—	—	e 39·7	42·8
Kodaikanal		96·1	80	49 18	?L	—	—	50·6	55·0
Colombo		98·5	84	54 6	?L	—	—	56·2	57·4
Victoria		99·6	320	54 31	?L	—	—	(54·5)	56·0
Lick	N.	100·2	310	—	—	—	—	e 58·2	59·6
Berkeley		100·6	310	—	—	—	—	e 59·6	—

Additional readings and notes: San Fernando gives MN = +27·0m., T_0 = 10h.1m.20s. Barcelona ? = +18m.27s. Cape Town L is given as P on the Milne instrument. Moncalieri MN = +30·0m. La Paz P = +9m.44s., T_0 =10h.2?m.12s. Paris e = +20m.36s. Strasbourg MN = +38·2m., T_0 =10h.0m.58s. Uccle MN = +33·2m., T_0 =10h.1m.6s. De Bilt MN = +38·2m. Ottawa e?E = +29m.30s., LE = +38·5m. Athens MN =33·6m., T_0 =10h.0m.30s. Lick and Berkeley readings are given 1h. late. Berkeley gives also eN = +58m.43s. and eZ = +59m.39s.

Dec. 5d. 21h. 57m. 24s. Epicentre 7°·2S. 150°·0E. (as on 1920 Jan. 14d.).

A = −·859, B = +·496, C = −·125; D = +·500, E = +·866;
G = +·108, H = −·063, K = −·992.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Riverview	26·7	178	e 5 56	+ 1	e 10 37	+ 2	e 13·5	15·7
Melbourne	31·0	185	—	—	e 11 36	−15	16·6	17·3
Manila	36·1	307	e 7 28	+ 5	—	—	—	—
Perth	40·3	229	15 8	?L	—	—	(15·1)	—
Batavia	42·8	269	e 7 13	−64	—	—	—	16·2
Honolulu	58·4	60	e 10 18	+17	i 16 48	−76	e 22·6	36·1
Victoria	93·2	42	28 57	?	—	—	43·1	47·6
Helwan	118·4	300	30 36	?	—	—	—	—
De Bilt	126·7	334	—	—	—	—	e 57·6	60·7
La Paz	135·5	123	20 20	[+49]	—	—	—	—

Additional readings: Riverview gives MN = +14·8m. De Bilt MN = +64·0m.

Dec. 5d. Readings also at 1h. (near Tacubaya), 2h. (Rio Tinto), 9h. (La Paz), 12h. and 14h. (Taihoku), 15h. (Point Loma), 19h. and 23h. (San Fernando).

Dec. 6d. 1h. 28m. 0s. Epicentre 25°·0N. 119°·5E. (as on 1920 Dec. 4d.).

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Hokoto	1·5	179	0 56	+33	(1 24)	+42	1·4	—
Taihoku	1·9	89	0 24	− 5	(0 43)	−10	0·7	1·1
Zi-ka-wei	6·4	15	e 1 38	0	e 3 8	+13	—	4·5
Manila	10·5	172	e 2 50	+13	—	—	—	—
Helwan	76·3	297	53 0	?	—	—	—	—
De Bilt	84·1	326	—	—	—	—	e 44·0	54·8
Strasbourg	84·6	322	—	—	—	—	e 53·0	55·0
Uccle	85·2	324	e 7 0	?	—	—	e 43·0	—
Edinburgh	85·7	322	—	—	—	—	48·0	56·5
Stonyhurst	86·7	330	42 18	?L	—	—	(42·3)	58·5
Kew	87·1	327	—	—	—	—	—	59·0
Paris	87·3	324	—	—	—	—	e 48·0	—
La Paz	168·9	42	17 4	?	—	—	—	—

Additional readings: Zi-ka-wei gives MN = +4·1m, +48m.0s. (?L). De Bilt MN = +55·8m. Helwan PN =

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Dec. 6d. Readings also at 3h. (Taihoku), 8h. (San Fernando), 10h. (Rio Tinto and near Batavia), 12h. (Perth), 13h. (Helwan, Vienna, Rocca di Papa, and near Athens), 15h. (Perth), 17h. (La Paz), 18h. (Helwan and Simla), 19h. (Apia), 21h. (Helwan), 22h. (La Paz), 23h. (Apia).

Dec. 7d. 15h. 14m. 30s. Epicentre 13°·0S. 166°·8E. (as on 1920 Aug. 15d.).

$A = -\cdot949$, $B = +\cdot222$, $C = -\cdot225$; $D = +\cdot228$, $E = +\cdot974$; $G = +\cdot219$, $H = -\cdot051$, $K = -\cdot974$.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Riverview	25·2	213	i 5 41	+ 1	e 10 5	− 2	e 12·0	13·2
Sydney	25·2	213	5 30	−10	9 52	−15	13·4	14·4
Wellington	29·1	167	7 30	?PR_1	—	—	18·5	—
Melbourne	31·5	214	—	—	11 54	− 6	16·2	17·3
Adelaide	33·6	224	—	—	—	—	e 14·7	22·7
Honolulu	48·6	46	—	—	e 17 0	+59	25·1	32·4
Perth	50·3	239	16 0	?S	(16 0)	−23	—	—
Manila	53·2	300	e 9 26	− 1	—	—	—	—
Batavia	59·4	270	e 9 50	−18	i 18 5	−11	—	—
Victoria	86·9	36	—	—	—	—	44·6	—
Chicago	110·2	49	—	—	19 20	?PR_1	52·5	—
Toronto	116·1	47	—	—	—	—	71·4	—
Ottawa	118·4	45	—	—	—	—	e 37·0	—
Helwan	135·6	300	41 30	?SR_1	—	—	—	—
De Bilt E.	138·2	343	—	—	—	—	e 66·5	73·3
N.	138·2	343	—	—	—	—	e 67·5	76·8
Uccle	139·6	343	—	—	e 44 30	?	e 66·5	—
San Fernando	155·7	346	33 30	?S	—	—	—	—

Additional readings: Riverview gives also iP = +6m.13s., PS = +10m.38s., MN = +13·4m., MZ = +13·7m., T_0 = 15h.14m.39s. Adelaide gives the following readings as e, +14m.42s., +18m.36s., +19m.48s., and +22m.0s. Victoria L = +34·8m. Toronto L = 19·2m. (?PR_1) and +37·6m. (?SR_1). Chicago L = +56·5m. and +63·5m. Ottawa eL = +19·5m. (?PR_1). Helwan PN = +40m.30s. De Bilt ePR_1 = +22m.54s.

Dec. 7d. Readings also at 4h. (La Paz and near Tokyo), 6h. (Batavia and near Zurich), 8h. (San Fernando), 10h. (Florence), 11h. (Manila), 15h. (La Paz), 21h. (Kodaikanal).

Dec. 8d. 3h. 55m. 20s. Epicentre 36°·7N. 21°·0E. ((as on 1919 Mar. 6d.).

$A = +\cdot749$, $B = +\cdot287$, $C = +\cdot598$; $D = +\cdot358$, $E = -\cdot934$; $G = +\cdot558$, $H = +\cdot214$, $K = -\cdot802$.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Athens	2·5	60	0 35	− 4	1 6	− 3	1·2	1·3
Rocca di Papa	8·1	311	i 3 4	+61	i 4 34	+54	(i 3·1)	5·9
N.	8·1	311	e 4 10	?L	—	—	e 5·9	7·6
Helwan	11·0	125	8 40	?	—	—	—	—
Vienna	12·0	345	e 3 28	+29	—	—	i 5·9	7·1
Moncalieri	13·0	314	e 3 53	+40	—	—	7·8	9·6
Zurich	14·0	324	—	—	—	—	e 6·7	—
Strasbourg	15·3	325	e 3 47	+ 4	—	—	e 6·7	9·8
Uccle	18·4	325	—	—	—	—	e 9·4	10·5
Hamburg	18·5	339	−e 0 32	?	—	—	e 9·7	—
De Bilt	19·0	329	—	—	e 7 51	−11	9·6	10·5
Stonyhurst	23·6	324	13 10	?L	—	—	(13·2)	—
Edinburgh	25·2	327	—	—	—	—	—	14·2

Additional readings: Athens gives also MN = +1·2m. Strasbourg MN = +7·1m. Helwan PN = +10m.40s.

Dec. 8d. Readings also at 2h. (Stonyhurst, Edinburgh, De Bilt, Hamburg, and near Tokyo and Mizusawa), 5h. (Batavia), 6h. (Apia and near Balboa Heights), 7h. (San Fernando and near La Paz), 11h. (La Paz), 14h. (near Tokyo), 16h. (near Batavia (2)), 19h. (Helwan, San Fernando, and Rio Tinto), 20h. (Batavia).

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Dec. 9d. Readings at 1h. (Taihoku), 2h. (Denver and La Paz), 5h. (Athens), 10h. (Rocca di Papa), 14h. (Batavia), 15h. (De Bilt and near Tokyo), 18h. (La Paz and near Tacubaya), 19h. (De Bilt), 20h. (4) and 21h. (near Algiers), 23h. (La Paz).

1920. Dec. 10d. 4h. 25m. 35s. Epicentre **39°·0S. 74°·5W.**

A = +·208, B = −·749, C = −·629; D = −·964, E = −·267; G = −·168, H = +·606, K = −·777.

		Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
La Paz	N.	23·2	16	i 5 20	+ 1	i 9 30	+ 1	12·4	14·1
Porto Rico	E.	57·8	11	e 17 47	?S	(e 17 47)	− 9	32·1	32·6
	N.	57·8	11	e 17 52	?S	(e 17 52)	− 4	35·2	—
Oaxaca		59·8	335	10 38	+27	19 18	+57	29·4	31·8
Tacubaya	E.	62·8	333	10 31	0	19 9	+11	31·4	38·4
	N.	62·8	333	10 28	− 3	19 6	+ 8	*30·5	36·3
Cape Town		71·5	120	20 44	?S	(20 44)	0	30·4	34·9
		71·5	120	21 5	?S	(21 5)	+21	31·3	46·2
Christchurch		77·6	225	33 43	?	—	—	57·4	78·9
Wellington		77·9	227	e 12 43	+37	e 22 19	+20	—	46·4
Georgetown	E.	77·9	359	e 12 25	+19	—	—	e 38·4	—
	N.	77·9	359	e 12 25	+19	22 9	+10	e 39·7	—
Washington		77·9	359	12 23	+17	22 3	+ 4	e 37·8	—
Tucson	E.	78·9	330	—	—	e 18 35	?	34·4	43·0
Ithaca		81·5	359	—	—	e 22 37	− 4	38·4	—
Chicago		81·6	351	12 37	+ 9	22 41	− 1	39·4	—
Ann Arbor	E.	81·7	354	—	—	21 55	−48	36·7	—
	N.	81·7	354	11 55	−34	21 49	−54	36·6	—
Toronto		82·7	356	—	—	e 23 31	+37	e 35·4	64·9
Ottawa		84·4	0	i 12 58	+14	i 23 10	− 2	e 40·1	—
Apia		86·9	258	—	—	e 24 31	+51	37·4	—
Berkeley		88·5	325	—	—	—	—	e 42·4?	—
Melbourne		95·1	210	24 49	?S	(24 49)	−18	45·8	50·9
Riverview		95·8	218	e 24 22	?S	(e 24 22)	−52	e 44·5	48·5
Sydney	E.	95·8	218	—	—	44 25	?	46·9	49·0
Victoria		97·5	330	i 26 23	?S	(i 26 23)	+52	49·0	53·0
San Fernando		98·2	50	24 13	?S	(24 13)	−85	54·1	66·4
Honolulu		98·5	290	—	—	e 25 25	−16	46·4	53·4
Rio Tinto		98·9	49	19 25	?PR_1	—	—	—	55·4
Coimbra	E.	99·5	45	e 14 27	+19	24 39	−72	45·3	53·4
	N.	99·5	45	13 32	−36	—	—	44·1	53·3
Adelaide		100·0	208	—	—	e 24 43	−73	e 50·0	55·8
Granada		100·2	50	13 35	−37	i 27 41	+103	—	—
Algiers		104·0	54	e 16 40	+130	24 52	−101	40·9	57·4
Tortosa		105·1	50	e 24 25	?S	(e 24 25)	−138	e 48·4	65·2
Barcelona	E.	106·4	50	—	—	e 26 42	−14	e 47·6	56·9
	N.	106·4	50	—	—	—	—	e 37·4	54·0
Perth		108·4	190	26 45	?S	(26 45)	−29	—	—
Puy de Dôme		109·4	45	28 45	?S	(28 45)	+82	—	—
Oxford		110·8	38	—	—	e 25 32	−123	47·9	59·6
Paris		111·0	42	—	—	e 28 40	+63	50·4	59·4
Kew		111·1	39	26 25	?S	(26 25)	−73	—	74·4
Stonyhurst		111·5	37	20 25	?PR_1	27 7	−35	50·8	69·6
Moncalieri		111·7	48	e 21 11	?PR_1	35 19	?SR_1	49·1	73·4
Besançon		112·0	46	—	—	—	—	50·4	—
Rocca di Papa		113·0	53	e 20 55	?PR_1	—	—	e 55·9	69·9
Uccle		113·2	41	e 19 43	?PR_1	i 29 0	+64	51·4	61·0
Florence		113·2	50	—	—	26 25	−91	—	63·4
Zurich		113·5	47	—	—	—	—	e 51·6	—
Pompeii		113·6	56	19 43	?PR_1	28 43	+44	56·4	68·4
Strasbourg		113·7	45	e 19 12	?	e 28 25	+25	52·0	64·7
De Bilt		114·2	41	—	—	e 27 24	−40	e 51·4	61·4
Padova		114·4	50	20 54	?PR_1	30 39	?	52·5	75·6
Seychelles		116·7	120	32 25	?	—	—	—	69·8
Hamburg		117·5	41	e 20 1	?PR_1	—	—	e 51·4	68·4
Vienna		118·5	49	e 20 10	?PR_1	e 31 19	?	e 50·4	61·6
Helwan	E.	119·8	75	22 31	?	—	—	—	82·7
	N.	119·8	75	23 31	?	—	—	—	79·7
Batavia		134·8	180	—	—	—	—	56·8	56·9
Colombo		140·5	138	71 25	?L	79 25	?	83·4	85·4
Kodaikanal		141·8	130	50 7	?	—	—	72·7	80·3
Bombay		145·4	117	71 24	?L	—	—	(71·4)	—
Manila		152·1	213	e 24 25	?PR_1	e 42 25	?SR_1	—	—
Taihoku		160·6	229	—	—	e 48 20	?	e 54·4	—
Zi-ka-wei		164·9	244	—	—	e 34 57	?	e 49·8	—

For Notes see next page.

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NOTES TO DEC. 10d. 4h. 25m. 35s.

Additional readings: La Paz gives also LE = +12·2min., T_0 = 4h.25m.42s. Epicentre 39°·0S. 72°·0W. Porto Rico gives S as P and records eSE = +24m.15s. Cape Town S = +28m.39s. and +25m.35s. Christchurch S = +42m.25s., SR_1 = +47m.13s. Wellington e = +14m.49s., +16m.13s., and +22m.37s. Georgetown LE = +41·4m., LN = +44·4m. Washington L = +59·4m. Chicago L = +44·4m. and +56·4m. Toronto S = +26m.37s., eL = +46·8m., and +49·0m., L = +60·1m., eL = +64·6m., L = +76·7m., eL = +106·1m., L(Rep.) = +142·8m. and +173·4m. Ottawa L = +46·4m., +59·4m., and +69·4m., T_0 = 4h.26m.19s. Melbourne S = +33m.55s., SR_1 = +38m.55s., SR_2 = +40m.55s. Riverview eS? = +31m.52s., e = +41m.0s., and +41m.31s., MZ = +47·7m., MN = +52·6m. Victoria iS = +31m.48s., eL = +77·6m. San Fernando MN = +62·4m. Honolulu i = +33m.7s., L = +42·3m. Adelaide i = +27m.25s., e = +29m.55s., +32m.37s., +34m.37s., +37m.1s., and = +41m.25s., i = +44m.49s., and +47m.49s., e = +69·7m. Algiers L = +37·4m. Oxford e = +39m.1s. Paris e = +34m.39s. Moncalieri MN = +65·0m. Uccle i = +35m.16s., MN = +59·6m. Strasbourg MN = +58·6m. De Bilt eE = +23m.36s., e = +29m.15s., e = +35m.31s., MN = +70·6m. Epicentre 39°·4S. 72°·0W. Hamburg MNZ = +63·6m. Vienna eZ = +33m.30s., eSE = +45m.20s., eLE = +56·4m., MZ = +70·9m. All these readings are given as on 9d. Batavia i = +23m.11s., +25m.17s., and 26m.54s., L = +71·2m., eL = +93·1m., eLE = +103·1m., 108·4m., and 115·4m.

Dec. 10d. 18h. 35m. 18s. Epicentre 36°·7N. 21°·0E. (as on 1920 Dec. 8d.).

A = +·749, B = +·287, C = +·598; D = +·358, E = −·934; G = +·558, H = +·214, K = −·802.

	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Athens	2·5	60	i 0 41	+ 2	1 10	+ 1	i 1·2	1·9
Pompeii	6·4	310	3 0	?L	—	—	(3·0)	4·7
Rocca di Papa	8·1	311	e 1 36	−27	3 30	−10	—	4·9
Helwan	11·0	125	7 42	?L	—	—	(7·7)	—
Padova	11·1	324	3 10	+24	—	—	—	—
Vienna	12·0	345	e 3 39	+40	—	—	—	7·8
Moncalieri	13·0	314	e 4 21	+68	6 16	?L	(6·3)	—
Strasbourg	15·3	325	—	—	—	—	e 6·3	8·7
Uccle	18·4	325	—	—	—	—	e 10·2	—
De Bilt	19·0	329	—	—	e 7 48	−14	e 10·7	12·3

Additional readings: Athens gives MN = +1·6m. Helwan PN = +6m.42s. De Bilt MN = +10·9m., T_0 = 18h.35m.21s.

Dec. 10d. Readings also at 1h. (near Nagasaki), 3h. (Stonyhurst (3)), 6h. and 8h. (La Paz), 12h. (Apia and Helwan), 13h. (La Paz and near Athens (2)), 17h. (La Paz), 18h. (Apia and La Paz), 20h. (Batavia), 22h. (near Tacubaya).

Dec. 11d. 21h. 22m. 18s. Epicentre 14°·5N. 91°·0W (as on 1920 Mar. 23d.).

A = −·017, B = −·968, C = +·250; D = −1·000, E = +·018; G = −·004, H = −·250, K = −·968.

		Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Oaxaca	E.	6·1	296	2 19	+46	—	—	3·0	4·0
	N.	6·1	296	—	—	—	—	3·3	3·7
Tacubaya		9·3	304	2 44	+24	4 54	+44	5·1	5·5
Vieques	E.	24·8	78	—	—	e 14 21	?L	16·3	—
Tucson	E.	25·4	318	—	—	—	—	e 16·0	18·0
Georgetown		27·3	24	e 5 42	−19	11 26	+40	e 16·4	—
Washington		27·3	24	6 1	0	11 25	+39	e 16·3	—
Chicago		27·4	6	4 40	−82	10 28	−20	11·7	—
Ann Arbor	E.	28·5	12	5 48	−25	11 42	+34	15·7	—
	N.	28·5	12	6 12	− 1	11 18	+10	15·9	—
Ithaca		30·7	23	—	—	e 12 24	+38	19·4	—
Toronto		30·8	17	—	—	12 6	+18	i 18·3	20·3
Ottawa		33·5	20	8 27	?PR_4	12 30	− 2	e 14·6	—
Berkeley		36·2	316	—	—	—	—	e 19·7	—
La Paz		38·3	143	7 37	− 3	13 35	− 7	18·2	22·5

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.
Victoria		43·1	329	—	—	(14 25)	−24	e 25·0	29·3
Honolulu		63·7	287	e 11 54	+78	i 20 24	+75	30·6	36·1
Coimbra		75·2	52	—	—	(e 21 52)	+24	e 21·9	—
Edinburgh		76·8	35	—	—	—	—	—	51·7
Rio Tinto		76·8	54	22 42	?S	(22 42)	+55	—	25·2
San Fernando	N.	77·3	55	15 42	?PR$_1$	—	—	—	47·7
Stonyhurst		77·5	37	22 30	?S	(22 30)	+35	43·2	52·2
Oxford		78·5	40	—	—	—	—	39·2	47·1
Kew		79·2	39	—	—	—	—	—	53·7
Paris		81·4	42	—	—	—	—	e 48·7	50·7
Uccle		82·2	40	—	—	e 22 42	− 6	e 38·7	51·7
De Bilt	E.	82·5	38	—	—	e 22 54	+ 2	e 39·7	51·0
	N.	82·5	38	—	—	—	—	e 37·7	50·0
Hamburg		84·7	37	—	—	—	—	e 47·7	—
Strasbourg		84·9	41	e 12 49	+ 2	—	—	e 44·7	50·7
Rocca di Papa		90·3	47	—	—	—	—	e 41·3	46·3
Helwan		108·9	51	28 42	?SR$_1$	—	—	—	—
Melbourne		125·6	234	—	—	—	—	e 61·2	67·7
Adelaide		131·1	235	—	—	—	—	e 62·7	72·4

Additional readings: Oaxaca gives MZ = +3·8m. Tacubaya MN = +5·9m. Readings given as at 20h. Tucson eE = +8m.36s., eN = +14m.9s., eE = +14m.34s., eLN = +17·0m. Georgetown eN = +4m.53s. Chicago L = +18·7m. Toronto SR$_1$? = +13m.24s., eL = +24·3m. Ottawa L = +18·7m., T$_o$ = 21h.25m.41s. Victoria gives S as L. Adelaide e = +66·4m.

Dec. 11d. Readings also at 1h. (San Fernando), 2h. and 3h. (Zante), 6h. (La Paz), 7h. (Zante and Manila), 11h., 14h., 18h. (2), and 19h. (La Paz).

Dec. 12d. Readings at 1h. (La Paz), 3h. (Vienna, Strasbourg, and near Zurich), 6h. (La Paz), 7h. (Apia and La Paz), 8h. (near Tacubaya), 14h. (Padova and Florence), 15h. (Point Loma).

Dec. 13d. 3h. 42m. 30s. Epicentre 7°·0S. 157°·0E.

A = −·914, B = +·388, C = −·122; D = +·391, E = +·920; G = +·112, H = −·048, K = −·993.

The origin of 1918 July 21d. 7°·0S. 155°·0E. is too far to the west to suit Honolulu and Batavia.

		Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Riverview		27·4	191	e 5 57	− 5	10 42	− 6	e 11·6	14·1
Adelaide		32·7	210	e 6 18	−36	i 11 30	−49	13·9	17·8
Melbourne		32·7	198	12 12	?S	(12 12)	− 7	17·1	17·8
Wellington		37·8	159	e 7 42	+ 6	i 13 42	+ 7	i 17·5	23·5
Christchurch		39·0	162	7 36	−10	14 0	+ 8	22·2	23·6
Perth		45·7	231	8 30	− 8	—	—	—	—
Batavia		49·8	269	e 9 8	+ 2	—	—	24·1	—
Honolulu		52·4	57	9 24	+ 2	i 17 6	+17	26·0	35·2
Victoria		88·5	41	22 37	?S	(22 37)	−81	40·4	47·4
Chicago		113·5	47	29 7	?S	35 0	?SR$_1$	e 39·7	—
Toronto		118·8	42	—	—	—	—	e 65·0	81·8
Ottawa	E.	120·6	40	—	—	e 36 55	?SR$_1$	e 56·5	—
Georgetown	N.	122·0	47	—	—	e 34 41	?	59·5	—
Washington		122·0	47	—	—	—	—	e 58·5	—
Helwan		124·2	301	20 30	?PR$_1$	—	—	—	—
De Bilt		129·3	337	—	—	—	—	e 57·5	64·7
La Paz		129·5	120	19 44	[+27]	31 9	?	63·5	67·0
Stonyhurst		130·2	342	34 30	?S	—	—	—	133·5
Paris		132·9	337	24 30	?PR$_1$	—	—	—	—
Coimbra		144·3	340	—	—	—	—	e 57·5	—
San Fernando	E.	146·8	335	115 30	?	—	—	—	126·5

Additional readings: Riverview gives also PS = +11m.29s., MZ = +14·8m., T$_o$ = 3h.42m.28s. Adelaide e = +9m.0s., i = +12m.12s., SR$_1$ = +13m.0s., i = +16m.6s., and +17m.0s. Melbourne S = +15m.54s., SR$_1$ = +16m.12s. Christchurch SR$_1$ = +17m.42s. Victoria S = +29m.3s. Chicago L = +53·5m., +55·5m., and +67·5m. Toronto e = +59m.48s., eL = +80·5m., and +83·8m. Ottawa LE = +69·5m. and 79·5m. Georgetown LE = +58·5m. Helwan PN = +27m.30s. De Bilt ePR$_1$ = +22m.33s., MN = +63·9m. La Paz i = +23m.42s., L = +56·5m., T$_o$ = 3h.48m.39s. San Fernando MN = +118·5m.

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Dec. 13d. Readings also at 1h. (San Fernando), 15h. (San Fernando), 16h. (2) and 17h. (La Paz), 21h. (Taihoku).

Dec. 14d. Readings at 2h. (near Osaka), 5h. (Taihoku), 11h. (Helwan), 12h. (La Paz), 15h. (Stonyhurst), 22h. (near Tokyo).

Dec. 15d. Readings at 1h. (Florence), 3h. (Point Loma), 6h. (near Tokyo), 7h. (Florence and near Mizusawa), 12h. (near Manila).

1920. Dec. 16d. 12h. 5m. 43s. Epicentre 35°·79N. 105°·74E.

A = −·219, B = +·781, C = +·585; D = +·963, E = +·271;
G = −·158, H = +·563, K = −·811.

See Note at end for discussion of these adopted values.

		Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Zi-ka-wei		13·9	103	i 3 33	+ 8	e 6 2	− 4	—	—
Hokoto		17·1	131	4 7	+ 1	5 56	−84	7·7	10·3
Taihoku		17·4	122	i 4 25	+15	(7 56)	+29	7·9	—
Calcutta	N.	20·1	233	4 47	+ 5	8 29	+ 4	—	—
Nagasaki		20·2	91	4 34	− 9	(8 18)	− 9	8·3	59·7
Kobe	E.	24·0	83	4 27	−61	(8 33)	−71	8·6	—
	N.	24·0	83	6 15	+47	(9 37)	− 7	9·6	—
Osaka		24·4	83	5 30	− 2	(9 52)	0	9·9	10·1
Manila		25·2	142	e 5 46	+ 6	9 57	−10	12·0	12·4
Nagoya		25·4	82	5 39	− 3	—	—	—	—
Tokyo		27·6	80	6 1	− 3	(10 55)	+ 3	10·9	29·8
Mizusawa	E.	28·1	72	6 1	− 8	10 39	−22	—	—
	N.	28·1	72	6 3	− 6	10 39	−22	—	—
Ootomari		29·7	57	6 11	−14	(11 5)	−24	11·1	—
Bombay		33·4	248	6 46	−14	—	—	—	—
Kodaikanal		36·2	232	7 23	− 1	—	—	10·9	28·4
Colombo		37·3	226	6 59	−33	8 47	?	11·8	—
Batavia		42·0	178	i 8 6	− 5	14 38	+ 3	—	15·0
Malabar		43·1	177	i 8 15	− 4	e 14 47	− 2	i 22·0	—
Lemberg		58·4	312	e 9 59	− 2	e 17 59	− 5	e 21·9	31·9
Helwan		61·3	288	10 5	−16	—	—	—	—
Seychelles		61·8	241	11 47	+83	—	—	20·3	—
Athens	E.	63·3	299	e 10 29	− 5	19 4	− 1	e 32·3	37·4
	N.	63·3	299	—	—	—	—	e 29·8	36·0
Vienna	E.	63·7	312	i 10 39	+ 3	i 19 16	+ 7	e 25·8	36·6
	N.	63·7	312	i 10 37	+ 1	19 13	+ 4	e 26·3	32·3
	Z.	63·7	312	e 10 33	− 3	19 15	+ 6	—	37·8
Hamburg	Z.	65·0	319	e 10 45	0	i 19 35	+10	i 29·7	—
Padova		67·8	311	11 6	+ 3	—	—	26·9	36·5
Pompeii		68·3	305	12 17	+71	21 17	+71	28·3	39·3
De Bilt		68·3	320	11 10	+ 4	20 7	+ 1	32·3	—
Perth		68·4	171	41 32	?L	—	—	(41·5)	—
Chur		68·5	313	11 12	+ 4	20 8	0	—	—
Strasbourg		68·7	315	i 11 6	− 3	20 3	− 7	e 30·8	35·3
Zurich		68·8	314	e 11 7	− 3	e 20 10	− 2	—	—
Florence		68·9	310	11 17	+ 7	20 12	− 1	24·5	37·3
Rocca di Papa	E.	69·1	308	i 11 11	− 1	e 20 31	+16	24·9	38·2
	N.	69·1	308	—	—	e 20 29	+14	e 24·1	—
Milan		69·3	312	11 5	− 8	36 29	?L	(36·5)	37·8
Uccle		69·3	318	e 11 11	− 2	20 20	+ 2	34·3	—
Neuchatel		69·9	314	11 23	+ 7	—	—	—	—
Besançon		70·3	316	11 21	+ 2	20 35	+ 5	25·3	—
Moncalieri		70·5	312	11 22	+ 2	i 20 32	0	25·7	38·3
Kew		71·4	321	10 17	−69	—	—	—	—
Paris		71·4	318	e 11 27	+ 1	e 20 21	−22	—	25·3
Oxford		71·8	321	11 32	+ 4	20 48	0	24·3	—
Sitka	N.	73·9	30	e 11 48	+ 7	e 21 18	+ 5	33·5	40·1
Barcelona		75·8	311	11 56	+ 2	i 21 34	− 1	e 32·9	48·3
Adelaide		77·1	151	i 11 29	−33	i 22 5	+15	e 35·3	49·9
Tortosa		77·2	312	11 57	− 5	21 50	− 1	34·0	44·3
Algiers		78·0	307	12 4	− 3	21 56	− 4	37·3	45·8
Riverview		81·6	143	e 12 32	+ 4	i 22 45	+ 3	e 33·6	35·8
Sydney		81·6	143	12 29	+ 1	22 47	+ 5	42·3	45·7
Melbourne		82·1	150	12 59	+28	(22 47)	0	22·8	—
Granada		82·1	311	e 12 37	+ 6	22 49	+ 2	—	—
Honolulu		82·5	69	12 41	+ 8	i 22 59	+ 7	—	54·3
Coimbra	E.	82·9	315	12 29	− 6	i 22 46	−10	40·6	45·9
Rio Tinto		83·4	313	16 17	?PR_1	—	—	—	51·3
San Fernando		84·0	311	12 44	+ 2	22 53	−15	32·6	41·3
Victoria		85·2	30	13 44	+55	19 23	−238	i 31·1	48·9
	Z.	85·2	30	10 47	−122	17 47	?PR_1	27·3	47·3

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.
Saskatoon	N.	88·1	19	12 56	−10	23 36	−17	e 38·3	50·3
Apia		92·1	105	13 35	+ 7	24 23	−13	43·4	45·1
Berkeley	E.	94·0	36	e 13 32	− 6	e 24 3	−53	e 41·4	55·0
	N.	94·0	36	e 13 35	− 3	e 24 1	−55	e 40·2	59·6
	Z.	94·0	36	e 13 26	−12	—	—	e 41·8	54·9
Ottawa		98·8	1	13 44	−20	24 23	−81	46·3	—
Denver	E.	99·4	22	23 17	?S	(23 17)	−153	47·3	52·3
Wellington		99·7	135	14 17	+ 8	24 47	−66	43·9	67·9
Christchurch		99·9	137	18 41	?PR_1	25 5	−50	42·8	69·0
Northfield		100·0	358	—	—	24 42	−74	e 40·3	60·3
Toronto		100·5	3	—	—	24 35	−86	i 50·5	62·1
Ann Arbor	E.	101·4	6	14 17	0	24 29	−100	45·7	62·2
	N.	101·4	6	14 11	− 6	24 35	−94	46·1	62·2
Chicago		101·5	9	14 2	−16	24 17	−113	—	—
Ithaca		101·7	1	i 18 35	?PR_1	—	—	42·8	—
Tucson	E.	103·7	30	18 36	?PR_1	—	—	43·8	59·3
Georgetown	E.	105·3	2	e 18 49	?PR_1	—	—	33·9	59·3
	N.	105·3	2	e 18 43	?PR_1	25 4	−101	46·3	66·6
	Z.	105·3	2	e 18 46	?PR_1	24 41	−124	e 33·8	67·6
Washington		105·3	2	14 24	−12	24 58	−107	43·3	—
Cheltenham	E.	105·4	2	19 17	?PR_1	—	—	45·6	66·0
	N.	105·4	2	18 31	?PR_1	—	—	·56·9	64·5
Capetown		107·1	240	20 11	?	27 41	+39	53·2	69·2
Mazatlan		113·5	30	—	—	32 28	?	43·7	59·2
Tacubaya	E.	120·0	27	19 49	?PR_1	32 30	?	53·5	65·6
	N.	120·0	27	19 48	?PR_1	30 34	?	59·3	63·6
Oaxaca	N.	122·9	24	21 46	?PR_1	33 21	?	55·0	66·9
Vieques	E.	125·3	349	—	—	e 31 7	?	54·0	70·7
	N.	125·3	349	—	—	e 32 29	?	57·8	72·0
Port au Prince		125·6	357	—	—	—	—	71·8	—
Balboa Heights	N.	134·9	6	19 55	[+25]	28 1	?	33·7	79·3
La Paz	E.	160·0	342	i 20 15	[+ 7]	34 27	?	68·9	87·4
	N.	160·0	342	—	—	—	—	68·3	76·4

Additional readings and notes: Calcutta PE = +4m.41s. (O−C = −1s.), T_o = 12h.5m.53s. Osaka MN = +10·0m. Tokyo S = +7m.59s. (?PR_1), Batavia i = +9m.40s. and +13·3m., T_o = 12h.5m.34s. Malabar i = +8m.43s., iN = +9m.35s., iE = +10m.30s., iN = +10m.55s. and +11m.55s., L = +17·0m., LME = +18·8m., iL = +25·4m. Helwan PN = +8m.29s. Athens iE = +19m.11s., iN = +19m.15s., SR_1 = +23m.14s., SR_2 = +25m.57s., T_o = 12h.5m.38s. Vienna ePR_1 = +13m.29s., PR_2E = +14m.24s., ePR_2 = +14m.35s. Epicentre 36°·0N. 106°·0E. Hamburg iSE = +19m.24s., iSN = +19m.30s., eSR_1 = +24m.0s., eSR_2 = +26m.46s., T_o = 12h.5m.50s. De Bilt PR_1 = +13m.41s., PR_2 = +15m.17s., T_o = 12h.5m.56s. Epicentre 36°·0N. 105°·5E. Padova reading has been increased by 1h. Strasbourg PR_2 = +15m.25s., SR_1E = +24m.40s., SR_1N = +24m.54s., SR_2N = +27m.28s., SR_2E = +27m.29s., MN = +38·2m., MZ = +42·5m., T_o = 12h.5m.52s. Florence P = +11m.12s., S = +20m.17s., and +20m.42s., L = +24·3m. Rocca di Papa iSN = +20m.7s. and +20m.17s., iSE = +20m.23s., eLV = +26·1m. Milan P = +11m.50s. Uccle iP = +11m.16s., iPR_1 = +15m.32s., SR_1 = +25m.6s., SR_2 = +27m.48s. Epicentre 38°·0N. 110°·0E., T_o = 12h.5m.44s. Moncalieri MN = +37·3m. Paris iP = +11m.30s., T_o = 12h.6m.16s. Barcelona ? = +26m.17s., MN = +41·0m., T_o = 12h.5m.59s. Adelaide e = +10m.17s., iP? = +14m.5s., iPR_1 = +15m.29s., ePR_2? = +17m.5s., PR_2 = +18m.11s., then 8 'i' readings followed by iSR_2 = +31m.5s., eSR_2 = +32m.47s. Algiers MN = +44·6m., T_o = 12h.5m.53s. Riverview iP = +12m.38s. and +12m.53s., PR_1 = +15m.49s., i = +22m.52s., +22m.59s., and +23m.0s., PS = +23m.34s., eSR_1 = +27m.37s., and +28m.47s., MZ = +46·9m., T_o = 12h.5m.55s. Sydney SR_1 = +28m.11s., SR_2 = +32m.47s. Melbourne S = +18m.5s. (?PR_1), SR_2 = +20m.29s. Granada iP = +12m.47s., T_o = 12h.6m.6s. Honolulu iSR_1 = +28m.53s., T_o = 12h.6m.6s., Coimbra SR_1N = +28m.7s., SR_1E = +28m.59s., SR_2N = +31m.47s., SR_2E = +32m.23s., MN = +43·8m., T_o = +12h.5m.53s. San Fernando MN = +45·3m., T_o = 12h.6m.16s. Victoria SR_1? = +21m.1s., SR_2 = +22m.39s., SR_3 = +23m.27s., SR_4 = +24m.39s., i = +28m.21s., L = +38·3m. Saskatoon SR_1N = +29m.42s., T_o = 12h.5m.56s. Apia i = +18m.17s., PS = +25m.35s., SR_1 = +30m.35s., i = +37m.17s., and +39m.17s., T_o = 12h.5m.59s. Ottawa eE = +31m.30s., iN = +32m.21s., eLE = +40·3m., T_o = 12h.6m.45s. Wellington ePR_1 = +18m.41s., eS = +25m.47s., +27m.35s., and +33m.35s. (?SR_1). Northfield L = +49·3m. and +54·3m. Denver LN = +49·3m., MN = +51·3m. Toronto PR_1? = +23m.35s., SR_1 = +25m.53s., SR_2 = +28m.41s., SR_3 = +33m.17s., i = +39m.17s., and +41m.17s., L? = +42·3m., eL = +43·4m., L = +46·1m. Chicago PR_1 = +18m.2s. Tucson eN = +18m.33s., eE = +26m.5s.; iE = +33m.27s., eN = +33m.57s., MN = +65·5m. Washington PR_1 = +18m.46s., L = +54·3m. Mazatlan MN = +59·1m. Oaxaca LE and LZ = +54·9m., ME and MZ = +67·0m. Vieques eE = +37m.28s., iN = +38m.27s., eN = +43m.27s. Port au Prince LNW = +54·3m., LNW = +73·3m. Balboa Heights ME = +76·3m. La Paz PR_2 = +24m.25s., PR_3 = +28m.21s., i = +31m.13s., SR_1 = +37m.53s., T_o = 12h.6m.49s.

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Discussion of the Residuals of 1920 Dec. 16d. 21h.

It is important that the material supplied by this earthquake, probably the best observed up to this date, should be fully scrutinized, since we may therefrom obtain at least provisional answers to several important questions.

(1) Are the Tables of Dr. Klotz preferable to those hitherto adopted for use?

At the Madrid meeting of the Geodetic and Geophysical Union, M. Somville expressed the opinion that the tables of Dr. Klotz gave rather more accordant residuals than those in use. It so happened that the work at Oxford had just reached this earthquake, which awaited final examination on Professor Turner's return from Madrid; and the residuals were therefore first examined on this point. The epicentre adopted was 35°·5N. 105°·5E., and T_0 = Dec. 16d.12h.5m.46s. These were ultimately given slight corrections in view of the discussion which follows; but these approximate values suffice for the moment.

The following table shows the mean correction to tables at various epicentral distances, according to both sets of tables :—

Mean Corrections.

Limits of Δ	No. of Obsn. P.	No. of Obsn. S.	Adopted Tables. δP.	Adopted Tables. δS.	Adopted Tables. δT_0	Klotz's Tables. δP.	Klotz's Tables. δS.	Klotz's Tables. δT_0
° °			s.	s.	s.	s.	s.	s.
30–20	5	4	+1·4	+ 3·5	− 1·2	+ 6·8	+ 8·2	+ 5·0
31–30	5	5	−9·4	−14·2	− 3·4	− 8·0	−13·2	− 1·5
31–50	4	2	−7·2	+ 1·5	−18·1	− 2·2	+ 7·5	−14·3
51–64	3	3	−5·8	− 2·0	−10·6	− 1·0	+ 3·8	− 7·0
65–70	10	8	−3·4	− 1·9	− 5·3	+ 3·8	+ 5·8	+ 1·3
71–80	9	8	−3·8	− 4·1	− 3·4	+ 5·2	+ 5·4	+ 4·9
81–89	8	7	−2·1	− 6·6	+ 3·4	+10·0	+ 5·1	+16·1

Looking first at the corrections for P and S, these results show that neither set of tables can be considered as finally satisfactory: both require corrections on the evidence of this well-observed earthquake, and those of Klotz do not seem to be appreciably nearer finality than those in use. It is, however, important to note that the real question is *not* whether Klotz's tables are better than those in use, but whether they show an advance sufficient to justify a change. A change is apt to cause confusion, and, in view of the large number of results already obtained with the adopted tables, a change to others could only be justified by a considerable gain in accuracy. It may fairly be claimed that no such great gain is indicated by the P and S residuals.

But there is another way of looking at the matter, which M. Somville explicitly mentioned. He remarked that he had found the values of T_0, deduced from S−P and P, more accordant with Klotz's tables than with the adopted tables. To test this point the corrections to T_0 (δT_0) have been calculated from the above residuals in the usual way. Thus the first pair δP = +1·4s., δS = +3·5s., give δ(S−P) = +2·1s. Since S−P = 0·8P approximately, the inferred value of δP from δ(S−P) is +2·1s. + 0·5s. = +2·6s., showing that T_0 must be corrected by +1·4s. − 2·6s. = −1·2s. as shown under heading δT_0. The numbers in both these columns show a negative dip near Δ = 50°, the 3rd line being especially large; but the number of S observations is very small and the accidental error may be large. The recovery to positive values of δT_0 near Δ = 80° is, however, much more marked for Klotz's tables, and the values of δT_0 are, in fact, much less accordant with his tables than with those adopted. To exhibit the matter in another way, the individual corrections δT_0 deduced from the various observatories were collected, omitting (as affected with largish accidental error in either P or S) Hokoto, Kobe, Colombo, Pompeii, Milan, Adelaide, Melbourne, Victoria, and all stations with Δ > 90°. The results are arranged in order of magnitude.

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Individual Corrections δT_0

Adopted Tables.				Klotz's Tables.			
s.	s.	s.	s.	s.	s.	s.	s.
+20	+19	+13	+ 9	+33	+27	+21	+20
+ 8	+ 7	+ 7	+ 5	+19	+16	+15	+14
+ 5	+ 4	+ 4	+ 3	+14	+14	+13	+11
+ 2	+ 1	+ 1	0	+ 9	+ 9	+ 9	+ 8
− 1	− 2	− 2	− 4	+ 7	+ 7	+ 6	+ 6
− 5	− 6	− 6	− 6	+ 5	0	0	0
− 6	− 8	− 9	−10	− 2	− 3	− 3	− 3
−10	−10	−12	−13	− 3	− 5	− 6	− 7
−14	−14	−16	−18	− 9	− 9	−12	−14
−24				−14			
Mean −3s.				Mean +5s.			

Here again there is certainly no marked superiority of Klotz's tables; and the systematic differences for different values of Δ show very clearly in the wide gap between +5s. and 0s., or in the double maximum: a feature also shown by the adopted tables in less degree. There seems no good reason for discussing the Klotz residuals further. We proceed to the next question:

(2) How accurately can the Epicentre and T_0 be determined with Adopted Tables?

The above discussion shows that a correction $\delta T_0 = -3$sec. is required to the T_0 originally adopted, making it Dec. 16d. 12h. 5m. 43sec. Using this revised value, the residuals δP and δS were converted into $\delta\Delta$ (by use of the adopted tables), and then collected according to Azimuth round the epicentre.

Groups in Azimuth were formed as follows. [A preliminary solution, including Bombay and Taihoku, showed that both these readings stood out unduly; and they were omitted from the solution below.]

Mean Az.	No. of Stations.	$\delta\Delta$	Sin Z.	Cos Z.	C.	O−C.
°		°			°	°
65	6	−0·28 =	+·91 x	+·42 y	−0·30	+0·02
108	3	−0·13	+·95 x	−·31 y	−0·10	−0·03
157	5	+0·20	+·39 x	−·92 y	+0·19	+0·01
233	2	+0·35	−·80 x	−·60 y	+0·33	+0·02
310	12	−0·02	−·78 x	+·63 y	+0·02	+0·00
317	11	−0·10	−·68 x	+·73 y	−0·07	−0·03

Equating the $\delta\Delta$ to an expression of the form $x \sin(\text{Az.}) + y \cos(\text{Az.})$ we find

$$x = -0°·20 \text{ and } y = -0°·29,$$

and substituting these values we get the column C. The residuals O−C are smaller than might have been expected from the obvious errors of the tables. We thus obtain the corrected epicentre

35°·79N. 105°·74E.,

which has been adopted for use. It is not intended to claim the second decimal place as exact; but it will serve to show that the determination is probably much more accurate than usual.

(3) Is there any evidence of unusual Focal Depth?

The La Paz residual [+7] for [P] suggests that the focus was rather *above* the normal: *i.e.*, nearer the earth's surface, which might account for the destructive nature of the shock. But the observations within 90° of the epicentre do not support this view. They are well distributed in Azimuth, and for a focal height of (say) ·010 above normal, terms would have to be added to the left side of the above six equations, which are all negative, and range from −0°·4 to −1°·3 in value. The solution for position of epicentre would no longer be satisfactory.

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Additional Stations.

After the above discussion had been completed and prepared for Press as above, the first of the *Monographies*, which are to form Series B of the Publications of the Central Bureau at Strasbourg, was received. It contains a discussion of the geology of the region (Chap. I) of the macroseismic information (Chap. II), and in Chap. III observations of P and S are given for a number of stations. No T_0 is assigned: but the epicentre 36°·0N. 105°·5E. is adopted (justification is to follow), and the distances of the stations have been calculated from this epicentre in km. The Strasbourg list does not contain some of the observations given above, notably those from Indian and American stations. On the other hand it contains information from seventeen stations which have not up to the present sent readings to Oxford. These are given below, with their distances (in degrees and tenths) from the Oxford epicentre, and residuals as usual. They fall naturally into two groups, according either to Azimuth or to Δ.

Group I.—Japanese.

	Δ	Az.	P.	O−C.	S.	O−C.	$\delta\Delta$(P).	$\delta\Delta$(S).
	°	°	m. s.	s.	m. s.	s.	°	°
Jinsen	16·8	78	3 18	−44	6 32	−41	−3·4	−1·8
Foukouoka	20·4	89	4 48	+ 2	8 35	+ 3	+0·2	+0·2
Gifu	25·2	82	5 33	− 7	9 49	−18	−0·7	−0·9
Maebasi	26·9	79	e 6 23	+30	11 8	+29	+2·6	+1·6
Mukaiyama	28·0	74	i 6 13	+ 5	11 8	+ 9	+0·5	+0·5
Tyosi	28·4	80	6 4	− 8	10 52	−14	−0·8	−0·8
Mean	24·3	80		− 4		− 5	−0·27	−0·20

The last two columns show the change of Δ required to satisfy the P or S observation exactly. But the Jinsen and Maebasi observations suggest rather an error in time determination than in Δ. If we omit them the mean values of $\delta\Delta$ are, for P, −0°·020; for S −0°·22. On the whole a mean value −0°·20 is suggested for azimuth 80°.

Group II.—European.

		°	°	m. s.	s.	m. s.	s.	°	°
Abisco		55·9	334	9 44	− 1	i 17 24	− 9	−0·2	−0·7
Upsala	E.	58·7	324	9 58	− 5	i 17 55	−12	−0·7	−1·0
	N.			e 10 0	− 3	i 17 55	−12		
Jena		65·3	316	i 10 42	− 5	i 19 36	+ 7	−0·8	+0·6
Dyce	E.	69·0	327	11 13	+ 2	20 16	+ 2	+0·4	0·0
	N.			e 11 14	+ 3	20 13	− 1		
Marseilles	E.	72·8	318	e 11 45	+10	21 11	+11	+1·6	+0·8
	N.			e 11 45	+10	21 8	+ 8		
Clermont Ferrand	E.	72·8	315	11 40	+ 5	20 52	− 8	+1·0	−0·5
	N.			e 11 42	+ 7	20 55	− 5		
Mean		65·8	322		+ 2		− 2	+0·22	−0·13

The corrections suggested by P and S are in opposite directions, the mean of the two being only +0°·04.

Now the Strasbourg position (36°·0N. 105°·5E.) is 0°·21N. and 0°·24W. of the Oxford position (35°·79N. 105°·74E.). Its adoption would *increase* Δ for the Japanese stations in mean azimuth 80°, by 0°·2, whereas we find that they suggest a *decrease* of 0°·2. And it would *diminish* the Δ for European stations in mean azimuth 322° by 0°·3, whereas we find a very slight *increase* suggested. Hence the omitted stations do not in themselves in any way favour a correction towards the Strasbourg epicentre: and their inclusion in the above discussion would clearly affect the position adopted very slightly.

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It is interesting to see what epicentre can be deduced from the macroseismic curves drawn in the Monograph above referred to. Let us assume, for instance, that the epicentre O is an approximate centre of symmetry for the contour lines. At the outset we do not know the position of O, but we can make a rough guess at an approximate position and draw through it a radius, say . . . C_2 B_2 A_2 OA_1 B_1 C_1, . . . cutting the series of coutours in A_1 A_2; B_1 B_2; C_1 C_2; &c. Then if O is a centre of symmetry we should have $OA_1/OA_2 = OB_1/OB_2 = OC_1/OC_2$, &c. Measure then in any unit the distances from any arbitrary zero to the points C_2 B_2 A_2 A_1 B_1 C_1, &c., and let them be . . . c_2, b_2, a_2, a_1, b_1, c_1 . . . The distance of O is, of course, unknown and to be found. Denote it by x. Then

$$\frac{x-a_2}{a_1-x} = \frac{x-b_2}{b_1-x} = \frac{x-c_2}{c_1-x} = \ldots = k = \frac{x-m_2}{m_1-x}$$

where m_2 and m_1 are the means of the quantities a_2 b_2 c_2, . . . a_1 b_1 c_1 . . . The ratio k is thus represented by any one of the ratios $(a_2-m_2)/(a_1-m_1)$; and the best value for it is found from

$$k^2 = \frac{(a_2-m_2)^2 + (b_2-m_2)^2 + (c_2-m_2)^2 + \ldots}{(a_1-m_1)^2 + (b_1-m_1)^2 + (c_1-m_1)^2 + \ldots}$$

Having got k we can find x from each of the individual ratios and take the mean. Thus $x = a_1 + (a_2-a_1)/(k+1)$.

With the position of O thus found, draw a radius at right angles to the former and repeat the process. If the new position is not far from that adopted these two operations may suffice: but it may be necessary to repeat the first with a radius parallel to the original one through the corrected position of O. Applying this general procedure to the particular case before us, a radius was first drawn through latitude 35°·5 of the large scale diagram in the Monographie at right angles to the meridian. The longitudes read off were 106°·62, 104°·90; 107°·78, 104°·58; 109°·38, 103°·89. [They were actually read with a scale of sixteenths of an inch, of which 21 go to the degree of longitude, and then reduced to decimals of a degree.]

$$\text{Hence } m_1 = (106°{\cdot}62 + 107°{\cdot}78 + 109°{\cdot}38)/3 = 107°{\cdot}93$$
$$m_2 = (104{\cdot}90 + 104{\cdot}58 + 103{\cdot}89)/3 = 104{\cdot}46$$

$$k^2 = \frac{(1{\cdot}31)^2 + (0{\cdot}15)^2 + (1{\cdot}45)^2}{(0{\cdot}44)^2 + (0{\cdot}12)^2 + (0{\cdot}57)^2} = 7{\cdot}20 = (2{\cdot}68)^2$$

The three deduced values of x are

105°·38, 105°·45, 105°·37; mean 105°·40.

Taking now a meridian through 105°·40, the latitudes 36°·60, 34°·60; 37°·21, 34°·19; 38°·08, 33°·23 were estimated (the last pair by extrapolation). Hence $m_1 = 37°{\cdot}30$, $m_2 = 34°{\cdot}01$.

$$k^2 = \frac{(0{\cdot}70)^2 + (0{\cdot}99)^2 + (0{\cdot}78)^2}{(0{\cdot}59)^2 + (0{\cdot}18)^2 + (0{\cdot}78)^2} = 1{\cdot}119 = (1{\cdot}060)^2$$

The three deduced values of y are

35°·57, 35°·66, 35°·58; mean 35°·61.

The three epicentres found are thus

	Lat. N.	Long. E.
Strasbourg	36°·0	105°·5
Oxford	35·79	105·74
Contours	35·61	105·40

A completely independent determination by Mr. J. S. Hughes gave

Contours (J.S.H.)	35·57	105·43

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As a general check on the method of contours we may compare the ratios of the segments into which the 4 radii are divided.

Contour.	Segments. Longitude.		Latitude.		Mean of 4.	Residuals. Long.		Lat.	
	°	°	°	°	°	°	°	°	°
Inner	1·22	0·50	0·99	1·01	0·93	−0·10	+0·01	+0·11	−0·01
Median	2·38	0·82	1·60	1·49	1·57	+0·15	−0·01	+0·11	−0·24
Outer	3·98	1·51	2·47	2·38	2·58	+0·32	+0·14	+0·02	−0·46
Means	2·53	0·94	1·69	1·96					
Ratios	1·42	0·53	0·95	1·10					

These are given in columns 2 to 5, with means at the foot. The mean of these means is 1°·73, and below them are given the ratios of each to this mean value, representing the expansion or contraction along that particular radius. In the 6th column are given the means of the 4 radii for each contour. Multiplying 0°·93 by the ratio 1·42, we get 1°·32, which is represented by the observation 1°·22. Thus O − C = −0°·10, as entered in the corresponding place under heading "Residuals." Some of these are large, but perhaps not more so than inspection of the contour lines would suggest. The curves are only very roughly similar.

Dec. 16d. 21h. 10m. 0s. Epicentre 13°·0S. 166°·8E. (as on 1920 Dec. 7d.).

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

A very rough determination.

	Δ	Az.	P.	O − C.	S.	O − C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Apia	20·8	95	i 4 55	+ 4	i 9 4	+24	i 9·8	—
Riverview	25·2	213	e 5 32	− 8	i 10 4	− 3	e 12·1	13·1
Melbourne	31·5	214	—	—	—	—	16·8	17·3
Honolulu	48·6	46	—	—	e 15 7	−54	24·0	32·6
Batavia	59·4	270	10 6	− 2	i 18 11	− 5	—	—
Victoria	86·9	36	—	—	—	—	41·7	44·2
Chicago	110·2	49	—	—	—	—	52·0	—
La Paz	118·1	117	e 20 25	?PR_1	—	—	60·1	63·9
Hamburg	135·5	340	—	—	—	—	e 68·0	—
Helwan	135·6	300	23 0	?PR_1	(36 0)	?	—	—
De Bilt	138·2	343	—	—	—	—	e 66·0	75·3
Uccle	139·6	343	—	—	—	—	e 67·0	77·0
Coimbra	152·5	352	—	—	—	—	e 75·0	—
Rio Tinto	154·5	348	91 0	?L	—	—	(91·0)	105·0
San Fernando N.	155·7	346	24 0	?PR_1	—	—	—	94·5

Additional readings: Riverview gives also MZ = +14·2m. Chicago L = +70·0m. De Bilt ePR_1 = +23m.6s., MN = +79·6m., T_0 = 21h.9m.50s. Barcelona gives 21h. approximately.

Dec. 16d. Readings also at 0h. (Mobile and Algiers), 4h. (near La Paz), 5h. (Taihoku), 6h. (Taihoku and Zi-ka-wei), 8h. (Zi-ka-wei (2) and Taihoku (6)), 9h. (Zi-ka-wei and Taihoku), 11h. (Apia), 14h. (La Paz), 17h. (La Paz, De Bilt, and Algiers), 19h. (near Taihoku (2)), 20h. (De Bilt, Helwan, and Uccle), 23h. (La Paz).

Dec. 17d. 3h. 38m. 28s. Epicentre 22°·0N. 123°·5E. (as on 1918 April 1d.).

A = −·512, B = +·773, C = +·375; D = +·834, E = +·552;
G = −·207, H = +·312, K = −·927.

	Δ	Az.	P.	O − C.	S.	O − C.	L.	M.
	°	°	m. s.	s.	m. s.	s.	m.	m.
Taihoku	3·5	330	e 1 13	+18	—	—	2·3	2·5
Hokoto	4·0	293	0 58	− 4	—	—	1·3	—
Manila	7·8	198	e 1 40	−18	—	—	—	—
Zi-ka-wei	9·4	348	e 2 22	0	e 4 14	+ 1	—	4·9
Helwan	81·0	299	49 32	?L	—	—	(49·5)	—
De Bilt	88·6	328	—	—	—	—	e 50·5	—

Helwan gives also PE = +51m.32s.

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Dec. 17d. 18h. 59m. 49s. Epicentre 33°·0S 68°·6W. (suggested by La Paz and De Bilt).

$A = +\cdot306$, $B = -\cdot781$, $C = -\cdot545$; $D = -\cdot931$, $E = -\cdot365$; $G = -\cdot199$, $H = +\cdot507$, $K = -\cdot839$.

		Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
La Paz	E.	16·5	2	i 4 0	+ 1	—	—	9·0	10·4
	N.	16·5	2	—	—	i 7 10	+ 3	9·1	12·6
Tacubaya	N.	60·0	327	10 13	+ 1	18 23	0	30·0	—
Georgetown	E.	72·4	354	e 11 31	− 1	20 54	− 1	—	—
	N.	72·4	354	e 11 31	− 1	20 49	− 6	e 40·3	—
Washington		72·4	354	11 14	−18	20 43	−12	e 39·2	—
Ann Arbor	E.	76·6	350	10 11	−108	23 11	+87	38·3	—
	N.	76·6	350	10 23	−96	22 23	+39	38·6	—
Chicago		76·8	346	11 0	−60	21 11	−36	38·2	—
Toronto		77·3	353	—	—	—	—	e 36·1	53·5
Ottawa	E.	78·7	356	—	—	e 21 1	−67	e 39·2	—
Wellington		85·6	223	e 12 59	+ 8	e 23 59	+33	e 48·2	—
Berkeley		86·8	321	—	—	—	—	e 47·2	—
San Fernando		90·7	45	22 11	?S	(22 11)	−130	—	61·7
Rio Tinto		91·3	44	23 11	?S	(23 11)	−76	—	69·2
Coimbra		91·9	41	—	—	23 45	−49	e 39·7	54·2
Algiers		96·7	50	24 58	?S	(24 58)	−25	48·2	54·7
Tortosa		97·4	45	—	—	—	—	e 36·2	62·2
Barcelona		98·8	46	—	—	—	—	46·6	54·4
Honolulu		101·0	289	—	—	25 59	− 6	53·2	56·0
Melbourne		102·6	207	—	—	—	—	e 52·2	57·2
Oxford		103·1	37	—	—	e 24 8	−137	33·0	57·8
Paris		103·4	40	—	—	i 28 27	+119	48·2	56·2
Kew		103·5	37	—	—	—	—	—	68·2
Stonyhurst		103·9	36	24 47	?S	(24 47)	−105	—	61·2
Moncalieri		104·2	45	—	—	—	—	40·4	67·1
Edinburgh		104·8	33	—	—	27 51	+71	51·2	61·9
Uccle		105·5	40	e 18 29	?PR_1	e 27 59	+72	e 49·2	57·0
Rocca di Papa	N.	105·5	50	e 18 53	?PR_1	e 26 23	−24	e 54·6	70·1
Florence		105·7	47	49 11	?L	—	—	(49·2)	81·2
Strasbourg		106·1	41	—	—	—	—	e 50·2	58·2
Pompeii	E.	106·2	51	28 11	?S	(28 11)	+77	—	—
De Bilt		106·6	38	—	—	e 28 7	+70	e 49·2	59·6
Hamburg		109·8	37	e 17 11	+135	—	—	—	66·2
Athens		110·9	57	—	—	—	—	e 62·2	—
Vienna	Z.	111·0	44	e 19 7	?PR_1	—	—	—	—
Helwan	E.	113·3	70	20 17	?PR_1	—	—	—	73·3
	N.	113·3	70	21 5	?PR_1	—	—	—	62·4
Batavia		140·6	172	e 22 57	?PR_1	—	—	—	—
Colombo		140·8	125	75 11	?L	—	—	83·2	85·2
Kodaikanal		141·3	119	76 23	?L	—	—	79·9	81·5

Additional readings: La Paz gives also $PR_1 = +4$m.8s., $SR_1 = +7$m.34s., $SR_2 = +8$m.5s., $T_0 = 18$h.59m.50s. Epicentre 33°·0S. 68°·6W. Georgetown eLN = +43·6m., $T_0 = 19$h.0m.1s. Washington L = +42·2m., $T_0 = 18$h.59m.33s. Chicago L = +50·2m., $T_0 = 18$h.58m.36s. Toronto L = +45·4m., eL = +50·3m., L = +52·6m. and +59·5m. Ottawa LN = +48·5m., L = +60·2m. Wellington gives its readings as e's. In addition to those given above we have e = +16m.41s., +29m.53s., +34m.47s., and 36m.47s. Barcelona MN = +52·5m. Honolulu e = +43m.41s. Paris MN = +51·2m. Moncalieri MN = +55·5m. Uccle $SR_1 = +33$m.41s. Strasbourg eL = +53·2m. Pompeii reading is given one hour late. De Bilt e = +25m.16s., MN = +52·2m. Batavia i = +23m.16s.

Dec. 17d. Readings also at 2h. (La Paz (2) and Zi-ka-wei), 8h. (San Fernando), 9h. (Batavia), 11h. (La Paz and Colombo), 12h. (Dehra Dun), 16h. and 17h. (near Athens), 19h. (La Paz), 20h. (Rocca di Papa, De Bilt, Athens, and Vienna), 21h. (La Paz), 22h. (near Mizusawa).

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Dec. 18d. 2h. 1m. 20s. Epicentre 40°·0N. 20°·0E. (as on 1920 Nov. 29d.).

$A = +·720$, $B = +·262$, $C = +·643$; $D = +·342$, $E = -·940$; $G = +·604$, $H = +·220$, $K = -·766$.

		Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Athens	E.	3·6	123	e 1 18	+22	e 2 6	+27	e 2·2	3·3
	N.	3·6	123	e 1 13	+17	—	—	—	3·2
Pompeii		4·2	281	1 27	+22	1 57	+ 2	—	4·2
Rocca di Papa		5·8	291	i 1 34	+ 4	—	—	(2·9)	4·4
Florence		7·5	303	2 2	+ 8	(3 30)	+ 6	—	5·2
Padova		8·0	315	(2 13)	+12	2 13	?P	—	—
Vienna		8·6	344	2 4	− 6	—	—	i 4·5	4·9
Lemberg		10·2	15	—	—	—	—	e 5·2	5·6
Moncalieri		10·3	303	e 3 2	+28	5 1	+24	5·7	9·0
Zurich		11·0	316	e 2 41	− 3	4 51	− 3	—	—
Strasbourg		12·2	318	e 2 55	− 7	5 30	+ 6	6·7	7·4
Besançon		12·4	310	5 1	?S	(5 1)	−28	(7·1)	7·7
Barcelona		13·6	288	—	—	—	—	7·8	9·7
Helwan	N.	13·7	134	8 40	?L	—	—	(8·7)	—
Tortosa		14·8	279	—	—	—	—	8·4	10·8
Hamburg		15·2	337	—	—	—	—	e 7·7	—
Paris		15·2	311	—	—	e 7 56	?L	8·7	11·7
Uccle		15·3	320	e 3 46	+ 3	—	—	e 7·7	—
De Bilt		15·8	325	—	—	—	—	e 7·6	11·9
Kew		18·1	316	—	—	—	—	—	13·7
Oxford		18·8	316	—	—	7 53	− 5	10·1	12·1
Stonyhurst		20·5	320	8 40	?S	(8 40)	+ 6	—	13·2
Rio Tinto		20·8	272	17 40	?	—	—	—	22·7
Coimbra		21·7	280	e 5 10	+ 9	9 8	+ 9	e 12·2	13·8
Edinburgh		22·0	324	—	—	—	—	11·7	—

Additional readings: Rocca di Papa gives also iPN = +1m.46s., L is given as PR_1. Lemberg e = +5m.28s. Moncalieri MN = +8·4m. Strasbourg MZ = +6·9m., MN = +7·0m. De Bilt MN = +9·4m.

Dec. 18d. 10h. 3m. 40s. Epicentre 0°·5N. 126°·5E.

$A = -·595$, $B = +·804$, $C = +·009$; $D = +·804$, $E = +·595$; $G = -·005$, $H = +·007$, $K = -1·000$.

A depth 0·020 of focus below normal is assumed.

		Corr. for Focus	Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	°	m. s.	s.	m. s.	s.	m.	m.
Manila		−0·5	15·1	339	e 3 34	0	6 17	− 5	7·0	9·0
Batavia		−0·8	20·7	251	4 40	0	—	—	14·7	15·1
Zi-ka-wei		−1·4	31·1	352	e 5 59	−26	—	—	—	—
Adelaide		−1·6	37·2	164	—	—	i 13 2	− 2	i 17·6	24·1
Riverview		−1·8	41·5	149	e 7 59	+ 7	e 14 20	+18	e 24·5	30·5
Sydney		−1·8	41·5	149	7 50	− 2	—	—	25·3	30·3
Kodaikanal		−2·1	49·7	282	30 26	?L	—	—	(30·4)	—
Wellington		−2·4	60·4	140	—	—	—	—	e 31·3	—
Honolulu		−2·6	76·3	69	e 13 8	+88	e 22 38	+88	36·7	45·2
Helwan	N.	−2·8	94·2	300	24 20	?S	(24 20)	− 8	—	—
De Bilt		—	108·2	326	—	—	—	—	e 56·3	63·5
Paris		—	111·2	323	—	—	—	—	64·3	—
La Paz		—	158·5	139	19 35	[−31]	22 33	?PR_1	24·3	24·9

Additional readings: Manila gives also MN = +8·1m., T_e = 10h.3m.53s. Batavia i = +5m.27s. and +8m.58s. Adelaide e = +21m.20s. and +23m.20s., e = +39m.38s., +43m.8s., and +44m.38s. Riverview eSR_1? = +17m.16s., MN = +28·5m., T_e = 10h.3m.37s. Wellington e = +15m.32s., +25m.56s., +32m.38s., and +39m.44s. Helwan PE = +23m.20s. De Bilt e = +41m.50s., MN = +63·2m.

Dec. 18d. Readings also at 0h. (De Bilt and La Paz), 1h. (San Fernando), 5h. (La Paz and Taihoku (2)), 7h. (La Paz), 9h. (Barcelona), 10h. (Riverview), 15h. (2) and 16h. (La Paz), 19h. (Taihoku), 21h. (San Fernando), 22h. (Zi-ka-wei, Taihoku, Osaka, near Nagasaki, and near Athens), 23h. (La Paz).

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Dec. 19d. 20h. 10m. 45s. Epicentre 38°·3N. 141°·0E.

$A = -\cdot610$, $B = +\cdot494$, $C = +\cdot620$; $D = +\cdot629$, $E = +\cdot777$; $G = -\cdot482$, $H = +\cdot390$, $K = -\cdot785$.

		Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Mizusawa	E.	0·8	6	0 34	+22	0 56	+34	—	—
Tokyo		2·8	201	0 29	−15	—	—	0·9	1·0
Sapporo		4·8	2	1 56	+42	2 53	+42	3·2	—
Osaka		5·8	233	1 25	− 5	—	—	3·0	4·1
Kobe	E.	5·9	234	1 30	− 1	2 36	− 5	3·0	4·1
	N.	5·9	234	1 33	+ 2	2 41	0	2·9	3·3
Ootomari		8·5	8	1 48	−21	(3 30)	−20	3·5	6·9
Nagasaki		10·6	242	2 40	+ 2	—	—	e 5·1	—
Zi-ka-wei		17·5	252	e 4 10	− 1	e 7 48	+19	—	—
Taihoku		21·1	237	—	—	e 8 37	− 9	12·2	—
Manila		29·6	222	e 6 34	+10	10 32	−55	12·1	13·8
Honolulu		54·5	89	e 11 15	+99	i 17 45	+30	e 25·2	45·6
Batavia		54·6	224	e 9 32	− 5	i 17 4	−12	—	17·5
Kodaikanal		63·0	263	39 39	?L	—	—	(39·6)	—
Riverview		72·8	171	e 20 33	?S	(e 20 33)	−27	e 34·4	38·4
Hamburg		78·9	333	e 12 12	0	—	—	e 44·2	—
Vienna		80·5	327	12 21	− 1	—	—	—	54·8
De Bilt	E.	81·8	334	—	—	22 50	+ 6	e 41·2	46·8
	N.	81·8	334	—	—	—	—	e 42·2	52·6
Stonyhurst		82·6	339	—	—	—	—	—	54·8
Uccle		83·1	334	e 12 35	− 2	e 22 57	− 1	e 41·2	44·2
Strasbourg		83·8	330	—	—	—	—	e 47·2	—
Kew		84·1	339	—	—	—	—	—	55·2
Wellington		85·4	155	—	—	—	—	e 41·2	—
Paris		85·5	334	—	—	—	—	e 45·2	46·2
Helwan		85·5	305	22 15	?S	(22 15)	−70	—	—
Moncalieri		86·7	330	—	—	—	—	47·4	—
Rocca di Papa		87·2	324	—	—	—	—	e 53·2	56·8
Tortosa		93·1	331	—	—	—	—	e 52·2	61·3
Coimbra		96·7	338	—	—	e 23 15	−128	53·2	63·5
Rio Tinto		98·3	335	59 15	?L	—	—	(59·2)	69·2
San Fernando		99·4	334	23 15	?S	(23 15)	−155	—	65·2
La Paz		146·4	56	i 19 49	[− 1]	—	—	71·2	81·8

Additional readings and notes: Mizusawa gives PN = +30s. Taihoku readings have been increased by 10min. Riverview gives also MN = +41·4m. Stonyhurst P = 20h.6m.42s. Paris MN = +51·2m. San Fernando MN = +67·8m. La Paz L = +76·6m.

Dec. 19d. Readings also at 0h. (San Fernando), 1h. (Apia), 3h. (Adelaide, Riverview, La Paz, and Wellington), 4h. (La Paz and Riverview), 8h. (La Paz), 9h. (San Fernando), 11h. (Taihoku), 15h. (near Nagasaki), 23h. (near Tokyo).

Dec. 20d. Readings at 0h. (San Fernando), 1h. (near La Paz), 4h. (Nagasaki), 5h. (La Paz), 11h. (Florence), 14h. (Tucson), 15h. and 16h. (La Paz), 19h. (near Athens (2)), 22h. (Helwan).

Dec. 21d. Readings at 0h. (San Fernando), 1h. (Adelaide), 4h. (Taihoku, Vienna, and Zi-ka-wei), 5h. (Helwan and near Batavia), 6h. (Zi-ka-wei), 8h. (near Athens), 19h. (near Lick (2) and Berkeley), 20h. (near Mizusawa), 21h. (Zi-ka-wei (3) and Nagasaki), 22h. (Helwan).

Dec. 22d. Readings at 1h. (La Paz), 3h. (Zi-ka-wei), 4h. (Lick), 5h. (near La Paz (2)), 6h. (Batavia), 14h. (near Capetown), 22h. (San Fernando, Batavia, and near Vienna).

Dec. 23d. Readings at 1h. (Helwan), 2h. (Apia and Florence), 5h. (Zi-ka-wei and Helwan), 21h. (San Fernando and Lick).

Dec. 24d. Readings at 0h. (La Paz), 13h. (Algiers), 17h. (La Paz, Riverview, and near Batavia), 18h. (Helwan), 19h. (La Paz), 21h. (near Osaka and Nagasaki), 22h. (San Fernando and Riverview).

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1920. Dec. 25d. 11h. 33m. 8s. Epicentre **35°·79N. 105°·74E.**
(as on 1920 Dec. 16d.).

$A = -\cdot219$, $B = +\cdot781$, $C = +\cdot585$; $D = +\cdot963$, $E = +\cdot271$; $G = -\cdot158$, $H = +\cdot563$, $K = -\cdot811$.

		Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Zi-ka-wei		13·9	103	i 3 42	+17	e 6 43	+37	e 7·2	9·1
Hokoto		17·1	131	e 5 16	+70	—	—	10·1	11·2
Taihoku		17·4	122	i 4 25	+15	i 7 58	+31	10·2	11·9
Calcutta	E.	20·1	233	4 58	+16	8 46	+21	12·1	13·9
	N.	20·1	233	4 58	+16	8 46	+21	12·5	13·8
Nagasaki		20·2	91	4 55	+12	8 52	+25	10·7	14·1
Dehra Dun		23·8	265	6 22	+56	—	—	—	—
Kobe	E.	24·0	83	5 29	+ 1	10 46	+62	13·9	—
Simla		24·2	268	6 22	+52	10 52	+64	14·4	17·3
Osaka		24·4	83	5 31	− 1	9 48	− 4	13·3	16·1
Manila		25·2	142	e 5 52	+12	9 54	−13	15·6	16·1
Tokyo		27·6	80	5 31	−33	10 25	−27	14·3	17·1
Mizusawa	N.	28·1	72	6 10	+ 1	11 24	+23	—	—
Ootomari		29·7	57	6 9	−16	(10 48)	−41	10·8	11·9
Bombay		33·4	248	6 35	−25	—	—	—	20·9
Kodaikanal		36·2	232	6 10	−74	—	—	12·1	26·2
Colombo		37·3	226	—	—	12 52	−36	19·9	25·9
Batavia		42·0	178	i 8 13	+ 2	i 14 39	+ 4	—	25·0
Lemberg		58·4	312	e 9 58	− 3	—	—	e 24·2	39·0
Helwan	E.	61·3	288	10 40	+19	—	—	—	40·7
	N.	61·3	288	11 28	+67	—	—	—	38·9
Seychelles		61·8	241	7 52	?	—	—	34·9	36·9
Vienna		63·7	312	i 10 35	− 1	19 10	+ 1	e 29·6	35·9
Hamburg	E.	65·0	319	—	—	e 19 28	+ 3	—	34·8
	N.	65·0	319	—	—	e 19 25	0	—	35·5
	Z.	65·0	319	e 10 45	0	—	—	e 29·9	35·6
Padova		67·8	311	11 3	0	19 57	− 3	—	—
Perth		68·4	171	27 52	?L	—	—	(27·9)	—
Pompeii	E.	68·3	305	i 11 9	+ 3	i 20 8	+ 2	26·9	53·9
De Bilt		68·3	320	11 9	+ 3	20 5	− 1	e 33·9	42·2
Strasbourg		68·7	315	e 11 7	− 2	—	—	e 33·9	44·3
Zurich		68·8	314	e 11 7	− 3	—	—	e 34·4	—
Florence		68·9	310	11 16	+ 6	19 52	−21	—	—
Rocca di Papa	E.	69·1	308	i 11 10	− 2	e 20 10	− 5	e 33·0	42·4
	N.	69·1	308	e 11 14	+ 2	e 20 16	+ 1	—	51·9
Uccle		69·3	318	i 11 14	+ 1	20 15	− 3	e 33·9	41·4
Edinburgh		70·3	326	—	—	—	—	—	39·9
Besançon		70·3	316	11 21	+ 2	17 53?	?	37·9	—
Moncalieri		70·5	312	11 15	− 5	26 20	?SR_1	36·5	44·0
Stonyhurst		71·2	323	25 4	?SR_1	28 40	?	37·8	41·9
Paris		71·4	318	e 11 26	0	e 20 56	+13	37·9	44·9
Kew		71·4	321	27 52	?L	—	—	(27·9)	53·9
Oxford		71·8	321	—	—	—	—	33·5	47·3
Barcelona		75·8	311	11 52	− 2	—	—	e 40·6	48·9
Adelaide		77·1	151	—	—	—	—	—	54·9
Tortosa		77·2	312	11 59	− 3	21 44	− 7	33·8	61·7
Algiers		78·0	307	12 4	− 3	21 55	− 5	e 30·9	49·9
Riverview		81·6	143	e 12 32	+ 4	e 22 51	+ 9	e 46·4	64·5
Melbourne		82·1	150	—	—	43 28	?L	47·5	58·4
Granada		82·1	311	12 19	−12	22 31	−16	—	—
Honolulu		82·5	69	e 12 22	−11	e 27 57	?SR_1	46·9	59·5
Coimbra	E.	82·9	315	12 30	− 5	22 47	− 9	e 40·9	50·9
Rio Tinto		83·4	313	16 52	?	—	—	—	58·9
San Fernando		84·0	311	12 34	− 8	23 24	+16	45·3	48·6
Victoria		85·2	30	—	—	22 35	−46	29·5	55·3
Berkeley		94·0	36	—	—	—	—	e 51·9	—
Lick		94·7	36	—	—	—	—	e 54·5	—
Ottawa		98·8	1	—	—	e 29 52	+248	47·4	—
Wellington		99·7	135	e 18 40	?PR_1	e 23 40	−133	—	—
Toronto		100·5	3	—	—	—	—	e 49·7	67·5
Ann Arbor		101·4	6	—	—	—	—	55·6	—
Chicago		101·5	9	18 2	?PR_1	25 24	−46	e 56·9	—
Ithaca		101·7	1	—	—	—	—	60·9	—
Georgetown		105·3	2	—	—	—	—	54·1	—
Washington		105·3	2	e 20 22	?PR_1	25 52	−53	e 52·9	—
Cape Town		107·1	240	19 15	?PR_1	—	—	—	62·6
La Paz		160·0	342	i 20 14	[+ 6]	33 49	?	78·9	106·6

For Notes see next page.

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NOTES TO DEC. 25d. 11h. 33m. 8s.

Additional readings and notes: Zi-ka-wei gives also MN = +8·3m., T_0 = 11h.33m.5s. Dehra Dun gives its reading as on 26d. Kobe 30m. have been deducted from these readings. Osaka MN = +14·3m., T_0 = 11h.33m.16s. Manila MN = +15·8m. Mizusawa SE = +10m.36s., T_0 = 11h.33m.44s. Ootomari MN = +18·5m. Kodaikanal P has been increased by 10m. Batavia i = +11m.0s., +16m.8s., and 24m.12s., T_0 = 11h.33m.13s. Vienna iSE = +19m.11s., i = +33m.57s., MN = +36·7m. Hamburg iPZ = +10m.47s., T_0 = 11h.33m.14s. De Bilt eN = +20m.41s., MN = +38·2, T_0 = 11h.33m.21s. Strasbourg e = +11m.8s., i = +13m.39s., e = +17m.46s., i = +17m.55s., MN = +39·0m. Rocca di Papa iSN = +20m.52s. Uccle MN = +45·1m., T_0 = 11h.33m.21s. Moncalieri MN = +43·9m. Paris MN = +39·9m., T_0 = 11h.33m.3s. Algiers PR_1 = +14m.55s., T_0 = 11h.33m.19s. Riverview MN = +50·3m., T_0 = 11h.33m.19s. Honolulu e = +34m.52s. Coimbra SN = +22m.55s., MN = +54·4m., T_0 = 11h.33m.19s. San Fernando MN = +54·4m., T_0 = 11h.32m.51s. Victoria i = +48m.14s. and +57m.38s. Ottawa eL = +44·4m., L = +56·9m. Toronto i = +54m.16s., iL = +56·4m., and +58·4m., eL = +62·2m. and +86·8m. Chicago L = +66·9m. Georgetown LN = +56·9m.

Dec. 25d. Readings also at 7h. (Zi-ka-wei, Vienna, and Taihoku), 8h. (La Paz), 17h. (Helwan), 22h. (near Tacubaya and Oaxaca).

Dec. 26d. Readings at 1h. and 2h. (2) (La Paz), 6h. (Taihoku), 7h. (Algiers), 8h. (Taihoku), 10h. (Vienna and near Rocca di Papa), 19h. (La Paz), 20h. (Wellington, Zi-ka-wei, Stonyhurst, Rio Tinto, De Bilt, La Paz, and Helwan), 22h. (La Paz), 23h. (La Paz and Helwan).

Dec. 27d. 9h. 20m. 20s. Epicentre 33°·2N. 138°·0E. (as on 1919 May 31d.).

A = −·622, B = +·560, C = +·548.

		△ °	P. m. s.	O−C. s.	S. m. s.	O−C. s.	L. m.	M. m.
Osaka		2·6	0 44	+ 3	—	—	2·6	3·4
Kobe		2·8	1 40	?L	—	—	(1·7)	—
Tokyo		2·8	e 1 6	+22	—	—	—	1·4
Mizusawa	E.	6·4	1 35	− 3	2 54	− 1	—	—
Zi-ka-wei		14·2	e 4 40	+71	—	—	—	—

Additional readings: Osaka gives also MN = +3·6m. Mizusawa PN = +1m.49s.

Dec. 27d. 16h. 19m. 0s. Epicentre 43°·8N. 11°·2E. (Florence) (as on 1920 Nov. 13).

A = +·708, B = +·140, C = +·692; D = +·194, E = −·981; G = +·679, H = +·134, K = −·722.

		△ °	Az. °	P. m. s.	O−C. s.	S. m. s.	O−C. s.	L. m.	M. m.
Florence		0·0	—	0 5	+ 5	—	—	—	0·4
Padova		1·7	17	0 20	− 6	0 40	− 8	—	—
Rocca di Papa		2·3	152	e 0 48	+12	—	—	(e 1·6)	1·9
Zurich	E.	4·0	332	e 1 2	0	i 1 41	− 9	—	—
	N.	4·0	332	e 0 56	− 6	i 1 38	−12	—	—
Vienna	Z.	5·7	37	2 57	?L	—	—	(3·0)	—

No additional readings.

Dec. 27d. Readings also at 2h. (Apia), 3h. (La Paz), 8h., 9h. (2), and 11h. (Tokyo), 12h. (Helwan), 14h. (Manila and near Tokyo), 15h. (La Paz), 17h. (Algiers), 20h. (La Paz).

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Dec. 28d. 3h. 16m. 30s. Epicentre 35°·5N. 104°·0E.

A = −·197, B = +·790, C = +·581; D = +·970, E = +·242;
G = −·140, H = +·564, K = −·814.

The shock appears to be connected with that of Dec. 16d., but the above variation from the epicentre is very definitely indicated.

		Δ	Az.	P.	O−C.	S.	O−C.	L.	M.
		°	°	m. s.	s.	m. s.	s.	m.	m.
Zi-ka-wei		15·1	102	e 3 36	− 4	e 6 36	+ 2	—	8·7
Taihoku		18·4	120	—	—	—	—	e 9·7	—
Calcutta	E.	18·8	231	4 54	+27	8 42	−16	11·8	—
	N.	18·8	231	4 54	+27	8 30	−28	11·7	—
Osaka		25·6	83	e 13 16	?L	—	—	(e 13·3)	16·0
Manila		25·9	140	e 5 56	+ 9	11 12	+52	14·8	16·0
Batavia		41·8	176	i 8 4	− 5	14 2	−30	e 27·5	—
Helwan		60·1	286	31 30	?L	—	—	(31·5)	—
Vienna		62·9	313	i 10 29	− 2	—	—	e 32·5	37·0
Hamburg	Z.	64·3	320	e 10 38	− 2	—	—	—	34·5
De Bilt		67·6	320	11 6	+ 4	e 19 59	+ 2	e 34·5	37·0
Strasbourg		67·9	315	e 11 30	+27	—	—	e 35·5	—
Rocca di Papa		68·1	307	e 11 0	− 5	—	—	—	11·5
Uccle		68·7	319	e 11 5	− 4	—	—	e 34·5	—
Edinburgh		69·8	325	—	—	—	—	—	39·5
Paris		70·7	317	—	—	—	—	36·5	—
Oxford		71·2	321	—	—	—	—	38·0	45·5
Rio Tinto		82·6	313	48 30	?L	—	—	(48·5)	53·5
La Paz		159·7	338	20 10	[+ 2]	—	—	—	—

Additional readings and notes: Osaka gives MN = +15·8m. Manila MN = +15·7m. Batavia S? has been corrected by −10m. Helwan PE = +40m.30s. Rocca di Papa iPE = +11m.4s. and iPN = +11m.8s.

Dec. 28d. 5h. 27m. 12s. Epicentre 38°·5N. 142°·5E. (as on 1918 Dec. 22d.).

A = −·621, B = +·476, C = +·623.

		Δ	P.	O−C.	S.	O−C.	L.	M.
		°	m. s.	s.	m. s.	s.	m.	m.
Mizusawa	N.	1·2	1 29	?L	2 53	?	(1·5)	—
Tokyo		3·6	0 46	−10	—	—	1·2	1·3
Nagoya		5·6	1 16	−11	—	—	—	—
Osaka		6·8	1 52	+ 8	—	—	3·2	4·2
Kobe	E.	7·1	2 13	+25	3 5	− 8	3·5	4·3
	N.	7·1	2 14	+26	2 59	−14	3·5	3·7
Zi-ka-wei		18·7	e 4 30	+ 5	—	—	—	—
De Bilt		82·1	—	—	—	—	e 45·8	56·3
La Paz		145·3	20 14	[+25]	—	—	—	—

Osaka gives MN = +4·5m.

Dec. 28d. Readings also at 1h. (La Paz), 2h. (near Mizusawa), 3h. (La Paz), 4h. (Tacubaya and San Fernando), 5h. (La Paz), 7h. (Lick), 15h. (Point Loma), 20h. (San Fernando).

Dec. 29d. Readings at 7h. (La Paz), 10h. (near Tokyo), 11h. (Apia), 13h. (Helwan) 14h. (La Paz), 15h. (Point Loma), 16h. and 17h. (La Paz), 21h. (San Fernando), 22h. (near Tokyo).

Dec. 30d. Readings at 0h. (Manila), 2h. (La Paz and near Tokyo and Mizusawa), 9h. (Stonyhurst), 12h. (Taihoku), 15h. (Point Loma), 16h. (Batavia), 17h. (near Tokyo and Mizusawa), 18h. (Rocca di Papa and near Tokyo and Mizusawa), 19h. (Apia and near Tokyo).

Dec. 31d. Readings at 2h. (San Fernando), 10h. (Melbourne, Riverview, and Wellington), 11h. (Helwan), 15h. (Point Loma and near Mizusawa), 21h. (Denver).

I.W. County Press.—232-1-25.