

SEISMOLOGICAL REPORTS.

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[Weather Bureau, Washington, D. C., Oct. 3, 1920.]

TABLE 1.—Noninstrumental earthquake reports, August, 1920.

Day.	Approximate time, Greenwich civil.	Station.	Approximate latitude.	Approximate longitude.	Intensity Rossi-Forel.	Number of shocks.	Duration.	Sounds.	Remarks.	Observer.
1920. Aug. 18 23	H. m. 7 20 23 10	CALIFORNIA.								
		Salinas.....	36 36	121 40	3	1	Sec. 5	None.....	Felt by many.....	Dr. E. D. Eddy. P. Hansen.
		Los Angeles.....	34 03	118 15	4	2-3do.....	Felt by several.....		
16	18 05	MONTANA.								
		Helena.....	46 40	112 00	3	1	2 ca.do.....do.....	N. T. Lathrop.
1	11 53	SOUTH CAROLINA.								
		Summerville.....	33 04	80 15	2	1		do.....	E. P. Lawton.
18	8 20	UTAH.								
		Beaver.....	38 12	112 45	3	1	5-6	Rumbling.....	Traveled from SW. to NE.....	C. T. Baldwin.

TABLE 2.—Instrumental reports, August, 1920.

[For significance of symbols and abbreviations, and for a description of stations and instruments, see the REVIEW for January, 1920, pp. 62-63.]

Date.	Char-acter.	Phase.	Time.	Period T.	Amplitude.		Dis-tance.	Remarks.
					A _N	A _S		
ALASKA. U. S. C. & G. S. Magnetic Observatory, Sitka.								
1920. Aug. 26			H. m. s. 23 08 16	Sec.	μ	μ	Km.	E not in operation. No distinct M.
	EN.....		23 19 —				20	
	MN.....							
	FN.....							
ARIZONA. U. S. C. & G. S. Magnetic Observatory, Tucson.								
1920. Aug. 3			H. m. s.	Sec.	μ	μ	Km.	Times uncertain. due to failure of marking apparatus. Preliminary tremors faint in both components.
	eP _E		20 09 08					
	eF _N		20 09 44					
	eS _F		20 17 39					
	eS _N		20 19 01					
	L _E		20 28 29	32				
	M _E		20 30 45	20	10			
	C _E		20 41 —	16				
	F _E		21 08 —	13				
	F _N		20 39 —					
15			H. m. s.					Not apparent on N. Preliminary tre- mors faint.
	eP _E		8 29 27					
	S _E		8 40 13					
	L _E		8 58 20					
	M _E		9 03 45	21	10			
	C _E		9 20 —	16				
	F _E		9 28 —	16				
20			H. m. s.					Record on N barely perceptible.
	L _E		16 54 07					
	L _N		16 55 04					
	M _E		17 00 52	14	10			
	C _E		17 03 —					
	F _E		17 14 —					
	F _N		17 01 —					
26			H. m. s.					Preliminary tremors faint on both com- ponents. Nothing else on N.
	eP _E		23 08 25					
	eF _N		23 08 24					
	eL _E		23 23 50	20				
	M _E		23 27 25	17	10			
	C _E		23 32 —	15				
	F _E		23 58 —					
	F _N		23 12 —					
29			H. m. s.					
	P _N		12 50 18					
	L _E		12 53 55					
	L _N		12 55 06					
	M _E		12 55 57	8	20			
	M _N		12 56 52	7		10		
	C _E		13 00 —					
	C _N		12 58 —					
	F _E		13 05 —					
	F _N		13 08 —					
CALIFORNIA. Theosophical University, Point Loma.								
1920. Aug. 1			H. m. s.	Sec.	μ	μ	Km.	Tremors during 24h. preceding 15h. on dates given.
2					200	300		
3					200	300		
4					100	100		
8					100	100		
15					100	100		
18					200	300		
21					100	100		
23					100	100		
25					200	200		
28					100	100		
29					100	100		
30					50	50		
31					100	100		
DISTRICT OF COLUMBIA. U. S. Weather Bureau, Washington.								
1920. July 2			H. m. s.	Sec.	μ	μ	Km.	Quake on Aug. 3 inserted in July report by mistake, instead of this quake.
	eL.....		19 39 30	30				
	L.....		19 48 —	20				
	L.....		19 55 —	18				
	F.....		20 15 ca.					
2			H. m. s.					Amplitudes small.
	P.....		21 56 27					
	S?.....		21 59 15					
	F.....		22 20 ca.					
Aug. 3			H. m. s.					Amplitudes small.
	P?.....		3 21 08					
	S.....		3 24 15					
	F.....		3 35 ca.					
3			H. m. s.				7,400	
	P.....		20 08 08					
	S.....		20 16 58					
	L _N		20 31 35					
	L _E		20 39 00					
	L.....		20 36 —	30				
	L.....		20 45 —	16				
	F.....		21 30 ca.					
12			H. m. s.				3,500	
	P.....		6 27 12					
	S.....		6 32 30					
	L.....		6 36 10	18				
	F.....		6 45 ca.					
13			H. m. s.				8,000	
	P.....		2 12 46					
	S.....		2 20 48					
	eL.....		2 33 30					
	F.....		2 40 ca.					

TABLE 2.—Instrumental reports, August, 1920—Continued.

DISTRICT OF COLUMBIA. U. S. Weather Bureau, Washington—Continued.

1920.		H. m. s.	Sec.	μ	μ	Km.	
Aug. 15	P	8 38 ca.				.8,500	
	S	8 46 ca.					
	eL	9 10 —					
	L	9 18 —	20				
	L	9 24 —	16				
	F	9 50 —					
20	P	16 27 25				.8,500	
	S	16 37 03					
	L	16 52 25					
	L	16 52 —	20				
	F	17 30 —					
26	P	23 10 14				.6,800	
	S	23 18 30					
	eL	23 29 52					
	F	0 15 —					Period not well defined.

HAWAII. U. S. C. & G. S. Magnetic Observatory, Honolulu.

1920.		H. m. s.	Sec.	μ	μ	Km.	
Aug. 3	S	20 22 36	17				First phase called S after comparison with Cheltenham and Tucson.
	e	20 39 48					
	L	20 45 48					
	M	20 50 18	17	*700			
	C	21 03 —	17				
	F	22 45 —	17				
15	iP	8 25 18	17				
	iS	8 32 08	17				
	eL	8 39 00	19				
	M	8 49 00	17	*3,000			
	C	8 54 —	17				
	F	9 53 —	17				
17	e	2 54 00					On account of failure of driving clock only the end portion of this quake was recorded.
	M	3 02 30	18	*200			
	F	3 08 —					
20	e	17 48 —					
	F	20 10 —					
25	P	22 04 30	17				
	S	22 12 54	17				
	L	22 22 00	30				
	M	22 31 42	17	*800			
	C	22 37 —	17				
	F	23 04 —	17				
26	eP	23 07 48					
	S	23 12 00	17				
	eL	23 16 00	17				
	M	23 20 48	17	*1,100			
	C	23 29 —	17				
	F	24 45 —	17				
27	eP	3 48 18	17				
	eL	4 05 00	17				
	M	4 09 48	17	*300			
	C	4 16 —	17				
	F	4 25 —	17				
29	P	11 05 18	17				
	L	11 12 18	30				
	M	11 20 48	19	*500			
	C	11 24 —	18				
	F	11 30 —					

*Trace amplitude.

ILLINOIS. U. S. Weather Bureau, Chicago.

1920.		H. m. s.	Sec.	μ	μ	Km.		
Aug. 2	e	6 30 00						
	L	6 35 —	18					
	F	7 05 ca.						
3	eP	3 21 22						
	PRi	3 27 07						
	SP	3 31 52						
	eL	3 32 40						
	L	4 10 —	20					
	F	5 20 ca.						
3	P	20 08 00				.7,700		
	S	20 17 05						
	L	20 20 —						
	L	20 33 —	30					
	L	20 40 —	20					
	F	24 ca.						
12	P	6 27 55				.4,300		
	S	6 34 00						
	L	6 39 12						
	L	6 41 —	20					
	F	7 20 ca.						
12	e	21 23 —					May not be seismic.	
	L?	21 38 —						
	F	23 ca.						
13	P	2 12 41				.6,900		
	S	2 21 04						
	eL	2 35 —						
	L	2 43 —	18					
	F	4 ca.						
15	e	0 50 —						
	L	0 57 —	16					
	F	1 30 ca.						
15	P?	8 33 58						
	S	8 44 ca.						
	L	9 10 —	26					
	L	9 18 —	18					
	F	11 10 ca.						
20	P	16 26 50				.8,900		
	S	16 36 56						
	L	16 54 15						
	L	17 01 —	24					
	L	18 — —	18					
	F	20 20 ca.						
26	P	23 08 10				.5,800		
	S	23 15 33						
	L	23 24 15	22					
	L	23 32 —	16					
27	F	1 30 ca.						
27	eL	13 54 30						
	L	14 01 45	18					
	F	14 30 ca.					May not be seismic.	
29	eL*	11 42 30					Nothing on NS.	
	L*	11 46 30	18					
	F	12 10 ca.						
29	e	13 00 00					Phases indistinguishable F lost in changing sheets.	
	F							

TABLE 2.—Instrumental reports, August, 1920—Continued.

MARYLAND. U. S. C. & G. S. Magnetic Observatory, Cheltenham.

1920. Aug. 3		H. m. s.	Sec.	μ	μ	Km.	
3	eP _N	20 08 10					P tremors only on E.
	eP _N	20 08 05					
	eS _N	20 16 59					
	S _N	20 16 49					
	L _N	20 31 33	30				
	M _N	20 38 07	18		20		
	C _N	20 47 —					
	F _N	20 25 —					
20	eP _N	16 27 29	3				No distinct M. Not apparent on E.
	S _N	16 37 16					
	eL _N	17 03 58					
26	eP _N	23 10 15					Preliminary tremors only on E.
	eP _N	23 10 17					
	eS _N	23 18 38					
	M _N	23 31 45	12		10		
	L _N	23 31 00					
	C _N	23 41 —					
F _N	23 16 —						
	24 01 —						

PORTO RICO. U. S. C. & G. S. Magnetic Observatory, Vieques.

1920. Aug. 3		H. m. s.	Sec.	μ	μ	Km.	
3	PR1 _N	20 07 12					This interpretation adopted after comparison with Cheltenham record. SR1 prominent in both components.
	S _N	20 12 13	12				
	eS _N	20 12 06					
	SR1 _N	20 15 33					
	SR1 _N	20 15 50					
	L _N	20 20 17	32				
	eL _N	20 21 47	14				
	M _N	20 22 18	20	250			
	M _N	20 26 25	16		30		
	C _N	20 27 —	13				
	C _N	20 29 —	16				
	F _N	20 45 —	13				
	F _N	20 36 —	9				
	7	P _N	2 41 41				
P _N		2 41 21					
M _N				15		15	
M _N							
F _N		2 45 —					
20	S _N	16 33 09					First appearance seems to be S from comparison with Cheltenham. L _N difficult to place.
	eL _N	16 42 00					
	eN _N	16 52 06					
	M _N	16 46 50	26	20		10	
	M _N						
	C _N	16 52 —	18				
	F _N	17 10 —					
	F _N	16 56 —					

CANAL ZONE. Panama Canal, Balboa Heights.

1920. Aug. 3		H. m. s.	Sec.	μ	μ	Km.	
3	P _N	20 04 38					Dist. about 4,000 km., probably NW.
	S _N	20 10 36					
	S _N	20 10 30					
	M _N	20 23 02		*500			
	M _N	20 23 44			*1,000		
	F _N	21 05 00					
	F _N	21 08 00					

*Trace amplitude.

VERMONT. U. S. Weather Bureau, Northfield.

1920. Aug. 3		H. m. s.	Sec.	μ	μ	Km.	
3	L _N	20 36 30	18				Other phases lost in unsteadiness due to loose joint.
	F _N	20 50 ca					

CANADA. Dominion Observatory, Ottawa.

1920. Aug. 3		H. m. s.	Sec.	μ	μ	Km.	
3	eP _N	3 23 04					Small disturbance, resembling micros.
	F _N	4 40 ca					
3	O _N	19 57 20				8,140	Irregular short periods of 2-4 secs. closely resembling micros. May not be seismic.
	P _N	20 08 48					
	S _N	20 18 15					
	eL _N	20 31 30	49				
	L _N	20 40 —	21				
	F _N	20 51 —	15				
13	I _N	2 13 30					Irregular short periods of 2-4 secs. closely resembling micros. May not be seismic.
	I _N	2 14 06					
	e _N	2 16 27					
	i or L _N	2 22 08					
	i _N	2 22 50					
	i _N	2 21 00					
	F _N	3 50 —					
15	O _N	8 22 08				10,000	Phases do not agree very well in giving dist.
	eP _N	8 35 10					
	S _N	8 46 08					
	SR1 _N	8 52 42					
	eL _N	9 07 —	33				
	L _N	9 26 —	18				
	L _N	9 29 —	17				
	L _N	9 39 —	16				
	L _N	10 00 —	15				
	L _N	10 31 —	20				
	F _N	10 40 —					
20	O _N	16 15 43				(9,140)	Phases do not agree very well in giving dist.
	eP _N	16 22 30					
	iP _N	16 28 03					
	iS _N	16 38 21					
	e _N	16 43 20					
	eL _N	16 52 30	40				
	L _N	17 09 —	18				
	L _N	17 17 to	13				
	L _N	17 25 —					
	L _N	17 36 —	12				
21	L _N	18 09 —	13				Phases do not agree very well in giving dist.
	L _N	18 20 —	13				
	F _N	18 30 —					
	e _N	21 26 26					
	L _N	21 37 —	11				
26	F _N	21 51 —					Phases do not agree very well in giving dist.
	O _N	23 00 04				6,200	
	iP _N	23 09 46					
	PR1 _N	23 12 13					
27	eS _N	23 17 33					Phases do not agree very well in giving dist.
	eL _N	23 27 30					
	L _N	23 31 —	24				
	L _N	23 44 —	13				
	L _N	0 05 —	13				
29	L _N	0 25 —	12				Phases do not agree very well in giving dist.
	F _N	1 00 —					
29	eL _N	{ 11 50 23	21				Phases do not agree very well in giving dist.
		{ to					
		{ 12 05 —					

No earthquakes were recorded during August, 1920, at the following stations:

COLORADO. *Sacred Heart College*, Denver.

Reports for August, 1920, have not been received from the following stations:

- ALABAMA. *Spring Hill College*, Mobile.
- DISTRICT OF COLUMBIA. *Georgetown University*, Washington.
- MASSACHUSETTS. *Harvard University*, Cambridge.
- MISSOURI. *St. Louis University*, St. Louis.
- NEW YORK. *Canisius College*, Buffalo; *Cornell University*, Ithaca; *Fordham University*, New York.
- CANADA. *Dominion Meteorological Service*, Victoria and Toronto.

SEISMOLOGICAL DISPATCHES¹

Kingston, Jamaica, July 2, 1920:

Kingston and St. Andrew were shaken by an earthquake at 12:20 last night. No damage is reported.—Associated Press.

Victoria, B. C., July 7, 1920:

A well-defined record on the Gonzales Observatory seismograph here to-day indicated an earthquake about 550 miles south of Victoria. The disturbance began at 10:45 a. m. and continued 20 minutes.—Associated Press.

Los Angeles, Calif., July 16, 1920:

A severe earthquake at 10:10 o'clock this morning apparently centered in Los Angeles city, caused slight damage to some of the older buildings, broke a number of plate-glass windows, and frightened the citizens generally. No extensive damage was reported.—Associated Press.

Luray, Va., July 25, 1920:

Following an earthquake, this county, at a late hour yesterday evening, was visited by one of the most severe electrical storms ever known. A short time before the storm struck the county the second most severe earthquake ever known here was experienced. In Luray it was particularly severe, rattling windows and doors.—International News Service.

Santiago, Chile, July 26, 1920:

This city was rocked by a strong earthquake at 12:30 o'clock this morning, but little damage has been reported. It was felt throughout the central zone of the country from Serena to Concepcion. The duration of the shock is estimated here at from 4 to 6 seconds.

Advices from Argentina say an earthquake occurred at Mendoza last night, lasting nearly 2 minutes.

Other estimates of the duration of the shock here vary, some reaching 25 seconds. An investigation revealed small damage to cornices and plaster walls of some buildings.

Dispatches from Valparaiso say that the earthquake produced considerable alarm there.

This morning's quake was the most intense since 1906. It appears to have been stronger at Valparaiso than at Santiago.—Associated Press.

Los Angeles, Calif., July 26, 1920.

A sharp earthquake shock awoke Los Angeles at 4:12 this morning. A few chimneys were knocked down, dishes broken, and windows rattled.—Associated Press.

Mexico City, August 19:

The volcano of Popocatepetl is showing signs of activity, luminous smoke being visible above its crater and ashes falling on the neighboring town of Ayotzingo, in the State of Mexico.—Associated Press.

Santiago, Chile, August 21:

A series of violent earthquakes visited the southern region of Chile Friday, causing considerable alarm, but so far as has been ascertained little property damage. The shocks were most intense in the Provinces of Malleco and Cautin; and lasted for about a minute. Twenty shocks were reported on the sparsely populated island of Mocha, off the Province of Malleco between 11 a. m. and 4 p. m. Friday, and lighthouses on the island were damaged. No fatalities have been reported.—Associated Press.

San Salvador, Republic of Salvador, August 27:

The volcano San Miguel is throwing out sand and ashes. No damages have been reported.—Associated Press.

London, August 29:

The island of Malta suffered an earthquake shock of considerable force at 2.45 o'clock this morning, says a Central News dispatch from Rome, quoting advices from Syracuse, Sicily. Numerous buildings in Floriana and the surrounding district were seriously damaged and the population was in a panic, the dispatch says.—Associated Press.

TABLE 3.—Late reports (instrumental).

Date.	Character.	Phase.	Time.	Period T.	Amplitude.		Distance.	Remarks.
					A _E	A _N		
DISTRICT OF COLUMBIA. <i>Georgetown University</i> , Washington.								
1920			<i>H. m. s.</i>	<i>Sec.</i>	μ	μ	<i>Km.</i>	
July 2	eLN		19 39 30	23				Heavy micros.
	L _E		19 45 31	23				
	L _N		19 45 15	23				
	F		19 57 —					
2	eE		21 30 25					Very heavy micros; doubtful.
	eN		21 30 25					
	S?		21 39 25					
	L _N		21 57 20					
	F		22 25 —					
7	eP _E		18 49 40					Micros.
	eP _N		18 49 40					
	S?		18 56 30					
	S?		18 56 30					
	eL _E		19 04 12	7				
	eL _N		19 04 24	7				
	M _E		19 05 20	6	*10,500			
	M _N		19 05 25	6		*5,700		
	F		19 50 —					
7	e		20 02 —					Micros.
	F		20 11 —					
26	e		5 23 58					Very heavy micros.
	S?		5 33 17					
	F		6 ca.—					
*Trace amplitude.								
PORTO RICO. <i>U. S. C. & G. S. Magnetic Observatory</i> , Vieques.								
1920			<i>H. m. s.</i>	<i>Sec.</i>	μ	μ	<i>Km.</i>	
July 7	eP _E		0 44 44					
	eP _N		0 44 54					
	L _N		0 45 20					
	M _E		0 45 45		25			
	M _N		0 45 40			25		
	F _E		0 50 —					
	F _N		0 49 —					

¹ Collected by seismological station, Georgetown University, Washington, D. C.