

Date	Station	Phase	G. C. T.			c	Remarks
			h	m	s		
Jan 1	P	eZ	07	43	12		Deep?
		eZ		44	10		
	MW	iZ		43	13		
		eZ		44	11		
Jan 1	P	ePEZ	08	14	.33		
	MW	ePZ			31		
	T	ePZ			54		
Jan 1	P	ePNEZ	11	30	48		Normal. Mexico. Aftershock of 1937, Dec. 31, 17h. USCGS: 15°N., 98°W. (approx) 0 = 11:25.1
	PX	iSNE		35	22		
		eLE		37.5			
	MW	ePZ		30	48		
	SB	ePZ		31	00		
	T	ePNE			08		
	H	ePN			30		
Jan 1	P	eZ	12	17	11		
	MW	eZ			04		
Jan 1	P	ePZ	12	58	13		Normal. Surface waves recorded. Aftershock, Mexico.
	MW	ePZ			11		
	T	ePZ			33		
Jan 1	P	ePZ	14	24	03		Normal. Surface waves recorded. Aftershock, Mexico?
	MW	iPZ			03		
Jan 1	P	ePZ	16	02	00		Normal? Surface waves recorded. Aftershock, Mexico?
	MW	iPZ			00		
	SB	ePZ			10		
	T	ePZ			23		
Jan 1	P	iPNEZ	23	40	24	d	Normal? Readings reported as S may be SKS.
		iZ			45		
	PX	iSE		50	55		
		eLN	24	04			
	MW	iPNEZ	23	40	24	d	
		eZ		43	27		
	SB	iPNZ		40	17		
	T	iPNEZ			17		
	eSNE		50	29			
	iPEZ		40	20			
Jan 2	P	ePNEZ	06	14	44		Normal?
	PX	eLN		23.2			
	MW	iPZ		14	45		
	T	iPNEZ		15	03		
		iZ			15		
Jan 2	P	ePZ	06	37	13		
	MW	ePZ			13		
Jan 2	P	iPNEZ	22	32	47	d	Normal. Damage in Guerrero (Mexico). USCGS: 15.7°N., 98.0°W. 0 = 22:27:13 J.S.A: 16.7°N., 98.3°W. 0 = 22:27:17
	PX	iSNE		37	22		
		eLN		39.1			
	MW	iPNEZ		32	47	d	
	SB	iPNEZ		32	58		
	T	iPNEZ		33	05	d	
	H	ePNEZ		32	59		
Jan 3	P	ePZ	21	29	47		
	MW	iPZ			47		
	T	ePZ			54		
Jan 4	P	iPZ	02	41	16		Deep?
		iZ			52		
		eZ		44	37		
	MW	iPZ		41	17		
		iZ			54		
		eZ		44	34		

Continued

# SEISMOLOGICAL LABORATORY

CALIFORNIA INSTITUTE OF TECHNOLOGY

PASADENA, CALIFORNIA

ADDRESS:  
SEISMOLOGICAL LABORATORY  
220 NORTH SAN RAFAEL AVE.  
PASADENA, CALIFORNIA

1937

## BULLETIN

The SEISMOLOGICAL LABORATORY, Pasadena, California, is maintained and operated by the California Institute of Technology and the Carnegie Institution of Washington, as a cooperative undertaking. This laboratory is the central station of a coordinated group. Auxiliary stations in southern California are maintained and operated as follows: At the Mount Wilson Observatory on Mount Wilson (a Department of the Carnegie Institution of Washington); at Riverside (in cooperation with the City of Riverside); at Santa Barbara (in cooperation with the Santa Barbara Museum of Natural History); at La Jolla (in cooperation with the Scripps Institution of Oceanography of the University of California); at Tinemaha, and at Haiwee, in the Owens Valley (in cooperation with the Department of Water and Power of the City of Los Angeles). Address all correspondence to Pasadena.

**TIME:** At all these stations the minute-marks on the seismograms are coordinated directly by means of auxiliary records written at each station on which the minute-marks are registered closely parallel with recorded dot-and-dash radiotelegraphic signals sent in ordinary course from a powerful transmitting station. This permits direct correlation of the minute-marks at all the stations of the group at practically all times with an accuracy of one second, and usually of one-fifth second.

Standard time is determined at Pasadena by comparing the station clock with automatically recorded radio time signals of the U. S. Naval Observatory, three to five times daily.

The constants of these stations follow.

### PASADENA SEISMOLOGICAL LABORATORY Central Station

$\Phi = 34^{\circ} 08.9' N., \lambda = 118^{\circ} 10.3' W., h = 295 \text{ m.},$  Deeply weathered granite rock, with inclusions of gneiss and schist.

Apparatus: horizontal-component torsion seismometers with electromagnetic damping and optical recording. (Cf. Bull. Seis. Soc. Am., XV, 1, 1925).

Instruments, and Constants (approximate);

	$T_0$	V	h
N — S	0.8 sec.	2,800	0.8-0.9
E — W	"	"	"
E — W	6 sec.	800	0.8-0.9

Seismometers with electromagnetic damping and galvanometric-optical recording.

(Cf. Bull. Seis. Soc. Am., XXII, 156, 1932).

N, E and Z inertia-mass 100 kg.,  $T_0 = 1.0 \text{ sec.}, h = 1$   
galvanometers: (1)  $T = 0.25 \text{ sec.}, h = 4.$   
(2)  $T = 2 \text{ min.}, h = 1.$

Horizontal strain seismometer (Cf. Bull. Seis. Soc. Am. XXV, 283, 1935) Axis in N-S line (Long period). Damping critical.

The constants of the short-period instruments do not undergo any significant changes. The constants of the instruments of longer period will be given from time to time when deviations from the values given are significant.

Experimental seismographs of various kinds are in process of development from time to time, and are used for intervals of variable duration. Information concerning these will be given when necessary.

## AUXILIARY STATIONS

Each of the auxiliary stations has equipment as follows:

Apparatus: two horizontal-component torsion seismometers with magnetic damping and optical recording;

Instruments and Constants (approximate);

	T <sub>0</sub>	V	h
N — S	0.8 sec.	2,800	0.8-0.9
E — W	“	“	“

one vertical component seismometer with galvanometric-optical recording;  
 inertia-mass 100 kg. T<sub>0</sub> = 1.0 or 0.5 sec. Damping critical or slightly less;  
 galvanometer: T<sub>1</sub> = 0.2 sec. h = 4.

The Station Constants follow.

Coördinates are geodetic positions referred to the North American Datum.

**Mount Wilson Seismologic Station**

Φ = 34° 13.5' N., λ = 118° 03.4' W., h = 1742 m., Weathered granite.

**Riverside Seismologic Station**

Φ = 33° 59.6' N., λ = 117° 22.5' W., h = 250 m. approx., Weathered granite.

**Santa Barbara Seismologic Station**

Φ = 34° 26.5' N., λ = 119° 42.9' W., h = 100m. approx., Heavy, boulder-laden alluvium.

**La Jolla (Scripps Institution Seismologic Station)**

Φ = 32° 51.8' N., λ = 117° 15.2' W., h = 7.7 m. approx., Consolidated detrital material.

**Tinemaha Seismologic Station**

Φ = 37° 05.7' N., λ = 118° 15.5' W., h = 1180 m. approx., Basalt.

**Haiwee Seismologic Station**

Φ = 36° 08.2' N., λ = 117° 57.9' W., h = 1100 m. approx., Loosely cemented tuff.

**SYMBOLS AND NOTATIONS:** in general the symbols and notation conform with the usual international practice. For the phases of deep-focus earthquakes the notation of F. J. Scrase is adopted. When surface waves are not reported no such waves are observed. c, d are abbreviations for compression and dilatation.

When measurements referring to local earthquakes are included P and S will be used without index or subscript, as no attempt will be made in these bulletins to distinguish between  $\bar{P}$ , P\*, and P<sub>n</sub>, although such complications are often clearly indicated and are the subject of study.

**SPECIAL SYMBOLS** indicating the stations of this coördinated group are as follows:

**PASADENA SEISMOLOGICAL LABORATORY**

- For routine instruments of period 0.8 second . . . . . P
- For routine instruments of period 6 seconds . . . . . P<sub>6</sub>
- For instruments of different period analogous notation will be employed.
- For routine instruments, galvanometer period 0.25 second . . . . . P
- For routine instruments, galvanometer period 2 minutes . . . . . PX
- Mount Wilson Seismologic Station . . . . . MW
- Riverside Seismologic Station . . . . . R
- Santa Barbara Seismologic Station . . . . . SB
- La Jolla (Scripps Institution Seismologic Station) . . . . . LJ
- Tinemaha Seismologic Station . . . . . T
- Haiwee Seismologic Station . . . . . H

In general detailed measurements will be given only for the records of the Seismological Laboratory: those for records of the other stations will be given only to supplement the information.

No. 2

PASADENA and auxiliary stations

1938

Date	Sta- tion	Phase	G. C. T.			c d	Remarks
			h	m	s		
Jan 4	SB	eZ	02	41	46		Continued
		iPZ			18		
	iZ	53					
	eZ	44 43					
	eE	41 56					
Jan 4	P	ePZ	19	43	35		
	MW	iPZ			35		
Jan 5	P	iPNEZ	06	54	38	d	Deep? Large, sharp iP with no other recorded motion.
	MW	iPZ			39		
	SB	iPZ			34		
	T	iPZ			47	d	
	H	ePE			45		
Jan 5	P	ePZ	08	24	42		Normal?
	PX	eLNE			32		
	MW	iPZ			24 39		
	SB	ePZ			54		
	T	iPZ			25 00		
	H	ePNE			24 59		
Jan 6	P	ePZ	13	39	27		
	MW	ePZ			27		
Jan 6	P	eSNEZ	14	39	08		Tucson: eP = 14:37:22 eS = 14:38:15 (Courtesy USCGS)
	MW	ePZ			38 14		
		eSZ			39 12		
Jan 6	P	iNEZ	15	52	30		
	MW	iZ			30		
Jan 7	P	ePZ	15	39	52		Normal. L large.
	PX	eLNE			16 03.4		
	MW	ePZ			15 39 51		
		eZ			43 22		
	R	iPZ			39 53		
	T	iZ			43 29		
Jan 8	P	iPNEZ	04	55	57	c	Deep.
		iZ			58 05		
	MW	iPZ			55 27	c	
		iZ			58 01		
	R	iPZ			55 58	c	
		iZ			58 04		
	T	iPZ			56 06	c	
Jan 8	P	ePZ	13	22	54		
	MW	iPZ			52		
	R	ePZ			52		
Jan 9	P	iPNEZ	19	47	48	d	Deep.
	MW	iPZ			49	d	
	R	iPNEZ			47 50		
		iZ			49 48		
	SB	ePZ			47 43		
	T	iPEZ			57	d	
Jan 9	P	ePN	20	37	54		Deep.
		iPZ			53		
		iZ			38 24		
	MW	iPZ			37 54		
		iZ			38 24		
Jan 9	T	iPZ	38	04			
		iZ			36		
		iZ					

1978

STATION AND OBSERVATION STATIONS

No. 2

Date	Time	Phase	S. O. T. (h m s)	Remarks
Jan 8	02	02	02 47 48	Continued
	18	18	02 47 18	
	22	22	02 47 22	
	24	24	02 47 24	
Jan 8	19	19	02 47 19	Deep, large, sharp P-wave, recorded motion.
	20	20	02 47 20	
Jan 8	21	21	02 47 21	Normal, P. large.
	22	22	02 47 22	
	23	23	02 47 23	
	24	24	02 47 24	
Jan 8	25	25	02 47 25	Normal, P. large.
	26	26	02 47 26	
	27	27	02 47 27	
	28	28	02 47 28	
Jan 8	29	29	02 47 29	Normal, P. large.
	30	30	02 47 30	
	31	31	02 47 31	
	32	32	02 47 32	
Jan 8	33	33	02 47 33	Normal, P. large.
	34	34	02 47 34	
	35	35	02 47 35	
	36	36	02 47 36	
Jan 8	37	37	02 47 37	Normal, P. large.
	38	38	02 47 38	
	39	39	02 47 39	
	40	40	02 47 40	
Jan 8	41	41	02 47 41	Normal, P. large.
	42	42	02 47 42	
	43	43	02 47 43	
	44	44	02 47 44	
Jan 8	45	45	02 47 45	Normal, P. large.
	46	46	02 47 46	
	47	47	02 47 47	
	48	48	02 47 48	
Jan 8	49	49	02 47 49	Normal, P. large.
	50	50	02 47 50	
	51	51	02 47 51	
	52	52	02 47 52	
Jan 8	53	53	02 47 53	Normal, P. large.
	54	54	02 47 54	
	55	55	02 47 55	
	56	56	02 47 56	
Jan 8	57	57	02 47 57	Normal, P. large.
	58	58	02 47 58	
	59	59	02 47 59	
	60	60	02 47 60	
Jan 8	61	61	02 47 61	Normal, P. large.
	62	62	02 47 62	
	63	63	02 47 63	
	64	64	02 47 64	
Jan 8	65	65	02 47 65	Normal, P. large.
	66	66	02 47 66	
	67	67	02 47 67	
	68	68	02 47 68	
Jan 8	69	69	02 47 69	Normal, P. large.
	70	70	02 47 70	
	71	71	02 47 71	
	72	72	02 47 72	
Jan 8	73	73	02 47 73	Normal, P. large.
	74	74	02 47 74	
	75	75	02 47 75	
	76	76	02 47 76	
Jan 8	77	77	02 47 77	Normal, P. large.
	78	78	02 47 78	
	79	79	02 47 79	
	80	80	02 47 80	
Jan 8	81	81	02 47 81	Normal, P. large.
	82	82	02 47 82	
	83	83	02 47 83	
	84	84	02 47 84	
Jan 8	85	85	02 47 85	Normal, P. large.
	86	86	02 47 86	
	87	87	02 47 87	
	88	88	02 47 88	
Jan 8	89	89	02 47 89	Normal, P. large.
	90	90	02 47 90	
	91	91	02 47 91	
	92	92	02 47 92	
Jan 8	93	93	02 47 93	Normal, P. large.
	94	94	02 47 94	
	95	95	02 47 95	
	96	96	02 47 96	
Jan 8	97	97	02 47 97	Normal, P. large.
	98	98	02 47 98	
	99	99	02 47 99	
	100	100	02 47 100	

Date	Sta- tion	Phase	G. C. T.			c d	Remarks
			h	m	s		
Jan 10	P	iPZ	00	16	46		
	T	iPZ			41		
Jan 10	P	ePZ	17	57	11		Normal? No surface waves.
	MW	iPZ			12		
	R	eZ		59	31		
	T	iPZ		57	15		
Jan 10	T	iPZ		56	58		Normal? No surface waves.
	P	iPZ	21	07	14	c	
	MW	iPZ			14	c	
	R	eZ		10	37		
	T	iPZ		07	17		
Jan 11	P	iZ			08		
	H	ePNE			10		
Jan 11	P	iZ	10	00	31		
	MW	iZ			32		
Jan 11	P	ePZ	13	42	09		
	MW	iPZ			11		
Jan 11	P	iPEZ	15	24	23	c	Normal. Japan. Reading reported as eS may be SKS.
		eZ		27	40		
	PX	eSE		34	44		
		eLE		49.9			
	MW	iPZ		24	25	c	
		iZ		27	28		
	R	ePNE		24	27		
	T	iPEZ			15		
Jan 12	P	ePZ			27		
	H	ePN			19		
Jan 12	P	ePZ	02	41	03		
	MW	iPZ			04		
Jan 12	P	iPNEZ	11	36	18	d	Deep? Surface waves very small.
	MW	iPZ			20	d	
		eZ		39	41		
	R	ePNE		36	20		
	T	ePNE			28		
Jan 13	H	ePN			26		
	P	ePZ	03	27	22		
	MW	iPZ			22		
	R	iPZ			24		
Jan 13	T	ePZ			31		
	P	ePZ	04	54	59		
	MW	iPZ		55	00		
Jan 13	R	iPZ			01		
	P	ePZ	09	37	19		
Jan 13	MW	iPZ			19		
	R	iPZ			22		
	T	iPZ			24		
	P	iPZ	09	55	46		
Jan 13	MW	iPZ			46		
	R	iPZ			50		
	T	ePZ			34		
	P	iPZ	10	26	41		
Jan 13	MW	iPZ			42		Very clear at these three stations. Too small to be recorded at Tinemaha or Tucson.
	R	iPZ			44		
	P	ePZ	10	34	55		
Jan 13	MW	iPZ			56		Deep?
		eZ		35	20		
	R	iPZ		34	52		
		iZ		35	17		

No. 4

PASADENA and auxiliary stations

1938

Date	Station	Phase	G. C. T.			c d	Remarks
			h	m	s		
Jan 13	P	ePNEZ	22	54	47		Normal? L small.
		eLN	23	13.5			
	MW	iPNZ	22	54	47		
	R	iPNEZ			45		
	LJ	ePNE			40		
	T	iPNE		55	07		
Jan 14	P	iPEZ	11	06	14	d	Deep.
	MW	iPZ			15	d	
		eZ		07	11		
	T	iPZ		05	58	d	
Jan 14	P	ePZ	14	04	39		
	MW	ePZ			37		
	T	ePZ			26		
Jan 26	P	ePZ	14	11	26		Normal? Surface waves small.
		eZ			49		
	PX	eLNE		30.7			
	MW	ePZ		11	23		
Jan 16	P	ePZ	20	11	03		
	MW	iPZ			03		
	R	ePZ			05		
Jan 16	P	iPNEZ	21	51	30	c	Deep?
		iZ			39		
	MW	iPZ			30	c	
	R	iPZ			25	c	
		iZ		52	22		
	T	iPZ		51	43		
Jan 18	P	eZ	02	57	25		
	R	eZ			35		
Jan 18	P	iNEZ	04	39	10		Normal? No surface waves recorded. Probably Sumatra.
		iNEZ		42	34		
	MW	iZ		39	11		
		iZ		42	32		
	R	iNEZ		39	08		
		iNEZ		42	32		
	SB	iZ			28		
	T	eZ		39	28		
		iZ		42	27		
Jan 18	P	eZ	09	47	39		
	MW	eZ			33		
	R	eZ			32		
	T	eZ			09		
Jan 22	P	iPNZ	15	46	22		Deep? Readings at 15 <sup>h</sup> 49 <sup>m</sup> probably are iP of a second and much larger shock.
		eZ		47	01		
		iNEZ		49	28	d	
	MW	iZ		46	19		
		iZ		49	29		
	R	eZ		46	22		
		iNEZ		49	31	d	
	T	iPZ		46	18		
		iZ		49	24		
	H	eN		49	19		
Jan 23	P	ePNEZ	08	39	49		Normal. Strong in the Hawaiian Islands. USCGS: 21.2°N., 156.1°W. 0 = 08:32.8 J.S.A: 21.0°N., 156.2°W. 0 = 08:32:50 Berkeley: P = 08:40:39 (Courtesy of Professor Byerly). Tucson: P = 08:39:31 (Courtesy of USCGS). See the next.
	PX	iPPNE		41	04		
		iSNE		45	28		
		iLNE		48	10		
	MW	iPEZ		39	50		
		iSE		45	34		
	R	iPNEZ		39	54		
	iSNE		45	35			

Continued

Date	Sta- tion	Phase	G. C. T.			c d	Remarks
			h	m	s		
Jan 23	SB	ePNZ	08	39	38	Continued	
		eSN		45	13		
	LJ	ePNEZ		39	54		
		eSE		45	35		
	T	ePZ		39	53		
		iNEZ			57		
	H	iSN		45	38		
		ePN		39	56		
Jan 23	P	eZ	09	16	01		Peculiar short-period disturbance. Duration 1-2 minutes at our stations. At Berkeley, duration from about 09:12 to 09:18, with an impulse at 09:15:57. Tucson, 09:12:00. Professor Byerly suggests this may be P <sub>2</sub> 'P <sub>2</sub> ' or some similar phase of the Hawaiian shock preceding.
	MW	eZ		15	38		
	R	eZ		16	17		
	SB	eZ		15	30		
	T	eZ		15	41		
Jan 24	P	eZ	10	50	28		Normal. Phases not clear. USCGS: 71°S., 47°W. 0 = 10:31.3 J.S.A: 60.4°S., 34.6°W. 0 = 10:31:45 Strasbourg: 58°S., 37°W.
		iNEZ		51	38		
	PX	iNE	11	01	23		
		eLNE			26.9		
	MW	eZ	10	50	29		
		eZ		51	28		
	R	eZ		50	16		
		eZ	11	00	58		
	T	eZ	10	50	31		
eZ			51	39			
		eZ	11	01	55		
Jan 25	P	ePNEZ	17	06	16	c	Normal.
		iSNE		16.7			
	PX	eLNE		32.3			
		ipZ		06	16		
	MW	iZ		09	33		
		ipNEZ		06	17		
	R				09		
LJ	ePNEZ			09			
T	ipZ			24			
	iZ		10	00			
Jan 26	P	eZ	03	59	21		Normal. Strasbourg: 34.8°N., 46.7°E.
	PX	eLN		04	13.2		
	MW	eZ		03	59		
Jan 26	P	ePZ	05	31	55		
	MW	ipZ			56		
Jan 26	P	ipZ	05	46	09		
	MW	ipZ			10		
Jan 26	P	eZ	11	06	47		
	MW	eZ			28		
	R	eZ			32		
Jan 27	P	eZ	02	27	52		
	MW	eZ			50		
Jan 27	P	eZ	09	20	31		
		iZ		23	51		
	MW	iZ		20	29		
		iZ		23	51		
	R	eZ		20	28		
		iZ		23	53		
	T	eZ		20	27		
		iZ		23	47		



No. 6

## PASADENA and auxiliary stations

1938

Date	Sta- tion	Phase	G. C. T.			c d	Remarks
			h	m	s		
Jan 28	MW	ePZ	06	20	18		
Jan 30	P	iPZ	17	22	14		
	R	iPZ			13		
	T	iPZ			24		
Jan 31	P	eZ	03	59	30		Tucson: e = 04:00:55 (Courtesy USCGS).
		iZ			41		
		iZ	04	01	12		
	MW	eZ	03	59	27		
		iZ	04	01	07		
	R	eZ	03	59	41		
	T	iZ			06		
		iZ	04	00	47		
	H	eE	03	59	16		

C. F. Richter

Pasadena, California

We wish to acknowledge with thanks receipt of the following bulletins during August and September:

Adelaide	June, 1938
Brisbane	May-July, 1938, No. 9-11
Bucarest	July, August, 1938
Budapest	August, 1938
Cape Girardeau	February, March, 1938, No. 1-3
Capetown	March, April, 1938
Firenze (Ximeniano)	January-May, 1938, No. 1-6
Florissant	November, December, 1937, No. 36-38
Florissant	January-March, 1938, No. 1-26
Fort-de-France	April-June, 1938
Goettingen	October-December, 1937
Graz	January-March, 1938, No. 1
Helwan	June, 1938
Hong Kong	June; July, 1938
Kew	July, August, 1938
Kobe	October-December, 1936, Vol. XII, No. 4
Kobe	January-March, 1937, Vol. XIII, No. 1
Ksara	July, 1938
Lemberg	October-December, 1937, No. 3
Little Rock	November, December, 1937, No. 15-19
Little Rock	January-March, 1938, No. 1-4
Manila	June, 1938; No. 21-24
Melbourne	April-June, 1938
Mexico	Years 1931-1932
New Zealand	June-August, 1938
Ottawa	June, 1938; No. 30-34
Parc St. Maur	June, July, 1938
Perth	September, October, 1937
Perth	March; June, 1938
Phu-Lien'	March, 1938
Phu-Lien, Preliminary	June, 1938
Port-au-Prince	Years 1934-1937
Riverview	June, July, 1938, No. 14-22
Saint Louis	November, December, 1937, No. 26-29
Saint Louis	January, February, 1938, No. 1-3
San Fernando	July, August, 1938, No. 4
State College	January-June, 1938
Strasbourg	
Union Geodesique	May-July, 1938, No. 83-127
Bureau Central	June; July, 1938, No. 38-54
1*Institut	June, July, 1938
Stuttgart	July, August, 1938, No. 10-11
Sydney	May, 1938
Uccle	January-March, 1938
Weston	September-December, 1937
Weston	January-June, 1938
Wien	January-December, 1937, No. 1-8
Zagreb	June-December, 1936, No. 17-22

## PASADENA, preliminary report.

September-October, 1938, No. 5

Times refer to P or P\* unless otherwise noted.

Readings are at Pasadena unless marked MW - Mount Wilson or R - Riverside

Corrections to the preceding report, No. 4.

- Sept. 17 03:46:31. This time is probably not that of P; it may be that of a late surface wave.
- Sept. 17 17:22:18. Not an aftershock of Sept. 12, 06<sup>h</sup>. Felt in Arizona and New Mexico, region of 33°N., 109°W., according to USCGS. 19:39:39 (R). Aftershock of the preceding. Pasadena reading at 19:42:40 is a surface wave. 21:17:33 (R). Aftershock? Pasadena 21:19:25 a surface wave?

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- Sept. 18 01:40:17\*, 16:21:07 (Arizona-New Mexico?), 17:29:34\*
- Sept. 19 00:41:45\* (i = 42:44), 00:53:00, 08:40:07 (MW), 12:12:02\*
- Sept. 20 03:13:06\*, 05:41:05 (Felt in Arizona and New Mexico, USCGS), 08:45:02\*, 13:16:49, 13:47:15\* (L = 14:17.0), 22:17:34\*
- Sept. 21 04:20:19 (MW), 07:59:44\*, 11:48:07\* (i = 49:38), 17:13:24, 19:03:58\* (i = 04:13, iS = 13:49, i = 14:16, eL = 24.3).
- Sept. 22 12:10:28, 14:19:55 (compression).
- Sept. 23 10:30:30, 11:23:40.
- Sept. 25 01:19:01, 16:43:12, 19:50:03, 20:26:27 (MW).
- Sept. 26 15:58:44.
- Sept. 27 02:51:09, 07:23:51 (MW), 10:29:03 (compression. i = 41:44, eL = 54.4), 12:24:39 (S = 25:29. Felt in Monterey County; epicenter probably not far from 36.5°N., 121°W.)
- Sept. 28 18:26:16 (i = 36:55, eL = 52.8).
- Sept. 29 09:01:44, 09:22:32 (e = 23:09), 11:04:36, 23:33:52, (Arizona-New Mexico) 23:36:59 (one or both of these shocks felt in Arizona and New Mexico, region of 33°N., 109°W., USCGS).
- Sept. 30 22:40:06.
- Oct. 1 20:07:53, 22:50:35. Oct. 2 08:21:00.
- Oct. 3 21:10:27.
- Oct. 4 09:38:33 (compression. eL = 10:08.0).
- Oct. 5 00:05:48.

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\*Shocks marked with an asterisk included in previous preliminary report, No. 4.

October 10, 1938.

PASADENA, preliminary report.

August-September, 1938, No. 4

Times refer to P or P' unless otherwise noted.  
Readings are at Pasadena unless marked MW - Mount Wilson or R - Riverside

USCGS gives: Aug. 25, 3°S., 103°E., 0 = 01:27.7

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- Aug. 29 15:36:55 (MW), (PP = 40:37, Philippines. USCGS gives 12°N., 124°E.,  
0 = 15:22.2), 19:57:14 (R).
- Aug. 30 12:03:15 (PP = 07:18, SKS? = 13:10, ST = 16:10, L = 32.7, Δ = 102°),  
14:11:58 (e = 12:56).
- Aug. 31 03:18:21 (33.8°N., 118.2°W. Felt at Long Beach, Los Angeles, etc.),  
16:58:53 (i = 59:14), 17:57:49 (dilatation from SW., deep; i = 59:08,  
i = 01:34, iS? = 07:52).
- Sept. 1 22:55:07 (dilatation from SE; iPCP = 57:43, eS = 00:28, iScP = 01:39,  
eL = 03.4, eScS = 05:38; Δ = 33°. USCGS gives: 13.1°N., 89.4°W., 0 = 22:48.5.
- Sept. 2 01:23:49, 11:14:21.
- Sept. 3 00:00:01 (MW), 16:11:01 (MW).
- Sept. 4 20:34:11 (i = 34:24), 21:23:06.
- Sept. 5 00:38:48, 14:55:41 (ePP = 59:23, eS? = 05:50, eL = 25.8), 21:37:54.
- Sept. 6 08:52:53, 20:56:54 (i = 57:07).
- Sept. 7 02:13:05 (MW), 04:17:00 (i = 27:34, e = 28:54, i = 30:11, iL = 44.6),  
05:50:30 (i = 51:01) (MW), 13:11:10 (dilatation from west; ipP = 11:49,  
iS = 21:56, i = 23:03, eL = 35.0; Δ = 90°, h = 150 km.)
- Sept. 8 15:28:47
- Sept. 9 03:07:44, 05:53:11, 17:36:40, 18:37:34 (i = 37:44), 20:09:58 (MW).
- Sept. 10 22:59:09
- Sept. 11 17:31:51
- Sept. 12 05:32:01 (R), 06:12:38 (iS = 14:08. Slight damage in Humboldt County,  
California; region of 40°N., 124°-125°W.)
- Sept. 13 01:18:46
- Sept. 14 08:27:34, 21:39:39?, 22:14:56, 23:12:51 (MW).
- Sept. 16 05:45:21
- Sept. 17 03:46:31 (Felt in Oklahoma, Arkansas and Tennessee), 14:23:32,  
(S = 23:55) 35.8°N., 117.8°W. Felt in Owens Valley), 17:22:18,  
(Aftershock of Sept. 12, 06h), 19:42:40, 21:19:25.
- Sept. 18 01:40:17, 17:29:34.
- Sept. 19 00:41:45 (i = 42:44), 12:12:02.
- Sept. 20 03:13:06, 08:45:02, 13:47:15 (L = 14:17.0), 22:17:34.
- Sept. 21 07:59:44, 11:48:07 (i = 49:38), 19:03:58 (i = 04:13, iS = 13:49,  
i = 14:16, eL = 24.3).
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Final report for December, 1937 is enclosed herewith. Your file should now be complete to the end of March, 1938. Bulletins for April and following months are in preparation.

September 23, 1938.

No. 7

PASADENA and auxiliary stations

1938

Date	Sta- tion	Phase	G. C. T.			c d	Remarks
			h	m	s		
Feb 1	T	iPZ	15	51	12		
Feb 1	P	iP'Z	19	10	07		Deep? East Indies? Tucson (Courtesy USCGS): e = 19:10:02, i = 19:10:20, i! = 19:12:51.
	R	iP'Z			08		
	T	iP'Z			05		
		eZ		11	54		
	H	iP'Z		10	07		
Feb 1	PX	ePZ	19	18	50		Normal. $\Delta = 109^\circ$ . O = 19:04:25. USCGS: 5°S., 131°E. O = 19:04.4. J.S.A: 5.5°S., 131°E. O = 19:04.4. Strasbourg: 5°S., 131.7°E. O = 19:04:29. G waves very large; return waves up to G <sub>8</sub> recorded at Pasadena as indicated. Phases not sharp, and confused by superposed short periods which may be due to small aftershocks. Microseisms heavy at Pasadena.
		eZ		21	58		
		iPPE		22	51		
		iPPEZ		23	27		
		iSKSE		29	29		
		ePSNE		32.6			
		iN		34.6			
		eSSN		38.6			
		iSSSN		42.3			
		iGN		48.6			
		iG <sub>2</sub> N	20	48.9			
		iG <sub>3</sub> N	22	18.7			
		iG <sub>4</sub> N	23	19.7			
Feb 2		eG <sub>5</sub> N	00	51			
		eG <sub>6</sub> N	01	51			
		eG <sub>7</sub> N	03	22			
		eG <sub>8</sub> N	04	22			
Feb 1	MW	ePPE	19	22	23		
		eSKSE		29	24		
	R	ePNZ		18	53		
		ePPN		23	14		
		eSKSNE		29	29		
	LJ	ePN		18	26		
		eN		22	02		
		iPPE		23	33		
		iSKSE		29	35		
	T	iPEZ		18	44		
		iPPNZ		22	58		
		eSKSE		29	29		
	H	ePEZ		18	48		
		iPPNE		23	26		
		iSKSE		29	33		
Feb 1	R	iPEZ	20	08	50		Aftershock.
	T	iPZ		04	12		
		iPPZ		08	20		
Feb 2	P	iPEZ	00	02	27		Deep?
	MW	iPZ			27		
	R	iPZ			28		
	T	iPZ			32		
		iZ		03	31		
Feb 2	P	ePZ	04	41	10		Deep?
	MW	iPZ			10		
		iZ			41		
	R	iPZ			12		
	T	iPZ		40	58		
		iZ		41	29		
Feb 2	P	eZ	09	56	10		May be two separate shocks.
		iZ		59	27		
	R	iZ		56	10		
		iZ		59	28		
	T	eZ		56	05		
		iZ		59	20		

1938

PARAMETER AND AUXILIARY STATIONS

1938

Station	Year	Month	Day	Time	Phase	Amplitude	Period	Remarks
Hannuyska	1938	Feb	1	19:10:02	P	10	0.7	
				19:10:02	S	10	0.7	
				19:10:02	T	10	0.7	
				19:10:02	H	10	0.7	
				19:10:02	L	10	0.7	
				19:10:02	Q	10	0.7	
				19:10:02	R	10	0.7	
				19:10:02	S	10	0.7	
				19:10:02	T	10	0.7	
				19:10:02	H	10	0.7	
				19:10:02	L	10	0.7	
				19:10:02	Q	10	0.7	
Hannuyska	1938	Feb	2	19:10:02	P	10	0.7	
				19:10:02	S	10	0.7	
				19:10:02	T	10	0.7	
				19:10:02	H	10	0.7	
				19:10:02	L	10	0.7	
				19:10:02	Q	10	0.7	
				19:10:02	R	10	0.7	
				19:10:02	S	10	0.7	
				19:10:02	T	10	0.7	
				19:10:02	H	10	0.7	
				19:10:02	L	10	0.7	
				19:10:02	Q	10	0.7	
Hannuyska	1938	Feb	3	19:10:02	P	10	0.7	
				19:10:02	S	10	0.7	
				19:10:02	T	10	0.7	
				19:10:02	H	10	0.7	
				19:10:02	L	10	0.7	
				19:10:02	Q	10	0.7	
				19:10:02	R	10	0.7	
				19:10:02	S	10	0.7	
				19:10:02	T	10	0.7	
				19:10:02	H	10	0.7	
				19:10:02	L	10	0.7	
				19:10:02	Q	10	0.7	
Hannuyska	1938	Feb	4	19:10:02	P	10	0.7	
				19:10:02	S	10	0.7	
				19:10:02	T	10	0.7	
				19:10:02	H	10	0.7	
				19:10:02	L	10	0.7	
				19:10:02	Q	10	0.7	
				19:10:02	R	10	0.7	
				19:10:02	S	10	0.7	
				19:10:02	T	10	0.7	
				19:10:02	H	10	0.7	
				19:10:02	L	10	0.7	
				19:10:02	Q	10	0.7	
Hannuyska	1938	Feb	5	19:10:02	P	10	0.7	
				19:10:02	S	10	0.7	
				19:10:02	T	10	0.7	
				19:10:02	H	10	0.7	
				19:10:02	L	10	0.7	
				19:10:02	Q	10	0.7	
				19:10:02	R	10	0.7	
				19:10:02	S	10	0.7	
				19:10:02	T	10	0.7	
				19:10:02	H	10	0.7	
				19:10:02	L	10	0.7	
				19:10:02	Q	10	0.7	
Hannuyska	1938	Feb	6	19:10:02	P	10	0.7	
				19:10:02	S	10	0.7	
				19:10:02	T	10	0.7	
				19:10:02	H	10	0.7	
				19:10:02	L	10	0.7	
				19:10:02	Q	10	0.7	
				19:10:02	R	10	0.7	
				19:10:02	S	10	0.7	
				19:10:02	T	10	0.7	
				19:10:02	H	10	0.7	
				19:10:02	L	10	0.7	
				19:10:02	Q	10	0.7	

The following table gives the results of the observations made at the station of Hannuyska during the period from 1938 to 1939. The observations were made during the hours of darkness, and the results are given in the form of a table. The table is divided into two parts, the first part giving the results of the observations made during the hours of darkness, and the second part giving the results of the observations made during the hours of daylight. The results are given in the form of a table, the columns of which are headed as follows: Station, Year, Month, Day, Time, Phase, Amplitude, Period, Remarks.

Date	Sta- tion	Phase	G. C. T.			c d	Remarks
			h	m	s		
Feb 3	P	iPZ	16	01	37		Normal?
	PX	eLN		14.5			
	MW	iPZ		01	37		
	T	iPZ			22		
Feb 3	P	iPZ	20	19	00		
	MW	iPZ			01		
	R	ePZ			03		
	T	ePZ		18	45		
Feb 4	R	iZ	09	55	15		
	T	iZ			24		
		eZ		56	17		
Feb 4	P	ePZ	10	35	03		
	MW	iPZ			05		
	R	iPZ			00		
	T	eZ		34	39		
		iZ		35	25		
		iZ		37	14		
Feb 4	T	ePZ	19	30	10		
Feb 5	P	ePNEZ	02	32	10		Deep. Damage in Colombia. USCGS: 4.5°N., 75.9°W. 0 = 02:23.6, h = 80 km. J.S.A: 5.1°N., 75.7°W. 0 = 02:23:38, h = 130 km. Strasbourg: 5.0°N., 76.0°W. 0 = 02:23:37, h = 150 km. Pasadena readings interpreted assuming Δ = 49°, 0 = 02:23:40, h = 150 km.
		iPNEZ			18		
		ipPZ			48		
		ispNE		33	04		
		ippZ		34	13		
		ispPE		35	01		
		iE		36	08		
		iPcSNZ		37	16		
		PX	eSN		39.0		
			isSN		40	13	
			iScSNE		41	51	
			isScSE		43	00	
	P		epP'P'Z	03	04	03	
			MW	iPNEZ	02	32	
	ipPZ				54		
	isPEZ			33	08		
	ePPE			34	24		
	isPPNZ			35	00		
	eScSN			41	50		
	R	iPNEZ			32	06	
		isPEZ			33	02	
		ePPE			34	22	
		eScSNE			41	46	
	SB	esScSN		42	55		
		iPNZ		32	22		
		iNZ			28		
		ipPZ		33	17		
		isPZ			42		
		iZ		35	16		
		iZ		37	21		
		eScSNZ		41	53		
		LJ	iPNEZ		32	03	
isPZ				32	54		
iPcSEZ			37	10			
iScSNE			41	41			
T	iPNEZ		32	22			
	ipPE		33	18			
	iNEZ		39	35			
	eSE		39	35			
	esScSN		43	22			

Continued

Station	Time	Phase	h	m	s	Remarks
01	02 22	W	18	02	22	Normal
02	02 22	W	18	02	22	
03	02 22	W	18	02	22	
04	02 22	W	18	02	22	
05	02 22	W	18	02	22	
06	02 22	W	18	02	22	
07	02 22	W	18	02	22	
08	02 22	W	18	02	22	
09	02 22	W	18	02	22	
10	02 22	W	18	02	22	
11	02 22	W	18	02	22	
12	02 22	W	18	02	22	
13	02 22	W	18	02	22	
14	02 22	W	18	02	22	
15	02 22	W	18	02	22	
16	02 22	W	18	02	22	
17	02 22	W	18	02	22	
18	02 22	W	18	02	22	
19	02 22	W	18	02	22	
20	02 22	W	18	02	22	
21	02 22	W	18	02	22	
22	02 22	W	18	02	22	
23	02 22	W	18	02	22	
24	02 22	W	18	02	22	
25	02 22	W	18	02	22	
26	02 22	W	18	02	22	
27	02 22	W	18	02	22	
28	02 22	W	18	02	22	
29	02 22	W	18	02	22	
30	02 22	W	18	02	22	
31	02 22	W	18	02	22	
32	02 22	W	18	02	22	
33	02 22	W	18	02	22	
34	02 22	W	18	02	22	
35	02 22	W	18	02	22	
36	02 22	W	18	02	22	
37	02 22	W	18	02	22	
38	02 22	W	18	02	22	
39	02 22	W	18	02	22	
40	02 22	W	18	02	22	
41	02 22	W	18	02	22	
42	02 22	W	18	02	22	
43	02 22	W	18	02	22	
44	02 22	W	18	02	22	
45	02 22	W	18	02	22	
46	02 22	W	18	02	22	
47	02 22	W	18	02	22	
48	02 22	W	18	02	22	
49	02 22	W	18	02	22	
50	02 22	W	18	02	22	



No. 9

PASADENA and auxiliary stations

1938

Date	Station	Phase	G. C. T.			c	Remarks	
			h	m	s			
Feb 5	H	ePEZ	02	32	17	Continued		
		esPPNE		34	54			
		ePcSEZ		37	21			
Feb 5	P	iZ	04	21	30			
		iZ			36			
	MW	iZ		27				
		iZ		32				
	R	eZ		28				
		iZ		34				
T	eZ		36					
Feb 5	P MW R	eZ	10	13	20	Philippines?		
		iZ			53			
		iZ			21			
Feb 5	MW R T	iPZ	12	38	43			
		ePZ			48			
		ePZ			12			
		iPZ			16			
Feb 5	P MW	iPNEZ	20	32	06	Deep?		
		iPZ			06			
	R	eZ		33	39			
		iPZ		32	06			
	T	iPZ		15				
		H	iPEZ		14			
Feb 6	P PX MW R T	ePZ	07	20	53	Normal? Surface waves small. Tucson (Courtesy USCGS): eZ = 07:25:25.		
		eLE			50			
		iPZ			20			52
		iPZ						55
		iPZ						52
Feb 6	P MW R T	iPZ	07	59	22			
		iPZ			21			
		iPZ			25			
		iPZ			15			
Feb 6	P MW R T H	ePZ	12	17	41			
		iPZ			42			
		iPZ			45			
		iPNEZ			27			
		ePZ			33			
Feb 6	P	iPNZ	19	16	50	Deep?		
		eZ			17			53
	MW	iPZ		16	52			
		iZ		17	56			
	R	iPZ		16	47			
		eZ		17	34			
	T	iPZ		17	03			
		H	ePZ		16			59
Feb 7	P MW R T	ePNZ	01	32	08			
		iNZ			18			
		iPZ			10			
		iPZ			12			
Feb 7	P	ePZ	14	54	54	Deep. Felt at and near Tokyo. $\Delta = 80^\circ$ , $h = 100$ km. Pasadena S? may be SKS or ScS. Tucson (Courtesy USCGS): iP = 14:55:30 i = 14:55:56		
		iNZ			55			28
		eZ			58			21
		iSN?			15			04
	MW	iPZ	14	54	55			
		iZ		55	18			
		iZ			24			
		iZ	58	07	22			

Continued

Date	Station	Phase	O. C. T.	Remarks
Feb 5	R	9282	02 52 17	Continued
Feb 5	R	9277	04 54 54	
Feb 5	R	9282	07 57 51	
Feb 5	R	9277	10 50 50	
Feb 5	HW	9277	11 50 50	
Feb 5	R	9277	12 52 52	
Feb 5	R	9277	13 52 52	
Feb 5	R	9277	14 52 52	
Feb 5	R	9277	15 52 52	
Feb 5	R	9277	16 52 52	
Feb 5	R	9277	17 52 52	
Feb 5	R	9277	18 52 52	
Feb 5	R	9277	19 52 52	
Feb 5	R	9277	20 52 52	
Feb 5	R	9277	21 52 52	
Feb 5	R	9277	22 52 52	
Feb 5	R	9277	23 52 52	
Feb 5	R	9277	24 52 52	
Feb 5	R	9277	25 52 52	
Feb 5	R	9277	26 52 52	
Feb 5	R	9277	27 52 52	
Feb 5	R	9277	28 52 52	
Feb 5	R	9277	29 52 52	
Feb 5	R	9277	30 52 52	
Feb 5	R	9277	31 52 52	
Feb 5	R	9277	32 52 52	
Feb 5	R	9277	33 52 52	
Feb 5	R	9277	34 52 52	
Feb 5	R	9277	35 52 52	
Feb 5	R	9277	36 52 52	
Feb 5	R	9277	37 52 52	
Feb 5	R	9277	38 52 52	
Feb 5	R	9277	39 52 52	
Feb 5	R	9277	40 52 52	
Feb 5	R	9277	41 52 52	
Feb 5	R	9277	42 52 52	
Feb 5	R	9277	43 52 52	
Feb 5	R	9277	44 52 52	
Feb 5	R	9277	45 52 52	
Feb 5	R	9277	46 52 52	
Feb 5	R	9277	47 52 52	
Feb 5	R	9277	48 52 52	
Feb 5	R	9277	49 52 52	
Feb 5	R	9277	50 52 52	
Feb 5	R	9277	51 52 52	
Feb 5	R	9277	52 52 52	
Feb 5	R	9277	53 52 52	
Feb 5	R	9277	54 52 52	
Feb 5	R	9277	55 52 52	
Feb 5	R	9277	56 52 52	
Feb 5	R	9277	57 52 52	
Feb 5	R	9277	58 52 52	
Feb 5	R	9277	59 52 52	
Feb 5	R	9277	60 52 52	
Feb 5	R	9277	61 52 52	
Feb 5	R	9277	62 52 52	
Feb 5	R	9277	63 52 52	
Feb 5	R	9277	64 52 52	
Feb 5	R	9277	65 52 52	
Feb 5	R	9277	66 52 52	
Feb 5	R	9277	67 52 52	
Feb 5	R	9277	68 52 52	
Feb 5	R	9277	69 52 52	
Feb 5	R	9277	70 52 52	
Feb 5	R	9277	71 52 52	
Feb 5	R	9277	72 52 52	
Feb 5	R	9277	73 52 52	
Feb 5	R	9277	74 52 52	
Feb 5	R	9277	75 52 52	
Feb 5	R	9277	76 52 52	
Feb 5	R	9277	77 52 52	
Feb 5	R	9277	78 52 52	
Feb 5	R	9277	79 52 52	
Feb 5	R	9277	80 52 52	
Feb 5	R	9277	81 52 52	
Feb 5	R	9277	82 52 52	
Feb 5	R	9277	83 52 52	
Feb 5	R	9277	84 52 52	
Feb 5	R	9277	85 52 52	
Feb 5	R	9277	86 52 52	
Feb 5	R	9277	87 52 52	
Feb 5	R	9277	88 52 52	
Feb 5	R	9277	89 52 52	
Feb 5	R	9277	90 52 52	
Feb 5	R	9277	91 52 52	
Feb 5	R	9277	92 52 52	
Feb 5	R	9277	93 52 52	
Feb 5	R	9277	94 52 52	
Feb 5	R	9277	95 52 52	
Feb 5	R	9277	96 52 52	
Feb 5	R	9277	97 52 52	
Feb 5	R	9277	98 52 52	
Feb 5	R	9277	99 52 52	
Feb 5	R	9277	100 52 52	

Deep. Well at and near Tokyo.  
 $\Delta = 80^\circ, h = 100 \text{ km. Pasadena 2?}$   
 may be OKS on 202, 14:55:50  
 Pasaden (Courtesy USCGL) 15 - 14:55:50  
 I - 14:55:50

Continued



Date	Station	Phase	O. C. T. H. M. S.	Remarks
Feb 7	H	SP2	14 55 00	Continued
	H	SP2	14 55 00	
	T	SP2	14 55 00	
	H	SP2	14 55 00	
Feb 7	P	SP2	15 34 33	Aftershock Tucson (Courtesy USGS): I = 15:25:10, I = 15:25:25.
	MW	SP2	15 34 33	
	H	SP2	15 34 33	
	T	SP2	15 34 33	
Feb 8	P	SP2	05 47 12	Felt in the coastal area of Ecuador.
	MW	SP2	05 47 12	
	H	SP2	05 47 12	
	T	SP2	05 47 12	
Feb 8	P	SP2	02 38 04	Moderate felt in Ecuador. Δ = 30°. Slightly waves small. Readings at 31° may be P of another shock.
	MW	SP2	02 38 04	
	H	SP2	02 38 04	
	T	SP2	02 38 04	
Feb 8	P	SP2	07 39 54	Mild. Moderate shock, felt at Twenty-nine Palms and Palm Springs. Tucson (Courtesy USGS): IIX = 07:40:25, IS = 40:44, IS = 40:25, SS = 42.0. Approximately 24.0°N, 116.1°W. O = 07:39.4
	MW	SP2	07 39 54	
	H	SP2	07 39 54	
	T	SP2	07 39 54	
Feb 8	P	SP2	11 40 11	
	MW	SP2	11 40 11	
	H	SP2	11 40 11	
	T	SP2	11 40 11	
Feb 8	P	SP2	13 41 14	
	MW	SP2	13 41 14	
	H	SP2	13 41 14	
	T	SP2	13 41 14	
Feb 8	P	SP2	18 40 13	
	MW	SP2	18 40 13	
	H	SP2	18 40 13	
	T	SP2	18 40 13	
Feb 8	P	SP2	19 38 53	
	MW	SP2	19 38 53	
	H	SP2	19 38 53	
	T	SP2	19 38 53	
Feb 8	P	SP2	20 05 05	
	MW	SP2	20 05 05	
	H	SP2	20 05 05	
	T	SP2	20 05 05	
Feb 8	P	SP2	21 34 51	Tucson (Courtesy USGS): SP = 15:25:25.
	MW	SP2	21 34 51	
	H	SP2	21 34 51	
	T	SP2	21 34 51	
Feb 8	P	SP2	23 43 43	Tucson (Courtesy USGS): SP = 15:25:10. Extremely small except at Pasadena. Station of Tucson (Courtesy USGS): Δ (tinned) about 101°. O about 13:12.8.
	MW	SP2	23 43 43	
	H	SP2	23 43 43	
	T	SP2	23 43 43	
Feb 8	P	SP2	24 30 22	Mild. Slightly waves small. Ecuador origin near that of 24 and 25.
	MW	SP2	24 30 22	
	H	SP2	24 30 22	
	T	SP2	24 30 22	
Feb 8	P	SP2	25 10 32	Continued
	MW	SP2	25 10 32	
	H	SP2	25 10 32	
	T	SP2	25 10 32	

No. 11

## PASADENA and auxiliary stations

1938

Date	Sta- tion	Phase	G. C. T.			c d	Remarks
			h	m	s		
Feb 8	T	iPZ iPPZ	14	30	37 32 28		Continued
Feb 8	P MW R T	eZ eZ eZ eZ	16	09	43 39 33 54		
Feb 8	P LJ	ePZ iSNE ePNZ? eSNE	19	23.0	24 17 22.4 23 19		Normal. At our stations P is obscured by small foreshocks. Tucson (Courtesy USCGS): iP? = 22:36, iS = 23:29.
Feb 8	P MW T	iPZ ePZ iPZ eZ	22	14	27 29 25 57		Deep? Tucson (Courtesy USCGS): iZ = 22:15:29.
Feb 8	P MW R T	iPZ iPZ iPZ iPZ	22	27	04 05 01 16		Tucson (Courtesy USCGS): iPZ = 22:26:24.
Feb 9	P R T	iZ iZ iZ iZ iZ	07	41	41 45 42 17 41 49 42 20 50		Deep? Tucson (Courtesy USCGS): iZ = 42:09, iZ = 42:40
Feb 9	P R T	iPZ iPZ iPZ	12	35	43 37 58	c	
Feb 11	MW R	eZ eZ	02	04	46 38		
Feb 11	P MW R T H	iPEZ iZ iPZ iPZ iZ ePE	07	07	43 57 43 47 34 46 38		Deep?
Feb 11	MW R	iZ iZ	08	58	24 27		
Feb 12	P MW R T H	ePNEZ eSNE? iPZ iPZ iSN ePZ	20	01	15 02 31 01 16 24 44 07		Normal. Felt in San Francisco Bay district.
Feb 12	P MW R T	iPZ iPZ iPZ iPZ	21	19	33 34 36 44		Deep? Tucson (Courtesy USCGS): iP = 21:19:53, e = 21:21:12.
Feb 13	P PX	ePNEZ ePPZ eSKSNE iSNE ePSNE eSSNE eLE	08	16	55 20 32 27 25 57 29 02 34.4 40.5		Normal. $\Delta = 91^\circ$ . O = 08:03:50. USCGS: $38^\circ\text{S}$ ., $179^\circ\text{W}$ .. O = 08:03.7 Wellington: $36^\circ\text{S}$ ., $179.5^\circ\text{E}$ .

Continued

No. 12

## PASADENA and auxiliary stations

1938

Date	Station	Phase	G. C. T.			c	Remarks	
			'h	m	s			
Feb 13	MW	ePZ	08	16	54		Continued	
		iPPZ		20	35			
	R	iPZ		16	56			
		ePPZ		20	28			
	SB	ePZ		16	44			
	T	ePZ		17	03			
		ePPZ		20	55			
Feb 14	P	ePZ	03	08	30		Normal? Possibly somewhat deeper. Strasbourg: 40.8°N., 53.5°E. O = 02:54.3. Pasadena $\Delta$ = 106°. Tucson (Courtesy USCGS): iP = 03:08:28, ePKKP = 03:23:56.	
		eZ		11	27			
		iPPZ		12	45			
		iPKKPZ		23	58			
		iZ		24	10			
					28			
		MW	iPZ		08			23
			iZ					37
			iZ		11			19
			iPPZ		12			46
		iPKKPZ		23	59			
		iZ		24	12			
					29			
	R	ePZ		08	25			
		iZ		24	11			
				28				
T	ePZ		08	12				
		iZ		11	28			
		ePPZ		12	23			
		iPKKPZ		24	41			
Feb 15	P	iPZ	03	40	01		Normal. Near the Capo Verde Islands. USCGS: 18°N., 25°W. O = 03:27.7. J.S.A: 19.3°N., 26.0°W. O = 03:27:45. Strasbourg: 18.2°N., 26.7°W. O = 03:27.7. Accordingly, Pasadena $\Delta$ = 82°.	
	PX	eLNE	04	06.3				
	MW	iPZ	03	40	01			
	R	iPNEZ		39	58			
	SB	ePZ		40	08			
	LJ	ePZ			02			
	H	ePE			04			
Feb 15	P	ePZ	07	09	29		Aftershock of the preceding.	
	MW	iPZ			29			
Feb 15	P	iPZ	07	46	07		Normal. Same origin as Feb 8, 07 <sup>h</sup> but larger. Reported felt at the same points. Tucson (Courtesy USCGS): iPZ = 07:46:49, iZ = 07:56:55, iZ = 07:47:03. Approximately 34.0°N., 116.1°W. O = 07:45.6. Small aftershock 10 <sup>m</sup> 37 <sup>s</sup> later.	
		iSNE			30			
	MW	iPZ			05			
		iSE			28			
	R	iPNEZ		45	57			
		iSNE		46	10			
	SB	ePZ			25			
		eSNEZ		47	13			
	LJ	iPNZ		46	07			
		iSNEZ			27			
	T	ePN			32			
		iSN		47	28			
H	ePZ		46	15				
	iZ			23				
	iSNE			55				
Feb 16	P	iZ	07	24	14		Tucson (Courtesy USCGS): eZ = 07:24:41, iZ = 07:26:55.	
	MW	iZ			15			
	R	iZ			16			
Feb 17	P	iSKPZ?	05	41	51		$\Delta$ = 110°? East Indies? Tucson (Courtesy USCGS): iZ = 05:38:50, iPPZ? = 05:40:00, iSKPZ? = 05:42:06.	
	MW	iPPZ?		39	15			
		iSKPZ?		41	53			
	R	ePPZ?		39	21			

1988

PARALM and auxiliary stations

No. 12

Time	Station	Phase	Time	Station	Phase	Time	Station	Phase
00:58:44	PARALM	P	00:58:44	PARALM	P	00:58:44	PARALM	P
00:58:45	PARALM	S	00:58:45	PARALM	S	00:58:45	PARALM	S
00:58:46	PARALM	T	00:58:46	PARALM	T	00:58:46	PARALM	T
00:58:47	PARALM	L	00:58:47	PARALM	L	00:58:47	PARALM	L
00:58:48	PARALM	W	00:58:48	PARALM	W	00:58:48	PARALM	W
00:58:49	PARALM	W	00:58:49	PARALM	W	00:58:49	PARALM	W
00:58:50	PARALM	W	00:58:50	PARALM	W	00:58:50	PARALM	W
00:58:51	PARALM	W	00:58:51	PARALM	W	00:58:51	PARALM	W
00:58:52	PARALM	W	00:58:52	PARALM	W	00:58:52	PARALM	W
00:58:53	PARALM	W	00:58:53	PARALM	W	00:58:53	PARALM	W
00:58:54	PARALM	W	00:58:54	PARALM	W	00:58:54	PARALM	W
00:58:55	PARALM	W	00:58:55	PARALM	W	00:58:55	PARALM	W
00:58:56	PARALM	W	00:58:56	PARALM	W	00:58:56	PARALM	W
00:58:57	PARALM	W	00:58:57	PARALM	W	00:58:57	PARALM	W
00:58:58	PARALM	W	00:58:58	PARALM	W	00:58:58	PARALM	W
00:58:59	PARALM	W	00:58:59	PARALM	W	00:58:59	PARALM	W
00:59:00	PARALM	W	00:59:00	PARALM	W	00:59:00	PARALM	W
00:59:01	PARALM	W	00:59:01	PARALM	W	00:59:01	PARALM	W
00:59:02	PARALM	W	00:59:02	PARALM	W	00:59:02	PARALM	W
00:59:03	PARALM	W	00:59:03	PARALM	W	00:59:03	PARALM	W
00:59:04	PARALM	W	00:59:04	PARALM	W	00:59:04	PARALM	W
00:59:05	PARALM	W	00:59:05	PARALM	W	00:59:05	PARALM	W
00:59:06	PARALM	W	00:59:06	PARALM	W	00:59:06	PARALM	W
00:59:07	PARALM	W	00:59:07	PARALM	W	00:59:07	PARALM	W
00:59:08	PARALM	W	00:59:08	PARALM	W	00:59:08	PARALM	W
00:59:09	PARALM	W	00:59:09	PARALM	W	00:59:09	PARALM	W
00:59:10	PARALM	W	00:59:10	PARALM	W	00:59:10	PARALM	W
00:59:11	PARALM	W	00:59:11	PARALM	W	00:59:11	PARALM	W
00:59:12	PARALM	W	00:59:12	PARALM	W	00:59:12	PARALM	W
00:59:13	PARALM	W	00:59:13	PARALM	W	00:59:13	PARALM	W
00:59:14	PARALM	W	00:59:14	PARALM	W	00:59:14	PARALM	W
00:59:15	PARALM	W	00:59:15	PARALM	W	00:59:15	PARALM	W
00:59:16	PARALM	W	00:59:16	PARALM	W	00:59:16	PARALM	W
00:59:17	PARALM	W	00:59:17	PARALM	W	00:59:17	PARALM	W
00:59:18	PARALM	W	00:59:18	PARALM	W	00:59:18	PARALM	W
00:59:19	PARALM	W	00:59:19	PARALM	W	00:59:19	PARALM	W
00:59:20	PARALM	W	00:59:20	PARALM	W	00:59:20	PARALM	W

No. 13

## PASADENA and auxiliary stations

1938

Date	Sta- tion	Phase	G. C. T.			c d	Remarks
			h	m	s		
Feb 17	P	ePZ	12	43	57		
	R	ePZ			52		
Feb 18	P	ePZ	05	05	39		
		iZ			56		
	MW	iPZ			40		
		iZ			56		
	R	iPZ			41		
	T	iZ			58		
Feb 18	P	ePZ	07	12	08		
	MW	ePZ			08		
	R	ePZ			10		
	T	iPZ			04		
Feb 19	T	iPZ	07	38	25		
Feb 19	P	iPZ	11	07	04		
	R	iPZ			02		
	T	iPZ			16		
Feb 21	P	eZ	00	47	35		
	MW	eZ			26		
	T	eZ			57		
Feb 21	P	eZ	02	00	08		Normal.
	PX	eLN		05	55		
	MW	eZ		00	00		
	R	eZ	01	59	46		
	T	eZ	02	00	25		
Feb 21	P	iPZ	14	45	12		South America. Tucson (Courtesy USCGS): eP = 14:44:42. La Plata gives: P = 36.5, S = 38.9.
	MW	ePZ			12		
	R	iPZ			07		
	T	iPZ			27		
Feb 22	P	ePZ	05	24	33		Distant. P may be P' or PP.
		eZ		26	08		
	MW	ePZ		24	30		
		eZ		26	07		
	R	ePZ		24	30		
		eZ		25	52		
	T	ePZ		24	37		
		eZ		26	15		
Feb 22	P	ePZ	06	17	40		Normal.
	PX	eNE		28	22		
		eLNE		46.0			
	MW	iPZ		17	40		
	T	iPZ			42		
Feb 22	P	ePZ	17	45	58		
	MW	ePZ		46	02		
	R	ePZ		45	54		
	T	ePZ		46	26		
	H	eNE			22		
Feb 22	P	iPZ	19	42	55		
	MW	iPZ			52		
	R	iPZ			45		
	T	iPZ		43	08		
Feb 22	P	eZ	20	07	26		Tinemaha reading may refer to two shocks.
	MW	eZ			31		
	R	eZ			33		
	T	eZ		04	29		
		iZ		07	49		
Feb 23	P	iZ	23	45	59		
	R	eZ			56		



No. 14

PASADENA and auxiliary stations

1938

Date	Station	Phase	G. C. T.			c	Remarks
			h	m	s		
Feb 24	P	iEZ	03	26	31		Normal?
	PX	eLE		36.3			
	MW	ePZ		26	22		
		iZ			31		
	R	iPZ			25		
		iZ			33		
		iZ			12		
	H	eNE			17		
Feb 24	P	iZ	03	50	36		
	MW	ePZ			29		
		iZ			37		
	R	ePZ			32		
		iZ			41		
	T	iZ			22		
Feb 24	P	iPZ	08	10	00		
	MW	iPZ			01		
	R	ePZ		09	57		
Feb 24	P	ePZ	13	58	27		
	MW	ePZ			26		
	R	ePZ			31		
Feb 25	MW	iPZ	08	54	58		
	R	iPZ		55	04		
		iZ		57	35		
	T	iPZ		54	38		
Feb 26	P	INEZ	07	58	53		Deep! Conspicuous shock, not reported by most other stations. Distant. Tucson (Courtesy USCGS): eZ = 07:58:56, iZ = 07:59:07, iZ = 08:01:46, iZ! = 08:02:25.
		INEZ!	08	02	03		
		iN			22		
		iZ		03	14		
	MW	iZ	07	58	54		
		iZ	08	02	02		
	R	iZ	07	58	55		
		INEZ	08	02	03		
	LJ	INEZ			07		
		iZ	07	58	53		
	iZ	08	01	58			
Feb 26	P	ePZ	22	56	16		Tucson (Courtesy USCGS): eP = 22:56:33.
	MW	ePZ			17		
	T	ePZ			25		
Feb 27	P	iPZ	00	35	25		Deep? South America.
	MW	ePZ			25		
	R	iPZ			21		
	T	iPZ			36		
Feb 27	P	iPEZ	01	40	27	c	Normal. Strasbourg: 60°N., 145°E. Is this possibly nearer 45°N., 145°E?
	PX	eLE	02	01.5			
	MW	iPZ	01	40	27	c	
	R	iPZ			30	c	
	T	iPZ			16	c	

C. F. Richter

1958

MAXIMUM AND AUXILIARY STATIONS

No. 14

Date	Time	Phase	Station	Amplitude	Period	Remarks
Feb 24	03 52 51	132	...	...	...	...
Feb 24	03 56 37	132	...	...	...	...
Feb 24	03 56 38	132	...	...	...	...
Feb 24	03 56 39	132	...	...	...	...
Feb 24	03 56 40	132	...	...	...	...
Feb 24	03 56 41	132	...	...	...	...
Feb 24	03 56 42	132	...	...	...	...
Feb 24	03 56 43	132	...	...	...	...
Feb 24	03 56 44	132	...	...	...	...
Feb 24	03 56 45	132	...	...	...	...
Feb 24	03 56 46	132	...	...	...	...
Feb 24	03 56 47	132	...	...	...	...
Feb 24	03 56 48	132	...	...	...	...
Feb 24	03 56 49	132	...	...	...	...
Feb 24	03 56 50	132	...	...	...	...
Feb 24	03 56 51	132	...	...	...	...
Feb 24	03 56 52	132	...	...	...	...
Feb 24	03 56 53	132	...	...	...	...
Feb 24	03 56 54	132	...	...	...	...
Feb 24	03 56 55	132	...	...	...	...
Feb 24	03 56 56	132	...	...	...	...
Feb 24	03 56 57	132	...	...	...	...
Feb 24	03 56 58	132	...	...	...	...
Feb 24	03 56 59	132	...	...	...	...
Feb 24	03 57 00	132	...	...	...	...
Feb 24	03 57 01	132	...	...	...	...
Feb 24	03 57 02	132	...	...	...	...
Feb 24	03 57 03	132	...	...	...	...
Feb 24	03 57 04	132	...	...	...	...
Feb 24	03 57 05	132	...	...	...	...
Feb 24	03 57 06	132	...	...	...	...
Feb 24	03 57 07	132	...	...	...	...
Feb 24	03 57 08	132	...	...	...	...
Feb 24	03 57 09	132	...	...	...	...
Feb 24	03 57 10	132	...	...	...	...
Feb 24	03 57 11	132	...	...	...	...
Feb 24	03 57 12	132	...	...	...	...
Feb 24	03 57 13	132	...	...	...	...
Feb 24	03 57 14	132	...	...	...	...
Feb 24	03 57 15	132	...	...	...	...
Feb 24	03 57 16	132	...	...	...	...
Feb 24	03 57 17	132	...	...	...	...
Feb 24	03 57 18	132	...	...	...	...
Feb 24	03 57 19	132	...	...	...	...
Feb 24	03 57 20	132	...	...	...	...
Feb 24	03 57 21	132	...	...	...	...
Feb 24	03 57 22	132	...	...	...	...
Feb 24	03 57 23	132	...	...	...	...
Feb 24	03 57 24	132	...	...	...	...
Feb 24	03 57 25	132	...	...	...	...
Feb 24	03 57 26	132	...	...	...	...
Feb 24	03 57 27	132	...	...	...	...
Feb 24	03 57 28	132	...	...	...	...
Feb 24	03 57 29	132	...	...	...	...
Feb 24	03 57 30	132	...	...	...	...
Feb 24	03 57 31	132	...	...	...	...
Feb 24	03 57 32	132	...	...	...	...
Feb 24	03 57 33	132	...	...	...	...
Feb 24	03 57 34	132	...	...	...	...
Feb 24	03 57 35	132	...	...	...	...
Feb 24	03 57 36	132	...	...	...	...
Feb 24	03 57 37	132	...	...	...	...
Feb 24	03 57 38	132	...	...	...	...
Feb 24	03 57 39	132	...	...	...	...
Feb 24	03 57 40	132	...	...	...	...
Feb 24	03 57 41	132	...	...	...	...
Feb 24	03 57 42	132	...	...	...	...
Feb 24	03 57 43	132	...	...	...	...
Feb 24	03 57 44	132	...	...	...	...
Feb 24	03 57 45	132	...	...	...	...
Feb 24	03 57 46	132	...	...	...	...
Feb 24	03 57 47	132	...	...	...	...
Feb 24	03 57 48	132	...	...	...	...
Feb 24	03 57 49	132	...	...	...	...
Feb 24	03 57 50	132	...	...	...	...
Feb 24	03 57 51	132	...	...	...	...
Feb 24	03 57 52	132	...	...	...	...
Feb 24	03 57 53	132	...	...	...	...
Feb 24	03 57 54	132	...	...	...	...
Feb 24	03 57 55	132	...	...	...	...
Feb 24	03 57 56	132	...	...	...	...
Feb 24	03 57 57	132	...	...	...	...
Feb 24	03 57 58	132	...	...	...	...
Feb 24	03 57 59	132	...	...	...	...
Feb 24	03 58 00	132	...	...	...	...

C. F. Richter

Date	Station	Phase	G. C. T.			c	Remarks
			h	m	s		
Mar 1	MW	iP'Z	23	46	31		Tucson (Courtesy USCGS): iP'' = 23:46:22. South Atlantic, using Capetown, San Fernando and La Plata. Roughly 55°S.0°W.
	R	iP''Z			31	d	
	T	iP''Z			33		
Mar 2	R	iPZ	20	59	26		Deep? Tucson (Courtesy USCGS): iP = 20:59:48.
		iZ			42		
	T	iPZ			25		
Mar 4	P	iPNEZ	02	33	17		Deep? P large; may be P'.
	MW	iPNEZ			18	c	
	R	iPZ			20		
	T	iPNEZ			04		
Mar 4	P	iPNEZ	13	36	21		Normal?
	PX	eLNEZ		40	44		
	MW	ePNE		36	19		
	R	iPNEZ			12		
	SB	ePZ			26		
	T	iPNEZ			53		
Mar 6	PX	eLNE	00	31			Normal.
Mar 6	P	ePZ	02	09	26		Normal? Surface waves small. Probably south Pacific.
		eZ			48		
		iZ			59		
	PX	eLNE	03	01			
	MW	ePZ	02	09	28		
		iZ			52		
	R	ePZ			27		
	iZ			52			
Mar 6	P	iPNEZ	17	05	14	d	Deep. Tucson (Courtesy USCGS): iP = 17:05:39, eP'P' = 17:32:10, iSKPP' = 17:34:52. Hence Tucson Δ about 82°, depth not far from 400 km. Pasadena Δ about 78°. Tonga region.
		iZ		08	13		
	MW	iPNEZ		05	15	d	
		eZ		06	46		
	R	eZ		08	11		
		iPNEZ		05	17	d	
		iZ		07	03		
	SB	iPZ		05	11		
	LJ	iPNEZ			14		
T	iPNEZ			23	d		
Mar 8	P	iPZ	04	24	22		Tucson (Courtesy USCGS): iP = 04:23:41.
	MW	iPZ			23		
	R	iPZ			19		
Mar 8	P	ePZ	05	48	33		Normal. Surface waves recorded.
		iZ			54		
	PX	eZ		52	13		
		ePZ		48	27		
	MW	iZ			55		
		iZ		49	12		
		iPZ		48	29		
		iZ			47		
	eZ		50	45			
Mar 8	P	iPZ	08	07	11		
	MW	ePZ			09		
	R	iPZ			16		
	T	ePE		06	56		
Mar 9	PX	ePPZ	02	16	13		Normal.
		eLZ		41			
	MW	ePZ		16	05		
R	ePZ			06			
Mar 9	P	iPNEZ	05	24	59	d	Normal? Small surface waves recorded. USCGS: 6.1°N., 83.0°W. 0 = 05:16:54.
	MW	ePZ			58	c	
		iPZ!		25	00		

Continued

No. 16

PASADENA and auxiliary stations

1938

Date	Sta- tion	Phase	G. C. T.			c d	Remarks				
			h	m	s						
Mar 9	R	iPZ	05	24	54	Continued c d					
		iZ!								55	
	SB	ePNEZ							25	05	
	LJ	ePNEZ							24	46	
	T	iPEZ		25	12						
Mar 10	P	iPZ	21	20	19		Deep? Tucson (Courtesy USCGS): iP = 21:20:44, i = 21:22:44.				
		eZ								22	17
	R	iPZ							20	22	
		eZ							22	17	
Mar 11	P	iPZ	02	16	34		Deep?				
		iZ								49	
	R	iPZ								29	
		iZ								43	
		iZ								46	
	T	iPZ								39	
		iZ								50	
	iZ			53							
Mar 11	P	iPZ	14	52	59	c	Deep? Tucson (Courtesy USCGS): iP = 14:53:23. This is not the shock destructive in Greece at about the same time.				
	R	iPZ							53	01	
	T	iPZ								08	
Mar 14	MW	iP"Z	01	07	26		Normal? Region of northern India, using Hong Kong, Zi-Ka-Wei, and stations reporting to Strasbourg. Possibly somewhat deep. Our stations distant about 112°.				
	R	iP"Z								27	
		iZ								34	
Mar 14	P	ePZ	21	22	20		Normal. By courtesy of USCGS: Boulder City: e = 21:22:15, eS = 21:23:01. Tucson: eS? = 21:25:39. Nevada about 38°N., 118°W. O = 21:21:07.				
		iSEZ								23	22
	MW	ePZ								22	20
		iSZ								23	16
	R	ePZ								22	29
		eSZ								23	29
	T	iPEZ								21	32
		iSE									52
Mar 16	MW	iPZ	02	35	13	c	South America. Tucson (Courtesy USCGS): eP = 02:34:41.				
	R	iPZ								12	
Mar 16	P	iPZ	04	57	03	c	Deep? South America. Tucson (Courtesy USCGS): iP = 04:56:31.				
	MW	iPZ								03	
	R	iPZ								02	
	T	iPZ								21	
Mar 16	MW	iZ	20	28	05		Tucson (Courtesy USCGS): iP = 20:27:08.				
	R	iZ								30	
Mar 17	P	iZ	02	36	28		Normal.				
	MW	eZ								26	
	R	eZ								17	
Mar 17	R	eZ	16	26	06						
		iSZ?								28	21
Mar 17	P	iPZ	20	02	15		Tucson (Courtesy USCGS): iP = 20:02:56.				
	R	iPZ								18	
Mar 18	P	iPZ	02	19	26	c	Tucson (Courtesy USCGS): iP = 02:20:01. P may be P'.				
	MW	iPZ								27	
	R	iPZ								29	

1958 10

Date	Time	Phase	Amplitude	Remarks
Nov 9	17:00	P	0.8	
Nov 9	17:00	S	0.8	
Nov 9	17:00	L	0.8	
Nov 9	17:00	T	0.8	
Nov 10	17:00	P	0.8	
Nov 10	17:00	S	0.8	
Nov 10	17:00	L	0.8	
Nov 10	17:00	T	0.8	
Nov 11	17:00	P	0.8	
Nov 11	17:00	S	0.8	
Nov 11	17:00	L	0.8	
Nov 11	17:00	T	0.8	
Nov 12	17:00	P	0.8	
Nov 12	17:00	S	0.8	
Nov 12	17:00	L	0.8	
Nov 12	17:00	T	0.8	
Nov 13	17:00	P	0.8	
Nov 13	17:00	S	0.8	
Nov 13	17:00	L	0.8	
Nov 13	17:00	T	0.8	
Nov 14	17:00	P	0.8	
Nov 14	17:00	S	0.8	
Nov 14	17:00	L	0.8	
Nov 14	17:00	T	0.8	
Nov 15	17:00	P	0.8	
Nov 15	17:00	S	0.8	
Nov 15	17:00	L	0.8	
Nov 15	17:00	T	0.8	
Nov 16	17:00	P	0.8	
Nov 16	17:00	S	0.8	
Nov 16	17:00	L	0.8	
Nov 16	17:00	T	0.8	
Nov 17	17:00	P	0.8	
Nov 17	17:00	S	0.8	
Nov 17	17:00	L	0.8	
Nov 17	17:00	T	0.8	
Nov 18	17:00	P	0.8	
Nov 18	17:00	S	0.8	
Nov 18	17:00	L	0.8	
Nov 18	17:00	T	0.8	
Nov 19	17:00	P	0.8	
Nov 19	17:00	S	0.8	
Nov 19	17:00	L	0.8	
Nov 19	17:00	T	0.8	
Nov 20	17:00	P	0.8	
Nov 20	17:00	S	0.8	
Nov 20	17:00	L	0.8	
Nov 20	17:00	T	0.8	
Nov 21	17:00	P	0.8	
Nov 21	17:00	S	0.8	
Nov 21	17:00	L	0.8	
Nov 21	17:00	T	0.8	
Nov 22	17:00	P	0.8	
Nov 22	17:00	S	0.8	
Nov 22	17:00	L	0.8	
Nov 22	17:00	T	0.8	
Nov 23	17:00	P	0.8	
Nov 23	17:00	S	0.8	
Nov 23	17:00	L	0.8	
Nov 23	17:00	T	0.8	
Nov 24	17:00	P	0.8	
Nov 24	17:00	S	0.8	
Nov 24	17:00	L	0.8	
Nov 24	17:00	T	0.8	
Nov 25	17:00	P	0.8	
Nov 25	17:00	S	0.8	
Nov 25	17:00	L	0.8	
Nov 25	17:00	T	0.8	
Nov 26	17:00	P	0.8	
Nov 26	17:00	S	0.8	
Nov 26	17:00	L	0.8	
Nov 26	17:00	T	0.8	
Nov 27	17:00	P	0.8	
Nov 27	17:00	S	0.8	
Nov 27	17:00	L	0.8	
Nov 27	17:00	T	0.8	
Nov 28	17:00	P	0.8	
Nov 28	17:00	S	0.8	
Nov 28	17:00	L	0.8	
Nov 28	17:00	T	0.8	
Nov 29	17:00	P	0.8	
Nov 29	17:00	S	0.8	
Nov 29	17:00	L	0.8	
Nov 29	17:00	T	0.8	
Nov 30	17:00	P	0.8	
Nov 30	17:00	S	0.8	
Nov 30	17:00	L	0.8	
Nov 30	17:00	T	0.8	

No. 17

PASADENA and auxiliary stations

1938

Date	Sta- tion	Phase	G. C. T.			c d	Remarks
			h	m	s		
Mar 19	P	iPZ	09	27	01		
	MW	iPZ			00	d	
	R	iPZ			04		
Mar 20	MW	iZ	20	54	12		Deep?
Mar 21	PX	eLZ	01	53.0			Normal? Near Apia, which reports iP = 01:20:10, with large amplitudes.
	MW	ePZ		31	10		
	R	iPZ			09		
Mar 21	P	iPZ	08	25	20		Tucson (Courtesy USCGS): iP = 08:26:05. P may be P'.
	MW	iPZ			21		
	R	iPZ			24		
Mar 22	P	iPZ	15	24	45	c	Deep. Tucson (Courtesy USCGS): iP = 15:25:15, i = 15:26:44.
		iZ		26	12		
	R	iPZ		24	47		
		iZ		26	14		
Mar 22	P	iPNEZ	15	26	58		Normal. Felt in the Queen Charlotte Islands. $\Delta = 22^\circ$ . USCGS: 53.0°N., 131.8°W. O = 15:22.3 J.S.A: 52.2N., 133.1°W. O = 15:22:08.
	PX	iSNEZ		30	59		
		eLNE		32.3			
	MW	ePNEZ		26	58		
		eSNE		31	01		
	R	iPNEZ		27	01		
		eSN		31	06		
	SB	ePNZ		26	50		
		eSN		30	47		
	LJ	ePZ		27	14		
H	ePNE		26	43			
	eSN		30	32			
Mar 22	R	iZ	19	21	13		
Mar 22	P	iPNEZ	22	32	30	c	Normal? Queen Charlotte Islands. Aftershock 15 <sup>n</sup> . O = 22:27.7 (USCGS). Differs remarkably from the principal shock; surface waves much smaller, but P large and sharp. Times at all stations agree closely with those of the principal shock.
	PX	eSE		36	32		
		iSE			37		
	MW	iPNEZ		32	30	c	
		eSE		36	29		
	R	iPNEZ		32	34		
		eSE		36	40		
	SB	iPZ		32	20		
		eSNE		36	17		
	LJ	ePNEZ		32	48		
H	ePEZ			13			
Mar 22	P	iPZ	22	42	32		Small. Probably a further aftershock.
	MW	iPZ			32		
	R	iPZ			42		
Mar 23	P	ePZ	14	10	57		Normal.
		iPNEZ		11	02		
	PX	eLNE		19.0			
	MW	ePZ		10	55		
		iPZ		11	00		
	R	iPZ		10	54		
	H	ePNEZ		11	12		
Mar 24	P	ePNZ	17	00	52		
	MW	iPZ			52		
	R	iPZ			57		
Mar 25	P	ePZ	02	20	56		
	MW	iPZ			57		
	R	ePZ		21	01		
Mar 25	R	iPZ	08	29	24		J. S. A: 17.0°N., 85.5°W. O = 08:22:50.



No. 18

## PASADENA and auxiliary stations

1938

Date	Sta- tion	Phase	G. C. T.			c d	Remarks
			h	m	s		
Mar 25	P	ePZ	16	01	12		Normal. Region of Samoa. Apia gives: iP = 15:51:00, iS = 15:52:13.
	PX	eLZ		23			
	MW	iPZ		01	12		
	R	iPZ			11		
	T	ePZ			22		
Mar 26	P	iPZ	04	08	06	c	Deep? Tucson (Courtesy USCGS): iPZ = 04:08:30, iZ = 04:14:03.
	MW	iPZ			07	c	
	R	iPZ			08	c	
		eZ		14	51		
Mar 26	P	iPZ	07	53	21		
	MW	iPZ			20		
	R	iPZ			24		
Mar 27	P	iPZ	11	29	26		Normal? Tucson (Courtesy USCGS): iP = 11:29:19. Yugoslavia. Strasbourg gives: 45.8°N., 17.0°E. O = 11:16:23.5 Zagreb, according to Strasbourg, gives 46°05'N., 16°45'E.
	MW	iPZ			26		
	R	iPZ			24		
Mar 27	P	iPNZ	21	56	18	c	Deep? P large and sharp at all stations. Tucson (Courtesy USCGS): iP = 21:56:42.
	MW	iPZ			19	c	
	R	iPZ			20	c	
	H	iPZ			25		
Mar 29	R	iPZ	21	59	32		Tucson (Courtesy USCGS): iP = 22:00:12.
Mar 30	P	iPZ	01	28	48	d	Deep. Tucson (Courtesy USCGS): iP = 01:28:15, i = 01:28:50, i = 01:29:04
		iZ		29	25		
	R	iPZ		28	46	d	
		eZ		29	11		
		iZ			21		
Mar 31	P	iPNZ	17	04	11		Normal. Readings by courtesy of USCGS: Boulder City: iP = 17:04:16, iS = 17:04:40 Tucson: iP = 17:05:02, iS = 17:06:32. Epicenter 34°45'N., 116°28'W. O = 17:03:43.
		iNEZ:			13		
		iSNE			33		
		iNEZ:			36		
	MW	ePN			10		
		iSNE			30		
	R	iPNEZ			04		
		iSNE			19		
	LJ	iPNEZ			20		
		iSNE			48		
	T	eSNE		05	10		
H	eSNE		04	42			

C. F. Richter





No. 19

PASADENA and auxiliary stations

Date	Sta- tion	Phase	G. C. T.			c d	Remarks
			h	m	s		
Apr 1	P	iPZ	18	17	19		
	MW	iPZ			20		
	R	iPZ			22		
Apr 1	P	iPZ	19	23	22		Normal. Approximately 32.4°N., 116.0°W., O = 19:22.6 Tucson: eP = 19:23:52
		iSNE			54		
	MW	iPZ			21		
		iSZ			53		
	R	iPZ			09		
	LJ	ePZ			01		
		iSNEZ			21		
Apr 2	P	iPZ	05	08	28		South America. La Plata reports; P = 04:58.8. Tucson: iP = 05:08:00
	MW	iPZ			27		
	R	iPZ			24		
Apr 2	P	eZ	06	20	52		Normal. South Atlantic.
	PX	eNE			30.1		
		eNE			36.6		
		eLNE			54.6		
	MW	eZ		20	37		
		eZ			50		
	R	eZ			15		
eZ				50			
Apr 2	P	iPNZ	07	41	07		Normal. Kurile Islands (using European stations and Zinsen).
	PX	eLE	08	02.4			
	MW	iPZ	07	41	05		
	R	iPZ			11		
	T	ePNE		40	54		
Apr 2	P	iPNEZ	21	37	30	c	Deep?
		eZ		39	43		
	MW	iPZ		37	29	c	
	R	iPZ			24	c	
		iZ		39	41		
	LJ	iPEZ		37	19		
T	ePNE			44			
Apr 3	P	ePZ	11	10	52		
	MW	ePZ			50		
	T	ePE		11	02		
	H	eNE			04		
Apr 4	P	iP"NEZ	21	26	56	d	Deep. East Indies, $\Delta = 114^\circ$ . Approximate solution, using Palau, Manila, Hong Kong, Phu-Lien, Perth, Brisbane, Ksara and Weston: 7°S., 127°E., O = 21:09:05, h = 450 km.
		iSKPNZ		29	54		
	MW	iP"Z		26	57	d	
		iSKPZ		29	54		
	R	iP"Z		26	58	d	
		iSKPZ		29	56		
	T	iP"Z		26	56		
		iPPZ		27	51		
		iSKPZ		29	53		
	H	iP"Z		26	57		
	iSKPZ		29	55			
Apr 5	P	iPZ	03	07	24		Normal?
		iZ			37		
	MW	iPZ			23		
		iZ			37		
	R	eZ			26		
		iZ			41		
Apr 5	P	ePZ	11	12	40		Normal. Probably on the peninsula of Baja California. Tucson: iP = 11:11:55.
		iSNEZ		14	31		
	MW	ePZ		12	43		
		iSNEZ		14	32		

Continued



No. 20

PASADENA and auxiliary stations

1938

Date	Sta- tion	Phase	G. C. T.			c d	Remarks
			h	m	s		
Apr 5	R	ePZ	11	12	32		Continued
		iSNEZ		14	20		
	LJ	iSNEZ		13	47		
Apr 5	MW	iPZ	17	18	44		Tucson: iP = 17:19:05
Apr 7	P	iPZ	04	02	36		
	MW	iPZ			36		
Apr 7	P	eZ	09	01	10		
	MW	eZ			07		
Apr 7	P	iPZ	10	17	39	c	Deep? P may be P'. Tucson: e = 10:22:11
	MW	iPZ			40	c	
	R	iPZ			42	c	
Apr 7	P	iPZ	14	05	06		Near Apia, which reports: P = 13:54:25, S = 56 sec., $\Delta = 2.7^\circ$ .
	MW	iPZ			07		
Apr 7	P	iPNZ	14	44	13		Deep? Tucson: iP = 14:43:40 d, i = 14:43:59
	MW	iPZ			13	d	
	R	iPZ			04	d	
Apr 7	P	iPNZ	22	35	11		Normal?
	MW	ePZ			08		
		iPZ			10		
	R	iPZ			06		
	T	ePNE			29		
Apr 9	P	iPNEZ	09	23	12		Deep? Surface waves small. Probably about h = 100 km., as given by Apia and Wellington. Epicenter by Apia: 16°S., 170°E. Epicenter by Wellington: 16°S., 169°E.
	PX	eLEZ		53			
	MW	iPZ		23	11		
		eZ		26	32		
	LJ	ePEZ		23	12		
	T	iPNEZ			18		
	H	ePE			17		
Apr 9	P	iPZ	22	01	07		
	MW	iPZ			07	d	
Apr 10	P	ePZ	19	36	32		Deep? Tucson: eP = 19:35:38, i = 19:35:56, etc. Guatemala, using data of Little Rock. Readings at 39 <sup>m</sup> refer to PcP, etc. May be a multiple shock.
		eZ			49		
		iZ		39	26		
	MW	iPZ		36	33		
		iZ			48		
	R	ePZ			26		
		iZ			43		
		iZ		39	25		
		iZ			39		
		iZ			57		
Apr 11	P	iPZ	05	09	36	c	Tucson: iP = 05:10:21 c
	MW	iPZ			36	c	
Apr 11	MW	iPZ	06	25	14		
Apr 11	P	iPNEZ	21	11	50		Deep? Tucson: iP = 21:11:38 c
	MW	iPZ			51	c	
		eZ		14	23		
	R	iPNE		11	49		
	T	ePNE		12	08		
Apr 12	P	ePZ	11	09	00		Normal. Tucson: eP = 11:08:03
	PX	eLNE		17.5			
	MW	ePZ		08	56		
	T	ePNE		09	16		

1938

PARAMETER and auxiliary stations

No. 20

Date	Time	Station	G.C.F.			Remarks
			h	m	s	
Apr 12	P	193	11	03	00	Normal, Tucson SF = 11:08:00
	W	193	11	03	00	
	T	193	11	03	00	
Apr 11	P	193	05	09	38	Tucson SF = 05:10:38
	W	193	05	09	38	
	T	193	05	09	38	
Apr 10	P	193	12	36	33	Large Tucson SF = 12:31:33
	W	193	12	36	33	
	T	193	12	36	33	
Apr 9	P	193	08	08	14	Normal, Tucson SF = 08:10:14
	W	193	08	08	14	
	T	193	08	08	14	
Apr 8	P	193	19	02	44	Tucson SF = 19:19:44
	W	193	19	02	44	
	T	193	19	02	44	
Apr 7	P	193	09	08	10	Normal
	W	193	09	08	10	
	T	193	09	08	10	
Apr 6	P	193	13	43	13	Large Tucson SF = 13:43:13
	W	193	13	43	13	
	T	193	13	43	13	
Apr 5	P	193	11	18	35	Tucson SF = 11:18:35
	W	193	11	18	35	
	T	193	11	18	35	
Apr 4	P	193	19	02	44	Tucson SF = 19:02:44
	W	193	19	02	44	
	T	193	19	02	44	



No. 21

PASADENA and auxiliary stations

1938

Date	Sta- tion	Phase	G. C. T.			c d	Remarks
			h	m	s		
Apr 12	P	ePZ	16	25	26	c d	Normal. 32°53'N., 115°35'W., O = 16:24:40. Tucson: iP = 16:25:39. Felt strongly in Imperial Valley; slight damage. Foreshocks numerous, P of the larger recorded at Pasadena as follows: 12:02:25, 14:47:22, 14:58:30, 15:05:23, 15:11:35, 15:30:22, 15:48:39, 16:19:25. Immediate aftershocks few and small. Compare April 13, 19 <sup>h</sup> .
		iNEZ			28		
	MW	iSN	26	00			
		iPZ	25	22			
		iPNEZ			12		
	LJ	iNE			17		
		iSNE			42		
		iPZ			06		
T	ePE	26	06				
	iSE	27	10				
Apr 12	P	iPNEZ	20	03	38	c	Deep? Tucson: iP = 20:04:02 c
	MW	iPZ			38	c	
	R	iPZ			45		
	T	iPNE			47		
Apr 13	P	iPNEZ	02	58	44	d	Deep. Δ = 95°. Felt in Italy. Strasbourg: 39.5°N., 15.0°E. J.S.A: 39.4°N., 15.0°E., O = 02:45:54, h = 300 km. Using reports of all available stations, we find 39.2°N., 15.2°E., O = 02:45:56, h = 270 km.
		iPPNEZ	03	02	37		
		isPPN	04	12			
		eSKSN	08	49			
	P	ePSN	11	23			
		iPPSNE	12	51			
		iPKKPZ	15	36			
		MW	iPZ	02	58		
	R	iPPZ	03	02	34		
		iPKKPZ	15	35			
		iP'P'Z	23	46			
		ePZ	02	58	39		
	LJ	iNEZ!			41		
		iZ	03	02	18		
		iPPZ			33		
		iPKKPZ	15	35			
T	iPZ	02	58	35			
	iPPE	03	02	39			
T	iPNE	02	58	32			
	eN	03	04	40			
Apr 13	PX	eLNE	12	50		Normal. Tucson: iP = 12:39:34	
Apr 13	P	iPEZ	14	03	05	Fort-de-France reports: P = 13:53:54, Δ = 340 km.	
	R	iPZ			02 58		
Apr 13	P	iPZ	18	54	19	Wellington reports: P = 18:43:42, S = 18:45:20	
		iPZ			19		
Apr 13	P	ePZ	19	30	32	Normal. 32°53'N., 115°35'W., O = 19:29:49. Tucson: iP = 19:30:48. Felt strongly in Imperial Valley. A close duplicate of April 12, 16:24. One large foreshock, Pasadena P = 18:58:36. Many small aftershocks, the two largest at 02:54:16, and 03:39:37.	
		iNEZ			36		
		iSNE	31	10			
	R	iPNEZ	30	20			
		iSNE			50		
	LJ	iPNEZ			14		
T	ePNE	31	07				
Apr 14	P	iP"Z	01	35	03	Deep. Δ = 115°, Burma. Strasbourg gives: h = 120 km. From station reports now available, we find 23°N., 95°E., O = 01:16:35, h=130 km.  This is tentative only. Tucson: iP" 01:35:14 iSKP 38:39 iPKKP 45:22	
		iSKPZ			38 25		
		ePKKPZ	45	37			
		eSKKPZ	49	12			
		MW	iP"Z	35	03		
	R	iSKPZ	38	28			
		iPKKPZ	45	38			
		iSKKPZ	49	14			
		iP"Z	35	04			
		iPKKPZ	45	35			
Apr 14	P	ePZ	18	42	51	Andes, according to La Plata. Tucson: oP = 18:42:13	
	MW	ePZ			50		
	R	ePZ			50		

Date	Sta- tion	Phase	G. C. T.			c d	Remarks
			h	m	s		
Apr 15	P	iPNEZ	03	11	13	d	Deep. Felt at Wellington. 33°S., 179°E., O = 03:59.3, h = 580 km. Tucson: iP = 03:11:31, ipP = 03:13:41
		ipPZ		13	19		
	R	iPZ		11	15	d	
	T	ePE			22		
	H	ePE			19		
Apr 15	P	iPZ	11	12	40		Tucson: iP = 11:12:04
	R	iPZ			35		
	T	iPZ			51		
Apr 15	P	iPZ	19	17	30		Deep? Tucson: iP = 19:17:55, i = 19:18:26
		iZ		18	01		
	R	iPZ		17	32		
Apr 15	P	iPZ	20	37	26		Small. Identifications of P and S uncertain. Boulder City (courtesy USRS): eP? = 20:36:35, eS = 20:37:55 Tucson: eP = 20:35:32, iSZ = 20:36:42
		iSN		39	24		
	R	iPZ		37	19		
	T	iSZ		39	12		
Apr 16	P	ePZ	18	24	43		Roughly 31°N., 114°W. (Gulf of California). Tucson: eP = 18:24:02
		iSNEZ		25	45		
	MW	iPZ		24	39		
		iSZ		25	43		
	R	ePZ		24	29		
		eSZ		25	26		
	LJ	ePE		24	17		
Apr 16	P	ePZ	18	32	04		Aftershock. Tucson: e = 18:31:31
		iSNZ		33	06		
	MW	ePZ		31	56		
		eSZ		33	04		
	R	ePZ		31	48		
		eSZ		32	50		
	LJ	ePE		31	38		
		eSE		32	23		
Apr 16	P	ePZ	19	13	09		Aftershock. Tucson: eP = 19:12:22
		eSNEZ		14	03		
	MW	ePZ		12	56		
		eSZ		14	01		
	R	ePZ		12	47		
	LJ	ePE		12	37		
Apr 16	P	iPZ	20	23	16		Normal. Central America. Tucson: iP = 20:22:22
	PX	eLN		31.5			
	MW	iPZ		23	15		
	R	iPZ		23	07		
	T	iPNEZ		23	22		
Apr 16	P	eZ	20	26	16		Probably not part of preceding shock.
	MW	iZ			19		
	R	eZ			22		
	T	iZ		25	50		
Apr 16	P	eZ	20	57	30		Tucson: iP = 20:56:36
	MW	ePZ			26		
Apr 17	MW	iPZ	01	56	27		Tucson: iP = 01:56:54
Apr 17	P	iPZ	03	48	10		Normal. Felt in Imperial Valley. 32°27'N., 115°37'W., O = 03:47:22 Tucson: eP = 03:48:21
		iSNEZ			44		
	MW	iPZ			09		
		eSZ			42		

Continued

No. 23

PASADENA and auxiliary stations

1938

Date	Sta- tion	Phase	G. C. T.			c d	Remarks	
			h	m	s			
Apr 17	R	ePNE	03	47	58		Continued	
		iSNE		48	25			
	LJ	ePEZ		47	48			
		iSEZ		48	10			
Apr 17	P	iP"Z	09	15	05		Normal? 47°S., 142°E., according to Wellington. This does not fit our readings, nor those at Manila.	
		iZ		16	17			
		iPKKPZ		25	45			
	MW	iP"Z		15	03			
		iPKKPZ		25	43			
T	iP"Z		15	07				
Apr 17	P	iPNEZ	14	50	48		Deep? Small surface waves recorded. Bolivia. Strasbourg: 17°S., 68°W., 0 = 14:39.9 St. Louis: 18.5°S., 69.0°W., 0 = 14:39:42, h = 50+ km.  Tucson: iP = 14:50:11 c, eP'P' = 15:19:00 Addendum: MW: iPNZ = 14:50:49	
		iZ			59			
	MW	iSNEZ	15	00	04			
		eP'P'Z		18	39			
		eSNZ		59	59			
	R	eP'P'Z	15	18	38			
		iPNE	14	50	44			
	T	iSNE		59	57			
		iPNEZ		51	01			
	H	iSNEZ	15	00	29			
ePNE		14	50	58				
Apr 18	P	iSNE	15	00	19			
	MW	iPZ	01	02	09		Tucson: iP = 01:01:14 d	
Apr 18	P	iPZ	05	40	22		Tucson: iP = 05:40:41 c	
	MW	iPZ			23			
Apr 18	MW	iPZ	07	58	16		Tucson: iP = 07:57:35	
Apr 19	P	ePZ	11	13	16		Normal. Destructive in Turkey. $\Delta = 102^\circ$ . USCGS: 39.5°N., 33.5°E., 0 = 10:59.3 Strasbourg: 38.9°N., 32.7°E., 0 = 10:59:25 J.S.A.: 39.0°N., 33.1°E., 0 = 10:59:23	
		eZ		17	19			
		iPPNZ			30			
		ePKKPZ		29	17			
		PX	eSSN		31			47
	MW	eLN		44.2				
		iPZ		13	16			
		iZ		16	00			
		iPPZ		17	27			
		ePPSZ		27	29			
		ePKKPZ		29	12			
Apr 19	P	eZ	21	56	01		South Pacific. Wellington suggests h = 100 km?	
		eZ			51			
	MW	eZ		55	57			
		iZ		57	00			
H	eN		56	08				
Apr 20	P	iPNEZ	06	39	41		Normal. New Hebrides. $\Delta = 87^\circ$ . 22°S., 175°E., according to Wellington.	
		PX	iPPZ		43			08
			eNE		50			10
	MW	iPSE		51	08			
		eLN	07	02	08			
		iPZ	06	39	39			
		R	ePNE					45
		eE		50	25			
		T	ePNE		39			49
			eNE		50			29
H	ePNZ		39	47				
Apr 20	P	iPZ	19	11	00		Tucson: iP = 19:10:22	
	MW	iPZ			00			

Date	Station	Phase	G. C. T.			c d	Remarks
			h	m	s		
Apr 21	P	iZ	01	35	03		Surface waves small or absent. Recorded at Cape Town.
	MW	eZ			03		
Apr 21	P	iPZ	16	46	48		Tucson: iP = 16:46:06. P may be P'.
	MW	iPZ			48		
	T	ePNE			03		
Apr 21	MW	iP	20	42	07		Tucson: iP = 20:42:25 c
Apr 22	P	iPNEZ	04	19	59	c	Normal. $\Delta = 18^\circ$ . Off Vancouver Island. 51°N., 129°W., approx. Tucson: iP = 04:20:50 c
	PX	eSNE		23	26		
		eLE			24.6		
	MW	iPNEZ		19	59	c	
	R	iPNE		20	04		
		eSN		23	36		
	LJ	ePEZ		20	16		
	T	iPNE		19	27		
	eSN		22	45			
	H	iPNEZ		19	29		
Apr 23	P	iPZ	00	40	49		Normal? According to Hukuoka, near Amami-Osima (Riu-Kiu Islands); this is roughly 28°N., 129°E.
		ePPZ		44	36		
	PX	eLEZ	01	15			
	MW	ePZ	00	40	51		
		ePPZ		44	09		
	T	eE		40	49		
	H	eE		40	48		
Apr 24	P	ePZ	00	17	39		Tucson: iP = 00:17:57
	MW	ePZ			37		
Apr 24	P	iPNEZ	14	22	27	d	Deep? Andes, according to La Plata, which reports: P = 14:14:04, S = 14:16.1 Tucson: iP = 14:21:55 d
	MW	iPNEZ			28		
	R	ePN			21		
	T	iPNE			39		
	H	iPNEZ			35		
Apr 24	P	iPZ	20	30	40		Tucson: iP = 20:29:53 c
Apr 25	P	iPZ	09	14	34		Normal. Apparently in the region of the Ural Mountains (?). Tucson: iP = 09:14:38
	PX	eLE		37	09		
	MW	iPZ		14	33		
	T	ePNE			15		
	H	ePN			21		
Apr 25	P	iPNEZ	09	31	23		Deep. Near Apia, which reports: iP = 09:21:47, iS = 09:22:58 Using Apia, Brisbane, and European stations: 19°S., 176°W., O = 09:20:16, h = 400 km. Tucson: iP = 09:31:48 c, ipP = 09:33:15
	MW	iPZ			23		
		ipPZ		32	54		
Apr 25	P	iPZ	11	46	58	c	Deep? Tucson: iP = 11:47:03 c, i = 11:49:21
	MW	iPZ			58	c	
		iZ		47	35		
	T	ePNE		46	38		
	H	ePNE			46		
Apr 25	P	iPZ	14	57	08		Japan.
	MW	ePZ			05		
		ePPZ		15	00	03	
Apr 25	P	ePNZ	17	14	53		Destructive in Nicaragua. Strasbourg: 13°N., 87°W.
		ePPZ		16	18		
	PX	eLN		23	12		
	MW	iPZ		14	48		
		iPPZ		16	18		
	T	ePE		15	08		



No. 25

PASADENA and auxiliary stations

1938

Date	Sta- tion	Phase	G. C. T.			c d	Remarks
			h	m	s		
Apr 26	P	iP"NEZ	13	12	02		Deep? East Indies, $\Delta = 115^\circ$ approx.
	MW	iP"Z			02		
	T	ePPZ			54		
	H	iP"E			02		
Apr 27	P	ePZ	05	04	41		Normal. Baja California; small. La Jolla S-P = 19 sec, Tucson: eP = 05:05:00, i = 05:05:12
	MW	iSNEZ			05 19		
		iPZ			04 41		
		iSZ			05 16		
Apr 27	MW	ePZ	15	11	39		Normal. Much nearer Tucson.
Apr 27	P	ePZ	20	14	24		Felt in Imperial Valley.
Apr 27	MW	iPZ	20	46	01		Tucson: iP = 20:46:06
Apr 28	P	iPNEZ	06	07	53	d	Normal. $32^\circ 37' N.$ , $118^\circ 12' W.$ , O = 06:07:26 Felt at San Diego, California Tucson: eP = 06:08:57 Boulder City (courtesy USRS): eP = 06:08:33, eS = 06:09:23
		iSNE			08 15		
	MW	iPNEZ			07 55	d	
	R	iPNEZ			53	d	
		iSNE			08 14		
	SB	iPNEZ			02	d	
		iSE			29		
	LJ	iPEZ			07 42	c	
		iSE			53		
	T	ePNE			08 36		
	iSE			09 44			
	H	iPNEZ			08 22	d	
Apr 28	P	iPZ	07	43	19		(Deep) Felt at Apia, which reports: iP = 07:32:49, iS = 07:33:32 Depth about 150 km.
		iZ			54		
	MW	iPZ			18		
		iZ			56		
Apr 28	MW	iPZ	21	49	10		Tucson: iP = 21:48:34
Apr 29	P	iZ	17	02	15		
	MW	iZ			26		
Apr 29	P	iPNEZ	18	19	59	c	Deep? Large, sharp impulse. Tucson: iP = 18:20:24 c
	MW	iPNZ			20 00	c	
	T	ePNE			07		
	H	iPNEZ			06		
Apr 30	P	iPNZ	22	17	20		Normal? Surface waves small. Tucson: iP = 22:16:21
	P6	eLN			22.5		
	T	ePNE			17 43		
	H	ePNE			38		

C. F. Richter

KASABENI and auxiliary stations  
1938

Date	Station	Time	G.C.T.			Remarks
			h	m	s	
Apr 29	H	11:52	08	08	08	Deeply disturbed Indian, Δ = 112° approx.
	T	11:57	08	08	08	
	M	12:02	08	08	08	
	L	12:07	08	08	08	
Apr 27	M	12:02	08	04	51	Normal. Some California; small. In table B-2 = 13 sec. Tension Δ = 05:02:00, I = 06:02:15
	L	12:07	08	04	51	
Apr 27	M	12:02	08	11	39	Normal. From nearby Tucson.
	L	12:07	08	11	39	
Apr 27	M	12:02	08	11	39	Felt in Imperial Valley.
	L	12:07	08	11	39	
Apr 26	M	12:02	08	18	01	Normal. Δ = 08:07:28 Felt at San Diego, California Tension Δ = 06:08:17 Boulder City (country USA) Δ = 08:05:28, Δ = 08:09:25
	H	11:53	08	18	01	
	T	11:48	08	18	01	
	L	11:43	08	18	01	
Apr 25	M	12:02	08	07	59	(Deep) Felt at Lga, which reported Δ = 07:08:40, Δ = 07:08:52 Depth about 150 km
	L	12:07	08	07	59	
Apr 25	M	12:02	08	07	59	Tension Δ = 21:40:34
	L	12:07	08	07	59	
Apr 25	M	12:02	08	19	39	Deeply disturbed, sharp impulses.
	L	12:07	08	19	39	
Apr 25	M	12:02	08	19	39	Normally surface waves small.
	L	12:07	08	19	39	

G. F. Richter



No. 25a

1938

NOTICE.

This Bulletin is now being prepared with closer attention than heretofore. Records at Pasadena and auxiliary stations are being scrutinized for shocks reported by other stations, either in their own bulletins or through the office of the International Union at Strasbourg.

By courtesy of the United States Coast and Geodetic Survey, we are fortunate in having regularly for examination the seismograms of the vertical Benioff instrument at Tucson. This instrument is extremely sensitive, and gives clear records of many shocks which might otherwise escape notice. Readings given for Tucson in this Bulletin are made at Pasadena on the original seismograms (vertical only).

The Coast and Geodetic Survey has also been instrumental in obtaining for us the privilege of regularly inspecting the seismograms written at Boulder City. This station is operated by the United States Reclamation Service, by whose courtesy the seismograms are available. It is located at  $35^{\circ}58'51''\text{N.}$ ,  $114^{\circ}50'02''\text{W.}$  At present there is one short-period torsion seismograph, recording the E-W component; but further developments are contemplated.

Readings at Tucson and Boulder City are given only for selected shocks.

It becomes necessary to delay the date of issue of our final Bulletin in order to include these additional data and interpretations. Accordingly, a preliminary bulletin giving readings at Pasadena has been circulated at irregular intervals since July 1, 1938.

January 3, 1939.

C. F. Richter



No. 26

PASADENA and auxiliary stations

Date	Sta- tion	Phase	G. C. T.			c d	Remarks
			h	m	s		
May 1	PX	eLNZ	01	26.5			Normal.
May 1	P	iPZ	01	46	05		
	MW	iPZ			06		
May 2	P	iPNZ	04	17	20		Deep?
	LW	iPZ			20	d	
	R	iPZ			21		
May 2	P	iPNEZ	05	55	40		Deep?
	MW	iPZ			41	c	
	R	iPZ			42		
May 2	LW	iPZ	23	49	11		Deep?
	R	iPZ			06		
May 3	P	iPNEZ	02	20	28		Deep. (h = 100 km) Damage at Iguala, Mexico. USCGS: 18°N., 99°W. O = 02;15.6, h = 100 km. J.S.A: 18.2°N., 99.1°W. O = 02;15;29, h = 100 km. Tacubaya: 17°47'N., 99°10'W. , O = 02;15;25 according to Strasbourg.
		ipPNE			49		
		iPcPZ		24	16		
	PX	iSE			38		
		eLE		25	39		
	MW	iPNEZ		20	28	d	
		iPcPZ		24	16		
		iSZ			31		
	R	iPNEZ		20	33		
		iPcPZ		24	14		
		iSNEZ		24	31		
	SB	iPNEZ		20	39		
		iPEZ			14		
	LJ	iSE		24	14		
		ePNE		20	46		
T	iNE		21	51			
	iPNEZ		20	40			
H	ipPZ		21	00			
	iPcPZ		24	20			
	iSNE			59			
May 3	P	ePZ	19	26	40		Deep? Kurile Islands. Probably h = 100 km. According to Zinsen, near Etoro (= Iturup). Using Zinsen, Hukuoka, Manila, Bucarest: 46°N., 149°E. O = 19:15.9
		iZ		27	06		
	R	iPZ		26	43		
		iZ		27	05		
May 3	P	iPZ	23	52	25		
	MW	iPZ			24		
	R	iPZ			19		
May 4	P	iPNEZ	02	38	37	c	Deep. Large. h = 550-600 km. Reported by few other stations. Probably in Tonga region. "Local tremor" 02:29, Apia. Compare Oct. 14, 1938, 02 <sup>n</sup> . Tucson: iP = 02:39:02, i = 02:41:04
		ipPZ		40	37		
		isPZ		41	38		
	MW	iPNEZ		38	38	c	
		ipPZ		40	36		
		isPZ		41	40		
	R	iPNEZ		38	39	c	
		ipPZ		40	35		
		isPZ		41	44		
		IPZ		38	32		
T	ePNE			46			
H	iPNEZ			44			
May 5	P	iPZ	16	37	56		
	MW	iPZ			55		
	R	iPZ			59		
May 6	P	ePZ	18	24	26		Normal. Strong in Nicaragua. USCGS: 13°N., 87°W. O = 18:17.4 J.S.A: 12.6°N., 86.9°W. O = 18:17:26
	PX	eLN		32	32		
	MW	iPZ		24	26		

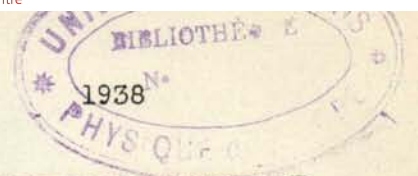
No. 27

PASADENA and auxiliary stations

1938

Date	Sta- tion	Phase	G. C. T.			c d	Remarks
			h	m	s		
May 7	P	iPZ	14	50	07		Tucson: iP = 14:50:35
	MW	iPZ			08		
May 8	P	eP'Z	14	07	46		Normal. $\Delta = 150^\circ$ . Southeastern Indian Ocean. $50^\circ\text{S.}$ , $98^\circ\text{E.}$ , $0 = 13:47:56$ , using Perth, Adelaide, Melbourne, Riverview, Brisbane, Christchurch, Wellington, Tananarive, Cape Town, Manila, Phu-Lien, and Hong Kong (Tananarive as reported by Strasbourg). Phu-Lien gives $46^\circ\text{S.}$ , $97^\circ\text{E.}$
		iP <sub>2</sub> 'NEZ			50		
	PX	eLNE		49.7			
	MW	eP'Z		07	47		
		iP <sub>2</sub> 'NEZ			51		
		iP'Z			57		
	R	eP'Z		08	52		
		iP <sub>2</sub> 'Z			52		
	SB	iNEZ			46		
	LJ	eZ			49		
	T	eP <sub>2</sub> 'NE			55		
	H	iP <sub>2</sub> 'Z			55		
May 8	P	iP''Z	14	58	08		Deep. East Indies, possibly Banda Sea.
	MW	iP''Z			08		
		iPPZ		59	25		
	R	iP''Z		58	09		
	H	iP''Z			09		
May 8	P	ePZ	17	31	02		
	MW	iPZ			03		
	R	ePZ			03		
May 9	P	ePZ	02	46	42		To the northwest. Tucson: eP = 02:47:48
	MW	ePZ			39		
	T	ePNE			08		
May 9	MW	iZ	03	29	13		Similar. Tucson: eP = 03:29:58
May 9	MW	iPZ	03	47	26		Similar. Tucson: iP = 03:48:31
May 9	P	iPNEZ	06	37	57	d	Deep. Tucson: iP = 06:38:31
	MW	iPZ			58	d	
	R	ePN			56		
	T	iPNE			45		
	H	iPZ			49		
May 9	P	iPZ	21	11	02		
	MW	iPZ			02		
May 10	MW	iZ	01	37	12		Tucson: eZ = 01:35:57
May 10	P	ePZ	10	33	15		Normal. Felt in Monterey and San Benito Counties, California. Foreshock recorded at 10:07, aftershock at 10:42.
		iSNE			56		
	MW	iPZ			16		
		iSZ			59		
	SH	iPZ			00		
		iSNEZ			44		
	T	iPNE			02		
	iSNE			37			
	H	iPZ			05		
		iSEZ			41		
May 10	P	ePZ	11	45	16		Tucson: iP = 11:44:25
	MW	ePZ			18		
May 11	P	iPZ	03	21	34		
	MW	ePZ			33		
May 11	MW	iZ	04	48	29		
May 11	P	iPNEZ	14	49	54		Normal. USCGS: $16.9^\circ\text{N.}$ , $101.0^\circ\text{W.}$ $0 = 14:44.9$ J.S.A: $16.8^\circ\text{N.}$ , $100.7^\circ\text{W.}$ , $0 = 14:44:45$
		iPPNEZ			50	42	
	PX	eSN		54.2			
		eLN		55.3			
	MW	ePNZ		49	52		
	SB	ePNEZ		50	03		
	LJ	ePZ		49	38		
	T	ePNE		50	14		
		H	ePZ			10	

Date	Sta- tion	Phase	G. C. T.			c d	Remarks
			h	m	s		
May 11	P	ipPZ	22	29	40		South America; Andes, according to La Plata. If pP is correctly identified, h = 50 km. Tucson: iP = 22:28:53 ipP = 22:29:08
	MW	ipZ			26		
		ipPZ!			40		
	T	eNE			54		
May 11	H	iZ			48		
	P	iZ	22	59	42		
	MW	eZ			17		
May 12		iZ			41		
	PX	ePNEZ	15	52	29		Normal. New Guinea. $\Delta = 97^\circ$ . USCGS: $8^\circ\text{S.}, 147^\circ\text{E.}$ 0 = 15:39.0 J.S.A: $5.0^\circ\text{S.}, 147.5^\circ\text{E.}$ 0 = 15:39:02 Strasbourg: $5.0^\circ\text{S.}, 147.5^\circ\text{E.}$ , 0 = 15:39:01 Wellington: $5^\circ\text{S.}, 147^\circ\text{E.}$ h = 60 km. The azimuth is nearly due west at Pasadena; longitudinal and transverse motions are unusually well separated.
		ePPE			56 16		
		iSKSE	16	03	10		
		eN			26		
		eSN		04.1			
		eSPZ		05	03		
		iPSE			17		
		iPPSZ			35		
		ISSNE		10	55		
	P	iP'P'Z		17	38		
	PX	iGN		18	30		
	MW	ePZ		52	30		
		iP'P'Z		17	33		
SB	ePNZ		52	31			
T	ePNE			36			
H	ePE			38			
May 12	MW	eZ	22	27	56		Crete.
May 13	MW	eZ	01	36	13		
May 13	P	iPZ	01	59	35		
	MW	iPZ			35		
May 13	P	ePZ	03	03	27		Normal. $60^\circ\text{N.}, 35^\circ\text{W.}$ , approx., according to Strasbourg.
		iZ			32		
	PX	eLE		24			
	MW	ePZ		03	26		
	SB	ePZ			34		
	T	ePNE			14		
May 13	H	iPZ			22		
	MW	iPZ	13	39	32		Tucson: iP = 13:39:50
May 14	P	ePEZ	23	48	44		P may be P'. Tucson: e = 23:47:50
	MW	ePZ			43		
May 15	MW	ePZ	03	43	39		$48^\circ\text{N.}, 33^\circ\text{W.}$ , approx., according to Strasbourg.
May 15	MW	iZ	16	57	48		
May 16	P	iPNE	01	18	56	d	Deep. Apia: $28.7^\circ\text{S.}, 174.0^\circ\text{W.}$ , 0 = 01:07:28, h = 650 km. Wellington: $29^\circ\text{S.}, 172^\circ\text{W.}$ h = 600 km. Tucson: iP = 01:19:17, e = 01:21:24
	MW	iPZ			57		
		ipPZ?		21	11		
		eZ		22	24		
	T	ePNE		19	04		
May 16	H	iPZ			03		
	MW	eZ	04	38	41		
May 16	P	ePNZ	11	56	05		Tucson: iP = 11:55:51
	MW	iPZ			06		
May 16	P	iPZ	18	13	11		Tucson: iP = 18:13:32
	MW	iPZ			12		
May 16	MW	ePZ	18	46	17		
May 17	P	iPNZ	02	39	58		Deep? Andes, according to La Plata, which reports: P = 02:31:31, S = 02:33.7 Tucson: iP = 02:39:26
	MW	ePZ			57		
		eZ		40	05		
	R	iPZ		39	55		
May 17		iZ		40	04		
	P	iPZ	03	53	39		
	R	iPZ			42		



No. 29

PASADENA and auxiliary stations

Date	Station	Phase	G. C. T.			c d	Remarks
			h	m	s		
May 18	P	iPZ	03	34	09		
	MW	iPZ			09		
	R	iPZ			10		
May 18	P	iPZ	14	14	39		
	MW	iPZ			39		
May 19	MW	eZ	15	27	06		
	R	eZ			06		
May 19	MW	eZ	15	44	08		Recorded at Australian and New Zealand stations.
May 19	PX	ePZ	17	23	42		Normal. $\Delta = 117^\circ$ . USCGS: $0.5^\circ\text{N.}, 119.0^\circ\text{E.}$ , $0 = 17:08.7$ J.S.A: $1.0^\circ\text{N.}, 118.9^\circ\text{E.}$ , $0 = 17:08:46$ Strasbourg: $0.0^\circ\text{N.}, 118.8^\circ\text{E.}$ h = 100 km. Destructive on Celebes.
	P	eP'Z		27	09		
		iP'NZ			29		
	PX	iPPNEZ		28	32		
		ePPZ		30	46		
		eSNE		35	58		
		ePSNE		37	56		
	P	ePKKPZ			59		
		iSKKPZ		41	33		
	PX	iSSNE		44	32		
		eLN		54	42		
	MW	ePZ		23	53		
		iP'Z		27	31		
		iPPZ		28	34		
		iPKKPZ		37	59		
	R	eP'Z		27	20		
		iPPZ		28	34		
	ePKKPZ		37	56			
T	ePE		27	25			
	ePPE		28	20			
	ePSE		37	50			
May 19	P	iNZ	18	53	50		Deep? Probably very distant. First reading may be P'. Tucson: i = 18:54:02, e = 18:55:27
		eZ		54	42		
		iZ		57	07		
	MW	iZ		53	49		
		iZ		54	42		
		iZ		57	08		
	R	eZ		53	49		
	eZ		54	42			
	eZ		57	08			
May 20	MW	iPZ	07	30	39		Tucson: iP = 07:31:02
	R	iPZ			41		
May 20	P	ePZ	09	14	11		Tucson: iP = 09:13:21. Balboa Heights reports: iP = 09:06:40 S = 09:07:17
	MW	iPZ			10		
May 20	P	iPEZ	11	00	59		Deep? Tucson: iP = 11:01:21
	MW	iPZ			59		
	R	iPZ		01	01		
May 21	MW	iPZ	12	47	53		
May 21	P	iPZ	20	28	33		Tucson: iP = 20:29:13
	MW	iPZ			33		
	R	iPZ			36		
May 22	MW	iPZ	03	03	27		Tucson: iP = 03:04:49
	R	iPZ			30		
May 22	P	ePZ	07	58	40		Normal. Wellington: $19^\circ\text{S.}, 168^\circ\text{E.}$
	PX	eLNZ	08	26.0			
	MW	iPZ	07	58	40		
	R	iPZ			43		
	T	ePNE			48		

Date	Sta- tion	Phase	G. C. T.			c d	Remarks
			h	m	s		
May 22	P	ePNEZ	08	34	58		Normal. Identical aftershock of the preceding. Wellington: 19°S., 168°E.
	PX	eLNZ	09	02.5			
	MW	iPZ	08	34	58		
	R	iPZ		35	01		
	T	ePNE			06		
May 23	P	iPNEZ	07	30	28		Normal, or slightly deeper. Damage in Japan. $\Delta = 78^\circ$ . USCGS: 36°N., 141°E., 0 = 07:18.5 J.S.A: 36.9°N., 141.1°E., 0 = 07:18:43, h = 100 km. Strasbourg: 36.0°N., 141.0°E., 0 = 07:18:32 Zinsen: 36.70°N., 141.45°E. Tucson: iP = 07:31:01, eP'P' = 07:57:25
	PX	iSNE		40	17		
		eLN		50	13		
	P	eP'P'Z		57	26		
	MW	iPNEZ		30	27		
		eSNE		40	18		
	R	iPNEZ		30	31		
		eSNEZ		40	17		
		eP'P'Z		57	27		
	SB	iPNEZ		30	24		
	T	ePNE		30	19		
		eSNE		40	01		
	H	ePE		30	21		
	eSE		40	03			
May 23	P	iPZ	08	35	55		Normal? Pasadena $\Delta = 105^\circ$ . Strasbourg: 19°N., 119°E., 0 = 08:22.0 Manila: 18°15'N., 119°45'E.
		eZ		40	03		
		ePPE			23		
	MW	iPZ		35	54		
		iZ		39	13		
		iZ		40	01		
		iPPZ			18		
	R	ePZ		35	58		
		eZ		39	38		
	T	eZ		40	16		
	ePNE		35	48			
May 23	MW	ePZ	12	21	43		Tucson: iPZ = 12:22:03
	R	eZ			46		
May 23	P	iPZ	14	28	13		Tucson: i = 14:30:38
	MW	iPZ			14		
	R	iPZ			16		
May 24	MW	iPZ	10	49	56		Tucson: iPZ = 10:49:09
	R	iPZ			52		P may be P'.
May 25	P	iPZ	14	14	07		Tucson: iP = 14:14:53
	MW	iPZ			06		
	R	iPZ			12		
May 26	P	iPZ	23	07	02		Very clear records. No trace of this shock at Tucson.
	MW	iPZ			03		
	R	iPZ			04		
May 27	P	iPZ	15	42	03		
	MW	iPZ			04		
		iZ			30		
May 27	P	eZ	17	30	42		Normal. Felt in Sierra County, California, region of 39°N., 120°E.
	MW	iPZ			46		
	R	eZ			41		
	T	ePNE		28	48		
		eSNE		29	25		
	H	ePZ		29	01		
	eSNEZ		29	52			
May 28	P	iPNEZ	10	16	39	c	Normal. Felt at Marshfield, Oregon, and other points on the Oregon coast. USCGS: 43°N., 125°W., 0 = 10:14.2 J.S.A: 43.3°N., 125.0°W., 0 = 10:14:06
	PX	eLN		18	33		
	MW	iPNEZ		16	39	c	
	R	iPNEZ			46	c	

Continued





No. 31

PASADENA and auxiliary stations

Date	Sta- tion	Phase	G. C. T.			c d	Remarks
			h	m	s		
May 28	SB T H	ePZ ePNE iSNE ePEZ eE	10	16	24		Continued
May 28	P MW R T	ePNEZ ePZ ePZ ePE	11	11	21		Tucson: eP = 11:10:37
May 28	P MW R LJ	eZ eSNZ iPZ iZ iSZ iPZ iZ iSZ ePNE iSNE	13	30	29		Normal. Tucson: eP = 13:30:37, i = 13:30:51, iS = 13:31:58. Boulder City (courtesy USRS): eS = 13:31:25. Roughly 32.6°N., 115.3°W., near Volcano Lake (Baja California). O = 13:29:37. Aftershock (?) at 16:07.
May 28	P PX MW R SB LJ T H	iPZ iSN iPZ ePZ iPNEZ ePNE ePNE eSNE iPZ	16	53	27		Normal, or nearly so. Surface waves recorded. Δ = 68°. Strong in Hokkaido (Japan). Strasbourg: 43°N., 144°E. O = 16:42.1 Zinsen: 43.6°N., 144.3°E.
May 28	P MW R	eNZ iNEZ eZ iZ eZ eZ	20	09	37		
May 30	P R	iPZ iZ iPZ iZ	02	46	30		Tucson: iP = 02:45:52, i = 02:45:57
May 30	MW R	iPZ iPZ eZ	03	19	04		Deep? Tucson: iPZ = 03:18:20, iZ = 03:18:43
May 30	P PX P MW R SB LJ	iPNEZ iZ iPPNZ eSKSEZ iSE iPSE eSSNZ iGN eP'P'Z iPNEZ iPPZ eP'P'Z iPNEZ eP'P'Z iPZ ePNE	14	42	36	c	Normal? or slightly deeper. Δ = 87°. USCGS: 20°S., 169°E., O = 14:29.8 Wellington: 19°S., 168°E. J.S.A: 20.4°S., 169.4°E. O = 14:29:48
						c	Continued

No. 32

PASADENA and auxiliary stations

1938

Date	Sta- tion	Phase	G. C. T.			c d	Remarks
			h	m	s		
Continued							
May 30	T	ePNE	14	42	46		
		eSKSE		53	06		
		iNE			33		
	H	ePEZ		42	43		
		eE		53	30		
May 30	P	iPZ	14	46	45		Aftershock.
	MW	iPZ			45		
	R	iPZ			47		
	SB	iPZ			41		
	T	ePNE			53		
	H	ePE			52		
May 30	P	iPZ	19	53	44		
	MW	iPZ			45		
	R	ePZ			45		
	T	ePE			52		
May 30	P	ePZ	23	38	37		Deep? The same late phases also recorded at Mt. Wilson and Riverside, slightly later. Horomushiro (Kurile Islands), according to Hukuoka. Tucson: iP = 23:49:15
		iZ			49		
		iZ		39	00		
		iZ			16		
	MW	iPZ		38	39		
		R	ePZ			42	
May 31	P	iPNEZ	08	35	09	d	Normal. Felt over a large area in southern California. Damage very slight. 33°41'N., 117°32'W., O = 08:34:55
		iSNEZ			18		
	MW	iPNEZ			09	d	
		iSNEZ			18		
	R	iPNEZ			01	d	
		iSNEZ			05		
	SB	iPEZ			28		
		iSE			59		
	LJ	iPNE			11		
		iSNE			23		
	T	ePEZ			49		
	H	iPNEZ			36		
		iNEZ			41		
		iSNE		36	13		
May 31	MW	ePZ	18	18	10		Tucson: eP = 18:18:46

C. F. Richter

Date	Sta- tion	Phase	G. C. T.			c d	Remarks
			h	m	s		
June 1	P	iPNZ	08	06	07		Normal. Gulf of California, approximately 30.8°N., 114.4°W., 0 = 08:04.6 Tucson: eP = 08:05:07, iS = 08:06:26 Foreshocks recorded at 04 <sup>h</sup> 14 <sup>m</sup> and 04 <sup>h</sup> 27 <sup>m</sup> (at Pasadena)
		iSNEZ		07	07		
	MW	iPZ		06	06		
		iSNEZ		07	06		
	R	iPZ		05	57		
	LJ	ePNE		05	36		
		iSNE		06	21		
June 1	P	iPNEZ	12	14	15		
	MW	ePZ			14		
	R	ePZ			15		
June 1	MW	iPZ	14	07	45		Tucson: iP = 14:07:10
	R	iPZ			42		
June 2	MW	eZ	03	34	40		
June 3	MW	iPZ	00	00	29		
June 3	P	iPZ	00	40	23		Tucson: eP = 00:40:44
	MW	iPZ			23		
June 3	P	ePZ	11	40	29		Andes, according to La Plata. Tucson: iP = 11:40:03
	MW	iPZ			28		
	R	ePZ			27		
June 3	P	ePZ	14	39	28		Normal. 32°15'N., 115°10'W., 0=14:38:34 Tucson: eP* = 14:39:42. Felt in Imperial Valley. Smaller shocks from the same source at 05:24, 11:48, 14:02, 14:14, 15:22, 20:39, and 20:40. Above epicenter corrects those given in our local shock list, for these and for shocks on June 6.
		iZ			31		
		iSNEZ		40	04		
	MW	iZ		39	30		
		iSNEZ		40	03		
	R	iPZ		39	14		
		iZ			22		
		iSNEZ			45		
	LJ	ePN			08		
		iNE			28		
	ePZ			48			
	eSE		40	53			
June 4	P	iPZ	11	29	23		Tucson: eP = 11:29:51
	MW	iPZ			25		
	R	iPZ			27		
June 4	P	iPZ	20	39	38		
	MW	iPZ			40		
June 4	P	iPZ	22	55	49	c	Tucson: iP = 22:56:03
	MW	iPZ			49	c	
June 5	P	eP	01	24	17		Normal. Tucson: iP = 01:23:22
	PX	eLNE		32	45		
	MW	iPZ		24	17		
	R	iPZ			13		
	SB	ePZ			31		
	LJ	ePNE			05		
	T	ePNE			38		
	H	ePNE			27		
June 5	P	iPNEZ	02	15	10		Normal. Tucson: iP = 02:14:14 Aftershock of the preceding.
	PX	eLNE		23.9			
	MW	iPZ		15	09		
	R	iPZ			05		
	SB	ePZ			27		
	LJ	ePNE		14	54		
	T	ePNE		15	25		
	H	ePE			18		
June 5	MW	iPZ	02	19	51		Normal. Tucson: iP = 02:18:56 Aftershock.
	R	iPZ			46		

Date	Sta- tion	Phase	G. C. T.			c d	Remarks
			h	m	s		
June 5	P	iPNZ	03	06	41		Deep. Tucson: iP = 03:06:06
	MW	iZ		07	03		
		iZ				16	
	R	iPZ		06	37		
		iZ		07	00		
		iZ				12	
June 5	MW	iPZ	03	47	12		Tucson: iP = 03:47:35
	R	iPZ			15		
June 5	P	ePZ	14	43	00		Tucson: eP = 14:42:20
	MW	iPZ			00		
	R	iPZ		42	56		
June 5	P	iPNEZ	16	43	36		Normal? No surface waves. Japan. Zinsen gives: 35.92°N., 140.28°E. Near Edozaki, Ibaragi-ken, according to Hukuoka and Zinsen.
		iZ			59		
	MW	iPZ			35		
	R	iPZ			39		
	LJ	ePNE			45		
	H	ePE			30		
June 5	P	eSN	17	19	29		Normal. Tucson: eP = 17:17:06 Probably Gulf of California.
	MW	ePZ		17	51		
		eSZ		19	33		
	R	ePZ		17	55		
	LJ	eNE			54		
June 6	P	ePZ	02	43	32		Normal. 32°15'N., 115°10'W., 0=02:42:42 Felt strongly in Imperial Valley, followed by small aftershocks, with a larger one at 05:52. The second reading at La Jolla and the third at Riverside are not the normal S. Boulder City (Courtesy U.S.Reclamation Service): eP̄ = 02:43:57, iS = 02:44:31 Tucson: iP* = 02:43:50
		iSNE		44	12		
	MW	iPZ		43	31		
		iSNE		44	11		
	R	iPNEZ		43	22		
		iZ!			31		
		iNEZ			53		
	LJ	iPNE			17		
		iNE		45	25		
	H	iSE			01		
June 6	P	iPZ	12	36	10		Normal, large aftershock. Felt in Imperial Valley.
		iSN			43		
	MW	ePZ			02		
		iZ			07		
		iSE			42		
	R	iPNEZ		35	54		
		iSNE		36	24		
	LJ	iPNE		35	50		
		iSNE		36	08		
	T	ePNE			57		
	H	eSN		38	11		
		ePE		36	39		
eSE			37	34			
June 8	P	iPNEZ	10	39	35	d	Deep? Probably South America. Tucson: iP = 10:39:01
	MW	iPZ			36	d	
		eZ		40	06		
	R	iPZ		39	32		
	T	ePNE			48		
H	ePE			44			
June 8	P	iPNEZ	12	15	07		Deep? Tucson: iP = 12:15:31 °
	MW	iPNEZ			08		
	R	iPZ			09		
	T	ePE			14		
	H	ePE			12		
June 9	P	ePZ	19	29	44		Normal. Δ = 112°. USCGS: 2°S., 128°E., 0 = 19:15.3 Strasbourg: 2.8°S., 126.0°E., 0=19:15:12
		iP"Z		33	51		
	PX	ePPEZ		34	31		

Continued

No. 35

PASADENA and auxiliary stations

1938

Date	Sta- tion	Phase	G. C. T.			c d	Remarks
			h	m	s		
June 9	PX	eSKSE	19	40	33	Continued	J.S.A: region of 3.1°S., 125.7°E., O = 19:15:09
		eSE		41	51		
		eLE	20	01.3			
	MW	ePZ	19	29	52		
		iP"Z		33	45		
		iPPZ		34	40		
	R	ePZ		29	56		
		iP"Z		33	52		
iPPZ			34	38			
June 10	P	iPZ	10	07	06		Normal. $\Delta = 96^\circ$ . Near Miyakojima, Riu-Kiu Islands, according to Hukuoka and Zinsen. USCGS: 25°N., 125°E., O = 09:53.7 Strasbourg: 25.0°N., 125.0°E., O = 09:53:43 J.S.A: 25.2°N., 124.6°E., O = 09:53:42
	PX	iPPEZ		11	03		
		eNE		17	43		
		iNEZ			52		
		iSN		18	26		
		iPSZ		19	41		
		eSSN		24.3			
		iSSSN		28	36		
		eLN		33.5			
		MW	ePZ	07	04		
	R	ePZ			03		
		ePPZ		11	06		
	LJ	ePNE		07	18		
		eNE		17	58		
	T	ePNE		07	01		
		ePPNE		10	48		
		eNE		17	37		
	H	ePE		07	00		
		iPPE		10	56		
eE			17	46			
June 10	P	iPNEZ	14	41	19	c	Normal. 34°08'N., 116°57'W., O = 06:40:58. Felt in the San Bernardino Mountains. Tucson: eP = 14:42:20
		iSN			34		
	MW	iPNEZ			18		
		iSNE			32		
	R	iPNEZ			09		
		iSNE			16		
	LJ	iPNE			23		
		iSNE			43		
	T	ePNE			56		
		iSNE		42	35		
	H	iPZ		41	35		
		iSE		42	06		
	June 10	MW	iPZ	15	36		
June 10	MW	iPZ	17	18	41		
June 10	P	iPNEZ	18	11	30		Normal. Felt slightly in Mexico City. USCGS: 16.5°N., 98°W., O = 18:06.0 J.S.A: 16.5°N., 97.9°W., O = 18:06:00 Tucson: eP = 18:10:28
		iSNE		16	02		
	eLNE		18.5				
	MW	iPZ		11	28		
		eSE		15	57		
	R	iPNEZ		11	23		
		eSNEZ		15	57		
	LJ	iPNE		11	15		
		iSNE		15	42		
	T	ePNE		11	47		
H	iPZ			41			
June 10	MW	iPZ	18	53	55		Aftershock. Tucson: iP = 18:53:02
		R			54		

Date	Station	Phase	G. C. T.			c d	Remarks	
			h	m	s			
June 10	P	ePZ	18	55	20			
	MW	iPZ			18			
	R	iPZ			19			
June 11	P	iZ	01	41	40		Deep? Tucson: iP = 01:42:11, i! = 01:42:26	
	MW	iZ			26			
		iZ			40			
	R	iZ			30			
		iZ			44			
June 11	P	iPNEZ	05	19	57	c	Deep. Near Apia, which reports: iP = 05:10:03, iS = 05:10:55 Tucson: iP! = 05:20:23 c, i = 05:21:29	
		iZ			21	03		
		iZ			22	39		
	MW	iPNEZ			19	58		c
		iZ			21	04		
		iZ			22	40		
	R	iPNEZ			20	00		
	LJ	iPNE			19	57		
T	iPNE			20	05			
June 11	P	iPZ	18	54	40	c	Deep? Tucson: iP = 18:55:02 c	
	R	iPZ			43			
June 12	P	ePZ	05	08	53			
	MW	ePZ			54			
	R	ePZ			58			
June 12	MW	ePZ	07	57	58			
	R	ePZ			58	00		
June 13	P	ePZ	03	17	00			
	MW	ePZ			16	57		
June 13	P	ePZ	03	33	03		Tucson: eP = 03:33:26	
	MW	iPZ			01			
	R	iPZ			04			
June 14	P	iPNEZ	04	05	47		Tucson: iP = 04:06:12	
	MW	iPZ			48			
June 15	P	iPNEZ	07	55	54		(Deep) Surface waves small. Felt in Argentina at San Juan and Mendoza, and in Chile at Valparaiso, etc. USCGS: 32°S., 68°W., 0 = 07:43.7 J.S.A: 31.3°S., 74.1°W., 0 = 07:44:03, h = 100 km. Using North American stations and La Plata we find: 31°S., 70.5°W., 0 = 07:43:50, h = 70 km. Tucson: iP = 07:55:24, iPZ = 07:55:43	
		iPZ			56	11		
	PX	eSNEZ	08	05	51			
		eLN			21			
	MW	iPNEZ	07	55	54			
		iPZ			56	12		
	R	ePZ			55	51		
		iPZ			56	09		
	T	ePNE			56	11		
		iSNE	08	06	17			
June 15	P	iPNEZ	12	53	41		Normal? Wellington: 20°S., 169°E.	
	PX	eE	13	04	11			
		eE			05	33		
June 15	MW	eLNE			23			
		iPNEZ	12	53	42			
	R	iPZ			44			
	T	ePNE			49			
	H	ePEZ			46			
	June 15	P	ePZ	20	26	30		Deep? New Hebrides region, not far from the preceding shock. Tucson: eP = 20:26:53, i = 20:27:57
			iZ			27	34	
PX		eLE?	21	01				
MW		ePZ	20	26	31			
		iZ			27	34		
		iZ				44		
R		eP			26	32		
		eZ			27	36		
		iZ				49		
H		eE				44		

Date	Sta- tion	Phase	G. C. T.			c d	Remarks
			h	m	s		
June 15	MW R	iZ eZ	22	47	01 03		
June 16	P PX P MW R LJ T H	iPNEZ ePPZ eSKSNZ iSN eLN eP'P'Z iPNEZ iPPZ eSKSNE eP'P'Z ePNEZ ePPZ ePE eN iPNEZ eNE iPE iPPE eE	02	28	21 31 58 38 49 39 18 53.2 53 56 28 22 31 57 38 58 53 51 28 25 32 03 28 31 39 05 28 17 38 45 28 18 31 53 38 45		Normal. Strong in the Riu-Kiu Islands. $\Delta = 92^\circ$ . USCGS: $29^\circ\text{N.}, 128^\circ\text{E.}$ , $0 = 02:15.3$ Strasbourg: $26.8^\circ\text{N.}, 129.4^\circ\text{E.}$ , $0 = 02:15:16$ J.S.A: $29.2^\circ\text{N.}, 127.7^\circ\text{E.}$ , $0 = 02:15:18$ Manila: $26.5^\circ\text{N.}, 127.5^\circ\text{E.}$ S. off Amamiosima, according to Hukuoka and Zinsen. Zinsen gives: $27.7^\circ\text{N.}, 129.4^\circ\text{E.}$ Tucson: eP = 02:28:48, eP'P' = 02:53:43
June 16	P MW R LJ H	iPNEZ iSNEZ iPZ iSNE iPNEZ iSN iPNE iSNE ePZ	05	59	39 57 38 56 29 39 29 39 06 00 02	c c c	$33^\circ 28' \text{N.}, 116^\circ 35' \text{W.}$ , $0 = 05:59:12$ Felt at Hemet and Aguanga. Tucson: iP = 06:00:30 Boulder City (Courtesy USRS): iS = 06:00:46
June 16	P MW R	eZ eZ eZ	11	57	31 26 34		Wellington: $20^\circ\text{S.}, 170^\circ\text{E.}$
June 18	P MW R T	iZ iPZ iZ eZ eZ eNE	00	55	22 11 22 13 24 14		Deep? Japanese Islands. According to Hukuoka and Zinsen, $36.5^\circ\text{N.}, 141^\circ\text{E.}$ , Kasimanada. Observations at distant stations suggest a deep focus about $5^\circ$ farther south.
June 18	MW	eP	01	25	41		Tucson: eP = 01:25:43
June 18	P MW R	iPZ iPZ ePZ	02	42	01 02 02		Near Apia, which reports: iP = 02:31:56, iS = 02:32:50
June 19	P MW R	iPZ iPZ ePZ	00	14	06 05 13 59		Tucson: iP = 00:13:23
June 19	MW R	ePZ ePZ	09	50	20 19		Tucson: eP = 09:50:42
June 19	P R T H	iPNEZ iZ iPZ iZ ePNE ePNE	17	20	13 22 08 17 30 22		Tucson: eP = 17:19:19, i = 17:19:31
June 20	P PX	iPNZ iPPZ iPcPZ eSN eLE	14	08	20 09 15 11 29 13 02 14.7	c	Normal? or slightly deeper, perhaps $h = 50 \text{ km.}$ $\Delta = 28^\circ$ approx. Tucson: iP = 14:08:15, i = 14:08:25 Very roughly, $5^\circ\text{N.}, 120^\circ\text{W.}$ , using Weston and Ottawa.

Continued

Station Name	U. C. T. (h m s)	Phase	Time
Station 1	01 28 41	W	01 28 41
Station 2	01 28 41	P	01 28 41
Station 3	01 28 41	R	01 28 41
Station 4	01 28 41	T	01 28 41
Station 5	01 28 41	H	01 28 41
Station 6	01 28 41	L	01 28 41
Station 7	01 28 41	F	01 28 41
Station 8	01 28 41	W	01 28 41
Station 9	01 28 41	R	01 28 41
Station 10	01 28 41	L	01 28 41
Station 11	01 28 41	T	01 28 41
Station 12	01 28 41	H	01 28 41
Station 13	01 28 41	L	01 28 41
Station 14	01 28 41	T	01 28 41
Station 15	01 28 41	H	01 28 41
Station 16	01 28 41	L	01 28 41
Station 17	01 28 41	T	01 28 41
Station 18	01 28 41	H	01 28 41
Station 19	01 28 41	L	01 28 41
Station 20	01 28 41	T	01 28 41
Station 21	01 28 41	H	01 28 41
Station 22	01 28 41	L	01 28 41
Station 23	01 28 41	T	01 28 41
Station 24	01 28 41	H	01 28 41
Station 25	01 28 41	L	01 28 41
Station 26	01 28 41	T	01 28 41
Station 27	01 28 41	H	01 28 41
Station 28	01 28 41	L	01 28 41
Station 29	01 28 41	T	01 28 41
Station 30	01 28 41	H	01 28 41
Station 31	01 28 41	L	01 28 41
Station 32	01 28 41	T	01 28 41
Station 33	01 28 41	H	01 28 41
Station 34	01 28 41	L	01 28 41
Station 35	01 28 41	T	01 28 41
Station 36	01 28 41	H	01 28 41
Station 37	01 28 41	L	01 28 41
Station 38	01 28 41	T	01 28 41
Station 39	01 28 41	H	01 28 41
Station 40	01 28 41	L	01 28 41
Station 41	01 28 41	T	01 28 41
Station 42	01 28 41	H	01 28 41
Station 43	01 28 41	L	01 28 41
Station 44	01 28 41	T	01 28 41
Station 45	01 28 41	H	01 28 41
Station 46	01 28 41	L	01 28 41
Station 47	01 28 41	T	01 28 41
Station 48	01 28 41	H	01 28 41
Station 49	01 28 41	L	01 28 41
Station 50	01 28 41	T	01 28 41
Station 51	01 28 41	H	01 28 41
Station 52	01 28 41	L	01 28 41
Station 53	01 28 41	T	01 28 41
Station 54	01 28 41	H	01 28 41
Station 55	01 28 41	L	01 28 41
Station 56	01 28 41	T	01 28 41
Station 57	01 28 41	H	01 28 41
Station 58	01 28 41	L	01 28 41
Station 59	01 28 41	T	01 28 41
Station 60	01 28 41	H	01 28 41
Station 61	01 28 41	L	01 28 41
Station 62	01 28 41	T	01 28 41
Station 63	01 28 41	H	01 28 41
Station 64	01 28 41	L	01 28 41
Station 65	01 28 41	T	01 28 41
Station 66	01 28 41	H	01 28 41
Station 67	01 28 41	L	01 28 41
Station 68	01 28 41	T	01 28 41
Station 69	01 28 41	H	01 28 41
Station 70	01 28 41	L	01 28 41
Station 71	01 28 41	T	01 28 41
Station 72	01 28 41	H	01 28 41
Station 73	01 28 41	L	01 28 41
Station 74	01 28 41	T	01 28 41
Station 75	01 28 41	H	01 28 41
Station 76	01 28 41	L	01 28 41
Station 77	01 28 41	T	01 28 41
Station 78	01 28 41	H	01 28 41
Station 79	01 28 41	L	01 28 41
Station 80	01 28 41	T	01 28 41
Station 81	01 28 41	H	01 28 41
Station 82	01 28 41	L	01 28 41
Station 83	01 28 41	T	01 28 41
Station 84	01 28 41	H	01 28 41
Station 85	01 28 41	L	01 28 41
Station 86	01 28 41	T	01 28 41
Station 87	01 28 41	H	01 28 41
Station 88	01 28 41	L	01 28 41
Station 89	01 28 41	T	01 28 41
Station 90	01 28 41	H	01 28 41
Station 91	01 28 41	L	01 28 41
Station 92	01 28 41	T	01 28 41
Station 93	01 28 41	H	01 28 41
Station 94	01 28 41	L	01 28 41
Station 95	01 28 41	T	01 28 41
Station 96	01 28 41	H	01 28 41
Station 97	01 28 41	L	01 28 41
Station 98	01 28 41	T	01 28 41
Station 99	01 28 41	H	01 28 41
Station 100	01 28 41	L	01 28 41



Date	Station	Phase	G. C. T.			c d	Remarks
			h	m	s		
Continued							
June 20	P	eScPZ	14	15	17		
	MW	ePNE		08	21		
	R	iPNEZ			20		
		ePPNEZ		09	13		
		ePcPZ		11	28		
	LJ	eN		08	58		
	T	eNE			48		
June 20	P	iPZ	15	21	39		Tucson: eP = 15:22:04. South Pacific.
	R	ePZ			35		
	T	eE		22	12		
June 21	P	ePZ	00	04	29		Normal, $\Delta = 102^\circ$ . Destructive in Turkestan. Strasbourg: $41.3^\circ\text{N.}, 77.3^\circ\text{E.},$ $0 = 23:50:25$ Tucson: ( $\Delta = 107^\circ$ ): eP = 00:04:43, i = 00:08:19, iP'P' = 00:28:42
		iZ		08	07		
		iPPZ			42		
		ePPPZ		10	54		
	PX	iNZ		17	47		
		eSSN		23.5			
	P	eP'P'Z		28	43		
	PX	eLN		31.6			
	R	ePPNE		08	41		
		eP'P'Z		28	34		
	LJ	ePPNE		08	52		
	T	ePPN			30		
June 21	P	ePZ	06	41	41		Deep? No surface waves recorded. New Hebrides region. Recorded at Brisbane, Riverview and Adelaide. P' recorded at European stations. Shock later in the same hour near Formosa not recorded.
		eZ		42	11		
		iZ		42	16		
	MW	iPZ		41	41		
	R	iPZ			43		
		iZ		42	15		
		iZ			18		
	T	ePE		41	48		
	eN		42	20			
June 21	MW	iPZ	06	56	49		Deep? Tucson: iP = 06:56:01 South America?
		eZ		57	10		
	R	ePZ		56	43		
		eZ		57	06		
June 22	MW	iPZ	03	16	22		Tucson: eP = 03:16:55
	R	ePZ			20		
June 22	P	iPNEZ	23	21	35		Deep? No surface waves. According to Riverview, felt in Papua (New Guinea). Tucson: eP = 23:22:05, e = 23:25:49
	MW	iPNEZ			36		
	R	iPNEZ			38		
June 23	P	iPZ	01	15	59		Deep? Probably h = 70 km. $\Delta = 85^\circ$ . Strong at Coquimbo and La Serena, Chile.
		iZ		16	18		
		iZ			26		
	PX	iSE		26	14		
	MW	iPNEZ		15	58		
		iZ		16	18		
		iZ			26		
	R	iPNEZ		15	56		
		iZ		16	14		
		iZ			22		
	SB	iPNEZ			23		
	T	iPNEZ			11		
		eSE		26	40		
	H	ePE		16	05		
		eSNE		26	29		
June 23	P	iPZ	13	08	12	c	Normal? or slightly deeper. $\Delta = 87^\circ$ . USCGS: $20^\circ\text{S.}, 169^\circ\text{E.},$ approx. $0 = 12:55.4$
		iPPNZ		11	39		
	PX	eSNE		18	50		
Continued							

Date	Sta- tion	Phase	G. C. T.			c d	Remarks
			h	m	s		
Continued							
June 23	PX	ePSE	13	19	53		J.S.A: 19.1°S., 168.9°E., 0 = 12:55:33 Wellington: 20°S., 169°E., h = 100 km. ca. Times reported at many stations correspond closely with those for May 30, 14 <sup>h</sup> . Tucson: iP = 13:08:36 c, eP'P' = 13:33:56
		iSSN		25	26		
		iLN		31.5			
	P	iP'P'Z		34	11		
	MW	iPNEZ		08	13	c	
		iPPZ		11	39		
	R	eP'P'Z		34	11		
		iPNEZ		08	14	c	
	SB	eP'P'Z		34	07		
	LJ	iPNEZ		08	00		
	T	ePNE			14		
		ePNE			21		
H	eSNE		19	05			
	ePNE		08	19			
June 23	P	iPNEZ	22	11	28	c	Normal. 34°10'N., 117°07'W., 0=22:11:06 Tucson: eP = 22:12:57. Felt in the San Bernardino Mountains.
		iSNE			40		
	MW	iPNEZ			26	c	
		iSN			37		
	R	iPNEZ		11	16	c	
	LJ	iSE			21		
ePN?				35			
June 25	P	iPNEZ	05	46	43	c	Normal. 33°57'N., 116°27'W., 0=05:46:15 Not reported felt. Boulder City (Courtesy USRS): eP = 05:47:04, iS = 05:47:41. Tucson: eP? = 05:47:29
		eSNE		47	03		
	MW	iPNEZ		46	42	c	
		iSE		47	02		
	R	iPNEZ		46	30	c	
		iSNE			41		
	LJ	iPN		46	39		
		iSN			56		
	H	iPEZ		47	06		
		iSE			27		
June 25	P	iPZ	12	00	31		Tucson: iP = 12:00:56
	MW	iPZ			32		
	R	iPZ			32		
June 25	P	iPNEZ	23	55	50	c	Normal, Δ = 65°. Arctic Ocean. Strasbourg: 77°N., 2°E., approx. Tucson: iP = 23:55:54 c
		iZ		56	37		
		ePPZ		58	09		
	PX	eLE	24	18.7			
	MW	iPEZ		55	50	c	
		iPPZ		58	13		
	R	iPEZ		55	48	c	
	SB	iPNEZ			51	c	
	T	iPNEZ			33	c	
	H	iPNEZ			39		
June 26	P	iPZ	07	13	23		Deep? Tucson: iP = 07:13:46 c, e = 07:14:10
	MW	iPZ			25		
	R	iPZ			26		
June 26	P	iPZ	16	15	26	c	Tucson: iP = 16:15:57
	MW	iPZ			27	c	
	R	iPZ			27		
	T	iPZ			22		
	H	iPNEZ			26		
June 27	P	iPZ	13	56	39		Tucson: e = 13:57:11
	MW	iPZ			40		
	R	iPZ			42		

Date	Station	Phase	G. C. T.			c d	Remarks
			h	m	s		
June 27	P	iPEZ	20	10	17		Tucson: iP = 20:10:48
	MW	iPZ			17	d	
	R	iPZ			19		
June 27	P	iPZ	22	00	14		Tucson: eP = 22:00:47
	MW	eZ			14		
	R	iPZ			14		
June 28	P	iPEZ	10	34	15	c	Deep? Tucson: iP = 10:34:52 c
	MW	iPEZ			16	c	
		eZ			43		
	R	iPZ			19		
		eZ			34		
	SB	iPZ			09		
June 28	H	ePNE			07		Deep (h = 110 km.) USCGS: 19°N., 100°W., O = 19:18.0, slightly deeper than normal. Tacubaya, according to Strasbourg, gives 18°12'N., 100°18'W., O = 19:17:42 J.S.A: 18.0°N., 99.3°W., O = 19:17:48, h = 100 km.
	P	iPNEZ	19	22	43		
		ipPNEZ		23	04		
	PX	iZ			40		
		eSN		26	40		
		iSE			46		
	MW	eLNE		29	10		
		ePZ		22	43		
		iSNEZ		26	52		
	R	iPNEZ		22	38		
		iSZ		26	35		
	SB	iPNEZ		22	57		
	LJ	iPNE		22	30		
		eSE		26	30		
T	iPNEZ		23	04			
H	iPNE		22	57			
	eSE		27	12			
June 29	MW	iPZ	03	57	05		Tucson: eP = 03:57:10
June 29	P	iPNEZ	10	25	38		Normal. 33°23'N., 115°36'W., O=10:24:58 Northern Imperial Valley; not reported felt. Boulder City (Courtesy USRS): eP=10:25:55, 10:26:37 Tucson: eP = 10:26:03. Small shocks from the same source at 10:19 and 10:33
		iSN		26	13		
	MW	iPZ		25	35		
		eSNE		26	06		
	R	iPNEZ		25	24	d	
	LJ	ePN			23		
June 29	PX	eLEZ	10	33.3			Normal. Tucson: iP = 10:09:24
June 29	P	ePZ	10	40	39		Normal. 33°23'N., 115°36'W., O= 10:39:58 No definite reports that this shock was felt. Larger than shock at 10:24. Smaller aftershocks at 14:56, 17:01, 21:13 etc.
		iSN		41	13		
	MW	iPZ		40	36		
		eSN		41	07		
	R	iPNEZ		40	28	d	
	LJ	iPN			24		
		iSN			50		
June 29	P	iPZ	14	13	28		Normal? Japan. Hukuoka reports: eP = 14:04:14.6, eS = 14:06:37.4, "SE off Sioyasaki". Zinsen: eP = 14:04:28.0, eS? = 14:06:32.5, "SE off the Cape of Sioya, 36.75°N., 141.95°E." Tucson: iP = 14:14:02, i = 14:14:16
		iZ			44		
	MW	iPZ			30		
	R	ePZ			33		
June 29	P	iPNEZ	18	56	01		Normal. Near Apia, which reports: P = 18:45:58, S = 18:47:18 Tucson: iP = 18:56:23
	PX	iSN		19	05	52	
		eLN			16		
	MW	iPZ		18	56	02	
	R	ePZ			02		
	SB	ePNEZ		55	58		
H	ePNE		56	13			

1958

MAGNITUDE AND AMPLITUDE STATIONS

No. 40

Station	Time	Phase	Amplitude	Magnitude
Tromsø IP - 18:58:18	18 58 01	PHEN	18 58 01	1.5
	18 58 02	PHN	18 58 02	1.5
	18 58 03	PHN	18 58 03	1.5
	18 58 04	PHN	18 58 04	1.5
	18 58 05	PHN	18 58 05	1.5
	18 58 06	PHN	18 58 06	1.5
	18 58 07	PHN	18 58 07	1.5
	18 58 08	PHN	18 58 08	1.5
	18 58 09	PHN	18 58 09	1.5
	18 58 10	PHN	18 58 10	1.5
Tromsø IP - 18:58:18	18 58 11	PHN	18 58 11	1.5
	18 58 12	PHN	18 58 12	1.5
	18 58 13	PHN	18 58 13	1.5
	18 58 14	PHN	18 58 14	1.5
	18 58 15	PHN	18 58 15	1.5
	18 58 16	PHN	18 58 16	1.5
	18 58 17	PHN	18 58 17	1.5
	18 58 18	PHN	18 58 18	1.5
	18 58 19	PHN	18 58 19	1.5
	18 58 20	PHN	18 58 20	1.5
Tromsø IP - 18:58:18	18 58 21	PHN	18 58 21	1.5
	18 58 22	PHN	18 58 22	1.5
	18 58 23	PHN	18 58 23	1.5
	18 58 24	PHN	18 58 24	1.5
	18 58 25	PHN	18 58 25	1.5
	18 58 26	PHN	18 58 26	1.5
	18 58 27	PHN	18 58 27	1.5
	18 58 28	PHN	18 58 28	1.5
	18 58 29	PHN	18 58 29	1.5
	18 58 30	PHN	18 58 30	1.5
Tromsø IP - 18:58:18	18 58 31	PHN	18 58 31	1.5
	18 58 32	PHN	18 58 32	1.5
	18 58 33	PHN	18 58 33	1.5
	18 58 34	PHN	18 58 34	1.5
	18 58 35	PHN	18 58 35	1.5
	18 58 36	PHN	18 58 36	1.5
	18 58 37	PHN	18 58 37	1.5
	18 58 38	PHN	18 58 38	1.5
	18 58 39	PHN	18 58 39	1.5
	18 58 40	PHN	18 58 40	1.5
Tromsø IP - 18:58:18	18 58 41	PHN	18 58 41	1.5
	18 58 42	PHN	18 58 42	1.5
	18 58 43	PHN	18 58 43	1.5
	18 58 44	PHN	18 58 44	1.5
	18 58 45	PHN	18 58 45	1.5
	18 58 46	PHN	18 58 46	1.5
	18 58 47	PHN	18 58 47	1.5
	18 58 48	PHN	18 58 48	1.5
	18 58 49	PHN	18 58 49	1.5
	18 58 50	PHN	18 58 50	1.5

Date	Station	Phase	G. C. T.			c d	Remarks
			h	m	s		
June 30	R	ePZ	09	30	42		Tucson: eP = 09:31:07
June 30	MW	iPZ	09	52	58		Tucson: iP = 09:53:24
	R	iPZ		53	00		
June 30	P	iPNEZ	16	57	31	c	Normal? or slightly deeper. Apia gives h = 60 km. USCGS: 24°S., 167°E., 0 = 16:45.6 Wellington: 20°S., 170°E. Aftershock of June 23, 12 <sup>h</sup> -13 <sup>h</sup> . Δ = 87°. Tucson: iP = 16:57:55, iP*P* = 17:23:19
		iZ			48		
		iZ			59		
		ePPZ	17	00	57		
	PX	eSE		08	12		
	P	eP*P*Z		23	29		
	PX	eLEZ			25.0		
	MW	iPNEZ	16	57	31		
		iPPZ	17	00	58		
		eP*P*Z		23	29		
	R	ePZ	16	57	33		
		eP*P*Z	17	23	27		
	SB	iPNEZ	16	57	28		
	LJ	ePNE			34		
	T	iPNEZ			38		
	H	ePNE			38		
June 30	P	iNZ	19	41	32		Peculiar. Possibly local. Not recorded at Tucson.
	MW	iZ			28		
	R	eZ			09		
		iZ			13		
June 30	P	iPZ	21	14	57		Tucson: iP = 21:15:29
	MW	iPZ			58		
	R	iPZ		15	00		
June 30	P	iPZ	21	26	47		Tucson: iP = 21:27:13
	MW	iPZ			49		
	R	iPZ			49		

Notes: Tucson readings by courtesy of U.S.C.G.S.

During June the vertical pendulum at Haiwee was moved a distance between 520 and 530 meters in a direction N.95° to 96°E. (true bearing) from its former position. No change in position was made for the horizontal pendulums or recording drums. Recording with the vertical pendulum in its new position was resumed on June 28, 1938.

C. F. Richter

Date	Time	Station	Amplitude	Phase	Remarks
June 30	17 55	195	45		Station 19 = 14°31'N, 173°15'W of June 29, 1955, A = 800 Wellington 1955, 170°E, 40°S L2015: 24°E, 147°E, 147°E gives h = 80 km. Normally of slightly longer. 1955
	17 56	195	45		
	17 57	195	45		
	17 58	195	45		
	17 59	195	45		
	18 00	195	45		
June 30	18 01	195	45		Station 19 = 14°31'N, 173°15'W of June 29, 1955, A = 800 Wellington 1955, 170°E, 40°S L2015: 24°E, 147°E, 147°E gives h = 80 km. Normally of slightly longer. 1955
	18 02	195	45		
	18 03	195	45		
	18 04	195	45		
	18 05	195	45		
	18 06	195	45		
June 30	18 07	195	45		Station 19 = 14°31'N, 173°15'W of June 29, 1955, A = 800 Wellington 1955, 170°E, 40°S L2015: 24°E, 147°E, 147°E gives h = 80 km. Normally of slightly longer. 1955
	18 08	195	45		
	18 09	195	45		
	18 10	195	45		
	18 11	195	45		
	18 12	195	45		
June 30	18 13	195	45		Station 19 = 14°31'N, 173°15'W of June 29, 1955, A = 800 Wellington 1955, 170°E, 40°S L2015: 24°E, 147°E, 147°E gives h = 80 km. Normally of slightly longer. 1955
	18 14	195	45		
	18 15	195	45		
	18 16	195	45		
	18 17	195	45		
	18 18	195	45		
June 30	18 19	195	45		Station 19 = 14°31'N, 173°15'W of June 29, 1955, A = 800 Wellington 1955, 170°E, 40°S L2015: 24°E, 147°E, 147°E gives h = 80 km. Normally of slightly longer. 1955
	18 20	195	45		
	18 21	195	45		
	18 22	195	45		
	18 23	195	45		
	18 24	195	45		

Notes: Station readings by courtesy of I.S.C. 1955

During June the vertical position of station 1955 (distance between 500 and 800 meters in a direction N. 30° E. from the former position. No change in position was noted for the vertical position or recording station. Recording with the vertical position of station 1955 was resumed on June 30, 1955.

G. T. Richter

G. T. Richter

Date	Sta- tion	Phase	G. C. T.			c d	Remarks
			h	m	s		
July 1	P	iPNEZ	11	59	28	d	Normal? Felt at Apia, which reports: iP = 11:48:39, iS = 57 sec., $\Delta = 1.4^\circ$ , and gives $15.0^\circ\text{S.}$ , $172.5^\circ\text{W.}$ Tucson: iP = 11:59:53 d
	MW	iPZ			29	d	
	R	iPZ			31		
	SB	eZ			22		
	H	iPNEZ			37		
July 1	P	ePZ	12	55	55		Tucson: iP = 12:55:59
	MW	iPZ			56		
July 1	MW	iPZ	13	09	04		Tucson: iP = 13:09:39
July 1	P	iPZ	15	14	05		
	MW	iPZ			06		
July 1	P	ePZ	18	15	36		Normal. Probably northeastern Nevada. Boulder City (courtesy USRS): eP? = 18:14:37, eS = 18:16:05 Tucson: eP = 18:15:17, eS? = 18:17:53. First motion uncertain at all stations.
		eSNEZ			17 16		
	MW	eSZ			18		
	SB	eNEZ			17.5		
	T	iPNEZ			14 51		
		iSNE			15 05		
	H	iPZ			15 01		
		iSEZ			16 27		
July 2	P	iZ	06	43	29		Deep? South America? Tucson: iP = 06:42:55, i = 06:43:20, i = 06:43:31
		iNEZ			54		
		eZ			44 07		
	MW	iZ			43 29	d	
		iZ			55		
		iZ			26	d	
July 2	P	ePZ	07	51	12		Tucson: iP = 07:51:14
	MW	ePZ			11		
July 2	P	iPNEZ	12	07	29	d	Tucson: iP = 12:06:48
	MW	iPZ			29		
	R	iPZ			25		
July 2	P	ePNEZ	21	12	21		Normal. Near Panama. Tucson: iP = 21:11:30
	PX	eLNEZ			26.1		
	MW	ePEZ			12 21		
	R	ePZ			17		
	LJ	ePNE			09		
July 3	P	iPZ	21	26	23		Near $37^\circ\text{S.}$ , $178^\circ\text{W.}$ , deeper than normal, according to Wellington. Tucson: iP = 21:26:40 d, i = 21:26:58
	MW	iPZ			24	d	
	R	iPZ			25	d	
July 4	P	ePNEZ	16	59	50		
July 4	P	ePZ	21	25	23	d	Normal. Wellington gives: $20^\circ\text{S.}$ , $170^\circ\text{E.}$
		iPNEZ			25		
	PX	eSKSE			36 12		
		ePSE			37 18		
		eLE			53.1		
	MW	iPZ			25 23		
		eZ			28 53		
	R	iPNEZ			25 26		
	SB	ePZ			22		
	LJ	ePNE			28		
	T	iPNEZ			32		
	H	ePE			33		
July 4	P	iPNEZ	22	00	22	c	Normal. $32^\circ 52' \text{N.}$ , $116^\circ 12' \text{W.}$ , O = 21:59:46. Not reported felt. Boulder City (courtesy USRS): eS = 22:01:28 Tucson: eP = 22:00:53
		iSNEZ			49		
	MW	iPNEZ			22	c	
		iSE			49		
	R	iPNEZ			12	c	
	iSNEZ			17			

Continued

Date	Time	Phase	G. C. T.			Remarks
			h	m	s	
July 1	17	1938	11	39	30	Normal. First 24 April, station reported.
July 1	18	1938	11	39	30	Normal. First 24 April, station reported.
July 1	19	1938	11	39	30	Normal. First 24 April, station reported.
July 1	20	1938	11	39	30	Normal. First 24 April, station reported.
July 1	21	1938	11	39	30	Normal. First 24 April, station reported.
July 1	22	1938	11	39	30	Normal. First 24 April, station reported.
July 1	23	1938	11	39	30	Normal. First 24 April, station reported.
July 1	24	1938	11	39	30	Normal. First 24 April, station reported.
July 1	25	1938	11	39	30	Normal. First 24 April, station reported.
July 1	26	1938	11	39	30	Normal. First 24 April, station reported.
July 1	27	1938	11	39	30	Normal. First 24 April, station reported.
July 1	28	1938	11	39	30	Normal. First 24 April, station reported.
July 1	29	1938	11	39	30	Normal. First 24 April, station reported.
July 1	30	1938	11	39	30	Normal. First 24 April, station reported.
July 1	31	1938	11	39	30	Normal. First 24 April, station reported.
July 2	01	1938	12	00	00	Normal. First 24 April, station reported.
July 2	02	1938	12	00	00	Normal. First 24 April, station reported.
July 2	03	1938	12	00	00	Normal. First 24 April, station reported.
July 2	04	1938	12	00	00	Normal. First 24 April, station reported.
July 2	05	1938	12	00	00	Normal. First 24 April, station reported.
July 2	06	1938	12	00	00	Normal. First 24 April, station reported.
July 2	07	1938	12	00	00	Normal. First 24 April, station reported.
July 2	08	1938	12	00	00	Normal. First 24 April, station reported.
July 2	09	1938	12	00	00	Normal. First 24 April, station reported.
July 2	10	1938	12	00	00	Normal. First 24 April, station reported.
July 2	11	1938	12	00	00	Normal. First 24 April, station reported.
July 2	12	1938	12	00	00	Normal. First 24 April, station reported.
July 2	13	1938	12	00	00	Normal. First 24 April, station reported.
July 2	14	1938	12	00	00	Normal. First 24 April, station reported.
July 2	15	1938	12	00	00	Normal. First 24 April, station reported.
July 2	16	1938	12	00	00	Normal. First 24 April, station reported.
July 2	17	1938	12	00	00	Normal. First 24 April, station reported.
July 2	18	1938	12	00	00	Normal. First 24 April, station reported.
July 2	19	1938	12	00	00	Normal. First 24 April, station reported.
July 2	20	1938	12	00	00	Normal. First 24 April, station reported.
July 2	21	1938	12	00	00	Normal. First 24 April, station reported.
July 2	22	1938	12	00	00	Normal. First 24 April, station reported.
July 2	23	1938	12	00	00	Normal. First 24 April, station reported.
July 2	24	1938	12	00	00	Normal. First 24 April, station reported.
July 2	25	1938	12	00	00	Normal. First 24 April, station reported.
July 2	26	1938	12	00	00	Normal. First 24 April, station reported.
July 2	27	1938	12	00	00	Normal. First 24 April, station reported.
July 2	28	1938	12	00	00	Normal. First 24 April, station reported.
July 2	29	1938	12	00	00	Normal. First 24 April, station reported.
July 2	30	1938	12	00	00	Normal. First 24 April, station reported.
July 2	31	1938	12	00	00	Normal. First 24 April, station reported.

Continued



Date	Sta- tion	Phase	G. C. T.			c d	Remarks
			h	m	s		
Continued							
July 4	LJ	iPNE	22	00	04		
		iSNE			18		
	H	iPZ			51		
		iSE		01	38		
July 5	P	iPZ	01	24	38		Tucson: iP = 01:25:01
	MW	iPZ			39		
	R	ePZ			40		
July 5	P	iPNZ	02	16	30		Normal. Wellington: 21°S., 169°E.
	PX	iSKSE			27.0		
		ePSE			28 26		
		eLE			44.1		
	MW	ePNEZ		16	29		
	R	ePZ			33		
	SB	iPEZ			27		
	LJ	ePN			27		
	T	iPNEZ			38		
		eE		27	13		
	H	iPNEZ		16	37		
	iZ		19	37			
July 5	P	iPZ	03	07	26		Normal. Wellington: 21°S., 169°E.
	PX	eSKSE			18.0		
	MW	ePEZ		07	27		
	R	iPZ			30		
	SB	ePZ			16		
	LJ	ePNE			18		
	T	iPNEZ			36		
		eE		18	11		
	H	ePNE		07	38		
July 5	P	iPZ	10	03	49		Probably same epicenter as the preceding.
	MW	iPZ			51		
	R	ePNEZ			53		
	T	ePNE		04	00		
	H	ePNEZ		03	57		
July 5	P	iPNEZ	18	07	09	d	Normal. 33°41'N., 117°32'W., O = 18:06:54. Santa Ana Mountains. Felt to distances of about 65 km. from from this epicenter. Boulder City (courtesy USRS): iP = 18:07:54, iS = 18:08:35 Tucson: eP = 18:08:23
		iSNE			18		
	MW	iPNEZ			08	d	
		iSNE			16		
	R	iPNEZ			02	d	
		iSNE			06		
	SB	iPZ			28		
		iSN			56		
LJ	iPNE			11	d		
	iSNE			23			
	iPZ			39			
	iSN		08	11			
July 5	MW	iPZ	22	19	09		Tucson: iPZ = 22:19:30
	R	ePZ			11		
July 5	P	iPZ	22	19	55		Normal. Δ = 87°. USCGS: 24°S., 173°E., O = 22:07.0 Wellington: 22°S., 171°E.
	PX	eSKSN			30 23		
		ePSE			31 47		
		eE			32 25		
		eLNE			43.7		
	MW	iPNEZ		19	57		
	R	iPNEZ			58		
	SB	iPNEZ			54		
	T	iPNEZ		20	05		
	H	ePNE			03		



No. 44

Pasadena and auxiliary stations

1938

Date	Sta- tion	Phase	G. C. T.			c d	Remarks
			h	m	s		
July 6	P MW R	iPZ iPZ ePZ	00	58	12		Tucson: iP = 00:58:49
July 6	P PX  MW R SB T H	iPNEZ iZ eSKSNE iE eEZ eLN iPNEZ ePNEZ ePNE ePE eNE	01	37	12	c	Normal. Strasbourg: 23.2°S., 171.3°E., O = 01:24.2 Wellington: 21°S., 169°E.
July 6	P MW R	iPZ iPZ ePZ	03	06	11		Tucson: iP = 03:06:34
July 6	MW R	eZ ePZ	04	00	54		Tucson: e = 04:01:16
July 6	MW R	iPZ ePZ	04	18	20		Tucson: e = 04:18:42
July 6	MW R	iPZ iPZ	04	59	35		Tucson: iP = 04:58:51
July 6	P MW R H	iPNZ iPZ ePNEZ ePE	06	15	18	c	Strasbourg: aftershock of shock at 01 <sup>h</sup> . Wellington: 21°S., 169°E.
July 6	P  MW  R  T  H	iPEZ iEZ: eSE iPZ iNEZ iSNEZ iPZ iPNEZ eSE iPNE iSNE iPZ iSNE	06	26	40		Normal. 35°48'N., 116°40'W., O = 06:26:06. South end of Death Valley, California. Not reported felt. Boulder City (courtesy USRS): P = 06:26:33, S = 06:26:52 Tucson: eP = 06:27:34, i = 06:27:56
July 6	R	iPZ	09	33	23		May not be seismic.
July 6	P MW R H	iPZ iPZ ePZ ePE	09	52	20		Strasbourg: same epicenter as shock at 01 <sup>h</sup> . Wellington: 22°S., 171°E.
July 6	P MW H	eZ eZ eE	13	13	10		South of Japan?
July 6	P MW R	iPZ iPZ iPZ	17	35	21		Tucson: iP = 17:35:40 c
July 6	P  MW  R	ePZ iSNE ePZ iPZ iSZ	18	21	08		Normal. 36.1°N., 114.8°W., O = 18:20:06 Boulder City (courtesy USRS): iP = 18:20:09. Felt at Boulder City. Tucson: eP = 18:21:24

Continued

No. 45

PASADENA and auxiliary stations

1938

Date	Sta- tion	Phase	G. C. T.			c d	Remarks
			h	m	s		
							Continued
July 6	T H	iPNEZ ePNE eSNE	18	21	05 56 31		
July 7	P MW R	iPZ iZ ePZ eZ iPZ	08	44	18 46 16 45 12		Tucson: iP = 08:43:19, e = 08:49:18
July 7	MW	iPZ	13	52	28		Tucson: iP = 13:52:52
July 7	P MW R T H	iPNZ iPNEZ ePNEZ ePEZ ePE	17	40	33 32 34 33 34	c	Tucson: eP=17:41:02
July 7	P MW R SB H	ePZ ePZ eZ ePZ ePN	18	06	06 06 13 08 18		Tucson: iP = 18:06:38
July 7	P MW R	iPZ iPZ iPZ	23	43	09 07 03		Tucson: eP = 23:42:06
July 8	MW R	iPZ eZ	11	35	20 24		Near Apia, which reports: iP = 11:24:31, iS = 11:25:31 Tucson: eP = 11:35:45
July 8	P MW R	iPZ iPZ iPZ	14	12	19 20 22		
July 8	P MW R	iPZ iPZ iPEZ	22	10	25 27 29		Tucson: iP = 22:10:49
July 9	P MW R	ePNEZ iPZ ePZ	06	34	16 16 14		Tucson: iP = 06:34:03
July 10	P MW R LJ	iPNEZ iSNEZ iPNEZ iSNE iPNEZ iSNEZ iPNZ iSNZ	18	06	50 18 50 15 41 08 35 46	c	Normal. 33°10'N., 116°25'W., O = 18:06:20. Reported felt in the mountainous area of San Diego County. Boulder City (courtesy USRS): eP = 18:07:20, eS = 18:07:55 Tucson: eP = 18:07:29, iP̄ = 18:07:52 Foreshock at 16 <sup>h</sup> 10 <sup>m</sup> .
July 11	P MW R SB LJ T H	iPNEZ iPNEZ iPNEZ iPNZ iPZ iPNEZ iPNEZ	02	00	11 12 14 08 09 21 19	d d d	Deep. Near Apia, which reports: P = 01:51:08, S = 01:52:36 Tucson: iP = 02:00:35 d
July 11	P MW R	iPZ iPZ ePZ	04	06	53 53 55		Tucson: iP = 04:07:15
July 12	MW R	iPZ iPZ	20	30	22 23		Tucson: iP = 20:29:29
July 12	MW R	iPZ iZ iPZ	04	43	39 02 41		Deep? Tucson: iP = 04:44:01

1933

TASCADA and auxiliary stations

No. 43

Year	Station	Phase	D. O. T.	Remarks
			P M S	
July 6	T	1P123	18 51 08	
	H	1P123	20 58 36	
	P	1P123	21 31 31	
July 7	P	1P123	08 44 18	Time: IP = 00:44:18, S = 00:44:18
	W	1P123	10 46 46	
	H	1P123	12 48 48	
	P	1P123	14 50 50	
July 8	W	1P123	16 52 52	Time: IP = 12:48:38
	H	1P123	18 54 54	Time: SP-IV:41:02
	P	1P123	20 56 56	
	H	1P123	22 58 58	
	P	1P123	24 00 00	Time: IP = 18:04:38
	W	1P123	26 02 02	
	H	1P123	28 04 04	
	P	1P123	30 06 06	
July 9	W	1P123	32 08 08	Time: SP = 23:42:02
	H	1P123	34 10 10	
	P	1P123	36 12 12	
July 10	H	1P123	38 14 14	
	P	1P123	40 16 16	
	W	1P123	42 18 18	
July 11	H	1P123	44 20 20	
	P	1P123	46 22 22	
	W	1P123	48 24 24	
July 12	H	1P123	50 26 26	
	P	1P123	52 28 28	
	W	1P123	54 30 30	
July 13	H	1P123	56 32 32	
	P	1P123	58 34 34	
	W	1P123	00 36 36	
July 14	H	1P123	02 38 38	
	P	1P123	04 40 40	
	W	1P123	06 42 42	
July 15	H	1P123	08 44 44	
	P	1P123	10 46 46	
	W	1P123	12 48 48	
July 16	H	1P123	14 50 50	
	P	1P123	16 52 52	
	W	1P123	18 54 54	
July 17	H	1P123	20 56 56	
	P	1P123	22 58 58	
	W	1P123	24 00 00	
July 18	H	1P123	26 02 02	
	P	1P123	28 04 04	
	W	1P123	30 06 06	
July 19	H	1P123	32 08 08	
	P	1P123	34 10 10	
	W	1P123	36 12 12	
July 20	H	1P123	38 14 14	
	P	1P123	40 16 16	
	W	1P123	42 18 18	
July 21	H	1P123	44 20 20	
	P	1P123	46 22 22	
	W	1P123	48 24 24	
July 22	H	1P123	50 26 26	
	P	1P123	52 28 28	
	W	1P123	54 30 30	
July 23	H	1P123	56 32 32	
	P	1P123	58 34 34	
	W	1P123	00 36 36	
July 24	H	1P123	02 38 38	
	P	1P123	04 40 40	
	W	1P123	06 42 42	
July 25	H	1P123	08 44 44	
	P	1P123	10 46 46	
	W	1P123	12 48 48	
July 26	H	1P123	14 50 50	
	P	1P123	16 52 52	
	W	1P123	18 54 54	
July 27	H	1P123	20 56 56	
	P	1P123	22 58 58	
	W	1P123	24 00 00	
July 28	H	1P123	26 02 02	
	P	1P123	28 04 04	
	W	1P123	30 06 06	
July 29	H	1P123	32 08 08	
	P	1P123	34 10 10	
	W	1P123	36 12 12	
July 30	H	1P123	38 14 14	
	P	1P123	40 16 16	
	W	1P123	42 18 18	
July 31	H	1P123	44 20 20	
	P	1P123	46 22 22	
	W	1P123	48 24 24	

Date	Sta- tion	Phase	G. C. T.			c d	Remarks
			h	m	s		
July 12	P	eZ	11	46	12		Tucson: eP = 11:46:34
		eZ			21		
	MW	eZ			13		
	R	eZ			17		
July 12	P	iPNEZ	12	49	33		Normal? Surface waves small. Wellington: 22°S., 170°E.
	PX	eSNE?	13	00.3			
		eLN			13.5		
	R	ePZ	12	49	36		
	T	ePE			45		
	H	ePNEZ			41		
July 12	P	iP'Z	20	27	39		Tucson: iP' = 20:27:46, e = 20:31:17. Very distant.
		eZ			31 05		
	MW	iP'Z			27 40		
		eZ			31 00		
	R	iP'Z			27 41		
	H	eP'NE			41		
July 13	MW	ePZ	04	18	15		Tucson: eP = 04:19:31
	R	iZ			22		
July 13	MW	iPZ	07	11	08		Tucson: iP = 07:11:45
July 14	MW	ePZ	06	04	39		Tucson: eP = 06:03:51
July 14	P	iPEZ	11	43	50		Normal. Mexico. Tucson: iP = 11:42:30, iSZ = 11:44:53
	PX	eLNEZ			46.6		
	MW	ePZ			43 44		
		iPZ			50		
	T	ePNE			44 13		
	H	ePZ			43 56		
July 14	MW	iPZ	19	28	43		Tucson: eP = 19:29:06
July 14	P	ePZ	23	43	57		Deep? Strasbourg: 21.5°S., 175.7°E. Wellington: 17°S., 175°E., h = 100 km. Apia reports: iP = 23:35:06, eS = 23:38:42, azimuth 235°, and gives Δ = 20°, h=80 km. The epicenter seems to be more to the West than those quoted above. Tucson: eP = 23:44:22, i = 23:44:40
		iZ			44 17		
		iZ			37		
	P6	eLE	24	11			
	MW	ePZ	23	43	58		
		iZ			44 10		
R	ePZ			43 59			
July 15	P	iPZ	05	05	33		Tucson: iP = 05:06:07
	MW	iPZ			33		
July 15	MW	iPZ	22	50	19		Tucson: iP = 22:49:46
	R	iPZ			17		
July 16	MW	ePZ	17	34	02		Tucson: eP = 17:33:25
July 16	P	ePZ	17	42	08		Near Apia, which reports: eP = 17:33:24, eS = 17:34:10 Tucson: eP = 17:42:27
	MW	ePZ			08		
	R	ePZ			08		
	H	eNEZ			19		
July 16	MW	ePZ?	20	39	18		Normal. Tucson: eP = 20:37:36, iP = 20:37:46, iS = 20:38:35
		eSZ			42 05		
July 17	P	eZ	13	03	52		Tucson: e = 13:05:07
	MW	eZ			54		
	R	eZ			04 00		
July 17	P	eZ	13	27	42		Tucson: eP = 13:28:12
	MW	iZ			43		
	R	eZ			45		
	H	eNE			46		
July 18	MW	ePZ	08	32	25		Near Apia, which reports: eP? = 08:23:21, eS = 08:24:31 Tucson: eP = 08:32:48
July 18	MW	iPZ	19	04	11		Tucson: iP = 19:04:49
	R	iPZ			14		
July 19	P	iPZ	09	09	49		Tucson: eP = 09:10:18
	MW	iPZ			49		

1958 PARALMMA and auxiliary stations No. 45

Date	Time	Station	Phase	Time	Remarks
July 15	11 58	P	42	11 58	Station 01 = 11:58:15
			43	51	
			45	13	
			46	14	
July 15	12 49	P	42	12 49	Normal surface waves null
			43	13 00.5	Station 02 = 12:49:55
			44	13 49	
			45	45	
			46	41	
July 15	12 57	P	42	12 57	Station 03 = 12:57:00, $\sigma = 20:01:14$
			43	31 05	Very distant.
			44	37 40	
			45	31 00	
			46	37 41	
			47	41	
July 15	06 18	P	42	06 18	Station 04 = 06:18:15
			43	28	
July 15	07 11	P	42	07 11	Station 05 = 07:11:15
July 15	08 04	P	42	08 04	Station 06 = 08:04:15
July 15	11 43	P	42	11 43	Normal, Mexico.
			43	46.6	Station 07 = 11:43:30, 123 = 11:44:30
			44	44	
			45	50	
			46	44	
			47	43	
			48	43	
July 15	12 57	P	42	12 57	Station 08 = 12:57:00
			43	43	Left instrument at 12:57:15
			44	44	Station 09 = 12:57:15, $\sigma = 100$ km.
			45	44	Left instrument at 12:57:30, $\sigma = 20:01:15$
			46	37	Left instrument at 12:57:30, $\sigma = 20:01:15$
			47	11	
			48	43	The epicenter seems to be near to the West than those quoted above.
			49	44	
			50	44	
			51	39	Station 10 = 12:57:00, $\sigma = 20:01:15$
			52	35	
July 15	22 50	P	42	22 50	Station 11 = 22:50:15
July 15	12 17	P	42	12 17	Station 12 = 12:17:15
July 15	14 48	P	42	14 48	Station 13, which reports:
			43	09	$\sigma = 17:03:15, \sigma = 17:04:10$
			44	09	Station 14 = 14:48:15
			45	49	
July 15	20 09	P	42	20 09	Normal, Station 15 = 20:09:15
			43	09	$\sigma = 20:07:46, \sigma = 20:08:20$
			44	09	Station 16 = 20:08:15
July 15	13 05	P	42	13 05	Station 17 = 13:05:15
			43	34	
			44	00	
July 15	13 27	P	42	13 27	Station 18 = 13:27:15
			43	45	
			44	45	
			45	45	
July 15	08 35	P	42	08 35	Left data, which reports:
			43	08	$\sigma = 08:33:41, \sigma = 08:34:11$
			44	08	Station 19 = 08:35:15
			45	11	
July 15	12 04	P	42	12 04	Station 20 = 12:04:15
			43	14	
July 15	08 09	P	42	08 09	Station 21 = 08:09:15
			43	49	

No. 47

PASADENA and auxiliary stations

1938

Date	Station	Phase	G. C. T.			c	Remarks
			h	m	s		
July 19	MW	iZ	12	16	54		May not be seismic.
July 20	P	ePZ	00	37	22		Destructive in Greece. 38°17'N., 23°45'E. (Strasbourg) Tucson: iP = 00:37:16
		ePPZ		41	24		
	PX	eLZ	01	19			
	MW	iPZ	00	37	22		
July 20		iPPZ		41	24		Epicenter in the Marianne Islands, (using Palau and Manila). Tucson: iP = 12:01:51
	P	iPNEZ	12	01	18		
		iZ		02	12		
		eSE		11	20		
	MW	iPZ		01	19		
		iZ		02	13		
July 20	R	ePZ		01	22		Atlantic Ocean about 5°N., 35°W., using Fort-de-France, Ottawa, Cartuja, Strasbourg and Stuttgart. Tucson: iP = 12:12:45
	SB	iPZ			17		
	H	ePEZ			18		
	P	iPNEZ	12	13	21		
July 20	MW	iPZ			20		Tucson: iP = 23:58:41
	R	iPZ			18	d	
	H	ePNEZ			21		
	P	iPNZ	23	58	18		
July 20	MW	iPZ			19		
	July 21	MW	iZ	08	59	11	
July 21	R	iZ		58	53		$\Delta = 141^\circ$ ? Africa? Tucson: iP = 09:30:12
	P	eNZ	09	30	20		
		eZ		33	38		
	MW	eZ		30	11		
	R	eZ			11		
July 21	SB	eP'Z			34		Tucson: iP = 14:19:33
	P	ePZ	14	18	54		
	MW	eZ			47		
		iZ			56		
July 21	R	eZ			51		Nevada? Tucson: eP = 06:08:12
	P	ePNZ	06	07	02		
		eSNEZ		08	06		
	MW	ePZ		06	55		
		iSZ		08	04		
July 22	T	iPZ		06	02		Normal? USCGS: 18.9°N., 107.0°W., 0 = 07:48.1 J.S.A: 18.9°N., 106.6°W., 0 = 07:48:11
	P	iPNEZ	07	52	22	d	
		iZ			46		
		iZ		53	07		
	PX	eSN?		54	44		
		iSN?		55	04		
		eLNZ		56	00		
	MW	iPNEZ		52	22	d	
	R	iPNEZ			18	d	
	SB	iPZ			36		
	LJ	ePNE			03		
	T	iPNEZ			52		
	H	ePNEZ			40		
July 22	P	eZ	09	01	21		Tucson: eP = 09:00:25
	MW	eZ			22		
July 23	P	ePZ	13	45	24		Normal. Aftershock, Mexico? Tucson: iP = 13:44:29 c
	PX	eLNE	14	09.5			
	MW	ePZ	13	45	24		
	R	ePZ			21		



1963

PARAMETERS and auxiliary stations

No. 47

Date	Time	Phase	G. C. T.			Remarks
			a	m	s	
July 21	15 18	12	15	16	36	May not be seismic.
July 21	15 19	12	15	16	36	May not be seismic.
July 21	15 20	12	15	16	36	May not be seismic.
July 21	15 21	12	15	16	36	May not be seismic.
July 21	15 22	12	15	16	36	May not be seismic.
July 21	15 23	12	15	16	36	May not be seismic.
July 21	15 24	12	15	16	36	May not be seismic.
July 21	15 25	12	15	16	36	May not be seismic.
July 21	15 26	12	15	16	36	May not be seismic.
July 21	15 27	12	15	16	36	May not be seismic.
July 21	15 28	12	15	16	36	May not be seismic.
July 21	15 29	12	15	16	36	May not be seismic.
July 21	15 30	12	15	16	36	May not be seismic.
July 21	15 31	12	15	16	36	May not be seismic.
July 21	15 32	12	15	16	36	May not be seismic.
July 21	15 33	12	15	16	36	May not be seismic.
July 21	15 34	12	15	16	36	May not be seismic.
July 21	15 35	12	15	16	36	May not be seismic.
July 21	15 36	12	15	16	36	May not be seismic.
July 21	15 37	12	15	16	36	May not be seismic.
July 21	15 38	12	15	16	36	May not be seismic.
July 21	15 39	12	15	16	36	May not be seismic.
July 21	15 40	12	15	16	36	May not be seismic.
July 21	15 41	12	15	16	36	May not be seismic.
July 21	15 42	12	15	16	36	May not be seismic.
July 21	15 43	12	15	16	36	May not be seismic.
July 21	15 44	12	15	16	36	May not be seismic.
July 21	15 45	12	15	16	36	May not be seismic.
July 21	15 46	12	15	16	36	May not be seismic.
July 21	15 47	12	15	16	36	May not be seismic.
July 21	15 48	12	15	16	36	May not be seismic.
July 21	15 49	12	15	16	36	May not be seismic.
July 21	15 50	12	15	16	36	May not be seismic.
July 21	15 51	12	15	16	36	May not be seismic.
July 21	15 52	12	15	16	36	May not be seismic.
July 21	15 53	12	15	16	36	May not be seismic.
July 21	15 54	12	15	16	36	May not be seismic.
July 21	15 55	12	15	16	36	May not be seismic.
July 21	15 56	12	15	16	36	May not be seismic.
July 21	15 57	12	15	16	36	May not be seismic.
July 21	15 58	12	15	16	36	May not be seismic.
July 21	15 59	12	15	16	36	May not be seismic.
July 21	15 60	12	15	16	36	May not be seismic.

No. 48

PASADENA and auxiliary stations

1938

Date	Sta- tion	Phase	G. C. T.			c d	Remarks
			h	m	s		
July 23	P	eZ	20	18	11		Tucson: eP = 20:18:53
		eZ			20		
	MW	eZ			13		
		iZ			21		
	R	eZ			16		
July 23	P	iPNEZ	23	13	40	c	Normal? New Guinea?
	MW	ePEZ			40	c	
	R	eZ			41		
	H	ePE			39		
July 24	P	ePZ	03	05	45		Baja California. Roughly 32.0°N., 116.2°W., 0 = 03:05:01 Boulder City (courtesy USRS): eP = 03:06:03 Tucson: eP = 03:06:12, iP = 03:06:26
		iPNEZ			49		
		iSN		06	20		
	MW	ePZ		05	44		
		iPZ			49		
	R	iPZ			33		
		iPZ			40		
	LJ	ePE			31		
	iPN			33			
	H	ePZ		06	11		
July 24	P	iPZ	13	19	42		Normal? USCGS: 53°N., 167°W., 0 = 13:12.2 J.S.A: 53.0°N., 164.0°W., 0 = 13:12:28, h = 50 km.
	PX	iSNE			25	41	
		eLNE			28	38	
		iScSNE			29	48	
	MW	iPZ			19	42	
	R	iPZ				46	
	SB	iPZ				35	
	LJ	ePNE				50	
		eSE			26	02	
		iScSE			29	55	
	T	iPNEZ			19	28	
		eSNE			25	37	
		eScSNE			29	36	
		iPNE			19	34	
	H	eSE			25	25	
July 24	MW	iPZ	18	47	24		Tucson: eP = 18:47:47
	R	ePZ			26		
	H	eE			42		
July 25	P	iPZ	08	09	13		Tucson: eP = 08:09:42
	MW	iPZ			14		
	R	iPZ			16		
July 25	MW	eZ	22	04	18		Tucson: e = 22:04:07
July 25	MW	eZ	23	54	58		
July 26	P	iPNZ	06	35	26	d	Normal. 35°35'N., 117°05'W., 0 = 06:34:57. Garlock fault, Mojave Desert. Boulder City (courtesy USRS): iP = 06:35:32, iS = 06:35:58 Tucson: iP = 06:36:28. Small aftershock at 06:47
		iSE			47		
	MW	iPZ			25	d	
		eSE			44		
	R	iPZ			25	d	
		iSEZ			47		
	SB	iPZ			41	d	
		iSN		36	16		
	T	iPZ		35	28		
	iSNE			51			
	H	ePE			14		
		iSNE			29		
July 26	MW	iPZ	07	02	07		Tucson: iP = 07:02:30
	R	ePZ			09		
July 26	P	eZ	15	38	47		Tucson: eP = 15:38:56
	MW	ePZ			41		



Date	Sta- tion	Phase	G. C. T.			c d	Remarks	
			h	m	s			
July 27	P	iPZ	11	23	34		Deep? Tucson: iP = 11:23:59. Near Apia, which reports: iP = 11:13:22, iS=11:14.0	
	MW	iPZ			34			
July 27	MW	eZ	11	53	01		Tucson: e = 11:53:32	
	R	eZ			04			
July 27	MW	ePZ	13	33	45		Tucson: iP = 13:33:22	
July 27	MW	iPZ	15	43	37		Tucson: iP = 15:43:05	
	R	iPZ			35			
July 27	P	ePZ	17	09	10			
	MW	ePZ			08			
July 27	P	iPZ	20	02	01	c	Tucson: iP = 20:02:05 c, i = 20:02:10. Arctic region?	
		iZ			06			
	MW	iPZ			01	c		
	R	iPZ			01			
	T	ePNE	01	44				
July 28	H	ePNE			49		Normal. Nevada. Roughly 37.6°N., 115.8°W., 0 = 16:38.5 Boulder City (courtesy USRS): P = 00:39:02, S = 00:39:29 Tucson: iP = 00:40:35, eSZ = 00:42:07 Smaller shocks from the same source at 00:00, 00:06, 00:07 etc., and 06:08.	
	P	iPZ	00	39	41			
		iSNEZ		40	35			
	MW	iPZ		39	40			
		iSZ		40	33			
	R	iPZ		39	39			
July 28	T	eSE		40	31			
		ePE		38	59			
	H	iSNE		39	29			
July 28	P	ePNE			08			
	H	iSNE			38			
July 28	P	ePZ	05	21	38			
	MW	iPZ			37			
	R	iPZ			40			
July 28	P	ePZ	08	27	47		Deep? Probably in the Kurile Islands. Tucson: iP = 08:28:24 c	
	MW	iPZ			48			
	R	iPZ			51			
	T	eE			49			
	H	eE			54			
July 28	MW	iZ	09	12	26			
	R	eZ			33			
July 28	P	iPZ	21	14	54		Deep? New Guinea?	
		iNEZ		15	10			
	MW	iPNEZ		14	58	c		
		iNEZ		15	12			
	R	iPZ		14	57			
		iZ		15	13			
July 29	T	eE			18			
	H	eE			16			
	P	iPZ	00	18	36			Tucson: iP = 00:19:13
	MW	iPZ			36			
R	iPZ			40				
SB	iPZ			29				
July 29	P	eP"Z	13	25	40		Normal? Surface waves small. Δ = 130°. USCGS: 1°N., 96°E., 0 = 13:06.2 Strasbourg: 0.3°N., 99.3°E., 0=13:06:45 J.S.A: 4.2°S., 100.5°E., 0 = 13:06:24	
		iP"Z			50			
		iPPNZ		28	08			
		iSKPNEZ		29	12			
	PX	eLEZ	14	09.3				
	MW	eP"NEZ	13	25	51			
		ePPZ		28	01			
		iSKPNEZ		29	14			
	R	iP"Z		25	52			
		iZ		26	03			
		ePPZ		28	07			
	iSKPZ		29	15				

Continued

No. 15 PARAGUAY and auxiliary stations 1951

Date	Time	Phase	G. O. T. (m s d)	Remarks
July 27	17 34	W	11 33 24	Station: 15 - 13:23:10
July 27	17 35	W	11 33 51	Station: 15 - 13:23:10
July 27	17 36	W	11 34 04	Station: 15 - 13:23:10
July 27	17 37	W	11 34 23	Station: 15 - 13:23:10
July 27	17 38	W	11 34 47	Station: 15 - 13:23:10
July 27	17 39	W	11 35 04	Station: 15 - 13:23:10
July 27	17 40	W	11 35 23	Station: 15 - 13:23:10
July 27	17 41	W	11 35 41	Station: 15 - 13:23:10
July 27	17 42	W	11 36 00	Station: 15 - 13:23:10
July 27	17 43	W	11 36 18	Station: 15 - 13:23:10
July 27	17 44	W	11 36 37	Station: 15 - 13:23:10
July 27	17 45	W	11 36 55	Station: 15 - 13:23:10
July 27	17 46	W	11 37 14	Station: 15 - 13:23:10
July 27	17 47	W	11 37 32	Station: 15 - 13:23:10
July 27	17 48	W	11 37 51	Station: 15 - 13:23:10
July 27	17 49	W	11 38 09	Station: 15 - 13:23:10
July 27	17 50	W	11 38 28	Station: 15 - 13:23:10
July 27	17 51	W	11 38 46	Station: 15 - 13:23:10
July 27	17 52	W	11 39 05	Station: 15 - 13:23:10
July 27	17 53	W	11 39 23	Station: 15 - 13:23:10
July 27	17 54	W	11 39 42	Station: 15 - 13:23:10
July 27	17 55	W	11 40 00	Station: 15 - 13:23:10
July 27	17 56	W	11 40 19	Station: 15 - 13:23:10
July 27	17 57	W	11 40 37	Station: 15 - 13:23:10
July 27	17 58	W	11 40 56	Station: 15 - 13:23:10
July 27	17 59	W	11 41 14	Station: 15 - 13:23:10
July 27	18 00	W	11 41 33	Station: 15 - 13:23:10
July 27	18 01	W	11 41 51	Station: 15 - 13:23:10
July 27	18 02	W	11 42 10	Station: 15 - 13:23:10
July 27	18 03	W	11 42 28	Station: 15 - 13:23:10
July 27	18 04	W	11 42 47	Station: 15 - 13:23:10
July 27	18 05	W	11 43 05	Station: 15 - 13:23:10
July 27	18 06	W	11 43 24	Station: 15 - 13:23:10
July 27	18 07	W	11 43 42	Station: 15 - 13:23:10
July 27	18 08	W	11 44 01	Station: 15 - 13:23:10
July 27	18 09	W	11 44 19	Station: 15 - 13:23:10
July 27	18 10	W	11 44 38	Station: 15 - 13:23:10
July 27	18 11	W	11 44 56	Station: 15 - 13:23:10
July 27	18 12	W	11 45 15	Station: 15 - 13:23:10
July 27	18 13	W	11 45 33	Station: 15 - 13:23:10
July 27	18 14	W	11 45 52	Station: 15 - 13:23:10
July 27	18 15	W	11 46 10	Station: 15 - 13:23:10
July 27	18 16	W	11 46 29	Station: 15 - 13:23:10
July 27	18 17	W	11 46 47	Station: 15 - 13:23:10
July 27	18 18	W	11 47 06	Station: 15 - 13:23:10
July 27	18 19	W	11 47 24	Station: 15 - 13:23:10
July 27	18 20	W	11 47 43	Station: 15 - 13:23:10
July 27	18 21	W	11 48 01	Station: 15 - 13:23:10
July 27	18 22	W	11 48 20	Station: 15 - 13:23:10
July 27	18 23	W	11 48 38	Station: 15 - 13:23:10
July 27	18 24	W	11 48 57	Station: 15 - 13:23:10
July 27	18 25	W	11 49 15	Station: 15 - 13:23:10
July 27	18 26	W	11 49 34	Station: 15 - 13:23:10
July 27	18 27	W	11 49 52	Station: 15 - 13:23:10
July 27	18 28	W	11 50 11	Station: 15 - 13:23:10
July 27	18 29	W	11 50 29	Station: 15 - 13:23:10
July 27	18 30	W	11 50 48	Station: 15 - 13:23:10
July 27	18 31	W	11 51 06	Station: 15 - 13:23:10
July 27	18 32	W	11 51 25	Station: 15 - 13:23:10
July 27	18 33	W	11 51 43	Station: 15 - 13:23:10
July 27	18 34	W	11 52 02	Station: 15 - 13:23:10
July 27	18 35	W	11 52 20	Station: 15 - 13:23:10
July 27	18 36	W	11 52 39	Station: 15 - 13:23:10
July 27	18 37	W	11 52 57	Station: 15 - 13:23:10
July 27	18 38	W	11 53 16	Station: 15 - 13:23:10
July 27	18 39	W	11 53 34	Station: 15 - 13:23:10
July 27	18 40	W	11 53 53	Station: 15 - 13:23:10
July 27	18 41	W	11 54 11	Station: 15 - 13:23:10
July 27	18 42	W	11 54 30	Station: 15 - 13:23:10
July 27	18 43	W	11 54 48	Station: 15 - 13:23:10
July 27	18 44	W	11 55 07	Station: 15 - 13:23:10
July 27	18 45	W	11 55 25	Station: 15 - 13:23:10
July 27	18 46	W	11 55 44	Station: 15 - 13:23:10
July 27	18 47	W	11 56 02	Station: 15 - 13:23:10
July 27	18 48	W	11 56 21	Station: 15 - 13:23:10
July 27	18 49	W	11 56 39	Station: 15 - 13:23:10
July 27	18 50	W	11 56 58	Station: 15 - 13:23:10
July 27	18 51	W	11 57 16	Station: 15 - 13:23:10
July 27	18 52	W	11 57 35	Station: 15 - 13:23:10
July 27	18 53	W	11 57 53	Station: 15 - 13:23:10
July 27	18 54	W	11 58 12	Station: 15 - 13:23:10
July 27	18 55	W	11 58 30	Station: 15 - 13:23:10
July 27	18 56	W	11 58 49	Station: 15 - 13:23:10
July 27	18 57	W	11 59 07	Station: 15 - 13:23:10
July 27	18 58	W	11 59 26	Station: 15 - 13:23:10
July 27	18 59	W	11 59 44	Station: 15 - 13:23:10
July 27	19 00	W	11 59 63	Station: 15 - 13:23:10

Date	Sta- tion	Phase	G. C. T.			c d	Remarks
			h	m	s		
Continued							
July 29	SB	iSKPZ	13	29	09		
	LJ	eP <sup>W</sup> NEZ		25	53		
		ePPEZ		28	25		
		eSKPZ		29	16		
	H	eP <sup>W</sup> E		25	49		
		ePPE		28	03		
		eSKPE		29	10		
July 29	P	iPZ	21	15	27		Normal. 34°45'N., 116°28'W., O=13:14:59. Mojave Desert. Boulder City (courtesy USRS) eP = 13:15:27, eS = 13:15:50. Tucson instruments disturbed.
		iNEZ!			29		
		iSZ			49		
		iSNE			52		
	MW	iPZ			26	c	
		iSN			46		
	R	iPZ			20	c	
		iSEZ			38		
	LJ	ePZ?			35		
		iSZ		16	02		
July 30	H	ePZ		15	36		
		eSN			55		
		iSE		16	02		
July 30	MW	iPZ	07	14	32		Tucson: iP = 07:13:57, e = 07:14:36
	R	iPZ			28		
		eZ			58		
July 30	P	ePZ	11	29	14		Normal. Location uncertain. Tucson: eP = 11:29:48, iP = 11:30:04. Small aftershock recorded at 11:54 and 20:07.
		iSN			51		
	MW	iPZ			15		
	R	ePZ		28	59		
	LJ	iSNZ		29	31		
July 31	P	ePZ	10	38	16		Normal. Nevada. 38.3°N., 115.8°W., O = 10:37:07. Boulder City (courtesy USRS): iP = 10:37:53, iS = 10:38:19 Tucson: iP = 10:38:57, iP! = 10:39:24 Aftershock at 12 <sup>h</sup> 42 <sup>m</sup> .
		iZ			29		
		iSN		39	21		
		iSEZ			24		
	MW	ePZ		38	15		
		iSZ		39	21		
	R	iPZ		38	15		
		iSEZ		39	19		
	T	iPZ		37	45		
		iSE		38	16		
	H	ePN		37	51		
	iSN		38	29			
July 31	MW	eZ	15	17	23		Normal. Tucson: iP = 15:15:03, iSZ = 15:15:37
	R	eZ			29		
July 31	P	ePZ	20	22	28		Tucson: iP = 20:22:52
	MW	eZ			29		
		eZ			46		
	R	iPZ			30		
July 31	P	ePNEZ	22	05	33	c	Deep? Tucson: iP = 22:06:05 c
	MW	iPZ			34	c	
	R	iPZ			37		
	SB	iPNZ			23		
	T	ePE			24		
	H	ePE			30		

1951

Station	Time	Phase	Amplitude	Remarks
Normal, ... No. 10, ... Station IP = 10:30:57, 121 = 10:30:52	1951	H	20	
	1951	T	20	
	1951	H	20	
	1951	H	20	
	1951	H	20	
	1951	H	20	
	1951	H	20	
	1951	H	20	
	1951	H	20	
	1951	H	20	
Normal, ... Station IP = 11:30:44, 121 = 11:30:40	1951	H	20	
	1951	T	20	
	1951	H	20	
	1951	H	20	
	1951	H	20	
	1951	H	20	
	1951	H	20	
	1951	H	20	
	1951	H	20	
	1951	H	20	
Normal, ... Station IP = 07:15:17, 121 = 07:15:13	1951	H	20	
	1951	T	20	
	1951	H	20	
	1951	H	20	
	1951	H	20	
	1951	H	20	
	1951	H	20	
	1951	H	20	
	1951	H	20	
	1951	H	20	

G. P. Richter

## Pasadena, California

We wish to acknowledge with thanks receipt of the following bulletins during November and December, 1938:

Adelaide	September, October, 1938
Adelaide	Year, 1934
Apia	July-September, 1938, No. 3
Brisbane	September, October, 1938, No. 13
Bucarest	October, November, 1938
Budapest	November, 1938, No. 38-51
Cape Girardeau	April, May, 1938, No. 4-7
Florissant	April, May, 1938, No. 4-6
Fort-de-France	July-September, 1938
Goettingen	January-September, 1938
Hamburg	August 15-October 29, 1938, No. 23-29
Helwan	September, 1938
Hong Kong	September, October, 1938
J.S.A.	July-September, 1938, No. 26-33
Kew	October, November, 1938
Ksara	October, 1938
La Paz	November 13-December 31, 1937, No. 39-46
La Paz	January 1-March 16, 1938, No. 1-13
La Plata	July-September, 1938, No. 7-9
Little Rock	April, May, 1938, No. 5-10
Madison	April-December, 1938
Manila	July-December, 1937
Manila	August-October, 1938, No. 29-37
Melbourne	July-September, 1938
New Zealand	September, October, 1938, No. E 79
Ottawa	August, 1938
Padova	Years 1935-1937
Parc St. Maur	September, 1938
Perth	September, October, 1938
Phu-Lien	April, May, 1938
Phu-Lien, preliminary	July, August, 1938
Riverview	August-October, 1938, No. 23-32
San Fernando	September, October, 1938
St. Louis	March-May, 1938, No. 1-9
Strasbourg, preliminary	November, 1938
Strasbourg	
Union Geodesique	July-September, 1938, No. 130-166
Bureau Central	August, September, 1938, No. 60-69
l'Institut	September, 1938
Strasbourg, Annuaire	1935
Stuttgart	October, November, 1938, No. 13-14
Sydney	August, September, 1938
Tiflis	January-June, 1937, No. 1-2
Tokyo	July-December, 1937
Weston, preliminary	October, November, 1938
Zinsen	August, September, 1938, No. 13-15