TABLE III.—*Data furnished by the Canadian Meteorological Service, January, 1919.*

Stations.	Altitude above M. S. L.[1] Jan. 1, 1916.	Pressure: Station reduced to mean of 24 hours.	Pressure: Sea level reduced to mean of 24 hours.	Pressure: Departure from normal.	Temperature: Mean max. + mean min ÷ 2.	Temperature: Departure from normal.	Temperature: Mean maximum.	Temperature: Mean minimum.	Temperature: Highest.	Temperature: Lowest.	Precipitation: Total.	Precipitation: Departure from normal.	Precipitation: Total snowfall.
	Feet.	Inches.	Inches.	Inches.	° F.	° F.	° F.	° F.	° F.	° F.	Inches.	Inches.	Inches.
St. Johns, N.F.	125	29.59	29.73	−0.13	25.9	+ 2.1	32.6	19.2	58	0	6.16	+0.25	13.0
Sydney, C. B. I.	48	29.82	29.86	− .07	26.4	+ 5.9	33.4	19.3	50	− 5	4.70	−0.40	13.0
Halifax, N. S.	88	29.78	29.88	− .09	27.3	+ 5.5	31.9	19.7	49	− 6	5.06	−0.71	5.8
Yarmouth, N. S.	65	29.81	29.88	− .12	30.3	+ 4.0	37.0	23.6	50	1	5.03	−0.38	6.1
Charlottetown, P. E. I.	38	29.82	29.86	− .10	22.2	+ 5.2	28.5	15.8	44	−12	2.72	−1.24	11.2
Chatham, N. B.	28	29.87	29.90	− .07	15.7	+ 5.9	24.5	6.9	39	−17	3.27	−0.32	31.5
Father Point, Que.	20	29.91	29.94	− .04	10.8	+ 2.8	19.6	2.1	34	−17	4.74	+1.89	45.4
Quebec, Que.	296	29.61	29.95	− .07	13.8	+ 4.7	20.4	7.1	36	−20	3.44	−0.57	33.4
Montreal, Que.	187	29.75	29.97	− .07	18.3	+ 6.6	26.3	10.4	40	−15	2.69	−1.04	16.8
Stonecliffe, Ont.	489	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ottawa, Ont.	236	29.71	29.99	− .03	18.1	+ 8.5	27.8	8.5	40	−20	2.68	−0.31	19.3
Kingston, Ont.	285	29.68	30.01	− .04	25.0	+ 7.9	33.0	17.0	46	−12	1.92	−1.53	11.7
Toronto, Ont.	379	29.58	30.01	− .04	29.3	+ 7.9	36.6	22.0	47	0	1.03	−1.89	4.3
White River, Ont.	1,244	28.54	29.91	− .10	8.5	+ 8.9	20.0	−3.0	35	−37	1.47	−0.22	14.7
Port Stanley, Ont.	592	29.37	30.03	− .14	29.2	+ 7.0	35.7	22.7	47	5	1.49	−1.50	4.9
Southampton, Ont.	656	29.23	.....	.....	27.1	+ 6.7	33.7	20.5	46	− 1	3.16	−0.89	21.0
Parry Sound, Ont.	688	29.24	29.97	− .04	22.9	+ 9.1	31.5	14.3	39	−20	3.58	−0.50	33.0
Port Arthur, Ont.	644	29.23	29.96	− .11	16.7	+13.6	26.2	7.2	38	−22	0.26	−0.56	2.6
Winnipeg, Man.	760	29.08	29.95	− .16	11.0	+17.8	19.1	2.9	37	−29	0.18	−0.70	1.8
Minnedosa, Man.	1,690	28.05	29.96	− .14	9.5	+16.7	19.6	−0.6	38	−35	0.74	−0.06	7.4
Qu'Appelle, Sask.	2,115	27.57	29.90	− .18	17.7	+21.5	27.8	7.6	43	−33	0.70	+0.20	6.6
Medicine Hat, Alberta	2,144	27.54	29.86	− .21	32.0	+26.5	42.0	22.0	58	−15	0.02	−0.55	.....
Swift Current, Sask.	2,392	27.24	29.88	− .21	25.5	+22.4	34.7	16.3	51	−25	0.50	−0.14	5.0
Calgary, Alberta	3,428	25.26	29.86	− .17	31.0	+22.6	42.0	20.0	55	6	0.34	−0.19	3.4
Banff, Alberta	4,521	24.25	29.97	− .03	23.6	+11.5	31.3	15.8	42	−14	2.07	+0.88	20.7
Edmonton, Alberta	2,150	27.47	29.81	− .22	21.8	+20.0	31.9	11.7	47	−15	1.08	+0.40	10.6
Prince Albert, Sask.	1,450	28.27	29.90	− .19	12.7	+21.1	22.1	3.2	45	−35	0.93	−0.04	9.3
Battleford, Sask.	1,592	28.07	29.87	− .21	15.6	+21.5	27.0	4.2	45	−27	0.74	+0.34	7.4
Kamloops, B. C.	1,262	28.78	30.11	+ .15	30.5	+ 7.5	35.6	25.3	47	5	0.32	−0.50	0.7
Victoria, B. C.	230	29.76	30.02	+ .05	41.3	+ 2.8	45.0	37.6	52	33	5.81	+0.42	.....
Barkerville, B. C.	4,180	25.52	29.89	.00	23.8	+ 6.0	30.1	17.5	38	0	2.30	−0.30	23.0
Hamilton, Bermuda	151	29.95	30.12	− .01	63.7	+ 1.7	68.7	58.8	74	51	6.56	+1.62	.....

SEISMOLOGICAL TABLES.

SEISMOLOGICAL REPORTS FOR JANUARY, 1919.

W. J. HUMPHREYS, Professor in Charge

[Dated: Seismological Investigations, Weather Bureau, March 3, 1919]

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.).
$\triangle$=distance to epicenter.

PHASES.

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

NATURE OF THE MOTION.

i=(impetus)=abrupt beginning.
e=(emersio)=gradual appearance.
T=period=twice time of oscillation.
A=amplitude of 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:
P_E is the E–W component of P.
P_N is the N–S component of P.
P_Z is the vertical component of P.
μ=micron, $\frac{1}{1,000}$ mm.

INSTRUMENTAL CONSTANTS.

T_0=period of instrument.
V=magnification of instrument.
ϵ=damping ratio.

TABLE I.—*Noninstrumental earthquake reports, January, 1919.*

Day.	Approximate time, Greenwich civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity, Rossi-Forel.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
	m. m.	CALIFORNIA.	° ′	° ′			Sec.			
Jan. 8	4 07	Hemet	33 45	116 45	2	1	2	Rumbling		C. E. McManigal.
20	9 30	Napa	38 18	122 20	5	1	5	Faint	Awakened people	Geo. A. Lewis.
		St. Helena	38 41	122 30	4	1	.....	None		F. B. Mackinder.
		Vallejo	38 07	122 18	4	1	.....	None	Shock distinct	Press report.
25	22 29	Bakersfield	35 32	119 00	3-4	3	.....		Like heavy trucks passing	F. W. Warthorst.
		Maricopa	35 05	119 23	3	1	.....	None		E. F. Foulke.
		Ojai	34 25	119 12	5	1	1	None		Wm. H. Duncan

TABLE 2.—*Instrumental seismological reports, January, 1919.*

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

[For significance of symbols see this REVIEW, p. 59.]

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 January, 1919, not received.)

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: E: V 10, T_0 17.7; N: V 10, T_0 16.6

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	*μ*	*μ*	*km.*	
1919. Jan. 1	.....	P_N	3 12 01	2	.....	.....	.....	Phases marked doubtful are in each case single large irregular waves of 0.5 to 1.0 min. amplitude.
		P_E	3 12 12	4	.....	.....	.....	
		S_N?	3 22 34	.....	.....	.....	.....	
		S_E?	3 22 37	.....	.....	.....	.....	
		M_E	3 22 48	.....	100	.....	.....	
		e_N?	3 28 14	.....	.....	.....	.....	
		e_E?	3 28 18	.....	.....	.....	.....	
		M_N	3 28 24	.....	.....	90	.....	
		e_E?	3 34 52	.....	.....	.....	.....	
		e_N?	3 34 54	.....	.....	.....	.....	
		F_E	3 44 ..	.....	.....	.....	.....	
		F_N	3 47 ..	.....	.....	.....	.....	

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: E: V 10, T_0 13.8; N: V 10, T_0 18.4

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	*μ*	*μ*	*km.*	
1919. Jan. 1	.....	P_N	3 12 28	.....	.....	.....	.....	E-W out of order. No well-defined long waves.
		iS_N	3 22 20	.....	.....	.....	.....	
		M_N	3 22 30	.....	.....	1,400	.....	
		F_N	4 22 ..	.....	.....	.....	.....	
17	.....	eP_N	11 54 17	5	.....	.....	.....	
		eP_E	11 54 28	6	.....	.....	.....	
		eS_N	11 58 29	6	.....	.....	.....	
		eS_E	11 58 40	6	.....	.....	.....	
		L_N	12 00 19	14	.....	.....	.....	
		L_E	12 00 28	16	.....	.....	.....	
		M_N	12 01 39	9	.....	180	.....	
		M_E	12 01 48	10	680	.....	.....	
		C_E	12 03 ..	9	.....	.....	.....	
		C_N	12 04 ..	9	.....	.....	.....	
		F_N	12 08 ..	.....	.....	.....	.....	
		F_E	12 26 ..	.....	.....	.....	.....	
31	.....	e_E	23 51 55	12	.....	.....	.....	
		e_N	23 52 29	12	.....	.....	.....	
		M_N	23 52 45	.....	.....	10	.....	
		M_E	23 51 ..	.....	20	.....	.....	
Feb. 1	.....	F_E	0 01 ..	.....	.....	.....	.....	
		F_N	0 03 ..	.....	.....	.....	.....	

California. *Berkeley. University of California.*

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

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

California. *Mount Hamilton. Lick Observatory.*

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

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

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

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

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

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	*μ*	*μ*	*km.*	
1919. Jan. 6	.....	.....	.....	.....	*50	*100	.....	Tremors during 24 hours preceding $16^h\ 00^m$ on date given.

* Amplitude on instrument.

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

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

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

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

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

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

(No earthquake recorded during January, 1919.)

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

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

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

Instrumental constants: V 110, T_0 6.4

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	*μ*	*μ*	*km*	
1919 Jan. 1	.....	eP	1 52 55?	.....	.....	.....	1,860?	
		eS	1 56 06	.....	.....	.....	.....	
		eL?	2 07 00	.....	.....	.....	.....	
		L	2 40 30	28	.....	.....	.....	
		L	2 55 00	20	.....	.....	.....	F lost in next quake.
1	.....	P	3 17 44	.....	.....	.....	5,300?	
		S	3 24 42	.....	.....	.....	.....	
		L	3 28 40	.....	.....	.....	.....	
		L	3 31 60	28	.....	.....	.....	
		L	3 39 30	18	.....	.....	.....	
		F	5 40 ..	.....	.....	.....	.....	
6	.....	eL	23 30 30	18	.....	.....	.....	On E-W only.
		F	23 40 00	.....	.....	.....	.....	
8	.....	eL	2 01 00	.....	.....	.....	.....	Not on N-S.
		F	2 07 00	.....	.....	.....	.....	
17	.....	e	11 55 45	.....	.....	.....	.....	
		S	12 01 07	.....	.....	.....	.....	
		eL?	12 13 19	.....	.....	.....	.....	
		F	12 30 00	.....	.....	.....	.....	
31	.....	e	23 59 30	.....	.....	.....	.....	
Feb. 1	.....	eL	0 02 50	.....	.....	.....	.....	
		F	0 20 00	.....	.....	.....	.....	

TABLE 2.—*Instrumental seismological reports, January, 1919*—Continued.

District of Columbia. *Washington. Georgetown University.*

F. A. Tondorf, S. J.

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

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

Instrumental constants..

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

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1919			*H. m. s.*	*Sec.*	*μ*	*μ*	*km*	
Jan. 1		eP_N	1 56 18					Microseisms. No distinct main.
		eP_E	1 56 19					
		eL?	2 25 06					
		L_N	2 33 00	17				
		L_E	2 33 19	17				F in next quake.
1		eP_E	3 17 57					
		eP_N	3 18 17					
		S_E	3 24 37					
		i_N	3 26 39					
		eL_E	3 28 24					
		eL_N	3 28 42					
		i_E	3 30 20					
		i_N	3 34 20					
		i_N	3 38 30					
		F	5 46 ..					
5		e	20 03 00					Little value can be set on these data because of local disturbances.
		S?	20 10 11					
		F	20 35 ..					
8		e_E	1 58 17					Scarcely visible on N-S.
		eL_E	2 01 ..					
		F	2 09 ..					
17		eP_E	11 53 41					Heavy microseisms F difficult.
		eP_N	11 54 00					
		S_E	12 01 07					
		S_N	12 01 08					
		L_E	12 16 55	11				
		L_N	12 17 55	11				
		F?	12 50 ..					
			VERTICAL.					
		eP_Z	*11 53 46*					
		L_Z	*12 18 12*	*10*				
		F_Z	*12 43* ..					
27		e_E	21 59 11					
		i_E	21 59 25					
		eL_E?	22 16 54					F?.
31		e_N	23 58 22					Microseisms.
Feb. 1		eL	0 03 30					
		L_E	0 05 43	11				
		L_N	0 07 25	11				
		F	0 20 ..					

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

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

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

Instrumental constant..T_0 18.6

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1919			*H. m. s.*	*Sec.*	*μ*	*μ*	*km*	
Jan. 1		P	1 45 24	19				
		S	1 55 12	17				
		L	2 08 18	22				
		M	2 22 18	18	*6,300			
		C	2 42 ..	19				F in next quake.
1		e	3 07 36	10				Waves of amplitude greater than the width of the record began abruptly at 3h 14m30s.
		L	3 14 30	20				
		M	3 15 00	20	*17,000			
		C	3 28 ..	18				
		F	7 18 ..					
5		eP	20 17 24	18				
		L	20 38 00	23				
		M	20 44 00	19	*400			
		C	20 47 ..	18				
		F	21 12 ..					
6		P	22 32 42	16				
		S	22 40 00	20				
		eL	22 46 54	20				
		M	22 55 00	18	*4,000			
		C	22 58 ..	18				
		F	25 30 ..					

Hawaii. *Honolulu*—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1919			*H. m. s.*	*Sec.*	*μ*	*μ*	*km.*	
Jan. 7		eL	12 41 06					
		M	12 47 48	18	*100			
		F	12 53 ..					
8		eL	2 37 00					
		M	2 43 12	18	*100			
		F	2 47 ..					
8		eL	6 54 00					
		M	6 58 48	21	*100			
		F	7 06 ..					
8		eL	22 11 06					
		M	22 15 30	18	*100			
		F	22 22 30					
11		eL	10 00 54	20				
		M	10 10 12	18	*200			
		F	10 31 ..					
17		eL	12 17 30	20				
		M	12 21 00	18	*200			
		F	12 25 ..					
27		eL	21 53 00	21				
		M	21 53 24		*200			
		F	22 42 ..					
29		L	3 23 00					Local shock, felt in the islands. Principal portion a mere haze (on account of the rapid motion) similar to record of a quake on a magnetograph.
		M	3 23 18		*200			
		C	3 23 48					
		F	3 29 ..					
31		eL	23 55 42	20				
Feb. 1		M	0 02 30	21	*200			
		F	0 14 ..					

* Trace amplitude.

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

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

Instrumental constants..

	V	T_0	ε
E	177	3.4	4:1
N	205	3.4	4:1

(Report for January, 1919, not received.)

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

Lat., 38° 44′ 00″ N.: long., 76° 50′ 30″ W. Elevation, 71.6 meters.
Instruments: Two Bosch-Omori, 10 and 12 kg.

Instrumental constants..

	V	T_0
E	10	15
N	10	15

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1919			*H. m. s.*	*Sec.*	*μ*	*μ*	*km.*	
Jan. 1		eP_N	1 56 55					
		eP_E	1 56 59					
		eL_E	2 37 40					
		eL_N	2 37 45					
		M_N	2 56 55	20		20		
		M_E	2 57 30	20	10			F in next quake.
1		P_E	3 19 20	3				Record not clear, phases not well defined.
		P_N	3 19 53	3				
		eS_E	3 25 12					
		iS_N	3 26 59			400		
		eL_E	3 29 09					
		M_N	3 34 54	18		460		
		M_E	3 35 19	14	250			
		eL_N	3 39 40					
		C_N	3 58 —					
		C_E	4 17 —					
		F_N	4 48 —					
		F_E	5 10 —					
17		eP_E	12 01 09	10				Phases obscured by microseisms.
		eP_N	12 01 17	9				
		M_N	12 09 30	8		10		
		M_E	12 09 34	10	20			
		F_E	12 31 —					
		F_N	12 33 —					

TABLE 2.—*Instrumental seismological reports, January, 1919*—Continued.

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

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

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

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

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1919.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Jan. 1		S_E?	1 53 51	10			16,000?	
		e_E?	2 19 42	20				
		eL_E	2 25 05	35				
		L	2 32 23	26				
		M	2 36 55	20				
		M	2 41 16 2 45 ..	24				
		C	3 08 ..	15				F in next record.
1		*O*	*3 11 43*				5,200	46° 48′ of arc.
		eP_N	3 20 24					
		eP_E	3 20 30	4				
		PR_N	3 20 56					
		PR_E	3 20 57					
		e_E	3 22 34	8				
		S_E	3 27 17	12				
		S_N	3 27 41	9				
		SR_N	3 30 59					Sn, undamped, followed by extraordinary large waves like MM up to 72 mm. Trace undamped.
		eL_E	3 34 28	20				
		M_N	3 36 ..		*66,000			
		M_E	3 40 ..					
		M_N	3 43 ..					
		M_N	3 48 ..					
		M_N	3 54 ..					
		C_N	3 56 ..					
		L_N	4 05 ..					A beautiful lenticular group of sinusoidal waves. Not I_{rep} waves. Must be S waves coming back from anticentrum.
		M_E	4 07 ..					
		M_E	4 11 ..					
		F_N	7 01 44					
4								Several disturbances on N-S between 10h 44m and 13h; possibly local temperature effects. Microseisms only on E-W.
6		*O*?	*23 04 15*				4,980?	Time somewhat uncertain.
		S_E?	23 19 43	8				
		L_E?	23 26 27					
		L_E	23 30 51	20				
7		L_N	0 20 49	24				Possibly part of preceding, but shown best on N-S while preceding quake is most legible on E-W.
		L_N	0 27 20	24				
		L_N	0 45 29	16				
		F	0 51 ..					
8		*O*?	*1 43 28*					Powder explosion at Acton, Mass., 26.8 km. away, bearing N. 75° W. Temperature about 0° C. Record superposed on L of preceding. SL probably forced ground wave traveling under sound wave around 333 m. per sec. No check on time at origin obtainable.
		e_N	1 59 49					
		SL	1 59 54	0.3				
		M_N	1 59 57	0.3	5			
		M_N	1 59 59	0.3	5			
		M_E	1 59 58	0.3	5			
		C_E	2 00 03					
		C_N	2 00 07					
		F_N	2 00 23					
		F_E	2 00 24					
9		e	11 51 38					
		e_E	11 56 48	3				
		e_E	11 56 49	10				
		S_E?	12 02 20	15				
		S_E?	12 02 33	13				
		L_E	12 11 41	12				
		L_E	12 17 ..	8				
		C_E	13 38 20					
		F	12 55 ..					

Massachusetts. *Cambridge*—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1919.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Jan. 17		e?	11 51 37					Some disturbance also from 8h onward.
		e_E	11 56 55	3				
		e_E	11 57 58	10				
		S_E?	12 02 29	15				
		S_E?	12 02 42	13				
		L_E?	12 11 50	12				
		L_N	12 15 .. 12 35 ..					
		C_E	12 38 ..					
		F_E	12 55 31					
18		L_N	9 20 52					Earlier phases masked by microseisms. Not recognizable on E-W.
		L_N	9 23 41	20				
		L_N	9 28 22	15				
		F	9 29 35					

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

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

Instrument: Wiechert 80 kg. astatic, horizontal pendulum.

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

(Report for January, 1919, not received.)

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

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

Instrument: Wiechert, 80 kg.

Instrumental constants.. E: V 72, T_0 5.0, ϵ 0; N: V 72, T_0 5.0, ϵ 0

(Report for January, 1919, not received.)

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

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

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

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

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1919.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Jan. 1		e_N?	1 56 16	5				
		e_E?	1 56 17	4				
		e_N	2 04 45	9				
		e_E	2 06 20	10				
		e_E	2 11 40	7				
		e_N	2 12 05	10				
		e_N	2 22 10	14				
		L_E	2 30 02	44				
		L_E	2 38 30	27				F in next 'quake.
1		eP_N	3 18 50	3				
		eP_E	3 19 20	5				
		e_E	3 22 05	4				
		e_E	3 24 45	8				
		e_E	3 27 45	18				
		L_E	3 37 ..	24				
		F_E	5 51 ..					
17		eP	11 56 50	5				
		S_E	12 01 36	11				
		S_N	12 01 40	13				
		eL	12 10 ..	10				
		F	12 51 ..					

TABLE 2.—*Instrumental seismological report, January, 1919*—Continued.

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.. V 35 T_0 20

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1919.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Jan. 1	.....	P.....	1 53 00	.....	.....	.....	.....	Distance and direction uncertain.
		F.....	1 59 00	.....	.....	.....	.....	
1	.....	P.....	3 16 00	.....	*1,500	*1,600	.....	Distance and direction uncertain.
		F.....	4 20 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.. E: V 10 T_0 17; N: V 10 T_0 20

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1919.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Jan. 1	.....	P_E.....	3 19 15	6	.....	.....	.....	Waves of irregular period and amplitude; apparently overlapping waves of different periods, a larger wave showing occasionally when the phases coincide.
		P_N.....	3 19 18	3	.....	.....	.....	
		eS_E.....	3 29 19	10	.....	.....	.....	
		M_E.....	3 30 05	20	200	.....	.....	
		eS_N.....	3 30 06	18	.....	.....	.....	
		L_E.....	3 35 35	20	.....	.....	.....	
		L_N.....	3 35 36	18	.....	.....	.....	
		M_N.....	3 35 52	18	.....	190	.....	
		C_N.....	3 37 ..	16	.....	.....	.....	
		C_E.....	3 40 ..	16	.....	.....	.....	
		F_N.....	4 19 ..	.....	.....	.....	.....	
		F_E.....	4 30 ..	.....	.....	.....	.....	

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

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

Instruments: Two Bosch-Omori, mechanical registration.

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

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1919.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Jan. 1	.....	eL_E.....	2 40 00	24	.....	.....	.....	
		L_E.....	2 58 30	20	.....	.....	.....	
		F.....	3 10 00	.....	.....	.....	.....	
1	.....	e.....	3 19 30	.....	.....	.....	.....	
		S_E?.....	3 26 54	.....	.....	.....	.....	
		L.....	3 28 50	22	.....	.....	.....	
		L.....	4 05 30	14	.....	.....	.....	
		F.....	5 00 00	.....	.....	.....	.....	

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

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

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

Instrumental constants.. V 120 T_0 26

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1919.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Jan. 1	.....	i_N.....	1 54 27	9	.....	.....	.....	The source lay nearer to Ottowa than Halifax and was probably at least 1,500 km. away from the former. F lost in next 'quake.
		e_N.....	2 03 44	12	.....	.....	.....	
		eL?...	2 26 ..	60	.....	.....	.....	
		L.....	2 36 ..	30	.....	.....	.....	
		L.....	2 40 ..	26	.....	.....	.....	
1	.....	*O?....*	*3 12 55*	.....	.....	.....	3,200?	Record very confusing, especially due to fact that the i records on N-S were not recorded on E-W and regular phases appearing on latter were not visible on former. Same phenomenon present on Halifax record.
		eP_E?..	3 19 10	.....	.....	.....	.....	
		eS_E?...	3 24 08	.....	.....	.....	.....	
		i_N.....	3 26 37	.....	.....	.....	.....	
		eL_E?..	3 28 30	.....	.....	.....	.....	
		i_N.....	3 29 24	.....	.....	.....	.....	
		i_N.....	3 34 38	.....	.....	.....	.....	
		i_N.....	3 38 40	.....	.....	.....	.....	
		L.....	3 40 ..	30	.....	.....	.....	
		L.....	3 50 ..	30	.....	.....	.....	
		L.....	4 05 ..	18	.....	.....	.....	
		L_N.....	4 10 ..	44	.....	.....	.....	
		L.....	4 20 ..	14	.....	.....	.....	
		L.....	4 35 ..	14	.....	.....	.....	
		L_N.....	4 45 ..	40	.....	.....	.....	
		L_N.....	5 15 ..	35	.....	.....	.....	
		F.....	6	.....	.....	.....	.....	
5	.....	i.....	20 13 07	8	.....	.....	.....	
		eL.....	20 35 ..	19	.....	.....	.....	
		F.....	20 50 ..	.....	.....	.....	.....	
6	.....	eL.....	23 26 .. / 23 40 ..	19	.....	.....	.....	Heavy microseisms.
		L.....	23 50 ..	17	.....	.....	.....	
7	.....	L.....	0 05 ..	15	.....	.....	.....	
		F.....	0 20 ..	.....	.....	.....	.....	
8	.....	e.....	1 58 18	.....	.....	.....	.....	Heavy microseisms.
		eL.....	2 01 ..	19	.....	.....	.....	
		F.....	2 20 ..	.....	.....	.....	.....	
17	.....	*O?....*	*11 49 44*	.....	.....	.....	3,840?	Short, choppy irregular L waves, the beginning of which can not be accurately determined.
		iP?....	11 56 50	.....	.....	.....	.....	
		e_N?....	12 02 05	.....	.....	.....	.....	
		eS?....	12 02 28	.....	.....	.....	.....	
		eL.....	?	10	.....	.....	.....	
		L.....	12 16 ..	8	.....	.....	.....	
		L.....	12 23 ..	7	.....	.....	.....	
		L_N.....	12 34 ..	.....	.....	.....	.....	
		F.....	13	.....	.....	.....	.....	
18	.....	eL.....	7 12 .. / 7 30 ..	.....	.....	.....	.....	Barely discernible; heavy microseisms.
27	.....	e.....	22 03 30	.....	.....	.....	.....	Irregular. Heavy microseisms.
		eL.....	22 09 ..	.....	.....	.....	.....	
		L.....	22 11 .. / 22 25 ..	.....	.....	.....	.....	
		F.....	22 40 ..	.....	.....	.....	.....	

TABLE 2.—*Instrumental seismological reports, January, 1919*—Continued.

Canada. *Toronto. Dominion Meteorological Service.*

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

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

Instrumental constant..18 T_0. Pillar deviation, 1 mm. swing of boom—0.45″.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1919.			*H. m. s.*	*Sec.*	*μ*	*μ*	*km.*	
Jan. 1		e	2 03 42					Early phases masked by microseisms.
		eL	2 10 06					
		L	2 36 48					
		L	2 53 42					
		M	2 56 06		*1,000			F lost in next 'quake.
1		S	3 16 12					First phases intermixed with trailers of previous quake.
		L?	3 25 54					
		i	3 28 43					
		eL	3 29 24					
		M	3 31 54		*4,000			
		iL	3 36 30					
		iL	3 38 48					
		iL	3 44 42					
		M	3 54 48		*3,400			
		iL	3 55 36					
		iL	3 57 18					
		iL	4 01 30					
		iL	4 09 06					
		iL	4 13 12					
		iL	4 21 24					F lost in microseisms.
5								Heavy microseisms at time of 'quake at other stations.
6		L	23 26 36					
		eL	23 30 30					
		M	23 33 12		*700			
		eL	23 38 36					F lost in microseisms.
7		L	0 41 54					
		eL	0 44 09					
		M	0 46 00		*400			F lost in microseisms.
8		L	2 03 06					
		eL	2 05 24					
		M	2 08 00		*300			F in microseisms.
17		L	12 09 42					Microseisms going on.
		M	12 16 48		*200			F in microseisms.
27		L?	21 56 06					Microseisms going on.
		M?	21 58 06		*300			
		eL?	22 19 00					F in microseisms.
31		L	23 48 48					Small microseisms going on.
		L	23 56 54					
		M			*300			
Feb. 1		L	0 01 48					F in microseisms.

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

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1919.			*H. m. s.*	*Sec.*	*μ*	*μ*	*km.*	
Jan. 1		P	1 47 32				9,220	F lost in next 'quake.
		S	1 57 53					
		L	2 11 50					
		M	2 41 05		*1,400			
1		P	3 11 00				1,310	
		S	3 13 19					
		L	3 17 17					
		M	3 22 44		*6,300			
		F	6 05 23					
			VERTICAL.		A_Z			
		P	*3 11 12*	*2–3*			*1,040*	*L?, F?*
		S	*3 13 04*	*4–6*				
		M	*3 26 00*	*24*	*143*			
6		L	20 39 59					
		M	20 43 25		*200			
		F	20 51 17					
6		P	22 47 55				4,120	
		S	22 53 49					
		L	23 03 40					
		M	23 16 27		*2,000			
7		F	0 17 28					
			VERTICAL.		A_Z			
		L	*23 03 00*	*24*				
		M	*23 11 00*	*20*	*3*			
7		P	0 44 28				1,710	
		S	0 47 25					
		L	0 51 21					
		M	0 59 13		*300			
		F	1 15 57					
8		P	2 17 08					
		L	2 21 36					
		M	2 24 34		*400			
		F	2 41 55					
17		P	12 09 07				660	
		L	12 10 35					
		M	12 12 04		*2,400			
		F	12 22 53					
			VERTICAL.		A_Z			
		P	*12 09 00*	*2*				*L?, F?.*
		M	*12 12 30*	*10*	*143*			
27		L	21 50 47					
		M	21 58 14		*200			
		F	22 23 01					
31		P	23 45 26	3			615	
		L	23 46 55					
		M	23 47 35		*1,000			
Feb. 1		F	0 03 47					
			VERTICAL.		A_Z			
		P	*23 45 12*	*3*			*600*	
		L	*23 46 34*	*8*				
		M	*23 47 20*	*20*	*6*			
		F	*0 00 00*					

SEISMOLOGICAL DISPATCHES.[1]

No reports for January, 1919.

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