



THE REGISTRATION OF EARTHQUAKES
AT THE BERKELEY STATION

AND

AT THE LICK OBSERVATORY STATION

FROM

April 1, 1925, to September 30, 1925

BY

PERRY BYERLY

BULLETIN OF THE SEISMOGRAPHIC STATIONS, VOL. 2, No. 10

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SYMBOLS AND NOTATIONS

1. *Character of the Earthquake*—
 I. Perceptible. II. Moderately strong. III. Strong.
 d (terrae motus domesticus) Local shock (origin less than 100 kilometers distant).
 v (terrae motus vicinus) Near shock (origin from 100 to 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 or teleseism (origin more than 5,000 kilometers distant).

2. *Phases of the Seismogram*—
 P (undae primae) Normal first phase, or first preliminary tremors (longitudinal).
 P' First preliminary tremors which have penetrated the core of the earth.
 PR_n Waves n times reflected at the earth's surface.
 S (undae secundae) Second phase, or second preliminary tremors (transverse).
 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.
 PPS Waves twice reflected at the earth's surface, having been longitudinal on two branches of the path and transverse on one branch.

In general a bar over two letters denoting types of waves indicates refraction. The subscript _c denotes the boundary at about 2900 km. depth between the metallic core and the middle shell which surrounds it. Thus:

$\overline{S.P.S}$ Waves which have penetrated the core, having been transverse before entering and after leaving the core, and longitudinal within the core.

$\overline{P_c P_c P_c P_c}$ Waves refracted at the core boundary into the core, reflected once at this boundary while within the core and again refracted out of the core, having remained longitudinal on all branches of the path.

L (undae longae) Long waves at the beginning of the surface phase.
 M (undae maximae) Shorter and more regular waves of large amplitude in the surface phase.

M_n Greatest motion in the surface phase.

C (coda) Tail or end portion.

F (finis) End of discernible movement.

\overline{P} For local earthquakes a special notation is used:
 \overline{P} The longitudinal wave which has traveled its whole path in the surface layer or crust of the earth.

\overline{S} The transverse wave which has traveled its whole path in the surface layer of the earth.

In general R₁ denotes reflection once at the lower (inferior) surface of the earth's crust. R₂ denotes reflection twice at this surface. R_n indicates reflection at the upper (superior) surface of the crust, i.e., the surface of the earth. Thus, e.g.:

R₁₂ $\overline{P_3S_2}$ A wave in the earth's crust which has been reflected twice at the lower surface, having been longitudinal on two branches of its path and transverse on two branches.

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 earth motion, measured from the median line in microns ($\mu = \frac{1}{1000}$ mm.) + toward the north, east, or zenith, - toward the south, west, or nadir.

A_E E-W component of A.

A_N N-S component of A.

A_Z Vertical component of A.

4. *Time*—

O (origin) Time of shock at point of origin.

THE BERKELEY STATION

CONSTANTS

Latitude and longitude of the center of the seismographic room:

$\varphi = 37^\circ 52' 15.9''$ N. Lat.

$\lambda = 122^\circ 15' 36.6''$ 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

Date	Apparatus	Component	V	T ₀	ϵ	$\frac{r}{T_0^2}$
1925 Apr. 17	Bosch-Omori 100 kg.	E	45	12.6	3.9	0.0032
	"	N	48	12.8	4.4	0.0036
	Wiechert 80 kg.	Z	42	5.5	5.5	0.0035
July 15	B.-O. 100 kg.	E	43	12.7	{ 4.5 5.5	0.0026
	"	N	50	12.9	4.8	0.0022
	W. 80 kg.	Z	44	5.4	{ 6.0 4.7	0.0045
Sept. 11	B.-O. 100 kg.	E	46	13.0	4.2	0.0027
	"	N	58	12.7	4.6	0.0028
	W. 80 kg.	Z	45	5.4	7.6	0.0045

BERKELEY STATION

No.	Date	Character	Phase	Time			Period	Amplitude			Remarks	
				G.	M.	C. T.		A _E	A _N	A _Z		
				h.	m.	s.	s.	μ	μ	μ		
1	1925 Apr. 4	Id	iP _N	12	43	18						
			iS _{ENZ}	12	43	20						
			F	12	43	35						
2	Apr. 4	Id	iP _N	0	48	27					Not recorded on E or Z.	
			iS _N	0	48	28						
			F	0	48	31						
3	Apr. 4	Id	iP _E	0	49	48						
			i _N	0	49	50.5						
			iS _{NZ}	0	49	52.5						
			F	0	49	58						
4	Apr. 11	Iu	iP' _Z	11	02	16	4			- 2		
			iP' _E	11	02	17						
			i	11	03	47	4					- 4
			iS _{cP_cP_Z} ?	11	03	58	3					- 5
			iS _{cP_cP_E} ?	11	04	07						
			iS _{cP_cP}	11	04	21						
			iPR _{iz}	11	07	48	4					- 6
			iPR _{iN}	11	07	49	4		<+2			
			iPR _{iE}	11	08	05						
			iP _{cS_cP_E} ?	11	10	46	10	+ 3				
			iP _{cS_cP_Z} ?	11	11	00	9					+12
			iP _{cS_cP_N} ?	11	11	10	8					
			iPR _{2E}	11	12	16	11	+ 2				
			iS _{cS_cP_E} ?	11	14	23	6	- 2				
			iS _{cS_cP_N}	11	14	45	9		- 3			
			iS _{cS_cP_Z}	11	15	09	12					-31
			i _E	11	30	37	28	-47				
			i _N	11	33	59	28		+45			
			i _E	11	37	25	30	+45				
			e _E	12	10	01						
e _N	12	12	31									
eM _Z	12	18	31									
iM _{E1}	12	23	21	19	-44							
iM _{N1}	12	26	10	18		+35						
F	12	54±										
5	Apr. 16	I	e _Z	20	08	5					Very faint waves appear on Z at about this time. Exact beginning masked by heavy microseisms. E.W. record in general much confused by heavy microseisms.	
			e _E	20	16	5						
			i _E	20	37	35	29	<-10				
			e _N	20	55	08	6		<-2			
			i _E	20	56	08	16	- 3				
			F	21	33±							



BERKELEY STATION

No.	Date	Character	Phase	Time			Period	Amplitude			Remarks
				G.	M.	C. T.		A _E	A _N	A _Z	
				h.	m.	s.	s.	μ	μ	μ	
6	1925 May 6	Iu	e _Z	17	39	26	5			+ 2	Very faint record of part of a distant earthquake.
			e _N	17	39	48	4		<-2		
			e _E	17	39	53	4	<-2			
			e _N	18	04	3	36		<+15		
			e _Z	18	09	1	42			-129	
			e _E	18	09	5	35		<-16		
7	May 3	Iu	e _Z	23	18	21	4			<+2	Strasbourg gives epicenter at λ=55° E, φ=34° S, Δ=180°.
			e _E	23	18	21	3	<-2			
			e _N	23	18	37	6		<+2		
			iP' _Z	23	20	05	9			-11	
			i _Z	23	23	50	3			- 4	
			i _N	23	24	04	4		<+2		
			i _E	23	24	07	4	<-2			
			i _Z	23	26	24	8			+ 4	
			e _N	23	30	39	8		<+2		
			e _N	23	45	3	10		<+2		
			e _Z	24	27	4	25			<-50	
			e _E	24	34	6	18	<-3			
			i _Z	24	35	01	20			+30	
			iM _{E1}	24	39	29	20	- 8			
iM _{N1}	24	42	29	18		+ 6					
iM _{Z1}	24	43	26	19			-54				
F	25	10±									
8	May 5	I?	e _Z	10	24	28					Barely perceptible.
			e _E	10	29	58	10				
			e _Z	10	33	38	7				
			e _N	10	38	21	10				
			e _E	10	53	15	36				
			e _Z	10	53	8	35				
			e _N	10	53	8	32				
			F	11	31±						
9	May 15	Iu	iP _{ENZ}	12	09	04	3			- 6	
			i _Z	12	09	05	3			+12	
			e _{LE}	12	20	28					
			e _{LN}	12	21	14					
			eM _E ?	12	21	50					
F	12	44±									

BERKELEY STATION

No.	Date	Character	Phase	Time G. M. C. T.			Period	Amplitude			Remarks
				h.	m.	s.		AE	AN	Az	
10	1925 May 19	Iu	iP'EZ	5	43	59	4	μ	μ	μ	PR ₁ -P=5m 33s. $\Delta=172^\circ$ ca.
			iP'Z ₁	5	44	02	4			+ 4	
			iP'N	5	45	48	4		<+2		
			iPR ₁ ZN	5	49	32	6			- 3	
			iPR ₁ E	5	49	36	5	<-2			
			iPR ₂ N	5	53	46	7		<+2		
			iPR ₂ E	5	54	00	7	<+2			
			eE	6	04	10					
			eN	6	06	04	10				
			eSR ₂ E	6	18	28	33	<-14			
			eM _E	6	55	28	16	<-3			
eM _N	7	00	10	20		<+4					
iM _{E1}	7	00	29	21	+10						
F	7	19	\pm								
11	May 28	I	iP _Z	6	15	22					The amplitudes are very small except on the vertical component. It is possible that i _Z 6h 21m 03s is really iS and that L comes about 10h 26 m on all components.
			i _Z	6	16	15					
			i _Z	6	17	08					
			e _N	6	18	05					
			i _Z	6	21	03					
			i _Z	6	21	21					
			i _Z	6	24	05					
			e _Z	6	24	56					
			e _Z	6	27	28					
			e _N	6	27	49					
			e _Z	6	28	05					
e _Z	6	36	10								
e _E	6	44	07								
F	6	47									
12	May 29	Id	i _Z	1	16	36				A very slight local shock which was not reported felt.	
			F	1	16	37					
13	May 31	I	eL _E	0	52	40				Very small amplitudes. P may be present among the microseisms on the vertical component, but it is impossible to be certain.	
			F	1	00	40					
14	June 3	I	e _E	4	58	37	12	<-2		Long sinusoidal waves. Barely perceptible. Not recorded on N or Z.	
			F	5	12	\pm					

BERKELEY STATION

No.	Date	Character	Phase	Time G. M. C. T.			Period	Amplitude			Remarks
				h.	m.	s.		AE	AN	Az	
15	1925 June 4	I	e _Z	1	17	14	6	μ	μ	μ	Barely perceptible irregular waves of about 15 minutes' duration.
			e _E	1	17	42	7	<-2			
			e _N	1	18	24					
			i _E	1	19	02	9	+ 4			
			i _Z	1	19	29	7			- 3	
			F	1	31	5 \pm					
16	June 4	I	e _Z	12	05	27					
			e _N	12	05	59	24		<-6		
			e _E	12	06	43	14	<+2			
			i _N	12	08	25	10		+ 3		
17	June 9	Iu	eP _Z	13	54	38	3				Not recorded on N.
			iP _{Z1}	13	54	42	3			+ 2	
			e _E	13	54	46	3	<+2			
			iPR ₁ Z	13	58	33	7			<-3	
			e _E	14	05	10	6	<-2			
			eS _Z ?	14	05	14					
			e _E	14	24	34	16	<-2			
			eL _Z	14	27	28	22			<+38	
			iM _{Z1}	14	35	48	18			-23	
			F	15	17	\pm					
18	June 28	IIIr	eP _N	1	23	55	9		+ 2		Dilatation. The Great Montana Earthquake. Felt from Seattle, Washington, to South Dakota. Epicenter near 111° E 45°5 N. See Bull. Seism. Soc. America, December, 1926, for full discussion.
			eP _Z	1	23	55	5			- 2	
			eP _E	1	23	56				+ 8	
			i _Z	1	24	14	6			+30	
			i _N	1	24	16	5		+40	-24	
			i _E	1	24	17	9	+27			
			i _N	1	24	31	9	-18			
			i _Z	1	24	42	9			- 3	
			i _N	1	24	47	4		+ 2		
			iS _E	1	26	10	12		+30	- 4	

BERKELEY STATION

No.	Date	Character	Phase	Time			Period	Amplitude			Remarks	
				G.	M.	C. T.		A _E	A _N	A _Z		
18	1925 June 28 (Cont.)	IIIr	iS _N	h.	m.	s.	s.	μ	μ	μ		
				1	26	13	10		+31			
			iS _Z	1	26	16	14		-8		-52	
											+86	
			iSR _{IN} ?	1	26	30	9		+5			
									-4			
			i _E	1	26	48	9		-63			
									+36			
			i _Z	1	26	57	8				-64	
											+86	
			i _N	1	26	57	10			+142		
										-157		
			iL _E	1	27	27	15		+357			
									-306			
19	June 28	IIr	iL _N	1	27	28	19		+312			
									-900			
			iL _Z	1	27	47	9				+165	
											-192	
			iM _N	1	27	57	14			+710		
										-790		
			iM _E	1	27	58	13		-606			
									+545			
			M _{N1}	1	28	33	12			+990		
			M _{E1}	1	28	57	11		+688			
M _{Z1}	1	28	59	9				-608				
								+660				
			F							Lost in aftershock.		
			i _Z	2	08	37	5			+4	Aftershock of above.	
			i _E	2	08	44	5				In coda of preceding	
			i _N	2	09	09	3				shock.	
			i _Z	2	09	14	8			-8		
			i _Z	2	10	22	11					
			i _N	2	10	50						
			i _Z	2	11	15	9			-22		
			iM _N	2	11	20	10			-13		
			iM _E	2	11	38	6		-32			
			iM _Z ?	2	11	52	5			+27		
			iM _{IE}	2	12	21	13	+118				
			iM _{IN}	2	12	54				-127		
			F	3	10	±						

BERKELEY STATION

No.	Date	Character	Phase	Time			Period	Amplitude			Remarks		
				G.	M.	C. T.		A _E	A _N	A _Z			
20	1925 June 28	Id	eP _N ?	h.	m.	s.	s.	μ	μ	μ			
				3	44	24	5						
			eP _E ?	3	44	27	4						
			e _Z	3	44	35	2						
			iS _N	3	44	51	4						
			iS _E	3	44	52	5						
			i _Z	3	46	14							
			iL _N	3	46	29	10						
			i _E	3	46	39	10						
			i _Z	3	46	42	5						
						F	3	50	±				
			21	June 29	III	iP _Z	14	43	20	2			± 2
eP _E	14	43				20	2	± 2					
iP _N	14	43				21	2		± 2				
iP _N ?	14	43				25	3		-8		-8		
iP _Z ?	14	43				25	3						
iP _E ?	14	43				26	2	+5					
i _Z	14	43				30	3				+8		
i _E	14	43				33	3	-11					
								+9					
i _N	14	43				33	3		+2				
									-1				
i _Z	14	43				35	2				-15		
											+8		
i _Z	14	43				39	4				+17		
											-6		
i _N	14	43				40	17			+70			
i _E	14	43				40	18	-69			-40		
i _Z	14	43				49	3				+25		
i _N	14	43	50	15			-128						
							+139						
i _E	14	43	51	14	+54			+44					
i _Z	14	43	59	2				-26					
i _Z	14	44	16	7				+83					
								-139					
i _E	14	44	21	9	-145								
					+137								
i _N	14	44	26	5			-108						
							+122						
iM _Z ?	14	44	27	6.5				+275					

BERKELEY STATION

No.	Date	Charac- ter	Phase	Time G. M. C. T.			Period	Amplitude			Remarks				
				h.	m.	s.		AE	AN	Az					
21	1925 June 29 (Cont.)	III	iME	14	44	32	10	+305	μ	μ	Off record. Off record. Hit bumper. Lost in aftershock.				
			iMN	14	44	40	9	-450	-287	+171					
			iM _{1E}	14	44	49	14?	+670	-905						
			iM _{1N}	14	45	11	12?								
			iM _{1Z}	14	45	18	9			+1570					
			F												
22	June 29	Iv	iNZ	16	05	08	10	+ 5	- 3		Short period waves on coda of pre- ceding shock.				
			iN	16	05	25									
23	June 29	IIv	iz	16	07	11	5	+ 4	- 5		Short period waves on coda of pre- ceding shocks.				
			iN	16	07	23									
			iz	16	07	24									
			iE	16	08	08									
			iN	16	08	09									
			iz	16	08	13									
			iz	16	08	25						3	- 6	+10	
			iEN	16	08	25									
			iE	16	08	29						4			
			iz	16	08	44						4	- 4	+ 8	
			iME	16	08	49						4	+ 7	- 4	
			iMN	16	08	51						9	+10	-16	
iMZ	16	08	52	9	+11	- 6									
24	June 29	II	F							Lost in following shock.					
			iPz	16	35	44	3	<-2		Possibly began 1.5 sec. earlier with Condensation. This is an after- shock. It is some- what masked by the preceding shock.					
			iPN	16	35	51									
			ePE	16	35	58									
			iz	16	36	41									
			iN	16	36	42									
			iE	16	36	49									
			iz	16	36	56									
			iLN	16	57	18									
			iLz	16	37	22									



BERKELEY STATION

No.	Date	Charac- ter	Phase	Time G. M. C. T.			Period	Amplitude			Remarks				
				h.	m.	s.		AE	AN	Az					
25	1925 June 29	IIv	ePNZE	18	57	10	4	μ	μ	μ	Another aftershock from Santa Bar- bara. No (+) motion.				
			ez	18	57	17	2								
			iN	18	57	45	3								
			iSE?	18	58	16	3	-16							
			iz	18	58	23									
			iN	18	58	48	8		+15	-23					
			iz	18	58	48	8			-21		+26			
			iN	18	58	56	8		±30						
			26	June 30	Iv	ePN	9	20	02	4					Santa Barbara.
						ePz	9	20	08	3					
iPNE	9	20				09	3								
iz	9	20				53	5.5			- 9					
iSEN	9	21				10	3.5	- 7	± 6						
iSz	9	21				13	3	+ 4		- 6	+ 4				
iE	9	21				28	6	- 8							
iLN	9	21				32	9.5		+ 3	- 2					
iE	9	21				47	14	- 9							
F	9	28±													
27	July 3	Iv	ePz	16	39	01	3				Indistinct.				
			ePN	16	39	02	3.5								
			ePE	16	39	06	4								
			eSz	16	40	03									
			eSNE	16	40	05	E2,N3	± 2	± 2						
			F	16	46										
28	July 3	IIv	ePNZ	18	22	10									
			eSN	18	23	02									
			eSEZ	18	23	03									
			F	18	41										
29	July 4	Id	ePE	19	18	20	2.5								
			iE	19	19	05	3								
			ePN	19	19	14	1.5								
			ez	19	19	17									
			eSNZ	19	19	52	2.5								
			iN	19	20	11	3								
			eLNZ	19	20	25	8								
			FNZ	19	23	27									
FE	19	25													

BERKELEY STATION

No.	Date	Character	Phase	Time			Period	Amplitude			Remarks
				G.	M.	C. T.		A _E	A _N	A _Z	
30	1925 July 7	IIr	eP _{EN}	h.	m.	s.	s.	μ	μ	μ	Not recorded on vertical. After 16-06 when records were removed.
			iP _N	14	17	29	3	+ 2	- 2		
			iP _E	14	17	32	4		+ 9		
			iP _E	14	17	34	4	-11			
			e _N	14	21	57	8		- 2		
			eL _E	14	24	05	20	+14			
			eL _N	14	24	29	20		+ 4		
			iM _N	14	25	41	17		-14		
			M _{IN}	14	26	22	15		+22		
			iM _E	14	26	23	15	+30			
			M _{IE}	14	28	21	13	-47			
F											
31	July 7	I	e _E	18	18	11					
			e _Z	18	19	59	17				
			e _{EZ}	18	21	11	17	- 3		+ 1	
			F	18	38						
32	July 19	IIId	eP _E	19	24	54	<0.5	+ 2			Dilatation. Focus on Haywards-Calaveras Fault system east of San Jose at a depth of about 30 km. See Bull. Seis. Soc. America, March, 1926, for complete discussion.
			i _E	19	24	55	<0.5	-12			
			R ₁ P _E	19	25	01	<0.5	+ 9			
			R ₁ P _N	19	25	01	<0.5		- 4		
			R ₁ P _Z	19	25	01	<0.5			- 5	
			i _N	19	25	02	<0.5		-14		
			iS _E	19	25	05	<0.5	+14			
			iS _N	19	25	06	4		-23		
			iS _Z	19	25	06	1			+11	
			i _Z	19	25	07	6			- 8	
			R ₁ P _{S_E}	19	25	09	14	-38			
R ₁ P _{S_Z}	19	25	10	1			-15				
R ₃ P _{S_N}	19	25	58	2		-16					
33	Aug. 7	I	eP _Z	7	53	26					Record on N slight. Probably Southern Mexico.
			iPR _{1Z}	7	54	05					
			ePR _{1E}	7	54	07					
			e _E	7	58	05					
			eS _E	7	58	44					
			L _E ?	8	01	12					
			F	8	18						
34	Aug. 19	Iu	eP _E	12	16	32					Only a trace on the N, none on vertical. Epicenter probably in Aleutian Islands off Kamchatka. The large amplitudes.
			iPR _{1E} ?	12	18	23					
			eS _E	12	23	39					
			eL _E	12	31	00					
			iM _E	12	37	28					
			F	12	58						



BERKELEY STATION

No.	Date	Character	Phase	Time			Period	Amplitude			Remarks
				G.	M.	C. T.		A _E	A _N	A _Z	
35	1925 Aug. 21	IIv	eP _E	h.	m.	s.	s.	μ	μ	μ	Rarefaction. Epicenter a few kilometers north of McNamara Lake in the Benton Range, Nevada. Depth of focus 12 km. ca. See Bull. Seis. Soc. America, March, 1926, for a complete discussion.
			eP _{EZ}	11	15	05					
			eP _N	11	15	09.5					
			eP _N	11	15	10					
			iS _E	11	15	44					
			iS _Z	11	15	47					
			iS _N	11	15	50	2		+ 7		
			iS _Z	11	15	52	4			-12	
			iS _E	11	15	54	3	+ 4		+ 2	
			R ₁₂ S _E	11	16	12		-11			
			F	11	23±						
36	Aug. 26	Id	eP _{EN}	6	49	41					Δ=6 km. Felt in Berkeley. R. F. II ca.
			iS _{EN}	6	49	42					
			M _{ZE}	6	49	43					
			M _{ZN}	6	49	44					
			F	6	50						
37	Aug. 29	I	eP _Z	22	40	04	5			<-2	
			eP _E	22	40	15	5	<+2			
			eP _N	22	40	23	2				
			eL _E	22	43	44	30	<-10			
			e _N	22	44	14	26		<-6		
			iM _E	22	44	32	21	+14			
			iM _Z	22	45	44	13			-12	
			F	23	12						
38	Aug. 31	Id	eP _{ZE}	22	38	06					A shorter period T< 1 sec. is superimposed.
			eP _N	22	38	10					
			iS _N	22	38	11	2		- 2		
			iS _{ZE}	22	38	12	T _E <1 T _Z =2	- 2		<+2	
39	Sept. 26	Id	iP _{NE}	3	52	24					Barely perceptible, not reported felt here.
			F	3	52	27					
40	Sept. 30	IIId	iP _E	15	22	58					S-P=1 sec.
			iP _{NZ}	15	22	59					
			iS _{ENZ}	15	22	59					
			i _Z	15	23	00.5					

THE LICK OBSERVATORY STATION

CONSTANTS

CONSTANTS OF THE STATION

Latitude and longitude of the center of the seismographic room:

$\phi = 37^\circ 20' 24.5''$ N. Lat.
 $\lambda = 121^\circ 38' 34''$ 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

Date	Apparatus	Component	V	T ₀	ϵ	$\frac{r}{T_0^2}$
Mar. 16	Wiechert 160 Kg. H. Wiechert 80 Kg. V.	E	95	10.1	6.1	0.0030
		N	86	7.9	6.3	0.0045
		Z	63	3.0	10.2	0.0011
June 8	160 Kg. H. 80 Kg. V.	E	101	9.2	4.7	0.0046
		N	86	7.7	3.6	0.0087
		Z	52	3.1	7.4	0.0008



LICK OBSERVATORY STATION

No.	Date	Charac- ter	Phase	Time		Period	Amplitude			Remarks
				G. M. C. T.	s.		A _E	A _N	A _Z	
1	1925 Apr. 11	Iu	iP' _E	h. m. s.	s.	μ	μ	μ	See Berkeley Bulletin for location of epicenter.	
			11 02 13	4	< -1					
			iP' _Z	11 02 20	4			< +3		
			iP' _N	11 02 26	4		< +1			
			iS _c P _c P _Z ?	11 04 00	4			< -3		
			iS _c P _c P _E ?	11 04 01	5	< -1				
			iS _c P _c P _N ?	11 04 05	6		+ 1			
			iPR _{1E}	11 07 42	3	< -1				
			iPR _{1N}	11 07 50	3		+ 1			
			iPR _{1Z}	11 07 53	4			< +3		
			i _N	11 09 07	6		- 1			
			iP _c S _c P _Z ?	11 11 10	6			< +6		
			iP _c S _c P _N	11 11 16	3		< -1			
			iP _c S _c P _E	11 11 33	3	- 1				
			iS _c S _c P _N ?	11 14 55	9		- 1			
			iS _c S _c P _E ?	11 14 58	8		- 1			
			S _c P _c SP _N	11 18 37	10		- 2			
			S _c P _c SP _E ?	11 19 21	15	+ 4				
			e _E	11 30 24	20	+11				
			e _N	11 30 38	20		-14			
e _N	11 37.5	42		-32						
e _E	11 37.5	25	- 6							
e _N	12 10.5	25		-11						
e _E	12 14 05	25	- 6							
iM _{1E}	12 23 59	19	- 3							
iM _{1N}	12 26 51	18		+16						
F	12 47									
2	Apr. 13	Id	iP _Z	22 58 20						
			F	22 58 21						
3	Apr. 13	Id	iP _{ENZ}	22 58 22					Lost in following shock.	
			F							
4	Apr. 13	Id	iP _{ENZ}	22 58 24					Lost in following shock.	
			F							
5	Apr. 13	Id	iP _{ENZ}	22 58 29					Seven distinct shocks registered on Z between 22h 58m and 22h 59m.	
			F	22 58 32						
6	Apr. 14	Id	iP _{EN}	0 29 48					Lost in following shock.	
			iS _{ENZ}	0 29 48						
			F							

LICK OBSERVATORY STATION

No.	Date	Character	Phase	Time G. M. C. T.	Period	Amplitude			Remarks
						AE	AN	Az	
7	1925 Apr. 14	Id	$i\bar{P}_{ENZ}$ F	h. m. s. 0 29 59 0 30 02	s.	μ	μ	μ	There were also many smaller shocks recorded on this day.
8	Apr. 15	Id	$i\bar{P}_{EN}$ F	23 44 29					Lost in following shock.
9	Apr. 15	Id	$i\bar{P}_{ENZ}$ F	23 44 36 23 44 39					Many other smaller shocks of swarm-type recorded on this date.
10	May 1	Id	$i\bar{P}_{ENZ}$ i_{NZ} $i\bar{S}_{ENZ}$ F	11:00 to 11:30					Time marker was not working, so exact time cannot be obtained. $\bar{S}-\bar{P}$ about 10 sec.
11	May 1	Id	$i\bar{P}_{ENZ}$ i_{NZ} $i\bar{S}_{ENZ}$ F	11:45 to 12:15					Time marker was not working, so exact time cannot be obtained. $\bar{S}-\bar{P}$ about 10 sec.
12	May 3	Iu							A distinct shock was recorded at about 17h 30m on H components only on this date, but the time marker was not functioning. See Berkeley Bulletin.
13	May 3	Iu							A distinct earthquake was registered on H component between 23h 00m and 23h 30m on this date but time marker was not functioning. See Berkeley Bulletin.

LICK OBSERVATORY STATION

No.	Date	Character	Phase	Time G. M. C. T.	Period	Amplitude			Remarks
						AE	AN	Az	
14	1925 May 7	Id	i_{EN} i_{EN} i_{ENZ} i_{EN} i_Z i_{ENZ} i_Z i_E i_{EN}	h. m. s. 1 00 24 1 00 27 1 00 29 1 00 31 1 00 33 1 00 34 1 00 36 1 00 38 1 00 41 1 00 44	s.	μ	μ	μ	These are probably separate shocks yet they are in a practically continuous group. Swarm type.
15	May 14	Id	$i\bar{P}_{ENZ}$ F	23 58 23 23 58 28					
16	May 15	Id	$i\bar{P}_{ENZ}$ $i\bar{S}_{ENZ}$ F	0 00 48 0 00 51 0 01.2					$\bar{S}-\bar{P}=3$ sec. Δ ca. 22 km.
17	May 15	Id	$i\bar{P}_E$ F	23 37 13					Lost in following shock.
18	May 15	Id	$i\bar{P}_{NZ}$ i_{NZ} F	23 37 18 23 37 20					May be \bar{S} or may be separate shock. F lost in following shock.
19	May 15	Id	$i\bar{P}_{EZ}$ F	23 37 25					Lost in following shock.
20	May 15	Id	$i\bar{P}_{EN}$ F	23 37 35 23 37 45					There may possibly be other shocks in this swarm occurring between 23h 37m and 23h 58m.
21	May 22	Id	$i\bar{P}_{EN}$ F	17 44 40 17 44 42					Not recorded on Z.
22	May 23	Id	$i\bar{P}_Z$ $i\bar{P}_N$ $i\bar{P}_E$ $i\bar{S}_N$ $i\bar{S}_E$ F	22 38 13 22 38 16 22 38 16 22 38 24 22 38 24 22 40.5±	1 1 1	< -1 - 2 + 2		$\bar{S}-\bar{P}=11$ sec. Δ = ca. 80 km. Not reported felt.	

LICK OBSERVATORY STATION

No.	Date	Character	Phase	Time G. M. C. T.			Period	Amplitude			Remarks	
				h.	m.	s.		AE	AN	Az		
23	1925 May 28	I	ce	6	13	37		μ	μ	μ	Barely perceptible.	
			en	6	15	27						
			ie	6	15	30						
			cz	6	15	31						
			iez	6	17	05						
			iez	6	21	05						
			en	6	21	08						
			ie	6	21	35						
			in	6	27	47						
			F	6	44±							
			24	June 3	Iu	ce		4	51	49		4
en	4	52				48	3					
ee	4	58				56	11					
en	4	59				1	37					
ee	5	22				3						
F	6	07±										
25	June 4	I	ce	1	17	37					Short irregular waves not recorded on Z.	
			en	1	18	18						
			F	1	29±							
26	June 4	I	ce	12	05	00	4				Not recorded on Z.	
			en	12	05	01						
			en	12	06	39	21					
			ie	12	07	04	7					
			F	13	12±							
27	June 7 June 8	I	ienz	23	50	51					No definite phases appear. May not be seismic.	
			F	0	04±							
28	June 9	Iu	ipz	13	54	31	4			< -3	S-P=10m. 39s. Δ=9,800 km. Not recorded on N.	
			ipe	13	54	38	4					< +1
			ipr _{ie}	13	58	03	4					< +1
			iz	13	58	29						
			ie	13	58	32	3					- 1
			ese	14	05	10	6					+ 1
			ee	14	13	03	14					< +2
			eL _E ?	14	26	2	20					
			eM _Z	14	28	9						
			ime	14	29	23	22					+10
			im _{ie}	14	37	38	17					-14
			F	15	25±							

LICK OBSERVATORY STATION

No.	Date	Character	Phase	Time G. M. C. T.			Period	Amplitude			Remarks		
				h.	m.	s.		AE	AN	Az			
29	1925 June 15	Id	ip _{ENZ}	14	45	39		μ	μ	μ	Local shock.		
			is _{EN}	14	45	40							
			is _Z	14	45	41							
			if	14	46	1							
30	June 28	IIIr	ipe	1	23	58	8.5	-12			The Great Montana Earthquake. See Berkeley Bulletin.		
			ip _N	1	23	59	8.5	-14					
			ip _Z	1	24	01	5.7						
			iz	1	24	06							
			ie	1	24	57.5	5	+28				-35	
			in	1	24	57.5	5	- 5					+46
			in	1	26	03	14					+28	-3
												- 90	
			ise	1	26	14	11	±31				+78	±292
			is _N	1	26	14	11					-55	
			is _Z	1	26	15	3					+98	< ±20
			iz	1	26	50	7						±37
			im _N	1	26	55	5					+146	-86
im _Z	1	27	16	6		-69	+198						
ime	1	27	23	5		-126	±292						
						+34							
M _{iz}	1	27	27.5	5			+593						
M _{in}	1	27	15	10		-442							
M _{ie}	1	27	43	13.5		-730	+647						
F _Z	1	40±											
F _{EN}	2	10					- 1						
31	June 28	IIr	ip _N	2	08	31	5				Merges into new shock. Montana aftershock.		
			in	2	10	47	15.5	- 8					
			ime	2	11	38	4	- 5				+12	
								+ 7					
			im _Z	2	11	40	4					- 9	
						+15							

THE INTERPRETATION OF THE DIRECTION OF
EARTH MOTION IN TERMS OF THE DIRECTION
OF MOTION OF THE MASS OF THE
SEISMOGRAPH

In the bulletins of the Berkeley Station and the Lick Observatory Station previous to about 1921, it was assumed that when the earth under the station moved, the masses of the seismographs, on account of their inertia, showed a relative motion in the direction opposite to that of the earth motion.

In the bulletins beginning about 1921 (the exact number is not known to the writer) this interpretation was abandoned for the horizontal components, the assumption being made for these that the masses acted in response to apparent tilt, thus showing a relative motion in the same direction as the earth motion. The older interpretation was retained for the vertical component.

In this issue of the bulletin we return to the earlier interpretation that the masses as a result of their inertia show a motion relative to their supports which is in a direction opposite to that of the earth motion.

This latter interpretation has seemed more satisfactory in the cases of a number of earthquakes which have been studied recently.