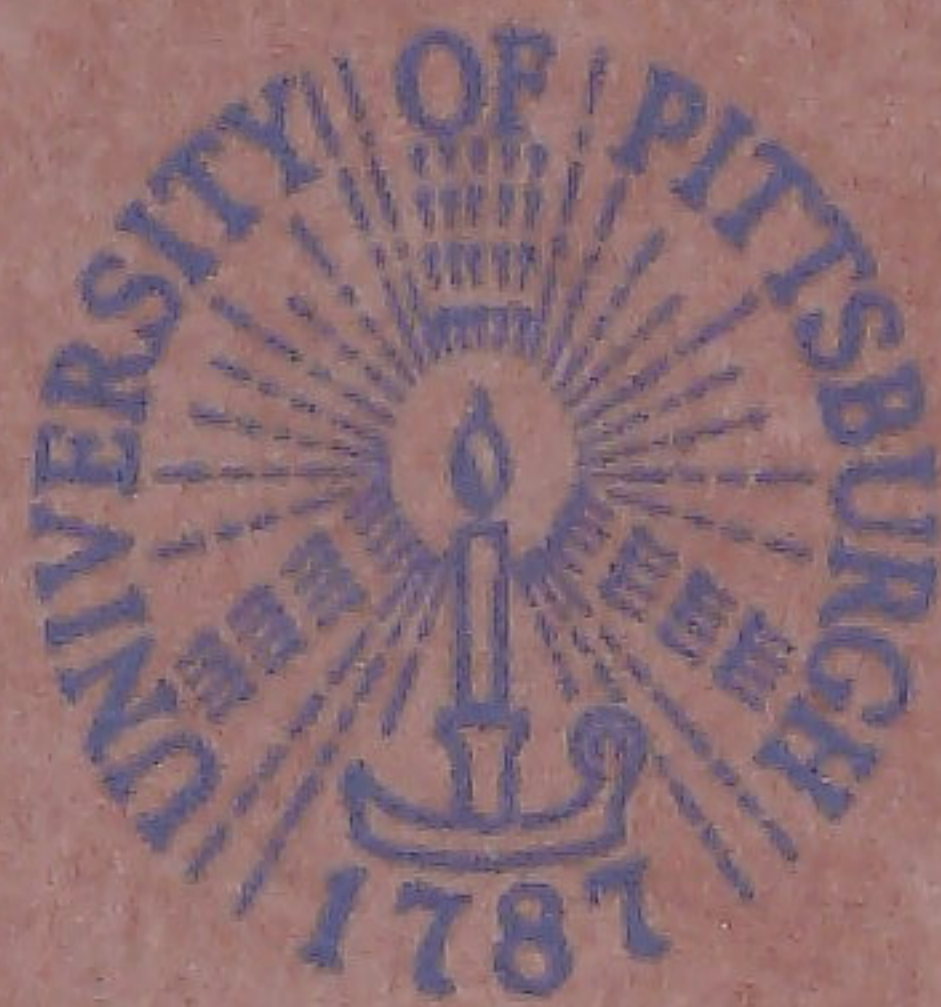


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SEISMOLOGICAL  
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UNIVERSITY OF PITTSBURGH



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ACKNOWLEDGED



# Seismological Observatory Bulletin

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SEISMOLOGICAL OBSERVATORY,

Dept. of Science & Industrial Research,  
LIBRARY

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  $30^{\circ}$  W and N  $60^{\circ}$  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.

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

### Instrument Constants

Magnification curves for the Wenner seismographs were given in No. 1, Vol. 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.

### Visual Recorder

A visual recorder, adapted to the Wenner seismometer, is being used currently on an experimental basis.



## 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 - 9	Above normal
	9 - 11	Considerably above normal
	11 - 15	Above normal
	15 - 20	Considerably above normal
	20 - 22	Above normal
	22 - 25	Considerably above normal
	25 - 31	Above normal
February	1 - 9	Above normal
	9 - 10	Considerably above normal
	10 - 11	Above normal
	11 - 12	Considerably above normal
	12 - 14	Above normal
	14 - 19	Slightly above normal
	19 - 24	Normal
	24 - 25	Slightly above normal
	25 - 28	Above normal
March	1 - 4	Above normal
	4 - 6	Considerably above normal
	6 - 8	Above normal
	8 - 9	Considerably above normal
	9 - 19	Above normal
	19 - 22	Slightly above normal
	22 - 26	Above normal
	26 - 30	Considerably above normal
	30 - 31	Above normal



	DATE	EVALUATION
April	1 - 4	Above normal
	4 - 5	Considerably above normal
	5 - 10	Above normal
	10 - 17	Slightly above normal
	17 - 18	Above normal
	18 - 30	Slightly above normal
May	1 - 3	Slightly above normal
	3 - 5	Normal
	5 - 10	Slightly above normal
	10 - 11	Above normal
	11 - 12	Slightly above normal
	12 - 15	Normal
	15 - 21	Slightly above normal
	21 - 26	Normal
	26 - 29	Slightly above normal
29 - 31	Above normal	
June	1 - 4	Normal
	4 - 5	Slightly above normal
	5 - 9	Normal
	9 - 10	Slightly above normal
	10 - 13	Normal
	13 - 16	Below normal
	16 - 17	Normal
	17 - 18	Slightly below normal
	18 - 20	Normal
	20 - 22	Slightly above normal
	22 - 23	Normal
	23 - 25	Below normal
	25 - July 5	Station closed
July	5 - 19	Below normal
	19 - 21	Normal
	21 - 22	Below normal
	22 - 23	Normal
	23 - 31	Below normal



	DATE	EVALUATION
August	1 - 5	Below normal
	5 - 7	Normal
	7 - 13	Above normal
	13 - 14	Normal
	14 - 15	Below normal
	15 - 16	Normal
	16 - 18	Slightly above normal
	18 - 26	Normal
	26 - September 6	Station closed
September	6 - 8	Normal
	8 - 17	Slightly above normal
	17 - 18	Above normal
	18 - 20	Considerably above normal
	20 - 21	Above normal
	21 - 22	Considerably above normal
	22 - 23	Above normal
	23 - 27	Normal
	27 - 29	Above Normal
	29 - 30	Normal
October	1 - 9	Normal
	9 - 13	Above normal
	13 - 17	Slightly above normal
	17 - 19	Above normal
	19 - 24	Slightly above normal
	24 - 25	Above normal
	25 - 26	Slightly above normal
	26 - 29	Above normal
	29 - 31	Slightly above normal
November	1 - 4	Slightly above normal
	4 - 6	Above normal
	6 - 11	Slightly above normal
	11 - 19	Above normal
	19 - 23	Considerably above normal
	23 - 24	Above normal
	24 - 25	Slightly above normal
	25 - 27	Above normal
	27 - 31	Considerably above normal



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December	1 - 2	Considerably above normal
	2 - 3	Above normal
	3 - 6	Slightly above normal
	6 - 8	Above normal
	8 - 14	Considerably above normal
	14 - 17	Above normal
	17 - 20	Considerably above normal
	20 - 27	Above normal
	27 - 29	Considerably above normal
	29 - 31	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. 5	Z	i	01-09-38	
				Seismic activity centering about 19h 05m G.C.T.
Jan. 6				Seismic activity centering about 01h 55m G.C.T.
Jan. 8				Seismic activity centering about 09h 10m G.C.T.
402 Jan 13	Z	iP	02-13-36	$\Delta(S-P) = 56.4^\circ = 6265 \text{ km}$
	H	iS	02-21-32	H = 02h 03m 57s G.C.T.
	H	i	02-23-05	
Jan. 25	Z	iP?	07-29-07	
Feb. 6				Seismic activity centering about 02h 50m G.C.T.
Feb. 15				Seismic activity centering about 07h 30m G.C.T.
Feb. 18	Z	e	08-12-07?	
Feb. 27	NE		20-02-45	U.S.C.G.S. gives
	NE		20-08-46	H = 19h 20m 38s G.C.T.
	NE		20-12-19	
403 Mar. 1	Z	iP	04-50-26	$\Delta(S-P) = 37.5^\circ = 4165 \text{ Km}$
	H	i	04-51-31	H = 04h 43m 11s G.C.T.
	H	iS	04-56-25	
	H	iM	05-03-05	
	Z	e	14-18-26	
	NW	i	14-22-29	
	NE	i	14-25-28	
Mar. 14	Z	i P?	13-22-12	
	NW	i	13-31-18	
	H	i	13-31-49	
404 Mar. 18	Z	iP	00-18-11	$\Delta(S-P) = 70.7^\circ = 7855 \text{ Km}$
	H	i	00-22-57	
	H	iS	00-27-29	
	H	i	00-33-04	
	H	i	00-36-23	
Mar. 22	Z	iP'	14-24-51	U.S.C.G.S. gives
	Z	i	14-24-59	H = 14h 05m 04s GCT
	Z	eScPcP?	14-28-22	
	Z	iPP?	14-28-27	



GNWCH DATE	COMPNT.	PHASE	GMT	
Mar. 29	Z	i	19-59-38	
Mar. 31	Z	e	18-36-15?	U.S.C.G.S. gives
	H	iPP?	18-38-23	H = 18h 17m 00s G.C.T.
	H	i	18-43-32	
	H	iPS?	18-48-17	
405 Apr. 4	Z	eP	19-29-55	$\Delta(S-P) = 28^\circ = 3110$ Km
	H	iS?	19-34-46	H = 19h 24m 01s G.C.T.
Apr. 14	H	i	01-48-06	U.S.C.G.S. gives
	H	i	01-50-31	H = 01h 28m 58s G.C.T.
	H	i	01-57-36	
Apr. 15	H	i	04-05-00	
Apr. 17	Z	iP?	18-47-05	U.S.C.G.S. gives
	H	i	18-56-35	H = 18h 35m 27s G.C.T.
Apr. 19	Z	i	20-35-31	U.S.C.G.S. gives
	NE	i	20-44-43	H = 20h 24m 05s G.C.T.
Apr. 20	H	e	02-23-53	
	H	e	02-33-08	
	NW	e	05-59-54	
	NW	e	06-09-07	
Apr. 26	Seismic activity centering about 02h 20m G.C.T.			
Apr. 28	Z	iP?	09-15-41	U.S.C.G.S. gives
	H	i	09-24-17	H = 19h 04m 59s G.C.T.
Apr. 30	H	i	00-47-57	
406 May 11	Z	iP	11-11-46	$\Delta(S-P) = 39.3^\circ = 4365$ Km
	H	iS	11-17-56	H = 11h 04m 16s G.C.T.
407 May 13	Z	iP	03-35-22	$\Delta(S-P) = 26^\circ = 2890$ Km
	H	iS	03-35-45	H = 03h 29m 47s G.C.T.
May 17	Z	iP <sub>1</sub> '	15-09-17	U.S.C.G.S. gives
	Z	iPP	15-11-32	H = 14h 49m 47s G.C.T.
	H	iScPcP	15-12-38	
May 25	Seismic activity centering about 03h 25m G.C.T.			
May 26	Seismic activity centering about 18h 03m G.C.T.			



GNWCH DATE	COMPNT.	PHASE	GMT	
408	May 28	Z	iP	06-31-43 $\Delta$ (S-P) = 68.9° = 7655Km
		Z	i	06-32-27 H = 06h 20m 42s G.C.T.
		H	i	06-40-52 U.S.C.G.S. gives H = 06h 20m 40s G.C.T.
May 29	Seismic activity centering about 14h 18m G.C.T.			
	Seismic activity centering about 17h 20m G.C.T.			
	Seismic activity centering about 21h 35m G.C.T.			
May 30	Z	i	12-49-21	
	H	i	12-54-29	
	H	i	12-55-16	
	H	i	12-55-50	
	H	i	12-59-28	
May 31	H	i	18-05-06	
	H	i	18-06-48	
June 2	Z	iP	00-29-12	$\Delta$ (S-P) = 63° = 7000Km
	H	eS	00-38-16	H = 00h 19m 17s G.C.T.
June 11	H	e	23-29-48	
	H	i	23-38-09	
409	June 12	Z	iP	20-42-50 $\Delta$ (S-P) = 80.2° = 8910Km
		H	eS	20-52-57 H = 20h 30m 43s G.C.T. U.S.C.G.S. gives H = 20h 30m 45s G.C.T.
410	June 14	Z	iP	06-17-49 $\Delta$ (S-P) = 30.6° = 3400Km
		NW	i	06-18-23 H = 06h 11m 31s G.C.T.
		NW	iS?	06-22-59
		NW	i	06-24-56
June 16	Seismic activity centering about 12h 05m G.C.T.			
411	June 20	Z	iP	12-18-10 $\Delta$ (S-P) = 63.1° = 7010Km
		Z	i	12-18-45 H = 12h 07m 47s G.C.T.
		H	iS	12-26-48
412	July 12	Z	iP	02-06-04 $\Delta$ (S-P) = 72.7° = 8080Km
		H	eS	02-15-34 H = 01h 54m 40s G.C.T.
413	July 16	Z	iP?	07-19-24 $\Delta$ (S-P) = 76.8° = 8535Km
		H	iS	07-26-32 H = 07h 07m 35s G.C.T.



GNWCH DATE	COMPNT.	PHSE	GMT	
July 17	Seismic activity centering about 22h 35m G.C.T.			
July 19	Seismic activity centering about 16h 50m G.C.T.			
July 20	Seismic activity centering about 00h 37m G.C.T.			
414 July 21	Z	iP	11-55-10	$\Delta(S-P) = 53.9^\circ = 5990 \text{ Km}$
	Z	i	11-55-34	H = 11h 45m 49s G.C.T.
	H	iS	12-02-51	U.S.C.G.S. gives
	H	i	12-05-36	H = 11h 45m 40s G.C.T.
July 26	H	i	04-23-03	
July 27	Z	i	18-28-03	U.S.C.G.S. gives
	H	iS	18-34-58	H = 18h 19m 08s G.C.T.
	H	iM	18-45-26	
Aug. 5	Seismic activity centering about 03h 34m G.C.T.			
415 Aug. 6	H	e	08-46-44	$\Delta(\text{Calc.}) = 106.5^\circ$
	H	ePP	08-49-54	H = 08h 31m 25s G.C.T.
	H	i	08-55-41	
	NE	i	08-56-57	
	H	iScPcPcS	08-57-04	
	H	i	08-58-05	
	H	iPS?	08-59-39	
Aug. 16	Z	e	12-05-33	
	H	i	12-12-19	
Aug. 21	H	i	17-56-49	
	H	i	18-02-16	
416 Aug. 23	Z	iP	15-39-45	$\Delta(S-P) = 34.6^\circ = 3845 \text{ Km}$
	H	iPPP	15-41-02	H = 15h 32m 42s G.C.T.
	H	iS	15-45-12	U.S.C.G.S. gives H = 15h 32m 40s G.C.T. Lat. $43\frac{1}{2}^\circ \text{N}$ Long. $128^\circ \text{W}$
Aug. 24	H	i	08-09-14	
Sept. 8	Seismic activity centering about 02h 58m G.C.T. Seismic activity centering about 04h 32m G.C.T.			
417 Sept. 11	Z	eP	08-49-13	$\Delta(S-P) = 23.3^\circ = 2590 \text{ Km}$
	NW	iS	08-53-26	H = 08h 44m 05s G.C.T.
	Seismic activity centering about 19h 05m G.C.T.			



GNWCH DATE	COMPNT.	PHASE	GMT	
418 Sept. 12	Z	iP	06-21-48	$\Delta (S-P) = 81.7^\circ = 9080 \text{ Km}$
	Z	i	06-22-07	H = 06h 09m 32s G.C.T.
	Z	i	06-22-09	
	H	iS	06-32-02	
Sept. 13	Z	iP?	02-11-09	
Sept. 20	Seismic activity centering about 14h 40m G.C.T.			
Sept. 21	Seismic activity centering about 08h 10m G.C.T.			
Sept. 23	Seismic activity centering about 16h 15m G.C.T.			
419 Sept. 28	Z	iP	18-15-49	$\Delta (S-P) = 28^\circ 8' = 3200 \text{ Km}$
	H	iS	18-20-46	H = 18h 09m 47s G.C.T.
Sept. 30	Seismic activity centering about 05h 05m G.C.T.			
Oct. 2	Seismic activity centering about 16h 23m G.C.T.			
Oct. 6	Z	iP?	11-14-58	U.S.C.G.S. gives
	H	iS	11-24-15	H = 11h 03m 16s G.C.T.
	Lat. $36^\circ \text{ S}$			
	Long. $70^\circ \text{ W}$			
Oct. 9	Seismic activity centering about 19h 22m G.C.T.			
Oct. 10	Seismic activity centering about 00h 05m G.C.T.			
	Z	i	09-16-48	
Oct. 12	Z	i	17-41-30?	
Oct. 13	Seismic activity centering about 10h 50m G.C.T.			
Oct. 14	NW		08-58-56	
420 Oct. 19	Z	iP	10-06-46	$\Delta(S-P) = 76.4^\circ = 8490 \text{ Km}$
	H	iS	10-16-35	H = 09h 54m 59s G.C.T.
	H	i	10-16-58	
Oct. 21	H	i	19-25-43	
	H	i	19-26-45	
	H	i	19-29-29	
	Z	i	23-29-04	
	Z	i	23-32-34	
Oct. 24	Seismic activity centering about 04h 30m G.C.T.			
Oct. 26	Seismic activity centering about 16h 25m G.C.T.			



GNWCH DATE	COMPNT.	PHASE	GMT	
Oct. 31	Z	i	06-16-24	
Nov. 10	H	i	02-08-27	
Nov. 15	H	Seismic activity centering about 10h 42m G.C.T.		
Nov. 23	Z	iP	06-41-18	
Other phases not readable because of microseisms.				
421 Dec. 6	Z	iP	04-41-12	$\Delta (S-P) = 60.3^\circ = 6700\text{Km}$
	H	iS	04-50-53	H=04h 31m 08s G.C.T.
Dec. 7	Seismic activity centering about 06h 10m G.C.T.			
Dec. 17	H	i	06-32-01 ?	