SEISMOLOGY.

W. J. HUMPHREYS, Professor in Charge.

[Dated: Weather Bureau, Washington, D C., June 3, 1919.]

TABLE 1.—*Noninstrumental earthquake reports, April, 1919.*

Day.	Approximate time, Greenwich Civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity Rossi-Forel.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
	H. m.	ARKANSAS.	° ′	° ′			*Sec.*			
Apr. 8	8 40	Ravenden	36 30	91 11	3-4	.....	.....	.....	May not be a quake	L. H. Walker.
		CALIFORNIA.								
1	5 46	Calexico	32 41	115 30	3	1	.....	Rumbling	.....	H. M. Rouse.
13	14 18	Stanford University	37 26	122 12	2	1	2	None	.....	Dr. S. D. Townley.
19	9 24	Calexico	32 41	115 30	3	1	3	Rumbling	Preceded by a jar	H. M. Rouse.

NOTE.

The following note by D. L. Hazard, Chief of Division of Terrestrial Magnetism, U. S. Coast and Geodetic Survey, gives some records of the sea waves produced by the earthquake of April 30, 1919:

"The tide gages of the United States Coast and Geodetic Survey at San Diego, and San Francisco, Calif., and Honolulu, Hawaii, recorded a marked tidal disturbance on April 30, 1919.

"At San Francisco, the first effect is shown on the tidal record at $18^h\ 40^m$ Greenwich mean time, at San Diego at $18^h\ 45^m$, and at Honolulu at $13^h\ 45^m$. The principal effect lasted from 12 to 20 hours and there are indications of a disturbance some hours later, although it can not be determined whether the effect was produced by wind or by the earthquake.

"The records of this earthquake from the seismographs at the magnetic observatories of this bureau are somewhat confused, and suggest the possibility that there may have been two earthquakes at nearly the same time, but the indications are that the principal earthquake occurred at about $7^h\ 16^m$ Greenwich mean time, the origin being somewhere in the southern Pacific."

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

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

[For significance of symbols see REVIEW for January, 1919, 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.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1919.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Apr. 17	.....	eP	20 57 10	.....	.....	.....	.....	E-W component undamped.
		iS_E	21 00 10	.....	.....	.....	.....	
		iS_N	21 00 25	.....	.....	.....	.....	
		L	21 00 45	5	.....	.....	.....	
		M_E	21 00 50	5	*11,000	.....	.....	
		M_N	21 05 40	5	.....	*5,000	.....	
		F	21 17 ..	.....	.....	.....	.....	
30	.....	e_E	7 35 50	.....	.....	.....	.....	Poor record.
		i	7 41 55	.....	.....	.....	.....	
		e_N	7 43 42	.....	.....	.....	.....	
		i	8 10 00	.....	.....	.....	.....	
		F	8 42 ..	.....	.....	.....	.....	

*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.. 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.
1919.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Apr. 17	.....	eP_E	21 10 06	.....	.....	.....	.....	
		eP_N	21 10 12	.....	.....	.....	.....	
		eL_E	21 21 30	.....	.....	.....	.....	
		eL_N	21 26 15	.....	.....	.....	.....	
		M_E	21 27 20	16	20	.....	.....	
		M_N	21 30 30	15	.....	10	.....	
		F_N	21 31 ..	.....	.....	.....	.....	
		F_E	21 36 ..	.....	.....	.....	.....	
18	.....	eL_E	21 26 00	.....	.....	.....	.....	Nothing on N-S.
		M_E	21 28 ..	10	10	.....	.....	
		F	21 36 ..	.....	.....	.....	.....	
30	.....	P_N	7 29 37	4	.....	.....	.....	
		eP_E	7 29 40	.....	.....	.....	.....	
		eS_N	7 40 49	9	.....	.....	.....	
		eS_E	7 41 11	11	.....	.....	.....	
		eL_E	8 04 14	18	.....	.....	.....	
		eL_N	8 04 42	.....	.....	.....	.....	
		M_E	8 19 41	17	40	.....	.....	
		M_N	8 19 48	16	.....	60	.....	
		C_N	8 20 ..	16	.....	.....	.....	
		C_E	8 31 ..	16	.....	.....	.....	
		F_N	9 03 ..	.....	.....	.....	.....	
		F_E	9 57 ..	.....	.....	.....	.....	

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

Arizona. *Tucson. Magnetic Observatory.* U. S. Coast and Geodetic Survey. Wm. 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 15; N: V 10, T_0 18

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1919.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Apr. 17	.....	P_N	20 58 29	4	.....	.....	.....	
		P_E	20 58 48	2	.....	.....	.....	
		iS_N	21 03 06	.....	.....	.....	.....	
		iS_E	21 03 11	.....	.....	.....	.....	
		L_N	21 06 35	20	.....	.....	.....	
		L_E	21 06 40	.....	.....	.....	.....	
		M_E	21 09 50	.....	*130	.....	.....	
		M_N	21	18	.....	*6,650	.....	Amplitude greater than given. Stylus off from 21h 10m to 21h 13m.
		C	21 14 ..	16	.....	.....	.....	
		F	21 26 ..	.....	.....	.....	.....	
18	.....	P_N	21 04 37	3	.....	.....	.....	
		eS_E	21 07 23	.....	.....	.....	.....	
		L_E	21 08 30	.....	.....	.....	.....	
		L_N	21 09 00	19	.....	.....	.....	
		M_E	21 10 23	9	*320	.....	.....	
		C_E	21 11 ..	7	.....	.....	.....	
		M_N	21 11 20	9	.....	*300	.....	
		Cn	21 14 ..	.....	.....	.....	.....	
		Fe	21 15 ..	.....	.....	.....	.....	
		Fn	21 31 ..	.....	.....	.....	.....	
19	.....	e_N	3 08 23	.....	.....	*50	.....	No definite phases.
		e_E	3 08 37	.....	*30	.....	.....	
		F	3 14 ..	.....	.....	.....	.....	
30	.....	P_N	7 29 22	4	.....	.....	.....	
		eL_N	7 54 15	.....	.....	.....	.....	
		M_N	8 13 44	16	.....	*440	.....	
		C_N	8 19 ..	.....	.....	.....	.....	
		F_N	10 22 ..	.....	.....	.....	.....	

* Trace amplitude.

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.
1919.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Apr. 5	.....	.....	.. .. ..	.....	*100	*100	.....	Tremors during the 24 hours preceding 15h on dates given.
6	.....	.....	.. .. ..	.....	*150	*200	.....	
7	.....	.....	.. .. ..	.....	*100	*200	.....	
8	.....	.....	.. .. ..	.....	*50	*50	.....	
11	.....	.....	.. .. ..	.....	*300	*300	.....	
14	.....	.....	.. .. ..	.....	*200	*200	.....	
15	.....	.....	.. .. ..	.....	*100	*100	.....	
18	.....	.....	.. .. ..	.....	*200	*200	.....	
20	.....	.....	.. .. ..	.....	*50	*50	.....	
21	.....	.....	.. .. ..	.....	*50	*50	.....	
25	.....	.....	.. .. ..	.....	*250	*300	.....	
26	.....	.....	.. .. ..	.....	*50	*100	.....	
30	.....	.....	.. .. ..	.....	*50	*50	.....	

* Trace amplitude.

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

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

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

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

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

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

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1919.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Apr. 3	.....	L_N	1 03 ..	.....	.....	.....	.....	Sinusoidal waves of small amplitude. Large period.
		M_N	1 07 ..	.....	.....	.....	.....	
		F_N	1 12 ..	.....	.....	.....	.....	
5	.....	L_N	1 08 ..	.....	.....	.....	.....	Irregular sinusoidal.
		F_N	1 15 ..	.....	.....	.....	.....	
17	.....	L	21 03 ..	.....	.....	.....	.....	Very distinct. P not discernible.
		M_N	21 04 ..	.....	.....	.....	.....	
		M_E	21 11 ..	.....	.....	.....	.....	
		F_E	21 22 ..	.....	.....	.....	.....	
		F_N	21 24 ..	.....	.....	.....	.....	
18	.....	P_E	22 08 ..	.....	.....	.....	.....	P not discernible on N-S.
		L	22 11 ..	9–10	*500	*5,500	.....	
		M_E	22 13 ..	.....	*5,500	.....	.....	
		M_N	22 14 ..	.....	.....	*5,500	.....	
		F	22 22 ..	.....	.....	.....	.....	
30	.....	P	7 39 ..	.....	.....	.....	.....	
		S_N	7 45 30	.....	.....	.....	.....	S_E obscured by time marks.
		L_E	7 57 ..	15	*3,000	.....	.....	
		L_N	7 59 ..	15	.....	*2,100	.....	
		M	8 08 ..	20–21	*3,000	*2,100	.....	
		F_E	9 11 ..	.....	.....	.....	.....	
		F_N	9 12 ..	.....	.....	.....	.....	

*Trace amplitude.

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

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

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

Instrumental constants.. V 110, T_0 6.4

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1919.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Apr. 2	.....	iP	0 54 38	.....	.....	.....	8,950	P very sharply defined on N-S. Other phases not discernible.
		S_E	1 04 46	.....	.....	.....	.....	
		F	1 30 ..	.....	.....	.....	.....	
17	.....	P_E	11 42 10	.....	.....	.....	3,810	
		SN?	11 47 46	.....	.....	.....	.....	
		L	11 51 40	.....	.....	.....	.....	
		F	13 55 ..	.....	.....	.....	.....	
17	.....	P	20 58 51	.....	.....	.....	2,050	
		S	21 02 19	.....	.....	.....	.....	
		L	21 03 40	24	.....	.....	.....	
		M	21 08 45	.....	*7,500	*7,500	.....	Movement dies out on E-W much sooner than on N-S.
		L	21 16 00	16	.....	.....	.....	
		F	22 30 ..	.....	.....	.....	.....	
18	.....	P	21 07 34	.....	.....	.....	3,600	
		S	21 12 58	.....	.....	.....	.....	
		L?	21 16 28	.....	.....	.....	.....	
		M_N	21 50 00	.....	.....	*6,000	.....	
		F	22 20 00	.....	.....	.....	.....	
19	.....	P?	3 02 42	.....	.....	.....	.....	No L waves visible
		S?	3 08 10	.....	.....	.....	.....	
		F	3 35 ..	.....	.....	.....	.....	
21	.....	P	11 34 38	.....	.....	.....	4,890	
		S	11 41 14	.....	.....	.....	.....	
		L	11 47 50	20	.....	.....	.....	
		F	12 30 ..	.....	.....	.....	.....	
21	.....	eL_N	15 54 50	18	.....	.....	.....	
		F	16 02 00	.....	.....	.....	.....	
27	.....	P?	0 42 53	.....	.....	.....	.....	Record indistinct.
		eL	1 35 00	.....	.....	.....	.....	
		L	1 41 00	16	.....	.....	.....	
		F	1 55 00	.....	.....	.....	.....	
28	.....	P	6 51 52	.....	.....	.....	2,930	Salvador.
		S	6 56 30	.....	.....	.....	.....	
		L?	6 58 45	.....	.....	.....	.....	
		L	7 03 30	12	.....	.....	.....	
		F	7 35 00	.....	.....	.....	.....	
30	.....	P	7 31 29	.....	.....	.....	9,850	Large record, but difficult of interpretation.
		S?	7 42 20	.....	.....	.....	.....	
		L	8 01 25	60	.....	.....	.....	
		L	8 10 ..	20	.....	.....	.....	
		L	8 27 ..	16	.....	.....	.....	
		F	11 40 ..	.....	.....	.....	.....	

*Trace amplitude.

TABLE 2.—*Instrumental seismological reports, April, 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*	*5.0*	*0*

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	*μ.*	*μ.*	*km.*	
1919. Apr. 17		eP_E	11 41 24					Not shown on N-S.
		S_E?	11 52 08					Sheets changed
		L_E	12 03 27	22				at 13h 09m, quake
		L_E	12 18 ..	22				still going on.
17		eP_E	20 58 52					
		eP_N	20 58 53					
		S	21 03 38					
		eL_E?	21 05 30					
		M_E	21 08 38	6	*1,900			
		M_E	21 09 21	6	*1,500			
		M_E	21 10 00	6	*1,700			
		M_N	21 12 02	14		*1,600		
		F	22 15 ..					
18		eP_E	21 07 30					P_N hardly shows.
		S	21 13 00					Microseisms present.
		eL	21 16 00	6				
		L_N	21 18 57	19				
		L_E	21 19 10	16				
		M_N	21 20 03	11		*800		
		M_E	21 20 31		*900			
		F	22 20 ..					F difficult.
19		L_E	3 21 13 3 25 ..					No other phases discernible. Microseisms present.
21		P_E	11 34 34					N-S poorly defined.
		S	11 41 12					
		eL_E	11 47 ..	38				F lost in changing sheets.
28		eP	6 51 45					eP poorly defined on N-S.
		S_E?	6 56 25					
		eL_E	7 01 12	16				
		F	7 30 ..					
30		eP	7 31 20					eP and other phases poorly defined on N-S.
		PR1	7 35 53					
		S_E	7 42 20					
		S_N?	7 42 23					Vertical component poorly defined.
		eL_E	8 01 06	22				
		M_E	8 17 53	19	*5,200			
		M_N	8 20 18	16		*1,800		
		M_E	8 20 20	19	*4,400			
		M_E	8 24 20	16	*3,800			
		F	13 23 ..					

* Trace amplitude.

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

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

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

Instrumental constant..T_0 18.1. Sensitiveness 0.40 arc tilt″=1 mm.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	*μ*	*μ*	*km.*	
1919. Apr. 17		P	11 31 48					
		S	11 38 24	18				
		L	11 49 00	22				
		M	11 54 54	19	*2,000			
		C	12 03 ..	17				
		F	14 45 ..					
17		P	21 03 54	19				
		S	21 12 30	18				
		L	21 23 30	18				
		M	21 26 06	20	*4,000			
		C	21 43 ..	18				
		F	23 03 ..					
18		P	21 21 48					Probably local.
		M	21 27 06	15	*900			
		F	22 45 ..					
21		L	13 40 48	19				
		M	13 45 00		*100			
		F	14 06 ..					
22		P	3 01 30	18				
		L	3 10 06	21				
		M	3 16 30	22	*300			
		C	3 21 ..	20				
		F	4 12 ..					
23		P	7 21 12	19				
		S or L	7 24 06					
		M	7 24 48		*500			
		M	7 47 ..		*500			
		F	8 00 ..					
27		L	0 46 ..	19				
		M	1 16 30	17	*700			
		C	1 20 30					
		F	1 35 ..					
28		L	7 17 ..	21				
		M	7 22 30		*300			
		F	7 38 ..					
30		P	7 26 00					The times given for S and L refer to points of marked increase of amplitude.
		S	7 32 24					
		L	7 35 42	19				
		M	7 41 30		*35,000			
		F	13 02 ..					

* Trace amplitude.

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

Illinois. *Chicago.* University of Chicago. U. S. Weather Bureau.

Lat., 41° 47′ N.; long., 87° 37′ W. Elevation, 180.1 meters.

Instruments: Two Milne-Shaw horizontal pendulums, 0.45 kg.

Instrumental constants..	V	T_0	ε	Sensitivity.
E	150	12	20:1	1″ arc tilt=26.6 mm.
N	150	8	20:1	1″ arc tilt=13.2 mm.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1919.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Apr. 2	.....	P.....	0 54 35	.....	.....	.....	.....	S? T_0 of N-S 12s and sensitivity 26.6 until Apr. 21.
		L.....	1 31 00	.....	.....	.....	.....	
		L.....	1 40 30	24	.....	.....	.....	
		L.....	2 22 00	16	.....	.....	.....	
		F.....	3 00 00	.....	.....	.....	.....	
16	.....	L_E....	4 04 50	24	.....	.....	.....	Record confused in tangled lines on N-S.
		L_E....	4 13 30	20	.....	.....	.....	
		F.....	4 40 00	.....	.....	.....	.....	
17	.....	P.....	11 41 14	.....	.....	.....	4,175	E-W trace wandered off sheet at 12h 36m, record lost for 1 hour. L continues on N-S with about same amplitude for 1½ hours or more.
		S.....	11 47 11	.....	.....	.....	.....	
		L.....	11 50 45	.....	.....	.....	.....	
		L.....	12 12 40	38	.....	.....	.....	
		F.....	14 30 00	.....	.....	.....	.....	
17	.....	P.....	20 58 50	.....	.....	.....	1,970	L waves irregular and continue with uniform period for over 2 hours on both components, though not as large on E-W as on N-S.
		S.....	21 02 10	.....	.....	.....	.....	
		L.....	21 04 30	.....	.....	.....	.....	
		M_N....	21 05 13	20	.....	120	.....	
		M_N....	21 13 35	20	.....	100	.....	
18	.....	F.....	0 24 30	.....	.....	.....	.....	
18	.....	P.....	21 07 00	.....	.....	.....	2,960	
		S.....	21 11 40	.....	.....	.....	.....	
		L.....	21 14 43	.....	.....	.....	.....	
		M.....	21 16 00	.....	67	67	.....	
		M_N....	21 18 00	.....	.....	67	.....	
		F.....	23 20 ..	.....	.....	.....	.....	
19	.....	P.....	3 02 51	.....	.....	.....	3,000	
		S.....	3 07 34	.....	.....	.....	.....	
		L.....	3 13 29	8	.....	.....	.....	
		F.....	4 10 00	.....	.....	.....	.....	
21	.....	P.....	11 35 36	.....	.....	.....	5,925	Record lost after 12h 45m, when trace wandered off sheet.
		S.....	11 43 08	.....	.....	.....	.....	
		L.....	11 51 31	26	.....	.....	.....	
21	.....	P.....	15 55 50	15	.....	.....	.....	
		F.....	16 20 ..	.....	.....	.....	.....	
22	.....	P.....	3 03 27	.....	.....	.....	8,430	
		S.....	3 13 09	.....	.....	.....	.....	
		L?....	3 26 00	.....	.....	.....	.....	
		L.....	3 31 00	18	.....	.....	.....	
		L.....	3 44 ..	18	.....	.....	.....	
		F.....	5 10 ..	.....	.....	.....	.....	
23	.....	e?.....	7 23 00	.....	.....	.....	.....	
		L.....	7 53 00	.....	.....	.....	.....	
		L.....	8 02 00	16	.....	.....	.....	
		L.....	9 24 ..	24	.....	.....	.....	Possibly Lrepl.
		L.....	9 33 ..	18	.....	.....	.....	
		F.....	9 50 ..	.....	.....	.....	.....	
27	.....	P?....	0 42 07	.....	.....	.....	.....	P and S doubtful. Instrument adjusted during beginning of quake.
		S.....	0 58 30	.....	.....	.....	.....	
		L.....	1 18 10	.....	.....	.....	.....	
		L.....	1 26 00	28	.....	.....	.....	
		L.....	1 38 ..	17	.....	.....	.....	
		F.....	2 40 ..	.....	.....	.....	.....	
28	.....	P.....	6 51 55	.....	.....	.....	2,940	L waves irregular both as to period and amplitude.
		S.....	6 56 34	.....	.....	.....	.....	
		L.....	6 59 24	.....	.....	.....	.....	
		F.....	8 40 ..	.....	.....	.....	.....	
30	.....	P.....	7 30 52	.....	.....	.....	9,510	
		S.....	7 41 28	.....	.....	.....	.....	
		L.....	7 59 00	50	.....	.....	.....	
		M_E....	8 09 ..	.....	147	.....	.....	Amplitudes largest on E-W.
		M_E....	8 13 ..	.....	266	.....	.....	L waves with amplitudes of 67 μ or more continue for nearly 2 hours.
		M_E....	8 21 ..	.....	420	.....	.....	F in microseisms sometime after 13h.
30	.....	P?....	7 34 48	.....	.....	.....	.....	All phases confused with preceding quake.
		S?....	7 45 18	.....	.....	.....	.....	

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

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

Instrument: Wiechert.

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

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1919.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Apr. 17	.....	iP_N....	20 58 23	.....	.....	.....	.....	S uncertain.
		eP_E....	20 58 28	.....	.....	.....	.....	
		iL_E....	21 02 55	.....	.....	.....	.....	
		iL_N....	21 02 56	.....	.....	.....	.....	
		M_N....	21 03 23	.....	.....	*3,750	.....	
		M_E....	21 03 25	.....	*3,200	.....	.....	
		F.....	21 58 ..	.....	.....	.....	.....	
18	.....	eP.....	21 06 04	.....	.....	.....	.....	
		S.....	21 10 14	.....	.....	.....	.....	
		L_E....	21 13 13	.....	.....	.....	.....	
		L_N....	21 13 14	.....	.....	.....	.....	
		M_N....	21 15 15	.....	.....	*4,700	.....	
		M_E....	21 15 17	.....	*6,250	.....	.....	
		F.....	21 58 ..	.....	.....	.....	.....	
30	.....	P_E....	7 30 17	.....	.....	.....	.....	
		P_N....	7 30 19	.....	.....	.....	.....	
		S_E?....	7 34 16?	.....	.....	.....	.....	Corresponding S_N not found. Possibly S_E?. Possibly S_N?.
		L_E?....	7 41 09	.....	.....	.....	.....	
		L_N?....	7 42 02	.....	.....	.....	.....	
		L?....	8 00 09	.....	.....	.....	.....	
		M_N....	8 02 25	.....	.....	*1,800	.....	
		M_E....	8 15 49	.....	*5,000	.....	.....	
		F.....	9 45 ..	.....	.....	.....	.....	

* Trace amplitude.

Maryland. *Cheltenham. Magnetic Ogservatory.* 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.*	
Apr. 17	.....	P_N....	20 58 55	3	.....	.....	.....	
		iP_E....	20 58 58	4	.....	.....	.....	
		iS_N....	21 03 44	14	.....	.....	.....	
		S_E....	21 03 48	6	.....	.....	.....	
		L_E....	21 09 19	16	.....	.....	.....	
		L_N....	21 09 42	17	.....	.....	.....	
		M_E....	21 12 21	12	*440	.....	.....	
		M_N....	21 12 27	15	.....	*1,800	.....	
		C.....	21 16 ..	14	.....	.....	.....	
		F_E....	21 32 ..	14	.....	.....	.....	
		F_N....	22 12 ..	13	.....	.....	.....	
18	.....	eP_E....	21 08 39	.....	.....	.....	.....	
		eP_N....	21 08 54	.....	.....	.....	.....	
		S_N....	21 13 13	8	.....	.....	.....	
		L_N....	21 19 17	.....	.....	.....	.....	L not well marked on E-W.
		L_E....	21 20 20	.....	.....	.....	.....	
		M.....	21 20 31	13	*20	*570	.....	
		F_E....	21 33 ..	.....	.....	.....	.....	
		F_N....	22 07 ..	.....	.....	.....	.....	
28	.....	eP_N....	6 51 54	.....	.....	.....	.....	
		eP_E....	6 51 59	.....	.....	.....	.....	
		L_N....	7 00 59	.....	.....	.....	.....	
		M_N....	7 03 44	.....	.....	*30	.....	
		F_E....	7 07 ..	.....	.....	.....	.....	
		C_N....	7 13 ..	.....	.....	.....	.....	
		F_N....	7 27 ..	.....	.....	.....	.....	
30	.....	e_E.....	7 34 33	.....	.....	.....	.....	Early phases not well defined. iP_E may be PR.
		iP_E....	7 35 51	4	.....	.....	.....	
		eP_N....	7 35 54	4	.....	.....	.....	
		eS_N....	7 44 00	10	.....	.....	.....	Possibly SR_N. at 7h 51m, 26s.
		L_E....	8 11 47	19	.....	.....	.....	
		eL_N....	8 17 ..	.....	.....	.....	.....	
		M_N....	8 22 31	14	.....	*1,580	.....	
		M_E....	8 24 41	15	*1,700	.....	.....	
		C.....	8 56 ..	15	.....	.....	.....	
		F_E....	10 13 ..	16	.....	.....	.....	
		F_N....	10 58 16	.....	.....	.....	.....	

*Trace amplitude.

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

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

Lat., 42° 22′ 36″.; 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, e 0; N: V 50, T_0 25, e 4:1}

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1919			*H. m. s.*	*Sec.*	*μ*	*μ*	*km.*	
Apr. 2	.....	e.....	1 52 29	8	.....	.....	.....	Cf. Ottawa, eL 1h 46m.
		L_N....	1 55 30	20	.....	.....	.....	Slight record on N-S.
		F.....	2 04 02	.....	.....	.....	.....	
15	.....	M_N?...	17 36 34 / 17 38 00	28 / 24	.....	.....	.....	Possibly not seismic; among irregular waves running from 13h 57m to 21h 30m.
16	.....	L_N....	3 59 52	20	.....	.....	.....	Cf. Ottawa eL 4h.
		L.....	4 12 40	18	.....	.....	.....	
		L.....	4 19 36	16	.....	.....	.....	
		F?....	4 20 50	.....	.....	.....	.....	
17	.....	*O?*....	*11 28* ..	.....	.....	.....	7,850*	Distance may be as much 8.050 km. Minute ticks failed during registration of P. Changed E-W record before 11h 55m.
		P_N?...	11 49 19	.....	.....	.....	.....	
		S_N?...	11 58 41	.....	.....	.....	.....	
		S_E....	11 59 46	.....	.....	.....	.....	
		eL_N...	12 12 42	64	.....	.....	.....	
		L_E....	12 20 41	32	.....	.....	.....	
		L.....	12 27 43	22.5	.....	.....	.....	Not Lrep.
		M_E....	12 27 53	20	.....	.....	.....	
		F.....	12 53 ..	.....	.....	.....	.....	
17	.....	*O*.....	*20 53 18*	.....	.....	.....	3,350	E-W gives distance 3,450 km.
		iP_N...	20 59 42	4	.....	.....	.....	
		iP_E...	20 59 43	4	.....	.....	.....	
		S_N....	21 04 49	.....	.....	.....	.....	
		S_E....	21 04 57	12	.....	.....	.....	
		i_N....	21 09 53	.....	.....	.....	.....	Large waves like L.
		L.....	21 10 29	26	.....	.....	.....	
		M_N....	21 12 31	.....	.....	.....	.....	
		M_E....	21 13 24	17	*29,000	.....	.....	
		M_N....	21 14 25	.....	.....	.....	.....	
		M_E....	21 15 26	17	*63,000	.....	.....	
		M_N....	22 23 45 / 22 35 50	.....	.....	.....	.....	A lenticular group of waves. E-W styles off drum from 22h 15m 42s to 22h 16m 48s. Automatic gong rang during occurrence of M.
		F.....	23 34 ..	.....	.....	.....	.....	
18	.....	*O*.....	*21 01 00*	.....	.....	.....	4,120	Cf. Ottawa, *O 21h 01m 02s.*
		P_E....	21 08 27	3	.....	.....	.....	
		i_N....	21 09 53	6	.....	.....	.....	
		i_E....	21 09 55	6	.....	.....	.....	
		S_N....	21 14 21	12	.....	.....	.....	
		S_E....	21 14 28	11	.....	.....	.....	
		L_N....	21 20 04	21	.....	.....	.....	
		L_N....	21 21 33	24	.....	.....	.....	
		L_E....	21 22 48	16	.....	.....	.....	
		M_E....	21 23 10	12	*6,000	.....	.....	Damped 1.5:1.
		M_E....	21 24 47	11	*4,000	.....	.....	
		F.....	22 45 ..	.....	.....	.....	.....	
19	.....	*O*.....	*3 05 50*	.....	.....	.....	3,100	P masked by microseism of 4 sec. period. N-S masked throughout.
		S_E....	3 16 59	6	.....	.....	.....	
		eL_E...	3 19 46	20	.....	.....	.....	
		e_N....	3 20 00	6.5	.....	.....	.....	
		L_N....	3 21 53	20	.....	.....	.....	
		L_E....	3 22 42	15-18	.....	.....	.....	
		L_N....	3 23 38	10	.....	.....	.....	
		F_E....	3 40 ..	.....	.....	.....	.....	
21	.....	*O*.....	*11 26 17*	.....	.....	.....	4,700	42° 18′ of arc.
		P_N....	11 34 25	.....	.....	.....	.....	
		P_E....	11 34 26	.....	.....	.....	.....	
		i_E....	11 35 22	6	.....	.....	.....	
		S_N....	11 40 51	6	.....	.....	.....	
		S_E....	11 40 54	10	.....	.....	.....	

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

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1919			*H. m. s.*	*Sec.*	*μ*	*μ*	*km.*	
Apr. 21	.....	eL_N?..	11 45 11	24	.....	.....	.....	Followed by waves of 20 sec. period. F merges into local disturbances peculiar to morning hours.
		eL_E?..	11 45 26	15	.....	.....	.....	
		F.....	12 22 ..	.....	.....	.....	.....	
		e_N?....	15 51 04	13	.....	.....	.....	Cf. Ottawa, eL 15h 35m.
		e_E....	15 58 36	7	.....	.....	.....	
		L_N....	15 59 44 / 16 01 04	15	.....	*500	.....	
		F_E....	16 14 37	.....	.....	.....	.....	
27	.....	*O?*....	*0 55 45*	.....	.....	.....	7,480	Distance probably greater than given.
		S_N?...	1 15 33	6	.....	.....	.....	
		S_E?...	1 15 47	6	.....	.....	.....	
		e_E....	1 21 58	9	.....	.....	.....	
		e_E....	1 23 31	.....	.....	.....	.....	
		L_E....	1 28 38	24	.....	.....	.....	Amplitude slight.
		L_N....	1 30 34	24	.....	.....	.....	
		L_N....	1 34 19	20	.....	.....	.....	
		F_E....	1 47 30	.....	.....	.....	.....	
28	.....	*O?*....	*6 44 22*	.....	.....	.....	4,420?	P in microseisms.
		e_E....	6 57 24	.....	.....	.....	.....	
		eP_N?..	6 57 55	3.5	.....	.....	.....	
		i_N....	6 58 15	4	.....	.....	.....	
		S_N?...	6 58 21	6	.....	.....	.....	
		i_N....	6 59 16	.....	.....	.....	.....	Pendulum shifted north.
		eL_E...	7 03 44	18	.....	.....	.....	
		eL_N...	7 03 59	16	.....	.....	.....	
		L_N....	7 06 11	22	.....	.....	.....	
		L_N....	7 06 33	15	.....	.....	.....	
		F.....	7 49 40	.....	.....	.....	.....	
28	.....	L_N....	11 32 00 / 11 34 06	20	.....	.....	.....	Amidst irregular waves of long periods; less distinct on E-W.
30	.....	*O*.....	*7 18 10*	.....	.....	.....	10,390	93.°5 of arc. Cf. La Paz, *07h 18m 20s*; distance, 9,550 km. Harvard and La Paz give intersection in longitude 158.5°.
		eP_E...	7 31 31	4	.....	.....	.....	
		P_N....	7 32 20	4	.....	.....	.....	
		#P_NR_1	7 36 18	3	.....	.....	.....	
		#P_ER_1	7 36 29	3.5	.....	.....	.....	
		P_ER_2..	7 37 18	7	.....	.....	.....	
		P_NR_2..	7 37 45	6.5	.....	.....	.....	
		S_N....	7 42 50	.....	.....	.....	.....	
		S_E....	7 42 56	.....	.....	.....	.....	
		#i_N....	7 44 14	19	.....	.....	.....	
		#i_E....	7 46 05	18	.....	.....	.....	
		S_ER_1..	7 47 00	.....	.....	.....	.....	E-W damped 1.5:1 by magnet.
		S_NR_1..	7 48 00	16	.....	.....	.....	
		#SP_E-P_N	7 52 10	47	.....	.....	.....	Looks like eL of a superposed second quake. i_N 7h 44m 14s looks like iS of a second quake. Times marked # fit into a supposed quake, distance 6,370 km.
		S_NR_2..	7 53 00	.....	.....	.....	.....	
		i_E....	7 59 30	.....	.....	.....	.....	
		#i_N....	8 00 00	.....	.....	.....	.....	
		eL_N...	8 02 42	49	.....	.....	.....	
		L_N....	8 05 10	53.5	.....	.....	.....	
		L_E....	8 05 13	20	.....	.....	.....	
		M_N....	8 17 23	18	.....	*61,500	.....	
		M_E....	8 18 45	15	*60,000	.....	.....	
		M_E....	8 20 30	.....	.....	.....	.....	
		M_E....	8 21 00	.....	.....	.....	.....	*O 7 26 26* iP_N 7 36 18 S_N 7 44 19 eL_N 7 52 10 M 8 00 ..
		M_N....	8 21 36	.....	.....	.....	.....	N-S stylus left drum and no further record on N-S. These maxima with a period of about 15 sec. and average trace amplitude of *60,000 μ continue until 8h 47m. The damping is too slight.
		M_E....	8 22 00	.....	.....	.....	.....	
		M_E....	8 24 00	.....	.....	.....	.....	
		C_E....	9 19 ..	.....	.....	.....	.....	
		L_{repi}..	9 37 00	.....	.....	.....	.....	
		M.....	9 38 ..	.....	.....	.....	.....	
		M.....	9 39 ..	.....	.....	.....	.....	
		L_{repa}..	11 10 ..	.....	.....	.....	.....	
		L_{repa}..	12 32 ..	.....	.....	.....	.....	F may be leter, record changed.
		F.....	12 37 ..	.....	.....	.....	.....	

*Trace amplitude.

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

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

Lat., 38° 38′ 15″ N.; long., 90° 13′ 58″ W. Elevation, 160.4 meters. Foundation: 1 feet of tough clay over limestone of Mississippi system, about 300 feet thick.

Instrument: Wiechert 80 kg. astatic, horizontal pendulum.

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

(Report for April, 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..V E 13, N 14; T_0 E 22, N 25; e E 4:1, N 4:1

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	Sec.	μ	μ	km.	
1919. Apr. 17		e_E	11 47 18	4				
		e_E	11 51 21	4				
		e_N	11 51 25	4				
		S_E	11 57 54	20				
		S_N	11 58 18	18				
		L_N	12 12 20	45				
		L_E	12 15 20	30				
		L	13 24 ..					
		F_E	14 06 ..					
17		P_N	20 59 01	5				
		S_E	21 04 19	9				
		M_N	21 12 45	17		*3,800		
		F_E	22 22 ..					
18		eP_E	21 08 46	7				
		eP_N	21 08 53	5				
		eS_E	21 13 21	8				
		e_N	21 16 18	7				
		L_N	21 19 48	15				
		F_E	22 12 ..					
21		P_E	11 34 31	4				
		P_N	11 34 33	4				
		e	11 37 35	5				
		S_E?	11 41 21	12				
		S_N?	11 41 23	5				
		L_N	11 47 19	12				
		L_E	11 47 21	9				
		F	12 20 ..					
28		e_E	6 57 55	5				
		e_N	6 58 53	6				
		L_E	7 01 56	15				
		L_N	7 02 36	12				
		F_E	7 33 ..					
30		eP_E	7 31 24	5				
		PR_1	7 35 19	5				
		S_E	7 42 21	9				
		S_N	7 43 16	8				
		L_N	8 01 16	60				
		M_E	8 24 56	16	*5,700			
		F_E	12 08 ..					

* Trace amplitude.

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

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

Instrument: Wiechert, 80 kg.

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

(Report for April, 1919, not received.)

Panama Canal Zone. *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.
			H. m. s.	Sec.	μ	μ	km.	
1919. Apr. 17		P_E	20 56 11				1,130	
		P_N	20 56 12					
		S_N	20 58 34					
		S_E	20 58 51					
		L_N	20 59 26					
		L_E	20 59 55					
		M_E	21 01 20		*900			
		M_N	21 01 38			*1,800		
		F	21 28 00					
28		P_E	6 48 22					San Salvador.
		P_N	6 48 27					
		S_N	6 49 53					
		L_N	6 51 09					
		M_N	6 53 37			*500		
		F	7 15 00					
30		P_N	7 30 40				10,400	
		P_E	7 30 45					
		S_E	7 41 49					
		S_N	7 42 00					
		L_N	7 57 00					
		L_E	8 02 20					
		M_E	8 18 00		*2,000			
		M_N	8 18 30			*2,000		
		F_E	10 03 00					
		F_N	10 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..V E 10, N 10; T_0 E 18, N 20

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	Sec.	μ	μ	km.	
1919. Apr. 17		eP_E	20 58 44	7				
		eP_N	20 59 17	7				
		iS_E	21 03 44	19				
		eS_N	21 04 26					
		L_N	21 06 15	24				
		L_E	21 06 42	19				
		M_N	21 06 45	30		100		
		M_E	21 12 44	14	160			
		C_N	21 17 ..	14				
		C_E	21 19 ..	14				
		F_N	21 29 ..					
		F_E	21 44 ..					
21		eP_E	11 31 35	9				
		eP_N	11 31 43					
		eS_E	11 35 30	10				
		eS_N	11 36 12					
		eL_E	11 37 35					
		M_E	11 42 40	8	10			
		M_N	11 43 25	7				
		F_E	11 59 ..					
		F_N	12 01 ..					
28		eP_E	6 55 32					
		eL_E	6 58 53					
		M_E	7 01 48	11	10			
		F_E	7 11 ..					
30		eP_N	7 35 31	7				This may be PR.
		eP_E	7 36 31	8				
		S_E	7 46 13					
		S_ER	7 52 28					
		S_NR	7 52 45					
		eL_N	8 03 ..	38				
		L_E	8 12 27	22				
		L_N	8 14 50					
		M_N	8 16 25	18		120		
		M_E	8 31 17	17	180			
		F_N	9 55 ..					
		F_E	10 29 ..					

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

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

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

Instruments: Two Bosch-Omori, mechanical registration.

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

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1919.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Apr. 17		e	20 58 58					
		S?	21 01 24					
		L	21 05 00	20				
		L	21 11 36	20				
		M_N	21 16 00	16		*10,000		
		F	22 10 00					
18		e	21 14 25					
		L	21 54 00	14				
		F	22 00 ..					
21								Trace on N-S about 11^h 45^m but no time marks.
28		eL_E	7 00 00					Does not show on N-S.
		L_E	7 04 00	12				
		F	7 20 ..					
30		e	7 35 53					All phases indistinct.
		L	8 12 00	24				
		L	8 17 00	18				L continues more or less irregular for over ½ hour, largest on E-W.
		F	11 00 ..					

* 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.. 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.*	
Apr. 2		e?	0 57 22					e, irregular, may be local.
		eL	1 46 .. / 2 05 ..	26				eL are regular sinusoidal waves of small amplitude.
16		eL	4 00 .. / 4 20 ..	15				Very small amplitude. Barely discernible.
17		*O*	*11 28 35*				9,760	
		P?	11 41 25					
		S_E?	11 52 12					
		L	12 11 54	48				
		L	12 20 ..	36				
		L	12 35 ..	16				
		L	13 05 ..	16				
		L	13 30 ..	22				F 14^h.
17		*O*	*20 53 02*				3,590	
		iP	20 59 49					
		eS	21 05 12					
		eL?	21 08 30					
		M	21 15 ..	17				
		L	21 36 ..	15				
		L	21 55 ..	14				
		F	22 30 ..					

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

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1919.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Apr. 18		*O*	*21 01 02*				3,940	
		P	21 08 16					
		PR	21 09 30					
		S	21 14 00					
		eL	21 20 18					
		L	21 22 ..	8				
		L	21 35 ..	8				
		L	21 43 ..	8				
		L	22 06 ..	8				
		F	22 30 ..					
19		iS	3 09 38					P lost in microseisms.
		L	3 19 30 / 3 33 ..	8				eL?.
		F	3 50 ..					
21		eL	15 55 .. / 16 10 ..	17				
22		eL	3 11 .. / 3 25 ..	13				F merges into next quake.
22		eL	3 38 .. / 4 05 ..	18				e in preceding quake.
		F	4 30 ..					Amplitudes very small.
23		e	7 35 ..					
		e	7 44 ..	8				
		eL_E	7 53 ..	36				
		L	8 02 ..	?				
		L	8 19 ..	?				
		L_E	8 26 ..	16				
		L_E	8 32 ..	14				
		F	8 45 ..					Record complete up to Apr. 23; next report will be issued about July 1.

Canada. *Toronto. Dominion Meteorological Service.*

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

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

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

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1919.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
Apr. 15		L	23 41 36					Doubtful as to being seismic.
		M	23 43 30		*200			
16		F	0 02 36					
16		e	4 03 12					
		L	4 09 48		*100			
		F	4 34 12					
17		P	11 40 42?				10,600	Possibly Japan.
		iS	11 52 06					
		i	12 03 24					
		e	12 06 18					
		eL	12 30 18					
		M	12 32 12		*100			
		eL	13 11 12					F merges into next quake.
17		eL	13 36 54					Possibly same origin as preceding. P and S lost in previous quake.
		eL	13 42 24					
		M	13 43 30		*800			
		iL	13 53 36					
		F	14 27 48					

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

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

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1919.			*H. m. s.*	*Sec.*	*μ*	*μ*	*km.*	
Apr. 17		P	21 00 00				3,810	P not well defined S of large amplitude.
		iS	21 05 36					
		iL	21 07 42					
		iL	21 11 42					
		iL	21 17 42					
		M	21 19 24		*8,500			
		F	23 16 36					
18		eS	21 15 48					
		L	21 20 48					
		M	21 21 30		*800			
		L	21 27 06					
		F	22 01 42					
19		L	3 12 42?					Barely noticeable.
		L	3 38 18					
21		L	11 43 42					
		eL	11 59 30					
		M	12 01 06		*300			
		F	12 44 30					Light off at 15h when other stations record quake.
22		L	3 24 42					
		L	3 53 24		*100			
		L	3 56 30					
22								Marked microseisms at 5h 31m 18s, amplitude *200.
23		L	8 05 30		*50			
		F	8 29 06					
27		e	1 25 18					
		eL	1 33 54					
		M	1 41 36		*100			
		F	2 25 18					
28		S?	7 00 00					San Salvador, P not recorded.
		iL	7 04 06					
		M	7 04 30		*800			
		F	7 42 18					
30		e	7 30 48?				6,790	One of the largest disturbances we have ever recorded.
		eP	7 32 00					
		e	7 35 18					
		e	7 37 00					
		eS	7 40 18					
		iL	7 44 36					
		iL	7 48 00					
		L	8 14 00					
		L	8 15 30					
		L	8 16 30					
		M	8 19 00		*25,000			From 8h 17m to 9h 15m a number of swings of very large amplitude.
		L	10 15 36					
		F	12 39 42					
30		L	17 49 00					
		eL	17 50 18					
		M	17 51 30		*700			
		F	18 23 48					

*Trace amplitude.

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

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

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

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

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1919.			*H. m. s.*	*Sec.*	*μ*	*μ*	*km.*	
Apr. 16		P	4 28 55					
		L	4 37 21					
		M	4 40 49		*100			
		F	4 50 14					
17		P	11 35 36				7,500	Japan.
		S	11 44 31					
		L	12 00 53					
		M	12 15 16		*1,200			F merges into next quake.

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

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1919.			*H. m. s.*	*Sec.*	*μ*	*μ*	*km.*	
Apr. 17		M	13 58 12		*400			
		F	14 30 03					
17		P	21 00 56				4,530	Southern Mexico.
		S	21 07 12					
		L	21 11 20					
		L	21 16 16					
		M	21 24 39		*9,500			
		F	23 11 45					
			Vertical		A_z			
		P	*21 01 03*	*4*			*3,870*	
		S	*21 06 42*	*8*				
		L	*21 15 27*	*20–24*				
		M	*21 23 42*	*24*	*29*			
18		P	21 10 26				1,710	Probably Alaska.
		S	21 13 23					
		L	21 19 17					
		M	21 23 42		*1,500			
19		L	3 18 47					
		M	3 21 15		*200			
		F	3 27 38					
21		L	12 03 01					
		M	12 13 26		*300			
		F	12 55 05					
22		L	3 24 42					
		M	3 33 33		*200			
		F	4 07 00					
23		P?	7 47 35					
		L	7 58 31					
		M	8 05 38		*200			
		F	8 20 52					
27		L	1 13 48					
		M	1 18 43		*200			
		F	1 35 55					
28		L	7 10 29					
		M	7 17 26		*600			
		F	7 42 43					
30		P	7 29 14				5,750	Probably South America.
		S	7 36 37					
		L	7 48 54					
		M	8 03 11		*34,500			Light off from 16h 43m to 17h 45m when other stations record quake.
		F	13 28 15					
			Vertical.		A_z.			
		P	*7 29 00*	*4*			*5,320*	
		S	*7 36 00*	*12*				
		L	*7 55 12*	*24*				
		M	*8 00 30*	*24*	*29*			

*Trace amplitude.

SEISMOLOGICAL DISPATCHES.[1]

Tokyo, Japan, March 29, 1919.

A slight earthquake was felt here to-day at 9:30 a. m. No damage done. (Special observer.)

San Salvador, April 28, 1919.

A violent earthquake occurred in this city at an early hour this morning. Later, about 20 additional shocks were felt, but of lesser violence. (Assoc. Press.)

Washington, D. C., April 29, 1919.

A severe earthquake occurred in San Salvador Monday morning (Apr. 28) at 1 o'clock, causing 49 deaths, injury to many persons, and considerable damage to property. (State Department.)

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