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

## RECORD OF THE SEISMOGRAPHIC STATION

### DEPARTMENT OF GEOLOGY AND GEOGRAPHY

$\phi = 42° 22' 36''$ N. $\lambda = 71° 06' 59''$ 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. | Kms. | |
| 869 | Jan. 1 | O | ϕ postea | - | | 16000? | |
| | | $S_E$? | 1 53 51 | 10 | | | |
| | | eE | 2 19 42 | 20 | | | |
| | | $eL_E$ | 2 25 05 | 35 | | | |
| | | L | 2 32 23 | 26 | | | |
| | | M | 2 36 55 | 20 | | | |
| | | M | 2 41 16 | 24 | | | |
| | | to | 2 45 ca. | | | | |
| | | C | 3 08 | 15 | | | |
| | | F. . . . . | . . . | . . . | . . . . | | In next record. |
| 870 | Jan. 1 | O | 3 11 43 | | | 5200 | 46° 48' of arc. |
| | | $eP_N$ | 3 20 24 | | | | |
| | | $eP_E$ | 3 20 30 | 4 | | | |
| | | $P_{RN}$ | 3 20 56 | | | | |
| | | $P_{RE}$ | 3 20 57 | | | | |
| | | $e_E$ | 3 22 34 | 8 | | | |
| | | $S_E$ | 3 27 17 | 12 | | | |
| | | $S_N$ | 3 27 41 | 9 | | | $S_N$ undamped, followed by extraordinarily large waves like MM. up to 72mm. trace (undamped). |
| | | $S_{RN}$ | 3 30 59 | | | | |
| | | $eL_E$ | 3 34 28 | 20 | | | |
| | | $M_N$ | 3 36 | | 66000 | | |
| | | $M_N$ | 3 40 | | | | |
| | | $M_N$ | 3 43 | | | | |
| | | $M_N$ | 3 48 | | | | |
| | | $M_N$ | 3 50 | | | | |
| | | $M_N$ | 3 54 | | | | |
| | | $C_N$ | 3 56 | | | | |
| | | $L_N$ | 4 05 | | | | A beautiful lenticular group of sinusoidal waves. Not Lrep. waves. Must be S waves of 3-27-41 coming back from anticentrum. |
| | | $M_E$ | 4 07 | | | | |
| | | $M_E$ | 4 11 | | | | |
| | | $F_N$ | 7 01 44 | | | | |
| | Jan. 4 | . . . . . | . . . . . | | | | Several disturbances registered by N between 10h 44m and 13h; possibly local temperature effects. Microseisms omly on E. |
| 871 | Jan. 6 | O? | 23 04 15 | | | 4980? | Time somewhat uncertain owing to rapid change in rate of Clock between times of Comparison with Harvard Observatory. |
| | | $S_E$? | 23 19 43 | 8 | | | |
| | | $L_E$? | 23 26 27 | | | | |
| | | $L_E$ | 23 30 51 | 20 | | | |
| 872 | Jan. 7 | $L_N$ | 0 20 49 | 24 | | | 872 possibly part of 871; but shown best on N while 871 most legible on E. |
| | | $L_N$ | 0 27 20 | 24 | | | |
| | | $L_N$ | 0 45 29 | 16 | | | |
| | | F | 0 51 ca. | | | | |

MIMEOGRAPHED February 11, 1919.

(For explanation of Symbols see other side)

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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.
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$\gamma\hat{u}$.....Milligal, or 1/1000 gal. acceleration of 10 micra per sec. per sec. (Klotz).
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$$2\pi\sqrt{\frac{1}{g}}$$

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## BIBLIOGRAPHY

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| No. | Date | Phase | Time | Periods | Amplitudes | Δ | REMARKS |
|---|---|---|---|---|---|---|---|
| | | | h. m. s. | s. | μ. | Kms. | |
| 873 | Jan 8 | O? | 1 43 28 | | | 3265? | |
| | | $S_N$ | 1 54 51 | 6 | | | |
| | | $eL_N$ | 1 57 58 | 20 | | | |
| | | $L_N$ | 2 05 ca. | 15 | | | |
| | | $F_N$ | 2 35 ca. | | | | |
| 874 | Jan 8 | O? | 1 58 24 | | | | Powder Explosion at Acton,Mass. |
| | | $e_N$ | 1 59 49 | | | | 26.82 kms.distant,bearing N75° |
| | | $SL_NE$ | 1 59 54 | 0.3 | | | from station. Temperature abou |
| | | $M_N$ | 1 59 57 | 0.3 | 5 | | 0°C. About 9 p.m. 75th meridia |
| | | $M_N$ | 1 59 59 | 0.3 | 5 | | time,west. The record was supe |
| | | $M_E$ | 1 59 58 | 0.3 | 5 | | posed on L waves of No.873. |
| | | $C_E$ | 2 00 03 | | | | SL probably forced ground wave |
| | | $C_N$ | 2 00 07 | | | | travelling under sound wave |
| | | $F_N$ | 2 00 23 | | | | around 333m per sec. |
| | | $F_E$ | 2 00 24 | | | | No check on time at origin ob- |
| | | | | | | | tainable. |
| 875 | Jan 9 | O | 11 postea | | | | |
| | | e | 11 51 38 | | | | |
| | | $e_E$ | 11 56 48 | 3 | | | |
| | | | 11 56 49 | 10 | | | |
| | | $S?_E$ | 12 02 20 | 15 | | | |
| | | | 12 02 33 | 13 | | | |
| | | $L_E$ | 12 11 41 | 12 | | | |
| | | | 12 17 ca. | 8 | | | |
| | | $C_E$ | 12 38 20 | | | | |
| | | F | 12 55 so | | | | |
| 876 | Jan 17 | e? | 11 51 37 | | | | Some disturbance also from |
| | | $e_E$ | 11 56 55 | 3 | | | 8h onward. |
| | | $e_E$ | 11 57 58 | 10 | | | |
| | | $S_E?$ | 12 02 29 | 15 | | | |
| | | | 12 02 42 | 13 | | | |
| | | $L_E?$ | 12 11 50 | 12 | | | |
| | | $L_N$ | 12 15 ca. | | | | |
| | | to | 12 35 ca. | | | | |
| | | $C_E$ | 12 38 ca. | | | | |
| | | $F_E$ | 12 55 31 | | | | |
| 877 | Jan 18 | $L_N$ | 9 20 52 | | | | Earlier phases masked by micro- |
| | | $L_N$ | 9 23 41 | 20 | | | seisms. No recognizable on E |
| | | $L_N$ | 9 28 22 | 15 | | | component. |
| | | F | 9 29 35 | | | | - - - - - - - - - - - - - |
| | | | | | | | Stylus of Component E not re- |
| | | | | | | | gistering from 1h 30m to 13h |
| | | | | | | | 31m on January 23d. |

J. B. Woodworth

MIMEOGRAPHED February 11,1919.

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|---|---|---|---|---|---|---|---|
| | | | h. m. s. | s. | μ. | Kms. | |
| 878 | Mar 31 | 0? | 23 53 34 | | | 2357? | P masked by micros. |
| | Feb 1 | $S_N$ | 0 02 20 | 6 | | | E damped 1½/1 by magr |
| | | $eL_N$ | 0 03 54 | 20 | | | net operating automat- |
| | | $M_N$ | 0 06 32 | 10 | | | ic alarm during M of |
| | | $F_N$? | 0 35 44 | | | | heavy earthquakes. |
| 879 | Feb 2 | 0 | 19 postea | | | | Phases before L 21-25-41 much distorted by microseisms. |
| | | $e_E$ | 20 06 23 | 8 | | | |
| | | $i_N$ | 20 06 38 | | | | |
| | | $e_E$ | 20 15 21 | 6 | | | |
| | | $e_N$ | 20 17 35 | 12 | | | |
| | | $e_E$ | 20 17 56 | 10 | | | |
| | | $L_E$? | 20 25 06 | 20 | | | |
| | | $L_E$ | 20 25 32 | 28 | | | |
| | | $L_E$ | 20 26 31 | 16 | | | |
| | | $F_E$? | 20 50 ca. | | | | |
| 880 | Feb 12 | L? | 13 25 51 | 18 | | | e Masked by micros. |
| | | $L_N$ | 13 32 20 | 20 | | | |
| | | L | 13 27 21 | 15 | | | |
| | | F? | 13 55 ca. | | | | |
| 881 | Feb 15 | 0? | 2 postea | | | | |
| | | $e_N$ | 2 31 22 | | | | |
| | | e | 2 31 29 | 6? | | | |
| | | $e_E$ | 2 34 59 | 5 | | | |
| | | $L_E$ | 2 37 49 | 20 | | | |
| | | $L_N$ | 2 38 03 | | | | |
| | | $L_E$ | 2 40 25 | 17 | | | |
| | | $L_N$ | 2 42 45 | 12 | | | |
| | | $F_E$ | 2 53 03 | | | | |
| 882 | Feb 16 | $i_E$ | 16 20 21 | | | | Cf. Ottawa e16-16-16. |
| | | $L_E$ | 16 20 35 | 8 | | | N time line tangled |
| | | | 43 | 9 | | | by heavy cyclonic |
| | | F? | 16 20 52 | | | | tilt of pendulum to |
| | | | | | | | the north for pre- |
| | | | | | | | vious 24 hours. |
| 883 | Feb 21 | 0 | 23 postea | | | | |
| | Feb 22 | $e_N$? | 0 00 03 | 6 | | | |
| | | $L_E$ | 0 04 22 | 22 | | | |
| | | $L_E$ | 0 08 13 | 14 | | | Rather weak record on |
| | | $M_N$? | 0 12 45 | 14and16 | | | both components. |
| | | to | 0 17 09 | | | | |
| | | $F_N$? | 0 30 | | | | |

MIMEOGRAPHED March 12, 1919.

J. B. Woodworth

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No. From March 1,1919 to [illegible] 191

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| No. | Date | Phase | Time | Periods | Amplitudes | Δ | REMARKS |
|---|---|---|---|---|---|---|---|
| | | | h. m. s. | s. | μ. | Kms. | |
| 884 | Mar 2 | O | 3 26 59 | [illegible] | | 9150 | ePE masked by micros. eL faint and difficult to fix. eL?-S gives Δ9860. E damped 1½/1 |
| | | $iP_N$ | 3 39 19 | 6 | | | |
| | | $S_N$ | 3 49 37 | 6 | | | |
| | | $S_E$ | 3 49 49 | 10 | | | |
| | | $iE$ | 3 54 39 | 10 | | | |
| | | $eL_N$? | 4 08 39 | | | | |
| | | $eL_E$? | 4 09 07 | | | | |
| | | $L_N$ | 4 09 26 | 40 | | | |
| | | $L_E$? | 4 10 19 | 20 | | | |
| | | $M_N$? | 4 13 55 | 20 | | | |
| | | $L_N$ | 4 24 14 | 16 | | | |
| | | $L_E$ | 4 26 50 | 18and20 | | | |
| | | F | 5 23 11 | | | | |
| 885 | Mar 2 | O | 11 45 27 | | | 9230 | Probably from same epicentre as 884- "homocentric". O-O:8h 18.5m. |
| | | $iP_N$ | 11 57 51 | | | | |
| | | $P_E$? | 11 57 | | | | |
| | | $S_{NE}$ | 12 08 13 | | | | |
| | | $iE$ | 12 08 23 | 20 | | | N-shaped wave, i from East. |
| | | $iN$ | 12 08 29 | 16 | | | N-shaped wave, i from North. |
| | | $eE$ | 12 13 13 | 20 | | | |
| | | $eL_E$ | 12 27 15 | 30 | | | |
| | | $eL_N$ | 12 27 51 | 40 | | | |
| | | $M_E$ | 12 29 ca. | 28 | | | Faint maxima. |
| | | $M_N$ | 12 31 55 | 25 | | | |
| | | $L_N$ | 12 36 54 | | | | |
| | | F | 13 29 ca. | | | | |
| | | $F_E$ | 14 24 ca. | | | | |
| 886 | Mar 9 | O | 3 17 00 | | | 9230 | Probably same epicentre as 884-885. |
| | | $iP_N$ | 3 29 24 | | | | |
| | | $S_N$ | 3 39 46 | | | | |
| | | $S_E$ | 3 39 52 | | | | |
| | | $eL_E$ | 3 59 20 | 30 | | | eLN not clear. |
| | | $L_E$ | 4 02 14 | 20 | | | |
| | | $M_E$? | 4 11 38 | 15+ | | | |
| | | F | 5 06 ca. | | | | |

NOTE: Mar 14d. E stylus turned over at 11h 56m. E out of commission until 13h 42m. This saltation of the stylus comes at the moment the time ticker strikes the smoked paper, and is evidently due to elastic rebound by the paper at a point on the drum where it does not fit tightly.

MIMEOGRAPHED April 3,1919.

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

No. From March 10,1919 to [illegible] 191

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| No. | Date | Phase | Time | Periods | Amplitudes | Δ | REMARKS |
|---|---|---|---|---|---|---|---|
| | | | h. m. s. | s. | μ. | Kms. | |
| 887 | Mar.22 | 0 | 16 postea | | | | |
| | | eE | 16 57 50 | | | | |
| | | $L_E$ | 17 04 25 | 30 | | | Sinusoidal |
| | | $L_N$? | 17 04 39 | 25 | | | |
| | | F | 17 50 ca. | | | | |
| (Note) | Mar 27 | ..... | ..... | ..... | ..... | ..... | Failure to record (Sunday) From To<br>N 9h 49m 50s...16h 44m<br>E14h 02m 40s...16h 51m |
| (Note) | Mar 31. | ..... | ..... | ..... | ..... | ..... | E stylus sprung up and and failed to record from 1h 55m 40s to 12h 25m ca. |
| | | | | | | | CORRECTION IN FEBRUARY LIST |
| Please substitute for record of | | | | | | | |
| 887 | Feb 22 | 0 | 4 postea | | | | |
| | | eN? | 5 00 03 | 6 | | | |
| | | $L_E$ | 5 04 22 | 22 | | | |
| | | $L_E$ | 5 08 13 | 14 | | | |
| | | $M_N$? | 5 12 45 | 14 and 16 | | | |
| | | to | 5 17 09 | | | | |
| | | $F_N$? | 5 30 | | | | |
| 878 | Jan 31 | 0? | 23 53 34 | | | | |
| | | | | | | | MIMEOGRAPHED APRIL 3,1919. |

J. B. Woodworth.

(For explanation of Symbols see other side)

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|---|---|---|---|---|---|---|---|
| | | | h. m. s. | s. | μ. | Kms. | |
| 888 | Apr 2 | e | 1 52 29 | 8 | | | Cf.Ottawa eL 1-46. |
| | | $L_N$ | 1 55 30 | 20 | | | Slight record on N. |
| | | F | 2 04 02 | | | | |
| 889 | Apr 15 | $M_N$? | 17 36 34 | 28 | | | Possibly non-seismic; |
| | | to | 17 38 00 | 24 | | | among irregular waves running from 13h 57m ca. to 21h 30m ca. |
| 890 | Apr 16 | $L_N$ | 3 59 52 | 20 | | | Cf.Ottawa eL 4-00 |
| | | L | 4 12 40 | 18 | | | |
| | | L | 4 19 36 | 16 | | | |
| | | F? | 4 20 50 | | | | |
| 891 | Apr 17 | O? | 11 28 ca. | | | 7850? | Δ up to 8050? Minute ticks failed during registration of P. Changed E records before 11h 55m |
| | | $P_N$? | 11 49 19 | | | | |
| | | $S_N$? | 11 58 41 | | | | |
| | | S | 11 59 46 | | | | |
| | | $eL_N$ | 12 12 42 | 64 | | | |
| | | $L_E$ | 12 20 41 | 32 | | | |
| | | $M_E$ | 12 27 53 | 20 | | | |
| | | L | 12 27 43 | 22.5 | | | Not Lrep. |
| | | F | 12 53 ca. | | | | |
| 892 | Apr 17 | O | 20 53 17 | | | 3350 | E gives Δ 3450. |
| | | $iP_N$ | 20 59 42 | 4 | | | |
| | | $iP_E$ | 20 59 43 | 4 | | | |
| | | $S_N$ | 21 04 49 | | | | |
| | | $S_E$ | 21 04 57 | 12 | | | |
| | | $i_N$ | 21 09 53 | | | | Large waves like L. |
| | | | 21 10 29 | 26 | | | Trace A 10mm. |
| | | $M_N$ | 21 12 31 | | | | |
| | | $M_E$ | 21 13 24 | 17 | | | Trace A 29mm. |
| | | $M_N$ | 21 14 25 | | | | |
| | | $M_E$ | 21 15 26 | 17 | | | Trace A 67mm. |
| | | $M_N$ | 22 23 45 | | | | Automatic 6 inch gong rang during M,M.M. |
| | | to | 22 35 50 | | | | A lenticular group of waves. Stylus E off drum from 22-15-42 to 22-16-48(1m 16s). |
| | | F | 23 34 ca. | | | | |

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|---|---|---|---|---|---|---|---|
| | | | h. m. s. | s. | μ. | Kms. | |
| 893 | Apr 18 | O | 21 01 00 | | | 4120 | Cf. Ottawa Δ3940; 21-01-02. |
| | | $P_E$ | 21 08 27 | 3 | | | |
| | | $i_N$ | 21 09 53 | 6 | | | |
| | | $i_E$ | 21 09 55 | 6 | | | |
| | | $S_N$ | 21 14 21 | 12 | | | |
| | | $S_E$ | 21 14 28 | 11 | | | |
| | | $L_N$ | 21 20 04 | 21 | | | |
| | | $L_N$ | 21 21 33 | 24 | | | |
| | | $L_E$ | 21 22 48 | 16 | | | |
| | | $M_E$ | 21 23 10 | 12 | | | Trace A 6mm damped 1.5/1 |
| | | $M_N$ | 21 24 47 | 11 | | | do 4mm do |
| | | F | 22 45 ca. | | | | M did not ring gong. |
| 894 | Apr 19 | O | 3 05 50 | | | 3100 | P masked by micros. of 4 secs. period. N record much masked throughout. |
| | | $S_E$ | 3 16 59 | 6 | | | |
| | | $eL_E$ | 3 19 46 | 20 | | | |
| | | $e_N$ | 3 20 00 | 6.5 | | | |
| | | $L_E$ | 3 21 57 | 20 | | | |
| | | $L_E$ | 3 22 42 | 15 and 18 | | | |
| | | $L_N$ | 3 23 38 | 10 | | | |
| | | $F_E$ | 3 40 ca. | | | | |
| 895 | Apr 21 | O | 11 26 17 | | | 4700 | 42°18' of arc. |
| | | $P_N$ | 11 34 25 | | | | |
| | | $P_E$ | 11 34 26 | | | | F merges into local disturbances peculiar to morning hours. |
| | | $i_E$ | 11 35 22 | 6 | | | |
| | | $S_N$ | 11 40 51 | 6 | | | |
| | | $S_E$ | 11 40 54 | 10 | | | |
| | | $eL_N$? | 11 45 11 | 24 | | | |
| | | $eL_E$? | 11 45 26 | 15 | | | then 20s. |
| | | F | 12 22 ca. | | | | |
| 896 | Apr 21 | eN? | 15 51 04 | 13 | | | Cf. Ottawa eL 15-55. |
| | | $e_E$ | 15 58 36 | 7 | | | |
| | | $L_N$ | 15 59 44 | 15 | | | Trace A 0.5mm. |
| | | to.. | 16 01 04 | | | | |
| | | $F_E$ | 16 14 37 | | | | |
| 897 | Apr 27 | O? | 0 55 45 | | | 7480? | Δ probably greater than given. |
| | | $S_N$? | 1 15 33 | 6 | | | |
| | | $S_E$? | 1 15 47 | 6 | | | |
| | | $e_E$ | 1 21 58 | 9 | | | |
| | | $e_E$ | 1 23 31 | | | | |
| | | $L_E$ | 1 28 38 | 24 | | | A slight. |
| | | $L_N$ | 1 30 34 | 24 | | | |
| | | $L_N$ | 1 34 19 | 20 | | | |
| | | $F_E$ | 1 47 30 | | | | |

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| | | | h. m. s. | s. | μ. | Kms. | |
| 898 | Apr 28 | O? | 6 44 22 | | | 4420? | P in microseisms. |
| | | $e_E$ | 6 57 24 | | | | |
| | | $eP_N$? | 6 57 55 | 3.5 | | | |
| | | $i_N$ | 6 58 15 | 4 | | | |
| | | $S_N$? | 6 58 21 | 6 | | | |
| | | $i_N$ | 6 59 16 | | | | ..Pendulum shifted N. |
| | | $eL_E$ | 7 03 44 | 18 | | | |
| | | $eL_N$ | 7 03 59 | 16 | | | |
| | | $L_N$ | 7 06 11 | 22 | | | |
| | | $L_N$ | 7 06 37 | 15 | | | |
| | | F | 7 49 40 | | | | |
| 899 | Apr 28 | $L_N$ | 11 32 00 | 30 | | | Less distanct on E( damped)and amidst irregular waves of long periods on N. |
| | | to | 11 54 06 | | | | |

Note a) Owing to a strike of the servants of the telephone company in Cambridge, time comparisons with Harvard Observatory were made from April 15th to April 20th by means of a stop-watch comparison of flash-light signals from the Observatory observed at night from the roof of the Geological Section of the University Museum.

Note b) Automatic return of the stylus of the 100 kg. Bosch tromometer. At this station the return of the stylus to the recording paper after the stylus has moved off at a time of heavy Maxima has been accomplished by having the smoked paper cut 0.5mm wider than the surface of the drum. The forward motion of the edge of the paper against the pendant stylus gradually draws the stylus up so that the zero-seeking force of the pendulum brings it back into position. A group of large artificial waves not to be mistaken for true seismic maxima naturally follow this operation and frequently become confused with maxima.

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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 April 29th,1919. to April 30th,1919. 191

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

## RECORD OF THE SEISMOGRAPHIC STATION

### DEPARTMENT OF GEOLOGY AND GEOGRAPHY

$\phi = 42° 22' 36''$ N. $\lambda = 71° 06' 59''$ 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 h. m. s. | Periods s. | Amplitudes μ. | Δ Kms. | REMARKS |
|---|---|---|---|---|---|---|---|
| 900 | Apr 30 | 0 | 7 18 10 | | | 10390 | 93.5°of arc. Cf.La Paz |
| | | ePE | 7 31 31 | 4 | | | 0:7h 18m 20s; Δ 9550 kms. Har- |
| | | PN | 7 32 20 | 4 | | | vard and La Paz give intersec- |
| | | PR1N | 7 36 18 | 3 | | | tion in longitude 158.5°W., Lat. |
| | | PR1E | 7 36 29 | 3.5 | | | 9°S., at or near Tongareva or |
| | | PR2E | 7 37 18 | 7 | | | ~~near~~ Penrhyn Island, a coral |
| | | PR2N | 7 37 45 | 6.5 | | | atoll, 9 miles long n.n.e. to |
| | | SN | 7 42 50 | 9 | | | s.s.w., and 5 miles wide; in- |
| | | SE | 7 42 56 | | | | habited by native fisherman. |
| | | iN | 7 44 14 | 19 | | | See Wilke's Exploring Expedi- |
| | | iE | 7 46 05 | 18 | | | tion. Vol.iv., pp. 277-280. |
| | | SR1N | 7 48 00 | 16 | | | |
| | | SR1E | 7 47.0 | | | | |
| | | SR2PN | 7 52 10 | 47 | | | Looks like eL of a superposed |
| | | SR2N | 7 53.0 | | | | second earthquake. |
| | | iE | 7 59.5 | | | | Small sinusoidal MM. |
| | | iN | 8 00.0 | | | | do do |
| | | eLN | 8 02 42 | 49 | | | |
| | | LN | 8 05 10 | 53.5 | | | |
| | | LE | 8 05 13 | 20 | | | E damped 1.5/1 by magnet. |
| | | MN | 8 17 23 | 18 | | | 61500 micra trace |
| | | ME | 8 18 45 | 15 | | | 60000 do do |
| | | ME | 8 20 30 | | | | |
| | | ME | 8 21.0 | | | | |
| | | MN | 8 21 36. | ..... | | | N stylus left drum and no fur- |
| | | ME | 8 22.0 | | | | ther record by N. |
| | | | 8 24.0 | | | | |
| | | | 8 24.6 | | | | |
| | | | 8 26.6 | | | | |
| | | | 8 27.6 | | | | |
| | | | 8 28.0 | | | | |
| | | | 8 28.0 | | | | These maxima average 60000 |
| | | | 8 31.5 | | | | micra trace, with periods of |
| | | | 8 32.3 | | | | 15 secs. But the damping is too |
| | | | 8 33.5 | | | | slight. |
| | | | 8 35.0 | | | | |
| | | | 8 36.0 | | | | iN 7-44-14 looks like iS of a |
| | | | 8 37.4 | | | | nearer earthquake. |
| | | | 8 38.0 | | | | The times marked "n"(nova) |
| | | | 8 39.6 | | | | fit into a supposed possible |
| | | | 8 41.0 | | | | earthquake Δ6370 kms. |
| | | | 8 44.8 | | | | e 7 26 26 |
| | | | 8 46.0 | | | | iPN 7 36 18 |
| | | | 8 47.5 | | | | SN 7 44 14 19 |
| | | CE | 9 19 ca | | | | eLN 7 52 10 |
| | | Lrep1 | 9 37.0 | | | | M 8 00 ca. |
| | | M | 9 38 | | | | |
| | | M | 9 39 | | | | |
| | | Lrep2 | 11 10 | | | | |
| | | Lrep3 | 12 32 | | | | |
| | | F | 12 37 (or later) | | | | when record was changed. |

J. B. Woodworth.

MIMEOGRAPHED May 28,1919.

(For explanation of Symbols see other side)

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i.....(impetus), a sharply defined impulse; *e.g.*, iP, iS.
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Az.....The same for the vertical component of motion.
$\gamma$.....Gal, or unit acceleration, one centimetre per sec. per sec.
$\gamma\hat{u}$.....Milligal, or 1/1000 gal. acceleration of 10 micra per sec. per sec. (Klotz).
$\phi$.....Latitude.
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ca .....Approximately.
T.....Period, complete time of oscillation; for simple pendulum;

$$2\pi\sqrt{\frac{1}{g}}$$

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No. From May 1, 1919. to May 6, 1919. 191

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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. | μ. | Kms. | |
| 901 | May 1 | O? | 7 23 54 | 6 | | 7280? | 65°31' of arc. |
| | | $S_N$? | 7 43 32 | 6 | | | First phase masked by |
| | | $eL_N$? | 7 56 02 | 40? | | | microseisms. |
| | | $L_N$ | 7 56 44 | 24 | | | |
| | | $L_E$ | 8 02 26 | 25 | | | |
| | | $L_N$ | 8 03 48 | 20 | | | |
| | | $L_E$ | 8 04 37 | 24 | | | |
| | | $M_E$? | 8 07 55 | 20 | | | |
| | | F | 8 38 ca. | | | | |
| 902 | May 2 | O? | 2 09 ca. | | | 10700? | Δ from eL-S. |
| | | $P_N$? | 2 22 19 | | | | |
| | | $i_N$ | 2 26 24 | 7 | | | |
| | | $S_N$? | 2 34 29 | 12 | | | |
| | | $eL_N$ | 2 56 21 | 32 | | | |
| | | $L_N$ | 2 58 54 | 18 | | | |
| | | $M_N$? | 3 08 ca | 17 | | | |
| | | F | 4 38 ca | | | | |
| 903 | May 3 | O? | 0 53 33 | | | 10525? | Δ from eL-P. |
| | | $ePN_E$ | 1 05 01 | 3 | | | |
| | | $i_N$ | 1 08 37 | 17 | | | SS phases rather vague- |
| | | $i_N$ | 1 15 32 | 16 | | | ly defined. Possibly |
| | | $S_N$ | 1 16 | | | | begins with PR1, making |
| | | $eL_N$ | 1 37 44 | 30 | | | Δ 11790kms. and 0:0h 46m |
| | | $L_N$ | 1 38 01 | 32 | | | 11s. ca. Cf. La Paz, Δ14260 |
| | | $L_E$ | 1 40 15 | 24 | | | kms.; 0:1h 51m±ca. |
| | | $M_N$ | 1 54 | | | | |
| | | $M_N$ | 1 55 | | | | |
| | | F | 5 19 | | | | |
| 904 | May 4 | $L_E$ | 23 43 02 | 20 | | | No trace on N. |
| | | L | 23 44 32 | 18 | | | |
| | 5 | F | 0 10 ca. | | | | |
| 905 | May 6 | $L_E$ | 7 09 16 | 20 | | | No trace on N. |
| | | L | 7 10 24 | 18 | | | |
| | | F | 7 28 37 | | | | |
| 906 | May 6 | O | 19 47 13 | | | 10640 | 95°45' of arc. |
| | | $ePE$ | 20 00 57 | | | | |
| | | $e_E$ | 20 02 13 | 6 | | | |
| | | $e_N$ | 20 02 33 | 6 | | | |
| | | $S_E$ | 20 12 13 | 12 | | | |
| | | $e_E$ | 20 16 46 | 15 | | | |
| | | $i_N$ | 20 20 07 | 24 | | | |
| | | $i_E$ | 20 20 27 | 20 | | | |
| | | $eL_N$ | 20 37 52 | 78 | | | |
| | | $eL_E$ | 20 33 54 | 60 | | | |
| | | L | 20 36 17 | 48 | | | |
| | | L | 20 37 00 | 9and15 | | | |
| | | L | 20 41 02 | 35 | | | |
| | | $eM_E$ | 20 42 54 | 18 | | | |

Continued on next sheet.

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|---|---|---|---|---|---|---|---|
| | | | h. m. s. | s. | μ. | Kms. | |
| 906 (cont) | May 6 | $M_E$ | 20 44 46 | 14 | | | |
| | | M | 20 56 02 | 18 | | | |
| | | M | 21 06 22 | 17 | | | |
| | | M | 21 08 07 | 15 | | | |
| | | M | 21 10 24 | 16 | | | |
| | | M | 21 13 52 | 15 | | | |
| | | M | 21 17 25 | 16 | | | |
| | | $C_E$ | 21 29 22 | | | | |
| | | F | 23 16.5 | | | | |
| 907 | May 7 | $e_E$ | 11 ca. | | | | Indistinct on N. |
| | | $L_E$ | 11 05 18 | 20 | | | |
| | | F | 11 31 ca. | | | | |
| 908 | May 18 | O? | 8 53 ca. | | | ? | Under 2000Kms.? |
| | | $e_N$ | 8 57 44 | 2 | | | |
| | | $e_E$ | 8 43 19 | | | | |
| | | $i_N$ | 8 58 29 | 6 | | | |
| | | $L_E$ | 9 01 59 | 10 | | | |
| | | F | 9 05 ca. | | | | |
| 909 | May 18 | O? | 10 postea | | | | Round 2000Kms. Cf. no. 908. |
| | | $e_E$ | 10 42 55 | | | | |
| | | $e_N$ | 10 43 19 | | | | |
| | | $L_E$? | 10 45 43 | 6 | | | |
| | | $L_N$ | 10 45 40 | | | | |
| | | $L_E$ | 10 46 21 | 8 | | | |
| | | F | 11 35 | | | | |
| 910 | May 20 | O? | 4 31 11 | | | 2805 | Δ&C from L-P. 25°13' |
| | | $iP_E$ | 4 36 49 | | | | of arc. i from west. |
| | | $iP_N$ | 4 36 59 | | | | i from north. |
| | | $e_E$ | 4 40 20 | 6 | | | |
| | | $e_N$ | 4 41 15 | | | | |
| | | $e_N$ | 4 41 36 | | | | |
| | | $eL_E$ | 4 42 29 | 13 | | | |
| | | $eL_N$ | 4 42 31 | 12 | | | |
| | | $M_N$ | 4 45 01 | | | | |
| | | $M_E$ | 4 45 24 | | | | |
| | | $C_N$ | 4 45 31 | | | | |
| | | $F_E$ | 5 15 ca | | | | |
| 911 | May 22 | O | 11 52 00 | | | 7790 | 70°16' of arc. Chang- |
| | | $P_N$ | 12 03 10 | 2 | | | ing records from 12h |
| | | $S_E$ | 12 12 19 | 8 | | | 09m ca. to 12h 26m ca. |
| | | $eL_N$ | 12 26 20 | 20 | | | |
| | | $L_E$ | 12 30 06 | 18 | | | |
| | | $L_E$ | 12 33 10 | 22 | | | |
| | | $C_E$ | 12 43 14 | 10 and 12 | | | |
| | | F? | 13 02 ca. | | | | |

A. B. Woodworth

MIMEOGRAPHED JUNE 4,1919.

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