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BY

E. F. DAVIS

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CONTENTS

Symbols and Notation

1. *Character of the Earthquake*—

I. Perceptible II. Moderately strong. III. Strong.

d (terrae motus domesticus)	Local shock (origin nearby, perceptible at the station).
v (terrae motus vicinus)	Near shock (origin less than 1,000 kilometers distant).
r (terrae motus remotus)	Distant shock (origin from 1,000 to 5,000 kilometers distant).
u (terrae motus ultimus)	Very distant shock (origin more than 5,000 kilometers distant).

2. *Phases of the Seismogram*—

P (undae primae)	First phase, or first preliminary tremors.
PR_n	Waves n-times reflected at the earth's surface.
S (undae secundae)	Second phase, or second preliminary tremors.
SR_n	Waves n-times reflected at the earth's surface.
PS	Waves changed from longitudinal to transverse oscillation, or vice versa, through reflection at the earth's surface.
L (undae longae)	Long waves, chief phase, or principal part.
M (undae maximae)	Greatest motion in the chief phase.
C (coda)	Tail or end portion.
F (finis)	End of discernible movement.

3. *Nature of the Motion*—

i (impetus)	Sudden beginning of the motion.
e (emersio)	Gradual beginning of the motion.
T (period)	Time of one complete oscillation.
A	amplitude of the motion, measured from the median line in microns ($\mu = 1/1000$ mm.).

A_E E-W component of A.

A_N N-S component of A.

A_V vertical component of A.

THE BERKELEY STATION

CONSTANTS

Latitude and longitude of the center of the seismographic room:

$\phi = 37° 52' 15''.9$ N. Lat.

$\lambda = 122° 15' 36''.6$ W. from Greenwich.

Time. All determinations are reduced to Greenwich mean civil time.

Altitude, 85.4 meters (280 feet) above mean sea level.

Constants of the Seismographs

	Period	Magnif.	Damping
Bosch-Omori Seismograph N-S component	15s	80	8–1
Bosch-Omori Seismograph E-W component	15s	80	8–1
Weichert Seismograph Vert. component	6s	80	8–1
Omori Tromometer N-S component	2s	60	.....
Omori Tromometer E-W component	2.5s	60	.....

No.	Date	Charac.	Phase	Time G. M. C. T.	Period	Amplitude A_E	Amplitude A_N	Amplitude A_V	Remarks
	1913			h m s	s	μ	μ	μ	
1	8 Oct.	I_V	e	6 43 17					Phases not distinguishable. Not registered by vertical.
			M_N	6 43 49	2		3		
			M_E	6 44 03	3	3			
			F	6 44 41					
2	12 Oct.	I?	e	15 40 06					Phases not distinguishable. N-S component only.
			M	15 45 04	10		3		
			F	15 28+					
3	20 Oct.	I_d	e	9 17 37					Thickening of pen traces on horizontal components.
			F	9 18 14					
4	22 Oct.	I_d	i P	8 58 53					Registered on vertical by a marked thickening of pen trace accompanied by a shifting of the line.
			i LM	8 58 56	<½	7	8	—	
			C	8 59 02					
			F	8 59 16					
5	25 Oct.	II_d		East-West	Com	pon	ent		Felt in Berkeley.
	*		e P	3 16 28	1½	9			* See discussion in text.
			e L	3 16 48	2	47			
			M	3 16 58	2	85			
			C	3 19 03					
			F	3 22 30±					
				North-South	Com	pon	ent		
			e P	3 16 23	1		9		
			e L	3 16 44	2		37		
			M_1	3 17 02	2½		76		
			M_2	3 17 24	4		60		
			C	3 19 13					
			†F	3 22+					† Lost in microseisms after $3^h 22^m$.
				Vertical	Com	pon	ent		
			e P	3 16 25	2			9	
			e L	3 16 44	2			25	
			M	3 16 46	3			37	
			C	3 18 56					
			F	3 21±					
6	25 Oct	I_d	e P_N	4 01 21					Registered on vertical by a thickening of the pen trace accompanied by a shifting of the line.
			e P_E	4 01 25					
			e L_N	4 01 38					
			e L_E	4 01 42					
			M_E	4 01 51	1½	5			
			M_N	4 01 44	2		4		
			C	not discernible					
			F	4 03±					

No.	Date	Charac.	Phase	Time G. M. C. T.	Period	Amplitude A_E	Amplitude A_N	Amplitude A_V	Remarks
	1912			h m s	s	μ	μ	μ	
7	7 Nov.	I_r	e P_N	7 46 13					On E-W, the beginning of motion is fairly clear, but after a few well defined waves had been recorded, the seismogram consists only of a few long flat waves in which no phases are discernible. No motion discernible on E-W after $8^h 07^m$. Not recorded by vertical. Slight disturbance indicated by Omori seismograph.
			e P_E	7 46 22					
			e S_N	7 51 34					
			M_E	7 51 54	17	6			
			e L_N	7 54 55					
			M_N	7 56 13	13		58		
			C	indefinite					
			F	9 37±					
8	14 Nov.	I_d	e	6 55 04					Barely noticeable disturbance of pens on horizontal components at this time.
9	19 Nov.	I_r	e P_N	14 00 42					Only a few long waves on East-West component $14^h 09^m$ to $14^h 20^m$. Not recorded by vertical or Omori seismograph.
			e S_N	14 05 48					
			e L_N	14 08 49					
			M_E	14 10 24	16	9			
			M_{N_1}	14 12 03	14		43		
			M_{N_2}	14 13 26	11		45		
			C	14 17 01					
			†F	14 07±					† Lost in microseisms after $14^h 07^m$
10	25 Nov.	I_d	i P	16 28 54					Registered on vertical by a thickening of the pen trace accompanied by a shifting of the line. Feeble record on Omori.
			i LM	16 28 55.6	<¾	15	43	—	
			C	16 28 58					
			F	16 29 23					
11	5 Dec.	I?	e	12 33 34					Preliminaries best written part of whole seismogram. Chief portion long, flat, barely noticeable waves. East-West record very poor. No vertical record.
			M	12 40 56	14	—	3		
			F	12 56 30±					
12	7 Dec.	I?	e	23 08 04					No preliminary tremors appear on record. Periods indicate it is not a local shock. Not recorded by vertical or Omori.
			M_N	23 08 24	6		39		
			M_E	23 08 56	8	11			
			F	23 21 30±					

No.	Date	Charac.	Phase	Time G. M. C. T.	Period	Amplitude A_E	Amplitude A_N	Amplitude A_V	Remarks
	1913			h m s	s	μ	μ	μ	
13	(9) Dec.	I_r	e P_N	8 39 02					Due to temperature changes, vertical seismograph had settled against safety stop. Barely perceptible waves on Omori seismogram.
			e P_E	8 39 08					
			e S_E?	8 44 46					
			e S_N?	8 44 51					
			e L_E	8 49 42					
			e L_N	8 49 48					
			M_{N_1}	8 51 57	24		37		
			M_{E_1}	8 52 36	22	50			
			M_{E_2}	8 54 57	13	18			
			M_{N_2}	8 55 18	14		26		
			M_{E_3}	8 56 22	12	66			
			C	8 59 38					
			F	9 46 30±					
14	18 Dec.	II_d	i P_V	7 35 23					Reported felt in Berkeley. Accompanied by a rumbling sound.
			i P_{EN}	7 35 23.7					
			i LM_V	7 35 24.5	<½			?	
			i LM_{EN}	7 35 25.2	<½	16	84		Vertical record confused, due to chattering of pen.
			M_{N_2}	7 35 26.5	<½		18		
			C	7 35 29					
			F	7 35 53					Registered by Omori, but effect of friction is apparent.
15	26 Dec.	I_d	i P	15 00 33.5					Horizontal components only. No record on Omori or vertical seismograph.
			i LM	15 00 38	<½	6	6		
			C	15 00 41					
			F	15 00 56					
16	5 Jan.	I?	e	13 30 28					Not recorded by vertical or by Omori seismographs.
			M_N	13 34 00	10		12		
			M_E	13 35 28	9	12			
			F	13 46±					
17	31/1 Feb.	I?	e	22 57 45					Best on North-South component. A few barely perceptible waves on East-West. Not recorded by vertical.
			M	23 03 39	15	—	6		
			F	0 37 30±					
18	7 Feb.	I_d	e_E	22 06 08					Barely perceptible disturbance on North-South, lasting from $22^h\,06^m\,08^s$ to $22^h\,06^m\,52^s$. Not recorded by vertical.
			M_E	22 06 14	4	4			
			F_E	22 06 49					
19	14 Feb.	I_d	e	0 29 49					Poorly registered. East-West component only.
			M	0 29 56	2	3			
			F	0 30 41					
20	18 Feb.	I?	e	0 39 09					Simple sinusoidal waves. Dying energy of chief phase of a distant earthquake.
			M_N	0 42 49	8		7		
			M_E	0 43 03	8	4			
			F	0 55±					

No.	Date	Charac.	Phase	Time G. M. C. T.	Period	Amplitude A_E	Amplitude A_N	Amplitude A_V	Remarks
	1913			h m s	s	μ	μ	μ	
21	3 Mar.	I_r	e	3 05 01					No vertical record. Slight disturbance on Omori record.
			e S_E?	3 05 40					
			e S_N?	3 06 35					
			e LM_N	3 08 01	10		33		
			e L_E	3 08 11					
			M_E	3 08 28	13	55			
			C	3 14 00					
			F	3 30±					
22	8 Mar.	I_r	e	16 12 04					Dying energy of chief phase of a distant earthquake. Not registered by vertical seismograph. Newspapers reported destructive earthquake at Guajimquilapa in Guatemala on this day.
			M	16 14 06	20	15	11	
			F	16 29±					
23	14 Mar.	I_r	e P_N	8 57 47					Poorly recorded on East-West component. Preliminaries well written.
			e_E	8 59 39					
			e S_E	9 09 26					
			e S_N	9 09 30					
			e L_E	indefinite					Clock driving vertical seismograph drum ran down.
			e L_N	9 19 17					
			M_N	9 29 32	33		15		
			C	indefinite					
			F	10 54 30±					
24	15 Mar.	I?	e	20 36 20					North-South only. Barely perceptible trace. Different from usual microseisms which are registered here.
			F	20 44±					
25	15 Mar.	I?	e	22 23 30					North-South only. Dying energy of chief phase of a distant shock. Av. amplitude 4 microns Av. period 12 sec.
			F	22 33±					
26	24 Mar.	I_d	i	8 27 45±					Time markers not working, time only approximate. Horizontal components only.
			M	— — —	<½	2	4		
27	31 Mar.	I_r	e P_N	3 48 58					On East-West component. Only a few long, flat, barely perceptible waves are found at about time of maxima in North-South record. Not recorded by vertical seismograph.
			e S_N	3 58 16					
			e L_N	4 05 13					
			M_{N_1}	4 05 22	9		35		
			M_{N_2}	4 07 22	12		32		
			C	indefinite					
			F	6 20±					

THE LICK OBSERVATORY STATION

CONSTANTS

Constants of the Station

Latitude and longitude of the center of the seismographic room:

$\phi = 37° 20' 24''.5$ N. Lat.
$\lambda = 121° 38' 34''$ W. from Greenwich.

Time. All determinations are reduced to Greenwich mean civil time.

Altitude, 1281.7 meters (4202.25 feet) above mean sea level.

Constants of the Seismographs

	Period	Magnif.	Damping
From September 30 to December 6, 1912—			
Wiechert Seismograph N-S component	4.0	80	8:1
Wiechert Seismograph E-W component	4.0	80	8:1
Weichert Seismograph Vert. component	3.5	80	8:1
From December 6, 1912, to March 31, 1913—			
Wiechert Seismograph N-S component	5.5	80	8:1
Wiechert Seismograph E-W component	3.5	80	8:1
Wiechert Seismograph Vert. component	3.5	80	8:1

No.	Date	Charac.	Phase	Time G. M. C. T.	Period	Amplitude A_E	Amplitude A_N	Amplitude A_V	Remarks
	1912			h m s	s	μ	μ	μ	
1	1 Oct.	I_d	e P	0 07 13					Registered on vertical by by a slight thickening of pen trace.
			i LM	0 07 17.5	$<\frac{1}{2}$	4	3	—	
			C	0 07 23					
			F	0 07 27					
2	3 Oct.	I_d	e	15 50 38					Marked thickening of pen traces in all components.
			F	15 50 49					
3	3 Oct.	I_d	e	19 16 49					Marked thickening of pen traces in all components.
			F	19 17 00					
4	3 Oct.	I_d	e	22 28 44					Marked thickening of pen traces in all components.
			F	22 29 01					
5	4 Oct.	I_d	e	1 37 00					Marked thickening of pen traces in all components.
			F	1 37 19					
6	4 Oct.	I_d	e	20 10 49					Marked thickening of pen traces in all components.
			F	20 11 03					
7	4 Oct.	I_d	i M	22 05 00	$<\frac{1}{2}$	8	10		Registered on vertical by thickening of pen trace.
			F	22 05 08					
8	5 Oct.	I_d	i P_{EN}	5 00 49.3					
			i P_V	5 00 49.8					
			i LM	5 00 51	$<\frac{1}{2}$	20	17	6	
			C	5 00 55					
			F	5 01 27					
9	6 Oct.	I_d	e	23 49 51					Marked thickening of pen traces in all components.
			F	23 50 07					
10	8 Oct.	I_d	e_{EV}	6 43 05					On East-West record the seismogram begins with minute barely perceptible waves which gradually increase in amplitude until a maximum is reached and then gradually decrease. No perceptible movement on North-South record.
			M_V	6 43 17	$<\frac{1}{2}$			3	
			M_E	6 43 22	1	3			
			F	6 44 08					
11	8 Oct.	I_d	e P	19 52 00					On North-South record there is a barely perceptible thickening of pen trace and a displacement of the line at $19^h\ 52^m\ 05^s$.
			i LM_V	19 52 04	$<\frac{1}{2}$			4	
			i LM_E	19 52 05	$<\frac{1}{2}$	4			
			F	19 52 06					
12	8 Oct.	I_d	i P	19 52 10					Not recorded on North-South.
			i LM	19 52 13	$<\frac{1}{2}$	3		4	
			F	19 52 14					

No.	Date	Charac.	Phase	Time G. M. C. T.	Period	Amplitude A_E	Amplitude A_N	Amplitude A_V	Remarks
	1912			h m s	s	μ	μ	μ	
13	8 Oct.	I_d	e	23 45 23					Marked thickening of pen traces in all components.
			F	23 45 35					
14	11 Oct.	U?	?	5 04 43					From $5^h\ 04^m\ 43^s$ to $5^h\ 10^m\ 43^s$ a series of disturbances is registered on horizontal components. These are strong on East-West component and are barely discernible on North-South component. The disturbances appear to consist of very minute vibrations superposed on vibrations whose period is about 3 seconds and whose amplitude is about 4 microns.
15	11 Oct.	I_d	e P_V	17 28 57					
			i P_{EN}	17 28 58					
			M_V	17 29 03	$<\frac{1}{2}$			2	
			M_N	17 29 04	$<\frac{1}{2}$		5		
			M_E	17 29 05	$<\frac{1}{2}$	3			
			F	17 29 12					
16	12 Oct.	I_d	e	19 34 20					Barely noticeable thickening of pen trace on North-South record.
			M_E	19 34 23	$<\frac{1}{2}$	2			
			M_V	19 34 29	$<\frac{1}{2}$			2	
			F	19 34 50					
17	13 Oct.	I_d	i P	2 16 23					
			i LM	2 16 25	$<\frac{1}{2}$	6	6	2	
			C	2 16 27					
			F	2 16 31					
18	13 Oct.	I_d	e P_E	4 10 06					
			e P_{NV}	4 10 07					
			i LM_{EN}	4 10 14	$<\frac{1}{2}$	3	3		
			i LM_V	4 10 15	$<\frac{1}{2}$			2	
			C	indefinite					
			F	4 10 25					
19	14 Oct.	I_d	e	4 46 31					Barely perceptible waves on all components. Period $\frac{3}{4}$ sec.
			F	4 47 03					
20	15 Oct.	I_d	e_V	5 05 45					On horizontal component records motion begins with maximum.
			i M	5 05 49	$<\frac{1}{2}$	4	5	2	
			F	5 05 59					
21	16 Oct.	I_d	e_E	5 49 30					
			e_V	5 49 35					
			e_N	5 49 36					
			M_V	5 49 43	$<\frac{1}{2}$			2	
			M_{EN}	5 49 44	$<\frac{1}{2}$	4	2		
			F	5 49 58					
22	18 Oct.	I_d	i P_{EN}	15 55 51.5					This earthquake not recorded by vertical.
			i S_E?	15 55 56					
			i LM_{EN}	15 55 58	$<\frac{1}{2}$	15	8		
			C	15 56 01					
			F	15 56 09					
23	19 Oct.	I_d	e	0 06 19					Marked thickening of pen traces in horizontal components. Barely perceptible disturbance on vertical.
			F	0 06 49					
24	20 Oct.	II_d	i P_{EN}	9 17 28					This shock was felt by many of the residents and appeared to be strongest in the vertical. Record on East-West imperfect. Chattering of writing points confuses the reord.
			i PM_{V_1}	9 17 28	$<\frac{1}{2}$			36	
			i LM_{EN}	9 17 30.5	$\frac{1}{2}$–1	40	>38		
			i LM_{V_2}	9 17 30.5	$<\frac{1}{2}$			13	
			F	9 18 52					
25	20 Oct.	I_d	e_E	17 22 51					North-South begins with maximum.
			e_V	17 22 53					
			i LM_V	17 22 57	$<\frac{1}{2}$			8	
			i LM_{EN}	17 22 58	$<\frac{1}{2}$	3	2		
			F	17 23 24					
26	21 Oct.	I_d	i M	18 13 57	$<\frac{1}{2}$			10	Vertical only.
			C	18 13 58					
			F	18 14 00					
27	22 Oct.	I_d	e_V	20 08 29					Barely noticeable on North-South.
			e_E	20 08 30					
			M_V	20 08 32					
			M_E	20 08 38					
			F	20 08 44					
28	22 Oct.	I_d	e_V	23 25 24					Barely perceptible on North-South.
			e_E	23 25 27					
			M_{EV}	23 25 39	$<\frac{1}{2}$	3		2	
			F	23 25 42					

No.	Date	Charac.	Phase	Time G. M. C. T.	Period	Amplitude			Remarks
						A_E	A_N	A_V	
	1912			h m s	s	μ	μ	μ	
29	23 Oct.	I_d	e_{EV}	22 30 56					Barely perceptible on North-South.
			M_V	22 31 04	$<\frac{1}{2}$			2	
			M_E	22 31 05	$<\frac{1}{2}$	1			
			F	22 31 09					
30	24 Oct.	I_d	e	1 54 12					Marked thickening of pen traces in all components.
			F	1 54 36					
31	24 Oct.	I_d	i P_{EV}	15 09 34					Barely perceptible on North-South.
			M_E	15 09 36	$<\frac{1}{2}$	2			
			i LM_V	15 09 38	$<\frac{1}{2}$			3	
			F	15 09 52					
32	24 Oct.	I_d	e	19 52 27					Marked thickening of pen traces in all components.
			F	19 52 46					
33	25 Oct.*	II-III$_d$		East-West	Com	pon	ent		* See discussion in text.
			e P	3 16 14					
			i LM	3 16 25	1–1½	375			† Confused by beginning of following shock.
			M_2	3 16 46	1–1½	350			North-South record limited on one side by safety stop.
			C	3 17 20					
			†F	?					‡ Motion in this component dies down at the time given and the maximum of the following shock begins suddenly.
				North-South	Com	pon	ent		
			e P	3 16 16					
			i LM	3 16 25	1–1½		>305		
			C	3 17 00					
			‡F	3 17 40±					
				Vertical	Com	pon	ent		Considerable friction apparent in vertical record.
			i P	3 16 10					
			i LM	3 16 20	1–1½			91	
			M_2	3 16 37.5	1–1½			122	
			C	3 18 00					The above shock was not generally noticed. Those who did feel it described the motion as swaying and without jolt.
			F	uncertain					
34	25 Oct.*	I_d	e M_{V_1}	3 19 34	¾–1			4	The beginning of this shock is lost in the end portion of the one preceding it.
			i M_{N_1}	3 19 47	¾–1		8		
			i M_E	3 19 49	1–2	16			
			M_{N_2}	3 19 50	¾–1		12		
			M_{V_2}	3 20 06	¾–1			9	* See discussion in text.
			C	3 20 07					
			F	3 20 40					
35	25 Oct.	I_d	e P_V	4 01 06.5					Aftershock of No. 33.
			e_E	4 01 08.5					
			i_N	4 01 17.5					
			i L	4 01 18	¾–1			7	
			M_{ENV}	4 01 18.7	¾–1	20	9		
			M_{N_2}	4 01 21.5	¾–1		12		
			M_{V_2}	4 01 27	¾–1			9	
			C	4 01 34					
			F	4 03 10±					
36	27 Oct.	I_d		1 49 21					Slight thickening of pen traces in all components at this time.
37	5 Nov.	I_d	e_{NE}	20 24 37					
			e_V	20 24 38					
			M	20 24 43	$<\frac{1}{2}$	3	2	3	
			F	20 24 45					
38	7 Nov.	I?	e	7 46 19					Poorly written record of distant earthquake. Record is peculiar in that the earlier part of the record is fairly well written while the latter part is very imperfect. Not recorded on North-South.
			F	8 06 11					
39	14 Nov.	I_d	e P_N	6 55 28					
			e P_E	6 55 29					
			i_V	6 55 30					
			e L_{EN}	6 55 39					
			i LM_V	6 55 42	$<\frac{1}{2}$			2	
			M_{EN}	6 55 43	¾–1	11	10		
			C	indefinite					
			F	6 56 25					
40	15 Nov.	I_d	i P	14 29 20					Vertical record obscured by overscoring.
			i LM	14 29 22	$<\frac{1}{2}$	6	4	—	
			C	14 29 23					
			F	14 29 31					
41	16 Nov.	I_d	e	5 40 36					Marked thickening of pen traces in all components.
			F	5 41 00					
42	17 Nov.	I_d	i P_{EN}	4 20 42					Felt by C. C. Keiss.
			i P_V	4 20 43					
			i LM_{EN}	4 20 45	$<\frac{1}{2}$	16	9		
			i LM_V	4 20 46	$<\frac{1}{2}$			4	
			C	4 20 47					
			F	4 20 57					

No.	Date	Charac.	Phase	Time G. M. C. T.	Period	Amplitude A_E	Amplitude A_N	Amplitude A_V	Remarks
	1912			h m s	s	μ	μ	μ	
43	18 Nov.	I_d	i M_E	22 00 21	$<\frac{1}{2}$	2			Thickening of pen trace on North-South $22^h\ 00^m\ 18^s$ to $22^h\ 00^m\ 28^s$.
			i M_V	22 00 22	$<\frac{1}{2}$			3	
			F	22 00 40					
44	19 Nov.	I_r	e_N	14 00 33					East-West record imperfect, damping device apparently working improperly.
			e S_N	14 05 37					
			e L_N	14 09 14					
			M_{N1}	14 11 13	$6\frac{1}{2}$		91		
			M_{N2}	14 12 38	7		126		e_N observed by microseisms.
			M_{N3}	14 14 07	6		104		
			C	14 22 23					F lost in microseisms after $14^h\ 45^m$.
			F	14 45±					
									A few waves recorded by vertical $14^h\ 11^m\ 53^s$ to $14^h\ 24^m\ 23^s$.
									Period 6 seconds
									Amplitude 4 microns
45	19 Nov.	I_d	i P_{EN}	22 12 25					Vertical record begins with maximum. North-South record indistinct.
			i LM	22 12 27	$<\frac{1}{2}$	8	4	3	
			C	22 12 29					
			F	22 12 34					
46	23 Nov.	I_d	e	4 34 57					No vertical record. Thickening of pen traces for horizontal components.
			F	4 35 13					
47	3 Dec.	I_d	e P_V	5 37 50					
			e P_E	5 37 51					
			i LM_V	5 37 55	$<\frac{1}{2}$			3	
			i LM_{EN}	5 37 56	$<\frac{1}{2}$	10	13		
			C	5 38 01					
			F	5 38 16					
48	7 Dec.	I_d	e_V	3 43 34					Horizontal records begin with maximum.
			i LM	3 43 38	$<\frac{1}{2}$	2	1	3	
			C	indefinite					
			F	4 43 48					
49	7 Dec.	I_d	i P	19 49 37					Registered on North-South by a thickening of pen trace.
			i LM_V	19 49 38.5	$<\frac{1}{2}$			2	
			i LM_E	19 49 39	$<\frac{1}{2}$	3			
			C	indefinite					
			F	19 49 47					
50	7 Dec.	I?	e L_N	23 07 59					Preliminary tremors obscured by strong microseisms after $23^h\ 19^m$.
			M_E	23 08 16	4	4			
			M_N	23 08 18	7		95		On East-West a few waves at time of maximum.
			C	23 12 27					
			F	23 19±					On vertical a few barely perceptible waves after $23^h\ 08^m$.

No.	Date	Charac.	Phase	Time G. M. C. T.	Period	Amplitude A_E	Amplitude A_N	Amplitude A_V	Remarks
	1912			h m s	s	μ	μ	μ	
51	8 Dec.	I_d	e	3 08 22					Marked thickening of pen traces in all components.
			F	3 08 34					
52	9 Dec.	I_d	e P	3 27 23					Registered on vertical and on North-South by a thickening of pen traces.
			i M	3 27 27	$<\frac{1}{2}$	2	—	—	
			C	3 27 29					
			F	3 27 37					
53	9 Dec.	I_r	e P	8 38 58					Barely perceptible waves on East-West and vertical at about time of maximum.
			e S?	8 44 35					
			e L	8 49 12					
			M	8 51 39	20	—	38	—	
			C	9 06 02					
			F	9 24+					
54	10 Dec.	I_d	e P	5 55 34					
			i LM_V	5 55 36	$<\frac{1}{2}$			2	
			i LM_E	5 55 36.5	$<\frac{1}{2}$	7			
			i LM_N	5 55 38	$<\frac{1}{2}$		4		
			F	5 55 47					
55	10 Dec.	I_d	i P	18 01 46					Registered on vertical by a slight thickening of pen trace.
			i LM	18 01 48.5	$<\frac{1}{2}$	3	2	—	
			C	18 01 51					
			F	18 01 56					
56	10 Dec.	I_d	i P	21 26 34					Registered on North-South and vertical by a thickening of pen trace.
			i LM	21 26 35	$<\frac{1}{2}$	2	—	—	
			C	21 26 37					
			F	21 26 42					
57	10 Dec.	I_d	e	22 51 39					Marked thickening of pen traces in all components.
			F	22 51 57					
58	11 Dec	I_d	e	0 39 09					Marked thickening of pen traces in all components.
			F	0 39 24					
59	11 Dec.	I_d	e P_E	9 09 22					
			e P_{NV}	9 09 23					
			i LM	9 09 25	$<\frac{1}{2}$	3	3	2	
			F	9 09 34					
60	11 Dec.	I_d	e	23 53 39					Marked thickening of pen traces in all components.
			F	23 53 52					
61	12 Dec.	I_d	e	17 26 44					Thickening of pen trace on North-South and vertical.
			i LM	17 26 49	$<\frac{1}{2}$	3	—	—	
			F	17 26 56					
62	13 Dec.	I_d	e	20 46 29					Marked thickening of pen traces in all components.
			F	20 46 44					
63	14 Dec.	I_d	e	17 38 13					Marked thickening of pen traces in all components.
			F	17 38 25					

No.	Date	Charac.	Phase	Time G. M. C. T.	Period	Amplitude A_E	Amplitude A_N	Amplitude A_V	Remarks
	1912			h m s	s	μ	μ	μ	
64	14 Dec.	I_d	e	20 39 03					Marked thickening of pen traces in all components.
			F	20 39 24					
65	14 Dec.	I_d	e	23 24 38					Marked thickening of pen traces in all components.
			F	23 24 50					
66	16 Dec.	I_d	e	21 39 16					Marked thickening of pen traces in all components.
			F	21 39 25					
67	22 Dec.	I_d	i M	0 42 31	$<\frac{1}{2}$	2	3	1	
			C	0 42 34					
			F	0 42 43					
68	23 Dec.	I_d	e	18 34 32					Thickening of pen traces in horizontal component records.
			M	18 34 34	$<\frac{1}{2}$	—	—	3	
			F	18 34 45					
69	27 Dec.	I_d	e	16 23 39					
			i LM_V	16 23 43	$<\frac{1}{2}$			4	
			M_{EN}	16 23 47	$<\frac{1}{2}$	4	5		
			F	16 23 51					
70	27 Dec.	I_d	e	22 39 53					Registered on horizontal by a thickening of pen traces.
			M	22 39 56	$<\frac{1}{2}$	—	—	3	
			F	22 40 05					
71	28 Dec.	I_d	i P	22 10 10					North-South record confused by microseisms.
			i LM	22 10 14	$<\frac{1}{2}$	5	—	2	
			C	22 10 21					
			F	22 10 30					
72	29 Dec.	I_d	e_E	6 54 26					North-South confused by microseisms.
			e_V	6 54 29					
			i LM_E	6 54 32	$<\frac{1}{2}$	3			East-West somewhat confused.
			i LM_{V_1}	6 54 35	$<\frac{1}{2}$			3	
			M_{V_2}	6 54 38	$<\frac{1}{2}$			4	
			F	6 54 58					
73	29 Dec.	I_d	i M	20 35 35	$<\frac{1}{2}$	3	2	2	
			F	20 35 44					
74	30 Dec.	I_d	i P	3 38 08					North-South confused by microseisms.
			i LM	3 38 10	$<\frac{1}{2}$	3	—	2	
			C	indefinite					
			F	3 38 24					
75	31 Dec.	I_d	e	1 15 02					Marked thickening of pen traces in all components.
			F	1 15 10					
	1913								
76	2 Jan.	I_d	e	0 13 50					Marked thickening of pen traces in all components.
			F	0 14 00					

No.	Date	Charac.	Phase	Time G. M. C. T.	Period	Amplitude A_E	Amplitude A_N	Amplitude A_V	Remarks
	1913			h m s	s	μ	μ	μ	
77	2 Jan.	I_d	i P	22 46 14.5					Not registered by vertical.
			i LM	22 46 16	$<\frac{1}{2}$	6	5		
			C	indefinite					
			F	22 46 18					
78	3 Jan.	I_d	i P	3 19 41.5					Thickening of pen trace on North-South.
			i LM	3 19 46	$<\frac{1}{2}$	2	—	2	
			F	3 19 55					
79	4 Jan.	I_V	e	10 16 52					Barely perceptible waves on vertical.
			M_E	10 17 15	2	2			
			M_N	10 17 17	2		2		
			F	10 18 32					
80	6 Jan.	I_d	e	20 51 24					
			i LM	20 51 26	$<\frac{1}{2}$	1	1	1	
			F	20 51 43					
81	8 Jan.	I_d	e_V	16 38 54					
			e_{EN}	16 38 55					
			M_{NV}	16 39 16	$<\frac{1}{2}$		3	3	
			M_E	16 39 19	$<\frac{1}{2}$	2			
			F	16 39 23					
82	9 Jan.	I_d	e	4 19 01					Marked thickening of pen traces in all components.
			F	4 19 12					
83	10 Jan.	I_d	e	0 42 48					Marked thickening of pen traces in all components.
			F	0 43 01					
84	10 Jan.	I_d	i P	3 14 18					Thickening of pen trace on vertical.
			i LM	3 14 21	$<\frac{1}{2}$	4	3	—	
			C	3 14 29					
			F	3 14 40					
85	10 Jan.	I_d	e	22 41 35					Marked thickening of pen traces in all components.
			F	22 41 52					
86	11 Jan.	I_d	e	20 50 33					A thickening of pen traces in all components.
			F	20 50 41					
87	12 Jan.	I_d	e	21 02 12					Thickening of pen traces in all components.
			F	21 02 26					
88	2 Feb.	I_d	i LM	18 29 16	$<\frac{1}{2}$	—	—	4	Registered on horizontal by a thickening of pen traces.
			M_2	18 29 18	$<\frac{1}{2}$	—	—	3	
			C	18 29 20					
			F	18 29 29					
89	6 Feb.	I_d	e	15 41 07					Thickening of pen traces in horizontal components.
			i LM	15 41 12	$<\frac{1}{2}$	—	—	4	
			F	15 41 20					

No.	Date	Charac.	Phase	Time G. M. C. T.	Period	Amplitude A_E	Amplitude A_N	Amplitude A_V	Remarks
	1913			h m s	s	μ	μ	μ	
90	7 Feb.	I_d	e	22 05 41					Vertical only.
			M	22 05 58	2			3	
			F	22 06 31					
91	9 Feb.	I_d	i P	22 27 31					Registered on vertical by a thickening of pen trace.
			i LM	22 27 34	$<\frac{1}{2}$	2	3	—	
			C	22 27 36					
			F	22 27 39					
92	11 Feb.	I_d	e P_N	15 54 25					Thickening of pen trace on East-West.
			e P_V	15 54 27					
			i LM_N	15 54 32	$<\frac{1}{2}$		2		
			i LM_V	15 54 33	$<\frac{1}{2}$			3	
			F	15 54 38					
93	13 Feb.	I_d	i M_N	15 49 21	$<\frac{1}{2}$		4		Sheet on vertical ran off.
			i M_E	15 49 25	$<\frac{1}{2}$	2			
			F_N	15 49 25					
94	14 Feb.	I_d	i P_{EN}	0 29 32					
			i P_V	0 29 33					
			i L_{EN}	0 29 41					
			i L_V	0 29 42					
			M_E	0 29 43	1	8			
			M_N	0 29 44	$\frac{3}{4}$		6		
			M_V	0 29 45	$1\frac{1}{2}$			4	
			C	0 29 57					
			F	0 30 18					
95	16 Feb.	I_d	e_N	20 55 39					
			e_{EN}	20 55 42					
			i LM_V	20 55 45	$<\frac{1}{2}$			3	
			i LM_{EN}	20 55 46	$<\frac{1}{2}$	4	4		
			C	indefinite					
			F	20 55 53					
96	20 Feb.	I_d	i	23 30±					Marking clock removed for repairs. No time on records. Slight shock on all three components.
			M		$<\frac{1}{2}$	3	6	—	
97	22 Feb.	I_d	e_V	18 58 35					Time approximate. Clock correction unknown. East-West record indistinct. Smoke film too thick.
			i LM_V	18 58 46	$<\frac{1}{2}$			3	
			i L_N	18 58 46					
			i M_N	18 58 48	$<\frac{1}{2}$		4		
			F	18 58 53					
98	23 Feb.	I_d	e P_V	18 36 10					Time approximate. Horizontal component records begin with maximum.
			i LM	18 36 14	$<\frac{1}{2}$	3	3	3	
			C	18 36 17					
			F	18 36 25					

No.	Date	Charac.	Phase	Time G. M. C. T.	Period	Amplitude A_E	Amplitude A_N	Amplitude A_V	Remarks
	1913			h m s	s	μ	μ	μ	
99	27 Feb.	I_d	e	4 45 46					Thickening of pen traces on East-West and vertical.
			M	4 45 50	$<\frac{1}{2}$		4		
			F	4 45 52					
100	3 Mar.	I_r	ev	3 05 17					Dying energy of chief phase of distant earthquake. No horizontal records on this day. Maximum amplitude 3 microns. Period 6 sec.
			F_V	3 19±					
101	12 Mar.	I_d	ev	16 01 42					Strong thickening of pen trace.
			F_V	16 01 53					
102	14 Mar.	I?	ev	9 00±					Barely perceptible waves on vertical. Dying energy of chief phase of a distant shock. No horizontal records on this day.
			F_V	11 14±					
103	31 Mar.	I?	e	3 49±					Dying energy of a distant earthquake. Best on vertical. Only a few barely perceptible vibrations on horizontal.
			F	5 15±					

THE EARTHQUAKE OF OCTOBER 25, 1912

This earthquake was peculiar in that it appears to have been a double shock—that is, the disturbance consisted of two separate earthquakes, occurring one after the other and separated by a short interval of time.

At the Lick Observatory the record is clearly that of two separate earthquakes. No. 33 in the record of Lick Observatory is the first shock and is the more intense of the two. No. 34 is the second and less intense earthquake. On the seismogram the first preliminaries of the second shock are merged with the end portion of the first shock. This earthquake was not generally felt at the Lick Observatory, but those who did feel it described it as a swaying motion. No report is made of feeling two separate shocks or of two maxima in the motion as felt at this station.

At Santa Clara two separate shocks were felt, the first at $3^h\ 16^m\ 14^s$ and the other about $3^h\ 20^m$.

The distance of the Berkeley Station from the origin was considerably greater and here the movement of the ground due to the first and more intense shock is prolonged over such an interval that the record of the weaker second shock is lost in the record of the first (No. 5, Berkeley Station). At this station therefore the seismogram gives no evidence of two separate earthquakes.

A slight shock recorded after $4^h\ 01^m$ appears to be an aftershock of the first earthquake.

With regard to the position of the epicenter, it was found impossible, from the data at hand, to calculate its location. Upon determining the epicentral distances from the three stations, Berkeley, Lick, and Santa Clara, according to the usual formula for near shocks, and constructing circles with centers at the three stations and radii equal to the respective epicentral distances, it is found that no definite intersection of the three circles can be obtained. This might, of course be due to the fact that the dimensions of the epicentral tract were large compared with the distances involved, but it appears more probable that the three stations were not advantageouly located for determining epicenters lying in this position.