

**SEISMOLOGICAL
OBSERVATORY BULLETIN
UNIVERSITY OF PITTSBURGH**

1945



PITTSBURGH, PENNSYLVANIA

Seismological Observatory Bulletin

University of Pittsburgh

VOLUME I

NO. 5

JANUARY - DECEMBER, 1945

EUGENE L. SULKOWSKI, *Acting Seismologist*

EUGENE NEY, *Assistant*

PITTSBURGH, PENNSYLVANIA

~

(This Bulletin is issued yearly)

STATION CONSTANTS AND INSTRUMENTS

Latitude— $40^{\circ} 26.7'$ North.

Longitude— $79^{\circ} 57.2'$ West.

Lithological foundation—Birmingham Shale—Pennsylvania age.

Elevation—273 meters above sea level.

Instruments

Two Wenner horizontal seismographs (Orientation N 30° W and N 60° 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 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.

Instrument 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.

New Instrument Vault

A new instrument vault has been 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.

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 - 11	Considerably above normal
	11 - 16	Normal
	16 - Feb. 2	Considerably above normal
February	2 - 7	Above normal
	7 - 15	Considerably above normal
	15 - 18	Above normal
	18 - 22	Slightly above normal
	22 - 25	Considerably above normal
	25 - Mar. 2	Above normal
March	2 - 7	Slightly above normal
	7 - 9	Considerably above normal
	9 - 10	Slightly above normal
	10 - 13	Normal
	13 - 15	Above normal
	15 - 20	Slightly above normal
	20 - 24	Considerably above normal
	24 - Apr. 2	Normal
April	2 - 7	Above normal
	7 - 10	Slightly above normal
	10 - 21	Normal
	21 - 24	Above normal
	24 - May 2	Slightly above normal
May	2 - 5	Considerably above normal
	5 - 9	Above normal
	9 - 13	Slightly above normal
	13 - 22	Normal
	22 - 23	Slightly above normal
	23 - June 2	Normal

(4)

MICROSEISMIC ACTIVITY

5

	DATE	EVALUATION
June	2 - 9	Above normal
	9 - 18	Normal
	18 - 23	Below normal
	23 - 25	Normal
	25 - 27	Slightly above normal
	27 - July 3	Normal
July	3 - 8	Below normal
	8 - 14	Normal
	14 - Aug. 7	Below normal
August	7 - 13	Normal
	13 - 18	Above normal
	18 - 19	Normal
	19 - 20	Below normal
	20 - 22	Normal
	22 - 27	Slightly below normal
	27 - 31	Above normal
	31 - Sept. 2	Normal
September	2 - 6	Above normal
	6 - 10	Slightly above normal
	10 - 16	Normal
	16 - 17	Above normal
	17 - 20	Considerably above normal
	20 - 23	Normal
	23 - 25	Considerably above normal
25 - Oct. 3	Normal	
October	3 - 4	Above normal
	4 - 6	Considerably above normal
	6 - 8	Slightly above normal
	8 - 9	Normal
	9 - 11	Above normal
	11 - 13	Considerably above normal
	13 - 17	Slightly above normal
	17 - 19	Normal
	19 - 22	Above normal
	22 - 24	Slightly above normal
24 - 26	Considerably above normal	

	DATE	EVALUATION
	26 - 28	Above normal
	28 - 30	Considerably above normal
	30 - Nov. 9	Slightly above normal
November	9 - 10	Normal
	10 - 11	Considerably above normal
	11 - 13	Slightly above normal
	13 - 15	Normal
	15 - 18	Considerably above normal
	18 - 19	Slightly above normal
	19 - 20	Considerably above normal
	20 - 24	Above normal
	24 - 25	Considerably above normal
	25 - 27	Above normal
	27 - 29	Slightly above normal
	29 - Dec. 1	Considerably above normal
December	1 - 5	Slightly above normal
	5 - 8	Considerably above normal
	8 - 9	Above normal
	9 - 16	Considerably above normal
	16 - 19	Above normal
	19 - 23	Considerably above normal
	23 - 24	Above normal
	24 - 28	Slightly above normal
	28 - Jan. 1	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.

SEISMIC DATA

9

GNWCH	DATE	COMPNT.	PHASE	GMT	
	Jan. 22	Z	e	07-51-55	
		H	L	07-55-53	
	Feb. 10	Z	iP	05-10-40	U.S.C.G.S. gives H = 04h 57.9m (G.M.T.) $\Delta = 10,050$ kms. Lat. 41.5° North Long. 142.0° East
	Feb. 13	Seismic activity centering about 11h 35m (G.M.T.) Phases indiscernible due to strong microseisms			
	Feb. 14	Seismic activity centering about 03h 15m (G.M.T.) Phases indiscernible due to strong microseisms			
	Feb. 18	Seismic activity centering about 07h 00m (G.M.T.) Seismic activity centering about 10h 30m (G.M.T.)			
	Feb. 20	H	eL	07-46-41	
	Feb. 26	Seismic activity centering about 22h 45m (G.M.T.)			
200	Mar. 11	Z	iP	18-03-53	
		H	e	18-06-37	
	Mar. 11	Z	iP	21-51-02	$\Delta(S-P) = 85.9^\circ = 9,545$ kms.
		H	e	21-24-52	H = 21-38-25 (G.M.T.)
		H	eS	22-01-37	
201	Mar. 18	Z	iP	00-04-38	$\Delta(S-P) = 33.4^\circ = 3,710$ kms.
		Z	i	00-05-48	H = 23-57-55 (G.M.T.)
		H	iS	00-10-07	
		Seismic activity centering about 19h 15m (G.M.T.)			
	Mar. 31	Z	i	07-04-31	
		Z	i	10-00-40	
	Apr. 2	Seismic activity centering about 23h 07m (G.M.T.)			
202	Apr. 15	Z	iP	02-46-25	$\Delta(S-P) = 67.2^\circ = 7,465$ kms.
		Z	eP	02-46-29	H = 02-35-35 (G.M.T.)
		H	iS	02-55-25	U.S.C.G.S. gives H = 02h 35.2m (G.M.T.) $\Delta = 7,750$ kms. Lat. 56° North Long. 146° East

GNWCH DATE	COMPNT.	PHASE	GMT	
Apr. 15	H	i	20-01-40	U.S.C.G.S. gives
	H	e	20-02-14	H = 19h 50.6m (G.M.T.)
	H	i	20-03-32	$\Delta = 3,300$ kms. Lat. 22.5° North Long. 108.0° West
Apr. 19	H	e	13-23-58	U.S.C.G.S. gives H = 13h 03.5m (G.M.T.) $\Delta = 13,600$ kms. Lat. 40° South Long. 179° East
203 Apr. 21	Z	iP	17-20-42	$\Delta(S-P) = 30.5^\circ = 3,390$ kms.
	H	i	17-21-12	H = 17-14-25 (G.M.T.)
	H	eS	17-25-51	U.S.C.G.S. gives H = 17h 14.5m (G.M.T.) $\Delta = 3,100$ kms. Lat. 19.3° North Long. 100.6° West Depth (probable) = 50-100 km
Apr. 23	Seismic activity centering about 07h 10m (G.M.T.)			
Apr. 29	H	e	20-32-08	
204 May 1	Z	eP	06-07-41	$\Delta(S-P) = 58.2^\circ = 6,465$ kms. H = 05-57-50 (G.M.T.)
	Z	iP	06-07-43	
	H	eS	06-15-48	
	H	i	06-16-20	
May 9	Z	e	03-49-35	
	H	e	03-49-44	
	H	e	03-52-18	
	H	i	03-52-41	
	H	i	02-38-06	
205 May 10	H	eP	18-02-55	$\Delta(S-P) = 54.1^\circ = 6,010$ kms.
	Z	e	18-03-37	H = 18-53-33 (G.M.T.)
	H	eS	18-10-36	

GNWCH DATE	COMPNT.	PHASE	GMT	
May 13	Seismic activity centering about 20h 45m (G.M.T.)			
206 May 19	Z	eP	08-01-46	$\Delta(S-P) = 29.2^\circ = 3,245$ kms.
	H	iS	08-06-46	H = 07-55-41 (G.M.T.) U.S.C.G.S. gives H = 7h 55.8m (G.M.T.) $\Delta = 3,250$ kms. Lat. 16.0° North Long. 98.4° West
207	Z	iP	15-13-57	$\Delta(S-P) = 33.7^\circ = 3,745$ kms.
	H	iS	15-19-28	H = 15-07-12 (G.M.T.) U.S.C.G.S. gives H = 15h 07.0m (G.M.T.) Lat. 40.2° North Long. 126.8° West
May 28	Seismic activity centering about 10h 45m (G.M.T.)			
208 June 1	H	eP	15-23-43	$\Delta(S-P) = 57.7^\circ = 6,410$ kms.
	H	eS	15-31-48	H = 15-13-56 (G.M.T.)
	H	e	15-33-22	
June 1	H	eL	22-40-48	
209 June 3	Z	iP	13-11-58	$\Delta(S-P) = 32.2^\circ = 3,580$ kms.
	H	ePP	13-12-54	H = 13-05-26 (G.M.T.)
	H	iS	13-17-19	U.S.C.G.S. gives H = 13h 05.6m (G.M.T.) Lat. 8.3° North Long. 82.6° West
June 4	H	e	16-03-56	
June 6	H	e	06-18-09	
	H	eL	06-59-12	
June 6	H	e	12-13-13	
	H	eL	12-15-24	
June 7	Seismic activity centering about 12h 45m (G.M.T.)			
June 14	H	e	00-07-14	
	H	eL	03-45-50	
June 17	H	eL	16-34-38	

GNWCH DATE	COMPNT.	PHASE	GMT	
210 June 20	Z	iP	01-36-02	$\Delta(S-P) = 80.9^\circ = 8,990$ kms.
	H	ePP	01-39-12	H = 01-23-50 (G.M.T.)
	H	eS	01-46-09	
	H	i	01-46-12	
	Seismic activity centering about 09h 56m (G.M.T.)			
	Seismic activity centering about 18h 30m (G.M.T.)			
	U.S.C.G.S. gives			
	H = 17h 35.0m (G.M.T.)			
	$\Delta = 9,200$ kms.			
	Lat. 45° North			
	Long. 153° East			
211 June 22	Z	iP	09-31-11	$\Delta(S-P) = 83.3^\circ = 9,255$ kms.
	Z	i	09-31-13	H = 09-18-47
	Z	i	09-31-42	U.S.C.G.S. gives
	H	ePP	09-34-56	H = 09h 18.5m (G.M.T.)
	H	eS	09-41-22	$\Delta = 9,700$ kms.
	H	iS	09-41-33	Lat. 43° North
	H	i	09-44-55	Long. 146° East
	H	eSS	09-47-15	
June 22	H	e	18-19-12	
	H	eS	18-25-16	
	H	i	18-28-26	
	H	eL	18-56-14	
212 June 24	H	eP	20-09-34	$\Delta(S-P) = 72.9^\circ = 8,100$ kms.
	H	ePP	20-12-38	H = 19-58-08 (G.M.T.)
	H	eS	20-19-05	
213 June 27	Z	iP	13-14-23	$\Delta(S-P) = 29.3^\circ = 3,255$ kms.
	Z	iS	13-19-34	H = 13-08-17 (G.M.T.)
	Z	i	13-23-50	U.S.C.G.S. gives
	H = 13h 08.2m (G.M.T.)			
	$\Delta = 3,250$ kms.			
	Lat. 26° North			
	Long. 110° West			
June 27	Z	eP	18-14-11	U.S.C.G.S. gives
	(Other phases indiscernible) H = 18h 08.1m (G.M.T.)			

GNWCH DATE	COMPNT.	PHASE	GMT	
				$\Delta = 3,300$ kms.
				Lat. 27° North
				Long. 112° West
June 28	Seismic activity centering about 17h 40m (G.M.T.)			
214 June 30	Z	iP	05-38-48	$\Delta(S-P) = 39.3^\circ = 4,365$ kms.
	Z	i	05-40-59	H = 05-31-18 (G.M.T.)
	H	eS	05-44-58	U.S.C.G.S. gives
	H	e	05-46-56	H = 05h 31.3m (G.M.T.)
	$\Delta = 4,500$ kms.			
	Lat. 17° North			
	Long. 116° West			
July 2	Seismic activity centering about 08h 50m (G.M.T.)			
July 3	Seismic activity centering about 04h 32m (G.M.T.)			
215 July 9	Z	iP	16-49-22	$\Delta(S-P) = 35.9^\circ = 3,990$ kms.
	H	e	16-51-46	H = 16-05-47 (G.M.T.)
	H	iS	16-55-09	U.S.C.G.S. gives
	H = 16h 41.8m (G.M.T.)			
	Lat. 1° North			
	Long. 77° West			
216 July 11	Z	iP	00-39-13	$\Delta(S-P) = 48^\circ = 5,335$ kms.
	H	e	00-41-20	H = 00-30-35 (G.M.T.)
	H	eS	00-46-16	
	H	eSS	00-49-32	
	H	e	00-55-52	
July 15	H	e	05-54-19	U.S.C.G.S. gives
	H	i	05-59-48	H = 5h 35.0m (G.M.T.)
	Lat. 17° North			
	Long. 145° East			
July 17	Seismic activity centering about 07h 08m (G.M.T.)			
July 22	Seismic activity centering about 11h 50m (G.M.T.)			
July 23	H	e	04-17-45	
July 26	Z	iP	10-34-16	$\Delta(S-P) = 7.63^\circ = 848$ kms.
	H	iS	10-35-43	U.S.C.G.S. gives
	H = 10h 32m 16s (G.M.T.)			
	Lat. 34.3° North			
	Long. 81.4° West			

GNWCH DATE	COMPNT.	PHASE	GMT	
July 29	Seismic activity centering about 19h 10m (G.M.T.)			
July 31	Seismic activity centering about 5h 25m (G.M.T.)			
Aug. 2	Seismic activity centering about 21h 05m (G.M.T.)			
	U.S.C.G.S. gives			
	H = 20h 44.8m (G.M.T.)			
	Lat. 54.2° North			
	Long. 133.1° West			
Aug. 3	Seismic activity centering about 4h 40m (G.M.T.)			
	U.S.C.G.S. gives			
	H = 4h 11.3m (G.M.T.)			
	Lat. 4.4° North			
	Long. 82.1° West			
217 Aug. 6	H	eP	23-10-28	$\Delta(S-P) = 44.7^\circ = 4,965$ kms
	H	sS	23-17-11	H = 23-02-15 (G.M.T.)
	H	eSS	23-20-15	
Aug. 7	Seismic activity centering about 23h 5m (G.M.T.)			
Aug. 8	Seismic activity centering about 10h 40m (G.M.T.)			
218 Aug. 10	H	eP	11-25-53	$\Delta(S-P) = 26.5^\circ = 2,945$ kms.
	H	eS	11-30-32	H = 11-20-13 (G.M.T.)
	U.S.C.G.S. gives			
	H = 11h 20.3m (G.M.T.)			
	Lat. 15.4° North			
	Long. 88.8° West			
Aug. 10	H	e	14-19-25	
219 Aug. 11	H	eP	00-40-35	$\Delta(S-P) = 32.2^\circ = 3,580$ kms.
	H	eS	00-45-56	H = 00-34-04 (G.M.T.)
	H	eSS	00-47-41	U.S.C.G.S. gives
	H = 0h 33.5m (G.M.T.)			
	Lat. 4.4° North			
	Long. 82.1° West			
Aug. 14	H	e	12-29-48	
Aug. 17	Seismic activity centering about 19h 40m (G.M.T.)			

GNWCH DATE	COMPNT.	PHASE	GMT	
220 Aug. 21	Z	iP	16-37-30	$\Delta(S-P) = 48.8^\circ = 5,420$ kms.
	Z	i	16-37-42	H = 16-28-46 (G.M.T.)
	H	iS	16-44-38	
	H	i	16-45-37	
	Seismic activity centering about 20h 50m (G.M.T.)			
Aug. 22	Seismic activity centering about 06h 10m (G.M.T.)			
Aug. 27	Seismic activity centering about 08h 25m (G.M.T.)			
Aug. 29	Seismic activity centering about 11h 30m (G.M.T.)			
221 Sept. 2	H	eP	12-04-59	$\Delta(S-P) = 73.2^\circ = 8,135$ kms.
	H	i	12-05-54	H = 11-53-32 (G.M.T.)
	H	ePP	12-07-39	U.S.C.G.S. gives
	H	i	12-11-58	H = 11h 53.9m (G.M.T.)
	H	eS	12-14-32	Lat. 34° North
	H	e	12-15-01	Long. 30° East
	H	e	12-17-05	
Sept. 3	Seismic activity centering about 13h 30m (G.M.T.)			
Sept. 5	Seismic activity centering about 22h 50m (G.M.T.)			
Sept. 6	Seismic activity centering about 15h 50m (G.M.T.)			
Sept. 7	Seismic activity centering about 17h 10m (G.M.T.)			
Sept. 9	H	e	04-23-03	
	H	eS	04-28-40	
	H	e	04-34-09	
222 Sept. 13	Z	iP	11-28-43	$\Delta(S-P) = 71.2^\circ = 7,910$ kms.
	H	e	11-31-29	H = 11-17-28 (G.M.T.)
	H	iS	11-38-04	U.S.C.G.S. gives
	H = 11h 17.0m (G.M.T.)			
	Lat. 34° South			
	Long. 70° West			
	Depth = about 90 kms.			
Sept. 13	H	e	21-17-30	
	H	e	21-22-13	

GNWCH DATE	COMPNT.	PHASE	GMT	
223 Sept. 14	Z	eP	02-11-18	$\Delta(S-P) = 49.7^\circ = 5,520$ kms.
	H	eS	02-18-32	H = 02-02-27 (G.M.T.)
	H	i	02-18-34	
Sept. 17	Seismic activity centering about 01h 15m (G.M.T.)			
Sept. 22	Seismic activity centering about 10h 30m (G.M.T.)			
Sept. 23	Z	eP	07-27-42	
	Z	i	07-28-10	
	H	e	07-29-00	
Sept. 23	H	e	10-11-10	
Sept. 26	Seismic activity centering about 04h 05m (G.M.T.)			
	Seismic activity centering about 14h 30m (G.M.T.)			
Sept. 28	Seismic activity centering about 23h 05m (G.M.T.)			
	U.S.C.G.S. gives			
	H = 22h 24m 05s (G.M.T.)			
	Lat. $41^\circ 40'$ North			
	Long. $126^\circ 55'$ West			
224 Oct. 7	Z	iP	13-29-23	$\Delta(S-P) = 28.1^\circ = 3,120$ kms.
	Z	i	13-32-43	H = 13-23-18 (G.M.T.)
	H	e	13-33-30	U.S.C.G.S. gives
	H	iS	13-34-15	H = 13h 23.4m (G.M.T.)
	H	i	13-35-29	Lat. 12.3° North
	Long. 89.0° West			
Oct. 9	Z	i	14-49-11	U.S.C.G.S. gives
	H	i	15-00-36	H = 14h 36.6m (G.M.T.)
	Lat. 43° North			
	Long. 150° East			
225 Oct. 11	Z	iP	16-58-34	$\Delta(S-P) = 27.8^\circ = 3,090$ kms.
	Z	iPP	16-58-53	H = 16-52-41 (G.M.T.)
	H	eS	17-03-24	U.S.C.G.S. gives
	H = 16h 52.7m (G.M.T.)			
	Lat. 17° North			
	Long. 97° West			
Oct. 16	Z	eP	16-22-05	U.S.C.G.S. gives
	Z	i	16-25-41	H = 8h 01.2m (G.M.T.)
	Lat. 59.0° North			
	Long. 140.0° West			

GNWCH DATE	COMPNT.	PHASE	GMT	
Oct. 25	Z	iP	15-09-49	
	Other phases indiscernible due to microseisms			
226 Oct. 27	Z	iP	11-30-06	$\Delta(S-P) = 24.6^\circ = 2,735$ kms.
	Z	i	11-30-08	H = 11-24-45 (G.M.T.)
	Z	iPPP	11-30-51	
	H	iS	11-34-30	
Oct. 29	Seismic activity centering about 11h 30m (G.M.T.)			
Nov. 3	Seismic activity centering about 22h 40m (G.M.T.)			
Nov. 27	Seismic activity centering about 22h 35m (G.M.T.)			
Dec. 8	Seismic activity centering about 01h 55m (G.M.T.)			
	Phases indiscernible due to microseisms			
	U.S.C.G.S. gives			
	H = 1h 04.0m (G.M.T.)			
	Lat. 1° South			
	Long. 148° East			
Dec. 9	Seismic activity centering about 21h 05m (G.M.T.)			
	Phases indiscernible due to microseisms			
	U.S.C.G.S. gives			
	H = 20h 45.6m (G.M.T.)			
	Lat. 15° North			
	Long. 92° East			
Dec. 23	Z	iP	08-16-43	
	Other phases indiscernible due to microseisms			
	U.S.C.G.S. gives			
	H = 08h 09.9m (G.M.T.)			
	Lat. 10.2° North			
	Long. 61.7° West			
Dec. 25	Z	iP	01-36-48	
Dec. 27	Seismic activity centering about 05h 40m (G.M.T.)			
	U.S.C.G.S. gives			
	H = 04h 41.0m (G.M.T.)			
	Lat. 6° South			
	Long. 148° East			
Dec. 28	Seismic activity centering about 18h 40m (G.M.T.)			
	U.S.C.G.S. gives			
	H = 18h 48.8m (G.M.T.)			
	Lat. 6° South			
	Long. 151° East			