

No. From **JAN 1 - 1918** to **JAN 15 1918** 191

HARVARD UNIVERSITY, CAMBRIDGE, MASS., U.S.A.

RECORD OF THE SEISMOGRAPHIC STATION
DEPARTMENT OF GEOLOGY AND GEOGRAPHY

$\phi = 42^{\circ} 22' 36''$ N. $\lambda = 71^{\circ} 06' 59''$ W. Gr. = 5.367 M. FOUNDATION: Glacial sand over clay.
 TIME: Mean Greenwich, midnight to midnight.
 INSTRUMENTS: Two Bosch-Omori 100 kg. horizontal pendulums (mechanical registration).

| No. | Date | Phase | Time | | | Periods | Amplitudes | Δ | REMARKS |
|-----|---------|-------------------|---------|----|----|---------|------------|----------|---|
| | | | h. | m. | s. | | | | |
| 754 | Jan. 3 | O | 16 hrs. | | | | | ? | Masked by micros. and local traffic jars. |
| | | eN | 16 | 33 | 38 | 16 | | | |
| | | LN | 16 | 39 | 57 | 20 | | | |
| | | F | 16 | 52 | ca | | | | |
| 755 | Jan. 4 | O | 4 | 29 | 55 | | | 3910 | Destructive in Guatemala City. |
| | | PN | 4 | 37 | 14 | | | | |
| | | S _{LE} | 4 | 42 | 56 | 6 | | | |
| | | eL _{LE} | 4 | 46 | 59 | 40 | | | |
| | | M _L | 4 | 49 | 43 | 26 | | | E comp. undamped, per. 25s |
| | | F | 6 | 16 | 36 | | | | |
| 756 | Jan. 12 | O? | 23 | 46 | 15 | | | 3914? | P masked by micros. |
| | | eS _{LE} | 23 | 59 | 07 | | | | |
| | 13 | S _{LN} | 0 | 00 | 14 | 6 | | | |
| | | eLN | 0 | 03 | 23 | 13 | | | |
| | | L _{LE} | 0 | 03 | 43 | 6 | | | |
| | | LN | 0 | 03 | 46 | 6 | | | |
| | | LN | 0 | 05 | 52 | 6 | | | Sinusoidal. |
| | | ME | 0 | 06 | 12 | | | | |
| | | MN | 0 | 06 | 18 | 9 | | | |
| | | CN | 0 | 07 | 12 | | | | |
| | | F?N | 0 | 08 | 34 | | | | |
| 757 | Jan. 13 | O? | 1 hr. | | | | | ? | Masked by microseisms. |
| | | LN? | 2 | 02 | 31 | 16 | | | |
| | | L | 2 | 03 | 21 | 16 | | | |
| | | L | 2 | 04 | 26 | 10 | | | |
| | | F? | 2 | 13 | 27 | | | | |
| 758 | Jan. 14 | iM | 4 | 47 | 28 | | | 0 | Frost crack near Station. A trace .3 mm. |
| | | C | 4 | 47 | 29 | | | | |
| | | F | 4 | 47 | 32 | | | | |
| 759 | Jan. 14 | iM | 4 | 52 | 32 | | | 0 | Frost crack near Station. A trace .3 mm. |
| | | C | 4 | 52 | 34 | | | | |
| | | F | 4 | 52 | 36 | | | | |
| 760 | Jan. 14 | iM | 7 | 22 | 28 | | | 0 | Frost crack near Station. A trace .5 mm. |
| | | C | 7 | 22 | 29 | | | | |
| | | F | 7 | 22 | 36 | | | | |
| 761 | Jan. 15 | O? | 23 hrs. | | | | | 4900? | Seismic? E stopped at 1h 42m. |
| | | S _{LN} ? | 23 | 56 | 39 | | | | |
| | | e | 23 | 58 | 07 | | | | |
| | 16 | eLN? | 0 | 03 | 10 | 16 | | | then 29s. |
| | | F | 1 | 42 | | | | | |

J. B. Woodworth

EXPLANATION OF SYMBOLS

The symbols, with the exception of a few additional characters, are those adopted by the International Seismological Association after Wiechert of Göttingen.

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|---|--|
| O | Time of earthquake at epicentre (or centre). (Seismol. Soc. Amer.). |
| P | Longitudinal waves, and their time of arrival at the station. |
| PR ₁ | " " once reflected, and time of arrival at station. |
| PR ₂ | " " twice reflected, and time of arrival at station. |
| S | Transverse waves, and time of arrival. |
| SR ₁ | " " once reflected, and time of arrival. |
| SR ₂ | " " twice reflected, and time of arrival. |
| PS | Alternating waves, and time of arrival (= PR ₁ S = SR ₁ P). |
| L | Long or surface or Rayleigh waves, and time of arrival. |
| M | Maximum of Long waves, and time of arrival. |
| M ¹ , M ² , M ³ , etc. | Successive maxima. |
| Lrep ₁ | Long waves reaching the station from the antipodes of the epicentre (antipode); path 40,000 kms. - Δ. |
| Lrep ₂ | Long waves again reaching station from the epicentre; path 40,000 kms. + Δ. |
| C | Cauda, end of Long waves, and beginning of trailers or tail. |
| F | Finis, end of record on seismogram. |
| n | Superposed phase of another earthquake; e.g., Pn. |
| e | (emersion), emergence of a phase not well defined; e.g., eP, eL. |
| i | (impetus), a sharply defined impulse; e.g., iP, iS. |
| AN | Amplitude of the N-S component of earth particle, deduced from the motion of the pendulum, usually L or M. |
| AE | The same for the E-W component of motion. |
| AZ | The same for the vertical component of motion. |
| γ | Gal, or unit acceleration, one centimetre per sec. per sec. |
| γ ₁₀₀₀ | Milligal, or 1/1000 gal. acceleration of 10 micra per sec. per sec. (Klotz). |
| φ | Latitude. |
| λ | Longitude from Greenwich. |
| h | Elevation above mean sea-level. |
| Δ | Distance, from epicentre to station; deduced from records. |
| ca | Approximately. |
| T | Period, complete time of oscillation; for simple pendulum; |
| | $2\pi \sqrt{\frac{l}{g}}$ |
| T ₀ | Period of undamped pendulum of seismograph. |
| T _e | Period of earth particle. |
| h, m, s | Time, Greenwich Mean Time, midnight to midnight. |
| M | Theoretical magnification of seismograph. |
| M _a | Actual magnification, for damping ratio and periods of earth particle and undamped pendulum. |
| V _P , V _S , V _L | Velocity of P, S, and L waves respectively. (Klotz.) |
| * | (large star) Epicentre. (After A. Siebert.) |

The following notation proposed by Wiechert is employed in many publications. The characters are implied by Δ and A.

I, Notable; II, striking; III, strong; referring to the intensity of earthquakes.

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| v | (vicinus), a nearby earthquake, under 1000 kms. distant; e.g., IIv. |
| r | (remotus), a distant earthquake, from 1000 to 5000 kms. |
| u | (ultimus), a very distant earthquake, over 5000 kms. distant. |

Measurements in the Metric System.

| | |
|--------|--|
| kms. | Kilometers (1000 kms. = 621.38 English statute miles. 111.1 kms. = 1° on the equator). |
| M or m | meter (s). (1 m. = 39.37079 inches.) |
| mm. | Millimeters (1 mm. = 0.03937 in.). |
| μ | Micron, 1/1000th of a millimeter = 0.00003937 in. |

BIBLIOGRAPHY

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| No. | Date | Phase | Time | | | Periods | Amplitudes | Δ | REMARKS |
|-----|---------|-------|------|------|----|---------|------------|--|---------|
| | | | h. | m. | s. | | | | |
| 762 | Jan. 16 | O? | 13 | hrs. | | | | Masked by microseisms | |
| | | eE? | 13 | 17 | 55 | | | | |
| | | eE? | 13 | 18 | 27 | | | | |
| | | eLE | 13 | 41 | 45 | 40 | | | |
| | | eLN | 13 | 43 | 23 | 20 | | | |
| | | F? | 14 | | | | | | |
| 763 | Jan. 25 | O? | 1 | 21 | 38 | | | 4600? Masked by microseisms. | |
| | | SE? | 1 | 29 | 39 | | | | |
| | | eN | 1 | 33 | 15 | | | | |
| | | eLN | 1 | 35 | 26 | 45? | | | |
| | | eLE | 1 | 35 | 29 | 40 | | | |
| | | ME | 1 | 37 | 54 | 25 | | | |
| | | MN | 1 | 41 | 37 | | | | |
| | | CE | 1 | 43 | 52 | | | | |
| | | LE? | 2 | 20 | 28 | 15 | | | |
| | | F? | 2 | 21 | ca | | | | |
| 764 | Jan. 30 | O? | 21 | 18 | 09 | | | 5110? E record illegible in tangled lines of undamped pendulum. Cf. record Nov. 23, 1913, with eL? 21h 42m 42s. Sept. 29, 1913; L 21-50-35; distance 13,300 kms. ca. Aug. 6, 1913; eL 21-40-00: *New Hebrides. | |
| | | SN | 21 | 33 | 33 | 6 | | | |
| | | eLN | 21 | 40 | 34 | 16 | | | |
| | | iL | 21 | 40 | 52 | | | | |
| | | iL | 21 | 42 | 19 | 18 | | | |
| | | L | 21 | 43 | 00 | 16 | | | |
| | | L | 21 | 48 | 31 | | | | |
| | | L | 22 | 57 | 42 | | | | |
| | | F | 23 | 36 | ca | | | | |
| 765 | Feb. 1 | OiME | 8 | 57 | 44 | | | 0.1ca Frost crack at Station | |
| | | C | 8 | 57 | 45 | | | | |
| | | F | 8 | 57 | 50 | | | | |
| 766 | Feb. 3 | eLE | 15 | 01 | 25 | 20 | | Very faint N. Micros. running. Cf. Victoria Distance 2525; 0:14-41-21. Honolulu P 14-16-51: eL 14-19-48. | |
| | | L | 15 | 13 | 27 | 15 | | | |
| | | F | 15 | 43 | | | | | |
| 767 | Feb. 12 | LE | 10 | 03 | 48 | 28 | | | |
| | | F | 10 | 45 | ca | | | | |
| 768 | Feb. 13 | eN | 3 | 43 | ca | | | Preceded for several hours by long period pulsations not clearly seismic. F very uncertain | |
| | | LN | 3 | 55 | 04 | 24 | | | |
| | | to | 3 | 58 | 26 | | | | |
| | | LN | 3 | 59 | 25 | 20 | | | |
| | | F? | | | | | | | |

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|----------------|----------|-------------------|-------------------------------------|---------|------------|----------|---|
| 769 | Feb. 13 | O? | 6 ^{h.} 08 ^{m.} ca | s. | μ . | 12400? | Distance and O from eL-S. Displacement of stylus. Both components undamped; but M amplitudes very much larger on N than on E. |
| | | eN? | 6 20 13 | | | | |
| | | eE | 6 28 04 | | | | |
| | | S?N | 6 35 45 | 10 | | | |
| | | e | 6 37 51 | 10 | | | |
| | | SR ₁ ? | 6 44 07 | 32 | | | |
| | | | 6 44 49 | 40 | | | |
| | | SR ₂ | 6 52 02 | 20-24 | | | |
| | | eLN | 7 01 34 | 56 | | | |
| | | | | 50 | | | |
| | | | | 48 | | | |
| | | eLE | 7 01 50 | 30 | | | |
| | | LN | 7 02 10 | 40 | | | |
| | | MN ₁ | 7 14 -- | 24 | | | |
| 2 | 7 15 40 | | | | | | |
| 3 | 7 17 15 | | | | | | |
| 4 | 7 19 15 | | | | | | |
| 5 | 7 22 -- | | | | | | |
| C _N | 7 28 ca | | | | | | |
| F | 8 23 | | | | | | |
| 770 | Feb. 19 | L? | 17 23 ca | | 20? | | Record too uncertain for closer readings. |
| | | L? | 18 02 | | 15 | | |
| 771 | Feb. 20 | e | 5 52 24 | | | | Variable short periods. |
| | | F | 5 53 25 | | | | |
| 772 | Feb. 20 | e | 6 50 01 | | | | do do Cf. Ottawa L 6-54 to 6-57 |
| | | F | 6 51 03 | | | | |
| 773 | Feb. 24 | eE | 23 12 36 | | | | Heavy micros. running. |
| | | L | 23 14 07 | 26 | | | |
| | | L | 23 14 33 | 20 | | | |
| | | F | 23 24 ca | 15 | | | |
| 774 | Mar. 16 | O | 13 40 54 | | | 3350 | In heavy microseisms. |
| | | ePE | 13 47 14 | 2 | | | |
| | | S | 13 52 21 | 6 | | | |
| | | eLE | 13 55 15 | 12 | | | |
| | | L | 14 22 34 | 15 | | | |
| | | to F? | 14 23 39 | | | | |
| | 14 26 30 | | | | | | |
| 775 | Mar. 19 | L _E | 6 57 25 | 24 | | | No microseisms. |
| | | L | 6 59 22 | 20 | | | |
| | | L | 7 15 44 | 15 | | | |
| | | F | 7 46 | | | | |
| 776 | Apr. 10 | O | 1 10 45 | | | 350 | Not heard from. |
| | | PE | 1 11 35 | | | | |
| | | S | 1 12 18 | | | | |
| | | M | 1 12 22 | | | | |
| | | C | 1 12 47 | | | | |
| | | F | 1 14 03 | | | | |

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|-----|---------|------------------|------|----|----|---------|------------|--|-----------------|
| | | | h. | m. | s. | | | | |
| 777 | Apr. 10 | O | 2 | ?? | ?? | | | 3710? | i is S? |
| | | i _E | 2 | 26 | 22 | | | | |
| | | L | 2 | 28 | 55 | 8 | | | |
| | | M? | 2 | 30 | 12 | | | | |
| | | F | 2 | 50 | 30 | | | | |
| 778 | Apr. 13 | L _E | 2 | 15 | 46 | 20 | | | In microseisms. |
| | | F? | 2 | 22 | 10 | | | | |
| 779 | Apr. 15 | | | | | | 5740 | No maximum. | |
| 779 | Apr. 15 | O | 8 | 27 | 41 | | | | |
| | | e _{PE} | 8 | 36 | 56 | 2 | | | |
| | | S | 8 | 44 | 18 | 6 | | | |
| | | L | 8 | 50 | 06 | | | | |
| | | F? | 9 | 20 | ca | | | | |
| 780 | Apr. 17 | L _E | 3 | 10 | 56 | 20 | | | |
| | | to | 3 | 20 | 55 | 15 | | | |
| 781 | Apr. 17 | L _E | 4 | 00 | 54 | 8-9 | | | |
| | | to | 4 | 02 | 56 | | | | |
| | | e | 4 | 06 | 01 | | | | |
| | | F | 4 | 06 | 36 | | | | |
| 782 | Apr. 17 | O | 6 | 50 | 07 | | 3220 | Press reports shocks felt in Martinique about this time. P masked by microseisms. No N record. | |
| | | e | 6 | 58 | 20 | | | | |
| | | S _E | 7 | 01 | 23 | 6 | | | |
| | | e _{LE} | 7 | 04 | 14 | 9 | | | |
| | | F | 7 | 28 | ca | | | | |
| 783 | Apr. 21 | O | 22 | 32 | 24 | | 4040 | Severe shock at Hamet and San Jacinto, southern California reported | |
| | | P _E | 22 | 39 | 45 | | | | |
| | | S | 22 | 45 | 34 | | | | |
| | | e _{LE} | 22 | 49 | 08 | | | | |
| | | L | 22 | 49 | 52 | 9 | | | |
| | | L | 22 | 51 | 34 | | | | |
| | Apr. 22 | M _E | 22 | 55 | 00 | | | A increases and diminishes. Stylus left drum for 1m 11s. Trace of A: 65mm. | |
| | | F | 0 | 48 | 27 | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| 784 | Apr. 27 | L _E ? | 20 | 35 | 01 | 5-8 | | Non-sinusoidal. | |
| | | L | 20 | 36 | 46 | 6 | | | |
| | | M | 20 | 37 | 33 | 11 | | | |
| | | F | 20 | 37 | 48 | | | | |
| 785 | Apr. 27 | O? | 14 | 43 | 43 | | 3950? | | |
| | | e? | 14 | 52 | ca | | | | |
| | | S _E | 14 | 56 | 42 | 6 | | | |
| | | e _{LE} | 15 | 01 | 03 | 28 | | | |
| | | L | 15 | 04 | 08 | 15 | | | |
| | | F | 15 | 25 | | | | | |

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| M ¹ , M ² , M ³ , etc. ... | Successive maxima. |
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Measurements in the Metric System.

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BIBLIOGRAPHY

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No.

From **MAY 1 - 1918** to

MAY 20 1918

191

HARVARD UNIVERSITY, CAMBRIDGE, MASS., U.S.A.

RECORD OF THE SEISMOGRAPHIC STATION
DEPARTMENT OF GEOLOGY AND GEOGRAPHY

$\phi = 42^{\circ} 22' 36''$ N. $\lambda = 71^{\circ} 06' 59''$ W. Gr. = 5.367 M. FOUNDATION: Glacial sand over clay.

TIME: Mean Greenwich, midnight to midnight.

INSTRUMENTS: Two Bosch-Omori 100 kg. horizontal pendulums (mechanical registration).

| No. | Date | Phase | Time | Periods | Amplitudes | Δ | REMARKS |
|-----|--------|---|---|-----------------------------------|------------|----------|---|
| 786 | May 1 | O eN eE SN? L L L L F F | 4 ^{h.} 20 ^{m.} 31 ^{s.} postea 4 50 31 4 51 00 4 51 01 4 51 11 4 51 29 4 54 55 4 55 26 5 07 | s. 2 6 12 8 | " | 270+ | No reports. |
| 787 | May 2 | O LN L to LN LE LN F | 2 postea 2 43 19 2 43 27 2 44 38 2 46 13 2 46 24 2 47 10 2 50 19 | 9-8 10 | | | |
| 788 | May 6 | O eE LE L F | 5 postea 5 15 09 5 16 08 5 18 24 5 26 30 | 3 12 10 | | | |
| 789 | May 11 | O? SN eLN L to F | 21 23 57 21 41 10 22 01 16 22 06 27 22 09 22 20 ca | 25 | | 8890? | Distance from L-S? SR 21 43 53 |
| 790 | May 16 | O eEN LN LE LE ME? CE FE | 21 postea 21 45 34 21 46 42 21 47 09 21 49 28 21 49 56 21 53 54 22 07 ca | 8 12-15 12 9 8-12 | | | Early phases masked. |
| 791 | May 20 | ON iPN PE SN SE eLE? ME ME CE Lrep F? | 14 35 43 14 44 19 14 44 41 14 51 08 14 51 22 14 57 32 14 58 40 15 01 36 15 22 15 56 1/2 17 33 | 36 25 15 15 16 16+ | | 5130 | L-O gives 7'235.1 kms. per min. N stylus left drum in S-E has almost contin- uous long waves to C.S. resonant to 14-55-23, from want of damper. |
| | | | | | | | Records were changed. |

J.B. Woodworth

EXPLANATION OF SYMBOLS

The symbols, with the exception of a few additional characters, are those adopted by the International Seismological Association after Wiechert of Göttingen.

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No.

From **MAY 20 1918** to

MAY 31 1918

191

HARVARD UNIVERSITY, CAMBRIDGE, MASS., U.S.A.

RECORD OF THE SEISMOGRAPHIC STATION
DEPARTMENT OF GEOLOGY AND GEOGRAPHY

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| No. | Date | Phase | Time | | | Periods | Amplitudes | Δ | REMARKS |
|-----|--------|----------------|------|----|----|---------|------------|----------|--|
| | | | h. | m. | s. | | | | |
| 792 | May 20 | O | 17 | 55 | 13 | | | 7890 | E damped 2 to 1 by magnet. |
| | | PE | 18 | 06 | 28 | | | | |
| | | PN | 18 | 06 | 36 | | | | |
| | | SN | 18 | 15 | 42 | 6 | | | |
| | | SE | 18 | 15 | 46 | | | | |
| | | eLE | 18 | 29 | 42 | 18 | | | |
| | | LN | 18 | 31 | 20 | 32 | | | |
| F? | 20 | ca | | | | | | | |
| 793 | May 20 | L ₂ | 21 | 40 | 46 | 10 | | | Probably part of No.792 |
| | | tO | 21 | 43 | 15 | | | | |
| 794 | May 22 | O? | 6 | 41 | 00 | | | 5650? | Record difficult to diagnose. |
| | | eP? | 6 | 50 | 08 | 4 | | | |
| | | SE? | 6 | 56 | 42 | 6 | | | |
| | | eLE | 7 | 05 | 02 | 8 | | | |
| | | L | 7 | 09 | 11 | 12 | | | |
| F | 7 | 24 | 30 | | | | | | |
| 795 | May 23 | O | 11 | 57 | 22 | | | 4115 | N component out of order and ran down before eP. |
| | | ePD | 12 | 04 | 48 | | | | |
| | | S | 12 | 10 | 41 | | | | |
| | | eLE | 12 | 15 | 08 | 31 | | | |
| | | L | 12 | 16 | 30 | | | | |
| | | ML | 12 | 18 | | 10 1/2 | | | |
| | | M ₂ | 12 | 20 | | 9 1/2 | | | |
| | | M ₃ | 12 | 21 | | | | | |
| | | M ₄ | 12 | 22 | | 11 1/2 | | | |
| | | M ₅ | 12 | 23 | | | | | |
| | | M ₆ | 12 | 25 | | | | | |
| | | M ₇ | 12 | 26 | | | | | |
| | | C | 12 | 53 | | 10-13 | | | |
| | | F? | 14 | ca | | | | | |

J. B. Woodworth

Issued June 29, 1918.

(For explanation of Symbols see other side)

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No. From (May 25,) June 1, 1918 June 7, 1918

HARVARD UNIVERSITY, CAMBRIDGE, MASS., U. S. A.

RECORD OF THE SEISMOGRAPHIC STATION

DEPARTMENT OF GEOLOGY AND GEOGRAPHY

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|-----|----------------|-------|------|--------|-----|---------|------------|---------------|---|
| | | | h. | m. | s. | | | | |
| 796 | 1918 May 25 | O | 19 | 29 | 34 | | | 8050 | Accidentally dropped from May List. |
| | | ePE | 19 | 40 | 58 | 4 | | | |
| | | PN | 19 | 40 | 59 | | | | |
| | | SE | 19 | 50 | 20 | 10 | | | |
| | | SN | 19 | 50 | 33 | | | | |
| | | eLE | 20 | 03 | 56 | 30 | | | |
| | | LN | 20 | 04 | 13 | 26 | | | |
| | | FE | 21 | 27 | ca. | | | | |
| 797 | June 3 | O | 0 | 03 | 07 | | | 7120 | E damped by magnet. N undamped; T: 25s. |
| | | iPE | 0 | 13 | 41 | 4 | | | |
| | | PN | 0 | 13 | 45 | | | | |
| | | SE | 0 | 22 | 16 | 6 | | | |
| | | SN | 0 | 22 | 19 | | | | |
| | | eLE | 0 | 28 | 59 | 9 | | | |
| | | eLN | 0 | 29 | 44 | 23 | | | |
| | | MN | 0 | 31 | 04 | 17 | | | |
| | | FN | 1 | 13 | ca. | | | | |
| 798 | June 4 | O | 4 | postea | | | | ? | From 3600 to 6000 kms. Deformed by local vibrations. MN? |
| | | eN | 5 | 00 | 10 | | | | |
| | | LN? | 5 | 09 | 39 | 26? | | | |
| | | LE | 5 | 11 | 08 | 24 | | | |
| | | LN | 5 | 15 | 38 | 20 | | | |
| | | F | 5 | 28 | ca. | | | | |
| 799 | June 4 | O? | 17 | 05 | ca | | | ?13000+ | Difficult to decipher. |
| | | ePE? | 17 | 20 | 38 | | | | |
| | | SE? | 17 | 27 | 51 | 6 | | | |
| | | eLN | 18 | 09 | 30 | 20 | | | |
| | | LN? | 18 | 15 | 08 | 16 | | | |
| | | F? | 18 | 50 | ca | | | | |
| 00 | June 7 | O | 21 | 16 | 12 | | | 7040 Δ | from SN*-PE. BLN-SN gives Δ 7035. A new P? N ran down 22h.5m. |
| | | PE | 21 | 26 | 42 | | | | |
| | | SN | 21 | 35 | 13 | 6 | | | |
| | | SE | 21 | 35 | 39 | 6 | | | |
| | | iE | 21 | 40 | 06 | 6 | | | |
| | | eE | 21 | 43 | 06 | | | | |
| | | Pn? | 21 | 47 | 03 | | | | |
| | | eLN | 21 | 47 | 03 | 28 | | | |
| | | LE | 21 | 48 | 41 | | | | |
| | | MN | 21 | 51 | 03 | 13 | | | |
| | | ME | 21 | 51 | 31 | 13 | | | |
| | | MN | 21 | 54 | 19 | 14 | | | |
| | | | | FE | 22 | 39 | ca. | | |

MIMEOGRAPHED JULY 30, 1918.



No.

From

July 7, 1918

to

July 17, 1918.

191

HARVARD UNIVERSITY, CAMBRIDGE, MASS., U.S.A.

RECORD OF THE SEISMOGRAPHIC STATION

DEPARTMENT OF GEOLOGY AND GEOGRAPHY

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|-----|-----------------|-------|------|--------|------|---------|------------|----------|--|
| | | | h. | m. | s. | | | | |
| 801 | 1918 June 11 | O | 12 | postea | | | | ? | |
| | | eE | 12 | 39 | 37 | 4 | | | |
| | | ePN | 12 | 40 | 08 | | | | |
| | | eLN? | 12 | 44 | 26 | 12 | | | |
| | | eE | 12 | 44 | 59 | 6 | | | |
| | | LE | 12 | 50 | 04 | 10 | | | |
| | | F | 13 | 20 | 24 | | | | |
| 802 | June 12 | O? | 4 | 21 | ca | | | 5610? | |
| | | eN? | 4 | 30 | 34 | | | | |
| | | eE | 4 | 32 | 34 | 6 | | | |
| | | eN | 4 | 36 | 28 | 4 | | | |
| | | | 4 | 44 | 39 | 7 | | | |
| | | LN | 4 | 46 | 05 | 12 | | | |
| | | LE | 4 | 46 | 48 | 14 | | | |
| 803 | June 13 | ON? | 8 | 58 | 26 | | | 3410? | There is a doubt about times by N component. L very short period by E, hard to read. Cf. Record of March 25, 1915 Δ 3440? 0:9-03-43? Press reports prolonged shock felt at St. Vincent, West Indies. eL not readily determined. Times by N record uncertain by reason of broken driving spring. |
| | | OE | 8 | 58 | 35 | | | | |
| | | iPN | 9 | 04 | 59 | 2 | | | |
| | | iPE | 9 | 05 | 08 | 2 | | | |
| | | SN | 9 | 10 | 08 | 6 | | | |
| | | SN | 9 | 10 | 17 | 5 | | | |
| | | eLN | 9 | 13 | 37 | 8 | | | |
| FE | 9 | 23 | ca. | | | | | | |
| 804 | June 16 | OE | 12 | 27 | 44.5 | | | 3330 | Not very distant. Cf. 804. Possibly local and non-seismic L microseismic. N (out of order) gives: e 16 45 16 L 16 45 49 to 16 46 15 L 16 48 10 to 16 48 45 F 16 53 ca. Readings by E preferred to N. |
| | | ON | 12 | 27 | 45 | | | 3170 | |
| | | iPN? | 12 | 33 | 57 | 2..4 | | | |
| | | iPE? | 12 | 34 | 11 | 2..4 | | | |
| | | SN? | 12 | 38 | 58 | 6 | | | |
| | | SE | 12 | 39 | 17 | 6 | | | |
| | | iN | 12 | 40 | 08 | | | | |
| | | iE | 12 | 40 | 35 | 8 | | | |
| | | iN | 12 | 41 | 26 | | | | |
| | | F | 12 | 55 | ca. | | | | |
| | June 17 | O | 16 | postea | | | | | |
| | | eE | 16 | 45 | 38 | 2 | | | |
| | | | 16 | 45 | 56 | 4 | | | |
| | | LE | 16 | 46 | 02 | 6 | | | |
| to | 16 | 46 | 49 | | | | | | |
| LE | 16 | 49 | 25 | 6 | | | | | |
| to | 16 | 50 | 12 | | | | | | |
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| M or m | meter (s). (1 m. = 39.37079 inches.) |
| mm. | Millimeters (1 mm. = 0.03937 in.). |
| μ | Micron, 1/1000th of a millimeter = 0.00003937 in. |

BIBLIOGRAPHY

KLOTZ, OTTO: Seismological Tables. Publications of the Dominion Observatory, Ottawa.
 Vol. iii, No. 2, pp. 19-61. 1916.

No.

From

June 17, 1918

to Ju

191

HARVARD UNIVERSITY, CAMBRIDGE, MASS., U.S.A.

RECORD OF THE SEISMOGRAPHIC STATION

DEPARTMENT OF GEOLOGY AND GEOGRAPHY

 $\phi = 42^{\circ} 22' 36''$ N. $\lambda = 71^{\circ} 06' 59''$ W. Gr. = 5.367 M. FOUNDATION: Glacial sand over clay.

TIME: Mean Greenwich, midnight to midnight.

INSTRUMENTS: Two Bosch-Omori 100 kg. horizontal pendulums (mechanical registration).

| No. | Date | Phase | Time | | | Periods | Amplitudes | Δ | REMARKS |
|-----------------------------|-----------------|----------|----------|-----------|-----|---------|------------|---|---------|
| | | | h. | m. | s. | s. | μ . | | |
| 806 | 1918 June 22 | O? | 21 | 56 | 51 | | | 6000? Δ and O very uncertain. E in microseisms. | |
| | | eN | 22 | 12 | 33 | | | | |
| | | iS? | 22 | 13 | 58 | 8 | | | |
| | | iN | 22 | 18 | 24 | 10 | | | |
| | | eLN? | 22 | 23 | 09 | 20 | | | |
| | | LE FN | 22 23 | 28 ca. | | | | | |
| 807 | June 26 | O? | 22 | 48 | 50 | | | 10050? | |
| | | SE? | 23 | 48 | 50 | 6 | | | |
| | | eN | 23 | 12 | 58 | 10 | | | |
| | | LE | 23 | 32 | 56 | 20 | | | |
| | | LN | 23 | 34 | 12 | 20 | | | |
| | | FE? | 23 | 41 | ca. | | | | |
| 808 | June 27 | O | 21 | postea | | | | Masked by microseisms. | |
| | | LN | 22 | 00 | 54? | 20 | | | |
| | | L | 22 | 01 | 46? | 20 | | | |
| | | LE | 22 | 06 | 31 | 15 | | | |
| | | L | 22 | 12 | 16 | 14 | | | |
| | | FN? | 22 | 16 | ca. | | | | |
| MIMEOGRAPHED JULY 30, 1918. | | | | | | | | | |

EXPLANATION OF SYMBOLS

The symbols, with the exception of a few additional characters, are those adopted by the International Seismological Association after Wiechert of Göttingen.

| | |
|---|--|
| O..... | Time of earthquake at epicentre (or centre). (Seismol. Soc. Amer.). |
| P..... | Longitudinal waves, and their time of arrival at the station. |
| PR ₁ | " " once reflected, and time of arrival at station. |
| PR ₂ | " " twice reflected, and time of arrival at station. |
| S..... | Transverse waves, and time of arrival. |
| SR ₁ | " " once reflected, and time of arrival. |
| SR ₂ | " " twice reflected, and time of arrival. |
| PS..... | Alternating waves, and time of arrival (= PR ₁ S = SR ₁ P). |
| L..... | Long or surface or Rayleigh waves, and time of arrival. |
| M..... | Maximum of Long waves, and time of arrival. |
| M ¹ , M ² , M ³ , etc. . . | Successive maxima. |
| Lrep ₁ | Long waves reaching the station from the antipodes of the epicentre (antipode); path 40,000 kms. - Δ. |
| Lrep ₂ | Long waves again reaching station from the epicentre; path 40,000 kms. + Δ. |
| C..... | Cauda, end of Long waves, and beginning of trailers or tail. |
| F..... | Finis, end of record on seismogram. |
| n..... | Superposed phase of another earthquake; <i>e.g.</i> , Pn. |
| e..... | (emersio), emergence of a phase not well defined; <i>e.g.</i> , eP, eL. |
| i..... | (impetus), a sharply defined impulse; <i>e.g.</i> , iP, iS. |
| AN..... | Amplitude of the N-S component of earth particle, deduced from the motion of the pendulum, usually L or M. |
| AE..... | The same for the E-W component of motion. |
| AZ..... | The same for the vertical component of motion. |
| γ..... | Gal, or unit acceleration, one centimetre per sec. per sec. |
| γ ₁₀₀₀ | Milligal, or 1/1000 gal. acceleration of 10 micra per sec. per sec. (Klotz). |
| φ..... | Latitude. |
| λ..... | Longitude from Greenwich. |
| h..... | Elevation above mean sea-level. |
| Δ..... | Distance, from epicentre to station; deduced from records. |
| ca..... | Approximately. |
| T..... | Period, complete time of oscillation; for simple pendulum; |
| | $2\pi \sqrt{\frac{l}{g}}$ |
| T ₀ | Period of undamped pendulum of seismograph. |
| T _e | Period of earth particle. |
| h, m, s..... | Time, Greenwich Mean Time, midnight to midnight. |
| M..... | Theoretical magnification of seismograph. |
| M _a | Actual magnification, for damping ratio and periods of earth particle and undamped pendulum. |
| V _P , V _S , V _L | Velocity of P, S, and L waves respectively. (Klotz.) |
| *..... | (large star) Epicentre. (After A. Siebert.) |

The following notation proposed by Wiechert is employed in many publications. The characters are implied by Δ and A.

I, Notable; II, striking; III, strong; referring to the intensity of earthquakes.

| | |
|--------|---|
| d..... | (domesticus), a local shock; <i>e.g.</i> , Id. |
| v..... | (vicinus), a nearby earthquake, under 1000 kms. distant; <i>e.g.</i> , IIv. |
| r..... | (remotus), a distant earthquake, from 1000 to 5000 kms. |
| u..... | (ultimus), a very distant earthquake, over 5000 kms. distant. |

Measurements in the Metric System.

| | |
|-------------|--|
| kms. | Kilometers (1000 kms. = 621.38 English statute miles. 111.1 kms. = 1° on the equator). |
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BIBLIOGRAPHY

KLOTZ, OTTO: Seismological Tables. Publications of the Dominion Observatory, Ottawa. Vol. iii, No. 2, pp. 19-61. 1916.

No.

From JULY 1, 1918. to JULY 14, 1918.

191

HARVARD UNIVERSITY, CAMBRIDGE, MASS., U.S.A.

RECORD OF THE SEISMOGRAPHIC STATION

DEPARTMENT OF GEOLOGY AND GEOGRAPHY

 $\phi = 42^{\circ} 22' 36''$ N. $\lambda = 71^{\circ} 06' 59''$ W. Gr. = 5.367 M. FOUNDATION: Glacial sand over clay.

TIME: Mean Greenwich, midnight to midnight.

INSTRUMENTS: Two Bosch-Omori 100 kg. horizontal pendulums (mechanical registration).

| No. | Date | Phase | Time | | | Periods | Amplitudes | Δ | REMARKS |
|-----|----------------|-------------------|------|--------|-------|---------|------------|----------|---------|
| | | | h. | m. | s. | | | | |
| 809 | 1918 July 3 | O | 7 | ca. | | 5 | | 13000+ | |
| | | PR ₁ E | 7 | 13 | 31 | 6 | | | |
| | | PR ₁ N | 7 | 14 | 26 | | | | |
| | | eE | 7 | 14 | 33 | 6 | | | |
| | | SN | 7 | 23 | 20 | 13 | | | |
| | | SE | 7 | 23 | 32 | 6 | | | |
| | | eS | 7 | 24 | 32 | 12 | | | |
| | | eE | 7 | 31 | 32 | 24-36 | | | |
| | | LN | 7 | 59 | 22 | | | | |
| | | MN | 8 | 03 | 36 | | | | |
| | | MN | 8 | 20 | 32 | | | | |
| | | Lr ₁ E | 8 | 39 | 00 | 40 | | | |
| | | Lr ₁ e | 8 | 42 | ca. | 30 | | | |
| | | Lr ₁ N | 8 | 44 | ca. | | | | |
| | | E | 8 | 49 | | 20 | | | |
| | | E | 9 | 11 | | 15 | | | |
| F | 9 | 29 | | | | | | | |
| 810 | July 8 | O | 10 | pastea | | | | 15000+ | |
| | | PN? | 10 | 32 | 27 | | | | |
| | | PE | 10 | 35 | 04 | 4 | | | |
| | | PN? | 10 | 37 | 27 | | | | |
| | | iN | 10 | 41 | 00 | 4 | | | |
| | | iE | 10 | 41 | 02 | 4 | | | |
| | | SN? | 10 | 46 | 59 | 6 | | | |
| | | SE? | 10 | 49 | 12 | | | | |
| | | SN | 10 | 50 | 17 | 8 | | | |
| | | eN | 10 | 55 | 26 | 17 | | | |
| | | eE | 10 | 56 | 04 | 7 | | | |
| | | eLN | 11 | 11 | 02 | | | | |
| | | eLE | 11 | 11 | 24 | 60 | | | |
| | | LE | 11 | 16 | 04 | 40 | | | |
| | | LN | 11 | 16 | 35 | | | | |
| | | LE | 11 | 19 | 14 | 30 | | | |
| | | LN | 11 | 20 | 24 | 40 | | | |
| | | LE | 11 | 22 | 42 | 20 | | | |
| | | LN | 11 | 23 | | | | | |
| | | MN | 11 | 24 | 26 | | | | |
| | | LE | 11 | 28 | 14 | 30 | | | |
| | | LE | 11 | 33 | 18 | 20 | | | |
| LE | 11 | 40 | 09 | 15 | | | | | |
| LN | 12 | 22 | ca | 20 | | Lrep1 | | | |
| LN | 12 | 28 | 28 | 24 | | | | | |
| LE | 12 | 29 | 02 | 20 | | | | | |
| F | 12 | 50 | ca | | | | | | |

MIMEOGRAPHED JULY 31, 1918.

No.

From

JULY 14, 1918

to

JU

191

HARVARD UNIVERSITY, CAMBRIDGE, MASS., U.S.A.

RECORD OF THE SEISMOGRAPHIC STATION

DEPARTMENT OF GEOLOGY AND GEOGRAPHY

 $\phi = 42^{\circ} 22' 36''$ N. $\lambda = 71^{\circ} 06' 59''$ W. Gr. = 5.367 M. FOUNDATION: Glacial sand over clay.

TIME: Mean Greenwich, midnight to midnight.

INSTRUMENTS: Two Bosch-Omori 100 kg. horizontal pendulums (mechanical registration).

| No. | Date | Phase | Time | | | Periods | Amplitudes | Δ | REMARKS |
|-----|-----------------|---|------|--------|-----|---------|------------|--------------------------------|--|
| | | | h. | m. | s. | | | | |
| 811 | 1918 July 14 | O eN L to F | 18 | postea | | | | Not registered on E component. | |
| | | | 18 | 37 | 01 | | | | |
| | | | 18 | 38 | 35 | 10 | | | |
| | | | 18 | 40 | 37 | | | | |
| | | | 18 | 43 | ca. | | | | |
| 812 | July 15 | Oe ePE PN SE SN SR2 SR2 eLN ME MN ME ME F | 0 | 22 | 29 | 2 | | 4280 | (Of. July 21, 1914: 0:22h 30m 43s; Δ 4280. Slide 0: 22h 31m 17s, putting *46°N., 130°W. Pulkovo gives *50°N., 140°W.) |
| | | | 0 | 30 | 15 | 2 | | 38°31' | |
| | | | 0 | 30 | 31 | | | | |
| | | | 0 | 36 | 18 | 8 | | | |
| | | | 0 | 36 | 40 | 6 | | | |
| | | | 0 | 39 | 18 | 8 | | | |
| | | | 0 | 39 | 50 | 10-12 | | | |
| | | | 0 | 42 | 00 | 40 | | | |
| | | | 0 | 44 | 13 | | | | |
| | | | 0 | 45 | 00 | 18 | | | |
| | | | 0 | 47 | 03 | | | | 2.75mm trace for A |
| | | | 0 | 48 | 05 | | | | 6.00mm trace A |
| | | | 0 | 49 | 57 | | | | |
| | | | 1 | 42 | ca. | | | | |
| 813 | JULY 21 | O? ePR1 iE eLE L Ma? L to LR1 L F | 6 | 15 | ca | | | 12400? | eL?-PR1::35m 49s. |
| | | | 6 | 30 | 32 | 4 | | 111°36' | ? |
| | | | 6 | 40 | 15 | 6 | | | Ladrone Ids.? or between |
| | | | 7 | 08 | 21 | 48 | | | Formosa and Great Liu |
| | | | 7 | 11 | 15 | 25 | | | Kiu Id?? |
| | | | 7 | 14 | 43 | 20 | | | |
| | | | 7 | 23 | 21 | 16 | | | BEAUTIFUL sinusoidal |
| | | | 7 | 51 | 37 | | | | record sets in. |
| | | | 8 | 04 | | 16 | | | |
| | | | 8 | 23 | 50 | 16 | | | Very faint L waves on |
| | | | 8 | 32 | | | | | N undamped. |
| 814 | July 24 | O e? e eLN? LN LE LN F? | 11 | postea | | | | | P and S masked by micro |
| | | | 11 | 35 | 46 | | | | seisms. |
| | | | 11 | 42 | 01 | 14 | | | |
| | | | 11 | 46 | 21 | 33-15 | | | |
| | | | 11 | 54 | 54 | 20 | | | |
| | | | 11 | 58 | 55 | 20-16 | | | to 11h 01 ca. Damped by |
| | | | 12 | 05 | ca. | | | | magnet. |
| | | | | | | | | | F lost in changing re- |
| | | | | | | | | | ords at 12h 35m. |
| 815 | July 29 | LN LE LE F? | 17 | 52 | 10 | 24 | | | Very distant; A very small |
| | | | 17 | 52 | 37 | 24 | | | |
| | | | 18 | 01 | 52 | 20 | | | M? |
| | | | 18 | 06 | 26 | | | | |

MIMEOGRAPHED JULY 31, 1918.

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| AZ | The same for the vertical component of motion. |
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| γû | Milligal, or 1/1000 gal. acceleration of 10 micra per sec. per sec. (Klotz). |
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| λ | Longitude from Greenwich. |
| h | Elevation above mean sea-level. |
| Δ | Distance, from epicentre to station; deduced from records. |
| ca | Approximately. |
| T | Period, complete time of oscillation; for simple pendulum; |
| | $2\pi \sqrt{\frac{l}{g}}$ |
| Tô | Period of undamped pendulum of seismograph. |
| Tê | Period of earth particle. |
| h, m, s. | Time, Greenwich Mean Time, midnight to midnight. |
| M | Theoretical magnification of seismograph. |
| Mâ | Actual magnification, for damping ratio and periods of earth particle and undamped pendulum. |
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| | |
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BIBLIOGRAPHY

KLOTZ, OTTO: Seismological Tables. Publications of the Dominion Observatory, Ottawa. Vol. iii, No. 2, pp. 19-61. 1916.

No. From July 29, 1918 to July 31, 1918. 191

HARVARD UNIVERSITY, CAMBRIDGE, MASS., U.S.A.

RECORD OF THE SEISMOGRAPHIC STATION

DEPARTMENT OF GEOLOGY AND GEOGRAPHY

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INSTRUMENTS: Two Bosch-Omori 100 kg. horizontal pendulums (mechanical registration).

| No. | Date | Phase | Time | | | Periods | Amplitudes | Δ | REMARKS |
|------------------------------|-----------------|-------|------|----|----|---------|------------|----------|---|
| | | | h. | m. | s. | | | | |
| 816 | 1918 July 31 | O? | 14 | 27 | 04 | | | 6450? | O: from eLN-eE 6s period for S. N undamped. E damped by magnet. |
| | | eN | 14 | 44 | 27 | | | | |
| | | eN | 14 | 45 | 01 | 6 | | | |
| | | iN | 14 | 48 | 49 | 6 | | | |
| | | iE | 14 | 52 | 02 | 6 | | | |
| | | eLN | 14 | 55 | 21 | 28 | | | |
| | | eLE | 14 | 55 | 48 | 20 | | | |
| | | MN | 14 | 59 | 15 | 17 | | | |
| | | LE | 15 | 01 | 47 | 15 | | | |
| | | LE | 15 | 22 | 59 | 20 | | | |
| FE | 15 | 28 | 30? | | | | | | |
| MIMEOGRAPHED AUGUST 1, 1918. | | | | | | | | | |

EXPLANATION OF SYMBOLS

The symbols, with the exception of a few additional characters, are those adopted by the International Seismological Association after Wiechert of Göttingen.

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| AN | Amplitude of the N-S component of earth particle, deduced from the motion of the pendulum, usually L or M. |
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| Az | The same for the vertical component of motion. |
| γ | Gal, or unit acceleration, one centimetre per sec. per sec. |
| γû | Milligal, or 1/1000 gal. acceleration of 10 micra per sec. per sec. (Klotz). |
| φ | Latitude. |
| λ | Longitude from Greenwich. |
| h | Elevation above mean sea-level. |
| Δ | Distance, from epicentre to station; deduced from records. |
| ca | Approximately. |
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BIBLIOGRAPHY

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August 1, 1918

No. From August to 191

HARVARD UNIVERSITY, CAMBRIDGE, MASS., U.S.A.

RECORD OF THE SEISMOGRAPHIC STATION
DEPARTMENT OF GEOLOGY AND GEOGRAPHY

phi = 42 degrees 22' 36" N. lambda = 71 degrees 06' 59" W. Gr. = 5.367 M. FOUNDATION: Glacial sand over clay.
TIME: Mean Greenwich, midnight to midnight.
INSTRUMENTS: Two Bosch-Omori 100 kg. horizontal pendulums (mechanical registration).

Table with columns: No., Date, Phase, Time (h. m. s.), Periods (s.), Amplitudes (mu.), Delta (Kms.), and REMARKS. Contains entries 807 through 822 with detailed seismic observations and corrections.

MIMEOGRAPHED Oct., 26, 1918

(For explanation of Symbols see other side)

EXPLANATION OF SYMBOLS

The symbols, with the exception of a few additional characters, are those adopted by the International Seismological Association after Wiechert of Göttingen.

| | |
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| Δ..... | Distance, from epicentre to station; deduced from records. |
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| kms. | Kilometers (1000 kms. = 621.38 English statute miles. 111.1 kms. = 1° on the equator). |
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HARVARD UNIVERSITY, CAMBRIDGE, MASS., U.S.A.

RECORD OF THE SEISMOGRAPHIC STATION

DEPARTMENT OF GEOLOGY AND GEOGRAPHY

$\phi = 42^{\circ} 22' 36''$ N. $\lambda = 71^{\circ} 06' 59''$ W. Gr. = 5.367 M. FOUNDATION: Glacial sand over clay.

TIME: Mean Greenwich, midnight to midnight.

INSTRUMENTS: Two Bosch-Omori 100 kg. horizontal pendulums (mechanical registration).

| No. | Date | Phase | Time | | | Periods | Amplitudes | Δ | REMARKS |
|-----|---------|-------------------|------|----|-----|---------|------------|----------|---|
| | | | h. | m. | s. | | | | |
| 823 | Aug. 15 | O? | 17 | 48 | 34 | | | 9850? | |
| | | S ₁ ? | 18 | 10 | 50 | 8 | | | |
| | | L ₁ | 18 | 50 | 18 | 26 | | | |
| | | L ₂ | 18 | 30 | .9? | | | | |
| | | L ₃ | 18 | 34 | 30 | 70 | | | |
| | | M ₁ ? | 18 | 39 | 57 | 24 | | | |
| | | L ₄ | 18 | 49 | | 20 | | | |
| | | F | 18 | 57 | | 15 | | | |
| | | | 19 | 52 | ca | | | | |
| 824 | Aug. 21 | O | 4 | 11 | 54 | | | 225 | Local shock near South Paris, Maine. (44°7'40"N. 70°32'18"W). Portland Daily Press Aug. 22d reports that doors flew open, bricks were loosened from chimneys, people dressed and rushed from houses. Eastern shore of Little Sabago Lake said to have risen about 4 inches; shock felt at Duck Pond and Bridgton. Other papers report loud rumbling heard at Mechanics Falls; earth tremors aroused scores of residents at Rumford, Norway and Mechanics Falls; at about 12.20 a.m. Tuesday August, 21, 1918. |
| | | P ₁ | 4 | 12 | 28 | | | | |
| | | M ₁ | 4 | 12 | 53 | | | | |
| | | C | 4 | 13 | 04 | 8 | | | |
| | | to | 4 | 13 | 45 | | | | |
| | | F | 4 | 14 | 08 | | | | |
| 825 | Aug. 23 | O | 6 | 48 | 47 | | | 10960 | N.B. Volcanoes "Llame" (Llaimas?) and Lanin in Andes reported in eruption to-day. Lanin in 71°30'W. 39°45'S. Round 9000 kms. |
| | | eP ₁ | 7 | 02 | ca | | | | |
| | | eS | 7 | 06 | 13 | | | | |
| | | S ₁ | 7 | 14 | 14 | 20 | | | |
| | | S ₂ | 7 | 14 | 59 | | | | |
| | | eL ₁ | 7 | 36 | 51 | 40 | | | |
| | | L ₁ | 7 | 42 | ca | 20 | | | |
| | | F | 7 | 48 | 54 | 15 | | | |
| | | | 8 | 50 | | | | | |
| 826 | Sept. 7 | O ₁ | 17 | 17 | 14 | | | 6500 | Special--subject to possible corrections. 8900 kms. (80°6' of arc) eP ₁ masked by micros. comes later 17-29-42 ca. S ₁ ROUND 17-40-22. record N unsatisfactory. Damped by magnet |
| | | iP ₁ | 17 | 29 | 22 | 7 | | | |
| | | S ₁ | 17 | 39 | 27 | 11 | | | |
| | | (M ₁) | 17 | 40 | 21 | 20 | | | |
| | | eL ₁ ? | 17 | 57 | | | | | |
| | | M ₁ | 18 | 04 | | 26 | 32,500 | | |
| | | M ₂ | 18 | 07 | 22 | 18 | 29,500 | | |
| | | M ₃ | 18 | 11 | ca | 16 | 35,750 | | |
| | | M ₄ | 18 | 12 | 36 | 14 | 65,000 | | |
| | | M ₅ | 18 | 15 | 27 | 15 | 49,750 | | |
| | | M ₆ | 18 | 21 | ca. | 16 | 40,000 | | |
| | | Lrep | 19 | 03 | 31 | 16-15 | 510 | | |
| | | to | 19 | 05 | 18 | | | | |
| | | Lrep? | 21 | 19 | 35 | 2-15 | | | |
| | | F ₁ | 22 | 05 | ca | | | | |

MINILOGRAPHED AUGUST 16, 1918.

(For explanation of Symbols see other side)

EXPLANATION OF SYMBOLS

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| PS | Alternating waves, and time of arrival (= PR ₁ S = SR ₁ P). |
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| M | Maximum of Long waves, and time of arrival. |
| M ¹ , M ² , M ³ , etc. | Successive maxima. |
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| AN | Amplitude of the N-S component of earth particle, deduced from the motion of the pendulum, usually L or M. |
| AE | The same for the E-W component of motion. |
| AZ | The same for the vertical component of motion. |
| γ | Gal, or unit acceleration, one centimetre per sec. per sec. |
| γû | Milligal, or 1/1000 gal. acceleration of 10 micra per sec. per sec. (Klotz). |
| φ | Latitude. |
| λ | Longitude from Greenwich. |
| h | Elevation above mean sea-level. |
| Δ | Distance, from epicentre to station; deduced from records. |
| ca | Approximately. |
| T | Period, complete time of oscillation; for simple pendulum; |
| | $2\pi \sqrt{\frac{l}{g}}$ |
| Tô | Period of undamped pendulum of seismograph. |
| Tê | Period of earth particle. |
| h, m, s | Time, Greenwich Mean Time, midnight to midnight. |
| M | Theoretical magnification of seismograph. |
| Mâ | Actual magnification, for damping ratio and periods of earth particle and undamped pendulum. |
| Vp, Vs, VL | Velocity of P, S, and L waves respectively. (Klotz.) |
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Sept. 8, 1918.

Se



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No. From to 191

HARVARD UNIVERSITY, CAMBRIDGE, MASS., U.S.A.

RECORD OF THE SEISMOGRAPHIC STATION
DEPARTMENT OF GEOLOGY AND GEOGRAPHY

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| No. | Date | Phase | Time | Periods | Amplitudes | Δ | REMARKS |
|-----|----------|--|---|--|------------|---------------|--|
| 827 | Sept. 8 | O? eN? SE eLE ML? CE F | 0 ^h 28 ^m 04 ^s 0 -- -- 0 46 06 0 56 32 1 01 50 1 07 14 1 20 ca. | s. 8 28 20 15 | μ . | Kms. 6485? | 58*25' ? N component had stopped |
| 828 | Sept. 8 | eLE LE F | 6 26 58 6 31 58 6 49 18 | 28-24 20 | | | N component not running between 0h and 14h 30m. |
| 829 | Sept. 11 | O eN? eLE LN? LE F | 4 postea 4 04 28 4 05 59? 4 06 57 4 07 01 4 14 ca | 4-5 12 | | | 1000 to 2000 kms. N undamped. E damped 1.5:1 |
| 830 | Sept. 14 | O? e? SE eLE L L L L F? | 17 05 ca. 17 39 24 17 39 24 17 51 32 17 54 42 17 58 52 18 04 52 18 09 46 18 25 ca. | 6 6 20-30 20 15 15 15 | | 10800? | N component not registering. Trouble with governor of driving clock. |
| 831 | Sept. 30 | O? e? SN SL eLN LE LE LE CE FE? | 13 20 44 13 44 58 13 44 59 14 05 18 14 08 20 14 08 59 14 14 09 14 16 23 14 41 ca. | 9 8 40 20 20 20 15 | | 10155? | e in microseisms. |
| 852 | Sept. 30 | O LE LE to LE to LE to LE FE | 18 postea 18 56 19 19 02 54 19 07 33 19 08 25 19 10 29 19 49 05 19 54 13 20 03 ca. 20 50 ca. | 24 20 15 20 20 15 | | | Δ very distant. N undamped record: L 19-30-40 M? 19-36-30.18s 19-38-00 15s 19 47 ca. 20s |
| 833 | Sept. 30 | O eLE LE LE F | 1 postea 1 39 15 1 41 39 1 44 41 2 03 ca. | 6 6 20 | | | Not identified on N. |

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From October 1, 1918 to October 13, 1918. 191

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|-----|---------|--------|------|----|-----|---------|------------|----------|---|
| | | | h. | m. | s. | | | | |
| 834 | Oct. 11 | O | 14 | 14 | 14 | | | 2690 | 24°10'. Destructive at west end of Puerto Rico, according to press reports from San Juan. Tidal wave at Aguadill and San Juan. (14-24-52; N stylus fell out) eLp not readily distinguished from S waves. As read W comes out 243.8 kms. per min (14-28-22; E stylus left the drum; worked on and off during MM. N stylus was put back by J.B.W. at 14-41-28). |
| | | PN | 14 | 19 | 41 | 4 | | | |
| | | ePE | 14 | 20 | 11 | 4 | | | |
| | | SE | 14 | 22 | 40 | 2 | | | |
| | | S | 14 | 24 | 01 | 10 | | | |
| | | SN | 14 | 24 | 07 | | | | |
| | | eLp? | 14 | 25 | 16 | 20 | | | |
| | | ME | 14 | 28 | 17 | | | | |
| | | ME | 14 | 29 | 52 | 12 | 41,500 | | |
| | | ML | 14 | 42 | | 12 | | | |
| | | ME | 14 | 46 | | 12 | | | |
| | | ML | 14 | 49 | | 12 | | | |
| | | ML | 14 | 52 | 37 | 12 | | | |
| | | ME | 14 | 53 | 47 | 12 | | | |
| | | ME | 14 | 54 | | 12 | | | |
| | | ME | 14 | 55 | | 12 | | | |
| | | ME | 14 | 56 | | 12 | | | |
| CN | 14 | 42 | ca | | | | | | |
| F? | 17 | postea | | | | | | | |
| 835 | Oct. 11 | O | 17 | 04 | 48 | | | 1900 | 17°6' |
| | | PN | 17 | 08 | 49 | | | | |
| | | PE | 17 | 09 | 49 | 4 | | | |
| | | SE | 17 | 12 | 11 | | | | |
| | | SE | 17 | 12 | 25 | 6 | | | |
| | | eLp | 17 | 13 | 39 | 8 | | | |
| | | eLp | 17 | 13 | 08 | 15 | | | |
| | | eLp | 17 | 14 | 49 | 18 | | | |
| | | ML | 17 | 16 | 10 | 15 | 11,000 | | |
| | | CN | 17 | 19 | 30 | | | | |
| CN | 17 | 26 | ca. | 12 | | | | | |
| F? | 18 | ca. | | | | | | | |
| 836 | Oct. 12 | O? | 0 | 14 | 23 | | | 3440? | 30°37' |
| | | PN | 0 | 20 | 59 | | | | |
| | | SE | 0 | 26 | 12 | 6 | | | |
| | | LN? | 0 | 30 | 11 | 12 | | | |
| | | LN? | 0 | 32 | 10 | 12 | | | |
| | | F? | 0 | 43 | ca. | | | | |
| 837 | Oct. 12 | LN | 1 | 46 | 21 | 10; 11 | | | |
| | | F | 1 | 48 | ca | | | | |
| 838 | Oct. 12 | O | 8 | 19 | 31 | | | 2640 | 23°45' |
| | | iPN | 8 | 24 | 53 | 3 | | | |
| | | ePE | 8 | 25 | 17 | 2 | | | |
| | | SN | 8 | 29 | 09 | 6 | | | |
| | | SL | 8 | 29 | 39 | 6 | | | |
| | | eLp | 8 | 31 | 00 | 20 | | | |
| | | LN | 8 | 32 | 16 | 15 | | | |
| | | LN | 8 | 35 | 31 | 13; 14 | | | |
| FNE | 8 | 52 | | | | | | | |

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|-----|---------|--|------|---------|-----------------|---------|------------|---|---------|
| | | | h. | m. | s. | | | | |
| 839 | Oct. 13 | O LN FN | 22 | postea | | 8 | | | |
| | | | 22 | 26 | | | | | |
| | | | 22 | 27 | | | | | |
| 840 | Oct. 14 | O ePN eP SE SN eLN eLE ME MN FE | 0 | 25 13.7 | | | 2150 | 19°21' | |
| | | | 0 | 29 43 | | | | | |
| | | | 0 | 29 56 | | | | | |
| | | | 0 | 33 19 | 6 | | | | |
| | | | 0 | 33 54 | 10 | | | | |
| | | | 0 | 35 50 | 25 | | | | |
| | | | 0 | 36 58 | 20 | | | | |
| | | | 0 | 40 47 | 12 | | | | |
| | | | 0 | 40 49 | 13 | 7,000 | | E damped 1.5/1 by magnet. Trace amplitude; undamped. | |
| | | | 1 | 20 | | | | | |
| 841 | Oct. 14 | O LN F | 2 | postea | | 10 | | | |
| | | | 2 | 30 37 | | | | | |
| | | | 2 | 32 18 | | | | | |
| 842 | Oct. 18 | O SN SE eLE eLN LE LN F | 21 | 50 13 | | | 3235 | 29°19' | |
| | | | 21 | 41 30 | 6 $\frac{1}{2}$ | | | P lost in microseisms. | |
| | | | 21 | 41 51 | 7 | | | | |
| | | | 21 | 44 22 | 25 | | | | |
| | | | 21 | 44 44 | | | | | |
| | | | 21 | 46 22 | 15 | | | | |
| | | | 21 | 52 42 | 12 | | | | |
| | | | 22 | 08 | | | | | |
| 843 | Oct. 19 | LE L F | 2 | 18 31 | 18 | | | | |
| | | | 2 | 21 19 | 30 | | | | |
| | | | 2 | 35 41 | | | | | |
| 844 | Oct. 19 | O? PN PE SN? SE? eLE eLN MN ME FE | 3 | 22 07 | | | 3870? | Δ from eLE-PN. | |
| | | | 3 | 29 16 | | | | | |
| | | | 3 | 30 20 | | | | | |
| | | | 3 | 34 24 | | | | | |
| | | | 3 | 35 10 | 11 | | | | |
| | | | 3 | 39 03 | 40 | | | | |
| | | | 3 | 39 07 | 34 | | | | |
| | | | 3 | 44 30? | | 27,500 | | | |
| | | | 3 | 44 34 | | 1,900 | | | |
| | | | 4 | 33 ca. | | | | Trace A. undamped. Trace A, damped 1 $\frac{1}{2}$ /1 by magnet operating automatic 6" gong during maximum motion. | |

MIMEOGRAPHED OCT. 9, 1918.

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| SR ₁ | “ “ once reflected, and time of arrival. |
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| PS | Alternating waves, and time of arrival (= PR ₁ S = SR ₁ P). |
| L | Long or surface or Rayleigh waves, and time of arrival. |
| M | Maximum of Long waves, and time of arrival. |
| M ¹ , M ² , M ³ , etc. | Successive maxima. |
| Lrep ₁ | Long waves reaching the station from the antipodes of the epicentre (antipodocentre); path 40,000 kms. - Δ. |
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| F | Finis, end of record on seismogram. |
| n | Superposed phase of another earthquake; e.g., Pn. |
| e | (emersiō), emergence of a phase not well defined; e.g., eP, eL. |
| i | (impetus), a sharply defined impulse; e.g., iP, iS. |
| AN | Amplitude of the N-S component of earth particle, deduced from the motion of the pendulum, usually L or M. |
| AE | The same for the E-W component of motion. |
| AZ | The same for the vertical component of motion. |
| γ | Gal, or unit acceleration, one centimetre per sec. per sec. |
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| φ | Latitude. |
| λ | Longitude from Greenwich. |
| h | Elevation above mean sea-level. |
| Δ | Distance, from epicentre to station; deduced from records. |
| ca | Approximately. |
| T | Period, complete time of oscillation; for simple pendulum; |
| | $2\pi \sqrt{\frac{l}{g}}$ |
| Tô | Period of undamped pendulum of seismograph. |
| Tê | Period of earth particle. |
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The following notation proposed by Wiechert is employed in many publications. The characters are implied by Δ and A.

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No. From Oct. 25, 1918. to 191

HARVARD UNIVERSITY, CAMBRIDGE, MASS., U.S.A.

RECORD OF THE SEISMOGRAPHIC STATION
DEPARTMENT OF GEOLOGY AND GEOGRAPHY

$\phi = 42^\circ 22' 36''$ N. $\lambda = 71^\circ 06' 59''$ W. Gr. = 5.367 M. FOUNDATION: Glacial sand over clay.

TIME: Mean Greenwich, midnight to midnight.

INSTRUMENTS: Two Bosch-Omori 100 kg. horizontal pendulums (mechanical registration).

| No. | Date | Phase | Time | Periods | Amplitudes | Δ | REMARKS |
|------------|----------|-------|-----------|---------|------------|----------|---|
| 845 | Oct. 25 | O | 3 42 59 | s. | " | 26.30 | Similar to Record Oct. 11, 1918. 0:14h 14m 14s. A decreases to next N. Undamped trace A. Trace A damped $1\frac{1}{2}/1$ |
| | | PE | 3 48 20 | 3 | | | |
| | | iPN | 3 48 47 | 4 | | | |
| | | en | 3 49 43 | 2-4 | | | |
| | | SE | 3 52 35 | 7 | | | |
| | | SN | 3 53 09 | 6 | | | |
| | | en? | 3 53 17 | 12 | | | |
| | | LE | 3 53 44 | 20 | | | |
| | | eLE | 3 55 31 | | | 4,250 | |
| | | MN | 3 57 05 | | | | |
| | | LE | 3 57 14 | 24 | | | |
| | | LE | 4 01 36 | 12 | | 500 | |
| | | MN | 4 04 27 | | | | |
| | | CN | 4 05 01 | | | | |
| FE | 4 52 ca. | | | | | | |
| 846 | Oct. 27 | O? | 15 33 ca. | | | 12,250? | $110^\circ 15'$ P ₂ not certainly identified among small micro E damped $1\frac{1}{2}/1$. N gave a less definite record. F apparently in next. |
| | | SE? | 16 00 00 | 8 | | | |
| | | en | 16 04 19 | 6 | | | |
| | | eL | 16 13 19 | 6 | | | |
| | | eLE? | 16 26 09 | | | | |
| | | LE | 16 28 30 | 30 | | | |
| | | LE | 16 30 21 | 32 | | | |
| | | LE | 16 35 03 | 20 | | | |
| | | LE | 16 39 53 | 18 | | | |
| | | to | 16 48 05 | | | | |
| | | LE | 16 58 49 | 15 | | | |
| to | 17 02 30 | | | | | | |
| 847 848 | Oct. 27 | O | 17 postea | | | | Probably two earthquakes Sinusoidal waves set in. 1 wave. N undamped less definite See attempted diagnosis below. |
| | | en | 17 22 53 | | | | |
| | | eL | 17 27 23 | 4 | | | |
| | | SE | 17 28 15 | 6 | | | |
| | | eLE | 17 31 51 | 15-8 | | | |
| | | LE | 17 33 35 | 8 | | | |
| | | LE | 17 42 05 | 18 | | | |
| | | LE | 17 42 23 | 8 | | | |
| | | LE | 18 11 16 | 26 | | | |
| | | LE | 18 28 33 | 20 | | | |
| | | LE | 18 34 25 | 16 | | | |
| | | LE | 18 44 47 | 15 | | | |
| | | LE | 18 53 32 | 15 | | | |
| | | LE | 19 01 17 | 12 | | | |
| LE | 19 17 05 | 20 | | | | | |
| F? | 19 50 15 | | | | | | |
| 847 | Oct. 27 | O | 17 12 16 | | | 3600 | $32^\circ 24'$ Δ from L-S F in next. |
| | | ePE | 17 22 27 | | | | |
| | | SE | 17 28 15 | 6 | | | |
| | | eLE | 17 31 51 | 15-8 | | | |
| | | LE | 17 33 35 | 8 | | | |
| | | to | 17 42 05 | 18 | | | |
| | | LE | 17 42 23 | 8 | | | |
| to | 17 48 15 | | | | | | |

EXPLANATION OF SYMBOLS

The symbols, with the exception of a few additional characters, are those adopted by the International Seismological Association after Wiechert of Göttingen.

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| AE..... | The same for the E-W component of motion. |
| AZ..... | The same for the vertical component of motion. |
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| γû..... | Milligal, or 1/1000 gal. acceleration of 10 micra per sec. per sec. (Klotz). |
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| λ..... | Longitude from Greenwich. |
| h..... | Elevation above mean sea-level. |
| Δ..... | Distance, from epicentre to station; deduced from records. |
| ca..... | Approximately. |
| T..... | Period, complete time of oscillation; for simple pendulum; |
| | $2\pi \sqrt{\frac{l}{g}}$ |
| Tô..... | Period of undamped pendulum of seismograph. |
| Tê..... | Period of earth particle. |
| h, m, s..... | Time, Greenwich Mean Time, midnight to midnight. |
| M..... | Theoretical magnification of seismograph. |
| Mâ..... | Actual magnification, for damping ratio and periods of earth particle and undamped pendulum. |
| VP, Vs, VL..... | Velocity of P, S, and L waves respectively. (Klotz.) |
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| kms. | Kilometers (1000 kms. = 621.38 English statute miles. 111.1 kms. = 1° on the equator). |
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No. From Oct. 27, 1918. to Oct. 31, 1918. 191

HARVARD UNIVERSITY, CAMBRIDGE, MASS., U.S.A.

RECORD OF THE SEISMOGRAPHIC STATION DEPARTMENT OF GEOLOGY AND GEOGRAPHY

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 TIME: Mean Greenwich, midnight to midnight.
 INSTRUMENTS: Two Bosch-Omori 100 kg. horizontal pendulums (mechanical registration).

| No. | Date | Phase | Time | | | Periods | Amplitudes | Δ | REMARKS | |
|-----|---------|-------|------|--------|-----|---------|------------|----------|---|-------------------------|
| | | | h. | m. | s. | | | | | s. |
| 848 | Oct. 27 | O | 17 | 22 | 36 | | | 11100 | 99°54' | |
| | | S | 17 | 48 | 15 | | | | | |
| | | eLN | 17 | 11 | 16 | 26 | | | | N record less definite. |
| | | L | 18 | 28 | 33 | 20 | | | | |
| | | L | 18 | 34 | 25 | 16 | | | | |
| | | L | 18 | 39 | 55 | 20 | | | | |
| | | L | 18 | 44 | 47 | 15 | | | | |
| | | L | 18 | 53 | 32 | 15 | | | | |
| | | L | 19 | 01 | 17 | 12 | | | | |
| | | L | 19 | 17 | 05 | 20 | | | | |
| L | 19 | 50 | 15 | | | | | | | |
| 849 | Oct. 30 | O | 12 | postea | | | | | P and S lost in microe. seisms of 6 secs. period. Round Δ 7000? eN 12 37 54;8s eN 12 42 31;12s | |
| | | eLN | 12 | 43 | 28 | 28 | | | | |
| | | eLN | 12 | 44 | 15 | 24 | | | | |
| | | LN | 12 | 44 | 39 | 18 | | | | |
| | | L | 12 | 45 | 20 | 16 | | | | |
| | | FE | 13 | 05 | ca. | | | | | |

MIMEOGRAPHED OCT. 11, 1918.

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No. From to 191
NOVEMBER 1, 1918. NOVEMBER 7, 1918.

HARVARD UNIVERSITY, CAMBRIDGE, MASS., U.S.A.

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| No. | Date | Phase | Time | | | Periods | Amplitudes | | Δ | REMARKS |
|-----|--------|-------|------|----|-------|---------|------------|---------|---|---------|
| | | | h. | m. | s. | | s. | μ . | | |
| 850 | Nov. 3 | O? | 11 | 47 | 36 | | | | 8540? Δ and O very doubtful. S. Kamtschatka? NEW VERY small. Not recognized on N undamped. | |
| | | SL? | 12 | 09 | 12 | 6 | | | | |
| | | eLE? | 12 | 25 | 03 | 28 | | | | |
| | | L | 12 | 30 | 06 | 20 | | | | |
| | | L | 12 | 40 | 41 | 20 | | | | |
| | | L | 12 | 44 | 51 | 15 | | | | |
| | | L | 13 | 00 | 06 | 15 | | | | |
| | | F | 13 | 02 | 24 | | | | | |
| 850 | Nov. 3 | O | 11 | 48 | 36 | | | | 7950 Second reading. $71^{\circ} 55'$ Press reports earthquake felt in Hawaiian Islands at "11h 33m p.m." and outbreak of Kilauea | |
| | | SL | 12 | 09 | 12 | 6 | | | | |
| | | eLE | 12 | 23 | 28 | 28 | | | | |
| | | L | 12 | 30 | 06 | 20 | | | | |
| | | L | 12 | 40 | 41 | 20 | | | | |
| | | L | 12 | 44 | 51 | 15 | | | | |
| | | L | 13 | 00 | 06 | 15 | | | | |
| | | F | 13 | 02 | 24 | | | | | |
| 851 | Nov. 4 | L? | 18 | 34 | 51 | 15-12 | | | Among microseisms of 8 secs. period and not assuredly seismic. | |
| | | F? | 18 | 36 | 45 | | | | | |
| 852 | Nov. 5 | O? | 22 | 30 | 05 | | | | 6580 $59^{\circ} 22'$ of arc. LE 23 00 04; 18-16 to 23 05 46 N undamped. | |
| | | SN? | 22 | 46 | 27 | 10 | | | | |
| | | eLN? | 22 | 58 | 57 | 38 | | | | |
| | | LN | 23 | 00 | 00 | 20 | | | | |
| | | MN | 23 | 02 | 06 | 20 | | | | |
| | | CN? | 23 | 04 | 16 | 15 | | | | |
| | | FN? | 23 | 16 | ca. | | | | | |
| 853 | Nov. 8 | O | 4 | 38 | 21 | | | | 8750 $78^{\circ} 45'$ of arc. Short waves superposed. do do A 235 A 515 A 1000 | |
| | | PN | 4 | 50 | 21 | 2 | | | | |
| | | PE | 4 | 51 | 08 | | | | | |
| | | SE | 5 | 00 | 19 | 6 | | | | |
| | | SN | 5 | 00 | 48 | 10 | | | | |
| | | iLN | 5 | 01 | 41 | | | | | |
| | | eLN | 5 | 02 | 50 | 13 | | | | |
| | | eLN | 5 | 03 | 19 | | | | | |
| | | eLN | 5 | 16 | 01 | 44 | | | | |
| | | LE | 5 | 17 | 15 | 35 | Trace | | | |
| | | M | 5 | 18 | 56 | 21 | 8000 | | | |
| | | M | 5 | 25 | 19 | 22 | 7000 | | | |
| | | M | 5 | 27 | 35 | 23 | 11500 | | | |
| | | M | 5 | 31 | 25 | 21 | 17500 | | | |
| | | M | 5 | 34 | 35 | | 12500 | | | |
| M | 5 | 36 | 49 | 20 | 9750 | | | | | |
| M | 5 | 37 | 43 | 17 | 18750 | | | | | |
| CE | 5 | 38 | 25 | 14 | | | | | | |
| FE | 7 | 22 | ca. | | | | | | | |

MIMMOGRAPHED NOV. 25, 1918.

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No.

From November 11, 1918 to

191

HARVARD UNIVERSITY, CAMBRIDGE, MASS., U.S.A.

RECORD OF THE SEISMOGRAPHIC STATION

DEPARTMENT OF GEOLOGY AND GEOGRAPHY

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|-------|--------|-------------------|------|----|-----|---------|------------|----------|--|
| | | | h. | m. | s. | | | | |
| 841 a | Oct 14 | O | 12 | 02 | 41 | | | 10320 | 92°59' by S _E -P _E |
| | | O | 12 | 02 | 48 | | | 10240 | 92°20' by L _N -S _E |
| | | eP _E | 12 | 15 | 59 | | | | |
| | | eN | 12 | 25 | 42 | | | | |
| | | S _E | 12 | 27 | 11 | 6 | | | |
| | | SN | 12 | 28 | 32 | | | | |
| | | eL | 12 | 41 | 11 | | | | |
| | | eN | 12 | 42 | 24 | | | | |
| | | en? | 12 | 47 | 05 | 6 | | | |
| | | eLN | 12 | 50 | 44 | 30 | | | |
| | | eL _E | 12 | 54 | 30 | 40 | | | |
| | | L _E | 12 | 56 | | 35 | | | |
| | | ME | 13 | 02 | | 20 | | | 600 micra trace |
| | | L _E | 13 | 04 | 06 | 32 | | | |
| | | L _E | 13 | 08 | | | | | |
| | | F _E ? | 13 | 27 | ca | | | | F lost in tangled lines. |
| | | Lr _E | 14 | 15 | 48 | 16 | | | |
| 14 | 28 | | 41 | 20 | | | | | |
| F | 14 | | 28 | 45 | | | | | |
| 854 | Nov 12 | ON | 21 | 44 | 24 | | | 2680 | 23°56' of arc. |
| | | iPN | 21 | 49 | 40 | 4 | | | N undamped. |
| | | iPr ₁ | 21 | 49 | 52 | | | | E damped by magnet |
| | | ePr ₁ | 21 | 50 | 09 | 2 | | | N starts before E. |
| | | SN | 21 | 53 | 59 | 14 | | | |
| | | SE? | 21 | 54 | 09 | 6 | | | Micros. partly mask |
| | | eLN | 21 | 55 | 45 | 22 | | | certain phases. |
| | | (then) | | | | 30 | | | Cf. Record Oct. 11, 1918 |
| | | eL _E | 21 | 55 | 33 | 24 | | | Δ 2690; 0:14h 14m 14s. |
| | | ML | 21 | 57 | 57 | 16 | 1500 | | |
| | | ME | 21 | 59 | 43 | 16 | 1250 | | |
| | | CN | 22 | 00 | 30 | | | | |
| FN | 22 | 43 | | | | | | | |
| FN | 22 | 56 | | | | | | | |
| 855 | Nov 18 | O | (18 | 41 | 55) | | | (16000) | O from Riverview, |
| | | iP _E | 18 | 59 | 35 | | | | Sidney, N.S.W. Δ 3470 |
| | | ePN | 19 | 00 | 46 | | | | kms., giving epicentre |
| | | PRx _E | 19 | 01 | 18 | 10 | 1000 | | Lat. 10°S., Long. |
| | | PRx _N | 19 | 01 | 30 | | 11000 | | 130°E.; reported as |
| | | PR ₁ N | 19 | 04 | 25 | 12 | 15000 | | felt at Port Darwin. |
| | | PR ₁ E | 19 | 05 | 01 | 8 | 13500 | | Information supplied |
| | | iSN | 19 | 13 | 18 | 9 | | | by E.F. Pigot, S.J. — |
| | | SR ₁ | 19 | 25 | 05 | 14 | | | Harvard Δ by 8 inch |
| | | SR ₂ | 19 | 29 | 16 | | 5750 | | globe. — Phases due by |
| | | iN | 19 | 32 | 56 | | 7300 | | current tables: |
| | | iN | 19 | 40 | 36 | 18 | 9000 | | Kl..Klotx..Sh..Shide. |
| | | eL _E | 19 | 51 | 06 | | | | P 18h 59m 30s...Sh. |
| | | MN | 19 | 54 | 05 | | | | S 19h 13m 00s...Sh. |
| | | MN | 19 | 57 | 22 | | 5700 | | eL 19h 51m 00s...Kl. |
| | | MN | 20 | 06 | 04 | | | | 230kms. |
| | | MN | 20 | 13 | 46 | | | | eL 19h 53m 05s...Kl. |
| MN | 20 | 15 | 36 | | | | 228kms. | | |

EXPLANATION OF SYMBOLS

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| L..... | Long or surface or Rayleigh waves, and time of arrival. |
| M..... | Maximum of Long waves, and time of arrival. |
| M ¹ , M ² , M ³ , etc. . . . | Successive maxima. |
| Lrep ₁ | Long waves reaching the station from the antipodes of the epicentre (antipodocentre); path 40,000 kms. - Δ. |
| Lrep ₂ | Long waves again reaching station from the epicentre; path 40,000 kms. + Δ. |
| C..... | Cauda, end of Long waves, and beginning of trailers or tail. |
| F..... | Finis, end of record on seismogram. |
| n..... | Superposed phase of another earthquake; e.g., Pn. |
| e..... | (emergensio), emergence of a phase not well defined; e.g., eP, eL. |
| i..... | (impetus), a sharply defined impulse; e.g., iP, iS. |
| AN..... | Amplitude of the N-S component of earth particle, deduced from the motion of the pendulum, usually L or M. |
| AE..... | The same for the E-W component of motion. |
| Az..... | The same for the vertical component of motion. |
| γ..... | Gal, or unit acceleration, one centimetre per sec. per sec. |
| γû..... | Milligal, or 1/1000 gal. acceleration of 10 micra per sec. per sec. (Klotz). |
| φ..... | Latitude. |
| λ..... | Longitude from Greenwich. |
| h..... | Elevation above mean sea-level. |
| Δ..... | Distance, from epicentre to station; deduced from records. |
| ca..... | Approximately. |
| T..... | Period, complete time of oscillation; for simple pendulum; |
| | $2\pi\sqrt{\frac{l}{g}}$ |
| Tô..... | Period of undamped pendulum of seismograph. |
| Tê..... | Period of earth particle. |
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The following notation proposed by Wiechert is employed in many publications. The characters are implied by Δ and A.

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Measurements in the Metric System.

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| kms. | Kilometers (1000 kms. = 621.38 English statute miles. 111.1 kms. = 1° on the equator). |
| M or m..... | meter (s). (1 m. = 39.37079 inches.) |
| mm. | Millimeters (1 mm. = 0.03937 in.). |
| μ..... | Micron, 1/1000th of a millimeter = 0.00003937 in. |

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| Δ | Distance, from epicentre to station; deduced from records. |
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| T | Period, complete time of oscillation; for simple pendulum; |
| | $2\pi \sqrt{\frac{l}{g}}$ |
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| T _e | Period of earth particle. |
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BIBLIOGRAPHY

KLOTZ, OTTO: Seismological Tables. Publications of the Dominion Observatory, Ottawa. Vol. iii, No. 2, pp. 19-61. 1916.

No.

From December 6, 1918. to December 14, 1918

191

HARVARD UNIVERSITY, CAMBRIDGE, MASS., U.S.A.

RECORD OF THE SEISMOGRAPHIC STATION

DEPARTMENT OF GEOLOGY AND GEOGRAPHY

$\phi = 42^{\circ} 22' 36''$ N. $\lambda = 71^{\circ} 06' 59''$ W. Gr. = 5.367 M. FOUNDATION: Glacial sand over clay.

TIME: Mean Greenwich, midnight to midnight.

INSTRUMENTS: Two Bosch-Omori 100 kg. horizontal pendulums (mechanical registration).

| No. | Date | Phase | Time | | | Periods | Amplitudes | Δ | REMARKS |
|------|-------|-------|------|--------|-----|---------|------------|---|---|
| | | | h. | m. | s. | | | | |
| 863 | Dec 6 | O | 8 | 40 | 54 | | | 3930 | 35°22' |
| | | iPE | 8 | 48 | 07 | | | | |
| | | SE | 8 | 53 | 50 | | | | |
| | | eLN | 8 | 59 | 44 | 44 | | | |
| | | eLE | 9 | 01 | 17 | 40 | | | |
| | | LE | 9 | 02 | 04 | 15 | 19000 | | |
| | | ME | 9 | 03 | | | | | |
| | | ML | 9 | 06 | 28 | | 13700 | | |
| | | FE | 9 | 54 | ca. | | | | |
| 865 | Dec 9 | O | 18 | postea | | | | | e lost in heavy micros. Clock pendulum out of order and times somewhat uncertain. |
| | | e? | 18 | 21 | ca. | | | | |
| | | eLN | 18 | 34 | 05 | 40 | | | |
| | | LE | 18 | 40 | 05 | 15 | | | |
| | | MH | 18 | 44 | 08 | 19 | | | |
| | | MH | 18 | 45 | 05 | | | | |
| | | F. | | | | | | | |
| 866 | Dec 9 | eN? | 19 | 20 | 28 | | | | On next record. e confused with earlier quake and micros. Trace A ad F in heavy micros. |
| | | eLN | 19 | 23 | 58 | 40 | | | |
| | | LE | 19 | 25 | 04 | 12 | | | |
| | | ME | 19 | 31 | 21 | 16 | 800 | | |
| | | LE | 19 | 34 | 37 | 16 | 1000 | | |
| | | MH | 19 | 34 | 53 | | | | |
| | | F? | 21 | 43 | ca. | | | | |
| 864 | Dec 6 | O | 12 | postea | | | | Δ 2000 to 3000 kms. e and F in micros. | |
| | | eN | 12 | 18 | 43 | | | | |
| | | eE | 12 | 22 | 14 | | | | |
| | | eLN | 12 | 22 | 16 | 40 | | | |
| | | LE | 12 | 23 | 51 | 4 and 6 | | | |
| | | ME | 12 | 24 | 13 | | | | |
| | | F? | 12 | 38 | ca. | | | | |
| H.B. | Dec12 | O? | 3 | 30 | ca. | | | Slight shock with rumbling noise reported at time given in Bangor, Maine.--Not registered at this station. Clock pendulum out of order and times approximate. | |
| 867 | Dec14 | O | 19 | circa | | | | | |
| | | eLE? | 19 | 40 | ca. | 16 | | | |
| | | L | 19 | 41.5 | | 20 | | | |
| | | to | 19 | 50 | ca. | | | | |

MILIOGRAPHED January 25, 1919.

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| ca..... | Approximately. |
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BIBLIOGRAPHY

KLOTZ, OTTO: Seismological Tables. Publications of the Dominion Observatory, Ottawa. Vol. iii, No. 2, pp. 19-61. 1916.

No.

From December 2, 1918. to December 4, 1918.

191

HARVARD UNIVERSITY, CAMBRIDGE, MASS., U.S.A.

RECORD OF THE SEISMOGRAPHIC STATION

DEPARTMENT OF GEOLOGY AND GEOGRAPHY

 $\phi = 42^{\circ} 22' 36''$ N. $\lambda = 71^{\circ} 06' 59''$ W. Gr. = 5.367 M. FOUNDATION: Glacial sand over clay.

TIME: Mean Greenwich, midnight to midnight.

INSTRUMENTS: Two Bosch-Omori 100 kg. horizontal pendulums (mechanical registration).

| No. | Date | Phase | Time | | | Periods | Amplitudes | Δ | REMARKS |
|-----|---|---------|------|-------|-------|---------|------------|---------------|--|
| | | | h. | m. | s. | | | | |
| 860 | Dec 2 | O | 9 | 47 | 48 | | | 4220 Δ | and O by $S_E^+P_E$. N gives different times by PN uncertain. |
| | | $P_E^?$ | 9 | 55 | 21 | | | | |
| | | $P_N^?$ | 9 | 55 | 24 | | | | |
| | | $S_N^?$ | 10 | 00 | 56 | 22 | | | |
| | | S_E | 10 | 01 | 21 | | | | |
| | | eL_E | 10 | 04 | 22 | 16 | | | |
| | | P_E | 11 | 30 | | | | | |
| 861 | Dec 4 | ON | 11 | 47 | 37 | | | 7550 | 67°57' |
| | | OL | 11 | 47 | 50 | | | 7650 | 68°45' |
| | | PN | 11 | 58 | 35 | | | | |
| | | P_E^+ | 11 | 58 | 53 | | | | |
| | | S_N^+ | 12 | 07 | 32 | 19 | | | |
| | | S_E | 12 | 07 | 55 | 14 | | | |
| | | eLN | 12 | 22 | 33 | 44 | | | |
| | | MI | 12 | 24 | 58 | 25 | | | |
| | | MI | 12 | 27 | 40 | 18 | 3500 | | |
| | | ME | 12 | 28 | 46 | 19 | 3500 | | Trace amplitudes |
| | | ME | 12 | 30 | 49 | 18 | 4375 | | |
| | | to | 12 | 34 | ca. | | | | |
| | | MI | 12 | 31 | 05 | 20 | | | |
| | | MI | 12 | 33 | 23 | 20 | a. | | a. Undamped, 40mm. trace. |
| | | MI | 12 | 35 | 51 | 20 | | | |
| | | ME | 12 | 36 | 02 | 18 | 5000 | | |
| | | MI | 12 | 37 | 24 | 20 | b. | | b. Undamped, 41mm. |
| | | CE | 12 | 40 | ca. | | | | |
| | | CN | 12 | 46 | ca. | | | | |
| | | | | ••••• | ••••• | ••••• | ••••• | ••••• | ••••• |
| | | CL | 14 | 25 | 22 | 16 | | | E removed 13h 06m |
| | | | 14 | 27 | 31 | 24 | | | replaced 14h 24m. |
| | | | 14 | 38 | 41 | 20 | | | N removed 13h 27m |
| | | | 14 | 43 | 16 | | | | replaced 14h 07m. |
| | | | 15 | 11 | ca. | 22 | | | |
| | | $F_N^?$ | 15 | 52 | | | | | F masked by micros. |
| *** | Severe earthquake reported in northern Chile. Despatches from Santiago state it was most severely felt between Taltal and Copiapo. Ten persons killed and 100 injured. 400 houses destroyed in Copiapo. Three tidal waves at Chanaral on coast south of Antofagasta destroyed a large part of the place. Tidal wave destroyed harbor works at Caldero. Vallenar inland said to have been damaged. Taltal $24^{\circ}24'45''$ S.; $70^{\circ}38'15''$ W.; Caldero $27^{\circ}03'25''$ S.; $70^{\circ}52'40''$ W.; (Captain Fitzroy; Appendix, Voyage of Adventure and Beagle). For map of Taltal, 19107, see Eduard Poirier: Chileen 1910. Santiago, plate opp. page 390, contour interval 2 meters. | | | | | | | | |
| | Vallenar $28^{\circ}40'$ S (F. Solano Asta-Buruaga: Diccionario Jeografico de la Republica de Chile. Nueva York. p. 407). | | | | | | | | |
| 862 | Dec 4 | LN | 18 | 16 | 04 | 20 | | | Not shown among micro-seisms by E; possibly non-seismic. |
| | | LN | 18 | 19 | 10. | 20 | | | |
| | | to | 18 | 23 | ca. | | | | |

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No. From December 21, 1918 to December 31, 1918. 191

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DEPARTMENT OF GEOLOGY AND GEOGRAPHY

$\phi = 42^{\circ} 22' 36''$ N. $\lambda = 71^{\circ} 06' 59''$ W. Gr. = 5.367 M. FOUNDATION: Glacial sand over clay.
TIME: Mean Greenwich, midnight to midnight.
INSTRUMENTS: Two Bosch-Omori 100 kg. horizontal pendulums (mechanical registration).

| No. | Date | Phase | Time | | | Periods s. | Amplitudes μ . | Δ Kms. | REMARKS |
|-----|--------|-------|------------------|------|------|---------------|-----------------------|--|--|
| | | | h. | m. | s. | | | | |
| 868 | Dec 21 | O? | 9 | 21 | 12 | | | 4170? | Δ and O from L-S? Pendulum steps north. Pendulum steps north. But microseisms of 6s period were running at the time. One wave; Δ slight. |
| | | in | 9 | 32 | 41 | | | | |
| | | eN | 9 | 33 | 22 | 2 | | | |
| | | in | 9 | 33 | 28 | | | | |
| | | SN? | 9 | 34 | 39 | 6 | | | |
| | | eL | 9 | 36 | 57 | 6 | | | |
| | | eLN | 9 | 34 | 39 | 13 | | | |
| | | eE | 9 | 40 | 46 | 6 | | | |
| | | eN | 9 | 42 | 34 | 6 | | | |
| | | EE | 9 | 42 | 53 | 8 | | | |
| | | LN | 9 | 43 | 15 | 10 | | | |
| LN | 9 | 47 | 48 | 10 | | | | | |
| F | 9 | 55 | ca. | | | | | | |
| *** | Dec 25 | O | 6 | 14 | 15ca | | 27 | Powder Mill Explosion Maynard, Mass. E damped $1\frac{1}{2}$ /1. N O/O. Loud noise heard; shook house near Station | |
| P | 6 | 14 | 19 | | | | | | |
| PE | 6 | 14 | 19 $\frac{1}{2}$ | | | | | | |
| ME | 6 | 14 | 21 $\frac{1}{2}$ | 0.41 | 500 | | | | |
| ML | 6 | 14 | 22 | | | | | | |
| CE | 6 | 14 | 28 | | | | | | |
| FE | 6 | 14 | 33 | | | | | | |
| FH | 6 | 14 | 41 | | | | | | |

MINI-OGRAPHED January 25, 1919.

J. B. Woodworth

EXPLANATION OF SYMBOLS

The symbols, with the exception of a few additional characters, are those adopted by the International Seismological Association after Wiechert of Göttingen.

| | |
|---|--|
| O..... | Time of earthquake at epicentre (or centre). (Seismol. Soc. Amer.). |
| P..... | Longitudinal waves, and their time of arrival at the station. |
| PR ₁ | “ “ once reflected, and time of arrival at station. |
| PR ₂ | “ “ twice reflected, and time of arrival at station. |
| S..... | Transverse waves, and time of arrival. |
| SR ₁ | “ “ once reflected, and time of arrival. |
| SR ₂ | “ “ twice reflected, and time of arrival. |
| PS..... | Alternating waves, and time of arrival (= PR ₁ S = SR ₁ P). |
| L..... | Long or surface or Rayleigh waves, and time of arrival. |
| M..... | Maximum of Long waves, and time of arrival. |
| M ¹ , M ² , M ³ , etc. . . | Successive maxima. |
| Lrep ₁ | Long waves reaching the station from the antipodes of the epicentre (antipode); path 40,000 kms. - Δ. |
| Lrep ₂ | Long waves again reaching station from the epicentre; path 40,000 kms. + Δ. |
| C..... | Cauda, end of Long waves, and beginning of trailers or tail. |
| F..... | Finis, end of record on seismogram. |
| n..... | Superposed phase of another earthquake; <i>e.g.</i> , Pn. |
| e..... | (emersio), emergence of a phase not well defined; <i>e.g.</i> , eP, eL. |
| i..... | (impetus), a sharply defined impulse; <i>e.g.</i> , iP, iS. |
| AN..... | Amplitude of the N-S component of earth particle, deduced from the motion of the pendulum, usually L or M. |
| AE..... | The same for the E-W component of motion. |
| Az..... | The same for the vertical component of motion. |
| γ..... | Gal, or unit acceleration, one centimetre per sec. per sec. |
| γû..... | Milligal, or 1/1000 gal. acceleration of 10 micra per sec. per sec. (Klotz). |
| φ..... | Latitude. |
| λ..... | Longitude from Greenwich. |
| h..... | Elevation above mean sea-level. |
| Δ..... | Distance, from epicentre to station; deduced from records. |
| ca..... | Approximately. |
| T..... | Period, complete time of oscillation; for simple pendulum; |
| | $2\pi \sqrt{\frac{l}{g}}$ |
| Tô..... | Period of undamped pendulum of seismograph. |
| Tê..... | Period of earth particle. |
| h, m, s. | Time, Greenwich Mean Time, midnight to midnight. |
| M..... | Theoretical magnification of seismograph. |
| Mâ..... | Actual magnification, for damping ratio and periods of earth particle and undamped pendulum. |
| V _P , V _S , V _L | Velocity of P, S, and L waves respectively. (Klotz.) |
| *..... | (large star) Epicentre. (After A. Siebert.) |

The following notation proposed by Wiechert is employed in many publications. The characters are implied by Δ and A.

I, Notable; II, striking; III, strong; referring to the intensity of earthquakes.

| | |
|--------|---|
| d..... | (domesticus), a local shock; <i>e.g.</i> , Id. |
| v..... | (vicinus), a nearby earthquake, under 1000 kms. distant; <i>e.g.</i> , IIv. |
| r..... | (remotus), a distant earthquake, from 1000 to 5000 kms. |
| u..... | (ultimus), a very distant earthquake, over 5000 kms. distant. |

Measurements in the Metric System.

| | |
|--------------|--|
| kms. | Kilometers (1000 kms. = 621.38 English statute miles. 111.1 kms. = 1° on the equator). |
| M or m..... | meter (s). (1 m. = 39.37079 inches.) |
| mm. | Millimeters (1 mm. = 0.03937 in.). |
| μ..... | Micron, 1/1000th of a millimeter = 0.00003937 in. |

BIBLIOGRAPHY

KLOTZ, OTTO: Seismological Tables. Publications of the Dominion Observatory, Ottawa. Vol. iii, No. 2, pp. 19-61. 1916.