

SEISMOLOGICAL BULLETIN OF SYCWA STATION, ANTARCTICA,

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1. Introduction

The seismic observation system at Syowa Station is schematically illustrated in Fig. 1. There are two types of seismometers, called SP (short period) or HES with the natural period of 1 s of the pendulum and called LP (long period) or PELS with the natural period of 12 s. The system was maintained by S. Matsumura through the wintering of JARE-26 (February 1985 - January 1986).

The coordinates of seismographic vault are $69^{\circ}00'31.7''S$ in latitude and $39^{\circ}35'31.6''E$ in longitude. The elevation is 20 m above the mean sea level.

2. Data

The overall frequency response and the magnification of the short-period and long-period seismographs (Z, N-S and E-W components) are shown in Fig. 2. The system clock was not connected to the recovered UTC from NNSS satellites (see Fig. 1) and the calibration was made by the short-wave receiver. The accuracy of the read-out data can be estimated as ± 0.2 s. Considering the delay time of 1-2 years between the publication of this report and the observing wintering period, which is

inevitable from the restriction of transport ability between Tokyo and Syowa Station, the PDE reports by NEIS are referred and only the tele-seismic events are edited. The graphic display outputs of the local events around Syowa Station are excluded from this report.

2.1. Read-out data

The onset of the events was picked from the pen-monitor records. The onset times of tele-seismic P-arrivals were read by Ms. K. Kokubun and they are listed in Table 1. Symbols E and I in the phase column denote weak and sharp onsets, respectively. The direction of ground motion is denoted by + for the upward direction and - for the downward direction. Arrival time is in UTC.

2.2. Digital data in a 9-track computer compatible tape

The current seismic observation system at Syowa Station can give us tele-seismic wave forms in a large computer compatible 9-track digital tape. Amplified seismic signals in Fig. 1 are analog-to-digital converted with the sampling rate of 10 points per second for the short-period and 1 point per second for the long-period components. The relation between the input voltage to the computer and the hexadecimal number is given in Table 2. The digital data acquisition system is controlled by the event-triggering method of STA/LTA ratio (Peterson et al., 1976) which is programmed in a micro-computer. The obtained original data consisted of 5 volumes of 1200 ft (1600 bpi) magnetic tape and the tele-typewriter message of the triggered events. The original

tapes are compiled by considering the PDE reports and edited into one volume of Non Label tape for the user. The edited tape contains tele-seismic wave forms of 80 events detected at Syowa Station. The 80 events are listed in Table 3 and their locations are mapped in Fig. 3.

In the appendix, examples of waveform output of each event (10 blocks) to the graphic display are shown. Explanation of the output is given in the No. 1 sheet. As inferred from the graphic display outputs, some events have an erroneous gap of 1 block data-length just after the onset portion of 1 block data-length seismic signals, which might have come from the malfunctioning of the micro-computer and can be corrected by the users' software programs.

Reference

- Peterson, J., Butler, H. M., Holcomb, L. G. and Hutt, C. R.
(1976): The Seismic Research Observatory. Bull. Seismol. Soc. Am., 66, 2049 - 2068.

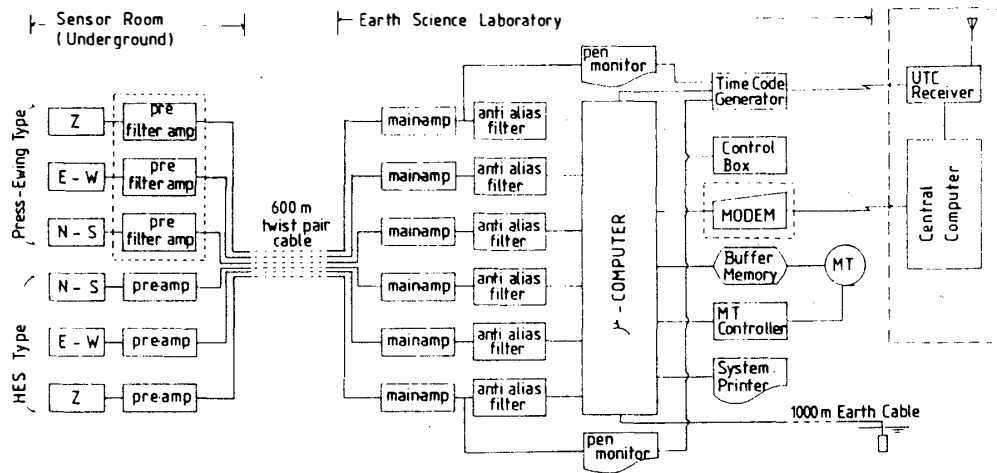


Fig. 1. The seismic observation system at Syowa Station.

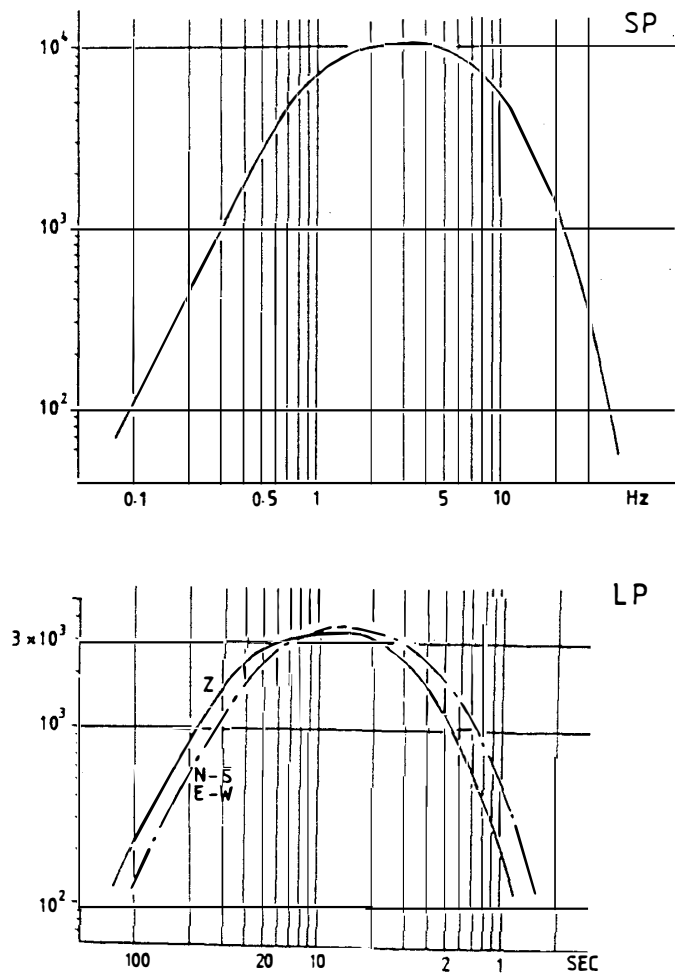


Fig. 2. Over-all frequency responses of the short-period and the long-period seismographs.

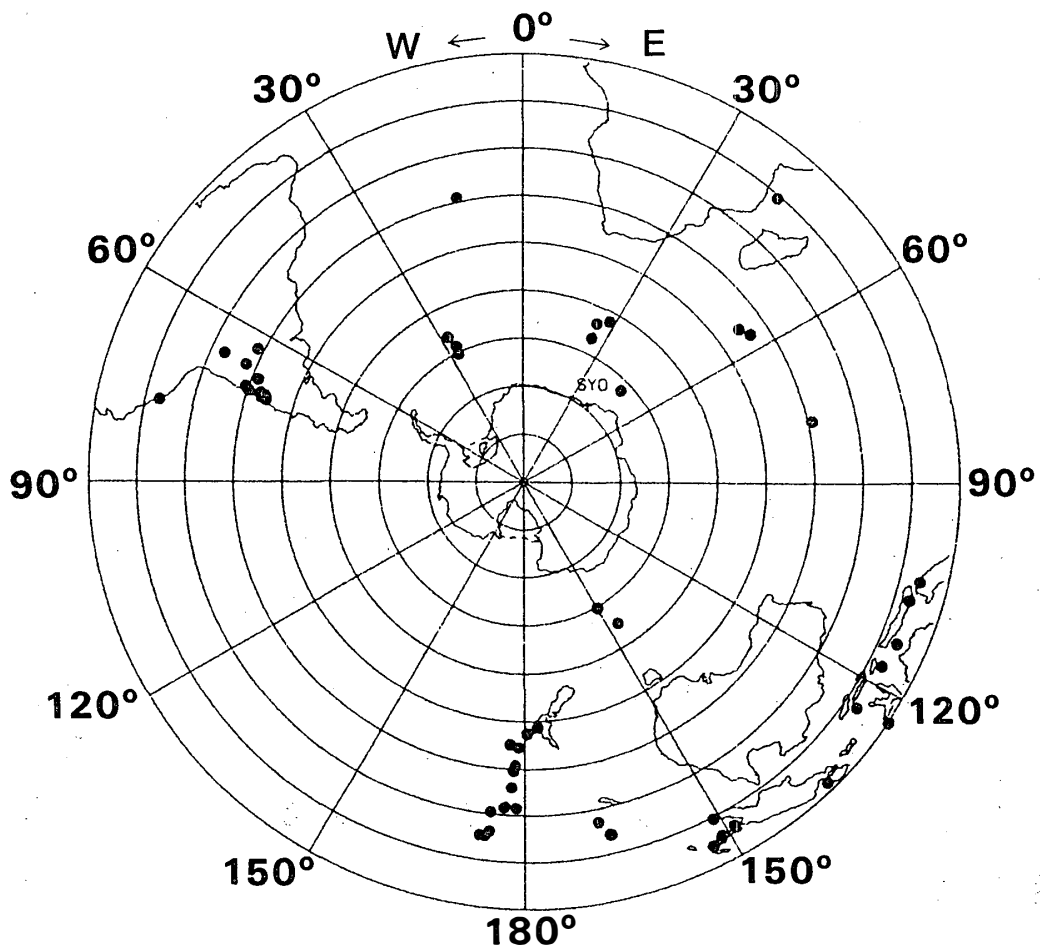
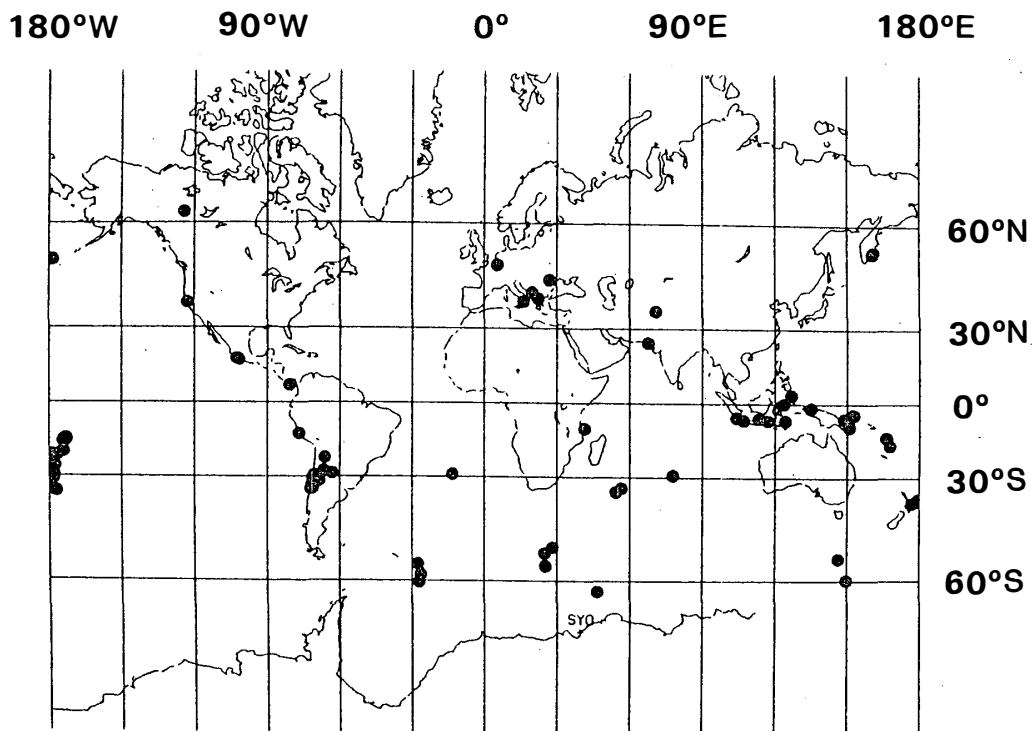


Fig. 3. Epicenters of the 80 events.

Table 1. Read-out data.

Date	Phase	Arrival time h m s	Date	Phase	Arrival time h m s	Date	Phase	Arrival time h m s
Jan. 01	+EPZ	01 36 15.3	Jan. 12	+EPZ	14 45 17.2	Feb. 02	EPZ	11 47 44.0
	EPZ	21 02 24.7	13	-EPZ	16 12 10.3		EPZ	12 34 06.6
	LP+EXZ	21 02 46.4	14	-FPZ	04 57 22.8	03	-IPZ	05 03 38.6
02	EPZ	13 10 11.8	15	EPZ	22 58 57.8		LP+IP	05 03 38.4
	LP EPZ	13 10 12.0	17	+EPZ	21 46 11.8		-EPZ	08 12 41.9
	EPZ	21 20 08.2	18	-IPZ	15 11 10.7		EPZ	08 42 33.3
	-EPZ	22 18 36.6		LP+IPZ	15 11 10.8		EPZ	16 50 37.4
03	EPZ	23 47 49.0	20	EPZ	20 14 09.7		LP-EP	16 50 38.0
04	-IPZ	02 29 38.4	21	+EPZ	01 08 15.8		EPZ	20 56 11.2
	LP+IPZ	02 29 38.8		LP+EPZ	01 08 16.4	04	EPZ	08 44 19.8
	EPZ	04 46 47.3		EPZ	09 11 02.5		LP EP	08 44 20.0
06	EPZ	18 43 15.8		EPZ	13 22 15.4	05	EPZ	07 26 50.1
	LP EPZ	18 43 16.0	24	+EPZ	12 42 00.3		EPZ	07 33 44.4
	+EPZ	19 41 58.3	25	-EPZ	21 27 40.3		LP EP	07 33 44.8
07	EPZ	23 59 48.3	26	-IPZ	03 17 44.1	06	+EPZ	01 31 29.2
08	-EPZ	03 06 24.7	27	FPZ	05 53 46.2	07	FPZ	18 22 38.3
	+EPZ	07 52 58.6	30	+EPZ	12 04 35.1	09	+EPZ	07 30 06.0
10	-EPZ	15 41 59.8		EPZ	13 16 03.4		-IPZ	09 03 42.4
11	+EPZ	06 34 07.3	31	-IPZ	04 42 55.0		LP-EP	09 03 42.8
	-IPZ	14 54 29.4		LP+IPZ	04 42 55.2		LP ES	09 06 44.0
	LP+IPZ	14 54 29.6					-EPZ	09 20 54.9
12	EPZ	02 58 02.9	Feb. 01	-EPZ	01 00 01.0	10	+EPZ	18 59 08.3

Date	Phase	Arrival time
		h m s
Feb. 12	-EPZ	03 31 47.2
	EPZ	20 49 17.0
13	+EPZ	00 54 34.6
	EPZ	03 13 03.5
	EPZ	17 55 37.6
14	+EPZ	04 44 25.2
	+EPZ	08 42 18.2
15	EPZ	03 54 07.3
16	+EPZ	00 34 53.0
	+EPZ	04 22 22.1
	EPZ	06 20 05.4
17	+EPZ	01 01 50.0
	+EPZ	20 35 47.5
18	EPZ	17 36 27.5
	-EPZ	22 10 23.0
19	EPZ	05 52 39.7
20	+EPZ	04 51 33.0
21	EPZ	02 29 02.3
	EPZ	16 53 44.2
22	EPZ	19 55 35.6
23	EPZ	04 04 35.9
	-IPZ	17 49 40.5

Date	Phase	Arrival time
		h m s
Feb. 23	+IPZ	20 38 05.3
25	+IPZ	08 46 43.4
	EPZ	12 40 28.0
26	EPZ	05 25 57.8
	EPZ	17 43 28.7
	+EPZ	20 17 06.7
27	EPZ	01 03 48.5
	EPZ	01 43 07.0
	EPZ	09 39 16.6
	EPZ	13 20 34.5
	EPZ	15 30 06.3
	-IPZ	21 12 47.4
28	EPZ	02 40 35.5
	EPZ	03 22 27.5
Mar. 01	EPZ	07 48 31.3
	+EPZ	17 23 51.1
02	EPZ	00 41 31.6
	EPZ	12 00 05.7
	-IPZ	16 00 07.3
	+EPZ	20 37 11.7
	EPZ	23 13 11.5

Date	Phase	Arrival time
		h m s
Mar. 03	-EPZ	04 27 14.9
	+IPZ	22 57 47.8
	LP-EPZ	22 57 48.0
	+IPZ	23 26 32.7
	+EPZ	23 50 16.6
	+IPZ	23 58 03.9
04	EPZ	00 17 54.6
	-EPZ	00 22 33.3
	-IPZ	00 43 09.0
	EPZ	02 11 10.7
	+EPZ	03 28 37.0
	+IPZ	03 43 38.6
	EPZ	06 03 57.1
	-IPZ	06 17 40.9
	+IPZ	06 48 45.2
	+EPZ	08 38 03.8
	+EPZ	09 16 20.2
	+EPZ	14 00 14.6
	-IPZ	15 11 49.4
	+EPZ	17 10 47.0
	EPZ	19 13 57.6
	EPZ	21 10 03.2

Date	Phase	Arrival time		
		h	m	s
Mar. 04	EPZ	22	56	03.2
05	+EPZ	07	29	06.1
09	EPZ	19	54	49.0
10	-EPZ	03	14	12.8
11	-EPZ	12	15	07.3
	EPZ	19	31	32.2
	EPZ	20	26	19.5
12	EPZ	08	19	33.0
	EPZ	14	49	04.8
13	+EPZ	19	54	56.3
	+EPZ	21	12	17.0
	+EPZ	23	04	09.3
14	-IPZ	22	14	41.6
	LP-IPZ	22	14	41.6
17	-EPZ	10	52	26.5
18	EPZ	05	11	43.6
19	+IPZ	04	11	54.4
	LP-IPZ	04	11	54.8
	EPZ	08	55	20.3
	LP EP	08	55	21.2
	EPZ	10	40	30.2
	EPZ	16	29	00.0

Date	Phase	Arrival time		
		h	m	s
Mar. 21	EPZ	00	07	26.6
	EPZ	16	25	43.4
23	EPZ	16	45	32.0
24	+EPZ	16	27	15.7
	EPZ	22	20	41.2
25	+EPZ	05	25	15.6
	LP-IP	05	25	16.0
	LP EXZ	05	25	26.4
	LP+LRZ	05	57	48.8
	EPZ	11	02	06.4
	+EPZ	11	19	21.8
	LP-IP	11	19	22.0
	LP EX	11	20	26.0
26	EPZ	06	45	35.7
27	EPZ	18	46	09.6
30	+EPZ	19	28	01.8
	-EPZ	21	58	01.5
31	+EPZ	13	17	41.2
	EPZ	18	56	13.7
Apr. 01	EPZ	10	30	14.5
09	-IPZ	02	07	41.2

Date	Phase	Arrival time		
		h	m	s
Apr. 09	LP+IPZ	02	07	41.6
13	+EPZ	20	39	04.3
19	EPZ	13	42	09.3
21	+IPZ	14	05	31.6
22	+EPZ	20	46	33.6
23	EPZ	21	23	35.5
	LP EPZ	21	23	36.4
	EPZ	21	43	47.8
24	+IPZ	01	37	48.3
	LP EP	01	37	48.8
25	+IPZ	01	16	03.4
28	+IPZ	08	40	48.3
	+EPZ	12	47	59.3
	+EPZ	23	03	11.8
	LP EP	23	03	12.4
29	EPZ	11	24	24.6
30	+IPZ	00	55	27.1
	+EPZ	03	23	52.2
	EPZ	07	55	37.9
May 01	+IPZ	13	39	47.4
02	EPZ	05	00	50.3

Date	Phase	Arrival time
		h m s
May 02	+IPZ	09 14 45.4
	+IPZ	15 39 39.7
03	+EPZ	09 17 23.6
04	+EPZ	13 45 34.9
06	+EPZ	03 24 24.8
	EPZ	03 57 52.2
	-EXZ	07 45 14.3
	EPZ	09 30 01.3
	+EPZ	15 01 26.1
	LP+EPZ	15 01 27.2
	+IPZ	17 21 11.2
	LP-IPZ	17 21 11.6
	LP+LRZ	17 48 50.0
	+EPZ	20 35 02.7
07	+EPZ	03 43 30.6
	EPZ	22 18 30.7
08	+EPZ	16 22 56.1
	EPZ	16 28 49.2
	+EPZ	20 16 49.1
	EPZ	21 03 22.0
09	EPZ	08 22 56.2
	+EPZ	19 25 18.4

Date	Phase	Arrival time
		h m s
May 09	+EPZ	19 34 04.6
	EPZ	03 11 12.5
10	+EPZ	15 48 57.5
	LP EPZ	15 48 58.0
	LP-IXZ	15 49 07.2
11	+EPZ	12 53 15.0
	+EPZ	15 49 50.6
12	EPZ	18 55 21.6
	EPZ	02 55 19.2
	EPZ	03 01 33.5
	+EPZ	15 41 39.4
	-IPZ	17 26 15.0
14	+IPZ	13 34 55.6
	LP+IPZ	13 34 55.6
	+IPZ	18 21 07.2
	LP-IPZ	18 21 07.2
15	+EPZ	02 35 24.8
	LP EP	02 35 24.8
	+IPZ	02 56 44.0
	LP+IP	02 56 44.0
	-EPZ	03 14 34.0
	EPZ	04 53 40.1

Date	Phase	Arrival time
		h m s
May 15	EPZ	12 33 01.4
	EPZ	20 18 56.5
	LP-EP	20 18 57.2
16	EXZ	00 28 15.0
	+IPZ	14 28 47.3
17	LP-IP	14 28 48.0
	LP+LR	14 43 26.4
18	EPZ	00 49 14.1
	EXZ	02 54 49.8
19	EPZ	11 24 53.3
	-EPZ	17 11 05.4
	LP+EP	17 11 05.6
20	LP IXZ	17 11 34.0
	+EPZ	07 18 30.1
	-IPZ	08 27 29.8
	LP+IPZ	08 27 30.0
21	-IPZ	18 20 18.1
	LP+IPZ	18 20 18.4
	LP+IXZ	18 48 26.0
22	+EXZ	18 48 27.0
	EPZ	20 22 33.6
23	EPZ	10 28 49.0

Date	Phase	Arrival time		
		h	m	s
May 24	EPZ	22	24	31.2
	LP-IPZ	22	24	32.8
25	EXZ	00	02	35.5
	EPZ	06	31	36.3
	EPZ	10	06	15.0
	EXZ	14	46	19.0
	+IPZ	23	49	06.7
	LP-IPZ	23	49	07.2
28	EPZ	09	57	06.0
29	EPZ	01	10	14.8
	EPZ	05	06	36.5
	EPZ	15	41	59.1
30	EPZ	10	37	23.6
	LP EPZ	10	37	24.0
	EPZ	11	18	01.8
	EPZ	12	11	45.8
	EPZ	13	25	34.7
June 02	+EPZ	16	37	19.5
	LP+IPZ	16	37	21.6
	EPZ	17	22	56.7
	LP+EPZ	17	22	56.8

Date	Phase	Arrival time		
		h	m	s
June 03	-IPZ	12	19	30.8
	LP+IPZ	12	19	31.2
	LP-LRZ	12	56	44.8
04	EPZ	15	43	38.6
	-EPZ	04	09	35.4
	EPZ	14	29	31.5
	EPZ	18	43	00.5
	EPZ	19	43	40.2
	+EPZ	20	50	23.0
	05	EPZ	01	07
06	EPZ	01	20	32.0
	EPZ	23	18	06.7
	LP-EPZ	23	18	06.8
	+EPZ	02	52	42.4
	LP-EPZ	02	52	42.8
	LP-LRZ	03	16	05.2
	EPZ	08	04	09.2
08	-EPZ	14	39	41.8
	LP+IPZ	14	39	42.0
	EPZ	14	59	27.5
	-EPZ	01	36	33.0
	-EPZ	13	32	29.8

Date	Phase	Arrival time		
		h	m	s
June 08	LP+IPZ	13	32	30.4
	EPZ	19	16	28.0
09	EPZ	00	00	33.6
10	EPZ	10	25	05.5
	+IPZ	15	47	54.6
	LP-IPZ	15	47	54.8
	LP+IXZ	15	48	37.2
11	EPZ	21	33	53.1
	EPZ	21	47	57.8
	EPZ	03	10	29.0
12	-EPZ	11	23	19.8
	EPZ	11	45	24.4
	-IPZ	15	34	39.4
	LP+IPZ	15	34	40.0
14	+EPZ	13	24	22.7
	LP-IPZ	13	24	23.2
	-EPZ	18	23	43.0
15	-IPZ	01	15	57.4
	LP+IPZ	01	15	58.0
	EPZ	05	48	49.0
	EPZ	11	51	30.7
	LP EPZ	11	51	30.8

Date	Phase	Arrival time
		h m s
June 15	LP+IXZ	11 54 11.6
	EPZ	12 06 41.1
16	EPZ	07 49 27.0
19	+EPZ	07 52 14.5
	EPZ	08 13 23.0
	EPZ	08 18 38.5
	EPZ	08 44 38.6
	EPZ	09 28 19.3
	EPZ	10 11 35.8
	EPZ	10 48 47.1
	EPZ	14 54 51.9
21	+IPZ	04 43 15.8
	LP-IPZ	04 43 16.0
22	+IPZ	23 29 04.9
23	+IPZ	07 06 39.1
	LP-IPZ	07 06 39.6
	-EPZ	13 14 42.1
	LP+EPZ	13 14 42.4
	LP+LRZ	13 54 14.0
	EXZ	20 02 59.5
26	EPZ	16 16 28.8
28	EPZ	07 06 17.0

Date	Phase	Arrival time
		h m s
June 28	LP EXZ	07 06 20.0
	-EPZ	07 42 17.4
	LP-EPZ	07 42 17.6
	LP+IXZ	07 42 21.6
	+IPZ	19 05 21.4
	LP-IPZ	19 05 22.0
29	+IPZ	04 19 04.0
	EXZ	04 24 05.0
	+IPZ	08 46 39.2
	EPZ	13 26 49.3
30	EXZ	01 49 18.6
	-IPZ	02 57 59.2
July 01	EPZ	05 37 31.6
	EXZ	21 43 31.0
02	EPZ	13 19 39.3
	I.P+EPZ	13 19 39.2
	EPZ	13 55 25.3
	LP+EPZ	13 55 25.6
	EPZ	14 21 46.2
	LP EPZ	14 21 46.4
	LP-IPZ	14 22 05.2

Date	Phase	Arrival time
		h m s
July 03	-EPZ	03 19 50.4
	LP+IPZ	03 19 50.4
	+IPZ	04 50 07.3
	LP+IPZ	04 50 07.6
	-IPZ	16 18 30.2
	LP+IPZ	16 08 30.2
	LP+LRZ	16 40 36.0
	EXZ	18 04 48.4
	-EPZ	19 20 30.7
	LP-IPZ	19 20 30.8
04	EXZ	00 03 29.0
05	EPZ	07 43 23.0
	+EPZ	15 33 25.5
	LP EPZ	15 33 26.0
06	EXZ	01 22 07.3
	-IPZ	03 49 11.6
	LP+IPZ	03 49 11.6
	LP LRZ	04 20 50.0
	+EPZ	08 43 53.3
	LP-EPZ	08 43 53.6
	EPZ	14 49 11.6
	LP+EPZ	14 49 12.0

Date	Phase	Arrival time
		h m s
July 07	-EPZ	11 36 01.4
	LP+IPZ	11 36 01.4
	EPZ	13 42 40.2
	EXZ	14 33 52.8
08	EPZ	19 45 29.4
	LP+EPZ	19 45 30.0
09	-IPZ	13 38 35.9
	LP+IPZ	13 38 36.0
	EPZ	22 58 26.6
10	FPZ	05 17 28.0
	LP-EPZ	05 17 28.0
11	-EPZ	20 42 03.0
15	EXZ	11 31 08.4
17	EPZ	02 01 22.4
	-IPZ	08 22 45.6
	LP-IPZ	08 22 45.6
	-EPZ	14 03 49.8
	EPZ	16 00 21.9
	EXZ	19 52 01.4
18	EXZ	00 32 50.8
	LP-EXZ	00 32 54.8
	EPZ	20 42 37.7

Date	Phase	Arrival time
		h m s
July 19	EPZ	04 31 00.5
	-IPZ	14 44 57.0
	LP+IPZ	14 44 57.2
20	EPZ	12 04 06.0
22	EXZ	09 19 12.6
	+EPZ	09 39 53.5
	LP+EPZ	09 39 53.6
23	-EXZ	03 34 52.0
25	+IPZ	14 19 39.9
	LP-IPZ	14 19 40.0
27	+IPZ	07 20 42.4
	LP-IPZ	07 20 42.4
	LP+ISZ	07 22 04.0
	EXZ	16 39 09.4
28	EPZ	23 05 45.7
	LP-IPZ	23 05 46.4
29	EXZ	01 26 07.4
	+EPZ	06 52 16.8
	EPZ	08 08 54.2
	LP+EPZ	08 08 54.4
	LP+ISZ	08 13 28.4
	EPZ	20 03 09.0

Date	Phase	Arrival time
		h m s
July 29	EPZ	22 23 45.7
30	EPZ	00 32 43.3
	EPZ	02 14 27.7
	EPZ	09 57 30.2
31	+IPZ	07 57 46.7
	LP+IPZ	07 57 46.8
	EPZ	11 47 30.3
	LP-EXZ	11 51 47.2
	-EPZ	18 31 41.7
	LP+EPZ	18 31 42.0
	EPZ	23 56 43.6
	LP-EXZ	23 56 50.0
Aug. 01	EPZ	00 10 30.7
	LP+EPZ	00 10 32.0
	EPZ	17 29 12.0
03	EPZ	22 28 25.0
04	+IPZ	00 13 28.2
	EXZ	02 49 44.3
	EPZ	05 03 44.9
	LP-EPZ	05 03 45.2
	EPZ	09 35 43.4

Date	Phase	Arrival time
		h m s
Aug. 04	EPZ	12 21 32.9
	LP-EPZ	12 21 33.2
05	EPZ	15 38 55.4
06	-IPZ	00 26 19.3
	LP+EPZ	00 26 19.4
	EXZ	02 40 12.5
07	EPZ	06 11 28.5
08	+IPZ	16 29 05.1
	LP-IPZ	16 29 05.2
	+IPZ	16 41 00.1
09	EPZ	01 08 26.6
	+EPZ	06 22 03.4
	LP-IPZ	06 22 03.6
	EPZ	09 44 16.2
	LP+EPZ	09 44 16.8
	+EPZ	13 23 04.1
	LP-EPZ	13 23 04.2
10	-EPZ	04 24 24.0
	LP EPZ	04 24 24.0
	+EPZ	16 49 25.2
11	+EPZ	10 19 34.6
	LP-EPZ	10 19 34.8

Date	Phase	Arrival time
		h m s
Aug. 11	LP+IXZ	10 19 47.2
	LP+ISZ	10 23 16.8
12	-EPZ	00 15 10.1
	LP+IPZ	00 15 10.1
	LP+LRZ	00 41 32.8
	+IPZ	04 30 03.3
	LP-IPZ	04 30 03.6
	-EPZ	05 41 51.5
14	EPZ	01 10 09.0
	EPZ	02 56 40.2
	LP-IPZ	02 56 40.4
	+EPZ	04 22 23.0
	LP+IPZ	04 22 23.2
	EPZ	05 08 33.2
15	+IPZ	00 17 58.4
	LP-IPZ	00 17 58.8
	-EPZ	09 10 46.9
	LP-EPZ	09 10 47.2
	EXZ	22 21 38.1
	LP+EPZ	22 21 38.4
17	+EPZ	00 56 16.7
	LP-IPZ	00 56 16.8

Date	Phase	Arrival time
		h m s
Aug. 17	EXZ	02 54 47.7
	LP EPZ	02 54 48.0
	EPZ	23 01 32.1
18	+EPZ	15 34 40.1
19	-EPZ	08 06 20.0
20	EPZ	21 23 40.3
21	-EPZ	10 56 23.6
	LP+IPZ	10 56 23.6
	+IPZ	11 39 29.0
	LP-IPZ	11 39 29.2
	EXZ	21 17 58.7
	LP-IPZ	21 17 58.8
22	+EPZ	19 42 34.8
	LP-EPZ	19 42 35.2
23	EPZ	01 31 12.5
	+EPZ	13 00 32.1
	LP EPZ	13 00 32.4
	LP+LRZ	13 37 08.0
	+EPZ	16 46 21.8
	LP-EPZ	16 46 22.0
	LP+ISZ	16 47 07.2
24	+IPZ	07 05 14.5

Date	Phase	Arrival time		
		h	m	s
Aug. 24	LP-IPZ	07	05	14.5
	LP-IXZ	07	06	38.8
26	+EPZ	00	10	26.0
27	EPZ	03	34	04.7
	+EPZ	07	52	13.8
	LP+IPZ	07	52	13.2
	+IPZ	10	56	03.6
	LP-IPZ	10	56	03.6
	28	EPZ	06	59
	EPZ	07	48	30.0
	EPZ	17	35	29.9
	LP+EXZ	17	37	35.6
	+IPZ	21	02	25.2
	LP-IPZ	21	02	25.6
	LP-ISZ	21	04	38.8
29	EXZ	04	32	05.0
	EPZ	22	22	06.2
	LP EXZ	22	22	40.0
	LP-IXZ	22	23	34.4
31	EPZ	03	45	25.8
	+EPZ	05	44	56.4
	LP EPZ	05	44	57.2

Date	Phase	Arrival time		
		h	m	s
Sep. 01	EXZ	08	39	13.3
03	-IPZ	23	45	39.3
	LP+IPZ	23	45	39.6
05	+EPZ	08	43	51.7
	LP EPZ	08	43	52.0
07	EPZ	00	34	47.7
	LP+EPZ	00	34	48.0
	-IPZ	04	53	17.1
	+EPZ	05	06	41.8
09	EXZ	09	46	19.0
	EPZ	10	10	10.9
	EPZ	23	33	28.3
10	-EPZ	04	20	54.1
	LP+EPZ	04	20	54.4
	LP+LRZ	04	57	42.0
	+EPZ	06	56	53.1
	LP EPZ	06	56	53.2
11	EPZ	00	31	45.0
	EXZ	04	27	47.6
	LP-EXZ	04	28	06.0
	-IPZ	18	00	41.4
	LP+IXZ	18	00	41.6

Date	Phase	Arrival time		
		h	m	s
Sep. 11	EXZ	19	30	16.3
	LP+EXZ	19	30	16.8
	LP+LRZ	19	52	55.2
15	EPZ	01	42	20.0
	LP EPZ	01	42	20.0
	LP-IXZ	01	42	24.8
	LP LRZ	02	18	58.0
	+EPZ	02	21	47.4
	-EPZ	02	55	49.2
	LP EPZ	02	55	49.2
	LP-LRZ	03	33	26.0
	+IPZ	11	37	30.3
	LP-IPZ	11	37	30.4
	EPZ	17	43	57.8
17	EPZ	04	47	23.6
	EPZ	23	54	05.5
	LP EPZ	23	54	08.0
18	EPZ	01	46	45.3
	LP-IPZ	01	46	45.6
	EPZ	10	58	22.0
19	EPZ	09	41	17.7
	LP EPZ	09	41	18.0

Date	Phase	Arrival time		
		h	m	s
Sep. 19	EPZ	13	36	47.6
	LP EPZ	13	36	48.0
	-IPZ	20	50	15.4
	LP+IPZ	20	50	15.6
21	EPZ	01	56	11.3
	LP-EXZ	01	56	16.0
	LP+ISZ	01	57	58.0
	EPZ	11	01	32.9
22	LP+IPZ	11	01	33.2
	+IPZ	05	27	39.7
23	+EPZ	17	38	55.7
	-EPZ	17	47	56.6
24	EPZ	14	36	58.2
	EPZ	20	41	09.4
	LP EPZ	20	41	10.0
25	EPZ	15	10	47.9
	EXZ	18	43	17.5
	EXZ	19	25	27.0
	EXZ	19	33	29.8
	EXZ	19	39	50.0
	EXZ	22	19	31.6
26	EXZ	05	20	47.0

Date	Phase	Arrival time		
		h	m	s
Sep. 26	EXZ	07	15	06.3
	-IPZ	07	39	16.6
	LP+IPZ	07	39	16.6
	+EPZ	08	44	09.7
	EXZ	15	42	12.0
	EXZ	16	44	55.7
	EXZ	17	06	09.6
	EPZ	18	11	21.6
	EPZ	19	48	23.0
	+EPZ	22	03	41.0
27	+EPZ	03	23	18.0
	LP-IPZ	03	23	18.4
	EPZ	03	52	12.0
	LP+IPZ	03	52	12.4
	LP+LRZ	04	31	08.0
29	EPZ	10	22	57.6
	LP+EPZ	10	22	57.6
	LP+LRZ	10	58	26.0
	+EPZ	02	44	05.8
30	LP-EPZ	02	44	06.2
	+EPZ	00	23	53.8
	-EPZ	00	48	25.3

Date	Phase	Arrival time		
		h	m	s
Sep. 30	EXZ	12	44	08.2
Oct. 01	-EPZ	07	25	59.9
	LP+IPZ	07	25	59.9
	+IPZ	17	17	03.1
02	LP-EPZ	17	17	03.2
	EPZ	21	36	31.9
	EPZ	06	11	05.5
	-EPZ	20	52	34.7
03	LP+IPZ	20	52	34.7
	EPZ	21	20	34.6
04	+IPZ	12	44	46.8
	LP EPZ	12	44	47.2
	EPZ	15	26	10.2
05	LP-EPZ	15	26	10.4
	+IPZ	15	44	05.4
	LP+IPZ	15	44	05.6
06	LP-IXZ	15	49	18.0
	-EPZ	12	12	56.3
07	LP+IPZ	12	12	56.4
	LP+ISZ	12	13	57.6
07	EPZ	00	02	24.3

Date	Phase	Arrival time		
		h	m	s
Oct. 08	-IPZ	09	58	36.6
	LP+IPZ	09	58	37.2
09	+IPZ	01	26	33.8
	LP+EPZ	01	26	34.4
	EPZ	09	53	30.0
	LP+IPZ	09	53	30.0
10	EPZ	13	53	31.3
	-IPZ	14	17	10.6
	LP+IPZ	14	17	11.2
	EPZ	18	55	21.4
11	LP-EPZ	18	55	22.0
	-IPZ	19	41	36.0
12	LP+IPZ	19	41	36.8
	+IPZ	02	25	21.6
	LP-IPZ	02	25	22.0
	EPZ	20	37	42.4
13	LP EXZ	20	38	48.0
	EPZ	17	37	01.1
14	EPZ	10	30	24.2
15	EXZ	14	40	33.1
	EXZ	17	04	03.3
	EXZ	19	51	32.4

Date	Phase	Arrival time		
		h	m	s
Oct. 15	EXZ	20	26	41.3
	EXZ	03	14	11.0
17	+IPZ	09	05	55.0
	LP-IPZ	09	05	55.6
18	EPZ	04	37	59.3
	LP+IXZ	04	41	06.4
20	LP-IPZ	21	48	13.2
22	EPZ	18	45	50.8
	LP-EXZ	18	46	21.6
23	+IPZ	01	01	10.9
	LP-IPZ	01	01	11.0
24	+IPZ	01	59	39.0
	LP-IPZ	01	59	39.0
25	+EPZ	01	33	30.3
	LP-IPZ	01	33	30.8
	+IPZ	18	23	36.3
26	LP-IPZ	18	23	36.4
	EPZ	02	14	51.5
27	EPZ	13	10	13.4
	LP EXZ	13	10	20.0
	EPZ	15	44	15.4
	LP+IXZ	15	44	32.8

Date	Phase	Arrival time		
		h	m	s
Oct. 28	-EPZ	10	40	38.8
	LP+IPZ	10	40	38.8
29	-IPZ	14	23	33.4
	LP+IPZ	14	23	33.6
30	LP+LRZ	14	58	06.0
	+IPZ	16	42	04.4
31	EPZ	21	03	01.4
	+EPZ	19	25	31.4
31	+IPZ	21	59	20.8
	LP-IPZ	21	59	20.8
31	LP+ISZ	22	01	17.6
	EXZ	22	27	20.8
Nov. 01	-EPZ	08	15	31.3
	LP EPZ	08	15	31.6
05	EXZ	20	02	14.3
	EXZ	08	27	44.2
06	+IPZ	08	21	29.3
	LP-IPZ	08	21	29.4
07	LP+LRZ	08	30	34.0
	EPZ	11	55	00.2
07	-IPZ	19	23	51.5

Date	Phase	Arrival time
		h m s
Nov. 07	LP+IPZ	19 23 51.6
08	+IPZ	14 06 02.9
	+EPZ	19 00 34.4
	LP-IPZ	19 00 34.4
09	-EPZ	13 08 16.5
	LP EPZ	13 08 16.8
	+IPZ	22 24 20.9
	LP-IPZ	22 24 20.9
10	EXZ	12 52 42.2
	+EPZ	19 49 30.6
	LP+IPZ	19 49 30.8
11	EPZ	18 09 17.7
12	EPZ	03 45 30.7
	LP EPZ	03 45 34.0
13	EPZ	10 29 22.0
14	EPZ	02 20 41.9
	LP+EPZ	02 20 42.0
16	EXZ	00 43 46.2
	+EPZ	04 19 28.4
	LP-IPZ	04 19 28.4
17	+EPZ	09 53 29.3
	LP+IPZ	09 53 30.4

Date	Phase	Arrival time
		h m s
Nov. 18	+EPZ	18 27 09.7
	LP-EPZ	18 27 10.0
20	EPZ	10 30 48.6
21	-IPZ	18 56 12.0
22	EPZ	08 58 27.1
	LP+EPZ	08 58 27.2
23	+IPZ	12 54 12.7
24	EXZ	21 38 34.3
26	EXZ	01 27 20.0
	EPZ	05 41 45.3
	EXZ	06 31 36.9
27	+IPZ	02 12 44.0
	LP-FPZ	02 12 44.0
	EPZ	04 29 41.2
28	+IPZ	02 38 35.0
	LP-IPZ	02 38 35.0
	+IPZ	04 02 46.9
	LP-IPZ	04 02 47.2
	+EPZ	06 50 40.6
	LP+EPZ	06 50 40.8
29	+IPZ	04 12 52.3
	EPZ	11 16 38.0

Date	Phase	Arrival time
		h m s
Nov. 30	+IPZ	02 36 02.0
	LP-IPZ	02 36 02.0
	-IPZ	03 17 07.5
	LP+IPZ	03 17 07.6
Dec. 03	EPZ	00 30 12.3
	LP-EPZ	00 30 12.4
05	EPZ	08 02 42.4
	LP EPZ	08 02 43.2
	LP EXZ	08 05 46.0
	EPZ	12 10 03.5
	-IPZ	15 19 38.8
	LP+IPZ	15 19 38.8
06	EPZ	22 39 27.0
	LP-EPZ	22 39 26.8
	LP+LRZ	23 17 22.4
09	EPZ	16 54 52.1
10	EPZ	06 32 54.0
11	EPZ	05 56 33.3
	LP EPZ	05 56 34.0
14	EPZ	01 07 45.3
	+EPZ	03 03 09.3

Date	Phase	Arrival time
		h m s
Dec. 14	LP EPZ	03 03 10.0
	+IPZ	06 59 22.9
	LP+EPZ	06 59 22.8
	-EPZ	18 26 06.8
16	-EPZ	08 16 03.0
	LP+EPZ	08 16 03.0
	LP+IPZ	08 17 00.0
	LP-LRZ	08 52 05.2
	-IPZ	17 05 28.1
17	EPZ	00 20 04.0
	+EPZ	00 56 30.3
18	EPZ	12 21 42.5
19	-IPZ	15 51 37.1
	LP+IPZ	15 51 37.2
20	EPZ	01 08 49.4
	LP+EPZ	01 08 50.0
21	+IPZ	01 26 13.8
	LP+IPZ	01 26 13.8
	LP+LRZ	02 00 06.8
	EPZ	02 19 22.7
	+EPZ	02 59 25.9
	LP+IPZ	02 59 26.4

Date	Phase	Arrival time
		h m s
Dec. 21	EPZ	10 14 50.3
	LP-IPZ	10 14 52.0
	LP+LRZ	10 50 22.0
	EPZ	11 22 44.9
	LP-EPZ	11 22 44.9
	EXZ	14 53 23.2
22	-IPZ	03 20 32.1
	LP+EPZ	03 20 32.1
	EXZ	17 26 39.4
23	EPZ	05 36 07.4
	LP+EPZ	05 36 06.0
	LP-ISZ	05 37 28.8
	EXZ	18 28 01.5
24	EPZ	04 16 33.7
	LP-EPZ	04 16 33.7
	EXZ	04 50 23.0
25	EPZ	03 13 53.3
	LP+EPZ	03 13 53.4
	EPZ	13 58 02.2
	LP EXZ	13 59 10.0
	-IPZ	15 55 10.2
	LP EPZ	15 55 10.2

Date	Phase	Arrival time
		h m s
Dec. 25	-IPZ	22 26 59.0
	LP+IPZ	22 26 59.0
	LP-ESZ	22 28 40.8
26	+EPZ	01 51 47.5
	LP+EPZ	01 51 46.0
27	-EPZ	05 50 40.4
	LP+EPZ	05 50 40.4
28	+IPZ	15 54 00.2
	LP+EPZ	15 54 00.4
	+IPZ	19 20 40.1
	EPZ	23 22 36.6
30	+EPZ	11 26 13.5
31	EPZ	05 56 30.3
	EPZ	06 10 21.3
	-EPZ	14 17 48.6
	LP EPZ	14 17 50.8

Table 2. A/D conversion of input voltage.

Input volt	Hexadecimal number
+10	FFF
+ 9	F33
+ 8	E66
+ 7	D99
+ 6	CCC
+ 5	C00
+ 4	B33
+ 3	A66
+ 2	999
+ 1	8CC
0	800
- 1	733
- 2	666
- 3	599
- 4	4CC
- 5	400
- 6	333
- 7	266
- 8	199
- 9	0CC
-10	000

Table 3. List of the 80 earthquakes.

Data No.	Origine time U T C			Geographic coordinates		Region	Depth (km)	Magnitude		Epicentral distance (degree)	Azimth (degree)
	Date	h	m	s	Latitude			Longitude	(Mb)		
1	01/04	02	17	34.7	26.057 S	177.518 W	133 D	5.3		81.279	33.255 SE
2	01/10	19	29	39.9	39.345 N	16.294 E	10 G	4.6		109.601	161.053 SW
3	01/11	14	41	58.5	0.196 N	123.582 E	189	5.9		88.021	95.679 SE
4	01/18	15	00	09.0	29.374 S	70.793 W	83 D	5.7		69.623	60.620 SW
5	02/03	04	50	55.2	20.547 S	174.099 W	57 D	5.8		87.325	31.332 SE
6	02/03	16	46	39.7	53.460 S	24.912 E	10 G	5.0		16.864	148.660 SW
7	02/05	07	41	25.9	5.096 S	151.380 E	166	5.1		92.886	67.830 SE
8	02/09	08	59	32.0	51.967 S	28.242 E	10 G	5.0		17.748	156.561 SW
9	03/03	22	46	56.8	33.107 S	71.737 W	33 N	5.5		66.438	58.347 SW
10	03/03	23	38	31.4	32.738 S	71.215 W	33 N	6.3	6.4	66.621	58.939 SW
11	03/03	22	47	07.2	33.135 S	71.871 W	33 N	6.7	7.8	66.453	58.222 SW
12	03/04	08	39	39.9	34.027 S	71.670 W	33 N	5.1		65.562	58.034 SW

13	03/04	15 01 07.0	33.842 S	71.249 W	Near Coast of Central Chile	40 D	6.0	6.0	65.605	58.466 SW
14	03/25	05 14 35.1	34.254 S	72.185 W	Near Coast of Central Chile	45	6.0	6.4	65.508	57.507 SW
15	04/09	01 56 59.4	34.131 S	71.618 W	Near Coast of Central Chile	38 D	6.3	7.2	65.450	58.036 SW
16	04/20	02 26 30.5	56.170 S	27.499 W	South Sandwich Islands Region	110 ?	5.0		31.462	79.272 SW
17	05/06	17 10 02.9	37.498 S	179.452 E	Off E. Coast of N. Island, N. Z.	30	5.8	6.1	69.555	33.082 SE
18	05/06	20 08 16.8	7.395 N	80.913 W	Panama	10 G	4.9		107.544	63.650 SW
19	05/10	15 35 50.5	5.599 S	151.045 E	New Britain Region	27	6.3	7.1	92.301	67.976 SE
20	05/14	13 24 57.8	10.610 S	41.423 E	North West of Madagascar	10 G	6.0	5.5	58.282	177.884 SE
21	05/14	18 11 08.9	10.562 S	41.424 E	North West of Madagascar	10 G	6.4	6.0	58.330	177.884 SE
22	05/15	02 34 58.7	15.350 S	172.729 W	Samoa Islands Region	33 N	4.4		92.676	31.074 SE
23	05/15	20 12 45.8	56.637 S	25.330 W	South Sandwich Islands Region	33 N	5.8	6.3	30.335	80.483 SW
24	05/16	14 20 25.1	29.081 S	77.735 E	Mid-Indian Rise	10 G	5.9	6.0	45.488	130.807 SE
25	05/16	18 34 00.8	31.354 S	68.671 W	San Juan Province, Argentina	100			67.111	61.674 SW

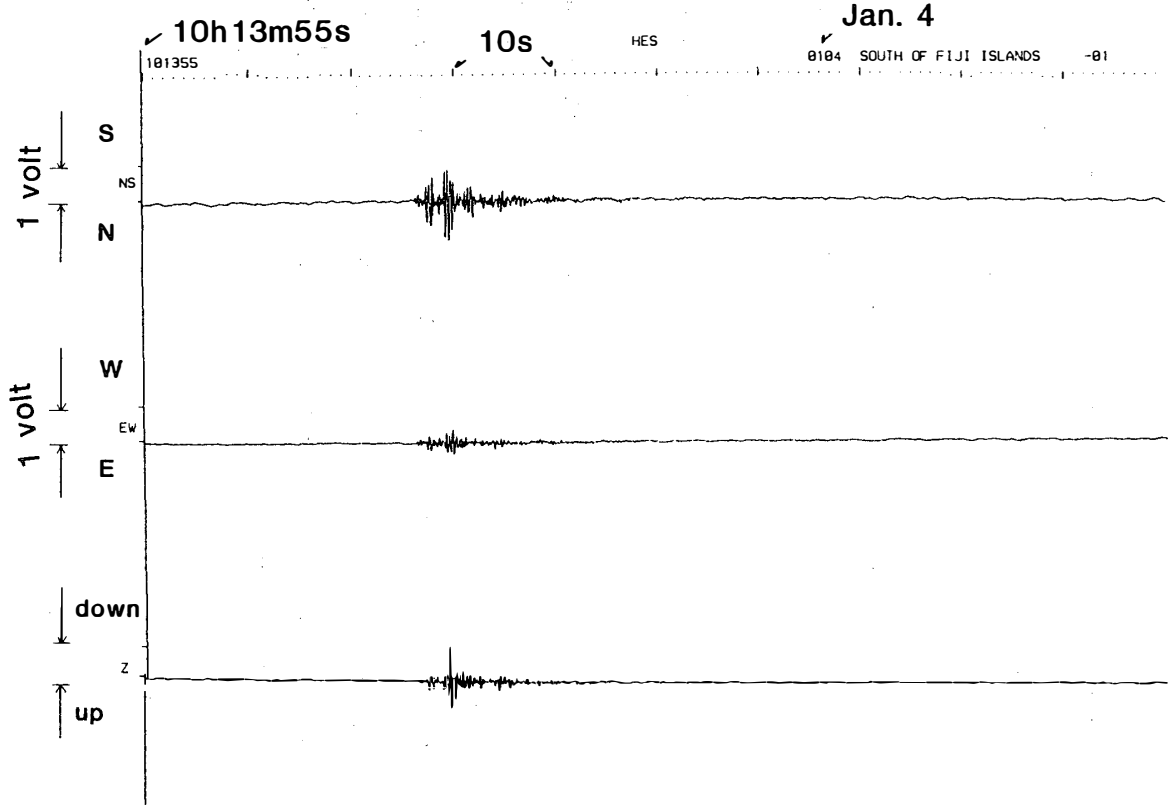
26	05/19 08 07 48.2	53.611 N	160.526 E	Near East Coast of Kamchatka	63 D	6.1		149.409	90.628 SE
27	05/19 18 09 15.6	30.253 S	71.329 W	Near Coast of Central Chile	39 D	5.9	6.0	68.971	59.818 SW
28	05/24 22 04 43.4	51.422 N	178.430 W	Andreanof Islands, Aleutian Is.	34 D	5.8	5.8	154.992	65.313 SE
29	05/25 23 29 21.7	54.055 N	160.992 E	Near East Coast of Kamchatka	46 D	5.9	5.4	149.928	90.733 SE
30	05/30 10 08 32.8	50.134 N	5.370 E	Belgium	13			121.669	154.940 SW
31	06/03 12 06 21.1	15.289 S	173.516 W	Tonga Islands	33 N	6.2	6.8	92.588	31.832 SE
32	06/04 20 25 49.7	40.407 N	22.419 E	Greece	10 G			110.031	166.154 SW
33	06/28 18 54 16.0	37.564 S	179.442 E	Off E. Coast of N. Island, N. Z.	50	5.6	5.2	69.489	33.073 SE
34	07/02 14 05 48.2	33.771 S	56.557 E	Atlantic-Indian Rise	10 G	4.7		36.388	155.867 SE
35	07/03 03 11 31.5	54.820 S	146.436 E	West of Macouarie Island	10 G	5.8	6.2	45.389	50.769 SE
36	07/03 04 36 51.7	4.439 S	152.826 E	New Britain Region	33 N	6.3	7.2	93.986	66.688 SE
37	07/03 15 55 48.7	17.243 S	167.834 E	Vanuatu Islands	29	5.8	6.4	86.359	48.731 SE
38	07/06 03 37 18.2	29.721 S	177.771 W	Kermadec Islands	50	5.7	5.9	77.657	32.650 SE
39	07/08 19 37 35.0	59.732 S	149.798 E	West of Macouarie Island	10 G	5.4	6.1	42.018	44.965 SE

40	07/19	14	34	01.2	38.778 S	176.973 E	North Island New Zealand	52	5.7	5.8	67.819	34.754 SE
41	07/22	09	26	53.8	6.291 S	148.783 E	New Britain Region	49	5.8	6.9	90.889	69.860 SE
42	07/27	07	18	50.4	62.118 S	46.695 E	South Indian Ocean	10 G	4.8	4.8	7.365	153.185 SE
43	07/28	22	59	54.5	60.241 S	26.883 W	South Sandwich Islands Region	33 N	5.9	6.4	28.213	74.292 SW
44	07/29	07	54	44.0	36.190 N	70.896 E	Hindu Kush Region	99	6.6		107.598	153.901 SE
45	07/29	21	57	49.0	38.797 N	122.775 W	Northern California	1 G			148.441	26.813 SW
46	08/08	16	18	02.6	6.102 S	113.491 E	Java	592 D	5.7		78.550	102.908 SE
47	08/12	04	18	59.0	6.997 S	117.215 E	Bali Sea	599 D	5.7		79.030	99.058 SE
48	09/19	13	17	47.3	18.190 N	102.533 W	Michoacan Mexico	28	6.8	8.1	124.153	44.814 SW
49	09/21	01	37	13.4	17.802 N	101.647 W	Near Coast of Guerrero Mexico	31	6.3	7.6	123.553	45.666 SW
50	09/24	13	14	13.7	6.121 S	148.766 E	New Britain Region	79 *	3.9		91.043	69.934 SE
51	09/26	07	27	51.1	34.693 S	178.656 W	South of Kermadec Islands	52 D	6.3	7.0	72.645	32.227 SE
52	09/26	08	38	53.7	35.25 S	176.88 W	East of North Island New Zealand	33 N	5.1		72.437	30.609 SE
53	10/05	15	24	02.2	62.237 N	124.266 W	North West Terrytories Canada	10 G	6.5	6.6	170.634	52.728 SW

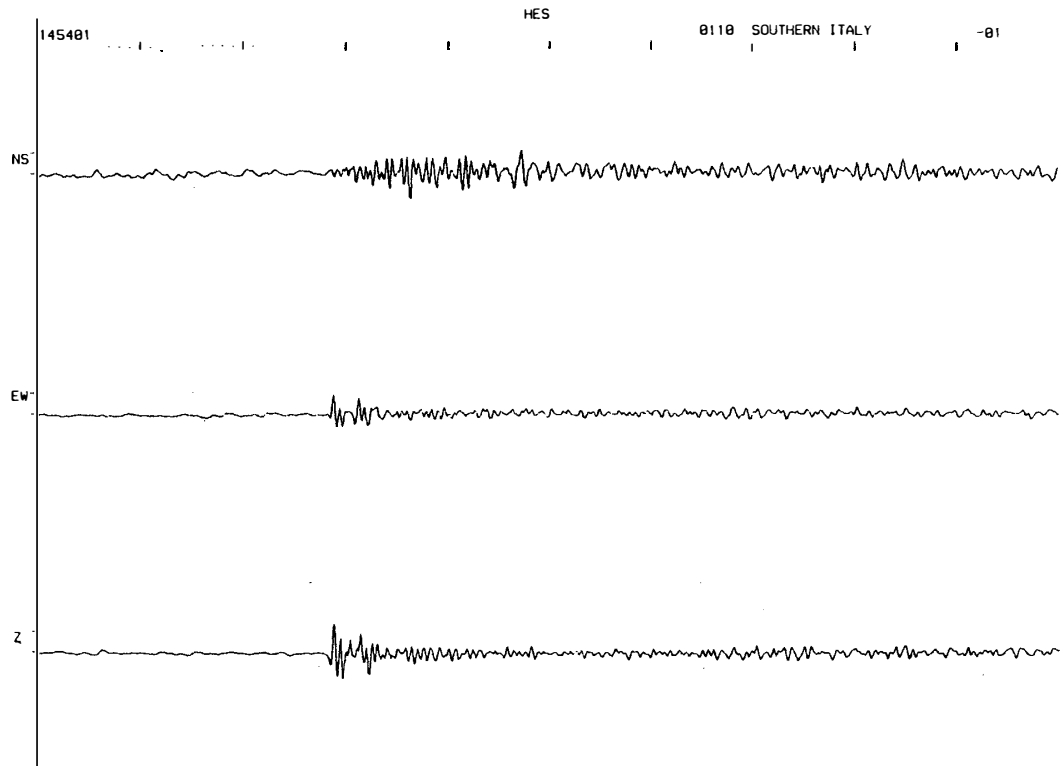
54	10/08 09 47 24.8	22.825 S	66.311 W	Jujuy Province Argentina	242 D	5.5		74.284	67.049 SW
55	10/09 01 15 04.6	6.791 S	107.082 E	Java	154 D	5.9		75.683	108.785 SE
56	10/11 19 29 44.7	30.791 S	178.142 W	Kermadec Islands	20 *	5.5		76.542	32.723 SE
57	10/12 02 12 57.9	21.656 S	176.382 W	Fiji Islands Region	155 G	5.9		85.801	33.191 SE
58	10/24 01 48 55.9	31.386 S	68.605 W	San Juan Province Argentina	110 D	5.7		67.060	61.718 SW
59	10/25 18 12 19.5	7.077 S	124.284 E	Banda Sea	596 D	5.9		81.489	92.390 SE
60	10/29 14 10 39.4	9.569 S	150.989 E	East Papua New Guinea Region	10 G	6.1	6.7	88.542	66.696 SE
61	10/31 21 49 20.2	28.692 S	63.171 W	Santiago Del Estero Province	596 D	5.8		67.789	67.535 SW
62	11/06 08 15 39.6	58.716 S	26.223 W	South Sandwich Islands Region	132 G	5.7		29.090	76.987 SW
63	11/09 22 13 27.0	27.851 S	66.750 W	Catamarca Province Argentina	175 D	5.4		69.748	64.736 SW
64	11/10 19 40 34.0	29.010 S	13.165 W	South Atlantic Ridge	10 G	5.5	5.4	49.977	114.615 SW
65	11/17 09 40 21.2	1.639 S	134.911 E	West Irian Region	10 G	6.0	7.1	90.384	84.448 SE
66	11/28 02 25 42.3	14.043 S	166.240 E	Vanuatu Islands	33 N	6.0	7.0	88.985	51.120 SE
67	11/28 03 49 54.1	13.987 S	166.185 E	Vanuatu Islands	33 N	6.3	7.1	89.024	51.187 SE

68	11/29	10 54 01.3	46.084 N	27.022 E	Romania	10 G			115.343	170.385 SW
69	11/30	03 04 18.8	16.366 S	174.197 W	Tonga Islands	165 D	5.7		91.403	32.260 SE
70	12/06	22 26 25.5	1.636 S	134.910 E	West Irian Region	25 D	5.8	5.8	90.387	84.450 SE
71	12/09	16 39 21.6	12.985 S	76.993 W	Near Coast of Peru	79 *			86.992	60.763 SW
72	12/16	08 07 15.7	3.717 N	126.758 E	Talau Islands	61 ?	4.9	5.7	92.447	93.982 SE
73	12/18	04 55 07.3	42.303 N	19.907 E	Yugoslavia	10 G			112.143	164.397 SW
74	12/20	00 42 42.3	24.752 N	67.641 E	Pakistan	33 N	4.7		95.842	154.580 SE
75	12/21	01 13 22.4	13.966 S	166.516 E	Vanuatu Islands	43 G	6.0	7.3	89.136	50.886 SE
76	12/21	10 01 58.6	14.187 S	166.452 E	Vanuatu Islands	33 N	5.6	5.9	88.907	50.882 SE
77	12/23	05 16 03.3	62.222 N	124.239 W	North West Territories Canada	6 G	6.4	6.9	170.614	52.732 SW
78	12/24	04 09 41.2	35.090 S	54.272 E	South Indian Ocean	10 G	6.0	6.0	34.769	158.678 SE
79	12/25	22 15 09.7	21.667 S	178.533 W	Fiji Islands Region	455	5.5		85.355	35.145 SE
80	12/27	05 38 53.4	5.763 S	104.191 E	Southern Sumatera	25 D	5.8	6.6	75.674	111.935 SE

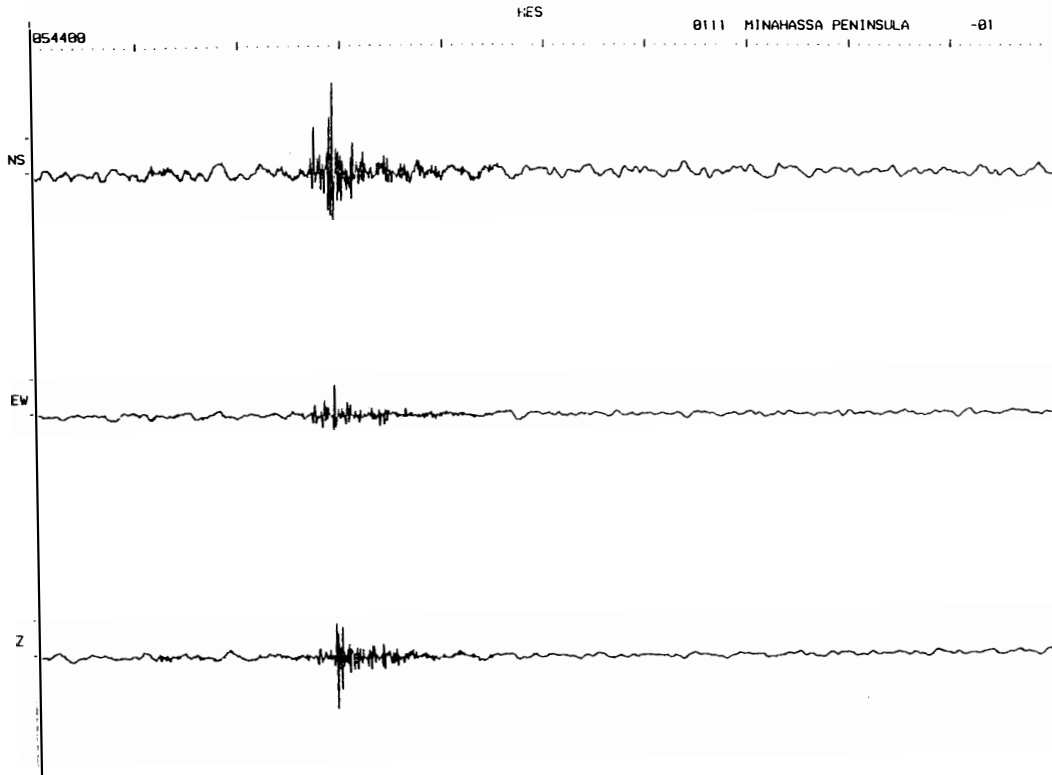
NO. 1



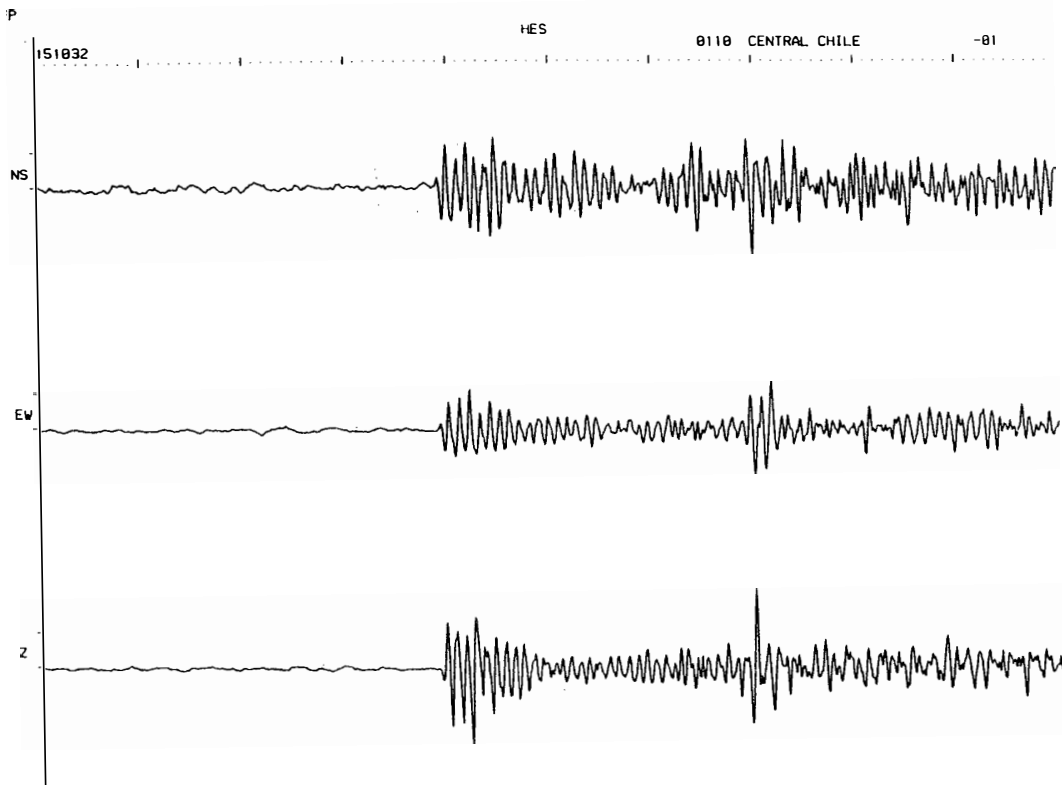
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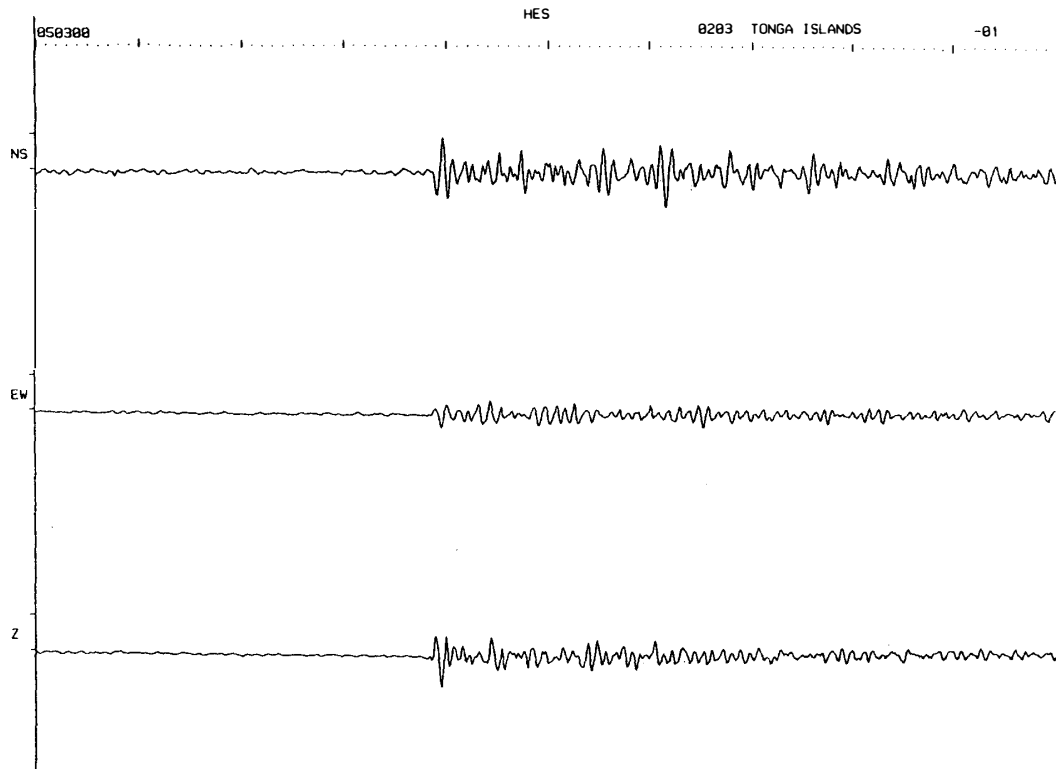
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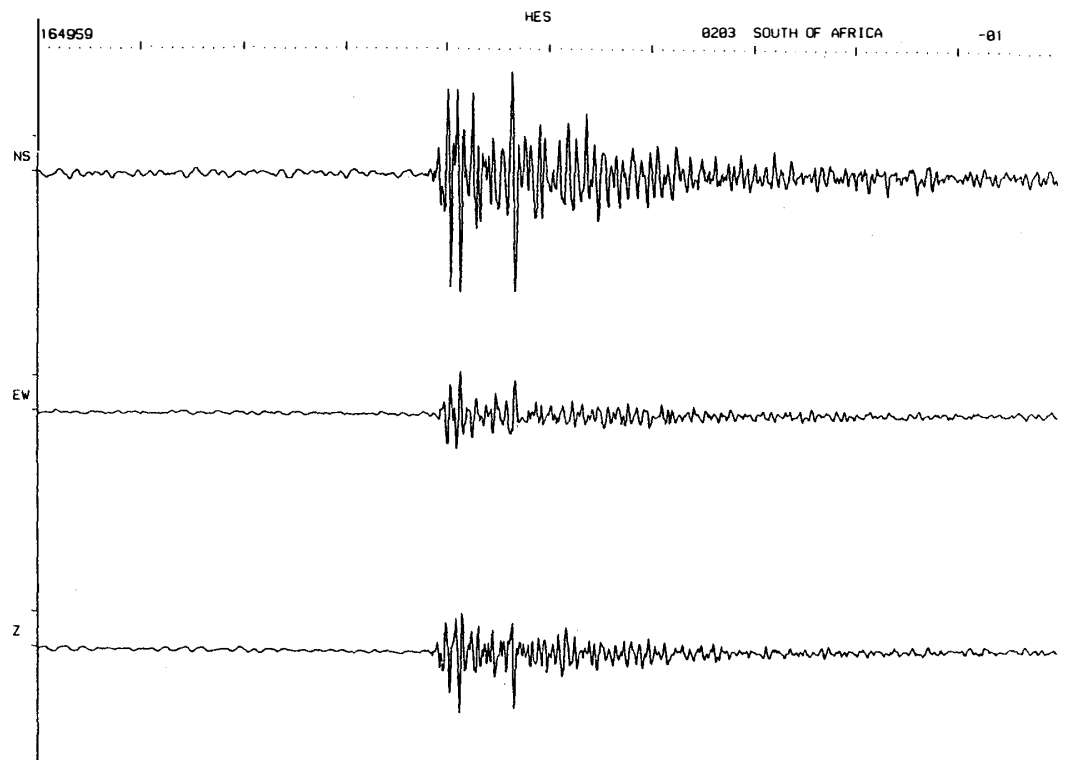
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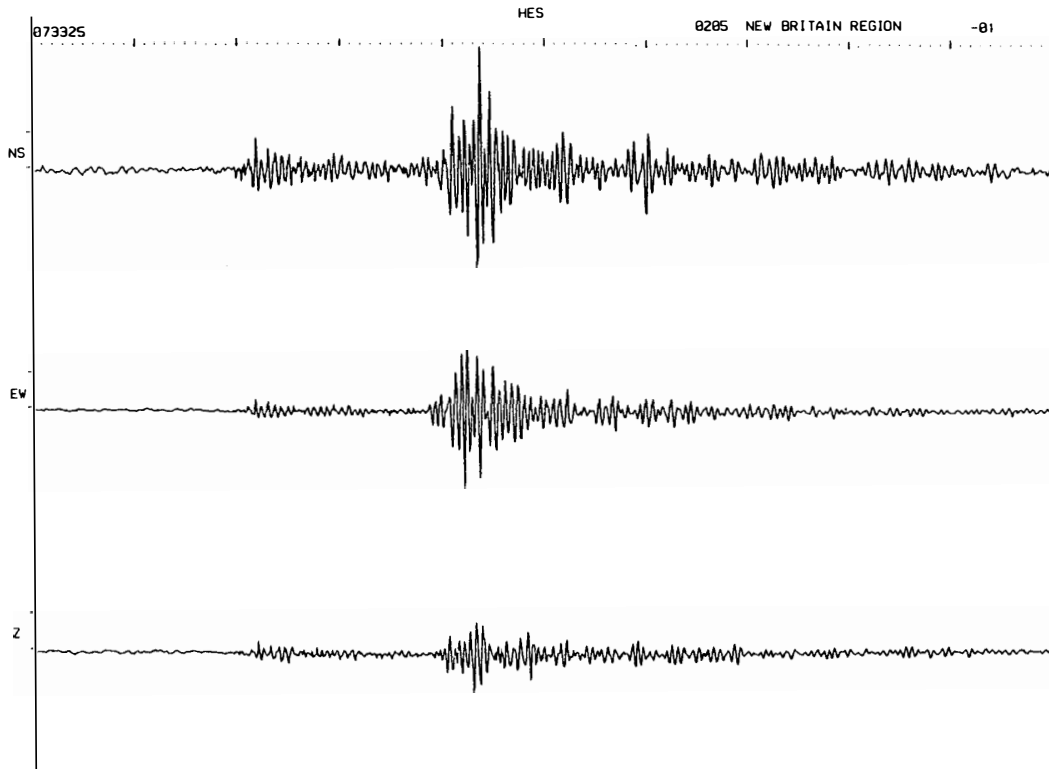
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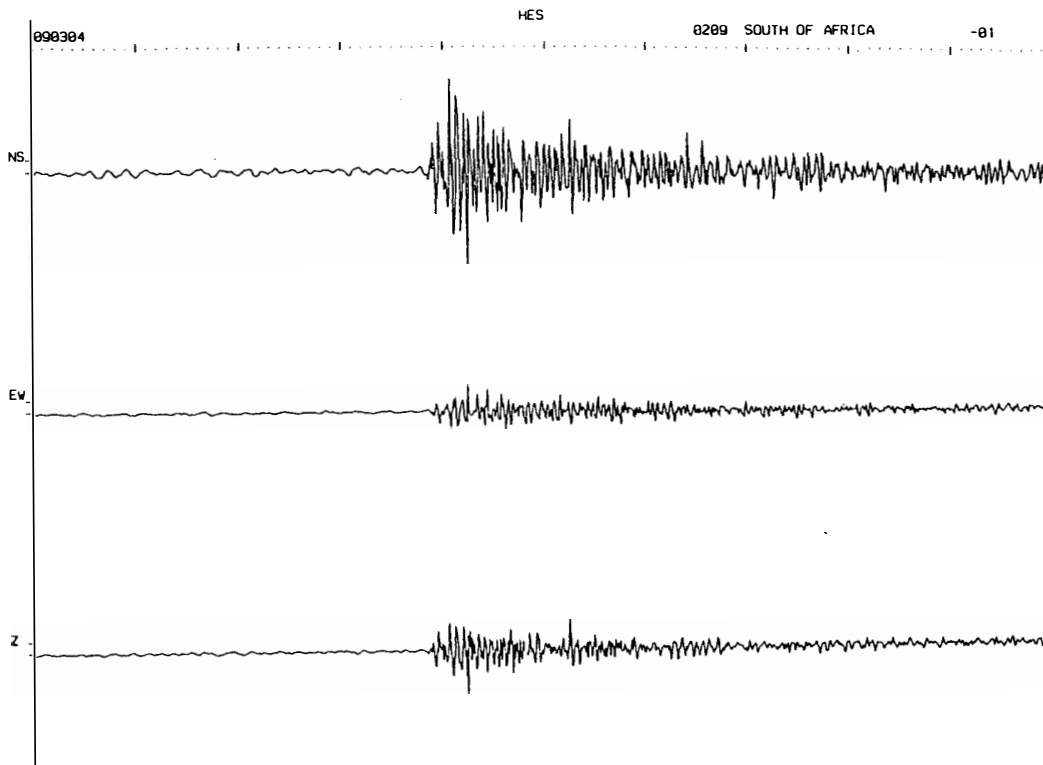
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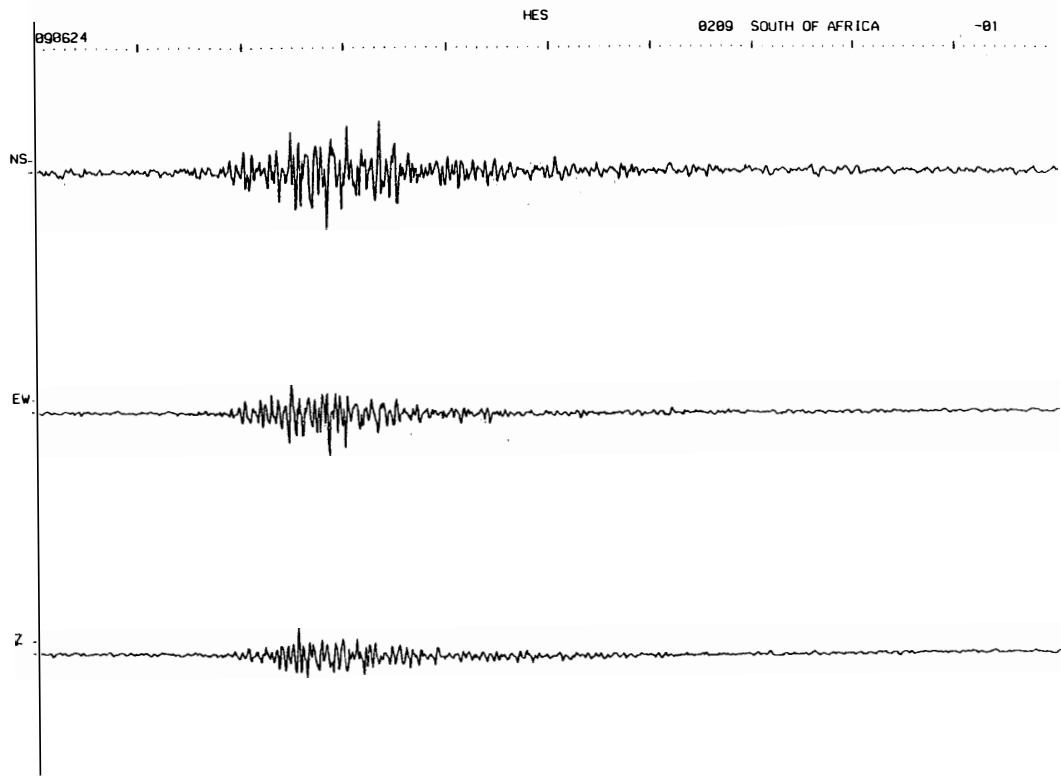
NO. 7



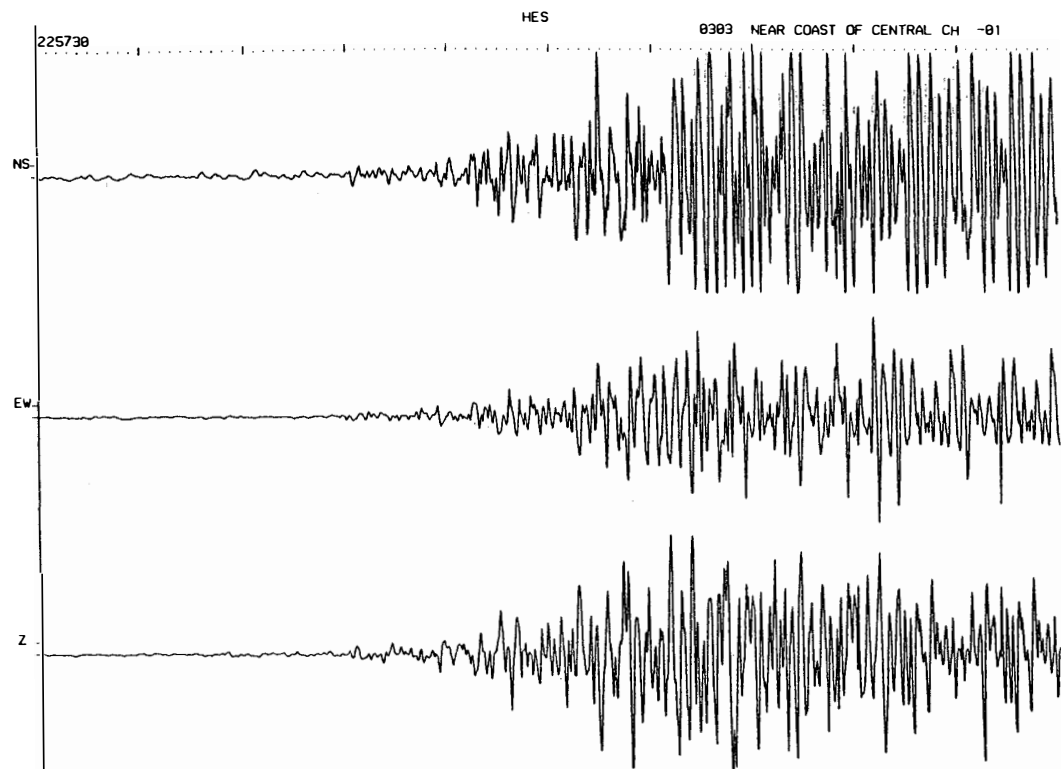
NO. 8 - 1



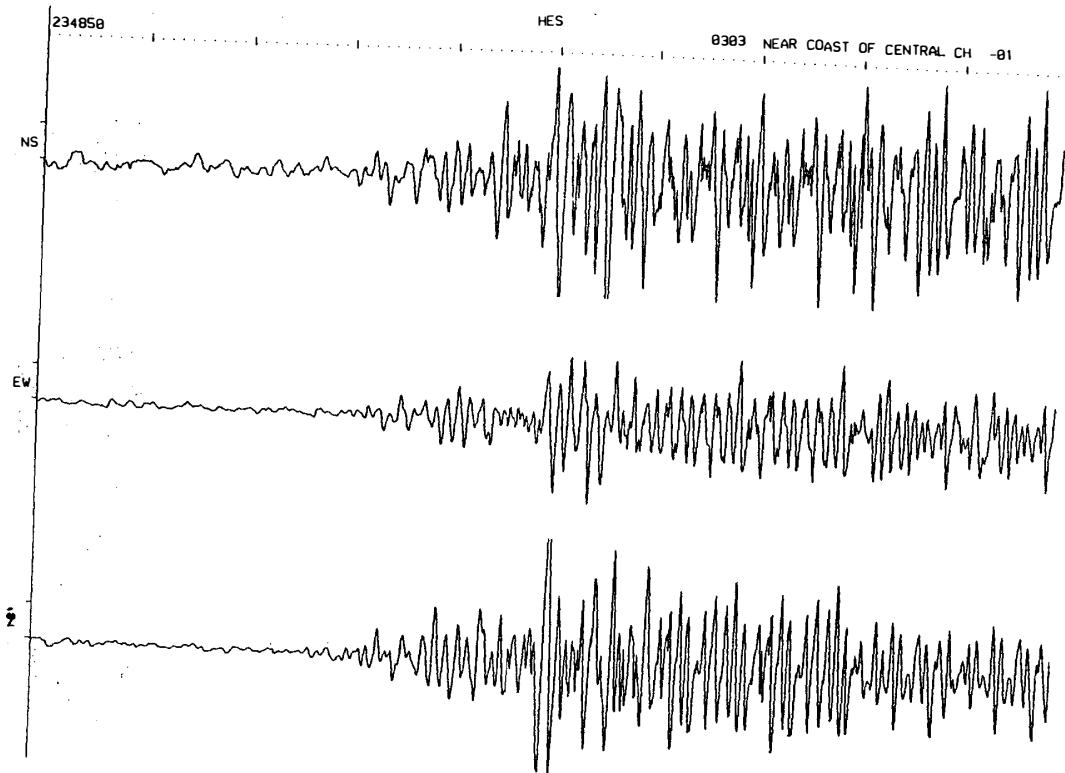
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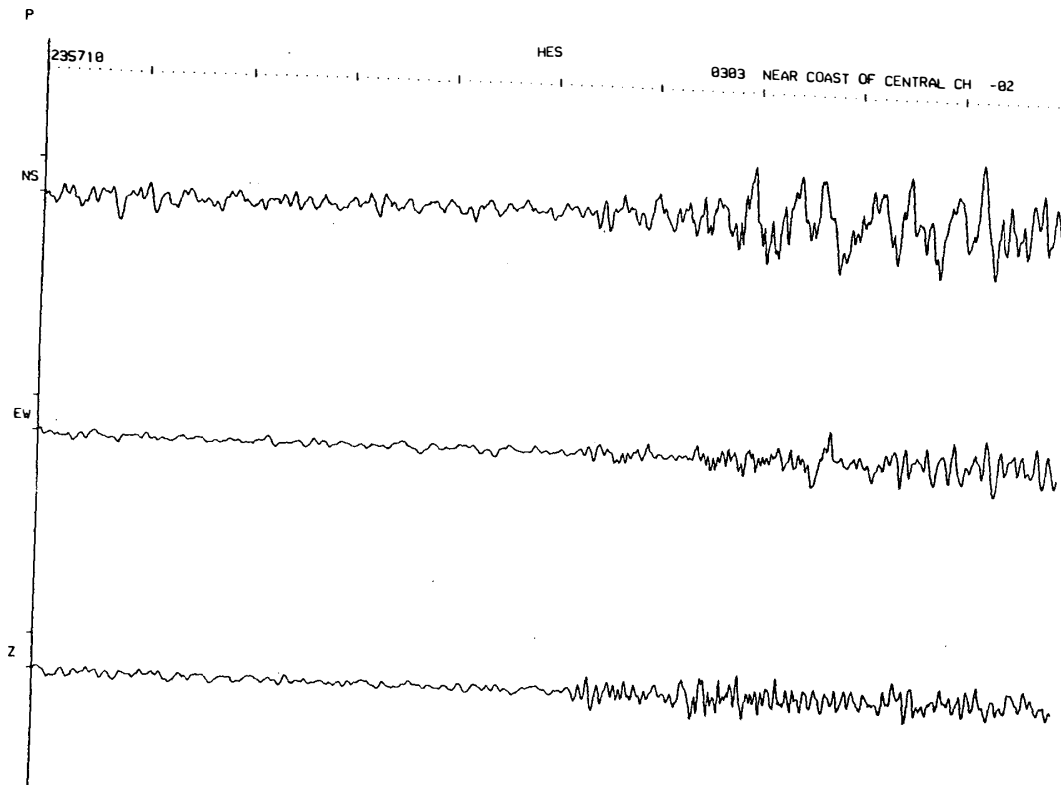
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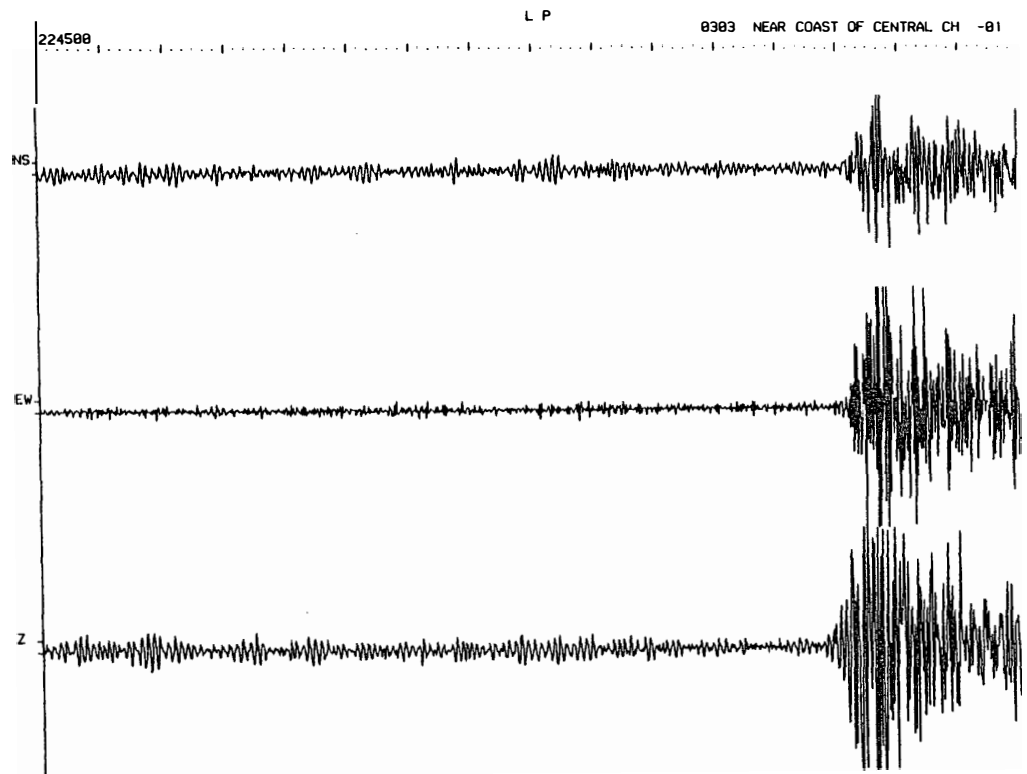
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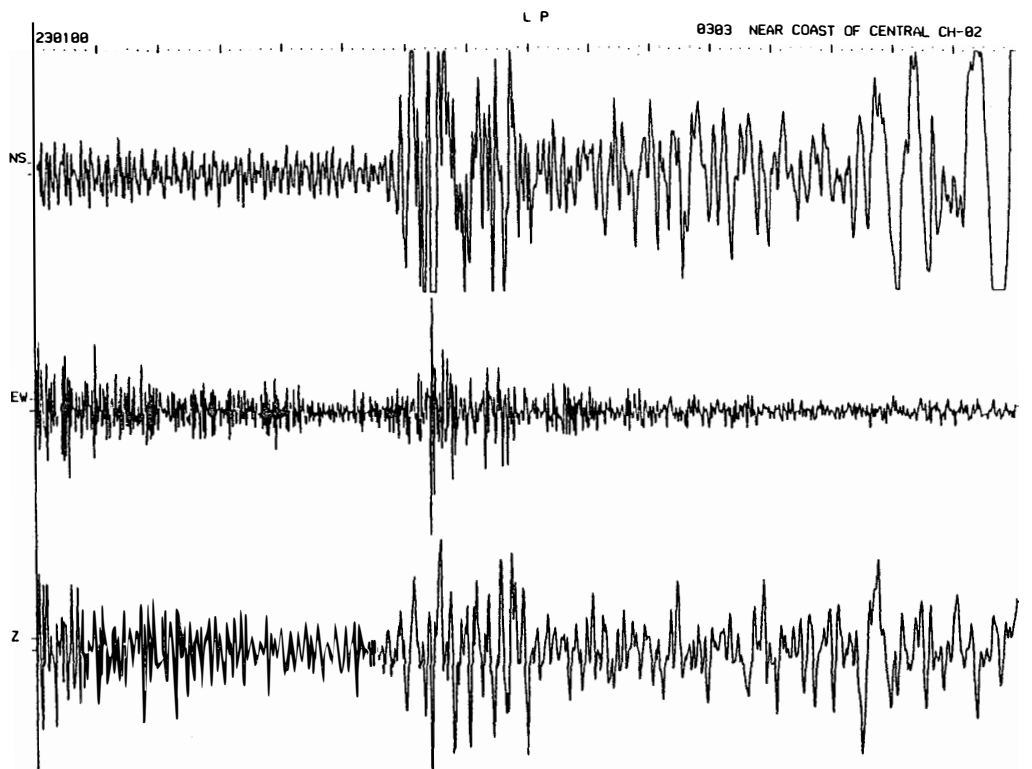
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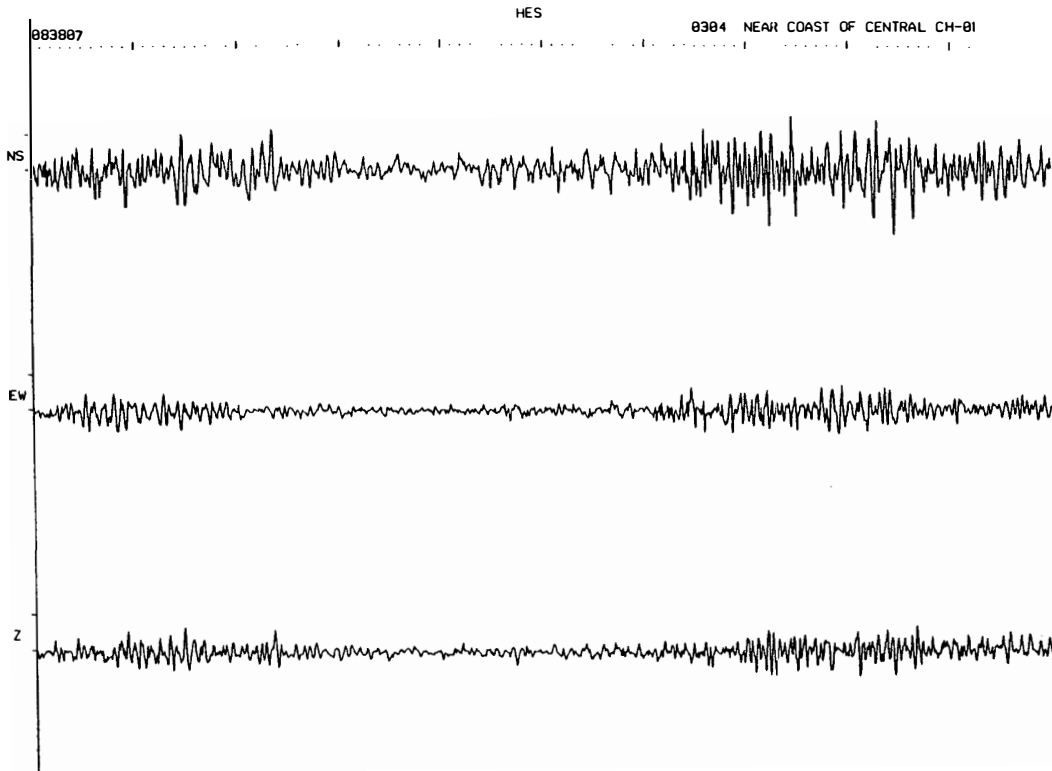
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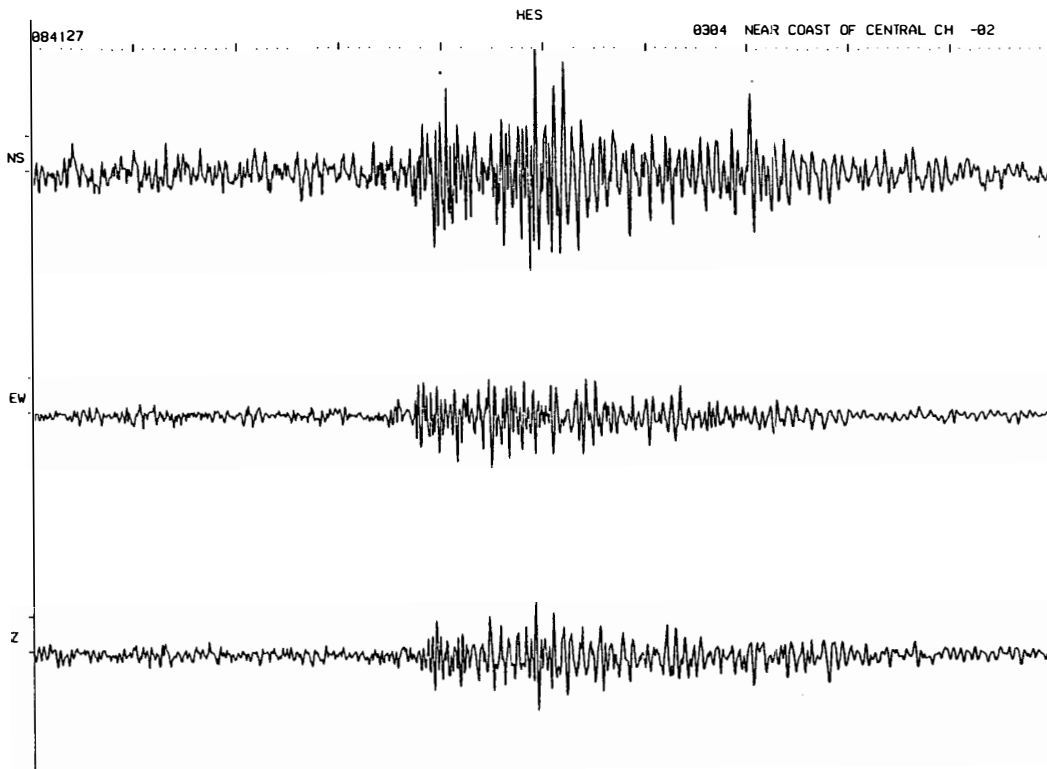
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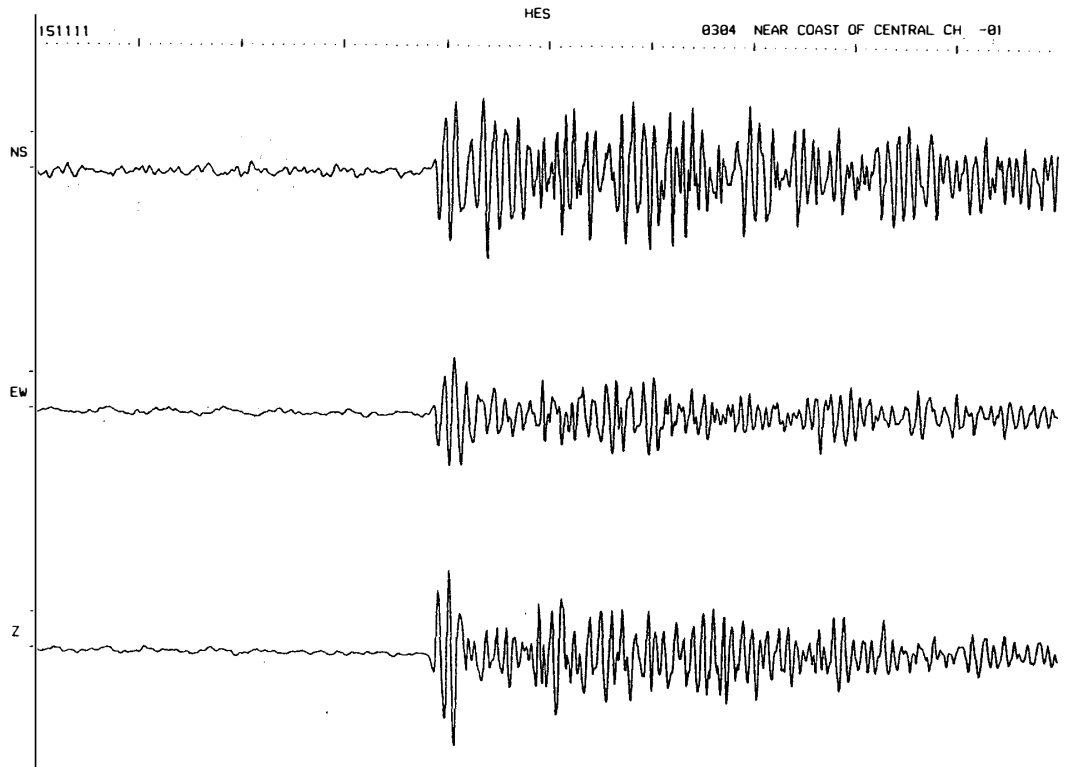
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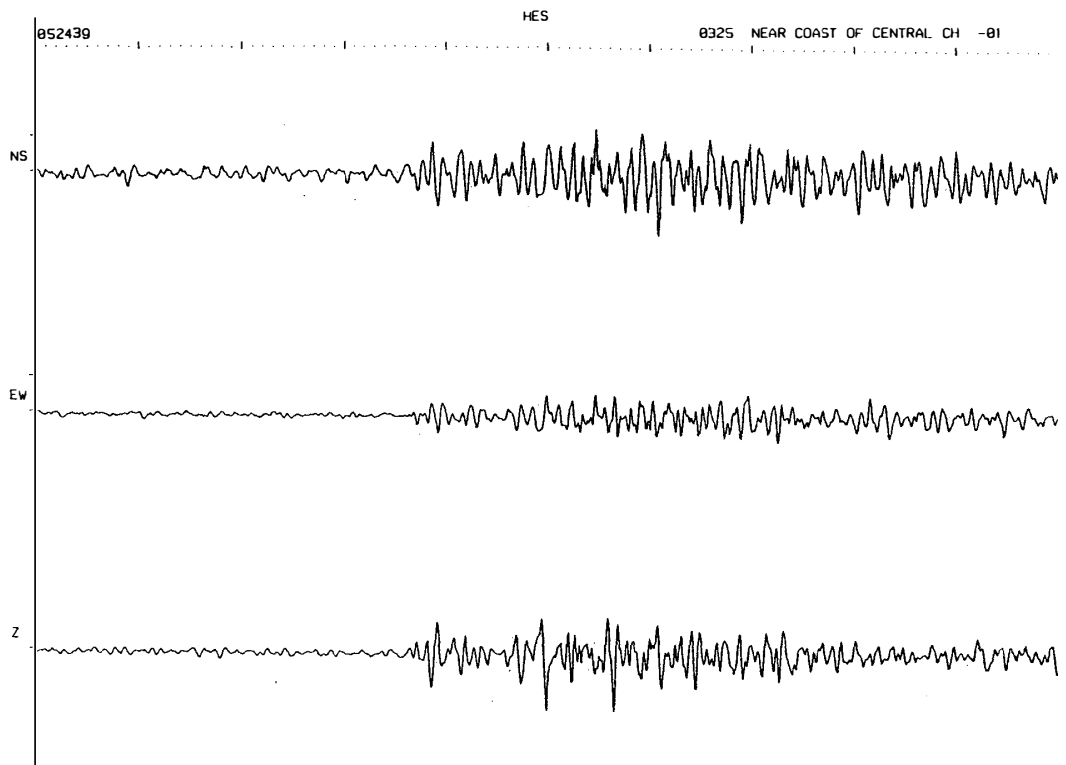
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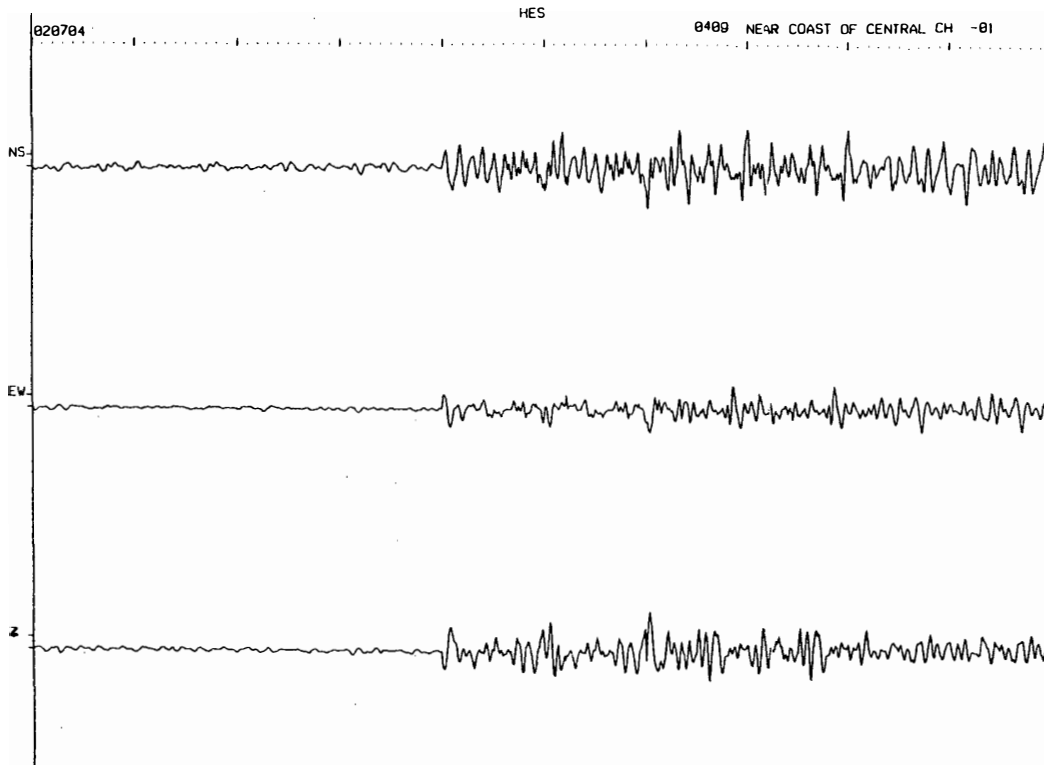
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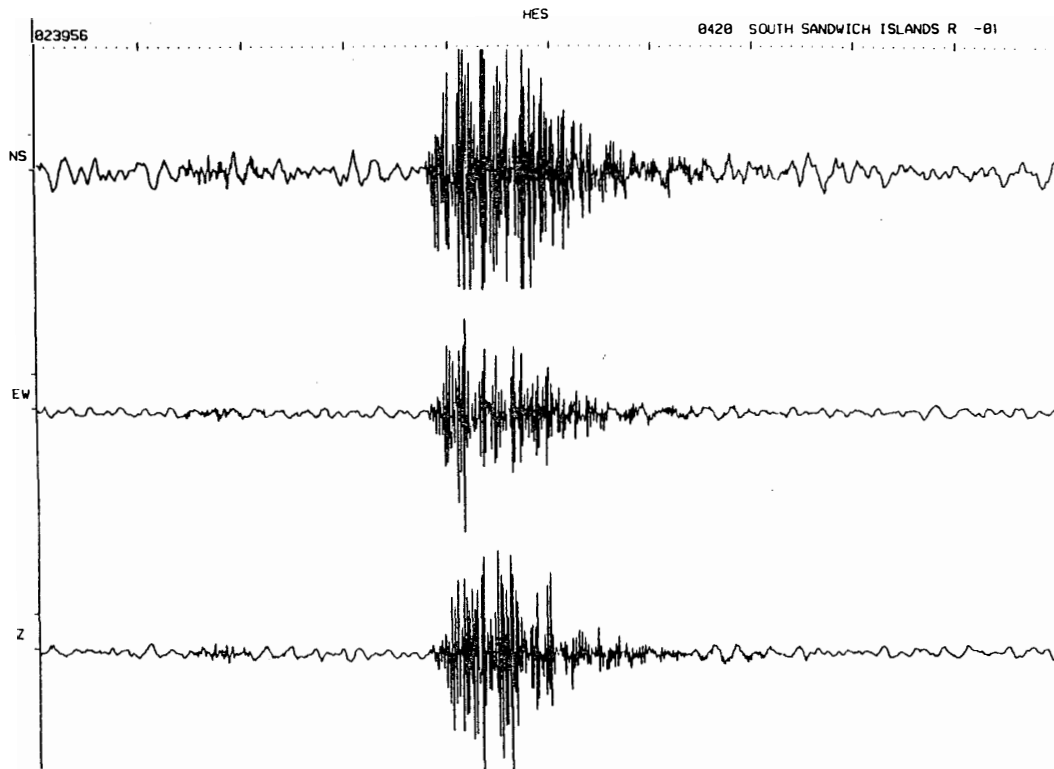
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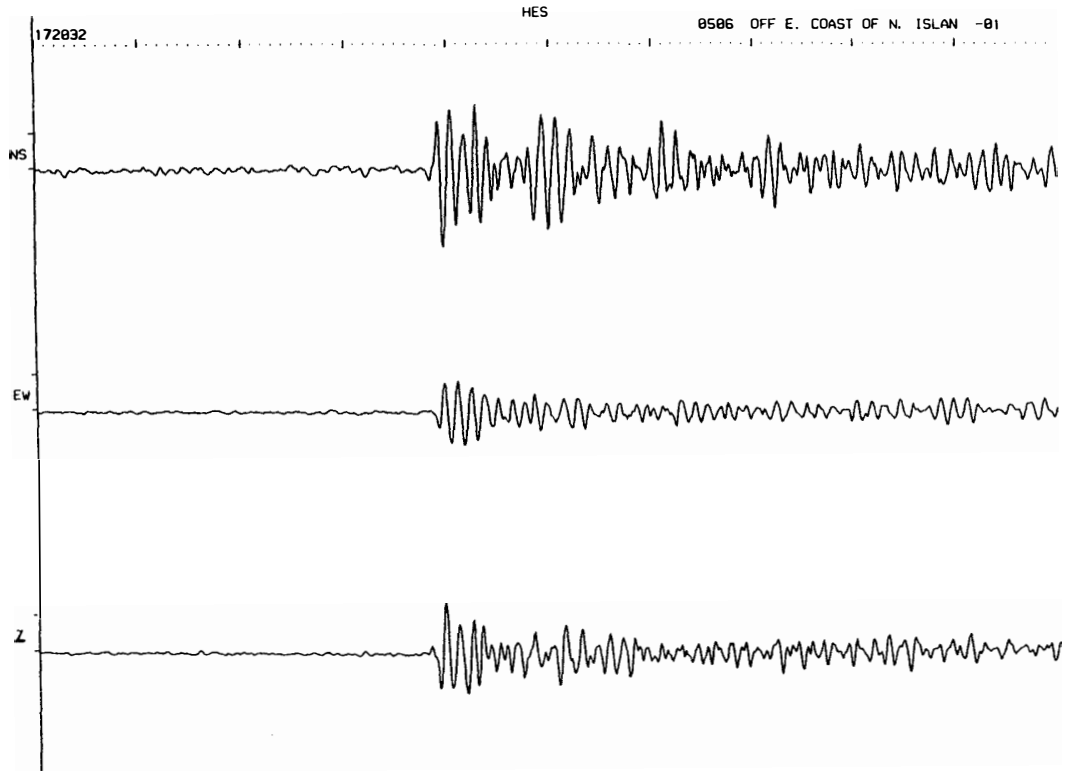
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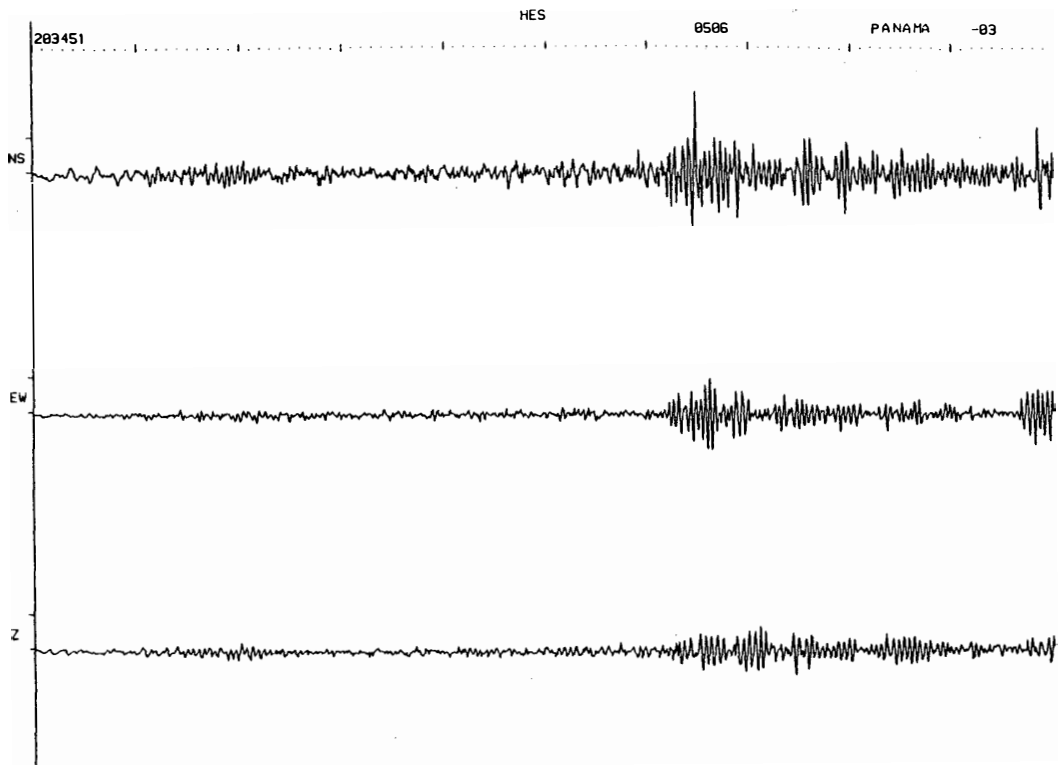
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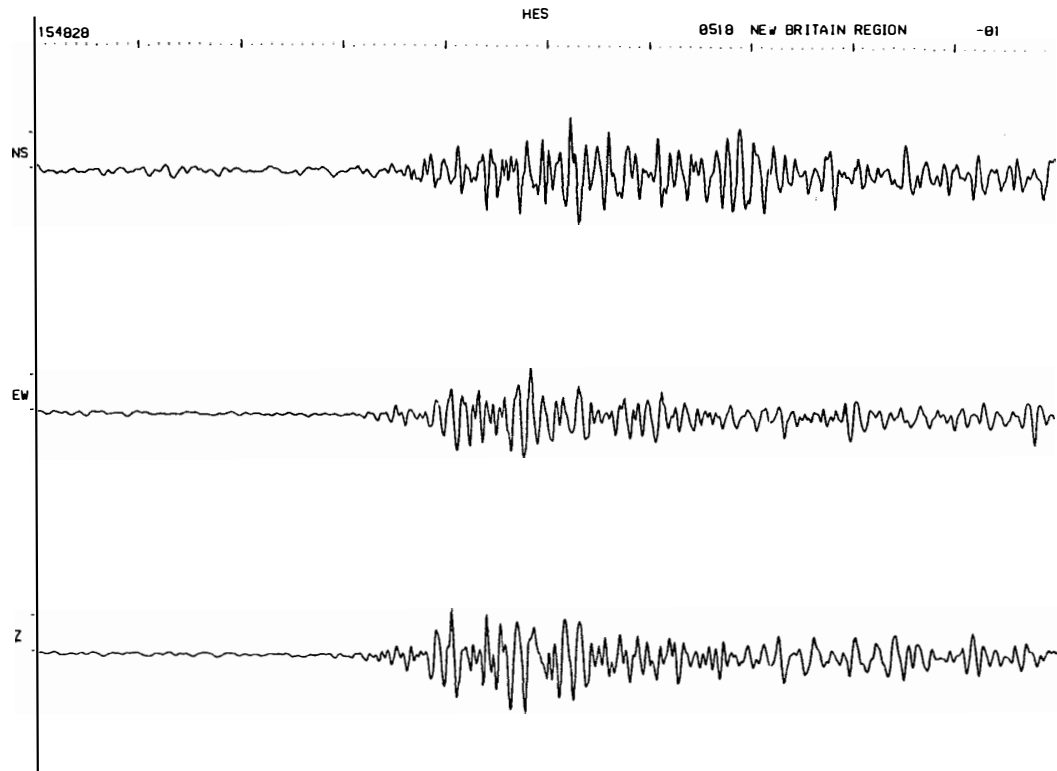
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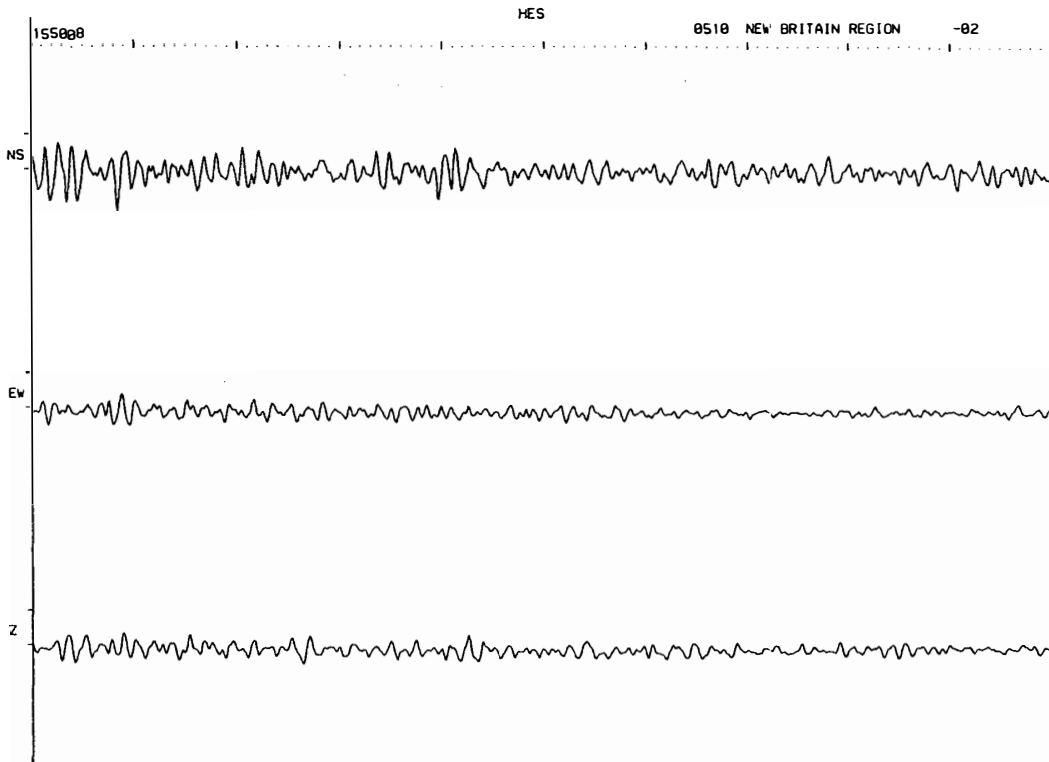
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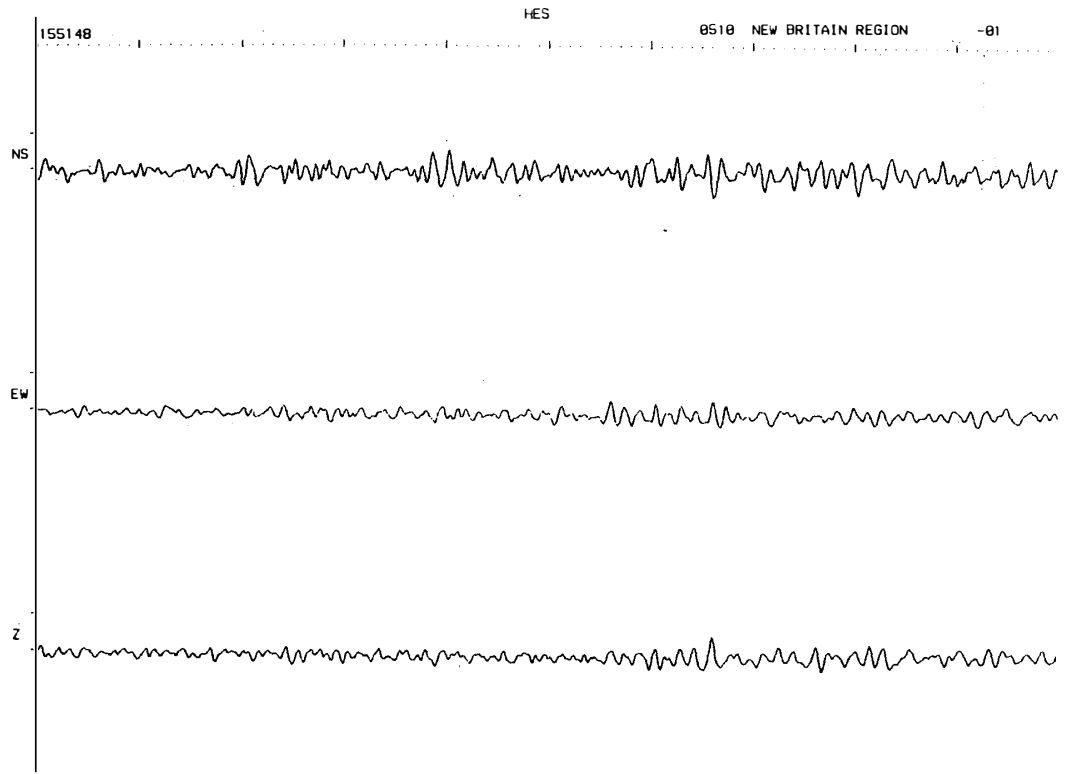
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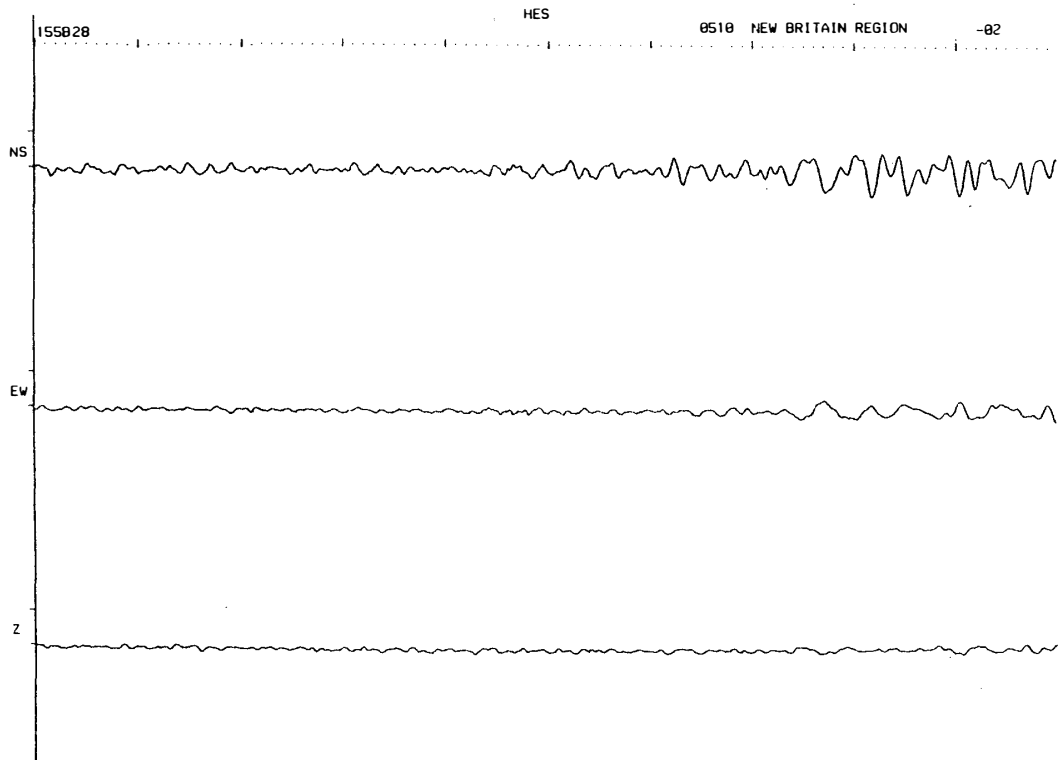
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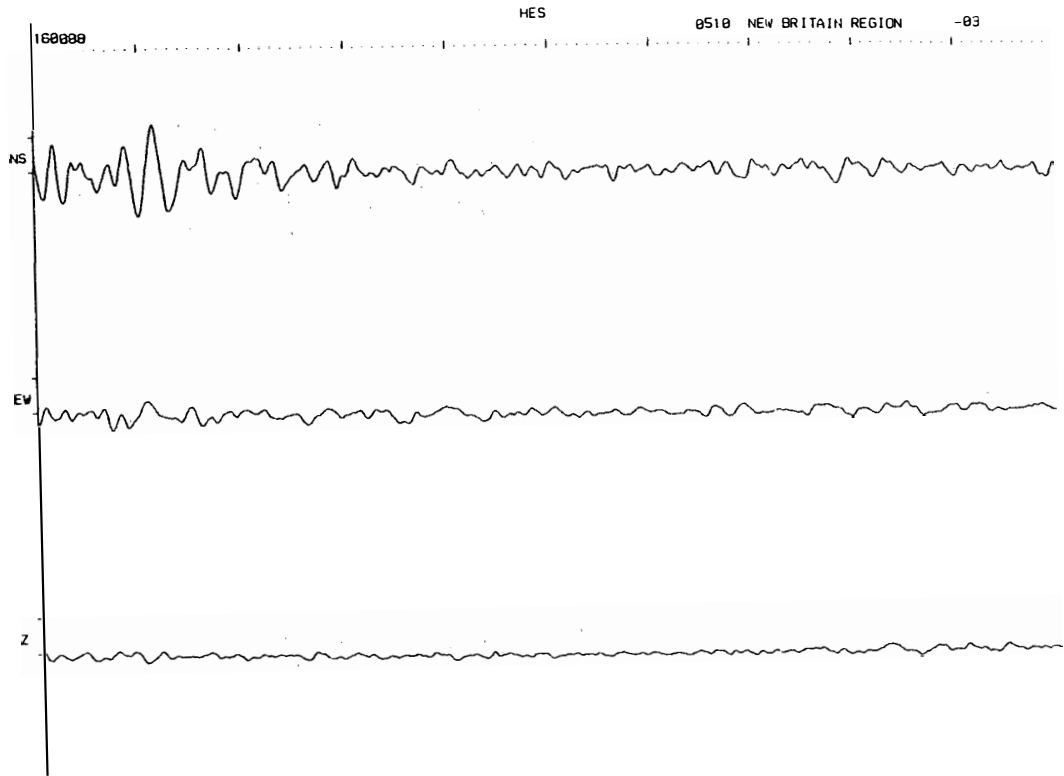
NO.19-3



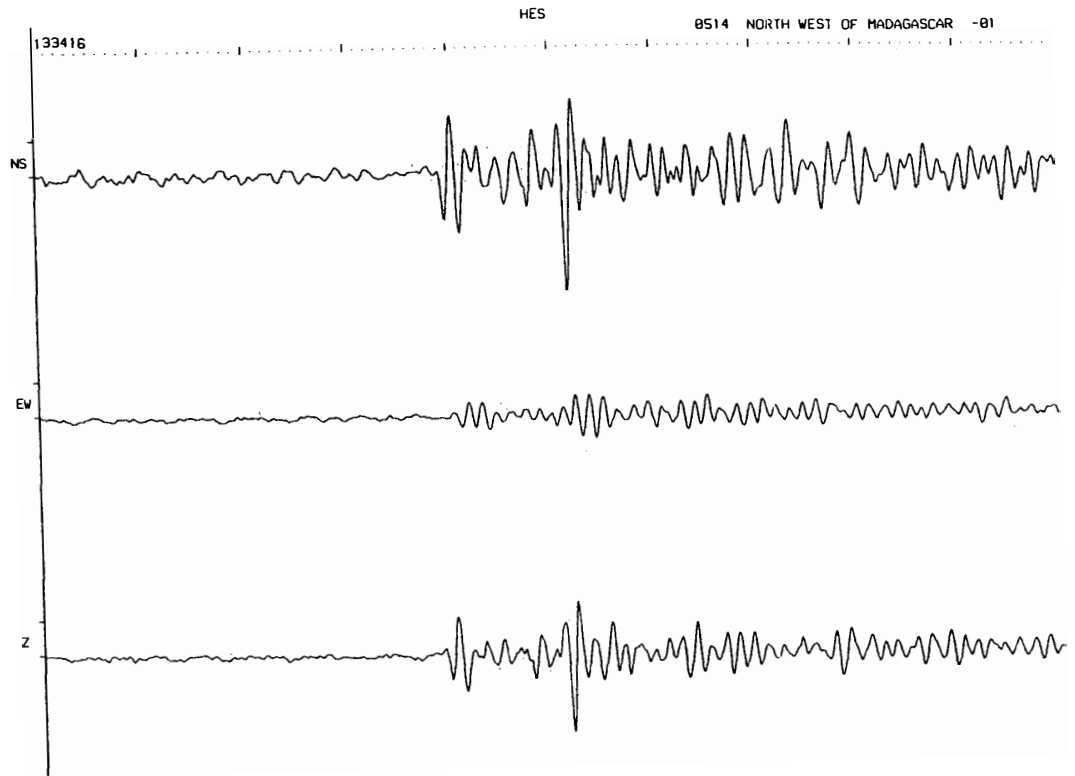
NO.19-4



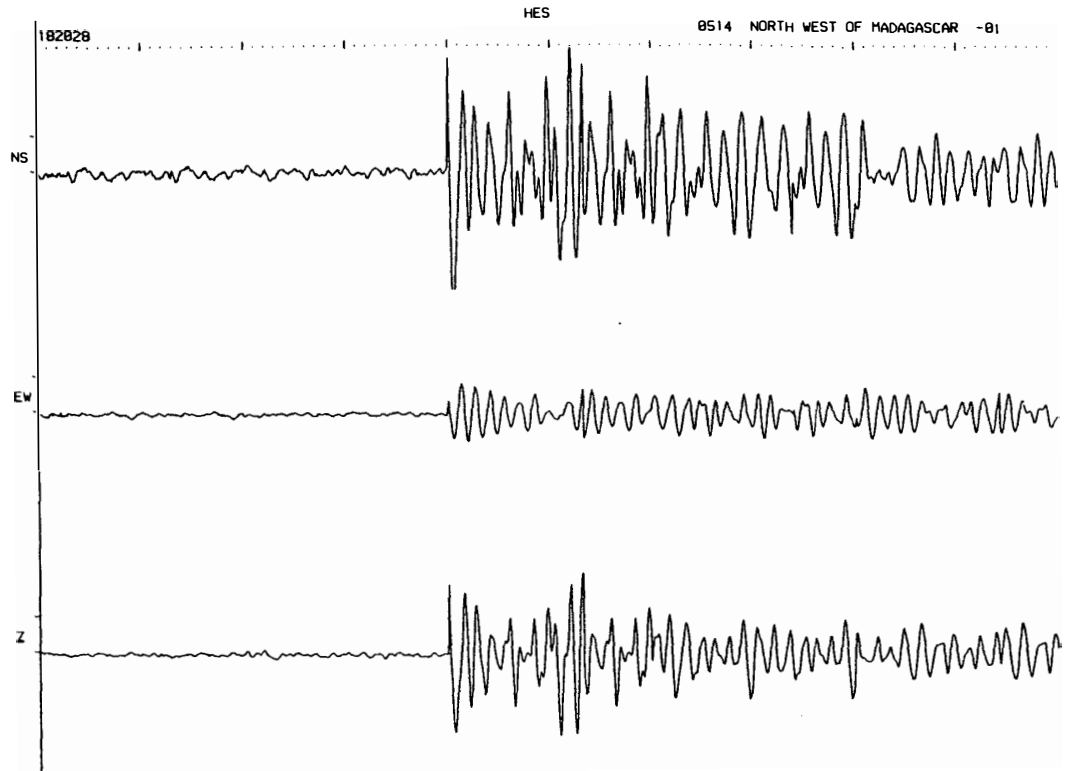
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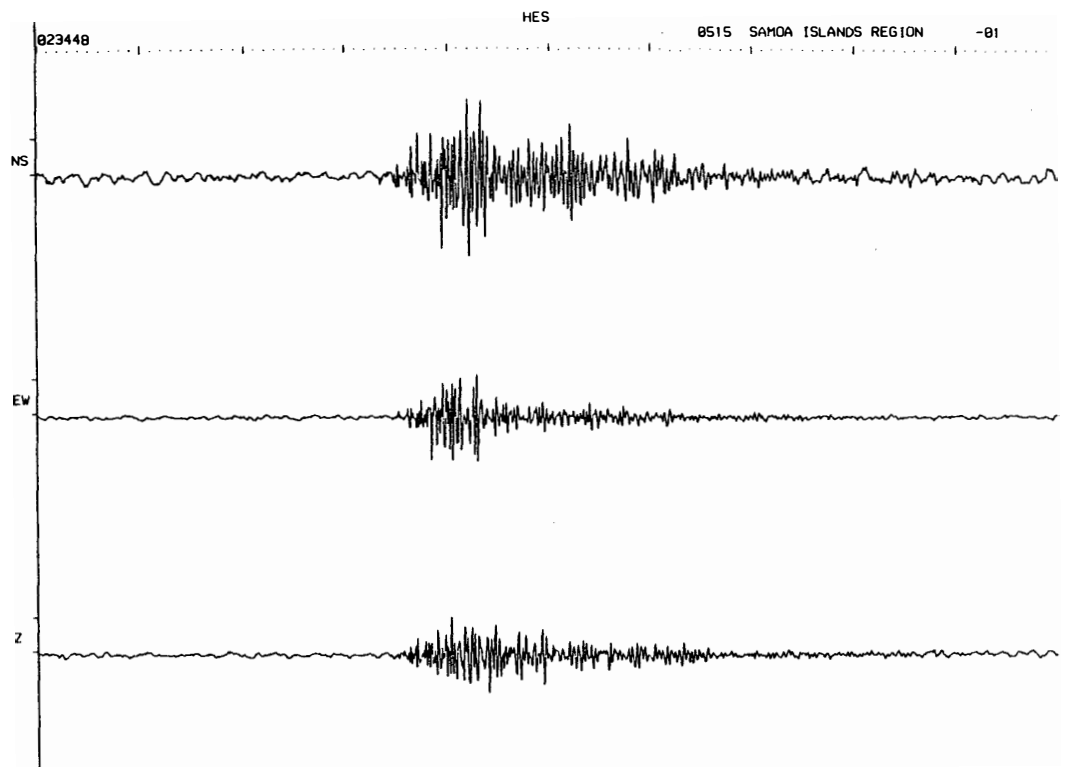
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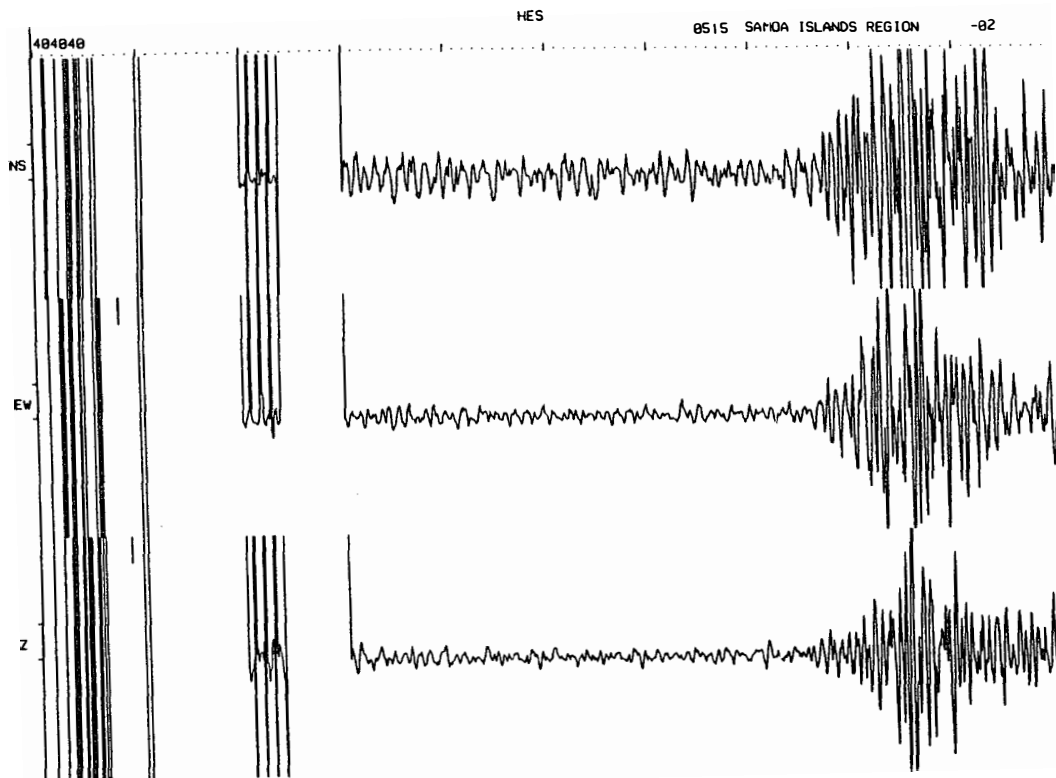
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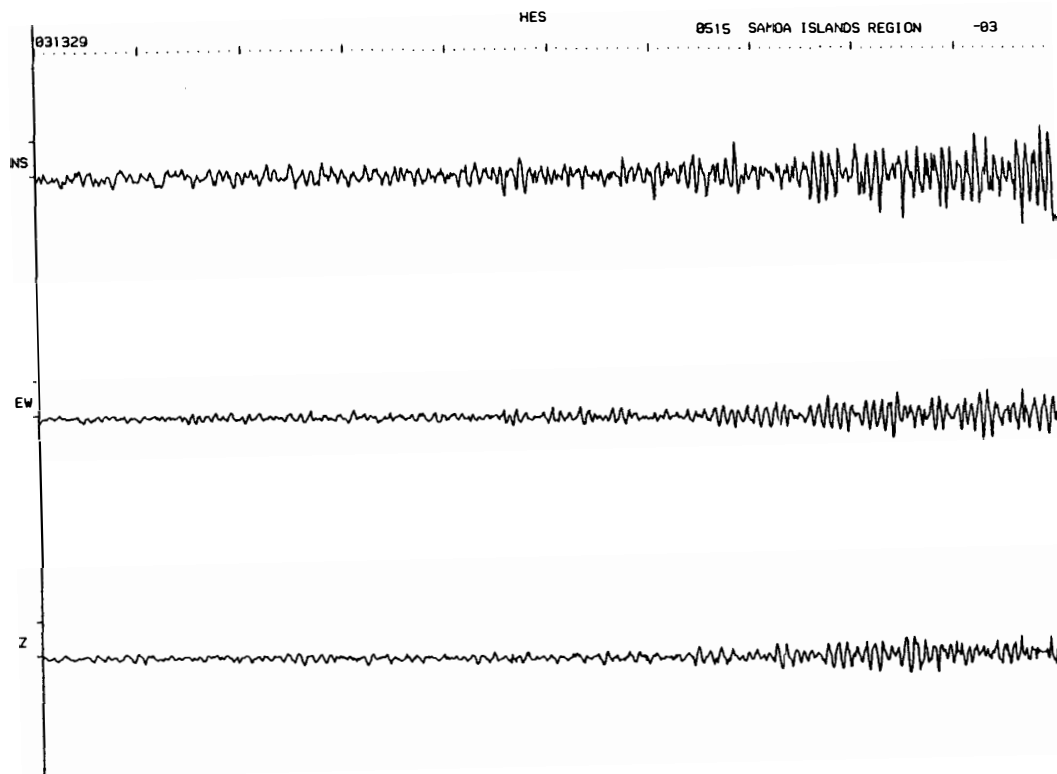
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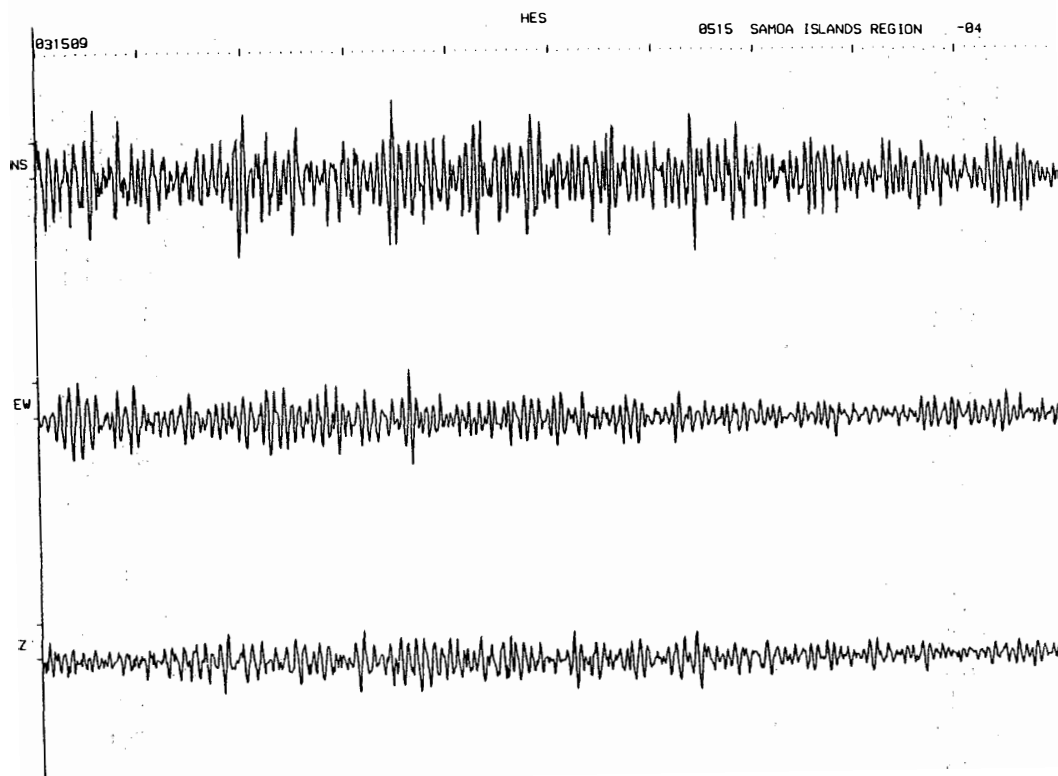
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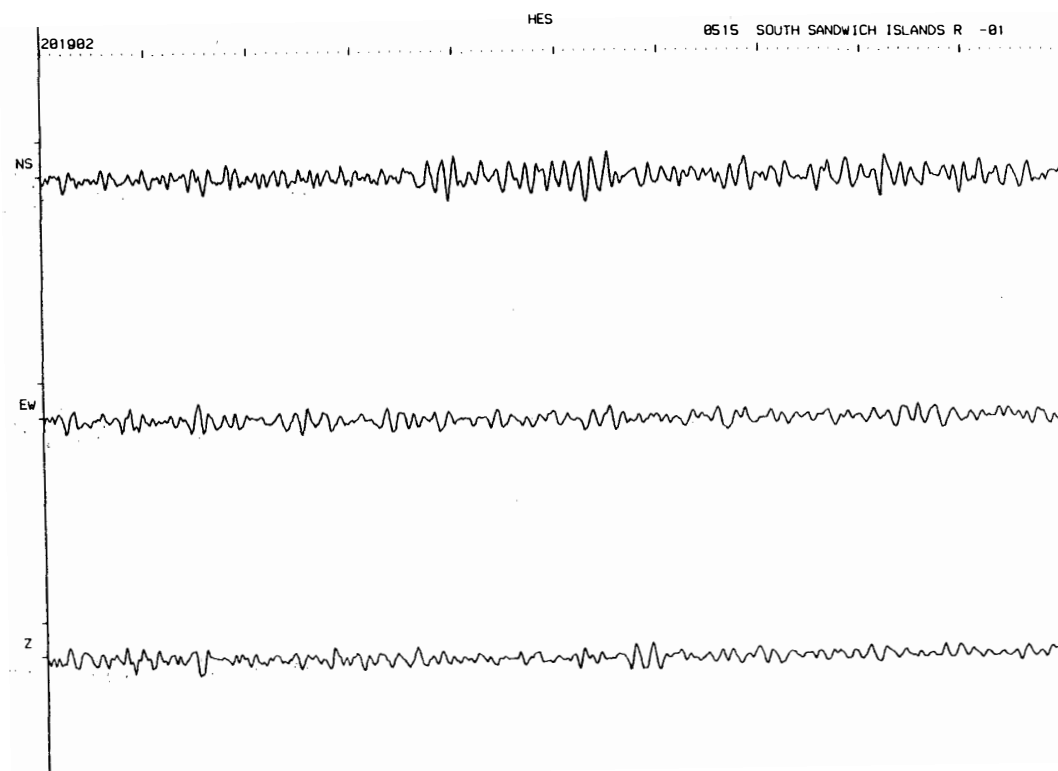
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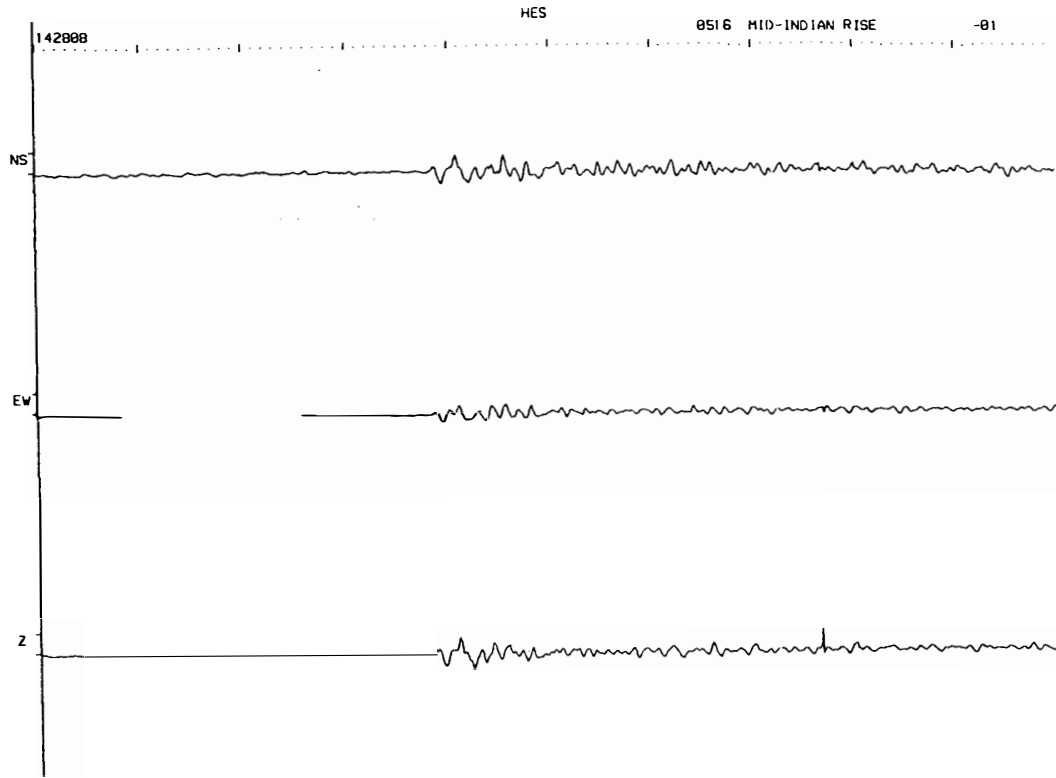
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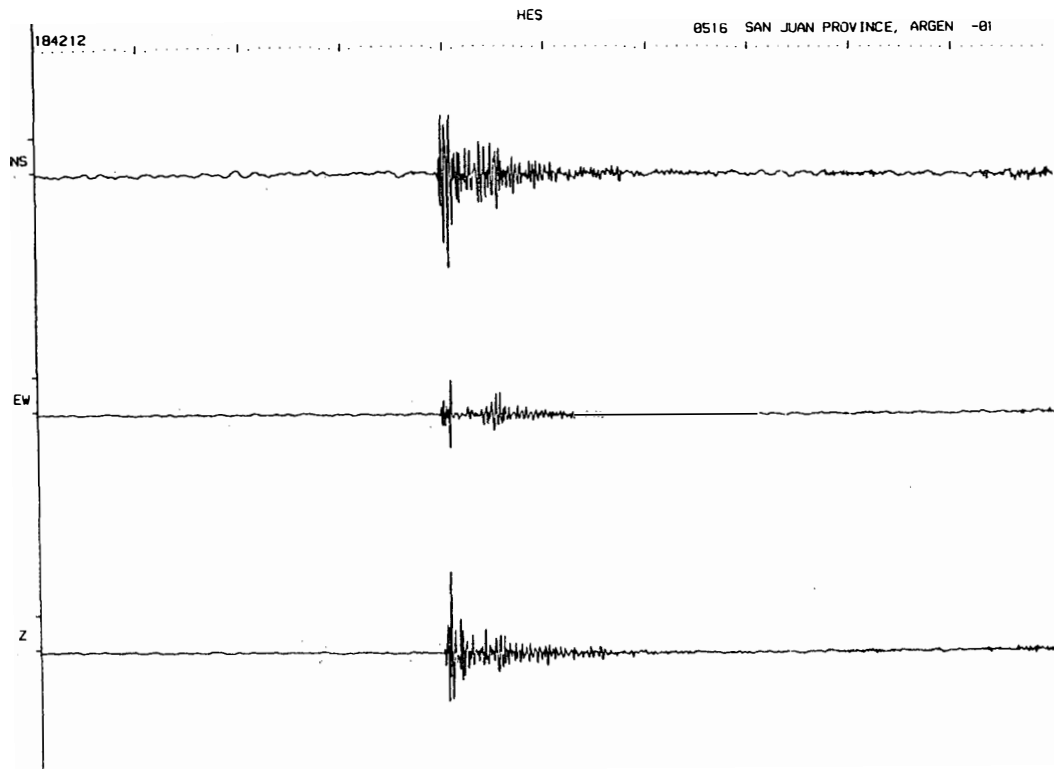
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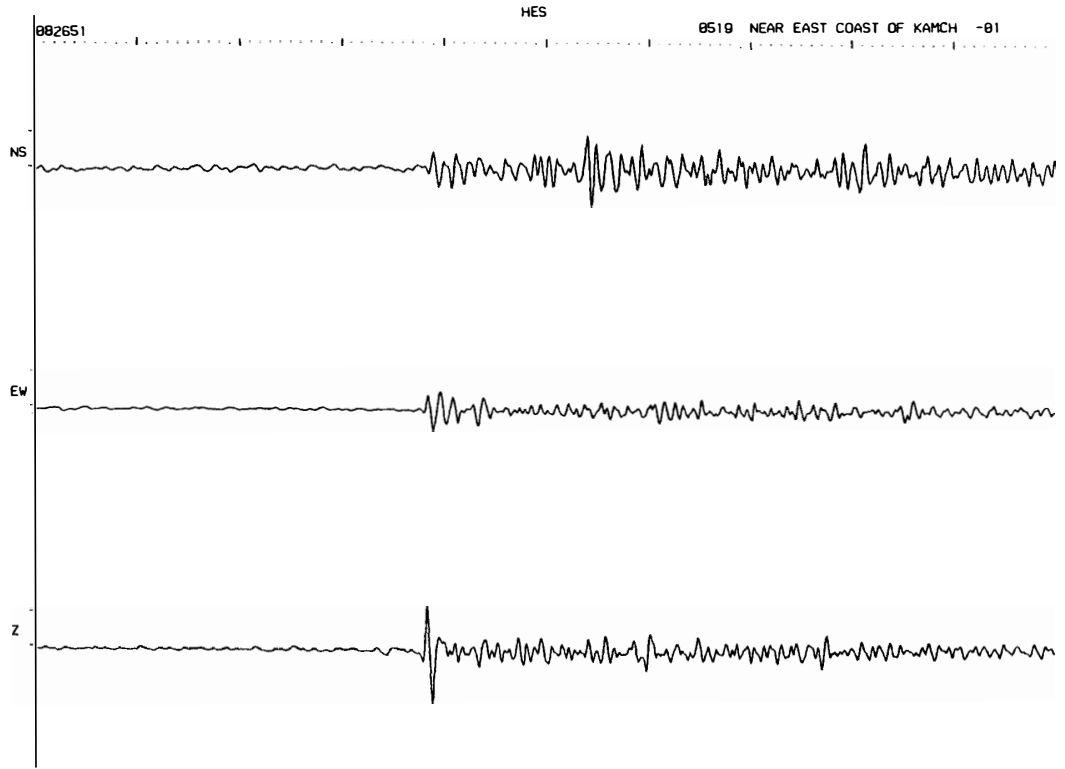
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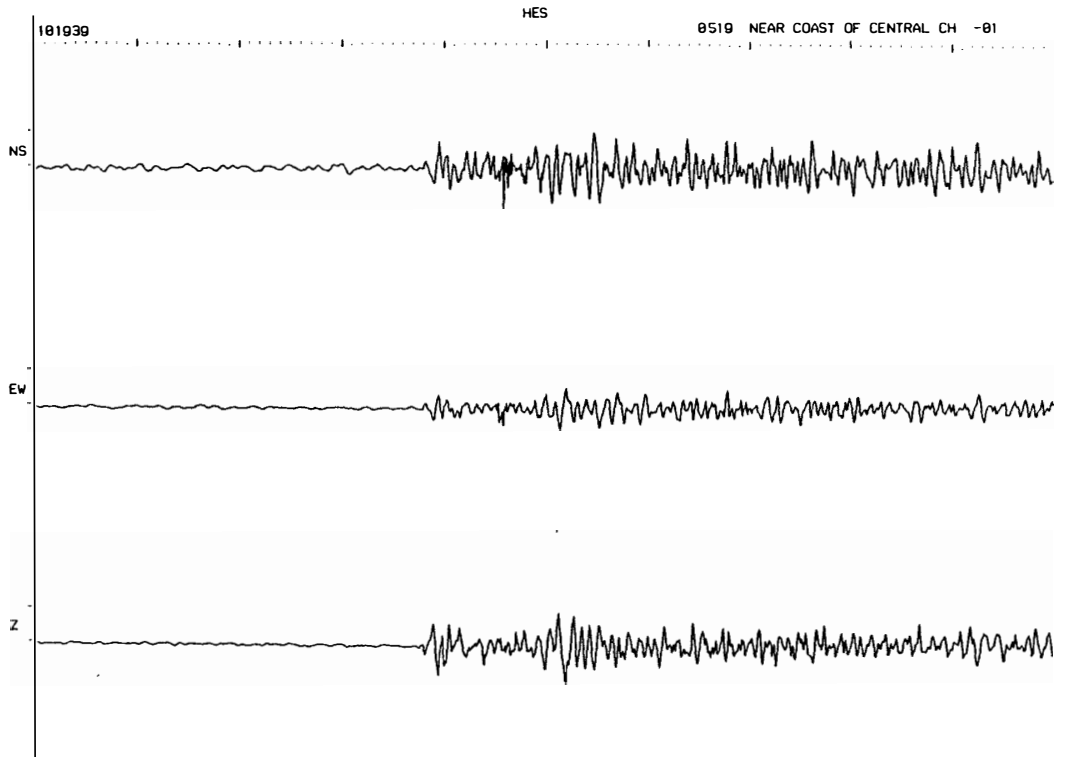
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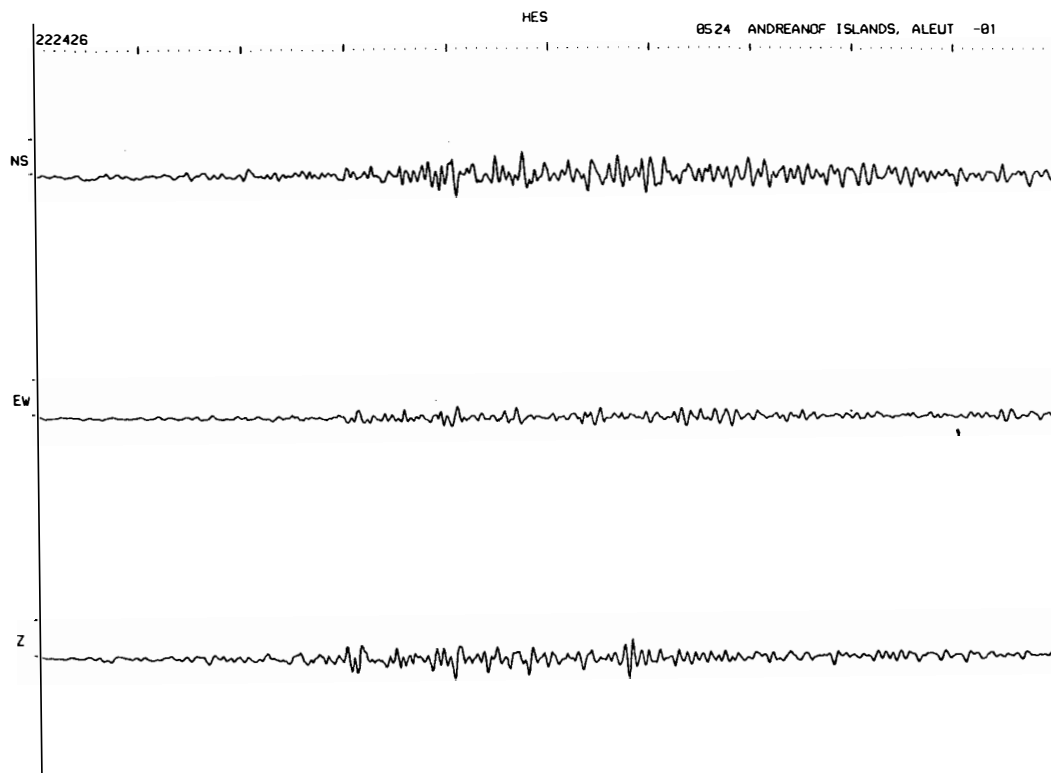
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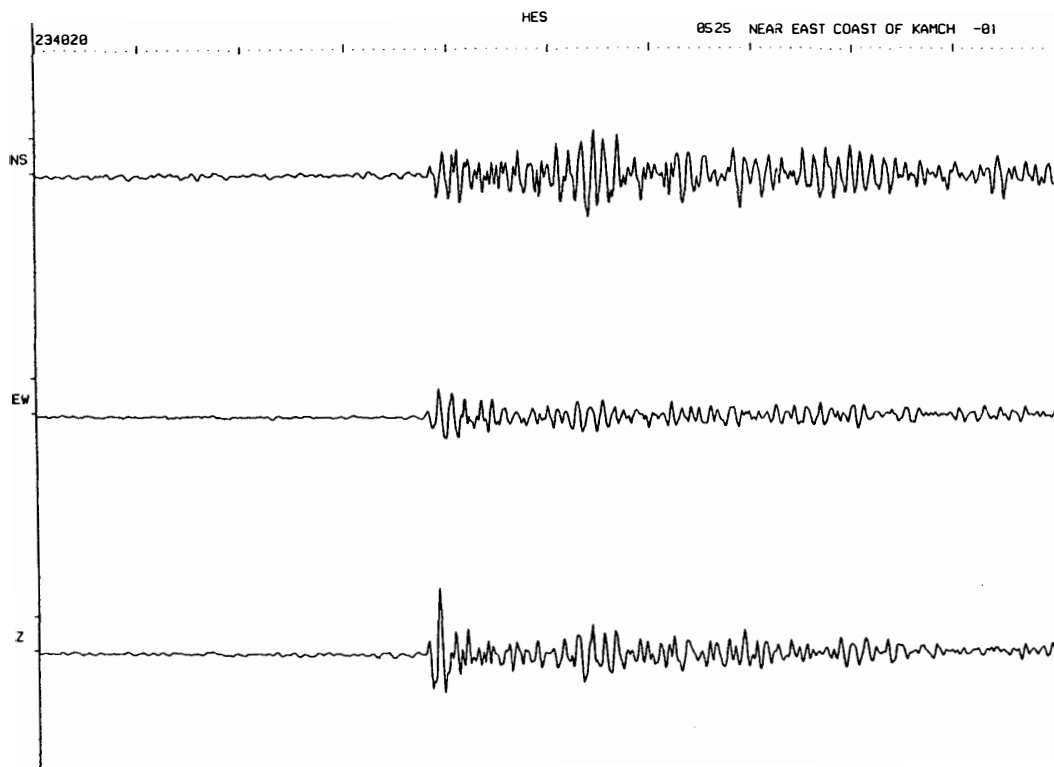
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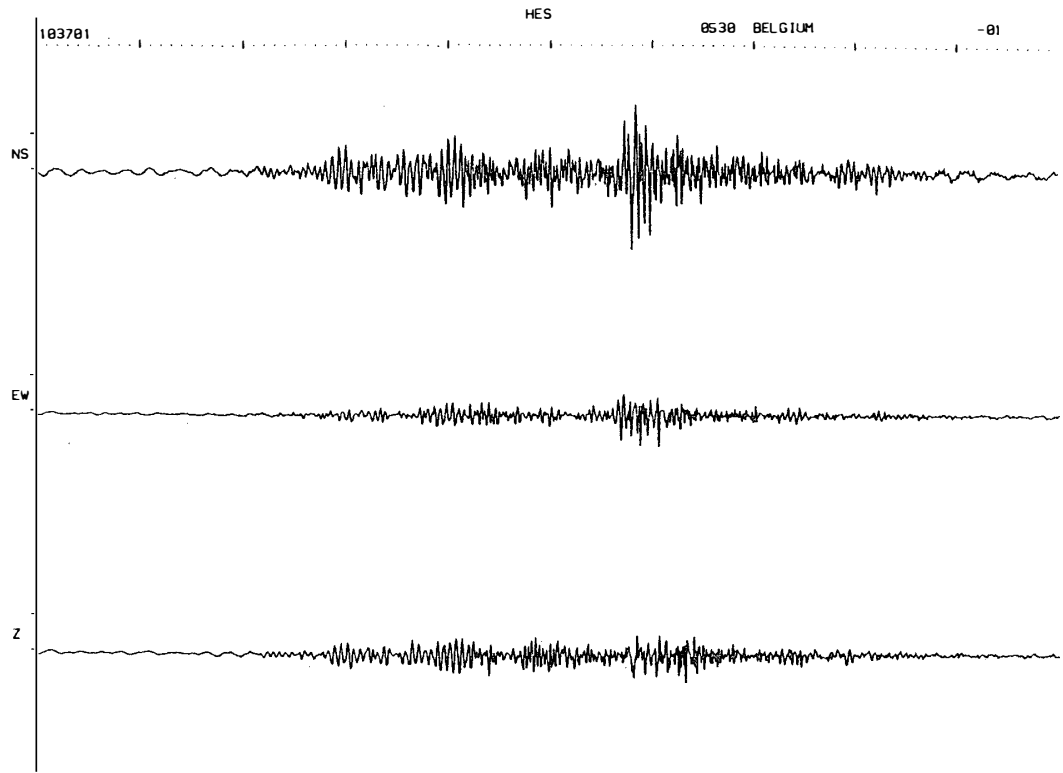
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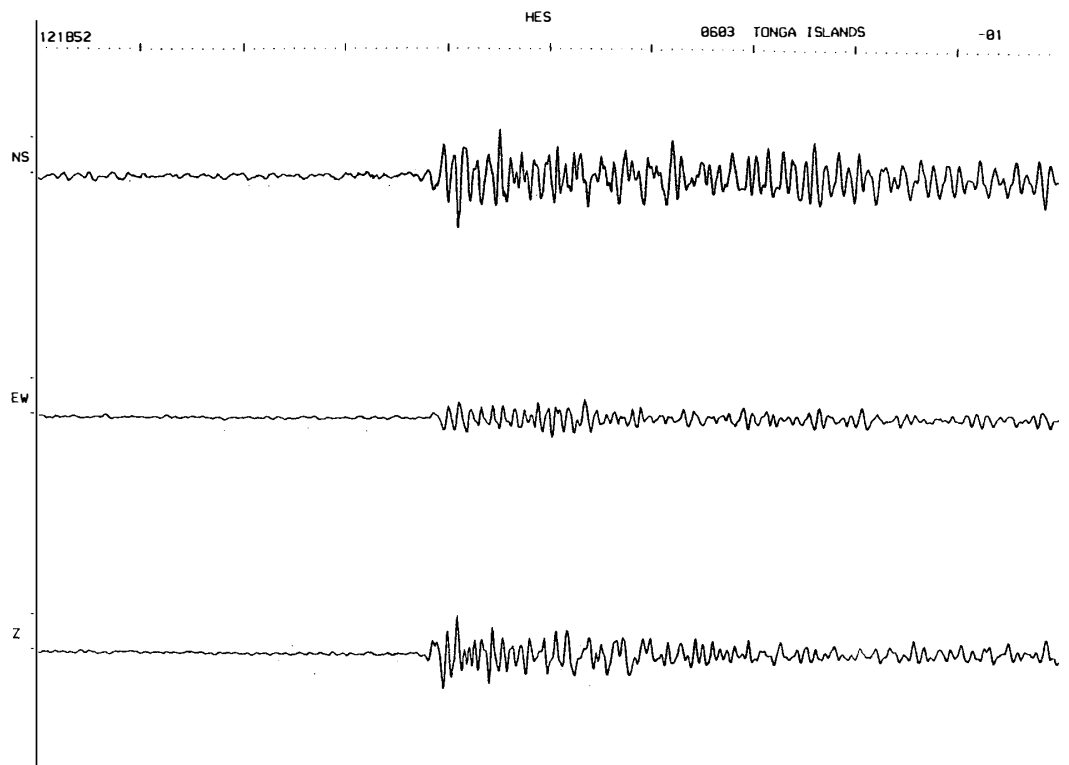
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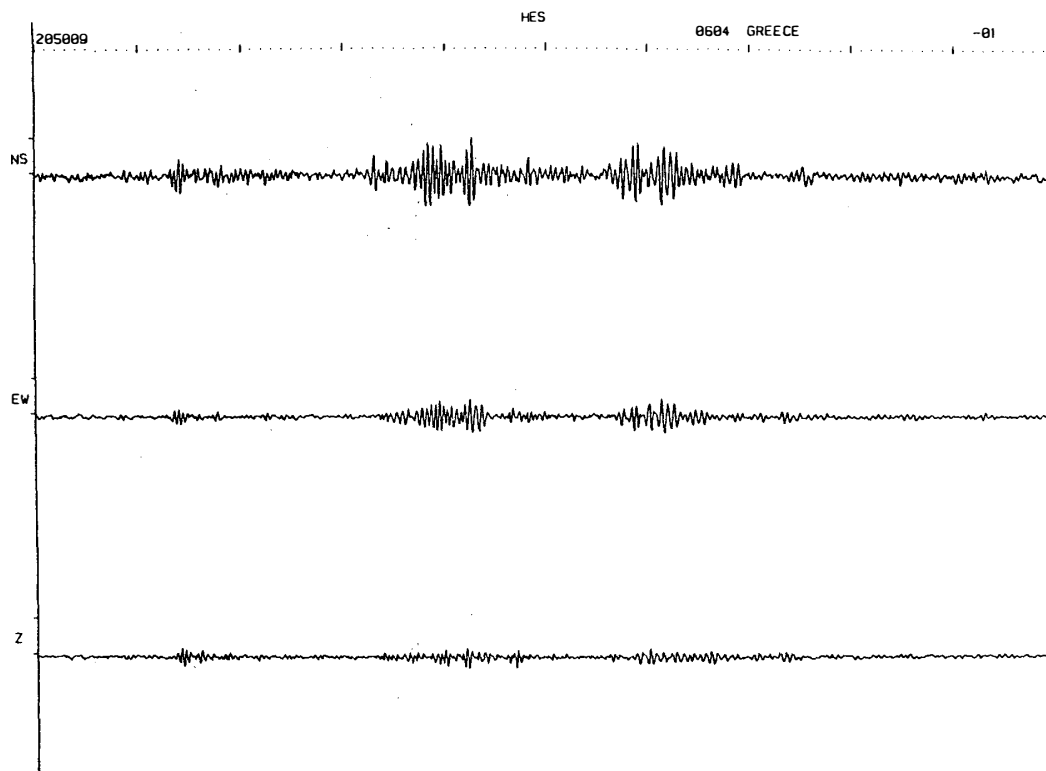
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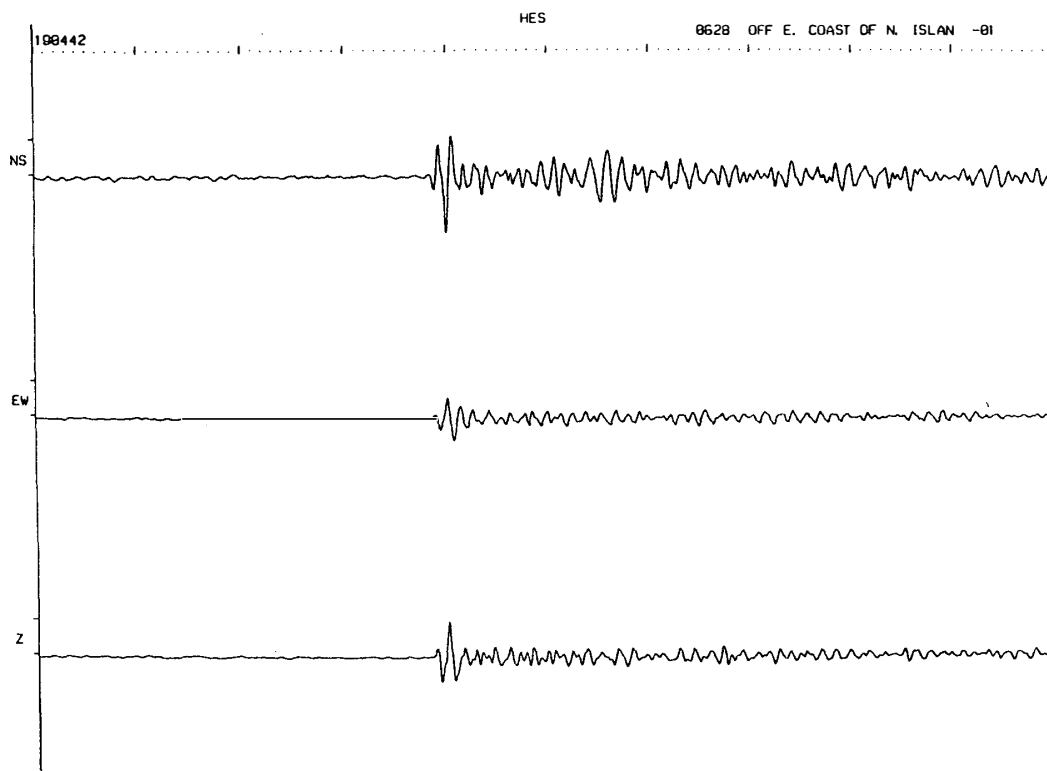
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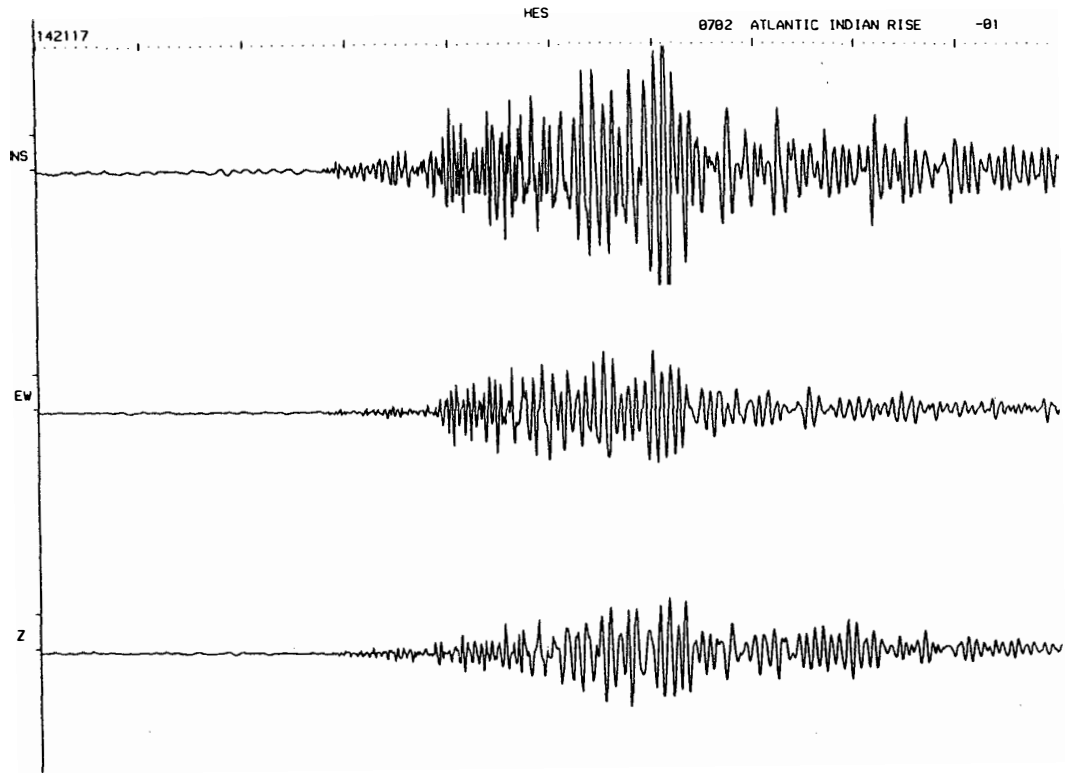
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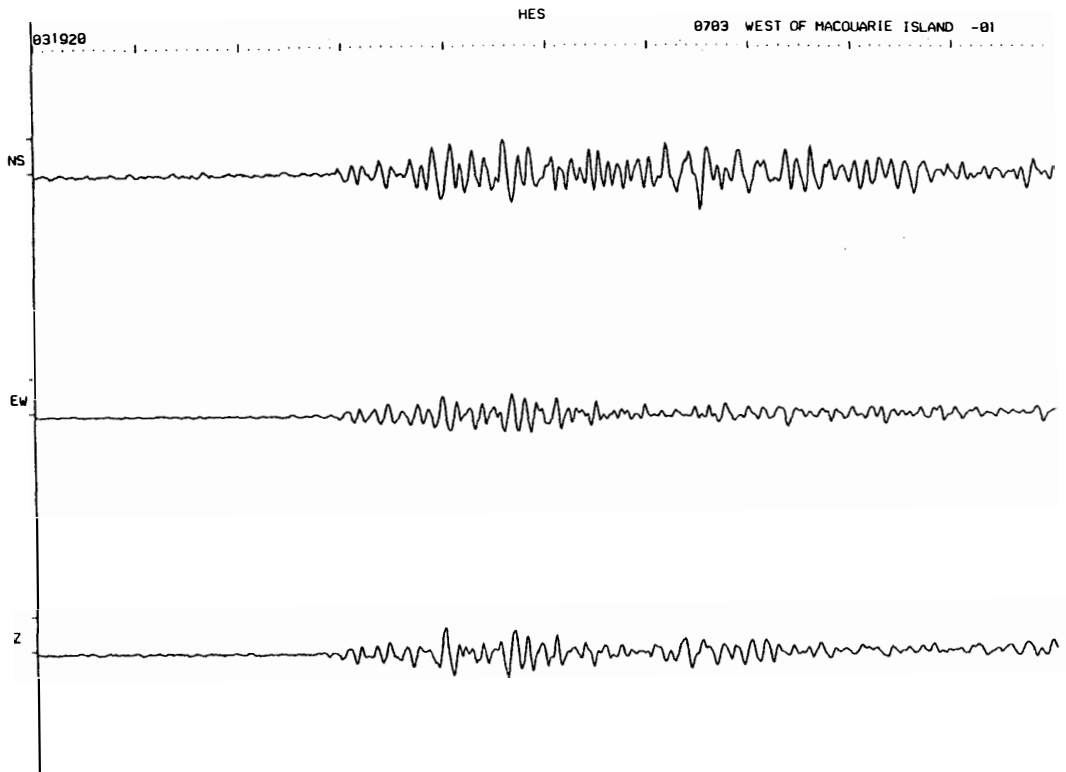
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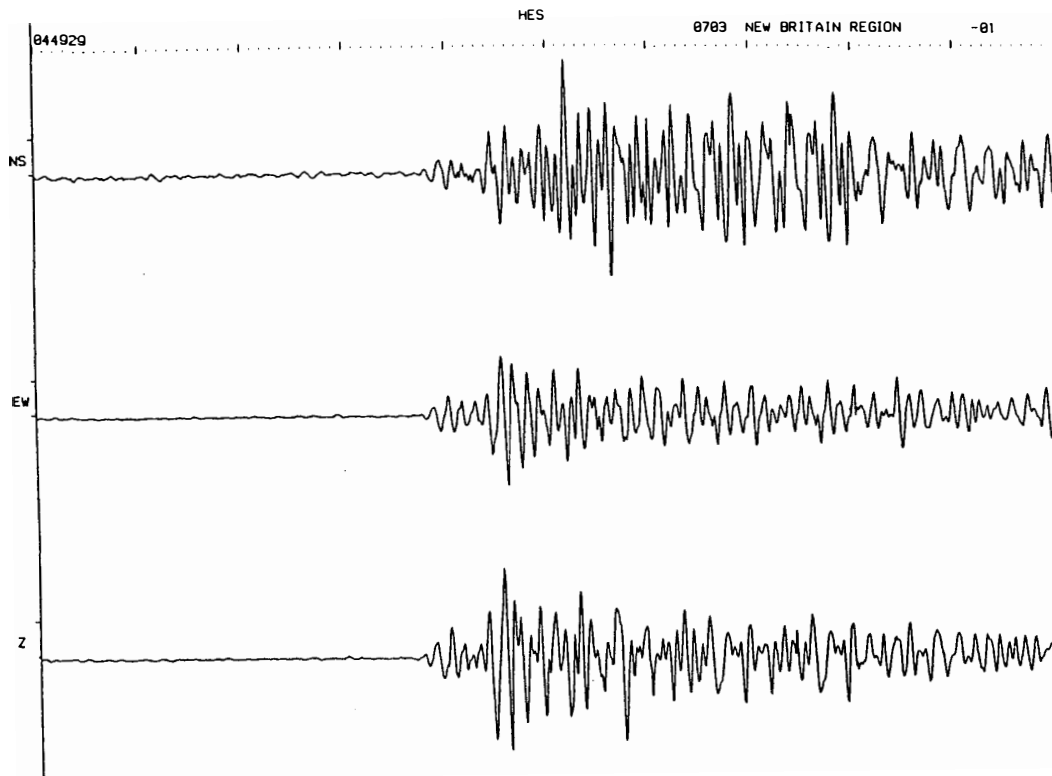
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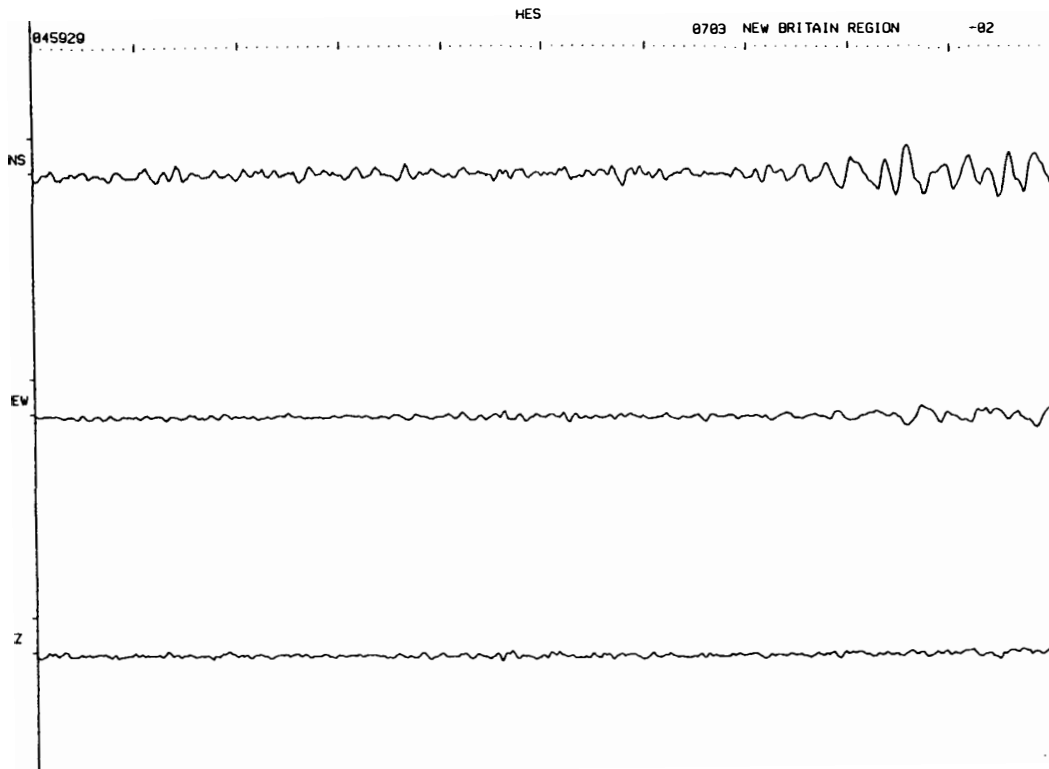
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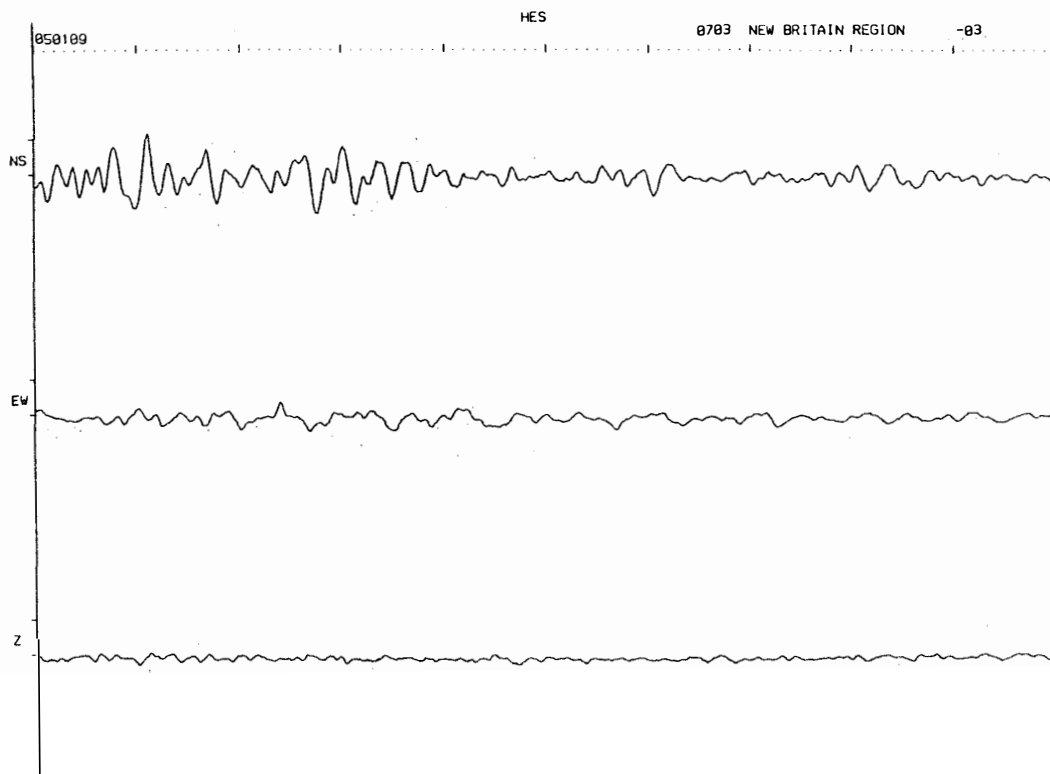
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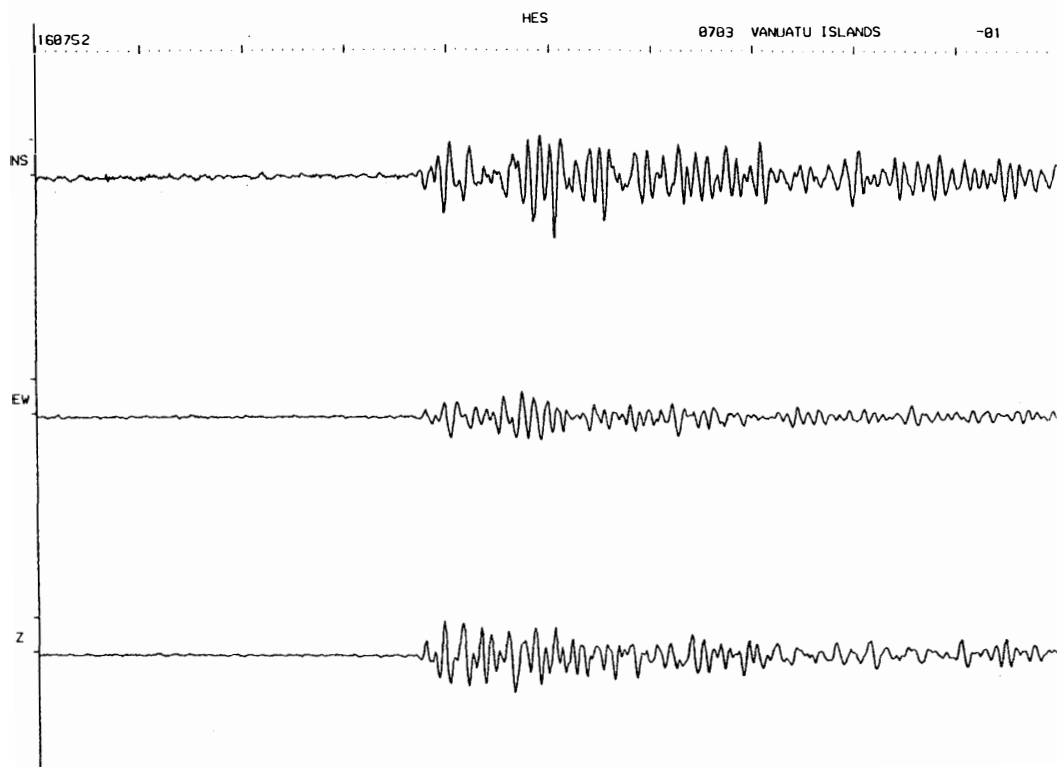
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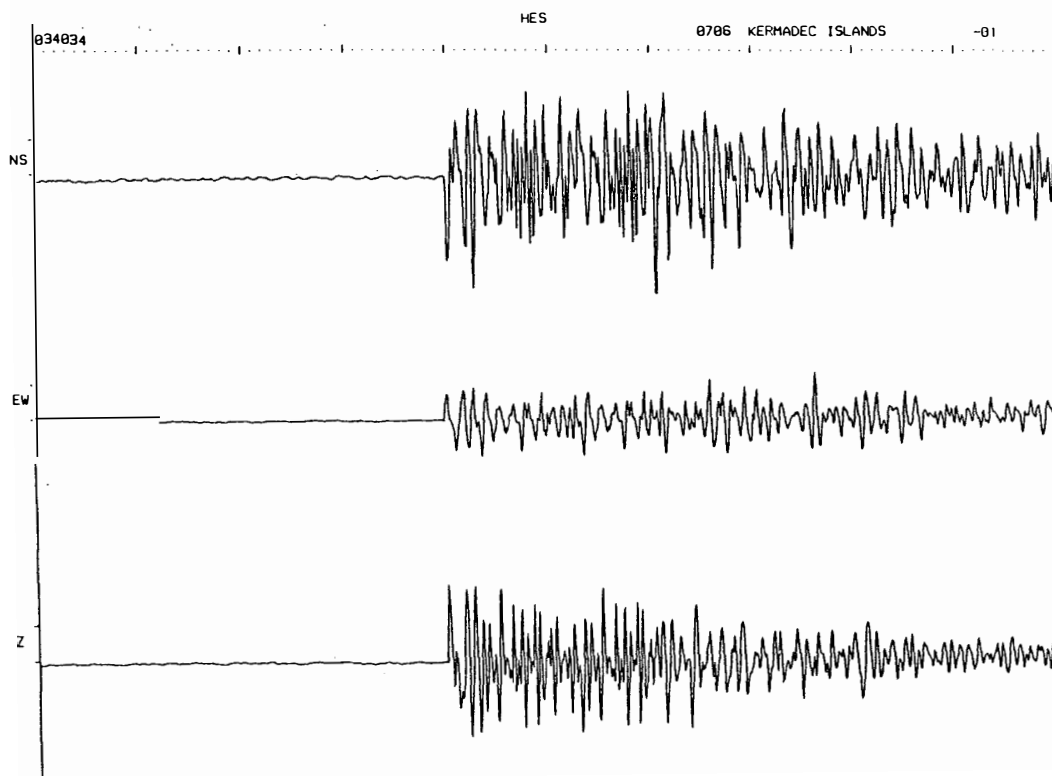
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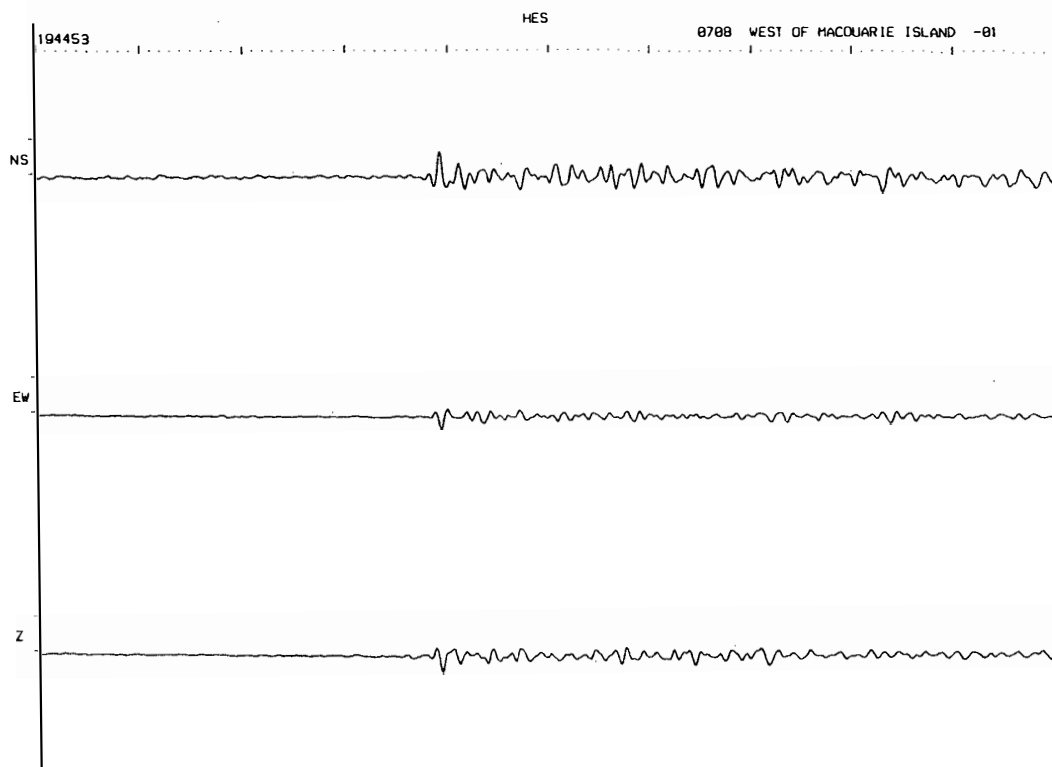
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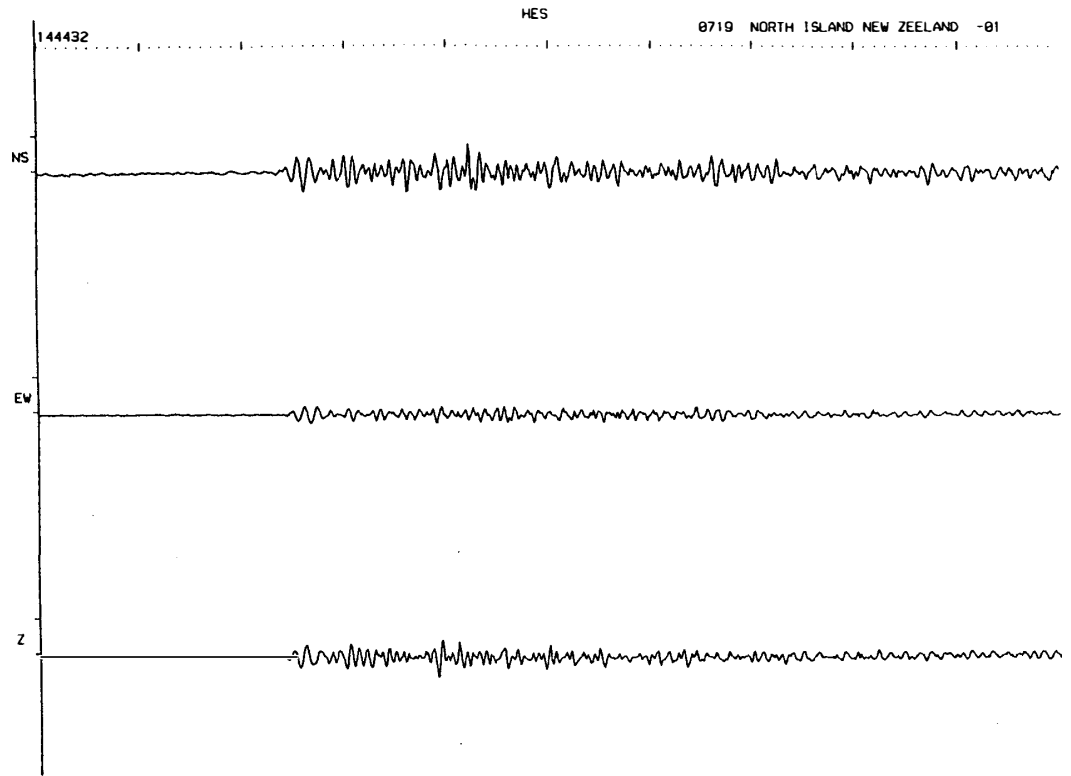
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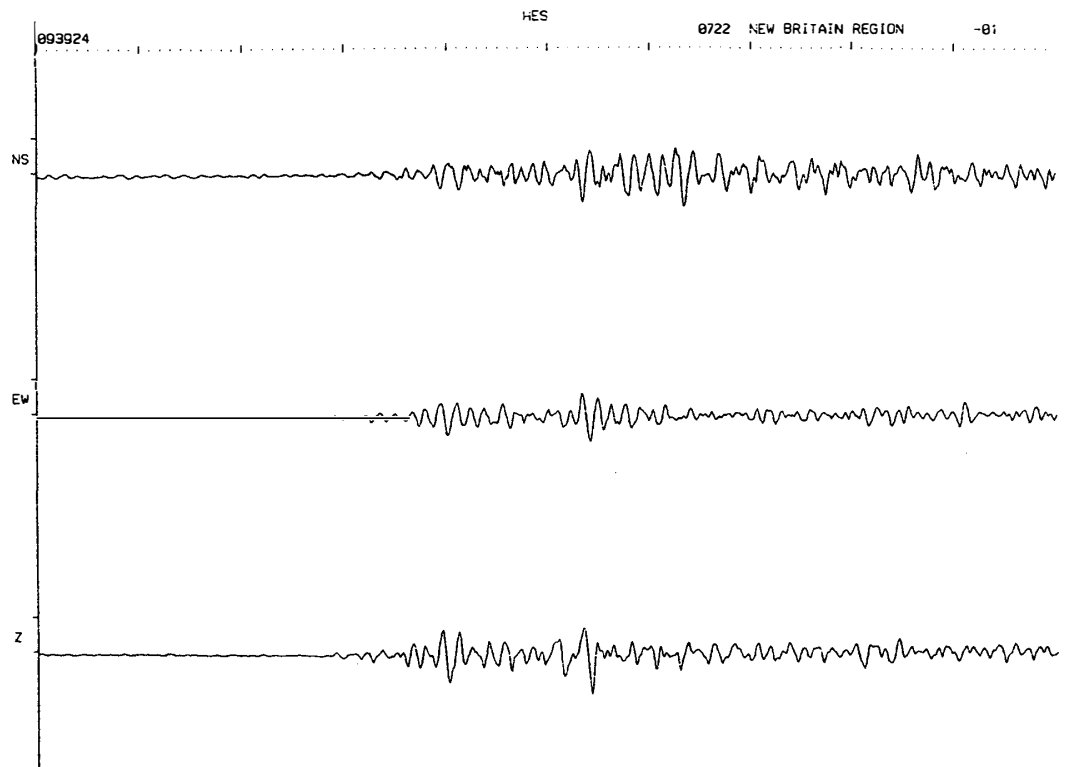
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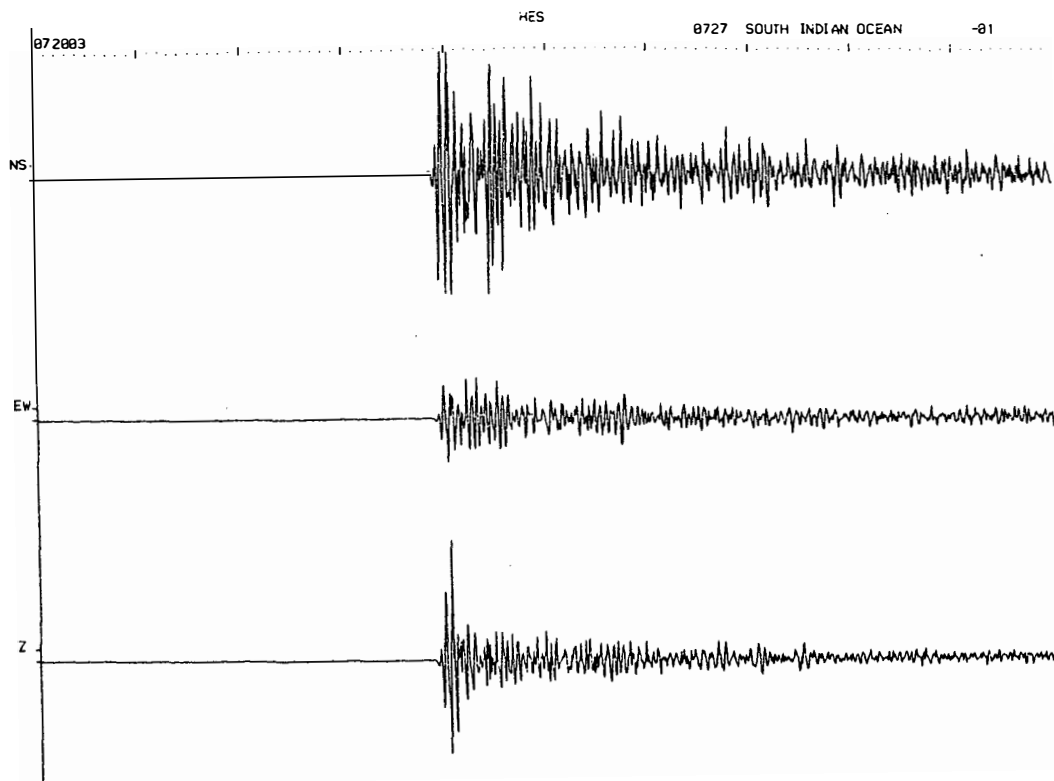
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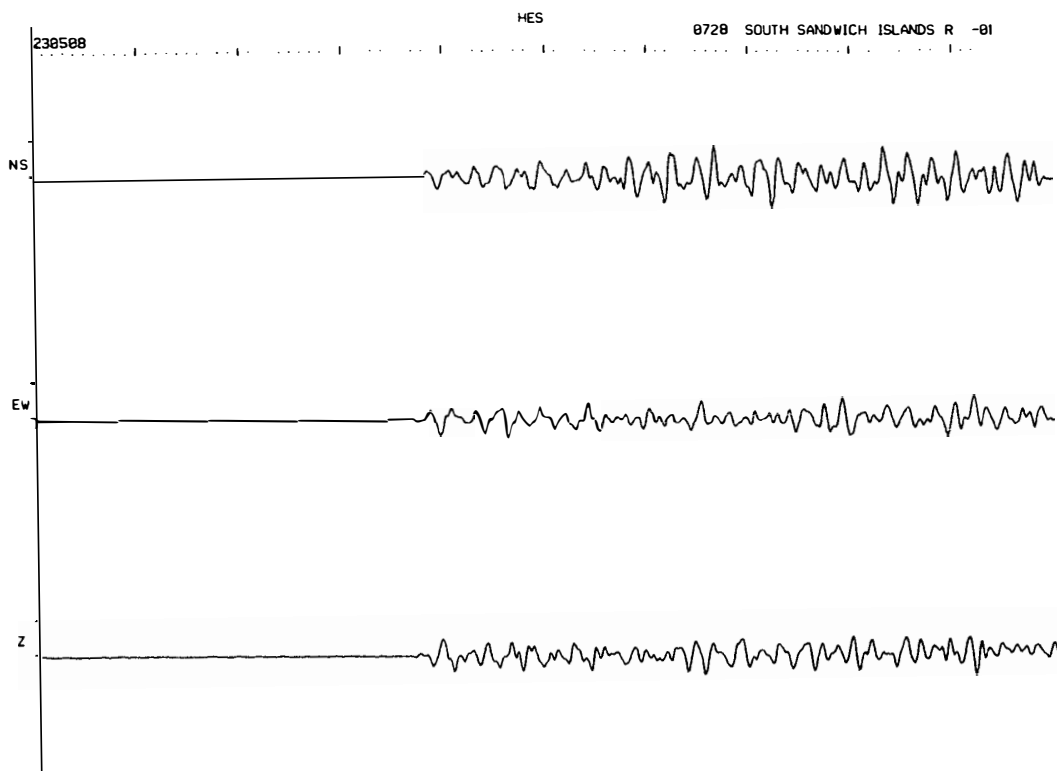
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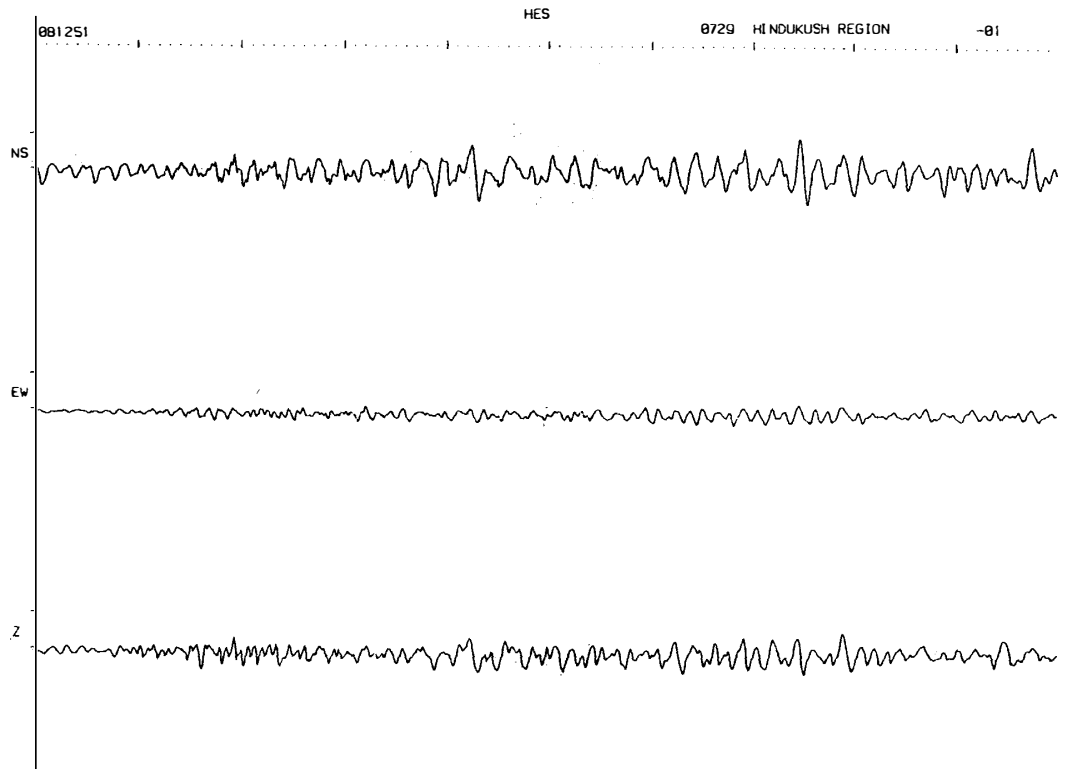
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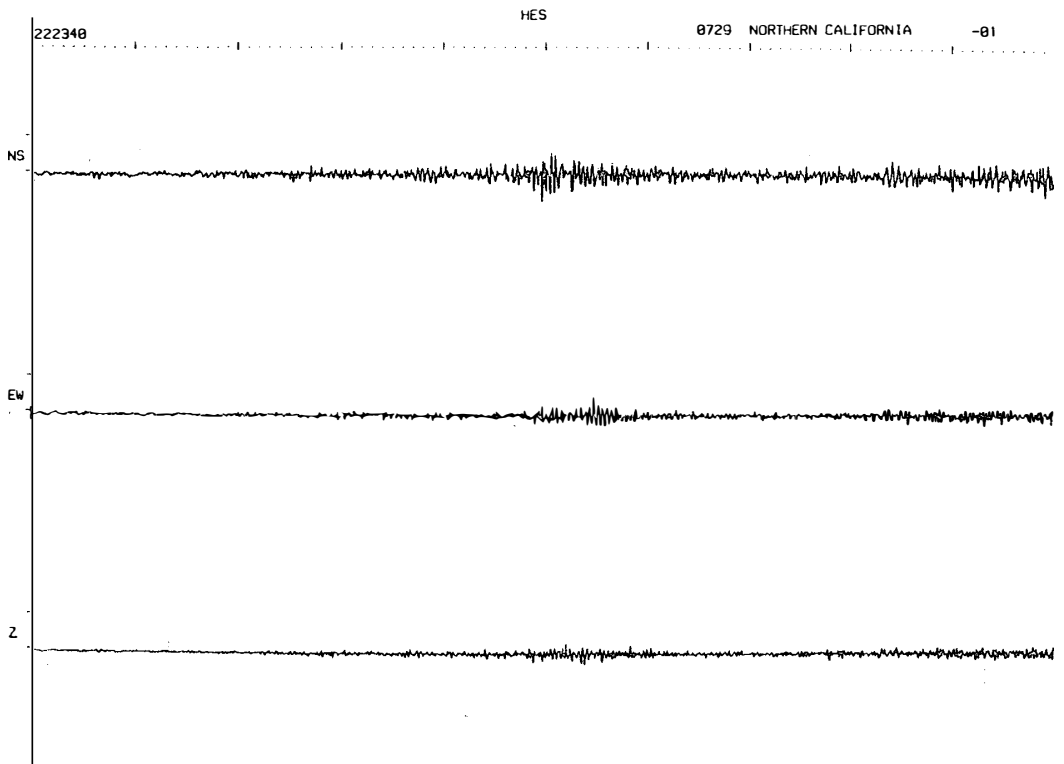
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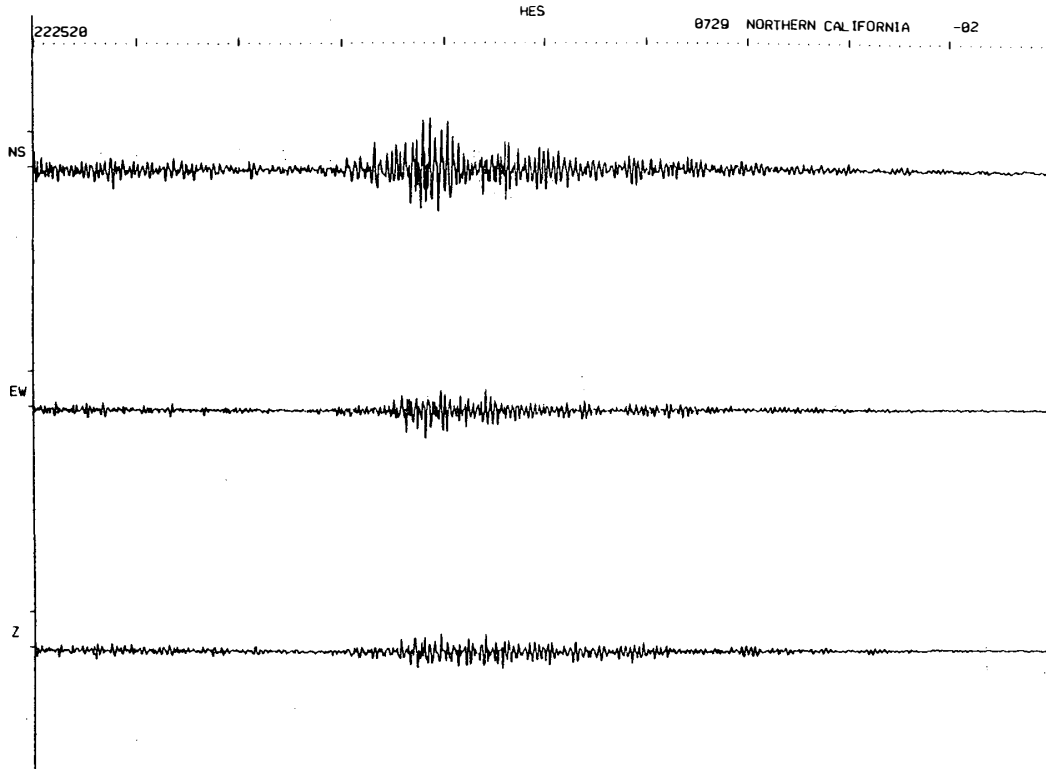
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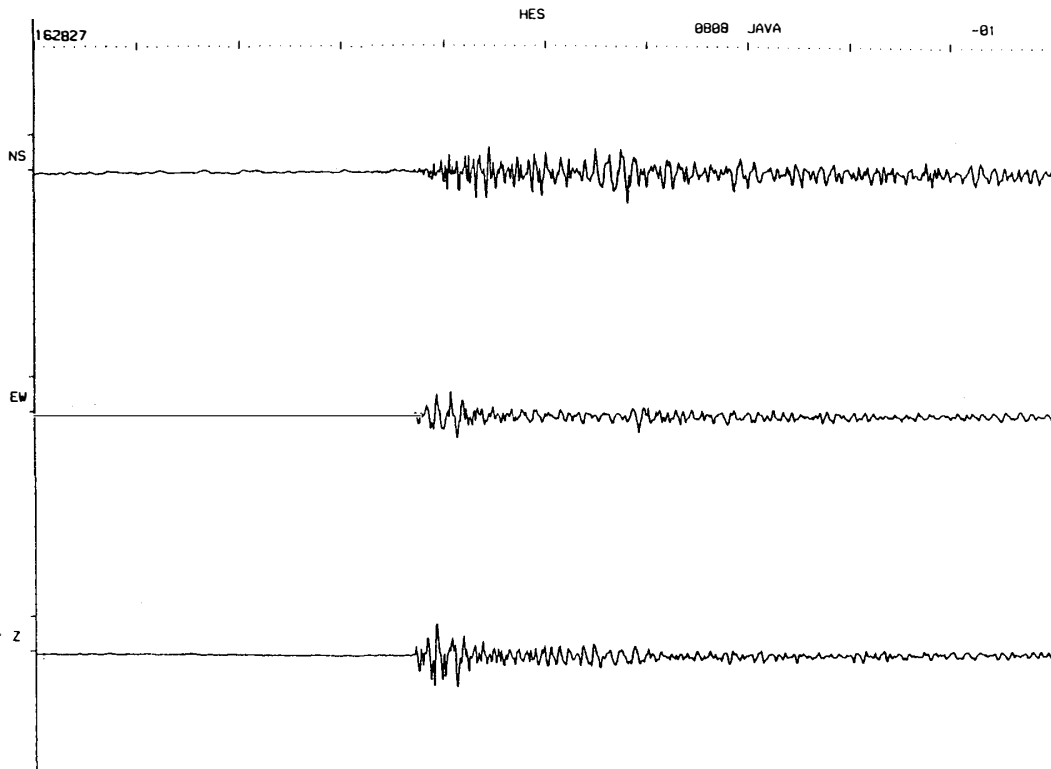
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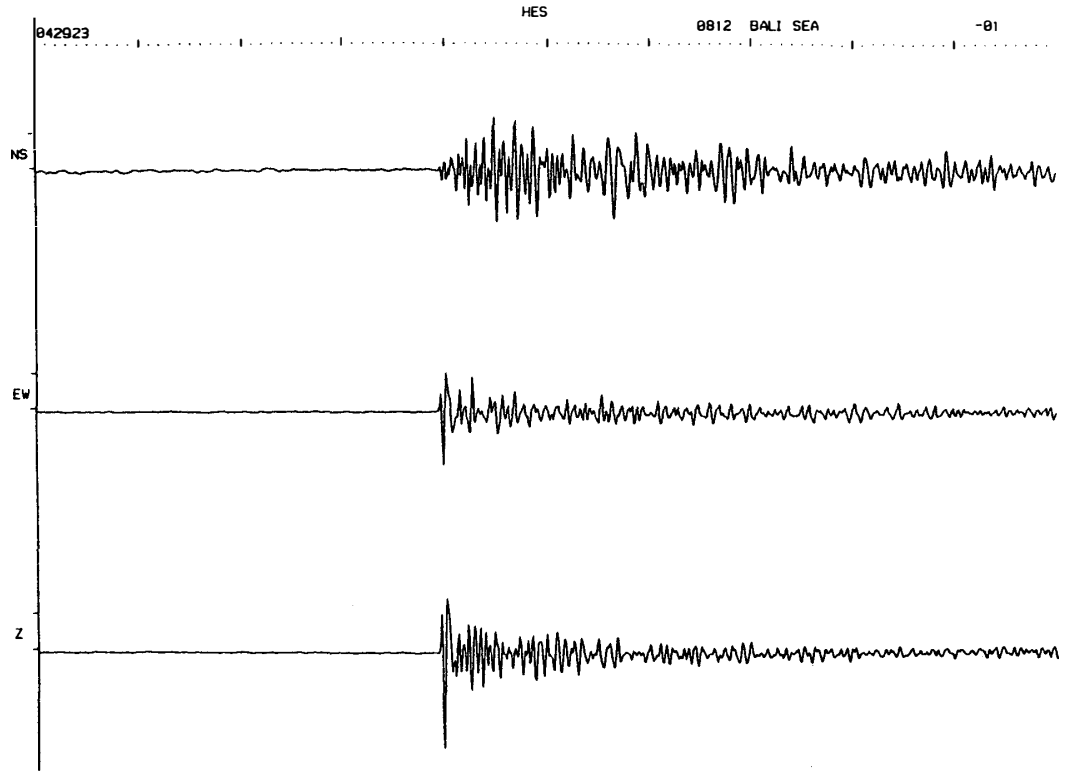
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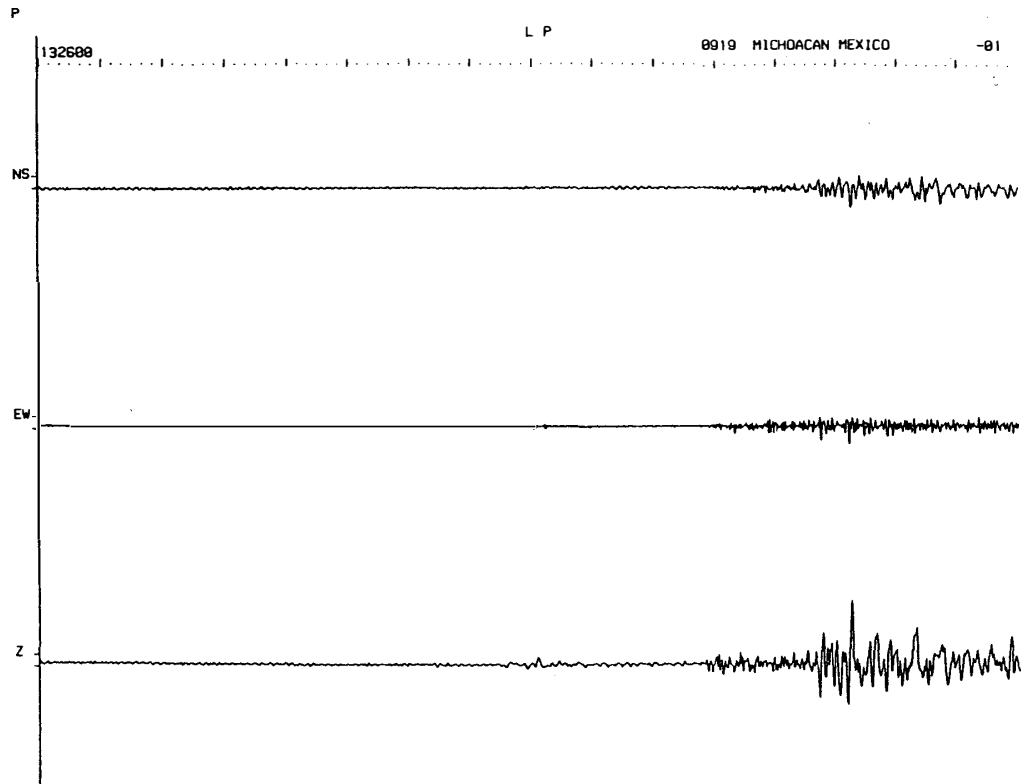
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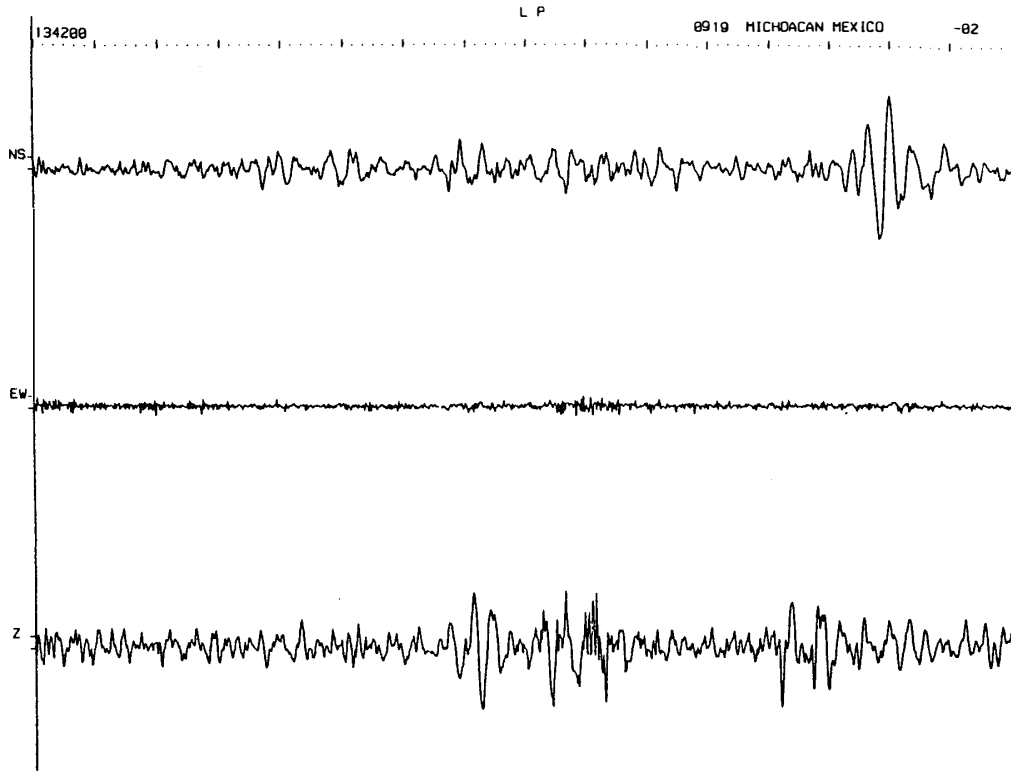
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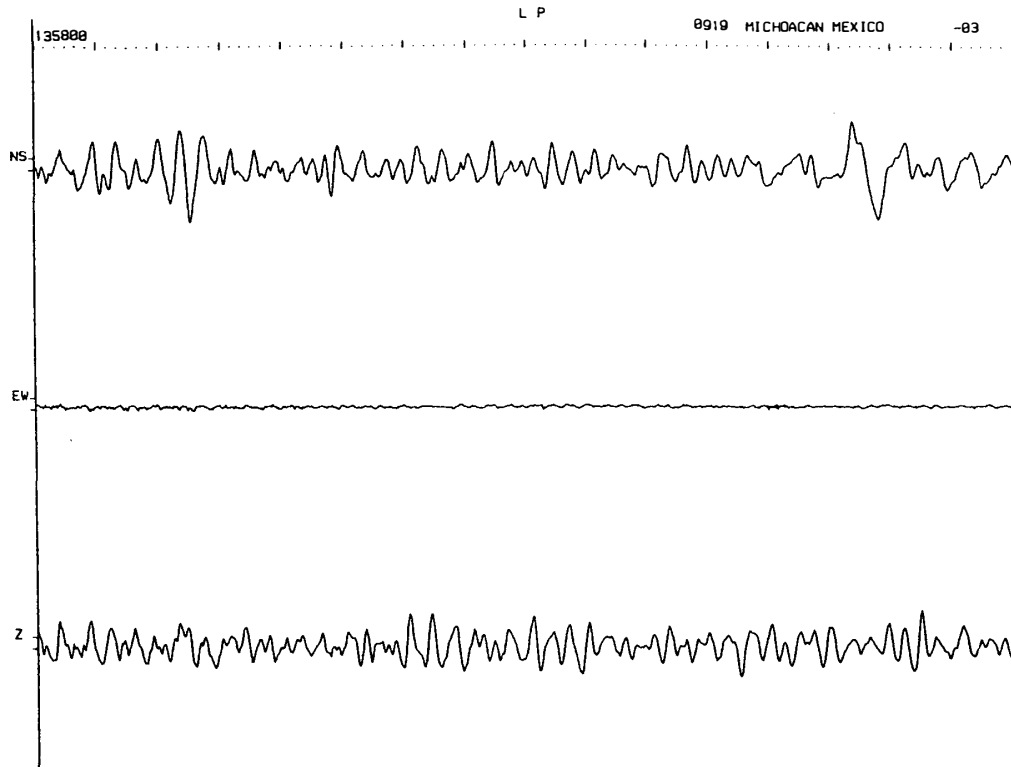
NO.48 -1



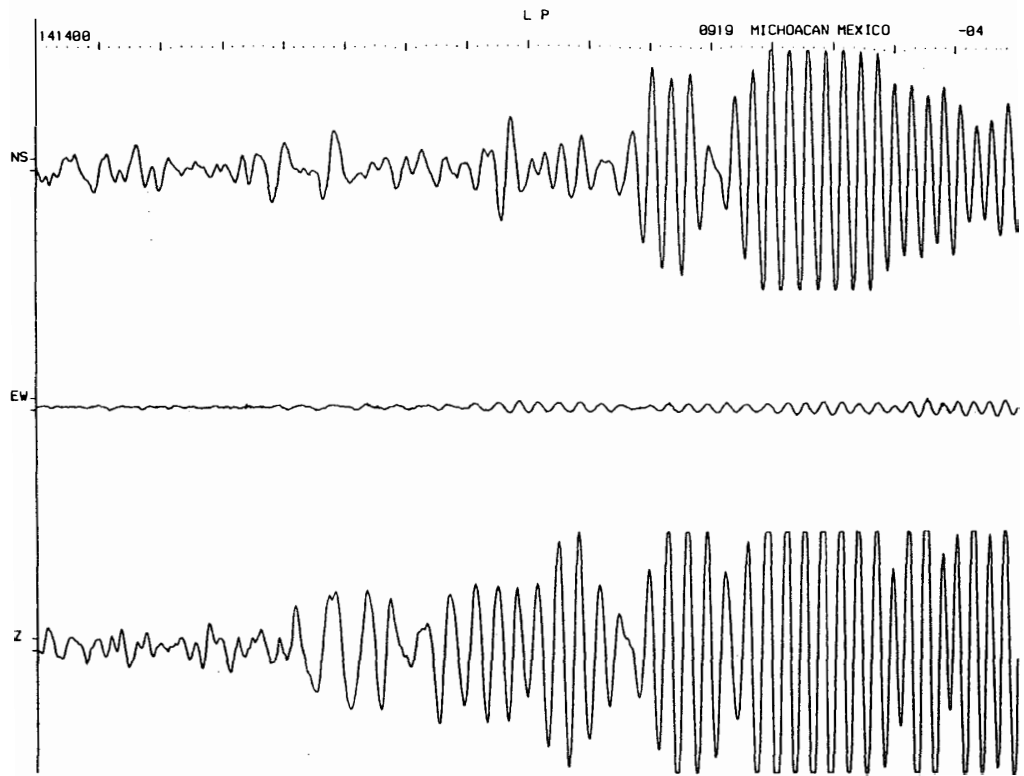
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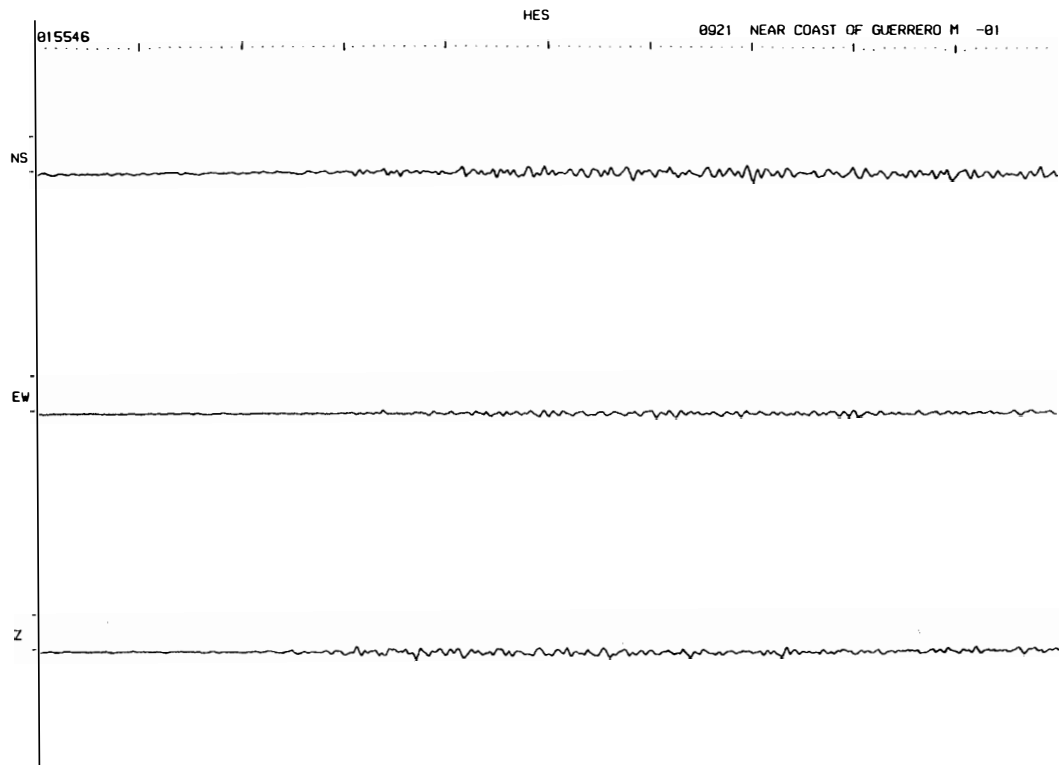
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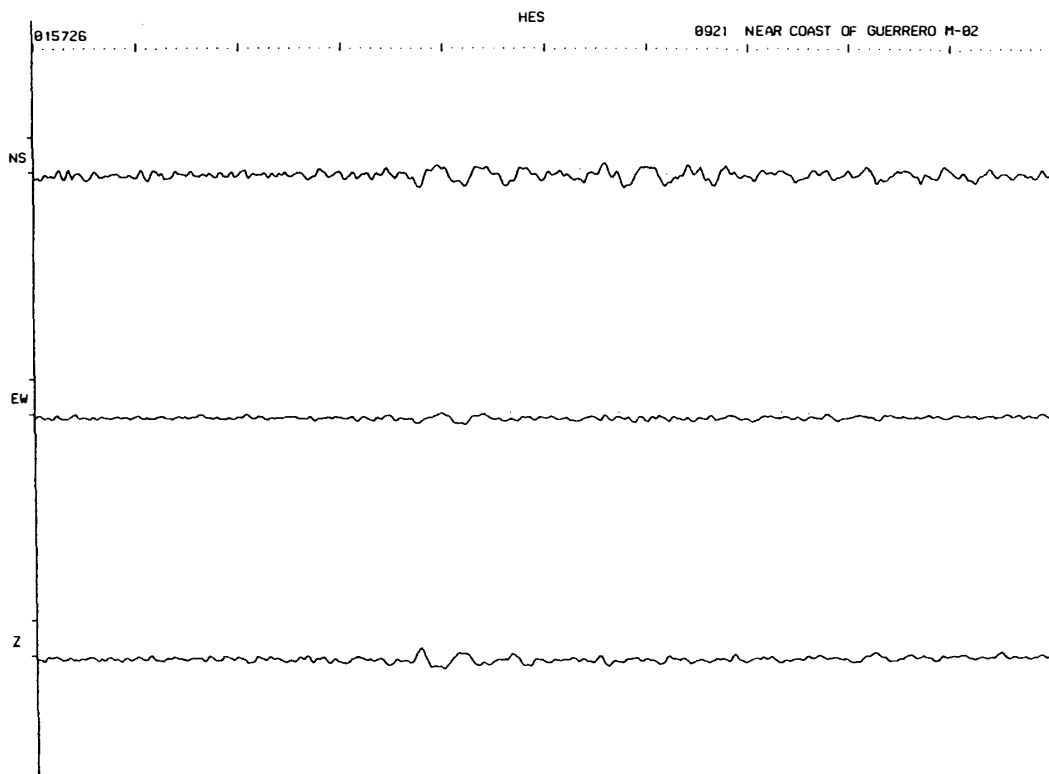
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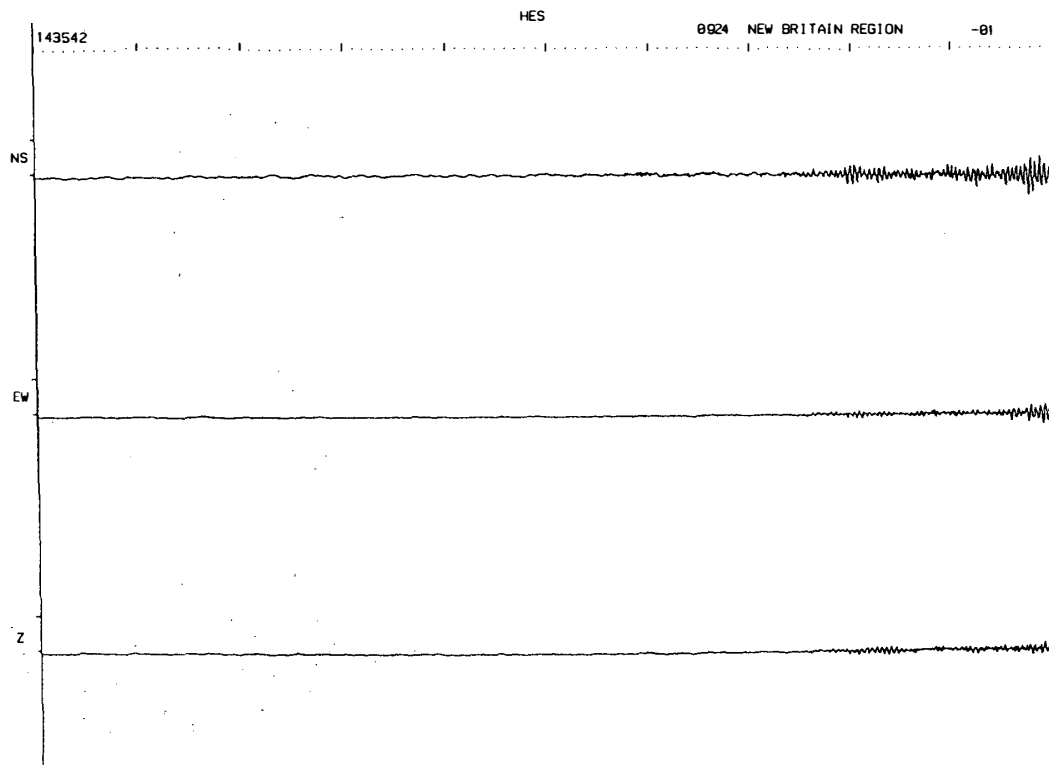
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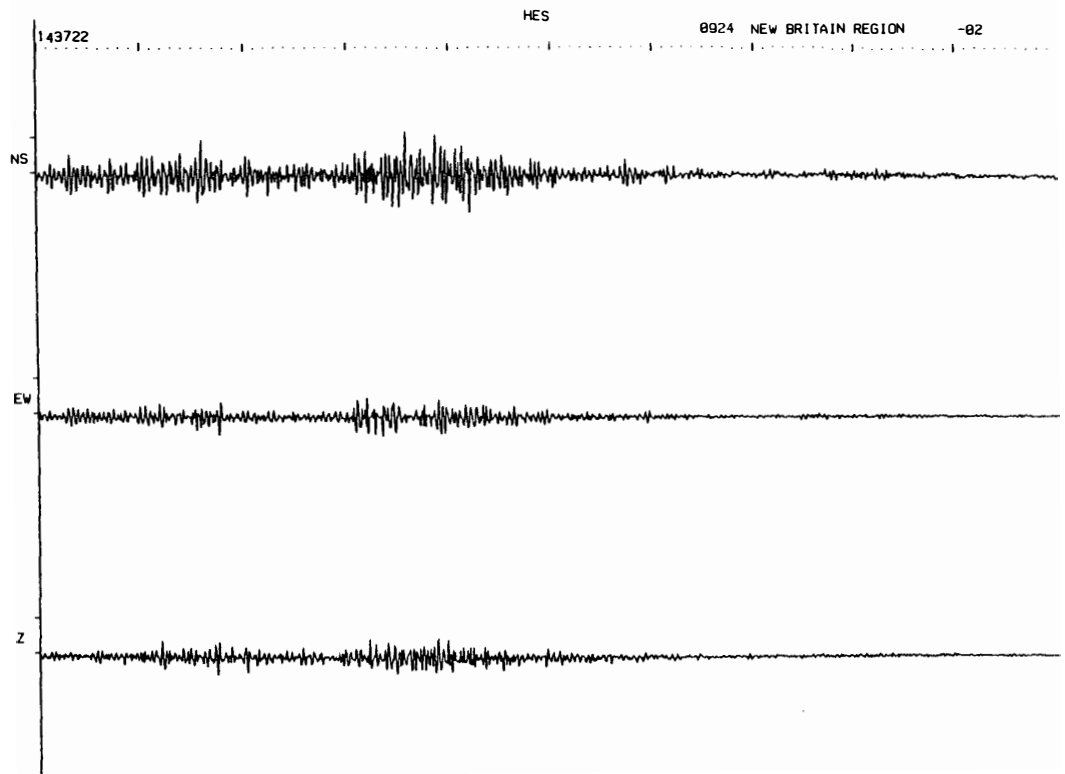
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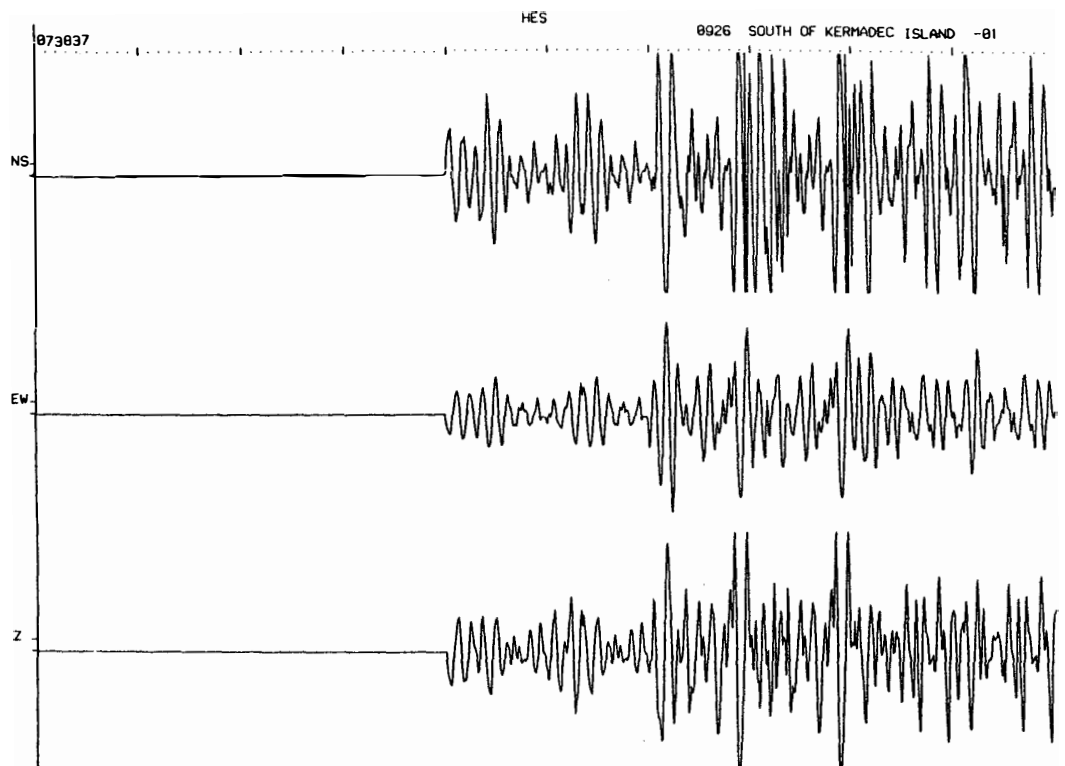
NO.50 -1



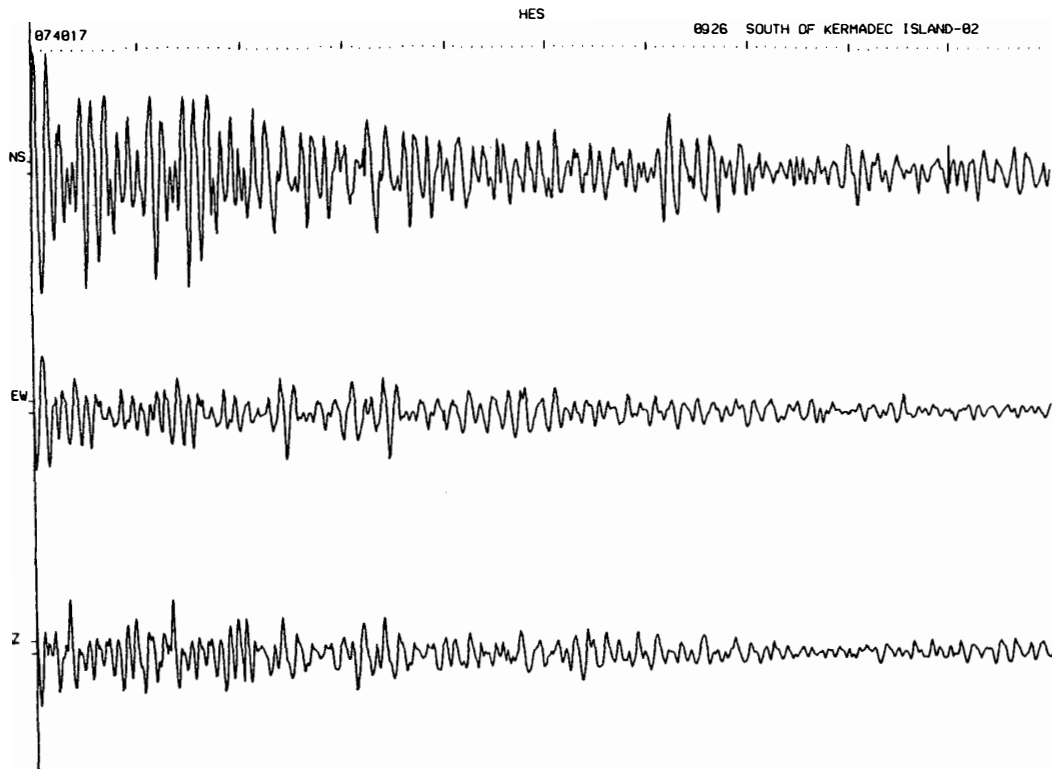
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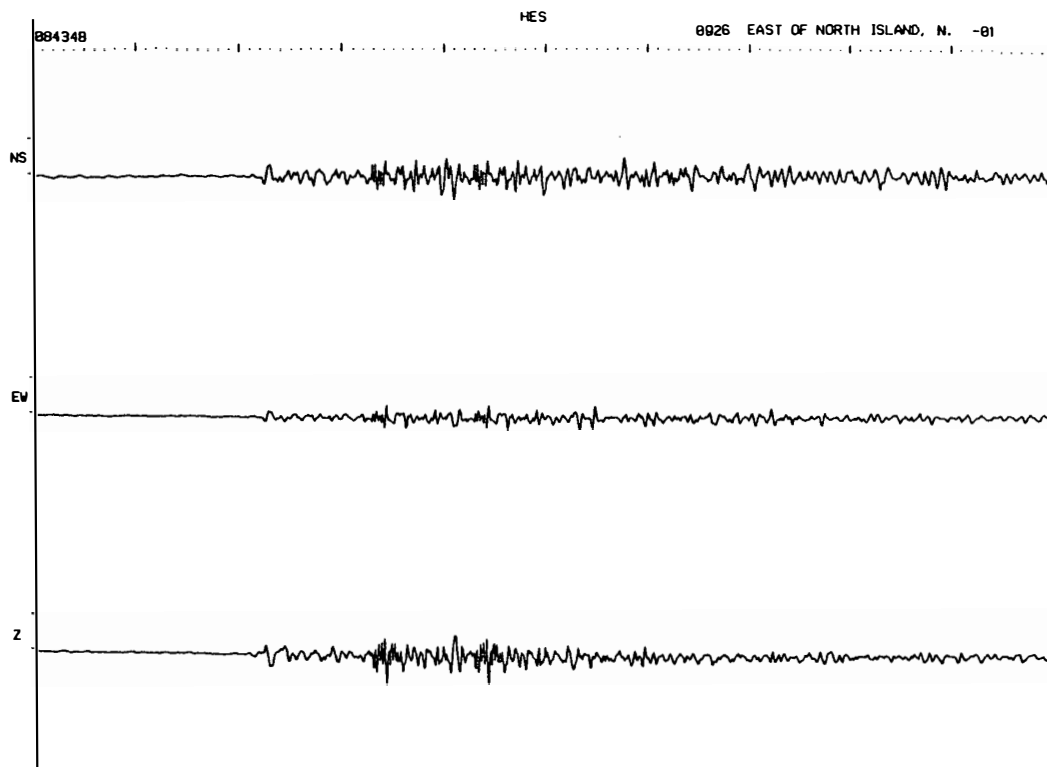
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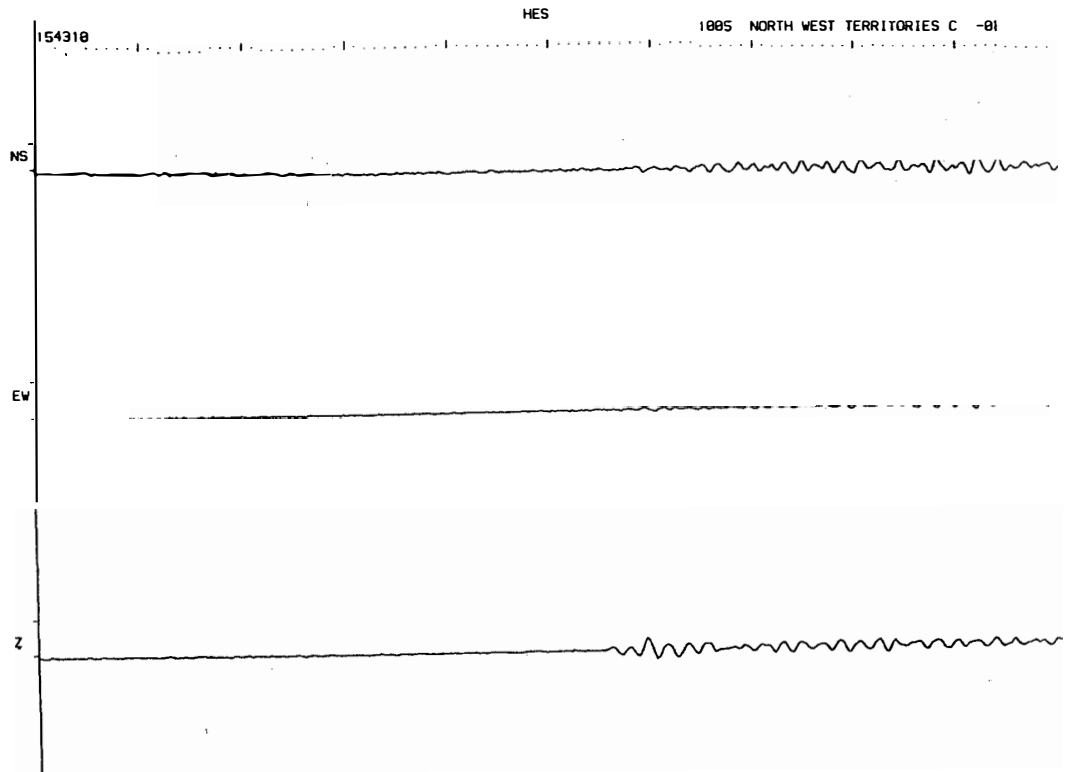
NO.51 -2



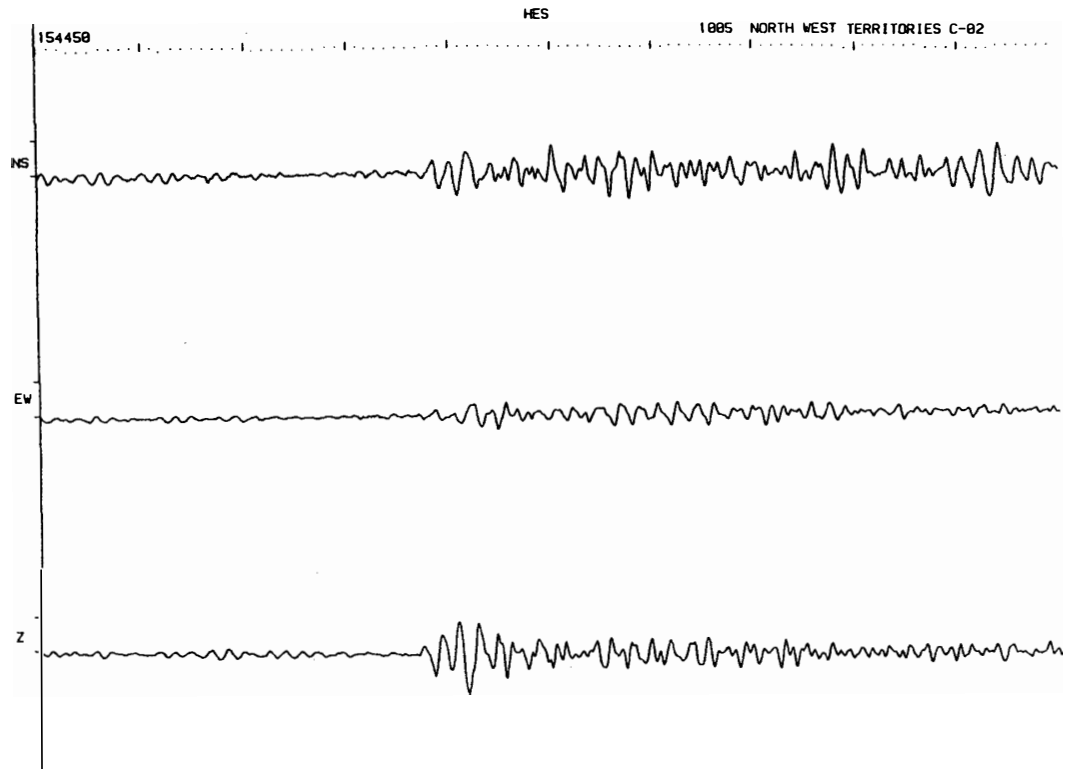
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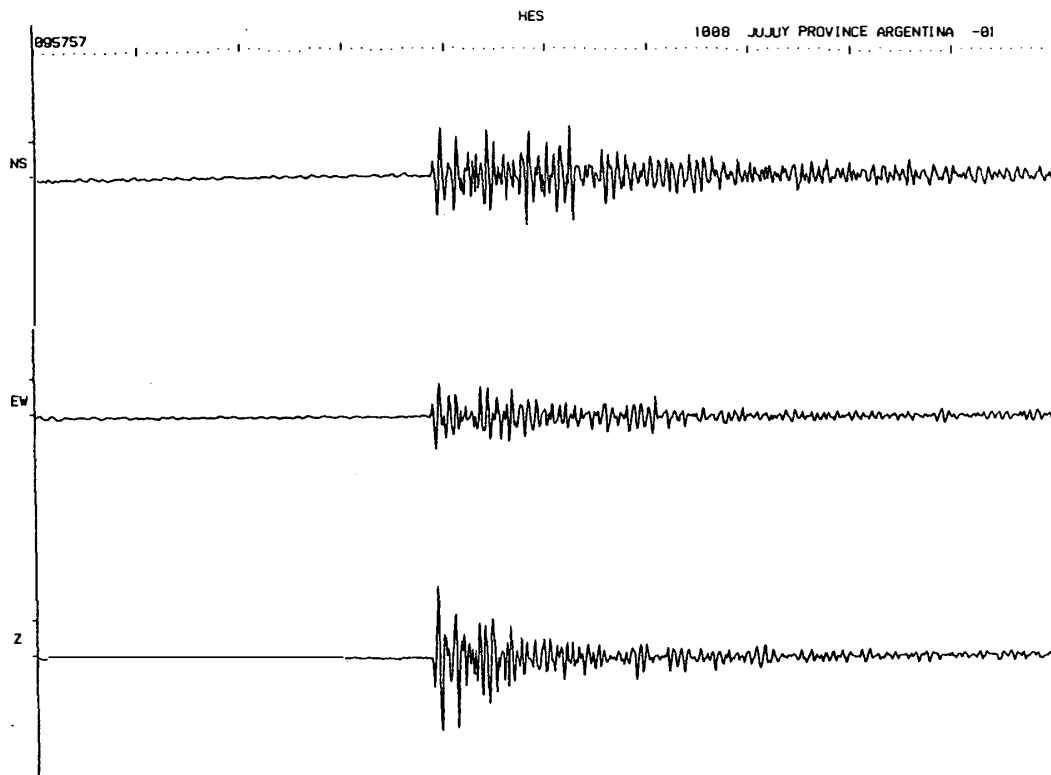
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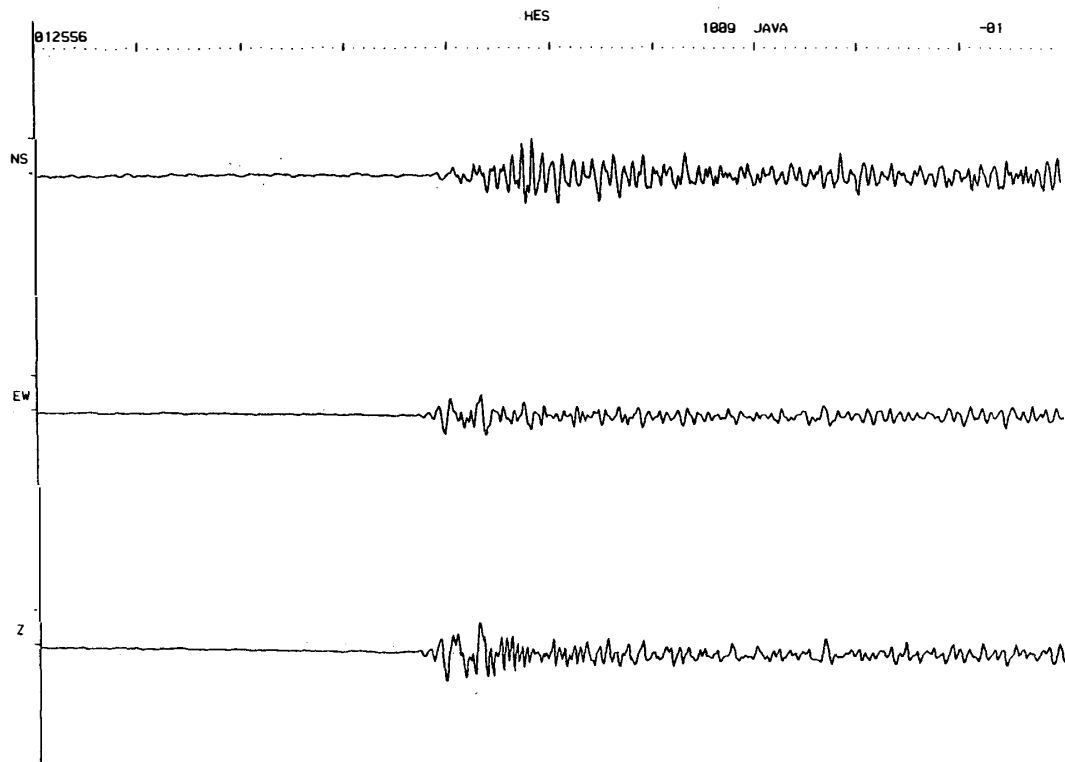
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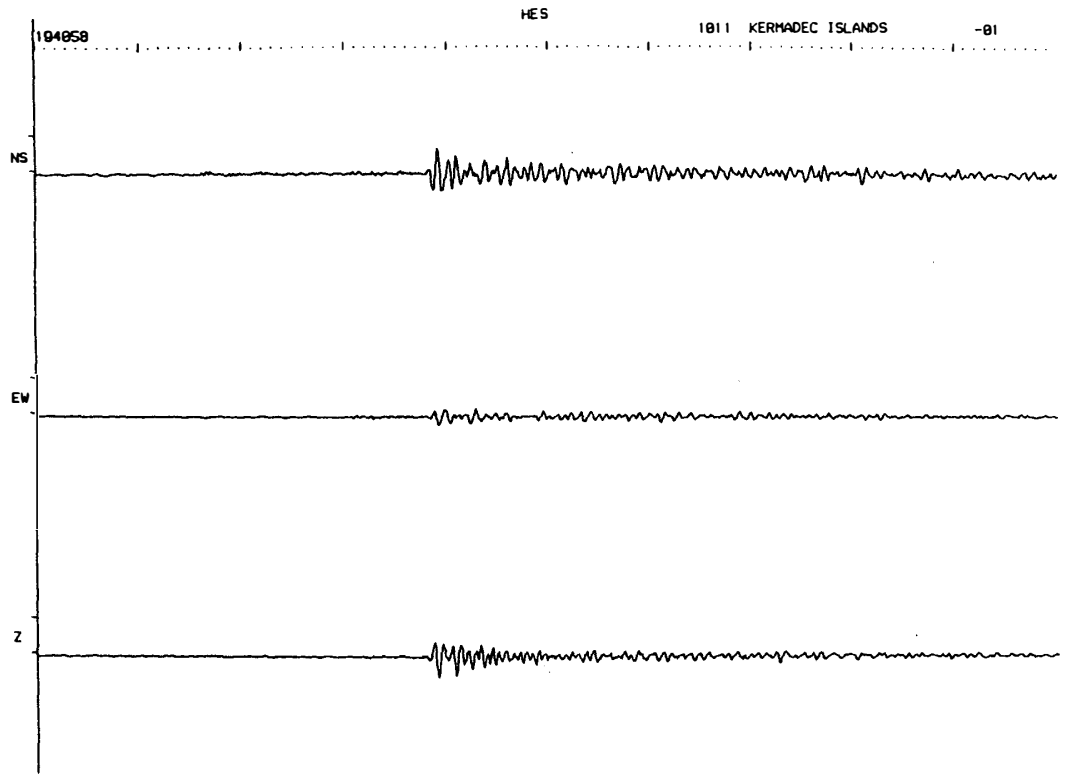
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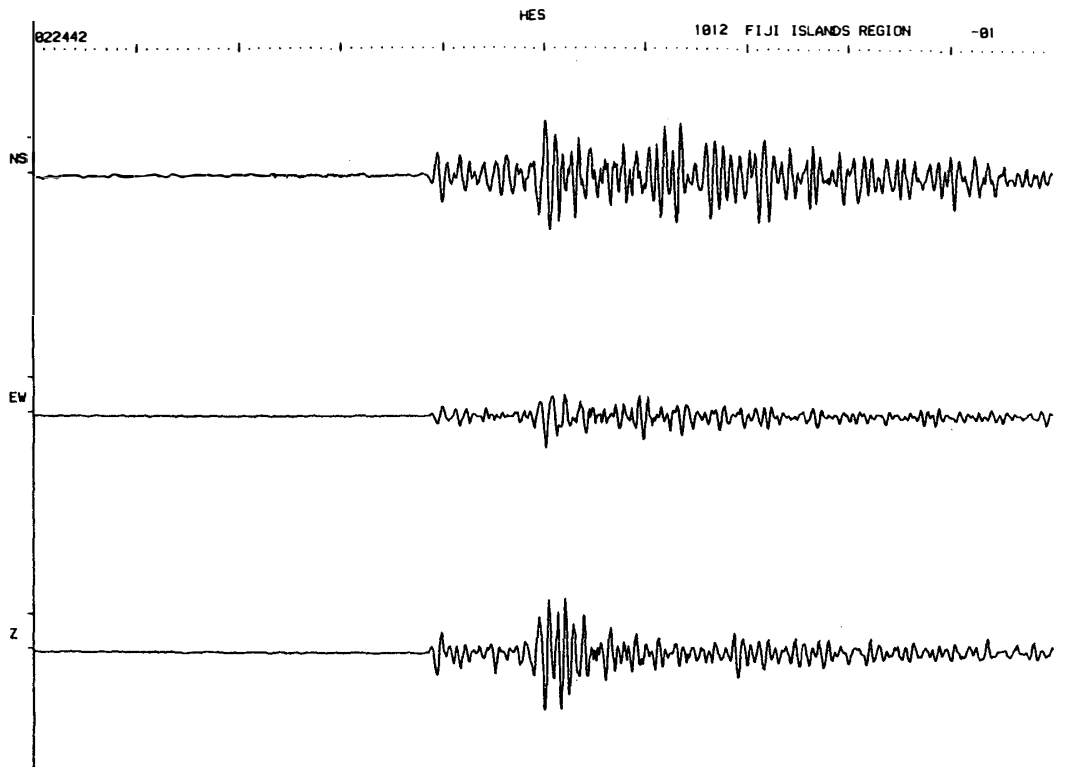
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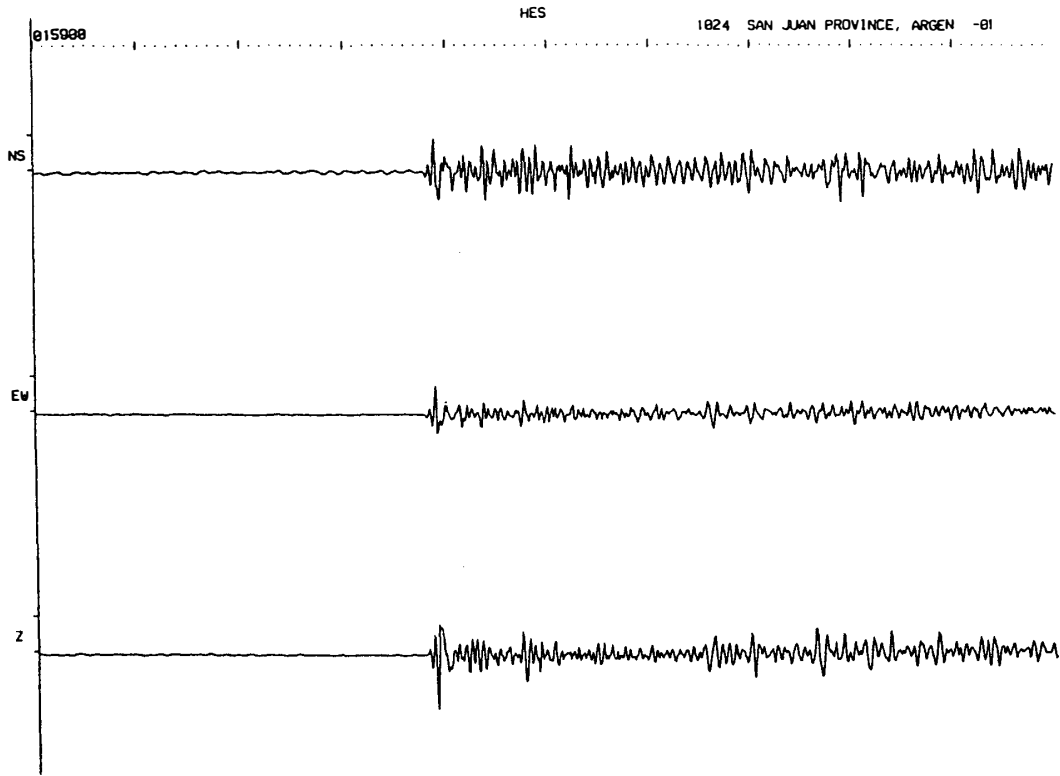
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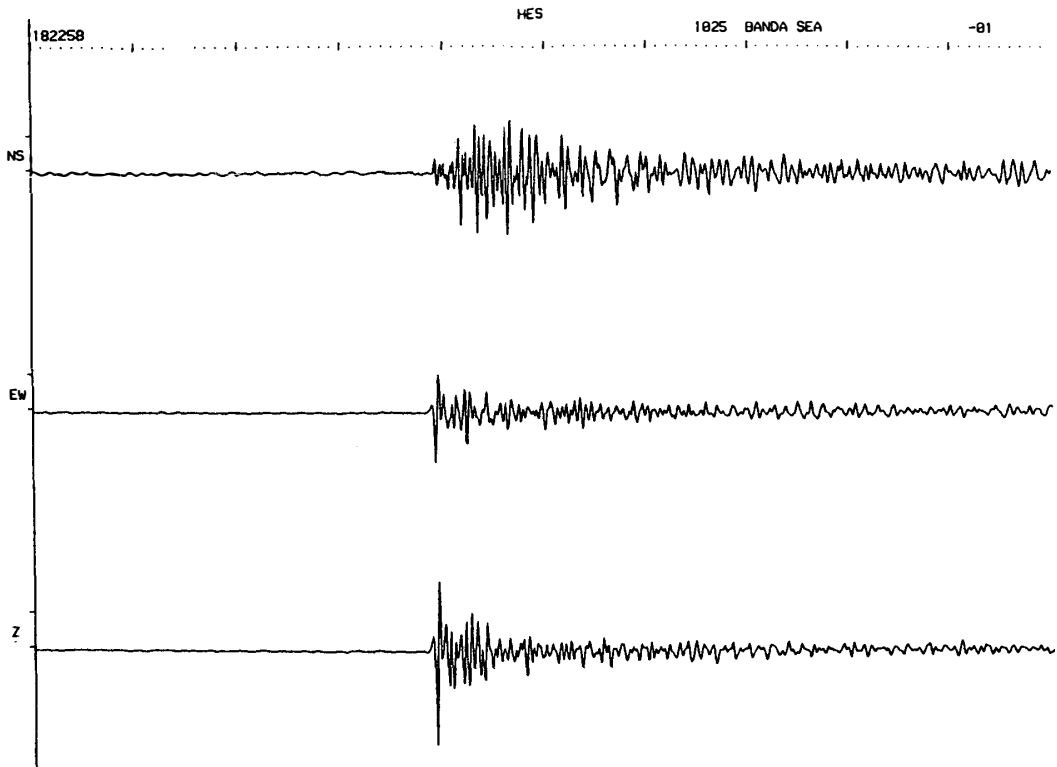
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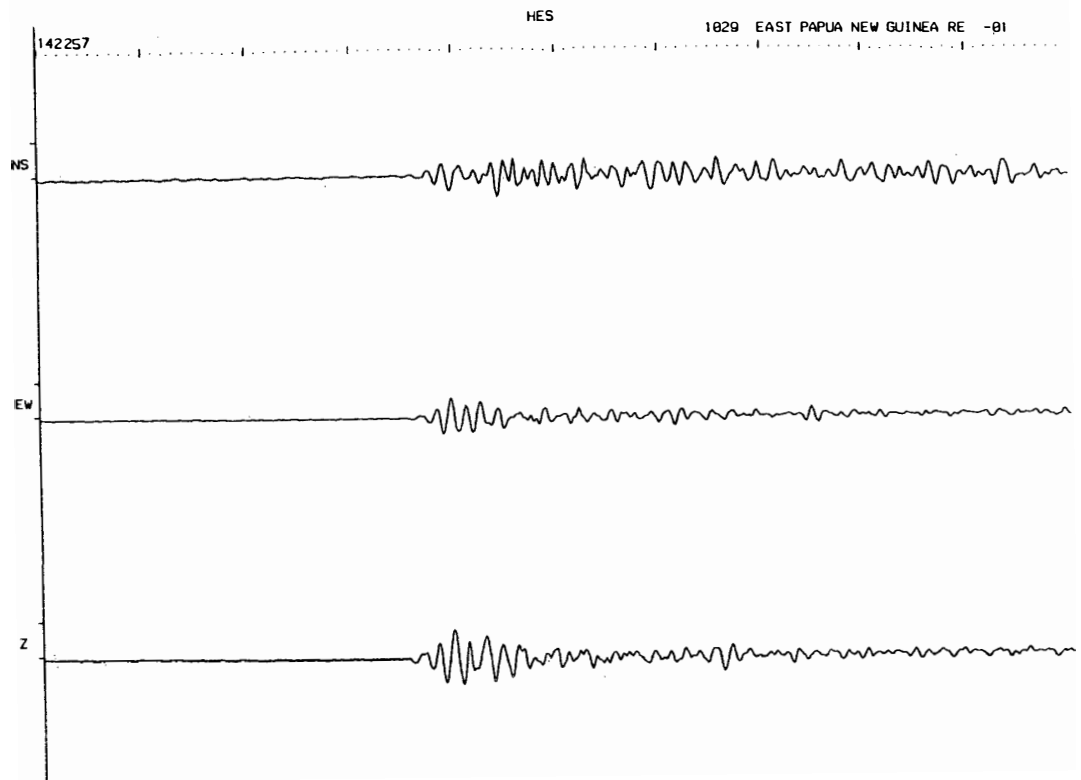
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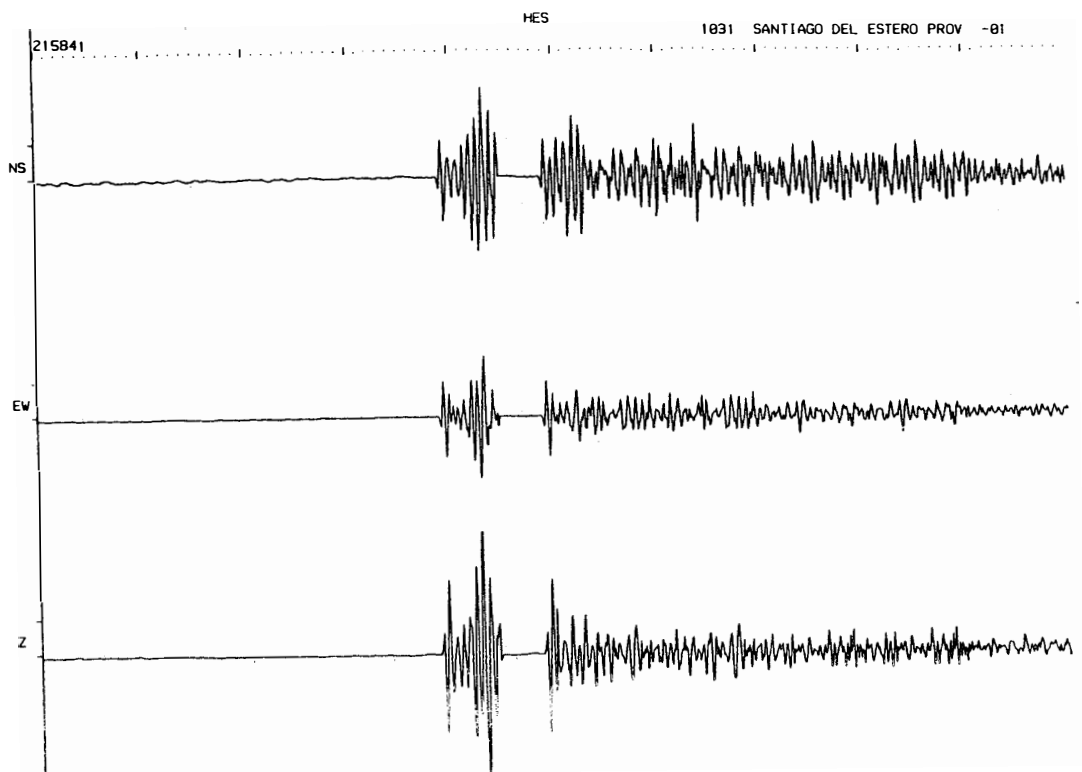
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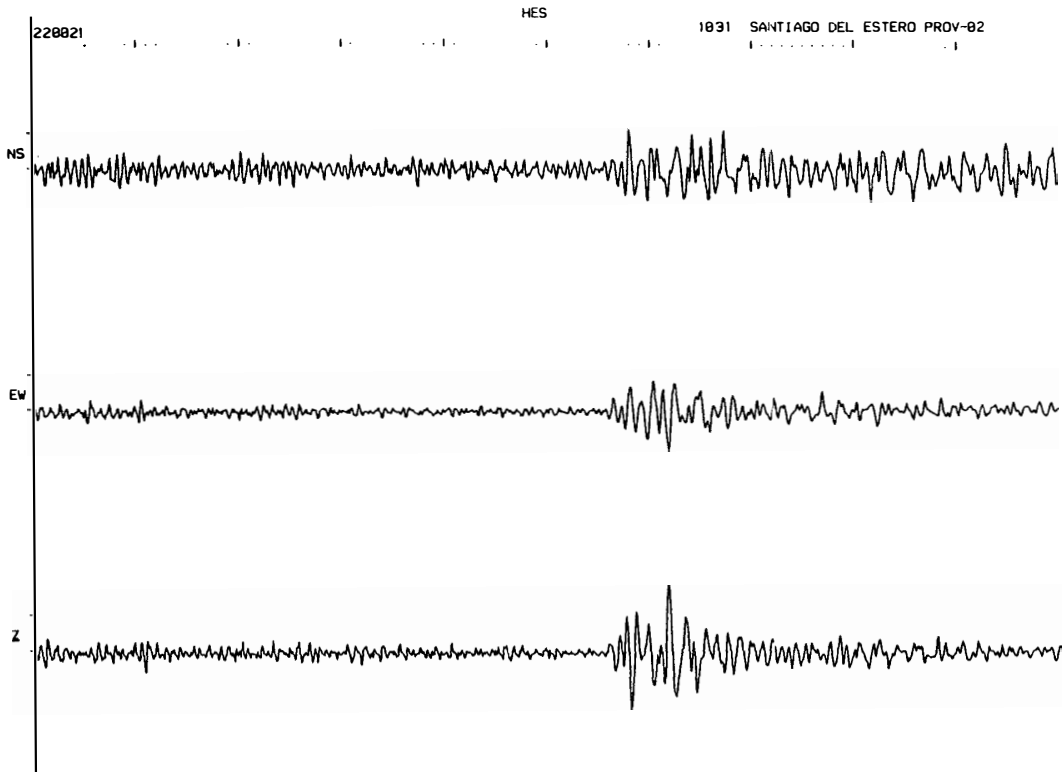
NO.60



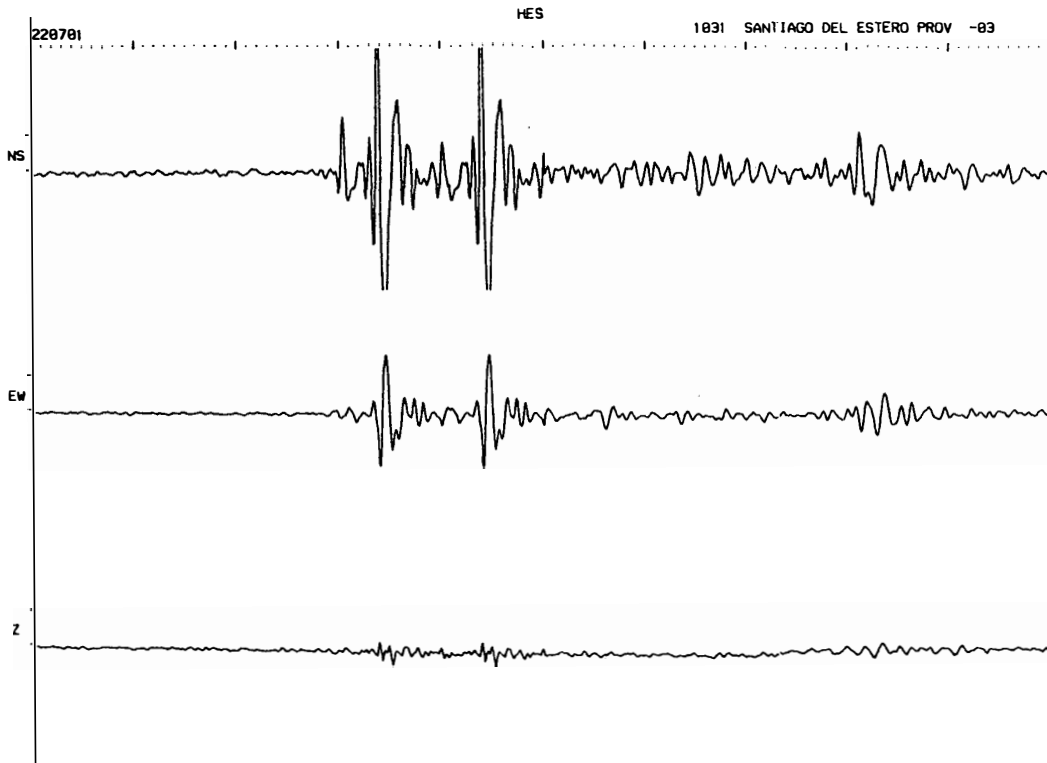
NO.61-1



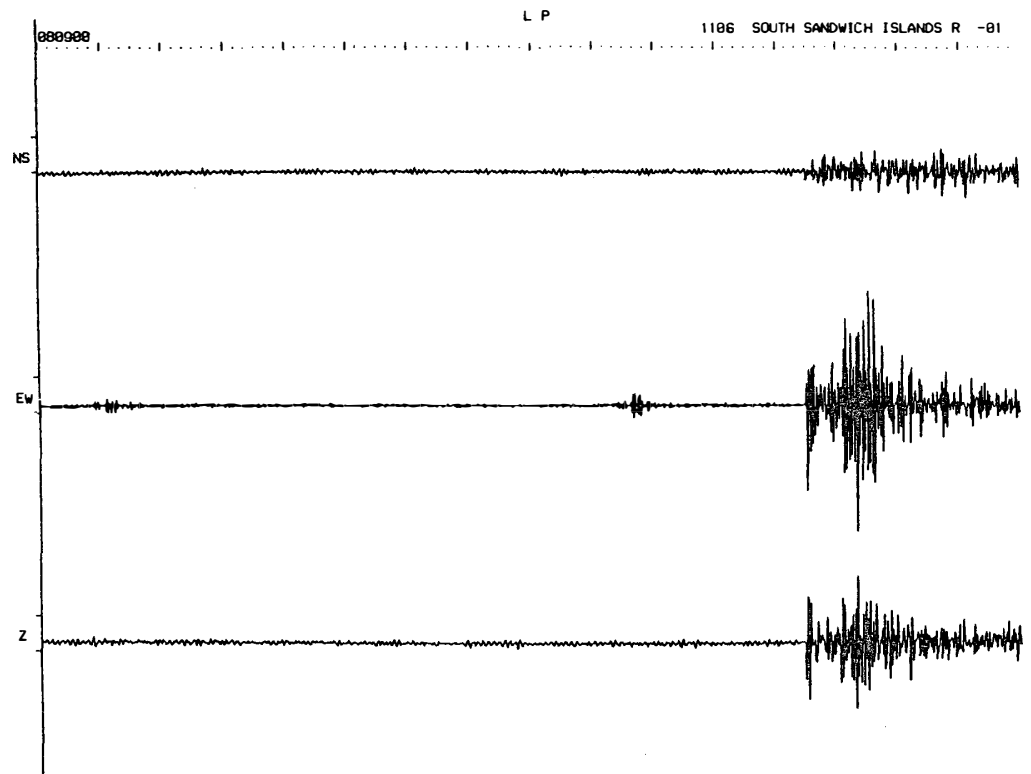
NO.61-2



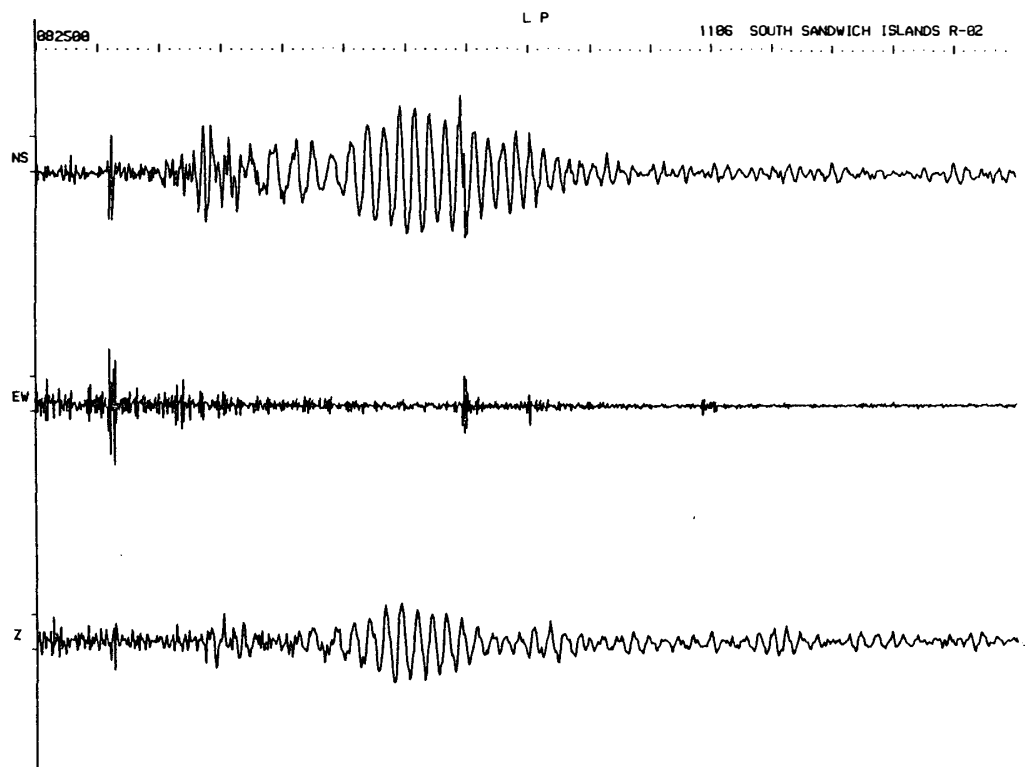
NO.61-3



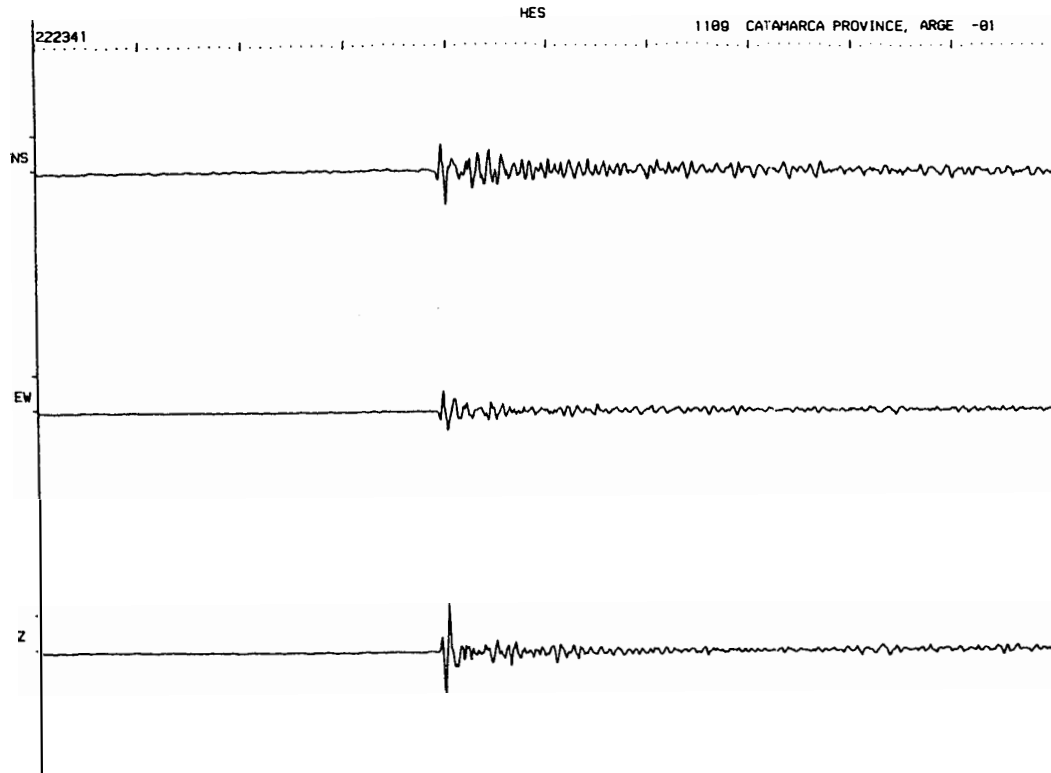
NO.62-1



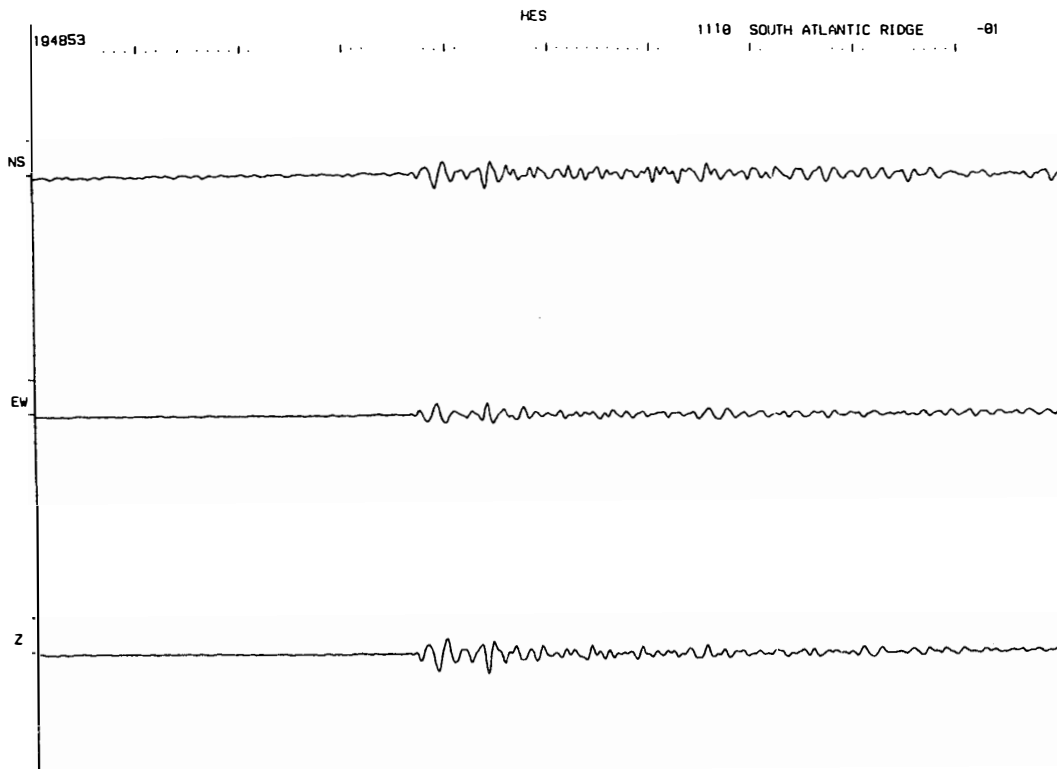
NO.62-2



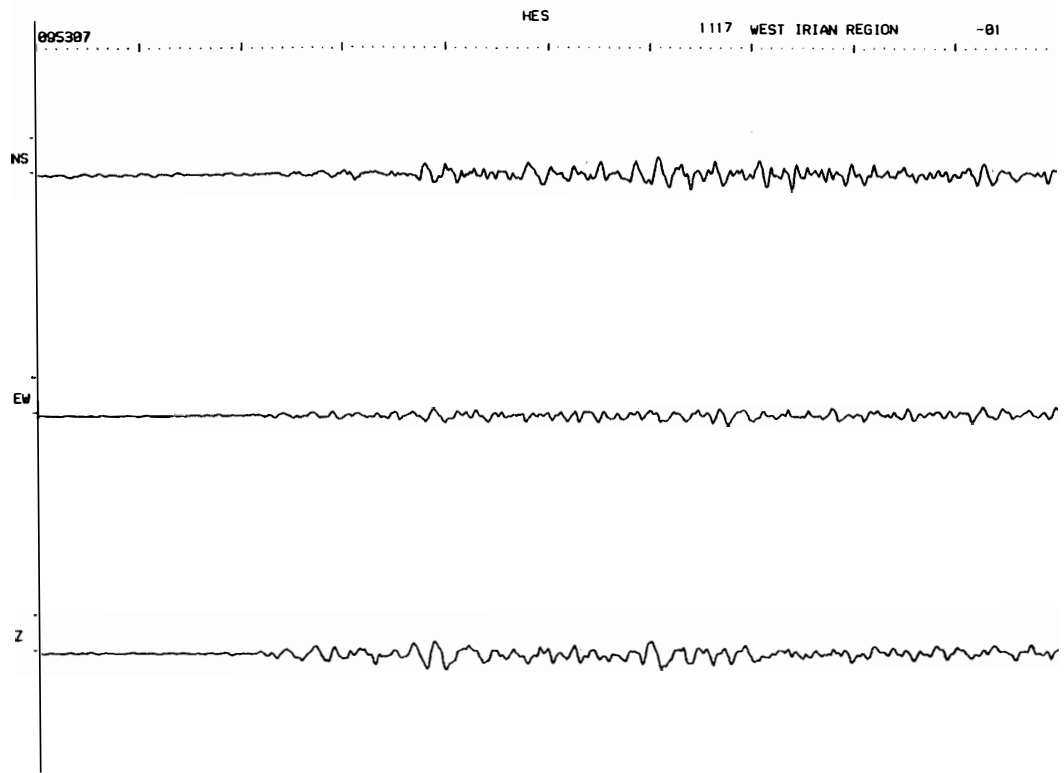
NO.63



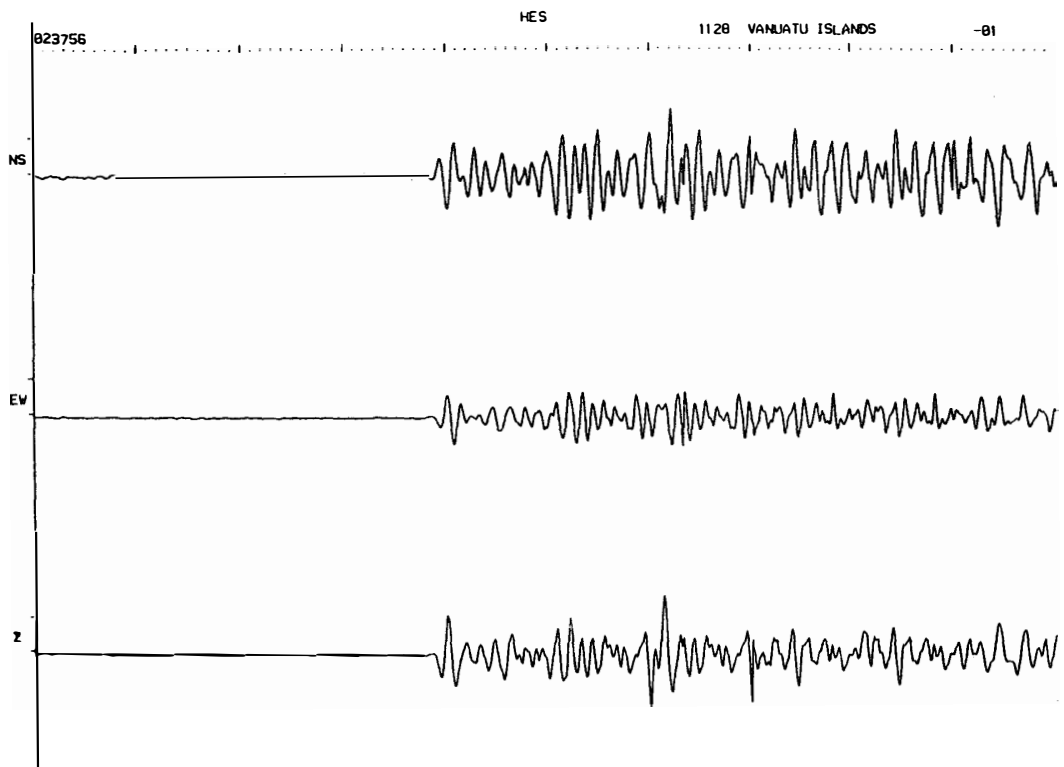
NO.64



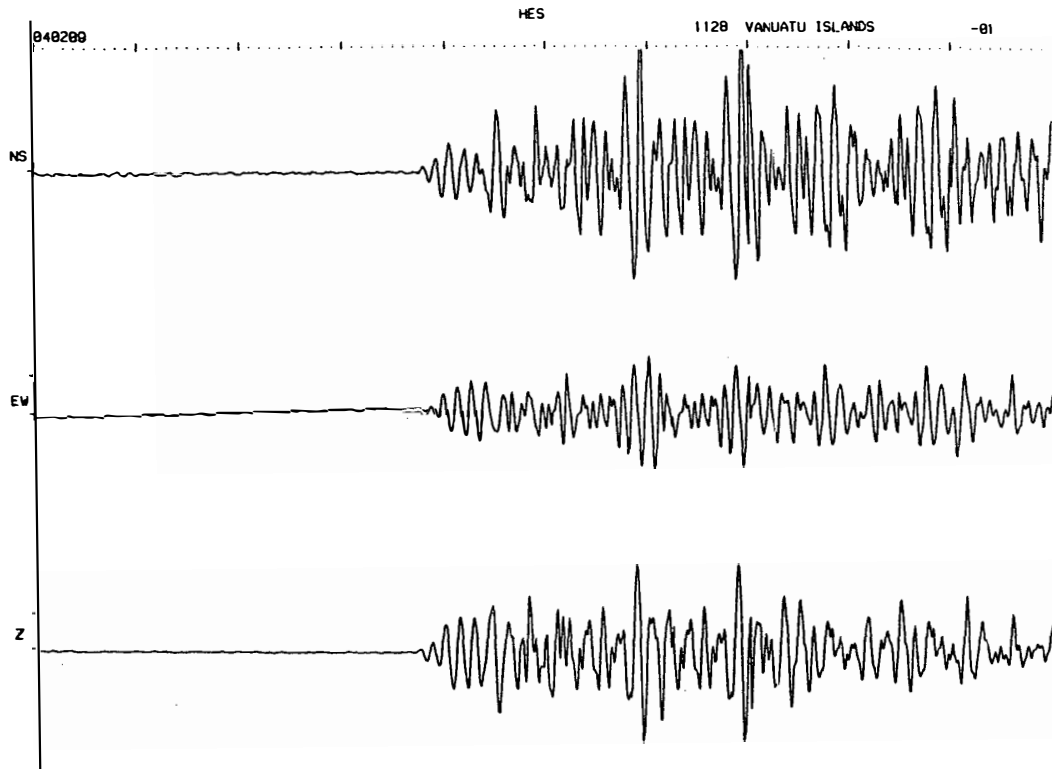
NO.65



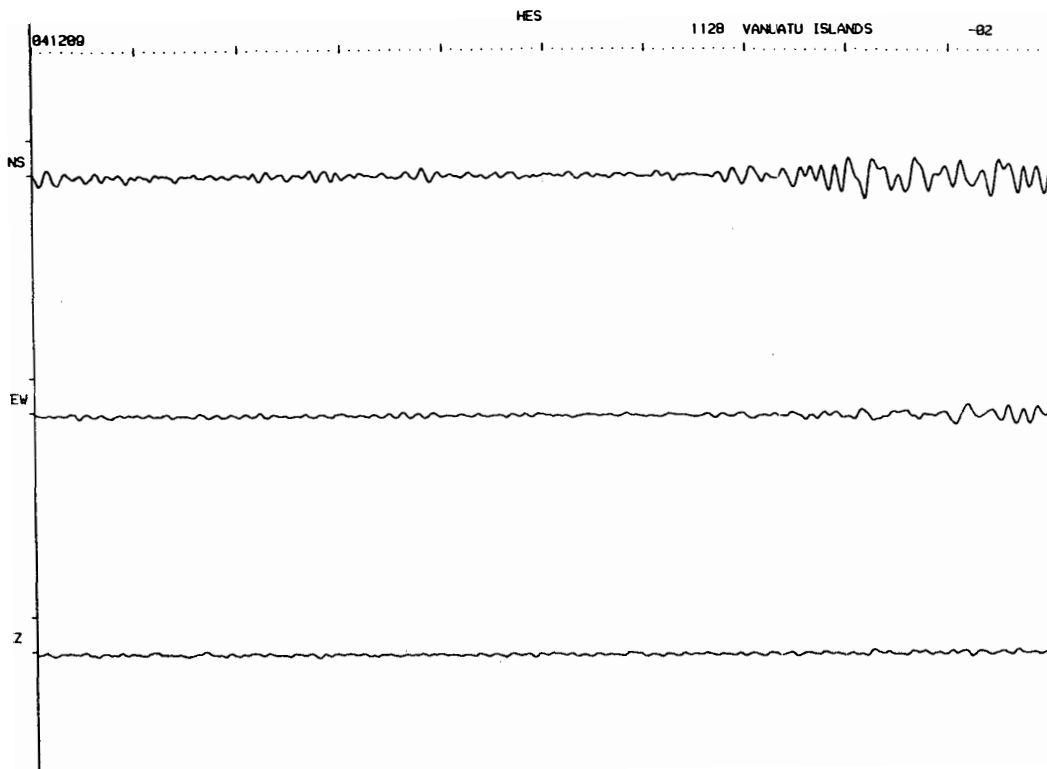
NO.66



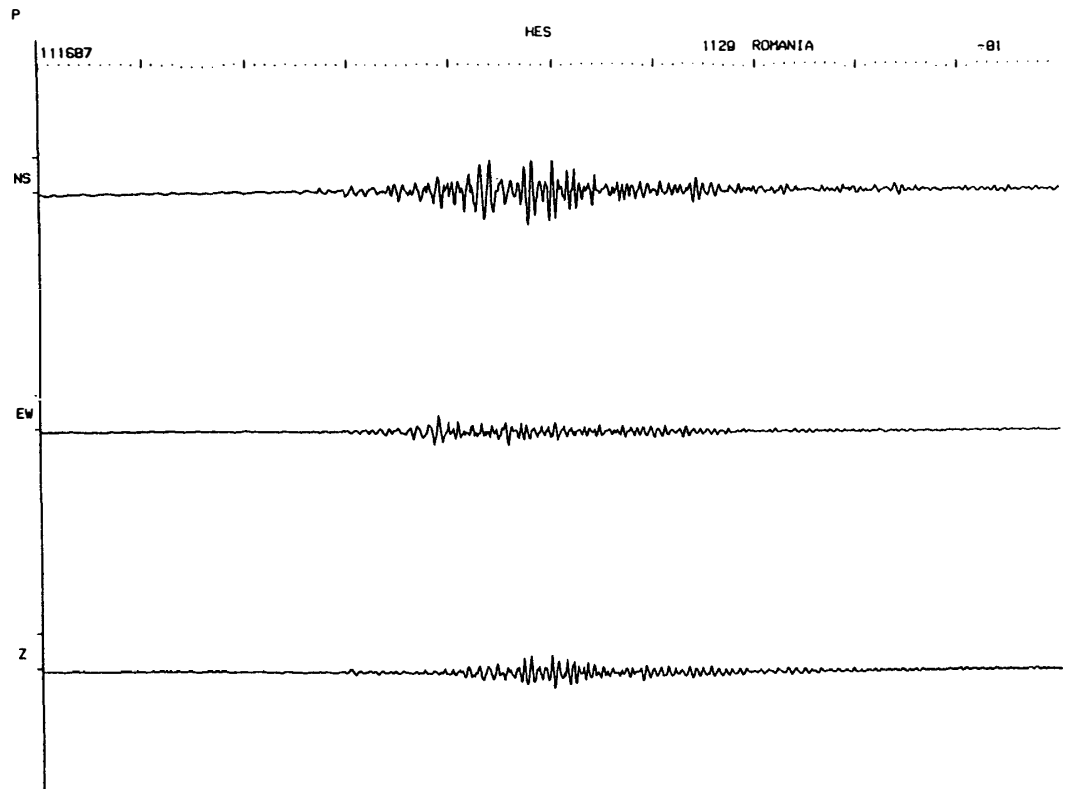
NO.67 -1



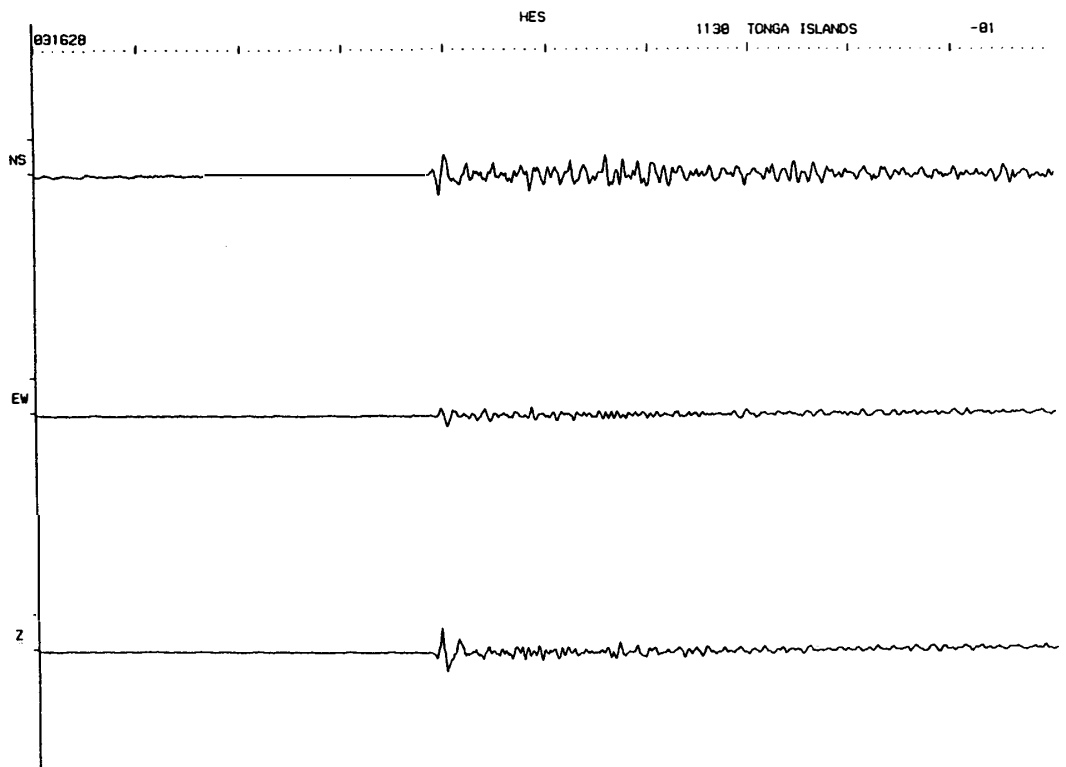
NO.67 -2



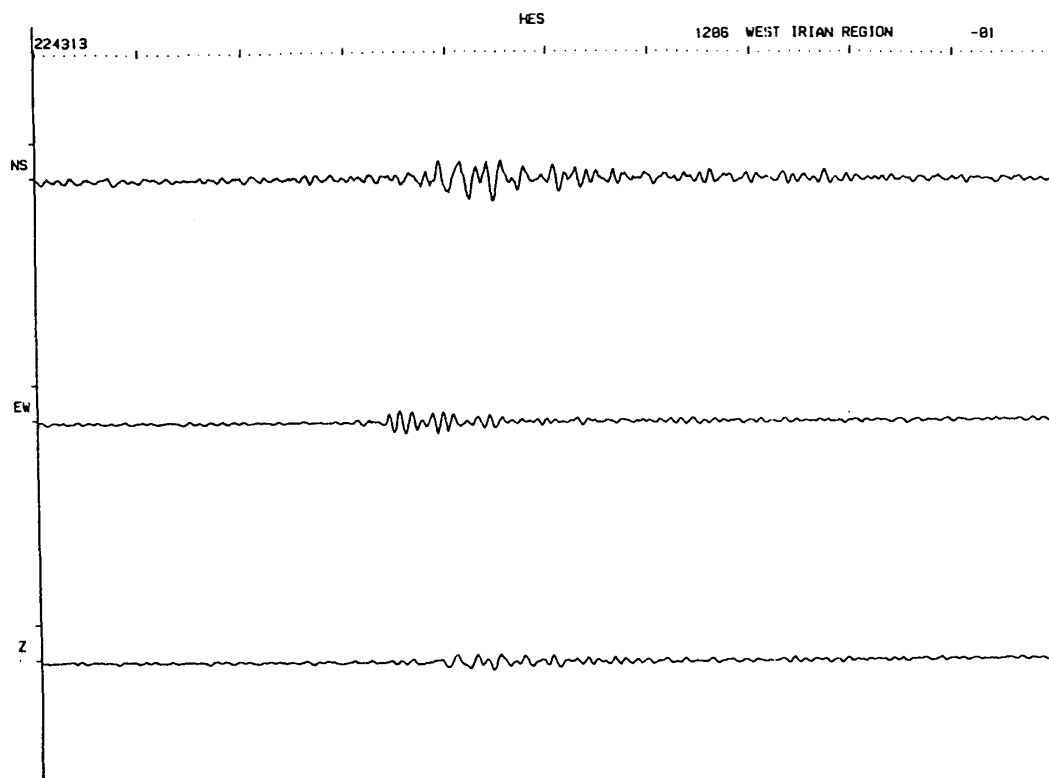
NO.68



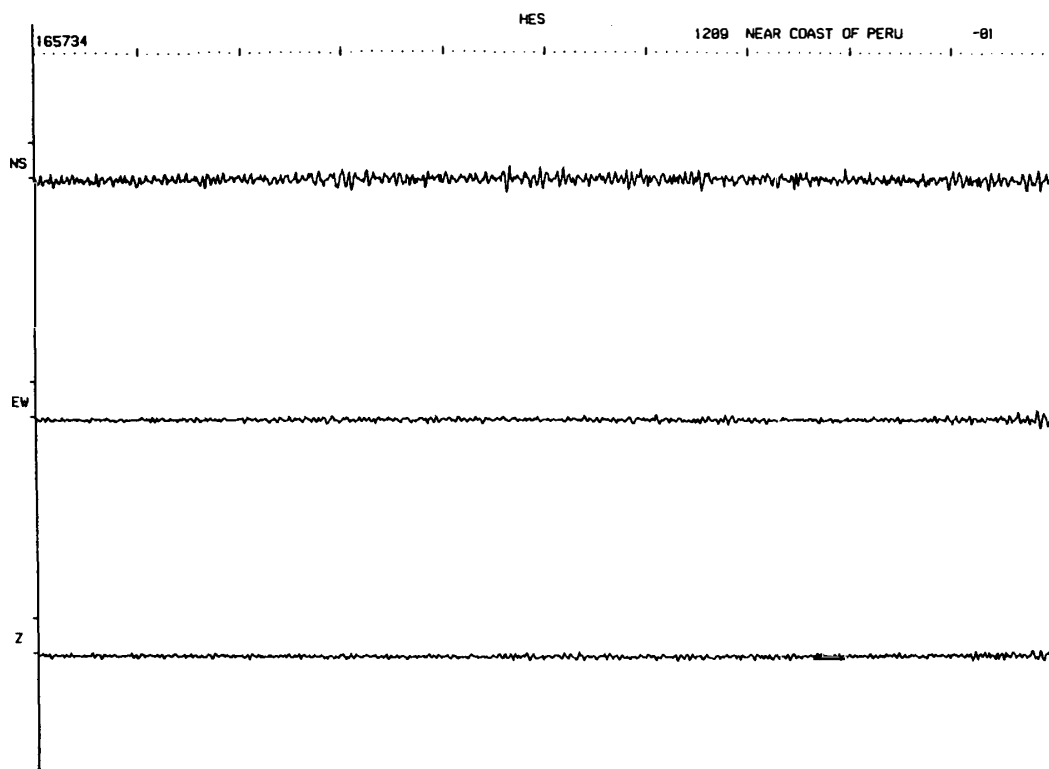
NO.69



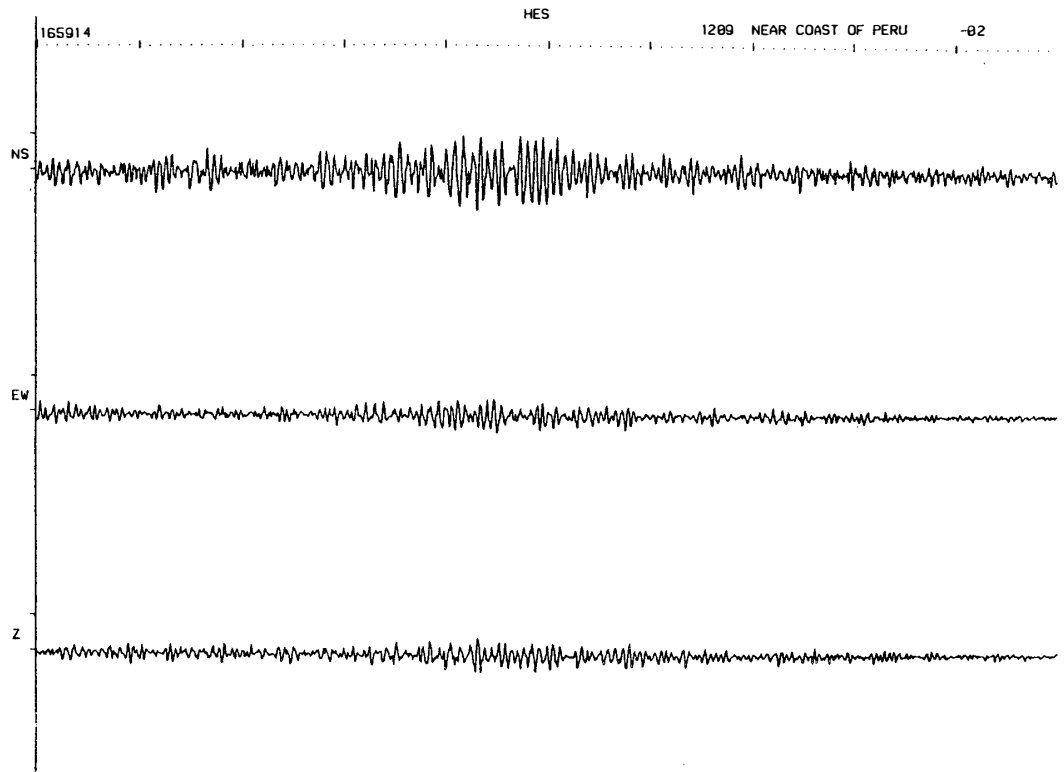
NO.70



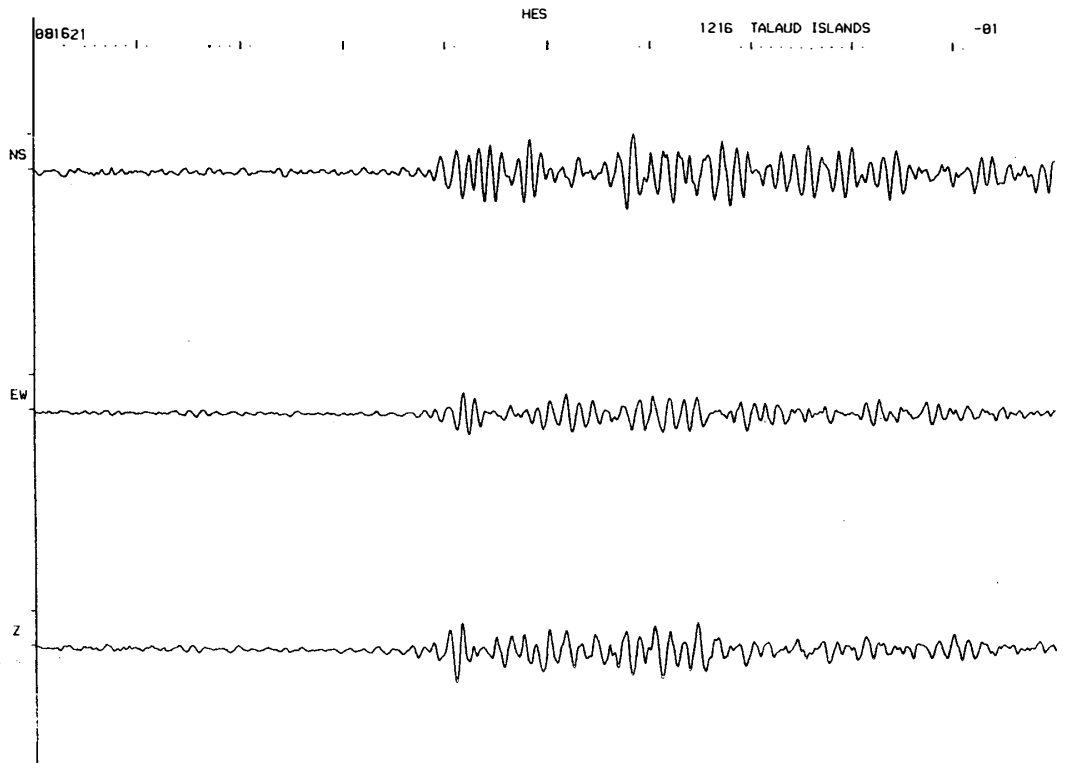
NO.71-1



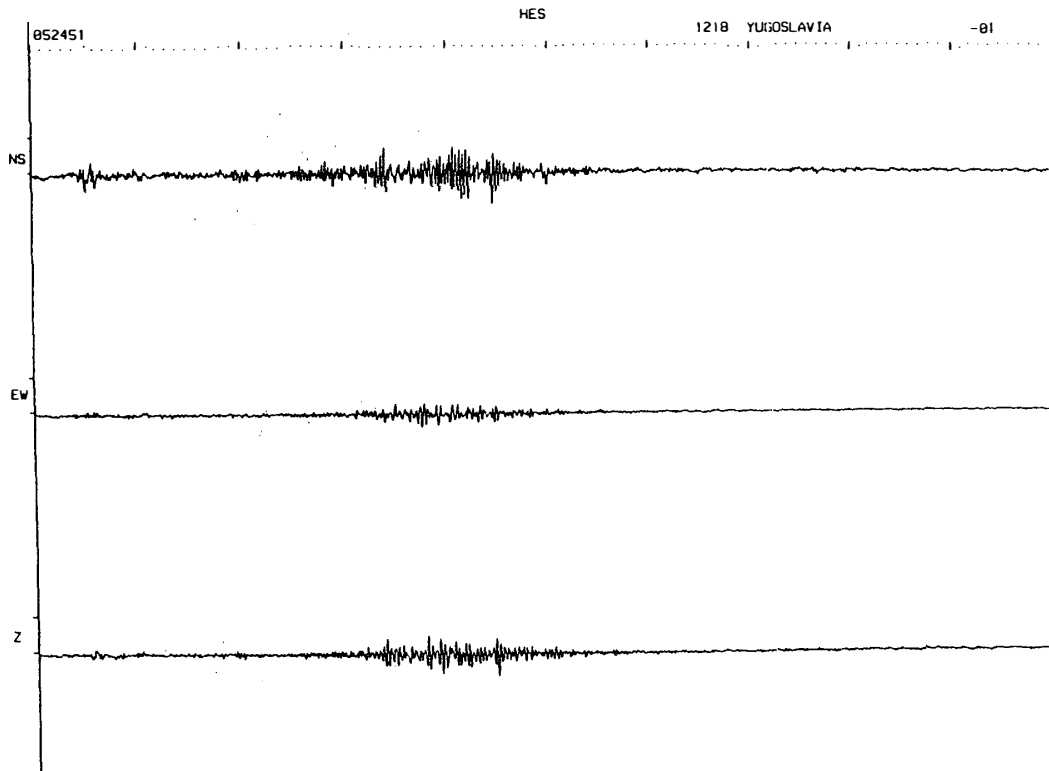
NO.71-2



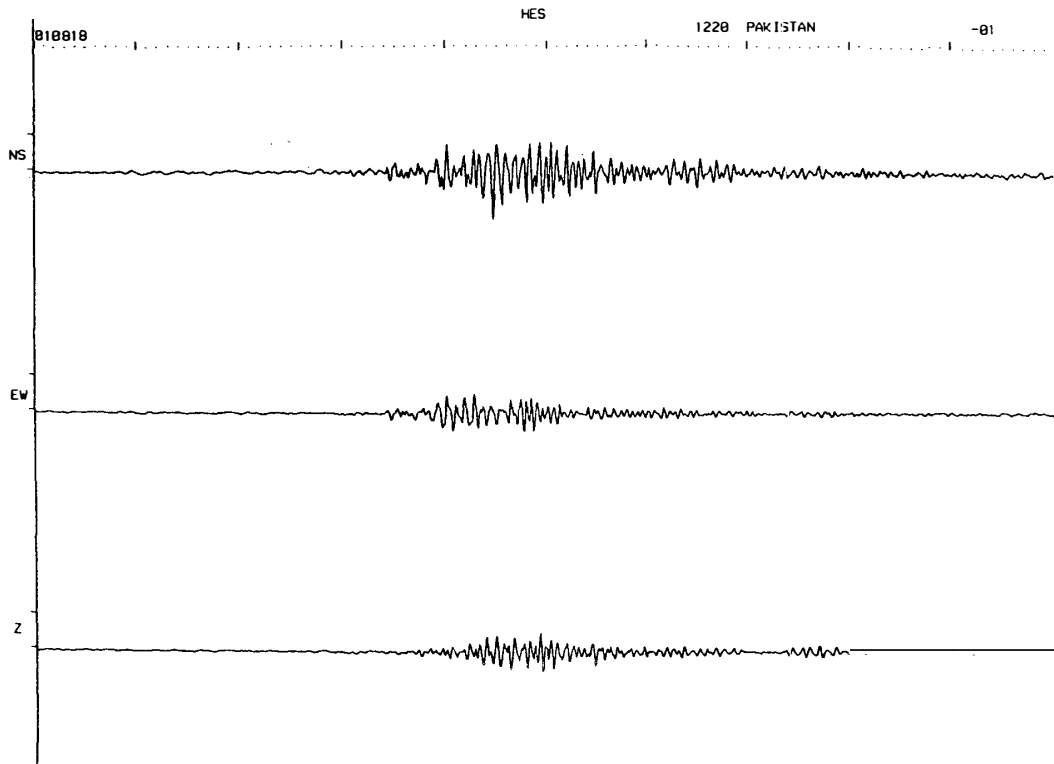
NO.72



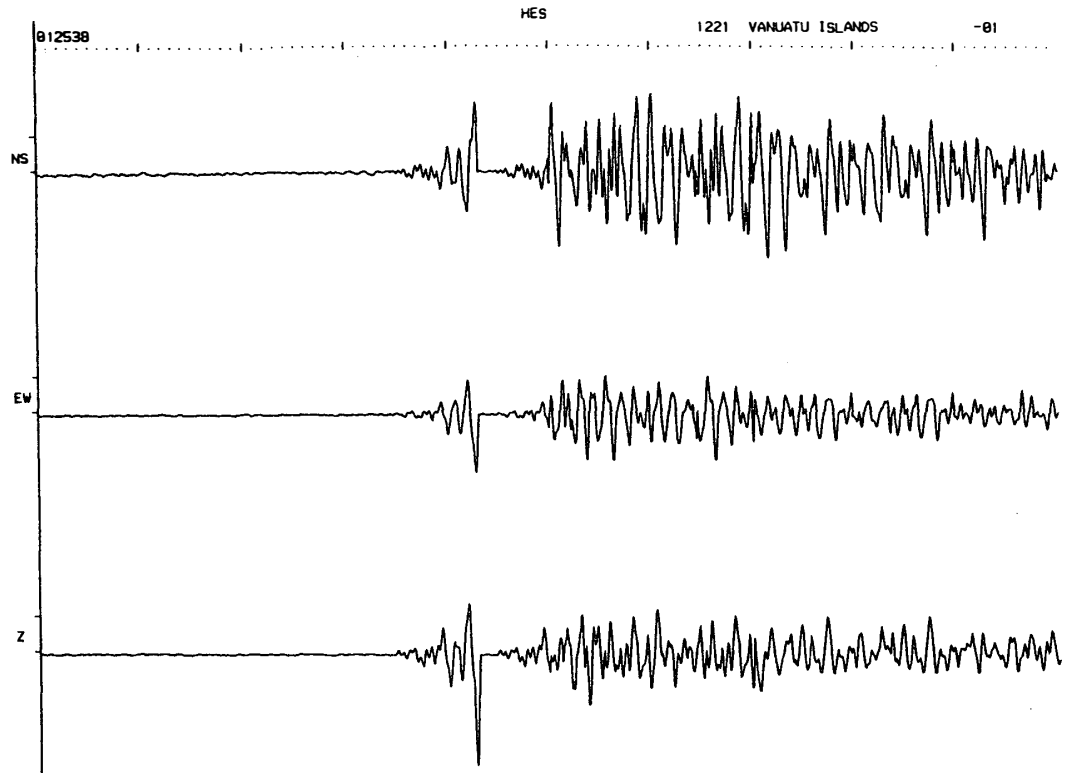
NO.73



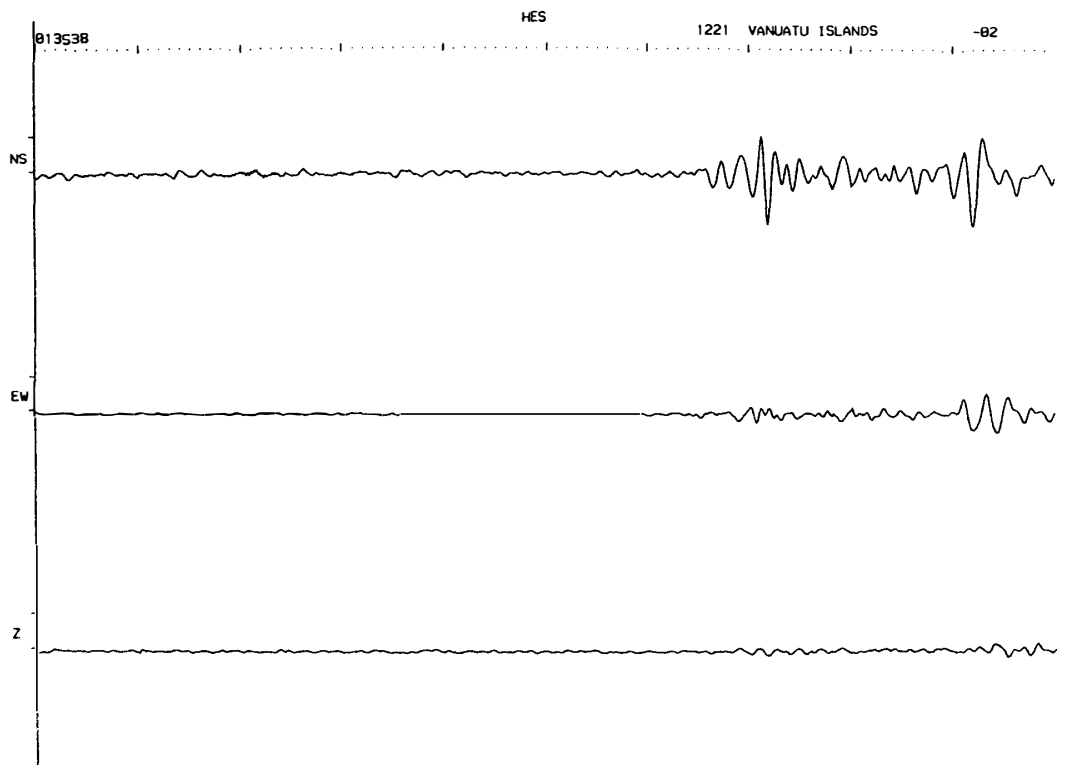
NO.74



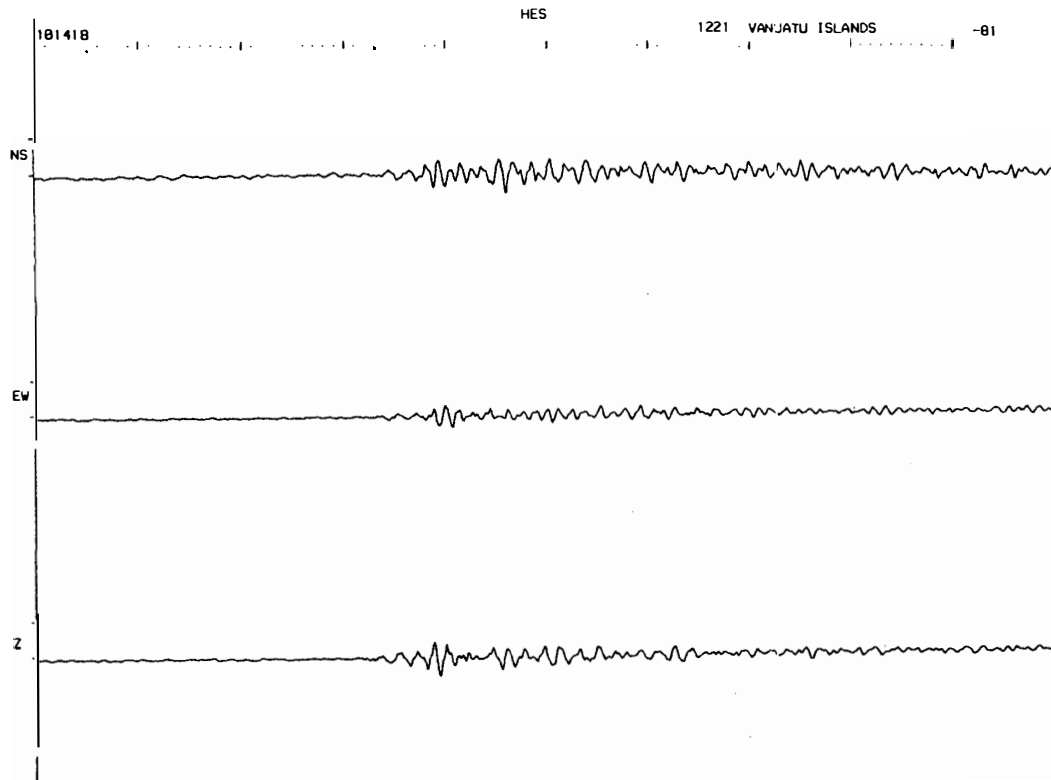
NO.75-1



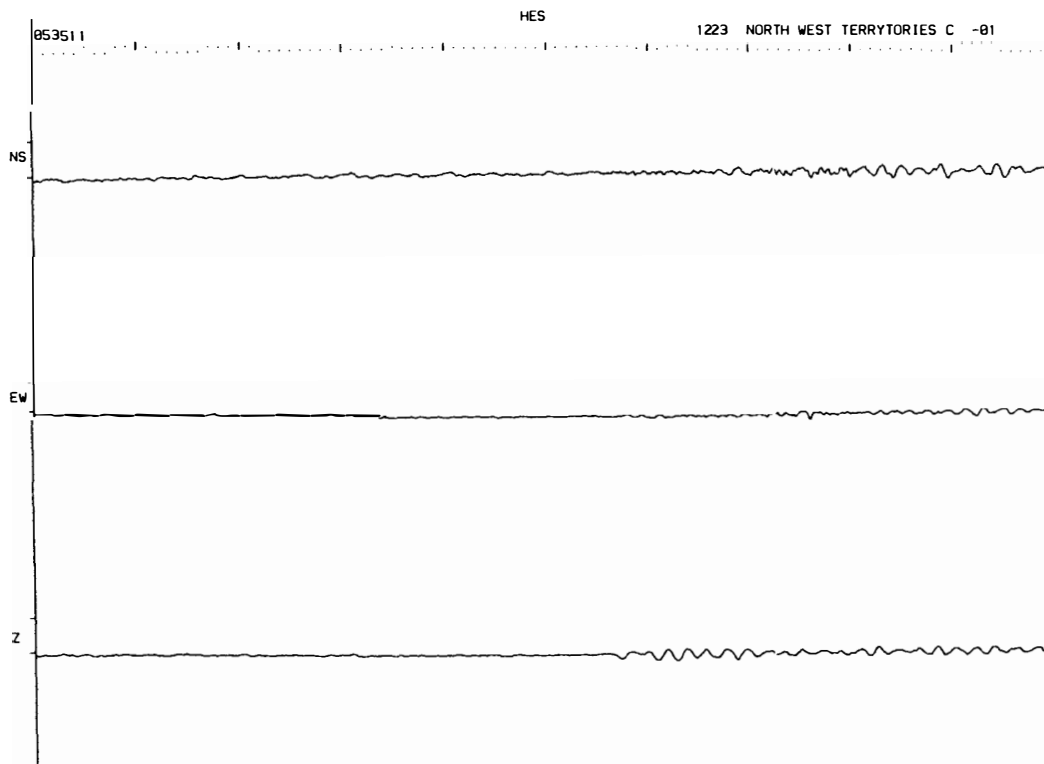
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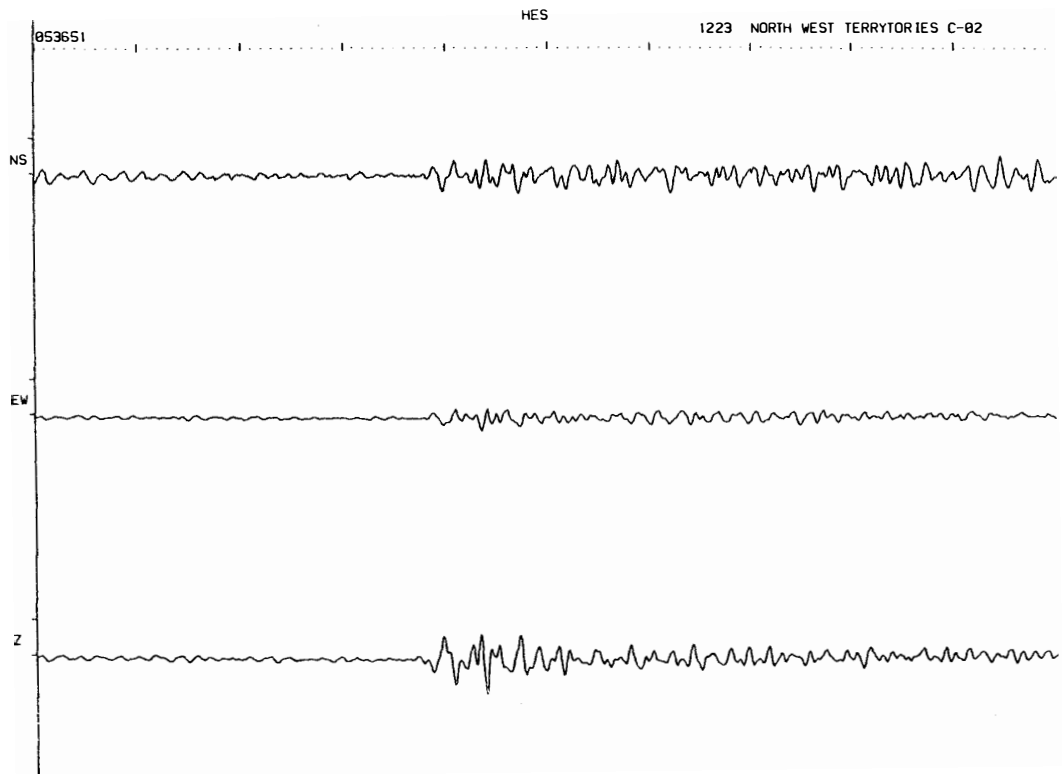
NO.76



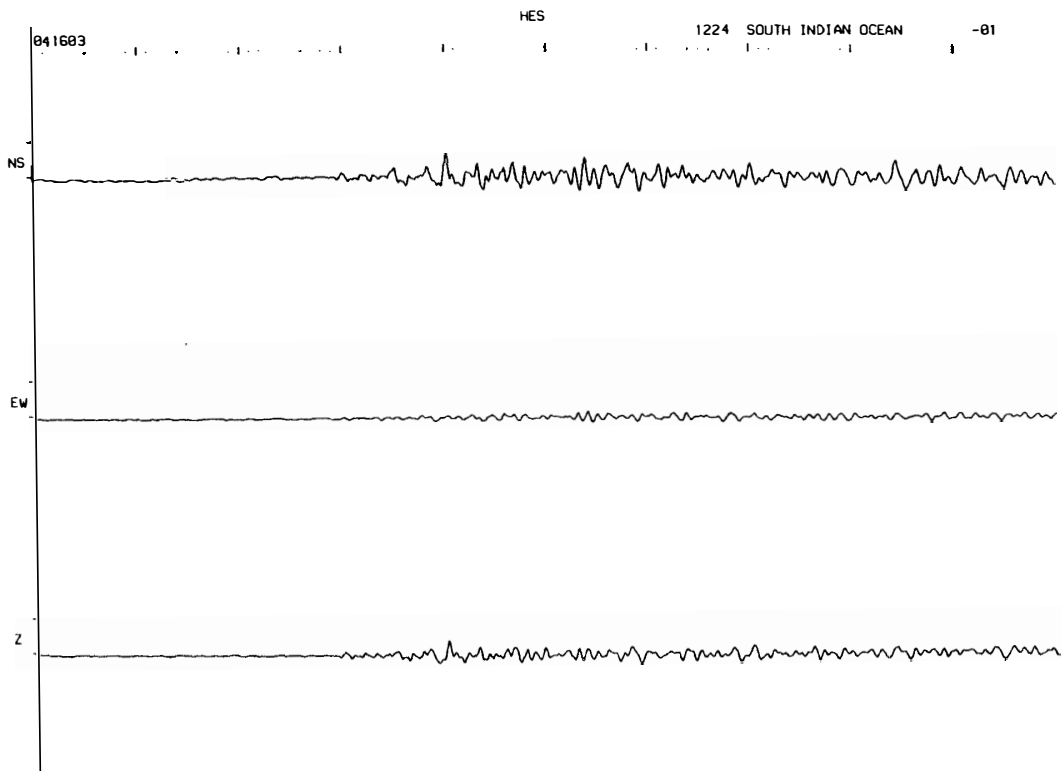
NO.77 -1



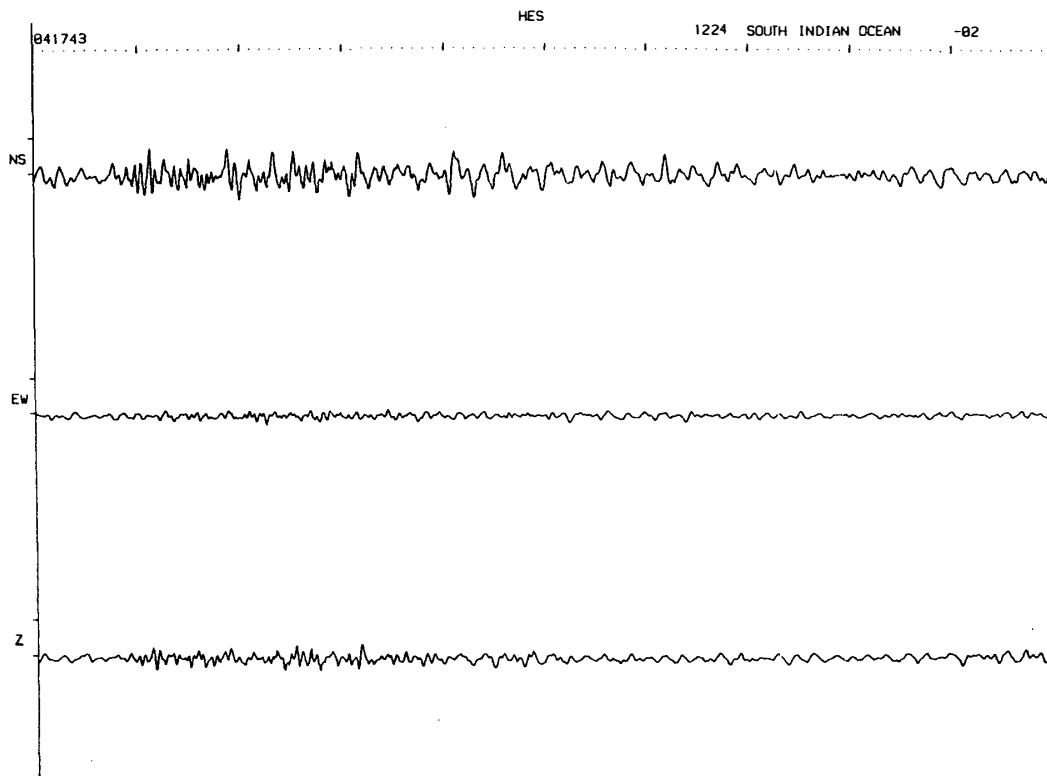
NO.77 -2



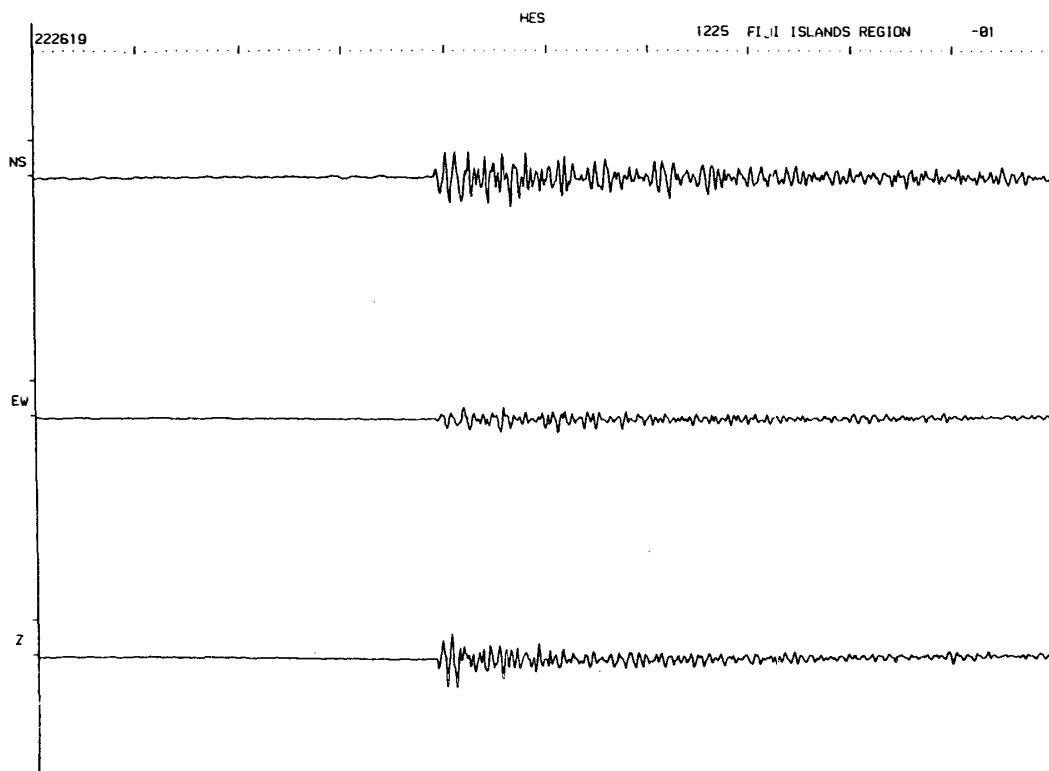
NO.78 -1



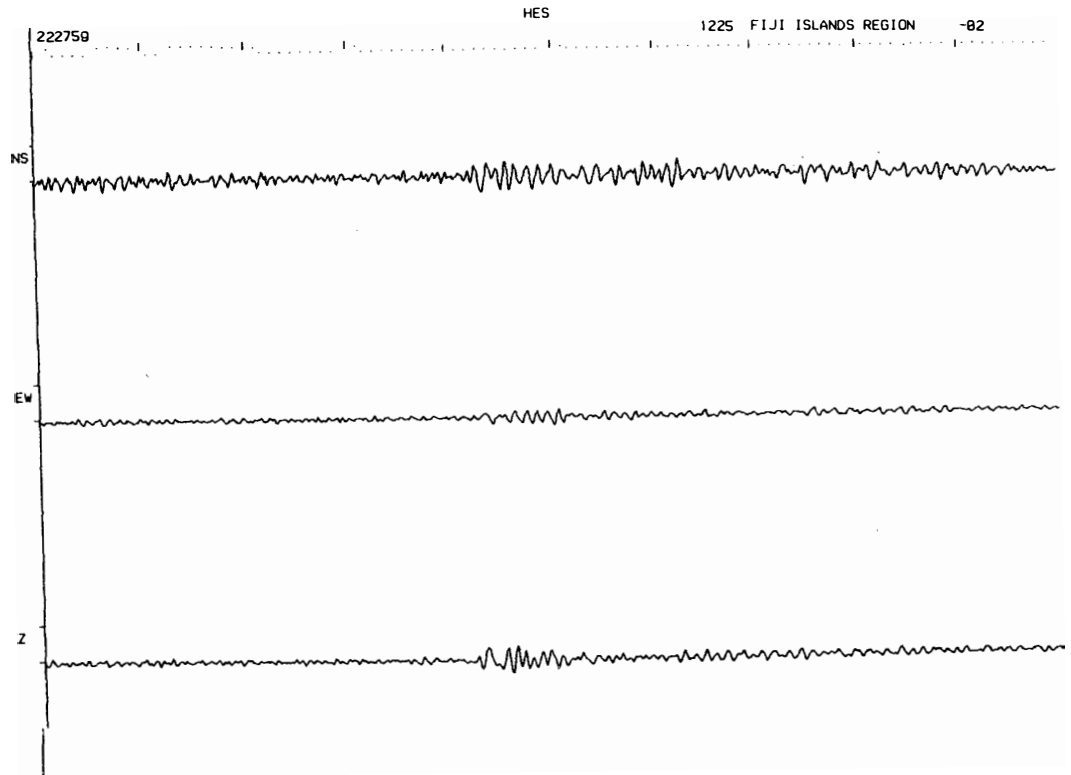
NO.78-2



NO.79-1



NO.79 -2



NO.80

