

SECTION V.—SEISMOLOGY.

SEISMOLOGICAL ABBREVIATIONS USED IN THE INSTRUMENTAL REPORTS.

CHARACTER OF THE EARTHQUAKE.

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

PHASES.

- P = (undæ primæ) = first preliminary tremors.
- PR_n = P waves reflected *n* times at the earth's surface.
- S = (undæ secundæ) = second preliminary tremors.
- SR_n = S waves reflected *n* times at the earth's surface.
- PS = transformed waves; longitudinal (P) to transversal (S) or vice versa.
- L = (undæ longæ) = long waves in the principal portion.

- M = (undæ maximæ) = greatest motion in the principal portion.
- C = (coda) = trailers.
- O = time at epicenter.
- L_{r ep1} = long waves reaching the station from the anti-epicenter (40,000 km. - Δ).
- L_{r ep2} = long waves again reaching the station from the anti-epicenter (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), 1000 mm.

INSTRUMENTAL CONSTANTS.

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

SEISMOLOGICAL REPORTS FOR JANUARY, 1918.

W. J. HUMPHREYS, Professor in Charge.

[Dated: Seismological Investigations, Weather Bureau, Washington, Mar. 2, 1918.]

TABLE 1.—Noninstrumental earthquake reports, January, 1918.

Day.	Approximate time, Greenwich Civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity Rossi-Forel.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
CALIFORNIA.										
1918. Jan. 14	H. m.	Eureka.....	40 48	124 11		1	M. s.			U. S. Weather Bureau.
16	12 00	Brawley.....	33 00	115 31	3	1		None.....		M. D. Witter.
MAINE.										
14	7 20	Calais.....	45 11	67 17	3	1		Rumbling..	Like coal through shute.....	U. S. Weather Bureau.
	7 20	Eastport.....	44 54	66 59	3	1		Rumbling..	Like coal through shute.....	U. S. Weather Bureau.
TENNESSEE.										
17	16 45	Knoxville.....	35 56	83 58	5	1	0 03	Explosion...	May have been dynamite on ice jam in river.	U. S. Weather Bureau.

TABLE 2.—Instrumental seismological reports, January, 1918.

[Time used: Mean Greenwich, midnight to midnight. Nomenclature: International.]
 [For significance of symbols, see REVIEW for January, 1918, p. 34.]

Date.	Char-acter.	Phase.	Time.	Pe-riod. T.	Amplitude.		Dis-tance.	Remarks.
					A _m	A _N		

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: $\begin{matrix} V & T_0 \\ E & 10 & 16.6 \\ N & 10 & 15.4 \end{matrix}$
 (Report for January, 1918, not received.)

Arizona. *Tucson. Magnetic Observatory.* U. S. Coast and Geodetic Survey. F. F. 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: $\begin{matrix} V & T_0 \\ E & 10 & 14 \\ N & 10 & 19 \end{matrix}$

1918.		H. m. s.	Sec.	μ	μ	km.	
Jan. 4	eP _N	4 36 54	5				
	eS _N	4 42 20					
	eL _N	4 48 32					
	eL _S	4 48					
	M _N	4 47 13	6		30		
	M _S	4 47 26	8				
	F	5 04	7				
25	e _s	1 25 38					No definite phases.
	S _N	1 26 07					
	M _N	1 36 00	7		60		
	M _S	1 39 01	6		40		
	F	2 13					

California. *Berkeley. University of California.*

Lat., 37° 52' 10" N.; long., 122° 18' 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.

1918.		H. m. s.	Sec.	μ	μ	km.	
Jan. 21				200	100		Microseisms during 24 hours preceding 10 h. 0 min. (G. M. T.) on dates given.
27				200	300		
28				100	100		

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

Lat., 37° 26' 30" N.; long., 121° 57' 03" W. Elevation, 27.43 meters.

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

Date.	Char-acter.	Phase.	Time.	Pe-riod. T.	Amplitude.		Dis-tance.	Remarks.
					A _m	A _N		

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.

(No seismic disturbance was observed during the month.)

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: $\begin{matrix} V & T_0 \\ E & 110 & 6.4 \end{matrix}$

1918.		H. m. s.	Sec.	μ	μ	km.	
Jan. 4	PP	4 38 25					Microseisms present.
	S	4 43 05					
	L	4 45 45	24				
	F	5 26					
13	ST	0 02 55					Microseisms present.
	L	0 04 00					
	F	0 15					
25	P	1 26 40					Microseisms present.
	ST	1 31 12					
	L	1 34 15	24				
	F	2 15					
30	P	21 31 02				8,750	
	S	21 41 00					
	L	22 01 00					
	F	22 40					

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: $\begin{matrix} V & T_0 & e \\ E & 165 & 5.4 & - \\ N & 143 & 5.2 & - \\ Z & 30 & 5.0 & - \end{matrix}$

1918.		H. m. s.	Sec.	μ	μ	km.	
Jan. 4	eP	4 37 02					Heavy microseisms. No distinct Main.
	S _N	4 42 31					
	eL _N	4 46 24	29				
	F	5 13					
12	e [†]	23 59 27					Heavy microseisms, e very uncertain.
13	S	0 03 00					
	eL	0 03 54	7				
	F	0 25					
25	e	1 26 38					Heavy microseisms, S doubtful.
	S _N	1 33 31					
	S _S	1 33 35					
	eL	1 37 12	16				
	L	1 41 01	12				
	F	2 20					
30	iP _N	21 31 01					Heavy microseisms. No distinct M. F lost in microseisms.
	eP _N	21 31 03					
	iS	21 41 00					
	L _N	22 01 14	24				
	L _S	22 03 22	17				
	VERTICAL						
	iP	21 51 02					
	iS	21 41 00					
	L	22 07 35	16				
	F	22 17					

Date.	Char-acter.	Phase.	Time.	Pe-riod. T.	Amplitude.		Dis-tance.	Remarks.
					A _B	A _N		

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... 18.5

1918.	Date.	Char-acter.	Phase.	Time.	Sec.	μ	μ	km.	Remarks.
Jan. 4	4	eP		4 52 00					
		eL		5 04 18					
		M		5 07 18	20	*500			
4	4	eP		16 03 48					
		eS		16 06 54					
		eL		16 11 48	23				
		M		16 21 12	20	*400			
		C		16 34					
12	12	e		18 54 24					
		M		19 05 00	19	*100			
		F		19 07					
15	15	e		16 04 36	25				
		eL		16 13 00	19	*300			
		M		16 19					
		C		16 21					
21	21	e		20 20 24					Beginning and final phases lost in tremors due to rapid change in temperature.
		M		20 26 30	19	*1100			
		C		20 28					
24	24	e		15 08 30					
		M		15 13 00					
		F		15 40		*200			
25	25	eS		1 39 54					
		eL		1 50 30	20				
		M		1 54 42	24	*600			
		C		2 03					
30	30	eP		21 28 12					
		B		21 36 06					
		eL		21 42 42	23				
		M		21 44 00	20	*4400			
		C		21 48					

* 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... $\begin{matrix} V & T_0 & \epsilon \\ E & 177 & 3.4 & 4.1 \\ N & 205 & 3.4 & 4.1 \end{matrix}$

(Report for January, 1918, 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... $\begin{matrix} V & T_0 & \epsilon \\ E & 10 & 32 \\ N & 10 & 27 \end{matrix}$

1918.	Date.	Char-acter.	Phase.	Time.	Sec.	μ	μ	km.	Remarks.
Jan. 4	4	eS _N		4 42 58					
		eL _N		4 46					
		eL _M		4 46 38				10	
		M _N		4 47 08	4				
		F		4 47 44	20	30			
25	25	eP _N		1 31 49					
		eP _M		1 32 10					
		eL _M		1 37					
		M _N		1 38 20	8	50			
		F		1 39 10	8		20		
30	30	eP		21 31 06					
		M		21 41 10			10		
		M		21 44 14					
		F		21 59					

Date.	Char-acter.	Phase.	Time.	Pe-riod. T.	Amplitude.		Dis-tance.	Remarks.
					A _B	A _N		

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... $\begin{matrix} V & T_0 & \epsilon \\ E & 80 & 23 & 0 \\ N & 50 & 23 & 4.1 \end{matrix}$

1918.	Date.	Char-acter.	Phase.	Time.	Sec.	μ	μ	km.	Remarks.
Jan. 3	3	O		16					
		e _N		16 33 38	16				Record irregular, masked by microseisms and traffic jara.
		L _N		16 39 57	20				
		F		16 52 ca					
4	4	O		4 29 55				3,910	Destructive at Guatemala City.
		P _N		4 37 14					
		S _N		4 42 56	6				
		eL _M		4 45 59	40				Undamped pendulum.
		M _N		4 49 43	26				
		F		6 15 36					
12	12	OP		23 46 13				3,914	P masked by microseisms.
		S _N		23 59 07					
13	13	S _N		0 00 14	6				
		eL _M		0 03 23	13				
		L _N		0 03 43	64				
		L _M		0 03 46	64				
		L _N		0 05 52	64				
		M _N		0 06 12	9				Undamped pendulum.
		M _N		0 06 18					
C _N		0 07 12							
13	13	OP		1					
		L _N		2 02 31	16				Masked by microseisms.
		L		2 03 21	16				
		L		2 04 25	10				
		F _N		2 13 27					
14	14	OIM		4 47 25				0	Frost crack at station. A. of trace = 0.3 mm.
		C		4 47 29					
		F		4 47 32					
14	14	OIM		7 22 28				0	Frost crack at station.
		C		7 22 29					
		F		7 22 36					
15	15	OP		23 35 ca				4,900?	Doubtful record in microseisms.
		S _N		23 56 39					
		i		23 58 07					
16	16	eL _N		0 03 10	16				
		F _N		1 42 ca					
16	16	OP		13					Doubtful record in microseisms.
		e _N		13 17 55					
		e		13 18 27					
		eL _M		13 41 45	40				
		L _N		13 43 23	20				
25	25	OP		1 21 38				4,600?	Much masked by microseisms.
		S _N		1 29 39					
		e _N		1 33 15					
		eL _M		1 35 26	45?				
		eL _M		1 35 29	40				Undamped pendulum.
		M _N		1 37 54	25				
		M _N		1 41 37					
C _N		1 43 52							
30	30	L _N		2 20 28	15				
		F _N		2 21 ca					
		O		21					
		e _N		21 33 33	6				Record lost in tangled lines of diurnal tilt.
		e _N		21 40 34	16				

Date.	Character.	Phase.	Time.	Per- iod. T.	Amplitude.		Dis- tance.	Remarks.
					A _n	A _w		

Missouri. *Saint Louis. St. Louis University.* Geophysical Observa-
tory. J. B. Goesso, S. J.

Lat., 35° 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.. $\frac{V}{T_0} \frac{e}{s}$
80 7 5:1

1918.			H. m. s.	Sec.	μ	μ	km.		
Jan. 25	I.	P _n	1 26 42				1,400	Microseisms daily throughout the month.	
		S _n	1 30 24						
		L.....	1 31 18	6					N-S masked by wind disturb- ances.
		L.....	1 35 36	9					
		L.....	1 36 48	6					
		L.....	1 40 24	6					
30	I.	L.....	1 44 12	6				F masked by mi- croseisms.	
		F.....	1 50						
		P _n	21 40 30						
		P _w	21 40 36						
		L _n	21 43 06		*6,000				
		L _w	21 44 00		*6,000				

* 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.. $\frac{V}{T_0} \frac{e}{s}$
80 7 5:1

(Report for January, 1918, 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.. $\frac{V}{T_0} \frac{e}{s}$
 $\begin{matrix} E & 72 & 5 & 1.5:1 \\ N & 72 & 5 & 3.8:1 \end{matrix}$

1918.			H. m. s.	Sec.	μ	μ	km.	
Jan. 25		eL.....	1 30 00					Magnified by reso- nance with mi- croseisms.
		F.....	1 44					
		eF _n	21 36 24					
30		IP _n	21 36 24					8 not discernible.
		eL _w	21 50 ca	20				
		L.....	21 55 ca					
		L.....	21 55 ca					

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).

Instrumental constants.. $\frac{V}{T_0} \frac{e}{s}$
 $\begin{matrix} E & 13 & 22 & 4:1 \\ N & 14 & 25 & 4:1 \end{matrix}$

1918.			H. m. s.	Sec.	μ	μ	km.	
Jan. 4		eL.....	4 45 56					Possibly not seis- mic.
		F.....	5 02					
		eP _n	1 32 24	8				
25		L _w	1 36 36	23				
		F.....	2 10					
		F.....	2 10					
30		S _w	21 35					
		S _n	21 40 54	4				
		F _w	22 22					

Date.	Character.	Phase.	Time.	Per- iod. T.	Amplitude.		Dis- tance.	Remarks.
					A _n	A _w		

Panama Canal. *Balboa Heights.* Governor, Panama Canal.

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

Instruments: Two Bosch-Omori, 100 kg.

Instrumental constants.. $\frac{V}{T_0} \frac{e}{s}$
10 20

1918.			H. m. s.	Sec.	μ	μ	km.	
Jan. 4		P _n	4 35 36				1,127	Probable direction NW.
		P _w	4 35 44					
		L _w	4 38 58					
		L _n	4 39 04					
		M _w	4 35 40	20	*1,500			
		M _n	4 40 22	20	*500			
8		F _w	4 58 50					
		F _n	4 59 30					
		M _w	9 13 48	20	*100			
		M _n	9 14 00	20	*200			
25		P _w	1 23 56				1,255	Probable direction NW.
		P _n	1 24 00					
		L _w	1 27 44					
		L _n	1 27 48					
		M _w	1 24 01	20	*4,000			
		M _n	1 24 04	20	*100			
26		F _w	1 55 00					F uncertain.
		F _n	1 57 00					
		L _w	18 01 20					
		L _n	18 01 25					
29		M _w	18 01 28	20	*1,200			F uncertain.
		M _n	18 01 30	20	*2,200			
		M.....	0 04 20	20	*100	*100		

* Trace amplitude.

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

Lat., 18° 08' 48" N.; long., 66° 26' 54" W. Elevation, 19.8 meters.

Instruments: Two Bosch-Omori.

Instrumental constants.. $\frac{V}{T_0} \frac{e}{s}$
 $\begin{matrix} E & 10 & 13 \\ N & 10 & 13 \end{matrix}$

1918.			H. m. s.	Sec.	μ	μ	km.	
Jan. 4		eP _w	4 36 53					
		eL _w	4 42 16					
		eL _n	4 42 21	18				
		M _w	4 48 05	17		20		
		M _n	4 48 50	18	60			
		C.....	4 54	17				
16		F.....	5 03	12				
		eL.....	13 33	14				
		M _w	13 35 20	12		10		
		M _n	13 37 15	12	20			
25		F.....	13 57					
		eP _w	1 25 20	4				
		eP _n	1 25 35					
		eS _w	1 29 35					
		eL _w	1 32 15	20				
		eL _n	1 32 20	20				
		M _w	1 35 20	18	50			
		M _n	1 36 15	15		20		
C.....	1 42	16						
F.....	1 57							

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.. $\frac{V}{T_0} \frac{e}{s}$
 $\begin{matrix} E & 10 & 15 \\ N & 10 & 15 \end{matrix}$

1918.			H. m. s.	Sec.	μ	μ	km.	
Jan. 4		e.....	4 43					Phases indistinct.
		eL.....	4 49					
		F.....	5 10					
13		e.....	0 02					
		F.....	0 10					
25		e.....	1 29					Phases lost whi changing sheet
		F.....	2 00					
30		P.....	21 30 52				8,490	
		S.....	21 40 37					
		F.....	22 10					

Date.	Character.	Phase.	Time.	Per-iod. T.	Amplitude.		Dis-tance.	Remarks.
					A ₁	A ₂		

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: $\frac{V}{T_0}$ 120 $\frac{T_0}{26}$

1918.		H. m. s.	Sec.	μ	μ	km.	
Jan. 4	eS [†]	4 43 44					Irregular periods mingled with microseisms.
	eL.....	4 46 30†					
	L.....	4 49 ..	24				
	Lw.....	4 54 to					
	F.....	5 20 ..					
13	e.....	0 00 00	3				
	eL.....	0 00 38	4				
	eLw.....	0 01 04	6				
	M.....	0 03 35†	7				
	F.....	0 10 ..					
25	O.....	1 21 32	ca.			3,600ca	Δ from eL-1 [†] . No trace of S. Heavy microseisms.
	P.....	1 22 20	2				
	e.....	1 35 48†	2				
	eL.....	1 37 24	28				
	L.....	1 41 ..	22				
30	O.....	21 18 48				8,560	
	IF.....	21 30 36					
	IS.....	21 40 24					
	L.....	21 42 12					
	eL.....	21 50 30†	28				
	L.....	22 05 ..	18				
	Lw.....	22 09 ..	15				
	L.....	22 20 ..	15				
	L.....	22 20 ..	15				
	F.....	22-35					

† Original time was 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... $\frac{T_0}{18}$. Pillar deviation, 1 mm. swing of boom=0.59'.

1918.		H. m. s.	Sec.	μ	μ	km.	
Jan. 4	eL.....	4 47 36					P and S not recorded.
	eL.....	4 49 24					
	IL.....	4 50 00					
	M.....	4 50 42		*1,900			
	F.....	5 26 18					
4	eL.....	16 55 18					Distant quake. Marked gradual thickening.
	M.....	17 04 00		*600			
	F.....	17 35 48					
12	L.....	23 34 12		*100			Air currents going on.
	L.....	23 38 54					
13	L.....	0 04 36		*200			Air currents going on.
	L.....	0 12 24					
16	L.....	13 46 30					May not be seismic.
	eL.....	13 51 21					
	M.....	13 55 48		*300			
	F.....	14 23 12					
21	L.....	20 54 06					Gradual thickening.
	L.....	20 58 06					
	M.....	21 04 48		*100			
	F.....	21 23 00					
24	eL.....	15 42 48					Gradual thickening.
	e.....	15 46 54					
	eL.....	15 50 18					
	M.....	15 54 12		*200			
	F.....	16 30 54					
25	P?.....	1 25 36					Air currents going on.
	e.....	1 29 48					
	eS.....	1 34 00					
	eL.....	1 37 12					
	IL.....	1 37 48					
	IL.....	1 40 54					"A. C."
	M.....	1 41 54		*2,400			
	F.....	1 41 54					
	IS.....	21 41 36					
	M.....	21 41 48		*1,700			
30	L.....	21 59 18					P not definite. Amplitude of S waves gradually became less.
	L.....	22 07 00					
	L.....	22 07 00					
	F.....	22 07 00					

* Trace amplitude.

Date.	Character.	Phase.	Time.	Per-iod. T.	Amplitude.		Dis-tance.	Remarks.
					A ₁	A ₂		

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'.

1918.		H. m. s.	Sec.	μ	μ	km.	
Jan. 4	ST.....	4 46 01					Vertical record ill-defined.
	L.....	4 50 02					
	L.....	4 56 22					
	M.....	5 03 08		*1,000			
	F.....	5 29 43					
4	VERTICAL.						
	M.....	5 01 30	18	A ₂			
	P.....	16 26 13					
	L.....	16 35 04					
	M.....	16 39 00		*400			
12	P or L.....	23 48 49					
	M.....	23 50 18		*200			
21	P or L.....	20 30 21					
	L?.....	20 39 12					
	M.....	20 47 18		*300			
	F.....	21 05 46					
24	P?.....	15 40 12					
	M.....	15 43 39		*100			
	F.....	15 48 04					
25	P or ST.....	1 35 35					Trace indistinct.
	L?.....	1 40 03					
	L.....	1 46 30					
	M.....	1 46 28		*500			
30	P?.....	21 23 30					Vertical record ill-defined.
	ST.....	21 28 32					
	L?.....	21 33 58					
	L.....	21 37 16					
	M.....	21 37 48		*600		3,270	
	L.....	22 18 34					
	F.....	22 23 00					

* Trace amplitude.

SEISMOLOGICAL DISPATCHES.¹

Geneva, January 5, 1918.

The Zurich observatory reports that a serious earthquake which was recorded recently has been located at Oberammergau, in upper Bavaria, and also in the upper valley of the Lech River. (Associated Press.)

Washington, D. C., January 4, 1918.

The entire city of Guatemala was wiped out by an earthquake shock Friday night (Jan. 4) at 10.45 o'clock. (Radio dispatch from Darien to the War Department.)

Washington, D. C., January 5, 1918.

Our manager at San Jose, Guatemala, telegraphs the following: "What was left of Guatemala City is now wiped out. Shocks at 10.35 p. m. finished everything. Steam is now coming up in the streets. Cathedral fallen; 300 killed." (Dispatch from the Central and American Telegraph Co.)

Guatemala City, January 5, 1918.

The earthquakes here continue with varying frequency and intensity. The capitol is in ruins. (Associated Press.)

Washington, D. C., January 27, 1918.

Further severe earthquake shocks in Guatemala City, capital of Guatemala, were reported yesterday to the State Department by the American legation there. No details of the extent of the damage were given.

Extensive damage was done to the city by earthquakes last month. (State Department.)

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

SECTION V.—SEISMOLOGY.

SEISMOLOGICAL REPORTS FOR FEBRUARY, 1918.

W. J. HUMPHREYS, Professor in Charge.

[Dated: Weather Bureau, Washington, D. C., April 5, 1918.]

TABLE 1.—Noninstrumental earthquake reports, February, 1918.

Day.	Approximate time, Greenwich Civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity Rossi-Forel.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
CALIFORNIA.										
1918.	H. m.		° ' "	° ' "			M. s.			
Feb. 11	22 45	Bishop.....	37 23	118 24	5	1	.....	Rumbling.....	Abrupt bump, S-N.....	E. M. Nordyke.
24	00 12	Eureka.....	40 48	124 11	4	Several.	0 01	None.....	Rapid rocking, W-E.....	U. S. Weather Bureau.
ILLINOIS.										
17	8 10	Cairo.....	37 00	89 10	3	1	0 02	Faint.....	Abrupt rocking, E-W.....	J. F. McGruder.

TABLE 2.—Instrumental reports, February, 1918.

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

[For significance of symbols see REVIEW for January, 1918, p. 34.]

Date.	Char-acter.	Phase.	Time.	Per-iod. T.	Amplitude.		Dis-tance.	Remarks.
					A _B	A _N		

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-Omorl, 10 and 12 kg.
 Instrumental constants... $\frac{V}{N}$ $\frac{T_0}{10}$ $\frac{10.7}{15.4}$

1918.		H. m. s.	Sec.	μ	μ	km.	
Feb. 13	e _N	5 31 13	4	Microseismic tremors on Feb. 12 and 20. No earthquakes recorded during January.
	e _S	5 31 42	30	.....	.....	.....
	e _L	5 41 32	19	.....	.....	.....
	M _S	5 52 52	10	.....	.....	.....
	M _N	5 54 53	.....	.....	.....	.....
	C.....	6 03 ..	.....	.....	.....	.....
	F.....	6 14 ..	.....	.....	.....	.....

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-Omorl, 10 and 12 kg.
 Instrumental constants... $\frac{V}{N}$ $\frac{T_0}{10}$ $\frac{13.9}{19.1}$

1918.		H. m. s.	Sec.	μ	μ	km.	
Feb. 12	cP _E ...	1 25 24	
	eL _E ...	1 25 36	.....	.....	.....	.....
	cP _N ...	1 25 50	2	.....	.....	.....
	eL _N ...	1 26 08	.....	.....	.....	.....
	M _S ...	1 26 08	11	120	.....	.....
	M _N ...	1 26 16	12	.....	150	.....
	C.....	1 34 ..	5	.....	.....	.....
12	eL _E ...	1 39 20	.....	.....	.....	.....
	M _S ...	1 39 36	8	10	.....	.....
	M _N ...	1 39 45	8	.....	40	.....
	C.....	1 43 ..	.....	.....	.....	.....
12	eL _E ...	2 05 ..	10	10	10	.....
	C.....	2 08 ..	.....	.....	.....	.....
12	eL _E ...	19 19 02	.....	.....	.....	.....
	eL _N ...	19 19 08	.....	.....	.....	.....
	M _S ...	19 19 32	12	.....	110	.....
	M _N ...	19 19 45	10	.....	80	.....
	F.....	19 25 ..	.....	.....	.....	.....
12	eL _E ...	19 30 38	.....	.....	.....	.....
	eL _N ...	19 30 52	.....	.....	.....	.....
	M _S ...	19 31 32	9	.....	60	.....
	M _N ...	19 32 24	8	.....	50	.....
	F.....	19 36 ..	.....	.....	.....	.....
12	eL _E ...	20 04 52	2	.....	.....	.....
	eL _N ...	20 05 19	2	.....	.....	.....
	eL _S ...	20 05 20	.....	.....	.....	.....
	eL _S ...	20 05 31	.....	.....	.....	.....
	M _S ...	20 05 40	6	710	590	.....
	C.....	20 07 ..	.....	.....	.....	.....
	F.....	20 16 ..	.....	.....	.....	.....

Date.	Char-acter.	Phase.	Time.	Per-iod. T.	Amplitude.		Dis-tance.	Remarks.
					A _B	A _N		

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.

1918.		H. m. s.	Sec.	μ	μ	km.	
Feb. 5				100	100	.....	Microseisms during 24 hours preceding 18 hours G. M. T. on dates given.
20				100	100	.....

California. *Santa Clara. University of Santa Clara.* J. S. Ricard, S. J.
 Lat., 37° 20' 38" 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.

1918.		H. m. s.	Sec.	μ	μ	km.	
Feb. 5	eL _E ...	24 ..	.....	.....	.....	.....	Wavelets.
6	F _E ...	3 ..	.....	.....	.....	.....
16	eL _E ...	16 10 00	.....	.....	.....	.....	Wavelets, thickening of pen marks.
	F _E ...	19 15 ..	.....	.....	.....	.....
26	eL _E ...	16 40 ..	.....	.....	.....	.....	Doubtful as to being seismic. Heavy machinery in motion nearby.
	F _E ...	16 55 ..	.....	.....	.....	.....
27	L.....	22 32 ..	.....	.....	.....	.....	Frequent wavelets and thickening of pen marks on both components during day.
	F.....	22 36 ..	.....	.....	.....	.....
28	eL _E ...	21 24 ..	.....	.....	.....	.....	Distinct activity on E-W during day. Most prominent at hour marked.
	F _E ...	21 26 ..	.....	.....	.....	.....

TABLE 2.—Instrumental reports, February, 1918—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude.		Dis- tance.	Remarks.
					A _s	A _w		

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: $\frac{V}{110}$ $\frac{T_0}{6.4}$

1918.		H. m. s.	Sec.	μ	μ	km.	Amplitude
Feb. 3	eLN	14 53 30					very small.
	F	15 07 ..					
4	eL7	20 54 ..					Heavy microseisms.
	F	21					Phases undiscernible.
12	e7	1 31 ..					
	L	1 45 05	10				
	F	2					
12	e	19 33 39					F merged with following quake.
	L	19 34 35	12				
	F	.. ..				
12	e	19 45 25					
	L	19 46 40	12				
	F	19 51 ..					
12	e	20 18 50					
	L	20 20 15					
	F	20 35 ..					
13	eL	3 57 30					
	F	4 10 ..					
13	e	6 27 30					
	eL	6 43 45	40				
	L	7 02 30	32				
	F	8					
19	e	17 25 ..					
	L	17 28 ..					
	F	17 40 ..					
24	P	23 06 39					
	S	23					
	L	23 17 27					
	F	23 25 ..					

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: $\begin{matrix} E & 165 & 5.4 & 0 \\ N & 143 & 5.2 & 0 \\ Z & 80 & 3.0 & 0 \end{matrix}$

1918.		H. m. s.	Sec.	μ	μ	km.	Remarks.
Feb. 3							Long waves show interruptedly from 14 ^h 48 ^m to 15 ^h 14 ^m . Periods variable. Heavy microseisms.
4	eL	20 54 00					Very heavy microseisms.
	F	21 10 ..					
12	e7	1 30 43					Heavy microseisms. All phases except eLN difficult.
	eLN	1 41 24					
	F	2 02 ..					
12	e	19 33 37					
	eLN	19 34 30	13				
	F	.. ..				
12	eP ₁	20 15 10					Microseisms.
	eP ₂	20 15 12					
	IS ₁	20 19 52					
	IS ₂	20 19 57					
	eL ₁	20 21 24					
	eL ₂	20 21 42					
	F	20 50 ..					
13	L ₁	4 02 12					Heavy microseisms.
	L ₂	4 08 ..					
13	e	6 27 ca					Series of long waves from 7 ^h 4 ^m to 7 ^h 35 ^m . Heavy microseisms.
	L	7 04 15					
	F	8 00 ..					
18							Series of long waves from 16 ^h 53 ^m to 17 ^h 8 ^m . Periods variable. Heavy microseisms. Observed
25	e ₁	23 06 40					Heavy microseisms.
	e ₂	23 06 41					
	L ₁	23 12 29	8				
	L ₂	23 12 33	8				
	F	23 25 ca					

Date.	Character.	Phase.	Time.	Period. T.	Amplitude.		Dis- tance.	Remarks.
					A _s	A _w		

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: Milno seismograph of the Seismological Committee of the British Association.

Instrumental constant: $\frac{T_0}{13.5}$

1918.		H. m. s.	Sec.	μ	μ	km.	Remarks.
Feb. 3	eP	14 16 54					
	eL	14 19 48	20				
	M	14 21 30	20	*500			
	C	14 33 ..					
	F	15 32 ..					
6	eP	3 24 00					
	eL	3 27 42	19				
	M	3 35 06	17	*100			
	C	3 38 ..					
	F	4 23 ..					
6	eL	14 59 00					
	M	15 03 54	19	*100			
	C	15 08 ..					
	F	15 16 ..					
7	eP	5 31 30					
	S	5 41 00					
	M	5 42 12		*1,800			
	eL	5 54 12	19				
	M	6 05 00	17	*1,000			
	C	6 12 ..					
	F	7 23 ..					
9	eL	21 11 34					
	M	21 11 54		*100			
	F	21 16 ..					
13	eL	2 57 ..					
	F	3 55 ..					
13	eP	6 29 06					
	eL	6 43 00	27				
	M	6 53 18	18	*4,000			
	C	6 58 ..					
	F	9 44 ..					
19	eP	16 36 24					
	eL	16 42 00	27				
	M	16 49 00	20	*1,500			
	C	16 52 ..					
	F	17 55 ..					
24	eL	23 23 54	19				
	M	23 26 30		*100			
	F	23 30 ..					
25	eP	6 18 30					
	eL	6 26 12	23				
	M	6 29 00	19	*100			
	C	6 34 ..					
	F	7 11 ..					
27	eP	3 29 00					
	eL	3 39 00	19				
	M	3 42 06	19	*200			
	C	3 46 48					
	F	4 09 ..					

* 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: $\begin{matrix} E & 177 & 3.4 & 4:1 \\ N & 205 & 3.4 & 4:1 \end{matrix}$

(Report for February, 1918, not received.)

TABLE 2.—Instrumental reports, February, 1918—Continued.

Date.	Char-acter.	Phase.	Time.	Pe-riod. T.	Amplitude.		Dis-tance.	Remarks.
					A _B	A _N		
Maryland. <i>Cheltenham. Magnetic Observatory.</i> 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. $\begin{matrix} V & T_0 & e \\ \{E & 10 & 15 \\ \{N & 10 & 15 \end{matrix}$								
1918.								
Feb. 12		OS.	1 40 49					E not recording properly.
		M _N	1 41 49	10		10		
		F	1 50 ..					
12		cP _N	19 33 52					
		cL _N	19 34 40					
		M _N	19 34 55	12		10		
		F	19 37 ..					
12		c	20 20 05					
		M _N	20 21 13	12		60		
		F	20 27 ..					
13		OS.	7 05 ..					A series of long waves.
		M _N	7 23 28	16		50		
		F	7 42 ..					

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).

$$\text{Instrumental constants. } \begin{matrix} V & T_0 & e \\ \{E & 80 & 23 & 0 \\ \{N & 50 & 25 & 4.1 \end{matrix}$$

(Report for February, 1918, not received.)

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

Lat., 38° 35' 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.

$$\text{Instrumental constants. } \begin{matrix} V & T_0 & e \\ \{E & 80 & 7 & 5.1 \end{matrix}$$

Date.	Char-acter.	Phase.	Time.	Pe-riod. T.	Amplitude.		Dis-tance.	Remarks.
					A _B	A _N		
Missouri. <i>Saint Louis. St. Louis University. Geophysical Observatory.</i> J. B. Goesse, S. J. Lat., 38° 35' 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. $\begin{matrix} V & T_0 & e \\ \{E & 80 & 7 & 5.1 \end{matrix}$								
1918.								
Feb. 12	I.	L	1 35 24					P _B and S _B masked by microseisms. S _N doubtful.
		F	1 45 ..					
12	I.	IS.	20 14 42					P lost by local disturbances.
		L	20 15 24	6				
		F	20 23 ..					
13	II.	cL	7 00 06	30				
		L _N	7 06 30					
		L _N	7 19 18					
		L _N	7 22 42					
		F	7 34 ..					
14								Record indicates seismic disturbances, but not readable on account of high wind disturbances. Microseisms present on 16th, 21st, 23d, 26th.

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.

$$\text{Instrumental constants. } \begin{matrix} V & T_0 & e \\ \{E & 80 & 7 & 5.1 \end{matrix}$$

(Report for February, 1918, not received.)

Date.	Char-acter.	Phase.	Time.	Pe-riod. T.	Amplitude.		Dis-tance.	Remarks.
					A _B	A _N		
New York. <i>Fordham. Fordham University.</i> 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. $\begin{matrix} V & T_0 & e \\ \{E & 72 & 6.8 & 1.5:1 \\ \{N & 72 & 7.1 & 3.3:1 \end{matrix}$								
1918.								
Feb. 12		IP _N	20 16 44					
		IP _N	20 16 49					
13		cL	6 59 00	22				
		F	7 23 00					

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).

$$\text{Instrumental constants. } \begin{matrix} V & T_0 & e \\ \{E & 13 & 22 & 4:1 \\ \{N & 14 & 25 & 4:1 \end{matrix}$$

(Report for February, 1918, not received.)

Panama Canal. *Balboa Heights. Governor, Panama Canal.*

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

Instruments: Two Bosch-Omori, 100 kg.

$$\text{Instrumental constants. } \begin{matrix} V & T_0 \\ \{E & 10 & 20 \end{matrix}$$

Date.	Char-acter.	Phase.	Time.	Pe-riod. T.	Amplitude.		Dis-tance.	Remarks.
					A _B	A _N		
Panama Canal. <i>Balboa Heights. Governor, Panama Canal.</i> Lat., 8° 57' 39" N.; long., 79° 33' 29" W. Elevation, 27.6 meters. Instruments: Two Bosch-Omori, 100 kg. Instrumental constants. $\begin{matrix} V & T_0 \\ \{E & 10 & 20 \end{matrix}$								
1918.								
Feb. 20		P _B	6 35 48				650	
		P _N	6 35 52					
		L _N	6 37 16	20		2,000		
		L _N	6 37 20	20		2,000		
		M _N	6 37 24					
		M _N	6 38 46					
		F _B	6 51 30					
		F _N	6 53 ..					

* 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.

$$\text{Instrumental constants. } \begin{matrix} V & T_0 \\ \{E & 10 & 17.5 \\ \{N & 10 & 18 \end{matrix}$$

Date.	Char-acter.	Phase.	Time.	Pe-riod. T.	Amplitude.		Dis-tance.	Remarks.
					A _B	A _N		
Porto Rico. <i>Vieques. Magnetic Observatory.</i> 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. $\begin{matrix} V & T_0 \\ \{E & 10 & 17.5 \\ \{N & 10 & 18 \end{matrix}$								
1918.								
Feb. 24		cL _N	23 02 25	8				
		cL _N	23 03 50	7		10		
		M _N	23 05 20	7				
		M _N	23 06 50	6		30		
		C	23 07 ..					
		F	23 17 ..					

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.

$$\text{Instrumental constants. } \begin{matrix} V & T_0 \\ \{E & 10 & 15 \\ \{N & 10 & 16 \end{matrix}$$

Date.	Char-acter.	Phase.	Time.	Pe-riod. T.	Amplitude.		Dis-tance.	Remarks.
					A _B	A _N		
Vermont. <i>Northfield. U. S. Weather Bureau.</i> Wm. A. Shaw. Lat., 44° 10' N.; long., 72° 41' W. Elevation, 256 meters. Instruments: Two Bosch-Omori, mechanical registration. Instrumental constants. $\begin{matrix} V & T_0 \\ \{E & 10 & 15 \\ \{N & 10 & 16 \end{matrix}$								
1918.								
Feb. 12		e	20 22 ..					
		F	20 30 ..					
13		cL	7 01 ..	24				
		L	7 16 35	16				
		F	7 35 ..					

TABLE 2.—Instrumental reports, February, 1918—Continued.

Date.	Char-acter.	Phase.	Time.	Per-iod. T.	Amplitude.		Dis-tance.	Remarks.
					A _N	A _S		
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. $\frac{V}{T_0} = 26$								
1918.			II. m. s.	Sec.	μ	μ	km.	
Feb. 3	eL _g		15 02 to 15 20	17				Heavy microseisms on NS. Amplitude of waves very small.
4	O		20 39 ca				3,100ca	
	eS _N †		20 50 06†					
	i		20 52 07	2				Press report from Revelstoke.
	eL		20 53 30					
	L		20 55	7				
	F		21					
12	eL _N		1 41 54					
	M _N		1 42 to	18				
	L _N		1 48					
	L _N		1 55 to	10				
	F		1 53					
	F		2 00					
12	e		19 34 41	2.5				
	eL _N		19 35 06	12				
	F		19 40					
12	eL _N		19 47 to 19 50	10				
12	e		20 20 42	3				
	eL		20 21 18	12				
	M		20 22	12				
	F		20 30					
13	eL		3 52 to 4 05	20				Δ of this quake appears to be of the same order as the next following quake.
13	O		6 07 48				12,000	
	P ₁ †		6 22 24					
	P ₂ †		6 26 48					
	Prep†		6 29 42					
	S		6 34 42					
	S ₂ †		6 42 42					
	S ₃ †		6 47					
	L		7 00 24					
	L ₂ †		8 16					
13	eL		7 02	30				These readings are from the record of the horizontal seismographs. The earlier phases are lacking on this instrument. Heavy microseisms.
	L		7 09	24				
	L		7 14	16				
	L		7 25	14				
	L		7 35	14				
	F		8					
13	eL		16 57 to 17 04	irreg.				Very small amplitude.
19	L ₂		17 22 to 17 51	20 15				
20	L		6 54 to 6 57	16				
23	eL ₂		19 02	20				
	L ₂		19 09	17				
	L ₂		19 13	16				
	L ₂		19 20	15				
	L ₂		19 27	15				
	F		19 35					
24	eL		23 10 to 23 30	17				The shutter did not work while the record of this quake and the next following one were being made, and the time marks are missing. The amplitude of the waves for both quakes is very small.
25	eL		7 ca to 7 30 ca	17				
27	eL ₂		4 18	18				
	L ₂		4 28	16				
	F		4 35					

† Time originally expressed in tenths of minutes.

Date.	Char-acter.	Phase.	Time.	Per-iod. T.	Amplitude.		Dis-tance.	Remarks.
					A _N	A _S		
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.								
Instrument constant. $\frac{V}{T_0} = 18$. Pillar deviation: 1 mm. swing of boom = 0.50°.								
1918.			II. m. s.	Sec.	μ	μ	km.	
Feb. 3	L		14 58 48					Marked gradual thickening.
	eL		15 00 54					
	M		15 05 36		*1,300			
	F		15 31					
6	L		3 59 12					
	L		4 00 30					
	eL		4 08 30					Gradual thickening.
	M		4 12 39		*500			
	F		4 33					
7	L		5 42 30					
	eL		5 58 48					Microseisms going on. F lost in unseisms.
	M		6 40 12		*400			
	F							
12	L		1 34 00					
	L		1 41 18					
	L		1 52 06		*100			F lost in microseisms.
	L		2 04 00					
	F							
12	L		19 33 42					
	F		19 40 36		*50			
12	L		20 20 42					
	M		20 23 30		*300			
	F		20 29 36					
13	L		3 53 24					
	L		4 00 00					
	M		4 18 36		*200			
	F		4 24 30					
13	eL		6 44 54					Markings at 6 ^h 21 ^m 12 ^s and 6 ^h 32 ^m 36 ^s , but may not be seismic.
	L		7 00 06					Amoy, China.
	iL		7 08 18					
	eL		7 11 18					
	M		7 14 48		*2,900			
	iL		7 20 36					
	F		8 52 24					
18	L		16 58 18					
	F		17 06 30		*100			
19	L		17 21 00					Marked gradual thickening.
	eL		17 26 06					
	M		17 30 12		*800			
	F		17 47 18					
20	eL		6 54 42					Gradual thickening.
	M		6 56 12		*300			
	F		6 59 18					
23	L		19 02 42					
	M		19 05 18		*200			
	F		19 14 36					
24	L		23 14 30					
	eL		23 17 30					
	M		23 20 30		*300			
	L		23 22 36					
	F		23 34 18					
25	eL		7 03 12					Brief gradual thickening.
	M		7 06 12		*300			
	F		7 15 12					
27	L		4 16 30					Thickenings barely perceptible.
	L		4 20 48		*50			
	F							

* Trace amplitude.

TABLE 2.—Instrumental reports, February, 1918—Continued.

Date.	Char-acter.	Phase.	Time.	Pe-riod. T.	Amplitude.		Dis-tance.	Remarks.
					A _m	A _n		
<p>Canada. Victoria, B. C. Dominion Meteorological Service. Lat., 48° 24' N.; long., 123° 9' W. Elevation, 67.7 meters. Subsoil: Rock. Instrument: Weichert, vertical; Milne horizontal pendulum, North. In the meridian. Instrumental constant . . 18. Pillar deviation: 1mm. swing of boom=0.54".</p>								
1918.			<i>H. m. s.</i>	<i>Sec.</i>	<i>μ</i>	<i>μ</i>	<i>km.</i>	
Feb. 3		P	14 45 36					
		L	14 51 30					
		M	14 55 26		*400			
		F	15 18 13					
	4	M	20 40 16		*50			Near Revelstoke.
		VERTICAL			A ₂			
		P	20 59 46	3				
		L	20 40 48	6				
		M	20 40 52	6	16		650	Near Revelstoke.
		F	20 45 28					
	6	L	4 04 22		*50			
	7	P	5 35 22					
		L	5 44 13					
		M	5 47 49		*500		1,200.	
		F	6 54 32					
		VERTICAL		50	A ₂			
	12	L	19 30 30		*50			
		F						
	12	P	20 08 35					
		L	20 12 34					
		M	20 15 05		*200			
		F	20 21 31					
	13	L	3 55 24		*200			Trace indistinct.
	13	P	6 31 10					Trace rather in-
		S	6 39 32					distinct.
		L	6 46 36					
		M	6 59 42		*1,500		6,860	
		F	8 10 02					
		VERTICAL			A ₂			
		Mf	7 07 00					
	13							Local tremor last-
								ing about 1 sec-
								ond reported
								from several
								parts of the city
								at 13 hr. Not re-
								corded.
	19	L	17 05 38					Marked gradual
		M	17 14 38		*400			thickening.
		F	17 37 08					
	27	L	4 07 07		Below			
					*50			

* Trace amplitude.

SEISMOLOGICAL DISPATCHES.¹

Revelstoke, B. C., February 5, 1918.

Several severe earthquakes were felt here yesterday, each shock lasting about 30 seconds. The movement was so marked that many persons experienced a feeling of nausea. No damage was caused so far as is known. (Associated Press.)

Honolulu, Hawaii, February 16, 1918.

The lava lake of Kilauea Volcano has taken a sudden rise and is at the highest level reached within the crater since 1894, according to reports reaching here to-day.

Lava spouting through cracks was gradually flowing over a depression in the rim and filling the valley caused by the last flow, the reports said. Kilauea threatened to pour a stream over its sides on January 26, 1918. After a week of violent action it subsided and was calm until yesterday. (Associated Press.)

Amoy, China, February 16, 1918.

A severe earthquake here to-day destroyed many buildings and damaged scores of others. No fatalities have been reported as yet. (Associated Press.)

Amoy, China, February 17, 1918.

Earthquake shocks continued here last night and to-day. Many persons have been injured, and it is estimated that more than 100 houses have collapsed. Cable communication with Hongkong is interrupted. (Associated Press.)

Amoy, China, February 20, 1918.

Reports reaching here to-day from the districts visited by earthquake last Wednesday show some loss of life and heavy damage resulting. Two hundred deaths were reported from Swatow. The number of persons injured has not been tabulated.

One-fifth of the buildings, it was said, were destroyed and the remainder damaged. Great damage was reported from Hongchowfu and delta towns, exact details of which were lacking. (Associated Press.)

San Salvador, Republic of Salvador, February 25, 1918.

Telegraphic communication with the interior of Guatemala is interrupted as a result of earthquake shocks of an extremely violent character. (Associated Press.)

Amoy, China, February 25, 1918.

Nearly 10,000 persons lost their lives as a result of recent earthquakes in the Amoy hinterland, according to the latest reports from Swatow. A series of earthquakes on February 16 and 17 caused extensive damage over a considerable area of Kwangtung. Buildings were wrecked in Amoy and many other towns. Several villages in the Amoy hinterland were virtually destroyed. (Associated 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 MARCH, 1918.

W. J. HUMPHREYS, Professor in Charge.

[Dated: Seismological Investigations, Weather Bureau, May 2, 1918.]

TABLE 1.—Noninstrumental earthquake reports, March, 1918.

Date.	Approximate time, Greenwich Civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity Rossi-Forel.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
CALIFORNIA.										
1918.	H. m.						Seconds.			
Mar. 1	2 35	Bishop (18 miles W.)	37 22	118 47	3	1	2	No.	Gradual trembling.	William Barth.
	2 25	Round Valley (6 miles W.)	37 25	118 48	4	1	15	Yes.	Rumbling and trembling.	Glen H. Crow.
3	4 30	Eureka.	40 48	124 11	3	1	Short.	No.	Trembling.	G. E. Kammerer.
5	11 00	Cahuilla.	33 32	116 45	4	1		No.	Water level in well fell 2 feet and rose several feet in well 3 miles north during following 48 hours and had not returned to former levels up to Apr. 8.	Hartwell W. Gardner.
6	16 30									
6	16 15									
6	18 25	Arroyo Seco.	34 07	118 11	4	1		No.		W. D. Marx.
		Hollywood.	34 06	118 20	5	1		No.		Los Angeles Times.
		Los Angeles.	34 03	118 15	5	1		No.		U. S. Weather Bureau.
		Santa Monica.	34 02	118 30	3	1		No.		W. F. Bates.
		Venice.	33 58	118 28	5	1	4	Yes.	Rumbling like an explosion, rocking NE-SW.	Dr. Jas. T. Brown.
8	12 30	Ocean Park.	34 02	118 30	4	2	Few.	Yes.	Rumbling and bumping.	A. W. Pugh.
		Venice.	33 58	118 28	5	1	2	Yes.	Rumbling and bumping.	A. H. Anthony.
12	10 30	Downieville.	39 34	120 50	8	1		No.	A few chimneys toppled over during these two quakes.	San Francisco Chronicle.
12	12 30	Downieville.	39 34	120 50	8	1		No.		
21	23 25	Barrett (6 miles N.)	32 42	116 41	5	1	3	Yes.	Loud rumbling and trembling.	L. Watts.
30	16 05	Cahuilla.	33 32	116 45	6	1		No.		Hartwell W. Gardner.
WASHINGTON.										
2	00 08	Walla Walla.	46 02	118 20	3	2	1	No.	Abrupt bumping N.-S.	C. C. Garrett.

LATE REPORT.

MICHIGAN.										
Feb. 22	Early morning.	Morrice.	42 51	84 11	4	1	1	Yes.	Abrupt bump. Frost crack 150 feet long, 4 feet deep. Numerous diverging cracks.	Mr. and Mrs. Buck.

TABLE 2.—Instrumental seismological reports, March, 1918.

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

[For significance of symbols see REVIEW for January, 1918, p. 34.]

Date.	Character.	Phase.	Time.	Period. T.	Amplitude.		Distance.	Remarks.	Date.	Character.	Phase.	Time.	Period. T.	Amplitude.		Distance.	Remarks.
					A _s	A _N								A _s	A _N		
Alaska. <i>Sitka. Magnetic Observatory.</i> 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-Omorl, 10 and 12 kg. Instrumental constants: $\begin{matrix} V & T_0 \\ E & 10 & 16 \\ N & 10 & 15 \end{matrix}$ (No earthquake recorded during March, 1918.)									California. <i>Berkeley. University of California.</i> Lat., 37° 52' 16" N.; long., 122° 15' 37" W. Elevation, 85.4 meters. (See Bulletin of the Seismographic Stations, University of California.) California. <i>Mount Hamilton. Lick Observatory.</i> Lat., 37° 20' 24" N.; long., 121° 38' 34" W. Elevation, 1,281.7 meters. (See Bulletin of the Seismographic Stations, University of California.)								
Arizona. <i>Tucson. Magnetic Observatory.</i> 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-Omorl, 10 and 12 kg. Instrumental constants: $\begin{matrix} V & T_0 \\ E & 10 & 19 \\ N & 10 & 19 \end{matrix}$ (No earthquake recorded during March, 1918.)									California. <i>Point Loma. Raja Yoga Academy.</i> F. J. Dick. Lat., 32° 43' 03" N.; long., 117° 15' 10" W. Elevation, 91.4 meters. Instrument: Two-component, C. D. West seismoscope.								
1918.	Mar. 5										H. m. s.	Sec.		μ 100	μ 100	km.	Tremors during 24 hours preceding 15 ^h .

TABLE 2.—Instrumental seismological reports. March, 1918—Continued.

Date.	Char-acter.	Phase.	Time.	Pe-riod. T.	Amplitude.		Dis-tance.	Remarks.
					A _m	A _N		

California. *Santa Clara. University of Santa Clara.* J. S. Ricard, S. J.
 Lat., 37° 26' 38" 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° 36' 54" W. Elevation, 1,655 meters.

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

1918.		H. m. s.	Sec.	μ	μ	km.	
Mar. 10							Activity and thickening of pen marks at intervals during day. Seismograph clock out of repair. Instrument not working. No 'quakes recorded.
14							
16							
22							
22							
31							

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

Lat., 38° 54' 12" N.; long., 77° 08' 03" W. Elevation, 21 meters.

Instrument: Marvin vertical pendulum, undamped. Mechanical registration.

Instrumental constants... $\begin{matrix} V & T_0 & \epsilon \\ E & 110 & 6.4 \\ N & & \end{matrix}$

1918.		H. m. s.	Sec.	μ	μ	km.	
Mar. 16	P.	13 46 20					
	Prep.	13 47 00					
	S.	13 54 33					
	Srep ¹ .	13 55 15					
	Srep ² .	13 55 55					
	eL.	14 08 ..					
	L.	14 13 50	20				
	V.	14 25 ..					
19	eL.	6 55 30					
	F.	7 20 ..					
21	e.	17 06 ..					
	eL.	17 10 25					
	F.	17 40 ..					

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 pendulum, 80 kg. vertical.

Instrumental constants... $\begin{matrix} V & T_0 & \epsilon \\ E & 165 & 5.4 & 0 \\ N & 143 & 5.2 & 0 \\ Z & 80 & 3.0 & 0 \end{matrix}$

1918.		H. m. s.	Sec.	μ	μ	km.	
Mar. 16							Quake lost between 13 ^h . and 14 ^h . while changing sheets.
19	L.	6 57 ..					
		7 18 ..					Periods variable. No trace on N-S. All seismographs show alike.
21	e.	3 53 59					Heavy microseisms.
	eL _N	4 39 ..					
21	e _N	17 05 19					Heavy microseisms. Gram difficult. L shows on vertical. No other phases apparent.
	e _N	17 05 21					
	S _N ?	17 10 51					
	eL _N ?	17 14 07					
	eL _N ?	17 14 10					
	F.	17 19 04	13				
	F.	17 36 ..					

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... $\frac{T_0}{18.6}$

(No earthquake recorded during March, 1918.)

Date.	Char-acter.	Phase.	Time.	Pe-riod. T.	Amplitude.		Dis-tance.	Remarks.
					A _m	A _N		

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... $\begin{matrix} V & T_0 & \epsilon \\ E & 177 & 3.4 & 4.0 \\ N & 205 & 3.4 & 3.8 \end{matrix}$

(Report for March, 1918, 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... $\begin{matrix} V & T_0 & \epsilon \\ E & 10 & 32 \\ N & 10 & 27 \end{matrix}$

(No earthquake recorded during March, 1918.)

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... $\begin{matrix} V & T_0 & \epsilon \\ E & 80 & 23 & 0 \\ N & 50 & 25 & 4.1 \end{matrix}$

(Report for March, 1918, 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... $\begin{matrix} V & T_0 & \epsilon \\ E & 80 & 7 & 5.1 \end{matrix}$

1918.		H. m. s.	Sec.	μ	μ	km.	
Mar. 4							Heavy microseisms. No other disturbances recorded during the month.
5							
21							

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... $\begin{matrix} V & T_0 & \epsilon \\ E & 80 & 7 & 5.1 \end{matrix}$

(Report for March, 1918, not received.)

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

Lat., 42° 28' 58" N.; long., 76° 29' 08" W. Elevation, 242.6 meters.

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

Instrumental constants... $\begin{matrix} V & T_0 & \epsilon \\ E & 13 & 22 & 4.1 \\ N & 14 & 25 & 4.1 \end{matrix}$

1918.		H. m. s.	Sec.	μ	μ	km.	
Mar. 21	e _N	17 11 13	S				See Table 3 for Feb. report.
	F _N	17 46 ..					

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

Lat., 40° 51' 47" N.; long., 73° 53' 08" W. Elevation, 23.0 meters.

Instrument: Wiechert, 80 kg.

Instrumental constants... $\begin{matrix} V & T_0 & \epsilon \\ E & 72 & 6.6 & 1.5:1 \\ N & 72 & 7.1 & 3.8:1 \end{matrix}$

(No earthquake recorded during March, 1918.)

TABLE 2.—Instrumental seismological reports, March, 1918—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude.		Dis- tance.	Remarks.
					A _w	A _g		

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.

$V \begin{matrix} T_0 \\ T_1 \end{matrix}$
Instrumental constants. . 35 20

1918. Mar. 11	Phase.	H. m. s.	Sec.	μ		km.	Direction?
				μ	μ		
P.		16 25 44					
L _w		16 25 32	20	*22,000			
M.		16 25 40					
L _w		16 28 32	20	*18,000			
M.		16 28 44					
F.		16 45					
F _s		16 46					

*Trace amplitude.

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

Lat., 18° 08' 48" N.; long., 65° 28' 54" W. Elevation, 19.8 meters.
Instruments: Two Bosch-Omori.

$V \begin{matrix} T_0 \\ T_1 \end{matrix}$
Instrumental constants. . {E 10 13
N 10 19

1918. Mar. 13	Phase.	H. m. s.	Sec.	μ		km.
				μ	μ	
e.		14 49 55				
M.		14 50 43	2	10	10	
F.		14 54				

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.

$V \begin{matrix} T_0 \\ T_1 \end{matrix}$
Instrumental constants. . {E 10 15
N 10 16

1918. Mar. 18	Phase.	H. m. s.	Sec.	μ		km.
				μ	μ	
e.		13 48				
Prept		13 55 36				
L.		14 04	12			
F.		14 20				

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

Lat., 45° 23' 38" N.; long., 75° 42' 57" W. Elevation, 83 meters.
Instruments: Two Bosch photographic horizontal pendulums, one Spindler & Hoy 30 kg. vertical seismograph.

$V \begin{matrix} T_0 \\ T_1 \end{matrix}$
Instrumental constants: 120 26

1918. Mar. 11	Phase.	H. m. s.	Sec.	μ		km.	Remarks.
				μ	μ		
eL		16 44	22				Heavy microseisms on both components. Heavy microseisms on both components.
O.		13 40 31			3,380		
P.		13 47 02					
Prept		13 47 45					
Prept		13 48 00					
S.		13 52 11					
eL.		13 55 51	14				
L.		14 04	10				
L.		14 30					
F.		14 30					
19	eL.	6 55 to	20				Δ approximate.
	L.	7 05	18				
	L.	7 09	17				
	L.	7 16	16				
L.	7 23	16					
L.	7 23	16					
F.	7 40						
21	Prept	73 49 20			6,000		
	S.	3 54 44					
	Prept	3 58 51					
21	eL.	73 43 30	16				
	F.	4 15					
	e?	7 39 30					
21	e.	17 06 43	5				No trace from 20 ^h 01 ^m to 21 st , 19 ^h 53 ^m . Center line so thick impossible to detect a small quake.
	eS?	17 12 04	8				
	e.	17 18 48	18				
	eL.	17 20	18				
22	L.	17 32	9				
	F.	17 55					
22	eL.	6 30 30					
	L.	6 40	18				
	F.	6 50					

† Original time given in tenths of a minute.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude.		Dis- tance.	Remarks.
					A _w	A _g		

Canada. *Toronto*. Dominion Meteorological Service.

Lat., 43° 40' 01" N.; long., 79° 23' 54" W. Elevation, 113.7 meters. Soil: Sand and Subsoil.

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

T_0
Instrumental constant. . 18. Pillar deviation: 1 mm. swing of boom=0.50".

1918. Mar. 11	Phase.	H. m. s.	Sec.	μ		km.	Remarks.
				μ	μ		
L.		16 38 00					Microseisms going on.
L.		16 43 24					
L.		16 48 36		*200			
F.		16 59 18					
16	L.	13 53 06					Marked gradual thickening. Markings at 0 ^h 45 ^m 42 ^s and 0 ^h 49 ^m 42 ^s ; may not be seismic.
	IL.	13 55 48					
	M.	13 56 42		*300			
	F.	14 30 36					
19	eL.	6 57 48					May not be seismic.
	M.	7 02 54		*800			
	F.	7 32 24					
19	L.	7 59 42					May not be seismic.
	L.	8 05 54		*50			
	L.	8 17 36					
20	L.	1 48 12		*50			May not be seismic.
	F.	1 52 12					
20	L.	2 06 24		*50			May not be seismic.
	F.	2 11 54					
21	L.	1 11 06					May not be seismic.
	M.	1 12 18		*200			
	F.	1 16 18					
21	L.	4 01 36					May not be seismic.
	L.	4 10 12		*100			
	F.	4 21 24					
21	L.	16 55 48		*50			Gradual thickening. Marked microseisms during night of 21st and morning of 22d.
	F.	17 03 06					
	L.	17 18 36		*300			
21	L.	17 20 36					Gradual thickening. Marked microseisms during night of 21st and morning of 22d.
	M.	17 28 42		*300			
	F.	17 35 48					
22	IL.	6 32 36		*200			Quake lost while changing sheet. Light down at 19 ^h 41 ^m .
	M.	6 32 48					
	F.	6 41 12					
26							Quake lost while changing sheet. Light down at 19 ^h 41 ^m .

* Trace amplitude.

† Original time of all readings given in tenths of a minute.

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".

1918. Mar. 16	Phase.	H. m. s.	Sec.	μ		km.	Remarks.
				μ	μ		
19	M.	14 00 00			*200		Marked gradual thickening.
	L.	6 38 51					
	eL.	6 39 24					
	F.	6 46 43		*1,000			
20	M.	7 19 40					No trace from 20 ^h 01 ^m to 21 st , 19 ^h 53 ^m . Center line so thick impossible to detect a small quake.
	M.	VERTICAL 6 41 30	20		A _g		
20	L.	1 56 35					No trace from 20 ^h 01 ^m to 21 st , 19 ^h 53 ^m . Center line so thick impossible to detect a small quake.
	M.	2 00 28		*400			
	F.	2 11 21					
20							No trace from 20 ^h 01 ^m to 21 st , 19 ^h 53 ^m . Center line so thick impossible to detect a small quake.
26	P.	19 51 41				1,410?	No trace from 20 ^h 01 ^m to 21 st , 19 ^h 53 ^m . Center line so thick impossible to detect a small quake.
	L.	19 54 06					
	F.	19 55 37		*700			
26	L.	20 01 32					No trace from 20 ^h 01 ^m to 21 st , 19 ^h 53 ^m . Center line so thick impossible to detect a small quake.
	F.	20 01 32					

* Trace amplitude.

TABLE 3.—Late reports (instrumental).

Date.	Character.	Phase.	Time.	Period. T.	Amplitude.		Distance.	Remarks.
					A _m	A _N		

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

Lat., 42° 28' 58" N.; long., 76° 29' 09" W. Elevation, 242.6 meters.

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

Instrumental constants. $\begin{matrix} V & T_0 & \epsilon \\ \{ E & 13 & 22 & 4:1 \\ & N & 14 & 25 & 4:1 \end{matrix}$

1918.		H. m. s.	Sec.	μ	μ	Km.
Feb. 12	eL _N ...	1 41 20	13			
	F _N ...	1 58 ..				
12	e _m ...	20 20 21	3			
	e _N ...	20 20 29	3			
	eL _N ...	20 20 58	14			
	eL _m ...	20 23 01	10			
	F...	20 28 ..				
13	eL _N ...	3 55 17	22			
	F _N ...	4 09 ..				
Feb. 13	e...	6 25 28				
	e...	6 27 50				
	e...	6 35 30				
	e _N ...	6 42 40	40			
	L _m ...	6 59 45	35			
	M _N ...	7 21 05	16		*500	
	F...	8 ..				
19	eL _N ...	17 21 ..	22			
	F _N ...	17 48 ..				

* Trace amplitude.

SEISMOLOGICAL DISPATCHES.¹

There were no press reports of seismological or vulcanological disturbances during March, 1918.

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

SECTION V.—SEISMOLOGY.

SEISMOLOGICAL REPORTS FOR APRIL, 1918.

W. J. HUMPHREYS, Professor in Charge.

[Dated: Seismological Investigations, Weather Bureau, June 4, 1918.]

TABLE I.—Noninstrumental earthquake reports., April, 1918.

Day.	Approximate time, Greenwich Civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity Rossi-Forel.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
ARIZONA.										
1918.	H. m.		° /	° /			M. s.			
Apr. 20	8 45	Flagstaff	35 12	111 37	2	1	Few.	Faint		G. T. Herrington.
	10 20	Flagstaff	35 12	111 37	2	1	Few.	Faint		G. T. Herrington.
21	22 30	Aztec	32 49	113 28	3	1	10	None	Gradual rocking.	M. Hawkins.
		Bouse	33 57	114 01	5	2	15	None	Gradual trembling NW-SE.	E. L. Short.
		Crozier	35 24	113 40	3	1	10	None	Abrupt rocking, windows shook.	W. H. Turk.
		Kingman	35 11	114 04	4	1	Few.	None		Arizona Gazette.
		Mohave City	35 02	114 38	5	1	Few.	None	Gradual rocking N-S.	Merle O. Smith.
		Oatman	35 02	114 25	5	1	Few.	None	Abrupt rocking.	Barbara J. Shearer.
		Parker	34 10	114 17	5	1	Few.	None	Rocking NW-SE.	M. E. Brown.
		Quartzsite	33 40	114 11	5	2	30	None	Gradual rocking, NE-SW.	J. L. Wilson.
		Salome	33 47	113 37	4	1	Few.	None	Gradual rocking, water in buckets stopped over, NW-SE.	Arizona Gazette.
		Seligman	35 19	112 51	1	1	Few.	None		San Francisco Chronicle.
		Somerton	32 35	114 43	4	2	Few.	None		M. A. Hoffpoutr.
		Truxton	34 18	113 36	3	1	Few.	None		Arizona Gazette.
		Wellton	32 40	114 08	4	1	Few.	Faint	Rattling, gradual rocking, W-E.	G. J. Schultheis.
		Wenden	33 49	113 32	4	2	Few.	None	Abrupt trembling.	August Nord.
		Yucca	34 52	114 09	4	1	30	Rumbling.	Vibration, NW.	Louis Jane.
		Yuma	32 45	114 36	5	1	03	Faint	Rattling, abrupt rocking, E-W; clock stopped.	U. S. Weather Bureau.
28	12 20	Flagstaff	35 12	111 37	1	1	Few.	None	Single sharp bump	G. T. Herrington.
	12 58	Flagstaff	35 12	111 37	5	1	15	Low	Rumble, slight rocking.	G. T. Herrington.
CALIFORNIA.										
17	6 45	Eureka	40 48	124 11	5	2	30	Rumbling.	Gradual trembling, N-S.	Geo. E. Kammerer.
		Eureka	40 48	124 11	5	2	20	Faint	Gradual trembling, N-S, ending with 2 distinct bumps, first bump strongest.	Lawrence M. Monfort.
21	22 30	Aguanga	33 27	116 55	8	3	24	Rumbling.	Rapid trembling, N-S, shocks continued through night with one next morning.	Paul Thomsen.
		Bagdad	34 35	115 52	5	2	05	None	Rapid rocking, E-W.	T. R. Morgan.
		Banning	33 55	116 03	9	2	05	None	Front of I. O. O. F. building fell out.	San Francisco Chronicle
		Bonita	32 39	117 03	5	3	30	Rumbling.	Rapid rocking, NE-SW.	R. M. Allen.
		Barrett (6 miles north)	32 42	116 41	5	4	04	Load.	Rumbling; gradual rocking, SE-NW.	L. Watts.
		Barstow	34 54	117 02	4	2	20	Faint	Rumbling; gradual rocking, SE-NW.	E. L. White.
		Beaumont	33 56	117 00	8	2	3 10	Faint	Rapid rocking, N-S; chimneys fell.	K. R. Smoot.
		Beaumont (5 miles north)	33 59	117 00	2	1	05	None	Abrupt trembling, N-S.	K. R. Smoot.
		Blythe	33 35	114 41	4	3	1 00	None	Gradual rocking, S-N and E-W.	Iva M. Grober.
		Cabazon	33 55	116 47	8	2	05	None	2 railroad water tanks toppled over.	San Francisco Chronicle.
		Cahuilla	33 32	118 45	9	4-5	15	Rumbling.	Rapid rocking. Nearly everything on shelves of store thrown to floor. Dust clouds on Mount Thomas immediately indicated land slips. Tremors continued throughout afternoon and night.	Hartwell W. Gardner.
		Calxico	32 41	115 30	5	1	3 00	Faint	Rumbling; gradual rocking, NE-SW.	H. M. Rouse.
		Calxico	32 41	115 30	6	Several.	3 00	Yes	Water barrel stopped over, N-S. Automobiles moved, N-S, about 4 feet. Triangle iron swinging free described an ellipse.	I. R. Ralston.
		Claremont	34 06	117 43	6	1	1 30	Faint	Rumbling. Gradual, quite strong, rocking, E-W. Clock stopped, pendulum swung N-S for 20 minutes.	260 East Third Street.
		Claremont	34 06	117 43	6	1	2 30	Moderate	Rapid trembling E-W, ending N-S.	F. P. Brackett.
		Corona	33 53	117 34	6	1	15	None	Abrupt rocking.	Thomas C. Seas.
		Corona	33 53	117 34	1	1	Few.	None	Faint secondary shock 17 minutes after last above.	Thomas C. Seas.
		El Cajon	32 48	116 59	6	1	2 00	Rumbling.	Abrupt rocking and trembling.	E. P. and P. G. Kessler.
		El Cajon	32 48	116 59	1	1	Few.	None	Secondary shock 18 minutes after last above.	E. P. and P. G. Kessler.
		Escondido	33 07	117 06	6	1	25	Load	Rumbling and bumping.	H. L. Harlow.
		Escondido	33 07	117 06	1	1	10	None	Secondary shock 12 minutes after last above, trembling continued till end of hour.	H. L. Harlow.
		Fairmont	34 45	118 26	6	3	05	Faint	Rumbling. Abrupt twisting, E-W.	Wm. F. C. Lowe.

TABLE 1.—Noninstrumental earthquake reports, April, 1918—Continued.

Day.	Approximate time, Greenwich Civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity Ross-Forel.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
CALIFORNIA—continued.										
1918. Apr. 21	H. m. 22 30	Fontana.....	34 06	117 27	5	1	M. 20	Loud.....	Rumbling. Abrupt rocking, E-W.	J. Lundemo.
		Fresno.....	36 43	119 49	2	1		None.....	Chandeliers swayed.....	W. E. Bonnett.
		Hemet.....	33 44	116 58	10	2	40	Loud.....	Every business house laid flat. Building losses appraised at \$75,000.	San Francisco Chronicle.
		Imperial.....	32 51	115 33	8				Railroad watertank toppled over.	San Francisco Chronicle.
		Indio.....	33 43	116 13	9	3	55	Rumbling.....	Rapid rocking and twisting, E-W. Great dust clouds arose on San Jacinto Mountains. Buildings damaged.	Bruce Drummond.
		Julian.....	33 04	116 36	6	2	15	Rumbling.....	Abrupt bumping and trembling.	J. H. L. Vogt.
		Laguna Beach.....	33 31	117 47	5	2	05	Rumbling.....	Abrupt rocking NE-SW.....	Wendell P. Hoge.
		Los Angeles.....	34 03	118 15	8	1	40	Loud.....	Rumbling, abrupt bumping, then rocking E-W and twisting, clock stopped, doors opened.	A. W. Fugh.
		Mecca.....	33 34	116 05	5	3	1 00		Water thrown out of irrigation ditches and reservoirs over a bank 3 feet high. Clouds of dust rose from canyons in the mountains.	Edgar A. Palmer.
		Mesa Grande.....	33 10	116 46	5	1+	1 00	Rumbling.....	5 or 6 secondary slight shocks followed during next 4 hours.	Edward H. Davis.
		Mount Lowe.....	34 13	118 08	8	1	07		Rapid rocking E-W, and up and down.	Edward Luclen Larkin.
		Mount Wilson.....	34 13	118 04	8	2	30		Abrupt rocking NE-SW. Rocks on mountain side dislodged.	A. H. Joy.
		Nelle.....	33 19	116 52	8	3	12	None.....	Abrupt bumping and rocking E-W.	Esther P. Hewlett.
		Nelle.....	33 19	116 52		1	04	None.....	Slight secondary shock 19 minutes after first one, and several slight tremors later.	Esther P. Hewlett.
		Nelle.....	33 19	116 52		1	04	None.....	Slight third shock 29 minutes after first one, and several slight tremors later.	Esther P. Hewlett.
		Newhall.....	34 23	118 33	5	1	20		Rapid rocking.....	P. J. Coyle.
		Ojai.....	34 25	119 12	5	1	05	None.....	Abrupt rocking E-W.....	Wm. H. Duncan.
		Point Loma.....	32 43	117 15	6	1	10	None.....	Rapid rocking SE-NW.....	Fred J. Dick.
		Pomona.....	34 03	117 45	4	1	19	None.....	Abrupt twisting NE-SW.....	John E. Adamson.
		Rodlands.....	34 03	117 11	9				Several buildings wrecked.....	San Francisco Chronicle.
		Rialto.....	34 06	117 22	4	2	10	Loud.....	Rumbling, trembling 7 seconds SE-NW, then a heavy twist for 3 seconds.	J. B. Witts.
		Riverside.....	33 59	117 23	7				Ornaments shook from courthouse cornice. Plate glass broken.	San Francisco Chronicle.
		San Bernardino.....	34 06	117 18	9				Wall 100 feet long of low brick building fell out.	San Francisco Chronicle.
		San Bernardino Mountain.....	34 07	116 56	9		30	Loud.....	Rumbling, mountain rocked like a cradle. Trees lapped N-S.	J. M. Henry.
		San Diego.....	32 43	117 10	6	1	Few.	None.....	Abrupt bumping and rocking E-W and N-S. Clock stopped. Milk bottle toppled over. Rocking chairs rocked.	Dean Blake.
		San Diego.....	32 43	117 10	5	2	05	None.....	First trembling, second twisting.	Archibald Campbell.
		San Diego (Camp Kearny 15 miles north).	32 56	117 10	4	2		None.....	Rapid rocking.....	Capt. Harry J. Willey.
		San Jacinto.....	33 46	116 58	10	2	40	Loud.....	Rumbling. Every business house laid flat. Building losses appraised at \$150,000. ^a	San Francisco Chronicle.
		Santa Anna.....	33 46	117 53	8	1	47	Rumbling.....	Gradual rocking E-W.....	R. L. Bishy.
		Santa Monica.....	34 02	118 30	6	3	20	None.....	Gradual rocking SW-NE.....	W. F. Bates.
Valley Center.....	33 13	117 04	7	5	1 20	Loud.....	Rumbling. Abrupt bumping and rocking.	Ben Amago.		
Venice.....	33 58	118 28	6	4	25	None.....	Abrupt rocking SW-NE.....	Dr. James T. Brown.		
Victorville.....	34 32	117 18	6	1	05	Loud.....	Rumbling, abrupt rocking N-S. Clock stopped. Articles thrown from shelves.	Virginia Messick.		
Victorville.....	34 32	117 18		1	01	None.....	Secondary faint shock a half-hour after above.	Virginia Messick.		
Victorville.....	34 32	117 18	5	3	37	Rumbling.....	Concrete tank cracked.	G. H. Matthews.		
Warner Springs.....	33 17	116 39	8	1		None.....	Plaster and adobe walls cracked.	J. A. Ream.		
Warner Springs.....	33 17	116 39		1	Few.	None.....	Secondary shock 15 minutes after above.	J. A. Ream.		
Whitewater.....	33 54	116 38	9				Two buildings collapsed.....	San Francisco Chronicle.		
Whittier.....	33 58	118 04	8				Slight damage.....	San Francisco Chronicle.		
Winchester.....	33 42	117 06	9				Earth slip buried 2 men in magnesite mine. Both rescued.	San Francisco Chronicle.		
Workman.....	33 55	118 11	8	2	1 02		Frame house on wood posts rocked to and fro. Two doors hinged N-S opened. Door hinged E-W closed.	F. H. Staverman, scientific assistant, Batavia Observatory, Java.		
22	Morning.	Aguanga.....	33 27	116 55		1		Faint shocks continued from 21st through night, with one on morning of 22d.	Paul Thomsen.	
23	5 03	Calxico.....	32 41	115 30	4	1	15	Faint.....	Rumbling. Abrupt bumping E-W.	H. M. Rouse.
	7 00	Hemet.....	33 44	116 58	4	1	Few.....	Windows shook, dishes rattled..	San Francisco Chronicle.	
	9 00	Hemet.....	33 44	116 58	4	1	Few.....	Windows shook, dishes rattled..	San Francisco Chronicle.	
	14 15	Hemet.....	33 44	116 58	5	1	Few.....	Windows shook, dishes rattled..	San Francisco Chronicle.	

^a Center of disturbances apparently San Jacinto fault, in Baptiste Canyon, 7 miles east of San Jacinto.—San Francisco Examiner.

TABLE 1.—Noninstrumental earthquake reports, April, 1918—Continued.

Day.	Approximate time, Greenwich Civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity Rossi-For.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.	
CALIFORNIA—continued.											
1918.	<i>H. m.</i>		<i>° ' "</i>	<i>° ' "</i>			<i>M. s.</i>				
Apr. 23	7 00	San Jacinto.....	33 46	116 58	4	1	Few.	.....	Windows shook, dishes rattled..	San Francisco Chronicle.
	9 00	San Jacinto.....	33 46	116 58	4	1	Few.	.....	Windows shook, dishes rattled..	San Francisco Chronicle.
	14 15	San Jacinto.....	33 46	116 58	5	1	Few.	.....	Windows shook, dishes rattled..	San Francisco Chronicle.
24	9 55	Warner Springs.....	33 17	116 39	2	1	Few.	None.....	Gradual rocking.....	J. A. Ream.	
25	3 00	San Jacinto.....	33 46	116 58	.....	1	Few.	.....	San Francisco Examiner.	San Francisco Examiner.
	7 00	San Jacinto.....	33 46	116 58	.....	1	Few.	.....	San Francisco Examiner.	San Francisco Examiner.
	10 05	Warner Springs.....	33 17	116 39	3	1	Few.	None.....	.....	J. A. Ream.
26	11 00	Mesa Grande.....	33 10	116 46	2	1	01	Faint.....	Trembling.....	Edward H. Davis.	
	12 00	Mesa Grande.....	33 10	116 46	2	1	01	Faint.....	Trembling.....	Edward H. Davis.	
27	5 30	Cahuilla.....	33 32	116 45	3	1	01	Rumbling.....	Gradual trembling, N-S.....	Hartwell W. Gardner.	
	6 00	San Jacinto.....	33 46	116 58	.....	1	Few.	.....	.....	Associated Press.
	10 00	Mesa Grande.....	33 19	116 46	2	1	01	Faint.....	Trembling.....	Edward H. Davis.	
	15 00	Cahuilla.....	33 32	116 45	4	1	01	Rumbling.....	Gradual rocking, N-S.....	Hartwell W. Gardner.	
	22 30	Cahuilla.....	33 32	116 45	3	1	01	Rumbling.....	Gradual trembling NE-SW.....	Hartwell W. Gardner.	
								Faint.....	Rumbling; gradual trembling N-S.	Hartwell W. Gardner.	
29	2 00	San Jacinto.....	33 46	116 58	5	1	Few.	.....	Rocked tables and furniture.....	Los Angeles Times.
	12 00	San Jacinto.....	33 46	116 58	3	1	Few.	.....	Rocked tables and furniture.....	Los Angeles Times.
DISTRICT OF COLUMBIA.											
10	1 09	Washington.....	38 54	77 03	3	1	01	None.....	Gradual trembling.....	Local observers, press reports.	
MARYLAND.											
		Bagley.....	39 30	76 23	1	1	01	None.....	Gradual trembling.....	D. Curtiss.	
		Baltimore.....	39 17	76 37	2	1	01	None.....	.....	The Baltimore News.
		Chesville.....	39 38	77 37	4	1	Few.	Loud.....	Like blasting; gradual trembling SW-NE.	D. E. Oswald.	
		Clear Spring.....	39 37	77 55	.....	.....	.....	None.....	5 large panes of glass found broken next day.	M. W. Frantz.
		College Park.....	38 58	76 55	3	1	01	None.....	.....	Thomas H. White.
		Solomons (?).....	38 19	76 27	4?	1?	1?	Faint?	Rumbling; abrupt trembling. (Reports time 31 minutes too late.)	W. H. Marsh, M. D.	
		Takoma Park.....	38 58	77 01	3	1	01	None.....	.....	L. M. Mooers.
		Woodstock.....	39 19	76 52	2	1	01	None.....	.....	Press report.
PENNSYLVANIA.											
		Colebrook.....	40 26	76 04	2	1	01	None.....	Gradual trembling.....	Wm. A. Rorer.	
VIRGINIA.											
		Buchanan.....	37 32	79 41	1	1	01	None.....	Gradual trembling.....	D. D. Booze.	
		Columbia.....	37 45	78 13	02	None.....	Like a violent wind.....	A. B. Payne.
		Culpepper.....	38 29	77 58	5	3	1	30	None.....	Abrupt rocking.....	R. E. Miller.
9	18 08	Dale Enterprise.....	38 27	78 55	1	1	01	None.....	Trembling.....	L. J. Heaterole.	
10	1 09	Dale Enterprise.....	38 27	78 55	3	2	03	Rumbling.....	Abrupt trembling.....	L. J. Heaterole.	
		Danville.....	36 34	79 26	2	2	Few.	None.....	Gradual rocking.....	Charles Alderson, Lewis Mitchell.	
		Gordonsville.....	38 09	78 11	3	2	30	None.....	Rapid trembling.....	J. C. Graves.	
		Guinea.....	38 09	77 26	1	1	04	None.....	Gradual trembling W-E.....	M. J. McNair.	
		Harrisonburg.....	38 25	78 52	5	.....	.....	.....	Rocking motion.....	Staunton Morning Leader.
		Luray.....	38 41	78 27	5-6	1	1	.....	.....	Staunton Daily News.
		Lynchburg.....	37 25	79 09	2	1	04	None.....	Gradual trembling.....	R. C. Williams.	
		New Canton.....	37 43	78 23	5	2	20	None.....	Abrupt trembling.....	Plummer F. Jones.	
		Orange.....	38 15	78 07	5	1	.....	Rumbling.....	Abrupt rocking.....	Miss Cleo Benedict.
		Rapidan.....	38 19	78 04	3	2	1	.....	Gradual trembling.....	F. H. Cainahan.
		Richmond.....	37 32	77 27	3	1	.....	None.....	Gradual rocking NW-SE.....	Mrs. Robert Currie.
		Roanoke.....	37 16	79 56	2	1	05	None.....	Gradual rocking.....	E. F. Ball.	
		Staunton.....	38 10	79 04	4	2	1	Rumbling.....	Gradual trembling NE-S.....	E. J. Cushing.
		University.....	38 02	78 31	5	1	30	Rumbling.....	Like quite heavy thunder; abrupt trembling SW-NE.	S. A. Mitchell.	
		White Post.....	39 04	78 07	4	1	1	.....	None.....	Staunton Daily News.
		Williamsburg.....	37 16	76 43	2	1	01	None.....	.....	W. E. Mosler.
		Winchester.....	39 10	78 10	4	1	30	Rumbling.....	Like a heavy truck running; abrupt trembling.	Walter I. Cooper.	
		Woodstock.....	38 53	78 31	5	1	.....	Rumbling.....	Like a heavy railroad train; gradual trembling E-W.	Tirzah L. Miley.
16	12 40	Luray.....	38 41	78 27	.....	1	.....	None.....	Windows rattled; fifth shock within a week.	Associated Press.
21	15 ..	Norfolk.....	36 51	76 17	.....	2	Few.	None.....	.....	Associated Press.
		Suffolk.....	36 43	76 35	.....	2	Few.	None.....	.....	Associated Press.
WEST VIRGINIA.											
10	1 09	Buckhannon.....	38 59	80 15	2	1	Few.	None.....	Gradual trembling.....	Mrs. H. A. Darnall.	
		Martinsburg.....	39 28	77 58	5	1	07	Rumbling.....	Gradual bumping.....	George W. Van Metre.	
UTAH.											
21	22 30	Milford.....	38 24	113 01	1	1	.....	None.....	.....	San Francisco Chronicle.
WASHINGTON.											
18	20 13	White Bluff Prairie (8 miles west of Spokane).	47 40	117 35	4	1	04	Faint.....	Rumbling; rocking N-S.....	Mrs. A. D. Currie.	

TABLE 2.—Instrumental reports, April, 1918.

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

[For significance of symbols see REVIEW for January, 1918, p. 34.]

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _E	A _N		

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: $\begin{matrix} V & T_0 \\ E & 10 & 16 \\ N & 10 & 15 \end{matrix}$

1918.		H. m. s.	Sec.	μ	μ	km.	
Apr. 14	e _N	8 32 42	5				E driving clock being repaired.
	M _N	8 32 46			60		
	F	8 42 ..					
21	eP _N	22 38 10	5				Do.
	S _N	22 42 58	12				
	eL _N	22 45 36	24				
	M _N	22 49 46	12		350		
	C	22 50 ..					
	F	23 58 ..					

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: $\begin{matrix} V & T_0 \\ E & 10 & 14 \\ N & 10 & 18 \end{matrix}$

1918.		H. m. s.	Sec.	μ	μ	km.	
Apr. 17	eP _N	6 49 14					
	eP _N	6 49 18					
	M _N	6 52 25	10		20		
	M _N	6 52 30	12	50			
	F	6 54 ..					
21	eP _N	22 33 50	9				N stylus off paper from 22:35 ⁰⁰ to 22:38 ¹⁵ .
	eP _N	22 33 58	8				
	eL _N	22 35 10	16				
	eL _N	22 35 19	10				
	M _N	22 36 34	8	6,900	8,620+		
	F	22 39 ..	12				
27	e	14 50 45	12				Nothing on N.
	M	15 02 ..	12	30			
	F	15 04 ..	12				

California. *Berkeley. University of California.*

Lat., 37° 32' 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, 1,261.7 meters.

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

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _E	A _N		

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.

1918.		H. m. s.	Sec.	μ	μ	km.	
Apr. 13					100		Tremors during 24 hours preceding. No magnification, but N-S component is absolutely astatic for an amplitude for an amplitude (half swing) of only 10 mm., and the E-W component for an amplitude of 5 mm. For the first time in 12 years a distinct vertical component was registered with an amplitude of 0.5 mm. True amplitudes are therefore estimated as 50 per cent of those recorded horizontally. Horizontal acceleration is estimated to have been between 400 mm. and 600 mm. per sec. per sec. Duration 7 to 10 seconds.
21	VI	22 35 ..		4,500	6,000		

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

Lat., 37° 25' 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: Wierchert 80 kg., astatic, horizontal pendulum.

Instrumental constants

1918.		H. m. s.	Sec.	μ	μ	km.	
Apr. 10-11.							Sinusoids of long period and small amplitude on both components recurring constantly during the day.
11	L _E F _E	2 10 .. 3 20 ..					Wavelets — thickening of penmarks.
16-17							Visible activity at intervals during the day.

TABLE 2.—Instrumental reports, April, 1918—Continued.

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					A _m	A _N		

Colorado. Denver—Continued.

1918.		H. m. s.	Sec.	μ	μ	km.	
Apr. 21	P _N	22 34					Not discernible.
	P _S	22 34					
	S _N	22 34					
	S _S	22 36					
	L _N	22 38	5	*22,000	25,000		
	L _S	22 38	5	*25,000			
	M _N	22 37	4-5	*60,000			
	M _S	22 38	4-5				
	C _N	22 40	8	*50,000	8,000		
	C _S	22 44	7	*2,000	8,000		
22	L _N	22 40					Broken waves visible—strong activity.
	F _N	23 33					
23-24							Long-period waves at intervals during the day.
30							Activity and wavelets at intervals during the day.

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

Instrumental constants.	V T ₀ e		
	E	N	Z
	125 5.4 0	143 5.2 0	30 5.0 0

1918.		H. m. s.	Sec.	μ	μ	km.	
Apr. 10	i	1 09 12					'Quake felt locally. F in heavy wind markings.
	M _N	1 09 29	1		*1,800		
	M _S	1 09 22		*2,000			
	F	1 13 28					
10	VERTICAL.						Earlier part of 'quake lost in changing of sheets. Heavy microseisms.
	i	1 09 15			A _S		
	M _S	1 09 34	2		*1,600		
	F	1 13 39					
15	S _N	2 25 31					Microseisms present.
	S _S	2 25 50					
	F	3 15					
	IP	8 36 49					
17	S	8 44 00					Heavy microseisms.
	eL _N	8 50 06	11				
	eL _S	8 50 24	11				
	M _N	8 53 42			*200		
	M _S	8 53 45			*300		
	F	9 11					
19	e	6 57 40					Disturbance felt locally, doubtful as to seismic origin.
	L	7 03 24	15				
	F	7 15					
21	VERTICAL.						Mainka shows: P _N 22°30'-00", P _S 22°39'-00", S _N 22°44'-19", S _S 22°44'-36".
	P _N	22 38 57					
	IP _N	22 39 04					
	S _N	22 44 25					
	S _S	22 44 31					
	eL	22 47 48					
	M _N	22 49 42	4		*42,500		
	M _S	22 49 50	5.5		*16,000		
	M _N	22 52 13	8		*10,500		
	M _S	22 53 43	5		*20,000		
22	F	0 40					P difficult, lost in heavy microseisms.
	VERTICAL.						
	P _N	22 39 09					
	S _N	22 44 38					
27	eL _N	22 47 48					P _S 5 seconds later evidently reaction from E-W component. S _N not discernible.
	M _N	22 49 31	5		*18,000		
	F	22 50					
	S _T	14 57 25					
21	eL _N	15 01 12	16				P _S 5 seconds later evidently reaction from E-W component. S _N not discernible.
	eL _S	15 01 30	16				
	F	15 28					
	F	15 28					

* Trace amplitude.

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					A _m	A _N		

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

1918.		H. m. s.	Sec.	μ	μ	km.	
Apr. 10	P	1 09 12?					Virginia earthquake. Timing clock stopped, time estimated.
	S _T	1 09 22?					
	M	1 09 34?		*3,000			
15	P	8 36 49					F lost in microseisms.
	S	8 44 01					
	L _T	8 49 30					
	F	9 20					
21	eP	22 39 01				3,800	San Jacinto, Cal.
	eS	22 44 25					
	L _T	22 48					
	M _N	22 50			*90,000		
	M _S	22 53			*65,000		
27	eL	15 01 50					Heavy microseisms.
	F	15 06					

* Trace amplitude.

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
		13.6

(No earthquake recorded during April, 1918.)

Kansas. Lawrence. University of Kansas. Department of Physics and Astronomy. F. E. Keeler.

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

Instrument: Wiechert.

Instrumental constants.		V	T ₀	e
		177	3.4	4.1
		205	3.4	4.1

1918.		H. m. s.	Sec.	μ	μ	km.			
Apr. 10	P	2 15 47					Trace 0.4		
	IP	2 15 48		0.4					
	eS _T	2 18 35							
	L	2 25 18							
	M _N	2 25 48			3.4				
	M _S	2 25 48				0.9			
	F _N	2 45							
	F _S	2 51							
	17	eP _N	6 47 57						P _S 5 seconds later evidently reaction from E-W component. S _N not discernible.
		eP _S	6 48 00						
eS _N		6 52 02							
eS _S		6 52 09							
L _N		6 55 24							
M _N		6 55 25							
L _S		6 55 55							
M _S		6 58 53							
F _N		7 05							
F _S		7 13							
21	IP _N	22 36 38					P _S 5 seconds later evidently reaction from E-W component. S _N not discernible.		
	S _N	22 39 43							
	S _S	22 40 04							
	L	22 41 34							
	L _N	22 41 58							
	L _S	22 41 59							
27	M _N	22 42 21					102.3		
	M _S	22 43 48							
	F _N	23 55							
	F _S	23 55							

TABLE 2.—Instrumental reports, April, 1918—Continued.

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.	
					A _m	A _N			
Maryland. <i>Cheltenham. Magnetic Observatory.</i> U. S. Coast and Geo-detic 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.									
					$\begin{matrix} V & T_0 & \epsilon \\ \text{Instrumental constants.} & \begin{cases} E & 10 & 15 \\ N & 10 & 15 \end{cases} \end{matrix}$				
1918			<i>H. m. s.</i>	<i>Sec.</i>	μ	μ	<i>km.</i>	Reported as felt at Cheltenham and Croome, Md. Principal portion recorded on magnetograph.	
Apr. 10		P	1 09 12						
		L	1 09 30						
		M	1 09 32	2	50				
		M _N	1 09 36	2		50			
		F	1 18 ..						
21		eP _N	22 39 12						E stylus not recording.
		S _N	22 44 29						
		eL _N	22 47 20	14					
		M _N	22 50 28	14		2,400			
		C	22 55 ..						
		F	23 40 ..						

Massachusetts. <i>Cambridge. Harvard University Seismographic Station.</i> 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):									
					$\begin{matrix} V & T_0 & \epsilon \\ \text{Instrumental constants.} & \begin{cases} E & 80 & 23 & 0 \\ N & 50 & 25 & 4.1 \end{cases} \end{matrix}$				
1918			<i>H. m. s.</i>	<i>Sec.</i>	μ	μ	<i>km.</i>	N component out of commission for repairs. Undamped pendulum. A increases as T shortens. Stylus left drum for 1m. 11s. Trace amplitude, 65 mm. Origin, southern California.	
Apr. 21		O	22 32 24				4,040		
		iP _N	22 39 45						
		S _N	22 45 34						
		eL _N	22 49 08	12					
		L _N	22 51 34	6					
		M _N	22 55 00	15					
22		F	0 48 27						

Missouri. <i>Saint Louis. St. Louis University.</i> 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.									
					$\begin{matrix} V & T_0 & \epsilon \\ \text{Instrumental constants.} & \begin{cases} E & 80 & 7 & 5.1 \end{cases} \end{matrix}$				
1918			<i>H. m. s.</i>	<i>Sec.</i>	μ	μ	<i>km.</i>	P on both components not recorded. No S on E-W. Son N-S doubtful. San Jacinto, Cal.	
Apr. 17	Ir	P _N	6 55 54						
		iS _N	6 57 42	21		*2,000			
		eL _N	6 57 42	12		*1,000			
		eL _N	6 57 42	12					
21	IIIr	iP	22 37 24				2,657		
		S	22 41 36						
		L	22 43 12						
		M	22 45 06	6		*70,000			
		M _N	22 45 06	12		*45,000			
		F _N	23 28 00						
		F _N	23 53 00						
22								Isolated shocks.	
23								Isolated shocks.	

New York. <i>Buffalo. Canisius College.</i> John A. Curtin, S. J.									
Lat., 42° 53' 02" N.; long., 78° 52' 40" W. Elevation, 100.5 meters.									
Instrument: Wiechert 80 kg. horizontal.									
					$\begin{matrix} V & T_0 & \epsilon \\ \text{Instrumental constants.} & \begin{cases} E & 80 & 7 & 5.1 \end{cases} \end{matrix}$				
(Report for April, 1918, not received.)									

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.	
					A _m	A _N			
New York. <i>Fordham. Fordham University.</i> Daniel H. Sullivan, S. J.									
Lat., 40° 51' 47" N.; long., 73° 53' 08" W. Elevation, 29.3 meters.									
Instrument: Wiechert, 80 kg.									
					$\begin{matrix} V & T_0 & \epsilon \\ \text{Instrumental constants.} & \begin{cases} E & 72 & 5.0 & 0 \\ N & 72 & 5.0 & 0 \end{cases} \end{matrix}$				
1918			<i>H. m. s.</i>	<i>Sec.</i>	μ	μ	<i>km.</i>	Great amplitudes due to resonance.	
Apr. 21		iP _N	23 34 55						
		P _N	23 34 59						
		iS _N	23 40 28						
		iS _N	23 40 31						
		L _N	23 44 07						
		L _N	23 44 19						
		M _N	23 46 28	4.5		*26,000			
		M _N	23 47 03	4.5		*53,000			
		C	23 56 00						
22		F	0 27 00						

New York. <i>Ithaca. Cornell University.</i> 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).									
					$\begin{matrix} V & T_0 & \epsilon \\ \text{Instrumental constants.} & \begin{cases} E & 13 & 22 & 4.1 \\ N & 14 & 25 & 4.1 \end{cases} \end{matrix}$				
(Report for April, 1918, not received.)									

Panama Canal. <i>Balboa Heights.</i> Governor, Panama Canal.									
Lat., 8° 57' 39" N.; long., 79° 33' 29" W. Elevation, 27.6 meters.									
Instruments: Two Bosch-Omori, 100 kg.									
					$\begin{matrix} V & T_0 \\ \text{Instrumental constants.} & \begin{cases} 35 & 20 \end{cases} \end{matrix}$				
1918			<i>H. m. s.</i>	<i>Sec.</i>	μ	μ	<i>km.</i>	Slight tremors from 22 ^h 40 ^m to 23 ^h 20 ^m . Distance and direction unknown.	
Apr. 21									
25									Slight tremor 3 ^h 15 ^m 00 ^s . Distance and direction unknown.
25		P _N	21 47 48				280		Direction?
		P _N	21 47 51						
		L _N	21 48 22	20					
		L _N	21 48 25	20					
		M _N	21 48 32			*3,000			
		M _N	21 48 33			*2,000			
		F _N	21 57 ..						
		F _N	21 59 ..						

Porto Rico. <i>Vieques. Magnetic Observatory.</i> 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.									
					$\begin{matrix} V & T_0 \\ \text{Instrumental constants.} & \begin{cases} E & 10 & 17.5 \\ N & 10 & 18.2 \end{cases} \end{matrix}$				
1918			<i>H. m. s.</i>	<i>Sec.</i>	μ	μ	<i>km.</i>		
Apr. 21		eP _N	22 41 17						
		eP _N	22 43 12						
		eL _N	23 00 40	26					
		eL _N	23 01 20	14					
		M _N	23 03 57	16		40			
		M _N	23 09 06	14		40			
		C	23 12 ..	12					
		F	23 50 ..	10					
22		e _N	4 15 50						
		e _N	4 15 52						
		M _N	4 15 57	2		40			
		M _N	4 16 02	4		40			
		F	4 21 ..						

Panama Canal. <i>Balboa Heights.</i> Governor, Panama Canal.									
Lat., 8° 57' 39" N.; long., 79° 33' 29" W. Elevation, 27.6 meters.									
Instruments: Two Bosch-Omori, 100 kg.									
					$\begin{matrix} V & T_0 \\ \text{Instrumental constants.} & \begin{cases} 35 & 20 \end{cases} \end{matrix}$				
1918			<i>H. m. s.</i>	<i>Sec.</i>	μ	μ	<i>km.</i>		
Apr. 21		eP _N	22 41 17						
		eP _N	22 43 12						
		eL _N	23 00 40	26					
		eL _N	23 01 20	14					
		M _N	23 03 57	16		40			
		M _N	23 09 06	14		40			
		C	23 12 ..	12					
		F	23 50 ..	10					
22		e _N	4 15 50						
		e _N	4 15 52						
		M _N	4 15 57	2		40			
		M _N	4 16 02	4		40			
		F	4 21 ..						

TABLE 2.—Instrumental reports, April, 1918—Continued.

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _m	A _N		

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

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

Instruments: Two Bosch-Omorl, mechanical registration.

Instrumental constants. $\frac{V}{E} \frac{T_0}{10} \frac{T_0}{15}$
 $\frac{V}{N} \frac{T_0}{10} \frac{T_0}{16}$

1918.		H. m. s.	Sec.	μ	μ	km.	
Apr. 17	eN	7 01 35					
	LN	7 04 40	12				
	F	7 03					
21	P	22 39 13				3,500	San Jacinto, Cal.
	S	22 44 30					
	L	22 48 10					
	M	22 54		*15,000			
	F	22 52 30			*43,000		

*Trace amplitude.

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 30k. vertical seismograph.

Instrumental constants. $\frac{V}{T_0} \frac{T_0}{120} \frac{T_0}{26}$

1918.		H. m. s.	Sec.	μ	μ	km.	
Apr. 10	eN	1 12 27					
		1 14	2.5				
							Both pendulums have been set to register N-S during the month.
10	eN	2 15 47	3				
	eN	2 25 17	1.5				
	eN	2 25 42	2.5				
	eN	2 26 48	4				
	eLN	2 28 30†	8				
	LN	2 31	8				
	LN	2 40	8				
	LN	2 45	8				
	LN	2 45	8				
	F	2 50					
13	eLN	2 08 to	20				
	LN	2 15					
	F	2 18	18				
15	O	8 27 44				5,080	
	P	8 36 15					
	P	8 38 08					
	S	8 43 00					
	LN	8 49 38†	12		60		
	F	8 57	8				
17	eN	3 04					
	eLN	3 08	15				
	F	3 17					
	F	3 20					
17	eLN	7 01					
	LN	7 03	15				
	LN	7 08	8				
	F	7 20					
21	O	22 22 24				3,600	
	eFN	22 39 12					
	S	22 44 36					
	S	22 46 14					
	eLN	22 48 12†			1,000		
	LN	23 51	12				
	LN	23 05	12				
	LN	23 12	12				
	LN	23 20	9				
	F	23 34	12				
27	OT	14 43 60				4,100†	
	eFN	14 51 15					
	eSN	14 57 08					
	S	15 59 24					
	eLN	15 02					
	LN	15 05	16				
	F	15 10	11				

† Original time given in tenths of a minute.

Date.	Charac-ter.	Phase.	Time.	Pe-riod T.	Amplitude.		Dis-tance.	Remarks.
					A _m	A _N		

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".

1918.		H. m. s.	Sec.	μ	μ	km.	
Apr. 10	L	2 25 48†					
	L	2 29 42					
	M	2 29 54		*300			
	F	2 38 48					
13	L	2 07 18					
	L	2 16 48					
	M	2 21 18		*200			
	F	2 48 48†					
15	L	8 47 06					
	L	8 53 06		*50			
	F	9 04 54					
17	eL	3 05 54					
	L	3 09 54					
	L	3 21 12		*200			
	F	3 30 06					
17	P	8 47 54					
	L	8 58 00					
	IL	7 04 24					
	M	7 04 54		*300			
	F	7 17 54†					
20	L	6 59 00					
	L	7 00 24					
	F	7 01 24		*200			
21	P	22 39 06				3,520	San Jacinto, Cal.
	S	22 44 24					Clear record, but P waves not well defined.
	IS	22 45 42					
	L	22 49 48					
	IL	22 51 36		*10,000			
22	IL	23 51 54					
	F	23 09 12					
27	L	15 02 06					
	M	15 07 48		*300			
	F	15 34 36†					

* Trace amplitude. † Original time for all readings given in tenths of a minute.

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".

1918.		H. m. s.	Sec.	μ	μ	km.	
Apr. 10	PT	2 21 24					
	M	2 22 21		*200			
	L	2 27 46					
13	L	2 10 36		*50			
15	P	8 31 51				2,410	Well-defined disturbance.
	L	8 35 49					
	M	8 37 48		*500			
	F	8 46 44					
	P	8 38 28	8-3		A.	8,410	
15	L	8 38 49	8				
	M	8 37 44	7-8				
	F	?					
	M	19 34 57		*50			Thickening.
17	P	2 48 33				550?	
	L	2 7 ?					
	M	2 49 33		*100			
	F	2 55 30					
17	P	6 46 06				1,110	
	L	6 48 06					
	M	6 48 34		*1,000			
	F	6 58 29					
	P	6 48 40	8-3		A.	550?	
	L	6 47 40†	8				
	M	6 48 00	7-8			10	

* Trace amplitude.

TABLE 2.—Instrumental reports, April, 1918—Continued.

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _a	A _x		
Canada. Victoria, B. C.—Continued.								
1918.			H. m. s.	Sec.	μ	μ	km.	
Apr. 20	L		7 11 12		*50			
	F		7 15 30					
21	P		22 35 57				1,770	San Jacinto, Cal.
	S		22 39 09					
	L		22 40 37					
	M		22 43 25		*25,000			
22	F		0 35 33					
		VERTICAL				A _a		
	P		22 56 16	5			1,710	
	S		22 59 15	10-12				
	L		22 41 17	12-14				
	M		22 45 54	18		36		
	F		23 54 07					
27	P or S		15 07 18					
	L		15 09 32					
	M		15 11 46		*500			
	F		15 18 42					

* Trace amplitude.

SEISMOLOGICAL DISPATCHES.¹

Washington, D. C., April 9, 1918.

A slight earthquake shock was felt here at 9hrs. 9m. 12s. p. m. In the neighborhood of the Georgetown University Seismic Station windows were broken. The tremors lasted for about three minutes. (Georgetown University Station.)

Richmond, Va., April 9, 1918.

Several residents of Highland Park reported to the police and the newspapers to-night that their homes were severely shaken for several seconds. Three distinct shocks were felt. (Assoc. Pr.)

Lynchburg, Va., April 9, 1918.

A pronounced earthquake shock, continuing for a little less than one minute, was felt here to-night shortly after 9 o'clock, causing many inquiries at the local newspapers. It was felt also in the contiguous counties. No damage. (Assoc. Pr.)

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

Woodstock, Md., April 9, 1918.

Slight earthquakes were felt here at a few minutes past 9 o'clock p. m. (Local observer.)

Luray, Va., April 16, 1918.

Northern Virginia felt the fifth earthquake shock within a week. The shock came at 8:40 a. m. Buildings rocked, windows rattled, and consternation reigned. (Assoc. Pr.)

[This 'quake was not recorded on seismographs at Washington, D. C.]

Eureka, Cal., April 17, 1918.

An earthquake, said to have been the most severe experienced here in a decade, occurred last night. The vibrations lasted 30 seconds. No damage. (Assoc. Pr.)

Fort de France, Martinique, April 19, 1918.

Slight earthquake shocks have been felt here for five days. The tremors began soon after noon Sunday, 14th, and continued until 2 o'clock this afternoon. (Assoc. Pr.)

Norfolk, Va., April 19, 1918.

Two distinct earthquake shocks were felt here and at Suffolk shortly before noon to-day. (Assoc. Pr.)

Los Angeles, Cal., April 21, 1918.

All of southern California and part of western Arizona and Utah were shaken to-day at 3:32 p. m. by an earthquake, which wrecked virtually all buildings and residences in Hemet and San Jacinto, two inland towns 45 miles southeast of Riverside, Cal., and caused minor property damage in practically every town and city in this section of the State. (Assoc. Pr.)

San Jacinto, Cal., April 23, 1918.

Three more shocks occurred in this place, one at midnight, one at 2 a. m., the third at 7:15 a. m. The last of these three was the more severe. Windows rattled and dishes were shaken. (Assoc. Pr.)

San Jacinto, Cal., April 25, 1918.

Two more earthquake shocks occurred during the night, one at 8 o'clock and the other at midnight. No damage was done. (Assoc. Pr.)

Rome, April 25, 1918.

Earthquake shocks lasting a minute were felt at Milan and Bergam, in northern Italy. No damage was done. (Assoc. Pr.)

San Jacinto, April 27, 1918.

One of the most severe of a score of earthquakes occurred last night at about 10:30. No damage was done. (Assoc. Pr.)

SECTION V.—SEISMOLOGY.

SEISMOLOGICAL REPORTS FOR MAY, 1918.

W. J. HUMPHREYS, Professor in Charge.

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

TABLE I.—Noninstrumental earthquake reports, May, 1918.

Day.	Approximate time, Greenwich Civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity Rossi-Forel.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.	
1918. May 1	H. M. 4 32	ARIZONA.									
		Cibola.....	33 21	114 42	3	1	M. 20	Rumbling.....	Gradual trembling E-W, rattling.	L. W. Bishop.	
		Yuma.....	32 45	114 36	3	1	03	Rattling.....	Abrupt rocking and trembling.	S. Hackett.	
		CALIFORNIA.									
	4 32	Bonita.....	32 39	117 03	3	1	05	Rattling.....	Gradual rocking.	R. M. Allen.	
		Calixico.....	32 41	115 30	6	1	1 00	Faint.....	Rumbling. Abrupt trembling and twisting N-S. Plate-glass win lows broken. Apparently central in Imperial Valley.	H. M. Rouse.	
		El Centro.....	32 48	115 32		1	30		Doors and windows rattled.	Associated Press.	
		Julian.....	33 04	116 36	3-4	1	03	Faint.....	Rumbling. Abrupt trembling.	J. H. L. Vogt.	
		Point Loma.....	32 43	117 15	2	1	Few.	None.....	Vibration in all directions.	Fred J. Dick.	
		San Diego.....	32 43	117 10	2	1	Few.	None.....	Vibration in all directions.	Fred J. Dick.	
	5 10	Calixico.....	32 41	115 30	2	1	01	None.....	Rapid trembling.	H. M. Rouse.	
	7 10	Calixico.....	32 41	115 30	4	1	02	Loud.....	Rumbling. Rapid trembling N-S.	H. M. Rouse.	
	11 12	Calixico.....	32 41	115 30	4	1	01	None.....	Rapid trembling.	H. M. Rouse.	
	14 50	Calixico.....	32 41	115 30	3	1	01	Faint.....	Rumbling. Gradual trembling NE-SW.	H. M. Rouse.	
2	12 51	Calixico.....	32 41	115 30	3	1	03	Faint.....	Rumbling. Rapid bump, then a twist NE-SW. Four other quakes reported during night by others.	H. M. Rouse.	
	17 12	Calixico.....	32 41	115 30	5	2	40	Faint.....	Rumbling. Gradual trembling N-S.	H. M. Rouse.	
13	8 30	Lone Pine.....	36 37	118 02	4	3	Few.	None.....	Abrupt rocking.	G. F. Marsh.	
16	16 40	Hemet.....	33 44	116 58	3	1	01	Loud.....	Abrupt bumping NE.	C. E. McManigal.	
22	11 08	Calixico.....	32 41	115 30	3	1	01	Faint.....	Rumbling. Rapid bumping NE-SW.	H. M. Rouse.	
21	9 35	Lone Pine.....	36 37	118 02		2	Few.	None.....	Dumping.	G. F. Marsh.	
25	17 37	Calixico.....	32 41	115 30	2	1	01	None.....	Abrupt bumping.	H. M. Rouse.	
28	12 30	Hemet.....	33 44	116 58	4	2	02	Yes.....	Abrupt bumping SE.	C. E. McManigal.	
		NEW MEXICO.									
28	11 30	Albuquerque.....	35 06	106 39	3	1	Few.	None.....	Slight trembling.	Albuquerque Evening Herald.	
		Cerillos.....	35 27	106 07	10				Many plastered ceilings and chimneys fell. People on street thrown off their feet. Heavy break in surface of earth at edge of town. No one badly injured.	Albuquerque Evening Herald.	
		Espanola.....	36 00	106 05	3-5	1	02	Faint.....	Like distant thunder. Rapid rocking and trembling. People awakened.	Mrs. E. F. McBride.	
		Estancia Lamy.....	34 49	106 04	2	1	1 00	None.....	Rapid twisting.	J. L. Stubblefield.	
			35 29	105 53	7-8				Rapid twisting about six times. Frame house swayed back and forth and walls creaked in the corners of rooms.	T. W. Hanna.	
		Las Vegas.....	35 35	105 14	2	1	Few.	None.....		Las Vegas Daily Optic.	
		Montoya.....	35 06	104 04	2	2	10	None.....	Abrupt trembling.	E. S. Micksel.	
		Moriarty.....	34 59	106 03	5	1-3	05	Rumbling.....	Like distant thunder. Abrupt trembling.	H. M. Bigger.	
		Pena Blanca.....	35 35	106 21	5-7	1				Samuel H. Sayce.	
		Porvenir.....	35 43	105 25	2	1	Few.	None.....		R. F. Springfels.	
		Santa Fe.....	35 41	105 57	1-7	1	03	Rumbling.....	Abrupt rocking SW-NE. Shook down plaster. Doors and windows rattled.	Charles E. Linney.	
		Stanley.....	35 07	106 00	5-8	1			Rumbling.	Henry Winans.	
		Valmora.....	35 47	104 59	2	1	Few.	None.....	Abrupt bump and rocking E-W. Doors rattled, piano sounded, some adobe walls cracked.	Alice Brown.	
		Waldo.....	35 28	106 10	5-8	1	Few.	None.....	Awakened people.	Albuquerque Evening Herald.	
		WASHINGTON.									
7	21 15	North Fork Sauk River.	48 06	121 22	4	1	05	Loud.....	Rumbling. Gradual trembling E-W.	C. M. Mackintosh.	

TABLE 2.—Instrumental seismological reports, May, 1918.

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

[For significance of symbols see RE VIEW for January, 1918, p. 34.]

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.	
					A _E	A _N			
Alaska. <i>Sitka. Magnetic Observatory. U. S. Coast and Geodetic Survey. J. W. Green.</i>									
Lat., 57° 03' 00" N.; long., 135° 30' 06" W. Elevation, 15.2 meters.									
Instruments: Two Bosch-Omori, 10 and 12 kg.									
					Instrumental constants: $\begin{matrix} V & T_0 \\ E & 10 & 16 \\ N & 10 & 15 \end{matrix}$				
1918.									
May 20	eP _N		15 00 01	12				E-W component out of order during entire month	
	eL _N		15 12 45	34					
	M _N		15 19 05	20		60			
	C _N		15 31						
	F _N		16 08						
23	eP _N		12 05 03						
	S _N		12 10 06						
	eL _N		12 15	28					
	M _N		12 20 11	12		280			
	C _N		12 22	9					
	F _N		13 10						

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.	
					A _E	A _N			
Arizona. <i>Tucson. Magnetic Observatory. U. S. Coast and Geodetic Survey. F. P. Ulrich.</i>									
Lat., 32° 14' 48" N.; long., 110° 50' 08" W. Elevation, 769.6 meters.									
Instruments: Two Bosch-Omori, 10 and 12 kg.									
					Instrumental constants: $\begin{matrix} V & T_0 \\ E & 10 & 14 \\ N & 10 & 18 \end{matrix}$				
1918.									
May '6	C _N		4 59 10	3					
	C _N		4 59 51						
	M _N		5 00 28	10		130			
	M _N		5 00 45	10		120			
	F _N		5 02						
20	eP _E		14 46					No motion on N-S.	
	eP _S		14 57						
	eL _E		15 11	20					
	M _E		15 19 05	16		50			
	F _E		15 22						
23	eP _N		11 58 52	4				Stylus off paper on N from 12 ^h . 00 ^m 50 ^s to 12 ^h . 07 ^m 12 ^s and on E from 12 ^h 00 ^m 56 ^s to 12 ^h 05 ^m 04 ^s .	
	eP _E		11 59 12	3					
	eL _E		12 00 12	20					
	eL _E		12 00 20	12					
	M _E				6,000+	3,150+			
	F _E		13 20						

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.		Distance.	Remarks.
					A _E	A _N		
California. <i>Point Loma. Raja Yoga Academy. F. J. Dick.</i>								
Lat., 32° 43' 03" N.; long., 117° 15' 10" W. Elevation, 91.4 meters.								
Instrument: Two-component, C. D. West seismoscope.								
1918.								
May 1	II		4 32			250	250	Very light shock.
3						300	300	Tremors during 24 hours preceding 15 ^h 00 ^m .
4						200	200	
9						100	100	
13						300	300	
17						100	200	

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

Lat., 37° 28' 30" 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.		Distance.	Remarks.
					A _E	A _N		
1918.								
May 23	P _N		7 7 ?					
	P _N		13 01					
	S _N		13 05					
	S _N		13 05					
	L _N		13 09	12-15	*15,000			
	L _N		13 09	9-12	*18,000			
	M _N		13 06	12	*45,000			
	M _N		13 06	10	*46,000			
	C _N		13 11					
	C _N		13 14					
	F _N		13 27					
25	L _N		11 30					Visible activity. Stronger on N-S.
	F _N		13					
27	L _N		12 10					Sineoidal of long period.
	F _N		13 30					
28	L _N		16 10					Quake reported from Albuquerque, N. Mex. Wavelets visible on both components.
	F _N		18					
29	L _N		13 35					Distinct waves at intervals during day.
	F _N		14 20					

* Trace amplitude.

TABLE 2.—Instrumental seismological reports, May, 1918—Continued.

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					A _m	A _N		
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: $V \frac{T_0}{T_1} = 110 \frac{7_0}{6.1}$								
1918.								
May 1		eP	4 48 ?					Time correction uncertain.
		eS?	4 49 ?					
		L	4 50 ?					
		F	5 05 ..					
2		e?	2 41 ..					Time correction uncertain.
		M	2 43 ?					
		F	2 50 ..					
6		eP?	5 05 ?					Time correction uncertain.
		eS?	5 11 ?					
		L	5 16 ?					
		F	5 35 ..					
9		eL?	9 54 ?					Time correction uncertain.
		F	10 00 ..					
11		eP?	21 34 ?					Time correction uncertain.
		eS?	21 44 ?					
		L	22 04 ..	16				
		F	22 15 ..					
16		e	21 42 17					
		L	21 46 02	10				
		F	22					
20		P	14 44 51					
		P _{app}	14 49 31					
		S	14 51 55					
		L	14 58 35	20				
		L	15 06 23	16				
		L	15 13 38	10				
		L	15 30 38	12				
		F	16 30 ..					
20		P	18 06 18					
		S	18 15 02					
		eL	18 30 33	28				
		F	19 30 ..					
22		eL	7 04 ..					
		F	7 15 ..					
23		P	12 03 45					
		S	12 10 05					
		L	12 13 25					
		M	12 14 30	*14,000	*31,000			
		F	13 30 ..					
25		P	19 40 34					
		S	19 49 38					
		eL	19 58 00	30				
		L	20 01 00					
		F	20 25 ..					

* Trace amplitude.

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: $\begin{matrix} E & V & T_0 & e \\ & 165 & 5.4 & 0 \\ N & 143 & 5.2 & 0 \\ Z & 80 & 3.0 & 0 \end{matrix}$

1918.			H. m. s.	Sec.	μ	μ	km.	
May 1		e _N	4 48 31					
		e _S	4 48 33					
		L _N	4 52 12	11				
		L _S	4 52 18	7				
		F	4 56 ..					
2		e?	2 33 28					e uncertain. heavy microseisms.
		L _N	2 41 57	6				
		L _S	2 42 46	6				
		F	2 47 ..					
6		e _N	5 12 26					Microseisms.
		e _S	5 12 27					
		L _N	5 13 12	11				
		L _S	5 14 43	11				
		F	5 27 ..					

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					A _m	A _N		
District of Columbia. Washington. Georgetown University—Contd.								
1918.								
May 16		eP _N	21 38 25					Microseisms: P _N does not show. No distinct main.
		S?	21 43 21					
		eL _N	21 45 37	10				
		L _N	21 46 15	11				
		F	22 00 ..					
20		iP _N	14 44 53					
		iP _S	14 44 54					
		iS	14 51 59					
		L	14 58 35	10				
		M	14 59 40		*1,500			
		M _S	14 59 51			*800		
		F	16 20 ..					
20		iP _N	18 06 02					No distinct main.
		eP _N	18 03 04					
		iS	18 15 02					
		eS _N	18 15 02					
		eL _N	18 26 16					
		eL _S	18 26 18					
		F	19 30 ..					
22		e _N	6 53 08					
		i _N	6 56 00					
		e _N	6 56 47					
		e _N	7 04 27	11				
		L _N	7 04 29	9				
		F	7 22 ..					
23		eP _N	12 03 57					From Bosch photographic seismograph. E-W light off. Lost on other seismographs while changing sheets.
		eS _N	12 09 40					
		eL _N	12 13 18	7.5				
		M _N	12 14 16		*2,000			
		M _S	12 17 40		*4,700			
		M _N	12 19 07		*2,500			
		M _S	12 19 40		*3,200			
		F	14 08 ..					
24								A series of long waves appears to show on N-S component from 16h 1m to 16h 8m.
25		P	19 40 35					
		S _N	19 45 23					
		S _S	19 45 24					
		L	19 49 55					
		F	20 30 ..					

* 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.

Instrumental constant: $\frac{T_0}{T_1} = 31$

1918.			H. m. s.	Sec.	μ	μ	km.	
May 20		P	14 58 24					Instrument out of adjustment during entire month of April and until May 20, and probably a portion of March also.
		S	15 02 00					
		L	15 06 00					
		M	15 12 42	30	*1,700			
		C	15 17 12					
		F	15 51 ..					
20		e	18 13 00					Sheets changed 18h 37m 12s to 18h 45m 12s.
		L	18 19 12	31				
		M	18 23 24	32	*1,500			
		C	18 27 ..					
		F	20 47 ..					
23		e	12 05 00					
		L	12 13 00	24				
		M	12 17 12	28	*4,500			
		C	12 22 ..					
		F	13 25 ..					
25		eP	19 42 12					
		S	19 52 48					
		L	20 04 48	30				
		M	20 06 36	42	*1,000			
		C	20 09 ..					
		F	20 27 ..					
31		eP	9 01 12					
		eL	9 05 42	29				
		M	9 08 36	29	*200			
		C	9 11 ..					
		F	9 25 ..					

* Trace of amplitude.

TABLE 2.—Instrumental seismological reports, May, 1918—Continued.

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					A _N	A _W		

Kansas. Lawrence. University of Kansas. Department of Physics and Astronomy. F. E. Keeter.

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

Instrument: Wiechert.

Instrumental constants. $\begin{cases} E & 177 & 3.4 & 4:1 \\ N & 205 & 3.4 & 4:1 \end{cases}$

1918.		H. m. s.	Sec.	μ	μ	km.	
May 1	P _N ?	4 38 45					P _N and S not discernible.
	eL _N	4 41 03					
	L _N	4 41 08					
	M _N	4 41 34	2.5	0.6			
	F _N	4 41 37	4.5	1.5			
6	IP?	5 00 14					Probably building shock. S _N not discernible.
	eP	5 00 32					
	S _N	5 03 21					
	L _N	5 05 50					
	F _N	5 06 33	12-15	5.4	3.7		
20	eP _N	16 46 21					N-S component tracing needs out of bearings.
	S _N	16 53 57		3.7			
	L _N	17 06 21					
	M _N	17 12 24		6.2			
	F _N	17 47					
23	P	12 01 40					
	S _N	12 04 53					
	S _W ?	12 04 59					
	L _N	12 07 01					
	F _N	12 07 03		72.6	63.9		

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

Lat., 38° 44' 00" N.; long., 76° 59' 30" W. Elevation, 71.6 meters.

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

Instrumental constants. $\begin{cases} E & 10 & 15 \\ N & 10 & 15 \end{cases}$

1918.		H. m. s.	Sec.	μ	μ	km.	
May 20	P	14 44 54	3				
	S _N	14 51 55	10	380	330		
	eL _N	14 58 40	20				
	eL _N	14 58 50	20		110		
	M _N	14 59 50	15				
	C	15 02 04	15	20			
	F	15 54					
20	e _N	18 05 03	5				
	e _N	18 05 21	5				
	M _N	18 15 25			10		
	M _N	18 15 39		60			
	F	18 23					
23	e _N	12 09 14					
	eL _N	12 13 08					
	M _N	12 15 28	16		900		
	M _N	12 17 08	10	150			
	C	12 24					
	F	13 00					
25	P	19 40 39	4				
	eS _N	19 48 35					
	eL _N	19 58	28				
	M _N	19 02 20	24	20	10		
	C	19 03					
	F	19 17					

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					A _N	A _W		

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. $\begin{cases} E & 90 & 23 & 4:1 \\ N & 50 & 25 & 4:1 \end{cases}$

1918.		H. m. s.	Sec.	μ	μ	km.	
May 1	e _N ?	4 50 31	2				
	S?	4 51 01	6				
	L _N	4 51 29	19				
	F	5 07 ca					
2	L _N	2 43 19					
	L _N	2 43 27					
	L _N	2 44 36	9-8				
	L _N	2 46 13					
	F	2 47 10					
6	O	5 15 00				540?	Not heard from.
	eP _N	5 15 09	3				
	L _N	5 16 08	12				
	L _N	5 18 24	10				
	F	5 26 30					
11	e?	20 43 56					P? Record very faint.
	L _N	21 04 47	20				
	L _N	21 06 38	10				
	F	21 17 ca					
16	e _N	21 45 34					P? or S? L? L?
	S _N	21 46 42	12, 15				
	S _N	21 47 09	12				
	L _N	21 49 20	10, 15				
	L _N	21 49 28	8				
	F	21 49 56					
20	L _N	21 53 54	8, 12				
	F _N	22 07 ca					
	O	14 55 43				5, 130	
	il _N	14 44 19					
	S _N	14 44 41					
20	S _N	14 51 08					Alaska? Around 140° W., 60° N. N stylus left drum shortly after S set in. E shows almost continuous long waves to C.
	S _N	14 51 22					
	O	17 55 18				7, 890	
	P _N	18 06 28					
	F _N	18 06 30					
20	S _N	18 15 42	6				Probably part of last record.
	S _N	18 15 46					
	eL _N	18 25 42	18				
	L _N	18 31 20	32				
	F?	20 ca					
22	L _N	21 40 46	10				
	L _N	21 43 16					
23	O	6				5, 650?	5,000 to 7,000 kms. Difficult to diagnose.
	e _N ?	6 50 08	4				
	F _N ?	6 58 42	6				
	eL _N ?	7 05 02	8				
	F	7 24 30					
23	O	11 57 22				4, 115	N component out of order.
	eP _N	12 04 48					
	S _N	12 10 41					
	eL _N	12 15 08	31				
	L _N	12 16 30					
	M _N	12 18 ca	10				
	M _N	12 20 ca	9				
	M _N	12 21 ca					
	M _N	12 22 ca	11				
	M _N	12 23 ca					
	M _N	12 25 ca					
C	12 53	10, 13					
F?	13 15						

Records changed.

TABLE 2.—Instrumental seismological reports, May, 1918—Continued.

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					A _m	A _n		

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. $\frac{V}{80} \frac{T_0}{7} \frac{\epsilon}{5:1}$

1918.		H. m. s.	Sec.	μ	μ	km.	Distance?
May 7	c _N	5 01 12					
	L _N	5 07 24	2	*2,000			
	L _N	5 07 24	12		*9,000		
	F _N	5 17 00					
20	iP _N	14 46 06				6,600	
	S _N	14 54 06					
	L _N	15 03 12					
	M _N	15 08 48	18	*21,000	*15,000		
	F _N	15 48 ..					
20	iP _N	18 05 00				4,000?	
	iP _N	18 06 18					
	S _N	18 ? ?					
	S _N	18 10 42					
	L _N	18 15 24	1	2,000			
	L _N	18 15 24					
	F _N	18 50 00	1		*4,000		
23	iP _N	12 02 18				2,300	
	S _N	12 06 06					
	S _N	12 06 12					
	L _N	12 07 06	9	*6,000			
	F _N	12 10 00	18		*34,000		

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. $\frac{V}{80} \frac{T_0}{7} \frac{\epsilon}{5:1}$

(Report for May, 1918, 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. $\frac{V}{80} \frac{T_0}{7} \frac{\epsilon}{5:1}$

1918.		H. m. s.	Sec.	μ	μ	km.	Remarks.
May 20	iP _N	15 40 12				5,300	No decided M.
	iP _N	15 42 00	4				
	iS _N	15 47 07					
	iS _N	15 47 10					
	L _N	15 50 49?					
	L _N	15 50 51?					
	F _N	17 00 ..					
20	eP _N	19 01 43				7,645	
	eP _N	19 01 49					
	iS _N	19 10 52					
	iS _N	19 10 58					
	L _N	19 ? ?					
	F _N	20 06 ..					

*Trace amplitude.

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					A _m	A _n		

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. $\frac{V}{13} \frac{T_0}{22} \frac{\epsilon}{4:1}$
 $\frac{V}{14} \frac{T_0}{25} \frac{\epsilon}{4:1}$

1918.		H. m. s.	Sec.	μ	μ	km.	Remarks.
May 1	e _N	4 48 52	3				
	e _N	4 49 18	12				
	F _N	4 59 30					
6	e _N	5 08 20	6				
	L _N	5 13 15	17				
	L _N	5 13 23	19				
	F _N	5 31 ..					
20	P _N	14 44 53	3				
	iS _N	14 52 14	13	*3,500			
	iS _N	14 52 15	15		*3,400		
	L _N	14 56 55	15				
	L _N	14 57 25	22				
	F _N	16 45 ..					
20	P _N	18 06 22	3				
	iS _N	18 15 38	6	*800			
	S _N	18 15 38	5				
	L _N	18 16 12	6	*900			
	i _N	18 16 12	6				
	L _N	18 27 18	15		*700		
	F _N	19 04 28	35				
22	e _N	6 54 52	5				
	e _N	6 56 44	6				
	e _N	6 58 55	6				
	F _N	7 04 23	11				
23	e _N	12 03 56	4				
	e _N	12 09 05	4				
	e _N	12 09 08	3				
	eL _N	12 11 42	12				
	M _N	12 15 00	10		*8,000		
25	M _N	12 15 55	9		*8,000		
	M _N	12 16 11	11		*8,000		
	M _N	12 17 28	11		*4,000		
	F _N	14 21 ..					
	eP _N	19 40 38	4				

Panama Canal. *Balboa Heights. Governor, Panama Canal.*

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

Instruments: Two Bosch-Omori, 100 kg.

Instrumental constants. $\frac{V}{35} \frac{T_0}{20}$

1918.		H. m. s.	Sec.	μ	μ	km.	Remarks.
May 20	P _N	14 43 48				3,220?	Direction uncertain.
	L _N	14 53 52?	20				
	L _N	14 54 03?	20				
	M _N	14 54 04		*2,500	*4,500		
	M _N	14 54 12					
	F _N	15 29 ..					
20	P _N	18 02 04				3,220?	Direction uncertain.
	P _N	18 02 10					
	L _N	18 12 04?	20				
	L _N	18 12 08?	20				
	M _N	18 12 12		*1,500	*1,000		
	F _N	18 26 ..					
25	P _N	19 36 33				2,010?	Direction uncertain.
	P _N	19 36 35					
	L _N	19 42 46	20				
	L _N	19 43 06					
	L _N	19 45 45	20		*2,000		
	M _N	19 46 07					
	F _N	20 22 ..					

* Trace amplitude.

TABLE 2.—Instrumental seismological reports, May, 1918—Continued.

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					A _m	A _n		

Porto Rico. *Vieques. Magnetic Observatory.* U. S. Coast and Geodetic Survey. W. M. Hill.
 Lat., 18° 09' N.; long., 65° 27' W. Elevation, 19.8 meters.
 Instruments: Two Bosch-Omorl.

Instrumental constants. $\frac{V}{N} \frac{T_0}{10}$

1918.		H. m. s.	Sec.	μ	μ	km.	
May 20	eP _m	14 42 30	3				
	eP _n	14 42 31	3				
	eS _m	14 47 30	8				
	eS _n	14 47 38	6				
	eL _m	14 49 16	22				
	eL _n	14 49 37	26				
	M _m	14 49 57	26		180		
	M _n	14 52 26	20	330			
	C _m	14 55					
	C _n	14 57					
20	e _m	18 05 55					No distinct phases.
	eL _m	18 13 30	16				
	eL _n	18 14					
	M _m	18 14 42		20	10		
	F	18 35					
25	e _m	19 38 54					Do.
	eL _m	19 46 21					
	eL _n	19 46 25					
	F	20 00					
	F	20 00					

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

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

Instruments: Two Bosch-Omorl, mechanical registration.

Instrumental constants. $\frac{V}{N} \frac{T_0}{10}$

1918.		H. m. s.	Sec.	μ	μ	km.	
May 6	e	5 14 40					
	L	5 15 45	12				
	F	5 30					
11	e	21 57					
	F	22 10					
16	e	21 49					
	F	22 00					
20	e	14 44 50					
	S	14 52 00					
	L	14 57 05	18				
	L	15 00 00	20				
	F	16 00					
20	e	18 06 37					
	S	18 16 00					
	F	18 30					
23	e	12 04 50					
	eL	12 12 30	12				
	F	13 30					
25	e	19 50 48					
	eL	19 57 50					
	F	20 04 00	20				

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. $\frac{V}{N} \frac{T_0}{120}$

1918.		H. m. s.	Sec.	μ	μ	km.	
May 1	OP	4 48 10				440?	
	eP ₁	4 49 11					
	eS ₁	4 50 00					
	L	4 50 30†	8				
	F	4 55	6				
2	e ₁	2 38 20	2				Heavy wind tremors all day interfere with the reading in both of these earthquakes. They may not be seismic.
	e ₂	2 40	8				
	F	2 48					
2	eL ₁	4 46	12				
	F	4 50					

† Original time given in tenths of a minute.

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					A _a	A _n		

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

1918.		H. m. s.	Sec.	μ	μ	km.	
May 6	OP	5 00 56				2,610?	
	eP ₁	5 06 14					
	eS ₁	5 19 28	8				
	M	5 16	8				
	L	5 19	8				
	L	5 25	7				
	L	5 30	7				
	L	5 43	10				
	F	5 50					
	9	e	9 52 12	1			
eL		9 52 30†	12				
L		9 54 30†	9				
F		10					
F		10					
11	e	21 23 16				8,980	
	eS	21 45 37					
	eL	22 03	30				
	L	22 10	15				
	F	22 15	15				
16	OP	21 27 44				2,630?	
	eP ₁	21 33 34					
	eS ₁	21 38 12					
	eL ₁	21 40 40					
	L	21 47	9				
	L	21 50	7				
	L	21 54	7				
	F	22 00	7				
20	e	14 55 55				5,740	The L waves arrive 3 minutes too early giving a velocity of 290 km/min. instead of the usual 228 km. The same is true of the Saskatoon record read here.
	1P	14 45 10					
	1S	14 52 32					
	eL	15 05	22				
	L	15 08	16				
	L	15 15	16				
	L	15 30	9				
	L	15 45	17				
	L	16 05	10				
	F	17	10				
20	e	17 55 15				8,120	Unusual increase in period of the L waves again.
	P	18 06 42					
	P ₁	18 09 46					
	P ₂	18 11 30†					
	S	18 16 08					
	S ₁	18 21 15					
	eL	18 30	35				
	L	18 35	21				
	L	18 40	17				
	eL	19 02	40				
22	e	6 41 15				5,300	
	1S	6 57 00					
	eL	7 04 48†					
23	L	7 12	8				
	L	7 40	8				
	F	8					
	F	8					
23	e	11 57 13				3,660	
	eL	12 04 06					
	eS	12 09 33					
	eL	12 13					
	F	12 32					
25	L	12 45					F lost in changing sheets.
	F	13 ? ?					
	e	19 29 26				8,520	
	1P	19 41 14					
	S	19 51 00					
	L	19 55 48†					
	L	20 06	40				
	L	20 13	16				
	L	20 28	8				
	F	20 50					
26	e	10 10 32					May not be seismic.
	F	10 13 20					
30	e	22 37	7				
	F	22 47					

TABLE 2.—Instrumental seismological reports, May, 1918—Continued.

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					A _m	A _n		
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=0.54'.								
1918.								
May 1.	L.		4 45 36†					Air currents going on.
	L.		4 49 36†		*50			(Microseisms going on during morning that would not ask any small quake.
2.								
4.								
6.	iL.		5 12 24					Microseisms at intervals.
	M.		5 12 54		*300			
	F.		5 22 12					
11.	L.		22 03 30		*50			
	F.		22 15 54					
16.	eL.		21 47 12					
	M.		21 50 12		*200			
	F.		22 06 18					
20.	L.		14 23 42		*100			Thickening.
	F.		14 26 42					
20.	eP.		14 45 12			6,340		La Serena, Chili. A clear record.
	IP.		14 52 24					
	IS.		14 53 06					
	eL.		14 58 24		*4,300			
	L.		15 01 06	Fast.				
	L.		15 02 18	Slow.				
	M.		15 05 42	18-24	*7,300			
	iL.		15 08 30	18				
	iL.		15 12 30					
20.	S or L.		18 15 48					May be a dual quake.
	M.		18 16 30		*1,300			
	eL.		19 06 24					
	eL.		19 11 12					
	M.		19 20 36		*800			
	eL.		20 15 42					
	M.		20 22 00		*300			
	F.		20 52 36					
22.	L.		6 55 24		*50			
	F.		7 51 36					
23.	S.		12 09 36					P not recorded. Alaska.
	iS.		12 13 36					
	iL.		12 14 30					
	M.		12 17 00		*8,000			
	L.		14 12 00					
	F.		15 19 54†					
25.	L.		19 51 30					
	eL.		20 00 48					
	M.		20 02 48		*300			
	F.		20 38 42					

* Trace amplitude.
† Original time of all readings given in tenths of seconds.

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					A _m	A _n		
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'.								
1918.								
May 1.	P or L.		4 40 41					
	M.		4 44 37		*300			
	F.		4 48 33					
4.	M?		7 13 10†		*50			May not be a quake.
4-11.								Sheets reversed when put on. Record too faint to detect any small quake.
16.	P.		21 41 49†				1,100†	
	L.		21 43 47					
	M.		21 45 16		*500			
	F.		21 53 42					
20.	P.		14 49 05				8,370	La Serena, Chili.
	S.		14 59 09					
	L.		15 10 12					
	M.		15 25 17					
	F.		17 27 46		*9,000			
	VERTICAL.							
	P.		14 48 54	2-3		A _z	10,180	La Serena, Chili.
	S.		15 00 00	9				
	L.		15 10 30	30				
	M.		15 22 30	24			7	
20.	P.		18 08 22				9,160	May also be from Chill.
	S.		18 18 41					
	L.		18 54 55					
	M.		18 47 22		*1,000			
	F.		20 44 15					
	VERTICAL.							
	P.		18 07 30	2-3		A _z		
	S.		18 30 12	6				
	L.		18 7 7					
	M.		18 41 30	30-36			3	
	F.		7 7 7					
22.	L.		6 52 44					
	M.		6 55 41		*300			
	F.		6 59 39					
23.	P.		12 02 31				2,930	8 waves of fairly large amplitude. Alaska.
	S.		12 07 09					
	L.		12 10 08					
	M.		12 13 36		*18,500			
	F.		13 54 45					
	VERTICAL.							
	P.		12 02 30	3		A _z	2,780	Alaska.
	S.		12 07 17	9				
	L.		12 10 50	14				
	M.		12 18 30	15			29	
	F.		7 7 7					
25.	PT.		19 40 25				10,040	
	ST.		19 51 25					
	L.		20 04 55					
	M.		20 16 25		*500			
	F.		20 52 25					

* Trace amplitude.

TABLE 3.—Late seismological reports (instrumental).

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.	
					A _m	A _n			
Massachusetts. Cambridge. Harvard University Seismograph Station, J. B. Woodworth.									
Lat., 42° 22' 36" N.; long., 71° 01' 59" W. Elevation, 5.4 meters. Foundation: Glacial sand over clay.									
Instruments: Two Bosch-Omori 100 kg. horizontal pendulums (mechanical registration).									
					$\begin{matrix} V & T_0 & \epsilon \\ \left\{ \begin{matrix} E & 80 & 23 & 0 \\ N & 50 & 25 & 4:1 \end{matrix} \right. \end{matrix}$				
1918.									
Feb. 1		OIM	8 57 44				0.1	Frost crack at station.	
		C	8 57 45						
		F	8 57 50						
3		eLm	15 01 25	20				Very faint, N microseisms running.	
		L	15 13 27	15					
		F	15 43						
12		Lm	10 03 48	28					
		F	10 45 ca						
13		eN	3 43 ca					Preceded for several hours by long period pulsations not clearly seismic.	
		Lm	3 55 04	24					
		eN	3 58 26						
		Lm	3 59 25	20					
		F	? ? ?						
13		O?	6 08 ca				12,400	Δ and O from ol-S. Displacement of stylus. Both components undamped; but M amplitudes very much larger on N than on E.	
		eN	6 20 13						
		eN	6 28 04						
		eN	6 35 45						
		e	6 37 51	10					
		Sweep?	6 44 07	32					
		Sweep	6 44 49	40					
		Sweep	6 52 32	20-24					
		eLm	7 01 34	56					
				48					
		eLm	7 01 50	30					
		Lm	7 02 10	40					
		Mm	7 14	24					
		2.	7 15 40						
		3.	7 17 15						
		4.	7 19 15						
		5.	7 22						
		6.	7 28 ca						
		C	8 23						
10		L?	17 23 ca					Record too uncertain for closer readings.	
		L?	18 02						
20		e	5 52 21					Variable short periods.	
		F	5 53 25						
20		e	6 50 01					Variable short periods.	
		F	6 51 03						
24		eN	23 12 36					Heavy microseisms.	
		L	23 14 07	26					
		L	23 14 33	20					
		F	23 24 ca	15					
1918.									
Mar. 16		O	15 40 54				3,350	Heavy microseisms.	
		eP	13 47 14	2					
		S	13 52 21	6					
		eLm	13 55 15	12					
		L	14 22 34	15					
		L	14 23 39						
		F	14 26 30?						
19		Lm	6 57 25						
		L	6 59 22	20					
		L	7 13 44	15					
		F	7 46						
20								Records during morning hours too much entangled to be deciphered.	
21									
1918.									
Apr. 10		O	1 10 45				350	Not heard from.	
		P	1 11 35						
		S	1 12 18						
		M	1 12 22						
		C	1 12 47						
		F	1 14 03						
10		O	2 7 ?				3,710?	inotable, may be S.	
		L	2 26 22						
		L	2 28 55	8					
		M	2 36 12						
		F	2 50 30						
13		Lm	2 15 46	20				Microseisms.	
		F?	2 22 10						

* Trace amplitude.

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					A _m	A _n		
Massachusetts. Cambridge. Harvard University Seismograph Station—Continued.								
1918.								
Apr. 15		O	8 27 41					No M.
		eP	8 36 56	2				
		S	8 44 18	6				
		L	8 50 06					
		F?	9 20 ca					
				20				
				15				
17		Lm	3 20 55					
			4 00 54					
			4 02 56	8-0				
		e	4 06 01					
		F	4 06 36					
17		O	6 50 07				3,220	Press reports shock in Martique about this time. P masked by microseisms. No N record.
		e	7 01 23	6				
		eLm	7 04 14	9				
		F	7 28 ca	9				
21		O	22 32 24				4,040	Severe shock reported at San Jacinto and Hemet, Cal.
		P	22 39 45					
		S	22 45 34					
		eLm	22 49 08					
		L	22 49 52	9				
		L	22 51 34					
		M	22 55 00					
		F	0 48 27					
22								A increases and T diminishes. Stylus left drum for 1m. 11s. Trace of A, 65mm.
27		Lm?	20 35 01					Nonsinusoidal.
		L	20 36 46	5-8				
		M	20 37 33	6				
		F	20 37 48	11				
27		O?	14 43 43				3,950?	
		e?	14 52 ca					
		S	14 56 42	6				
		eLm	15 01 03	28				
		L	15 04 08	15				
		F	15 25					

New York. Ithaca. Cornell University. Heinrich Ries.

Lat., 42° 28' 58" N.; long. 76° 20' 09" W. Elevation, 242 meters.

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

$$\begin{matrix} V & T_0 & \epsilon \\ \left\{ \begin{matrix} S & 13 & 22 & 4:1 \\ N & 14 & 25 & 4:1 \end{matrix} \right. \end{matrix}$$

Date.	Character.	Phase.	Time.	Period T.	Amplitude.	Distance.	Remarks.
1918.							
Mar. 19		eLm	6 57 50				Omitted from March report.
		F	7 38				
1918.							
Apr. 17		eP	1 10 58				
		S	1 11 00	1			*300
		S	1 11 11	4			
		F	1 12 05	3			
		F	1 14				
17		P	2 25 33	2			
		P	2 25 34	2			
		eS	2 26 00	4			
		eS	2 26 02	3			
		F	2 28				
15		P	8 36 14	4			
		P	8 36 25	4			
		S	8 43 22	4			
		S	8 43 23	7			
		eLm	8 52 23	8			
		F	9 12				
17		eLm	3 13	12			
		F	3 20				
17		Lm	7 01 19	28			
		L	7 04 40	10			
		F	7 10				
21		P	22 38 57	4			
		S	22 44 21	5			
		S	22 44 25	6			
		L	22 47 16	15			
		M	22 50 10	16			
		M	22 52 25	9			*20,000
		F	00 30				*8,000
27		eLm	15 02 23	21			
		F	15 15				

* Trace amplitude.

SEISMOLOGICAL DISPATCHES.¹

El Centro, Cal., April 30, 1918.

An earthquake shock, lasting 30 seconds, was felt here at 9:35 o'clock to-night. Doors and windows rattled. Damage slight. (Assoc. Pr.)

Phoenix, Ariz., April 30, 1918.

Yuma, Ariz., felt an earthquake shock which lasted for a few seconds, at 9:33 o'clock to-night. No damage. (Assoc. Pr.)

Calexico, Cal., April 30, 1918.

An earthquake shock was felt here shortly after 9 o'clock to-night. Plate glass windows were broken. No further damage was done. (Assoc. Pr.)

Los Angeles, Cal., May 1, 1918.

A single earth tremor felt throughout the Imperial Valley in southern California and western Arizona at 9:32 last night caused only slight damage at various points which had reported early to-day. The shock appeared to have been most severe at El Centro. Reports from San Jacinto and Hemet indicate that the shocks were not felt there. At Calexico, plate glass windows were broken. (Assoc. Pr.)

Santiago, Chile, May 21, 1918.

The earthquake yesterday at La Serena, capital of the Province of Coquimbo, damaged a large number of buildings. Fire started in the center of the town, causing further loss. The shock was felt, to a less extent, in the neighboring villages. (Assoc. Pr.)

Valparaiso, Chile, May 21, 1918.

It is reported that there was loss of life in the earthquake yesterday at Serena. (Assoc. Pr.)

Santa Fe, N. Mex., May 28, 1918.

An earthquake shock was felt in Santa Fe at 5:30 o'clock this morning and was heavy enough to shake plaster off the walls of houses. No serious damage has been reported. (Assoc. Pr.)

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

PROPAGATION OF EARTHQUAKE WAVES THROUGH THE EARTH.

Dr. C. G. KNOTT.

(Abstract of paper before Royal Society of Edinburgh, Jan. 14, 1918.)

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When a large earthquake occurs at any part of the earth elastic waves are sent out in all directions through the earth, emerging at the surface as disturbances which can be recorded on delicate seismometers. Up to about 120° from the epicentre, the times at which these variations emerge after the time of occurrence of the earthquake were first tabulated by J. Milne. The increasing number of observations and the improvement of the instruments have led to the tabulation of more accurate data than was possible in the earlier days. Following up certain calculations made in 1908, Dr. Knott, using these more recent data, has made fresh calculations of the velocities of the seismic waves through the earth by a mathematical method based on the theory of integral equations and entirely free from assumptions. As has long been recognized, two types of wave are transmitted through the body of the earth known as the primary (P) and the secondary (S) waves. The broad results of the investigation may be stated thus: The velocity of the P wave increases steadily with depth from 4.46 miles (7.18 kilometers) per second at the surface to 6.2 miles (10 km.), per second at a depth of 400 miles (650 km.), continuously increasing at a slightly smaller rate of increase until it reaches 7.95 miles (12.8 km.) per second at a depth of 1,000 miles (1,600 km.), after which, at greater depths, the speed of propagation remains constant. The S wave travels more slowly than the P wave, but changes in very much the same way, the values of the speed being 2.47 miles (3.98 km.) per second at the surface, 3.43 miles (5.53 km.) at a depth of 400 miles, and 4.25 miles (6.84 km.) at depths greater than 1,000 miles.

SECTION V.—SEISMOLOGY.

SEISMOLOGICAL REPORTS FOR JUNE, 1918.

W. J. HUMPHREYS, Professor in Charge.

[Dated: Weather Bureau, Washington, D. C., Aug. 1, 1918.]

TABLE 1.—Noninstrumental earthquake reports, June, 1918.

Day.	Approximate time Greenwich Civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity Rossi-For.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
CALIFORNIA.										
1918.	H. m.		° ' "	° ' "			M. s.			
June 3	15 05	Bishop Creek.....	37 23	118 23	3-5	2	15	Rumbling.....	Abrupt bumps and trembling...	E. M. Nordyke, Wm. Barth, E. L. Herzinger.
5	4 33	Calxico.....	32 41	115 30	3	1	01	Faint.....	Rumbling, single bump, NE-SW.	H. M. Rouse.
6	22 32	Beaumont.....	33 55	117 00	4	1	15	None.....	Rapid rocking, NE-SW.....	F. D. Campbell.
		Corona.....	33 53	117 34	3	2		None.....		Thomas C. Sias.
		Escondido.....	33 07	117 06	4	1		None.....		A. R. Moon.
		Hemet.....	33 44	116 58	5	2	04	Rumbling.....	Gradual twisting, S-E.....	C. E. McManigal.
		Indio.....	33 43	116 13	5	1		Rumbling.....	Gradual rocking and trembling.....	Fred N. Johnson.
		Riverside.....	33 59	117 23	4	1		None.....		John H. D. Cox.
		San Bernardino.....	34 06	117 18	4	1		None.....		Mrs. Sarah W. Frantz.
		San Diego.....	32 43	117 10	2	1	02	None.....	Rapid trembling, N-S.....	H. F. Alcidiore.
		San Diego (Camp Kearny, 13 miles north).	32 56	117 10	2	1		None.....		San Francisco Examiner.
		Warner Springs.....	33 17	116 39	4-5	1	30	None.....		J. A. Ream.
12	8 47	Calxico.....	32 41	115 30	4	1	05	None.....	Gradual rocking N-S.....	H. M. Rouse.
	14 19	Calxico.....	32 41	115 30	3	1	01	Loud.....	Rumbling, rapid trembling, E-W.	H. M. Rouse.
14	10 24	Hemet.....	33 44	116 58	5	2	06	Loud.....	Abrupt bumping, NE.....	C. E. McManigal.
16	22 10	Hemet.....	33 44	116 58	3	1	03	Rumbling.....	Abrupt bumping, NE.....	C. E. McManigal.
20	12 10	Hemet.....	33 44	116 58	3	1	03	Loud.....	Abrupt bumping, NE.....	C. E. McManigal.
21	19 37	Hemet.....	33 44	116 58	3	1	03	Faint.....	Abrupt bumping, NE.....	C. E. McManigal.
22	5 527	Barrett (6 miles north)...	32 42	116 41	5	1	03	Faint.....	Abrupt bumping, N.....	L. Watts.
	6 007	Mesa Grande.....	33 10	116 48	3	1	01	Loud.....	Rumble from west 4-5 seconds before shocks, then an abrupt bump, W-E; rumble ended in 9 seconds, in E.	Edward H. Davis.
29	5 577	Warner Springs.....	33 17	116 39	3-4	1	30	None.....	Gradual rocking and trembling, A-SW.	J. A. Ream.
	16 17	Salinas.....	36 41	121 39	4	1	02	None.....	Abrupt bumping, SE-NW.....	Dr. Earl D. Eddy.
		Spreckels.....	36 38	121 36	3	1	01	None.....	Gradual rocking, N-S.....	Dr. M. A. Klein.
TENNESSEE.										
22	1 007	Clinton.....	36 05	84 08	4	1	05	Rumbling.....	Gradual trembling, NE.....	J. E. Weaver.
		Kingston.....	35 52	84 32	3	1	03	Rumbling.....	Rapid trembling, SW.....	Sallie Littleton.
		Knoxville.....	35 59	83 58	3	3	09	Faint.....	Rumbling, rapid rocking.....	J. F. Voorhees.
		Lenoir City.....	35 47	84 17	6			Loud.....	Rumbling like a pair of heavy trucks rolling over the floor, gradual trembling.	W. N. Lacy.
		Loudon.....	35 44	84 21	5	1	15	Loud.....	Like rumbling thunder; abrupt bump, then rapid trembling, NW.	Robert W. Clark.
		McGhee.....	35 35	84 14	57	1	1 00	Rumbling.....	Gradual onset with bumping, NE.	John O. Woods.
		Philadelphia.....	35 41	84 25	5	1	05	Faint.....	Abrupt bump, then gradual rocking and trembling, NE.	Will C. Cannon.
		Sweetwater.....	35 36	84 29	5	2	04	None.....	Abrupt trembling, N-S.....	Hulah C. Browder.
WASHINGTON.										
21	5 47	Lougshire.....	46 46	121 50	5	1	02	Faint.....	Rumbling, gradual swaying, N-S.	John B. Flett.

TABLE 2.—*Instrumental reports, June, 1918.*
(Time used: Mean Greenwich, midnight to midnight. Nomenclature: International.)
{For significance of symbols see REVIEW for January, 1918, p. 34.}

Date.	Charac- ter.	Phase.	Time.	Period T.	Amplitude.		Dis- tance.	Remarks.
					A _m	A _w		

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: $\begin{cases} V & T_0 \\ E & 10 & 15 \\ N & 10 & 15 \end{cases}$

1918.		H. m. s.	Sec.	μ	μ	Km.	Remarks.
June 17	P	16 28 25	2				Probably local.
	M	16 28 42		30			
	C	16 29 40					
	F	16 33					

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: $\begin{cases} V & T_0 \\ E & 10 & 14 \\ N & 10 & 18 \end{cases}$

(Report for June, 1918, not received.)

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.

1918.		H. m. s.	Sec.	μ	μ	Km.	Remarks.
June 6				300	300		Tremors during 24 hours preceding 15 hours on dates given.
14				250	300		
17				100	100		
19				200	200		
20				200	200		
22				200	300		
25				50	50		

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.	Charac- ter.	Phase.	Time.	Period T.	Amplitude.		Dis- tance.	Remarks.
					A _m	A _w		

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

Lat., 39° 40' 30" N.; long., 104° 56' 54" W. Elevation, 1,655 meters.

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

1918.		H. m. s.	Sec.	μ	μ	Km.	Remarks.
June 5							Apparent activity at intervals during day.
7	P	21 34					
	S	21 7					
	L	21 36		4	*5,000		
	M	21 36		6	*5,000		
	M	21 36		4-6	*10,000		
	C	21 37		4-6	*9,000		
16-17	F	21 42					Visible waves of long period, more noticeable on N-S.
	F	21 44					

* 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: $\begin{cases} V & T_0 \\ E & 110 & 6.4 \end{cases}$

1918.		H. m. s.	Sec.	μ	μ	Km.	Remarks.
June 3	P	0 14 04					
	S	0 22 48					
	L	0 30 20					
	L	0 35	20				
	F	0 50					
4	eL	5 12 40	20				
	F	5 25					
4	L	18 04 30	20				
	F	18 45					
7	eP	21 33 28					
	S	21 38 33					
	L	21 41 50					
	L	21 47 57	12				
	F	22 45					
11	P	12 41 44					
	S	12 45 41					
	L	12 45 30	18				
12	P	4 37 09					
	S	4 42 20					
	L	4 45 22					
	F	4 55					
13	P	9 04 19					
	S	9 08 46					
	L	9 10 47					
	F	9 30					
16	P	12 33 27					
	S	12 37 57					
	L	12 40 30					
	F	12 55					
17	e	16 45 37					Phases indistinguishable.
	F	16 50					
22	S	22 11 53					
	L	22 17 27					
	L	22 22 50	20				
	F	22 45					

TABLE 2.—Instrumental reports, June, 1918—Continued.

Date.	Charac- ter.	Phase.	Time.	Period T.	Amplitude.		Dis- tance.	Remarks.		
					A _m	A _n				
District of Columbia. <i>Washington. Georgetown University.</i> 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.										
					$\begin{matrix} V & T_0 & \epsilon \\ \text{Instrumental constants} \dots & \begin{matrix} E & N & Z \end{matrix} & \begin{matrix} 165 & 143 & 80 \\ 5.4 & 5.2 & 5.0 \\ 0 & 0 & 0 \end{matrix} \end{matrix}$					
1918.										
June 3	e		0 14 05					Microseisms. e pos- sibly 50 seconds sooner. No dis- tinct M.		
	S		0 22 51							
	eL		0 30 18	16						
	eLN		0 30 18	22						
	F		1 00 ..							
4	em		17 40 07					Microseisms.		
	em		17 40 24							
	L		18 06 14	24.5						
	L		18 06 14	22						
	F		18 30 ..							
7	eP		21 34 07					S very doubtful.		
	eP		21 34 11							
	S		21 38 31							
	S		21 38 50							
	eL		21 44 00	4						
	eL		21 44 06	5.5						
	M		21 45 15		*2,500					
	M		21 47 22		*1,500					
	M		21 48 18			*600				
	F		22 50 ..							
11	eP		12 41 42							
	eP		12 41 44							
	S		12 45 58							
	eL		12 48 06	13						
	F		13 16 ..							
12	em		4 35 24					Microseisms.		
	eL		4 44 30							
	L		4 47 04	10						
	L		4 48 02	10						
	F		4 59 ..							
13	IP		9 04 20							
	S		9 09 57							
	eL		9 13 18							
	F		9 26 ..							
16			12 ? ?					Quake lost in changing sheets. Bosch photo- graphic shows: P-S 4m. 32s., S-eL 1m. 30s.		
17	e		16 43 157					Microseisms. Time of phases uncer- tain because of loss of clock cor- rection.		
	S		16 45 507							
	S		16 45 547							
	F		16 57 ..							
22	e		22 12 00					Heavy micro- seisms. e possi- bly 24 seconds sooner. S very doubtful.		
	S		22 16 23							
	eLN		22 18 12							
	L		22 21 23	23						
	L		22 22 07	16						
	F		22 40 ..							

*Trace amplitude.

Date.	Charac- ter.	Phase.	Time.	Period T.	Amplitude.		Dis- tance.	Remarks.		
					A _m	A _n				
Hawaii. <i>Honolulu. Magnetic Observatory. U. S. Coast and Geodetic Survey. Frank Neumann.</i>										
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.										
					$\begin{matrix} T_0 \\ \text{Instrumental constant} \dots \end{matrix} 29.4$					
1918.										
June 4	P		4 14 12							
	L		4 29 48							
	M		4 34 12	30	*1,900					
	C		4 36 06							
	F		4 57 ..							
4	P		17 26 36							
	L		17 29 24							
	M		17 32 36	29	*1,500					
	C		17 35 42	32						
	F		17 59 ..							
7	e		21 50 48							
	M		21 52 06	29	*100					
	F		21 56 ..							
14	e		21 45 48					Local quake. Mo- tion irregular.		
	M		21 47 00		*600					
	C		21 49 36							
	F		21 55 ..							
16	P		5 28 12							
	L		5 35 12	32						
	M		5 36 54	26	*400					
	F		5 48 ..							
21	P		4 28 54							
	eST		4 34 12							
	L		4 36 54	29						
	M		4 37 30		*100					
	F		4 40 ..							
24	P		14 56 18							
	S		15 04 00	27						
	L		15 11 30	32						
	M		15 14 00	30	*500					
	C		15 15 42							
	F		15 37 ..							
26	P		21 46 06	31						
	L		21 52 12	32						
	M		21 53 42	29	*400					
	C		21 55 00							
	F		22 01 ..							
27	P		21 36 18							
	L		21 42 36	27						
	M		21 46 00		*200					
	F		22 03 ..							

*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.

$$\begin{matrix} V & T_0 & \epsilon \\ \text{Instrumental constants} \dots & \begin{matrix} E & N & Z \end{matrix} & \begin{matrix} 177 & 205 & 205 \\ 3.4 & 3.4 & 4.1 \\ 4.1 & 4.1 & 4.1 \end{matrix} \end{matrix}$$

(Report for June, 1918, not received.)

TABLE 2.—Instrumental reports, June, 1918—Continued.

Date.	Char-acter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _N	A _W		
Maryland. <i>Cheltenham. Magnetic Observatory. U. S. Coast and Geodetic Survey. George Hartnell.</i>								
Lat., 38° 44' 00" N; long., 76° 50' 30" W. Elevation, 71.6 meters.								
Instruments: Two Bosch-Omori, 10 and 12 kg.								
Instrumental constants. $\begin{matrix} V & T_0 \\ E & 10 & 15 \\ N & 10 & 15 \end{matrix}$								
1918.								
June 7								P phases doubtful.
			H. m. s.	Sec.	μ	μ	km.	
			21 34 06	5				
			21 34 18	10				
			21 44 21	4				
			21 44 31	4				
			21 46 11	12				
			21 47 25	10				
			21 48 10	12	60			
			21 48 25	12		50		
			21 51 ..	10				
			21 53 ..	10				
			22 06 ..	9				
11			12 41 41	3				
			12 41 43	3				
			12 46 53	3				
			12 46 54	3				
			12 48 37	3				
			12 49 00	10	10			
			12 53 45	10	10			
			12 55 09	9		10		
			12 57 ..	9				
			13 04 ..	9				
12			4 44 09	12		10		
			4 47 03	12	10			
			4 48 09	12	10			
			4 54 ..	12				
13			9 04 20	3				
			9 11 50	3	10			
			9 12 00	3		20		
			9 31 ..	3				
17			16 48 02	3		10		
			16 48 45	3		10		
			16 48 47	3	10			
			16 50 ..	3				
22			22 12 09	4				Phases doubtful, barely perceptible on E.
			22 17 09	4				
			22 23 12	18		10		
			22 25 20	18		10		
			22 27 ..	18		10		

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

Lat., 42° 22' 38" N.; long., 71° 09' 39" W. Elevation, 5.4 meters. Foundation: Glacial sand over clay.

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

Instrumental constants. $\begin{matrix} V & T_0 \\ E & 80 & 22 & 0 \\ N & 50 & 25 & 4:1 \end{matrix}$

Date.	Char-acter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _N	A _W		
1918.								
June 3								E damped by magnet. N undamped: T ₀ =25 sec.
			H. m. s.	Sec.	μ	μ	km.	
			0 05 07	4			7120	
			0 13 41	4				
			0 13 45	4				
			0 22 16	9				
			0 22 19	9				
			0 28 59	9				
			0 29 44	23				
			0 31 04	17				
			1 13 ..	17				
4			4 postea				3600-6000	L _W ? deformed by local vibrations. M _W ?
			5 00 10					
			5 09 30	267				
			5 11 08	24				
			5 15 38	20				
			5 28 ..	20				
4			17 05 ca				13000+?	Difficult to decipher.
			17 20 38					
			17 27 51	9				
			18 09 30	20				
			18 15 08	16				
			18 50 ..	16				
7			21 16 18				7040	Epicenter computed from S _W -P _N .
			21 26 42	6				
			21 35 13	6				
			21 35 39	6				
			21 40 06	6				
			21 43 06					A new P?
			21 47 03					
			21 47 03	25				
			21 48 41					
			21 51 03	13				
			21 51 31	12				
			21 54 19	14				N ran down at 22h. 05m.
			22 39 ..					

Date.	Char-acter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _N	A _W		
Massachusetts. <i>Cambridge. Howard University Seismographic Station—Continued.</i>								
1918.								
11			H. m. s.	Sec.	μ	μ	km.	
			12 postea					
			12 30 37	4				
			12 40 08					
			12 44 26	12				
			12 44 59	6				
			12 50 04	10				
			13 20 24					
12			4 21 ca				5610?	
			4 30 34					
			4 32 34	6				
			4 36 28	4				
			4 44 39	7				
			4 46 05	12				
			4 46 48	14				
			4 56 43					
13			8 58 36				3410?	Time uncertain on North component, on account of broken driving spring.
			8 58 56					
			9 04 50?	2				
			9 05 08	2				
			9 10 08?	6				
			9 10 17?	5				
			9 13 37?	8				
			9 23 ..					
16			12 27 44				3330	Press reports prolonged shock at St. Vincent, W. I., eL uncertain, also L _W and of very short period.
			12 27 45?				3170?	Time on N component uncertain. Compare with record of March 25, 1915, $\Delta=3440?$ O, 9h. 05m. 43s.7
			12 33 57?	2-4				
			12 34 11	2-4				
			12 38 58?	6				
			12 39 17	6				
			12 40 08?					
			12 40 35	8				
			12 41 26?					
			12 55 ..					
17			16 postea					Possibly local and nonseismic. L microseismic. N (out of order) gives:
			16 45 38	2				o 16 45 10
			16 45 56	4				L 16 45 49 to
			16 46 02	8				16 46 15
			16 46 49					L 16 48 10 to
			16 49 25	8				16 48 45
			16 50 12					F 16 53 ..
			16 56 ..					
22			21 57 51				6000?	Δ and O very uncertain. o in microseisms.
			22 12 33	8				
			22 13 58	10				
			22 18 24	20				
			22 23 09	20				
			22 28 29					
			23 ..					
26			22 48 53				10050?	Δ and O very uncertain.
			23 12 58	6				
			23 32 56	20				
			23 34 12	20				
			23 41 ..					
27			21 postea					Masked by microseisms.
			22 00 54?	20				
			22 01 48?	20				
			22 06 31	15				
			22 12 16	14				
			22 16 ..					

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. $\begin{matrix} V & T_0 \\ E & 80 & 7 & 5:1 \end{matrix}$

Date.	Char-acter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _N	A _W		
1918.								
June 7								Time uncertain because of local disturbances.
			H. m. s.	Sec.	μ	μ	km.	
			21 32 30?				2,980?	
			21 37 06?					
			21 38 30?					
			21 42 24?	12		4,500		
			22 18 ..					

*Trace amplitude.

TABLE 2.—Instrumental reports, June, 1918—Continued.

Date.	Char-acter.	Phase.	Time.	Pe-riod. T.	Amplitude.		Dis-tance.	Remarks.
					A _N	A _S		
New York. <i>Buffalo. Canisius College.</i> 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. $\begin{matrix} V & T_0 & \epsilon \\ \text{E} & 13 & 22 & 4.1 \\ \text{N} & 80 & 7 & 5.1 \end{matrix}$								

New York. <i>Ithaca. Cornell University.</i> 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. $\begin{matrix} V & T_0 & \epsilon \\ \text{E} & 13 & 22 & 4.1 \\ \text{N} & 14 & 25 & 4.1 \end{matrix}$								

(Report for June, 1918, not received.)

Panama Canal. *Balboa Heights.* Governor, Panama Canal.
Lat., 8° 57' 39" N.; long., 79° 33' 29" W. Elevation, 27.6 meters.

Instruments: Two Bosch-Omori, 100 kg.

Instrumental constants. $\begin{matrix} V & T_0 \\ \text{E} & 35 & 20 \end{matrix}$

1918	Date	Phase	H. m. s.	Sec.	μ	μ	km.	Remarks.
June	19	P _N	12 29 34				630	Direction probably NW.
		P _N	12 29 51					
		L _N	12 30 58	20				
		M _N	12 31 05		*2,000			
		L _N	12 31 15	20				
		M _N	12 31 19			*1,800		
	20	P _N	5 24 00				300	Faint tremors. Very faint trace on N-S.
		P _N	5 36 00	20				
	22	P _N	22 06 44				385	Direction uncertain.
		P _N	22 06 50					
		L _N	22 07 26	20				
		L _N	22 07 52	20				
M _N		22 08 28		*11,400				
M _N		22 08 44		*8,000				
28	P _N	8 01 41				385	Direction uncertain.	
	P _N	8 01 42						
	L _N	8 02 30	20					
	L _N	8 02 33	20					
	M _N	8 02 34			*500	385	Direction uncertain.	
	M _N	8 02 36						
	F _N	8 10 14						
	F _N	8 10 30						

* 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. $\begin{matrix} V & T_0 \\ \text{E} & 10 & 18 \\ \text{N} & 10 & 20 \end{matrix}$

1918	Date	Phase	H. m. s.	Sec.	μ	μ	km.	Remarks.
June	7	C _N	21 50 35					Only a few L waves.
		M _N	21 51 20	18	10			
		F _N	21 52 ..					
11		C	12 ? ?	57				Began while sheet was being changed. New sheet started at 12h. 39 m. 03s.
		M _N	12 39 17		90			
		M _N	12 39 41		170			
		F _N	12 50 ..					
22		C _N	22 10 17	6				Only a few waves.
		C _N	22 10 28	6				
		F _N	22 27 ..					

Date.	Char-acter.	Phase.	Time.	Pe-riod. T.	Amplitude.		Dis-tance.	Remarks.
					A _N	A _S		
Vermont. <i>Northfield. U. S. Weather Bureau.</i> Wm. A. Shaw.								
Lat., 44° 10' N.; long., 72° 41' W. Elevation, 256 meters.								
Instruments: Two Bosch-Omori, mechanical registration.								
Instrumental constants. $\begin{matrix} V & T_0 \\ \text{E} & 10 & 15 \\ \text{N} & 10 & 16 \end{matrix}$								

1918	Date	Phase	H. m. s.	Sec.	μ	μ	km.	Remarks.
June	7	e	21 45 25					
		L	21 50 30					
		F	22 15 ..					
11		P _T	12 41 58					
		S _T	12 46 30					
		L	12 46 20					
16		P _T	12 38 40					
		S _T	12 38 55					
		L	12 42 ..					
		F	13 10 ..					
		P _T	12 38 40					
		F	12 55 ..					

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. $\begin{matrix} V & T_0 \\ \text{E} & 120 & 26 \end{matrix}$

1918	Date	Phase	H. m. s.	Sec.	μ	μ	km.	Remarks.	
June	3	e _N	0 23 06†						
		e _L	0 30 ..						
		F	1 30 ..						
4		e	4 23 36†						
		e	4 33 42†						
		e	4 43 48†						
		e	4 59 ..						
		eL	5 02 ..						
		F	5 20 ..						
4		e	17 29 44		6		12,000		
		e	17 40 30†		6				
		e	18 05 ..		8				
		eL	18 08 ..		18				
		L	18 15 ..		17				
		L	18 37 ..		15				
7		O	21 27 10				3,780		
		eP	21 34 12						
		P _{evol}	21 35 30						
11		S	21 39 46						
		S _{rept}	21 41 42						
		eL	21 43 56						
		L	21 48 ..		12				
		L	21 55 ..		8				
		L	22 04 ..		7				
12		L	22 23 ..		7				
		F	22 45 ..		7				
		e	12 41 54†						
13		eL	12 49 24†						
		F	13 ..						
		e	4 37 30†						
16		eL	4 45 48†						
		F	5 ..						
		O	8 58 54						3,460
		F	9 05 11						
		S	9 10 25						
		L ₇	9 13 30†		7				
L	9 15 ..		7						
F	9 40 ..								
16		eL	6 10 to 6 35 ..		25 to 18				
		e	12 27 48						3,410
17		iP	12 34 21						
		L	12 35 48						
		eS _N	12 39 30						
		S _{rept}	12 40 36						
		eL	12 42 30†						
		F	13 ..						
22		i	16 43 20		2				
		e	16 43 32		5				
		e	16 44 52		6				
		e	16 45 54†		6				
		F	17 ..						
		F	17 ..						
24		i	22 15 12†					From Deformation Instrument. Seismograph clock stopped. i may not be seismic.	
		i	22 18 36†						
		eL	22 26 ..						
26		i	15 41 54†						
		eL	15 46 ..		21				
		F	16 ..						
26		eL	22 29 ..		28				
		L	22 34 ..		18				
		L	22 38 ..		17				
		F	22 50 ..						

† Original time given tenths of a minute.

TABLE 2.—Instrumental reports, June, 1918—Continued.

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _W	A _N		

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... 18. T₀ Pillar deviation, 1 mm. swing of boom = 0.45".

1918.			H. m. s.	Sec.	μ	μ	km.	
June 2	L.		13 41 18†					
	F.		13 44					
3	S?		0 23 42					Microseisms.
	L _W		0 31 48					
	L _N		0 39 54					
	M.		0 44 12		*1,300			
	F.		1 57 42?					
4	L.		4 59 42					P, S, & F, masked by microseisms.
	L _W		5 11 24					
	L _N		5 15 30					
	M.		5 18 54		*300			
	F.		5 ? ?					
4	L.		18 02 18					Microseisms going on before L.
	L _W		18 08 00					
	M.		18 12 42		*1,600			
	F.		? ? ?					
	L?		19 36 36					
5-6								Heavy microseisms during night and morning.
7	IP.		21 34 54				3,610	Microseisms before and after quake. Boom suddenly moved to west at beginning of L.
	S.		21 40 18					
	IL.		21 48 24					
	M.		21 53 24		*1,300			
	F.		? ? ?					
11	L.		12 48 18					
	L _W		12 49 30					
	M.		12 54 48		*300			
	F.		13 28 30					
12	L _W		4 46 18					
	M.		4 46 48		*300			
	F.		5 06 48					
13	L.		9 10 48		*50			
	F.		9 38 12					
16	L.		6 19 00					Thickening.
	L _W		6 25 36		*200			
	F.		6 47 30					
16	S.		12 37 18					
	I. or S.		12 39 24					
	L.		12 42 18					
	M.		12 46 42		*200			
	F.		13 05 06					
17			16 43 ?					Light off. Small quake missed. Microseisms going on.
21	L?		4 45 12					
	L.		4 58 12		*100			
22	L.		22 21 00					
	L _W		22 24 42					
	M.		22 25 54		*600			
	F.		22 43 48					
24	L?		15 50 12					
	L _W		15 58 06					
	M.		16 02 30		*100			
	F.		16 34 48					
26	L _W		22 32 06					Very gradual thickening.
	M.		22 39 18		*400			
	F.		23 15 06†					
27	L.		22 01 18					Microseisms going on before L.
	L _W		22 05 42					
	M.		22 07 24		*200			
	F.		22 37 42					

* Trace amplitude.
† All readings originally given in tenths of a minute.

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _W	A _N		

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... 18. T₀ Pillar deviation, 1 mm., swing of boom = 0.54".

1918.			H. m. s.	Sec.	μ	μ	km.	
June 2	P or L.		13 22 25					
	M.		13 22 47		*100			
	F.		14 27 22					
3	P.		0 31 34					
	L.		0 49 16					
	M.		0 57 38		*500			
	F.		1 31 34					
4	P.		4 29 24					
	L.		4 46 15†					
	M.		4 51 52					
	F.		4 59 08		*400			
	L?		5 15 01					
4	P.		17 34 35					
	L.		17 49 35					
	M.		18 00 10		*400			
	F.		18 50 19					
5	M.		24 18 33		*100			
7	P.		21 33 58				1,170	
	S.		21 39 55					
	L.		21 45 23					
	M.		21 47 51		*2,000			
	F.		22 14 23					
			VER TICAL		Az			
	P.		21 33 48	5				
	S.		? ? ?					
	L.		21 47 48	9				
	M.		21 47 20	12	4			
	F.		? ? ?					
11	M.		13 13 57		*400			
	F.		13 31 39					
12	L.		4 27 45					
	M.		4 28 44		*400			
	F.		4 41 51					
13	M.		9 22 30		*100			
16	P.		5 46 33†				4,120	
	S.		5 52 27					
	L.		6 00 20					
	M.		6 05 45		*200			
	F.		6 14 00†					
16	L.		12 56 43		*50			
	F.		13 01 37					
21	P.		4 37 03				1,440	
	L.		4 39 32					
	M.		4 42 00		*200			
	F.		4 49 27					
22	L.		22 31 53					
	L _W		22 36 48					
	M.		22 44 10		*100			
	F.		22 54 57					
24	P.		15 29 30				2,040	
	S.		15 32 57					
	L.		15 38 51					
	M.		15 44 15		*200			
	F.		15 59 00					
26	L.		22 10 33					
	L _W		22 20 57		*400			
	F.		22 30 57					
27	P.		21 40 28					
	M.		21 52 22		*200			
	F.		22 13 11					

* Trace amplitude.

SEISMOLOGICAL DISPATCHES.¹

St. Vincent, B. W. I., June 16, 1918.

A severe and protracted earthquake shock was felt here Saturday morning (June 15). (Assoc. Pr.)

Managua, Nicaragua, June 16, 1918.

Three strong shocks of earthquake were experienced early this morning. No serious damage has been reported. The wires are down to some points in the republic. (Assoc. Pr.)

London, June 16, 1918.

Violent earth shocks were felt in two widely separated parts of Italy, Saturday, June 15, in the town of Salerno, Province of Campania, and in Sicily.

Considerable material damage was caused in both, but no deaths have been reported so far. (Int. News Serv.)

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

LATE REPORTS.

Date.	Charac- ter.	Phase.	Time.	Period T.	Amplitude.		Dis- tance.	Remarks.
					A _n	A _w		

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

Lat., 42° 22' 33" 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. $\begin{matrix} V & T_0 & \epsilon \\ E & 80 & 23 & 0 \\ N & 50 & 25 & 4:1 \end{matrix}$

1918.		H. m. s.	Sec.	μ	μ	km.	Remarks.
May 25	O	18 29 34	8050	Omitted in May re- port.
	eP _n	19 40 58	4	.....	.....	.....
	P _n	19 40 59	.....	.....	.....	.....
	S _n	19 50 20	10	.....	.....	.....
	S _w	19 50 33	.....	.....	.....	.....
	eL _n	20 03 56	30	.....	.....	.....
	L _n	20 04 13	26	.....	.....	.....
	F _n	21 27 ..	.....	.....	.....	.....

SECTION V.—SEISMOLOGY.

SEISMOLOGICAL REPORTS FOR JULY, 1918.

W. J. HUMPHREYS, Professor in Charge.

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

TABLE I.—Noninstrumental earthquake reports, July, 1918.

Day.	Approximate time, Greenwich Civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity Rossi-Forel.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
CALIFORNIA.										
1918.	H. m.						M. s.			
July 8	5 15	Salinas.....	36 41	121 39	2	2	02	None.....	Abrupt rocking NE-SW.....	Dr. M. A. Klein.
	0 30	Cahulla.....	33 32	116 45	3	1	Few.	Rumbling.....	Gradual trembling N-S.....	Hartwell W. Gardner.
	1 20	Hemet.....	33 44	116 58	4	1	03	Loud.....	Abrupt bumping E-W.....	C. E. McManigal.
	1 25	Warner Springs.....	33 17	116 39	2-3	1	01	None.....	Abrupt rocking NE-SW.....	J. A. Ream.
10	5 24	Jullian.....	33 04	116 36	2	1	08	Rumbling.....	Rapid rocking.....	J. H. L. Vogt.
12	17 20	Salinas.....	36 41	121 39	3	1	06	None.....	Abrupt trembling.....	Dr. E. D. Edity.
15	0 28	Big Bar (Trinity County).....	40 44	123 18	2	3	06	Yes.....	Abrupt trembling.....	H. W. Brannan.
		Boulder Creek (Santa Cruz County).....	37 08	122 07	4	1	06	None.....	.....	The Sunspot.
		Eureka.....	40 48	124 11	6	2	20	Yes.....	Like a rushing wind. Gradual trembling 6 seconds, interval 2 seconds, then rocking 12 seconds E-W. Buildings swayed. All pendulum clocks on N-S walls and many on E-W stopped.	James Jones, observer, U. S. Weather Bureau.
		Fort Bragg.....	39 25	123 47	3	1	01	None.....	.....	W. F. Fuller.
		Morgan Hill.....	37 08	121 38	4	1	01	None.....	.....	The Sunspot.
22	0 55	Eureka.....	40 48	124 11	3	1	01	None.....	A single surge W-E.....	Beryl Adams.
22	12 42	Rialto.....	34 06	117 22	1	1	01	None.....	Abrupt jar and trembling.....	J. B. Witte.
24	23 38	Calexico.....	32 41	115 30	3	1	01	Faint.....	Tumbling. Rapid bumping SE-NW.....	H. M. Rouse.
26	2 54	Mount Wilson.....	34 13	118 04	3	1	02	Rumbling.....	Abrupt rocking N-S.....	Wendell P. Hoge.
27	21 40	Koeler.....	36 38	117 52	4	1	01	None.....	Abrupt trembling N-S.....	P. Hansen.
MISSOURI.										
1	19 02	Hannibal.....	39 41	91 20	2	1	01	None.....	Gradual rocking.....	B. L. Waldron.

TABLE 2.—Instrumental seismological reports, July, 1918.

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

[For significance of symbols see Review for January, 1918, p. 34.]

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					A _N	A _E		
1918.								
July 3	ea.		7 15 27	8				No distinct phases.
	en.		7 45 33	9				
	Ma.		7 15 52	20	10			
	Mn.		7 29 18			20		
	F.		8 11 ..					
8	P _N		10 45 56	7				Throughout the month there were frequent faint tremors on E, apparently microseismic. On N there was frequently a wavy motion which sometimes resembled a portion of a distant quake, though usually with irregular waves.
	P _E		10 46 00	5				
	oL _N		11 06 15	35				
	sL _N		11 07 55	30				
	M _N		11 11 16	20	10	20		
	M _E		11 17 ..	26				
	F _N		11 23 ..	18				
	F _E		11 38 ..	18				
15	P _N		0 27 14	3				
	P _E		0 27 16	4				
	L _N		0 30 37	1				
	L _E		0 30 45					
	M _N		0 31 30	15	30			
	M _E		0 31 52	18		40		
	C _N		0 33 ..	8				
	C _E		0 37 ..	9				
	F _N		0 59 ..	8				
	F _E		1 00 ..	8				
21	P _N		6 39 11	12				Very doubtful.
	F _N		7 09 ..					

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					A _N	A _E		
1918.								
July 3	ea.		7 15 27	8				No distinct phases.
	en.		7 45 33	9				
	Ma.		7 15 52	20	10			
	Mn.		7 29 18			20		
	F.		8 11 ..					
8	P _N		10 45 56	7				Throughout the month there were frequent faint tremors on E, apparently microseismic. On N there was frequently a wavy motion which sometimes resembled a portion of a distant quake, though usually with irregular waves.
	P _E		10 46 00	5				
	oL _N		11 06 15	35				
	sL _N		11 07 55	30				
	M _N		11 11 16	20	10	20		
	M _E		11 17 ..	26				
	F _N		11 23 ..	18				
	F _E		11 38 ..	18				
15	P _N		0 27 14	3				
	P _E		0 27 16	4				
	L _N		0 30 37	1				
	L _E		0 30 45					
	M _N		0 31 30	15	30			
	M _E		0 31 52	18		40		
	C _N		0 33 ..	8				
	C _E		0 37 ..	9				
	F _N		0 59 ..	8				
	F _E		1 00 ..	8				
21	P _N		6 39 11	12				Very doubtful.
	F _N		7 09 ..					

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-Omorl. 10 and 12 kg.

Instrumental constants $\begin{matrix} V & T_0 \\ \sqrt{E} & 10 & 17 \\ \sqrt{N} & 10 & 15 \end{matrix}$

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-Omorl. 10 and 12 kg.

Instrumental constants $\begin{matrix} V & T_0 \\ \sqrt{E} & 10 & 14 \\ \sqrt{N} & 10 & 18 \end{matrix}$

(Report for July 1, 1918, not received.)

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, 1,261.7 meters.

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

TABLE 2.—Instrumental seismological reports, July, 1918—Continued.

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _W	A _N		
California. <i>Point Loma. Raja Yoga College. F. J. Dick.</i>								
Lat., 32° 43' 03" N.; long., 117° 15' 10" W. Elevation, 91.4 meters.								
Instrument: Two-component, C. D. West seismoscope.								
1918.			<i>H. m. s.</i>	<i>Sec.</i>	μ	μ	<i>km.</i>	
July 7					200	200		Tremors during 24 hours preceding 15h. on dates given.
10					200	300		
12					200	200		
14					100	100		
15					100	100		
19					100	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.

(No earthquake records were kept during the month of July, 1918.)

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.

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _W	A _N		
District of Columbia. <i>Washington. U. S. Weather Bureau.</i>								
Lat., 38° 54' 12" N.; long., 77° 03' 03" W. Elevation, 21 meters.								
Instrument: Marvin (vertical pendulum), undamped. Mechanical registration.								
Instrumental constants... $\begin{matrix} V & T_0 & e \\ 110 & 6.4 & \end{matrix}$								
1918.			<i>H. m. s.</i>	<i>Sec.</i>	μ	μ	<i>km.</i>	
July 1	P?		6 29 42					Amplitude small.
	S?		6 35 40					
	L		6 42 30					
	L		7 07					
	L		7 25	20				
	to		7 40					
	M		7 29 30			*200		
	F		8					
3	F		7 11 10					
	S?		7 15 20					
	L		7 41 30	16				
	L		7 48					
	L		7 54	24				
	L		7 58	20				
	to		9 20	20				
	F		9 30					
8	P?		10 33 00					
	S?		10 41 48					
	L		10 47 22					
	L		11 14					
	L		11 19	40				
	L		11 29	24				
	F		12 40					
12	eS		21 21 04					
	F		21 39					
15	P		0 30 99					
	S?		0 35 52					
	L		0 39 25					
	M		0 43 33			*7,000		
	F		1 40					
16	P		20 20 55					
	S?		20 25 18					
	F		20 40					
21	e		6 26 30					
	eL		6 40 20					
	L		7 05					
	L		7 17	20				
	F		8 15					
29	eS		17 07 30					
	F		17 40					
31	P		14 42 57					
	S		14 48 00					
	L?		14 52 35	16				
	F		15 30					

*Trace amplitude.

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _W	A _N		
District of Columbia. <i>Washington. Georgetown University.</i>								
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... $\begin{matrix} V & T_0 & e \\ E & 165 & 5.4 & 0 \\ N & 143 & 5.2 & 0 \\ Z & 80 & 3.0 & 0 \end{matrix}$

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _W	A _N		
District of Columbia. <i>Washington. U. S. Weather Bureau.</i>								
Lat., 38° 54' 12" N.; long., 77° 03' 03" W. Elevation, 21 meters.								
Instrument: Marvin (vertical pendulum), undamped. Mechanical registration.								
1918.			<i>H. m. s.</i>	<i>Sec.</i>	μ	μ	<i>km.</i>	
July 1	e		6 29 37					Microseisms. F lost.
	L		7 25	26				
3	eS		7 11 10					Microseisms. No distinct max.
	eS		7 11 13					
	P		7 13 24					
	P		7 13 38					
	eS		7 14 35					
	eS		7 14 42					
	S		7 23 28					
	S		7 23 30					
	eL		7 43 06	17				
	eL		7 43 06	17				
	F		9 20					
8	e		10 41 55					Microseisms.
	S		10 47 41					
	eL		11 09 24	21				
	F		12 35					
12	e		21 20 10					Heavy micro-seisms.
	F		21 58					
14	eS		18 35 52					Heavy micro-seisms. (quake does not show on E-W.)
	F		18 40					
15	eP		0 30 11					E-W component readings more reliable.
	eP		0 30 14					
	eS		0 36 03					
	eS		0 36 10					
	eL		0 39 42					
	M		0 44 03	8	*1,240			
	M		0 44 03	10	*1,950			
	F		1 50					
16	e		20 21 27					Microseisms.
	eL?		20 25 18					
	F		20 50					
21	e		6 30 15					
	S?		6 40 13					
	S?		6 40 15					
	L		7 05	20				
	F		8 13					
24	e		11 35 21					Microseisms. Record lost after 12h. 31m. changing sheets.
	eL		11 46 24					
29	L		17 52					Quake still going on.
	to		18 08	20ca				
31	eP		14 43 01					Heavy micro-seisms.
	S		14 48 19					
	eL		14 53 06	15				
	eL		14 52 24					
	F		? ? ?					

*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: $\begin{matrix} V & T_0 & e \\ E & 177 & 3.4 & 4.1 \\ N & 205 & 3.4 & 4.1 \end{matrix}$

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _W	A _N		
Kansas. <i>Lawrence. University of Kansas. Department of Physics and Astronomy. F. E. Kester.</i>								
Lat., 38° 57' 30" N.; long., 95° 14' 58" W. Elevation, 301.1 meters.								
Instrument: Wiechert.								
Instrumental constants: $\begin{matrix} V & T_0 & e \\ E & 177 & 3.4 & 4.1 \\ N & 205 & 3.4 & 4.1 \end{matrix}$								
1918.			<i>H. m. s.</i>	<i>Sec.</i>	μ	μ	<i>km.</i>	
July 15	eP		0 28 14					E-W component was so feeble that only S and F could be distinguished.
	S		0 32 50					
	L?		0 35 26					
	M?		0 36 00					
	M?		0 36 01					
	F		0 59					

TABLE 2.—Instrumental seismological reports, July, 1918—Continued.

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _m	A _N		
Maryland. <i>Cheltenham. Magnetic Observatory.</i> 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: $\begin{matrix} V & T_0 \\ E & 10 & 15 \\ N & 10 & 15 \end{matrix}$								
1918.								
July 3								
	P _m		7 13 30	7				
	P _N		7 13 31	6				
	eS _m		7 33 21	10				
	eS _N		7 30 30	11				
	eL _m		7 55 45	25				
	eL _N		7 56 16	25				
	M _m		8 06 22	19		30		
	M _N		8 19 36	17				
	C _m		8 26 ..	16				
	C _N		8 26 ..	17				
	F _m		9 09 ..	17				
	F _N		9 16 ..	18				
8								
	P _m		10 41 46	3				
	P _N		10 41 58	3				
	S _m		10 ? ?					
	eS _N		10 52 35					
	eL _N		11 18 01	40				
	eL _m		11 18 19	40				
	M _m		11 21 39	40		30		
	M _N		11 33 34	40			20	
	C _m		11 46 ..	18				
	F _m		7 ? ?					
	F _N		12 05 ..					
17								
	P _m		0 30 24	3				
	P _N		0 30 29	3				
	S _m		0 38 12	5				
	S _N		0 38 17	5				
	L _m		0 41 42	18				
	eL _N		0 42 ..	20				
	M _m		0 44 23	14		270		
	M _N		0 46 26	13		190		
	C _m		0 54 ..	10				
	F _m		1 32 ..					
21								
	eL _N		7 11 45	11				Phases very in- definite.
	eL _m		7 12 49	20				
	M _m		7 19 ..	18		50		
	M _N		7 21 ..	18			10	
	C _m		7 22 ..	16				
	C _N		7 23 ..	16				
	C _m		7 28 ..	17				
	F _m		8 02 ..					
	F _N		8 04 ..					
31								
	S _m		14 48 08	8				Microseisms most of day
	S _N		14 48 12	7				
	L _m		14 52 34	19				
	L _N		14 52 43	21				
	M _m		14 54 08	15		50		
	M _N		14 55 51	16			60	
	C _m		14 59 ..	13				
	C _N		14 59 ..	14				
	F _m		15 10 ..					
	F _N		15 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: Glacia-sand over clay.

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

Instrumental constants: $\begin{matrix} V & T_0 & \epsilon \\ E & 80 & 23 & 0 \\ N & 50 & 25 & 4.1 \end{matrix}$

1918.	Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.	Dis-tance.	Remarks.
						A _m	A _N	
July 3		O		7 13 31	6			13,000±
		P _{m repl}		7 14 26				
		e _m		7 14 33	6			
		S _m		7 23 29	13			
		S _N		7 23 32	6			
		e _m		7 24 32	12			
		e _N		7 31 32	24-36			
		L _m		7 59 22				
		M _m		8 03 36				
		M _N		8 20 32				
		L _{m repl}		8 39 00	40			
		L _{m repl}		8 42 ..	30			
		L _{m repl}		8 44 ..				
		L _m		8 49 ..	20			
		L _m		9 11 ..	15			
		F _m		9 20 ..				

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _m	A _N		
Massachusetts. <i>Cambridge. Harvard University Seismographic Station.</i> —Continued.								
1918.								
July 8								
	O		10 postea					13,000±
	P _{m?}		10 32 27	4				
	P _{N?}		10 37 27	4				
	L _m		10 41 00	4				
	L _N		10 41 02	4				
	S _{m?}		10 43 59	6				
	S _{N?}		10 49 12	8				
	S _m		10 50 17	8				
	e _m		10 55 26	17				
	e _N		10 56 04	7				
	eL _m		11 11 02					
	eL _N		11 11 24	60				
	L _m		11 16 04	40				
	L _N		11 16 35					
	L _m		11 19 14	30				
	L _N		11 20 24	40				
	L _m		11 22 42	29				
	L _N		11 23 42					
	M _m		11 24 26					
	L _m		11 28 14	30				
	L _N		11 33 18	20				
	L _m		11 40 09	15				
	L _N		12 22 20	20				
	L _m		12 28 28	24				
	L _N		12 29 02	20				
	F _m		12 50 ..					
14								
	O		18 postea					Not registered on East compo- nent.
	e _m		18 37 01					
	L _m		18 38 35	10				
	L _N		18 40 37					
	F _m		18 43 ..					
15								
	O _m		0 22 29					4,280
	eF _m		0 30 15	2				(38° 31')
	P _m		0 30 31					
	S _m		0 36 18	8				
	S _N		0 38 40	6				
	S _m		0 39 18	8				
	S _N		0 39 50	10-12				
	eL _m		0 42 00	40				
	M _m		0 44 13					
	M _N		0 45 00	18				
	M _m		0 47 53			2,750		
	M _N		0 48 05			46,000		
	M _m		0 49 57					
	F _m		1 42 ..					
21								
	O _m		6 15 ca					12,400?
	eF _{m repl}		6 16 32	4				(111° 38' ?)
	L _m		6 40 15	6				
	eL _m		7 08 21	48				
	L _m		7 11 15	25				
	M _{m?}		7 14 43	20				
	L _m		7 23 21	16				
	L _N		7 51 37					Beautiful sinu- soidal record sets in.
	L _m		8 04 ..	16				Very faint L waves on N undamped.
	L _N		8 23 50	16				
	F _m		8 32 ..					
24								
	O		11 postea					P and S masked by micro- seisms.
	e _m		11 35 46					
	e _N		11 42 01	14				
	eL _{m?}		11 46 21	33-15				
	L _m		11 54 54	20				
	L _N		11 58 55	20				
	L _m		12 01 ..	16				
	L _N		12 05 ..					Damped by mag- net. F lost in changing rec- ords at 12h. 35m.
	F _m		12 ? ?					
29								
	L _N		17 52 10	24				Very distant. Amplitude very small. M uncertain.
	L _m		17 52 37	24				
	L _N		18 01 52	20				
	F _m		18 06 26					
31								
	O _m		14 27 04					6,450?
	e _m		14 44 27					
	F _m		14 45 01	6				
	L _m		14 48 49	6				
	L _N		14 52 02	6				
	eL _m		14 55 21	28				N undamped. E damped by magnet.
	eL _N		14 55 48	20				
	M _m		14 59 15	17				
	L _m		15 01 47	15				
	L _N		15 22 59	20				
	F _m		15 28 30?					

* Trace amplitude.

TABLE 2.—Instrumental seismological reports, July, 1918—Continued.

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					A _h	A _v		

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

Lat., 36° 38' 15" N.; long., 90° 13' 58" W. Elevation, 160.4 meters. Foundation: 12 feet of tough clay over limestones of Mississippi system, about 300 feet thick.

Instrument: Wiechert 80 kg. astatic, horizontal pendulum.

Instrumental constants: $\frac{V}{80} \frac{T_0}{7} \frac{e}{5:1}$

1918.	Date.	Character.	Phase.	Time.	Period T.	Amplitude.	Distance.	Remarks.	
						A _h A _v			
July	3	eLw		7 20				P and S not visible on record. Not registered on E-W.	
		Lw		7 50					
		Mw		7 55	24		*2,000		
		F		8 32					
	8	ePw		10 41 54					?
		Sw		10 42 54					
		Lw		10 51 06					
		eLw		11 07 12	18				
		Lw		11 20 30					
		Lw		11 22	48				
		Lw		11 23 12					
		Lw		11 25 06	36				
15	IPw		0 28 42				3,000		
	IPw		0 28 45						
	ISw		0 33 30						
	eLw		0 35 00	6					
21	eLw		0 39 06						
	Mw		0 39 12	15		*8,000			
	F		1 38						
	ePw		6 29 307				9,1007		
21	Sw		6 ? ?						
	eLw		6 55						
	Lw		7 05 12						
	Mw		7 16	18		*1,000			
	to		7 19						
	F		8 23						

* 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: $\frac{V}{80} \frac{T_0}{7} \frac{e}{5:1}$

(Report for July, 1918, not received.)

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

Lat., 40° 51' 47" N.; long., 73° 53' 08" W. Elevation, 29.3 meters.

Instrument: Wiechert, 80 kg.

Instrumental constants: $\left\{ \begin{matrix} E & V & T_0 & e \\ 72 & 5.0 & 0 & 0 \\ N & 72 & 5.0 & 0 \end{matrix} \right.$

(Report for July, 1918, not received.)

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					A _h	A _v		

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: $\left\{ \begin{matrix} E & V & T_0 & e \\ 13 & 22 & 4:1 \\ N & 14 & 25 & 4:1 \end{matrix} \right.$

1918.	Date.	Character.	Phase.	Time.	Period T.	Amplitude.	Distance.	Remarks.			
						A _h A _v					
July	3	ePw		7 13 16	4						
		ePw		7 14 36	4						
		Sw		7 23 16	9						
		Sw		7 24 58	11						
		Sw		7 30 24	9						
		Sw		7 30 27	12						
		Sw		7 35 48	9						
		eLw		7 48 50	40						
		eLw		7 49 32	24						
		Fw		9 17							
		Fw		9 23							
		8		ePw		10 41 17	3				
Sw				10 49 04	5						
Sw				10 50 52	5						
Sw				10 57 12	7						
Sw				10 57 18	13						
Lw				11 10 14	40						
eLw				11 17 57	38						
Fw				12 35							
Fw				12 37							
21				Sw		6 46 37	7			Seismograph not in operation from July 13, 1h 45m to July 15, 22h 10m.	
				Sw		6 46 36	14				
				eLw		7 03 41	30				
		eLw		7 07 22	28						
31		Fw		8 18				Time mechanism out of order.			
		Fw		8 22							
		Pw		14 43 23	3						
		ePw		14 44 37	4						
31		eSw		14 48 35	6						
		eSw		14 50 23	9						
		Lw		14 54 09	20						
		Lw		14 54 32	26						
		Fw		15 19							
		Fw		15 22							

Panama Canal. *Balboa Heights. Governor, Panama Canal.*

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

Instruments: Two Bosch-Omori, 100 kg.

Instrumental constants: $\frac{V}{35} \frac{T_0}{20}$

1918.	Date.	Character.	Phase.	Time.	Period T.	Amplitude.	Distance.	Remarks.
						A _h A _v		
July	8	P		10 41 50	20			Very slight tremors.
		F		10 53 16				
17		Pw		15 39 14				2 disturbances reported from Chitre, Panama. Time of M also. Do.
		Fw		15 39 21				
		Lw		15 39 26	20		*1,500	
		Lw		15 39 34	20		*2,000	
19		Fw		15 40 27				Direction uncertain.
		Fw		15 40 28				
		P		21 28 51				
		Lw		21 29 31	20			
28		Lw		21 29 34	20			Do.
		M		21 29 42			*1,000 *1,000	
		Fw		21 34 11				
		Fw		21 34 16				
31		P		20 58 32			370	Do.
		Lw		20 59 14	20			
		Lw		20 59 18	20			
		Mw		20 59 24			*2,500	
		Mw		20 59 32			*1,500	
		Fw		21 05 04				
31		Fw		21 06 00				Do.
		Pw		14 39 16			1,160	
		Pw		14 39 23				
		Lw		14 41 27	20			
		Lw		14 41 28	20			
		Mw		14 42 16			*2,500	
31		Mw		14 42 42				
		Fw		14 56 14			*2,000	
		Fw		14 56 14				
		Fw		14 56 54				

* Trace amplitude.

TABLE 2.—Instrumental seismological reports, July, 1918—Continued.

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					A _N	A _E		
Porto Rico. <i>Vieques. Magnetic Observatory. U. S. Coast and Geodetic Survey. F. L. Adams.</i>								
Lat., 18° 09' N.; long., 65° 27' W. Elevation, 19.8 meters.								
Instruments: Two Bosch-Omori.								
Instrumental constants. $\begin{matrix} V & T_0 \\ \text{E} & 10 & 17.3 \\ \text{N} & 10 & 19.8 \end{matrix}$								
1918.								
July 3		P _N	7 11 59	9	μ	μ	km.	May be the record of two quakes.
		P _M	7 12 21	10				
		eL _M	8 33 48	30				
		L _N	8 ? ?					
		M _N	8 42 00	20		10		
		M _M	8 42 16	20	30			
		C _M	8 48 ..	20				
		C _N	8 ? ?					
		F _M	9 04 ..	16				
		F _N	9 07 ..	17				
8		P _N	10 45 01	5				Nothing clear except the first appearance. Remainder very faint.
		P _M	10 45 12	5				
		F _N	10 52 ..					
31		P _M	14 41 26	7				
		eP _N	14 41 38	7				
		eS _M	14 46 09					
		S _N	14 7 ?					
		L _M	14 48 06	22				
		L _N	14 ? ?					
		eM _N	14 52 53	12		10		
		M _M	14 54 10	15	20			
		C _M	14 57 ..	16				
		C _N	14 7 ?					
		F _M	15 02 ..	14				
		F _N	15 02 ..					

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. $\begin{matrix} V & T_0 \\ \text{E} & 10 & 15 \\ \text{N} & 10 & 16 \end{matrix}$

Date.	Character.	Phase.	Time.	Period T.	Amplitude.	Distance.	Remarks.
1918.							
July 3		P _M	7 10 20				N-S component of small amplitude.
		S _M	7 17 45				
		eL _M	7 45 ..				
		L _M	7 57 ..	26			
		L _N	8 01 ..	20			
		L _M	8 13 ..	to 18			
		L _M	8 45 ..	24			
		F _M	9 ..				
8		eL _M	10 46 10				
		L _M	11 02 ..				
15		P _M	0 30 03				E-W component not recording.
		S _M	0 38 11				
		eL _M	0 42 50				
		M _M	0 47 30		3,500		
		F _M	1 20 ..				
21		eL _M	7 13 ..	24			
		L _M	7 25 ..	16			
		F _M	7 50 ..				
31		eL _M	14 45 ..				
		S _M	14 49 45				
		L _M	14 58 40	24			
		F _M	15 10 ..				

* Trace amplitude.

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. $\begin{matrix} V & T_0 \\ 120 & 23 \end{matrix}$

Date.	Character.	Phase.	Time.	Period T.	Amplitude.	Distance.	Remarks.
1918.							
July 1		i	6 29 00	4			F lost in wind tremors.
		eL _M	6 38 54				
		eL _M	7 09 ..				
		L _M	7 25 ..	20			
		L _N	7 37 ..	16			
		F _M	7 ? ?				
3		F _{repr}	7 13 00	4		12,000	
		eL _M	7 20 ..	8			
		eL _M	7 22 54	8			
		eL _M	7 25 12	12			
		eL _M	7 30 ..	12			
		eL _M	7 45 ..				
		L _M	7 53 ..	20			

Appears to be the confused record of several shocks.

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					A _N	A _E		
Canada. <i>Ottawa. Dominion Astronomical Observatory—Continued.</i>								
1918.								
July 3		L	7 59 ..	22				
		L	8 05 ..	18				
		L	8 10 ..	18				
		L	8 15 ..	17				
		L	8 33 ..	17				
		L	8 50 ..	20				
		L	9 03 ..	17				
		L	9 11 ..	17				
		L	9 21 ..	15				
		L	9 32 ..	15				
		F	10 ..					
8		O _L	10 24 ca			9,420?	F lost changing sheets at 12h 10m.	
		iP _N	10 36 37					
		i _N	10 40 ..					
		F _{repr}	10 41 08					
		iS _N	10 47 08					
		i	10 56 30					
		eL _M	11 07 ..	45				
		L _M	11 16 ..	34				
		L _N	11 30 ..	22				
		L _N	11 40 ..	16				
12		F	12 ? ?					
		eL _M	21 22 42					
		eL _M	21 23 12	10				
		L _M	21 30 ..	10				
		C _M	21 51 ..					
		F	22 ..					
14		eL _M	18 36 04	4				
		eL _M	18 37 ..	10				
		L _M	to 18 41 ..	6				
		C _M	to 18 54 ..	6				
		F	to 18 59 ..	6				
15		O	0 22 66			3,960		
		iP _N	0 30 03					
		iS _N	0 35 42					
		eL _M	0 39 ..					
		M _M	0 44 ..	15	50	425		
		L _M	0 51 ..	8				
		L _N	1 05 ..	9				
		L _N	1 15 ..	8				
		L _N	1 29 ..	9				
		L _N	1 55 ..	7				
		L _N	2 05 ..	8				
		F	2 35 ..	8				

SASKATOON RECORD.

Date.	Character.	Phase.	Time.	Period T.	Amplitude.	Distance.	Remarks.
1918.							
16		O	0 22 66			1,910	
		iP _N	0 26 59				
		iS _N	0 30 14				
		eL _M	0 31 24				
		eL _M	20 15 06	6			
		eL _M	20 17 56	6			
		eL _M	20 24 24	6			
		L _M	20 29 06				
		F	20 45 ..				
21		O _L	6 18 10			8,640?	
		P _M	6 30 04				
		S _M	6 39 56				
		eL _M	6 55 ..				
		L _M	7 03 ..	30			
		L _N	7 14 ..	20			
		L _N	7 25 ..	16			
		L _N	7 41 ..	15			
		L _N	8 00 ..	15			
		F	8 20 ..				
21		eL _M	10 46 ..				F lost in changing sheets.
		L _M	to 11 10 ..	18			
23		eL _M	14 25 ..	21			
		F					
24		eL _M	11 45 ..				
		L _M	11 56 ..	18			
		L _N	12 03 ..	17			
		L _N	12 07 ..	16			
		F	12 20 ..				
25		eL _M	21 45 ..				
		L _M	to 22 ..				
26		eL _M	12 21 ..				Amplitude very small. May not be seismic. High wind.
		L _M	to 12 30 ..	18			
29		eL _M	17 28 ..				
		L _M	to 18 30 ..				
31		O	14 36 40			4,210	
		P _M	14 43 33				
		P _{repr}	14 45 06				
		S _M	14 49 52				
		S _{repr}	14 52 ..				
		eL _M	14 54 36	24			
		L _M	14 58 ..	21			
		L _N	15 06 ..	11			
		F	16 40 ..				

TABLE 2.—Instrumental seismological reports, July, 1918—Continued.

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.	Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					A _n	A _x								A _n	A _o		
<p>Canada. Toronto. Dominion Meteorological Service.</p> <p>Lat., 43° 40' 01" N.; long., 79° 23' 54" W. Elevation, 113.7 meters. Subsoil: Sand and clay.</p> <p>Instrument: Milne horizontal pendulum, North. In the meridian.</p> <p style="text-align: center;">T₀</p> <p>Instrumental constant... 18. Pillar deviation: 1 mm. swing of boom=0.50".</p>									<p>Canada. Victoria, B. C. Dominion Meteorological Service.</p> <p>Lat., 48° 24' N.; long., 123° 19' W. Elevation, 67.7 meters. Subsoil: Rock.</p> <p>Instrument: Wiechert, vertical; Milne horizontal pendulum, North. In the meridian.</p> <p style="text-align: center;">T₁</p> <p>Instrumental constant... 18. Pillar deviation: 1 mm. swing of boom=0.54".</p>								
1918.			H. m. s.	Sec.	μ	μ	km.		1918.			H. m. s.	Sec.	μ	μ	km.	
July 1	L.		7 02 48†					Microseisms going on.	July 1	P.		6 32 00				6,200	
	L.		7 17 18							S.		6 39 02					
	L.		7 38 12		*200					L.		6 53 33					
	F.		8 00							M.		7 23 39		*500			
	F.		8 00							F.		8 06 26					
3	P.		7 14 30†					P not defined. Sudden deflection to east at 7h 30m 30s and then a momentary pause.	3	P.		7 05 38				9,000	Time of P determined from Vertical seismograph. Probably South America.
	P.		7 16 54							S†		7 08 54					
	S.		7 21 54							S.		7 15 48					
	S or IL		7 25 42							IS		7 17 28					
	IL.		7 30 30							L.		7 36 22		*4,000			
	L _m		7 34 42							M.		7 47 47					
	L.		7 48 36							Repeat							
	IL.		7 58 30							L.		8 56 41					
	M.		8 04 18		*4,300					IL.		9 05 34					
	IL.		8 12 12							L _m		9 10 04					
	Repeat.									L.		9 20 22					
	L.		8 43 36							M.		9 24 16		*1,400			
	L _m		8 57 30							F.		9 57 42					
	M.		9 00 00		*1,500												
	L.		9 19 30														
	F.		9 23 42														
8	P.		10 37 54†					P doubtful. May be a dual quake.	8	P.		10 46 14				6,870	Northern Peru.
	S.		10 48 36							S.		10 54 36					
	IS.		10 56 24							L.		11 08 12		*1,700			
	L.		11 01 24							M.		11 26 06					
	IL.		11 14 54		*1,000		0,650?			F.		12 38 02					
	M.		11 35 36														
	L _m		12 39 24														
	F.		13 41 54														
14								Microseisms after 17h.									
15	P.		? ? ?					Microseisms. Eureka, Cal.?									
	IS.		0 35 00														
	IL.		0 41 42														
	IL.		0 44 12														
	M.		0 44 54		*2,400												
	F.		1 46 42														
16	L†		20 48 06†						15	P.		0 25 25				651	Northern California. Felt at Eureka.
	L.		20 50 36		*50					S or L.		0 26 53					
	F.		20 56 48							M.		0 28 51		*11,500			
16	L.		23 55 18		*50					F.		1 19 50					
	F.		23 59 12														
21	P†		6 31 18†					Time doubtful. Clock stopped. Microseisms very numerous. Phases masked.									
	S†		6 40 30														
	L.		6 55 42														
	L.		7 05 18														
	L.		7 18 36														
	M.		7 22 54		*2,000												
	F.																
21	M.		11 01 54†		*100			Do.									
23	S or L†		14 27 24					Phases masked by microseisms.									
	L _m		14 31 30														
	M.		14 37 48		*300												
	F†		14 50 36														
24	L _m		11 56 36					Do.									
	M.		11 59 42		*200												
	F.																
25								Microseisms when small quake was recorded at other stations. Also sheets 20th to 27th a mass of microseisms.									
29			12					Microseisms when small quake was recorded at other stations.									
29	M.		18 03 06		*200			Microseisms mask phases.									
31	P†		14 48 36					Microseisms going on.									
	S.		14 53 42														
	L.		14 57 12														
	M.		15 00 06		*1,000												
	F.																
31	L.		23 00 48†					Time doubtful. Microseisms mask phases.									
	M.		23 09 12†		*100												
	F.																

*Trace amplitude. †Original measurements given in tenths of minutes.

* Trace amplitude.

TABLE 3.—Late seismological reports (instrumental).

SEISMOLOGICAL DISPATCHES.¹

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _N	A _{N'}		
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 $\begin{pmatrix} E & V & T_0 \\ N & 10 & 14 \\ & 10 & 13 \end{pmatrix}$								
1918.			H. m. s.	Sec.	μ	μ	km.	
June 7	P _N		21 31 02	5				
	P _{N'}		21 31 03	4				
	eL _N		21 35 17	18				
	eL _{N'}		21 35 47	13				
	M _N		21 37 01	13	1,200			
	M _{N'}		21 37 42	13		860		
	C _N		21 40 ..	10				
	C _{N'}		21 40 ..	12				
	F _N		22 00 ..	7				
	F _{N'}		22 06 ..	12				
12	P _N		4 28 44	4				
	P _{N'}		4 28 50					
	eL _N		4 33 56					
	eL _{N'}		4 33 58					
	M _N		4 35 ..	10	10	10		
	F _N		4 45 ..					
	F _{N'}		4 58 ..	8				

Panama, July 20, 1918.

Earthquake shocks have been felt 80 miles to the west of this city, causing some apprehension among the people of that region. No casualties occurred nor was any damage done. (Assoc. Pr.)

Johannesburg, South Africa, July 21, 1918.

Ten earth shocks occurred in this region yesterday. They caused the collapse of the mine works. Damage has not been ascertained as yet. (Assoc. Pr.)

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

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).

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _N	A _{N'}		
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 $\begin{pmatrix} E & V & T_0 & e \\ N & 13 & 22 & 4:1 \\ & 14 & 25 & 4:1 \end{pmatrix}$								
1918.			H. m. s.	Sec.	μ	μ	km.	
June 1	e _N		14 53 30	12				
	F _N		15 58 ..					
3	eP _N		0 14 02	6				
	eP _{N'}		0 14 05	5				
	S _N		0 23 00	5				
	S _{N'}		0 23 12	13				
	L _N		0 30 18	30				
	F _N		1 00 ..					
4	e _N		17 40 00	13				
	e _{N'}		17 40 32	21				
	L _N		18 04 08	38				
	L _{N'}		18 05 10	25				
7	e _N		21 39 ..					Part of record lost changing sheets. Periods short.
	N _N		22 29 ..					
11	e _N		12 46 36	4				
	e _{N'}		12 46 41	5				
	e _N		12 48 59	18				
	e _{N'}		12 49 37	12				
	F _N		13 09 ..					
12	L _N		4 45 30	14				
	F _N		5 02 ..					
13	eP _N		9 05 14	4				
	eP _{N'}		9 05 20	3				
	eS _N		9 10 59	7				
	eS _{N'}		9 11 02	9				
	F _N		9 19 ..					
16	F _N		12 33 57	3				
	S _N		12 38 48	5				
	S _{N'}		12 38 49	4				
	F _N		12 51 ..					
17	e _N		16 44 57	10				
	e _{N'}		16 45 02	7				
	F _N		16 49 ..					
	F _{N'}		16 50 ..					
22	eP _N		22 13 37	6				
	eS _N		22 16 48	11				
	L _N		22 23 54	22				
	L _{N'}		22 24 48	25				
	F _N		22 35 ..					
	F _{N'}		22 38 ..					

SECTION V.—SEISMOLOGY.

SEISMOLOGICAL REPORTS FOR AUGUST, 1918.

W. J. HUMPHREYS, Professor in Charge.

(Dated: Seismological Investigations, Weather Bureau, October 2, 1918.)

TABLE I.—Noninstrumental earthquake reports, August, 1918.

Day.	Approximate time, Greenwich Civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity Rossi-Forel.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
1918.		CALIFORNIA.								
Aug. 1	19 46	Callexico.....	32 41	115 30	3	1	M. 01	Faint.....	Rumble and bump.....	H. M. Rouse.
3	18 30	Stanford University.....	37 25	122 10	3	1	03	None.....		Prof. S. D. Townley.
12	16 30	Coulterville.....	37 43	120 13	3	1	04	Loud.....	Rumble in N., then an abrupt twist N-SW.	W. H. Dudley.
		North Fork (15 miles NE of Kaiser Diggings, Madera Co.)	37 20	119 20	4	1		None.....		U. S. Forest Service.
17	8 45	Callexico.....	32 41	115 30	4	3	01	Faint.....	Rumble; then 3 sharp, rapid, downward bumps.	H. M. Rouse.
	8 49	Callexico.....	32 41	115 30	4	1	01		A sharp downward bump.	H. M. Rouse.
20	10 41	Eureka.....	40 48	124 11	4	1	10	Rumble.....	Then a bump and twist E-W.	L. M. Monfort.
	18 45	Morgan Hill (Santa Clara Co.)	37 08	121 38	5	1		None.....		San Jose Evening News.
24	16 29	Callexico.....	32 41	115 30	4	1	01	None.....	Abrupt jerk SE.-NW.	H. M. Rouse.
		MAINE.								
21	4 12	Bridgton.....	44 03	70 42	5	2	13	Loud.....	Rumble. Abrupt rocking NE.-SW.	Charles L. Chadbourne.
		Cape Elizabeth.....	43 35	70 14				Few.....		Frank W. Sparrow.
		Duck Pond Lake.....	43 40	70 21						Portland Daily Press.
		Lewiston.....	44 05	70 12						Portland Express Advertiser.
		Little Sebago Lake.....	43 53	70 24					Water on eastern shore of lake dropped about 4 inches.	George E. Sawyer.
		Norway.....	44 12	70 32	8				Chimneys fell.	Charles L. Chadbourne.
		South Paris.....	44 13	70 30	7-8				Bricks fell from chimneys. Doors flew open.	Portland Daily Press.
		NEVADA								
19	10 53	Winnemucca.....	40 58	117 43	4	1	03	None.....	Rapid rocking N.-S.....	Ray L. Fisher.

TABLE 2.—Instrumental seismological reports, August, 1918.
(Time used: Mean Greenwich, midnight to midnight. Nomenclature: International.)
[For significance of symbols see REVIEW for January, 1918, p. 34.]

Date.	Charac- ter.	Phase.	Time.	Period T.	Amplitude.		Dis- tance.	Remarks.
					A _N	A _E		

Alaska. *Sitka. Magnetic Observatory.* U. S. Coast and Geodetic Survey. F. P. Ulrich.
Lat., 57° 03' 00" N.; long., 135° 39' 06" W. Elevation, 15.2 meters.
Instruments: Two Bosch-Omori, 10 and 12 kg.

Instrumental constants. $\begin{matrix} V & T_0 \\ E & 10 & 17 \\ N & 10 & 15 \end{matrix}$

1918.		H. m. s.	Sec.	μ	μ	km.	
Aug. 15.	eP _N	12 32 15	5				
	eP _E	12 35 09	5				
	S _N	12 42 23	16				
	eS _N	12 42 27	10				
	M _N	12 43 11	10	140			
	eL _N	12 55 05					
	M _N	12 57 57			120		
	C _N	12 59 ..					
	eL _N	13 01 28	35				
	M _E	13 03 45	25	70			
	C _N	13 10 ..	24				
	F _N	14 05 ..	16				
	F _N	14 09 ..	17				

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. $\begin{matrix} V & T_0 \\ E & 10 & 14 \\ N & 10 & 18 \end{matrix}$

(Report for August, 1918, not received.)

California. *Berkeley. University of California.*
Lat., 37° 52' 18" 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.

1918.		H. m. s.	Sec.	μ	μ	km.	
Aug. 28.				50	50		Tremors during 24 hours preceding 15h. 00m.

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' 38" N.; long., 104° 58' 54" W. Elevation, 1,655 meters.
Instrument: Wiechert 80-kg., astatic, horizontal pendulum.

Instrumental constants

1918.		H. m. s.	Sec.	μ	μ	km.		
Aug. 5.							Activity on both components from 10h. to 13h.	
	15.	L _N	13 08 ..	40		*500		P not discernible. Very long record. Seems to be made up of several quakes. Record also disturbed by heavy machinery in motion.
		L _E	13 13 ..	40	*1,000			
		C _N	13 18 ..					
		L _N	13 22 ..	20				
		C _N	13 36 ..					
		L _N	13 40 ..	20				
		C _N	13 47 ..					
		L _N	13 49 ..	20				
		C _N	13 55 ..					
		L _N	13 57 ..	15				
		C _N	14 32 ..					
		F _N	14 43 ..					
		17.						
								NOTE.—No record during July.

* Trace amplitude.

Date.	Charac- ter.	Phase.	Time.	Period T.	Amplitude.		Dis- tance.	Remarks.
					A _N	A _E		

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. $\begin{matrix} V & T_0 \\ E & 110 & 6.4 \\ N & 110 & 6.4 \end{matrix}$

1918.		H. m. s.	Sec.	μ	μ	km.	
Aug. 4.	eW?	16 20 35					Amplitude small. Phases uncertain.
	eE	16 28 40					
	F	16 42 ..					
8.	P	10 03 29				5,650	
	S	10 18 22					
	SSEPI	10 24 30					
	L?	10 34 30					
	L	10 44 30					
	L	10 47 30		28			
	F	11 50 ..					
15.	P	12 37 27				5,200	
	S	12 44 25					
	eL	12 50 ..					
	L	12 58 ..					
	F	15 40 ..		36			
15.	eW	17 51 37					
	S	17 52 45					
	eL	18 10 30					
	L	18 38 ..					
	F	19 15 ..		16			
17.	P	7 03 30				6,520	
	S	7 11 34					
	eL	7 22 30					
	L	7 28 ..		24			
	F	7 40 ..					
23.	e	6 56 27					Microseisms.
	eL	7 34 ..					
	L	7 40 ..		20			
	F	8 40 ..					

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 dolomite.

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

Instrumental constants. $\begin{matrix} V & T_0 & e \\ E & 165 & 5.4 & 0 \\ N & 143 & 5.2 & 0 \\ Z & 80 & 5.0 & 0 \end{matrix}$

1918.		H. m. s.	Sec.	μ	μ	km.	
Aug. 4.	eW	16 28 09					Microseisms. Does not show on E-W component.
	eW	16 29 27					
	F	16 37 ..					
8.	eP _N	10 08 19					Heavy microseisms.
	EP _N	10 09 08					
	eS	10 18 29					
	L _N	10 49 34		30			
	F	11 47 ..		28			
15.	eP	12 37 39					Record from Bosch photographic seismograph.
	S	12 44 31					
	eL	12 50 24		9			
	M _N	13 34 08		22	*1,200		
	F	15 10 ..		23	*1,100		
15.	e	17 51 00					Do.
	S	17 53 11					
	S	17 53 16					
	eL _N	18 09 12					
	F	19 30 ..					
17.	eP _N	7 03 29					Does not show on E-W.
	S	7 11 34					
	eL	7 25 30					
	L	7 28 17		22			
	F	7 58 ..					
23.	e	7 56 48					Heavy microseisms. Record faint on E-W. [NOTE.—Time of phases is one hour later than at other stations.]
	eW	7 56 48					
	e	8 06 21					
	eL	8 33 13		19			
	eL	8 33 30		21			
	L	8 40 ..		19			
	L	8 40 ..					
	F	10 ..					

* Trace amplitude.

TABLE 2.—Instrumental seismological reports, August, 1918—Continued.

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _m	A _N		
Hawaii. <i>Honolulu. Magnetic Observatory. U. S. Coast and Geodetic Survey. Frank Neuman.</i>								
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 constants.. $\begin{matrix} T_0 \\ \mu \\ \mu \\ \mu \end{matrix} \begin{matrix} 18 \\ 100 \\ 400 \\ 5,100 \end{matrix}$								
1918.								
Aug. 1	e		4 54 45					
	M		5 01 18	18		*100		
	F		5 05 ..					
1	eP		11 55 24					
	L		11 58 30	21				
	M		11 59 54	18		*400		
	C		12 04 ..					
	F		13 08 ..					
8	P		9 57 30					
	S		10 05 24					
	L		10 14 06	25				
	M		10 21 00	19		*5,100		
	C		10 30 00					
	F		14 43 ..					
15	P		12 30 12					Maximum ampli-tude probably 38 mm. Tremors continued to the beginning of the next quake.
	S		12 40 18					
	L		12 54 00	25				
	M		13 03 ..	19		*17,000+		
	C		13 32 ..					
	F		.. ..				
15	P		17 42 12					
	S		17 51 36					
	L		18 05 06	25				
	M		18 20 00	17		*1,500		
	C		18 27 ..					
	F		19 55 ..					
17	eP		7 17 54					
	L		7 38 00					
	M		7 49 30	17		*100		
	C		7 51 ..					
	F		8 42 ..					
22	e		8 48 48					
	L		8 55 42					
	M		9 00 00	18		*100		
	C		9 02 ..					
	F		9 15 ..					
23	P		6 45 30					
	S		6 52 30					
	L		7 00 24	24				
	M		7 06 48	19		*4,500		
	C		7 13 ..					
	F		10 40 ..					
23	e		22 47 42					Possibly an arti-ficial distur-bance.
	L		22 49 48					
	M		22 50 12	18		*1,300		
	C		22 56 ..					
	F		23 48 ..					

* 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.. $\begin{matrix} V \\ T_0 \\ e \end{matrix} \begin{matrix} 177 \\ 3.4 \\ 4.1 \end{matrix} \begin{matrix} N \\ 205 \\ 3.4 \\ 4.1 \end{matrix}$
 Report for August, 1918, 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.. $\begin{matrix} V \\ T_0 \\ e \end{matrix} \begin{matrix} 10 \\ 15 \end{matrix} \begin{matrix} N \\ 10 \\ 15 \end{matrix}$

1918.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.	Dis-tance.	Remarks.
					A _m	A _N	
Aug. 8	eLN		10 48 ..	27			P and S not dis-cernible.
	eLM		10 49 ..	26			
	M		10 55 ..	21	10	10	
	C		10 57 ..				
	C _N		11 02 ..				

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _m	A _N		
Maryland. <i>Cheltenham. Magnetic Observatory—Continued.</i>								
1918.								
Aug. 15	eP		12 37 35					Sheets changed on North from 12 h. 47 m. 35 s. to 13 h. 06 m. 55 s. and on East from 13 h. 08 m. 40 s. to 13 h. 20 m. 23 s.
	eP		12 37 42	3				
	eL		12 58 ..	45				
	eLN		13 20 ..	35				
	ME		13 41 53	18	300			
	M		13 50 02	18		150		
	C		14 01 ..	17				
	C _N		14 17 ..	16				
	F		14 34 ..	17				
	F _N		14 53 ..	16				
15	eP		17 52 50	3				Possibly a few long waves on North about 1 hour later.
23	eLN		7 39 ..					
	eLM		7 41 ..					
	M		7 45 ..	17	10			
	C		7 53 ..	16		10		
	C _N		7 56 ..	16				
	C _N		7 57 ..	17				

Massachusetts. *Cambridge. Harvard University Seismographic Station, J. B. Woodworth.*
 Lat., 42° 22' 38" 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.. $\begin{matrix} V \\ T_0 \\ e \end{matrix} \begin{matrix} 80 \\ 25 \\ 0 \end{matrix} \begin{matrix} N \\ 50 \\ 25 \\ 4.1 \end{matrix}$

1918.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.	Dis-tance.	Remarks.
					A _m	A _N	
Aug. 5	L _N		2 35 ..				Minutes approxi-mate. Clock contacts failed.
	L _N		2 50 ..				
8	O		10 ..				E damped by mag-net. N undamp-ed.
	eP		10 25 17				
	eLN		10 28 21	40			
	L		10 43 31	20			
	L _N		10 46 21	30			
	L _N		10 49 55	25			
	L _N		10 51 00	30			
	L _N		10 56 47	20			Amplitude N in-creases.
	L _N		10 59 11	18			
	F _N		11 37 ..				
14	L _N		18 15 51				
	F _N		19 19 ..				
14	e		20 54 37				May not be seis-mic. Less defi-nite on N-S.
	L _N		20 54 53	8-13			
	L		21 15 ..				
15	O		12 20 21			6126	Break in record changing sheets from 12h. 31m. to 12h. 33m., also E stylus tipped over from 14h. 56m. to 15h. 44m.
	P _N		12 35 44	2			
	L		12 37 56				
	L		12 38 07	2			
	S _N		12 42 43	20			
	eLN		12 52 22				
	eLN		12 58 ..	22			
	M _N		13 28 ..	28			
	M _N		13 30 30	30			
	M _N		13 38 30	30			
	M _N		13 46 36	16			
	M _N		13 54 ..				
	L _N		14 04 30				
	L _N		16 34 ..	24			
	L _N		16 46 ..				
	F _N		17 15 ..				
15	O		17 48 21			9850?	
	S _N		18 10 50	8			
	L _N		18 30 18	26			
	L _N		18 30 54				
	L _N		18 34 30	30			
	M _N		18 39 53	24			
	L _N		18 49 ..	20			
	L _N		18 57 ..	15			
	F		19 52 ..				
21	O		4 11 54			225	Local shock near South Paris, Me. (lat. 44° 07' 40" N.; long. 70° 32' 18" W.). [See also noninstru-mental reports, table I].
	P		4 12 28				
	C		4 13 04	8			
	C		4 13 45				
	F		4 14 08				
23	O		6 48 47?			10000?	Volcanos "Llama" (Lalimus) and Lanin (lat. 39° 45' S.; long. 71° 30' W.) reported in eruption. Lanin distant about 9,000 kms.
	eP		7 02 ..				
	e _N		7 06 13				
	S _N		7 14 14	20			
	S _N		7 14 59				
	eLN		7 30 51	49			
	L _N		7 42 ..	20			
	L _N		7 48 54	15			
	F		8 50 ..				

TABLE 2.—Instrumental seismological reports, August, 1918—Continued.

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					A _m	A _N		

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

Lat., 38° 33' 15" N.; long., 90° 13' 53" 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. $\frac{V}{N} \frac{T_0}{20} \frac{e}{5:1}$

1918.		H. m. s.	Sec.	μ	μ	km.
Aug. 15	eP _N ...	12 38 48				5,475
	eS _N ...	12 46 06				
	eS _m ...	12 46 12				
	eL...	12 52 06				
	L...	12 55 48				
	L...	13 19				
	M...	13 22	25		*4,000	
	L...	13 34 30				
	L...	13 38 18				
	L...	13 43				
	L...	13 46 48				
	F...	15 02				

* 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. $\frac{V}{N} \frac{T_0}{80} \frac{e}{7:5:1}$

(Report for August, 1918, not received.)

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

Lat., 40° 51' 47" N.; long., 73° 53' 08" W. Elevation, 29.3 meters.

Instrument: Wiechert, 80 kg.

Instrumental constants. $\frac{V}{N} \frac{T_0}{72} \frac{e}{5:0:0}$

(Report for August, 1918, not received.)

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

Lat., 42° 29' 58" N.; long., 76° 29' 09" W. Elevation, 242 meters.

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

Instrumental constants. $\frac{V}{N} \frac{T_0}{13} \frac{e}{22:4:1}$

(Report for August, 1918, 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. $\frac{V}{N} \frac{T_0}{35} \frac{e}{20}$

1918.		H. m. s.	Sec.	μ	μ	km.	Remarks.
Aug. 1	P...	0 05 04					Trace faint.
	F _N ...	0 12 00					
	F _m ...	0 13 00					
8	P...	10 02 44				285	Direction uncertain.
	L...	10 03 14	20				
	M...	10 03 18		*500			
	L...	10 03 20			*1,000		
	F _m ...	10 05 24					
	F _N ...	10 05 34					
15	P...	12 38 11				17,380	Do.
	F _N ...	12 38 14					
	S _m ...	12 49 10					
	S _N ...	12 51 01					
	L _N ...	13 30 10	20				
	L _m ...	13 30 47	20				
	M...	13 40 17		*5,000			
	M...	13 40 40			*1,000		
	F _m ...	14 30 00					
	F _N ...	14 31 00					

* Trace amplitude.

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					A _m	A _N		

Panama Canal Zone. *Balboa Heights*—Continued.

1918.		H. m. s.	Sec.	μ	μ	km.
Aug. 27	P...	7 03 46	20			
	P _N ...	7 03 54				
	L...	7 05 28	20			
	M...	7 05 40		*600	*300	
	F...	7 13 00				
	F _N ...	7 15 00				

* Trace amplitude.

Porto Rico. *Vieques. Magnetic Observatory.* U. S. Coast and Geodetic Survey. W. M. Hill.

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

Instruments: Two Bosch-Omori.

Instrumental constants. $\frac{V}{N} \frac{T_0}{10} \frac{e}{18:20}$

1918.		H. m. s.	Sec.	μ	μ	km.	Remarks.
Aug. 8	eL _N ...	10 59	20				Only a few L waves. E not recording.
	M...	11 03	20		10		
	C...	11 12					
15	eP _m ...	12 39 03	5				S and L uncertain.
	eP _N ...	12 39 05	6				
	S _m ...	12 45 28	18				
	S _N ...	12 45 40	17				
	S _m ...	13 07 54	15				
	S _N ...	13 08 06					
	M _{al} ...	13 08 35	30		120		
	eL _m ...	13 22 15	40				
	eL _N ...	13 33 00	30				
	M _N ...	13 38 48	25		60		
	M _{al} ...	13 39 15	27		70		
	C...	13 51	19				
F...	14 45	17					
23	eL...	7 44	19				Only a few L waves.
	M...	7 50		10			
	M _N ...	7 52			10		
	C...	7 55					

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. $\frac{V}{N} \frac{T_0}{10} \frac{e}{15:18}$

1918.		H. m. s.	Sec.	μ	μ	km.
Aug. 8	eL _m ...	11 00				
	C...	11 00				
15	eL...	12 38 30				
	L...	12 56 30				
	L...	13 14	30			
	L...	13 26	24			
	L...	13 40	18			
	L...	13 50	16			
	L...	14 04	14			
	F...	14 40				

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. $\frac{V}{N} \frac{T_0}{120} \frac{e}{26}$

1918.		H. m. s.	Sec.	μ	μ	km.
Aug. 4	eN...	16 21	6			
	F...	16 42	8			
5	eN _T ...	2 05 30				
	eL _N ?	2 30	12			
	eL _N ...	2 39 30	16			
	L...	2 42	16			
	L...	2 50	16			
	F...	2 56	16			
8	F...	3 05				
	O...	9 56 34				8,640
	P...	10 08 28				
	S...	10 18 20				
	S _{graph}	10 25 04				
	eL _m ...	10 36				
	L...	10 40	30			
	L...	10 50	24			
	L...	10 54	20			
	L...	11 05	17			
F...	11 20	16				

TABLE 2.—Instrumental seismological reports, August, 1918—Continued.

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _B	A _N		
Canada. Ottawa. Dominion Astronomical Observatory—Continued								
1918.			H. m. s.	Sec.	μ	μ	km.	
Aug. 15	O		12 27 32				6,300	F merges into next
	P _N		12 37 20					quake. Tremors
	S _N		12 45 12					lasted, faintly
	L		12 56	50				marked, for near-
	L		13 17	35				ly five hours.
	L		13 30	23				
	L		13 51	16				
	L		14 10	15				
	L		14 35	17				
	L		14 55	15				
	F							
15	I		17 51 08					
	I		18 08 30					
	I		18 08					
	eL _N		18 21					
	L _N		18 30	24				
	L		18 40	22				
	L		18 45	19				
	F		19 10					
17	O		6 53 27				7,300	
	P		7 04 11					
	S		7 12 55					
	eL _N		7 25					
	L		7 30	24				
	L		7 35	18				
	F		8 00					
21	O		4 12 50				420	Reported from
	IP _N		4 13 48					South Paris, Me.
	e		4 14 03					Record barely
	F		4 14 30					visible. Distance
								taken from the
								globe and used
								with P to get O.
22	e _N		8 44 56					Faint traces only
			9 10					on E-W. May
								not be seismic.
23	I		6 56 13					
	e		7 02 21					
	e		7 06 23					
	I		7 12 54					
	eL		7 36	18				
	L		7 44	16				
	L		7 51	15				
	L		8 03	14				
	L		8 13	14				
	L		8 24	13				
	L		8 44	13				
	F		9					

Canada. Toronto. Dominion Meteorological Service.

Lat., 43° 40' 01" N.; long., 76° 23' 54" W. Elevation, 113.7 meters. Subsoil: Sand and clay.

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

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

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _B	A _N		
1918.			H. m. s.	Sec.	μ	μ	km.	
Aug. 4								Light off. at time
								some stations re-
								cord quake at
								16h. 21m.
5	L		2 42 00?					Microseisms mask
								phases.
8	S _{rep}		10 25 24					P and S not re-
	e		10 34 30					corded.
	L		10 48 00					
	iL		10 49 06					
	L _N		10 55 30					
	M		10 59 18		*1,200			
	F		12 59 24?					
15	P		12 37 30					P may not be seis-
	I		12 39 48					mic.
	I		12 45 42					Microseisms going
	iS		12 51 24					on some time
	iS		12 55 12					previous.
	L		12 58 00					
	L		13 02 06					Clear record.
	iL		13 27 18					
	iL		13 35 06					
	M		13 39 36		*14,400			
	iL		13 50 30					
	iL		13 55 36					
	L		14 02 18					Merged in next
	F							quake.

*Trace amplitude.

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _B	A _N		
Canada. Toronto. Dominion Meteorological Service—Continued.								
1918.			H. m. s.	Sec.	μ	μ	km.	
Aug. 15	L		17 51 54					
	L		18 13 00					
	L		18 57 00					
	M		18 59 06		*300			
	F		20 05 06					
16	L		9 20 42		*50			Doubtful as to being
								seismic.
17	L		7 31 36					F lost in microse-
	eL		7 40 06					isms.
	M		7 41 42		*200			
	F							
21	L		4 14 24					Doubtful as to being
	M		4 14 36					seismic. F
	F							lost in microse-
								isms.
22	L		8 42 18		*50			Doubtful as to being
	F		8 47 36					seismic.
23	P		7 01 12?					Microseisms at 6h.
	IP		7 05 54					55m. 05s.
	S		7 12 54					
	eL		7 17 06					
	eL		7 35 36					
	eL		7 37 48					
	M		7 47 24		*2,300			
	L		8 08 12					
	L		8 57 36					
	F		10 10 00?					

*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. 18. Pillar deviation, 1 mm., swing of boom=0.54".

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _B	A _N		
1918.			H. m. s.	Sec.	μ	μ	km.	
Aug. 5	P		2 12 58?				5,200	
	S		2 19 51					
	L		2 29 01					
	M		2 35 35		*300			
	F		3 01 39?					
8	P		10 11 45				4,120	
	S		10 17 39					
	L		10 19 57					
	M		10 41 45		*1,500			
	F		12 27 29					
	P		10 11 54		6	Az	4,550	
	S		10 17 59					
	L		10 29 50		30			
	M		10 54 50		24		4	
15	P		12 32 18				10,440	Probably in vicini-
	S		12 43 36					ty of Malay Arch-
	L		12 55 24					ipelago.
	or		12 58 21					
	M		13 23 27		*9,000			
	F		17 10 10					
	P		12 32 18			Az	11,770	Probably in vicinity
	S		12 44 30		8-10			of Malay Archi-
	L		13 04 50		24		18	pelago.
	M		13 06 18		30			
	F		7 7 7					
15	P		17 55 54				9,890	May be from above
	S		18 06 47					area.
	L		18 17 03					
	M		18 42 37		*400			
	F		19 11 09?					
16	L or S		9 22 34					
	M		9 38 47		*100			
17	L		7 43 40					
	M		7 45 28		*100			
	F		7 47 20					
22								
	Local		16 21 55			Az	1	Lasted 1 second,
								preceded by 2
								rumbling noise.
								Felt at Victoria
								Observatory and
								in rocky parts of
								city, causing arti-
								cles in rattle. Prob-
								ably under Strait
								of De Fuca.
23	P		6 56 31				4,140	Extreme western
	S		7 05 26					part of Aleutian
	L		7 15 45					islands?
	M		7 27 06		*4,000			Vertical out of or-
	F		9 36 24					der.

*Trace amplitude.

TABLE 3.—Late seismological reports (instrumental).

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _N	A _W		
Arizona. Tucson. Magnetic Observatory. U. S. Coast and Geodetic Survey. F. P. Ulrich. Lat., 32° 14' 48" N.; long., 110° 50' 06" W. Elevation, 769.0 meters. Instruments: Two Bosch-Omori, 10 and 12 kg. Instrumental constants: $\begin{matrix} E & V & T_0 \\ N & 10 & 13.6 \\ & 10 & 13.6 \end{matrix}$								
1918.								
July 3	eP		7 15 49	7				Very faint. Noth- ing on N.
	eL		7 39 ..					
	M		7 59 ..	17	10			
	F		9 23 ..					
8	eP		10 43 12	5				
	eL		11 17 50	40				
	eL		11 22 37	25	10			
	M		11 26 17	25				
	C		11 37 ..					
	F		12 08 ..	17				
14	eP		18 21 00	4				Probably local.
	eP		18 21 05	2				
	M		18 22 45	5	10	10		
	F		18 28 ..					
15	P		0 26 42	4				
	S		0 29 37	4				
	S		0 29 41	4				
	L		0 30 47	18				
	L		0 30 53	18				
	M		0 32 30	12		340		
	M		0 33 12	13	360			
	C		0 37 ..	10				
	C		0 40 00	9				
	F		1 18 ..	8				
	F		1 25 ..	8				
21	eP		6 27 15					Phases very doubt- ful. Nothing on N.
	eS		6 35 50					
	eL		6 54 35	25				
	M		7 00 35	19	20			
	C		7 16 ..	16				
	F		7 53 ..	16				
31	eL		14 55 ..					Only a few long waves.
	eL		14 57 ..					
	M		15 00 ..	18		10		
	M		15 10 ..	12	10			
	C		15 15 ..					
	F		15 15 ..					

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.... T₀

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _N	A _W		
1918.								
July 1	P		6 19 12					Period of pendu- lum on July 1, 29.4 seconds, sen- sitivity 0.23"; period of pendu- lum after July 1, 25.5 seconds sen- sitivity 0.46"; Pendulum re- adjusted on July 23 to a period of 18.2 seconds, sen- sitivity 1.11".
	S		6 29 18					
	L		6 41 54	30				
	M		6 44 00			*1500		
	C		8 47 36					
	F		7 39 ..					
3	P		7 02 30					
	S		7 11 12					
	L		7 23 24	30				
	M		7 26 06			*3300		
	C		7 55 ..					
	F		10 47 ..					

*Trace amplitude.

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _N	A _W		
Hawaii. Honolulu. Magnetic Observatory—Continued.								
1918.								
Aug. 6	eP		20 25 00					
	eL		20 37 30	30				
	M		20 40 30			*400		
	C		20 44 00					
	F		20 51 ..					
8	e		5 54 12					Tremors and waves very ir- regular, about 1 imm. amplitude except at M, which is well marked. Prob- ably only part of this disturbance is seismic.
	M		11 18 00			*8500		
	C		11 22 ..					
	F		19 30 ..					
9	eP		2 17 48					
	eL		2 31 00					
	M		2 33 00	28		*100		
	F		3 45 ..					
11	e		22 07 00					
	M		22 09 00	23		*100		
	F		22 16 ..					
15	eP		0 30 00					Recorded on variometer.
	L		0 37 06					
	M		0 40 00			*1000		
	C		0 42 38					
	F		1 54 ..					
21	P		6 18 06					
	S		6 26 18					
	eL		6 33 00					
	M		6 37 00			*3100		
	C		6 44 ..					
	F		8 48 ..					
21	eP		10 01 12					Probably a recur- rence of the pre- ceding quake.
	eL		10 10 30					
	M		10 12 00			*500		
	F		10 49 ..					
23	eP		13 39 24					Pendulum ad- justed just after this.
	eL		13 47 00	29				
	M		13 52 00			*500		
	C		13 56 ..					
	F		14 18 ..					
29	eP		11 32 06					
	eL		11 38 00					
	M		11 45 18			*600		
	C		11 49 ..					
	F		12 30 ..					
29	eP		17 00 42					
	S		17 09 00					
	eL		17 19 00					
	M		17 34 12	20		*1000		
	C		17 42 ..					
	F		19 30 ..					
31	P		14 48 30					
	S		14 56 54					
	L		15 09 12	27				
	M		15 13 48			*400		
	C		15 18 ..					
	F		16 48 ..					
31	P		22 14 00					
	L		22 22 00	19				
	M		22 28 30			*500		
	F		23 28 ..					

*Trace amplitude.

SEISMOLOGICAL DISPATCHES.¹

There were no press reports of seismological or vul-
canological disturbances during August, 1918.

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

SECTION V.—SEISMOLOGY.

SEISMOLOGICAL REPORTS FOR SEPTEMBER, 1918.

W. J. HUMPHREYS, Professor in Charge.

[Dated: Weather Bureau, Washington, D. C., Nov. 1, 1918.]

TABLE 1.—Noninstrumental earthquake reports, September, 1918.

Day.	Approximate time, Greenwich Civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity Rossi-Forel.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
CALIFORNIA.										
1918. Sept. 7	H. m.						M. s.			
	9 55	Calexico.....	32 41	115 30	4	1	15	None.....	Bump and rapid trembling N-S.	H. M. Rouse.
	10 02	.....do.....	32 41	115 30	4	1	20	None.....	.....do.....	Do.
	10 24	.....do.....	32 41	115 30	3	1	03	None.....	Rapid trembling E-W.....	Do.
OKLAHOMA.										
10	15 457	El Reno.....	35 31	97 57	.....	1	03	.....	.....	M. B. Cope.
	15 307	Union City.....	35 23	97 57	.....	1	01	.....	Abrupt bump.	James E. Robbins.
	20 007	Fort Reno.....	35 33	98 02	.....	3	1	Few	Rumbling.....	Corpl. O. A. Gassaway
11	5 407	El Reno.....	35 31	97 57	5-7	1	05	.....	.....	M. B. Cope and J. R. Randolph.
	5 207	Fort Reno.....	35 33	98 02	5	1	Few	Rumbling.....	Abrupt trembling.....	Corpl. O. A. Gassaway.
	5 307	Union City.....	35 23	97 57	5	1	01	Rumbling.....	Abrupt bump; some dishes and fruit jars broke.	James E. Robbins.
	5 457	Yukon.....	35 30	97 44	5	1	03	Faint.....	Rumbling from west like distant freight train, ending with abrupt thud and trembling W-E.	Gordon McComas.
	8 007	El Reno.....	35 31	97 57	Light	1	01	.....	.....	M. B. Cope.
	8 307	Union City.....	35 23	97 57	.....	1	01	.....	.....	James E. Robbins.

TABLE 2.—Instrumental seismological reports, September, 1918.

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

[For significance of symbols see Review for January, 1918, p. 34.]

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _s	A _n		

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. $\begin{matrix} V & T_s \\ E & 10 & 17 \\ N & 10 & 15 \end{matrix}$

1918.			H. m. s.	Sec.	μ	μ	km.	
Sept. 7	eP _s		17 24 33	5				
	eP _n		17 24 40	6				
	S _n		17 31 19	16				
	S _s		17 31 20	14				
	L _s		17 38 17	25				
	M _s		17 48 16	17	3,250			
	M _n		17 48 42	18		1,110		
	C _s		17 50 ..	17				
	Y _s		20 23 ..	11				
	F _s		20 41 ..	11				
12	eP _n		18 06 24					
	eP _s		18 06 30					
	eL _s		18 08 04	15				
	L _s		18 08 06					
	M _s		18 09 45	9	10			
	M _n		18 09 54	10		20		
	C _s		18 19 ..	8				
	F _s		18 19 ..					

Arizona. *Tucson. Magnetic Observatory.* U. S. Coast and Geodetic Survey. F. P. Ulrich.
 Lat. 32° 14' 48" N.; long., 110° 50' 06" W. Elevation, 786.6 meters.
 Instruments: Two Bosch-Omori, 10 and 12 kg.

Instrumental constants. $\begin{matrix} V & T_s \\ E & 10 & 14 \\ N & 10 & 19 \end{matrix}$

1918.			H. m. s.	Sec.	μ	μ	km.		
Sept. 4	P _s		19 55 01	4				Records for this month not very good, some lost motion in the stylus being indicated.	
	P _n		19 56 13						
	eL _s		19 56 49						
	eL _n		19 57 09						
	M _s		19 57 46	6	10	5			
	C _s		19 58 26	6					
	F _s		19 59 ..						
	7	P _n		17 28 10					
		P _s		17 28 12					
		S _n		17 37 12					
S _s			17 37 16						
eL _s			17 51 ..	22					
eL _n			17 52 ..	20					
M _s			18 06 04	17		120			
M _n			18 11 57	17	850				
C _s			18 23 ..	16					
F _s			20 30 ..	15					
11	eP _s		3 48 31						
	eL _s		3 49 20						
	M _s		3 49 55			40			
	M _n		3 50 41		30				
	C _s		3 51 ..						
	F _s		3 53 ..						

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.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _s	A _n		

California. *Point Loma. Raja Yoga College.* F. J. Dick.
 Lat., 32° 43' 03" N.; long., 117° 15' 10" W. Elevation, 91.4 meters.
 Instrument: Two-component, C. D. West seismoscope.

1918.		H. m. s.	Sec.	μ	μ	km.		
Sept. 5				100	100		Tremors during 24 hours preceding 15h. 00m. on dates given.	
				100	200			
					200	200		
					100	200		
					100	200		
					50	100		
					50	50		
21				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.

1918.			H. m. s.	Sec.	μ	μ	km.			
Sept. 7	P _s		17 37 ..					Time of S very doubtful.		
	P _n		17 38 ..							
	S _s		17 48 (?)							
	L _s		17 53 ..	15	*2,000-3,000					
	L _n		17 54 ..	15	*2,000-3,000					
	M _s		18 05 ..	15	*2,000-3,000					
	C _s		18 37 ..							
	F _s		19 28 ..							
	14									Wavelets at intervals during day.
17	L		5 ..					Visible activity on both components.		
	F		8 ..							
28	L _s		4 10 ..					Distinct but very small and irregular.		
	F _s		4 17 ..							

* 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. $\begin{matrix} V & T_s \\ E & 110 & 6.4 \end{matrix}$

1918.			H. m. s.	Sec.	μ	μ	km.	
Sept. 7	eP _s		17 28 48					Long continued L waves of nearly uniform amplitude.
	eS _s		17 39 22					
	eL _s		17 49 ..					
	L		18 03 04					
11	e		4 03 40					F lost in micro-seisms.
	F		4 15 ..					
12	e		18 24 ..					
	L		18 29 10					
	F		18 50 ..					
14	P		17 17 36				9,080	Trace of small amplitude throughout.
	S		17 27 56					
	L		17 51 ..	20				
	F		18 35 ..					
22	e		10 14 20					Do.
	S _s		10 17 30					
	eL _s		11 15 ..					
	F _s		11 30 ..					

TABLE 2.—Instrumental seismological reports, September, 1918—Continued.

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _m	A _w		
District of Columbia. Washington. U. S. Weather Bureau—Contd.								
1918.			<i>H. m. s.</i>	<i>Sec.</i>	μ	μ	<i>km.</i>	
Sept. 29	eP		12 19					e lost in micro-seisms. Amplitudes small; do not show on E-W.
	S		12 19 55					
	eL		12 47					
	F		13 10					
30	P		13 44 45				7,075	
	S		13 53 23					
	L		14 10					
	L		14 15	16				
	F		14 50					
30	eL		18 45					Trace amplitudes small throughout.
	L		19 00	20				
	L		19 36	16				
	F		20 15					

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.

		<i>V</i>	<i>T₀</i>	<i>a</i>
Instrumental constants.	E	165	5.4	0
	N	143	5.2	0
	Z	80	3.0	0

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _m	A _w		
District of Columbia. Washington. Georgetown University. F. A. Tondorf, S. J.								
1918.			<i>H. m. s.</i>	<i>Sec.</i>	μ	μ	<i>km.</i>	
Sept. 4	e _m		20 10 06					Heavy microseisms.
	e _w		20 10 11					
7	eP		17 28 53					Do.
	eS _w		17 39 26					
	iS _m		17 39 29					
	eL		17 49 48	14				
	M _{st}		18 07 57	20	*3,400	*2,800		
	M _{st}		18 13 05	17				
	M _{st}		18 18 37	17	*2,000	*2,000		
	M _{st}		18 19 10	15				
	F		22 30					
11	e _w		4 03 40					Do.
	e _w		4 04 07					
	F		4 50					
14	eP		17 17 40					
	S		17 28 09					
	L _m		17 52	19				
	L _w		17 55 25	19				
	F		19 15					
29	eP		12 18 59					Do.
	S _w		12 29 58					P possibly earlier. Sheet taken off at 12h. 35m.
	S _w		12 30 03					
	F		? ? ?					
30	eP		14 07 43					Needle put down at 14h. 04m.
	L _m		14 11 37	17				Very heavy microseisms.
	L _w		14 11 48	17				
	F		14 50					
30	L _x		18 56 40	21				Very heavy microseisms. Does not show on N-S.
	F		20 12					

* 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.

		<i>T₀</i>
Instrumental constant.		18.6

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _m	A _w		
Hawaii. Honolulu. Magnetic Observatory. U. S. Coast and Geodetic Survey. Frank Neumann.								
1918.			<i>H. m. s.</i>	<i>Sec.</i>	μ	μ	<i>km.</i>	
Sept. 2	P		14 25 00					Beginning very faint.
	S		14 22 30	19				
	L		14 41 00	20				
	M		14 49 00	19	*500			
	C		14 55	18				
	F		15 29	19				
5	eP		7 45 18	20				Phases ill defined.
	L		7 49 12	22				First P tremors very irregular.
	M		7 58 06	18	*200			Faint disturbance as early as 7h. 27 m.
	C		8 06 12	19				
	F		8 17	19				

* Trace amplitude.

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _m	A _w		
Hawaii. Honolulu. Magnetic Observatory—Continued.								
1918.			<i>H. m. s.</i>	<i>Sec.</i>	μ	μ	<i>km.</i>	
Sept. 7	eL		7 51	19				Little more than a series of irregular tremors preceded by microseisms.
	M		8 00 48		*100			
	C		8 02 48					
	F		8 14					
7	P		17 25 00					Pendulum swinging continuously off paper during time of M.
	S		17 32 00					Amplitude possibly 3 or 4 times this amount.
	L		17 36 54	18				
	M		17 41					
	L _o		17 50		*17,000			
	C		19 30	17				
	F		22 30	18				
8	P		0 25 48	18				
	S		0 32 24	20				
	L		0 36 06					
	M		0 41 00	20	*1,100			
	C		0 45	18				
	F		1 30	18				
8	eP		5 49 00	18				
	S		5 55 42	18				
	L		6 04 42					
	M		6 07 30	20	*300			
	C		6 12	19				
	F		7 07	18				
8	eP		12 02 30					
	M		12 07		*100			
	C		12 10					
	F		12 19					
11	eP		4 17 48	19				Phases ill defined.
	S		4 27 48	18				Small disturbance at 6h. 28m. may be a separate quake, amplitude *100.
	L		4 46 00					
	M		4 55 00	18	*300			
	C		5 07	19				
	F		7 16	19				
12	P		13 31 30	17				
	L		13 42 06					
	M		13 44 36	18	*200			
	C		13 50 00	19				
	F		15 01	19				
12	eP		18 15 42					F lost changing sheets.
	L		18 17 24					
	M		18 18 24		*300			
	C		18 21					
	F							
14	eP		17 13 36	18				
	S		17 20 24	18				
	L		17 30 54					
	M		17 34 36	18	*1,600			
	C		17 40	18				
	F		19 43	18				
15	eP		18 18 00					
	L		18 31 30					
	M		18 38 00		*200			
	C		18 42					
	F		19 03					
16	eP		13 26 00					
	L		13 45 42					
	M		13 49 36		*200			
	C		13 55					
	F		14 38					
22	P		10 19 48	20				Tremors of *100 and *200 amplitude occur at 13h. 30m. and 14h. 22m., respectively.
	L		10 54 00	19	*400			Preceded by light tremors; c may be P or S.
	M		11 03 48	18				
	C		11 11	18				
	F		14 48	18				
25	e		10 08 00	20				
	L		10 18 00	18				
	M		10 23 00		*200			
	F		11 48					
28	J		10 57 12	18				Quake preceded and followed by light tremors.
	M		11 01 30		*100			
	C		11 06					
	F		11 18					
30	eP		13 42 12	18				Record very irregular; evidently local.
	S		13 46 36					
	L		13 48 00	18				
	M		13 49 00	18	*1,100			
	C		13 58 48	18				
	F		15 28	17				
30	P		16 24 18					Tremors continuous to following quake.
	L		16 34 42	18				
	M		16 38 00		*100			
	C		16 41					
	F							

* Trace amplitude.

TABLE 2.—Instrumental seismological reports, September, 1918—Continued.

Date.	Charac- tor.	Phase.	Time.	Period T.	Amplitude.		Dis- tance.	Remarks.
					A _m	A _N		
Hawaii. Honolulu. Magnetic Observatory—Continued.								
1918.			<i>H. m. s.</i>	<i>Sec.</i>	μ	μ	<i>km.</i>	
Sept. 30		P	18 08 42	19				Tremors continu- ous to follow quake.
		S	18 14 30	19				
		L	18 19 08					
		M	18 25 30	18	*3,600			
		C	18 32 ..	18				
		F	18	17				
30		P	18 55 30					Possibly Srepl oc- curs at 19h. 03m. .06s.
		L	19 05 18	18				
		M	19 10 00	19	*3,600			
		C	19 21 ..	10				
		F	21 47 ..	19				

* 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. $\left\{ \begin{array}{l} E \\ N \end{array} \right. \begin{array}{l} T \\ 177 \\ 205 \end{array} \begin{array}{l} T_1 \\ 3.4 \\ 3.4 \end{array} \begin{array}{l} e \\ 4:1 \\ 4:1 \end{array}$

Date.	Charac- tor.	Phase.	Time.	Period T.	Amplitude.		Dis- tance.	Remarks.
					A _m	A _N		
1918.			<i>H. m. s.</i>	<i>Sec.</i>	μ	μ	<i>km.</i>	
Sept. 7		eP	12 23 05					Record very com- plex; many small waves through- out the record and their begin- nings and end- ings very illeg- ible.
		S _m ?	12 35 20					
		or	12 37 53					
		S _N	12 37 57					
		eL _m	12 48 57					
		L _m ?	12 48 57					
		or	12 50 57					
		M _m	1 06 37			*12,400		
		M _N	1 06 56					
		F _m	2 39 ..					
		F _N	2 53 ..					

* Trace amplitude.

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. $\left\{ \begin{array}{l} E \\ N \end{array} \right. \begin{array}{l} V \\ 10 \\ 10 \end{array} \begin{array}{l} T_1 \\ 15 \\ 15 \end{array}$

Date.	Charac- tor.	Phase.	Time.	Period T.	Amplitude.		Dis- tance.	Remarks.
					A _m	A _N		
1918.			<i>H. m. s.</i>	<i>Sec.</i>	μ	μ	<i>km.</i>	
Sept. 7		P	17 29 23	3				
		S _N	17 40 00	14				
		S _m	17 40 11	14				
		eL	18 01 30	19				
		M _m	18 24 31	15	1,200			
		M _N	18 29 02	15		1,710		
		C _m	18 36 ..	15				
		C _N	18 53 ..	15				
		F _m	20 35 ..	15				
		F _N	21 40 ..	15				
11		P _N	4 03 58	3				
		P _m	4 04 04	3				
		M _N	4 08 ..	8		5		
		C _N	4 12 ..					
12		eL _m	18 29 48					
		eL _N	18 30 08					
		M _N	18 30 25	13		10		
		M _m	18 30 55	11		10		
		F _m	18 34 ..					
		F _N	18 38 ..					
30		e _m	14 12 25					
		L _m	14 14 57					
		M _m	14 15 57	15		20		
		F _m	14 23 ..					

Date.	Charac- tor.	Phase.	Time.	Period T.	Amplitude.		Dis- tance.	Remarks.
					A _m	A _N		
Massachusetts. Cambridge. Harvard University Seismographic Station, J. B. Woodworth.								
Lat., 42° 22' 36" N.; long., 71° 08' 59" W. Elevation, 5.4 meters. Foundation: Glacial sand over clay.								
Instruments: Two Bosch-Omori 100 kg. horizontal pendulums (mechanical registration).								

Instrumental constants. $\left\{ \begin{array}{l} E \\ N \end{array} \right. \begin{array}{l} V \\ 80 \\ 50 \end{array} \begin{array}{l} T_1 \\ 23 \\ 25 \end{array} \begin{array}{l} e \\ 0 \\ 4:1 \end{array}$

Date.	Charac- tor.	Phase.	Time.	Period T.	Amplitude.		Dis- tance.	Remarks.
					A _m	A _N		
1918.			<i>H. m. s.</i>	<i>Sec.</i>	μ	μ	<i>km.</i>	
Sept. 7		O	17 17 14				8,900	(80° 06' of arc.) Special, subject to possible correc- tions. N record unsatisfactory. ePN masked by microseisms, comes later about 17h. 23m. 42s., and S _m about 17h. 40m. 22s., damped by mag- net. East tylos off sheet from 18h. 12m. 33s. to 18h. 13m. 03s.
		IP _m	17 29 22	7				
		S _m	17 39 27	11				
		M _m	17 40 21	20	8,500			
		eL _m ?	17 53 ..					
		M _m	18 04 ..	28	22,500			
		M _N	18 07 22	18	29,500			
		M _m	18 11 ..	16	35,750			
		M _N	18 12 56	14	65,000			
		M _m	18 15 27	15	49,750			
		M _N	18 21 ..	16	40,000			
		L _{mp}	19 03 31	16	510			
		L _o	19 05 18	15				
		L _{mp} ?	21 19 35	2-15				
		F _m	22 05 ..					
8		OP	0 28 04				6,485?	88° 25' ? N compo- nent stopped.
		e _m ?	0					
		S _m	0 46 06	8				
		eL _m	0 56 32	28				
		M _m ?	1 01 50	20				
		C _m	1 07 14	15				
		F _m	1 20 ..					
8		eL _m	6 26 38	28-24				N component not working.
		L _m	6 31 58	20				
		F _m	6 49 18					
11		O	4 <i>postea</i>				1,000	N undamped. E damped 1.5:1.
		e _m ?	4 04 28				2,000	
		S _m	4 05 59					
		L _m ?	4 06 57	4-6				
		L _m	4 07 01	12				
		F _m	4 14 ..					
14		OP	17 05 ..				10800?	N component not registering.
		S _m	17 39 24	6				
		eL _m	17 51 32	20-30				
		L _m	17 54 42	20				
		L _m	17 58 52	15				
		L _m	18 04 52	15				
		L _m	18 09 46	15				
		F _m	18 25 ..					
30		OP	13 20 44				10156?	e in microseisms.
		e _m ?	13 1 1					
		S _m	13 44 58	8				
		S _N	13 44 59	8				
		eL _m	14 05 18	40				
		L _m	14 06 20	20				
		L _m	14 06 59	20				
		L _m	14 14 59	20				
		C _m	14 18 23	15				
		F _m ?	14 41 ..	15				
30		O	18 <i>postea</i>					Very distant. N undamped.
		L _m	18 56 19	24				
		L _m	19 02 54	20				
		to	19 07 53					
		L _m	19 08 25	15				
		to	19 10 20					
		L _m	19 30 40					
		M _m ?	19 36 30	18				
		M _N	19 38 00	15				
		M _m	19 47 ..	20				
		L _m	19 49 05	20				
		to	19 54 13					
		L _m	20 03 ..	15				
		F _m	20 50 ..					
30		O	1 <i>postea</i>					Not identified on N.
		e _m ?	1 39 15	6				
		e _m	1 41 39	6				
		L _m	1 44 41	20				
		F _m	2 03 ..					

TABLE 2.—Instrumental seismological reports, September, 1918—Continued.

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _B	A _N		
Missouri. <i>Saint Louis. St. Louis University.</i> Geophysical Observa-tory. 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: Wiechart 80 kg. astatic, horizontal pendulum. $\frac{V}{N} \frac{T_0}{10} \frac{\epsilon}{1}$ Instrumental constants. .80 7 5:1								
1918.								
Sept. 7	eP		H. m. s.	Sec.	μ	μ	km.	Reported from South Africa.
			17 28 18				8,900	
			17 38 24					
	L		17 53 48	30				
	M		17 59 30	24		*19,000		
	M		18 07 18	18	*18,000			
	M		18 10 18	18		*12,000		
	M		18 25 30	18		*8,000		
	M		18 32 00	18		*7,000		
	F		20 25					
12	eL		18 25 30	1			*2,000	
	L		18 25 00					
	L		19 42 06	0.5			*1,000	
30	S		13 47 00				3,860	
	P		13 52 42					
	L		13 56 30					
	M		14 06 12	24			*1,000	

* 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: Wiechart 80 kg. horizontal.

$$\frac{V}{N} \frac{T_0}{10} \frac{\epsilon}{1}$$

Instrumental constants. .80 7 5:1

(Report for September, 1918, not received.)

New York. *Fordham University.* Daniel H. Sullivan, S. J.
 Lat., 40° 51' 47" N.; long., 73° 53' 08" W. Elevation, 29.3 meters.
 Instrument: Wiechart, 80 kg.

$$\frac{V}{N} \frac{T_0}{10} \frac{\epsilon}{1}$$

Instrumental constants. .E 72 5.0 0
 N 72 5.0 0

(Report for September, 1918, 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 pendulum (mechanical registration).

$$\frac{V}{N} \frac{T_0}{10} \frac{\epsilon}{1}$$

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

(Report for September, 1918, not received.)

Panama Canal. *Balboa Heights.* Governor, Panama Canal.
 Lat., 8° 57' 39" N.; long., 79° 33' 29" W. Elevation, 27.6 meters.
 Instruments: Two Bosch-Omori, 100 kg.

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.	
					A _B	A _N			
Instrumental constants. $\frac{V}{N} \frac{T_0}{10} \frac{\epsilon}{1}$.35 20									
1918.									
Sept. 7	P _a		H. m. s.	Sec.	μ	μ	km.	Trace indistinct.	
			8 29 07				400		
	P _b		8 29 15						
	L _a		8 30 11	20					
	L _b		8 30 15	20					
	M _a		8 30 25			*400			
	M _b		8 30 27			*200			
	F		8 34 00						
	8	P		0 03 28	20				
		F		0 05 34					
8	P _a		17 35 04				3,950		
	P _b		17 35 16						
	L _a		18 03 04	20					
	L _b		18 03 16	20					
	M _a		18 13 24			*1,500			
	M _b		18 14 52			*1,000			
	F _a		20 07 00						
	F _b		20 20 00						

* Trace amplitude.

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _B	A _N		
Panama Canal. <i>Balboa Heights.</i> Governor, Panama Canal—Contd.								
1918.								
Sept. 17	P _a		H. m. s.	Sec.	μ	μ	km.	330
			22 46 08					
	P _b		22 46 12					
	L _a		22 46 22	20				
	L _b		22 47 06	20				
	M _a		22 47 14			*2,000		
	M _b		22 47 16			*2,000		
	F _a		22 55 00					
F _b		22 56 00						

* 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.

$$\frac{V}{N} \frac{T_0}{10} \frac{\epsilon}{1}$$

Instrumental constants. .E 10 17
 N 10 20

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _B	A _N		
Instruments: Two Bosch-Omori.								
1918.								
Sept. 7	eP _a		H. m. s.	Sec.	μ	μ	km.	Phases tabulated as eP may be P _{app} .
			17 35 29	9				
	eP _b		17 35 50	9				
	S _a		17 43 14	16				
	S _b		17 50 48	16				
	S _c		17 51 00	16				
	L _a		18 07 28	40				
	eL _a		18 13					
	M _a		18 25 16	21		400		
	M _b		18 32 14	17	480			
	C _a		18 37	17				
	C _b		18 39	16				
	F _a		20 19	17				
	F _b		20 28	17				

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.

$$\frac{V}{N} \frac{T_0}{10} \frac{\epsilon}{1}$$

Instrumental constants. .E 10 15
 N 10 16

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.	
					A _B	A _N			
Instruments: Two Bosch-Omori, mechanical registration.									
1918.									
Sept. 7	P _a		H. m. s.	Sec.	μ	μ	km.	N component not registering.	
			17 28 35						
	eS _a		17 38 02						
	eL _a		17 50						
	L _a		18 00	20					
	L _b		18 08	16					
	M _a		18 15			*25,000			
	F _a		20 15						
	30	eL		14 13					
		F		14 25					

* Trace amplitude.

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.

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _B	A _N		
Instrumental constants. $\frac{V}{N} \frac{T_0}{10} \frac{\epsilon}{1}$.120 26								
1918.								
Sept. 2	eL _a		H. m. s.	Sec.	μ	μ	km.	
			15 08	19				
4	L		15 20 to					
			15 53	18				
4	S _a		20 11 28					
	F		20 18 30					
7	O		17 17 57				7,360	Difficult record, is evidently is not S, but can not be identified with any other phase. The same impulse appears on the records of Saskatoon and Halifax, particularly on E-W components.
	F		17 28 24					
	eS		17 27 11					
	is		17 38 50					
	L _a		17 50	40				
	M		18 10	16	550	500		
	L		18 25	16				
	L		19 00	16				
	L		19 25	15				
	L		19 45	14				
	L		19 50	14				
	L		20 10	17				
	L		20 35	17				
	L		21 20	17				
8	F		1 20					

TABLE 2.—Instrumental seismological reports, September, 1918—Continued.

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					A _m	A _N		
Canada. Ottawa. Dominion Astronomical Observatory—Continued.								
VERTICAL.								
1918.								
Sept. 7								
			H. m. s.	Sec.	p.	Az.	dm.	
			17 28 45					
			17 55 30					
			18 00 ..	32				
			18 06 ..	16				
			18 10 ..	17				
			18 15 ..	17				
			18 20 ..	17				
			18 25 ..	17				
			18 30 ..	16				
			18 35 ..	15				
			19 10 ..					
7			17 17 51				5,500	Saskatoon record furnished by Ottawa.
			P _N	17 26 31				
			S _m	17 33 40				
			i _a	17 35 13				
			i _v	17 42 30				
7			17 17 51				8,000	Halifax record furnished by Ottawa.
			P.....	17 29 12				
			S _m	17 35 32				
			i _a	17 39 48				
			i _v	17 52 ..				
8			e _N	6 08 ..				
			e _S	6 11 30				
			e _L	6 25 10				
			F.....	6 35 10	13			
			F.....	7 ..				
11			e.....	4 05 to				
			F.....	4 17 ..	8			
			F.....	4 40 ..				
11			e _L	5 04 ..				
			i _L	5 17 ..	22			
			L.....	5 30 ..				
			F.....	5 40 ..				
12			e _N	18 25 ..				
			e _L	18 27 to	16			
			F.....	18 55 ..	8			
			F.....	19 ..				
14			O.....	17 05 01			8,880	
			L _N	17 17 08				
			S.....	17 27 12				
			e _L	17 41 30	23			
			L.....	17 44 ..	17			
			L.....	17 55 ..	18			
			L.....	18 03 ..	15			
			L.....	18 30 ..	15			
			L.....	18 43 ..	15			
			F.....	19 ..				
16			e _L	14 13 ..	26			
			L.....	14 19 ..	18			
			L.....	14 25 ..	16			
			F.....	14 35 ..				
22			e.....	10 13 30				
			i.....	10 17 53				
			e _L	10 29 18				
			e _L	11 07 ..				
			L.....	11 07 ..	27			
			L.....	11 15 ..	27			
			L.....	11 20 ..	27			
			F.....	11 35 ..				
29			O.....	13 07 19			8,720	
			P.....	12 19 17				
			S.....	12 29 13				
			e _L	12 43 ..	44			
			L.....	12 55 ..	19			
			L.....	13 00 ..	17			
			F.....	13 30 ..				
30			O.....	13 24 38			6,820	
			P.....	13 44 50				
			S.....	13 53 10				
			L.....	14 03 30				
			L.....	14 12 ..	18			
			L.....	14 25 ..	15			
			L.....	14 52 ..	12			
			F.....	15 10 ..				

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					A _m	A _N		
Canada. Ottawa. Dominion Astronomical Observatory—Continued.								
1918.								
Sept. 30								
			H. m. s.	Sec.	p.	Az.	dm.	
			18 42 ..	32				
			18 45 ..	32				
			18 53 ..	25				
			19 00 ..	17				
			19 15 ..	15				
			19 20 ..	15				
			19 35 ..	18				
			19 53 ..	17				
			20 15 ..	14				
			20 40 ..					
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".								
1918.								
Sept. 2								
			H. m. s.	Sec.	μ	μ	km.	
			15 19 42					
			15 26 06		*100			
			15 51 00					
5								Microseisms going on from 12h. to 13h. when other stations recorded a small quake.
7							7,140?	Real beginning of P m a y b o masked by microseisms. The phase at 17h. 38m. 48s. may suggest a dual quake.
			e _L	17 27 12				
			e _P	17 28 24				
			i.....	17 29 19				
			S.....	17 32 36				
			L.....	17 37 00				
			L.....	17 38 48				
			L.....	17 40 48				
			L.....	17 49 48				
			L.....	17 53 00				
			L.....	18 02 12				
			L.....	18 06 18				
			L.....	18 11 36				
			M ₁	18 13 36				
			to	18 15 00	*25,000			
			i _L	18 16 24				
			M ₂	18 17 30				
			L.....	18 18 36				
			L.....	19 54 06				
			L.....	20 00 54				
			L _{total}	22 38 18				
			F.....	22 56 36				
8								Distant. Gradual thickening.
			e _L	0 49 48				
			i _L	1 01 54				
			M.....	1 04 30	*300			
			L.....	1 16 36				
			F.....	1 45 30				
8								Gradual thickening.
			e _L	6 13 42				
			e _L	6 25 30				
			e _L	6 27 54				
			M.....	6 28 06	*300			
			e _L	6 32 06				
			F.....	6 59 18				
8								Microseisms began at 14h. 42m. and were very heavy during night until morning of 9th.
11								Microseisms during morning hours.
			e _L	18 26 18				
			e _L	18 28 18				
			M.....	18 28 42	*200			
			e _L	19 06 06				
			F.....	19 11 18?				
14								Microseisms going on before e.
			e.....	17 21 24				
			e _S	17 26 06				
			L.....	17 42 06				
			e _L	17 45 00				
			L.....	17 54 54				
			M.....	17 55 54	*300			
			F.....	19 16 30				
16								
			L.....	14 11 12				
			L.....	14 13 18				
			e _L	14 16 42				
			L.....	14 18 30	*300			
			F.....	14 41 54				

TABLE 2.—Instrumental seismological reports, September, 1918—Continued.

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _W	A _N		
Canada. Toronto. Dominion Meteorological Service—Continued.								
1918.			<i>H. m. s.</i>	<i>Sec.</i>	<i>μ</i>	<i>μ</i>	<i>km.</i>	
Sept. 22	L		10 34 42					Microseisms going on.
	L		10 52 48					
	eL		11 18 36					
	M		11 19 42		*200			
	F		11 48 54†					
29	S?		12 30 12					Distant.
	e		12 35 00					
	L		12 44 06					
	eL		12 54 18					
	eL		12 56 54					
	M		12 57 30		*300			
	F		13 30 24†					
30	P?		13 45 00†					Time of P and F very doubtful.
	eS		13 53 42					Microseisms going on.
	eL		14 02 00					
	M		14 10 30		*600			
	L		14 30 48					
	F		? ? ?					
30	e		18 44 00					May be a dual quake.
	L		18 52 48					
	eL		18 56 36					
	M		19 02 24		*2,000			
	eL		19 42 36					
	eL		19 49 00					
	M		19 53 00		*800			
	IL		19 57 00					
	F?		21 13 30					

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

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _W	A _N		
Canada. Victoria, B. C. Dominion Meteorological Service.								
1918.			<i>H. m. s.</i>	<i>Sec.</i>	<i>μ</i>	<i>μ</i>	<i>km.</i>	
Sept. 2	P?		14 57 22					
	M		15 07 42		*200			
	F?		15 21 28					
5	M		12 30 56		*100			
7	P		17 23 38					
	S		17 25 02					
	L		17 27 44					
	L		17 33 28					
	M		17 53 08		*30,000			
	M		17 57 02					
	F		22 29 32					
VERTICAL.								
	P		17 23 50	5			1,450	Lines crossed at time of quake.
	S		17 26 00	8				
	L		? ? ?					
	M		17 48 00	24				
	F		? ? ?					
8	P or L?		0 11 56					Probably after-shock from above.
	M		0 50 07		*200			
	F		1 20 50					
8	P		6 03 00					Do.
	L		6 14 30					
	M		6 21 30		*200			
	F		7 01 00					
8	L?		22 27 37					Do.
	eL		22 42 30					Microseisms from 2h. 20m. 8th to 9h. 40m. 9th.
	M		22 56 08		*200			
	F		0 33 31					
9	L		0 01 05		*200			
	F		0 04 05					
9								Local tremor felt in parts of city at 12h. 30m. duration 1 sec. and accompanied by a rumbling noise. Not recorded.
12	M		13 51 31		*100			Probably after-shock.

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _W	A _N		
Canada. Victoria, B. C. Dominion Meteorological Service—Contd.								
1918.			<i>H. m. s.</i>	<i>Sec.</i>	<i>μ</i>	<i>Az.</i>	<i>km.</i>	
Sept. 12	P		18 06 15				1,410	Alaska?
	L		18 10 45					
	M		18 12 11		*200			
	F		18 22 01					
14	P		17 21 17				2,770	
	S		17 25 43					
	L		17 37 01					
	M		17 44 53		*500			
	F		18 38 00					
15	M?		6 13 29		*50			
16	P		14 01 49†					
	M		14 12 38		*200			
	F		14 23 57					
22	P		10 58 51				1,720	
	S		11 01 49					
	L		11 07 43					
	M		11 12 06		*200			
	F		11 29 50					
26	P		10 56 30					
	M		10 59 27		*100			
	F		11 03 24					
29	eL		12 50 21					
	eL		12 52 08					
	L		12 57 03					
	M		13 06 54		*500			
	F		13 30 30					
30	P		18 21 33				1,710	
	S		18 34 30					
	L		18 39 25					
	M		18 55 39		*600			
	F		14 54 10					
30	P		18 04 32				2,760	
	S		18 06 57					
	L		18 15 31					
	M		18 47 18		*1,000			
	F		? ? ?					
30	L		19 15 50					P and S probably masked by end of previous quake.
	M		19 40 55		*1,500			
	F		20 42 23					

* Trace amplitude.

TABLE 3.—Late seismological reports (instrumental).

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _W	A _N		
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-Omor, 10 and 12 kg.								
Instrumental constants $\frac{V}{N}$ $\frac{T_0}{19}$								
1918.			<i>H. m. s.</i>	<i>Sec.</i>	<i>μ</i>	<i>μ</i>	<i>km.</i>	
Aug. 6	eL		10 33 20	24	10			
	M		10 41 37	19				
	F		10 55 ..	16				
15	eP		12 38 30	6				Paper on E was changed between 14h. 06m. and 14h. 26m. End occurred during this time.
	eF		12 39 40	5				
	S		12 48 23	16				
	S		12 48 28					
	eL		13 14 37	25				
	eL		13 16 24	24				
	M		13 26 30	18	150			
	M		13 47 24	16		20		
	C		13 53 ..	16				
	C		13 56 ..	16				
	F		14 09 ..	16				
23	eL		7 18 46	24				
	M		7 40 49	16	10			
	F		8 05 ..	15				

TABLE 2.—Instrumental seismological reports, September, 1918—Con.

Date.	Charac-ter.	Place.	Time.	Period, T.	Amplitude.		Dis-tance.	Remarks.
					A _h	A _v		
Massachusetts. Cambridge. Harvard University Seismographic Station, J. B. Woodsworth. Lat., 42° 27' 37" N.; long., 71° 06' 39" W. Elevation, 3.4 meters. Foundation: Glacial sand over clay. Instruments: Two South-Ostrom 100 kg. horizontal pendulums (mechanical registration). Instrumental constants: $\begin{matrix} V & S & P \\ N & 50 & 25 & 2 \\ & 50 & 25 & 4 \end{matrix}$								
1918.								
Aug. 4								8 sec. periods for about 15 minutes. (Check contacts failed; time approximate only.)
5	Ls		2 35	20				
8	oL		10 35 17					
	oL		10 38 23	40				
	oL		10 43 24	30				
	oL		10 49 21	30				
	oL		10 49 55	30				
	oL		10 51 00	30				
	oL		10 56 47	30				Amplitude N increases.
	oL		10 59 11	18				
	F		11 37					
14	Ls		18 15 51					
	F		19 18					
16	oL		30 34 27					Possibly artificial. Same record on N also.
	oL		30 54 33	8-13				
	F		31 15					
15	O		12 28 21				0.425	Break in record from 13 h. 01 m. to 13 h. 55 m. changing sheets, and on 8 from 14 h. 56 m. to 15 h. 44 m. stylus tipped over.
	oL		12 33 34	2				
	oL		12 37 36	3				
	oL		12 42 43	30				
	oL		12 43 43	30				
	oL		12 52 23	30				
	oL		12 58	30				
	oL		13 28	30				
	oL		13 33 30	30				
	oL		13 38 30	30				
	oL		13 48 36	18				
	oL		13 54	30				
	oL		14 06 30					
	oL		15 34	30				
	oL		15 44	30				
	F		17 15					
15	O		27 42 21				0.587	
	oL		28 13 50	3				
	oL		28 33 18	30				
	oL		28 39 57	30				
	oL		28 39 30	30				
	oL		28 39 33	30				
	oL		28 49	30				
	oL		28 57	30				
	F		29 22					
21	O		4 17 54				325	Local shock near South Park, Mo. (41° 57' 45" N., 10° 37' 35" W.).
	oL		4 12 28					
	oL		4 12 53					
	oL		4 13 04	8				
	oL		4 13 43					
	F		4 24 08					
23	O		8 25 47				30,980	Volcanoes "Llaima" (Llaima) and Llanin in Andes reported to eruption. Llanin 71° 30' W., 39° 45' S., about 4,000 kms.
	oL		8 27					
	oL		8 30 13					
	oL		8 34 14	30				
	oL		8 34 29	30				
	oL		8 35 21	40				
	oL		8 42 36	30				
	oL		8 48 24	15				
	F		8 50					

SEISMOLOGICAL DISPATCHES.¹

Buenos Aires, August 25, 1918 (belated dispatch).

Government telegraph stations report that the eruption of Mounts Llaima and Llanin, in the territory of Neuquen, are not serious. The inhabitants of two towns near the mountains were reported to have left their homes. (Assoc. Pr.)

Honolulu, T. H., August 20, 1918 (belated dispatch).

The great active volcano of Kilauea, on the island of Hawaii, which caused a sensation in the scientific world last February by suddenly discharging a lava flow from its inner pit, is now showing preliminary signs of another eruption. (Assoc. Pr.)

No press reports of seismological or volcanological disturbances were received during September, 1918.

RECORD OF SEA WAVES PRODUCED BY THE EARTHQUAKE OF SEPTEMBER 7, 1918.

(Commented by the United States Coast and Geodetic Survey.)

The tide gages of the United States Coast and Geodetic Survey at San Francisco, Cal., and Honolulu, Hawaii, recorded a marked tidal disturbance on the two days following the earthquake of September 7, 1918. The disturbance began with a rise of tide in each case.

At Honolulu the beginning occurred at 1^h 25^m p. m., Hawaiian standard time, or 23^h 55^m G. M. T. The maximum amplitude of about 0.9 foot came not quite an hour later. The waves were quite regular, as a rule, with an average period of about 25 minutes, and were still in evidence, though of small amplitude, two days after the beginning.

At San Francisco the beginning occurred about 6^h 40^m p. m., 120th meridian standard time, or 2^h 40^m G. M. T., September 8. The maximum amplitude of about 3 inches came not quite an hour later. The waves were very irregular, so that only an approximate determination of the period was possible, somewhere between 15 and 20 seconds.

Records of this earthquake from the seismographs at the magnetic observatories of this bureau indicate that the earthquake occurred at about 17^h 17^m G. M. T., so that it took the sea waves 6^h 38^m to reach Honolulu and 9^h 23^m to reach San Francisco.

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, 1918.

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[Dated: Seismological Investigations, Weather Bureau, Dec. 3, 1913.]

TABLE I.—Noninstrumental earthquake reports, October, 1918.

Day.	Approximate time, Greenwich Civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity Rossi-Forest.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
ARKANSAS.										
1918. Oct. 4	H. M. 9 21	Bauxite.....	34 33	92 24		3	M. s.	Low.	Like an explosion, followed by three bumps and rapid rocking.	Arkansas Gazette.
		Black Rock.....	36 08	91 02		1	20			S. J. Howe.
		Brinkley.....	31 53	91 07	5	1	Few	None.	Abrupt trembling SE-NW.	H. L. D. Whitson.
		Carlisle.....	34 47	91 39	5	1	10	Rumbling.	Gradual rocking and trembling.	J. F. Gillespie.
		England.....	34 32	91 52						Arkansas Gazette.
		Little Rock.....	34 45	92 06		3	06	Rumbling.	Abrupt rocking N-S.	R. E. Stevenson et. al.
		Lonoke.....	34 47	91 49						Arkansas Gazette.
		Pine Bluff.....	34 13	91 54		1				W. P. McGeorge.
		Scott.....	34 43	92 01						Arkansas Gazette.
		Searcy.....	35 15	91 39	5		Few	Rumbling.	A series of quivers; windows rattled, furniture moved.	Sarah Cypert.
13	10 00?	Black Rock.....	36 08	91 02	2	3	30	None.	Three abrupt shocks.	S. J. Howe.
	9 30?	Hoxie.....	26 03	90 55	5	1	30	Rumbling.	Abrupt rocking N-S.	J. E. Pringle.
	? ?	Jonesboro.....	35 31	90 39				None.	Rocking.	Benedictine Sisters.
	9 35?	Pocahontas.....	30 15	90 56	5	1	30	Rumbling.	Gradual trembling N-S.	Do.
16	2 11?	Hardy.....	36 19	91 21	3	1	30	Rumbling.	Gradual rocking N-S.	C. A. Caywood.
CALIFORNIA.										
11	4 00?	Calexico.....	32 41	115 30	2	1	01	None.	Abrupt lurch N-S.	H. M. Rouse.
	3 45?	Hemet.....	33 44	116 58	3	1	02	Faint.	Trembling NE-SW.	C. E. McManigal.
	4 01?	Indio.....	33 43	116 13	3	1	15	Faint.	Rumbling; gradual rocking.	Fred N. Johnson.
	4 00?	Mecca.....	33 34	116 05	3	1	15	Faint.	Gradual trembling.	Edgar A. Palmer.
	4 15?	Mesa Grande.....	33 10	116 46	3	1	1	Faint.	Very slight jar N-S.	Edward H. Davis.
12	12 30	Lakeport.....	39 03	122 56	3	1	02	None.	Gradual trembling N-S.	Mrs. Elizabeth Lawlor.
14	12 05	Calexico.....	32 41	115 30	5	1	06	Low.	Severe lurch N-S accompanied by a heavy muffled explosion, and followed by loud rumbling and trembling.	H. M. Rouse.
ILLINOIS.										
16	2 30?	Anna.....	37 28	89 14			15	None.	Trembling W-E.	Dr. James I. Hale.
	2 15?	Cairo.....	37 00	89 10	2	1	01	None.	Gradual trembling NE-SW.	R. T. Lindley.
MICHIGAN.										
1	6 38	Calumet.....	47 14	88 28	3	1	01	None.	Trembling.	E. S. Gullson.
TENNESSEE.										
4	9 21	Memphis.....	35 09	90 03	2	1	05		Bump.	S. C. Emery.
16	2 15?	Clarksville.....	36 31	87 22	3	1	17 00	Rumbling.	Gradual trembling.	R. I. Miller.
	2 15?	Memphis.....	35 09	90 03	3	2	02	Rumbling.	Rocking N-S.	S. C. Emery.
	2 30?	Savannah.....	35 12	88 15	5	2			Gradual rocking E-W.	F. H. Kendall.
	2 ?	Union City.....	36 28	89 04	3	1	02	None.	Rocking N-S.	J. R. Oliver.
PORTO RICO.										
11-29	14 15	Aguadilla.....	18 26	67 09	10	55+	*20 ..	None.	Began with trembling, followed by rocking and bumping NE-SW; buildings thrown down. A tidal wave swept inland over an area 2 miles long and a half mile wide, leaving its marks 40 feet high on the cliffs. Thirty houses and 9 lives were lost in this tidal wave. First shock lasted 2½ minutes, all others from 1 to 3 or 6 seconds and with intensities 2-7.	William M. Orr.
		Isabela.....	18 30	67 03	10	55+	*20 ..	None.	Began with trembling followed by rocking and bumping NE-SW; buildings thrown down, but no one hurt. Tidal wave swept away several houses. There were almost continuous tremors after the first shocks, intensifying at intervals for several days, and many slight shocks and tremors each day continuing till Oct. 29. Slight shocks were still continuing at intervals into November.	Do.
		San Juan.....	18 29	66 07	8	6	12 ..	None.	First shock was vertical or bumping for 2 minutes; remainder were rocking or swaying N-S. Second shock lasted a half minute; last four only a few seconds each.	F. E. Hartwell.
26	3 40	San Juan.....	18 29	66 07	7	1	20	None.	Vertical bump and trembling E-W.	Do.

* Days.

TABLE 2.—*Instrumental reports, October, 1918.*
(Time used: Mean Greenwich, midnight to midnight. Nomenclature: International.)
[For significance of symbols see REVIEW for January, 1918, p. 34.]

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _E	A _N		

Alabama. *Mobile. Spring Hill College.* Cyril Ruhlmann, S. J.
Lat., 30° 41' 44" N.; long., 88° 08' 46" W. Elevation, 60 meters.

Instrument: Wiechert 80 kg. horizontal.

Instrumental constants. $\frac{V}{T_0} = \frac{1}{2}$

1918.		H. m. s.	Sec.	μ	μ	km.	
Oct. 11	IP	16 20 43	4			2,750	E-W component always un- damped.
	S	16 25 07	12				
	L _N	16 23 07	8				
	L _E	16 27 23	8				
	M _N	16 31 02	15	*36,000			
	M _E	16 31 19	15	*44,000			
11	eP	18 09 47					
	S?	19 14 00					
	M _N	19 22 21	13	*1,500			
	F	19 27					
19	P _N	5 28 55					
	IP _N	5 29 00					
	S _N	5 31 59					
	M _N	5 32 12					
	F _N	5 33 05	6	*4,000			
25	eP	6 48 05				2,490	
	S	6 52 09					
	L _N	6 54 01					
	M _N	6 56 13	10	*3,000			
	F _N	6 56 13	8	*2,500			

*Trace amplitude.

Alaska. *Sitka. Magnetic Observatory.* U. S. Coast and Geodetic Survey. F. P. Ulrich.

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

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

Instrumental constants. $\frac{V}{T_0} = \frac{10}{17}$ (E), $\frac{V}{T_0} = \frac{10}{15}$ (N)

1918.		H. m. s.	Sec.	μ	μ	km.
Oct. 11	P _N	14 25 14				
	eS _N	14 33 40				
	eL _N	14 47 31	17			
	eL _E	14 49	20			
	M _N	14 50 21	15		610	
	M _E	14 55 07	13	420		
	C _N	14 54	13			
	C _E	14 58	13			
	F _N	15 43	12			

Arizona. *Tucson. Magnetic Observatory.* U. S. Coast and Geodetic Survey. William H. Cullum.

Lat., 32° 14' 48" N., long., 110° 50' 06" W. Elevation, 769.6 meters.

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

Instrumental constants. $\frac{V}{T_0} = \frac{10}{14}$ (E), $\frac{V}{T_0} = \frac{10}{18}$ (N)

1918.		H. m. s.	Sec.	μ	μ	km.
Oct. 11	P _N	14 22 22				
	P _E	14 22 26				
	S	14 28 47				
	eL _N	14 28 52				
	eL _E	14 34 15				
	M _N	14 42 30	12		480	
	M _E	14 48 12	12	440		
	C _N	14 47	12			
	C _E	14 51	12			
	F _N	15 30	13			
	F _E	16 03	12			

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _E	A _N		

Arizona. *Tucson. Magnetic Observatory—Continued.*

1918.		H. m. s.	Sec.	μ	μ	km.	
Oct. 14	e _N	12 37 13					Nothing definite on N.
	M _N	12 41	20		10		
	F _N	12 47					
19	e _N	2 07 13					
	eL _N	2 07 54					
	e _E	2 08 44					
	M _N	2 09	9		10		
	eL _E	2 10 00					
	M _E	2 13	9		10		
	F _N	2 17	8				
19	eP _N	3 28 40	4				Phases not well defined.
	eP _E	3 28 47	4				
	S _N	3 33 09	4				
	L _N	3 33 21					
	L _E	3 38 51					
	M _N	3 38 59					
	F _N	3 40 19	19		140		
25	eP _N	3 52 34					No well defined phases.
	eP _E	3 52 49					
	eL _N	4 06	24				
	eL _E	4 07					
27	M _N	4 13 30	15		5		Nothing on N.
	M _E	4 18 10	14		10		
	F _N	4 20					
	F _E	4 21					
	eL _N	16 10 30	25				
27	M _N	16 14 30	21				Nothing on N.
	F _N	16 31	18				
	eL _N	18 00 50	20				
27	M _N	18 14 45	17		10		Nothing on N.
	F _N	18 26	17				

California. *Berkley. 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 College.* F. J. Dick.

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

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

1918.		H. m. s.	Sec.	μ	μ	km.	
Oct. 18				50	100		Tremors during 24 hours preceding 15h.

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, 1918—Continued.

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _N	A _H		
Colorado. <i>Denver. Sacred Heart College. Earthquake Station. A. W. Forstall, S. J.</i>								
Lat., 39° 40' 36" N.; long., 104° 56' 54" W. Elevation, 1,655 meters.								
Instrument: Wiechert 80-kg., astatic, horizontal pendulum.								
Instrumental constants.....								
1918.								
Oct. 2	P.		14 22					S not discernible. Record affected by heavy machinery in motion.
	S.		14 7 ?					
	L.		14 33	15-20	*4,000			
	L _w		14 34	20		*4,000		
	M.		14 37	15		*8,000		
	M _a		14 41	15	*7,500			
	C.		15 07					
	F _w		15 29					
	F _a		15 31					
12-13								Activity on both components at intervals during day.
16								Wavelets at intervals during day.
25	L _w		17 12					Visible waves and thickening of pen marks.
	F _w		17 17					
28	L.		1 10					Visible activity on both components.
	F.		2 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.

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _N	A _H		
District of Columbia. <i>Washington. Georgetown University. F. A. Tondorf, S. J.</i>								
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. $\frac{V}{Z} \frac{T_0}{\sigma}$ $\begin{matrix} E & 145 & 5.4 & 0 \\ N & 143 & 4.2 & 0 \\ Z & 80 & 3.0 & 0 \end{matrix}$								
1918.								
Oct. 4	P.		9 27 04					Disturbance small and irregular. Apparently a near-by quake.
	F.		9 29					
11	P.		14 19 27					F lost in next quake.
	S.		14 23 29					
	M.		14 24 20		*40,000			
	L.		14 24 50					
	M.		14 30 30		*35,000	*50,000		
	F.		17 7 ?					
11	P.		17 08 41					F lost in microseisms.
	S.		17 12 42					
	L.		17 14 06	16				
	F.		18 7 ?					
11	P.		20 11 18					Do.
	F.		20 20 ?					
12	P.		0 04 38					Do.
	ST.		0 08 40					
	F.		0 15					
12	P.		0 20 50					Do.
	S.		0 24 52					
	L.		0 30 30	12				
	F.		0 7 ?					
12	P?		0 37 58					Do.
	ST.		0 41 54					
	F.		0 7 ?					
12	P.		8 24 40					2,440
	S.		8 28 40					
	L.		8 34 15	14				
	F.		9					
13	P.		4 56 32					2,400
	S.		5 00 34					
	L.		5 06	12				
	F.		5 30					
14	P.		0 29 31					2,480
	S.		0 33 55					
	L.		0 38 50	12				
	F.		1 15					

* Trace amplitude.

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _N	A _H		
District of Columbia. <i>Washington. U. S. Weather Bureau—Contd.</i>								
1918.								
Oct. 14	P.		2 20 30					2,500
	S.		2 24 35					
	L.		2 30 15	12				
	F.		2 40					
18	P.		21 38 32					2,440
	S.		21 42 32					
	L.		21 46	20				
	F.		22					
19	L.		2 18 to					
	F.		2 28					
19	P.		3 28 45					3,070
	S.		3 33 33					
	L.		3 39 30	16				
	F.		4 30					
25	P.		3 47 56					2,410
	S.		3 51 54					
	L.		3 58 15					
	L.		3 57	16				
	F.		5					
27	eL.		16 31	24				
	F.		16 50					
27	e.		17 29?					Time uncertain. Clock failed to register hour marks.
	ST.		17 32??					
	eL.		18 10?					
	L.		18 23?	20				
	L.		18 33?	16				
	F.		19					
29	P.		12 31 22					2,020
	S.		12 34 47					
	L.		12 42	20				
	F.		13 15					

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.

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _N	A _H		
District of Columbia. <i>Washington. Georgetown University. F. A. Tondorf, S. J.</i>								
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. $\frac{V}{Z} \frac{T_0}{\sigma}$ $\begin{matrix} E & 145 & 5.4 & 0 \\ N & 143 & 4.2 & 0 \\ Z & 80 & 3.0 & 0 \end{matrix}$								
1918.								
Oct. 4	e.		9 27 03					Heavy microseisms.
	eL?		9 29 24					
	F.		9 50					
11	JP.		14 19 19					Gram from Mainka. F lost in a second quake. Vertical lost in changing sheets.
	SM.		14 23 28					
	SW.		14 23 54					
	eL.		14 24 33					
	M.		14 30 19	14		*10,500		
	M _w		14 30 27	9		*28,000		
	M _a		14 35 50	12		*18,000		
	M _w		14 48 49	12		*6,500		
	M _a		14 51 25	12		*7,000		
	M _w		15 00 03			*15,000		
11	F _w		17 08 39					No distinct M.
	F _a		17 08 41					
	SM.		17 12 43					
	SW.		17 12 51					
	eL.		17 14 00					
	L _w		17 17 03	16				
	L _w		17 18 31	15				
	F.		18 10					
	P.		17 08 14					Do.
	S.		17 12 14					
	eL.		17 15 48					
	L.		17 18 14	16				
	F.		18 20					
12	eF _w		0 20 42					
	eF _a		0 20 48					
	ST.		0 25 27					
	L.		0 35 47	9				
	F.		0 50					
12	L.		1 45 17	7				
	to		1 50					

* Trace amplitude.

TABLE 2.—Instrumental reports, October, 1918—Continued.

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _m	A _n		
District of Columbia. Washington. Georgetown University—Contd.								
1918.			H. m. s.	Sec.	μ	μ	km.	
Oct. 12	P _N		8 24 39					Microseisms. No distinct M.
	P _S		8 24 44					
	S _N		8 25 41					
	S _L		8 25 52					
	L _N		8 31 22	12				
	F		9 09					
13	eP		4 56 34					No distinct M.
	S ₇		5 00 37					
	eL		5 02 37					
	L _N		5 06 28	17				
	L _N		5 06 35	11				
	F		5 16					
13	L		22 24 to 22 30	7				Heavy micro-seisms.
14	iP _N		0 29 33					No distinct M.
	iP _S		0 29 36					
	iS _N		0 33 40					
	eS _N		0 33 42					
	eL		0 34 47					
	L _N		0 39 01	13				
	L _N		0 39 22	17				
	F		1 03					
14	L _N		2 30 27 to 2 35	11				Does not show on E.
18	eP _N		21 38 35					
	eP _S		21 38 44					
	S _N		21 42 49					
	S _L		21 42 58					
	eL ₇		21 44 06					
	L _N		21 48 08	15				
	L _N		21 48 38	16				
	F		22					
19	L		2 18 to 2 24	18				Scarcely shows on E. Microseisms.
19	eP		3 28 48					Microseisms.
	S		3 33 34					
	eL ₇		3 35 34					
	M _N		3 38 35	19	*800			
	M _N		3 ? ?	11		*400		
	F		4 22					
25	P _N		3 47 58					Microseisms. No distinct M.
	iP _N		3 47 58					
	S _N		3 52 09					
	S _L		3 52 16					
	eL ₇		3 53 42					
	eL _N		3 53 48					
	L _N		3 55 27	10				
	L _N		3 57 16	16				
	F		5 20					
27	e		16 01 20					
	L _N		16 26 20	30				
	L _N		16 28 20	30				
	F		17					
27	e		17 27 36					Heavy micro-seisms. Very difficult.
	S ₇		17 32 22					
	F		19 25					
29								Quake registered. Data omitted because of uncertainty of time. Clock out of order.
30	e		12 43 ?					Sheet off at 13h., .08m. Time doubtful. Clock out of order.
	F		? ? ?					
* 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								
1918.			H. m. s.	Sec.	μ	μ	km.	
Oct. 1	e		1 22 00					Phase ill-defined.
	L		1 23 18					
	M		1 32 48	18	*300			
	C		1 37	18				
	F		2 47	18				
* Trace amplitude.								
Hawaii. Honolulu. Magnetic Observatory—Continued.								
1818.			H. m. s.	Sec.	μ	μ	km.	
Oct. 2	eP		0 31 48					
	L		0 38 42	18				
	S		0 45 54	18				
	M		0 56 30	19	*100			
	C		1 02	19				
	F		1 34	19				
6	e		20 21 00	18				
	L		20 31 00					
	M		20 34 00	17				
	F		20 44	17				
9	iP		9 40 48	17				
	eL		10 02 30					
	M		10 05 00	18	*300			
	C		10 10	18				
	F		10 41	19				
11	P		14 27 24	17				
	S		14 37 42	19	*2,100			
	L		14 55 00	21				
	M		15 09 18	17	*3,100			
	C		15 46	17				
	F		18 30	17				
13	P		12 57 48					
	S		13 00 54					
	L		13 02 00					
	M		13 07 00	18	*200			
	C		13 10	18				
	F		13 42					
14	P		12 15 18					Waves ill-defined, because of irregular motion of the paper.
	S		12 19 12					
	L		12 22					
	M		12 20 30	18	*500			
	F		13 33	19				
16	e		20 27 30					Phases ill-defined, because of irregular motion of the paper.
	L		20 46					
	M		20 53 48	16	*100			
	C		21 04	17				
	F		22 20					
19	P		3 34 06	19				An abrupt change at 3 ^h 55 ^m 12 ^s , too early for L.
	S		3 42 48	19				
	L		3 55					
	M		3 57 42	18	*1,000			
	C		4 04	18				
	F		5 41	18				
21	eL		23 09					
	M		23 15	18	*100			
	F		23 28					
22	eL		9 48 12					
	M		9 53 06	18	*100			
	F		9 57					
22	P		10 28 24	18				
	L		10 40					
	M		10 45	19	*100			
	C		10 48	18				
	F		11 14	18				
24	eP		19 33 00					
	L		19 46					
	M		19 51 00	18	*100			
	C		19 53 00	18				
	F		20 15					
25	eP		3 55 00					
	iS		4 06 00	19				
	L		4 23 00					
	M		4 34 12	18	*300			
	C		4 40	17				
	F		6 34	17				
27	iP		15 37 00	17				Tremors continue to the beginning of the next quake.
	iS		15 43 42	17				
	L		15 51 06	27				
	M		15 53 30	19	*6,900			
	C		16 24	19				
27	eP		17 19 18					Obscured by C of preceding quake.
	iS		17 24 42	18				
	eL		17 31 30					
	M		17 41 00	17	*2,400			
	C		18 09 00	18				
	F		20 14	18				
29	eL		12 59 00					
	M		13 02 00	18	*100			
	F		13 19					
* Trace amplitude.								

TABLE 2.—Instrumental reports, October, 1918—Continued.

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					A _s	A _w		
<p>Kansas. <i>Lawrence. University of Kansas. Department of Physics and Astronomy. F. E. Kester.</i></p> <p>Lat., 38° 57' 30" N.; long., 95° 14' 58" W. Elevation, 301.1 meters.</p> <p>Instrument: Wiechert.</p> <p>Instrumental constants. $\begin{matrix} V & T_1 & \epsilon \\ E & 177 & 3.4 & 4:1 \\ N & 205 & 3.4 & 4:1 \end{matrix}$</p>								
1918.								
Oct. 4								Disturbance identified by press reports from Pine Bluff and Little Rock, Ark.
	eP _N		9 22 02					
	eP _N ?		9 22 15					
	eS _N		9 23 51					
	L _N		9 23 16					
	L _N ?		9 23 17					
	M _N		9 23 22		10.2	7.8		
	F _N		9 30					
11	iP _N		14 22 00					
	eP _N		14 22 01					
	iS _N		14 26 18					
	S _N ?		14 27 14					
	L _N ?		14 31 33					
	L _N ?		14 31 43					
	M _N		14 33 29			39.8		
	M _N		14 37 13		35.0			
	F _N		16 03					
19	eP _N		2 05 37					Records changed here. S not discernible. P phase not clear.
	L _N		2 02 46		15	1.7		
	M _N		2 12 50		6-8	0.5		
	F _N		2 18 04					
19	P		3 28 24					S not discernible.
	L _N		3 28 20					
	L _N		3 32 46					
	L _N ?		3 32 50					
	M _N		3 33 00			8.8		
	F _N		3 33 39		4.2			

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

Lat., 38° 44' 00" N.; long., 76° 59' 30" W. Elevation, 71.6 meters.

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

Instrumental constants. $\begin{matrix} V & T_1 & \epsilon \\ E & 10 & 15 \\ N & 10 & 15 \end{matrix}$

1918.			H. m. s.	Sec.	μ	μ	Km.	
Oct. 4	P		9 27 29					
	eL _N		9 27 48					
	eL _N		9 28 00					
	M _N		9 28 06	3	10	20		
	F _N		9 29					
11	P		14 19 29	4				
	S _N		14 23 38	13				
	S _N		14 23 45	13				
	eL _N		14 26 08	23				
	eL _N		14 27 28					
	M _N		14 30 13	15	4,700	5,200		
	M _N		14 30 33					
	C _N		14 35	14				
	C _N		14 41	13				
	F _N		15 38	14				
11	IP		17 08 40	3				No long waves on E.
	S _N		17 12 41	3				
	S _N		17 12 44	3				
	L _N		17 16 20	14	10	40		
12	L _N		8 24 43	3				No long waves on E.
	M _N		8 34 19					
	F _N		8 34 50	13		10		
13	P		4 57	3				No long waves on E.
	eL _N		5 05 35					
	M _N		5 07 20	13				
	F _N		5 09					
14	eP		0 30 26	3				No long waves on E.
	eL _N		0 39 30					
	M _N		0 40 17	12		10		
	F _N		0 50					

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					A _s	A _w		
<p>Maryland. <i>Cheltenham. Magnetic Observatory—Continued.</i></p>								
1918.								
Oct. 18	P _N		21 38 41					Nothing on E.
	S _N		21 42 40	9				
	L _N		21 46 12					
	M _N		21 49 28	13		10		
	C _N		21 50					
	F _N		21 52					
19	eP _N		3 28 42	4				No long waves on E.
	eP _N		3 28 50	4				
	eS _N		3 33 27	4				
	L _N		3 39 01	18				
	M _N		3 42 18	12	30	150		
	C _N		3 44	12				
	F _N		4 05	12				
25	P		3 48 27	3				No long waves on E.
	S _N		3 52 33	3				
	eL _N		3 56 30	18				
	M _N		4 00 18	16		40		
	C _N		4 08	16				
	F _N		4 37	12				
27	eL _N		16 35					Nothing on E.
	F _N		18 47					
29	eP _N		12 33 55					Nothing on E. Time of P uncertain on account of microseisms.
	eL _N		12 41 57					
	M _N		12 49 00	16		10		
	C _N		12 49	16				
	F _N		12 57	14				

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. $\begin{matrix} V & T_1 & \epsilon \\ E & 80 & 23 & 0 \\ N & 50 & 25 & 4:1 \end{matrix}$

1918.			H. m. s.	Sec.	μ	μ	Km.	
Oct. 11	O		14 14 14				2,690	24° 10'. Destructive at west end of Porto Rico. Tidal wave at Aguadilla and San Juan. N stylus not registering from 14h. 24m. 52s. to 14h. 41m. 23s. E stylus left drum at 14h. 28m. 22s. and worked on and off during M. eL _N not readily distinguished from S waves. As read, velocity of long waves comes out 243.8 kms. per minute. PS _N alternating waves. F lost in next record.
	eP		14 19 41	4				
	PS _N		14 22 40	2				
	S _N		14 24 01	10				
	S _N		14 24 07					
	eL _N ?		14 25 19	20				
	M _N		14 28 17					
	M _N		14 29 52	12		*41,500		
	M _N		14 42	12				
	M _N		14 46	12				
	M _N		14 49	12				
	M _N		14 52 37	12				
	M _N		14 53 47	12				
	M _N		14 54	12				
	M _N		14 55	12				
	M _N		14 58	12				
	F _N		14 42					
	FT		17 postea					
11	O		17 04 48				1,900	17° 6'. M _N , 17h. 16m. 52s.; 1,000 micra.
	P _N		17 08 49					
	S _N		17 09 49	4				
	S _N		17 12 11	6				
	S _N		17 12 25	6				
	eL _N		17 13 08	15				
	eS _N		17 13 39	8				
	eL _N		17 14 49	18				
	M _N		17 16 10	15		*11,000		
	C _N		17 19 30					
12	C _N		17 26	12				30° 37'.
	FT		18					
	O?		0 14 43				3,440?	
	P _N		0 20 59					
	S _N		0 26 12	6				
	L _N ?		0 30 11	12				
	M _N		0 32 10	12				
	FT		0 43					
12	L _N		1 46 21	10-11				
	F _N		1 48					

* Trace amplitude.

TABLE 2.—Instrumental reports, October, 1918—Continued.

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					A _m	A _w		
Massachusetts. Cambridge. Howard University Seismographic Station—Continued.								
1918 Oct. 12	O		8 19 51				2,640	23° 45'.
	IP _N		8 24 53	3				
	eP _N		8 25 17	2				
	S _N		8 29 09	6				
	eL _N		8 31 00	20				
	L _N		8 32 16	15				
	L _N		8 35 31	13-14				
	F		8 52					
13	O		22 26	8				
	L _N		22 26					
	F		22 27					
14	O		0 25 14				2,150	19° 21'.
	eP _N		0 29 43					
	S _N		0 29 56					
	S _N		0 33 19					
	S _N		0 33 54	10				
	eL _N		0 35 50	25				
	eL _N		0 36 58	20				
	M _N		0 40 47	12				E damped 1.5/1 by magnet. Undamped.
	M _N		0 40 49	13		*7,000		
	F _N		1 20					
14	O		2 30 37	10				
	L _N		2 32 18					
	F		2 32 18					
14	O		12 08 41				10,320	92° 50' by Sr-Pe.
	O		12 08 48				10,240	92° 20' by L _N -S _N .
	eL _N		12 15 59					NW. India?
	S _N		12 25 42					
	S _N		12 27 11					
	S _N		12 28 32					
	S _N		12 41 11					
	eL _N		12 42 24					
	eL _N		12 47 05	6				
	eL _N		12 50 44	30				
	eL _N		12 54 20	40				
	L _N		12 56 19	35				
	M _N		13 02	20		*600		Trace.
	L _N		12 08	15				
	F _N		13 27					
	L _N repl		14 15 45	16				Long waves returning from anti-centrum, amplitudes very slight.
	F		14 22 41	20				
	F		14 28 45					
18	O		21 30 15				3,235	29° 19'. P lost in microseisms.
	S _N		21 41 30	61				
	S _N		21 41 51	7				
	eL _N		21 44 22	25				
	eL _N		21 44 44					
	L _N		21 46 22	15				
	L _N		21 52 42	12				
	F		22 08					
19	L _N		2 18 31	18				
	L _N		2 21 19	20				
	F		2 35 41					
19	O?		3 22 07				3,870?	Δ from eL _N -P _N .
	P _N		3 20 16					
	P _N		3 30 20					
	S _N ?		3 34 24					
	S _N ?		3 35 10	11				
	eL _N		3 39 03	40				
	eL _N		3 39 07	34				
	M _N		3 44 30			*27,500		Undamped. Damped 1 1/1 magnetically.
	M _N		3 44 34			*1,900		
	F _N		4 33					
25	O		3 42 59				2,630	Similar to record of Oct. 11, 1918, O: 14h. 14m. 14s.
	P _N		3 48 20	3				
	IP _N		3 48 47	4				
	S _N		3 49 43	2-4				
	S _N		3 52 35	7				
	S _N		3 53 09	6				
	eL _N		3 53 17	12				
	eL _N		3 53 44	20				
	eL _N		3 55 31					
	M _N		3 57 05			*4,250		Undamped.
	L _N		3 57 14	24				
	L _N		4 01 36	12		*500		Damped 1 1/1.
	M _N		4 04 27					
	C _N		4 05 01					
	F _N		4 52					
27	O		16 53				12,260?	110° 15'. P not identified among small microseisms. N gave a less definite record. F lost in next 'quake.
	S _N ?		16 00 00	8				
	S _N		16 01 19	6				
	S _N		16 13 19	6				
	eL _N		16 26 09					
	L _N		16 28 30	30				
	L _N		16 30 21	32				
	L _N		16 35 03	20				
	L _N		16 39 53	18				
	to		16 48 05					
	L _N		16 58 49	15				
	to		17 02 30					
	F		17 ? ?					

* Trace amplitude.

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					A _m	A _w		
Massachusetts. Cambridge. Howard University Seismographic Station—Continued.								
1918 Oct. 27	O		17 22 53					Probably two 'quakes. See attempted diagnosis in two records next below. N less definite. Sinusoidal waves set in. One wave.
	ea		17 22 53					
	ea		17 27 23	4				
	S _N		17 28 15	6				
	eL _N		17 31 51	15-8				
	L _N		17 33 35	8				
	L _N		17 42 05	18				
	L _N		18 11 16	26				
	L _N		18 28 33	20				
	L _N		18 34 25	16				
	L _N		18 44 47	15				
	L _N		18 53 32	15				
	L _N		19 01 17	12				
	L _N		19 17 05	20				
	F _N		19 50 15					
27	O		17 12 16				3,600	32° 24'. Δ from L-S. F lost in next 'quake.
	eP _N		17 22 23					
	S _N		17 28 15	6				
	eL _N		17 31 51	15-8				
	L _N		17 33 35	8				
	to		17 42 05	18				
	L _N		17 42 23	8				
	to		17 48 15					
	F		? ? ?					
27	O		17 22 56				11,100	99° 54'. N record less definite.
	S _N		17 48 15					
	eL _N		18 11 16	26				
	L _N		18 28 33	20				
	L _N		18 34 25	16				
	L _N		18 39 55	20				
	L _N		18 44 47	15				
	L _N		18 53 32	15				
	L _N		19 01 17	12				
	L _N		19 17 05	20				
	F _N		19 50 15					
30	O		12 37 54				7,000?	P and S lost in microseisms of 6-second period.
	ea		12 42 31	8				
	ea		12 42 31	12				
	eL _N		12 43 28	28				
	eL _N		12 44 15	24				
	L _N		12 44 39	18				
	L _N		12 45 20	16				
	F _N		13 05					

* Trace amplitude.

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. $\frac{V}{T} \frac{T_0}{\epsilon}$
 .80 7 5:1

Date.	Character.	Phase.	Time.	Period T.	Amplitude.	Distance.	Remarks.
1918 4	IP		9 22 36			500	Pine Bluff, Ark.
	L		9 22 48	(?)		*1,000	
	F		9 24 12				
11	IP _N		14 20 30			3,300	Porto Rico.
	P _N		14 20 ?				
	S _N		14 25 24				
	S _N		14 25 30				
	L _N		14 27 30				
	L _N		14 27 48				
	M _N		14 30 12	12		*22,000	
	M _N		14 31 30			*24,000	
	M _N		14 32 36	24		*10,000	
	F _N		16 10				
11	IP _N		17 09 36			4,500	Hardly any record on E.
	S _N		17 16 00				
	L _N		17 20 36	12		*1,000	
	F _N		17 35				
19	eP _N		3 28 18			2,800	
	P _N		3 ? ?				
	IS _N		3 32 48				
	S _N		3 33 30				
	S _N		3 34 36				
	M _N		3 40 12	24		*12,000	
	eL _N		3 40 42	12		*1,000	
	F		4 05				
25	P _N		3 48 54			3,000	No record on E.
	S _N		3 53 42				
	L _N		3 56 06				
	M _N		4 03 00	3		*	

TABLE 2.—Instrumental reports, October, 1918—Continued.

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _m	A _N		
New York. <i>Buffalo. Canisius College.</i> John A. Curtin, S. J. Lat., 42° 53' 02" N.; long., 78° 32' 40" W. Elevation, 190.5 meters. Instrument: Wiechert 80 kg. horizontal. V T ₀ s Instrumental constants.. 80 7 5:1 (Report for October, 1918, not received.)								
New York. <i>Fordham. Fordham University.</i> Daniel H. Sullivan, S. J. Lat., 40° 51' 47" N.; long., 73° 53' 08" W. Elevation, 29.3 meters. Instrument: Wiechert, 80 kg. V T ₀ s Instrumental constants.. E 72 5.0 0 N 72 5.0 0 (Report for October, 1918, not received.)								
New York. <i>Ithaca. Cornell University.</i> Heinrich Ries. Lat., 42° 26' 53" N.; long. 76° 29' 09" W. Elevation, 242 meters. Instruments: Two Bosch-Omori, 25 kg., horizontal pendulums (mechanical registration) V T ₀ s Instrumental constants.. E 13 22 4:1 N 14 25 4:1								

1918.		H. m. s.	Sec.	μ	μ	Km.	
Oct. 4	P _w ...	9 27 52	2				
	L _w ...	9 28 23	8				
	F _w ...	9 32 ..					
11	P _N ...	14 19 69	3				
	S _N ...	14 20 51	7		*1700		
	S _N ...	14 24 32	15				
	M _N ...	14 29 13	14		*9000		
	M _N ...	14 32 37	13		*13000		
	M _N ...	14 33 30	13		*14000		
	M _N ...	14 33 35	12		*18000		
	F _N ...	14 34 40	12		*16000		
11	P _N ...	17 09 08	3				
	S _N ...	17 13 39	7				
	L _N ...	17 15 35	20				
	F _N ...	18 00 ..					
14	P _N ...	0 30 05	3				
	S _N ...	0 34 31	6				
	eL _N ...	0 37 15	20				
	F _N ...	0 52 ..					
14	eP _N ...	8 25 03	3				
	eS _N ...	8 29 45	5				
	L _N ...	8 32 18	22				
	F _N ...	8 50 ..					
14	P _N ?...	12 16 22	4				P indistinct, possibly microseisms.
	e _N ...	12 19 07	4				
	eS _N ...	12 27 59	8				
	eS _N ...	12 28 38	9				
	eL _N ...	12 55 ..	25				
	F _N ...	13 09 ..					
18	eP _N ...	21 39 53	5				Early phases obscured by microseisms.
	eS _N ...	21 44 33	7				
	eS _N ...	21 44 40	5				
	L _N ...	21 46 32	22				
19	e...	2 16 30					Microseisms.
	eL _N ...	2 19 35	18				
	F _N ...	2 36 ..					
19	P _N ...	3 29 47	4				Do.
	S _N ...	3 35 20	5				
	S _N ...	3 35 21	5				
	F _N ...	4 33 ..					
25	P _N ...	3 48 43	5				
	S _N ...	3 53 11					
	S _N ...	3 53 12					
	L _N ...	3 55 04	23				
	F _N ...	5 17 ..					
27	e...	15 48 30					F lost in next 'quake.
	e...	15 54 30					
	e...	15 57 15					
	e...	16 04 ..					
	eL...	16 25 ..	28				
27	e...	17 36 ..					
	eL...	18 04 30					
	F...	19 28 ..					
29	e _N ...	12 37 30	4				
	e...	12 41 ..					
	eL _N ...	12 43 30	16				
	F _N ...	13 11 ..					

* Trace amplitude.

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.			
					A _m	A _N					
Panama Canal. <i>Balboa Heights.</i> Governor, Panama Canal. Lat., 8° 57' 39" N.; long., 79° 33' 29" W. Elevation, 27.6 meters. Instruments: Two Bosch-Omori, 100 kg. V T ₀ s Instrumental constants.. 35 20 (Report for October, 1918, not received.)											
1918.	Oct.	11	P _N ...	14 19 07				1,370			
			P _N ...	14 19 08							
			L _N ...	14 22 07							
			L _N ...	14 22 16							
			M _N ...	14 22 27		*22,000					
			M _N ...	14 22 30		*10,000					
			F _N ...	15 34 00							
			F _N ...	15 36 13							
			11	P...	17 09 00		*900	*500			Paint trace.
				F...	17 20 00						
F _N ...	17 28 00										
14	P...	0 30 00						Paint trace. Amplitudes too small to measure.			
	F...	0 35 00									
19	P _N ...	3 26 46					1,325				
	P _N ...	3 26 54									
	L _N ...	3 30 46									
	M _N ...	3 31 06		*700	*600						
	M _N ...	3 32 02									
25	P _N ...	3 43 00									
	F _N ...	3 44 00									
	P...	3 46 32					1,060				
	L _N ...	3 49 32									
	L _N ...	3 49 42		*1,100							
29	P _N ...	3 49 44									
	L _N ...	3 49 56					*2,900				
	F _N ...	4 11 00									
	F _N ...	4 15 00									
	P _N ...	12 26 53					1,110				
11	P _N ...	12 26 54									
	L _N ...	12 29 28									
	M _N ...	12 29 50		*1,400							
	M _N ...	12 31 54			*1,100						
	F _N ...	12 43 16									
	F _N ...	12 45 00									

* Trace amplitude.

Porto Rico. *Vieques. Magnetic Observatory.* U. S. Coast and Geodetic Survey. Wallace M. Hill.
Lat., 18° 09' N.; long., 65° 27' W. Elevation, 19.8 meters.
Instruments: Two Bosch-Omori.
V T₀ s
Instrumental constants.. E 10 17.5
N 10 18.2
(Report for October, 1918, not received.)

1918.		H. m. s.	Sec.	μ	μ	Km.				
1918.	Oct.	11	P...	14 15 07				Within 15 seconds after beginning, pendulums swung against stops jarring the stylus points from their bearings. E was replaced at 14 ^h 21 ^m and N at 14 ^h 24 ^m . The large number of small shocks recorded during the rest of the month are of the same general character, beginning with waves of 1 to 2 seconds period and ending with waves of 4 to 6 seconds period. In a few cases there appear to be two or three long waves of 10 to 12 seconds period at the time of the maximum with the short-period waves superimposed upon them.		
			L _N ...	14 15 07						
			L _N ...	14 15 12						
			C...	14 27 ..	15					
			F _N ...	16 18 ..	12					
			F _N ...	16 32 ..	12					
			11	P _N ...	15 50 51	2				
				P _N ...	15 50 54	2				
				L _N ...	15 51 20				60	
			11	M _N ...	15 51 34					
F _N ...	15 56 ..	4								

TABLE 2.—Instrumental reports, October, 1918—Continued.

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _m	A _n		
Porto Rico. Vieques. Magnetic Observatory—Continued.								
1918.			H. m. s.	Sec.	μ	μ	km.	
Oct. 11	P		16 02 28	2				
	L _N		16 02 51					
	L _M		16 02 58					
	M		16 03 08		170	180		
	F		16 10 ..	5				
11	P		17 04 17	6				
	eL _M		17 04 26	18				
	eL _N		17 04 36	18				
	M _N		17 05 13	18		3,240		
	M _M		17 06 38	14	1,250			
	C		17 07 ..	11				
	F		17 33 ..	8				
11	eF _M		17 18 28					
	eL _M		17 18 54					
	M _N		17 19 28		20	20		
	F		17 24 ..					
11	eF _M		17 24 20					
	eF _N		17 24 33					
	F		17 30 ..		20	20		
11	P		18 26 51					
	M _N		18 27 02		10	30		
	F		18 31 ..					
11	P		18 09 00					
	eL _M		19 10 03					
	eL _N		19 10 06					
	M		19 10 23		40	40		
	F		19 18 ..					
11	eF _M		20 06 53					
	eF _N		20 07 06					
	M _N		20 07 35			170		
	M _M		20 07 53		60			
	F		20 17 ..					
11	eF _M		21 51 47					
	eF _N		21 51 55		10	10		
	F		21 57 ..					
11	eF		23 32 13					
	F		23 39 ..		20	20		
11	eF		23 48 58					
	F		23 51 ..		10	10		
11	eF _N		23 58 42					
	eF _M		23 58 46					
	F		24 00 ..		10	20		
12	eF _M		0 00 00					
	eF _N		0 00 12					
	M _N		0 04 14		40	40		
	F		0 09 ..					
12	P _N		0 16 10					
	L		0 16 38					
	M _N		0 16 56		70	120		
	F		0 26 ..					
12	P _N		0 28 18					
	L _N		0 28 42					
	L _M		0 28 45					
	M _N		0 29 02		30	20		
	F		0 34 ..					
12	P _N		0 33 16					
	L _N		0 33 40		20	30		
	L _M		0 33 46					
	F		0 45 ..					
12	eF _M		1 03 14					
	eF _N		1 03 21					
	L _N		1 03 34					
	M _N		1 03 56		20	10		
	F		1 10 ..					
12	eF _M		4 31 43					
	eF _N		4 31 49					
	F		4 33 ..		10	10		
12	eF _M		4 33 43					
	L _N		4 34 07					
	L _M		4 34 12					
	M _N		4 34 43		20	20		
	F		4 44 ..					
12	eF		6 58 28					
	F		7 02 ..		20	20		
12	eF _M		8 09 42					
	L _N		8 10 03					
	M _N		8 10 24		20	20		
	F		8 14 ..					
Porto Rico. Vieques. Magnetic Observatory—Continued.								
1918.			H. m. s.	Sec.	μ	μ	km.	
Oct. 12	P _N		8 19 34	2				
	P _M		8 19 39	2				
	eL _M		8 19 52	16				
	eL _N		8 20 02	16				
	M _N		8 20 24	10		550		
	M _M		8 20 40	10	350			
	C		8 23 ..	8				
	F		8 41 ..	5				
13	eF _M		4 52 11					
	eF _N		4 52 19	2				
	eL _M		4 52 39	10				
	M _N		4 53 00			90		
	M _M		4 54 17			190		
	F		5 04 ..	4				
13	eF _M		18 19 38					
	eF _N		18 19 45					
	F		18 25 ..		10	20		
13	eF _M		20 23 47					
	eF _N		20 23 56					
	L _N		20 24 11					
	L _M		20 24 14					
	M _N		20 24 43			30		
	M _M		20 25 20			40		
	F		20 32 ..					
14	P		0 25 18	2				
	L _N		0 25 42					
	M		0 26 02	13	200	900		
	C		0 28 ..					
	F		0 40 ..	5				
14	P		2 16 21					
	L _N		2 16 42					
	L _M		2 16 48			20		
	M _N		2 17 04				20	
	M _M		2 18 00					
	F		2 24 ..					
14	P		4 53 26	1				Possibly two or three separate shocks.
	eL		4 53 48					
	F		5 03 ..	4	40	30		
16	eF _M		0 13 54	2				
	L		0 14 14			20	20	
	F		0 24 ..	5				
15	eF _N		3 15 46					
	eF _M		3 16 02					
	F _N		3 16 14	2				
	eL _N		3 16 26					
	eL _M		3 16 36					
	M _N		3 16 55	10	70			
	M _M		3 17 25	8		70		
	F		3 29 ..	5				
16	eF _M		19 20 17	2				
	eF _N		19 20 25	2				
	L _N		19 20 46					
	F		19 31 ..	5	20	20		
17	e		8 19 40	2				
	L		8 19 59					
	M _N		8 20 16	10	40			
	M _M		8 20 44	14		40		
	F		8 26 ..					
17	eF _M		21 29 29					
	eF _N		21 29 35					
	F		21 36 ..		20	20		
18	P		19 22 54	2				
	L _N		19 23 19					
	F		19 29 ..	5	20	20		
18	P _N		21 34 13	2				
	P _M		21 34 17	2				
	L _N		21 34 35	17				
	L _M		21 34 42					
	M _N		21 35 00	18	620			
	M _M		21 35 51	11		376		
	C		21 37 ..	9				
	F		21 58 ..	7				
19	eF _M		3 28 12					Distant earth-quake.
	eF _N		3 28 56					
	L		3 35 28	28				
	M _N		3 40 00	18	30			
	M _M		3 37 13	22		20		
	C		3 42 ..	15				
	F		3 45 ..	20				
	F		3 56 ..	14				

TABLE 2.—Instrumental reports, October, 1918—Continued.

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					A _m	A _N		
Porto Rico. Vieques. Magnetic Observatory—Continued.								
1918.			<i>H. m. s.</i>	<i>Sec.</i>	μ	μ	<i>km.</i>	
Oct. 10	eP _N		7 05 48	1				
	eP _S		7 05 57	1				
	eL _N		7 06 24					
	eL _S		7 06 37					
	M _N		7 06 41	5	30			
	M _S		7 07 14	5		20		
	F _N		7 14 ..	5				
21	eP		6 44 49					
	F		6 49 ..		20	20		
21	eP		6 49 12					
	F		6 55 ..		10	10		
21	eP _N		13 09 ..					Nothing definite on E.
	F _N		13 11 ..			10		
23	eP		14 31 10					
	F		14 38 ..		10	10		
24	eP		22 59 38					
	F		23 04 ..		10	10		
25	eP _N		3 43 26	2				N stylus jarred from bearings at 3 42 50; replaced at 3 53.
	L		3 43 29					
	M _N		3 44 05	17	7,000			
	C _N		3 43 ..	14				
	F _N		4 38 ..	10				
	F _S		4 35 ..	10				

Vermont. Northfield. U. S. Weather Bureau. Wm. A. Shaw.
 Lat., 44° 10' N.; long., 72° 41' W. Elevation, 256 meters.
 Instruments: Two Bosch-Omorì, mechanical registration.

Instrumental constants. $\frac{V}{T_0}$ $\frac{T_0}{N}$
 $\frac{E}{N}$ 10 15
 10 16

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					A _m	A _N		
Vermont. Northfield. U. S. Weather Bureau. Wm. A. Shaw.								
1918.			<i>H. m. s.</i>	<i>Sec.</i>	μ	μ	<i>km.</i>	
Oct. 11	P		14 20 19				2,870	
	S		14 24 53					
	L		14 26 53	18				
	M _N		14 33 ..			25,000		
	M _S		14 34 30		21,000			
	F		16 45 ..					
11	P _N		17 14 ..					Not conspicuous on N.
	eL _N		17 16 ..					
	F		17 30 ..					
10	e		3 30 50					
	L		3 43 30					
	F		4 ..					
25	P		3 48 20				3,050	
	S		3 53 07					
	L		3 55 ..					
	L		3 55 ..					
	F		4 20 ..					

*Trace amplitude.

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. $\frac{V}{T_0}$ $\frac{T_0}{N}$
 120 26

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					A _m	A _N		
Canada. Ottawa. Dominion Astronomical Observatory. Earthquake Station. Otto Klotz.								
1918.			<i>H. m. s.</i>	<i>Sec.</i>	μ	μ	<i>km.</i>	
Oct. 1	e		0 16 45					Small irregular amplitudes in L.
	e		0 35 41					
	eL		0 41 ..					
	F		1 10 ..					
11	O		14 14 10				3,190	Porto Rico. F merged in next 'quake.
	P _N		14 20 24					
	S _N		14 25 21					
	L _N		14 28 ..					
	M _N		14 34 ..	12		550		
	L _N		14 55 ..	12				
	L _N		15 10 ..	10				
	L _N		15 30 ..	13				
	L _N		15 40 ..	13				
	L _N		15 50 ..	12				
	L _N		16 00 ..	12				
	L _N		16 15 ..	12				
	F		17 ?					

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					A _r	A _q		
Canada. Ottawa. Dominion Astronomical Observatory—Continued.								
1918.			<i>H. m. s.</i>	<i>Sec.</i>	μ	μ	<i>km.</i>	
Oct. 11	VERTICAL. Az.							
	eP		14 20 38					
	eS		14 26 09					
	eL		14 29 ..	30				
	L		14 34 ..	12				
	L		15 00 ..	10				
	F		15 20 ..					
	SASKATOON.							
	O		14 14 44				4,980	
	P		14 23 11					
	S		14 29 52					
	Supl		14 33 10					
	L ?		14 37 ..					
	HALIFAX.							
	O		14 14 10				3,080	
	P _N		14 20 14					
	S _N		14 23 03					
	L _N		14 28 ..					
11	e _N		17 08 15					The deformation instrument confirms the phase noted, and also seems to indicate phases at about 16h. 58m. and 17h. 03m. 30s. The record is so contradictory in itself and in conjunction with the Halifax and Saskatoon records next below that it is impossible to deduce a value for either Δ or O .
	e		17 09 34					
	I _N		17 14 15					
	eL		17 16 ..	18				
	F		18 20 ..					
	HALIFAX.							
	I _N		17 09 25					
	e		17 14 14					
	eL _N		17 15 30		18			
	eL _N		17 17 ..	16				
	SASKATOON.							
	I		17 12 22					
	I		17 24 31					
	eL		17 29 ..	16				
12	e _N ?		0 25 ..					
	e		0 29 36					
	L		0 37 ..					
	F		0 50 ..					
12	e ?		8 30 ..					Irregular small amplitudes from 5h. 40m. to 9h. 10m.
	e		8 32 06					
	eL		8 34 48		14			
	F		9 10 ..					
14	P		0 30 ?					Disturbance lasting about an hour and of small amplitude. Minute breaks failed to record. Time approximated from deformation instrument whose rate is only 17mm. per hour.
	eL		0 36 ?		20			
	F		1 ?					
14	e		12 207 ..					Do.
	eL		12 287 ..					
	F		13 ? ..					
15	e _N		23 48 ..		3			
	e _N		23 50 12		4			
	eL		23 52 ..		12			
	F		0 05 ..					
16								
18	O?		21 53 47				2,890	
	eP _N ?		21 39 53					
	eS?		21 44 08					
	eL		21 48 ..					
	L		21 50 ..		18			
	L		22 18 ..		12			
	F		22 25 ..					
19	e		2 13 30					
	eL		2 20 00		15			
	L		2 25 ..		8			
	F		2 50 ..					
19	O		3 28 49				3,620	
	iP		3 29 39					
	iS		3 33 04					
	eL		3 38 18					
	L		3 44 ..		18			
	L		4 05 ..		12			
	L		4 11 ..		12			
	F		4 30 ..					
	VERTICAL. Az.							
	eL?		3 59 ..					
	L		3 44 ..		20			
	F		3 45 ..					

TABLE 2.—Instrumental reports, October, 1918—Continued

Date	Character.	Phase.	Time.	Period	Amplitude.		Distance.	Remarks.
					AP	AQ		

Canada. Ontario. Dominion Astronomical Observatory—Continued.

1918.		H. m. s.	Sec.	μ	μ	km.	Remarks.
Oct. 25	O	3 42 50				3,040	Reported from Porto Rico.
	P _N	3 48 50					
	eS _N	3 53 38					
	eL	3 54 40	3				
	eL	3 55	20				
	L	4 03	12				
	L	4 14	11				
	L	4 30	11				
	F	5 05					
27	O	15 35 +				13,000	Δ from S-P _N and O from S-L ₁ (interval 8 for S-O).
	eF _{apl}	15 55 23					
	eS	16 03 43					
	eL	16 29	20				Sinusoidal L waves.
	L	16 43	16				F lost in next 'quake.
	F	17 ? ?					
27	O	17 06?				13,500	Data very conflicting. Δ probably too small and O too late.
	e	17 27 21					
	e	17 37 11					
	eL	18 05 54	26				
	L	18 30	16				
	L	18 40	16				
	L _{apl}	19 04	20				
	F	19 40					
20	e _N	12 33 41	6				Microseisms mask the earlier phases. N component better of the two.
	e _N	12 37 00	6				
	e _N	12 38 56	6				
	e	12 40 26					
	e _N	12 43					
	eL	12 46	20				
	L	12 55	12				
	L	13 06	8				
	F	13 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.

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

1918.		H. m. s.	Sec.	μ	μ	km.	Remarks.
Oct. 1	eL	1 38 24					
	eL	1 42 00					
	M	1 45 06					
	F	2 10 06					
2	L?	1 37 06?					
11	P	14 20 42				2,990	Phases masked by microseisms. Porto Rico. Destructive tidal wave. Clear record.
	iP	14 21 12					
	iS	14 25 24					
	L	14 26 12					
	iL	14 29 48					
	M	14 34 30					
	to	14 36 30					
	eL	17 17 30					
	eL	17 20 06					
	M	17 25 06					
	F	18 02 00?					
13	M	3 00 24					
13	eL	5 08 18					Marked gradual thickening.
	M	5 10 36					
	F	5 15 30					
13	L	15 52 24					
	F	14 00 30					
14	L	0 34 30					
	eL	0 40 12					
	M	0 41 18					
	F	1 16 54?					
14	e	12 28 18?					
	L	12 54 24					
	eL	12 56 24					
	M	13 00 54					
	F	13 48 42					
15	L	23 49 00					F lost in microseisms.
	M	23 50 54					
	F	? ? ?					

* Trace amplitude.

† Over *25000.

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					AP	AQ		

Canada. Toronto. Dominion Meteorological Service—Continued.

1918.		H. m. s.	Sec.	μ	μ	km.	Remarks.
Oct. 18	S?	21 44 30					
	L?	21 46 24					
	eL	21 49 30					
	M	21 53 30					
	F	22 06 30					
19	eL	2 18 48					
	M	2 20 06					
	F	2					
19	P	3 28 42				3,910	Possibly Central Africa. F lost in microseisms.
	S	3 34 24					
	iL	3 41 06					
	iL	3 43 18					
	M	3 49 24					
	F						
25	eP	3 49 18				3,070	Reported from Porto Rico. Amplitude of P increased gradually.
	eS	3 54 06					
	eL	3 55 36					
	M	3 58 48					
	M	4 03 36					
	iL	4 06 00					
	F	5 22 42					
27	e	15 29 48					Microseisms at 15h. 22m. Light off at 17h. 27m. attending to instrument. F merged into next 'quake.
	e	15 50 18					
	P?	15 56 18					
	c	16 09 18					
	L	16 24 48					
	L	16 26 30					
	eL	16 28 48					
	M	16 38 48					
	L	16 54 00					
	F	17 ? ?					
27	L	17 55 18					F merged in next 'quake.
	L	18 01 12					
	eL	18 17 48					
	L	18 22 36					
	M	18 28 54					
	eL	18 42 06					
	L	19 01 42					
	F	19 ? ?					
27	eL	19 14 42					
	M	19 26 18					
	P?	20 18 12					
29	L	12 43 48					
	M	12 47 00					
	F	13 19 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.

To
Instrument constant. .18. Pillar deviation, 1 mm., swing of boom=0.54".

1918.		H. m. s.	Sec.	μ	μ	km.	Remarks.
Oct. 1	L	1 19 47					
	M	1 26 11					
	F	1 37 50					
2	Por L	0 45 24?					
	M	1 21 48					
	F	? ? ?					
9	M	9 46 34					
	F	9 56 53					
11	P	14 23 38				5,750	Porto Rico. Disastrous 'quake.
	S	14 31 01					
	L	14 42 49					
	M	14 51 10					
	M _{apl}	17 30 31					
	F	18 14 47					
	Vertical.						
	P	14 54 00	5			5,110	Porto Rico.
	S	14 57 42	8-10				
	L	14 44 42	24				
	M	14 50 24	12			31	
	F						
13	P	2 57 49					
	L	3 01 16					
	M	3 02 15					
	F	3 08 39					

* Trace amplitude.

TABLE 2.—Instrumental reports, October, 1918—Continued.

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					A _s	A _N		
Canada. Victoria, B. C. Dominion Meteorological Service—Contd.								
1918.			<i>H. m. s.</i>	<i>Sec.</i>	μ	μ	<i>km.</i>	
Oct. 13	M.		13 25 57		*100			
	F.		13 39 43					
14	M.		1 02 24		*100			
	F.		1 20 06					
14	P.		12 33 53					
	L.		12 38 58					
	M.		12 44 13		*500			
	F.		13 40 07					
15	P.		23 31 19					
	L.		23 32 49					
	M.		23 33 48		*200			
	F.		23 42 14					
18	L.		22 01 49					
	L.		22 06 46					
	M.		22 10 15		*200			
	F.		22 15 02					
19	P.		3 30 21			5,750		May be West Indies or Central America.
	S.		3 37 44					
	L.		3 46 35					
	M.		3 54 27		*2,000			
	F.		4 49 02					
25	P.		3 52 18			5,130		
	S.		4 00 01					
	L.		4 11 30					
	M.		4 19 32		*9,000			
	F.		5 11 30					
27	P.		15 51 05			4,180		F merged in next 'quake.
	S.		15 57 02					
	L.		16 07 24					
	M.		16 20 41		2,000			
	F.		17 ? ?					
27	P.		17 30 01					Do.
	L.		17 45 16					
	M.		17 58 32		*1,300			
	L.		18 23 11					
	F.		19 ? ?					
27	L.		19 31 007					
	M.		19 43 18		*250			
	F.		20 05 26					
29	L.		12 50 47					
	M.		12 59 09		*100			
	F.		13 ? ?					

*Trace amplitude.

TABLE 3.—Late seismological reports (Instrumental).

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).

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					A _s	A _N		
Instrumental constants. $\frac{V}{N} \frac{T_0}{25} \frac{e}{4.1}$								
1918.			<i>H. m. s.</i>	<i>Sec.</i>	μ	μ	<i>km.</i>	
Aug. 8	C _M		10 37 30	5				
	L _M		10 46 29	36				
	L _N		10 47 35	32				
	F _M		11 17 ..					
	F _N		11 23 ..					
15	eP _N		12 39 24	4				
	C _M		12 41 15	4				
	C _N		12 42 24	4				
	C _M		12 47 06	7				
	C _N		12 47 07	9				
	C _M		12 50 06	10				
	C _N		12 52 27	16				
	C _M		12 57 10	15				
	C _N		12 57 28	13				
	L _M		13 13 10	32				
	L _N		13 15 14	40				
	F _M		15 15 ..					
	F _N		15 24 ..					

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

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					A _s	A _N		
New York. Ithaca. Cornell University—Continued.								
1918.			<i>H. m. s.</i>	<i>Sec.</i>	μ	μ	<i>km.</i>	
Aug. 15	eS _M		18 07 59	6				
	eL _M		18 24 ..	26				
	F _M		19 13 ..					
17	eP _N		7 05 55	4				
	S _M		7 12 15	11				
	L _M		7 27 49	29				
	L _N		7 29 ..	25				
	F _M		7 41 ..					
23	C _M		7 03 39					
	C _N		7 03 59	6				
	C _M		7 06 25	16				
	C _N		7 07 25	8				
	C _M		7 13 05	16				
	L _M		7 35 ..	28				
	L _N		7 37 50	24				
	F _M		8 45 ..					
Sept. 7	eP _N		17 28 45	4				
	eP _N		17 28 59	4				
	S _M		17 38 40	8				
	S _N		17 38 42	9				
	L _M		17 49 00	20				
	M _M		18 05 50	21	7,400			
	M _N		18 15 25	17	5,600			
	F _M		21 08 ..					
	F _N		22 13 ..					
12	C _M		18 26 36	6				
	eL _M		18 27 40	13				
	eL _N		18 28 33	13				
	F _M		18 30 ..					
14	C _M		17 22 ..	7				
	eS _M		17 27 17	8				
	eL _M		17 45 50	17				
	F _M		18 30 ..					
29	eL _N		12 46 25	30				
	F _N		13 04 ..					
30	P _M		13 43 10	3				
	eP _N		13 44 50	4				
	S _N		13 53 07	8				
	eL _N		14 09 ..	20				
	F _N		14 40 ..					
30	eL _N		18 55 30	20				
	F _N		20 00 ..					

*Trace amplitude.

SEISMOLOGICAL DISPATCHES.¹

Pine Bluff, Ark., October 4, 1918.

Earth tremors lasting several seconds shortly after 3 o'clock this morning were reported from Pine Bluff, Ark. (Assoc. Pr.)

San Juan, P. R., October 11, 1918.

There were two earthquakes this morning, the first of which occurred at 10:19 and the second three minutes later. They lasted several seconds, shaking and cracking buildings. Light tremors continued to be felt until 1:02 o'clock this afternoon. Gov. Yager estimates the loss of life at 150. Unconfirmed reports state that there was great damage done by the quake in Santo Domingo. (Assoc. Pr.)

San Juan, P. R., October 12, 1918.

A slight additional shock was felt at 4 o'clock this morning. (Assoc. Pr.)

St. Thomas, Virgin Islands, October 12, 1918.

A heavy and prolonged earthquake was felt here at 10:15 o'clock Friday morning (Oct. 11). No damage was done. (Assoc. Pr.)

Mayagüez, P. R., October 14, 1918.

There were more than a dozen distinct shocks felt here in the course of the night. Seventy-five per cent of the masonry buildings at Mayagüez are a total loss. (Assoc. Pr.)

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

SECTION V.—SEISMOLOGY.

SEISMOLOGICAL REPORTS FOR NOVEMBER, 1918.

W. J. HUMPHREYS, Professor in Charge.

[Dated: Weather Bureau, Washington, D. C., Dec. 3, 1918.]

TABLE 1.—Noninstrumental earthquake reports, November, 1918.

Day.	Approximate time, Greenwich Civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity Rossi-Forel.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
CALIFORNIA.										
1918.	<i>H. m.</i>						<i>M. s.</i>			
Nov. 8	13 24	Calarico.....	32 41	115 30	4	1	20	None.....	Trembling, jarring.....	H. M. Rouse.
15	7 47	Lone Pine.....	36 37	118 02	4	3		Few.....	Abrupt bumping.....	A. F. Marsh.
19	20 157	Port Los Angeles.....	34 02	118 30	5	1	4	None.....	Bumping from west to east.....	A. P. Deraga.
	20 197	Santa Monica.....	34 02	118 30	5	1	3	Faint.....	Abrupt bump.....	Neilie Barker-Bates.
	20 187	Venice.....	33 58	118 28	7	2	30	Yes.....	Like an explosion, a sudden dropping sensation. Plaster and dishes thrown to the floor. Gradual rocking in all directions.	Dr. Jas. T. Brown.
20	22 41	Mount Wilson.....	34 13	118 04	2	1	10			Wendell P. Hoge.
29	23 24	Eureka.....	40 48	124 11						James Jones.
		Table Bluff.....	40 41	124 10	5	1	2	Loud.....	Abrupt bumping and jarring, east to west.	A. F. Peters.
PORTO RICO.										
10	20 17	San Juan.....	18 20	66 07	3	1	6	None.....	Abrupt trembling.....	F. E. Hartwell.
12	12 01	San Juan.....	18 29	66 07	4	1	8	None.....	Gradual rocking.....	F. E. Hartwell.
	21 43	San Juan.....	18 29	66 07	6	1	15	None.....	Gradual bumping and trembling.	F. E. Hartwell.
UTAH.										
16	12 457	Clarkston.....	41 55	112 03	5	1	1 00	Yes.....	Gradual rocking E-W.....	W. J. Griffiths.
17	12 437	Tremonton.....	41 42	112 10		2	3	Yes.....	Gradual trembling S-N.....	A. J. Rosa.

TABLE 2.—Instrumental seismological reports, November, 1918.

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

[For significance of symbols see Review for January, 1918, p. 34.]

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					A _m .	A _n .		
Alabama.	Mobile.	Spring Hill College.	Earthquake Station.	Cyril Ruhlmann, S. J.				
								Lat., 30° 41' 44" N.; long., 88° 08' 46" W. Elevation, 60 meters.
								Instrument: Wiechert 80 kg.; astatic, horizontal pendulum.
								(Report for November, 1918, not received.)
Arizona.	Tucson.	Magnetic Observatory.	U. S. Coast and Geodetic Survey.	William H. Cullum.				
								Lat., 32° 14' 48" N.; long., 110° 50' 06" W. Elevation, 769.6 meters.
								Instruments: Two Bosch-Omori, 10 and 12 kg.
								Instrumental constants: $\begin{matrix} V & T_0 \\ E & 10 & 14 \\ N & 10 & 18 \end{matrix}$
Alaska.	Sitka.	Magnetic Observatory.	U. S. Coast and Geodetic Survey.	F. P. Ulrich.				
								Lat., 57° 03' 00" N.; long., 135° 20' 08" W. Elevation, 15.2 meters.
								Instruments: Two Bosch-Omori, 10 and 12 kg.
								Instrumental constants: $\begin{matrix} V & T_0 \\ E & 10 & 18 \\ N & 10 & 17 \end{matrix}$
Nov. 8								
			<i>H. m. s.</i>	<i>Sec.</i>	μ	μ	$\sigma M.$	
	P.....		4 49 34	4				Instrument not in good adjustment during November; does not show smooth regular waves.
	S.....		4 59 10					
	eLw.....		5 13 25				80	
	Mw.....		5 14 07					
	eLm.....		5 15 00					
	Mm.....		5 22 10	18	150			
	C.....		5 27 ..					
	Fw.....		6 28 ..					
	Fm.....		7 23 ..					
12	eP.....		21 54 20	5				Nothing visible on N.
	eLw.....		22 12 40					
	Mw.....		22 15 10	15	10			
	Fw.....		22 53 ..					
16	eP.....		6 06 09	5				
	S.....		6 09 10					
	S.....		6 09 12					
	eLm.....		6 11 20					
	M.....		6 12 ..	10	10	10		
	F.....		6 13 ..					
18	eP.....		19 01 51					Phases doubtful; nothing definite on N.
	eP.....		19 02 20					
	eLw.....		19 35 ..					
	F.....		19 42 ..					
	M.....		19 51 ..		30			
	F.....		21 12 ..					
Nov. 8			<i>H. m. s.</i>	<i>Sec.</i>	μ	μ	$\sigma M.$	
	P.....		4 46 22	3				N not in good adjustment.
	eLw.....		5 00 30	20				
	Mw.....		5 00 33	25				
	Mw.....		5 05 25	20	260			
	M.....		5 05 49	15	30			
	C.....		5 17 ..	17				
	Fw.....		5 38 ..	15				
	Fm.....		6 28 ..	10				
18	eP.....		18 59 05					Phases not well defined.
	eP.....		18 59 18	4				
	S.....		19 05 22					
	M.....		19 08 49		40			
	eL.....		19 13 25					
	M.....		19 13 40		50			
	Fw.....		19 43 ..	8				
	Fm.....		19 46 ..	14				

TABLE 2.—Instrumental seismological reports, November, 1918—Continued.

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _m .	A _n .		

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.

1918.		H. m. s.	Sec.	μ	μ	km.	
Nov. 9				100	150		Tremors during 24 hours preceding 10h 00m on dates given.
10				50	100		
17				300	300		
20							

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

Lat., 37° 28' 38" 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' 38" N.; long., 104° 56' 54" W. Elevation, 1,655 meters.

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

1918.		H. m. s.	Sec.	μ	μ	km.	
Oct. 4	L _N ...	20 28 ..					Time of first preliminary somewhat doubtful. Second preliminary not discernible.
	F _N ...	20 36 ..					
4	L _N ...	21 50 ..					
	F _N ...	22 02 00					
4	L _N ...	22 35 ..					
	F _N ...	22 41 ..					
8	P.....	4 59 ..					
	S.....	5 ..			*250		
	L.....	5 15 ..	20-30	*250			
	M.....	5 19 ..	20	*2,250	*2,000		
	C.....	5 25 ..					
	F.....	5 39 ..					
23	L _N ...	21 06 ..					
	F _N ...	21 27 ..					

* Trace amplitude.

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _m .	A _n .		

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. $\left\{ \begin{matrix} V \\ 110 \\ \mu \\ 6.4 \end{matrix} \right.$

1918		H. m. s.	Sec.	μ	μ	km.	
Nov. 2	e _m ...	10 33 12					
	L.....	10 34 10	12				
	F.....	11 00 ..					
3	e _m ...	11 36 00					Small amplitudes soon lost in microseisms.
	F.....	? ? ?					
5	P _w ...	22 45 48					
	S _w ...	22 50 58					
	L _w ...	22 56 15	20				
	F.....	23 15 ..					
8	P.....	4 50 40					
	S.....	5 01 12					
	L.....	5 17 30	22				
	L.....	5 20 00	30				
	L.....	5 25 00	20				
	L.....	5 35 00	16				
	F.....	8 15 ..					
9	e.....	0 15 30					Small amplitudes. Confused with microseisms. F lost in microseisms.
	F.....	0 25 ..					
12	P.....	21 49 43					
	S.....	21 53 48					
	L.....	21 55 40	20				
	L.....	22 00 00	16				
18	P.....	19 01 00					Difficult to read distant quake.
	P _{app} ...	19 04 05					
	L.....	19 44 00	35				
	L.....	19 58 00	20				
	F.....	21 10 ..					
23	e.....	23 17 13					
	S _r ...	23 20 10					
	L.....	23 39 00	24				
24	L.....	0 12 00	20				
	F.....	0 30 ..					
30	e.....	7 28 00					
	L.....	7 32 00	18				
	F.....	7 45 ..					

TABLE 2.—Instrumental seismological reports, November, 1918—Continued.

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.	
					A _m .	A _n .			
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 e				
Instrumental constants..					E	165	5.4	0	
					N	143	5.2	0	
					Z	80	3.0	0	
1918			H. m. s.	Sec.	μ	μ	km		
Nov. 2			L _m 10 34 ..	10				Microseisms.	
			L _n 10 38 ..	10					
			F 11 ..						
3			L _m 12 28 ..					Do.	
			F 13 (ca)						
8			P 4 50 47					Do.	
			S _m 5 01 25						
			S _n 5 01 34						
			eL _m 5 17 00	24					
			eL _n 5 17 18	27					
			M _n 5 29 12			*1,700			
			M _m 5 29 32	22	*1,500				
			F 8 ..						
			VERTI-CAL.		Az				
8			P 4 50 47					S doubtful. No distinct main.	
			L 4 51 03						
			eL 5 17 24	19					
			F 7 54 ..						
12			IP 21 49 47					Heavy microseisms. No distinct main. F surely after 23 hours.	
			IS _m 21 53 52						
			IS _n 21 54 00						
			eL 21 55 48						
			F ..						
18			P 19 01 08					Possibly overlapping quakes. F difficult because of microseisms. No distinct main.	
			IS 19 04 44						
			IS 19 04 48						
			S _m 19 13 55						
			S _n ? 19 14 10						
			IS 19 22 28						
			L _m 19 42 40	21					
			L _n 19 44 ..	25					
			F 21 ..						
22			e 16 30 ..						
			eL _m 16 38 ..	9					
			eL _n 16 38 24	7					
			F 16 33 ..						
30			L _m 7 25 ..	22				Heavy microseisms.	
			L _n 7 31 ..	16					
			F 7 50 ..						

*Trace amplitudes.

98630-19-3

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.	
					A _m .	A _n .			
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.	Sensitiveness 0".40			
Nov. 2			H. m. s.	Sec.	μ	μ	km		
			L 10 02 00					Sharp earthquake reported from the island of Hawaii, with renewed activity of Kilauea.	
			M 10 03 54		9.4				
			C 10 11 ..						
			F 10 48 ..						
3			e 11 53 54					P was probably obscured by the irregular motion of the paper.	
			L 11 56 06						
			M 12 00 30		0.5				
			C 12 06 ..						
			F 12 55 ..						
8			P 4 45 36	17				Pen beyond limits of paper for two minutes at time of maximum. Paper not moving at a uniform rate.	
			S 4 53 00	18					
			eL 5 02 48						
			M 5 05 ..		17+				
			C 6 22 ..		18				
			F 8 35 ..		17				
12			eP 21 58 30					Paper not moving at a uniform rate.	
			L 22 25 48						
			M 22 38 18		18	0.1			
			C 22 42 ..		18				
			F 25 27 ..		19				
14			eP 16 22 06					Paper not moving at a uniform rate.	
			L 16 33 18						
			M 16 37 00		0.1				
			C 16 40 ..						
			F 17 10 ..						
18			P 18 33 48					Paper not moving at a uniform rate.	
			S 19 02 48						
			L 19 17 00						
			M 19 28 06		15.0				
			C 19 55 ..		18				
			F 21 48 ..		19				
22			P 16 03 24	17				Preceded and followed by air tremors.	
			L 16 15 00						
			M 16 19 12		18	0.5			
			C 16 22 ..		17				
			F 7 7 7						
23			eP 23 10 24	18				Paper not moving at a uniform rate.	
			S 23 19 18	18					
			L 23 33 42						
			M 23 46 06		18	1.0			
			C 24 01 ..		18				
			F 25 47 ..						
30			e 7 15 ..					Paper not moving at a uniform rate.	
			M 7 20 ..		0.1				
			F 7 39 ..						

TABLE 2.—Instrumental seismological reports, November, 1918—Continued.

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _m .	A _N .		
<p>Kansas. Lawrence. University of Kansas. Department of Physics and Astronomy. F. E. Kester.</p> <p>Lat., 38° 57' 30" N.; long., 95° 14' 58" W. Elevation, 301.1 meters. Instrument: Wiechert.</p> <p>Instrumental constants. $\begin{matrix} E & T_0 & \epsilon \\ \hline 177 & 3.4 & 4:1 \\ N & 205 & 3.4 & 4:1 \end{matrix}$</p>								
1918 Nov. 8	IP _N		4 49 56					
	IP _N		4 49 57					
	S _N		4 59 49					
	S _N		5 00 06					
	L _N		5 09 07					
	L _N		5 09 15					
	M _N		5 22 40		8.6			
	M _N		5 27 44			6.8		
	F _N		7 00 ..					
12	P _N		21 51 09					Primary confused by clock signals. S not discernible.
	L _N		22 00 33					
	L _N		22 02 56					
	M _N		22 06 43		3.4			
	M _N		22 23 ..					Lost.
18	eF _N		19 00 47					
	eF _N		19 00 49?					
	S _N		19 02 54					
	L _N		19 04 05					
	M _N		19 04 13		8.8	5.6		
	F _N		20 59 ..					

<p>Maryland. Cheltenham. Magnetic Observatory. U. S. Coast and Geodetic Survey. George Hartnell.</p> <p>Lat., 38° 44' 00" N.; long., 76° 50' 30" W. Elevation, 71.6 meters. Instruments: Two Bosch-Omori, 10 and 12 kg.</p> <p>Instrumental constants. $\begin{matrix} E & T_0 & \epsilon \\ \hline 10 & 15 & \\ N & 10 & 15 \end{matrix}$</p>								
1918 Nov. 2	eL _N		10 38 30					
	M _N		10 40 30		11	10		
	F _N		10 43 ..		10			
8	P _N		4 51 00		3			
	S _N		5 01 37		4			
	eL _N		5 19 10					
	eL _N		5 23 40					
	M _N		5 32 35		18	40		
	C _N		5 38 ..		15			
	M _N		5 40 48		14	210		
	C _N		5 49 ..		15			
	F _N		5 52 ..					
	F _N		6 57 ..		15			
12	P _N		21 49 37		3			No long waves on E.
	S _N		21 53 42					
	L _N		21 55 46		23			
	M _N		21 59 52			60		
	C _N		22 04 ..		18			
	F _N		22 17 ..					
	F _N		22 36 ..					
18	e _N		19 01 07					Phases doubtful.
	e _N		19 01 10					
	ST _N		19 04 52					
	eL _N		19 15 ..					
	M _N		19 45 18			40		
	F _N		20 06 ..					
	F _N		20 55 ..					
23	e _N		23 20 ..					
	e _N		23 20 50					
	F _N		23 29 ..					
24	eL _N		0 12 30					
	M _N		0 17 ..		20	10		
	F _N		0 27 ..					

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _m .	A _N .		
<p>Massachusetts. Cambridge. Harvard University Seismographic Station. J. B. Woodworth.</p> <p>Lat., 42° 22' 36" N.; long., 71° 06' 59" W. Elevation, 5.4 meters. Foundation: Glacial sand over clay.</p> <p>Instruments: Two Bosch-Omori 100 kg. horizontal pendulums (mechanical registration).</p> <p>Instrumental constants. $\begin{matrix} E & T_0 & \epsilon \\ \hline 80 & 23 & 0 \\ N & 50 & 23 & 4:1 \end{matrix}$</p>								

(Report for November, 1918, not received.)

<p>Missouri. Saint Louis. St. Louis University. Geophysical Observatory. J. B. Goesse, S. J.</p> <p>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.</p> <p>Instrument: Wiechert 80 kg. astatic, horizontal pendulum.</p> <p>Instrumental constants. $\begin{matrix} E & T_0 & \epsilon \\ \hline 80 & 7 & 5:1 \end{matrix}$</p>								
1918 Nov. 8	P _N		4 50 12					
	S _N		5 00 18					
	L _N		5 15 12					
	L _N		5 16 06					
	M _N		5 21 12		24	*30,000		
	M _N		5 25 06		21	*36,000		
	M _N		5 21 12		24	*24,000		
	F _N		6 34 ..					
12	eP _N		21 50 42				3,300?	P difficult to determine on account of microseisms.
	S _N		21 55 48					
	L _N		21 58 18					
	L _N		22 03 24		18	*12,000		
	L _N		22 04 24		12	9,000		EW not working satisfactorily.
	F _N		23 00 00					
17	eL _N		22 59 09					17th and 18th impossible to decipher on account of high wind influence.
	F _N		23 25 00					
18	IS _N		19 04 21					Nov. 19-20; 25-26; and 26-27, record full of microseisms.

*Trace amplitude.

<p>New York. Buffalo. Canisius College. John A. Curtin, S. J.</p> <p>Lat., 42° 53' 02" N.; long., 78° 52' 40" W. Elevation, 190.5 meters.</p> <p>Instrument: Wiechert 80 kg. horizontal.</p> <p>Instrumental constants. $\begin{matrix} E & T_0 & \epsilon \\ \hline 80 & 7 & 5:1 \end{matrix}$</p>								
<p>(Report for November, 1918, not received.)</p>								

<p>New York. Fordham. Fordham University. Daniel H. Sullivan, S. J.</p> <p>Lat., 40° 51' 47" N.; long., 73° 53' 08" W. Elevation, 23.9 meters.</p> <p>Instrument: Wiechert, 80 kg.</p> <p>Instrumental constants. $\begin{matrix} E & T_0 & \epsilon \\ \hline 72 & 5.0 & 0 \\ N & 72 & 5.0 & 0 \end{matrix}$</p>								
<p>(Report for November, 1918, not received.)</p>								

TABLE 2.—Instrumental seismological reports, November, 1918—Continued.

New York. *Ithaca. Cornell University. Heinrich Ries.*
 Lat., 42° 26' 38" N.; long. 76° 29' 09" W. Elevation, 242.6 meters.
 Instruments: Two Bosch-Omori, 25 kg., horizontal pendulums (mechanical registration).

Instrumental constants. $\begin{matrix} V & T_0 & \epsilon \\ \sqrt{E} & 13 & 22 & 4:1 \\ & N & 14 & 25 & 4:1 \end{matrix}$

Date	Charac-ter	Phase	Time	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _m .	A _N .		
1918.								
Nov. 3	eL _m		12 27	20				
	F _m		12 38					
8	P _m		4 50 45	3				
	P _N		4 50 46	3				
	P _{sep}		4 54 08	5				
	S _m		5 01 06	7				
	S _N		5 01 14	9				
	L _m		5 16 05	30				
	L _N		5 16 35	30				
	M _m		5 28 11	18	*1,900			
	F _m		8 26					
12	eP _N		21 50 13	3				Microseisms.
	eP _m		21 50 15	3				
	S _m		21 54 39	7				
	S _N		21 54 41	5				
	L _m		21 56 26	25				
	L _N		21 56 44	20				
	F _m		22 45					
18	eP _N		19 02 07	7				
	eP _m		19 02 09	6				
	l _N		19 05 52	8		*500		
	l _m		19 05 53	7				
	eS _m		19 14 07	8				
	eS _N		19 14 44	10				
	eL _m		19 38 40	32				
	F _m		21 37					

* Trace amplitude.

Panama Canal. *Balboa Heights. Governor, Panama Canal.*

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

Instruments: Two Bosch-Omori, 100 kg.

Instrumental constants. $\begin{matrix} V & T_0 \\ \sqrt{E} & 35 & 20 \end{matrix}$

Date	Charac-ter	Phase	Time	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _m .	A _N .		
1918.								
Nov. 5	P _m		22 42 16				910	
	P _N		22 42 18					
	L _m		22 44 16	20				
	L _N		22 44 18	20				
	M _m		22 44 52		*500			
	M _N		22 44 54			*700		
	F _m		22 49					
	F _N		22 51					
8	P _m		4 57 00	20	*300	*200		
	F _m		6 34					
12	P _m		21 48 02				990	
	P _N		21 48 06					
	L _m		21 51 00	20				
	L _N		21 51 14	20		*1,700		
	M _m		21 51 18	20		*500		
	M _N		21 51 34					
	F _m		22 12					
18	P _m		19 01 23					
	P _N		19 01 36					
	L _m		19 24 18?	20				
	L _N		19 24 42?	20				
	M _m		19 7 7		*700			
	M _N		19 24 48			*1,000		
	F _m		20 33					
22	P _m		23 18 00	20				Faint tremors.
	F _m		23 25					
29	P _m		4 23 02				330	
	P _N		4 23 04					
	L _m		4 23 44	20				
	L _N		4 23 52	20				
	M _m		4 24 26		*500			
	M _N		4 24 28			*400		
	F _m		4 29					
	F _N		4 30					
29	P _m		18 11 12				90	Direction probably southerly.
	P _N		18 11 13					
	L _m		18 11 19	20				
	L _N		18 11 20	20				
	M _m		18 11 21			*1,300		
	M _N		18 11 23			*1,400		
	F _m		18 13 11					
	F _N		18 14 00					

* Trace amplitude.

Porto Rico. *Vieques. Magnetic Observatory. U. S. Coast and Geo-detic Survey. Wallace M. Hill.*
 Lat., 18° 09' N.; long., 65° 27' W. Elevation, 19.8 meters.
 Instruments: Two Bosch-Omori.

Instrumental constants. $\begin{matrix} V & T_0 \\ \sqrt{E} & 10 & 17 \\ & N & 10 & 20 \end{matrix}$

Date	Charac-ter	Phase	Time	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _m .	A _N .		
1918.								
Nov. 7	P _m		9 33 56	1				Not far distant.
	P _N		9 33 59	1				
	M _m		9 34 14			20		
	M _N		9 34 23					
	F _m		9 38					
8	eP _m		4 56 59	5				This may be P _{sep} . This may be S _{reg} . On E there are two regular waves, period 28 sec., beginning at 5h. 22m. 10s., and four waves, period about 40 sec., beginning at 5h. 26m. 30s.
	eS _m		5 12 36					
	eL _m		5 35 28					
	M _m		5 36 08	22		40		
	M _N		5 46 48	20				
	C _m		5 53	17				
	F _m		6 01	17				
	F _N		6 15	17				
12	iP _m		12 02 28	1				Not far distant.
	L _m		12 02 50					
	M _m		12 03 05	6		80	200	
	F _m		12 12	4				
12	iP _m		21 45 14	3				Not far distant. Felt at Vieques.
	eL _m		21 45 34					
	M _m		21 46 02	16		6,380	3,340	
	C _m		21 49	12				
	F _m		22 19	10				
18	iP _m		19 01 50	6				This may be P _{sep}
	eP _m		19 02 25	6				
	eL _m		19 47 10					
	eL _N		19 58 00					
	M _m		20 03 08	30		30		
	M _N		20 05 12	30			10	
	C _m		20 08	28				
	F _m		20 34	20				
	F _N		20 42	22				
11	P _m		7 21 44	2				Not far distant.
	eP _m		7 21 57					
	M _m		7 22 15			30		
	M _N		7 22 20				20	
	F _m		7 24	3				
	F _N		7 28	3				

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. $\begin{matrix} V & T_0 \\ \sqrt{E} & 10 & 15 \\ & N & 10 & 16 \end{matrix}$

Date	Charac-ter	Phase	Time	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _m .	A _N .		
1918.								
Nov. 8	P _m		4 50 32					
	S _m		5 00 57					
	L _m		5 18 00	20				
	L _N		5 20 30	24				
	L _m		5 25 30	20				
	L _N		5 34 30	16				
	F _m		7 00	16				
12	P _m		21 50 38					
	S _m		21 54 42					
	L _m		21 58 00	18				
	F _m		22 30					
18	P _m		19 00 59					Distant quake. Record appar- antly confused.
	S _m		19 04 38					
	eL _m		19 28 00					
	L _m		19 37 00	60				
	F _m		20 45					
23	e _f		23 16 10					
	F _m		23 16 40					

TABLE 2.—Instrumental seismological reports, November, 1918—Continued.

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _m .	A _n .		
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.								
$V \frac{T}{2}$								
Instrumental constants. 120 26								
1918.								
Nov. 2	e _m ?		10 28 24					
	e _p		10 33 30	10				
	e		10 35 00	10				
	L		10 38 ..	8				
	L		10 40 ..	7				
	L		10 44 ..	6				
	F		11 ..					
3	e		11 36 30	7				Early phases on
	e?		11 55 ..	12				NS confused in
	e _N		12 15 ..	407				heavy micros.
	eL _m		12 21 ..	30				Beautiful sinu-
	L		12 29 40	18				soidal L waves.
	L		12 38 ..	15				
	L		12 42 ..	15				
	L _m		13 00 ..	14				
	F		13 15 ..					
5	i		22 48 28	3				
	eL		22 59 ..	20				
	F		23 15 ..					
8	0		4 38 50			8,180		Very long period of
	iP		4 50 20					the S _{msl} waves.
	eP _{repr}		4 53 25					First read as L,
	eS		4 59 49					which they close-
	eS _{repr}		5 05 54	36				ly resemble.
	eL		5 14 30	22				
	L		5 25 ..	18				
	L		5 45 ..	17				
	L		6 00 ..	12				
	L		6 25 ..	12				
	L		6 40 ..	12				
	L		6 50 ..	10				
	L		6 55 ..	10				
	L		7 06 ..	10				
	F		8 00 ..					
HALIFAX RECORD.								
8	0		4 38 36			9,380		Halifax record fur-
	P		4 51 08					nished by Ot-
	S		5 01 37					tawa.
	L _T		5 14 30	45				L waves arrive too
SASKATOON RECORD								
8	0		4 38 49			7,100		soon by about 7
	P		4 49 22					minutes, appear-
	S		4 57 56					ing at the time
	L _T		5 06 ..					SR should ap-
SASKATOON RECORD								
8	0		4 38 49			7,100		pear, but with a
	P		4 49 22					period of 45s.
	S		4 57 56					Saskatoon record
	L _T		5 06 ..					furnished by Ot-
SASKATOON RECORD								
8	0		4 38 49			7,100		tawa.
	P		4 49 22					L waves arrive 4
	S		4 57 56					minutes too soon.
	L _T		5 06 ..					They may be
SASKATOON RECORD								
8	0		4 38 49			7,100		S _{msl} , but there is
	P		4 49 22					no break be-
	S		4 57 56					tween them and
	L _T		5 06 ..					the true L.
9	e		0 17 to					
	F		0 30 ..	8				May not be seismic.

Canada. Ottawa. Dominion Astronomical Observatory—Continued.

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _m .	A _n .		
SASKATOON RECORD—Con.								
1918.								
Nov. 10	e		13 00 to					
	F		13 05 ..		6			May not be seismic.
10	e		15 47 to		22			Very small ampli-
	F		15 50 ..					tude. NS is con-
11	eL		8 04 to					fused with wind
			8 10 ..		15			and micros.
12	0		11 45 00				2,880	
	eP		21 50 45					
	eS		21 55 19					
	eL		21 58 ..	24				
	L		22 05 ..	14				
	L		22 22 ..	14				
	F		22 45 ..					
16	eL _m		6 15 to					Very slight indica-
	F		6 25 ..					tion. NS record
18	i		19 01 01					is lost in micros-
	i		19 03 40					isms.
	i		19 04 32					Phases confused.
	eL _m		19 23 18	25				No readings ob-
	eL		19 39 ..	60				tained. Halifax
	L		19 50 ..	30				and Saskatoon
	L		20 00 ..	20				records equally
	L		20 20 ..	18				unreadable. The
	L		20 35 ..	18				records indicate
	L		21 01 ..	16				that the distur-
	F		21 30 ..					bance came from
22	e		16 31 ..					the east. Tidal
	eL		16 38 ..	17				wave at New-
	L		16 44 ..	17				foundland on
	F		17 10 ..					same date and
23	i		23 20 20					was probably
	i		23 20 35	4				connected with
	i		23 21 14	7				this earthquake,
	e _m		23 31 30	10				according to re-
24	L _T		0 05 ..	28				ports received
	L		0 20 ..	16				from Halifax.
	F		0 50 ..					
25	e _m		2 27 18	6				Heavy micros.
	eL _m		2 30 30					
	L _m		2 33 ..	18				
	L _n		2 35 ..	13				
	F		2 40 ..					
30	eL		7 17 18					Very small ampli-
	L _m		7 22 ..	19				tude. Record
	L		7 25 ..	17				barely discerni-
	L		7 30 ..	14				ble.
	L		7 34 ..	9				Seismograph out
	F		7 55 ..					of commission

TABLE 2.—Instrumental seismological reports, November, 1918—Continued.

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _m .	A _n .		
Canada. Toronto. Dominion Meteorological Service.								
Lat., 43° 40' 01" N.; long., 79° 23' 51" W. Elevation, 113.7 meters. Subsoil: Sand and clay.								
Instrument: Milne horizontal pendulum, North; in the meridian.								
Instrumental constant .187. Pillar deviation, 1 mm. swing of boom = 0.45"								
1918.			H. m. s.	Sec.	F	F	km.	
Nov. 2	L		10 45 24					
	L		10 54 24		*50			
3	L		12 25 12					Time doubtful.
	L		12 28 36					
	M		12 30 48		*700			
	F		13 44 12					
5	L		22 58 30					
	eL		23 00 48					
	M		23 02 30		*200			
	F		23 23 06					
8	eP		4 50 48				8,560	Clear record. Epi- center, lat. 51° 28' N, long. 145° East.
	iP		4 54 00					
	eS		5 00 36					
	iS		5 05 54					
	iL		5 11 00					
	iL		5 14 24					
	iL		5 24 36					
	M		5 29 00		*14,000			
	iL		5 33 42					
	iL		5 37 24					
	iL		5 46 54					
	L		6 14 00					
	F		9 18 42					
11	L		7 57 24					
	L		8 02 48		*100			
	F		8 17 36					
12	P		21 50 54				2,900	
	S		21 55 36					
	L		21 57 48					
	L		22 00 00					
	eL		22 01 06					
	M		22 05 12					
	F		23 17 30		*3,300			
16	L		6 14 48					Small micros.
18	P		19 00 00?				3,070?	May be a dual quake. S waves large.
	iS		19 04 48					
	eL		19 15 06					
	M		19 24 18		*2,000			
	iL		19 47 36					
	eL		20 02 42					
	M		20 06 48		*3,000			
	eL		20 46 54					
	F		Micros.					
22	L7		16 33 30					
	L		16 37 36					
	M		16 43 30		*300			
	F		16 56 36					
23	P7		23 25 42					
	S7		23 36 18					
	L		23 46 36					
34	eL		0 17 54					
	M		0 22 30		*300			
	eL, repl		1 04 30					
	eL		1 06 54					
	F		1 38 42					
35	L		2 27 18					
	eL		2 35 18					
	M		2 36 18		*300			
	F		3 12 12					
36								Heavy micros. began after 22 hours, continuing to 15 hours of the 27th.
30	eL		7 23 48					Disturbance abruptly became smaller at 7h 31m 24s.
	M		7 28 24					
	L		8 16 24		*400			
	F		8 18 24					

*Trace amplitudes.

Date.	Charac-ter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _m .	A _n .		
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 .187. Pillar deviation: 1 mm. swing of boom = 0.54"								
Nov. 3	P		11 43 34				9,310	
	S		11 54 00					
	L		12 06 31					
	eL		12 19 02					
	M		12 24 03		*500			
	F		12 32 04					
8	P		4 47 25				4,180	Kamchatka.
	S		4 53 22					
	L		5 03 47					
	M		5 20 29				8,000	
	F		8 48 01					
	VERTI- CAL.						Az.	
	P		4 47 00	2-5			5,060	Kamchatka.
	S		4 58 46	3				
	L		5 01 40	24				
	M		5 22 08	24			14	
12	P		21 54 14				6,330	May be West Indies.
	S		22 02 08					
	L		22 12 52					
	M		22 20 28				*1,000	
	eL		22 27 20					
	F		23 05 06					
16	P		6 14 04?					
	L		6 18 59					
	M		6 20 27		*200			
	F		6 27 50					
18	P		18 55 14				2,770	S waves well defined.
	S		18 59 40					
	L		19 08 03					
	M		19 44 25		*9,000			
	eL		20 57 33					
	eL		21 01 09					
	M, repl		21 05 09		*1,000			
	eL		21 13 45					
	F		22 01 09					
	VERTI- CAL.						Az.	
	S		19 00 18	3-4				
	L		19 07 38	14				
	M		19 44 34	36			4	
	F		7 7 7					
20	M		6 57 19		*100			
22	P		18 05 00?					
	M		18 29 30		*200			
	F		17 01 30					
23	P		23 21 36				7,400?	
	e		23 28 14					
	S		23 30 27					
	L		23 41 45?					
	L		23 46 11?					
24	M		0 06 51		*500			
	F		1 33 24					
30	S		7 09 03					Disturbance abruptly became less at 7h 24m 04s.
	L		7 16 44					
	M		7 22 07		*400			
	F		7 41 02					

*Trace amplitudes.

SEISMOLOGICAL DISPATCHES.¹

San Juan, P. R., October 25, 1918.

Another heavy earthquake shock was felt at 11.15 o'clock last night. The disturbance is reported to have caused further property loss at Mayaguez and Ponce, and small loss of life and property at Aguadilla. (Assoc. Press.)

Honolulu, Hawaii, November 4, 1918.

Spouting lava a hundred feet from new cracks in the old floor Saturday morning, the crater Kilauea entirely buried the old resthouse. The eruption followed severe earthquakes throughout the island of Hawaii Friday night at 11.33 o'clock. The Kilauea fire pit has been rising for three days, and lava is flowing continuously in several directions. (Assoc. Press.)

Rome, Italy, November 11, 1918.

Heavy earth shocks, accompanied by property damage and loss of life occurred Sunday in the provinces of Florence and Forli.

The villages of Santa Sofia, Bagnodiromaga and Mordane particularly suffered. At Santa Sofia a church collapsed, eight persons being killed and several injured. (Assoc. Press.)

San Juan, P. R., November 14, 1918.

Two earthquakes occurred in Porto Rico yesterday, the first at 8 o'clock in the morning, and the second at 6 o'clock in the evening. Both shocks caused some damage in cities reporting losses in the earthquake of last October, but there was no additional loss of life. (Assoc. Press.)

Guatemala, November 16, 1918.

Four earthquake shocks were felt at this place between the hours of 8 and 10 o'clock a. m., local time. (Special observer.)

Guatemala, November 18, 1918.

A shock was felt at 10 o'clock a. m. (Special observer.)

Los Angeles, Cal., November 19, 1918.

An earthquake, sharp enough to rattle windows and jar dishes from shelves, was felt to-day in the southwestern part of Los Angeles and along the ocean as far as Santa Monica. The tremor, which lasted more than half a minute, seemed to be most pronounced at Santa Monica. (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 DECEMBER, 1918.

W. J. HUMPHREYS, Professor in Charge.

[Dated: Seismological Investigations, Weather Bureau, Feb. 3, 1919.]

TABLE 1.—Noninstrumental earthquake reports, December, 1918.

Day.	Approximate time, Greenwich Civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity Rossi-Forcl.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
CALIFORNIA.										
1918.	H. m.						M. s.			
Dec. 5	2 38	Paso Robles.....	35 37	120 42	4	1	5	Rumbling.....	Abrupt rocking.....	F. J. Nye.
		San Luis Obispo.....	35 18	120 39	2	1	Few.	None.....	Trembling.....	J. E. Hissong.
14	10 00	San Miguel Island.....	34 02	120 20	4	1		None.....		James R. Moore.
29	6 50	Calexico.....	32 41	115 30	2	1		Rumbling.....	Bumping.....	H. M. Rouse.
	7 00	do.....	32 41	115 30	1	1		None.....	do.....	Do.
OREGON.										
6	8 45	Portland.....	45 32	122 41	1	6	12	Faint.....	Gradual rocking.....	Helen J. Olson.
WASHINGTON.										
6	8 45	Seattle.....	47 38	122 20		1				Associated Press.

TABLE 2.—Instrumental reports, October, 1918.

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

[For significance of symbols see REVIEW for January, 1918, p. 34.]

Date.	Character.	Phase.	Time.	Period. T.	Amplitude.		Distance.	Remarks.
					A _m	A _N		

Alabama. *Mobile. Spring Hill College.* Cyril Ruhlmann, S. J.
 Lat., 30° 41' 44" N.; long., 88° 08' 46" W. Elevation, 60 meters.
 Instrument: Wiechert 80 kg. horizontal.

V T₀
 Instrumental constants. — — — — —

1918.		H. m. s.	Sec.	μ	μ	km.	
Dec. 2	e.....	10 03 00					N undamped.
	eP.....	11 57 50				6,350	
4	F _{respl}	12 00 20					
	S _N	12 05 45					
	F.....	13 19 00					
6	eP.....	8 47 50					* Trace amplitude.
	iS.....	8 53 28					
	S _{respl}	8 59 20	8	*1,000	*3,500		
	L _N	9 00 50	6	*5,000	*20,000		
	L _M	9 01 02	6	*5,000			
	M _N	9 01 22	6	*5,000	*31,000		
	M _S	9 02 20	6	*5,500			
	M _N	9 03 50	5		*15,000		
	F.....	9 36 00					
6	e.....	12 21 20					
	F.....	12 36 00					

Alaska. *Sitka. Magnetic Observatory.* U. S. Coast and Geodetic Survey. F. P. Ulrich.
 Lat., 57° 03' 00" N.; long., 135° 30' 06" W. Elevation, 15.2 meters.
 Instruments: Two Bosch-Omori, 10 and 12 kg.

V T₀
 Instrumental constants. — — — — —

1918.		H. m. s.	Sec.	μ	μ	km.	
Dec. 4	eL _N	12 55					Only a few long waves.
	M.....	13 01	18	10			
	C _N	13 03					
6	F _N	8 43 15	4			1,040	Time at origin 8h., 41m.
	eP _N	8 43 23	7				
	eS _N	8 45 10					
	eS _N	8 45 12					
	L _N	8 45 32	20				
	L _N	8 45 39	18				
	M.....	8 46 15	18	870			
	M _N	8 46 43	16		1,070		
	C.....	8 45	10				
	F _N	9 23	10				
	F.....	9 34	6				
6	eP _S	12 07 09	4				Not far distant. No discount M. N not in good adjustment.
	eP _N	12 07 24					
	eL _N	12 07 45		10			
	eL _N	12 08 02			10		
	F.....	12 28	4				

Arizona. *Tucson. Magnetic Observatory.* U. S. Coast and Geodetic Survey. William H. Cullum.

Lat. 32° 14' 48" N.; long., 110° 50' 08" W. Elevation, 769.6 meters.

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

V T₀
 Instrumental constants. — — — — —

1918.		H. m. s.	Sec.	μ	μ	km.	
Dec. 2	eL _N	10 21 00					Nothing on N.
	M _N	10 25 20	19	10			
	C _N	10 31					
	F _N	11 07					
4	eP _N	11 58 00	4				Time marking clock out of order. Times are based on the assumption of a uniform rate of the driving clocks.
	eP _N	11 59 23					
	eS _N	12 08 22					
	eL _N	12 16					
	eL _N	12 24					
	M _N	12 26 34	15	60			
	M _N	12 26 35			40		
	C _N	12 35					
	C _N	12 30	15				
	F _N	13 24					
	F _N	14 07	13				
6	F _N	8 45 52	3				
	F _N	8 46 50	3				
	S _N	8 49 53	12				
	S _N	8 50 55					
	eL _N	8 51 15	25				
	eL _N	8 54 10					
	M _N	8 55 30	17		340		
	M _N	8 55 35	12	600			
	C _N	8 57					
	C _N	9 00	11				
	F _N	9 11					
	F _N	9 42	8				
9	eP _S	19 21 20					
	eL _N	19 43 15					
	M _N	19 46 10	16	10			
	F _N	20 39					
23	eP _S	19 54 35					
	eL _N	19 59 23					
	M _N	20 00 43	12	50			
	F _N	20 14					

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, October, 1918—Continued.

Date.	Charac-ter.	Phase.	Time.	Period. T.	Amplitude.		Dis-tance.	Remarks
					A _m	A _N		

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 College. F. J. Dick.*
 Lat., 32° 43' 03" N.; long., 117° 15' 10" W. Elevation, 91.4 meters.
 Instrument: Two-component, C. D. West seismoscope.

1918.	Date.	H. m. s.	Sec.	μ	μ	km.	Remarks
Dec.	4			200	200		Tremors during 24 hours preceding 16h. 00m. on date given.

California. *Santa Clara. University of Santa Clara. J. S. Ricard, S. J.*
 Lat., 37° 26' 38" 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.

1918.	Date.	H. m. s.	Sec.	μ	μ	km.	Remarks
Dec.	2	L _w 14 30 F _w 19					Distinct activity on E-W.
	4	L 11 37 F 11 46	20	*500	*500		Very regular sinusoidal. Time and beginning somewhat doubtful.
	6	P 8 43 S 8 49 L 8 50 M _w 8 51 C 8 53 F 9 02	5-6	*4,000 *6,000 *7,600	*3,500 *9,000 *7,500		First preliminaries of large amplitude. Second preliminaries not easily discernible.
	21	L _w 12 26 F _w 12 34					Distinct but very small waves, stronger on N-S.
	30-31						Activity at intervals.
	31	P 3 33 L 3 36 F 3 53	20	*6,800			First preliminaries on N-S have large amplitude. Second preliminaries not discernible.

* 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.

1918.	Date.	H. m. s.	Sec.	μ	μ	km.	Remarks
Dec.	1	iL 2 59 33 eL 3 30 L 3 33 F 4 00					
	2	iP 9 55 21 S 10 01 35 L 10 05 49 F 11 00				4,080	
	4	P 11 58 24 S 12 06 55 L 12 15 L 12 29 L 12 44 L 14 28 F 15 00	24			7,030	

Date.	Charac-ter.	Phase.	Time.	Period. T.	Amplitude.		Dis-tance.	Remarks.
					A _m	A _N		

District of Columbia. *Washington—Continued.*

1918.	Date.	H. m. s.	Sec.	μ	μ	km.	Remarks.
Dec.	6	iP 6 43 10 S 8 53 54 L 9 57 40 M 9 02 F 9 55			*75,000 *75,000	3,940	
	6	e 12 20 M 12 22 40 F 12 45			*7,000		Followed by very heavy microseisms.
	9	e 18 41 L 18 44 30 F 19 00	16				
	9	P 19 03 34 S 19 17 36 eL 19 27 35 L 19 31 30 F 20 25	16				
	21	P 9 32 20 S 9 37 52 L 9 47 F 9 55				3,040	
	23	e 19 58 23 eL 19 59 20 F 20 20					

* Trace amplitude.

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...
 E 165 5.4 0
 N 143 5.2 0
 Z 80 3.0 0

1918.	Date.	H. m. s.	Sec.	μ	μ	km.	Remarks.
Dec.	1	e 2 59 30 eL 3 30 06 L 3 33 12 L 3 33 37 F 3 55					Heavy microseisms. No distinct Main.
	2	P 9 55 21 S 10 01 38 S 10 01 39 eL 10 07 00 F 10 50					Do.
	4	VERTICAL. Az.					S doubtful.
		eP 9 55 29 eL 10 06 48 F 10 40	24				
	4	P 11 58 22 P 11 58 27 S 12 07 07 eL 12 17 42 M 12 19 54 M 12 30 00 F 15 ca			*1,000 *1,300		Heavy microseisms. F difficult.
	6	e 7 41 10 Set post- on.					Microseisms. Dif- ficult.
	6	iP 8 48 11 S 8 53 37 eL 8 57 24 eL 8 57 30 M 9 00 44 M 9 00 51 F 10ca			*42,000+ *30,500		E-W needle off.
	6	VERTICAL. Az.					Gram difficult, very heavy microseisms. F surely after 12h, 30m.
		P 8 47 64 eS 8 53 29 eL 8 56 30 M 9 00 48 F 10 20	11 7		*11,500		

* Trace amplitude.

TABLE 2.—Instrumental reports, October, 1918—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude.		Dis- tance.	Remarks.
					A _B	A _N		
District of Columbia. Washington—Continued.								
1918.			H. m. s.	Sec.	μ	μ	km.	
Dec. 9	e		18 41 26					Very heavy microseisms. F lost in following 'quake.
	eL ₇		18 43 42	16				
	eL ₇		18 44 24	13				
	L ₇		18 46 24	16				
	F ₇		19 ? ?					
9	eL		19 26 ..					Very heavy microseisms. F difficult.
	L _N		19 30 30	14				
	L _N		19 30 42	16				
	L _N		19 34 ..	19				
	L _N		19 35 ..	19				
	F		20 20 ..					
21	P _N		9 32 21					Heavy microseisms. B very doubtful.
	F _N		9 32 24					
	S _N		9 32 56					
	S _N		9 38 23					
	eL		9 42 06	11				
	L		9 47 ..	14				
	F		10 02 ..					
23	e		19 57 04					Heavy microseisms. B very doubtful.
	S ₇		19 58 38					
	S ₇		19 58 40					
	F		20 10 ..					

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.

Instrument constant .18.5

Date.	Character.	Phase.	Time.	Period. T.	Amplitude.		Dis- tance.	Remarks.
					A _B	A _N		
District of Columbia. Washington—Continued.								
1918.			H. m. s.	Sec.	μ	μ	km.	
Dec. 9	e		18 41 26					Very heavy microseisms. F lost in following 'quake.
	eL ₇		18 43 42	16				
	eL ₇		18 44 24	13				
	L ₇		18 46 24	16				
	F ₇		19 ? ?					
9	eL		19 26 ..					Very heavy microseisms. F difficult.
	L _N		19 30 30	14				
	L _N		19 30 42	16				
	L _N		19 34 ..	19				
	L _N		19 35 ..	19				
	F		20 20 ..					
21	P _N		9 32 21					Heavy microseisms. B very doubtful.
	F _N		9 32 24					
	S _N		9 32 56					
	S _N		9 38 23					
	eL		9 42 06	11				
	L		9 47 ..	14				
	F		10 02 ..					
23	e		19 57 04					Heavy microseisms. B very doubtful.
	S ₇		19 58 38					
	S ₇		19 58 40					
	F		20 10 ..					

Date.	Character.	Phase.	Time.	Period. T.	Amplitude.		Dis- tance.	Remarks.
					A _B	A _N		
District of Columbia. Washington—Continued.								
1918.			H. m. s.	Sec.	μ	μ	km.	
Dec. 9	e		4 32 00					Tremors continue to next 'quake.
	M		4 44 00	19	*100			
	C		4 46 ..	19				
	F		4 59 ..					
9	eP		18 16 18					Tremors continue to next 'quake.
	iS		18 18 24					
	eL		18 21 42					
	M		18 25 00		*700			
	F		19 ? ?					
9	eP		19 01 00					Pendulum not entirely free from Dec. 16-23.
	iS		19 06 48					
	eL		19 12 00					
	M		19 16 00		*1,200			
	C		19 20 ..					
	F		20 13 ..					
10	e		17 33 30	22				Pendulum not entirely free from Dec. 16-23.
	M		17 39 12		*200			
	C		17 42 ..					
	F		17 55 ..					
23	eP		20 14 54	20				Pendulum not entirely free from Dec. 16-23.
	eL		20 16 00	20				
	M		20 19 30	18	*100			
	C		20 22 ..	18				
	F		21 22 ..					
25	P		10 20 12	18				Pendulum not entirely free from Dec. 16-23.
	iS		10 36 24	20				
	eL		10 49 12					
	M		10 52 54		*300			
	C		11 01 ..					
	F		11 23 ..					
20	eP		7 36 24	20				Pendulum not entirely free from Dec. 16-23.
	eL		7 42 48	21				
	M		7 48 00	17	*200			
	C		7 50 ..	18				
	F		8 21 ..					

*Trace amplitude.

Kansas. Lawrence. University of Kansas. Department of Physics and Astronomy. F. E. Keeler.

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

Instrument: Wiechert.

Instrumental constants. $\begin{matrix} E & V & T_0 & \epsilon \\ 177 & 3.4 & 4.1 \\ N & 205 & 3.4 & 4.1 \end{matrix}$

Date.	Character.	Phase.	Time.	Period. T.	Amplitude.		Dis- tance.	Remarks.
					A _B	A _N		
District of Columbia. Washington—Continued.								
1918.			H. m. s.	Sec.	μ	μ	km.	
Dec. 4	eP		11 58 41					Preceded and followed by five hours of microseisms.
	eS ₇		12 07 43					
	eS ₇		12 07 51					
	L ₇		12 10 22					
	L ₇		12 16 53					
	M ₇		12 16 58		7.9			
	M ₇		12 17 10			2.0		
	F ₇		14 45 ..					
	F ₇		14 51 ..					
	F ₇		14 51 ..					
6	P _N		8 46 24					Preceded and followed by five hours of microseisms.
	P _N		8 46 26					
	C		8 46 27		-7.6	-3.9		
	M		8 46 30	4-6	+27.1	+15.6		
	S _N		8 50 49					
	S _N		8 50 51					
	L _N		8 53 57					
	L _N		8 54 04					
	M _N		8 54 32	4-5	+55.4			
	M _N		8 54 39	4-5		-48.3		
	F		10 15 ..					
6	P _N		12 08 17					Preceded and followed by five hours of microseisms.
	P _N		12 08 19					
	C		12 08 20		+25.4	-19.5		
	S ₇		12 12 48					
	S ₇		12 12 52					
	L ₇		12 15 55					
	L ₇		12 15 57					
	F		12 46 ..					

TABLE 2.—Instrumental reports, October, 1918—Continued.

Date.	Charac-ter.	Phase.	Time.	Period. T.	Amplitude.		Dis-tance.	Remarks.
					A _N	A _N		

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

Lat. 38° 44' 00" N.; long., 78° 50' 30" W. Elevation, 71.6 meters.

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

Instrumental constants. $\frac{V}{N} \frac{T_0}{10} \frac{\epsilon}{15}$
 $\frac{V}{N} \frac{T_0}{10} \frac{\epsilon}{15}$

1918.	Date.	Charac-ter.	Phase.	Time.	Period. T.	Amplitude. A _N	Amplitude. A _N	Dis-tance. Km.	Remarks.		
1918.	Dec. 1	eL _N	S	3 32 20	15	10	10		Long waves not well defined.		
				3 33 30							
				3 34 10							
				3 34 20							
		F	15	10	10	15	10	10			
											3 46 ..
											9 55 36
											10 01 46
		S	9	10	10	9	10	10			
											10 01 55
											10 02 00
											10 07 20
M _N	9	20	30	9	20	30					
								10 31 ..			
								10 38 ..			
								11 58 30			
P	3	10	410	3	10	410					
								12 07 00			
								12 25 45			
								12 28 40			
eL _N	18	50	410	18	50	410					
								12 30 10			
								12 30 30			
								12 30 30			
C	8	50	410	8	50	410					
								12 33 ..			
								13 47 ..			
								8 48 16			
P	3	10	4,020	3	10	4,020					
								8 58 40			
								9 00 06			
								9 00 40			
M _N	550	600	600	550	600	600					
								9 01 02			
								9 06 ..			
								9 35 ..			
eP _N	3	10	600	3	10	600					
								12 21 28			
								12 22 08			
								12 22 40			
S	3	10	600	3	10	600					
								12 22 40			
								12 25 45			
								12 28 40			
M _N	6	20	410	6	20	410					
								12 25 45			
								12 31 ..			
								18 44 30			
eL _N	18	420	410	18	420	410					
								18 44 50			
								18 48 ..			
								18 49 ..			
F	18	420	410	18	420	410					
								19 28 25			
								19 30 55			
								19 36 15			
M _N	15	10	10	15	10	10					
								19 37 10			
								19 52 ..			
								19 54 51			
eP _N	8	20	410	8	20	410					
								19 55 46			
								19 59 24			
								19 59 54			
L _N	11	20	410	11	20	410					
								20 00 18			
								20 00 18			
								20 01 ..			
C	8	20	410	8	20	410					
								20 13 ..			
								20 13 ..			
								20 13 ..			

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. $\frac{V}{N} \frac{T_0}{23} \frac{\epsilon}{0}$
 $\frac{V}{N} \frac{T_0}{23} \frac{\epsilon}{0}$

1918.	Date.	Charac-ter.	Phase.	Time.	Period. T.	Amplitude. A _N	Amplitude. A _N	Dis-tance. Km.	Remarks.								
1918.	Dec. 1	O	S	2 59 44	6	7	7		Isolated waves. Continuous record from 0 _N .								
				3 00 40													
				3 12 51													
				3 24 52													
				3 27 06													
				3 28 20													
				4 04 30													
				4 05 50													
				L _N						8	10	10	8	10	10		
																	5 48 49
																	5 49 45
																	5 49 45

Date.	Charac-ter.	Phase.	Time.	Period. T.	Amplitude.		Dis-tance.	Remarks.
					A _N	A _N		

Massachusetts. *Cambridge—Continued.*

1918.	Date.	Charac-ter.	Phase.	Time.	Period. T.	Amplitude. A _N	Amplitude. A _N	Dis-tance. Km.	Remarks.								
1918.	Dec. 2	O	S	9 47 48	22	16	16	4,220	N uncertain.								
				9 55 21													
				9 55 24													
				10 00 56													
				10 01 21													
				10 04 22													
				11 30 ..													
				11 47 57													
				4						O	S	11 47 50	18	16	16	7,550	67° 57'. Northern (Chlo. 68° 45'. Break in records changing sheets from 13h. 06m. to 14h. 24m. F masked by microseisms.
												11 58 35					
												11 58 53					
												12 07 32					
12 07 55																	
12 22 33																	
12 24 58																	
12 27 40																	
12 28 48																	
12 30 49																	
12 34 ..																	
12 31 05																	
12 33 23																	
12 35 51																	
12 36 02																	
12 37 24																	
12 40 ..																	
12 46 ..																	
14 25 22																	
14 27 31																	
14 38 41																	
14 43 16																	
15 11 ..																	
15 52 ..																	
4	L _N	20	20	20	20	20	20	4,020	Time at origin 8h., 41m.								
										15 16 04							
										18 19 10							
										18 23 ..							
6	O	S	8 40 54	44	40	40	3,930	35° 22'. N undamped, stylus thrown off sheet at 9h. 02m.									
			8 43 07														
			8 53 50														
			8 59 44														
			9 01 17														
			9 02 04														
			9 03 ..														
			9 06 28														
			9 54 ..														
			6						O	S	12 postea	4	2,000	3,000	2,000	e and F in microseisms.	
											12 18 43						
											12 22 14						
12 22 16																	
9	O	S	12 postea	4	2,000	3,000	2,000	e lost in heavy microseisms. Times of phases somewhat uncertain, clock pendulum out of order. F merged in next 'quake.									
			18 21 ..														
			18 34 05														
			18 40 05														
9	O	S	18 41 08	19	19	19	19	19									
			18 45 05														
			19 ? ?														
			19 20 28														
9	O	S	19 20 28	40	40	40	40	40									
			19 22 58														
			19 25 04														
			19 31 21														
9	O	S	19 34 37	16	16	16	16	16									
			19 34 53														
			21 43 ..														
			19 ..														
14	O	S	19 40 ..	16	16	16	16	16									
			19 40 ..														
			19 41 30														
			19 50 ..														
21	O	S	9 31 18	2	2	2	4,170	Δ and O from L-S. Pendulum steps north. Pendulum steps north. But microseisms of 6sec. period were running at the time.									
			9 32 41														
			9 33 22														
			9 33 28														
			9 34 39														
			9 36 37														
			9 36 79														
			9 40 46														
			9 42 34														
			9 42 53														
			9 43 15														
			9 47 48														
9 55 ..																	
25	O	S	6 14 16	0.41	*500	*500	*500	27	Explosion of powder mill, Maynard, Mass. E damped 1.5/; N 0/1. Loud noise heard, shook house near by.								
			6 14 19														
			6 14 19														
			6 14 21														
			6 14 22														
			6 14 28														
			6 14 33														
			6 14 41														

* Trace amplitude.

TABLE 2.—Instrumental reports, October, 1918—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude.		Distance.	Remarks.
					A ₁	A ₂		

Missouri. *Saint Louis. St. Louis University.* Geophysical Observa-
tory. J. B. Goesse, S. J.

Lat., 38° 38' 15" N.; long., 90° 13' 53" W. Elevation, 160.4 meters. Foundation: 12 feet of tough clay over limestone of Mississippi system, about 800 feet thick.

Instrument: Wiechert 80 kg. astatic, horizontal pendulum.

Instrumental constants. $\frac{V}{80} \frac{T_0}{7} \frac{e}{5.1}$

1918.		H. m. s.	Sec.	μ	μ	km.	
Dec. 2	eP	9 56 48				5,200	
	eS	10 03 42					
	eL	10 06 06					
	M	10 09 06	30		*1,000		
	F	11 05					
4	iP _N	11 58 42				9,600	Reported from
	eS	12 08 24			*4,000		Chili. N-S well
	L	12 19 00	18				defined, E-W
	L	12 26 00	18				very undefined
	L	12 29 54	18		*3,000		and irregular.
	F	13 26					
4	eL	13 48 06					Record on E-W
	P	13 7					well defined, N-S
	S	13 7					hardly noticea-
	F	14					ble; hence it is
							believed that
							this disturbance
							is quite distinct
							from the one
							above. P and S
							lost changing rec-
							ord. F lost in
							microseisms,
							which continued
							all day.
6	iP _N	8 47 00				3,200	Both E and N un-
	eS	8 51 48					damped.
	S	8 52 00					
	L	8 55 36					
	L	8 55 54					
	M	8 56 18	6		*46,000		
	M	8 56 30	9		*21,000		
	F	10 16					
6	e _N	12 10 54					
	e _N	12 17 36					
	i _N	12 17 48					
	e _N	12 20 12					
	F	? ? ?					
9	e _N	18 22 00					
	eL	18 35 36					
	F	? ? ?					
9	iP _N	19 03 00					
	e	19 11 09					
	L	19 26 00					
	F	21 ? ?					

* 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. $\frac{V}{80} \frac{T_0}{7} \frac{e}{5.1}$

(Report for December, 1918, not received.)

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

Lat., 40° 51' 46" N.; long., 73° 53' 08" W. Elevation, 29.3 meters.

Instrument: Wiechert, 80 kg.

Instrumental constants. $\begin{cases} E & 72 & 5.0 & 0 \\ N & 72 & 5.0 & 0 \end{cases}$

Date.	Character.	Phase.	Time.	Period. T.	Amplitude.		Distance.	Remarks.
					A ₁	A ₂		

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

Lat., 42° 36' 58" N.; long., 76° 29' 09" W. Elevation, 242.6 meters.

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

Instrumental constants. $\begin{cases} V & T_0 & e \\ E & 13 & 22 & 4:1 \\ N & 14 & 25 & 4:1 \end{cases}$

1918.		H. m. s.	Sec.	μ	μ	km.	
Dec. 2	eP _N	9 51 19	3				Microseisms. Time
	eP _N	9 51 23	3				clock erratic.
	S _N	9 57 47	15				
	S _N	9 57 48	17				
	L _N	10 08 02	21				
	L _N	10 03 10	16				
	M _N	10 03 55	15		*600		
	F _N	10 51					
4	eP _N	11 58 47	3				
	eP _N	12 06 25	3				
	eS _N	12 08 43	10				
	eS _N	12 08 50	9				
	i _N	12 09 45	15	*1,000			
	M _N	12 34 10	19		*1,500		
	M _N	12 34 20	18		*1,300		
	F _N	15					
6	P _N	8 48 33	3				Time clock not in
	P _N	8 4 358	3				good order.
	eS _N	8 54 02	6				
	eS _N	8 54 03	7				
	M _N	9 00 33	16	*4,200	*7,000		
	M _N	9 01 09	10	*4,000			
	M _N	9 01 18	9		*6,000		
	F _N	9 59					
6	e	12 19	5				Microseisms.
	M	12 22 15	5	*500			
	L	12 24 45	11				
	F	12 31					
9	eL _N	18 40	25				
	F _N	19 02					
9	eP _T	19 12	4				Time marker not
	eL _T	18 27 15	13				working; times
	L _T	19 30	14				estimated.
	F _T	20 11					
21	eP _N	9 33 26	3				
	S _N	9 39 14	6				
	e	9 42 30	5				
	L _N	9 44 15	26				
	F _N	10 00					
23	e _N	19 54 15	6				
	L _N	19 59 11	25				
	F _N	20 22					

* Trace amplitude.

Panama Canal. *Balboa Heights.* Governor, Panama Canal.

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

Instruments: Two Bosch-Omori, 100 kg.

Instrumental constants. $\frac{V}{35} \frac{T_0}{20}$

1918.		H. m. s.	Sec.	μ	μ	km.	
Dec. 2	P	9 54 46					Faint trace.
	F	10 28 00					
4	P _N	11 55 08				2,320	
	P _N	11 55 16					
	L _N	12 01 42					
	L _N	12 02 08					
	M _N	12 04 06			*4,000		
	M _N	12 13 56				*3,000	
	P _N	13 27 32					
	F _N	13 30 00					
4	P _N	15 27 36				90	
	P _N	15 27 56					
	L _N	15 28 24					
	M _N	15 28 36			*800		
	L _N	15 28 34					
	M _N	15 28 40			*1,800		
	P _N	15 32 00					
	F _N	15 34 00					

* Trace amplitude.

TABLE 2.—Instrumental reports, October, 1918—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude.		Dis- tance.	Remarks.	
					A _m	A _N			
Panama Canal. Balboa Heights—Continued.									
1918. Dec. 4		P	H. m. s. 17 15 04			μ *300	μ *500	km.	Faint trace.
		F	17 19 00						
6		P	8 51 00						Do.
		F	8 58 00						
11		P _N	17 48 50					735	
		P _m	17 49 14						
		L _m	17 50 50						
		M _m	17 50 54			*1,000			
		L _N	17 52 26						
		M _N	17 52 36				*1,000		
		F	18 00 00						
12		P	8 21 00						Very indistinct trace.
		F	8 22 00						
21		P _m	9 27 46					1,000	
		P _N	9 27 49						
		L _m	9 29 53						
		L _N	9 29 54						
		M _m	9 29 55			*3,000			
		M _N	9 29 57				*1,500		
		F	9 42 00						
23		P	19 47 00						Slight disturbance.
		F	20 02 00						
27		P	8 27 00						Do.
		F	8 31 00						

* Trace amplitude.

Porto Rico. Vieques. Magnetic Observatory. U. S. Coast and Geodetic Survey. Wallace M. Hill.

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

Instruments: Two Bosch-Omori.

Instrumental constants. $\begin{matrix} V & T_0 \\ E & 10 & 17 \\ N & 10 & 20 \end{matrix}$

Date.	Character.	Phase.	Time.	Period. T.	Amplitude.		Dis- tance.	Remarks.	
					A _m	A _N			
1918. Dec. 2		P _m	H. m. s. 9 52 44			μ	μ	km.	
		P _N	9 52 50						
		S _T	9 56 52						
		M _m	9 57 50				20		
		M _N	9 58 14			28		300	
		C	10 00 ..			8			
		F	10 50 ..						
4		eP _N	11 55 50			3			Phases not well defined and difficult to correlate. Paper of N changed at 12h., 57m. and nothing appears on the new sheet.
		eP _m	11 56 12			3			
		eS _m	12 03 34			13			
		eS _N	12 03 52			8			
		T _m	12 06 40			24			
		T _N	12 06 56			14			
		M _m	12 07 12			26	420		
		eL _m	12 10 30			24			
		eL _N	12 12 20			30			
		M _m	12 14 30			22	240		
		M _N	12 19 01			18		1,200	
		C	12 25 ..			16			
		F _m	12 57 ?			15			
		F _N	14 02 ..			16			
6		P _m	8 51 32			4			P and S very faint.
		S _m	8 59 02			8			
		S _N	8 59 08			8			
		eL _m	9 09 11			24			
		eL _N	9 09 50			22			
		M _m	9 16 04			20		20	
		M _N	9 16 31			26		20	
		C	9 20 ..			17			
		F	9 34 ..						
21		O _m	9 29 54			5			No definite phases.
		e _m	9 30 25					10	
		M _m	9 33 03			8			
		F _m	9 37 06			12	10		
		F _N	9 42 ..						
		F _m	9 50 ..						
23		P _m	19 49 31			5			
		P _N	19 49 46			5			
		S _T	19 55 50						
		eL _m	20 00 11			10			
		eL _N	20 00 20			12			
		M _m	20 00 25			14	10		
		F _m	20 05 ..						
		F _N	20 08 ..			(end)			

Date.	Character.	Phase.	Time.	Period. T.	Amplitude.		Dis- tance.	Remarks.
					A _m	A _N		
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. $\begin{matrix} V & T_0 \\ E & 10 & 15 \\ N & 10 & 16 \end{matrix}$								

Date.	Character.	Phase.	Time.	Period. T.	Amplitude.		Dis- tance.	Remarks.	
					A _m	A _N			
1918. Dec. 2		e	H. m. s. 9 55 27			μ	μ	km.	
		S	10 01 44						
		L	10 03 00			20			
		L	10 21 00			14			
		F	10 40 ..						
4		P	11 58 54						
		S	12 09 05						
		eL	12 16 20						
		L	12 34 00			16			
		F	13 20 ..						
6		P	8 47 57						
		S	8 53 55						
		eL	8 59 7						
		M _m	9 04 ..			*6,000			
		F	9 40 ..						
6		e _m	12 21 ..						Phases uncertain.
		F	12 35 ..						

* Trace amplitude.

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. $\begin{matrix} V & T_0 \\ E & 120 & 26 \end{matrix}$

Date.	Character.	Phase.	Time.	Period. T.	Amplitude.		Dis- tance.	Remarks.	
					A _m	A _N			
1918. Dec. 1		I	H. m. s. 2 58 56			μ	μ	km.	
		eL _m	3 14 48						
		L	3 20 ..			32			
		L	3 28 ..			18			
		L	3 43 ..			14			
		F	3 55 ..						
2		O	9 47 30					4,800	
		IP	9 55 45						
		IS	10 02 16						
		eL	10 05 30			21			
		L	10 09 ..			21			
		L	10 17 ..			14			
		L	10 32 ..						
		F	11 10 ..						
4		O	11 47 43					8,000	
		eP	11 59 04						
		eS	12 08 24						
		eL	12 19 18			34			
		L	12 30 ..			19			
		L	12 36 ..			17			
		L	12 50 ..			17			
		L	13 00 ..			18			
		L	13 15 ..			18			
		L	13 33 ..			18			
		L	13 50 ..			15			
		L	14 05 ..			15			
		L	14 15 ..			15			
		L _w	14 16 ..			30			
		L _w	14 25 ..			23			
		F	15 10 ..						
6		I	7 42 28						
		eL _m	8 05 48			18			
		to	8 17 ..						
6		O	8 40 58					3,850	
		P	8 47 60						
		S	8 53 16						
		eL	8 55 ..			7			
		M	9 00 ..			10	100	200	
		L	9 20 ..			10			
		F	9 58 ..						
SASKATOON RECORD.									
		O	8 40 58					1,460	
		S	8 44 05						
		S	8 48 38						
		L	8 47 26						

TABLE 2.—Instrumental reports, October, 1918—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude.		Distance.	Remarks.
					A _w	A _s		
Canada. Ottawa—Continued.								
HALIFAX RECORD.								
1918.								
	O.....		8 40 57				4,560	N-S component of the sheet during maximum. Above value for Δ, indicate an epicenter in northern British Columbia.
	P.....		8 48 55					
	S.....		8 55 13					
6	e _h ?		12 13 44					F merged in next 'quake.
	e.....		12 15					
	eL?		12 19 36					
	M.....		12 22		15ca	35ca		
	F.....		12 35					
9	e.....		18 30 30					e lost in microseisms and Coda of 'quake above.
	eL?		18 35 30					
	L.....		18 39		21			
	L.....		18 43		15			
	L.....		18 52		15			
	F.....		? ? ?					
9	e.....		? ? ?					Very small amplitude, barely visible.
	eL?		19 25					
	L.....		19 29		15			
	L.....		19 45		13			
	L.....		20 01		13			
	F.....		20 40					
19	eL _w ?		20 40					Very small amplitude, barely visible.
	to		20 45					
21	O.....		9 24 51				4,920	L barely visible.
	P.....		9 33 14					
	S.....		9 39 52					
	eL _w		9 45 30					
	L _w		9 51		24			
	F.....		10 05		12			
23	e _h ?		19 56					L barely visible.
	eL.....		20 00		217			
	L.....		20 10		147			
	F.....		20 35					
25	e.....		10 59 40					L barely visible.
	eL.....		11 24		21			
	to		11 32					
	F.....		11 40					
26	eL _w		8 49		21			Barely visible.
	to		8 54					

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... 13. Pillar deviation: 1 mm. swing of boom=0.50".

Date.	Character.	Phase.	Time.	Period. T.	Amplitude.		Distance.	Remarks.
					A _w	A _s		
1918.								
Dec. 1	P?		3 14 24?					F lost in microseisms.
	e.....		3 21 24					
	eL.....		3 22 24					
	eL.....		3 32 24					
	eL.....		3 37 42					
	M.....		3 42 48			*700		
	L?		4 36 42					
	F.....		? ? ?					
2	P.....		9 56 00				5,220	S waves came in abruptly and of large amplitude. F lost in microseisms.
	iS.....		10 02 54					
	L.....		10 05 36					
	L.....		10 08 42					
	M.....		10 09 48			*1,300		
	F.....		? ? ?					
3								Microseisms during night hours when other stations record a small 'quake.
4	cP.....		11 59 36				7,850	Chill Well-defined record. S waves of large amplitude.
	e.....		12 07 36					
	iS.....		12 08 48					
	iL.....		12 15 48					
	L.....		12 19 36					
	iL.....		12 39 48					
	iL.....		12 37 12					
	M.....		12 38 54			*4,800		
	iL.....		12 44 06					
	eL.....		12 56 12					
	eL.....		13 39 18					
	eL.....		14 55 12					
	F.....		15 21 36					

Date.	Character.	Phase.	Time.	Period. T.	Amplitude.		Distance.	Remarks.
					A _w	A _s		
Canada. Toronto—Continued.								
1918.								
4	eL.....		18 22 12					Microseisms masked other phases.
	M.....		18 23 12			*100		
	F.....		18 41 00					
6	L.....		7 47 24				*100	Epicenter 49° 32' N, 127° W. P poorly defined and microseisms may have masked beginning of S. F lost in microseisms.
6	P.....		8 47 54				3,520	
	e.....		8 50 18					
	S.....		8 53 12					
	L.....		8 55 00					
	iL.....		8 58 06					
	M.....		9 01 24			*6,800		
	L.....		9 18 42					
	F.....		? ? ?					
6	L.....		12 18 30					F lost in microseisms.
	L.....		12 20 06					
	M.....		12 21 42			*400		
	F.....		? ? ?					
9	eL.....		5 20 36					Gradual thickening.
	M.....		5 23 24			*200		
	F.....		5 38 18					
9	L.....		18 35 12					F merged in to ing 'quake.
	L.....		18 39 48					
	eL.....		18 43 06					
	M.....		18 44 12			*300		
	F.....		19					
9	L.....		19 31 36					Earlier phases lost; right off at 19h, 21m.
	M?		19 33 48			*2,200		
	eL.....		19 39 36					
	F.....		20 35 12					
14	L.....		19 02 48				*50	Gradual thickening.
	F.....		19 19 18					
14	L.....		19 37 54					Heavy microseisms.
	eL.....		19 43 36					
	M.....		19 50 18			*200		
	F.....		20 02 ..					
19	L?		20 24 ..					F lost in microseisms.
21	S.....		9 39 42					
	eL.....		9 47 36			*700		
	M.....		9 49 36					
	F.....		? ? ?					
23	c?		19 46 00				4,120?	Microseisms going on during first phases.
	e?		19 51 18					
	P.....		19 52 48					
	S.....		19 58 42					
	eL.....		20 00 18					
	eL.....		20 01 00					
	M.....		20 02 12			*1,000		
	F.....		20 37 06					
25	L.....		11 24 12				*200	Microseisms masked phases.
	L.....		11 31 24					
	L.....		11 32 24					
	F.....		? ? ?					
26								Microseisms going on when other stations record a small 'quake.

* 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... 18. Pillar deviation: 1 mm. swing of boom=0.54".

Date.	Character.	Phase.	Time.	Period. T.	Amplitude.		Distance.	Remarks.
					A _w	A _s		
1918.								
Dec. 1	P.....		3 13 09?					Alaska?
	S.....		3 17 34					
	L.....		3 24 27					
	M.....		3 30 31			*300		
	F.....		4 04 18					
2	P.....		10 07 30?				3,240	Aleutian Islands? Times of P and S very doubtful.
	S.....		10 12 30?					
	L.....		10 22 00					
	M.....		10 38 00			*1,200		
	F.....		12 55 00					

* Trace amplitude.

TABLE 2.—Instrumental reports, October, 1918—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude.		Distance.	Remarks.
					A _m	A _N		
Canada. Toronto—Continued.								
1918 Dec. 4	M.		H. m. s. 0 00 19	Sec.	μ	μ	km.	
	F.		0 07 12		*50			
4	P.		12 00 56				9,520	Northern Chili (Copiapo).
	S.		12 11 14					
	S.		12 11 32					
	L.		12 28 51					
	M.		12 42 59		*2,900			
	F.		15 37 42					
	VERTICAL.				Az.			
	P.		18 00 44				8,710	Do.
	S.		18 10 40					
	L.		18 19 00					
	M.		18 41 00				9	
	F.		18 26 00					
4	P.		18 24 08				890	
	S.		18 26 07					
	L.		18 29 46					
	M.		18 32 04		*300			
	F.		18 52 54					
6	P.		8 04 18					
	M.		8 12 20		*200			
	F.		? ? ?					
6	P.		8 41 39				3367	Probably off west coast of Vancouver Island and northwest of Estevan.
	S. & L.		8 42 27					
	M.		8 43 15		*17,000			
	eL.		9 24 34					
	F.		10 34 23					
	VERTICAL.				Az.			
	P.		8 41 44				380	Do.
	S. & L.		8 42 28					
	M.		8 48 10				490	
	F.		9 29 00					
6	P.		12 02 51				220	Probably off west coast of Vancouver Island and south of Estevan
	S. & L.		12 03 21					
	M.		12 04 20		*1,500			
	F.		12 24 10					
	VERTICAL.				Az.			
	P.		18 03 32				270	Do.
	S. & L.		18 04 08					
	M.		18 04 24				71	
	F.		18 16 00					
9	P.		4 51 47				4,140?	
	S.		4 56 42					
	L.		5 04 08					
	M.		5 05 37		*200			
	F.		5 11 34					
9	P.		18 10 04?				1,400?	
	S.		18 12 31					
	L.		18 15 58					
	M.		18 25 18		*400			
	F.		18 49 53					
9	L.		19 04 41					
	M.		19 16 35		*500			
	F.		20 02 42					
11			9					Estevan reports 2 local tremors. Not recorded at Victoria.
14	L.		18 59 31?					
	M.		19 03 29		*200			
	M.		19 30 16		*400			May be a dual quake.
	F.		19 39 11					
19	L.		20 11 00					No cut-off for first phases.
	M.		20 20 21		*200			
	F.		20 28 13					
21	P.		9 38 33?				2,770?	
	S.		9 42 59					
	L.		9 52 19					
	M.		10 03 09		*200			
	F.		10 28 14					
23	M?		20 12 12		*1,000			First phases lost at cut-off.
	F.		20 24 30					
25	L.		10 50 04					
	M.		11 16 13		*400			
	F.		11 31 57?					

* Trace amplitude.

TABLE 3.—Late seismological reports (instrumental).

Date.	Character.	Phase.	Time.	Period. T.	Amplitude.		Distance.	Remarks.
					A _m	A _N		
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. $\frac{V}{E} \frac{T_0}{N} \frac{e}{\Delta}$								
$\frac{V}{E} \frac{T_0}{N} \frac{e}{\Delta}$ $\frac{1}{30} \frac{23}{25} \frac{0}{4.1}$								
1918 Nov. 3	O		H. m. s. 11 48 36	Sec.	μ	μ	km.	71° 55'.
	S _m		12 00 12		6		7,950	
	eL _m		12 23 28		28			Amplitude E very small; not recognized on N undamped.
	L.		12 30 06		20			Press reports 'quake in Hawaii at 11h., 33m. p. m. and cut-break of Kilauea.
	L.		12 40 41		20			
	L.		12 44 51		15			
	L.		13 00 06		15			
	F.		13 02 24					
4	L _m ?		18 34 51	15-12				Not assuredly seismic; among microseisms of 8 sec. period.
	F _m ?		18 36 46					
5	O?		22 50 05				6,580	59° 22' of arc. N undamped.
	S _m ?		22 46 27		10			L _m 23h., 00m., 04s. to 23h., 05m., 46s. period.
	eL _m ?		22 58 57		38			
	L _m ?		23 00 00		20			
	M _m ?		23 02 36		20			18-16 sec.
	C _m ?		23 04 16		15			
	F _m ?		23 16					
8	O		4 38 21				8,750	78° 45' of arc.
	F _m ?		4 50 21		2			
	F		5 01 06		6			
	S _m		5 00 19		6			
	S _N		5 00 48		10			
	I _m		5 01 41					
	e _m		5 02 50		13			
	e _N		5 03 19					
	eL _m		5 16					Short waves superposed. Do.
	eL _m		5 16 01		44			
	L _m		5 17 15		35			
	M _m		5 18 56		21	*3,000		A 235.
	M _m		5 25 19		22	*7,000		
	M _m		5 27 35		23	*11,500		
	M _m		5 31 25		21	*17,500		A 515.
	M _m		5 34 35			*12,500		
	M _m		5 36 49		20	*9,750		
	M _m		5 37 43		17	*18,750		A 1,000.
	C _m		5 38 25		14			
	F		7 22					
12	O		21 44 24				2,880	23° 58' of arc. N undamped, E damped by magnet, N starts before E. Microseism mask certain phases. Compare record Oct. 11, 1918, Δ 2,590, O 14h., 14m., 14s.
	IP _m		21 49 40		4			
	IP _{repr}		21 49 52		2			
	eP _{repr}		21 50 09		2			
	S _m		21 53 59		14			
	S _m ?		21 54 09		6			
	eL _m		21 55 45	22-30				
	eL _m		21 55 33		24			
	M _m		21 57 57		16	*1,500		
	M _m		21 59 43		16	*1,250		
	C _m		22 00 30					
	F _m		22 43					
	F _m		22 56					
18	O		18 41 55				18,000	O computed from Riverview, Sydney, N. S. W., gives Δ 3,470 km., giving epicenter lat. 10° S., long. 130° E.; reported as felt at Port Darwin, 1 from W. L _m at 20h., 23m. is evidently M of a second 'quake coming from same epicenter about 35m. after the first M on return of P reflected from anticentrum. M ₁ does not accord with L _{repr} . A similar group of lenticular M waves appears about 35m. after M ₁ in the record of Jan. 1, 1919; 0, 5h. plus.
	IP _m		18 59 35					
	eP _m		19 00 46					
	F _{repr}		19 01 18		10	*1,000		
	F _{repr}		19 01 30		12	*5,000		
	F _{repr}		19 04 25		8	*3,500		
	F _{repr}		19 05 01		8			
	IS _m		19 13 18		9			
	S _{repr}		19 23 05		14			
	S _{repr}		19 29 16			*5,750		
	I _m		19 32 56			*7,300		
	I _m		19 40 36		18	*9,000		
	eL _m		19 51 06					
	M _m		19 54 05			*5,700		
	M _m		19 57 22					
	M _m		20 06 04					
	M _m		20 13 46					
			to 20 15 36					
	L _m		20 28					
	M _m		20 28 24					
	F _m		21 17					

* Trace amplitude.

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

Date.	Character.	Phase.	Time.	Period. T.	Amplitude.		Dis- tance.	Remarks.
					A _s	A _w		
Massachusetts. Cambridge—Continued.								
1918.								
Nov. 23	O		8 28 11				10,550	94° 57' Δ and O from Lw-S _w . N much masked by microseisms.
	Pa		23 09 31		3			
	Is		23 09 51		6			
	Pa		23 17 02		6			
	Lw		23 26 34					
	Is ⁷		23 26 57		8			
	eLw		23 34 40		24			
	eLw		23 38 29		28			
	Lw		23 39 20		36			
	Lw		23 43 49		24			
	Lw		23 50 30		16			
24	Lw		0 03 10		24			
	Lw		0 07 29		24			
	Lw		0 10 16		20			
			to 0 51					
	L _{rep}		0 57 50		16			
	Fa		1 05					
30	O ⁷		6 28 15				11,970	† 107° 44' from eL-87 P and S masked by microseisms.
	Pa ⁷		6 55 06		6			
	eLw		7 21 22		28			
	Lw		7 23 39		27			
	Lw		7 24 18		20			
	Lw		7 26 45		18			
	Lw		7 28 03					A increased slightly.
			to 7 30 07		14			
	Lw		7 38 45		20-16			
	Lw		7 41 51		14-12			
	Fa		7 49					

* Trace amplitude.

SEISMOLOGICAL DISPATCHES.¹

Santiago, Chile, Dec. 4, 1918.

An earthquake has occurred in Northern Chile. In the towns of Copiapo and Vallener important damages were caused. In other localities damage of minor importance resulted.

Reports received here say that the earthquake destroyed Vallener, and that it wrecked 10 per cent of the buildings at Copiapo. Several deaths occurred in Copiapo, where many persons are homeless. (Assoc. Pr.)

Vancouver, British Columbia, Dec. 6, 1918.

This city was shaken violently by an earth tremor at 12:45 this morning. The tremors, which appeared to be from north to south, were felt for two minutes. A distinct rumbling was noticeable. Occupants of tall buildings were especially affected by the disturbance, many being seized with nausea.

The shock was felt in all parts of the city, many persons being awakened by the shaking of furniture and tumbling of dishes. (Assoc. Pr.)

Victoria, British Columbia, Dec. 6, 1918.

A pronounced earthquake of several seconds' duration was felt here at 12:45 o'clock this morning. Houses shook and windows rattled all over the city. Island points in the immediate vicinity also reported noticing the disturbance. (Assoc. Pr.)

Seattle, Washington, Dec. 6, 1918.

What was believed to be an earth disturbance was felt in Seattle at 12:45 o'clock this morning. The tremor shook buildings in the downtown district. (Assoc. Pr.)

EARTHQUAKES FELT IN THE UNITED STATES DURING 1918.

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

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

[Dated: Weather Bureau, Washington, Feb. 4, 1919.]

During the year 1918, 127 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 (XLVI-111)) at the end of this issue of the Review.

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

Earthquakes of moderate intensities, V-VI (Rossi-Forel), accompanied by only slight damage or none at all, occurred in California on February 11, March 6, 8, 21, 30, April 7, 23, 29, May 1, 2, June 3, 6, 14, 22, July 15, August 20, October 14, November 19, 29; in Arizona on April 21, 28; in Virginia on April 10; in the State of Washington on June 21, December 6; in Tennessee on June 22, October 16; in Oklahoma on September 11; in Arkansas on October 4, 13; and in Utah on November 16. The Virginia earthquake was apparently central in the vicinity of Luray and was felt over most of Virginia, a portion of West Virginia, much of Maryland, the District of Columbia, and into Pennsylvania.

Earthquakes of intensity, VII-VIII, accompanied by only a very moderate amount of damage, such as the fall of chimneys, occurred in California on March 12, apparently central near Downville; and in Maine on August 21, apparently central near South Paris.

An earthquake of intensity, IX-X, and accompanied by some destruction of property, occurred in California on April 21, when the entire business sections of Hemet and San Jacinto were destroyed. This shock was felt over southern California and Nevada, western New Mexico, and into Utah, and was apparently caused by a new slip in the San Jacinto Fault.

An earthquake of similar intensity occurred in New Mexico on May 28, causing an open break in the surface of the ground at Cerillos.

There remains to be mentioned the great earthquake, not shown on the chart, but given in the tables, which occurred in Porto Rico on October 11. A great tidal wave 2 miles wide swept inland a half mile at Aguadilla, rising to a height of 40 feet against the cliffs, destroying everything in its path, and drowning many people. Over 60 shocks were noted during the period from October 11 to November 12. The frequency diminished rapidly, as is usual, and had fallen to about one a day by the end of October.

TABLE 1.—Places in the United States reporting earthquakes during 1918. (Consult also Chart XI (XLV-122) in this issue.)

Place.	Ap- proxi- mate lati- tude (north).	Ap- proxi- mate longi- tude (west).	Num- ber of quakes re- ported.	Place.	Ap- proxi- mate lati- tude (north).	Ap- proxi- mate longi- tude (west).	Num- ber of quakes re- ported.
ARIZONA.				CALIFORNIA.			
Aztec.....	32 49	113 28	1	Aguanga.....	33 27	116 55	2
Bouse.....	33 57	114 01	1	Arroyo Seco.....	34 07	118 11	1
Cibola.....	33 21	114 42	1	Bagdad.....	34 35	115 52	1
Crozier.....	35 24	113 40	1	Banning.....	33 55	116 53	1
Flagstaff.....	35 12	111 37	4	Barrett.....	32 42	116 41	3
Kingman.....	35 11	114 04	1	Barstow.....	34 54	117 02	1
Mohave City.....	35 02	114 38	1	Beaumont.....	33 55	117 00	3
Oatman.....	35 02	114 25	1	Big Bar.....	40 44	123 18	1
Parker.....	34 10	114 17	1	Bishop.....	37 23	118 24	3
Quartzite.....	33 40	114 11	1	Blythe.....	33 35	114 41	1
Salome.....	33 47	113 37	1	Bonita.....	32 39	117 03	2
Selician.....	35 19	112 51	1	Boulder Creek.....	37 08	122 07	1
Somerton.....	32 35	114 43	1	Brawley.....	33 00	115 31	1
Truxton.....	35 18	113 36	1	Cabazon.....	33 55	116 47	1
Wellton.....	32 40	114 08	1	Cahuilla.....	33 32	116 45	10
Wenden.....	33 49	113 32	1	Calxico.....	32 41	115 30	27
Yuma.....	34 52	114 09	1	Claremont.....	34 06	117 43	3
Yuma.....	32 45	114 36	2	Corona.....	33 53	117 34	3
ARKANSAS.				CALIFORNIA.			
Bauxite.....	34 33	92 24	1	Downsville.....	39 34	120 60	2
Black Rock.....	36 08	91 02	2	El Cajon.....	32 48	116 69	3
Brinkley.....	34 53	91 07	1	Escondido.....	33 07	117 06	3
Carlisle.....	34 47	91 39	1	Eureka.....	40 49	124 11	8
England.....	34 32	91 52	1	Fairmont.....	34 45	118 26	1
Hardy.....	36 19	91 21	1	Fontana.....	34 06	117 27	1
Hoxie.....	36 03	90 55	1	Fort Bragg.....	39 25	123 47	1
Jonesboro.....	35 51	90 39	1	Fresno.....	36 43	119 40	1
Little Rock.....	34 45	92 06	1	Hemet.....	33 44	116 68	21
Lonoke.....	34 47	91 49	1	Hollywood.....	34 06	116 30	1
Pine Bluff.....	34 13	91 54	1	Imperial.....	32 51	115 33	1
Pocahontas.....	36 15	90 56	1	Indio.....	33 43	116 13	3
Scott.....	34 43	92 01	1	Julian.....	33 04	116 36	3
Searcy.....	35 15	91 39	1	Keeler.....	36 38	117 52	1
				Laguna Beach.....	33 31	117 47	1
				Lakeport.....	39 03	122 66	1

TABLE 1.—Places in the United States reporting earthquakes during 1918—Continued.

Place.	Ap- prox- imate lati- tude (north).	Ap- prox- imate longi- tude (west).	Num- ber of quakes re- ported.	Place.	Ap- prox- imate lati- tude (north).	Ap- prox- imate longi- tude (west).	Num- ber of quakes re- ported.	Place.	Ap- prox- imate lati- tude (north).	Ap- prox- imate longi- tude (west).	Num- ber of quakes re- ported.	Place.	Ap- prox- imate lati- tude (north).	Ap- prox- imate longi- tude (west).	Num- ber of quakes re- ported.
CALIFORNIA—CON.				ILLINOIS.				NEW MEXICO— continued.				UTAH.			
Lone Pine.....	36 37	118 02	3	Anna.....	37 28	89 14	1	Las Vegas.....	35 35	105 14	1	Clarkston.....	41 55	112 05	1
Los Angeles.....	34 03	118 15	2	Cairo.....	37 00	89 10	2	Montoya.....	35 06	104 04	1	Millford.....	38 24	113 01	1
Mooca.....	33 34	116 05	2	MAINE.				Portsmouth.....	35 43	105 25	1	Tremonton.....	41 42	112 10	1
Mesa Grande.....	33 10	116 46	6	Bridgton.....	44 03	70 42	1	Santa Fe.....	35 35	106 21	1	VIRGINIA.			
Morgan Hill.....	37 08	121 38	2	Cape Elizabeth.....	43 35	70 14	1	Stanley.....	35 07	106 00	1	Buchanan.....	37 32	79 41	1
Mt. Lowe.....	34 13	118 06	1	Duck Pond Lake.....	43 46	70 21	1	Valmora (Wat- rous).....	35 47	104 59	1	Columbia.....	37 45	78 13	1
Mr. Wilson.....	34 13	118 04	3	Eastport.....	44 54	66 59	1	Waldo.....	35 28	108 10	1	Culpeper.....	38 29	77 58	1
Nellis.....	33 19	116 52	3	Lewisport.....	44 05	70 12	1	OKLAHOMA.				Dale Enterprise.....	38 27	78 55	2
Newhall.....	34 23	118 33	1	Little Sebago Lake.....	43 53	70 24	1	El Reno.....	35 31	97 57	3	Danville.....	36 34	79 26	1
North Fork.....	37 20	119 20	1	Norway.....	44 12	70 32	1	Fort Reno.....	35 33	98 02	2	Gordonsville.....	38 09	78 11	1
Ocean Park.....	34 01	118 30	1	South Paris.....	44 13	70 30	1	Yukon.....	35 30	97 44	1	Guinea.....	35 09	77 26	1
Ojai.....	34 25	119 12	1	MARYLAND.				Portland.....	45 32	122 41	1	Harrisonburg.....	38 25	78 52	1
Paso Robles.....	35 37	120 42	1	Bagley.....	39 30	76 23	1	OREGON.				Luray.....	38 41	78 27	2
Point Loma.....	32 43	117 15	2	Baltimore.....	39 17	76 37	1	Richmond.....	43 32	122 41	1	Lynchburg.....	37 25	79 09	1
Pomona.....	34 03	117 45	1	Chevsyville.....	39 38	77 37	1	Roanoke.....	37 16	79 56	1	New Canton.....	37 43	78 23	1
Redlands.....	34 03	117 11	1	Clear Spring.....	39 37	77 55	1	Suffolk.....	36 51	76 17	1	Norfolk.....	36 51	76 17	1
Rialto.....	34 06	117 22	2	College Park.....	38 58	76 55	1	Orange.....	38 15	78 07	1	University.....	38 02	78 31	1
Riverside.....	33 59	117 23	2	Solomons.....	38 19	76 27	1	Rapidan.....	38 19	78 04	1	White Post.....	39 04	78 07	1
Round Valley.....	37 25	118 46	1	Takoma Park.....	38 58	77 01	1	Richmond.....	37 32	77 27	1	Williamsburg.....	37 16	78 43	1
Salinas.....	36 41	121 39	3	Woodstock.....	39 19	76 32	1	Stanton.....	38 10	79 04	1	Winchester.....	39 10	78 10	1
San Bernardino.....	34 06	117 18	2	MICHIGAN.				Stanton.....	38 10	79 04	1	Woodstock.....	38 53	78 31	1
San Bernardino Mt.....	34 07	116 56	1	Calumet.....	47 14	88 28	1	PORTO RICO.				Washington.			
San Diego.....	32 43	117 10	4	Morrice.....	42 51	84 11	1	Aguadilla.....	18 26	67 09	60	Longmire.....	46 46	121 50	1
San Diego (Camp Kearny).....	32 56	117 10	2	MISSOURI.				Isabela.....	18 30	67 03	60	North Fork Sauk River.....	48 06	121 22	1
San Jacinto.....	33 46	116 58	9	Hannibal.....	39 41	91 20	1	Mayaguez.....	18 12	67 09	1	Seattle.....	47 38	122 20	1
San Luis Obispo.....	35 18	120 39	1	NEVADA.				San Juan.....	18 29	66 07	5	Walla Walla.....	46 02	118 20	1
San Miguel Island.....	34 02	120 20	1	Windemucca.....	40 58	117 43	1	TENNESSEE.				White Bluff Prairie.....	47 40	117 35	1
Santa Ana.....	33 46	117 53	1	NEW MEXICO.				Clarksville.....	36 31	87 22	1	WEST VIRGINIA.			
Santa Monica.....	34 02	118 30	4	Albuquerque.....	35 06	106 39	1	Clinton.....	38 05	84 08	1	Buckhannon.....	38 59	80 15	1
Spreckels.....	36 38	121 36	1	Carroll.....	35 27	106 07	1	Kingston.....	35 52	84 32	1	Martinsburg.....	39 28	77 58	1
Stanford Univer- sity.....	37 25	122 10	1	Espanola.....	36 00	106 05	1	Knoxville.....	35 56	83 58	2				
Table Bluff.....	40 41	124 10	1	Estancia.....	34 49	106 04	1	Lenoir City.....	35 47	84 17	1				
Valley Center.....	33 13	117 04	1	Lamy.....	35 29	105 03	1	London.....	35 44	84 21	1				
Venice.....	33 58	118 28	4					McGhee.....	35 35	84 14	1				
Victorville.....	34 32	117 18	2					Memphis.....	35 09	90 03	2				
Warner Springs.....	33 17	118 39	6					Philadelphia.....	35 41	84 25	1				
Whitewater.....	33 53	116 38	1					Savannah.....	35 12	85 15	1				
Whittier.....	33 58	118 04	1					Sweetwater.....	35 36	84 29	1				
Winchester.....	33 42	117 06	1					Union City.....	36 26	89 04	1				
Workman Sta- tion.....	33 55	118 11	1												
DISTRICT OF COLUMBIA.															
Washington.....	38 54	77 03	1												