550.34

SECTION V.—SEISMOLOGY.

SEISMOLOGICAL ABBREVIATIONS USED IN THE INSTRUMENTAL REPORTS.

CHARACTER OF THE EARTHQUAKE.

I = noticeable.
II = conspicuous.
III = strong.
d = (terræ motus domesticus) = local earthquake (sensible or felt).
v = (terræ motus vicinus) = near-by earthquake (within 1,000 km.)
r = (terræ motus remotus) = distant earthquake (1,000 to 5,000 km. distant).
u = (terræ motus ultimus) = very distant earthquake (beyond 5,000 km.).
Δ = distance to epicenter.

PHASES.

P = (undæ primæ) = first preliminary tremors.
PR*n* = P waves reflected *n* times at the earth's surface.
S = (undæ secundæ) = second preliminary tremors.
SR*n* = S waves reflected *n* times at the earth's surface.
PS = transformed waves; longitudinal (P) to transversal (S) or vice versa.
L = (undæ longæ) = long waves in the principal portion.
M = (undæ maximæ) = greatest motion in the principal portion.
C = (coda) = trailers.
O = time at epicenter.
L_{rep1} = Long waves reaching the station from the antiepicenter (40,000 km. − Δ).
L_{rep2} = long waves again reaching the station from the antiepicenter (40,000 km + Δ).
F = (finis) = end of perceptible trace.

NATURE OF THE MOTION.

i = (impetus) = abrupt beginning.
e = (emersio) = gradual appearance.
T = period = twice the time of oscillation.
A = amplitude of the earth's movement, reckoned from the zero line.
E, N, or *Z* attached to a symbol signifies the E–W, the N–S, or the vertical component, respectively, thus:

A_E is the E–W component of A.
A_N is the N–S component of A.
A_z is the vertical component of A
} Measured in microns (μ), $\frac{1}{1000}$ mm.

INSTRUMENTAL CONSTANTS.

T = period of instrument.
V = magnification of instrument.
ϵ = damping ratio.

SEISMOLOGICAL REPORTS FOR JANUARY, 1917.

W. J. HUMPHREYS, Professor in Charge.

[Dated: Weather Bureau, Washington, D. C., Mar. 2, 1917.]

TABLE 1.—*Noninstrumental earthquake reports, January, 1917.*

Day.	Approximate time, Greenwich Civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity Rossi-Forel.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
		CALIFORNIA.								
1917.	*H. m.*		° ′	° ′			*M. s.*			
Jan. 12	22 42	Fairmont	34 45	118 25	3	1				Wm. F. Lowe.
	22 42	Mojave	35 03	118 12	3	1				R. Kelsey.
	22 42	Neenach	34 47	118 37	3	1				J. Anderson.
19	13 20	Mt. Wilson	34 13	118 16	2	1		None	Recorded on float raingage	Wendell P. Hoge.
		NEW YORK.								
26	19 37	Alexandria Bay	44 22	75 54	2	2				Douglas F. Manning.
	19 37	Canton	44 36	75 10	4	2	7		Caused pumping in barometers	U. S. Weather Bureau.
	19 37	Gabriels	44 25	74 10	3	2	5	Rumbling	Shook buildings slightly	R. Shea.
	19 37	Harkness	44 31	73 34	4–5	1		Rumbling	Shook buildings	J. W. Harkness.
	19 37	Ogdensburg	44 42	75 30	4	1	2	None		D. C. Farley.
	19 37	Plattsburg	44 43	73 27	4	1			Rattled dishes	Press report.

TABLE 2.—*Instrumental seismological reports, January, 1917.*

Alaska. *Sitka. Magnetic Observatory.* U. S. Coast and Geodetic Survey. J. W. Green.

Lat. 57° 03′ 00″ N.; long., 135° 30′ 06″ W. Elevation, 15.2 meters.

Instruments: Two Bosch-Omori, 10 and 12 kg.

Instrumental constants: V T_0 E 10 16; N 10 15

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917.			*H m. s.*	*Sec.*	μ	μ	*Km.*	
Jan. 30	.....	eP	2 51 56	.....	.....	.....	.....	Microseisms Jan. 7–9.
		S	2 57 16	.....	.....	.....	.....	
		eL	3 01 ..	.....	.....	.....	.....	
		M_N	3 05 41	16	.....	530	.....	
		M_E	3 09 11	15	410	.....	.....	
		C	3 18 ..	.....	.....	.....	.....	
		F	6 25 ..	.....	.....	.....	.....	

Arizona. *Tuscon. Magnetic Observatory.* U. S. Coast and Geodetic Survey. F. P. Ulrich.

Lat., 32° 14′ 48″ N.; long., 110° 50′ 06″ W. Elevation, 769.6 meters.

Instruments: Two Bosch-Omori, 10 and 12 kg.

Instrumental constants: V T_0 E 10 13.9; N 10 19.1

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917.			*H m. s.*	*Sec.*	μ	μ	*Km.*	
Jan. 30	.....	P	2 56 08	.....	.....	.....	.....	
		eS_N	3 04 32	.....	.....	.....	.....	
		eS_E	3 04 37	.....	.....	.....	.....	
		L	3 13 34	.....	.....	.....	.....	
		M_E	3 23 17	18	210	.....	.....	
		M_N	3 30 09	15	.....	140	.....	
		C_E	3 34 ..	.....	.....	.....	.....	
		C_N	3 37 ..	.....	.....	.....	.....	
		F	5 06 ..	.....	.....	.....	.....	

California. *Berkeley. University of California.*

Lat., 37° 52′ 16″ N.; long., 122° 15′ 37″ W. Elevation, 85.4 meters.

(See Bulletin of the Seismographic Stations, University of California.)

California. *Mount Hamilton. Lick Observatory.*

Lat., 37° 20′ 24″ N.; long., 121° 38′ 34″ W. Elevation, 1,281.7 meters.

(See Bulletin of the Seismographic Stations, University of California.)

California. *Point Loma. Raja Yoga Academy.* F. J. Dick.

Lat., 32° 43′ 03″ N.; long., 117° 15′ 10″ W. Elevation, 91.4 meters.

Instrument: Two-component, C. D. West seismoscope.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917.			*H m. s.*	*Sec.*	μ	μ	*Km.*	
Jan. 1	.....	.....	.....	.....	*300	*250	.....	Tremors recorded during 24 hours ending 15h on dates given.
4	.....	.....	.....	.....	*300	*400	.....	
8	.....	.....	.....	.....	*100	*100	.....	
10	.....	.....	.....	.....	*200	*200	.....	
12	.....	.....	.....	.....	*400	*400	.....	
18	.....	.....	.....	.....	*100	*100	.....	
24	.....	.....	.....	.....	*150	*150	.....	
25	.....	.....	.....	.....	*300	*400	.....	

*Amplitude on instrument.

California. *Santa Clara. University of Santa Clara.* J. S. Ricard, S. J.

Lat., 37° 26′ 36″ N.; long., 121° 57′ 03″ W. Elevation, 27.43 meters.

(See record of the Seismographic Station, University of Santa Clara.)

Colorado. *Denver. Sacred Heart College.* Earthquake Station.

A. W. Forstall, S. J.

Lat., 39° 40′ 36″ N.; long., 104° 56′ 54″ W. Elevation, 1,655 meters.

Instrument: Wiechert 80 kg., astatic, horizontal pendulum.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Jan. 16	.....	L_N	1 40 ..	.....	.....	.....	.....	Thickening of pen-marks.
		F_N	4 30 ..	.....	.....	.....	.....	Wavelets somewhat doubtful as to being seismic.
21	.....	.....	.....	.....	.....	.....	.....	Activity at intervals during day. Somewhat doubtful as to being seismic.
28	.....	L_N	23 58 ..	.....	.....	.....	.....	Activity at intervals from 2h to 3h 30m on 29th.
29		F_N	0 01 ..	.....	.....	.....	.....	
30	III_r	P	3 02 ..	.....	.....	.....	.....	S_N?
		S_E?	3 07 ..	.....	.....	.....	.....	
		L_N	3 07 ..	40–50	.....	*2000	.....	
		L_E	3 08 ..	35–45	*3000	.....	.....	
		M_N	3 12 ..	20–30	.....	*5000	.....	
		M_E	3 18 ..	30	*6000	.....	.....	
		C	3 29 ..	15–20	.....	.....	.....	
		F_E	3 35 ..	.....	.....	.....	.....	
		F_N	3 36 ..	.....	.....	.....	.....	
30	.....	L	3 38 ..	20	.....	.....	.....	Has appearance of new quake. Maximum doubtful on N–S.
		M_N	3 39 ..	.....	.....	*1000	.....	
		M_E	3 40 ..	15	*4000	.....	.....	
		F_N	3 49 ..	.....	.....	.....	.....	
		F_E	3 50 ..	.....	.....	.....	.....	

* Trace amplitude.

District of Columbia. *Washington. U. S. Weather Bureau.*

Lat., 38° 54′ 12″ N.; long., 77° 03′ 03″ W. Elevation, 21 meters.

Instrument: Marvin (vertical pendulum, undamped. Mechanical registration).

Instrumental constants: V T_0 110 6.4

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Jan. 26	.....	e	19 39 30	.....	.....	.....	.....	Minute, very rapid tremors.
		F	19 40 20	.....	.....	.....	.....	
30	III_u	P	2 57 04	.....	.....	.....	7,925	Good record, all phases distinct.
		S	3 06 20	.....	.....	.....	.....	
		L	3 13 04	22	.....	.....	.....	
		L	3 14 16	24	.....	.....	.....	
		L	3 18 08	30	.....	.....	.....	
		L	3 33 00 / 3 35 00	20	.....	.....	.....	
		L	3 35 00 / 3 45 00	18	.....	.....	.....	
		F	6 30 00	.....	.....	.....	.....	
31	.....	P?	4 19 23	.....	.....	.....	.....	Phases indistinct.
		S?	4 22 42	.....	.....	.....	.....	
		L	5 03 08 / 5 11 00	30	.....	.....	.....	
		L	5 12 00 / 5 20 00	20	.....	.....	.....	
		F	5 45 00	.....	.....	.....	.....	

TABLE 2.—*Instrumental seismological reports, January, 1917*—Continued.

District of Columbia. *Washington. Georgetown University.* F. L. Tondorf, S. J.

Lat., 38° 54′ 25″ N.; long., 77° 04′ 24″ W. Elevation, 42.4 meters. Subsoil: decayed diorite.

Instruments: Wiechert 200 kg. astatic horizontal pendulums, 80 kg. vertical.

Instrumental constants:

	V	T_0	ε
E	165	5.4	0
N	143	5.2	0
Z	80	3.0	0

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917.			*H. m. s.*	*Sec.*	*μ*	*μ*	*Km.*	
Jan. 26		e_E	19 39 29					Heavy microseisms present.
		e_N	19 39 32					
		F	19 40 17					
30		eP	2 57 02					Good record with much larger amplitudes obtained on Bosch-Omori instrument.
		S_E	3 06 22					
		S_N	3 06 25					
		eL	3 18 00					
		M_E	3 26 28	15	61			
		M_E	3 28 26	15	44			
		M_N	3 31 32	15		22		
		M_E	3 32 23	17	44			
		M_N	3 34 41	20		28		
		M_E	3 35 37	20	22			
		M_N	3 39 08	17		12		
		M_E	3 39 56	17	19			
		C	4 52 00					
		F	5 50 00					
			Vertical.		A_Z			
		eP	*2 56 58*					S not discernible.
		L	*3 24 01*					
		M	*3 30 49*	*17*	*16*			
		M	*3 37 53*	*20*	*8*			
		F	*5 29 53*					
30								What appears to be a long wave is shown on the Bosch-Omori at 8h 07m 17s and later.

Hawaii. *Honolulu. Magnetic Observatory.* U. S. Coast and Geodetic Survey. Frank Neuman.

Lat., 21° 19′ 12″ N.; long., 158° 03′ 48″ W. Elevation, 15.2 meters.

Instrument: Milne seismograph of the Seismological Committee of the British Association.

Instrumental constant.. T_0 18

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917.			*H. m. s.*	*Sec.*	*μ*	*μ*	*Km.*	
Jan. 4		eL	17 25 42					
		M	17 36 12	17	*400			
		C	17 39 24					
		F	17 46 42					
19		eL	23 28 00					
		M	23 32 06	20	*100			
		F	23 36 06					
20		P	23 35 42					
		eL	23 53 54					
21		M	0 10 06	18	*300			
		C	0 17 06					
		F	0 56 00					
26		eP	5 27 48					
		eL	5 30 54					
		M	5 36 30	21	*700			
		C	5 39 54					
		F	5 51 00					An insect in the seismograph from Jan. 21 to Feb. 2 caused frequent oscillations of pendulum. The quake of Jan. 30 was recorded only in part, making time of phases too uncertain.

* Trace amplitude.

Kansas. *Lawrence. University of Kansas.* Department of Physics and Astronomy. F. E. Kester.

Lat., 38° 57′ 30″ N.; long., 95° 14′ 58″ W. Elevation, 301.1 meters.

Instrument: Wiechert.

Instrumental constants..

	V	T_0	ε
E	177	3.4	4.0
N	205	3.4	3.8

(Report for January, 1917, not received.)

Maryland. *Cheltenham. Magnetic Observatory.* U. S. Coast and Geodetic Survey. George Hartnell.

Lat., 38° 44′ 00″ N.; long., 76° 50′ 30″ W. Elevation, 71.6 meters.

Instruments: Two Bosch-Omori, 10 and 12 kg.

Instrumental constants..

	V	T_0
E	10	32
N	10	27

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917			*H. m. s.*	*Sec.*	*μ*	*μ*	*Km.*	
Jan. 30		eP_E	2 56 55					
		eP_N	2 57 05					
		S	3 06 31					
		L	3 17 ..					
		M_E	3 26 40	20	193			
		M_N	3 31 10	24		215		
		C_E	3 44 ..					
		C_N	3 46 ..					
		F	4 56 ..					

Massachusetts. *Cambridge. Harvard University Seismographic Station.* J. B. Woodworth.

Lat., 42° 22′ 36″ N.; long., 71° 06′ 59″ W. Elevation, 5.4 meters. Foundation: Glacial sand over clay.

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

Instrumental constants..

	V	T_0	ε
E	80	23	0
N	50	25	4:1

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917			*H. m. s.*	*Sec.*	*μ*	*μ*	*Km.*	
Jan. 26		*O*	*19 36 02*				410?	Reported in eastern Canada. P begins with thickening of line followed by rapid jars of stylus coming during L about 3 per sec. Period of LL microseisms, hence doubt as to nature of record.
		eF?	19 36 56					
		L	19 37 41	3				
		C	19 38 59					
		F	19 39 18					
30		*O*	*2 45 39*				7,880	Kamchatka? by inference.
		P_N	2 56 54					
		P_E	2 57 02					
		S_N	3 06 10					
		S_E	3 06 16					
		eL_E	3 14 00					
		L_N	3 17 40	28				
		M_N	3 29 36			400		
		F	7 -- --					

Missouri. *Saint Louis. St. Louis University.* Geophysical Observatory. J. B. Goesse, S. J.

Lat., 38° 38′ 15″ N.; long., 90° 13′ 58″ W. Elevation, 160.4 meters. Foundation: 12 feet of tough clay over limestone of Mississippi system, about 300 feet thick.

Instruments: Wiechert, 80 kg. astatic, horizontal pendulum.

Instrumental constants.. V 80, T_0 7, ε 5:1

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917.			*H. m. s.*	*Sec.*	*μ*	*μ*	*Km.*	
Jan. 30	III_u	P	2 56 18				7,900	
		S	3 05 06					
		L	3 16 00					
		F	5 28 00					

TABLE 2.—*Instrumental seismological reports, January, 1917*—Continued.

New York. *Fordham.* *Fordham University.* Daniel H. Sullivan, S. J.

Lat., 40° 51′ 47″ N.; long., 73° 53′ 08″ W. Elevation, 23.9 meters.

Instrument: Wiechert, 80 kg.

Instrumental constants.. E: V 72, T_0 6.6, e 1.5:1; N: V 72, T_0 7.1, e 3.8:1

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Jan. 30	.....	eP	2 52 33	.....	.....	.....	.....	Damper not in use on E-W.
		$PR2_N$	2 57 00	.....	.....	.....	.....	
		S	3 01 51	.....	.....	.....	.....	
		L	3 17 21	.....	.....	.....	.....	
		M_N	3 21 36	18.4	.....	1,458	.....	
		M_E	3 21 36	16.2	2,736	.....	.....	
		F_E	4 17 21	.....	.....	.....	.....	
		F_N	5 04 21	.....	.....	.....	.....	

New York. *Ithaca.* *Cornell University.* Heinrich Ries.

Lat., 42° 26′ 58″ N.; long., 76° 29′ 09″ W. Elevation, 242.6 meters.

Instruments: Two Bosch-Omori, 25 kg., horizontal pendulums (mechanical registration).

Instrumental constants.. E: V 13, T_0 22, e 4:1; N: V 14, T_0 25, e 4:1

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Jan. 30	.....	P_N	2 56 45	4–7	.....	.....	.....	
		P_E	2 56 50	4	.....	.....	.....	
		S_N	3 05 50	8	.....	.....	.....	
		S_E	3 05 56	8	.....	.....	.....	
		L_E	3 16 22	52	.....	.....	.....	
		M	3 25 06	18	846	1,928	.....	
		M_N	3 27 28	18	.....	1,428	.....	
		M_N	3 28 50	19	.....	1,572	.....	N-S stylus not recording.
		F_E	7 56 00	.....	.....	.....	.....	

Panama Canal Zone. *Balboa Heights.* Isthmian Canal Commission.

Lat., 8° 57′ 39″ N.; long., 79° 33′ 29″ W. Elevation, 27.6 meters.

Instruments: Two Bosch-Omori, 100 kg.

Instrumental constants.. V 10, T_0 20

(No earthquake recorded during January, 1917.)

Porto Rico. *Vieques.* *Magnetic Observatory.* U. S. Coast and Geodetic Survey. F. L. Adams.

Lat., 18° 08′ 48″ N.; long., 65° 26′ 54″ W. Elevation, 19.8 meters.

Instruments: Two Bosch-Omori.

Instrumental constants.. E: V 10, T_0 18; N: V 10, T_0 18

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Jan. 6	.....	eL_E	21 42 03	.....	.....	.....	.....	
		eL_N	21 42 13	.....	.....	.....	.....	
		M_E	21 42 28	12	40	.....	.....	
		M_N	21 42 35	12	.....	20	.....	
		F	21 46 ..	.....	.....	.....	.....	
30	.....	eS	3 10 ..	.....	.....	.....	.....	
	.....	eL_E	3 16 45	.....	.....	.....	.....	
		eL_N	3 17 04	.....	.....	.....	.....	
		M_E	3 38 00	18	60	.....	.....	
		M_N	3 46 45	20	.....	75	.....	
		C	3 52 ..	.....	.....	.....	.....	
		F	5 11 ..	.....	.....	.....	.....	

Vermont. *Northfield.* *U. S. Weather Bureau.* Wm. A. Shaw.

Lat., 44° 10′ N.; long., 72° 41′ W. Elevation, 256 meters.

Instruments: Two Bosch-Omori, mechanical registration.

Instrumental constants.. E: V 10, T_0 15; N: V 10, T_0 16

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Jan. 26	.....	e	19 36 38	.....	.....	.....	.....	Thickening of line.
		F	19 40 00	.....	.....	.....	.....	
30	.....	eP	2 56 45	.....	.....	.....	7,600	
		S	2 05 45	.....	.....	.....	.....	
		L	2 13 43	40	.....	.....	.....	
			2 22 30					
		L	2 23 30	14–18	.....	.....	.....	
			2 43 00					
		F	5 50 00	.....	.....	.....	.....	

Canada. *Ottawa.* *Dominion Astronomical Observatory.* Earthquake Station. Otto Klotz.

Lat., 45° 23′ 38″ N.; long., 75° 42′ 57″ W. Elevation, 83 meters.

Instruments: Two Bosch photographic horizontal pendulums, one Spindler & Hoyer 80kg. vertical seismograph.

Instrumental constants.. V 120, T_0 26

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Jan. 26	.....	*O*	*19 35 50*	.....	.....	.....	180	Local shock. Not severe. Some things rattled in places.
		P_E	19 36 17	.....	.....	.....	.....	
		i	19 36 20	.....	.....	.....	.....	
		S_N	19 36 37	.....	.....	.....	.....	
		S_E	19 36 38	.....	.....	.....	.....	
		F	19 37 06	.....	.....	.....	.....	
30	.....	*O*	*2 45 43*	.....	.....	.....	7,440	Fine record.
		P	2 56 34	2	.....	.....	.....	
		S	3 05 26	.....	.....	.....	.....	
		eL	3 13 24	24–26	.....	.....	.....	
		L	3 16 00	40	.....	.....	.....	
		L	3 22 00	20	.....	.....	.....	
		M	3 24 00	16	200	750	.....	
		L	3 30 00	16	.....	.....	.....	
		L	3 40 00	15	.....	.....	.....	
		L	3 50 00	15	.....	.....	.....	
		L	4 05 00	13	.....	.....	.....	
		F	6 10 00	.....	.....	.....	.....	
31	.....	i_N	4 21 07	.....	.....	.....	.....	
		e_E	4 21 20	2	.....	.....	.....	
		eL_N	5 04 00	36	.....	.....	.....	
		L	5 10 00	24	.....	.....	.....	
		L	5 14 00	22	.....	.....	.....	
		L	5 20 00	20	.....	.....	.....	
		F	5 45 00	.....	.....	.....	.....	

TABLE 2.—*Instrumental seismological reports, January, 1917*—Concluded.

Canada. *Toronto. Dominion Meteorological Service.*

Lat., 43° 40′ 01″ N.; long., 79° 23′ 54″ W. Elevation, 113.7 meters. Subsoil: Sand and clay.

Instrument: Milne horizontal pendulum, North; in the meridian.

Instrumental constant.. T_0 18. Pillar deviation, 1 mm. swing of boom=0.50″.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Jan. 20		P?	23 55 42					Marked thickenings.
21		L	0 09 06					
		L	0 25 18					
		eL	0 35 30					
		M	0 37 30		*300			
		eL	0 59 54					
		M	1 05 12		*300			
		F?	1 37 06					
24		eL	1 46 00					Reported from Isle of Bali, Malay Archipelago. Loss of life.
		iL	1 48 30					
		M	1 49 48		*300			
		F	2 15 54					
26		eL	5 46 42					Marked thickenings. Distant earthquake.
		M	5 51 30		*300			
		eL	5 52 54					
		F	6 09 30					
30		e	2 48 18				7,490	Very large disturbance, clear record. A decided marking at $2^h 48^m 18^s$, can not say whether local or not, and a more decided one at $2^h 56^m 36^s$. Very large vibrations $3^h 22^m 48^s$ to $3^h 28^m 18^s$.
		P	2 56 36					
		P	2 58 48					
		S	3 05 30					
		iS	3 11 54					
		iL	3 14 00					
		iL	3 21 06					
		M	3 24 12 / 3 28 18		*35,000			
		Lrep	7 50 54					
		L	7 59 36					
		M	8 01 42		*500			
		F	8 27 48					
31		L	4 40 12		*50			
		F?	4 49 30					
31		P?	4 55 36					
		S?	5 02 48					
		L	5 11 54					
		eL	5 18 06					
		M	5 28 06		*300			
		F	6 05 12					

*Trace amplitude.

Canada. *Victoria, B. C. Dominion Meteorological Service.*

Lat., 48° 24′ N.; long., 123° 19′ W. Elevation, 67.7 meters. Subsoil: Rock.

Instruments: Wiechert, vertical. Milne horizontal pendulum, North; in the meridian.

Instrumental constant.. T_0 18. Pillar deviation: 1 mm. swing of boom=0.54″.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Jan. 20		P?	23 48 03				6,340?	
		S?	23 55 57					
21		M	0 18 46		*200			
		F	0 50 00					
24		L?	1 36 42					
		M	1 41 09		*100			
		F?	1 46 07					
26		P?	5 35 44					
		M	5 39 12		*100			
		F	5 42 10					
30		P	2 53 13				5,280	P and S waves quite large.
		S	3 00 10					
		L	3 04 47					
		M	3 11 04 / 3 11 34		*25,000			
		Lrep	5 39 50					
		M	5 59 11		*600			
		F	7 51 14					
			Vertical.		A_E			
		P	*2 53 00*	*3*				Time of P taken from above record. Only intervals are reliable. Clock time unreliable.
		S	*3 00 00*	*9*				
		L	*3 04 18*	*18*				
		M	*3 07 00*	*30*				
		M	*3 08 00*	*30*	†*60*			
		M	*3 13 42*	*14*	†*80*			
31		P	4 27 40					May be quake apart from one following.
		M	4 29 29		*200			
		F	4 35 26					
31		P	4 46 21				5,820	May be from same region as large quake.
		S	4 53 47					
		L	4 56 46					
		M	5 04 12		*300			
		F?	5 25 31					

*Trace amplitude. † True earth movement.

TABLE 3.—*Late seismological reports.* (*Instrumental.*)

Massachusetts. *Cambridge. Harvard University Seismographic Station.*

[J. B. Woodworth temporarily absent. Records interpreted by U. S. Weather Bureau.]

Lat., 42° 22′ 36″ N.; long., 71° 06′ 59″ W. Elevation, 5.4 meters. Foundation: Glacial sand over clay.

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

Instrumental constants..		*V*	*T₀*	*ε*
	E	80	23	0
	N	50	25	4:1

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1916.			*H. m. s.*	*Sec.*	*μ*	*μ*	*Km.*	
July 8		e_E	9 51 39					
		L_E	10 02 15					
		F	10 50 00					
16		L_E	19 06 00	20				All phases indistinct.
		F	19 40 00					
17		P_E?	10 38 10				4,350?	
		S_E	10 44 17					
		L_E?	10 48 05					
		F	11 00 00					
22		e_E?	6 25 50					
		L_E?	6 33 00					
		F	6 50 00					
22		L_E	16 57 37					
		F	17 20 00					
28		P_E?	17 44 22				2,730?	
		S_E	17 48 45					
		L_E?	17 53 50					
		L_E	17 57 22	16				
		F	18 25 00					
Aug. 3		P_E	1 52 00				8,280	
		S_E	2 01 34					
		L_E	2 08 15					
		L_E	2 41 03					
		F	3 50 00					
3		e_E	14 04 20					
		L_E?	14 08 55					
		F	14 20 00					
3		e_E	14 35 00					All phases indistinct.
		L	14 39 25					
		F	15 10 00					
6		e_E	20 00 08					
		L_E	20 02 36					
		F	20 30 00					
8		e_E?	4 47 40					
		L_E	5 15 00	24				
		F	5 35 00					
18		P_E?	1 20 45				6,075?	
		S_E?	1 28 25					
		L_E?	1 34 40					
		F	1 45 00					
25		P	9 54 53				7,130	P strongest on N–S.
		S	10 03 29					
		L_E	10 10 45	30				
		F	11 20 00					
26		L_E?	11 10 05					
		F	11 30 00					
27		e_E	23 06 15					
		e_E	23 20 55					
		L_E	23 34 47	22				
		F	23 55 00					
28		P_E	6 57 50				4,775	
		S_E	7 04 20					
		L_E	7 23 10	24				
		L_E	7 36 10	20				
		L_E	7 42 30	14				
		L_E	7 45 45	16				
		F	9 15 00					
Sept. 3		S_E?	7 43 12					
		L_E	7 49 24	16				
		L_E	8 12 10	28				
		L_E	8 25 00	16				
		F	9 20 00					
5		L_E	23 06 16	24				
		L_E	23 18 40 / 23 25 00	20				
		F	24 00 00					
1916.			*H m. s.*	*Sec.*	*μ*	*μ*	*Km.*	
Sept. 11		P	6 50 06				8,820	
		S	7 00 07					
		L_E	7 14 02					
		F	8 30 00					
15		P_E	7 13 59				7,960?	
		S_E?	7 23 17					
		L_E	7 36 46					
		L_E	7 54 50	24				
		F	8 30 00					
21		P_E	18 59 50				3,450	
		S_E	19 05 04					
		L	19 08 55	12				
		F	19 30 00					
21		P	19 52 20				2,320?	
		S_E?	19 56 10					
		L_E	19 59 35					
		F	20 15 00					
23		P	5 49 52				3,840	
		S	5 55 30					
		L_E	5 59 20					
		L	6 02 50	20				
		M_E	6 05 30					
		F	7 10 00					
29		P_E?	19 02 14				7,250	
		S_E?	19 10 56					
		L_E?	19 20 36					
		L_E	19 26 00	20				
		F	19 45 00					
Oct. 3		P	1 35 42				6,400	
		S	1 43 40					
		L_E	1 51 00					
		F	4 00 00					
3		P_E?	4 59 00				4,150?	
		S_E?	5 04 56					
		L	5 06 44					
		F	5 25 00					
11		S_E?	11 15 38					
		L_E	11 25 14					
		F	11 40 00					
11		P_E?	18 24 00				3,180	
		S_E	18 28 56					
		L_E	18 31 55					
		F	18 55 ..					F in microseisms.
20		P_E?	17 21 04				9,190?	
		S_E?	17 31 24					
		L_E?	17 38 00					
		L	17 57 00 / 18 32 00	14				
		F	19 30 00					
21		L_E	22 57 00					
		F	23 10 00					
31		P_E	15 42 58				8,475	
		S_E	15 52 42					
		L_E	16 01 30					
		L_E	16 15 52	28				
		L	16 18 00					
		F	17 10 00					
Nov. 10		P	9 20 30				4,225	
		S_E	9 26 30					
		L	9 30 42	16				
		F	10 00 00					
18		L_E	7 31 42					Phases masked by microseisms.
		F	7 45 ..					
21								No record.
24		L_E	12 40 25					Record lost in microseisms.
30		P	3 23 19				3,030	
		S_N	3 27 04					
		S_E	3 27 14					
		L_N	3 30 13	14				
		F_E	5 00 00					
Dec. 4		L_E	17 34 13 / 17 42 30	16				P, S, and F in microseisms.
23		S_E?	9 43 39					Other phases lost in microseisms.
		L_E	10 01 07	16				

TABLE 3.—*Late seismological reports.* (*Instrumental*)—Concluded.

Canada. *Toronto. Dominion Meteorological Service.*

Lat., 43° 40′ 01″ N.; long., 79° 23′ 54″ W. Elevation, 113.7 meters. Subsoil: Sand and clay.

Instrument: Milne horizontal pendulum, North. In the meridian.

Instrumental constant.. T_0 18. Pillar deviation, 1 mm.; swing of boom=0.50″.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1916.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Dec. 2		e	12 49 36					P and S masked by microseisms. Distant quake.
		L	13 07 48					
		eL	13 10 42					
		M	13 18 54		*700			
		F?	14 47 18					
6		L?	22 47 30					Air currents going on.
7		L?	12 19 42		*100			Mixed up with air currents. F in air currents.
14		P?	17 04 42				8,325	Possibly air currents at beginning. Part of quake lost when light was turned down at 17h 43m to attend to instrument.
		S?	17 14 18					
		L	17 20 42					
		L	17 29 06					
		eL	17 30 06					
		eL	17 31 48					
		M	17 35 00		*500			
		eL	17 36 48					
23		iP	9 44 42				7,485	Marked disturbance. S waves prolonged.
		PR	9 47 36					
		S	9 53 36					
		eS	9 56 42					
		S?	10 01 12					
		iL	10 05 30					
		M	10 06 30		*700			
		eL	10 08 06					
		L	10 35 36					
		F	11 27 42					
26		e?	4 24 00					May be preceded by air currents.
		eL	4 40 30					
		M	4 42 18		*200			F in air currents.
26		e?	20 48 36					Distant quake. Gradual and marked swellings.
		e	20 52 30					
		L	21 18 24					
		eL	21 20 00					
		M	21 25 18		*300			
		L	21 42 36					
		F?	21 57 48					
27		e	22 33 18					Air currents masked early phases.
		L	22 43 12					
		eL	22 53 48					
		M	23 00 12		*300			F in air currents.

* Trace amplitude.

Canada. *Victoria, B. C. Dominion Meteorological Service.*

Lat., 48° 24′ N.; long., 123° 19′ W. Elevation, 67.7 meters. Subsoil: Rock.

Instrument: Wiechert, vertical; Milne horizontal pendulum, North. In the meridian.

Instrumental constant.. T_0 18. Pillar deviation, 1 mm.; swing of boom=0.54″.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1916.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Dec. 2		L	12 51 13					
		M	12 58 15		*400			
		F	13 16 01					
5		P?	22 11 54					
		M	22 14 53		*100			
		F?	22 16 51					
6		L?	23 05 30		*50			Minute thickenings.
6		P?	22 41 37					
		L	22 42 37					
		M	22 43 07		*100			
		F	22 44 37					
7		L	12 20 12		*50			
		F	12 26 12					
14		P?	17 05 09				3,220	
		S?	17 10 07					
		L	17 12 35					
		M	17 18 33		*200			
		F	18 14 04					
23		P?	9 48 10				8,700?	
		S?	9 58 05					
		L?	10 06 01					
		M	10 15 56		*500			
		F	11 10 59					
26		L?	4 27 36					
		M	4 37 02		*200			F?
26		e	20 42 24					Some small movements before 20h 42m 24s, but impossible to measure. Gradual marked swellings.
		L	20 54 24					
		M	21 05 24		*500			
		eL	21 11 06					
		F	21 17 48					
27		L	22 27 43					
		M	22 35 39		*500			
		F?	22 45 33					

* Trace amplitude.

SEISMOLOGICAL DISPATCHES.[1]

Moodus, Conn. (*belated dispatch*) [*Dec. 2, 1916*].

Distinct earthquake shocks were felt here on December 2 between 4 and 5 o'clock a. m. Homes were shaken and dishes rattled. (Local observer.)

Knoxville, Tenn, Janaurj 2, 1917.

A seismic disturbance accompanied by a noise resembling a peal of thunder, in a wide area of which Mascot, Tenn., was the center, occurred at 4:30 this morning. The earthshock was of pronounced intensity and caused much alarm. No material damage. (Assoc. Press.)

[It has been found that this disturbance was due to a heavy dynamite explosion near McMillan, Tenn.]

Unionville, Humboldt County, Nev., January, 1917.

Mr. G. A. Bice reports the following: A very heavy quake at 11:30 a. m. and light ones at 5:40 p. m., 6:06 p. m., and 6:19 p. m. on December 24, 1916; light shocks at 7:05 a. m., 6 p. m., and 6:55 p. m., December 25; very heavy shocks at 9:40 a. m. and 10:50 p. m., December 26. Pacific time.

Montreal, Quebec, January 5, 1917.

Earthquake tremors were felt here late to-night, the section of the city affected being along the higher levels at the foot of the mountain. (Assoc. Press.)

Tokyo, Japan, January 6, 1917.

Three hundred persons have been killed and many injured in a disastrous earthquake in central Formosa, according to special dispatches from Taihoku, the capital of Formosa. It is estimated that 1,000 houses have been destroyed. The city of Nanto has been damaged extensively by fire. (Assoc. Press.)

London, January 25, 1917, 4:05 p. m.

Fifty natives were killed and 200 others were injured in an earthquake on the island of Bali, in the Malay Archipelago, according to a dispatch from Amsterdam to the Central News. More than 1,000 houses and factories and the native temples were destroyed. The governor's palace was seriously damaged. (Assoc. Press.)

Montreal, Quebec, January 26, 1917.

An earthquake shock which continued for 15 seconds rocked this district this afternoon. Buildings shook throughout the city, causing considerable alarm among office tenants in the business section, where high structures stand. (Assoc. Press.)

Ottawa, Ontario, January 26, 1917.

Earthquake tremors were recorded here for 4 seconds this afternoon. (Assoc. Press.)

Ogdensburg, N. Y., January 26, 1917.

Slight earth tremors lasting 2 seconds were felt here at 2:34 p. m. to-day. (Assoc. Press.)

Redding, Cal., January 27, 1917.

Lassen Peak has erupted with tremendous force, following a series of violent internal explosions, according to reports telephoned here from Macoumber Flat. A stream of heavy black smoke 20 miles long poured out within half an hour, indicating that a greater crater on the mountain top had been blasted open. (Assoc. Press.)

The Dutch S. S. *Tjikembang*—Nagasaki toward Hongkong—reports that on Oct. 18, 1916, at 21h 16m G. M. T., latitude 29° 29′ N., longitude 125° 11′ E., in 45 fathoms of water, a subdued blow was heard, after which the ship began to shake as if it would break in two. One blade of the propeller was broken but no scratch could be found on the hull. (Abstract from report to U. S. Hydrographic Office.)

[Perhaps due to breaking of propeller.—EDITOR.]

CORRIGENDUM.

Instrumental report, Sacred Heart College, MONTHLY WEATHER REVIEW, October, 1916: Page 591, date should be 1916.

[1] Reported by the organization indicated and collected by the seismological station at Georgetown University, Washington, D. C.