SEISMOLOGY.

W. J. HUMPHREYS, Professor in Charge.

[Dated: Weather Bureau, Washington, D. C., Jan. 3, 1920.]

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

Day.	Approximate time, Greenwich civil.		Station.	Approximate latitude.		Approximate longitude.		Intensity Rossi-Forel.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
	H.	*m.*		°	′	°	′			*Sec.*			
			ARKANSAS.										
Nov. 3	20	40	Pocahontas	36	15	90	55	5	1	.....	Loud rumbling	Felt by many	Benedictine Sisters.
			CALIFORNIA.										
6	0	15	Redlands	34	04	117	12	4	1	.....	None	Felt by several	P. W. Moore.
	0	15	Riverside	33	58	117	21	4	1	.....	None	do	J. H. D. Cox.
25	11	03	Centerville	37	30	122	00	5	2	.....	Loud rumbling	Felt by many	M. L. Mowry.
	11	03	Livermore	37	40	121	45	4	1	.....	None	Felt by several	E. J. Still.
	11	03	Los Gatos	37	12	121	58	4	1	.....	None	Felt by many	F. H. McCullagh.
	11	03	Petaluma	38	15	122	38	5	1	.....	None	do	*Santa Rosa Press Dem'ct.*
	11	03	San Francisco	37	45	122	30	4	1	5	None	Many people awakened	U. S. Weather Bureau.
	11	03	San Jose	37	15	121	53	3	1	10	None	Felt by many	Maurice Connell.
	11	03	San Jose	37	15	121	53	3	1	.....	None	do	U. S. Weather Bureau.
	11	03	Spreckles	36	35	121	38	3	2	2?	None	do	M. A. Klein.
	11	03	Stanford University	37	27	122	09	3	1	Few	None	do	S. D. Townley.
	11	15	Salinas	36	36	121	40	4	1	20	None	do	E. D. Eddy.

CORRIGENDUM.

REVIEW, September, 1919:
Page 688. The first quake on the 27th of September in the Toronto report should be deleted; it belongs to the Victoria report.

TABLE 2.—*Instrumental seismological reports, November, 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.* Seismic Observatory. Cyril Ruhlman, S. J.

Lat., 30° 41′ 44″ N.; long., 88° 08′ 46″ W. Elevation, 60 meters.

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

(No earthquake recorded during November, 1919.)

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

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

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

Instrumental constants.. V E 10, N 10; T_0 17, 15

(No earthquake recorded during November, 1919.)

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.. V E 10, N 10; T_0 17, 18

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1919.			*H. m. s.*	*Sec.*	*μ*	*μ*	*Km.*	
Nov 14..	.....	P_E....	6 48 36	3	.....	.....	.....	N not in operation.
		M_E....	6 49 20	.....	20	.....	.....	
		F_E....	6 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.)

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

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

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

(Report for November, 1919, not received.)

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

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

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

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

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

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

(No earthquake recorded during November, 1919.)

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 pendulum, 80 kg. vertical.

Instrumental constants.. V E 165, N 143, Z *80*; T_0 5.4, 5.2, *3.0*; e 0, 0, *0*

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1919.			*H. m. s.*	*Sec.*	*μ*	*μ*	*Km.*	
Nov. 6	.....	P_E....	7 19 29	.....	.....	.....	.....	Very heavy micros.
		P_N....	7 19 34	.....	.....	.....	.....	
		S_E....	7 25 36	.....	.....	.....	.....	
		S_N....	7 25 25	.....	.....	.....	.....	
		F.....	7 50 —	.....	.....	.....	.....	
18	.....	e.....	4 21 44	.....	.....	.....	.....	
		F.....	5 00 —	.....	.....	.....	.....	
18	.....	L_E....	22 37 36	22	.....	.....	.....	Very heavy micros.
		L_N....	22 33 26	24	.....	.....	.....	
		F.....	23 ca.	.....	.....	.....	.....	
18	.....	*eL_Z*...	*22 40 36*	.....	.....	.....	.....	Micros.
		L_Z....	*22 44 04*	*16*	.....	.....	.....	
		F.....	*23 ca.*	.....	.....	.....	.....	
20	.....	e_E....	14 41 00	.....	.....	.....	.....	Very heavy micros.
		e_N....	14 41 31	.....	.....	.....	.....	
		eL_E?..	15 14 36	.....	.....	.....	.....	
		L_E....	15 17 00	20	.....	.....	.....	
		F.....	15 30 —	.....	.....	.....	.....	
20	.....	*e_Z*....	*14 41 48*	.....	.....	.....	.....	Very heavy micros.
		L_Z....	*15 14 59*	*16*	.....	.....	.....	
		F.....	*15 30* ..	.....	.....	.....	.....	
28	.....	e_E?....	14 20 00	.....	.....	.....	.....	Very heavy micros; difficult.
		e_N?....	14 23 00	.....	.....	.....	.....	
		L.....	14 27 50	15	.....	.....	.....	
		F.....	14 38 ..	.....	.....	.....	.....	

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.*	
Nov. 6	.....	e.....	7 24 00	.....	.....	.....	.....	Heavy micros; phases indeterminable.
		F.....	7 40 ca.	.....	.....	.....	.....	
18	.....	e.....	4 21 00	.....	.....	.....	.....	Phases indeterminable.
		F.....	4 35 00	.....	.....	.....	.....	
18	.....	S?.....	22 16 16	.....	.....	.....	.....	
		L.....	22 28 45	28	.....	.....	.....	
		L.....	22 33 30	20	.....	.....	.....	
		L.....	22 40 ..	16	.....	.....	.....	
		F.....	23 ca. ..	.....	.....	.....	.....	
20	.....	eL.....	14 40 ..	.....	.....	.....	.....	
		L.....	15 15 ..	20	.....	.....	.....	
		L.....	15 18 ..	16	.....	.....	.....	
		F.....	15 45 ..	.....	.....	.....	.....	
28	.....	e.....	14 22 00	.....	.....	.....	.....	
		L.....	14 27 50	16	.....	.....	.....	
		F.....	14 35 ca.	.....	.....	.....	.....	

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 18.4. Sensitivity, 0.40″.

(Report for November, 1919, not received.)

TABLE 2.—*Instrumental seismological reports, November, 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.*	
Nov. 6		P?.....	7 21 25					
		S.....	7 26 04					
		L.....	7 28 30					
		L.....	7 34 ..	20				
		F.....	8 10 ca.					
14		P.....	6 49 41					
		S?.....	6 56 38					
		F.....	7 20 ca.					Lost in micros.
18		P.....	4 21 07					
		L.....	4 40 ..	18				
		L.....	4 58 ..	15				
		L.....	5 14 ..	15				
		F.....	5 40 ca.					Lost in micros.
18		S?.....	22 16 06					
		L.....	22 34 ..	22				
		L.....	22 40 ..	18				
		L.....	22 45 ..	15				
		F.....	23 50 ca.					Lost in micros.
20		P.....	14 30 30					
		S.....	14 40 05					
		L.....	14 46 50					
		L.....	15 07 ..	25				
		L.....	15 11 ..	18				
		L.....	15 20 ..	16				
		F.....	17 ca...					Lost in heavy micros.
23		L.....	6 56 ..	22				Heavy micros: P. and S. not discernible.
		L.....	7	20				
		L.....	8 05 ..	15				
		F.....	8 30 ..					
28		P.....	14 21 00					Micros.
		S.....	14 27 08					
		L.....	14 29 45	17				
		F.....	16 ca...					

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: Weichert.

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

(Report for November, 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	14
	N	10	14

(No earthquake recorded during November, 1919.)

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

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

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

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

(Report for November, 1919, not received.)

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

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

Instrument: Wiechert 80 kg. astatic, horizontal pendulum.

Instrumental constants	V	T_0	ε
	80	7	5:1

(Report for November, 1919, not received.)

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

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

Instrument: Wiechert 80 kg. horizontal.

Instrumental constants	V	T_0	ε
	80	7	5:1

(Report for November, 1919, not received.)

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

Lat., 42° 26′ 58″ N.; long., 76° 29′ 03″ W. Elevation, 242.6 meters.

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

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

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1919.			*H. m. s.*	*Sec.*	*μ*	*μ*	*km.*	
Nov. 18		e_E.....	22 13 50	10				
		L_E.....	22 23 50	25				
		F_E.....	23 10 ..					
20		L_E.....	15 15 50	20				Earlier phases lots in micros.
		F_E.....	15 38 ..					

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	T_0	ε
	E	72	5.0	0
	N	72	5.0	0

(Report for November, 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. and 25 kg.

Instrumental constants	V	T_0
	35	20
	10	20

(Report for November, 1919, not received.)

Porto Rico. *Viegues.* *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	T_0
	10	17
	10	19

(Report for November, 1919, not received.)

TABLE 2.—*Instrumental seismological reports, November, 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.. E: V 10, T_0 15; N: V 10, T_0 16

(No earthquake recorded during November, 1919.)

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 Nov. 6		L_E	*H. m. s.* 7 27	*Sec.*	μ	μ	*Km.*	N.-S. masked by micros.
		L_E	7 29	15				
		L_E	7 33	15				
		F	7 40	15				
18		i	4 21 27					L wavessinusoidal, but so small in amplitude as to be barely visiole.
		L_E	4 38 to 5 15					
		F	5 25					
18		iS?	22 15 23					Micros interfere with any preceding phases.
		eL	22 26 24	40				
		L	22 30	25				Sinusoidal L waves which are remarkable for the similarity on both components.
		L	22 39	16				
		L_E	22 58	9				
		F	23 10					
20		$e?_E$	14 41 09					
		eL?	15 05					
		L	15 14					
		L_E	15 18 to 15 30	18				
		F	15 36					
23		L_E	6 58 to 7 11	24				
		L_E	7 13 to 7 18					
		L_E	7 23					
		F	7 28					
28		iS_N?	14 19 18					This quake, though smaller, bears a striking resemblance to the second quake on Nov. 18, above.
		$iS?_E$	14 19 24					
		eL	14 23 40	15				
		L_E	14 28 to 14 32	13				
		F	14 35					

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. Nov. 1		eL	*H. m. s.* 5 58 06	*Sec.*	μ	μ	*Km.*	Gradual thickening.
		M	5 59 42		*200			
		F	6 07 18					
6		L	7 27 48					
		eL	7 39 06		*100			
		F	7 45 06					
18		L	4 31 18					
		L	4 45 00		*50			
		L	4 46 18					

* Trace amplitude.

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

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1919. Nov. 18		e	*H. m. s.* 22 06 18	*Sec.*	μ	μ	*Km.*	P. waves not defined.
		e	22 12 30					
		S	22 14 48					
		L	22 24 30					
		L	22 35 00					
		L	22 39 36					
		eL	22 40 48					
		M	22 41 36		*1,300			
		F	23 42 54					
20		e	14?37 12					Small micros interfered with initial phases.
		L	14 41 18		*100			
		L	14 58 12					
		L	15 15 00					
		eL	15 19 00					Marked thickening 15 19 to 15 26 12.
		M	15 24 12		*800			
		F	16?03 00					
20		L	16 28 54		*50			
		F	17 09 48					
23		e	7 03 30					
		eL	7 11 42					
		M	7 18 18		*200			Gradual thickening.
		F	7 31 54					
28		e	14 12 30					Asia Minor. Micros interfered with definition of waves.
		L	14 22 30					
		L	14 25 42					
		M	14 29 42					
		F			*100			Micros.

*Trace amplitude.

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

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

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

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

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1919. Nov. 6		P?	*H. m. s.* 7 47 51	*Sec.*	μ	μ	*Km.*	
		M	7 51 47		*300			
		F	8 03 36					
14		P	6?57 06					
		L	6 58 35					
		M	7 02 32		*300		656?	
		F	7 16 18					
18		P	4 23 04					
		S	4 31 26					
		L	4 45 41					
		M	4 54 47		*500		6,860	
		F	5 17 10					
18		P?	22 29 32					
		S?	22 34 27					
		L	22 40 51					
		M	22 48 13		*500		3,170?	
		F	23 25 06					
20		P	14 24 15					
		S	14 27 52					
		L?	14 34 05					
		M	14 37 32		*400		2,160	
		eL	14 56 52					
		F	15 25 14					
20		M	16 43 56		*200			
		F	17 00 40					
23		P	6 23 31					
		S	6?30 24					
		L	6 38 16					
		M	6 46 38		*400		5,200?	
		F	7?09 45					
28		P?	14 04 28					
		M	14 35 27		*200			Asia Minor?

* Trace amplitude.

SEISMOLOGICAL DISPATCHES.[1]

Guatemala City, Guatemala, October 14, 1919.

A severe earthquake was felt this day at Amatitlan, a town situated about 25 kilometers from this place. At Puerto Barrios its intensity was such as to cause general alarm. (Georgetown Cooperative Station.)

Florence, Italy, October 26, 1919.

Homes and schools were abandoned in a panic here when an earthquake rocked the city yesterday afternoon. The quake was a strong undulating movement of the ground, especially heavy in Avezzo and Valdarno, where heavy damage was reported. The tremor was also felt at San Repolero and throughout the valley of Arno and Chiana. (Associated Press.)

Quebec, Canada, October 27, 1919.

An earthquake shock was recorded on the north shore of the Gulf of St. Lawrence early Sunday morning. It started at 5.28 and the tremor was felt for two minutes. No damage reported. (Associated Press.)

Fort de France, Martinique, November 7, 1919.

Quite a strong earthquake shock was felt here at 3.15 this morning. No serious damage resulted. (Associated Press.)

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

Salta, Argentina, November 10, 1919.

A strong earthquake shock, lasting several seconds, was felt here shortly after last midnight. The tremors were repeated at 5 o'clock this morning with less intensity. No damage has been reported.

San Francisco, November 25, 1919.

Portions of San Francisco were shaken for half a minute early this morning by an earthquake. No damage was reported, though sleepers were jarred from their beds. The quake occurred at 3.04 o'clock. (United Press.)

Detroit, Mich., November 27, 1919.

That a meteor of tremendous size plunged into Lake Michigan last night, causing earth tremors felt in a dozen southern Michigan cities and sending a pillar of flame hundreds of feet into the air which was visible for a radius of more than 50 miles, was the theory generally accepted early to-day in explanation of the earth shock which at first was believed to have been caused by a terrific explosion at some industrial plant. (Associated Press.)

Paris, November 29, 1919.

A slight earthquake shock, lasting seven seconds, was felt at 20 minutes to 10 o'clock last night at Cannes, in the Riviera, it was announced in messages received here this morning. A heavier shock was experienced a half hour after midnight at Foix, 45 miles south of Toulouse, at the foot of the Pyrenees. Only slight damage was done at either place. (Associated Press.)

TABLE 3.—LATE 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).

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

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1919.			*H. m. s.*	*Sec.*	*μ*	*μ*	*Km.*	
Sept. 6	.....	P_N	9 35 44	4	.....	.....	.....	Clock out of order. Clock error uncertain throughout month.
		S_E	9 40 03	7	.....	.....	.....	
		S_N	9 40 07	6	.....	.....	.....	
		L_N	9 41 13	11	.....	.....	.....	
		L_E	9 41 17	11	.....	.....	.....	
		F_E	10 27 ..	.....	.....	.....	.....	
13	.....	e_N	12 30 15	4	.....	.....	.....	
		i_E	12 38 17	5	.....	.....	.....	
		i_N	12 38 18	5	.....	.....	.....	
		L_N	12 52 ..	20	.....	.....	.....	
		F_N	13 09 ..	.....	.....	.....	.....	
15	.....	i	17 49 15	5	.....	.....	.....	Phases lost in micros.
		F	18 05 ..	.....	.....	.....	.....	
27	.....	e_N	11 33 10	3	.....	.....	.....	e_N may be micros. Phases overlapping. Origin not far away.
		e_E	11 33 39	3	.....	.....	.....	
		F_N	11 39 ..	.....	.....	.....	.....	
30	.....	e_N	7 55 15	4	.....	.....	.....	
		e_E	7 55 52	11	.....	.....	.....	
		F	8 12 ..	.....	.....	.....	.....	
Oct. 3	.....	L_E	10 37 ..	18	.....	.....	.....	
		F_E	10 58 ..	.....	.....	.....	.....	
10	.....	L	1 27 06	18	.....	.....	.....	
		F	2 01 ..	.....	.....	.....	.....	
12	.....	e_N	22 11 12	4	.....	.....	.....	
		eL_N	23 13 15	24	.....	.....	.....	
		F	23 27 ..	.....	.....	.....	.....	
27	.....	P_N	3 50 30	4	.....	.....	.....	
		e_E	3 52 59	5	.....	.....	.....	
		eS	3 58 24	5	.....	.....	.....	
		L_E	4 08 18	16	.....	.....	.....	
		F_E	4 17 ..	.....	.....	.....	.....	

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

Lat., 19° 09′ N.; 65° 27′ W. Elevation, 19.8 meters.

Instruments: Two Bosch-Omori.

Instrumental constants: E: V 10, T_0 17; N: V 10, T_0 19

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1919.			*H. m. s.*	*Sec.*	*μ*	*μ*	*Km.*	
Oct. 14	.....	L_E	17 03 17	.....	.....	.....	.....	Nothing on N. Times obtained by interpolation over an interval of 12 hours.
		M_E	17 05 35	17	10	.....	.....	
		F_E	17 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.

Instrumental constant: T_0 18.4. Sensitiveness 0.40 arc tilt-1 mm.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1919.			*H. m. s.*	*Sec.*	*μ*	*μ*	*Km.*	
Oct. 3	.....	iP	9 51 18	17	*3,300	.....	.....	The actual maximum, 3,300, occurs at 9.56, and probably obscures the beginning of L.
		iS	9 54 30	.....	.....	.....	.....	
		eL	10 00 12	.....	.....	.....	.....	
		M	10 06 30	16	*1,100	.....	.....	
		C	10 22 ..	15	.....	.....	.....	
		F	11 36 ..	18	.....	.....	.....	
6	.....	L	2 04 36	.....	.....	.....	.....	
		M	2 08 12	.....	*100	.....	.....	
		F	2 19 ..	.....	.....	.....	.....	
8	.....	eP	4 50 18	18	.....	.....	.....	
		S	4 58 30	17	.....	.....	.....	
		eL	5 09 24	.....	.....	.....	.....	
		M	5 22 00	17	*500	.....	.....	
		C	5 29 ..	17	.....	.....	.....	
		F	6 30 ..	18	.....	.....	.....	
10	.....	L	1 18 18	.....	.....	.....	.....	
		M	1 27 00	16	*2,000	.....	.....	
		C	1 30 00	17	.....	.....	.....	
		F	2 40 ..	16	.....	.....	.....	
21	.....	P	21 39 18	21	.....	.....	.....	
		L	21 49 24	22	.....	.....	.....	
		M	21 59 30	16	*400	.....	.....	
		C	22 05 30	16	.....	.....	.....	
		F	22 50 ..	19	.....	.....	.....	
23	.....	P	0 43 24	.....	.....	.....	.....	
		M	0 44 24	.....	*400	.....	.....	
		C	0 46 ..	.....	.....	.....	.....	
		F	0 49 ..	.....	.....	.....	.....	
23	.....	eP	16 23 30	.....	.....	.....	.....	Hourly time breaks missing. Times obtained by interpolation over a period of 17 hours.
		eL	16 41 ..	.....	.....	.....	.....	
		M	16 49 00	15	*100	.....	.....	
		C	16 54 30	.....	.....	.....	.....	
		F	20 34 ..	.....	.....	.....	.....	
26	.....	L	19 29 ..	.....	.....	.....	.....	
		M	19 36 20	18	*100	.....	.....	
		C	19 42 ..	.....	.....	.....	.....	
		F	21 18 ..	.....	.....	.....	.....	
27	.....	P	4 04 54	.....	.....	.....	.....	
		M	4 07 12	20	*100	.....	.....	
		C	4 10 30	.....	.....	.....	.....	
		F	4 38 ..	.....	.....	.....	.....	
31	.....	eP	19 35 18	.....	.....	.....	.....	
		L	19 43 00	.....	.....	.....	.....	
		M	19 46 18	15	*100	.....	.....	
		C	20 02 ..	17	.....	.....	.....	
		F	20 10 ..	19	.....	.....	.....	

* Trace amplitude.