

Seismological Bulletin of Syowa Station, Antarctica 1968 - 1969

Compiled by

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The seismological observation at Syowa Station was started in 1959 by the 3rd party of Japanese Antarctic Research Expedition using a HES seismograph of Z component. In 1961, added with HES seismographs of two horizontal components, the seismological observation at Syowa Station was carried on with a three-component seismograph.

Since 1966, the observations have been continued by JARE, using three-component HES seismographs.

A three-component long period seismograph of Press-Ewing type was set at Syowa Station in 1967.

In this bulletin the data of the respective seismic events interpreted on the seismograms are listed in chronological order.

1. Date.
2. Identified phase name with its sharpness indication (e or i) and ground motion direction (+: UP, E, N, -: Down, W, S). If a phase was identified by horizontal components, the phase is denoted with E (detected by E-W component) or N (detected by N-S component). The data from long period seismographs are denoted with LP.
3. Arrival time in G. M. T.,
4. Period of the phase in seconds.
5. Amplitude in millimeters.

The instrumental constants and magnification curve of HES seismographs are shown in Table 1. The seismographs are usually operated with the attenuation factor $\mu=1/5$ in the summer season and $\mu=1/2$ in the winter season.

In 1968, the seismographs were operated by Mr. M. Yoshida and Dr. T. Eto of the 9th JARE. The reading data were sent to USCGS through-out the wintering

period. HES seismograms were operated with $\mu=1/5$ from February to May 9 and from January 1 to January 31, and with $\mu =1/2$ from May 9 to January 1.

The seismograms were read again by Miss R. Kawashima of Earthquake Research Institute.

Table 1. Instrumental constants of HES and LP seismographs.

Component	Z	N - S	E - W
HES			
T ₁ (s)	1.0	1.0	1.0
S ₁ (A/mm)	2.80×10^{-6}	2.03×10^{-5}	2.03×10^{-5}
R ₁ (Ω)	940	920	930
Ω_1 (Ω)	820	1160	920
h ₁	1.0	1.0	1.0
1968 - 1969			
T ₂ (s)	1.06	1.04	1.04
S ₂ (A/mm)	1.47×10^{-9}	1.20×10^{-9}	1.35×10^{-9}
R ₂ (Ω)	600	650	630
Ω_2 (Ω)	1200	1200	1200
h ₂	1.0	1.0	1.0
LP			
T ₁ (s)	18.7	18.1	16.4
S ₁ (A/mm)	2450	3240	2820
R ₁ (Ω)	3100	3200	2900
Ω_1 (Ω)	45	156	38
h ₁	1.0	1.0	1.0
T ₂ (s)	0.91	0.98	0.97
S ₂ (A/mm)	0.906×10^{-9}	0.812×10^{-9}	0.790×10^{-9}
R ₂ (Ω)	520	530	540
Ω_2 (Ω)	1702	1868	1960
h ₂	1.0	1.0	1.0

T₁: Period of the pendulum.

T₂: Period of the galvanometer.

S₁: Sensitivity of the transducer.

S₂: Sensitivity of the Galvanometer.

R₁: Resistance of the pendulum coil.

R₂: Resistance of the galvanometer coil.

Ω_1 : External damping resistance of the transducer.

Ω_2 : External damping resistance of the galvanometer.

h₁: Damping constant of the pendulum.

h₂: Damping constant of the galvanometer.

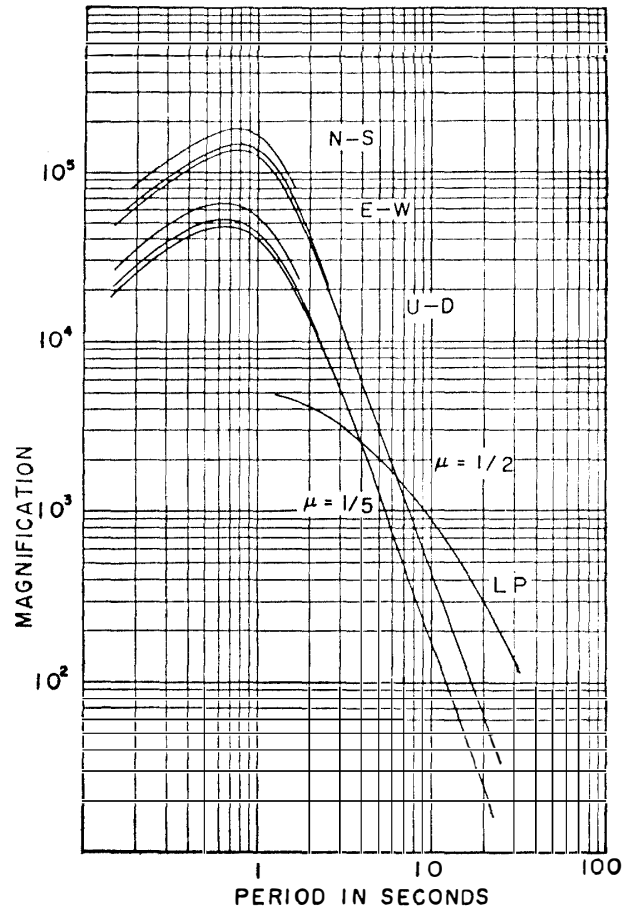


Fig. 1. Magnification curves of HES and Long Period seismographs.

February 1968

Date	Component and Phase	Arrival time			Period s	Amplitude mm
		h	m	s		
02-03	Extreme microseismic activity					
06	-ePE	11	30	17.7	1.2	2.5
	-ePN			17.7	1.2	1.0
	-iP			17.7	1.2	7.0
12-13	Extreme microseismic activity					
18	+ePE	09	40	57.8	1.0	0.5
	-eP			57.8	1.0	1.0
20	-ePE	21	49	24.5	0.8	0.7
	+eP			24.4	1.0	2.0
21	+ePE	15	49	39.3	1.0	0.5
	+ePN			39.5	0.8	0.3
	+eP			39.3	1.0	3.0
25	eXE	05	09	04.1	3.4	4.0

March 1968

Date	Component and Phase	Arrival time			Period s	Amplitude mm
		h	m	s		
02-06	Extreme microseismic activity					
09	+ePE	21	49	20.7	1.0	0.7
	+ePN			20.7	0.6	0.4
12-16	Extreme microseismic activity					
19-21	Extreme microseismic activity					
22	+ePE	02	07	30.3	0.8	0.6
	+eP			30.3	1.0	1.5
	-ePE	15	19	39.2	1.2	1.5
	-eP			39.2	1.2	6.0
24	-ePE	00	29	36.6	0.6	0.5
	-ePN			36.8	0.6	0.5
	-eP			37.0	0.8	1.0
	+ePE	20	24	51.5	1.0	0.8
	-ePN			51.4	0.8	0.8
	+eP			51.3	1.0	0.7
26	+iPE	00	53	07.7	1.0	1.6
	-iP			07.7	1.0	3.0
	+iPE	01	02	18.9	2.0	5.0
	+iP			19.3	1.6	3.0
28-31	Extreme microseismic activity					

April 1968

Date	Component and Phase	Arrival time			Period s	Amplitude mm
		h	m	s		
01	+ePE	01	00	58.4	1.6	0.8
	-eP			58.4	1.0	1.5
	-ePE	21	11	19.8	1.2	1.0
	+ePN			20.1	1.0	2.0
	-eP			20.1	1.0	1.5
03-07	Extreme microseismic activity					
08	+iPE	14	31	22.2	1.0	3.5
	+iPN			22.2	0.6	3.0
	-iP			22.2	0.8	4.5
10-14	Extreme microseismic activity					
19	+ePE	08	15	49.1	0.8	0.5
	-ePE	09	11	54.5	1.2	1.3
	+ePN			54.5	0.8	0.8
	+eP			53.9	1.6	1.3
20	+ePE	01	07	41.5	0.8	0.7
	-ePE	20	24	30.8	1.0	0.5
	-eP			30.8	1.2	0.6
21	+ePE	03	41	04.7	1.0	0.4
	-ePN			05.2	1.2	0.8

May 1968

Date	Component and Phase	Arrival time			Period s	Amplitude mm
		h	m	s		
01	-iPE	00	01	31.7	1.8	3.5
	+ePN			32.0		2.5
	-iP			31.6	1.8	6.5
02	-ePE	04	29	40.5	1.2	0.3
	-ePN			40.8	1.4	0.5
	+eP			40.5	1.4	1.0
	+iPE	23	38	23.2	2.0	3.5
	-eSE			48	1.8	1.4
	-ePN			38	1.0	1.0
	+eSN			48	1.8	0.5
	+iP			38	1.8	2.8
03	-ePE	29	00	11.2	1.2	0.5
	+ePN			11.1	1.2	0.2
	-eP			11.1	1.0	0.2
04	+ePE	06	14	11.7	1.4	0.1
	-ePN			11.8	0.8	0.2
	-eP			11.9	0.8	0.2
08-09	Extreme microseismic activity					
08	+ePE	11	08	26.9	1.6	0.8
	-ePN			26.8	1.6	1.0
	+eP			26.6	1.0	1.0
09	+ePE	07	31	39.5	1.8	2.8
	+ePN			39.2	1.2	0.6
	+iP			39.2	1.8	4.0
10	+ePE	23	00	55.9	1.4	0.1
	+ePN			55.7	1.0	0.4
	+iP			55.6	0.8	1.0
11	-iPE	13	40	06.5	0.8	1.8
	+eXE			42	1.6	1.2
	+ePN			40	0.7	0.6
	-iP	42	40	06.7	0.8	4.6
	iX			03.9	1.6	1.5
	-ePE	15	46	34.7	1.6	1.5
	+ePN			34.9	1.2	0.5
	+iP			34.9	1.2	2.5
13	eXE	16	54	11.0	0.7	1.0
	eXN			10.7	1.0	2.0
	eX			11.6	1.0	1.5
14	+ePE	14	23	32.6		0.4
	+ePN			32.6		2.0
	+eP			32.6	1.8	3.1
15	+ePE	08	00	40.0	1.8	3.0
	+ePN			38.7	1.4	2.1
	-eP			39.5	1.2	3.5

May 1968

Date	Component and Phase	Arrival time			Period s	Amplitude mm	
		h	m	s			
15	+ePN	15	12	27.6	1.0	1.0	
	+eP			27.5	1.1	2.0	
16	+ePE	01	08	20.8	1.6	2.1	
	+ePN			21.5		0.5	
	-eP	24	24	21.3	4.0	5.0	
	-eS			44.2		6.5	
	LP +eP						5.5
							+iS
	-ePE	22	56	52.1	1.6	1.0	
	-ePN			52.3	1.2	1.0	
	-iP			52.3	0.6	3.0	
	eXE	23	26	24.3	2.8	3.0	
eXN	24.3			2.0	1.0		
eX	23.9			3.0	4.5		
17	+ePN	08	09	33.4	1.2	2.4	
	+ePN	19	11	50.2	0.4	2.0	
	-eP			50.2	0.4	3.0	
18	+ePE	00	12	12.0	1.6	1.2	
	+ePN			11.8	1.8	0.3	
	+eP			11.5		1.0	
	-ePE	01	08	56.8	1.6	2.5	
	iXE			14	08.2	2.4	7.6
	+ePN	08	08	57.0	2.4	0.2	
	eXN			14		08.6	3.0
	-iP	08	08	57.1	1.6	4.5	
	eX			14	08.2	2.0	2.8
	-ePN	08	27	12.2	0.8	0.4	
	-eP			12.2	0.6	0.8	
	+ePE	16	04	17.2	1.0	1.5	
	+ePN			16.2		0.7	
	-eP			16.2		0.8	
	+ePE	20	38	05.8	0.7	1.2	
	+ePN			06.2	0.6	0.5	
+eP	06.2			0.6	0.4		
20	-iPE	07	24	54.6	1.2	3.8	
	+eSE			34	32.4	1.6	0.5
	+iPN	24	24	54.5	1.6	9.0	
	+eSN			34	32.5	1.8	1.5
	+iP	24	24	54.5	1.6	23.0	
	+eS			34	32.8	3.6	2.0
	-ePE	10	23	12.8	0.8	0.5	
	LP +iPE			20	17	45.8	3.8
	+iSE	27	26.1			3.8	4.0
	+iPN	17	45.8				1.5
+iSN	27	28.9	3.8			6.0	

May 1968

Date	Component and Phase	Arrival time			Period s	Amplitude mm	
		h	m	s			
23	LP +iPE	17	34	58.4	5.6	3.0	
	-iSE		43	36.0		10.0	
	+iPN		34	58.4		7.0	
	+iSN		43	35.1		4.0	
24	Extreme microseismic activity						
25	-ePE	23	59	48.0	0.8	0.5	
	-ePN			47.1	1.0	1.1	
	-eP			47.2	1.0	2.5	
26	-ePE	14	50	01.5	1.8	1.0	
	+ePN			01.3	1.6	1.1	
	eXN			52	41.8	4.0	3.5
	-eP			50	01.3	1.2	0.6
	eX			52	41.0		2.0
28-29	Extreme microseismic activity						
30	+ePE	04	35	29.2	1.8	1.8	
	-ePN			29.3	1.8	2.0	
	-eP			29.2	1.8	5.6	
	+ePE	19	54	14.7	1.6	1.6	
	+eSE	20	03	58.8	3.0	1.9	
	-iPN	19	54	14.6	2.0	4.5	
	-eSN	20	03	59.8	2.4	1.5	
	-iP	19	54	14.4	2.2	11.4	

June 1968

Date	Component and Phase	Arrival time			Period s	Amplitude mm	
		h	m	s			
01	+ePE	11	34	23.1	1.2	0.2	
	+ePN			23.2	1.0	0.2	
	+eP			23.2	1.0	1.0	
02	-ePE	08	31	42.8	1.0	0.6	
	+ePN			42.8	0.8	0.5	
	-eP			42.5	0.8	1.3	
03	+ePE	09	30	29.7	1.8	1.2	
	-ePN			29.8	2.0	1.1	
	+eP			29.6	0.8	1.2	
04	+ePE	10	51	20.0	1.4	1.0	
05	+iPE	12	53	49.2	1.4	2.7	
	-iPN			49.3	1.8	4.0	
	-iP			49.3	1.6	6.5	
06	-ePE	12	57	28.5	0.8	0.3	
	-ePN			28.4	0.8	0.2	
	-eP			28.1	0.8	0.7	
	+ePE	20	45	14.0	1.0	0.8	
	+ePN			13.9	0.8	0.5	
	+iP			14.0	0.8	1.0	
07	+ePE	12	10	04.9	2.4	1.2	
	+eSE			20	31.1	10.0	4.0
	-ePN			10	04.9	2.4	1.0
	-eP			04.9	2.8	2.3	
	LP -ePE	12	10	07.6	3.8	3.5	
	-iSE			20	24.2	9.4	11.0
	-eSN				24.2	9.4	4.5
	+iP		10	05.7	5.6	6.0	
	-ePE	21	43	25.8	1.4	1.0	
+eP	25.8			1.4	1.5		
08	+iPE	23	28	43.0	1.6	3.4	
	+eSE			32	14.6	1.2	5.2
	-iPN			28	43.5	1.6	7.8
	+iP				43.5	2.0	10.2
	LP -iPE	28	28	43.9		1.5	
	-iSE			32	17.6		10.0
	-iPN			28	42.1		10.0
	-iSN			32	17.6		4.5
	-iP			28	42.1		15.5
12	-ePE	14	00	58.7	2.0	0.6	
	+ePN			58.7	1.6	0.3	
	+eP			58.8	2.4	1.5	
	LP -ePE	01	01	07.3		0.5	
	-iSE			04	34.2	3.8	10.0
	-iSN				34.2	3.8	4.5
	+eP				07.3		1.0

June 1968

Date	Component and Phase	Arrival time			Period s	Amplitude mm
		h	m	s		
12	+ePE	14	16	50.7	0.8	1.5
	+ePN			50.8	0.8	0.2
	+iP			50.7	1.0	2.4
	+ePE	20	28	49.3	1.4	1.0
	+ePN			49.9	1.4	0.6
	-eP			49.3	1.2	1.2
13	+ePE	21	51	19.7	1.2	0.2
	+ePN			19.8	1.4	0.5
	-eP			19.8	1.0	0.8
15	+ePE	11	47	11.9	1.4	0.8
	-ePN			11.8	2.0	1.0
	+iP			11.6	0.8	1.2
	+ePE	13	46	53.9	1.6	0.4
	+ePN			54.4	1.4	0.2
	+eP			53.4	1.4	0.3
+ePE	14	19	38.9	1.2	0.6	
+ePN			38.9	1.0	0.4	
+iP			38.9	1.0	3.2	
16	+iPE	19	18	44.8	1.2	1.5
	-iPN			44.8	1.0	1.3
	+iP			44.8	1.2	2.0
	LP +iPE	18	22	44.8	3.8	5.0
	-iSE			28.9		7.5
	-iPN			45.8		3.0
	-iSN			32.6		4.5
	-iP			43.9		1.5
	-iS			29.8		5.5
	+ePE			10		53
+eP	47.7	0.8	1.1			
-iPE	18	22	34.7		1.6	
+iPN			34.7	1.6	1.2	
+iP			34.7	1.4	3.1	
19	+iPE	08	26	52.1	1.4	1.3
	+ePN			52.2	1.2	0.2
	+iP			51.9	1.2	3.2
	LP +iPE	26	37	53.0	3.8	1.5
	+iSE			28.5		7.0
	-iP			53.0		3.0
	-PP			43.6		3.8
	+ePE	11	37	42.7	1.4	0.7
	+ePN			43.0	1.4	0.5
	+eP			43.2	1.0	0.8
	-ePE	20	07	51.0	1.2	1.0
-ePN	51.0			1.6	0.2	
-eP	51.0			1.5	1.2	

June 1968

Date	Component and Phase	Arrival time			Period s	Amplitude mm
		h	m	s		
20	+ePE	02	51	55.8	1.8	0.6
	+eP			55.8	2.0	1.0
22	+ePE	00	34	19.6	1.0	1.0
	+ePN			20.4	0.6	0.4
	+eP			19.4	1.0	1.3
23	+ePE	11	25	16.0	1.4	0.8
	+ePN			15.8	0.8	0.6
	+eP			15.7	0.8	0.6
26	+eP	02	02	13.8	1.2	0.9
	-ePE	15	52	44.3	1.4	0.3
	+ePN			44.2	2.4	0.3
	+eP			44.4	1.0	0.3
27	-iPE	22	25	56.6	1.0	3.0
	+ePN			56.6	1.0	0.4
	+iP			56.6	1.0	6.0
28	-ePE	12	41	40.3	1.0	1.0
	-ePN			40.2	1.0	1.0
	-eP			40.1	1.4	4.0

July 1968

Date	Component and Phase	Arrival time			Period s	Amplitude mm
		h	m	s		
01	+ePE	11	04	08.0	1.4	0.5
	-ePN			07.8	1.6	0.4
	+iP			07.6	1.2	1.0
02	+iPE	04	42	44.6	1.8	3.0
	+iPN			44.5	1.4	4.0
	+iP			44.4	1.3	6.0
	-ePE	18	53	08.3	1.0	0.5
	-ePN			08.6	1.2	0.6
	+eP			08.0	1.2	1.0
	-ePE	19	59	21.2	1.0	0.4
	+ePN			21.1	0.8	0.2
	+eP			21.1	1.2	0.8
03	+ePE	01	22	23.2	1.2	0.2
	-ePN			23.2	1.2	0.4
	-eP			23.0	1.2	1.1
04	-ePE	23	14	00.5	1.6	0.6
	+ePN			00.4	1.6	0.8
	-eP			00.7	1.4	1.0
05	+ePE	11	47	18.1	1.4	0.5
	+ePN			18.7	1.4	0.1
	-eP			18.3	1.2	1.5
	+ePE	13	49	44.5	1.0	1.2
	+ePN			44.2	0.8	0.8
	+iP			44.2	0.8	1.8
06	-eP	14	22	27.5	1.4	0.5
	+iPE	19	41	31.7	0.8	1.5
	-ePN			31.7	1.0	0.6
	-iP			31.7	1.0	3.0
07	-ePE	03	35	40.1	1.0	0.5
	+ePN			40.2	0.4	0.3
	+eP			40.2	0.8	0.6
	-ePE	12	55	25.0	1.0	1.0
	+eP			25.3	0.8	1.0
08	-eP	00	01	24.7	1.6	0.8
10	+ePE	11	24	06.4	1.0	0.4
	-eP			06.4	1.4	1.0
	LP +ePE		24	06.2		1.0
	-PPE		25	39.0	3.8	2.5
	-PPPE		25	56.7	2.0	1.0
	-iSE		30	05.3	9.4	6.0
	+ePN		24	06.2		0.5
	-iSN		30	06.2	7.6	4.0
	-eP		24	06.2		1.0
	-PP		25	37.1	3.8	4.0
	-PPP		25	56.7	7.6	5.5

July 1968

Date	Component and Phase	Arrival time			Period s	Amplitude mm
		h	m	s		
15	+ePE	10	18	55.9	1.4	0.4
	-ePN			56.0	1.2	1.2
	-iP			55.9	0.6	2.0
17	+ePE	05	36	25.4	2.0	0.6
	-eP			25.4	1.8	1.0
19	+ePE	05	09	07.2	1.4	0.5
	-ePN			07.2	1.0	0.3
	-eP			06.8	1.4	1.0
	-ePE	09	34	02.5	1.4	0.8
	+ePN			02.7	1.2	0.2
	+eP			02.5	1.6	1.4
20	Extreme microseismic activity					
21	+ePE	17	36	19.9	1.4	1.0
	+ePN			19.6	1.4	0.4
	-eP			19.9	1.4	1.0
22	-ePE	05	14	12.7	1.4	1.0
	+ePN			12.7	1.4	1.0
	-iP			12.7	1.4	1.2
	LP +iPE			14	2.0	4.3
	-iSE			18	5.6	8.5
	-iPN			14		2.3
	-iSN			18	9.4	9.5
	-iP			14	2.0	5.5
	-eS			18	5.6	10.5
	-ePE	18	10	58.7	1.4	0.8
	+ePN			58.7	1.4	0.5
	+iP			58.7	1.	1.3
23	-ePE	03	31	59.9	1.6	1.5
	-ePN			32	1.4	1.4
	+eP			01.4	1.4	1.0
24	+ePE	01	05	33.8	0.6	0.3
	-ePN			33.9	1.4	0.3
	+eP			34.0	0.8	0.3
	-ePE	17	35	11.9	0.8	0.2
	-ePN			11.6	0.8	0.4
	+eP			11.7	0.6	0.5
25	-iPE	07	34	53.2	2.0	3.0
	-eSE			44	2.4	3.8
	+iPN			34	2.0	5.2
	+eSN			44	2.8	5.5
	+iP			34	2.0	10.4
	+eS			44		2.4
	LP -iPE			34	3.6	10.5
	-iSE			44	5.6	14.0
	+iPN			34	3.6	23.5
	iSN			44	5.6	15.5
	-iP			34	3.6	6.8

July 1968

Date	Component and Phase	Arrival time			Period s	Amplitude mm	
		h	m	s			
25	-ePE	07	59	33.8	1.0	0.3	
	+eP			33.8	0.8	1.2	
	+ePE	11	09	55.7	0.6	0.2	
	-eP			55.3	1.8	1.0	
	+ePE	19	04	08.3	1.4	0.2	
	-ePN			08.3	1.0	0.2	
	-eP			08.3	1.0	1.0	
	+ePE	20	37	38.3	2.2	1.5	
	+ePN			38.3	2.0	0.3	
-eP	38.1			2.2	1.5		
26	+ePE	17	17	02.5	1.6	0.2	
	+ePN			02.8	1.4	0.5	
	+eP			02.5	1.2	0.6	
27-28	Extreme microseismic activity						
28	-ePN	11	11	02.0	1.6	0.6	
	+eP			01.6	1.2	0.8	
	+eP	21	30	37.9	1.0	2.0	
29	-ePN	11	24	34.6	3.0	0.8	
	-eP			34.6	3.0	1.5	
	LP +iSE		35	03.2	5.6	3.0	
	+ePN			35.0		0.5	
	+eSN			03.2	7.6	1.5	
	+iP	12	32	35.0	3.8	3.5	
	+ePE			22.5	1.6	0.5	
	+ePN			22.1	1.4	0.5	
	+eP			22.1	1.2	0.3	
30	-ePE	00	05	21.3	2.0	1.0	
	+ePN			21.1	2.0	0.3	
	+eP			21.3	1.6	1.6	
	LP -ePE		05	21.9	2.0	4.5	
	+eSE			15	51.0	5.6	1.5
	ePN			05	21.9		0.3
	-iP	04	22	21.9	2.0	4.5	
	-ePN			48.5	1.4	0.8	
	-eP			48.6	1.2	1.0	
	+ePE	20	51	56.5	1.0	0.3	
	-ePN			56.8	1.1	0.3	
	+eP			56.1	1.4	1.0	
	-ePE	22	25	18.7	1.4	0.6	
	+ePN			18.7	1.2	0.5	
	-eP			18.7	1.4	0.5	
31	-ePE	13	57	43.9	1.4	0.4	
	+ePN			44.0	1.0	0.4	
	+eP			43.9	1.2	1.0	

August 1968

Date	Component and Phase	Arrival time			Period s	Amplitude mm	
		h	m	s			
01	-ePE	00	26	16.6	1.2	1.0	
	+iPN			16.6	1.0	1.8	
	+iP			16.6	2.2	4.0	
	LP -iPE			26	15.0		0.7
	+iSE			36	11.3	7.6	2.5
	+iPN			26	15.0	2.0	2.3
	+iSN			36	11.3	5.6	3.0
-iP	26			15.0	2.0	5.5	
02	LP -ePE	01	33	17.1		1.0	
	+PPPE			37	49.0		1.5
	-iSE			43	56.5	6.0	7.0
	+iXN			37	50.5	3.8	1.3
	+eSN			43	57.4	6.0	3.0
	-iP			33	17.1	5.6	3.0
	-PP			36	16.2	9.4	4.5
	+iX			37	49.9	7.6	29.0
	+eP	14	25	32.4	1.2	0.6	
	LP iXE			36	55.4	16.8	9.5
	eXE			43	45.2	11.2	5.0
	iXN			36	55.4	7.6	2.0
	+eP			43	47.0	11.2	6.5
	03	-ePE	05	13	09.8	2.0	0.4
-ePN		10.0			2.0	0.4	
+eP		09.9			1.8	1.2	
LP -eP			13	07.7		0.5	
04		-iPE	11	54	37.0	1.2	1.2
	-ePN	37.5			1.2	0.6	
	+iP	36.8			1.4	2.0	
05	+iPE	00	02	22.7	1.0	2.0	
	+eSE			06	05.6	0.6	1.2
	-iPN			02	22.8	1.2	2.2
	+eSN			06	04.8	0.6	1.0
	+iP			02	22.8	1.0	3.0
	-eS			06	05.6	0.6	1.2
	-ePE	16	35	55.0	2.0	1.2	
	+ePN			55.0	2.0	0.2	
	+eP			55.0	2.0	2.5	
08	-ePN	20	42	55.2	1.6	0.5	
	+eP			54.9	1.6	0.4	
09	-ePN	03	20	48.5	1.6	0.2	
	+eP			47.5	1.6	0.6	
	+ePE	07	01	44.5	1.0	0.3	
	+ePN			44.5	1.0	0.1	
+eP			44.4	1.0	0.4		

August 1968

Date	Component and Phase	Arrival time			Period s	Amplitude mm
		h	m	s		
09	+ePE	07	24	15.8	1.0	0.5
	+ePN			15.8	1.0	0.2
	+eP			15.8	1.0	1.3
10	-ePE	02	20	03.2	1.2	1.2
	+eSE			30	2.4	2.4
	+ePN			20	1.2	0.5
	+eSN	20	30	34.4	2.6	2.1
	+iP			03.2	1.2	2.1
	LP -iPE			20	09.1	7.6
	-PPE	20	30	31.6	5.6	13.0
	-eSE			40.0	5.6	13.0
	+iPN			09.1	7.6	2.0
	-eSN	20	30	40.0	5.6	2.5
	-iP			09.1	7.6	46.5
	-PP			23	31.6	5.6
	+ePE	04	18	49.2	1.2	0.3
	+ePN			49.7	1.0	0.2
	-eP			48.8	1.4	0.6
+ePE	06	04	46.0	0.4	0.4	
+ePN			45.8	0.6	0.2	
-eP			45.9	0.6	1.0	
-ePE	10	18	53.2	0.8	0.3	
+eP			53.3	0.6	0.4	
+ePE	19	30	54.0	1.0	0.4	
-ePN			53.8	1.2	1.0	
-eP			53.9	1.0	1.2	
11	-ePE	02	54	14.4	1.2	1.0
	-ePN			14.4	1.0	0.2
	-iP			14.4	1.0	2.0
-ePE	20	13	42.4	1.4	0.4	
+ePN			42.4	1.6	0.1	
+eP			42.4	1.6	1.0	
13	Extreme microseismic activity					
14	-ePE	22	27	02.1	1.4	0.6
	-ePN			02.4	1.2	0.2
	+eP			02.6	1.6	0.4
15	-ePE	07	02	47.9	0.6	0.3
	+ePN			47.8	1.2	1.0
	+eP			47.9	0.6	1.4
LP	-iPE	08	27	10.0	3.8	5.0
	-PPE			30	13.2	6.0
	-iPN			27	5.6	1.5
	+PPSN			38	13.2	20.0
	-iP			27	3.8	19.0
	-PP			30	13.2	18.5
	-PPP			32	13.2	12.5

August 1968

Date	Component and Phase	Arrival time			Period s	Amplitude mm
		h	m	s		
15	+ePE	11	53	11.1	1.0	1.0
	-ePN			11.1	1.4	0.4
	-eP			11.1	1.0	2.2
	+ePE	17	54	32.1	1.8	0.3
	-ePN			32.1	1.6	0.4
	-eP			32.1	1.8	1.0
	+ePE	19	46	55.1	1.4	0.3
	-ePN			55.1	1.2	0.2
	+eP			55.1	1.4	0.5
16	Extreme microseismic activity					
17	-ePE	04	13	34.8	1.0	1.0
	-ePN			34.8	2.0	0.5
	+eP			34.6	1.6	0.8
18	+ePE	12	14	29.7	0.8	0.2
	-eP			29.7	1.0	1.0
	+ePE	18	21	34.5	1.0	0.2
	+ePN			33.7	1.2	0.3
	+eP			33.7	1.2	0.6
	16	+iPE	18	50	32.9	1.2
eXE			52	37.4	1.8	5.0
-eSE		19	00	16.7	2.8	3.3
-iPN		18	50	32.9	1.2	2.8
eXN			52	38.7	1.8	3.5
+eSN		19	00	17.0	3.0	5.8
-iP		18	50	32.9	1.2	9.0
eX			52	37.7	0.8	5.0
+eS		19	00	17.0	1.8	1.4
LP +iPE		18	50	37.1	2.0	3.0
iXE			52	37.6		1.0
-iSE		19	00	15.3	3.8	6.5
-iPN		18	50	37.1	2.0	2.0
iXN			52	37.6		2.0
+iSN		19	00	15.3	3.8	13.5
+iP	18	50	37.1	2.0	11.0	
eX		52	37.6	3.8	13.5	
-iS	19	00	15.3	5.0	9.0	
+ePE	19	09	46.2	1.2	1.0	
+ePN			46.7	1.0	1.0	
+eP			46.3	1.6	2.0	
+ePE	19	18	27.7	1.0	1.0	
+ePN			27.2	1.0	0.5	
+eP			27.4	0.8	1.8	
19	+ePE	15	55	21.9	0.6	0.3
	-ePN			22.1	0.6	0.6
	+eP			22.1	0.8	1.0

August 1968

Date	Component and Phase	Arrival time			Period s	Amplitude mm	
		h	m	s			
20	+ePE	02	56	53.5	0.8	0.6	
	-ePN			53.5	0.8	1.0	
	-eP			53.5	0.4	1.6	
	-ePE	15	37	18.3	1.0	0.6	
	+ePN			18.2	1.0	1.2	
	+eP			18.4	0.8	3.0	
21	-ePE	18	08	35.3	0.6	0.4	
	+ePN			35.8	0.6	0.4	
	-eP			35.9	1.6	0.4	
	LP +ePE		08	42.2		0.5	
	-ePN			42.2		0.5	
	-eP			41.3	2.8	0.5	
22	Extreme microseismic activity						
23	-iPE	22	47	34.9	1.0	5.2	
	eXE			49	26.7	1.6	6.0
	-eSE			56	24.9	1.2	3.5
	+ePN			47	35.7	0.8	1.5
	eXN			49	27.3	0.8	1.0
	+eSN			56	24.9	2.8	4.5
	-iP			47	34.9	1.4	12.3
	eX			49	25.9	1.2	8.0
	+eS			56	26.4	1.0	1.8
	-ePE			23	25	35.9	0.6
	+ePN	35.9	0.8			0.4	
	-eP	36.0	0.8			6.0	
	24	-ePE	12	30	58.2	1.0	0.2
-ePN		57.9			1.2	0.2	
+eP		58.5			0.6	0.5	
+ePE		15	18	34.5	1.2	0.6	
-ePN				34.4	1.2	0.6	
-eP				34.3	2.0	1.6	
25	+ePE	11	28	25.7	1.2	0.4	
	-ePN			25.7	1.2	1.0	
	-eP			25.7	1.2	1.5	
	-ePE	13	36	06.5	1.4	0.2	
	-ePN			06.5	1.4	0.4	
	+eP			06.5	1.2	1.0	
28	+ePE	12	03	07.4	1.0	0.2	
	-ePN			07.4	1.2	0.6	
	-eP			07.4	1.0	1.0	
29	-ePE	23	34	39.9	1.2	3.8	
	-ePN			39.7	1.2	3.6	
	+eP			39.3	1.0	4.0	
31	LP +ePN	11	06	19.2	6.0	2.5	
	-iSN			12	32.4	7.6	6.0
	+eP			06	19.2	3.8	2.0

September 1968

Date	Component and Phase	Arrival time			Period s	Amplitude mm	
		h	m	s			
01	+ePE	00	35	57.0	1.2	1.3	
	-ePN			57.3	1.2	3.0	
	-eP			57.4	1.0	5.2	
02	Extreme microseismic activity						
03	+ePE	23	42	54.5	1.4	0.3	
	-ePN			54.8	1.6	0.3	
	-eP			54.8	1.6	1.0	
05	+ePE	02	52	55.7	1.4	1.0	
	+ePN			55.7	2.0	0.6	
	+eP			55.7	1.4	1.5	
	+ePE	20	06	56.6	0.6	0.4	
	+ePN			56.4	0.6	0.3	
	+eP			56.4	0.8	0.2	
06	+ePE	07	48	45.2	1.8	0.5	
	+ePN			44.9	1.6	0.2	
	+eP			44.8	1.8	0.4	
	+ePE	14	19	38.4	0.4	0.2	
	+ePN			38.5	0.4	0.2	
	+eP			38.4	1.0	2.0	
07	-ePE	02	13	29.6	1.2	0.2	
	-ePN			29.4	0.6	0.2	
	-eP			29.4	0.6	0.5	
	+ePE	07	00	58.4	0.6	0.2	
	+ePN			59.0	1.0	1.0	
	-eP			59.0	1.0	1.0	
	-iPE	15	58	11.0	1.4	1.5	
	-ePN			12.2	1.0	0.6	
	-iP			11.0	1.2	1.5	
	-eP	23	28	19.3	1.4	1.0	
08	-ePE	13	10	32.0	1.0	1.2	
	-ePN			32.1	0.8	0.3	
	-iP			32.0	1.0	1.5	
	+ePE	13	42	35.8	1.4	0.3	
	+ePN			35.3	1.6	0.2	
	+eP			35.3	1.2	0.3	
	+ePE	15	25	28.3	1.6	3.0	
	-ePN			28.3	1.6	1.5	
	-eP			28.3	1.8	7.0	
	LP -ePE		25	28.8			1.0
	-PPE		29	03.5	3.8		3.0
	+eSE		36	23.3	7.6		1.5
	-ePN		25	28.8			1.0
	-PPN		29	06.3	7.6		1.0
-eSN		36	23.3	7.6		1.5	
-eP		25	28.8			0.5	
+PP		29	03.5			1.0	

September 1968

Date	Component and Phase	Arrival time			Period s	Amplitude mm	
		h	m	s			
09	+ePE	00	50	31.1	1.0	0.3	
	+eP			31.1	1.2	1.0	
11	-ePE	18	36	29.6	1.0	0.2	
	+ePN			29.8	1.0	0.2	
	-eP			29.0	1.2	1.2	
12	+ePN	08	29	44.2	1.0	0.7	
	+eP			44.2	1.0	0.6	
	+iPE	22	55	38.3	1.0	3.5	
	eXE			57	50.8	1.4	2.0
	-eSE	23	05	00.5	2.0	7.8	
	-iPN	22	55	38.3	1.0	7.0	
	eXN			57	51.5	2.2	4.0
	+eSN	23	05	01.0	2.0	7.0	
	-iP	22	55	38.3	1.0	24.0	
	eX			57	51.3	1.6	7.0
	+eS	23	05	00.5	1.8	2.0	
	13	+ePE	06	59	36.0	1.2	1.0
		-ePN			35.7	1.4	1.6
-eP		35.7			1.0	3.2	
14	-ePE	01	34	15.2	1.4	1.5	
	-ePN			15.4	1.2	0.3	
	+eP			14.9	1.8	3.0	
	+ePE	07	08	16.6	1.2	0.5	
	+ePN			17.0	1.4	0.5	
	-eP			16.8	1.0	1.2	
16	+ePE	02	08	53.2	1.6	0.2	
	-ePN			54.2	1.4	0.2	
	-eP			53.2	1.6	0.5	
	-ePE	14	08	35.2	1.0	1.8	
	+eSE			19	00.2	3.6	3.0
	+ePN			08	35.4	1.0	1.0
	+eSN			19	00.2	3.0	2.4
	+eP			08	35.3	1.0	3.0
	LP -iPE			08	35.2	5.6	2.0
	+iSE	19	01.5	5.6	4.5		
	+iPN	08	35.2	5.6	0.5		
	-iSN	19	01.5	3.8	3.5		
	-iP	08	35.2	5.6	1.0		
	+ePE	14	23	24.7	1.6	1.5	
	-ePN			24.5	1.6	2.0	
	-eP			24.7	1.2	7.0	
-ePE	16	13	50.2	1.0	0.5		
+ePN			50.0	1.6	0.6		
+iP			50.2	1.2	2.0		

September 1968

Date	Component and Phase	Arrival time			Period s	Amplitude mm				
		h	m	s						
17	+ePE	14	19	38.7	1.6	0.6				
	+ePN			38.9	1.6	0.6				
	-eP			38.5	1.6	3.8				
	-ePE	20	54	31.9	1.4	0.6				
	+eP			31.1	1.6	0.6				
18	+ePE	11	56	19.0	1.4	0.7				
	-ePN			19.0	1.6	0.8				
	-iP			19.0	1.2	2.2				
	+ePE	14	23	54.0	1.6	1.3				
	+ePN			53.5	1.6	0.8				
	+eP			53.7	1.4	1.0				
19	+ePE	22	00	27.9	0.4	0.6				
	+ePN			28.9	1.0	0.6				
	-eP			26.9	1.2	1.2				
	+ePN	23	45	48.9	1.4	0.5				
	-eP			48.9	1.4	1.0				
20	eX	06	18	11.9	1.8	5.0				
20-22	Extreme microseismic activity									
20	LP			-ePE	08	48	04.5	5.6	1.5	
				-iSE		53	25.2	5.6	12.0	
				-ePN		48	04.5		0.3	
				+PcPN		50	43.0		0.5	
				-iSN		53	25.2	3.8	2.0	
				+eP		48	04.5	3.8	1.5	
				+PcP		50	43.0	4.0	1.5	
22				+ePE	08	12	21.6	1.4	2.0	
				+ePN			21.0	1.6	1.2	
				+eP			21.0	1.8	2.6	
					-iPE	22	04	11.1	1.2	7.5
					-iSE			13	2.4	5.0
					-ePN			04	1.0	1.3
					+iSN			13	2.6	4.0
					-iP			04	1.2	16.5
+iS	13	2.0	2.0							
24				+ePE	08	59	05.1	2.0	0.6	
				+ePN			05.6	1.2	0.6	
				-eP			05.1	1.2	1.5	
					-ePE	13	04	32.1	1.6	0.4
					+ePN			31.9	1.4	1.5
					-eP			31.9	1.0	1.0
					+ePE	17	24	39.1	0.8	0.3
					-ePN			39.7	1.2	1.0
				-eP			39.6	1.0	4.0	

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Date	Component and Phase	Arrival time			Period s	Amplitude mm		
		h	m	s				
25	-ePE	07	12	43.2	2.0	1.3		
	+ePN			43.4	2.0	2.2		
	+eP			43.2	2.2	4.5		
	LP -ePE		12	43.0		0.5		
	-ePN			43.0	3.8	1.0		
	-eP			43.0	3.8	1.0		
26	+iPE	14	50	01.5	1.2	1.0		
	+eSE	15	00	01.2	2.0	0.6		
	-iPN	14	50	01.5	1.0	2.5		
	+eSN	15	00	02.0	2.0	1.5		
	-iP	14	50	01.5	1.2	7.0		
	-eS	15	00	02.2	1.8	1.0		
	-ePE	18	14	39.6	1.8	1.2		
	+eSE			24	24.3	3.0	9.0	
	+iPN			14	39.7	1.6	2.0	
	+eSN			24	22.1	3.0	3.0	
	+iP			14	39.8	1.6	4.0	
	+eS			24	24.1	2.0	1.0	
	LP -iPE				14	39.9	3.0	2.0
	+iSE	24	23.8			5.6	10.5	
	+iPN	14	39.9			3.0	4.5	
	+iSN	24	21.6			3.0	3.7	
	-iP	14	39.9			3.8	14.5	
	-iS	24	26.6			15.0	8.5	
	27	-iPE	04			11	09.6	0.8
		+eSE		21	12.2		1.4	2.0
		+ePN		11	09.6		0.8	1.0
+eSN		21		12.2	1.2		0.7	
+iP		11		09.6	0.8		5.0	
LP +ePE				11	09.7		2.0	0.5
-eSE			21		12.4	5.6	3.6	
-ePN			11		10.6	2.0	0.5	
+iSN			21		13.4	3.0	1.7	
-iP			11		09.7	2.0	0.8	
-iS			21		13.4	5.6	3.5	
+ePE		16	52	54.7	1.6	0.5		
+eSE		17	02	43.0	3.4	2.3		
+ePN		16	52	54.9	1.0	0.2		
+eSN		17	02	41.4	3.6	1.0		
+eP		16	52	54.7	1.6	1.5		
+eS		17	02	43.0	3.6	2.0		
+ePE		22	59	24.9	1.8	0.8		
+ePN				24.9	0.6	0.2		
+eP				24.7	0.6	1.2		
28		-ePE	14	06	11.9	1.2	3.2	
	-ePN	11.9			1.0	1.0		
	-iP	11.9			1.6	12.0		

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Date	Component and Phase	Arrival time			Period s	Amplitude mm
		h	m	s		
29	+ePE	04	01	52.8	1.0	0.8
	+ePN			52.8	0.6	0.5
	+eP			52.6	0.6	1.0
	-ePE	13	39	45.8	1.0	0.4
	+eP			45.8	1.0	0.8
	-eP	13	49	33.6	0.8	1.0
	-ePE	19	53	55.6	1.0	1.0
	+ePN			55.5	1.0	0.4
	+eP			55.5	1.0	1.2
	-ePE	22	26	01.7	1.0	0.5
	+ePN			01.7	1.0	0.3
	-eP			01.7	0.8	1.4
30	+ePE	11	49	15.7	1.6	0.5
	-ePN			15.6	2.0	1.0
	-eP			15.7	1.0	1.5
	-ePE	14	28	50.7	1.0	1.0
	+eP			50.7	0.8	1.3
	+ePE	18	55	03.3	1.4	0.8
	+ePN			02.7	1.2	0.5
	+eP			03.0	0.6	0.4

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Date	Component and Phase	Arrival time			Period s	Amplitude mm	
		h	m	s			
01	+ePE	01	05	29.9	1.6	0.6	
	-ePN			29.9	1.6	1.3	
	-eP			29.8	1.6	2.0	
	-ePE	18	50	21.9	0.8	0.3	
	-ePN			21.5	0.6	0.3	
	+eP			21.8	0.8	0.4	
	-ePE	20	32	42.5	1.0	0.2	
	-eP			42.5	1.0	0.2	
	-ePE	21	22	56.4	1.2	0.5	
	+ePN			57.4	1.4	0.3	
+eP	57.4			1.6	0.6		
02	+ePE	07	24	53.9	0.8	0.5	
	+eP			53.9	1.2	1.0	
	+ePE	14	09	43.8	1.0	0.6	
	+ePN			44.4	1.2	0.3	
	+eP			44.0	1.0	1.0	
03	+ePE	08	17	25.2	1.0	1.4	
	-ePN			25.2	1.0	1.0	
	-iP			25.2	1.2	3.5	
	+ePE	12	29	37.2	1.6	1.2	
	+ePN			36.2	2.0	0.8	
	+eP			36.2	1.6	1.5	
04	-iPE	06	10	48.7	1.0	3.0	
	eXE			15	49.3	3.6	9.0
	+eSE			21	08.1	1.8	3.8
	+ePN			11	49.7	1.8	4.0
	eXN			15	48.6	1.8	4.8
	-eSN			21	07.1	1.4	5.4
	-iP			10	48.6	1.0	6.0
	04-05			Extreme microseismic activity			
05	-ePE	04	19	44.1	1.8	1.0	
	+ePN			44.5	1.6	0.6	
	+eP			44.7	1.2	1.5	
06	-ePE	07	55	00.2	1.0	1.0	
	+eP			00.2	0.6	1.2	
	-ePE	09	00	13.2	1.4	1.0	
	+ePN			13.2	1.8	1.0	
	+eP			13.4	1.2	2.0	
06-08	Extreme microseismic activity						
07	+ePE	19	38	10.4	1.0	2.6	
	eXE			44	15.2	1.4	7.8
	+ePN			38	11.5	1.0	3.0
	eXN			44	15.2	1.8	5.0
	eX			44	15.2	4.0	5.0

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Date	Component and Phase	Arrival time			Period s	Amplitude mm						
		h	m	s								
07	LP	-PPE	19	41	17.4	7.6	5.5					
				48	25.8		4.5					
				38	12.7		0.3					
				39	24.3		0.5					
				41	17.4		0.5					
				38	12.7		2.0	5.0				
				39	24.3		3.0	8.0				
				41	17.4		3.8	10.0				
				48	25.8		15.0	16.0				
				22	+ePE		50	49.8	1.4	2.2		
					-ePN			49.7	1.6	1.5		
					+eP			50.1	1.2	4.5		
08	LP		07	50	43.9	1.0	1.0					
					43.9	0.8	0.7					
					43.9	1.0	3.0					
					50	43.6	3.8	2.8				
					52	11.7	5.0	1.5				
					56	39.1	9.4	4.0				
					56	41.0	11.2	3.0				
					50	43.6	5.6	5.5				
					52	11.7	5.0	3.5				
					56	41.0	8.0	4.5				
					15				04	51.2	0.8	1.3
									14	07.2	2.2	3.0
04	51.6	0.8	0.5									
14	07.2	2.6	4.0									
04	51.2	1.0	4.0									
14	07.2	1.6	1.0									
09-10	Extreme microseismic activity											
10			15	18	50.3	1.4	3.0					
					50.3	1.8	2.0					
					50.3	1.2	5.0					
11			08	02	14.2	0.4	0.7					
					14.2	0.8	0.4					
					14.2	0.6	1.8					
				17	23	27.2	1.6	1.2				
						27.2	1.8	1.5				
						27.2	1.8	5.0				
12			19	29	19.0	1.2	1.8					
				31	27.0	1.6	1.2					
				38	44.7	2.2	4.8					
				29	19.0	1.2	3.2					
				31	26.7	1.6	1.8					
				38	45.3	2.2	4.0					
				29	19.0	1.0	10.0					
				31	26.7	1.8	2.3					
				38	45.4	2.0	2.0					

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Date	Component and Phase	Arrival time			Period s	Amplitude mm	
		h	m	s			
13	-ePE	08	16	55.4	1.2	0.7	
	+ePN			55.5	1.0	1.0	
	+iP			55.4	1.0	3.0	
	-ePE	12	15	17.7	0.6	0.6	
	-ePN			17.4	1.2	0.4	
	-eP			17.7	0.4	1.0	
14	+ePE	03	08	32.1	1.8	2.4	
	+eSE			26.3	5.0	10.0	
	-ePN			32.1	1.2	1.4	
	+eSN			16	25.8	7.0	9.0
	-eP			08	31.8	1.2	5.0
	+eS			16	25.8	6.8	7.5
	LP +iPE			08	35.6	4.0	6.5
	+PPE			10	36.6	7.6	2.5
	+PcSE			13	41.2	5.6	2.5
	-eSE	16	34.4	6.0	7.0		
	-iPN	08	35.6	4.0	1.5		
	-eSN	16	34.4	6.0	7.5		
	+iP	08	35.6	5.6	1.0		
	+PP	10	36.6	7.6	1.0		
	+eP	05	35	50.8	1.0	3.2	
	15	-ePN	17	42	05.4	1.2	1.3
		-eP			05.4	1.2	3.0
		+ePE	20	22	34.7	1.0	1.8
-ePN		34.7			1.0	0.8	
-eP		34.7			1.0	2.0	
16-17		Extreme microseismic activity					
17	-ePE	15	53	12.1	1.2	0.5	
	-ePN			12.3	1.6	1.0	
	+eP			11.9	1.2	1.6	
18	+ePE	15	56	53.2	1.4	1.5	
	-ePN			53.4	1.2	1.0	
	+eP			53.1	1.6	3.0	
19	-ePE	17	41	54.2	1.4	0.8	
	+ePN			54.2	1.2	1.0	
	+eP			54.2	1.4	2.2	
20	+ePN	05	52	49.6	1.2	1.0	
	+eP			49.5	1.6	1.8	
	-ePE	13	43	55.1	1.4	0.5	
	+ePN			55.1	1.4	0.5	
	-eP			55.1	1.6	1.0	
	+ePE	17	12	14.1	1.2	0.8	
	+ePN			14.4	2.0	1.5	
	+eP			14.1	1.2	1.3	

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Date	Component and Phase	Arrival time			Period s	Amplitude mm	
		h	m	s			
23	+eP	02	02	06.7	1.6	1.5	
	-ePE	13	37	38.5	1.0	1.0	
	+eP			38.5	0.8	2.0	
	+ePE	21	17	51.5	1.2	1.0	
	eXE		21	30.0	3.0	3.8	
	+eSE		28	46.5	3.6	3.2	
	+ePN		17	51.5	1.6	1.4	
	+eSN		28	46.5	3.0	6.5	
	+eP		17	51.5	1.8	7.5	
	eX		21	25.5	2.0	9.0	
	LP -iPE			17	56.1	4.0	4.0
	+pPE			18	37.3	5.6	3.5
	+PPE			21	29.7	3.6	2.0
	-eSE			28	26.2	11.0	2.5
	+iPN			17	56.1	4.0	2.5
	+eSN			28	26.2	11.0	2.5
	-eP			17	56.1	4.0	18.0
	-pP			18	36.4	3.0	0.5
	+PP			21	29.7	5.6	6.0
	-eS			28	26.2		1.0
	+iPE	21	25		03.0	1.2	7.0
	+iPN				03.0	1.0	5.5
	+iP				03.0	1.4	13.0
24	LP +iPN	05	13	04.5	5.6	0.5	
	+iP			04.5	5.6	0.5	
	-eSE	08	17	31.7	13.2	3.0	
	+eSN			34.5	11.2	2.0	
+ePE	17	45	28.3	0.8	2.2		
+ePN			28.3	1.0	3.0		
24-27	Extreme microseismic activity						
27	-ePE	17	55	24.0	1.0	1.0	
	+iP			24.1	1.2	3.5	
28-29	Extreme microseismic activity						
28	-ePE	23	45	25.9	1.0	1.6	
	+eSE		56	14.3	2.2	1.3	
	+ePN		45	25.9	1.0	2.0	
	+eSN		56	12.9	5.4	3.4	
LP -iPE		45	25.5	2.0	2.0		
-eSE		55	53.5	5.6	5.0		
-iPN		45	25.5	2.0	2.0		
+eSN		55	53.5	11.2	6.0		
-iP		45	25.5	2.0	2.5		
29	+ePE	07	33	12.4	1.0	0.8	
	-ePN			12.4	0.8	1.0	

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Date	Component and Phase	Arrival time			Period s	Amplitude mm	
		h	m	s			
29	-iP	07	33	14.4	0.8	3.0	
	-ePE	11	39	26.5	1.0	0.6	
	-ePN			26.5	1.0	0.2	
	-eP			26.2	0.8	1.0	
	-ePE	17	13	40.3	1.4	0.8	
	-ePN			40.9	1.4	0.5	
	+eP			40.3	1.4	1.2	
	30	+ePE	09	53	21.8	1.0	0.6
		-ePN			21.8	1.0	0.5
-eP		21.8			1.0	1.5	
+ePE		23	38	33.1	0.8	1.0	
+ePN				33.6	2.0	0.5	
31		-ePE	09	19	34.1	1.2	3.0
	+eSE	04.9			2.6	1.0	
	+ePN	19			1.0	0.6	
	+eSN	28			04.6	3.0	0.6
	+iP	19			34.1	1.5	8.0
	+eS	28			04.9	2.2	3.0

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Date	Component and Phase	Arrival time			Period s	Amplitude mm		
		h	m	s				
01	+ePE	01	43	00.9	1.0	0.6		
	-ePN			00.8	0.8	1.2		
	-eP			01.0	1.0	2.5		
03	-ePE	08	22	49.0	1.0	0.7		
	+eP			49.0	1.2	1.3		
	-ePE	08	59	10.9	1.0	0.6		
	-ePN			10.9	0.6	0.2		
	-ePN	09	25	14.2	0.8	0.5		
	+eP			14.4	0.8	0.1		
04	+ePE	09	14	50.9	1.0	0.3		
	+ePN			50.9	1.0	0.6		
	-iP			50.9	1.0	1.5		
	+iPE	09	19	39.1	1.0	1.0		
	-eSE			29	3.0	1.2		
	-iPN			19	1.2	1.8		
	+eSN			29	3.4	1.8		
	-iP			19	1.4	6.0		
	+eS			29	3.4	2.0		
	-ePE			15	34	39.6	1.0	1.0
	-ePN					39.6	1.0	0.6
-eP	39.6	1.0	3.2					
	-ePE	19	26	04.1	0.8	0.3		
	-ePN			03.7	0.8	0.4		
	+iP			04.1	1.2	1.1		
05-06	Extreme microseismic activity							
07	+ePE	03	45	56.0	1.6	0.5		
	-ePN			56.0	1.6	0.8		
	-eP			56.2	1.4	1.2		
	+ePE	08	50	32.2	1.0	0.8		
	-ePN			32.4	0.8	0.6		
	-eP			32.5	0.8	0.3		
	+iPE	10	21	36.1	1.0	2.2		
	+iPN			36.2	1.0	3.1		
	+iP			35.9	1.0	2.4		
	-ePE	11	05	43.7	1.0	0.2		
	-ePN			43.4	1.0	0.6		
	+eP			43.7	0.8	0.6		
08-09	Extreme microseismic activity							
08	-ePE	07	55	35.6	1.0	0.6		
	+ePN			35.6	1.0	1.2		
	+iP			35.6	1.2	3.6		

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Date	Component and Phase	Arrival time			Period s	Amplitude mm
		h	m	s		
08	-ePE	18	39	04.8	0.6	1.5
	+iPN			04.8	1.0	1.1
	+iP			04.8	1.0	2.8
09-16	Extreme microseismic activity					
16	+iPE	00	36	02.9	1.4	2.2
	-iPN			03.0	1.2	2.6
17	+ePE	05	31	37.6	1.2	1.8
	-ePN			37.6	0.8	0.8
	-eP			37.6	1.0	3.8
	+ePE	23	13	22.9	1.2	0.8
	-eP			22.7	1.0	1.5
18	+ePE	01	51	42.7	1.0	0.9
	-ePN			42.9	0.8	0.2
	-iP			42.6	0.8	2.2
	-ePE			02	55	04.4
+ePN	04.4	1.2	0.8			
	+eP	06	57	04.4	1.0	1.7
	+ePE			31.4	1.2	1.1
19	-ePN	07	47	56.3	0.8	0.3
	-eP			56.3	0.6	0.4
	-iPE	09	58	54.3	1.0	1.0
	+iPN			54.3	1.0	1.5
	-iP			54.3	1.0	2.1
	+ePE	10	26	19.3	1.2	0.6
	-ePN			19.3	1.0	0.8
	-eP			19.3	1.0	1.6
	-ePE	12	33	44.3	1.2	1.0
	+ePN			44.1	1.0	0.5
20	Extreme microseismic activity					
22-25	Extreme microseismic activity					
22	+ePE	08	47	32.4	1.0	1.0
	+ePN			32.4	0.8	0.5
	+eP			32.4	0.6	0.2
	-ePE	10	44	46.7	1.0	0.8
	+ePN			46.9	0.6	0.2
	+iP			46.7	1.2	3.2
24	eXE	21	43	32.4	2.0	1.8
	eXN			32.4	2.2	5.0
25	-ePE	11	31	24.3	1.4	0.6
	-eP			24.1	1.6	2.3

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Date	Component and Phase	Arrival time			Period s	Amplitude mm	
		h	m	s			
25	-ePE	18	50	08.6	1.0	1.2	
	-ePN			08.6	1.0	0.8	
	-eP			08.4	1.2	1.5	
26	+iPE	00	08	18.3	1.2	1.5	
	eXE			12	32.4	3.0	2.3
	-ePN			08	18.3	1.0	1.0
	eXN	12	30.9	3.4	8.5		
	+iP	08	18.3	1.0	2.0		
	eX	12	30.7	2.2	3.0		
	-iPE	01	23	19.3	1.0	2.1	
	+iPN			19.3	1.0	1.4	
	+iP			19.3	1.0	7.2	
27	-ePN	17	27	18.8	0.8	1.1	
	-eP			18.9	0.8	1.0	
	-ePE	17	52	41.3	1.0	0.3	
	-ePN			41.3	1.0	1.0	
	+ePE	18	51	29.8	1.0	0.5	
	-ePN			29.8	1.0	0.5	
28	+ePE	03	47	58.5	1.0	1.5	
	+ePN			58.7	1.0	0.5	
	+iPE	16	43	26.8	1.2	5.0	
	-iPN			26.7	1.2	1.8	
	-iP			26.2	1.8	10.1	
	+ePE	22	15	11.2	1.0	0.8	
	+ePN			10.7	1.0	0.8	
	+eP			11.0	1.0	1.0	
	29	-ePE	04	14	16.1	1.0	1.3
+ePN		16.3			1.0	0.8	
-iP		16.1			1.0	2.0	
-ePE		16	52	11.6	0.6	0.8	
-ePN				11.6	1.0	1.4	
+eP				11.4	0.8	1.5	

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Date	Component and Phase	Arrival time			Period s	Amplitude mm		
		h	m	s				
01	-ePE	05	35	07.4	1.0	0.5		
	+iPN			07.3	1.2	1.5		
	eXN			36	44.7	2.4	1.5	
	+iP			35	07.4	1.0	2.6	
	eX			36	44.7	2.0	2.1	
	-ePE	16	22	08.8	0.8	1.5		
	-ePN			09.4	0.8	2.0		
	+eP			09.4	0.8	2.0		
	02	-ePE	02	43	21.2	1.0	1.0	
+iPN		20.4			1.0	2.0		
-iP		20.5			1.0	4.8		
+ePN		12	12	31.9	0.6	0.3		
-eP				32.0	0.8	1.5		
+iPE		13	00	05.5	1.0	1.9		
-ePE		19	10	00.0	0.6	1.2		
+iP	00.4			1.0	3.0			
03	+iPE	02	52	16.3	1.2	2.5		
03-04	Extreme microseismic activity							
05	-ePE	00	21	28.8	0.6	1.5		
	-ePN			28.8	0.6	0.8		
	+eP			28.8	0.6	1.0		
06	eXE	00	24	54.6	1.0	1.0		
	eXN			54.6	2.0	3.0		
	iX			54.5	1.2	3.2		
07	-ePE	00	19	14.9	1.0	1.4		
	-eP			14.9	0.8	1.5		
	LP +ePE	05	11	03.4		0.3		
				+eSE	21	47.9	6.0	1.0
				-eSN		47.9	6.6	1.0
				+eP	11	03.4	2.0	0.5
	+ePE	14	56	16.6	1.0	2.0		
	-ePN			16.7	0.6	1.1		
	+eP			16.6	0.6	0.6		
	+ePE	17	22	43.2	1.4	0.6		
	+ePN			43.2	1.4	1.3		
	-eP			43.0	1.6	3.0		
	-iPE	20	45	11.6	1.0	5.0		
	-iPN			11.4	1.0	2.2		
	-iP			11.5	1.0	12.0		

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Date	Component and Phase	Arrival time			Period s	Amplitude mm		
		h	m	s				
07	-ePE	21	48	06.2	1.0	0.8		
	eXE			23.2	2.0	7.3		
	-eSE			58	19.8	3.6	2.0	
	-ePN			48	06.2	1.2	1.5	
	eXN			23.2	2.0	8.2		
	-eSN			58	20.2	2.0	1.2	
	+iP			48	05.2	1.0	2.2	
	eX			23.8	1.0	5.8		
	-ePE			22	36	36.9	1.0	0.5
	08			+ePN	10	55	31.9	0.8
+eP		31.9	0.8	1.0				
-iPE		13	23	57.3	1.0	0.5		
-ePN				57.5	1.0	0.8		
+iP				57.3	1.0	2.2		
-ePE		13	40	49.3	1.0	0.5		
+ePN				48.3	0.8	0.5		
-eP				48.8	1.0	1.0		
09-10		Extreme microseismic activity						
09		-ePE	16	18	14.4	1.2	1.5	
	+eP	14.4			1.2	1.8		
10	-ePE	19	07	27.1	1.0	1.2		
	+iPN			27.1	1.0	5.0		
	-iP			27.1	1.0	4.5		
	eX			10	22.3	1.0	3.0	
	-ePE	20	48	51.7	1.0	1.3		
	+ePN			51.4	1.2	1.0		
	+eP			51.4	1.2	1.0		
11	eXE	03	03	47.4	1.0	0.6		
	eXN			47.0	1.4	2.1		
	eX			47.2	1.2	4.0		
	+ePE	03	52	17.7	0.8	1.2		
	+ePN			18.4	8.6	0.8		
	+iP			17.6	0.6	3.6		
	+ePE	13	07	53.5	0.6	0.3		
	-ePN			53.5	0.6	0.5		
	+iP			53.4	0.8	1.9		
	-ePE	21	46	27.5	1.2	0.4		
	+ePN			27.6	1.2	1.2		
	+iP			27.5	1.2	3.2		
	+ePE	22	50	53.9	0.8	1.5		
	+ePN			53.7	1.2	2.1		
+eP	53.6			1.2	1.0			

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Date	Component and Phase	Arrival time			Period s	Amplitude mm
		h	m	s		
12	+ePE	07	32	05.9	0.8	0.5
	+ePN			05.6	0.8	1.2
	+eP			05.6	0.8	3.0
15	+ePE	02	34	10.3	0.8	0.5
	+ePE	13	20	55.6	0.8	0.4
	-ePN			55.5	1.0	1.1
	-eP			55.5	0.8	0.2
	-ePE	13	37	51.2	1.0	1.1
	-ePN			51.2	1.0	1.5
	+eP			51.2	1.0	2.0
	-ePE	14	21	11.8	0.8	0.5
	+eP			11.7	0.8	2.1
	-ePE	14	59	54.2	1.0	1.0
	+eP			53.7	1.8	2.0
	-ePE	17	30	33.8	0.8	0.8
+ePN	33.7			1.0	1.3	
-eP	33.8			0.8	0.8	
16	+ePE	06	59	34.2	1.6	3.0
	-ePN			34.7	1.2	6.0
	+ePN	11	38	37.7	1.0	1.4
-eP	37.5			1.0	2.2	
17	+ePE	12	22	10.8	1.0	0.9
	+eSE			33	1.8	6.1
	-ePN			22	0.8	0.5
	-eSN			33	1.0	8.0
	+iP			22	1.4	6.0
	+eS			33	1.6	7.0
19	-ePE	15	35	40.8	1.0	1.6
	+ePN			40.6	1.6	2.2
	+iP			40.6	1.6	9.5
	+iPE	16	49	39.5	1.0	4.9
+iPN	39.3			1.2	4.0	
20	+ePE	22	35	48.1	1.2	1.5
21	-ePE	12	40	13.6	1.0	1.0
	-ePN			12.6	0.8	1.5
	+eP			13.0	1.0	1.2
22	-ePN	15	47	37.3	0.6	0.7
	-eP			37.4	0.6	0.5

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Date	Component and Phase	Arrival time			Period s	Amplitude mm
		h	m	s		
23	-ePN	05	00	20.1	0.8	0.8
	-eP			20.1	0.8	0.6
	-ePE	06	05	51.0	0.8	1.0
	-ePN			50.9	0.8	0.5
-iP	50.8			1.0	3.6	
	-ePN	10	59	02.8	0.8	0.5
	-eP			03.0	0.8	0.4
	-ePN	22	46	01.4	0.8	1.5
	+eP			01.4	1.0	2.1
24	+ePN	00	35	54.6	1.0	0.3
	+eP			54.7	1.0	0.5
	+ePE	18	56	58.3	1.4	1.4
	+ePN			58.0	1.0	0.3
	+iP			58.0	1.0	1.6
25	+ePE	04	13	04.0	1.4	1.0
	-ePE			10.0	1.2	0.5
	+ePN	08	37	09.9	1.2	0.7
	+eP			10.0	1.4	1.1
	+ePE	19	08	39.2	1.2	1.0
	+iPN			38.9	1.0	0.9
	+iP			38.9	1.0	2.0
	+ePE	22	53	03.9	1.0	1.5
	+iPN			03.9	0.8	1.0
	+iP			03.9	1.0	3.1
27	+ePE	02	16	46.5	0.8	0.2
	-ePN			47.0	0.8	0.4
	+eP			46.5	0.8	1.3
	-ePE	22	43	54.9	1.0	2.0
	+ePN			54.9	1.0	1.2
	+iP			54.9	0.8	5.6
28	+ePE	06	40	22.8	1.2	1.4
	+eP			22.4	1.0	1.9
	-ePE	17	50	35.8	0.8	0.4
+ePN	35.8			1.0	1.2	
+eP	35.8			1.0	1.5	
29	-ePE	02	07	16.0	1.0	1.0
	+iPN			16.0	1.0	2.5
	+iP			15.8	1.2	7.0
	+ePE	04	19	45.3	1.2	1.2
	+ePN			44.8	1.0	0.5
	+eP			44.6	1.0	1.6

December 1969

Date	Component and Phase	Arrival time			Period s	Amplitude mm
		h	m	s		
29	-ePE	08	00	47.8	1.0	0.5
	+ePN			47.8	1.0	0.5
	-eP			47.6	1.0	1.2
	-ePE	03	11	02.1	1.0	1.5
	-ePE	16	40	42.0	0.6	0.5
	+ePN			42.8	1.0	1.2
-eP	42.0			0.6	2.1	
30-31	Extreme microseismic activity					

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Date	Component and Phase	Arrival time			Period s	Amplitude mm		
		h	m	s				
02	+iPE	17	57	04.4	1.0	3.9		
	+ePN			05.4	0.8	2.5		
03-05	Extreme microseismic activity							
05	+ePE	12	39	47.0	1.6	0.8		
	+eP			46.5	1.2	1.0		
06	+ePE	15	42	10.9	1.4	1.5		
	-eSE			52	2.2	1.0		
	-ePN			42	1.6	4.0		
	+eSN			52	2.4	1.0		
	-eP			42	1.6	10.0		
	+eS			52	2.6	2.0		
08-17	Extreme microseismic activity							
18	+ePE	03	08	41.3	1.0	2.1		
	eXE			13	2.0	5.2		
	eXN				2.4	6.5		
	eX				2.8	4.0		
19	+ePE	07	21	02.3	1.4	2.0		
	eXE			24	2.4	4.0		
	+ePN			21	1.6	2.3		
	eXN			24	1.8	1.0		
	-eP			21	1.4	7.0		
	eX			24	2.2	10.0		
	-iPE			19	03	33.5	1.4	6.5
	+iPN					03	1.6	7.8
	+eSN					13	3.8	5.4
	+iP					03	1.4	31.5
-eS	13	1.2	2.5					
20	-ePE	14	40	04.4	1.4	1.0		
	+ePN			04.4	1.0	0.3		
	+iP			04.4	1.2	0.4		
22	+eP	01	02	21.1	1.6	1.8		
	-ePE			17	34	10.4	1.2	0.5
	-ePN					10.4	1.2	1.0
+eP			10.4	1.0	1.0			
23	Extreme microseismic activity							
24	+iPE	02	44	42.4	1.0	6.0		
	+eSE			54	2.0	8.5		
	+iPN			44	0.8	2.0		
	+eSN			54	1.8	9.0		
	+eP			44	1.0	8.0		
	-eS			54	1.8	3.8		
25	-ePE	05	32	13.4	1.6	1.0		
	+eP			13.4	1.0	1.0		

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Date	Component and Phase	Arrival time			Period s	Amplitude mm
		h	m	s		
25	-ePE	11	17	34.4	1.6	0.8
	+ePN			34.4	1.4	1.0
	+eP			34.4	1.6	2.0
27-29	Extreme microseismic activity					
31	+ePE	00	27	26.2	1.2	1.5
	+eP			26.2	1.0	0.5
	-ePE	23	00	50.2	1.0	1.0
	-ePN			50.1	0.8	1.0
	-eP			50.1	1.0	1.3
	+ePE	23	42	15.5	1.0	1.0
	-iPN			15.5	1.0	2.0
	-iP			15.5	1.0	5.0