SECTION V.—SEISMOLOGY.

SEISMOLOGICAL REPORTS FOR JULY, 1918.

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

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

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

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

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

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

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

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

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

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

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1918.			*H. m. s.*	*Sec.*	*μ*	*μ*	*km.*	
July 3		e_E	7 15 27	8				No distinct phases.
		e_N	7 15 33	9				
		M_E	7 15 52		10			
		M_N	7 29 18	20		20		
		F	8 11 ..					
8		P_N	10 45 56	7				Throughout the month there were frequent faint tremors on E, apparently microseismic. On N there was frequently a wavy motion which sometimes resembled a portion of a distant 'quake, though usually with irregular waves.
		P_E	10 46 00	5				
		eL_N	11 06 15	35				
		eL_E	11 07 55	30				
		M_N	11 11 16	20		20		
		M_E	11 17 ..	26	10			
		F_E	11 23 ..					
		F_N	11 38 ..	18				
15		P_N	0 27 14	3				
		P_E	0 27 16	4				
		L_N	0 30 37					
		L_E	0 30 45	1				
		M_E	0 31 30	15	30			
		M_N	0 31 52	18		40		
		C_E	0 33 ..	8				
		C_N	0 37 ..	9				
		F_E	0 59 ..	8				
		F_N	1 00 ..	8				
21		e_N	6 39 11	12				Very doubtful.
		F_N	7 09 ..					

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

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

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

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

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

California. *Berkeley. University of California.*

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

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

California. *Mount Hamilton. Lick Observatory.*

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

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

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

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

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

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

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1918.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
July 7	.....	.....	.....	.....	200	200	.....	Tremors during 24 hours preceding 15h. on dates given.
10	.....	.....	.....	.....	200	300	.....	
12	.....	.....	.....	.....	200	200	.....	
14	.....	.....	.....	.....	100	100	.....	
15	.....	.....	.....	.....	100	100	.....	
19	.....	.....	.....	.....	100	100	.....	

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

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

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

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

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

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

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

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

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

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

Instrumental constants.. V 110 T_0 6.4

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1918.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
July 1	.....	P?....	6 29 42	.....	.....	.....	.....	
		S?....	6 35 40	.....	.....	.....	.....	
		L.....	6 42 30	.....	.....	.....	.....	
		L.....	7 07 ..	.....	.....	.....	.....	
		L.....	7 25 ..	20	.....	.....	.....	
		to.....	7 40 ..	.....	.....	.....	.....	
		M.....	7 29 30	.....	.....	*200	.....	Amplitude small.
		F.....	8	.....	.....	.....	.....	
3	.....	P.....	7 11 10	.....	.....	.....	.....	
		S?....	7 18 20	.....	.....	.....	.....	
		L.....	7 41 30	16	.....	.....	.....	
		L.....	7 48 ..	.....	.....	.....	.....	
		L.....	7 54 ..	24	.....	.....	.....	
		L.....	7 58 ..	20	.....	.....	.....	Nearly continuous and uniform long waves. No definite maximum. Many amplitudes of about 0.5 mm.
		to.....	9 20 ..	20	.....	.....	.....	
		F.....	9 30 ..	.....	.....	.....	.....	
8	.....	P?....	10 33 00	.....	.....	.....	.....	
		P_{repl}?	10 41 48	.....	.....	.....	.....	
		S.....	10 47 22	.....	.....	.....	.....	
		L.....	11 14 ..	.....	.....	.....	.....	
		L.....	11 19 ..	40	.....	.....	.....	
		L.....	11 29 ..	24	.....	.....	.....	
		F.....	12 40 ..	.....	.....	.....	.....	
12	.....	e_N.....	21 21 04	.....	.....	.....	.....	
		F.....	21 30 ..	.....	.....	.....	.....	Does not show on E-W.
15	.....	P.....	0 30 09	.....	.....	.....	.....	
		S?....	0 35 52	.....	.....	.....	.....	
		L?....	0 39 25	.....	.....	.....	.....	
		M.....	0 43 33	.....	.....	*7,000	.....	
		F.....	1 40 ..	.....	.....	.....	.....	
16	.....	P.....	20 20 55	.....	.....	.....	.....	
		S?....	20 25 18	.....	.....	.....	.....	
		F.....	20 40 ..	.....	.....	.....	.....	
21	.....	e.....	6 26 30	.....	.....	.....	.....	
		eL....	6 40 20	.....	.....	.....	.....	
		L.....	7 05 ..	.....	.....	.....	.....	
		L.....	7 17 ..	20	.....	.....	.....	
		F.....	8 15 ..	.....	.....	.....	.....	
29	.....	e_E.....	17 09 30	.....	.....	.....	.....	
		F.....	17 40 ..	.....	.....	.....	.....	
31	.....	P.....	14 42 57	.....	.....	.....	.....	
		S.....	14 48 09	.....	.....	.....	.....	
		L?....	14 52 35	16	.....	.....	.....	
		F.....	15 30 ..	.....	.....	.....	.....	

*Trace amplitude.

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

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

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

Instrumental constants.... {E 165 5.4 0; N 143 5.2 0; *Z 80 3.0 0*}

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1918.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
July 1	.....	e.....	6 29 37	.....	.....	.....	.....	Microseisms. F lost.
		L.....	7 25 ..	26	.....	.....	.....	
3	.....	e_N.....	7 11 10	.....	.....	.....	.....	Microseisms. No distinct main.
		e_E.....	7 11 13	.....	.....	.....	.....	
		$P_{N\ repl.}$	7 13 24	.....	.....	.....	.....	
		$P_{E\ repl.}$	7 13 38	.....	.....	.....	.....	
		e_E.....	7 14 35	.....	.....	.....	.....	
		e_N.....	7 14 42	.....	.....	.....	.....	
		S_E.....	7 23 28	.....	.....	.....	.....	
		S_N.....	7 23 30	.....	.....	.....	.....	
		eL_E...	7 43 06	17	.....	.....	.....	
		eL_N...	7 43 06	17	.....	.....	.....	
		F.....	9 20 ..	.....	.....	.....	.....	
8	.....	e.....	10 41 55	.....	.....	.....	.....	Microseisms.
		S.....	10 47 41	.....	.....	.....	.....	
		eL....	11 09 24	21	.....	.....	.....	
		F.....	12 35 ..	.....	.....	.....	.....	
12	.....	e.....	21 20 10	.....	.....	.....	.....	Heavy microseisms.
		F.....	21 58 ..	.....	.....	.....	.....	
14	.....	e_N.....	18 35 52	.....	.....	.....	.....	Heavy microseisms. 'Quake does not show on E-W.
		F.....	18 46 ..	.....	.....	.....	.....	
15	.....	iP_E....	0 30 11	.....	.....	.....	.....	E-W component readings more reliable.
		eP_N...	0 30 14	.....	.....	.....	.....	
		eS_E...	0 36 03	.....	.....	.....	.....	
		eS_N...	0 36 10	.....	.....	.....	.....	
		eL....	0 39 42	.....	.....	.....	.....	
		M_E....	0 44 03	8	*1,240	.....	.....	
		M_N....	0 44 03	10	.....	*1,950	.....	
		F.....	1 50 ..	.....	.....	.....	.....	
16	.....	e.....	20 21 27	.....	.....	.....	.....	Microseisms.
		eL?...	20 25 18	.....	.....	.....	.....	
		F.....	20 50 ..	.....	.....	.....	.....	
21	.....	e.....	6 30 15	.....	.....	.....	.....	
		S_N?...	6 40 13	.....	.....	.....	.....	
		S_E?...	6 40 15	.....	.....	.....	.....	
		L.....	7 05 ..	20	.....	.....	.....	
		F.....	8 13 ..	.....	.....	.....	.....	
24	.....	e.....	11 35 21	.....	.....	.....	.....	Microseisms. Record lost after 12h. 31m. changing sheets.
		eL....	11 46 24	.....	.....	.....	.....	
29	.....	L_N.....	17 52 ..	.....	.....	.....	.....	Quake still going on.
		to.....	18 08 ..	20ca	.....	.....	.....	
31	.....	eP....	14 43 01	.....	.....	.....	.....	Heavy microseisms.
		S.....	14 48 19	.....	.....	.....	.....	
		eL_N...	14 53 06	15	.....	.....	.....	
		eL_E...	14 52 24	15	.....	.....	.....	
		F.....	? ? ?	.....	.....	.....	.....	

*Trace amplitude.

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

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

Instrument: Wiechert.

Instrumental constants: {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.
1918.			*H. m. s.*	*Sec.*	μ	μ	*km*	
July 15	.....	eP_N...	0 28 14	.....	.....	.....	.....	E-W component was so illegible that only S and F could be distinguished.
		S.....	0 32 50	.....	.....	.....	.....	
		L_N?...	0 35 26	.....	.....	.....	.....	
		M_E?...	0 36 00	.....	.....	.....	.....	
		M_N?...	0 36 01	.....	.....	.....	.....	
		F.....	0 56 ..	.....	.....	.....	.....	

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

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

Lat., 38° 44′ 00″ N.; long., 76° 50′ 30″ W. Elevation, 71.6 meters.

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

Instrumental constants: E: V 10, T_0 15; N: V 10, T_0 15

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	*μ*	*μ*	*km.*	
1918. July 3		P_E	7 13 30	7				
		P_N	7 13 31	6				
		eS_N	7 30 21	10				
		eS_E	7 30 30	11				
		eL_N	7 55 45	25				
		eL_E	7 56 16	25				
		M_N	8 06 22	19		30		
		M_E	8 19 36	17	30			
		C_E	8 26 ..	16				
		C_N	8 26 ..	17				
		F_E	9 09 ..	17				
		F_N	9 16 ..	18				
8		P_E	10 41 46	3				
		P_N	10 41 58	3				
		S_E	10 ? ?					
		eS_N	10 52 35					
		eL_N	11 18 01	40				
		eL_E	11 18 19	40				
		M_E	11 21 39	40	30			
		M_N	11 33 34	40		20		
		C	11 46 ..	18				
		F_E	? ? ?					
		F_N	12 05 ..					
1[illegible]		P_E	0 30 24	3				
		P_N	0 30 29	3				
		S_E	0 36 12	5				
		S_N	0 36 17	5				
		L_E	0 41 42	18				
		eL_N	0 42 ..	20				
		M_N	0 44 23	14		270		
		M_E	0 46 26	13	190			
		C	0 54 ..	10				
		F	1 32 ..					
21		eL_N	7 11 45	11				Phases very indefinite.
		eL_E	7 12 49	20				
		M_E	7 19 ..	18	50			
		M_N	7 21 ..	18		10		
		C_N	7 22 ..	16				
		C_E	7 28 ..	17				
		F_N	8 02 ..					
		F_E	8 04 ..					
31		S_E	14 48 08	8				Microseisms most of day
		S_N	14 48 12	7				
		L_E	14 52 34	19				
		L_N	14 52 43	21				
		M_E	14 54 08	15	50			
		M_N	14 55 51	16		60		
		C_E	14 59 ..	13				
		C_N	14 59 ..	14				
		F_E	15 10 ..					
		F_N	15 12 ..					

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

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

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

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

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	*μ*	*μ*	*km.*	
1918. July 3		*O*	7 *ca* ..				13,000+	
		P_E repl	7 13 31	6				
		P_N repl	7 14 26					
		e_E	7 14 33	6				
		S_N	7 23 20	13				
		S_E	7 23 32	6				
		e_N	7 24 32	12				
		e_E	7 31 32	24–36				
		L_N	7 59 22					
		M_N	8 03 36					
		M_N	8 20 32					
		L_E repl	8 39 00	40				
		L_E repl	8 42 ..	30				
		L_N repl	8 44 ..					
		L_E	8 49 ..	20				
		L_E	9 11 ..	15				
		F	9 29 ..					

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

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	*μ*	*μ*	*km.*	
1918. July 8		*O*	*10 postca*				13,000±	
		P_N?	10 32 27					
		P_E	10 35 04	4				
		P_N?	10 37 27					
		i_N	10 41 00	4				
		i_E	10 41 02	4				
		S_N?	10 46 59	6				
		S_E?	10 49 12					
		S_N	10 50 17	8				
		e_N	10 55 26	17				
		e_E	10 56 04	7				
		eL_N	11 11 02					
		eL_E	11 11 24	60				
		L_E	11 16 04	40				
		L_N	11 16 35					
		L_E	11 19 14	30				
		L_N	11 20 24	40				
		L_E	11 22 42	20				
		L_N	11 23 ..					
		M_N	11 24 26					
		L_E	11 28 14	30				
		L_E	11 33 18	20				
		L_E	11 40 09	15				
		L_N	12 22 ..	20				Possibly L_N repl.
		L_N	12 28 28	24				
		L_E	12 29 02	20				
		F	12 50 ..					
14		*O*	*18 postca*					Not registered on East component.
		e_N	18 37 01					
		L	18 38 35	10				
		to	18 40 37					
		F	18 43 ..					
15		O_E	*0 22 29*				4,280 (38° 31′)	Compare July 21, 1914, *O 22h 30m 43s, 4280.* Shide, *O 22h 31m 17s,* putting epicenter 46° N., 130° W.; Pulkova gave 50° N., 140° W.
		eP_E	0 30 15	2				
		P_N	0 30 31					
		S_E	0 36 18	8				
		S_N	0 36 40	6				
		S_{repl}	0 39 18	8				
		S_{repl2}	0 39 50	10–12				
		eL_N	0 42 00	40				
		M_E	0 44 13					
		M_N	0 45 00	18				
		M_E	0 47 03		*2,750			
		M_E	0 48 05		*6,000			
		M_E	0 49 57					
		F	1 42 ..					
21		*O*?	*6 15 ca*				12,400? (111° 36′ ?)	$eL_E - eP_{repl}$ = 37m. 49s. Ladrone Islands? or between Formosa and Great Liu Kiu Island??
		eP_{repl}	6 30 32	4				
		i_E	6 40 15	6				
		eL_E	7 08 21	48				
		L	7 11 15	25				
		M_E?	7 14 43	20				
		L	7 23 21	16				Beautiful sinusoidal record sets in.
		to	7 51 37					
		L_{repl}	8 04 ..	16				
		L_E	8 23 50	16				Very faint L waves on N undamped.
		F	8 32 ..					
24		*O*	*11 postca*					P and S masked by microseisms.
		e?	11 35 46					
		e	11 42 01	14				
		eL_N?	11 46 21	33–15				
		L_N	11 54 54	20				
		L_E	11 58 55	20				
		to	12 01 ..	16				Damped by magnet. F lost in changing records at 12h. 35m.
		L_N	12 05 ..					
		F	12 ? ?					
29		L_N	17 52 10	24				Very distant. Amplitude very small. M uncertain.
		L_E	17 52 37	24				
		L_E	18 01 52	20				
		F?	18 06 26					
31		*O*?	*14 27 04*				6,450?	*O* from $eL_N - e_E$ (assumed synchronous with S_N).
		e_N	14 44 27					
		e_E	14 45 01	6				
		i_N	14 48 49	6				
		i_E	14 52 02	6				
		eL_N	14 55 21	28				N undamped. E damped by magnet.
		eL_E	14 55 48	20				
		M_N	14 59 15	17				
		L_E	15 01 47	15				
		L_E	15 22 59	20				
		F_E	15 28 30?					

* Trace amplitude.

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

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

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

Instrument: Wiechert 80 kg. astatic, horizontal pendulum.

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

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1918.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
July 3		eL_N	7 20 ..					P and S not visible on record. Not registered on E-W.
		L_N	7 50 ..					
		M_N	7 55 ..	24		*2,000		
		F	8 32 ..					
8		eP_N	10 41 54				?	
		i_E	10 42 54					
		S_N?	10 51 06					
		L_N	11 07 12	18				
		eL_E	11 20 30					
		L_N	11 22 ..	48				
		L_E	11 23 12					
		L_N	11 25 06	36				
		L_N	11 27 12	24				
		L_E	11 33 06					
		F	11 56 ..					
15		iP_N	0 28 42				3,000	
		iP_E	0 28 45					
		iS_N	0 33 30					
		eL_N	0 35 00	6				
		eL_E	0 39 06					
		M_N	0 39 12	15		*8,000		
		F	1 38 ..					
21		eP_N	6 29 30?				9,100?	Not registered on E-W.
		S_N	6 ? ?					
		eL_N	6 55 ..					
		L_N	7 05 12					
		M_N	7 16 ..					
		to	7 19 ..	18		*1,000		
		F	8 23 ..					

* Trace amplitude.

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

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

Instrument: Wiechert 80 kg. horizontal.

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

(Report for July, 1918, not received.)

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

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

Instrument: Wiechert, 80 kg.

Instrumental constants: V 72 T_0 5.0 ϵ 0 (E); V 72 T_0 5.0 ϵ 0 (N)

(Report for July, 1918, 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 13 T_0 22 ϵ 4:1 (E); V 14 T_0 25 ϵ 4:1 (N)

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. Ao	Distance.	Remarks.
1918.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
July 3		eP_E	7 13 16	4				
		eP_N	7 14 36	4				
		e_E	7 23 16	9				
		e_N	7 24 58	11				
		e_N	7 30 24	9				
		e_E	7 30 27	12				
		e_N	7 35 48	9				
		eL_E	7 48 50	40				
		eL_N	7 49 32	24				
		F_N	9 17 ..					
		F_E	9 23 ..					
8		eP_N	10 41 17	3				
		e_E	10 49 04	5				
		e_N	10 50 52	5				
		e_N	10 57 12	7				
		e_E	10 57 18	13				
		L_E	11 10 14	40				
		eL_N	11 17 37	38				
		F_E	12 35 ..					
		F_N	12 37 ..					
								Seismograph not in operation from July 13, 1h 45m to July 15, 22h 10m.
21		e_N	6 46 37	7				
		e_E	6 46 38	14				
		eL_N	7 03 41	30				
		eL_E	7 07 22	28				
		F_N	8 18 ..					
		F_E	8 22 ..					
31		P_N	14 43 23	3				Time mechanism out of order.
		eP_E	14 44 37	4				
		eS_N	14 48 35	6				
		eS_E	14 50 23	9				
		L_E	14 54 09	20				
		L_N	14 54 32	26				
		F_E	15 19 ..					
		F_N	15 22 ..					

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

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

Instruments: Two Bosch-Omori, 100 kg.

Intrumental constants.. V 35 T_0 20

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. Ao	Distance.	Remarks.
1918.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
July 8		P	10 41 50	20				Very slight tremors.
		F	10 53 16					
17		P_N	15 39 14					2 disturbances reported from Chitre, Panama.
		P_E	15 39 21					
		L_N	15 39 28	20		*1,500		Time of M also.
		L_E	15 39 34	20	*2,000			Do.
		F_E	15 40 27					
		F_N	15 40 28					
19		P	21 28 51				265	Direction uncertain.
		L_E	21 29 31	20				
		L_N	21 29 34	20				
		M	21 29 42		*1,000	*1,000		
		F_N	21 34 11					
		F_E	21 34 16					
28		P	20 58 32				370	Do.
		L_E	20 59 14	20				
		L_N	20 59 18	20				
		M_N	20 59 24			*2,500		
		M_E	20 59 32		*1,500			
		F_E	21 05 04					
		F_N	21 06 00					
31		P_E	14 39 16				1,160	Do.
		P_N	14 39 23					
		L_N	14 41 27	20				
		L_E	14 41 28	20				
		M_N	14 42 16			*2,500		
		M_E	14 42 42		*2,000			
		F_N	14 56 14					
		F_E	14 56 54					

* Trace amplitude.

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

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

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

Instruments: Two Bosch-Omori.

Instrumental constants.. V E 10, N 10; T_0 E 17.6, N 19.8

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1918.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
July 3		P_N	7 11 59	9				May be the record of two 'quakes.
		P_E	7 12 21	10				
		eL_E	8 33 48	30				
		L_N	8 ? ?					
		M_N	8 42 00	20		10		
		M_E	8 42 16	20	30			
		C_E	8 48 ..	20				
		C_N	8 ? ?					
		F_E	9 04 ..	16				
		F_N	9 07 ..	17				
8		P_N	10 45 01	5				Nothing clear except the first appearance. Remainder very faint.
		P_E	10 45 12	5				
		F	10 52 ..					
31		P_E	14 41 26	7				
		eP_N	14 41 38	7				
		eS_E	14 46 09					
		S_N	14 ? ?					
		L_E	14 48 06	22				
		L_N	14 ? ?					
		eM_N	14 52 53	12		10		
		M_E	14 54 10	15	20			
		C_E	14 57 ..	16				
		C_N	14 ? ?					
		F_E	15 02 ..	14				
		F_N	15 02 ..					

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

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

Instruments: Two Bosch-Omori, mechanical registration.

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

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1918.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
July 3		P_E?	7 10 20					N-S component of small amplitude.
		S_E?	7 17 45					
		eL_E	7 48 ..					
		L_E	7 57 ..	26				
		L_E	8 01 ..	20 ..				
		to	8 13 ..	to 18				
		L_E	8 45 ..	24				
		F_E	9					
8		e_N	10 46 10					
		eL_E	11 09 ..					
		F	11 15 ..					
15		P?	0 30 03					
		S?	0 36 11					
		eL	0 42 50					
		M	0 47 30		*3,500			
		F	1 20 ..					
21		eL	7 13 ..	24				
		L	7 25 ..	16				
		F	7 50 ..					
31		e_N	14 45 ..					E-W component not recording.
		S_N?	14 49 45					
		L_N	14 56 40	24				
		F_N	15 10 ..					

* Trace amplitude.

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

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

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

Instrumental constants.. V 120; T_0 26

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1918.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
July 1		i	6 29 00	4				F lost in wind tremors.
		e_N	6 38 54					
		eL_E?	7 09 ..					
		L	7 25 ..	20				
		L	7 37 ..	16				
		F	? ? ?					
3		P_{repl}	7 13 00	4			12,000	Appears to be the confused record of several shocks.
		e_N	7 20 ..	8				
		e_E	7 22 54	8				
		e	7 25 12	12				
		e	7 30 ..	12				
		eL?	7 45 ..					
		L	7 53 ..	20				

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

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1918.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
July 3		L	7 59 ..	22				
		L	8 05 ..	18				
		L	8 10 ..	18				
		L	8 15 ..	17				
		L	8 33 ..	17				
		L	8 50 ..	20				
		L	9 03 ..	17				
		L	9 11 ..	17				
		L	9 21 ..	15				
		L	9 32 ..	15				
		F	10					
8		*O?*	*10 24 ca*				9,420?	F lost changing sheets at 12h 10m.
		iP_N?	10 36 37					
		i_N	10 40 ..					
		P_{repl}?	10 41 06					
		iS?	10 47 08					
		i	10 56 30					
		eL	11 07 ..	45				
		L	11 16 ..	34				
		L	11 30 ..	22				
		L	11 40 ..	16				
		F	12 ? ?					
12		e	21 22 42					
		eL	21 23 12	10				
		L	21 30 ..	10				
		e_E	21 51 ..					
		F	22					
14		e	18 36 04	4				
		e	18 37 ..	10				
		to	18 41 ..	6				
		e_N	18 54 ..	6				
		to	18 59 ..	6				
		F	.. .. ..					
15		*O*	*0 23 55*				3,860	
		iP	0 30 03					
		iS	0 35 42					
		eL	0 39 ..					
		M	0 44 ..	15	50	425		
		L	0 51 ..	8				
		L	1 05 ..	9				
		L	1 15 ..	8				
		L	1 29 ..	9				
		L	1 55 ..	7				
		L	2 05 ..	8				
		F	2 35 ..					

SASKATOON RECORD.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
		O	*0 23 56*				1,910	
		iP	0 26 59					
		iS	0 30 14					
		eL	0 31 24					
16		e	20 15 06	6				
		e	20 17 36	6				
		eL?	20 24 24	6				
		L?	20 29 06					
		F	20 45 ..					
21		*O?*	*6 18 10*				8,640?	
		P?	6 30 04					
		S_N?	6 39 56					
		eL	6 55 ..					
		L	7 03 ..	30				
		L	7 14 ..	20				
		L	7 25 ..	16				
		L	7 41 ..	15				
		L	8 00 ..	15				
		F	8 20 ..					
21		eL	10 46 ..					
		to	11 10 ..	18				
23		eL	14 25 ..	21				F lost in changing sheets.
		F	.. .. ..					
24		eL_N?	11 45 ..					
		L	11 56 ..	18				
		L	12 03 ..	17				
		L	12 07 ..	16				
		F	12 20 ..					
25		eL	21 45 ..					
		to	22					
29		eL	12 21 ..					Amplitude very small.
		to	12 30 ..	18				
29		eL?	17 28 ..					May not be seismic. High wind.
		to	18 30 ..					
31		*O*	*14 36 20*				4,210	
		P	14 43 53					
		P_{repl}	14 45 06					
		S	14 49 52					
		S_{repl}	14 52 ..					
		eL	14 54 36	24				
		L	14 58 ..	21				
		L	15 06 ..	11				
		F	15 40 ..					

TABLE 2.—*Instrumental seismological reports, July, 1918*—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.. T_0 18. Pillar deviation: 1 mm. swing of boom=0.50″.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1918.			*H. m. s.*	*Sec.*	*μ*	*μ*	*km.*	
July 1		L	7 02 48†					Microseisms going on.
		L	7 17 18					
		L	7 38 12		*200			
		F	8 00 ..					
3		P	7 14 30?					P not defined. Sudden deflection to east at 7h 30m 30s and then a momentary pause.
		P	7 16 54					
		S	7 21 54					
		S or iL	7 25 42					
		iL	7 30 30					
		L_E	7 34 42					
		L	7 48 36					
		iL	7 58 30					
		M	8 04 18		*4,300			
		iL	8 12 12					
		Repeat						
		L	8 53 36					
		L_E	8 57 30					
		M	9 00 00		*1,500			
		L_E	9 19 30					
		F	9 23 42					
8		P	10 37 54?					P doubtful. May be a dual 'quake.
		S	10 48 36					
		iS	10 56 24					
		L	11 01 24					
		iL	11 14 54					
		M	11 35 36		*1,000		9,650?	
		L_E	12 39 24					
		F	13 41 54					
14								Microseisms after 17h.
15		P	? ? ?					Microseisms. Eureka, Cal.?
		iS	0 35 00					
		iL	0 41 42					
		iL	0 44 12					
		M	0 44 54		*2,400			
		F	1 46 42					
16		L?	20 48 06?					
		L	20 50 36		*50			
		F	20 56 48					
16		L	23 55 18		*50			
		F	23 59 12					
21		P?	6 31 18?					Time doubtful. Clock stopped. Microseisms very numerous. Phases masked.
		S?	6 40 30					
		L	6 55 42					
		L	7 05 18					
		L	7 18 36					
		M	7 22 54		*2,900			
		F						
21		M	11 01 54?		*100			Do.
23		S or L?	14 27 24					Phases masked by microseisms.
		L_E	14 31 30					
		M	14 37 48		*300			
		F?	14 50 36					
24		L_E	11 56 36					Do.
		M	11 59 42		*200			
		F						
25								Microseisms when small 'quake was recorded at other stations. Also sheets 20th to 27th a mass of microseisms.
29			12					Microseisms when small 'quake was recorded at other stations.
29		M	18 03 06		*200			Microseisms mask phases.
31		P?	14 48 36					Microseisms going on.
		S	14 53 42					
		L	14 57 12					
		M	15 00 06		*1,000			
		F						
31		L	23 00 48?					Time doubtful. Microseisms mask phases.
		M	23 09 12?		*100			
		F	.. .. ..?					

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

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 meridia

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_O	Distance.	Remarks.
1918.			*H.m.s.*	*Sec.*	*μ*	*μ*	*km.*	
July 1		P	6 32 00				6,290	
		S	6 39 52					
		L	6 53 38					
		M	7 23 39		*500			
		F	8 06 26					
3		P	7 05 38				9,000	Time of P determined from Vertical seismograph. Probably South America.
		S?	7 08 54					
		S	7 15 48					
		iS	7 17 28					
		L	7 36 22					
		M	7 47 47		*4,000			
		Repeat						
		L	8 56 41					
		iL	9 05 34					
		L_E	9 10 04					
		L_E	9 20 22					
		M	9 24 16		*1,400			
		F	9 57 42					
				VERTICAL		*Az.*		
		P	*7 05 30*	*3*				
		S	*? ? ?*					
		L	*7 36 00*	*18–24*				
		M	*7 44 36*	*18*		*7*		
		F	*? ? ?*					
8		P	10 46 14				6,870	Northern Peru.
		S	10 54 36					
		L	11 08 12					
		M	11 26 05		*1,700			
		F	12 58 02					
				VERTICAL		*Az*		
		P	*10 45 07*	*3*			*7,740*	*Northern Peru.*
		S	*10 54 13*	*6*				
		L	*? ? ?*	*36*				
		M	*11 28 43*	*30*		*3*		
		F	11 ? ?					
15		P	0 25 25				651	Northern California. Felt at Eureka.
		S or L	0 26 53					
		M	0 28 51		*11,500			
		F	1 19 50					
				VERTICAL.		*Az.*		
		P	*0 25 00*	*3*			*750*	*Do.*
		S	*0 26 48*	*6*				
		L	*0 28 40*	*12–15*				
		M	*0 29 15*	*10*		*25*		
		F	*? ? ?*					
16		M	20 50 32		*100			
16		L	23 58 24?					
17		M	0 02 51		*200			
		F	0 06 47					
21		P	6 33 26				5,560	
		S	6 40 39					
		L	6 51 34					
		M	7 09 20		*2,000			
		F	9 07 52					
21		M	10 40 48		*300			
23		L	14 07 26?					
		M	14 18 15		*300			
		F	14 36 27					
24		L	11 37 34					
		M	11 51 20		*200			
		F	12 15 56					
27								Revelstoke reports a slight quake during night of 27–28.
29		L	12 01 06					
		M	12 08 36		*200			
		F	12 23 06					
29		P	17 12 36				10,900	
		S	17 24 13					
		L	17 44 53					
		M	17 59 08		*500			
		F	18 04 34					
31		S	15 01 49?					
		L	15 06 14					
		M	15 16 04		*700			
		F	15 58 51					
31		L	22 45 04					
		M	22 55 23		*250			
		F	23 10 09					

* Trace amplitude.

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

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
Arizona. *Tucson. Magnetic Observatory.* U. S. Coast and Geodetic Survey. F. P. Ulrich.								
Lat. 32° 14′ 48″ N.; long., 110° 50′ 06″ W. Elevation, 769.6 meters.								
Instruments: Two Bosch-Omori, 10 and 12 kg.								
Instrumental constants				V	T_0			
				E 10	14			
				N 10	18			
1918.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
June 7	.....	P_E	21 31 02	5	.....	.....	.....	
		P_N	21 31 03	4	.....	.....	.....	
		eL_E	21 35 17	18	.....	.....	.....	
		eL_N	21 35 47	13	.....	.....	.....	
		M_E	21 37 01	13	1,230	.....	.....	
		M_N	21 37 42	13	.....	860	.....	
		C_E	21 40 ..	10	.....	.....	.....	
		C_N	21 40 ..	12	.....	.....	.....	
		F_N	22 00 ..	7	.....	.....	.....	
		F_E	22 06 ..	12	.....	.....	.....	
12	.....	P_E	4 28 44	4	.....	.....	.....	
		P_N	4 28 50	.....	.....	.....	.....	
		eL_E	4 33 56	.....	.....	.....	.....	
		eL_N	4 33 58	.....	.....	.....	.....	
		M	4 35 ..	10	10	10	.....	
		F_N	4 45 ..	.....	.....	.....	.....	
		F_E	4 58 ..	8	.....	.....	.....	
New York. *Ithaca. Cornell University.* Heinrich Ries.								
Lat., 42° 26′ 58″ N.; long., 76° 29′ 09″ W. Elevation, 242.6 meters.								
Instruments: Two Bosch-Omori, 25 kg., horizontal pendulums (mechanical registration).								
Instrumental constants				V	T_0	e		
				E 13	22	4:1		
				N 14	25	4:1		
1918.			*H. m. s.*	*Sec.*	μ	μ	*km.*	
June 1	.....	e_E	14 53 30	12	.....	.....	.....	
		F_E	15 58 ..	.....	.....	.....	.....	
3	.....	eP_N	0 14 02	6	.....	.....	.....	
		eP_E	0 14 05	5	.....	.....	.....	
		S_N	0 23 00	5	.....	.....	.....	
		S_E	0 23 12	13	.....	.....	.....	
		L_N	0 30 18	30	.....	.....	.....	
		F_E	1 00 ..	.....	.....	.....	.....	
4	.....	e_E	17 40 00	13	.....	.....	.....	
		e_E	17 46 32	21	.....	.....	.....	
		L_E	18 04 08	38	.....	.....	.....	
		L_N	18 05 10	25	.....	.....	.....	
		F_E	18 57 ..	.....	.....	.....	.....	
7	.....	e_E	21 39 ..	.....	.....	.....	.....	Part of record lost changing sheets. Periods short.
		F_E	22 29 ..	.....	.....	.....	.....	
11	.....	e_N	12 46 36	4	.....	.....	.....	
		e_E	12 46 41	5	.....	.....	.....	
		e_E	12 48 59	18	.....	.....	.....	
		e_N	12 49 37	12	.....	.....	.....	
		F_N	13 09 ..	.....	.....	.....	.....	
		F_E	13 15 ..	.....	.....	.....	.....	
12	.....	L_N	4 45 30	14	.....	.....	.....	
		F_N	5 02 ..	.....	.....	.....	.....	
13	.....	eP_N	9 05 14	4	.....	.....	.....	
		eP_E	9 05 29	3	.....	.....	.....	
		eS_N	9 10 59	7	.....	.....	.....	
		eS_E	9 11 02	9	.....	.....	.....	
		F_E	9 19 ..	.....	.....	.....	.....	
		F_N	9 21 ..	.....	.....	.....	.....	
16	.....	P_N	12 33 57	3	.....	.....	.....	
		S_E	12 38 48	5	.....	.....	.....	
		S_N	12 38 49	4	.....	.....	.....	
		F_E	12 51 ..	.....	.....	.....	.....	
		F_N	12 52 ..	.....	.....	.....	.....	
17	.....	e_E	16 44 57	10	.....	.....	.....	
		e_N	16 45 02	7	.....	.....	.....	
		F_N	16 49 ..	.....	.....	.....	.....	
		F_E	16 50 ..	.....	.....	.....	.....	
22	.....	eP_N	22 13 37	5	.....	.....	.....	
		eS_E	22 19 48	11	.....	.....	.....	
		L_E	22 23 54	22	.....	.....	.....	
		L_N	22 24 43	25	.....	.....	.....	
		F_N	22 35 ..	.....	.....	.....	.....	
		F_E	22 38 ..	.....	.....	.....	.....	

SEISMOLOGICAL DISPATCHES.[1]

Panama, July 20, 1918.

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

Johannesburg, South Africa, July 21, 1918.

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

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