

FOURTH  
ANNUAL REPORT OF THE SEISMOGRAPH STATION  
AT HILL VIEW, WOODBRIDGE HILL,  
GUILDFORD, ENGLAND

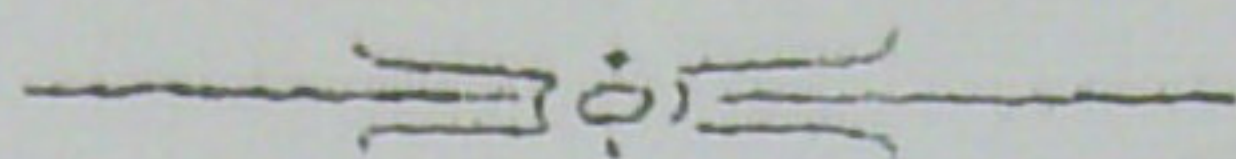
YEAR 1913

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# THE SEISMOGRAPH STATION AT HILL VIEW, WOODBRIDGE HILL, GUILDFORD, ENGLAND.



POSITION.  $\lambda = 0^{\circ} 35' 47''$  W. of Greenwich.  $\phi = 51^{\circ} 15' 1''$  N. Booms 187 feet or 57 metres above mean sea level at Liverpool.

BASE. London Clay (Eocene, marine).

GREENWICH MEAN TIME is kept, Ohro. = Midnight, and is now expressed in hours, minutes and seconds.

INSTRUMENT, a modification of the Milne Instrument, having a mast 4' 2" (1.27 metres) from Booms to summit, Booms 4 ins. above the concrete base; the concrete base stretching down 3 ft. above the ground and 5 feet below it. Two Booms, one facing North and one West, each 3 ft (91.4 cms.) long, and having a weight of 100 lbs. (45.36 kilograms) at the outer end. Magnetic damping. Photographic recording by means of crossed slits and glass multiplying levers. From January to November the magnification was 45:1 and the Boom-period 9 secs. In December, the magnification was 100:1, and the Boom-period 8 secs. The recording paper travels at a linear rate of 25 cms. per hour.

ABBREVIATIONS used in the following Register.

h = hour  
m = minute  
sec = second } of Mean Time.

i = impetus; that is, a sudden marked wave-front, of whatever phase.  
e = emergence; that is, a gradual indefinite arrival of waves, of whatever phase.  
N, S, (small capital letters) denote a movement of the West Boom towards the north or south respectively.

E, W, (small capital letters) denote a movement of the North Boom towards the east or west respectively.

a = a displacement of the Boom from rest to an extent indicated.

d = duration.

mm = millimetres.

km = kilometres.

micro = microscopic; used of movements which have a range of less than 0.02 mm.

Amplitude = the Range of motion of the Boom.

N (large capital letter) = the Component (Boom) which faces Northwards.

W (large capital letter) = the Component (Boom) which faces Westwards.

P (large) = time of arrival of the First Preliminary Phase at this Station.

S (large) = time of arrival of the Second Preliminary Phase at this Station.

L (large) = time of arrival of the Long Waves (Third Phase) at this Station.

M (large) = time of arrival of a Maximum of the Long Waves at this Station.

C (large) = time of arrival of a Maximum of the Aftershocks at this Station.

F (large) = time of end of movement at this Station, of whatever phase.

T (large) = the duration in seconds of time of a complete wave, crest to crest.

E (large) = the position on the world of the Epicentre of an Earthquake.

$\alpha$  = Azimuth of the Epicentre from this Station.

$\Delta$  = distance (in kilometres) of the Epicentre from this Station, as deduced from the interval of time elapsing between P and S.

$\lambda$  = longitude East or West from Greenwich.

$\phi$  = latitude North or South.

$\psi$  = the distance (in arc measure, i.e. degrees) of the Epicentre from this Station, as deduced from the interval of time elapsing between P and L.

Alas! Milne is dead. We have lost our Chief; and we have lost our friend. Ever genial he was, ever kindly, ever ready to take trouble for other people; and yet ever determined in his fight on behalf of the little Science which his life-work has given to the world. With him was found the original spark of genius which kindled the whole into flame: and let this never be forgotten, no matter how much other have built and will build upon the foundations which he laid. He was typical of the true spirit of Scientific Research — giving the results of his labours for the good of men, giving his experience and ideas to the scores of workers who came to him.

Narrowness and jealousy were exactly opposite to his wide and generous nature; it pained him to see them in others, and they always drew from him some courteous rebuke. Rather than keep for himself the many clever schemes which his genius framed, he gave them freely to all who might care to listen and to profit thereby. To his encouragement this Seismograph Observatory owes its existence and its place. Our hope is, now, to continue his work upward into the clearer light, and (as our wish has always been) to add something to the wisdom, the advance and the betterment of mankind.

This Station has also to mourn the death of Mr T. L. Inman, who since its inception had shown the greatest interest in our work, and had developed our photographic records from the first.

THE REGISTER this year has been simplified by the reduction of the number of columns and by the omission of Mascina belonging to the First and Second Phase. I still regard these Mascina as important, but the labour involved in registering them is too great for me.

I have striven to give the Time correct to seconds: this will be rendered more simple if our experiments (detailed below) are successful.

To save the cost of printing, the register is being duplicated on a Typograph.

Other corroborated earthquakes of which I can only give a few details will be found in the Monthly Circulars of the Seismological Committee of the British Association, by whose courtesy my figures are there printed.

Where such interpretation seems probable, I have registered multiple shocks, proceeding from the same epicentre at intervals of a few minutes, and coincident earthquakes from different epicentres. It must please be understood that such interpretations are made with great thought and care; but, in common with all interpretation of seismograms, they are not to be taken as incontrovertible facts.

CONFERENCE. I wish very strongly to support the suggestion of an annual Meeting at a convenient place such as Oxford, between the Milne Observers and other Seismologists, Mathematicians and Physicists. Instead of being so isolated, we could then assist each other, and the Science as a whole.

MOST GRATEFUL THANKS are offered to the Observers at Stonyhurst, Bidston, San Fernando, Irkutsk, Zi ka wei, Osaka, Taihoku and Ottawa, for sending me their Earthquake Bulletins. Coming from such widely separated parts, they are of great value in correcting the interpretation of seismograms. COMPARATIVE COMMENCEMENTS and Epicentral Distances are given in my "Notes" Column. The positions of certain Stations mentioned here, but not given in the new Shide Bulletins, are:—

|                                  |                                     |
|----------------------------------|-------------------------------------|
| Tainan 22° 59' N. 120° 12' E.    | Gifu 35° 27' N. 136° 46' E.         |
| Taihoku 25° 23' N. 121° 30.7' E. | Nagoya 35° 10' N. 136° 55' E.       |
| Nase 28° 23' N. 129° 30' E.      | Tokyo 35° 40' N. 139° 48' E approx. |
| Changchun 43° 48' N. 125° 29' E. | Mizusawa 39° 5' N. 141° 48' E "     |
| Chemulpo 37° 29' N. 126° 32' E.  | Limerick 52° 38' N. 8° 41' W        |
| Nagasaki 32° 44' N. 129° 52' E.  | Ucdé 50° 47' N. 4° 21' E approx.    |
| Fukuoka 33° 35' N. 130° 25' E.   | Simla 31° 6' N. 77° 11' E "         |

BOOM-PERIODS. I see every reason to reduce the natural period of my Booms from 9 secs. to 8 secs. With these guide periods the Preliminary Phases are much more readily picked up, giving more decisive records. The real shapes of the long waves are also given; instead of a cumulative or conflicting oscillation, which is probably not the true maximum. High magnification and quick running papers are necessary. Let the register which follows speak for itself. Although P1 ought to be more sharply defined than in my present records. Friction damping is essential. There is no use in recording earthquakes unless what we say is P1 is really P1, and unless our maxima are the really largest of the long waves.

Earthquakes from comparatively close Epicentres are much better given by a quick-period Boom. See the mine-explosion in Portsmouth Harbour (April 9th) and the Earthquakes of May 19th and July 20th.

EXPERIMENTS. We have built a light Seismograph, which has just been started.

TREMORS. AT this Station we get (a) cumulative, long-continued tremors of about the natural Boom-period, usually during gales; (b) tremors of 5 or 6 secs period, in small groups, usually when the temperature of the soil is fairly low; (c) irregular tremors, of varying periods, often during uniformly cold weather; (d) occasional waves of 28 to 30 secs.

SLOW PERIOD TILTING Observations seem to be almost hopeless here, as the changes in humidity in the London Clay produce continual tiltings which hide the smaller and longer movements.

PLEASE EXCUSE me for leaving the binding spaces on the wrong sides of my pages, so that the register begins at the end of this book and works backwards like the monthly reports from Japan.

THUNDER CLAPS. There have been three storms in the near distance of this Station, during the year, suitable for correlating with possible earth-vibrations. Each time, there happened to be something wrong with either the Seismograph or the Records, or the timing apparatus. No results have therefore been obtained as yet. But I am very grateful to Mr. J. J. Shaw for having introduced me to the most fascinating subject of Etherial Telegraphy, which (like Seismology) is essentially a matter of waves that travel by wonderful and mysterious paths.

F. Edward Norris.

Owner and Observer of the Seismograph Station,  
Hill View, Woodbridge Hill, GUILDFORD,  
England -

February, 1914.

| DATE   | PHASE | GREENWICH MEAN TIME |    |     | PERIOD | AMPLITUDE | OF W | Δ      | NOTES              |
|--------|-------|---------------------|----|-----|--------|-----------|------|--------|--------------------|
| 1913   |       | h                   | m  | sec | sec    | mm        | mm   | km     |                    |
| Jan 5  | P     | 17                  | 37 | 36  |        |           |      | 9015   | Fukuoka, P=17 22 5 |
|        | S     |                     | 47 | 48  |        |           |      |        | Zi Ka Wei, " 23 11 |
|        | L     | 18                  | 10 | 0   |        |           |      |        | Tokyo, " 23 33     |
|        | M     |                     | 12 | 12  | 18     | 0.8       |      |        | Taipei, " 23 38    |
|        |       |                     | 14 | 6   | 20?    | 1.0       |      |        | Tsingtau, " 23 51  |
|        |       |                     | 15 | 36  | 19     | 0.6       |      |        | Manila, " 25 29    |
|        |       |                     | 17 | 24  | 18     | 0.7       |      |        | Irkutsk, " 27 13   |
|        |       |                     | 18 | 18  | 19     | 0.3       |      |        |                    |
|        |       |                     | 19 | 0   | 19     | 0.8       |      |        |                    |
|        |       |                     | 20 | 36  | 17     | 0.5       |      |        |                    |
|        |       |                     | 22 | 24  | 19     | 0.8?      |      |        |                    |
|        | C     |                     | 26 | 54  | 16.5   | 0.3       |      |        |                    |
|        |       |                     | 31 | 12  | 15     | 0.2       |      |        |                    |
| Jan 7  | P?    | 23                  | 5  | 42  |        |           |      | 10880? |                    |
|        | S?    |                     | 17 | 18  |        |           |      |        |                    |
|        | L?    |                     | 40 | 42  |        |           |      |        |                    |
|        | M     |                     | 42 | 6   | 17     | 0.4?      |      |        |                    |
|        |       |                     | 46 | 18  | 20     | 0.8       |      |        |                    |
|        |       |                     | 19 | 30  | 19     | 1.0       |      |        |                    |
|        |       |                     | 51 | 34  | 19     | 1.0       |      |        |                    |
|        | M     |                     | 53 | 48  | 19     | 0.25      |      |        |                    |
|        |       |                     | 55 | 12  | 19     | 0.65      |      |        |                    |
| " 8    | C     | 0                   | 2  | 42  | 19     | 0.2       |      |        |                    |
|        |       |                     | 7  | 24  | 19     | 0.2       |      |        |                    |
|        |       |                     | 9  | 10  | 19     | 0.3       |      |        |                    |
|        |       |                     | 21 | 10  | 19     | 0.3       |      |        |                    |
|        |       |                     | 26 | 42  | 19     | 0.2       |      |        |                    |
|        |       |                     | 30 | 0   | 19     | 0.3       |      |        |                    |
|        |       |                     | 39 | 0   | 19     | 0.2       |      |        |                    |
|        |       |                     | 12 | 30  | 19     | 0.25      |      |        |                    |
|        | F     | 1                   | 15 | 30  |        |           |      |        |                    |
| Jan 8  | F     | 20                  | 7  | 24  |        |           | 0.3  |        |                    |
|        | F     |                     | 17 | 30  |        |           |      |        |                    |
| Jan 9  | M     | 3                   | 54 | 36  |        |           | 3.5  |        | During tremors.    |
| Jan 10 | W     | 8                   | 14 | 21  |        | 0.9       |      |        |                    |
|        | E     |                     | 17 | 15  |        | 0.4       |      |        |                    |
|        | L     |                     | 22 | 48  |        | ?         |      |        |                    |
|        | M     |                     | 24 | 6   |        | 0.4       |      |        |                    |
|        |       |                     | 25 | 6   |        | 0.4       |      |        |                    |
|        |       |                     | 26 | 54  |        | 1.25      |      |        |                    |
|        |       |                     | 28 | 45  |        | 1.6       |      |        |                    |
| Jan 11 | P?    | 13                  | 6  | 12  |        |           |      | 7845?  |                    |
|        | E     |                     | 12 | 18  |        | 0.5       |      |        |                    |
|        | E     |                     | 12 | 30  |        | 0.3       |      |        |                    |
|        | S     |                     | 15 | 24  |        | 0.9       |      |        |                    |
|        | L     |                     | 29 | 36  |        |           |      |        |                    |
|        | M     |                     | 32 | 36  | 25     | 0.3       |      |        |                    |
|        |       |                     | 36 | 18  | 18     | 0.3       |      |        |                    |
|        |       |                     | 43 | 0   | 17?    | 0.6       |      |        |                    |
|        |       |                     | 46 | 0   | 17     | 0.3       |      |        |                    |
|        |       |                     | 56 | 24  | 18?    | 0.25?     |      |        |                    |
| Jan 11 | P?W   | 13                  | 42 | 18  |        | 0.3       |      | 9850?  | Manila, P=13 20 3  |
|        | N     |                     | 49 | 36  |        | 0.4       |      |        | Mizusawa, " 24 39  |
|        | E     |                     | 51 | 36  |        | 0.8       |      |        | Irkutsk, " 26 6    |
|        | S?    |                     | 53 | 9   |        | 0.3       |      |        |                    |
|        | L     | 14                  | 19 | 30  |        |           |      |        |                    |
|        | M     |                     | 21 | 36  | 16     | 0.6       |      |        |                    |
|        |       |                     | 26 | 36  | 16     | 0.25      |      |        |                    |
|        |       |                     | 27 | 30  | 16     | 0.4       |      |        |                    |
|        |       |                     | 30 | 18  | 16     | 0.5       |      |        |                    |
|        |       |                     | 32 | 18  | 18     | 0.3       |      |        |                    |
|        |       |                     | 36 | 0   | 18     | 0.3       |      |        |                    |
|        |       |                     | 40 | 24  | 29     | 0.2       |      |        |                    |

| DATE<br>1913     | PHASE | GREENWICH<br>MEAN TIME |    |     | PERIOD<br>OF N | AMPLITUDE<br>OF W | △<br>KM | NOTES |                             |       |
|------------------|-------|------------------------|----|-----|----------------|-------------------|---------|-------|-----------------------------|-------|
|                  |       | h                      | m  | sec | sec            | mm                | mm      |       |                             |       |
| 11/I<br>(cont'd) | C     | 14                     | 50 | 18  | 18?            | 0.15              |         |       |                             |       |
|                  |       |                        | 56 | 54  | 22             | 0.15              |         |       |                             |       |
|                  |       | 15                     | 7  | 18  | 19             | 0.2               |         |       |                             |       |
|                  |       |                        | 59 | 12  | 18             | 0.2               |         |       |                             |       |
|                  |       | 16                     | 16 | 54  | 13.5           | 0.07              |         |       |                             |       |
| 15/I             | P W   | 19                     | 4  | 12  |                | 0.2               |         | 8800  |                             |       |
|                  | S E   |                        | 14 | 12  |                |                   |         |       |                             |       |
|                  | L E   |                        | 25 | 48  |                | 0.2               |         |       |                             |       |
|                  | M     |                        | 35 | 6   |                |                   |         |       |                             |       |
|                  |       |                        | 36 | 0   | 16             | 0.75              |         |       |                             |       |
|                  |       |                        | 36 | 42  |                | 1.05              |         |       |                             |       |
|                  |       |                        | 37 | 6   |                | 0.7               |         |       |                             |       |
|                  |       |                        | 37 | 24  |                | 0.65              |         |       |                             |       |
|                  |       |                        | 39 | 0   | 18?            | 0.3               |         |       |                             |       |
|                  |       |                        | 40 | 42  |                | 0.2               |         |       |                             |       |
|                  |       |                        | 42 | 18  | 16             | 0.5               |         |       |                             |       |
|                  |       |                        | 45 | 6   | 19             | 0.6               |         |       |                             |       |
|                  |       |                        | 46 | 30  |                | 0.3               |         |       |                             |       |
|                  | C     |                        | 54 | 12  | 17.5           | 0.4               |         |       |                             |       |
|                  | F     | 20                     | 17 | 48  | 16.5           | 0.2               |         |       |                             |       |
|                  |       |                        | 20 |     |                |                   |         |       |                             |       |
| 16/I             | P W   | 8                      | 32 | 24  |                |                   |         | 2150  |                             |       |
|                  | S E   |                        | 36 | 0   |                | 0.8               |         |       |                             |       |
|                  | L E   |                        | 39 | 21  |                |                   |         |       |                             |       |
|                  | M     |                        | 39 | 39  |                | 1.35              |         |       |                             |       |
|                  |       |                        | 41 | 24  |                | 1.8               |         |       |                             |       |
|                  |       |                        | 42 | 18  |                | 1.8               |         |       |                             |       |
|                  |       |                        | 43 | 18  |                | 0.95              |         |       |                             |       |
|                  | C     |                        | 44 | 36  |                | 0.9               |         |       |                             |       |
|                  |       |                        | 50 | 18  |                | 0.9               |         |       |                             |       |
|                  |       |                        | 51 | 24  |                | 0.8               |         |       |                             |       |
|                  | F     |                        | 52 | 24  |                | 1.0               |         |       |                             |       |
|                  |       |                        | 55 | 30  |                |                   |         |       |                             |       |
| 19/I             | P E   | 17                     | 18 | 21  |                |                   |         | 6440  | Felt in Ceylon              |       |
|                  | S W   |                        | 26 | 15  |                |                   |         |       | Colombo, P=17               | 1 54  |
|                  | L E   |                        | 26 | 21  |                |                   |         |       | Zirka wei, "                | 13 45 |
|                  | P2 W  |                        | 33 | 18  |                | 0.3               |         |       | Manila, "                   | 12 42 |
|                  | S2 E  |                        | 38 | 12  |                |                   |         | 1180  | Irkutsk, "                  | 14 53 |
|                  | L2 E  |                        | 40 | 18  |                |                   |         |       | Osaka, "                    | 15 25 |
|                  | M2    |                        | 43 | 6   |                |                   |         |       |                             |       |
|                  | M     | 18                     | 43 | 21  | 10             | 0.75              |         |       |                             |       |
|                  |       |                        | 1  | 12  | 18             | 0.7               |         |       |                             |       |
|                  |       |                        | 3  | 18  | 19             | 0.95              |         |       |                             |       |
|                  |       |                        | 5  | 3   | 17             | 0.6               |         |       |                             |       |
|                  |       |                        | 10 | 54  | 15.5           | 0.8               |         |       |                             |       |
|                  | C     |                        | 34 | 18  | 24             | 0.25              |         |       |                             |       |
|                  |       |                        | 54 | 36  | 22             | 0.15              |         |       |                             |       |
|                  |       | 19                     | 18 | 30  | 17             | 0.05              |         |       |                             |       |
|                  | E     |                        | 36 | 42  | ?              | 0.35*             |         |       | *Displacement to East.      |       |
|                  |       |                        | 39 | 48  | 22             | 0.2               |         |       |                             |       |
|                  | F     | 20                     | 14 | 0   | 18             | 0.3?              |         |       |                             |       |
|                  |       |                        | 16 |     |                |                   |         |       |                             |       |
| 20/I             | M     | 0                      | 40 | 18  | 14             | 0.3               |         |       | Mizusawa, P= 19/I, 23 50 22 |       |
| 20/I             | P W   | 15                     | 57 | 42  |                |                   |         |       |                             |       |
|                  | S W   |                        | 58 | 6   | 9              |                   |         |       |                             |       |
|                  | L W   | 16                     | 7  | 54  |                | 1.0               |         |       |                             |       |
|                  | F     |                        | 9  | 24  |                |                   |         |       |                             |       |
| 21/I             | P?    | 11                     | 55 | 18  |                |                   |         |       |                             |       |
|                  | S?    | 12                     | 4  | 12  |                |                   |         |       |                             |       |
|                  | L     |                        | 13 | 18  |                |                   |         |       |                             |       |
|                  | M     |                        | 22 | 42  | 18.5           | 0.15              |         |       |                             |       |

| DATE<br>1913 | PHASE | GREENWICH<br>MEAN TIME |    |     | PERIOD<br>T<br>SEC | AMPLITUDE<br>OF N<br>mm | AMPLITUDE<br>OF W<br>mm | $\Delta$<br>km | NOTES                                                    |
|--------------|-------|------------------------|----|-----|--------------------|-------------------------|-------------------------|----------------|----------------------------------------------------------|
|              |       | h.                     | m  | sec |                    |                         |                         |                |                                                          |
| 23/I         | P     | 14                     | 10 | 15  |                    |                         |                         | 7545           | Irkutsk, P=14 11 59                                      |
|              | S     |                        | 19 | 12  |                    |                         |                         |                |                                                          |
|              | M     |                        | 41 | 6   |                    | 0.3                     |                         |                |                                                          |
|              |       |                        | 48 | 0   | 18                 | 0.3                     |                         |                |                                                          |
| 27/I         | S     | 19                     | 52 | 51  |                    |                         |                         |                |                                                          |
|              | L     | 20                     | 2  | 0   |                    |                         |                         |                |                                                          |
|              | M     |                        | 2  | 18  | 15.5               | 0.1                     |                         |                |                                                          |
| 28/I         | e     | 3                      | 11 | 15  |                    |                         |                         |                |                                                          |
|              | L     |                        | 35 | 0   |                    |                         |                         |                |                                                          |
|              | M     |                        | 40 | 24  | 16                 | 0.07                    |                         |                |                                                          |
|              | C     |                        | 42 | 42  |                    | 0.07                    |                         |                |                                                          |
|              |       |                        | 51 | 0   |                    | 0.05                    |                         |                |                                                          |
| 31/I         | i     | 23                     | 22 | 18  |                    |                         |                         |                |                                                          |
|              | L     |                        | 37 | 0   |                    |                         |                         |                |                                                          |
|              | M     |                        | 42 | 0   | 16                 | 0.15                    |                         |                |                                                          |
| 11/II        | M     | 22                     | 47 | 24  | 16                 | 0.15                    |                         |                | Records spoiled, 3 <sup>rd</sup> - 10 <sup>th</sup> Feb. |
| 12/II        | M     | 0                      | 48 | 48  |                    | 0.1                     |                         |                |                                                          |
| 14/II        | M     | 19                     | 26 | 30  |                    | 0.2                     |                         |                |                                                          |
| 14/II        | e     | 20                     | 18 | 0   |                    |                         |                         |                |                                                          |
|              | i     |                        | 24 | 18  |                    |                         |                         |                |                                                          |
| 18/II        | e     | 16                     | 2  | 39  |                    |                         |                         | 7315           |                                                          |
|              | P     |                        | 11 | 24  |                    |                         |                         |                |                                                          |
|              | S     |                        | 24 | 18  |                    |                         |                         |                |                                                          |
|              | L     |                        | 24 | 54  |                    | 0.2                     |                         |                |                                                          |
|              | M     |                        | 29 | 0   |                    | 0.15                    |                         |                |                                                          |
| 20/II        | i     | 9                      | 12 | 12  |                    |                         |                         | 7850           | Mizusawa, P=9 0 1                                        |
|              | P     |                        | 21 | 24  |                    |                         |                         |                | Nagoya, " 1 13                                           |
|              | S     |                        | 43 | 0   |                    |                         |                         |                | Osaka, " 1 21                                            |
|              | L     |                        | 47 | 42  | 20                 | 0.7                     |                         |                | Zi ka wei, " 3 36                                        |
|              | M     |                        | 52 | 36  | 13                 | 0.4                     |                         |                | Irkutsk, " 4 48                                          |
|              | C     | 10                     | 0  | 36  | 15                 | 0.15                    |                         |                | Simla, " 10 0                                            |
|              |       |                        |    |     |                    |                         |                         |                | Slonyhurst, " 12 24                                      |
|              |       |                        |    |     |                    |                         |                         |                | San Fernando, " 13 0                                     |
| 27/II        | M     | 17                     | 13 | 24  |                    | 0.03                    |                         |                |                                                          |
| 1/III        | e     | 15                     | 14 | 12  |                    |                         |                         |                |                                                          |
|              | S     |                        | 23 | 12  |                    | 0.2                     |                         |                |                                                          |
|              | L     |                        | 24 | 39  | 14                 | 0.2                     |                         |                |                                                          |
|              | M     |                        |    |     |                    |                         |                         |                |                                                          |
| 6/III        | e     | 2                      | 17 | 36  |                    |                         |                         | 7965           | Irkutsk, P=2 14 49                                       |
|              | P     |                        | 26 | 54  |                    |                         |                         |                |                                                          |
|              | S     |                        | 43 | 18  |                    |                         |                         |                |                                                          |
|              | L     |                        | 45 | 15  | 18                 | 0.5                     |                         |                |                                                          |
|              | M     |                        | 48 | 18  | 14.5               | 0.25                    |                         |                |                                                          |
| 6/III        | P     | 9                      | 34 | 12  |                    |                         |                         | 435            |                                                          |
|              | S     |                        | 35 |     |                    |                         |                         |                |                                                          |
|              | L     |                        | 35 | 42  |                    |                         |                         |                |                                                          |
|              | M     |                        | 36 | 21  |                    | 4.3                     |                         |                |                                                          |
|              | C     |                        | 51 | 42  |                    | 3.7                     |                         |                |                                                          |
|              | F     |                        | 52 | 42  |                    |                         |                         |                |                                                          |
| 6/III        | P     | "                      | 7  | 57  |                    |                         |                         | 8100           | Irkutsk, P=11 9 49. Pamir.                               |
|              | S     |                        | 17 | 22  |                    | 0.65                    |                         | 8070           | Osaka, " 12 1                                            |
|              | E     |                        | 26 | 45  |                    |                         |                         |                |                                                          |

| DATE<br>1913 | PHASE                | GREENWICH<br>MEAN TIME |    |     | PERIOD<br>T<br>sec | AMPLITUDE<br>OF N<br>mm | AMPLITUDE<br>OF W<br>mm | $\Delta$<br>km | NOTES                               |
|--------------|----------------------|------------------------|----|-----|--------------------|-------------------------|-------------------------|----------------|-------------------------------------|
| h            | m                    | h                      | m  | sec |                    |                         |                         |                |                                     |
| 6/III        | e L                  | 11                     | 36 | 24  |                    |                         |                         |                |                                     |
| Cont'd       | j M                  |                        | 38 | 48  | 15.2               | 1.0                     |                         |                |                                     |
|              |                      |                        | 39 | 30  | 15.2               | 1.0?                    |                         |                |                                     |
|              |                      |                        | 40 | 0   |                    | 0.5?                    |                         |                |                                     |
|              | C                    |                        | 44 | 6   |                    | 0.5?                    |                         |                |                                     |
|              |                      |                        | 52 | 0   |                    |                         |                         |                |                                     |
| 8/III        | P.1.                 | 16                     | 0  | 0   |                    |                         |                         | 8800           |                                     |
|              | P.2.                 |                        | 2  | 12  |                    |                         |                         | 8800           |                                     |
|              | S.1 W                |                        | 10 | 0   |                    | 0.25                    |                         |                |                                     |
|              | W                    |                        | 11 | 36  |                    | 0.4                     |                         |                |                                     |
|              | S.2.                 |                        | 12 | 12  |                    |                         |                         |                |                                     |
|              | Alternative reading. |                        |    |     |                    |                         |                         |                |                                     |
|              | P                    | 16                     | 2  | 12  |                    |                         |                         | 8085           |                                     |
|              | S W                  |                        | 11 | 36  |                    |                         |                         |                |                                     |
|              | L1                   |                        | 30 | 54  |                    |                         |                         |                |                                     |
|              | L2                   |                        | 32 | 54  |                    |                         |                         |                |                                     |
|              | M                    |                        | 33 | 42  | 25*                | 0.2                     |                         |                | *Distorted.                         |
|              |                      |                        | 38 | 51  | 19                 | 0.5                     |                         |                |                                     |
|              |                      |                        | 41 | 6   | 19.7               | 0.4                     |                         |                |                                     |
|              |                      |                        | 45 | 12  | ?                  | 0.3?                    |                         |                |                                     |
|              | C                    |                        | 47 | 42  | 24                 | 0.2                     |                         |                |                                     |
|              |                      |                        | 51 | 0   | 18                 | 0.1                     |                         |                |                                     |
|              | F                    | 17                     | 5  | 24  | 17                 | 0.03                    |                         |                |                                     |
| 9/III        | i M E                | 16                     | 49 | 42  |                    |                         |                         |                | Osaka, e = 16 42 55                 |
|              |                      | 17                     | 12 | 36  |                    | 0.8                     |                         |                |                                     |
| 10/III       | e L                  | 15                     | 9  | 42  |                    |                         |                         |                |                                     |
|              | M                    |                        | 13 | 30  | 14                 | 0.2                     |                         |                |                                     |
| 14/III       | i P.1.               | 8                      | 58 | 15  |                    |                         |                         | 10115          | Siao, Sangir, Talaut Is. (Celebes). |
|              | P.2.                 |                        | 58 | 42  |                    |                         |                         | 10045          | 107 inhabitants buried alive.       |
|              | S.1.                 | 9                      | 9  | 18  |                    |                         |                         |                | Manila, P = 8 47 38                 |
|              | S.2.                 |                        | 9  | 42  |                    |                         |                         |                | Taihooku, " 50 20                   |
|              | L                    |                        | 30 | 30  |                    |                         |                         |                | Zi ka wei, " 50 38                  |
|              | M                    |                        | 31 | 48  |                    | 2.8                     |                         |                | Fukuoka, " 51 16                    |
|              |                      |                        | 35 | 18  |                    | 2.2                     |                         |                | Osaka, " 51 21                      |
|              |                      |                        | 36 | 24  |                    | 2.2                     |                         |                | Nagoya, " 51 27                     |
|              |                      |                        | 37 | 18  |                    | 3.3                     |                         |                | Mizusawa, " 52 9                    |
|              |                      |                        | 38 | 36  |                    | 2.9                     |                         |                | Irkutsk, " 53 54                    |
|              |                      |                        | 40 | 36  |                    | 4.0                     |                         |                |                                     |
|              |                      |                        | 43 | 18  |                    | 8.4                     |                         |                |                                     |
|              |                      |                        | 44 | 18  | 30                 | 4.0                     |                         |                |                                     |
|              |                      |                        | 45 | 54  |                    | 6.0                     |                         |                |                                     |
|              |                      |                        | 47 | 30  | 20                 | 5.0                     |                         |                |                                     |
|              |                      |                        | 49 | 45  | 25                 | 7.6                     |                         |                |                                     |
|              |                      |                        | 54 | 0   |                    | 6.0                     |                         |                |                                     |
|              |                      |                        | 56 | 3   | 20                 | 7.0                     |                         |                |                                     |
|              |                      |                        | 57 | 42  | 20                 | 4.1                     |                         |                |                                     |
|              | C                    | 10                     | 0  | 54  | 18                 | 1.9                     |                         |                |                                     |
|              |                      |                        | 6  | 36  | 19                 | 2.0                     |                         |                |                                     |
|              |                      |                        | 10 | 0   | 33                 | 2.6                     |                         |                |                                     |
|              |                      |                        | 13 | 18  | 15                 | 1.6                     |                         |                |                                     |
|              |                      |                        | 16 | 18  | 14                 | 1.35                    |                         |                |                                     |
|              |                      |                        | 40 | 36  | 16.5               | 0.55                    |                         |                |                                     |
|              | M'                   | 11                     | 13 | 48  | 16                 | 1.0                     |                         |                |                                     |
|              |                      | 12                     | 18 | 0   | 35                 | 2.1                     |                         |                |                                     |
|              |                      |                        | 18 | 48  | ?                  | 3.0                     |                         |                |                                     |
|              | F                    |                        | 53 | 30  |                    |                         |                         |                |                                     |
| 23/III       | e M                  | 21                     | 7  | 18  |                    |                         |                         |                | Zi ka wei, P = 20 51 54             |
|              |                      |                        | 28 | 27  | 10                 | 0.25                    |                         |                | Irkutsk, " 55 3                     |
|              |                      |                        | 42 | 42  | 17                 | 0.2                     |                         |                |                                     |
|              | F                    |                        | 58 | 50  |                    |                         |                         |                |                                     |

| DATE<br>1913 | PHASE   | GREENWICH<br>MEAN TIME |    |     | PERIOD<br>T<br>sec | AMPL<br>OF IN<br>in m | ITUDE<br>OF W<br>mm | $\Delta$<br>km | NOTES                                                                                                                                                                                               |
|--------------|---------|------------------------|----|-----|--------------------|-----------------------|---------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|              |         | h                      | m  | sec |                    |                       |                     |                |                                                                                                                                                                                                     |
| 31/III       | P.E.S   | 3                      | 54 | 3   |                    | 0.35                  | 0.25                | 7785           | $\alpha = 1^{\circ} 24' W. of N.$<br>$\lambda = 143.7^{\circ} W.$<br>$\phi = 58.5^{\circ} N.$<br>$\psi = 70.9^{\circ}$<br>Irkutsk gives<br>$\lambda = 167.4^{\circ} W.$<br>$\phi = 54.6^{\circ} N.$ |
|              | P.2.E   |                        | 57 | 6   |                    |                       |                     | 7725           |                                                                                                                                                                                                     |
|              | P.3.E   |                        | 59 | 3   |                    | 0.4                   |                     | 7785           |                                                                                                                                                                                                     |
|              | S.W.S   | 4                      | 3  | 12  |                    | 0.8                   | 0.6                 |                |                                                                                                                                                                                                     |
|              | S.2.    |                        | 6  | 12  |                    |                       |                     |                |                                                                                                                                                                                                     |
|              | S.3.W   |                        | 8  | 12  |                    |                       |                     |                |                                                                                                                                                                                                     |
|              | P.4.W   |                        | 7  | 27  |                    |                       |                     | 7785           |                                                                                                                                                                                                     |
|              | S.4.W   |                        | 16 | 36  |                    |                       |                     |                |                                                                                                                                                                                                     |
|              | L.1.    |                        | 21 | 9   |                    |                       |                     |                |                                                                                                                                                                                                     |
|              | M.1.    |                        | 23 | 0   | 33                 | 0.6                   |                     |                |                                                                                                                                                                                                     |
|              | L.2.    |                        | 25 | 12  |                    |                       |                     |                |                                                                                                                                                                                                     |
|              | M.2.    |                        | 26 | 36  | 17                 | 0.73                  |                     |                |                                                                                                                                                                                                     |
|              | L.3.    |                        | 27 | 12  |                    |                       |                     |                |                                                                                                                                                                                                     |
|              | M.3     |                        | 27 | 51  | 24                 | 0.9                   |                     |                |                                                                                                                                                                                                     |
|              |         |                        | 30 | 0   | 18                 |                       | 0.75                |                |                                                                                                                                                                                                     |
|              |         |                        | 30 | 30  | 16.5               | 0.95                  |                     |                |                                                                                                                                                                                                     |
|              |         |                        | 31 | 36  | 19                 | 1.15                  |                     |                |                                                                                                                                                                                                     |
|              |         |                        | 33 | 3   | 16                 | 1.35                  |                     |                |                                                                                                                                                                                                     |
|              | L.4     |                        | 34 | 12  |                    |                       |                     |                |                                                                                                                                                                                                     |
|              | M.4     |                        | 35 | 3   | 24                 | 0.9                   |                     |                |                                                                                                                                                                                                     |
|              |         |                        | 35 | 48  | 17                 |                       | 0.7                 |                |                                                                                                                                                                                                     |
|              |         |                        | 36 | 0   | 18                 | 1.05                  |                     |                |                                                                                                                                                                                                     |
|              |         |                        | 37 | 48  | 15.5               | 1.0                   |                     |                |                                                                                                                                                                                                     |
|              |         |                        | 39 | 18  | 17.5               |                       | 0.7                 |                |                                                                                                                                                                                                     |
|              |         |                        | 40 | 42  | 16                 | 1.15                  |                     |                |                                                                                                                                                                                                     |
|              |         |                        | 42 | 0   | 19                 | 1.15                  |                     |                |                                                                                                                                                                                                     |
|              |         |                        | 44 | 18  | 14                 | 1.2                   |                     |                |                                                                                                                                                                                                     |
|              | C       |                        | 47 | 36  | 13.5               | 0.8                   |                     |                |                                                                                                                                                                                                     |
|              |         |                        | 51 | 3   | 15                 | 0.85                  |                     |                |                                                                                                                                                                                                     |
|              |         |                        | 52 | 15  | 13                 | 0.8                   |                     |                |                                                                                                                                                                                                     |
|              |         |                        | 56 | 12  | 16                 | 0.8                   |                     |                |                                                                                                                                                                                                     |
|              |         | 5                      | 4  | 45  | 13                 | 0.9                   |                     |                |                                                                                                                                                                                                     |
|              |         |                        | 8  | 45  | 14                 | 0.8                   |                     |                |                                                                                                                                                                                                     |
|              |         |                        | 23 | 36  | 14                 | 0.3                   |                     |                |                                                                                                                                                                                                     |
|              |         |                        | 36 | 12  | 16                 | 0.4                   |                     |                |                                                                                                                                                                                                     |
|              |         |                        | 46 | 24  | 11                 | 0.4                   |                     |                |                                                                                                                                                                                                     |
|              | F       | 6                      | 34 | 36  |                    |                       |                     |                |                                                                                                                                                                                                     |
| 31/III       |         | 18                     | 20 | 24  |                    |                       |                     |                |                                                                                                                                                                                                     |
|              | L       |                        | 41 | 24  |                    |                       |                     |                |                                                                                                                                                                                                     |
|              | M       |                        | 42 | 21  | 15                 | 0.4                   |                     |                |                                                                                                                                                                                                     |
| 31/III       |         | 23                     | 1  | 9   |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        | 8  | 24  |                    |                       |                     |                |                                                                                                                                                                                                     |
|              | M       |                        | 14 | 12  | 13                 | 0.03                  |                     |                |                                                                                                                                                                                                     |
|              |         |                        | 31 | 48  | 18                 | 0.07                  |                     |                |                                                                                                                                                                                                     |
|              |         |                        | 42 | 54  |                    | 0.03                  |                     |                |                                                                                                                                                                                                     |
| 3/IV         | P       | 0                      | 5  | 3   |                    |                       |                     | 8380           |                                                                                                                                                                                                     |
|              | P.2.E   |                        | 6  | 10  |                    |                       |                     |                |                                                                                                                                                                                                     |
|              | S.2.    |                        | 14 | 42  |                    |                       |                     |                |                                                                                                                                                                                                     |
|              | S.3.    |                        | 23 | 39  |                    |                       |                     |                |                                                                                                                                                                                                     |
|              | L       |                        | 38 | 39  | 15.5               | 0.1                   |                     |                |                                                                                                                                                                                                     |
|              | M       |                        | 41 | 36  | 12                 | 0.2                   |                     |                |                                                                                                                                                                                                     |
|              | C       |                        | 46 | 39  |                    | 0.07                  |                     |                |                                                                                                                                                                                                     |
|              | F       |                        | 51 | 0   |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        | 50 |     |                    |                       |                     |                |                                                                                                                                                                                                     |
| 7/IV         | P       | 14                     | 1  | 0   |                    |                       |                     | 9145           |                                                                                                                                                                                                     |
|              | P.2.W.N |                        | 11 | 18  |                    | 0.8                   | 0.25                | 8325           |                                                                                                                                                                                                     |
|              | S       |                        | 20 | 54  |                    |                       |                     |                |                                                                                                                                                                                                     |
|              | L       |                        | 42 | 18  | 18                 |                       | 0.4                 |                |                                                                                                                                                                                                     |
|              | M       |                        | 44 | 18  | 15                 |                       | 0.3                 |                |                                                                                                                                                                                                     |
|              |         |                        | 47 | 36  | 14                 |                       | 0.4                 |                |                                                                                                                                                                                                     |
|              | F       | 15                     | 51 | 6   |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        | 56 |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
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|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
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|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
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|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
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|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
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|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
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|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
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|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        |    |     |                    |                       |                     |                |                                                                                                                                                                                                     |
|              |         |                        | </ |     |                    |                       |                     |                |                                                                                                                                                                                                     |



| DATE<br>1913 | PHASE | GREENWICH<br>MEAN TIME |    |      | PERIOD<br>T<br>SEC. | AMPLITUDE   |             | $\Delta$<br>km. | NOTES.                                                                                               |
|--------------|-------|------------------------|----|------|---------------------|-------------|-------------|-----------------|------------------------------------------------------------------------------------------------------|
|              |       | h.                     | m. | sec. |                     | of N<br>mm. | of W<br>mm. |                 |                                                                                                      |
| 8/IV         | P     | 2                      | 42 | 0    |                     |             |             | 7845            | Zika wei, e 2 22 57 and<br>e 2 50 17<br>Taihoku, e 2 24 42 and<br>iP 2 49 3<br>( $\Delta = 208$ km.) |
|              |       |                        | 51 | 12   |                     |             |             |                 |                                                                                                      |
|              | M     | 3                      | 12 | 18   |                     |             |             |                 |                                                                                                      |
|              |       |                        | 17 | 42   |                     |             | 0.25        |                 |                                                                                                      |
|              |       |                        | 25 | 42   |                     |             | 0.1         |                 |                                                                                                      |
|              | C     |                        | 32 | 18   |                     |             | 0.03        |                 |                                                                                                      |
| 9/IV         | P     | 12                     | 13 | 39   |                     |             |             | 80              |                                                                                                      |
|              |       |                        | 13 | 48   |                     |             |             |                 |                                                                                                      |
|              | M     |                        | 14 | 15   |                     |             |             |                 |                                                                                                      |
|              |       |                        | 15 | 0    |                     |             | 0.8         |                 |                                                                                                      |
|              |       |                        | 22 | 18   |                     |             |             |                 |                                                                                                      |
| 9/IV         | P     | 16                     | 1  | 42   |                     |             |             |                 |                                                                                                      |
|              |       |                        | 2  | 15   |                     |             |             |                 |                                                                                                      |
|              | M     |                        | 2  | 27   |                     |             |             |                 |                                                                                                      |
|              |       |                        | 4  |      |                     |             | 0.75        |                 |                                                                                                      |
| 9/IV         | P     | 18                     | 10 | 0    |                     |             |             | 5275?           |                                                                                                      |
|              |       |                        | 16 | 57   |                     |             |             |                 |                                                                                                      |
|              | M     |                        | 28 | 6    |                     |             |             |                 |                                                                                                      |
|              |       |                        | 30 | 48   | 13                  |             | 0.2         |                 |                                                                                                      |
|              |       |                        | 32 | 42   | 14                  |             | 0.2         |                 |                                                                                                      |
| 9/IV         | P     | 18                     | 9  | 0    |                     |             |             | 9775            | Irkutsk, P 18 12 26                                                                                  |
|              |       |                        | 19 | 48   |                     |             |             |                 |                                                                                                      |
|              | M     |                        | 39 | 0    |                     |             |             |                 |                                                                                                      |
|              |       |                        | 46 | 48   | 29                  |             | 0.05        |                 |                                                                                                      |
| 9/IV         | P     | 18                     | 17 | 42   |                     |             |             | 7600            | Osaka, e(PS) 18 12 32                                                                                |
|              |       |                        | 26 | 42   |                     |             |             |                 |                                                                                                      |
|              | M     |                        | 48 | 45   |                     |             |             |                 |                                                                                                      |
|              |       |                        | 53 | 54   | 20                  |             | 0.4         |                 |                                                                                                      |
|              |       | 19                     | 15 | 18   | 17                  |             | 0.03        |                 |                                                                                                      |
|              |       |                        | 35 | 42   |                     |             |             |                 |                                                                                                      |
| 13/IV        | P     | 6                      | 54 | 24   |                     |             |             | 8200            | Osaka, P 6 41 29                                                                                     |
|              |       |                        | 59 | 25   |                     |             | 0.04        |                 | Zi ka wei, " 42 27                                                                                   |
|              | M     | 7                      | 3  | 54   |                     |             |             |                 | Taihoku, " 43 4.2                                                                                    |
|              |       |                        | 12 | 24   |                     |             |             |                 | Irkutsk, " 46 12                                                                                     |
|              |       |                        | 24 | 0    |                     |             |             |                 | Manila, " 45 0                                                                                       |
|              |       |                        | 26 | 24   | 35                  |             | 0.2         |                 |                                                                                                      |
|              |       |                        | 28 | 45   | 24                  |             | 0.25        |                 |                                                                                                      |
|              |       |                        | 30 | 16   | 23                  |             | 0.35        |                 |                                                                                                      |
|              |       |                        | 32 | 21   | 20                  |             | 0.17        |                 |                                                                                                      |
|              |       |                        | 37 | 24   | 15                  |             | 0.6         |                 |                                                                                                      |
|              |       |                        | 39 | 51   | 13.7                |             | 0.8         |                 |                                                                                                      |
|              |       |                        | 47 | 24   | 16                  |             | 0.1         |                 |                                                                                                      |
|              |       |                        | 13 | 24   |                     |             |             |                 |                                                                                                      |
| 14/IV        | P     | 8                      | 2  | 27   |                     |             |             | 9700            | Tainan, P 7 48 35                                                                                    |
|              |       |                        | 11 | 33   |                     |             |             |                 | Taihoku, P 7 49 5.4                                                                                  |
|              |       |                        | 13 | 12   |                     |             |             |                 | " 49 16.3                                                                                            |
|              |       |                        | 18 | 24   |                     |             |             |                 | Zi ka wei, P 49 25.4                                                                                 |
|              |       |                        | 27 | 45   |                     |             | 0.55        |                 | Osaka, e 50 28                                                                                       |
|              |       |                        | 35 | 12   |                     |             |             |                 | Irkutsk, P 52 46                                                                                     |
|              |       |                        | 39 | 6    | 24                  |             | 0.5         |                 |                                                                                                      |
|              |       |                        | 41 | 0    | 26                  |             | 0.5         |                 |                                                                                                      |
|              |       |                        | 43 | 9    | 16                  |             | 0.6         |                 |                                                                                                      |
|              |       |                        | 47 | 0    | 17.5                |             | 0.35        |                 | * distorted.                                                                                         |
| 14/IV        | P     | 9                      | 2  | 42   |                     |             |             |                 |                                                                                                      |
|              |       |                        | 7  | 24   | 18                  |             | 0.3         |                 |                                                                                                      |
| 14/IV        | P     | 8                      | 18 | 30   |                     |             |             | 7965            |                                                                                                      |
|              |       |                        | 27 | 48   |                     |             | 0.6         |                 |                                                                                                      |
|              |       |                        | 48 |      |                     |             |             |                 |                                                                                                      |
| 14/IV        | P     | 8                      | 51 | 40   |                     |             |             |                 | San Fernando, P 8 41 0                                                                               |
|              |       |                        | 51 | 51   |                     |             |             |                 |                                                                                                      |
|              |       |                        | 13 | 0    |                     |             |             |                 |                                                                                                      |
|              |       |                        | 16 | 0    | 17.5                |             | 0.4         |                 |                                                                                                      |

| Date<br>1913 | Phase                                         | Greenwich<br>Mean Time<br>h. m. sec.                                                                                                                                                                                                                                | Period<br>T<br>sec                                                                                                                                 | Amplitude<br>of N<br>mm | Amplitude<br>of W<br>mm                                                                                                                                                          | $\Delta$<br>km | Notes.                                                                                                                                                           |
|--------------|-----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 18/IV        | i P N<br>i S S<br>L M                         | 19 19 54<br>30 24<br>54 18<br>20 0 45<br>5 27<br>11 12                                                                                                                                                                                                              | 20<br>24                                                                                                                                           |                         |                                                                                                                                                                                  | 9400           | Taihoku, P 19 6 11.5<br>Zi ka wei, " 7 28<br>Osaka, " 8 14                                                                                                       |
| 24/IV        | P?<br>S?<br>L?                                | 10 33 54<br>44 45<br>11 6 0<br>13 24<br>30 6                                                                                                                                                                                                                        | 20<br>18                                                                                                                                           |                         | 0.5?<br>?<br>0.25                                                                                                                                                                | 9845?          | Faint trace.<br>Taihoku, P 10 19 11.6<br>Zi ka wei, " 20 14<br>Osaka, " 20 54<br>Irkutsk, " 23 48<br>" " 25 35<br>S. Fernando " 33 0                             |
| 24/IV        | P?<br>S?<br>L?                                | 12 31 18<br>41 3<br>13 5 0<br>22 0<br>24 51                                                                                                                                                                                                                         |                                                                                                                                                    | 0.03                    | 0.05                                                                                                                                                                             | 8500?          | Faint trace.<br>Taihoku, P 12 18 59.2<br>Zi ka wei, " 20 19<br>Irkutsk, " 23 47                                                                                  |
| 25/IV        | i P N<br>i S S<br>L M<br>M N<br>M N<br>C<br>F | 18 10 6<br>21 0<br>31 9<br>45 18<br>47 12<br>48 18<br>51 21<br>54 18<br>55 39<br>57 0<br>59 6<br>19 0 12<br>0 42<br>2 30<br>6 36<br>8 18<br>10 0<br>11 24<br>13 48<br>14 45<br>15 24<br>18 48<br>20 39<br>21 48<br>27 18<br>29 0<br>31 39<br>40 57<br>52 36<br>27 ? | 20<br>22<br>13<br>22<br>18.5<br>19<br>20<br>13.5<br>20<br>21<br>19<br>20<br>20?<br>17?<br>18.5<br>17.5<br>18<br>14.5<br>20<br>19<br>18<br>18<br>18 |                         | 0.4<br>0.4<br>0.65<br>1.3<br>0.9<br>0.95<br>0.95<br>1.05<br>1.65<br>1.4<br>0.9<br>1.0<br>1.0?<br>1.0?<br>1.05<br>1.2<br>0.7<br>0.65<br>0.65<br>0.75<br>0.4<br>0.4<br>0.3<br>0.35 | 9910           | Taihoku, P 18 0 38.5<br>Zika wei, " 1 28<br>Osaka, " 2 22<br>Irkutsk, " 4 54<br>Chemulpo, " 4 39<br>Manila, " 17 58 32<br>Fukuoka, " 18 2 22<br>Mizusawa, " 2 58 |
| 26/IV        | i P N<br>i S S<br>L M                         | 12 55 12<br>13 4 42<br>26 0<br>29 54<br>31 42                                                                                                                                                                                                                       | 17<br>20                                                                                                                                           |                         | 0.2<br>0.2                                                                                                                                                                       | 8200?          | During Tremors.<br>Ollawa, P 12 44 39                                                                                                                            |
| 28/IV        | i P S<br>i S L<br>L M<br>C F                  | 18 55 20<br>19 6 21<br>36 0<br>38 12<br>42 0<br>45 54<br>54 48<br>58 42<br>9                                                                                                                                                                                        | 20<br>20<br>15<br>19<br>18<br>16                                                                                                                   |                         | 0.1<br>0.2<br>0.35<br>0.2?<br>0.07                                                                                                                                               | 10065          | Taihoku, P 18 43 17.5<br>Zi ka wei, " 44 31<br>Osaka, " 45 41<br>Irkutsk, " 47 51                                                                                |
| 29/IV        | i P S<br>i S S<br>L?<br>M                     | 3 38 0<br>39 51<br>47 24<br>54 54<br>4 5 24<br>15 36                                                                                                                                                                                                                | 19                                                                                                                                                 |                         | 0.25<br>0.7<br>0.3                                                                                                                                                               | 8085           | Taihoku, P 3 12 7.3                                                                                                                                              |
| 29/IV        | i P1 S<br>i P2 S<br>i S1<br>i S2              | 23 36 22<br>40 24<br>41 30<br>46 18<br>47 0<br>50 12<br>51 10                                                                                                                                                                                                       |                                                                                                                                                    |                         |                                                                                                                                                                                  | 8715<br>8555   | Irkutsk, P 23 36 55                                                                                                                                              |



| DATE<br>1913 | PHASE | GREENWICH<br>MEAN TIME |     |    | PERIOD<br>T<br>SEC | AMPLITUDE<br>OF N<br>OF W<br>mm | Δ<br>km | NOTES                   |
|--------------|-------|------------------------|-----|----|--------------------|---------------------------------|---------|-------------------------|
| 9/V          | P?    | 21                     | 39  | 12 |                    |                                 | 9775?   | Taihoku, e 21 26 41.8   |
|              | S     | 22                     | 49  | 10 |                    |                                 |         |                         |
|              | S     | 22                     | 51  | 0  |                    |                                 |         |                         |
|              | S     | 22                     | 16  | 9  |                    |                                 |         |                         |
|              | S     | 22                     | 18  | 48 |                    |                                 |         |                         |
|              | S     | 22                     | 38  | 10 |                    | 0.05                            |         |                         |
| 18/V         | P     | 2                      | 22  | 15 |                    |                                 | 11400   | Nase, P 2 12 55         |
|              | P     | 3                      | 34  | 12 |                    | 0.7                             |         | Taihoku, P 2 13 30.6    |
|              | P     | 3                      | 8   | 10 | 29                 | 0.35                            |         | Osaka, " 14 2           |
|              | P     | 3                      | 10  | 12 | 23                 | 0.9                             |         | Nagoya, " 13 57         |
|              | P     | 3                      | 10  | 35 | 36                 | 0.8                             |         | Gifu, " 13 59           |
|              | P     | 3                      | 11  | 6  | 24                 | 0.95                            |         | Fukuoka, " 14 3         |
|              | P     | 3                      | 13  | 36 | 25                 | 0.7                             |         | Mizusawa, " 14 22       |
|              | P     | 3                      | 18  | 45 | 19                 | 0.6                             |         | Manila, " 14 26         |
|              | P     | 3                      | 21  | 24 | 22                 | 0.4                             |         | Zikawei, " 14 51        |
|              | P     | 3                      | 32  | 18 | 25                 | 0.2                             |         | Irkutsk, " 17 57        |
|              | P     | 3                      | 35  | 54 | 20                 | 0.2                             |         |                         |
|              | P     | 4                      | 15? |    |                    |                                 |         |                         |
| 19/V         | P     | 15                     | 49  | 10 |                    | 0.2                             | 1930    | Irkutsk, P 15 53 1      |
|              | P     | 15                     | 52  | 27 |                    | 0.3                             |         |                         |
|              | P     | 15                     | 52  | 31 |                    | 1.4                             |         |                         |
|              | P     | 15                     | 52  | 27 |                    |                                 |         |                         |
|              | P     | 15                     | 55  | 15 |                    | 0.95                            |         |                         |
|              | P     | 15                     | 55  | 20 |                    |                                 |         |                         |
|              | P     | 15                     | 55  | 39 | 2.8                | 1.95                            |         |                         |
|              | P     | 15                     | 55  | 45 |                    |                                 |         |                         |
|              | P     | 15                     | 55  | 54 | 1.65               |                                 |         |                         |
|              | P     | 15                     | 56  | 0  |                    | 1.9                             |         |                         |
|              | P     | 15                     | 56  | 9  |                    | 1.8                             |         |                         |
|              | P     | 15                     | 56  | 15 | 1.8                |                                 |         |                         |
|              | P     | 15                     | 56  | 42 | 1.35               |                                 |         |                         |
|              | P     | 15                     | 57  | 0  | 1.65               |                                 |         |                         |
|              | P     | 15                     | 57  | 17 |                    | 3.0                             |         |                         |
|              | P     | 15                     | 57  | 30 | 1.9                |                                 |         |                         |
|              | P     | 15                     | 57  | 48 |                    | 2.6                             |         |                         |
|              | P     | 15                     | 58  | 0  | 1.8                |                                 |         |                         |
|              | P     | 15                     | 58  | 20 |                    | 3.5                             |         |                         |
|              | P     | 15                     | 58  | 40 | 2.35               |                                 |         |                         |
|              | P     | 15                     | 59  | 12 | 2.0                |                                 |         |                         |
|              | P     | 15                     | 59  | 40 | 1.9                |                                 |         |                         |
|              | P     | 15                     | 59  | 54 |                    | 2.0                             |         |                         |
|              | P     | 16                     | 0   | 42 | 1.4                |                                 |         |                         |
|              | P     | 16                     | 0   | 51 |                    | 1.0                             |         |                         |
|              | P     | 16                     | 1   | 10 |                    | 0.9                             |         |                         |
|              | P     | 16                     | 1   | 33 |                    | 1.2                             |         |                         |
|              | P     | 16                     | 1   | 48 | 1.15               | 1.7                             |         |                         |
|              | P     | 16                     | 2   | 40 | 1.0                |                                 |         |                         |
|              | P     | 16                     | 3   | 6  |                    | 1.4                             |         |                         |
|              | P     | 16                     | 3   | 30 | 0.8                |                                 |         |                         |
|              | P     | 16                     | 3   | 42 |                    | 1.7                             |         |                         |
|              | P     | 16                     | 5   | 0  |                    | 1.35                            |         |                         |
|              | P     | 16                     | 5   | 51 |                    | 1.8                             |         |                         |
|              | P     | 16                     | 6   | 39 |                    | 1.05                            |         |                         |
|              | P     | 16                     | 7   | 15 | 1.7                |                                 |         |                         |
|              | P     | 16                     | 7   | 24 |                    | 1.15                            |         |                         |
|              | P     | 16                     | 8   | 27 |                    | 1.0                             |         |                         |
|              | P     | 16                     | 9   | 15 | 1.6                |                                 |         |                         |
|              | P     | 16                     | 9   | 24 |                    | 0.75                            |         |                         |
|              | P     | 16                     | 9   | 51 |                    | 1.0                             |         |                         |
|              | P     | 16                     | 10  | 57 |                    | 1.4                             |         |                         |
|              | P     | 16                     | 12  | 0  | 0.6                | 0.7                             |         |                         |
|              | P     | 16                     | 16  | 20 |                    |                                 |         |                         |
|              | P     | 16                     | 17  | 48 |                    |                                 |         |                         |
|              | P     | 16                     | 21  | 30 |                    |                                 |         |                         |
|              | P     | 16                     | 30  | 0  |                    |                                 |         |                         |
| 24/V         | P     | 23                     | 39  | 11 |                    |                                 | 8835    | San Fernando, P 23 38 0 |
|              | P     | 23                     | 49  | 13 |                    |                                 |         | Irkutsk, " 44 50        |
|              | P     | 23                     | 49  | 24 |                    |                                 |         | Δ = ca. 15000.          |
| 25/V         | P     | 0                      | 8   | 21 | 25                 | 0.25                            |         |                         |
|              | P     | 0                      | 15  | 20 | 27                 | 0.25                            |         |                         |
|              | P     | 0                      | 16  | 42 | 19.5               | 0.35                            |         |                         |
|              | P     | 0                      | 21  | 12 |                    |                                 |         |                         |

| DATE<br>1913 | PHASE | GREENWICH<br>MEAN TIME             | PERIOD<br>OF N | AMPLITUDE<br>OF W | $\Delta$<br>km | NOTES                            |
|--------------|-------|------------------------------------|----------------|-------------------|----------------|----------------------------------|
|              |       | h m sec                            | sec            | mm                |                |                                  |
| 25/V (C)     |       | 24 30 19                           |                | 0.2               |                |                                  |
|              |       | 30 0 20                            |                | 0.25              |                |                                  |
|              |       | 38 18 20                           |                | 0.1               |                |                                  |
| 29/V         | C     | 13 53 3                            |                | 0.5               |                | In Tremors.                      |
|              | N     | 14 19 48                           |                | 0.2               |                | Taihoku, P13 31 8.1              |
|              | L     | 21 18 24                           |                | 0.7               |                | Osaka, " 33 49                   |
|              | M     | 27 46 15?                          |                | 0.07              |                | Irkutsk, " 36 6                  |
|              | C     | 40 6 14                            |                |                   |                |                                  |
|              |       | 58                                 |                |                   |                |                                  |
| 30/V         | P     | 12 1 20                            |                |                   | 12875          | Manila, P11 54 30                |
|              | S     | 14 12 12                           |                |                   | Solomon        | Taihoku, " 54 43.2               |
|              | M     | 43 30 45                           |                | 0.7               | Islands.       | Osaka, " 55 15                   |
|              |       | 40 18 42                           |                | 0.8               |                | Zikawei, " 55 35                 |
|              |       | 49 15 42                           |                | 1.8               |                | Chemulpo, " 55 53                |
|              |       | 54 40 28                           |                | 1.7               |                | Changchun, " 57 27               |
|              |       | 57 54 20                           |                | 2.4               |                | Irkutsk, " 58 13                 |
|              |       | 13 0 45                            |                | 1.6               |                |                                  |
|              |       | 2 0 21                             |                | 1.35              |                |                                  |
|              |       | 5 12 20                            |                | 1.2               |                |                                  |
|              |       | 9 17 19.5                          |                | 0.75              |                |                                  |
|              |       | 11 12 17                           |                | 0.7               |                |                                  |
|              |       | 13 20 16.5                         |                | 0.6               |                |                                  |
|              | C     | 21 0 16                            |                | 0.55              |                |                                  |
|              |       | 30 9 17                            |                | ?                 |                |                                  |
|              |       | 43 47 20                           |                | 0.3               |                |                                  |
|              |       | 52 30 ?                            |                | 0.2               |                |                                  |
|              |       | 54 15 22?                          |                | 0.15              |                |                                  |
|              |       | 14 1 0 17?                         |                | 0.2               |                |                                  |
|              |       | 14 15 19                           |                | 0.2               |                |                                  |
|              | M"    | 44 12 19                           |                |                   |                |                                  |
|              | F     | 15 28 40                           |                |                   |                |                                  |
|              |       | 31?                                |                |                   |                |                                  |
| 11/VI        | L?    | 6 12                               |                |                   |                | Osaka, 5 59 53                   |
|              | F     | 7 45                               |                |                   |                | Taihoku, e 6 1 57.8              |
|              |       |                                    |                |                   |                | Manila, 6 3 0                    |
|              |       |                                    |                |                   |                | Irkutsk, 6 4 55                  |
| 13/VI        | P     | 3 10 45                            |                |                   |                |                                  |
|              | S     | 11 43                              |                | 0.05              |                |                                  |
|              | L     | 20 3                               |                |                   |                |                                  |
|              | M     | 24 18                              |                |                   |                |                                  |
|              |       | 41 18 29                           |                | 0.03              |                |                                  |
|              |       | 45 18 23                           |                | 0.25              |                |                                  |
|              |       | 51 12 19                           |                | 0.07              |                |                                  |
|              |       | 56 50 17                           |                | 0.05              |                |                                  |
|              | C     | 4 6 17                             |                | 0.02              |                |                                  |
|              |       | 9 12 18                            |                |                   |                |                                  |
|              | F     | 21 48 19                           |                |                   |                |                                  |
|              |       | 46 20                              |                |                   |                |                                  |
| 14/VI        | M     | 9 14 48                            | 16             | 0.2               |                | Instrument being set.            |
|              |       |                                    |                |                   |                | Oldawa, P8 43 43, $\Delta$ 3750. |
| 14/VI        | P, S, | lost during setting of Instrument. |                |                   |                |                                  |
|              | L     | 9 41 42                            |                |                   |                | Tirnovovo Occurred, 9 33         |
|              | M     | 42 11                              |                |                   |                | Bulgaria. Leibach, P 9 35 -      |
|              |       | 42 3                               |                |                   |                | W. Bromwich P 9 38 -             |
|              |       | 42 30 8 to 10                      |                |                   |                | San Fernando P 38 30             |
|              |       | 44 24 16                           |                |                   |                | Irkutsk, P 42 24 $\Delta$ 5515   |
|              |       | 45 0 10                            |                |                   |                | Oldawa, P 44 18 $\Delta$ 7550    |
|              |       | 45 18                              |                |                   |                | Zikawei, P 44 44                 |
|              |       | 46 51 7                            |                |                   |                | Osaka, P 46 15                   |
|              |       | 45 24 10                           |                |                   |                |                                  |
|              |       | 46 6 10                            |                |                   |                |                                  |
|              |       | 46 24 6                            |                |                   |                |                                  |
|              |       | 47 18 6.6                          |                |                   |                |                                  |
|              |       | 47 48 8                            |                |                   |                |                                  |
|              |       | 48 6 7.5                           |                |                   |                |                                  |
|              |       | 50 12 7                            |                |                   |                |                                  |
|              |       | 48 15 7                            |                |                   |                |                                  |
|              |       | 49 6 ?                             |                |                   |                |                                  |
|              |       | 50 9                               |                |                   |                |                                  |
|              |       | 51 3 14                            |                |                   |                |                                  |
|              |       | 51 42 12                           |                |                   |                |                                  |
|              |       | 51 48 7                            |                |                   |                |                                  |
|              |       | 52 12 3                            |                |                   |                |                                  |
|              |       | 53 0 10                            |                |                   |                |                                  |
|              |       | 54 18 11                           |                |                   |                |                                  |



International  
Seismological  
Centre

| DATE<br>1913      | PHASE | GREENWICH<br>MEAN TIME<br>h m sec | PERIOD<br>SEC | AMPLITUDE<br>OF N OF W<br>mm mm | △<br>km. | NOTES                    |
|-------------------|-------|-----------------------------------|---------------|---------------------------------|----------|--------------------------|
| XIV/VI<br>(Contd) |       | 56 48 13                          |               | 2                               |          |                          |
|                   |       | 58 6                              |               | 10.0                            |          |                          |
|                   |       | 59 0                              |               | 9.0?                            |          |                          |
|                   |       | 10 0 4                            |               | 10.4                            |          |                          |
|                   |       | 1 54                              |               | 10.0                            |          |                          |
|                   |       | 2 50                              |               | 10.0                            |          |                          |
|                   |       | 4 0                               |               | 10.3                            |          |                          |
|                   |       | 6 0                               |               | 10.0                            |          |                          |
|                   |       | 7 45                              |               | 10.7                            |          |                          |
|                   |       | 9 0                               |               | 10.0                            |          |                          |
|                   |       | 10 0                              |               | 10.0                            |          |                          |
|                   |       | 11 12                             |               | 7.0                             |          |                          |
|                   |       | 13 9                              |               | 4.3                             |          |                          |
|                   |       | 14 0                              |               | 3.0                             |          |                          |
|                   |       | 15 0                              |               | 3.0                             |          |                          |
|                   |       | 16 6                              |               | 1.9                             |          |                          |
|                   |       | 18 0                              |               | 2.65                            |          |                          |
|                   |       | 18 36                             |               | 2.2                             |          |                          |
|                   |       | 19 42                             |               | 2.15                            |          |                          |
|                   |       | 20 12                             |               | 2.4                             |          |                          |
|                   | C     | 23 24                             |               | 1.0                             |          |                          |
|                   |       | 24 24                             | 10            | 1.0                             |          |                          |
|                   |       | 28 9                              | 13            | 0.8                             |          |                          |
|                   |       | 32 12                             | 10            | 0.7                             |          |                          |
|                   |       | 45 54                             |               | 0.2                             |          |                          |
|                   |       | 51 18                             | 18            | 0.1                             |          |                          |
|                   |       | 15 30                             | 15            | 0.03                            |          |                          |
|                   |       | 18 24                             |               | 0.15                            |          |                          |
|                   | L' S  | 27 24                             | 32            | 0.02                            |          |                          |
|                   | M' S  | 34 42                             |               | 0.2                             |          |                          |
|                   | P S   | 37 3                              |               | 0.6                             | 2550     | Ottawa, 11 38 46, Δ 3100 |
|                   | S S   | 38 30                             |               | 0.25                            |          | Irkutsk, e 43 35         |
|                   | N S   | 40 3                              |               | 0.3                             |          |                          |
|                   | M' S  | 41 12                             |               | 0.65                            |          |                          |
|                   | L S   | 43 21                             | 17            | 0.9                             |          |                          |
|                   |       | 44 36                             |               | 1.15                            |          |                          |
|                   |       | 47 24                             | 8             | 1.05                            |          |                          |
|                   |       | 49 54                             | 8             | 2.0                             |          |                          |
|                   |       | 51 21                             | 8             | 0.95                            |          |                          |
|                   | C     | 55 18                             | 7.5           | 0.8                             |          |                          |
|                   | F     | 12 24                             | 14            | 0.1                             |          |                          |
| 22/VI             | e P1  | 13 39                             | 40            |                                 | 7800     | Alaska.                  |
|                   | S1    | 48 50                             |               |                                 | 7900     | "                        |
|                   | P2    | 58 0                              |               |                                 | 8025     | "                        |
|                   | P3    | 14 2                              | 48            |                                 |          | Mizusawa, P13 56 31      |
|                   | S2    | 7 15                              |               |                                 |          | Osaka, " 57 29           |
|                   | L1    | 10 0                              |               |                                 |          | Nagoya, " 57 32          |
|                   | S3    | 12 9                              |               |                                 |          | Fukuoka, " 58 8          |
|                   | M1    | 13 20                             | 18            | 0.25                            |          | Santa Clara, " 58 35     |
|                   |       | 17 3                              | 24            | 0.4                             |          | Irkutsk, " 58 35         |
|                   |       | 20 42                             | 20            | 0.25                            |          | Zi ka wei, e 59 8        |
|                   |       | 25 24                             | 20            | 0.2                             |          | Manila, " 14 0 33        |
|                   | L2    | 26 50                             |               |                                 |          | San Fernando, " 0 42     |
|                   | M1    | 27 42                             | 19.5          | 0.2                             |          | Ottawa, " 0 48           |
|                   | M2    | 29 54                             | 35            | 0.35                            |          | x-distorted.             |
|                   | L3    | 31 45                             |               |                                 |          |                          |
|                   | M2    | 34 12                             | 25            | 0.45                            |          |                          |
|                   | M3    | 36 0                              | ?             | ?                               |          |                          |
|                   | M2    | 37 0                              | 25            | 0.4                             |          |                          |
|                   | M3    | 37 42                             | 20            | 0.55                            |          |                          |
|                   | M2    | 38 48                             | ?             | ?                               |          |                          |
|                   | M3    | 39 24                             | 19.5          | 0.4                             |          |                          |
|                   | M2    | 40 0                              | ?             | ?                               |          |                          |
|                   | M3    | 41 0                              | 25            | 0.4                             |          |                          |
|                   | M2?   | 42 0                              | ?             | ?                               |          |                          |
|                   | M3    | 43 0                              | 21            | 0.55                            |          |                          |
|                   | M2    | 44 36                             | ?             | ?                               |          |                          |
|                   | M3    | 45 54                             | 16            | 0.7                             |          |                          |
|                   | "     | 46 51                             | 16.5          | 0.8                             |          |                          |
|                   | M2    | 48 24                             | 18            | ?                               |          |                          |
|                   | M3    | 49 54                             | 18            | 0.9                             |          |                          |
|                   | "     | 51 48                             | 19            | 0.75                            |          |                          |
|                   | M2?   | 53 0                              | 21            | 0.3                             |          |                          |
|                   | M3    | 54 18                             | 20            | 0.3                             |          |                          |
|                   | C     | 57 9                              | 17            | 0.07                            |          |                          |
|                   |       | 15 4                              | 18            | 0.03                            |          |                          |
|                   |       | 22 12                             | 20            | 0.06                            |          |                          |

| DATE<br>1913   | PHASE                                                | GREENWICH<br>MEAN TIME |                                                                                        |                                                                                      | PERIOD<br>sec                          | AMPLITUDE<br>OF N OF W                                                          |    | Δ<br>km                   | NOTES                                                                                                                                                                                                                                                                                                                         |
|----------------|------------------------------------------------------|------------------------|----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------|---------------------------------------------------------------------------------|----|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                |                                                      | h                      | m                                                                                      | sec                                                                                  |                                        | mm                                                                              | mm |                           |                                                                                                                                                                                                                                                                                                                               |
| 22/vi<br>(ctd) | M/                                                   | 16                     | 29<br>35<br>48<br>17<br>28<br>30<br>58<br>24                                           | 6<br>8<br>7<br>18<br>0<br>3<br>21<br>?                                               | 16<br>25<br>20<br>25<br>22<br>22<br>22 | 0.04<br>micro<br>"<br>0.15<br>0.1<br>0.1<br>0.02                                |    |                           |                                                                                                                                                                                                                                                                                                                               |
| 26/vi          | F                                                    | 17                     |                                                                                        |                                                                                      |                                        |                                                                                 |    |                           |                                                                                                                                                                                                                                                                                                                               |
| 26/vi          | Record too faint, insufficient development.          |                        |                                                                                        |                                                                                      |                                        |                                                                                 |    |                           | Submergence of islands in Tonga Group<br>Sydney, P.5 3 58<br>Tokio, 8 34<br>Mizusawa, 8 48<br>Osaka, 8 56<br>Fukuoka, 9 2<br>Manila, 9 3<br>Zika Wei, 9 28 Δ±9000<br>Chemulpo, 9 29<br>Taihoku, 9 53-8Δ8860<br>Irkutsk, 11 6 Δ9850<br>Ottawa, 11 50<br>Uccle, 17 -<br>Bidston, 17 6<br>San Fernando, 17 12<br>Limerick, 17 24 |
| 28/vi          | P<br>S<br>L<br>M                                     | 8<br>9                 | 59<br>1<br>3<br>4<br>5                                                                 | 42<br>36<br>12<br>15<br>18<br>54                                                     |                                        |                                                                                 |    | 1060<br>Cosenza<br>Italy. | Irkutsk, P.9 2 50<br>Trace faint.                                                                                                                                                                                                                                                                                             |
| 1/vii          | L?<br>M                                              | 4<br>5                 | 50.2<br>4<br>17<br>26                                                                  | 36<br>0<br>18                                                                        | ?                                      | 0.2                                                                             |    |                           | Trace faint.                                                                                                                                                                                                                                                                                                                  |
| 2/vii          | S<br>N<br>L<br>M                                     | 12<br>13               | 33<br>41<br>52<br>0                                                                    | 36<br>24<br>0<br>24                                                                  | 16.5                                   | 0.03                                                                            |    |                           |                                                                                                                                                                                                                                                                                                                               |
| 6/vii          | e1<br>e2<br>i1<br>i2<br>i3<br>i4<br>M<br>M<br>C<br>F | 7                      | 11<br>14<br>15<br>15<br>16<br>17<br>18<br>19<br>19<br>22<br>23<br>27<br>32<br>40<br>41 | 54<br>30<br>0<br>24<br>24<br>24<br>18<br>18<br>48<br>30<br>24<br>6<br>12<br>42<br>30 | 12.5<br>17.5<br>15<br>8<br>7<br>8      | 0.45<br>0.35<br>0.35<br>0.3<br>0.65<br>0.4<br>0.8<br>0.25<br>0.02<br>micro<br>" |    |                           | Irkutsk, P.7 15 7                                                                                                                                                                                                                                                                                                             |
| 6/vii          | P<br>N<br>S<br>N<br>L<br>M                           | 16<br>17               | 34<br>38<br>46<br>9<br>19<br>27<br>29                                                  | 30<br>9<br>6<br>24<br>48<br>48<br>15                                                 |                                        |                                                                                 |    | 11025                     | Irkutsk, P.16 22 32<br>" Δ6340 Moluccas<br>Taihoku, P.16 18 23<br>" Δ2852                                                                                                                                                                                                                                                     |
| 7-11/vii       | Records too faint to decipher.                       |                        |                                                                                        |                                                                                      |                                        |                                                                                 |    |                           |                                                                                                                                                                                                                                                                                                                               |
| 12/vii         | P<br>N<br>S?<br>L<br>M<br>C<br>M/                    | 10<br>11<br>12<br>13   | 45<br>50<br>56<br>14<br>24<br>27<br>29<br>33<br>38<br>41<br>44<br>0<br>38<br>20<br>29  | 8<br>42<br>43<br>20<br>20<br>24<br>15<br>19<br>18<br>42<br>45<br>50<br>40<br>42<br>0 | 16<br>15<br>19<br>18<br>19<br>16       | 0.3<br>0.3<br>0.25<br>0.1<br>0.15<br>0.05<br>0.03<br>0.03<br>micro<br>0.02      |    | 10850?                    | Osaka, P.10 26 25 near.<br>Taihoku, " 28 7.4 Δ:2924.<br>Zika Wei, " 28 14<br>Irkutsk, " 31 19 Δ:4155<br>Limerick, e 35 24<br>Ottawa, e 48 16                                                                                                                                                                                  |

| DATE<br>1913 | PHASE   | GREENWICH<br>MEAN TIME<br>h m sec | PERIOD<br>sec | AMPLI<br>OF N<br>mm | TUDE<br>OF W<br>mm | $\Delta$<br>km. | NOTES.                                |
|--------------|---------|-----------------------------------|---------------|---------------------|--------------------|-----------------|---------------------------------------|
| 14/VII       | S N     | 10 48 24                          |               |                     |                    |                 |                                       |
|              |         | 11 4 30                           |               |                     |                    |                 |                                       |
|              |         | 12 8 30                           | 15            |                     | 0.1                |                 |                                       |
| 20/VII       | S M     | 12 8 36                           | 12            |                     | 0.05               |                 |                                       |
|              |         | 9 40                              |               |                     |                    | 580             | Occurred S.W. Germany, 12 7           |
|              |         | 9 57                              |               |                     |                    |                 |                                       |
|              |         | 10 34                             |               |                     | 4.2                |                 |                                       |
|              |         | 10 57                             |               |                     | 2.6                |                 |                                       |
|              |         | 11 55                             |               |                     | 2.2                |                 |                                       |
|              |         | 12 10                             |               |                     | 1.8                |                 |                                       |
|              |         | 13 15                             |               |                     | 1.0                |                 |                                       |
|              |         | 14 21                             |               |                     | 0.65               |                 |                                       |
|              |         | 15 33                             |               |                     | 0.6                |                 |                                       |
|              |         | 16 58                             |               |                     | 0.4                |                 |                                       |
|              |         | 17 9                              |               |                     | 0.3                |                 |                                       |
|              |         | 18 34                             |               |                     | 0.4                |                 |                                       |
|              |         | 19 54                             |               |                     | 0.7                |                 |                                       |
|              |         | 22 21                             |               |                     | 0.3                |                 |                                       |
|              |         | 23 30                             |               |                     | 0.07               |                 |                                       |
| 22/VII       | F       | 23 45                             |               |                     |                    |                 |                                       |
|              | P       | 6 57 0                            |               |                     |                    |                 |                                       |
|              | S?      | 7 8 21                            |               |                     |                    | 10525?          | Manila, P 6 41 40                     |
|              | L       | 31 20                             |               |                     |                    |                 | Taihoku, eP 6 42 45.7, $\Delta$ 5533. |
|              | M       | 43 24                             | 32            |                     | 0.25               |                 | Osaka, P 43 22                        |
|              |         | 52 36                             | 27            |                     | 0.1                |                 | Irkutsk, P 45 53, $\Delta$ 7450.      |
|              |         | 55 6                              | 23            |                     | 0.04               |                 | Limerick, P 56                        |
|              |         | 58 10                             | 18            |                     | 0.02               |                 |                                       |
|              | C       | 7 40                              | 20            |                     | 0.02               |                 |                                       |
|              |         | 11 51                             | 18.5          |                     | 0.02               |                 |                                       |
|              |         | 16 42                             | 18            |                     | 0.02               |                 |                                       |
|              | F       | 54 24                             |               |                     | micro              |                 |                                       |
| 24/VII       | e1 (P?) | 9 14 14                           |               |                     |                    | (2665?)         | Ottawa, P 9 5 1, $\Delta$ 3300        |
|              | e2 (S?) | 18 32                             |               |                     |                    |                 | Irkutsk, e 14 50.                     |
|              | L       | 24 45                             |               |                     |                    |                 |                                       |
|              | M       | 25 0                              | 18            |                     | 0.07               |                 |                                       |
|              |         | 26 16                             | 13            |                     | 0.15               |                 |                                       |
|              |         | 28 3                              | 13.5          |                     | 0.2                |                 |                                       |
|              | C       | 30 25                             | 10            |                     | 0.02               |                 |                                       |
|              |         | 37 30                             | 9             |                     | 0.03               |                 |                                       |
|              |         | 48 45                             | 9             |                     | 0.03               |                 |                                       |
|              | F       | 51 18                             |               |                     |                    |                 |                                       |
| 25/VII       | P1      | 12 49 59                          |               |                     |                    | 7985            | Ottawa, P 12 44 46, $\Delta$ 3600     |
|              | P2      | 52 57                             |               |                     |                    | 7850            | Irkutsk, e 57 45                      |
|              | S1      | 59 18                             |               |                     |                    | Jamaica         |                                       |
|              | S2      | 2 9                               |               |                     |                    |                 |                                       |
|              | L1      | 9 21                              |               |                     |                    |                 |                                       |
|              | M1      | 11 40                             | 26            |                     | 0.1                |                 |                                       |
|              |         | 12 54                             | 17            |                     | 0.1                |                 |                                       |
|              | L2      | 13 18                             |               |                     |                    |                 |                                       |
|              | M2      | 17 10                             | 19            |                     | 0.15               |                 |                                       |
|              |         | 19 42                             | 19            |                     | 0.1                |                 |                                       |
|              |         | 21 13                             | 19            |                     | 0.15               |                 |                                       |
|              | C       | 27 12                             | 18            |                     | 0.07               |                 |                                       |
|              |         | 28 12                             | 17            |                     | 0.1                |                 |                                       |
|              |         | 29 54                             | 18            |                     | 0.03               |                 |                                       |
|              |         | 40 40                             |               |                     | micro              |                 |                                       |
|              |         | 53 40                             |               |                     | "                  |                 |                                       |
|              | F       | 56 20                             |               |                     |                    |                 |                                       |
| 26/VII       | P N     | 20 55 12                          |               |                     |                    | 2470?           | S. on fastening-band.                 |
|              | S?      | 59 15                             |               |                     |                    |                 | Limerick, P 20 55 6                   |
|              | L N     | 1 0                               |               |                     | 0.8                |                 | Ottawa, P 58 13, $\Delta$ 4000        |
|              | M E     | 1 0                               |               | 0.7                 |                    |                 | Irkutsk, eP 21 0 31, $\Delta$ 5370    |
|              |         | 1 20                              | 11            |                     | 2.4                |                 | Intermaximal tulls:                   |
|              |         | 1 45                              | 9             |                     | 2.05               |                 | 21 1 54                               |
|              |         | 2 3                               | 8             |                     | 1.3                |                 | 2 21                                  |
|              |         | 2 40                              | 13            |                     | 1.9                |                 | 7 15                                  |
|              |         | 3 30                              | 11.5          |                     | 2.7                |                 |                                       |
|              |         | 3 51                              | 11            |                     | 2.4                |                 |                                       |
|              |         | 4 17                              | 9.5           |                     | 2.6                |                 |                                       |
|              |         | 5 15                              | 10            |                     | 4.25               |                 |                                       |
|              |         | 6 30                              | 9             |                     | 2.0                |                 |                                       |
|              |         | 6 42                              | 9             |                     | 2.95               |                 |                                       |
|              | L2?     | 7 0                               |               |                     |                    |                 |                                       |
|              | M       | 7 30                              | 12            |                     | 1.6                |                 |                                       |
|              |         | 8 33                              | 10            |                     | 4.0                |                 |                                       |
|              |         | 9 1                               | 10            |                     | 1.6                |                 |                                       |
|              |         | 9 57                              | 10.5          |                     | 4.7                |                 |                                       |



| DATE<br>1913 | PHASE  | GREENWICH<br>MEAN TIME |    |    | PERIOD<br>SEC | AMPL<br>OF N<br>mm | AMPL<br>OF W<br>mm | $\Delta$<br>km    | NOTES                                                                                                |
|--------------|--------|------------------------|----|----|---------------|--------------------|--------------------|-------------------|------------------------------------------------------------------------------------------------------|
| 6/VIII       | e P    | 22                     | 27 | 47 | 5             |                    |                    | 10615             | Probably two Earthquakes,<br>at different Epicentres.<br>M1 is agitated,<br>M2 is quiet and regular. |
|              | e(P2?) |                        | 28 | 10 | 5             |                    | 0.2                | ?                 |                                                                                                      |
|              | S      |                        | 30 | 40 |               |                    |                    |                   |                                                                                                      |
|              | S      |                        | 33 | 7  | 5             |                    | 0.35               |                   |                                                                                                      |
|              | S      |                        | 35 | 45 | 6             |                    | 0.2                |                   |                                                                                                      |
|              | S      |                        | 39 | 12 |               |                    | 0.9                |                   |                                                                                                      |
|              | L1     |                        | 52 | 20 |               |                    |                    |                   |                                                                                                      |
|              | M1     |                        | 56 | 0  | 35            |                    | 3.7                |                   |                                                                                                      |
|              |        |                        | 57 | 55 | 25            |                    | 2.25               |                   |                                                                                                      |
|              | M      | 23                     | 59 | 42 | 29.5          |                    | 2.4                |                   |                                                                                                      |
|              | L2?    |                        | 1  | 30 | 25            |                    | 2.35               |                   |                                                                                                      |
|              | M2     |                        | 1  | 50 |               |                    |                    |                   |                                                                                                      |
|              |        |                        | 4  | 3  | 22            |                    | 4.8                |                   |                                                                                                      |
|              |        |                        | 6  | 9  | 18            |                    | 8.5                |                   |                                                                                                      |
|              |        |                        | 7  | 40 | 18.5          |                    | 3.75               |                   |                                                                                                      |
|              |        |                        | 8  | 18 | 17            |                    | 2.9                |                   |                                                                                                      |
|              |        |                        | 9  | 24 | 19            |                    | 3.3                |                   |                                                                                                      |
|              |        |                        | 11 | 39 | 19            |                    | 1.55               |                   |                                                                                                      |
|              |        |                        | 12 | 42 | 19            |                    | 1.9                |                   |                                                                                                      |
|              |        |                        | 16 | 59 | 19            |                    | 1.65               |                   |                                                                                                      |
|              |        |                        | 18 | 18 | 18            |                    | 1.2                |                   |                                                                                                      |
|              |        |                        | 21 | 6  | 18.5          |                    | 0.9                |                   |                                                                                                      |
|              |        |                        | 23 | 20 | 19            |                    | 1.0                |                   |                                                                                                      |
|              |        |                        | 26 | 48 | 15            |                    | 0.95               |                   |                                                                                                      |
|              |        |                        | 29 | 20 | 19            |                    | 0.85               |                   |                                                                                                      |
|              |        |                        | 31 | 28 | 19            |                    | 0.75               |                   |                                                                                                      |
|              |        |                        | 32 | 41 | 18            |                    | 0.9                |                   |                                                                                                      |
|              |        |                        | 37 | 20 | 19            |                    | 0.6                |                   |                                                                                                      |
|              |        |                        | 38 | 58 | 18.5          |                    | 0.75               |                   |                                                                                                      |
|              |        |                        | 47 | 24 | 18            |                    | 0.5                |                   |                                                                                                      |
|              |        |                        | 49 | 24 | 20            |                    | 0.35               |                   |                                                                                                      |
|              |        |                        | 54 | 50 | 18.5          |                    | 0.45               |                   |                                                                                                      |
| 7/VIII       |        | 0                      | 0  | 0  | 25            |                    | 0.2                |                   |                                                                                                      |
|              |        |                        | 9  | 18 | 24            |                    | 0.25               |                   |                                                                                                      |
|              |        |                        | 18 | 18 | 32            |                    | 0.1                |                   |                                                                                                      |
|              |        |                        | 35 | 30 | 21            |                    | 0.2                |                   |                                                                                                      |
|              |        |                        | 52 | 0  | 20            |                    | 0.1                |                   |                                                                                                      |
|              |        | 1                      | 33 | 12 | 12            |                    | micro              |                   |                                                                                                      |
|              |        | 2                      | 3  | 48 | 16            |                    | 0.02               |                   |                                                                                                      |
|              |        |                        | 50 | 0  |               |                    | micro              |                   |                                                                                                      |
|              |        | 3                      | 59 | 42 | 18            |                    | 0.1                |                   |                                                                                                      |
|              |        |                        | 1  | 36 |               |                    |                    |                   |                                                                                                      |
|              |        |                        | 46 | 20 |               |                    |                    |                   |                                                                                                      |
| 13/VIII      | e P    | 4                      | 40 | 48 |               |                    |                    | [?77°E<br>by 2°N] | Manila, P4 31 18                                                                                     |
|              | e S    |                        | 50 | 51 |               |                    |                    |                   | Taihoku, " 32 46.2, $\Delta=5017$ .                                                                  |
|              | e L    | 5                      | 19 | 43 |               |                    |                    |                   | Zi-ka-wei, " 33 17                                                                                   |
|              | M      |                        | 26 | 6  | 27            |                    | 0.7                | 8850              | Fukuoka, " 33 20                                                                                     |
|              |        |                        | 27 | 30 | 27            |                    | 0.85               |                   | Nagasaki, " 34 3                                                                                     |
|              |        |                        | 30 | 3  | 23            |                    | 0.65               |                   | Irkutsk, " 35 37, $\Delta=6085$ .                                                                    |
|              |        |                        | 33 | 6  | 25            |                    | 0.75               |                   | Ottawa, " 45 6                                                                                       |
|              |        |                        | 35 | 24 | 22            |                    | 0.7                |                   |                                                                                                      |
|              |        |                        | 38 | 14 | 23            |                    | 0.75               |                   |                                                                                                      |
|              |        |                        | 45 | 12 | 21            |                    | 0.55               |                   |                                                                                                      |
|              |        | 7                      | 14 | ?  |               |                    |                    |                   |                                                                                                      |
| 15/VIII      | e P1   | 19                     | 15 | 48 |               |                    |                    | 9910              | Osaka, P19 5 33                                                                                      |
|              | e P2   |                        | 16 | 24 |               |                    |                    | 10045             | Fukuoka " 6 0                                                                                        |
|              | i S1   |                        | 26 | 42 |               |                    | 0.2                |                   | Mizusawa, " 6 4                                                                                      |
|              | i S2   |                        | 27 | 24 |               |                    | 0.3                |                   | Nagasaki, " 6 11                                                                                     |
|              | L      |                        | 52 | 30 |               |                    |                    |                   | Zi ka wei, " 7 24                                                                                    |
|              | M      |                        | 58 | 48 | 15            |                    | 0.05               |                   | Taihoku, e 7 43                                                                                      |
|              |        | 20                     | 0  | 42 | 26            |                    | 0.1                |                   | Irkutsk, P 10 23                                                                                     |
|              |        |                        | 4  | 45 | 23            |                    | 0.2                |                   |                                                                                                      |
|              |        |                        | 7  | 24 | 24            |                    | 0.06               |                   |                                                                                                      |
|              |        |                        | 10 | 21 | 20            |                    | 0.04               |                   |                                                                                                      |
|              |        |                        | 17 | 48 | 15            |                    | 0.03               |                   |                                                                                                      |
|              |        |                        | 25 | 55 | 15            |                    | 0.02               |                   |                                                                                                      |
|              | F      |                        | 52 |    |               |                    |                    |                   |                                                                                                      |
| 30/VIII      | e1?    | 23                     | 38 | 0  |               |                    |                    |                   |                                                                                                      |
|              | e2?    |                        | 44 | 50 |               |                    |                    |                   |                                                                                                      |
| 31/VIII      | L      | 0                      | 6  | 15 |               |                    |                    |                   |                                                                                                      |
|              | M      |                        | 12 | 42 | 24            |                    | 0.04               |                   |                                                                                                      |
|              |        |                        | 14 | 54 | 17.5          |                    | 0.03               |                   |                                                                                                      |
|              |        |                        | 16 | 40 | 17            |                    | 0.03               |                   |                                                                                                      |
| 31/VIII      | e?     | 7                      | 22 | 15 |               |                    |                    |                   | The trace crossing.                                                                                  |
|              | S?     |                        | 28 | 50 |               |                    |                    |                   | Stonyhurst, eP7 14 18.                                                                               |

| DATE<br>1913       | PHASE         | GREENWICH<br>MEAN TIME |                 |     | PERIOD<br>SEC | AMPL<br>OF N<br>mm | AMPL<br>OF W<br>mm | $\Delta$<br>km | NOTES.                                                                                                                                            |
|--------------------|---------------|------------------------|-----------------|-----|---------------|--------------------|--------------------|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
|                    |               | h                      | m               | sec |               |                    |                    |                |                                                                                                                                                   |
| 31/VIII<br>(contd) | L<br>M        | 7                      | 55              | 0   | 22            |                    | 0.04               |                |                                                                                                                                                   |
|                    |               |                        | 57              | 40  | 24.5          |                    | 0.03               |                |                                                                                                                                                   |
|                    |               | 8                      | 58              | 51  | 26            |                    | 0.07               |                |                                                                                                                                                   |
|                    |               |                        | 0               | 20  | 22            |                    | 0.02               |                |                                                                                                                                                   |
|                    |               |                        | 2               | 0   |               |                    |                    |                |                                                                                                                                                   |
| 31/VIII            | P?<br>S?<br>M | 17                     | 44              | 20  |               |                    |                    | 8050?          | The traces crossing<br>Osaka, e 17 19 28                                                                                                          |
|                    |               | 18                     | 53              | 42  |               |                    |                    |                |                                                                                                                                                   |
|                    |               |                        | 15              | 15  | 16            |                    | 0.3                |                |                                                                                                                                                   |
|                    |               |                        | 23              | 54  | 20            |                    | 0.2                |                |                                                                                                                                                   |
|                    |               |                        | 26              | 24  | 22            |                    | 0.2                |                |                                                                                                                                                   |
|                    |               |                        | 28              | 55  |               |                    |                    |                |                                                                                                                                                   |
| 3/IX               | S<br>M        | 21                     | 13              | 3   |               |                    | 0.4                |                | No sign of P.<br>Taihoku, P=20 59 38.2, $\Delta=4768$<br>Osaka, " 59 33 <del>7850</del><br>Zi ka wei, " 59 52<br>Irkutsk, " 21 2 41 $\Delta=7850$ |
|                    |               |                        | 44              | 0   | 27            |                    | 0.1                |                |                                                                                                                                                   |
|                    |               |                        | 50              | 21  | 31            |                    | 0.25               |                |                                                                                                                                                   |
|                    |               |                        | 56              | 45  | 28.5          |                    | 0.65               |                |                                                                                                                                                   |
|                    |               |                        | 59              | 25  | 29            |                    | 0.4                |                |                                                                                                                                                   |
|                    |               | 22                     | 0               | 18  | 26.5          |                    | 0.65               |                |                                                                                                                                                   |
|                    |               |                        | 2               | 30  | 25            |                    | 0.5                |                |                                                                                                                                                   |
|                    |               |                        | 6               | 21  | 22            |                    | 0.4                |                |                                                                                                                                                   |
|                    |               |                        | 8               | 20  | 25.5          |                    | 0.65               |                |                                                                                                                                                   |
|                    |               |                        | 11              | 18  | 21            |                    | 0.35               |                |                                                                                                                                                   |
|                    |               |                        | 12              | 36  | 21            |                    | 0.05               |                |                                                                                                                                                   |
|                    |               |                        | 16              | 0   | 20            |                    | 0.03               |                |                                                                                                                                                   |
|                    |               |                        | 23              | 18  | 21            |                    | 0.1                |                |                                                                                                                                                   |
|                    |               |                        | 51              | 24  |               |                    |                    |                |                                                                                                                                                   |
|                    |               |                        | 57              | 36  |               |                    |                    |                |                                                                                                                                                   |
|                    |               | 23                     | 28              | 15  |               |                    |                    |                |                                                                                                                                                   |
| 13/IX              | P<br>S<br>M   | 2                      | 16              | 57  |               |                    |                    | Ca.<br>16200   | Osaka, P=2 9 2<br>Zi ka wei, e= 10 55                                                                                                             |
|                    |               |                        | 32              | 0   |               |                    |                    |                |                                                                                                                                                   |
|                    |               |                        | 51              |     |               |                    |                    |                |                                                                                                                                                   |
|                    |               | 3                      | 4               | 0   |               |                    |                    |                |                                                                                                                                                   |
| 16/IX              | P<br>S<br>M   | 12                     | 1               | 25  |               |                    |                    | 7075           |                                                                                                                                                   |
|                    |               |                        | 9               | 58  |               |                    |                    |                |                                                                                                                                                   |
|                    |               |                        | 27              | 40  | 19            |                    | 0.2                |                |                                                                                                                                                   |
|                    |               |                        | 31              | 0   | 17            |                    | 0.25               |                |                                                                                                                                                   |
|                    |               |                        | 32              | 42  | 13            |                    | 0.9                |                |                                                                                                                                                   |
|                    |               |                        | 33              | 54  | 13            |                    | 0.7                |                |                                                                                                                                                   |
|                    |               |                        | 36              | 12  | 18            |                    | 0.7                |                |                                                                                                                                                   |
|                    |               |                        | 37              | 15  | 16            |                    | 0.2                |                |                                                                                                                                                   |
|                    |               |                        | 40              | 18  |               |                    |                    |                |                                                                                                                                                   |
|                    |               |                        | Traces crossing |     |               |                    |                    |                |                                                                                                                                                   |
|                    |               | 13                     | 38              | 30  |               |                    |                    |                |                                                                                                                                                   |
| 23/IX              | P<br>S<br>M   | 14                     | 34              | 18  |               |                    |                    | 2945           |                                                                                                                                                   |
|                    |               |                        | 38              | 57  |               |                    |                    |                |                                                                                                                                                   |
|                    |               |                        | 45              | 38  | 11            |                    | 0.15               |                |                                                                                                                                                   |
|                    |               |                        | 46              | 33  | 9             |                    | 0.15               |                |                                                                                                                                                   |
|                    |               |                        | 47              | 50  | 11            |                    | 0.1                |                |                                                                                                                                                   |
|                    |               |                        | 49              | 35  |               |                    |                    |                |                                                                                                                                                   |
| 30/IX              | P?<br>S?<br>M | 7                      | 27              | 12  |               |                    |                    | 3055?          |                                                                                                                                                   |
|                    |               |                        | 31              | 59  |               |                    |                    |                |                                                                                                                                                   |
|                    |               |                        | 35              | 48  | 11            | 0.85               |                    | 2690           | Irkutsk, P 7 43 39, $\Delta 6500$ .                                                                                                               |
|                    |               |                        | 36              | 20  |               |                    |                    |                |                                                                                                                                                   |
|                    |               |                        | 39              | 0   |               |                    |                    |                |                                                                                                                                                   |
|                    |               |                        | 43              | 20  |               |                    | 0.15               |                |                                                                                                                                                   |
|                    |               |                        | 43              | 20  |               |                    |                    |                |                                                                                                                                                   |
|                    |               |                        | 47              | 58  |               | 0.05               |                    |                |                                                                                                                                                   |





| DATE<br>1913 | PHASE                  | GREENWICH<br>MEAN TIME<br>h m sec |    |    | PERIOD<br>sec | AMPLITUDE<br>OF N mm OF W mm |  | $\Delta$<br>km | NOTES.                             |
|--------------|------------------------|-----------------------------------|----|----|---------------|------------------------------|--|----------------|------------------------------------|
| 7/x          | P?<br>S?<br>e L        | 10                                | 22 | 12 |               |                              |  | 5215?          |                                    |
|              |                        |                                   | 29 | 6  |               |                              |  |                |                                    |
|              |                        |                                   | 44 | 5  |               |                              |  |                |                                    |
|              |                        |                                   | 45 | 38 | 18            | 0.3                          |  |                |                                    |
|              |                        |                                   | 46 | 36 | 18            | 0.25                         |  |                |                                    |
|              |                        |                                   | 48 | 21 | 16            | 0.2                          |  |                |                                    |
|              |                        |                                   | 50 | 6  | 14.5          | 0.2                          |  |                |                                    |
|              |                        |                                   | 51 | 7  | 20            | 0.2                          |  |                |                                    |
|              |                        |                                   | 54 | 12 | 17.5          | 0.25                         |  |                |                                    |
|              |                        |                                   | 56 | 1  | 15.5          | 0.1                          |  |                |                                    |
|              | C                      | 11                                | 1  | 42 | 16.5          | 0.15                         |  |                |                                    |
|              |                        |                                   | 7  | 12 | 13            | 0.05                         |  |                |                                    |
|              | F                      |                                   | 19 |    |               |                              |  |                |                                    |
| 11/x         | e P<br>i S<br>L<br>M   | 1                                 | 52 | 0  |               |                              |  | 13200          | Manila, P 1 42 0                   |
|              |                        | 2                                 | 5  |    |               |                              |  |                | Zi-ka-wei, e 1 42 32               |
|              |                        |                                   | 31 | 18 |               |                              |  |                | Osaka, eP 42 41                    |
|              |                        |                                   | 40 | 24 | 41            | 0.3                          |  |                | Irkutsk, iP 45 30                  |
|              |                        |                                   | 46 | 35 | 35            | 0.65                         |  |                | { $\Delta$ 7665, New Pomerania.    |
|              |                        |                                   | 48 | 21 | 31            | 0.8                          |  |                |                                    |
|              |                        |                                   | 55 | 53 | 27            | 0.6?                         |  |                |                                    |
|              | C                      | 3                                 | 1  | 30 | 20            | 0.4                          |  |                |                                    |
|              |                        |                                   | 15 | 42 | 33            | 0.1                          |  |                | End in Tremors.                    |
| 11/x         | i P<br>i S<br>L<br>M   | 4                                 | 22 | 24 |               |                              |  | 14700          | Manila, P 4 13 51                  |
|              |                        |                                   | 36 | 18 |               |                              |  |                | Osaka, P 4 14 9                    |
|              |                        | 5                                 | 9  | 0  |               |                              |  |                | Zi ka wei eP 14 32                 |
|              |                        |                                   | 17 | 18 | 36            | 0.6                          |  |                | Irkutsk, iP 17 21                  |
|              |                        |                                   | 20 | 20 | 28.5          | 0.9                          |  |                | { $\Delta$ 7710, New Pomerania.    |
|              |                        |                                   | 22 | 4  | 28            | 1.1                          |  |                | Taihoku, P 4 14 26.1               |
|              |                        |                                   | 28 | 12 | 18            | 0.75                         |  |                | { $\Delta$ 4539                    |
|              |                        |                                   | 30 | 36 |               | 0.4                          |  |                |                                    |
|              |                        |                                   | 33 | 39 | 25            | 0.55                         |  |                |                                    |
|              |                        |                                   | 39 | 0  | 20            | 0.4                          |  |                |                                    |
|              |                        | 6                                 | 5  | 21 | 20            | 0.3                          |  |                |                                    |
|              |                        | lines crossing                    |    |    |               |                              |  |                |                                    |
| 11/x         | e S<br>i L<br>M        | 9                                 | 23 | 6  |               |                              |  |                | Mizusawa, P 9 10 27                |
|              |                        |                                   | 32 | 15 |               |                              |  |                | Zi ka wei, P 9 14 24               |
|              |                        |                                   | 33 | 21 |               |                              |  |                | Irkutsk, 9 15 59, $\Delta$ 3400    |
|              |                        |                                   | 34 | 54 |               |                              |  |                | Ottawa, P? 9 22 41, $\Delta$ 9700? |
|              |                        |                                   | 56 | 42 |               |                              |  |                | Manila, 9 16 45                    |
|              |                        |                                   | 57 | 54 | 25            | 0.8                          |  |                |                                    |
|              |                        | 10                                | 6  | 0  | 18            | 1.75                         |  |                |                                    |
|              |                        | lines crossing                    |    |    |               |                              |  |                |                                    |
| 12/x         | i P?<br>e S<br>L?<br>M | 17                                | 15 | 22 |               |                              |  | 11980?         | Mizusawa, 17 4 17                  |
|              |                        |                                   | 18 | 42 |               |                              |  |                | Osaka, 17 5 50, close              |
|              |                        |                                   | 27 | 42 |               |                              |  | or 7600        | Zi ka wei 8 18                     |
|              |                        |                                   | 48 | 21 |               |                              |  |                | Irkutsk 9 54 $\Delta$ 3420.        |
|              |                        | 18                                | 1  | 50 |               |                              |  |                | (Kuriles).                         |
|              |                        |                                   | 6  | 42 | 18            | 0.1                          |  |                | Guildford, probably iPs is         |
|              |                        |                                   | 11 | 18 | 18            | 0.25                         |  |                | correct.                           |
|              |                        |                                   | 14 | 0  | 17            | 0.3                          |  |                |                                    |
|              |                        |                                   | 14 | 36 | 15            | 0.35                         |  |                |                                    |
|              |                        |                                   | 19 | 21 | 15            | 0.1                          |  |                |                                    |
|              | C                      | 19                                | 5  |    |               |                              |  |                |                                    |
| 14/x         | i P<br>P<br>L?<br>M    | 6                                 | 42 |    | 8             |                              |  |                |                                    |
|              |                        |                                   | 44 | 21 | 9             |                              |  |                |                                    |
|              |                        | 7                                 | 16 | 48 |               |                              |  |                |                                    |
|              |                        |                                   | 20 | 45 | ?             | 0.04                         |  |                |                                    |
|              |                        |                                   | 26 | 20 |               | 0.2                          |  |                |                                    |
|              | F                      | in Tremors                        |    |    |               |                              |  |                |                                    |
| 14/x         | e P1?<br>i S<br>S1?    | 8                                 | 16 | 40 |               |                              |  | 13000?         | San Fernando, P 8 15 30            |
|              |                        |                                   | 18 | 18 | 6             | 0.2                          |  |                | Possibly a quake from              |
|              |                        |                                   | 29 | 36 |               |                              |  |                | a second epicentre.                |

| DATE<br>1913  | PHASE   | GREENWICH<br>MEAN TIME |    |     | PERIOD<br>SEC | AMPLITUDE<br>of N<br>mm | AMPLITUDE<br>of W<br>mm | $\Delta$<br>km | NOTES                          |
|---------------|---------|------------------------|----|-----|---------------|-------------------------|-------------------------|----------------|--------------------------------|
|               |         | h                      | m  | sec |               |                         |                         |                |                                |
| 14/X<br>Contd | P2 S    | 8                      | 28 | 9   |               |                         | 1.03                    | 15800          | Sydney, {P 8 13 28             |
|               | P2 E    |                        | 28 | 9   | 8             | 0.3                     |                         |                | {M 17 40                       |
|               | S2      |                        | 29 | 32  | 8             |                         | 3.7                     |                | Manila, P 17 31                |
|               | a       |                        | 42 | 54  |               |                         |                         |                | Fukuoka, P 18 59               |
|               | L1 S    |                        | 43 | 0   | 9-10          |                         | 2.4                     |                | Mizusawa, P 19 3               |
|               | M1      |                        | 51 | 28  | 25            |                         | 0.5?                    |                | Nagasaki P 19 7                |
|               | M2      |                        | 53 | 39  | 20            |                         | 0.3                     |                | Taihoku {P 19 22.5             |
|               | L2      | 9                      | 3  | 0   |               |                         |                         |                | { $\Delta$ 3885                |
|               | M       |                        | 3  | 18  | 26            |                         | 0.75                    |                | Zi ka wei P 8 19 28            |
|               |         |                        | 11 | 46  | 38            |                         | 0.6                     |                | Chemulpo P 19 37               |
|               |         |                        | 19 | 14  | 30            |                         | 0.7                     |                | Irkutsk, {P 21 33              |
|               |         |                        | 22 | 35  | 50            |                         | 0.6                     |                | { $\Delta$ 9100, New Hebrides. |
|               |         |                        | 24 | 42  | 28            |                         | 0.65                    |                | Ottawa, P? 27 48               |
|               | i M S   |                        | 27 | 21  | 13            |                         | 0.9                     |                | Bidston P 28 24                |
|               | M       |                        | 31 | 54  | 25            |                         | 0.7                     |                | San Fernando P 28 30           |
|               |         |                        | 35 | 12  | 35            |                         | 0.4                     |                |                                |
|               |         |                        | 40 | 18  | 26            |                         | 0.6                     |                |                                |
|               |         |                        | 42 | 18  | 24            |                         | 0.6                     |                |                                |
|               |         |                        | 45 | 48  | 42            |                         | 0.27                    |                |                                |
|               |         |                        | 51 | 8   | 21            |                         | 0.35                    |                |                                |
|               |         |                        | 54 | 10  | 20            |                         | 0.4                     |                |                                |
|               |         | 10                     | 57 | 27  | 20            |                         | 0.3                     |                |                                |
|               |         |                        | 1  | 2   | 27            |                         | 0.35                    |                |                                |
|               |         |                        | 3  | 0   | 28.5          |                         | 0.35                    |                |                                |
|               |         |                        | 8  | 40  | 21            |                         | 0.35                    |                |                                |
|               |         |                        | 16 | 38  | 19            |                         | 0.3                     |                |                                |
|               |         |                        | 22 | 32  | 20            |                         | 0.25                    |                |                                |
|               | c M'    |                        | 28 | 36  | 20.5          |                         | 0.1                     |                |                                |
|               |         | 11                     | 14 | 45  | 36            |                         | 0.03                    |                | Ottawa, L' 10 31 0             |
|               |         |                        | 21 | 57  | 30            |                         | 0.04                    |                |                                |
|               |         |                        | 29 | 25  | 20            |                         | 0.06                    |                |                                |
|               | i c S   |                        | 31 | 58  | 7.5           |                         | 0.25                    |                |                                |
|               |         |                        | 37 | 3   | 18            |                         | 0.07                    |                |                                |
|               |         |                        | 44 | 51  | 18            |                         | 0.04                    |                |                                |
|               | e M''   |                        | 45 | 21  | 8             |                         |                         |                |                                |
|               | i M'' N |                        | 51 | 45  | 31.5          |                         | 0.05                    |                |                                |
|               |         |                        | 53 | 18  | 8             |                         | 0.25                    |                |                                |
|               | c''     | 12                     | 24 | 15  | 15            |                         | 0.03                    |                |                                |
|               | F       |                        | 27 | 18  |               |                         |                         |                |                                |
| 14/X          | e L     | 13                     | 14 | 42  |               |                         |                         |                |                                |
|               | M       |                        | 25 | 36  | 18.5          |                         | 0.15                    |                |                                |
| 14/X          | e L     | 14                     | 55 | 57  |               |                         |                         |                | Zi ka wei, eP 14 22 58         |
|               | M       | 15                     | 7  | 42  | 22            |                         | 0.15                    |                | Irkutsk, 24 32                 |
| 14/X          | e L     | 16                     | 52 | 54  |               |                         |                         |                |                                |
|               | M       | 17                     | 2  | 18  | 16            |                         | 0.05                    |                | Zi ka wei, eP 16 12 34         |
|               |         |                        | 4  | 0   | 17.2          |                         | 0.03                    |                | Irkutsk, P 14 15               |
| 14/X          | e L     | 22                     | 27 | 0   |               |                         |                         |                | Irkutsk, eP 21 36 47           |
|               | M       |                        | 31 | 24  | 10            |                         | 0.05                    |                |                                |
|               |         |                        | 33 | 30  | 17            |                         | 0.07                    |                |                                |
|               |         |                        | 36 | 48  | 10            |                         | 0.05                    |                |                                |
|               |         |                        | 40 | 20  | 17            |                         | 0.1                     |                |                                |
| 15/X          | e L     | 14                     | 48 | 36  |               |                         |                         |                |                                |
|               | M       |                        | 50 | 30  | 25            |                         | 0.06                    |                |                                |
|               |         |                        | 56 | 21  | 22            |                         | 0.03                    |                |                                |
|               |         |                        | 58 | 19  | 26            |                         | 0.07                    |                |                                |
|               |         | 15                     | 12 | 0   | 16            |                         | 0.03                    |                |                                |
|               |         |                        | 19 | 48  | 19            |                         | 0.03                    |                |                                |
|               |         |                        | 22 | 12  | ?             |                         | 0.03                    |                |                                |
|               |         |                        | 28 | 12  | 19            |                         | 0.03                    |                |                                |
|               | c F     |                        | 34 | 15  | 15            |                         | 0.02                    |                |                                |
|               |         |                        | 46 | 10  |               |                         |                         |                |                                |
| 20/X          | e L     | 9                      | 38 | 36  |               |                         |                         |                |                                |
|               | M       |                        | 39 | 20  | 18            |                         | 0.1                     |                |                                |
|               |         |                        | 45 | 40  | 21            |                         | 0.07                    |                |                                |
|               |         | 10                     | 2  | 40  | 28            |                         | 0.15                    |                |                                |
|               | c       |                        | 12 | 12  | ?             |                         | ?                       |                |                                |

| DATE<br>1913 | PHASE                                               | GREENWICH<br>MEAN TIME<br>h m sec |                                                                                                    |                                                                                        | PERIOD<br>SEC              | AMPLITUDE<br>OF N OF W<br>mm. mm. |                                                                         | △<br>km | NOTES.                                                           |
|--------------|-----------------------------------------------------|-----------------------------------|----------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|----------------------------|-----------------------------------|-------------------------------------------------------------------------|---------|------------------------------------------------------------------|
| 23/X         | P<br>S<br>L<br>M                                    | 15                                | 12<br>21<br>36<br>45<br>46<br>47<br>53                                                             | 18<br>40<br>48<br>12<br>12<br>36<br>51                                                 |                            |                                   |                                                                         | 8045    | Irkutsk, e1, 15 21 3<br>eL1, 41<br>L2, 50<br>Ottawa, eP 7 58     |
|              | C<br>F                                              | 16                                | 21<br>22                                                                                           | 12                                                                                     | 10                         | 0.2<br>0.05                       |                                                                         |         |                                                                  |
| 25/X         | P?<br>S<br>L<br>M                                   | 15                                | 31<br>40<br>58                                                                                     | 48<br>54<br>12                                                                         |                            |                                   |                                                                         | 7725?   | Irkutsk, e 15 46 16                                              |
|              |                                                     | 16                                | 5<br>8<br>12                                                                                       | 10<br>19<br>20                                                                         | 20<br>20<br>20             | 0.03<br>0.03<br>0.03              |                                                                         |         |                                                                  |
| 29/X         | P?<br>N<br>S<br>M?                                  | 4                                 | 47<br>51<br>56                                                                                     | 24<br>18<br>21                                                                         |                            |                                   |                                                                         |         |                                                                  |
|              |                                                     | 5                                 | 3<br>9<br>35                                                                                       | 24<br>42                                                                               |                            |                                   |                                                                         |         |                                                                  |
|              |                                                     | Lines crossing                    |                                                                                                    |                                                                                        |                            |                                   |                                                                         |         |                                                                  |
| 31/X         | S?<br>L?<br>M                                       | 7                                 | 39<br>39<br>56                                                                                     | 8<br>10                                                                                | 6?                         | 0.8<br>1.0                        | 0.8<br>1.0                                                              |         |                                                                  |
|              |                                                     | 8                                 | 2                                                                                                  | 43                                                                                     | 10.5                       | 0.05                              | 0.05                                                                    |         |                                                                  |
| 4/XI         | e L<br>M                                            | 12                                | 27<br>37                                                                                           | 21                                                                                     | 27                         |                                   | 0.25                                                                    |         |                                                                  |
| 4/XI         | e L<br>M                                            | 13                                | 44<br>47<br>52<br>59                                                                               | 23<br>20<br>45<br>12                                                                   | 20<br>32<br>18             | 0.2<br>0.3<br>0.3                 |                                                                         |         |                                                                  |
|              |                                                     | 14                                | 2                                                                                                  | 12                                                                                     | 16.5                       |                                   | 0.35                                                                    |         |                                                                  |
| 8/XI         | L<br>M                                              | 6                                 | 46<br>56                                                                                           | 42<br>25                                                                               | 20                         |                                   | 0.2<br>0.3                                                              |         |                                                                  |
|              |                                                     | 7                                 | 13                                                                                                 | 12                                                                                     | 22                         |                                   |                                                                         |         |                                                                  |
| 9/XI         | N<br>S<br>S<br>S<br>S<br>S<br>S<br>S<br>S<br>S<br>M | 1                                 | 28<br>33<br>46<br>47<br>48<br>48<br>49<br>49<br>21<br>23                                           | 50<br>47<br>2<br>22<br>42<br>18<br>26<br>40<br>18                                      |                            |                                   | 0.1<br>0.3<br>0.2<br>0.15<br>0.2<br>0.15<br>0.15<br>0.15<br>0.25<br>0.2 |         |                                                                  |
| 10/XI        | P<br>S<br>L<br>M                                    | 21                                | 33<br>34<br>37<br>47<br>56<br>19<br>24<br>25<br>30<br>34<br>37<br>40<br>47<br>48<br>50<br>52<br>56 | 15<br>2<br>57<br>36<br>0<br>0<br>24<br>21<br>5<br>2<br>36<br>24<br>25<br>0<br>21<br>18 |                            |                                   |                                                                         | 14800?  | Osaka, P 21 22 46<br>Irkutsk, iP 25 21<br>Stonyhurst, P 31 36    |
|              |                                                     | 22                                | 24<br>25<br>30<br>34<br>37<br>40<br>47<br>48<br>50<br>52<br>56                                     | 24<br>21<br>5<br>2<br>36<br>24<br>25<br>0<br>21<br>18                                  | 28<br>30<br>20<br>24<br>26 | 0.1<br>0.2<br>0.3<br>0.4<br>0.55  |                                                                         |         | Intermaximal full,<br>22 42 48 (0.22 47 48<br>(0.15mm. [0.0mm.)) |
| 29/XI        | P<br>S?<br>C                                        | 5                                 | 26<br>28<br>29                                                                                     | 20<br>16<br>6                                                                          |                            |                                   |                                                                         | 1600    |                                                                  |

