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PITTSBURGH, PENNSYLVANIA

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(This Bulletin is issued yearly)

STATION CONSTANTS AND INSTRUMENTS

Latitude—40° 26.7′ North

Longitude—79° 57.2′ West

Lithological foundation—Birmingham Shale—Pennsylvania age.

Elevation—273 meters above sea level.

Instruments

Two Wenner horizontal seismographs (Orientation N30°W and N60°E)

One Benioff vertical seismograph (long period recording only)

(The above instruments operate with photographic recording)

Time Service and Control

Time marks are given by two Observatory master clocks. One is a special astronomical type (used as stand-by), while the other is a Frodsham astronomical clock, (used for routine work).

Time signals are recorded automatically (or manually, depending on the weather conditions) several times daily. These signals are transmitted from Washington, D. C. via stations NSS and WWV, and from Ottawa via station CHU.

The average clock drift is one-half second per day.

Instrumental Constants

Magnification curves for the Wenner seismographs were given in No. 1 of this Bulletin. The magnification curve for the Benioff is not yet completed. The "nominal" magnification for this instrument is approximately 24,000.

The New Instrument Vault

A new instrument vault is being built in the Cathedral of Learning to house the mechanically recording pendula. Included in this vault will be an interferometer type tiltmeter and a well gage recorder. Construction has been halted for the duration of the war.

MICROSEISMIC ACTIVITY

These data have been evaluated according to the following scale:

HORIZONTAL AMPLITUDE	DESIGNATION
Less than 2 microns	Below normal
Between 2 and 3 microns	Normal
More than 3 microns	Above normal

	DATE	EVALUATION
January	1 – 3	Above normal
	3 – 6	Considerably above normal
	6 – 12	Above normal
	12 – 14	Slightly above normal
	14 – 15	Above normal
	15 – 18	Slightly above normal
	18 – 19	Above normal
	19 – 20	Considerably above normal
	20 – 31	No records taken
February	2 – 8	Above normal
	8 – 10	Slightly above normal
	10 – 14	Above normal
	14 – 15	Slightly above normal
	15 – 17	Above normal
	17 – 18	Normal
	18 – 19	Slightly above normal
	19 – 20	Above normal
	20 – 21	Slightly above normal
	21 – 23	Normal
	23 – 24	Slightly below normal
	24 – 27	Normal
	27 – 28	Slightly above normal
March	1 – 3	Normal
	3 – 6	Above normal
	6 – 8	Slightly above normal
	8 – 9	Above normal
	9 – 10	Slightly above normal

	DATE	EVALUATION
	10 – 12	Slightly below normal
	12 – 15	Normal
	15 – 16	Slightly above normal
	16 – 18	Normal
	18 – 19	Slightly above normal
	19 – 20	Normal
	20 – 23	Above normal
	23 – 25	Slightly above normal
	25 – 28	Normal
	28 – 29	Above normal
	29 – 31	Normal
April	1 – 2	Above normal
	2 – 6	Slightly above normal
	6 – 9	Normal
	9 – 11	Slightly above normal
	11 – 13	Above normal
	13 – 14	Considerably above normal
	14 – 16	Above normal
	16 – 17	Slightly above normal
	17 – 18	Normal
	18 – 19	Slightly below normal
	19 – 20	Slightly above normal
	20 – 22	Above normal
	22 – 24	Slightly above normal
	24 – 26	Normal
	26 – 27	Slightly below normal
	27 – 30	Normal
May	1 – 3	Above normal
	3 – 5	Slightly above normal
	5 – 9	Normal
	9 – 13	Above normal
	13 – 15	Slightly above normal
	15 – 18	Normal
	18 – 22	Slightly above normal
	22 – 31	Above normal

	DATE	EVALUATION
June	1 – 4	Normal
	4 – 5	Above normal
	5 – 9	Slightly above normal
	9 – 11	Above normal
	11 – 17	Normal
	17 – 23	Slightly above normal
	23 – 24	Normal
	24 – 27	Slightly above normal
	27 – 29	Normal
	29 – 30	Slightly above normal
July	1 – 6	Normal
	6 – 11	Slightly above normal
	11 – 13	Normal
	13 – 14	Slightly above normal
	14 – 19	Normal
	19 – 20	Slightly below normal
	20 – 21	Normal
	21 – 23	Above normal
	23 – 25	Slightly above normal
	25 – 30	Normal
	30 – 31	Slightly below normal
August	1 – 2	Slightly below normal
	2 – 4	Normal
	4 – 7	Above normal
	7 – 8	Slightly above normal
	8 – 15	Normal
	15 – 18	Slightly above normal
	18 – 21	Above normal
	21 – 24	Normal
	24 – 31	Above normal
September	1 – 2	Normal
	2 – 9	Above normal
	9 – 13	Slightly above normal
	13 – 14	Above normal
	14 – 15	Normal
	15 – 17	Above normal
	17 – 20	Slightly above normal
	20 – 22	Normal

MICROSEISMIC ACTIVITY (Cont'd)

	DATE	EVALUATION
	22 – 27	Slightly above normal
	27 – 28	Above normal
	28 – 29	Considerably above normal
	29 – 30	Above normal
October	1 – 3	Slightly above normal
	3 – 14	Above normal
	14 – 17	Considerably above normal
	17 – 31	Above normal
November	1 – 2	Above normal
	2 – 4	Slightly above normal
	4 – 13	Above normal
	13 – 15	Considerably above normal
	15 – 21	Above normal
	21 – 24	Considerably above normal
	24 – 30	Above normal
December	1 – 2	Above normal
	2 – 5	Considerably above normal
	5 – 6	Above normal
	6 – 9	Considerably above normal
	9 – 10	Above normal
	10 – 14	Considerably above normal
	14 – 22	Above normal
	22 – 23	Considerably above normal
	23 – 25	Above normal
	25 – 26	Considerably above normal
	26 – 29	Above normal
	29 – 31	Considerably above normal

SECTION ON SEISMIC DATA

(Earthquakes for which preliminary phases have been identified, or for which preliminary epicenters have been worked out, are numbered in the left hand column as of No. 1, September 8, 1939.) It was on this date that our new station was placed in operation.

	GNWCH DATE		COMPNT.	PHASE	GMT	
	Jan.	20-31	No records taken			
	Feb.	6	NW	e	03-41-19	
107	Feb.	16	NW	iP	07-36-57	Δ(S-P) = 47° = 5,220 kms.
				iS	07-44-27	H = 07-28-57 (G.M.T.)
				e(sS)	07-46-32	Depth = 300 kms. approx.
	Feb.	17	Seismic activity centering about 04h20m (G.M.T.)			
108	Feb.	22	Z-NE	iP	09-26-50	Δ(S-P) = 30.8° = 3,423 kms.
			Z	iL	09-37-43	H = 09 – 20 – 30 (G.M.T.)
			NE	iS	09-31-53	U.S.C.G.S. gives
				i	09-32-12	H = 09h20.8m (G.M.T.)
						Lat. 17.6° North
						Long. 101.3° West
109	Mar.	5	Z	iP	00-38-42	Δ(S-P) = 35° = 3,890 kms.
			NE	iS	00-44-16	H = 00-31-46 (G.M.T.)
						U.S.C.G.S. gives
						H = 0h 31m 47s (G.M.T.)
						Lat. 5.8° North
						Long. 82.8° West
110	Mar.	7	Z	iP	03-12-34	Δ(S-P) = 68.6° = 7,621 kms.
			NE	iS	03-21-36	H = 03-01-27 (G.M.T.)
						U.S.C.G.S. gives
						H = 3h01.5m (G.M.T.)
						Lat. 57 ±° North
						Long. 164 ±° East
	Mar.	9	Z-NW	i	03-25-53	U.S.C.G.S. gives
			Z-NW-NE	i	03-26-15	H = 3h 25m 32s (G.M.T.)
						Lat. 42.2° North
						Long. 80.9° West
111	Mar.	9	NW	ePP	10-07-50	Δ = 109° = 12,110 kms.
			NW	e(PPP)	10-10-09	H = 09-49-00 (G.M.T.)
			NW	e(SKS)	10-14-06	U.S.C.G.S. gives
			NW	ePS	10-17-19	H = 9h 48m 37s (G.M.T.)
						Lat. 56° South
						Long. 22° West

	GNWCH DATE	COMPNT.	PHASE	GMT	
	Mar. 14	NW	e(PS)	17-37-15	U.S.C.G.S. gives
		NW	e	17-42-35	Δ = 13,300 kms.
		NW	e(M)	17-34-27	H = 17h 11.0m (G.M.T.)
					Lat. 22 ± ° South
					Long. 170 ± ° East
112	Mar. 14	Z	iP	18-48-01	Δ(S-P) = 60.2° = 6,688 kms.
		Z	ipP	18-48-29	H = 18-38-09 (G.M.T.)
		NW-NE	iS	18-56-05	depth = 120 ± kms.
		NE	i(sS)	18-56-54	U.S.C.G.S. gives
					Δ = 6,750 kms.
					H = 18h 37.8m (G.M.T.)
					Lat. 21 ± ° South
					Long. 71 ± ° West
	Mar. 15	NW	e	03-12-27	U.S.C.G.S. gives
		NW	eM	03-28-27	Δ = 13,350 kms.
					H = 2h 24.6m (G.M.T.)
					Lat. 21 ± ° South
					Long. 169 ± ° East
	Mar. 15	NW	e(L)	05-41-48	U.S.C.G.S. gives
		NW	e(M)	05-41-10	Δ = 13,000 kms.
					H = 4h 47.9m (G.M.T.)
					Lat. 10 ± ° North
					Long. 142 ± ° East
113	Mar. 15	NW	iSKS	23-23-04	Δ = 102° = 11,335 kms.
		NW	iS	23-24-15	H = 22-59-39 (G.M.T.)
		NW	isS	23-26-27	depth 300 ± kms.
					U.S.C.G.S. gives
					Δ = 11,550 kms.
					H = 22h 59.2m (G.M.T.)
					depth 300 ± kms
					Lat. 14 ± ° South
					Long. 174 ± ° West
	Mar. 20	NW	e	5-47-38	

	GNWCH DATE	COMPNT.	PHASE	GMT	
	Mar. 21	NW	e	21-04-42	U.S.C.G.S. gives
		NW	e(SS)	21-12-55	Δ = 14,150 kms.
		NW	e(M)	21-30-28	H = 20h 35.4m (G.M.T.)
					Lat. 6 ± ° South
					Long. 146 ± ° East
	Mar. 25	NW	e	18-47-00	
		NW	e	18-54-48	
		NW	e(L)	19-19-10	
	Mar. 26	NE	e	17-57-37	
		NE-NW	e	18-03-07	
		NE-NW	e	18-06-30	
	Apr. 1	Seismic activity centering about 15h 30m (G.M.T.)			
	Apr. 6	Z-NW-NE i		16-20-58	U.S.C.G.S. gives
		Z-NW-NE e(L)		16-43-44	Δ = 8,080 kms.
		Other phases indiscernible			H = 16h 07.1m (G.M.T.)
		due to overlapping trace.			Lat. 32° South
					Long. 70° West
	Apr. 7	NW	e	13-18-26	
		NW	e(S)	13-27-40	
		NW	e(L)	13-21-16	
114	Apr. 7	Z	iP	23-29-15	Δ(S-P) = 71.6° = 7,956 kms.
		NW-NE	eS	23-38-34	H = 23-17-50 (G.M.T.)
		NW	eM	00-02-18	
115	Apr. 9	NW	e(P′)	09-07-22	Δ = 108° = 12,000 kms.
		NW	i(SKS)	09-13-21	H = 08-48-43 (G.M.T.)
		NW	iS	09-14-54	depth 100 ± kms.
		NW	isS	09-15-44	U.S.C.G.S. gives
					Δ = 12,000 kms.
					H = 8h 48.8m (G.M.T.)
					depth about 100 kms.
					Lat. 19° North
					Long. 195° East
	Apr. 11	NW	e	13-10-34	
		NW	i	13-23-37	
		NW	e(L)	13-39-45	

GNWCH	DATE	COMPNT.	PHASE	GMT	
	Apr. 15	NW	e	11-26-45	
		NW	e	11-56-37	
	Apr. 17	NE	e	01-05-31	
		NW	e(L)	01-07-18	
	Apr. 19	NW	e(P)	01-25-15	
		NW	i(S)	01-28-35	
		NW	e(L)	01-31-27	
	Apr. 29	NE	i	15-47-49	
		NE	e	15-48-23	
116	May 2	Z	iP	17-24-49	Δ(S-P) = 33.4° = 3,711 kms.
		NW	i(S)	17-30-10	H = 17-18-17 (G.M.T.)
		Other phases indiscernible due to overlapping trace.			depth 100 ± kms. U.S.C.G.S. gives Δ = 3,740 kms. H = 17h 18.2m (G.M.T.) depth probably 50-100 kms. Lat. 6.4° North Long. 80.1° West
117	May 3	Z	iP′	02-18-07	Δ = 123° = 13,665 kms.
		Z	iPP	02-19-50	H = 01-59-09 (G.M.T.)
		NW	i(SKS)	02-25-11	The Jesuit S.A. gives
		NW	i(SKKS)	02-26-42	H = 01-59-11 (G.M.T.) Lat. 11.8° North Long. 123.0° East
	May 13	NE	e	23-41-04	
		NE	e(L)	23-41-23	
		NW	e(M)	23-44-23	
	May 16	Much undecipherable long period activity. 02h 45m 41s (G.M.T.)			
	May 17	NW	eL	17-37-36	
	May 18	NW	e	06-25-23	
		NW	i	06-26-08	
		NW	e	06-34-47	
	May 21	NW-NE	eL	07-48-17	

GNWCH	DATE	COMPNT.	PHASE	GMT	
118	May 22	NW	eP	09-13-14	Δ(S-P) = 71.4° = 7,934 kms.
		NW-NE	iS	09-22-32	H = 09-01-50 (G.M.T.)
119	May 25	Z	iP′	23-26-38	Δ = 126° = 14,000 kms.
		Z	i(PP)	23-28-42	H = 23-07-41 (G.M.T.)
		NE	iSS	23-35-35	U.S.C.G.S. gives Δ = 14,100 kms. H = 23h 7.6m (G.M.T.) Lat. 7 1/2° North Long. 126 1/2° East
	May 26	NW	e	10-37-00	U.S.C.G.S. gives
		NW	e	10-38-21	Δ = 3,600 kms.
		NW	i	10-42-44	H = 10h 31.4m (G.M.T.)
		NW	i(S)	10-43-08	Lat. 17 1/2° North Long. 106 1/2° West
	May 31	NW	e	02-38-00	
		NW	e(L)	02-44-21	
	June 1	NW	e	04-26-51	
		NW	e	04-28-11	
		NW	e(L)	04-32-22	
120	June 2	Z	iP	05-29-24	Δ(S-P) = 25.2° = 2,802 kms.
		NW-NE	iS	05-33-47	H = 05-23-55 (G.M.T.)
	June 3	NE	e	20-18-26	
		NE	e(L)	20-49-13	
	June 7	NE	e	19-05-59	
		NE	i	19-06-15	
	June 7	NW	e	23-43-03	
		NW	i	23-50-41	
		NE	e(L)	00-31-33	
121	June 8	NW	eP′	21-02-20	U.S.C.G.S. gives
		NW-NE	i(SKP)	21-06-00	Δ = 13,260 kms. H = 20h 42.2m (G.M.T.) Lat. 19° North Long. 116° East

	GNWCH DATE	COMPNT.	PHASE	GMT	
122	June 9	Z	e(P′)	03-25-58	U.S.C.G.S. gives
		NE	i(SKP)	03-29-32	Δ = 14,240 kms.
					H = 3h 6.7m (G.M.T.)
					Lat. 9° North
					Long. 120° East
123	June 13	Z	iP	05-24-39	Δ(S-P) = 89° = 9,890 kms.
		Z	ePP	05-28-12	H = 05-11-41 (G.M.T.)
		NE	iS	05-35-27	U.S.C.G.S. gives
					Δ = 9,890 kms.
					H = 5h 11m 44s (G.M.T.)
					Lat. 43° North
					Long. 142° East
124	June 13	Z	iP	08-49-55	Δ(S-P) = 89° = 9,890 kms.
		NE	iS	09-00-43	H = 08-36-57 (G.M.T.)
					1st aftershock
					U.S.C.G.S. gives
					Δ = 9,890 kms.
					H = 8h 37.0m (G.M.T.)
125	June 13	NW	eS	18-03-03	Δ(S-H) = 89° = 9,890 kms.
					H = 17-39-18 (G.M.T.)
					2d aftershock
					U.S.C.G.S. gives
					H = 17h 39.3m (G.M.T.)
126	June 14	NW	eP	03-17-17	Δ(S-P)? = 14° = 1,555 kms.
		NW	e(S)	03-19-53	H = 03-13-55 (G.M.T.)
		NW	e(L)	03-21-33	
127	June 15	NW	eP	11-23-43	Δ(S-P) = 89° = 9,890 kms.
		NE	iS	11-34-30	H = 11-10-45 (G.M.T.)
		NW	eL	12-01-06	U.S.C.G.S. gives
					4th aftershock to
					earthquake on June 13.
					Δ = 9,890 kms.
					H = 11h 10.8m (G.M.T.)

	GNWCH DATE	COMPNT.	PHASE	GMT	
128	June 15	NE-NW	eP	18-27-37	Δ(S-P) = 28° = 3,110 kms.
		NE	i(S)	18-32-19	H = 18-21-42 (G.M.T.)
					U.S.C.G.S. gives
					Δ = 3,150 kms.
					H = 18h 21.7m (G.M.T.)
					Lat. 14 1/2° North
					Long. 93° West
129	June 15	NE-NW	eP	19-51-23	Δ(S-P) = 28° = 3,110 kms.
		NE-NW	iS	19-56-06	H = 19-45-28 (G.M.T.)
					U.S.C.G.S. gives
					1st aftershock
					Δ = 3,150 kms.
					H = 19h 45.4m (G.M.T.)
130	June 15	NE	eP	20-31-35	Δ = 28° = 3,110 kms.
		NW	e(S)	20-36-18	H = 20-25-40 (G.M.T.)
					U.S.C.G.S. gives
					2d aftershock
					Δ = 3,150 kms.
					H = 20h-25.6m (G.M.T.)
	June 18	NE	M	14-30-22	
	June 18	NE	e	17-03-24	
		NE	e	17-04-55	
	June 19	NE	e	09-31-40	
		NW	eL	09-56-54	
	June 20	NE-NW	eS	15-54-40	
		NW	eL	16-10-42	
131	June 20	NE-NW	eP	17-51-48	Δ(S-P) = 80° = 8,890 kms.
		NW	iS	18-01-52	H = 17-39-35 (G.M.T.)
		NW	eL	18-17-28	
	June 23	NW	e	23-08-15	
		NW	e	23-11-39	
		NW	e(L)	23-16-09	
	June 24	NW	e	06-01-21	

	GNWCH DATE	COMPNT.	PHASE	GMT	
	June 24	NW	e	20-48-05	
		NW	e	21-13-57	
	June 28	NW	e	03-11-25	
		NW	e	03-36-26	
	June 29	Z	i	09-27-13	
		NW	e	09-27-08	
		NW	e(M)	09-43-48	
132	June 30	Z	iP	11-07-19	Δ(S-P) = 20.5° = 2,275 kms.
		NW	iS	11-11-04	H = 11-03-36 (G.M.T.)
		NW	e(L)	11-13-28	
133	June 30	NW	iP	20-22-32	Δ (S-P) = 54.7° = 6,077 kms.
		NW	iS	20-30-08	H = 20-13-04 (G.M.T.)
		NW	i	20-31-03	deeper than normal
					U.S.C.G.S. gives
					Δ = 6,130 kms.
					H = 20h 13.0m (G.M.T.)
					possibly deeper than normal
					Lat. 14 1/2° South
					Long. 74° West
134	July 4	NW-NE	eP	09-58-21	Δ(S-P) = 31.5° = 3,500 kms.
		NW-NE	eS	10-03-29	H = 09-51-55 (G.M.T.)
					U.S.C.G.S. gives
					Δ = 3,520 kms.
					H = 9h 52.1m (G.M.T.)
					depth possibly, 100 kms.
					Lat. 9° North
					Long. 84 1/2° West
	July 4	NE	e	22-11-01	
		NE	e(L)	22-15-01	
135	July 5	NE-NW	iP	21-17-32	Δ(S-P) = 57.2° = 6,357 kms.
		NE-NW	iS	21-25-27	H = 21-07-41 (G.M.T.)
					U.S.C.G.S. gives
					Δ = 6,490 kms.
					H = 21h 7.6m (G.M.T.)
					Lat. 17 1/2° South
					Long. 73° West

	GNWCH DATE	COMPNT.	PHASE	GMT	
	July 6	NW	i	09-57-27	
		NE	e	09-59-11	
	July 6	NE	e	11-42-44	
		NE-NW	e	11-45-07	
	July 6	NE-NW	e	13-20-22	
		NE-NW	e	13-25-44	
	July 6	NW	i	22-13-35	N.E.S.A. Bulletin No.121 gives
		NE	i	22-14-11	H = 22-10-14.5 (G.M.T.)
					Lat. 44.9° North
					Long. 73.2° West
	July 7	NE-NW	e(L)	13-48-13	
	July 8	NE	e	13-59-28	
		NE	e(L)	14-03-18	
	July 9	Seismic activity centering about 23h 40m (G.M.T.)			
136	July 11	NE	e(P′)	02-29-10	Δ = ca 113° ± = ca 12,550 kms.
		NE	iPP	02-30-03	H = 02-10-30 (G.M.T.)
		NE	ePS	02-39-33	
		NW	iSS	02-45-42	
	July 14	NE-NW	e(L)	11-07-03	
	July 14	NE	e	20-05-02	
		NE	e	20-10-34	
		NE	e(L)	20-48-51	
137	July 15	NE-NW	eP	12-28-17	Δ(S-P) = 23.1° = 2,566 kms.
		NE	e(S)	12-32-25	H = 12-24-09 (G.M.T.)
		NE	e(L)	12-34-26	
	July 18	NE	e	08-14-11	
	July 19	NE	e	11-15-46	
		NE	e	11-21-09	
	July 21	NE	e(P)	04-26-19	depth more than normal?
		NW	e(S)	04-36-15	
138	July 22	NE	eP	02-17-11	Δ(S-P) = 38.7° = 4,297 kms.
		NE	e(S)	02-23-08	H = 02-09-44 (G.M.T.)

GNWCH	DATE	COMPNT.	PHASE	GMT	
139	July 23	NW	eP′	15-12-42	Δ = ca 145° = ca 16,110 kms.
		NE-NW	iPP	15-16-04	H = 15-53-02 (G.M.T.)
		NE	i(SS)	15-34-53	U.S.C.G.S. gives
					Δ = 15,300 kms.
					H = 15h 52.9m (G.M.T.)
					depth normal
					Lat. 10 1/2° South
					Long. 117 1/2° East
	July 28	NE	e	04-22-56	
		NE	i	04-27-03	
		NE	e	04-29-22	
	July 29	NE	eP	03-07-34	U.S.C.G.S. gives
			other phases unde-		Δ = 2,670 kms.
			cipherable		H = 03h 02m 14s (G.M.T.)
					Lat. = 18.9° North
					Long. = 67.0° West
	July 29	NE	e(P)	11-48-34	
		NE	e(S)	11-52-27	
140	July 30	NW	eP	01-07-48	Δ(S-P) = 22.7° = 2,522 kms.
		NE	iS	01-11-52	H = 01-02-44 (G.M.T.)
	July 30	NW	e	21-31-32	
		NW	e	21-32-37	
141	July 31	NW	eP	03-27-26	Δ(S-P) = 22.7° = 2,522 kms.
		NW	eS	03-31-30	H = 03-22-22 (G.M.T.)
					aftershock?
142	July 31	NW	eP	20-08-26	Δ(S-P) = 22.7° = 2,522 kms.
		NW	eS	20-12-30	H = 20-03-22 (G.M.T.)
					aftershock?
	Aug. 1	NW	e(S)	01-22-00	
		NW	e(L)	01-28-06	
	Aug. 1	NW	e	14-02-54	
	Aug. 1	NW	i	16-43-36	
	Aug. 2	NE	e	01-08-08	
		NE	i	01-09-14	
		NE	e(L)	01-49-04	
	Aug. 7	NW	e	11-29-25	
		NW	e	11-31-03	

GNWCN	DATE	COMPNT.	PHASE	GMT.	
143	Aug. 8	(Z)-NW	e	00-44-02	Δ(S-P) = 24° = 2,665 kms.
		NE-NW	i	00-48-16	H = 00-39-47 (G.M.T.)
	Aug. 9	NW	e	05-41-10	
		NW	e	05-42-27	
		NE	i	05-46-06	
	Aug. 10	NW	e	14-10-32	
144	Aug. 10	NW	e(P)	15-24-32	Δ(S-P) = 72° = 8,000 kms.
		NE	e	15-29-40	H = 15-13-05 (G.M.T.)
		NE	iS	15-33-53	U.S.C.G.S. gives
					Δ = 8,050 kms.
					H = 15h 13.3m (G.M.T.)
					Lat. 54° North
					Long. 161° East
	Aug. 11	NW	e	13-30-10	
	Aug. 12	NE-NW	e	05-15-10	
	Aug. 12	NW	e	11-32-10	
	Aug. 13	NE-NW	e	07-55-41	
		NW	e	08-01-58	
	Aug. 14	NE	e	04-51-40	
145	Aug. 15	NW	e(P)	00-18-27	Δ(S-P) = 24° = 2,665 kms.
		NE-NW	iS	00-22-47	H = 00-13-10 (G.M.T.)
		NE-NW	eL	00-24-35	
	Aug. 22	NW	e(P)	11-15-07	
		NW	e	11-22-30	
		NW	e(L)	11-42-14	
	Aug. 26	NW	e(L)	01-31-49	
		NW	e	01-33-54	
	Aug. 29	NW	e	03-03-36	
		NE	e	03-06-26	
	Aug. 29	NE	i	04-01-20	
	Aug. 31	NW	e(L)	15-45-43	
146	Aug. 31	NW	eP	16-16-31	Δ(S-P) = 28.6° = 3,176 kms.
		NE	iS	16-21-17	H = 16-10-31 (G.M.T.)
					U.S.C.G.S. gives
					H = 16h 10.5m (G.M.T.)
					Lat. 13.5° North
					Long. 91.5° West

	GNWCH DATE	COMPNT.	PHASE	GMT	
147	Sept. 5	NW	e(P′)	08-53-47	Δ = ca 134° = ca 14,890 kms.
		NW	i(SKP)	08-57-23	H = 08-34-28 (G.M.T.)
		NW	iSKKS	09-03-13	U.S.C.G.S. gives
					Δ = 14,900 kms.
					H = 8h 34.8m (G.M.T.)
					Lat. 0°
					Long. 125° East
148	Sept. 6	NE-NW	eP′	04-00-42	Δ = 141° = 15,665 kms.
		NE	iPP	04-03-46	H = 03-41-10 (G.M.T.)
		NE	e(SKKS)	04-10-37	U.S.C.G.S. gives
					Δ = 15,500 kms.
					H = 3h 41.5m (G.M.T.)
					Lat. 53.2° South
					Long. 159.4° East
	Sept. 7	NE	e(L)	19-46-10	
149	Sept. 11	NE-NW	e(S)	19-58-50	Δ = ca 97.5° = ca 10,835 kms.
		NW	e(PS)	20-00-14	H = 19-33-50 (G.M.T.)
					U.S.C.G.S. gives
					Δ = 10,900 kms.
					H = 19h 34.0m (G.M.T.)
					Lat. 16 1/2° South
					Long. 173° West
150	Sept. 14	NW	e(P′)	02-19-00	Δ = ca 117° = ca 13,000 kms.
		NW	iSKS	02-27-00	H = 02-01-20 (G.M.T.)
		NW	eSP	02-31-02	
	Sept. 14	NE	ePP	04-07-14	
		NE	eL	04-46-14	
151	Sept. 14	NE	i	07-37-13	Δ = ca 116° = ca 12,890 kms.
		NE-NW	eSKS	07-43-20	H = 07-17-44 (G.M.T.)
		NW	iPS	07-47-16	
	Sept. 17	NW	eL	10-35-49	
	Sept. 19	NW	e	05-06-11	
		NW	i	05-09-11	
	Sept. 20	NW	iS	01-05-27	U.S.C.G.S. gives
					Δ = 3,640 kms.
					H = 0h 53.7m (G.M.T.)
					Lat. 19 1/2° North
					Long. 109° West

	GNWCH DATE	COMPNT.	PHASE	GMT.	
	Sept. 22	NW	i	23-30-51	
		NW	e	23-42-25	
152	Sept. 23	NE-NW	iP	15-06-23	Δ(S-P) = 26.5° = 2,945 kms
		NE-NW	e	15-06-53	H = 15-00-42 (G.M.T.)
		NE	iS	15-10-56	U.S.C.G.S. gives
					Δ = 3,050 kms.
					H = 15h 00.5m (G.M.T.)
					Lat. 15° North
					Long. 92° West
	Sept. 24	NW	i	06-59-46	
		NW	e(M)	07-26-11	
	Sept. 24	NW	e(L)	12-26-33	
	Sept. 26	NW	e	02-31-24	
		NW	e(L)	03-37-07	
	Sept. 26	NW	e	18-30-35	
		NW	e(L)	18-44-19	
	Sept. 27	Seismic activity centering about 23h (G.M.T.)			
	Sept. 28	NW	e(L)	12-40-48	
	Oct. 1	NW	i	18-09-04	
		NW	e(L)	18-12-39	
	Oct. 2	NW	i(L)	11-34-13	
		NW	e(M)	11-41-05	
	Oct. 3	NW	e	01-06-52	
		NW	e	01-10-52	
		NW	e(L)	01-18-50	
	Oct. 4	NW	e	11-04-46	
		NW	i	11-09-28	
		NW	e(L)	11-26-28	
	Oct. 13	NW	i	04-55-27	
		NW	i	04-57-22	
		NW	i	04-58-22	
	Oct. 20	NW	e	04-21-37	
153	Oct. 21	NW	iSKS	23-33-13	Δ = ca 110° = ca 12,220 kms.
		NW	e	23-34-26	H = 23-08-00 (G.M.T.)
		NW	e(PS)	23-36-36	U.S.C.G.S. gives
					Δ = 12,200 kms.
					H = 23h 07.7m (G.M.T.)
					Lat. = 16.5° South
					Long. 178° East

	GNWCH DATE	COMPNT.	PHASE	GMT	
154	Oct. 23	NW	iPP	17-42-55	Δ = ca 116° = ca 12,890 kms.
		NW	iSKS	17-48-36	H = 17-23-01 (G.M.T.)
		NE-NW	iPS	17-53-32	U.S.C.G.S. gives
					Δ = 12,850 kms.
					H = 17h 23.3m (G.M.T.)
					Lat. 25° North
					Long. 92.5° East (Assam)
	Oct. 24	NW	e	16-24-48	
		NW	e	16-29-44	
		NW	i	16-30-32	
		NW	e(L)	16-53-56	
	Oct. 24	NW	Seismic activity about 17h (G.M.T.)		
	Oct. 26	NW	e	05-04-54	
		NW	e(L)	05-06-49	
	Nov. 2	NW	e	18-23-54	
		Other phases indiscernible due to overlapping trace.			
155	Nov. 3	NE-NW	iP	14-40-49	Δ(P-S) = 46.2° = 5,132 kms.
		NW	eS	14-47-36	H = 14-32-10 (G.M.T.)
					U.S.C.G.S. gives
					Δ = 5,200 kms.
					H = 14h 32.3m (G.M.T.)
					Lat. 62° North
					Long. 151° West (Alaska)
	Nov. 4	NW	e(P)	06-20-53	
		NW	i	06-37-44	
		NW	eM	06-52-42	
	Nov. 5	NW	eL	11-01-07	
156	Nov. 6	NE-(NW)	iP′	08-50-30	Δ = ca 135° = ca 15,000 kms.
		NE	i(PP)	08-53-05	H = 08-31-07 (G.M.T.)
		Other traces indiscernible due to overlapping trace and strong microseisms.			U.S.C.G.S. gives
					Δ = 15,000 kms.
					H = 8h 31.6m (G.M.T.)
					Lat. 5.5° South
					Long. 134° East (Banda Sea)
	Nov. 8	Seismic activity about 07h 30m (G.M.T.) Phases indiscernible due to strong microseisms.			

	GNWCH DATE	COMPNT.	PHASE	GMT	
	Nov. 9	Seismic activity about 12h 00m (G.M.T.) Phases indiscernible due to strong microseisms			
157	Nov. 16	NW	iP	11-47-35	Δ(S-P) = 54.9° = 6,099 kms.
		NW	iS	11-55-15	H = 11-38-00 (G.M.T.)
	Nov. 16	NW	e(L)	18-48-28	
	Nov. 20	NW	eM	19-01-58	
	Nov. 24	NW	Seismic activity centering about 14h (G.M.T.)		
158	Nov. 26	NE-(NW)	eP	22-32-53	Δ(S-P) = 81.7° = 9,077 kms.
		NE	iS	22-43-06	H = 22-20-31 (G.M.T.)
					U.S.C.G.S. gives
					Δ = 9,000 kms.
					H = 22h 20.7m (G.M.T.)
					Lat. 41° North
					Long. 36° East (Turkey)
	Nov. 28	NW	e	07-38-35	
	Nov. 28	NW	e(L)	17-49-57	
	Nov. 29	NW	i(P)	19-48-09	Δ(S-P) = 68.5° = 7,610 kms.
		NW	iS	19-57-10	H = 19-37-02 (G.M.T.)
159	Dec. 1	NW	e(PP)	06-25-39	Δ = ca 127° = ca 14,110 kms.
		NW	e	06-31-41	H = 06-04-31 (G.M.T.)
		NW	ePS	06-35-40	
160	Dec. 1	NW	iP	10-44-58	Δ(S-P) = 60° = 6,665 kms.
		NW	iS	10-53-05	H = 10-35-03 (G.M.T.)
					depth 100 ± kms.
					U.S.C.G.S. gives
					H = 10h 34.7m (G.M.T.)
					depth probably about 100 kms.
					Lat. 20.2° South
					Long. 68.1° West
					(Southwest Bolivia)
	Dec. 2	NW	i	05-33-03	
		NW	e(L)	05-52-35	
	Dec. 3	NW	Seismic activity centering about 07h (G.M.T.) Phases indiscernible due to strong microseisms		
	Dec. 9	NW	e(L)	03-53-16	

	GNWCH DATE	COMPNT.	PHASE	GMT	
161	Dec. 21	NW	iP	13-52-19	Δ(S-P) = 28.8° = 3,198 kms.
		NW	eS	13-57-08	H = 13-46-17 (G.M.T.)
					U.S.C.G.S. gives
					Δ = 3,140 kms.
					H = 13h 46.4m (G.M.T.)
					depth between normal
					and 100 kms.
					Lat. 13° North
					Long. 70.5° West (Gulf of
					Venezuela)
	Dec. 22	NW	e	07-17-30	
		NW	e	07-23-14	
	Dec. 22	NW	i(P)	12-59-04	
			other phases indiscernible		
			due to strong microseisms		
	Dec. 23	NW	Seismic activity		U.S.C.G.S. gives
			centering about 16h		H = 15h 56.0m (G.M.T.)
			(G.M.T.). Phases		depth between normal
			indiscernible due		and 100 kms.
			to overlapping		Lat. 13.3° North
			trace and strong		Long. 70.4° West
			microseisms		(Gulf of Venezuela)
162	Dec. 23	NE-(NW)	iPP	19-20-42	Δ = ca 124° = ca 13,780 kms.
		NW	iSKS	19-25-57	H = 18-59-53 (G.M.T.)
		NW	i(PS)	19-30-31	U.S.C.G.S. gives
					Δ = 13,800 kms.
					H = 19h 00.1m (G.M.T.)
					Lat. 6° South
					Long. 152° East
					(East of New Guinea)
	Dec. 24	NW	iS	01-11-37	
	Dec. 24	NW	i	02-18-37	
	Dec. 24	NW	eL	06-04-54	
	Dec. 24	NW	eL	12-42-27	
	Dec. 25	NW	eL	05-33-49	
	Dec. 25	NW	i	08-28-40	
			i	08-30-53	
	Dec. 26	NW	eL	05-09-51	
	Dec. 30	NW	eL	23-05-08	