# The International Seismological Summary for 1922 January, February, March.

FORMERLY THE BULLETIN OF THE BRITISH ASSOCIATION SEISMOLOGY COMMITTEE.

The present number opens the fifth year of the Summary in its international form. The work of identifying the epicentres and times has been almost entirely done by Mr. J. S. Hughes, M.A., of New College, Oxford, whose salary has been provided as before, partly by the generosity of Dr. J. E. Crombie, of Dyce, Aberdeen, and partly by the Board of Scientific and Industrial Research. Miss E. F. Bellamy, Assistant in the University Observatory, Oxford, has collected the readings from the various Observatories on the cards, and arranged them under dates. The printing has been paid for by the International Funds.

The present number of the Summary deals with 68 epicentres, 32 of which are new and 36 repetitions from old epicentres. Corresponding figures are :

| | New | Old | Ratio |
|---|---|---|---|
| 1913-1920 March | 597 | 550 | 1·09 |
| 1920 Apr.—Dec. | 85 | 139 | 0·61 |
| 1921 Jan.—Dec. | 104 | 149 | 0·70 |

The ratio of New Epicentres to Old is not perhaps decreasing so rapidly as might be expected.

The work of collation is still subject to delays from the tardy receipt of information.

**These observers who have not already communicated their readings for 1922 and 1923 are urgently requested to send them without delay to the University Observatory, Oxford.**

There are five cases of suggested abnormal focal depth and one of height, viz. :—

| | d. | h. | | | | |
|---|---|---|---|---|---|---|
| Jan. | 17 | 3 | 2·0°S. | 72·0°W. | Depth | 0·070 |
| Feb. | 5 | 3 | 5·5°S. | 119·0°E. | Height | 0·040 |
| Mar. | 4 | 18 | 52·5°N. | 157·5°E. | Depth | 0·030 |
| Mar. | 6 | 21 | 52·5°N. | 157·5°E. | ,, | 0·030 |
| Mar. | 10 | 16 | 22·0°S. | 180·0 | ,, | 0·060 |
| Mar. | 28 | 3 | 21·0°S. | 67·0°W. | ,, | 0·010 |

The evidence for the abnormality is shown by the figures, as well as being usually reviewed in a special note.

As we gain experience in this work attention is arrested at times by the curious differences in general precision with which earthquakes are recorded. Look, for instance, at the readings for Jan. 9d. 5h. 9m. 22s. : 24°·0N. 46°·0W. (Mid-Atlantic). The O—C for P and S is as follows :—

| Limits. | Cases : P. | Cases : S. |
|---|---|---|
| s. s. | | |
| over 30 | 2 | 4 |
| +29 to +20 | 2 | 3 |
| +19 to +10 | 7 | 4 |
| + 9 to 0 | 22 | 19 |
| − 1 to −10 | 18 | 14 |
| −11 to −20 | 0 | 4 |
| −21 to −30 | 1 | 2 |
| under −30 | 2 | 2 |

The concentration of the errors near 0 is really remarkable, considering the miscellaneous character of the instruments and the various possibilities of error.

Moreover, the L and M are almost equally consistent. We know that they fall near $\Delta/2$, when $\Delta$ is expressed in degrees and L and M in minutes. From the present earthquake the formulæ

$$L = 0{\cdot}480\ \Delta + 0{\cdot}3 \text{ min.}$$
$$M = 0{\cdot}516\ \Delta + 0{\cdot}5 \text{ min.}$$

give very good results. Does the constant 0·3min. represent the time taken to reach the surface from the focus ? This would fit in with other evidence for the depth of focus.

On the other hand, Jan. 22d. 3h. 24m. 0s. 19°·0S. 177°·0W. may be taken as an example of poor and irregular observations. Of course, there are not many well-equipped observatories within 90° of the epicentre.

A general account of the procedure adopted in drawing up the Summary was given in the number for 1920 Jan.-Mar. ; but the following particulars may be repeated for convenience of reference :—

*Tables.*—The adopted tables are those given by Zöppritz, and have been many times printed in condensed form in the Summary and its predecessors, *e.g.*, on the back of the last number for 1921. They were also printed in expanded form and distributed with the Summary. While admittedly requiring correction,

they are at least as good as others which have hitherto been suggested, as is shown in the discussion of the great Earthquake in China in 1920 Dec. 16; and it seems, in the interests of uniformity, undesirable to make a change until we are sure that it will be essentially nearer the truth. One reason for delay arises from the uncertainty as to average depth of focus, on which opinion is divided. Evidence has been presented in the Summary for presuming it to be about 0·03 or 0·04 of the earth's radius. See the discussion in the Summary for 1920 Jan. to Mar.

*Constants for the Epicentre.*—These are given so that $\Delta$ (the distance of any observing station) and Z (its azimuth from N., through E., S., W.) may be calculated from the formulæ

$$2 \text{ versin } \Delta = (a-A)^2 + (b-B)^2 + (c-C)^2$$
$$2 \sin \Delta \sin Z = (a-D)^2 + (b-E)^2 + c^2 - 2$$
$$2 \sin \Delta \cos Z = (a-G)^2 + (b-H)^2 + (c-K)^2 - 2$$

Here, if $l$, $d$ are the longitude and latitude of the observing station, $\lambda$, $\delta$ of the epicentre

$$a = \cos l \cos d, \quad b = \sin l \cos d, \quad c = \sin d$$
$$A = \cos \lambda \cos \delta, \quad B = \sin \lambda \cos \delta, \quad C = \sin \delta; \quad D = \sin \lambda, \quad E = -\cos \lambda;$$
$$G = \cos \lambda \sin \delta, \quad H = \sin \lambda \sin \delta, \quad K = -\cos \delta.$$

The constants a, b, c were printed for a number of stations as Appendix III to the "Large Earthquakes of 1916," but this list has since been greatly extended in another circulated with the Summary about two years ago. Nearly 50 more stations have, however, since come in, and a supplementary list is issued with the present number of the Summary.

The azimuth Z is not wanted with great accuracy, so that the 2nd and 3rd formulæ of the above set are not often used, except near the epicentre, Z being read from a globe for the other stations.

$T_0$, the time of the shock, is given in Greenwich solar time reckoned from midnight. *It is a great convenience in collating observations to have them all given in this form*, even for widely different longitudes. Some observatories (especially in Japan) have lately tended to revert to local time. They are urgently requested to consider the advantages of uniformity.

H. H. TURNER.

University Observatory, Oxford,
1925 Nov. 23.

# 1922 JANUARY, FEBRUARY, & MARCH.

Jan. 1d. 12h. 3m. 45s. Epicentre 3°·5S. 146°·5E.

A = −·832, B = +·551, C = −·061; D = +·552, E = +·834;
G = +·050, H = −·034, K = −·998.

| | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|
| | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Riverview | 30·6 | 172 | e 6 28 | − 6 | e 10 39 | −65 | e 11·2 | 18·3 |
| Sydney | 30·6 | 172 | 12 3 | ?S | (12 3) | +19 | 14·8 | 15·8 |
| Manila | 31·2 | 308 | e 6 45 | + 5 | — | — | — | — |
| Melbourne | 34·3 | 181 | — | — | e 10 39 | −125 | 16·4 | 19·8 |
| Batavia | 39·6 | 265 | e 7 51 | 0 | — | — | — | — |
| Hong Kong | 40·8 | 311 | 7 57 | − 4 | 14 11 | − 7 | 17·8 | 17·9 |
| Zi-ka-wei | 42·1 | 328 | e 8 10 | − 2 | e 15 24 | +48 | — | — |
| Mizusawa | 42·9 | 355 | 8 25 | + 8 | 14 55 | + 8 | — | — |
| Colombo | 67·3 | 279 | 12 15 | +75 | — | — | — | 39·2 |
| La Paz | 140·4 | 124 | 19 46 | [+ 6] | i 23 18 | ?$PR_1$ | — | — |

Additional readings: Riverview gives also MN = +21·7m., MZ = +20·8m., $T_o$ = 12h.4m.55s. Melbourne e$SR_1$? = +13m.27s. Batavia iE = +8m.51s., i = +10m.4s.

**1922. Jan. 1d. 19h. 46m. 15s.** Epicentre **19°·0S. 177°·0W.**
(as on 1919 April 23d.).

A = −·944, B = −·049, C = −·326; D = −·052, E = +·999;
G = +·325, H = +·017, K = −·946.

| | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|
| | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Apia | 7·3 | 45 | 1 51 | 0 | — | — | — | 3·8 |
| Christchurch | 26·0 | 197 | — | — | 12 45 | +143 | 16·0 | 18·8 |
| Riverview | 31·9 | 236 | (i 6 52) | + 6 | i 12 13 | + 6 | e 15·2 | 17·6 |
| Sydney | 31·9 | 236 | 7 45 | +59 | 12 15 | + 8 | 16·8 | 18·4 |
| Melbourne | 38·5 | 232 | 7 33 | − 9 | 13 48 | + 3 | 19·5 | 23·0 |
| Honolulu | 44·4 | 26 | e 8 12 | −17 | i 14 44 | −23 | 17·8 | 20·2 |
| Perth | 60·7 | 243 | 19 10 | ?S | (19 10) | +38 | 37·3 | — |
| Tokyo | 68·3 | 324 | — | — | e 19 38 | −28 | e 39·2 | — |
| Manila | 69·7 | 294 | e 12 15 | +60 | — | — | — | — |
| Osaka | 70·2 | 320 | 11 32 | +14 | — | — | — | 37·2 |
| Batavia | 74·9 | 269 | i 11 58 | +10 | — | — | e 30·8 | — |
| Berkeley | 76·6 | 41 | e 12 12 | +13 | — | — | e 34·7 | 36·2 |
| Z. | 76·6 | 41 | i 12 5 | + 6 | — | — | e 35·0 | — |
| Zi-ka-wei | 77·5 | 310 | e 14 45 | ?$PR_1$ | e 21 40 | −15 | — | — |
| Hong Kong | 78·9 | 299 | 12 13 | + 1 | 21 50 | −21 | 36·7 | 40·2 |
| Victoria | 82·7 | 33 | 16 4 | ?$PR_1$ | — | — | 29·3 | 41·6 |
| La Paz | 101·6 | 112 | 18 49 | ?$PR_1$ | 30 6 | ?$SR_1$ | 48·7 | 60·0 |
| Chicago | 102·3 | 50 | 24 52 | ?S | (24 52) | −86 | e 45·2 | — |
| Colombo | 104·7 | 272 | 23 45 | ?S | — | — | — | 72·8 |
| Ann Arbor | 105·0 | 50 | — | — | — | — | 50·8 | — |
| Kodaikanal | 107·9 | 275 | 25 51 | ?S | (25 51) | −78 | 63·4 | 70·0 |
| Toronto | 108·4 | 49 | — | — | e 30 15? | ? | e 56·8 | 65·4 |
| Georgetown E. | 109·4 | 54 | — | — | — | — | 54·4 | — |
| Washington | 109·4 | 54 | — | — | — | — | e 52·8 | — |
| Ithaca | 110·3 | 51 | — | — | — | — | e 53·2 | — |
| Northfield | 113·3 | 49 | — | — | — | — | e 58·8 | — |
| Dyce | 141·6 | 5 | — | — | — | — | 73·8 | 86·8 |
| Edinburgh | 143·0 | 6 | — | — | 75 25 | ?L | (75·4) | 81·8 |
| Eskdalemuir | 143·3 | 6 | — | — | — | — | 65·6 | 79·4 |
| Stonyhurst | 144·9 | 6 | — | — | 76 15 | ?L | (76·2) | 87·2 |
| Hamburg | 145·0 | 352 | — | — | — | — | e 82·8 | — |
| Bidston | 145·3 | 6 | — | — | — | — | — | 95·0 |

*Continued on next page.*

| | | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| De Bilt | E. | 146·9 | 358 | — | — | e 41 54 | ?SR$_1$ | e 72·8 | 78·3 |
| | N. | 146·9 | 358 | — | — | e 42 55 | ?SR$_1$ | e 68·8 | 83·8 |
| Oxford | | 147·1 | 4 | — | — | — | — | 76·2 | 88·2 |
| Kew | | 147·5 | 4 | — | — | — | — | — | 96·8 |
| Uccle | | 148·2 | 358 | e 19 56 | [+ 3] | e 30 39 | ? | e 47·8 | 83·8 |
| Strasbourg | | 150·2 | 352 | 20 3 | [+ 7] | — | — | e 74·2 | 86·7 |
| Paris | | 150·3 | 1 | — | — | — | — | e 74·8 | 88·8 |
| Belgrade | | 150·4 | 335 | e 19 47 | [− 9] | e 32 17 | ? | e 83·6 | — |
| Helwan | | 152·1 | 298 | 20 7 | [+ 8] | — | — | — | 91·8 |
| Padova | | 152·6 | 346 | 20 29 | [+29] | 21 15 | ? | — | 21·4 |
| Pola | | 152·6 | 343 | 20 32 | [+32] | — | — | — | 100·3 |
| Moncalieri | | 153·6 | 352 | e 20 21 | [+20] | — | — | 61·1 | 86·6 |
| Florence | | 154·3 | 346 | 20 14 | [+13] | — | — | — | 89·8 |
| Marseilles | | 155·6 | 357 | — | — | — | — | e 79·8 | — |
| Rocca di Papa | | 155·9 | 342 | 20 3 | [ 0] | — | — | e 87·6 | 89·0 |
| Coimbra | | 156·7 | 23 | e 38 18 | ? | e 49 22 | ? | e 71·2 | 86·4 |
| Barcelona | | 157·6 | 0 | — | — | — | — | e 76·6 | 82·7 |
| Tortosa | N. | 158·2 | 5 | — | — | — | — | e 79·8 | 98·6 |
| Rio Tinto | | 159·5 | 22 | 43 45 | ? | — | — | — | 97·8 |
| San Fernando | | 160·8 | 23 | — | — | — | — | 78·0 | 85·6 |
| Granada | | 161·0 | 16 | e 20 23 | [+14] | 31 34 | ? | 80·4 | 87·6 |

Additional readings and notes: Riverview gives also eP = +4m.33s., the true P is given as PR$_1$, iS = +12m.23s., PS = +12m.41s., MN = +16·4m., MZ = +18·5m., T$_e$ = 19h.41m.11s. Melbourne PR$_1$ = +9m.3s., SR$_1$ = +16m.33s. Honolulu MN = +22·0m. Perth PR$_1$ = +23m.10s., S = +27m.41s., SR$_1$ = +31m.14s., and +34m.34s. Osaka MN = +40·7m. Tokyo records S as e and gives eS = +25m.12s. Batavia i = +21m.25s., iE = +22m.52s. Berkeley iZ = +12m.44s. Chicago PR$_1$ = +27m.9s., S = +32m.50s. Ann Arbor reading is diminished by 1h. Toronto e = +34m.9s.? Georgetown LN = +59·2m., LE = +63·8m. Washington L = +63·8m. Ithaca L = +54·8m. and +59·8m. Dyce MN = +85·8m. De Bilt eE = +58m.45s. Strasbourg PN = +20m.6s., PE = +20m.15s., MN = +86·6m. Paris MN = +86·8m. Belgrade L = +91·5m. Marseilles LN = +85·8m. Rocca di Papa ePN = +20m.9s. San Fernando MN = +87·2m. Granada iP = +20m.32s., PR$_1$ = +25m.44s., and +26m.35s.

Jan. 1d. Readings also at 0h. (near Manila), 2h. (La Paz), 4h. (near Tokyo), 6h. (Vera Cruz and near Tacubaya), 9h. (Taihoku, Mizusawa, Zi-ka-wei (2), and Toronto). 11h. (near Taihoku (2) and near Balboa Heights), 16h. (Florence), 21h. (Sinj).

Jan. 2d. Readings at 2h. (La Paz), 4h. (near Athens), 6h. (Apia and near Balboa Heights), 19h. (Merida and Vera Cruz), 20h. (Oaxaca), 21h. (Tokyo, Taihoku, and La Paz).

Jan. 3d. 20h. 56m. 42s. Epicentre 15°·0S. 178°·0E.

A = −·965, B = +·034, C = −·259; D = +·035, E = +·999; G = +·259, H = −·009, K = −·966.

| | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|
| | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Apia | 10·0 | 79 | — | — | — | — | — | 6·3 |
| Riverview | 30·7 | 226 | i 6 37 | + 2 | — | — | e 14·7 | 18·7 |
| Melbourne | 37·0 | 225 | (7 24?) | − 6 | 7 24? | ?P | 12·6 | 14·2 |
| Manila | 63·7 | 297 | e 10 38 | + 2 | (19 5) | − 4 | 19·1 | — |
| Batavia | 70·2 | 269 | i 10 50 | −28 | i 19 29 | −59 | — | — |
| Hong Kong | 72·8 | 300 | 11 33 | − 2 | 20 48 | −12 | — | — |

Additional readings: Riverview gives also i = +9m.16s. and +15m.9s., MN = +20·9m. Melbourne SR$_1$? = +10m.6s. Batavia i = +14m.2s., iN = +19m.50s.

Jan. 3d. Readings also at 1h. (Stonyhurst and near Porto Rico and Port au Prince), 3h. (near Taihoku), 4h. (Zi-ka-wei), 8h. (Christchurch and Melbourne), 17h. (Zante), 20h. (Berkeley), 21h. (La Paz (2)), 23h. (Manila, La Paz (2), and near Batavia).

Jan. 4d. Readings at 0h. (Colombo, Melbourne, Kodaikanal, Hong Kong, and Manila), 6h. (near Tokyo, Mizusawa, and Nagoya), 9h. (Mizusawa), 13h. (Manila), 19h. (Manila and near Algiers).

Jan. 5d. Readings at 0h. (near Tacubaya), 5h. (La Paz), 9h. (Victoria, Honolulu, Berkeley, Ithaca, and Sitka), 13h. (Uccle), 18h. (Mizusawa), 19h. (Manila and La Paz), 23h. (Manila and Batavia).

## 1922. Jan. 6d. 14h. 10m. 36s. Epicentre 19°·0S. 76°·0W.

A = + ·229, B = − ·918, C = − ·326 ; D = − ·970, E = − ·242 ;
G = − ·079, H = + ·316, K = − ·946.

| | | Δ | Az. | P. | O − C. | S. | O − C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| La Paz | | 7·9 | 73 | i 1 57 | − 3 | i 3 51 | +17 | 4·0 | 4·7 |
| Balboa Heights | N. | 28·2 | 353 | 6 10 | 0 | 11 0 | − 3 | 14·6 | 17·4 |
| Porto Rico | E. | 38·6 | 16 | — | — | — | — e | 24·6 | 27·2 |
| Oaxaca | | 41·5 | 331 | 6 59 | −68 | — | — | 17·0 | 21·4 |
| Vera Cruz | | 43·0 | 332 | — | — | — | — | 21·9 | 24·4 |
| Tacubaya | E. | 44·7 | 330 | 8 40 | + 9 | — | — | 18·9? | 24·5 |
| | N. | 44·7 | 330 | 8 41 | +10 | — | — | 18·7 | 24·1 |
| Cheltenham | E. | 57·8 | 359 | — | — | 18 3 | + 7 | 26·0 | 34·7 |
| | N. | 57·8 | 359 | e 10 20 | +22 | 17 43 | −13 | 28·0 | 36·1 |
| Georgetown | E. | 58·0 | 359 | 10 7 | + 8 | 17 56 | − 3 e | 26·4 | — |
| | N. | 58·0 | 359 | 10 7 | + 8 | 17 55 | − 4 | 35·5 | — |
| Washington | | 58·0 | 359 | 9 59 | 0 | 17 48 | −11 e | 27·2 | — |
| Fordham | E. | 59·9 | 2 | — | — | e 17 28 | −54 | 39·4 | — |
| Ithaca | | 61·5 | 0 | e 10 28 | + 6 | 18 42 | 0 | 27·7 | — |
| Chicago | | 61·7 | 351 | 10 32 | + 9 | 18 36 | − 8 | — | — |
| Ann Arbor | | 61·7 | 355 | 17 54? | ? | 19 18? | +34 | 27·9? | — |
| Toronto | | 62·7 | 358 | — | — | 19 54 | +57 e | 27·5 | 38·3 |
| Northfield | | 63·3 | 3 | — | — | — | — e | 35·4 | — |
| Ottawa | E. | 64·4 | 0 | — | — | 19 5 | −13 e | 25·4 | — |
| Lick | N. | 70·9 | 324 | e 12 1 | +39 | — | — e | 36·4 | — |
| Berkeley | E. | 71·6 | 324 | e 11 52 | +25 | e 21 40 | +55 e | 35·1 | 40·5 |
| Victoria | | 79·6 | 330 | 13 26 | +69 | 22 47? | +28 | 33·1 | 46·4 |
| Cape Town | | 83·0 | 124 | — | — | e 22 52 | − 5 | 41·2 | 49·4 |
| San Fernando | | 86·1 | 50 | 13 18 | +24 | 23 24 | − 7 | 39·2 | 50·9 |
| Coimbra | | 86·3 | 45 | 12 55 | 0 | 22 58 | −35 e | 35·4 | 47·5 |
| Rio Tinto | | 86·4 | 48 | 15 24 | +149 | — | — | — | 53·4 |
| Granada | | 88·2 | 50 | i 13 4 | − 2 | i 24 13 | +19 e | 44·4 | 48·4 |
| Honolulu | E. | 89·8 | 293 | — | — | 24 9 | − 3 | 41·9 | 44·1 |
| | N. | 89·8 | 293 | — | — | 24 39 | +27 | 42·4 | 85·6 |
| Apia | | 90·9 | 257 | — | — | — | — | 44·4 | — |
| Wellington | | 91·0 | 225 | e 14 0 | +39 | 24 24 | 0 | 44·7 | 46·4 |
| Tortosa | N. | 92·7 | 47 | 13 34 | + 3 | 24 19 | −23 e | 44·4 | 53·1 |
| Algiers | | 92·9 | 52 | 15 13? | +101 | 25 13 | +29 | 46·4 | 53·4 |
| Barcelona | | 94·0 | 47 | — | — | e 24 14 | −42 e | 47·3 | 57·9 |
| Bidston | | 95·6 | 36 | 20 44 | ?$PR_1$ | 25 19 | + 7 | — | 59·7 |
| Oxford | | 95·9 | 38 | i 13 44 | − 4 | 23 58 | −77 | 39·4 | 51·5 |
| Stonyhurst | | 96·1 | 36 | e 15 6 | +76 | 24 24 | −53 | 50·4 | 60·4 |
| Eskdalemuir | | 96·3 | 33 | e 13 44 | − 7 | 24 27 | −52 | 37·4 | 59·0 |
| Kew | | 96·3 | 38 | 24 24 | ?S | (24 24) | −55 | — | 56·4 |
| Edinburgh | | 96·6 | 33 | — | — | e 24 24 | −58 | 49·4 | 54·1 |
| Marseilles | | 96·9 | 46 | — | — | e 39 24 | ? e | 50·4 | — |
| Paris | E. | 96·9 | 40 | — | — | e 24 36 | −49 | 49·4 | 53·4 |
| Dyce | E. | 97·6 | 31 | e 15 29 | +91 | e 25 4 | −28 | — | 51·3 |
| | N. | 97·6 | 31 | — | — | e 25 4 | −28 | 40·3 | 54·2 |
| Uccle | | 98·7 | 39 | e 13 49 | −15 | e 24 42 | −61 e | 42·4 | 56·5 |
| Moncalieri | | 99·0 | 45 | 13 31 | −34 | 24 48 | −58 | 44·1 | 60·7 |
| De Bilt | | 99·6 | 39 | e 14 6 | − 3 | e 24 48 | −64 e | 42·4 | 58·0 |
| Strasbourg | | 100·1 | 42 | e 13 56 | −15 | — | — e | 48·4 | 53·4 |
| Florence | | 101·1 | 47 | 35 24 | ?$SR_1$ | — | — | — | 63·9 |
| Rocca di Papa | E. | 101·5 | 50 | e 14 32 | +14 | 24 48 | −82 e | 55·0 | — |
| | N. | 101·5 | 50 | e 14 30 | +12 | — | — e | 55·9 | — |
| Innsbruck | N. | 102·1 | 44 | e 14 18 | − 3 | — | — e | 52·4 | — |
| Pompeii | | 102·6 | 51 | — | — | — | — | 56·1 | — |
| Hamburg | | 102·8 | 38 | e 14 12 | −12 | e 25 6 | −76 e | 40·4 | 59·8 |
| Pola | | 103·2 | 46 | 14 24? | − 2 | e 25 13 | −73 | 53·9 | 61·0 |
| Vienna | | 105·6 | 43 | e 14 30 | − 7 | e 25 13 | −95 e | 51·4 | 59·3 |
| Budapest | | 107·2 | 45 | e 9 41 | ? | (e 28 10) | +67 e | 28·2 | — |

*Continued on next page.*

| | | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Belgrade | | 107·7 | 47 | e 13 36 | −71 | e 22 58 | ?PR$_1$ | e 28·2 | — |
| Upsala | | 108·1 | 32 | — | — | e 25 25 | −106 | e 46·4 | 59·7 |
| Konigsberg | E. | 109·2 | 37 | — | — | i 25 27 | −114 | e 56·4 | 60·2 |
| Riverview | | 110·6 | 221 | e 15 29 | +29 | — | — | e 53·0 | 56·3 |
| Sydney | | 110·6 | 221 | 20 30 | ?PR$_1$ | — | — | 55·0 | 59·4 |
| Melbourne | | 111·3 | 215 | e 19 42 | ?PR$_1$ | — | — | i 29·7 | 31·6 |
| Helwan | | 113·9 | 66 | e 19 44 | ?PR$_1$ | — | — | 58·4 | 66·5 |
| Adelaide | | 116·8 | 211 | — | — | e 30 54 | ? | e 59·0 | 63·9 |
| Tokyo | | 144·4 | 306 | — | — | — | — | e 68·3 | — |
| Osaka | | 148·1 | 306 | 58 57 | ?L | — | — | (59·0) | 75·9 |
| Bombay | | 150·5 | 85 | — | — | e 38 49 | ?SR$_1$ | — | — |
| Kodaikanal | | 152·8 | 105 | e 34 54 | ? | — | — | 49·4 | 100·0 |
| Simla | | 152·9 | 58 | e 38 48 | ? | — | — | — | 77·9 |
| Colombo | | 153·6 | 114 | 21 24 | ? | — | — | 92·4 | 94·0 |
| Batavia | | 154·6 | 187 | e 20 7 | [+ 5] | i 26 16 | ?PR$_1$ | e 79·3 | 83·8 |
| Zi-ka-wei | | 160·1 | 311 | e 34 21 | ? | e 45 15 | ? | — | — |
| Taihoku | | 162·7 | 294 | — | — | — | — | e 77·6 | — |
| Manila | | 163·2 | 257 | e 23 54 | ?PR$_1$ | — | — | — | — |
| Hong Kong | | 169·9 | 291 | 22 9 | ?PR$_1$ | — | — | — | 83·9 |

Additional readings and notes: Porto Rico gives also eLN = +24·1m., eE = +31m.34s. Washington gives also L = +33·9m. Ithaca L = +34·4m. and +45·4m. Ann Arbor LN = +33·9m.? Toronto eL = +31·6m., +35·3m., +44·7m., and +79·6m. Ottawa LE = +28·4m. Berkeley eLN = +35·8m. Victoria PV = +12m.54s., MV = +47·4m. San Fernando MN = +51·4m. Coimbra eLN = +34·7m., MN = +47·6m. Honolulu eE = +30m.41s. Barcelona MN = +53·3m. Bidston alternative P = +21m.21s. Eskdalemuir PR$_1$ = +17m.34s., MN = +42·6m. Paris eN = +24m.30s., MN = +61·4m. Dyce iE = +19m.44s. Uccle i = +26m.29s., MN = +45·0m. Moncalieri MN = +55·2m. De Bilt MN = +53·2m. Strasbourg MN = +56·0m. Florence readings increased by 1h. Hamburg MN = +59·6m. Pola MN = +61·9m. Upsala MN = +62·8m. Konigsberg iN = +26m.51s., eLZ = +58·8m., MZ = +65·4m. Riverview ePS? = +29m.58s., eSR$_1$ = +36m.6s. and +36m.42s., MZ = +55·6m. Sydney L = +35·9m. Adelaide eL = +37·9m., e = +57m.12s.

Jan. 6d. 19h. 20m. 38s. Epicentre 19°·0S. 76°·0W. (as at 14h.).

| | | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| La Paz | | 7·9 | 73 | i 2 2 | + 2 | 3 34 | 0 | 3·9 | 4·1 |
| Chicago | | 61·7 | 351 | — | — | — | — | e 31·9 | — |
| Victoria | | 79·6 | 330 | — | — | — | — | 41·8 | 46·3 |
| Coimbra | | 86·3 | 45 | e 12 56 | + 1 | e 23 12 | −21 | e 37·4 | — |
| Stonyhurst | | 96·1 | 36 | e 49 52 | ?L | — | — | (e 49·9) | — |
| Kew | | 96·3 | 38 | — | — | — | — | — | 58·4 |
| Edinburgh | | 96·6 | 33 | 50 22 | ?L | — | — | (50·4) | — |
| Paris | | 96·9 | 40 | — | — | — | — | e 50·4 | 53·4 |
| Uccle | | 98·7 | 39 | — | — | e 25 52 | + 9 | e 42·4 | 56·4 |
| De Bilt | E. | 99·6 | 39 | — | — | e 25 28 | −24 | e 48·4 | 57·9 |
| | N. | 99·6 | 39 | — | — | — | — | e 42·4 | 55·2 |
| Hamburg | | 102·8 | 38 | — | — | — | — | e 54·4 | 57·4 |
| Pola | | 103·2 | 46 | — | — | — | — | e 46·4 | — |
| Melbourne | | 111·3 | 215 | — | — | — | — | e 49·5 | 61·6 |
| Helwan | | 113·9 | 66 | — | — | — | — | e 58·6 | 67·4 |
| Perth | | 127·8 | 194 | — | — | — | — | 74·4 | — |
| Colombo | | 153·6 | 114 | 84 52 | ?L | — | — | (84·9) | 87·4 |

Additional readings: Chicago L = +36·4m. Eskdalemuir (Δ = 96°·3) gives simply 20h. to 21h.

Jan. 6d. Readings also at 4h. (near Nagoya, Osaka, and Kobe), 5h. (near Sarajevo and Belgrade (2) ), 12h. (near Tokyo, Mizusawa, and Nagoya), 13h, (Tiflis and near Tokyo), 15h. (Melbourne and near La Paz), 16h. (Batavia and Azores), 19h. (La Paz), 20h. (Hamburg and Victoria), 22h. (near La Paz).

**Jan. 7d. 9h. 20m. 12s. Epicentre 6°·7N. 128°·3E.**

A = −·616, B = +·779, C = +·117 ; D = +·785, E = +·620 ;
G = −·072, H = +·092, K = −·993.

| | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|
| | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Manila | 10·7 | 318 | e 2 45 | + 5 | — | — | 6·2 | 7·3 |
| Taihoku | 19·4 | 341 | — | — | e 8 7 | − 3 | — | — |
| Hong Kong | 20·7 | 320 | — | — | — | — | — | 12·6 |
| Batavia | 25·0 | 239 | 5 38 | 0 | — | — | i 12·4 | — |
| Zi-ka-wei | 25·3 | 346 | 5 37 | − 4 | e 10 0 | − 9 | — | 16·0 |
| Riverview | 46·0 | 152 | — | — | e 15 24 | − 4 | e 30·2 | 35·1 |
| Melbourne | 47·1 | 162 | — | — | e 16 42 | +60 | e 19·8 | 37·3 |
| Kodaikanal | 50·4 | 280 | 34 0 | ?L | — | — | (34·0) | — |
| De Bilt | 104·0 | 328 | — | — | — | — | e 53·8 | 65·4 |
| Uccle | 105·1 | 327 | — | — | — | — | e 53·8 | 65·8 |
| Eskdalemuir | 106·2 | 334 | — | — | — | — | e 49·8 | — |

Additional readings: Manila gives also MN = +6·5m. Batavia iN = +18m.17s. Riverview eSR$_1$? = +19m.0s. and +19m.11s., MN = +30·8m. De Bilt MN = +57·9m.

Jan. 7d. Readings also at 1h. (La Paz), 7h. (Adelaide), 8h. (Manila, Batavia, Hong Kong, and Zi-ka-wei), 10h. (Hong Kong and near Mizusawa), 18h (Azores), 20h. (Manila), 22h. (Oaxaca, Vera Cruz, and Tacubaya).

**Jan. 8d. 1h. 57m. 0s. Epicentre 52°·5N. 158°·0E.**

A = −·564, B = +·228, C = +·793 ; D = +·375, E = +·927 ;
G = −·736, H = +·297, K = −·609.

| | | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Mizusawa | E. | 17·7 | 228 | 4 13 | 0 | 7 32 | − 1 | — | — |
| | N. | 17·7 | 228 | 4 12 | − 1 | 7 34 | + 1 | — | — |
| Osaka | | 24·0 | 231 | 4 57 | −31 | — | — | 5·8 | 6·7 |
| Hong Kong | | 44·9 | 242 | 20 5 | ?L | — | — | (20·1) | — |
| Chicago | | 70·0 | 46 | — | — | — | — | e 35·5 | — |
| Hamburg | | 70·6 | 340 | — | — | — | — | e 40·0 | — |
| Batavia | | 72·9 | 234 | e 10 48 | −47 | i 20 54 | − 7 | — | — |
| De Bilt | | 72·9 | 343 | — | — | — | — | e 40·0 | 42·8 |
| Budapest | | 74·0 | 333 | 11 19 | −23 | — | — | 41·6 | — |
| Vienna | | 74·1 | 334 | e 11 42 | − 1 | — | — | — | 52·5 |
| Uccle | | 74·3 | 343 | e 11 45 | + 1 | — | — | e 40·0 | — |
| Strasbourg | | 75·8 | 340 | e 12 0 | + 6 | — | — | — | — |
| Innsbruck | N. | 76·2 | 337 | i 11 57 | + 1 | — | — | — | — |
| Pola | | 77·8 | 335 | — | — | — | — | e 38·0 | — |
| Rocca di Papa | | 81·0 | 334 | — | — | — | — | 51·1 | 58·6 |

Additional readings: De Bilt gives also MN = +48·9m. Vienna iP = +11m.44s.

**Jan. 8d. 23h. 49m. 0s. Epicentre 33°·0N. 142°·0E.**

A = −·661, B = +·516, C = +·545 ; D = +·616, E = +·788 ;
G = −·429, H = +·335, K = −·839.

| | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|
| | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Tokyo | 3·2 | 325 | i 0 59 | + 9 | e 1 45 | +17 | (e 1·8) | 2·0 |
| Nagoya | 4·7 | 299 | 0 59 | −14 | — | — | 1·6 | 2·2 |
| Osaka | 5·7 | 290 | 1 29 | + 1 | — | — | 2·2 | 2·9 |
| Kobe | 6·0 | 289 | e 1 27 | − 5 | — | — | 2·4 | 3·7 |
| Mizusawa | 6·1 | 354 | 1 29 | − 4 | — | — | — | — |

Additional readings: Nagoya gives also MN = +1·9m. Osaka MN = +3·0m. Mizusawa PN = +1m.54s.

Jan. 8d. Readings also at 2h. (near La Paz), 13h. (La Paz and near Balboa Heights), 17h. (Simla), 19h. (La Paz), 20h. (Azores and Simla).

## 1922. Jan. 9d. 5h. 9m. 22s. Epicentre 24°·0N. 46°·0W.

A = +·635, B = −·657, C = +·407; D = −·719, E = −·695; G = +·283, H = −·292, K = −·914.

| | | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Porto Rico | E. | 19·0 | 256 | — | — | — | — | e 9·3 | 9·4 |
| | N. | 19·0 | 256 | i 4 48 | +19 | 8 29 | +27 | 9·8 | 10·2 |
| Azores | | 22·1 | 47 | — | — | — | — | — | 10·1 |
| Port au Prince | N.E. | 25·1 | 263 | e 5 52 | +13 | 13 52 | ?L | 20·2 | — |
| Fordham | E. | 28·7 | 313 | e 6 15 | 0 | — | — | — | 12·6 |
| Northfield | | 29·7 | 320 | e 6 53 | +28 | — | — | 14·3 | — |
| Cheltenham | E. | 30·0 | 307 | 6 23 | − 5 | 11 26 | − 8 | 14·4 | 15·3 |
| | N. | 30·0 | 307 | 6 30 | + 2 | — | — | 13·0 | 13·9 |
| Georgetown | | 30·2 | 307 | e 6 25 | − 5 | 11 43 | + 6 | e 14·8 | — |
| Washington | | 30·2 | 307 | 6 28 | − 2 | 11 38 | + 1 | 15·1 | — |
| Ithaca | | 31·2 | 316 | 6 36 | − 4 | 11 57 | + 3 | 14·0 | — |
| Ottawa | E. | 32·2 | 320 | 6 46 | − 4 | 11 59 | −12 | e 14·1 | — |
| Toronto | | 33·6 | 316 | i 7 2 | + 1 | i 12 8 | −26 | e 16·8 | 21·8 |
| Coimbra | E. | 35·4 | 53 | 7 9 | − 8 | 12 33 | −28 | 16·1 | 16·9 |
| Rio Tinto | | 36·1 | 59 | 9 38 | ? | — | — | — | 24·6 |
| San Fernando | | 36·2 | 61 | 7 23 | − 1 | 13 14 | + 1 | 17·0 | 23·2 |
| Granada | | 38·4 | 60 | i 7 39 | − 2 | i 13 43 | − 1 | i 18·6 | 20·1 |
| Chicago | | 38·7 | 309 | 7 38 | − 6 | 13 38 | −10 | 18·4 | — |
| St. Louis | | 40·1 | 301 | i 7 56 | 0 | 14 8? | 0 | 16·8 | 18·3 |
| Tortosa | | 42·1 | 54 | 8 7 | − 5 | 14 30 | − 6 | 18·4 | 21·9 |
| Barcelona | | 43·4 | 54 | 8 15 | − 6 | i 14 49 | − 5 | e 20·3 | 22·5 |
| Bidston | | 43·5 | 37 | 9 50 | +88 | 16 20 | +85 | (18·1) | 23·8 |
| Algiers | | 43·7 | 60 | i 8 17 | − 7 | i 14 52 | − 6 | 20·6 | 26·0 |
| West Bromwich | | 43·7 | 38 | 8 25 | + 1 | 14 38 | −30 | — | 23·5 |
| Oxford | | 43·8 | 40 | 8 16 | − 8 | i 14 57 | − 2 | 18·5 | 23·3 |
| Stonyhurst | | 44·0 | 37 | i 8 32 | + 6 | i 15 8 | + 6 | 22·6 | 24·1 |
| Eskdalemuir | Z. | 44·2 | 34 | i 8 23 | − 4 | i 15 7 | + 2 | 21·6 | — |
| Kew | | 44·3 | 40 | 8 38 | +10 | — | — | — | 32·6 |
| Edinburgh | | 44·5 | 34 | 8 32 | + 2 | 15 12 | + 3 | — | 23·0 |
| Paris | | 45·2 | 45 | i 8 34 | 0 | i 15 15 | − 3 | 20·6 | 22·6 |
| Dyce | E. | 45·6 | 31 | i 8 33 | − 4 | i 15 20 | − 2 | 19·0 | 22·1 |
| | N. | 45·6 | 31 | i 8 38 | + 1 | i 15 20 | − 2 | 19·0 | 21·0 |
| La Paz | E. | 45·9 | 211 | e 8 43 | + 4 | i 15 30 | + 3 | 22·5 | 25·9 |
| | N. | 45·9 | 211 | i 8 38 | − 1 | i 15 14 | −13 | 21·5 | 25·1 |
| Marseilles | | 46·0 | 52 | 8 53 | +13 | i 15 44 | +16 | 22·1 | 26·6 |
| Vera Cruz | E. | 46·7 | 274 | 7 43 | −62 | — | — | 20·0 | 24·6 |
| | N. | 46·7 | 274 | 7 38 | −67 | — | — | 20·0 | 22·6 |
| | | 46·9 | 42 | 8 44 | − 2 | i 15 39 | − 1 | 20·6 | 23·0 |
| Uccle | | 47·0 | 176 | e 8 26 | −21 | 15 38 | − 3 | 24·7 | 26·1 |
| Rio de Janeiro | N. | 47·1 | 47 | 8 49 | + 1 | 15 44 | + 2 | 21·6 | — |
| Besançon | | 47·7 | 41 | 8 54 | + 2 | 15 50 | 0 | e 21·6 | 23·8 |
| De Bilt | E. | 47·7 | 41 | — | — | 15 53 | + 3 | e 20·6 | 24·0 |
| | N. | 47·9 | 50 | 9 1 | + 8 | 15 56 | + 3 | 23·0 | 27·5 |
| Moncalieri | | 48·5 | 46 | 8 57 | 0 | 15 56 | − 4 | e 21·6 | 24·9 |
| Strasbourg | | 48·9 | 48 | i 9 4 | + 5 | i 16 8 | + 3 | e 23·0 | — |
| Zurich | | 49·4 | 275 | 9 8 | + 5 | 15 54 | −17 | 22·6 | — |
| Tacubaya | E. | 49·4 | 275 | 9 8 | + 5 | 15 59 | −12 | 22·3 | — |
| | N. | 50·3 | 52 | 9 3 | − 6 | 16 28 | + 5 | 23·8 | 26·1 |
| Florence | | 50·7 | 47 | e 9 18 | + 7 | i 16 35 | + 8 | e 23·7 | — |
| Innsbruck | N.E. | 50·7 | 47 | — | — | e 16 33 | + 6 | e 24·1 | 27·7 |
| | N.W. | 50·9 | 39 | i 9 16 | + 4 | i 16 38 | + 8 | e 23·6 | 27·9 |
| Hamburg | | 50·9 | 50 | 9 29 | +17 | 16 24 | − 6 | 23·6 | 28·6 |
| Padova | | 51·3 | 56 | e 9 20 | + 5 | i 16 44 | + 9 | e 24·9 | 31·4 |
| Rocca di Papa | | 52·2 | 50 | i 9 39 | +18 | i 17 12 | +26 | e 24·9 | 29·8 |
| Pola | | 52·7 | 57 | i 10 6 | +42 | 17 56 | +64 | 27·4 | 41·4 |
| Pompeii | | 54·2 | 46 | — | — | i 17 25 | +14 | e 25·6 | 33·3 |
| Vienna | E. | 54·2 | 46 | 9 42 | + 8 | i 17 26 | +15 | — | 32·8 |
| | Z. | 55·9 | 48 | i 9 28 | −17 | i 17 19 | −14 | 25·6 | — |
| Budapest | | 56·2 | 33 | 9 59 | +11 | 17 47 | + 9 | e 26·9 | 28·8 |
| Upsala | E. | 56·2 | 33 | — | — | 17 48 | +10 | e 24·0 | 30·5 |
| | N. | 56·9 | 50 | e 10 0 | + 9 | e 18 6 | +21 | e 27·7 | 30·7 |
| Belgrade | | 57·2 | 39 | i 10 2 | + 9 | i 16 58 | −51 | 26·6 | 28·6 |
| Konigsberg | | 64·1 | 315 | — | — | i 18 32 | −42 | 29·0 | 35·9 |
| Victoria | | 64·8 | 301 | e 11 6 | +22 | — | — | e 30·2 | — |
| Lick | N. | | | | | | | | |

*Continued on next page.*

| | | Δ | Az, | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Berkeley | | 65·1 | 302 | 10 58 | +12 | 20 3 | +37 | 30·5 | 35·9 |
| Tiflis | | 74·8 | 50 | — | — | e 21 38 | +14 | 35·6 | — |
| Cape Town | | 84·3 | 131 | — | — | e 24 0 | +49 | — | — |
| Honolulu | N. | 99·9 | 298 | — | — | — | — | e 42·6 | — |
| Simla | | 102·5 | 47 | — | — | — | — | e 53·6 | 62·2 |
| Bombay | | 106·5 | 60 | e 58 31 | ?L | — | — | (e 58·5) | — |
| Kodaikanal | | 114·9 | 66 | 29 20 | ?S | (29 20) | +71 | 63·7 | 69·8 |
| Zi-ka-wei | | 123·5 | 12 | e 34 36 | ? | — | — | — | — |
| Taihoku | | 129·5 | 14 | — | — | — | — | e 60·6 | — |
| Manila | | 139·3 | 19 | 22 28 | ?$PR_1$ | — | — | 73·9 | 85·3 |
| Batavia | | 148·4 | 61 | e 18 54 | [−59] | — | — | 77·9 | — |
| Riverview | | 162·1 | 233 | — | — | e 34 1 | ? | e 69·1 | 78·7 |

Additional readings and notes: Azores gives also P = 4h.57m.30s. Ithaca $PR_1$ = +7m.33s., LN = +13·5m. Toronto iL = +19·8m., eL = +26·1m., and +47·8m. Coimbra ePN = +7m.13s., MN = +18·4m., $T_0$ 5h.9m.43s. San Fernando MN = +19·6m. Granada iP = +13m.7s., $PR_1$ = +9m.14s., MN = +20·4m. Barcelona $PR_1$ = +9m.56s., $PR_2$ = +11m.13s., $SR_1$ = +18m.15s., MN = +22·4m. Paris eS = +15m.12s., MN = +24·6m. La Paz $PR_1$ = +10m.22s., $SR_1N$ = +18m.25s., $SR_1E$ = +18m.48s., $T_0$ = 5h.9m.31s. Vera Cruz readings are given as at 4h. instead of 5h. Uccle $PR_1$ = +11m.23s., $SR_1$ = +19m.12s., MN = +21·5m., origin 33°·0N. 57°·0W. Moncalieri MN = +27·1m. Strasbourg MN = +25·3m., MZ = +25·2m. Hamburg i$SR_1$ = +21m.47s., e$SR_1$ = +22m.7s., MN = +25·5m. Pola MN = +31·2m. Vienna iZ = +9m.43s., iE = +17m.18s., iSN = +17m.24s. Belgrade iP = +10m.2s., $PR_1E$ = +11m.25s., $PR_1N$ = +11m.22s., iSN = +18m.5s. Konigsberg $PR_1Z$ = +13m.37s., iE = +14m.45s., iSN = +16m.59s., $SR_1$ = +21m.41s., eLN = +24·3m. Berkeley PN = +11m.10s. MZ = +35·5m. Manila MN = +83·2m. Batavia eLN = +104·4m. Riverview MN = +79·0m.

Jan. 9d. Readings also at 6h. and 8h. (2) (Algiers), 14h. (near Tokyo), 19h. and 23h. (La Paz).

Jan. 10d. 13h. 41m. 12s. Epicentre 24°·0N. 123°·0E. (as on 1921 July 25d.).

A = −·498, B = +·766, C = +·407; D = +·839, E = +·545; G = −·224, H = +·341, K = −·913.

| | | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Taihoku | | 1·7 | 308 | 0 26 | 0 | — | — | 0·8 | 0·9 |
| Hokoto | | 3·2 | 262 | 1 50 | ?L | — | — | (1·8) | 2·2 |
| Zi-ka-wei | | 7·3 | 349 | e 1 50 | − 1 | e 3 14 | − 4 | — | 4·3 |
| Hong Kong | | 8·3 | 260 | 1 33 | −33 | — | — | — | 4·5 |
| Manila | | 9·6 | 192 | e 2 9 | −15 | — | — | 4·3 | 4·6 |
| Nagasaki | | 10·6 | 33 | e 2 56 | +18 | — | — | e 5·6 | — |
| Batavia | | 34·1 | 209 | e 6 24 | −42 | — | — | — | — |
| Simla | | 41·0 | 290 | — | — | — | — | e 22·1 | 22·8 |
| Kodaikanal | | 45·5 | 261 | 26 48 | ?L | — | — | (26·8) | — |
| Riverview | | 63·7 | 154 | — | — | — | — | e 38·0 | 40·1 |
| Hamburg | | 83·4 | 327 | — | — | — | — | e 50·8 | — |
| Pola | | 85·7 | 319 | — | — | — | — | e 45·8 | — |
| De Bilt | E. | 86·7 | 327 | — | — | — | — | e 46·8 | 48·4 |
| | N. | 86·7 | 327 | — | — | — | — | e 43·8 | 56·2 |
| Dyce | N. | 86·7 | 334 | — | — | — | — | 44·8 | — |
| Strasbourg | | 87·4 | 323 | — | — | — | — | e 46·8 | — |
| Uccle | | 87·8 | 326 | — | — | e 22 48 | −62 | e 43·8 | 47·8 |
| Edinburgh | | 88·0 | 333 | 45 48 | ?L | — | — | (45·8) | 56·3 |
| Eskdalemuir | | 88·4 | 333 | — | — | — | — | 43·8 | — |
| Stonyhurst | | 89·1 | 330 | e 42 18 | ?L | — | — | (e 42·3) | 51·8 |
| Kew | | 89·6 | 329 | — | — | — | — | — | 57·8 |
| Bidston | | 89·6 | 330 | — | — | — | — | — | 59·8 |
| Oxford | | 90·0 | 329 | — | — | — | — | 41·8 | 58·2 |
| Paris | | 90·0 | 326 | — | — | — | — | e 47·8 | 57·8 |
| Tortosa | N. | 96·1 | 320 | — | — | — | — | e 48·8 | 54·2 |
| Coimbra | | 101·6 | 324 | e 43 45 | ?L | e 48 48 | ?L | 53·8 | — |
| La Paz | | 167·1 | 56 | 20 12 | [− 1] | — | — | — | — |

Additional readings: Zi-ka-wei gives also MN = +4·2m. Riverview MN = +44·2m.

Jan. 10d. Readings also at 0h. (La Paz), 2h. (Manila and near Taihoku), 5h. (near Nagasaki), 8h. (Tokyo, La Paz, and Manila), 10h. (La Paz), 19h. (near Belgrade), 23h. (near Athens).

Jan. 11d. Readings at 0h. (Azores), 16h. (near Athens), 19h. (Mizusawa and La Paz).

Jan. 12d. 10h. 42m. 0s. Epicentre 40°·0N. 20°·0E. (as on 1920 Dec. 18d.).

$A = +\cdot720$, $B = +\cdot262$, $C = +\cdot643$; $D = +\cdot342$, $E = -\cdot940$; $G = +\cdot604$, $H = +\cdot220$, $K = -\cdot766$.

Was there a shock about 1 minute earlier, as suggested by Sarajevo, Pompeii, Sinj, and Moncalieri?

| | | 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 44 | + 5 | i 1·9 | 2·3 |
| Mostar | | 3·7 | 335 | i 1 9 | +11 | i 2 9 | +27 | — | 2·7 |
| Sarajevo | | 4·1 | 344 | e 0 0 | −64 | i 0 38 | −75 | — | 1·1 |
| Pompeii | | 4·2 | 281 | e 0 12 | −53 | 3 32 | +97 | 8·0 | — |
| Sinj | | 4·5 | 327 | e 0 0 | −70 | 0 50 | −74 | — | 1·0 |
| Belgrade | | 4·8 | 4 | e 1 10 | − 4 | i 2 27 | +16 | — | 2·7 |
| Rocca di Papa | E. | 5·8 | 291 | e 1 24 | − 6 | 2 48 | + 9 | — | — |
| | N. | 5·8 | 291 | e 1 42 | +12 | 2 42 | + 3 | — | — |
| Pola | | 6·6 | 319 | 1 43 | + 2 | i 3 8 | + 8 | — | 4·5 |
| Budapest | | 7·5 | 355 | 1 24 | −30 | i 3 43 | +19 | — | — |
| Padova | | 8·0 | 315 | 3 22 | ?S | (3 22) | −15 | — | 8·0 |
| Vienna | | 8·6 | 344 | 2 38 | +28 | 4 50 | +57 | — | 5·5 |
| Innsbruck | | 9·6 | 322 | e 2 11 | −13 | e 5 40 | +82 | e 7·6 | — |
| Lemberg | | 10·2 | 15 | e 2 30 | − 3 | — | — | e 4·2 | 6·2 |
| Moncalieri | | 10·3 | 303 | e 1 14 | −80 | 4 13 | −24 | 6·1 | 8·0 |
| Strasbourg | | 12·2 | 318 | — | — | e 5 0 | −24 | 7·0 | — |
| De Bilt | | 15·8 | 325 | — | — | — | — | e 9·0 | — |

Additional readings: Athens gives also P = +1m.8s., MN = +2·6m. Mostar iP = +1m.25s., MN = +2·2m. Sarajevo iP = +13s. Are all the times 1 min. in error? Sinj P = +0m.30s. Belgrade iP = +1m.23s., MN = +2·8m. Pola MN = +4·1m. Padova MN = +7·5m.

Jan. 12d. Readings also at 15h. (Taihoku, Hong Kong, and Zi-ka-wei), 18h. (near Kobe, Osaka, and Nagoya).

Jan. 13d. Readings at 13h. (Manila), 17h. (Taihoku).

Jan. 14d. Readings at 0h. (near Pompeii), 3h. (2) and 5h. (near Tokyo), 6h. (Batavia), 8h. (La Paz), 9h. (Honolulu), 10h. (Colombo), 11h. (near Manila), 17h. (Strasbourg, Innsbruck, Moncalieri, and near Zurich), 19h. (Moncalieri and near Zurich), 20h. (Batavia and Manila), 21h. (De Bilt), 23h. (La Paz).

Jan. 15d. Readings at 0h. (Colombo), 3h. (Mizusawa), 6h. (Port au Prince), 9h., 12h., and 18h. (Taihoku).

Jan. 16d. Readings at 2h. (Colima, Innsbruck, Pola, and near Sarajevo and Sinj), 3h. (Stonyhurst and La Paz), 4h. (La Paz), 5h. (Manila), 14h. (La Paz), 16h. (Zi-ka-wei and near Athens), 17h. (Riverview and Manila), 20h. (near Athens), 23h. (Apia).

## 1922. Jan. 17d. 3h. 50m. 24s. Epicentre 2°·0S. 72°·0W.

A = +·309, B = −·950, C = −·035; D = −·951, E = −·309; G = −·011, H = +·033, K = −·999.

A depth of focus 0·070 below normal is adopted in this solution. See note at end.

| | | Corr. for Focus | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Balboa Hts. | E. | −1·5 | 13·3 | 326 | 3 18 | +22 | 4 28 | −46 | 5·7 | 6·2 |
| | N. | −1·5 | 13·3 | 326 | 3 20 | +24 | 4 32 | −42 | 5·7 | — |
| La Paz | | −1·9 | 15·0 | 166 | i 3 4 | −10 | i 5 28 | −18 | 6·1 | — |
| Port au Prince | | −2·9 | 20·5 | 359 | e 4 29 | +17 | 6 12 | −81 | 7·6 | 8·1 |
| Porto Rico | | −3·0 | 21·2 | 18 | 4 44 | +25 | (7 21) | −23 | 7·4 | 8·5 |
| Oaxaca | | −4·4 | 31·0 | 310 | 6 18 | +24 | 11 0 | +27 | 14·0 | 15·8 |
| | Z. | −4·4 | 31·0 | 310 | 6 17 | +23 | 10 58 | +25 | 14·0 | 13·8 |
| Vera Cruz | | −4·5 | 31·8 | 315 | 4 16 | −105 | — | — | 8·9 | 9·4 |
| | Z. | −4·5 | 31·8 | 315 | 4 14 | −107 | — | — | — | 9·3 |
| Puebla | | −4·6 | 33·2 | 312 | 6 6 | − 8 | — | — | — | — |
| Tacubaya | E. | −4·7 | 34·2 | 310 | 6 15 | − 8 | 11 27 | + 1 | 15·0 | 15·0 |
| | N. | −4·7 | 34·2 | 310 | 6 20 | − 3 | 11 27 | + 1 | 15·1 | 15·2 |
| | Z. | −4·7 | 34·2 | 310 | 6 18 | − 5 | 11 18 | − 8 | 14·3 | 16·0 |
| Rio de Janeiro | | −4·8 | 34·9 | 130 | i 6 0 | −29 | 10 36 | −60 | 14·1 | 14·3 |
| Cheltenham | E. | −5·5 | 41·0 | 357 | e 7 31 | +13 | — | — | 16·3 | 16·7 |
| | N. | −5·5 | 41·0 | 357 | i 7 19 | + 1 | — | — | 13·1 | 16·7 |
| Georgetown | E. | −5·5 | 41·2 | 356 | e 7 13 | − 6 | i 13 2 | − 4 | e 17·0 | 18·1 |
| | N. | −5·5 | 41·2 | 356 | i 7 16 | − 3 | i 13 4 | − 2 | e 17·2 | 19·3 |
| | Z. | −5·5 | 41·2 | 356 | i 7 16 | − 3 | 13 1 | − 5 | e 17·0 | — |
| Washington | | −5·5 | 41·2 | 356 | 7 15 | − 4 | 13 2 | − 4 | 17·4 | 19·6 |
| Mazatlan | | −5·5 | 41·9 | 310 | 7 25 | 0 | 14 1 | +45 | 17·0 | 17·2 |
| St. Louis | | −5·7 | 44·0 | 340 | i 7 39 | − 1 | 9 36 | ? $PR_1$ | 10·9 | 13·7 |
| Ithaca | | −5·7 | 44·6 | 357 | 7 46 | + 1 | 13 49 | − 2 | 17·6 | — |
| Ann Arbor | | −5·8 | 45·6 | 350 | 8 12 | +19 | 14 30 | +27 | 17·6 | 16·0 |
| Chicago | | −5·9 | 46·0 | 346 | 7 58 | + 2 | — | — | — | — |
| Toronto | | −5·9 | 46·1 | 354 | — | — | i 13 42 | −28 | e 24·0 | — |
| Northfield | | −5·9 | 46·2 | 0 | 7 58 | + 1 | 14 8 | − 3 | — | — |
| Ottawa | N. | −6·0 | 47·5 | 358 | 8 6 | − 1 | 14 36 | + 8 | e 21·3 | — |
| Tucson | E. | −6·2 | 50·2 | 319 | 8 29 | + 3 | — | — | 17·1 | 17·4 |
| Azores | | −6·9 | 58·3 | 43 | 9 6 | −10 | — | — | — | 17·4 |
| Lick | E. | −7·0 | 60·5 | 318 | e 9 36 | + 6 | i 17 6 | +13 | — | — |
| | N. | −7·0 | 60·5 | 318 | e 9 31 | + 1 | e 17 12 | + 9 | — | — |
| Saskatoon | | −7·1 | 61·0 | 339 | i 9 38 | + 6 | i 17 23 | +15 | 26·1 | — |
| Berkeley | E. | −7·1 | 61·2 | 318 | e 9 36 | + 2 | i 17 19 | + 9 | — | — |
| | N. | −7·1 | 61·2 | 318 | e 9 37 | + 3 | i 17 17 | + 7 | — | — |
| | Z. | −7·1 | 61·2 | 318 | e 9 33 | − 1 | i 17 17 | + 7 | — | — |
| Victoria | | −7·5 | 67·1 | 327 | i 10 15 | + 6 | e 18 33 | +15 | — | 19·2 |
| | Z. | −7·5 | 67·1 | 327 | 10 16 | + 7 | (18 26) | + 8 | 18·4 | 18·7 |
| Coimbra | N. | −7·8 | 71·5 | 46 | i 10 39 | + 3 | i 19 21 | +12 | 30·8 | 31·2 |
| San Fernando | | −7·8 | 72·0 | 51 | 10 49 | +10 | (19 24) | + 9 | 19·4 | 20·8 |
| Rio Tinto | | −7·8 | 72·0 | 49 | 12 36 | ? $PR_1$ | — | — | — | 28·6 |
| Accra | | −7·8 | 72·1 | 84 | 17 36 | ? | — | — | — | 30·6 |
| Granada | | −8·0 | 74·2 | 51 | i 10 51 | − 2 | i 19 46 | + 6 | 36·9 | 49·8 |
| Sitka | | −8·1 | 77·6 | 331 | e 11 32 | +18 | i 20 27 | + 7 | — | 20·5 |
| Tortosa | N. | −8·2 | 78·2 | 48 | 11 14 | − 3 | i 20 29 | + 3 | 32·2 | 32·8 |
| Bidston | | −8·2 | 79·2 | 36 | 12 36 | +73 | 16 36 | ? $PR_1$ | — | 26·8 |
| Algiers | | −8·2 | 79·3 | 52 | 11 18 | − 6 | i 20 42 | + 3 | 32·6? | 39·1 |
| Barcelona | | −8·2 | 79·5 | 48 | 11 21 | − 4 | i 20 45 | + 3 | e 31·5 | 33·9 |
| Stonyhurst | | −8·2 | 79·8 | 36 | i 11 18 | − 9 | (20 24) | −21 | 20·4 | 21·8 |
| Oxford | | −8·2 | 79·8 | 38 | i 11 25 | − 2 | 20 53 | + 8 | — | — |
| Eskdalemuir | | −8·2 | 79·8 | 33 | i 11 25 | − 2 | i 20 46 | + 1 | — | — |
| Edinburgh | | −8·2 | 80·0 | 33 | 11 39 | +11 | 20 50 | + 2 | — | 20·9 |
| Kew | | −8·2 | 80·3 | 38 | 11 36 | + 5 | — | — | — | 20·6 |
| Dyce | E. | −8·2 | 81·0 | 31 | i 11 32 | − 3 | i 20 57 | − 3 | — | — |
| Puy de Dôme | | −8·2 | 81·1 | 43 | e 11 42 | + 7 | 21 19 | +18 | 34·4 | — |
| Paris | | −8·3 | 81·4 | 40 | e 11 33 | − 4 | i 20 58 | − 5 | 28·6 | 29·6 |
| Marseilles | | −8·3 | 82·3 | 47 | e 11 48 | + 6 | 21 20 | + 6 | 35·5 | — |
| Uccle | | −8·3 | 83·0 | 39 | 11 38 | − 9 | 21 7 | −15 | i 34·2 | 35·0 |
| Besançon | | −8·3 | 83·3 | 42 | 11 43 | − 6 | 21 26 | 0 | 32·6 | — |
| De Bilt | | −8·3 | 83·7 | 38 | 11 53 | + 2 | i 21 29 | − 1 | e 30·6 | 31·5 |
| Moncalieri | | −8·3 | 84·2 | 45 | 11 48 | − 6 | 21 18 | −18 | — | 27·1 |
| Strasbourg | | −8·4 | 84·8 | 41 | 11 46 | −11 | i 21 38 | − 4 | 30·6 | — |
| Zurich | | −8·4 | 85·1 | 43 | e 11 49 | −10 | i 21 27 | −18 | — | — |
| Florence | | −8·5 | 86·5 | 46 | 11 56 | −11 | 20 45 | −75 | — | 42·9 |

*Continued on next page.*

| | | Corr. for Focus | Δ | Az. | P. | | O−C. | S. | | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | ° | m. | s. | s. | m. | s. | s. | m. | m. |
| Hamburg | | −8·5 | 86·9 | 37 | i 11 | 58 | −11 | i 21 | 39 | −26 | e 31·5 | 45·9 |
| Honolulu | E. | −8·5 | 87·0 | 292 | 12 | 1 | − 9 | 21 | 31 | −35 | e 41·5 | 42·4 |
| | N. | −8·5 | 87·0 | 292 | 12 | 11 | + 1 | 21 | 36 | −30 | — | — |
| Innsbruck | | −8·5 | 87·0 | 42 | e 11 | 59 | −11 | i 21 | 34 | −32 | e 30·6 | 31·9 |
| Padova | | −8·5 | 87·1 | 44 | 12 | 23 | +12 | 22 | 7 | 0 | — | — |
| Rocca di Papa | E. | −8·5 | 87·4 | 48 | — | | — | e 21 | 36 | −35 | i 31·7 | 59·1 |
| | N. | −8·5 | 87·4 | 48 | — | | — | e 22 | 6 | − 5 | e 32·0 | — |
| Pola | | −8·5 | 88·4 | 45 | e 12 | 16 | − 2 | i 22 | 19 | − 3 | e 30·3 | 32·3 |
| Pompeii | | −8·5 | 88·6 | 49 | i 11 | 29 | −51 | 20 | 54 | −90 | 29·6 | — |
| Cape Town | | −8·6 | 89·2 | 56 | i 12 | 11 | −12 | i 21 | 40 | −50 | — | — |
| Vienna | E. | −8·6 | 90·4 | 41 | 12 | 24 | − 5 | i 21 | 55 | −49 | e 37·4 | 50·9 |
| | N. | −8·6 | 90·4 | 41 | 12 | 17 | −12 | 21 | 51 | −53 | e 36·4 | 50·9 |
| Mostar | | −8·6 | 91·2 | 47 | i 12 | 18 | −16 | i 26 | 6 | ? $SR_1$ | i 41·6 | — |
| Upsala | E. | −8·6 | 91·6 | 150 | e 12 | 19 | −17 | i 22 | 38 | −19 | — | 45·4 |
| | N. | −8·6 | 91·6 | 150 | e 12 | 27 | − 9 | i 22 | 36 | −21 | e 37·1 | 48·8 |
| Budapest | | −8·6 | 92·2 | 43 | e 12 | 13 | −27 | i 21 | 40 | −85 | — | — |
| Konigsberg | | −8·7 | 93·1 | 35 | 12 | 27 | −17 | 22 | 11 | −61 | e 34·2 | 41·1 |
| Belgrade | | −8·7 | 93·2 | 45 | e 12 | 35 | −10 | i 23 | 56 | +42 | i 30·8 | — |
| Athens | | −8·8 | 95·8 | 52 | e 12 | 15 | −44 | 22 | 17 | −84 | e 33·6 | 37·8 |
| Apia | | −9·0 | 99·0 | 258 | 15 | 22 | +126 | 17 | 5 | ? $PR_1$ | — | 22·6 |
| Helwan | | −9·1 | 102·5 | 61 | 13 | 9 | −25 | 17 | 48 | ? $PR_1$ | — | 31·9 |
| Wellington | | −9·2 | 105·8 | 226 | e 13 | 36 | −16 | e 26 | 12 | +50 | e 57·1 | — |
| Tiflis | | — | 111·1 | 43 | e 11 | 36 | ? | | — | — | 19·6 | — |
| Riverview | | — | 125·9 | 224 | e 18 | 10 | [−58] | e 21 | 56 | ? $PR_1$ | e 47·2 | 62·7 |
| Sydney | | — | 125·9 | 224 | 14 | 16 | −114 | 24 | 0 | ? | 40·9 | 42·1 |
| Melbourne | | — | 127·6 | 217 | 19 | 51 | ? $PR_1$ | 30 | 12 | ? | 52·2? | 65·2 |
| Mizusawa | E. | — | 132·2 | 323 | 18 | 28 | [−55] | 21 | 4 | ? $PR_1$ | — | — |
| Adelaide | | — | 133·2 | 215 | — | | — | 21 | 6 | ? $PR_1$ | e 38·2 | — |
| Tokyo | | — | 135·3 | 321 | e 19 | 12 | [−21] | e 26 | 56 | ? | e 37·0 | 40·8 |
| Nagoya | | — | 137·3 | 323 | 18 | 34 | [−61] | | — | — | 21·3 | — |
| Osaka | | — | 138·5 | 324 | 18 | 53 | [−44] | 29 | 31 | ? | 39·0 | 39·6 |
| Kobe | | — | 138·7 | 324 | 18 | 40 | [−57] | | — | — | — | 39·6 |
| Simla | E. | — | 138·8 | 40 | 18 | 36 | [−62] | | — | — | 49·4 | 49·8 |
| | N. | — | 138·8 | 40 | 18 | 42 | [−56] | | — | — | 47·8 | 49·0 |
| Bombay | | — | 141·6 | 60 | 18 | 38 | [−64] | | — | — | — | 46·6 |
| Perth | | — | 145·3 | 192 | (18 | 32) | [−77] | 24 | 41 | ? | 38·3 | — |
| Zi-ka-wei | | — | 148·2 | 338 | e 18 | 55 | [−58] | e 28 | 8 | ? | e 41·8 | 47·4 |
| Kodaikanal | | — | 148·5 | 74 | 18 | 36 | [−77] | | — | — | 26·8 | 54·0 |
| Colombo | | — | 151·5 | 79 | 19 | 18 | [−40] | 23 | 6 | ? $PR_1$ | 28·8 | 37·7 |
| Calcutta | | — | 152·0 | 42 | 19 | 0 | [−59] | 27 | 36 | ? | 36·2 | — |
| Taihoku | N. | — | 153·5 | 331 | e 19 | 11 | [−50] | e 23 | 50 | ? | e 29·0 | — |
| Hong Kong | | — | 158·8 | 344 | 20 | 58 | [+51] | 28 | 39 | ? | 43·8 | 44·1 |
| Manila | | — | 162·1 | 315 | e 19 | 13 | [−56] | 30 | 13 | ? | 52·5 | 56·4 |
| Batavia | | — | 171·7 | 172 | 19 | 15 | [−61] | | — | — | e 52·6 | — |

Additional readings and notes: Port au Prince gives also iP = +4m.41s., MN = +8·4m. Porto Rico eE = +8m.15s., MN = +8·6m. Georgetown iE = +9m.9s. and +10m.27s., iZ = +9m.3s., LZ = +28·6m. Mazatlan readings have been diminished by 19m. St. Louis MN = +13·8m. Ann Arbor SN = +14m.36s., LE = +18·0m., LN = +18·1m. and +20·6m. Toronto $PR_1$? = +9m.36s., iL = +19·8m.?, eL = +53·8m. +69·6m., and +113·8m. Ottawa $PR_2N$? = +10m.8s., $T_0$ = 3h.50m.17s. Lick iPN = +9m.38s., ePZ = +9m.40s., iPZ = +9m.43s., $iPR_1Z$ = +11m.52s., $iPR_1EN$ = +11m.53s., $SR_1N$ = +21m.48s. and several other readings. Saskatoon $PR_1N$ = +12m.6s., $T_0$ = 3h.50m.22s. Berkeley $iPR_1EN$ = +11m.55s., $iPR_1Z$ = +11m.52s., $iSR_1Z$ = +22m.3s., $iSR_1N$ = +22m.4s., $iSR_2E$ = +23m.33s., $iSR_2N$ = +23m.35s., and very many other readings. Victoria eS? = +11m.44s., SZ = +12m.21s., L? = +16·7m., eL = +72·0m. and +119·6m. Coimbra $SR_1E$ = +23m.23s. and +24m.39s., $T_0$ = 3h.50m.22s. San Fernando S = +15m.12s. (?$PR_1$), MN = +20·4m. Granada i = +11m.52s., $SR_1$ = +25m.48s. The M is given as for a second shock, for which eP = +41m.1s. Sitka eE = +13m.23s. Tortosa ePN = +36m.36s. Barcelona $PR_1$ = +14m.44s., $PR_2$ = +16m.44s., ? = +24m.47s., $SR_1$ = +26m.31s., $SR_2$ = +29m.45s., MN = +33·6m., $PR_3$ = +40m.38s. Stonyhurst S = +13m.54s. Dyce e?N = +4m.37s., iN = +11m.27s. Puy de Dôme e = +40m.33s. Paris $SR_1$ = +25m.9s. Marseilles $PR_1$ = +15m.17s., $SR_1$ = +25m.32s., e = +40m.32s. Uccle iP = +11m.55s., $PR_1$ = +15m.4s., iS = +21m.19s., MN = +36·1m. and five i's. Origin 4°·0N. 65°·0W. De Bilt eE = +21m.13s., eN = +25m.35s., MN = +31·2m. Moncalieri MN = +34·0m. Strasbourg e = +40m.8s. Zurich iE = +11m.53s., iN = +11m.59s. Origin 2°·0N. 78°·0W. Hamburg $iPR_1Z$ = +14m.25s. and +15m.58s., $iPR_1N$ = +14m.37s., $iSR_1N$ = +26m.14s., MZ = +42·8m. Honolulu $SR_1N$ = +26m.37s. Innsbruck $PR_1SE$ = +14m.9s., $SR_1NE$ = +25m.38s., e = +37m.48s., eNW = +40m.18s., and +58m.30s., given

*Notes continued on next page.*

as separate shocks. Padova $PR_1 = +17m.50s.$, $SR_1 = +22m.26s.$ Rocca di Papa $i = +12m.5s.$, $e = +12m.28s.$ M is given as belonging to an independent shock, for which also $ePE = +58m.36s.$ and $ePN = +58m.54s.$ Pola $ePN = +12m.19s.$, $MN = +32{\cdot}5m.$ Pompeii separate readings $P = +42m.36s.$ and $P = +63m.36s.$ Capetown $PR_1 = +15m.48s.$, $PR_2 = +17m.59s.$, $iSR_1 = +26m.14s.$ Vienna $ePZ = +12m.12s.$, $iPZ = +12m.14s.$, and sixteen other i's. Mostar $PR_1 = +13m.48s.$, $PR_2 = +16m.0s.$, $PR_3 = +18m.42s.$, $SR_1 = +27m.18s.$, $SR_2 = +28m.24s.$ Upsala $iE = +21m.57s.$, $i = +26m.54s.$, $SR_1 = +28m.9s.$ Konigsberg $iPEZ = +12m.42s.$, $PSZ = +22m.50s.$, $eLZ = +34{\cdot}7m.$, $MN = +39{\cdot}1m.$, $MZ = +48{\cdot}1m.$, and several other readings. Belgrade $iP = +13m.38s.$, $PR_1 = +14m.43s.$, $PR_2 = +15m.18s.$, $PR_3 = +16m.3s.$, $PR_4 = +17m.26s.$, $PR_5 = +19m.35s.$, $SR_1 = +24m.34s.$, $SR_2 = +25m.25s.$ Athens $PR_1 = +15m.46s.$, $PR_2 = +16m.56s.$, $MN = +38{\cdot}8m.$, $i = +23m.14s.$ and $+39m.33s.$, $T° = 3h.50m.35s.$ Apia $MV = +17{\cdot}3m.$, $MN = +23{\cdot}6m.$ Helwan $PR_1 = +15m.36s.$ Riverview gives also $PR_1 = +20m.17s.$, $e = +29m.2s.$ and $+29m.14s.$, $eSR_1? = +33m.50s.$, $MZ = +63{\cdot}3m.$, $MN = +64{\cdot}5m.$ Sydney $SR_1 = +33m.36s.$ Melbourne $PR_1 = +23m.42s.$, $PR_2 = +25m.48s.$, $SR_1 = +36m.21s.$, $SR_2 = +40m.12s.$ Mizusawa $PN = +18m.29s.$, $SN = +21m.3s.$ Adelaide $e = +24m.36s.$, $eSR_2 = +32m.36s.$ Osaka $MN = +39{\cdot}5m.$ Perth [P] is given as $PR_1$, $SR_1 = +37m.45s.$ Zi-ka-wei $PR_1N = +21m.35s.$, $PR_1E = +21m.43s.$, $PR_2N = +22m.38s.$, $SR_1E = +31m.58s.$, $SR_1N = +32m.5s.$, $MN = +51{\cdot}9m.$ Manila $MN = +53{\cdot}8m.$ Batavia $i = +19m.46s.$, $+21m.18s.$, $+24m.35s.$, $+25m.26s.$, and $+29m.18s.$, $iE = +44m.49s.$

The evidence for the considerable focal depth $+0{\cdot}070$ may be briefly summarised as follows: (a) Firstly, the adopted $T_0$ is clearly well supported by the majority of the stations, as we see from the smallness of the residuals of P and S. (b) There are 19 observations of [P] near the antipodes consistently giving large negative residuals. In order of magnitude they are (in seconds) $+51$, $-3$, $-21$, $-40$, $-44$, $-50$, $-55$, $-56$, $-56$, $-57$, $-58$, $-58$, $-59$, $-61$, $-61$, $-62$, $-64$, $-77$, $-77$. The middle value is $-57s.$, and the mean is $-47s.$ if we include everything, and $-53s.$ if we omit the exceptional $+51$ sec. (for Hong Kong).

Omitting the stations nearest the epicentre (Balboa Heights to Rio de Janeiro), there are four good azimuth groups :—

| No. Stations | Mean. Azim. | $\Delta$ | Focus. Corrn. | Sin Az. | Cos Az. |
|---|---|---|---|---|---|
| | ° | ° | ° | | |
| 4 | 314 | $-0{\cdot}1$ | $-7{\cdot}2$ | $-{\cdot}72\,x$ | $+\ {\cdot}69\,y$ |
| 5 | 341 | $+1{\cdot}1$ | $-6{\cdot}5$ | $-{\cdot}33\,x$ | $+\ {\cdot}95\,y$ |
| 6 | 357 | $-0{\cdot}4$ | $-5{\cdot}7$ | $-{\cdot}05\,x$ | $+1{\cdot}00\,y$ |
| 7 | 48 | $0{\cdot}0$ | $-7{\cdot}9$ | $+{\cdot}74\,x$ | $+\ {\cdot}67\,y$ |

The distribution in Azimuth, however, is not extensive. These mean values represent it as over an arc of 94° only (though individual stations extend this to 120°). A glance at the coefficients of x and y in the 5th and 6th columns shows us first that there can be no large value of x, whether we accept the corrections for focus or not; secondly, that if we accept these corrections the value of y is also small, but if we reject them the value of y must be about $-28°{\cdot}3/3{\cdot}31 = -8°{\cdot}6$. Even then we have considerable discrepancies between the inner and outer groups. And if we attempt to make this correction through y, (*i.e.* to move the epicentre 8°·6 further north) we should throw the stations near the epicentre into worse confusion. It must be admitted that their residuals are not very good at present, but if we take an epicentre at 6°·0N. 72°·0W., the distance from Rio de Janeiro for instance becomes about 42°, whereas the observations indicate 27°; and the distance from La Paz becomes 23°, whereas the observation of P indicates about 12°.

Jan. 17d. Readings also at 3h. (Colombo), 10h. (Bidston), 11h. (Helwan and Bidston), 15h. (La Paz), 19h. (Manila and Tiflis).

Jan. 18d. Readings at 3h. (Algiers and La Paz), 5h. (La Paz), 12h. (Apia and Zi-ka-wei), 17h. (near Mizusawa).

Jan. 19d. 21h. 58m. 50s. Epicentre 7°·0S. 140°·0E. (as on 1917 July 27d.)

$A = -·760$, $B = +·638$, $C = -·122$; $D = +·643$, $E = +·766$; $G = +·093$, $H = -·078$, $K = -·993$.

| | | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Adelaide | | 28·0 | 182 | — | — | — | — | — | 15·0 |
| Manila | | 28·7 | 319 | e 6 26 | +11 | 11 18 | + 6 | 14·1 | 14·3 |
| Riverview | | 28·8 | 161 | e 6 9 | − 7 | i 11 6 | − 7 | e 12·4 | 18·6 |
| Sydney | | 28·8 | 161 | — | — | 9 28 | ? | 12·8 | 16·0 |
| Melbourne | | 31·1 | 171 | — | — | e 10 28 | −85 | 14·2 | 17·6 |
| Batavia | | 32·9 | 270 | e 6 57 | + 1 | — | — | i 16·3 | — |
| Perth | | 33·6 | 219 | — | — | 12 20 | −14 | 18·2 | 19·0 |
| Taihoku | | 36·7 | 331 | 13 31 | ?S | (13 31) | +11 | 16·4 | — |
| Zi-ka-wei | | 42·1 | 336 | e 8 10 | − 2 | e 14 36 | 0 | — | — |
| Tokyo | | 42·7 | 259 | e 14 16 | ?S | (e 14 16) | −28 | (e 19·4) | — |
| Christchurch | | 46·4 | 146 | — | — | 15 10 | −23 | 22·6 | 33·8 |
| Apia | | 47·8 | 102 | — | — | — | — | 19·2 | — |
| Colombo | | 61·6 | 281 | 11 10 | +47 | 23 10 | ?$SR_1$ | 34·2 | 36·5 |
| Kodaikanal | | 64·6 | 285 | 19 22 | ?S | (19 22) | + 2 | 34·3 | 44·5 |
| Honolulu | E. | 67·0 | 63 | 19 28 | ?S | (19 28) | −22 | 32·7 | 34·2 |
| | N. | 67·0 | 63 | 19 18 | ?S | (19 18) | −32 | 32·5 | 38·7 |
| Simla | | 71·0 | 308 | — | — | e 22 10 | +92 | — | 42·0 |
| Bombay | | 71·0 | 293 | 21 15 | ?S | (21 15) | +37 | — | — |
| Victoria | | 99·6 | 42 | 26 0 | ?S | (26 0) | + 8 | 44·7 | 57·0 |
| Berkeley | E. | 100·4 | 52 | — | — | e 32 17 | ?$SR_1$ | e 46·2 | — |
| Helwan | | 109·7 | 299 | e 19 25 | ?$PR_1$ | — | — | 59·8 | 69·2 |
| Capetown | | 111·4 | 229 | — | — | — | — | — | 61·2 |
| Konigsberg | | 112·4 | 327 | — | — | — | — | e 58·0 | — |
| Hamburg | | 118·5 | 329 | — | — | — | — | e 58·2 | 62·2 |
| Pola | | 120·1 | 319 | — | — | e 31 10 | ?$SR_1$ | — | — |
| De Bilt | | 121·7 | 329 | — | — | e 42 22 | ?$SR_1$ | e 58·2 | 64·7 |
| Dyce | | 121·8 | 336 | — | — | — | — | — | 71·2 |
| Strasbourg | | 122·2 | 323 | — | — | — | — | e 61·2 | — |
| Uccle | | 122·9 | 328 | e 32 16 | ? | e 42 46 | ?$SR_1$ | e 57·2 | 65·4 |
| Eskdalemuir | | 123·6 | 334 | — | — | 31 10 | ? | — | — |
| Moncalieri | | 124·0 | 320 | — | — | — | — | 61·9 | — |
| Stonyhurst | | 124·2 | 332 | e 22 52 | ?$PR_1$ | — | — | — | 69·7 |
| Kew | | 124·8 | 330 | — | — | — | — | — | 72·2 |
| Paris | | 125·0 | 326 | — | — | — | — | 61·2 | 64·2 |
| Oxford | | 125·1 | 330 | — | — | — | — | 58·3 | 67·2 |
| Chicago | | 125·5 | 42 | — | — | — | — | 61·3 | — |
| Ann Arbor | | 127·8 | 39 | — | — | — | — | 66·2 | — |
| Toronto | | 129·8 | 36 | — | — | — | — | 64·7 | 85·2 |
| Tortosa | N. | 130·6 | 320 | — | — | — | — | e 67·2 | — |
| Ottawa | E. | 130·8 | 32 | — | — | — | — | e 64·2 | — |
| Georgetown | E. | 133·9 | 40 | — | — | — | — | 77·6 | — |
| Granada | | 135·3 | 317 | — | — | — | — | e 79·2 | 83·2 |
| Rio Tinto | | 136·9 | 320 | 70 10 | ?L | — | — | (70·2) | 125·2 |
| San Fernando | | 137·4 | 318 | 65 10 | ?L | — | — | (65·2) | 117·2 |
| La Paz | | 143·6 | 130 | e 20 14 | [+28] | — | — | 69·7 | 82·0 |

Additional readings: Manila gives also MN = +14·2m. Riverview iS = +10m.36s., $SR_1$ = +11m.44s., MN = +15·6m., MZ = +17·4m. Melbourne $SR_1$ = +12m.4s., $SR_2$ = +12m.52s. Batavia iE = +8m.26s., iN = +14m.49s. Perth $PR_1$ = +8m.6s., $SR_1$ = +15m.20s. Tokyo gives S as eP and L as eS. Christchurch $PR_1$? = +10m.34s., $SR_1$ = +18m.52s. Colombo P = +19m.10s. (?$PR_1$). Honolulu SE = +26m.38s., SN = +26m.42s. De Bilt MN = +64·9m. Uccle MN = +65·2m. Paris MN = +62·2m. Chicago L = +64·5m. Toronto eL = +73·5m. and +127·4m. Ottawa LE = +78·7m. San Fernando MN = +117·7m. La Paz P = +20m.28s.

Jan. 19d. Readings also at 1h. (Batavia), 3h. (Batavia and Vera Cruz and Tacubaya), 6h. (Batavia and near Mizusawa), 13h. (Puy de Dôme), 16h. (Manila), 17h. (La Paz), 18h. (Stonyhurst, De Bilt, Helwan, Kodaikanal and Colombo).

Jan. 20d. 6h. 50m. 54s. Epicentre 6°·5S. 166°·5E.

A = −·966, B = +·232, C = −·113; D = +·233, E = +·972; G = +·110, H = −·026, K = −·994.

| | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|
| | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Riverview | 30·8 | 205 | e 6 40 | + 4 | e 11 55 | + 7 | e 14·2 | 16·9 |
| Sydney | 30·8 | 205 | 10 6 | ? | 13 18 | ?$SR_1$ | 15·5 | 17·5 |
| Melbourne | 36·9 | 209 | — | — | e 12 48 | −34 | 16·4 | 18·4 |
| Adelaide | 38·3 | 281 | — | — | e 11 30 | −132 | i 14·8 | 16·5 |
| Manila | 49·8 | 295 | e 9 6 | 0 | — | — | — | — |
| Perth | 53·5 | 235 | 16 59 | ?S | (16 59) | − 4 | 30·9 | — |
| Batavia | 59·2 | 268 | i 9 40 | −26 | — | — | — | 17·5 |
| La Paz | 121·3 | 115 | e 22 11 | ?$PR_1$ | — | — | — | — |

Additional readings: Riverview gives also eS = +12m.12s., MNZ = +17·0m. Melbourne $PR_1$ = +8m.24s., $SR_1$ = +14m.6s. Adelaide e = +30m.36s., Perth $PR_1$ = +19m.33s.

Jan. 20d. Readings also at 1h. (La Paz), 2h. (Tucson), 4h. (Ithaca, Chicago, Washington, Berkeley, Victoria, Tacubaya, and near Tucson), 5h. (Riverview and Melbourne), 8h. (Tiflis), 17h. (Manila), 21h. (3) and 22h. (Tiflis), 23h. (La Paz).

Jan. 21d. Readings at 7h. (Mizusawa), 12h. (Tacubaya), 16h. (Fordham), 19h. (Zi-ka-wei, Simla, Manila, and Colombo).

Jan. 22d. 3h. 24m. 0s. Epicentre 19°·0S. 177°·0W. (as on 1922 Jan. 1d.).

A = −·944, B = −·049, C = −·326; D = −·052, E = +·999; G = +·325, H = +·017, K = −·946.

| | | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Wellington | | 23·3 | 196 | e 8 12 | ? | i 11 12 | ?L | e 13·2 | 15·0 |
| Christchurch | | 26·0 | 197 | — | — | 9 54 | −28 | 15·8 | 21·7 |
| Riverview | | 31·9 | 236 | e 6 32 | −14 | e 11 50 | −17 | e 14·0 | 15·9 |
| Sydney | | 31·9 | 236 | 7 36 | +50 | 11 54 | −13 | 16·5 | 18·5 |
| Melbourne | | 38·5 | 232 | 7 6 | −36 | 13 42 | − 3 | 20·3 | 23·3 |
| Adelaide | | 42·2 | 238 | — | — | i 14 18 | −20 | e 20·5 | 25·5 |
| Honolulu | E. | 44·4 | 26 | i 14 8 | ?S | (i 14 8) | −59 | 18·1 | 20·2 |
| | N. | 44·4 | 26 | — | — | — | — | 18·2 | 20·3 |
| Perth | | 60·7 | 243 | 18 16 | ?S | (18 16) | −16 | 37·4 | — |
| Tokyo | | 68·3 | 324 | e 16 49 | ? | 29 24 | ?L | (29·4) | — |
| Manila | | 69·7 | 294 | e 11 32 | +17 | 20 25 | + 3 | 32·2 | — |
| Mizusawa | | 70·1 | 327 | — | — | 19 24 | −63 | (28·0) | — |
| Osaka | | 70·2 | 320 | — | — | 15 45 | ? | — | 39·0 |
| Kobe | | 70·3 | 320 | — | — | — | — | — | 34·5 |
| Taihoku | | 74·2 | 306 | — | — | e 20 0 | −76 | — | — |
| Batavia | | 74·9 | 269 | i 11 38 | −10 | — | — | e 33·0 | — |
| Ootomari | | 75·0 | 333 | 18 22 | ? | — | — | — | — |
| Berkeley | | 76·6 | 41 | i 11 36 | −23 | e 21 42 | − 2 | e 33·9 | — |
| Lick | | 76·8 | 42 | — | — | — | — | e 30·0 | — |
| Zi-ka-wei | | 77·5 | 310 | e 11 0 | −64 | — | — | — | — |
| Victoria | | 82·7 | 33 | 22 7 | ?S | (22 7) | −47 | 33·9 | 42·9 |
| Sitka | E. | 83·6 | 22 | — | — | — | — | 36·8 | 46·0 |
| La Paz | | 101·6 | 112 | e 18 29 | ?$PR_1$ | 28 54 | ? | 48·3 | 50·3 |
| Chicago | | 102·3 | 50 | — | — | 32 15 | ?$SR_1$ | 47·0 | — |
| Colombo | | 104·7 | 272 | 25 0 | ?S | (25 0) | −99 | — | 73·0 |
| Ann Arbor | | 105·0 | 50 | — | — | — | — | 36·0? | — |
| Toronto | | 108·4 | 49 | — | — | — | — | e 51·4 | 63·9 |
| Georgetown | E. | 109·4 | 54 | — | — | — | — | e 52·0 | — |
| Washington | | 109·4 | 54 | — | — | — | — | e 53·5 | — |
| Cheltenham | E. | 109·5 | 54 | — | — | — | — | e 53·2 | 56·9 |
| | N. | 109·5 | 54 | — | — | e 53 59 | ?L | e 59·7 | — |
| Ithaca | | 110·3 | 51 | — | — | — | — | 54·5 | — |

*Continued on next page.*

| | | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Ottawa | E. | 111·0 | 48 | — | — | e 28 22 | +45 | e 51·0 | — |
| Tiflis | | 138·0 | 312 | — | — | — | — | e 72·0 | — |
| Dyce | N. | 141·6 | 5 | — | — | — | — | — | 72·0 |
| Konigsberg | | 141·8 | 343 | — | — | e 67 43 | ?L | e 73·6 | 79·7 |
| Edinburgh | | 143·0 | 6 | — | — | — | — | — | 79·0 |
| Eskdalemuir | | 143·3 | 6 | — | — | — | — | 71·0 | — |
| Stonyhurst | | 144·9 | 6 | e 36 0 | ?$SR_1$ | — | — | — | 83·0 |
| Hamburg | | 145·0 | 352 | — | — | — | — | e 69·0 | 82·0 |
| Bidston | | 145·3 | 6 | 66 9 | ?L | 85 3 | ? | (66·2) | 96·8 |
| De Bilt | E. | 146·9 | 358 | e 47 0 | ? | e 59 48 | ? | e 71·0 | 85·7 |
| | N. | 146·9 | 358 | — | — | — | — | e 67·0 | 83·1 |
| Oxford | | 147·1 | 4 | — | — | — | — | 70·4 | 86·4 |
| Uccle | | 148·2 | 358 | e 41 0 | ?$SR_1$ | e 47 0 | ? | e 65·0 | 86·0 |
| Budapest | | 148·7 | 339 | 19 17 | [−37] | — | — | e 73·3 | — |
| Vienna | | 149·0 | 343 | 19 31 | [−23] | — | — | e 62·5 | 87·0 |
| Strasbourg | | 150·2 | 352 | e 19 5 | [−51] | e 19 58 | [+ 2] | 79·0 | 81·0 |
| Paris | | 150·3 | 1 | — | — | e 57 0 | ? | 76·0 | 81·0 |
| Belgrade | | 150·4 | 335 | e 19 20 | [−36] | e 21 41 | ? | 28·4 | — |
| Innsbruck | | 150·9 | 348 | e 19 49 | [− 9] | — | — | — | — |
| Besançon | | 151·7 | 356 | — | — | — | — | 89·0 | — |
| Helwan | | 152·1 | 298 | 19 57 | [− 2] | — | — | 74·0 | 91·0 |
| Pola | | 152·6 | 343 | — | — | — | — | — | 160·5 |
| Moncalieri | | 153·6 | 352 | e 20 23 | [+22] | 35 14 | ? | 47·4 | 98·7 |
| Marseilles | | 155·6 | 357 | — | — | — | — | e 80·0 | — |
| Rocca di Papa | | 155·9 | 342 | e 20 57 | [+54] | — | — | e 87·8 | 98·9 |
| Coimbra | E. | 156·7 | 23 | — | — | e 51 0 | ? | 74·4 | 78·3 |
| Barcelona | | 157·6 | 0 | — | — | — | — | e 79·1 | 86·1 |
| Tortosa | N. | 158·2 | 5 | — | — | — | — | e 72·0 | 83·8 |
| Rio Tinto | | 159·5 | 22 | 65 0 | ?L | — | — | (65·0) | 99·0 |
| San Fernando | | 160·8 | 23 | — | — | — | — | 79·4 | 85·0 |
| Granada | | 161·0 | 16 | e 58 8 | ? | 1 67 23 | ? | 79·3 | 82·3 |
| Algiers | | 162·3 | 0 | — | — | — | — | 85·0 | 92·0 |

Additional readings and notes: Christchurch gives also $SR_1$ = +12m.12s. Riverview PS = +12m.5s., e$SR_1$ = +13m.12s., MN = +15·2m., $T_0$ = 3h.23m.49s. Melbourne $PR_2$ = +9m.12s., $SR_1$ = +16m.48s. Adelaide i = +18m.0s. Honolulu SE = +17m.10s., SN = +17m.17s. Perth $PR_1$ = +21m.0s., S = +25m.50s., $SR_1$ = +31m.0s., and +32m.54s. Osaka MN = +39·2m. Kobe MN = +39·2m. Berkeley eLN? = +31·1m. Victoria S = +26m.3s.? Toronto eL = +55·2m. Georgetown LE = +54·0m. and +63·0m. Washington L = +63·0m. Cheltenham eN = +56m.28s. Ottawa e$SR_1$E? = +34m.30s. Uccle e = +36m.0s. Vienna iZ = +19m.55s. Moncalieri MN = +84·9m. Marseilles eL = +91·0m. Rocca di Papa eP = +21m.2s. Coimbra eN = +48m.0s., eLN = +73·0m. San Fernando MN = +86·0m. Granada MN = +88·4m.

Jan. 22d. 20h. 44m. 20s. Epicentre 19°·0S. 177°·0W. (as at 3h.).

| | | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Apia | | 7·3 | 45 | 1 12 | −39 | — | — | — | 4·2 |
| Wellington | | 23·3 | 196 | — | — | e 10 10 | +39 | e 13·7 | 14·7 |
| Christchurch | | 26·0 | 197 | — | — | 12 4 | +102 | 16·1 | 19·5 |
| Riverview | | 31·9 | 236 | e 6 26 | −20 | e 12 11 | + 4 | e 15·7 | 17·2 |
| Sydney | | 31·9 | 236 | 7 58 | +70 | 12 10 | + 3 | 17·4 | 19·3 |
| Adelaide | | 42·2 | 238 | (e 10 40) | ?$PR_1$ | e 14 52 | +14 | e 18·3 | 26·2 |
| Honolulu | E. | 44·4 | 26 | 14 30 | ?S | (14 30) | −37 | 18·3 | 19·7 |
| | N. | 44·4 | 26 | 14 27 | ?S | (14 27) | −40 | 18·5 | 20·5 |
| Perth | | 60·7 | 243 | 18 15 | ?S | (18 15) | −17 | 34·3 | — |
| Manila | | 69·7 | 294 | e 12 35 | +80 | (20 9) | −13 | 20·2 | — |
| Batavia | | 74·9 | 269 | e 12 0 | +12 | e 21 18 | − 7 | e 39·1 | — |
| Berkeley | | 76·6 | 41 | i 11 54 | − 5 | — | — | e 34·3 | — |
| Lick | | 76·8 | 42 | 12 48 | +48 | — | — | e 34·8 | — |
| Zi-ka-wei | | 77·5 | 310 | e 15 40 | ?$PR_1$ | — | — | — | — |
| Tucson | | 81·4 | 51 | — | — | — | — | 37·0 | 41·9 |
| Victoria | | 82·7 | 33 | 23 18 | ?S | (23 18) | +24 | 36·7 | 42·4 |
| La Paz | | 101·6 | 112 | e 17 54 | ? | 28 52 | +161 | 50·0 | 55·7 |
| Chicago | | 102·3 | 50 | — | — | e 27 10 | +52 | 47·7 | — |
| Colombo | | 104·7 | 272 | 36 40 | ? | — | — | — | 74·7 |
| Toronto | | 108·4 | 49 | — | — | — | — | e 54·4 | 63·6 |
| Georgetown | | 109·4 | 54 | — | — | — | — | 54·0 | — |

*Continued on next page.*

| | | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Washington | | 109·4 | 54 | — | — | — | — | e 53·7 | — |
| Ottawa | E. | 111·0 | 48 | — | — | e 28 36 | +59 | 58·2 | — |
| Dyce | N. | 141·6 | 5 | — | — | — | — | — | 90·7 |
| Konigsberg | | 141·8 | 343 | — | — | — | — | 95·7 | — |
| Hamburg | | 145·0 | 352 | — | — | — | — | e 81·7 | — |
| De Bilt | E. | 146·9 | 358 | — | — | e 59 40 | ? | e 75·7 | 86·1 |
| | N. | 146·9 | 358 | — | — | e 62 40 | ? | e 77·7 | 84·7 |
| Oxford | | 147·1 | 4 | — | — | — | — | — | 88·3 |
| Uccle | | 148·2 | 358 | — | — | e 46 40 | ?$SR_1$ | e 68·7 | — |
| Vienna | | 149·0 | 343 | 19 53 | [− 1] | — | — | — | — |
| Strasbourg | | 150·2 | 352 | e 19 59 | [+ 3] | e 46 47 | ? | 81·7 | — |
| Paris | | 150·3 | 1 | — | — | — | — | e 79·7 | 88·7 |
| Belgrade | | 150·4 | 335 | e 14 59 | ? | e 26 8 | ?$PR_1$ | 30·2 | — |
| Helwan | | 152·1 | 298 | 20 9 | [+10] | — | — | 82·7 | — |
| Pola | | 152·6 | 343 | — | — | — | — | e 75·7 | — |
| Rocca di Papa | | 155·9 | 342 | — | — | (24 16) | ?$PR_1$ | 24·3 | — |
| Coimbra | | 156·7 | 23 | e 48 40 | ? | e 60 40 | ? | e 73·7 | — |
| Tortosa | N. | 158·2 | 5 | — | — | — | — | e 76·7 | 93·7 |
| Rio Tinto | | 159·5 | 22 | 78 40 | ?L | — | — | (78·7) | 96·7 |
| San Fernando | | 160·8 | 23 | — | — | — | — | 79·2 | 86·7 |
| Granada | | 161·0 | 16 | i 20 57 | [+48] | i 32 30 | ? | e 79·7 | 87·6 |

Additional readings and notes: Apia gives also readings at +1m.50s. and +3m.13s. Wellington gives S as e and iS = +12m.22s. (?iL). Christchurch $SR_1$ = +14m.16s. Riverview PS = +12m.30s., MN = +19·4m., $T_0$ = 20h.43m.28s. Adelaide e = +22m.22s. Honolulu SE = +17m.26s. Perth $PR_1$ = +20m.40s., S = +25m.8s., $SR_1$ = +30m.3s. Batavia iE = +22m.6s. Berkeley eLN = +34·7m. La Paz L = +49·1m., $T_0$ = 20h.51m.14s. Ann Arbor Δ = 105·0 gives simply L = 21h.? Toronto L = +34·4m. Ottawa eE = +34m.55s. Strasbourg e = +20m.14s. and +47m.5s. Rocca di Papa L = +46m.46s. (?$SR_1$). San Fernando MN = +87·2m. Granada MN = +85·9m. All readings are increased by 1h.

Jan. 22d. 22h. 5m. 20s. Epicentre 37°·5N. 140°·0E.

A = −·608, B = +·510, C = +·609; D = +·643, E = +·766; G = −·466, H = +·391, K = −·793.

| | | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Mizusawa | E. | 1·9 | 28 | 0 33 | + 4 | 0 53 | 0 | — | — |
| | N. | 1·9 | 28 | 0 32 | + 3 | 0 52 | − 1 | — | — |
| Tokyo | | 1·9 | 186 | i 0 36 | + 7 | i 0 57 | + 4 | — | 1·0 |
| Nagoya | | 3·4 | 227 | 1 5 | +12 | — | — | 1·9 | 3·0 |
| Osaka | | 4·6 | 233 | — | — | 2 16 | +10 | 3·6 | 4·3 |
| Kobe | | 4·8 | 235 | i 1 29 | +15 | — | — | 2·9 | 3·5 |
| Sapporo | | 5·7 | 10 | 4 43 | ? | — | — | 5·6 | — |
| Ootomari | | 9·4 | 12 | 1 27 | −55 | — | — | 3·0 | — |
| Nagasaki | | 9·6 | 243 | 2 28 | + 4 | — | — | 5·2 | — |
| Zi-ka-wei | | 16·6 | 253 | e 4 40 | +40 | — | — | — | — |
| Manila | | 28·5 | 221 | e 6 29 | +16 | — | — | 16·6 | — |
| Batavia | | 53·5 | 222 | e 9 26 | − 4 | i 16 58 | − 5 | — | — |
| Hamburg | Z. | 79·2 | 332 | i 12 11 | − 3 | — | — | — | — |
| Budapest | | 80·2 | 324 | 11 57 | −23 | — | — | — | — |
| Vienna | Z. | 80·7 | 327 | i 12 19 | − 4 | — | — | — | 50·7 |
| Belgrade | | 81·3 | 321 | (11 57) | −30 | — | — | 12·0 | — |
| De Bilt | E. | 82·2 | 334 | — | — | — | — | e 43·7 | 46·4 |
| | N. | 82·2 | 334 | — | — | — | — | e 44·7 | 52·4 |
| Innsbruck | N.E. | 83·6 | 329 | e 12 34 | − 6 | — | — | — | — |
| Strasbourg | | 84·1 | 330 | e 12 34 | − 9 | — | — | — | — |
| Rocca di Papa | | 87·4 | 324 | i 12 50 | −11 | 16 16 | ?$PR_1$ | — | 16·7 |
| La Paz | | 147·5 | 57 | i 19 49 | [− 3] | — | — | — | 20·4 |

Additional readings: Nagoya gives also MN = +2·8m. Osaka MN = +3·8m. Kobe MN = +3·3m. Belgrade gives P as L, also eP = +7m.23s. Strasbourg e = +12m.44s.

Jan. 22d. Readings also at 1h. (La Paz), 4h. (Kodaikanal and Belgrade), 6h. (Florence), 13h. (Apia), 14h. (La Paz, Batavia, Manila, and Colombo), 15h. (Manila, Tacubaya, Zi-ka-wei, Perth, La Paz, Sydney, Riverview, Adelaide, and Helwan), 21h. (Vienna, Budapest, Adelaide, Riverview, and Sydney), 23h. (La Paz).

**Jan. 23d. 23h. 31m. 50s. Epicentre 37°·2N. 139°·0E. (as on 1912 Dec. 20d.).**

**A = −·601, B = +·522, C = +·605.**

| | | Δ | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|
| | | ° | m. s. | s. | m. s. | s. | m. | m. |
| Mizusawa | E. | 2·5 | 0 34 | − 5 | 0 59 | −10 | — | — |
| Nagoya | | 2·7 | 0 26 | −16 | — | — | — | — |
| Osaka | | 3·9 | 1 7 | + 6 | (1 57) | +10 | 2·0 | 2·6 |
| Kobe | | 4·0 | e 1 13 | +11 | (2 9) | +19 | 2·2 | 2·5 |

Additional readings: Mizusawa gives also PN = +33s. Kobe MN = +3·0m.

Jan. 23d. Readings also at 3h. (Batavia, Manila, Riverview, and La Paz), 7h. (Taihoku), 14h. (Kodaikanal), 16h. (Algiers, Vienna, Batavia, Manila, and near Helwan), 20h. (La Paz), 21h. (Stonyhurst and Kodaikanal). 23h. (La Paz).

Jan. 24d. 13h. 3m. 6s. Epicentre 51°·0N. 141°·0E.

A = −·489, B = +·396, C = +·777; D = +·629, E = +·777;
G = −·604, H = +·489, K = −·629.

| | | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Mizusawa | E. | 11·9 | 179 | 2 40 | −18 | 5 10 | − 7 | — | — |
| | N. | 11·9 | 179 | 2 59 | + 1 | 5 19 | + 2 | — | — |
| Zi-ka-wei | | 24·5 | 224 | — | — | e 9 54 | 0 | — | — |
| Konigsberg | | 63·2 | 326 | — | — | — | — | e 41·0 | — |
| Vienna | | 70·0 | 324 | 11 5 | −12 | — | — | e 41·4 | 47·9 |
| De Bilt | E. | 70·4 | 333 | — | — | — | — | e 40·9 | 45·0 |
| | N. | 70·4 | 333 | — | — | — | — | e 38·9 | 48·7 |
| Uccle | | 71·7 | 333 | — | — | — | — | e 44·9 | — |
| Pola | | 73·8 | 324 | — | — | — | — | e 42·9 | — |

Konigsberg gives also L = +41·4m.

Jan. 24d. Readings also at 9h. (Azores), 10h. (near Tokyo), 12h. (La Paz), 13h. (near Zi-ka-wei), 15h. (Mizusawa), 16h. (La Paz), 19h. (Mizusawa), 20h. (Stonyhurst).

Jan. 25d. Readings at 2h. (Azores), 9h. (Melbourne), 14h. (Taihoku and Stonyhurst), 15h. (near La Paz).

Jan. 26d. 9h. 19m. 12s. (I)
9h. 31m. 12s. (II) } Epicentre 43°·0N. 125°·0W. (as on 1919 Aug. 24d.).

A = −·420, B = −·599, C = +·682; D = −·819, E = +·574;
G = −·391, H = −·559, K = −·731.

| | | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| I Victoria | | 5·5 | 12 | 1 33 | + 8 | — | — | 3·4 | 3·9 |
| I | Z. | 5·5 | 12 | 1 48 | +23 | — | — | 3·8 | 3·8 |
| II | | 5·5 | 12 | 1 21 | − 4 | — | — | 2·8 | 3·5 |
| II | Z. | 5·5 | 12 | 1 18 | − 7 | — | — | 3·3 | 3·3 |
| I Berkeley | N. | 5·5 | 157 | — | — | e 2 24 | − 7 | — | — |
| II | N. | 5·5 | 157 | — | — | — | — | i 5·0 | — |
| I Lick | N. | 6·5 | 155 | e 1 28 | −11 | i 2 23 | −34 | i 3·4 | — |
| II | N. | 6·5 | 155 | (e 1 51) | +12 | — | — | i 3·5 | — |
| I Tucson | E. | 15·5 | 129 | — | — | — | — | 7·6 | — |
| II | E. | 15·5 | 129 | i 3 51 | + 5 | 7 19 | +35 | 8·9 | 15·7 |
| II Sitka | E. | 15·5 | 339 | — | — | (6 55) | +11 | 6·9 | 7·5 |

*Continued on next page.*

| | | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| II Chicago | | 27·4 | 80 | — | — | e 10 58 | +10 | (15·3) | — |
| II | | 27·4 | 80 | — | — | — | — | 14·6 | — |
| II Ann Arbor | | 30·1 | 77 | — | — | — | — | 16·8 | — |
| II Toronto | | 32·8 | 72 | — | — | 10 6 | −135 | e 19·0 | 22·0 |
| II Vera Cruz | | 34·0 | 125 | — | — | — | — | — | 22·8 |
| II Ottawa | | 34·9 | 69 | e 7 18 | + 6 | e 10 10 | ? | e 18·3 | — |
| I Honolulu | E. | 34·9 | 243 | 7 15 | + 3 | — | — | 15·2 | 16·6 |
| II | E. | 34·9 | 243 | — | — | — | — | e 14·1 | 15·5 |
| II Ithaca | | 35·1 | 74 | — | — | — | — | 19·6 | — |
| II Georgetown | | 36·0 | 80 | e 6 15 | −67 | — | — | 20·2 | — |
| II Washington | | 36·0 | 80 | e 7 3 | −19 | — | — | 19·6 | — |
| II Cheltenham | | 36·2 | 80 | e 10 27 | ? | — | — | 19·8 | 23·1 |
| II Northfield | | 37·3 | 70 | — | — | e 12 48 | −40 | 20·8 | — |
| II Dyce | | 69·0 | 29 | — | — | — | — | 36·8 | — |
| II Eskdalemuir | | 70·0 | 31 | — | — | — | — | 34·8 | 42·3 |
| II Kew | | 74·1 | 32 | — | — | — | — | — | 46·8 |
| II De Bilt | | 75·6 | 29 | — | — | — | — | e 37·8 | 46·3 |
| II Hamburg | | 76·0 | 26 | — | — | — | — | e 29·8 | — |
| II Uccle | | 76·4 | 30 | — | — | — | — | — | 46·8 |
| II La Paz | | 79·1 | 125 | 12 27 | +13 | — | — | — | — |
| II Rio Tinto | | 81·8 | 45 | 36 48 | ?L | — | — | (36·8) | 56·8 |
| II Moncalieri | | 82·5 | 32 | — | — | e 35 58 | ? | 47·0 | — |
| II Hong Kong | | 95·0 | 308 | 51 18 | ?L | — | — | (51·3) | — |
| II Simla | | 103·1 | 341 | — | — | — | — | e 59·7 | 61·0 |

Additional readings: Berkeley I gives also eN = +2m.35s. Lick I iN = +3m.23s. Lick II iE = +4m.47s. and +5m.35s., ePN is given as eLN. Toronto II iL = +21·6m. Ottawa LE = +22·3m. Georgetown eLE = +10·8m., eLN = +10·4m., LN = +19·8m. Cheltenham MN = +20·8m. Dyce L = +43·8m. All readings increased by 1h. De Bilt MN = +45·0m.

Jan. 26d. Readings also at 7h. (Stonyhurst), 8h. (Hong Kong, Batavia, and Manila), 15h. (La Paz).

Jan. 27d. Readings at 6h. (La Paz and Rio de Janeiro), 10h. and 13h. (La Paz), 15h. (Rocca di Papa), 18h. (near Batavia (2) ), 20h. (near Port au Prince).

Jan. 28d. Readings at 6h. (near Batavia), 10h. (Colombo, Helwan, and Innsbruck), 11h. (De Bilt), 15h. (Riverview and Melbourne), 16h. (Azores and Rio Tinto), 18h. (Tiflis), 19h. (Innsbruck, Helwan, De Bilt, Colombo, and Pola).

Jan. 29d. Readings at 4h. (Manila, Hong Kong, De Bilt, Zi-ka-wei, and Taihoku), 5h. (near Manila), 17h. (Tiflis and near Mizusawa), 21h. (Taihoku).

Jan. 30d. Readings at 9h. (La Paz), 10h. (near Marseilles), 11h. (Taihoku, Zi-ka-wei, and Hong Kong), 13h. (La Paz), 16h. (Melbourne), 17h. (Colombo and Riverview), 20h. (near La Paz).

**1922. Jan. 31d. 13h. 17m. 18s.** Epicentre **41°·1N. 126°·6W.**
(as on 1918 July 15d.).

A = −·449, B = −·605, C = +·657; D = −·803, E = +·596;
G = −·392, H = −·528, K = −·754.

On 1918 July 15 it is noted that a position 40°·7N. 125°·0W. would suit the observations better, especially those in the Eastern States. A similar displacement of the epicentre (0°·2 southwards and 1°·2 eastwards) was inferred from the present material. Thus 40°·8N. 125°·2W. may be taken as an improved epicentre suiting both earthquakes.

| | | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Berkeley | | 4·6 | 134 | i 1 3 | − 8 | i 2 15 | + 9 | — | 2·6 |
| Lick | | 5·3 | 132 | e 1 20 | − 2 | i 2 25 | 0 | — | 2·6 |
| Victoria | Z. | 7·7 | 17 | 0 42 | −75 | — | — | 2·7 | 5·6 |
| Tucson | E. | 15·3 | 120 | i 3 41 | − 2 | 6 49 | +10 | 7·4 | — |
| Denver | | 16·5 | 88 | 2 42 | −77 | (7 42) | +35 | 7·7 | 9·7 |
| Sitka | E. | 16·9 | 343 | i 4 12 | + 8 | — | — | 7·6 | 8·7 |
| | N. | 16·9 | 343 | — | — | — | — | 7·7 | 11·9 |
| Saskatoon | | 18·0 | 46 | i 4 0 | −17 | i 7 22 | −18 | — | 11·1 |
| Mazatlan | | 24·6 | 130 | 5 9 | −25 | 9 52 | − 3 | 12·2 | 15·5 |
| | Z. | 24·6 | 130 | 5 7 | −27 | 9 54 | − 1 | 12·6 | 15·5 |
| St. Louis | | 27·8 | 83 | i 5 54 | −12 | 10 36 | −19 | 12·4 | 18·2 |
| Chicago | | 29·0 | 76 | 5 57 | −21 | 10 49 | −28 | — | — |
| Colima | | 30·1 | 133 | 6 30 | + 1 | 11 20 | −16 | 15·2 | 20·2 |
| Ann Arbor | E. | 31·7 | 73 | 5 48 | −56 | — | — | — | 17·9 |
| Tacubaya | E. | 31·8 | 126 | 6 29 | −16 | 11 38 | −27 | 13·9 | 18·6 |
| | N. | 31·8 | 126 | 6 26 | −19 | 11 34 | −31 | 13·9 | 17·1 |
| | Z. | 31·8 | 126 | 6 30 | −15 | 11 45 | −20 | — | 20·1 |
| Puebla | | 32·7 | 124 | — | — | — | — | 11·4 | 15·9 |
| Honolulu | | 33·1 | 243 | i 6 52 | − 5 | 12 20 | − 6 | — | — |
| Vera Cruz | E. | 33·9 | 122 | 6 6 | −58 | 11 48 | −51 | 16·7 | 22·0 |
| | N. | 33·9 | 122 | 6 6 | −58 | 11 50 | −49 | 16·7 | 22·0 |
| | Z. | 33·9 | 122 | 6 5 | −59 | 11 46 | −53 | 16·7 | 21·9 |
| Toronto | | 34·5 | 70 | i 7 12 | + 3 | i 12 54 | + 6 | i 18·2 | 22·6 |
| Oaxaca | | 35·1 | 125 | 6 48 | −26 | 12 24 | −33 | 16·4 | 20·6 |
| Ottawa | | 36·7 | 66 | i 7 12 | −16 | i 12 53 | −27 | e 16·7 | 22·8 |
| Ithaca | | 36·8 | 71 | 7 13 | −15 | 12 55 | −26 | e 16·2 | — |
| Georgetown | E.N. | 37·5 | 76 | i 7 18 | −16 | i 13 10 | −21 | e 18·7 | 21·0 |
| | Z. | 37·5 | 76 | i 7 17 | −17 | e 13 18 | −13 | e 17·1 | 23·4 |
| Washington | | 37·5 | 76 | i 7 17 | −17 | i 13 5 | −26 | 17·4 | 26·7 |
| Cheltenham | E. | 37·7 | 77 | i 7 14 | −22 | i 13 2 | −32 | 19·4 | 23·9 |
| | N. | 37·7 | 77 | e 7 19 | −17 | — | — | 17·4 | — |
| Northfield | | 39·1 | 67 | 7 29 | −18 | 13 32 | −21 | 18·5 | 25·7 |
| Fordham | E. | 39·1 | 74 | 7 32 | −15 | 13 26 | −27 | 19·7 | 23·7 |
| | N. | 39·1 | 74 | 7 38 | − 9 | 13 39 | −14 | 19·7 | — |
| Halifax | | 45·2 | 64 | 8 25 | − 9 | 15 4 | −14 | e 21·5 | 23·8 |
| Port au Prince | | 51·2 | 100 | e 9 32 | +18 | — | — | 30·9 | 36·0 |
| Porto Rico | E. | 56·6 | 95 | 9 55 | + 5 | 17 45 | + 4 | 29·2 | 30·6 |
| | N. | 56·6 | 95 | — | — | 17 58 | +17 | 27·6 | 34·0 |
| Ootomari | | 61·8 | 310 | 10 41 | +17 | 19 17 | +31 | 26·7 | 35·0 |
| Mizusawa | E. | 67·0 | 303 | 11 14 | +16 | 20 17 | +27 | — | — |
| Apia | | 69·0 | 229 | 11 16 | + 5 | 20 33 | +19 | 30·3 | 32·2 |
| Tokyo | | 69·8 | 300 | 11 4 | −12 | 20 21 | − 3 | 30·5 | 39·4 |
| Edinburgh | | 71·8 | 30 | e 11 33 | + 5 | 20 58 | +10 | 30·7 | 39·9 |
| Dyce | E. | 71·8 | 28 | e 11 32 | + 4 | 20 52 | + 4 | 25·3 | 78·5 |
| | N. | 71·8 | 28 | e 11 32 | + 4 | 20 42 | − 6 | 28·9 | 42·7 |
| Eskdalemuir | | 72·2 | 30 | e 11 33 | + 2 | i 20 59 | + 7 | 34·7 | 38·6 |
| Azores | | 73·2 | 55 | 11 42 | + 5 | — | — | — | 50·7 |
| Osaka | | 73·3 | 301 | 12 49 | +71 | 21 42 | +36 | 30·2 | 41·2 |
| Kobe | | 73·4 | 301 | e 11 47 | + 9 | (e 20 15) | −52 | e 20·2 | 40·8 |
| Bidston | | 73·7 | 31 | 12 48 | +68 | 32 12 | ?L | (32·2) | 41·7 |
| Stonyhurst | | 73·7 | 30 | 11 36 | − 4 | 20 54 | −16 | 30·2 | 43·4 |
| Upsala | | 74·8 | 18 | 11 51 | + 3 | i 21 28 | + 4 | e 32·6 | 37·4 |
| West Bromwich | | 74·9 | 31 | 11 50 | + 2 | i 21 24 | − 1 | — | — |
| Oxford | | 75·7 | 32 | 11 54 | + 1 | 21 32 | − 2 | 27·6 | 41·7 |
| Kew | | 76·3 | 31 | 22 42 | ?S | (22 42) | +61 | — | 43·7 |
| De Bilt | | 77·8 | 28 | 12 11 | + 5 | 22 9 | +11 | e 34·7 | 40·2 |
| Nagasaki | | 78·0 | 304 | e 22 15 | ?S | (e 22 15) | +15 | e 31·1 | — |
| Hamburg | | 78·2 | 25 | i 12 10 | + 2 | i 22 8 | + 6 | e 38·9 | 41·0 |
| Ucole | | 78·6 | 29 | e 12 11 | − 0 | i 22 12 | + 5 | 33·7 | 38·3 |

*Continued on next page.*

| | | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| La Paz | | 78·9 | 124 | i 12 15 | + 3 | i 22 13 | + 2 | i 36·2 | 58·6 |
| Paris | | 79·5 | 31 | e 12 19 | + 3 | i 22 19 | + 1 | 33·7 | 36·7 |
| Coimbra | E. | 81·2 | 43 | e 12 31 | + 5 | 21 30 | −67 | 33·2 | 37·3 |
| | N. | 81·2 | 43 | — | — | — | — | 32·8 | 37·4 |
| Strasbourg | E. | 81·7 | 29 | e 12 28 | − 1 | 22 30 | −13 | e 37·7 | 42·7 |
| | N. | 81·7 | 29 | e 12 32 | + 3 | 22 44 | + 1 | — | 46·2 |
| | Z. | 81·7 | 29 | e 12 28 | − 1 | — | — | — | 48·8 |
| Puy de Dôme | | 82·2 | 33 | 12 32 | + 1 | 22 52 | + 4 | 38·7 | — |
| Besançon | | 82·2 | 30 | 11 21? | −70 | 22 55 | + 7 | 33·7 | — |
| Zurich | | 83·0 | 29 | 11 42? | −54 | — | — | — | — |
| Rio Tinto | | 84·0 | 44 | 17 42 | ?$PR_1$ | — | — | — | 49·7 |
| Innsbruck | | 84·1 | 27 | i 12 45 | + 2 | i 23 7 | − 2 | e 39·7 | 44·2 |
| Zi-ka-wei | | 84·3 | 309 | e 12 48 | + 4 | e 23 10 | − 1 | — | — |
| Moncalieri | | 84·7 | 31 | 12 26 | −20 | 23 3 | −13 | 34·8 | 45·2 |
| Vienna | | 84·9 | 24 | i 12 45 | − 2 | i 23 15 | − 3 | e 41·2 | 45·9 |
| Tortosa | | 84·9 | 37 | 12 46 | − 1 | 23 7 | −11 | 34·9 | 49·8 |
| Marseilles | | 85·2 | 33 | e 12 42 | − 7 | e 23 42 | +21 | e 28·7 | 36·7 |
| Barcelona | | 85·3 | 36 | e 13 3 | +13 | e 23 17 | − 5 | e 32·1 | 42·4 |
| Lemberg | | 85·5 | 18 | e 12 46 | − 5 | e 23 18 | − 7 | e 43·0 | 47·4 |
| San Fernando | | 85·2 | 44 | 13 16 | +27 | 23 24 | + 3 | 34·9 | 47·5 |
| Granada | | 86·0 | 43 | i 12 54 | + 1 | i 23 26 | − 4 | e 34·7 | 46·6 |
| Budapest | | 86·3 | 22 | i 12 51 | − 4 | i 23 28 | − 5 | 29·1 | — |
| Pola | | 87·0 | 27 | e 12 51 | − 8 | e 23 46 | + 5 | e 37·1 | 48·7 |
| Florence | | 87·0 | 29 | 12 27 | −32 | 22 58 | −43 | 36·7 | 40·2 |
| Taihoku | | 88·6 | 304 | — | — | e 23 20 | −39 | 36·9 | — |
| Belgrade | | 89·2 | 22 | e 13 27 | +16 | e 24 7 | + 2 | e 34·4 | — |
| Rocca di Papa | | 89·3 | 29 | i 13 26 | +14 | i 24 0 | − 6 | e 40·1 | 58·2 |
| Algiers | | 89·5 | 38 | e 12 58 | −15 | 23 45 | −24 | 40·7 | 48·7 |
| Pompeii | | 90·9 | 28 | 13 12 | − 9 | 23 52 | −31 | 40·7 | — |
| Hong Kong | | 95·2 | 307 | 17 29 | ?$PR_1$ | 25 2 | − 6 | 40·7 | 53·0 |
| Athens | | 96·5 | 23 | e 13 6 | −46 | e 24 10 | −71 | e 38·0 | 48·3 |
| Tiflis | | 96·9 | 6 | — | — | e 27 42 | +137 | 44·7 | — |
| Wellington | | 98·3 | 220 | — | — | i 25 24 | −15 | 47·4 | 48·4 |
| Rio de Janeiro | | 100·2 | 112 | e 17 51 | ? | — | — | 43·2 | — |
| Christchurch | | 100·8 | 221 | 24 54 | ?S | (24 54) | −69 | 46·7 | 60·3 |
| Simla | E. | 104·5 | 340 | e 26 12 | −26 | e 43 30 | ? | e 57·6 | 58·2 |
| | N. | 104·5 | 340 | e 24 54 | −104 | — | — | e 56·0 | 56·8 |
| Helwan | | 106·2 | 20 | e 18 42 | ?$PR_1$ | — | — | — | 60·7 |
| Riverview | | 106·4 | 239 | — | — | e 26 33 | −23 | e 43·8 | 45·0 |
| Sydney | | 106·4 | 239 | 21 30 | ? | 34 0 | ?$SR_1$ | 53·2 | 56·0 |
| Accra | | 112·5 | 60 | 27 42 | ?S | (27 42) | − 8 | — | 69·7 |
| Melbourne | | 112·8 | 239 | — | — | 27 42 | −10 | 55·3 | 64·7 |
| Adelaide | | 115·4 | 245 | — | — | e 25 42 | −151 | i 49·3 | 69·9 |
| Bombay | | 117·4 | 339 | e 41 7 | ? | — | — | — | 59·9 |
| Batavia | | 121·2 | 291 | 21 23 | ?$PR_1$ | — | — | 63·4 | — |
| Kodaikanal | | 124·1 | 332 | 36 18 | ?$SR_1$ | — | — | 58·3 | 83·0 |
| Colombo | | 126·3 | 327 | 21 18 | ?$PR_1$ | — | — | 38·3 | 73·9 |
| Perth | | 130·1 | 260 | 27 56 | ? | 39 14 | ? | — | — |
| Capetown | | 151·6 | 87 | — | — | — | — | 73·0 | 80·0 |

Additional readings: Berkeley gives also iNEZ = +1m.13s., ePNEZ = +1m.20s., iPNEZ = +1m.23s., iZ = +1m.45s., ME = +15·5m., $T_e$ = 13h.17m.21s. Epicentre 41°8′N. 125°30′E. Lick ePEZ = +1m.21s., iPENZ = +1m.24s., iZ = +1m.33s., iEN = +1m.35s., iPZ = +1m.43s., iPEN = +1m.45s., iNEZ = +1m.53s., and +2m.1s., iNZ = +2m.15s., iN = +2m.21s., MN = +4·0m., $T_e$ = 13h.17m.21s. Epicentre 41°8′N. 125°30′E. Mazatlan and Colima readings have been diminished by 22m. Ann Arbor S = +5m.12s., L = +8·3m., ME = +17·0m., LN = +19·2m. Honolulu $PR_2E$ = +7m.53s., $PR_2N$ = +8m.2s., eE = +14m.21s., eN = +13m.52s., $SR_1N$ = +14m.22s., $SR_1E$ = +14m.52s. Toronto e = +12m.24s., iL? = +20·2m. Oaxaca LZ = +16·8m.?, MZ = +22·6m. Ottawa MN = +20·6m., $T_e$ = 13h.17m.19s Georgetown MN = +21·3m., other phases as for E component. Cheltenham LN = +18·5m. Halifax $SR_1E$ = +18m.29s., $T_e$ = 13h.17m.19s. Mizusawa SN = +20m.14s. Apia +28m.44s., +29m.32s., and MN = +33·2m. Eskdalemuir $SR_1$? = +26m.18s., $SR_2$? = +29m.8s. Osaka MN = +39·7m. Kobe MN = +31·5m. Upsala MN = +43·6m. W. Bromwich SE = +20m.42s. De Bilt MN = +38·9m. Hamburg $SR_1Z$ = +27m.40s., $SR_2$ = +31m.12s., L = +35·5m., MN = +43·5m., MZ = +43·8m. Ucele $PR_1$ = +14m.35s., $SR_1$ = +27m.7s., MN = +43·8m. Epicentre 40°N. 127°W. La Paz i = +27m.20s., L = +38·2m., MN = +44·6m., $T_e$ = 13h.17m.32s. Paris MN = +38·7m. Strasbourg $PR_1E$ = +16m.4s., $SR_1E$ = +28m.4s. Zurich S−PN = 9m.53s., S−PE = 10m.28s. Innsbruck MNW = +49·2m. Zi-ka-wei $SR_1N$ = +29m.10s. Moncalieri MN = +49·0m. Vienna $SR_1N$? = +28m.44s., $SR_1E$? = +28m.52s., MNZ =

*Notes continued on next page.*

+49·7m. and 8 i's. Marseilles e = 13h.14m.45s. Barcelona $PR_1$ = +16m.39s., ? = +26m.26s. San Fernando MN = +48·5m. Granada MN = 44·2m. Pola MN = +51·3m. Florence S has been increased by 10m. Belgrade $PR_1$ = +16m.40s., +18m.21s., +23m.10s., $SR_1$ = +25m.6s. and +28m.22s., L = +55·5m. Algiers MN = +52·2m. Hong Kong +14m.33s. (O − C = +49s.). Athens ePN = +13m.41s. (O − C = −11s.), $PR_2$ = +17m.32s., i = +26m.24s., MN = +53·0m., $T_0$ = 13h.17m.15s. Wellington e = +24m.24s., $iSR_1$ = +32m.18s., $eSR_2$ = +36m.36s. Christchurch P = +27m.24s., +32m.54s., and +35m.36s. Riverview $ePR_1$ = +17m.41s., $SR_1$ = +34m.0s., and +34m.14s., MZ = +61·8m. Sydney $PR_1$ = +25m.12s., $SR_1$ = +38m.42s., $SR_2$ = +46m.54s. Accra gives its readings as on 30d. Melbourne $PR_1$ = +19m.42s., $SR_1$ = +35m.36s. Adelaide gives numerous e and i phases in addition, also $iSR_1$ = +36m.12s. Batavia i = +31m.36s., +37m.28s., and +39m.28s., eL = +51·4m., eLN = +72·4m. Perth $PR_1$ = +31m.42s., $SR_1$ = +45m.55s.

The following readings were not communicated to Oxford, but are taken from Father MacIlwaine's paper on this earthquake in Bull. Seism. Soc. of America, Vol. 13, No. 2 (June 1923).

| | | Δ | Az. | P. | O − C. | S. | O − C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Santa Clara | | 5·2 | 134 | i 1 14 | − 6 | i 1 59 | −24 | — | — |
| Spokane | | 9·2 | 42 | i 2 19 | −18 | 4 4 | −39 | 4·2 | 4·9 |
| Hawaii | | 32·6 | 237 | 6 49 | − 4 | 12 7 | −11 | 13·9 | 15·3 |
| Halifax | E. | 45·1 | 63 | 8 25 | − 9 | 15 4 | −12 | e 21·5 | 23·8 |
| Balboa Heights | E. | 52·5 | 114 | 9 24 | + 1 | 16 42 | − 8 | — | 28·2 |
| | N. | 52·5 | 114 | 9 26 | + 3 | 16 44 | − 6 | — | 28·2 |
| Sendai | | 67·6 | 302 | 12 13 | +71 | 20 33 | +36 | — | 36·7 |
| Le Mans | | 79·2 | 33 | e 11 58 | −16 | 22 42 | +28 | 36·1 | 46·7 |
| Gottingen | N.E. | 79·9 | 26 | i 12 19 | + 1 | i 22 26 | + 4 | e 37·2 | 43·2 |
| Potsdam | | 80·9 | 24 | 12 23 | − 1 | 22 29 | − 5 | e 37·7 | 44·7 |
| Jugenheim | | 81·0 | 28 | i 12 28 | + 3 | i 22 40 | + 5 | e 37·7 | 48·6 |
| Lisbon | | 81·9 | 44 | 12 33 | + 3 | 22 39 | − 6 | 35·8 | 42·0 |
| Nordlingen | | 82·4 | 27 | 12 37 | + 5 | 22 57 | + 7 | 38·1 | 48·0 |
| Munich | | 83·4 | 27 | 12 41 | + 3 | 23 3 | + 2 | e 39·6 | 44·8 |

Jan. 31d. Readings also at 0h. (La Paz), 2h. (Batavia), 13h. (Mizusawa), 15h. (La Paz, Batavia, and Granada), 17h. (Kingston), 18h. (Taihoku and near Athens), 23h. (near Mizusawa).

Feb. 1d. Readings at 0h. (near Taihoku), 4h. (near Tokyo), 13h. (Dehra Dun), 17h. (La Paz).

Feb. 2d. 2h. 51m. 30s. Epicentre 49°·0S. 132°·0W.

A = −·439, B = −·488, C = −·755; D = −·743, E = +·669; G = +·505, H = +·561, K = −·656.

| | | Δ | Az. | P. | O − C. | S. | O − C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Wellington | | 37·5 | 261 | — | — | — | — | e 16·7 | 19·5 |
| Riverview | | 57·1 | 255 | — | — | e 17 45 | − 2 | e 26·7 | 28·3 |
| Melbourne | | 58·4 | 247 | — | — | — | — | e 30·0 | 32·5 |
| La Paz | | 60·6 | 81 | i 10 19 | + 3 | 18 33 | + 2 | 28·8 | — |
| Adelaide | | 63·1 | 246 | — | — | e 19 30 | +28 | 32·5 | 36·0 |
| Honolulu | N. | 74·1 | 335 | — | — | — | — | e 37·2 | — |
| Victoria | | 97·6 | 6 | — | — | — | — | 48·2 | 52·6 |
| Eskdalemuir | | 148·7 | 59 | — | — | — | — | 68·5 | — |
| Uccle | | 152·2 | 69 | — | — | — | — | e 84·5 | — |
| De Bilt | | 153·0 | 67 | — | — | e 64 30 | ? | e 75·5 | — |

Additional readings: Riverview gives also e? = +3m.30s., e = +16m.10s., and +18m.10s., MN = +27·4m. Helwan (Δ = 157°·0) gives simply 4h.

**Feb. 2d.** Readings also at 1h. (Apia), 7h. (near Berkeley and Lick), 9h. (Bidston), 14h. (Strasbourg and Barcelona), 17h. (near La Paz), 22h. (near Granada and Malaga).

**Feb. 3d.** Readings at 10h. (near Mizusawa), 16h. (La Paz), 19h. (La Paz), 20h. (Algiers).

**Feb. 4d.** Readings at 4h. (Colombo), 6h. (Manila), 7h. (Taihoku), 13h. (near Osaka), 18h. and 20h. (La Paz), 23h. (near Tokyo).

**Feb. 5d. 3h. 39m. 16s.** Epicentre 5°·5S. 119°·0E.

$A = -\cdot483$, $B = +\cdot871$, $C = -\cdot096$; $D = +\cdot875$, $E = +\cdot485$; $G = +\cdot046$, $H = -\cdot084$, $K = -\cdot995$.

A height of focus 0·040 is assumed.

| | | Corr. for Focus | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Batavia | | +0·7 | 12·1 | 266 | 3 7 | − 3 | e 5 39 | 0 | i 8·2 | — |
| Manila | | +1·6 | 20·2 | 6 | 5 6 | + 3 | — | — | — | — |
| Adelaide | | +3·0 | 34·6 | 151 | e 5 14 | −141 | — | — | e 17·9 | 21·1 |
| Zi-ka-wei | | +3·1 | 36·8 | 5 | e 7 57 | + 3 | e 14 3 | − 2 | — | — |
| Melbourne | | +3·3 | 40·0 | 147 | 8 20? | 0 | 13 44 | −68 | 18·9 | 25·8 |
| Colombo | | +3·4 | 41·0 | 287 | 13 44 | ?S | (13 44) | −83 | — | 18·7 |
| Riverview | | +3·4 | 41·1 | 139 | e 13 35 | ?S | e 18 23 | ?$SR_1$ | e 21·2 | 23·2 |
| Sydney | E. | +3·4 | 41·1 | 139 | 8 26 | − 4 | — | — | 19·9 | 24·7 |
| Kodaikanal | | +3·6 | 44·3 | 291 | 25 56 | ?L | — | — | (25·9) | — |
| De Bilt | | +5·8 | 108·5 | 324 | — | — | — | — | e 57·7 | 69·0 |
| Uccle | | +5·9 | 109·7 | 322 | — | — | — | — | e 60·7 | 63·7 |
| Eskdalemuir | | — | 112·4 | 329 | — | — | — | — | 56·7 | — |
| Stonyhurst | | — | 112·5 | 325 | e 29 44 | ?S | (e 29 44) | +114 | — | 82·2 |
| La Paz | | — | 156·9 | 162 | 20 29 | [+24] | — | — | 83·7 | — |

Additional readings: Adelaide gives also e = +11m.44s. and +14m.56s. Riverview MN = +28·2m. De Bilt MN = +66·1m.

**Feb. 5d. 22h. 19m. 28s.** Epicentre 36°·0N. 134°·0E. (as on 1919 July 27d.).

$A = -\cdot562$, $B = +\cdot582$, $C = +\cdot588$.

| | Δ | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|
| | ° | m. s. | s. | m. s. | s. | m. | m. |
| Kobe | 1·6 | 0 21 | − 3 | — | — | 0·7 | 0·8 |
| Osaka | 1·8 | 0 28 | 0 | — | — | 0·9 | 1·0 |
| Nagoya | 2·5 | 0 52 | +13 | — | — | 1·4 | 2·2 |
| Tokyo | 4·7 | e 2 10 | ?S | (e 2 10) | + 1 | e 2·8 | 3·6 |

No additional readings.

**Feb. 5d.** Readings also at 0h. (Apia), 1h. (Berkeley, Lick, and near Osaka and Kobe), 3h. (La Paz and near Helwan), 4h. (La Paz and near Helwan), 5h. (Berkeley), 6h. (Lick), 8h. (Taihoku), 9h. (Riverview), 10h. (Victoria, Adelaide, and Melbourne), 11h. (Zi-ka-wei, De Bilt (2), Taihoku (2), and Hong Kong), 14h. (near Mizusawa), 16h. (Taihoku), 17h. (near Mizusawa).

**Feb. 6d.** Readings at 0h. and 2h. (near Taihoku), 5h. (Stonyhurst), 8h. (La Paz), 11h. (near Tokyo), 16h. (Manila), 21h. (La Paz).

**Feb. 7d.** Readings at 5h. (Batavia), 6h. (Zi-ka-wei and La Paz), 16h. (La Paz), 20h. (Stonyhurst), 22h. (near Tokyo and Mizusawa).

Feb. 8d. Readings at 13h. (Simla), 14h. (La Paz), 18h. (Taihoku).

Feb. 9d. 14h. 53m. 36s. Epicentre 33°·2N. 138°·0E. (as on 1921 Mar. 15d.).

A = −·622, B = +·560, C = +·548.

| | | Δ | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|
| | | ° | m. s. | s. | m. s. | s. | m. | m. |
| Nagoya | | 2·2 | 0 24 | −10 | (0 39) | −21 | 0·6 | 1·3 |
| Osaka | | 2·6 | 0 30 | −11 | (0 49) | −23 | 0·8 | 1·8 |
| Kobe | | 2·8 | i 0 45 | + 1 | (1 4) | −13 | 1·1 | 1·3 |
| Tokyo | | 2·8 | 0 52 | + 8 | e 1 29 | +12 | e 1·8 | e 2·6 |
| Mizusawa | N. | 6·4 | 1 33 | − 5 | 2 55 | 0 | — | — |
| Zi-ka-wei | | 14·2 | e 3 19 | −10 | — | — | — | — |

Additional readings: Kobe gives also MN = +1·2m. Tokyo MN = +2·8m. Mizusawa SE = +3m.3s.

Feb. 9d. 23h. 48m. 30s. Epicentre 49°·0N. 144°·0E. (as on 1918 March 23d.).

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

| | | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Mizusawa | E. | 10·1 | 193 | 2 33 | + 2 | 4 22 | −10 | — | — |
| Tokyo | | 13·7 | 195 | i 5 57 | ?S | (i 5 57) | − 4 | (i 6·1) | 6·1 |
| Hamburg | | 70·4 | 334 | — | — | — | — | e 43·5 | — |
| Eskdalemuir | | 72·2 | 342 | — | — | e 21 0 | + 8 | 36·5 | — |
| De Bilt | E. | 73·1 | 335 | — | — | — | — | e 42·5 | 48·0 |
| | N. | 73·1 | 335 | — | — | — | — | e 41·5 | 45·0 |
| Stonyhurst | | 73·3 | 340 | 26 0 | ?$SR_1$ | — | — | — | 53·5 |
| Bidston | | 73·9 | 340 | — | — | — | — | — | 49·5 |
| Uccle | | 74·4 | 335 | — | — | — | — | e 41·5 | 43·5 |
| Zagreb | | 75·0 | 325 | — | — | — | — | 47·5 | — |
| Strasbourg | | 75·4 | 332 | — | — | — | — | e 42·5 | — |
| Pola | | 76·6 | 327 | — | — | — | — | e 47·5 | — |

Additional readings: Mizusawa gives also SN = +4m.28s. Helwan (Δ = 81°·0) gives simply 10d.0h.

Feb. 9d. Readings also at 7h. (Almeria and Wellington), 8h. (La Paz), 9h. (Kodaikanal (2)), 14h. (Azores), 15h. (Manila), 18h. (Oaxaca and Vera Cruz), 21h. (Azores).

Feb. 10d. 13h. 37m. 0s. Epicentre 38°·5N. 142°·5E. (as on 1920 Dec. 28d.).

A = −·621, B = +·476, C = +·623.

| | | Δ | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|
| | | ° | m. s. | s. | m. s. | s. | m. | m. |
| Mizusawa | E. | 1·2 | 0 24 | + 6 | 0 45 | +12 | — | — |
| Tokyo | | 3·6 | i 1 44 | ?S | (i 1 44) | + 5 | i 2·2 | 2·5 |
| Nagoya | | 5·6 | 0 51 | −36 | — | — | 2·0 | 2·6 |
| Osaka | | 6·8 | 1 43 | − 1 | (2 39) | −26 | 2·6 | 3·9 |
| Stonyhurst | | 82·8 | 16 30 | ?$PR_1$ | — | — | — | 18·0 |

Additional readings: Mizusawa gives also PN = +0m.25s. Tokyo iS = +1m.54s.

Feb. 10d. Readings also at 1h. (La Paz), 3h. (Taihoku), 6h. (Zi-ka-wei), 12h. (Manila), 21h. (Stonyhurst).

Feb. 11d. Readings at 2h. (near La Paz), 3h. (Stonyhurst and near La Paz), 8h. (Tacubaya and Oaxaca), 12h. (Innsbruck), 13h. (Manila), 14h. (Manila and Taihoku), 22h. (near Tokyo).

Feb. 12d. Readings at 4h. and 7h. (La Paz), 14h. (near Mizusawa and Tokyo), 15h. (Bidston), 22h. (Nagoya and near Tokyo (2) ), 23h. (near La Paz).

Feb. 13d. Readings at 0h. (near Mizusawa), 5h. (Tiflis), 11h. (La Paz), 17h. (De Bilt), 19h. (De Bilt, Edinburgh, Stonyhurst, Uccle, and La Paz), 20h. (La Paz), 22h. (Taihoku).

Feb. 14d. 1h. 6m. 45s. Epicentre 38°·0N. 136°·0E. (as on 1920 May 12d.).

A = −·567, B = +·547, C = +·616 ; D = +·695, E = +·719, ;
G = −·443, H = +·428, K = −·788.

| | | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Nagoya | | 2·9 | 166 | 0 33 | −12 | — | — | 1·5 | 1·9 |
| Tokyo | | 3·3 | 166 | i 1 6 | +14 | 1 24 | − 7 | 1·6 | 2·5 |
| Osaka | | 3·4 | 188 | 0 39 | −14 | — | — | 1·7 | 3·2 |
| Kobe | | 3·4 | 192 | e 2 4 | +71 | — | — | 2·8 | 3·2 |
| Mizusawa | E. | 4·1 | 74 | 1 0 | − 4 | 1 48 | − 5 | — | — |
| | N. | 4·1 | 74 | 1 3 | − 1 | 1 51 | − 2 | — | — |

Additional readings: Nagoya readings increased by 1m. Osaka gives MN = +2·0m. Kobe MN = +3·0m.

Feb. 14d. 12h. 8m. 30s. (I) } Epicentre 65°·5N. 31°·5W.
12h. 23m. 24s. (II) }

A = +·354, B = −·217, C = +·910 ; D = −·522, E = −·853 ;
G = +·776, H = −·475, K = −·415.

| | | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| I Dyce | N. | 16·1 | 107 | — | — | — | — | i 8·7 | — |
| II | N. | 16·1 | 107 | — | — | — | — | — | 8·3 |
| I Edinburgh | | 16·6 | 112 | 8 30 | ?L | — | — | (8·5) | — |
| II | | 16·6 | 112 | — | — | — | — | — | 10·6 |
| I Eskdalemuir | | 17·0 | 113 | e 4 8 | + 3 | — | — | 8·0 | 9·9 |
| II | | 17·0 | 113 | e 4 4 | − 1 | — | — | 7·6 | 9·3 |
| II Stonyhurst | | 18·4 | 115 | — | — | — | — | — | 10·6 |
| I Bidston | | 18·5 | 117 | 9 8 | ?S | (9 8) | +77 | (10·1) | 12·3 |
| II | | 18·5 | 117 | 4 58 | +35 | 9 27 | ?L | (9·4) | 12·8 |
| II Kew | | 21·1 | 116 | — | — | — | — | — | 12·6 |
| I De Bilt | | 22·7 | 108 | — | — | — | — | e 11·5 | 14·8 |
| II | | 22·7 | 108 | — | — | e 9 30 | +11 | e 11·6 | 14·9 |
| I Uccle | | 23·4 | 111 | e 5 24 | + 3 | — | — | e 11·5 | — |
| II | | 23·4 | 111 | e 5 30 | + 9 | e 9 41 | + 8 | e 10·6 | — |
| I Hamburg | | 23·5 | 100 | — | — | — | — | e 14·5 | — |
| II | | 23·5 | 100 | — | — | — | — | — | 16·6 |
| II Paris | | 24·3 | 117 | — | — | — | — | e 12·6 | — |
| II Strasbourg | | 26·5 | 110 | — | — | — | — | e 14·6 | — |
| II Besançon | | 27·0 | 114 | — | — | e 10 30 | −11 | — | — |
| II Vienna | | 30·1 | 100 | — | — | — | — | e 16·2 | 18·6 |
| I Tortosa | N. | 30·6 | 128 | 6 24 | −10 | — | — | — | — |
| II | | 30·6 | 128 | 6 25 | − 9 | — | — | e 13·6 | 17·9 |
| I Rio Tinto | | 31·3 | 140 | 15 30 | ?L | — | — | (15·5) | 18·5 |
| II | | 31·3 | 140 | 15 36 | ?L | — | — | (15·6) | 18·6 |
| II Florence | | 31·8 | 112 | 18 6 | ?L | — | — | (18·1) | — |
| II Pola | | 32·0 | 107 | — | — | 10 36 | ? | — | — |
| I San Fernando | | 32·6 | 140 | 8 12 | +79 | — | — | — | — |
| II Ithaca | N. | 33·9 | 249 | — | — | — | — | e 23·6 | — |
| I Belgrade | | 34·7 | 98 | — | — | — | — | e 14·0 | — |
| II | | 34·7 | 98 | — | — | — | — | 16·6 | — |
| II Washington | | 37·1 | 245 | 15 54 | ?$SR_1$ | 22 21 | ?L | (22·4) | — |
| II Chicago | | 38·9 | 261 | 15 13 | ?S | (15 13) | +82 | (19·3) | — |
| II Berkeley | | 56·4 | 289 | e 9 56 | + 8 | e 17 10 | −29 | e 19·9 | — |
| II La Paz | | 86·5 | 215 | e 13 4 | + 8 | — | — | — | — |

Additional readings: Eskdalemuir II gives also MN = +10·1m. Bidston II P = +5m.37s. De Bilt II MN = +15·1m. Belgrade I L = +14·4m., II L = +20·0m. and +25·2m. Berkeley eLNZ = +20·2m.

Feb. 14d. 12h. 27m. 45s. Epicentre 26°·0N. 100°·0W.

A = −·156, B = −·885, C = +·438 ; D = −·985, E = +·174 ;
G = −·076, H = −·432, K = −·899.

Very rough.

| | | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Mazatlan | | 6·4 | 246 | — | — | — | — | 2·5 | — |
| Tacubaya | E. | 6·6 | 174 | 1 48 | + 7 | 3 13 | +13 | 3·5 | 5·0 |
| | N. | 6·6 | 174 | 1 48 | + 7 | 3 14 | +14 | 4·6 | 6·4 |
| Vera Cruz | | 7·6 | 151 | 1 45 | −10 | — | — | 3·9 | 5·5 |
| Oaxaca | | 9·4 | 161 | 2 26 | + 4 | — | — | 4·3 | 5·6 |

Mazatlan readings given as 17h.

Feb. 14d. 12h. 45m. 12s. Epicentre 13°·5S. 68°·5E.

A = +·356, B = +·905, C = −·233 ; D = +·930, E = −·366 :
G = −·086, H = −·217, K = −·972.

| | | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Colombo | | 23·3 | 29 | 10 24 | ?S | (10 24) | +53 | 11·8 | 12·7 |
| Kodaikanal | | 25·3 | 21 | 10 36 | ?S | (10 36) | +27 | 14·4 | 16·0 |
| Bombay | | 32·6 | 8 | e 18 39 | ?L | — | — | (e 18·6) | — |
| Batavia | | 38·4 | 83 | e 7 41 | 0 | — | — | i 14·9 | — |
| Calcutta | | 40·9 | 29 | 8 6 | + 4 | 14 6 | −14 | 21·1 | — |
| Capetown | | 49·6 | 236 | 8 18 | −46 | — | — | 22·7 | 25·0 |
| Helwan | | 56·2 | 322 | e 9 48 | + 1 | 17 38 | + 2 | 34·8 | 36·8 |
| Manila | | 59·0 | 63 | e 10 27 | +22 | — | — | 14·3 | — |
| Zi-ka-wei | | 67·6 | 47 | e 8 38 | ? | — | — | — | — |
| Melbourne | | 71·1 | 126 | — | — | e 21 0 | +21 | 36·8 | 40·3 |
| Belgrade | E. | 72·7 | 328 | e 11 39 | + 5 | e 18 16 | ?$PR_1$ | e 25·6 | — |
| Pompeii | | 73·7 | 321 | 11 18 | −22 | 21 18 | + 8 | — | — |
| Budapest | | 75·2 | 328 | 11 38 | −12 | — | — | e 32·1 | — |
| Rocca di Papa | | 75·4 | 321 | e 11 42 | − 9 | — | — | — | 12·3 |
| Zagreb | | 75·8 | 326 | e 11 54 | 0 | — | — | 32·8 | — |
| Riverview | | 76·8 | 123 | — | — | — | — | e 39·7 | 47·5 |
| Sydney | E. | 76·8 | 123 | 33 54 | ? | — | — | 40·3 | 43·8 |
| Vienna | | 77·1 | 329 | 11 49 | −13 | — | — | e 33·3 | 50·3 |
| Florence | | 77·4 | 322 | — | — | — | — | — | 56·3 |
| Innsbruck | | 79·2 | 325 | (e 12 18) | + 4 | e 12 18 | ?P | — | — |
| Algiers | | 79·4 | 314 | e 12 5 | −10 | e 21 37 | −39 | 35·8 | 38·8 |
| Moncalieri | | 80·2 | 321 | e 11 20 | −60 | 22 17 | − 8 | 33·0 | — |
| Strasbourg | | 82·0 | 325 | e 12 48 | +18 | e 15 48? | ?$PR_1$ | e 34·8 | — |
| Besançon | | 82·3 | 323 | — | — | — | — | 34·8 | — |
| Tortosa | N. | 82·9 | 317 | 12 40 | + 5 | — | — | 34·4 | 53·2 |
| Hamburg | | 83·5 | 330 | — | — | e 25 48 | ? | e 50·8 | 66·8 |
| Granada | | 84·4 | 311 | i 12 42 | − 2 | e 23 47 | +35 | e 40·2 | 54·0 |
| Uccle | | 85·0 | 326 | e 12 48 | 0 | 23 19 | 0 | 35·8 | — |
| Paris | | 85·2 | 323 | — | — | — | — | 35·8 | 35·8 |
| De Bilt | | 85·2 | 328 | — | — | e 23 15 | − 6 | 35·8 | 36·6 |
| San Fernando | | 86·1 | 310 | — | — | — | — | 43·5 | 55·3 |
| Rio Tinto | | 86·8 | 311 | 44 48 | ?L | — | — | (44·8) | 58·8 |
| Kew | | 87·8 | 324 | — | — | — | — | — | 61·8 |
| Coimbra | | 89·0 | 313 | e 13 33 | +23 | e 26 34 | ? | 37·8 | 55·6 |
| Stonyhurst | | 90·1 | 325 | — | — | — | — | — | 69·3 |
| Bidston | | 90·3 | 325 | — | — | — | — | — | 71·8 |
| Eskdalemuir | | 91·0 | 328 | — | — | e 23 48 | −36 | 37·3 | 57·8 |
| Dyce | N. | 91·3 | 30 | — | — | — | — | 37·3 | 72·8 |
| Edinburgh | | 91·3 | 328 | 44 48 | ?L | — | — | (44·8) | — |
| La Paz | | 127·7 | 236 | 12 24 | ? | — | — | 51·2 | 55·2 |
| Ithaca | | 138·2 | 320 | — | — | — | — | — | 77·8 |
| Toronto | | 139·2 | 324 | — | — | — | — | e 78·4 | 87·5 |
| Georgetown | E. | 140·4 | 316 | — | — | — | — | 75·8 | — |
| Washington | | 140·4 | 316 | — | — | — | — | e 69·8 | — |
| Ann Arbor | N. | 142·5 | 325 | 61 48 | ?L | — | — | (61·8) | — |
| Victoria | | 143·7 | 12 | — | — | — | — | — | 89·8 |
| Chicago | | 144·9 | 327 | e 19 35 | [−13] | 30 33 | ? | 62·6 | — |

Additional readings : Belgrade gives also $SR_1E$ = +22m.4s., $SR_1N$ = +21m.47s. Rocca di Papa ePN = +11m.47s., iP = +11m.49s. Riverview MN = +44·3m. Granada MN = +51·3m. Uccle $SR_1$ = +28m.52s. San Fernando MN = +53·3m. Coimbra MN = +52·9m. Eskdalemuir MN = +71·8m. Dyce L = +55·3m. Toronto eL = +80·0m.

Feb. 14d. Readings also at 0h. (De Bilt, Stonyhurst, and near Tokyo), 3h. (Riverview), 11h. (St. Louis and near Tokyo), 14h. (Rio Tinto and Kew), 16h. (near La Paz), 18h. (Batavia).

Feb. 15d. 1h. 16m. 6s. Epicentre 37°·0N. 141°·0E.

A = −·621, B = +·502, C = +·602.

Very rough.

| | | Δ | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|
| | | ° | m. s. | s. | m. s. | s. | m. | m. |
| Tokyo | | 1·7 | i 0 33 | + 7 | i 0 47 | − 1 | i 0·9 | 1·6 |
| Mizusawa | N. | 2·1 | 0 35 | + 2 | 1 1 | + 3 | — | — |
| Nagoya | | 3·8 | 0 49 | −10 | — | — | 1·8 | 2·2 |
| Osaka | | 5·1 | — | — | 2 4 | −16 | 3·0 | 3·8 |
| Kobe | | 5·3 | 1 53 | +31 | — | — | i 3·0 | 4·1 |

Additional readings: Tokyo gives also MN = +1·0m. Mizusawa SE = +0m.57s. Osaka MN = +3·9m. Kobe MN = +4·6m.

Feb. 15d. 8h. 10m. 0s. Epicentre 48°·0S. 170°·0E.

A = −·659, B = +·116, C = −·743; D = +·174, E = +·985; G = +·732, H = −·129, K = −·669.

Very scanty material, and the determination is not at all reliable.

| | | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Riverview | | 20·0 | 308 | (e 4 36) | − 5 | e 4 36 | ?P | e 10·1 | 11·5 |
| Melbourne | | 20·9 | 290 | — | — | e 8 24 | −18 | 10·8 | 11·4 |
| Adelaide | | 26·6 | 288 | — | — | e 11 0 | +27 | e 12·0 | 12·6 |
| Manila | | 76·3 | 311 | e 12 0 | + 3 | — | — | — | — |
| La Paz | | 97·3 | 125 | — | — | e 34 41 | ?$SR_1$ | 44·2 | 47·0 |
| Zagreb | | 162·2 | 273 | — | — | — | — | 92·0 | 95·0 |
| Rocca di Papa | E. | 162·8 | 257 | e 19 18 | [−52] | — | — | e 93·6 | — |
| Algiers | | 165·3 | 225 | — | — | — | — | e 68·0 | 88·0 |
| Hamburg | | 166·2 | 302 | — | — | — | — | e 94·0 | — |
| San Fernando | | 168·1 | 195 | 32 54 | ? | — | — | — | 94·5 |
| Granada | | 168·2 | 206 | e 20 13 | [− 1] | 36 56 | ? | e 56·0 | 89·3 |
| Strasbourg | | 168·2 | 279 | — | — | — | — | e 50·0 | — |
| De Bilt | | 169·5 | 299 | — | — | e 53 0 | ? | e 84·0 | 95·0 |
| Rio Tinto | | 169·5 | 195 | 14 0 | ? | — | — | — | 18·0 |
| Tortosa | N. | 169·6 | 230 | — | — | — | — | e 74·0 | 86·2 |
| Dyce | N. | 169·7 | 336 | — | — | — | — | 90·5 | 95·0 |
| Uccle | N. | 170·3 | 292 | — | — | — | — | — | 81·0 |
| Edinburgh | | 171·1 | 335 | 93 0 | ?L | — | — | (93·0) | — |
| Eskdalemuir | | 171·6 | 332 | — | — | — | — | 80·0 | — |
| Paris | | 171·7 | 280 | — | — | — | — | e 92·0 | 93·0 |
| Stonyhurst | | 172·4 | 324 | e 67 30 | ?L | — | — | (e 67·5) | 96·0 |
| Kew | | 172·8 | 304 | — | — | — | — | — | 103·0 |
| Bidston | | 173·0 | 324 | — | — | — | — | — | 103·7 |

Additional readings: Riverview gives also MN = +14·0m. Melbourne $SR_i$ = +9m.24s. Helwan (Δ = 143°·7) gives a reading at 8h. Rocca di Papa iPN = +19m.36s. San Fernando MN = +89·0m. Granada i = +21m.53s. De Bilt MN = +93·7m.

Feb. 15d. Readings also at 0h. (Taihoku), 4h. (Manila, Zi-ka-wei, and Taihoku), 11h. (Perth), 12h. (Azores and Strasbourg), 14h. (Manila, Riverview, Melbourne, Adelaide, and Sydney), 15h. (Eskdalemuir, Uccle, De Bilt, and Stonyhurst), 22h. (Manila and La Paz), 23h. (La Paz).

**Feb. 16d. 2h. 51m. 0s. Epicentre 46°·5N. 28°·3W. (as on 1921 Oct. 21d.).**

A = +·606, B = −·326, C = +·725; D = −·474, E = −·880; G = +·639, H = −·344, K = −·688.

| | | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Coimbra | | 15·7 | 106 | 4 4 | +16 | 5 45 | −63 | 7·3 | — |
| Bidston | | 17·5 | 58 | 5 0 | +49 | 7 46 | +17 | — | 13·3 |
| Eskdalemuir | | 17·9 | 52 | 4 13 | − 3 | e 7 23 | −15 | 8·0 | — |
| Stonyhurst | | 18·0 | 56 | e 4 30 | +13 | — | — | — | 10·3 |
| Edinburgh | | 18·2 | 50 | — | — | — | — | — | 9·3 |
| Oxford | | 18·3 | 63 | i 4 20 | − 1 | (7 42) | − 5 | 8·2 | 9·4 |
| Kew | | 18·9 | 64 | — | — | — | — | — | 10·0 |
| Dyce | N. | 19·2 | 46 | — | — | — | — | i 9·0 | — |
| Granada | | 20·5 | 108 | i 4 52 | + 5 | — | — | 10·2 | — |
| Paris | | 20·7 | 72 | 4 53 | + 4 | — | — | 11·0 | 11·0 |
| Tortosa | N. | 21·5 | 95 | 5 4 | + 5 | 9 0 | + 5 | 11·6 | 12·3 |
| Uccle | | 21·8 | 67 | 5 0 | − 3 | 9 1 | 0 | e 10·0 | — |
| De Bilt | | 22·3 | 63 | e 5 11 | + 2 | e 9 6 | − 5 | e 10·6 | 12·9 |
| Barcelona | | 22·3 | 92 | e 5 10 | + 1 | 9 20 | + 9 | — | — |
| Besançon | | 23·3 | 76 | 5 20? | 0 | — | — | — | — |
| Strasbourg | | 24·2 | 72 | i 5 27 | − 3 | 9 48 | 0 | 12·0 | 14·8 |
| Moncalieri | | 24·9 | 80 | 4 21 | −76 | 10 6 | + 5 | 14·0 | — |
| Algiers | | 25·2 | 101 | 5 43 | + 3 | e 10 15 | + 8 | 13·0 | 14·5 |
| Hamburg | | 25·2 | 60 | — | — | e 11 0 | +53 | — | 15·0 |
| Zagreb | | 30·2 | 75 | — | — | — | — | e 13·0 | — |
| Manila | | 113·0 | 32 | — | — | — | — | e 47·0 | — |

Additional readings: Bidston gives alternative P = +5m.56s. Granada iS = +12m.38s. De Bilt MN = +11·8m.

**Feb. 16d. 3h. 14m. 48s. Epicentre 13°·0N. 85°·4W. (as on 1919 Dec. 5d.).**

A = +·078, B = −·971, C = +·225; D = −·997, E = −·080; G = +·018, H = −·224, K = −·974.

| | | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Balboa Hts. | E. | 7·0 | 124 | 1 36 | −10 | 2 48 | −22 | 3·5 | 4·9 |
| | N. | 7·0 | 124 | 1 40 | − 6 | 2 52 | −18 | 3·6 | 5·8 |
| Oaxaca | | 11·7 | 292 | 2 17 | −38 | 5 37 | +25 | 6·2 | 6·9 |
| Port au Prince | | 13·8 | 65 | — | — | — | — | 7·9 | 10·3 |
| Tacubaya | E. | 14·7 | 298 | 3 26 | − 9 | 7 45 | ?L | — | — |
| | N. | 14·7 | 298 | 3 24 | −11 | 7 42 | ?L | 8·4 | 8·6 |
| Porto Rico | E. | 19·9 | 72 | 4 42 | + 2 | 8 24 | + 3 | 10·1 | 26·0 |
| | N. | 19·9 | 72 | 4 59 | +19 | — | — | 12·7 | 15·1 |
| Mazatlan | | 22·4 | 300 | 3 23 | −107 | — | — | 11·0 | 13·9 |
| St. Louis | | 26·0 | 351 | 5 48 | 0 | 10 30 | + 8 | e 18·4 | 21·0 |
| Cheltenham | E. | 26·8 | 15 | — | — | 12 35 | +118 | 15·5 | 16·3 |
| | N. | 26·8 | 15 | 7 4 | +68 | — | — | 26·8 | 40·3 |
| Georgetown | E. | 26·9 | 14 | e 5 55 | − 2 | e 10 44 | + 5 | e 13·0 | 17·7 |
| | N. | 26·9 | 14 | e 5 55 | − 2 | e 10 50 | +11 | — | 17·4 |
| Washington | | 26·9 | 14 | 7 4 | +67 | 11 4 | +25 | 12·7 | — |
| Chicago | | 28·8 | 355 | 5 51 | −25 | i 10 59 | −14 | 14·1 | 18·7 |
| Ann Arbor | E. | 29·3 | 3 | 12 18 | ?S | (12 18) | +56 | 21·8 | — |
| | N. | 29·3 | 3 | 8 36 | ?$PR_1$ | 15 36 | ?L | 21·8 | — |
| Fordham | N. | 29·6 | 18 | 5 26 | −58 | 11 28 | + 1 | — | 9·2 |
| Tucson | E. | 30·2 | 314 | 7 19 | +49 | — | — | 17·9 | 19·5 |
| Ithaca | | 30·4 | 13 | — | — | 11 34 | − 7 | 16·3 | — |
| Toronto | | 31·1 | 9 | — | — | 13 12 | ?$SR_1$ | e 17·9 | 25·6 |
| Northfield | | 33·1 | 18 | — | — | — | — | e 14·2 | — |
| Ottawa | | 33·4 | 13 | i 6 49 | −11 | i 12 20 | −10 | 18·2 | — |
| La Paz | | 34·1 | 150 | 6 43 | −23 | 11 55 | −47 | i 14·4 | 22·0 |
| Berkeley | | 41·1 | 315 | e 9 45 | ?$PR_1$ | — | — | e 22·0 | 23·7 |
| Victoria | | 47·3 | 326 | — | — | e 21 43 | ? | 27·7 | — |
| Coimbra | E. | 71·8 | 51 | e 10 2 | −86 | 19 1 | −107 | 31·0 | 43·0 |
| | N. | 71·8 | 51 | e 9 57 | −91 | e 20 52 | + 4 | — | — |
| Rio Tinto | | 73·3 | 54 | 36 12 | ?L | — | — | (36·2) | 49·2 |
| San Fernando | E. | 73·7 | 56 | — | — | — | — | — | 36·9 |
| Edinburgh | | 74·9 | 37 | 38 42 | ?L | — | — | (38·7) | 46·0 |
| Eskdalemuir | | 74·9 | 37 | — | — | e 21 20 | − 5 | 32·2 | 43·2 |
| Bidston | | 75·0 | 40 | 19 48? | ?S | (19 48?) | −98 | (27·6?) | 34·6 |

*Continued on next page.*

| | | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Stonyhurst | | 75·4 | 40 | e 22 12 | ?S | (e 22 12) | +42 | — | 45·2 |
| Dyce | N. | 75·5 | 34 | — | — | — | — | 32·8 | 39·2 |
| Granada | | 75·7 | 55 | i 11 43 | −10 | i 21 36 | + 2 | 33·1 | 35·4 |
| Oxford | | 76·2 | 40 | — | — | — | — | 35·1 | 47·7 |
| Kew | | 76·8 | 40 | 35 12 | ?L | — | — | (35·2) | 52·2 |
| Tortosa | N. | 78·5 | 51 | 12 8 | − 2 | 22 8 | + 2 | 33·4 | 42·1 |
| Paris | | 78·9 | 43 | — | — | — | — | e 35·2 | 42·2 |
| Barcelona | | 79·6 | 50 | e 12 52 | +35 | e 21 32 | −47 | e 35·0 | 45·2 |
| Uccle | | 79·8 | 41 | — | — | (22 17) | − 4 | 33·7 | 44·2 |
| De Bilt | E. | 80·1 | 40 | — | — | 22 21 | − 3 | e 37·2 | 48·4 |
| | N. | 80·1 | 40 | — | — | — | — | e 33·2 | 36·1 |
| Algiers | | 81·0 | 54 | — | — | — | — | e 35·2 | 47·2 |
| Besançon | | 81·5 | 45 | — | — | — | — | 42·2 | — |
| Strasbourg | | 82·4 | 43 | — | — | — | — | 41·9 | 45·7 |
| Hamburg | | 82·7 | 37 | — | — | — | — | e 37·2 | 49·2 |
| Moncalieri | | 83·0 | 46 | 12 18 | −18 | 22 50 | − 7 | 33·6 | 45·2 |
| Pola | | 87·2 | 45 | — | — | e 23 31 | −12 | — | 55·1 |
| Rocca di Papa | | 87·3 | 48 | e 12 47 | −14 | e 21 6 | ? | e 44·0 | — |
| Vienna | | 88·0 | 40 | 12 54 | −11 | 23 54 | + 2 | e 43·7 | 47·2 |
| Konigsberg | N. | 88·2 | 34 | — | — | — | — | e 49·3 | 50·2 |
| Zagreb | | 88·4 | 43 | — | — | e 23 50 | − 6 | 38·2 | 49·2 |
| Helwan | | 105·6 | 53 | — | — | e 22 12 | ? | 53·2 | 59·7 |
| Capetown | | 108·7 | 123 | — | — | — | — | — | 63·2 |
| Manila | | 142·0 | 315 | — | — | — | — | e 92·2 | — |
| Kodaikanal | | 151·2 | 37 | 98 48 | ?L | — | — | (98·8) | — |
| Colombo | | 155·3 | 37 | 75 12 | ?L | — | — | (75·2) | 102·2 |

Addtional readings: Oaxaca gives also MN = +7·1m. St. Louis SE = +10m.36s. Cheltenham eE = +10m.17s., eN = +8m.51s., eE = +14m.15s. Washington L = +15·7m. Ann Arbor SE = +18m.36s. Ithaca e = 13m.37s. Toronto E? = +9m.24s., eL = +23·4m. Ottawa LEN = +23·2m., $T_e$ = 3h.14m.40s. Berkeley eE = +9m.46s., MN = +25·7m. San Fernando MN = +41·7m. Uccle S is given as $PR_1$, also S = +27m.33s. (?$SR_1$). Moncalieri MN = +46·5m. Pola e = 3h.5m.?, MN = +55·4m. Rocca di Papa iPN = +12m.48s., eL = +46·7m. Zagreb MNW = +50·2m.

Feb. 16d. Readings also at 1h. and 2h. (Innsbruck), 6h. (Hong Kong), 7h. (Vera Cruz), 10h. (Zagreb and near Port au Prince), 11h. (Algiers), 15h. (La Paz), 19h. (near Taihoku).

Feb. 17d. Readings at 2h., 5h., and 6h. (La Paz), 7h. (near Kobe), 11h. (Helwan), 16h. (Taihoku), 17h. (La Paz), 21h. (Taihoku).

Feb. 18d. Readings at 0h. (Manila), 2h. (Taihoku), 4h. (Riverview), 6h. (Helwan), 7h. (Rocca di Papa), 13h. and 16h. (La Paz), 21h. (Azores), 22h. (Riverview, Adelaide, and Sydney).

Feb. 19d. 21h. 52m. 34s. Epicentre 32°·5N. 31°·5W. (as on 1913 Dec. 25d.).

A = +·719, B = −·441, C = +·537; D = −·523, E = −·853; G = +·458, H = −·281, K = −·843.

| | | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Coimbra | | 20·1 | 61 | 4 51 | + 9 | 7 51 | −34 | 8·9 | 10·7 |
| Rio Tinto | | 21·0 | 69 | 9 26 | ?L | — | — | (9·4) | 12·9 |
| Granada | | 23·3 | 70 | e 5 33 | +13 | i 9 0 | −31 | 11·1 | 13·9 |
| Tortosa | N. | 26·9 | 63 | — | — | — | — | e 12·4 | 13·4 |
| Bidston | | 29·2 | 36 | 10 26 | ?S | (10 26) | −54 | (12·7) | 16·9 |
| Oxford | | 29·2 | 40 | — | — | — | — | — | 14·8 |
| Kew | | 29·6 | 41 | — | — | — | — | — | 16·4 |
| Stonyhurst | | 29·7 | 36 | e 9 26 | ? | — | — | — | 15·4 |
| Paris | | 30·2 | 46 | — | — | e 10 26 | −71 | — | 14·4 |
| Dyce | N. | 31·8 | 29 | — | — | — | — | 12·4 | 14·4 |

*Continued on next page.*

| | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|
| | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Uccle | 32·0 | 44 | — | — | e 11 53 | −15 | e 14·4 | 15·4 |
| De Bilt | 32·9 | 42 | — | — | 12 13 | − 9 | e 14·4 | 16·4 |
| Strasbourg | 33·4 | 49 | — | — | — | — | e 15·4 | — |
| Rocca di Papa | 36·0 | 61 | — | — | — | — | 16·6 | 36·6 |
| Ottawa | 36·2 | 304 | — | — | e 11 45 | −88 | e 14·9 | — |
| Hamburg | 36·2 | 42 | e 6 26 | −58 | — | — | e 16·8 | 18·4 |
| Ithaca | 36·6 | 299 | — | — | (e 13 26) | + 8 | 15·3 | — |
| Georgetown E. | 37·1 | 292 | — | — | — | — | 16·7 | — |
| Washington | 37·1 | 292 | — | — | (e 13 44) | +19 | e 13·7 | — |
| Zagreb | 38·3 | 56 | — | — | e 12 26 | −76 | — | 21·4 |
| Toronto | 38·7 | 301 | — | — | — | — | 22·3 | 24·5 |
| Ann Arbor N. | 41·9 | 300 | — | — | (14 14) | −20 | 14·2 | — |
| Konigsberg N. | 42·4 | 42 | — | — | — | — | e 23·1 | 24·5 |
| Chicago | 44·9 | 299 | 9 51 | +79 | 13 58 | −76 | 15·8 | — |
| La Paz | 60·2 | 220 | 10 13 | 0 | 18 25 | − 1 | 29·0 | 42·7 |

Additional readings and notes: Coimbra gives also MN = +10·2m., $T_0$ = 21h.53m.42s. Granada i = +6m.6s., S? = 10m.13s. Bidston P = +12m.6s. Paris MN = +12·4m. De Bilt MN = +16·3m. Ottawa LE = +19·4m. Ithaca S is given as eL. Georgetown eLN? = +13·8m., LN = +15·0m. Helwan (Δ = 53°·0) gives a reading at 22h. simply.

Feb. 19d. Readings also at 0h. (Zante and near Athens), 1h. and 4h. (Riverview), 7h. (Osaka and Manila), 18h. (Batavia), 19h. (La Paz), 20h. (Zi-ka-wei), 21h. (La Paz, Manila, and Riverview), 23h. (La Paz).

Feb. 20d. 7h. 43m. 50s. Epicentre 17°·0S. 168°·0W. (as on 1914 Dec. 20d.).

A = −·935, B = −·199, C = −·292; D = −·208, E = +·978; G = +·286, H = +·061, K = −·956.

| | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|
| | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Apia | 4·8 | 310 | 1 18 | + 4 | 2 16 | + 5 | — | 3·2 |
| Wellington | 28·5 | 208 | e −0 22 | ? | e 9 34 | −94 | e 13·8 | 14·7 |
| Christchurch | 30·9 | 208 | (6 34) | − 3 | 6 34 | ?P | 16·9 | 20·5 |
| Riverview | 40·2 | 237 | — | — | e 15 10 | +60 | e 16·7 | 19·5 |
| Sydney E. | 40·2 | 237 | 7 58 | + 1 | — | — | 17·5 | 20·4 |
| Melbourne | 46·1 | 233 | — | — | 13 22 | −127 | 20·8 | 24·7 |
| Adelaide | 50·7 | 238 | — | — | e 14 10 | −137 | e 27·0 | 27·7 |
| Perth | 69·6 | 241 | 9 15 | −120 | 19 1 | −80 | 35·3 | — |
| Manila | 76·9 | 290 | e 11 52 | − 8 | — | — | — | — |
| Batavia | 83·6 | 266 | i 11 56 | −44 | i 22 30 | −35 | — | — |
| La Paz | 94·2 | 109 | e 18 15 | ?$PR_1$ | 24 13 | −45 | — | 48·0 |
| Chicago | 94·3 | 48 | — | — | — | — | e 50·2 | — |
| Ann Arbor N. | 97·3 | 48 | — | — | — | — | 51·3 | — |
| Toronto | 100·6 | 47 | — | — | — | — | e 56·8 | 60·8 |
| Georgetown E. | 101·3 | 53 | — | — | — | — | e 56·8 | — |
| Ottawa | 103·5 | 46 | — | — | e 47 58 | ? | e 53·7 | — |
| Stonyhurst | 141·5 | 14 | 73 10 | ?L | — | — | (73·2) | 90·2 |
| Zagreb N.W. | 151·0 | 354 | e 19 58 | [+ 1] | — | — | — | — |

Additional readings: Christchurch gives also $SR_1$ = +11m.16s., $SR_2$ = +12m.52s. Riverview e = +12m.4s., MN = +19·2m. Melbourne $SR_1$ = +16m.40s. Adelaide e = +20m.10s., eL? = +22·2m.; the reading taken as L is given as e. Perth +5m.9s., $PR_1$ = +12m.32s. Batavia i = +21m.47s.

Feb. 20d. Readings also at 11h. and 12h. (near Mizusawa), 13h. (Apia and Wellington), 15h. (Wellington and Adelaide), 16h. (Christchurch and Riverview), 17h. (Tiflis).

Feb. 21d. Readings at 3h. (Taihoku), 18h. (Honolulu).

**Feb. 22d. 17h. 18m. 40s. Epicentre 28°·0N. 127°·0E.**

A = −·531, B = +·705, C = +·470.

Very rough.

| | Δ | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|
| | ° | m. s. | s. | m. s. | s. | m. | m. |
| Nagasaki | 5·3 | 1 33 | +11 | — | — | 2·6 | — |
| Taihoku | 5·7 | e 1 36 | + 8 | — | — | 2·6 | — |
| Zi-ka-wei | 5·8 | i 1 40 | +10 | e 2 35 | − 4 | — | 3·1 |
| Tokyo | 13·2 | e 2 56 | −20 | — | — | e 5·0 | 6·6 |
| Manila | 14·6 | e 5 55 | ?S | (e 6 5) | −17 | — | — |

Zi-ka-wei gives also MN = +3·0m.

Feb. 22d. Readings also at 8h. (Edinburgh), 9h. (near Mizusawa), 19h. (La Paz), 22h. (Zagreb, Vienna, and La Paz), 23h. (Simla).

Feb. 23d. Readings also at 0h. (Perth), 2h. (Algiers), 14h. (La Paz), 15h. (Manila), 16h. (Riverview, Adelaide, Sydney, Perth, and Melbourne), 17h. (La Paz), 20h. (near Padova, Pola, Rocca di Papa, Vienna, and Zagreb), 23h. (Manila and Zagreb).

**Feb. 24d. 13h. 27m. 20s. Epicentre 40°·5N. 22°·5E.**

A = +·702, B = +·291, C = +·649; D = +·383, E = −·924;
G = +·600, H = +·248, K = −·760.

| | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|
| | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Athens | 2·8 | 160 | 0 35 | − 9 | 1 30 | +13 | e 1·7 | 2·2 |
| Belgrade | 4·6 | 342 | i 1 19 | + 8 | i 1 56 | −10 | — | 2·0 |
| Zagreb N.W. | 7·1 | 320 | — | — | e 2 58 | −15 | i 4·1 | 9·4 |
| Rocca di Papa | 7·5 | 282 | e 4 22 | ?L | — | — | (e 4·4) | — |
| Pola | 7·7 | 307 | — | — | — | — | e 3·8 | — |

Additional readings: Athens gives also MN = +2·5m. Zagreb MNE = +9·2m. Rocca di Papa e = +34s. Helwan gives small tremor at 13h.

Feb. 24d. Readings also at 0h. (near Tokyo and Mizusawa), 5h. (La Paz, De Bilt Chicago, Honolulu, and Victoria), 6h. (Zi-ka-wei), 8h. (Zi-ka-wei and near Mizusawa), 20h. (La Paz).

Feb. 25d. Readings at 3h. (near La Paz), 10h. (Zagreb), 13h. (Manila), 23h. (Dyce).

**Feb. 26d. 8h. 56m. 40s. Epicentre 44°·0N. 145°·0E.**

A = −·589, B = +·413, C = +·695; D = +·574, E = +·819;
G = −·569, H = +·399, K = −·719.

| | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|
| | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Ootomari | 3·1 | 329 | 1 2 | +13 | — | — | 2·1 | 2·8 |
| Mizusawa | 5·7 | 212 | 1 30 | + 2 | 2 40 | + 4 | — | — |
| Manila | 35·8 | 223 | e 6 48 | −32 | — | — | — | — |
| Victoria | 59·7 | 50 | — | — | — | — | 27·8? | 32·4 |
| Colombo | 67·4 | 259 | 44 20 | ?L | — | — | (44·3) | 49·3 |
| De Bilt E. | 77·8 | 336 | — | — | — | — | e 38·3 | — |
| Uccle | 79·2 | 336 | e 12 2 | −12 | — | — | e 38·3 | — |
| Zagreb | 79·5 | 327 | e 12 14 | − 2 | — | — | — | — |

Additional readings: Ootomari gives also MN = +2·7m. Mizusawa SN = +2m.42s. De Bilt eLN = +40·3m.

Feb. 26d. Readings also at 2h. (La Paz), 3h. (Colombo), 5h. (Tortosa and Alicante), 7h. (Colombo), 18h. (near Chur, Innsbruck, Zurich, Munich, Padova, and Zagreb), 19h. (Almeria and Bidston), 20h. and 22h. (La Paz).

**Feb. 27d. 20h. 39m. 50s. Epicentre 10°·0N. 123°·0E.**

A = −·536, B = +·826, C = +·174; D = +·839, E = +·545; G = −·095, H = +·146, K = −·985.

| | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|
| | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Manila | 5·0 | 337 | e 1 19 | + 2 | (2 21) | + 4 | 2·4 | 4·6 |
| Hong Kong | 14·9 | 327 | 3 35 | − 3 | — | — | 9·3 | — |
| Zi-ka-wei | 21·2 | 356 | 4 56 | + 1 | e 8 48 | 0 | — | — |
| Batavia | 22·8 | 225 | i 5 15 | 0 | — | — | i 10·8 | — |
| Colombo | 42·7 | 269 | 10 22 | +126 | — | — | — | 31·2 |
| Riverview | 51·4 | 150 | — | — | e 16 28 | − 8 | — | 20·7 |
| De Bilt | 98·4 | 327 | — | — | — | — | e 51·2 | 53·4 |
| Uccle | 99·4 | 326 | — | — | — | — | e 51·2 | — |
| Eskdalemuir | 100·9 | 332 | — | — | — | — | 49·2 | — |

Additional readings: Manila gives also MN = +4·3m. Riverview MN = +20·5m. De Bilt MN = +53·6m.

**Feb. 27d.** Readings also at 2h. (Kobe (2) ), 6h. (Zante), 15h. (La Paz), 17h. (Tortosa and La Paz).

**Feb. 28d.** Readings at 1h. (near Manila and near Tokyo and Mizusawa), 13h. (Perth and near Tokyo and Mizusawa), 14h. (Perth), 15h. (near Melbourne and Riverview), 17h. (Tiflis), 21h. (Tucson, La Paz, Georgetown, Washington, Ann Arbor, Chicago, Ottawa, Toronto, Vera Cruz, Oaxaca, and Tacubaya).

**Mar. 1d.** Readings at 7h. (Taihoku), 8h. (La Paz), 9h. (Zi-ka-wei, Manila (2), and Helwan), 11h. (Helwan), 16h. (Besançon and La Paz), 17h. (La Paz (2) ), 21h. (Berkeley and Tiflis).

**Mar. 2d. 14h. 49m. 27s. Epicentre 43°·0N. 44°·0E. (as on 1921 June 29d.).**

A = +·526, B = +·508, C = +·682; D = +·695, E = −·719; G = +·491, H = +·474, K = −·731.

| | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|
| | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Lemberg | 15·3 | 303 | — | — | e 6 3 | −36 | e 10·2 | 11·6 |
| Belgrade | 17·0 | 284 | e 5 56 | ? | e 9 2 | ?L | e 13·5 | — |
| Budapest | 18·0 | 293 | 3 52 | +25 | — | — | — | — |
| Konigsberg | 19·3 | 316 | i 4 34 | + 1 | 8 2 | − 6 | 12·2 | — |
| Vienna | 19·9 | 295 | i 4 45 | + 5 | e 8 30 | + 9 | 10·9 | 12·8 |
| Zagreb | 20·1 | 288 | e 4 48 | + 6 | — | — | e 12·6 | — |
| Pola | 21·6 | 285 | — | — | e 8 45 | −12 | — | 15·5 |
| Rocca di Papa | 23·0 | 278 | i 5 18 | + 1 | — | — | — | 6·0 |
| Upsala | 23·2 | 326 | i 5 26 | + 7 | i 9 27 | − 2 | — | 15·3 |
| Hamburg | 24·7 | 307 | e 5 49 | +14 | e 9 52 | − 5 | e 12·8 | 17·8 |
| De Bilt | 27·4 | 303 | — | — | e 10 47 | − 1 | e 13·8 | — |
| Eskdalemuir | 32·5 | 309 | — | — | — | — | 14·6 | — |

Additional readings: Belgrade gives also L = +22·9m., e = +40m.57s. Konigsberg iPE = +4m.38s., SN? = +8m.0s., LN = +10·2m., and LE = +13·3m. Vienna iPEZ = +4m.46s., iZ = +4m.52s., +5m.3s., and +5m.14s. Rocca di Papa iPN = +5m.21s. Upsala iSN = +9m.25s., all readings given as for 13h. Hamburg MN = +18·8m. Helwan gives slight tremors at 14h.

**Mar. 2d.** Readings also at 0h. (Marseilles), 3h. (near Algiers), 9h. (Stonyhurst, Nagasaki, and La Paz), 10h. (De Bilt, Stonyhurst, and Eskdalemuir), 13h. (Tiflis), 14h. (Taihoku and Batavia), 15h. (Taihoku).

**Mar. 3d. Readings at 2h. (La Paz (2) ), 21h. (near Tokyo), 23h. (La Paz).**

## 1922. Mar. 4d. 13h. 7m. 34s. Epicentre 52°·5N. 157°·5E.

A = −·562, B = +·233, C = +·793 ; D = +·383, E = +·924 ;
G = −·733, H = +·304, K = −·609.

A depth of focus 0·030 is assumed ; see note at end.

| | | Corr. for Focus | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Ootomari | | −0·5 | 11·2 | 244 | 2 47 | + 7 | (4 47) | − 1 | 4·8 | 4·9 |
| Mizusawa | E. | −1·0 | 17·5 | 227 | 4 1 | + 2 | 7 12 | + 5 | — | — |
| | N. | −1·0 | 17·5 | 227 | 4 2 | + 3 | 7 10 | + 3 | — | — |
| Tokyo | | −1·3 | 21·0 | 224 | 5 0 | +23 | 6 11 | ? | 7·7 | 8·7 |
| Nagoya | | −1·4 | 22·6 | 228 | 4 42 | −13 | — | — | — | 10·5 |
| Osaka | | −1·5 | 23·7 | 230 | 5 4 | − 3 | (9 0) | − 9 | 9·0 | 9·2 |
| Kobe | | −1·5 | 23·9 | 230 | i 7 4 | ? | (i 9 3) | −10 | i 9·0 | 10·4 |
| Nagasaki | E. | −1·8 | 28·0 | 236 | 5 33 | −17 | (10 15) | −11 | 10·2 | 16·1 |
| | N. | −1·8 | 28·0 | 236 | — | — | (10 2) | −24 | 10·0 | 12·0 |
| Zi-ka-wei | | −2·2 | 33·7 | 245 | i 5 46? | −57 | e 10 56 | −64 | — | 15·8 |
| Taihoku | E. | −2·4 | 38·5 | 239 | 7 11 | −12 | 10 25 | ? | 12·6 | — |
| Hong Kong | | −2·8 | 44·6 | 244 | 7 56 | −13 | — | — | 20·4 | 22·9 |
| Honolulu | E. | −2·9 | 46·1 | 116 | 8 20 | 0 | 14 47 | − 4 | 21·4 | — |
| | N. | −2·9 | 46·1 | 116 | — | — | 14 59 | + 8 | 21·5 | — |
| Manila | | −3·0 | 47·7 | 232 | i 8 28 | − 3 | (15 1) | −10 | 15·0 | 17·8 |
| Victoria | | −3·0 | 48·0 | 61 | 9 35 | +62 | i 16 2 | +47 | 21·1 | 22·5 |
| Berkeley | | −3·4 | 55·3 | 71 | i 9 20 | + 1 | i 17 10 | +27 | e 23·7 | — |
| Calcutta | | −3·6 | 59·7 | 270 | 9 44 | − 3 | 14 25 | ? $PR_1$ | 19·2 | — |
| Upsala | | −3·7 | 63·1 | 339 | i 10 9 | + 1 | i 18 20 | + 4 | — | 37·2 |
| Konigsberg | N. | −3·7 | 66·9 | 335 | i 10 33 | 0 | 19 3 | 0 | 35·5 | 44·2 |
| | E. | −3·7 | 66·9 | 335 | 10 36 | + 3 | 19 6 | + 3 | 35·4 | 36·7 |
| Dyce | N. | −3·8 | 69·0 | 350 | i 10 49 | + 3 | 20 29 | +62 | — | — |
| Tiflis | | −3·8 | 69·3 | 314 | (9 56) | −52 | 9 56 | ? P | 27·4 | — |
| Chicago | | −3·8 | 70·2 | 46 | 11 48 | +54 | 19 46 | + 4 | 29·6 | — |
| Lemberg | | −3·8 | 70·3 | 330 | e 11 2 | + 7 | — | — | e 28·6 | 36·2 |
| Edinburgh | | −3·8 | 70·4 | 350 | — | — | i 19 47 | + 2 | — | — |
| Hamburg | | −3·8 | 70·5 | 341 | i 10 59 | + 3 | i 19 54 | + 8 | — | 41·8 |
| Eskdalemuir | | −3·8 | 71·0 | 350 | i 10 57 | − 2 | i 19 55 | + 3 | — | — |
| Ann Arbor | E. | −3·8 | 71·5 | 43 | 14 2 | ? $PR_1$ | 22 8 | ? | 40·0 | — |
| | N. | −3·8 | 71·5 | 43 | 14 8 | ? $PR_1$ | 22 38 | ? | 33·3 | — |
| St. Louis | | −3·8 | 71·6 | 50 | i 11 1 | − 2 | i 20 6 | + 6 | e 30·4 | — |
| Bombay | | −3·8 | 71·9 | 278 | 11 11 | + 6 | — | — | — | — |
| Ottawa | | −3·8 | 72·0 | 37 | i 12 0 | +55 | i 20 7 | + 3 | e 29·4 | — |
| Toronto | | −3·8 | 72·1 | 40 | 10 8 | −58 | 17 2 | ? | e 33·5 | 45·1 |
| Stonyhurst | | −3·8 | 72·3 | 348 | — | — | (20 26) | +18 | 20·4 | 22·2 |
| Batavia | | −3·9 | 72·6 | 233 | i 11 13 | + 4 | i 20 16 | + 6 | — | — |
| De Bilt | | −3·9 | 72·8 | 343 | 11 14 | + 4 | i 20 20 | + 7 | — | 42·6 |
| Bidston | | −3·9 | 72·9 | 348 | 18 2? | ? $PR_1$ | 21 14 | +60 | — | 22·4 |
| West Bromwich | | −3·9 | 73·6 | 347 | 11 16 | + 1 | 20 22 | 0 | — | — |
| Vienna | | −3·9 | 73·9 | 334 | i 11 18 | + 1 | i 20 29 | + 3 | 28·7 | 38·4 |
| Budapest | | −3·9 | 73·9 | 332 | i 10 50 | −27 | e 20 2 | −24 | 30·0 | — |
| Oxford | | −3·9 | 74·2 | 348 | — | — | i 20 22 | + 2 | — | — |
| Northfield | | −3·9 | 74·2 | 35 | 12 15 | +56 | 20 32 | + 2 | — | — |
| Uccle | | −3·9 | 74·2 | 344 | 11 19 | 0 | 30 33 | + 3 | — | — |
| Kew | | −3·9 | 74·3 | 348 | — | — | — | — | — | 28·4 |
| Strasbourg | | −3·9 | 75·7 | 340 | i 11 28 | 0 | 20 50 | + 2 | 33·4 | 42·7 |
| Belgrade | | −3·9 | 75·9 | 330 | i 11 31 | + 1 | i 20 50 | 0 | e 29·7 | 36·7 |
| Innsbruck | | −3·9 | 76·1 | 337 | i 11 31 | 0 | i 20 55 | + 3 | e 35·3 | 42·3 |
| Zagreb | N.E. | −3·9 | 76·3 | 333 | i 11 32 | 0 | i 20 57 | + 2 | — | 42·6 |
| | N.W. | −3·9 | 76·3 | 333 | e 11 33 | + 1 | i 20 54 | − 1 | e 33·5 | 40·4 |
| Paris | | −3·9 | 76·5 | 344 | i 11 34 | 0 | i 20 59 | + 2 | 36·4 | 45·4 |
| Fordham | E. | −3·9 | 76·6 | 38 | e 12 27 | +53 | e 21 1 | + 3 | e 31·2 | — |
| Zurich | | −3·9 | 76·6 | 339 | e 11 33 | − 1 | i 21 0 | + 2 | — | — |
| Colombo | | −3·9 | 76·9 | 266 | 11 26 | −10 | — | — | — | 27·9 |
| Georgetown | E. | −3·9 | 77·0 | 40 | e 11 26 | −11 | i 21 6 | + 3 | e 32·8 | — |
| | N. | −3·9 | 77·0 | 40 | 11 38 | + 1 | 21 9 | + 6 | 47·0 | — |
| Washington | | −3·9 | 77·0 | 40 | 13 26 | +109 | 22 5 | +62 | — | — |
| Besançon | | −3·9 | 77·4 | 340 | 11 40 | + 1 | 21 8 | 0 | 33·4 | — |
| Padova | | −4·0 | 77·7 | 336 | 9 59 | ? | 19 26 | −104 | — | 19·8 |
| Pola | | −4·0 | 77·7 | 334 | e 11 42 | + 2 | e 21 12 | + 2 | e 35·0 | 41·4 |
| Moncalieri | | −4·0 | 79·1 | 339 | 11 43 | − 7 | 22 6 | +39 | 30·8 | 45·9 |
| Florence | | −4·0 | 79·4 | 337 | 11 51 | 0 | 21 26 | − 4 | — | 32·9 |
| Rocca di Papa | | −4·0 | 80·9 | 334 | 11 54 | − 6 | i 21 41 | − 7 | e 33·6 | — |
| | | −4·0 | 80·9 | 334 | i 11 56 | − 4 | e 21 44 | − 4 | i 23·9 | — |

*Continued on next page.*

| | | Corr. for Focus | Δ | Az. | P. | O—C. | S. | O—C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Athens | | −4·0 | 81·1 | 325 | 11 58 | − 4 | i 21 44 | − 6 | e 38·4 | — |
| Pompeii | | −4·0 | 81·4 | 332 | 12 1 | − 2 | 21 46 | − 7 | 39·4 | 42·4 |
| Tacubaya | E. | −4·0 | 82·4 | 69 | 12 6 | − 3 | 22 6 | + 1 | — | — |
| | N. | −4·0 | 82·4 | 69 | 12 9 | 0 | 22 8 | + 3 | — | — |
| Barcelona | | −4·1 | 83·6 | 342 | e 12 13 | − 3 | 22 15 | − 3 | e 35·2 | 46·3 |
| Tortosa | | −4·1 | 84·5 | 344 | 12 16 | − 5 | 22 17 | −11 | e 38·4 | — |
| Helwan | | −4·1 | 85·2 | 316 | i 12 20 | − 6 | 22 20 | −16 | — | 22·4 |
| Coimbra | | −4·1 | 86·5 | 350 | 12 24 | − 8 | i 22 43 | − 7 | 37·4 | — |
| Riverview | | −4·1 | 86·5 | 185 | e 12 27 | − 5 | e 22 27 | −23 | e 38·9 | 43·7 |
| Algiers | | −4·2 | 88·0 | 339 | 12 29 | −12 | 22 36 | −31 | 50·9 | — |
| Rio Tinto | | −4·2 | 88·6 | 349 | 25 26 | ? $SR_1$ | — | — | — | 27·4 |
| Granada | | −4·2 | 88·8 | 347 | i 12 38 | − 8 | i 23 12 | − 3 | e 38·7 | 51·2 |
| San Fernando | | −4·2 | 89·8 | 348 | — | — | — | — | — | 25·0 |
| Melbourne | | −4·2 | 91·0 | 190 | — | — | — | — | 43·9 | 46·3 |
| Perth | | −4·2 | 91·9 | 215 | 17 29 | ? $PR_1$ | 23 0 | −49 | 29·0 | — |
| La Paz | | — | 129·3 | 60 | 19 1 | [−16] | 31 51 | +115 | 58·2 | — |
| Cape Town | | — | 145·5 | 284 | 19 18 | [−31] | — | — | — | — |

Additional readings: Ootomari MN = +4·8m. Osaka MN = +9·1m. Kobe MN = +9·3m. Nagasaki SN = +6m.28s., SE = +6m.32s. Honolulu $PR_1N$ = +9m.55s., $SR_1E$ = +17m.56s., $SR_1N$ = +17m.46s., $SR_2E$ = +19m.16s., $SR_2N$ = +19m.7s. Manila MN = +15·2m. Victoria L = +26·9m. Berkeley iNEZ = +10m.10s., iNE = +18m.50s. Upsala i = +11m.35s., $PR_1$ = +13m.17s., i = +19m.36s., and +19m.57s., MN = +40·7m. Konigsberg E = +11m.27s., $PR_1Z$ = +13m.44s., $PR_2Z$ = +15m.31s., PSN = +20m.4s., PSE = +20m.7s. Dyce iN = +19m.34s. Tiflis P? = 13h.7m. Chicago $PR_1$ = +14m.28s. Hamburg MN = +40·4m. Ottawa i$PR_1N$ = +14m.33s., $T_0$ = 13h.9m.30s. Toronto E = +13m.50s., iL = +26·8m., eL = +44·4m. Stonyhurst P = 12h.45m.0s. De Bilt i = +20m.57s. Vienna iZ = +11m.32s., iS? = +19m.57s. Uccle i = +12m.13s., and +22m.9s., $SR_1$ = +26m.45s. Epicentre 55°N. 152°E. Strasbourg iV = +12m.22s., iN = +16m.56s., iE = +22m.28s., MN = +43·2m. Belgrade $PR_1E$ = +12m.24s., $PR_1N$ = +12m.28s., $PR_2EN$ = +16m.59s., $SR_1E$ = +22m.0s., $SR_1N$ = +22m.4s., MN = +36·6m. Zagreb iPNW = +11m.40s., i = +11m.52s., i$PR_1$ = +14m.28s. Paris i = +22m.35s., MN = +44·4m. Fordham SN = +21m.3s. Zurich i = +12m.51s., and +22m.41s. Epicentre 53°·0N. 145°·0E. Georgetown iE = +12m.31s., iN = +12m.34s. Pola MN = +42·5m. Moncalieri MN = +39·2m. Rocca di Papa iSN = +21m.51s. Athens iP = +11m.59s., i = +16m.0s., $T_0$ = 13h.7m.46s. Barcelona S = +23m.55s. Coimbra iE = +24m.18s., LE = +51·4m., $T_0$ = 13h.7m.37s. Epicentre 57°·6N. 171°·0E. Riverview iPS? = +22m.47s., MN = +45·3m. Granada $PR_1$ = +16m.14s., iS = +22m.42s., $SR_1$ = +25m.5s. San Fernando MN = +26·1m. La Paz i$PR_1$ = +19m.54s.

The evidence for the abnormal focal depth rests chiefly on the Japanese stations in azimuths near 225°, and the American stations in azimuths near 45°. But that of the latter is weakened by several cases of large positive P residuals (Victoria, Ottawa, Toronto, Northfield, Fordham, Washington), though Berkeley, St. Louis, and Georgetown are all in good accord.

Mar. 4d. Readings also at 2h. (Manila), 3h. (La Paz), 5h. (Manila, Nagoya, La Paz, Adelaide, Batavia, and Melbourne), 6h. (near Mizusawa), 13h. (Riverview, Adelaide, and Melbourne (2) ), 17h. (Riverview), 20h. (Zagreb), 22h. (Batavia).

Mar. 5d. Readings at 2h. (La Paz), 4h. (near Mizusawa), 7h. (near Taihoku), 9h. (Batavia and near Tokyo), 10h. (Batavia, Zagreb, and near Belgrade), 19h. (La Paz), 23h. (Tokyo).

**Mar. 6d. 21h. 20m. 30s.** Epicentre 52°·5N. 157°·5E. (as on Mar. 4d.).

The same depth of focus 0·030 is assumed as on Mar. 4d.

| | | Corr. for Focus | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Mizusawa | E. | −1·0 | 17·5 | 227 | 3 54 | − 5 | 7 1 | − 6 | — | — |
| | N. | −1·0 | 17·5 | 227 | 4 0 | + 1 | 7 12 | + 5 | — | — |
| Tokyo | | −1·3 | 21·0 | 224 | e 4 46 | + 9 | — | — | — | — |
| Osaka | | −1·5 | 23·7 | 230 | 26 36 | ? | — | — | — | 31·9 |
| Kobe | | −1·5 | 23·9 | 230 | i 5 10 | 0 | — | — | — | 10·9 |
| Manila | | −3·0 | 47·7 | 232 | e 8 54 | +23 | (15 18) | + 7 | 15·3 | — |
| Batavia | E. | −3·9 | 72·6 | 233 | i 10 32 | −37 | — | — | — | — |

Additional readings: Kobe gives also MN = +10·0m. Batavia iE = +11m.30s. Helwan gives slight tremors at 21h.

**Mar. 6d.** Readings also at 12h. (near Taihoku).

**Mar. 7d. 16h. 54m. 50s.** Epicentre 23°·3S. 150°·6E. (as on 1918 June 6d.).

A = −·800, B = +·451, C = −·396; D = +·491, E = +·871; G = +·344, H = −·194, K = −·918.

| | | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Sydney | E. | 10·5 | 178 | 2 40 | + 3 | — | — | 6·9 | 8·9 |
| Riverview | | 10·5 | 178 | (e 2 41) | + 4 | e 2 41 | ?P | e 4·1 | 8·8 |
| Melbourne | | 15·3 | 197 | 3 40 | − 3 | 6 58 | +19 | 8·5 | 11·6 |
| Adelaide | | 15·6 | 219 | (e 2 10) | −97 | e 2 10 | ?P | e 7·2 | 10·1 |
| Christchurch | | 27·2 | 144 | 5 52 | − 8 | 10 16 | −29 | 17·0 | 20·2 |
| Perth | | 31·8 | 247 | — | — | 14 12 | ?L | 19·1 | — |
| De Bilt | | 141·0 | 326 | — | — | — | — | e 55·2 | — |

Additional readings and notes: Riverview gives also P = 16h.53m.21s., MN = +17·0m. Adelaide e = +8m.52s. and +16m.28s., i = +13m.44s. Perth $PR_1$ = +9m.19s., $SR_1$ = +16m.1s. De Bilt eLN = +57·2m.

**Mar. 7d.** Readings also at 11h. (Hong Kong and Zi-ka-wei), 13h. (near Osaka, Kobe, and Nagoya), 14h. (Tiflis (2)), 16h. (Manila), 17h. (Hong Kong, Riverview, and Zi-ka-wei), 19h. (near Tokyo), 22h. (Batavia, Melbourne, Riverview, Sydney, and Manila), 23h. (De Bilt and Eskdalemuir).

**Mar. 8d. 17h. 33m. 45s.** Epicentre 34°·5N. 25°·0E. (as on 1921 Oct. 4d.).

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 | 1 9 | +13 | 1 51 | +12 | 2·0 | 2·5 |
| Helwan | | 7·1 | 129 | e 2 10 | +22 | 3 35 | ?L | (3·6) | 9·8 |
| Pompeii | | 10·3 | 310 | 4 18 | ?S | (4 18) | −19 | (6·3) | — |
| Belgrade | | 10·9 | 343 | e 3 0 | +17 | i 4 57 | + 5 | e 6·2 | 6·8 |
| Rocca di Papa | | 12·1 | 310 | i 3 9 | + 9 | i 6 9 | ?L | (i 6·2) | 7·4 |
| Zagreb | N.E. | 13·2 | 331 | e 3 22 | + 6 | i 5 43 | − 6 | e 7·1 | 8·4 |
| | N.W. | 13·2 | 331 | e 3 26 | +10 | i 5 46 | − 3 | e 7·2 | 9·0 |
| Pola | | 13·4 | 324 | 3 15? | − 3 | e 5 52 | − 1 | e 8·1 | 8·7 |
| Budapest | | 13·7 | 343 | e 5 51 | ?S | (e 5 51) | −30 | — | — |
| Padova | | 14·8 | 321 | 3 33 | − 3 | 8 7 | ?L | (8·1) | 18·8 |
| Vienna | | 15·2 | 337 | 3 44 | + 2 | i 7 20 | +43 | e 8·3 | 10·2 |
| Lemberg | | 15·4 | 359 | e 4 27 | +43 | — | — | e 8·4 | 10·0 |
| Innsbruck | N.E. | 16·4 | 326 | e 3 58 | + 1 | i 7 1 | − 3 | — | 10·2 |
| | N.W. | 16·4 | 326 | i 3 56 | − 1 | — | — | e 9·6 | 11·2 |

*Continued on next page.*

| | | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Algiers | | 17·9 | 284 | e 4 11 | − 5 | 7 30 | − 8 | — | — |
| Strasbourg | | 19·0 | 323 | e 4 21 | − 8 | e 7 57 | − 5 | — | 11·2 |
| Tortosa | N. | 20·3 | 295 | 4 57 | +12 | 8 15 | −14 | — | 16·9 |
| Konigsberg | | 20·6 | 352 | i 4 46 | − 2 | 8 36 | 0 | 13·6 | 15·4 |
| Hamburg | | 21·8 | 336 | e 5 4 | + 1 | e 9 15 | +14 | — | 13·4 |
| Uccle | | 22·1 | 324 | e 5 3 | − 3 | e 9 24 | +17 | — | — |
| De Bilt | | 22·6 | 327 | e 6 39 | ?$PR_1$ | e 8 57 | −20 | e 12·2 | — |
| Granada | | 23·2 | 285 | e 5 49 | +30 | — | — | — | — |
| Kew | | 24·9 | 321 | — | — | — | — | — | 19·2 |
| Oxford | | 25·6 | 321 | — | — | — | — | — | 17·8 |
| Upsala | | 25·8 | 352 | 5 59 | +13 | e 10 29 | +11 | e 15·0 | 19·0 |
| Stonyhurst | | 27·3 | 324 | e 7 15 | +74 | — | — | — | 20·8 |
| Eskdalemuir | | 28·5 | 326 | — | — | e 11 15 | + 7 | 14·2 | — |

Additional readings and notes: Athens gives also iP = +1m.11s., MN = +2·2m., $T_o$ = 17h.34m.1s. Pompeii records S as P and L as S. Zagreb iNE = +6m.20s. Pola readings are given as at 7h. Padova P has been increased by 3m., $SR_1$ = +8m.45s. Konigsberg SN = +8m.47s., iE = +9m.8s. Hamburg MN = +15·4m. Granada iP = +5m.55s., $PR_1$ = +8m.31s. Stonyhurst P is taken to be at 17h.41m.0s.

Mar. 8d. Readings also at 5h. (La Paz), 11h. (near Batavia), 13h. (Besançon), 14h. (Stonyhurst), 19h. (La Paz), 21h. (Melbourne and Riverview).

Mar. 9d. Readings at 5h. (La Paz and Zagreb (2) ), 10h. (La Paz), 22h. (Nagasaki).

Mar. 10d. 11h. 20m. 55s. Epicentre 33°·0N. 121°·5W. (as on 1920 June 22d.).

A = −·438, B = −·715, C = +·545; D = −·853, E = +·522; G = −·284, H = −·464, K = −·839.

| | | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Lick | N. | 4·3 | 358 | e 1 6 | − 1 | i 2 1 | + 3 | — | — |
| Berkeley | E. | 4·9 | 352 | 1 18 | + 2 | e 2 1 | −13 | — | 2·3 |
| | N. | 4·9 | 352 | 1 21 | + 5 | i 1 59 | −15 | — | 2·3 |
| Tucson | E. | 9·0 | 92 | 3 59 | ?S | (3 59) | − 4 | 5·5 | 6·8 |
| Victoria | | 15·4 | 356 | 6 41 | ?S | (6 41) | 0 | 6·8 | 8·3 |
| Mazatlan | | 16·5 | 122 | — | — | — | — | 9·3 | 10·8 |
| Tacubaya | E. | 24·1 | 119 | 6 16 | +47 | 11 8 | +82 | 13·4 | 15·0 |
| | N. | 24·1 | 119 | 6 16 | +47 | 11 9 | +83 | 13·7 | 13·8 |
| St. Louis | | 25·8 | 68 | e 6 5 | +19 | 13 35 | ? | e 15·1 | 15·7 |
| Vera Cruz | | 26·5 | 115 | (5 37) | −16 | — | — | 5·6 | 6·6 |
| Oaxaca | N. | 27·4 | 119 | 5 18 | −44 | — | — | 14·4 | 17·0 |
| Chicago | | 28·1 | 62 | 11 3 | ?S | (11 3) | + 2 | (14·3) | 17·1 |
| Ann Arbor | E. | 31·0 | 62 | — | — | — | — | 18·2 | 21·1 |
| Toronto | | 34·3 | 61 | 10 11 | ? | — | — | i 19·4 | 20·1 |
| Honolulu | N. | 34·4 | 260 | — | — | — | — | 15·5 | 17·4 |
| Georgetown | E. | 36·1 | 68 | e 13 47 | ?S | (e 13 47) | +36 | e 21·5 | 22·7 |
| | N. | 36·1 | 68 | e 13 47 | ?S | (e 13 47) | +36 | e 21·2 | 21·3 |
| Washington | | 36·1 | 68 | — | — | e 13 5 | − 6 | — | 20·2 |
| Cheltenham | E. | 36·2 | 68 | — | — | — | — | e 19·1 | 22·4 |
| | N. | 36·2 | 68 | — | — | — | — | e 14·6 | 22·1 |
| Ithaca | | 36·3 | 62 | — | — | — | — | 18·1 | — |
| Ottawa | | 37·0 | 59 | — | — | — | — | e 17·1 | 19·4 |
| Fordham | | 38·4 | 64 | e 16 59 | ? | e 20 3 | ?L | e 22·2 | — |
| Northfield | | 39·2 | 59 | — | — | — | — | e 20·1 | — |
| Halifax | | 45·6 | 58 | — | — | e 40 5 | ? | e 50·6 | — |
| Dyce | N. | 76·4 | 29 | — | — | — | — | 41·1 | — |
| Edinburgh | | 76·8 | 30 | — | — | — | — | 37·1 | 45·2 |
| Eskdalemuir | | 77·2 | 30 | — | — | e 22 5 | +14 | 34·1 | 41·2 |
| Bidston | | 78·5 | 32 | 24 45 | ?$SR_1$ | 31 57 | ? | (36·0) | 45·8 |
| Stonyhurst | | 78·5 | 32 | — | — | — | — | — | 41·1 |
| Oxford | | 80·4 | 33 | — | — | — | — | — | 45·5 |

*Continued on next page.*

| | | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| De Bilt | | 83·0 | 30 | — | — | e 23 11 | +14 | e 35·1 | 46·6 |
| Hamburg | | 83·8 | 27 | — | — | — | — | e 40·1 | 44·4 |
| Paris | | 84·2 | 33 | — | — | e 23 0 | −10 | 42·1 | 44·1 |
| Coimbra | | 84·2 | 45 | e 16 22 | ?$PR_1$ | — | — | 39·9 | 44·4 |
| Konigsberg | | 86·3 | 20 | — | — | — | — | e 46·4 | 49·0 |
| Strasbourg | E. | 86·7 | 30 | — | — | — | — | e 44·6 | 53·5 |
| Besançon | | 87·0 | 32 | — | — | 22 56 | −45 | — | 47·1 |
| Tortosa | N. | 88·9 | 40 | (e 17 5) | ?$PR_1$ | — | — | e 17·1 | 48·1 |
| Innsbruck | | 89·2 | 30 | — | — | — | — | e 44·1 | — |
| Barcelona | | 89·3 | 38 | — | — | — | — | e 32·7 | 51·9 |
| Moncalieri | | 89·4 | 33 | e 20 23 | ?$PR_1$ | 34 45 | ? | 45·6 | 52·2 |
| Vienna | | 90·4 | 25 | e 13 11 | − 7 | — | — | e 39·9 | 49·4 |
| Budapest | | 92·1 | 25 | e 13 11 | −17 | — | — | e 47·2 | — |
| Pola | | 92·2 | 29 | — | — | e 24 5? | −32 | — | 49·9 |
| Zagreb | N.E. | 92·3 | 28 | — | — | — | — | 39·1 | 50·3 |
| Algiers | | 93·1 | 40 | — | — | — | — | e 48·1 | 51·1 |

Additional readings and notes : Lick gives also iPN = +1m.12s. and +1m.18s., iPE = +1m.19s., iZ = +1m.46s. Berkeley MZ = +3·7m. Mazatlan readings are given as at 13h. Tucson readings increased by 5m. Tacubaya readings are given as at 7h. Chicago gives S as P and L as S. Ann Arbor LN = +14·9m. Honolulu LE = +17·4m. Georgetown SN = +19m.4s. Cheltenham eN = +19m.14s. Ithaca L = +19·2m. and +21·7m. Fordham ePN = +17m.1s. Northfield L = +23·1m. Bidston P = +26m.29s. De Bilt MN = +48·4m. Hamburg MN = +46·0m., MZ = +51·1m. Coimbra LN = +38·9m. Strasbourg MN = +51·0m. Zagreb MNW = +55·1m. Helwan gives tremors at 12h.

## 1922. Mar. 10d. 16h. 52m. 15s. Epicentre 22°·0S. 180°·0.

(as on 1921 April 25d.).

A = −·927, B = ·000, C = −·375 ; D = ·000, E = +1·000 ;
G = +·375, H = ·000, K = −·927.

The observations would be improved by moving the epicentre 0°·5S., but the old origin is retained for convenience of comparison. A depth 0·060 of focus below normal is assumed on this occasion. On 1921 April 25d. a depth 0·040 was assumed, and on 1917 May 24d. 19h. some depth was suspected, but none assumed.

| | | Corr. for Focus | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Apia | | −0·9 | 11·3 | 45 | 2 42 | + 6 | i 3 13 | −87 | 3·5 | — |
| Wellington | | −2·4 | 19·8 | 191 | — | — | e 6 27 | −60 | — | 10·2 |
| Christchurch | | −2·8 | 22·4 | 194 | 9 39 | ?S | (9 39) | +84 | 13·2 | 16·2 |
| Riverview | | −3·5 | 28·0 | 239 | e 5 17 | −16 | i 9 48 | − 6 | e 12·6 | 15·2 |
| Sydney | E. | −3·5 | 28·0 | 239 | 5 27 | − 6 | (9 51) | − 3 | 9·8 | 13·0 |
| Melbourne | | −4·1 | 34·0 | 234 | (e 6 3) | −24 | e 6 3 | ?P | e 18·8 | 21·4 |
| Honolulu | | −5·4 | 48·4 | 28 | — | — | i 14 12 | −36 | — | — |
| Perth | | −6·0 | 57·2 | 245 | — | — | 16 31 | − 3 | 34·5 | — |
| Manila | | −6·7 | 68·5 | 297 | e 10 30 | + 6 | (19 6) | −20 | 19·1 | — |
| Tokyo | | −6·7 | 69·1 | 327 | e 10 46 | +18 | e 13 28 | ?$PR_1$ | — | — |
| Osaka | | −6·8 | 70·7 | 322 | — | — | 16 42 | ? | — | 19·8 |
| Mizusawa | E. | −6·8 | 71·1 | 330 | 10 42 | + 2 | — | — | — | — |
| Batavia | | −6·9 | 72·1 | 270 | i 10 53 | + 7 | i 19 35 | + 8 | — | — |
| Taihoku | | −6·9 | 73·7 | 306 | e 11 10 | +13 | — | — | — | — |
| Zi-ka-wei | | −7·1 | 77·3 | 313 | i 11 21 | + 3 | — | — | — | — |
| Hong Kong | | −7·1 | 78·0 | 300 | 11 24 | + 2 | 20 35 | − 2 | — | 28·1 |
| Berkeley | | −7·2 | 80·7 | 42 | e 11 42 | + 3 | — | — | e 20·7 | — |
| | Z. | −7·2 | 80·7 | 42 | i 11 31 | − 8 | — | — | e 20·8 | — |
| Lick | N. | −7·2 | 80·9 | 43 | e 15 45 | ?$PR_1$ | — | — | — | — |
| Victoria | | −7·4 | 86·7 | 34 | — | — | — | — | 14·4 | 27·2 |
| Colombo | | −7·7 | 102·0 | 273 | 22 45 | ? | — | — | — | — |
| La Paz | | −7·7 | 102·9 | 114 | e 15 39 | ?$PR_1$ | i 23 7 | −121 | — | — |
| Chicago | | −7·8 | 106·2 | 51 | 24 36 | ? | 28 23 | ? | — | — |

*Continued on next page.*

| | | Corr. for Focus | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Georgetown | E. | — | 113·4 | 56 | — | — | i 22 58 | ? | — | — |
| Washington | | — | 113·4 | 56 | — | — | e 26 19 | −98 | — | — |
| Ottawa | | — | 115·4 | 49 | — | — | e 27 53 | −20 | e 31·2 | — |
| Konigsberg | | — | 143·8 | 340 | 18 48 | [−59] | e 21 34 | ? $PR_1$ | — | 25·1 |
| Edinburgh | | — | 146·0 | 3 | (18 57) | [−53] | — | — | — | 40·4 |
| Eskdalemuir | | — | 146·6 | 4 | 18 54 | [−57] | i 28 17 | ? | i 44·2 | — |
| Hamburg | | — | 147·5 | 350 | i 18 55 | [−57] | — | — | e 67·8 | — |
| Stonyhurst | | — | 148·1 | 3 | e 19 15 | [−38] | — | — | — | 41·2 |
| Bidston | | — | 148·5 | 4 | (20 0) | [+ 6] | 20 0 | ? P | — | 26·8 |
| De Bilt | | — | 149·7 | 354 | i 19 9 | [−46] | e 22 12 | ? $PR_1$ | e 44·6 | — |
| Budapest | | — | 150·3 | 334 | 18 42 | [−24] | — | — | — | — |
| Oxford | | — | 150·3 | 2 | i 19 6 | [−50] | i 41 9 | ? | — | — |
| Vienna | | — | 150·7 | 337 | i 19 1 | [−56] | i 22 28 | ? $PR_1$ | — | — |
| Helwan | | — | 150·9 | 292 | 19 7 | [−50] | — | — | — | 52·7 |
| Uccle | | — | 151·0 | 353 | e 19 1 | [−56] | e 22 15 | ? $PR_1$ | — | — |
| Belgrade | | — | 151·7 | 328 | e 19 11 | [−47] | i 22 4 | ? $PR_1$ | e 31·7 | 34·6 |
| Strasbourg | E. | — | 152·8 | 349 | 19 14 | [−46] | e 22 18 | ? $PR_1$ | e 23·8 | — |
| Zagreb | | — | 152·9 | 335 | e 19 9 | [−51] | e 21 45 | ? $PR_1$ | — | — |
| Paris | | — | 153·2 | 356 | e 19 13 | [−47] | — | — | — | — |
| Pola | | — | 154·5 | 337 | e 19 32 | [−30] | e 26 44 | ? | e 33·0 | 33·1 |
| Moncalieri | | — | 156·2 | 346 | e 19 10 | [−53] | 26 6 | ? | 33·6 | — |
| Pompeii | | — | 157·6 | 330 | 19 26 | [−40] | — | — | 42·9 | — |
| Rocca di Papa | | — | 157·6 | 335 | i 18 21 | [−105] | 19 45 | ? | — | — |
| Barcelona | | — | 160·5 | 355 | e 20 4 | [− 4] | — | — | e 25·4 | 25·2 |
| Coimbra | | — | 160·5 | 19 | e 25 45 | ? $PR_1$ | 36 45 | ? | 47·4 | — |
| Tortosa | N. | — | 161·2 | 359 | 20 1 | [− 8] | — | — | e 49·8 | 53·2 |
| Granada | | — | 164·5 | 11 | 19 28 | [−44] | 29 13 | ? | — | — |
| Algiers | | — | 165·0 | 351 | e 19 20 | [−52] | 24 5 | ? $PR_1$ | 36·8 | — |

Additional readings and notes: Christchurch readings are diminished by 1h. Sydney gives also S = +8m.15s. Riverview alternative iS = +9m.56s., $T_g$ = 16h.51m.49s. Melbourne $SR_1$ = +11m.15s., $SR_2$ = +14m.15s. Perth $PR_1$ = +9m.31s., $PR_2$ = +12m.20s. Readings are increased by 1hr. Manila S = +16m.8s. Osaka MN = +20·4m. Mizusawa PN = +10m.43s. Batavia i = +23m.0s. Berkeley iZ = +13m.28s. La Paz i = +17m.51s., $iSR_1$ = +24m.24s., i = +27m.7s. Konigsberg PN = +18m.52s. Edinburgh gives [P] as M. Eskdalemuir iN = +22m.21s., iE? = +40m.34s. Vienna iPE = +20m.7s., iZ = +20m.12s., and +20m.21s. Uccle e = +21m.20s., and +25m.39s. Belgrade $PR_1N$ = +19m.46s., $PR_1E$ = +19m.56s., $SR_1N$ = +22m.28s., $SR_1E$ = +23m.41s. Strasbourg PV = +18m.59s., PN = +19m.12s., eL = +80·8m. Zagreb i = +19m.18s., Granada $PR_1$ = +20m.30s., $PR_2$ = +25m.25s. Algiers ? = +27m.5s.

Mar. 10d. Readings also at 1h. (La Paz), 4h. (near Manila), 9h. (Kobe, Osaka, and Nagoya), 10h. (St. Louis), 17h. (near Granada), 21h. (near Rocca di Papa), 23h. (Apia).

Mar. 11d. Readings at 0h. (near Osaka and Kobe), 1h. (Tiflis), 6h. (Puebla), 7h., 9h., and 14h. (La Paz), 15h. (Pola and Zagreb, and near Rocca di Papa), 16h. (Zagreb and near Rocca di Papa, Adelaide, and Tiflis), 17h. (La Paz), 18h. (Zurich).

## 1922. Mar. 12d. 16h. 51m. 45s. Epicentre 38°·0S. 73°·5W.

(as on 1920 Aug. 20d.).

A = +·224, B = −·755, C = −·616; D = −·959, E = −·284; G = −·175, H = +·590, K = −·788.

| | | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| La Paz | | 22·0 | 14 | 5 15 | +10 | e 9 21 | +16 | i 11·6 | 13·6 |
| Rio de Janeiro | E. | 30·0 | 69 | e 6 23 | − 5 | 11 19 | −15 | 16·3 | 16·8 |
| | N. | 30·0 | 69 | e 6 19 | − 9 | 11 19 | −15 | 15·8 | 16·8 |
| Capetown | | 71·2 | 119 | — | — | 20 51 | +11 | 33·6 | 39·2 |
| Washington | | 77·0 | 357 | — | — | — | — | e 48·2 | — |
| Ithaca | | 80·5 | 358 | — | — | — | — | 45·2 | — |
| Chicago | | 80·6 | 350 | 11 25 | −58 | 22 22 | − 8 | e 33·2 | — |
| Ann Arbor | N. | 80·8 | 353 | — | — | — | — | 20·6 | — |
| Toronto | | 81·8 | 356 | — | — | 19 27 | ? | e 36·0 | — |

*Continued on next page.*

| | | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Ottawa | | 83·4 | 359 | — | — | i 23 0 | − 1 | e 36·2 | — |
| Melbourne | | 96·3 | 210 | — | — | — | — | e 46·8 | 52·6 |
| San Fernando | | 97·0 | 49 | — | — | — | — | 55·0 | 59·0 |
| Riverview | | 97·1 | 217 | — | — | e 24 23 | −64 | e 46·2 | 49·2 |
| Victoria | | 97·1 | 329 | — | — | 24 30 | −57 | 37·3 | 54·0 |
| Rio Tinto | | 97·6 | 47 | 30 15 | ? | — | — | — | 68·2 |
| Coimbra | | 98·2 | 43 | 15 57 | ? | e 26 57 | +79 | e 43·9 | 57·2 |
| Honolulu | N. | 98·9 | 290 | — | — | e 46 24 | ? | 51·5 | 53·2 |
| Granada | | 99·0 | 50 | — | — | — | — | e 50·6 | 53·4 |
| Algiers | | 102·6 | 52 | — | — | — | — | e 52·2 | 62·2 |
| Tortosa | N. | 103·8 | 49 | — | — | — | — | 50·0 | 63·7 |
| Barcelona | | 105·2 | 50 | — | — | — | — | e 48·8 | 57·8 |
| Marseilles | E. | 108·1 | 48 | — | — | — | — | e 58·2 | — |
| Oxford | | 109·5 | 38 | i 28 38 | ?S | (i 28 38) | +74 | — | 62·8 |
| Bidston | | 109·7 | 37 | 25 15 | ?S | (25 15) | −130 | (39·3) | 66·2 |
| Paris | | 109·8 | 41 | — | — | i 36 37 | ?SR$_1$ | 52·2 | 61·2 |
| Kew | | 109·9 | 38 | 58 15 | ?L | — | — | (58·2) | 70·2 |
| Stonyhurst | | 110·2 | 37 | e 24 45 | ?S | — | — | 57·8 | 70·2 |
| Moncalieri | | 110·5 | 47 | e 28 50 | ?S | 35 46 | ? | 51·5 | 67·8 |
| Besançon | | 110·7 | 45 | — | — | — | — | 54·2 | — |
| Eskdalemuir | | 110·8 | 35 | e 19 27 | ?PR$_1$ | e 28 52 | +77 | 48·2 | 63·8 |
| Edinburgh | | 111·2 | 34 | 29 9 | ?S | 40 15 | ? | 58·2 | 65·4 |
| Rocca di Papa | E. | 111·8 | 51 | e 19 15 | ?PR$_1$ | — | — | e 56·8 | 61·4 |
| | N. | 111·8 | 51 | — | — | — | — | e 59·8 | 64·8 |
| | | 111·9 | 40 | — | — | e 29 6 | +81 | — | 62·0 |
| Uccle | | 112·0 | 50 | 37 50 | ? | — | — | — | 63·2 |
| Florence | | 112·5 | 45 | — | — | — | — | 55·2 | 66·4 |
| Strasbourg | E. | 112·5 | 45 | — | — | — | — | 56·2 | 66·3 |
| | N. | 112·5 | 45 | — | — | — | — | 63·2 | — |
| Dyce | N. | 112·5 | 32 | — | — | — | — | e 53·2 | 62·7 |
| De Bilt | | 113·0 | 40 | e 19 45 | ?PR$_1$ | e 29 27 | +93 | e 53·4 | 66·2 |
| Innsbruck | N.E. | 113·9 | 48 | — | — | — | — | — | 71·4 |
| Pola | | 114·1 | 50 | — | — | e 24 15 | ? | 53·2 | 68·5 |
| Zagreb | | 115·9 | 50 | — | — | — | — | e 60·2 | 70·4 |
| Hamburg | | 116·3 | 40 | — | — | — | — | 67·2 | 73·2 |
| Athens | | 117·1 | 60 | — | — | — | — | e 59·2 | 66·2 |
| Vienna | | 117·3 | 46 | — | — | — | — | e 68·3 | 72·3 |
| Belgrade | N. | 118·2 | 52 | — | — | e 61 21 | ? | 61·8 | 75·2 |
| Helwan | | 118·8 | 73 | e 20 20 | ?PR$_1$ | — | — | 79·6 | 81·4 |
| Kodaikanal | | 141·9 | 129 | 71 15 | ?L | — | — | (69·2) | — |
| Bombay | | 145·0 | 116 | 69 14 | ?L | — | — | e 84·2 | — |
| Manila | | 153·3 | 213 | — | — | — | — | e 91·8 | — |
| Taihoku | E. | 161·8 | 229 | — | — | — | — | — | 52·6 |
| Zi-ka-wei | | 166·0 | 245 | e 20 9 | [− 3] | — | — | | |

Additional readings and notes: La Paz gives also iS = +9m.32s., $T_o$ = 16h.51m.52s. Chicago L = +50·2m. Toronto i = +24m.3s., eL = +33·0m. Ottawa eSR$_1$E = +28m.15s., LE = +38·2m., and +64·2m. San Fernando MN = +59·8m. Riverview MN = +49·5m. Coimbra MN = +57·3m. Honolulu eE = +47m.15s. Granada MN = +58·6m. Algiers MN = +54·8m. Marseilles eLN = +57·2m. Bidston P = +30m.57s., S = +35m.46s. Moncalieri MN = +65·4m. Eskdalemuir e = +34m.52s. Uccle MN = +61·6m. Strasbourg LV = +58·2m. De Bilt MN = +65·3m. Zagreb MNW = 69·6m. Hamburg MN = +65·6m., MZ = +67·6m.

Mar. 12d. Readings also at 11h. (Perth), 12h. (Christchurch, Riverview, Wellington, Adelaide, and Melbourne, also near Tacubaya, Vera Cruz, and Oaxaca), 17h. (La Paz), 18h. (Riverview), 19h. (Rio Tinto and near Oaxaca and Tacubaya), 20h. (Vera Cruz).

Mar. 13d. Readings at 0h. (La Paz, Simla, Bombay, and Azores), 1h. (La Paz), 5h. (Kobe and La Paz), 13h. and 14h. (La Paz), 15h. (Mizusawa), 16h. (La Paz and near Mizusawa), 18h. (La Paz), 20h. (Tokyo and La Paz), 21h. (Manila and near Zurich).

Mar. 14d. Readings at 1h. and 2h. (Tiflis). 3h. (Azores), 11h. (Zi-ka-wei), 15h. (Manila), 17h. (near La Paz).

**Mar. 15d. 3h. 27m. 42s. Epicentre 25°·0N. 2°·0E.**

A = +·906, B = +·035, C = +·423 ; D = +·035, E = −·999 ; G = +·422, H = +·015, K = −·906.

Very rough.

| | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|
| | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Algiers | 11·8 | 4 | — | — | — | — | e 5·7 | 13·3 |
| Granada | 13·1 | 340 | i 3 1 | −13 | i 5 53 | + 7 | 6·9 | 9·8 |
| Tortosa N. | 15·9 | 356 | — | — | — | — | 9·3 | 15·4 |
| Barcelona | 16·4 | 0 | — | — | — | — | e 11·0 | 12·6 |
| Coimbra | 17·5 | 333 | e 4 27 | +16 | 7 55 | +27 | e 10·9 | 14·0 |
| Moncalieri | 20·5 | 11 | e 4 43 | − 4 | — | — | 10·9 | 17·0 |
| Zagreb | 23·6 | 24 | — | — | — | — | 12·3 | 15·7 |
| Paris | 23·8 | 1 | — | — | — | — | e 12·3 | 13·3 |
| Strasbourg | 24·0 | 9 | — | — | — | — | e 16·3 | — |
| Uccle | 25·9 | 3 | — | — | — | — | e 14·3 | — |
| De Bilt | 27·2 | 4 | — | — | — | — | e 14·3 | 22·0 |
| Bidston | 28·7 | 354 | — | — | 16 31? | ?L | (16·5) | 26·3 |
| Stonyhurst | 29·1 | 355 | e 8 48 | ?$PR_1$ | — | — | — | 19·8 |
| Eskdalemuir | 30·5 | 354 | — | — | — | — | 16·3 | — |
| Edinburgh | 31·1 | 354 | 18 18 | ?L | — | — | (18·3) | — |

Additional readings : Algiers gives also e = +6m.38s., i = +7m.40s., and +9m.8s. Granada iSE = +5m.25s. All these readings have been diminished by 7m. Coimbra ePE = 3h.10m.7s., MN = +14·2m., $T_o$ = 3h.23m.33s. ; perhaps the P belongs to a small shock corresponding to one of the readings in the notes to the day. De Bilt MN = +23·5m.

**Mar. 15d. 5h. 12m. 35s. Epicentre 39°·0N. 22°·0E.**

A = +·721, B = +·291, C = +·629 ; D = +·375, E = −·927 ; G = +·584, H = +·236, K = −·777.

De Bilt records that the shock was felt at Domokos, which is close to this origin.

| | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|
| | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Athens | 1·7 | 127 | i 0 24 | − 2 | (i 0 44) | − 4 | i 0·7 | 1·0 |
| Mostar E. | 5·3 | 326 | e 0 55 | −27 | i 2 28 | + 3 | — | 2·8 |
| N. | 5·3 | 326 | e 0 57 | −25 | i 2 35 | +10 | — | 3·0 |
| Belgrade E. | 5·9 | 344 | e 1 29 | − 2 | e 2 51 | +10 | — | 3·8 |
| N. | 5·9 | 344 | e 1 30 | − 1 | e 2 57 | +16 | — | 3·8 |
| Rocca di Papa | 7·6 | 294 | e 1 43 | −12 | — | — | i 4·5 | 5·0 |
| Zagreb N.W. | 8·1 | 329 | e 1 57 | − 6 | — | — | i 4·6 | 5·2 |
| Pola | 8·4 | 316 | 2 7 | 0 | e 4 43 | +56 | e 5·0 | 5·4 |
| Budapest | 8·8 | 347 | 4 17 | ?L | — | — | (4·3) | — |
| Padova | 9·8 | 314 | 3 25 | +58 | — | — | — | 6·9 |
| Vienna | 10·0 | 338 | e 2 24 | − 6 | e 4 13 | −16 | i 5·3 | 6·9 |
| Strasbourg | 14·0 | 318 | — | — | — | — | 7 4 | — |
| De Bilt | 17·6 | 324 | — | — | — | — | e 8·0 | — |

Additional readings and notes : Athens gives also MN = +0·9m., $T_o$ = 5h.12m.41s. Mostar iPE = +1m.16s., $PR_1E$ = +1m.56s., $PR_1N$ = +2m.5s., readings all increased by 1m. Belgrade ePE = +1m.49s., readings all increased by 2m. Rocca di Papa eN = +1m.49s., readings all increased by 1m. Zagreb iNE = +4m.27s., MNE = +5·0m. Pola MN = +5·2m.

**Mar. 15d. Readings also at 2h. (La Paz), 3h. (Colombo, Capetown, Helwan, La Paz, Pompeii, and Rocca di Papa), 4h. (Apia), 9h. (Taihoku), 15h. (near Oaxaca), 21h. (La Paz).**

**Mar. 16d. 14h. 56m. 50s. Epicentre 6°·0N. 37°·0E. (as on 1919 June 30d.).**

A = +·794, B = +·599, C = +·105 ; D = +·602, E = −·799 ; G = +·083, H = +·063, K = −·994.

| | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|
| | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Helwan | 24·4 | 348 | e 5 32 | 0 | 9 47 | − 5 | — | 13·3 |
| Tiflis | 36·3 | 10 | — | — | — | — | e 18·2 | — |
| Algiers | 43·7 | 320 | — | — | — | — | e 25·8 | 33·2 |
| Zagreb | 43·8 | 339 | e 8 28 | + 4 | — | — | 24·2 | 25·2 |
| Vienna | 45·7 | 341 | e 8 39 | + 1 | — | — | — | — |
| De Bilt | 53·0 | 337 | — | — | — | — | e 28·2 | 30·0 |

**Zagreb gives also MNW = +28·2m.**

Mar. 16d. 18h. 31m. 18s. Epicentre 35°·0N. 143°·0E. (as on 1920 Nov. 8d.).

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 | i 0 39 | − 5 | i 1 10 | − 7 | — | 1·4 |
| Mizusawa | E. | 4·4 | 340 | 1 4 | − 4 | 1 48 | −13 | — | — |
| | N. | 4·4 | 340 | 1 3 | − 5 | 1 49 | −12 | — | — |
| Osaka | | 6·2 | 270 | 2 0 | +25 | 3 0 | +11 | — | 3·9 |
| Kobe | | 6·4 | 266 | e 2 0 | +22 | 2 28 | −27 | 3·1 | 4·1 |
| Zi-ka-wei | Z. | 18·4 | 266 | e 4 14 | − 8 | e 7 50 | + 1 | — | 12·0 |
| De Bilt | | 85·4 | 336 | — | — | — | — | e 44·7 | 54·2 |
| Zagreb | | 86·1 | 326 | — | — | — | — | 46·7 | 54·7 |
| Uccle | | 86·7 | 336 | — | — | — | — | e 44·7 | — |
| Bidston | | 86·8 | 340 | — | — | — | — | — | 56·7 |
| Strasbourg | E. | 87·4 | 331 | — | — | — | — | 49·7 | — |

Additional readings and notes: Tokyo gives also MN = +1·3m. All these readings have been diminished by 1m. Osaka MN = +3·6m. Kobe MN = +3·3m. De Bilt MN = +54·0m.

Mar. 16d. 23h. 11m. 20s. Epicentre 36°·5N. 122°·0W. (as on 1920 Oct. 5d.).

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

| | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|
| | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Lick | 0·9 | 18 | 0 11 | − 3 | i 0 30 | + 5 | — | — |
| Berkeley | 1·4 | 352 | e 0 21 | 0 | — | — | e 0·8 | 1·6 |
| Victoria | 11·9 | 355 | — | — | — | — | 5·8 | 7·3 |
| Chicago | 27·0 | 68 | — | — | — | — | e 13·3 | — |
| Toronto | 32·6 | 64 | — | — | — | — | 9·4 | — |
| Washington | 35·3 | 72 | — | — | — | — | e 15·3 | — |

Lick gives also iPZ = +21s., iN = +37s., iE = +39s., iN = +48s., iNE = +50s., and iN = +56s.

Mar. 16d. Readings also at 1h. (Taihoku), 4h. (Vienna, Innsbruck, and Zagreb), 5h. (Taihoku, Manila (2), Zi-ka-wei, Tiflis, Strasbourg, and Port au Prince), 9h. (Riverview), 12h. (near Nagoya), 13h. and 19h. (Mizusawa).

Mar. 17d. Readings at 0h. (near Kobe (2)), 12h. (Budapest), 13h. (Vienna, La Paz, Manila, Riverview, Adelaide, and Melbourne), 14h. (De Bilt), 16h. (La Paz), 17h. (Manila, Riverview, Adelaide, and La Paz), 21h. (Batavia, near Mizusawa, and near Manila), 23h. (near Kobe).

Mar. 18d. 8h. 58m. 0s. Epicentre 37°·0N. 138°·5E. (as on 1920 Feb. 19d.).

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

| | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|
| | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Tokyo | 1·6 | 142 | i 0 33 | + 9 | 0 39 | − 6 | i 0·8 | 0·8 |
| Nagoya | 2·2 | 214 | 0 45 | +11 | — | — | 1·6 | 1·8 |
| Mizusawa | 2·9 | 44 | 0 49 | + 4 | 1 18 | − 2 | — | — |
| Osaka | 3·5 | 227 | — | — | 1 35 | − 2 | 2·7 | 3·5 |

Additional readings: Nagoya gives also MN = +2·4m. Mizusawa SN = +1m.23s. Osaka MN = +3·1m.

**Mar. 18d.** Readings also at 1h. (near Granada and Malaga), 6h. (La Paz and Tokyo), 7h. (De Bilt and Uccle), 8h. (near Tokyo and Mizusawa), 19h. (Azores), 21h. (near Mizusawa).

**Mar. 19d.** Readings at 8h. (La Paz), 9h. (Taihoku and Apia), 15h. (Rocca di Papa), 16h. (La Paz), 19h. (Azores).

**Mar. 20d.** Readings at 0h. (Lick), 8h. (Azores), 15h. (La Paz), 19h. (Tiflis (2) and La Paz), 20h. (near Tacubaya), 21h. (near Tacubaya, Vera Cruz, and Oaxaca).

**Mar. 21d. 16h. 56m. 12s.** Epicentre 33°·0N. 50°·0E.

A = +·539, B = +·643, C = +·545; D = +·766, E = −·643; G = +·350, H = +·417, K = −·839.

| | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|
| | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Helwan | 16·3 | 264 | i 3 56 | 0 | 7 10 | + 8 | — | 12·9 |
| Lemberg | 25·5 | 319 | — | — | e 10 36 | +23 | — | 12·7 |
| Pola | 30·2 | 304 | — | — | e 11 39 | + 2 | — | 19·4 |
| Innsbruck | 32·4 | 309 | i 6 53 | + 1 | i 12 10 | − 4 | — | — |
| Strasbourg | 35·0 | 310 | — | — | (e 13 48) | +53 | e 13·8 | — |
| Hamburg | 35·0 | 320 | — | — | e 13 48 | +53 | e 20·4 | 22·5 |
| De Bilt | 37·4 | 314 | — | — | — | — | e 22·8 | 27·7 |
| Uccle | 37·6 | 312 | e 7 35 | 0 | e 16 23 | ?$SR_1$ | — | — |
| Kew | 40·6 | 314 | — | — | — | — | — | 2·8 |
| Eskdalemuir | 42·8 | 320 | — | — | e 14 48 | + 3 | 23·8 | — |
| Bidston | 43·2 | 317 | 15 41 | ?S | (15 41) | +50 | 18·0 | 28·1 |
| La Paz | 122·3 | 270 | 41 50 | ?$SR_1$ | — | — | — | — |

Innsbruck gives also ePNE = +6m.55s.

**Mar. 21d.** Readings also at 3h. (Mizusawa (2)), 4h. (De Bilt), 10h. (near Mizusawa), 11h. (Sydney and Riverview), 12h. (Adelaide), 18h. (Taihoku and Strasbourg).

**Mar. 22d. 22h. 29m. 25s.** Epicentre 37°·5N. 90°·0W.

A = ·000, B = −·793, C = +·609; D = −1·000, E = ·000; G = ·000, H = −·609, K = −·793.

| | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|
| | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| St. Louis | 1·1 | 352 | i 0 14 | − 3 | i 0 35 | + 4 | — | 0·7 |
| Chicago | 4·6 | 23 | 1 53 | +42 | 2 33 | +27 | 4·0 | — |
| Ann Arbor E. | 6·8 | 43 | 5 53 | ?L | — | — | (5·9) | — |
| Georgetown | 10·2 | 78 | — | — | e 4 21 | −14 | — | — |
| Washington | 10·2 | 78 | 5 45 | ?L | — | — | (5·8) | — |
| Ithaca | 11·4 | 61 | e 5 32 | ?L | — | — | (e 5·6) | — |
| Ottawa | 13·2 | 49 | — | — | — | — | e 6·3 | — |

Additional readings: Ann Arbor gives also PN = +6m.23s. Georgetown eN = +4m.35s. Ithaca S = +6m.1s.

**Mar. 22d.** Readings also at 0h. (Tiflis), 14h. (Apia), 22h. (St. Louis).

**Mar. 23d.** Readings at 2h. (St. Louis and Chicago), 3h. (Taihoku), 4h. and 5h. (Porto Rico), 20h. (La Paz).

## 1922. Mar. 24d. 12h. 21m. 50s. Epicentre 45°·0N. 22°·0E.

A = +·656, B = +·265, C = +·707 ; D = +·375, E = −·927 ;
G = +·656, H = +·265, K = −·707.

| | | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Belgrade | | 1·1 | 261 | i 0 28 | +11 | i 0 33 | + 2 | — | 0·8 |
| Sarajevo | | 2·8 | 246 | i 0 42 | − 2 | — | — | — | — |
| Budapest | | 3·2 | 321 | e 0 56 | + 6 | e 1 30 | + 2 | — | — |
| Mostar | | 3·4 | 241 | e 0 43 | −10 | i 1 18 | −16 | — | 2·8 |
| Sinj | | 4·0 | 253 | i 0 52 | −10 | i 1 35 | −15 | — | 2·0 |
| Zagreb | | 4·3 | 283 | 1 14 | + 7 | i 1 55 | − 3 | — | 2·2 |
| Lemberg | | 5·0 | 15 | e 1 52 | +35 | — | — | e 3·3 | 5·4 |
| Vienna | | 5·0 | 312 | 1 32 | +15 | 2 43 | +26 | — | 3·8 |
| Pola | | 5·7 | 271 | e 1 34 | + 6 | — | — | i 2·9 | 3·4 |
| Pompeii | | 6·9 | 235 | 2 5 | +20 | 3 0 | − 7 | — | 3·6 |
| Padova | | 7·1 | 276 | 1 21 | −27 | 3 49 | +36 | 3·8 | 5·7 |
| Athens | | 7·2 | 169 | 2 3 | +14 | 3 42 | +27 | 4·1 | 4·6 |
| Rocca di Papa | | 7·5 | 247 | i 1 48 | − 6 | i 3 16 | − 8 | — | 4·2 |
| Innsbruck | | 7·7 | 291 | i 2 5 | + 8 | e 3 35 | + 6 | e 4·3 | 4·5 |
| Florence | | 7·8 | 265 | 1 57 | − 1 | 3 40 | + 9 | — | 4·5 |
| Zurich | | 9·6 | 289 | e 2 27 | + 3 | — | — | — | — |
| Konigsberg | | 9·9 | 355 | 3 4 | +35 | 5 1 | +35 | e 5·8 | 8·7 |
| | Z. | 9·9 | 355 | 3 4 | +35 | 5 3 | +37 | e 6·0 | 7·8 |
| Moncalieri | | 10·1 | 275 | 2 39 | + 8 | 4 25 | − 7 | — | 6·6 |
| Strasbourg | E. | 10·4 | 295 | i 2 40 | + 4 | 5 7 | +27 | 5·5 | 7·0 |
| | N. | 10·4 | 295 | — | — | 4 58 | +18 | 5·6 | 7·8 |
| Besançon | | 11·3 | 287 | 2 49? | 0 | 5 41? | +39 | 6·2 | — |
| Hamburg | | 11·6 | 322 | e 3 2 | + 9 | e 5 24 | +15 | e 7·1 | 8·7 |
| Marseilles | | 12·0 | 268 | e 3 10 | +11 | 5 10 | − 9 | 6·4 | — |
| Uccle | | 13·1 | 303 | 3 20 | + 6 | e 6 12 | +26 | e 7·2 | 8·7 |
| De Bilt | | 13·2 | 308 | 3 23 | + 7 | — | — | 7·9 | 9·2 |
| Puy de Dôme | | 13·4 | 280 | 3 10 | − 8 | — | — | — | — |
| Paris | | 13·8 | 293 | e 3 30 | + 7 | 6 45 | +42 | 7·6 | 8·2 |
| Barcelona | | 14·8 | 263 | e 3 .7 | −29 | e 6 29 | + 2 | e 7·2 | 9·6 |
| Upsala | | 15·1 | 352 | 3 59 | +19 | 7 8 | +34 | e 8·7 | 12·2 |
| Kew | | 16·1 | 302 | 9 10 | ?L | — | — | (9·2) | 12·2 |
| Tortosa | | 16·2 | 263 | e 3 10 | −45 | — | — | e 8·2 | 11·0 |
| Algiers | | 16·4 | 246 | — | — | — | — | 9·3 | 10·7 |
| Oxford | | 16·8 | 302 | — | — | i 7 19 | + 6 | i 9·0 | 11·0 |
| W. Bromwich | | 17·4 | 304 | 3 51 | −18 | 7 10 | −15 | 8·6 | — |
| Bidston | | 18·3 | 306 | 8 43 | ?S | (8 43) | +56 | (11·3) | 13·2 |
| Eskdalemuir | | 19·0 | 312 | e 4 40 | +11 | e 8 14 | +12 | 9·6 | 13·2 |
| Edinburgh | | 19·2 | 314 | e 4 28 | − 3 | e 8 14 | + 8 | — | 13·8 |
| Dyce | N. | 19·3 | 318 | — | — | 8 29 | +21 | i 11·7 | 14·6 |
| Granada | | 20·7 | 257 | i 5 3 | +14 | i 8 34 | − 4 | 10·8 | 11·6 |
| Rio Tinto | | 22·5 | 261 | 10 10 | ?L | — | — | (10·2) | 15·2 |
| Coimbra | | 22·8 | 269 | 5 19 | + 4 | 9 17 | − 4 | 11·5 | 14·0 |
| La Paz | | 101·6 | 258 | 14 43 | +25 | — | — | 48·3 | — |

Additional readings and notes: Belgrade gives also ME = +4·3m. Mostar MN = +2·2m. Zagreb PNE = +1m.17s., i = +1m.26s., and +1m.43s., MNW = +2·4m. Vienna iP = +1m.35s. and +1m.55s. Pola iP = +1m.46s., MN = +3·2m. Athens MN = +6·0m., $T_0$ = 12h.21m.53s. Rocca di Papa ePN = +1m.52s. Zurich $SR_1$ = +4m.55s. Epicentre 44°25′N. 20°25′E. Konigsberg LENZ = +6·6m. Moncalieri MN = +6·9m. Strasbourg MZ = +6·6m., P in the table is PZ Hamburg iE = +5m.48s., iN = +6m.0s., MZ = +8·6m., MN = +8·9m. De Bilt MN = +9·1m. Upsala MN = +11·6m. Oxford iL = +9·6m. W. Bromwich e = +3m.47s., i = +4m.16s. Granada iN = +8m.54s., MN = +11·7m. Helwan gives a reading at 12h.

Mar. 24d. Readings also at 3h. (near Mizusawa), 5h. (Nagasaki).

Mar. 25d. Readings at 2h. (near Belgrade (2) and Zagreb), 12h. (near Nagoya, Osaka, and Kobe), 14h. (Zurich), 16h. (Hong Kong), 19h. (near La Paz (2)).

**Mar. 26d. 13h. 25m. 32s.** Epicentre 41°·0S. 135°·0W.

A = −·534, B = −·534, C = −·656 ; D = −·707, E = +·707 ;
G = +·464, H = +·464, K = −·755.

Very doubtful.

| | | Δ | Az. | P. | O−C. | S. | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | m. s. | s. | m. s. | s. | m. | m. |
| Christchurch | | 38·2 | 249 | 7 40 | 0 | 13 40 | − 1 | 17·3 | 22·5 |
| Apia | | 41·9 | 300 | 16 20 | ?$SR_1$ | — | — | 18·4 | 20·4 |
| Riverview | | 57·3 | 252 | e 21 31 | ? | e 26 42 | ? | e 29·2 | 32·5 |
| Sydney | E. | 57·3 | 252 | 19 10? | ?S | (19 10?) | +70 | 33·0 | 34·1 |
| Melbourne | | 59·7 | 243 | — | — | e 30 10? | ?L | (e 30·2) | 38·7 |
| Adelaide | | 65·5 | 244 | — | — | e 32 33 | ?L | e 37·5 | 40·0 |
| Honolulu | | 65·9 | 338 | — | — | — | — | e 32·7 | — |
| Victoria | | 90·0 | 8 | — | — | — | — | 54·4 | 57·4 |
| Toronto | | 98·3 | 37 | — | — | — | — | e 75·3 | 79·0 |
| Batavia | | 106·4 | 245 | — | — | — | — | e 36·0 | — |
| Zi-ka-wei | Z. | 119·4 | 287 | — | — | e 26 6 | −159 | — | — |
| Rio Tinto | | 140·6 | 79 | 110 28 | ?L | — | — | (110·5) | 115·5 |
| Uccle | | 150·5 | 57 | — | — | — | — | e 101·5 | — |
| De Bilt | | 150·9 | 54 | — | — | — | — | e 101·5 | — |

Additional readings : Apia gives also P = +17m.28s. All these readings are given as at 14h. Sydney S = +27m.16s.? Riverview MN = +32·7m., $T_0$ = 13h.40m.24s. Melbourne e$SR_1$ = +33m.22s., L = +37·4?m. Adelaide iL = +38·5m. De Bilt eLN = +102·5m.

Mar. 26d. Readings also at 2h. (Nagasaki), 3h. (near Mizusawa and Osaka), 6h. (near Belgrade), 11h. (Stonyhurst and Batavia), 14h. (near Mizusawa and Tokyo), 15h. (Nagasaki), 23h. (La Paz and near Porto Rico and Port au Prince).

Mar. 27d. Readings also at 0h. (Mizusawa), 10h. (near Tokyo), 17h. (near Padova and Innsbruck), 23h. (Taihoku).

## 1922. Mar. 28d. 3h. 57m. 50s. Epicentre 21°·0S. 67°·0W.

(as on 1920 June 7d.).

A = +·365, B = −·860, C = −·358 ; D = −·920, E = −·391 ;
G = −·140, H = +·330, K = −·934.

A depth of focus 0·010 is assumed. On 1920 June 7 the material was too scanty to give any information about depth of focus.

| | | 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 | 4·6 | 345 | i 1 26 | +15 | 2 3 | − 3 | 2·3 | 6·4 |
| Rio de Janeiro | E. | −0·6 | 22·2 | 101 | e 5 6 | + 6 | 9 4 | + 7 | — | 9·2 |
| | N. | −0·6 | 22·2 | 101 | i 4 46 | −14 | 8 58 | + 1 | 11·4 | 14·0 |
| Balboa Hts. | E. | −0·7 | 32·4 | 336 | 6 28 | −16 | 11 26 | −37 | — | 11·6 |
| | N. | −0·7 | 32·4 | 336 | — | — | 11 42 | −21 | — | 11·8 |
| Porto Rico | | −0·8 | 39·2 | 2 | 7 21 | −20 | i 13 2 | −42 | 16·1 | 16·6 |
| Vera Cruz | | −1·0 | 49·3 | 323 | 9 15 | +19 | — | — | — | — |
| Tacubaya | E. | −1·0 | 51·2 | 320 | 9 36 | −28 | 16 45 | +24 | — | — |
| Cheltenham | N. | −1·2 | 60·5 | 351 | i 9 57 | −10 | i 17 59 | −16 | 27·8 | 38·9 |
| Georgetown | E. | −1·2 | 60·6 | 351 | e 10 10 | + 2 | i 18 15 | − 1 | e 28·5 | — |
| | N. | −1·2 | 60·6 | 351 | i 10 6 | − 2 | i 18 14 | − 2 | 38·2 | — |
| Washington | | −1·2 | 60·6 | 351 | 12 6 | ?$PR_1$ | 20 9 | ? | 39·9 | — |
| Fordham | | −1·2 | 62·2 | 355 | e 10 19 | 0 | e 18 33 | − 3 | e 25·5 | — |
| Ithaca | | −1·2 | 64·0 | 354 | i 10 29 | − 2 | i 18 55 | − 3 | e 37·2 | — |
| Ann Abor | N. | −1·2 | 65·1 | 347 | 14 10 | ?$PR_1$ | 23 4 | ?$SR_1$ | 36·0 | — |
| Northfield | | −1·2 | 65·4 | 357 | 10 35 | − 4 | 19 13 | − 2 | — | — |
| Toronto | | −1·2 | 65·6 | 350 | 10 34 | − 7 | i 19 34 | +16 | 41·6 | — |
| Chicago | | −1·2 | 65·6 | 344 | 10 34 | − 7 | 30 20 | ?L | 42·2 | — |
| Ottawa | | −1·2 | 66·9 | 354 | i 10 46 | − 3 | 19 26 | − 7 | e 32·2 | — |

*Continued on next page.*

| | | Corr. for Focus | △ | Az. | P. | | O−C. | S. | | O−C. | L. | M. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ° | ° | ° | m. | s. | s. | m. | s. | s. | m. | m. |
| Tucson | | −1·3 | 67·8 | 322 | i 10 | 50 | − 5 | i 19 | 36 | − 8 | 33·8 | — |
| Cape Town | | −1·3 | 74·9 | 121 | i 11 | 43 | + 3 | i 21 | 16 | + 7 | — | — |
| Lick | N. | −1·3 | 77·8 | 320 | i 11 | 54 | − 4 | i 22 | 34 | +51 | — | — |
| Berkeley | | −1·3 | 78·5 | 320 | i 11 | 55 | − 7 | i 22 | 33 | +42 | — | — |
| San Fernando | | −1·3 | 81·2 | 46 | 12 | 28 | +10 | — | | — | — | 23·7 |
| Rio Tinto | | −1·3 | 81·6 | 44 | 14 | 10 | ? | — | | — | — | 37·2 |
| Coimbra | | −1·3 | 82·0 | 41 | 12 | 20 | − 3 | i 22 | 31 | 0 | 39·7 | 50·9 |
| Granada | | −1·4 | 83·3 | 47 | i 12 | 28 | − 2 | i 22 | 42 | − 3 | 42·2 | 50·7 |
| Victoria | | −1·4 | 85·7 | 327 | 11 | 26 | −78 | i 21 | 50 | −81 | 45·2 | 49·1 |
| Algiers | | −1·4 | 87·7 | 49 | e 12 | 50 | − 5 | i 23 | 9 | −24 | 38·2 | 54·2 |
| Tortosa | | −1·4 | 88·0 | 45 | 12 | 50 | − 7 | i 23 | 11 | −26 | — | — |
| Barcelona | | −1·4 | 89·3 | 45 | e 12 | 59 | − 5 | i 23 | 16 | −35 | e 27·4 | — |
| Marseilles | | −1·4 | 92·3 | 43 | — | | — | 23 | 46 | −37 | 40·2 | — |
| Bidston | | −1·4 | 92·5 | 34 | 17 | 53 | ?PR$_1$ | 24 | 33 | + 8 | — | 41·7 |
| Oxford | | −1·4 | 92·6 | 34 | e 13 | 10 | −12 | i 23 | 37 | −49 | 30·4 | 39·2 |
| West Bromwich | | −1·4 | 92·6 | 33 | 13 | 17 | − 5 | 23 | 34 | −52 | — | — |
| Stonyhurst | | −1·4 | 93·1 | 30 | e 0 | 10 | ? | i 23 | 40 | −52 | — | 51·7 |
| Paris | | −1·4 | 93·2 | 38 | e 13 | 15 | −11 | i 23 | 39 | −54 | 33·2 | 51·2 |
| Eskdalemuir | | −1·4 | 93·4 | 29 | 13 | 17 | −10 | i 23 | 39 | −56 | — | 30·6 |
| Edinburgh | | −1·4 | 93·7 | 30 | e 13 | 13 | −16 | i 23 | 37 | −61 | 40·2 | 50·9 |
| Moncalieri | | −1·4 | 94·3 | 43 | 13 | 19 | −13 | 23 | 45 | −59 | 34·2 | 61·2 |
| Besançon | | −1·4 | 94·5 | 40 | — | | — | 23 | 49 | −57 | 29·2 | — |
| Dyce | N. | −1·4 | 95·0 | 29 | — | | — | 23 | 46 | −66 | — | — |
| Uccle | | −1·4 | 95·1 | 38 | 13 | 20 | −16 | i 23 | 49 | −64 | e 36·2 | — |
| Christchurch | | −1·4 | 95·5 | 219 | 11 | 58 | ? | 16 | 16 | ? | 24·4 | 25·8 |
| De Bilt | | −1·4 | 96·1 | 36 | e 13 | 29 | −13 | i 23 | 57 | −66 | — | — |
| Zurich | | −1·4 | 96·1 | 41 | e 13 | 26 | −16 | e 23 | 56 | −67 | — | — |
| Strasbourg | | −1·4 | 96·1 | 40 | i 13 | 26 | −16 | 23 | 56 | −67 | 39·9 | 52·6 |
| Rocca di Papa | | −1·4 | 96·5 | 49 | i 13 | 22 | −22 | e 23 | 52 | −75 | — | — |
| Padova | | −1·4 | 97·4 | 43 | 16 | 52 | ? | — | | — | 27·3 | 28·2 |
| Innsbruck | | −1·5 | 97·8 | 42 | i 13 | 36 | −15 | i 24 | 4 | −75 | e 36·4 | — |
| Honolulu | E. | −1·5 | 98·4 | 290 | — | | — | 25 | 8 | −17 | — | 87·7 |
| | N. | −1·5 | 98·4 | 290 | — | | — | 25 | 44 | +19 | — | 92·6 |
| Pola | | −1·5 | 98·5 | 45 | — | | — | e 24 | 9 | −77 | — | 27·5 |
| Hamburg | | −1·5 | 99·4 | 36 | 13 | 41 | −18 | i 24 | 14 | −81 | e 42·2 | 55·2 |
| Zagreb | | −1·5 | 100·2 | 44 | e 13 | 10 | −54 | i 24 | 17 | −86 | 42·2 | — |
| Vienna | | −1·5 | 101·3 | 40 | 13 | 49 | −21 | i 24 | 58 | −56 | e 49·2 | 67·2 |
| Budapest | | −1·5 | 102·7 | 44 | e 15 | 10 | +54 | e 24 | 14 | ?PR$_1$ | 27·1 | — |
| Belgrade | | −1·5 | 102·8 | 47 | e 13 | 51 | −26 | e 23 | 45 | ? | 40·5 | — |
| Upsala | | −1·5 | 105·4 | 31 | e 18 | 33 | ?PR$_1$ | i 26 | 0 | −34 | 45·2 | — |
| Konigsberg | | −1·5 | 105·6 | 37 | i 18 | 42 | ?PR$_1$ | 24 | 38 | −116 | 33·2 | 61·3 |
| Helwan | | −1·5 | 107·2 | 64 | e 18 | 47 | ?PR$_1$ | 24 | 48 | −121 | 57·2 | 68·3 |
| Riverview | | — | 114·2 | 214 | e 17 | 32 | ? | e 29 | 5 | +61 | e 47·6 | 48·7 |
| Colombo | | — | 145·0 | 109 | 19 | 40 | [− 8] | — | | — | — | 86·7 |
| Mizusawa | E. | — | 149·8 | 305 | 19 | 44 | [−12] | — | | — | — | — |
| Batavia | | — | 152·2 | 167 | 19 | 46 | [−13] | — | | — | — | — |
| Zi-ka-wei | | — | 168·4 | 325 | i 20 | 3 | [−11] | e 24 | 46 | ? | — | 29·8 |
| Manila | | — | 170·1 | 239 | 20 | 8 | [− 7] | — | | — | 26·0 | — |
| Hong Kong | | — | 178·2 | 320 | 21 | 53 | ? | — | | — | — | 47·3 |

Additional readings: La Paz readings are given as on 27d. Porto Rico gives also LN = +16·6m. Cheltenham SR$_2$E = +23m.43s. Ithaca L = +61·7m. Ann Arbor LE = +36·2m. Toronto E? = +5m.46s. Ottawa LE = +41·2m., T$_o$ = 3h.57m.53s. Lick eN = +15m.37s. (?PR$_1$). Berkeley iPZ = +11m.53s., iNZ = +11m.56s., iLE = +21·7m., iN = +22m.39s. San Fernando MN = +23·6m. Coimbra eL = +34·2m., T$_o$ = 3h.57m.57s. Epicentre 19°·2S. 67°·0W. Granada PS = +23m.46s. Barcelona PS? = +23m.39s., ? = +24m.41s. Oxford iPR$_1$ = +17m.39s. Eskdalemuir PR$_1$ = +16m.54s., iEN = +24m.11s., iN = +25m.36s., SR$_1$? = +30m.51s., M = +40·3m. Moncalieri MN = +42·5m. Uccle i = +25m.50s. Strasbourg MN = +52·7m. Rocca di Papa iPE = + +12m.46s. Honolulu SR$_1$E = +31m.47s., SR$_1$N = +32m.0s. San Fernando MN = +23·6m. Hamburg iSN = +24m.15s. Zagreb i = +27m.59s. Vienna iPS = +24m.17s., SR$_1$? = +32m.33s., all readings given as on 27d. Konigsberg SN = +24m.39s., MN = +49·4m., MZ = +61·4m. Riverview eS = +29m.20s., SR$_1$ = +35m.57s. Mizusawa PN = +19m.42s. Hong Hong gives alternative P at +20m.46s. Upsala iE = +24m.40s., +25m.28s., iSN = +25m.58s., iE = +27m.39s.

Mar. 28d. Readings also at 6h. (La Paz), 15h. (near Sapporo), 16h. (near Mizusawa).

**Mar. 29d.** Readings at 3h. (near Port au Prince), 5h. (Riverview), 7h. (Manila, Colombo, Batavia, Zi-ka-wei, Zagreb, and near Belgrade), 8h. (Eskdalemuir and De Bilt), 9h. (Zi-ka-wei, Kew, Hong Kong, near Taihoku, and near Tacubaya (2) ), 12h. (Oaxaca and Tacubaya), 13h. (De Bilt), 20h. (La Paz and near Belgrade), 21h. (Tortosa).

Mar. 30d. Readings at 3h. (La Paz), 4h. and 5h. (near Belgrade), 9h. (La Paz), 14h. (near Mizusawa), 15h. (Batavia), 17h. (Algiers).

Mar. 31d. Readings at 2h. (La Paz and Port au Prince), 10h. (La Paz, Kew, Eskdalemuir, De Bilt, Uccle, Hamburg, Strasbourg, Edinburgh, Paris, Oxford, and Marseilles), 15h. (near Nagasaki), 17h. (Taihoku), 19h. (Bidston), 20h. (Hong Kong, Zi-ka-wei, and Batavia), 21h. (De Bilt and Uccle).

## Constants for New Stations (Nov. 1925).

| | ° ′ | ° ′ | a | b | c |
|---|---|---|---|---|---|
| Abisko | 68 20 N. | 18 49 E. | +·349 | +·119 | +·929 |
| Akita | 39 41 N. | 140 6 E. | −·590 | +·494 | +·639 |
| Alicante | 38 21 N. | 0 29 W. | +·784 | −·007 | +·620 |
| Almeria | 36 51 N. | 2 28 W. | +·799 | −·033 | +·600 |
| Amboina | 3 42 S. | 128 10 E. | −·617 | +·784 | −·064 |
| Coire | 46 51 N. | 9 31 E. | +·674 | +·113 | +·730 |
| Colima | 18 12 N. | 103 42 W. | −·225 | −·923 | +·312 |
| Gihu | 35 24 N. | 136 46 E. | −·594 | +·558 | +·579 |
| Gorje | 46 23 N. | 14 5 E. | +·669 | +·168 | +·724 |
| Hakodate | 41 46 N. | 140 44 E. | −·577 | +·472 | +·666 |
| Hokoto | 23 32 N. | 119 33 E. | −·452 | +·798 | +·399 |
| Hukuoka | 33 35 N. | 130 25 E. | −·540 | +·634 | +·553 |
| Hyderabad | 17 26 N. | 78 27 E. | +·191 | +·935 | +·300 |
| Kagosima | 31 34 N. | 130 33 E. | −·554 | +·647 | +·524 |
| Kakioka | 36 14 N. | 140 11 E. | −·620 | +·517 | +·639 |
| Kyoto | 35 4 N. | 135 46 E. | −·586 | +·571 | +·575 |
| Le Mans | 48 0 N. | 0 13 E. | +·669 | +·002 | +·743 |
| Lisbon | 38 43 N. | 9 9 W. | +·770 | −·124 | +·625 |
| Maebasi | 36 24 N. | 139 4 E. | −·611 | +·527 | +·593 |
| Malaga | 36 44 N. | 4 25 W. | +·799 | −·062 | +·598 |
| Maron | 7 34 S. | 111 25 E. | −·362 | +·923 | −·132 |
| Matuyama | 33 50 N. | 132 45 E. | −·564 | +·610 | +·557 |
| Mazatlan | 23 11 N. | 106 24 W. | −·260 | −·882 | +·394 |
| Merida | 20 57 N. | 89 37 W. | +·006 | −·934 | +·358 |
| Mito | 36 23 N. | 140 28 E. | −·621 | +·512 | +·593 |
| Mukaiyama | 38 15 N. | 140 52 E. | −·609 | +·495 | +·619 |
| Munich | 48 9 N. | 11 37 E. | +·653 | +·134 | +·745 |
| Nagano | 36 40 N. | 138 12 E. | −·598 | +·535 | +·597 |
| Naples | 40 50 N. | 14 16 E. | +·733 | +·186 | +·654 |
| Niigata | 37 55 N. | 139 3 E. | −·596 | +·517 | +·614 |
| Numadu | 36 6 N. | 138 51 E. | −·608 | +·532 | +·589 |
| Oaxaca | 17 1 N. | 96 46 W. | −·113 | −·950 | +·293 |
| Ootomari | 46 39 N. | 142 46 E. | −·546 | +·415 | +·727 |
| Phu-Lien | 20 48 N. | 106 38 E. | −·267 | +·896 | +·355 |
| Plymouth | 50 22 N. | 4 9 W. | +·636 | −·046 | +·770 |
| Puebla | 19 3 N. | 98 12 W. | −·135 | −·936 | +·326 |
| Puy de Dôme | 45 46 N. | 2 58 E. | +·697 | +·036 | +·716 |
| Sapporo | 43 4 N. | 141 21 E. | −·572 | +·456 | +·683 |
| Sumoto | 34 21 N. | 134 53 E. | −·583 | +·585 | +·564 |
| Toledo | 39 52 N. | 4 1 W. | +·766 | −·054 | +·641 |
| Travnik | 43 13 N. | 17 41 E. | +·694 | +·221 | +·685 |
| Tukubasan | 36 13 N. | 140 6 E. | −·619 | +·518 | +·591 |
| Tyosi | 35 44 N. | 140 51 E. | −·630 | +·512 | +·584 |
| Upsala | 59 51 N. | 17 38 E. | +·479 | +·152 | +·865 |
| Venice | 45 26 N. | 12 20 E. | +·685 | +·150 | +·712 |
| Vera Cruz | 19 12 N. | 96 8 W. | −·101 | −·939 | +·329 |

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