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.
PRn = P waves reflected n times at the earth's surface.
S = (undæ secundæ) = second preliminary tremors.
SRn = 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_{rep_1} = Long waves reaching the station from the antiepicenter (40,000 km. − Δ).
L_{rep_2} = 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 T₀; E 10 16; N 10 15

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H m. s.	*Sec.*	*μ*	*μ*	*Km.*	
1917. Jan. 30	.....	eP.....	2 51 56	.....	.....	.....	.....	Microseisms Jan. 7–9.
		S.....	2 57 16	.....	.....	.....	.....	
		eL.....	3 01 ..	.....	.....	.....	.....	
		M_E.....	3 05 41	16	.....	530	.....	
		M_N.....	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 T₀; E 10 13.9; N 10 19.1

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H m. s.	*Sec.*	*μ*	*μ*	*Km.*	
1917. Jan. 30	.....	P.....	2 56 08	.....	.....	.....	.....	
		eS_E.....	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.
			H m. s.	*Sec.*	*μ*	*μ*	*Km.*	
1917. 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.
			H. m. s.	*Sec.*	*μ*	*μ*	*Km.*	
1917. 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_t...	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 38 ..	.....	.....	.....	.....	
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 110 T₀ 6.4

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	*μ*	*μ*	*Km.*	
1917. 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 to 3 35 00	20	.....	.....	.....	
		L.....	3 35 00 to 3 45 00	18	.....	.....	.....	
		F.....	6 30 00	.....	.....	.....	.....	
31	.....	P?.....	4 19 23	.....	.....	.....	.....	Phases indistinct.
		S?.....	4 22 42	.....	.....	.....	.....	
		L.....	5 03 08 to 5 11 00	30	.....	.....	.....	
		L.....	5 12 00 to 5 20 00	20	.....	.....	.....	
		F.....	5 45 00	.....	.....	.....	.....	

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

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_H	Amplitude. A_N	Distance.	Remarks.

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*	*5.0*	*0*

1917.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Jan. 26	.....	e_N	19 39 29	.....	.....	.....	.....	Heavy microseisms present.
		e_E	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

1917.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Jan. 4	.....	eL	17 25 42	.....	.....	.....	.....	
		M	17 36 12	17	*100	.....	.....	
		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.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_H	Amplitude. A_N	Distance.	Remarks.

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

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	103	.....	.....
		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

1917			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Jan. 26	.....	*O*	*19 36 02*	.....	.....	.....	4107	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.
		eP?	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	T_0	ε
	80	7	5:1

1917.			*H. m. s.*	*Sec.*	μ	μ	*Km.*
Jan. 30	III_0	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.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
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..				V: E 72, N 72	T_0: 6.6, 7.1	ε: 1.5:1, 3.8:1		
1917. Jan. 30	.....	eP.....	*H. m. s.* 2 52 33	*Sec.*	μ	μ	*Km.*	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..				V: E 13, N 14	T_0: 22, 25	ε: 4:1, 4:1		
1917. Jan. 30	.....	P_N....	*H. m. s.* 2 56 45	*Sec.* 4–7	μ	μ	*Km.*	
		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..				V: E 10, N 10	T_0: 18, 18			
1917. Jan. 6	.....	eL_E....	*H. m. s.* 21 42 03	*Sec.*	μ	μ	*Km.*	
		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 ..	.....	.....	.....	.....	

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
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..				V: E 10, N 10	T_0: 15, 16			
1917. Jan. 26	.....	e.....	*H. m. s.* 19 36 38	*Sec.*	μ	μ	*Km.*	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			
1917. Jan. 26	.....	O.....	*H. m. s.* 19 35 50	*Sec.*	μ	μ	*Km.* 180	Local shock. Not severe.
		P_E....	19 36 17	.....	.....	.....	.....	Some things rattled in places.
		P.....	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	.....	.....	.....	.....	
		o_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.
			H. m. s.	*Sec.*	μ	μ	*Km.*	
1917.								
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.
		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	.....	.....	Very large vibrations 3^h 22^m 48^s to 3^h 28^m 18^s.
		L_{Rep}..	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.
			H. m. s.	*Sec.*	μ	μ	*Km.*	
1917.								
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	.....	.....	
		L_{Rep}..	5 39 50	.....	.....	.....	.....	
		M.....	5 59 11	.....	*600	.....	.....	
		F.....	7 51 14	.....	.....	.....	.....	
			Vertical.		A_Z			
		P.....	*2 55 00*	*8*	.....	.....	.....	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*	*50*	†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.. {E 80 23 0 / N 50 25 4:1} (V, T_0, e)

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*Km.*	
1916. 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					

Massachusetts. *Cambridge. Harvard University Seismographic Station*—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*Km.*	
1916. 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_E	3 27 04					
		S_E	3 27 14					
		L_E	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.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
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″.								
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.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
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″.								
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, January 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.

SECTION V.—SEISMOLOGY.

SEISMOLOGICAL REPORTS FOR FEBRUARY, 1917.

W. J. HUMPHREYS, Professor in charge.

[Dated: Weather Bureau, Washington, D. C., April 3, 1917.]

TABLE 1.—*Noninstrumental earthquake reports, February, 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.*			
Feb. 1	5 18	Santa Maria	34 58	120 28	4	2	10	None		R. E. Collom.
9	15 28	San Jose	37 20	121 54	3	1	2	None		U. S. Weather Bureau.
		MINNESOTA.								
6	17 46	Red Lake	47 55	95 00	4	1	1 0	Rumbling		A. C. Goddard.

TABLE 2.—*Instrumental reports, February, 1917.*

[Time used: Mean Greenwich, midnight to midnight. Nomenclature: International.]

[For significance of symbols see REVIEW for January, 1917, p. 26.]

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 16.7; N 10 15.4

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Feb. 20	.....	eP_N	19 47 02	10	.....	.....	.....	Preliminary phases uncertain. Times are more reliable for N–S. Drum motion on E-W appears irregular.
		eP_E	19 48 00	.....	.....	.....	.....	
		L_W	19 58 35	27	.....	.....	.....	
		L_E	19 59 28	18	.....	.....	.....	
		M_N	20 01 50	16	.....	5350	.....	
		M_E	20 02 17	14	760	.....	.....	
		C_N	20 04 25	12	.....	.....	.....	
		C_E	20 05 17	10	.....	.....	.....	
		F_E	20 46 00	.....	.....	.....	.....	
		F_N	20 51 00	.....	.....	.....	.....	

Arizona. *Tucson.* *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.*	
Feb. 20	.....	eP_E	19 36 10	4	.....	.....	.....	
		eP_N	19 36 13	4	.....	.....	.....	
		S_E	19 43 00	8	.....	.....	.....	
		S_N	19 43 30	8	.....	.....	.....	
		L_N	19 50 12	13	.....	.....	.....	
		L_E	19 50 20	10	.....	.....	.....	
		M_N	19 51 30	14	.....	320	.....	
		M_E	19 55 10	10	190	.....	.....	
		C_N	19 58 00	10	.....	.....	.....	
		C_E	19 59 00	8	.....	.....	.....	
		F_E	20 38 00	10	.....	.....	.....	
		F_N	20 44 00	8	.....	.....	.....	

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.*	
Feb. 3	.....	.....	.....	.....	*300	*300	.....	Tremors recorded during 24 hours preceding 15h on dates given.
16	.....	.....	.....	.....	*150	*300	.....	
27	.....	.....	.....	.....	*200	*400	.....	

* Trace amplitude.

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.)

TABLE 2.—*Instrumental reports, February, 1917*—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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.

Instrumental constants.....

1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Feb. 1	.....	.....	19 39 ..	.....	.....	.....	.....	Wavelets, thickening of penmarks, especially on N-S.
		.....	19 48 ..	.....	.....	.....	.....	
1	.....	.....	23 52 ..	.....	.....	.....	.....	Small irregular waves on N-S.
		.....	23 59 ..	.....	.....	.....	.....	
2	.....	.....	1 20 ..	.....	.....	.....	.....	Recurrence of small irregular waves on N-S.
		.....	1 25 ..	.....	.....	.....	.....	
3	.....	.....	0 30 ..	.....	.....	.....	.....	Wavelets, thickening of penmarks, especially on N-S.
		.....	2 20 ..	.....	.....	.....	.....	
5	.....	.....	1 00 ..	.....	.....	.....	.....	Distinct but very irregular waves on N-S.
		.....	1 32 ..	.....	.....	.....	.....	
9–10	.....	.....	.....	.....	.....	.....	.....	Activity at intervals during day on both components.
20	III,	P.....	19 38 ..	.....	.....	.....	.....	Good record, but S can not be identified to a certainty.
		L_N....	19 47 ..	15–20	.....	.....	.....	
		M_N....	19 47 ..	20	.....	*9050	.....	
		L_E....	19 49 ..	15–20	.....	.....	.....	
		M_E....	19 50 ..	20	*8500	.....	.....	
		C_E....	19 55 ..	.....	.....	.....	.....	
		C_N....	19 56 ..	.....	.....	.....	.....	
		F.....	20 28 ..	.....	.....	.....	.....	

* 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.

	V	T_0
Instrumental constants..	110	6.4

1917.			*M. m. s.*	*Sec.*	μ	μ	*km.*	
Feb. 12	.....	eL_E....	10 05 40	20	.....	.....	.....	Record does not show on N-S.
		L_E.....	10 13 40	16	.....	.....	.....	
		F.....	10 30 00	.....	.....	.....	.....	
15	I_N.....	P.....	0 59 36	.....	.....	.....	7,640	
		S.....	1 08 38	.....	.....	.....	.....	
		L.....	1 16 12	14	.....	.....	.....	
		L.....	1 18 04	20	.....	.....	.....	
		L.....	1 30 24	20	.....	.....	.....	
		F.....	2 00 00	.....	.....	.....	.....	
20	III, ..	iP.....	19 34 09	.....	.....	.....	2,210	Amplitudes very large; pens went off sheet occasionally. From 19h 40m to 19h 46m amplitudes of from 4—8 cm. F merges in succeeding quake.
		S.....	19 37 50	.....	.....	.....	.....	
		L.....	19 54 00 } 21 00 00 }	14	.....	.....	.....	
		F.....	21 35 00	.....	.....	.....	.....	
20	I_E.....	P?.....	20 57 45	.....	.....	.....	2,110?	Amplitude of 5μ from 21h 4m to 21h 8m. F in end of preceding quake.
		S?.....	21 01 18	.....	.....	.....	.....	
		F?.....	21 20 ..	.....	.....	.....	.....	

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

District of Columbia. *Washington. Georgetown University.* F. A. 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	*e*
	E	165	5.4	0
	N	143	5.2	0
	Z	*80*	*5.0*	*0*

1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Feb. 15	.....	P.....	0 59 30	.....	.....	.....	.....	Microseisms present. S possibly 10–15 seconds sooner. No distinct maximum.
		S_E.....	1 09 02	.....	.....	.....	.....	
		S_N.....	1 09 03	.....	.....	.....	.....	
		eL.....	1 24 08	.....	.....	.....	.....	
		F.....	1 54 00	.....	.....	.....	.....	
20	.....	P_E.....	19 34 15	.....	.....	.....	.....	Time markings poor because of intensity of quake; hence possible error of 2–3 seconds.
		iP_N....	19 34 17	.....	.....	.....	.....	
		S_E.....	19 37 52	.....	.....	.....	.....	
		S_N.....	19 38 06	.....	.....	.....	.....	
		eL.....	19 38 34	.....	.....	.....	.....	
		M_E....	19 40 22	8	*48,000	.....	.....	
		M_N....	19 40 22	7	.....	*49,000	.....	Good record with large amplitudes also obtained on Bosch-Omori machine.
		M_E....	19 41 08	13	*130,000	.....	.....	F last in second quake.
				VERTICAL.				
					A_Z			
		iP.....	*19 34 15*	.....	.....	.....	.....	
		S.....	*19 37 54*	.....	.....	.....	.....	
		eL.....	*19 38 38*	.....	.....	.....	.....	
		M.....	*19 41 21*	*8*	*14,000*	.....	.....	
		M.....	*19 48 00*	*8*	*11,000*	.....	.....	
		F?.....	*20 57 00*	.....	.....	.....	.....	F in second quake.
20	.....	e_N?....	20 58 00	.....	.....	.....	.....	e and S doubtful because confused with preceding quake.
		e_E?....	20 58 06	.....	.....	.....	.....	
		S.....	21 04 07	.....	.....	.....	.....	
		eL.....	21 07 28	.....	.....	.....	.....	
		F.....	21 21 00	.....	.....	.....	.....	
				VERTICAL.				
		e.....	*20 58 32*	.....	.....	.....	.....	Phases confused with preceding quake.
		L.....	*21 07 14*	.....	.....	.....	.....	
		F.....	*21 13 00*	.....	.....	.....	.....	

* Trace amplitude.

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

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.

	T_0
Instrumental constant..	18 6

1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Feb. 4	.....	L.....	11 06 30	.....	.....	.....	.....	
		M.....	11 08 00	.....	*100	.....	.....	
		F.....	11 19 00	.....	.....	.....	.....	
5	.....	L.....	12 49 48	.....	.....	.....	.....	
		M.....	12 56 00	.....	*200	.....	.....	
		F.....	13 10 00	.....	.....	.....	.....	
10	.....	L.....	17 28 00	.....	.....	.....	.....	
		M.....	17 29 24	.....	*100	.....	.....	
		F.....	17 31 00	.....	.....	.....	.....	

* Trace amplitude.

TABLE 2.—*Instrumental reports, February, 1917*—Continued.

Hawaii. *Honolulu. Magnetic Observatory.* U. S. Coast and Geodetic Survey—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*km.*	
1917. Feb. 12	.....	P	9 13 12	.....	.....	.....	.....	
		S	9 20 54	.....	.....	.....	.....	
		L	9 27 48	25	.....	.....	.....	
		M	9 32 12	.....	*2,300	.....	.....	
		C	9 34 42	.....	.....	.....	.....	
		F	11 24 00	.....	.....	.....	.....	
12	.....	L	23 24 00	.....	.....	.....	.....	
		M	23 27 12	.....	*200	.....	.....	
		F	23 32 06	.....	.....	.....	.....	
15	.....	P	1 07 00	.....	.....	.....	.....	Tremors in end portion from 2h 32m to 2h 48m, may be a seismic tremor.
		S	1 20 48	.....	.....	.....	.....	
		L	1 33 30	25	.....	.....	.....	
		M	1 38 30	.....	*1,900	.....	.....	
		C	1 44 18	.....	.....	.....	.....	
		F	3 32 00	.....	.....	.....	.....	
18	.....	L	1 44 00	.....	.....	.....	.....	
		M	1 45 18	.....	*100	.....	.....	
		F	1 50 00	.....	.....	.....	.....	
18	.....	L	1 56 12	.....	.....	.....	.....	
		M	2 04 00	.....	*100	.....	.....	
		F	2 20 00	.....	.....	.....	.....	
20	.....	L	3 32 12	.....	.....	.....	.....	
		M	3 37 54	.....	*200	.....	.....	
		F	3 42 00	.....	.....	.....	.....	
20	.....	P	19 51 30	.....	.....	.....	.....	
		L	20 04 30	30	.....	.....	.....	
		M	20 17 54	.....	*100	.....	.....	
		C	20 28 48	.....	.....	.....	.....	
		F	22 24 00	.....	.....	.....	.....	
21	.....	P	10 14 00	.....	.....	.....	.....	
		L	10 26 30	24	.....	.....	.....	
		M	10 31 30	.....	*300	.....	.....	
		C	10 35 24	.....	.....	.....	.....	
		F	10 48 30	.....	.....	.....	.....	
21	.....	L	14 26 18	.....	.....	.....	.....	
		M	14 30 06	.....	*300	.....	.....	
		F	14 43 00	.....	.....	.....	.....	
22	.....	P	9 36 30	.....	.....	.....	.....	
		S	9 44 00	.....	.....	.....	.....	
		L	9 56 42	24	.....	.....	.....	
		M	10 01 24	.....	*500	.....	.....	
		C	10 05 18	.....	.....	.....	.....	
		F	11 15 00	.....	.....	.....	.....	
25	.....	P	5 41 24	.....	.....	.....	.....	
		L	6 00 30	21	.....	.....	.....	
		M	6 03 18	.....	*400	.....	.....	
		M	6 27 00	.....	*400	.....	.....	
		M	6 32 42	.....	*400	.....	.....	
		C	6 35 00	.....	.....	.....	.....	
		F	6 56 00	.....	.....	.....	.....	
26	.....	L	9 20 30	.....	.....	.....	.....	
		M	9 22 48	.....	*100	.....	.....	
		F	9 34 00	.....	.....	.....	.....	

*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.. {E: V 177, T_0 3.4, ϵ 4:1; N: V 205, T_0 3.4, ϵ 4:1}

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*km.*	
1917. Feb. 20	.....	P	19 35 06	4–5	1	1	.....	Amplitude of P waves about 15 sec. later, 25 to 30 μ.
		S	19 39 32	10–12	.....	.....	.....	
		L_E?	19 42 51	.....	.....	.....	.....	
		L_N?	19 43 10	.....	.....	.....	.....	
		M_N	19 44 07	10–15	.....	133	.....	
		M_E	19 44 12	10–15	97	.....	.....	
		F	21 16 00	.....	.....	.....	.....	

Maryland. *Cheltenham. Magnetic Observatory.* U. S. Coast and Geodedetic 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.. {E: V 10, T_0 32; N: V 10, T_0 27}

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*km.*	
1917. Feb. 15	.....	eI_N	1 21 30	22	.....	.....	.....	
		M_N	1 30 16	20	.....	10	.....	
		C_N	1 36 00	.....	.....	.....	.....	
20	.....	P_N	19 31 10	3	.....	.....	.....	
		P_E	19 34 14	3	.....	.....	.....	
		S_N	19 37 50	4	.....	.....	.....	
		S_E	19 37 53	4	.....	.....	.....	
		L_E	19 40 11	18	.....	.....	.....	
		eL_N	19 40 51	16	.....	.....	.....	
		M_E	19 41 16	14	3,180	.....	.....	
		M_N	19 42 20	14	.....	1,200	.....	
		C_E	19 46 00	12	.....	.....	.....	
		C_N	19 48 00	8	.....	.....	.....	
		F_E	20 41 00	12	.....	.....	.....	
		F_N	20 47 00	12	.....	.....	.....	

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.. {E: V 80, T_0 23, ϵ 0; N: V 50, T_0 25, ϵ 4:1}

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*km.*	
1917. Feb. 15	.....	*O*	*0 49 54*	.....	.....	.....	6,990?	P and S do not agree well with Ottawa and Georgetown.
		eP_N	1 00 01	.....	.....	.....	.....	
		eP_E	1 00 34	.....	.....	.....	.....	
		S_E?	1 08 20	.....	.....	.....	.....	
		S_N?	1 09 29	.....	.....	.....	.....	
		eL_E?	1 17 53	22	.....	.....	.....	
		eL_E	1 20 54	10	.....	.....	.....	
		eL_N	1 23 21	.....	.....	.....	.....	
		eL_E	1 31 32	20	.....	.....	.....	
20	.....	*O*	*19 27 54*	.....	.....	.....	2,090	N-S record preferred, as there is doubt about setting of stylus on E-W.
		O	*19 28 10*	.....	.....	.....	.....	
		eP_E	19 34 37	.....	.....	.....	.....	
		IP_N	19 34 53	.....	.....	.....	.....	
		S_E	19 38 57	.....	.....	.....	.....	
		S_N	19 39 15	.....	.....	.....	.....	
		eL_N	19 42 —	.....	.....	.....	.....	
		eL_E	19 43 26	.....	.....	.....	.....	

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.

Instrument: 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.
			H. m. s.	*Sec.*	μ	μ	*km.*	
1917. Feb. 20	IIL_r	P	19 34 42	.....	.....	.....	2,400	
		S	19 38 36	.....	.....	.....	.....	
		L	19 39 36	.....	.....	.....	.....	
		F	20 57 00	.....	.....	.....	.....	

TABLE 2.—*Instrumental reports, February, 1917*—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

New York. *Buffalo. Canisius College.* John A. Curtin, S. J.

Lat., 42° 53′ 02″ N.; long., 78° 52′ 40″ W. Elevation, 190.5 meters.

Instrument: Wiechert, 80 kg., horizontal.

	V	T_0	ε
Instrumental constants	80	7	5:1

(Report for February, 1917, not received.)

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.

		V	T_0	ε
Instrumental constants	E	72	7.2	1.5:1
	N	72	7.2	3.8:1

(Report for February, 1917, not received.)

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).

		V	T_0	ε
Instrumental constants	E	13	22	4:1
	N	14	25	4:1

1917.			H. m. s.	Sec.	μ	μ	km.	
Feb. 20	.....	P.....	19 35 13	4	.....	.....	.....	
		S_E.....	19 39 23	8	.....	.....	.....	
		S_N.....	19 39 24	7–14	.....	.....	.....	
		M_E.....	19 44 12	13	*57000	.....	.....	E-W pen went off drum.
		M_N.....	19 44 12	12	.....	*21000	.....	
		F_E.....	20 13 00	.....	.....	.....	.....	
		F_N.....	20 20 00	.....	.....	.....	.....	

* Trace amplitude.

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.

	V	T_0
Instrumental constants	10	20

1917.			H. m. s.	Sec.	μ	μ	km.	
Feb. 5	.....	P_K.....	6 09 14	.....	.....	.....	233	Direction SW. or NE.
		P_E.....	6 09 16	.....	.....	.....	.....	
		L_N.....	6 09 40	.....	.....	.....	.....	
		L_E.....	6 09 42	.....	.....	.....	.....	
		M_E.....	6 09 42	.....	400	.....	.....	
		M_N.....	6 09 50	.....	.....	380	.....	
		F_N.....	6 14 26	.....	.....	.....	.....	
		F_E.....	6 14 28	.....	.....	.....	.....	
20	.....	P_N.....	19 32 14	.....	.....	.....	1,680	Direction unknown.
		P_E.....	19 32 19	.....	.....	.....	.....	
		S_E.....	19 34 10	.....	.....	.....	.....	
		S_N.....	19 35 14	.....	.....	.....	.....	
		L_E.....	19 36 43	.....	.....	.....	.....	
		M_E.....	19 37 02	.....	4,500	.....	.....	
		L_N.....	19 37 31	.....	.....	.....	.....	
		M_N.....	19 37 48	.....	.....	3,900	.....	
		F_E.....	20 15 00	.....	.....	.....	.....	
		F_N.....	20 18 00	.....	.....	.....	.....	
26	.....	P.....	3 57 54	.....	.....	.....	315	No record on N-S, clock stopped.
		L.....	3 58 28	.....	.....	.....	.....	
		M.....	3 58 30	.....	240	.....	.....	
		F.....	4 03 06	.....	.....	.....	.....	

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

Lat., 18° 09′ N.; long., 65° 27′ W. Elevation, 19.8 meters.

Instruments: Two Bosch-Omori.

		V	T_0
Instrumental constants	E	10	17.5
	N	10	18.0

1917.			H. m. s.	Sec.	μ	μ	km.	
Feb. 9	.....	P.....	7 15 16	3	.....	.....	.....	Local shock, not felt.
		M.....	7 15 30	3	20	20	.....	
		F_E.....	7 17 00	.....	.....	.....	.....	
		F_N.....	7 18 30	.....	.....	.....	.....	
12	.....	e_N.....	20 06 28	2	.....	.....	.....	
		e_E.....	20 06 31	2	.....	.....	.....	
		M.....	20 06 41	2	40	30	.....	
		F.....	20 10 00	.....	.....	.....	.....	
15	.....	e.....	0 57 00	.....	.....	.....	.....	
		M_E.....	1 18 00	20	10	.....	.....	
		M_N.....	1 19 30	20	.....	20	.....	
		F_N.....	1 32 00	.....	.....	.....	.....	
		F_E.....	1 38 00	.....	.....	.....	.....	
20	.....	P_E.....	20 32 35	7	.....	.....	.....	The stylus of N-S went off the sheet at 20h 39m 40s and did not free itself until 20h 50m 30s. Amplitude to edge of paper, 6,500 μ.
		P_N.....	20 32 40	8	.....	.....	.....	
		L_N.....	20 35 25	17	.....	.....	.....	
		L_E.....	20 35 29	20	.....	.....	.....	
		M_E.....	20 38 40	18	3,380	.....	.....	
		C_E.....	20 42 00	13	.....	.....	.....	
		F_E.....	22 35 00	.....	.....	.....	.....	
		F_N.....	22 45 00	.....	.....	.....	.....	

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.

		V	T_0
Instrumental constants:	E	10	15
	N	10	16

1917.			H. m. s.	Sec.	μ	μ	Km.	
Feb. 15	.....	e?.....	0 59 30	.....	.....	.....	.....	
		S?.....	1 08 27	.....	.....	.....	.....	
		F.....	1 20 00	.....	.....	.....	.....	
20	H_T.....	P.....	19 35 06	.....	.....	.....	2,960	
		S.....	19 39 46	.....	.....	.....	.....	
		L.....	19 43 20	20	.....	.....	.....	
		M_E.....	19 45 00	.....	2900	.....	.....	
		M_N.....	19 45 30	.....	.....	1900	.....	
		F.....	21 10 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 80 kg. vertical seismograph.

	V	T_0
Instrumental constants:	120	26

1917.			H. m. s.	Sec.	μ	μ	km.	
Feb. 12	.....	e?.....	9 38 20	.....	.....	.....	.....	Strong microseisms mask phases on N-S.
		eL_E...	10 00 00	30	.....	.....	.....	
		eL_N...	10 05 00	20	.....	.....	.....	
		L_N.....	10 13 00	20	.....	.....	.....	
		L_E.....	10 17 00	18	.....	.....	.....	
		F.....	.....	.....	.....	.....	.....	
15	.....	*O*.....	*0 48 53*	.....	.....	.....	8,420	
		P.....	1 00 16	4	.....	.....	.....	
		S_N.....	1 09 57	.....	.....	.....	.....	
		S_E.....	1 09 58	.....	.....	.....	.....	
		eL.....	1 22 00	30	.....	.....	.....	
		L.....	1 26 00	30	.....	.....	.....	
		L.....	1 32 00	20	.....	.....	.....	
		L.....	1 37 00	17	.....	.....	.....	
		L.....	1 50 00	15	.....	.....	.....	
		F.....	2 15 00	.....	.....	.....	.....	

TABLE 2.—*Instrumental reports, February, 1917*—Continued.

Canada. *Ottawa. Dominion Astronomical Observatory.* Earthquake Station—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*km.*	
1917. Feb. 20	.....	O.....	19 29 31	.....	.....	.....	2,900	
		iP.....	19 35 18	.....	.....	.....	.....	
		eP.....	19 35 22	.....	.....	.....	.....	
		S.....	19 39 54	.....	.....	.....	.....	
		eL.....	19 43 42	.....	.....	.....	.....	
		M.....	19 45 18	12	350	200	.....	
		L_N.....	20 00 00	17	.....	.....	.....	
		L.....	{20 12 00 / 20 17 00}	11	.....	.....	.....	
		L_N.....	20 26 00	12	.....	.....	.....	
		L_N.....	20 45 00	12	.....	.....	.....	
		F.....	21 30 00	.....	.....	.....	.....	

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.. $\frac{T_0}{18}$. Pillar deviation, 1 mm. swing of boom=0.50″.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. μ	Distance.	Remarks.
1917. Feb. 12	.....	e?.....	*H. m. s.* 9 48 00	*Sec.*	.....	*km.*	
		L.....	10 02 30	.....	.....	.....	
		eL.....	10 08 12	.....	.....	.....	
		M.....	10 14 54	.....	*1300	.....	
		F?.....	10 50 30	.....	.....	.....	
12	.....	L?.....	11 20 18	.....	*50	.....	Doubtful as to being seismic.
		F.....	11 31 30	.....	.....	.....	
14	.....	L.....	5 40 06	.....	*100	.....	
		F?.....	6 02 30	.....	.....	.....	
15	.....	P.....	0 59 36	.....	.....	.....	Beginning of P not well defined.
		S.....	1 08 30	.....	.....	.....	
		L.....	1 26 18	.....	.....	.....	
		L.....	1 32 30	.....	.....	.....	
		M.....	1 44 36	.....	*400	.....	
		L.....	2 36 12	.....	.....	.....	
		F?.....	3 22 00	.....	.....	.....	
20	.....	P?.....	19 36 00	.....	.....	.....	Minute P waves.
		iS.....	19 39 24	.....	.....	.....	Beginning very indistinct.
		iL.....	19 42 24	.....	.....	.....	
		M.....	{19 44 30 / 19 45 30}	.....	*25000	.....	Marked large disturbance.
		iL.....	20 10 18	.....	.....	.....	Possibly in West Indies of submarine origin.
		iL.....	20 22 00	.....	.....	.....	
		F.....	21 50 00	.....	.....	.....	
21	.....	e.....	10 01 54	.....	.....	.....	Slight thickenings.
		L.....	10 26 54	.....	.....	.....	
		L.....	10 45 18	.....	*50	.....	
		F.....	10 58 48	.....	.....	.....	
21	.....	L.....	15 10 48	.....	*100	.....	Thickening.
		F.....	15 19 30	.....	.....	.....	
22	.....	eL.....	9 33 54	.....	.....	.....	
		L.....	10 06 42	.....	*200	.....	
		L.....	10 20 00	.....	.....	.....	
		F.....	10 53 36	.....	.....	.....	
25	.....	L.....	6 32 00	.....	.....	.....	Minute thickenings at intervals.
		L.....	6 51 30	.....	*50	.....	
		F.....	7 18 42	.....	.....	.....	

* 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.. $\frac{T_0}{18}$. Pillar deviation, 1 mm., swing of boom=0.54″.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. μ	Distance.	Remarks.
1917. Feb. 12	.....	P.....	*H. m. s.* 9 27 39	*Sec.*	.....	*km.* 3,470	
		S.....	9 32 54	.....	.....	.....	
		L.....	9 38 03	.....	.....	.....	
		M.....	9 54 55	.....	*500	.....	
		F.....	10 18 17	.....	.....	.....	
14	.....	M.....	5 39 10	.....	*50	.....	
15	.....	P?.....	1 12 55	.....	.....	.....	
		S?.....	1 18 22	.....	.....	.....	
		L.....	1 25 39	.....	.....	.....	
		M.....	1 49 11	.....	*1,500	.....	
		F.....	2 54 34	.....	.....	.....	

* Trace amplitude.

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

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917.			*H. m. s.*		μ	μ	*km.*	
			VERTICAL.					
Feb. 15	.....	M.....	*1 40 —*	*15*	A_Z †6	.....	.....	
20	.....	P?.....	19 36 57	.....	.....	.....	.....	
		iP.....	19 40 25	.....	.....	.....	.....	
		S.....	19 45 23	.....	.....	.....	.....	
		iS.....	19 48 51	.....	.....	.....	.....	
		iL.....	19 56 03	.....	.....	.....	.....	
		L.....	19 58 51	.....	.....	.....	.....	
		M.....	20 02 44	.....	*3000	.....	.....	
		L.....	20 16 03	.....	.....	.....	.....	
		F.....	21 08 41	.....	.....	.....	.....	
			VERTICAL.					
					A_Z			
		P?.....	*19 37 30*	*6*	.....	.....	.....	
		S?.....	*19 41 00*	*6*	.....	.....	.....	
		L.....	*19 45 40*	*10-12*	.....	.....	.....	
		M.....	*20 02 40*	*10*	†47	.....	.....	
21	.....	L.....	10 29 28	.....	.....	.....	.....	Probably part of long-distance quake.
		M.....	10 33 31	.....	*100	.....	.....	
		F?.....	10 37 29	.....	.....	.....	.....	
21	.....	M.....	14 53 21	.....	*200	.....	.....	
22	.....	L.....	9 59 23	.....	.....	.....	.....	
		M.....	10 03 51	.....	*300	.....	.....	
		F.....	10 15 15	.....	.....	.....	.....	
25	.....	P?.....	6 42 16	.....	.....	.....	.....	
		L.....	6 45 44	.....	.....	.....	.....	
		M.....	6 47 43	.....	*300	.....	.....	
		F.....	6 56 38	.....	.....	.....	.....	

* Trace amplitude. † True earth movement.

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

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	4:1
N	205	3.4	4:1

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. μ	Distance.	Remarks.
1916. Nov. 21	.....	P_E.....	*H. m. s.* 6 30 46	*Sec.* 1–2	.....	*km.*	N–S component out of order.
		S_E.....	6 34 58	2–15	.....	.....	
		L_E.....	6 39 07	.....	.....	.....	
		M_E.....	6 43 29	6–8	1	.....	
		F.....	7 50 00	.....	.....	.....	

(No record in December, 1916.)

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917. Jan. 30	.....	P_E.....	*H. m. s.* 2 56 13	*Sec.*	.....	.....	*km.*	
		P_E.....	2 56 23	.....	.....	.....	.....	
		P_N.....	2 56 24	.....	.....	.....	.....	
		S_N.....	3 04 50	.....	.....	.....	.....	
		S_E.....	3 04 52	.....	.....	.....	.....	
		L_E.....	3 13 33	20–40	.....	.....	.....	
		L_N.....	3 14 22	20–40	.....	.....	.....	
		M_E.....	3 21 39	20	66	.....	.....	
		M_N.....	3 22 07	20	.....	20	.....	
		F.....	5 37 00	.....	.....	.....	.....	

SEISMOLOGICAL DISPATCHES.[1]

Murcia, Spain. (*Belated dispatch.*)

An earth movement in an east-west direction, which lasted for 3 seconds, was felt on January 28 at $22^h\ 35^m$, G. M. T., in this city and neighborhood. Great alarm was occasioned. (Special dispatch.)

Honolulu, H. I. February 24, 1917.

Intense activity, greater than known heretofore to any Hawaiians now living, is manifest in Kilauea volcano. (United Press.)

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

SECTION V.—SEISMOLOGY.

SEISMOLOGICAL REPORTS FOR MARCH, 1917.

W. J. HUMPHREYS, Professor in Charge.

[Dated: Weather Bureau, Washington, D. C., May 1, 1917.]

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

Day.	Approximate time, Greenwich Civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity Rossi-Forel.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
		CALIFORNIA.								
	H. m.		° ′	° ′			*M. s.*			
3	16 00	Table Bluff	40 39	124 15	6	1	11	None	Broke mantle in lighthouse tower.	A. F. Petters.
13	15 15	Salinas	36 36	122 40	3	1		None		Dr. E. D. Eddy
18	12 30	Lone Pine	36 37	118 01	4	1		None		G. F. Marsh.
19	8 50	Lone Pine	36 37	118 01	4	1		None	Windows rattled	Do.
21	17 10	Bishop	37 22	118 24	4	1	25	Rumbling		E. L. Herzinger.
20	8 06	Fillmore	34 23	118 54	4	1			People awakened	Press report.
29	12 59	Stanford University	37 27	122 09	3	1	2	None		Lucile Townley.
		NEVADA.								
28	11 13	Rebel Creek	41 39	117 45	3-4	1	2	None	Buildings shaken	F. Whitaker.
	11 13	Winnemucca	40 58	117 43	3	1	3	None		U. S. Weather Bureau.
		TENNESSEE.								
5	3 07	Knoxville	35 56	83 58	3	1				Press report.
25	22 15	Jefferson City	36 08	83 30	3	1				C. C. Maddox.
	22 15	Talbott	36 08	83 24	3	1	2	Rumbling		M. A. Roberts.
26	13 50	Talbott	36 08	83 24	3	1	2	....do		Do.
27	21 00	Jefferson City	36 08	83 30	5	1			Shook buildings	C. C Maddox.
		TEXAS.								
28	19 56	Panhandle	35 20	101 20	6	2	20	Rumbling	Caused considerable alarm	G. F. L. Bishop.
	19 56	....do	35 20	101 20	6	2	8	....do	Plaster cracked	J. Sid O'Keefe.
		WASHINGTON.								
28	17 05	Ashford	46 48	121 58	5	2	2	Rumbling	Shook buildings	J. B. Flett.
		WYOMING.								
10	14 34	Rawlins	41 47	107 15	4	2	20	Rumbling	Some ran out of houses	C. J. Ehrenfeld.
	14 34	Rock River	41 34	105 59	2	1		....do		M. W. Gordon.

TABLE 2.—*Instrumental seismological reports, March, 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.*	
Mar. 6	.....	eP_N	2 13 26	.....	.....	.....	.....	P and S confused by microseisms. Only a few long waves certain on E-W.
		S_N?	2 22 44	8	.....	.....	.....	
		S_E?	2 22 46	.....	.....	.....	.....	
		L_N	2 34 16	18	.....	.....	.....	
		L_E	2 35 14	.....	.....	.....	.....	
		M_E	2 36 02	13	10	.....	.....	
		M_N	2 39 22	13	.....	40	.....	
		F_E	2 41 ..	.....	.....	.....	.....	
		F_N	2 54 ..	.....	.....	.....	.....	

Arizona. *Tucson. 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.*	
Mar. 6	.....	P	3 11 10	4	.....	.....	.....	
		S_E	3 15 23	6	.....	.....	.....	
		S_N	3 15 23	7	.....	.....	.....	
		L_N	3 18 36	.....	.....	.....	.....	
		L_E	3 18 42	15	.....	.....	.....	
		M_E	3 19 30	13	730	.....	.....	
		M_N	3 20 50	15	.....	230	.....	
		C	3 23 ..	11	.....	.....	.....	
		F	3 59 ..	.....	.....	.....	.....	
26	.....	e_E	14 04 09	4	.....	.....	.....	
		e_N	14 04 16	3	.....	.....	.....	
		M_E	14 05 04	8	80	.....	.....	
		M_N	14 05 20	7	.....	20	.....	
		F_N	14 13 ..	.....	.....	.....	.....	
26	.....	e_E	14 28 47	3	.....	.....	.....	
		e_N	14 28 58	2	.....	.....	.....	
		M_N	14 29 54	6	.....	10	.....	
		M_E	14 29 56	8	20	.....	.....	
		F_E	14 38 ..	.....	.....	.....	.....	
		F_N	14 40 ..	.....	.....	.....	.....	

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

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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.

1917.			H. m. s.	Sec.	μ	μ	km.	
Mar. 2	.....	.....	.....	.....	*250	*300	.....	Tremors recorded during 24 hours preceding 15h on dates given.
9	.....	.....	.....	.....	*400	*400	.....	
20	.....	.....	.....	.....	*200	*250	.....	
22	.....	.....	.....	.....	*200	*300	.....	
24	.....	.....	.....	.....	*400	*400	.....	
25	.....	.....	.....	.....	*100	*100	.....	
26	.....	.....	.....	.....	*300	*400	.....	
27	.....	.....	.....	.....	*200	*300	.....	
28	.....	.....	.....	.....	*300	*400	.....	
29	.....	.....	.....	.....	*100	*200	.....	
30	.....	.....	.....	.....	*100	*100	.....	
31	.....	.....	.....	.....	*200	*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.

1917.			H. m. s.	Sec.	μ	μ	km.	
Mar. 5–6	.....	.....	.....	.....	.....	.....	.....	Evident activity at intervals during day, especially on N-S.
6	.....	L_N.....	3 16 ..	.....	.....	.....	.....	Quite discernible but phases obscure. Hardly any record on E-W.
		M_N.....	3 17 ..	4–8	.....	*500	.....	
		F_N.....	3 19 ..	.....	.....	.....	.....	
6	.....	L_E.....	3 22 ..	.....	.....	*500	.....	Clearer and stronger than preceding. Probably new quake. No preliminaries can be seen.
		M_E.....	3 23 ..	4–8	.....	.....	.....	
		M_N.....	3 23 ..	10	.....	*760	.....	
		F_E.....	3 26 ..	.....	.....	.....	.....	
		F_N.....	3 28 ..	.....	.....	.....	.....	
30	.....	L_N.....	22 22 ..	.....	.....	.....	.....	Wavelets and thickening of penmarks. Maximum rather doubtful.
		M_N.....	22 26 ..	.....	.....	.....	.....	
		F_N.....	22 55 ..	.....	.....	.....	.....	

* Trace amplitude.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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 110, T_0 6.4

1917.			H. m. s.	Sec.	μ	μ	km.	
Mar. 3	I_r.....	P_N?...	10 19 51	.....	.....	.....	3,810?	
		S?.....	10 25 27	.....	.....	.....	.....	
		L.....	10 30 20	20	.....	.....	.....	
		F.....	11 00 00	.....	.....	.....	.....	
6	I_r.....	P_N?...	3 12 17	.....	.....	.....	3,515?	All phases masked by microseisms. F lost in microseisms.
		S.....	3 17 35	.....	.....	.....	.....	
		L.....	3 23 50	15	.....	.....	.....	
15	.....	S?.....	0 54 12	.....	.....	.....	.....	Phases indeterminate; small amplitude.
		eL.....	1 01 27	.....	.....	.....	.....	
		L.....	1 05 08	16	.....	.....	.....	
		L.....	1 08 00	20	.....	.....	.....	
		L.....	1 13 30	20	.....	.....	.....	
		L.....	1 18 40	16	.....	.....	.....	
		F.....	1 45 00	.....	.....	.....	.....	
26	I_r.....	P.....	14 12 21	.....	.....	.....	2,510	
		S.....	14 16 27	.....	.....	.....	.....	
		L.....	14 19 00	.....	.....	.....	.....	F in succeeding quake.
26	I_r.....	P?.....	14 37 30	.....	.....	.....	2,330?	
		S.....	14 41 21	.....	.....	.....	.....	
		L?.....	14 44 40	.....	.....	.....	.....	
		F.....	14 55 00	.....	.....	.....	.....	
29	I_n.....	P.....	2 08 05	.....	.....	.....	6,240	
		PR?...	2 11 11	.....	.....	.....	.....	
		S.....	2 15 54	.....	.....	.....	.....	
		L.....	2 24 52	20	.....	.....	.....	
		F.....	2 40 00	.....	.....	.....	.....	

District of Columbia. *Washington. Georgetown University.* F. A. 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*	*5.0*	*0*

1917.			H. m. s.	Sec.	μ	μ	km.	
Mar. 3	.....	e.....	10 23 26	.....	.....	.....	.....	Grim very doubtful because of microseisms, especially on E-W.
		S_N?...	10 29 12	.....	.....	.....	.....	
		S_E?...	10 29 32	.....	.....	.....	.....	
		L_N.....	10 34 12	.....	.....	.....	.....	
		L_E.....	10 34 15	.....	.....	.....	.....	
		F.....	10 57 00	.....	.....	.....	.....	
6	.....	e?.....	3 12 24	.....	.....	.....	.....	Heavy microseisms present.
		S_E?...	3 18 45	.....	.....	.....	.....	
		S_N?...	3 18 49	.....	.....	.....	.....	
		eL_E...	3 26 20	.....	.....	.....	.....	
		eL_N...	3 26 26	.....	.....	.....	.....	
14	.....	.....	.....	.....	.....	.....	.....	Very heavy thickening of tracing from 23h 24m to 23h 39m. Quite certain of seismic origin. Phases not discernible.
15	.....	e.....	1 01 21	.....	.....	.....	.....	Heavy microseisms present. Phases difficult to discern.
		eL.....	1 12 03	.....	.....	.....	.....	
		F.....	1 22 00	.....	.....	.....	.....	
26	.....	e_E.....	14 12 20	.....	.....	.....	.....	Confused by heavy local disturbance. Phases on E-W less distinct. F lost in second quake.
		e_N.....	14 12 40	.....	.....	.....	.....	
		S.....	14 16 46	.....	.....	.....	.....	
		L_E.....	14 19 32	.....	.....	.....	.....	
		L_N.....	14 19 40	.....	.....	.....	.....	
26	.....	e.....	14 36 42	.....	.....	.....	.....	Phases difficult to discern; microseism present.
		S_E.....	14 41 22	.....	.....	.....	.....	
		S_N.....	14 41 30	.....	.....	.....	.....	
		F.....	15 00 00	.....	.....	.....	.....	
29	.....	e.....	2 08 23	.....	.....	.....	.....	Microseisms present. E-W very difficult. All phases doubtful.
		S?.....	2 11 23	.....	.....	.....	.....	
		eL?...	2 16 23	.....	.....	.....	.....	
		F.....	2 36 —	.....	.....	.....	.....	

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

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 18.5

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Mar. 1	.....	e.....	5 40 24	.....	*100	.....	.....	
		M.....	5 43 18	.....		.....	.....	
		F.....	5 50 00	.....		.....	.....	
3	.....	e.....	10 52 12	.....	*100	.....	.....	
		M.....	10 54 06	.....		.....	.....	
		F.....	10 55 24	.....		.....	.....	
4	.....	e.....	6 20 12	.....	*100	.....	.....	
		M.....	6 23 48	.....		.....	.....	
		F.....	6 37 12	.....		.....	.....	
6	.....	eS?....	3 17 00	.....	.....	.....	.....	No distinct phases; resembles air tremors.
		L.....	3 25 00	.....	*50	.....	.....	
		F.....	4 05 00	.....		.....	.....	
15	.....	P.....	0 23 54	.....	.....	.....	.....	Actual maximum at 0h 32m 12s (*1300) probably caused by observer entering room to observer time break.
		S?.....	0 31 18	.....	.....	.....	.....	
		L?.....	0 44 36	.....	.....	.....	.....	
		M.....	0 49 06	.....	*800	.....	.....	
		C.....	1 05 24	.....	.....	.....	.....	
		F.....	1 54 00	.....	.....	.....	.....	
16	.....	e.....	12 04 42	.....	.....	.....	.....	
		M.....	12 09 12	.....	*100	.....	.....	
		F.....	12 14 00	.....	.....	.....	.....	
21	.....	e.....	8 16 24	.....	.....	.....	.....	
		M.....	8 20 24	.....	*100	.....	.....	
		F.....	8 23 06	.....	.....	.....	.....	
26	.....	e.....	14 22 54	.....	.....	.....	.....	
		M.....	14 24 24	.....	*100	.....	.....	
		F.....	14 27 42	.....	.....	.....	.....	
28	.....	P?.....	5 20 12	.....	.....	.....	.....	
		S?.....	5 25 36	.....	.....	.....	.....	
		L.....	5 30 12	.....	.....	.....	.....	
		M.....	5 33 18	.....	*200	.....	.....	
		C.....	5 35 24	.....	.....	.....	.....	
		F.....	5 43 —	.....	.....	.....	.....	
29	.....	P?.....	2 20 42	.....	.....	.....	.....	P and S doubtful; may be artificial disturbance.
		S?.....	2 27 42	.....	.....	.....	.....	
		L.....	2 42 18	.....	.....	.....	.....	
		M.....	2 46 00	.....	*200	.....	.....	
		C.....	2 47 42	.....	.....	.....	.....	
		F.....	2 57 —	.....	.....	.....	.....	

* 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.

	V	T_0	ϵ
Instrumental constants.. E	177	3.4	4.1
N	205	3.4	4.1

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Mar. 6	.....	iP.....	3 11 17	.....	2	4	.....	P and S unusually prominent.
		iS$_E$....	3 15 30	.....	6	.....	.....	
		iS$_N$....	3 15 31	.....	.....	11	.....	
		eL?....	3 20 37	.....	.....	.....	.....	L almost insignificant.
		M$_E$....	3 24 50	.....	2	.....	.....	
		M$_N$....	3 26 17	8–10	.....	2	.....	F lost in microseisms.
26	.....	P.....	14 05 02	.....	.....	.....	.....	S indeterminable.
		L.....	14 10 27	.....	.....	.....	.....	
		M$_N$....	14 11 33	.....	.....	4	.....	
		M$_E$....	14 11 42	.....	4	.....	.....	
		F.....	14 28 00	.....	.....	.....	.....	
26	.....	P.....	14 29 43	.....	.....	.....	.....	S indeterminable.
		L$_E$....	14 35 02	.....	.....	.....	.....	
		L$_N$....	14 35 03	.....	.....	.....	.....	
		M$_N$....	14 35 18	.....	.....	3	.....	
		M$_E$....	14 36 16	.....	2	.....	.....	
28	.....	L?....	19 55 24	.....	.....	.....	.....	Isolated phase.
28	.....	P.....	19 56 11	.....	.....	.....	.....	
		L.....	19 56 44	.....	.....	.....	.....	
		M.....	19 57 02	.....	2	2	.....	
		F.....	20 02 —	.....	.....	.....	.....	

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.

	V	T_0
Instrumental constants.. E	10	32
N	10	27

1917			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Mar. 6	.....	P$_N$....	3 12 25	4	.....	.....	.....	Phases obscured by miscisimic tremors.
		S$_E$....	3 17 09	6	.....	.....	.....	
		S$_N$....	3 17 54	.....	.....	.....	.....	
		L$_N$....	3 23 37	13	.....	.....	.....	
		L$_E$....	3 24 20	15	.....	40	.....	
		M$_N$....	3 27 34	12	.....	.....	.....	
		M$_E$....	3 27 55	10	15	.....	.....	
		C.....	3 31 ..	10	.....	.....	.....	
		F$_E$....	3 41 ..	.....	.....	.....	.....	
		F$_N$....	3 53 ..	.....	.....	.....	.....	
26	.....	e$_E$....	14 17 05	4	.....	.....	.....	Barely perceptible.
		e$_N$....	14 17 37	4	.....	.....	.....	
		F.....	14 24 ..	.....	.....	.....	.....	

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)

	V	T_0	ϵ
Instrumental constants. E	80	23	0
N	50	25	4.1

1917			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Mar. 3	.....	*O?*....	*10 13 58*	.....	.....	.....	2,930	Distance from N-S= 2,880 *km.* N-S*O*= 10h 13m 47s.
		eP$_E$?..	10 19 38	.....	.....	.....	.....	
		eP$_N$?..	10 19 42	2	.....	.....	.....	
		S$_E$....	10 24 16	6	.....	.....	.....	
		S$_N$?...	10 24 42	.....	.....	.....	.....	
		eL$_E$...	10 27 16	20	.....	.....	.....	
		L$_N$....	10 28 00	.....	.....	.....	.....	
		L$_E$....	10 28 34	14	.....	.....	.....	
		L$_E$....	10 31 06	12	.....	.....	.....	
		C.....	10 33 14	10	.....	.....	.....	
		F.....	11 18 ..	.....	.....	.....	.....	
6	.....	*O*.....	*3 05 19*	.....	.....	.....	3,680	Masked by microseisms of 4.8 seconds period. N-S record illegible.
		P?.....	3 12 13	.....	.....	.....	.....	
		S$_E$....	3 17 41	.....	.....	.....	.....	
		eL$_E$...	3 22 02	20	.....	.....	.....	
		L.....	3 26 43	12	.....	.....	.....	
		C?.....	3 31 29	.....	.....	.....	.....	
		F?.....	4 01 ..	.....	.....	.....	.....	
15	.....	eL$_E$...	1 01 43	14	.....	.....	.....	*O*? P and S lost in tangled lines of diurnal waves. Maximum weak. N-S too faint.
		L$_E$....	1 05 37	20	.....	.....	.....	
		M$_E$?...	1 09 10	18	.....	.....	.....	
		F?.....	1 24 ..	.....	.....	.....	.....	
26	.....	e$_E$....	14 19 30	3	.....	.....	.....	*O*?
		e$_N$....	14 19 40	4	.....	.....	.....	
		L$_E$?...	14 20 37	10	.....	.....	.....	
		L$_E$....	14 22 30	10	.....	.....	.....	
		L$_N$?...	14 23 21	6	.....	.....	.....	
		L$_E$?...	14 29 11	6	.....	.....	.....	
		L$_E$....	14 32 14	6	.....	.....	.....	
		F?.....	14 40 ..	.....	.....	.....	.....	
26	.....	L$_E$?...	14 44 44	13–10	.....	.....	.....	
		F.....	14 51 ..	.....	.....	.....	.....	
29	.....	e$_E$?...	2 17 53	6	.....	.....	.....	Not recognizable on N–S.
		eL$_E$...	2 20 11	24	.....	.....	.....	
		L.....	2 28 04	20	.....	.....	.....	
		L.....	2 46 59	10	.....	.....	.....	
		F?.....	3 00 00	.....	.....	.....	.....	

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

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.

Instrument: 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. Mar. 6	U_r	P	3 11 18				2,100	
		S	3 14 48					
		L	3 15 36					
		F	3 41 00					
26								Two quakes registered between 14h and 15h. Times wanting owing to contacts not working.

New York. *Buffalo. Canisius College.* John A. Curtin, S. J.

Lat., 42° 53′ 02″ N.; long., 78° 52′ 40″ W. Elevation, 190.5 meters.

Instrument: Wiechert 80 kg. horizontal.

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

(Report for March, 1917, not received.)

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..	V	T_0	ϵ
E	72	6.6	1.5:1
N	72	7.1	3.8:1

(Report for March, 1917, not received.)

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..	V	T_0	ϵ
E	13	22	4:1
N	14	25	4:1

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917. Mar. 3		e_E	10 27 43	5				
		e_N	10 27 46	4				
		L_E	10 29 48	20				
		L_N	10 29 57	16				
		F_E	10 43 ..					
		F_N	10 49 ..					
15		eL_E	1 06 59	22				
		eL_N	1 08 13	20				
		F_E	1 26 00					
		F_N	1 38 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

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917. Mar. 6		P_N	3 09 10				1,080	Direction?
		P_E	3 09 44					
		S_N	3 10 26					
		S_E	3 10 48					
		L_E	3 12 50					
		M_N	3 12 57			100		
		L_E	3 13 04					
		M_E	3 13 06		50			
		F_E	3 36 12					
		F_N	3 43 02					
13		P_E	9 45 02				185	Direction?
		P_N	9 45 04					
		L_N	9 45 32					
		L_E	9 45 34					
		M_N	9 45 34			100		
		M_E	9 45 36					
		F_N	9 47 04					
		F_E	9 47 12					
29		P_N	2 05 00				1,225	Direction?
		P_E	2 05 01					
		L_E	2 07 29					
		M_E	2 07 49		20			
		L_N	2 09 04					
		M_N	2 09 44			160		
		F_N	2 23 04					

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..	V	T_0
E	10	17.5
N	10	18

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917. Mar. 6		P_E	3 12 38	5				Initial phases obscured by wind tremors.
		L_N	3 20 24	14				
		L_E	3 20 34	19				
		M_N	3 23 58	16		30		
		M_E	3 24 26	16	20			
		F	4 13 ..					
29		P_N	2 07 05	8				Initial phases obscured by wind tremors. Barely perceptible on E–W.
		S_N	2 11 50	9				
		L_E	2 16 00	20				
		M_E	2 21 30	15		30		
		F	2 51 ..	13				

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..	V	T_0
E	10	15
N	10	16

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917. Mar. 6		S?	3 18 24					Very feeble record. F lost during changing of sheets.
		L	3 27 16	22				
15		L_E	1 07 00	20				Other phases indistinguishable.
		F	1 20 00					
26		e	14 19 18					
		F	14 30 00					
26		e	14 44 00					
		F	14 52 00					

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

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.*	
Mar. 3	.....	*O*.....	*10 14 20*	.....	.....	.....	2,840	
		P_N.....	10 20 01	.....	.....	.....	.....	
		P_E.....	10 20 04	.....	.....	.....	.....	
		S_N.....	10 24 32	.....	.....	.....	.....	
		S_E.....	10 24 37	.....	.....	.....	.....	
		eL.....	10 27 18	20	.....	.....	.....	
		L.....	10 31 00	14	.....	.....	.....	
		L.....	10 40 00	10	.....	.....	.....	
		F.....	11 10 00	.....	.....	.....	.....	
6	.....	*O*.....	*3 05 18*	.....	.....	.....	4,000	Distance approximate. Seismograph clock stopped. Record from deformation instrument where 17 mm.=1 hour.
		P.....	3 12 36	.....	.....	.....	.....	
		S.....	3 18 24	.....	.....	.....	.....	
		L.....	3 22 18	.....	.....	.....	.....	
		F.....	4 20 ..	.....	.....	.....	.....	
15	.....	P_N?...	0 41 14	.....	.....	.....	7,100?	
		P_E?...	0 41 16	.....	.....	.....	.....	
		S_N?...	0 49 50	.....	.....	.....	.....	
		S_N?...	0 49 51	.....	.....	.....	.....	
		L.....	1 02 00	20	.....	.....	.....	
		L.....	1 06 00	20	.....	.....	.....	
		L.....	1 11 00	19	.....	.....	.....	
		F.....	1 30 00	.....	.....	.....	.....	
26	.....	e.....	14 18 14	.....	.....	.....	.....	
		i.....	14 18 34	.....	.....	.....	.....	
		eL_E?...	14 19 37	8	.....	.....	.....	
		L_E?...	14 23 00	8	.....	.....	.....	
		F.....	14 35 00	.....	.....	.....	.....	
26	.....	e_N.....	14 42 48	.....	.....	.....	.....	
		i_N.....	14 43 07	.....	.....	.....	.....	
		i_N.....	14 43 08	.....	.....	.....	.....	
		eL_E?...	14 44 09	8	.....	.....	.....	
		L_E?...	14 46 00	8	.....	.....	.....	
		F.....	14 57 ..	.....	.....	.....	.....	

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.*	
Mar. 3	.....	eL.....	10 26 54	.....	.....	.....	.....	P and S not recorded.
		L.....	10 29 54	.....	.....	.....	.....	
		M.....	10 32 06	.....	.....	.....	.....	
		M.....	10 34 30	.....	*800	.....	.....	
		F.....	10 44 30	.....	.....	.....	.....	
6	.....	e.....	3 16 00	.....	.....	.....	.....	
		L.....	3 25 18	.....	.....	.....	.....	
		M.....	3 26 18	.....	*1200	.....	.....	
		F?.....	4 44 48	.....	.....	.....	.....	
15	.....	iP.....	0 37 30	.....	*200	.....	.....	Movements gradually increased from first L to M.
		S.....	0 49 48	.....	.....	.....	.....	
		eL.....	0 59 18	.....	.....	.....	.....	
		M.....	1 11 48	.....	*800	.....	.....	
		L.....	1 34 12	.....	.....	.....	.....	
		L.....	2 18 42	.....	.....	.....	.....	
		L.....	2 20 54	.....	.....	.....	.....	
		F.....	2 25 00	.....	.....	.....	.....	
16	.....	eL.....	10 42 00	.....	.....	.....	.....	Gradual thickening.
		M.....	10 44 48	.....	*200	.....	.....	
		F.....	10 50 36	.....	.....	.....	.....	
26	.....	L.....	14 17 24	.....	*200	.....	.....	
		F.....	14 27 00	.....	.....	.....	.....	
29	.....	P.....	2 21 00	.....	.....	.....	.....	
		S.....	2 25 42	.....	.....	.....	.....	
		L.....	2 27 24	.....	.....	.....	.....	
		L.....	2 30 18	.....	.....	.....	.....	
		M.....	2 31 18	.....	*300	.....	.....	
		F.....	2 59 36	.....	.....	.....	.....	

* 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.*	
Mar. 3	.....	L.....	10 25 06	.....	.....	.....	.....	
		M.....	10 42 27	.....	*200	.....	.....	
		F.....	10 53 52	.....	.....	.....	.....	
6	.....	P?.....	3 19 42	.....	.....	.....	.....	
		S?.....	3 23 10	.....	.....	.....	.....	
		L.....	3 27 38	.....	.....	.....	.....	
		M.....	3 33 05	.....	*1500	.....	.....	F uncertain.
		VERTICAL			A_Z			
		P.....	*3 14 00*	*5*	.....	.....	.....	*S?*
		L.....	*3 28 00*	*7-8*	.....	.....	.....	
		M.....	*3 33 00*	*11*	*60*	.....	.....	
		F.....	*3 42 30*	.....	.....	.....	.....	
15	.....	L.....	0 32 43	.....	.....	.....	.....	
		M.....	0 59 00	.....	*200	.....	.....	
		F.....	1 36 42	.....	.....	.....	.....	
16	.....	M?.....	10 57 34	.....	.....	.....	.....	May be M part of long-distance quake.
26	.....	P?.....	14 10 37	.....	.....	.....	.....	
		L.....	14 13 30	.....	.....	.....	.....	
		M.....	14 15 58	.....	*400	.....	.....	
		F.....	14 21 52	.....	.....	.....	.....	
29	.....	P?.....	2 33 27	.....	.....	.....	.....	
		S?.....	2 35 56	.....	.....	.....	.....	
		L.....	2 38 59	.....	.....	.....	.....	
		M.....	2 41 53	.....	*500	.....	.....	
		F.....	2 57 45	.....	.....	.....	.....	

* Trace amplitude. A_Z=true earth movement in μ.

SEISMOLOGICAL DISPATCHES.[1]

Knoxville, Tenn., March 5, 1917.

A shock was felt here last evening (Mar. 4) at 9:07 o'clock. This is the second seismic disturbance felt in Knoxville and vicinity within the past 10 days. No damage resulted from the slight quake of Sunday evening. (Assoc. Press.)

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

SECTION V.—SEISMOLOGY.

SEISMOLOGICAL REPORTS FOR APRIL, 1917.

W. J. HUMPHREYS, Professor in charge.

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

TABLE 1.—*Non-instrumental earthquake reports, April, 1917.*

Date.	Approximate time, Greenwich Civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity Rossi-Forel.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
		ARKANSAS.								
1917.	*H. m.*		° ′	° ′			*M. s.*			
Apr. 9	20 52	Black Rock	36 08	91 04	3	1	10		Windows trembled	S. J. Howe.
		Corning	36 23	90 33	4–5	1	5	Rumbling	Shook buildings	J. N. Crutchfield.
		Hardy	36 19	91 22	3	2	60	None		A. A. Caywood.
		Marked Tree	35 32	90 22	4–5	1		do	Furniture moved	A. R. Shearon.
		Osceola	35 43	89 54	4	1	30	do		A. P. Smith.
		Paragould	36 05	90 25	2					A. S. Snowden.
		Piggott	36 22	90 10	3	1	30			J. C. Latta.
		Pocahontas	36 15	90 55	2	1	60			Benedictine Sisters.
		St. Francis	36 25	90 06	3–4	1	30	None	Hanging lamps swayed	J. A. Reed.
		CALIFORNIA.								
2	9 00	Berkeley	37 52	122 16	3–4	1	1	Rumbling		E. F. Davis.
13	4 03	Nordhoff	34 35	119 14	5	1	2	None	Concrete tower cracked	W. H. Duncan.
		Oxnard	34 12	119 08	5	3		do	Dishes rattled	Press report.
		Santa Barbara	34 23	119 40	6	1			Most severe in recent years	Do.
		Ventura	34 17	119 17	4	2				Do.
13	12 30	Cedarville	41 32	120 08	2–3	1	60	Faint		T. H. Johnstone Co.
16	6 00	Cedarville	41 32	120 08	3	1				Do.
18	23 43	Calexico	32 41	115 30	3	2	5	Rumbling		C. N. Perry.
21	6 59	Santa Barbara	34 23	119 40	4	2				Press report.
		Ventura	34 17	119 17	4	1			Awakened people	Do.
		IDAHO.								
20	4 30	Pierson	44 03	114 48	5	3	60	Rumbling		E. E. Lanning.
		ILLINOIS.								
9	20 52	Alton	38 54	90 12	5	2		None		Mildred Brown.
		Anna	37 27	89 18	4	2	9	Rumbling		J. I. Hale.
		Cairo	37 00	89 10	4	2	14	None		U. S. Weather Bureau.
		Carbondale	37 45	89 14	4	2	25	do	Windows rattled	Prof. F. H. Colyer.
		Carlinville	39 17	89 53	5	2	30	do	Radiators swayed	Dr. J. D. Conley.
		Carterville	37 46	89 05	3	2	30	do		J. J. West.
		Chester	37 55	89 50	5	1	15	Rumbling	Buildings trembled	F. C. Kennedy.
		Danville	40 09	87 36	3	1				J. J. Lemon.
		Edwardsville	38 48	89 59	5	1		None		W. H. Morgan.
		Elizabethtown	37 27	88 12	4	1			Buildings trembled	
		Equality	37 44	88 22	3	1		None		Elizabeth Davis.
		Fairview	40 38	90 12	3–4	1		do		Abram Wilson.
		Golconda	37 22	88 31	4	2		Rumbling		J. M. Ramsey.
		Grafton	38 59	90 26	5	1			Buildings shook	W. T. Bymer.
		Greenville	38 53	89 25	5	4	30			F. P. Seawell.
		Griggsville	39 42	90 43	4	2	2	None		G. F. Kneeland.
		Harrisburg	37 45	88 34	3	1		do		Clarence Bonnell.
		Highland	38 44	89 42	5	1				Chas. Schuttinger.
		McLeansboro	38 07	88 34	3	1	2	None		A. E. Wilson.
		Mascoutah	38 30	89 48	5	1	60			Dr. R. F. Lischer.
		Morrisonville	39 31	89 30	4	1		Rumbling		J. D. Lowes.
		Nashville	38 22	89 23	4	1				E. D. Garlich.
		New Athens	38 18	89 52	4	3		None		D. M. Fullmer.
		New Burnside	37 34	88 45	3	3	30	do		Miss Mae McCabe.
		Pulaski	37 15	89 11	3–4	1				H. Reeves.
		Quincy	39 55	91 22	4	1				Press report.
		Shawneetown	37 42	88 10	4	1	10	None		E. F. Armstrong.
		Springfield	39 48	89 39	4–5	2	4	do	Shook buildings	U. S. Weather Bureau.
		Sparta	38 08	89 43	3–4	1	3			W. F. Clendenin.
		Staunton	39 01	89 50	4	3		None		Mary Whalen.
		Valmeyer	38 18	90 19	5	1	25	Faint		Chas. Schaefer.
		Vienna	37 25	88 54	5	1				C. C. Clymon.
		Waterloo	38 19	90 11	5–6	3	12	Rumbling	Shook buildings	W. E. Elfbracht.
		White Hall	39 27	90 25	5	1	30	Loud		R. B. Pearce.
9	23 35	Anna	37 27	89 18	2	1	7	None		J. I. Hale.
		Valmeyer	38 18	90 19		1	9			Chas. Schaefer.
		INDIANA.								
9	20 52	Evansville	37 58	87 33	3	1		None		U. S. Weather Bureau.
		Treviac	39 16	86 21	2	1				B. N. Doylan.
		IOWA.								
9	20 52	Cedar Rapids	41 56	91 39	2–3		20			J. W. Brush.
		Clinton	41 50	90 13	3	3		None		E. T. Carew.
		Davenport	41 30	90 38		1		do		U. S. Weather Bureau.
		Eldridge	41 38	90 35	3			do		M. H. Calderwood.
		Keokuk	40 22	91 26	3	1	2	do		U. S. Weather Bureau.
		Keosauqua	40 45	91 56	3	1	2	do		J. H. Landes.

TABLE 1.—*Non-instrumental earthquake reports, April, 1917.*

Date.	Approximate time, Greenwich Civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity Rossi-Forel.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
		KANSAS.								
1917.	*H. m.*		° ′	° ′			*M. s.*			
Apr. 9	20 52	Lawrence	38 58	90 15	2	1				Prof. F. E. Kester.
		KENTUCKY.								
9	20 52	Bardwell	36 53	89 01	3	2				Arthur Halteman.
		Hickman	36 35	89 11	4	2				Mrs. Ella Werner.
		Laketon	36 52	89 00	3	2				E. T. Parker.
		Milburn	36 49	88 53	3	1		None		W. R. Wilkerson.
		Paducah	37 06	88 37	5	1	15	Rumbling		E. Futrell, jr.
		Smithland	37 09	88 29	4	1	12	None		W. D. Threekeld.
		Water Valley	36 35	88 50	3					W. E. Barnes.
		Wickliffe	36 57	90 05	3-4	3	30	None		Prof. G. M. Moore.
		MISSISSIPPI.								
9	20 52	Evansville	34 38	90 19	2					J. M. Phillips.
		MISSOURI.								
9	20 52	Allenton	38 30	90 40	5-6	3			Buildings swayed	W. M. Sevier.
		Augusta	38 34	90 51	5		8	None		W. J. Hays.
		Bismarck	37 48	90 36	5	2	30			G. J. Goeltz.
		Bloomfield	36 54	89 53	4-5	1	10	None		W. E. Cooper.
		Cape Girardeau	37 20	89 31	5	3		do		H. L. Roberts.
		Columbia	38 57	92 20	3-4	1		do		U. S. Weather Bureau.
		Des Arc	37 18	90 37	5	2	30	Rumbling		W. E. McKee.
		De Soto	38 06	90 33	6			do	Bricks fell off chimneys	C. C. Mitakin.
		Doniphan	36 38	90 47	5	2		None		W. W. Martin.
		Dudley	36 48	90 04	5	2	50	do		Mrs. T. J. Fields.
		Farmington	37 47	90 24	5	2	40	Loud		J. B. Smith.
		Fredericktown	37 43	90 16	5-6	3	40			A. T. Lacey.
		Graniteville	37 38	90 44	5	2				Ella Sheahan.
		Greenville	37 07	90 25	5	1	30	Rumbling		
		Hannibal	39 41	91 20	5	1	50	None		U. S. Weather Bureau.
		Hematite	38 13	90 30	5	2		Rumbling		D. O. Jarvis.
		Hendrickson	36 50	90 26	5	1		do		J. L. Harwell.
		High Ridge	38 27	90 32	5-6	1	1 00	do		F. H. Klemme.
		Hogan	37 32	90 39	5	3		do	Many people alarmed	Bessie Wilson.
		Irondale	37 51	90 38	5-6	1	1 30	do		E. S. Tetley.
		Ironton	37 36	90 37	6	2		do	Windows broken	W. H. Delano.
		Jackson	37 25	89 40	5	1	1 00	do		L. M. Bean.
		Kansas City	39 05	94 37	3	1		None		U. S. Weather Bureau.
		Kimmswick	38 23	90 22	5-6	2		Rumbling		J. J. Hilgert.
		Manchester	38 36	90 31	5	1	1 00	do		O. N. Kulhne.
		Marquand	37 27	90 07	5	2		do		Blanche White.
		New Madrid	36 35	89 32	3					Miss Josie Smith.
		Oak Ridge	37 34	89 48	5	1		Rumbling	Dishes rattled	E. C. Trickey.
		Orchard Farm	38 51	90 27	5	2	2 00	do		F. H. Meyer.
		Palmer	37 49	90 54	5	2	11	do	Furniture moved	B. G. Halbert.
		Perryville	37 45	89 51	5	1	15	do		A. E. Deen.
		Pevely	38 17	90 30	5-6	2	4	do		H. J. Englebach.
		Poplar Bluff	36 46	90 21	4-5	1		None		Belle Kinne.
		Potosi	37 57	90 46	5-6	2	30	Rumbling		B. E. Flynn.
		Rolla	37 57	91 45	4	1	30	do	Chandeliers swayed	E. E. Harris.
		St. Charles	38 48	90 30	5	1	15	None	Many alarmed	Louis Saeger.
		St. Louis	38 38	90 12	5-6	2	6	do	Some windows broken	U. S. Weather Bureau.
		St. Marys	37 53	89 59	5	2		Rumbling		J. J. Davis.
		St. Peters	38 48	90 40	5	1	1 00	do		A. B. Iftrig.
		Ste. Genevieve	37 58	90 02	5	1	23	do		L. P. Kern.
		Salem	37 40	91 30	5					C. J. Carnico.
		Seventy Six	37 45	89 38	5	1				G. S. Hatch.
		Sikeston	36 54	89 34	4	1		None		W. E. Burnham.
		Silvermine	37 34	90 27	5	1		Rumbling		Robert Meacher.
		Steelville	37 58	91 20	5	1	5	do	Many people frightened	J. T. Haley.
		Sturdivant	37 03	90 00	4	2		Faint		B. F. Baker.
		Van Buren	36 58	91 01	4	1		None		O. Coleman.
		Warrenton	38 48	91 07	5					Press report.
		Wittenberg	37 45	89 32	5	1	30	Rumbling		C. R. Swan.
		Zion	37 26	90 17	5			do		E. Barker.
9	23 35	Bismarck	37 48	90 36	3	1				G. J. Goeltz.
		Cape Girardeau	37 20	89 31	3	1				H. L. Roberts.
		De Soto	38 06	90 33	3	1				C. C. Mitaken.
		Hematite	38 13	90 30		1	30			D. O. Jarvis.
		Irondale	37 51	90 38		1	30			E. S. Tetley.
		Ironton	37 36	90 37	4	2		Rumbling	Shook oil in lamps	W. H. Delano.
		Jackson	37 25	89 40		1	30			L. M. Bean.
		Perryville	37 45	89 51		1	6			A. E. Deen.
		St. Marys	37 53	89 59	5	1	2 00	Rumbling	Furniture moved	J. J. Davis.
		Ste. Genevieve	37 58	90 02						L. P. Kern.
		Steelville	37 58	91 20						J. T. Haley.
		Zion	37 26	90 17	4	1	1 00	Rumbling		E. Barker.
		MONTANA.								
23	3 50	Butte	46 00	112 31	4	2	10	None		Wm. Hocking.
		NEVADA.								
15	19 02	Fallon	39 30	118 48	3	1	1			E. W. Curtis.
		SOUTH CAROLINA.								
11	19 01	Summerville	33 03	80 14	1-2	1		None		Miss E. H. Gadsden.
		TENNESSEE.								
9	20 52	Hornbeak	36 19	89 21	3-4	1				D. C. Williams.
		Memphis	35 09	90 03	3	2	6	None		U. S. Weather Bureau.
		Tiptonville	36 24	89 30	4-5	1	30			L. F. Lemonds.
		WISCONSIN.								
9	20 52	Madison	43 05	89 23	2	2	6			U. S. Weather Bureau.

TABLE 2.—*Instrumental reports, April, 1917.*

[Time used: Mean Greenwich, midnight to midnight. Nomenclature: International.]

[For significance of symbols see REVIEW for January, 1917, p. 26.]

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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

(No earthquake recorded during April, 1917.)

Arizona. *Tucson. 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

(No earthquake recorded during April, 1917.)

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.

1917.			H. m. s.	Sec.	μ	μ	km.	
Apr. 2	.....	.....	.....	.....	*200	*200	.....	Tremors recorded during 24 hours preceding 15h on dates given.
5	.....	.....	.....	.....	*300	*600	.....	
6	.....	.....	.....	.....	*200	*200	.....	
8	.....	.....	.....	.....	*100	*100	.....	
12	.....	.....	.....	.....	*250	*200	.....	
13	.....	.....	.....	.....	*200	*200	.....	
14	.....	.....	.....	.....	*250	*150	.....	
15	.....	.....	.....	.....	*200	*250	.....	
20	.....	.....	.....	.....	*150	*200	.....	
23	.....	.....	.....	.....	*200	*200	.....	
24	.....	.....	.....	.....	*250	*250	.....	
25	.....	.....	.....	.....	*150	*150	.....	
30	.....	.....	.....	.....	*100	*200	.....	

* 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.

1917.			H. m. s.	Sec.	μ	μ	km.	
Apr. 6	.....	L_N....	4 30 ..	.....	.....	.....	.....	Very small sinusoidal waves of long period.
		F_N....	6 10 ..	.....	.....	.....	.....	

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

Colorado. *Denver*—Continued.

1917.			H. m. s.	Sec.	μ	μ	km.	
Apr. 8	.....	L_N....	12 15 ..	.....	.....	.....	.....	Recurring sinusoidal waves of long period during day. More pronounced during hours marked.
		F_N....	14 10 ..	.....	.....	.....	.....	
9	.....	.....	.....	.....	.....	.....	.....	Sinusoidal wavelets recurring during day. Weaker but more frequent than on the 8th.
13	.....	L_N....	19 14 ..	.....	.....	.....	.....	Extremely small and irregular waves at intervals during day.
		F_N....	19 18 ..	.....	.....	.....	.....	
15	.....	L_N....	17 20 ..	.....	.....	.....	.....	Somewhat doubtful as to being seismic.
	.....	F_N....	17 23 ..	.....	.....	.....	.....	

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 = 110, T_0 = 6.4

1917.			H. m. s.	Sec.	μ	μ	km.	
Apr. 9	.....	e.....	20 57 30	.....	.....	.....	.....	Missouri quake. Minute but distinct tremors with very short period superimposed on microseisms.
		F.....	20 58 38	.....	.....	.....	.....	
21	.....	e?.....	1 06 45	.....	.....	.....	.....	
		i.....	1 13 23	.....	.....	.....	.....	
		F.....	1 50 ..	.....	.....	.....	.....	
22	.....	e?.....	6 23 50	.....	.....	.....	.....	Doubtful as to being seismic.
		M.....	6 32 30	.....	.....	.....	.....	
		M.....	6 34 22	.....	.....	.....	.....	
		M.....	6 35 16	.....	.....	.....	.....	
		F.....	6 45 00	.....	.....	.....	.....	
28	.....	e.....	16 16 32	.....	.....	.....	.....	Phases indistinguishable.
		M_B....	16 20 38	.....	23	.....	.....	
		F.....	16 45 00	.....	.....	.....	.....	
29	.....	e?.....	12 02 50	.....	.....	.....	.....	
		e?.....	12 16 50	.....	.....	.....	.....	
		eL.....	12 45 00	20	.....	.....	.....	
		F.....	13 01 00	.....	.....	.....	.....	

District of Columbia. *Washington. Georgetown University.*

F. A. 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*

1917.			H. m. s.	Sec.	μ	μ	km.	
Apr. 21	.....	e?.....	1 05 14	.....	.....	.....	.....	P very uncertain. Heavy microseisms present.
		iS_E....	1 13 22	.....	.....	.....	.....	
		iS_N....	1 13 23	.....	.....	.....	.....	
		F.....	1 50 00	.....	.....	.....	.....	
22	.....	e.....	6 24 41	.....	.....	.....	.....	Phases very difficult to distinguish.
		F.....	6 52 00	.....	.....	.....	.....	
28	.....	eE.....	16 16 23	.....	.....	.....	.....	Heavy microseisms present. No distinct maximum.
		e_N....	16 16 28	.....	.....	.....	.....	
		S.....	16 20 19	.....	.....	.....	.....	
		eL_N...	16 21 05	.....	.....	.....	.....	
		eL_E...	16 21 10	.....	.....	.....	.....	
		F.....	16 57 00	.....	.....	.....	.....	
29	.....	L_E....	12 45 34	.....	.....	.....	.....	Very heavy microseisms present.
		L_N....	12 45 51	.....	.....	.....	.....	
		F.....	12 55 00	.....	.....	.....	.....	

TABLE 2.—*Instrumental reports, April, 1917*—Continued.

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.*	
Apr. 3	.....	e.....	13 25 18	.....	.....	.....	.....	
		L.....	13 37 36	24	.....	.....	.....	
		M.....	13 46 36	.....	*500	.....	.....	
		C.....	13 51 00	.....	.....	.....	.....	
		F.....	14 04 00	.....	.....	.....	.....	
5	.....	L.....	4 35 00	.....	.....	.....	.....	Times uncertain; motion of paper not uniform.
		M.....	4 23 18	.....	*200	.....	.....	
		C.....	4 45 00	.....	.....	.....	.....	
12	.....	e.....	3 40 48	.....	.....	.....	.....	
		eL.....	3 50 06	20	.....	.....	.....	
		M.....	3 56 00	.....	*400	.....	.....	
		C.....	3 59 48	.....	.....	.....	.....	
		F.....	4 08 —	.....	.....	.....	.....	
15	.....	eP.....	12 29 24	.....	.....	.....	.....	
		L.....	12 39 06	20	.....	.....	.....	
		M.....	12 42 18	.....	*100	.....	.....	
		C.....	12 45 00	.....	.....	.....	.....	
		F.....	12 49 00	.....	.....	.....	.....	
16	.....	eP.....	19 30 48	.....	.....	.....	.....	
		eL.....	19 42 54	.....	.....	.....	.....	
		M.....	19 49 00	19	*100	.....	.....	
		C.....	19 53 00	.....	.....	.....	.....	
21	.....	eP.....	1 23 12	.....	.....	.....	.....	
		eL.....	1 33 54	20	.....	.....	.....	
		M.....	1 35 30	.....	*100	.....	.....	
		C.....	1 43 00	.....	.....	.....	.....	
23	.....	eL.....	0 46 00	20	.....	.....	.....	
		M.....	0 46 36	.....	*100	.....	.....	
		F.....	1 43 00	.....	.....	.....	.....	
28	.....	P.....	14 13 00	.....	.....	.....	.....	
		eL.....	14 18 54	21	.....	.....	.....	
		M.....	14 20 54	.....	*200	.....	.....	
		C.....	14 23 42	.....	.....	.....	.....	
		F.....	14 40 —	.....	.....	.....	.....	
29	.....	e.....	12 27 48	.....	.....	.....	.....	
		M.....	12 42 00	20	*100	.....	.....	
		F.....	13 25 00	.....	.....	.....	.....	
29	.....	eP.....	16 20 54	.....	.....	.....	.....	
		eL.....	16 32 30	.....	.....	.....	.....	
		M.....	16 36 24	19	*100	.....	.....	
		F.....	16 44 —	.....	.....	.....	.....	

* 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	4:1
	N	205	3.4	4:1

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Apr. 9	.....	P_E.....	20 53 15	.....	.....	.....	.....	Shock felt locally.
		P_N.....	20 53 23	.....	.....	.....	.....	
		S_N?...	20 53 56	.....	.....	.....	.....	
		S_E?...	20 53 57	.....	.....	.....	.....	
		L.....	20 54 12	.....	.....	.....	.....	
		M_E...	20 54 13	.....	.....	.....	.....	Needles left paper at end of maximum.
		M_N...	20 54 14	.....	.....	.....	.....	
		F.....	21 08 —	.....	.....	.....	.....	
9	.....	P.....	23 35 56	.....	.....	.....	.....	P and S very faint.
		S?.....	23 36 29	.....	.....	.....	.....	
		L.....	23 36 45	.....	.....	.....	.....	
		M.....	23 36 47	.....	3	2	.....	
		F.....	23 42 —	.....	.....	.....	.....	
28	.....	P_E or S_E.	16 15 19	.....	.....	.....	.....	
		P_N or S_N.	16 15 24	.....	.....	.....	.....	
		L.....	16 19 32	.....	.....	.....	.....	
		M_E...	16 19 44	3-4	.....	.....	.....	
		M_N...	16 20 07	.....	.....	.....	.....	
		F.....	16 40 —	.....	.....	.....	.....	

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

(No earthquakes recorded during April, 1917.)

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

(Report for April, 1917, not received.)

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

Lat., 38° 38′ 15″ N.; long., 90° 13′ 58″ W. Elevation, 180.4 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	T_0	ϵ
	80	7	5:1

1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Apr. 9	II_D....	P_E?...	20 52 30	.....	.....	.....	.....	Local shock; period of 4.5 seconds; amplitude 19–20 mm. A very blurred record.
		M.....	20 53 42	.....	.....	.....	.....	
		F.....	21 00 00	.....	.....	.....	.....	
9	II_D....	P_E?...	23 35 06	.....	.....	.....	.....	N–S record too blurred.
		M_E....	23 35 18	.....	.....	.....	.....	
		F.....	23 54 00	.....	.....	.....	.....	
28-29	.....	.....	.....	.....	.....	.....	.....	Hour contact out of order.

New York. *Buffalo. Canisius College.* John A. Curtin, S. J.

Lat., 42° 53′ 02″ N.; long., 78° 52′ 40″ W. Elevation, 190.5 meters.

Instrument: Wiechert 80 kg. horizontal.

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

(Report for April, 1917, not received.)

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..		V	T_0	ϵ
	E	72	6.6	1.5:1
	N	72	7.1	3.8:1

(No record, clock connection out of order.)

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..		V	T_0	ϵ
	E	13	22	4:1
	N	14	25	4:1

(Report for April, 1917, not received.)

TABLE 2.—*Instrumental reports, April, 1917*—Continued.

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 April, 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.. V 10, T_0 18 (E); 10, 18 (N)

(No earthquake recorded during April, 1917.)

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.. V 10, T_0 15 (E); 10, 16 (N)

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917. Apr. 28	.....	e.....	*H. m. s.* 16 18 00	*Sec.*	.....	.....	.....	No phases discernible.
		F.....	16 25 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 80k. vertical seismograph.

Instrumental constants.. V 120, T_0 26

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917. Apr. 21	.....	i.....	*H. m. s.* 1 12 50	*Sec.*	.....	.....	.....	Masked by microseisms.
		L.....	1 28 ..	17	.....	.....	.....	
			1 37 ..					
		F.....	1 50 ..	.....	.....	.....	.....	
28	.....	e_E.....	16 13 21	1-2	.....	.....	.....	
		i_E.....	16 14 18	1-2	.....	.....	.....	
		i_N.....	16 15 14	1-2	.....	.....	.....	
		S_E?...	16 16 54	3	.....	.....	.....	
		S_N?...	16 16 57	2	.....	.....	.....	
		F.....	16 35 ..	.....	.....	.....	.....	
29	.....	L.....	8 57 ..	10	.....	.....	.....	
29	.....	e_E?....	12 05 16	.....	.....	.....	.....	Distance probably of the order of 11,000 km.
		e_N?....	12 05 30	.....	.....	.....	.....	
		e?.....	12 07 29	.....	.....	.....	.....	
		eS_E?..	12 17 22	.....	.....	.....	.....	
		eS_E?..	12 17 34	.....	.....	.....	.....	
		L.....	12 40 ..	20	.....	.....	.....	L well marked.
			12 44 ..					
		L_N....	12 47 ..	14	.....	.....	.....	
		F.....	13 05 ..	.....	.....	.....	.....	

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. Apr. 3	.....	L.....	*H. m. s.* 14 14 06	*Sec.*	.....	.....	.....	
		M.....	14 17 18	.....	*200	.....	.....	End in air currents.
12	.....	L.....	4 03 30	.....	*50	.....	.....	
		F.....	4 07 00	.....	.....	.....	.....	
21	.....	L?....	0 46 18	.....	.....	.....	.....	Microseisms going on.
		L.....	1 07 12	.....	.....	.....	.....	
		L.....	1 34 54	.....	*100	.....	.....	
		F.....	1 43 00	.....	.....	.....	.....	
23	.....	e?.....	1 24 18	.....	.....	.....	.....	Minute thickening.
		e.....	1 25 48	.....	*50	.....	.....	
		F.....	1 47 42	.....	.....	.....	.....	
28	.....	L.....	16 17 36	.....	*50	.....	.....	
		F.....	16 19 54	.....	.....	.....	.....	
29	.....	e?.....	12 11 18	.....	.....	.....	.....	
		L.....	12 38 18	.....	.....	.....	.....	
		L.....	12 39 24	.....	.....	.....	.....	
		eL.....	12 41 24	.....	.....	.....	.....	
		M.....	12 42 54	.....	*300	.....	.....	
		F?....	13 23 00	.....	.....	.....	.....	

*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. Apr. 3	.....	P?....	*H. m. s.* 13 48 30	*Sec.*	.....	.....	*m.*	
		L?....	13 55 26	.....	.....	.....	.....	
		M.....	14 05 21	.....	*300	.....	.....	
		F.....	14 24 41	.....	.....	.....	.....	
12	.....	M.....	3 58 03	.....	*100	.....	.....	
23	.....	P?....	1 00 30	.....	.....	.....	.....	
		M.....	1 21 49	.....	*200	.....	.....	
28	.....	e.....	16 16 06	.....	.....	.....	.....	
		e.....	16 16 48	.....	*50	.....	.....	
29	.....	P?....	12 30 34	.....	.....	.....	.....	
		S?....	12 32 34	.....	.....	.....	.....	
		L.....	12 34 33	.....	.....	.....	.....	
		M.....	12 38 31	.....	*500	.....	.....	
		F.....	12 49 55	.....	.....	.....	.....	

*Trace amplitude.

SEISMOLOGICAL DISPATCHES.[1]

Tokyo, Japan, Mar. 18, 1917. (Belated dispatch.)

Heavy earthquake felt in Tokyo to-day from 7:20 to 7:30 a. m., local time.

London, Apr. 4, 1917.

Reuter's Melbourne correspondent reports a local earthquake having been felt in towns in northeastern Victoria. A dispatch to Reuter

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

from Auckland, New Zealand, says a violent eruption of the volcano Waimangu began Sunday and still continues. Two persons have been killed. (Assoc. Press.)

St. Louis, Mo., Apr. 9, 1917.

A distinct earthquake shock was felt for several seconds this afternoon throughout this section. A number of windows were broken and several chimneys were knocked down. The after-vibrations continued for eight minutes. (Assoc. Press.)

[See Table 1 and note hereunder, this issue of the REVIEW.]

Santa Barbara, Cal., Apr. 12, 1917.

A severe earthquake shock was felt here at 8 o'clock to-night. No damage was done. Ventura and Oxnard, 20 and 30 miles east, respectively, along the coast, also felt the shock but experienced no damage. (Assoc. Press.)

Los Angeles, Cal., Apr. 20, 1917.

Two earthquake shocks in rapid succession were felt in various parts of southern California late to-night. No damage was reported. (Assoc. Press.)

London, Apr. 27, 1917, 8:38 a. m.

A violent earthquake in Tuscany and Umbria is reported in a Rome dispatch to the Exchange Telegraph Co. to have occurred on Thursday morning. Many persons are reported killed at Monterchi, near Arezzo, the capital of the Province of that name. Considerable material damage is also reported. (Assoc. Press.)

Rome, Apr. 30, 1917.

Earthquake shocks were reported at Monterchi to-day, the same district laid waste by earth tremors last week. (United Press.)

THE MISSOURI EARTHQUAKE OF APRIL 9, 1917.

By RUY H. FINCH, Assistant.

[Seismological Investigations, Weather Bureau, May 29, 1917.]

On the 9th of April, 1917, a little before 3 p. m., central time, an earthquake occurred near the middle of the eastern border of Missouri that was felt in 10 different States. It was felt over most of Missouri and Illinois, and at many places in Iowa, Wisconsin, Indiana, Kentucky, Tennessee, Mississippi, Arkansas, and Kansas. At first it was thought that the quake had its origin in the New Madrid region, but later reports indicate that the epicenter was somewhere between there and St. Louis.

Most of the information relative to this quake was obtained from some 160 question cards filled out by cooperative observers of the Weather Bureau—postmasters and others—most of whom rendered these reports shortly after the occurrence of the shock while its effects were still fresh in their minds. The majority of the accounts thus received are given in some detail in Table 1, page 182, of this issue of the REVIEW; their intensities and geographical distribution are shown on the accompanying isoseismal map, figure 1.

As was recently pointed out by Montessus de Ballore,[1] the use of isoseismals drawn from estimates of intensities that at best are bound to be at variance is unsatisfactory. Nevertheless such isoseismals give a better idea of the relative distribution of intensities than would be had if omitted.

The area over which this quake was felt, elliptical in shape, extends about 600 miles in a north-south direction and over 500 miles east-west, covering approximately 200,000 square miles. In addition to being both felt and instrumentally recorded at St. Louis University, St. Louis, Mo., and the University of Kansas, Lawrence, Kans., slight records were also obtained at St. Ignatius College, Cleveland, Ohio, about 520 miles away, and the Weather Bureau, Washington, D. C., about 760 miles from the epicentral region.

The beginning of the disturbance as given by the majority of observers was $2^h\ 52^m$ to $2^h\ 53^m$ p. m. (Central time). The time at origin as calculated from the seismograph record of the University of Kansas was $2^h\ 52^m\ 24^s \pm 5^s$. This is in fair agreement with the record obtained at St. Louis University, within a very short distance of the origin, which began at $2^h\ 52^m\ 30^s$ p. m.

Sounds were quite generally reported within the territory bounded by the V isoseismal. Within the VI isoseismal many places reported that heavy rumbling both preceded and accompanied the shock.

No good evidence as to the direction of the vibrations is at hand, though the majority of the observers thought it was east-west. The observer at Ironton, Mo., Mr. W. H. Delano, says that he looked down and could see the earth rock—rise up and sway back and forth as from west to east.

The damage occasioned by this quake was slight. Some windows were broken, bricks shaken from chimneys, and plaster cracked over most of the territory bounded by the VI isoseismal. Several horses were thrown to the pavement in different parts of St. Louis. A painter working on a ladder in Granite City, Mo., was shaken off and fell into a flower garden but was unharmed. Many people hurriedly left their homes in fright. The school children at Warrenton, Mo., and several other places, were thrown into a panic and were dismissed. As is well known, birds and many other animals are more sensitive to light shocks than human beings. This may explain why a team of horses in Golconda, Ill., were uneasy and restless at the time of the quake while the driver felt nothing.

No preliminary shocks to the main quake were noticed except for a slight tremor that was recorded on April 9 by the seismograph at St. Louis University, $8^h\ 45^m$ a. m. A second shock at $5^h\ 35^m$ p. m. was felt quite generally over most of the southern half of the territory bounded by the V isoseismal and was specially noticeable in the corresponding part within the VI isoseismal. This would lead one to think that the origin was located somewhere in the southern half of the VI isoseismal area.

The middle Mississippi Valley, the southern Appalachian region, the Atlantic Coastal Plain in the vicinity of Charleston, S. C., northern and eastern New York, and New England are the well-known seismic regions of the eastern United States. Most, though by no means all, of the middle Mississippi Valley quakes occur in the New Madrid region. Two quakes, one occurring on May 26, 1909, the other on January 2, 1912, and described by Udden [2] apparently had their origin southwest of Chicago. Scarcely a year passes without one or more quakes being felt in the New Madrid region. One on October 7, 1857, whose origin appears to have been either a little to the south of St. Louis or near New Madrid, was not quite as severe as the one under discussion. Another that occurred on October 31, 1895, was probably the most severe since the great shocks of 1811–12. The last shock of note in this region occurred on December 7, 1915, when an intensity of V Rossi-Forel was reported. Several observers ventured the assertion that the quake under discussion was the most severe since the great New Madrid earthquake, and this may be true for the region about St. Louis but is improbable as regards southeastern Missouri.

Judging from the distance to which the waves of this disturbance was propagated it seems probable that the origin was at some depth below the surface. It is known that a series of faults, running in a general east-west direction, occur in the underlying Paleozoic rock of the central region of this earthquake, and it is probable that the recent shake had its origin in one or more of these faults.

[1] Bull., Seis. soc. America.

[2] Trans., Illinois Academy of science, 1912, 5:—

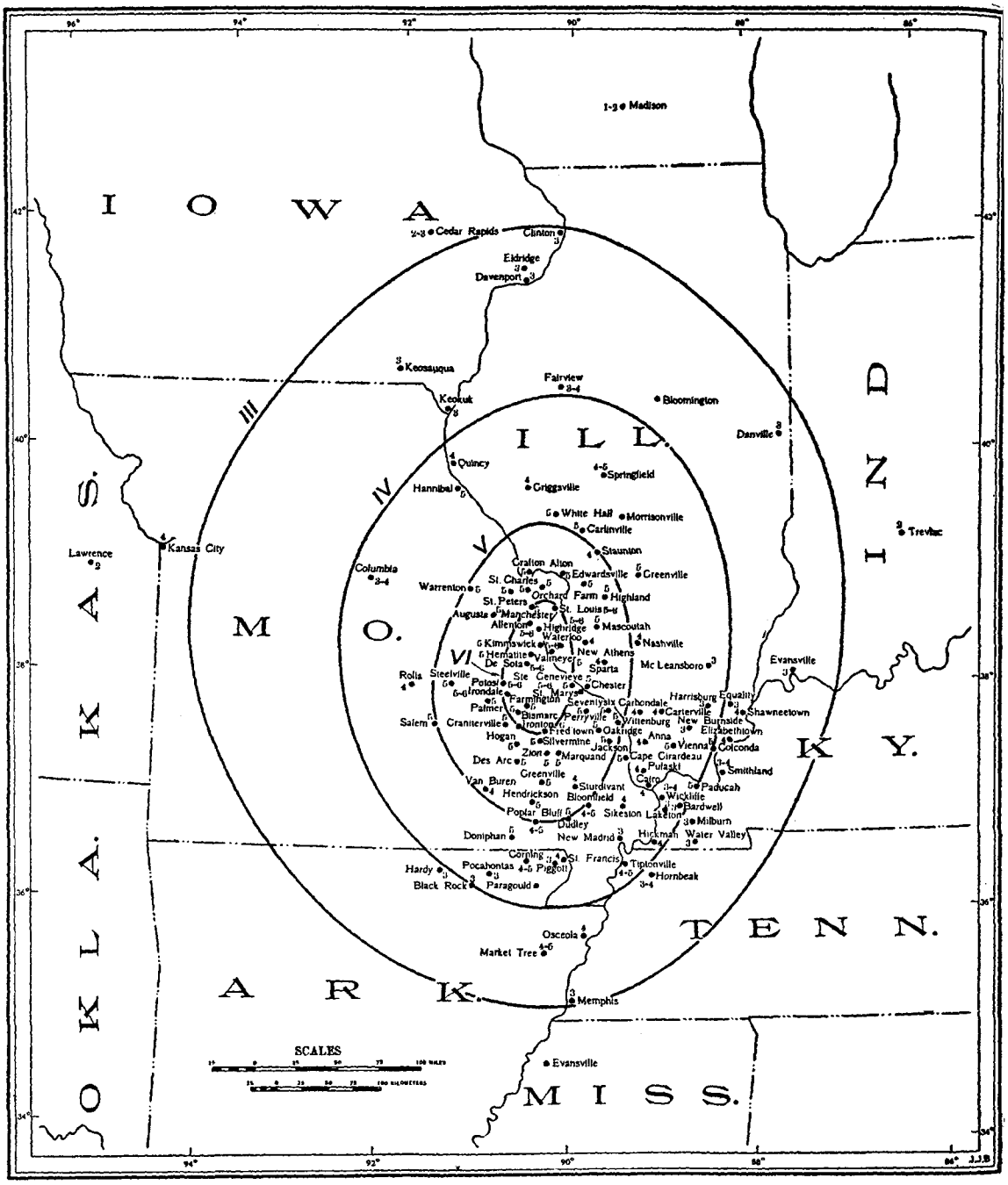

Fig. 1.—Isoseismals of the earthquake of April 9, 1917, in Missouri and Illinois. Arabic numbers opposite places indicate Rossi-Forel intensities.

SECTION V.—SEISMOLOGY.

SEISMOLOGICAL REPORTS FOR MAY, 1917.

W. J. HUMPHREYS, Professor in charge.

[Dated: Weather Bureau, Washington, D. C., July 3, 1917.]

TABLE 1.—*Non-instrumental earthquake reports, May, 1917.*

Date.	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.*			
May 11	22 36	Markleeville	38 42	119 46	5	1				W. S. Coyan.
		Towle	39 14	120 48	5	2	8	Rumbling		F. L. Harmon.
18	6 06	Calexico	32 41	115 30	3	1	1	Rumbling	Sounds before shock	C. N. Perry.
19	6 35	Yorba Linda	33 51	117 50	5	2	3	Faint	Awakened people	W. A. Walker.
19	7 19	Yorba Linda	33 51	117 50	4	3	3	Faint		W. A. Walker.
20	9 45	Yorba Linda	33 51	117 50	5	1		Rumbling	Shook buildings	W. A. Walker.
27	9 30	Brawley	32 59	115 40	5	1		Loud		M. D. Witter.
28	6 07	Barrett Dam	32 40	116 40	5	1		None		R. Wieste.
		Blythe	33 35	114 38		1		None		C. L. Suits.
		Brawley	32 59	115 40	6	1		Loud	Many frightened	M. W. Witter.
		Calexico	32 41	115 30	4–5	2		Rumbling	Lifting motion noted	I. R. Ralston.
		Coachella	33 40	116 10	4–5	2	42			Frank McCarroll.
		Indio	33 43	116 12	3–4	1	1 00	None		Bruce Drummond.
		Julian	33 05	116 37	5	2	20	Rumbling		J. H. L. Vogt.
		Mecca	33 34	116 05	5	1		None		E. A. Palmer.
		Mesa Grande	33 11	116 42	3	1	2	Rumbling		E. H. Davis.
		Mount Wilson	34 13	118 16	2	2		None	Observed in telescope	Wendell P. Hoge.
		Nellie	33 22	116 52	3–4	2	10	Faint		Esther Hewlett.
		Point Loma	32 43	117 15	3	1	3	None		F. J. Dick.
		Riverside	33 58	117 21	5	1		None	People awakened	Press report.
		Warner Springs	33 17	116 37	3	1	1 00	None		J. A. Ream.
28	7 05	Calexico	32 41	115 30	3	1	12	None		H. M. Rouse.
28	10 17	Julian	33 05	116 37	5	1	10	Rumbling		W. J. Norman.
31	2 10	Brawley	32 59	115 40	5	1		None		M. D. Witter.
		Calexico	32 41	115 30	3	2	1	Rumbling		H. M. Rouse.
31	4 35	Cahuilla	33 32	116 43	5	1	4			Dr. W. L. Shawk.
		MISSOURI.								
9	9 —	Hendrickson	36 50	90 26	4	1	1 —	Rumbling		Geo. Magill.
9	15 —	Hendrickson	36 50	90 26	3	1				Geo. Magill.
		NEW YORK.								
22	8 59	Alexandria Bay	44 22	75 54	3	1	6	Rumbling	A few people awakened	Douglas F. Manning.
		Canton	44 36	75 10	4	1	12	Faint	Many awakened	U. S. Weather Bureau.
		Malone	44 51	74 18	4–5	1	10			Press report.
		Watertown	43 57	75 53	4–5	1			Shook furniture	Press report.
22	9 19	Canton	44 36	75 10	3	1				U. S. Weather Bureau.
		VERMONT.								
22	8 59	Ferrisburg	44 13	73 15	3–4	1			Windows rattled	Rev. J. H. Long.
		Montpelier	44 16	72 34	3	1			People awakened	Press report.

TABLE 2.—*Instrumental reports, May, 1917.*

[Time used: Mean Greenwich, midnight to midnight. Nomenclature: International.]

[For significance of symbols see REVIEW for January, 1917, p. 26.]

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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.

	V	T_0
Instrumental constants... E	10	16.7
N	10	15.4

1917.			H. m. s.	Sec.	μ	μ	km.	
May 1	.....	eP_E	18 38 32	.....	.....	.....	.....	S and L uncertain. It may be that two earthquakes overlap.
		eP_N	18 39 46	.....	.....	.....	.....	
		S_N	18 50 16	10	.....	.....	.....	
		S_E	18 51 24	10	.....	.....	.....	
		e?	18 57 38	.....	.....	.....	.....	
		L_N	19 06 57	28	.....	.....	.....	
		L_E	19 09 16	28	.....	.....	.....	
		M_E	19 09 48	28	.....	160	.....	
		M_E	19 11 16	20	160	.....	.....	
		C	19 18 —	15	.....	.....	.....	
		F_N	21 19 —	.....	.....	.....	.....	
		F_E	21 24 —	.....	.....	.....	.....	
9	.....	P_N	16 16 18	11	.....	.....	.....	
		L_N	16 24 31	22	.....	.....	.....	
		M_N	16 30 30	13	.....	30	.....	
		C_N	16 42 —	14	.....	.....	.....	
		F_N	17 04 —	.....	.....	.....	.....	
31	.....	eP	8 50 54	3	.....	.....	.....	
		eL_N	8 53 39	20	.....	.....	.....	
		eL_E	8 54 28	20	.....	.....	.....	
		M_N	8 55 25	16	.....	520	.....	
		M_E	8 57 20	17	1,620	.....	.....	
		C	9 06 —	12	.....	.....	.....	
		F_E	10 23 —	.....	.....	.....	.....	
		F_N	11 12 —	.....	.....	.....	.....	

Arizona. *Tucson. 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.

	V	T_0
Instrumental constants... E	10	13.9
N	10	18.9

1917.			H. m. s.	Sec.	μ	μ	km.	
May 1	.....	P_N	18 39 36	4	.....	.....	.....	S and L doubtful.
		P_E	18 39 40	4	.....	.....	.....	
		S_E	18 50 01	11	.....	.....	.....	
		S_N	18 50 08	14	.....	.....	.....	
		L_N	19 02 41	14	.....	.....	.....	
		L_E	19 03 01	16	.....	.....	.....	
		M_N	19 08 43	21	.....	170	.....	
		M_E	19 29 52	16	280	.....	.....	
		C	19 42 —	16	.....	.....	.....	
		F	22 46 —	.....	.....	.....	.....	
25	.....	eP_N	14 42 33	2	.....	.....	.....	
		eP_E	14 42 45	4	.....	.....	.....	
		M_N	14 43 50	6	.....	100	.....	
		M_E	14 44 05	12	140	.....	.....	
		F_E	14 57 —	.....	.....	.....	.....	
		F_N	15 02 —	.....	.....	.....	.....	
28	.....	e_E	6 06 42	4	.....	.....	.....	
		e_N	6 06 44	2	.....	.....	.....	
		M_E	6 08 05	5	10	.....	.....	
		M_N	6 08 10	6	.....	20	.....	
		F_E	6 13 —	.....	.....	.....	.....	
		F_N	6 15 —	.....	.....	.....	.....	
31	.....	P_N	8 55 24	4	.....	.....	.....	
		eP_E	8 55 39	8	.....	.....	.....	
		eS_E	9 01 41	10	.....	.....	.....	
		eS_N	9 01 41	4	.....	.....	.....	
		L_N	9 04 40	22	.....	.....	.....	
		M_E	9 08 26	12	20	.....	.....	
		M_N	9 09 57	22	.....	90	.....	
		F_E	10 52 —	.....	.....	.....	.....	
		F_N	10 56 —	.....	.....	.....	.....	

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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.

1917.			H. m. s.	Sec.	μ	μ	km.	
May 2	.....	.....	.....	.....	*100	*100	.....	Tremors recorded during 24 hours ending 15h on dates given, except the record of a local shock on the 28th.
3	.....	.....	.....	.....	*100	*100	.....	
6	.....	.....	.....	.....	*100	*100	.....	
10	.....	.....	.....	.....	*500	*100	.....	
16	.....	.....	.....	.....	*100	*100	.....	
22	.....	.....	.....	.....	*100	*100	.....	
24	.....	.....	.....	.....	*100	*200	.....	
26	.....	.....	.....	.....	*50	*100	.....	
28	.....	.....	14 — —	.....	*400	*400	.....	2 to 3 seconds duration.
30	.....	.....	.....	.....	*50	*50	.....	

* Amplitude on instrument.

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

Lat., 37° 20′ 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.

1917.			H. m. s.	Sec.	μ	μ	km.	
May 1	.....	P	18 49 ..	.....	.....	.....	.....	P and S somewhat obscured.
		S	19 04 ..	.....	.....	.....	.....	Three sets of waves appear on record.
		L_N	19 09 ..	30–32	.....	*2,300	.....	Waves appear in sharp, well-defined groups with periods of calm between.
		L_E	19 09 ..	28–30	*2,700	.....	.....	
		M_N	19 10 ..	32	.....	*2,800	.....	
		M_E	19 10 ..	30	*2,800	.....	.....	Another maximum at 19h 15m.
		C	19 51 ..	20	*1,000	*1,000	.....	
		F	19 55 ..	.....	.....	.....	.....	
9	.....	L_N	16 38 ..	.....	.....	.....	.....	Very regular sinusoidal waves. Three well-defined groups. No preliminaries visible.
		L_E	16 41 ..	.....	.....	.....	.....	
		M_E	16 48 ..	20	*750	.....	.....	
		M_N	16 50 ..	20	.....	*750	.....	
		P_E	16 50 ..	.....	.....	.....	.....	
		P_N	16 51 ..	.....	.....	.....	.....	
17	.....	.....	.....	.....	.....	.....	.....	Wavelets at intervals from 3h to 13h of long period and small amplitude.
31	.....	L_N	8 43 ..	.....	.....	.....	.....	Very distinct and regular sinusoidal waves. Time doubtful; clock stopped. No record on E–W.
		P_N	8 50 ..	.....	.....	.....	.....	

* Trace amplitude.

TABLE 2.—*Instrumental reports, May, 1917*—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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 110, T_0 6.4

1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
May 1	II_u	P	18 36 30				8,760	
		S	18 46 28					
		SR	18 52 16					
		L	18 57 08	24				
		L	19 29 30	19				
		L	19 50 00	16				
		L	20 33 00	15				
		L	20 44 00	20				
		F	23 00 00					
4		eL	1 46 00					
		F	2 35 00					
9		eL	16 18 20					
		L	16 48 00	20				
		F	17 40 00					
14*		e	21 57 30					(*)
		L	22 02 00	20				
		F	22 35 00					
25		i	14 58 03					Phases uncertain.
		F	15 08 00					
25		e	6 21 46					In California. Phases indistinguishable.
		F	6 24 00					
29*		eL	6 56 00					(*)
		F	7 40 00					
31	II_u	P	8 56 56				6,140	
		S	9 04 40					
		L?	9 13 00					L waves very irregular.
		F	10 35 00					
31		eL	19 54 17					
		F	20 05 00					

* Occurrence and times based on experimental records of Marvin's new 2-component vertical pendulum, not yet described.

District of Columbia. *Washington. Georgetown University.* F. A. 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*	*5.0*	*0*

1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
May 1		eP	18 46 06					Microseisms present.
		S_E	18 56 10					
		S_N	18 56 26					
		eL_E	19 02 11					
		eL_N	19 02 17					
		M_E	19 29 47		16			
		M_N	19 34 17			13		
		F	21 40 ..					
3		F	13 48 00					Microseisms present. Sheet put on at 12h 58m; at 12h 59m long waves show.
4		e	1 40 55					Microseisms present.
		L_N?	1 46 10	20				
		L_E?	1 47 18	15				
		F	2 23 00					
9		e_E	16 36 20					Very heavy microseisms present. No distinct maximum.
		e_N	16 36 30					
		eL_N?	16 47 42					
		eL_E?	16 47 43					
		L_N	16 57 07	20				
		L_E	16 57 40	20				
		F	17 30 00					
25		e?	14 52 19					All phases doubtful.
		S_N?	14 57 49					
		S_E?	14 57 56					
		F	15 11 00					
31		P	8 57 05					Vertical shows P at 8h 57m 9s. Other phases indistinct.
		S_N	9 04 42					
		S_E	9 04 43					
		L	9 15 38	18				
		M_E	9 20 02		21			
		M_N	9 22 38			11		
		F	11 05 ..					
31		eL	19 54 02					Microseisms present.
		F	20 10 ..					

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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

Lat., 21° 19′ 12″ N.; long., 153° 03′ 48″ W. Elevation, 15.2 meters.

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

Instrumental constant..T_0 18.6

1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
May 1		P	18 35 54					
		L	18 44 00	21				
		M	18 58 48		*17,000			
		C	20 05 00					
		F	23 37 00					
2		P	1 38 12					
		L	1 48 00	18				
		M	1 52 18		*400			
		C	1 58 42					
2		e	3 21 30					
		M	3 37 00	18	*500			
		C	3 30 00					
		F	4 24 00					
2		eP	4 39 00					
		eL	4 49 48					
		M	4 53 06	21	*200			
		C	4 56 00					
		F	5 28 00					
2		L	14 27 12	20				
		M	14 39 18		*200			
		F	15 34 00					
3		L	13 17 30					
		M	13 29 54	19	*200			
		F	13 27 00					
4		P	0 52 54					
		L	0 59 24					
		M	1 14 00	19	*600			
		C	1 26 00					
		F	2 35 00					
6		P	23 14 00					
		L	23 23 54	21				
		M	23 25 00		*600			
		C	23 32 00					
		F	24 14 00					
7		e	8 28 00					
		M	8 28 48	19	*100			
		F	8 47 00					
9		eP	16 05 24					
		eS	16 13 54					
		L	16 21 18					
		M	16 25 00	20	*3500			
		C	16 49 00					
9		eP	19 50 06					
		L	20 00 06	20				
		M	20 03 48		*400			
		C	20 06 00					
		F	21 57 00					
10		eP	22 54 18					
		M	23 05 18	20	*200			
		C	23 09 00					
		F	23 18 00					
14		L	0 40 24					
		M	0 42 12		*100			
		F	0 57 00					
14		eP	22 17 54					
		eL	22 25 36	20				
		M	22 30 42		*1000			
		C	22 33 00					
		F	23 28 00					
18		P	19 12 12					Time of P doubtful. Observer entered room at time of maximum.
		L	19 21 54					
		M	19 30 00	21	*500			
		C	19 34 00					
		F	20 14 00					
21		L	9 41 00					
		M	9 43 48	15	*100			
		C	9 46 00					
		F	9 54 00					
23		L	21 53 06					
		M	21 57 06	21	*200			
		F	22 13 00					
24		eP	19 37 00					
		eS	19 43 00					
		L	19 49 18					
		M	19 52 18	19	*400			
		C	19 57 00					
		F	20 43 00					

* Trace amplitude.

TABLE 2.—*Instrumental reports, May, 1917*—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
Hawaii. *Honolulu. Magnetic Observatory*—Continued.								
1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
May 24	.....	eL.....	23 50 30	.....	.....	.....	.....	
		M.....	23 56 12	20	*100	.....	.....	
		F.....	0 05 00	.....	.....	.....	.....	
25	.....	eL.....	4 29 00	.....	.....	.....	.....	
		M.....	4 36 00	20	*100	.....	.....	
		F.....	4 41 00	.....	.....	.....	.....	
29	.....	P.....	6 19 24	.....	.....	.....	.....	
		S.....	6 24 12	.....	.....	.....	.....	
		L.....	6 26 54	22	.....	.....	.....	
		M.....	6 31 06	.....	*1000	.....	.....	
		F.....	7 09 00	.....	.....	.....	.....	
31	.....	eP.....	8 54 42	.....	.....	.....	.....	
		L.....	9 00 12	.....	.....	.....	.....	
		M.....	9 09 48	21	*6000	.....	.....	
		C.....	9 12 00	.....	.....	.....	.....	
		F.....	12 18 00	.....	.....	.....	.....	

* 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	e
	E	177	3.4	4:1
	N	205	3.4	4:1

1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
May 1	.....	eP_N...	18 40 51	.....	.....	.....	.....	Very faint record. P_E not discernible.
		S.....	18 51 20	.....	.....	.....	.....	
		L.....	19 09 27	55–60	.....	.....	.....	
		L?....	19 11 07	30	.....	.....	.....	
		M_E...	19 26 17	18	17	.....	.....	
		M_N...	19 27 23	17	.....	14	.....	
		F.....	22 09 ..	.....	.....	.....	.....	
9	.....	eP_N...	16 13 04	.....	.....	.....	.....	Record on E-W very illegible. iP_N may be building shock.
		iP_N?..	16 14 00	.....	.....	1	.....	
		eS_N...	16 19 14	.....	.....	.....	.....	
		L_N....	16 27 33	.....	.....	.....	.....	
		M_N....	16 48 50	23	.....	1	.....	
		F.....	17 37 ..	.....	.....	.....	.....	
31	.....	eP_E?..	8 55 46	.....	.....	.....	.....	N–S not recording properly.
		iP_E....	8 55 54	.....	.....	.....	.....	
		S_E?....	9 02 17	.....	.....	.....	.....	
		S_E.....	9 06 08	.....	.....	.....	.....	
		iL_E?..	9 09 25	.....	.....	.....	.....	
		L_E....	9 10 15	20–25	.....	.....	.....	
		M_E....	9 13 25	.....	8	.....	.....	
		F_E....	10 00 ..	.....	.....	.....	.....	

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	33
	N	10	25

1917			*H. m. s.*	*Sec.*	μ	μ	*km.*	
May 1	.....	eP_E...	18 45 24	2	.....	.....	.....	S and L doubtful; it may be that there are two earthquakes overlapping.
		S_E....	18 56 03	.....	.....	.....	.....	
		S_N....	18 56 28	.....	.....	.....	.....	
		L_E....	19 02 30	.....	.....	.....	.....	
		L_N....	19 02 32	.....	.....	.....	.....	
		L_N....	19 22 34	20	.....	.....	.....	
		L_E....	19 24 12	22	.....	.....	.....	
		M_E....	19 25 37	24	*1100	.....	.....	
		M_N....	19 34 20	17	.....	*450	.....	
		C.....	19 47 —	17	.....	.....	.....	
		F.....	20 33 —	.....	.....	.....	.....	
31	.....	P_E....	8 57 03	4	.....	.....	.....	
		P_N....	8 57 06	4	.....	.....	.....	
		S_N....	9 04 46	8	.....	.....	.....	
		S_E....	9 04 49	8	.....	.....	.....	
		eL_E...	9 13 24	19	.....	.....	.....	
		eL_N...	9 13 35	19	.....	.....	.....	
		M_E....	9 20 27	21	*500	.....	.....	
		M_N....	9 22 46	21	.....	*300	.....	
		C_E....	9 39 —	14	.....	.....	.....	
		C_N....	9 46 —	14	.....	.....	.....	
		F_N....	10 21 —	12	.....	.....	.....	
		F_E....	10 26 —	.....	.....	.....	.....	

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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	e
	E	80	23	0
	N	50	25	4:1

(Report for May, 1917, not received.)

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.

Instrument: Wiechert 80 kg. astatic, horizontal pendulum.

Instrumental constants..	V	T_0	e
	80	7	5:1

1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
May 1	III_u...	eP.....	18 45 01	.....	.....	.....	.....	Times uncertain; wireless time service suspended.
		eS.....	19 — —	.....	.....	.....	.....	
		eL.....	19 16 —	.....	.....	.....	.....	
		F.....	22 17 —	.....	.....	.....	.....	
4	I_u.....	eP.....	1 20 —	.....	.....	.....	.....	
		F.....	2 — —	.....	.....	.....	.....	
9	I_u.....	e_m.....	16 50 —	.....	.....	.....	.....	
		F.....	17 40 —	.....	.....	.....	.....	
25	I_u.....	e.....	14 52 —	.....	.....	.....	.....	
		F.....	15 02 —	.....	.....	.....	.....	
31	II_u.....	eP.....	8 56 —	.....	.....	.....	5,100	
		S?.....	9 02 04	.....	.....	.....	.....	
		L.....	9 08 —	.....	.....	.....	.....	
		M.....	10 10 03	20	5	.....	.....	
		F.....	10 20 —	.....	.....	.....	.....	

New York. *Buffalo. Canisius College.* John A. Curtin, S. J.

Lat., 42° 53′ 02″ N.; long., 78° 52′ 40″ W. Elevation, 190.5 meters.

Instrument: Wiechert, 80 kg., horizontal.

Instrumental constants..	V	T_0	e
	80	7	5:1

(Report for May, 1917, not received.)

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..		V	T_0	e
	E	72	7.2	1.5:1
	N	72	7.2	3.8:1

(Report for May, 1917, not received.)

TABLE 2.—*Instrumental reports, May, 1917*—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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

Lat., 42° 26′ 53″ N.; long., 76° 29′ 09″ W. Elevation, 242.6 meters.

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

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

1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
May 1	.....	eP_N	18 45 54	6	.....	.....	.....	Instrument out of order during later part of April.
		eP_E	18 48 10	6	.....	.....	.....	
		P_E	18 51 58	7	.....	.....	.....	
		S_E?	18 55 57	20	.....	.....	.....	
		S_N?	18 56 08	20	.....	.....	.....	
		eS_E	19 02 18	22	.....	.....	.....	
		eS_N	19 02 26	17	.....	.....	.....	
		L_N	19 14 50	56	.....	.....	.....	
		M_N	19 35 02	18	.....	340	.....	
		M_E	19 38 42	17	250	.....	.....	
		F_N	22 16 ..	.....	.....	.....	.....	
		F_E	22 57 ..	.....	.....	.....	.....	
2	.....	eL_E	2 25 38	16	.....	.....	.....	
		F_E	2 53 ..	.....	.....	.....	.....	
2	.....	eL_E	4 01 15	16	.....	.....	.....	
		F	4 44 ..	.....	.....	.....	.....	
2	.....	eL_E	5 34 24	17	.....	.....	.....	
		F	5 55 ..	.....	.....	.....	.....	
4	.....	eL_N	1 34 15	20	.....	.....	.....	
		F_N	2 23 ..	.....	.....	.....	.....	
9	.....	e_E	16 40 35	24	.....	.....	.....	
		F	17 46 ..	.....	.....	.....	.....	
9	.....	e_E	20 36 05	17	.....	.....	.....	
		F	20 49 ..	.....	.....	.....	.....	
25	.....	e_N	14 57 57	3-9	.....	.....	.....	
		F	15 09 ..	.....	.....	.....	.....	
31	.....	P_N	8 56 34	4	.....	.....	.....	
		P_E	8 56 40	4	.....	.....	.....	
		S_N	9 04 02	7	.....	.....	.....	
		S_E	9 04 05	6	.....	.....	.....	
		eL_N	9 13 07	7-20	.....	.....	.....	
		eL_E	9 13 10	7-18	.....	.....	.....	
		F_N	10 58 ..	.....	.....	.....	.....	
		F_E	11 13 ..	.....	.....	.....	.....	

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	T_0
	10	20

(Report for May, 1917, not received.)

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

Lat., 18° 09′ N.; long., 65° 27′ W. Elevation, 19.8 meters.

Instruments: Two Bosch-Omori.

Instrumental constants..	V	T_0
E	10	17.5
N	10	18.0

1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
May 1	.....	eP_E	18 37 35	7	.....	.....	.....	S and L uncertain. It may be that two earthquakes overlap.
		e_N	18 46 43	7	.....	.....	.....	
		S_E	18 56 25	12	.....	.....	.....	
		S_N	18 56 27	18	.....	.....	.....	
		L_E	19 21 50	30	.....	.....	.....	
		L_N	19 22 27	20	.....	.....	.....	
		M_E	19 22 55	27	*130	.....	.....	
		M_N	19 25 27	23	.....	*270	.....	
		M_N	19 40 07	18	.....	*270	.....	
		M_E	19 40 15	17	*130	.....	.....	
		C_N	20 00 —	16	.....	.....	.....	
		C_E	20 04 —	15	.....	.....	.....	
		F_E	21 05 —	.....	.....	.....	.....	
		F_N	21 27 —	.....	.....	.....	.....	
9	.....	eP_N	16 35 00	.....	.....	.....	.....	
		M_N	17 12 30	26	.....	*30	.....	
		F_N	18 08 00	.....	.....	.....	.....	
31	.....	P	9 09 10	.....	.....	.....	.....	
		M_E	9 33 40	20	*30	.....	.....	
		M_N	9 33 45	18	.....	*180	.....	
		C_E	9 39 —	16	.....	.....	.....	
		C_N	9 42 —	16	.....	.....	.....	
		F_E	10 25 —	.....	.....	.....	.....	
		F_N	10 30 —	.....	.....	.....	.....	

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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..	V	T_0
E	10	15
N	10	16

1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
May 1	II_E	P	18 37 26	.....	.....	.....	8,360	
		S	18 47 04	.....	.....	.....	.....	
		L	18 57 00	20	.....	.....	.....	
		L	19 23 20	34	.....	.....	.....	
		L	19 27 20	20	.....	.....	.....	
		F	22 40 00	.....	.....	.....	.....	
9	.....	e	16 18 13	.....	.....	.....	.....	
		L	16 46 45	34	.....	.....	.....	
		F	17 25 00	.....	.....	.....	.....	
25	.....	e	14 59 23	.....	.....	.....	.....	
		F	15 10 00	.....	.....	.....	.....	
31	II_E	P	8 56 57	.....	.....	.....	5,680	
		S	9 04 16	.....	.....	.....	.....	
		L	9 13 26	20	.....	.....	.....	
		F	11 00 00	.....	.....	.....	.....	
31	.....	e	19 57 00	.....	.....	.....	.....	
		F	20 00 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 80 kg. vertical seismograph.

Instrumental constants..	V	T_0
	120	26

1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
May 1	.....	*O*	*18 27 —*	.....	.....	.....	12,900	*O* and distance approximate.
		eP_E?	18 42 00	.....	.....	.....	.....	
		iS_N..	18 54 58	.....	.....	.....	.....	
		e_E....	18 56 28	20	.....	.....	.....	
		i_N....	18 56 54	.....	.....	.....	.....	
		e_N....	19 15 —	56–48	.....	.....	.....	
			19 21 —	40–26	.....	.....	.....	
		eL_E...	19 23 36	30	.....	.....	.....	
		eL_N...	19 24 00	24	.....	.....	.....	
		M_N....	19 35 00	18	.....	180	.....	
		L.....	19 40 00	16	.....	.....	.....	
		L.....	19 47 00	16	.....	.....	.....	
		L.....	20 00 00	16	.....	.....	.....	
		L.....	20 19 00	15	.....	.....	.....	
		$LR1_N$.	20 25 00	40	.....	.....	.....	
		$LR1_E$.	20 26 00	24	.....	.....	.....	
		L.....	20 31 00	25	.....	.....	.....	
		L.....	20 42 00	20	.....	.....	.....	
		F.....	21 40 00	.....	.....	.....	.....	
2	.....	eL.....	2 28 00	.....	.....	.....	.....	
		L.....	2 40 —	16	.....	.....	.....	
			2 50 —					
2	.....	eL.....	4 01 —	.....	.....	.....	.....	
		L.....	4 01 —	20–16	.....	.....	.....	
			4 15 —					
2	.....	eL_N..	15 08 18	.....	.....	.....	.....	
		L.....	15 17 —	20	.....	.....	.....	
			15 30 —					
3	.....	eL_N..	12 56 00	.....	.....	.....	.....	
		L.....	13 08 00	18	.....	.....	.....	
		F.....	13 35 00	.....	.....	.....	.....	
4	.....	eP_N?	1 33 23	.....	.....	.....	5,000?	
		eP_E?	1 33 28	.....	.....	.....	.....	
		S_E?....	1 40 06	.....	.....	.....	.....	
		S_N?....	1 40 10	.....	.....	.....	.....	
		eL_N...	1 47 36	18	.....	.....	.....	
		eL_E...	1 48 24	18	.....	.....	.....	
		L.....	1 56 —	18–15	.....	.....	.....	
			2 22 —					
		F.....	2 45 —	.....	.....	.....	.....	
9	.....	*O*.....	*16 02 45*	.....	.....	.....	8,380	
		eP_E...	16 14 25	.....	.....	.....	.....	
		eP_N...	16 14 26	.....	.....	.....	.....	
		S_E....	16 24 02	.....	.....	.....	.....	
		S_N....	16 24 05	.....	.....	.....	.....	
		eL_N...	16 39 00	20	.....	.....	.....	
		L.....	16 44 24	40	.....	.....	.....	
		L.....	16 56 00	20	.....	.....	.....	
		L.....	17 10 00	11	.....	.....	.....	
		F.....	17 45 —	.....	.....	.....	.....	

TABLE 2.—*Instrumental reports, May, 1917*—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
Canada. *Ottawa. Dominion Astronomical Observatory*—Continued.								
1917. May 22	.....	eP....	*H. m. s.* 9 00 34	*Sec.*	.....	.....	*km.* 30	Local shock. A few people were awakened.
		S_E....	9 00 37	.....	.....	.....	.....	
		F.....	9 00 42	.....	.....	.....	.....	
25	.....	eP?...	14 59 10	.....	.....	.....	950?	
		eL?...	15 01 14	8	.....	.....	.....	
		F.....	15 15 —	.....	.....	.....	.....	
28	.....	eP_N?..	6 22 40	.....	.....	.....	.....	
		eP_E?..	6 23 09	.....	.....	.....	.....	
		eL_N...	6 24 30	7	.....	.....	.....	
		eL_E...	6 25 36	8	.....	.....	.....	
		F.....	6 32 —	.....	.....	.....	.....	
31	.....	O.....	8 47 23	.....	.....	.....	5,580	
		iP_N...	8 56 28	.....	.....	.....	.....	
		eP_E...	8 56 29	.....	.....	.....	.....	
		SR1..	9 07 36	.....	.....	.....	.....	
		eL....	9 12 00	10	.....	.....	.....	
		L.....	9 16 00	20	.....	.....	.....	
		M.....	9 17 30	20	35	165	.....	
		L.....	9 33 00	16-14	.....	.....	.....	
		L.....	9 44 —	14-12	.....	.....	.....	
		L.....	9 55 —	13-12	.....	.....	.....	
		L.....	10 02 —	11	.....	.....	.....	
		$LR1_M$?	11 16 30	10	.....	.....	.....	
		F.....	11 45 00	.....	.....	.....	.....	
31	.....	eL....	19 56 — / 20 08 —	20	.....	.....	.....	

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″.

1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
May 1	.....	P.....	18 42 06	.....	.....	.....	.....	Vibrations large and clearly defined. S waves of large amplitude.
		iP	18 46 24	.....	.....	.....	.....	
		eS.....	18 53 24	.....	.....	.....	.....	
		iS.....	18 54 48	.....	.....	.....	.....	
		iS.....	18 56 30	12-18	*5000	.....	.....	
		iL.....	19 03 06	.....	.....	.....	.....	
		L.....	19 21 30	.....	.....	.....	.....	
		iL.....	19 25 36	.....	.....	.....	.....	
		iL.....	19 27 36	.....	.....	.....	.....	
		M.....	19 31 48 / 19 37 18	.....	*27000+	.....	.....	
		M.....	19 40 00	.....	.....	.....	.....	
		iL.....	19 45 12	.....	.....	.....	.....	
		iL.....	19 47 12	.....	.....	.....	.....	
		iL.....	19 49 18	.....	.....	.....	.....	
		L.....	19 50 18	.....	.....	.....	.....	
		L.....	21 52 42	.....	.....	.....	.....	
		L.....	22 51 18	.....	.....	.....	.....	
		L.....	23 42 06	.....	.....	.....	.....	
2	.....	F.....	0 51 54	.....	.....	.....	.....	
2	.....	L.....	2 21 36	.....	.....	.....	.....	
		eL....	2 25 42	.....	.....	.....	.....	
		M.....	2 27 54	.....	*400	.....	.....	
		F.....	3 13 12	.....	.....	.....	.....	
2	.....	L?....	3 31 54	.....	.....	.....	.....	May be part of preceding quake.
		eL....	3 59 42	.....	.....	.....	.....	
		M.....	4 12 24	.....	*400	.....	.....	
		F.....	5 06 24	.....	.....	.....	.....	
2	.....	e?....	5 15 24	.....	.....	.....	.....	
		eL....	5 26 30	.....	.....	.....	.....	
		M.....	5 29 18	.....	*300	.....	.....	
		F?....	7 19 12	.....	.....	.....	.....	
2	.....	e.....	8 14 18	.....	*50	.....	.....	
		F.....	8 18 00	.....	.....	.....	.....	
2	.....	e?....	14 39 30	.....	.....	.....	.....	
		L.....	15 02 06	.....	.....	.....	.....	
		e.....	15 11 36	.....	.....	.....	.....	
		eL....	15 15 24	.....	.....	.....	.....	
		M.....	15 17 24	.....	*300	.....	.....	
		F.....	15 30 36	.....	.....	.....	.....	
3	.....	e.....	13 01 36	.....	.....	.....	.....	
		L.....	13 05 00	.....	.....	.....	.....	
		M.....	13 06 18	.....	*200	.....	.....	
		F.....	13 30 24	.....	.....	.....	.....	

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
Canada. *Toronto. Dominion Meteorological Service*—Continued.								
1917. May 4	.....	e.....	*H. m. s.* 0 49 36	*Sec.*	.....	.....	*km.*	
		e.....	1 13 12	.....	.....	.....	.....	
		e.....	1 35 54	.....	.....	.....	.....	
		eL....	1 44 18	.....	.....	.....	.....	
		M.....	1 50 06	.....	*700	.....	.....	
		eL....	1 54 12	.....	.....	.....	.....	
		M.....	1 56 12	.....	*700	.....	.....	
		e.....	3 13 54	.....	.....	.....	.....	
		F.....	3 35 06	.....	.....	.....	.....	
6	.....	e.....	23 41 06	.....	.....	.....	.....	
		L.....	23 52 00	.....	.....	.....	.....	
7		L.....	0 00 48	.....	.....	.....	.....	
		eL....	0 03 48	.....	.....	.....	.....	
		M.....	0 06 48	.....	*300	.....	.....	
		F.....	0 42 00	.....	.....	.....	.....	
7	.....	e.....	9 19 06	.....	*50	.....	.....	
		F.....	9 24 30	.....	.....	.....	.....	
9	.....	e.....	16 18 30	.....	.....	.....	.....	Marked disturbance.
		S?....	16 26 30	.....	.....	.....	.....	
		e.....	16 32 42	.....	.....	.....	.....	
		L.....	16 41 06	.....	.....	.....	.....	
		L.....	16 45 12	.....	.....	.....	.....	
		iL....	17 00 00	18	.....	.....	.....	
		iL....	17 03 00	.....	.....	.....	.....	
		M.....	17 06 00	.....	*1600	.....	.....	
		M.....	17 09 00	.....	*1600	.....	.....	
		L.....	18 14 18	.....	.....	.....	.....	
		L?....	18 39 18	.....	.....	.....	.....	
		F.....	18 53 48	.....	.....	.....	.....	
9	.....	L.....	20 34 00	.....	.....	.....	.....	Possibly a dual earthquake.
		eL....	20 36 00	.....	.....	.....	.....	
		M.....	20 37 30	.....	*500	.....	.....	
		L.....	21 40 12	.....	.....	.....	.....	
		L.....	21 41 18	.....	.....	.....	.....	
		M.....	21 49 24	.....	*800	.....	.....	F in air currents.
14	.....	L?....	22 35 18	.....	.....	.....	.....	Phases masked by air currents.
		L?....	22 49 30	.....	.....	.....	.....	
		L?....	23 19 54	.....	.....	.....	.....	F lost in air currents.
24	.....	eL....	20 25 06	.....	.....	.....	.....	
		M.....	20 27 42	.....	*200	.....	.....	F?.
25	.....	L.....	14 58 30	.....	.....	.....	.....	
		M.....	15 01 12	.....	*100	.....	.....	
		F.....	15 05 12	.....	.....	.....	.....	
29	.....	L.....	6 59 48	.....	.....	.....	.....	Marked gradual increasing and decreasing thickening.
		eL....	7 04 12	.....	.....	.....	.....	
		M.....	7 12 30	.....	*900	.....	.....	
		F.....	7 48 12	.....	.....	.....	.....	
31	.....	P.....	8 56 30	.....	.....	.....	5,500	In Alaska. Marked record.
		S.....	9 03 42	.....	.....	.....	.....	
		eS....	9 06 48	.....	.....	.....	.....	
		iS....	9 07 48	.....	.....	.....	.....	
		L.....	9 13 06	.....	.....	.....	.....	
		iL....	9 14 00	18-24	.....	.....	.....	
		M.....	9 21 30	.....	*4000	.....	.....	
		eL....	10 02 42	.....	.....	.....	.....	
		L_{rep}..	12 05 24	.....	.....	.....	.....	
		F.....	12 29 12	.....	.....	.....	.....	
31	.....	L.....	19 53 36	.....	*50	.....	.....	

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″.

1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
May 1	.....	P.....	18 31 32	.....	.....	.....	6,370	Kamchatka.
		S.....	18 39 28	12-18	.....	.....	.....	
		L.....	18 49 54	.....	.....	.....	.....	
		M.....	19 15 01 / 19 18 09	.....	*17,000+	.....	.....	
		F.....	23 35 01	.....	.....	.....	.....	
			VERTICAL.		A_Z			
		*P.....	*18 32 00*	*4-6*	.....	.....	.....	Time unreliable for L, M, and F.
		*S.....	*18 40 20*	*8-10*	.....	.....	.....	
		*L?....	*18 50 00*	*24*	.....	.....	.....	
		M.....	?	20	200	.....	.....	

* Trace amplitude.

TABLE 2.—*Instrumental reports, May, 1917*—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_H	Amplitude. A_N	Distance.	Remarks.
Canada. *Victoria, B. C. Dominion Meteorological Service*—Contd.								
1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
May 2	.....	P or S.	1 51 22	.....	.....	.....	.....	‡
		M.....	2 10 43	.....	*500	.....	.....	
		F.....	2 31 32	.....	.....	.....	.....	
2	.....	L.....	3 41 27	.....	.....	.....	.....	M at cut-off.‡
		F.....	4 04 44	.....	.....	.....	.....	
2	.....	M.....	5 12 12	.....	*200	.....	.....	‡
2	.....	L?....	14 54 52	.....	.....	.....	.....	‡
		M.....	15 02 49	.....	*100	.....	.....	
3	.....	M.....	13 18 09	.....	*400	.....	.....	
		F.....	13 22 32	.....	.....	.....	.....	
4	.....	P?....	1 06 45	.....	.....	.....	.....	
		M.....	1 41 27	.....	*700	.....	.....	
		F.....	2 28 34	.....	.....	.....	.....	
6	.....	P or L.	23 33 31	.....	.....	.....	.....	
		M.....	23 44 26	.....	*600	.....	.....	
		F.....	23 58 49	.....	.....	.....	.....	
7	.....	P?....	8 58 49	.....	.....	.....	.....	
		M.....	9 02 17	.....	*100	.....	.....	
		F.....	9 04 44	.....	.....	.....	.....	
9	.....	P.....	15 59 49	.....	.....	.....	6,370	May be Kamchatka.
		S.....	16 07 45	.....	.....	.....	.....	
		L.....	16 17 32	.....	.....	.....	.....	
		M.....	16 44 27	.....	*3,500	.....	.....	
		eL....	18 28 00	.....	.....	.....	.....	F?
			VERTICAL.		A_Z			
		P.....	*16 59 00*	*2–4*	.....	.....	*6,320*	
		S.....	*16 08 00*	*6*	.....	.....	.....	*L?*
		M.....	*16 39 50*	*18*	*167*	.....	.....	
9	.....	M.....	21 30 34	.....	*200	.....	.....	May be part of above.
14	.....	P?....	22 41 59	.....	.....	.....	.....	
		L.....	22 44 28	.....	.....	.....	.....	
		M.....	22 52 24	.....	*200	.....	.....	
		F.....	23 16 42	.....	.....	.....	.....	
24	.....	P?....	20 03 00	.....	.....	.....	.....	
		L?....	20 10 30	.....	.....	.....	.....	
		M.....	20 12 00	.....	*200	.....	.....	F?
Canada. *Victoria, B. C. Dominion Meteorological Service*—Contd.								
1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
May 25	.....	P.....	14 52 02	.....	.....	.....	.....	
		L.....	14 53 31	.....	.....	.....	.....	
		M.....	14 55 01	.....	*200	.....	.....	
		F?....	15 00 58	.....	.....	.....	.....	
29	.....	P?....	6 44 35	.....	.....	.....	.....	
		L.....	6 47 02	.....	.....	.....	.....	
		M.....	6 51 57	.....	*500	.....	.....	
		F.....	7 02 48	.....	.....	.....	.....	
31	.....	P.....	8 53 54	.....	.....	.....	2,290	Alaskan Peninsula. S waves of large amplitude.
		iP.....	8 55 53	.....	.....	.....	.....	
		iS.....	8 57 42	.....	.....	.....	.....	
		L.....	8 58 22	.....	.....	.....	.....	
		M.....	9 01 20	.....	*14,500	.....	.....	
		F.....	12 25 38	.....	.....	.....	.....	
			VERTICAL.		A_Z			
		P.....	*8 53 54*	*3–4*	.....	.....	*1,680*	
		S.....	*8 56 48*	*4*	.....	.....	.....	
		L.....	*8 58 12*	*18*	.....	.....	.....	
		M.....	*9 01 00*	*21*	*67*	.....	.....	
31	.....	L.....	19 53 42	18–24	*100	.....	.....	
		F?....	19 59 00	.....	.....	.....	.....	

* Trace amplitude. ‡ Probably after-shocks.

SEISMOLOGICAL DISPATCHES.[1]

Rome, May 9, 1917.

Violent earthquakes in Calabria created a panic among the populace there to-day. Inhabitants of towns and villages fled to the open fields. No fatalities have been reported. (United Press.)

Ogdensburg, N. Y., May 22, 1917.

Three distinct earth shocks were felt in this vicinity at 4 a. m. to-day. Persons were roused from sleep by the shaking of their houses, but no damage has been reported. (Assoc. Press.)

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

SECTION V.—SEISMOLOGY.

SEISMOLOGICAL REPORTS FOR JUNE, 1917.

W. J. HUMPHREYS, Professor in Charge.

[Dated: Weather Bureau, Washington, D. C., July 1, 1917.]

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

Date.	Approximate time, Greenwich Civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity Rossi-Forel.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
		ALABAMA.								
1917.	H. m.		° ′	° ′			M. s.			
30	2 28	Greensboro	32 41	87 32	4–5	1	4	Rumbling...	This and the next disturbance probably not seismic.	Wm. Gerby.
		Rosemary	32 40	87 30	5	1	.....	Rumbling...	.....	H. F. Adams.
30	2 50	Rosemary	32 40	87 30	5	1	.....	Rumbling...	.....	H. F. Adams.
		CALIFORNIA.								
2	4 35	Cahuilla	33 32	116 43	4–5	1	.....	.....	.....	Dr. W. L. Shawk.
2	14 30	Victorville	34 32	117 18	3	1	.....	.....	.....	
6	5 ..	Saugus	34 20	118 30	3	1	.....	.....	.....	
7	15 41	Calexico	32 41	115 30	3	1	1	.....	.....	Ivan R. Ralston.
8	0 30	Calexico	32 41	115 30	4	1	3	Rumbling...	.....	C. N. Perry.
8	6 13	Calexico	32 41	115 30	3	2	1	Faint	.....	C. N. Perry.
9	3 30	Carmel	36 34	121 56	4	1	.....	Rumbling...	.....	Charlotte Vickery.
		Salinas	36 36	121 40	3	1	10	None	Dishes rattled	Dr. E. D. Eddy.
		Soledad	36 28	121 16	5	1	30	None	.....	Wm. Weber.
11	0 20	Calexico	32 41	115 30	3	1	30	Rumbling...	.....	H. M. Rouse.
11	2 13	Calexico	32 41	115 30	3	1	½	Rumbling...	.....	Ivan R. Ralston.
11	3 54	Julian	33 05	116 37	5	1	5	Rumbling...	.....	Wm. L. Schilling.
13	4 06	Calexico	32 41	115 30	3	1	1	Rumbling...	.....	Ivan R. Ralston.
17	6 ..	Heber	32 45	115 31	5	1	.....	Rumbling...	Shook buildings	.....
18	9 55	Calexico	32 41	115 30	4	3	.....	Rumbling...	Awakened some people	W. J. Best.
18	14 21	Calexico	32 41	115 30	2	1	1	None	.....	C. N. Perry.
22	4 05	Julian	33 05	116 37	4	1	7	Loud	.....	W. J. Norman.
26	13 26	Eureka	40 38	124 11	4	1	3	Rumbling...	.....	U. S. Weather Bureau.
27	6 26	Calexico	32 41	115 30	3–4	1	½	Rumbling...	Noise preceded shock	Ivan R. Ralston.
30	23 38	Los Angeles	34 03	118 15	4	1	1	Rumbling...	Followed by 4 light shocks	U. S. Weather Bureau.
		IDAHO.								
1	10 35	Cottonwood	46 03	116 20	4	1	12	None	.....	Rev. Father Jerome.
		ILLINOIS.								
9	13 14	Cairo	37 00	89 10	4	1	3	None	.....	U. S. Weather Bureau.
		MISSOURI.								
9	13 14	New Madrid	36 35	89 32	4	1	Few.	Rumbling...	.....	Miss Josie Smith.
		NEVADA.								
1	20 37	Winnemucca	40 58	117 43	3	1	2	None	.....	U. S. Weather Bureau.
		TENNESSEE.								
9	13 14	Springville	36 18	88 14	2	1	2	None	.....	H. A. Boden.
		WASHINGTON.								
9	14 30	Glenoma	46 32	122 09	4	1	30	Rumbling...	Shook buildings	J. A. Welsh.
		Longmire	46 45	121 50	4–5	1	1	Loud	.....	J. B. Flett.

TABLE 2.—*Instrumental reports, June, 1917.*

[Time used: Mean Greenwich, midnight to midnight. Nomenclature: International.]

[For significance of symbols see REVIEW for January, 1917, p. 26.]

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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	16.7
	N	10	15.4

1917.			H. m. s.	Sec.	μ	μ	km.	
June 4	.....	P_E	1 32 35	4	.....	.....	.....	Phases uncertain.
		S_E	1 34 42	.....	.....	.....	.....	
		e_N	1 35 26	20	.....	.....	.....	
		L_E	1 36 30	20	.....	.....	.....	
		M_N	1 36 58	18	.....	10	.....	
		M_E	1 37 16	20	10	.....	.....	
		F_E	2 17 ..	.....	.....	.....	.....	
		F_N	2 37 ..	.....	.....	.....	.....	
8	.....	e_N	1 14 40	.....	.....	.....	.....	
		L_E	1 20 31	27	.....	.....	.....	
		L_N	1 20 33	28	.....	.....	.....	
		M_E	1 25 30	18	20	.....	.....	
		M_N	1 31 54	16	.....	100	.....	
		C_E	1 34 ..	16	.....	.....	.....	
		C_N	1 38 ..	13	.....	.....	.....	
		F_E	1 46 ..	.....	.....	.....	.....	
		F_N	2 00 ..	.....	.....	.....	.....	
10	.....	eP_N	4 31 12	.....	.....	.....	.....	Phases uncertain.
		eP_E	4 33 32	.....	.....	.....	.....	
		S_N	4 35 52	.....	.....	.....	.....	
		S_E	4 36 40	.....	.....	.....	.....	
		L_N	4 38 50	20	.....	.....	.....	
		L_E	4 38 55	18	.....	.....	.....	
		M_N	4 40 42	11	.....	100	.....	
		M_E	4 42 40	8	20	.....	.....	
		C_N	4 47 ..	9	.....	.....	.....	
		C_E	4 49 ..	8	.....	.....	.....	
		F_E	5 11 ..	.....	.....	.....	.....	
		F_N	5 42 ..	.....	.....	.....	.....	
13	.....	e_N	7 26 ..	.....	.....	.....	.....	Nothing on E–W; only long waves on N–S.
		M_N	7 40 ..	19	.....	10	.....	
		F_N	8 17 ..	.....	.....	.....	.....	
24	.....	P_N	20 02 04	.....	.....	.....	.....	Motion very slight; phases doubtful.
		S_E	20 11 30	.....	.....	.....	.....	
		S_N	20 11 32	.....	.....	.....	.....	
		C_N	20 54 ..	.....	.....	.....	.....	
26	.....	P_E	6 01 42	6	.....	.....	.....	
		P_N	6 01 44	10	.....	.....	.....	
		S_E	6 11 42	12	.....	.....	.....	
		S_N	6 11 46	12	.....	.....	.....	
		L_E	6 25 02	25	.....	.....	.....	
		L_N	6 25 06	28	.....	.....	.....	
		M_N	6 25 24	17	.....	920	.....	
		M_E	6 33 02	17	2,400	.....	.....	
		C_E	6 49 ..	.....	.....	.....	.....	
		C_N	6 50 ..	19	.....	.....	.....	
		F_E	8 44 ..	.....	.....	.....	.....	
		F_N	9 00 ..	.....	.....	.....	.....	

Arizona. *Tucson. 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

1917.			H. m. s.	Sec.	μ	μ	km.	
June 1	.....	eP_N	16 50 51	3	.....	.....	.....	Motion very slight on E-W.
		eP_E	16 51 20	.....	.....	.....	.....	
		eL_N	16 51 20	.....	.....	.....	.....	
		M_E	16 51 40	.....	40	.....	.....	
		M_N	16 51 46	6	.....	50	.....	
		F_E	16 57 —	.....	.....	.....	.....	
		F_N	17 05 —	.....	.....	.....	.....	
3	.....	P_E	6 49 34	.....	.....	.....	.....	E-W component not in good adjustment.
		P_N	6 49 39	.....	.....	.....	.....	
		L_N	6 50 22	.....	.....	.....	.....	
		M_N	6 50 39	.....	.....	.....	.....	
		M_E	6 51 27	.....	.....	.....	.....	
		F_E	6 51 52	.....	.....	.....	.....	
		F_N	7 02 09	.....	.....	.....	.....	

Arizona. *Tucson. Magnetic Observatory*—Continued.

1917.			H. m. s.	Sec.	μ	μ	km.	
June 3	.....	e_N	11 11 15	2	.....	.....	.....	Nothing on E-W.
		M_N	11 11 50	4	.....	20	.....	
		F_N	11 19 —	.....	.....	.....	.....	
8	.....	P_N	0 57 30	4	.....	.....	.....	
		P_E	0 57 32	.....	.....	.....	.....	
		S_N	1 02 21	5	.....	.....	.....	
		S_E	1 02 31	10	.....	.....	.....	
		L_N	1 06 53	24	.....	.....	.....	
		L_E	1 07 00	20	.....	.....	.....	
		M_E	1 08 53	12	890	.....	.....	
		M_N	1 10 58	18	.....	3,680	.....	
		C_E	1 17 —	12	.....	.....	.....	
		C_N	1 19 —	12	.....	.....	.....	
		F_E	3 34 —	10	.....	.....	.....	
		F_N	3 39 —	10	.....	.....	.....	
10	.....	eP_N	4 36 23	5	.....	.....	.....	
		eP_E	4 38 08	.....	.....	.....	.....	
		L_N	4 40 00	14	.....	.....	.....	
		M_N	4 43 07	13	.....	30	.....	
		M_E	4 43 13	.....	20	.....	.....	
		F_E	5 33 —	.....	.....	.....	.....	
		F_N	5 41 —	.....	.....	.....	.....	
13	.....	e_N	7 05 10	.....	.....	.....	.....	No distinct phases.
		e_E	7 05 21	.....	.....	.....	.....	
		M_E	7 42 38	16	20	.....	.....	
		M_N	7 43 46	15	.....	40	.....	
		F_N	8 27 —	.....	.....	.....	.....	
		F_E	8 31 —	.....	.....	.....	.....	
26	.....	P_N	6 01 33	6	.....	.....	.....	
		P_E	6 01 37	10	.....	.....	.....	
		S_E	6 11 26	11	.....	.....	.....	
		S_N	6 11 41	10	.....	.....	.....	
		L_E	6 24 50	25	.....	.....	.....	
		L_N	6 24 56	22	.....	.....	.....	
		M_E	6 26 02	24	3,400	.....	.....	
		M_N	6 32 57	17	.....	5,800	.....	
		C_E	6 45 00	17	.....	.....	.....	
		C_N	6 45 00	16	.....	.....	.....	
		F_E	8 38 —	15	.....	.....	.....	
		F_N	9 00 —	.....	.....	.....	.....	
29	.....	P_N	16 09 58	4	.....	.....	.....	E-W record defective; no regular waves.
		eP_E	16 11 43	.....	.....	.....	.....	
		L_N	16 14 46	10	.....	.....	.....	
		eL_E	16 15 47	.....	.....	.....	.....	
		M_N	16 15 58	7	.....	20	.....	
		M_E	16 16 19	.....	40	.....	.....	
		F_N	16 54 —	.....	.....	.....	.....	
30	.....	e_N	18 00 40	.....	.....	.....	.....	
		C_N	18 28 —	15	.....	.....	.....	

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.

1917.			H. m. s.	Sec.	μ	μ	km.	
June 1	.....	.....	.....	.....	*250	*100	.....	Tremors recorded during the 24 hours ending 15h on dates given.
3	.....	.....	.....	.....	*50	*50	.....	
4	.....	.....	.....	.....	*100	*100	.....	
6	.....	.....	.....	.....	*100	*150	.....	
9	.....	.....	.....	.....	*200	*200	.....	
11	.....	.....	.....	.....	*100	*100	.....	
24	.....	.....	.....	.....	*200	*200	.....	

*Amplitude on instrument.

TABLE 2.—*Instrumental reports, June, 1917*—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
California. *Santa Clara. University of Santa Clara.* J. S. Ricard, S. J.								
Lat., 37° 26′ 36″ N.; long., 121° 57′ 63″ 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.								
Instrumental constants								
1917. June 8	.....	P_N	*H. m. s.* 1 01 ..	*Sec.*	μ	μ	*km.*	Preliminaries very indistinct.
		eP_E?	1 08 ..					S_E?
		S_N	1 04 ..					
		L_N	1 08 ..					
		L_E	1 10 ..					
		M_N	1 10 ..	18		*1000		
		M_E	1 11 ..	20	*1000			
		C_E	1 13 ..					
		C_N	1 16 ..					
		F_E	1 17 ..					
		F_N	1 24 ..					
12–13	.....							Distinct activity during day. At times broken waves, other times regular sinusoidal waves.
26	.....	P	6 02 ..					Very good record. Remarkably long on N–S.
		S	6 13 ..					
		L	6 23 ..					
		M_E	6 29 ..	33	*2000			
		M_N	6 30 ..	25		*2500		
		C_E	6 38 ..					
		C_N	6 45 ..					
		F_E	6 47 ..					
		F_N	7 36 ..					
*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 110	T_0 6.4			
1917. June 1	.....	P?	*H. m. s.* 17 05 29	*Sec.*	μ	μ	*km.* 380?	
		S	17 06 11					
		L?	17 06 55					
		F	17 15 00					
3	.....	P?	7 04 34				290?	
		S	7 05 06					
		L?	7 05 46					
		F	7 12 —					
3	.....	P?	19 53 42				3,360?	
		S?	19 58 40					
		L	20 01 40					
		F	20 10 00					
4	.....	P	1 39 08				6,010	
		S	1 46 45					
		L	1 57 57	20				
		L	1 58 35					
		L	2 03 15	16				
		F	2 09 40					

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
District of Columbia. *Washington. U. S. Weather Bureau*—Continued.								
1917. June 7	.....	P_E	*H. m. s.* 3 05 00	*Sec.*	μ	μ	*km.* 7,760	No phases distinguishable on N–S.
		S_E	3 14 08					
		L_E	3 21 00					
		F	3 35 —					
8	II_r	P	0 57 31				2,875	Salvador quake.
		S	1 02 05					
		L	1 05 10					
		L	1 06 30	16				
		F	2 45 —					
8	.....	P	3 04 35				2,920	
		S?	3 09 12					
		L	3 14 50					
		F	3 35 —					
9	.....	eL	18 03 00					
10	I_r	P	4 39 53				4,030	
		S	4 45 42					
		L	4 53 36	16				
		F	6 00 —					
12	.....	P?	2 03 24				2,150	
		S	2 07 00					
		F	2 20 —					
13	.....	P?	7 01 37				4,025?	
		S	7 07 15					
		L	7 11 23	16				
		L	7 38 40	24				
		L	7 43 30	20				
		F	9 20 —					
16	.....	P	15 56 03				3,580?	
		S?	16 01 25					
		L	16 08 55					
		F	16 25 —					
16	.....	P?	22 55 47				2,760?	
		S?	23 01 12					
		L	23 10 25					
		F	23 30 —					
22	.....	P?	5 38 22				6,075?	
		S?	5 46 02					
		L	5 56 00					
		F	6 10 —					
24	.....	P	20 07 45				3,800	
		S	20 13 20					
		L	20 17 00					
		F	21 15 —					
26	II_e	P	6 03 44				9,515	
		S	6 14 20					
		L	6 22 00					
		L	6 38 00	30				
		M_E	6 45 00		91			
		F	10 30 —					
27	.....	e	12 06 12					
		S?	12 14 48					
		F	12 20 —					
27	.....	P	12 33 05				3,420	
		S	12 38 17					
		L	12 42 50	20				
		F	13 15 —					
28	.....	L	14 50 00					Scarcely visible on N–S.
		F	15 05 —					
29	.....	P	16 13 34				3,840	
		S?	16 19 12					
		L	16 28 00					
		F	17 00 —					
30	.....	P	17 57 02				3,400	
		S	18 02 12					
		L	18 06 46					
		F	18 35 —					

TABLE 2.—*Instrumental reports, June, 1917*—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

District of Columbia. *Washington. Georgetown University.*

F. A. 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

1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
June 1	.....	e_E	17 06 06	.....	.....	.....	.....	Microseisms present. Phases not discernable. Vertical shows e at 17h 06m 20s.
		e_N	17 06 08	.....	.....	.....	.....	
		F	17 17 00	.....	.....	.....	.....	
4	.....	e_E	1 38 00	.....	.....	.....	.....	
		e_N	1 38 52	.....	.....	.....	.....	
		L	1 59 00	20	.....	.....	.....	
		F	2 45 00	.....	.....	.....	.....	
7	.....	e_E	3 05 01	.....	.....	.....	.....	
		e_N	3 05 16	.....	.....	.....	.....	
		F	3 35 00	.....	.....	.....	.....	
8	.....	P	0 57 29	.....	.....	.....	.....	
		S_E	1 02 21	.....	.....	.....	.....	
		S_N	1 02 24	.....	.....	.....	.....	
		eL_E	1 05 03	.....	.....	.....	.....	
		eL_N	1 05 04	.....	.....	.....	.....	
		M	1 07 04	13	*3700	*1200	.....	
		F	2 31 ..	.....	.....	.....	.....	
			VERTICAL.					
		P	*0 57 28*	.....	.....	.....	.....	
		S	*1 02 17*	.....	.....	.....	.....	
		eL	*1 05 08*	.....	.....	.....	.....	
		F	*2 10 00*	.....	.....	.....	.....	
8	.....	e_N	3 05 40	.....	.....	.....	.....	
		e_E	3 05 41	.....	.....	.....	.....	
		eL_E	3 15 08	.....	.....	.....	.....	
		eL_N	3 15 11	.....	.....	.....	.....	
		L_E	3 17 17	.....	.....	.....	.....	
		F	3 26 00	.....	.....	.....	.....	
10	.....	eP_E	4 39 39	.....	.....	.....	.....	
		eP_N	4 39 43	.....	.....	.....	.....	
		S_E	4 45 43	.....	.....	.....	.....	
		S_N	4 45 44	.....	.....	.....	.....	
		eL_N	4 49 43	.....	.....	.....	.....	
		eL_E	4 49 45	.....	.....	.....	.....	
		M_N	4 56 12	17	.....	*300	.....	
		M_E	4 58 57	17	*1800	.....	.....	
		F	5 33 00	.....	.....	.....	.....	
12	.....	eP_E	2 03 22	.....	.....	.....	.....	F lost in microseisms. Phases difficult to distinguish.
		eP_N	2 03 30	.....	.....	.....	.....	
		eL	2 06 57	.....	.....	.....	.....	
		F	2 15 00	.....	.....	.....	.....	
13	.....	e_N	7 07 10	.....	.....	.....	.....	Long waves from 7h 39m 15s to 8h 4m 0s. No distinct maximum.
		e_E	7 07 13	.....	.....	.....	.....	
		eL_E?	7 11 35	.....	.....	.....	.....	
		L_E	7 39 15	.....	.....	.....	.....	
		L_N	7 39 16	.....	.....	.....	.....	
		F	9 08 00	.....	.....	.....	.....	
16	.....	e_E	15 56 06	.....	.....	.....	.....	Microseisms present.
		e_N	15 56 15	.....	.....	.....	.....	
		L_N	16 10 20	.....	.....	.....	.....	
		L_E	16 10 26	.....	.....	.....	.....	
		F	16 30 00	.....	.....	.....	.....	
16	.....	e	22 56 04	.....	.....	.....	.....	Heavy microseisms present.
		L_N	23 10 04	15	.....	.....	.....	
		L_E	23 10 26	15	.....	.....	.....	
		F	23 40 00	.....	.....	.....	.....	
24	.....	e	20 07 47	.....	.....	.....	.....	Microseisms present.
		S_E?	20 13 40	.....	.....	.....	.....	
		S_N?	20 13 43	.....	.....	.....	.....	
		eL?	20 17 00	15	.....	.....	.....	
		F	21 15 00	.....	.....	.....	.....	

*Trace amplitude.

District of Columbia. *Washington. Georgetown University*—Contd.

1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
June 26	.....	eP_N	6 03 48	.....	.....	.....	.....	Phases difficult. Mainka instrument shows P at 6h 3m 42s; S at 6h 13m 42s; and eL at 6h 31m 42s.
		eP_E	6 03 49	.....	.....	.....	.....	
		S	6 14 48	.....	.....	.....	.....	
		M_N	6 43 58	30	.....	*2400	.....	
		M_E	6 45 04	24	*5400	.....	.....	
		F	8 56 00	.....	.....	.....	.....	
			VERTICAL.					
		eP	*6 03 56*	.....	.....	.....	.....	S?
		L	*6 38 42*	*40*	.....	.....	.....	
		M	*6 45 28*	.....	.....	.....	.....	
		F	*9 08 00*	.....	.....	.....	.....	
27	.....	e	12 32 21	.....	.....	.....	.....	Sheets changed at 13h 8m 0s while quake was still going on.
		L_E	12 43 16	30	.....	.....	.....	
		L_N	12 44 55	24	.....	.....	.....	
28	.....	L	14 52 00	.....	.....	.....	.....	Record confused by microseisms and local disturbances.
		F	15 05 00	.....	.....	.....	.....	
29	.....	eP	16 12 46	.....	.....	.....	.....	Microseisms present. S_E?
		S_E	16 19 32	.....	.....	.....	.....	
		eL_E	16 22 48	10	.....	.....	.....	
		eL_N	16 22 54	10	.....	.....	.....	
		L	16 29 00	.....	.....	.....	.....	
		F	17 10 00	.....	.....	.....	.....	
30	.....	P	17 57 01	.....	.....	.....	.....	Microseisms present.
		S_E	18 02 12	.....	.....	.....	.....	
		S_N	18 02 13	.....	.....	.....	.....	
		L	18 09 00	20	.....	.....	.....	
		F	18 50 00	.....	.....	.....	.....	

*Trace amplitude.

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

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
	18.6

1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
June 1	.....	eL	9 01 24	.....	.....	.....	.....	
		M	9 08 00	19	*100	.....	.....	
		C	9 13 ..	.....	.....	.....	.....	
		F	9 31 00	.....	.....	.....	.....	
3	.....	e	15 16 30	.....	.....	.....	.....	
		M	15 22 00	19	*100	.....	.....	
		F	15 43 00	.....	.....	.....	.....	
3	.....	e	19 44 30	.....	.....	.....	.....	
		M	19 52 18	.....	*100	.....	.....	
		F	19 59 00	.....	.....	.....	.....	
4	.....	P	1 41 36	.....	.....	.....	.....	
		L	1 43 54	20	.....	.....	.....	
		M	1 48 48	.....	*600	.....	.....	
		C	1 53 06	.....	.....	.....	.....	
		F	2 54 00	.....	.....	.....	.....	
7	.....	e	3 02 30	.....	.....	.....	.....	
		M	3 03 24	18	*100	.....	.....	
		F	3 18 00	.....	.....	.....	.....	
8	.....	P	1 10 36	.....	.....	.....	.....	
		S	1 14 36	.....	.....	.....	.....	
		L	1 21 18	21	.....	.....	.....	
		M	1 26 30	.....	*3000	.....	.....	
		C	1 47 00	.....	.....	.....	.....	
		F	2 54 00	.....	.....	.....	.....	
10	.....	P	4 37 48	.....	.....	.....	.....	
		L	4 45 12	19	.....	.....	.....	
		M	4 52 24	.....	*3600	.....	.....	
		C	4 56 06	.....	.....	.....	.....	
		F	6 18 00	.....	.....	.....	.....	

*Trace amplitude.

TABLE 2.—*Instrumental reports, June, 1917*—Continued.

Hawaii. *Honolulu. Magnetic Observatory*—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*km.*	
1917. June 13	.....	eP....	6 51 00	.....	.....	.....	.....	
		S.....	6 59 24	.....	.....	.....	.....	
		L.....	7 09 54	.....	.....	.....	.....	
		M.....	7 13 54	20	*3000	.....	.....	
		C.....	7 20 00	.....	.....	.....	.....	
		F.....	10 40 00	.....	.....	.....	.....	
13	.....	eP....	17 29 12	.....	.....	.....	.....	
		eL....	17 34 00	21	.....	.....	.....	
		M.....	17 37 54	.....	*500	.....	.....	
		C.....	17 42 00	.....	.....	.....	.....	
		F.....	17 56 00	.....	.....	.....	.....	
16	.....	e.....	23 03 00	.....	.....	.....	.....	
		M.....	23 07 30	18	*100	.....	.....	
		F.....	23 11 00	.....	.....	.....	.....	
17	.....	e.....	8 40 24	.....	.....	.....	.....	
		M.....	9 00 30	.....	*100	.....	.....	
		F.....	9 12 00	.....	.....	.....	.....	
18	.....	e.....	22 35 30	.....	.....	.....	.....	
		M.....	22 40 00	20	*100	.....	.....	
		F.....	22 47 12	.....	.....	.....	.....	
24	.....	eP....	19 57 36	.....	.....	.....	.....	
		S.....	20 03 30	.....	.....	.....	.....	
		L.....	20 07 06	.....	.....	.....	.....	
		M.....	20 08 00	20	*3200	.....	.....	
		C.....	20 16 00	.....	.....	.....	.....	
		F.....	21 30 00	.....	.....	.....	.....	
26	.....	eP....	5 57 00	.....	.....	.....	.....	
		S.....	6 03 30	.....	.....	.....	.....	Record off paper from $6^h\ 07^m\ 36^s$ to $6^h\ 12^m\ 30^s$.
		L.....	6 07 36	.....	*17000+	*17000+	.....	
		C.....	7 05 00	.....	.....	.....	.....	
		F.....	10 39 00	.....	.....	.....	.....	
26	.....	P.....	14 12 54	.....	.....	.....	.....	
		L.....	14 15 48	.....	.....	.....	.....	
		M.....	14 16 18	20	*400	.....	.....	
		C.....	14 25 00	.....	.....	.....	.....	
		F.....	14 51 00	.....	.....	.....	.....	
27	.....	e.....	5 32 30	.....	.....	.....	.....	
		M.....	5 33 06	18	*100	.....	.....	
		F.....	5 46 00	.....	.....	.....	.....	
27	.....	e.....	13 01 00	.....	.....	.....	.....	
		M.....	13 06 24	.....	*500	.....	.....	
		C.....	13 09 00	.....	.....	.....	.....	
		F.....	13 15 00	.....	.....	.....	.....	

* Trace amplitude.

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

Lat., 38° 57′ 39″ N.; long., 95° 14′ 58″ W. Elevation, 301.1 meters.

Instrument: Wiechert.

	V	T_0	*c*
Instrumental constants.. E	177	3.4	4:1
N	205	3.4	4:1

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*km.*	
1917. June 8	.....	iP$_N$...	0 57 15	1–2½	.....	.....	.....	E-W component illegible.
		S? or L	1 01 42	5–10	.....	.....	.....	
		M$_N$....	1 02 05	.....	.....	24	.....	
		L$_N$?...	1 08 44	15–20	.....	.....	.....	
		M$_N$....	1 09 20	.....	.....	4	.....	F lost in succeeding tremor.
8	.....	eP$_N$...	1 38 48	.....	.....	.....	.....	
		S? or L	1 43 36	.....	.....	.....	.....	
		M$_N$....	1 43 40	.....	.....	1	.....	
		F.....	2 14 ..	.....	.....	.....	.....	
26	.....	eP$_E$...	6 02 41	.....	.....	.....	.....	
		eP$_N$...	6 02 45	.....	.....	.....	.....	
		S$_N$....	6 12 48	.....	.....	.....	.....	
		L$_N$?...	6 30 21	.....	.....	.....	.....	
		L$_E$....	6 31 35	.....	.....	.....	.....	
		M$_E$....	6 36 14	.....	24	.....	.....	
		M$_N$....	6 36 24	.....	.....	11	.....	
		F.....	9 06 00	.....	.....	.....	.....	
29	.....	eP$_E$...	16 12 54	.....	.....	.....	.....	
		iS$_E$....	16 16 41	.....	.....	.....	.....	
		eS$_E$?..	16 17 43	.....	.....	.....	.....	
		L$_E$....	16 20 07	.....	.....	.....	.....	
		M$_E$....	16 20 32	.....	5	.....	.....	
		F.....	16 44 00	.....	.....	.....	.....	

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.

	V	T_0
Instrumental constants.. E	10	33
N	10	25

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*km.*	
1917. June 1	.....	P$_E$....	17 06 07	4	.....	.....	.....	Record very faint; no distinct phases.
		P$_N$....	17 06 14	3	.....	.....	.....	
		M$_E$....	17 07 12	5	10	.....	.....	
		M$_N$....	17 07 42	.....	.....	10	.....	
		F$_N$....	17 09 ..	.....	.....	.....	.....	
		F$_E$....	17 13 ..	.....	.....	.....	.....	
4	.....	eP$_E$...	1 46 11	5	.....	.....	.....	Phases not well-defined.
		eP$_N$...	1 46 56	5	.....	.....	.....	
		M.....	1 59 44	16	10	10	.....	
		F$_E$....	2 14 ..	.....	.....	.....	.....	
		F$_N$....	2 25 ..	.....	.....	.....	.....	
8	.....	P$_N$....	0 57 29	3	.....	.....	.....	
		P$_E$....	0 57 35	3	.....	.....	.....	
		S$_E$....	1 02 25	8	.....	.....	.....	
		S$_N$....	1 02 27	9	.....	.....	.....	
		L$_E$....	1 05 11	18	.....	.....	.....	
		L$_N$....	1 05 12	18	.....	.....	.....	
		M$_E$....	1 07 12	18	550	.....	.....	
		M$_N$....	1 07 18	16	.....	310	.....	
		C$_N$....	1 15 ..	15	.....	.....	.....	
		C$_E$....	1 16 ..	13	.....	.....	.....	
		F$_N$....	3 20 ..	.....	.....	.....	.....	
		F$_E$....	3 30 ..	.....	.....	.....	.....	
10	.....	P$_N$....	4 39 54	.....	.....	.....	.....	Phases uncertain.
		P$_E$....	4 39 55	.....	.....	.....	.....	
		S$_E$....	4 46 00	8	.....	.....	.....	
		S$_N$....	4 47 04	.....	.....	.....	.....	
		L$_E$....	4 53 23	13	.....	.....	.....	
		L$_N$....	4 53 44	14	.....	.....	.....	
		M$_N$....	4 56 19	10	.....	40	.....	
		M$_E$....	4 59 07	10	40	.....	.....	
		C$_N$....	5 00 ..	.....	.....	.....	.....	
		C$_E$....	5 02 ..	.....	.....	.....	.....	
		F.....	5 31 ..	.....	.....	.....	.....	
13	.....	P$_E$....	7 07 22	7	.....	.....	.....	Phases uncertain.
		P$_N$....	7 07 24	4	.....	.....	.....	
		S$_N$....	7 17 36	.....	.....	.....	.....	
		L$_E$....	7 39 50	24	.....	.....	.....	
		L$_N$....	7 40 10	25	.....	.....	.....	
		M$_N$....	7 48 40	17	.....	40	.....	
		C$_N$....	7 54 ..	16	.....	.....	.....	
		M$_E$....	7 54 48	16	20	.....	.....	
		F$_N$....	8 25 ..	.....	.....	.....	.....	
		F$_E$....	8 30 ..	.....	.....	.....	.....	
24	.....	P$_E$....	20 07 54	6	.....	.....	.....	Motion very slight; phases uncertain.
		S$_E$....	20 13 45	8	.....	.....	.....	
		eS$_N$...	20 14 36	8	.....	.....	.....	
		L$_E$....	20 17 07	10	.....	.....	.....	
		M$_E$....	20 18 30	9	10	.....	.....	
		F.....	20 35 ..	.....	.....	.....	.....	
26	.....	P$_N$?...	6 03 06	.....	.....	.....	.....	Phases not well defined.
		eP$_E$...	6 04 00	10	.....	.....	.....	
		S$_E$....	6 14 26	13	.....	.....	.....	
		S$_N$....	6 14 29	.....	.....	.....	.....	
		L$_E$....	6 37 51	34	.....	.....	.....	
		L$_N$....	6 38 13	26	.....	.....	.....	
		M$_E$....	6 42 00	28	4,600	.....	.....	
		M$_N$....	6 44 42	26	.....	3,300	.....	
		C$_E$....	6 57 ..	17	.....	.....	.....	
		C$_N$....	7 01 ..	22	.....	.....	.....	
		F$_N$....	8 51 ..	18	.....	.....	.....	
		F$_E$....	8 55 ..	18	.....	.....	.....	
27	.....	P$_E$....	12 32 26	.....	.....	.....	.....	Phases not well defined. Nothing definite on N-S.
		S$_E$....	12 38 24	10	.....	.....	.....	
		L$_E$....	12 43 12	20	.....	.....	.....	
		M$_E$....	12 44 57	20	10	.....	.....	
		F.....	13 02 ..	.....	.....	.....	.....	
29	.....	eP$_E$...	16 22 06	6	.....	.....	.....	Motion very slight. No distinct phases.
		eP$_N$...	16 22 49	6	.....	.....	.....	
		M$_E$....	16 27 43	10	10	.....	.....	
		M$_N$....	16 30 49	6	.....	10	.....	
		F$_N$....	16 37 ..	.....	.....	.....	.....	
		F$_E$....	16 39 ..	.....	.....	.....	.....	
30	.....	e$_N$....	17 57 03	.....	.....	.....	.....	Phases uncertain.
		e$_E$....	17 58 21	.....	.....	.....	.....	
		S$_N$....	18 02 11	8	.....	.....	.....	
		S$_E$....	18 02 12	8	.....	.....	.....	
		L$_N$....	18 07 01	.....	.....	.....	.....	
		L$_E$....	18 07 37	22	.....	.....	.....	
		M$_N$....	18 09 13	18	.....	10	.....	
		M$_E$....	18 09 26	18	20	.....	.....	
		C$_E$....	18 15 ..	15	.....	.....	.....	
		F$_N$....	18 28 ..	.....	.....	.....	.....	
		F$_E$....	18 30 ..	.....	.....	.....	.....	

TABLE 2.—*Instrumental reports, June, 1917*—Continued.

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

1917.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
June 1	.....	*O*.....	*18 02 04*	.....	.....	.....	2,140	Short period L waves.
		eP_W...	12 06 32	.....	.....	.....	.....	
		eP_E...	12 06 39	.....	.....	.....	.....	
		I_N.....	12 08 32	4	.....	.....	.....	Amplitude of N–S increases.
		S_E.....	12 10 07	6	.....	.....	.....	
		eL_E?..	12 11 56	8	.....	.....	.....	
		L_E....	12 12 08	8	.....	.....	.....	Later LL irregular.
		F?.....	12 22 ..	.....	.....	.....	.....	
3	.....	e_E....	7 07 24	.....	.....	.....	.....	
		i.....	7 07 51	.....	.....	.....	.....	
		L_E....	7 09 25	.....	.....	.....	.....	
		L.....	7 11 20	10	.....	.....	.....	
		F.....	7 25 ..	.....	.....	.....	.....	
3	.....	e?.....	19 48 18	.....	.....	.....	.....	
		e.....	19 53 11	.....	.....	.....	.....	
		e.....	19 53 53	.....	.....	.....	.....	
		L_E?..	20 01 18	15	.....	.....	.....	
		F.....	20 20 ..	.....	.....	.....	.....	
4	.....	*O*?....	*1 27 09*	.....	.....	.....	7,240	Distance from L–S.
		eP_E?..	1 38 41	.....	.....	.....	.....	
		S_E.....	1 46 31	.....	.....	.....	.....	
		eL_E...	1 58 54	20	.....	.....	.....	
		L.....	2 02 17	.....	.....	.....	.....	
		F.....	3 19 ..	.....	.....	.....	.....	
5	.....	*O*?....	4	.....	.....	.....	16,000†	
		eP?...	4 18 25	.....	.....	.....	.....	
		S?.....	4 33 44	.....	.....	.....	.....	
		i.....	4 46 46	.....	.....	.....	.....	
		eL?...	5 01 50	20	.....	.....	.....	
		L_{rept}...	5 27 12 5 29 42	15	.....	.....	.....	Distance from L_{rept}–L.
		F.....	5 34 ..	.....	.....	.....	.....	
6	.....	*O*?....	*16 27 19*	.....	.....	.....	6,420?	Distance from eI–S.
		S_E?...	16 45 13	8	.....	.....	.....	Early phases masked by pulsations—not microseisms. Amplitude of E–W increases at L and becomes irregular in period.
		eL_E...	16 55 28	16	.....	.....	.....	
		L.....	17 04 13	.....	.....	.....	.....	
		F?.....	17 40 ..	.....	.....	.....	.....	
7	.....	*O*.....	*2 55 07*	.....	.....	.....	5,600	(N. B. Messines Ridge in France, reported blown up at about 3h.)
		P_E....	3 05 13	.....	.....	.....	.....	
		P_W....	3 05 16	.....	.....	.....	.....	
		S_E....	3 12 28	6	.....	.....	.....	
		eL_E?...	3 20 38	18	.....	.....	.....	
		eL_E...	3 20 50	15	.....	.....	.....	
		L_E....	3 25 34	8	.....	.....	.....	
		F.....	3 42 ..	.....	.....	.....	.....	
7	.....	*O*?....	*20 07 29*	.....	.....	.....	3,625?	Distance from L–S. A weak record.
		eP?...	20 15 24	.....	.....	.....	.....	
		S_E....	20 19 45	.....	.....	.....	.....	
		eL_E...	20 23 20	.....	.....	.....	.....	
		F.....	20 41 ..	.....	.....	.....	.....	
8	.....	*O*.....	*0 51 32*	.....	.....	.....	3,520	San Salvador quake [see dispatches, p. 317.]
		P_E....	0 58 14	.....	.....	.....	.....	
		P_W....	0 58 22	.....	.....	.....	.....	
		S_E....	1 03 32	.....	.....	.....	.....	
		S_N....	1 03 35	.....	.....	.....	.....	
		eL_E...	1 06 20	38	.....	.....	.....	
		eL_N...	1 06 35	16	.....	.....	.....	
		M_E....	1 09 59	17	.....	.....	.....	
		M_E....	1 14 44	15	.....	.....	.....	
		L_{rept}...	3 15 59 3 17 59 3 26 51	10 15 13	.....	.....	.....	Amplitude decreases with period.
		F.....	3 38 30	.....	.....	.....	.....	
9	.....	O?....	*17 30 12*	.....	.....	.....	7,560?	
		P?.....	17 41 10	.....	.....	.....	.....	
		S_E?...	17 50 13	7	.....	.....	.....	
		eL_E...	18 03 26	16	.....	.....	.....	Period then becomes 17, 20.
		L.....	18 17 26	.....	.....	.....	.....	End of sinusoidals.
		L.....	18 20 12 18 23 08	16	.....	.....	.....	
		L.....	18 35 16	16	.....	.....	.....	
		F.....	18 37 20	.....	.....	.....	.....	

† = 20,000 − ½ (25.3 meters × 320 km.).

Massachusetts. *Cambridge. Harvard University Seismographic Station*—Continued.

1917.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
June 10	.....	*O*.....	*4 52 21*	.....	.....	.....	4,500	
		P_E....	4 40 15	3	.....	.....	.....	
		i.....	4 41 45	6–8	.....	.....	.....	
		S_E....	4 46 30	.....	.....	.....	.....	
		L_E....	4 54 12	20	.....	.....	.....	
		M?....	4 57 43	.....	.....	.....	.....	
		C.....	4 58 45	8	.....	.....	.....	
		C.....	5 08 45	.....	.....	.....	.....	A_E increases again.
		F?.....	5 46 ..	.....	.....	.....	.....	
12	.....	*O*.....	*2 03* ..	.....	.....	.....	.....	Felt in lower St. Lawrence (Klotz).
		e.....	2 03 48	.....	.....	.....	.....	
		i.....	2 04 30	.....	.....	.....	.....	
		i.....	2 04 32	4	.....	.....	.....	
		L_E....	2 04 42	4	.....	.....	.....	
		F.....	2 05 25	.....	.....	.....	.....	
13	.....	*O*?....	*6 49 04*	.....	.....	.....	9,760?	
		eP?...	7 01 54	.....	.....	.....	.....	
		i.....	7 07 38	.....	.....	.....	.....	
		i.....	7 09 02	.....	.....	.....	.....	
		S_E....	7 12 01	.....	.....	.....	.....	Sinusoidal waves set in following S. No definite eL_E. First L probably SS but looks LL.
		L.....	7 18 30	20	.....	.....	.....	
		L.....	7 40 41	20–30	.....	.....	.....	
		M_E....	7 50 37	.....	.....	.....	.....	
		L_{rept}..	9 58 24	20	.....	.....	.....	
		F.....	10 15 10	.....	.....	.....	.....	
16	.....	L_E....	16 11 45	14	.....	.....	.....	e? Periods run down to 8 secs.
		F.....	16 28 41	.....	.....	.....	.....	
16	.....	e?.....	22 59 30	.....	.....	.....	.....	Periods run down to 8 secs.
		I_E?...	23 10 59	15	.....	.....	.....	
		M_E?...	23 13 14	15	.....	.....	.....	
		F.....	23 36 ..	.....	.....	.....	.....	
21	.....	L_E....	14 01 18 14 02 18	14	.....	.....	.....	e? Doubtful as to being seismic.
		L_E....	14 04 26 14 05 27	.....	.....	.....	.....	
		L_E....	14 06 04 14 06 40	8	.....	.....	.....	F?
21	.....	e?.....	2 53 58	.....	.....	.....	.....	Amplitude very small.
		L_E....	2 59 10	20	.....	.....	.....	
		F.....	3 08 06	.....	.....	.....	.....	
22	.....	e.....	5 42 27	.....	.....	.....	.....	
		S?.....	5 46 11	16	.....	.....	.....	
		e.....	5 49 55	12	.....	.....	.....	
		L_E....	5 58 14	20	.....	.....	.....	
		F.....	6 25 52	..	.....	.....	.....	
24	.....	e?.....	20 07 10	.....	.....	.....	.....	*O* near 20h. Phases indistinct.
		e_E....	20 08 50	.....	.....	.....	.....	
		i_E....	20 13 50	6	.....	.....	.....	
		i.....	20 14 47	9	.....	.....	.....	
		i.....	20 31 26	12	.....	.....	.....	
		L_E....	20 48 28	20	.....	.....	.....	
		F.....	21 50 ..	.....	.....	.....	.....	
26	.....	*O*.....	*5 50 53*	.....	.....	.....	10,000	
		eP_E...	6 03 55	.....	.....	.....	.....	
		i.....	6 08 35	.....	.....	.....	.....	
		i.....	6 14 27	.....	.....	.....	.....	
		S_E....	6 14 43	.....	.....	.....	.....	
		i.....	6 17 46	.....	.....	.....	.....	
		eL_E...	6 33 15	19	.....	.....	.....	
		M_E....	6 40 15 7 21 —	50–17	.....	.....	.....	
		F.....	11 08 —	.....	.....	.....	.....	
27	.....	e_N....	12 34 40	2	.....	.....	.....	E–W component stopped at 12h. N–S, damped, does not register clearly.
28	.....	eL_E	14 42 24	23	.....	.....	.....	
		L.....	14 43 46	18	.....	.....	.....	Amplitude increases.
		F?.....	15 29 —	.....	.....	.....	.....	
29	.....	O?.....	*16 05 03*	.....	.....	.....	4,780?	Distance from L–S. eP_E, 16h 13m 30s, gives 4,480 km. and *O* at 16h 05m 34s.
		eP_E?..	16 15 48	4	.....	.....	.....	
		S?.....	16 19 48	7	.....	.....	.....	
		eL_E...	16 25 03	9	.....	.....	.....	
		eL_N...	16 25 04	.....	.....	.....	.....	
		L_E....	16 27 47	19–8	.....	.....	.....	
		L_N....	16 27 52	.....	.....	.....	.....	
		F.....	17 22 —	.....	.....	.....	.....	
30	.....	O?.....	*17 50 54*	.....	.....	.....	3,880	
		iP_N...	17 57 00	2	.....	.....	.....	
		S_E?...	18 02 14	4	.....	.....	.....	S_E masked by local traffic jars.
		eL_E...	18 09 36	.....	.....	.....	.....	
		F.....	18 58 —	.....	.....	.....	.....	

TABLE 2.—*Instrumental reports, June, 1917*—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
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.								
Instrument: Wiechert 80 kg. astatic, horizontal pendulum.								
Instrumental constants.. V 80, T_0 7, e 5:1								
1917. June 3		e	*H. m. s.* 15 50 00	*Sec.*	μ	μ	*km.*	
		F	16 02 00					
7	II_F	iP	12 56 06				2,800	
		S	13 00 30					
		L	13 02 00					
		F	13 30 —					
9		eP	15 42 00					
		S?	15 45 30					
		F	16 22 —					
13		eL	7 33 00					
		F	8 14 00					
26	II_S	eP	18 03 00					
		S?	18 12 30					
		L	18 14 —					
		F	20 38 —					
New York. *Buffalo. Canisius College.* John A. Curtin, S. J.								
Lat., 42° 53′ 02″ N.; long., 78° 52′ 40″ W. Elevation, 190.5 meters.								
Instrument: Wiechert, 80 kg., horizontal.								
Instrumental constants..80 V, 7 T_0, 5:1 e								
(Report for June, 1917, not received.)								
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 7.2, e 1.5:1; N: V 72, T_0 7.2, e 3.8:1								
(Report for June, 1917, not received.)								
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								
(Report for June, 1917, not received.)								
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..10 V, 20 T_0								
1917. June 8		L_N	*H. m. s.* 0 44 19	*Sec.*	μ	μ	*km.* 965	Direction north.
		M_N	0 44 52			*1200		
		M_E	0 45 22		*300			
		F_N	0 46 56					
8		P_N	0 54 08				965	Direction north.
		P_E	0 54 10					
		L_E	0 56 38					
		L_N	0 56 44					
		M_N	0 58 16			*4000		
		M_E	1 01 18		*2000			
		F_E	1 50 00					
		F_N	2 02 05					
8		M_N	3 09 00			*200	965?	Direction north?
13		L_E	7 34 55					Distance and direction unknown.
		M_N	7 39 55			*200		
		M_E	7 41 00		*200			
		F_E	8 07 00					

* Trace amplitude.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. Aa	Amplitude. An	Distance.	Remarks.
Panama Canal Zone. *Balboa Heights*—Continued.								
1917. June 26		P_E	*H. m. s.* 6 03 32	*Sec.*	μ	μ	*km.* 4,830	Direction unknown.
		P_N	6 04 00					
		L_E	6 14 52					
		M_E	6 15 00		*2000			
		L_N	6 15 07					
		M_N	6 16 04			*3000		
		F_E	8 23 00					
		F_N	8 33 20					
27		P_N	12 27 30				465	Direction north.
		P_E	12 27 32					
		L_N	12 28 28					
		L_E	12 28 32					
		M_E	12 28 56		*39000			
		M_N	12 29 04			*68000		
		F_N	12 56 00					
		F_E	12 57 00					
30		P_N	17 51 14				300	Direction probably westerly.
		P_E	17 51 18					
		L_N	17 51 50					
		L_E	17 51 53					
		M_N	17 52 04			*40000		
		M_E	17 52 30		*53000			
		F	18 00 22					
30		P	18 00 22					
		L_N	18 00 57					
		L_E	18 00 58					
		M_N	18 01 05			*19000		
		M_E	18 01 24		*20000			
		F_N	18 16 49					
		F_E	18 17 00					
30		M_E	22 20 03					
		M_N	22 20 04					

* Trace amplitude.

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

Lat., 18° 09′ N.; long., 65° 27′ W. Elevation, 19.8 meters.

Instruments: Two Bosch-Omori.

Instrumental constants.. E: V 10, T_0 17.5; N: V 10, T_0 18.0

1917. June 8		e_E	*H. m. s.* 0 56 51	*Sec.* 4	μ	μ	*km.*	Beginning uncertain.
		S	0 59 18					
		L_E	1 01 05	24				
		L_N	1 01 05	28				
		M_E	1 05 00	21	100			
		M_N	1 08 00	17		110		
		C_E	1 11 ..	15				
		C_N	1 14 ..	13				
		F_E	1 57 ..	13				
		F_N	2 05 ..	13				
13		e_E	7 07 15					
		e_N	7 09 44					
		S_E	7 18 36	13				
		S_N	7 18 48					
		L_E	7 38 ..	35				
		L_N	7 39 ..	24				
		M_E	7 40 ..	24	20			
		M_N	7 40 ..	22		10		
		C	8 00 ..	18				
		F_N	9 03 ..					
		F_E	9 08 ..					
26		e_E	6 09 01	6				Beginning uncertain; N–S so thinly smoked that part of record could not be seen.
		e_N	6 09 36	8				
		S_E	6 15 11	12				
		S_N	6 16 54	14				
		L_E	6 40 45	33				
		L_N	6 40 48	32				
		M_E	6 43 00	26	400			
		M_N	6 43 28	28		70		
		C_E	7 04 ..	15				
		F_E	9 04 ..					
30		P_N	17 51 30	4				
		P_E	17 51 33	4				
		S_E	17 57 37	10				
		S_N	17 57 38	7				
		L_N	18 00 13	20				
		L_E	18 00 15	19				
		M_E	18 03 20	18	10			
		M_N	18 06 31	14		10		
		F_E	18 20 ..					
		F_N	18 20 ..					

TABLE 2.—*Instrumental reports, June, 1917*—Continued.

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

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

Instruments: Two Bosch-Omori, mechanical registration.

Instrumental constants.. V T₀ E 10 15 N 10 16

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
June 1		e	17 08 00					
		F	17 10 ..					
3		e	7 06 03					
		F	7 15 ..					
4		L	1 57 50					
		F	2 10 ..					
8		P?	0 59 00				3,050?	
		S?	1 03 47					
		L	1 08 06					
		F	2 15 ..					
8		e	3 07 00					
		L	3 15 30					
		F	3 30 ..					
10		P	4 40 00				4,400	
		S	4 46 10					
		L	4 53 35					
		F	5 50 ..					
13		e	7 02 32					
		L	7 12 16	16				
		L	7 19 00	20				
		L	7 48 00	16				
		F	9 00 ..					
24		e	20 08 52					
		F	20 45 ..					
26		e	6 04 15					
		S	6 14 35					
		L	6 22 00					
		L	6 40 00	40				
		F	8 40 ..					
29		L	16 28 30					
		F	16 50 ..					
30		P	17 57 33				4,100?	
		S?	18 03 26					
		L	18 10 45					
		F	18 30 ..					

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 80 kg. vertical seismograph.

Instrumental constants.. V T₀ 120 26

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
June 1		eP_N	17 07 10					
		eP_E?	17 07 14					
		i_N	17 07 35					
		i_E	17 07 40					
		i_E	17 09 23					
		eL?	17 09 32	8				
		L_E	17 10 30	8				
		F	17 20 —					
3		eP_N	7 06 13					
		i_N	7 06 35					
		eL_N?	7 07 48	10				
		i_E	7 09 30					
		L_E	7 09 36	10				
		F	7 20 —					
3		eP?	19 53 36					
		eL	20 01 26	8				
		F	20 15 —					
4		*O*?	*1 26 45*				7,100?	
		eP?	1 37 18					
		S_E	1 45 52					
		S_N	1 46 05					
		L	1 57 00	20				
		L	2 00 —	18–17				
		L_E	2 16 —	12				
		F	2 30 —					

Canada. *Ottawa. Dominion Astronomical Observatory*—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
June 8		*O*?	*0 51 19*				3,730?	Press report San Salvador destroyed. [See p. 317.]
		eP?	0 58 17					
		iP_N	0 58 24					
		iS_N	1 03 48					
		eL	1 08 00	28				
		M	1 10 00	20–16	30	60		
		L	1 15 —	16–18				
		L	1 32 —	12				
		LR1?	3 19 —	13				
		F	3 55 —					
9		e_N	17 57 18					
		eL_N	18 03 18					
		L	18 05 —	18				
		L	18 11 —	18				
		L	18 23 —	15				
		F	18 40 —					
10		*O*	*4 38 30*				3,940	
		iP_E	4 39 44					
		i	4 41 10					
		S_E	4 45 28					
		eL	4 50 00	10				
		M	4 54 42	20–13	17	80		
		L	5 13 —	8				
		L	5 30 —	7				
		F	6 30 —					
12		e	2 03 47					Felt in lower St. Lawrence.
		i	2 04 07					
		F	2 06 —					
		VERTICAL.						
		O	*2 01 29*					
		P?	*2 02 45*					
		S	*2 03 47*					
		L	*2 04 06*					
13		*O*	*6 48 50*				9,450	
		eP	7 01 25					
		eS_N?	7 11 50					
		iS_E	7 11 58					
		eL_N	7 29 24	17				
		L	7 35 —	20				
		M	7 50 —	17	10	30		Fine sinusoidal waves at M.
		M	7 55 —	16				
		M	8 05 —	15				
		ME	8 10 —	15				
		$LR1_N$?	8 48 —	27				
		L	9 10 —	20				
		$LR2_N$?	10 06 —	17				
		F	10 25 —					
16		e	15 55 56					
		e	16 03 20					
		eL	16 09 42	16–18				
		F	16 30 —					
16		e	22 57 08					
		eL_N	23 09 18	11				
		eL_E	23 10 42	18				
		F	23 30 —					
22		*O*	*5 28 45*				5,650	
		P	5 37 54					
		S	5 45 11					
		L	5 53 18	20				
24		*O*?	*19 54 58*				7,960?	
		P?	20 06 14					
		S	20 16 32					
		eL?	20 39 48	17				
		L	20 50 —	17				
		L	21 06 —	16				
		L	21 18 —	12				
		F	21 50 —					
26		*O*	*5 50 53*				10,000	
		P_E	6 03 55					
		S_E	6 14 53					
		eL_E	6 32 —	20				
		eL_N	6 34 —	40				
		M	6 47 —	20	70	140		
		L	7 00 —	16				
		L	7 45 —	15–18				
		LR1	8 02 —	24				
		L	8 08 —	16–19				
		$LR2_N$	9 53 —	24				
		F	10 25 —					
27		e_N	12 03 —					Apparently several quakes.
		i_N	12 16 32					
		L_N	12 28 48	13				
		i_E	12 34 00	2				
		i_N	12 35 35	2				
27		O	*12 35 58*				1,910	
		P	12 40 00					
		S	12 43 15					
		L_E	12 45 00	26				
		L_N	12 46 36	22				
		F	14 00 —					

TABLE 2.—*Instrumental reports, June, 1917*—Continued.

Canada. *Ottawa. Dominion Astronomical Observatory*—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. As	Amplitude. An	Distance.	Remarks.
1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
June 28	.....	eL_N	14 47 —	20	.....	.....	.....	
		L	14 55 —	18	.....	.....	.....	
		F	15 20 —	.....	.....	.....	.....	
29	.....	*O*?	*16 06 53*	.....	.....	.....	4,050?	
		P_N	16 14 15	.....	.....	.....	.....	
		S_N	16 20 05	.....	.....	.....	.....	
		eL_N	16 22 54	8	.....	.....	.....	
		eL_E	16 23 54	8	.....	.....	.....	
		M_N	16 27 54	8	.....	50	.....	
		L	16 30 —	8	.....	.....	.....	
	.....	L	16 35 —	6	.....	.....	.....	
		F	17 05 —	.....	.....	.....	.....	
30	.....	*O*	*17 50 25*	.....	.....	.....	4,150	
		P_N	17 57 54	.....	.....	.....	.....	
		S_E	18 03 50	.....	.....	.....	.....	
		L	18 10 00	24	.....	.....	.....	
		L	18 15 —	18–15	.....	.....	.....	
		L	18 35 —	15	.....	.....	.....	
		F	18 50 —	.....	.....	.....	.....	

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.

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

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. As	Amplitude. An	Distance.	Remarks.
1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
June 3	.....	P?	19 48 48	.....	.....	.....	.....	
		L	19 59 42	.....	.....	.....	.....	
		eL	20 02 12	.....	.....	.....	.....	
		M	20 04 12	.....	*300	.....	.....	
		F	20 17 06	.....	.....	.....	.....	
4	.....	P?	1 36 36	.....	.....	.....	6,790	
		S	1 44 54	.....	.....	.....	.....	
		L	1 57 06	.....	.....	.....	.....	
		iL	2 00 30	.....	.....	.....	.....	
		M	2 01 48	18–24	*1900	.....	.....	
		L	2 33 24	.....	.....	.....	.....	
		F?	3 41 30	.....	.....	.....	.....	
4	.....	L	8 30 06	.....	.....	.....	.....	
		M	8 31 36	.....	*200	.....	.....	
		F	8 35 06	.....	.....	.....	.....	
6	.....	L	5 01 30	.....	.....	.....	.....	
		M	5 08 48	.....	*200	.....	.....	
		F	5 35 00	.....	.....	.....	.....	
6	.....	P?	16 35 30	.....	.....	.....	.....	Doubtful as to being seismic.
		S?	16 43 06	.....	.....	.....	.....	
		L	16 54 12	.....	.....	.....	.....	
		M	16 56 48	.....	*200	.....	.....	
		F	17 09 48	.....	.....	.....	.....	
7	.....	L	3 14 36	.....	.....	.....	.....	
		L	3 17 42	.....	.....	.....	.....	
		M	3 19 00	.....	*400	.....	.....	
		F	3 32 00	.....	.....	.....	.....	
8	.....	S	1 03 00	.....	.....	.....	3,792	San Salvador quake. P not recorded. Distance from L-S.
		L	1 06 00	.....	.....	.....	.....	
		L	1 07 00	.....	.....	.....	.....	
		L	1 07 48	.....	.....	.....	.....	
		iL	1 08 54	.....	.....	.....	.....	
		M	1 09 48	18–24	*8700	.....	.....	
		L_{rep}	3 17 54	.....	.....	.....	.....	
		F	4 04 36	.....	.....	.....	.....	
9	.....	L	18 03 00	.....	.....	.....	.....	Phases interfered with on account of attention to instrument.
		M	18 05 00	.....	700	.....	.....	
10	.....	S	4 45 18	.....	.....	.....	.....	P?
		L	4 52 00	.....	.....	.....	.....	
		iL	4 54 18	.....	.....	.....	.....	
		M	4 54 36	.....	*1800	.....	.....	
		F	5 39 48	.....	.....	.....	.....	
13	.....	P?	7 00 42	.....	.....	.....	9,400?	Distinctly defined. Waves well defined at maxima.
		e	7 06 42	.....	.....	.....	.....	
		S	7 11 12	.....	.....	.....	.....	
		eL	7 42 00	.....	.....	.....	.....	
		M	7 48 18	18–24	*4800	.....	.....	
		M	7 53 12	18–24	*3300	.....	.....	
		M	7 59 12	18	*2300	.....	.....	
		L_{rep}	8 57 12	.....	.....	.....	.....	
		L_{rep}	9 56 12	.....	.....	.....	.....	
		F	10 30 18	.....	.....	.....	.....	

* Trace amplitude.

Canada. *Toronto. Dominion Meteorological Service*—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. As	Amplitude. An	Distance.	Remarks.
1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
June 16	.....	L	16 08 42	.....	*50	.....	.....	
		F	16 23 54	.....	.....	.....	.....	
16	.....	L	16 35 06	.....	*50	.....	.....	
		F	16 52 06	.....	.....	.....	.....	
22	.....	L	5 59 00	.....	.....	.....	.....	
		M	6 00 24	.....	*200	.....	.....	
		F	6 18 54	.....	.....	.....	.....	
24	.....	P?	20 07 18	.....	.....	.....	4,780	S waves well defined.
		iS	20 13 48	.....	.....	.....	.....	
		L	20 16 42	.....	.....	.....	.....	
		M	20 18 12	.....	*300	.....	.....	
		L	20 49 12	.....	.....	.....	.....	
		F	22 17 12	.....	.....	.....	.....	
26	.....	P	6 04 18	.....	.....	.....	9,650	Clear record, well defined and continuous large vibrations. P and S well marked.
		iP	6 07 36	.....	*800	.....	.....	
		S	6 15 00	.....	*5000	.....	.....	
		L	6 32 24	18	.....	.....	.....	
		iL	6 42 00	.....	.....	.....	.....	
		iL	6 49 06	18–24	.....	.....	.....	
		M	6 51 06	18–24	*20000	.....	.....	Amplitude doubtful.
		iL	6 59 00	.....	.....	.....	.....	
		M	7 00 18	.....	*11000	.....	.....	
		iL	7 02 18	.....	.....	.....	.....	
		iL	7 10 30	.....	.....	.....	.....	
		L_{rep}	8 04 18	.....	.....	.....	.....	
		L_{rep}	8 20 36	.....	.....	.....	.....	
		F	10 51 36	.....	.....	.....	.....	
27	.....	e	12 04 18	.....	.....	.....	.....	May be a dual earthquake.
		e	12 26 12	.....	.....	.....	.....	
		P	12 39 24	.....	.....	.....	.....	
		S	12 43 24	.....	.....	.....	.....	
		eL	12 46 24	.....	.....	.....	.....	
		M	12 48 24	.....	*1400	.....	.....	
		M	12 51 06	.....	*1400	.....	.....	
		L_{rep}	13 23 36	.....	.....	.....	.....	
		F	13 47 36	.....	.....	.....	.....	
28	.....	eL	14 48 18	.....	*400	.....	.....	Amplitude doubtful. Some phases lost attending instrument.
		eL	15 06 54	.....	.....	.....	.....	
29	.....	S	16 19 24	.....	.....	.....	.....	P not recorded.
		iL	16 26 00	.....	.....	.....	.....	
		M	16 26 42	.....	*400	.....	.....	
		F?	17 13 00	.....	.....	.....	.....	
30	.....	S?	18 01 36	.....	.....	.....	.....	Beginning of disturbance lost during attention to instrument. Time of S doubtful.
		S	18 02 00	.....	.....	.....	.....	
		eL	18 09 30	.....	.....	.....	.....	
		M	18 11 30	.....	*800	.....	.....	
		F	19 16 24	.....	.....	.....	.....	

*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.

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

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. As	Amplitude. An	Distance.	Remarks.
1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
June 3	.....	P	19 41 35	.....	.....	.....	.....	
		L	19 44 04	.....	.....	.....	.....	
		M	19 46 20	.....	*400	.....	.....	
		F	19 50 23	.....	.....	.....	.....	
4	.....	P	1 32 52	.....	.....	.....	1,610	
		S	1 35 39	.....	.....	.....	.....	
		L	1 38 46	.....	.....	.....	.....	
		M	1 42 42	.....	*2000	.....	.....	
		F	2 00 55	.....	.....	.....	.....	
		VERTICAL.			A_E			
		P	*1 32 52*	*8*	.....	.....	.....	*S*?
		L	*1 38 52*	*24*	.....	.....	.....	
		M	*1 39 52*	*24*	*8*	.....	.....	
4	.....	P	8 10 45	.....	.....	.....	.....	
		M	8 12 43	.....	*100	.....	.....	
		F	8 15 40	.....	.....	.....	.....	
6	.....	L	4 44 17	.....	.....	.....	.....	
		M	4 46 11	.....	*200	.....	.....	
		F	5 07 00	.....	.....	.....	.....	

* Trace amplitude.

TABLE 2.—*Instrumental reports, June, 1917*—Concluded.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. As	Amplitude. An	Distance.	Remarks.
Canada. *Victoria, B. C. Dominion Meterological Service*—Continued.								
1917.			*H. m. s.*	*Sec.*	*μ*	*μ*	*km.*	
June 7	.....	P or S.	16 22 11	.....	.....	.....	.....	
		L.....	16 37 23	.....	*50	.....	.....	F?
7	.....	P?....	2 55 25	.....	.....	.....	1,100	
		S.....	2 57 24	.....	.....	.....	.....	
		L.....	2 59 52	.....	.....	.....	.....	
		M.....	3 00 52	.....	*200	.....	.....	
		F.....	3 05 50	.....	.....	.....	.....	
8	.....	P?....	1 04 16	.....	.....	.....	4,020	San Salvador quake.
		iP.....	1 06 16	.....	.....	.....	.....	
		S.....	1 10 04	.....	.....	.....	.....	
		L.....	1 14 36	.....	.....	.....	.....	
		M.....	1 19 31	.....	*14000	.....	.....	
		L_{rep}...	3 26 10	.....	.....	.....	.....	
		L_{rep}...	3 29 10	.....	.....	.....	.....	
		F.....	3 53 54	.....	.....	.....	.....	
			VERTICAL.		A_Z			
		P.....	*1 04 16*	*3*	.....	.....	*5,100*	
		S.....	*1 11 04*	*6*	.....	.....	.....	
		L.....	*1 19 06*	*18*	.....	.....	.....	
		M.....	*1 50 28*	*14*	*25*	.....	.....	*F?*
9	.....	P.....	17 41 31	.....	.....	.....	.....	
		L.....	17 44 59	.....	.....	.....	.....	
		M.....	17 47 28	.....	*200	.....	.....	
		F.....	18 04 49	.....	.....	.....	.....	
10	.....	P.....	4 33 34	.....	.....	.....	550	
		L.....	4 34 34	.....	.....	.....	.....	
		M.....	4 35 33	.....	*3000	.....	.....	
		F.....	4 55 23	.....	.....	.....	.....	
			VERTICAL.		A_Z			
		P.....	*4 33 34*	*2*	.....	.....	*550*	
		L.....	*4 34 20*	*6–8*	.....	.....	.....	
		M.....	*4 38 02*	*9*	*55*	.....	.....	
		F.....	*4 48 00*	.....	.....	.....	.....	
10	.....	L.....	6 04 18	.....	.....	.....	.....	Probably part of Italian quake.
		M.....	6 08 16	.....	*200	.....	.....	
		F.....	6 13 44	.....	.....	.....	.....	
13	.....	P.....	7 05 12	.....	.....	.....	6,380	
		S.....	7 13 09	.....	.....	.....	.....	
		L.....	7 20 05	.....	.....	.....	.....	
		M.....	7 31 59	.....	*2000	.....	.....	
		L_{rep}...	9 40 05	.....	.....	.....	.....	
		F.....	10 00 14	.....	.....	.....	.....	
			VERTICAL.		A_Z			
		P.....	*7 05 18*	*3*	.....	.....	.....	*S?*
		L.....	*7 20 30*	*6*	.....	.....	.....	
		M.....	*7 38 42*	*20*	*7*	.....	.....	*F?*
16	.....	P or L.	15 50 30	.....	.....	.....	1,120	
		M.....	15 52 28	.....	*50	.....	.....	
		F.....	15 57 24	.....	.....	.....	.....	
			VERTICAL.		A_Z			
		P or *L*.	*15 50 30*	*6*	.....	.....	*1,120*	
		M.....	*15 52 30*	*7*	*5*	.....	.....	
22	.....	P?....	5 39 43	.....	.....	.....	.....	
		L.....	5 40 42	.....	.....	.....	.....	
		M.....	5 42 11	.....	*200	.....	.....	
		F.....	5 45 40	.....	.....	.....	.....	
24	.....	P.....	20 11 23	.....	.....	.....	.....	L and M lost at cut-off.
		F.....	20 58 59	.....	.....	.....	.....	
26	.....	P.....	6 01 56	.....	.....	.....	7,510	
		S.....	6 10 51	.....	.....	.....	.....	
		L.....	6 25 14	.....	.....	.....	.....	
		M.....	6 30 41	.....	*19000	.....	.....	
		iL.....	7 23 46	.....	.....	.....	.....	
		L.....	8 15 52	.....	.....	.....	.....	
		L.....	8 19 16	.....	.....	.....	.....	
		L_{rep}...	9 35 58	.....	.....	.....	.....	
		L_{rep}...	9 42 16	.....	.....	.....	.....	
		L_{rep}...	9 46 16	.....	.....	.....	.....	
		L.....	9 52 58	.....	.....	.....	.....	
		F.....	10 22 45	.....	.....	.....	.....	
			VERTICAL.		A_Z			
		P.....	*6 08 00*	*6*	.....	.....	*8,200*	
		S.....	*6 11 30*	*12*	.....	.....	.....	
		L.....	*6 25 06*	*18–20*	.....	.....	.....	
		M.....	*6 37 21*	*20*	*33*	.....	.....	*F?*
27	.....	P.....	12 56 26	.....	.....	.....	.....	
		M.....	13 01 24	.....	*200	.....	.....	
		F.....	13 09 50	.....	.....	.....	.....	
28	.....	P.....	14 34 08	.....	.....	.....	.....	
		M.....	14 37 06	.....	*200	.....	.....	
		F.....	14 42 33	.....	.....	.....	.....	
29	.....	P.....	16 23 30	.....	.....	.....	.....	
		M.....	16 26 57	.....	*100	.....	.....	
		F.....	16 33 37	.....	.....	.....	.....	
30	.....	P.....	18 21 46	.....	.....	.....	.....	
		M.....	18 30 41	.....	*100	.....	.....	
		F.....	18 40 37	.....	.....	.....	.....	

* Trace amplitude.

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

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_H	Amplitude. A_M	Distance.	Remarks.
Massachusetts. *Cambridge. Harvard University Seismographic Station.* J. B. Woodworth.								
1917.			*H. m. s.*	*Sec.*	*μ*	*μ*	*km.*	
Mar. 29	.....	e_E.....	2 17 53	6	.....	.....	.....	Record overlooked in March. First phases masked by microseisms.
		eL?...	2 20 11	24	.....	.....	.....	
		M?....	2 28 04	20	.....	.....	.....	
		L.....	2 46 59	10	.....	.....	.....	
		F?....	3 00 —	.....	.....	.....	.....	
29	.....	L?....	3 08 00	10	.....	.....	.....	Probably part of preceding quake.
		F?....	3 08 20	.....	.....	.....	.....	
Apr. 21	.....	O?....	*0 52 10*	.....	.....	.....	8,450?	Only quake in April. Possibly iP. Interpretation doubtful. A very slight.
		i_N.....	1 12 55	3	.....	.....	.....	
		i_E.....	1 12 55	2	.....	.....	.....	
		S_E.....	1 13 37	10	.....	.....	.....	
		L_E.....	1 29 46	20	.....	.....	.....	
		L.....	1 38 56	18	.....	.....	.....	
		L.....	1 45 56	20	.....	.....	.....	
		F?....	2 04 30	.....	.....	.....	.....	

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.. $\begin{cases} & V & T_0 & \epsilon \\ E & 80 & 23 & 0 \\ N & 50 & 25 & 4:1 \end{cases}$

SEISMOLOGICAL DISPATCHES.[1]

Washington, D. C., June 8, 1917.

Dispatches from American Minister Long at San Salvador sent at 9 o'clock last night while the volcano of San Salvador was erupting said part of the city had been destroyed by fire but that it was under control. Great damage was done.

Washington, D. C., June 8, 1917.

A dispatch said that about 6:35 p. m. yesterday severe earthquake shocks began and continued until about 8:45 with varying degrees of intensity. At about 8:45 the volcano of San Salvador began to belch forth fire and smoke apparently on the side toward Quezaltepeque. There was later one very severe shock, but the tremors of the earth continued with decreasing violence. At the same time there was a steady shower of dry ashes falling over the city. (Assoc. Press.)

Rome, June 11, 1917.

Four violent earthquakes early to-day caused a panic at Terni. Dispatches received here assert considerable damage was done. All inhabitants of the town fled to the open fields and are now camping out there, fearing further earth tremors. Terni is a town of about 31,000 population, located in the Province of Perugia, 49 miles northeast of Rome. A big Government arsenal is there. The town is famed for its Roman ruins and a cathedral. (Assoc. Press.)

San Salvador, Republic of Salvador, June 14, 1917.

Several earthquake shocks of varying intensity were felt here yesterday and to-day, but no damage has been reported.

The various relief committees are distributing provisions to the destitute, and shelters are being built to house the thousands of homeless who at present are encamped on the streets. The wounded are being attended by the Red Cross. Several bodies have been recovered at Armenia and Quezaltepeque. The tracks of the Occidental Railway are covered by streams of lava. Several craters of the volcano have formed into one. (——)

Seward, Alaska, June 18, 1917.

The Pavlof and Shishaldin Volcanoes on the Alaskan Peninsula were in violent action late in May and early in June, according to word brought here to-day by the steamer *Dora*. Smoke and flames poured forth night and day from the Pavlof crater. An earthquake shock lasting two minutes, of such force that people left their homes, was felt at Unga at 10 p. m., May 30. There have been continuous tremors since the National Geographic Society expedition, led by Dr. Robert F. Briggs of the University of Ohio, left Kodiak to visit Katmai last week. Katmai, Redoubt, Lliamna, and St. Augustine Volcanoes also are active, according to report. (Assoc. Press.)

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

MEMORANDUM ON THE MISSOURI EARTHQUAKE OF APRIL 9, 1917.

By SIDNEY PAIGE.

[Communicated to the U. S. Weather Bureau by the Director of the U. S. Geological Survey, June 30, 1917.]

The origin of the earthquake is almost certainly connected with a well-defined fault zone trending in a general northwest-southeast direction, and located about 12 to 15 miles southwest of Sainte Genevieve. The course of this fault zone changes radically at a point about 3 miles south-southeast of Weingarten. Northwest of this point the zone trends N. 35°–40° W., but east of the point it swings to the east and follows a S. 85° E. direction for at least 10 miles, beyond which it again follows a more southerly course.

An appreciable movement along any portion of this fault zone should produce vibrations most intense along the fault zone (omitting differences in the character of the rocks involved) and growing less at a distance from the fault zone. A map on which are plotted isoseismals should therefore show a roughly elliptical area, the longer axis of which would be approximately parallel to the fault zone and dependent for its length upon the distance over which movement took place. (All fault movements die out at some point.)

The longer axis of the elliptical area outlined on the isoseismal map [published in this REVIEW, April, 1917, p. 188] trends, however, slightly east of north, and not northwesterly, as might be expected considering the trend of the fault zone. This may be due to several causes. An isoseismal map can be used to discover the locus of earth movement or cause of the disturbance only in a most general way unless the geologic structure and material of the general region and of the particular place from which the data are derived be taken into consideration.

Areas of semiconsolidated or wholly loose material, such as flood-plain deposits or very recent geologic formations, are subject to more intense vibration than older consolidated formations and massive igneous rocks. It is therefore not surprising that the generalized isoseismals in the figure referred to do not reveal a relationship to the northwest trending fault zone mentioned above. Isoseismals drawn on complete geologic maps, where abundant records are available, bring out to an astonishing degree the dependence of relative shock upon geologic structure and material. (Note the San Francisco earthquake data.)

In the case under consideration, the flood-plain deposits of the Mississippi in the southern part of the area have served to increase intensity of shock in this direction, and thus masked the relation of disturbance to the fault zone. More abundant and more evenly distributed records on the northwest quarter would probably have corrected the apparent disagreement in this portion of the area. The extension of the No. V intensity eastward to Vienna is probably an expression of the relation of shock to the easterly trending fault zone. Moreover, the fault zone under consideration is a most irregular one, characterized by many short branching and intersecting faults, permitting movement to take place within restricted areas. Thus, intensities might vary along the fault in a most irregular manner, complicating the interpretation of the data for an isoseismal map. Such seems to be the nature of the data on hand.

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.
PRn = P waves reflected n times at the earth's surface.
S = (undæ secundæ) = second preliminary tremors.
SRn = 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_{rep_1} = Long waves reaching the station from the antiepicenter (40,000 km. $-\Delta$).
L_{rep_2} = long waves again reaching the station from the antiepicenter (40,000 km. $+\Delta$).
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 JULY, 1917.

W. J. HUMPHREYS, Professor in Charge.

[Dated: Weather Bureau, Washington, D. C., Sept. 4, 1917.]

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

Day.	Approximate time, Greenwich Civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity Rossi-Forel.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
		CALIFORNIA.								
	H. m.		° ′	° ′			*M. s.*			
7	(Morning)	Owenyo	36 40	113 01	6–7	1			Broke aqueduct	Wm. Mulholland.
7	20 57	San Luis Obispo	35 18	120 39	3	2	7		Rattled windows	U. S. Weather Bureau.
8	3 20	Santa Maria	34 58	120 27	2–3	1	10			Henry Neil, jr.
9	5 15	Bishop	37 24	118 26	3	1		Rumbling		William Barth.
9	22 22	San Luis Obispo	35 18	120 39	4	1	2	Loud		U. S. Weather Bureau.
15	19 05	Mt. Wilson	34 13	118 16	4	2	2	Rumbling	House creaked	Wendell P. Hoge.
16	6 50	Calexico	32 41	115 30	2	1	½	Rumbling	Sounds before shock	H. M. Rouse.
21	16 50	Ferndale	40 35	124 16	3	3		None		M. Eriksen.
26	8 31	San Luis Obispo	35 18	120 39	2	1	2	None		U. S. Weather Bureau.
		Santa Maria	34 58	120 27	4–5	3	15		Moved furniture	R. E. Collom.
		PORTO RICO.								
13	6 20	Mayaguez	18 13	67 08	5	3	28	Faint		C. Alemar, jr.
27	2 01	Mayaguez	18 13	67 08	6		20	Faint		C. Alemar, jr.
		San Juan	18 29	66 07	6	2	6		Clock stopped	U. S. Weather Bureau.

TABLE 2.—*Instrumental reports, July, 1917.*

[Time used: Mean Greenwich, midnight to midnight. Nomenclature: International.]

[For significance of symbols see above, p. 373.]

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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	16.6
N	10	15.4

1917.			H. m. s.	Sec.	μ	μ	km.	
July 25	.....	eL_N	3 25 07	19	.....	.....	.....	
		eL_E	3 26 24	19	.....	.....	.....	
		M_E	3 27 44	18	10	.....	.....	
		M_N	3 28 17	15	.....	20	.....	
		C_E	3 30 —	.....	.....	.....	.....	
		C_N	3 35 —	.....	.....	.....	.....	
		F	4 15 —	.....	.....	.....	.....	
27	.....	eP_N	1 11 54	.....	.....	.....	.....	
		eS_N	1 20 02	8	.....	.....	.....	
		eL_N	1 32 40	26	.....	.....	.....	
		eL_E	1 34 —	.....	.....	.....	.....	
		M_N	1 37 35	13	.....	100	.....	
		M_E	1 44 22	14	60	.....	.....	
		C	1 45 —	.....	.....	.....	.....	
		F	2 44 —	.....	.....	.....	.....	
27	.....	eP_N	3 19 04	.....	.....	.....	.....	Barely discernible on E-W. No phases.
		eL_N	3 46 46	25	.....	.....	.....	
		M_N	3 49 50	18	.....	20	.....	
		C	3 55 —	.....	.....	.....	.....	
		F	4 28 —	.....	.....	.....	.....	
29	.....	eP_E	22 05 24	7	.....	.....	.....	
		eS_E	22 15 59	8	.....	.....	.....	
		eS_N	22 15 08	9	.....	.....	.....	
		eL_N	22 28 10	20	.....	.....	.....	
		eL_E	22 33 00	.....	.....	.....	.....	
		M_E	22 17 26	9	80	.....	.....	
		M_E	22 38 45	20	20	.....	.....	
		M_N	22 38 00	18	.....	20	.....	
		C	22 49 —	.....	.....	.....	.....	
30	.....	F	0 44 —	.....	.....	.....	.....	
31	.....	e_N	0 21 24	.....	.....	.....	.....	Mere tremor of E-W. No phases.
		e_E	0 38 34	.....	.....	.....	.....	
		L_N	0 39 08	20	.....	.....	.....	
		M_N	0 43 38	16	.....	30	.....	
		C	0 47 —	.....	.....	.....	.....	
		F_E	0 57 —	.....	.....	.....	.....	
		F_N	1 41 —	.....	.....	.....	.....	

Arizona. *Tucson. 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.

Instruments constants:

	V	T_0
E	10	13.9
N	10	18.9

1917.			H. m. s.	Sec.	μ	μ	km.	
July 27	.....	e_E	1 08 26	.....	.....	.....	.....	No well defined phases.
		e_N	1 09 28	.....	.....	.....	.....	
		M_N	1 27 20	16	.....	100	.....	
		M_E	1 34 24	16	60	.....	.....	
		F	4 03 —	.....	.....	.....	.....	
29	.....	e_E	22 11 15	.....	.....	.....	.....	Record very faint.
		M_E	22 57 54	17	10	.....	.....	
		M_N	23 05 28	20	.....	10	.....	
30	.....	F	0 22 —	.....	.....	.....	.....	

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.)

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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.

(Report for July, 1917, not received.)

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.)

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

1917.			H. m. s.	Sec.	μ	μ	km.	
July 1	.....	.....	.....	.....	.....	.....	.....	Small quake, beginning about 13h 36m; L about 13h 41m; and F about 13h 50m. No time marks.
4	.....	P.....	0 57 14	.....	.....	.....	8,675	
		S.....	1 07 08	.....	.....	.....	.....	
		L.....	1 25 30	60	.....	.....	.....	
		L.....	1 31 00	40	.....	.....	.....	
		L.....	1 37 00	24	.....	.....	.....	
		F.....	2 35 00	.....	.....	.....	.....	
12	.....	L.....	12 41 33	.....	.....	.....	.....	
		L.....	12 43 30	20	.....	.....	.....	
		L.....	12 47 00	16	.....	.....	.....	F lost changing sheets.
13	.....	iP.....	5 19 07	.....	.....	.....	2,090	
		S.....	5 22 38	.....	.....	.....	.....	
		L.....	5 25 00	.....	.....	.....	.....	
		F.....	5 40 00	.....	.....	.....	.....	
25	.....	P.....	3 28 58	.....	.....	.....	6,125	
		S.....	3 36 41	.....	.....	.....	.....	
		L.....	3 45 15	.....	.....	.....	.....	
		L.....	3 49 30	20	.....	.....	.....	
		F.....	4 30 00	.....	.....	.....	.....	
25	.....	P.....	22 42 44	.....	.....	.....	6,140	
		S.....	22 50 28	.....	.....	.....	.....	
		L.....	23 03 00	.....	.....	.....	.....	
		F.....	23 30 00	.....	.....	.....	.....	
27	II_4.....	iP.....	1 06 11	.....	.....	.....	2,340	
		S.....	1 10 03	.....	.....	.....	.....	
		L.....	1 13 55	16	.....	.....	.....	C merges with succeeding quake.
27	I_4.....	P.....	3 02 47	.....	.....	.....	7,725	
		S.....	3 11 53	.....	.....	.....	.....	
		L?	3 20 15	.....	.....	.....	.....	
		L.....	3 24 45	20	.....	.....	.....	
		F.....	3 40 00	.....	.....	.....	.....	
27	.....	P.....	16 20 09	.....	.....	.....	2,150	
		S.....	16 23 45	.....	.....	.....	.....	
		L?	16 25 50	.....	.....	.....	.....	
		L.....	16 29 15	12	.....	.....	.....	
		F.....	17 30 00	.....	.....	.....	.....	
28	.....	e.....	1 31 05	.....	.....	.....	.....	
		S?.....	1 39 20	.....	.....	.....	.....	
		L.....	1 49 00	.....	.....	.....	.....	
		F.....	2 00 00	.....	.....	.....	.....	
29	.....	P.....	14 55 54	.....	.....	.....	4,370?	
		S?.....	15 02 02	.....	.....	.....	.....	
		L.....	15 10 00	20	.....	.....	.....	
		L.....	15 22 00	20	.....	.....	.....	
		F.....	16 15 00	.....	.....	.....	.....	
29	.....	P?.....	22 11 40	.....	.....	.....	.....	
		e.....	22 15 06	.....	.....	.....	.....	
		L.....	22 25 00	.....	.....	.....	.....	
		L.....	22 52 00	40	.....	.....	.....	
		L.....	23 02 00	18	.....	.....	.....	
30	.....	F.....	1 00 00	.....	.....	.....	.....	
31	.....	eL.....	0 50 00	.....	.....	.....	.....	
		L.....	0 55 00	24	.....	.....	.....	
		F.....	1 40 00	.....	.....	.....	.....	
31	.....	P?.....	3 35 35	.....	.....	.....	8,430?	
		S.....	3 45 17	.....	.....	.....	.....	
		L.....	3 57 00	.....	.....	.....	.....	
		F.....	4 40 00	.....	.....	.....	.....	

TABLE 2.—*Instrumental reports, July, 1917*—Continued.

District of Columbia. *Washington. Georgetown University.*

F. A. 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	89	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.*	
July 4	.....	e_E	0 57 13	.....	.....	.....	.....	Microseisms present. No distinct maximum.
		e_N	0 57 21	.....	.....	.....	.....	
		eL	1 07 13	.....	.....	.....	.....	
		L	1 31 31	.....	.....	.....	.....	
		F	2 33 00	.....	.....	.....	.....	
13	.....	eP	5 19 05	.....	.....	.....	.....	
		S_E	5 22 52	.....	.....	.....	.....	
		S_N	5 22 54	.....	.....	.....	.....	
		eL	5 23 06	.....	.....	.....	.....	
		F	6 10 00	.....	.....	.....	.....	
14	.....	e_N	21 31 34	.....	.....	.....	.....	Microseisms present. All phases doubtful.
		e_E	21 31 36	.....	.....	.....	.....	
		S	21 43 04	.....	.....	.....	.....	
		eL_E	21 50 04	.....	.....	.....	.....	
		eL_N	21 50 09	.....	.....	.....	.....	
		F	22 15 00	.....	.....	.....	.....	
25	.....	eP	3 38 18	.....	.....	.....	.....	Microseisms present.
		S_N	3 36 31	.....	.....	.....	.....	
		S_E	3 36 37	.....	.....	.....	.....	
		eL	3 49 00	.....	.....	.....	.....	
		F	4 45 00	.....	.....	.....	.....	
		VERTICAL.						
		e	*3 23 57*	.....	.....	.....	.....	S not discernible.
		eL	*3 49 53*	.....	.....	.....	.....	
		L	*3 51 53*	*30*	.....	.....	.....	
		F	*4 11 00*	.....	.....	.....	.....	
25	.....	e	22 42 43	.....	.....	.....	.....	Very difficult to interpret. All phases doubtful.
		eS	22 50 17	.....	.....	.....	.....	
		eL	23 03 17	.....	.....	.....	.....	
		F	23 40 00	.....	.....	.....	.....	
27	.....	iP	1 06 11	.....	.....	.....	.....	
		iS	1 10 02	.....	.....	.....	.....	
		eL	1 11 48	.....	.....	.....	.....	
		M_N	1 16 52	10	.....	*1950	.....	
		M_E	1 17 00	9	*3720	.....	.....	F lost in succeeding quake.
		VERTICAL.						
		P	*1 06 15*	.....	.....	.....	.....	
		S	*1 10 16*	.....	.....	.....	.....	
		eL	*1 12 18*	.....	.....	.....	.....	
		F	*2 35* ..	.....	.....	.....	.....	
27	.....	eP	3 02 46	.....	.....	.....	.....	No distinct maximum.
		iS	3 12 01	.....	.....	.....	.....	
		L	3 17 00	11	.....	.....	.....	
		F	4 00 ..	.....	.....	.....	.....	
		VERTICAL.						
		eP	*3 02 51*	.....	.....	.....	.....	
		S	*3 12 09*	.....	.....	.....	.....	
		L	*3 33 30*	*24*	.....	.....	.....	
		F	*4 00* ..	.....	.....	.....	.....	
27	.....	eP_N	16 20 11	.....	.....	.....	.....	No distinct maximum.
		eP_E	16 20 13	.....	.....	.....	.....	
		S_N	16 24 09	.....	.....	.....	.....	
		S_E	16 24 13	.....	.....	.....	.....	
		eL_N	16 25 00	17	.....	.....	.....	
		eL_E	16 25 12	17	.....	.....	.....	
		F	17 14 ..	.....	.....	.....	.....	
29	.....	e	14 44 49	.....	.....	.....	.....	
		L_N	15 23 30	.....	.....	.....	.....	
		L_E	15 24 48	.....	.....	.....	.....	
		F	16 01 ..	.....	.....	.....	.....	
29	.....	e_N	22 11 42	.....	.....	.....	.....	e possibly sooner. Microseisms present.
		e_E	22 12 00	.....	.....	.....	.....	
		S_E	22 15 06	.....	.....	.....	.....	
		S_N	22 15 08	.....	.....	.....	.....	
		eL?	22 16 18	.....	.....	.....	.....	F lost in changing
		L	22 25 00	.....	.....	.....	.....	
30		F	1	13	.....	.....	.....	
30	.....	e	12 29 24	.....	.....	.....	.....	Microseisms present.
		L	13 08 .. / 13 20 ..	.....	.....	.....	.....	F?

* Trace amplitude.

District of Columbia. *Washington. Georgetown University*—Contd.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917.			*H. m. s.*	*Sec.*	*μ*	*μ*	*km.*	
July 31	.....	e_E	0 13 24	.....	.....	.....	.....	e_N and S_N not discernible.
		eS_E?	0 20 44	.....	.....	.....	.....	
		eL	0 50 42	.....	.....	.....	.....	
		L_E	0 56 08	24	.....	.....	.....	
		L_N	1 01 ..	30	.....	.....	.....	
		F	1 30 ..	.....	.....	.....	.....	
31	.....	eP_E	3 36 04	.....	.....	.....	.....	
		eP_N	3 36 07	.....	.....	.....	.....	
		S_E	3 45 38	.....	.....	.....	.....	
		S_N	3 46 07	.....	.....	.....	.....	
		eL?	3 51 15	.....	.....	.....	.....	
		F	4 40 ..	.....	.....	.....	.....	

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.*	
July 27	.....	P_N	1 14 00	.....	.....	.....	.....	Chilean quake. Good record but P and S do not appear on E-W component. E-W record much less satisfactory than N-S.
		S_N	1 18 00	.....	.....	.....	.....	
		L_N	1 23 00	15–20	.....	*1,500	.....	
		L_E	1 25 00	10–12	*1,000	.....	.....	
		M_N	1 27 00	22	.....	*2,500	.....	
		M_E	1 27 00	21	*1,200	.....	.....	
		C_E	1 28 00	.....	.....	.....	.....	
		C_N	1 29 00	8	.....	.....	.....	
		F_E	1 32 00	.....	.....	.....	.....	
		F_N	1 37 00	.....	.....	.....	.....	

* Trace amplitude.

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 18.5

(Report for July, 1917, not received.)

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	4.1
N	205	3.4	4.1

(Report for July, 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	33
N	10	25

1917.			*H. m. s.*	*Sec.*	*μ*	*μ*	*km.*
July 25	.....	e_N	2 42 38	.....	.....	.....	.....
		e_E	2 43 29	.....	.....	.....	.....
		eL_E	2 49 22	16	.....	.....	.....
		eL_N	2 49 36	16	.....	.....	.....
		M_E	2 53 28	14	10	.....	.....
		M_N	2 54 39	12	.....	20	.....
		C	2 55 00	.....	.....	.....	.....
		F	3 07 00	.....	.....	.....	.....

TABLE 2.—*Instrumental reports, July, 1917*—Continued.

Maryland. *Cheltenham. Magnetic Observatory*—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
July 27	.....	P.....	1 06 12	.....	.....	.....	.....	
		S.....	1 10 00	3	.....	.....	.....	
		eL_E...	1 12 09	18	.....	.....	.....	
		M_E...	1 10 32	.....	980	.....	.....	
		M_N...	1 18 53	14	.....	260	.....	
		M_E...	1 19 10	25	300	.....	.....	
		C.....	1 47 00	.....	.....	.....	.....	
		F.....	2 20 00	.....	.....	.....	.....	
27	.....	eP_E...	3 02 38	.....	.....	.....	.....	No long waves on E-W.
		eP_N...	3 02 40	.....	.....	.....	.....	
		S_E.....	3 11 52	.....	.....	.....	.....	
		S_N.....	3 11 54	.....	.....	.....	.....	
		eL_N...	3 33 00	24	.....	.....	.....	
		M_N...	3 35 36	24	.....	20	.....	
		C.....	3 41 00	.....	.....	.....	.....	
		F.....	4 00 00	.....	.....	.....	.....	
29	.....	eP_N...	22 13 50	.....	.....	.....	.....	Phases indefinite.
		eP_E...	22 13 54	.....	.....	.....	.....	
		eS_N...	22 23 35	.....	.....	.....	.....	
		eS_E...	22 23 56	.....	.....	.....	.....	
		eL_N...	22 49 00	18	.....	.....	.....	
		eL_E...	22 55 00	18	.....	.....	.....	
		M_E...	23 03 22	.....	140	.....	.....	
		M_N...	23 05 36	.....	.....	20	.....	
		C.....	23 21 00	.....	.....	.....	.....	
30	.....	F.....	0 14 00	.....	.....	.....	.....	
31	.....	e.....	0 54 00	.....	.....	.....	.....	Phases on N-S not defined, record barely discernible on E-W.
		M_N...	1 04 00	.....	.....	10	.....	
		F.....	1 15 00	.....	.....	.....	.....	

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. { E: V 80, T_0 23, ε 0; N: 80, 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.*	
July 1	.....	*O?*....	*13 28 50*	.....	.....	.....	3,000?	
		eP_N...	13 34 47	.....	.....	.....	.....	
		S_N.....	13 39 30	.....	.....	.....	.....	
		S_E.....	13 39 54	6	.....	.....	.....	
		eL_N...	13 42 24	6–10	.....	.....	.....	Followed by periods of 8 seconds.
		F.....	14 03 00	.....	.....	.....	.....	
4	.....	*O?*....	*0 49 01*	.....	.....	.....	4,850	
		eP_N...	0 57 11	.....	.....	.....	.....	
		S_E.....	1 03 53	6	.....	.....	.....	
		e_N.....	1 11 02	.....	.....	.....	.....	
		e_E.....	1 13 11	.....	.....	.....	.....	
		L_E.....	1 27 42	42–50	.....	.....	.....	
		L_E.....	1 33 27	30	.....	.....	.....	
		L_E.....	1 35 53	25	.....	.....	.....	
		L_E.....	1 38 09	25	.....	.....	.....	
		F.....	2 54 00	.....	.....	.....	.....	
4	.....	e_E.....	6 14 08	.....	.....	.....	.....	*O* at 5h plus. Amplitude very small.
		eL_E...	6 37 01	20	.....	.....	.....	
		L_E.....	6 38 56	.....	.....	.....	.....	
		F.....	7 20 00	.....	.....	.....	.....	
10	.....	L_E....	18 20 22 18 31 38	20	.....	.....	.....	
11	.....	*O?*....	*22 45 00*	.....	.....	.....	12,100	
		S_E.....	23 09 45	7	.....	.....	.....	
		e.....	23 28 27	14	.....	.....	.....	
		e.....	23 33 09	14	.....	.....	.....	
		eL_E...	23 34 45	30	.....	.....	.....	
		L_E.....	23 38 51	20	.....	.....	.....	
12		F.....	0 11 00	.....	.....	.....	.....	
12	.....	L_E.....	12 43 02	24	.....	.....	.....	
		L_E.....	12 47 13	20	.....	.....	.....	
		L_E.....	12 58 51	16	.....	.....	.....	Record changed between 13h, 10m and 13h, 25m.
		F.....	14 14 00	.....	.....	.....	.....	
13	.....	*O*.....	*5 15 02*	.....	.....	.....	2,220	
		P_N.....	5 19 39	.....	.....	.....	.....	
		S_E.....	5 23 21	6	.....	.....	.....	
		eL_E...	5 24 35	21–16	.....	.....	.....	
		F.....	5 45 00	.....	.....	.....	.....	

Massachusetts. *Cambridge. Harvard University*—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
July 15	.....	.....	.....	.....	.....	.....	.....	E-W component ran down at 0h 50m; in commission at 15h 22m.
25	.....	*O*.....	*3 19 02*	.....	.....	.....	6,300	Some uncertainty as to times by E-W component.
		P_E.....	3 28 38	3	.....	.....	.....	
		P_N.....	3 28 50	.....	.....	.....	.....	
		S_E.....	3 36 22	.....	.....	.....	.....	
		S_N.....	3 36 48	6	.....	.....	.....	
		i_E.....	3 40 12	10	.....	.....	.....	
		eL_N...	3 48 21	.....	.....	.....	.....	
		eL_E...	3 49 00	20	.....	.....	.....	
		M_E.....	3 53 27	20	.....	.....	.....	
		F_E.....	4 52 00	.....	.....	.....	.....	
25	.....	*O?*....	*22 32 09*	.....	.....	.....	6,470	
		P_N.....	22 42 22	.....	.....	.....	.....	
		S_N.....	22 50 37	6	.....	.....	.....	
		e_N.....	23 01 14	10	.....	.....	.....	
		L_N.....	23 04 37	23	.....	.....	.....	
		L_N.....	23 07 50	18	.....	.....	.....	
26	.....	F.....	0 02 00	.....	.....	.....	.....	
27	.....	*O*.....	*1 00 50*	.....	.....	.....	2,690	
		P_E.....	1 06 17	.....	.....	.....	.....	
		P_N.....	1 06 30	10	.....	.....	.....	
		S_E.....	1 10 27	.....	.....	.....	.....	
		S_N.....	1 10 42	.....	.....	.....	.....	
		L_N.....	1 14 24	.....	.....	.....	.....	F lost in succeeding quake.
27	.....	*O*.....	*2 51 22*	.....	.....	.....	7,870	
		P_N.....	3 03 00	.....	.....	.....	.....	
		P_E.....	3 03 07	.....	.....	.....	.....	
		S_N.....	3 12 13	.....	.....	.....	.....	
		S_E.....	3 12 25	.....	.....	.....	.....	
		eL_E...	3 26 01	.....	.....	.....	.....	
		L_E.....	3 37 27	.....	.....	.....	.....	
		L_{surf}...	5 37 35	20	.....	.....	.....	
		F.....	4 41 31	.....	.....	.....	.....	
27	.....	*O*.....	*16 14 46*	.....	.....	.....	2,640	
		P_N.....	16 20 08	.....	.....	.....	.....	
		P_E.....	16 20 47	.....	.....	.....	.....	
		S_E.....	16 24 24	.....	.....	.....	.....	
		eL_N...	16 26 06	.....	.....	.....	.....	
		eL_E...	16 27 34	15	.....	.....	.....	
		C_E.....	16 34 28	.....	.....	.....	.....	
		F.....	16 50 ..	.....	.....	.....	.....	
28	.....	e_E.....	0 41 11	.....	.....	.....	.....	
		L_E.....	0 42 59	20	.....	.....	.....	
		L_E.....	0 47 25	24	.....	.....	.....	
		F.....	1	.....	.....	.....	.....	
28	.....	e_E?....	1 26 55	.....	.....	.....	.....	
		S_E?....	1 30 04	6	.....	.....	.....	
		L_E?....	1 35 16	20	.....	.....	.....	
		e.....	1 43 31	6	.....	.....	.....	
		L_E.....	1 46 33	16	.....	.....	.....	
		F.....	2 02 ..	.....	.....	.....	.....	
29	.....	L_N.....	6 22 41	15	.....	.....	.....	
		F.....	6 52 ..	.....	.....	.....	.....	
29	.....	e_E.....	14 56 07	.....	.....	.....	.....	*O* at 14h+, N-S run down at 13h 9m. Started at 15h 18m. Records changed at 15h 12m. L_N at 15h 19m 1s, period 32 sec.
		e_E.....	15 05 35	.....	.....	.....	.....	
		L_E.....	15 27 51	20	.....	.....	.....	
		F.....	15 40 ..	.....	.....	.....	.....	
29	.....	e_N.....	22 14 02	.....	.....	.....	.....	May be artificial disturbance.
		S_N?....	22 14 06	9	.....	.....	.....	
		L_N?....	22 24 10 22 31 32	10–12	.....	.....	.....	
30	.....	F.....	1 45 ..	.....	.....	.....	.....	
30	.....	L_N.....	5 33 17	20	.....	.....	.....	Artificial disturbance?
		L_N.....	5 44 24	16	.....	.....	.....	
		F_N.....	5 54 20	.....	.....	.....	.....	
30	.....	L_N.....	9 22 16	.....	.....	.....	.....	Very faint record. Possibly artificial disturbance.
		F.....	9 32 06	.....	.....	.....	.....	
30	.....	L_N.....	12 31 17	14	.....	.....	.....	Artificial disturbance? Changing records from 13h 24m to 13h 30m. Amplitude increases.
		L_N.....	12 33 03	16	.....	.....	.....	
		L_N.....	12 57 04	.....	.....	.....	.....	
		L_N.....	13 06 58	14–16	.....	.....	.....	
		L_N.....	13 07 34	.....	.....	.....	.....	
		L_N.....	13 14 ..	.....	.....	.....	.....	
		L_N.....	13 38 20	16	.....	.....	.....	
		F.....	17 10 ..	.....	.....	.....	.....	

TABLE 2.—*Instrumental reports, July, 1917*—Continued.

Massachusetts. *Cambridge. Harvard University*—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917. July 31	.....	S_N?...	*H. m. s.* 0 23 51	*Sec.* 7	μ	μ	*km.*	
		eL_M?..	0 51 17	30	.....	.....	.....	
		L.....	0 51 29	24	.....	.....	.....	
		L.....	0 55 11	24	.....	.....	.....	
		L.....	1 02 51	15	.....	.....	.....	
		F.....	1 38 43	.....	.....	.....	.....	
31	.....	*O*.....	3 25 58	.....	.....	.....	8,710	Masked by microseisms.
		P_N....	3 35 56	.....	.....	.....	.....	
		P_E....	3 36 03	2	.....	.....	.....	
		S_N....	3 45 52	10	.....	.....	.....	
		S_E....	3 46 05	6	.....	.....	.....	
		L_E....	3 48 50	10	.....	.....	.....	
		L_N....	3 49 32	.....	.....	.....	.....	
		eL_N...	3 52 34	.....	.....	.....	.....	
		eL_E...	3 52 53	16	.....	.....	.....	
		F.....	4 48 17	.....	.....	.....	.....	

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.

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

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

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917. July 25	I_E.....	IS?....	*H. m. s.* 21 35 00	*Sec.*	μ	μ	*km.*	
		F.....	22 00 ..	.....	.....	.....	.....	
27	III_E...	eP.....	0 07 00	.....	.....	.....	2,500	
		S.....	0 12 00	.....	.....	.....	.....	
		L.....	0 14 30	.....	.....	.....	.....	
		M_N....	0 15 00	24	.....	10	.....	
		F.....	1 22 00	.....	.....	.....	.....	
27	III_E...	iP_E...	2 03 00	.....	.....	.....	4,400	
		S_E?....	2 11 30	.....	.....	.....	.....	
		F.....	2 27 00	.....	.....	.....	.....	
27	II_E....	e.....	7 45 00	.....	.....	.....	.....	
		F.....	8 00 00	.....	.....	.....	.....	
29	I_E.....	e.....	22 19 00	.....	.....	.....	.....	
		F.....	22 25 00	.....	.....	.....	.....	
31	I_E.....	e.....	0 53 00	.....	.....	.....	.....	
		F.....	1 36 00	.....	.....	.....	.....	
31	I_E.....	e.....	1 44 00	.....	.....	.....	.....	
		F.....	2 04 00	.....	.....	.....	.....	

New York. *Buffalo. Canisius College.* John A. Curtin, S. J.

Lat., 42° 53′ 02″ N.; long., 78° 52′ 40″ W. Elevation, 190.5 meters.

Instrument: Wiechert 80 kg. horizontal.

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

(Report for July, 1917, not received.)

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..		*V*	T_0	ε
	E	72	6.6	1.5:1
	N	72	7.1	3.8:1

(Report for July, 1917, not received.)

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

Lat., 42° 26′ 53″ N.; long., 76° 29′ 09″ W. Elevation, 242.6 meters.

Instruments: Two Bosch-Omori, 25 kg., horizontal pendulums. Mechanical registration.

Instrumental constants..		*V*	T_0	ε
	E	13	22	4:1
	N	14	25	4:1

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917. July 1	.....	e_N.....	*H. m. s.* 13 37 03	*Sec.* 3	μ	μ	*km.*	
		e_E.....	13 37 06	4	.....	.....	.....	
		L_E?...	13 39 39	9	.....	.....	.....	
		L_N?...	13 40 18	10	.....	.....	.....	
		F_E.....	13 43 30	.....	.....	.....	.....	
		F_N.....	13 44 00	.....	.....	.....	.....	

New York. *Ithaca. Cornell University*—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917. July 4	.....	e_E.....	*H. m. s.* 1 11 40	*Sec.* 9	μ	μ	*km.*	
		e_N.....	1 11 41	11	.....	.....	.....	
		eL_E...	1 27 18	36	.....	.....	.....	
		eL_N...	1 31 13	24	.....	.....	.....	
		F_E.....	2 09 00	.....	.....	.....	.....	
		F_N.....	2 17 00	.....	.....	.....	.....	
13	.....	e_N.....	5 19 20	4	.....	.....	.....	
		e_E.....	5 22 11	4	.....	.....	.....	
		e_E.....	5 23 12	4	.....	.....	.....	
		e_N.....	5 23 22	3	.....	.....	.....	
		F_N.....	5 30 00	.....	.....	.....	.....	
		F_E.....	5 30 30	.....	.....	.....	.....	
25	.....	e_E.....	3 35 28	6	.....	.....	.....	
		eL_N...	3 44 32	36	.....	.....	.....	
		F_N.....	4 28 00	.....	.....	.....	.....	
27	.....	P_N....	1 05 55	4	.....	.....	.....	
		S_N....	1 10 21	8	.....	.....	.....	
		L_N....	1 12 13	16	.....	.....	.....	
		M_N....	1 13 50	19	.....	*2,200	.....	
		L_N....	1 16 37	14	.....	.....	.....	
		M_N....	1 20 03	12	.....	*2,800	.....	
		F_N....	2 45 00	.....	.....	.....	.....	
27	.....	eP_N...	3 02 27	4	.....	.....	.....	
		S_N....	3 12 01	9	.....	.....	.....	
		L_N....	3 28 08	28	.....	.....	.....	
		F_N....	4 13 00	.....	.....	.....	.....	
27	.....	e_N.....	16 24 29	7	.....	.....	.....	
		L_N....	16 26 20	24	.....	.....	.....	
		F_N....	16 56 00	.....	.....	.....	.....	
29	.....	L_N....	22 51 43	32	.....	.....	.....	Seismograph not recording during early phases.
		F_N....	24 19 00	.....	.....	.....	.....	

* Trace amplitude.

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*	T_0
	10	20

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917. July 1	.....	M_E....	*H. m. s.* 0 24 17	*Sec.*	μ	μ	*km.*	Distance and direction?
		M_N....	0 25 18	.....	.....	.....	.....	
11	.....	M_E....	7 26 16	.....	*100	.....	.....	Slight movement.
		M_N....	7 26 16	.....	*200	.....	.....	
27	.....	P_N....	1 04 48	.....	.....	.....	1,815	Direction N?
		P_E....	1 04 50	.....	.....	.....	.....	
		S.....	1 07 46	.....	.....	.....	.....	
		L_N....	1 09 16	.....	.....	.....	.....	
		L_E....	1 09 24	.....	.....	.....	.....	
		M_E....	1 05 06	.....	*9,000	.....	.....	
		M_N....	1 07 56	.....	.....	*10,000	.....	
		F_E....	2 02 00	.....	.....	.....	.....	
		F_N....	2 06 00	.....	.....	.....	.....	
27	.....	P_N....	2 59 36	.....	.....	.....	1,945	Direction N?
		P_E....	2 59 42	.....	.....	.....	.....	
		L_N....	3 05 31	.....	.....	.....	.....	
		L_E....	3 05 36	.....	.....	.....	.....	
		M_N....	3 05 54	.....	.....	*1,500	.....	
		M_E....	3 09 42	.....	*500	.....	.....	
		F_E....	3 57 00	.....	.....	.....	.....	
		F_N....	4 01 00	.....	.....	.....	.....	

* Trace amplitude.

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..		*V*	T_0
	E	10	17.5
	N	10	18

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917. July 13	.....	eP_E....	*H. m. s.* 5 14 25	*Sec.*	μ	μ	*km.*	
		eS_E....	5 14 48	.....	.....	.....	.....	
		eS_E....	5 14 55	.....	.....	.....	.....	
		eL.....	5 15 20	6	.....	.....	.....	
		M_N....	5 15 43	5	.....	100	.....	
		M_E....	5 15 35	.....	90	.....	.....	
		C.....	5 17 00	.....	.....	.....	.....	
		F.....	5 26 00	.....	.....	.....	.....	

TABLE 2.—*Instrumental reports, July, 1917*—Continued.

Porto Rico. *Vieques. Magnetic Observatory*—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*km.*	
1917. July 27	.....	P.....	1 02 02	.....	.....	.....	.....	Both needles went off the sheet at 1h 03m 10s. Neither instrument was recording during what was probably the maximum part of the disturbance.
		eL_E...	1 02 20	.....	.....	.....	.....	
		eL_N...	1 02 25	.....	7,000	6,800	.....	
		C.....	1 11 00	.....	.....	.....	.....	
		F.....	2 40 00	.....	.....	.....	.....	
27	.....	P.....	16 16 02	.....	.....	.....	.....	The end of the E–W record was confused by wind tremors.
		S.....	16 16 38	.....	.....	.....	.....	
		L.....	16 16 54	.....	.....	.....	.....	
		M_N...	16 17 06	18	.....	720	.....	
		M_E...	16 17 26	15	920	.....	.....	
		C.....	16 21 00	.....	.....	.....	.....	
		F.....	16 26 00	.....	.....	.....	.....	
29	.....	P_E....	6 10 50	.....	.....	.....	.....	Time of phases on E–W uncertain on account of time-marking device not working properly.
		P_N....	6 10 52	.....	.....	.....	.....	
		L_N....	6 11 02	.....	.....	.....	.....	
		L_E....	6 11 06	.....	.....	.....	.....	
		M_N...	6 11 10	.....	.....	50	.....	
		M_E...	6 11 25	.....	70	.....	.....	
		C.....	6 12 00	.....	.....	.....	.....	
		F.....	6 18 00	.....	.....	.....	.....	

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..		*V*	T_0
	E	10	15
	N	10	16

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*km.*	
1917. July 1	.....	S?.....	13 38 20	.....	.....	.....	.....	
		L.....	13 51 00	.....	.....	.....	.....	
		F.....	14 00 ..	.....	.....	.....	.....	
4	.....	L.....	1 38 00	.....	.....	.....	.....	
		F.....	2 15 ..	.....	.....	.....	.....	
25	.....	P.....	3 28 17	.....	.....	.....	6,400	
		S.....	3 36 15	.....	.....	.....	.....	
		L.....	3 45 40	.....	.....	.....	.....	
		L.....	3 50 00	20	.....	.....	.....	
		F.....	4 00 ..	.....	.....	.....	.....	
25	.....	e.....	22 45 12	.....	.....	.....	.....	No phases discernible.
		F.....	23 15 ..	.....	.....	.....	.....	
27	.....	P.....	1 06 38	.....	.....	.....	2,875	
		S.....	1 11 12	.....	.....	.....	.....	
		L.....	1 14 15	.....	.....	.....	.....	
		F.....	2 30 ..	.....	.....	.....	.....	
27	.....	P.....	3 02 21	.....	.....	.....	9,450	
		S.....	3 12 54	.....	.....	.....	.....	
		L.....	3 31 35	.....	.....	.....	.....	
		F.....	4 00 ..	.....	.....	.....	.....	
27	.....	e?.....	16 27 15	.....	.....	.....	.....	
		L.....	16 31 15	.....	.....	.....	.....	
		F.....	17 00 ..	.....	.....	.....	.....	
29	.....	eL.....	15 12 30	.....	.....	.....	.....	
		L.....	15 20 40	24	.....	.....	.....	
		F.....	15 40 ..	.....	.....	.....	.....	
29	.....	e.....	22 13 40	.....	.....	.....	.....	
		L.....	22 32 00	.....	.....	.....	.....	
		L.....	22 57 00	24	.....	.....	.....	
		L.....	23 02 00	20	.....	.....	.....	
30	.....	F.....	0 15 ..	.....	.....	.....	.....	
31	.....	eL.....	0 57 00	.....	.....	.....	.....	
		L.....	1 01 00	20	.....	.....	.....	
		F.....	1 15 00	.....	.....	.....	.....	
31	.....	e.....	3 38 50	.....	.....	.....	.....	
		S?.....	3 44 56	.....	.....	.....	.....	
		L.....	3 55 05	.....	.....	.....	.....	
		F.....	4 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*	T_0
	120	26

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*km.*	
1917. July 1	.....	i.....	13 36 59	2	.....	.....	.....	
		i.....	13 37 33	4	.....	.....	.....	
		L_E....	13 48 00	24	.....	.....	.....	
		F.....	14 00 00	.....	.....	.....	.....	
4	.....	*O?*....	*0 48 54*	.....	.....	.....	4,800?	
		eP_E?..	0 57 06	.....	.....	.....	.....	
		iP_N?..	0 57 11	2	.....	.....	.....	
		iS_E?..	1 03 38	.....	.....	.....	.....	
		iS_N?..	1 03 42	.....	.....	.....	.....	
		eL_N?..	1 11 ..	14	.....	.....	.....	
		eL_E?..	1 12 ..	14	.....	.....	.....	
		L.....	1 25 ..	40	.....	.....	.....	
		L.....	1 32 ..	30	.....	.....	.....	
		L.....	1 38 ..	20	.....	.....	.....	
		L.....	1 44 ..	19	.....	.....	.....	
		L.....	1 49 ..	15	.....	.....	.....	
		L.....	2 09 ..	16	.....	.....	.....	
		L.....	2 22 ..	16	.....	.....	.....	
		F.....	2 40 ..	.....	.....	.....	.....	
4	.....	O?.....	*5 48 55*	.....	.....	.....	4,720?	
		iP?....	5 55 04	.....	.....	.....	.....	
		iS?.....	6 01 31	.....	.....	.....	.....	
		eL?....	6 09 00	20	.....	.....	.....	
		L.....	6 32 ..	32	.....	.....	.....	
		L.....	6 37 ..	27	.....	.....	.....	
		L.....	6 42 ..	20	.....	.....	.....	
		L.....	6 45 .. / 7 01 ..	17–14	.....	.....	.....	
		F.....	7 10 ..	.....	.....	.....	.....	
12	.....	eL.....	12 41 24	20–25	.....	.....	.....	
		L.....	12 48 ..	22	.....	.....	.....	
		L.....	13 00 ..	18	.....	.....	.....	
		F.....	14 00 ..	.....	.....	.....	.....	
13	.....	*O?*....	*5 16 47*	.....	.....	.....	4,400?	
		eP?....	5 24 34	.....	.....	.....	.....	
		$iPR1_E$	5 25 41	.....	.....	.....	.....	
		$iPR2_E$	5 26 13	.....	.....	.....	.....	
		eS_N?..	5 30 27	8	.....	.....	.....	
		eS_E?..	5 30 31	.....	.....	.....	.....	
		i.....	5 30 50	.....	.....	.....	.....	
		eL.....	5 34 12	14	.....	.....	.....	
		L.....	5 40 ..	14	.....	.....	.....	
		F.....	6 00 ..	.....	.....	.....	.....	
15	.....	e_N.....	10 45 00	4	.....	.....	.....	
		e_N.....	10 47 24	4	.....	.....	.....	
		e_N.....	10 50 48	7	.....	.....	.....	
		e_N.....	10 54 32	6	.....	.....	.....	
		eL_N...	11 00 42	16	.....	.....	.....	
		L_N....	11 05 .. / 11 33 ..	20	.....	.....	.....	
		F.....	11 45 ..	.....	.....	.....	.....	
25	.....	*O*.....	*3 19 12*	.....	.....	.....	5,660	
		iP.....	3 28 22	.....	.....	.....	.....	
		iS.....	3 35 40	.....	.....	.....	.....	
		eL.....	3 44 18	8	.....	.....	.....	
		L.....	3 50 ..	16	.....	.....	.....	
		L.....	4 10 ..	13	.....	.....	.....	
		F.....	5 00 ..	.....	.....	.....	.....	
25	.....	*O*.....	*22 32 54*	.....	.....	.....	5,710	
		iP.....	22 42 07	.....	.....	.....	.....	
		iS.....	22 49 28	6	.....	.....	.....	
		eL.....	22 58 04	8	.....	.....	.....	
		L.....	23 04 ..	16	.....	.....	.....	
		L.....	23 14 ..	7	.....	.....	.....	
		L.....	23 28 ..	7	.....	.....	.....	
		F.....	24 00 ..	.....	.....	.....	.....	
27	.....	*O*.....	*1 01 16*	.....	.....	.....	2,900	
		eP_N..	1 07 02	.....	.....	.....	.....	
		iP_N...	1 07 04	.....	.....	.....	.....	
		iS.....	1 11 39	8	.....	.....	.....	
		eL_E...	1 13 30	20	.....	.....	.....	
		L_E....	1 16 00	14	.....	.....	.....	
		M_N....	1 22 42	12	.....	190	.....	
		L.....	1 30 ..	14	.....	.....	.....	
		L.....	1 55 ..	12	.....	.....	.....	
		L.....	2 07 ..	14	.....	.....	.....	
		L.....	2 38 ..	12	.....	.....	.....	Merges into succeeding quake.

TABLE 2.—*Instrumental reports, July, 1917*—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
Canada. *Ottawa. Dominion Astronomical Observatory*—Continued.								
1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
July 27	.....	*O*.....	*2 51 55*	.....	.....	.....	8,550	
		iP.....	3 03 23	.....	.....	.....	.....	
		iS.....	3 13 11	.....	.....	.....	.....	
		eL.....	3 30 00	24	.....	.....	.....	
		L.....	3 40 00	20	.....	.....	.....	
		L.....	3 55 00	17	.....	.....	.....	
		L.....	4 19 00	15	.....	.....	.....	
		LR1?..	5 11 00	18	.....	.....	.....	
		L.....	5 17 00	14	.....	.....	.....	
		F.....	6 00 00	.....	.....	.....	.....	
27	.....	*O*?....	*16 13 40*	.....	.....	.....	3,550?	
		P?.....	16 20 24	.....	.....	.....	.....	
		S?.....	16 25 44	.....	.....	.....	.....	
		eL.....	16 28 00	17–18	.....	.....	.....	
		L.....	16 36 00	14	.....	.....	.....	
		L.....	16 53 00	13	.....	.....	.....	
		L.....	17 13 00	12	.....	.....	.....	
28	.....	e?.....	1 30 16	.....	.....	.....	.....	
		eL.....	1 44 48	18	.....	.....	.....	
		L.....	1 53 00	12	.....	.....	.....	
		F.....	2 30 00	.....	.....	.....	.....	
29	.....	*O*?....	*14 48 49*	.....	.....	.....	5,300?	
		eP?....	14 55 36	.....	.....	.....	.....	
		iP$_N$...	14 55 47	.....	.....	.....	.....	
		S$_N$....	15 02 33	.....	.....	.....	.....	
		eL?...	15 11 12	12	.....	.....	.....	
		L.....	15 15 00	26–24	.....	.....	.....	
		L.....	15 24 00	24	.....	.....	.....	
		L.....	15 30 00	19	.....	.....	.....	
		F.....	16 10 00	.....	.....	.....	.....	
29	.....	P.....	22 12 48	.....	.....	.....	.....	No record from seismograph. Clock stopped. Record from "Deformation instrument."
		i.....	22 16 12	.....	.....	.....	.....	
		i.....	22 25 12	.....	.....	.....	.....	
		i.....	22 30 36	.....	.....	.....	.....	
		M.....	22 57 48	.....	.....	.....	.....	
		M.....	23 52 12	.....	.....	.....	.....	
30		F.....	1 00 00	.....	.....	.....	.....	
31	.....	e$_N$.....	0 20 00	.....	.....	.....	.....	Record masked by microseisms.
		e$_E$.....	0 20 28	.....	.....	.....	.....	
		eL?...	0 46 00	36	.....	.....	.....	
		L.....	0 53 00	24–20	.....	.....	.....	
		L.....	1 00 00	20	.....	.....	.....	
		L.....	1 05 00	14–18	.....	.....	.....	
		L.....	1 13 00	14	.....	.....	.....	
		F.....	1 40 00	.....	.....	.....	.....	
31	.....	*O*?....	*5 24 11*	.....	.....	.....	8,000?	Record masked by microseisms.
		iP?....	3 35 32	4	.....	.....	.....	
		i.....	3 39 10	2	.....	.....	.....	
		iS?....	3 44 53	2	.....	.....	.....	
		i.....	3 46 30	6	.....	.....	.....	
		i.....	3 48 50	6	.....	.....	.....	
		eL$_E$?..	3 54 42	12	.....	.....	.....	
		eL$_N$?..	3 58 00	20	.....	.....	.....	
		L.....	4 05 00	22	.....	.....	.....	
		L.....	4 10 00	20	.....	.....	.....	
		L.....	4 24 00	20	.....	.....	.....	
		L.....	4 40 00	18	.....	.....	.....	
		F.....	5 00 00	.....	.....	.....	.....	

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″.

(Report for July, 1917, not received.)

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″.

(Report for July, 1917, not received.)

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

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
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.								
				V	T_0	*e*		
Instruments[1] constants..		E		13	22	4:1		
		N		14	25	4:1		
1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
June 3	.....	e$_N$....	7 05 26	3	.....	.....	.....	
		F.....	7 10 30	.....	.....	.....	.....	
3	.....	E$_E$....	19 48 01	5	.....	.....	.....	
		eL$_E$...	20 06 31	23	.....	.....	.....	
		F$_E$....	20 14 00	.....	.....	.....	.....	
4	.....	eS$_E$...	1 46 06	6	.....	.....	.....	
		eS$_N$...	1 46 12	6	.....	.....	.....	
		eL$_E$...	1 57 47	20	.....	.....	.....	
		eL$_N$...	1 58 32	20	.....	.....	.....	
		F$_N$....	2 22 00	.....	.....	.....	.....	
		F$_E$....	2 32 00	.....	.....	.....	.....	
7	.....	L$_E$....	3 19 51	16	.....	.....	.....	
		F$_E$....	3 28 00	.....	.....	.....	.....	
8	.....	e$_N$....	0 57 45	3	.....	.....	.....	
		e$_E$....	1 02 31	4	.....	.....	.....	
		M$_E$....	1 08 46	14	*1,000	.....	.....	
		L$_E$....	3 15 33	14	.....	.....	.....	
		F$_N$....	3 24 00	.....	.....	.....	.....	
		F$_E$....	3 26 00	.....	.....	.....	.....	
9	.....	eL$_E$...	18 00 34	22	.....	.....	.....	
		F$_E$....	18 17 00	.....	.....	.....	.....	
10	.....	e$_E$....	4 39 26	4	.....	.....	.....	
		e$_N$....	4 39 55	5	.....	.....	.....	
		eS$_E$...	4 45 12	10	.....	.....	.....	
		eL$_E$...	4 52 18	15	.....	.....	.....	
		eL$_N$...	4 52 19	16	.....	.....	.....	
		F$_N$....	5 38 00	.....	.....	.....	.....	
		F$_E$....	5 44 30	.....	.....	.....	.....	
12	.....	e$_N$....	2 04 45	2	.....	.....	.....	
		e$_E$....	2 04 46	2	.....	.....	.....	
		L$_N$....	2 05 29	4	.....	.....	.....	
		F$_E$....	2 06 00	.....	.....	.....	.....	
		F$_N$....	2 07 00	.....	.....	.....	.....	
13	.....	e$_N$....	7 07 01	16	.....	.....	.....	
		e$_E$....	7 07 02	8	.....	.....	.....	
		L$_N$....	7 31 50	40	.....	.....	.....	
		L$_E$....	7 38 31	25	.....	.....	.....	
		F$_E$....	9 06 00	.....	.....	.....	.....	
		F$_N$....	9 11 00	.....	.....	.....	.....	
16	.....	eL$_E$...	16 08 32	15	.....	.....	.....	
		F.....	16 14 30	.....	.....	.....	.....	
24	.....	e$_E$....	20 08 00	5	.....	.....	.....	
		S$_E$....	20 14 07	6	.....	.....	.....	
		i$_N$....	20 14 54	6	.....	.....	.....	
		F$_E$....	20 33 00	.....	.....	.....	.....	
		F$_N$....	21 03 00	.....	.....	.....	.....	
26	.....	eP$_E$...	6 02 59	4	.....	.....	.....	Time clock not correct.
		eP$_N$...	6 03 46	3	.....	.....	.....	
		S$_E$....	6 13 50	8	*1,100	.....	.....	
		i$_E$....	6 16 59	10	.....	.....	.....	
		eL$_E$...	6 38 19	42	.....	.....	.....	
		M$_N$....	6 46 39	20	.....	*3,500	.....	
		M$_E$....	6 50 28	18	*4,100	.....	.....	
		F$_E$....	10 15 00	.....	.....	.....	.....	
27	.....	e$_E$....	12 38 31	10	.....	.....	.....	
		L$_E$....	12 42 28	32	.....	.....	.....	
		F.....	12 58 00	.....	.....	.....	.....	
28	.....	eL$_E$...	14 50 42	18	.....	.....	.....	
		F.....	15 01 00	.....	.....	.....	.....	
29	.....	e$_N$....	16 22 51	6	.....	.....	.....	
		e$_E$....	16 23 03	4	.....	.....	.....	
		F$_N$....	16 45 00	.....	.....	.....	.....	
		F$_E$....	17 01 00	.....	.....	.....	.....	
30	.....	eP$_E$...	17 56 22	4	.....	.....	.....	
		S$_E$....	18 02 10	6	.....	.....	.....	
		S$_N$....	18 02 11	5	.....	.....	.....	
		L$_E$....	18 08 22	24	.....	.....	.....	
		L$_N$....	18 12 41	17	.....	.....	.....	
		F$_N$....	18 39 00	.....	.....	.....	.....	
		F$_E$....	18 42 00	.....	.....	.....	.....	

*Trace amplitude.

SEISMOLOGICAL DISPATCHES.[1]

Rome, July 9, 1917.

Pope Benedict was awakened by an earth shock which shook the whole of Rome early Sunday morning. Many people dressed, others left their homes, fearing a second shock. The Pope inquired as to the extent of the earthquake and learned there was no damage or victims. The shock was specially felt at Avezzano, which was practically destroyed in the earthquake of January, 1915. (Assoc. Press.)

Pago Pago, Tutuila, American Samoa (July 10, 1917, mail correspondence).

The earthquake experienced here *June 25* was the severest shock in 50 years. After the tremor subsided a small tidal wave caused many people to take to the hillside for safety. The wave receded as suddenly as it came. The center of the disturbance was about 70 miles southwest of Samoa. Reports from Tongo stated that it was felt severely in that group, while at Keppet's Island the waters of the lagoon rose high on the island and left thousands of fish as they receded. (Assoc. Press.)

Catania, Sicily, July 16, 1917.

The most recent eruption of Mount Etna, although very brief, caused a panic among the population of the near-by districts in consequence of the enormous quantity of lava discharged, which surpassed previous records. (Assoc. Press.)

Buenos Aires, July 27, 1917.

An earthquake of great intensity in Chile was reported from Santiago in dispatches received to-day by La Nacion. The tremors have been felt in Santiago, Cordia, San Luis, Mendoza, Rosario, and Tucuman. In Buenos Aires slight tremors were noticeable. (Assoc. Press.)

Washington, D. C., July 31, 1917.

Official dispatches to the Chilean Embassy yesterday deny widely-published reports from Santiago, of an earthquake with great damage to Chilean cities. At the same time a quake was reported from Chile there actually was an earth disturbance in Argentina. (Assoc. Press.)

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

SECTION V.—SEISMOLOGY.

SEISMOLOGICAL REPORTS FOR AUGUST, 1917.

W. J. HUMPHREYS, Professor in Charge.

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

TABLE 1.—*Noninstrumental earthquake reports, August, 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.*			
Aug. 3	4 20	Cahuilla	33 32	116 43	4	1	0 3	Rumbling		Dr. Wm. L. Shawk.
19	6 00	Boulevard	32 38	116 15	3	1	1	None		J. J. Schwartzberg.
19	7 10	Julian	33 05	116 37	5	2	30	Rumbling		J. H. L. Vogt.
		Julian	33 03	116 37		2	8	Rumbling		W. J. Norman.
28	0 35	Bishop	37 22	118 24	5	4		None		E. L. Herzinger.
28	8 40	Bishop	37 22	118 24	4	1	1		Awakened people	E. L. Herzinger.
		Bishop Creek	37 15	118 17	3			None		Wm. Barth.
31	19 20	Ojai	34 25	119 12	4	1	1	None		Wm. H. Duncan.
31	20 25	Ojai	34 25	119 12	4	1	1	None		Wm. H. Duncan.

TABLE 2.—*Instrumental reports, August, 1917.*

[Time used: Mean Greenwich, midnight to midnight. Nomenclature: International.]

[For significance of symbols see REVIEW for July, 1917, p. 373.]

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	16.7
	N	10	15.4

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Aug. 5	.....	e_N	16 42 22	21	.....	10	.....	
		F	16 58 ..	.....	.....	.....	.....	
30	.....	eP_E	4 25 07	.....	.....	.....	.....	
		eL_E	4 32 21	14	.....	.....	.....	
		eL_N	4 34 45	18	.....	.....	.....	
		M_E	4 35 01	14	40	.....	.....	
		M_N	4 40 20	18	.....	20	.....	
		F_N	5 35 ..	.....	.....	.....	.....	
31	.....	eP_E	11 47 44	.....	.....	.....	.....	
		eP_N	11 48 20	.....	.....	.....	.....	
		S	11 57 06	10	.....	.....	.....	
		eL_E	12 15 ..	18	.....	.....	.....	
		eL_N	12 16 ..	20	.....	.....	.....	
		M_N	12 20 02	17	.....	60	.....	
		C_N	12 27 ..	16	.....	.....	.....	
		M_E	12 28 42	15	10	.....	.....	
		C_E	12 29 ..	.....	.....	.....	.....	
		F_E	12 55 ..	.....	.....	.....	.....	
		F_N	13 02 ..	.....	.....	.....	.....	

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

Lat., 32° 14′ 48″ N.; long., 110° 50′ 06″ W. Elevation, 760.6 meters.

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

Instrumental constants...		*V*	T_0
	E	10	13.9
	N	10	18.9

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Aug. 30	.....	e_E	4 28 22	4	.....	.....	.....	
		e_N	4 28 44	5	.....	.....	.....	
		M_N	4 45 04	14	.....	10	.....	
		M_E	5 09 04	20	10	.....	.....	
		F_E	5 36 ..	.....	.....	.....	.....	
		F_N	5 45 ..	.....	.....	.....	.....	
31	.....	P	11 44 35	5	.....	.....	.....	
		S	11 51 20	8	.....	.....	.....	
		eL_N	11 58 00	28	.....	.....	.....	
		eL_E	11 59 02	28	.....	.....	.....	
		M_E	11 59 43	13	30	.....	.....	
		M_N	12 03 49	24	.....	20	.....	
		F_N	12 54 ..	.....	.....	.....	.....	
		F_E	13 04 ..	.....	.....	.....	.....	

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.)

TABLE 2.—*Instrumental reports, August, 1917*—Continued.

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.
(Report for August, 1917, not received.)

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.
(No earthquake recorded during August, 1917.)

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).

	V	T_0
Instrumental constants:	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.	
Aug. 5	L_1	P	16 11 18				4,080?	
		S?	16 17 10					
		L	16 28 20	16				
		L	16 54 20					
		F	17 40 00					
9		P	16 18 ..					No time marks; values approximate.
		S	16 22 ..					
		L	16 24 ..					
		F	16 40 ..					
11								No record obtained; instrument not recording properly.
21		P	10 49 30					Time correction uncertain; time values approximate.
		L	11 10 30	16				
		F	11 30 ..					S uncertain.
22		L_E	22 13 30	20				
		F	22 25 00					
30		iP	3 31 06				3,910	
		iS	3 36 48					
		L	3 41 00					
		F	4 00 ..					
30		P	4 26 24				8,510?	
		PR	4 29 30					
		S?	4 36 10					
		L	4 47 15					
		L	5 05 00	24				
		L	5 21 00	20				
		F	6 30 00					
31	II_1	iP	11 43 14				3,740	
		iS	11 48 46					
		L	11 52 30	20				
		L	12 07 03	16				
		F	13 30 00					

District of Columbia. *Washington. Georgetown University.*
F. A. 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.

		V	T_0	ϵ
Instrumental constants:	E	165	5.4	0
	N	143	5.2	0
	Z	*80*	*5.0*	*0*

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917.			*H. m. s.*	*Sec.*	μ	μ	km.	
Aug. 5		ePg	16 11 12					Microseisms present. P possibly earlier. No distinct maximum.
		ePN	16 11 15					
		eL	16 54 18	24				
		F	17 45 ..					
			VERTICAL.					
		eP	*16 11 21*					e? 16h 09m 38s.
		eL	*16 54 21*	*20–24*				
		F	*17 50 00*					
11		ePg?	14 44 06					Heavy microseisms present; entire record doubtful.
		ePg?	14 44 36					
		SN?	14 49 22					
		Sg?	14 49 43					
		eLN?	15 00 21					
		eLg?	15 00 23					
		F	16					
30		eg	3 30 55					Microseisms present. e shows on vertical at 3h 31m 12s. F lost in succeeding quake.
		eN	3 31 06					
		SN	3 36 39					
		Sg	3 36 46					
		eL	3 39 24					
30		ePg	4 26 28					Microseisms present. No distinct maximum.
		ePE	4 26 29					
		S	4 30 05					
		eLE	4 31 18					
		eLN	4 31 30					
		L	4 58 ..	30				
		F	6 22 ..					
			VERTICAL.					
		eP	*4 26 30*					
		S	*4 30 05*					
		L	*4 43 30*	*21*				
		L	*5 30 48*	*22*				
		F	*5 40* ..					
31		iPN	11 43 19					Microseisms present.
		ePE	11 43 21					
		iS	11 48 49					
		eL?	11 51 30					
		Mg	11 54 17		*1700			
		MN	11 54 43			*600		
		F	13 54 ..					
			VERTICAL.					
		eP	*11 43 22*					
		L	*11 56* ..					
		F	*12 25* ..					

* Trace amplitude.

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.

	T_0
Instrumental constant..	18.5

(Report for August, 1917, received too late.)

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.

		V	T_0	ϵ
Instrumental constants:	E	177	3.4	4.1
	N	205	3.4	4.1

(Report for August, 1917, not received.)

TABLE 2.—*Instrumental reports, August, 1917*—Continued.

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: E 10, N 10; T_0: E 32, N 27

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917 Aug. 30	.....	eP.....	*H. m. s.* 4 26 44	*Sec.* 2	μ	μ	*km.*	
		eS_N...	4 30 20	2				
		eS_E...	4 30 26	2				
		M_E....	4 36 28	6	20			
		C_E....	4 40 ..					
		F_N....	6 10 ..					
31	.....	P.....	11 43 18	4				
		S.....	11 48 52	8				
		eL_E...	11 53 25	12				
		M_N....	11 57 22	16		140		
		M_E....	11 58 01	16	80			
		C.....	12 09 ..	15				
		F.....	12 41 ..					

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

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

nstruments: Two Busch-Omori 100 kg. horizontal pendulums (mechanical registration).

Instrumental constants.. V: E 80, N 50; T_0: E 23, N 25; e: E 0, N 4:1

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917 Aug. 5	.....	*O*?....	*H. m. s.* *15 45* ..	*Sec.*	μ	μ	*km.* 13,000+	
		e_E?....	15 59 58					
		eS_E...	16 12 51	10				
		eL_E...	16 59 17	24				
		L.....	17 02 33	18				Sinusoidals set in.
		L.....	17 06 51	18				
		L.....	17 16 14	15				
		L.....	17 49 25	15				
		F.....	18 49 ..					
5	.....	L_E....	20 00 16	20				Possibly LR of preceding quake.
		L.....	20 24 40	20				
		F.....	20 58 ..					
5	.....	L_E....	23 22 49	12–14				This and the next possibly LR of first quake.
		F.....	23 29 31					
6	.....	L_E....	1 18 51	12				
		L_E....	1 22 38	12				
		F.....	1 25 37					
21	.....	L_E....	22 13 37	24–18				E–W component stopped at 22h, 27m, 53s.
		L_N....	22 15 48	24				
		F?....	22 27 17					
30	.....	*O*?....	*5 23 35*				4,340?	L–S_E interval gives 4425km eL_E—*O* gives speed of L as as 230km. per minute. F lost in succeeding quake.
		P_E?...	3 31 18	3				
		S_E....	3 37 24	9				
		S_N....	3 37 51	6				
		eL_E...	3 42 26	24				
		eL_N...	3 42 18					
		L_N....	3 46 16	16				
30	.....	*O*.....	*4 06 22*				7,550	
		eS_E...	4 26 17	8				
		S_N....	4 26 40	6				
		iSR_E?.	4 29 53	12				
		iSR_N...	4 30 24	14				
		eL_E...	4 39 26	12				Followed by a long series of irregular L waves.
		eL_N...	4 40 23					
		F.....	5 46 ..					
31	.....	*O*.....	*11 36 35*				4,120	
		P_N....	11 44 00					
		P_E....	11 44 07					
		iS_N....	11 49 54					First movement pendulum to north. First movement of pendulum in iS_E to east.
		iS_E....	11 50 27	6				
		SR?....	11 52 57	10				
		eL_E?..	11 54 29	24				
		eL_N...	11 54 36					
		M_N....	11 59 42					
		M_E....	11 59 48					
		M_E....	12 01 56					
		F_E....	13 56 ..					

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.

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

Instrumental constants.. V: 80; T_0: 7; e: 5:1

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917. Aug. 30	I.....	e_N....	*H. m. s.* 16 27 30	*Sec.*	μ	μ	*km.*	Barely perceptible.
		F_N....	16 33 ..					
31	II_E....	iP_E...	11 47 00					
		iP_N...	11 47 45					
		S_E....	11 56 30					
		S_N....	11 57 00					
		M_N....	11 58 30			63		
		M_E....	12 00 06					
		F_E....	12 22 ..					
		F_N....	12 30 ..					

New York. *Buffalo. Canisius College.* John A. Curtin, S. J.

Lat., 42° 53′ 02″ N.; long., 78° 52′ 40″ W. Elevation, 190.5 meters.

Instrument: Wiechert 80 kg. horizontal.

Instrumental constants.. V: 80; T_0: 7; e: 5:1

(Report for August, 1917, not received.)

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

(Report for August, 1917, not received.)

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

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917. Aug. 3	.....	e_N....	*H. m. s.* 22 48 32	*Sec.* 4	μ	μ	*km.*	Absolute times inaccurate throughout month. Repairs being made in seismograph room. Master clock not running.
		e_N....	22 51 36	4				
		L_N....	23 01 52	44				
		F_N....	23 42 ..					
5	.....	eL_E...	16 53 50	22				
		eL_N...	16 54 40	27				
		F_E....	17 22 ..					
		F_N....	17 26 ..					
30	.....	eP_N...	3 30 12	3				
		S_N....	3 36 12	6				
		e_N....	3 40 20	7				
		eL_N...	3 44 10	16				
		F_N....	4 17 ..					
30	.....	e_N....	4 26 16	4				
		i_N....	4 28 40	3				
		L_N....	4 46 03	13				
		L_N....	5 01 32	34				
		F_N....	6 17 ..					
31	.....	P_N....	11 43 15	3				
		S_N....	11 49 05	6				
		M_N....	12 00 14	19		*1,000		
		F_N....	13 20 ..					

*Trace amplitude.

TABLE 2.—*Instrumental reports, August, 1917*—Continued.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

Panama Canal Zone. *Balboa Heights.* Isthmian Canal Commission.
Lat., 8° 57′ 30″ N.; long., 79° 33′ 29″ W. Elevation, 27.6 meters.
Instruments: Two Bosch-Omori, 100 kg.
Instrumental constants.. V 10, T_0 20

1917.			H. m. s.	Sec.	μ	μ	km.	
Aug. 30	.....	P_E	3 26 08	.....	.....	.....	950	Direction probably south.
		P_N	3 26 10	.....	.....	.....	.....	
		L_E	3 28 10	.....	.....	.....	.....	
		L_N	3 28 20	.....	.....	.....	.....	
		M_E	3 28 42	.....	*1500	.....	.....	
		M_N	3 28 54	.....	.....	*3900	.....	
		F_E	3 47 00	.....	.....	.....	.....	
		F_N	3 51 00	.....	.....	.....	.....	
31	.....	P_E	11 38 08	.....	.....	.....	910	Direction probably south.
		P_N	11 38 12	.....	.....	.....	.....	
		S	11 39 44	.....	.....	.....	.....	
		L_E	11 40 10	.....	.....	.....	.....	
		L_N	11 40 12	.....	.....	.....	.....	
		M_N	11 40 49	.....	.....	*62000	.....	
		M_E	11 41 52	.....	*46000	.....	.....	
		F_E	12 34 00	.....	.....	.....	.....	
		F_N	12 36 00	.....	.....	.....	.....	

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.. V: E 10, N 10; T_0: E 17.5, N 18.2

1917.			H. m. s.	Sec.	μ	μ	km.	
Aug. 7	.....	e_N	11 27 53	.....	.....	.....	.....	Local quake.
		e_E	11 28 15	.....	.....	.....	.....	
		eL	11 28 40	2	.....	.....	.....	
		M_N	11 28 50	.....	.....	20	.....	
		M_E	11 28 55	.....	20	.....	.....	
		F	11 35 ..	.....	.....	.....	.....	
9	.....	eP_N	16 15 26	.....	.....	.....	.....	Very small waves superimposed on others having a period of 6 to 10 seconds.
		eP_E	16 15 31	.....	.....	.....	.....	
		eL_N	16 16 25	.....	.....	.....	.....	
		eL_E	16 16 35	6	.....	.....	.....	
		M_E	16 16 40	7	50	.....	.....	
		M_N	16 16 50	7	.....	40	.....	
		C	16 20 ..	6	.....	.....	.....	
		F	16 26 ..	.....	.....	.....	.....	
30	.....	eP_E	3 28 18	4	.....	.....	.....	
		eL_E	3 33 33	17	.....	.....	.....	
		M_E	3 34 24	17	70	.....	.....	
		M_N	3 35 20	18	.....	20	.....	
		C_E	3 41 ..	13	.....	.....	.....	
		F_E	3 52 ..	.....	.....	.....	.....	
31	.....	eP_N	11 40 17	4	.....	.....	.....	The drums were taken off to change the paper at 12h 22m, while the quake was still in progress.
		eP_E	11 40 23	4	.....	.....	.....	
		eS_N	11 43 42	8	.....	.....	.....	
		eL_E	11 44 15	30	.....	.....	.....	
		eL_N	11 45 23	19	.....	.....	.....	
		M_N	11 48 10	21	.....	*3090	.....	
		M_E	11 49 55	17	*3520	.....	.....	
		C_E	12 00 ..	.....	.....	.....	.....	

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

1917.			H. m. s.	Sec.	μ	μ	km.	
Aug. 5	.....	e_E	16 11 56	.....	.....	.....	.....	Does not show on N–S.
		L_E	16 57 00	20	.....	.....	.....	
		L_E	17 11 00	20	.....	.....	.....	
		F	17 30 ..	.....	.....	.....	.....	F in microseisms.
30	.....	P	4 26 36	.....	.....	.....	7,780?	
		PR	4 29 36	.....	.....	.....	.....	
		S?	4 35 45	.....	.....	.....	.....	
		L	4 47 ..	.....	.....	.....	.....	
		L	5 12 ..	20	.....	.....	.....	
		F	6 15 ..	.....	.....	.....	.....	
31		iP	11 44 00	.....	.....	.....	4,120?	
		S?	11 49 54	.....	.....	.....	.....	
		L	11 53 00	.....	.....	.....	.....	
		L_N	11 59 50	20	.....	.....	.....	
		L_E	12 03 15	20	.....	.....	.....	
		F	12 45 ..	.....	.....	.....	.....	

* Trace amplitude.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

Canada. *Ottawa. Dominion Astronomical Observatory.* Earthquake Station. Otto Klotz.
Lat., 45° 23′ 38″ N.; long., 75° 42′ 57″ W. Elevations, 83 meters.
Instruments: Two Bosch photographic horizontal pendulums, one Spindler & Hoyer 80k. vertical seismograph.
Instrumental constants., V 120, T_0 26

1917.			H. m. s.	Sec.	α	α	km.	
Aug. 5	.....	O	15 50 48	.....	.....	.....	14,000	In New Zealand, from press reports.
		e_N	16 09 52	.....	.....	.....	.....	
		iPR1	16 11 45	.....	.....	.....	.....	
		iS	16 21 50	8	.....	.....	.....	
		e_N	16 29 ..	11	.....	.....	.....	
		e_E	16 30 ..	20	.....	.....	.....	
		L	16 51 ..	15	.....	.....	.....	From 16h 50m onwards the L waves are more or less continually sinuous.
		L	17 00 ..	18–19	.....	.....	.....	
		L	17 08 ..	17	.....	.....	.....	
		L	17 11 ..	17	.....	.....	.....	
		L	17 17 ..	15	.....	.....	.....	
		L	17 27 ..	15	.....	.....	.....	
		L	17 35 ..	15	.....	.....	.....	
		LR1	17 56 ..	20	.....	.....	.....	
		F	18 10 ..	.....	.....	.....	.....	
9	.....	eL_N	16 30 ..	14	.....	.....	.....	
		L_N	16 40 ..	14	.....	.....	.....	
		F	17 00 ..	.....	.....	.....	.....	
21	.....	O?	10 44 38	.....	.....	.....	4,450?	
		eP?	10 52 22	.....	.....	.....	.....	
		eS	10 58 34	.....	.....	.....	.....	
		eL_N	11 06 36	20	.....	.....	.....	
		L	11 09 ..	14	.....	.....	.....	
		F	11 25 ..	.....	.....	.....	.....	
21	.....	L	22 17 ..	20–22	.....	.....	.....	
		F	22 30 ..	.....	.....	.....	.....	
30	.....	O	3 24 10	.....	.....	.....	4,530	Fairly strong microseisms prevail.
		iP	3 32 06	2	.....	.....	.....	
		iS	3 38 22	.....	.....	.....	.....	
		eLI	3 41 18	16	.....	.....	.....	
		L	3 51 ..	.....	.....	.....	.....	
		F	4 07 ..	.....	.....	.....	.....	
30	.....	O	4 15 36	.....	.....	.....	7,650	
		P	4 26 38	.....	.....	.....	.....	
		iPR1	4 29 53	.....	.....	.....	.....	
		PR2	4 31 11	.....	.....	.....	.....	
		S	4 35 40	.....	.....	.....	.....	
		eL	4 48 18	20	.....	.....	.....	
		L	4 53 ..	20	.....	.....	.....	
		L	5 03 ..	15	.....	.....	.....	
		L	5 20 ..	20	.....	.....	.....	
		L	5 33 ..	17	.....	.....	.....	
		L	5 49 ..	17	.....	.....	.....	
		LR1?	6 06 ..	30	.....	.....	.....	
		F	6 35 ..	.....	.....	.....	.....	
31	.....	O	11 36 20	.....	.....	.....	4,470	In Colombia.
		iP	11 44 12	2–4	.....	.....	.....	
		iS	11 50 25	6–8	.....	.....	.....	
		eL_E	11 56 30	20	.....	.....	.....	
		eL_N	11 57 ..	20	.....	.....	.....	
		L	12 02 ..	20	.....	.....	.....	
		L	12 05 ..	16–15	.....	.....	.....	
		L	12 13 ..	16–15	.....	.....	.....	
		L	12 24 ..	15	.....	.....	.....	
		L	12 44 ..	13	.....	.....	.....	
		F	13 10 ..	.....	.....	.....	.....	

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″.

(Report for August, 1917, not received.)

Canada. *Victoria, B. C. Dominion Meterological 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″.

(Report for August. 1917, not received.)

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

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.

T_0
Instrumental constant.. 18.5

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
July 1	.....	eL	1 10 30	20	.....	.....	.....	Only E-W motion recorded.
		M	1 18 00	.....	*200	.....	.....	
		C	1 21 12	.....	.....	.....	.....	
		F	1 26 ..	.....	.....	.....	.....	
4	.....	eP	0 50 18	.....	.....	.....	.....	Trace in jerks. Waves indistinct.
		eS	0 56 48	.....	.....	.....	.....	
		eL	1 11 54	21	.....	.....	.....	
		M	1 22 18	.....	*2100	.....	.....	
		C	1 29 00	.....	.....	.....	.....	
		F	2 14 ..	.....	.....	.....	.....	
4	.....	eP	5 57 00	.....	.....	.....	.....	Trace in jerks. Waves indistinct.
		L	6 11 12	.....	.....	.....	.....	
		M	6 20 12	.....	*600	.....	.....	
		C	6 27 ..	.....	.....	.....	.....	
		F	6 56 ..	.....	.....	.....	.....	
4	.....	eL	22 57 42	.....	.....	.....	.....	
		M	23 12 ..	20	*100	.....	.....	
		C	23 15 ..	.....	.....	.....	.....	
		F	23 19 ..	.....	.....	.....	.....	
7	.....	.....	.....	.....	.....	.....	.....	Light failed on the the 7th from 13h 40m to 18h 33m.
11	.....	L	22 59 00	.....	.....	.....	.....	
		M	23 05 18	19	*700	.....	.....	
		C	23 08 ..	.....	.....	.....	.....	
		F	23 29 ..	.....	.....	.....	.....	
12	.....	eP	11 51 48	.....	.....	.....	.....	
		eL	12 09 30	21	.....	.....	.....	
		M	12 13 12	.....	*800	.....	.....	
		C	12 18 ..	.....	.....	.....	.....	
		F	13 50 ..	.....	.....	.....	.....	
18	.....	P	8 08 48	.....	.....	.....	.....	
		eL	8 16 54	23	.....	.....	.....	
		M	8 24 12	20	*300	.....	.....	
		C	8 29 ..	.....	.....	.....	.....	
		F	9 11 ..	.....	.....	.....	.....	
25	.....	L	3 31 06	.....	.....	.....	.....	
		M	3 37 00	18	*400	.....	.....	
		C	3 41 12	.....	.....	.....	.....	
		F	5 12 ..	.....	.....	.....	.....	
25	.....	L	22 46 ..	18	.....	.....	.....	
		M	22 54 48	.....	*100	.....	.....	
		F	23 03 ..	.....	.....	.....	.....	
27	.....	P	1 13 54	.....	.....	.....	.....	
		S	1 24 18	.....	.....	.....	.....	
		L	1 41 18	21	.....	.....	.....	
		M	1 49 42	19	*1600	.....	.....	
		C	2 02 ..	.....	.....	.....	.....	F in next quake.
27	.....	L	3 37 24	22	.....	.....	.....	P and S lost in preceding quake.
		M	3 42 06	.....	*3400	.....	.....	
		C	3 50 00	.....	.....	.....	.....	
		F	6 00 ..	.....	.....	.....	.....	
27	.....	eP	23 54 00	.....	.....	.....	.....	
28		eL	0 04 36	18	.....	.....	.....	
		M	0 10 00	.....	*700	.....	.....	
		C	0 13 00	.....	.....	.....	.....	
		F	0 48 ..	.....	.....	.....	.....	
29	.....	eP	14 42 12	.....	.....	.....	.....	
		S	14 49 42	.....	.....	.....	.....	
		eL	14 57 24	18	.....	.....	.....	
		M	14 50 00	.....	*500	.....	.....	
		M	15 15 24	.....	*400	.....	.....	
		F	16 28 ..	.....	.....	.....	.....	
29	.....	P	22 08 54	.....	.....	.....	.....	
		S	22 12 12	.....	.....	.....	.....	
		L	22 22 30	22	.....	.....	.....	
		M	22 29 00	.....	*13000	.....	.....	
		C	22 18 ..	.....	.....	.....	.....	
30		F	2 15 ..	.....	.....	.....	.....	
30	.....	eL	16 55 00	.....	.....	.....	.....	
		M	16 58 48	18	*200	.....	.....	
		F	17 17 ..	.....	.....	.....	.....	

*Trace amplitude.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

Hawaii. *Honolulu. Magnetic Observatory*—Continued.

			H. m. s.	*Sec.*	μ	μ	*km.*	
31	.....	eP	0 16 18	.....	.....	.....	.....	
		eL	0 30 36	18	.....	.....	.....	
		M	0 53 12	.....	*900	.....	.....	
		C	0 58 00	.....	.....	.....	.....	
		F	1 39 ..	.....	.....	.....	.....	
31	.....	eP	3 33 06	.....	.....	.....	.....	
		eL	3 46 54	20	.....	.....	.....	
		M	3 50 18	.....	*1600	.....	.....	
		C	3 52 ..	.....	.....	.....	.....	
		F	4 45 ..	.....	.....	.....	.....	

*Trace amplitude.

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.

V T_0
Instrumental constants.. 10 20

1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
May 1	.....	P_N	18 43 20	.....	.....	.....	5,310	Direction?
		P_E	18 43 37	.....	.....	.....	.....	
		S_N	18 51 04	.....	.....	.....	.....	
		S_E	18 51 24	.....	.....	.....	.....	
		L_E	18 59 10	.....	.....	.....	.....	
		L_N	18 59 32	.....	.....	.....	.....	
		M_E	19 24 10	.....	*3,000	.....	.....	
		M_N	19 35 50	.....	.....	*1,500	.....	
		F_E	21 01 00	.....	.....	.....	.....	
		F_N	21 54 00	.....	.....	.....	.....	

*Trace amplitude.

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.

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

1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
July 1	.....	P?	13 27 48	.....	.....	.....	5,220?	Felt in south end of Graham Island in Queen Charlotte Islands.
		S	13 34 42	.....	.....	.....	.....	
		L	13 38 48	.....	.....	.....	.....	
		M	13 39 06	.....	*200	.....	.....	
		F	13 53 12	.....	.....	.....	.....	
4	.....	S?	1 04 30	.....	.....	.....	.....	Distant quake.
		eL	1 12 06	.....	.....	.....	.....	
		L	1 25 12	.....	.....	.....	.....	
		L	1 31 18	.....	.....	.....	.....	
		M	1 38 18	.....	*400	.....	.....	
		F	2 44 12	.....	.....	.....	.....	
4	.....	P or S	6 29 24	.....	.....	.....	.....	Distant quake.
		L	6 39 48	.....	.....	.....	.....	
		M	6 54 00	.....	*200	.....	.....	
		F	7 14 30	.....	.....	.....	.....	
9	.....	L	0 17 48	.....	.....	.....	.....	
		L	0 55 30	.....	*50	.....	.....	
11	.....	eL	23 34 36	.....	.....	.....	.....	Quake and tidal wave reported from the Samoan Islands; damage done. Also felt in Friendly Is.
		eL	23 40 12	.....	.....	.....	.....	
		M	23 43 00	.....	*300	.....	.....	
12		F	0 05 30	.....	.....	.....	.....	
12	.....	L	13 57 54	.....	*50	.....	.....	
		F	14 06 18	.....	.....	.....	.....	
13	.....	P?	5 27 30	.....	.....	.....	.....	
		L?	5 30 24	.....	.....	.....	.....	
		M	5 35 18	.....	*50	.....	.....	
		F	5 42 24	.....	.....	.....	.....	
15	.....	.....	.....	.....	.....	.....	.....	No record obtained on 15th: clock stopped.
21	.....	P	3 24 12	.....	.....	.....	.....	
		S	3 35 42	.....	.....	.....	.....	
		L	3 47 06	.....	.....	.....	.....	
		iL	3 50 18	.....	.....	.....	.....	
		M	3 51 36	.....	*1,800	.....	.....	
		L_{imp}	5 01 36	.....	.....	.....	.....	
		F?	5 18 36	.....	.....	.....	.....	

*Trace amplitude.

TABLE 3.—*Late seismological reports (instrumental)*—Continued.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
Canada. *Toronto. Dominion Meteorological Service*—Continued.								
			H. m. s.	*Sec.*	μ	μ	*km.*	
25	.....	P.....	22 42 42	.....	.....	.....	.....	
		S?.....	22 52 54	.....	.....	.....	.....	
		L.....	23 01 42	.....	.....	.....	.....	
		eL.....	23 03 18	.....	.....	.....	.....	
		M.....	23 04 24	.....	*300	.....	.....	
		F?.....	23 31 24	.....	.....	.....	.....	
27	.....	P.....	1 06 54	.....	.....	.....	2,990	
		S.....	1 11 36	.....	.....	.....	.....	
		L.....	1 13 24	.....	.....	.....	.....	
		iL.....	1 17 06	.....	.....	.....	.....	
		iL.....	1 18 00	.....	.....	.....	.....	
		M.....	1 21 06	.....	*9,300	.....	.....	F merges into next quake.
27	.....	P?.....	3 01 42	.....	.....	.....	10,740?	A quake of much intensity reported from Chile.
		iS.....	3 13 12	.....	.....	.....	.....	
		L.....	3 25 30	.....	.....	.....	.....	
		L.....	3 41 00	.....	.....	.....	.....	
		M.....	3 48 00	.....	*800	.....	.....	
		L_{resp}...	4 54 30	.....	.....	.....	.....	
		F.....	5 36 12	.....	.....	.....	.....	
27	.....	P.....	16 20 24	.....	.....	.....	3,810	
		S.....	16 26 00	.....	.....	.....	.....	
		L.....	16 28 24	.....	.....	.....	.....	
		M.....	16 28 48	.....	*300	.....	.....	
		F.....	17 14 12	.....	.....	.....	.....	
28	.....	L.....	0 40 06	.....	.....	.....	.....	Thickenings.
		L.....	0 47 54	.....	.....	.....	.....	
		F.....	1 06 30	.....	.....	.....	.....	
28	.....	eL.....	1 44 24	.....	.....	.....	.....	
		M.....	1 45 42	.....	*200	.....	.....	
		F.....	1 57 48	.....	.....	.....	.....	
29	.....	P.....	{14 51 54 {14 55 54	}	.....	.....	.....	Possibly two quakes overlapping.
		S?.....	15 08 36	.....	.....	.....	.....	
		eS.....	15 19 42	.....	.....	.....	.....	
		L.....	15 21 48	.....	.....	.....	.....	
		iL.....	15 25 00	.....	.....	.....	.....	
		M.....	15 28 36	.....	*1,600	.....	.....	
		F.....	16 53 18	.....	.....	.....	.....	
29	.....	P?.....	22 11 42	.....	.....	.....	11,330?	
		iP.....	22 15 24	.....	.....	.....	.....	
		iS.....	22 23 36	.....	.....	.....	.....	
		iS.....	22 31 18	.....	.....	.....	.....	
		L.....	22 35 36	.....	.....	.....	.....	
		L.....	22 59 12	.....	.....	.....	.....	
		M.....	23 08 48	18–48	*4,300	.....	.....	
		eL.....	23 16 06	.....	.....	.....	.....	
		L_{resp}...	23 56 00	.....	.....	.....	.....	Either L_{resp} or another quake.
30	.....	iL.....	0 02 12	.....	.....	.....	.....	F lost in microseisms.
		iL.....	0 05 48	18	*2,500	.....	.....	
30	.....	L.....	17 31 00	.....	.....	.....	.....	
		L.....	17 35 36	.....	.....	.....	.....	F?.
31	.....	P?.....	0 21 06	.....	.....	.....	.....	Strong microseisms going on.
		S?.....	0 29 00	.....	.....	.....	.....	
		L.....	0 41 12	.....	.....	.....	.....	
		L.....	0 46 00	.....	.....	.....	.....	
		M.....	0 58 12	.....	*900	.....	.....	
		L.....	1 30 12	.....	.....	.....	.....	F in microseisms.
31	.....	P?.....	3 25 12	.....	.....	.....	7,380?	Microseisms going on.
		S.....	3 34 00	.....	.....	.....	.....	
		L.....	3 45 48	.....	.....	.....	.....	
		M.....	3 46 00	.....	*400	.....	.....	
		L.....	3 59 00	.....	.....	.....	.....	
		eL.....	4 34 12	.....	.....	.....	.....	F in microseisms.

* 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.. $\frac{T_0}{18}$. Pillar deviation: 1 mm. swing of boom = 0.54″.

			H. m. s.	*Sec.*	μ	μ	*km.*	
1917. July 1	.....	P.....	13 21 37	.....	.....	.....	.....	Felt at south end of Graham Island in Queen Charlotte Islands, Wireless operator reported sharp quake at 13h 20m.
		S or L	13 22 17	.....	.....	.....	.....	
		M.....	13 23 06	.....	*600	.....	.....	
		F.....	13 32 26	.....	.....	.....	.....	
			VERTICAL.		A_E			
		P.....	*13 21 57*	*2*	.....	.....	.....	
		L.....	*13 22 37*	*3–4*	.....	.....	.....	
		M.....	*13 22 55*	*6*	*1*	.....	.....	
		F.....	*13 27 55*	.....	.....	.....	.....	

* Trace amplitude.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
Canada. *Victoria, B. C. Dominion Meteorological Service*—Con.								
			H. m. s.	*Sec.*	μ	μ	*km.*	
4	.....	P.....	0 50 42	.....	.....	.....	9,190	Probably in Chile or Philippines.
		S.....	1 01 02	.....	.....	.....	.....	
		L.....	1 18 15	.....	.....	.....	.....	
		M.....	1 41 51	.....	*500	.....	.....	
		F.....	2 28 05	.....	.....	.....	.....	
4	.....	L.....	6 29 04	.....	.....	.....	.....	
		M.....	6 40 22	.....	*200	.....	.....	
9	.....	P?.....	0 47 58	.....	.....	.....	.....	
		L.....	0 50 27	.....	.....	.....	.....	
		M.....	0 51 27	.....	*200	.....	.....	
		F.....	0 54 55	.....	.....	.....	.....	
11	.....	P?.....	23 14 54	.....	.....	.....	.....	
		L.....	23 17 23	.....	.....	.....	.....	
		M.....	23 22 20	.....	*300	.....	.....	
		F.....	23 34 14	.....	.....	.....	.....	
12	.....	P.....	12 06 57	.....	.....	.....	4,120	
		S.....	12 12 51	.....	.....	.....	.....	
		L.....	12 23 10	.....	.....	.....	.....	
		M.....	12 31 47	.....	*600	.....	.....	
		F.....	12 59 34	.....	.....	.....	.....	
12	.....	L?.....	13 27 06	.....	.....	.....	.....	Probably distinct from above.
		M.....	13 30 03	.....	*200	.....	.....	
		F.....	13 37 55	.....	.....	.....	.....	
15	.....	P?.....	11 37 52	.....	.....	.....	.....	
		L?.....	11 44 18	.....	.....	.....	.....	
		M.....	11 48 20	.....	*300	.....	.....	
		F.....	12 14 37	.....	.....	.....	.....	
25	.....	P.....	3 25 50	.....	.....	.....	1,710	
		S.....	3 28 47	.....	.....	.....	.....	
		L.....	3 30 45	.....	.....	.....	.....	
		M.....	3 32 43	.....	*1,500	.....	.....	
		F.....	4 32 43	.....	.....	.....	.....	
			VERTICAL.		A_E			
		P.....	*3 25 30*	*3*	.....	.....	*2,080*	
		S.....	*3 29 00*	*4–6*	.....	.....	.....	
		L.....	*3 31 48*	*18–20*	.....	.....	.....	
		M.....	*3 32 30*	*20*	*10*	.....	.....	
		F.....	*3 48 00*	.....	.....	.....	.....	
27	.....							[Other components lost; clock stopped.]
			VERTICAL.		A_E			
		P.....	*1 10 28*	*5–6*	.....	.....	*9,000*	
		S.....	*1 20 48*	*12*	.....	.....	.....	
		L.....	*1 29 48*	*18*	.....	.....	.....	
		M.....	*1 36 18*	*18*	*8*	.....	.....	
		F.....	*1 46 00*	.....	.....	.....	.....	
27	.....	M.....	3 44 56	.....	*3,500	.....	.....	Earlier records missed; clock stopped.
		F.....	5 36 17	.....	.....	.....	.....	
			VERTICAL.		A_E			
		L.....	*3 36 00*	*18–20*	.....	.....	.....	
		M.....	*3 41 00*	*20*	.....	.....	.....	*F?*.
27	.....	S?.....	16 42 48	.....	.....	.....	.....	
		L.....	16 48 30	.....	.....	.....	.....	
		M.....	16 54 06	.....	*100	.....	.....	
		F.....	17 08 42	.....	.....	.....	.....	
28	.....							Clock stopped on 28th.
29	.....	P.....	14 51 27	.....	.....	.....	5,730	
		S.....	14 58 49	.....	.....	.....	.....	
		L.....	15 05 43	.....	.....	.....	.....	
		M.....	15 10 53	.....	*400	.....	.....	
		F.....	16 17 31	.....	.....	.....	.....	
29	.....	P?.....	22 06 43	.....	.....	.....	7,420?	P uncertain.
		S.....	22 15 34	.....	.....	.....	.....	
		L.....	22 35 14	.....	.....	.....	.....	
		M.....	22 50 58	.....	*3,500	.....	.....	
30	.....	L_{resp}...	0 25 24	.....	*1,500	.....	.....	
		F.....	1 16 33	.....	.....	.....	.....	
			VERTICAL.		A_E			
		P.....	*22 04 24*	*5–6*	.....	.....	*12,400*	
		S.....	*22 17 00*	*6–8*	.....	.....	.....	
		L.....	*22 35 06*	*30–32*	.....	.....	.....	
		M.....	*22 45 00*	*24*	*16*	.....	.....	*F?*.
30	.....	M.....	17 21 29	.....	*50	.....	.....	Thickening.
31	.....	P or S.	3 33 47	.....	.....	.....	.....	
		L.....	3 40 09	.....	.....	.....	.....	
		M.....	4 22 28	.....	*200	.....	.....	
		F.....	4 39 41	.....	.....	.....	.....	
31	.....	P?.....	0 36 14	.....	.....	.....	7,420	
		S.....	0 45 05	.....	.....	.....	.....	
		L.....	0 50 00	.....	.....	.....	.....	
		M.....	0 58 51	.....	*600	.....	.....	
		F.....	1 40 10	.....	.....	.....	.....	

* Trace amplitude.

SEISMOLOGICAL DISPATCHES.[1]

Belated dispatch, June 24, 1917.

Mount Etna broke into an unusual volcanic action yesterday at about 10:30 p. m. (true local time, 9:30 p. m.). The northeastern crater, which was formed in 1911, ejected reddish smoke and incandescent lapilli for about 30 minutes. Spurts of flames continued at intervals for several hours after the ejection of solid matter ceased. A similar phenomenon occurred in 1900 from the central crater. The northeastern crater is about 10,000 feet above sea level; the highest point of the volcano is about 10,750 feet. The matter ejected reached a maximum height of about 1,000 feet above the crater; part of it fell back into the crater and part fell upon the slopes of the volcano. There was a light wind from the west during the eruption; no seismic disturbance accompanied the phenomenon and there was no damage to life or property. (Consular Service.)

Report received by the Navy Department from Commander J. M. Poyer, governor of American Samoa. (Belated dispatch, June 25, 1917.).

About 6:30 p. m., June 25, an earthquake and moderate tidal wave occurred here. Earthquakes are somewhat frequent here, but this was the severest one that has occurred, according to old residents. No one was injured. A few buildings on the island were injured, notably two churches—one in Leone and one in Pago Pago—which were so badly damaged that their further use is dangerous and has been forbidden. There was no damage at the naval station. The observatory at Apia broadcasted the following information by wireless: "The observer here places the center of the disturbance about 75 miles southwest of Samoa and considers it was due to a submarine landslide. No serious damage was done. Earthquake violent for about minute and a half, and minor shakes were experienced throughout the night at intervals. Tidal waves about 3 feet high were experienced on south coast of Savail, Upola, and Tutuila, causing minor damage, but no loss of life."

The rise and fall of the water in Pago Pago Bay exceeded that reported from Apia. The bay is much narrower at its head than at its mouth, with the result that at the head of the bay the water rose and fell between 5 and 6 feet above and below normal. Many of the natives were frightened and sought refuge in the mountains for the remainder of the night. (Assoc. Press.)

London, August 6, 1917.

A violent earthquake, which caused great damage, has occurred in the southern portion of *North Island, New Zealand,* according to a Reuter dispatch from Wellington. The Wairarapa district, northwest of Wellington, suffered most severely. Pioneer residents of North Island, the dispatch adds, describes the quake as the worst since the terrible upheaval 60 years ago. (Assoc. Press.)

Wellington, New Zealand, August 9, 1917.

Further severe earthquake shocks occurred at Wairarapa, northwest of Wellington. There were no casualties. (Assoc. Press.)

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

SECTION V.—SEISMOLOGY.

SEISMOLOGICAL REPORTS FOR SEPTMBER, 1917.

W. J. HUMPHREYS, Professor in Charge.

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

TABLE 1.—*Noninstrumental earthquake reports, September, 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.*			
Sept. 4	23 57	Calexico	32 41	115 30	3	1				I. R. Ralston.
8	19 01	Calexico	32 41	115 30	3	2	½	Rumbling		H. M. Rouse.
12	11 26	Berkeley	37 52	122 16	3	1			Recorded on instruments	E. F. Davis.
		Los Gatos	37 12	121 58	2	1	10	None		I. H. Snyder.
		Mountain View	37 23	122 05	3	1	Few			Chas. A. Huff.
		San Jose	37 20	121 54	2	1	5	None		U. S. Weather Bureau
		San Francisco	37 48	122 26	3	1	3	Faint		U. S. Weather Bureau
		Santa Cruz	36 57	122 02	2	1	3	None		W. R. Springer.
13	2 14	Eureka	40 48	124 11	4	2		None	Windows rattled	U. S. Weather Bureau.
24	21 21	Campbell	37 17	121 57	3	1		None		F. M. Righter.
		Hollister	36 50	121 20	4	1	8	do		J. N. Thompson.
		Los Gatos	37 12	121 58	3	1	15	do	Recorded on instrument	I. H. Snyder.
		Salinas	36 36	121 40	3	1	5	do		E. D. Eddy.
		San Francisco	37 48	122 26	3	1	3	do		F. D. Young.
		Santa Cruz	36 57	122 02	4	2	4	do		W. R. Springer.
		Watsonville	36 55	121 46	4	1	Few	Faint		E. H. Haack.
25	18 34	Calexico	32 41	115 30	2	1	½	None		H. M. Rouse.
		MINNESOTA.								
3	21 28	Aldrich	46 23	94 53	5	1	1	Rumbling		Nettie Hansen.
		Alexandria	45 53	95 20	3	1				P. O. Unumb.
		Brainerd	46 21	94 08	5-6	3	7	Rumbling	Bricks fell from chimneys	J. A. Hoffman.
		Crosby	46 30	93 51	4	1	5	do		E. B. Brown.
		Crow Wing	46 17	94 15		1		do		Martin Berggreen.
		Eagle Bend	46 10	95 00	4-5	1	20	do		W. J. Sorff.
		Fort Ripley	46 09	94 17		1		do		C. A. Tucker.
		Henning	46 20	95 23	3-4			Faint	Dishes jarred	Louise von Ohlen.
		Grant	46 37	94 33	5	1	20	Rumbling		E. M. Hinch.
		Gull Lake Dam	46 27	94 16	4-5	1	10	do		A. L. Wampel.
		Jenkins	46 38	94 17	4-5	1			Shook buildings	O. B. Whitney.
		Leader	46 30	94 36	5	1	5	Rumbling	Windows and stoves rattled	O. A. Olsen.
		Lincoln	46 13	94 37	6	1		do	Plaster cracked	H. H. Craighead.
		Long Prairie	45 58	94 50	3	1		None		L. E. Stallcop.
		McGregor	46 37	93 16	3	1	2	Rumbling		Elmer Hallberg.
		Merrifield	46 30	94 06	3	1	6	do		Quin Parker.
		Milaca	45 44	93 38	3				Dishes rattled	Esther Riesland.
		Minneapolis	44 59	93 18	2-3	1	10	None		A. E. Houstario.
		Motley	46 20	94 36	5	1	25	Rumbling		E. G Haymaker.
		Onamia	46 04	93 38	3			do		Henry Gonlet.
		Parkers Prairie	46 10	95 16	5	1	20	do		Aaron Lundblad.
		Philbrook	46 18	94 40	5	2		do		J. W. Winsot.
		Pierz	45 58	94 02	3	1		do		C. E. Gravel.
		Pillager	46 20	94 24	5	2	20	do		J. C. Peterson.
		Pine River Dam	46 42	94 23						H. F. Leider.
		Pequot	46 37	94 16	4-5	3	6	Rumbling	Goods shaken off shelf	A. R. Holman.
		Sauk Center	45 47	94 57	3	1	6			Dr. A. L. Bilz.
		Staples	46 22	94 45	6	1	10	Rumbling	Walls cracked	R. Arundel.
		Sylvan	46 21	94 22	5			do		
		Verndale	46 24	94 59		1		do		Lewis Bradford.
		Wadena	46 27	95 06				do		Postmaster.

TABLE 2.—*Instrumental reports, September, 1917.*

(Time used: Mean Greenwich, midnight to midnight. Nomenclature: International.)

[For significance of symbols see REVIEW for July, 1917, p. 373.]

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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

(No earthquake recorded during September, 1917.)

Arizona. *Tucson.* *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	18.9

1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Sept. 11	.....	e_E	9 35 45	2	.....	.....	.....	
		e_N	9 35 50	4	.....	.....	.....	
		M_E	9 36 34	5	20	.....	.....	
		M_N	9 36 42	5	.....	30	.....	
		F	9 44 ..	.....	.....	.....	.....	
21	.....	e	8 44 26	2	.....	.....	.....	
		M_E	8 45 04	5	20	.....	.....	
		M_N	8 45 17	5	.....	20	.....	
		F	8 53 ..	.....	.....	.....	.....	
	.....							
21		e_E	21 23 57	4	.....	.....	.....	
		e_N	21 24 00	3	.....	.....	.....	
		M_N	21 24 50	9	.....	20	.....	
		M_E	21 25 03	8	20	.....	.....	
		F	21 23 ..	.....	.....	.....	.....	

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.

(No earthquake recorded during August and September, 1917.)

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

Lat., 37° 26′ 36″ N.; long., 121° 57′ 63″ W. Elevation, 27.43 meters.

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

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

Colorado. *Denver.* *Sacred Heart College.* Earthquake Station. A. W. Forstall, S. J.

Lat., 39° 40′ 36″ N.; long. 104° 58′ 54″ W. Elevation, 1,655 meters.

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

1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Sept. 10	.....	L_N	8 ..	.....	.....	.....	.....	Distinct sinusoidal waves but very small.
		M_N	8 02 ..	.....	.....	.....	.....	
		F_N	11	.....	.....	.....	.....	
17–18	.....	.....	.....	.....	.....	.....	.....	Small waves and thickening of pen marks at times during day, especially on E–W.
21	.....	L_N	17 50 ..	.....	.....	.....	.....	Very small but distinct waves.
		F_N	17 57 ..	.....	.....	.....	.....	
25–26	.....	.....	.....	.....	.....	.....	.....	Distinct wavelets on both components during day.
26–27	.....	.....	.....	.....	.....	.....	.....	Distinct sinusoidal waves at intervals during day, especially on N–S. Long period, small amplitude.
30	.....	L_N	2 45 ..	.....	.....	.....	.....	Distinct sinusoidal waves at intervals during day, but especially at hours marked. Large period, small amplitude.
		M_N	11 10 ..	.....	.....	.....	.....	
		F_N	13 02 ..	.....	.....	.....	.....	

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

1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Sept. 20	.....	e?	3 46 14	.....	.....	.....	.....	
		eL	3 59 40	.....	.....	.....	.....	
		L	4 02 00	16	.....	.....	.....	
		F	4 15 00	.....	.....	.....	.....	

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

Lat., 38° 54′ 25″ N.; long., 77° 04′ 21″ 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*

1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Sept. 20	.....	e?	3 46 09	.....	.....	.....	.....	Mainka shows e at $3^h\ 47^m\ 31^s$. Very heavy microseisms present.
		L_N	4 01 00	20	.....	.....	.....	
		L_E	4 02 18	20	.....	.....	.....	
		F	4 40 00	.....	.....	.....	.....	

TABLE 2.—*Instrumental reports, September, 1917*—Continued.

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

	T_0
Instrumental constant..	18.6

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*km.*	
1917. Sept. 5	.....	eP.....	16 42 36	.....	.....	.....	.....	
		eL.....	16 49 30	.....	.....	.....	.....	
		M.....	16 51 00	18	*100	.....	.....	
		F.....	17 25 ..	.....	.....	.....	.....	
16	.....	eP.....	17 13 54	.....	.....	.....	.....	F lost in air tremors.
		eL.....	17 17 00	.....	.....	.....	.....	
		M.....	17 17 54	18	*200	.....	.....	
		C.....	17 26 ..	.....	.....	.....	.....	
17	.....	eL.....	14 47 00	19	.....	.....	.....	
		M.....	14 51 00	.....	*100	.....	.....	
		F.....	14 55 ..	.....	.....	.....	.....	
18	.....	eL.....	22 08 12	19	.....	.....	.....	
		M.....	22 16 00	.....	*100	.....	.....	
		F.....	22 22 ..	.....	.....	.....	.....	
20	.....	eP.....	2 58 18	.....	.....	.....	.....	
		S.....	3 06 06	.....	.....	.....	.....	
		eL.....	3 17 24	20	.....	.....	.....	
		M.....	3 23 00	18	*1,500	.....	.....	
		C.....	3 29 ..	.....	.....	.....	.....	
		F.....	4 19 ..	.....	.....	.....	.....	
23	.....	eL.....	16 15 30	20	.....	.....	.....	
		M.....	16 22 12	.....	*100	.....	.....	
		F.....	16 23 ..	.....	.....	.....	.....	
24	.....	eP.....	20 17 30	.....	.....	.....	.....	
		eS.....	20 24 54	.....	.....	.....	.....	
		eL.....	20 36 00	23	.....	.....	.....	
		M.....	20 40 48	21	*700	.....	.....	
		C.....	20 42 54	.....	.....	.....	.....	
		F.....	21 14 ..	.....	.....	.....	.....	

* 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.

		V	T_0	ϵ
Instrumental constants..	E	177	3.4	4.0
	N	205	3.4	3.8

(Report for September, 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.

		V	T_0
Instrumental constants...	E	10	32
	N	10	27

(No earthquakes recorded during September, 1917.)

Massachusetts. *Cambridge. Harvard University Seismographic Station.* J. B. Woodworth.
Lat., 42° 22′ 30″ 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).

		V	T_0	ϵ
Instrumental constants..	E	80	23	0
	N	50	25	4.1

(Report for September, 1917, not received.)

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.

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

(Report for September, 1917, not received.)

New York. *Buffalo. Canisius College.* John A. Curtin, S. J.
Lat., 42° 53′ 02″ N.; long., 78° 52′ 40″ W. Elevation, 190.5 meters.
Instrument: Wiechert 80 kg. horizontal.

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

(Report for September, 1917, not received.)

New York. *Ithaca. Cornell University.* Heinrich Ries.
Lat., 42° 26′ 58″ N.; long., 76° 29′ 03″ W. Elevation, 242.6 meters.
Instruments: Two Bosch-Omori, 25 kg., horizontal pendulums (mechanical registration).

		V	T_0	ϵ
Instrumental constants..	E	13	22	4:1
	N	14	25	4:1

(Report for September, 1917, not received.)

New York. *Fordham. Fordham University.* W. C. Repetti, S. J.
Lat., 40° 51′ 47″ N.; long., 73° 53′ 03″ W. Elevation, 23.0 meters.
Instrument: Wiechert, 80 kg.

		V	T_0	ϵ
Instrumental constants..	E	72	6.6	1.5:1
	N	72	7.1	3.3:1

(No earthquake recorded during September, 1917.)

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.

	V	T_0
Instrumental constants..	35	20

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*km.*	
1917. Sept. 11	.....	P.....	4 11 15	.....	.....	.....	210	Direction?
		L_E.....	4 11 37	.....	.....	.....	.....	
		L_N.....	4 11 39	.....	.....	.....	.....	
		M_N.....	4 11 47	.....	.....	*1,000	.....	
		M_E.....	4 12 00	.....	*500	.....	.....	
		F_E.....	4 14 25	.....	.....	.....	.....	
		F_N.....	4 15 00	.....	.....	.....	.....	

* Trace amplitude.

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.

		V	T_0
Instrumental constants..	E	10	18
	N	10	18

(No earthquake recorded during September, 1917.)

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.

		V	T_0
Instrumental constants..	E	10	15
	N	10	16

(No earthquake recorded during September, 1917.)

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 80k. vertical seismograph.

	V	T_0
Instrumental constants..	120	26

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*km.*	
1917. Sept. 20	.....	eL.....	3 54 .. / 4 15 ..	18	.....	.....	.....	

TABLE 2.—*Instrumental reports, September, 1917*—Continued.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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.

T_0

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

1917.			H. m. s.	Sec.	μ	μ	km.	
Sept. 18	.....	P or S?	22 04 30	.....	.....	.....	.....	
		L.....	22 20 48	.....	.....	.....	.....	
		eL...	22 26 06	.....	.....	.....	.....	
		M.....	22 33 48	.....	*300	.....	.....	
		F.....	23 11 54	.....	.....	.....	.....	
20	.....	eL....	3 54 54	.....	.....	.....	.....	
		L.....	4 57 00	.....	.....	.....	.....	
		M.....	4 00 24	.....	*1,200	.....	.....	
		F!....	5 16 42	.....	.....	.....	.....	
24	.....	L.....	20 34 30	.....	.....	.....	.....	Air currents going on.
		L.....	20 35 42	.....	.....	.....	.....	

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.

T_0

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

1917.			H. m. s.	Sec.	μ	μ	km.	
Sept. 18	.....	S.....	22 11 32	.....	.....	.....	.....	
		M.....	.....	.....	*50	.....	.....	L, M, and F?
20	.....	S?....	3 33 17	.....	.....	.....	.....	
		L.....	3 38 15	.....	.....	.....	.....	
		M.....	3 45 41	.....	*400	.....	.....	
		F.....	4 03 31	.....	.....	.....	.....	
24	.....	P?....	20 30 06	.....	.....	.....	.....	Not recorded on vertical.
		S?....	20 41 01	.....	.....	.....	.....	
		L.....	20 50 56	.....	.....	.....	.....	
		M.....	21 02 20	.....	*300	.....	.....	
		F.....	21 19 42	.....	.....	.....	.....	

* Trace amplitude.

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

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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.

1917.			H. m. s.	Sec.	μ	μ	km.	
July 12	.....	.....	.....	.....	*100	*100	.....	Tremors recorded during the 24 hours ending 15h on dates given.
14	.....	.....	.....	.....	*50	*100	.....	
29	.....	.....	.....	.....	*50	*100	.....	

* Amplitude on instrument.

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.

T_0

Instrumental constant.. 18

1917.			H. m. s.	Sec.	μ	μ	km.	
Aug. 5	.....	eP....	16 01 18	.....	.....	.....	.....	
		S.....	16 09 48	.....	.....	.....	.....	
		eL....	16 23 42	17	.....	.....	.....	
		M.....	16 30 30	.....	*700	.....	.....	
		C.....	17 10 ..	.....	.....	.....	.....	
		F.....	17 54 ..	.....	.....	.....	.....	
14	.....	e.....	8 39 54	.....	.....	.....	.....	
		M.....	8 42 48	18	*1,000	.....	.....	
		C.....	8 47 ..	.....	.....	.....	.....	
		F.....	9 01 ..	.....	.....	.....	.....	
16	.....	P.....	23 13 00	.....	.....	.....	.....	
		L.....	23 18 42	22	.....	.....	.....	
		M.....	23 31 06	.....	*200	.....	.....	
		C.....	23 49 00	.....	.....	.....	.....	
17	.....	F.....	0 24 00	.....	.....	.....	.....	
21	.....	e.....	23 00 00	.....	.....	.....	.....	
		M.....	23 02 30	18	*100	.....	.....	
		F.....	23 06 ..	.....	.....	.....	.....	
21	.....	e.....	23 34 48	.....	.....	.....	.....	
		M.....	23 38 12	18	*100	.....	.....	
		F.....	23 54 ..	.....	.....	.....	.....	
30	.....	e.....	3 47 06	.....	.....	.....	.....	
		eL....	4 02 54	24	.....	.....	.....	
		M.....	4 08 42	.....	*500	.....	.....	
		C.....	4 14 ..	.....	.....	.....	.....	F lost in next quake.
30	.....	P.....	4 19 06	.....	.....	.....	.....	
		L.....	4 28 48	18	.....	.....	.....	
		M.....	4 51 12	.....	*2,100	.....	.....	
		C.....	4 56 48	.....	.....	.....	.....	
		F.....	7 10 ..	.....	.....	.....	.....	
31	.....	P.....	11 48 00	.....	.....	.....	.....	
		S.....	11 58 42	.....	.....	.....	.....	
		eL....	12 14 48	25	.....	.....	.....	
		M.....	12 20 00	20	*3,000	.....	.....	
		C.....	12 28 00	.....	.....	.....	.....	
		F.....	14 34 ..	.....	.....	.....	.....	

* Trace amplitude.

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

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.

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

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_H	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*km.*	
1917. Aug. 5	.....	e?	16 08 18	.....	.....	.....	.....	Quake reported from North Island, N. Z.
		P	16 11 18	.....	.....	.....	.....	
		S	16 21 54	.....	.....	.....	.....	
		e	16 29 36	.....	.....	.....	.....	
		L	16 52 24	.....	.....	.....	.....	
		eL	16 55 30	.....	.....	.....	.....	
		M	17 01 36	.....	*2000	.....	.....	
		L	17 15 18	.....	.....	.....	.....	F lost attending instrument.
9	.....	L	16 29 48	.....	.....	.....	.....	
		L	16 32 18	.....	*50	.....	.....	
		F	16 54 06	.....	.....	.....	.....	
17	.....	L	0 00 24	.....	.....	.....	.....	
		eL	0 04 36	.....	.....	.....	.....	
		M	0 08 24	.....	*200	.....	.....	
		F	0 38 24	.....	.....	.....	.....	
21	.....	L	11 07 30	.....	.....	.....	.....	
		eL	11 08 54	.....	.....	.....	.....	
		M	11 12 06	.....	*100	.....	.....	
		F	11 31 24	.....	.....	.....	.....	
21	.....	P?	22 02 00	.....	.....	.....	7,260?	
		S	22 10 42	.....	.....	.....	.....	
		eL	22 21 18	.....	.....	.....	.....	
		M	22 23 18	.....	*200	.....	.....	
		F	22 41 42	.....	.....	.....	.....	
30	.....	e?	3 25 12	.....	.....	.....	.....	e may not be seismic.
		P?	3 33 42	.....	.....	.....	.....	
		S	3 38 18	.....	.....	.....	.....	
		eL	3 41 24	.....	.....	.....	.....	
		eL	3 50 42	.....	.....	.....	.....	
		M	4 02 42	.....	*200	.....	.....	F merged into next quake.
30	.....	P	4 21 18	.....	.....	.....	.....	
		PR?	4 30 18	.....	.....	.....	.....	
		S	4 32 18	.....	.....	.....	.....	
		L	4 40 30	.....	.....	.....	.....	
		M	5 37 24	.....	*1300	.....	.....	
		eL	5 57 42	.....	.....	.....	.....	
		eL	6 01 48	.....	.....	.....	.....	
		F	7 07 42	.....	.....	.....	.....	
31	.....	e?	11 35 54	.....	.....	.....	4,250	e may not be seismic.
		P	11 44 06	.....	.....	.....	.....	S waves well defined with large amplitude.
		IS	11 50 12	.....	.....	.....	.....	In Colombia.
		IL	11 59 18	.....	.....	.....	.....	
		IL	12 03 06	.....	.....	.....	.....	
		M	12 05 36	.....	*5300	.....	.....	
		IL	12 10 24	.....	.....	.....	.....	
		L_{max}	13 30 12	.....	.....	.....	.....	
		F	14 19 42	.....	.....	.....	.....	

* 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.

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

Date.	Character.	Place.	Time.	Period T.	Amplitude. A_H	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*km.*	
1917. Aug. 5	.....	P?	16 16 58	.....	.....	.....	1,040?	Probably southeastern Pacific, about New Zealand.
		S?	16 27 57	.....	.....	.....	.....	
		L	16 41 13	.....	.....	.....	.....	
		M	17 01 24	.....	*300	.....	.....	
		F	18 16 58	.....	.....	.....	.....	
16	.....	P?	23 38 27	.....	.....	.....	3,590?	
		S	23 43 50	.....	.....	.....	.....	
		L	23 49 14	.....	.....	.....	.....	
		M	23 55 18	.....	*300	.....	.....	
17	.....	F	0 04 00	.....	.....	.....	.....	
21	.....	L?	11 15 37	.....	.....	.....	.....	
		M?	11 16 07	.....	*200	.....	.....	
21	.....	L?	22 44 38	.....	.....	.....	.....	
		L?	22 46 38	.....	.....	.....	.....	
		M	22 47 35	.....	*200	.....	.....	
		F	22 53 58	.....	.....	.....	.....	
30	.....	P?	4 04 19	.....	.....	.....	.....	
		S?	4 13 39	.....	.....	.....	.....	
		S?	4 27 25	.....	.....	.....	.....	Second S may belong to another quake.
		L	4 36 18	.....	.....	.....	.....	
		M	5 15 08	.....	*1000	.....	.....	
		F	6 58 24	.....	.....	.....	.....	
			VERTICAL		A_Z			
		P	*4 04 30*	*3*	.....	.....	.....	
		S	*4 12 18*	*6*	.....	.....	.....	
		L	*4 21 18*	*18*	.....	.....	.....	
		M	*4 43 18*	*24–88*	*3*	.....	.....	*F?*
31	.....	P	11 45 39	.....	.....	.....	6,840	Bogotá, Colombia.
		S	11 54 00	.....	.....	.....	.....	
		L	12 08 46	.....	.....	.....	.....	
		M	12 19 06	.....	*2000	.....	.....	
		F	14 01 53	.....	.....	.....	.....	
			VERTICAL		A_Z			
		P	*11 46 40*	*3*	.....	.....	*4,990*	
		S	*11 58 22*	*6–8*	.....	.....	.....	
		L	*12 06 58*	*30*	.....	.....	.....	
		M	*12 19 28*	*18–24*	*3*	.....	.....	

* Trace amplitude.

SEISMOLOGICAL DISPATCHES.[1]

Bogotá, Colombia, Sept. 1, 1917.

Severe earthquakes occurred in Colombia to-day. No serious damage reported. (Assoc. Press.)

Washington, D. C.

The State Department report of the earthquake at Bogotá, Colombia, says 300 houses were reported destroyed. A telegram to the department was sent from Baranquilla, where the number of casualties was unknown. (State Department.)

St. Paul, Minn., Sept. 5, 1917.

Earthquake shocks lasting as long as 20 seconds were reported tonight at St. Cloud, Little Falls, Brainerd, Staples, and other towns in the north central part of the State. In places the shock was heavy enough to break windows. (Assoc. Press.) [See Table 1, non-instrumental reports.]

Washington, D. C.

Official dispatches to-day from Bogotá, Colombia, say the earth shocks which began there August 29 continued intermittently until September 13. A few buildings were damaged and six persons were killed. (State Department.)

Santa Cruz, Cal., Sept. 24, 1917.

A slight earthquake was felt here to-day at 1.20 p. m. No damage done. (Assoc. Press.) [See Table 1.]

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

SECTION V.—SEISMOLOGY.

SEISMOLOGICAL REPORTS FOR OCTOBER, 1917.

W. J. HUMPHREYS, Professor in Charge.

[Dated: Weather Bureau, Washington, D. C., Dec. 1, 1917.]

TABLE 1.—*Noninstrumental earthquake reports, October, 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.*			
Sept. 3	7 40	San Francisco	37 48	122 26	4	3		None		George Miller.
11	21 26	Salinas	36 36	121 40	4	1	2	None		Dr. E. D. Eddy.
		Spreckels	36 35	121 38	3	1	1	Rumbling		Dr. M. A. Klein.
14	0 50	San Francisco	37 48	122 26	2	1		None		O. E. Faubion.
16	23 50	Calexico	32 41	115 30	3	2	6	None		I. R. Ralston.
		Calexico	32 41	115 30	3	1	5	None		C. N. Perry.
26	9 18	Berkeley	37 52	122 16	3	2		None	Good record on instrument.	E. F. Davis.
		Los Gatos	37 12	121 58	4	1	8	None		I. H. Snyder.
		San Francisco	37 48	122 26	3	1	2	None		G. H. Willson.
		San Jose	37 20	121 54	5	2	9	None		Maurice Connell.
		San Jose	37 20	121 54	3			None	Slight instrumental record.	L. H. Kroeck.
		Stanford University	37 27	122 09	3	1	5			S. D. Townley.
27	3 49	Eureka	40 48	124 11	2	1	1	None	House creaked	James Jones.
		NEW JERSEY.*								
19	17 00	Northfield	39 22	74 32	3–4	1	Few	None	Doors and windows rattled. Other shocks at intervals.	Edna Ryan.
		Ocean City	39 18	74 34	3–4	1		None		B. F. Smith.
		Pleasantville	39 23	74 32	3	1		None		Eugene Swilkey.
		Somers Point	39 18	74 35	4		Few	None		Lucelda Locy.
		Ventnor	39 21	74 26	4	1	Few	None		Wm. A. Dunn.
		NEW YORK.								
2	2 14	Glens Falls	43 21	73 36	2–3	1	3	Rattling		C. L. Williams.

* Possibly due to gun firing.

TABLE 2.—*Instrumental reports, October, 1917.*

[Time used: Mean Greenwich, midnight to midnight. Nomenclature: International.]

[For significance of symbols see REVIEW for July, 1917, p. 373.]

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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	16.7
	N	10	15.4

No earthquake recorded during October, 1917.

Arizona. *Tucson. 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

1917.			*H. m. s.*	*Sec.*	*μ*	*μ*	*km.*
Oct. 13	.....	eP	4 24 40	4	.....	.....	.....
		eL	4 29 20	7	.....	.....	.....
		M_E	4 29 57	8	20	.....	.....
		M_N	4 30 23	4	.....	10	.....
		F	4 42 ..	.....	.....	.....	.....
19	.....	e_E	16 46 34	4	.....	.....	.....
		e_N	16 37 36	15	.....	.....	.....
		M_E	16 52 42	4	10	.....	.....
		M_N	16 54 37	20	.....	20	.....
		F	17 10 ..	.....	.....	.....	.....

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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.

(Report for October, 1917, not received.)

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.)

TABLE 2.—*Instrumental reports, October, 1917*—Continued.

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.
			H. m. s.	*Sec.*	μ	μ	*km.*	
1917. Oct. 7	.....	L_N	21 31 ..	.....	.....	.....	.....	Time rather doubtful.
		M_N	21 35 ..	.....	.....	.....	.....	Very irregular waves.
		C_N	21 36 ..	.....	.....	.....	.....	
		F_N	21 37 ..	.....	.....	.....	.....	
13	.....	L_N	21 49 ..	.....	.....	.....	.....	Sinusoidal waves constantly occurring on N–S.
		F_N	21 55 ..	.....	.....	.....	.....	
13	.....	L_N	22 20 ..	.....	.....	.....	.....	
		F_N	24 00 ..	.....	.....	.....	.....	
14	.....	L_N	1 30 ..	.....	.....	.....	.....	Visible activity at intervals from 1^h 30^m on.
15	.....	L_N	2 30 ..	.....	.....	.....	.....	Activity.
		F_N	4 15 ..	.....	.....	.....	.....	
16–17	.....	.....	.....	.....	.....	.....	.....	Strong activity on N–S all day.
17–18	.....	.....	.....	.....	.....	.....	.....	Small but very distinct sinusoidal waves all day on N–S.
30	.....	L_N	2 20 ..	.....	.....	.....	.....	Sinusoidals at frequent intervals on N–S all day.
		F_N	15 00 ..	.....	.....	.....	.....	

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.
			H. m. s.	*Sec.*	μ	μ	*km.*	
1917. Oct. 7	.....	P	15 00 58	.....	.....	.....	3,100?	
		S_N?	15 05 48	.....	.....	.....	.....	
		eL_N	15 10 10	.....	.....	.....	.....	
		F	15 20 00	.....	.....	.....	.....	
19	.....	P	16 43 04	.....	.....	.....	2,240	
		S	16 47 48	.....	.....	.....	.....	
		L	16 52 00	.....	.....	.....	.....	
		L	16 53 24	20	.....	.....	.....	
		F	17 30 ..	.....	.....	.....	.....	
22	.....	P	7 26 30	.....	.....	.....	3,925	
		S	7 32 13	.....	.....	.....	.....	
		L	7 37 00	.....	.....	.....	.....	
		L	7 41 00	20	.....	.....	.....	
		F	8 20 00	.....	.....	.....	.....	
23	.....	eL	8 03 30	.....	.....	.....	.....	
		F	8 10 00	.....	.....	.....	.....	

District of Columbia. *Washington. Georgetown University.* F. A. 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	*e*
	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.
			H. m. s.	*Sec.*	μ	μ	*km.*	
1917. Oct. 19	.....	e_E	16 42 07	.....	.....	.....	.....	Heavy microseisms. Heavy traffic markings because of heavy drayage near observatory.
		e_N	16 42 12	.....	.....	.....	.....	
		S_N?	16 47 49	.....	.....	.....	.....	
		S_E?	16 48 07	.....	.....	.....	.....	
		eL	16 52 18	.....	.....	.....	.....	
		L_E	16 54 47	24	.....	.....	.....	
		L_N	16 54 48	24	.....	.....	.....	
		F	17 58 ..	.....	.....	.....	.....	
22	.....	e_E?	7 25 47	.....	.....	.....	.....	Heavy microseisms. No distinct maximum; interpretation difficult.
		e_N?	7 26 21	.....	.....	.....	.....	
		eL_E	7 36 24	.....	.....	.....	.....	
		eL_N	7 37 00	.....	.....	.....	.....	
		L_E	7 38 15	.....	.....	.....	.....	
		L_N	7 42 33	.....	.....	.....	.....	
		F	8 37 00	.....	.....	.....	.....	

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

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
	18.6

(Report for October, 1917, not received.)

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	*e*
	E	177	3.4	4:1
	N	205	3.4	4:1

(Report for October, 1917, received too late.)

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	15
	N	10	15

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*km.*	
1917. Oct. 19	.....	eP_N	16 43 03	.....	.....	.....	.....	Phases not well defined.
		eP_E	16 44 00	4	.....	.....	.....	
		eL_E	16 52 54	15	.....	.....	.....	
		M_N	16 53 13	4	.....	10	.....	
		M_E	16 56 30	13	70	.....	.....	
		C_E	16 58 ..	12	.....	.....	.....	
		F_E	17 07 ..	.....	.....	.....	.....	

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

Lat., 42° 22′ 36″ N.; long., 71° 00′ 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	*e*
	E	80	23	0
	N	50	25	4:1

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*km.*	
1917. Oct. 7	.....	*O*.....	*14 50 00*	.....	.....	.....	5,015	Distance from L–S.
		S_E	15 00 11	6	.....	.....	.....	
		eL_E...	15 00 55	20	.....	.....	.....	
		F.....	15 44 17	.....	.....	.....	.....	
13	.....	L_E....	4 40 47	8	.....	.....	.....	Compare with Ottawa record.
19	.....	*O*.....	*16 37 33*	.....	.....	.....	3,330	
		P_E....	16 44 47	.....	.....	.....	.....	
		S_E....	16 49 11	6	.....	.....	.....	
		eL_E?..	16 53 48	30	.....	.....	.....	
		M_N....	16 58 —	.....	.....	.....	.....	
		F?....	17 25 —	.....	.....	.....	.....	F in microseisms.
22	.....	*O*?....	*7 21 25*	.....	.....	.....	3,375?	Distance from L–S.
		e_E.....	7 33 00	6?	.....	.....	.....	e may be S?
		eL_E...	7 36 08	20	.....	.....	.....	
		l_E....	7 37 04	4	.....	.....	.....	l intrusive?
		L.....	7 37 12	16	.....	.....	.....	
		L.....	7 40 20	16	.....	.....	.....	
		L.....	7 44 07	20	.....	.....	.....	
		L.....	7 50 36	15	.....	.....	.....	
		L.....	7 54 30	15	.....	.....	.....	
		F?....	8	.....	.....	.....	.....	
30	.....	.....	.....	.....	.....	.....	.....	Doubtful long waves from 10^h, 18^m to 10^h 24^m.

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.

Instrument: Wiechert 80 kg. astatic, horizontal pendulum.

Instrumental constants..	*V*	T_0	*e*
	80	7	5:1

(Report for October, 1917, not received.)

TABLE 2.—*Instrumental reports, October, 1917*—Continued.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

New York. *Buffalo. Canisius College.* John A. Curtin, S. J.

Lat., 42° 53′ 02″ N.; long., 78° 52′ 40″ W. Elevation, 190.5 meters.

Instrument: Wiechert, 80 kg., horizontal.

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

(Report for October, 1917, not received.)

New York. *Fordham. Fordham University.* W. C. Repetti. S. J.

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

Instrument: Wiechert, 80 kg.

Instrumental constants.. V 72, T_0 5, ε 1.5:1 (E); V 72, T_0 5, ε 3.8:1 (N)

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917. Oct. 19	.....	L.....	*H. m. s.* 17 11 00	*Sec.*	*μ*	*μ*	*km.*	Possible error of a few seconds in the time.

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.. V 13, T_0 22, ε 4:1 (E); V 14, T_0 25, ε 4:1 (N)

(Report for October, 1917, not received.)

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 35, T_0 20

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917. Oct. 22	.....	P_E.....	*H. m. s.* 7 20 44	*Sec.*	*μ*	*μ*	*km.* 740	Direction?
		P_N.....	7 21 10	.....	.....	.....	.....	
		L_E.....	7 22 20	.....	.....	.....	.....	
		L_N.....	7 22 46	.....	.....	.....	.....	
		M_N.....	7 23 06	.....	.....	*57	.....	
		M_E.....	7 23 10	.....	*86	.....	.....	
		F_E.....	7 45 00	.....	.....	.....	.....	
		F_N.....	7 48 00	.....	.....	.....	.....	
26	.....	P.....	13 24 48	.....	.....	.....	630	
		L_N.....	13 26 10	.....	.....	.....	.....	
		M_N.....	13 26 14	.....	.....	*200	.....	
		L_E.....	13 26 18	.....	.....	.....	.....	
		M_E.....	13 26 34	.....	*200	.....	.....	
		F_E.....	13 53 12	.....	.....	.....	.....	
		F_N.....	13 55 08	.....	.....	.....	.....	

*Trace amplitude.

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

Lat., 18° 09′ N.; long., 65° 27′ W. Elevation, 19.8 meters.

Instruments: Two Bosch-Omori.

Instrumental constants.. V 10, T_0 17.5 (E); V 10, T_0 18.2 (N)

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917. Oct. 19	.....	eP_E.....	*H. m. s.* 16 47 50	*Sec.*	*μ*	*μ*	*km.*	
		eP_N.....	16 48 36	4	.....	.....	.....	
		eL_E.....	16 52 43	16	.....	.....	.....	
		eL_N.....	16 53 00	16	.....	.....	.....	
		M_E.....	16 55 32	14	20	.....	.....	
		M_N.....	16 56 32	12	.....	10	.....	
		F.....	17 12 ..	.....	.....	.....	.....	
22	.....	eP_N.....	7 24 12	4	.....	.....	.....	
		eP_E.....	7 24 20	.....	.....	.....	.....	
		eL_E.....	7 27 52	14	.....	.....	.....	
		eL_N.....	7 27 56	10	.....	.....	.....	
		M_E.....	7 28 16	10	30	.....	.....	
		M_N.....	7 28 30	10	.....	10	.....	
		F_E.....	7 50 ..	.....	.....	.....	.....	

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.. V 10, T_0 15 (E); V 10, T_0 16 (N)

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917. Oct. 19	.....	eL_E...	*H. m. s.* 16 52 00	*Sec.*	*μ*	*μ*	*km.*	
		F.....	17 15 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 80 kg. vertical seismograph.

Instrumental constants.. V 120, T_0 26

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917. Oct. 7	.....	*O*.....	*H. m. s.* *14 55 49*	*Sec.*	*μ*	*μ*	*km.* 2,750	Readings from deformation instrument.
		P.....	15 01 21	.....	.....	.....	.....	
		S_E.....	15 05 45	.....	.....	.....	.....	
		L.....	15 08 24	.....	.....	.....	.....	
13	.....	eL.....	4 40 ..	20	.....	.....	.....	
19	.....	*O*.....	*16 37 11*	.....	.....	.....	3,600	A further outcrop of short-period waves resembling P on both instruments at $16^h\ 54^m$.
		P_N.....	16 43 59	.....	.....	.....	.....	
		S_N.....	16 49 23	.....	.....	.....	.....	
		eL?	16 33 30	.....	.....	.....	.....	
		L.....	16 56 ..	30	.....	.....	.....	
		L.....	17 00 ..	14	.....	.....	.....	
		F.....	17 20 ..	.....	.....	.....	.....	
22	.....	e.....	7 53 50	2	.....	.....	.....	
		L.....	7 40 .. / 7 50 ..	17	.....	.....	.....	

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. Oct. 7	.....	L?.....	*H. m. s.* 15 26 42	*Sec.*	*μ*	*μ*	*km.*	
		L.....	15 45 12	.....	.....	.....	.....	
		M.....	.....	.....	*300	.....	.....	M and F in air currents.
13	.....	L.....	5 00 18	.....	*50	.....	.....	
		F.....	5 06 36	.....	.....	.....	.....	
19	.....	P.....	16 39 48	.....	.....	.....	.....	Air currents going on. P and S very doubtful.
		P.....	16 42 47	.....	.....	.....	.....	
		S.....	16 46 42	.....	.....	.....	.....	
		S.....	16 49 18	.....	.....	.....	.....	
		L.....	16 51 36	.....	.....	.....	.....	
		iL.....	16 55 48	.....	.....	.....	.....	
		M.....	16 57 00	.....	*1,300	.....	.....	F in air currents.
20	.....	L?.....	18 35 36	.....	.....	.....	.....	
		L?.....	18 44 18	.....	*200	.....	.....	
22	.....	S_E?....	7 33 12	.....	.....	.....	.....	
		iL.....	7 36 24	.....	.....	.....	.....	
		M.....	7 37 36	.....	*800	.....	.....	
		L.....	7 46 18	.....	.....	.....	.....	
		L.....	8 06 24	.....	.....	.....	.....	
		F.....	8 24 24	.....	.....	.....	.....	
23	.....	L?.....	8 04 18	.....	*50	.....	.....	Air currents going on.
28	.....	L_E.....	13 40 36	.....	.....	.....	.....	
		L.....	13 43 42	.....	.....	.....	.....	
		M.....	13 46 36	.....	*800	.....	.....	
		F.....	14 10 30	.....	.....	.....	.....	
28	.....	L.....	17 52 12	.....	.....	.....	.....	Other phases lost, attending instruments.
29	.....	L?.....	21 41 30	.....	.....	.....	.....	
		L.....	21 47 18	.....	.....	.....	.....	
		M.....	21 51 42	.....	*300	.....	.....	
		F.....	22 58 18	.....	.....	.....	.....	

*Trace amplitude.

TABLE 2.—*Instrumental reports, October, 1917*—Continued.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
Canada. *Victoria, B. C. Dominion Meteorological Service.*								
Lat., 48° 24′ N.; long., 123° 19′ W. Elevation, 67.7 meters. Subsoil: Rock.								
Instrument: Weichert, vertical; Milne horizontal pendulum, North. T_0 In the meridian Instrumental constant.. 18. Pillar deviation, 1 mm., swing of boom=0.54″.								
1917. Oct. 7	.....	P.....	*H. m. s.* 15 21 34	*Sec.*	*μ*	*μ*	*km.* 2,490?	
		S?.....	15 25 38	.....	.....	.....	.....	
		L.....	15 30 35	.....	.....	.....	.....	
		M.....	15 35 33	.....	*500	.....	.....	
		F?.....	15 49 55	.....	.....	.....	.....	
13	.....	L.....	4 40 00	.....	.....	.....	.....	Minute and sharp vibrations.
		L.....	4 43 24	.....	*100	.....	.....	
		F.....	4 50 06	.....	.....	.....	.....	
19	.....	P.....	16 44 24	.....	.....	.....	5,250	
		S.....	16 51 20	.....	.....	.....	.....	
		L.....	17 00 46	.....	.....	.....	.....	
		M.....	17 07 42	.....	*500	.....	.....	
		F.....	17 36 28	.....	.....	.....	.....	
			VERTICAL.		A_Z			
		M.....	*17 07 00*	*14–16*	*1*	.....	.....	
20	.....	L.....	18 15 09	.....	.....	.....	.....	
		M.....	18 21 42	.....	*200	.....	.....	
		F.....	18 29 39	.....	.....	.....	.....	
22	.....	P or S?	7 42 06	.....	.....	.....	.....	
		L.....	7 51 01	.....	.....	.....	.....	
		M.....	7 56 28	.....	*400	.....	.....	
		F.....	8 21 46	.....	.....	.....	.....	
23	.....	P.....	8 05 58	.....	.....	.....	.....	
		L.....	8 11 25	.....	.....	.....	.....	
		M.....	8 14 53	.....	*200	.....	.....	
		F.....	8 19 51	.....	.....	.....	.....	
28	.....	L.....	13 57 20	.....	*50	.....	.....	
		F.....	14 09 20	.....	.....	.....	.....	
28	.....	L.....	17 50 44	.....	*100	.....	.....	
		F.....	18 14 14	.....	.....	.....	.....	
29	.....	P.....	20 59 20	.....	.....	.....	.....	S?
		L.....	21 17 42	.....	.....	.....	.....	
		M.....	21 30 35	.....	*300	.....	.....	
		F.....	21 46 57	.....	.....	.....	.....	

*Trace amplitude.

SEISMOLOGICAL DISPATCHES.[1]

There were no press reports of seismological or vulcanological disturbances during October, 1917.

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

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

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
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.. E: *V* 80, T_0 23, *ε* 0; N: 50, 25, 4:1								
1917. Sep. 18	.....	e?.....	*H. m. s.* 18 53 49	*Sec.*	*μ*	*μ*	*km.*	e in microseisms.
		L.....	18 54 42	24	.....	.....	.....	F?, after 19h 05m.
18	.....	O?.....	*22 04 07*	.....	.....	.....	5,280?	P in microseisms; *O* from eL–S.
		eP?.....	22 13 20	.....	.....	.....	.....	
		S_E.....	22 19 50	6	.....	.....	.....	
		eL_E.....	22 25 53	24	.....	.....	.....	
		L.....	22 38 54	16	.....	.....	.....	
		F.....	22 51 ..	.....	.....	.....	.....	
20	.....	L_E.....	3 41 16	.....	.....	.....	.....	L possibly earlier.
		L.....	4 03 20	15	.....	.....	.....	
		L.....	4 16 14	14	.....	.....	.....	L from southward.
		F.....	4 30 25	.....	.....	.....	.....	
21	.....	O?.....	*8 45 04*	.....	.....	.....	3,425?	*O* and distance from L–S.
		eP?.....	8 54 11	.....	.....	.....	.....	
		i.....	8 54 46	.....	.....	.....	.....	
		S_E.....	8 56 50	6	.....	.....	.....	
		S_W?...	8 57 56	6	.....	.....	.....	
		eL_E...	9 00 16	12	.....	.....	.....	
		eL_N...	9 00 54	9	.....	.....	.....	
		L_E.....	9 02 43	6	.....	.....	.....	
		F_E.....	9 04 54	.....	.....	.....	.....	
24	.....	e_E.....	21 02 24	20	.....	.....	.....	Forepart irregular.
		L_E.....	21 14 36	24	.....	.....	.....	
		L.....	{21 17 16 / 21 25 24}	20–18	.....	.....	.....	
31	.....	O?.....	*21 36 05*	.....	.....	.....	920?	Doubtful record, subject to confirmation.
		P?.....	21 38 07	.....	.....	.....	.....	
		S?.....	21 39 47	6	.....	.....	.....	
		eL_N...	21 40 07	.....	.....	.....	.....	
		eL_E...	21 40 11	12	.....	.....	.....	
		L_N.....	21 40 38	13	.....	.....	.....	F in microseisms.

EARTH TREMOR DUE TO THUNDER NOTES.[2]

Mr. Douglas F. Manning, Alexandria Bay, N. Y., sends the following report under date of October 28, 1917:

A peculiar effect of thunder was felt here last night (Oct. 27, 1917), between the hours of 10 and 11 p. m. The day had been ideal with a light south wind, mild temperature, and a few alto-cumuli moving lazily from the west; in fact, it was an "Indian Summer" type of day.

Toward evening my aneroid began to fall rapidly and the clouds increased, and by 8 o'clock a rain was falling. At about 10 [p. m.] I noticed a flash of lightning, and this was followed in a short interval by a deep, prolonged rumble, causing windows and doors to rattle, chinaware to jar, and a distinct earth tremor was felt; in fact, many thought it was one. The lightning increased in intensity and frequency and the same marked earth tremors followed each flash at short intervals, and it seemed as if a series of earthquakes were taking place, so strong was the concussion produced. The storm gradually passed over accompanied by a tremendous but brief downpour of rain mixed with small hail, and by 11 o'clock all was still again.

To-day one hears many stories of the storm and its peculiar behavior, all making note of the trembling effect produced.

This instructive letter is published for the benefit of others interested in these problems.

Since "musical" notes of very low pitch and great volume are occasionally produced by a series of sequent or pulsating lightning discharges, it seems probable that the shaking described by Mr. Manning was owing in great measure to the resonance response of rooms to thunder notes of this character.— *W. J. Humphreys.*

[2] In this connection compare *W. Schmidt* "On Thunder," MONTHLY WEATHER REVIEW, December, 1914, 42 : 665 fig.

SECTION IV.—RIVERS AND FLOODS.

RIVERS AND FLOODS, NOVEMBER, 1917.

By ALFRED J. HENRY, Professor in Charge.

Flood stages were not reached in the rivers in any part of the country during November, 1917.

Hydrographs for typical points on several principal rivers are shown on Chart I. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.

MEAN LAKE LEVELS DURING NOVEMBER, 1917.

By UNITED STATES LAKE SURVEY.

[Dated: Detroit, Mich., Dec. 5, 1917.]

The following data are reported in the "Notice to Mariners" of the above date:

Data.	Lakes.*			
	Superior.	Michigan and Huron.	Erie.	Ontario.
Mean level during November, 1917:	*Feet.*	*Feet.*	*Feet.*	*Feet.*
Above mean sealevel at New York	602.46	581.16	572.97	246.69
Above or below—				
Mean stage of October, 1917	−0.21	−0.20	+0.16	+0.01
Mean stage of November, 1916	−0.99	+0.52	+1.30	+1.04
Average stage for November, last 10 years	−0.05	+1.02	+1.26	+1.17
Highest recorded November stage	−1.05	−1.76	−0.70	−1.13
Lowest recorded November stage	+0.96	+1.98	+2.27	+3.28
Average relation of the November level to—				
October level	−0.2	−0.3	−0.4	−0.3
December level	+0.2	+0.1	+0.1	+0.2

* Lake St. Clair's levels: October, 575.77; November, 575.76 feet.

MEAN LAKE LEVELS DURING OCTOBER, 1917.*

By UNITED STATES LAKE SURVEY.

[Dated: Detroit, Mich., Nov. 5, 1917.]

The following data are reported in the "Notice to Mariners" of the above date:

Data.	Lakes.			
	Superior.	Michigan and Huron.	Erie.	Ontario.
Mean level during October, 1917:	*Feet.*	*Feet.*	*Feet.*	*Feet.*
Above mean sealevel at New York	602.67	581.36	572.81	246.68
Above or below—				
Mean stage of September, 1917	−0.06	−0.32	−0.47	−0.25
Mean stage of October, 1916	−0.97	+0.76	+0.92	+0.62
Average stage for October, last 10 years	−0.01	+0.96	+0.74	+0.88
Highest recorded October stage	−0.89	−1.58	−0.89	−1.13
Lowest recorded October stage	+1.09	+1.76	+2.01	+3.01
Average relation of the October level to—				
September level	±0.0	−0.2	−0.3	−0.4
November level	+0.2	+0.3	+0.4	+0.3

* This report was not received in time for the October issue of the REVIEW.

SECTION V.—SEISMOLOGY.

SEISMOLOGICAL REPORTS FOR NOVEMBER, 1917.

W. J. HUMPHREYS, Professor in Charge.

[Dated: Seismological Investigations, Weather Bureau, Jan. 3, 1918.]

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

Date.	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.*			
Nov. 1	13 50	Calexico	32 41	115 30	2	1		None		Ivan R. Ralston.
5	9 04	Cloverdale	38 46	123 00	3	2	4	Faint		John O. Ogle.
		Lakeport	39 04	122 56	2	2	10	Rumbling		A. S. Riggs.
13	7 50	Calexico	32 41	115 30	3	1	2½	Rumbling		H. M. Rouse.
19	17 30	El Cajon	32 48	116 58	2	1		None		H. H. Kessler.
		Indio	32 43	116 12	4	1	30	None		Bruce Drummond.
		Indio	32 43	116 12	4	1		Rumbling		Fred N. Johnson.
		Mecca	33 35	116 05	4	2	30	Rattling	Shook buildings	E. A. Palmer.
		WASHINGTON.								
12	10 47	Cedar Lake	47 24	121 43	4	1	4	None		D. A. Brown.
		Longmire	46 45	121 50	5	3	6	Rattling		John B. Flett.
		Summit Inn	47 28	121 26		2	40	Rumbling		J. P. Holden.
14	2 57	Longmire	46 45	121 50	5	1	3	Rumbling		John B. Flett.

TABLE 2.—*Instrumental reports, November, 1917.*

[Time used: Mean Greenwich, midnight to midnight. Nomenclature: International.]

[For significance of symbols see REVIEW for July, 1917, p. 373.]

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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

(Report for November, 1917, not received.)

Arizona. *Tucson. 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 19; N 10 19

1917.	Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
				H. m. s.	*Sec.*	*μ*	*μ*	*km.*	
Nov.	7		e_N	1 36 31					E-W component not working during entire month.
			M_N	1 38 01	7		20		
			F	1 47 ..					
	8		e_N	5 34 16					
			M_N	5 52 16	7		20		
			F	6 07 ..					
	16		eP_N	3 32 20					
			eL_N	3 56 ..	30				
			M_N	4 20 58	16		20		
			F	5 15 ..					

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.

1917.	Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
				H. m. s.	*Sec.*	*μ*	*μ*	*km.*	
Nov.	3					*50	*100		Tremors recorded during the 24 hours preceding 13h 00m on dates given.
	5					*50	*100		
	6					*50	*100		
	7					*100	*100		
	9					*50	*100		
	11					*100	*200		
	22					*50	*100		

*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.

1917.	Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
				H. m. s.	*Sec.*	*μ*	*μ*	*km.*	
Nov.	1		L_N	23 30 ..					Very strong seismicity.
	2		F_N	1 40 ..					
	6		L_N	9					Distinct wavelets at intervals on N-S.
			F_N	12					
	7		L_N	6 30 ..					Distinct wavelets appear at intervals on N-S.
			F_N	9 15 ..					
	16		L	5 31 ..					Times somewhat doubtful. P and S not discernible.
			M_N	5 33 ..		30	*750		
			M_E	5 33 ..		40	*750		
			C_N	5 34 ..					
			F_N	5 36 ..					
			C_E	5 38 ..					
			F_E	5 43 ..					
	16		L	5 48 ..		20	*500	*500	Seems to be new quake. P and S not discernible.
			F	5 53 ..					

* 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 110 T_0 6.4

1917.	Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
				H. m. s.	*Sec.*	*μ*	*μ*	*km.*	
Nov.	4		e_N	12 25 40					
			L	13 18 40	24				
			L	13 30 00	18				
			F	13 50 00					
	7		e	1 49 01					
			L	1 50 08					
			F	2 00 00					
	8		e	5 46 00					Phases not defined.
			IR?	6 06 00					
			F	6 20 00					
	14		eL	9 54 30					
			L	9 58 30	16				
			F	10 10 00					
	15		eL_N	1 56 30					
	16		P	3 38 49				9,025	
			PR?	3 45 05					
			S	3 49 01					
			L	4 06 50	20				
			L	4 08 10	45				
			L	4 17 00	24				
			L	4 26 00	18				
			F	5 50 ..					
	16		eL_N	23 27 00					
	18		P?	3 17 16					
			L	4 02 00					
			L	4 16 40	20				
			F	4 35 00					

TABLE 2.—*Instrumental reports, November, 1917*—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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

Lat., 38° 54′ 25″ N.; long., 77° 04′ 21″ 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

1917.			H. m. s.	Sec.	μ	μ	km.	
Nov. 4	.....	e_N	12 25 08	.....	.....	.....	.....	Interpretation difficult; heavy microseisms present.
		e_E	12 25 27	.....	.....	.....	.....	
		L	13 08 13	30	.....	.....	.....	Sheet taken off at 13h 22m, quake still on.
7	.....	S_E?	1 49 11	.....	.....	.....	.....	Microseisms present.
		S_N?	1 49 18	.....	.....	.....	.....	
		L_N	1 50 12	10	.....	.....	.....	
		L_E	1 51 20	10	.....	.....	.....	
		F	2 06 ..	.....	.....	.....	.....	
14	.....	e_E	9 37 56	.....	.....	.....	.....	Heavy microseisms present.
		e_N	9 37 58	.....	.....	.....	.....	
		L	9 58 30	22	.....	.....	.....	
		F	10 31 00	.....	.....	.....	.....	
15	.....	e	1 52 06	.....	.....	.....	.....	Only N-S component shows.
		F	2 20 ..	.....	.....	.....	.....	Heavy microseisms present.
16	.....	e	3 39 01	.....	.....	.....	.....	Do.
		S_E?	3 49 03	.....	.....	.....	.....	S difficult.
		S_N?	3 49 20	.....	.....	.....	.....	Recorded on vertical instrument.
		eL_N	4 07 00	30	.....	.....	.....	
		eL_E	4 10 48	32	.....	.....	.....	
		M_E	4 18 24	25	*600	*400	.....	
		M_N	4 26 37	25	.....	.....	.....	
18	.....	eL	3 56 12	.....	.....	.....	.....	F lost in microseisms.
		L	4 07 50	30	.....	.....	.....	

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

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, E-W component.

Instrumental constant....T_0 18.6

1917.			H. m. s.	Sec.	μ	μ	km.
Nov. 4	.....	e	12 22 ..	.....	.....	.....	.....
		M	13 01 36	.....	*300	.....	.....
		F	14 46 ..	.....	.....	.....	.....
7	.....	e	1 52 00	.....	.....	.....	.....
		M	1 56 00	22	*100	.....	.....
		F	2 01 ..	.....	.....	.....	.....
8	.....	e	18 46 30	.....	.....	.....	.....
		M	18 50 12	18	*100	.....	.....
		F	18 54 ..	.....	.....	.....	.....
14	.....	eP	9 29 36	.....	.....	.....	.....
		eL	9 31 36	21	.....	.....	.....
		M	9 38 06	18	*300	.....	.....
		C	9 44 00	.....	.....	.....	.....
		F	10 38 ..	.....	.....	.....	.....
15	.....	e	1 30 54	.....	.....	.....	.....
		M	1 37 50	18	*100	.....	.....
		F	1 43 00	.....	.....	.....	.....
15	.....	e	17 58 00	.....	.....	.....	.....
		M	18 10 00	18	*100	.....	.....
		F	18 16 ..	.....	.....	.....	.....
16	.....	P	3 28 18	.....	.....	.....	.....
		S	3 36 12	.....	.....	.....	.....
		eL	3 49 30	20	.....	.....	.....
		M	3 51 48	20	*5200	.....	.....
		C	3 57 ..	.....	.....	.....	.....
		F	7 21 ..	.....	.....	.....	.....

*Trace amplitude.

Hawaii. *Honolulu. Magnetic Observatory*—Continued.

1917.			H. m. s.	Sec.	μ	μ	km.
Nov. 16	.....	P	22 38 06	.....	.....	.....	.....
		eL	22 51 36	28	.....	.....	.....
		M	22 58 54	23	*600	.....	.....
		C	23 06 ..	.....	.....	.....	.....
		F	23 30 ..	.....	.....	.....	.....
17	.....	e	8 34 54	.....	.....	.....	.....
		M	8 49 12	17	*100	.....	.....
		F	9 05 ..	.....	.....	.....	.....
18	.....	eP	3 12 30	.....	.....	.....	.....
		S	3 21 00	.....	.....	.....	.....
		eL	3 34 12	25	.....	.....	.....
		M	3 46 54	17	*1200	.....	.....
		C	3 56 ..	.....	.....	.....	.....
		F	4 47 ..	.....	.....	.....	.....
21	.....	e	0 28 42	.....	.....	.....	.....
		M	0 33 18	18	*100	.....	.....
		F	0 38 ..	.....	.....	.....	.....
22	.....	eP	6 30 ..	.....	.....	.....	.....
		M	6 44 00	19	*100	.....	.....
		F	6 47 ..	.....	.....	.....	.....
22	.....	e	23 45 30	.....	.....	.....	.....
		M	23 57 06	19	*100	.....	.....
23		F	0 02 ..	.....	.....	.....	.....
24	.....	eP	11 20 48	.....	.....	.....	.....
		S	11 28 42	.....	.....	.....	.....
		eL	11 36 18	26	.....	.....	.....
		M	11 43 00	19	*300	.....	.....
		C	11 49 ..	.....	.....	.....	.....
		F	12 15 ..	.....	.....	.....	.....
24	.....	e	20 10 30	.....	.....	.....	.....
		M	20 16 54	19	*200	.....	.....
		F	20 21 ..	.....	.....	.....	.....
28	.....	e	2 53 48	.....	.....	.....	.....
		M	3 01 54	20	*100	.....	.....
		F	3 16 ..	.....	.....	.....	.....
29	.....	eL	22 35 18	.....	.....	.....	.....
		M	22 45 00	20	*400	.....	.....
		C	22 48 30	.....	.....	.....	.....
		F	23 00 00	.....	.....	.....	.....
30	.....	eP	17 24 18	.....	.....	.....	.....
		S	17 28 00	.....	.....	.....	.....
		eL	17 30 48	20	.....	.....	.....
		M	17 35 00	18	*900	.....	.....
		C	17 38 ..	.....	.....	.....	.....
		F	18 23 ..	.....	.....	.....	.....

* 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	4:1
N	205	3.4	4:1

(Report for November, 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	15
N	10	15

1917			H. m. s.	Sec.	μ	μ	km.	
Nov. 16	.....	eP_E	3 49 ..	.....	.....	.....	.....	Just perceptible on N–S component at 4h 27m.
		eL_E	4 14 ..	24	.....	.....	.....	
		M_E	4 27 ..	16	100	.....	.....	
		C_E	5 17 ..	.....	.....	.....	.....	

TABLE 2.—*Instrumental reports, November, 1917*—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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

Lat., 42° 22′ 36″ N.; long., 71° 06′ 59″ W. Elevation, 5.1 meters. Foundation: Glacial sand over clay.

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

		V	T_0	e
Instrumental constants..	E	80	23	0
	N	50	25	4:1

(Report for November, 1917, not received.)

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.

Instrument: Wiechert 80 kg. astatic, horizontal pendulum.

	V	T_0	e
Instrumental constants..	80	7	5:1

1917.			H. m. s.	Sec.	μ	μ	km.	
Nov. 7	.....	P_N	2 04 30	.....	.....	.....	.....	Barely perceptible.
		F_N	2 05 30	.....	.....	.....	.....	
7	.....	ePg	9 41 00	.....	.....	.....	.....	
		M_N	9 46 30	.....	.....	.....	.....	
		M_E	9 46 30	.....	.....	.....	.....	
		F_N	9 53 ..	.....	.....	.....	.....	
16	.....	eP_E	3 43 30	.....	.....	.....	.....	
		eP_N	3 44 30	.....	.....	.....	.....	
		S_N	4 03 ..	.....	.....	.....	.....	
		S_E	4 10 ..	.....	.....	.....	.....	
		M_N	4 23 ..	.....	.....	.....	.....	
		M_E	4 25 ..	.....	.....	.....	.....	
		F	5 00 ..	.....	.....	.....	.....	

New York. *Buffalo. Canisius College.* John A. Curtin, S. J.

Lat., 42° 53′ 02″ N.; long., 78° 52′ 40″ W. Elevation, 190.5 meters.

Instrument: Wiechert 80 kg. horizontal.

	V	T_0	e
Instrumental constants..	80	7	5:1

(Report for November, 1917, not received.)

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.

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

(Report for November, 1917, not received.)

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).

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

1917.			H. m. s.	Sec.	μ	μ	km.
Nov. 7	.....	e_N	1 49 15	4–10	.....	.....	.....
		F	1 59 ..	.....	.....	.....	.....
8	.....	e_N	6 05 ..	4–10	.....	.....	.....
		F	6 16 ..	.....	.....	.....	.....
16	.....	e_E	3 48 55	20	.....	.....	.....
		L_E	4 08 48	52	.....	.....	.....
		F_E	5 40 ..	.....	.....	.....	.....

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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.

	V	T_0
Instrumental constants..	35	20

1917.			H. m. s.	Sec.	μ	μ	km.	
Nov. 13	.....	P	8 59 02	.....	.....	.....	300	Direction probably north.
		L_E	8 59 43	.....	.....	.....	.....	
		L_N	8 59 48	.....	.....	.....	.....	
		M_E	9 00 01	.....	*500	.....	.....	
		M_N	9 00 06	.....	.....	*1,000	.....	
		F	9 06 00	.....	.....	.....	.....	
16	.....	L_N	4 05 09	.....	.....	.....	.....	Very distant. Time not working on N-S component.
		M	4 17 09	.....	*1,500	*500	.....	
		F	4 35 09	.....	.....	.....	.....	

* Trace amplitude.

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

Lat., 18° 09′ N.; long., 65° 27′ W. Elevation, 19.8 meters.

Instruments: Two Bosch-Omori.

		V	T_0
Instrumental constants..	E	10	17.5
	N	10	18.0

1917.			H. m. s.	Sec.	μ	μ	km.
Nov. 16	.....	ePN	3 48 ..	.....	.....	.....	.....
		eL_E	4 15 ..	30	.....	.....	.....
		eL_N	4 17 ..	25	.....	.....	.....
		M_E	4 18 30	22	40	.....	.....
		M_N	4 19 30	24	.....	60	.....
		C	4 38 ..	.....	.....	.....	.....
		F	5 01 ..	.....	.....	.....	.....

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.

	V	T_0
Instrumental constants.. E	10	15
N	10	16

1917.			H. m. s.	Sec.	μ	μ	km.	
Nov. 16	.....	S?	3 49 28	.....	.....	.....	.....	Beginning occurred while sheets were being changed.
		SR	3 55 32	.....	.....	.....	.....	
		eL	4 10 00	.....	.....	.....	.....	
		L	4 16 00	35	.....	.....	.....	
		L	4 22 20	20	.....	.....	.....	
		F	5 30 00	.....	.....	.....	.....	

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

Lat., 45° 23′ 33″ N.; long., 75° 42′ 57″ W. Elevation, 83 meters.

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

	V	T_0
Instrumental constants..	120	26

1917.			H. m. s.	Sec.	μ	μ	km.
Nov. 4	.....	eL_E	13 07 ..	16	.....	.....	.....
			13 40 ..				
7	.....	e	1 50 34	.....	.....	.....	.....
		eL?	1 51 12	9	.....	.....	.....
			1 53 ..				
		F	1 59 ..	.....	.....	.....	.....
8	.....	e	5 49 ..	6	.....	.....	.....
		e_E	5 51 42	6	.....	.....	.....
		e_E	6 05 47	2	.....	.....	.....
		e_E	6 06 13	2	.....	.....	.....
		e	6 06 56	6	.....	.....	.....
		e_E	6 09 ..	8	.....	.....	.....
			6 10 30				
		F	6 15 ..	.....	.....	.....	.....

†Dr. Klotz, since assuming the directorship of the observatory, will be unable to read all the seismograms, probably only those of tectonic origin. All the grams will be read by Ernest A. Hodgson, seismologist in charge.

TABLE 2.—*Instrumental reports, November, 1917*—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
Canada. *Ottawa. Dominion Astronomical Observatory*—Continued.								
1917.			*H. m. s.*	*Sec.*	μ	μ	km.	
Nov. 14	.....	eL.....	9 49 ..	20	.....	.....	.....	
			9 50 ..					
		iL$_N$....	9 57 ..	16	.....	.....	.....	
		L.....	10 02 ..	16	.....	.....	.....	
		F.....	10 10 ..	.....	.....	.....	.....	
15	.....	eL$_N$....	1 51 ..	14	.....	.....	.....	
			1 59 ..					
16	.....	*O*.....	*3 26 09*	.....	.....	.....	9,560	
		P.....	3 38 50	.....	.....	.....	.....	
		i.....	3 47 35	8	.....	.....	.....	
		S.....	3 49 28	10	.....	.....	.....	
		SR1...	3 55 50	.....	.....	.....	.....	
		eL.....	4 09 ..	50	.....	.....	.....	
		L.....	4 13 ..	26	.....	.....	.....	
		L.....	4 25 ..	17	.....	.....	.....	
		L.....	4 35 ..	17	.....	.....	.....	
		L.....	4 48 ..	15	.....	.....	.....	
		L.....	4 55 ..	14	.....	.....	.....	
		L.....	5 05 ..	14	.....	.....	.....	
		LR1..	5 26 ..	26	.....	.....	.....	
		F.....	6 00 ..	.....	.....	.....	.....	
		eL$_N$....	23 22 ..	24	.....	.....	.....	
			23 29 ..					
18	.....	e$_N$.....	3 17 40	5	.....	.....	.....	N-S component masked considerably by microseisms.
		eL$_N$....	3 57 ..	30	.....	.....	.....	
		L.....	4 10 ..	24	.....	.....	.....	
			4 15 ..					
		L$_N$.....	4 25 ..	16	.....	.....	.....	
		F.....	4 35 ..	.....	.....	.....	.....	
24	.....	eL$_N$....	12 10 ..	24	.....	.....	.....	N-S masked by microseisms.
			12 18 ..					

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″.

1917.			*H. m. s.*	*Sec.*	μ	μ	km.	
Nov. 4	.....	L.....	13 04 54	.....	.....	.....	.....	Markings at 12^h 43^m 06^s and 12^h 52^m 36^s may be due to air currents.
		L.....	13 14 36	.....	.....	.....	.....	
		L.....	13 19 48	.....	.....	.....	.....	
		M.....	13 49 06	.....	*300	.....	.....	
		F?....	14 57 30	.....	.....	.....	.....	
7	.....	L.....	1 49 48	.....	.....	.....	.....	F in air currents.
		M.....	1 51 00	.....	*300	.....	.....	
8	.....	L.....	6 04 48	.....	*100	.....	.....	Air currents going on.
14	.....	L.....	9 51 48	.....	.....	.....	.....	
		eL.....	9 57 18	.....	.....	.....	.....	
		M.....	9 58 00	.....	*300	.....	.....	
		F.....	10 31 42	.....	.....	.....	.....	
15	.....	L.....	1 58 12	.....	.....	.....	.....	Doubtful as to being seismic.
		M.....	1 58 30	.....	*200	.....	.....	
16	.....	eP.....	3 38 36	.....	.....	.....	10,310	
		iS.....	3 49 48	.....	.....	.....	.....	S waves well defined.
		iS.....	3 50 30	.....	.....	.....	.....	
		L.....	4 09 36	.....	.....	.....	.....	
		L.....	4 23 12	.....	.....	.....	.....	
		M.....	4 25 36	18	*9,200	.....	.....	
		iL.....	4 32 30	12-18	.....	.....	.....	
		L.....	5 45 54	.....	.....	.....	.....	
		F?....	7 01 00	.....	.....	.....	.....	
16	.....	L.....	23 21 12	.....	.....	.....	.....	
		L.....	23 41 18	.....	*100	.....	.....	
		F.....	23 56 54	.....	.....	.....	.....	
18	.....	L.....	3 36 30	.....	*50	.....	.....	
		F.....	3 42 24	.....	.....	.....	.....	
18	.....	L?....	4 01 00	.....	.....	.....	.....	
		L.....	4 10 48	.....	.....	.....	.....	
		M.....	4 21 36	.....	*200	.....	.....	
		F.....	5 02 06	.....	.....	.....	.....	
24	.....	L.....	12 11 24	.....	*50	.....	.....	
			12 16 26					
29	.....	L?....	22 56 18	.....	.....	.....	.....	
		L?....	23 03 54	.....	*50	.....	.....	
30	.....	L.....	18 05 06	.....	.....	.....	.....	
		L.....	18 08 30	.....	*50	.....	.....	
		F?....	18 25 36	.....	.....	.....	.....	

* 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″.

1917.			*H. m. s.*	*Sec.*	μ	μ	km.	
Nov. 4	.....	P.....	12 33 02	.....	.....	.....	13,000	
		S?....	12 46 43	.....	.....	.....	.....	
		L.....	12 53 41	.....	.....	.....	.....	
		M.....	13 20 14	.....	*600	.....	.....	
		F.....	13 49 45	.....	.....	.....	.....	
7	.....	P?....	0 49 12	.....	.....	.....	.....	
		M.....	1 48 18	.....	*400	.....	.....	
14	.....	P or S.	9 30 26	.....	.....	.....	.....	
		L.....	9 39 22	.....	.....	.....	.....	
		M.....	9 46 18	.....	*100	.....	.....	
		F.....	9 35 15	.....	.....	.....	.....	
16	.....	P.....	3 32 27	.....	.....	.....	9,290	
		S.....	3 42 52	.....	.....	.....	.....	
		L.....	3 57 15	.....	.....	.....	.....	
		M.....	4 11 08	.....	*3,000	.....	.....	
		F.....	6 33 27	.....	.....	.....	.....	
			VERTICAL		A_Z			
		P.....	*3 32 00*	*3-4*	.....	.....	.....	
		L.....	*4 02 00*	*24*	.....	.....	.....	
		M.....	*4 05 00*	*30*	*10*	.....	.....	
16	.....	L.....	23 19 01	.....	50	.....	.....	
18	.....	L?....	3 22 35	.....	.....	.....	.....	
		M.....	3 30 30	.....	*100	.....	.....	
18	.....	P?....	3 41 54	.....	.....	.....	.....	
		S?....	3 46 22	.....	.....	.....	.....	
		L?....	3 54 48	.....	.....	.....	.....	
		M.....	4 02 04	.....	*200	.....	.....	
		F.....	4 44 23	.....	.....	.....	.....	
28	.....	P?....	15 21 31	.....	.....	.....	.....	May not be a 'quake.
		M.....	15 23 29	.....	*100	.....	.....	
		F.....	15 26 28	.....	.....	.....	.....	
29	.....	L.....	23 00 09	.....	.....	.....	.....	
		M.....	23 04 09	.....	*300	.....	.....	
		F.....	23 09 30	.....	.....	.....	.....	
30	.....	S?....	17 44 43	.....	.....	.....	.....	
		L?....	17 48 42	.....	.....	.....	.....	
		M.....	17 55 33	.....	*500	.....	.....	
		F.....	18 05 01	.....	.....	.....	.....	

* Trace amplitude.

TABLE 3.—*Late reports (instrumental).*

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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 18.5

1917.			H. m. s.	Sec.	μ	μ	km.
Oct. 6	.....	eP....	13 02 00	.....	.....	.....	.....
		eL....	13 06 24	19	.....	.....	.....
		M.....	13 07 00	.....	*200	.....	.....
		C.....	13 09 00	.....	.....	.....	.....
		F.....	13 30 00	.....	.....	.....	.....
7	.....	eP....	15 21 54	.....	.....	.....	.....
		eL....	15 49 00	26	.....	.....	.....
		M.....	15 57 12	18	*200	.....	.....
		C.....	16 02 00	.....	.....	.....	.....
		F.....	16 09 00	.....	.....	.....	.....
14	.....	eP....	3 26 00	.....	.....	.....	.....
		eL....	3 38 54	20	.....	.....	.....
		M.....	3 43 54	19	*500	.....	.....
		C.....	3 49 00	.....	.....	.....	.....
		F.....	3 58 00	.....	.....	.....	.....
17	.....	eL....	15 09 36	26	.....	.....	.....
		M.....	15 18 42	18	*400	.....	.....
		C.....	15 24 00	.....	.....	.....	.....
		F.....	15 37 00	.....	.....	.....	.....
22	.....	eP....	7 42 06	.....	.....	.....	.....
		eL....	7 59 00	20	.....	.....	.....
		M.....	8 01 12	18	*200	.....	.....
		C.....	8 03 00	.....	.....	.....	.....
		F.....	8 48 00	.....	.....	.....	.....
23	.....	eP....	1 21 06	.....	.....	.....	.....
		L.....	1 24 00	18	.....	.....	.....
		M.....	1 24 39	18	*300	.....	.....
		C.....	1 33 00	.....	.....	.....	.....
		F.....	1 49 00	.....	.....	.....	.....
24	.....	e.....	3 03 06	.....	.....	.....	.....
		M.....	3 04 54	17	*100	.....	.....
		F.....	3 07 00	.....	.....	.....	.....
25	.....	eP....	20 06 00	.....	.....	.....	.....
		eL....	20 15 18	18	.....	.....	.....
		M.....	20 24 18	19	*200	.....	.....
		C.....	20 27 00	.....	.....	.....	.....
		F.....	20 51 00	.....	.....	.....	.....
27	.....	e.....	6 55 12	21	.....	.....	.....
		M.....	7 00 00	19	*100	.....	.....
		C.....	7 03 00	.....	.....	.....	.....
		F.....	7 21 00	.....	.....	.....	.....
28	.....	eL....	13 57 36	23	.....	.....	.....
		M.....	14 02 24	18	*200	.....	.....
		C.....	14 05 00	.....	.....	.....	.....
		F.....	14 35 00	.....	.....	.....	.....
31	.....	eP....	2 27 00	.....	.....	.....	.....
		eL....	2 35 00	20	.....	.....	.....
		M.....	2 39 42	19	*200	.....	.....
		C.....	2 44 00	.....	.....	.....	.....
		F.....	2 57 00	.....	.....	.....	.....

*Trace amplitude.

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

Lat., 42° 26′ 58″ N.; long. 76° 29′ 09″ W. Elevation, 242 meters.

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

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

1917.			H. m. s.	Sec.	μ	μ	km.
Oct. 19	.....	eLN ..	16 53 45	.....	.....	.....	.....
		FN ...	17 16 ..	.....	.....	.....	.....
22	.....	eLN ..	7 42 08	22	.....	.....	.....
		FN ...	8 10 ..	.....	.....	.....	.....

SEISMOLOGICAL DISPATCHES.[1]

Portland, Oreg, Nov. 16, 1917.

Mount Rainier has been shaken twice this week by earthquakes, according to Prof. John Plett, who has been in the Government service at Rainier National Park for many years. He declares rocks have come hurtling down the mountain side, and his office severely shaken. (Associated Press).

Melbourne, Australia, Nov. 18, 1917.

An earthquake of unusual intensity was recorded here to-day and also at Sydney. The disturbance was located approximately in the Kermadec Islands, a small British archipelago off the east coast of Australia. (Associated Press.)

MINNESOTA'S EARTHQUAKE OF SEPTEMBER 3, 1917.

By Prof. C. J. POSEY.

[Dated: Department of Geology, University of Minnesota, Minneapolis, Nov. 28, 1917.]

It is well known that earthquakes occur much more frequently in some parts of the world than in others. In some regions a shock must be rather severe in order to receive more than passing notice, while in others even a slight tremor arouses general interest, so infrequently are earthquakes experienced. It is to this latter class that the upper Mississippi valley belongs.

About 3:30 on the afternoon of September 3, 1917, a slight earthquake was felt in central Minnesota, which is of interest not so much on account of its severity, or lack of it, as of the fact of its occurrence. So far as the writer has been able to learn there are no written accounts of earthquakes within the limits of the State since its settlement. That they have occurred here we know from the testimony of old settlers. The Long Prairie Leader of September 6, 1917, quotes Hon. Wm. E. Lee, of that city, as saying that "the vicinity experienced a harder shock in 1860, one that would have done damage had the country been more thickly settled at that time." In a recent letter to Mr. Warren Upham, Mr. Ora J. Parker, of Le Sueur, writes of an earthquake there on a Sunday afternoon between 1865 and 1870, a shock that was generally talked about the next day. It is not likely that these gentlemen refer to the same disturbance, for the dates do not coincide, and the two localities referred to are so far apart that a quake severe enough to be felt at the two places would have been more generally remembered.

The shock of September 3, 1917, was most severe at Staples, notheastern Todd County; at Lincoln, some 15 miles to the southeast in Morrison County; and at Brainerd, about 30 miles to the east, in Crow Wing County. Along a line running north of east and slightly oblique to this east-west line, the disturbance was felt at places approximately 110 miles apart; and along a line connecting Brainerd and Minneapolis it was felt for a maximum distance of about 120 miles. The total area over which the shock was felt was probably not more than 10,000 square miles. The distance it was felt east of Brainerd was about the same as that west of Staples; but along the northwest-southeast line it was felt several times as far to the south of Brainerd as to the north, thus showing that the disturbance was damped more rapidly northward.

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

An inspection of the accompanying table shows that but one shock is generally reported, though two places indicate two shocks and two others mention three. The places experiencing more than one shock are so scattered that there is no apparent reason why they should have had the extra numbers. The reported duration of the shocks varied from one second at Aldrich to 25 seconds at Motley, both places ranking high in intensity. Perhaps a fair average of the duration would be 10 seconds. Those places experiencing three shocks give a total duration of less than 10 seconds. The accompanying sounds are generally described as a rumbling noise, similar to that of an incoming train or heavily laden trucks.

TABLE 1.—*Noninstrumental reports on the Staples earthquake.*

[Adapted from the U. S. Weather Bureau seismological reports for Sept., 1917.]

Day.	Station.	Intensity Rossi-Forel.	Number of shocks.	Duration.	Sounds.	Remarks.
1917.				*Secs.*		
Sept. 3, 3:30 p.m	Aldrich	5	1	1	Rumbling	
	Alexandria	3	1	.....	.....	Dishes and pans rattled.
	Brainerd	5-6	3	7	Rumbling	Bricks fell from chimneys.
	Crosby	4	1	5	Rumbling	
	Crow Wing	.....	1	.....	Rumbling	
	Eagle Bend	4-5	1	20	Rumbling	
	Fort Ripley	.....	1	.....	Rumbling	
	Henning	3-4	.....	.....	Faint	Dishes jarred.
	Grant	5	1	20	Rumbling	
	Gull Lake Dam	4-5	1	10	Rumbling	
	Jenkins	4-5	1	.....	.....	Shook buildings.
	Leader	5	1	5	Rumbling	Windows and stoves rattled.
	Lincoln	6	1	.....	Rumbling	Plaster cracked; stove pipe thrown down.
	Little Falls	.....	.....	20	Rumbling	Dishes and stove lids rattled.
	Long Prairie	3	1	.....	None	Caused some alarm windows rattled.
	McGregor	3	1	2	Rumbling	
	Merrifield	3	1	6	Rumbling	
	Milaca	3	.....	.....	.....	Dishes rattled.
	Minneapolis	2-3	1	10	None	
	Motley	5	1	25	Rumbling	
	Onamia	3	.....	.....	Rumbling	
	Park Rapids	2	1	.....	.....	
	Parkers Prairie	5	1	20	Rumbling	
	Philbrook	5	2	.....	Rumbling	
	Pierz	3	1	.....	Rumbling	
	Pillager	5	2	20	Rumbling	
	Pine River Dam.	.....	.....	.....	.....	
	Pequot	4-5	3	6	Rumbling	Goods shaken off shelf.
	Saint Cloud	2	1	.....	.....	
	Sauk Center	3	1	6	.....	
	Staples	6	1	10-20	Rumbling	Walls cracked; cement floor cracked.
	Sylvan	5	.....	.....	Rumbling	
	Verndale	.....	1	20	Rumbling	Rattled dishes and windows.
	Wadena	.....	.....	.....	Rumbling	

Based on an adapted Rossi-Forel scale, the intensities were not above VI, only three places, Staples, Lincoln, and Brainerd, being of this higher number. The greater disturbances generally follow the Crow Wing-Missisippi valleys between Staples and Brainerd. From the noninstrumental data received, the accompanying figure showing the isoseismal lines of intensity III and above has been drawn.

As might be expected from an intensity of only VI, little damage was done. The wall on one side of a brick building in Staples was cracked, as was also the cement floor in the vault of the city clerk's office. The only damage mentioned from Brainerd was the dislodging of several courses of brick from a chimney there. A chimney was thrown down near Lincoln. In no case were windows reported broken.

The cause of the earthquake is obscure. The region is one of pre-Cambrian rocks that were much shattered before Cambrian times. The rocks show no evidence of recent faulting and, both because of the small area disturbed and the weakness of the rock, it is extremely unlikely that this recent disturbance was caused by faulting. The more plausible explanation is that there was a slight settling of the material of some of the filled-in preglacial valleys in that vicinity.

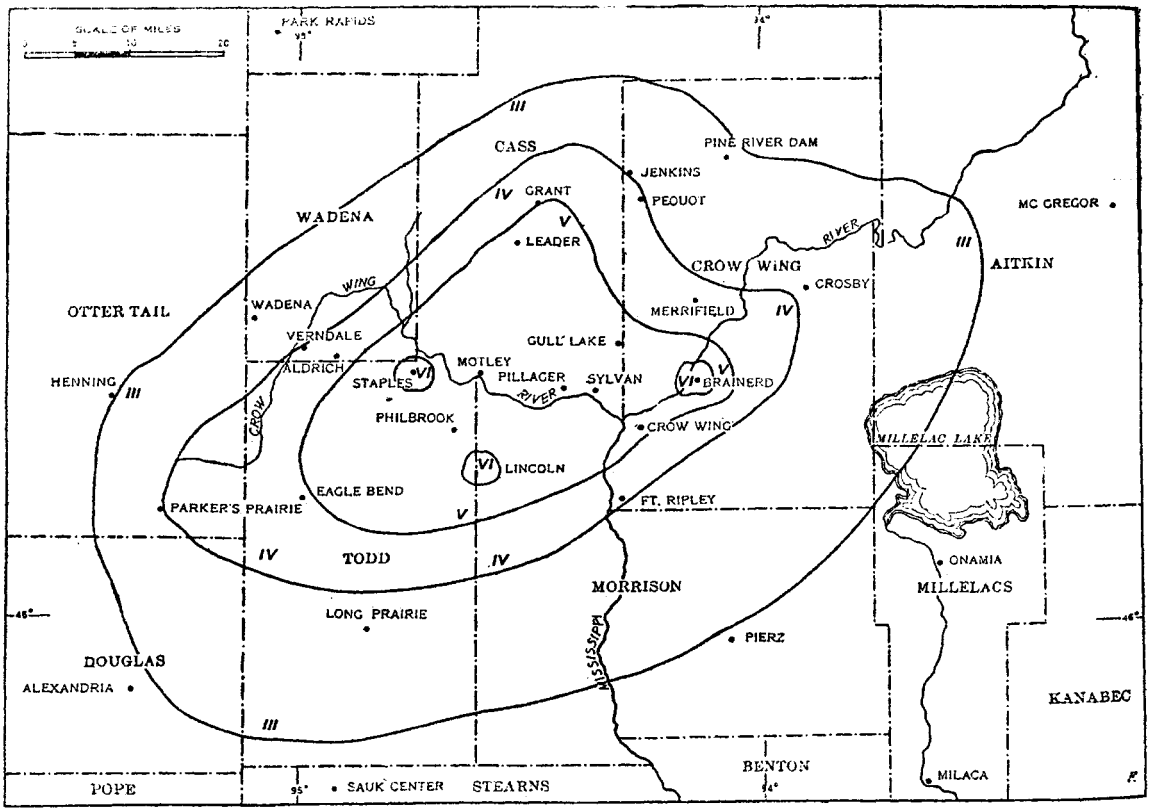

FIG. I.—Isoseismals of Staples, Minn., earthquake, Sept. 3, 1917.

SECTION V.—SEISMOLOGY.

SEISMOLOGICAL REPORTS FOR DECEMBER, 1917.

W. J. HUMPHREYS, Professor in charge of Seismological Investigations.

[Dated: Weather Bureau, Washington, D. C., February 2, 1918.]

TABLE 1.—*Noninstrumental earthquake reports, December, 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.*			
Dec. 8	9 45	Calexico	32 41	115 30	4	1	5	Rumbling...	Doors and dishes rattled	Ivan R. Ralston.
20	8 23	Barrett Dam	32 40	116 44	3	1		None		Lorenzo Watts.
		Brawley	33 00	115 31	4	1	5	Rumbling		M. D. Witter.
		Calexico	32 41	115 30	3	1	5	Rumbling		H. M. Rouse.
		Calexico	32 41	115 40	4	2	5	None		Ivan R. Ralston.
		IDAHO.								
12	12 00	Ashton	44 04	111 29	2	1	1 0	None		A. M. Slaterv.
		Chesterfield	42 53	111 52	5	1	8	None		Charles S. West.
		Fort Hull	43 09	112 10	3	1	2	None		C. H. Southworth.
		Idaho Falls	43 29	112 01	2	1		None		Anna Lee Bridges.
		Irwin	43 25	111 20	5	1	20	None		Lula Sanders.
		Pocatello	42 52	112 29	3	1		None		A. R. Teeple.
		Sugar	43 52	111 44	2	1		None		Hattie Gearhart.
		WYOMING.								
12	11 50	Bedford	42 54	110 58	5	1	30	Rumbling...		Charles G. Heiner.

TABLE 2.—*Instrumental reports, December, 1917.*

[Time used: Mean Greenwich, midnight to midnight. Nomenclature: International.

[For significance of symbols see REVIEW for July, 1917, p. 373.]

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

Lat. 57° 03′ 00″ N.; long., 135° 30′ 00″ 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.*	
Dec. 21	.....	ePg	17 56 46	.....	.....	.....	.....	
		eN	17 58 03	.....	.....	.....	.....	
		eSg	17 59 16	.....	.....	.....	.....	
		Mg	18 00 01	.....	670	.....	.....	
		eLg	18 01 02	18	.....	.....	.....	
		Mg	18 07 22	18	650	.....	.....	
		Mg	18 07 49	14	.....	950	.....	
		C	18 12 ..	12	.....	.....	.....	
		F	20 18 ..	.....	.....	.....	.....	
21	.....	eN	20 56 16	.....	.....	.....	.....	No phases.
		eg	20 57 04	.....	.....	.....	.....	
		MN	21 03 28	.....	.....	60	.....	
		F	21 35 ..	.....	.....	.....	.....	
26	.....	eN	13 35 36	.....	.....	.....	.....	No phases. Driving clock on E-component had stopped.
		MN	13 46 ..	11	.....	20	.....	
		F	13 58 ..	.....	.....	.....	.....	
28	.....	.....	.....	.....	.....	.....	.....	Imperfect record. Impossible to determine any of the phases of earthquake on this date.
29	.....	ePN	22 59 30	3	.....	.....	.....	E-component not recording.
		SN	23 07 06	10	.....	.....	.....	
		eIN	23 15 40	26	.....	.....	.....	
		MN	23 20 20	15	.....	600	.....	
		C	23 26 ..	10	.....	.....	.....	
		F	23 50 ..	.....	.....	.....	.....	

Arizona. *Tucson. 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 19; N 10 19

Date.	Character.	Phase.	Time.	Period, T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Dec. 21	.....	ePg	18 01 24	6	.....	.....	.....	
		eSg	18 07 34	.....	.....	.....	.....	
		eLg	18 13 00	14	.....	.....	.....	
		Mg	18 25 59	13	20	.....	.....	
		Fg	19 08 ..	.....	.....	.....	.....	
26	.....	eg	5 31 06	.....	.....	.....	.....	
		eN	5 31 11	.....	.....	.....	.....	
		Mg	5 37 07	7	10	.....	.....	
		MN	5 37 50	8	.....	10	.....	
		F	5 51 ..	.....	.....	.....	.....	
28	.....	P	21 21 57	4	.....	.....	.....	
		eLN	21 34 30	14	.....	.....	.....	
		eLg	21 36 29	12	.....	.....	.....	
		Mg	21 42 51	10	10	.....	.....	
		MN	21 45 30	11	.....	20	.....	
		F	22 04 ..	.....	.....	.....	.....	
29	.....	ePg	22 55 18	8	.....	.....	.....	
		ePN	22 55 22	8	.....	.....	.....	
		eSg	22 59 30	10	.....	.....	.....	
		eSN	22 59 36	12	.....	.....	.....	
		L	23 02 12	20	.....	.....	.....	
		Mg	23 03 ..	13	6,260+	.....	.....	Movement limited by brushes.
		MN	23 06 ..	11	.....	6,000+	.....	
		C	23 10 ..	14	.....	.....	.....	
30	.....	F	1 15 ..	10	.....	.....	.....	

TABLE 2.—*Instrumental reports, December, 1917*—Continued.

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.*	
Dec. 3					50	50		Tremors recorded during the 24 hours ending 16h 00m on dates given.
5					50	50		
6					50	100		

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

Lat., 37° 26′ 36″ N.; long., 121° 57′ 63″ 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.

Instrumental constants .....

Date.	Character.	Phase.	Time.	Period, T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1917.			*H. m. s.*	*Sec.*	*μ*	*μ*	*km.*	
Dec. 12	II_r	L_N	12 20 ..					P and S waves not discernable.
		L_E	12 30 ..					
		M_N	(?)					
		M_E	12 20 40	4–6		*4,000		
		F_E	12 22 ..					
		F_N	12 23 ..					
21	I_r	L_E	18 12 ..					P and S waves not discernable.
		L_N	18 13 ..					
		M	18 14 ..	10–13	*1,000	*1,000		
		F_N	18 20 ..					
		F_E	18 21 ..					
27								Very strong activity at intervals.
28								
28	I_r	L	21 38 ..	0.5				
		F	21 50 ..					
29	III_r	P	22 58 ..					
		L	23 02 ..	5–6	*10,000	*8,500		
		M_E	23 08 ..	7				
		M_N	23 10 ..	5				
		C_E	23 15 ..					
		C_N	23 19 ..					
		F_E	23 29 ..					
		F_N	23 30 ..					

* 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.

	V	T_0
Instrumental constants..	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.*	
Dec. 12		S?	11 04 23					
		L?	11 06 19					
		F	11 15 ..					
21		P	18 03 35				5,600	
		S	18 10 50					
		SRI	18 13 20					
		L	18 14 42	20				
		L	18 20 15	20				
		F	19 45 ..					
21		P?	21 01 15					
		S	21 08 23					
		L	21 18 25	16				
		F	22 00 ..					
23		eL	14 38 ..					
		L	14 45 ..					
		F	15 00 ..					
23		?e	15 59 20					
		S	16 04 10					
		L	16 05 45					
		L	16 09 30					
		F	16 30 ..					
26		e	5 30 ..					
		L	5 35 ..					
		F	5 50 ..					
26		eL	13 58 ..					
		F	14 30 ..					
28		P	21 23 21				4,820	
		S	21 29 53					
		SRI	21 33 21					
		L	21 35 ..					
		L	21 40 15	20				
		F	21 45 ..					
29		P	22 56 35				3,040	
		S	23 01 21					
		L?	23 03 ..					
		L	23 05 20	28				
30		F	00 30 ..					

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

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

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

		V	T_0	c
Instrumental constants..	E	165	5.4	0
	N	143	3.2	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.*	
Dec. 12	III	e	11 00 09					e doubtful.
		S	11 04 46					
		eL	11 06 03					
		F	11 16 ..					
21	IIIu	e	18 03 23					Microseisms present, but not heavy. P and S waves on Mainka 7m 14s.
		S	18 10 46					
		L_N	18 20 13	21				
		L_E	18 20 13	20				
		M_N	18 24 59			*2,000		
		M_E	18 26 27		*2,000			
		F	19 45 ..					
				VERTICAL.				
		e_Z	*18 03 43*					*S waves not discernible.*
		L_Z	*18 21 09*	*20*				*No distinct main.*
		F_Z	*19 18* ..					
21		e_N?	21 05 56					Heavy microseisms.
		e_E?	21 06 10					
		eL?	21 18 12					S waves in nowise discernible.
		F	22 09 ..					
23		e?	15 59 00					Heavy microseisms present.
		L	16 06 02	17				
		F	16 25 ..					

* Trace amplitude.

TABLE 2.—*Instrumental reports, December, 1917*—Continued.

Date.	Character.	Phase.	Time.	Period, T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
District of Columbia. *Washington. Georgetown University.* F. A. Tondorf, S. J.—Continued.								
1917. Dec. 26		e_N?....	*H. m. s.* 5 30 00	*Sec.*	μ	μ	*km.*	Gram very difficult.
		e_E?....	5 30 04					Microseisms present.
		S_N?....	5 34 29					
		S_E?....	5 34 41					
		eL?....	5 35 24					
		F.....	5 52 ..					
26								Quake between 13h and 14h at postea lost in changing sheets.
28		e.....	21 23 28					Heavy microseisms present.
		eL.....	21 35 00					Sinusoidal waves from 21h 49m to 22h. F waves lost in microseisms.
		L.....	21 41 18	14				
	II-III	iP_N....	22 56 28					Heavy microseisms. F uncertain.
		iP_E....	22 56 30					
		S_N.....	23 01 16					
		S_E.....	23 01 18					
		eL.....	23 03 07	17				
		M_N....	23 10 17			*1,900		
		M_E....	23 12 27		*2,200			
30		F.....	1 (ca)					
				VERTICAL.				
29		*iP_E....	*22 56 51*					*S waves not quite as certain as P waves.*
		*S_E.....	*23 01 39*					
		*L_E.....	*23 06 44*	33				*No distinct main.*
30		*F_E.....	*1 00(ca)*					

* Trace amplitude.

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

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, E–W component.

	T_0
Instrumental constant....	18.6

1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Dec. 3		e.....	4 56 12					
		M.....	5 04 00	19	100			
		F.....	5 22 ..					
9		eL.....	2 44 00					
		M.....	2 45 00	18	100			
		F.....	2 48 ..					
9		e.....	16 11 48					
		M.....	16 14 00	19	100			
		F.....	16 27 ..					
11		e.....	13 32 12					
		M.....	13 36 48	20	100			
		F.....	13 44 ..					
13		e.....	3 18 18					
		M.....	3 30 36	19	100			
		F.....	3 32 ..					
15		eL.....	16 03 42					Phases uncertain on account of wind tremors.
		M.....	16 08 00	18	100			
		F.....	16 16 ..					
17		e.....	19 27 06					Observer in the room at the time.
		M.....	19 28 00	20	300			
		F.....	19 31 ..					
21		eP.....	18 03 18					Seismograph not working properly. Impossible to determine phases.
21		eL.....	21 09 00					
		M.....	21 09 24	11	900			
		C.....	21 12 00					
		F.....	21 18 ..					

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.

	V	T_0	ϵ
Instrument constants.. E	177	3.4	4:1
Instrument constants.. N	205	3.4	4:1

(Report for December, 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.

	V	T_0
Instrumental constants.. E	10	33
Instrumental constants.. N	10	25

1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Dec. 12		e_E.....	11 04 40					Very faint. N component too disturbed by wind tremors to distinguish any seismic motion.
		F.....	11 08 ..					
21		eP_E....	18 03 36	2				
		S_E.....	18 10 58	4				
		S_N.....	18 11 06	4				
		eL_N....	18 20 30	17				
		eL_E....	18 20 46	17				
		M_E.....	18 27 08	15	600			
		M_N.....	18 27 57	15		580		
		C.....	18 32 00					
		F.....	19 02 ..					
26		e.....	5 33 00					
		M_N.....	5 38 38	10		10		
		M_E.....	5 39 ..	10	10			
		F.....	5 54 ..					
28		eP_E....	21 23 58					
		eS_N....	21 30 57					
		eS_E....	21 31 17					
		eL_E....	21 41 37	12				
		eL_N....	21 41 48	12				
		M_E.....	21 46 43	17	200			
		M_N.....	21 53 25	12		140		
		C.....	22 01 ..					
		F.....	22 29 ..					
29		eP_N....	22 56 27	4				
		eP_E....	22 56 32	4				
		S.....	23 01 27	8				
		eL_E....	23 04 25	18				
		eL_N....	23 04 50	14				
		M_E.....	23 10 27	14	450			
		M_N.....	23 15 08	12		100		
		C.....	23 28 ..					
30		F.....	00 09 ..					

TABLE 2.—*Instrumental reports, December, 1917*—Continued.

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

1917.	Character.	Phase.	Time.	Period, T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*km.*	
Dec. 30	.....	iM_E...	3 07 08	.....	*500	.....	.....	Local frost cracks: ground half bare, half iced over temperatures from 0° to −14°F on a.m. of 30th, Greenwich mean time.
		C.....	3 07 10	.....	.....	.....	.....	
		F.....	3 07 13	.....	.....	.....	.....	
30	.....	iM_E...	3 20 42	.....	*500	.....	.....	
		C.....	3 30 44	.....	.....	.....	.....	
		F.....	3 20 50	.....	.....	.....	.....	
30	.....	iM_E...	3 21 48	.....	.....	.....	.....	
		F.....	3 21 56	.....	.....	.....	.....	
30	.....	iM_E...	3 22 50	.....	.....	.....	.....	
		C.....	3 22 52	.....	*1,000	.....	.....	
		F.....	3 23 00	.....	.....	.....	.....	
30	.....	iM_E...	4 09 42	.....	*1,300	.....	.....	
		F.....	4 09 47	.....	.....	.....	.....	
30	.....	iM_E...	5 21 57	.....	*500	.....	.....	
		C.....	5 21 59	.....	.....	.....	.....	
		F.....	5 22 07	.....	.....	.....	.....	
30	.....	P_E....	6 49 50	.....	.....	.....	6?	No reports.
		iM.....	6 49 50	.....	.....	.....	.....	
		C.....	6 49 51	.....	.....	.....	.....	
		F.....	6 49 56	.....	.....	.....	.....	
30	.....	M_E....	7 03 20	.....	.....	.....	.....	
		C.....	7 03 22	.....	.....	.....	.....	
		F.....	7 03 29	.....	.....	.....	.....	
30	.....	iM_E...	7 48 44	.....	.....	.....	.....	
		C.....	7 48 45	.....	.....	.....	.....	
		F.....	7 48 49	.....	.....	.....	.....	
30	.....	P_E....	7 55 23	.....	.....	.....	10?	No reports.
		M.....	7 55 24	.....	.....	.....	.....	
		F.....	7 55 33	.....	.....	.....	.....	
30	.....	M_E....	9 11 20	.....	.....	.....	.....	
		C.....	9 11 23	.....	.....	.....	.....	
		F.....	9 11 29	.....	.....	.....	.....	
30	.....	M_E....	9 54 32	.....	.....	.....	.....	
		C.....	9 54 34	.....	.....	.....	.....	
		F.....	9 54 36	.....	.....	.....	.....	
30	.....	M_E....	9 58 14	.....	.....	.....	.....	
		C.....	9 58 16	.....	.....	.....	.....	
		F.....	9 58 20	.....	.....	.....	.....	
30	.....	M.....	10 44 52	.....	.....	.....	.....	
		C.....	10 44 54	.....	.....	.....	.....	
		F.....	10 44 57	.....	.....	.....	.....	
30	.....	M.....	10 45 41	.....	.....	.....	.....	
		F.....	10 45 43	.....	.....	.....	.....	
30	.....	M.....	12 08 14	.....	.....	.....	.....	
		F.....	12 08 16	.....	.....	.....	.....	
30	.....	M.....	14 22 11	.....	.....	.....	.....	
		F.....	14 22 12	.....	.....	.....	.....	
31	.....	iM_E...	6 40 46	.....	*500	.....	.....	†
		C.....	6 40 48	.....	.....	.....	.....	
		F.....	6 40 50	.....	.....	.....	.....	
31	.....	iM.....	9 44 08	.....	$250	.....	.....	†
		C.....	9 44 10	.....	.....	.....	.....	
		F.....	9 44 14	.....	.....	.....	.....	
31	.....	iM.....	11 26 55	.....	.....	.....	.....	
		C.....	11 27 01	.....	.....	.....	.....	
		F.....	11 27 06	.....	.....	.....	.....	

*Trace amplitude.

†Dec. 31, press report from Maynard, Mass., states that at an early hour this morning (eastern standard time) earth tremors shook houses, broke dishes, and caused people to think there had been an explosion. Several wide cracks in the ground, extending in some places more than half a mile, have been found. A large pear tree on the premises of William H. Millington on Bent Avenue was split from the base to the topmost limb. Two large crevices have been found on the Millington property.—(Note from Boston Post, Jan. 1, 1918, through Harvard University.)

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.

Instrument: Wiechert 80 kg. astatic, horizontal pendulum.

Instrumental constants.—

V	T_0	ε
80	7	5:1

1917.	Character.	Phase.	Time.	Period, T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*km.*	
Dec. 21	III...	iP.....	18 09 12	.....	.....	.....	2,011	
		iS_E...	18 12 36	.....	.....	.....	.....	
		iS_N...	18 12 42	.....	.....	.....	.....	
		L_E....	18 13 12	.....	.....	.....	.....	
		L_N....	18 13 12	18	.....	*3,000	.....	
		M_N....	18 20 24	.....	.....	.....	.....	
		M_E....	18 22 06	12	*3,000	.....	.....	
		F.....	19 00 ..	.....	.....	.....	.....	
28	III...	e_N?....	19 37 30	.....	.....	.....	.....	Shocks recorded intermittently on E-W.
		F_N....	20 10 ..	.....	.....	.....	.....	
29	II.....	iP.....	22 55 48	.....	.....	.....	2,736	
		iS_N...	23 00 09	.....	.....	.....	.....	
		iS_E...	23 00 12	.....	.....	.....	.....	
		L_N....	23 01 18	30	.....	*12,000	.....	
		L_E....	23	.....	.....	.....	.....	
		F.....	24 00 ..	.....	.....	.....	.....	

* Trace amplitude.

New York. *Buffalo. Canisius College.* John A. Curtin, S. J.

Lat., 42° 53′ 02″ N.; long., 78° 52′ 40″ W. Elevation, 190.5 meters.

Instrument: Wiechert 80 kg. horizontal.

Instrumental constants.—

V	T_0	ε
80	7	5:1

(Report for December, 1917, not received.)

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.—

	V	T_0	ε
E	72	6.6	1.5:1
N	72	7.1	3.8:1

1917.	Character.	Phase.	Time.	Period, T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*km.*	
Dec. 21	.....	eP_E...	17 59 06	.....	.....	.....	.....	N-S not recording.
		eS_E...	18 06 19	.....	.....	.....	.....	
		L_E....	18 16 49	.....	.....	.....	.....	
		M_E....	18 21 24	17	*2,060	.....	.....	
		C_E....	18 33 24	.....	.....	.....	.....	
		F_E....	19 05 24	.....	.....	.....	.....	
21	.....	eL?....	21 16 44	12	.....	.....	.....	
		F.....	21 30 ..	.....	.....	.....	.....	
28	.....	eP_E...	21 26 27	.....	.....	.....	.....	
		eP_N...	21 26 29	.....	.....	.....	.....	
		eL.....	21 35 50?	.....	.....	.....	.....	
		M.....	{21 40 00 / 21 57 00}	13	.....	.....	.....	Sinusoidal. No decided max.
		F.....	22 20 00	.....	.....	.....	.....	
29	.....	iP_E...	22 52 32	.....	.....	.....	.....	N-S not recording satisfactorily.
		iS_E...	22 57 45	.....	.....	.....	.....	
		L_E....	23 02 04	.....	.....	.....	.....	
		M_E....	23 07 04	14	*2,300	.....	.....	
		F_E....	23 55 ..	.....	.....	.....	.....	

* Trace amplitude.

TABLE 2.—*Instrumental reports, December, 1917*—Continued.

Date.	Character.	Phase.	Time.	Period, T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
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..					V: E 13, N 14	T_0: E 22, N 25	ε: E 4:1, N 4:1	
1917. Dec. 21		e_N	*H. m. s.* 18 03 17	*Sec.* 4				
		S_N	18 10 26	7				
		L_{HN}	18 18 25	24				
		M_N	18 30 18	11		*1,500		
		F_N	20 06 ..					
21		e_N	21 08 05	6				
		L_N	21 17 50	16				
		F	21 56 ..					
23		eL	16 10 50	13				
		F	16 24 ..					
26		e	14 04 07	9				
		F	14 13 ..					
28		e_N	21 30 21	8				
		eL_N	21 40 11	18				
		F	23 03 00					
29		P_N	22 56 56	6				
		S_N	23 02 18	13				
		L_N	23 06 19	43				
		M_N	23 13 25	20		*2,500		
		F	24 43 ..					
*Trace amplitude.								
Panama Canal Zone. *Balboa Heights.* The Panama Canal.								
Lat., 8° 57′ 39″ N; long., 79° 33′ 29″ W. Elevation, 27.6 meters.								
Instruments: Two Bosch-Omori, 100 kg.								
Instrumental constants..					V: 35	T_0: 20		
1917. Dec. 26		M_E	*H. m. s.* 1 25 48	*Sec.* 20	μ *300		*km.*	
		M_N	1 25 52	20		*500		
29		P	22 54 40					
		L_E	22 58 12					
		L_N	22 58 14					
		M_E	22 55 ..	20	*5,600		1,175	Direction probably NW.
		M_N	22 55 01	20		*1,500		
		F_E	23 48 40					
		F_N	23 49 ..					
* Trace amplitude.								
Porto Rico. *Vieques. Magnetic Observatory.* U. S. Coast and Geodetic Survey. F. L. Adams.								
Lat., 18° 09′ N; long., 65° 27′ W. Elevation, 19.8 meters.								
Instruments: Two Bosch-Omori.								
Instrumental constants..					V: E 10, N 10	T_0: E 17.5, N 18.0		
1917. Dec. 21		eL_E	*H. m. s.* 18 24 55	*Sec.* 24	μ		*km.*	North component not recording.
		M_E	18 36 ..	19	40			
		C	18 48 ..					
		F	19 05 ..					
29		e_E	22 57 05					
		e_N	22 57 20					
		eL_N	23 02 ..					North component not recording properly.
		eL_E	23 02 07	30				
		M_E	23 14 40	17	30			
		C	23 17 ..	12				
		F	23 56 ..					

Date.	Character.	Phase.	Time.	Period, T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
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..					V: E 10, N 10	T_0: E 15, N 16		
1917. Dec. 21		P	*H. m. s.* 18 03 26	*Sec.*	μ	μ	*km.*	
		S	18 10 36					
		L	18 14 20					
		L	18 20 00	20				
		F	19 00 ..					
21		eL	21 20 30					
		F	21 45 ..					
28		P?	21 23 26					
		S?	21 30 00					
		eL	21 36 00					
		L	21 41 30	20				
		F	22 30 ..					
29		P	22 57 16					
		S	23 02 40					
		L	23 08 50	28				
		F	24 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 80 kg. vertical seismograph								
Instrumental constants..					V: 120	T_0: 26		
1917. Dec. 21		Q	*H. m. s.* 17 54 45	*Sec.*	μ	μ	*km.* 5,040	
		P	18 03 16					
		S	18 10 ..					
		SRl	18 13 ..					
		L_N	18 17 ..	24				
		M_N	18 22 ..	20		200		
		L	18 25 ..	12				
		L	18 41 ..	12				
		L	18 46 ..	10				
		L	19 10 ..	10				
		LRl?	20 25 ..	irreg.				
		F	21 00 ..					
21		e_N	21 07 44					Probably of the order of about 5,000 kilometers, and resembles the preceding quake but is less intense.
		e_N	21 13 ..	4				
		e_N	21 13 30†	8				
		eLf	21 17 ..	16				
		L	21 18 ..	16				
		L	21 25 ..	12				
		L	21 33 ..	12				
		L_N	21 40 ..	10				
		F	22 10 ..					
23		eL_N	14 37 ..	12				
			14 45 ..					
		L_N	14 50 ..	8				
			14 55 ..					
		F	15 00 ..					
23		eS_N?	16 05 ..	5				
		eL_N	16 07 30†	15				
		L_N	16 17 ..	11				
		F	16 35 ..					
26		eL_N	13 57 ..	15				
			14 15 ..	11				
28		Q	21 14 37				5,140	
		Pn	21 23 14					
		S	21 30 04					Note the marked resemblance in these phases to those on Dec. 21.
		SRl	21 33 02					
		eL_N?	21 36 30†					
		L	21 38 ..	18				
		M_N	21 42 30†	20		80		
		L	21 48 ..	12				
		L	21 53 ..	11				
		L	22 01 ..	9				
		L	22 10 ..	9				
		L_N	22 29 ..	11				
		F	23 00 ..					
* Original time in tenths of a minute.								

TABLE 2.—*Instrumental reports, December, 1917*—Continued.

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

Date.	Character.	Phase.	Time.	Period, T.	Amplitude. A_s	Amplitude. A_N	Distance.	Remarks.
1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Dec. 29		*O*	22 50 29				3,690	Guatemala.
		P	22 57 24					
		S	23 02 53					
		eL$_{RE}$	23 06 30†					
		L	23 10 ..	30				
		M	23 16 ..					
			23 24 ..	18				
		L	23 30 ..	16				
		L	23 42 ..	12				
			24 00 ..					
30		L	00 10 ..					
		F	00 30 ..					

† Original time in tenths of a minute.

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″.

1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Dec. 20		L$_{RE}$	2 56 00					
		M	2 57 36		*300			Gradual thickening.
		F	3 28 24					
21		P						P lost changing sheet.
		S or L	18 10 18					
		Li	18 18 36					
		Li	18 21 36					
		M	18 24 12		*6000			
		F?	20 05 30					
21		L?	21 09 00					
		L	21 16 36					Air currents on P and S masked.
		L$_{RE}$	21 20 36					
		M	21 22 30		*800			
		F						
23		L	14 38 48		*50			
		F	14 42 54					
		L	16 06 36		*50			
		F	16 09 54					
26		L$_{RE}$	4 46 42					
		Li	4 47 12					
		M	4 48 00		*500			Guatemala earthquake.
		F	5 19 30					
26		Le	5 37 06					
		L	5 38 06					
		M	5 38 30		*700			Guatemala.
		F	5 55 06					
26		L$_{RE}$	6 36 30					
		M	6 36 48		*300			Guatemala.
		F	6 48 12					
26		S or L	13 55 42					
		L	13 59 24					
		M	13 59 48		*200			Guatemala.
		F	14 17 42					
28		S$_R$	21 30 06					No P waves registered.
		L$_{RE}$	21 38 00					
		L	21 41 06					
		M	21 44 30		*2300			
		L$_{RE}$	22 04 24					
		F	23 43 42					
29		L	20 27 54					
		L$_{RE}$	20 29 48					
		M	20 30 06		*300			Thickening.
		F	20 49 24					
29		P	22 57 00					
		S	23 02 36					
		Li	23 04 24	12?				
		L	23 07 12					
		Li	23 09 48					
		M	23 15 54		*4100		3,810	Disastrous Guatemala earthquake.
30		L$_{RE}$	1 01 06					
		F	2 03 36					
31		L	16 31 06					
		L	16 35 30					
		M	16 41 24		*200			Thickening.
		F	16 55 48					

* 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″.

1917.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Dec. 20		M	2 50 00		*100			
21		P	17 58 21					
		L	18 02 39					
		M	18 06 07		*7000		2,660	Alaska?
		F	19 47 46					
			VERTICAL.		A_s			
		P	*17 59 02*	*5–4*				
		S	*18 02 56*	*7–8*				
		L	*18 03 45*	*12–14*				
		M	*18 07 58*	*12*	*67*		*2,380*	
21		P	20 51 18					
		S	20 55 14					
		L	21 00 10					
		M	21 05 05		*300		2,390	Alaska.
		F	21 39 30					
22		P or L	14 20 33					
		M	14 22 32		*200			
		F	14 31 57					
23		L	14 20 37					
		M	14 22 01		*200			
		F	14 32 43					
23		P or L	15 48 54					
		M	15 50 52		*200			
		F	15 58 14					
26		P?	4 54 26					
		L	4 58 52					
		M	5 01 20		*200		?	Guatemala.
		F	5 03 18					
26		P	5 42 55					
		S?	5 45 58					
		L	5 48 57					
		M	5 51 55		*300			Guatemala.
		F	5 56 53					
26		M	6 49 27		*100			Guatemala.
26		P	13 36 04					
		S	13 40 02					
		L	13 42 01					
		M	13 44 30		*300			Guatemala.
		F	13 51 26					
28		P	21 19 20					Alaska, fine record.
		L	21 22 49					
		M	21 28 16		*2,000		2,070	
		L$_{RE}$	21 53 54					
		F	22 30 35					
			VERTICAL.		A_s			
		P	*21 19 05*					
		S	*21 22 47*					
		L	*21 25 47*					
		M	*21 27 49*		*67*		*2,220*	
		F	*22 08 00?*					
29		P	20 39 33					
		L	20 42 33					
		M	20 44 03		*200			
		F	20 49 33					
29		P	22 58 09					
		S	23 03 30					
		L	23 07 26					
		M	23 17 46		*8,500			Guatemala.
		F	25 09 24					
			VERTICAL.		A_z			
		P	*22 58 19*	*3*				
		S	*23 05 01*	*12*				
		L	*23 11 51*	*18*				
		M	*23 17 15*	*18*	*25*		*4,990*	*Guatemala.*
		F	? ? ?					
31		M	16 29 06		*100			

* Trace amplitude.

TABLE 3.—*Late reports (instrumental).*

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
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	16.7				
			N 10	15.4				
1917. Nov. 16	.....	e_E.....	*H. m. s.* 3 31 34	*Src.*	.....	μ	*km.*	
		e_N.....	3 32 54	.....	.....	.....	.....	
		eL_N...	3 50 30	32	.....	.....	.....	
		M_N....	4 02 56	32	.....	20	.....	
		F.....	5 38 ..	.....	.....	.....	.....	
Massachusetts. *Cambridge. Harvard University Seismographic Station.* J. B. Woodworth.								
Lat., 42° 22′ 35″ 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			
1917. Nov. 24	.....	L_E....	12 11 31	20	.....	.....	.....	
		F.....	12 21 47	.....	.....	.....	.....	
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.								
Instrument: Wiechert 80 kg. astatic, horizontal pendulum.								
Instrumental constants..			V	T_0	ϵ			
			80	7	5:1			
1917. Nov. 6	I.....	S_E....	14 02 12	.....	.....	.....	.....	These were omitted from the regular report for November, 1917.
		S_E....	14 02 24	.....	.....	.....	.....	
		L.....	14 03 36	.....	.....	.....	2,600	
		F_E....	14 08 ..	.....	.....	.....	.....	
		F_E....	14 10 ..	.....	.....	.....	.....	
7	I.....	eP_E...	1 41 54	.....	.....	.....	.....	
		S_E....	1 44 18	.....	.....	.....	2,400	
		S_E....	1 44 30	.....	.....	.....	.....	
		L_E....	1 45 18	.....	.....	.....	.....	
		L_E....	1 45 30	.....	.....	.....	.....	
		F_E....	1 52 00	.....	.....	.....	.....	
		F_E....	1 52 06	.....	.....	.....	.....	

SEISMOLOGICAL DISPATCHES.[1]

Idaho Falls, Idaho, December 12, 1917.

Distinct vibrations of the earth were felt here at 4 o'clock this morning. No damage was done. (Assoc. Press.)

New York, N. Y., December 27, 1917.

Guatemala City was partly destroyed by an earthquake on Christmas Day according to meager advices reaching here tonight. According to the message, the disturbance began late Tuesday night and was still continuing at 1 o'clock Wednesday afternoon. (International News.)

San Salvador, December 30, 1917.

Guatemala City has been completely destroyed by an earthquake. (Assoc. Press.)

Cable to Navy Department, December 30, 1917.

Bad earthquake yesterday finished the work of others. Everything in ruins and beyond description as a result of last night's shock. One hundred and twenty-five thousand people are in the streets.

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

Guatemala City, Guatemala, December 31, 1917.

Earth shocks that began here at 11 o'clock Christmas night, and are still continuing, caused millions of dollars of damage to this city, the death of a few persons, and injury of about 100 others. Every house in the city was rendered uninhabitable, and the entire population is living in the parks and open spaces. The first shocks were light, giving warning of the heavy ones that might follow. The devastation wrought was widespread. (Assoc. Press.)

EARTHQUAKES FELT IN THE UNITED STATES DURING 1917.

W. J. HUMPHREYS,
Professor in Charge of Seismological Investigations.

[Dated: Weather Bureau, Washington, D. C., Feb. 2, 1918.]

During the year 1917, 112 separate earthquakes strong enough to be felt were reported from different parts of the continental United States, as listed in the accompanying Table 1 and graphically represented (a dot for each report) on Chart XI (XLV–122) at the end of this issue of the REVIEW.

None of the 'quakes reported resulted in any appreciable damage.

'Quakes of moderate intensities, *V–VI* (Rossi-Forel), occurred in California on March 3, April 13, on six dates in May, and on August 19 and 28; at Panhandle, in Texas, on March 28; in northeastern New York on May 22, and in the State of Washington on November 12 and 14.

A 'quake of intensity *VII* on July 7 broke the Los Angeles aqueduct.

On April 9 a 'quake of intensity *VI*, central in eastern Missouri, was felt in 10 States. A second shock of intensity *V* followed the first 2 hours and 43 minutes later, and was felt in both Missouri and Illinois. This quake is discussed in detail by R. H. Finch in this REVIEW, April, 1917, pages 187–188.

On September 3 a 'quake of intensity *VI* was reported from 34 separate points in Minnesota, central about Brainerd, Lincoln, and Staples. This 'quake is discussed in detail by C. J. Posey in this REVIEW, November, 1917, pages 556–558.

TABLE 1.—*Places in the United States reporting earthquakes during 1917.*

[Consult also Chart XI (XLV–122) in this issue.]

Place.	Approximate latitude (north).	Approximate longitude (west).	Number of quakes reported.	Place.	Approximate latitude (north).	Approximate longitude (west).	Number of quakes reported.
ALABAMA.	° ′	° ′		CALIFORNIA—con.	° ′	° ′	
Greensboro.....	32 41	87 32	1	Cedarville.....	41 32	120 08	2
Rosemary.....	32 40	87 30	1	Cloverdale.....	38 46	123 00	1
ARKANSAS.				Coachella.....	33 40	116 10	1
				El Cajon.....	32 48	116 58	1
				Eureka.....	40 48	124 11	3
Black Rock.....	36 08	91 04	1	Fairmont.....	34 45	118 25	1
Corning.....	36 23	90 33	1	Ferndale.....	40 35	124 16	1
Hardy.....	36 19	91 22	1	Fillmore.....	34 23	118 54	1
Marked Tree.....	35 32	90 22	1	Heber.....	32 45	115 31	1
Osceola.....	35 43	89 54	1	Hollister.....	36 50	121 20	1
Paragould.....	36 05	90 25	1	Indio.....	33 43	116 12	2
Piggott.....	36 22	90 10	1	Julian.....	33 05	116 39	5
Pocahontas.....	36 15	90 55	1	Lakeport.....	39 04	122 56	1
St. Francis.....	36 25	90 06		Lone Pine.....	36 37	118 01	2
CALIFORNIA.				Los Angeles.....	34 03	118 15	2
				Los Gatos.....	37 12	121 58	3
				Markleeville.....	38 48	119 46	1
Banning.....	33 58	116 52	1	Mayfield.....	37 23	122 05	1
Barrett Dam.....	32 40	116 44	2	Mecca.....	33 34	116 05	2
Berkeley.....	37 52	122 16	3	Mesa Grande.....	33 11	116 45	1
Bishop.....	37 22	118 24	4	Mojave.....	35 03	118 12	1
Blythe.....	33 35	114 38	1	Mount Wilson.....	34 13	118 04	3
Boulevard.....	32 38	116 15	1	Neenach.....	34 47	118 37	1
Brawley.....	33 00	115 31	4	Nellie.....	33 22	116 52	1
Cahuila.....	33 32	116 45	4	Nordhoff.....	34 35	119 14	1
Calexico.....	32 41	115 30	22	Ojai.....	34 25	119 12	3
Campbell.....	37 17	121 57	1	Olancha.....	36 15	118 00	1
Carmel.....	36 34	121 56	1	Owenyo.....	36 40	118 01	1

TABLE 1.—*Places in the United States reporting earthquakes during 1917*—Continued.

[Consult also Chart XI (XLV–122) in this issue.]

Place.	Approximate latitude (north).	Approximate longitude (west).	Number of quakes reported.
CALIFORNIA—con.			
Oxnard	34 12	119 08	1
Point Loma	32 43*	117 15	1
Salinas	36 36	121 40	4
San Francisco	37 48	122 26	5
San Jose	37 20	121 54	3
San Luis Obispo	35 18	120 39	3
Santa Barbara	34 23	119 40	2
Santa Cruz	36 57	122 02	2
Santa Maria	34 58	120 28	3
Saugus	34 23	118 33	2
Soledad	36 38	121 16	1
Spreckles	36 35	121 38	1
Stanford University	37 27	122 09	2
Table Bluff	40 39	124 15	1
Towle	39 14	120 48	1
Ventura	34 17	119 17	2
Victorville	34 32	117 18	1
Warner Springs	33 17	116 39	1
Watsonville	36 55	121 46	2
Yorba Linda	33 51	117 50	3
IDAHO.*			
Ashton	44 04	111 29	1
Chesterfield	42 53	111 52	1
Cottonwood	46 03	116 20	1
Fort Hall	43 09	112 10	1
Idaho Falls	43 29	112 01	1
Irwin	43 25	111 20	1
Pierson	44 03	114 48	1
Pocatello	42 52	112 29	1
Sugar	43 52	111 44	1
ILLINOIS.			
Alton	38 54	90 12	1
Anna	37 27	89 17	2
Bloomington	40 29	89 01	1
Cairo	37 00	89 10	2
Carbondale	37 45	89 14	1
Carlinville	39 17	89 53	1
Carterville	37 46	89 05	1
Chester	37 55	89 50	1
Danville	40 09	87 36	1
Decatur	39 52	88 58	1
Edwardsville	38 48	89 59	1
Elizabethtown	37 27	88 12	1
Equality	37 44	88 22	1
Fairview	40 38	90 12	1
Golconda	37 22	88 31	1
Grafton	38 59	90 26	1
Greenville	38 53	89 25	1
Griggsville	39 42	90 43	1
Harrisburg	37 45	88 34	1
Highland	38 44	89 42	1
McLeansboro	38 07	88 34	1
Mascoutah	38 30	89 48	1
Morrisonville	39 31	89 30	1
Nashville	38 22	89 23	1
New Athens	38 18	89 52	1
New Burnside	37 34	88 45	1
Pulaski	37 15	89 11	1
Quincy	39 55	91 22	1
Shawneetown	37 42	88 10	1
Sparta	38 08	89 43	1
ILLINOIS—cont'd.			
Springfield	39 48	89 39	1
Staunton	39 01	89 50	1
Valmeyer	38 18	90 19	2
Vienna	37 25	88 54	1
Waterloo	38 19	90 11	1
White Hall	39 27	90 25	1
INDIANA.			
Evansville	37 58	87 33	1
Treviac	37 16	86 21	1
IOWA.			
Cedar Rapids	41 56	91 39	1
Clinton	41 50	90 13	1
Davenport	41 30	90 38	1
Eldridge	41 38	90 35	1
Keokuk	40 22	91 26	1
Keosauqua	40 45	91 56	1
KANSAS.			
Lawrence	38 58	90 15	1
KENTUCKY.			
Bardwell	36 53	89 01	1
Hickman	36 35	89 11	1
Laketon	36 52	89 00	1
Milburn	36 49	88 53	1
Paducah	37 06	88 37	1
Smithland	37 09	88 29	1
Water Valley	36 35	88 50	1
Wickliffe	36 58	89 06	1
MINNESOTA.			
Aldrich	46 23	94 53	1
Alexandria	45 53	95 20	1
Brainerd	46 21	94 08	1
Crosby	46 30	93 51	1
Crow Wing	46 17	94 15	1
Eagle Bend	46 10	95 00	1
Fort Ripley	46 09	94 17	1
Henning	46 20	95 23	1
Grant	46 37	94 33	1
Gull Lake Dam	46 27	94 16	1
Jenkins	46 38	94 17	1
Leader	46 30	94 36	1
Lincoln	46 13	94 37	1
Long Prairie	45 58	94 50	1
McGregor	46 37	93 16	1
Merrifield	46 30	94 06	1
Milaca	45 44	93 38	1
Minneapolis	44 59	93 18	1
Motley	46 20	94 36	1
Onamia	46 04	93 38	1
Parkers Prairie	46 10	95 16	1
Philbrook	46 18	94 40	1
Pierz	45 58	94 02	1
Pillager	46 20	94 24	1
Pine River Dam	46 42	94 23	1
Pequot	46 37	94 16	1
Sauk Center	45 47	94 57	1
Staples	46 22	94 45	1
Sylvan	46 21	94 22	1
MINNESOTA—con.			
Verndale	46 24	94 59	1
Wadena	46 27	95 06	1
Red Lake	47 55	96 00	1
MISSISSIPPI.			
Evansville	34 38	90 19	1
MISSOURI.			
Allenton	38 30	90 40	1
Augusta	38 34	90 51	1
Bismarck	37 48	90 36	1
Bloomfield	36 54	89 53	1
Brule	37 45	90 48	1
Cape Girardeau	37 20	89 31	2
Columbia	38 57	92 20	1
Des Arc	37 18	90 37	1
De Soto	38 06	90 33	2
Doniphan	36 38	90 47	1
Dudley	36 48	90 04	1
Farmington	37 47	90 24	1
Fredericktown	37 43	90 16	1
Glencoe	38 32	90 36	1
Graniteville	37 38	90 44	1
Greenville	37 07	90 25	1
Hannibal	39 41	91 20	1
Hematite	38 13	90 30	2
Hendrickson	36 50	90 26	3
High Ridge	38 27	90 32	1
Hilderbrand			2
Hogan	37 32	90 39	1
Irondale	37 51	90 38	2
Ironton	37 36	90 37	2
Jackson	37 25	89 40	2
Kansas City	39 05	94 37	1
Kimmswick	38 23	90 22	1
Manchester	38 36	90 31	1
Marquand	37 27	90 07	1
New Madrid	36 35	89 32	2
Oak Ridge	37 34	89 48	2
Orchard Farm	38 51	90 27	1
Palmer	37 49	90 54	1
Perryville	37 45	89 51	2
Pevely	38 17	90 30	1
Poplar Bluff	36 46	90 21	1
Potosi	37 57	90 46	1
Rolla	37 57	91 45	1
Saco	37 22	90 25	1
St. Charles	38 48	90 30	1
St. Genevieve	37 58	90 02	2
St. Louis	38 38	90 12	1
St. Mary's	37 53	89 59	2
St. Peter's	38 48	90 40	1
Salem	37 40	91 30	1
Seventysix	37 45	89 38	2
Sikeston	36 54	89 34	1
Silvermine	37 34	90 27	2
Steelville	37 58	91 20	2
Sturdivant	37 03	90 00	1
Sulphur Springs	38 20	90 25	2
Uniontown	37 38	89 45	1
Van Buren	36 58	91 01	1
Warrenton	38 48	91 07	1
Wittenberg	37 45	89 32	1
Zion	37 26	90 17	2
MONTANA.			
Butte	46 00	112 31	1
NEVADA.			
Fallon	39 30	118 48	1
Rebel Creek	41 39	117 45	1
Winnemucca	40 58	117 43	2
NEW JERSEY.			
Atlantic City (Chelsea and Ventnor)	39 21	74 26	4(?)
Northfield	39 22	74 32	4(?)
Ocean City	39 18	74 34	1(?)
Pleasantville	39 23	74 32	1(?)
Somers Point	39 18	74 35	1(?)
NEW YORK.			
Alexandria Bay	44 22	75 54	2
Ausable	44 31	73 34	1
Canton	44 36	75 10	3
Gabriels	44 25	74 10	1
Glens Falls	43 21	73 36	1
Ogdensburg	44 42	75 30	1
SOUTH CAROLINA.			
Summerville	33 03	80 14	
TENNESSEE.			
Hornbeck	36 19	89 21	1
Jefferson City	36 08	83 30	2
Knoxville	35 56	83 58	1
Memphis	35 09	90 03	1
Newport	35 56	83 12	1
Springville	36 18	88 14	1
Talbott	36 08	83 24	2
Tiptonville	36 24	89 30	1
TEXAS.			
Panhandle	35 20	101 20	1
VERMONT.			
Ferrisburg	44 13	73 15	1
Montpelier	44 16	72 34	1
WASHINGTON.			
Ashford	46 48	121 56	1
Cedar Lake	47 24	121 43	1
Glenome	46 32	122 09	1
Longmire	46 45	121 50	3
Summit Inn	47 28	121 26	1
WISCONSIN.			
Madison	43 05	89 23	1
WYOMING.			
Bedford	42 54	110 58	1
Medicine Bow	41 52	106 08	1
Rawlins	41 47	107 15	1
Rock River	41 34	105 59	1

* Erase the red dot at Boise, Idaho, on Chart XI (XLV—122).