SECTION V.—SEISMOLOGY.

REPORTS FOR JANUARY, 1915.

By W. J. HUMPHREYS, Professor of Meteorological Physics, in charge of Seismological Work.

[Dated Weather Bureau, Mar. 1, 1915.]

The following extract from the instructions issued by the Weather Bureau, for the noninstrumental observation of earthquakes may interest those unacquainted with this portion of the bureau's seismological work.

Request for cooperative observers.

Although each of the Weather Bureau's regular stations, approximately 200, will report all earthquakes felt, yet the territory covered is so great that its seismic disturbances can not adequately be recorded without the aid of a large number of voluntary assistants. Hence it is earnestly hoped that, so far is possible, all the bureau's numerous cooperative observers will assist also in the collection of seismological data, by reporting, on cards that will be furnished for that purpose, the date, etc., of each earthquake that they may experience. To each observer the labor will be exceedingly light, and the time consumed only a few minutes in a whole year, but the collected results will be permanent and extremely valuable—absolutely essential to the construction of the maps in question [viz, maps that locate geologic faults and indicate their activity in the production of earthquakes] and exceedingly helpful in the explanation of many obscure earthquake phenomena.

Instructions for the collection of earthquake data.

The particular earthquake data desired is indicated on the question cards that will be supplied to all who take part in this work, but the method of collecting and forwarding this information to the Central Office for classification and study is explained by the following instructions:

1. Regular Weather Bureau stations will be communicated with directly from the Central Office; cooperative stations entirely by, or, when necessary, through section centers.

2. All routine communications on seismology directed to the Central Office will be inclosed in penalty envelopes marked "Seismology."

3. Each regular Weather Bureau station and each cooperative station that agrees to assist in this work will be furnished with a supply of question cards [as published last month].

4. Each station, regular and assisting cooperative, will promptly fill out and forward in a penalty envelope one question card for each earthquake felt.

5. The regular stations at Boston, Atlanta, St. Louis, Denver, and San Francisco will also send to the Central Office such newspaper clippings in regard to earthquakes in the United States as may come to their notice.

6. Each section center may supply question cards to other reliable persons in addition to the cooperative observers. This is especially desirable in those portions of the country which are either subject to earthquake shocks or sparsely inhabited.

7. An earthquake that produces any appreciable damage will be made the subject of a special investigation determined upon at the time.

8. All question cards collected by section centers recording the occurrence of an earthquake will be promptly forwarded to the Central Office.

TABLE 1.—*Noninstrumental earthquake reports, January, 1915.*

Day.	Approximate time Greenwich Civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity Rossi-Forel.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
	h. m.	CALIFORNIA.	° ′	° ′			m. s.			
12	4 33	Bakersfield	35 22	119 0	5	2	5			Santa Fe Co.
	4 33	Lonoak	36 20	120 0	2	2	2			Martin L. Griffin.
	4 33	Nordhoff	34 35	119 14	3	1		Faint		W. H. Duncan.
	4 33	Ozena	34 53	119 16	5	1	6	Faint		J. D. Reyes.
	4 33	Paso Robles	35 34	120 40	4	2	5			Dr. F. W. Sawyer.
	4 33	San Luis Obispo	35 18	120 39	5	4	30			U. S. Weather Bureau.
	4 33	Santa Barbara	34 23	119 40	5	1	5	Faint	Lamps swung	G. W. Russell.
	4 33	.....do	34 23	119 40	6	1	5			Forest Service.
12	14 15	Aguanga	33 26	116 51	4	2	4	Rumbling		Forest Service.
	14 15	Mesa Grande	33 11	116 42	2	1	2	Rumbling		E. H. Davis.
14	15 30	Rohnerville	40 33	124 11	4	1	2			W. D. Gray.
	15 30	Shively	40 25	123 56	3	2	2	Faint		Frank Essig.
17	4 53	Coyote	37 14	121 41	3	1	1			Stanley Sharp.
20	19 30	Brawley	32 59	115 40	3	2	1			M. D. Witter.
26	10 30	.....do	32 59	115 40						M. D. Witter.
28	15 00	.....do	32 59	115 40	2	1		Rumbling		M. D. Witter.
31	8 30	Branscomb	39 40	123 40	3	4	4			A. J. Haun.
		OREGON.								
19		Summerville	45 27	118 05	5					Press at La Grande Oreg.
		TENNESSEE.								
14	9 20	Bristol	36 36	82 12	3-4	1	20		Rattled windows	B. F. Sperow.
		WASHINGTON.								
26	0 55	Longmire	46 48	121 56	4	1	½	Loud		Forest Service.

TABLE 2.—*Instrumental reports, January, 1915.*

Time used: Mean Greenwich, midnight to midnight. Nomenclature: [International.]

[For significance of symbols see REVIEW for December, 1914, p. 689.]

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

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

Instrument: Marvin (vertical pendulum).

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	*μ*	*μ*	*Km.*	
1915. Jan. 5–6	II_r	eP_N	23 45 17	4			3,960	Phases not distinct.
		S_N	23 51 32	7				
		L_N	23 55 25	16				
		M_N	23 56 37			16		
		F	0 53 00					
13	II_e	P?	(?)					P, L_N, and F lost in strong microseisms. Destructive earthquake in Italy.
		S_N	7 11 35	10				
		L_N	(?)					
		L	7 28 00		16	14		
		F	8 (?) 00					

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

Lat., 38° 54′ 25″ N.; long., 77° 04′ 24″ W. Elevation, 42 meters. Subsoil: decayed diorite.

Instruments: Astatic pendulums after Wiechert, 200 kgm. (horizontal).

Instrumental constants:

	V	T_0	*ε*
A_N	143	5.2	3.4
A_E	165	5.4	2.6
A_Z			

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	*μ*	*μ*	*Km.*	
1916. Jan. 5	III_r	iP_N	23 52 45.4				1,800?	E–W not discernible. Vertical instrument in repair.
		S_N	23 57 18					
		L_N	23 57 40.6	10	161*			
13	I_r	L_N	7 28 40	15	500*	290*	?	Phases not discernible, lost in microseisms. Reported in Rome.
		L_E	7 23 20	15				
		F_N	7 36 40	?				
		F_E	7 33 00	?				

*Trace amplitudes.

Massachusetts. Cambridge. Harvard University. J. B. Woodworth.

Lat., 42° 22′ 36″ N.; long., 71° 06′ 59″ W. Elevation, 5 meters.

Instruments: Two Bosch-Omori.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	*μ*	*μ*	*Km.*	
1915. Jan. 5–6		*O*	23 37 39				3,960	N. B.—Pendulums undamped. *O* equals time at origin calculated from Brit.
		eP_N	23 44 56					
		S_E	23 50 40					
		eL	23 54 01	10–15				
		M_E	0 18 22	24				
		L_N	0 32 36	20				
		F	0 56 00					
10		*O*?	Indeterm.					e in microseism. Time interpolated because of failure of minute ticks.
		eL?	23 24 26	20–15				
		F	23 45 00					
13		*O*	6 52 29				6,750	All phases superposed on microseisms. P to S on N component illegible. Maximum ill-defined. Destructive earthquake reported about Lago di Fucino in central Italy. Origin near 42° N., 13° E.
		eP_E	7 02 45					
			7 04 17	4				
		S_E	7 11 01	15				
		eL_E	7 19 21	35				
			7 22 24	25				
			7 26 25	20				
		M_E	7 27 48	20	(1.1 mm.)			
		F	8 05 00					
27		*O*						Between 1h and 2h.
		eN?	1 37 44					No decided maximum.
		L_E	1 40 30	40				
			1 41 14	22				
			1 43 37	16				
			1 45 42	20				
			1 48 18					
		L_E	1 49 04	20–16				
		L_N	1 51 33					
		F_E	2 12 00					

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

Lat., 38° 38′ 15″ N.; long., 90° 15′ 58″ W. Elevation, 160 meters. Foundation: 12 feet of tough clay over limestone of Mississippi System, about 300 ft. thick.

Instrument: Weichert 80 kgm., 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.
			H. m. s.	*Sec.*	*μ*	*μ*	*Km.*	
1915. Jan. 13	I_r	eS_E	7 11 15				6,600	No P on either component. Reported from Italy. This disturbance was preceded and followed by almost continuous microseisms, which at times were of unusual character; the records show such on Jan. 12, 13, 14, and 15. Jan. 29 and 30 the records show frequent microseisms of the usual kind.
		L	7 20 02					
		L	7 28 to					
			7 42 05					
		M_E	7 36 40	22				
		F	7 45 00					

Vermont. Northfield. U. S. Weather Bureau.

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

Instruments: Two Bosch-Omori.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	*μ*	*μ*	*Km.*	
1914. Dec. 20	I_e	P_E	14 27 36				8,875	All phases uncertain.
		PR_E	14 34 35					
		PR_N	14 35 32					
		S_N	14 37 40					
		L_N	14 54 35					
		F	15 50 00					
25	I_r	P_N?	3 47 45				2,690	All phases uncertain.
		S_N	3 52 05					
		L_N	3 54 35					
		M_E	3 57 00					
		M_N	3 59 00					
		F	4 10 00					
1915. Jan. 5–6		M_N	23 54 56					P, S, and L lost in process of changing sheet.
		F	1 00 00					
13	II_e	P_E	7 02 52				6,945	Phases indistinct, strong microseisms prevailed. Earthquake in Italy.
		S_N	7 11 18					
		L_N	7 19 15					
		F	8 00 00					
27		L_N	1 57 00					Faint.

Canada. Ottawa. Dominion Astronomical Observatory. Otto Klotz.

Lat., 45° 23′ N.; long., 75° 43′ W. Elevation, 83 meters.

Instruments: Two Bosch photographic pendulums.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	*μ*	*μ*	*Km.*	
1915. Jan. 5–6		P	23 45 07				4,220	
		S	23 51 07					
		L_N	23 54 04	20				
		L_E	23 54 05	20				
		L	24 01 00					
		L	24 06 00 to 24 28 00	18				
		F	24 45 00					
13		P	7 02 57	2			6,860	Destructive earthquake in Italy. No marked maximum. Strong microseisms prevailed.
		S	7 11 19					
		SR_3	7 18 08	12				
		L	7 20 05	32				
		L	7 24 00	20				
		L	7 29 00 to 7 42 00	16–14				
		F	8 00 00					

TABLE 2.—*Instrumental reports, January, 1915*—Continued.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

Canada. Toronto. 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.

T_0, 18. Pillar deviation, 1 mm. swing of boom=0″.59.

1915.			H. m. s.	Sec.	μ	μ	Km.	
Jan. 4		L	10 07 42					Gradual thickening.
		M	10 10 12			200		
		F?	10 24 00					
5		P	14 59 36					M not defined.
		Pi	15 02 48					
		S	15 09 00					
		L	15 16 54					
		L	15 35 12					
		L	15 41 30					
		M	15 44 24			300		
		Li	15 46 36					
		F?	16 17 24					
5		P	16 45 00					Doubtful as being seismic.
		L	16 51 42			200		
		F	17 04 24					
5		L	17 28 42			100		Uniform thickening.
		F	17 32 06					
5		P	23 45 48					Marked disturbance.
		L	23 55 06					
		Li	23 56 00					
6		M	0 12 42			700		
		L	0 21 30					
		F	1 27 36					
7		P	12 37 00			500		
		F	12 54 48					
11		P	0 02 30					P doubtful.
		P	0 07 06					
		S	0 11 18					
		Li	0 24 12					
		M	0 28 03			800		
		F	0 51 24					
12		P	4 39 54			50		
		F	4 42 54					
13		P	7 12 12					Disastrous Italian quake. Registered at Rome, 6h 52m 55s, G. M. T.
		S	7 19 54					
		S	7 21 54					
		L	7 25 06					
		Li	7 30 42					
		M_1	7 32 24			2,800		
		M_2	7 34 12			2,600		
		C_1	7 38 12			1,300		
		C_2	7 38 48					
		L	7 46 12					
		F	8 34 00					
14		P	14 16 12					Doubtful as to being seismic.
		L	14 36 42			100		
		F	14 39 24					
17		P	7 57 06					Marked thickening. Doubtful as to being seismic.
		L	8 02 48			100		
		F	8 06 54					
22		L	5 45 18			50		
		F	5 48 00					
22		P	6 03 00			50		
		F	6 04 00					
26		P?	1 24 54					
		S?	1 30 36					
		L	1 49 36			100		
		L	1 54 30					
		F	2 27 00					
30		L	8 47 00			200		
		F	8 53 12					

Canada. Victoria, B. C. Meteorological Service.

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

Instrument: Milne horizontal pendulum, North. In the meridian.

Instrumental constants: T_0, 18. Pillar deviation, 1 mm. swing of boom=0″.54.

1915.			h. m. s.	Sec.	μ	μ	Km.	
Jan. 4		P	1 15 42					
		L	1 19 42					
		M	1 24 42			200		
		F	1 37 42					
5		P	14 56 06					
		S	15 01 36					
		L	15 19 36					
		M	15 23 36			500		
		F	15 52 36					
5		P	23 39 24					
		S	23 43 24					
		L	23 49 24					
		M	23 51 06			1,000		
6		F	0 48 36					
7		P	12 35 30					
		L	?					
		M	12 42 30			100		
		F	12 49 30					
11		P	0 01 12					
		L	0 09 12					
		M	0 11 12			200		
		F	0 23 12					
12		P	4 35 00					
		L	4 40 30					
		M	4 41 00			100		
		F	4 47 00					
13		P	7 15 48					Disastrous Italian earthquake.
		S	7 21 48					
		S	7 26 24					
		L	7 31 36					
		Li	7 36 48					
		L	7 39 30					
		M	7 42 30			1,900		
		M	7 45 24			2,000		
		M	7 48 36			1,750		
		L	7 50 36					
		F	8 57 48					
22		P	5 56 06					
		M	5 57 06			200		
		F	6 01 06					
27		L	1 43 36?					
		L	1 57 36					
		M	2 03 06			200		
		F	2 17 36					
30		P	8 24 48					
		L	8 29 48					
		M	8 32 48			200		
		F	8 40 18					

SECTION V.—SEISMOLOGY.

SEISMOLOGICAL REPORTS FOR FEBRUARY, 1915.

W. J. HUMPHREYS, Professor in Charge of Seismological Investigations.

[Dated: Washington, D. C., Mar. 31, 1915.]

TABLE 1.—*Noninstrumental earthquake reports, February, 1915.*

Day.	Approximate time. Greenwich Civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity Rossi-Forel.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
	h. m.	CALIFORNIA.	° ′	° ′			m. s.			
16	13 30	Julian	33 05	116 37	5	1	6	Rumbling		J. H. L. Vogt.
17	11 00	Cahuilla	33 32	116 43	3	1	2	Rumbling		Dr. W. L. Shawk.
18	9 47	Eureka	40 48	124 11	2	1	Few.		Sudden jolt.	U. S. Weather Bureau.
	9 47	Rohnerville	40 33	124 11	4	1				W. D. Gray.
21		Redding	40 36	122 27	7	Many.	1 0		30 miles east of Redding.	J. H. Buick.
28	11 00	Arbolado	36 15	121 47	5	2	6	Rumbling		Forest Service.
	11 00	Hollister	36 50	121 20	4	1	12			J. N. Thompson.
	11 00	Spreckels	36 20	121 48	3	1	10			J. K. Scott.
		COLORADO.								
28	7 51	Grand Junction	39 09	108 33	1	1	?			Whipple Chester.
		ILLINOIS.								
5	6 55	Equality	37 45	88 22	2	1	1	Rumbling		L. W. Gordon.
	6 55	Harrisburg	37 45	88 34	4–5	1	1 0	Rumbling	Shook buildings	Clarence Bonnell.
19	4 35	Cairo	37 00	89 10	2	1	3			U. S. Weather Bureau.
	4 35	Mound City	37 09	89 10	4	1	3		Shook buildings	Press at Cairo, Ill.
		MASSACHUSETTS.								
21	1 59	Haverhill	42 47	71 05	3	1	2	Rumbling		Press at Haverhill.
	1 59	Lawrence	42 41	71 10	2	1	15			Richard A. Hale.
	2 03	Lowell	42 39	71 20	2	1				Press at Boston.
	2 21	Andover	42 42	71 08	4	1		Rumbling	Shook buildings	Press at Boston.
	2 21	Haverhill	42 47	71 05	4	1	2	Rumbling	Felt in southern New Hampshire.	Press at Haverhill.
	2 21	Lowell	42 39	71 20	4	1				Press at Boston.
	2 30	Andover	42 42	71 08	4	1		Faint		Press at Boston.
	2 30	Lawrence	42 41	71 10	4	1	15	Rumbling	Shook buildings	Richard A. Hale.
	2 35	Andover	42 42	71 08	2	1		Rumbling		Press at Boston.
	2 45	Andover	42 42	71 08	2	1		Rumbling		Press at Boston.
		NEVADA.								
9	23 10	Gerlach	40 26	119 41	2	1	5		Shook oil in lamps	A. T. Dauterman.
	23 10	Sand Pass	40 18	119 48	2	1	5			R. R. Mott.
		NEW YORK.								
21	23 41	Beekmantown	44 45	73 24	3–4	1	8	Rumbling		Geo. K. Pardy.
	23 41	Beekmantown	44 45	73 24	3	1	3			Mary Calluman.
		UTAH.								
12	19 50	Enterprise	37 35	113 50	3	1	50	Loud		Jas. E. Hall.
13	8 30	Enterprise	37 35	113 50	3	1				Jas. E. Hall.
		WASHINGTON.								
11	3 07	Queets River	47 30	124 15	3	1	30			C. A. Bullard.
28	18 00	Lakeside	47 50	120 01	3	1				W. H. Van Meter.
		PORTO RICO.								
1		Arecibo	18 28	66 44	3	1	Few.	Rumbling		W. J. Young.
3	11 18	Arecibo	18 28	66 44	3	1	Few.	Rumbling		W. J. Young.
17	13 35	Arecibo	18 28	66 44	4	1	8	Rumbling	Shook buildings	W. J. Young.
	13 35	Lares	18 23	66 55	2	2				Paul Vilella, jr.
	13 35	Mayagues	18 13	67 09	4–5	1	6	Rattling		P. R. Expt. Station.

TABLE 2.—*Instrumental reports.*

[Time used: Mean Greenwich, midnight to midnight. Nomenclature: International.]

[For significance of symbols see this Review, December, 1914, p. 689.]

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

Lat., 32° 14′ 48″ N.; long., 110° 50′ 01″ W. Elevation, 769.6 meters.

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

Instrumental constants: { E V 10, T_0 16; N 10, 19.6 }

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	*μ*	*μ*	*Km.*	
Jan. 12	I_E....	P_E....	4 35 18	3	.....	.....	.....	
		eN.....	4 35 36	4	.....	.....	.....	
		M.....	4 36 30	10	30	10	.....	
		C.....	4 39 00	6	.....	.....	.....	
		F.....	4 46 00	4	.....	.....	.....	
13	.....	L.....	7 35 00	30	.....	.....	.....	
		M.....	7 38 00	30	10	10	.....	
		C.....	7 48 00	.....	.....	.....	.....	
Feb. 14	.....	eE.....	11 34 09	.....	.....	.....	.....	No motion discernible on N.
		M_E....	11 35 54	11	10	.....	.....	
		F.....	11 37 00	.....	.....	.....	.....	
25	.....	P_E....	20 57 05	4	.....	.....	.....	
		M.....	20 57 25	8	50	10	.....	
		F.....	21 01 00	5	.....	.....	.....	

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: Weichert, 80 kilograms, astatic, horizontal pendulum.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	*μ*	*μ*	*Km.*	
Jan. 11	.....	.....	5 30 ..	.....	.....	.....	.....	Quake reported from Santa Barbara, Cal. Possibly slight record here at hour marked.
			6					
28	.....	.....	5	.....	.....	.....	.....	Activity—Thickening of pen marks.
			7					
Feb. 4	.....	.....	16 13 ..	.....	.....	.....	.....	Long period, very weak waves. Activity during day. Rather doubtful.
9	.....	.....	16	.....	.....	.....	.....	Wavelets on E-W, but very irregular and somewhat doubtful.
			19 ends.					
13	.....	.....	2	.....	.....	.....	.....	Activity at hours marked, but doubtful. Heavy machinery in motion near by.
			4					
14	.....	.....	10	.....	.....	.....	.....	Possible activity.
			11					
22	.....	.....	12	.....	.....	.....	.....	Very small waves, long period, both components.
			14					
25	.....	.....	1	.....	.....	.....	.....	Long-period waves on E-W.
			3 ends.					
28	.....	.....	(?)	.....	.....	.....	.....	Long-period waves, very weak, especially on N-S.

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 kilograms.

Instrumental constants: { E V 10, T_0 31; N 10, 29 }

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	*μ*	*μ*	*Km.*	
Jan. 5	.....	P_N....	23 46 07	.....	.....	.....	.....	No motion discernible on E.
		L_N....	23 55 00	16	.....	.....	.....	
		M_N....	23 56 45	14	.....	40	.....	
		C_N....	23 59 00	.....	.....	.....	.....	
		F_N....	24 55 00	.....	.....	.....	.....	
13	.....	L_N....	7 25 00	20	.....	.....	.....	No motion discernible on E. Well-defined microseisms for several hours earlier and later.
		M_N....	7 28 00	20	.....	20	.....	
		F_N....	7 37 00	.....	.....	.....	.....	
Feb.	.....	.....	.....	.....	.....	.....	.....	No earthquake recorded during February. Microseisms on Feb. 2.

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 kilogram, horizontal pendulums (mechanical registration.)

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	*μ*	*μ*	*Km.*	
Feb. 7	.....	*O*[1]....	*5 16 30*	.....	.....	.....	*15*	Local shock: Not reported by persons.
		iP$_N$....	5 16 32	.....	.....	.....	.....	
		iM.....	5 16 34	.....	.....	.....	.....	
		F.....	5 16 50	.....	.....	.....	.....	
16	.....	*O*.....	*17 05 26*	.....	.....	.....	85	Not heard from.
		iP.....	17 05 38	.....	.....	.....	.....	
		M.....	17 05 48	.....	.....	.....	.....	
		F.....	17 05 54	.....	.....	.....	.....	
16	.....	*O*.....	*19 24 39*	.....	.....	.....	100	Not heard from.
		P.....	19 24 53	.....	.....	.....	.....	
		M.....	19 25 05	.....	.....	.....	.....	
		F.....	19 25 18	.....	.....	.....	.....	
19	.....	*O*.....	*22 24 58*	.....	.....	.....	90	Not heard from.
		P.....	22 25 10	.....	.....	.....	.....	
		M.....	22 25 20	.....	.....	.....	.....	
		F.....	22 26 52	.....	.....	.....	.....	
20	.....	*O*.....	*15 36 37*	.....	.....	.....	20	Not reported as felt.
		iP.....	15 36 40	.....	.....	.....	.....	
		M.....	15 36 42	.....	10	.....	.....	
		C.....	15 36 50	.....	.....	.....	.....	
		F.....	15 37 06	.....	.....	.....	.....	
20	.....	*O*.....	*19 54 13*	.....	.....	.....	95	Not heard from.
		iP.....	19 54 18	.....	.....	.....	.....	
		L.....	19 54 37	.....	.....	.....	.....	
		C.....	19 55 02	.....	.....	.....	.....	
		F.....	19 55 18	.....	.....	.....	.....	
20	.....	*O*?....	.....	.....	.....	.....	.....	Not heard from.
		P$_N$....	23 08 38	.....	.....	.....	.....	Deflection N. No. M.
		F.....	23 09 48	.....	.....	.....	.....	

[1] *O* indicates time of occurrence at origin, calculated from Brit.

TABLE 2.—*Instrumental reports*—Continued.

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

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*Km.*	
1915. Feb. 21	.....	*0*.....	0 39 08	.....	.....	.....	.....	Not heard from.
		iP_N...	0 39 15	.....	.....	.....	.....	
		L.....	0 39 21	6	.....	.....	.....	
		M.....	0 39 34	.....	.....	6	.....	
		F.....	0 39 42	.....	.....	.....	.....	
21	.....	*0*.....	.....	.....	.....	.....	70	Not heard from.
		P.....	1 20 11	.....	.....	.....	.....	
		L.....	1 20 19	.....	.....	.....	.....	
		F.....	1 21 01	.....	.....	.....	.....	
21	.....	*0*.....	*1 56 53*	.....	.....	.....	40	Felt in Haverhill, Mass. (45 kms.) at "8:55."
		P.....	1 57 06	.....	.....	.....	.....	
		L.....	1 57 10	.....	.....	.....	.....	
		M.....	1 57 12	.....	.....	.....	.....	
		F.....	1 57 22	.....	.....	.....	.....	
21	.....	*0*.....	1 57 49	.....	.....	.....	45	Cf. preceding.
		P.....	1 57 57	.....	.....	.....	.....	
		L.....	1 58 05	.....	.....	.....	.....	
		F.....	1 58 16	.....	.....	.....	.....	
21	.....	*0*.....	.....	.....	.....	.....	.....	Phases indistinct. No M. Lowell, Mass., reported shock felt at 9:03 p. m.
		P.....	2 02 46	.....	.....	.....	.....	
		F.....	2 03 46	.....	.....	.....	.....	
21	.....	*0*.....	*2 20 53*	.....	.....	.....	20	Felt at Andover, Mass. Lowell reported shock felt at 9:30 p. m. (2:30 G. M. T.)
		P.....	2 20 55	.....	.....	.....	.....	
		L.....	2 20 58	.....	.....	.....	.....	
		F.....	2 21 17	.....	.....	.....	.....	
21	.....	*0*.....	*2 35 14*	.....	.....	.....	30	Felt at Andover, Mass. (30 kms.). Another at 9:45 p. m. of which there is a trace on records (N).
		P.....	2 35 18	.....	.....	.....	.....	
		L.....	2 35 21	.....	5	.....	.....	
		F.....	2 35 38	.....	.....	.....	.....	
21	.....	*0*.....	.....	.....	.....	.....	.....	Phases indistinct.
		P_N...	3 09 30	.....	.....	.....	.....	
		F.....	3 09 36	.....	.....	.....	.....	
23	.....	*0*.....	*23 13 08*	.....	.....	.....	145	
		P.....	23 13 25	.....	.....	6	.....	
		L.....	23 13 42	.....	.....	.....	.....	
		F.....	23 14 10	.....	.....	.....	.....	
25	.....	*0?*.....	*9 03 41*	.....	.....	.....	3440	*0* from S–P. Phases masked by microseisms.
		P_E...	9 10 19	3	.....	.....	.....	
		S.....	9 15 32	6	.....	.....	.....	
		L_E...	9 25 19	12	.....	.....	.....	A 0.25 mm. on record.
		L_N...	9 26 06	16	.....	.....	.....	A 0.25 mm. on record.
		M.....	9 28 53	.....	.....	.....	.....	
		F.....	9 48 ..	.....	.....	.....	.....	
25	.....	*0*.....	*20 47 07*	.....	.....	.....	9200	Phases masked by microseisms.
		P?.....	20 59 42	.....	.....	.....	.....	
		.....	21 01 34	.....	.....	.....	.....	
		iS.....	21 10 02	6	.....	.....	.....	
		eL_N...	21 23 36	13	.....	.....	.....	
		.....	21 24 38	20	.....	.....	.....	
		L_N...	21 46 07	20	.....	.....	.....	
		F.....	21 48 ..	.....	.....	.....	.....	
25	.....	*0*.....	*22 14 06*	.....	.....	.....	260	Not heard from.
		P.....	22 14 48	.....	.....	.....	.....	
		L.....	22 15 17	.....	.....	.....	.....	
		F.....	22 15 49	.....	.....	.....	.....	
28	.....	*0?*.....	.. .. ..	.....	.....	.....	.....	P and S in microseisms.
		e.....	19 38 20	7	.....	.....	.....	
		.....	19 39 30	6	.....	.....	.....	
		L_E...	19 49 34	40	.....	.....	.....	
		L.....	19 54 02	30	.....	.....	.....	
		.....	19 58 03	26	.....	.....	.....	
		M.....	19 59 20	22	.....	.....	.....	A 0.5 mm. on record.
		F.....	20 49 ..	.....	.....	.....	.....	

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.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*Km.*	
1915. Jan. 10	.....	.....	18 00 00	10 to 15	150*	.....	.....	Earth tremors (per diem et noctem).
11	.....	.....	19 07 00	10	100 to 150*	.....	.....	Earth tremors—groups of 5 to 6 per min., average 18 per hour. Shocks reported from Santa Clara, Cal.
12	.....	.....	.....	?	?	.....	.....	Same as above, but decreased amplitude and intensity.
13	I_u...	P.....	.....	.....	.....	.....	7724	P not distinguishable from increased earth tremors. Reported from Italy. C of varying period during following 24 hours due either to reflected waves or minor shocks.
		iS.....	7 11 49	.....	Small	.....	.....	
		N–PS?	7 23 34	15	.....	400*	.....	
		E–PS?	7 24 00	20	250*	.....	.....	
		eL_E...	7 28 34	30	300*	.....	.....	
		L_E...	7 29 00	26	550*	.....	.....	
		L_E...	7 30 00	30	500*	.....	.....	
		L_N...	7 29 00	20	.....	350*	.....	
		F_E...	7 37 00	.....	.....	.....	.....	
		F_N...	7 37 00	.....	.....	.....	.....	
14	.....	.....	.....	.....	.....	.....	.....	Many microseisms on both components.
31	.....	P.....	2 04 15	.....	.....	.....	4506	S. doubtful.
		S.....	2 11 13	.....	.....	.....	.....	
Feb. 1	.....	.....	18 04 00	.....	.....	.....	.....	Earth tremors, N–S.
		.....	18 07 00	.....	.....	.....	.....	
2	.....	.....	23 00 00	.....	.....	.....	.....	Earth tremors, N–S.
3	.....	.....	3 00 00	.....	.....	.....	.....	
4	.....	L_E...	1 26 00	.....	250*	.....	.....	Reported in England.
6	.....	i?.....	21 25 00	.....	.....	.....	.....	Sharp shocks (2) from east.
9	.....	.....	.....	.....	.....	.....	.....	Microseisms per diem, N–S.
10	.....	iP.....	14 13 45	.....	.....	.....	4024	Sharp shock, south.
		S.....	14 19 00	.....	.....	.....	.....	
11	.....	iP.....	11 51 00	.....	.....	.....	.....	Sharp shock, south.
13	.....	.....	20 00 00	.....	.....	.....	.....	Earth tremors on N–S.
		.....	22 00 00	.....	.....	.....	.....	
15	.....	.....	1 56 00	.....	.....	.....	.....	Earth tremors on N–S, 24 hours' duration.
15	.....	eL_N...	19 42 00	15	Small	200*	.....	
		F.....	19 45 00	.....	.....	.....	.....	
18	.....	i?.....	0 30 00	.....	.....	.....	.....	Slight shock from W.
18	.....	.....	.....	.....	.....	.....	.....	Slight shock from W. (No time, clock off.)
19	.....	i?.....	0 12 30	.....	.....	.....	.....	Slight shock from W.
21	.....	.....	.....	.....	.....	.....	.....	Intermittent tremors, N–S and E–W.
23	.....	L.....	23 18 00	.....	.....	.....	.....	Earth tremors, a. m.
		L_N...	23 21 00	.....	.....	660*	.....	
28	.....	.....	3 07 00	.....	.....	.....	.....	Earth tremors, N–S.
		.....	3 12 00	.....	.....	.....	.....	
28	.....	.....	11 45 00	.....	.....	.....	.....	Earth tremors, N–S.
		.....	11 48 00	.....	.....	.....	.....	

* Trace amplitude.

TABLE 2.—*Instrumental reports*—Continued.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
New York. Fordham. Fordham University. W. C. Repetti, S. J. Lat., 40° 51′ 47″ N.; long., 73° 53′ 08″ W. Elevation, 23.9 meters. Instruments: Wiechert, 80 kilograms. Instrumental constant: T_0=6.								
1915 Feb. 25	I	iL$_N$	H. 10 m. 20 s. 20	Sec.	Mm.	Mm.	Km.	Microseisms from 12h 00m 00s until 23h 00m 00s.
		L$_N$	10 23 02	9		0.12		
		eL$_E$	10 19 08					
		L$_E$	10 17 42	13	0.12			
		F$_N$	10 28 42					
		F$_E$	10 27 57					
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 20 N 25; T_0 E 15 N 16								
1915 Feb. 25		L$_N$	H. 9 m. 24 s. 30 / 9 27 45	Sec. 12	μ	μ	Km.	No marked maximum.
28		L$_N$	20 07 .. / 20 14 ..	20				
Alaska. Sitka. Magnetic Observatory. U. S. Coast and Geodetic Survey. J. W. Green. Lat., 57° 03′ 00″ N.; long., 135° 20′ 06″ W. Elevation, 15.2 meters. Instruments: Two Bosch-Omori, 10 and 12 kilograms. Instrumental constants: V E 10 N 10; T_0 E 17.4 N 15.6								
1915. Jan. 5		eP$_E$	H. 23 m. 38 s. 15	Sec. 3	μ	μ	Km.	
		eL	23 43 00	12				
		M	23 49 18	10	10	20		
		F	24 02 00					
13		eL	7 31 40	16				
		M	7 39 45	18	10	10		
		F	7 50 00					Microseisms present on Jan. 1, 2, 8–11, and 16.
Hawaii. Honolulu. Magnetic Observatory. U. S. Coast and Geodetic Survey. Wm. W. Merrymon. 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=19.								
1915. Jan. 3		eL	H. 0 m. 39 s. 48	Sec.	μ	μ	Km.	
		M	0 47 48	18	200*			
		F	1 08 00					
4		eP	0 37 18					
		eL	0 44 36	25				
		M	0 52 48	18	300*			
		C	0 57 42					
		F	1 55 00					
4		eL	22 44 00	23				
		M	22 55 30	20				
		C	23 06 00		100*			
5		P	15 42 24					
		S	15 49 12					
		L	15 53 24	21				
		M	15 55 00	20	1,500*			
		C	16 10 00					
		F	17 41 00					
5		P	23 38 12					Time may be in error by as much as 30 seconds.
		L	23 47 00	22				
		M	23 48 00	19	1,800*			
		C	24 32 00					
		F	26 20 00					
10		L	23 41 36					Doubtful.
		M	23 49 48	19	100*			
		F	24 33 00					
13		P	7 23 54					
		L	7 45 18	18				
		M	8 03 00	20	700*			
		C	8 30 00					
		F	10 43 00					

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
Hawaii. Honolulu. Magnetic Observatory. U. S. Coast and Geodetic Survey. Wm. W. Merrymon—Continued.								
1915. Jan. 21		P	H. 15 m. 26 s. 48	Sec.	μ	μ	Km.	
		S	15 37 48					
		L	15 45 30	20				
		M	15 55 12	19	100*			
		C	16 00 00					
		F	16 13 00					
21		L	21 49 24	22				
		M	21 56 24	21	200*			
		F	22 33 00					
30		eL	8 14 06					
		M	8 14 36	20	100*			
		F	8 55 00					
Feb. 7		L	22 18 54					
		M	22 28 54	18	300*			
		C	22 35 54					
		F	23 01 18					
10		L	4 20 30					
		M	4 23 12	18	100*			
		F	4 34 30					
17		P	15 30 18					
		L	15 40 48					
		M	15 42 36	20	200*			
		C	15 46 36					
		F	15 51 06					
25		eP	9 16 54					
		L	9 19 06					
		M	9 20 54	20	400*			
		C	9 25 54					
		F	10 22 54					
25		L	14 18 18	24				
		M	14 22 54	20	200*			
		C	14 28 42					
		F	15 26 54					
25		P	20 43 48					
		L	20 49 30					
		M	20 49 48	20	1,700*			
		C	21 12 24					
		F	22 15 00					
26		eL	3 23 54	21				
		M	3 28 06	18	300*			
		C	3 34 18					
		F	3 56 36					
28		P	19 19 54					
		L	19 32 18	27				
		M	19 40 24	18	2,000*			
		C	19 59 24					
		F	22 07 00					
Canada. Ottawa. Dominion Astronomical Observatory Earthquake Station. Otto Klotz. Lat., 45° 23′ 38″ N.; long., 75° 42′ 57″ W. Elevation, 83 meters. Instruments: Two Bosch photographic horizontal pendulums, one Spindler and Hoyer 80 kg. vertical seismograph.								
Feb. 25		P	H. 9 m. 11 s. 22	Sec.	μ	μ	Km. 3000?	
		Sg?	9 15 43					
		eLg	9 23 03	20				
		L	9 25 to / 9 28	14 to / 18				
		F	9 40					
25		iP	20 50 28	3			9150	
		i	21 01 41					
		iS?	21 09 46					
		eLN	21 23 03	40				
		F	21 45					
26								Between 1h and 2h 30m disturbances occur which, however, can not be identified with any phases and again between 12h and 15h.
28		PR$_1$?	18 59 00				13000+	
		iSR$_1$?	19 18 08					
		iSR$_2$F	19 27 30					
		eL	19 45 07	40				
		L	19 50	40				
		L	19 55	27				
		L	20 01 to / 20 16	24 to / 18				
		F	20 25					

*Trace amplitude in millimeters.

TABLE 2.—*Instrumental reports*—Continued.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

Canada. Toronto. Dominion Meteorological Service.

Lat., 43° 10′ 01″ N.; long., 79° 23′ 54″ W. Elevation, 113.7 meters. Subsoil: Sand and clay.

Instrument: Milne horizontal pendulum, north. In the meridian.

Instrumental constants: $T_0 = 18$.

1 millimeter swing of boom = pillar deviation of 0.59″.

1915.			H.	m.	s.	Sec.	μ	μ	Km.	
Feb. 25	.....	P.....	9	13	00	.....	.....	.....	3350	After 9h 24m 30s, vibrations gradually decreased. Abrupt increase at 9h 24m 12s.
		P.....	9	15	36	.....	.....	.....	.....	
		SR....	9	17	18	.....	.....	.....	.....	
		L.....	9	23	00	.....	.....	.....	.....	
		iL....	9	24	12	.....	.....	.....	.....	
		M.....	9	24	30	.....	400	.....	.....	
		F.....	9	31	06	.....	.....	.....	.....	
25	.....	L.....	15	23	00	.....	.....	.....	.....	Phases not defined.
		F.....	15	33	00	.....	50	.....	.....	
25	.....	P.....	20	54	48	.....	.....	.....	.....	Appearance of air currents at 20h 46m 36s.
		iS.....	21	00	06	.....	.....	.....	.....	Air currents mixed up with movements at 21h 41m 42s.
		iL....	21	03	24	.....	.....	.....	.....	
		M.....	21	04	42	.....	300	.....	.....	
		iL....	21	22	30	.....	.....	.....	.....	
		iL....	21	34	36	.....	.....	.....	.....	
		iL....	21	38	06	.....	.....	.....	.....	
		F.....				.....	.....	.....	.....	Air currents.
28	.....	P.....	19	24	54	.....	.....	.....	.....	
		S.....	19	33	06	.....	.....	.....	.....	
		S.....	19	40	54	.....	.....	.....	.....	
		iS.....	19	45	54	.....	.....	.....	.....	S waves prolonged.
		iL....	19	55	24	.....	.....	.....	.....	
		L.....	20	00	24	.....	.....	.....	.....	
		M.....	20	03	12	.....	500	.....	.....	
		iM....	20	07	24	.....	400	.....	.....	
		iL....	21	04	00	.....	.....	.....	.....	
		F.....	21	24	00	.....	.....	.....	.....	

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

Canada. Victoria. Dominion Meteorological Service.

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

Instrument: Milne horizontal pendulum, north. In the meridian.

Instrumental constants: $T_0 = 18$.

1 millimeter swing of boom = pillar deviation of 0.54″.

1915.			H.	m.	s.	Sec.	μ	μ	Km.
Feb. 25	.....	P.....	9	03	37	.....	.....	.....	800
		L.....	9	05	37	.....	.....	.....	.....
		M.....	9	06	37	.....	1200	.....	.....
		F.....	9	18	37	.....	.....	.....	.....
25	.....	P.....	15	07	07	.....	.....	.....	.....
		L.....				.....	.....	.....	.....
		M.....	15	08	07	.....	200	.....	.....
		F.....	15	11	33	.....	.....	.....	.....
25	.....	P.....	20	51	02	.....	.....	.....	.....
		S.....	20	55	02	.....	.....	.....	.....
		L.....	20	57	02	.....	.....	.....	.....
		M.....	20	57	32	.....	500	.....	.....
		iL....	21	23	24	.....	.....	.....	.....
		F.....	21	47	32	.....	.....	.....	.....
28	.....	P.....	19	22	21	.....	.....	.....	.....
		S.....	19	27	51	.....	.....	.....	.....
		L.....	19	46	51	.....	.....	.....	.....
		M.....	20	03	21	.....	500	.....	.....
		F.....	20	35	21	.....	.....	.....	.....

SECTION V.—SEISMOLOGY.

SEISMOLOGICAL REPORTS FOR MARCH, 1915.

By W. J. HUMPHREYS, Professor of Meteorological Physics, in charge of Seismological Investigations.

[Dated, Weather Bureau, Washington, D. C., Apr. 28, 1915.]

TABLE 1.—*Noninstrumental earthquake reports, March, 1915.*

Day.	Approximate time Greenwich Civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity Rossi-Forel.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
	H. m	CALIFORNIA.	° ′	° ′			*M. s.*			
1	17 15	Brawley	32 59	115 40	4	1		Rumbling		M. D. Witter.
4	12 50	Julian	33 05	116 37	5	1	8	Rumbling		J. H. L. Vogt.
12	14 00	Cahuilla	33 32	116 43	4	1	2	Rumbling		Dr. W. L. Shawk.
17	3 25	Arbolado	36 15	121 47	3	1	1	Rumbling		Forest Service.
19	19 04	Rialto	34 12	117 27	2	2	4			So. Cal. Edison Co.
29	13 40	China Flat	40 56	123 30	1	1	3			O. I. Westerburg.
30	18 00	Brawley	32 59	115 40	1	1				M. D. Witter.
		IDAHO.								
15	3 35	Montpelier	42 20	111 17	5	1		Rumbling		Forest Supervisor.
		MICHIGAN.								
3	7 45	Calumet	47 13	88 26	3-4	1		Rumbling	Mine caving in?	E. S. Grierson.
		MONTANA.								
4	15 00	Lytle	48 01	111 26	3	1	30	Rumbling		J. F. Fait.
4	8 30	Shelby	48 30	111 55	2	1	4			O. C. Fjeld.
		WASHINGTON.								
1	3 00	Lakeside	47 50	120 00	3	1				W. H. Van Meter.
6	5 10	Lakeside	47 50	120 00	1	1				W. H. Van Meter.
6	5 30	Lakeside	47 50	120 00	4	1	5	Rumbling	Shook buildings	W. H. Van Meter.
		WYOMING.								
31	18 30	Bedford	42 56	110 56	4	1	8	Rumbling	Shook buildings	C. G. Heiner.

TABLE 2.—*Instrumental reports, March, 1915.*

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

[For significance of symbols see this REVIEW, December, 1914, p. 689.]

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 16; N 10 19.6

Date.	Character.	Phase.	Time.	Period. T	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	*μ*	*μ*	*Km.*	
Mar. 5	.....	e_N	4 23 06	6	.....	.....	.....	
		e_E	4 22 46	10	.....	.....	.....	
		M_N	4 25 04	8	.....	100	.....	
		M_E	4 23 36	10	30	.....	.....	
		C	4 28 00	6	.....	.....	.....	
		F	4 39 00	6	.....	.....	.....	
28	.....	P_E	19 52 07	2	.....	.....	.....	
		P_N	19 52 10	.....	.....	.....	.....	
		L_E	19 55 22	5	.....	.....	.....	
		L_N	19 56 23	3	.....	.....	.....	
		M_E	19 57 08	6	30	.....	.....	
		M_N	19 57 23	4	.....	20	.....	
		C	20 02 00	5	.....	.....	.....	
		F	20 10 00	3	.....	.....	.....	

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.
1915.			*H. m. s.*	*Sec.*	*μ*	*μ*	*Km.*	
Mar. 1	.....	.....	7 51 —	.....	.....	.....	.....	Minor earthquake at Grand Junction, Colo. Very slight tremors recorded.
			7 52 —					
3	.....	.....	9 59 —	.....	.....	.....	.....	Slight sinusoidal curve, but not regular.
			10 00 —					
5	.....	.....	23 59 —	.....	.....	.....	.....	Very small, irregular waves, especially on N–S, recurring several times during the day.
6	.....	.....	0 06 —	.....	.....	.....	.....	
6	.....	.....	.....	.....	.....	.....	.....	Activity; thickening of penmarks; possibly connected with quake reported from Abruzzi Provinces, Italy.

TABLE 2.—*Instrumental reports, March, 1915*—Continued.

Date.	Character.	Phase.	Time	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
Colorado. Denver. Heart College. Earthquake Station—Contd.								
1915.				*Sec.*	μ	μ	*Km.*	
Mar. 13	.....	.....	18 39 —	.....	.....	.....	.....	Very strange record of broken waves especially strong on N–S.
			18 45 —	.....	.....	.....	.....	
			18 45 —	.....	.....	.....	.....	
			19 00 —	.....	.....	.....	.....	
24	.....	.....	.....	.....	.....	.....	.....	Activity: thickening of penmarks at times during the day.

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

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

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

	V	T_0
Instrumental constants..	110	6

1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Mar. 5	.....	e_N.....	4 34 36	4	.....	.....	.....	No distinct maximum.
		L_N.....	4 35 47	10	.....	.....	.....	
		F.....	4 47 00	.....	.....	.....	.....	
20	.....	e_N.....	22 34 47	.....	.....	.....	.....	Beginning uncertain.
		L_E.....	22 45 01	.....	.....	.....	.....	Phases doubtful.
		F.....	22 51 00	.....	.....	.....	.....	

Hawaii. Honolulu. Magnetic Observatory. U. S. Coast and Geodetic Survey. Wm. W. Merrymon.

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.

	T_0
Instrumental constant..	18.9

1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Mar. 5	.....	e.....	4 37 42	23	.....	.....	.....	
		M.....	4 41 42	.....	400*	.....	.....	
		C.....	4 51 00	.....	.....	.....	.....	
8	.....	P.....	15 47 12	.....	.....	.....	.....	
		L.....	15 56 30	22	.....	.....	.....	
		M.....	15 59 48	.....	400*	.....	.....	
		C.....	16 51 06	.....	.....	.....	.....	
		F.....	16 45 30	.....	.....	.....	.....	
10	.....	P.....	1 09 42	.....	.....	.....	.....	
		L.....	1 25 54	23	.....	.....	.....	
		M.....	1 30 42	.....	300*	.....	.....	
		C.....	1 34 12	.....	.....	.....	.....	
		F.....	2 09 48	.....	.....	.....	.....	
11	.....	e.....	16 36 06	24	.....	.....	.....	
		M.....	16 39 48	.....	200*	.....	.....	
		C.....	16 45 00	.....	.....	.....	.....	
		F.....	16 50 00	.....	.....	.....	.....	
11	.....	P.....	18 25 30	.....	.....	.....	.....	
		L.....	18 34 00	22	.....	.....	.....	
		M.....	18 41 12	.....	800*	.....	.....	
		C.....	18 52 54	.....	.....	.....	.....	
		F.....	19 17 06	.....	.....	.....	.....	
12	.....	P.....	15 08 42	.....	.....	.....	.....	
		S.....	15 15 42	.....	.....	.....	.....	
		L.....	15 24 42	24	.....	.....	.....	
		M.....	15 33 54	.....	800*	.....	.....	
		C.....	15 46 30	.....	.....	.....	.....	
		F.....	17 31 00	.....	.....	.....	.....	
17	.....	e.....	19 01 54	.....	.....	.....	.....	F occurred during daily attention to instrument.
		M.....	19 02 54	20	400*	.....	.....	
		M.....	19 16 06	20	400*	.....	.....	
		C.....	19 21 06	.....	.....	.....	.....	
18	.....	e.....	1 56 48	20	.....	.....	.....	
		M.....	2 02 00	.....	200*	.....	.....	
		C.....	2 08 30	.....	.....	.....	.....	
		F.....	2 25 30	.....	.....	.....	.....	
28	.....	e.....	18 57 18	.....	.....	.....	.....	Beginning obscured by air tremors.
		M.....	18 58 18	.....	200*	.....	.....	
		C.....	19 08 54	.....	.....	.....	.....	F occurred during daily attention to instrument.
31	.....	e.....	18 32 30	.....	.....	.....	.....	
		M.....	18 36 48	.....	200*	.....	.....	
		C.....	18 44 00	.....	.....	.....	.....	
		F.....	18 50 00	.....	.....	.....	.....	

*Trace amplitude.

Date.	Character.	Phase.	Time	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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

Lat., 38° 57′30″ N.; long., 95° 14′58″ W. Elevation, 304.8 meters.

Instrument: Wiechert.

	V	T_0	ϵ
Instrumental constants.. E	121	3.7	3.7
N	126	3.7	4.5

1915			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Mar. 5	.....	P_N.....	4 22 25	.....	.....	.....	2,370	
		S_N.....	4 26 20	.....	.....	.....	.....	
		M_N.....	4 28 10	.....	.....	.....	.....	
		M_E.....	4 28 10	.....	.....	.....	.....	
12	.....	P_N.....	5 21 15	.....	.....	.....	1207	
		S_N?...	5 21 27	.....	.....	.....	.....	
		M_N.....	5 21 38	.....	.....	.....	.....	
20	.....	P_N.....	22 23 08	.....	.....	.....	2,620	
		M_E.....	22 31 04	.....	.....	.....	.....	

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.

	V	T_0
Instrumental constants.. E	10	31
N	10	29

1915			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Mar. 5	.....	e_N.....	4 34 22	.....	.....	.....	.....	
		e_E.....	4 34 25	.....	.....	.....	.....	
		M_N.....	4 35 40	10	.....	30	.....	
		M_E.....	4 37 40	10	10	.....	.....	
		C.....	4 41 00	.....	.....	.....	.....	

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, undamped (mechanical registration).

	V	T_0
Instrumental constants.. E	80	23
N	50	25

1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Mar. 5	.....	e_N.....	4 36 26	.....	.....	.....	.....	
		L_E.....	4 37 43	.....	.....	.....	.....	
		L_N.....	4 37 58	7	.....	.....	.....	
		F.....	4 49 28	.....	.....	.....	.....	
12	.....	e_N.....	15 53 12	.....	.....	.....	.....	Masked by microseisms.
		L_N.....	15 56 35	18	.....	.....	.....	
		L_N.....	16 01 59	.....	.....	.....	.....	
		F.....	16 05 00	.....	.....	.....	.....	
20	.....	e?.....	22 — —	.....	.....	.....	.....	F lost in microseisms?
		L_N.....	22 51 12?	18	.....	.....	.....	
31	.....	e.....	17 53 16	.....	.....	.....	.....	Masked by microseisms and confused in tangled lines.
		L_E.....	17 54 36	.....	.....	.....	.....	
		F?.....	18 01 —	.....	.....	.....	.....	

TABLE 2.—*Instrumental reports, March, 1915*—Continued.

Missouri. **Saint Louis. St. Louis University.** Geophysical Observatory. J. B. Goosse, 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:1 5:1

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Mar. 5	II,..	eP?....	4 21 46	.....	.....	.....	3,475	
		iS_E....	4 27 00	.....	.....	.....	.....	
		iS_N....	4 27 02	.....	.....	.....	.....	
		eL....	4 29 12	.....	.....	.....	.....	
		M_E....	4 29 58	8	9	.....	.....	
		M_N....	4 29 58	8	.....	10	.....	
		M_N....	4 30 36	9	.....	16	.....	
		F.....	4 44 00	.....	.....	.....	.....	

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: ———.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Mar. 1	.....	.....	4 19 00	.....	.....	.....	.....	Earth tremors, N-S.
			4 21 00	.....	.....	.....	.....	
			4 43 00	.....	.....	.....	.....	
			4 44 00	.....	.....	.....	.....	
4	I_u....	eP_E....	4 23 00	.....	.....	.....	7232?	Reported in Florence, Italy.
		S_E....	4 34 00	.....	.....	.....	.....	
		L_E....	4 35 00	12	450*	.....	.....	
		L_N....	4 35 00	.....	.....	150*	.....	
		F_E....	4 38 45	.....	.....	.....	.....	
11	.....	.....	.....	.....	.....	.....	.....	Earth tremors, N-S.
12	.....	.....	.....	.....	.....	.....	.....	Earth tremors, N-S.
30	I_u....	P?....	17 28 00	.....	.....	.....	.....	S indiscernible. Distant earthquake?
		L_E....	17 54 00	10	250*	.....	.....	

* Trace amplitude.

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

Lat., 40° 57′ 47″ N.; long., 73° 53′ 08″. W. Elevation, 23.9 meters.

Instrument: Wiechert 80 kg.

Instrumental constant.. T_0 6

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Mar. 4	I....	iL_N....	18 00 00	.....	.....	.....	.....	Because of repairs being made to the station clock, the time of each phase of this report is only approximate.
		iL_E....	18 00 30	.....	.....	.....	.....	
		M_N....	18 00 00	13	.....	13	.....	
		M_E....	18 00 30	13	28	.....	.....	
		M_E....	18 02 25	13	14	.....	.....	
		F_N....	18 04 45	.....	.....	.....	.....	
		F_E....	18 05 00	.....	.....	.....	.....	
5	I....	eL_N....	3 13 00	.....	.....	.....	.....	Time of each phase approximate.
		M_N....	3 15 00	6.5	.....	2	.....	
		M_N....	3 15 15	6.5	.....	2	.....	
		M_N....	3 15 50	8.2	.....	3	.....	
		M_E....	3 17 40	7	2	.....	.....	
		M_E....	3 19 15	7	2	.....	.....	
		F.....	3 30 00	.....	.....	.....	.....	

Panama, Canal Zone. Balboa Heights. Isthmian Canal Commission.

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

Instruments: Two Bosch-Omori 25 kg.

Instrumental constants.. V 8, T_0 20

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Mar. 14	III..	.....	.....	.....	.....	.....	.....	No record. Seismograph room in repair. Disturbance began at 12:25 p. m.
23	I....	P_E....	9 26 20	.....	.....	.....	620	
		P_N....	9 26 20	.....	.....	.....	.....	
		L_E....	9 27 40	.....	.....	.....	.....	
		L_N....	9 27 40	.....	.....	.....	.....	
		M_E....	9 28 15	.....	188	.....	.....	
		M_N....	9 29 35	.....	.....	250	.....	
		F_N....	9 34 40	.....	.....	.....	.....	
		F_E....	9 36 00	.....	.....	.....	.....	

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 20, N 25; T_0: 15, 16

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Mar. 5	.....	e_N....	4 36 12	.....	.....	.....	.....	No well defined maximum.
		L_N....	4 37 23	11	.....	.....	.....	
		F.....	5 00 00	.....	.....	.....	.....	
12	.....	L_N....	16 01 30	.....	.....	.....	.....	No maximum.
		F.....	16 12 00	.....	.....	.....	.....	
17	.....	L_N....	19 07 50	12	.....	.....	.....	Phases doubtful.
		L_N....	19 10 15	14	.....	.....	.....	
		F.....	19 30 00	.....	.....	.....	.....	

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

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

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

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Mar. 2	.....	P_E....	21 22 46	2	.....	.....	1300	
	.....	L.....	21 25 07	12-20	.....	.....	.....	
	.....	F.....	21 30 00	.....	.....	.....	.....	
5	.....	L.....	4 36 00	20	.....	.....	.....	P and S masked by microseisms.
		M_E....	4 36 08	20	12	.....	.....	
		M_N....	4 37 03	20	.....	40	.....	
		F.....	5 00 00	.....	.....	.....	.....	
12	.....	L.....	15 56 00	24	.....	.....	.....	
		F.....	16 10 00	.....	.....	.....	.....	
17	.....	P.....	18 57 29	5	.....	.....	9050	
		S.....	19 07 42	6	.....	.....	.....	
		L_E....	19 23 05	12	.....	.....	.....	
		L_E....	19 26 00	60	.....	.....	.....	
		L.....	19 31 00 to 19 41 00	24 to 18	.....	.....	.....	
		F.....	19 50 00	.....	.....	.....	.....	
20	.....	e_E....	22 31 00	7	.....	.....	.....	Microseisms strong.
		i.....	22 38 00	6	.....	.....	.....	
		L_E....	22 41 00	9	.....	.....	.....	
		F.....	22 52 00	.....	.....	.....	.....	
23	.....	e_E....	21 38 48	4	.....	.....	.....	Somewhat masked by microseisms.
		eL_E....	21 41 08	16	.....	.....	.....	
		L_E....	21 46 00	20	.....	.....	.....	
		L_N....	21 47 05	20	.....	.....	.....	
		F.....	21 55 00	.....	.....	.....	.....	
31	.....	e?.....	17 29 26	.....	.....	.....	.....	
		L.....	17 54 04	20	.....	.....	.....	
		F.....	18 02 00	.....	.....	.....	.....	

TABLE 2.—*Instrumental reports, March, 1915*—Continued.

Canada. **Toronto. Dominion Meteorological Service.**

Lat., 43° 40′ 01″ N.; long., 79° 22′ 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.
1915.			*H. m. s.*	*Sec.*	*μ*	*μ*	*Km.*	
Mar. 5	.....	L.....	4 35 06	.....	.....	.....	.....	
		iL.....	4 35 18	.....	.....	.....	.....	
		M.....	4 35 42	.....	600*	.....	.....	
		i.....	4 37 18	.....	.....	.....	.....	
		M.....	4 37 36	.....	400*	.....	.....	
		F.....	4 52 00	.....	.....	.....	.....	
11	.....	P.....	18 54 00	.....	.....	.....	.....	Time of P uncertain.
		S.....	19 09 06	.....	.....	.....	.....	
		SR.....	19 12 12	.....	.....	.....	.....	
		L.....	19 16 18	.....	.....	.....	.....	
		iL.....	19 19 18	.....	.....	.....	.....	
		M.....	19 22 18	.....	300*	.....	.....	
		F.....	19 55 00	.....	.....	.....	.....	Time of F uncertain.
12	.....	P.....	15 25 30	.....	.....	.....	.....	Time of P uncertain.
		iS.....	15 38 12	.....	.....	.....	.....	15h 53m 54s may be the beginning of another earthquake.
		iL?....	15 53 54	.....	.....	.....	.....	
		L.....	15 58 00	.....	.....	.....	.....	
		iL.....	16 04 24	.....	.....	.....	.....	F doubtful, suspicion of air currents going on.
		M.....	16 10 18	.....	200*	.....	.....	
		F.....	16 38 00	.....	.....	.....	.....	
17	.....	S?.....	19 08 06	.....	.....	.....	.....	
		iL.....	19 35 54	.....	100*	.....	.....	
		F.....	.....	.....	.....	.....	.....	F lost in air currents.
20	.....	P.....	22 12 30	.....	.....	.....	.....	Strong microseisms prevailed.
		S.....	22 18 54	.....	.....	.....	.....	
		L.....	22 24 30	.....	.....	.....	.....	Suspicion of air currents.
		L.....	22 35 48	.....	100*	.....	.....	
		L.....	23 00 00	.....	.....	.....	.....	
		F.....	23 14 00	.....	.....	.....	.....	
23	.....	P.....	21 30 00	.....	.....	.....	.....	Time of P uncertain.
		L.....	21 42 54	.....	.....	.....	.....	
		iL.....	21 45 06	.....	.....	.....	.....	
		M.....	21 46 48	.....	500*	.....	.....	
		L.....	22 08 00	.....	200*	.....	.....	
		F.....	22 12 12	.....	.....	.....	.....	

* Trace amplitude.

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

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

Instrument: 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.
1915.			*H. m. s.*	*Sec.*	*μ*	*μ*	*Km.*	
Mar. 5	.....	iL.....	4 33 38	.....	.....	.....	.....	
		M.....	4 35 38	.....	500*	.....	.....	
		F.....	4 43 08	.....	.....	.....	.....	
11	.....	P.....	18 50 42	.....	.....	.....	.....	
		L.....	18 58 42	.....	.....	.....	.....	
		M.....	19 03 42	.....	100*	.....	.....	
		F.....	19 13 42	.....	.....	.....	.....	
12	.....	P.....	15 14 39	.....	.....	.....	.....	Time uncertain.
		L.....	15 27 39	.....	.....	.....	.....	
		M.....	15 29 39	.....	100*	.....	.....	
		F.....	15 34 39	.....	.....	.....	.....	
12	.....	P.....	15 48 39	.....	.....	.....	.....	May be a continuation of the preceding. All times uncertain.
		L.....	16 02 39	.....	.....	.....	.....	
		M.....	16 03 39	.....	100*	.....	.....	
		F.....	16 22 39	.....	.....	.....	.....	
17	.....	P.....	19 02 22	.....	.....	.....	.....	
		M.....	19 11 22	.....	200*	.....	.....	
		F.....	19 25 22	.....	.....	.....	.....	
23	.....	L.....	21 55 00	.....	.....	.....	.....	Phases not well defined.
		L.....	21 59 00	.....	.....	.....	.....	
		M.....	22 00 30	.....	200*	.....	.....	
		F.....	22 05 00	.....	.....	.....	.....	

* Trace amplitude.

TABLE 3.—*Late reports.* (*Instrumental.*)

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: 1 5: 1

Date.	Character.	Phase.	Time.	Period.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	*μ*	*μ*	*Km.*	
Feb. 25	I....	eP.....	20 58 38	.....	.....	.....	8,000	S probably merged in local disturbance.
		eS?....	21 08 00	.....	.....	.....	.....	
		M_E....	20 59 24	5	8	.....	.....	Microseisms were of frequent occurrence throughout the month.
		M_N....	20 59 54	7	.....	9	.....	
		F.....	21 12 00	.....	.....	.....	.....	

SECTION V.—SEISMOLOGY.

SEISMOLOGICAL REPORTS FOR MARCH, 1915.

W. J. HUMPHREYS, Professor in charge of Seismological Investigations.

[Dated: Weather Bureau, Washington, D. C., June 1, 1915.]

TABLE 1.—*Noninstrumental earthquake reports, April, 1915.*

Day.	Approximate time Greenwich Civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity Rossi-Forel.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
		CALIFORNIA.								
	H. m.		° ′	° ′			*M. s.*			
1	13 25	Julian	33 05	116 37	2	1	6	Rumbling		J. H. L. Vogt.
	13 25	Mesa Grande	33 11	116 42	2	1	4	Rumbling		Edward H. Davis.
3	20 00	El Cajon	32 48	116 58	3	1	3	Rumbling	Windows rattled	H. H. Kessler.
5	21 45	Bridgeport	38 17	119 16	3	1	3	Rumbling		A. F. Scott.
	21 45	Coleville	38 36	119 32	4	1		Rattling		F. W. Chichester.
	21 45	Coulterville	37 42	120 13	3	1		Rumbling	Windows rattled	W. H. Dudley.
5	23 11	Bridgeport	38 17	119 16	4	1	5	Rumbling	Shook buildings	A. F. Scott.
	23 11	Camino	38 46	120 41	2	3				U. S. Forest Service.
	23 11	Coleville	38 36	119 32	5	2		Rumbling	Shook buildings	F. W. Chichester.
	23 11	Coulterville	37 42	120 13	3	2		Rumbling	Windows rattled	W. H. Dudley.
	23 11	Markleeville	38 42	119 46	2	2		Faint		Mrs. Mary Thornburg.
	23 11	Northfork	37 08	119 33	2	1	1			U. S. Forest Service.
	23 11	Sonora	37 59	120 24	3	1				Chas. P. Jones.
	23 11	Towle	39 14	120 48	3	1	6		Windows rattled	F. P. Harmon.
6	16 27	Coyote	37 14	121 44	3	3	4		Windows rattled	Bay Cities Water Co.
	16 27	Spreckels	36 35	121 38	4	1	5			J. K. Scott.
	16 27	Watsonville	36 55	121 46	5	1	15	Rumbling		Spreckels Sugar Co.
13	20 09	San Diego	32 43	117 10	2	1	3			U. S. Weather Bureau.
17	6 20	Markleeville	38 42	119 46	2	4	20	Rumbling		Mrs. Mary Thornburg.
	6 20	Sonora	37 59	120 24	4	1		Faint		Chas. P. Jones.
21	5 30	Cahuilla	33 32	116 43	3	1	2	Rumbling		Dr. Wm. L. Shawk.
21	10 00	Lonoak	36 20	120 00	2	1				M. L. Griffin.
	10 00	San Luis Obispo	35 18	120 39	3	1	3	Rumbling		U. S. Weather Bureau.
28	3 10	Brawley	32 59	115 40	4	1	2	Rumbling		M. D. Witter.
30	5 30	Brawley	32 59	115 40	2	1				M. D. Witter.
30	8 20	Brawley	32 59	115 40	5	1	3	Rumbling	People awakened	M. D. Witter.
30	13 45	Brawley	32 59	115 40	3	1			Several lighter shocks during day.	M. D. Witter.
		ILLINOIS.								
15	13 20	Olney	38 45	88 07	2	1		Rumbling		J. T. Ratcliffe.
		MISSOURI.								
28	23 40	New Madrid	36 35	89 32	4	1		Rumbling		Miss Josie Smith.
		NEVADA.								
5	21 45	Smith	38 43	119 21	2	1			See California	C. M. Carter.
5	23 11	Gardnerville	38 55	119 43	5	2	2		See California	U. S. Forest Service.
	23 11	Smith	38 43	119 21	4	1		Rumbling		C. M. Carter.
	23 11	Yerington	38 58	119 11	4	1	10			A. E. Ricksecker.
		TENNESSEE.								
28	23 40	Tiptonville	36 23	89 30	5	1	8	Rumbling	Many frightened; see Missouri	I. F. Lemonds.
		UTAH.								
26	5 30	Emery	38 54	111 17	2	1		Rumbling		H. C. Wickman.
		WASHINGTON.								
22	18 35	Sumner	47 12	122 13	3	1	3	Rumbling	Felt at several places along head of Puget Sound.	H. E. Thompson.
	18 35	Tacoma	47 16	122 23	5	1	8	Rumbling		U. S. Weather Bureau.

TABLE 2.—*Instrumental reports, April, 1915.*

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

[For significance of symbols see this REVIEW, December, 1914, p. 689.]

Date.	Character.	Phase.	Time.	Period. T	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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 kilograms.

Instrumental constants:

	V	T_0.
E	10	17.4
N	10	15.6

[No earthquakes recorded during April; 1915.]

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	16
N	10	19.6

Date.	Character.	Phase.	Time.	Period. T	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915. Apr. 10	.....	e_E	*H. m. s.* 0 52 18	*Sec.*	.....	.....	*Km.*	
		e_N	0 52 37	.....	.....	.....	.....	
		M_E	0 54 28	9	10	.....	.....	
		M_N	0 53 33	8	.....	10	.....	
		F_E	1 00 00	.....	.....	.....	.....	
23	.....	L	15 44 49	4	.....	.....	.....	
		M	15 44 54	5	20	10	.....	
		C	15 47 00	4	.....	.....	.....	
		F	15 55 00	4	.....	.....	.....	

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

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

Instrument: West, two-component seismoscope.

Date.	Character.	Phase.	Time.	Period. T	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915. Apr. 13	L_d	.....	*H. m. s.* 12 10 —	*Sec.*	*μ* 125	*μ* 125	*Km.*	Windows rattled.

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.
1915. Apr. 15	.....	.....	*H. m. s.* 19 56 00	*Sec.*	*μ*	*μ*	*Km.*	Activity, especially on E–W, and also later during day.
19	.....	$?_E$	18 26 00	.....	.....	.....	.....	Nothing on N–S.
19	.....	$?_E$	21 02 00	.....	.....	.....	.....	Nothing on N–S.
		F	21 04 00	.....	.....	.....	.....	
20	.....	L_E	17 27 00	.....	.....	.....	.....	
		F	17 29 00	.....	.....	.....	.....	
20	.....	L	19 02 00	.....	.....	.....	.....	On both components. Occurs later during day on N–S.
24	.....	L	18 30 00	.....	.....	.....	.....	Not on N–S.
		F	19 00 00	.....	.....	.....	.....	
24	.....	.....	20 29 00	.....	.....	.....	.....	Nothing on N–S.
		F	20 42 00	.....	.....	.....	.....	

Date.	Character.	Phase.	Time.	Period. T	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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

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

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

Instrumental constants.. V = 110, T_0 = 6

Date.	Character.	Phase.	Time.	Period. T	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915. Apr. 3	.....	.....	*H. m. s.*	*Sec.*	*μ*	*μ*	*Km.*	Microseisms of unusual amplitude from 1:30 p. m. to midnight, accompanying passage of storm off the Atlantic coast.
7	.....	P_N	16 04 40	.....	.....	.....	.....	Phases uncertain.
		S_N	16 13 13	.....	.....	.....	.....	Amplitudes very small.
		F	16 20 00	.....	.....	.....	.....	
23	I_r	eP_N	15 36 52	2	.....	.....	4465	
		iP_N	15 36 55	.....	.....	.....	.....	
		S_N	15 43 05	.....	.....	.....	.....	
		L_N	15 50 46	.....	.....	.....	.....	L doubtful.
		F	16 20 00	.....	.....	.....	.....	

District of Columbia. Washington. Georgetown University. F. L. 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.

Instrumental constants:

	V	T_0	e
E	165	5.4	0
N	143	5.2	0

Date.	Character.	Phase.	Time.	Period. T	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915. Apr. 23	I_r	iP_N	*H. m. s.* 15 36 57	*Sec.*	*μ*	*μ*	*Km.*	E–W not discernible.
		I	15 42 42	.....	.....	.....	.....	
		S_N	15 43 36	.....	.....	.....	.....	
		L?	15 49 10	10	.....	11	.....	
		L?	15 49 42	10	.....	.....	.....	
		F	16 05 54	.....	.....	.....	.....	

Hawaii. Honolulu. Magnetic Observatory. U. S. Coast and Geodetic Survey. Wm. W. Merrymon.

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

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

Instrumental constant.. T_0 = 18.9

Date.	Character.	Phase.	Time.	Period. T	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915. Apr. 2	.....	e	*H. m. s.* 6 46 36	*Sec.*	*μ*	*μ*	*Km.*	Beginning faint and doubtful.
		M	6 51 54	.....	200*	.....	.....	
		C	6 56 12	.....	.....	.....	.....	
2	.....	e	12 12 49	.....	.....	.....	.....	
		M	12 17 06	.....	200*	.....	.....	
		C	12 22 36	.....	.....	.....	.....	
3	.....	P	20 41 12	.....	.....	.....	.....	
		L	20 45 48	22	.....	.....	.....	
		M	20 50 12	.....	1,000*	.....	.....	
		C	20 58 12	.....	.....	.....	.....	
		F	22 53 30	.....	.....	.....	.....	
4	.....	e	9 00 24	.....	.....	.....	.....	
		M	9 10 12	20	200*	.....	.....	
		C	9 14 36	.....	.....	.....	.....	

* Trace amplitude.

Hawaii. **Honolulu. Magnetic Observatory**—Continued.

Date.	Character.	Phase.	Time.	Period. T	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	*μ*	*μ*	*Km.*	
Apr. 4	.....	P.....	9 59 06	.....	.....	.....	.....	
		L.....	10 02 06	21	.....	.....	.....	
		M.....	10 05 06	.....	500*	.....	.....	
		C.....	10 10 00	.....	.....	.....	.....	
		F.....	11 16 36	.....	.....	.....	.....	
4	.....	P.....	15 47 06	.....	.....	.....	.....	
		L.....	15 58 00	.....	.....	.....	.....	
		M.....	16 04 00	.....	400*	.....	.....	
		C.....	16 12 06	.....	.....	.....	.....	
		F.....	16 46 30	.....	.....	.....	.....	
4	.....	e.....	18 49 42	.....	.....	.....	.....	
		M.....	18 55 54	.....	200*	.....	.....	
		C.....	19 01 36	.....	.....	.....	.....	
		F.....	19 08 24	.....	.....	.....	.....	
7	.....	P.....	16 20 24	.....	.....	.....	.....	
		L.....	16 42 18	21	.....	.....	.....	
		M.....	16 46 18	.....	500*	.....	.....	
		C.....	16 55 00	.....	.....	.....	.....	
		F.....	17 50 30	.....	.....	.....	.....	
8	.....	P.....	14 19 36	.....	.....	.....	.....	
		L.....	14 30 18	22	.....	.....	.....	
		M.....	14 33 24	.....	600*	.....	.....	
		C.....	14 38 24	.....	.....	.....	.....	
		F.....	14 48 30	.....	.....	.....	.....	
23	.....	L.....	15 50 48	20	.....	.....	.....	Preliminary phases indistinct.
		M.....	15 53 06	.....	300*	.....	.....	
		C.....	15 59 00	.....	.....	.....	.....	
		F.....	16 32 00	.....	.....	.....	.....	
24	.....	P.....	17 26 54	.....	.....	.....	.....	
		L.....	17 39 30	.....	.....	.....	.....	
		M.....	17 45 30	22	200*	.....	.....	
		C.....	17 54 00	.....	.....	.....	.....	
		F.....	18 06 00	.....	.....	.....	.....	
27	.....	e.....	11 43 54	.....	.....	.....	.....	
		M.....	11 55 54	.....	200*	.....	.....	
		F.....	11 58 24	.....	.....	.....	.....	
29	.....	P.....	19 27 48	.....	.....	.....	.....	
		L.....	19 37 30	.....	.....	.....	.....	
		M.....	19 41 18	20	300*	.....	.....	
		C.....	19 44 06	.....	.....	.....	.....	
		F.....	19 50 18	.....	.....	.....	.....	

*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, 304.8 meters.

Instrument: Wiechert.

Instrumental constants.

	V	T_0	*ε*
E	121	3.7	3.7
N	126	3.7	4.5

Date.	Character.	Phase.	Time.	Period. T	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	*μ*	*μ*	*Km.*	
Apr. 23	.....	P.....	15 37 26	2	.....	.....	2,300	
		S.....	15 41 15	2–3	.....	.....	.....	
		L.....	15 44 00	3–4	15	40	.....	
		F.....	15 57 00	.....	.....	.....	.....	
27	.....	P.....	23 53 10	1	.....	.....	200?	
		L.....	23 53 32	.....	4	3	.....	
		F.....	24 00 00	.....	.....	.....	.....	

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	31
N	10	29

[No earthquake recorded during April, 1915.]

Date.	Character.	Phase.	Time.	Period. T	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	*μ*	*μ*	*Km.*	
Apr. 5	.....	.....	.....	.....	.....	.....	.....	Strong microseisms simultaneous with passage of storm of April 3rd.
23	I....	eP_N....	15 32 32	.....	.....	.....	.....	
		eP_E....	15 32 37	.....	.....	.....	.....	
		P_E....	15 32 54	2.6	1	.....	.....	
		P_N....	15 32 55	4.1	.....	5	.....	
		S_N....	15 35 33	4.3	.....	1	.....	
		L_N....	15 37 17	4.6	.....	.....	.....	
		M_N....	15 38 56	5	.....	7	.....	
		M_E....	15 38 59	5	2	.....	.....	
		M_N....	15 42 45	6.4	.....	4	.....	
		M_E....	15 42 45	5	1	.....	.....	
		F_E....	15 58 30	.....	.....	.....	.....	
		F_N....	15 59 30	.....	.....	.....	.....	

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, undamped (mechanical registration).

Instrumental constants.

	V	T_0
E	80	23
N	50	25

Date.	Character.	Phase.	Time.	Period. T	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	*μ*	*μ*	*Km.*	
Apr. 3	.....	L_E....	21 04 46	18	.....	.....	.....	
			21 07 43	16–18	.....	.....	.....	F masked by microseisms.
		F.....	21 25 ..	.....	.....	.....	.....	
7	.....	*0*.....	*15 58* ..	.....	.....	.....	4,300?	e masked by microseisms.
		$S?_E$....	16 11 57	.....	.....	.....	.....	N component restrained by friction.
			16 13 46	8	.....	.....	.....	
			16 15 17	13	.....	.....	.....	
		eL....	16 15 59	10	.....	.....	.....	
		L.....	16 20 44	16	.....	.....	.....	
		F.....	16 37 00	.....	.....	.....	.....	
23	.....	*0*.....	*15 29 10*	.....	.....	.....	4,670	
		P_N....	15 37 21	.....	.....	.....	.....	P and S strong, L weak.
		P_E....	15 37 23	.....	.....	.....	.....	
		S_E....	15 43 45	6	.....	.....	.....	
		S_N....	15 43 46	6	.....	.....	.....	
		$SR_1?$..	15 46 04	.....	.....	.....	.....	
		L_N....	15 48 42	16	.....	.....	.....	
		F.....	.. .. ..	.....	.....	.....	.....	F lost in microseisms.
28	.....	e_E....	4 10 04	.....	.....	.....	.....	N record faint.
		L.....	4 13 28	20	.....	.....	.....	
			4 17 38	20	.....	.....	.....	
		F.....	4 41 ..	.....	.....	.....	.....	

0 = Time at origin.

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 April, 1915, 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: ———.

[Report for April, 1915, not received.]

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

Lat., 40° 57′ 47″ N.; long., 73° 53′ 08″ W. Elevation, 23.9 meters.

Instrument: Wiechert 80 kg.

Instrumental constant.

T_0
6

Date.	Character.	Phase.	Time.	Period. T	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

Panama, Canal Zone. Balboa Heights. Isthmian Canal Commission.

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

Instruments: Two Bosch-Omori 25 kg.

Instrumental constants.. V 8, T_0 20

1915.			H. m. s.	Sec.	μ	μ	Km.	
Apr. 23	I...	P_E...	15 33 00	.....	.....	.....	995	A secondary shock at 15h 43m 15s.
		P_N...	15 33 00	.....	.....	.....	.....	
		L_N...	15 36 00	.....	.....	.....	.....	
		L_E...	15 36 05	.....	.....	.....	.....	
		M_E...	15 36 08	.....	62	.....	.....	
		M_N...	15 36 10	.....	.....	126	.....	
		F_E...	15 45 55	.....	.....	.....	.....	
		F_N...	15 46 50	.....	.....	.....	.....	

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: 15, 16

1915.			H. m. s.	Sec.	μ	μ	Km.	
Apr. 3	.....	L_N...	21 04 40	.....	.....	.....	.....	
		L_N...	21 20 00	16	.....	.....	.....	
		F.....	21 45 00	.....	.....	.....	.....	
7	.....	P_N...	16 07 00	.....	.....	.....	.....	Phases uncertain.
		S_N...	16 14 15	.....	.....	.....	.....	
		F.....	16 25 00	.....	.....	.....	.....	
23	I_E...	P_N...	15 37 30	.....	.....	.....	4,945	
		S_N...	15 44 09	.....	.....	.....	.....	
		L_N...	15 51 00	.....	.....	.....	.....	
		F.....	16 15 00	.....	.....	.....	.....	

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

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

Instruments: Two Bosch photographic horizontal pendulums, one Spindler & Hoyer 80 kg. vertical siesmograph.

Instrumental constants.. V 120, T_0 26

1915.			H. m. s.	Sec.	μ	μ	Km.
Apr. 3	.....	L.....	21 04 00	18	.....	.....	.....
		L.....	21 10 00	18	.....	.....	.....
		F.....	21 23 00	.....	.....	.....	.....

Date.	Character.	Phase.	Time.	Period. T	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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

1915.			H. m. s.	Sec.	μ	μ	Km.	
Apr. 7	.....	eP_N...	16 05 33	.....	.....	.....	4440	N partly masked by fairly strong microseisms.
		SR_{1E}.	16 14 27	.....	.....	.....	.....	
		SR_{1N}.	16 14 28	.....	.....	.....	.....	
		SR_{2N}.	16 15 19	.....	.....	.....	.....	
		SR_{2E}.	16 15 44	.....	.....	.....	.....	
		eL_E...	16 16 01	10	.....	.....	.....	
		L_E...	16 20 to 16 26 00	20	.....	.....	.....	
		F.....	16 34 00	.....	.....	.....	.....	
23	.....	P_N...	15 37 40	4	.....	.....	5000	
		P_E...	15 37 43	.....	.....	.....	.....	
		I.....	15 42 41	.....	.....	.....	.....	
		S.....	15 44 23	.....	.....	.....	.....	
		I.....	15 46 27	.....	.....	.....	.....	
		LI.....	15 49 00	20	.....	.....	.....	
		L.....	15 51 00	20	.....	.....	.....	
		L_E...	15 56 00	14	.....	.....	.....	
		L_E...	16 04 00	14	.....	.....	.....	
		F.....	16 10 00	.....	.....	.....	.....	
28	.....	L_E...	4 09 00	40	.....	.....	.....	
		L.....	4 18 00	18	.....	.....	.....	
		L.....	4 26 00	16	.....	.....	.....	
		F.....	4 35 00	.....	.....	.....	.....	

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 = 0.59″.

[Report for April, 1915, not received.]

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

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

Instrument: Milne horizontal pendulum, North. In the meridian.

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

[Report for April, 1915, not received.]

SECTION V.—SEISMOLOGY.

SEISMOLOGICAL REPORTS FOR MAY, 1915.

W. J. HUMPHREYS, Professor in Charge of Seismological Investigations.

[Dated: Washington, D. C., June 29, 1915.]

TABLE 1.—*Noninstrumental earthquake reports, May, 1915.*

Day.	Approximate time, Greenwich Civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity Rossi-Forel.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
		CALIFORNIA.								
	H. m.		° ′	° ′			M. s.			
1	21 48	Brawley	32 59	115 40	2	1		Faint	Period of unrest continued from April.	M. D. Witter.
3	7 30	Branscomb	39 40	123 40	3	1				A. J. Haun.
3	19 52	Susanville	40 27	120 40	3	2		Rattling	Windows rattled	Geo. H. Taylor.
6	12 10	Branscomb	39 40	123 40	5	1	0 5			A. J. Haun.
	12 10	Eureka	40 48	124 11	2	2	5			U. S. Weather Bureau.
	12 10	Fort Bragg	39 23	123 48	5	1	15			W. F. Fuller.
	12 10	Shively	40 25	123 56	3	2	4			Frank Essig.
11	11 45	Cahuilla	33 32	116 43	4	1		Rumbling		Dr. Wm. L. Shawk.
	11 45	Campo	32 38	116 28	4	1		Rattling		Seth Swenson.
	11 45	Julian	33 05	116 37	5	1	8	Rumbling	Very light shock, 11h.	J. H. L. Vogt.
	11 45	Nellie	33 22	116 52	3	1	5	....do		W. H. Hargrave.
13	12 00	Aguanga	33 26	116 51	3	1	10	Faint		Mrs. N. C. Matzen.
28	18 30	Glennville	35 40	118 45	2	1			Shook houses	C. H. Likely.
28	18 55	Bakersfield	35 22	119 01	5	2	3		Rocking motion	P. W. Doane.
29	6 45	Fresno	36 43	119 49	2	1			Felt from Merced to Bakersfield	U. S. Weather Bureau.
	6 45	Hot Springs	35 56	118 34	3	3	4			T. E. Evans.
	6 45	Lone Pine	36 37	118 01	5	2	8	Rumbling		G. F. Marsh.
		WYOMING.								
		Yellowstone Park:								
8	16 10	Canyon Station	44 58	110 42	5	3	15		Shook buildings	J. A. Schady.
	16 10	Lake Station	44 56	110 40	5	2	10		Furniture moved	E. E. Brown.
	16 10	Tower Falls	44 50	110 36	5		20			B. Ashcroft.

TABLE 2.—*Instrumental reports, May, 1915.*

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

[For significance of symbols see this REVIEW, December, 1914, p. 689.]

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 kilograms.

Instrumental constants: E: V = 10, T_s = 17.4; N: V = 10, T_s = 15.6

Date.	Character.	Phase.	Time.	Period. T	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			H. m. s.	Sec.	μ	μ	Km.	
May 1	.....	Pe	5 07 54	2	.....	.....	.....	
		S	5 14 08	13	.....	.....	.....	
		L_E	5 19 46	26	.....	.....	.....	
		L_N	5 22 00	23	.....	.....	.....	
		M_E	5 23 04	20	710	.....	.....	
		M_N	5 18 00	.....	.....	650	.....	
		M_N	5 27 26	11	.....	280	.....	
		C_E	5 32 00	18	.....	.....	.....	
		F_E	7 26 00	.....	.....	.....	.....	
6	.....	I_E	12 16 35	16	.....	.....	.....	Preliminary phases uncertain.
		I_N	12 15 20	16	.....	.....	.....	
		M_E	12 17 23	16	90	.....	.....	
		M_N	12 18 50	12	.....	20	.....	
		C_E	12 22 00	10	.....	.....	.....	
		C_N	12 26 00	13	.....	.....	.....	
		F	12 40 00	.....	.....	.....	.....	

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: E: V = 10, T_s = 16; N: V = 10, T_s = 19.6

Date.	Character.	Phase.	Time.	Period. T	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			H. m. s.	Sec.	μ	μ	Km.	
May 1	.....	P	5 11 19	4	.....	.....	.....	
		S	5 20 26	7	.....	.....	.....	
		L_E	5 29 16	28	.....	.....	.....	
		M_E	5 35 23	22	100	.....	.....	
		M_N	5 36 40	20	.....	40	.....	
		C_N	5 44 00	18	.....	.....	.....	
		F_E	7 36 00	14	.....	.....	.....	
6	.....	P	12 12 42	4	.....	.....	.....	
		eI_E	12 18 41	11	.....	.....	.....	
		eI_N	12 17 42	14	.....	.....	.....	
		M_E	12 19 38	11	100	.....	.....	
		M_N	12 18 54	11	.....	110	.....	
		C_E	12 27 00	8	.....	.....	.....	
		F_E	13 08 00	6	.....	.....	.....	
27	.....	eE	14 22 06	4	.....	.....	.....	Paper being changed on N.
		M_E	14 23 10	4	10	.....	.....	
		C_E	14 25 00	.....	.....	.....	.....	

Date.	Character.	Phase.	Time.	Period. T	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

Arizona. **Tuson. Magnetic Observatory**—Continued.

1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
May 27	.....	e.....	14 39 20	.....	.....	.....	.....	
		M_E....	14 40 24	5	10	.....	.....	
		M_N....	14 40 14	4	.....	10	.....	
		C_E....	14 46 28	4	.....	.....	.....	
		C_N....	14 42 28	4	.....	.....	.....	
27	.....	e.....	16 38 57	4	.....	.....	.....	
		M_E....	16 40 05	5	10	.....	.....	
		M_N....	16 39 30	5	.....	10	.....	
		C.....	16 42 00	.....	.....	.....	.....	
27	.....	e.....	19 27 03	4	.....	.....	.....	
		M_E....	19 28 16	4	10	.....	.....	
		M_N....	19 27 40	4	.....	10	.....	
		C.....	19 30 00	.....	.....	.....	.....	
27	.....	e.....	19 32 06	4	.....	.....	.....	
		M_E....	19 33 01	5	50	.....	.....	
		M_N....	19 32 48	5	.....	40	.....	
		C.....	19 34 00	.....	.....	.....	.....	
27	.....	e.....	19 49 55	4	.....	.....	.....	
		M.....	19 51 09	5	30	30	.....	
		C.....	19 54 00	4	.....	.....	.....	
29	.....	e.....	6 49 44	4	.....	.....	.....	
		M.....	6 50 20	5	90	70	.....	
		C.....	6 53 00	4	.....	.....	.....	
29	.....	e.....	8 33 34	3	.....	.....	.....	
		M.....	8 34 10	4	20	20	.....	
		C.....	8 36 00	.....	.....	.....	.....	

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.

1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
May 1	.....	.....	8 30 00	.....	500	100	.....	

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.

1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
May 1	.....	L_N....	5 31 00	40	.....	7	.....	Good record, but preliminary phases not discernible. Said to have been in Japan, but not confirmed.
		L_E....	5 31 00	35	6	.....	.....	
		M_E....	5 33 00	35	8	.....	.....	
		M_N....	5 34 00	40	.....	9	.....	
		C_E....	5 39 00	20?	.....	.....	.....	
		C_N....	5 40 00	20?	.....	.....	.....	
		F_E....	5 55 00	.....	.....	.....	.....	
		F_N....	6 08 00	.....	.....	.....	.....	
4	.....	.....	.....	.....	.....	.....	.....	Activity on E–W from $21^h\ 54^m$ to 22^h.
8	.....	.....	.....	.....	.....	.....	.....	Long slender waves on both components from $18^h\ 20^m$ to 19^h; especially on E–W.
12	.....	.....	.....	.....	.....	.....	.....	Activity on E–W from $20^h\ 25^m$ to $20^h\ 26^m$.
13	.....	.....	.....	.....	.....	.....	.....	Activity on E–W from 20^h to $20^h\ 10^m$.
14	.....	.....	.....	.....	.....	.....	.....	Activity on E–W. Visible all day.
22	.....	.....	.....	.....	.....	.....	.....	Broken, irregular waves on E–W from $21^h\ 28^m$ to $21^h\ 34^m$.
30	.....	.....	.....	.....	.....	.....	.....	Irregular waves on E–W from 16^h to $20^h\ 03^m$.

Date.	Character.	Phase.	Time.	Period. T	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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

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

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

Instrumental constants.....	*V*	T_0
	110	6

1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
May 1	H_u..	iP.....	5 12 24	3	.....	.....	8,935	
		S.....	5 22 31	6	.....	.....	.....	
		$SR1_N$	5 24 40	.....	.....	.....	.....	
		$SR2_E$	5 27 56	8	.....	.....	.....	
		$SR3_E$	5 31 38	.....	.....	.....	.....	
		eL.....	5 36 22	16	.....	.....	.....	
		M_E....	5 45 16	20	14	.....	.....	
		M_N....	5 45 16	20	.....	14	.....	
		M_E....	5 57 30	20	27	.....	.....	Distinct long waves continue for over 3 hours.
		F.....	10 00 00	.....	.....	.....	.....	
3	I_u...	P_N....	3 26 40	4	.....	.....	9,190	
		S_N....	3 37 00	.....	.....	.....	.....	
		eL_E...	3 51 50	.....	.....	.....	.....	
		M_E....	4 05 30	18	.....	.....	.....	
		L_N....	4 14 00	18	.....	.....	.....	
		F.....	4 30 00	.....	.....	.....	.....	
3	I_u...	P_N....	4 24 22	.....	.....	.....	8,875?	Origin presumably the same as that of preceding.
		S_N....	4 34 20	.....	.....	.....	.....	
		L_N....	5 14 00	22	.....	.....	.....	
		L_E....	5 14 00	22	.....	.....	.....	
		F.....	5 50 00	.....	.....	.....	.....	
6	I_r...	P_N....	12 15 43	.....	.....	.....	4,015	
		S_N....	12 21 31	.....	.....	.....	.....	
		eL_N...	12 25 05	.....	.....	.....	.....	
		M_N....	12 30 00	20	.....	14	.....	
		F.....	13 20 00	.....	.....	.....	.....	
12	I_u...	P_N....	10 39 58	.....	.....	.....	7,215	All amplitudes very small.
		S_N....	10 48 38	.....	.....	.....	.....	
		L_E....	11 03 00	24	.....	.....	.....	
		F.....	11 40 00	.....	.....	.....	.....	
17	I_r...	P_N....	13 15 10	.....	.....	.....	3,125	All amplitudes very small.
		S_N....	13 20 02	.....	.....	.....	.....	
		L_N....	13 25 08	.....	.....	.....	.....	
		L_N....	13 28 00	16	.....	.....	.....	
		F.....	13 40 00	.....	.....	.....	.....	
27	I_r...	P_N....	19 42 03	.....	.....	.....	3,125	Long waves not perceptible. Another quake from $20^h\ 05^m$ to $20^h\ 10^m$, phases indistinct.
		S_N....	19 46 55	.....	.....	.....	.....	
29	I_r...	P_N....	7 02 55	.....	.....	.....	1,600?	No long waves perceptible.
		S_E....	7 05 41	.....	.....	.....	.....	
		F.....	7 10 00	.....	.....	.....	.....	
29	.....	e.....	8 46 57	.....	.....	.....	.....	
		F.....	8 50 00	.....	.....	.....	.....	
30	.....	P_N....	13 32 00	.....	.....	.....	990?	
		S_N....	13 33 57	.....	.....	.....	.....	
		L_N....	13 34 52	.....	.....	.....	.....	
		F.....	13 40 00	.....	.....	.....	.....	

District of Columbia. **Washington. Georgetown University.** F. L. 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.

Instrumental constants:		*V*	T_0	*s*
	E	165	5.4	0
	N	143	5.2	0

1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
May 1	I_r...	iP_N....	5 12 24	.....	.....	.....	.....	P_E less distinct than P_N. S_E much more discernible.
		iP_E....	5 12 34	.....	.....	.....	.....	
		S_N....	5 22 30	.....	.....	.....	.....	
		S_E....	5 22 40	.....	.....	.....	.....	
		M_N....	5 44 42	12-18	.....	6	.....	
		M_E....	5 45 02	20	11	.....	.....	
		F_N....	7 02 32?	.....	.....	.....	.....	
		F_E....	?	.....	.....	.....	.....	
5	I_r...	eP_N....	12 25 42	.....	.....	.....	.....	
		P_E....	?	.....	.....	.....	.....	
		S_E....	12 29 24	.....	.....	.....	.....	
		S_N....	12 29 50	.....	.....	.....	.....	
		L_N....	12 31 43	10	.....	5	.....	
		L_E....	12 32 24	10	.....	.....	.....	
		L_N....	12 32 47	.....	.....	4	.....	
		F_N....	12 39 50	.....	.....	.....	.....	
		F_E....	12 45 40	.....	.....	.....	.....	

Hawaii. **Honolulu. Magnetic Observatory.** U. S. Coast and Geodetic Survey. Wm. W. Merrymon.

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 19.2.

Date.	Character.	Phase.	Time.	Period. T	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	Sec.	μ	μ	Km.	
1915. May 1	.....	P.....	5 09 00	.....	.....	.....	.....	
		S.....	5 15 54	.....	.....	.....	.....	
		L.....	5 21 30	25	.....	.....	.....	
		M.....	5 25 00	.....	17,000*	.....	.....	
		C.....	7 04 36	.....	.....	.....	.....	
		F.....	11 05 54	.....	.....	.....	.....	
2	.....	P.....	4 14 24	.....	.....	.....	.....	
		S.....	4 18 18	.....	.....	.....	.....	
		L.....	4 22 18	24	.....	.....	.....	
		M.....	4 25 54	.....	1,200*	.....	.....	
		C.....	4 33 24	.....	.....	.....	.....	
		F.....	5 07 54	.....	.....	.....	.....	
3	.....	P.....	3 29 36	.....	.....	.....	.....	
		S.....	3 33 24	.....	.....	.....	.....	
		L.....	3 37 18	21	.....	.....	.....	
		M.....	3 40 12	.....	2,100*	.....	.....	
		C.....	3 47 54	.....	.....	.....	.....	End covered by beginning of next earthquake.
3	.....	P.....	4 22 48	.....	.....	.....	.....	
		L.....	4 35 06	27	.....	.....	.....	
		M.....	4 40 24	.....	2,800*	.....	.....	
		C.....	4 53 42	.....	.....	.....	.....	
		F.....	7 16 36	.....	.....	.....	.....	
3	.....	e.....	12 31 42	.....	.....	.....	.....	
		M.....	12 51 18	.....	200*	.....	.....	
		P.....	13 10 24	.....	.....	.....	.....	
3	.....	P.....	22 09 18	.....	.....	.....	.....	
		L.....	22 22 00	23	.....	.....	.....	
		M.....	22 26 36	.....	300*	.....	.....	
		C.....	22 31 18	.....	.....	.....	.....	
		F.....	22 55 36	.....	.....	.....	.....	
5	.....	P.....	11 30 18	.....	.....	.....	.....	
		L.....	11 42 18	.....	.....	.....	.....	
		M.....	11 49 42	20	1,000*	.....	.....	
		C.....	11 59 36	.....	.....	.....	.....	
		F.....	12 48 24	.....	.....	.....	.....	
5	.....	eL.....	15 53 24	.....	.....	.....	.....	
		M.....	15 54 24	20	200*	.....	.....	
		F.....	16 15 48	.....	.....	.....	.....	
6	.....	eP.....	12 17 00	.....	.....	.....	.....	
		eL.....	12 23 00	.....	.....	.....	.....	
		M.....	12 25 36	19	1,400*	.....	.....	
		C.....	12 40 00	.....	.....	.....	.....	
		F.....	13 39 00	.....	.....	.....	.....	
8	.....	eL.....	15 09 18	22	.....	.....	.....	
		M.....	15 15 18	19	200*	.....	.....	
		C.....	15 41 54	.....	.....	.....	.....	
		F.....	16 08 12	.....	.....	.....	.....	
12	.....	eP.....	11 41 36	.....	.....	.....	.....	
		eL.....	12 09 00	20	.....	.....	.....	
		M.....	12 33 48	.....	200*	.....	.....	
		C.....	12 44 24	.....	.....	.....	.....	
		F.....	13 05 00	.....	.....	.....	.....	
14	.....	P.....	6 56 42	.....	.....	.....	.....	
		S.....	7 00 12	.....	.....	.....	.....	
		L.....	7 04 00	24	.....	.....	.....	
		M.....	7 06 48	18	800*	.....	.....	
		C.....	7 13 42	.....	.....	.....	.....	
		F.....	7 56 24	.....	.....	.....	.....	
14	.....	eL.....	14 47 00	20	.....	.....	.....	
		M.....	14 54 36	.....	200*	.....	.....	
		F.....	15 10 06	.....	.....	.....	.....	
16	.....	eL.....	17 09 00	18	.....	.....	.....	
		M.....	17 10 48	.....	200*	.....	.....	
		F.....	17 18 00	.....	.....	.....	.....	
16	.....	eL.....	17 50 00	20	.....	.....	.....	
		M.....	17 52 18	.....	200*	.....	.....	
		F.....	18 03 00	.....	.....	.....	.....	
21	.....	eL.....	5 48 30	22	.....	.....	.....	
		M.....	5 53 12	.....	200*	.....	.....	
		F.....	6 11 42	.....	.....	.....	.....	
21	.....	P.....	12 32 54	.....	.....	.....	.....	
		eL.....	12 59 00	20	.....	.....	.....	
		M.....	13 01 30	.....	200*	.....	.....	
		F.....	13 09 12	.....	.....	.....	.....	

* Trace amplitude.

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

Lat., 38° 57′ 30″ N.; long., 95° 14′ 58″ W. Elevation, 304.8 meters.

Instrument: Wiechert.

	V	T_0	s
Instrumental constants.. E	121	3.7	3.7
Instrumental constants.. N	126	3.7	4.5

Date.	Character.	Phase.	Time.	Period. T	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	Sec.	μ	μ	Km.	
1915. May 1	.....	P.....	5 11 30	2	.....	.....	.....	
		S.....	5 20 53	10	.....	.....	.....	
		L.....	5 36 30	20	28	24	.....	
6	.....	P.....	12 14 21	3	.....	.....	.....	Not certain as to seconds.
		S.....	12 18 45	6	.....	.....	.....	
		L.....	12 22 26	16	7	28	.....	
		F.....	12 56 00	.....	.....	.....	.....	

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.

	V	T_0
Instrumental constants.. E	10	31
Instrumental constants.. N	10	29

Date.	Character.	Phase.	Time.	Period. T	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	Sec.	μ	μ	Km.	
1915. May 1	.....	P_E.....	5 12 23	3	.....	.....	.....	
		P_N.....	5 12 29	3	.....	.....	.....	
		S_E.....	5 22 27	8	.....	.....	.....	
		S_N.....	5 22 42	12	.....	.....	.....	
		L_E.....	5 38 31	20	.....	.....	.....	
		L_N.....	5 39 21	16	.....	.....	.....	Phases on E more clearly defined than on N.
		M_E.....	5 48 50	26	100	.....	.....	
		M_N.....	5 45 40	26	.....	150	.....	
		C_E.....	5 58 ..	16	.....	.....	.....	
		C_N.....	6 06 ..	18	.....	.....	.....	
		F.....	7 04 ..	12	.....	.....	.....	
6	.....	eP_N.....	12 21 55	.....	.....	.....	.....	Phases on E uncertain.
		L.....	12 29 12	14	.....	.....	.....	
		M.....	12 30 12	17	10	50	.....	
		C.....	12 37 ..	10	.....	.....	.....	
		F.....	12 41 ..	.....	.....	.....	.....	

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, undamped (mechanical registration).

	V	T_0
Instrumental constants.. E	80	23
Instrumental constants.. N	50	25

Date.	Character.	Phase.	Time.	Period. T	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	Sec.	μ	μ	Km.	
1915. May 1	.....	*0*.....	4 59 00	.....	.....	.....	8,980	Kurile Islands?
		eP_N.....	5 12 16	.....	.....	.....	.....	
		eP_E.....	5 12 21	.....	.....	.....	.....	
		S_E.....	5 22 25	32	.....	.....	.....	
		SR1?..	5 28 14	.....	.....	.....	.....	
		SR2....	5 28 39	.....	.....	.....	.....	
		eL_E...	5 37 29	.....	.....	.....	.....	
		M_N.....	5 46 15	.....	.....	114	.....	
		M_N.....	5 50 07	.....	.....	134	.....	
		M_N.....	5 53 41	.....	.....	.....	.....	
		C_N.....	5 57 29	.....	.....	.....	.....	
		F.....	8 17 00	.....	.....	.....	.....	
1	.....	e?.....	9 29 17	.....	.....	.....	3,850?	S? Possibly part of last.
		L_E.....	9 32 31	20	.....	.....	.....	No trace on N.
		L_E.....	9 34 06	16	.....	.....	.....	
		L_E.....	9 36 40	15	.....	.....	.....	
		F.....	9 38 00	.....	.....	.....	.....	
5	.....	*0*?.....	11 17 00	.....	.....	.....	8,730?	*0* from eL-S. P in microseisms.
		S?.....	11 39 31	8	.....	.....	.....	
		eL.....	11 53 50	18	.....	.....	.....	
		L_E.....	12 19 07	.....	.....	.....	.....	
		L_N.....	12 19 31	.....	.....	.....	.....	
		L_E.....	12 20 49	20	.....	.....	.....	
		L_E.....	12 33 31	20–15	.....	.....	.....	
		F?.....	12 50 00	.....	.....	.....	.....	
6	.....	*0*.....	12 08 02	.....	.....	.....	4,820	
		eP_E.....	12 16 26	.....	.....	.....	.....	
		?.....	12 19 55	6	.....	.....	.....	
		S.....	12 22 58	.....	.....	.....	.....	
		eL.....	12 33 44	.....	.....	.....	.....	
		M.....	12 33 59	.....	.....	.....	.....	
		M.....	12 35 14	.....	.....	.....	.....	
		F.....	13 20 00	.....	.....	.....	.....	

0 = Time at origin.

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

Date.	Character.	Phase.	Time.	Period. T	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
May 8	.....	e.....	14 44 42	.....	.....	.....	.....	Disturbance of uncertain origin.
		to.....	15 10 00	.....	.....	.....	.....	
12	.....	*0*.....	10 29 42	.....	.....	.....	6,075	*0* from eL-P. S not well defined.
		eP_E...	10 39 29	.....	.....	.....	.....	
		eS.....	10 42 14	.....	.....	.....	.....	
		eN_N...	10 43 02	8	.....	.....	.....	
		eL_E...	10 55 23	.....	.....	.....	.....	
		L_E....	10 57 04	.....	.....	.....	.....	
		L_E....	10 59 26	24	.....	.....	.....	
		L_E....	11 10 17	15	.....	.....	.....	
		F.....	11 30 00	.....	.....	.....	.....	
21	.....	*0*?.....	4 27 46	.....	.....	.....	8,800?	S uncertain.
		eP_N...	4 40 00	.....	.....	.....	.....	
		eL.....	5 04 36	.....	.....	.....	.....	
		L_E....	5 08 09	16	.....	.....	.....	
		L_E....	5 10 30	24	.....	.....	.....	
		L_E....	5 14 00	16	.....	.....	.....	
		F.....	5 30 20	.....	.....	.....	.....	

O—Time at origin.

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:1 5:1

Date.	Character.	Phase.	Time.	Period. T	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
May 1	II_r...	eP.....	5 11 55	.....	.....	.....	8,300	
		eS.....	5 21 33	.....	.....	.....	.....	
		L.....	5 35 00	.....	.....	.....	.....	
		M_E....	5 42 12	24	50	.....	.....	
		M_N....	5 43 09	21	.....	38	.....	
		M_E....	5 44 18	19	38	.....	.....	
		M_N....	5 46 15	18	.....	50	.....	
		F.....	7 00 00	.....	.....	.....	.....	
6	I_r...	eP.....	12 15 01	.....	.....	.....	3,300	
		eS?....	12 20 03	.....	.....	.....	.....	
		L_M....	12 23 00	.....	.....	.....	.....	
		L_E....	12 24 00	.....	.....	.....	.....	
		M_E....	12 25 15	11	12	.....	.....	
		M_N....	12 25 24	12	.....	62	.....	
		F.....	12 50 00	.....	.....	.....	.....	

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: ————.

[Report for May, 1915, not received.]

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

Lat., 40° 57′ 47″ N.; long., 73° 53′ 08″ W. Elevation, 23.9 meters.

Instrument: Wiechert 80 kg.

Instrumental constants.. T_0 {E..6.6 {N..7.1

Date.	Character.	Phase.	Time.	Period. T	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
May 1	II_u...	iP_N...	5 07 54	.....	.....	.....	.....	Trace of E-W component from 5h 08m 15s till 5h 33m 00s lost through defective smoking of record.
		P_N....	5 08 02	8.4	.....	6	.....	
		P_N....	5 08 17	10.2	.....	7	.....	
		iP_E...	5 07 54	.....	.....	.....	.....	
		P_E....	5 07 59	3.0	2	.....	.....	
		$PR1_N$..	5 10 49	11.4	.....	5	.....	
		$PR2_N$..	5 12 39	10.2	.....	4	.....	
		iS_N...	5 17 41	.....	.....	.....	.....	
		S_N....	5 18 12	7.2	.....	15	.....	
		S_N....	5 18 52	16.0	.....	66	.....	
		$SR1_N$..	5 23 35	.....	.....	.....	.....	
		$SR2_N$..	5 26 46	.....	.....	.....	.....	
		$SR2_N$..	5 27 36	20.0	.....	35	.....	
		L_N....	5 32 24	11-22	.....	.....	.....	
		ML_N...	5 41 05	21.0	.....	170	.....	

New York. **Fordham. Fordham University**—Continued.

Date.	Character.	Phase.	Time.	Period. T	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
May 1		$M2_N$...	5 45 37	19.0	.....	180	.....	
		M_E....	5 50 23	22.0	350	.....	.....	
		C_E....	5 57 00	.....	.....	.....	.....	
		C_N....	6 00 00	.....	.....	.....	.....	
		F_N....	7 55 00	.....	.....	.....	.....	
		F_E....	7 55 00	.....	.....	.....	.....	
3	I....	eI_N...	5 07 34	.....	.....	.....	.....	
		F_N....	5 23 34	.....	.....	.....	.....	
	I....	eI_N...	6 06 30	.....	.....	.....	.....	
		M_N....	6 10 51	23.0	.....	13	.....	
		L_E....	6 09 30	.....	.....	.....	.....	
		F_N....	6 17 00	.....	.....	.....	.....	
5	I....	L_N....	12 17 04	18.0	.....	.....	.....	
		F_N....	12 25 34	.....	.....	.....	.....	
6	I....	eP_N?..	12 09 06	.....	.....	.....	.....	
		eI'_E?..	12 09 13	.....	.....	.....	.....	
		S_E?...	12 14 44	.....	.....	.....	.....	
		S_N?...	12 14 59	.....	.....	.....	.....	
		L_N?...	12 20 40	.....	.....	.....	.....	
		L_E?...	12 24 25	.....	.....	.....	.....	
		MI_N...	12 25 54	19.0	.....	20	.....	
		MI_E...	12 27 00	40.0	5	.....	.....	
		$M2_N$...	12 27 22	11.0	.....	19	.....	
		$M2_E$...	12 27 28	12.0	10	.....	.....	
		F_N....	13 00 00	.....	.....	.....	.....	
17	I....	P_N?...	16 12 08	4.0	.....	.....	.....	
		P_E?...	16 12 11	3.0	.....	.....	.....	
		S_N?...	16 16 55	4.0	.....	.....	.....	
		eL_N...	16 21 35	20.0	.....	.....	.....	

Panama Canal Zone. Balboa Heights. Isthmian Canal Commission.

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

Instruments: Two Bosch-Omori 25 kg.

Instrumental constants.. V 8, T_0 20

[No earthquake recorded during May, 1915.]

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 15 16

Date.	Character.	Phase.	Time.	Period. T	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
May 1	II_u	iP_N...	5 12 11	.....	.....	.....	8,755	
		S_N....	5 22 09	.....	.....	.....	.....	
		$SR2_E$..	5 27 17	.....	.....	.....	.....	
		$SR2_E$..	5 27 25	.....	.....	.....	.....	
		L_N....	5 44 30	28	.....	.....	.....	
		M_N....	5 45 45	.....	.....	45	.....	
		M_N....	5 51 00	.....	.....	55	.....	
		M_N....	5 54 15	28	.....	55	.....	
		M_N....	5 58 15	.....	.....	45	.....	
		F.....	9 00 00	.....	.....	.....	.....	
3	.....	P_N?...	3 26 31	.....	.....	.....	.....	
		S_N....	3 36 40	.....	.....	.....	.....	
		M_N....	4 05 00	18	.....	.....	.....	
		F?.....	4 20 00	.....	.....	.....	.....	Second earthquake beginning about 4h 24m, continued until 5h 30m.
5	.....	P_N?...	11 32 00	.....	.....	.....	.....	Record faint; phases doubtful.
		F.....	12 00 00	.....	.....	.....	.....	
6	.....	P_N....	12 15 16	.....	.....	.....	5,165?	
		S_N?...	12 22 07	.....	.....	.....	.....	
		L_N....	12 25 20	16	.....	.....	.....	
		F.....	13 20 00	.....	.....	.....	.....	
27	.....	L_N....	19 50 30	.....	.....	.....	.....	
29	.....	P_N?...	7 03 07	.....	.....	.....	1,700?	No long waves visible.
		S_N?...	7 05 12	.....	.....	.....	.....	
		F.....	7 12 00	.....	.....	.....	.....	

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

Lat., 42° 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.
1915.			*H. m. s.*	*Sec.*	*μ*	*μ*	*Km.*	
May 1	.....	iP.....	5 11 56	3	.....	.....	8,420	The L waves continue for over 4 hours, hence must show some LRs. The average speed of the L waves is about 220 km./min.; but this velocity does not fit in very well; 270 km./min. fits best, hence, and for other reasons, the Ls are interpreted as the various LR's.
		S.....	5 21 37	6	.....	.....	.....	
		eL.....	5 33 05	44	.....	.....	.....	
		M_N.....	5 43 03	24	.....	65	.....	
		M_N.....	5 48 03	20	.....	70	.....	
		M_E.....	5 52 00	20	65	.....	.....	
		M_N.....	5 53 00	18	.....	80	.....	
		L.....	5 56 00–	18	.....	.....	.....	
			6 16 00	18	.....	.....	.....	
		L.....	6 29 00	16	.....	.....	.....	
		L.....	6 49 00	12	.....	.....	.....	
		LR1..	6 58 00	12–16	.....	.....	.....	
		L.....	7 21 00	20	.....	.....	.....	
		L.....	7 27 00	13	.....	.....	.....	
		L.....	7 43 00	18	.....	.....	.....	
		LR2..	7 59 00	20	.....	.....	.....	
		L.....	8 21 00	18	.....	.....	.....	
		LR3..	9 25 05	20	.....	.....	.....	
		L.....	9 38 00	16	.....	.....	.....	
		F.....	9 50 00	.....	.....	.....	.....	
2	.....	P_N?...	4 10 19	2	.....	.....	9,280?	
		PR1?.	4 13 54	.....	.....	.....	.....	
		PR2?.	4 16 10	.....	.....	.....	.....	
		S?.....	4 20 43	6	.....	.....	.....	
		eL.....	4 37 09	20	.....	.....	.....	
		L.....	4 39 00	20	.....	.....	.....	
		L.....	4 43 00–	18	.....	.....	.....	
			4 50 00	18	.....	.....	.....	
		L.....	4 52 00–	16–14	.....	.....	.....	
			5 02 00		.....	.....	.....	
		F.....	5 15 00	.....	.....	.....	.....	
3	.....	P.....	3 26 14	.....	.....	.....	8,640	
		S.....	3 36 08	.....	.....	.....	.....	
		L.....	3 50 05	30	.....	.....	.....	
		L.....	3 55 00	18	.....	.....	.....	
		L.....	4 04 00–	14	.....	.....	.....	
			4 20 00	14	.....	.....	.....	
		i_N.....	4 24 47	4	.....	.....	.....	i_N apparently another quake, but no S shows.
		L.....	5 00 00	40	.....	.....	.....	
		L.....	5 06 00	30	.....	.....	.....	
		L.....	5 14 00	20	.....	.....	.....	
		L.....	5 28 00	18	.....	.....	.....	
		F.....	6 10 00	.....	.....	.....	.....	
5	.....	P_N?...	11 32 08	.....	.....	.....	8,000?	
		eL.....	11 53 00	40	.....	.....	.....	
		L_E.....	12 12 00	24	.....	.....	.....	
		L_N.....	12 15 03	30	.....	.....	.....	
		L.....	12 18 00–	20–18	.....	.....	.....	
			12 38 00		.....	.....	.....	
		F.....	13 00 00	.....	.....	.....	.....	
6	.....	P.....	12 16 15	4	.....	.....	3,960	
		S.....	12 22 00	10	.....	.....	.....	
		L_E.....	12 27 05	30	.....	.....	.....	
		L_N.....	12 27 06	40	.....	.....	.....	
		M_N.....	12 29 07	14	.....	50	.....	
		M_E.....	12 32 00	14	45	.....	.....	
		L.....	12 34 00	8	.....	.....	.....	
		L.....	12 42 00	8	.....	.....	.....	
		F.....	13 30 00	.....	.....	.....	.....	
8	.....	L_E.....	14 41 00	20	.....	.....	.....	L_N masked by microseisms.
		L_E.....	14 57 00	16	.....	.....	.....	
		F.....	15 10 00	.....	.....	.....	.....	
12	.....	P_E?..	10 40 13	.....	.....	.....	6,500?	
		S_N?...	10 49 07	6	.....	.....	.....	
		L_N.....	10 57 00	28	.....	.....	.....	
		L_E.....	11 04 06	20	.....	.....	.....	
		L_N.....	11 05 06	20	.....	.....	.....	
		L.....	11 11 00–	18–14	.....	.....	.....	
			11 36 00		.....	.....	.....	
		F.....	12 00 00	.....	.....	.....	.....	
14	.....	e.....	6 52 49	.....	.....	.....	.....	Phases difficult to read.
		L.....	7 21 00	18	.....	.....	.....	
		L.....	7 25 00	17	.....	.....	.....	
		L.....	7 31 00	14	.....	.....	.....	
		L.....	7 47 00	14	.....	.....	.....	
		F.....	8 00 00	.....	.....	.....	.....	
17	.....	P_N.....	13 17 23	4	.....	.....	2,740?	
		S_N?...	13 21 47	8	.....	.....	.....	
		L_N.....	13 26 02	14	.....	.....	.....	
		L_E.....	13 27 00	20	.....	.....	.....	
		L.....	13 29 00	20	.....	.....	.....	
		F.....	13 50 00	.....	.....	.....	.....	

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

Date.	Character.	Phase.	Time.	Period. T	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	*μ*	*μ*	*Km.*	
May 18	.....	e_N.....	14 56 11	.....	.....	.....	5,600?	
		S_E?...	15 03 27	6	.....	.....	.....	
		eL.....	15 10 03	20	.....	.....	.....	
		L.....	15 13 00	16	.....	.....	.....	
		F.....	15 20 00	.....	.....	.....	.....	
21	.....	e_N?...	4 43 20	.....	.....	.....	7,000?	N somewhat masked by microseisms.
		e_E.....	4 43 24	.....	.....	.....	.....	
		e_N.....	4 44 12	.....	.....	.....	.....	
		eL_N...	5 01 05	40	.....	.....	.....	
		L_N.....	5 05 06	30	.....	.....	.....	
		L.....	5 09 00	20	.....	.....	.....	
		L.....	5 13 00–	18–14	.....	.....	.....	
			5 24 00		.....	.....	.....	
		F.....	5 35 00	.....	.....	.....	.....	
29	.....	eL.....	0 35 03	20	.....	.....	.....	
		L.....	0 37 00	16	.....	.....	.....	
		F.....	0 45 00	.....	.....	.....	.....	
29	.....	e_N.....	7 03 00	.....	.....	.....	.....	
		e_E.....	7 03 05	6	.....	.....	.....	
		l_E.....	7 06 00	10	.....	.....	.....	
		F.....	7 15 00	.....	.....	.....	.....	
29	.....	eL_N...	8 47 08	20	.....	.....	.....	
		L_E.....	8 50 00	10	.....	.....	.....	
		F.....	8 53 00	.....	.....	.....	.....	
30	.....	e.....	13 31 38	2–3	.....	.....	.....	
		L?.....	13 32 00	7	.....	.....	.....	
		F.....	13 40 00	.....	.....	.....	.....	

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 = 0.59″.

[Report for May, 1915, not received.]

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

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

Instrument: Milne horizontal pendulum, North. In the meridian.

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

[Report for May, 1915, not received.]

TABLE 3.—*Late reports.* (*Instrumental.*)

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:1 5:1

Date.	Character.	Phase.	Time.	Period.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	*μ*	*μ*	*Km.*	
Apr. 23	I_E.....	eP.....	15 37 18	.....	.....	.....	4,450	Record on N–S component too slight for analysis.
		iS.....	15 43 30	.....	.....	.....	.....	
		L_E.....	15 46 00	.....	.....	.....	.....	
		M_E...	15 46 04	5	25	.....	.....	
		F.....	15 55 00	.....	.....	.....	.....	

SECTION V.—SEISMOLOGY.

SEISMOLOGICAL ABBREVIATIONS USED IN THE INSTRUMENTAL REPORTS.

CHARACTER OF THE EARTHQUAKE.

I = noticeable.
II = conspicuous.
III = strong.
d = (terræ motus domesticus) = local earthquake (sensible or felt).
v = (terræ motus vicinus) = nearby earthquake (within 1000 km.).
r = (terræ motus remotus) = distant earthquake (1000 to 5000 km. distant).
u = (terræ motus ultimus) = very distant earthquake (beyond 5000 km.).

Examples.—I_d indicates a local earthquake of small intensity but sensible to individuals.

III_r indicates a distant earthquake whose record shows motions of considerable amplitude.

PHASES.

P = (undæ primæ) = first preliminary tremors.
PRn = P waves reflected n times at the earth's surface.
S = (undæ secundæ) = second preliminary tremors.
SRn = S waves reflected n times at the earth's surface.
PS = transformed waves; longitudinal (P) to transversal (S) or vice versa.
L = (undæ longæ) = long waves in the principal portion.
M = (undæ maximæ) = greatest motion in the principal portion.
C = (coda) = trailers.
F = (finis) = end of sensible disturbance.

NATURE OF THE MOTION.

i = (impetus) = abrupt beginning.
e = (emersio) = gradual appearance.
T = period = twice the time of oscillation.
A = amplitude of the earth's movement, reckoned from the zero line.

E or N attached to a symbol signifies the E–W and N–S component, respectively, thus:

A_E is the E–W component of A; A_N is the N–S component of A: measured in microns (μ) $\frac{1}{1000}$ mm.

INSTRUMENTAL CONSTANTS.

T_0 = period of the instrument.
V = magnification of the instrument.
ϵ = damping coefficient.

SEISMOLOGICAL REPORTS FOR JUNE, 1915.

By WILLIAM J. HUMPHREYS, Professor in charge of Seismological Investigations.

[Dated, Washington, D. C., July 29, 1915.]

TABLE 1.—*Noninstrumental earthquake reports, June, 1915.*

Day.	Approximate time, Greenwich Civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity Rossi-Forel.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
		ARIZONA.								
	H. m.		° ′	° ′			*M. s.*			
23	4 00	Tucson	32 15	110 50	2	1			Disturbance in southern California.	C. E. Gassick.
	4 00	Wickenburg	33 56	112 44	3	1				W. J. Haswell.
	4 00	Yuma	32 45	114 36	7	1	2	Rumbling		C. J. Wood.
	4 00	Yuma	32 45	114 36	6	1	5		Slight damage	E. E. Roddis.
23	4 56	Parker	34 06	114 13	5	3	3	Rattling		F. B. Macpherson.
	4 56	Wickenburg	33 56	112 44	5		4		Shook buildings	W. J. Haswell.
	4 56	Yuma	32 45	114 36	7	1	4			C. J. Wood.
	4 56	Yuma	32 45	114 36	6	1	5			U. S. Weather Bureau.
27	8 30	Mesa	33 24	111 50	2	6	6			E. B. Hill.
		CALIFORNIA.								
4	21 10	Shively	40 25	123 56	5	3	1			Frank Essig.
6	17 51	Coyote	37 14	121 44			3			Chas. Fletcher.
	17 51	Oakland	37 47	122 15	4	1	2			Chas. Burckhalter.
	17 51	Oakland	37 47	122 16	4	1	2	Faint		Mrs. O. Whittaker.
	17 51	San Francisco	37 48	122 26	4	1				U. S. Weather Bureau.
15	20 55	Chester	33 53	117 38	2	2				G. W. Olsen.
17	16 13	San Jose	37 15	121 46	4		1			Prof. Louis Kroeck.
18	15 05	Avalon	33 27	118 22	5	1	1			T. S. Manning.
	15 05	Los Angeles	34 03	118 15	4	1				Mrs. J. J. Walsh.
	15 05	San Pedro	33 45	118 14	4	3			Rattled windows	Mr. Walters.
	15 05	Santa Monica	34 00	118 30	5	1	5			F. E. Hill.
19	15 15	Avalon	33 27	118 22	2	1	1			T. S. Manning.

TABLE 1.—*Noninstrumental earthquake reports, June, 1915*—Concluded.

Day.	Approximate time, Greenwich Civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity Rossi-Forel.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
	H. m.	CALIFORNIA—contd.	° ′	° ′			M. s.			
23	4 00	Barrett Dam	32 43	116 46	5	1				Mrs. L. P. Beidleman.
	4 00	Beaumont	33 55	117 00	3	2	1			Beaumont Co.
	4 00	Bonita	32 40	117 03	4	1	5			R. B. Dilley.
	4 00	Blythe	33 35	114 38	2	2	1 00			C. L. Suits.
	4 00	Brawley	32 59	115 40	8	1	1 00	Rumbling	Walls cracked.	M. D. Witter.
	4 00	El Cajon	32 48	116 58	4	1	30			H. H. Kessler.
	4 00	Indio	33 43	116 12	5	1	30			Bruce Drummond.
	4 00	Indio	33 43	116 12	6	1				F. N. Johnson.
	4 00	Julian	33 05	116 37	3	1	5	Rattling		J. H. L. Vogt.
	4 00	Los Angeles	34 03	118 15	2	1				U. S. Weather Bureau.
	4 00	Nellie	33 22	116 52	3	2	6	Faint		N. H. Hargrave.
	4 00	Oak Grove	33 26	116 51	5	2	24			J. B. Simmons.
	4 00	Sterling	32 49	114 50	4	1	10	Rumbling		J. G. Castleberry.
23	4 56	Barrett Dam	32 43	116 46	5	1	10			Mrs. L. P. Beidleman.
	4 56	Blythe	33 35	114 38	2	1	1			C. L. Suits.
	4 56	Bonita	32 40	117 03	4	1	5			R. B. Dilley.
	4 56	Brawley	32 59	115 40	8	1	1 00	Rumbling	Walls cracked.	M. D. Witter.
	4 56	El Cajon	32 48	116 58	4	2	30			H. H. Kessler.
	4 56	Indio	33 43	116 12	4	2				Bruce Drummond.
	4 56	Julian	33 05	116 17	3	1	35	Rattling		J. H. L. Vogt.
	4 56	Los Angeles	34 03	118 15	3					U. S. Weather Bureau.
	4 56	Nellie	33 22	116 52	3	2	6			N. H. Hargrave.
	4 56	Oak Grove	33 26	116 51	5	1	12			J. B. Simmons.
	4 56	Sterling	32 49	114 50	5	1	10	Rumbling		J. G. Castleberry.
	4 56	Redlands	34 04	117 12	2	1		Faint		P. W. Moore.
		NEVADA.								
28	6 18	Thorne	38 26	118 38	3	1				A. D. Radcliffe.
	6 18	Yerrington	38 58	119 10	4	2	10	Faint		A. E. Ricksecker.
		PORTO RICO.								
29	0 30	Vieques	18 09	65 27	3	1	5	Rumbling		H. W. Pease.

TABLE 2.—*Instrumental seismological reports, June, 1915.*

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

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 kilograms.

Instrumental constants: {E V 10, Tₒ 17.4; N V 10, Tₒ 15.6}

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E.	Amplitude. A_N.	Distance.	Remarks.
1915.			H. m. s.	Sec.	μ	μ	Km.	
June 1	.....	eP_N	14 53 34	.....	.....	.....	.....	
		S_N	14 58 04	.....	.....	.....	.....	
		L_N	15 05 50	19	.....	.....	.....	
		M	15 07 40	12	950	100	.....	
		C	15 12 00	13	.....	.....	.....	
		F	15 36 00	.....	.....	.....	.....	
6	.....	eP_E	21 43 22	4	.....	.....	.....	No principal portion on E–W.
		S_E	21 52 52	8	.....	.....	.....	
		S_N	21 53 02	.....	.....	.....	.....	
		L_N	22 00 02	20	.....	.....	.....	
		M	22 01 25	25	.....	20	.....	
		F	22 47 00	.....	.....	.....	.....	
23	.....	eL	4 15 00	10	.....	.....	.....	Only a few waves of small amplitude.
		C	4 20 00	.....	10	.....	.....	
23	.....	L	5 12 06	8	.....	.....	.....	
		M	5 12 42	.....	10	10	.....	
		C	5 17 00	.....	.....	.....	.....	

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: {E V 10, Tₒ 16; N V 10, Tₒ 19.6}

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E.	Amplitude. A_N.	Distance.	Remarks.
1915.			H. m. s.	Sec.	μ	μ	Km.	
June 1	.....	eP_E	15 03 09	9	.....	.....	.....	
		eP_N	15 03 49	9	.....	.....	.....	
		L	15 15 49	12	.....	.....	.....	
		M_E	15 18 08	17	120	.....	.....	
		M_N	15 22 42	14	.....	80	.....	
		C	15 25 00	14	.....	.....	.....	
		F	15 50 00	10	.....	.....	.....	
6	.....	P	21 40 00	7	.....	.....	.....	
		S	21 48 32	8	.....	.....	.....	
		L	21 56 17	33	.....	.....	.....	
		M	21 49 31	10	50	50	.....	
		M_E	22 00 12	20	30	.....	.....	
		M_N	22 09 28	24	.....	20	.....	
		C_N	22 11 00	20	.....	.....	.....	
		F_N	22 35 00	10	.....	.....	.....	
23	.....	P	3 59 46	4	.....	.....	.....	
		L	4 00 50	5	.....	.....	.....	
		M	4 01 30	6	300	680	.....	
		C	4 02 00	4	.....	.....	.....	
		F	4 32 00	4	.....	.....	.....	
23	.....	P	4 56 33	3	.....	.....	.....	
		L	4 57 26	3	.....	.....	.....	
		M	4 57 36	4	510	300	.....	
		C	4 59 06	4	.....	.....	.....	
		F	5 25 04	4	.....	.....	.....	

TABLE 2.—*Instrumental seismological reports, June, 1915*—Continued.

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

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

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

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E.	Amplitude. A_N.	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*Km.*	
1915. June 23	I_d		8 02 00					
		M	8 58 00		1,140*	1,020*		

*Amplitude on instrument.

Colorado. **Denver. Sacred Heart College.** 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.
			H. m. s.	*Sec.*	μ	μ	*Km.*	
1915. June 3			7 57 00					Very small waves on E-W. Thickening of pen marks on N-S.
			8 03 00					
5			3 30 00					Very small but distinct wavelets on N-S.
6		L_E	21 48 00					Just visible on E-W; very broken and irregular on N-S.
		M_E	21 49 00					
		F	21 52 00					
23		L_N	4 03 00	6				Earthquake in Imperial Valley, Cal.
		L_E	4 03 00					
		M_N	4 03 50	6		62		Preliminary phases very doubtful.
		C	4 05 00	4–5				
		C_N	4 05 –					
		F	4 08 00					Hardly anything on E-W except broken irregular waves.
23		L_N	5 30 00					Earthquake in Imperial Valley, Cal.
		L_E	5 30 00					
		M_N	5 30 00	12		87		Preliminary phases not visible on either component.
		M_E	5 30 00	10	37			
		C	5					
		F	5 50 ..					
24								Very small period waves on N-S from 10h 30m to 10h 32m.

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

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

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

Instrumental constants.. V 110, T_0 6

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E.	Amplitude. A_N.	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*Km.*	
1915. June 1	I_c	eP_N	14 52 37				4,400	
		iP_N	14 52 58					
		S_N?	14 58 47					
		I_E	15 09 27	22				Long waves nearly equal in intensity from 15h 09m 30s to 15h 18m 00s.
		M_E	15 09 00	20	23			
		M_N	15 14 00	18		23		
		F	16 00 00					
6	I_a	iP_N	21 39 09				6,240	
		iS_E	21 46 58					
		L_E	21 54 24	22				
		M_E	21 54 55		20			
		F	23 30 00					
12		e_E	6 33 00					Phases not distinct.
		F	6 50 00					
22	I_a	P_N	3 34 03				6,750	Other phases not distinct.
		S	3 42 19					
		F	4 20 00					
23	I_c	eP_E	4 09 54				3,210?	Origin in Imperial Valley, Cal.
		S_N	4 14 52					
		M_N	4 16 10	7		32		Long waves not well marked.
		F	4 55 00					
23	I_c	P_N	5 06 07				3,690	Long waves not distinct.
		S_N	5 11 36					
		M_N	5 15 15	6		32		
		F	5 50 00					

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

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

Instrument: Wiechert, 200 Kg., astatic horizontal pendulums.

Instrumental constants: {E 165 5.4 2.6; N 143 5.2 3.4}

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E.	Amplitude. A_N.	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*Km.*	
1915. June 1		eP_E	15 01 07	3			5,997	
		eP_N	15 01 08	4		1		
		$PR1_N$	15 03 09					
		$PR2_N$	15 03 30	4				
		S_N	15 08 07	6		2		
		S_E?	15 08 14					
		L_E	15 14 35					
		L_N	15 16 42					
		M_E	15 18 48	23	33			
		M_N	15 25 33	12		6		
		F_E	15 40 00					
		F_N	15 50 00					
6		eP_N	21 47 22	2			4,648?	
		P_E	21 47 58					
		S_N?	21 52 55	6				Record lost from 21h 53m to 21h 55m 30s in change of record.
		L_N?	21 59 24	19				
		L_E	22 00 09					
		M_E	22 03 06	21	11			L_N irregular; no decided maximum.
		F_E	22 23 00					
		F_N	22 37 00					
23		P_E	4 10 01?					Imperial Valley, Cal.
		I_N	4 11 19					
		I_N	4 23 07	7				
		L_E	4 23 11					
		F_E	4 33 00					
		F_N	4 34 00					
23		P_N	5 08 12					Imperial Valley, Cal.
		P_E?	5 09 24					
		I_E	5 19 30					
		I_N	5 19 39					
		M_N	5 20 32	4		6		
		M_E	5 21 21	3	2			
		F_E	5 30 00					
		F_N	5 35 00					

Hawaii. **Honolulu. Magnetic Observatory.** U. S. Coast and Geodetic Survey. Wm. W. Merrymon.

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 18.9

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E.	Amplitude. A_N.	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*Km.*	
1915. June 1		P	14 59 06					
		S	15 11 18					
		L	15 23 42	22				
		M	15 27 30		500*			
		C	15 41 30					
		F	16 50 18					
3		L	23 43 54	24				
		M	23 49 06		300*			
		F	23 55 12					
4		P	22 14 36					
		L	22 22 48	24				
		M	22 27 36		300*			
		C	22 39 12					
		F	23 12 36					
6		L	3 56 30					
		M	4 05 12		100*			
		F	4 14 24					
6		eP	7 20 54					
		L	7 24 42					
		M	7 28 00		200*			
		C	7 33 42					
		F	7 55 00					
6		L	8 49 00					
		M	8 53 30		100*			
		F	9 07 00					
6		P	19 54 24					
		L	20 02 18	26				
		M	20 08 54		1,400*			
		C	20 19 12					
		F	20 45 00					

TABLE 2.—*Instrumental seismological reports, June, 1915*—Continued.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E.	Amplitude. A_N.	Distance.	Remarks.
Hawaii. Honolulu. Magnetic Observatory—Continued.								
1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
June 6	.....	P	21 43 30	.....	.....	.....	.....	
		S	21 47 36	.....	.....	.....	.....	
		L	21 53 00	.....	.....	.....	.....	
		M	21 54 48	.....	2,500*	.....	.....	
		C	22 28 36	.....	.....	.....	.....	
7	.....	F	0 43 36	.....	.....	.....	.....	
7	.....	P	22 15 00	.....	.....	.....	.....	
		L	22 22 12	24	.....	.....	.....	
		M	22 28 36	.....	500*	.....	.....	
		C	22 33 18	.....	.....	.....	.....	
		F	23 19 48	.....	.....	.....	.....	
11	.....	eP	3 52 12	.....	.....	.....	.....	
		M	3 59 12	.....	100*	.....	.....	
		F	4 03 12	.....	.....	.....	.....	
11	.....	eP	15 28 54	.....	.....	.....	.....	
		M	15 31 54	.....	200*	.....	.....	
		C	15 42 24	.....	.....	.....	.....	
		F	16 25 06	.....	.....	.....	.....	
14	.....	eL	3 49 00	.....	.....	.....	.....	
		M	3 54 24	.....	200*	.....	.....	
		F	4 02 48	.....	.....	.....	.....	
18	.....	L	0 12 30	.....	.....	.....	.....	
		M	0 22 30	.....	200*	.....	.....	
		C	0 30 00	.....	.....	.....	.....	
		F	0 40 00	.....	.....	.....	.....	
23	.....	L	4 16 24	.....	.....	.....	.....	
		M	4 19 24	.....	400*	.....	.....	
		C	4 25 00	.....	.....	.....	.....	
23	.....	L	5 14 24	.....	.....	.....	.....	
		M	5 16 12	.....	300*	.....	.....	
		C	5 19 00	.....	.....	.....	.....	
27	.....	P	15 41 30	.....	.....	.....	.....	
		L	15 48 54	22	.....	.....	.....	
		M	15 55 00	.....	1,200*	.....	.....	
		C	16 01 00	.....	.....	.....	.....	
		F	16 46 00	.....	.....	.....	.....	
29	.....	P	13 56 42	.....	.....	.....	.....	
		L	14 07 42	22	.....	.....	.....	
		M	14 12 12	.....	500*	.....	.....	
		C	14 23 00	.....	.....	.....	.....	
		F	14 39 48	.....	.....	.....	.....	

*Trace amplitude.

Corrigendum.—This note in the REVIEW, February, 1915, should read as here.

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

Lat., 38° 57′ 30″ N.; long., 95° 14′ 58″ W. Elevation, 304.8 meters.

Instrument: Wiechert.

Instrumental constants.. {E: V 177, T_0 3.7, ϵ 4.0; N: V 205, T_0 3.7, 3.8}

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E.	Amplitude. A_N.	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
June 1	.....	P	15 54 08	.....	.....	.....	.....	
		S	16 05 49	15	.....	.....	.....	
		L	16 10 ?	18–25	3	2	.....	L waves lost in the P waves of another quake.
1	.....	P	16 06 07	.....	.....	.....	.....	
		F	16 14 47	.....	.....	.....	.....	
6	.....	P	21 50 ?	2	.....	.....	.....	
		L	21 58 10	10	50	28	.....	
23	.....	P	4 02 33	2	.....	.....	.....	Phases indistinct.
		L	4 07 46	10	8	28	.....	
		F	4 27 00	.....	.....	.....	.....	
23	.....	P	4 59 16	2–3	.....	.....	.....	Phases indistinct.
		L	5 04 21	10	12	27	.....	
		F	5 28 00	.....	.....	.....	.....	
29	.....	P	23 49 23	2	.....	.....	.....	
		L	23 54 39	12	.....	.....	.....	

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.

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

Instrumental constants.. {E: V 10, T_0 31; N: 10, 29}

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E.	Amplitude. A_N.	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
June 1	.....	P	15 00 24	3	.....	.....	.....	
		L	15 09 34	28	.....	.....	.....	
		M_E	15 10 42	21	90	.....	.....	
		M_N	15 14 03	16	.....	20	.....	
		C	15 18 00	13	.....	.....	.....	
		F	15 45 00	10	.....	.....	.....	
6	.....	P_N	21 39 20	3	.....	.....	.....	
		S	21 47 05	4	.....	.....	.....	
		L	21 54 22	22	.....	.....	.....	
		M_E	21 54 45	16	20	.....	.....	
		M_N	21 58 52	17	.....	50	.....	
		C_N	22 15 00	16	.....	.....	.....	
		F	22 31 00	14	.....	.....	.....	
23	.....	P_N	4 15 24	4	.....	.....	.....	Only a few waves of P on E–W.
		L_N	4 15 53	10	.....	.....	.....	
		M_N	4 16 18	12	.....	50	.....	
		C_N	4 17 00	8	.....	.....	.....	
		F	4 25 00	.....	.....	.....	.....	
23	.....	P_N	5 11 54	3	.....	.....	.....	Nothing on E–W except a few waves of P.
		L_N	5 12 38	10	.....	.....	.....	
		M_N	5 12 48	12	.....	80	.....	
		C	5 14 00	8	.....	.....	.....	
		F	5 22 00	.....	.....	.....	.....	

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.

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

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

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E.	Amplitude. A_N.	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
June 1	.....	*O*	14 43 50	.....	.....	.....	5,100	
		eP	14 52 29	.....	.....	.....	.....	
		S_N	14 59 13	.....	.....	.....	.....	
		S_E	14 59 17	.....	.....	.....	.....	
		$SR1_N$	15 02 37	15	.....	.....	.....	
		$SR1_E$	15 02 41	15	.....	.....	.....	
		eL_E	15 05 08	.....	.....	.....	.....	Sinusoidals set in.
		L_N	15 07 09	26	.....	.....	.....	
		L_E	15 08 47	.....	.....	.....	.....	
		M_E	15 12 33	.....	.....	.....	.....	
		C_E	15 17 03	.....	.....	.....	.....	
		F	16 15 00	.....	.....	.....	.....	
6	.....	*O*?	.....	.....	.....	.....	.....	P and S lost in microseisms.
		P_E?	20 16 26	.....	.....	.....	.....	
		S_N?	20 33 54	.....	.....	.....	.....	
		L_E	20 38 07	30–20	.....	.....	.....	
		F	20 50 00	.....	.....	.....	.....	
6	.....	*O*	21 29 37	.....	.....	.....	6,450	
		P_N	21 39 32	.....	.....	.....	.....	
		P_E	21 39 34	.....	.....	.....	.....	
		S_N	21 47 32	.....	.....	.....	.....	
		S_E	21 47 34	.....	.....	.....	.....	Amplitude (undamped) of S_E very large.
		M_E	21 47 53	.....	.....	.....	.....	
			21 49 31	.....	.....	.....	.....	No decided maximum of long waves.
			21 50 32	.....	.....	.....	.....	
		eL_E	21 54 14	.....	.....	.....	.....	
		eL_N?	21 54 30	.....	.....	.....	.....	
		F_N	22 58 00	.....	.....	.....	.....	
7	.....	F_E	0 20 00	.....	.....	.....	.....	

Record from June 16 will not be issued until about October 1.

O=Time at origin.

TABLE 2.—*Instrumental seismological reports, June, 1915*—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:1 5:1

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E.	Amplitude. A_N.	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*Km.*	
1915. June 1	II_e	eS_E?	14 59 00				4,800	
		eL_E	15 04 30					
		M_E	15 14 12	13	30			
		F	15 37 00					
6	II_e	eS_E?	21 39 26				5,800	
		L_E	21 47 24					
		M_N	21 47 34	8		44		
		M_E	21 47 38	8	94			
		M_E	21 50 24	10	50			
		F	22 12 00					
22	I_e	i_E	3 41 48					
		eL_N	3 41 48					
		F	3 48 00					
23	II_e	eP_E	4 04 ?				2,450	
		L_E	4 10 00					
		L_N	4 10 00					
		F	4 20 30					
23	II_e	eP_E	5 03 ?				2,450	
		eP_N	5 03 00					
		S_N	5 06 12?					
		S_E	5 07 00					
		M_N	5 07 00					
		M_E	5 08 12	9	14			
		F	5 20 00					

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:1 5:1

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E.	Amplitude. A_N.	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*Km.*	
1915. June 1	II_u	eP_N	14 50 10	2			6,200	Reported from Alaska.
		eS_E	14 57 00					
		eS_N	14 57 30	5				
		L	15 05 00					
		L_E	15 07 00					
		L_N	15 07 00					
		M_E	15 08 00	25	25			
		M_N	15 13 00	15		30		
		C_E	15 16 00					
		C_N	15 17 00					
		F_E	15 23 00					
		F_N	15 26 00					
3	I	i_E	19 04 00	3				This shock was preceded by intermittent earth tremors on E-W.
6	II_e	iP_N	21 37 45	10		2		
		iP_E	21 38 00					
		iS_N	21 46 00	15		3		
		iS_E	21 46 00	15	16			
		M	21 54 00	25				L and M waves interwoven with those of succeeding quake.
		F	22 11 00					
6	II_e	iP_N	21 38 30					
		iS_N	21 47 30			2		
		S_E	21 48 30					
		M	22 07 00	25				
		F	22 19 00					
23	I_e	eP	4 12 15					No record on E-W.
		M	4 15 00	20		12		S masked by microseisms.
		C	4 19 00					
		F	4 20 00					Reported from southern California.
23	I_e	eP	5 08 00					Not recorded on E-W.
		M	5 10 00	18		18		S masked by microseisms.
		C	5 11 30					
		F	5 14 00					
27	I_e	iP_E	22 35 10					
		iP_N	22 35 15					
		iS_E	22 36 10					
		M_N	22 36 30	8				
		M_E	22 36 30	15	2			
		F_N	22 36 45					
		F_E	22 36 50					

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

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

Instrument: Wiechert, 80 Kg.

Instrumental constants.. T_0 E 6.6, N 7.1

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E.	Amplitude. A_N.	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*Km.*	
1915. June 1		eP_E	14 48 07					
		eP_N	14 47 59	4				
		S_N?	14 55 00	6				
		S_E	14 55 12	6				
		L_E	15 01 48					
		L_N	15 02 48					
		M_E	15 05 39	20	335			
		M_N	15 05 59	22		210		
		F_E	15 52 00					
		F_N	15 56 00					
3-4								Microseisms on the 3d-4th.
6		eP_N	21 34 52					
		eP_E	21 35 05	2				
		S_N	21 42 43					
		S_E	21 42 50					
			21 42 53	7	13			
		S_N	21 43 01	8		10		
		L_N	21 51 48					
		L_E	21 52 05					
		M_N	22 01 00	21		140		
		F_E	22 12 00					
		F_N	22 47 00					
23								Record received of the California earthquake, but time marks failed to record.

Panama, Canal Zone. Balboa Heights. Isthmian Canal Commission.

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

Instruments: Two Bosch-Omori 25 kg.

Instrumental constants.. V 8, T_0 20

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E.	Amplitude. A_N.	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*Km.*	
1915. June 6	I_v	P_E	14 35 25				1,600	
		P_N	14 35 30					
		L_E	14 40 15					
		L_N	14 40 15					
		M_N	14 42 05			250		
		M_E	14 45 50		62			
		F_E	14 52 50					
		F_N	15 10 05					
17	II_v	P_N	5 33 28				485	Direction probably southwest.
		P_E	5 33 30					
		L_N	5 34 28					
		L_E	5 34 30					
		M_E	5 34 39		75			
		M_N	5 34 45			125		
		F_E	5 39 08					
		F_N	5 40 30					
28	III_v	P_E	8 27 01				145	Direction southeast.
		P_N	8 27 16					
		L_E	8 27 16					
		L_N	8 27 31					
		M_N	8 27 31			1,250		
		M_E	8 27 36		250			
		F_E	8 28 01					
		F_N	8 29 26					

Porto Rico. **Vieques. Magnetic Observatory.** U. S. Coast and Geodetic Survey. H. M. Pease.

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

Instruments: Two Bosch-Omori.

Instrumental constants.. V, T_0: E 10, 21.4; N 10, 21.1

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E.	Amplitude. A_N.	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*Km.*	
1915. June 6		P	21 37 27	5				
		S	21 41 58	8				
		L	21 45 00	12				
		M	21 46 06	12	350	180		
		C	21 56 00	11				
		F	22 42 00	10				
29	I_d	L	0 35 37					Felt by several people in Vieques.
		M	0 35 42		10	10		
		F	0 35 54					

TABLE 2.—*Instrumental seismological reports, June, 1915*—Continued.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E.	Amplitude. A_N.	Distance.	Remarks.
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.								
				V	T_0			
Instrumental constants.. E				10	15			
Instrumental constants.. N				10	16			
1915. June 1	L_r	eP_N	*H. m. s.* 14 52 12	*Sec.*	μ	μ	*Km.* 4,885	
		S_N	14 58 48					
		L_E	15 07 02	22				
		M_E	15 10 30	16	20			
		M_E	15 11 30	14	20			
		F	16 00 00					
6	L_s	eP_N	21 39 45				6,750	Long waves not well developed.
		S_N	21 48 01					
		F	23 15 00					
22		M_E	3 43 35		25			Other phases indistinct.
		M_E	3 44 16		25			
		F	4 00 00					
		eS_N?	4 15 06					Origin in southern California.
23		M_N	4 17 56	12		125		
		F	4 40 02					
23	L_r	eP_N	5 06 40				3,360	Origin in southern California.
		S_N	5 11 48					
		M_N	5 14 32	12		125		Record on E-W very faint.
		F	5 40 00					
Canada. Ottawa. Dominion Astronomical Observatory. Earthquake Station. Otto Klotz.								
Lat., 42° 23′ 38″ N.; long., 75° 42′ 57″ W. Elevation, 83 meters.								
Instruments: Two Bosch photographic horizontal pendulums, one Spindler & Hoyer 80 kg. vertical seismograph.								
				V	T_0			
Instrumental constants..				120	26			
1915. June 1		eP_N	*H. m. s.* 14 52 03	*Sec.*	μ	μ	*Km.* 4,860	
		iP	14 52 07					
		PR_N	14 53 49					
		S	14 58 38	5				
		eL_E	15 04 08	36				
		eL_N	15 04 09	40				
		L_E	15 06 00	26				
		L_N	15 07 00	26				
		L_E	15 07 00	20				
		M_E	15 07 05	20	50			
		M_N	15 10 00	18		60		
		L_E	15 11 *to* 15 44 00	12 .11				
		F	16 10 00					
4		eL	21 30 08	20				
		L_E	21 32 00	10				
		F	21 35 00					
4		e_E	22 21 22	6				
		L	22 50 04	24-20				
		L_E	22 58 00	12				
		L_N	23 03 29					
		F	23 05 00					

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E.	Amplitude. A_N.	Distance.	Remarks.
Canada. Ottawa. Dominion Astronomical Observatory—Continued.								
1915. June 5		L_E	*H. m. s.* 20 02 *to* 20 05 00	*Sec.* 22 22	μ	μ	*Km.*	
5		e	20 15 33	4				
		e	20 25 22					
		F	20 30 00					
6		eL_E	20 38 02	24				
		eL_N	20 41 02	20				
		L_E	20 42 00	20				
		L_E	20 45 00	18				
		L_E	20 53 00	16				
		F	21 00 00					
6		iP_N	21 39 53	5			6,940	
		iS	21 48 19	5	25	9		
		i	21 49 30	5				
		i_E	21 50 49	5				
		eL_N	21 56 02	40				
		eL_E	21 56 07	44				
		L	22 01 00	20-18				
		L_E	22 11 00	20				
		L_N	22 13 00	17				
		L_E	22 16 00	16				
		i_N	22 32 03	5				
		L	22 38 00	14				
		L	22 48 00	14				
		F	24 00 00					
7		e	12 26 00	6				
		eL_E	12 26 00	20				
		L_E	12 28 00	18				
		F	12 35 00					
12		e_N	6 32 00					By mishap spot-light not on E-W.
		e_N	6 40 00					
		eL_N	6 46 03	20				
		L_N	6 49 00	14				
		L_N	6 52 00	12				
		F	7 00 00					
22		iP_N	3 34 55				7,210	
		iS	3 43 38	6				
		SR2?	3 51 02	11				
		eL_N	3 54 05	22				
		eL_E	3 55 00	22				
		L	4 00 00	11				
		F	4 15 00					
23		eP_N?	4 10 14				3,700	In southern California.
		iS_N	4 15 43	3				
		S_E	4 16 00					
		M_N	4 16 58	5		5		
		M_E	4 17 24	10	2			
		eL	4 18 03	20-18				
		F	4 55 00					
23		eP_N?	5 06 48				3,700	
		iS_N	5 12 19					
		S_E	5 12 36					
		M_N	5 13 34	5		10		
		M_E	5 15 36	10	4			
		eL	5 15 50	20-10				
		F	5 55 00					

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

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E.	Amplitude. A_N.	Distance.	Remarks.
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:1 5:1						
1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Apr. 1	.....	.....	14 18 30	.....	.....	.....	.....	Earth tremors on N–S.
	.....	.....	14 19 30	.....	.....	.....	.....	
2	.....	.....	14 00 00	.....	.....	.....	.....	Earth tremors on N–S.
	.....	.....	14 20 00	.....	.....	.....	.....	
3	.....	.....	.....	.....	.....	.....	.....	Earth tremors per day and night on N–S.
23	I....	i_N.....	15 36 45	3	.....	12	.....	
		i_E.....	15 36 45	1	.....	.....	.....	
23	I....	i_N.....	15 43 15	5	.....	38	.....	
		i_E.....	15 43 15	3	25	.....	.....	
		F.....	15 46 30	.....	.....	.....	.....	
24–25	.....	.....	.....	.....	.....	.....	.....	Earth tremors on E–W on 24th and 25th.
May 1	II_e..	eP....	5 12 45	3	.....	.....	8,976?	E–W component not recorded; pen being repaired.
		eS....	5 22 45	5	.....	.....	.....	
		L.....	5 43 00	.....	.....	.....	.....	
		M.....	5 47 00	30	.....	62	.....	
		M.....	5 50 00	25	.....	.....	.....	
		M.....	5 53 00	.....	.....	62	.....	
		C.....	5 58 00	15	.....	.....	.....	
		C.....	6 00 00	10	.....	.....	.....	
		C.....	6 04 00	.....	.....	.....	.....	
		C.....	6 31 00	.....	.....	.....	.....	
		F.....	6 46 00	.....	.....	.....	.....	
6	II_e..	eP....	12 21 40	.....	.....	.....	2,340	Pen of E–W component not working properly.
		eS....	12 23 50	.....	.....	.....	.....	
		L.....	12 26 30	10	.....	.....	.....	
		M.....	12 28 00	15	.....	16	.....	
		C.....	12 30 00	8	.....	.....	.....	
Canada. Toronto. Dominion Meteorological Service.								
Lat., 43° 40′ 01″ N.; long., 79° 23′ 54″ W. Elevation, 113.7 meters. Subsoil: Sand an clay.								
Instrument: Milne horizontal pendulum, North. In the meridian.								
Instrumental constant.. T_0 18. Pillar deviation, 1 mm. swing of boom = 0.59″.								
1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Apr. 2	.....	P.....	6 02 30	.....	.....	.....	.....	
		L.....	6 12 06	.....	.....	.....	.....	
		M.....	6 14 30	.....	200*	.....	.....	
		F.....	6 19 48	.....	.....	.....	.....	
3	.....	P.....	20 49 06	.....	.....	.....	.....	
		L.....	21 00 54	.....	.....	.....	.....	
		iL.....	21 06 42	.....	.....	.....	.....	
		iL.....	21 10 48	.....	.....	.....	.....	
		M.....	21 11 12	.....	500*	.....	.....	
		F.....	21 45 48	.....	.....	.....	.....	
3	.....	P?....	22 00 00	.....	.....	.....	.....	
		L.....	22 05 24	.....	.....	.....	.....	
		M.....	22 06 42	.....	100*	.....	.....	
		F.....	22 32 36	.....	.....	.....	.....	
7	.....	L.....	16 15 30	.....	.....	.....	.....	
		iL.....	16 16 18	.....	.....	.....	.....	
		M.....	16 16 48	.....	300*	.....	.....	
		F.....	16 20 48	.....	.....	.....	.....	
7	.....	L.....	16 35 48	.....	50*	.....	.....	
		F.....	16 43 12	.....	.....	.....	.....	
8	.....	L.....	14 44 12	.....	200*	.....	.....	
		F.....	14 51 54	.....	.....	.....	.....	
23	.....	P?....	15 38 48	.....	.....	.....	.....	
		S.....	15 44 12	.....	.....	.....	.....	
		L.....	15 52 42	.....	.....	.....	.....	
		L.....	16 00 00	.....	.....	.....	.....	
		M.....	16 01 00	.....	200*	.....	.....	
		F.....	16 14 12	.....	.....	.....	.....	
28	.....	P.....	4 04 30	.....	.....	.....	.....	
		L.....	4 16 48	.....	.....	.....	.....	
		M.....	4 23 54	.....	100*	.....	.....	
		F.....	4 34 00	.....	.....	.....	.....	
Canada. Toronto. Dominion Meteorological Service—Continued.								
1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Apr. 30	.....	P?....	2 15 48	.....	.....	.....	.....	
		L.....	2 39 12	.....	50*	.....	.....	
		F.....	3 03 24	.....	.....	.....	.....	
May 1	.....	iP.....	5 12 24	.....	300*	.....	7,700	A well-marked disturbance. Long waves continued for a long time. Three elongated cigar-shaped movements before and just after M.
		iP.....	5 15 12	.....	.....	.....	.....	
		S.....	5 22 12	.....	2,300*	.....	.....	
		L.....	5 31 12	18	1,300*	.....	.....	
		L.....	5 42 12	.....	2,300*	.....	.....	
		M.....	5 45 06	.....	8,200*	.....	.....	
		iL.....	5 48 24	.....	.....	.....	.....	
		M.....	5 51 42	18–24	12,000*	.....	.....	
		M.....	5 52 42	.....	8,500*	.....	.....	
		iL.....	5 56 36	.....	4,300*	.....	.....	
		iL.....	5 58 54	.....	.....	.....	.....	
		C.....	6 02 06	24	.....	.....	.....	
		C.....	6 03 12	.....	.....	.....	.....	
		M.....	6 05 12	.....	4,300*	.....	.....	
		L.....	6 59 00	.....	800*	.....	.....	
		L.....	7 02 18	.....	.....	.....	.....	
		L.....	7 20 12	.....	.....	.....	.....	
		iL.....	7 38 00	.....	.....	.....	.....	
		L.....	8 01 24	.....	.....	.....	.....	
		L.....	9 20 00	.....	.....	.....	.....	
		F?....	9 23 48	.....	.....	.....	.....	
1	.....	L?....	9 25 54	.....	.....	.....	.....	Possibly a dual earthquake with the preceding, or repeat.
		L.....	9 29 30	.....	.....	.....	.....	
		M.....	9 31 06	.....	300*	.....	.....	
		M.....	9 35 18	.....	.....	.....	.....	
		F.....	9 58 12	.....	.....	.....	.....	
1	.....	L.....	11 19 42	.....	100*	.....	.....	Slight thickeness of line.
		F.....	11 33 00	.....	.....	.....	.....	
2	.....	P.....	4 31 12	.....	.....	.....	.....	Well-marked light disturbance.
		S.....	4 40 24	.....	.....	.....	.....	
		L.....	4 44 24	.....	.....	.....	.....	
		M.....	4 50 42	.....	400*	.....	.....	
		L.....	4 53 54	.....	.....	.....	.....	
		F.....	5 20 54	.....	.....	.....	.....	
3	.....	P.....	3 45 54	.....	.....	.....	.....	
		S.....	3 51 00	.....	.....	.....	.....	
		L.....	3 55 06	.....	.....	.....	.....	
		L.....	3 59 06	.....	.....	.....	.....	
		M.....	4 05 42	.....	1,300*	.....	.....	
		L.....	4 08 48	.....	.....	.....	.....	
		L.....	4 26 48	.....	.....	.....	.....	
		F.....	4 47 30	.....	.....	.....	.....	
3	.....	P.....	4 50 12	.....	.....	.....	.....	
		L.....	5 03 06	.....	.....	.....	.....	
		L.....	5 11 18	.....	.....	.....	.....	
		M.....	5 27 42	.....	400*	.....	.....	
3	.....	P?....	6 06 24	.....	.....	.....	.....	P mixed up with trailers of preceding earthquake.
		S.....	6 15 [illegible]	.....	.....	.....	.....	
		iL.....	6 21 36	.....	.....	.....	.....	
		M.....	6 22 54	.....	300*	.....	.....	
		F.....	6 40 18	.....	.....	.....	.....	
5	.....	P.....	12 04 48	.....	.....	.....	.....	
		L.....	12 20 12	.....	.....	.....	.....	
		M.....	12 30 48	.....	800*	.....	.....	
5	.....	P?....	13 13 12	.....	.....	.....	.....	P mixed up with trailers of preceding quake.
		iL.....	13 28 42	.....	200*	.....	.....	
		F.....	14 06 00	.....	.....	.....	.....	
6	.....	P.....	12 17 30	.....	.....	.....	.....	
		S.....	12 21 48	.....	.....	.....	.....	
		S.....	12 25 42	.....	.....	.....	.....	
		iL.....	12 29 24	.....	600*	.....	.....	
		L.....	12 29 48	.....	.....	.....	.....	
		L.....	12 31 00	.....	.....	.....	.....	
		M.....	12 31 48	.....	800*	.....	.....	
		F.....	13 01 18	.....	.....	.....	.....	
8	.....	L?....	14 48 54	.....	.....	.....	.....	P lost in local vibrations.
		L.....	14 52 12	.....	.....	.....	.....	
		M.....	14 52 36	.....	300*	.....	.....	
		F.....	15 17 00	.....	.....	.....	.....	
12	.....	P?....	10 43 54	.....	.....	.....	.....	
		S.....	10 50 00	.....	.....	.....	.....	
		L.....	11 04 12	.....	.....	.....	.....	
		L.....	11 11 30	.....	.....	.....	.....	
		M.....	11 13 30	.....	300*	.....	.....	
		F.....	12 13 00	.....	.....	.....	.....	
12	.....	P?....	17 07 42	.....	.....	.....	.....	
		S.....	17 09 18	.....	.....	.....	.....	
		L.....	17 15 36	.....	.....	.....	.....	
		M.....	17 16 30	.....	200*	.....	.....	
		F.....	17 27 54	.....	.....	.....	.....	

* Trace amplitude.

TABLE 3.—*Late seismological reports. (Instrumental)*—Continued.

Canada. Toronto. Dominion Meteorological Service—Continued.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E.	Amplitude. A_N.	Distance.	Remarks.
1915.			*H. M. S.*	*Sec.*	μ	μ	*Km.*	
May 14	.....	iP.....	7 12 00?	.....	.....	.....	.....	P and S phases doubtful.
		iS.....	7 18 00?	.....	.....	.....	.....	
		iL.....	7 21 00	.....	.....	.....	.....	
		L.....	7 30 18	.....	.....	.....	.....	
		M.....	7 32 06	.....	300*	.....	.....	
		L.....	7 35 12	.....	.....	.....	.....	
		F.....	8 06 06	.....	.....	.....	.....	
17	.....	L.....	13 27 24	.....	.....	.....	.....	
		M.....	13 30 12	.....	100*	.....	.....	
		F.....	13 40 24	.....	.....	.....	.....	
18	.....	L.....	15 11 48	.....	100*	.....	.....	P and S not recorded.
		F.....	15 15 42	.....	.....	.....	.....	
21	.....	L.....	5 11 06	.....	.....	.....	.....	P and S not recorded.
		L.....	5 14 36	.....	.....	.....	.....	
		M.....	5 16 24	.....	300*	.....	.....	
		M.....	5 20 36	.....	300*	.....	.....	
		iL.....	5 29 30	.....	.....	.....	.....	
		M.....	5 31 00	.....	200*	.....	.....	
		F.....	5 45 06	.....	.....	.....	.....	
29	.....	L.....	0 34 24	.....	50*	.....	.....	
		F.....	0 56 42	.....	.....	.....	.....	
29	.....	L.....	7 04 42	.....	50*	.....	.....	
		F.....	7 08 48	.....	.....	.....	.....	

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

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

Instrument: Milne horizontal pendulum, North. In the meridian.

Instrumental constant.. T_s 18. Pillar deviation: 1 mm. swing of boom=0.54″.

1915.			*H. M. S.*	*Sec.*	μ	μ	*Km.*	
Apr. 2	.....	P.....	0 18 54	.....	.....	.....	.....	
		L.....	0 20 24	.....	.....	.....	.....	
		M.....	0 20 54	.....	200*	.....	.....	
		F.....	0 24 54	.....	.....	.....	.....	
3	.....	P.....	20 41 54	.....	.....	.....	.....	
		L.....	20 46 54	.....	.....	.....	.....	
		M.....	20 59 54	.....	300*	.....	.....	
		F.....	21 26 24	.....	.....	.....	.....	
3	.....	P.....	21 42 48	.....	.....	.....	.....	
		L.....	21 49 36	.....	100*	.....	.....	
		F.....	22 07 36	.....	.....	.....	.....	
7	.....	P.....	16 18 00	.....	.....	.....	.....	
		L.....	16 20 00	.....	.....	.....	.....	
		M.....	16 20 18	.....	100*	.....	.....	
		F.....	16 23 48	.....	.....	.....	.....	
8	.....	P.....	14 37 42	.....	.....	.....	.....	
		L.....	14 38 42	.....	.....	.....	.....	
		M.....	14 41 12	.....	400*	.....	.....	
		F.....	14 45 42	.....	.....	.....	.....	
23	.....	P.....	15 40 06	.....	.....	.....	.....	
		L.....	15 48 18	.....	.....	.....	.....	
		M.....	15 49 06	.....	400*	.....	.....	
		F.....	16 08 36	.....	.....	.....	.....	
26	.....	P?.....	19 00 18	.....	100*	.....	.....	
		L.....	.. .. ..	.....	.....	.....	.....	
		F.....	19 02 18	.....	.....	.....	.....	
28	.....	P.....	4 05 54	.....	.....	.....	.....	
		L.....	4 09 24	.....	.....	.....	.....	
		M.....	4 10 24	.....	200*	.....	.....	
		F.....	4 25 24	.....	.....	.....	.....	
30	.....	P.....	2 11 30	.....	.....	.....	.....	
		L.....	2 29 30	.....	.....	.....	.....	
		M.....	2 35 00	.....	200*	.....	.....	
		F.....	2 58 30	.....	.....	.....	.....	

* Trace amplitude.

Canada. Victoria, B. C. Dominion Meteorological Service—Continued.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E.	Amplitude. A_N.	Distance.	Remarks.
1915.			*H. M. S.*	*Sec.*	μ	μ	*Km.*	
May 1	.....	iP.....	5 08 30	18	.....	.....	4800?	Well-defined disturbance. Long waves continued for several hours.
		iP.....	5 10 24	.....	.....	.....	.....	
		P.....	5 13 36	.....	.....	.....	.....	
		iS.....	5 15 48	.....	1800*	.....	.....	
		iL.....	5 20 24	30	2800*	.....	.....	
		M.....	5 35 30	.....	.....	.....	.....	
		M.....	5 38 48	18–30	6500*	.....	.....	
		L.....	5 39 42	18	.....	.....	.....	
		C.....	5 45 12	.....	.....	.....	.....	
		C.....	5 47 06	18	.....	.....	.....	
		iL.....	6 08 30	18–30	4300*	.....	.....	
		F.....	9 10 30	.....	.....	.....	.....	
1	.....	P.....	9 12 30	.....	.....	.....	.....	
		S.....	9 15 30	.....	.....	.....	.....	
		L.....	9 20 00	.....	.....	.....	.....	
		M.....	9 20 30	.....	300*	.....	.....	
		F.....	9 53 30	.....	.....	.....	.....	
2	.....	P.....	4 32 24	.....	.....	.....	.....	
		L.....	4 34 54	.....	.....	.....	.....	
		M.....	4 36 54	.....	500*	.....	.....	
		F.....	5 16 24	.....	.....	.....	.....	
3	.....	P.....	3 35 00	.....	.....	.....	.....	
		S.....	3 38 36	.....	.....	.....	.....	
		L.....	3 43 24	.....	.....	.....	.....	
		L.....	3 47 24	.....	.....	.....	.....	
		M.....	3 51 54	.....	600*	.....	.....	
3	.....	P.....	4 49 24	.....	.....	.....	.....	Beginning confused with trailers of preceding.
		L.....	4 52 24	.....	.....	.....	.....	
		M.....	4 55 24	.....	500*	.....	.....	
		F.....	5 37 24	.....	.....	.....	.....	
3	.....	P.....	6 01 48	.....	.....	.....	.....	
		L.....	6 07 42	.....	50*	.....	.....	
		F.....	6 39 06	.....	.....	.....	.....	
5	.....	P.....	11 56 18	.....	.....	.....	.....	
		L.....	11 59 18	.....	.....	.....	.....	
		M.....	12 03 48	.....	200*	.....	.....	
		F.....	12 32 18	.....	.....	.....	.....	
6	.....	P.....	12 12 54	.....	.....	.....	.....	
		L.....	12 13 24	.....	.....	.....	.....	
		M.....	12 14 54	.....	400*	.....	.....	
		F.....	13 08 24	.....	.....	.....	.....	
8	.....	P.....	15 02 30	.....	.....	.....	.....	
		L.....	15 10 30	.....	.....	.....	.....	
		M.....	15 12 30	.....	100*	.....	.....	
		F.....	15 27 30	.....	.....	.....	.....	
12	.....	P.....	11 14 06	.....	.....	.....	.....	
		S.....	11 20 36	.....	.....	.....	.....	
		L.....	11 24 06	.....	.....	.....	.....	
		M.....	11 33 36	.....	500*	.....	.....	
		F.....	12 02 06	.....	.....	.....	.....	
12	.....	P.....	16 56 06	.....	.....	.....	.....	
		S.....	16 58 06	.....	.....	.....	.....	
		L.....	17 00 36	.....	.....	.....	.....	
		M.....	17 01 36	.....	100*	.....	.....	
		F.....	17 05 36	.....	.....	.....	.....	
14	.....	P.....	7 07 42	.....	.....	.....	.....	
		L.....	7 13 12	.....	.....	.....	.....	
		M.....	7 17 12	.....	300*	.....	.....	
		F.....	8 02 12	.....	.....	.....	.....	
17	.....	L.....	13 44 00	.....	50*	.....	.....	
		F.....	13 46 00	.....	.....	.....	.....	
21	.....	L.....	5 30 54	.....	.....	.....	.....	Measurements doubtful.
		L.....	5 35 42	.....	.....	.....	.....	
		M.....	5 38 06	.....	50*	.....	.....	
		F.....	5 44 42	.....	.....	.....	.....	
23	.....	P.....	23 26 42	.....	.....	.....	.....	
		L.....	23 29 12	.....	.....	.....	.....	
		M.....	23 29 42	.....	100	.....	.....	
		F.....	23 31 42	.....	.....	.....	.....	
29	.....	P.....	6 48 18	.....	.....	.....	.....	
		L.....	6 53 18	.....	.....	.....	.....	
		M.....	6 53 48	.....	200*	.....	.....	
		F.....	7 01 18	.....	.....	.....	.....	

* Trace amplitude.

SECTION V.—SEISMOLOGY.

SEISMOLOGICAL REPORTS FOR JULY, 1915.

By WILLIAM J. HUMPHREYS, Professor in charge of Seismological Investigations.

[Dated: U. S. Weather Bureau, Washington, D. C., Aug. 30, 1915.]

TABLE 1.—*Noninstrumental earthquake reports, July, 1915.*

Day.	Approximate time, Greenwich Civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity Rossi-Forel.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
	H. m.	CALIFORNIA.	° ′	° ′			*Sec.*			
3	23 45	Brawley	32 59	115 40						M. D. Witter.
13	5 43	Victorville	34 32	117 18						J. M. Henry.
15	18 00	Drakesbad	40 28	121 29	2	1		Faint		A. Sifford.
21	24 00	Drakesbad	40 28	121 29	3	1		Rumbling		A. Sifford.
22	11 00	Mineral	40 21	121 32	2	2				W. E. Gerber.
22	20 36	Eureka	40 48	124 11	2	1	5		Shook chandeliers	U. S. Weather Bureau.
27	19 43	Newhall	34 22	118 30	2	2	1			P. J. Coyle.
27	22 41	Newhall	34..22	..118..30	2	1	½			P. J. Coyle.
		UTAH.								
15	22 00	Heber	40 35	111 28	5	1	2		Rattled dishes	John Cook.
	22 00	Lehi	40 23	111 52	.....	1	10			Joseph Anderson.
	22 00	Midvale	40 36	111 53	5	4	8			E. D. Camomile.
	22 00	Park City	40 38	111 35	3	.....	.....	Rumbling		Geo. Cunningham.
	22 00	Provo	40 16	111 44	6	1	4	Rumbling	Cracked a few ceilings	U. S. Reclamation Service.
	22 00	Salt Lake City	40 46	111 54	3	1	10			U. S. Weather Bureau.
	22 00	Spanish Fork	40 08	111 44	2	1	.....			W. P. Shippee.
	22 00	Thistle	40 00	111 36	3	1	4	Rumbling		R. H. Thomas.
30	19 50	Garland	41 45	112 11	5	2	.....	Faint	Shook dishes from shelves	John T. Roberts.
		WASHINGTON.								
18	20 54	Lakeside	47 50	120 00	4	1	.....	Faint		W. H. Van Meter.

TABLE 2.—*Instrumental seismological reports, July, 1915.*

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

[For significance of symbols see this REVIEW, June, 1915, p. 289.]

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:

	V	T_0
E	10	17.4
N	10	15.6

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
July 31	.....	P	1 38 19	3	.....	.....	.....	
		S	1 43 46	12	.....	.....	.....	
		L_E	1 50 14	21	.....	.....	.....	
		L_N	1 50 40	20	.....	.....	.....	
		M_E	1 51 42	18	970	.....	.....	
		M_N	1 52 15	18	.....	1,100	.....	
		C	1 54 00	16	.....	.....	.....	
		F	2 56 00	.....	.....	.....	.....	

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	16
N	10	19.6

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
July 31	.....	P_E	1 41 51	5	.....	.....	.....	
		P_N	1 41 56	4	.....	.....	.....	
		S_E	1 50 25	.....	.....	.....	.....	
		S_N	1 50 29	.....	.....	20	.....	
		L_E	2 02 38	22	.....	.....	.....	
		M_E	2 05 07	22	30	.....	.....	
		M_N	2 08 50	13	.....	10	.....	
		C	2 10 00	.....	.....	.....	.....	
		F	2 46 00	.....	.....	.....	.....	

TABLE 2.—*Instrumental seismological reports, July, 1915*—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
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.								
1915. July 11 to 12.	.....	.....	*H. m. s.*	*Sec.*	μ *100	μ *100	*Km.*	No time obtained. Light tremors.
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.								
1915. July 1-2	.....	-	*H. m. s.*	*Sec.*	μ	μ	*Km.*	Constant activity at intervals on N-S. Only thickening of pen marks on E-W. Waves are broken and irregular.
3-4	.....	.....	.....	.....	.....	.....	.....	Activity at intervals on N-S.
4-5	.....	.....	.....	.....	.....	.....	.....	Activity on N-S.
16	.....	.....	.....	.....	.....	.....	.....	Activity on both components, especially E-W, from 3h to 5h.
21	.....	.....	9 00 00	.....	.....	.....	.....	Small but distinct oscillations at intervals on N-S.
			13 00 00	.....	.....	.....	.....	
31	I_N...	P_N....	1 49 00	.....	.....	.....	.....	P disturbed through minute marks. S not visible.
		L_N....	2 01 00	.....	.....	.....	.....	
		M_N....	2 03 00	20	.....	6	.....	
		C_N....	2 05 00	.....	.....	.....	.....	
		F_N....	2 07 00	.....	.....	.....	.....	
31	.....	.....	11 48 00	.....	.....	.....	.....	Wavelets on N-S.
			12 04 00	.....	.....	.....	.....	
District of Columbia. *Washington. U. S. Weather Bureau.*								
Lat., 38° 54′ N.; long., 77° 03′ W. Elevation, 21 meters.								
Instrument: Marvin (vertical pendulum), undamped. Mechanical registration.								
Instrumental constants.. V = 110, T_0 = 6								
1915. July 16	I_Y....	P_E....	*H. m. s.* 20 33 45	*Sec.*	μ	μ	*Km.* *410?	Long waves doubtful.
		S_E....	20 35 13	.....	.....	.....	.....	
		M_E....	20 37 25	.....	7	.....	.....	
		F.....	20 54 00	.....	.....	.....	.....	
22	I_E...	P_E....	4 16 53	.....	.....	.....	3,995?	Phases doubtful.
		S_E....	4 22 40	.....	.....	.....	.....	
		L_E....	4 29 40	12	.....	.....	.....	
		F.....	4 45 00	.....	.....	.....	.....	
25	I_N...	P_E?...	21 03 15	.....	.....	.....	7,235?	P and S very doubtful.
		S_E?...	21 11 56	.....	.....	.....	.....	
		L_E....	21 16 40	.....	.....	.....	.....	
		F.....	21 45 00	.....	.....	.....	.....	

* Amplitude on instrument.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
District of Columbia. *Washington. U. S. Weather Bureau*—Contd.								
1915. 29	.....	e_E....	*H. m. s.* 10 49 30	*Sec.*	μ	μ	*Km.*	Phases uncertain
		L_E....	10 51 40	.....	.....	.....	.....	
		F.....	11 10 00	.....	.....	.....	.....	
31	I_E...	P_E....	1 43 01	.....	.....	.....	S.165	
		S_N....	1 52 29	.....	.....	.....	.....	
		L_E....	2 01 00	18	.....	.....	.....	Long waves continued with approximately the same magnitude until 2h 25m with a period of 20-24 seconds.
		F_E....	4 00 00	.....	.....	.....	.....	
District of Columbia. *Washington. Georgetown University.* F. L. 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.								
Instrumental constants..					V	T_0	ε	
					E 165	5.4	2.6	
					N 143	5.2	3.4	
1915. July 31	I....	eP_E...	*H. m. s.* 1 36 43	*Sec.*	μ	μ	*Km.*	
		eP_N...	1 36 46	3	.....	.....	.....	
		S_E....	1 46 13	.....	.....	.....	.....	
		S_N....	1 46 24	12	.....	.....	.....	
		L_N....	2 07 40	20	.....	.....	.....	
		M_N....	2 11 46	18	.....	2	.....	
		F_N....	2 57 16	.....	.....	.....	.....	
Hawaii. *Honolulu. Magnetic Observatory.* U. S. Coast and Geodetic Survey. Wm. W. Merrymon.								
Lat., 21° 19′ 12″ N.; long., 158° 03′ 48″ W. Elevation, 15.2 meters.								
Instruments: Milne seismograph of the Seismological Committee of the British Association.								
Instrumental constant.. T_0 = 18.9								
1915. July 2	.....	eL....	*H. m. s.* 14 00 36	*Sec.*	μ	μ	*Km.*	
		M.....	14 10 12	.....	*100	.....	.....	
		C.....	14 26 36	.....	.....	.....	.....	
4	.....	eL....	2 28 54	.....	.....	.....	.....	
		M.....	2 39 00	.....	*100	.....	.....	
		F.....	2 48 30	.....	.....	.....	.....	
8	.....	P.....	22 36 36	.....	.....	.....	.....	
		S.....	22 41 12	.....	.....	.....	.....	
		L.....	22 45 12	.....	.....	.....	.....	
		M.....	22 57 48	24	*300	.....	.....	
		C.....	23 05 48	.....	.....	.....	.....	
		F.....	23 23 54	.....	.....	.....	.....	
10	.....	eL....	1 01 48	.....	.....	.....	.....	
		M.....	1 02 42	20	*100	.....	.....	
		F.....	1 10 12	.....	.....	.....	.....	
13	.....	eL....	19 45 00	.....	.....	.....	.....	
		M.....	19 51 12	18	*100	.....	.....	
		C.....	19 55 36	.....	.....	.....	.....	
		F.....	20 03 36	.....	.....	.....	.....	
24	.....	eL....	19 18 54	.....	.....	.....	.....	
		M.....	19 27 36	.....	*100	.....	.....	
		C.....	19 31 00	.....	.....	.....	.....	
		F.....	19 42 54	.....	.....	.....	.....	
25	.....	eL....	21 02 54	.....	.....	.....	.....	
		M.....	21 04 12	.....	*100	.....	.....	
		F.....	21 14 42	.....	.....	.....	.....	
28	.....	eL....	9 27 00	.....	.....	.....	.....	
		M.....	9 42 48	20	*200	.....	.....	
		C.....	9 48 48	.....	.....	.....	.....	
		F.....	10 03 42	.....	.....	.....	.....	
31	.....	P.....	1 40 12	.....	.....	.....	.....	From 1h 52m 12s to 1h 56m 48s amplitude exceeded width of record.
		S.....	1 46 18	.....	.....	.....	.....	
		L.....	1 52 30	22	.....	.....	.....	
		C.....	3 14 36	.....	.....	.....	.....	
		F.....	5 35 48	.....	.....	.....	.....	

* Trace amplitude.

TABLE 2.—*Instrumental seismological reports, July, 1915*—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
Kansas. *Lawrence. University of Kansas.* Department of Physics and Astronomy. F. E. Kester.								
Lat., 38° 57′ 30″ N.; long., 95° 14′ 58″ W. Elevation, 304.8 meters.								
Instrument: Wiechert.								
Instrumental constants..			V: E 177, N 205	T_0: 3.4, 3.4	ε: 4.0, 3.8			
1915. July 31	.....	P.....	H. m. s. 1 41 51	Sec. 2	μ	μ	Km.	
		S.....	1 50 46	5–8	.....	.....	.....	
		L.....	2 06 52	24	15	8	.....	
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: E 10, N 10	T_0: 31, 29				
1915. July 31	.....	P_E.....	H. m. s. 1 43 28	Sec. 2	μ	μ	Km.	
		P_N.....	1 43 32	2	.....	.....	.....	
		S_N.....	1 53 34	12	.....	.....	.....	
		L_E.....	2 05 00	24	.....	.....	.....	
		L_N.....	2 06 44	26	.....	.....	.....	
		M_E.....	2 08 52	32	30	.....	.....	
		M_N.....	2 17 20	22	.....	180	.....	
		C_E.....	2 18 00	16	.....	.....	.....	
		C_N.....	2 22 00	19	.....	.....	.....	
		F_E.....	2 28 00	20	.....	.....	.....	
		F_N.....	3 17 00	20	.....	.....	.....	
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:1: 5:1			
1915. July 31	$I_{E...}$	P_E.....	H. m. s. 1 42 30	Sec.	μ	μ	Km. 7,600	Phases and times on N-S component same as on E-W. 4 after-shocks registered on both components, with maximum amplitudes of 2 mm. and uniform periods of 18 seconds.
		S_E.....	1 51 30	.....	.....	.....	.....	
		L_E.....	1 59 00	.....	.....	.....	.....	
		F.....	3 12 00	.....	.....	.....	.....	
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:1: 5:1			
1915. July 5	$I_{....}$	iI_E.....	H. m. s. 19 48 30	Sec. 10	24	.....	Km.	P and S not discernible on either component.
		iI_N.....	19 48 40	4	.....	10	.....	
		L_N.....	19 49 00	.....	.....	.....	.....	
		L_E.....	19 49 10	.....	.....	.....	.....	
8	.....	.....	.....	.....	.....	.....	.....	Microseisms on E-W component from 17^h 56^m to 17^h 58^m.
8	I.....	.....	17 56 10	.....	.....	.....	.....	Mild shock from south.
9	.....	.....	.....	.....	.....	.....	.....	Microseisms on E-W component from 16^h 22^m to 19^h 00^m.
12	I.....	.....	22 11 15	.....	.....	.....	.....	Shock from southwest.
31	$I_{u...}$	eP_N.....	1 42 10	2	.....	.....	8,000	
		eP_E.....	1 42 30	2	.....	.....	.....	
		eS_N.....	1 51 30	3	.....	.....	.....	
		eS_E.....	1 51 30	5	.....	.....	.....	
		iL_N.....	2 06 00	10	.....	10	.....	
		iL_E.....	2 08 00	20	13	.....	.....	
		M_E.....	2 14 30	30	.....	.....	.....	
		L.....	2 16 00	.....	.....	.....	.....	
		C_N.....	2 28 00	.....	.....	.....	.....	
		C_E.....	2 30 00	.....	.....	.....	.....	

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
New York. *Fordham. Fordham University.* W. C. Repetti, S. J.								
Lat., 40° 57′ 47″ N.; long., 73° 53′ 08″ W. Elevation, 23.9 meters.								
Instrument: Wiechert 80 kg.								
Instrumental constant..				T_0: 6				
(Report for July, 1915, not received.)								
Panama Canal Zone. *Balboa Heights.* Isthmian Canal Commission.								
Lat., 8° 57′ 39″ N.; long., 79° 33′ 29″ W. Elevation, ——.								
Instruments: Two Bosch-Omori 25 kg.								
Instrumental constants..			V: 8	T_0: 20				
1915. July 14	$I_{v....}$	P.....	H. m. s. 10 57 10	Sec.	μ	μ	Km. 328	Probable direction southwest.
		L.....	10 57 58	.....	.....	.....	.....	
		M_E.....	10 58 04	.....	25	.....	.....	
		M_N.....	10 58 04	.....	.....	62	.....	
		F_E.....	11 01 00	.....	.....	.....	.....	
		F_N.....	11 01 40	.....	.....	.....	.....	
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: 15, 16				
1915 July 31	$I_{u...}$	P_N.....	H. m. s. 1 42 47	Sec.	.....	.....	Km. 7,000	
		S_E.....	1 52 06	.....	.....	.....	.....	
		L.....	2 00 10	.....	.....	.....	.....	
		L.....	2 15 00	24	.....	.....	.....	
		L.....	2 22 40	18	.....	.....	.....	
		F.....	3 10 00	.....	.....	.....	.....	
Canada. *Ottawa. Dominion Astronomical Observatory.* Earthquake Station. Otto Klotz.								
Lat., 42° 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: 120			V:	T_0: 26				
1915 July 22	.....	P.....	H. m. s. 4 25 00	Sec.	μ	μ	Km. 3,480	
		S.....	4 28 16	.....	.....	.....	.....	
		L.....	4 32 07	19	.....	.....	.....	
		F.....	4 45 00	.....	.....	.....	.....	
25	.....	P.....	21 05 13	.....	.....	.....	4,520	
		S.....	21 14 36	.....	.....	.....	.....	
		L.....	21 16 05	25	.....	.....	.....	
		F.....	21 40 00	.....	.....	.....	.....	
29	.....	L.....	10 55 05	12	.....	.....	.....	
31	.....	IP.....	1 42 32	.....	.....	.....	7,700	
		$PR1_E$.....	1 45 20	.....	.....	.....	.....	
		$PR2_E$.....	1 47 01	.....	.....	.....	.....	
		S_N.....	1 51 37	.....	.....	.....	.....	
		S_E.....	1 51 38	.....	.....	.....	.....	
		L.....	1 59 07	60	.....	.....	.....	
		L.....	2 04 00	40	.....	.....	.....	
		L.....	2 09 00	28	.....	.....	.....	
		L.....	2 22 00	18	.....	.....	.....	
		L.....	3 00 00	14	.....	.....	.....	
		F?.....	4 30 00	.....	.....	.....	.....	
Canada. *Toronto. Dominion Meteorological Service.*								
Lat., 43° 40′ 01″ N.; long., 79° 23′ 54″ W. Elevation, 113.7 meters. Subsoil: Sand and clay.								
Instrument: Milne horizontal pendulum, North. In the meridian.								
Instrumental constant: 18.				T_0:				
Pillar deviation, 1 mm. swing of boom=0.59″.								
(Report for July, 1915, not received.)								
Canada. *Victoria, B. C. Dominion Meteorological Service.*								
Lat., 48° 24′ N.; long., 123° 19′ W. Elevation, 67.7 meters. Subsoil: Rock.								
Instrument: Milne horizontal pendulum, North. In the meridian.								
Instrumental constant: 18.				T_0:				
Pillar deviation, 1 mm. swing of boom=0.54″.								
(Report for July, 1915, not received.)								

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

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.

T_0 Instrumental constant..18. Pillar deviation, 1mm. swing of boom=0.59″.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
June 1		IP?	14 57 36		*300		3,245?	
		IS?	15 05 18					
		IL	15 07 30					
		L	15 09 54					
		M	15 11 18		*13,200			
		M	15 12 24		*13,000			
		M	15 12 42		*12,100			
		C	15 13 24		*900			
		C	15 13 42					
		L	15 31 54					
		M	15 32 30		*100			
		F	16 50 12					
4		P	21 23 24					
		L	21 38 12		*50			
		F	22 19 18					
4		IP	22 30 06					
		L	22 41 18					
		L	22 52 00					
		M	22 56 00		*200			
		F	23 21 18					
6		P	15 48 18					
		L	15 55 30					
		M	15 57 12		*300			
		F	16 01 36					
6		IP	20 21 30					
		IS	20 28 18					
		L	20 39 24					
		L	20 41 12					
		M	20 48 42		*300			
		L	20 52 42					
		L	21 12 24					
		F	21 18 12					
6		P	21 36 06					
		P	21 38 12					
		P	21 40 18					
		S	21 48 24					
		L	21 49 24					
		M	21 51 30		*5,000			
		M	21 56 30					
		C	21 56 36		*1,000			Long waves continued for a long time.
		C	21 59 00		*4,000			
		C	22 00 30					
		L	22 02 12					
		M	22 11 06		*1,000			
		C	22 12 36					
		L	22 14 36					
		L	22 22 06					
		L	23 16 00					
		L	23 34 06					
		F	23 32 00					
7		L	12 27 54		*50			
		F	12 36 00					
7		L?	22 48 54					
		L	22 52 00					
		M	22 52 42		*200			
		F	23 06 54					
11		L	7 37 12		*100			
		F	7 56 48					
12		L	6 43 24					
		M	6 44 00		*100			
		F	6 49 48					
22		L	3 44 00					Marked quake, P possibly not recorded.
		M	3 45 18		*900			
		F	4 13 30					
22		L	13 05 18		*50			
		F	13 13 24					
23		P	4 06 06				3,880	Origin in southern California.
		IS	4 14 42					
		L	4 17 36					
		M	4 17 36		*400			
		F	4 34 00					

*Trace amplitude.

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

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			*H.m.s.*	*Sec.*	μ	μ	*Km.*	
23		P	5 06 00				3,880	Origin in southern California.
		S	5 10 36					
		L	5 12 30					
		M	5 12 42		*400			
		F	5 32 48					
27		L	16 16 36					P lost on account of air currents.
		M	16 18 36		*300			
		F						F uncertain on account of air currents.
29		L	14 42 06					F lost in air currents.
		L	14 53 36					
		M	14 55 24		*100			

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

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

Instrument: Milne horizontal pendulum, North. In the meridian.

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

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
June 1		IP	15 00 18					
		S	15 03 18		*3,200			
		L	15 07 48					
		L	15 09 36					
		M	15 10 48		*6,000			
		F	16 14 18					
6		L	20 20 24					P lost in attention to instrument.
		L	20 21 00					
		M	20 33 36		*870			
		F	20 38 24					
6		P	21 42 24					
		L	21 43 24					
		M	21 43 24		*1,000			
		F	21 48 24					
6		P	21 49 54					
		L	21 51 54					
		M	21 53 30		*3,000			
		F	(?)					
6		P	22 11 12					
		L	22 15 06					
		M	22 20 42		*2,000			
7		F	0 18 24					
11		P	6 57 42					
		L	7 03 42					
		M	7 16 42		*200			
		F	7 26 42					
22		P	3 45 00					
		L	3 47 30					
		M	3 48 00		*200			
		F	3 58 00					
22		L	13 10 00					Measurements doubtful.
		M	13 13 48		*50			
23		P	4 07 42					Origin in southern California.
		L	4 11 00					
		M	4 12 30		*1,000			
		F	4 18 00					
23		P	5 04 00					Origin in southern California.
		L	5 07 30					
		M	5 09 00		*1,200			
		F	5 22 00					
27		P	15 53 00					
		L	16 04 30					
		M	16 16 00		*200			
		F	16 26 00					
29		P	14 25 00					
		S	14 28 00					
		L	14 41 00					
		M	14 43 00		*200			
		F	15 03 00					

*Trace amplitude.

DETECTION OF SEISMIC ZONES BY MEANS OF BAROMETRIC GRADIENT.[1]

By A. NAKAMURA.

[*Reprinted from* Science Abstracts, Sec. A, July 26, 1915, §815.]

The barometric gradient as a secondary cause of earthquake has already been discussed by Terada [Abs. 778 (1909)] and by Hasegawa. The latter has shown that the barometric gradient in Gihu district at the epoch when an earthquake in that district occurs, is generally perpendicular to the dislocation line of the Mino-Owari earthquake in 1891. Nagaoka suggested that if such is the case in general a clue may be found for detecting the direction of some unknown seismic zones or dislocation lines. The method, if feasible, will probably be more accurate than to construct the zones statistically by locating a large number of epicenters. The present author, to test the general applicability of the method, has taken 50 earthquakes, all weak or slight, observed in Tukuba during 1904. Hasegawa's method was adopted of taking the barometric pressure just at the moment of the earthquake by graphical interpolation from 4 observations, while the gradients were given by Okada's process. Tables are given, and the result is found that the direction of the prevailing gradient at the epoch of earthquakes is nearly perpendicular to the seismic zone found by Omori from statistical grouping of epicenters. This confirms Hasegawa's results and realizes Nagaoka's suggestion.—*H. H. Ho[dgson]*.

[1] *See* Proc. Mathematical-physical Society, Tokyo, 1915, 8 : 69-72.

SECTION V.—SEISMOLOGY.

SEISMOLOGICAL REPORTS FOR AUGUST, 1915.

By W. J. HUMPHREYS, Professor in charge of Seismological Investigations.

[Dated: Weather Bureau, Washington, D. C., Sept. 30, 1915.]

TABLE 1.—*Noninstrumental earthquake reports, August, 1915.*

[Time used: Mean Greenwich, midnight to midnight. Nomenclature: International.]

Day.	Approximate time, Greenwich Civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity Rossi-Forel.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
		CALIFORNIA.								
	H. m.		° ′	° ′			*Sec.*			
5	16 30	Drakesbad	40 28	121 29	5	1	1	Rumbling		A. Sifford.
	18 33	Spreckles	36 32	121 38	3–4	2	2		Windows rattled	Mrs. A. Boncquet.
6	18 40	Mineral	40 21	121 32	2	1	2			Frank C. Hardin.
		NORTH DAKOTA.								
8	15 15	Williston	48 09	103 35	3	1			Awakened by shock	Miss Florence Bennett.
	15 15	Williston	48 09	103 35	4	1	3		Rattled dishes	Rev. I. G. Monson.
	15 15	Williston	48 09	103 35	3	1	5		Rattled dishes	W. H. Shemorry.
	15 15	Williston	48 09	103 35	3–4	1	2		Shook house	Geo. F. Carpenter.
	15 15	Williston	48 09	103 35	3	1				C. F. Anderson.
	15 15	Williston, R. F. D.	48 08	103 36	3	1		Rumbling		R. C. Ike.
		UTAH.								
11	10 20	Iosepa	40 32	112 44	7	1	10	Rumbling		James K. Halemanu.
		WASHINGTON.								
18	14 04	Glacier	48 54	121 57	4	2	.6	Faint	Origin in southern British Columbia.	C. C. McGuire.
	14 04	Lakeside	47 50	120 00	3	1		Faint		W. H. Van Meter.
	14 04	Laurier	48 59	118 13	4	1				Mrs. J. S. Myers.
	14 04	Marblemount	48 32	121 26	5	1	5	Loud		Henry Soll.
	14 04	Seattle	47 38	122 20	2	1	3			U. S. Weather Bureau.
18	18 00	Marblemount	48 32	121 26	3	1	1	Faint		Henry Soll.

TABLE 2.—*Instrumental reports, August, 1915.*

[Time used: Mean Greenwich, midnight to midnight. Nomenclature: International.]

[For significance of symbols see REVIEW for June, 1915, p. 289.]

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:		*V*	T_0
	E	10	17.4
	N	10	15.6

No earthquakes recorded during August.

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	16
	N	10	19.6

No earthquakes recorded during August.

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 August, 1915, not received.

California. *Santa Clara. University of.* 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.)

TABLE 2.—*Instrumental reports, August, 1915*—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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

Lat., 39° 40′ 45″ 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.
1915. Aug. 1	I_u	e	*H. m. s.* 10 15 00	*Sec.*	μ	μ	*Km.*	Irregular waves on N-S.
		F_N	10 20 00					
2		e	8 05 00					Wavelets at intervals.
		F_N	15 00 00					
5		e	21 02 00					Very irregular waves.
		F_E	21 20 00					
9	I_u	e	17 20 00					Very small sinusoidal waves.
		F_N	17 22 00					
9	I_u	eP_N	20 06 00					
		M_N	20 10 00	15				
		F_N	20 11 00					
10	I_u	e	10 50 00					Very small sinusoidal waves, irregular on E-W.
		F_N	11 00 00					
12	I_u	e	10 00 00					Sinusoidal waves at intervals—long period with very small amplitude.
		F_N	11 00 00					
18	I_u	e	13 04 00					Earthquake reported from British Columbia.
		F_N	13 08 00					
18		e	13 24 00	26				Thickening of pen marks on E-W.
		F_N	13 27 00					
20	I_u	e	7 00 00	20–35	4	7		Almost continual activity, especially on N-S.
		F_N	15 00 00					
25		e	16 00 00	20–30	4	4		
27		e	12 20 00	10–15				Very small sinusoidals at intervals on N-S. Irregular on E-W.
		F_N	15 15 00					
29		e	11 20 00					Long waves at frequent intervals.
		F_E	15 00 00					
31		e	12 40 00					Irregular long period waves on N-S. Less visible on E-W.
		F_N	15 30 00					

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

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

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

	V	T_0
Instrumental constants..	110	6

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915. Aug. 3		P	*H. m. s.* 13 26 48	*Sec.*	μ	μ	*Km.*	
		S	13 31 48					
3		eL	14 09 00					P and S not discernible.
		eL	14 20 00					
		F	14 50 00					
6		P	13 25 14					
		PR1	13 28 28					S lost while changing sheets.
		eL	13 59 00					
		L	14 20 00	20				
		F	14 50 00					
7		P	15 24 26					Other phases not discernible.
		F	15 45 00					
16		P?	1 16 44					
		L	1 30 00					
		L	1 36 00	20				
		F	2 10 00					
19		P	0 16 50					
		L	0 32 00					
		F	0 45 00					

District of Columbia. *Washington. Georgetown University.* F. L. 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.

	V	T_0	e
Instrumental constants: E	165	5.4	2.6
N	143	5.2	3.4

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915. Aug. 6	I_r	e	*H. m. s.* 13 58 44	*Sec.*	μ	μ	*Km.*	E-W barely discernible.
		L_N	14 06 00					No distinct maximum.
		L_E	14 06 15					
		F_N	14 49 02					

Hawaii. *Honolulu. Magnetic Observatory.* U. S. Coast and Geodetic Survey. Wm. W. Merrymon.

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.

	T_0
Instrumental constant..	18.8

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915. Aug. 3		P	*H. m. s.* 13 16 36	*Sec.*	μ	μ	*Km.*	
		S	13 26 42					
		L	13 37 30	22				
		M	13 46 12		*3,900			
		C	14 11 30					
		F	16 31 24					
6		P	13 28 18					
		S	13 33 00					
		L	13 38 18	24				
		M	13 40 30		*2,300			
		C	13 53 48					
		F	15 06 42					
10		eP	2 59 42					
		M	3 05 24		*200			
		C	3 09 30					
		F	3 42 18					
12		P	7 59 36					
		L	8 19 24					
		M	8 24 54		*400			
		C	8 33 00					
		F	8 55 00					
12		eL	10 09 00					
		M	10 19 30		*100			
		F	10 32 00					
16		P	1 09 06					
		S	1 11 00					
		L	1 13 18	23				
		M	1 18 12		*1,200			
		C	1 28 36					
		F	2 15 30					
19		eL	1 04 24					
		M	1 10 42		*100			
		F	1 26 54					Record lost from Aug. 21, 1h 34m to Aug. 22 18h 26m.
31		eP	21 03 18					
		L	21 22 30					
		M	21 28 18		*200			
		C	21 32 42					
		F	22 02 00					

* Trace amplitude.

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

Lat., 38° 57′ 39″ N.; long., 95° 14′ 58″ W. Elevation, 304.8 meters.

Instrument: Wiechert.

	V	T_0	e
Instrumental constants.. E	177	3.7	4.0
N	205	3.7	3.8

No earthquakes recorded during August, 1915.

TABLE 2.—*Instrument reports, August, 1915*—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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	31
	N	10	29

No earthquakes recorded during August.

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, undamped (mechanical registration).

Instrumental constants..		V	T_0
	E	80	23
	N	50	25

Report for August, 1915, not received.

Missouri. *St. 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	c: 1
	80	7	5: 1

Report for August, 1915, 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	c: 1
	80	7	5: 1

1915			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Aug. 8			19 15 00					
			23 45 00					Microseisms E–W.
11	I$_E$	P$_E$	10 06 30					
		S$_E$	11 11 15					
		M$_E$	10 14 45	10	19		3,450	
		C$_E$	10 21 30					
		P$_N$	10 11 15					Not discernible.
		S$_N$	10 14 45	8				
14		M$_N$	8 48 00					Intermittent microseisms E–W.
			18 00 00					

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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

Lat., 40° 57′ 47″ N.; long., 73° 53′ 08″ W. Elevation, 23.9 meters.

Instrument: Wiechert 80 kg.

Instrumental constants..		T_0
	E	6.6
	N	7.1

Report for August, 1915, not received.

Panama Canal Zone. *Balboa Heights.* Isthmian Canal Commission.

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

Instruments: Two Bosch-Omori 100 kg.

Instrumental constants..	V	T_0
	10	20

1915			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Aug. 31		P	21 33 40					
		L	21 35 00					
		M	21 35 35		200		620	
		F	21 36 25					

Porto Rico. *Vieques. Magnetic Observatory.* U. S. Coast and Geodetic Survey. H. M. Pease.

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

Instruments: Two Bosch-Omori.

Instrumental constants..		V	T_0
	E	10	21.4
	N	10	21.1

No earthquake recorded during August.

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

1915			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Aug. 3		P?	13 26 33					
		S?	13 31 33					
		L	13 36 30					
		F	14 00 00					
6		P	13 24 56					S not discernible.
		F	14 00 00					
7		P	15 23 52					
		S	15 31 10					
		L	15 45 30		18			
		F	16 00 00					
16		P	1 16 23					
		S?	1 21 08					
		L	1 40 00		16			
		F	2 00 00					
19		P?	0 17 15					Mere trace, all phases doubtful.

TABLE 2.—*Instrumental reports, August, 1915*—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
								Canada. *Ottawa. Dominion Astronomical Observatory.* Earthquake Station. Otto Klotz.
								Lat., 42° 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
1915. Aug. 3	.....	P.....	*H. m. s.* 13 26 22	*Sec.*	μ	μ	*Km.* 3,240	
		S.....	13 31 22					
		L.....	13 36 01	20				
		L.....	14 02 00	34				
		L.....	14 20 00	20				
		L.....	14 32 00	18				
		F.....	15 35 00					
6	.....	P.....	13 24 48	3			9,150	
		PP1..	13 28 05					
		S.....	13 35 07					
		L.....	13 55 02	28				
		L.....	14 07 00	18–16				
		L.....	14 13 00	16				
		F.....	15 00 00					
7	.....	P.....	15 23 58				5,600	
		S_N.....	15 31 12					
		L.....	15 37 00	30				
		L.....	15 38 00	28				
		L.....	15 43 00	18				
		L.....	15 53 00	14				
		F.....	16 10 00					
11	.....	L.....	9 45 00	40				Very distant, inferred from deformation instrument.*
16	.....	e_N.....	1 15 44				3,500?	
		e_E.....	1 15 48					
		S?.....	1 21 00					
		L.....	1 26 00	20				
		L.....	1 30 00	24–22				
		L.....	1 37 00	15–14				
		L.....	1 51 00	14–13				
		L.....	2 00 00	15–13				
		F.....	2 20 00					
19	.....	P?.....	0 16 32				5,550?	
		S_E?....	0 23 42					
		S_N?....	0 23 44					
		L_N.....	0 33 02	20				
		L.....	0 52 00	40				
		L.....	0 56 00	30				
		L.....	0 58 00	28				
		L.....	1 00 00	20				
		L.....	1 06 00	18				
		F.....	1 20 00					
22	.....	L.....	9 36 00	40				
		F.....	9 55 00					
22	.....	L.....	11 31 00	28				
		F.....	11 50 00					

* Instrument just mounted in special vault for study of deformation of the earth by moon and sun; hence expression "deformation" instrument.

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.

Instrument constant: T_0 18. Pillar deviation, 1 mm. swing of boom=0.59″.

1915. Aug. 3	.....	P.....	*H. m. s.* 13 27 18	*Sec.*	μ	μ	*Km.*	
		S.....	13 33 18		*200			
		L.....	13 43 30					
3	.....	P.....	?14 00 12					Possibly dual earthquakes.
		S.....	14 02 18					P may be mixed up with trailers.
		IL.....	14 13 06					
		IL.....	14 18 54					
		M.....	14 24 30		*2,200			
		Repeat	15 19 12					
		F.....	15 46 54					

*Trace amplitude.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
								Canada. *Toronto. Dominion Meteorological Service*—Continued.
1915. Aug. 6	.....	P.....	*H. m. s.* 13 44 48	*Sec.*	μ	μ	*Km.*	
		S.....	13 51 00					
		IL.....	13 58 54					
		M.....	14 08 24		*800			
		F.....	14 55 06					
7	.....	P.....	?15 31 42					P doubtful.
		S.....	15 39 54					
		IL.....	15 46 42					
		M.....	15 49 30		*800			
		F.....	16 11 24					
10	.....	P.....	?2 40 00					
		S.....	2 44 18					Beginning not well defined.
		L.....	2 45 36					
		M.....	2 47 18		*800			
		F.....	2 59 24					
11	.....	L.....	9 52 18					Minute thickening.
		F.....	9 59 30					
16	.....	P.....	1 15 06					
		L.....	1 30 12					
		IL.....	1 31 54					
		M.....	1 33 48		*300			
		L.....	1 37 06					
		L.....	1 49 30					
		M.....	1 50 24		*300			
		F.....	2 42 00					
19	.....	P?.....	?0 21 24					
		L?.....	0 45 54					
		L.....	1 07 06		*200			Watch hand touching boom interfered with some phases.
		F.....	1 45 30					

*Trace amplitude.

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

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

Instrument: Milne horizontal pendulum, North. In the meridian.

Instrument constant: T_0 13. Pillar deviation, 1 mm. swing of boom=0.54″.

1915. Aug. 3	.....	P.....	*H. m. s.* 13 34 26	*Sec.*	μ	μ	*Km.* 9,600	
		S.....	13 51 46					
		L.....	13 59 26					
		M.....	14 08 56		*1,500			
		F?.....	16 49 56					
6	.....	P.....	13 40 18					
		L.....	13 49 18					
		M.....	13 52 18		*500			
		F.....	14 54 18					
7	.....	P.....	15 27 21				10,600?	
		S.....	15 46 51					
		L.....	15 52 21					
		M.....	15 56 21		*500			
		F.....	16 20 21					
10	.....	P?.....	2 45 30					P. Doubtful.
		L.....	2 51 30					Not recorded on vertical seismograph.
		M.....	2 59 30		*300			
		F.....	3 23 00					
16	.....	S?.....	1 09 25					
		L.....	1 15 25					
		M.....	1 16 25		*400			
		F.....	2 48 55					
18	.....	P.....	14 05 00				80	Eq. felt in Victoria, vibration of 1 sec., also along Fraser Valley and Puget Sound.
		S.....	14 05 20		*100			
		L.....						
		M.....						
		F.....	14 08 00					
19	.....	P.....	1 03 01				13,000	
		S.....	1 16 01					
		L.....	1 22 01					
		M.....	1 23 01		*100			
		F.....	1 43 01					

*Trace amplitude.

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

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

Porto Rico. *Vieques. Magnetic Observatory.* U. S. Coast and Geodetic Survey. H. M. Pease.

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: 21.4, 21.1

1915.			H. m. s.	Sec.	μ	μ	Km.	
July 31	.....	L_E	2 20 00	.....	.....	.....	.....	
		L_N	2 22 24	26	.....	.....	.....	
		M_E	2 26 10	20	10	.....	.....	
		M_N	2 29 10	20	.....	50	.....	
		C	2 38 00	.....	.....	.....	.....	

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=0.59″.

1915.			H. m. s.	Sec.	μ	μ	Km.	
July 20	.....	P?....	16 04 54	.....	.....	.....	.....	
		L.....	16 09 48	.....	* 100	.....	.....	
		F.....	16 15 00	.....	.....	.....	.....	
22	.....	L.....	4 30 24	.....	* 100	.....	.....	Air currents going on before L begin.
		F.....	4 40 42	.....	.....	.....	.....	
25	.....	P.....	21 04 18	.....	.....	.....	.....	
		S?.....	21 08 48	.....	.....	.....	.....	
		L.....	21 16 36	.....	.....	.....	.....	
		L.....	21 19 48	.....	.....	.....	.....	
		M.....	21 22 30	.....	* 400	.....	.....	
		M.....	21 47 42	.....	.....	.....	.....	
		F.....	21 51 12	.....	.....	.....	.....	
31	.....	P.....	1 41 48	.....	.....	.....	8,325	A marked disturbance. Long waves continued for a long time. Four distinct maximums recorded. Origin near Kurile Islands.

* Trace amplitude.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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

1915.			H.m.s.	Sec.	μ	μ	Km.	
July 31	.....	S.....	1 51 48	.....	.....	.....	.....	
		L.....	2 01 00	.....	.....	.....	.....	
		L.....	2 05 30	30–18	.....	.....	.....	
		L.....	2 10 36	.....	.....	.....	.....	
		M.....	2 11 42	18–24	*3,400	.....	.....	
		L.....	2 13 54	.....	.....	.....	.....	
		M.....	2 15 06	18	*3,800	.....	.....	
		M.....	2 17 24	.....	*3,200	.....	.....	
		L.....	2 20 42	.....	.....	.....	.....	
		M.....	2 22 06	12–18	*2,800	.....	.....	
		L.....	2 39 36	.....	.....	.....	.....	
		L.....	3 43 48	.....	.....	.....	.....	
		F.....	5 20 48	.....	.....	.....	.....	

* Trace amplitude.

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

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

Instrument: Milne horizontal pendulum, North. In the meridian.

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

1915.			H. m. s.	Sec.	μ	μ	Km.	
July 20	.....	P.....	16 07 48	.....	.....	.....	.....	
		L.....	(?)	.....	.....	.....	.....	
		M.....	16 07 54	.....	* 100	.....	.....	
		F.....	16 12 54	.....	.....	.....	.....	
22	.....	P.....	4 25 54	.....	.....	.....	.....	
		S.....	4 29 54	.....	.....	.....	.....	
		L.....	4 36 24	.....	.....	.....	.....	
		M.....	4 40 54	.....	* 300	.....	.....	
		F.....	4 55 24	.....	.....	.....	.....	
25	.....	P.....	20 59 48	.....	.....	.....	.....	
		S.....	21 01 48	.....	.....	.....	.....	
		L.....	21 02 48	.....	.....	.....	.....	
		M.....	21 31 48	.....	* 500	.....	.....	
		F.....	21 18 18	.....	.....	.....	.....	
31	.....	P.....	1 39 48	.....	.....	.....	3,800	Origin near Kurile Islands.
		S.....	1 46 24	.....	.....	.....	.....	
		L.....	1 50 36	.....	.....	.....	.....	
		M.....	1 57 48	.....	*3,800	.....	.....	
		F.....	5 11 48	.....	.....	.....	.....	

* Trace amplitude

SECTION V.—SEISMOLOGY.

SEISMOLOGICAL REPORTS FOR SEPTEMBER, 1915.

WILLIAM J. HUMPHREYS, Professor in charge of Seismological Investigations.

[Dated: U. S. Weather Bureau, Washington, D. C., Oct. 30, 1915.]

TABLE 1.—*Noninstrumental earthquake reports, September, 1915.*

Day.	Approximate time, Greenwich Civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity Rossi-Forel.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
	H. m.	CALIFORNIA.	° ′	° ′			M. s.			
6	2 20	Mesa Grande	33 11	116 42	4	1	1	Loud		Edward H. Davis.
8	7 42	Point Loma	32 43	117 15	5	1		Rumbling	Swayed buildings	F. J. Dick.
	7 42	San Diego	32 43	117 10	2	1	3			U. S. Weather Bureau.
8	12 45	Coalinga	35 19	120 20	4	2	8			L. Nuckolls.
	12 45	Paso Robles	35 34	120 40	4	1	4			F. W. Sawyer.
	12 45	San Luis Obispo	35 18	120 39	2–3	2	20			U. S. Weather Bureau.
29	13 00	Yorba Linda	33 51	117 50	3	1				W. A. Walker.
		NEBRASKA.								
16	19 00	Kirkwood	42 45	99 17	3	1	30	Loud	Explosion(?)	Mrs. C. Arter.
		NEVADA.								
2	22 42	Gerlach	40 38	119 24	3	1				W. T. Dauterman.
3	0 50	Gerlach	40 38	119 24	4	1	1 00		Swayed buildings	W. T. Dauterman.
3	5 57	Gerlach	40 38	119 24	6	1	3 00		Cracked concrete floor	W. T. Dauterman.
3	9 10	Gerlach	40 38	119 24	3	1	4			W. T. Dauterman.
		UTAH.								
20	1 28	Thistle	40 00	111 36	3	2	6	Rumbling		R. H. Thomas.

TABLE 2.—*Instrumental seismological reports, September, 1915.*

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

[For significance of symbols see this REVIEW, June, 1915, p. 289.]

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: V T$_o$. E 10 16.7; N 10 15.4

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			H. m. s.	Sec.	μ	μ	Km.	
Sept. 7	.....	P_N	1 30 30	7	.....	.....	.....	
		P_E	1 30 40	.....	.....	.....	.....	
		S_N	1 38 01	11	.....	.....	.....	
		S_E	1 38 10	.....	.....	.....	.....	
		L_N	1 48 55	26	.....	.....	.....	
		L_E	1 49 26	28	.....	.....	.....	
		M_E	1 53 10	22	410	.....	.....	
		M_N	2 00 00	18	.....	220	.....	
		C	2 03 00	14	.....	.....	.....	
		F	2 59 00	.....	.....	.....	.....	

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$_o$. E 10 16; N 10 19.6

Date.	Character.	Phase.	Time.	Period. T	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			H. m. s.	Sec.	μ	μ	Km.	
Sept. 7	.....	P	1 26 37	6	.....	.....	.....	
		S_E	1 31 16	12	.....	.....	.....	
		S_N	1 31 30	6	.....	.....	.....	
		L_E	1 35 06	13	.....	.....	.....	
		L_N	1 35 11	11	.....	.....	.....	
		M_E	1 38 23	16	2,280	.....	.....	
		M_N	1 41 42	16	.....	1,170	.....	
		C	1 43 00	14	.....	.....	.....	
		F_N	2 23 00	.....	.....	.....	.....	
		F_E	3 05 00	.....	.....	.....	.....	
	7	e	4 35 21	6	.....	.....	.....	Probably after effect of previous earthquake.
		M_E	4 41 46	14	10	.....	.....	
		M_N	4 44 50	10	.....	10	.....	
		F_E	4 56 00	.....	.....	.....	.....	
		F_N	5 09 00	.....	.....	.....	.....	

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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.

(Instrument out of commission owing to repairs. See noninstrumental report.)

California. *Santa Clara, University of.* 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.* 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.
1915. Sept. 3	.....	eP_N	7 52 00	.....	.....	.....	.....	Nothing on E-W.
		L	7 56 00	.....	.....	.....	.....	
		F	7 59 00	.....	.....	.....	.....	
5	.....	e_E	13 36 00	.....	.....	.....	.....	Only thickening of pen marks on N-S.
		M	13 38 00	.....	.....	.....	.....	
		F	13 40 00	.....	.....	.....	.....	
7	.....	P	1 26 00	.....	.....	.....	.....	S doubtful owing to creases in and overlapping of paper. From 1h 33m on, all the waves are quite broken and irregular.
		S	1 30 00	.....	.....	.....	.....	
		L_E	1 31 00	10	68	.....	.....	
		L_N	1 32 00	10	.....	69	.....	
		M_N	1 33 00	10–12	.....	143	.....	
		M_E	1 35 00	10–12	143	.....	.....	
		C	1 46 00	10–15	25	25	.....	
		F	2 17 00	.....	.....	.....	.....	
								Activity on 13, 16–17, and 25.
27	.....	eL_N	6 57 00	20–30	.....	.....	.....	
		F	6 59 00	.....	.....	.....	.....	

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

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915. Sept. 7	III_r	iP	1 26 32	.....	.....	.....	3,070	Severe earthquake off the Pacific coast of Central America.
		S	1 31 20	.....	.....	.....	.....	
		M_E	1 34 30	.....	364	.....	.....	
		L?	1 35 35	.....	.....	.....	.....	
		L_r	1 37 00	16	.....	.....	.....	
		M_N	1 37 05	.....	.....	500	.....	Many other large maxima. (Pendulum undamped.)
		L_N	1 46 55	12	.....	.....	.....	
		F	.....	.....	.....	.....	.....	F merges in subsequent disturbance.
7	I_r	P	4 29 18	.....	.....	.....	2,910?	
		S	4 33 54	.....	.....	.....	.....	
		L	4 38 38	.....	.....	.....	.....	
		L_r	4 41 30	12	.....	.....	.....	L possibly in part due to circumterrestrial waves from preceding earthquake.
		M_N	4 42 30	.....	.....	.....	.....	
		F	5 00 00	.....	.....	.....	.....	
7	I_r	P	5 04 18	.....	.....	.....	2,990?	
		S	5 09 00	.....	.....	.....	.....	
		L	5 13 36	.....	.....	.....	.....	
		L_r	5 17 30	12	.....	.....	.....	
		F	5 30 00	.....	.....	.....	.....	
7	I_r	P	5 37 22	.....	.....	.....	.....	
		S?	5 41 38	.....	.....	.....	.....	
		L_N	5 46 32	.....	.....	.....	.....	
		F	5 55 00	.....	.....	.....	.....	

District of Columbia. *Washington*—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915. Sept. 7	I_r	P	6 13 36	.....	.....	.....	3,030	
		S	6 18 21	.....	.....	.....	.....	
		L?	.....	.....	.....	.....	.....	L, doubtful.
		F	6 25 00	.....	.....	.....	.....	
7	I_r	P	12 53 42	.....	.....	.....	.....	
		S	12 58 06	.....	.....	.....	.....	
		L	13 07 00	12	.....	.....	.....	
		F	13 30 00	.....	.....	.....	.....	
7	I_r	P	20 45 06	.....	.....	.....	.....	
		S?	20 49 38	.....	.....	.....	.....	
		L	20 54 36	.....	.....	.....	.....	
		L	20 57 20	10	.....	.....	.....	
		F	21 30 00	.....	.....	.....	.....	
12	I_u	P	20 52 17	.....	.....	.....	5,275	
		S	20 59 14	.....	.....	.....	.....	
		L	21 05 36	.....	.....	.....	.....	
		F	.....	.....	.....	.....	.....	F lost in microseisms.

District of Columbia. *Washington. Georgetown University.* F. L. 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 2.6; N 143 5.2 3.4; Z ....

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. μ	Amplitude. μ	Distance.	Remarks.
1915. Sept. 7	III_r	eP_E	1 26 27	4	.....	.....	.....	
		eP_N	1 26 32	4	.....	.....	.....	
		S_E	1 31 12	10	.....	.....	.....	
		S_N	1 31 20	9	.....	.....	.....	
		L_N	1 34 36	40	.....	304	.....	
		L_E	1 34 40	40	345	.....	.....	
		M_E	1 37 11	20	466	.....	.....	
		M_N	1 37 16	20	.....	713	.....	
		F_E	2 2 18	.....	.....	.....	.....	
		F_N	2 45 22	.....	.....	.....	.....	
				VERTICAL.				
		eP	1 26 33		A_Z			
		iP	1 26 44	.....	.....	.....	.....	
		L	1 35 07	10	*17,400	.....	.....	
		M	1 37 24	20	*46,900	.....	.....	
		F	2 46 30	.....	.....	.....	.....	

* Trace amplitude.

Hawaii. *Honolulu. Magnetic Observatory.* U. S. Coast and Geodetic Survey. Wm. W. Merrymon.

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 18.9

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. μ	Amplitude. μ	Distance.	Remarks.
1915. Sept. 3	.....	eL	23 22 18	23	.....	.....	.....	
		M	23 30 18	.....	*200	.....	.....	
		C	23 37 00	.....	.....	.....	.....	
6	.....	S	17 42 54	.....	.....	.....	.....	
		L	17 44 54	21	.....	.....	.....	
		M	17 49 18	.....	*1,200	.....	.....	
		C	17 57 30	.....	.....	.....	.....	
		F	19 07 18	.....	.....	.....	.....	
7	.....	P	1 31 36	.....	.....	.....	.....	
		S	1 40 30	.....	.....	.....	.....	
		M	1 41 12	.....	*4,000	.....	.....	
		L	1 50 48	23	.....	.....	.....	
		M	1 54 06	.....	*3,200	.....	.....	
		M	2 01 24	.....	*3,200	.....	.....	
		C	2 38 24	.....	.....	.....	.....	
		F	6 16 12	.....	.....	.....	.....	
12	.....	eL	0 19 42	.....	.....	.....	.....	
		M	0 42 30	20	*200	.....	.....	
		F	0 59 42	.....	.....	.....	.....	
15	.....	eL	22 26 48	.....	.....	.....	.....	
		M	22 29 12	18	*100	.....	.....	
		F	22 32 36	.....	.....	.....	.....	
28	.....	eL	9 46 48	.....	.....	.....	.....	
		M	9 49 30	18	*100	.....	.....	
		F	9 55 30	.....	.....	.....	.....	

*Trace amplitude.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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: E 177, N 205; T_0: 3.7, 3.7; ε: 4.0, 3.8

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915. Sept. 7	.....	P.....	*H. m. s.* 1 26 13	*Sec.* 2–3	μ 10	μ 28	*Km.*	
		S.....	1 30 38	4–5	35	58	.....	
		L.....	?	20–30	31	19	.....	Beginning of L not discernible.
		F.....	3 00 00	.....	.....	.....	.....	

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: E 10, N 10; T_0: 31, 29

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915. Sept. 7	.....	P.....	*H. m. s.* 1 26 40	*Sec.* 4	μ	μ	*Km.*	
		S.....	1 31 25	6	.....	.....	.....	
		L_N...	1 35 01	12	.....	.....	.....	
		L_E...	1 35 38	13	.....	.....	.....	
		M.....	1 37 12	20	290	[1]700	.....	
		F_E...	2 43 00	.....	.....	.....	.....	
		F_N...	3 05 00	.....	.....	.....	.....	
7	.....	e_N....	4 38 10	10	.....	.....	.....	Probably connected with the preceding earthquake. Nothing on N-S.
		M.....	4 46 55	10	.....	.....	.....	
		F.....	4 57 00	.....	.....	.....	.....	

[1] Amplitude probably greater, as stylus passed off the sheet.

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, undamped (mechanical registration).

(Report for September, 1915, not received.)

Missouri. *Saint Louis. Saint 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.
1915. Sept. 7	III_r	eP_E...	*H. m. s.* 1 26 12	*Sec.*	μ	μ	*Km.* 3,200	
		iP_N...	1 26 36	.....	.....	.....	.....	
		$PR2_N$.	1 27 06	.....	.....	.....	.....	
		iS.....	1 31 00	.....	.....	.....	.....	
		L.....	1 33 12	.....	.....	.....	.....	
		M_E....	1 36 30	.....	20	.....	.....	
		M_N....	1 37 00	.....	.....	28	.....	
		F.....	2 10 00	.....	.....	.....	.....	
7	.....	e_N....	4 28 54	.....	.....	.....	.....	
		F.....	4 53 00	.....	.....	.....	.....	
7	.....	e_N....	5 04 00	.....	.....	.....	.....	
		F.....	5 23 00	.....	.....	.....	.....	
7	.....	e_N....	12 52 48	.....	.....	.....	.....	
		F.....	13 14 00	.....	.....	.....	.....	
7	.....	e_N....	20 46 36	.....	.....	.....	.....	
		F.....	21 06 00	.....	.....	.....	.....	

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

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915. Sept. 7	II_r	eP_N...	*H. m. s.* 1 24 26	*Sec.*	μ	μ	*Km.* 4,000	Reported in Central America.
		eP_E...	1 24 30	.....	.....	.....	.....	
		S.....	1 29 30	6	.....	.....	.....	
		L_N...	1 32 40	38	.....	125	.....	
		L_E...	1 32 50	45	125	.....	.....	
		M_E....	1 34 00	10	625	.....	.....	
		M_N....	1 35 00	.....	.....	150	.....	Amplitude of N-S pen limited.
		C_E....	1 35 00	.....	.....	.....	.....	
		F_N....	2 08 00	.....	.....	.....	.....	
		F_E....	2 53 00	.....	.....	.....	.....	
24	.....	.....	.....	.....	.....	.....	.....	Tremors on E–W.
27	.....	.....	.....	.....	.....	.....	.....	Tremors on E–W.

New York. *Fordham. Fordham University.* W. C. Repetti, 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: 7.2, 7.2; ε: 1.5:1, 3.8:1

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915. Sept. 6	.....	L_N....	*H. m. s.* 18 37 30	*Sec.*	μ	μ	*Km.*	
7	.....	iP_N...	1 22 27	5	.....	.....	.....	
		iS.....	1 27 37	.....	.....	.....	.....	
		L_N...	1 31 01	.....	.....	.....	.....	
		L_E...	1 31 21	.....	.....	.....	.....	
		M_E....	1 34 31	15	583	.....	.....	
		M_N....	1 34 36	12	.....	444	.....	
		F_E....	2 20 00	.....	.....	.....	.....	
		F_N....	2 55 00	.....	.....	.....	.....	
7	.....	L_N....	4 37 00	.....	.....	.....	.....	

Panama Canal Zone. *Balboa Heights.* Isthmian Canal Commission.

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

Instruments: Two Bosch-Omori, 100 kg.

Instrumental constants.. V: 10; T_0: 20

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915. Sept. 7	III_r	P_E....	*H. m. s.* 1 23 19	*Sec.*	μ	μ	*Km.* 1,210	Direction NW.
		L_N....	1 23 26	.....	.....	.....	.....	
		S_N....	1 25 45	.....	.....	.....	.....	
		S_E....	1 25 48	.....	.....	.....	.....	
		L_N....	1 26 58	.....	.....	.....	.....	
		L_E....	1 26 59	.....	.....	.....	.....	
		M_E....	1 27 33	.....	2,300	.....	.....	
		M_N....	1 27 52	.....	.....	3,150	.....	
		F_E....	2 23 16	.....	.....	.....	.....	
		F_N....	2 24 18	.....	.....	.....	.....	
17	I_d	P.....	6 14 10	.....	.....	.....	300	Direction SW?
		L.....	6 14 46	.....	.....	.....	.....	
		M_E....	6 14 50	.....	20	.....	.....	
		M_N....	6 15 00	.....	.....	20	.....	
		F.....	6 16 30	.....	.....	.....	.....	
20	I_d	P.....	1 09 38	.....	.....	.....	240	
		L.....	1 10 06	.....	.....	.....	.....	
		M_E....	1 10 10	.....	50	.....	.....	
		M_N....	1 10 11	.....	.....	80	.....	
		F_E....	1 11 20	.....	.....	.....	.....	
		F_N....	1 11 38	.....	.....	.....	.....	
23	I_d	P_E....	7 54 46	.....	.....	.....	170	Direction probably SW.
		P_N....	7 54 52	.....	.....	.....	.....	
		L_E....	7 55 04	.....	.....	.....	.....	
		L_N....	7 55 10	.....	.....	.....	.....	
		M_E....	7 55 04	.....	200	.....	.....	
		M_N....	7 55 14	.....	.....	300	.....	
		F_E....	7 56 35	.....	.....	.....	.....	
		F_N....	7 56 40	.....	.....	.....	.....	

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

Porto Rico. *Vieques. Magnetic Observatory.* U. S. Coast and Geodetic Survey. H. M. Pease.

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

Instruments: Two Bosch-Omori.

	V	T_0
Instrumental constants.. E	10	21.4
N	10	21.1

1915.			H. m. s.	Sec.	μ	μ	Km.	
Sept. 7	.....	P.....	1 25 57	7	.....	.....	.....	N-S not recording.
		S.....	1 27 57	5	.....	.....	.....	
		L.....	1 30 15	9	.....	.....	.....	
		M.....	1 34 53	10	[1] 750	.....	.....	
		C.....	1 50 00	9	.....	.....	.....	
		F.....	2 18 00	.....	.....	.....	.....	

[1] Maximum amplitude probably greater, as the stylus went off the paper.

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.

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

1915.			H. m. s.	Sec.	μ	μ	Km.	
Sept. 7	III,	P.....	1 27 24	.....	.....	.....	3,435	
		S.....	1 32 37	.....	.....	.....	.....	
		L.....	1 36 38	.....	.....	.....	.....	
		M_N.....	1 43 00	.....	.....	160	.....	
		M_E.....	1 44 00	.....	[1] 600	.....	.....	
		F.....	4 00 00	.....	.....	.....	.....	
7	.....	P?.....	4 31 19	.....	.....	.....	.....	
		e_N.....	4 38 20	.....	.....	.....	.....	
		L_N.....	4 46 30	.....	.....	.....	.....	
		F.....	5 00 00	.....	.....	.....	.....	
12	.....	M.....	20 59 30	.....	.....	.....	.....	Disturbance slight; phases uncertain.
		F.....	21 20 00	.....	.....	.....	.....	

[1] Approximate, pen ran off sheet.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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

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

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

	V	T_0
Instrumental constants..	120	26

1915.			H. m. s.	Sec.	μ	μ	Km.	
Sept. 6	.....	e.....	17 50 27	.....	.....	.....	.....	
		L_E.....	17 54 00	20	.....	.....	.....	
		L_E.....	18 00 00	20	.....	.....	.....	
		L_N.....	18 15 00	12	.....	.....	.....	
		L.....	18 25 to 18 54 00	20–14	.....	.....	.....	
		F.....	19 15 00	.....	.....	.....	.....	
7	.....	P.....	1 27 27	2	.....	.....	3,750	
		PR1...	1 27 58	.....	.....	.....	.....	
		S.....	1 33 00	.....	.....	.....	.....	
		L.....	1 36 06	40	.....	.....	.....	
		M_N.....	1 40 06	30	.....	1,830	.....	
		M_E.....	1 39 to 1 40 30	30	1,800	.....	.....	
		L.....	1 51 00	40	.....	.....	.....	
		L.....	2 03 00 to 2 55 00	16–13	.....	.....	.....	
		F.....	.....	.....	.....	.....	.....	F merges in another quake.
			VERTICAL.					
						A_Z		
		eP....	*1 27 29*	.....	.....	.....	.....	
		iP....	*1 27 38*	.....	.....	.....	.....	
		eL....	*1 36 50*	.....	.....	.....	.....	
		L.....	*1 39 00*	*24*	.....	.....	.....	
		M.....	*1 40 30*	*26*	*3,600*	.....	.....	
		L.....	*1 50 00*	*12*	.....	.....	.....	
		F.....	*1 55 00*	.....	.....	.....	.....	
7	.....	P.....	4 35 27	.....	.....	.....	3,750?	
		L.....	4 44 00	12	.....	.....	.....	
		L.....	4 48 00	12	.....	.....	.....	
		F.....	5 10 00	.....	.....	.....	.....	
7	.....	P.....	5 10 30	.....	.....	.....	3,750?	
		L.....	5 19 00	15–13	.....	.....	.....	
		L.....	5 26 00	13	.....	.....	.....	
		F.....	5 35 00	.....	.....	.....	.....	
7	.....	e_E?...	12 55 31	.....	.....	.....	3,750?	
		i_N....	12 59 50	.....	.....	.....	.....	
		L.....	13 07 00	20–15	.....	.....	.....	
		F.....	13 25 00	.....	.....	.....	.....	
7	.....	P.....	20 46 04	.....	.....	.....	3,750?	P and S not pronounced.
		S_N....	20 51 26	.....	.....	.....	.....	
		S_E....	20 51 48	.....	.....	.....	.....	
		L_E....	20 54 30	10	.....	.....	.....	
		L.....	20 54 48	10	.....	.....	.....	
		L.....	21 00 00	20–13	.....	.....	.....	
		L.....	21 06 00	16–14	.....	.....	.....	
		F.....	21 20 00	.....	.....	.....	.....	
8	.....	eL_E...	12 48 00	12	.....	.....	.....	
		eL_N...	12 52 00	12	.....	.....	.....	
12	.....	P.....	20 52 39	2	.....	.....	5,530	
		S.....	20 59 50	6	.....	.....	.....	
		eL.....	21 05 06	20	.....	.....	.....	
		L.....	21 08 00	20	.....	.....	.....	
		F.....	21 25 00	.....	.....	.....	.....	

SECTION V.—SEISMOLOGY.

SEISMOLOGICAL REPORTS FOR OCTOBER, 1915.

By W. J. HUMPHREYS, Professor in charge of Seismological Investigations.

[Dated: Weather Bureau, Washington, D. C., Dec. 1, 1915.]

TABLE 1.—*Noninstrumental earthquake reports, October, 1915.*

Day.	Approximate time, Greenwich Civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity Rossi-Forel.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
		CALIFORNIA.								
	H. m.		° ′	° ′			M. s.			
1	15 26	Livermore	37 40	121 45	2	1				E. G. Still.
	15 26	Oakland	37 47	122 15	2	1	2		Chandeliers swayed	Chas. Burckhalter.
	15 26	Petaluma	38 15	122 38	4–5	2				John Landis.
	15 26	San Francisco	37 48	122 26	3	1	5	Rattling		U. S. Weather Bureau.
	15 26	do	37 47	122 26						Dominican Sisters.
	15 26	San Jose	37 20	121 54	2	1	3			U. S. Weather Bureau.
3	1 50	Camptonville	39 23	121 04	4	1	30			Elmer Hall.
3	6 56	Alturas	41 32	120 30						C. B. Towle.
	6 56	Bridgeport	38 18	119 15	4	2				A. F. Scott.
	6 56	Camptonville	39 23	121 04	4	1				Elmer Hall.
	6 56	Chester	40 18	121 15	2	2				O. W. Olson.
	6 56	Chico	39 40	121 40	2	2	30			R. L. Beagles.
	6 56	Coleville	38 36	119 32	4	1				F. W. Chichester.
	6 56	Colgate	39 22	121 14	2	1				M. P. Werry.
	6 56	Colusa	39 12	122 00	5	2				C. D. McComish.
	6 56	De Sabla	39 50	121 37		1	15	Rattling		C. B. Adams.
	6 56	Donner	39 17	120 21		1	5			E. F. Stewart.
	6 56	Fort Bidwell	41 51	120 08	4–5	1	1 00		Many awakened by shock	C. R. Decious.
	6 56	Fresno	36 43	119 49	3	2	10		Windows rattled	U. S. Weather Bureau.
	6 56	Gold Run	39 12	120 50	2	1				O. E. Collins.
	6 56	Lathrop	37 51	121 17	4	1	20			O. A. Seamands.
	6 56	Lindsay	36 13	119 06	2					Basil Prior.
	6 56	Lonoak	36 20	122 00	2	1				M. L. Griffin.
	6 56	McCloud	41 17	122 09	3	1			Windows rattled	F. A. Thomas.
	6 56	Markleeville	38 42	119 46	1	1	20	Rumbling		Mary Thornburg.
	6 56	Magalia	39 45	121 36		1	1 00			H. S. Conan.
	6 56	Nevada City	39 17	121 01						S. W. Marsh.
	6 56	Oroville	39 29	121 39						E. D. Fairchild.
	6 56	Sacramento	38 35	121 30	5	3	18			U. S. Weather Bureau.
	6 56	San Jose	37 20	121 54	5	1	5		Clocks stopped	U. S. Weather Bureau.
	6 56	Stockton	37 57	121 22	2	1				E. P. Higby.
	6 56	Tallac	38 56	120 03						W. D. Sloan.
	6 56	Woodfords	38 47	119 49	5	2	14	Faint		G. P. Merrill.
8	3 02	Sebastopol	38 23	122 46	3	1	5	Rumbling	A few awakened by shock	E. H. Parnell.
8	5 25	Oakland	37 47	122 15	4	3	1	Rattling		Chas. Burckhalter.
	5 25	Petaluma	38 15	122 38	4	1		Rumbling		John Landis.
	5 25	Sebastopol	38 23	122 46	3	1				E. H. Parnell.
	5 25	San Francisco	37 48	122 27	4	2	10			U. S. Weather Bureau.
	5 25	Tamalpais	37 56	122 35	3	1	10			U. S. Weather Bureau.
8	5 35	Oakland	37 47	122 15	3	1	2	Rattling		Chas. Burckhalter.
	5 35	San Francisco	37 48	122 27	2	1	2			U. S. Weather Bureau.
8	21 20	Petaluma	38 15	122 38	4	1				John Landis.
10	5 06	Seven Oaks	34 05	117 12	4–5	1	2			E. N. Munns.
20	8 15	New Meadows	44 57	116 18	2	1				Lee Highley.
22	6 18	Oakland	37 47	122 15	3	1	2	Rattling		Chas. Burckhalter.
24	5 26	Holcomb Valley	34 17	117 05						J. McHenry.
		KENTUCKY.								
26	7 40	Mayfield	36 45	88 38	5	1	3	Rumbling		W. L. Hale.
		MICHIGAN.								
4	14 02	Calumet	47 13	88 26	3	1	1		Shook pictures off walls	E. S. Grierson.
		NEVADA.								
2	23 41	Fallon	39 30	118 48	2	1	10			E. W. Curtis.
	23 41	Gerlach	40 38	119 24	6	1	1 00		Clocks stopped	W. T. Dauterman.
	23 41	Reno	39 32	119 49	1	1	4			U. S. Weather Bureau.
	23 41	Unionville	40 28	118 09	4	1				Jane Hatton.
	23 41	Virginia City	39 14	119 40	1	1				F. O'Connor.
	23 41	Yerington	38 58	119 11	3		2			Carlton Hieronymus.
3	1 50	Austin	39 31	117 05	4	1	10			U. S. Forest Service.
	1 50	Fallon	39 30	118 48	5	1	30	Faint	Some clocks stopped	E. W. Curtis.
	1 50	Reno	39 32	119 49	3	1	4		Few clocks stopped	U. S. Weather Bureau.
	1 50	Sand Pass	40 15	119 48	5	1	30			R. R. Mott.
	1 50	Unionville	40 28	118 09	5	1				Jane Hatton.
	1 50	Virginia City	39 14	119 40	5	1			Chandeliers swayed	F. O'Connor.
	1 50	Yerington	38 58	119 11	2	1	2			Carlton Hieronymus.
3	6 56	Arthur	40 32	115 21	7	2	17	Loud	Some walls cracked	Isaac Woodhouse.
	6 56	Austin	39 31	117 05	5	1	30	Loud		U. S. Forest Service.
	6 56	Battle Mountain	40 40	116 57			22	Rumbling		C. C. Carlson.
	6 56	Beowawe	40 36	116 29	6			Rumbling		L. Grebene.

TABLE 1.—*Noninstrumental earthquake reports, October, 1915*—Continued.

Day.	Approximate time, Greenwich Civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity Rossi-Forel.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
		NEVADA—continued.								
	H. m.		° ′	° ′			*M. s.*			
3	6 56	Caliente	37 35	114 26			30			J. L. Denton.
	6 56	Carson City	39 11	119 48	3-4	1	30			Annie Martin.
	6 56	East Cherry Creek	39 43	114 51	4	1			Shook beds violently	J. H. Leishman.
	6 56	Elko	40 51	115 45	5	6				Western Pacific Co.
	6 56	Eureka	39 23	115 59	7	8		Rattling		Clay Simms.
	6 56	Fallon	39 30	118 48	7					E. W. Curtis.
	6 56	Golconda	40 58	117 30	7					E. W. Merrill.
	6 56	Golconda	40 58	117 30	7	4		Rumbling	Some walls cracked	D. H. Pettingell.
	6 56	Gold Creek	41 42	115 43	6	2	1 15	Rumbling	Clocks stopped	U. S. Forest Service.
	6 56	Halleck	40 54	115 28	6	3				R. C. Simms.
	6 56	Las Vegas	36 09	115 09	3	1	2			C. P. Squires.
	6 56	Lida	37 21	117 24	5	2	20			L. F. Detwiler.
	6 56	Lovelocks	40 11	118 30	8		30	Rumbling	Water tanks wrecked	W. C. Watson.
	6 56	McGill	39 19	114 48	6	2	1 00		Clocks stopped	R. E. Middagh.
	6 56	Millett	39 01	117 15	7	3		Rumbling	Plaster fell	F. J. Jones.
	6 56	Mina	38 24	118 06	5	1				G. L. Eckley.
	6 56	Mount Rose	39 16	119 55	6	1				Prof. Baker.
	6 56	North Fork	41 24	115 50	5-6	5		Rumbling		Charles Pratt.
	6 56	Rebel Creek	41 39	117 45	5			Rumbling		F. Whitaker.
	6 56	Reno	39 32	119 49	6		45	Rumbling		U. S. Weather Bureau.
	6 56	San Jacinto	41 53	114 42	5	2	20			J. S. Parmley.
	6 56	Sharp	38 07	115 28	5	2	4			F. A. Sears.
	6 56	Tecoma	41 14	114 05	5	2	30	Rumbling		W. E. Smith.
	6 56	Tonopah	38 04	117 14	6	1	10		Clocks stopped	U. S. Weather Bureau.
	6 56	Unionville	40 28	118 09	8			Rumbling	Cracks formed in earth	Jane Hatton.
	6 56	Virginia City	39 14	119 40	4	3				F. O'Connor.
	6 56	Vya	41 34	119 53	2	3		Faint		W. N. Lord.
	6 56	Winnemucca	40 58	117 43	8	1	30		Many thrown out of bed	U. S. Weather Bureau.
	6 56	Yerington	38 58	119 11	5-6	3	6		Some clocks stopped	Carlton Hieronymus.
3	8 45	Garrison			4	1	30			E. M. Smith.
15	20 21	Fallon	39 30	118 48	2	1	5			E. W. Curtis.
	20 21	Gerlach	40 38	119 24	4	1	1 00			W. T. Dauterman.
	20 21	Winnemucca	40 58	117 43	3					U. S. Weather Bureau.
20	2 34	Fallon	39 30	118 48	3	1	10			F. B. Headley.
23	4 09	Fallon	39 30	118 48	2	1	5			F. B. Headley.
		NORTH CAROLINA.								
29	5 45	Asheville	35 36	82 32	4	1	15		Shook buildings	U. S. Weather Bureau.
		OKLAHOMA.								
8	16 50	Muskogee	35 45	95 16	3	1	10	Rumbling	(Explosion?)	L. B. Smith.
		OREGON.								
3	6 56	Baker	44 46	117 50	6	1	30		A few walls cracked	U. S. Weather Bureau.
	6 56	Beckley	42 40	119 05	4-5		10		Many awakened by shock	O. T. Stuart.
	6 56	Burns	43 35	119 04	3	1				J. C. Welcome, jr.
	6 56	Lakeview	42 12	120 20	4	2				C. C. Gott.
	6 56	Sunrise Valley	43 08	118 09	4	2				W. R. Gardner.
	6 56	Valley Falls	42 32	120 15		1				E. H. Meyer.
20	7 30	Fruita	45 20	116 46		1				H. J. Neiman.
		SOUTH DAKOTA.								
23	7 05	Kadoka	43 48	101 30	5	1		Loud	Earth cracked open. (Collapse of cavern roof?)	John Bush.
		UTAH.								
2	23 41	Salt Lake City	40 46	111 54	1-2	1				U. S. Weather Bureau.
3	1 50	Salt Lake City	40 46	111 54	2	2	4			U. S. Weather Bureau.
3	6 56	Corinne	41 34	112 07	2	1				A. C. Murphy.
	6 56	Garland	41 45	112 11	4	1			Dishes rattled	J. W. Roberts.
	6 56	Grantville	40 37	112 27	4	1				Monto Barrus.
	6 56	Grouse Creek	41 43	113 55	5	3	5	Rumbling		Philip Paskett.
	6 56	Kelton	41 45	113 06	5	2	30			F. W. Clock.
	6 56	Lucin	41 22	113 54	6	1	30		Some clocks stopped	E. C. Puryear.
	6 56	Midvale	40 36	111 53	5	2	5	Rumbling		E. D. Camomile.
	6 56	Modena	37 48	113 54	2					Mr. Wood.
	6 56	New Castle	37 40	113 30		1	3			R. E. Griffiths.
	6 56	Ogden	41 14	111 58	5	1		Rumbling		R. E. Shorten.
	6 56	Promontory Point	41 13	112 27		1				M. H. Compson.
	6 56	Reed	38 35	113 10	5	1	10			D. N. Hickman.
	6 56	Salt Lake City	40 46	111 54	6	1	30	Rumbling	Some clocks stopped	U. S. Weather Bureau.
	6 56	Snowville	42 00	112 43	4-5	2				J. C. Cutler.
	6 56	Standrod	42 00	113 26	5	1				T. B. Jones.
4	12 00	Clarkston	41 55	112 04	2	1		Rumbling		W. J. Griffiths.
5	8 00	Ibapah	40 04	114 00	6	1		Rumbling	Clocks were stopped	A. B. Reagon.
25	17 13	Joseph	38 37	112 18	1-2	1	3			S. E. Henri.
		WYOMING.								
17	3 06	Yellowstone Park	44 20	110 20	2	1	1			C. M. Moore.
		PORTO RICO.								
11	19 35	Isabela	18 30	67 04	5	1	4			W. M. Orr.
	19 35	Lares	18 33	66 55	5	1	5	Rumbling		Paul Vilella, jr.
	19 35	San Juan	18 29	66 07	5	1			Some clocks stopped	U. S. Weather Bureau.

TABLE 2.—*Instrumental reports, October, 1915.*

[Time used: Mean Greenwich, midnight to midnight. Nomenclature: International.]

[For significance of symbols see this REVIEW, June, 1915, p. 289.]

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: V E 10, N 10; T_0 E 17.4, N 15.6

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*Km.*	
Oct. 3	.....	P_E	6 58 09	5	.....	.....	.....	
		P_N	6 58 12	9	.....	.....	.....	
		S_E	7 01 57	12	.....	.....	.....	
		S_N	7 01 58	16	.....	.....	.....	
		L_N	7 04 33	22	.....	.....	.....	
		L_E	7 04 42	24	.....	.....	.....	
		M_N	7 04 52	17	.....	*5,850	.....	
		M_E	7 05 02	20	*4,650	.....	.....	
		C	7 14 00	10	.....	.....	.....	
		F_N	8 15 00	.....	.....	.....	.....	
		F_E	8 28 00	.....	.....	.....	.....	

* Trace amplitude.

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 E 10, N 10; T_0 E 16, N 19.6

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*Km.*	
Oct. 2	.....	eP	23 44 35	3	.....	.....	.....	
		M	23 45 55	5	60	20	.....	
		F	23 51 00	.....	.....	.....	.....	
3	.....	eP	1 52 56	4	.....	.....	.....	
		L	1 53 46	6	.....	.....	.....	
		M	1 53 56	7	330	250	.....	
		C	1 56 19	6	.....	.....	.....	
		F	2 08 00	6	.....	.....	.....	
3	.....	P_E	6 55 40	4	.....	.....	.....	
		P_N	6 55 22	5	.....	.....	.....	
		L_N	6 58 21	11	.....	.....	.....	
		L_E	6 58 25	7	.....	.....	.....	
		M_E	6 59 39	9	430	.....	.....	Stylus went off paper.
		M_N	6 59 58	5	.....	490	.....	
		C_N	7 06 18	7	.....	.....	.....	
		C_E	7 13 18	10	.....	.....	.....	
		F_N	8 11 00	.....	.....	.....	.....	
		F_E	8 50 00	.....	.....	.....	.....	
12	.....	P_E	2 24 14	4	.....	.....	.....	No distinct record on N–S.
		M	2 24 44	5	10	.....	.....	
		F	2 29 29	.....	.....	.....	.....	
28	.....	P	16 05 13	4	.....	20	.....	
		M_N	16 05 50	3	.....	.....	.....	
		M_E	16 06 55	4	30	.....	.....	
		F	16 11 00	.....	.....	.....	.....	

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.

1915.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*Km.*	
Oct. 4	.....	.....	.....	.....	*600	*600	.....	All of these tremors occurred at unknown hours being recorded during the 24 hours preceding 15h on dates given. No perceptible shocks were felt.
8	.....	.....	.....	.....	*200	*200	.....	
10	.....	.....	.....	.....	*400	*600	.....	
12	.....	.....	.....	.....	*300	*300	.....	
15	.....	.....	.....	.....	*400	*600	.....	
16	.....	.....	.....	.....	*300	*300	.....	
17	.....	.....	.....	.....	*400	*600	.....	
20	.....	.....	.....	.....	*200	*100	.....	
22	.....	.....	.....	.....	*200	*200	.....	
25	.....	.....	.....	.....	*200	*300	.....	
29	.....	.....	.....	.....	*100	*100	.....	

* Amplitude on instrument.

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

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

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

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

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

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

1915.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*Km.*	
Oct. 2	I_V...	P_E	23 42 00	.....	.....	.....	.....	P not discernible on N–S. Nevada earthquake.
		S_E	23 44 00	.....	.....	.....	.....	
		M	23 45 00	8	25	25	.....	
		F	23 50 00	.....	.....	.....	.....	
3	I_V...	M_E	1 53 00	15–20	35	.....	.....	P and S not discernible. Nevada earthquake.
		M_N	1 53 00	1–4	.....	68	.....	
		C	1 56 00	.....	.....	.....	.....	
		F	2 03 00	.....	.....	.....	.....	
3	III$_V$.	L_E	6 56 00	10–12	112	.....	.....	P and S not discernible. Periods of M doubtful, owing to pens jumping off the paper. Amplitudes of M doubtful owing to safety stops—probably larger.
		L_N	6 56 30	10–12	.....	62	.....	
		M_E	6 57 30	8–12	687	.....	.....	
		M_N	6 58 00	8–12	.....	537	.....	
		C	7 19 00	8	.....	.....	.....	
		F	7 48 00	.....	.....	.....	.....	
7	.....	.....	.....	.....	.....	.....	.....	Very small sinusoidal waves at times.
23	.....	.....	.....	.....	.....	.....	.....	Intermittent activity on E–W.

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

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

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

Instrumental constants.. V 110, T_0 6

1915.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*Km.*	
Oct. 2	I_V...	S	23 56 15	.....	.....	.....	.....	P lost in microseisms. No record obtained on E-W component for this and the next two earthquakes.
		M	23 57 35	.....	.....	18	.....	
		L?	23 57 41	.....	.....	.....	.....	
		M	23 59 50	.....	.....	14	.....	
3	.....	F	0 20 00	.....	.....	.....	.....	
3	I_V...	P	.....	.....	.....	.....	.....	P uncertain.
		S	2 04 49	.....	.....	.....	.....	
		M	2 05 45	.....	.....	.....	.....	
		L	2 07 49	14	.....	.....	.....	
		F	2 35 00	.....	.....	.....	.....	

TABLE 2.—*Instrumental reports, October, 1915*—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
District of Columbia. *Washington*—Continued.								
1915. Oct. 3	III$_r$	P	*H. m. s.* 6 59 37	*Sec.*	μ	μ	*Km.* 3,360	Many large maxima from 7h 09m to 7h 37m. Stylus ran off sheet. Severe earthquake in Nevada.
		S	7 04 45					
		L	7 07 29					
		F	8 50 00					
11	I$_u$	P	2 46 38				5,400	
		S	2 53 42					
		F	3 20 00					
11	II$_r$	P	19 37 49				2,340	Felt in Porto Rico.
		S	19 41 41					
		M	19 42 40			41		
		L	19 45 19	16				
		F	20 50 00					
12	I$_r$	P	2 22 42				2,400	
		S	2 26 39					
		L	2 30 05	14				
		F	2 50 00					
22		e	5 08 29					Phases indistinct, lost in microseisms.
		M	5 09 29					
28		e	16 19 00					Phases indiscernible.
		F	16 25 00					

District of Columbia. *Washington. Georgetown University.*

F. L. 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	2.6
N	143	5.2	3.4
Z	*80*	*5.0*	*0*

1915. Oct. 2	I$_r$	eP_N?	*H. m. s.* 23 55 23	*Sec.*	μ	μ	*Km.*	P_E not discernible.
		S_E	23 55 46					
		S_N	23 56 18	5				
		L_N	23 57 19					
		L_E?	23 58 31					
		L_E	23 59 51					No distinct maximum.
3		F_N	0 05 44					
		F_E	0 07 19					
3	I$_r$	eP_N	1 59 41					S_N and S_E doubtful.
		eP_E	2 01 21					
		L_N	2 05 19	12				
		L_E	2 07 38	9				
		F_N	2 15 20					
		F_E	2 20 19					
3	III$_r$	eP_E?	6 59 44	5				P masked in microseisms. Reported in Nevada, Utah, Idaho, and Oregon.
		eP_N?	6 59 47	5				
		iS_E	7 04 41	12				
		S_N	7 04 43	10				
		L_N	7 08 45	12				
		M_N	7 09 46	9		102		
		L_E	7 10 01	12				
		M_N	7 10 20	9		150		
		M_E	7 12 41	9	78			
		M_E	7 12 52	9	81			
		F_E	8 46 31					
		F_N	8 48 13					
			VERTICAL. (A_Z)					
		M	*7 10 18*	*9*	**5,500*			
		M	*7 18 30*	*8*	**9,600*			
		F	*7 20 04*					
11	II$_r$	iP_N	19 37 53	4				
		P_E	19 37 55	4				
		S_N	19 41 51	7				
		S_E	19 42 03	6				
		L_N	19 45 11	9-10				
		L_E	19 45 54	10				
		M_N	19 47 56	10		3		
		M_E	19 48 20	10	2			
		F_E	20 17 08					
		F_N	20 23 13					

*Trace amplitude.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

Hawaii. *Honolulu. Magnetic Observatory.* U. S. Coast and Geodetic Survey. Wm. W. Merrymon.

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 18.8

1915. Oct. 3		eL	*H. m. s.* 2 05 36	*Sec.*	μ	μ	*Km.*	
		M	2 10 00	18	*100			
		F	2 20 00					
3		P	7 01 30					
		L	7 10 12	23				
		M	7 12 24		*6,100			
		C	8 48 06					
		F	10 40 24					
5		P	13 57 18					
		M	14 04 36	19	*500			
		C	14 09 36					
		F	15 04 12					
8		e	15 54 12					
		L	15 59 12					
		M	15 59 42	18	*200			
		C	16 07 06					
		F	16 22 12					
10		eL	6 15 18	23				
		M	6 21 24		*200			
		F	6 37 12					
10		e	10 32 54					
		M	10 37 48	20	*100			
		F	10 43 00					
11		e	16 34 42					
		M	16 41 00		*200			
		F	16 45 18					
11		e	20 14 36					
		M	20 21 42		*400			
		F	21 38 00					
12		e	21 45 48					
		M	21 46 42		*400			
		C	21 50 54					
		F	22 46 30					
23		L	12 15 00	22				
		M	12 20 12		*600			
		C	12 22 42					
		F	12 35 42					

* Trace amplitude.

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

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

Instrument: Wiechert.

Instrumental constants..	V	T_0	ϵ
E	177	3.4	4.0
N	205	3.4	3.8

1915. Oct. 2		P	*H. m. s.* 23 41 51	*Sec.*	μ	μ	*Km.*	
		P	23 44 00					
		S	23 47 19					
		L?	23 49 18					
		M		10–12	3	6		
3		F	0 08 00					
3		P_E	1 51 57					
		P_E	1 52 26					
		S	1 55 42					
		S	1 57 24	2- 3				
		L_N	1 57 43	10–15				
		M_N	1 58 27			9		
		L_E	1 59 21	8–10				
		M_E	1 59 41		7			
		F	2 12 00					
3		P	6 57 20		16			
		PM		3- 4	37	7		
		S	7 00 38					
		SM		4- 8	37	22		
		L_N	7 01 51					
		L_E	7 02 05					
		M_N	7 04 00			278		N-S needle thrown from bearings.
		M_E	7 05 10		260			
		F	8 44 00					

TABLE 2.—*Instrumental reports, October, 1915*—Continued.

Kansas. *Lawrence. University of Kansas*—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915. Oct. 11	.....	P_E?.....	*H. m. s.* 19 33 29	*Sec.*	μ	μ	*Km.*	Slight tremors preceded first identified primary wave. Phases very indistinct.
		P_N?.....	19 33 49	.....	.....	.....	.....	
		S_E?.....	19 39 12	2- 3	.....	.....	.....	
		S_N?.....	19 39 19	2- 3	.....	.....	.....	
		L_E.....	19 40 03	2- 3	.....	.....	.....	
		P_N?.....	19 42 13	.....	.....	.....	.....	
		S_E.....	19 45 26	3- 5	.....	.....	.....	
		S_N.....	19 46 01	3- 5	.....	.....	.....	
		L_E?.....	19 47 01	.....	.....	.....	.....	
		L_N.....	19 48 01	10-20	.....	.....	.....	
		F_N.....	21 00 00	.....	.....	.....	.....	

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	31
	N	10	29

1915.			*H.m.s.*	*Sec.*	μ	μ	*Km.*	
Oct. 2	.....	eP.....	23 55 36	.....	.....	.....	.....	
		L.....	23 56 46	.....	.....	.....	.....	
		M.....	23 56 51	.....	10	10	.....	
		C.....	24 00 00	.....	.....	.....	.....	
3		F.....	0 02 09	.....	.....	.....	.....	
3	.....	eP_E.....	2 04 44	.....	.....	.....	.....	
		eP_N.....	2 04 57	.....	.....	.....	.....	
		M_N.....	2 05 41	4	.....	10	.....	
		M_E.....	2 06 56	6	10	.....	.....	
		F.....	2 20 00	.....	.....	.....	.....	
3	.....	P_E.....	6 59 09	4	.....	.....	.....	
		P_N.....	6 59 37	4	.....	.....	.....	
		S_E.....	7 04 17	12	.....	.....	.....	
		S_N.....	7 04 51	12	.....	.....	.....	
		L.....	7 09 17	21	.....	.....	.....	
		M.....	7 10 01	10	392	550	.....	
		C.....	7 18 00	10	.....	.....	.....	
		F.....	8 05 00	.....	.....	.....	.....	
11	.....	P.....	19 38 03	3	.....	.....	.....	
		L.....	19 41 51	11	.....	.....	.....	
		M_E.....	19 42 00	8	40	.....	.....	
		M_N.....	19 48 33	12	.....	40	.....	
		C.....	19 49 00	12	.....	.....	.....	
		F.....	20 05 00	.....	.....	.....	.....	

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.

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

Instrumental constants..		*V*	T_0	e:1
	E	80	23	0
	N	50	25	4:1

1915.			*H.m.s.*	*Sec.*	μ	μ	*Km.*	
Oct. 2	.....	*O*?.....	.....	.....	.....	.....	.....	
		e.....	23 58 12	.....	.....	.....	.....	e in microseisms.
		S.....	23 59 55	6	.....	.....	.....	N–S component out of commission.
3		L.....	0 01 22	8-10	.....	.....	.....	
		F.....	0 05 52	.....	.....	.....	.....	
3	.....	*O*?.....	.....	.....	.....	.....	.....	
		e_E.....	2 03 17	.....	.....	.....	.....	e in microseisms.
		S.....	2 06 35	.....	.....	.....	.....	
		L.....	2 08 50	10-12	.....	.....	.....	
		F.....	2 25 22	.....	.....	.....	.....	
3	.....	*O*?.....	*6 58 18*	.....	.....	.....	3,780	*O* from S–P by tables furnished by Dr. Klotz.
		eP_E.....	7 00 06	.....	.....	.....	.....	
		S.....	7 05 40	22	.....	.....	.....	
		eL.....	7 10 36	.....	.....	.....	.....	
		M.....	7 12 11	.....	.....	.....	.....	
		F.....	8 57 00	.....	.....	.....	.....	

Massachusetts. *Cambridge. Harvard University*—Continued.

1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Oct. 11	.....	*O*?.....	*19 23 55*	.....	.....	.....	2,450	Press reports slight shock at San Juan, Porto Rico, at "3:35" p. m. Oct. 11. N–S in operation.
		eP_N.....	19 38 25	3	.....	.....	.....	
		P_E.....	19 38 44	.....	.....	.....	.....	
		S.....	19 42 24	10	.....	.....	.....	
		eL.....	19 45 22	.....	.....	.....	.....	
		L_N.....	19 48 51	11-12	.....	.....	.....	
		F.....	20 40 00	.....	.....	.....	.....	
12	.....	e_E.....	22 19 38	.....	.....	.....	.....	e in microseisms.
		eL?.....	22 22 00	17-21	.....	.....	.....	No trace on N–S (damped 4:1).
		L.....	22 28 10	15	.....	.....	.....	
		F.....	22 43 00	.....	.....	.....	.....	

O—Time at origin.

Missouri. *St. 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	e: 1
	80	7	5: 1

1915.			*H.m.s.*	*Sec.*	μ	μ	*Km.*	
Oct. 2	I_r....	P.....	23 44 00	.....	.....	.....	.....	
3		F.....	0 20 00	.....	.....	.....	.....	
3	I_r....	P.....	1 53 12	.....	.....	.....	.....	
		F.....	2 13 00	.....	.....	.....	.....	
3	III_r..	P.....	6 58 06	.....	.....	.....	2,300	
		S.....	7 02 06	.....	.....	.....	.....	
		L.....	7 03 00	.....	.....	.....	.....	
		F.....	8 42 00	.....	.....	.....	.....	
11	II_r..	P_E.....	19 43 42	.....	.....	.....	2,500	
		S_E.....	19 49 30	.....	.....	.....	.....	
		L_E.....	19 50 00	.....	.....	.....	.....	
		F.....	20 24 00	.....	.....	.....	.....	

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	e:1
	80	7	5:1

1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Oct. 3	III_r	EP_N.....	6 58 00	.....	.....	.....	.....	Reported in Nevada, Utah, Idaho, and Oregon. The L and M waves indicate two distinct earthquakes, arriving two minutes and thirty seconds apart. Two S_E also seem to confirm this conclusion. Second P_E and P_N indistinct. The first shock appeared to come from the SW., the second from the NW.
		eP_E.....	6 58 30	.....	.....	.....	.....	
		S_N.....	7 03 00	.....	.....	.....	.....	
		iS_E.....	7 03 30	12	.....	.....	.....	
		iS.....	7 06 00	15	.....	.....	.....	
		L_N.....	7 06 00	9	.....	140	.....	
		L_E.....	7 07 00	10	.....	.....	.....	
		L_N.....	7 08 00	.....	.....	.....	.....	
		M_N.....	7 09 00	7	.....	250	.....	
		L_E.....	7 09 30	.....	155	.....	.....	
		M_E.....	7 10 00	8	240	.....	.....	
		M_N.....	7 11 45	.....	.....	180	.....	
		C.....	7 12 00	.....	.....	.....	.....	
		M_E.....	7 12 30	.....	305	.....	.....	
		C_E.....	7 13 00	.....	.....	.....	.....	
		C_E.....	7 16 00	.....	.....	.....	.....	
		C_N.....	7 16 30	.....	.....	.....	.....	
		F_E.....	8 03 00	.....	.....	.....	.....	
		F_N.....	8 04 00	.....	.....	.....	.....	
11	I_r	eP.....	19 42 00	.....	.....	.....	.....	Not heard of. Direction doubtful.
		S_E.....	19 46 30	.....	.....	.....	.....	
		S_N.....	19 47 00	.....	.....	.....	.....	
		M_N.....	19 53 00	16	.....	.....	.....	
		M_E.....	19 53 00	15	.....	.....	.....	
		C_E.....	19 57 00	.....	.....	.....	.....	
		F_E.....	20 00 00	.....	.....	.....	.....	

TABLE 2.—*Instrumental reports, October, 1915*—Continued.

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

Lat., 40° 57′ 47″ N.; long., 73° 53′ 08″ W. Elevation, 23.9 meters.

Instrument: Wiechert 80 kg.

Instrumental constants.. V: E 72, N 73; T_0: 7.2, 7.2; e: 1.5, 3.75

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	*μ*	*μ*	*Km.*	
Oct. 2	.....	L_E	23 52 52	.....	.....	.....	.....	Combined with microseisms on both components.
		L_N	23 53 00	.....	.....	.....	.....	
		P_N	23 57 26	.....	.....	.....	.....	
		P_E	23 58 26	.....	.....	.....	.....	
3	.....	L_N	2 01 21	.....	.....	.....	.....	
		L_E	2 01 26	.....	.....	.....	.....	
		M_N	2 01 56	12	.....	4	.....	
		M_E	2 04 26	12	4	.....	.....	
		P_E	2 10 26	.....	.....	.....	.....	
		P_N	2 11 26	.....	.....	.....	.....	
3	.....	iP_E	6 55 26	.....	.....	.....	.....	
		eP_N	6 55 30	.....	.....	.....	.....	
		eS_N	7 00 39	20	.....	9	.....	Complex wave.
		iS_E	7 00 44	26	38	.....	.....	Complex wave.
		eL_N?	7 04 56	.....	.....	.....	.....	
		eL_E?	7 05 26	.....	.....	.....	.....	
		M_N	7 06 36 – 7 08 26	10	.....	596	.....	Pen swung to extreme limit during this interval.
		M_E	7 09 36	9	354	.....	.....	
		P_E	8 16 26	.....	.....	.....	.....	
		P_N	8 26 00	.....	.....	.....	.....	
11	.....	iP_N	19 33 38	3	.....	.....	.....	
		iS_E	19 37 34	.....	.....	.....	.....	
		S_N	19 37 38	.....	.....	.....	.....	
		eL_N?	19 40 38	.....	.....	.....	.....	
		eL_E?	19 40 38	.....	.....	.....	.....	
		M_N	19 45 53	10	.....	5	.....	No decided maximum on E-W.
		P_N	20 17 38	.....	.....	.....	.....	
		P_E	20 22 38	.....	.....	.....	.....	

Panama Canal Zone. *Balboa Heights.* Isthmian Canal Commission.

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

Instruments: Two Bosch-Omori 100 kg.

Instrumental constants.. V: 10; T_0: 20

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	*μ*	*μ*	*Km.*	
Oct. 11	.....	P_E	19 35 55	.....	.....	.....	1,340	Direction?
		P_N	19 36 00	.....	.....	.....	.....	
		S_E	19 37 55	.....	.....	.....	.....	
		S_N	19 38 05	.....	.....	.....	.....	
		L.....	19 40 00	.....	.....	.....	.....	
		M_N	19 36 08	.....	.....	100	.....	
		M_E	19 36 10	.....	100	.....	.....	
		P_N	19 51 40	.....	.....	.....	.....	
		P_E	19 56 25	.....	.....	.....	.....	
21	.....	P.....	2 25 12	.....	.....	.....	240	Direction SW.
		L.....	2 25 40	.....	.....	.....	.....	
		M_E	2 25 44	.....	100	.....	.....	
		M_N	2 25 45	.....	.....	150	.....	
		P_E	2 28 34	.....	.....	.....	.....	
		P_N	2 29 55	.....	.....	.....	.....	

Porto Rico. *Vieques. Magnetic Observatory.* U. S. Coast and Geodetic Survey. H. M. Pease.

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: 21.4, 21.1

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	*μ*	*μ*	*Km.*	
Oct. 3	.....	P_E	7 02 01	8	.....	.....	.....	
		P_N	7 02 10	4	.....	.....	.....	
		S_N	7 09 04	12	.....	.....	.....	
		S_E	7 09 20	10	.....	.....	.....	
		L.....	7 16 26	27	.....	.....	.....	
		M_E	7 20 00	20	470	.....	.....	
		M_N	7 22 43	22	.....	750	.....	
		C.....	7 34 30	12	.....	.....	.....	
		F.....	8 10 00	.....	.....	.....	.....	
11	.....	P.....	19 34 03	6	.....	.....	.....	This earthquake was felt on the Island of Porto Rico.
		L.....	19 34 48	.....	.....	.....	.....	
		M.....	19 35 14	8	1,900	2,400	.....	
		C.....	19 39 00	6	.....	.....	.....	
		P_N	19 47 00	.....	.....	.....	.....	
		P_E	19 57 00	.....	.....	.....	.....	

Utah. *Salt Lake City. University of Utah.* F. J. Pack.

Lat., 40° 46′ N.; long., 111° 54′ W. Elevation, 1,330 meters.

Instruments: Bosch-Omori, —— registration.

Instrumental constants.. ——.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	*μ*	*μ*	*Km.*	
Oct. 2	.....	P.....	23 39 00	.....	.....	.....	.....	
		S.....	23 40 30	.....	.....	.....	.....	
		L.....	23 41 30	.....	.....	.....	.....	
		F.....	23 51 00	.....	.....	.....	.....	
3	.....	P.....	1 48 20	.....	.....	.....	.....	
		S.....	1 48 50	.....	.....	.....	.....	
		L.....	1 49 40	.....	.....	.....	.....	
		F.....	2 00 40	.....	.....	.....	.....	
3	.....	L.....	6 53 20	.....	.....	.....	.....	Threw stylus off.

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: 15, 16

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915			*H. m. s.*	*Sec.*	*μ*	*μ*	*Km.*	
Oct. 2	.....	P.....	.....	.....	.....	.....	.....	P not discernible.
		S.....	23 56 07	.....	.....	.....	.....	
3		F.....	0 20 00	.....	.....	.....	.....	
3	.....	P.....	.....	.....	.....	.....	.....	P not discernible.
		S?.....	2 04 17	.....	.....	.....	.....	
		M.....	2 08 00	.....	.....	.....	.....	
		F.....	2 25 00	.....	.....	.....	.....	
3	III,	P.....	6 59 53	.....	.....	.....	3,590	Severe earthquake in Nevada.
		S.....	7 05 16	.....	.....	.....	.....	
		L.....	7 10 15	.....	.....	.....	.....	Many large maxima. N-S stylus ran off sheet.
		M_N	7 11 00	.....	.....	.....	.....	
		M_E	7 13 10	.....	.....	.....	.....	
		F.....	8 30 00	.....	.....	.....	.....	
11	.....	L_N	2 54 30	.....	.....	.....	.....	Phases very indistinct.
11	I_r	P.....	19 38 37	.....	.....	.....	2,730	Earthquake felt in Porto Rico.
		S?.....	19 43 00	.....	.....	.....	.....	
		M_N	19 51 40	.....	.....	.....	.....	
		F.....	20 45 00	.....	.....	.....	.....	
22	.....	e_N	5 07 45	.....	.....	.....	.....	Phases less distinct on E-W.
		M.....	5 10 50	.....	.....	.....	.....	
		F.....	5 20 00	.....	.....	.....	.....	
28	.....	e.....	16 20 40	.....	.....	.....	.....	Phases not discernible.
		F.....	16 30 00	.....	.....	.....	.....	

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

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

Instruments: Two Bosch photographic horizontal pendulums, one Spindler & Hoyer 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.
1915			*H. m. s.*	*Sec.*	*μ*	*μ*	*Km.*	
Oct. 2	.....	P?	23 51 10	.....	.....	.....	.....	Somewhat masked by microseisms.
		P_E P_N?	23 52 20	.....	.....	.....	.....	
		S_N	23 56 14	.....	.....	.....	.....	
		S_E	23 56 15	.....	.....	.....	.....	
		L_E	23 58 12	8	.....	.....	.....	
3		F.....	0 20 00	.....	.....	.....	.....	
3	.....	P_E?	1 56 40	.....	.....	.....	.....	Somewhat masked by microseisms.
		P_N	1 56 44	.....	.....	.....	.....	
		S_E	1 59 46	.....	.....	.....	.....	
		L.....	2 04 00	8	.....	.....	.....	
		F.....	2 40 00	.....	.....	.....	.....	
3	.....	P_E	6 59 34	2	.....	.....	3,330	
		P_N	6 59 35	2	.....	.....	.....	
		S_N	7 04 40	10	.....	.....	.....	
		eL_N	7 09 12	20	.....	.....	.....	
		eL_E	7 09 18	20	.....	.....	.....	
		M_N	7 11 36	20	.....	33	.....	
		M_E	7 12 42	20	13	.....	.....	
		L.....	7 35 00	16	.....	.....	.....	
		L.....	7 45 00	10	.....	.....	.....	
		L.....	8 00 00	11-13	.....	.....	.....	
		L.....	8 24 00	12-13	.....	.....	.....	
		F.....	9 15 00	.....	.....	.....	.....	
				VERTICAL. (A_Z)				
		L.....	*7 10 00*	*18*	**3,500*	.....	.....	
		M.....	*7 11 06*	*14*	**3,500*	.....	.....	
		M.....	*7 13 18*	*8*	**3,700*	.....	.....	
		M.....	*7 13 54*	*8*	**3,600*	.....	.....	

TABLE 2.—*Instrumental reports, October, 1915*—Concluded.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
Canada. *Ottawa. Dominion Astronomical Observatory*—Continued.								
1915. Oct. 11	.....	P_E	*H. m. s.* 2 47 11	*Sec.*	.....	.....	*Km.* 5,430	P not well marked. Small microseisms.
		P_N	2 47 12	.....	.....	.....	.....	
		S	2 54 17	.....	.....	.....	.....	
		L	3 00 30	16	.....	.....	.....	
		L	3 02 00 / 3 05 00	20	.....	.....	.....	
		F	3 20 00	.....	.....	.....	.....	
11	.....	P	19 40 00	.....	.....	.....	2,140	Seismograph drum clock out of repair. Readings from "deformation instrument" where time scale is only 17.7 mm. per hour.
		S	19 43 36	.....	.....	.....	.....	
		L	19 46 06	.....	.....	.....	.....	
		M	19 46 54	.....	.....	.....	.....	
		F	20 44 00	.....	.....	.....	.....	

*Trace amplitude.

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=0.59″.

1915. Oct. 2	.....	L	*H. m. s.* 23 57 42	*Sec.*	.....	.....	*Km.*	
		M	23 58 24	.....	*200	.....	.....	
3		F	0 02 00	.....	.....	.....	.....	
3	.....	IP	1 59 42	.....	.....	.....	.....	Marked small earthquake.
		S	2 04 24	.....	.....	.....	.....	
		L	2 06 06	.....	.....	.....	.....	
		M	2 06 42	.....	*300	.....	.....	
		F	2 17 30	.....	.....	.....	.....	
3	.....	IP	6 59 36	.....	.....	.....	3,164	Origin in Nevada.
		iS	7 04 30	.....	.....	.....	.....	
		L	7 07 12	.....	.....	.....	.....	
		L	7 09 18	.....	.....	.....	.....	
		M	7 10 30	.....	*27,000	.....	.....	
		M	7 11 36	.....	*16,000	.....	.....	
		M	7 12 18	.....	*12,000	.....	.....	
		L	7 24 30	.....	.....	.....	.....	
		M	7 25 36	.....	*5,500	.....	.....	
		L	7 36 42	.....	.....	.....	.....	
		L	7 39 12	.....	.....	.....	.....	
		L	7 54 00	.....	.....	.....	.....	
		L	7 59 06	.....	.....	.....	.....	
		L	8 06 12	.....	.....	.....	.....	
		L	8 34 48	.....	.....	.....	.....	
		L	9 48 18	.....	.....	.....	.....	
		L	9 53 18	.....	.....	.....	.....	
		F	10 40 42	.....	.....	.....	.....	
5	.....	L	14 14 30	.....	.....	.....	.....	Suspicion of air currents.
		iL	14 50 24	.....	*100	.....	.....	
		F	14 53 30	.....	.....	.....	.....	
10	.....	P?	6 44 54	.....	.....	.....	.....	Gradual thickening.
		S or L	6 54 06	.....	.....	.....	.....	
		iL	6 59 54	.....	.....	.....	.....	
		M	7 03 00	.....	*200	.....	.....	
		F	7 17 06	.....	.....	.....	.....	
10	.....	L	10 20 00	.....	*50	.....	.....	
		F	10 32 00	.....	.....	.....	.....	
11	.....	S?	2 54 36	.....	.....	.....	.....	
		L	3 05 42	.....	.....	.....	.....	
		M	3 08 00	.....	*200	.....	.....	
		F	3 18 00	.....	.....	.....	.....	
11	.....	P?	19 40 06	.....	.....	.....	2,165	Marked disturbance.
		iS	19 43 42	.....	.....	.....	.....	
		L	19 46 12	.....	.....	.....	.....	
		iL	19 50 00	.....	.....	.....	.....	
		eL	19 50 30	.....	.....	.....	.....	
		M	19 53 48	.....	*2,000	.....	.....	
		F?	20 39 48	.....	.....	.....	.....	
12	.....	.....	.....	.....	.....	.....	.....	Earthquake lost; clock stopped.

*Trace amplitude.

16331—15——3

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
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″.

1915. Oct. 2	.....	P	*H. m. s.* 23 44 29	*Sec.*	.....	.....	*Km.* 220	Origin in southeastern Washington.
		L	23 44 53	.....	.....	.....	.....	
		M	23 45 29	.....	*600	.....	.....	
		F	23 51 29	.....	.....	.....	.....	
3	.....	P	1 52 31	.....	.....	.....	220	
		L	1 52 55	.....	.....	.....	.....	
		M	1 53 49	.....	*2,200	.....	.....	
		F	2 00 25	.....	.....	.....	.....	
3	.....	P	6 54 55	.....	.....	.....	1,300	Origin in Nevada.
		L	6 57 13	.....	.....	.....	.....	
		M	6 57 25	.....	*17,000	.....	.....	
		M	7 00 48	.....	*38,000	.....	.....	
		L	7 21 12	.....	.....	.....	.....	
		L	8 15 00	.....	.....	.....	.....	
		F	10 35 23	.....	.....	.....	.....	
				VERTICAL.	(A_Z)			
		P	*6 55 25*	.....	.....	.....	.....	
		S	*6 57 10*	.....	.....	.....	.....	
		L	*6 58 30*	.....	.....	.....	.....	
		M	*6 59 40*	.....	*1,000	.....	.....	
		F	?	.....	.....	.....	.....	
5	.....	P	14 08 54	.....	.....	.....	1,740	Origin in California?
		S	14 11 54	.....	.....	.....	.....	
		M	14 14 36	.....	*200	.....	.....	
		F	14 43 54	.....	.....	.....	.....	
10	.....	P	6 32 46	.....	.....	.....	1,430	
		S	6 35 16	.....	.....	.....	.....	
		L	6 35 16	.....	.....	.....	.....	
		M	6 40 04	.....	*200	.....	.....	
		F	6 49 46	.....	.....	.....	.....	
10	.....	P	10 32 19	.....	.....	.....	440	
		L	10 33 07	.....	.....	.....	.....	
		M	10 34 19	.....	*100	.....	.....	
		F	10 38 07	.....	.....	.....	.....	
11	.....	L?	3 14 13	.....	.....	.....	.....	
		L	3 17 19	.....	.....	.....	.....	
		L	3 22 13	.....	.....	.....	.....	
		M	3 32 19	.....	*50	.....	.....	
		F	3 19 13	.....	.....	.....	.....	
11	.....	P	19 58 32	.....	.....	.....	.....	
		S	20 03 02	.....	.....	.....	.....	
		L	20 08 20	.....	.....	.....	.....	
		M	.....	.....	.....	.....	.....	M cut off.
		F	20 39 02	.....	.....	.....	.....	
12	.....	P	1 34 05	.....	.....	.....	1,650	
		L	1 36 56	.....	.....	.....	.....	
		M	1 39 23	.....	*600	.....	.....	
		F	1 44 18	.....	.....	.....	.....	
12	.....	P	22 06 56	.....	.....	.....	.....	
		M	22 08 58	.....	*100	.....	.....	
		F	22 11 55	.....	.....	.....	.....	
28	.....	P	16 17 06	.....	.....	.....	.....	
		M	16 18 06	.....	*100	.....	.....	
		F	16 20 06	.....	.....	.....	.....	
31	.....	P	10 25 37	.....	.....	.....	.....	
		L	10 25 51	.....	.....	.....	.....	
		M	10 26 21	.....	*100	.....	.....	
		F	10 28 50	.....	.....	.....	.....	

*Trace amplitude.

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

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	c:1
E	80	23	0
N	50	25	4:1

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
June 22	.....	*O*.....	3 24 22	.....	.....	.....	6,790	
		eP.....	3 34 40	.....	.....	.....	.....	
		S_E.....	3 42 58	6	.....	.....	.....	
		L.....	3 43 42	10	.....	.....	.....	L indistinct.
		F?.....	3 50 48	.....	.....	.....	.....	
23	.....	*O*.....	4 00 21	.....	.....	.....	4,110	*O* from eL–S deciphered in light of published data in this REVIEW, June, 1915, p. 289–294. Origin in southern California. Local observers give time 4h 00m.
		eP_N?...	4 06 28	.....	.....	.....	.....	
		S.....	4 13 45	6	.....	.....	.....	
		eL.....	4 17 31 4 18 08	10	.....	.....	.....	
		F.....	4 54 00	.....	.....	.....	.....	
23	.....	*O*.....	4 58 34	.....	.....	.....	3,850	Second shock in southern California. Reported 4h 56m. Vd. loc. cit. E–W component gives different but more doubtful readings. Short pre-phases.
		eS?.....	5 11 20	.....	.....	.....	.....	
		eL.....	5 14 31	.....	.....	.....	.....	
		M_N.....	5 14 38	.....	.....	.....	.....	
		F.....	5 35 00	.....	.....	.....	.....	
27	.....	*O*?.....	15 36 10	.....	.....	.....	3,525?	
		L_E.....	15 51 16	.....	.....	.....	.....	
		F.....	16 22 00	.....	.....	.....	.....	
July 8	.....	*O*.....	22 30 48	.....	.....	.....	.....	
		l_E.....	23 08 41	15	.....	.....	.....	
		L_E.....	23 12 27	28	.....	.....	.....	
		L_E.....	23 14 45	24	.....	.....	.....	
		F.....	23 25 56	.....	.....	.....	.....	
22	.....	*O*?.....	4 06 08	.....	.....	.....	7,140?	Readings doubtful.
		eP_N.....	4 16 44	.....	.....	.....	.....	
		S_N.....	4 25 20	.....	.....	.....	.....	
		S_E.....	4 25 36	.....	.....	.....	.....	
		eL_E.....	4 30 02	.....	.....	.....	.....	
		L_N.....	4 32 52	.....	.....	.....	.....	
		F.....	4 46 00	.....	.....	.....	.....	
25	.....	*O*?.....	20 47 25	.....	.....	.....	7,400?	eP uncertain.
		S?.....	21 06 56	7	.....	.....	.....	L illegible on N–S.
		L_E.....	21 18 12	28	.....	.....	.....	
		F.....	21 49 00	.....	.....	.....	.....	
29	.....	L_E.....	10 55 58	20	.....	.....	.....	Origin in Pacific region. Not registered at Barcelona or Heidelberg.
		L_E.....	10 59 46	15	.....	.....	.....	
		F.....	11 04 22	.....	.....	.....	.....	
31	.....	*O*.....	1 31 26	.....	.....	.....	8,200	Aleutians off Kamchatka, near λ 168° E., ϕ 53° N.
		P_E.....	1 42 58	.....	.....	.....	.....	
		PR_E.....	1 45 48	.....	.....	.....	.....	
		PR_E.....	1 47 20	.....	.....	.....	.....	
		PR_N.....	1 52 28	.....	.....	.....	.....	
		S_E.....	1 52 28	.....	.....	.....	.....	
		S.....	1 52 40	.....	.....	.....	.....	
		SR_E.....	1 58 26	.....	.....	.....	.....	
		eL_E.....	2 03 02	60	.....	.....	.....	
		L_N.....	2 03 56	.....	.....	.....	.....	
		L_E.....	2 10 10	22	.....	.....	.....	
		L_N.....	2 19 54	14	.....	.....	.....	
		F_E.....	4 21 00	.....	.....	.....	.....	

Massachusetts. *Cambridge. Harvard University*—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Aug. 3	.....	*O*.....	13 04 27	.....	.....	.....	14,960	
		e.....	13 26 19	.....	.....	.....	.....	
		e.....	13 31 39	.....	.....	.....	.....	
		e.....	14 10 42	.....	.....	.....	.....	
		L_E.....	14 16 04	22–15	.....	.....	.....	
		LR1....	15 06 10	20	.....	.....	.....	
		F.....	15 47 00	.....	.....	.....	.....	
6	.....	*O*.....	13 12 03	.....	.....	.....	9,000	
		eP?....	13 23 25	.....	.....	.....	.....	eP in microseisms.
		S.....	13 35 09	.....	.....	.....	.....	
		eL_N....	13 55 18	20	.....	.....	.....	
		L_E.....	14 01 53	24–22	.....	.....	.....	
		F.....	14 55 00	.....	.....	.....	.....	
7	.....	*O*.....	15 04 16	.....	.....	.....	7,000?	
		e.....	15 31 09	.....	.....	.....	.....	
		L.....	15 39 27	20	.....	.....	.....	
		L.....	15 46 16	16	.....	.....	.....	
		F.....	16 07 00	.....	.....	.....	.....	
19	.....	.....	.....	.....	.....	.....	.....	A few seismic waves at about 1h.
Sept. 6	.....	*O*.....	17 20 36	.....	.....	.....	10,300?	
		e.....	17 53 39	.....	.....	.....	.....	
		L.....	18 16 55	.....	.....	.....	.....	
		L.....	18 22 15	15	.....	.....	.....	
		F.....	19 22 00	.....	.....	.....	.....	
7	.....	*O*.....	1 20 30	.....	.....	.....	3,580	Destructive earthquake in Guatemala and Salvador. Stylus ran off the drum several times during the maxima.
		iP_E.....	1 27 19	2	.....	.....	.....	
		P_N.....	1 27 21	2	.....	.....	.....	
		PR.....	1 27 51 1 27 56 1 28 33 1 28 40	.....	.....	.....	.....	
		iS_N.....	1 32 41	.....	.....	.....	.....	
		iS_E.....	1 33 54	.....	.....	.....	.....	
		eL_E.....	1 34 23	26	.....	.....	.....	
		M_E.....	1 35 54	.....	.....	.....	.....	
		eL_N.....	1 37 01	.....	.....	.....	.....	
		M_E.....	1 38 07 1 38 35	.....	.....	.....	.....	
		M_N.....	1 39 42	.....	.....	.....	.....	
		M_E.....	1 39 44 1 40 01	.....	.....	.....	.....	
		M_N.....	1 40 53 1 40 58 1 41 03	.....	.....	.....	.....	
		M_E.....	1 42 58	.....	.....	.....	.....	
		M_N.....	1 43 20	.....	.....	.....	.....	
		M_E.....	1 44 05 1 44 21	.....	.....	.....	.....	
		C_N.....	1 45 03	.....	.....	.....	.....	
		M_E.....	1 45 22 1 46 11 1 47 14	.....	.....	.....	.....	
		C_E.....	1 50 02	.....	.....	.....	.....	
		LR_N....	2 35 03	12–14	.....	.....	.....	
		F_N.....	2 59 56	.....	.....	.....	.....	

O—time at origin.

SEISMOLOGICAL DISPATCHES.[1]

Am. S. S. *Algiers*, Oct. 15, 1915.

Ship's time, 2 a. m.; N. 28° 29′; W. 92° 45′. Felt a terrific shock in this position which woke everybody on board. Lasted for a couple of minutes. (U. S. Hyd. Office.)

Panama, Oct. 22, 1915.

Slight earthquake at Aquadulce, 40 miles SW. of Panama. No damage of importance. Shock not felt in Canal Zone. (Assoc. Press.)

Asheville, N. C., Oct. 29, 1915.

Two distinct shocks were felt here at 12:35 a. m. The shocks came about two minutes apart and lasted a few seconds each. No damage reported. (Assoc. Press; Intern. news serv.).

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

SECTION V.—SEISMOLOGY.

SEISMOLOGICAL REPORTS FOR NOVEMBER, 1915.

By W. J. HUMPHREYS, Professor in charge of Seismological Investigations.

[Dated: Weather Bureau, Washington, D. C., Dec. 31, 1915.]

TABLE 1.—*Noninstrumental earthquake reports, November, 1915.*

Day.	Approximate time, Greenwich Civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity Rossi-Forel.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
		ARIZONA.								
	H. m.		° ′	° ′			*M. s.*			
21	0 15	Parker	34 10	114 16	4	1	1 00			Dr. Anna Nettle.
	0 15	Yuma	32 45	114 36	6	1	40		Clocks stopped	U. S. Weather Bureau.
	0 15	Yuma	32 44	114 37	6	1	40			C. J. Wood.
		CALIFORNIA.								
21	0 15	Aguanga	33 25	116 50		1	15			John B. Simmons.
	0 15	Blythe	33 35	114 38	2	1	30			C. L. Suits.
	0 15	Brawley	32 59	115 40						M. D. Witter.
	0 15	El Cajon	32 48	116 58	5	3	10	Rumbling		H. H. Kessler.
	0 15	San Diego	32 43	117 10	6	1	50		Many clocks stopped	U. S. Weather Bureau.
	0 15	Tustin	33 43	118 49	3	2	20			Mrs. Hazel Browning.
21	3 00	El Cajon	32 48	116 58	4	1	10			H. H. Kessler.
25	13 45	Julian	33 05	116 37	2	1	3	Rumbling		J. H. L. Vogt.
		NEVADA.								
17	23 35	Elko	40 51	115 45	5–6	1				(From press report.)
23	3 33	Fallon	39 30	118 48	2	1	5			F. B. Headley.
	3 33	Winnemucca	40 58	117 43	3	1	7			U. S. Weather Bureau.
		WASHINGTON.								
18	23 42	La Center	45 52	122 40	5	1	10	Loud		Joseph Bros.

TABLE 2.—*Instrumental reports, November, 1915.*

[Time used: Mean Greenwich, midnight to midnight. Nomenclature: International.]

[For significance of symbols see REVIEW for June, 1915, p. 289.]

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:

	V	T_0
E	10	16.7
N	10	15.4

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*Km.*	
1915. Nov. 21	.....	S	0 24 42	7	.....	.....	.....	Beginning and end of quake obscured by microseisms.
		L_E	0 27 08	26	.....	.....	.....	
		L_N	0 27 22	24	.....	.....	.....	
		M_N	0 32 20	8	.....	17	.....	
		M_E	0 33 12	14	46	.....	.....	
		C	0 35 00	10	.....	.....	.....	

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

Lat., 32° 14′ 48″ N.; long., 110° 50′ 05″ W. Elevation, 769.6 meters.

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

Instrumental constants:

	V	T_0
E	10	16
N	10	19.6

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*Km.*	
1915. Nov. 21	.....	P_E	0 14 44	2	.....	.....	.....	The stylus of N-S was off the sheet from $0^h\ 16^m\ 16^s$ to $0^h\ 22^m\ 24^s$. Maximum given was measured to the edge of the paper.
		P_N	0 14 52	4	.....	.....	.....	
		L_E	0 15 57	.....	.....	.....	.....	
		L_N	0 15 58	.....	.....	.....	.....	
		M_E	0 16 38	.....	461	385	.....	
		C_E	0 18 31	7	.....	.....	.....	
		C_N	0 23 33	9	.....	.....	.....	
		F	1 26 00	.....	.....	.....	.....	
21	.....	eL	3 46 54	.....	.....	.....	.....	Probably recurrence of previous disturbance.
		M_E	3 47 18	.....	.....	10	.....	
		M_E	3 47 50	.....	20	.....	.....	
		F	3 52 00	.....	.....	.....	.....	

TABLE 2.—*Instrumental reports*—Continued.

Date.	Character.	Phase.	Time.	Period T.	Amplitude A_E	Amplitude A_N	Distance.	Remarks.

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.

1915.			H. m. s.	Sec.	μ	μ	Km.	
Nov. 5					*300	*400		Except when time is given, all of these tremors occured at unknown hours, beinc recorded durinc the24 hours preceding 15h on dates given. No shocks felt except those for which time is given.
6					*200	*400		
13					*200	*200		
14			8 02 00		*100	*500		
15					*200	*200		
17					*200	*400		
19					*200	*600		
20					*200	*400		
21			0 15 00		*3,175	*2,780		
21			3 00 00		*200	*200		
22					*100	*400		
24					*400	*700		
25					*350	*350		
26					*600	*400		
27					*300	*300		
28					*200	*200		
29					*400	*800		
30					*200	*200		

* Amplitude on instrument.

California. *Santa Clara, University of.* 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.

1915.			H. m. s.	Sec.	μ	μ	Km.	
Nov. 11–12.								Activity on both components.
14–15								Activity on both components.
21		P_N	0 10 00					Imperial Valley, Cal. Time of phases approximate, clock being repaired. P and S hardly discernible.
		P_E	0 10 00					
		S_N	0 12 00					
		S_E	0 12 00					
		iL_N	0 13 00	10-12		573		
		L_E	0 13 00	8-10	570			
		M_N	0 14 00	10-12		650		
		L_E	0 14 00	10-12	837			
		C_E	0 16 00	8- 9	137			
		C_N	0 17 00	7- 8		175		
		F_N	0 32 00					
		F_E	0 36 00					
29-30								Intermittent activity on both components.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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.

1915.			H. m. s.	Sec.	μ	μ	Km.	
Nov. 1	I_E	P_E	7 37 12				9,560	Microseisms present. Many small maxima.
		S	7 47 50					
		eL	8 07 24	26				
		F	10 15 00					
21	III_r	P	0 20 00				3,500	Earthquake felt in southern California.
		S	0 25 17					
		L	0 28 01					
		L?	0 29 19					
		M_N	0 32 50					Several other large maxima.
		M_E	0 35 20					
		F	2 00 00					F in microseisms.
26	I_r	P_N	19 18 33				3,470	Southwest of Panama.
		S_N	19 23 48					
		L_N	19 29 30	12				
		F	19 45 00					F merges into microseisms.
30		eL	5 04 10					
		F	5 20 00					

District of Columbia. *Washington. Georgetown University.* F. L. 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.

Instrumental constants.. V, T_0, e

E 165 5.4 2.6

N 143 5.2 3.4

1915.			H. m. s.	Sec.	μ	μ	Km.	
Nov. 1		eP_E	7 36 34					Heavy microseisms for 24 hours. All phases masked in microseisms.
		eP_N	7 37 01					
		eS_E	7 48 18					
		eS_N	7 48 39					
		L_E	8 08 45					
		L_N	8 09 18					
		M_E	8 22 20	20	3			
		M_N	8 24 38	17		3		
		F_E	10 17 50					
		F_N	10 20 29					
21	III_r	eP_N	0 24 51	9				Phases masked in microseisms. Earthquake felt in southern California.
		eP_E	0 25 03					
		S_N	0 30 41	7				
		S_E	0 30 42	6				
		L_N	0 31 01	10				
		L_E	0 31 11	10				
		M_N	0 32 01			65		
		M_N	0 32 53			63		
		M_E	0 33 28		21			
		M_N	0 33 42			76		
		M_E	0 34 42		42			
		M_E	0 35 27		52			
		F	1 30 00					

TABLE 2.—*Instrumental reports*—Continued.

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

Hawaii. *Honolulu. Magnetic Observatory.* U. S. Coast and Geodetic Survey. Wm. W. Merrymon.

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

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

Instrumental constant.. T_0 18.9

1915.			H. m. s.	Sec.	μ	μ	Km.	
Nov. 1	.....	P.....	7 33 36	.....	.....	.....	.....	
		S.....	7 36 30	.....	.....	.....	.....	
		L.....	7 40 36	.....	.....	.....	.....	
		M.....	8 02 24	.....	*6,500	.....	.....	
		F.....	11 28 00	.....	.....	.....	.....	
4	.....	e.....	3 29 06	.....	.....	.....	.....	
		M.....	3 30 00	.....	*200	.....	.....	
		C.....	3 34 30	.....	.....	.....	.....	
		F.....	4 23 42	.....	.....	.....	.....	
6	.....	e.....	10 09 24	.....	.....	.....	.....	
		M.....	10 16 48	.....	*100	.....	.....	
		F.....	10 31 48	.....	.....	.....	.....	
7	.....	P.....	8 00 00	.....	.....	.....	.....	
		S.....	8 01 48	.....	.....	.....	.....	
		L.....	8 10 00	.....	.....	.....	.....	
		M.....	8 14 00	.....	*300	.....	.....	
		C.....	8 18 12	.....	.....	.....	.....	
		F.....	8 26 24	.....	.....	.....	.....	
13	.....	e.....	11 37 06	.....	.....	.....	.....	
		M.....	11 41 00	.....	*100	.....	.....	
		F.....	11 46 00	.....	.....	.....	.....	
18	.....	P.....	4 11 42	.....	.....	.....	.....	
		L.....	4 19 42	.....	.....	.....	.....	
		M.....	4 20 36	.....	*800	.....	.....	
		C.....	4 42 54	.....	.....	.....	.....	
		F.....	5 25 00	.....	.....	.....	.....	
18	.....	P.....	20 40 54	.....	.....	.....	.....	
		L.....	20 58 12	.....	.....	.....	.....	
		M.....	21 03 48	.....	*500	.....	.....	
		C.....	21 16 48	.....	.....	.....	.....	
		F.....	21 25 24	.....	.....	.....	.....	
21	.....	P.....	0 21 06	.....	.....	.....	.....	
		S.....	0 27 18	.....	.....	.....	.....	
		L.....	0 30 06	22	.....	.....	.....	
		M.....	0 35 12	.....	*6,600	.....	.....	
		C.....	1 01 48	.....	.....	.....	.....	
		F.....	3 21 18	.....	.....	.....	.....	
29	.....	e.....	10 32 00	.....	.....	.....	.....	
		M.....	10 35 24	.....	*100	.....	.....	
		F.....	10 40 00	.....	.....	.....	.....	
29	.....	e.....	14 37 30	.....	.....	.....	.....	
		M.....	14 39 18	.....	*100	.....	.....	
		F.....	14 44 48	.....	.....	.....	.....	
30	.....	e.....	5 23 06	.....	.....	.....	.....	
		M.....	5 25 00	.....	*100	.....	.....	
		F.....	5 29 00	.....	.....	.....	.....	

*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.

	V	T_0	ε
Instrumental constants.. E	177	3.4	4.0
N	205	3.4	3.8

1915.			H. m. s.	Sec.	μ	μ	Km.	
Nov. 1	.....	P_E.....	7 36 49	2- 3	.....	.....	.....	Slight tremors during much of preceding day.
		S_E.....	7 46 59	12-14	.....	.....	.....	
		L.....	.....	.....	.....	.....	.....	L not discernible.
		M_E.....	8 17 30	15-18	3	.....	.....	Record of N-S component lost.
		F.....	9 20 00	.....	.....	.....	.....	
21	.....	P_N.....	0 17 41	1- 2	.....	.....	.....	P_E, S_E, and M_E lost.
		S_N.....	0 21 10	5- 6	.....	.....	.....	
		L_N.....	0 22 44	5-10	.....	.....	.....	
		L_E.....	0 22 48	.....	.....	.....	.....	
		M_N.....	0 23 45	10-12	.....	209	.....	
		F_N.....	1 35 00	.....	.....	.....	.....	

Date.	Character.	Phase.	Time.	Period T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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.

	V	T_0
Instrumental constants.. E	10	31
N	10	29

1915.			H. m. s.	Sec.	μ	μ	Km.	
Nov. 21	.....	eP_N.....	0 29 10	3	.....	.....	.....	
		L_E.....	0 33 09	11	.....	.....	.....	
		L_N.....	0 30 30	10	.....	.....	.....	
		M_N.....	0 31 14	10	.....	215	.....	
		M_E.....	0 34 30	6	90	.....	.....	
		C_N.....	0 36 00	12	.....	.....	.....	
		C_E.....	0 37 00	8	.....	.....	.....	
		F_E.....	1 04 00	.....	.....	.....	.....	
		F_N.....	1 11 00	.....	.....	.....	.....	

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

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

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

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

1915.			H. m. s.	Sec.	μ	μ	Km.	
Nov. 1	.....	O.....	7 24 31	.....	.....	.....	9,590	eP in microseisms.
		eP.....	7 37 13	.....	.....	.....	.....	
		S_E.....	7 47 06	.....	.....	.....	.....	
		S_N.....	7 47 52	6	.....	.....	.....	
		eL_E.....	8 09 56	.....	.....	.....	.....	
		M.....	8 20 28	.....	.....	.....	.....	
		LR_N.....	9 50 30	18-20	.....	.....	.....	
		F.....	10 33 00	.....	.....	.....	.....	
21	.....	O.....	0 13 35	.....	.....	.....	3,900	Earthquake in Imperial Valley, Cal.
		eP_E.....	0 20 46	.....	.....	.....	.....	
		S_N.....	0 26 33	.....	.....	.....	.....	
		S_E.....	0 26 35	.....	.....	.....	.....	
		eL_E.....	0 29 54	.....	.....	.....	.....	
		eL_N.....	0 30 00	.....	.....	.....	.....	
		M_N.....	0 33 14	16	.....	†300	.....	Maxima of E-W, undamped less than N-S, damped 4:1.
		M_E.....	0 33 58	.....	.....	.....	.....	
		M_E.....	0 35 57	.....	.....	.....	.....	
		C_E.....	0 39 50	.....	.....	.....	.....	
		F.....	1 45 00	.....	.....	.....	.....	
26	.....	e?.....	19 27 34	.....	.....	.....	.....	All phases masked by microseisms.
		L.....	19 31 46	29	.....	.....	.....	
		L.....	19 36 14 / 19 39 14	16-13	.....	.....	.....	
		F.....	.....	.....	.....	.....	.....	

O = time at origin.
† N-S stylus left drum, returning at 1h 35m 34s.

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.

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

1915.			H. m. s.	Sec.	μ	μ	Km.	
Nov. 1	I_E.....	eP_N.....	7 41 00	.....	.....	.....	3,200	
		S_N.....	7 46 00	.....	.....	.....	.....	
		L.....	7 47 00	.....	.....	.....	.....	
		F.....	9 01 00	.....	.....	.....	.....	
21	III_E.....	eP.....	0 18 24	.....	.....	.....	2,500	
		S.....	0 22 54	.....	.....	.....	.....	
		L.....	0 24 18	.....	.....	.....	.....	
		M_N.....	0 21 18	18	.....	56	.....	
		M_E.....	0 24 24	12	34	.....	.....	
		F.....	1 20 00	.....	.....	.....	.....	

TABLE 2.—*Instrumental reports*—Continued.

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:1 5:1

Date.	Character.	Phase.	Time.	Period. T	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915. Nov. 1	.....	eP_E	H. m. s. 7 48 50	Sec.	μ	μ	Km.	
		eP_N	7 49 30					
		S_E	7 59 30					
		S_N	8 01 00					
		L_E	8 14 00					
		L_N	8 15 00					
		M_E	8 25 00	22	5			
		M_N	8 27 00	16		6		
		(illegible)	8 29 00					
		I_N	8 31 00					
		F_E	8 36 00					
		F_N	8 37 00					
21	III,...	eP_N	0 23 20					Reported in southwestern part of the United States.
		eP_E	0 21 00					
		S_N	0 28 10					
		S_E	0 29 00					
		L_N	0 30 00					
		L_E	0 30 45					
		M_E	0 31 50	10	53			
		M_N	0 32 30	9		56		
		M_E	0 32 45	8	44			
		M_N	0 33 00	6		50		
		(illegible)	0 33 15					
		M_N	0 35 00			72		
		C_N	0 36 00					
		F_N	1 10 00					
		F_E	1 14 00					

New York. *Fordham. Fordham University.* W. C. Repetti, 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 7.2, N 7.2; ε:1: E 1.5:1, N 3.8:1

Date.	Character.	Phase.	Time.	Period. T	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915. Nov. 1	.....	eP_N	H. m. s. 7 43 29	Sec.	μ	μ	Km.	
		eP_E?...	7 43 29					
		eS_N?..	7 53 39					
		eL?..	8 06 04					
		M_E	8 14 11	18	15			
		M_N	8 17 48 / 8 25 27	18		12		Sinusoidal waves with no decided maximum.
		F_E	8 46 00					
		F_N	8 55 00					
21	.....	S_N	0 21 28					P masked by microseisms.
		S_E	0 21 35					
		L_N	0 25 58					
		L_E	0 26 58					
		M_N	0 29 43	10		358		
		M_E	0 31 18	9	219			
		F_N	1 09 00					
		F_E	1 12 00					

Panama Canal Zone. *Balboa Heights.* Isthmian Canal Commission

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

Instruments: Two Bosch-Omori 100 kg.

Instrumental constants.. V 10, T_0 20

Date.	Character.	Phase.	Time.	Period. T	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915. Nov. 26	.....	P_E	H. m. s. 19 12 30	Sec.	μ	μ	Km. 190	Direction SW?
		P_N	19 12 45					
		L_E	19 12 51					
		L_N	19 13 06					
		M_E	.....	.....	2,750	2,900	.....	Pens ran off sheets during maxima; amplitudes greater than here given.
		F_E	19 29 36					
		F_N	19 31 05					
26	.....	P_E	19 34 04				198	Direction SW?
		P_N	19 34 33					
		L_E	19 34 26					
		M_E	19 34 31	.....	25			
		L_N	19 34 55					
		M_N	19 34 58			50		
		F_E	19 35 50					
		F_N	19 36 30					

Panama Canal Zone. *Balboa Heights*—Continued.

Date.	Character.	Phase.	Time.	Period. T	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915. Nov. 26	.....	P_E	H. m. s. 20 23 06	Sec.	μ	μ	Km. 198	Direction SW?
		P_N	20 23 36					
		L_E	20 23 28					
		M_E	20 23 30		625			
		L_N	20 23 58					
		M_N	20 24 04			500		
		F?	.....					
26	.....	P?	.....					Direction SW?
		L_E	20 26 30					
		M_E	20 26 38		200			
		L_N	20 27 00					
		M_N	20 27 10			150		
		F_E	20 32 15					
		F_N	20 34 51					
27	.....	P_E	0 14 18				183	Direction SW?
		P_N	0 14 36					
		L_E	0 14 36					
		M_E	0 14 39		40			
		L_N	0 14 58					
		M_N	0 15 04			25		
		F_N	0 16 27					
		F_E	0 16 34					
27	.....	P_E	4 16 44				328	Direction SW?
		P_N	4 17 10					
		L_E	4 17 24					
		M_E	4 17 28		100			
		L_N	4 17 50					
		M_N	4 17 52			75		
		F_E	4 20 20					
		F_N	4 22 28					
27	.....	P_E	19 04 00				212	Direction SW?
		P_N	19 04 19					
		L_E	19 04 24					
		M_E	19 04 26		100			
		L_N	19 04 43					
		M_N	19 04 49			60		
		F_E	19 06 30					
		F_N	19 07 15					
27	.....	P_E	23 19 20				212	Direction SW?
		P_N	23 19 48					
		L_E	23 19 44					
		M_E	23 19 46		50			
		L_N	23 20 12					
		M_N	23 20 18			50		
		F_E	23 21 16					
		F_N	23 21 45					
27	.....	P_E	23 22 46				212	Direction SW?
		P_N	23 23 12					
		L_E	23 23 10					
		M_E	23 23 14					
		L_N	23 23 36					
		M_N	23 23 40					
		F_E	23 24 20					
		F_N	23 24 30					
30	.....	P_E	4 49 32				357	Direction SW?
		P_N	4 49 57					
		L_E	4 50 20					
		L_N	4 50 33					
		M_N	4 50 44			800		
		M_E	4 51 00		450			
		F_E	5 01 40					
		F_N	5 02 40					

Porto Rico. *Vieques. Magnetic Observatory.* U. S. Coast and Geodetic Survey. H. M. Pease.

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 21.4, N 21.1

Date.	Character.	Phase.	Time.	Period. T	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
Nov. 21	.....	P_E	H. m. s. 0 29 12	Sec. 5	μ	μ	Km.	
		S_E	0 33 06	10				
		L_E	0 37 56	18				
		L_N	0 38 40	28				
		M_N	0 45 00	16		10		
		M_E	0 48 04	14	20			
		C	0 58 00	14				
		F	1 17 00					

TABLE 2.—*Instrumental reports*—Continued.

Date.	Character.	Phase.	Time.	Period T	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
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			
1915 Nov. 1	I_E	P_E?...	*H. m. s.* 7 37 06	*Sec.*	μ	μ	*Km.* 9,280?	
		S.....	7 47 30					
		eL....	8 07 00					Maxima on E - W more pronounced than on N-S.
		F.....	10 00 00					
21	III_E....	P?....	0 20 40				3,675?	Phases masked by microseisms.
		S.....	0 26 08					
		L.....	0 29 17	12				
		M_N....	0 33 05					
		M_E....	0 35 12					
		F.....	2 00 00					
26	.....	M.....	19 35 05					Earthquake southwest of Panama. Beginning of all phases indiscernible.
		F.....	19 45 00					
30	.....	M.....	5 04 19					All phases indistinct. Maximum very small.
		F.....	5 06 40					
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			
1915. Nov. 1	.....	P.....	*H. m. s.* 7 37 03	*Sec.* 2	μ	μ	*Km.* 9,340	Off Japan.
		S.....	7 47 30					
		SRi_E.	7 53 35					
		L.....	8 07 36	40				
		L.....	8 10 00	20				
		M_E....	8 17 00	20	28			
		M_N....	8 23 00	20		52		Waves from antipicentershow well.
		M_E....	8 24 00	16	28			
		M_N....	8 27 00	16		56		
		L_E....	8 33 to 9 04 00	14-16				
		LR....	9 51 00	20				
		LR....	9 56 00	20-18				
		F.....	10 30 00					
18	.....	I_E.....	4 26 06					Strong microseisms mask N-S.
		eL_E...	4 55 00					
		L_E....	4 58 00	18				
		L_E....	5 01 00	18				
		F.....	5 10 00					
21	.....	P_E....	0 20 34	2			3,520	Microseisms mask P_N.
		S.....	0 25 52					
		L_W....	0 28 48	40				
		L_E....	0 29 00					
		M_W....	0 32 30			720		
		M_E....	0 35 00		460			
		L.....	1 00 00	11				
		F.....	3 00 00					
		VERTICAL.						
		M.....	0 34 00		(A_Z) 650			
26	.....	P_N....	19 19 33	2			4,140	
		S_E....	19 25 28					
		S_N....	19 25 30					
		L_E....	19 30 48	30				Microseisms mask L_N.
		L_E....	19 34 00	20				
		L_E....	19 35 00	18				
		L_E....	19 36 00	14				
		F.....	19 47 00					

Date.	Character.	Phase.	Time.	Period T	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
Canada. *Ottawa, Dominion Astronomical Observatory*—Continued.								
1915 Nov. 30	.....	P_N?...	4 53 09	2			3,900?	
		S_E?...	4 59 50					
		S_N?...	4 59 51					
		eL_E?..	5 03 24	60				
		L_E....	5 05 00	40				
		L_E....	5 07 00	30				
		L_E....	5 08 00	20				
		L_N....	5 09 00	24				
		L.....	5 10 00	20-18				
		F.....	5 15 00					
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=0.59″.
[Report for November, 1915, not received.]								
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″.
[Report for November, 1915, not received.]								

SEISMOLOGICAL DISPATCHES.[1]

Rome, via Paris, Nov. 14, 1915.

The royal observatory at Catania reports that the volcano of Stromboli was in violent eruption at 9 o'clock yesterday morning, according to the Stefani agency. Great blocks of lava and ashes have fallen over the entire island. The town of Lipari, on the island of the same name, felt a shock which lasted for a short time. (Assoc. Press.)

Los Angeles, Cal., Nov. 20, 1915.

Accompanying an earthquake shock that rocked the southwest, damaged buildings in Mexico and the Imperial Valley, a volcano at Andrade, Mexico, across the line from Yuma, sprang into activity this afternoon. The shocks were felt as far north as San Diego and reported more or less heavy in all parts of the Imperial Valley. In Mexico they were reported strong. At Calexico walls were cracked and buildings damaged. (Assoc. Press; United Press.)

Canal Zone, Panama, Dec. 1, 1915. (See above Table 2. p. —.)

Ten distinct seismic disturbances were recorded at the Balboa Heights observatory during the four days from November 26 to November 29, inclusive. The first shock, intensity V on the Rossi-Forel scale of I to X, was the heaviest and was similar in many ways to the disturbance that occurred on October 1, 1913. The shocks that followed were comparatively light. The indicated distances of the disturbances varied, but all seem to have had a common origin about 195 to 225 kilometers southwest of Balboa Heights, probably in the neighborhood of Los Santos province. The disturbance that was recorded about midnight of November 29 was over 320 kilometers away, but in all probability occurred along the same fault as those previously recorded. (Assoc. Press.)

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

SECTION V.—SEISMOLOGY.

SEISMOLOGICAL REPORTS FOR DECEMBER, 1915.

By WILLIAM J. HUMPHREYS, Professor in charge of Seismological Investigations.

[Dated: U. S. Weather Bureau, Washington, D. C., Feb. 3, 1916.]

TABLE 1.—*Noninstrumental earthquake reports, December, 1915.*

Day.	Approximate time, Greenwich Civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity (Rossi-Forel).	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
		ARKANSAS.								
	H. m.		° ′	° ′			*Secs.*			
7	18 40	Black Rock	31 08	91 04	2	1	30			S. J. Howe.
	18 40	Black Rock	31 08	91 04	2	1	30			N. F. Coffey, jr.
	18 40	Blytheville	35 55	89 53		1				J. K. Sartain.
	18 40	Brinkley	34 53	91 07	4	1				H. L. D. Whitson.
	18 40	Forest City	35 02	90 43	5	1				L. Tierley.
	18 40	Hardy	36 19	91 22	2	1	30			C. A. Caywood.
	18 40	Hunter	35 06	91 05	5	1	30	Rumbling	Shook articles off shelves	J. R. High.
	18 40	Jonesboro	35 51	90 38	5	1				Benedictine Sisters.
	18 40	Little Rock	34 45	92 06	3–4	1	5			G. H. Speaker.
	18 40	Marion	35 14	90 10	4	1	4			S. A. Johnson.
	18 40	Newport	35 36	91 13		1				A. J. Sheil.
	18 40	Ravenden	36 15	91 12	4	1			Windows rattled	L. H. Walker.
	18 40	Wynne	35 14	90 44	2	1	5			J. M. Larkan.
		CALIFORNIA.								
1	14 05	Corona	33 52	117 35	3	1	½			J. W. Garthwaite.
	14 05	Holcomb Valley	34 17	117 05		1				J. M. Henry.
	14 05	Redlands	34 04	117 12	4	1	1	Rumbling		P. W. Moore.
	14 05	Riverside	33 58	117 21	3–4	1				(From press report.)
14	15 00	Seven Oaks	34 06	117 10	3	1	1			E. N. Munns.
27	7 24	Lonoak	36 20	122 00	3	1				M. L. Griffin.
	7 24	Salinas	36 36	122 40						Miss Ruth Abbott.
	7 24	San Jose	37 20	121 54						(From press report.)
	7 24	Santa Cruz	36 57	122 02	5	1	10	Rumbling	Windows rattled	W. R. Springer.
	7 24	Soledad	36 28	121 16						A. H. Abbott.
	7 24	Spreckels	36 35	121 38	5	2				Paul Hols.
	7 24	Watsonville	36 55	121 46	5	1	10	Rumbling		Spreckels Sugar Co.
31	12 20	Eureka	40 48	124 11	3			Faint		J. P. Spetz.
	12 20	Shively	40 25	123 56	3	1	2			Frank Essig.
		ILLINOIS.								
7	18 40	Anna	37 27	89 18	4	1	7			J. I. Hale.
	18 40	Cairo	37 00	89 10	5	2	14	Faint	Shook buildings	U. S. Weather Bureau.
	18 40	Golconda	37 24	88 31	4	1	5			C. A. Werner.
	18 40	Harrisburg	37 45	88 34	2–3	1	15		Dishes rattled	Clarence Bonnell.
		KENTUCKY.								
7	18 40	Benton	36 51	88 20	2	1				
	18 40	Calvert City	37 02	88 18	4	1	5		Doors moved	J. C. Nobel.
	18 40	Clinton	37 40	89 00	4	1	10			Otis Jackson.
	18 40	Fulton	36 30	88 52	4	1				(From press report.)
	18 40	Hickman	36 35	89 12	4					J. C. Sexton.
	18 40	Kevil	37 06	88 53	5	1	5			M. Kempendall.
	18 40	Lone Oak	37 03	88 42	3	2	4			Mrs. R. C. Gore.
	18 40	Mayfield	36 45	88 38	3	1	10			T. J. Cross.
	18 40	Murray	36 37	88 17	4	1			Dishes rattled	E. H. Robertson.
	18 40	Paducah	37 06	88 37	3–4	1				F. L. Brown.
	18 40	Wickliffe	36 58	89 06	5	1				W. L. Timeall.
		MISSISSIPPI.								
7	18 40	Tupelo	34 16	88 36	3	1	10			W. S. Vincent.
		MISSOURI.								
7	18 40	Cardwell	36 04	90 16	5	1	5	Rumbling		E. M. Perry.
	18 40	Caruthersville	36 14	89 40	5	1				H. E. Averill.
	18 40	New Madrid	36 35	89 32	3	1	1			Miss Josie Smith.
		NEVADA.								
18	9 00	Winnemucca	40 58	117 43	4	1	5			U. S. Weather Bureau.
		SOUTH CAROLINA.								
13	0 55	Charleston	32 47	79 56	3	1		Faint		Dr. J. S. Rhame.
	0 55	Charleston	32 47	79 56	3–4	1	1	Loud		W. T. Tarrant.
	0 55	Summerville	33 05	80 14	2	1	½	Faint		Miss E. H. Gadsden.
		TENNESSEE.								
7	18 40	Brownsville	35 35	89 15	2	1	5			Robt. Y. Moses.
	18 40	Memphis	35 09	90 03	2	1	15		Dishes rattled	U. S. Weather Bureau.
	18 40	Milan	35 55	88 46	3–4	2	10	Rumbling	Shook buildings	O. F. Cantwell.
	18 40	Murfreesboro	35 52	86 27						E. F. Wright.
	18 40	Springville	36 17	88 11	3–4	1	2	Loud		H. A. Boden.
	18 40	Union City	36 27	89 05	5	2	5	Rumbling	Shook buildings	J. R. Oliver.
		WASHINGTON.								
10	20 45	Spokane	47 40	117 25	3–4	1			Shook buildings	U. S. Weather Bureau.

TABLE 2.—*Instrumental seismological reports, December, 1915.*

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

[For significance of symbols see this REVIEW, June, 1915, p. 289.]

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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: {E V 10, T_0 17.4; N 10, 15.6}

1915.			H. m. s.	Sec.	μ	μ	Km.	
Dec. 12	.....	eL.....	21 34 01	12	.....	.....	.....	Nothing on E–W.
		M.....	21 36 48	10	.....	20	.....	
		C.....	21 41 00	.....	.....	.....	.....	

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: {E V 10, T_0 16; N 10, 19.6}

1915.			H. m. s.	Sec.	μ	μ	Km.	
Dec. 13	.....	e.....	5 13 29	3	.....	.....	.....	Very faint. Recorded on magnetogram at 5h 15m.
		M.....	5 14 07	4	10	10	.....	
		F.....	5 16 22	3	.....	.....	.....	
31	.....	P_E....	12 23 36	4	.....	.....	.....	
		L_E....	12 29 06	11	.....	.....	.....	
		L_W....	12 29 24	.....	.....	.....	.....	
		M.....	12 29 37	11	470	40	.....	
		C.....	12 31 00	10	.....	.....	.....	
		F_E....	12 36 00	.....	.....	.....	.....	
		F_E....	13 02 00	.....	.....	.....	.....	

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.

1915.			H. m. s.	Sec.	μ	μ	Km.	
Dec. 8	.....	.....	.....	.....	*350	*350	.....	These tremors occurred at unknown hours being recorded during the 24 hours preceding 15h on dates given. No shocks felt.
		.....	.....	.....	*300	*300	.....	

*Amplitude on instrument.

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

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

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

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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.

Instrumental constants.....

1915.			H. m. s.	Sec.	μ	μ	Km.	
Dec. 2	.....	L_W....	15	.....	.....	.....	.....	Activity on both components, especially on N–S.
		F.....	18	.....	.....	.....	.....	
11	.....	L_E....	12 12 00	.....	.....	.....	.....	Small distinct waves.
		F_E....	12 17 00	.....	.....	.....	.....	
11	.....	L_E....	12 31 00	.....	.....	.....	.....	Reappearance of small waves.
		F_E....	12 36 00	.....	.....	.....	.....	
11	.....	L_E....	15 01 00	.....	.....	.....	.....	Very small, but distinct and regular waves. N–S component disturbed by machinery.
		M_E....	15 13 00	7–8	8	.....	.....	
		C_E....	15 28 00	.....	.....	.....	.....	
		F_E....	15 31 00	.....	.....	.....	.....	
15	.....	L_W....	8	25–40	.....	.....	.....	Very distinct on N–S, but indistinct on E–W.
		F_E....	14	.....	.....	.....	.....	
29–30	.....	.....	.....	20–24	.....	9	.....	Very striking activity. Waves were distinct and regular on N–S.
31	.....	L.....	12 27 00	.....	.....	.....	.....	Preliminaries not discernible. Waves much clearer on N–S.
		M_W....	12 28 00	10	.....	18	.....	
		M_E....	12 30 00	10	18	.....	.....	
		F_E....	12 34 00	.....	.....	.....	.....	
		F_E....	12 37 00	.....	.....	.....	.....	

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

1915.			H. m. s.	Sec.	μ	μ	Km.	
Dec. 7	I_E.....	P.....	10 48 44	.....	.....	.....	5,085	
		S.....	10 53 31	.....	.....	.....	.....	
		L.....	10 59 40	.....	.....	.....	.....	
		F.....	11 25 00	.....	.....	.....	.....	
7	I_E.....	P?....	18 43 18	.....	.....	.....	1,180	Near Cairo, Ill. Waves with a period of 1 second superimposed on secondary.
		S.....	18 45 24	.....	.....	.....	.....	
		L.....	18 46 28	.....	.....	.....	.....	
12	I_E.....	P.....	21 08 32	.....	.....	.....	4,200	Strong microseisms prevailed. L uncertain, F lost in microseisms.
		S.....	21 14 30	.....	.....	.....	.....	
28	I_E.....	P.....	23 48 00	.....	.....	.....	5,965	
		S.....	23 55 34	.....	.....	.....	.....	
29		L?....	0 03 05	.....	.....	.....	.....	F lost in microseisms.
31	I_E.....	P.....	12 27 09	.....	.....	.....	3,080	
		S.....	12 32 55	.....	.....	.....	.....	
		L?....	12 39 03	.....	.....	.....	.....	
		F?....	13 30 ..	.....	.....	.....	.....	F merges in microseisms.
31	I_E.....	P.....	23 13 14	.....	.....	.....	3,055	
		S.....	23 18 15	.....	.....	.....	.....	
		L?....	23 23 09	.....	.....	.....	.....	
		F?....	23 40 ..	.....	.....	.....	.....	F merges in microseisms.

TABLE 2.—*Instrumental seismological reports, December, 1915*—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

District of Columbia. *Washington. Georgetown University.*

F. L. 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	2.6
N	143	5.2	3.4
Z	80	*5.0*	*0*

1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Dec. 7	.....	ePE?..	18 40 57	.....	.....	.....	.....	Heavy microseisms. P and S very doubtful.
		ePN?..	18 41 23	.....	.....	.....	.....	
		SE?....	18 44 31	.....	.....	.....	.....	Reported from Cairo, Ill.
		SN?....	18 45 05	.....	.....	.....	.....	
		LW.....	18 45 28	5	.....	.....	.....	
		LE.....	18 45 30	5	.....	.....	.....	
		MN.....	18 45 35	.....	.....	6	.....	No distinct ME.
		F.....	19 15 00	.....	.....	.....	.....	
12	II,	iPN....	21 08 32	.....	.....	.....	.....	Heavily masked by microseisms. No distinct maximum.
		ePE....	21 08 37	.....	.....	.....	.....	
		SN?....	21 12 21	.....	.....	.....	.....	
		SE.....	21 12 30	.....	.....	.....	.....	
		LE.....	21 14 37	15	.....	.....	.....	
		eLN....	21 15 58	15	.....	.....	.....	
		F.....	21 40 00	.....	.....	.....	.....	
31	II,	eP.....	12 30 48	.....	.....	.....	.....	Phases masked by microseisms. E-W illegible.
		eLE....	12 40 13	20	.....	.....	.....	
		MN.....	12 44 20	.....	.....	6	.....	Mainka seismograph shows eP at $12^h\ 29^m\ 13^s$.
		F.....	13 05 00	.....	.....	.....	.....	Gram poor because of poor paper accidentally used.

Hawaii. *Honolulu. Magnetic Observatory.* U. S. Coast and Geodetic Survey. Wm. W. Merrymon.

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 18.8

1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Dec. 3	.....	P.....	3 03 30	.....	.....	.....	.....	
		S.....	3 17 00	.....	.....	.....	.....	
		L.....	3 28 00	21	.....	.....	.....	
		M.....	3 33 24	.....	*300	.....	.....	
		C.....	3 43 00	.....	.....	.....	.....	
		F.....	5 09 00	.....	.....	.....	.....	
6	.....	P.....	21 15 18	.....	.....	.....	.....	
		L.....	21 23 42	22	.....	.....	.....	
		M.....	21 27 18	.....	*200	.....	.....	
		C.....	21 32 18	.....	.....	.....	.....	
		F.....	21 48 48	.....	.....	.....	.....	
9	.....	L.....	13 42 36	24	.....	.....	.....	
		M.....	13 47 36	.....	*500	.....	.....	
		C.....	13 52 12	.....	.....	.....	.....	
		F.....	14 29 18	.....	.....	.....	.....	
14	.....	e.....	8 16 24	24	.....	.....	.....	
		M.....	8 21 18	.....	*100	.....	.....	
		F.....	8 33 30	.....	.....	.....	.....	
17	.....	P.....	7 44 00	.....	.....	.....	.....	
		S.....	7 52 06	.....	.....	.....	.....	
		L.....	8 00 36	22	.....	.....	.....	
		M.....	8 01 42	.....	*200	.....	.....	
		C.....	8 18 54	.....	.....	.....	.....	
		F.....	8 55 48	.....	.....	.....	.....	
19	.....	e.....	21 07 00	.....	.....	.....	.....	Not well defined.
		M.....	21 14 12	.....	*100	.....	.....	
		C.....	21 19 42	.....	.....	.....	.....	
		F.....	22 34 48	.....	.....	.....	.....	

*Trace amplitude.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

Hawaii. *Honolulu. Magnetic Observatory*—Continued.

1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Dec. 21	.....	e.....	9 32 54	.....	.....	.....	.....	
		M.....	9 36 18	.....	*100	.....	.....	
		F.....	9 41 12	.....	.....	.....	.....	
22	.....	e.....	12 04 24	.....	.....	.....	.....	
		M.....	12 09 06	.....	*100	.....	.....	
		F.....	12 28 00	.....	.....	.....	.....	
27	.....	L.....	4 35 18	24	.....	.....	.....	
		M.....	4 44 00	.....	*400	.....	.....	
		C.....	4 47 54	.....	.....	.....	.....	
		F.....	5 12 36	.....	.....	.....	.....	
29	.....	e.....	0 08 24	.....	.....	.....	.....	
		M.....	0 25 12	.....	*100	.....	.....	
		F.....	0 33 12	.....	.....	.....	.....	
29	.....	e.....	22 16 00	.....	.....	.....	.....	
		M.....	22 19 30	.....	*100	.....	.....	
		F.....	22 28 00	.....	.....	.....	.....	
31	.....	P.....	12 27 54	.....	.....	.....	.....	
		S.....	12 30 48	.....	.....	.....	.....	
		L.....	12 34 06	20	.....	.....	.....	
		M.....	12 37 42	.....	*2,000	.....	.....	
		C.....	12 45 12	.....	.....	.....	.....	
		F.....	13 58 36	.....	.....	.....	.....	
31	.....	P.....	23 02 42	.....	.....	.....	.....	
		S.....	23 05 54	.....	.....	.....	.....	
		L.....	23 08 48	21	.....	.....	.....	
		M.....	23 17 42	.....	*400	.....	.....	
		C.....	23 23 48	.....	.....	.....	.....	
Jan. 1	(1916).	F.....	0 03 18	.....	.....	.....	.....	

*Trace amplitude.

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

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

Instrument: Wiechert.

Instrumental constants..

	V	T_0	ε
E	177	3.4	4
N	205	3.4	4

1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Dec. 7	.....	P.....	18 41 25	.....	2	1	.....	Press reports located Cairo, Ill.
		SN?....	18 42 10	.....	.....	.....	.....	S not discernible on E-W.
		L.....	18 42 29	.....	.....	.....	.....	
		M.....	18 42 45	.....	11	13	.....	
		F.....	18 59 00	.....	.....	.....	.....	
11–12	.....	.....	.....	.....	.....	.....	.....	Strong microseisms prevailed in continually recurring trains of waves, generally smooth sine curves from 3 or 4 up to 12 or more waves in a train with periods of 5 or 6 seconds. Strongly suggestive of Wiechert standing waves within a definite thickness of earth's crust.
12	.....	P.....	21 09 15	2–3	1	1	.....	SE and LE not discernible.
		SN.....	21 13 38	5–10	.....	2	.....	
		LN?..	21 18 34	.....	.....	.....	.....	
		ME.....	21 19 15	8–10	3	.....	.....	
		MN.....	21 19 30	8–10	.....	2	.....	
		F.....	.....	.....	.....	.....	.....	F in microseisms.
31	.....	PE.....	12 25 09	3–4	1	.....	.....	
		PN.....	12 25 10	.....	.....	.....	.....	Apparently due to E-W motion of pendulum.
		SN.....	12 29 33	3–6	.....	.....	.....	
		SE.....	12 29 35	.....	.....	.....	.....	
		LW.....	12 33 33	.....	.....	.....	.....	LE?.
		MN.....	12 34 00	12–15	.....	3	.....	
		ME.....	12 35 00	12–15	6	.....	.....	
		F.....	13 17 00	.....	.....	.....	.....	

TABLE 2.—*Instrumental seismological reports, December, 1915*—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..

	V	T_0
E	10	31
N	10	29

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915. Dec. 7			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
		P_N	18 45 24	3				
		P_E	18 45 27	3				
		L_N	18 45 36					
		M	18 45 45		10	20		
		C	18 47 00					
		F	18 49 00					
12		P_N	21 08 08	3				Beginning and end confused by wind tremors.
		L_E	21 14 37	7				
		L_N	21 15 14	7				
		M_W	21 16 57	10		60		
		M_E	21 17 40	9	50			
		C_N	21 19 00	7				
		F_N	21 31 00					
31		L_N	12 41 09	13				Phases not well defined, particularly at the beginning.
		L_E	12 41 14	12				
		M_W	12 41 24	16		60		
		M_E	12 43 18	16	80			
		C	12 47 00	10				
		F	13 05 00					

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	e:1
E	80	23	0
N	50	25	4:1

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915. Dec. 3			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
		e?	.. .. ..					E–W record entangled.
		L_N	3 43 10	25				
		L	3 47 00	20				
		F	4 06 00					
6		*O?*	*20 60 00*				*16,900?*	
		e?	21 30 35					P and S masked by microseisms. Distance from LR1—eL_E=30.75 mins. Distance = 20,000 minus 30.75/2×202 Km. Amplitude decreases suddenly at 21h 52m 28s.
		eL_E	21 49 15					
		L	21 50 30 / 21 52 28	20				
		LR1	22 20 00 / 22 22 22	12				
		P	22 59 00					
7		*O*	*10 38 26*				*4,600*	
		P_E	10 46 20					
		S	10 52 37	6				
		L	10 57 08	20				
		F	11 28 00					
7		*O?*	*12 50 25*				*2,460?*	
		iP	12 35 28					
		S?	12 39 40					
		eL	12 41 36					eL possibly P of another quake?
		L	12 53 34	16				F lost in microseisms.
		L	13 10 02 / 13 11 39	10				Sheets changed at 13h 35m 30s.
7		*O?*	*18 40 00*					*O* from St. Louis records. Reported near Cairo, Ill., by St. Louis Observatory.
		iP	18 43 35					
		L_E	18 47 50					
		L_N	18 48 14					
		F	18 50 00					
8		e?	18 25 53	11				Record of doubtful character. Preceded and followed by similar disturbances.
			18 33 46	70				
				36				
				62				
			18 39 05	26				
			18 44 14 / 18 45 24	15				F indeterminate.

O—time at origin.

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

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915. Dec. 12			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
		O	*21 02 01*				*4,000*	Except P_N, record much masked by microseisms.
		P_N	21 09 19	3				
		iP	21 09 35	4				iP, steady mass thrown south.
		$ePn?$	21 10 34					
		S_N	21 15 06					
		S_E	21 15 23					
		L_N	21 18 20					
		L_E	21 18 22					
		F	21 35 30					
17		L_E	5 57 29	16				Masked by microseisms.
		F	5 58 31					
17		*O?*	*7 40 21*				*4,345?*	e—S? Distance from S–L?
		e	7 54 11					
		L_E	7 58 30	20				L not registered on N–S.
		F	8 15 12					
18		L_E	.. .. ..					Between 14h and 21h a group of long waves beginning about 4 mins. past the hour; undeterminable because of entangled lines.
19		$L_E?$	21 23 00					
		F	21 44 00					
29		$L_E?$	0 12 34					e earlier? Phases masked by microseisms.
		F?	0 17 58					
31		*O?*	*12 19 23*				*4,810*	*O* from S–eL. Readings for P and S unreliable.
		eP?	12 27 38					
		R	12 28 57					
		S_E	12 33 53					
		S_N	12 34 00					
		eL_N	12 40 25					
		L_N	12 41 13	10–12				
		M_E	12 45 03	16–14				
		F?	13 42 00					F lost in changing records.

O—time at origin.

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	e:1
80	7	5:1

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915. Dec. 7	III_v		*H. m. s.*	*Sec.*	μ	μ	*Km.*	
		iP	18 40 42				1847	Reported principally from Cairo, Ill.
		ePn	18 40 48					
		S_N	18 41 06					
		S_E	18 41 12					
		M_E	18 41 30		41			
		M_N	18 41 36			28		
		F	18 58 00					
12	II_v	iP	21 14 00				1,600	
		S_N	21 16 18					
		S_E	21 16 30					
		L_N	21 17 00					
		L_E	21 17 12					
		M_E	21 17 42	7	24			
		M_N	21 18 06	7		45		F lost in microseisms.
31	II_v	eP	12 30 30				6,300?	
		S_N	12 35 00					
		S_E	12 35 12					
		L_N	12 35 42					
		L_E	12 37 06					
		M_N	12 36 12	10		50		
		M_E	12 37 18	10	25			F lost in microseisms. Microseisms continuous from 2h 37m of Dec. 28, 1915, to Jan. 1, 1916.

TABLE 2.—*Instrumental seismological reports, December, 1915*—Continued.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.

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:1
	80	7	5:1

1915. Date.	Character.	Phase.	Time. H. m. s.	Period. Sec.	Amplitude. μ	Amplitude. μ	Distance. Km.	Remarks.
Dec. 7	I_r	i_E	18 43 20		20			A sudden shock from the southwest, followed by microseisms.
		i_N	18 48 30	10		25		
		F_E	13 49 25					
		F_N	13 49 45					
12	I_r	ePg	21 16 10					Preceded by microseism for 24 hours and followed by same for 8 hours.
		S_E	21 19 40					N-S masked by microseisms.
		M_E	21 22 10	15	20			
		F_E	21 27 00					
31	II_r	ePN	12 29 45					Preliminary tremors for 48 hours. S masked by microseisms.
		ePg	12 31 45					
		L_N	12 41 00					
		L_E	12 43 00					
		M_N	12 42 00	12		25		Reported in Honduras.
		M_E	12 44 00	20				
		F_N	12 59 00					
		F_E	13 01 00					

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

Lat., 40° 57′ 47″ N.; long., 73° 53′ 08″ W. Elevation, 23.9 meters.

Instrument: Wiechert 80 kg.

Instrumental constants..	V	T_0	ε
E	72	7.2	1.5
N	73	7.2	3.75

(Report for December, 1915, not received.)

Panama Canal Zone. *Balboa Heights.* Isthmian Canal Commission.

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

Instruments: Two Bosch-Omori 100 kg.

Instrumental constants..	V	T_0
	10	20

1915. Date.	Character.	Phase.	Time. H. m. s.	Period. Sec.	Amplitude. μ	Amplitude. μ	Distance. Km.	Remarks.
Dec. 5		P_E	1 23 45				227	Direction probably SW?
		P_N	1 24 00					
		L_E	1 24 11					
		M_E	1 24 17		150			
		L_N	1 24 26					
		M_N	1 24 34			200		
		F_E	1 26 10					
		F_N	1 26 30					
12		P	21 06 00				1,635	Direction probably northerly.
		S_N	21 08 20					
		S_E	21 08 22					
		M_E	21 08 30		60			
		L_N	21 10 50					
		L_E	21 11 00					
		M_N	21 11 10			100		
		F_E	21 22 30					
		F_N	21 26 45					

Panama Canal Zone. *Balboa Heights*—Continued.

1915. Date.	Character.	Phase.	Time. H. m. s.	Period. Sec.	Amplitude. μ	Amplitude. μ	Distance. Km.	Remarks.
Dec. 15		P	14 19 05				227	Direction SW?
		L	14 19 21					
		M_E	14 19 34		1,100			
		M_N	14 19 45			750		
		F	14 26 00					
15		P	19 22 12				212	Direction SW.? Record on E-W. lost, account of clock stopping.
		L	19 22 36					
		M	19 22 38			800		
		F	19 28 00					
26		L	23 21 17					Distance and direction, unknown, probably NW.
		M_E	23 21 35		20			
		M_N	23 21 41			20		
		F	(?)					
28		P_E	23 44 21				1,530	Direction probably NW.
		P_N	23 44 25					
		L_E	23 48 53					
		L_N	23 49 00					
		M_E	23 49 25		80			
		M_N	23 50 07			100		
29		F_E	0 03 40					
		F_N	0 06 20					
30		P_N	6 45 33				644	Direction probably NW?
		P_E	6 45 34					
		L_N	6 46 50					
		L_E	6 46 55					
		M_N	6 47 00			50		
		M_E	6 47 15		50			
		F_E	6 54 10					
		F_N	6 55 20					

Porto Rico. *Vieques. Magnetic Observatory.* U. S. Coast and Geodetic Survey. H. M. Pease.

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

Instruments: Two Bosch-Omori.

Instrumental constants..	V	T_0
E	10	21.4
N	10	21.1

1915. Date.	Character.	Phase.	Time. H. m. s.	Period. Sec.	Amplitude. μ	Amplitude. μ	Distance. Km.	Remarks.
Dec. 12		eL	21 10 57	20				Only a few long waves.
		M	21 13 53	15	20	40		
		C	21 21 00	11				

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

1915 Date.	Character.	Phase.	Time. H. m. s.	Period. Sec.	Amplitude. μ	Amplitude. μ	Distance. Km.	Remarks.
Dec. 7		L	10 58 30					Very feeble long waves.
7								Feeble disturbance from 18h 46m to 18h 50m. Phases indistinct.
12		L	21 18 42	16				Other phases uncertain and confused in microseisms.
		F	21 30 00					
21		L	12 39 47					P and S not discernible.
		F	13 15 00					

TABLE 2.—*Instrumental seismological reports, December, 1915*—Continued.

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.
1915			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Dec. 3	.....	P_N?...	3 12 32	.....	.....	.....	7,500?	Phases masked by strong microseisms.
		eL_E...	3 34 42	30	.....	.....	.....	
		L_E...	3 43 00	20	.....	.....	.....	
		L_N...	3 47 00	20	.....	.....	.....	
		L_E...	3 53 00	18	.....	.....	.....	
		F.....	4 10 00	.....	.....	.....	.....	
7	.....	P.....	10 47 07	2	.....	.....	5,340	Phases masked by strong microseisms.
		S_E...	10 54 06	.....	.....	.....	.....	
		S_N...	10 54 10	.....	.....	.....	.....	
		eL.....	10 59 42	18	.....	.....	.....	
		L_E...	11 04 00	16	.....	.....	.....	
		L_E...	11 11 00	14	.....	.....	.....	
		F.....	11 30 00	.....	.....	.....	.....	
7	.....	P.....	18 47 16	2	.....	.....	700	
		S.....	18 48 33	.....	.....	.....	.....	
		F.....	18 55 00	.....	.....	.....	.....	
12	.....	P.....	21 10 25	.....	.....	.....	3,240	Exceedingly strong microseisms present.
		S.....	21 15 25	.....	.....	.....	.....	
		eL.....	21 18 30	38	.....	.....	.....	
		F.....	21 45 00	.....	.....	.....	.....	
17	.....	S_E?...	7 55 04	.....	.....	.....	3,300?	
		eL.....	7 58 00	20	.....	.....	.....	
		L.....	8 02 16	.....	.....	.....	.....	
		F.....	8 15 00	.....	.....	.....	.....	
28	.....	P_N?...	23 51 33	.....	.....	.....	3,800?	Phases masked by very strong microseisms.
29		S_E?...	23 57 08	.....	.....	.....	.....	
		eL_E...	0 09 00	24	.....	.....	.....	
31	.....	P_E....	12 27 03	2	.....	.....	4,000	Phases masked by very strong microseisms.
		$PR2_E$.	12 28 27	.....	.....	.....	.....	
		S_E....	12 32 50	.....	.....	.....	.....	
		L.....	12 38 00	40	.....	.....	.....	
		M_N...	12 40 42 12 41 24	.....	.....	130	.....	
		M_E...	12 42 24	.....	70	.....	.....	
		F.....	13 30 00	.....	.....	.....	.....	
31	.....	P_E....	23 13 34	2	.....	.....	3,200	N-S component masked by microseisms.
		S_E....	23 18 32	.....	.....	.....	.....	
		$SR1_E$..	23 19 38	.....	.....	.....	.....	
		L_E....	23 22 36	28	.....	.....	.....	
		F.....	23 50 00	.....	.....	.....	.....	

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=0.59″.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Dec. 3	.....	L.....	3 35 30	.....	*200	.....	.....	Air currents going on.
7	.....	S?	10 55 48	.....	.....	.....	.....	Air currents going on.
		iL.....	11 06 30	.....	*300	.....	.....	
		F.....	11 36 18	.....	.....	.....	.....	
7	.....	.....	.....	.....	.....	.....	.....	Marked air currents going on from 12h 18m 24s to 14h 39m.
7	.....	L.....	18 46 30	.....	*50	.....	.....	Air currents going on.
		F?....	18 54 06	.....	.....	.....	.....	
12	.....	P?....	21 09 00	.....	.....	.....	.....	Air currents going on before and after principal movements.
		S.....	21 13 30	.....	.....	.....	.....	
		L.....	21 14 42	.....	.....	.....	.....	
		L.....	21 17 36	.....	.....	.....	.....	
		M.....	21 19 00	.....	*1,700	.....	.....	
		F.....	21 53 30	.....	.....	.....	.....	
17	.....	iP.....	7 52 30	.....	.....	.....	.....	Suspicion of air currents about time of IP.
		S or L.	7 58 54	.....	.....	.....	.....	
		L.....	8 01 42	.....	.....	.....	.....	
		M.....	8 04 48	.....	*300	.....	.....	F lost in air currents.
18	.....	L.....	19 08 00	.....	*200	.....	.....	Gradual beginning and ending.
		F.....	19 14 54	.....	.....	.....	.....	

* Trace amplitude.

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

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
28	.....	P.....	23 51 24	.....	.....	.....	.....	
		S.....	23 56 36	.....	.....	.....	.....	
29		L.....	0 04 00	.....	.....	.....	.....	
		M.....	0 04 24	.....	*300	.....	.....	
		L.....	0 10 00	.....	.....	.....	.....	F lost in air currents.
31	.....	P?....	12 28 00	.....	.....	.....	.....	
		S.....	12 31 54	.....	.....	.....	.....	
		L.....	12 35 48	.....	.....	.....	.....	
		L.....	12 38 12	.....	.....	.....	.....	
		M.....	12 40 30	.....	*1,800	.....	.....	
		F.....	13 23 54	.....	.....	.....	.....	
31	.....	P.....	23 13 18	.....	.....	.....	.....	
		S.....	23 21 18	.....	.....	.....	.....	
		L.....	23 24 42	.....	.....	.....	.....	
		M.....	23 26 36	.....	*300	.....	.....	
1		F.....	0 12 06	.....	.....	.....	.....	

* 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.
1915.			*H. m. s.*	*Sec.*	μ	μ	*Km.*	
Dec. 3	.....	P.....	3 31 23	.....	.....	.....	2,040	
		S.....	3 34 51	.....	.....	.....	.....	
		L.....	3 38 19	.....	.....	.....	.....	
		M.....	3 40 18	.....	*500	.....	.....	
		F.....	3 53 12	.....	.....	.....	.....	
7	.....	P.....	11 08 41	.....	.....	.....	.....	
		S.....	11 14 08	.....	.....	.....	.....	
		L.....	11 18 07	.....	.....	.....	.....	
		M.....	11 22 05	.....	*200	.....	.....	
		F.....	11 50 20	.....	.....	.....	.....	
7	.....	P?....	12 25 33	.....	.....	.....	.....	
		S.....	?	.....	.....	.....	.....	
		L.....	?	.....	.....	.....	.....	
		M.....	12 27 02	.....	*200	.....	.....	
		F.....	12 50 20	.....	.....	.....	.....	
12	.....	P or S.	21 32 56	.....	.....	.....	.....	
		L.....	21 41 26	.....	.....	.....	.....	
		M.....	21 42 26	.....	*200	.....	.....	
		F.....	21 48 26	.....	.....	.....	.....	
17	.....	P or S.	7 51 31	.....	.....	.....	.....	
		L.....	7 59 31	.....	.....	.....	.....	
		M.....	8 03 01	.....	*200	.....	.....	
		F.....	8 11 01	.....	.....	.....	.....	
18	.....	L.....	19 28 00	.....	*50	.....	.....	Not well defined.
		F.....	19 34 36	.....	.....	.....	.....	
28	.....	P or S.	23 58 22	.....	.....	.....	.....	
29		L.....	0 00 52	.....	.....	.....	.....	
		M.....	0 01 22	.....	*300	.....	.....	
		F.....	0 07 22	.....	.....	.....	.....	
29	.....	P.....	?	.....	.....	.....	.....	
		S.....	?	.....	.....	.....	.....	
		L.....	0 16 45	.....	.....	.....	.....	
		M.....	0 24 45	.....	*200	.....	.....	
		F.....	0 38 15	.....	.....	.....	.....	
31	.....	P.....	12 20 47	.....	.....	.....	830	Eureka, Cal.
		S.....	12 22 17	.....	.....	.....	.....	
		L.....	12 25 17	.....	.....	.....	.....	
		M.....	12 26 17	.....	*1,400	.....	.....	
		F.....	13 25 17	.....	.....	.....	.....	
			VERTICAL.					
					A_E			
		P.....	*12 21 18*	*6*	.....	.....	.....	
		S.....	*12 22 54*	*8*	.....	.....	.....	
		L.....	*12 23 34*	*17*	.....	.....	.....	
		M.....	*12 27 44*	.....	*40*	.....	.....	
		F.....	*13 09 44*	.....	.....	.....	.....	
31	.....	P?....	23 15 57	.....	.....	.....	.....	
		S?.....	?	.....	.....	.....	.....	
		L.....	23 16 27	.....	.....	.....	.....	
		M.....	23 21 27	.....	*400	.....	.....	
		F.....	23 49 27	.....	.....	.....	.....	
			VERTICAL.					
					A_E			
		P.....	*23 05 34*	*2*	.....	.....	*1,160*	
		S.....	*23 07 38*	*3–5*	.....	.....	.....	
		L.....	*23 15 06*	.....	.....	.....	.....	
		M.....	*23 16 34*	.....	*1*	.....	.....	

* Trace amplitude.

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

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.

T_0 Instrumental constant..18. Pillar deviation, 1 mm. swing of boom=0.59″.

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*Km.*	
1915. Nov. 1	.....	iP.....	7 47 48	.....	*1,100	.....	11,766	P well defined. A well-defined disturbance. Boom fairly steady from 8h 9m 48s to 8h 10m 18s.
		iS.....	8 00 00	.....	.....	.....	.....	
		iL.....	8 10 18	12	*1,000	.....	.....	
		L.....	8 13 18	12	.....	.....	.....	
		L.....	8 14 18	.....	*4,000	.....	.....	
		L.....	8 17 12	.....	.....	.....	.....	
		L.....	8 19 12	.....	.....	.....	.....	
		M.....	8 24 12	18	*3,000	.....	.....	
		L.....	8 27 18	.....	.....	.....	.....	
		L.....	8 32 48	.....	.....	.....	.....	Trailers and F merge into succeeding quake.
1	.....	S or L.	9 46 48	.....	.....	.....	.....	Possibly a dual earthquake.
		iL.....	9 53 54	.....	.....	.....	.....	
		M.....	10 00 36	.....	*1,000	.....	.....	
		C.....	10 05 42	.....	.....	.....	.....	
		C or M.	10 07 42	.....	*300	.....	.....	
		L.....	10 21 12	.....	.....	.....	.....	
		F.....	11 23 24	.....	.....	.....	.....	
18	.....	L.....	4 51 36	.....	.....	.....	.....	P, S, and F in air currents.
		L.....	4 56 08	.....	.....	.....	.....	
		M.....	5 04 18	.....	*300	.....	.....	
21	.....	S.....	0 26 06	.....	.....	.....	.....	P not recorded. A well-marked earthquake. Origin in southern California.
		L.....	0 30 54	.....	.....	.....	.....	
		M.....	0 31 48	.....	*5,900	.....	.....	
		M.....	0 33 18 0 33 36	.....	*7,000	.....	.....	
		F?....	3 08 30	.....	.....	.....	.....	
22	.....	L.....	5 46 48	.....	*100	.....	.....	Gradual thickening. Doubtful as to being seismic.
		F.....	5 48 24	.....	.....	.....	.....	
26	.....	P?....	19 22 48	.....	.....	.....	.....	P very doubtful, not well defined.
		S or L.	19 29 12	.....	.....	.....	.....	
		L.....	19 31 18	.....	.....	.....	.....	
		L.....	19 34 24	.....	.....	.....	.....	
		M.....	19 35 24	.....	*700	.....	.....	
		F.....	20 01 00	.....	.....	.....	.....	
26	.....	.....	.....	.....	.....	.....	.....	Air currents from 20h 22m 0s to 20h 40m 30s.
30	.....	S?....	5 03 12	.....	.....	.....	.....	P possibly not recorded. S doubtful, may be a long wave.
		L.....	5 06 54	.....	.....	.....	.....	
		M.....	5 09 00	.....	*800	.....	.....	
		F.....	5 27 00	.....	.....	.....	.....	

* 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.

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

Date.	Character.	Phase.	Time.	Period. T.	Amplitude. A_E	Amplitude. A_N	Distance.	Remarks.
			H. m. s.	*Sec.*	μ	μ	*Km.*	
1915. Nov. 1	.....	P?....	7 34 00	.....	.....	.....	7,280	
		S.....	7 42 42	12–18	.....	.....	.....	
		iS?....	7 46 30	.....	.....	.....	.....	
		L.....	8 00 54	18–24	.....	.....	.....	
		M.....	8 04 54	30	*3,500	.....	.....	
		F.....	11 10 06	.....	.....	.....	.....	
18	.....	P.....	4 41 48	.....	.....	.....	.....	
		L.....	4 44 18	.....	.....	.....	.....	
		M.....	4 44 48	.....	*100	.....	.....	
		F.....	4 49 18	.....	.....	.....	.....	
20	.....	P.....	15 38 54	.....	.....	.....	.....	
		L.....	15 39 54	.....	.....	.....	.....	
		M.....	15 41 24	.....	*100	.....	.....	
		F.....	15 42 54	.....	.....	.....	.....	
21	.....	P.....	0 14 36	.....	.....	.....	1,940	In southern California.
		S.....	0 17 54	.....	.....	.....	.....	
		L.....	0 20 48	.....	.....	.....	.....	
		M.....	0 23 24	.....	*28,000	.....	.....	
		M.....	0 25 18	.....	*17,000	.....	.....	
		F.....	1 00 30	.....	.....	.....	.....	
			VERTICAL.		A_Z.			
		*P.....	*0 14 42*	.....	.....	.....	.....	
		*S.....	*0 18 06*	.....	.....	.....	.....	
		*L.....	*0 20 48*	.....	.....	.....	.....	
		*M.....	*0 22 36*	.....	*233	.....	.....	
		*F.....	*1 17 00*	.....	.....	.....	.....	
22	.....	L.....	5 42 06	.....	*50	.....	.....	
		F.....	5 43 30	.....	.....	.....	.....	
23	.....	P.....	12 52 42	.....	.....	.....	.....	Very doubtful as to being seismic.
		L.....	12 54 12	.....	.....	.....	.....	
		M.....	12 54 12	.....	*100	.....	.....	
		F.....	12 56 42	.....	.....	.....	.....	
26	.....	L.....	19 45 12	.....	.....	.....	.....	Light very unsteady. Measurements doubtful. No record from 19h 52m 30s, lights off.
		L.....	19 49 54	.....	.....	.....	.....	
30	.....	L.....	5 14 30	.....	.....	.....	.....	Measurements doubtful, light flickered.
		L.....	5 24 18	.....	*50	.....	.....	

* Trace amplitude.

CORRIGENDA.

Instrumental report, Harvard University, MONTHLY WEATHER REVIEW, October, 1915:
Page 525, column 2, line 1: October 11, *0h* should be *19h, 33m, 23s.*
Page 528, column 1, June 23, Remarks *for* "short pre-phases" *read*: "Short period phases."

SEISMOLOGICAL DISPATCHES.[1]

Rome, Dec. 6, 1915, via Paris, 5:10 a. m.

Earthquake shocks were felt at 2 o'clock the morning of the 5th in Latium, at Foli, Frosinone, Genna, Caprino, and Tivoli. There was neither loss of life nor damage of property. (Assoc. Press.)

Cairo, Ill., Dec. 7, 1915.

A severe earthquake shock lasting 90 seconds was felt here at 12:45 p. m. to-day. No damage was reported. (Assoc. press.)

Catania, Sicily, Dec. 17, 1915, 10:35 p. m.

Mount Etna is again showing considerable activity, emitting red-hot lava which, streaming along the side of the mountain and melting the snow, produces a wonderful effect, especially at night. In addition glowing cinders and smoke form an umbrella-shaped cloud above the volcano. (Assoc. Press.)

Guatemala City, Guatemala, Dec. 23, 1915.

There have been 20 severe earthquakes in Guatemala in the last two days. No serious damage has been reported. (Assoc. Press.)

San Salvador, Salvador, via Galveston, Texas, Dec. 29, 1915.

Another earthquake to-day has destroyed what was left standing of the city of Gracias in Honduras. The earthquake of Dec. 27th partly devastated the city, leaving a few buildings standing. Four thousand persons are made homeless by the destruction of the town. Most of them have come to Salvador, which is 70 miles southwest of Gracias. The shocks here, which began on the 27th, have continued at intervals ever since, but have not been nearly so severe as those in the country to the north and east. (Mexican cable to the New York Herald.)

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

EARTHQUAKES FELT IN THE UNITED STATES DURING 1915.

W. J. HUMPHREYS, Professor in Charge of Seismology.

During 1915, 150 earthquakes strong enough to be fell were reported from different parts of the continentat United States, as listed in the accompanying table, Table 1, and graphically represented (a dot for each report) on W. J. H. figure 1 (XLIII—141), at the end of this issue of the REVIEW.

This graphic scheme, when used on so small a map, does not always distinguish between frequency of shocks and proximity of stations. Nevertheless it gives a general idea of the relative seismicity of the different parts of the country *during the year in question*. Those who wish the facts in greater detail will find them in the annual and monthly tables.

The severest of all these quakes, judging from the area over which it was felt, occurred on October 2, along a fault in Pleasant Valley, Nev. Fortunately the break was so far from towns and thickly settled communities that but little damage was done to property and no loss of life sustained.

The second in severity occurred on June 22, in the Imperial Valley, Cal. Six persons were killed (in Mexicali), many injured, and property damaged to the estimated extent of about $900,000.

Both the above quakes gave large instrumental records at Washington, Ottawa, Sitka, Honolulu, La Paz (Bolivia), and many other distant stations; indeed the vibrations from the Nevada quake appear to have reached all parts of the world.

Four of the sensible earthquakes have been studied in detail and the results published as follows:

"Earthquake at Los Alamos, Cal., Jan. 11," Carl H. Beal, Bulletin of the Seismological Society of America, 5, pp. 14–25.

"The Earthquake in the Imperial Valley, Cal., June 22," Carl H. Beal, Bulletin of the Seismological Society of America, 5, pp. 130–149.

"The Pleasant Valley, Nev., Earthquake of Oct. 2," J. Claude Jones, Bulletin of the Seismological Society of America, 5, pp. 190–205.

"The Earthquake of Oct. 7, in Central California," E. F. Davis, Bulletin of the Seismological Society of America, 5, pp. 230–235.

TABLE 1.—*Places in the United States reporting earthquakes during 1915.*

[Consult also the chart W. J. H. fig. 1, XLIII—141.]

Place.	Approximate latitude.	Approximate longitude.	Number of quakes reported.
ARIZONA.	° ′	° ′	
Mesa	33 24 N.	111 50 W.	1
Parker	34 10	114 16	2
Tucson	32 15	110 50	1
Wickenburg	33 56	112 44	1
Yuma	32 45	114 36	3
ARKANSAS.			
Black Rock	36 08	91 04	1
Blytheville	35 55	89 53	1
Brinkley	34 53	91 07	1
Forest City	35 02	90 43	1
Hardy	36 19	91 22	1
Hunter	35 06	91 05	1
Jonesboro	35 51	90 38	1
Little Rock	34 45	92 06	1
Marion	35 14	90 10	1
Newport	35 36	91 13	1
Ravenden	36 15	91 12	1
Wynne	35 14	90 44	1
CALIFORNIA.			
Aguanga	33 26	116 51	3
Alturas	41 32	120 30	1
Arboldo	36 15	121 47	2
Avalon	33 27	118 22	2
Bakersfield	35 22	119 00	2
Barrett Dam	32 43	116 46	2
Beaumont	33 55	117 00	1
Blythe	33 35	114 38	3
Bonita	32 40	117 03	2
Branscomb	39 40	123 40	1
Brawley	32 59	115 40	13
Bridgeport	38 18	119 15	3

TABLE 1.—*Places in the United States reporting earthquakes during 1915*—Continued.

Place.	Approximate latitude.	Approximate longitude.	Number of quakes reported.
CALIFORNIA—continued.	° ′	° ′	
Cahuilla	33 32	116 43	5
Calexico	32 40	115 28	2
Camino	38 46	120 41	1
Campo	32 38	116 28	1
Camptonville	39 23	121 04	2
Chester	40 18	121 15	2
Chico	39 40	121 40	1
China Flat	40 56	123 30	1
Coalinga	35 19	120 20	1
Coleville	38 36	119 32	3
Colgate	39 22	121 14	1
Colusa	39 12	122 00	1
Converse Nursery	34 04	117 12	1
Corona	33 52	117 35	1
Coulterville	37 42	120 13	2
Coyote	37 14	121 44	3
De Sabla	39 50	121 37	1
Donner	39 17	120 21	1
Drakesbad	40 28	121 29	3
El Cajon	32 48	116 58	4
Eureka	40 48	124 11	3
Fort Bidwell	41 51	120 08	1
Fort Bragg	39 24	123 48	1
Fresno	36 43	119 49	2
Glennville	35 45	118 42	1
Gold Run	39 12	120 50	1
Holcomb Valley	34 17	117 05	5
Hollister	36 50	121 20	1
Hot Springs	35 54	118 38	1
Indio	33 43	116 12	2
Julian	33 05	116 37	7
Lakeport	39 04	122 56	1
Lathrop	37 51	121 17	1
Lindsay	36 13	119 06	1
Livermore	37 40	121 45	1
Lonoak	36 20	122 00	4
Lone Pine	36 37	118 01	1
Los Angeles	34 03	118 15	3
McCloud	41 17	122 09	1
Magalia	39 45	121 36	1
Mammoth Tank	32 49	114 50	2
Markleeville	38 42	119 46	3
Mesa Grande	33 11	116 42	3
Mineral	40 21	121 32	2
Neille	33 22	116 52	3
Nevada City	39 17	121 01	2
Newhall	34 22	118 30	2
Nordhoff	34 35	119 14	1
Northfork	37 08	119 33	1
Oak Grove	33 27	116 52	2
Oakland	37 47	122 15	4
Oroville	39 29	121 39	1
Ozena	34 53	119 16	1
Paso Robles	35 34	120 40	2
Peachland	38 23	122 38	2
Petaluma	38 15	122 38	3
Point Loma	32 43	117 15	5
Redding	40 36	122 24	2
Redlands	34 04	117 12	3
Rialto	34 12	117 27	1
Riverside	33 58	117 21	1
Rohnerville	40 33	124 11	2
Sacramento	38 35	121 30	1
Salinas	36 36	122 40	1
San Diego	32 43	117 10	3
San Francisco	37 48	122 26	6
San Jose	37 20	121 54	4
San Luis Obispo	35 18	120 39	3
San Pedro	33 45	118 14	1
Santa Barbara	34 23	119 40	1
Santa Monica	34 00	118 30	1
Seven Oaks	34 05	117 12	2
Shively	40 25	123 56	4
Soledad	36 28	121 16	1
Sonora	37 59	120 24	2
Spreckels	36 35	121 38	4
Stockton	37 57	121 22	1
Susanville	40 25	120 39	1
Tallac	38 56	120 03	1
Tamalpais	37 56	122 35	1
Towle	39 14	120 48	1
Tustin	33 46	117 46	2
Watsonville	36 55	121 46	3
Woodfords	38 47	119 49	1
Yorba Linda	33 51	117 50	1
COLORADO.			
Grand Junction	39 04	108 34	1
IDAHO.			
Aberdeen	42 56	112 52	2
Arrowrock	43 35	116 05	1
Boise	43 37	116 08	1
Bonners Ferry	48 42	116 30	1
Caldwell	43 42	116 42	1
Emmett	43 51	116 34	1
Fairfield	43 20	114 45	1
Garden Valley	44 08	115 58	1
Glenns Ferry	42 57	115 18	1
Hailey	43 32	114 20	1
Idaho City	43 34	115 58	1
Indian Valley	44 32	116 26	1

TABLE 1.—*Places in the United States reporting earthquakes during 1915*—Continued.

Place.	Approximate latitude.	Approximate longitude.	Number of quakes reported.
IDAHO—continued.	° ′	° ′	
Little Camas	42 52	114 42	1
Meridian	43 36	116 24	1
Mount Home	43 07	115 50	1
Montpelier	42 20	111 17	1
New Meadows	44 57	116 18	2
Payette	44 05	116 56	1
Pine	43 30	115 20	1
Pocatello	42 52	112 29	1
Shoshone	42 56	114 25	1
Silver City	43 02	116 46	1
Weiser	44 15	116 58	1
Wendell	42 48	114 42	1
ILLINOIS.			
Anna	37 27	89 18	1
Cairo	37 00	89 10	2
Equality	37 45	88 22	1
Golconda	37 24	88 31	1
Harrisburg	37 45	88 34	2
Olney	38 45	88 07	1
KENTUCKY.			
Benton	36 51	88 20	1
Calvert City	37 02	88 18	1
Clinton	37 40	89 00	1
Fulton	36 30	88 52	1
Hickman	36 35	89 12	1
Kevil	37 06	88 53	1
Lone Oak	37 03	88 42	1
Mayfield	36 45	88 38	2
Murray	36 37	88 17	1
Paducah	37 06	88 37	1
Wickliffe	36 58	89 06	1
MASSACHUSETTS.			
Andover	42 42	71 08	4
Haverhill	42 47	71 05	2
Lawrence	42 41	71 10	2
Lowell	42 39	71 20	2
MICHIGAN.			
Calumet	47 13	88 26	2
MISSISSIPPI.			
Tupelo	34 16	88 36	1
MISSOURI.			
Cardwell	36 04	90 16	1
Caruthersville	36 14	89 40	1
New Madrid	36 35	89 32	2
MONTANA.			
Lytle	48 01	111 26	1
Shelby	48 30	111 55	1
NEVADA.			
Arthur	40 32	115 21	1
Austin	39 31	117 05	2
Battle Mountain	40 40	116 57	1
Beowawe	40 36	116 29	1
Callente	37 35	114 26	1
Carson City	39 11	119 48	1
Cherry Creek	39 53	114 51	1
Elko	40 51	115 45	2
Eureka	39 23	115 59	1
Fallon	39 30	118 48	7
Gerlach	38 55	119 43	4
Gold Creek	41 42	115 43	1
Golconda	40 58	117 30	2
Halleck	40 54	115 28	1
Lida	37 21	117 24	1
Las Vegas	36 09	115 09	1
Lovelock	40 11	118 30	1
McGill	39 19	114 48	1
Millett	39 01	117 15	1
Mina	38 24	118 06	1
North Fork	41 24	115 50	1
Paradise Valley	41 32	117 34	1
Rebel Creek	41 39	117 45	1
Reno	39 32	119 49	4
Sand Pass	40 15	119 48	3
San Jacinto	41 53	114 42	1
Sharp	38 07	115 28	1
Smith	38 43	119 21	1
Tecoma	41 14	114 05	1
Thorne	38 35	118 33	1
Tonopah	38 04	117 14	1
Unionville	40 28	118 09	1
Virginia City	39 14	119 40	1

TABLE 1.—*Places in the United States reporting earthquakes during 1915*—Continued.

Place.	Approximate latitude.	Approximate longitude.	Number of quakes reported.
NEVADA—continued.	° ′	° ′	
Vya	41 34	119 53	1
Winnemucca	40 58	117 43	4
Yerington	38 58	119 11	5
NEW YORK.			
Beekmanton	44 45	73 24	1
NORTH CAROLINA.			
Asheville	35 36	82 32	1
NORTH DAKOTA.			
Williston	48 09	103 35	1
OREGON.			
Baker	44 46	117 50	1
Beckley	42 40	119 05	1
Burns	43 35	119 04	1
Fruita	45 20	116 50	1
Lakeview	42 12	120 20	1
Sunrise Valley	43 08	118 09	1
Valley Falls	42 32	120 15	1
SOUTH CAROLINA.			
Charleston	32 47	79 56	1
Summerville	33 05	80 14	1
TENNESSEE.			
Bristol	36 36	82 12	1
Brownsville	35 35	89 15	1
Memphis	35 09	90 03	1
Milan	35 55	88 46	1
Murfreesboro	35 52	85 27	1
Springville	36 17	88 11	1
Tiptonville	36 23	89 30	1
Union City	36 27	89 05	1
UTAH.			
Clarkston	41 55	112 04	1
Corinne	41 34	112 07	1
Emery	38 54	111 17	1
Enterprise	37 35	113 50	1
Garland	41 45	112 11	2
Grantsville	40 37	112 27	1
Grouse Creek	41 43	113 55	1
Heber	40 35	111 28	1
Ibapah	40 04	114 00	1
Iosepa	40 32	112 44	1
Kelton	41 35	113 06	1
Lehi	40 23	111 52	1
Lucin	41 22	113 54	1
Midvale	40 36	111 53	2
Modena	37 48	113 54	1
New Castle	37 50	113 30	1
Ogden	41 14	111 58	1
Park City	40 38	111 35	1
Promontory Point	41 13	112 27	1
Provo	40 16	111 44	1
Reed	38 35	113 10	1
Salt Lake City	40 46	111 54	4
Snowville	41 58	112 43	1
Spanish Fork	40 08	111 44	1
Standrod	42 00	113 26	1
Thistle	40 00	111 36	2
WASHINGTON.			
Ashford	46 48	121 56	1
Glacier	48 54	121 57	1
La Center	45 52	122 40	1
Lakeside	47 50	120 01	6
Laurier	48 59	118 13	1
Marblemount	48 32	121 36	2
Queets River	47 30	124 15	1
Seattle	47 38	122 20	1
Spokane	47 40	117 25	1
Sumner	47 12	122 13	1
Tacoma	47 16	122 23	1
Winthrop	48 28	120 10	1
WYOMING.			
Bedford	42 56	110 56	1
Yellowstone National Park	44 20	110 20	2
PORTO RICO.			
Arecibo	18 28	66 44	4
Isaoela	18 30	67 04	1
Lares	18 23	66 55	2
Mayaguez	18 13	67 09	1
San Juan	18 29	66 07	1
Vieques	18 09	65 27	1