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HARVARD SEISMOGRAPHIC STATION
FOURTH ANNUAL REPORT FOR THE YEAR,
1 AUGUST, 1911 — 31 JULY, 1912.

By J. B. WOODWORTH.

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No. 2.—*Harvard Seismographic Station. Fourth Annual Report for the Year, 1 August, 1911—31 July, 1912.*

By J. B. WOODWORTH.

The seismic records given herewith continue the list published in the *Bull. M. C. Z.*, **55**, p. 1-24. The constants of the Station remain as in previous years: viz.—

LATITUDE $42^{\circ} 22' 56''$ N. LONGITUDE $71^{\circ} 06' 59''$ W. ALTITUDE 5.36 M.
TIME:—Mean Greenwich, midnight to midnight.

INSTRUMENTS:—Two Bosch-Omori 100 kg. horizontal pendulums, with mechanical registration. Period of pendulums, 25 secs. MAGNIFICATION:—N., 50; E., 80. DAMPING:—N. 4:1 (See Remarks). E., O.

NOMENCLATURE:—Göttingen.

In the column of Remarks the following abbreviations are employed:—Q, quake, earthquake; Qf., felt earthquake; Ql., local shock; Qr., earthquake reported; O., origin or epicentre; TO., time at origin, calculated by Benndorf's tables; Δ , distance from Cambridge to origin, calculated from record. Micros., microseisms mask the record.

No.	Date	Phase	Time	Periods	Amplitudes	Remarks	
149	1911 Aug. 16	NP	h. m. s. 23 00 38	s.	mm.	Klotz gives O = ϕ 31° $24' N$, λ $142^{\circ} 28' E$.	
		S	23 19 19				
		L	23 38 31				
	Aug. 17	M	0 00 19			9.5	Qr. Eap, W. Caroline Ids.
		F	1 16				
150	Aug. 27	eNP	11 08 00			Klotz gives O = ϕ 31° $50' N$, λ $112^{\circ} 15' W$. No maximum.	
		eS	11 12 25				
		eL	11 21 15				
		F	11 49				
151	Sept. 6	NP	1 06 25			E-W component out of order.	
		S	1 17 19				

No	Date	Phase	Time		Ampli- tudes	Remarks
			h. m. s.	s.		
157	1911 Sept. 20	eNL	5 59 24	13-16	mm.	Probably part of pre- ceding group.
		E	6 00			
		NF	6 01 22			
158	Sept. 22	eNP	5 10 05	3-4	5.7	Klotz gives $O = \phi 60^\circ$ 26' N, $\lambda 146^\circ 30'$ W. Prince William Sound, Alaska. $\Delta 5230$ kms. (3250 mi.). TO 5h. 03m. 01s.
		eE	5 10 02	2		
		NS	5 17 00	13		
		eNL	5 25 36	24		
		E	5 24 37			
		NM	5 26 46			
		NF	6 10 14			
E	6 14					
159	Oct. 6	NP	10 20 13	6	4.7 0.1	San Domingo earth- quake. $\Delta 2640$ kms. (1630 mi.). Klotz gives $O = \phi 17^\circ$ 44' N, $\lambda 71^\circ$ W. Tidal wave reported at Guaymas, Mex. TO 10h. 16m. 19s. (Station clock out of order).
		E	10 20 53			
		NS	10 24 29	10-17		
		E	10 24 41			
		NL	10 29 53	20		
		E	10 30 37			
		NM	10 32 56			
		E?	10 31 24			
F	11 38					
160	Oct. 10	eEP?	13 18 17	3-4	7.5 3.0	Masked by micro- seisms. Station clock electric contact out of order and times very uncertain. Klotz gives $O = \phi 12^\circ$ 02' N, $\lambda 84^\circ 36'$ W. N drum stopt at 14:26.
		S?	13 23 45	112		
		NL	13 26 38			
		E	13 26 08	22		
		NM	13 32 50			
		E	13 30 13			
161	Oct. 13	NS	2 55 43	6	0.5	$O = \phi 48^\circ 34'$ N, $\lambda 157^\circ$ 35' E. (Klotz). Time uncertain by 30 secs.
		eL	3 22	20		
		F	4 16			
162*	Oct. 14	eN	17 00 35	35-36		P lost in micros. Sta- tion clock out of order.
			17 09 39	36		

No.	Date	Phase	Time		Peri- ods	Ampli- tudes	Remarks
			h. m. s.	s.			
	1911	L	17 12 30		24-20		Time very uncertain. Reported for record of phases. Ottawa e17-01 -20.
		M	17 15 37			3.0	
		eE	17 09 44				
		L	17 14 54		16-20	(1.0)	
		F	17 36				
163	Oct. 20	eEL	18 44 40				Batavia P 17-53-48.
		F	19 01				
164	Oct. 26	eNP	14 19 32		3		No decided M.
		?S	14 21 43		11-30	(1.5)	Began and ended masked by micros.
		L	14 31 21		25		
		EL	14 32 57		28-18	(0.25)	Irregular LL? during forenoon of 26th.
		NF	15 01				
165	Oct. 29	eNP	18 19 15				Masked by previous line.
		S	18 23 54		10		
			18 28 19		12		
		eL	18 36 20		17		No maximum.
		F	19 15				
		eEP	18 19 01		4		Ottawa P 18-17-18.
		S	18 23 54		6		LL not well defined.
			18 27 09		12-10		
		L	18 35 55		17		
			18 39 55		14		
		F	19 12				
166	Nov. 1	NP	9 33 38		3		Ottawa P-9-33-50.
		E	9 33 32		2-3		
		NS	9 39 12		12		Δ 3770 kms. (2375 mi.).
		NL	9 44 46		24	(0.2)	
		eEL	9 47 08		20		Q reported from San Juan del Sur, Nicara- gua (2400 mi).
		NM	9 48 26			7.0	Press gives time 3:40 a. m.
		NF	10 34 38				TO = 9-27-23.
167	Nov. 7	eNS	6 12 44		8		Microseisms ?
		L	6 15 00		9		

No.	Date	Phase	Time	Peri- ods	Ampli- tudes	Remarks
	1911		h. m. s.	s.	mm.	
		M	6 15 02		0.9	
		F	6 35			
		EL?	6 15 00	10-12		
		M	6 15 10		0.5	
		F	6 25			
168	Nov. 13	eN?				Earlier phases masked by microseisms. Bata- via P 16-25-23. E-W record ill defined.
		L	16 47 43	25		
		F	17 52			
169	Nov. 18	eNS?	7 45 52	8		P lost in microseisms.
			7 55 13	24		
		L?	7 56 01	14-18	(0.75)	Ottawa P? 7-37-32.
		C	7 58 41			
		F	8 31 40?			
		eE	7 46 06			
		L	7 56 02	20		Lost about 8-20 in micros.
		F	— — —			(No records between 17hrs. and 21hrs. 30m.).
	(Nov. 19)					
170	Nov. 20	eN	14 03 27			P masked by micro- seisms?
		S	14 06 40	26		Attendant was setting up instruments as late as 14h. 03m. 11s.
		L	14 09 43			Masked by micro- seisms.
		M	14 11	20	8.0	
		F	14 24 38			
		eEP	14 02 23			
		L	14 08 35	22		Qr. Martinique, W.I.
		M	14 11 06	20	8.0	
		F	15 ?			
171	Nov. 21	eP	18 53 47	3-4		
		S	18 54 36	16	1.0	E-W microseisms only.
		L	18 55 16	9	0.5	
		F	19 01 42			

No.	Date	Phase	Time	Peri- ods	Ampli- tudes	Remarks
	1911		h. m. s.	s.	mm.	
171a	Nov. 22	eN	10 28 26			
			10 29 28	7-8		
		F	10 34 36			
172*	Nov. 25	eNL	19 51 41	20		P? and F masked by micros. St. Louis e 19-35.8. O = SW?
		eL?	19 51 50	10		
		F?	19 56 47			
		eEL	19 52 51			
		L?	19 53 50	10	1.0	
		F?	19 56 40			
173	Dec. 16	O	19 14 39			Estimated time of earthquake. S-P 6m. 6s. Δ 4330 kms. 2700 mi. L-S 7m. 18s. Qf. Mexico. O = ϕ 19° 10' N, λ 102° 15' W. (Klotz). Damped pendulum. S-P 5m. 42s., Δ 3910 kms. 2440 mi. L-S 8m. 13s.
		NP	19 21 22	6-3		
		S	19 27 28			
		L	19 34 46			
		M	19 37 38	17	45	
		M	19 39 24	14		
		F	20 34 12			
		EP	19 21 19	4-6		
		S	19 27 01	10		
		L	19 35 14	28		
		M	19 37 40	22-25	40	
		M		14		
		F	21 51			
174	Dec. 20	eNS	6 21 13	40		N-S damped 4:1. P masked by micros. Undamped.
		eL	6 28 23	20		
		F	7 04			
		eES	6 15 17	18		
			6 21 37	40		
		L	6 25 26	20		
		M	6 28 43	20	0.5	
F	7 19					
175	Dec. 22	eEP	13 01 51	4-5		S-P, 5m. 42s., Δ 3910 kms., 2420 mi. Undamped pendulum. Local jars superposed. Qr. Mexico City 6.15 a. m.
		S	13 07 33	12-14		

No.	Date	Phase	Time	Peri- ods	Ampli- tudes	Remarks
			h. m. s.	s.	mm.	
176*	Dec. 23	F				Lost in microseisms. No record on N damped 4:1. Records tangled E-W and masked by micro- seisms.
		eNS	21 22 43			
		eL	21 26 25			
		F	21 37 41			
		eEP?	21 07 09			
		S	21 16 57			
		L	21 24 56			
		F	21 45			
176a	Dec. 23	NM	22 07 28	1-		Local shock. Ice crack; not felt by persons.
		F	22 07 30			
177	1912. Jan. 4	eES	16 05 39	12	2	Ottawa P? 15-57-14. L-S, Δ 5400? miles. N chronograph not re- cording.
		L	16 22 27	24		
		M	16 25 51	18		
		F	17 44 54			
178	Jan. 11	NM	7 25 52			Local unfelt shock at Station. Crack in ground ice.
		F	7 25 55			
179	Jan. 11	NM	10 24 58			Local unfelt shock at Station. E gives pre- ferred reading.
		EM	10 24 59			
		F	10 25 01			
180	Jan. 19	M	0 00 54	1-		14 secs. Local weak shock. Ice coated ground.
		F	0 00 56			
181	Jan. 19	M	1 08 15	1-		4 secs. Local shock. Ice coated ground.
		F	1 08 17			
182	Jan. 21	M	12 15 17	1-	0.5	Local shock. Ice crack.
183	Jan. 26	NM	4 21 22	1-	0.05	Local shock. Crack in ground ice. Not felt by persons.
		F	4 21 24			