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SEISMOLOGICAL  
OBSERVATORY BULLETIN  
UNIVERSITY OF PITTSBURGH

1954



PITTSBURGH, PENNSYLVANIA

## 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 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.

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 - 4	Above normal
	4 - 6	Considerably above normal
	6 - 12	Above normal
	12 - 13	Considerably above normal
	13 - 22	Above normal
	22 - 23	Slightly above normal
	23 - 25	Above normal
	25 - 27	Slightly above normal
	27 - 28	Above normal
	28 - 29	Considerably above normal
29 - 31	Above Normal	
February	1 - 4	Slightly above normal
	4 - 5	Above normal
	5 - 9	Slightly above normal
	9 - 10	Above normal
	10 - 15	Considerably above normal
	15 - 22	Above normal
	22 - 23	Slightly above normal
	23 - 28	Above normal
March	1 - 11	Slightly above normal
	11 - 12	Above normal
	12 - 14	Considerably above normal
	14 - 17	Above normal
	17 - 18	Considerably above normal
	18 - 26	Above normal
	26 - 28	Slightly above normal
	28 - 31	Above normal

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## MICROSEISMIC ACTIVITY

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	DATE	EVALUATION	
April	1 - 3	Above normal	
	3 - 5	Considerably above normal	
	5 - 6	Above normal	
	6 - 14	Slightly above normal	
	14 - 17	Above normal	
	17 - 21	Slightly above normal	
	21 - 27	Normal	
	27 - 30	Slightly above normal	
	May	1 - 8	Slightly above normal
		8 - 9	Normal
9 - 13		Slightly above normal	
13 - 16		Above normal	
16 - 18		Slightly above normal	
18 - 26		Normal	
26 - 31		Slightly above normal	
June		1 - 2	Normal
	2 - 3	Above normal	
	3 - 5	Normal	
	5 - 6	Slightly above normal	
	6 - 14	Normal	
	14 - 15	Above normal	
	15 - 23	Normal	
	23 - 26	Slightly below normal	
	26 - 30	Station closed	
	July	1 - 6	Station closed
6 - 7		Slightly below normal	
7 - 11		Normal	
11 - 12		Slightly above normal	
12 - 18		Normal	
18 - 31		Below normal	
August		1 - 7	Below normal
		7 - 16	Normal
	16 - 17	Below normal	
	17 - 18	Normal	
	18 - 21	Above normal	

	DATE	EVALUATION
August	21 - 22	Normal
	22 - 24	Below normal
	24 - 29	Normal
	29 - 30	Above normal
	30 - 31	Considerably above normal
September	1 - 3	Slightly above normal
	3 - 11	Above normal
	11 - 13	Considerably above normal
	13 - 14	Above normal
	14 - 15	Slightly above normal
	15 - 20	Normal
	20 - 30	Slightly above normal
October	1 - 2	Slightly above normal
	2 - 6	Above normal
	6 - 10	Considerably above normal
	10 - 15	Above normal
	15 - 16	Considerably above normal
	16 - 24	Station closed
	24 - 27	Considerably above normal
	27 - 29	Above normal
	29 - 30	Considerably above normal
	30 - 31	Above normal
November	1 - 3	Slightly above normal
	3 - 6	Above normal
	6 - 7	Considerably above normal
	7 - 9	Slightly above normal
	9 - 16	Above normal
	16 - 17	Considerably above normal
	17 - 19	Above normal
	19 - 20	Slightly above normal
	20 - 30	Above normal
December	1 - 6	Above normal
	6 - 7	Considerably above normal
	7 - 27	Above Normal
	27 - 30	Normal
	30 - 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. 12				Seismic activity centering about 15h 45m G.C.T.
Jan. 13				Seismic activity centering about 00h 40m G.C.T. Other phases indiscernible due to microseisms.
Feb. 2				Seismic activity centering about 18h 20m G.C.T.
383 Feb. 5				Seismic activity centering about 10h 55m G.C.T.
383 Feb 5	Z	iP	15-23-34	$\Delta(S-P) = 25.8^\circ = 2865 \text{ km}$ H = 10h 18m 01s G.C.T.
	H	iS	15-28-08	U.S.C.G.S. gives H = 15h 17m 59s G.C.T. Lat. $17\frac{1}{2}^\circ \text{ N}$ Long. $92^\circ \text{ W}$
Feb. 8	Z	i	14-29-55	U.S.C.G.S. gives H = 14h 19m 09s G.C.T.
	H	iS?	14-37-55	Lat. $22^\circ\frac{1}{2} \text{ S}$
	H	i	14-38-45	Long. $68^\circ \text{ W}$
Feb. 11	H	i	00-54-52	
	H	i	00-57-19	
Feb. 15				Seismic activity centering about 20h 10m G.C.T.
384 Feb. 19	Z	iP	00-46-36	$\Delta(S-P) = 28.3^\circ = 3145 \text{ Km}$
	Z	iPP	00-47-34	H = 00h 40m 39s G.C.T.
	H	iS	00-51-30	
	H	iM	00-57-13	
	H	eL	20-02-56	
	H	eM	20-10-23	
385	Z	1P	21-40-46	$\Delta(S-P) = 28.2^\circ = 3135 \text{ Km}$
	H	iS	21-45-39	H = 21h 34m 50s G.C.T. U.S.C.G.S. gives H = 21h 34m 41s G.C.T. Lat. $21\frac{1}{2}^\circ \text{ N}$ Long. $87\frac{1}{2}^\circ \text{ W}$
Feb. 20				Seismic activity centering about 02h 25m G.C.T.
Mar. 3	Z	i	06-22-09	
	Z	i	06-24-17	
	H	i	06-25-30	
	Z	iP	07-56-10	

GNWCH DATE	COMPNT.	PHASE	GMT	
				Seismic activity centering about 20h 47m G.C.T.
Mar. 9				Seismic activity centering about 02h 56m G.C.T.
				Seismic activity centering about 06h 30m G.C.T.
Mar. 11	Z	eP?	10-35-49	U.S.C.G.S. gives H = 10h 30m 10s G.C.T. Lat. 14½°N Long. 90½°W
Mar. 19	Z	iP	10-00-40	U.S.C.G.S. gives
	H	iM	10-10-16	H = 09h 54m 27s GCT Lat. 33.3° N Long. 116.1° W
Mar. 21	Z	iP	00-00-34	U.S.C.G.S. gives
	Z	iPP	00-01-39	H = 23h 42m 05s G.C.T.
	H	i	00-07-09	Lat. 24½°N
	H	i	00-03-16	Long. 95°E
	H	PPS?	00-12-22	
Mar. 28				Seismic activity centering about 21m 30s G.C.T.
Mar. 29	Z	iP	06-26-03	
	H	iPP	06-28-16	U.S.C.G.S. gives
	H	i	06-33-17	H = 06h 17m 10.5s G.C.T.
	H	i	06-34-47	Lat. 37° N
	H	i	06-36-55	Long. 3½° W
Mar. 30				Seismic activity centering about 17h 16m G.C.T.
	H	i	19-01-40	
Mar. 31	H	i	18-45-34	
386 Apr. 1	Z	iP	14-14-31	$\Delta(S-P) = 22.5^\circ = 2500\text{Km}$
	H	iS	14-18-37	H = 14h 09m 31s G.C.T.
				Seismic Activity centering about 19h 15m G.C.T.
Apr. 17	Z	i	20-18-22	U.S.C.G.S. gives
	Z	i	20-21-20	H = 20h 10m 37s G.C.T.
	H	i	20-30-21	Lat. 5½°N Long. 179°W
Apr. 25				Seismic activity centering about 01h 02m G.C.T.
				Seismic activity centering about 21h 03m G.C.T.

GNWCH DATE	COMPNT.	PHASE	GMT	
387 Apr. 26	Z	iP	20-36-24	$\Delta(S-P) = 73.1^\circ = 8120\text{Km}$
	H	iS?	20-45-56	H = 20h 14m 58s G.C.T. U.S.C.G.S. gives H = 20h 24m 44s G.C.T. Lat. 51° N Long. 158½° E
388 Apr. 27	Z	e	02-13-13	
	Z	iP	10-13-16	$\Delta(S-P) = 34.6^\circ = 3845\text{ Km}$
	H	iS	10-18-15	H = 10h 06m 24s G.C.T. U.S.C.G.S. gives H = 10h 06m 24s G.C.T. Lat. 6°N Long. 82½° W
Apr. 29	Z	iP?	10-55-57	
	Z	iL?	11-04-54	
	Z	i	11-10-39	
	Z	i	11-20-03	
				Other phases indiscernible because of overlapping trace
Apr. 30	Z	iP?	13-14-12	U.S.C.G.S. gives
	H	i	13-23-10	H = 13h 02m 36s G.C.T. Lat. 39½° N Long. 22° E
				Seismic activity centering about 23h 35m G.C.T.
389 May 3	Z	e	15-41-25	
	H	i	15-50-58	
	Z	iP	17-19-25	$\Delta(S-P) = 26.8^\circ = 2980\text{Km}$
	H	i	17-24-07	H = 17h 13m 42s G.C.T.
May 4				Seismic activity centering about 18h 09m G.C.T.
May 5				Seismic activity centering about 11h 20m G.C.T.
	Z	i	13-16-00	U.S.C.G.S. gives
	H	iS?	13-20-55	H = 13h 09m 46s G.C.T. Lat. 27½° S Long. 112½° E
May 6	Z	i	09-14-11	U.S.C.G.S. gives
	H	i	09-23-48	H = 09h 02m 14s G.C.T. Lat. 50°N Long. 155½° E

GNWCH DATE	COMPNT.	PHSE	GMT	
390 May 13	Z	iP	14-52-20	$\Delta$ (S-P) = 26.3° = 2920Km
	H	iPP	14-52-57	H = 14h 46m 42s G.C.T.
	H	iS	14-56-58	U.S.C.G.S. gives
	H	iSS	14-58-11	H = 14h 46m 38s G.C.T. Lat. 17° N Long. 95½° E
May 14	Z	i	22-42-34	U.S.C.G.S. gives
	Z	i	22-56-33	H = 22h 39m 25s G.C.T.
	Z	i	22-57-27	Lat. 36° N.
	Z	i	22-57-55	Long. 137° E
	H	i	23-04-53	
May 20	Seismic activity centering about 00h 30m G.C.T.			
May 31	Seismic activity centering about 16h 55m G.C.T.			
391 June 4	Z	iP	06-58-37	$\Delta$ (S-P) = 42.3° = 4700Km
	H	iS	07-06-49	H = 06h 50m 43s G.C.T. U.S.C.G.S. gives H = 06h 50m 42s G.C.T. Lat. ½° N Long. 91½° W
	Seismic activity centering about 16h 32m G.C.T.			
	Seismic activity centering about 21h 06m G.C.T.			
June 6	Z	i	17-10-00	U.S.C.G.S. gives
	H	i	17-13-24	H = 16h 50m 33s G.C.T. Lat. 3½° N Long. 136½° W
June 24	Seismic activity centering about 03h 15m G.C.T.			
June 15	Z	iP	13-38-13	U.S.C.G.S. gives
	Z	i	13-38-42	H = 13h 29m 59s G.C.T.
	NE	i	13-44-51	Lat. 5° S
	NE	i	13-45-42	Long. 77° W
June 17	Seismic activity centering about 02h 35m G.C.T.			
392 June 21	Z	iP	01-59-06	$\Delta$ (S-P) = 61.6° = 6845Km
	H	iS	02-07-35	H = 01h 48m 53s G.C.T.

GNWCH DATE	COMPNT.	PHASE	GMT	
393 July 6	Z	iP	11-19-26	$\Delta$ (S-P) = 28° = 3110Km
	H	iS	11-24-17	H = 11h 13m 22s G.C.T. U.S.C.G.S. gives H = 11h 13m 19s G.C.T. Lat. 39½° N Long. 118½° W
394	H	iP	22-13-48	H = 22h 07m 49s G.C.T.
	H	iS	22-18-43	after shock
July 13	Seismic activity centering about 09h 30m G.C.T.			
July 23	Seismic activity centering about 04h 40m G.C.T.			
July 23	Z	iP?	04-44-46	U.S.C.G.S. gives H = 04h 33m 26s G.C.T. Lat. 31° S Long. 70° ½ W
	Aug. 3 Seismic activity centering about 00h 05m G.C.T.			
Aug. 5	NE	e	08-09-25?	
Aug. 9	Z	iP	19-28-17	
	Z	i	19-28-26	
Aug. 14	Z	i	00-48-26	
Aug. 18	Z	i	05-01-01	U.S.C.G.S. gives
	H	i	05-06-58	H = 04h 42m 20s G.C.T.
	H	i	05-07-38	Lat. 21½° S
	H	i	05-08-31	Long. 176° W
	H	i	05-10-23	
Aug. 21	Seismic activity centering about 00h 55m G.C.T. Seismic activity centering about 07h 47m G.C.T.			
Aug. 24	Z	iP?	05-51-23	U.S.C.G.S. gives
	Z	iL	06-06-23	H = 05h 51m 31.5s G.C.T. Lat. 39.5° N Long. 118.5° E
Aug. 27	H	i	11-19-34	
Aug. 31	H	i	22-36-15	
Sept. 1	Seismic activity centering about 05h 42m G.C.T.			
Sept. 4	Seismic activity centering about 09h 50m G.C.T.			

GNWCH DATE	COMPNT.	PHASE	GMT	
Sept. 6	Z	eP	18-42-08	U.S.C.G.S. gives
	Z	i	18-42-13	H=18h 30m 48s G.C.T.
	Z	i	18-42-71	Lat. 51°N
	H	i	18-51-47	Long. 158° E
	H	i	18-52-09	
395 Sept. 9	Z	iP	01-14-53	$\Delta(S-P)=62.6^\circ=6955\text{ Km}$
	H	iPP	01-17-14	H = 01h 04m 34s G.C.T.
	H	iS	01-23-27	U.S.C.G.S. gives H=01h 04m 37s G.C.T. Lat. 36° N Long. 1½°
Sept. 13	H	i	02-29-19	U.S.C.G.S. gives
	H	i	02-34-35	H = 02h 09m 55s G.C.T. Lat. 21°S Long. 17½°W
Sept. 15	Seismic activity centering about 13h 40m G.C.T.			
	NE	i	18-20-08	
	NE	i	18-20-52	
	NE	i	18-22-40	
Sept. 17	NE	i	11-21-53	U.S.C.G.S. gives
	H	i	11-27-34	H = 11h 03m 19s G.C.T.
	NW	i	11-29-13	Lat. 20½°S Long. 177½°W
Oct. 1	NW	iPP?	03-15-36	U.S.C.G.S. gives
	NW	iS <sub>c</sub> P <sub>c</sub> S?	03-21-27	H=02h 55m 31s G.C.T.
	NW	iPS?	03-25-14	Lat. 11°S Long. 166°E
Nov. 1	Seismic activity centering about 21h 18m G.C.T.			
Nov. 2	Z	eP?	08-43-48	U.S.C.G.S. gives H=08h 24m 08s GCT Lat. 7½°S Long. 119°S
396 Nov. 12	Z	iP	12-26-51	$\Delta(S-P)=29.9^\circ=3320\text{ Km}$
	H	iS	12-38-08	H = 12h 26m 51s G.C.T.

GNWCH DATE	COMPNT.	PHASE	GMT	
				U.S.C.G.S. gives H = 12h 26m 47s G.C.T. Lat. 31½°N Long. 116°W
Nov. 21	Seismic activity centering about 12h 55m G.C.T.			
397 Nov. 25	Z	eP	11-23-26	$\Delta(S-P)=34.5^\circ=3335\text{ Km}$
	Z	i	11-23-30	H = 11h 16m 35s G.C.T.
	H	iS	11-29-03	U.S.C.G.S. gives H = 11h 16m 36s G.C.T. Lat. 40½°N Long. 126°W
	Seismic activity centering about 21h 17m G.C.T.			
Dec. 3	Seismic activity centering about 09h 14m G.C.T.			
Dec. 4	Seismic activity centering about 08h 20m G.C.T.			
398	Z	iP	18-37-52	$\Delta(S-P) = 32^\circ = 3555\text{ Km}$
	Z	iPP	18-39-06	H = 18h 31m 22s G.C.T.
	Z	i	18-40-49	U.S.C.G.S. gives
	H	iS	18-43-11	H = 18h 31m 07s G.C.T.
	H	i	18-45-10	Lat. 11°N Long. 61°W
399 Dec. 10	Z	iP	13-05-34	$\Delta(S-P)=24.1^\circ=2680\text{ Km}$
	H	i	13-06-43	H = 13h 00m 18s G.C.T.
	H	iS	13-09-54	
400 Dec. 16	Z	iP	11-13-17	$\Delta(\text{Calc.})=29^\circ=3220\text{ Km}$
	H	iPP	11-14-02	H = 11h 07m 14s G.C.T.
	H	i	11-14-45	U.S.C.G.S. gives
	Z	i	11-17-36	H = 11h 07m 10s G.C.T. (overlapping trace)
				Lat. 39½°N Long. 118°W
401 Dec. 21	Z	iP	20-03-04	$\Delta(S-P) 33.1^\circ=3680\text{ Km}$
	H	iPPP?	20-04-23	H = 19h 56m 24s G.C.T.
	H	iS	20-08-31	U.S.C.G.S. gives H = 19h 56m 25s G.C.T. Lat. 41°N Long. 124°W
Dec. 28	Seismic activity centering about 01h 50m G.C.T.			
Dec. 30	Z	i	11-42-17	