

SEISMOLOGICAL BULLETIN OF SYOWA STATION, ANTARCTICA,

1984

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1. Introduction

The current observation system of the Seismographic Observatory 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 and called LP (long period) or PELS with the natural period of 12 s. The seismic observation system was maintained by S. Tsunomura through the wintering of JARE-25 (February 1984 - January 1985).

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

2. Data

The over-all 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. Figure 3 shows examples of pen-monitor records of the Z component seismograph (4-mm/s pen-speed for SP and 2-mm/s pen-speed for LP). 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 (see an example in Fig. 4). 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 85 events detected at Syowa Station. The 85 events are listed in Table 3 and their locations are mapped in Fig. 5.

The data on an edited tape has a block structure. The tape format is specified as follows:

- (1) Volume constitution of the edited tape is specified in Fig. 6-1.
- (2) The data structure in Fig. 6-1 is specified in Fig. 6-2.
- (3) Header of the event in Fig. 6-2 is specified in Fig. 6-3. Numerals in content column are written usually by binary number.
- (4) One block of A/D data in Fig. 6-2 is specified in Fig. 6-4. It consists of 768 bytes and contains 10 s' wave data for short-period and 2 min' wave data for long-period (rec. 2 - rec. 11).
- (5) One data in Fig. 6-4 consists of 3 channels (N-S, E-W and Z components). Data format of each channel is specified in Fig. 6-5.
- (6) Time data in Fig. 6-3 (record number 6) and in Fig. 6-4 are specified in Fig. 6-6.

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.

This report was compiled with the help of H. Otsuka and K. Kokubun, Support Section for Geophysical Observations, National Institute of Polar Research.

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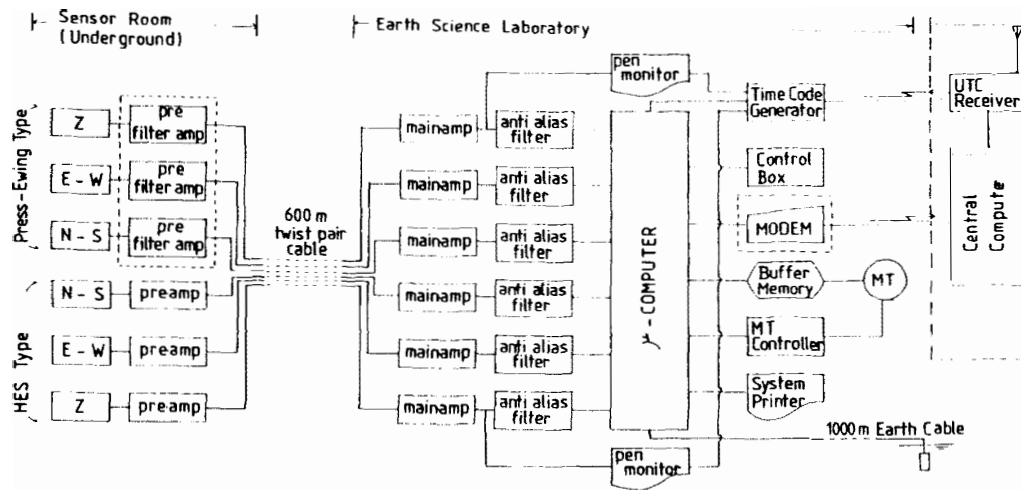


Fig. 1. The seismic observation system at Syowa Station.

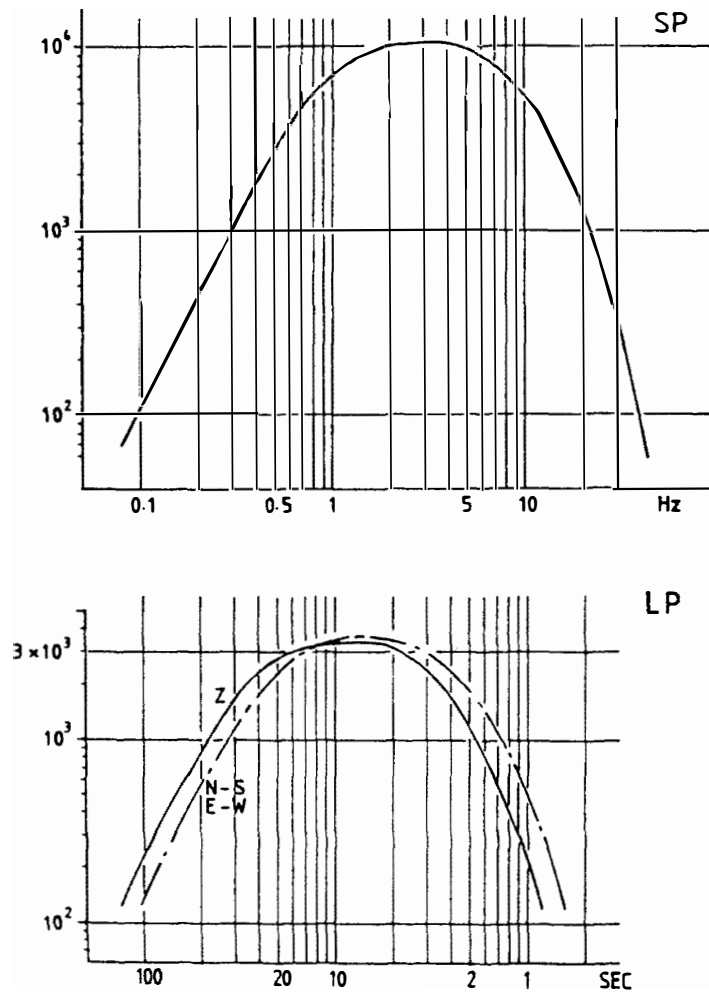


Fig. 2. Over-all frequency responses of the short-period and the long-period seismicographs.

DEC 30, 1984 21^h 36^m 56^s 36.66°S 177.51°E 39^{km} Mb=6.2 OFF EAST COAST OF
0100Z NORTH ISLAND, N.Z.

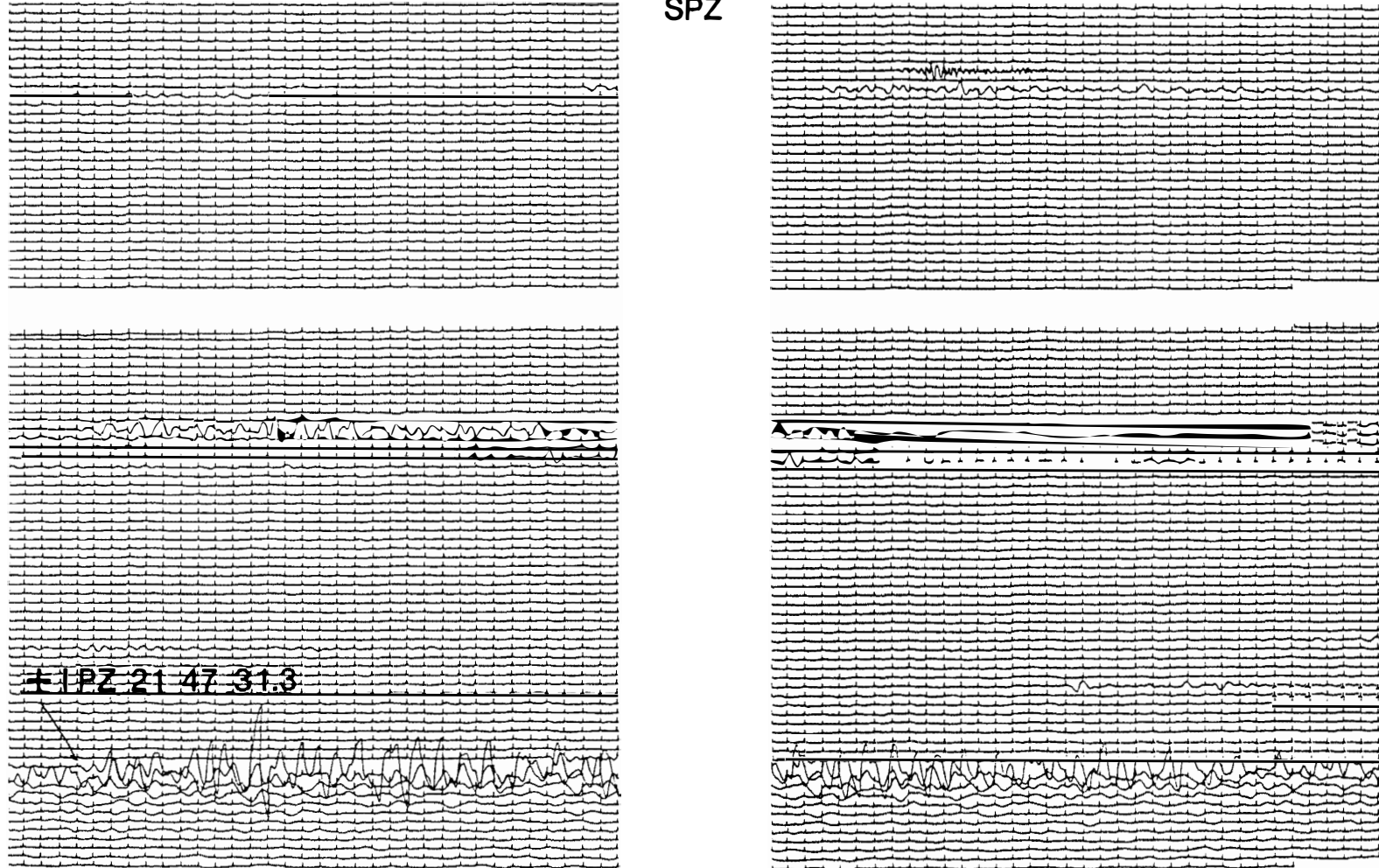


Fig. 3-1. A pen-monitor example of the short-period teleseismic event.

DEC 30, 1984 21^h 36^m 56^s 36.66°S 177.51°E 39^{km} Mb=6.2 OFF EAST COAST OF
0100Z NORTH ISLAND, N.Z.

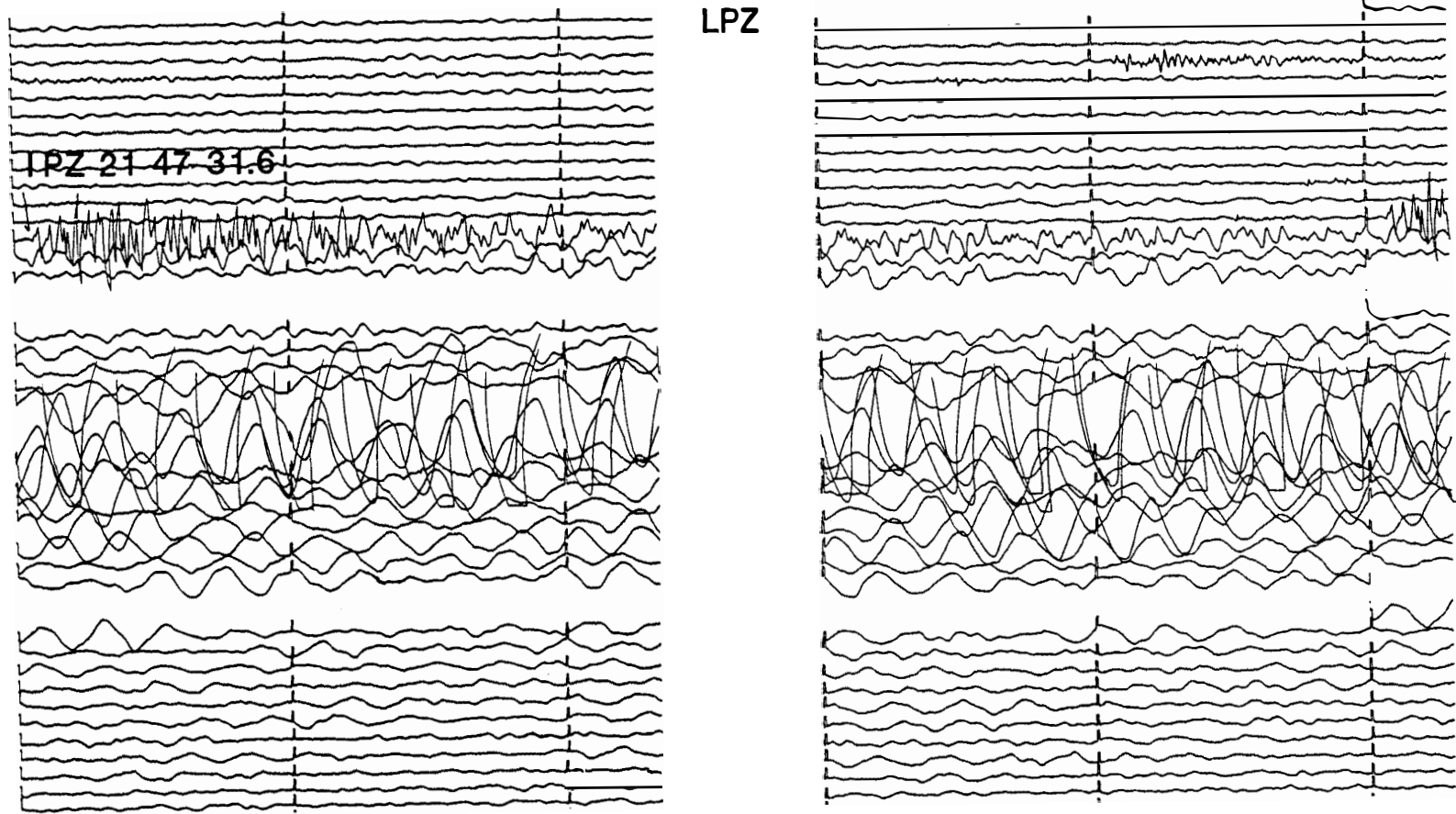


Fig. 3-2. A pen-monitor example of the long-period teleseismic event.


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* SHORT PERIOD * DETECTED AT TIME = 345. 18. 13. 33.
SEPARATE EVENT NO. = 00078 TOTAL EVENT NO. = 00087
NOISE LEVEL = 811 DETECT LEVEL = 84A
SAMPLE NO. = 10 LOGGING TIME = 440SEC

* SYSTEM CHECK *
CHECK TIME = 346. 09. 42. 26.
CHECK LEVEL WES 990 NOISE LEVEL WES 804 804 804
             HES 990             HES 810 80F 80F
             L.P 990             L.P 80B 81B 829
PIO-1 OK PIO-2 OK MAIN OK HOST OK
* CHECK END *

* SHORT PERIOD * TRIGGER ON AT CHANNEL = 1
TIME = 346. 12. 36. 55. NOISE LEVEL = 811 DETECT LEVEL = 84B

* SHORT PERIOD * TRIGGER ON AT CHANNEL = 1
TIME = 346. 13. 20. 27. NOISE LEVEL = 810 DETECT LEVEL = 84C

* SHORT PERIOD * DETECTED AT TIME = 346. 13. 20. 28.
SEPARATE EVENT NO. = 00079 TOTAL EVENT NO. = 00088
NOISE LEVEL = 810 DETECT LEVEL = 84C
SAMPLE NO. = 10 LOGGING TIME = 1200SEC

WARNING ! NOISE LEVEL.LT.804 !

* SHORT PERIOD * TRIGGER ON AT CHANNEL = 1
TIME = 346. 17. 41. 30. NOISE LEVEL = 811 DETECT LEVEL = 845

WARNING ! NOISE LEVEL.LT.804 !

* SHORT PERIOD * DETECTED AT TIME = 346. 17. 41. 30.
SEPARATE EVENT NO. = 00080 TOTAL EVENT NO. = 00089
NOISE LEVEL = 811 DETECT LEVEL = 845
SAMPLE NO. = 10 LOGGING TIME = 440SEC

* SHORT PERIOD * TRIGGER ON AT CHANNEL = 1
TIME = 346. 22. 46. 57. NOISE LEVEL = 811 DETECT LEVEL = 84E

WARNING ! NOISE LEVEL.LT.804 !

* SHORT PERIOD * DETECTED AT TIME = 346. 22. 46. 58.
SEPARATE EVENT NO. = 00081 TOTAL EVENT NO. = 00090
NOISE LEVEL = 811 DETECT LEVEL = 84E
SAMPLE NO. = 10 LOGGING TIME = 440SEC

* SHORT PERIOD * TRIGGER ON AT CHANNEL = 3
TIME = 346. 23. 33. 56. NOISE LEVEL = 80F DETECT LEVEL = 846

* SHORT PERIOD * DETECTED AT TIME = 346. 23. 33. 56.
SEPARATE EVENT NO. = 00082 TOTAL EVENT NO. = 00091
NOISE LEVEL = 80F DETECT LEVEL = 846
SAMPLE NO. = 10 LOGGING TIME = 1200SEC

* LONG PERIOD * TRIGGER ON AT CHANNEL = 1
TIME = 346. 23. 43. 27. NOISE LEVEL = 800 DETECT LEVEL = 84F

WARNING ! NOISE LEVEL.LT.804 !

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Fig. 4. Message outputs from the tele-typewriter.

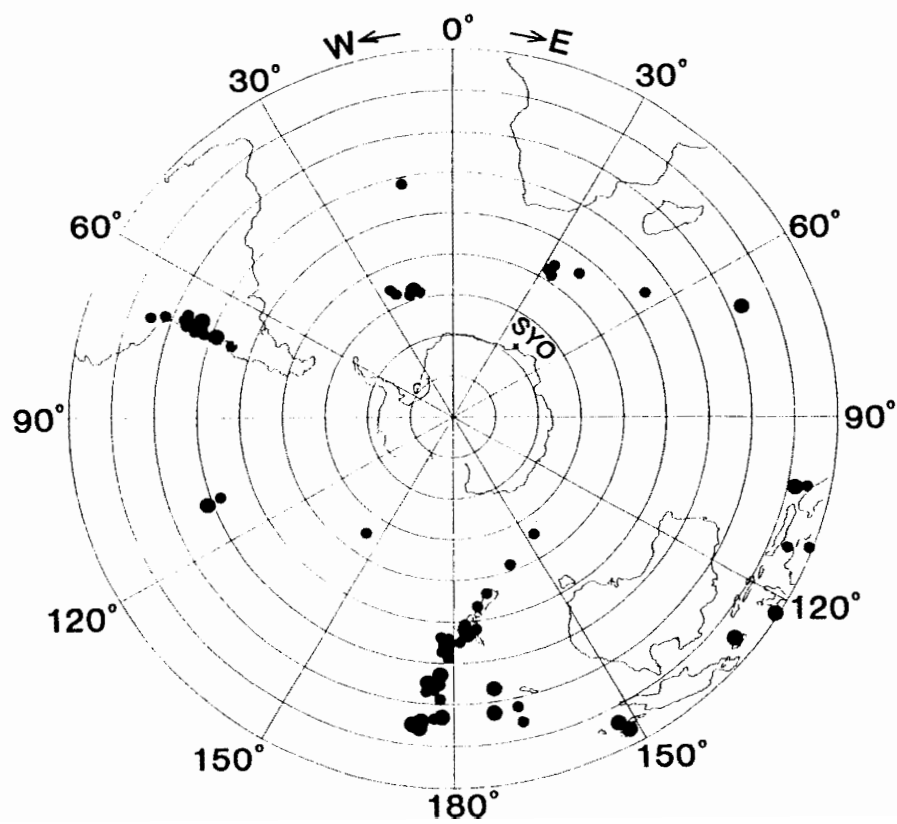
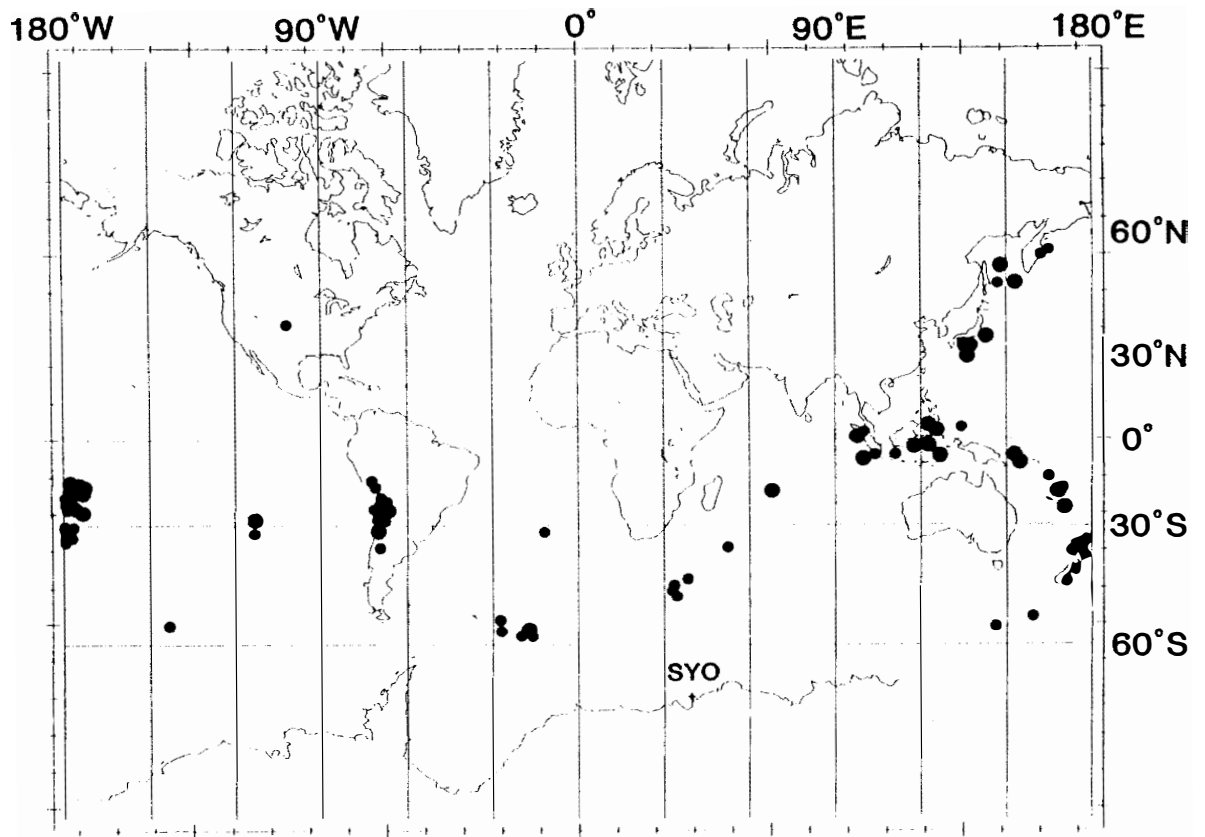


Fig. 5. Epicenters of the 85 events.

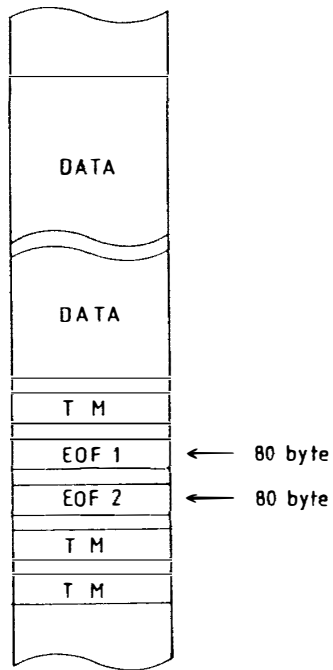


Fig. 6-1. Volume constitution.

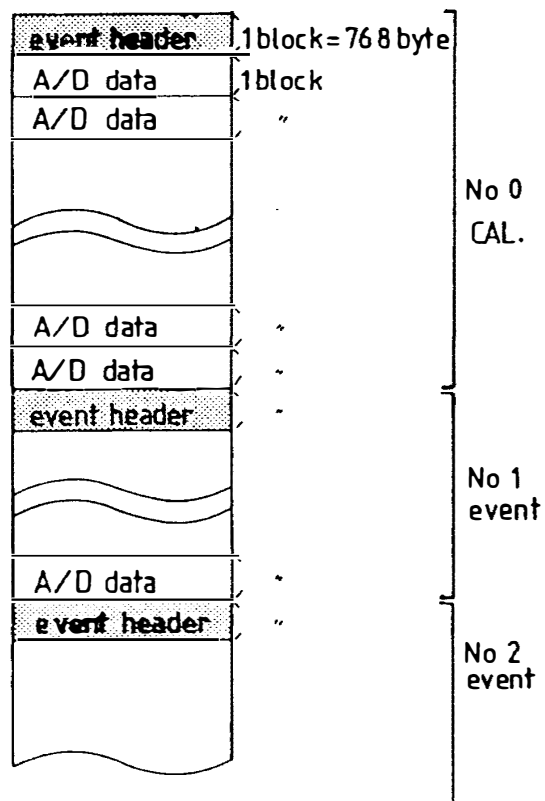
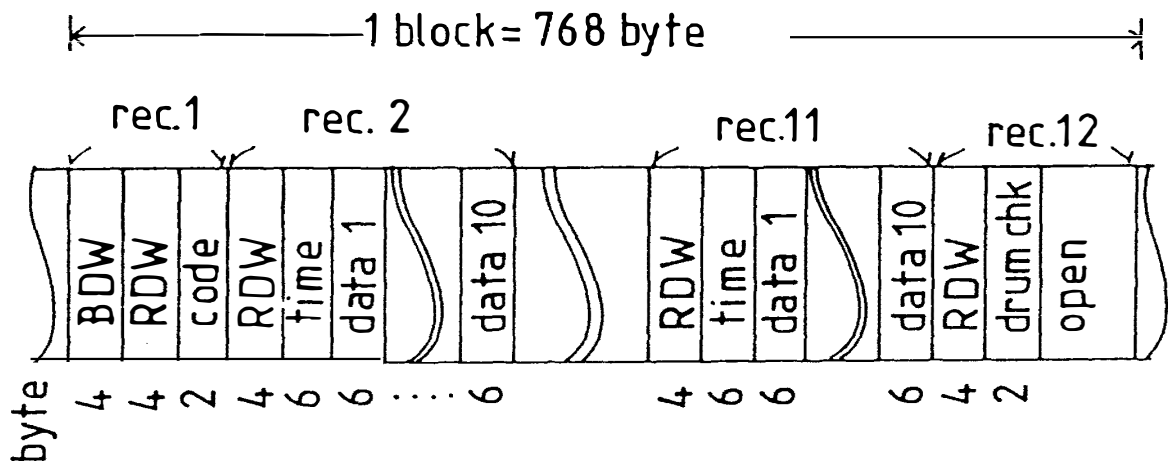


Fig. 6-2. Data constitution.

record	number	name	position	length	content
	1	BDW	0-1 2-3	2 2	byte number (00) ₁₆
1	2	RDW	4-5 6-7	2 2	byte number (00) ₁₆
	3	code	8-9	2	' B '
2	4	RDW	10-11 12-13	2 2	see no. 2
	5	event code	14-15	2	'HE'
	6	event no.	16-17	2	see Table 3
	7	total no.	18-19	2	dummy
	8	triggered time	20-25	6	see Fig. 6-6
	9	noise level	26-31	6	LTA
	10	K-value	32-33	2	threshold value
	11	triggered level	34-35	2	STA
	12	channel no.	36-37	2	3
	13	data acqui- sition time	38-39	2	1800 or 1200 or 440 s
	14	sample rate	40-41	2	10 samples/s
	15	block no.	42-43	2	181 or 121 or 45
	16	total block number	44-45	2	dummy
	3	17	RDW	46-47 48-49	2 2
18		origin time	50-67	18	PDE report
19		latitude	68-75	8	PDE report
20		longitude	76-85	10	PDE report
21		region name	86-109	24	PDE report
22		depth	110-117	8	PDE report
23		dummy	118-119	2	' '
24		magnitude	120-123	4	MB in PDE report
25		magnitude	124-125	4	MS in PDE report
26		dummy	126-127	2	' '
27		comment	128-143	16	see Table 3
4	28	open	144-767	622	(40) ₁₆

1 block length = 768 byte

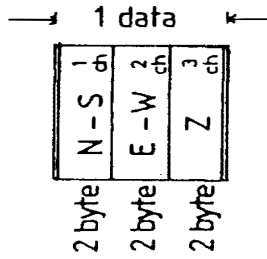
Fig. 6-3. Header of the event.



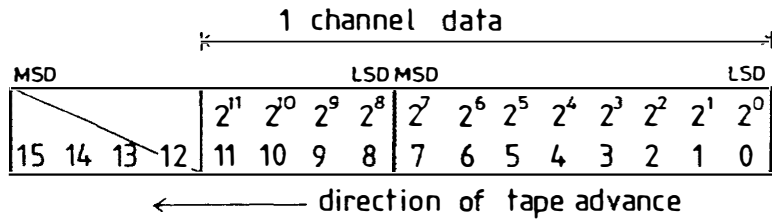
record	number	name	position	length	content
1	1	BDW	0-1 2-3	2 2	byte number (00) ₁₆ —
	2	RDW	4-5 6-7	2 2	byte number (00) ₁₆ —
	3	code	8-9	2	'HE'
2	4	RDW	10-11 12-13	2 2	see no. 2
	5	time	14-19	6	see Fig. 6-6
	6	data 1	20-25	6	see Fig. 6-5
	⋮				
	15	data 10	74-79	6	see Fig. 6-5
⋮					
11	112	RDW	640-641 642-643	2 2	see no. 2
	113	time	644-649	6	see Fig. 6-6
	114	data 1	650-655	6	see Fig. 6-5
	⋮				
	123	data 10	704-709	6	see Fig. 6-5
12	124	RDW	710-711 712-713	2 2	see no. 2
	125	drum check	714-715	2	(FF) ₁₆ : NG (00) ₁₆ : OK
	126	open	716-767	52	(40) ₁₆

Fig. 6-4. Constitution of A/D converted data in one block.

1. data sequence



2. data format



3. track number and bit

bit	2^2	2^0	2^4	P	2^5	2^6	2^7	2^1	2^3
track No	1	2	3	4	5	6	7	8	9
data name	5	7	3	P	2	1	0	6	4

Fig. 6-5. Data format of the sampled waveform.

No	item	1 byte				comment
		$2^7, 2^6, 2^5, 2^4$		$2^3, 2^2, 2^1, 2^0$		
		higher		lower		
1	dummy	$(40)_{16}$				
2	day	$(0)_{16}$		100-th digit 8, 4, 2, 1		max 399day
3		10-th digit 8, 4, 2, 1		1-st digit 8, 4, 2, 1		
4	hour	10-th digit 2, 1		1-st digit 8, 4, 2, 1		max 23hour
5	minute	10-th digit 4, 2, 1		1-st digit 8, 4, 2, 1		max 59minute
6	second	10-th digit 4, 2, 1		1-st digit 8, 4, 2, 1		max 59second

Time data — BCD number

Fig. 6-6. Format of the clock data.

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	09 21 54.2	JAN. 23	EPZ	08 41 18.0	FEB. 13	EPZ	15 44 05.1
	LP-IPZ	09 21 54.4	24	+IPZ	23 13 16.4	14	-EPZ	00 22 05.0
	+EPZ	22 19 25.3	26	-EPZ	19 07 09.3		+EPZ	03 25 04.8
	LP-IPZ	22 19 25.5		-IPZ	19 43 41.7		EPZ	06 19 08.3
	LP EXZ	22 28 35.2		-IPZ	22 58 28.1		+EPZ	14 15 20.0
02	EPZ	20 05 17.4	27	+EPZ	01 49 44.3	15	-EPZ	12 26 31.9
	EPZ	22 19 17.4		+EPZ	13 19 47.4	17	-EPZ	10 44 13.2
	LP EPZ	22 19 18.0		LP EPZ	13 20 32.5		+IPZ	16 44 36.0
03	EPZ	21 47 55.6	28	EPZ	13 23 42.6		LP-IPZ	16 44 36.8
	EPZ	23 06 15.1	29	+IPZ	10 25 10.6	19	-EPZ	04 16 00.3
04	EPZ	00 10 00.5		-IPZ	17 45 43.4		-EPZ	06 58 53.3
	EPZ	19 19 25.4	31	EPZ	03 35 44.0		+EPZ	22 37 27.7
05	EXZ	07 54 59.1		EPZ	09 28 51.0	20	+IPZ	17 47 17.3
06	-IPZ	15 13 05.4				21	+EPZ	08 34 06.8
07	+IPZ	12 07 01.5	FEB. 01	-IPZ	07 46 46.7	22	-EPZ	09 08 34.8
08	-IPZ	15 36 40.2		LP+IPZ	07 46 46.8		EPZ	17 50 24.7
	LP+EPZ	15 36 40.2		-ISZ	07 49 34.1	24	-IPZ	21 33 25.9
09	EPZ	07 31 21.0		LP+ISZ	07 49 34.0	25	+EPZ	03 40 05.4
11	-IPZ	18 51 01.0		-EPZ	07 57 48.8		+IPZ	07 20 49.4
12	+IPZ	01 50 00.4		EPZ	19 24 21.0		-EPZ	07 41 21.3
	EPZ	08 57 21.4		+EPZ	19 41 44.7		-IPZ	15 41 50.4
14	EPZ	04 02 02.2	02	+EPZ	11 54 32.1	26	-IPZ	08 30 22.6
16	+EPZ	12 39 18.0		-IPZ	17 45 33.0		-EPZ	14 19 00.3
	LP-IPZ	12 39 18.5	03	+IPZ	08 40 54.8			
17	-IPZ	02 20 34.3		LP-IPZ	08 40 54.8	MAR. 01	+IPZ	18 04 38.4
	EPZ	15 50 57.5		+EPZ	19 18 35.5		LP-IPZ	18 04 38.8
	EPZ	16 32 34.6		-EPZ	21 05 24.8	04	+IPZ	22 45 48.0
	EPZ	19 57 52.9	05	-IPZ	18 00 25.8		LP-IPZ	22 45 48.8
	EPZ	20 05 24.2	07	-IPZ	05 24 58.5	05	-IPZ	03 46 08.4
18	EPZ	07 52 04.3		-IPZ	21 46 29.3		LP+EPZ	03 46 10.4
	EPZ	12 18 56.3		LP-IPZ	21 46 29.2		LP+ISZ	03 48 26.0
19	-IPZ	16 27 08.7		LP+ISZ	21 53 02.0		LP+IXZ	03 58 00.8
	LP+IPZ	16 27 09.2		LP+IXZ	22 01 04.0		+EPZ	04 11 01.9
	-EPZ	23 53 52.2		LP-EXZ	22 59 17.2		-IPZ	07 18 30.8
	LP+IPZ	23 53 53.2		EXZ	22 22 14.8	06	+EPZ	00 37 57.8
20	EPZ	04 04 21.1	08	-IPZ	00 52 56.0		+IPZ	02 35 19.9
	EPZ	07 33 47.3	09	EPZ	15 23 43.1		LP-EPZ	02 35 21.6
	EPZ	09 31 17.4	12	EPZ	12 28 54.0		LP-ISZ	02 38 10.8
21	EPZ	09 06 01.2		-EPZ	20 14 35.2		-EPZ	09 35 50.3
	EPZ	15 23 49.0	13	EPZ	00 27 53.4	07	+EPZ	16 03 34.8

DATE	PHASE	ARRIVAL TIME	H	M	S
MAR. 08	-IPZ	00 51 45.6			
	LP-EPZ	00 51 46.8			
10	-EPZ	09 13 36.7			
11	-EPZ	09 15 25.9			
12	+EPZ	11 02 19.8			
14	-EPZ	06 07 00.4			
	+IPZ	11 48 17.1			
18	-EPZ	20 31 00.0			
19	EPZ	00 18 42.1			
	EPZ	12 43 32.5			
	EPZ	20 10 06.3			
	-EPZ	20 47 10.3			
	LP-EPZ	20 47 10.8			
	LP-IXZ	20 47 51.2			
	-EPZ	20 58 11.2			
20	EPZ	01 25 52.2			
	EPZ	13 39 23.4			
21	+IPZ	03 03 52.2			
	LP-IPZ	03 03 52.4			
	-IPZ	08 34 17.2			
24	-EPZ	06 53 51.1			
	+EPZ	10 44 03.6			
28	-IPZ	17 14 23.2			
30	-EPZ	09 25 10.1			
	+IPZ	16 47 22.9			
31	EPZ	20 34 39.0			
APR. 01	-EPZ	08 05 50.0			
02	-EPZ	22 45 41.2			
03	+IPZ	03 22 22.5			
05	+EPZ	18 27 44.9			
06	-EPZ	04 21 35.0			
	LP+IPZ	04 21 34.8			
	LP+ISZ	04 23 26.0			
	LP+LRZ	04 43 50.8			
	-IPZ	23 20 41.7			
	LP-EPZ	23 20 42.0			
	LP+ISZ	23 21 20.4			
07	+EPZ	21 50 28.6			
08	+EPZ	00 09 07.1			

DATE	PHASE	ARRIVAL TIME	H	M	S
APR. 09	-EPZ	13 59 38.4			
10	+EPZ	07 53 08.2			
12	-EPZ	08 41 26.3			
13	-IPZ	22 17 55.3			
14	+EPZ	08 33 02.9			
	-EPZ	18 26 19.5			
17	-EPZ	04 27 40.9			
18	-EPZ	07 02 05.5			
	+EPZ	09 58 51.7			
20	+IPZ	06 49 33.4			
	-ISZ	06 52 18.9			
	+IXZ	07 00 39.9			
	+EPZ	17 20 56.5			
21	-EPZ	12 49 20.7			
22	+IPZ	03 44 35.4			
	LP-IPZ	03 44 35.6			
	-EPZ	06 26 34.6			
	+EPZ	23 24 48.0			
23	+EPZ	21 59 05.4			
24	+EPZ	03 16 44.3			
	+EPZ	03 20 30.3			
	+IPZ	04 29 36.5			
	LP-IPZ	04 29 36.8			
	LP-IXZ	04 31 17.2			
	LP-ISZ	04 32 34.4			
	+EPZ	21 35 01.3			
25	-IPZ	04 31 46.3			
26	+IPZ	10 21 56.3			
	-IPZ	11 57 29.7			
	-EPZ	13 58 36.0			
27	+EPZ	21 54 39.2			
29	-EPZ	17 32 10.9			
	-EPZ	22 46 31.7			
30	+EPZ	06 06 40.3			
	-EPZ	12 27 04.1			
MAY 01	+IPZ	19 24 38.7			
	LP-IPZ	19 24 38.8			
02	EPZ	06 24 46.6			
	+EPZ	12 15 17.2			

DATE	PHASE	ARRIVAL TIME	H	M	S
MAY 03	+EPZ	12 40 28.0			
04	-EPZ	00 32 36.8			
	+EPZ	17 44 49.5			
06	-IPZ	03 35 17.0			
	-IPZ	20 15 02.0			
07	-EPZ	14 15 05.9			
08	+IPZ	03 49 06.9			
10	-EPZ	00 06 38.2			
	-IXZ	00 06 44.8			
	-IPZ	17 52 22.0			
12	+EPZ	19 01 16.0			
13	+EPZ	05 53 12.7			
	+EPZ	15 04 13.1			
16	-IPZ	03 55 57.3			
17	+IPZ	17 00 30.0			
	LP-EPZ	17 00 30.0			
18	-IPZ	23 01 26.2			
19	+EPZ	04 06 45.0			
20	-EPZ	20 11 06.3			
	+EPZ	22 18 14.7			
21	+EPZ	08 18 22.7			
	+EPZ	11 43 37.0			
23	+IPZ	05 25 45.4			
	LP-IPZ	05 25 45.2			
	EPZ	21 22 57.2			
25	+IPZ	02 44 32.3			
	-EPZ	08 09 39.4			
	+IPZ	21 55 45.3			
26	-EPZ	00 03 41.1			
	LP+EPZ	00 03 41.2			
	LP-LRZ	00 25 41.2			
	+EPZ	02 54 33.5			
	LP-LRZ	03 17 13.6			
	+IPZ	03 32 09.9			
	EPZ	04 04 24.6			
	LP+IPZ	04 04 25.2			
	-EPZ	04 29 31.5			
	EPZ	13 32 48.4			
	+EPZ	22 55 57.5			
29	-IPZ	04 48 25.2			

DATE	PHASE	ARRIVAL TIME			
		H	M	S	
MAY	29	LP+IPZ	04	48	25.2
		+EPZ	19	07	22.9
	30	-EPZ	07	49	09.6
		+EPZ	08	02	39.3
		LP-IPZ	08	02	42.0
		LP-ISZ	08	03	21.2
		LP+EXZ	08	18	46.0
31	+IPZ	08	43	44.5	
	+IPZ	13	23	39.4	
	LP-IPZ	13	23	39.6	
JUN.	01	-EPZ	06	14	28.4
		+EPZ	19	08	14.7
		+EPZ	23	55	02.5
	02	-IPZ	03	57	10.3
		-EPZ	04	09	00.4
	03	-EPZ	01	53	54.3
		+EPZ	14	58	56.2
		+EPZ	16	13	00.0
	04	-EPZ	21	53	38.0
	05	+EPZ	04	28	30.7
		+EPZ	23	19	09.9
	06	-EPZ	05	51	03.0
		-EPZ	13	47	57.8
		+IPZ	17	33	00.1
		LP-IPZ	17	33	00.0
		LP-IXZ	17	33	07.6
		+ISZ	17	34	08.0
		-EPZ	17	53	26.9
	08	-EPZ	01	52	59.7
	09	+EPZ	17	20	31.2
	11	+IPZ	02	16	33.4
		LP-IPZ	02	16	33.4
		-EPZ	02	44	44.9
	13	+EPZ	13	55	27.5
		+EPZ	14	07	45.3
	14	-EPZ	12	23	05.9
	15	+EPZ	07	47	16.5
-IPZ		14	35	04.0	
LP+IPZ		14	35	04.4	

DATE	PHASE	ARRIVAL TIME			
		H	M	S	
JUN.	15	LP+ISZ	14	36	06.8
	17	+EPZ	04	40	40.5
	-IPZ	08	30	21.3	
	+EPZ	14	36	15.1	
18	-IPZ	11	32	31.6	
	-EPZ	18	05	26.8	
20	-EPZ	20	07	59.2	
21	+EPZ	08	32	03.4	
22	+EPZ	08	31	24.8	
	+IPZ	16	00	59.5	
	LP-IPZ	16	01	00.0	
24	-EPZ	11	35	18.3	
	LP EPZ	11	35	18.4	
	LP+IXZ	11	36	44.0	
	LP-LRZ	12	18	30.0	
	-EPZ	13	40	01.2	
	LP-IPZ	13	40	02.8	
	LP+LRZ	14	05	35.2	
	-EPZ	22	10	28.9	
25	-EPZ	07	09	30.3	
	-EPZ	17	42	43.3	
26	-EPZ	02	24	34.6	
	+EPZ	19	38	23.0	
27	+EPZ	11	00	53.1	
28	-IPZ	07	56	09.0	
	-EPZ	11	32	39.5	
	-EPZ	13	09	22.7	
	-EPZ	20	04	30.2	
29	+EPZ	04	41	35.0	
30	-EPZ	11	49	54.5	
	-EPZ	21	07	07.0	
	-EPZ	21	56	29.5	
JUL.	01	+EPZ	06	29	36.0
	02	+EPZ	14	34	12.3
	-EPZ	15	21	09.2	
03	+IPZ	13	44	42.7	
	+ISZ	13	45	00.3	
	+EPZ	13	54	00.2	
	+EPZ	14	44	35.8	

DATE	PHASE	ARRIVAL TIME			
		H	M	S	
JUL.	03	-IPZ	19	43	30.3
		+EPZ	22	32	16.2
04	-EPZ	14	05	59.1	
	-EPZ	05	34	59.6	
05	LP-EPZ	05	34	59.6	
	LP-LRZ	06	12	54.0	
	-EPZ	21	00	57.2	
07	-EPZ	10	14	04.5	
	-EPZ	15	53	32.5	
	LP EPZ	15	53	32.8	
	-EPZ	15	59	56.0	
09	-EPZ	03	52	32.8	
	+EPZ	14	22	39.5	
	-EPZ	17	54	51.5	
	-EPZ	23	30	07.4	
	LP EPZ	23	30	08.0	
10	+EPZ	00	46	56.8	
	-EPZ	18	25	28.7	
11	+EPZ	05	53	34.7	
	LP-IPZ	05	53	35.2	
	+EPZ	06	35	09.6	
12	-EPZ	03	15	33.6	
	-EPZ	17	31	57.4	
13	EPZ	04	34	53.0	
	EPZ	20	34	08.7	
	LP EPZ	20	34	13.2	
14	+IPZ	01	28	07.2	
	EPZ	17	36	50.6	
	EPZ	19	01	14.1	
16	EPZ	12	37	05.0	
	-EPZ	15	39	30.5	
17	-EPZ	01	38	39.6	
	+IPZ	14	20	26.0	
	LP-IPZ	14	20	26.8	
	LP-IXZ	14	26	47.2	
18	EPZ	03	13	50.0	
	EPZ	18	56	45.6	
22	+EPZ	07	56	05.0	
	+EPZ	17	31	36.5	
	EPZ	20	59	40.9	

DATE	PHASE	ARRIVAL TIME H M S	DATE	PHASE	ARRIVAL TIME H M S	DATE	PHASE	ARRIVAL TIME H M S
JUL. 23	-IPZ	04 43 32.8	AUG. 04	-EPZ	18 47 12.5	AUG. 22	+EPZ	09 20 18.5
	LP-EPZ	04 43 32.8	06	-IPZ	12 14 12.7	23	+EPZ	07 27 54.5
	+EPZ	05 09 43.8		LP+IPZ	12 14 13.2		+EPZ	14 45 56.0
	+EPZ	06 19 13.3		LP+IXZ	12 15 18.0		+IPZ	23 27 23.0
	LP-EPZ	06 19 13.2		LP+ISZ	12 26 39.2	24	EPZ	04 57 35.7
	-IPZ	16 16 39.5		-EPZ	12 40 03.4		EPZ	10 10 28.0
	LP-EPZ	16 16 39.6		LP+LRZ	12 47 24.0		+IPZ	16 58 36.3
24	+IPZ	05 01 13.7		-EPZ	19 25 26.9		LP-IPZ	16 58 40.8
	LP-IPZ	05 01 14.0		LP+EPZ	19 25 27.6		LP-ESZ	17 03 13.6
25	EPZ	10 26 14.9	07	-EPZ	08 37 10.6		EPZ	18 06 49.1
	+EPZ	13 22 11.0	09	EPZ	03 47 52.3	25	EPZ	19 48 41.0
	+IPZ	15 49 39.7		-EPZ	07 55 24.6		+EPZ	20 48 02.3
	+EPZ	17 36 18.4		+EPZ	15 39 28.5	26	+EPZ	00 34 46.9
	+EPZ	19 47 50.5		+EPZ	19 09 45.5		LP+EPZ	00 34 47.2
26	EPZ	03 31 24.2		-EPZ	21 54 57.0		-IPZ	05 12 13.6
27	-EPZ	13 10 50.8	10	+IPZ	08 47 58.7		LP-IPZ	05 12 14.4
	LP-EPZ	13 10 50.8		+EPZ	07 33 56.8		LP-EXZ	05 14 12.8
	+EPZ	16 17 39.6	11	+EPZ	12 09 07.3		EPZ	05 21 15.2
	+EPZ	21 46 08.0		+EPZ	13 41 41.4		LP-EXZ	05 21 39.6
28	-EPZ	11 33 16.8		EPZ	13 59 00.5	27	+EPZ	02 19 57.2
	-EPZ	19 18 30.5	12	+EPZ	12 03 06.9		-EPZ	07 39 11.0
	+EPZ	19 50 05.9		LP+IPZ	12 03 07.6	30	+IPZ	16 17 47.7
	-EPZ	20 00 11.2	14	-EPZ	01 23 36.1		LP-IPZ	16 17 48.4
	EPZ	23 02 06.6		EPZ	03 27 12.3		-EPZ	19 15 35.2
29	EPZ	02 22 33.4		EPZ	22 47 06.0	31	EPZ	12 55 32.3
	+EPZ	03 40 26.7	15	+EPZ	08 38 50.0		EPZ	14 41 03.0
	-EPZ	18 20 44.0		+EPZ	13 31 04.9		+IPZ	15 54 55.0
30	+EPZ	00 16 25.6	16	-EPZ	05 05 08.7		LP+EPZ	15 54 55.2
	EPZ	03 24 53.0	17	+EPZ	03 24 47.5		LP-LRZ	16 26 56.0
	-EPZ	12 36 27.9		+EPZ	10 54 51.9			
	EPZ	20 17 03.8	18	-IPZ	04 21 36.8	SEP. 01	+EPZ	21 28 12.0
31	-EPZ	08 32 34.9		LP+IPZ	04 21 37.6	02	EPZ	01 48 02.4
				+EPZ	13 36 18.6		EPZ	13 47 28.5
AUG. 02	-EPZ	05 12 03.9		LP+EPZ	13 36 19.2	03	+IPZ	12 00 19.3
03	-EPZ	12 34 09.4		EPZ	14 19 48.3	04	EPZ	00 44 54.2
	-EPZ	14 32 35.6		-EPZ	19 19 34.4	05	-IPZ	08 29 49.3
	-EPZ	22 53 08.6	19	-EPZ	06 40 37.4		EPZ	09 43 49.6
04	-EPZ	09 31 59.4		LP-EPZ	06 40 37.6		LP EPZ	09 43 56.0
	+EPZ	15 11 09.7	21	-EPZ	10 01 47.8		EPZ	22 40 25.6
	LP-IPZ	15 11 10.8		EPZ	23 17 52.6		+EPZ	23 20 08.6

DATE	PHASE	ARRIVAL TIME		
		H	M	S
SEP. 06	+EPZ	22	08	30.0
07	EPZ	15	22	37.6
	LP-EPZ	15	22	37.2
	+EPZ	19	42	38.7
08	EPZ	04	04	37.9
	EPZ	06	45	16.0
09	-EPZ	02	41	28.7
	EPZ	04	16	45.5
	-EPZ	07	10	04.9
	+EPZ	10	00	10.4
	-EPZ	18	37	10.0
10	-EPZ	01	09	50.0
	-IPZ	02	08	54.7
	+EPZ	02	41	18.2
10	+EPZ	03	17	12.0
	EPZ	03	33	57.3
	LP EPZ	03	33	57.6
	-EPZ	14	13	44.5
11	-EPZ	01	01	53.0
	LP EPZ	01	01	53.2
	LP ESZ	01	06	20.0
	+IPZ	07	29	12.0
	LP-IPZ	07	29	12.0
13	-EPZ	14	19	39.2
14	-EPZ	00	07	52.4
	LP EPZ	00	07	52.4
	-EPZ	09	50	14.0
16	+EPZ	07	19	27.0
	LP-EPZ	07	19	27.2
	+EPZ	22	39	02.0
	LP EPZ	22	39	02.0
17	+EPZ	06	51	05.4
	LP-EPZ	06	51	05.6
	+EPZ	09	20	32.6
	LP-IPZ	09	20	32.8
	LP-LRZ	09	50	48.0
18	+EPZ	03	26	58.0
	+IPZ	17	21	41.0
	LP-IPZ	17	21	41.2
	LP+ESZ	17	23	36.8

DATE	PHASE	ARRIVAL TIME		
		H	M	S
SEP. 18	EPZ	17	34	24.0
19	+EPZ	03	15	52.7
	-EPZ	04	01	52.5
	LP EPZ	04	01	52.8
	+IPZ	04	44	36.5
	LP EPZ	04	44	36.8
	+IPZ	20	35	11.8
	LP-IPZ	20	35	12.0
20	-IPZ	06	55	23.6
	-IPZ	12	55	56.5
	+EPZ	14	34	03.0
	EPZ	18	38	11.2
	LP-EXZ	18	38	14.8
22	EPZ	05	44	38.5
	-EPZ	10	26	56.8
	LP EPZ	10	26	56.8
	+EPZ	11	54	57.5
	LP EPZ	11	54	57.6
	+IPZ	21	55	56.0
	LP-IPZ	21	55	56.0
	LP-LRZ	22	26	29.6
23	-EPZ	00	49	46.7
	+EPZ	01	35	25.7
	+EPZ	19	14	12.7
24	-IPZ	15	04	01.0
	+EPZ	15	17	24.2
	-EPZ	15	22	04.6
	+EPZ	18	23	24.8
25	EPZ	03	25	38.5
	EPZ	11	37	48.4
27	+EPZ	04	28	17.9
	-EPZ	12	11	05.4
	EPZ	22	05	53.0
28	-IPZ	00	15	55.7
	LP+IPZ	00	15	55.7
	LP-LRZ	00	54	02.8
	-EPZ	02	14	57.2
	-IPZ	03	15	46.9
	LP+IPZ	03	15	47.2
	+EPZ	06	05	44.4

DATE	PHASE	ARRIVAL TIME		
		H	M	S
SEP. 28	-EPZ	07	22	31.1
	-EPZ	08	40	27.6
	-EPZ	10	52	21.0
	LP+EPZ	10	52	21.2
29	+EPZ	07	26	23.7
	LP EPZ	07	26	24.0
	+EPZ	11	11	25.6
	EPZ	21	50	48.5
30	EPZ	10	58	45.2
OCT. 01	-EPZ	09	41	59.5
	+IPZ	12	15	46.4
02	+EPZ	01	49	45.7
	LP-EPZ	01	50	46.0
	+EPZ	06	32	24.5
	+EPZ	19	54	25.0
04	EPZ	09	53	56.0
	+EPZ	16	43	43.7
	LP+EPZ	16	43	44.8
	LP-LRZ	17	11	58.0
05	EPZ	05	25	00.9
	-EPZ	16	06	40.8
06	+EPZ	03	05	32.0
	EPZ	19	00	34.6
07	EPZ	02	03	49.8
08	EPZ	02	17	11.6
	EPZ	02	27	29.8
	LP EPZ	02	27	30.0
	EPZ	03	02	56.0
	LP EPZ	03	02	56.0
	LP+EXZ	03	10	26.8
	+IPZ	05	20	18.0
	LP-IPZ	05	20	18.0
	ISZ	05	20	27.8
	LP EPZ	05	41	04.8
09	+EPZ	02	52	55.7
	-EPZ	09	52	40.0
10	+EPZ	16	40	15.0
	LP-EPZ	16	40	15.0
	+EPZ	16	42	01.5

DATE	PHASE	ARRIVAL TIME		
		H	M	S
OCT. 10	-IPZ	19	17	33.8
	LP+IPZ	19	17	33.8
	+EPZ	22	20	26.8
11	+EPZ	08	32	50.0
	LP+EPZ	08	32	50.8
12	-EPZ	01	02	18.3
	-EPZ	18	34	43.6
	LP EPZ	18	34	45.6
	EPZ	19	12	59.7
	-IPZ	23	17	13.3
13	+EPZ	02	16	43.2
	LP-EPZ	02	16	43.2
	EPZ	03	38	48.7
	+EPZ	04	05	35.7
	LP-EPZ	04	05	35.7
	EPZ	05	45	40.0
	LP EPZ	05	45	41.6
	EPZ	19	27	59.4
15	+EPZ	10	34	03.0
	LP-IPZ	10	34	03.6
	LP+IXZ	10	34	40.4
16	+EPZ	05	56	44.2
	-EPZ	10	07	40.4
17	+EPZ	00	32	39.8
	EPZ	09	30	22.0
	LP+EPZ	09	30	22.0
18	+EPZ	10	23	32.0
	EPZ	15	50	03.8
	EPZ	16	56	22.8
19	+IPZ	14	50	46.8
	LP-IPZ	14	50	46.8
	EPZ	17	11	17.7
	+IPZ	17	57	56.1
	EPZ	20	11	45.9
20	-EPZ	05	02	08.7
	-IPZ	18	10	29.8
	LP+IPZ	18	10	30.0
	LP+ISZ	18	11	19.2
	-EPZ	18	19	43.8
	+IPZ	21	33	53.5

DATE	PHASE	ARRIVAL TIME		
		H	M	S
OCT. 21	EPZ	09	19	07.3
	+EPZ	05	37	22.0
22	-EPZ	15	38	40.5
	LP EPZ	15	38	42.4
	EPZ	17	02	02.0
	EPZ	02	20	48.3
23	EPZ	12	27	58.6
	EPZ	12	38	53.0
	LP EXZ	12	38	54.0
24	EPZ	23	13	33.3
	-EPZ	02	40	31.2
	EPZ	07	13	51.4
	EPZ	07	42	45.5
25	-IPZ	06	49	28.5
	EPZ	07	22	55.0
26	EPZ	08	22	41.8
	-EPZ	06	51	44.3
	EPZ	07	53	47.4
	EPZ	09	02	21.6
	LP-EPZ	09	02	21.6
27	EPZ	16	58	29.0
	+IPZ	02	09	07.1
	EPZ	02	19	04.1
29	EPZ	09	48	58.0
	-EPZ	10	05	45.0
	+EPZ	02	09	31.6
30	-EPZ	23	31	05.7
	LP+IPZ	23	31	06.4
	+EPZ	01	18	37.9
	LP-EPZ	01	18	38.0
	LP+IXZ	01	18	40.0
	LP+IXZ	01	19	15.2
	+IPZ	03	24	31.3
NOV. 01	EPZ	17	32	16.5
	+IPZ	20	45	26.3
	-EPZ	05	02	07.2
NOV. 01	LP-IPZ	05	02	09.2
	-EPZ	09	40	04.7
	LP+IPZ	09	40	04.8

DATE	PHASE	ARRIVAL TIME		
		H	M	S
NOV. 01	EPZ	19	03	27.0
	LP EPZ	19	03	27.0
02	+EPZ	03	49	39.5
	EPZ	04	09	04.6
04	-EPZ	01	34	27.0
05	-EPZ	04	28	23.9
	-IPZ	11	52	45.7
06	+EPZ	08	08	09.6
	LP-IPZ	08	08	09.6
08	+EPZ	09	56	51.8
	+EPZ	06	43	55.5
	EPZ	13	22	15.2
	+EXZ	13	28	23.0
	EXZ	13	34	13.7
10	-IPZ	14	28	30.3
	+IPZ	06	33	14.4
11	+IPZ	04	46	46.9
12	-EPZ	13	20	49.3
13	EPZ	23	42	55.5
15	+IPZ	02	58	31.7
	EPZ	06	04	37.0
	EPZ	17	40	19.5
16	+IPZ	07	07	36.0
	LP-IPZ	07	07	36.0
17	-IPZ	00	39	22.3
	-IPZ	07	01	33.6
	LP+EPZ	07	01	34.0
18	+IPZ	13	57	51.8
	LP-IPZ	13	57	52.8
	+EPZ	22	56	34.0
18	EPZ	12	40	53.6
	EPZ	04	30	29.5
19	EPZ	12	26	24.7
	-IPZ	08	28	09.2
	LP+IPZ	08	28	09.2
20	+EPZ	10	16	40.0
	EPZ	14	46	18.5
21	LP EPZ	14	46	19.2
	EPZ	18	30	50.2
	LP EPZ	18	30	50.4

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 85 earthquakes.

Data number	Origin time UTC			Geographic coordinates		Region	Depth (km)	Magnitude (Mb)	Epicentral distance (degree)	Azimuth (degree)	Comment	
	date	hr	mn	sec	latitude	longitude						
1	01/01	09	03	38.8	33.683°N	136.894°E	Near South Coast of South Honshu	368	6.5	123.664	97	
2	01/02	22	09	58.1	56.745°S	142.655°W	South Pacific Cordillera	10	5.6	54.467	2	S
3	01/03	22	55	39.2	40.525°S	174.023°E	Cook Strait, New Zealand	82	5.3	65.680	37	
4	01/06	15	01	36.0	23.686°S	68.543°W	Northern Chile	102	5.4	74.261	295	
5	01/08	15	24	13.5	2.823°S	118.806°E	Sulawesi	33	6.0	83.579	99	S
6	01/16	12	27	14.0	29.982°S	112.320°W	Easter Isl. Region	10	6.0	79.082	335	
7	01/19	16	15	16.3	23.642°S	178.321°W	South of Fiji Isl.	332	5.8	83.595	35	S
8	01/19	23	48	20.2	59.253°S	17.928°W	S.W. Atlantic Ocean	10	5.5	25.761	277	
9	02/01	07	28	28.7	49.063°N	146.590°E	Sea of Okhotsk	573	5.9	140.626	98	
10	02/07	05	13	19.3	25.755°S	178.793°W	South of Fiji Isl.	352	5.3	81.448	34	
11	02/17	16	32	21.3	6.598°S	130.117°E	Banda Sea	158	6.1	84.132	87	
12	02/25	07	16	00.1	47.909°S	31.775°E	South of Africa	10	5.5	21.328	195	

13	02/25	15 29	14.5	16.747°S	174.772°W	Tonga Islands	257	5.5	91.007	33	
14	02/26	08 18	19.8	17.316°S	70.526°W	Near coast of Peru	113	5.8	80.852	295	
15	03/05	03 33	50.9	8.147°N	123.762°E	Mindanao, Philippine Islands	649	6.5	95.526	98	S, LP
16	03/06	02 17	21.2	29.384°N	138.935°E	South of Honshu, Japan	457	6.2	120.502	93	
17	03/08	00 40	50.5	38.252°S	177.224°E	North Island N.Z.	88	5.9	68.537	35	
18	03/10	09 02	00.6	7.641°S	106.957°E	Java	52	5.7	74.959	109	
19	03/12	10 50	48.8	23.423°S	179.971°W	South of Fiji Isl.	547	5.5	83.466	36	S only
20	03/21	02 44	24.3	49.176°N	155.385°E	Kuril Islands	41	6.0	143.874	91	
21	04/03	03 09	44.2	14.316°S	167.222°E	Vanuatu Islands	156	5.5	89.095	50	
22	04/06	04 13	18.9	55.511°S	147.076°E	West of MacQuarie Island	10	5.5	45.104	50	
23	04/06	23 08	22.3	18.903°S	168.850°E	Vanuatu Islands	182	5.7	85.155	47	S
24	04/18	06 49	13.9	15.934°S	174.352°W	Tonga Islands	150	6.0	122.932	40	S
25	04/20	06 31	10.6	50.120°N	148.745°E	Sea of Okhotsk ?	582	6.0	142.281	98	
26	04/22	03 33	00.5	21.866°S	179.375°W	Fiji Isl. Region	593	5.7	85.101	36	
27	04/24	04 11	29.0	30.909°N	138.431°E	South of Honshu, Japan	403	6.1	121.706	94	
28	05/08	03 37	14.5	30.305°S	177.722°W	Kermadec Islands	33	5.6	77.240	32	

29	05/16	03	44	57.8	27.393°S	67.200°W	Catamarca Province, Argentina	158	5.4	70.379	295	
30	05/17	16	53	46.3	36.429°S	52.419°E	Atlantic-Indian Rise	10	5.7	105.739	169	LP
31	05/23	05	16	33.1	51.950°S	161.089°E	North of MacQuarie Island	10	5.9	51.940	42	
32	05/25	02	32	45.9	30.650°S	178.210°W	Kermadec Islands	59	5.5	76.810	33	
33	05/26	03	58	56.9	43.548°S	38.944°E	Prince Edward Isl.	10	5.7	25.532	181	LP
34	05/29	04	36	09.0	3.565°N	97.138°E	Northern Sumatera	71	5.8	82.243	122	
35	05/30	07	49	43.6	4.843°S	151.577°E	New Britain Region	174	6.2	93.256	68	S, LP
36	05/31	13	04	00.1	37.103°N	116.048°W	Southern Nevada Explosion	0	5.8	145.314	324	N
37	06/06	17	28	13.0	48.274°S	31.696°E	South of Africa	10	5.3	21.139	195	
38	06/11	02	05	34.0	30.707°S	71.179°W	Near Coast of Central Chile	46	6.3	68.569	300	
39	06/15	14	22	23.0	15.816°S	174.831°W	Tonga Island	247	6.1	91.903	33	
40	06/18	11	20	17.9	15.705°S	72.491°W	Southern Peru	117	5.8	82.999	296	
41	06/20	19	56	46.6	24.101°S	66.965°W	Salta Province, Argentina	196	5.5	73.359	294	S only
42	06/22	15	55	28.4	58.318°S	15.786°W	South Western Atlantic Ocean	10	6.2	25.675	274	LP
43	06/24	13	29	39.2	43.541°S	170.673°E	South Island N.Z.	6	5.8	62.066	38	
44	07/05	05	21	48.9	6.056°S	154.424°E	Solomon Islands	33	6.0	93.054	65	

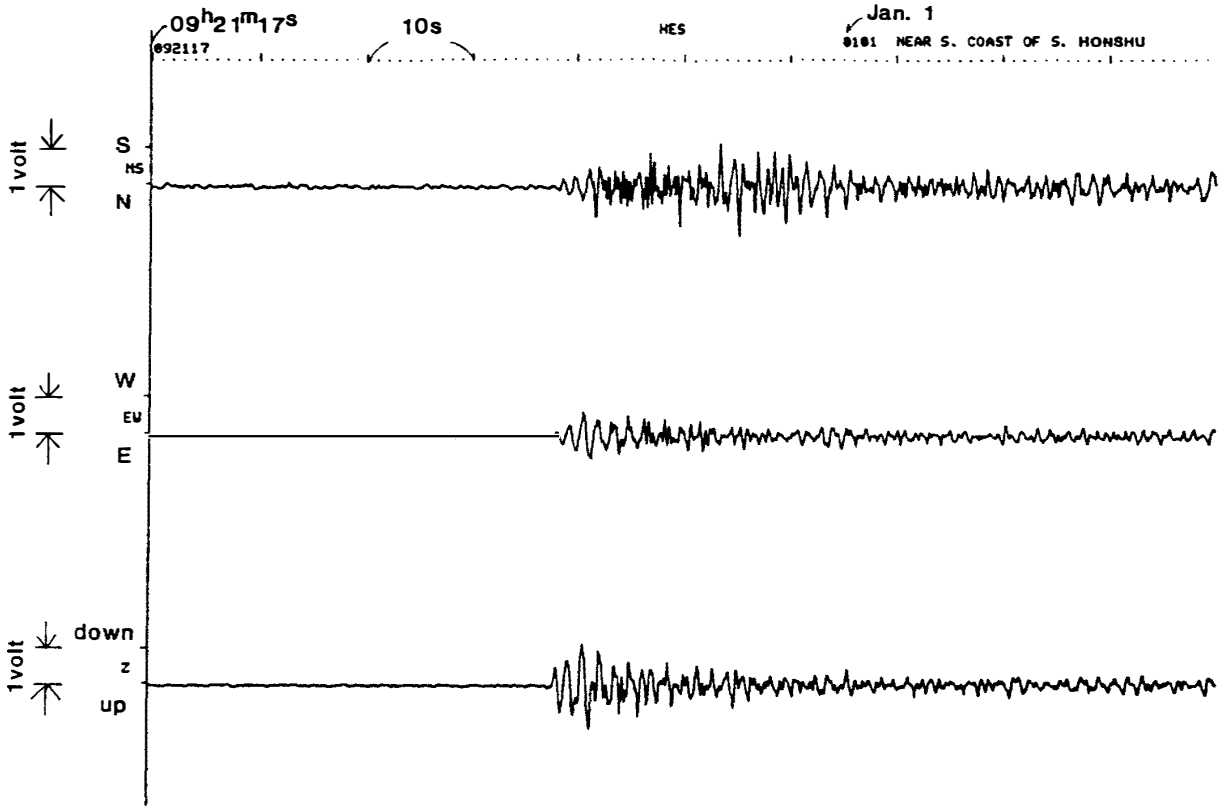
45	07/07	15	47	18.7	56.100°S	27.399°W	South Sandwich Isl.	98	5.5	31.508	281	
46	07/09	23	19	03.5	5.788°S	111.298°E	Java Sea	534	5.8	78.077	105	
47	07/17	14	14	17.3	56.392°S	27.388°W	South Sandwich Isl.	129	5.9	31.278	281	S
48	07/24	04	49	45.5	25.730°S	70.478°W	Near Coast of Northern Chile	34	5.6	72.981	298	
49	08/06	12	01	52.4	0.086°S	122.517°E	Minahassa Peninsula	242	6.2	87.442	97	S
50	08/12	11	51	41.8	24.186°S	69.179°W	Northern Chile	101	5.6	74.002	296	
51	08/18	04	10	43.1	27.876°S	66.717°W	Catamarca Province, Argentina	173	5.2	69.774	295	
52	08/24	16	53	07.1	58.917°S	16.521°W	South Western Atlantic Ocean	10	5.8	25.501	275	
53	08/26	05	00	45.6	23.594°S	179.070°E	South of Fiji Isl.	560	5.9	83.096	37	S, LP
54	08/30	16	06	13.9	33.332°S	179.359°W	South of Kermadec Islands	33	5.9	73.982	33	S
55	08/31	15	42	11.7	17.957°S	172.149°E	Vanuatu Islands	29	6.1	86.912	45	
56	09/11	07	16	35.1	15.501°S	167.685°E	Vanuatu Islands	129	5.6	88.092	49	
57	09/17	09	08	48.8	32.157°S	178.320°W	South of Kermadec Islands	10	5.8	75.325	33	
58	09/18	17	02	44.3	34.006°N	141.500°E	Off East Coast of Honshu, Japan ?	48	6.6	125.605	93	
59	09/22	21	44	17.2	32.040°S	178.405°W	South of Kermadec Islands	44	5.5	75.422	33	

60	09/28	00 03	34.5	25.849°S	175.911°W	South of Tonga Isl.	21	6.4	81.922	32	
61	09/28	03 03	46.8	21.510°S	177.796°W	Fiji Islands Region	364	5.8	85.773	35	S
62	09/28	10 40	24.2	31.576°S	110.841°W	Easter Island Reg.	10	5.9	77.205	334	
63	10/01	12 04	15.6	30.065°S	178.784°W	Kermadec Islands	220	4.9	77.266	33	
64	10/08	05 15	27.4	47.860°S	31.950°E	South of Africa	10	5.4	21.529	194	LP
65	10/10	19 05	58.1	20.147°S	179.271°W	Fiji Islands Reg.	676	5.6	86.790	36	
66	10/11	08 21	33.0	33.998°S	179.723°E	South of Kermadec Islands	135	5.5	73.155	34	
67	10/15	10 21	07.5	15.860°S	173.643°W	Tonga Islands	128	6.5	92.088	32	S, LP
68	10/20	17 59	17.0	24.072°S	66.832°W	Salta Province, Argentina	192	6.0	73.342	294	S, LP
69	10/29	23 18	05.1	5.731°N	125.543°E	Mindanao, Philippine Islands	153	5.9	93.921	96	
70	10/30	01 05	49.9	17.109°S	174.076°W	Tonga Islands	141	6.0	90.788	32	
71	11/01	18 43	44.1	55.209°N	163.692°E	Off East Coast of Kamchatka	49	5.8	151.804	90	
72	11/06	07 58	51.3	18.876°S	67.352°E	Mid-Indian Rise	10	6.2	53.059	146	
73	11/15	02 46	19.8	22.022°S	170.950°E	Loyalty Islands Region	105	6.3	82.712	45	S
74	11/15	05 52	30.5	20.388°S	177.421°W	Fiji Islands Region	348	5.7	86.939	34	
75	11/17	06 49	30.0	0.197°N	98.027°E	Northern Sumatera	33	6.3	79.390	120	LP

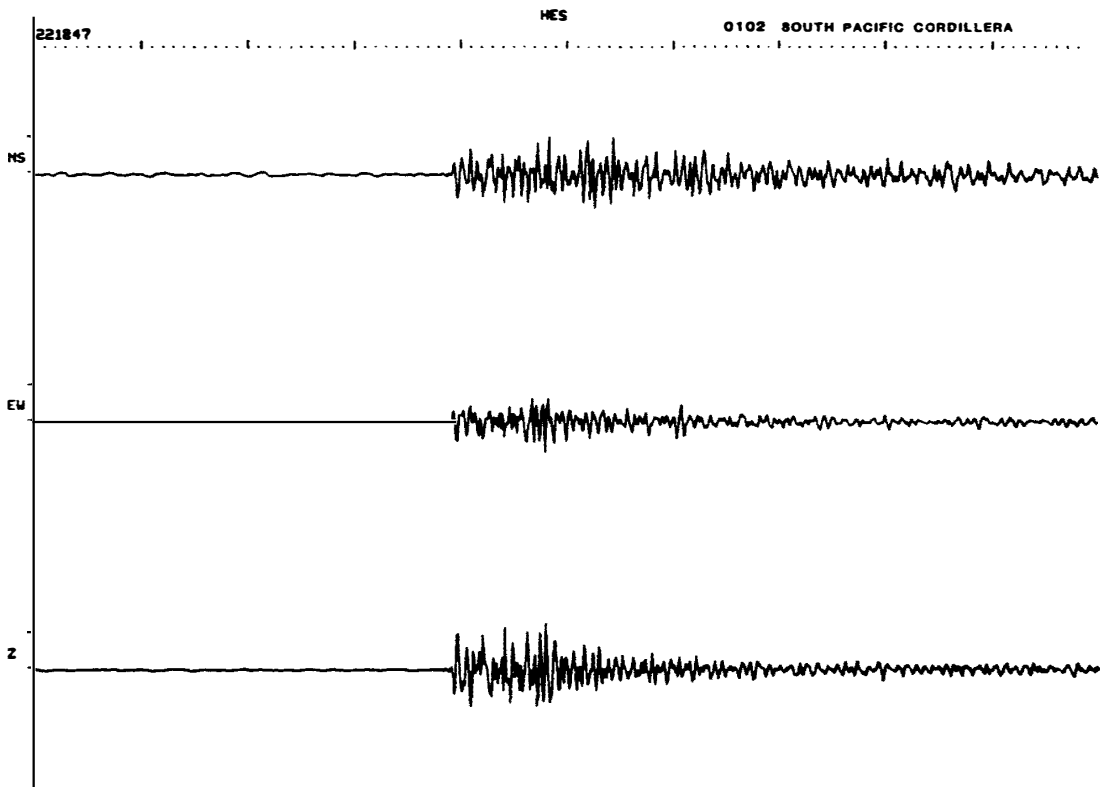
76	11/17	13 45	49.1	18.785°S	178.032°W	Fiji Islands Region	451	6.1	88.371	35	S, LP
77	11/20	08 15	16.2	5.167°N	125.124°E	Mindanao, Philippine Islands	202	6.4	93.248	96	LP
78	11/22	00 50	43.4	30.958°S	13.485°W	South Atlantic Ridge	10	5.9	48.359	247	
79	11/22	17 07	36.1	17.779°S	178.050°W	Fiji Islands Region	646	5.9	89.344	36	
80	11/23	04 45	53.2	7.993°S	102.255°E	South West of Sumatera	33	6.0	72.928	113	
81	11/29	19 12	30.8	35.419°S	71.085°W	Central Chile	99	5.4	64.167	302	
82	12/11	23 22	19.3	22.407°S	68.599°W	Northern Chile	92	5.7	75.471	295	
83	12/28	10 37	53.7	56.194°N	163.460°E	Near East Coast of Kamchatka	33	6.2	152.451	91	LP
84	12/30	20 59	56.1	36.695°S	177.493°E	Off East Coast of North Island, N.Z.	36	5.1	70.095	35	
85	12/30	21 36	56.4	36.663°S	177.512°E	Off East Coast of North Island, N.Z.	39	6.2	70.130	35	LP

- (i) The events and the epicentral data are picked from the PDE reports.
- (ii) LP in the comment column means that digital long-period seismogram was obtained.
- (iii) S in the comment column means that clear S-phase was obtained.
- (iv) N in the comment column means nuclear explosion.
- (v) Azimuth indicates the anti-clockwisely measured angle from South Pole to Swowa Station to Epicenter.

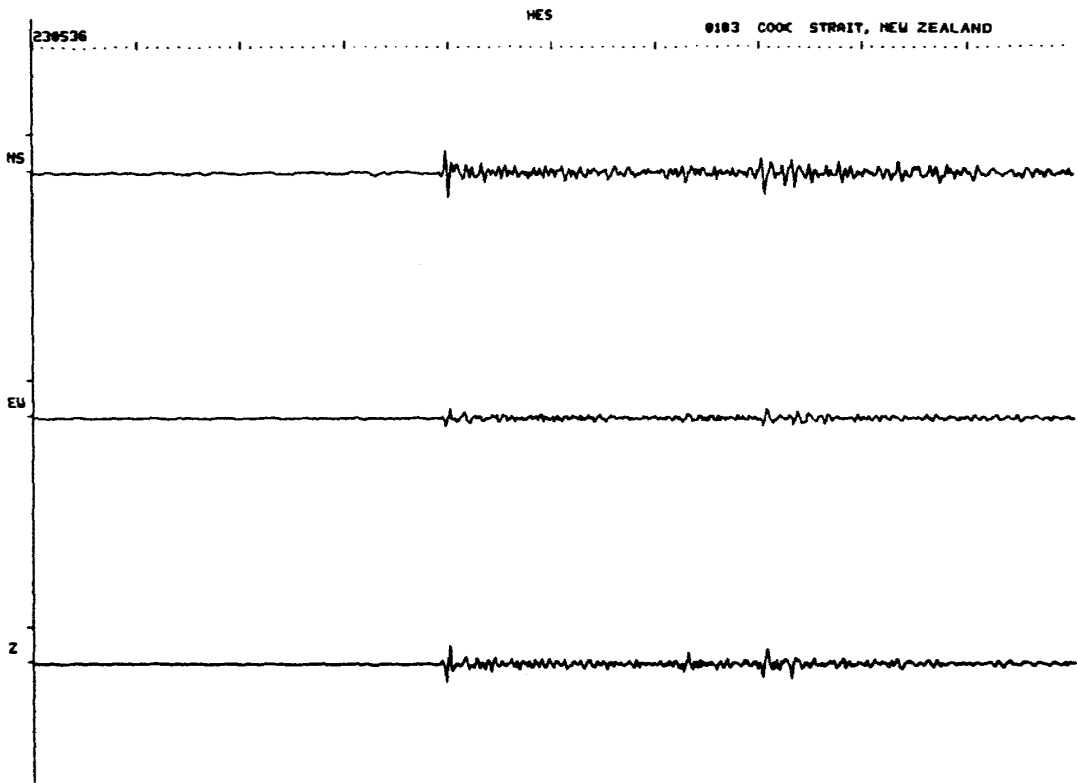
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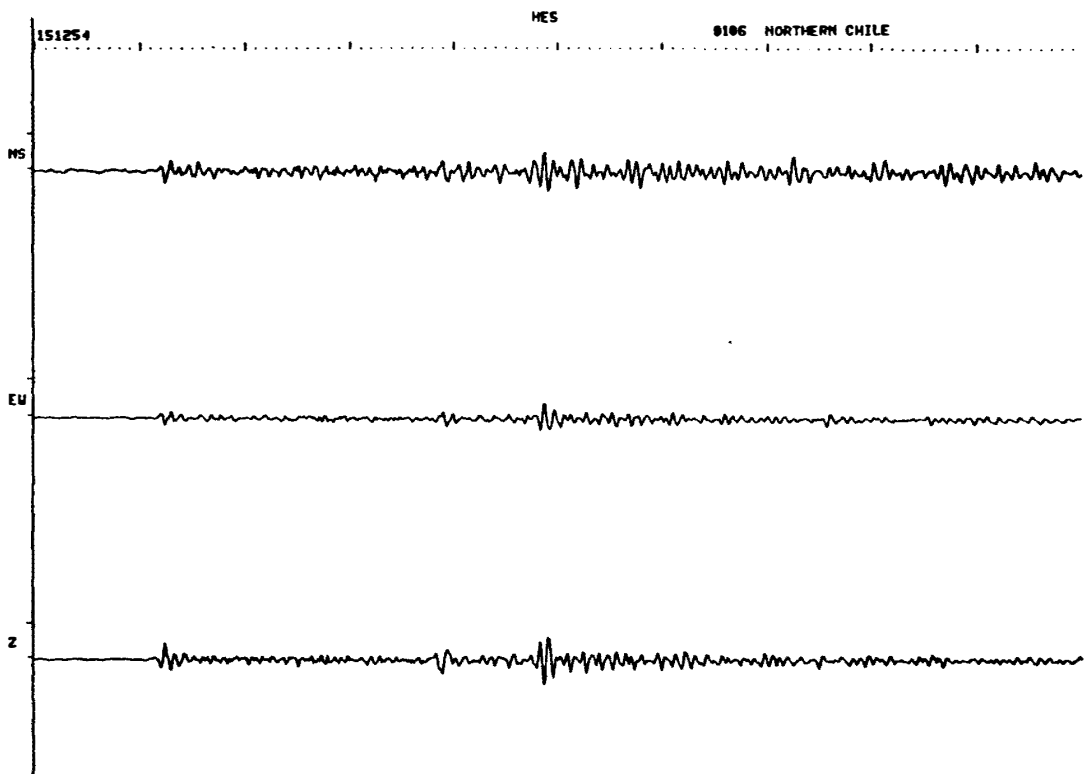
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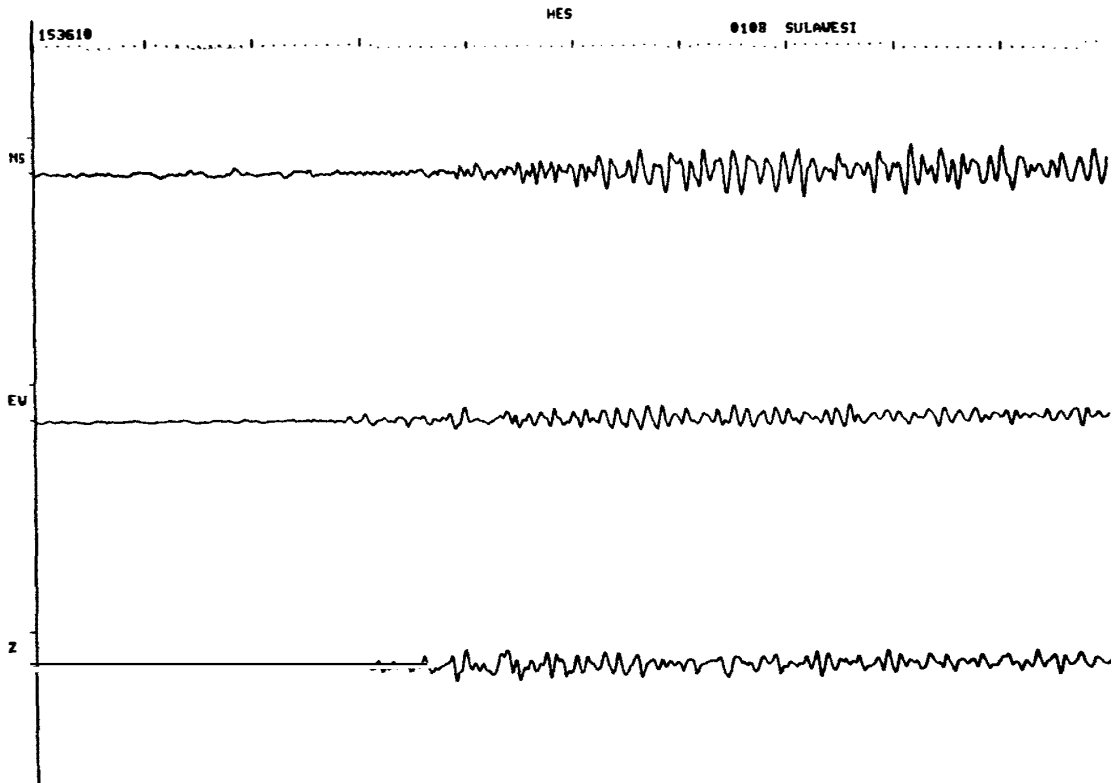
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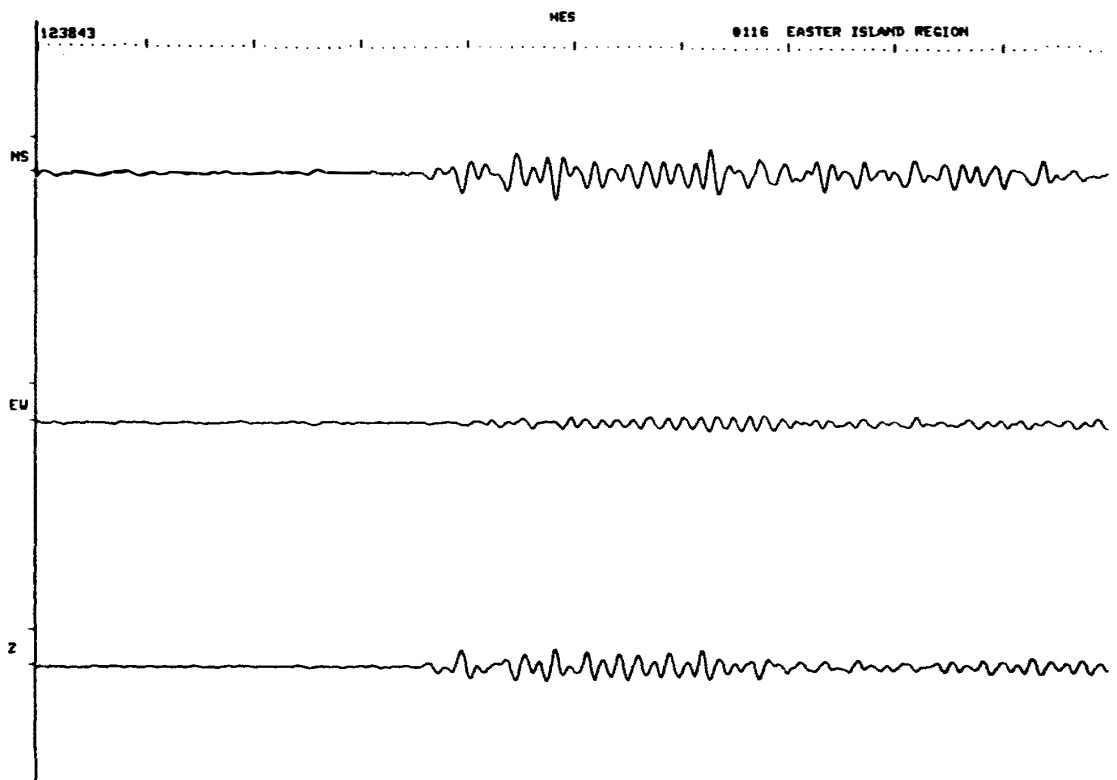
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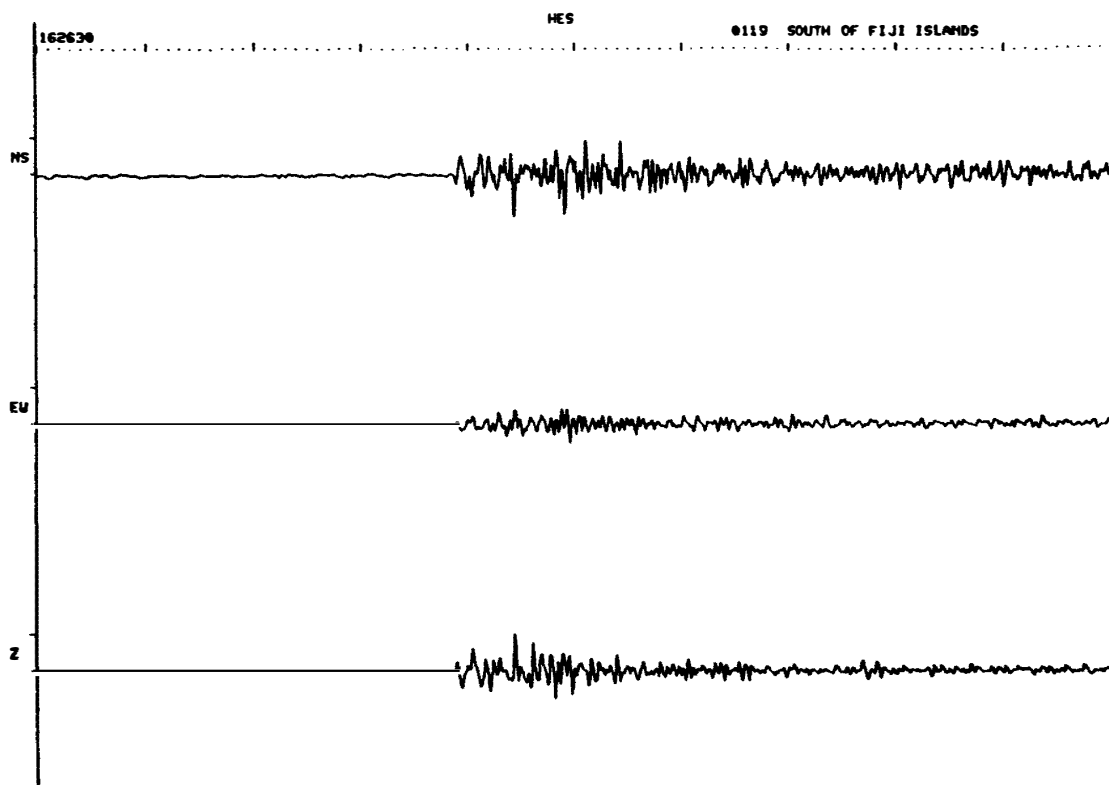
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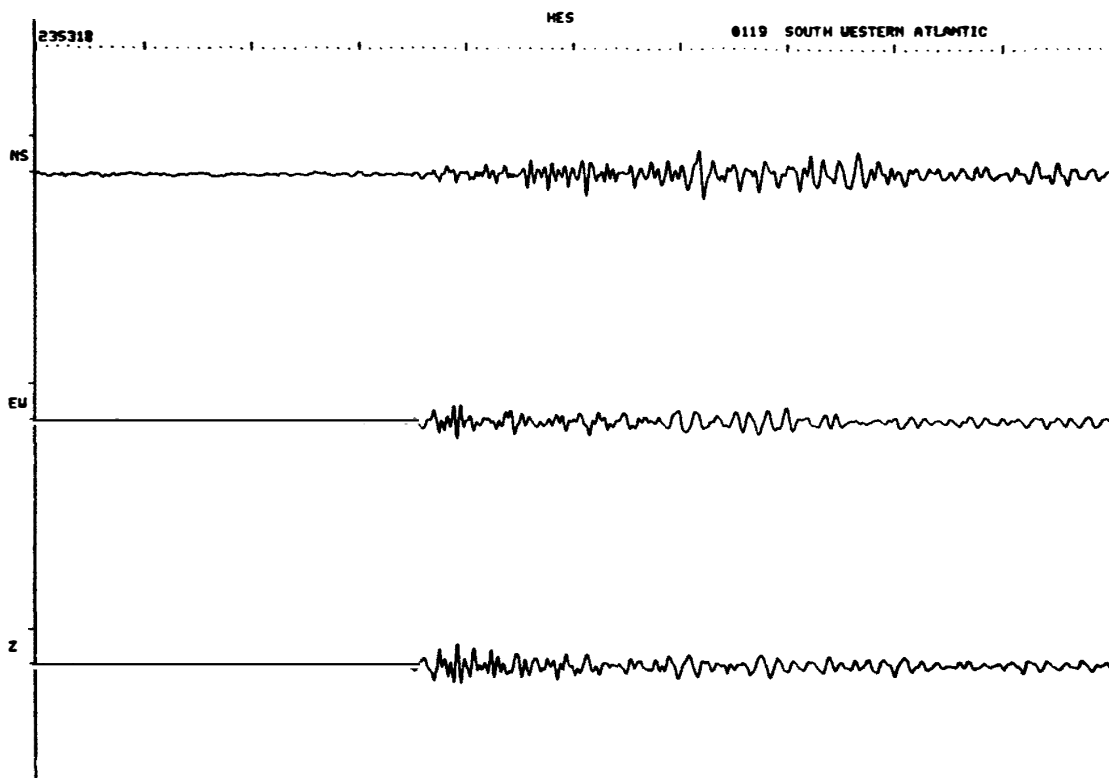
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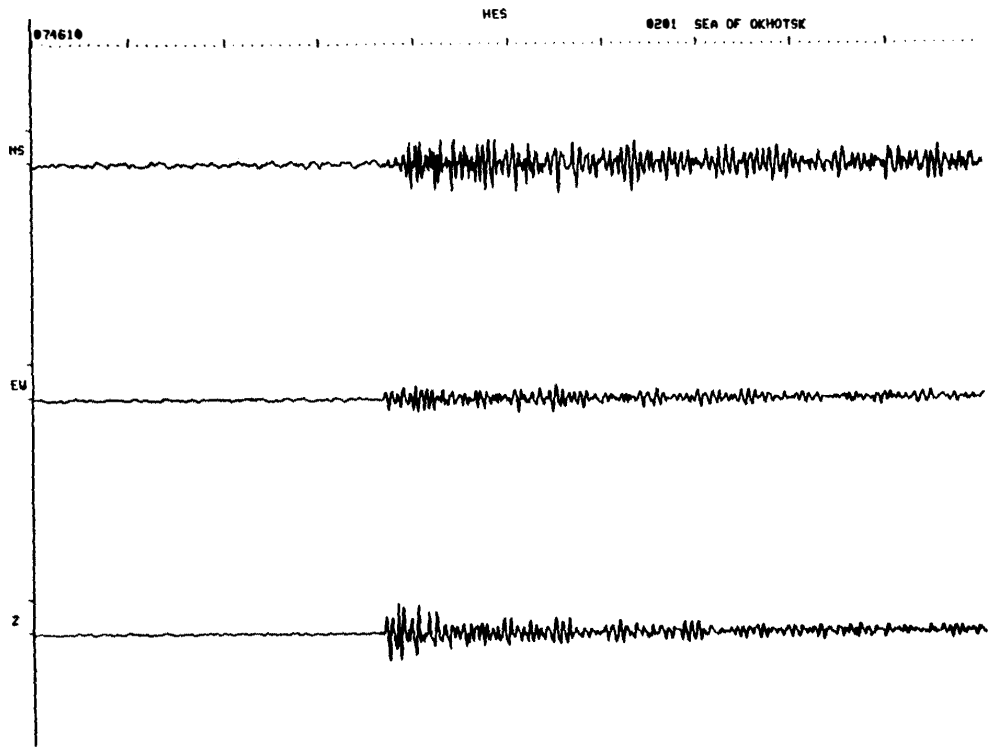
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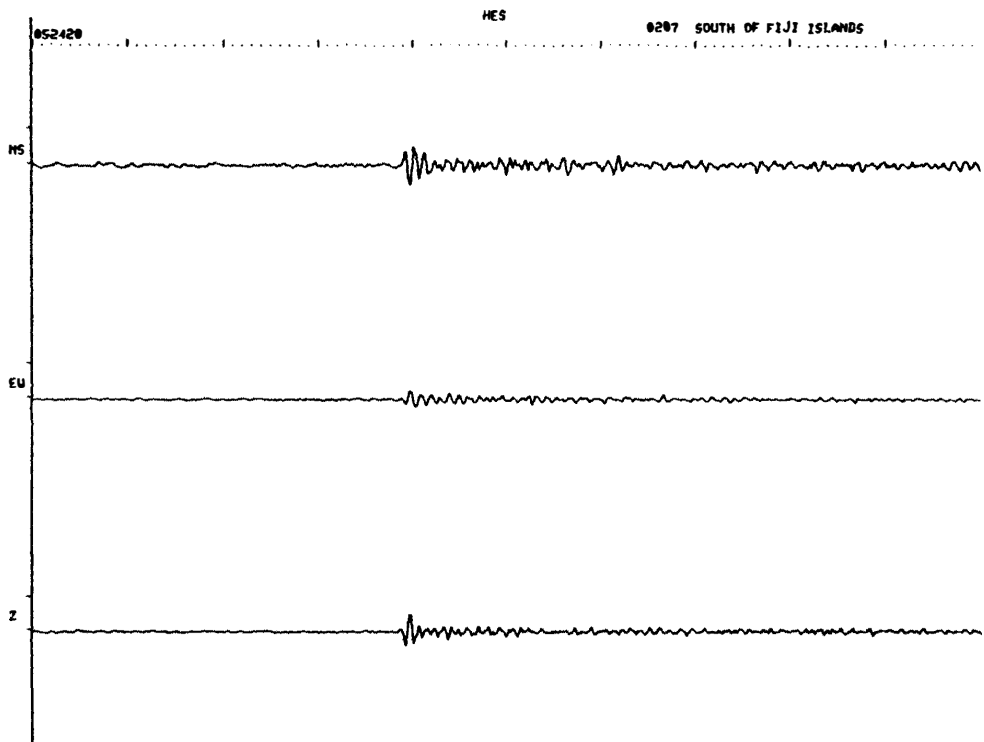
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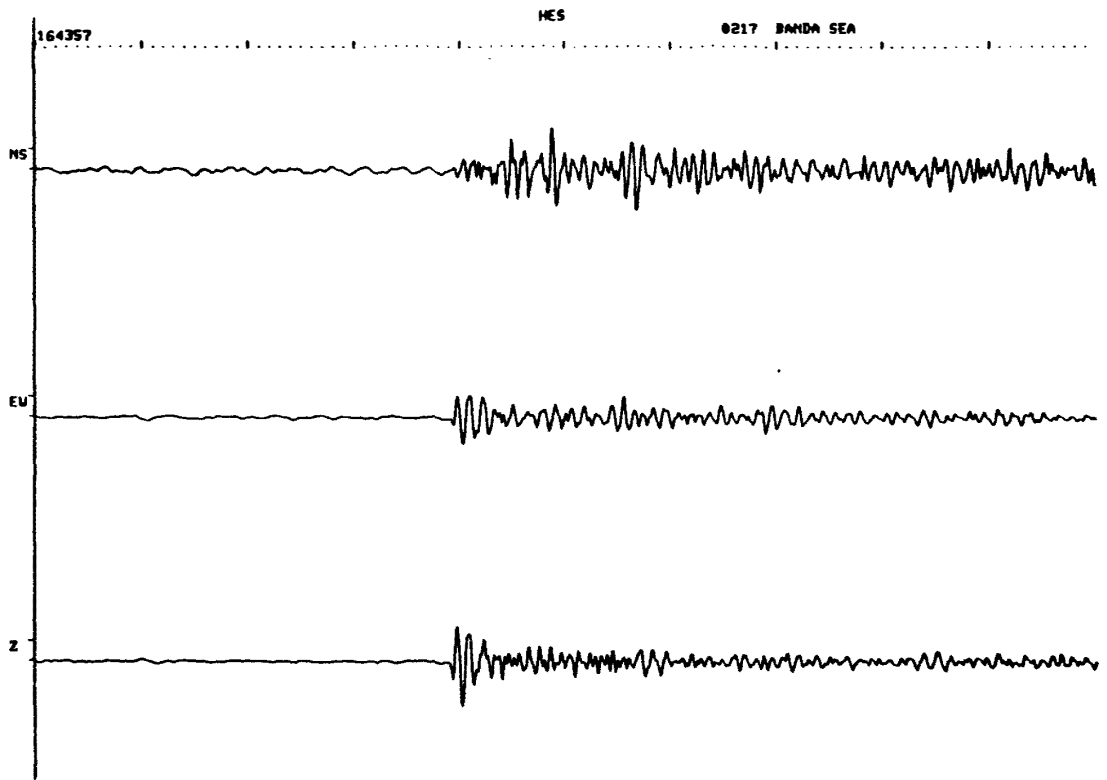
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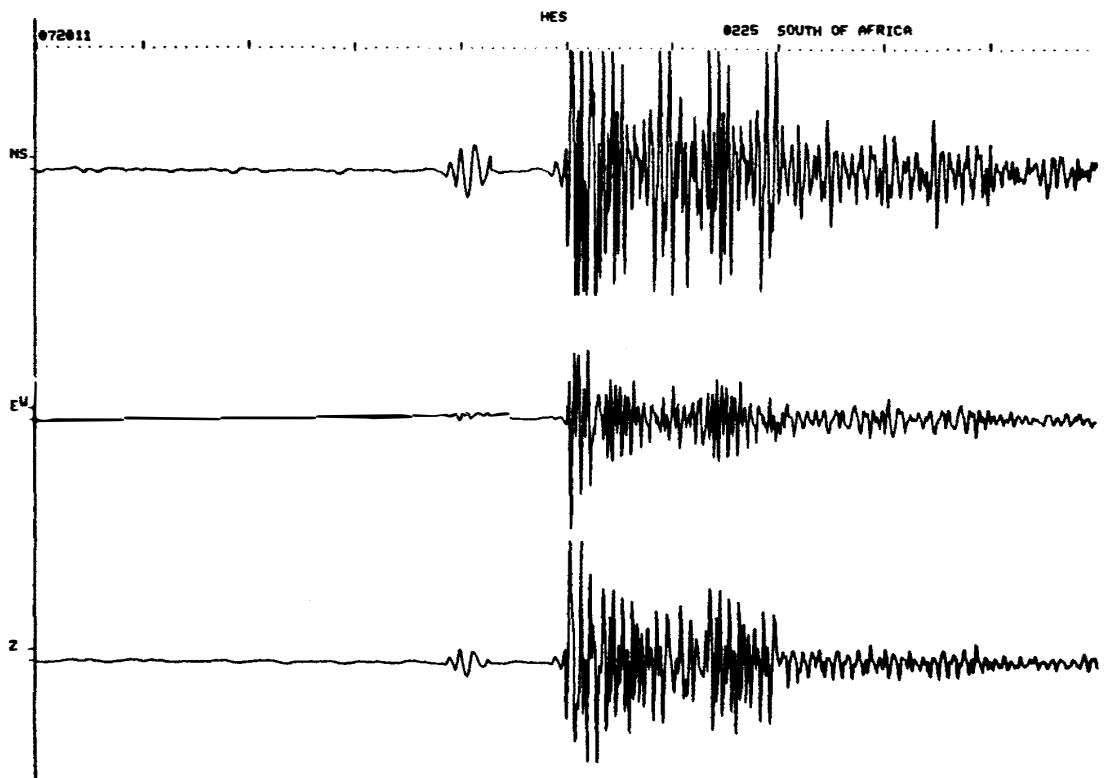
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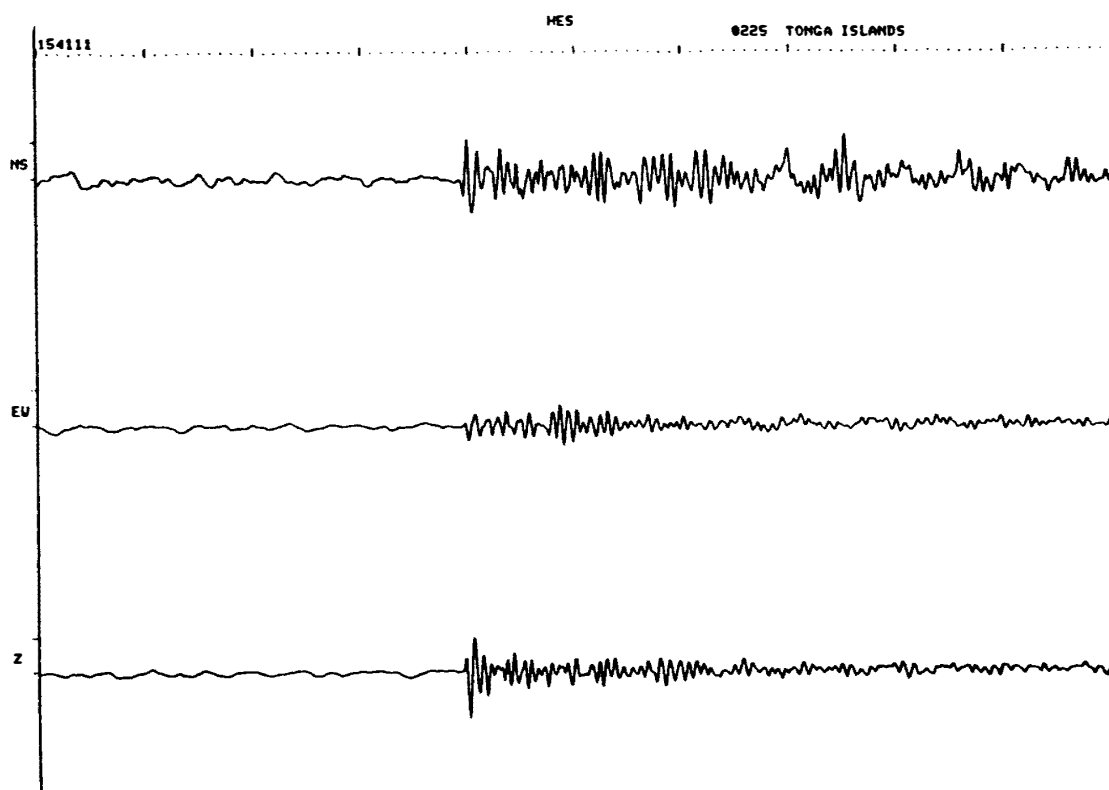
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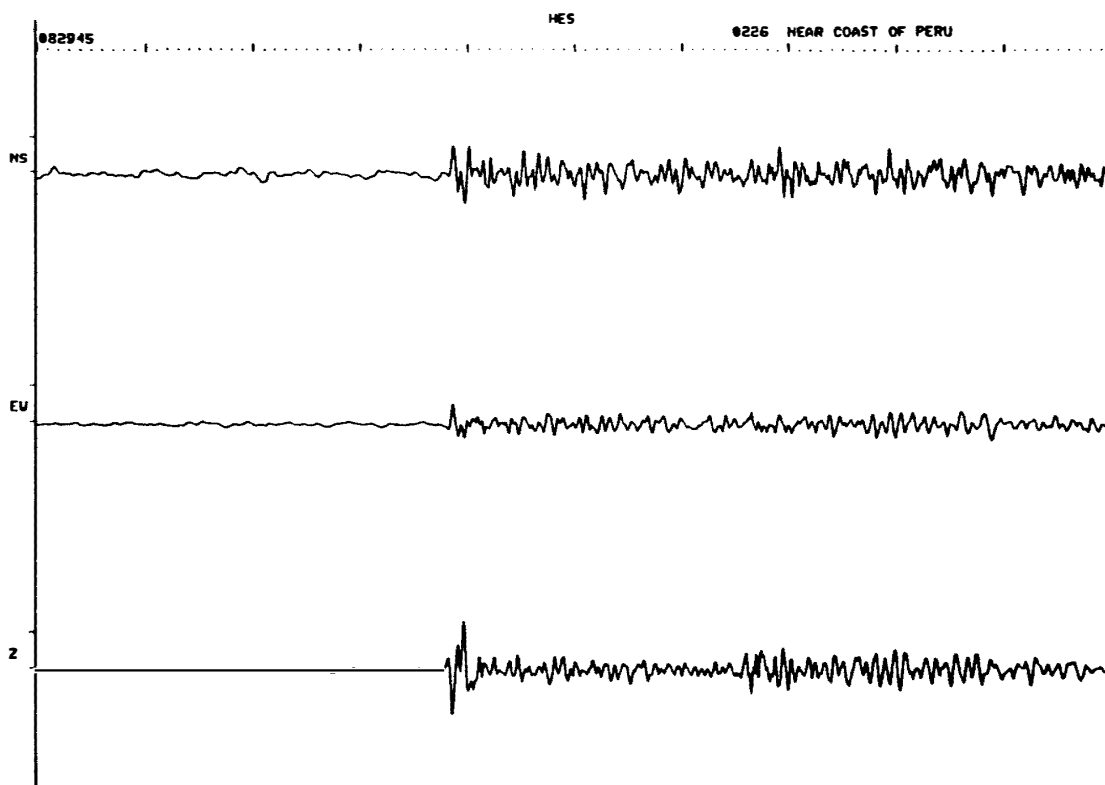
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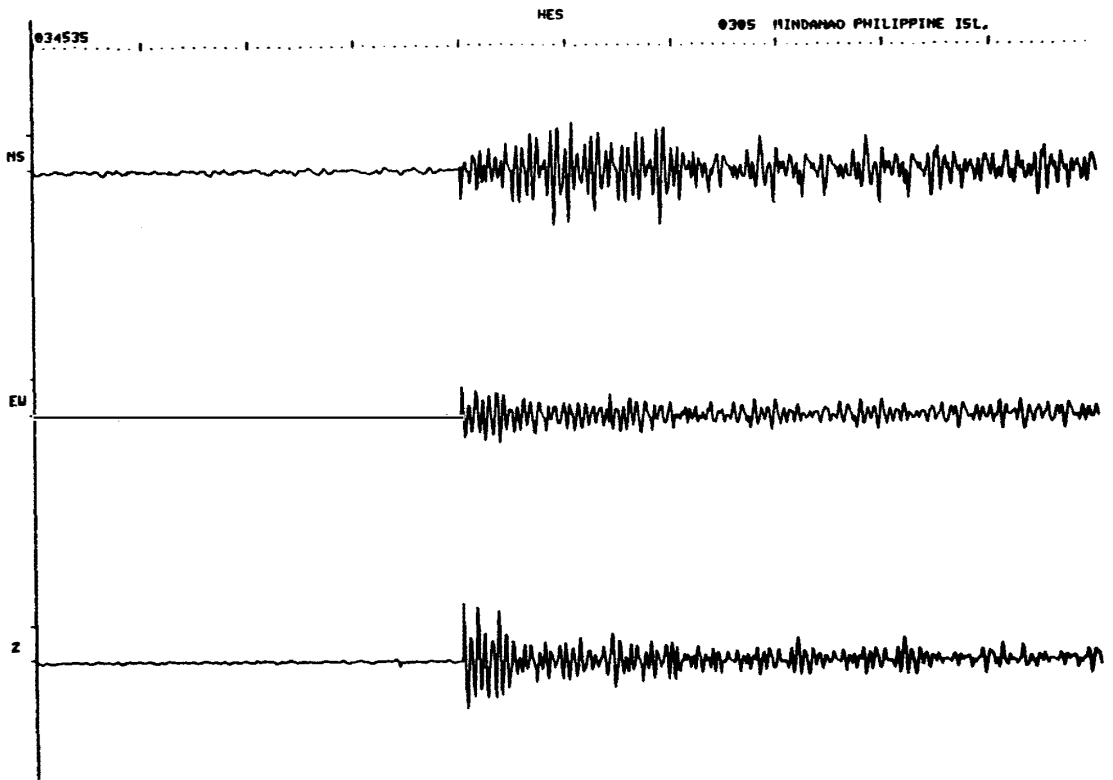
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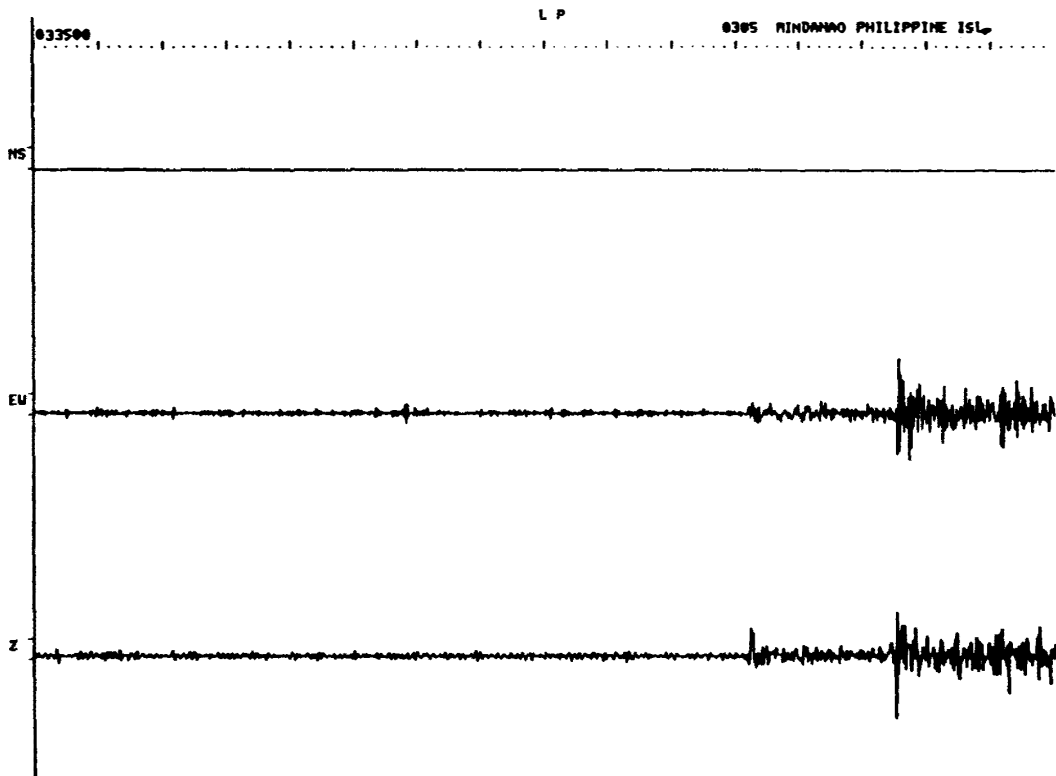
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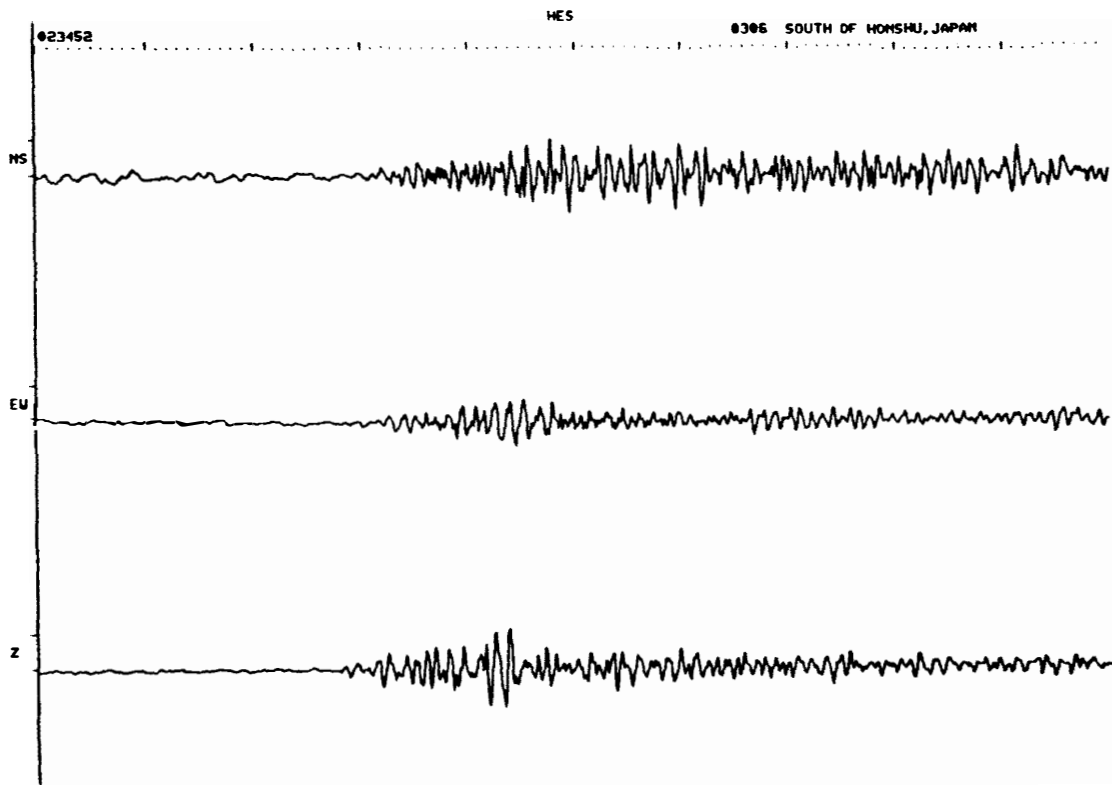
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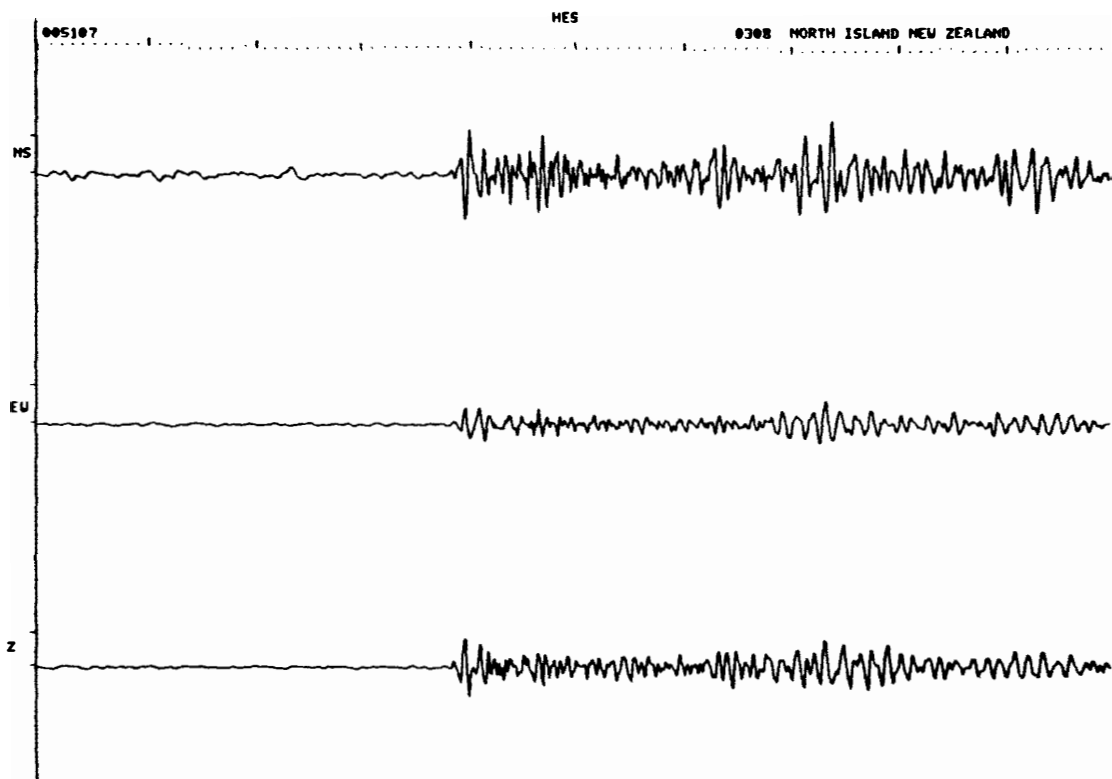
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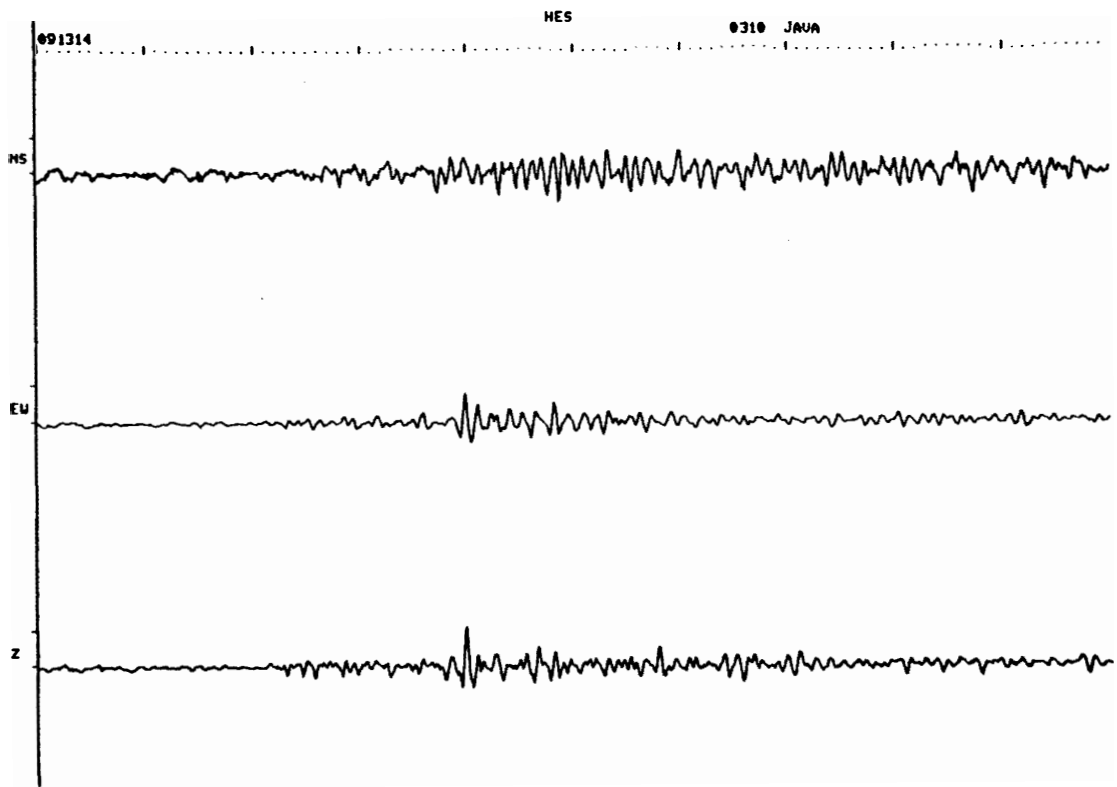
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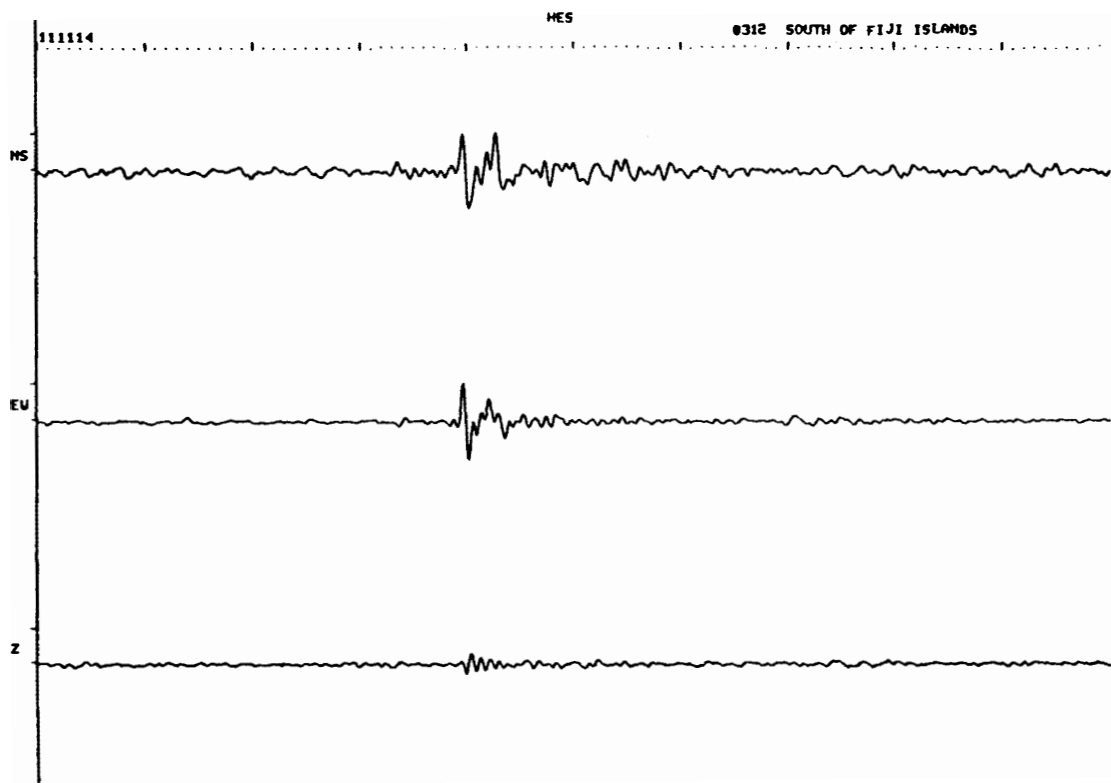
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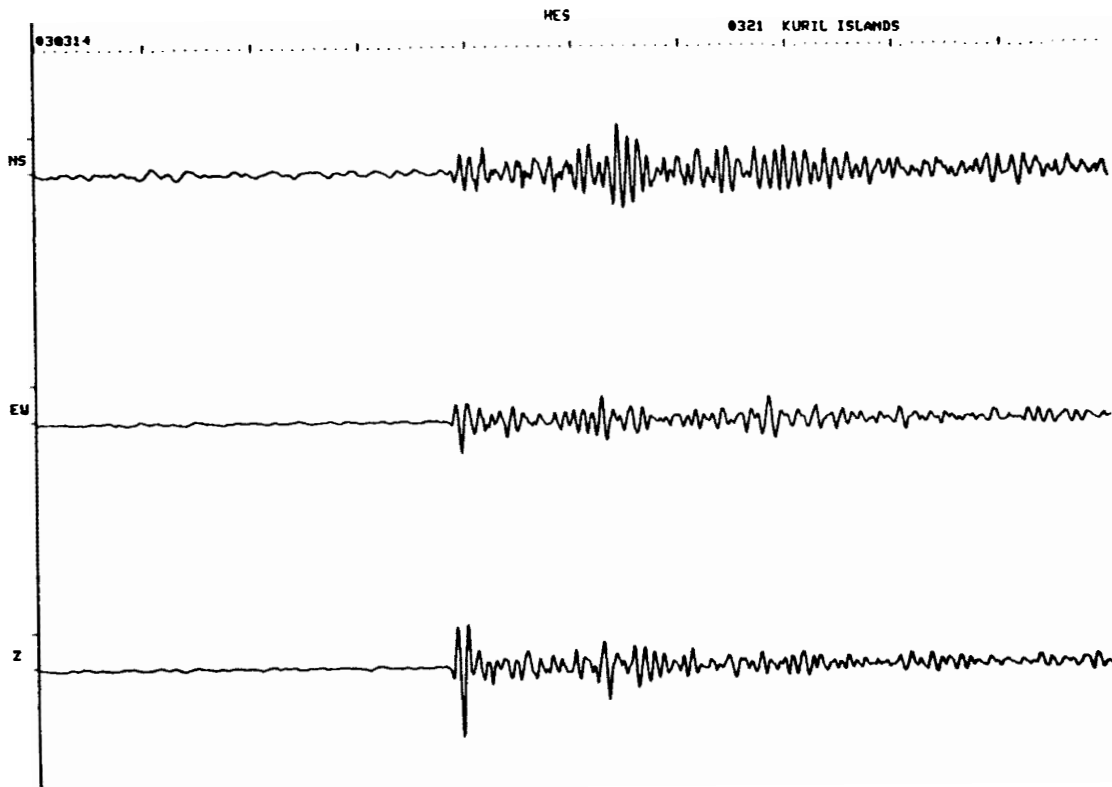
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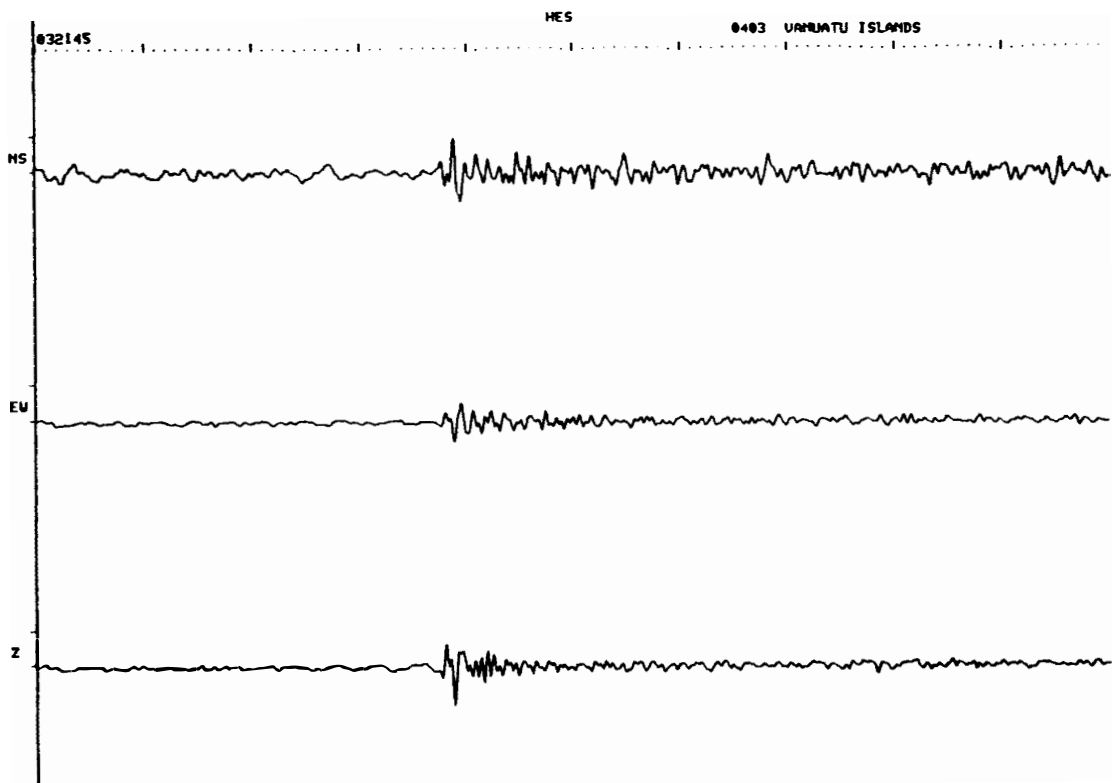
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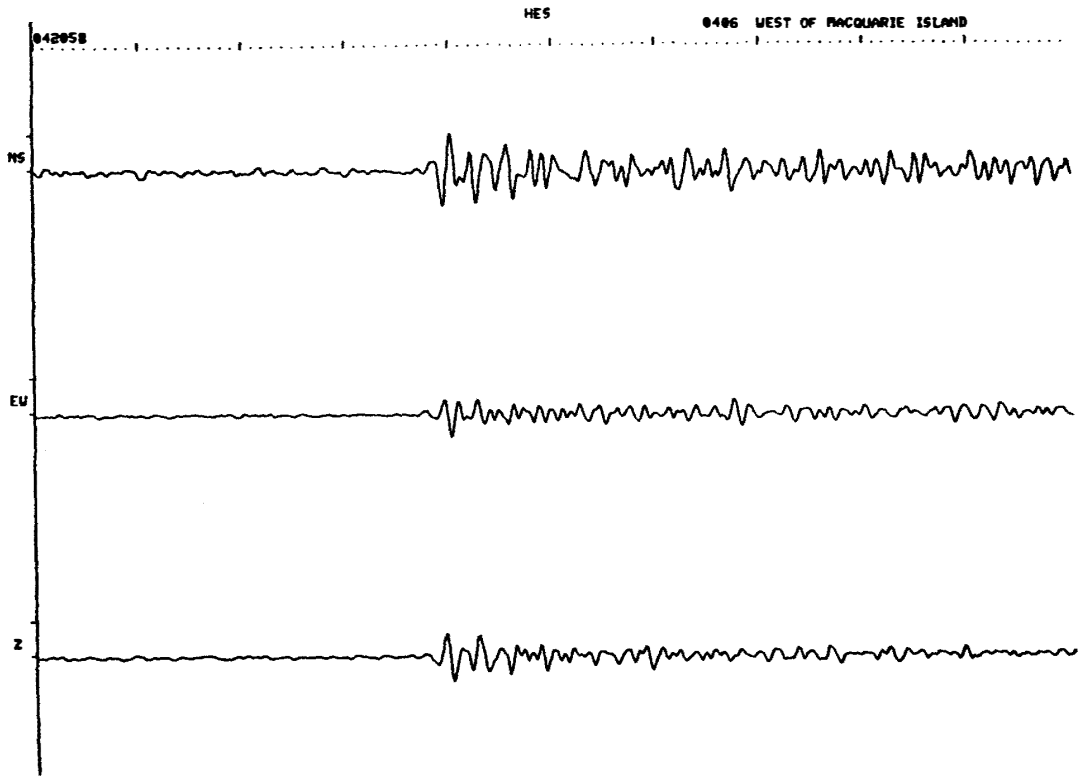
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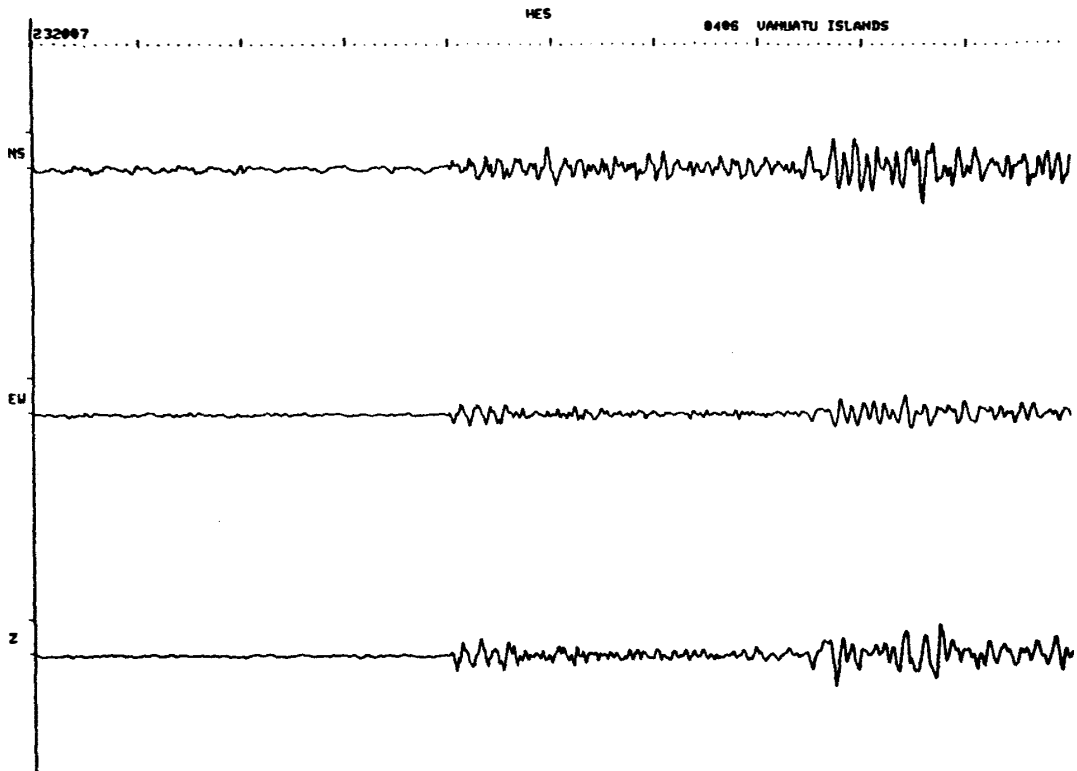
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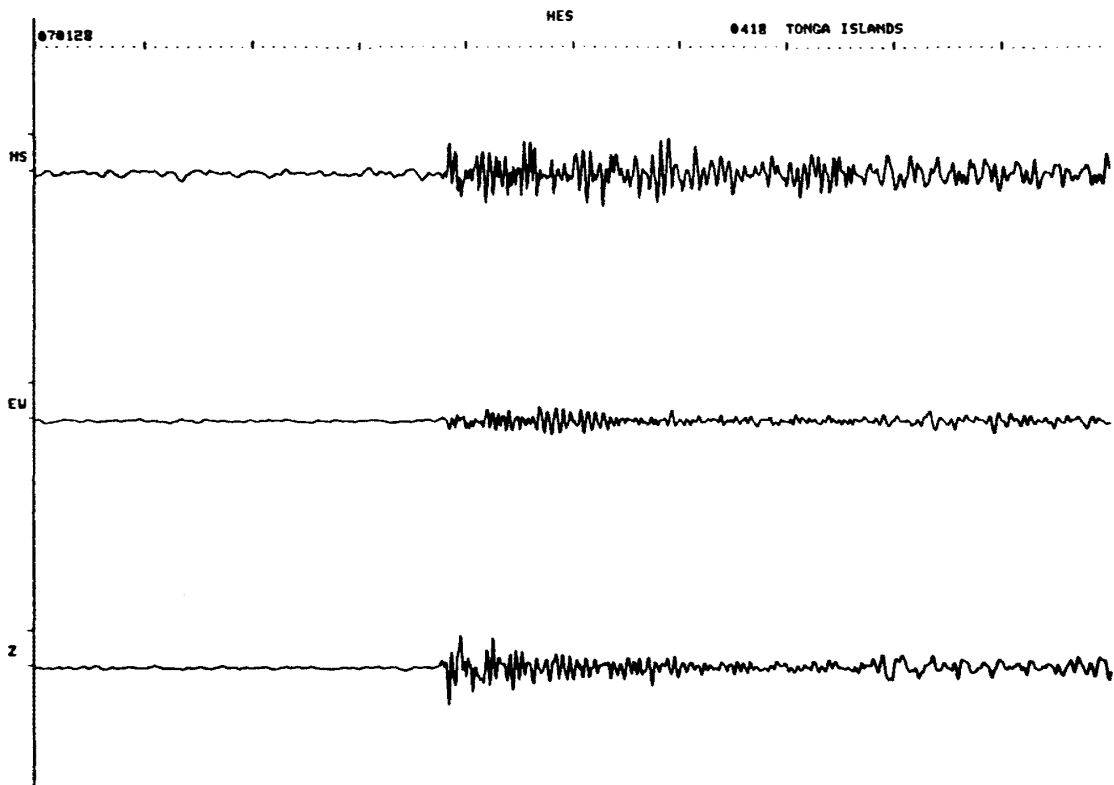
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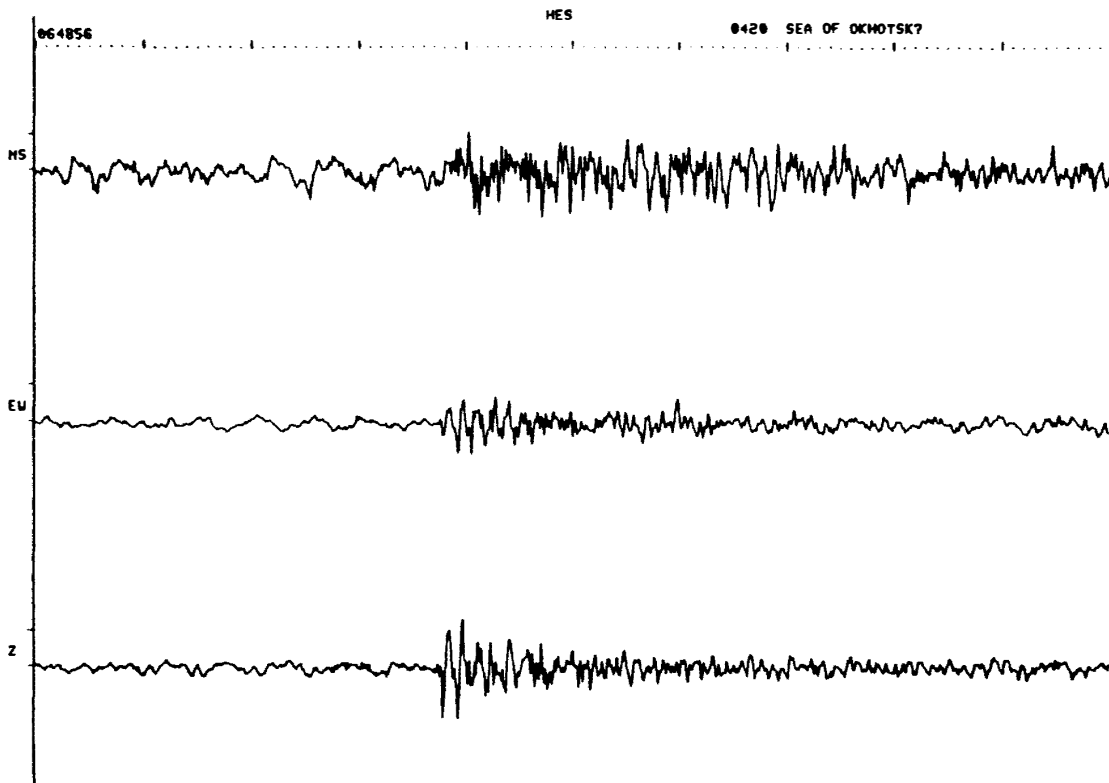
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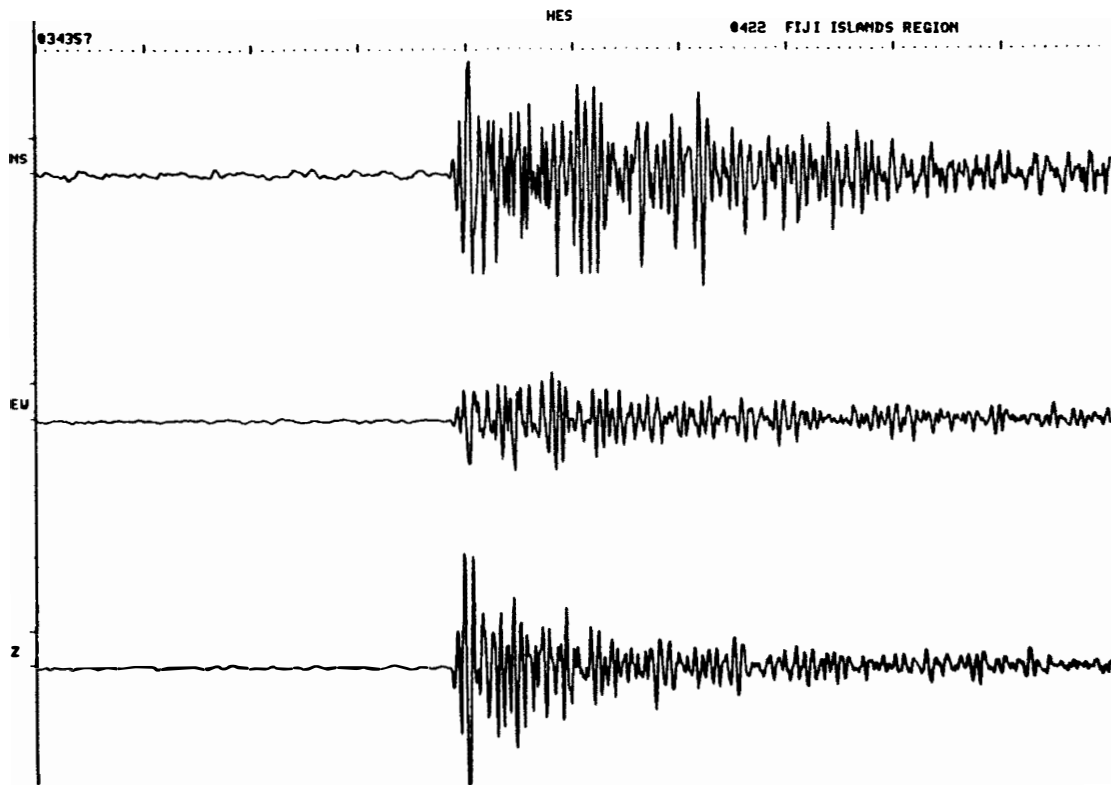
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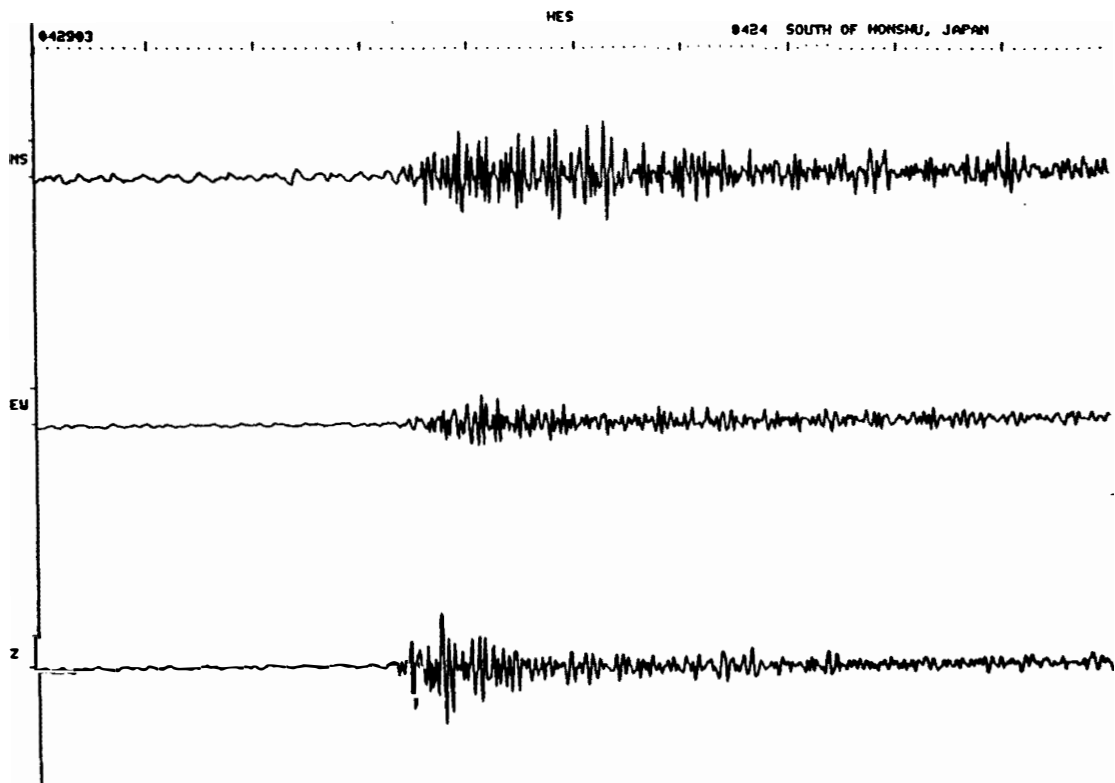
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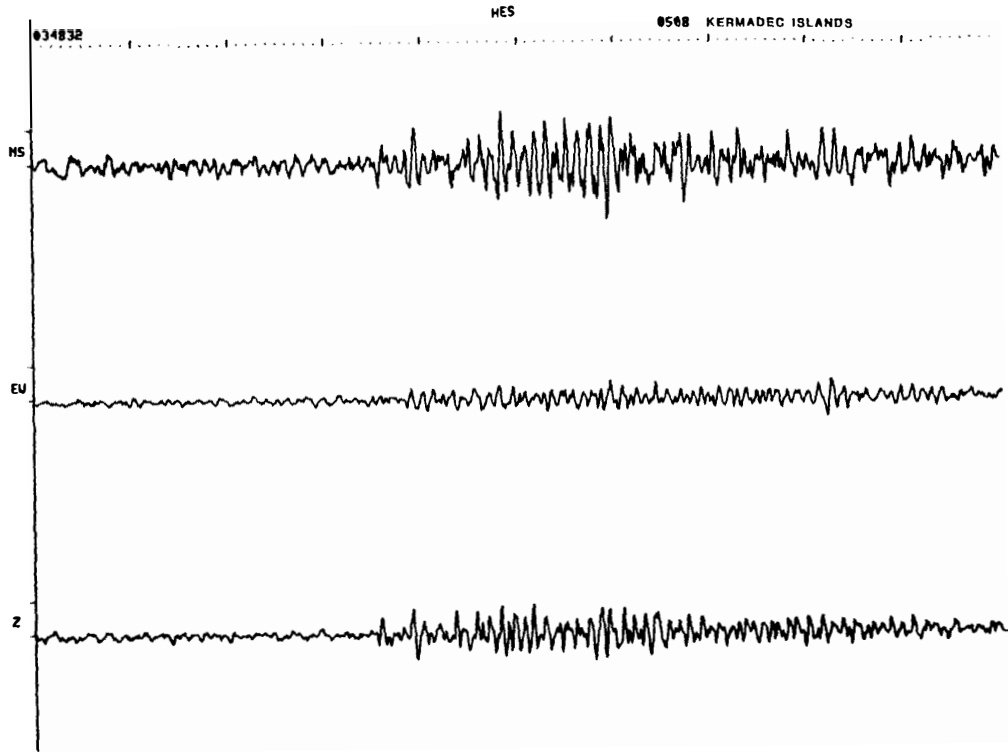
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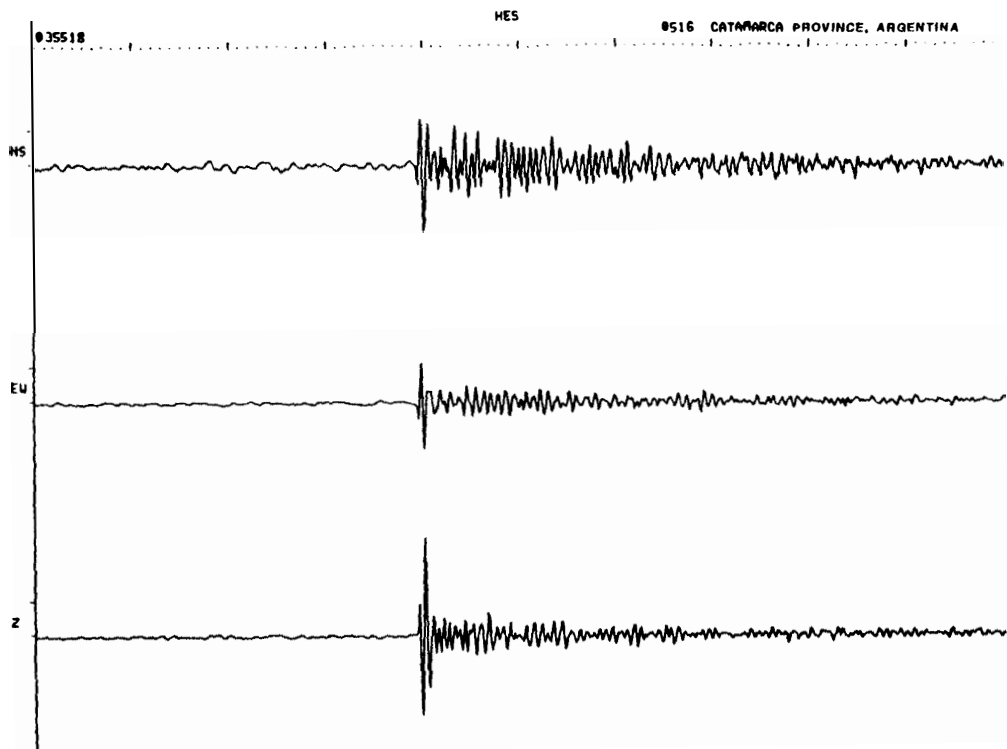
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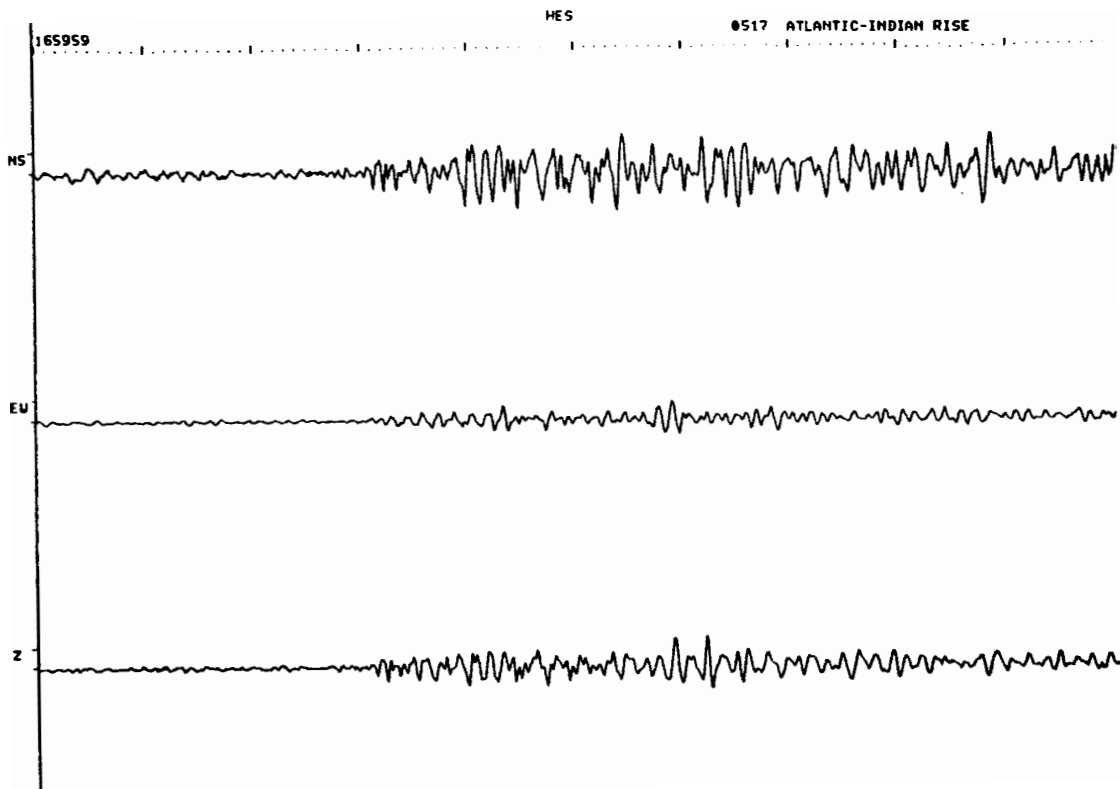
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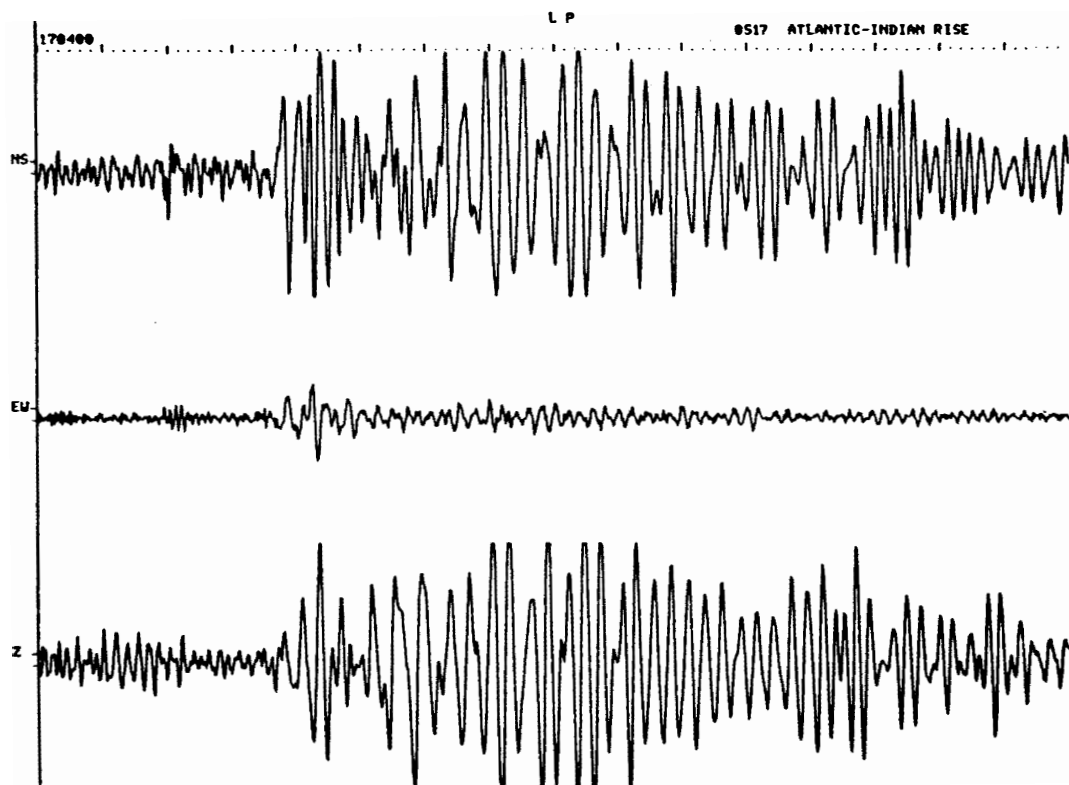
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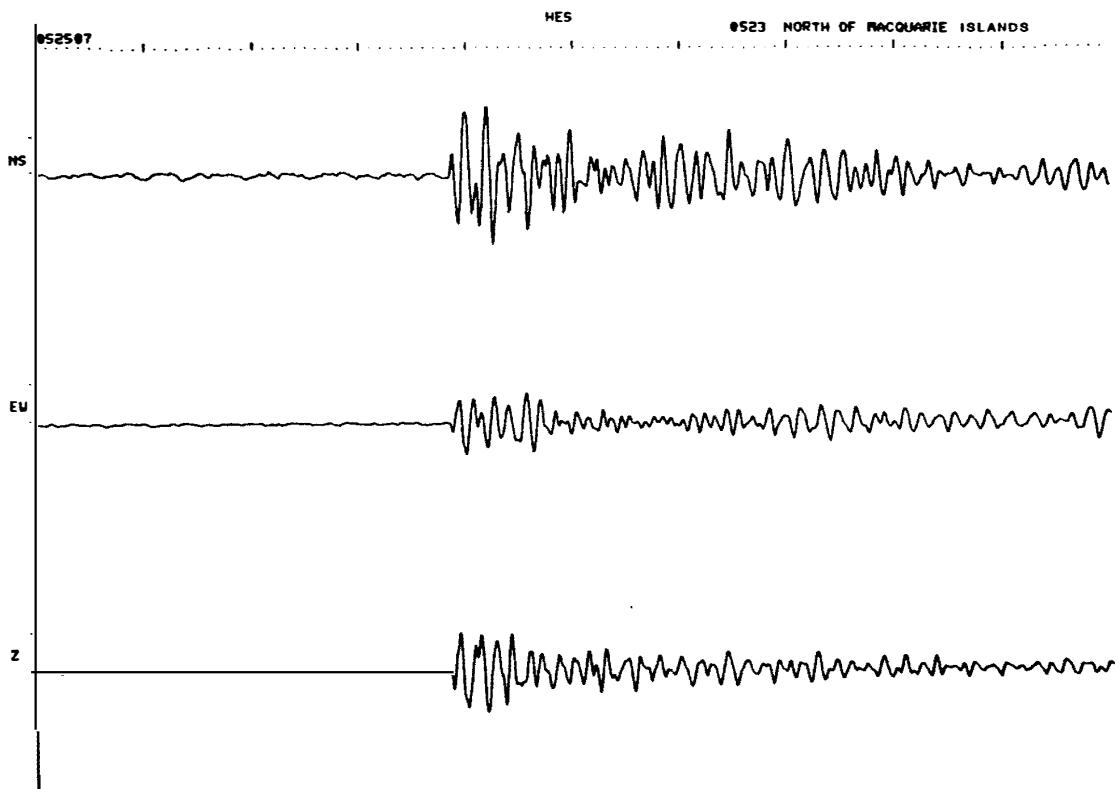
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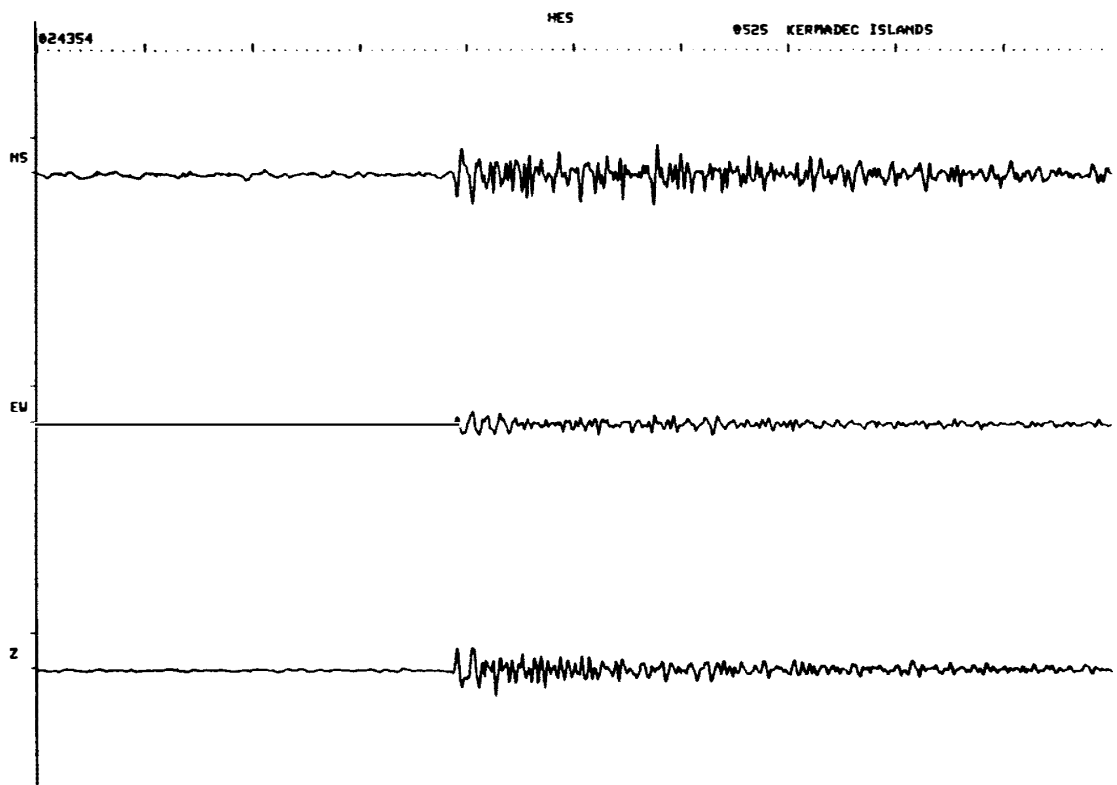
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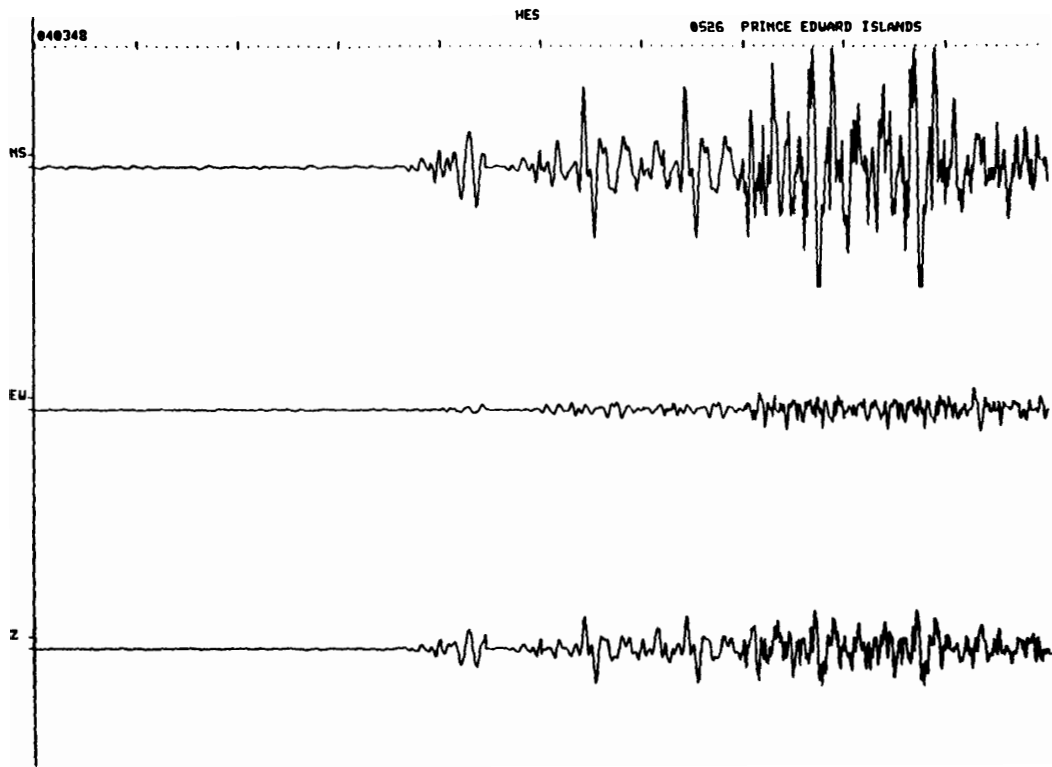
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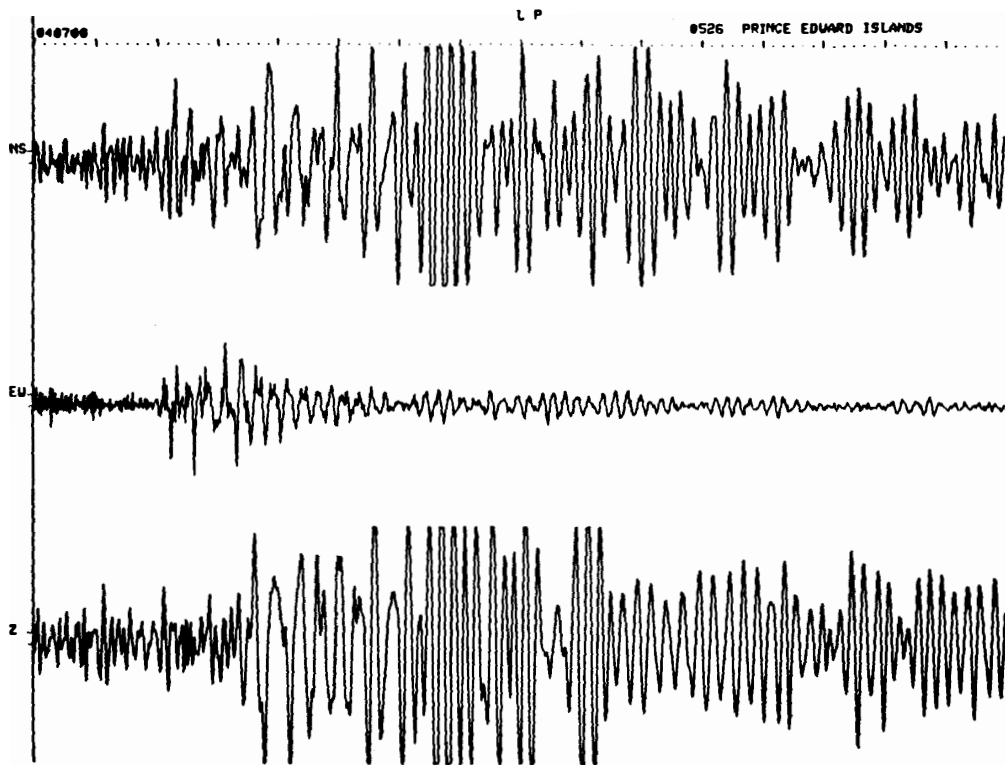
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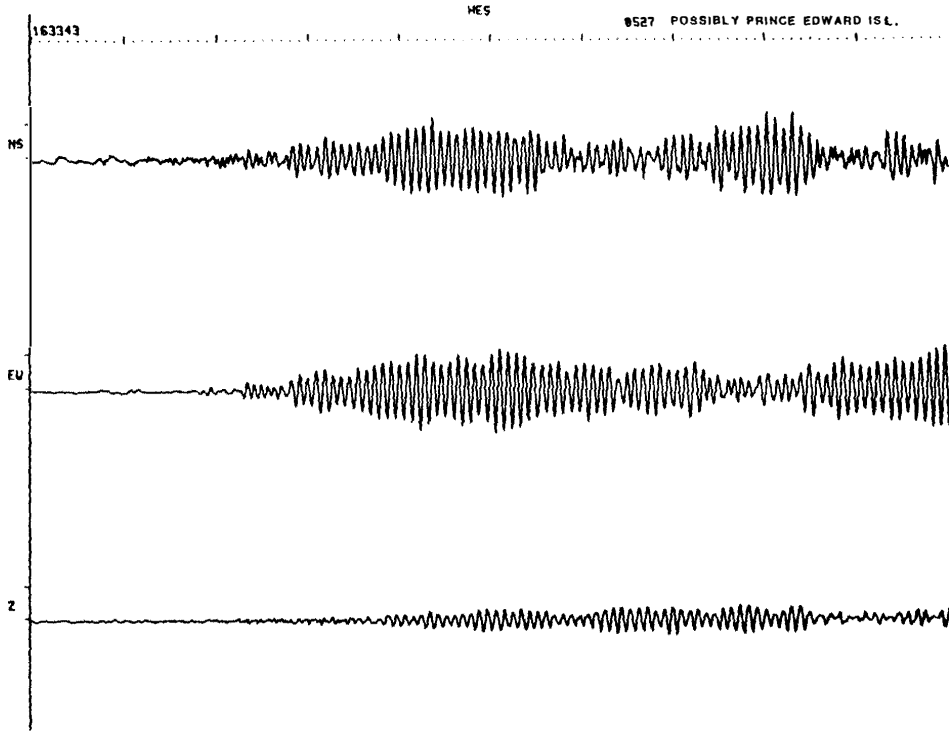
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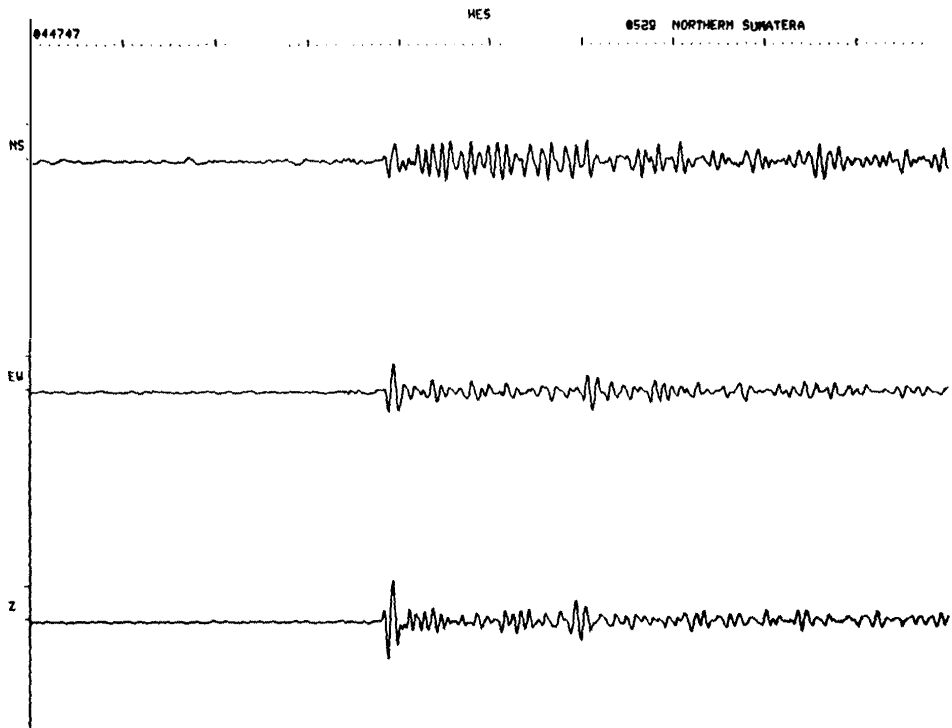
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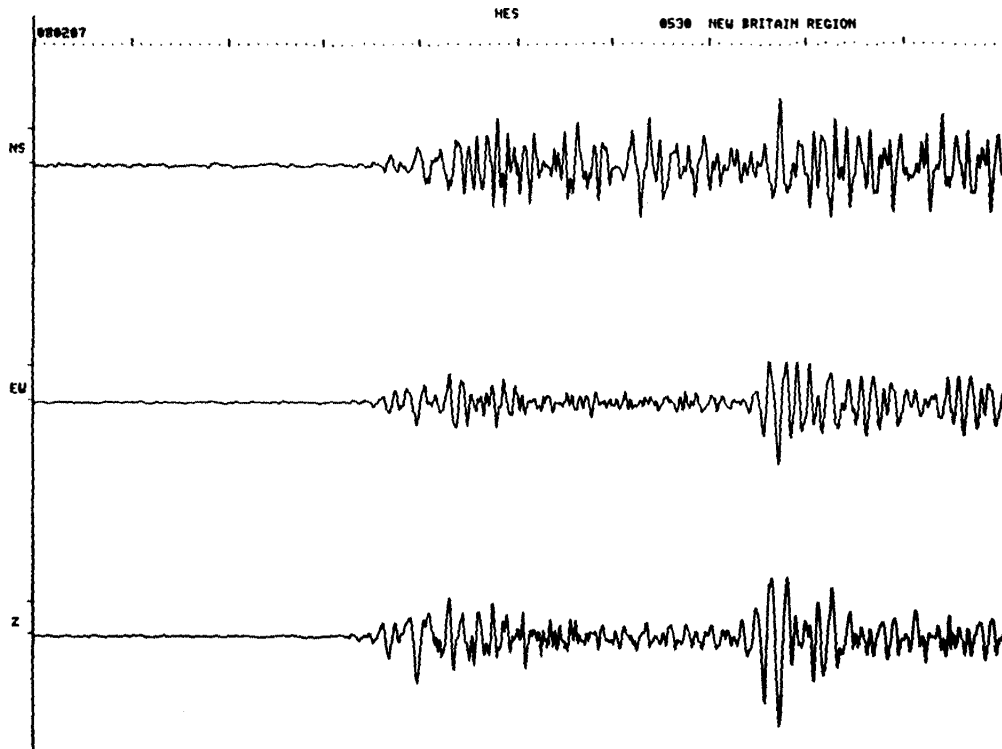
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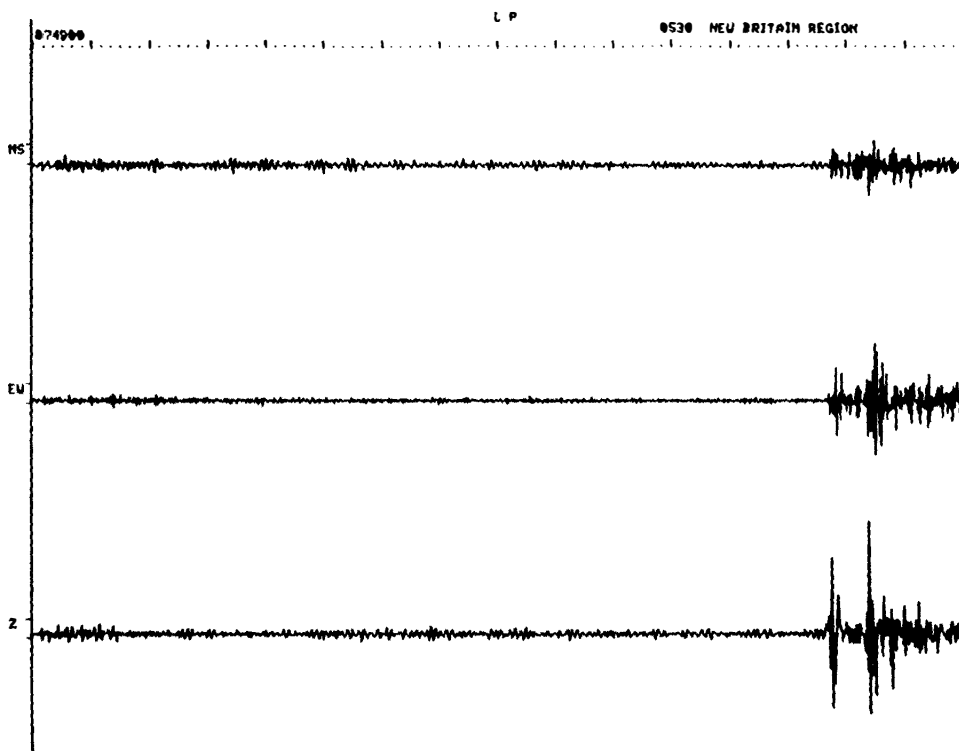
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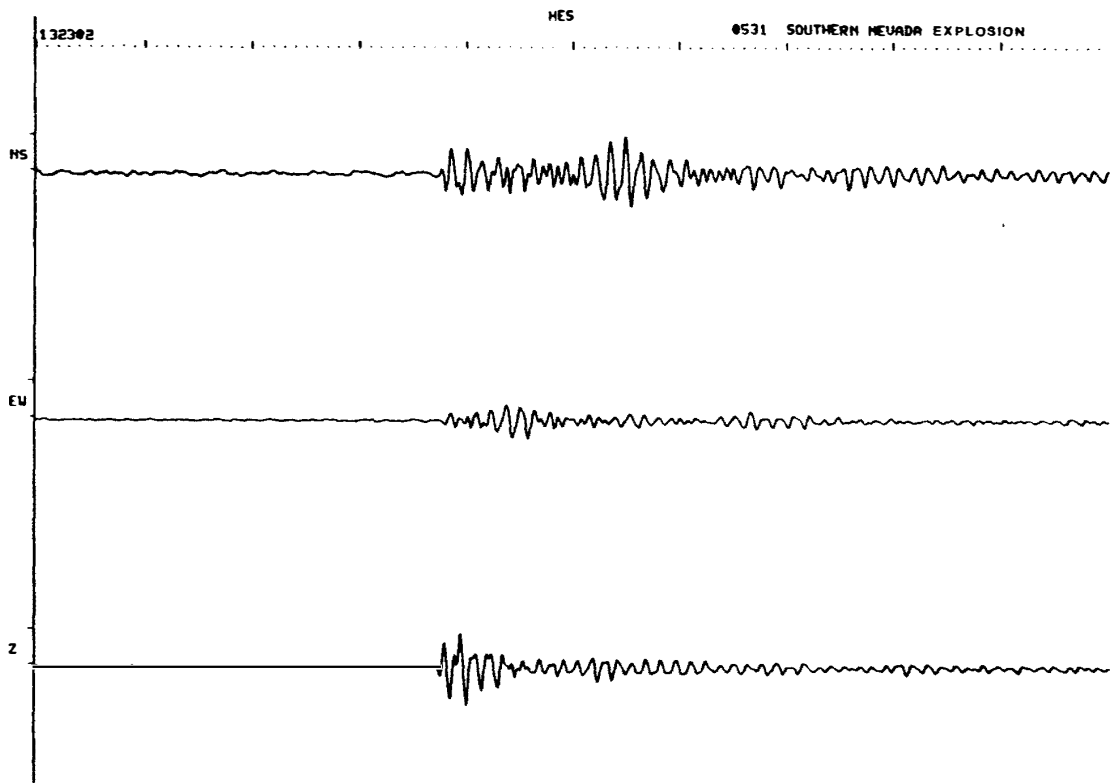
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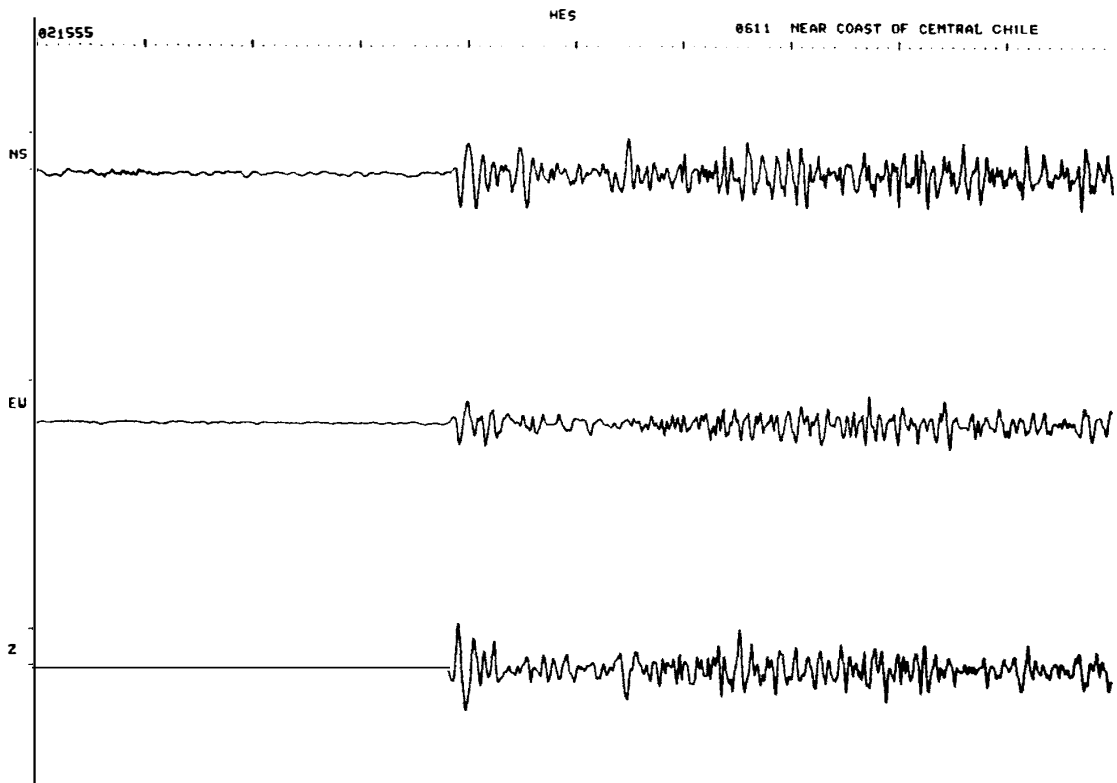
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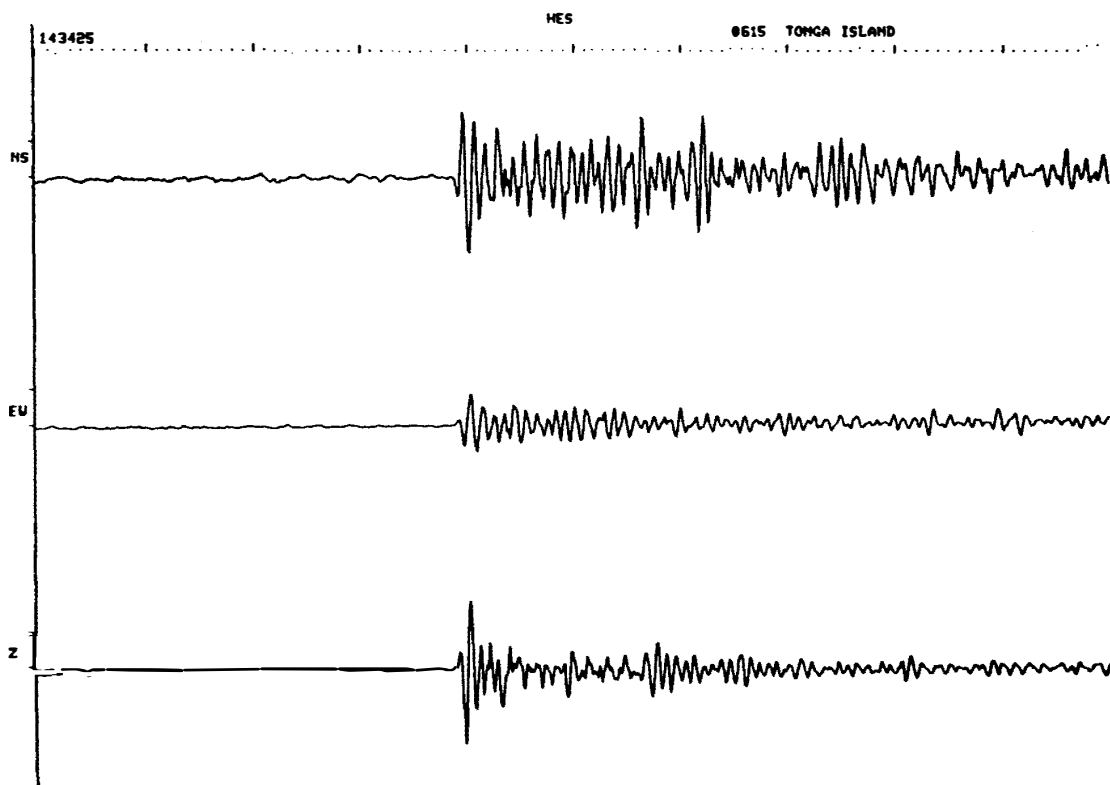
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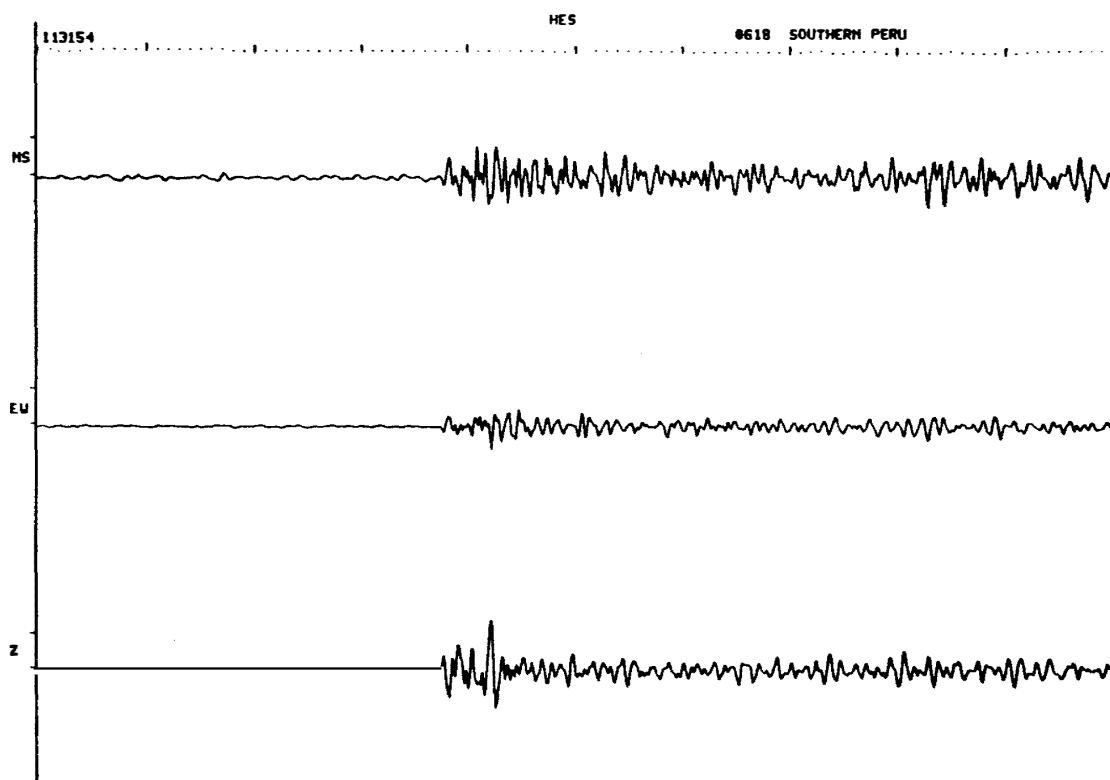
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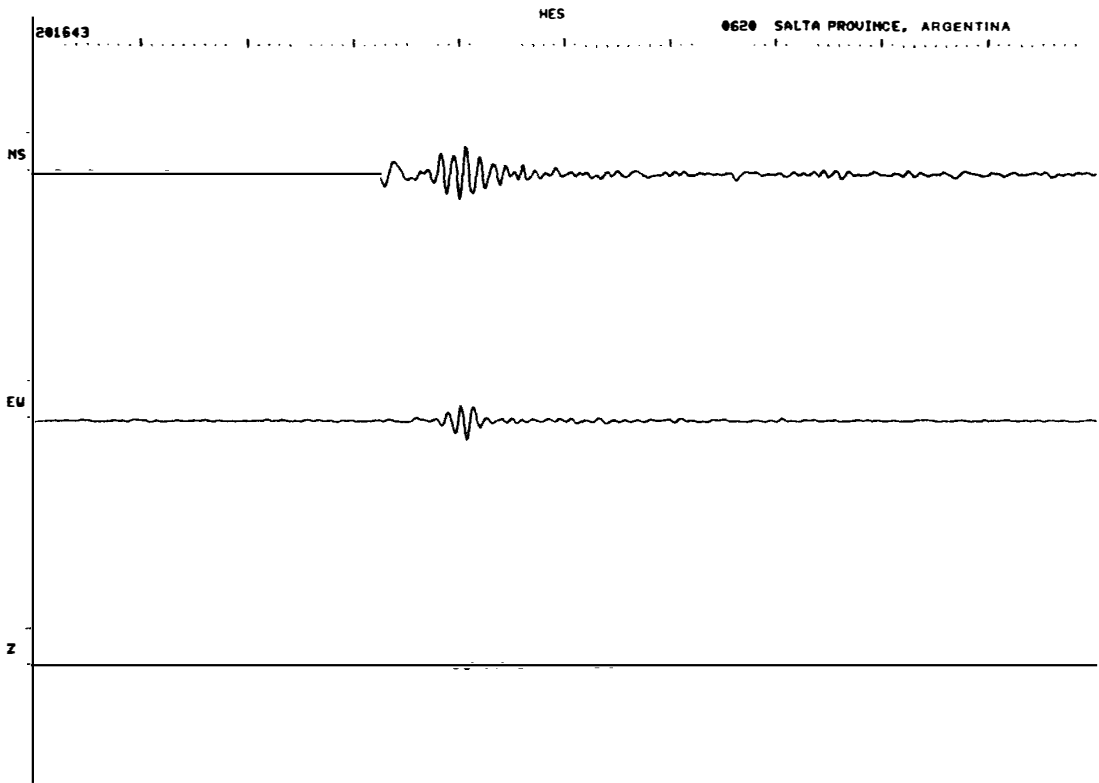
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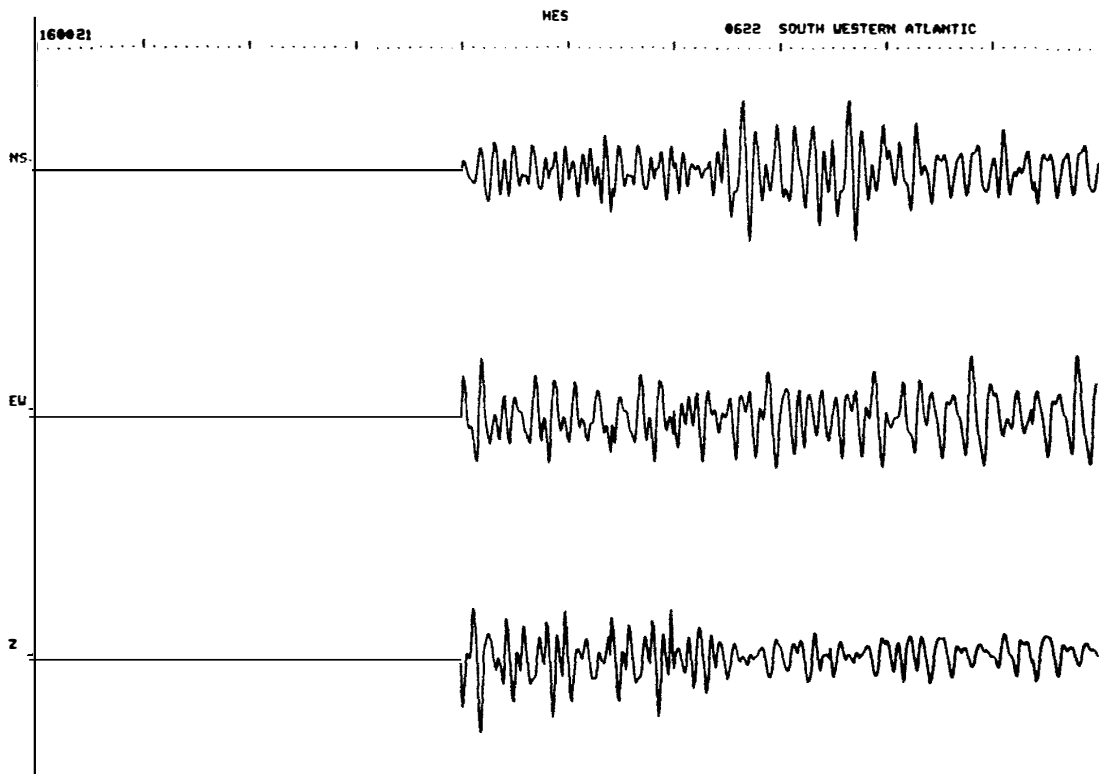
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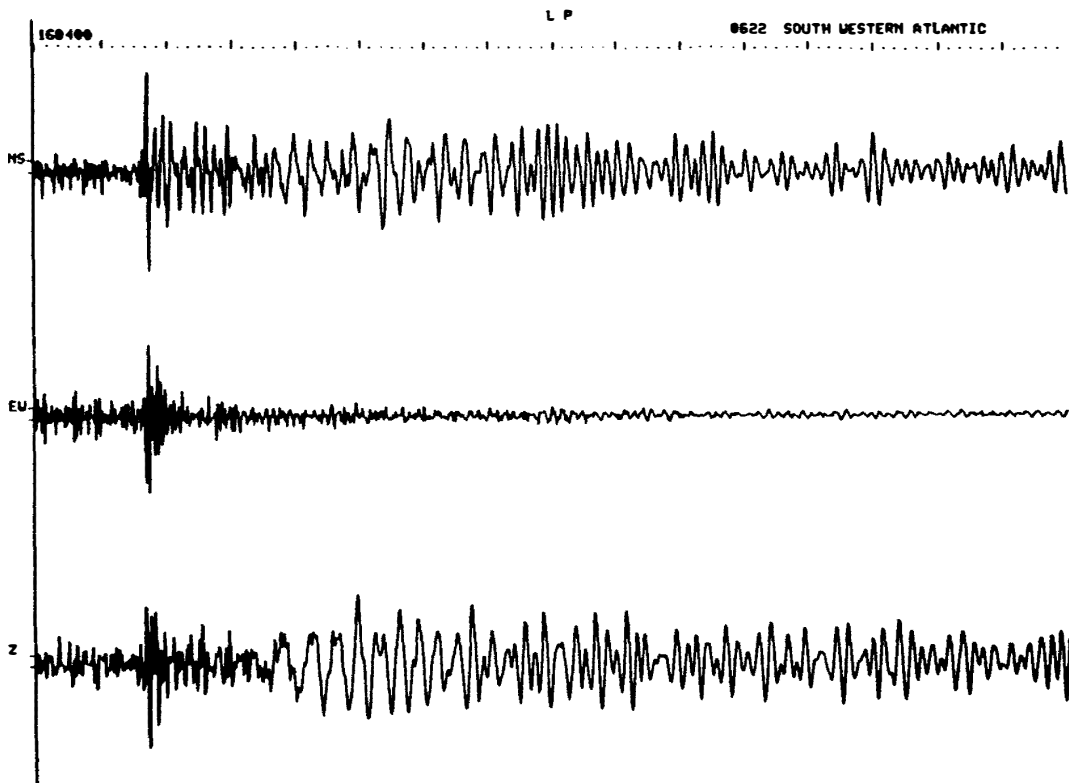
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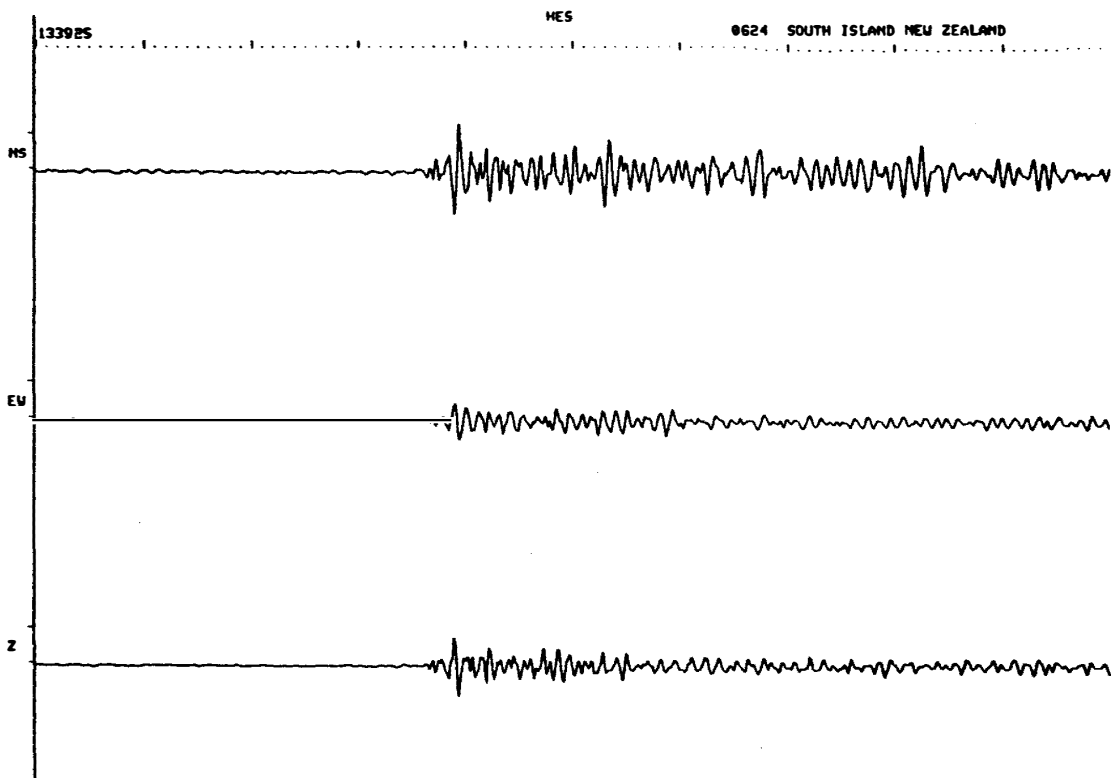
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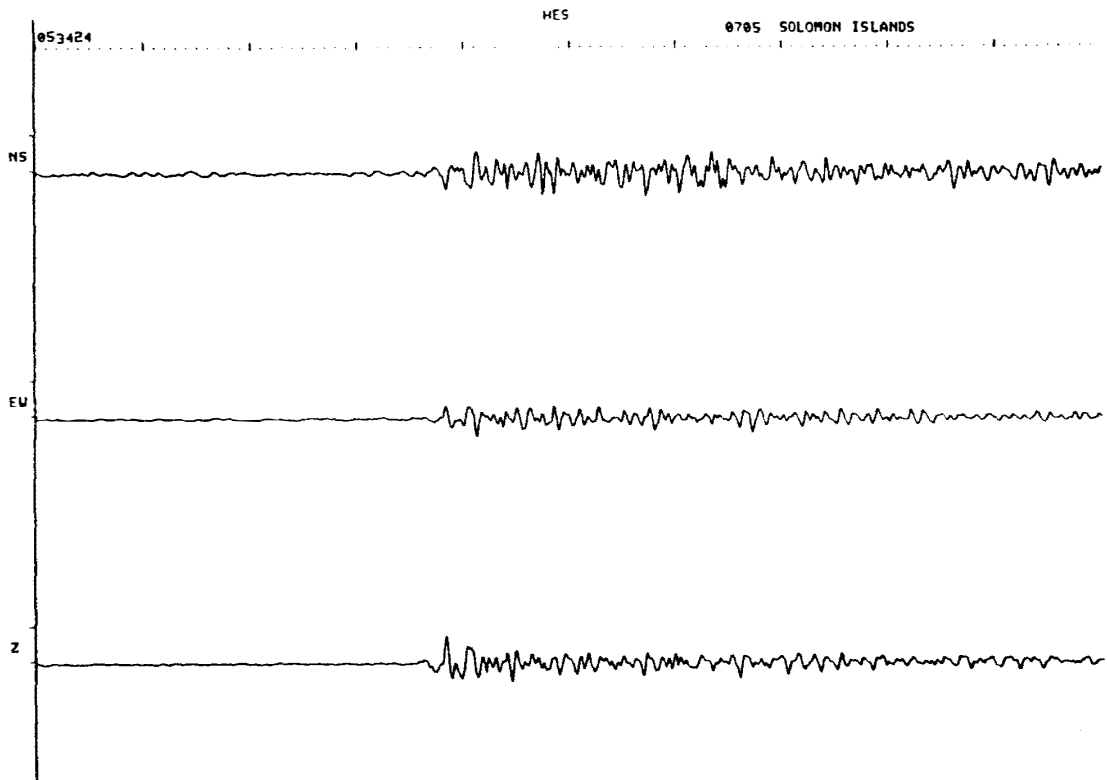
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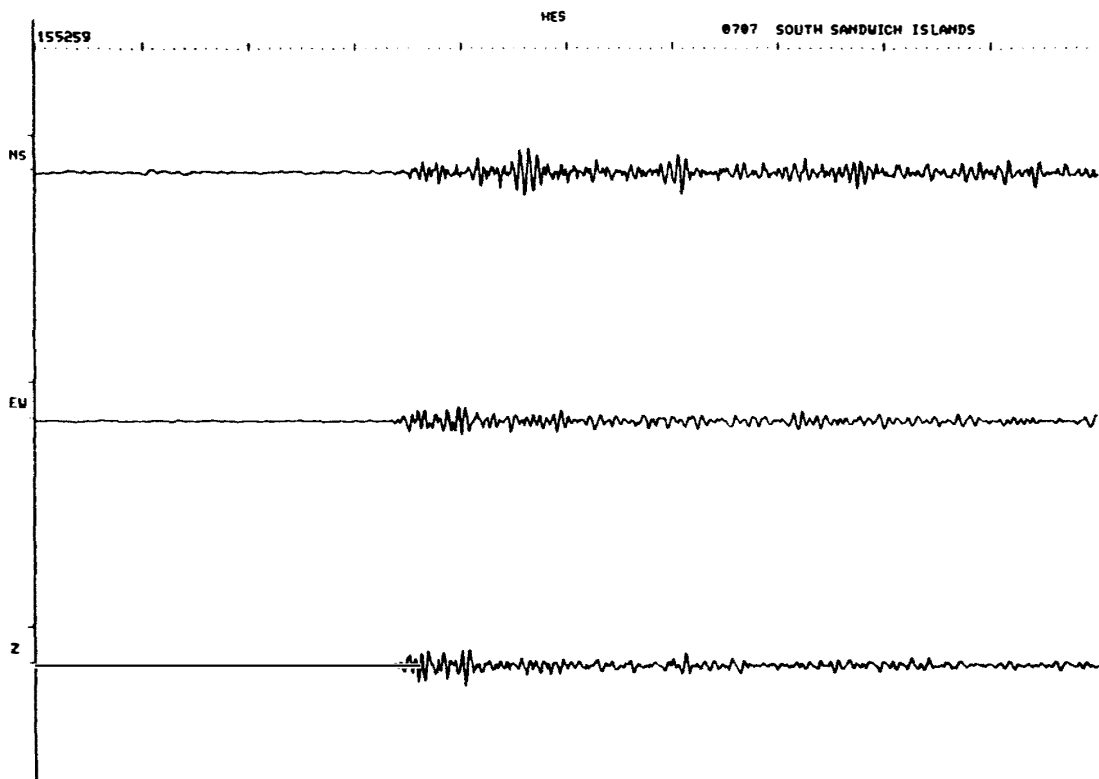
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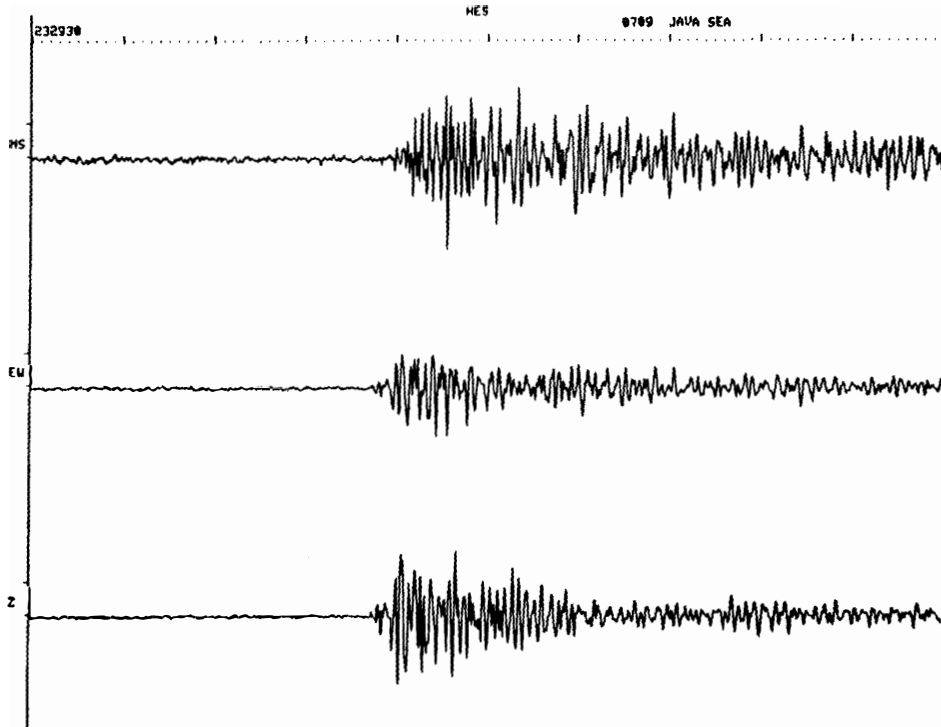
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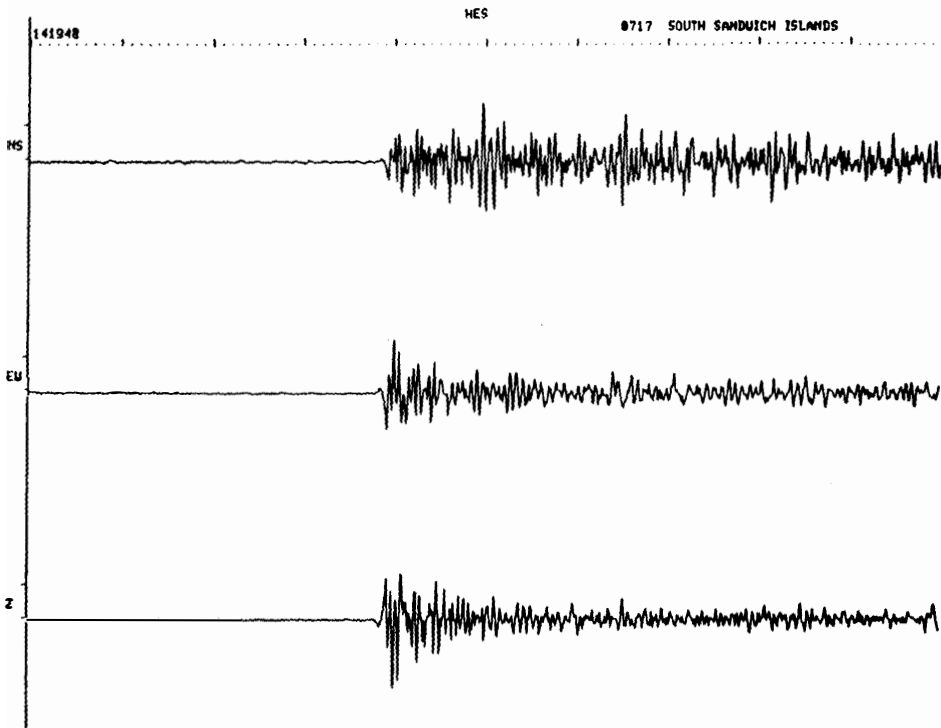
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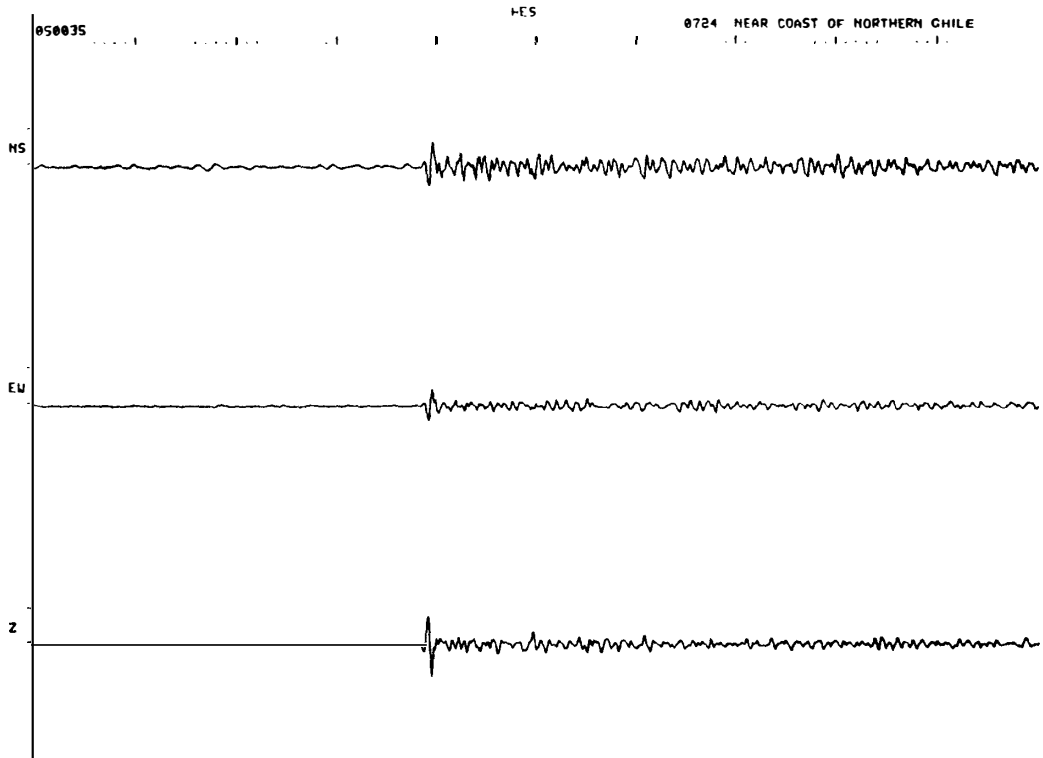
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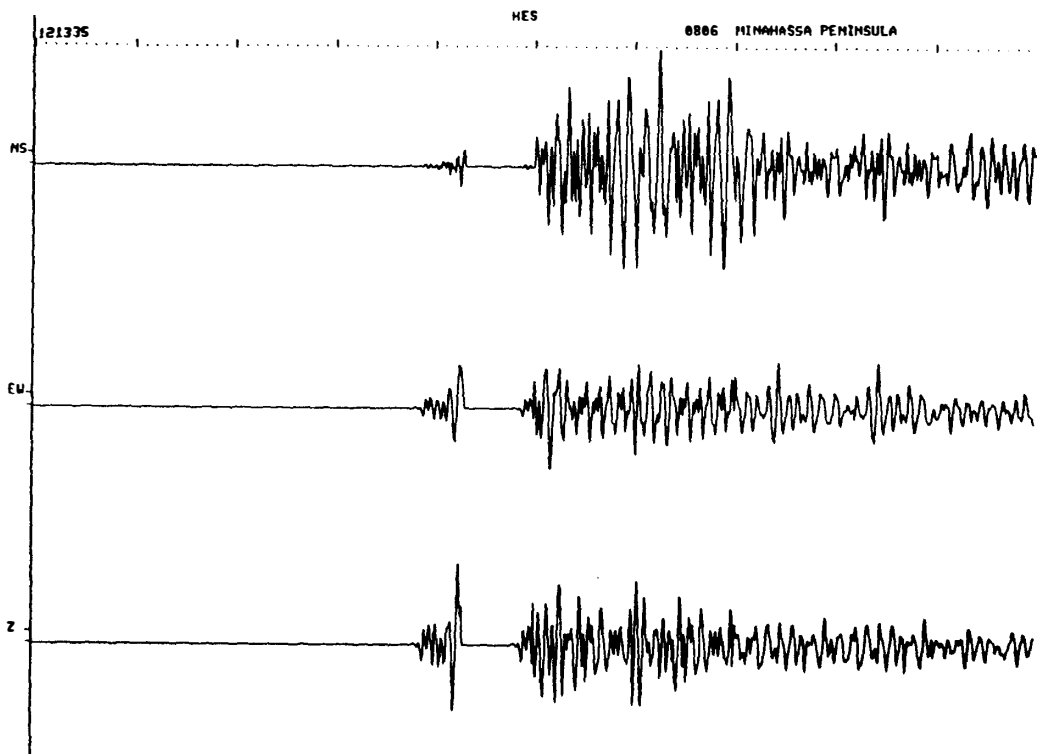
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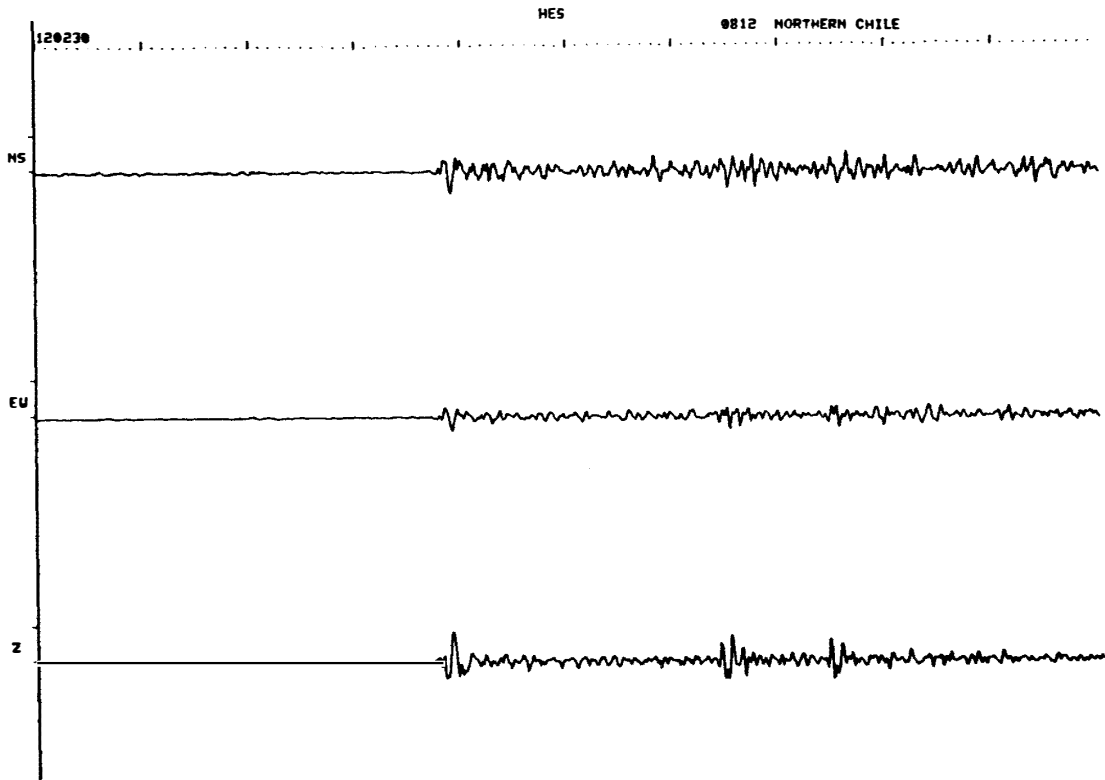
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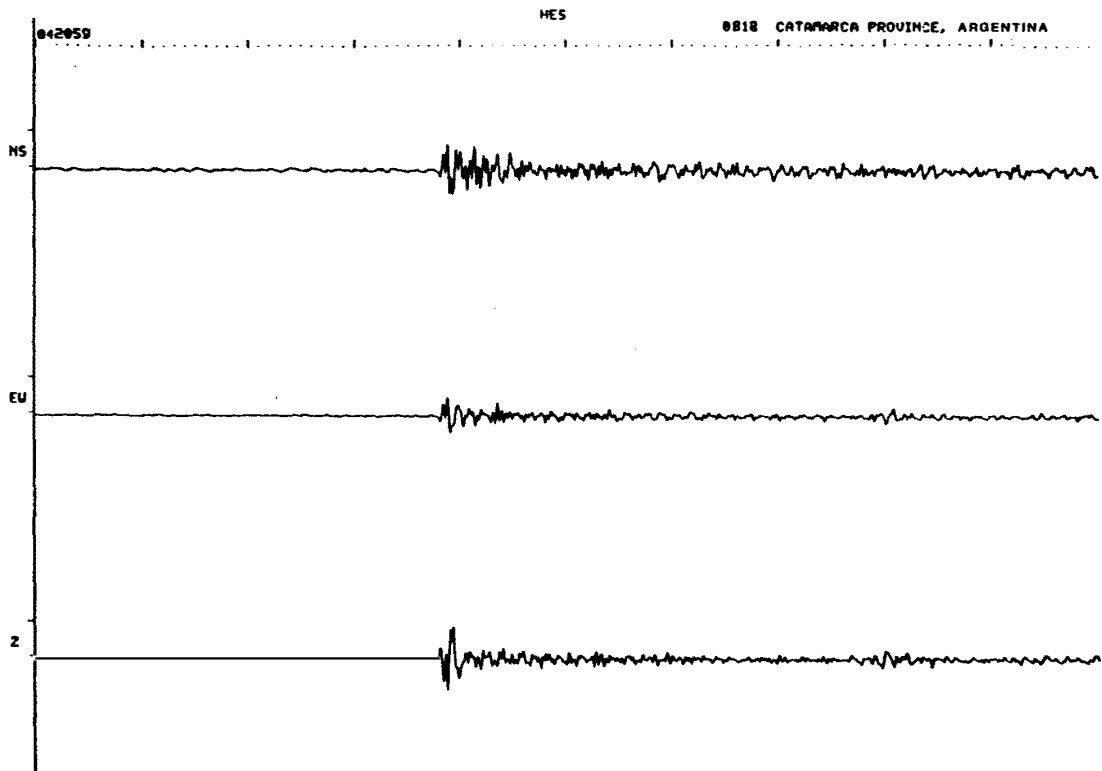
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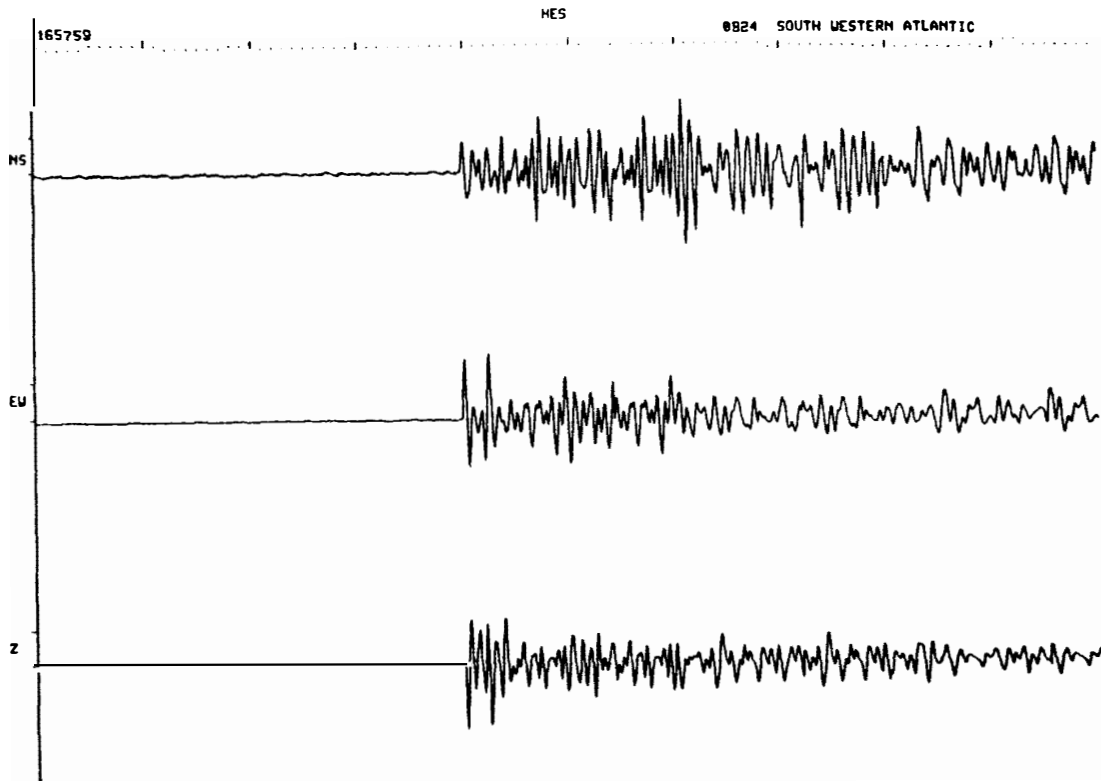
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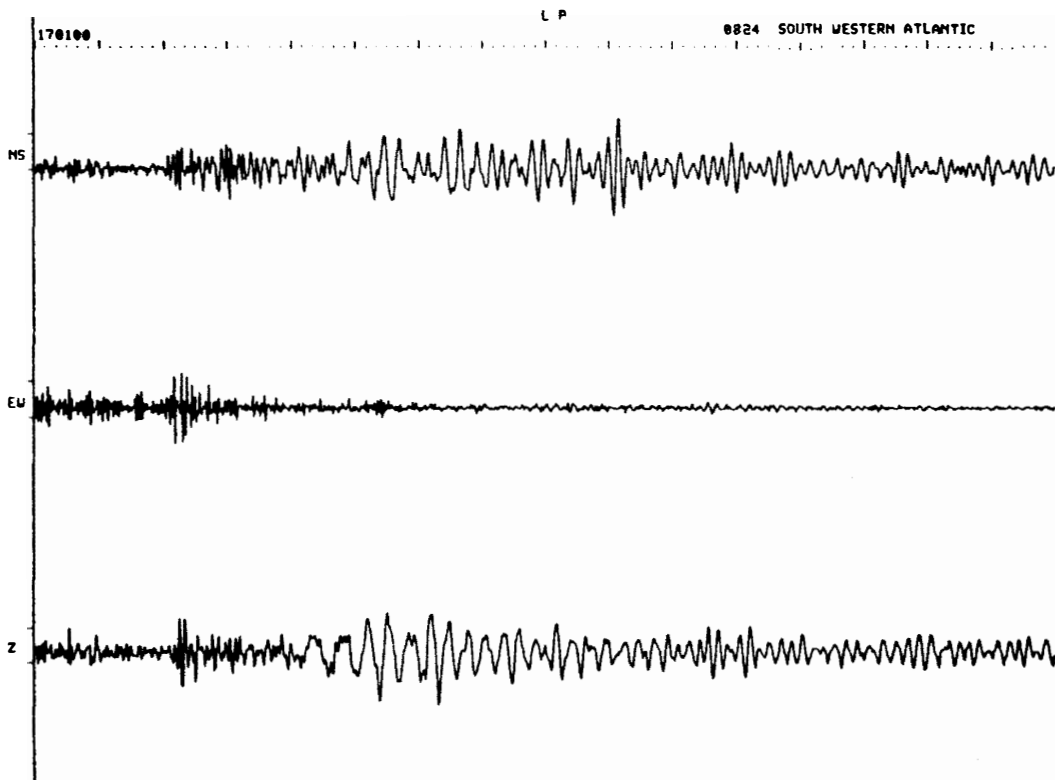
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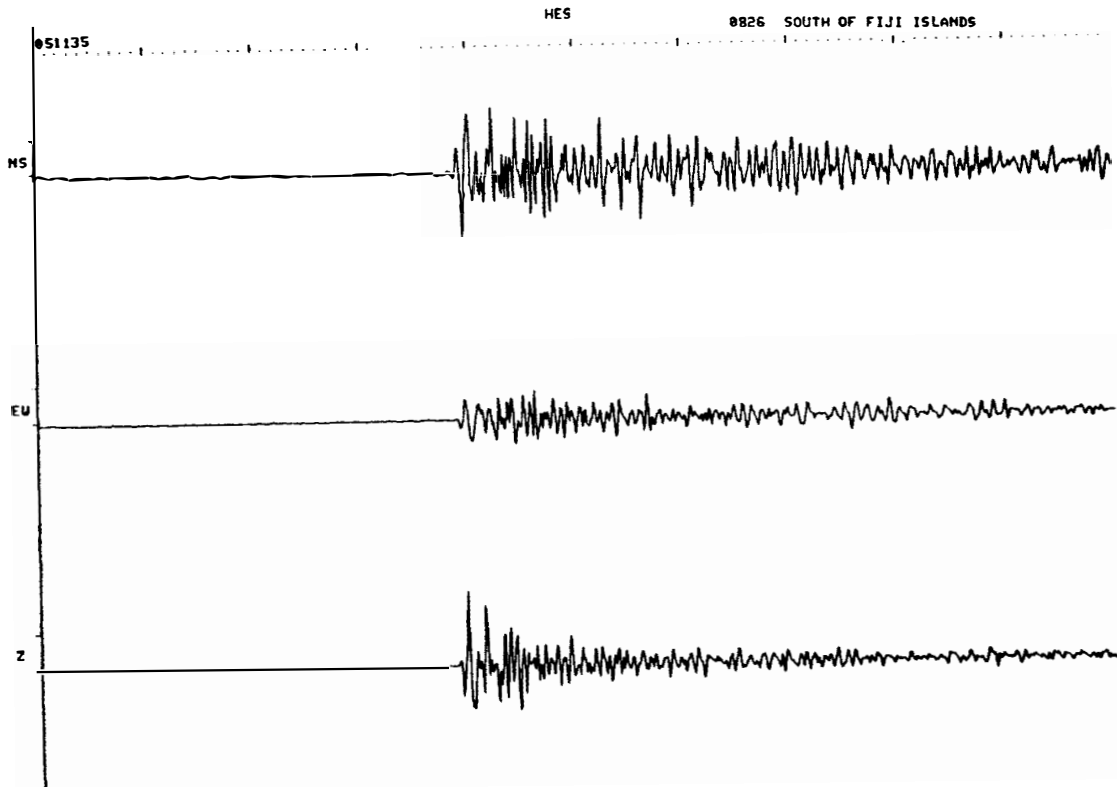
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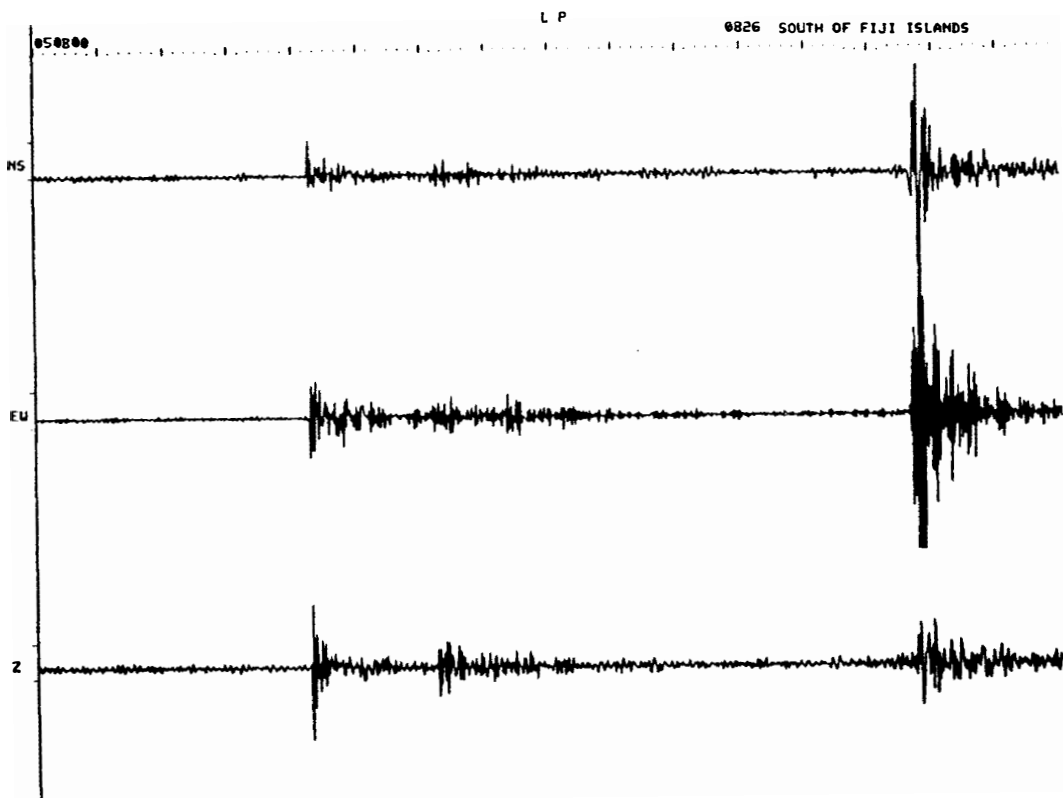
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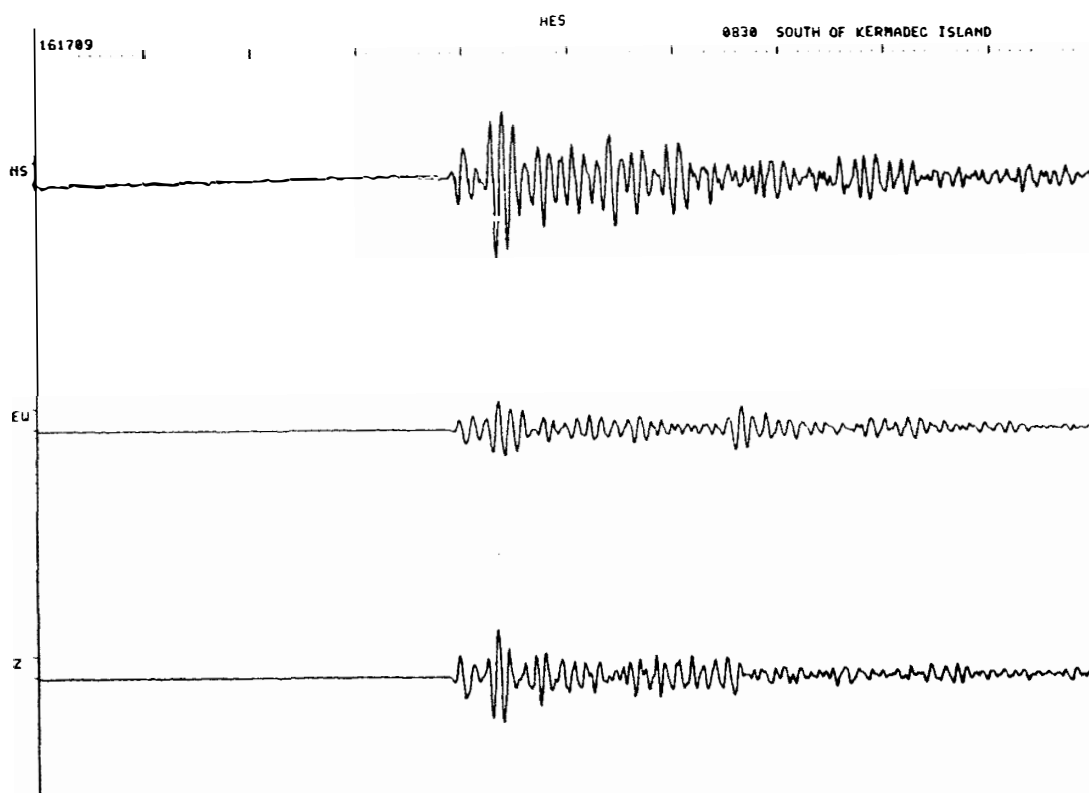
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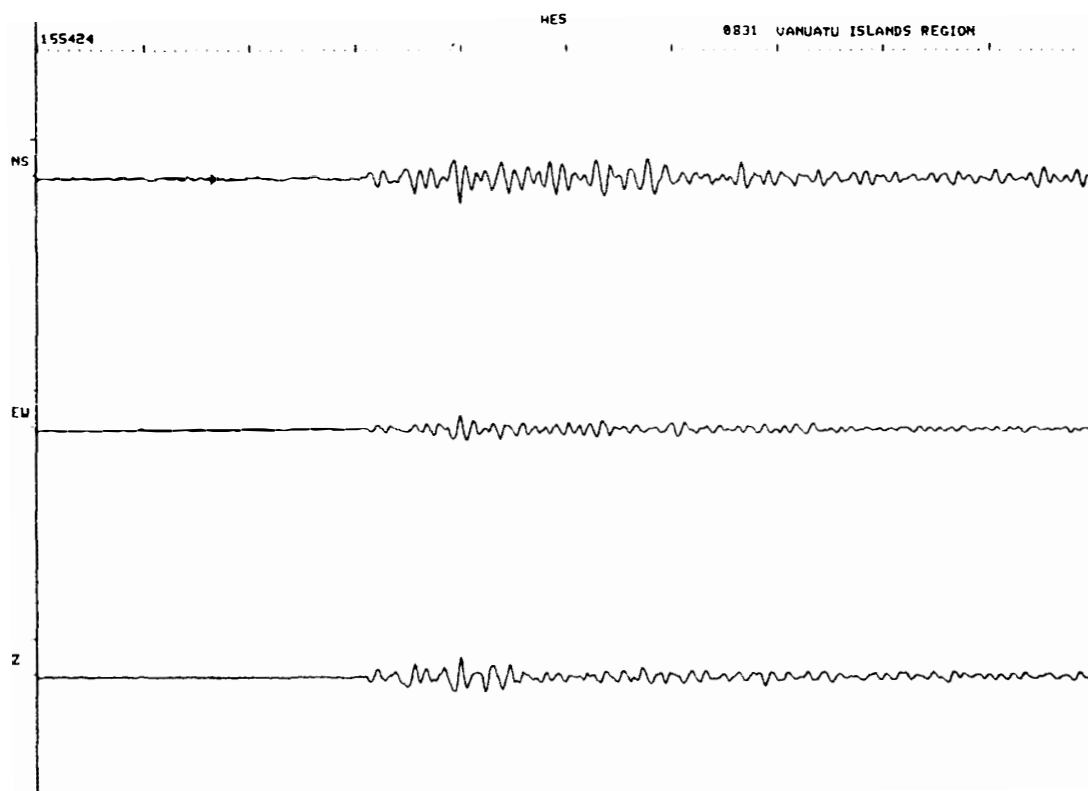
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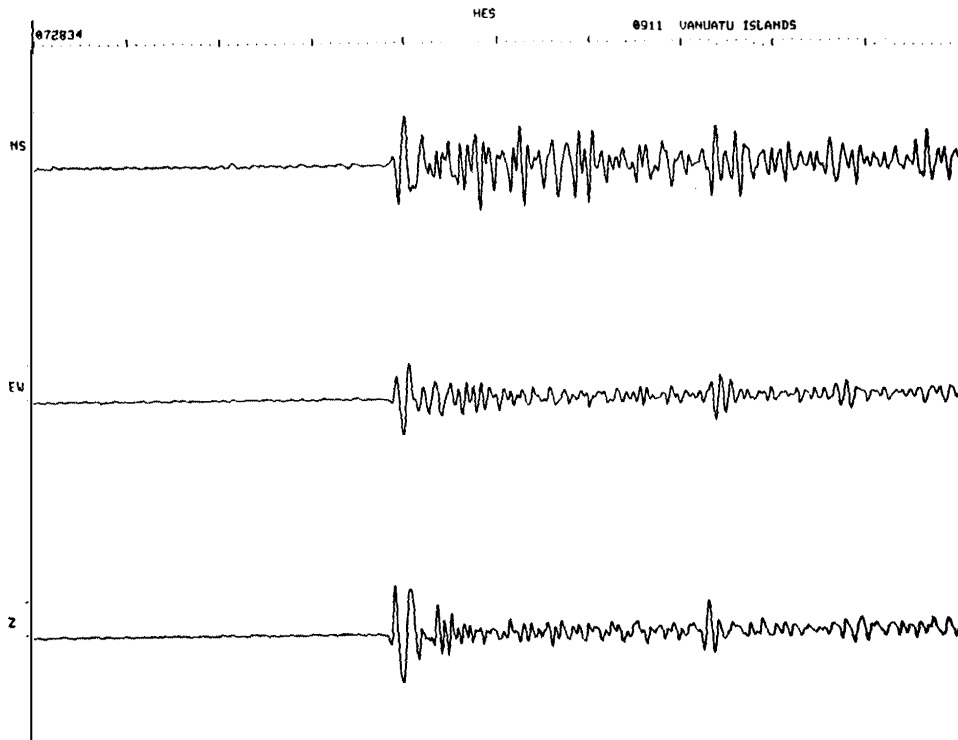
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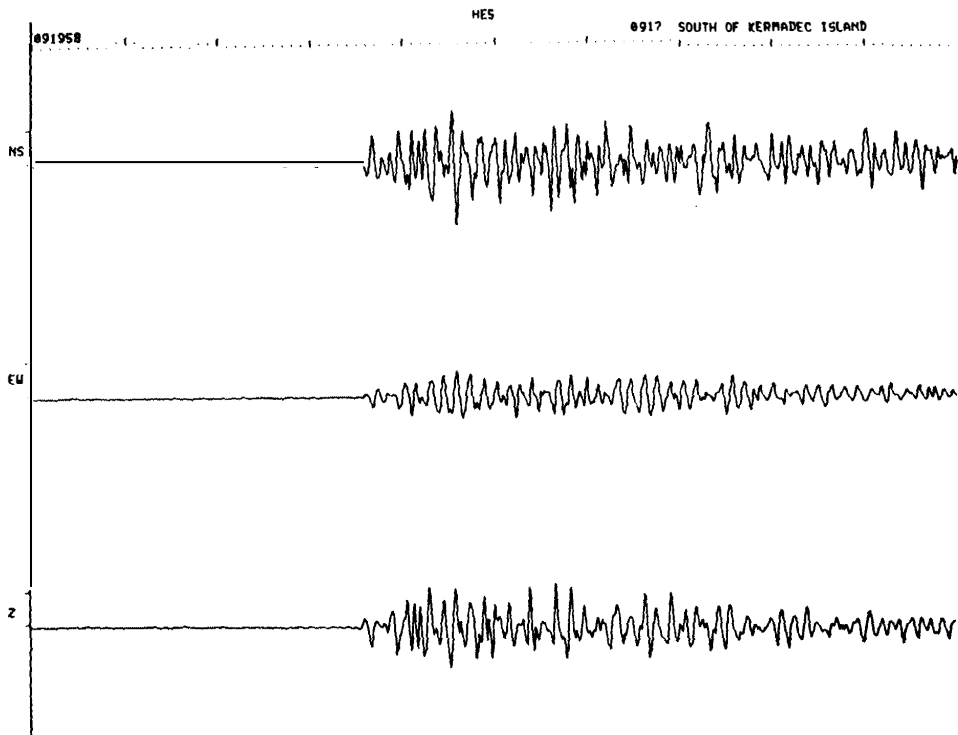
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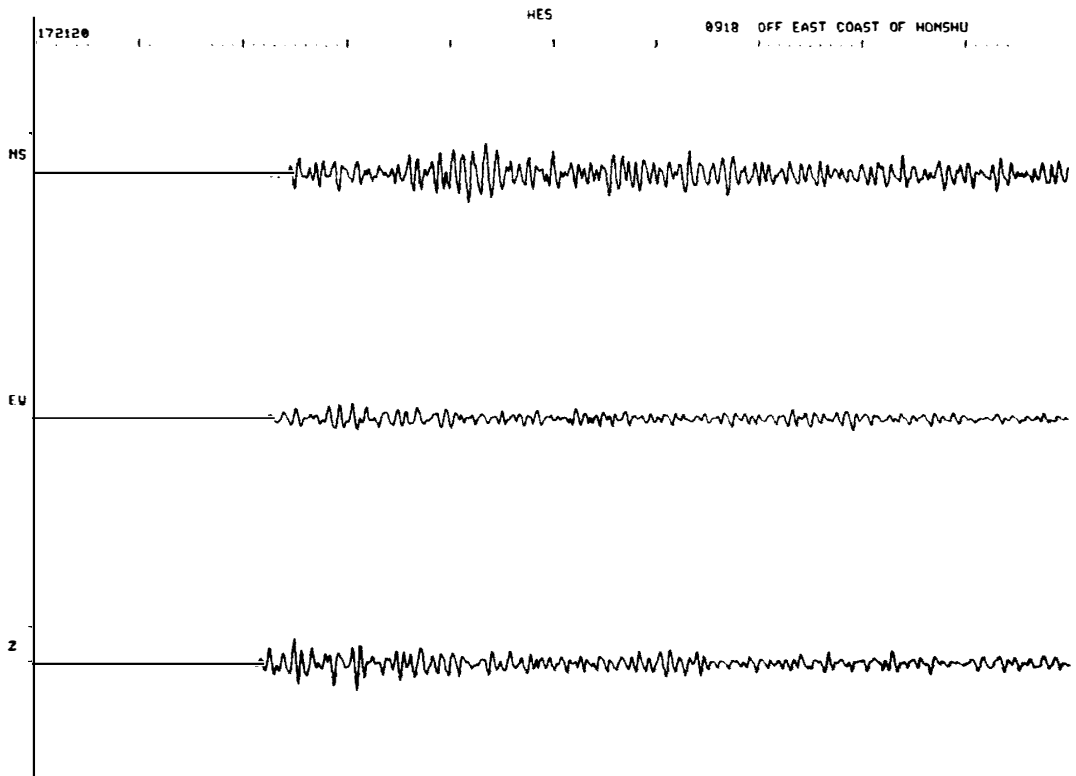
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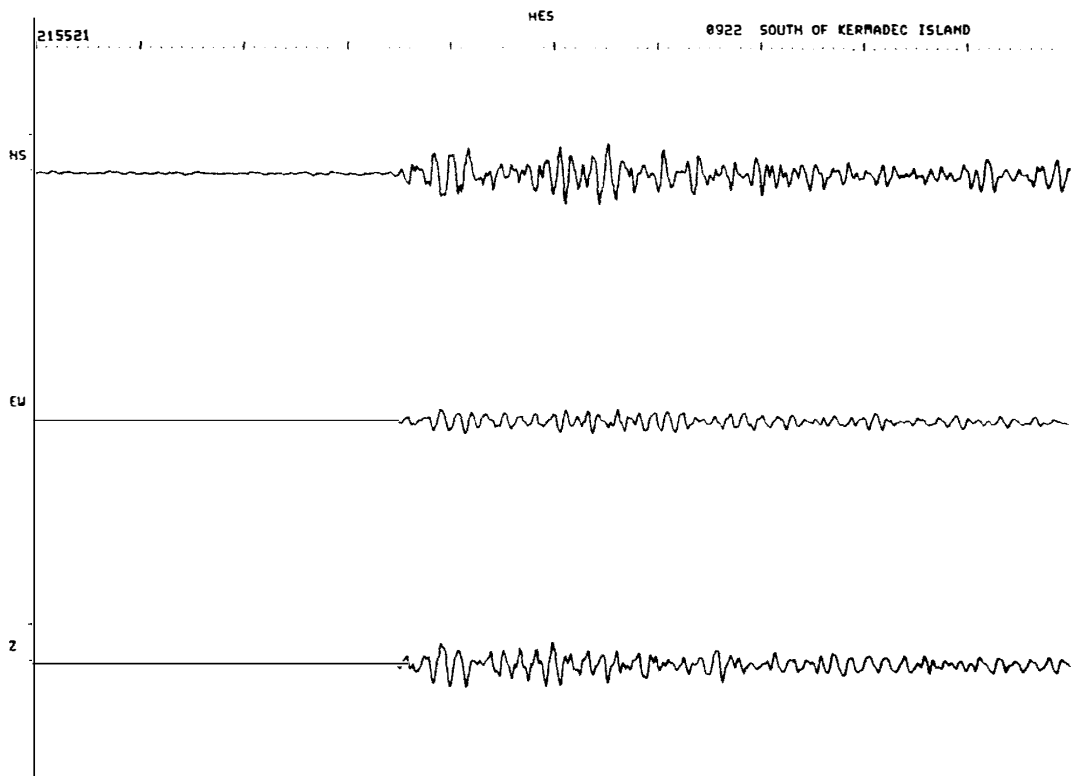
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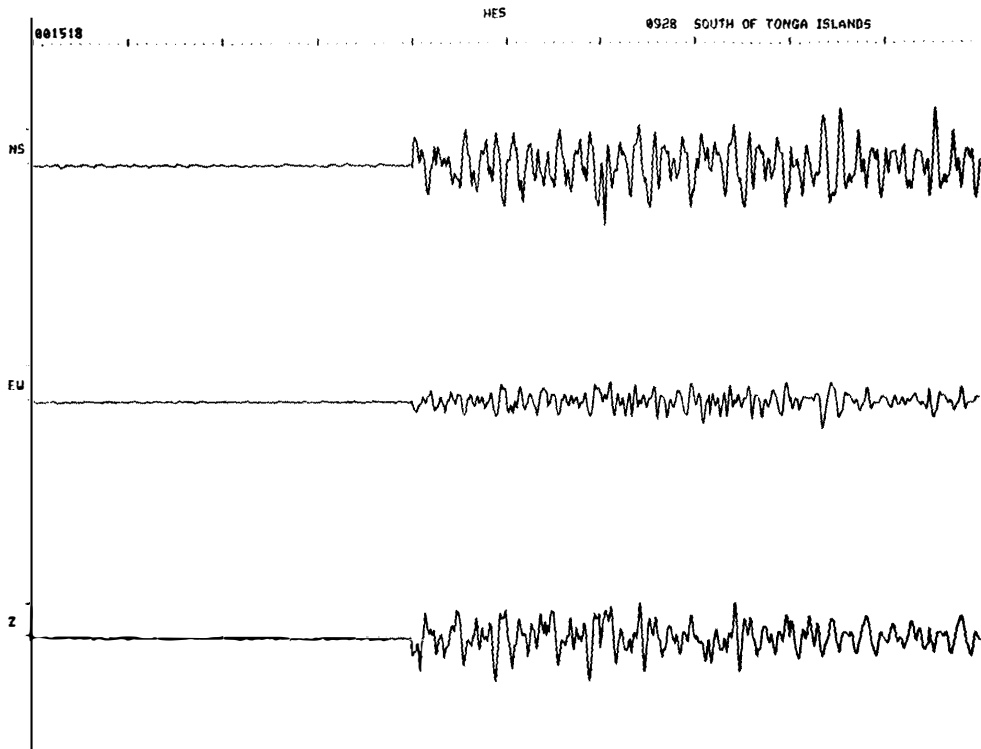
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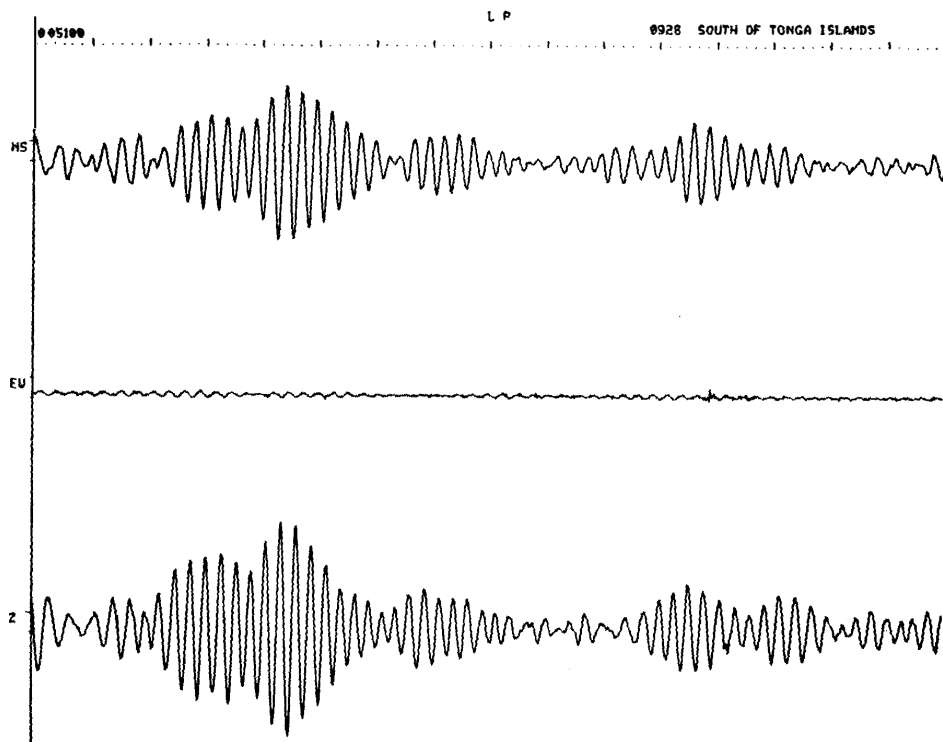
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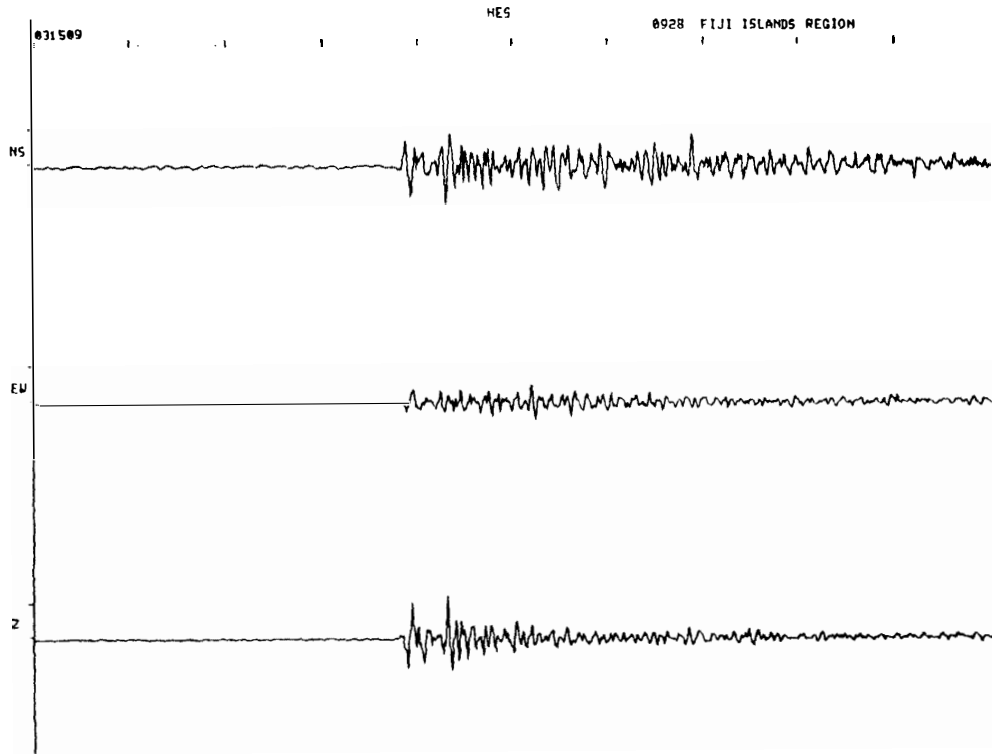
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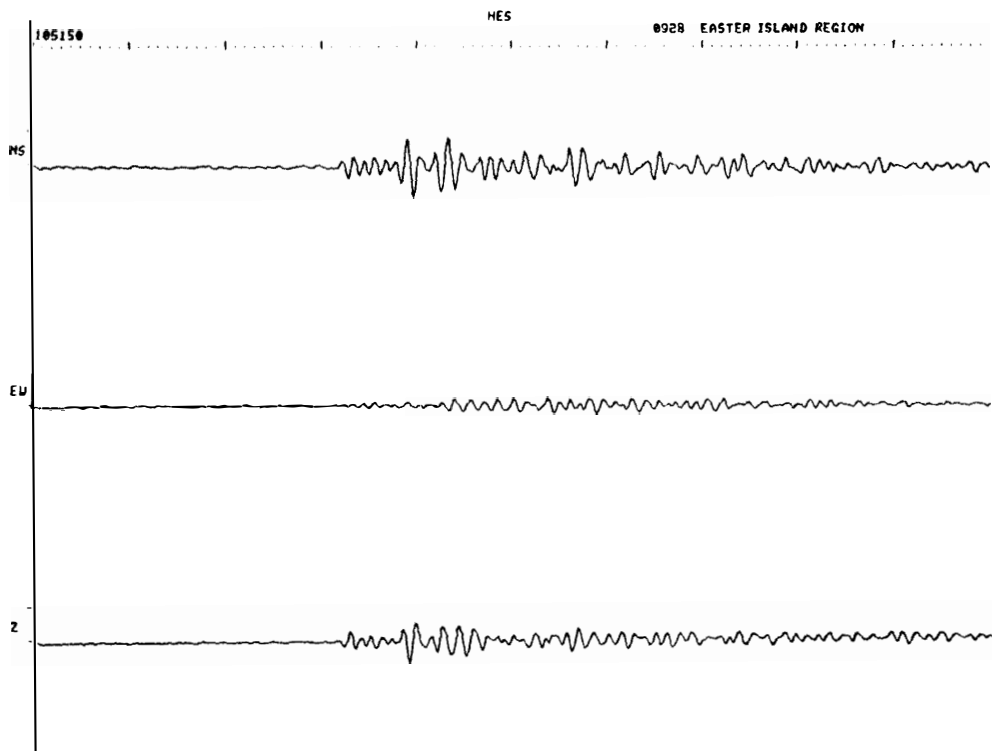
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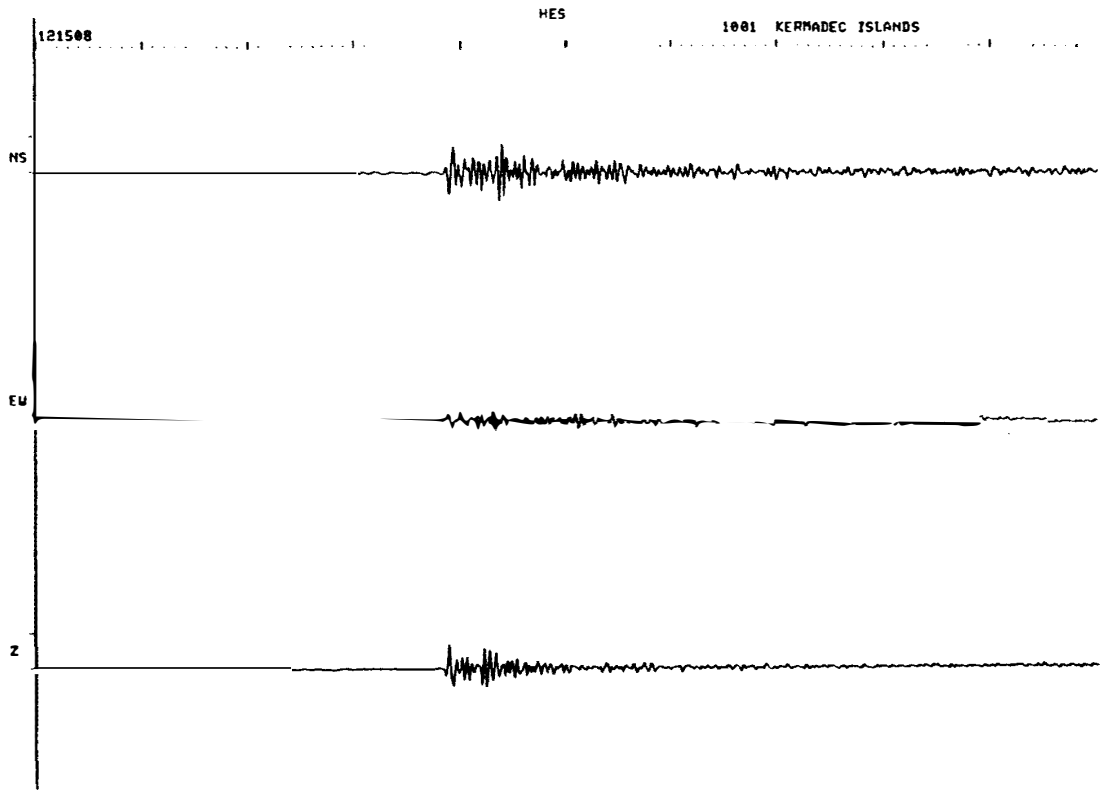
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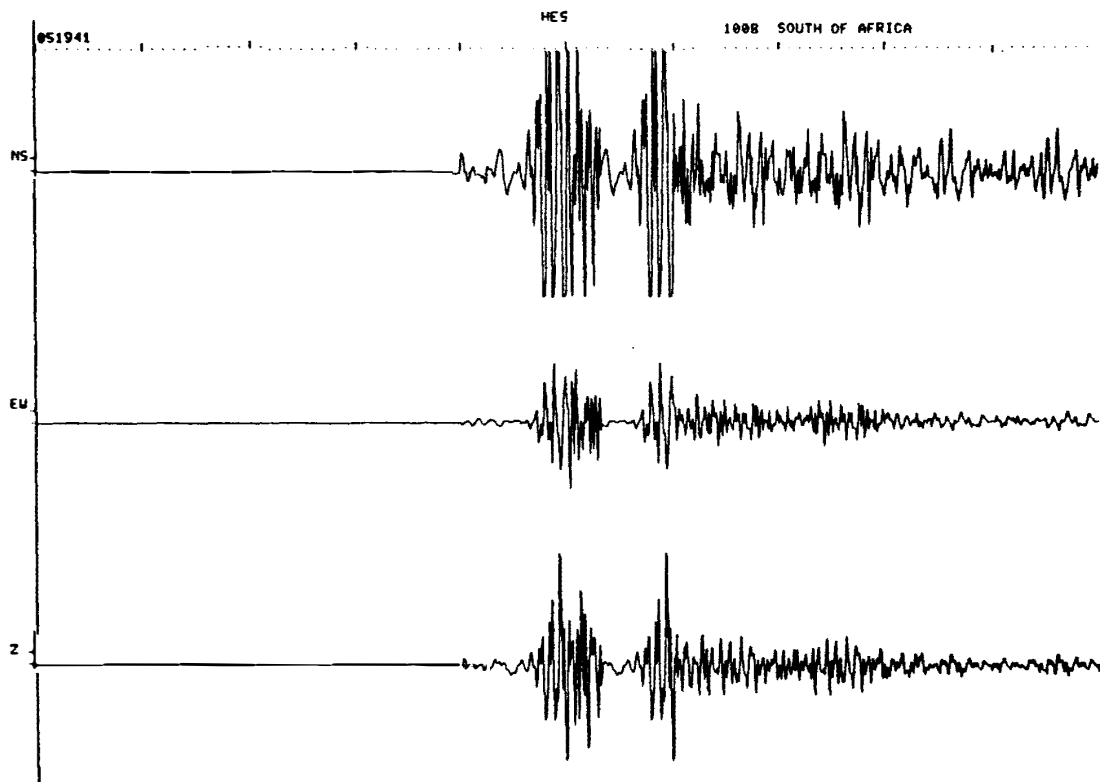
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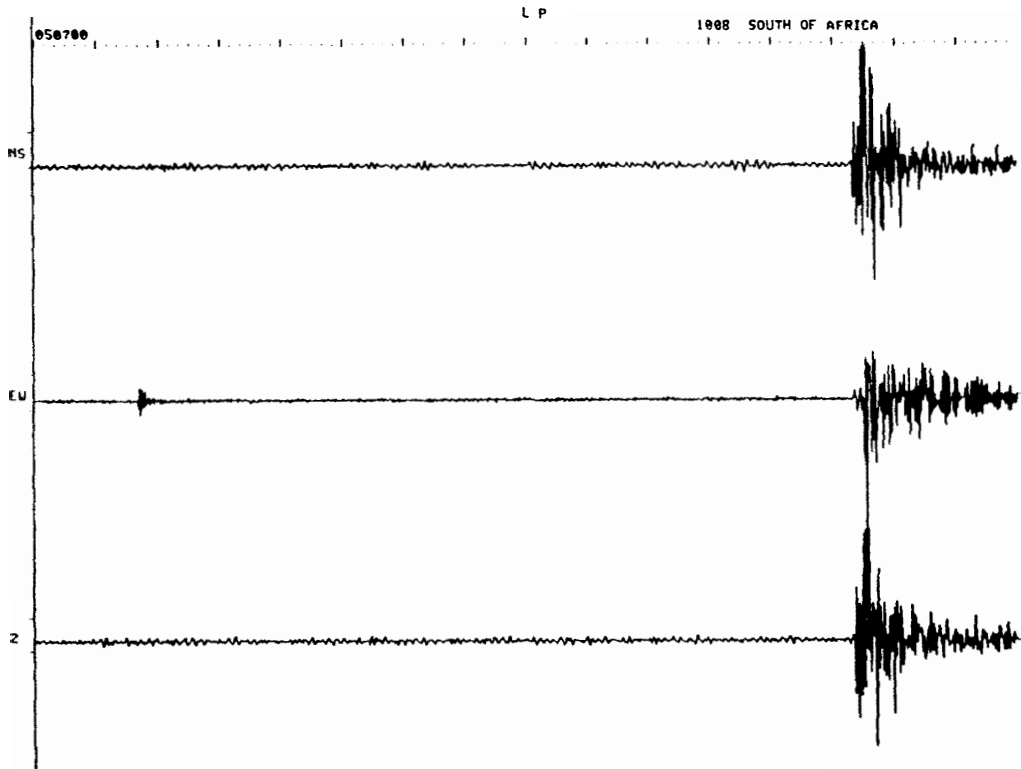
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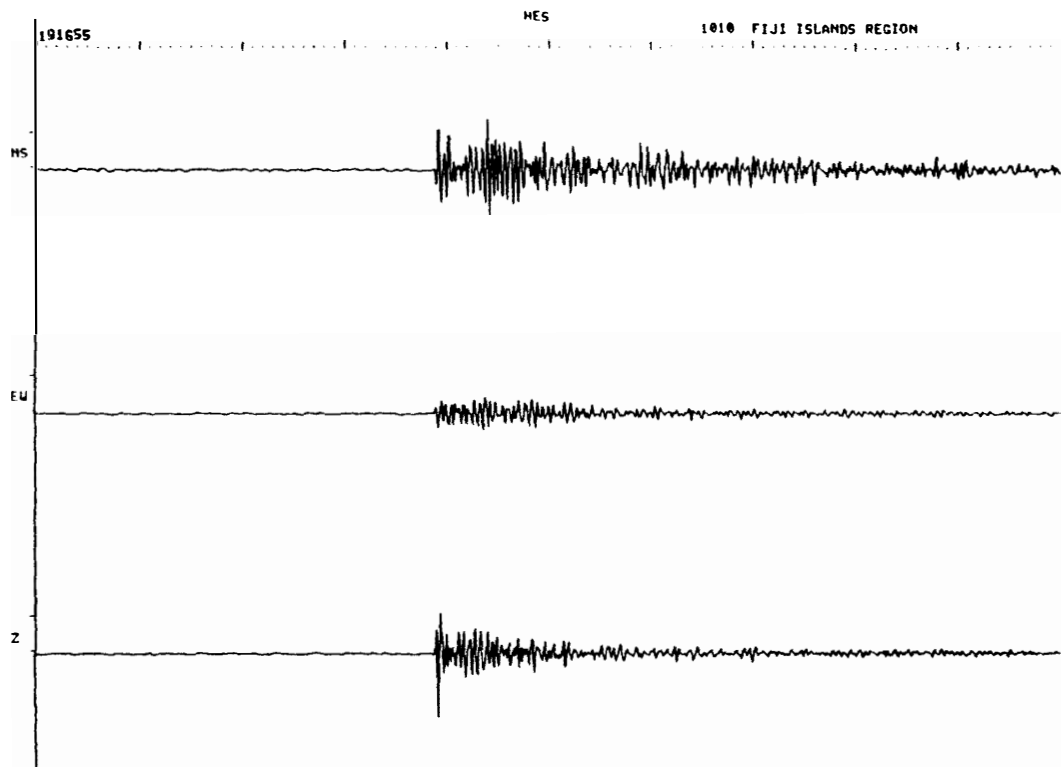
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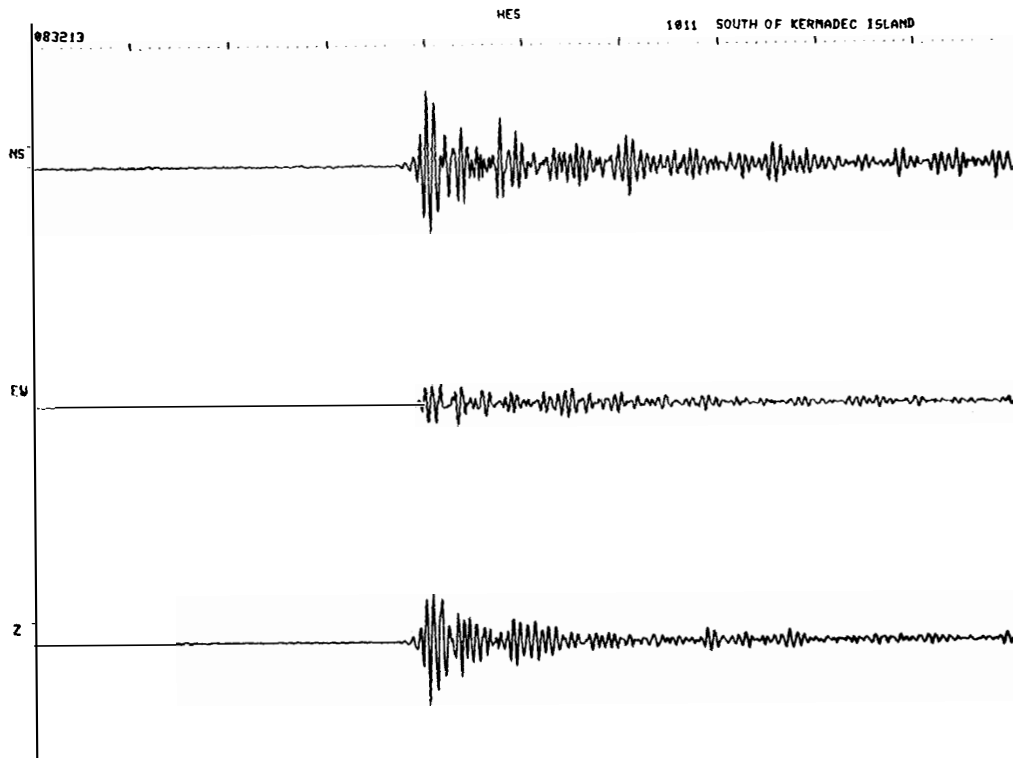
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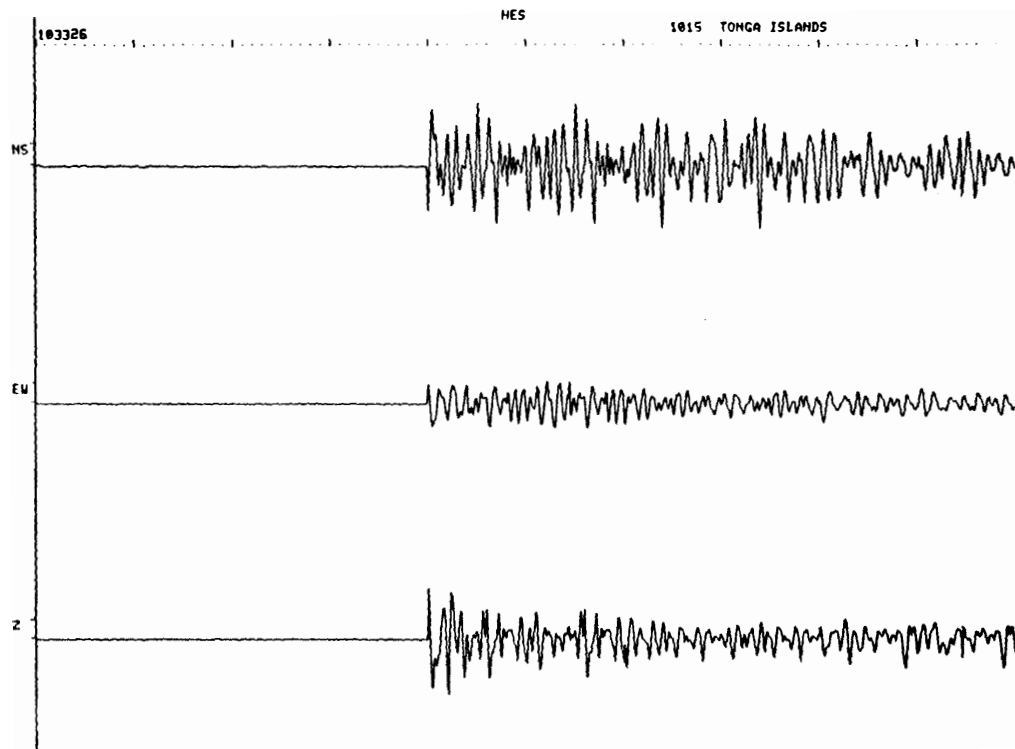
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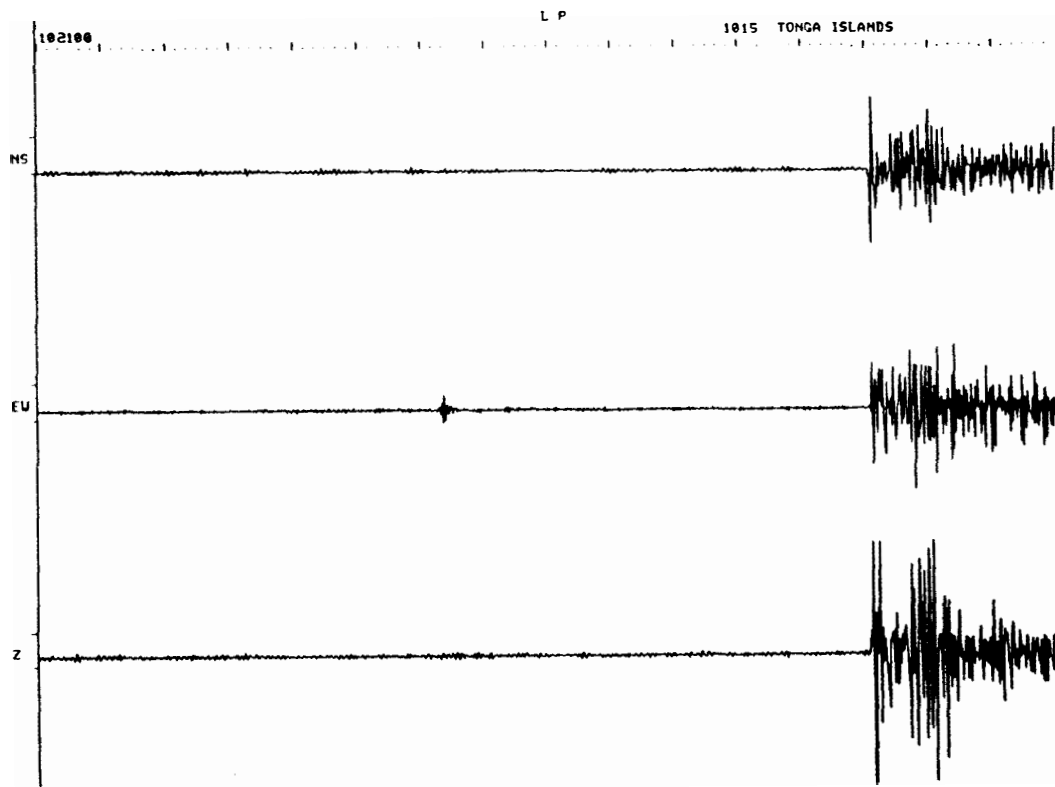
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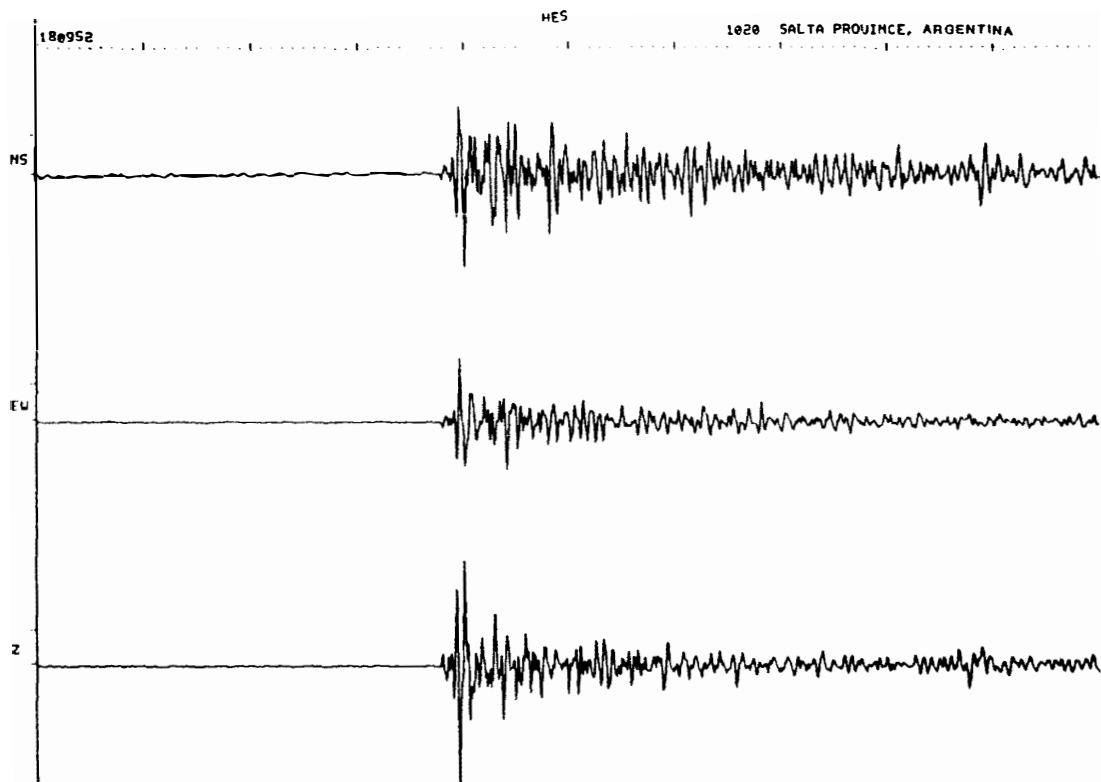
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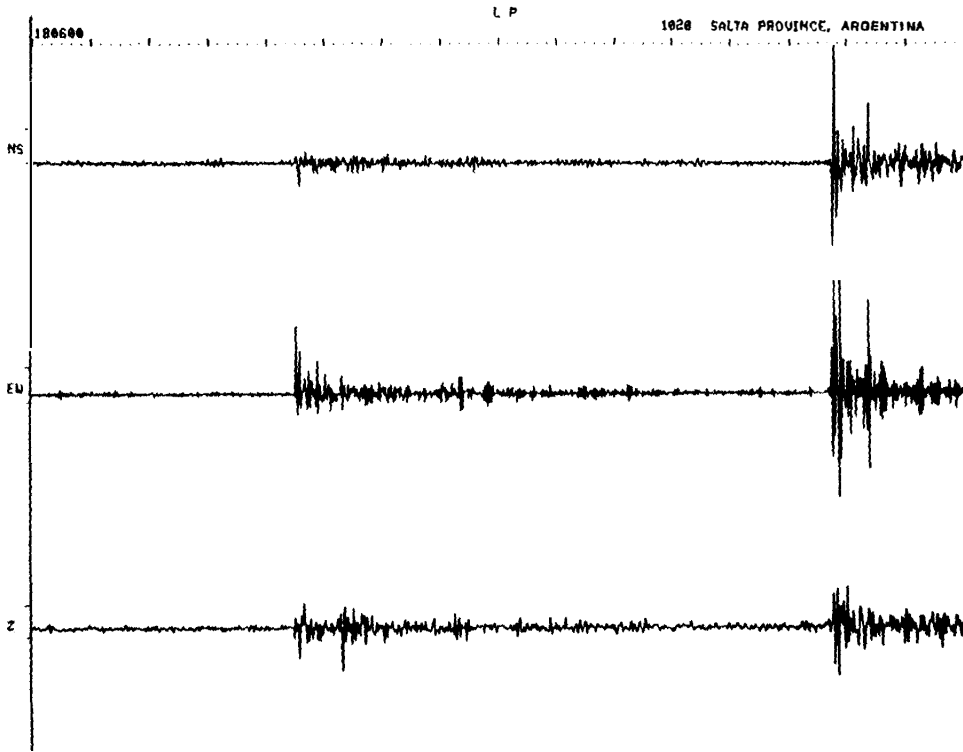
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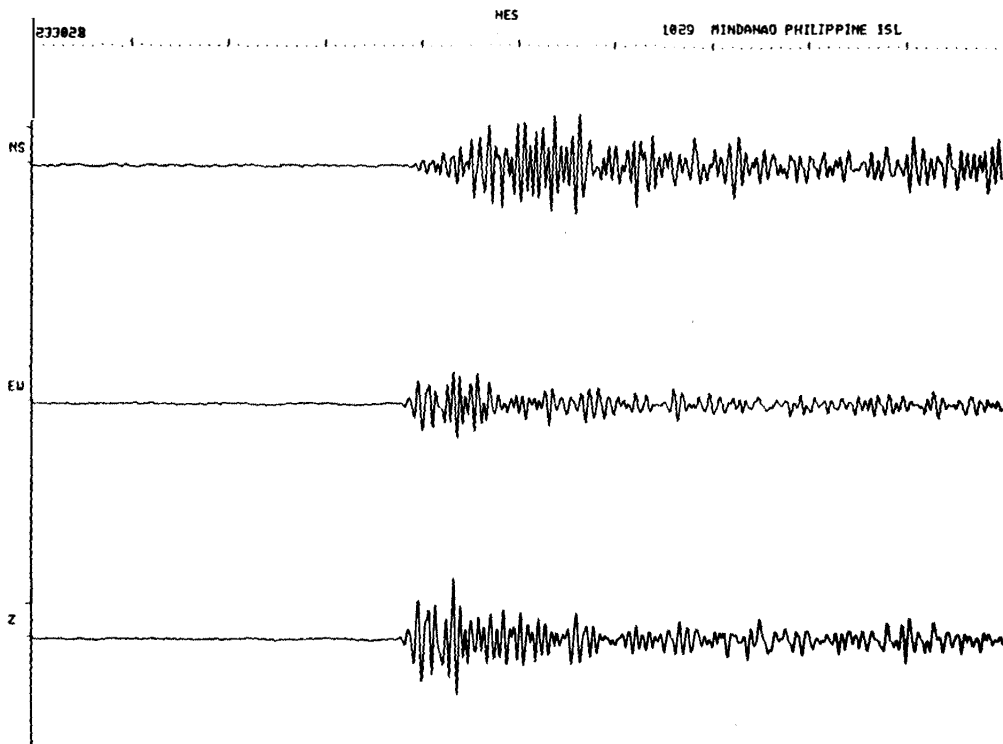
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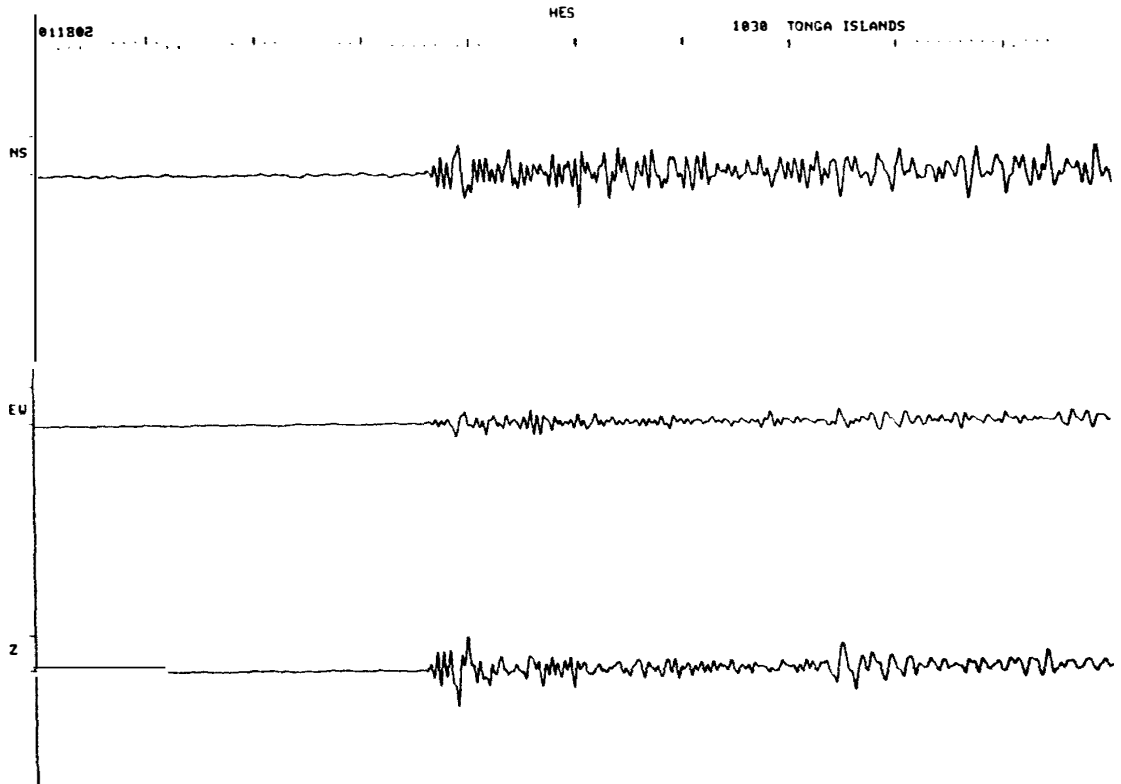
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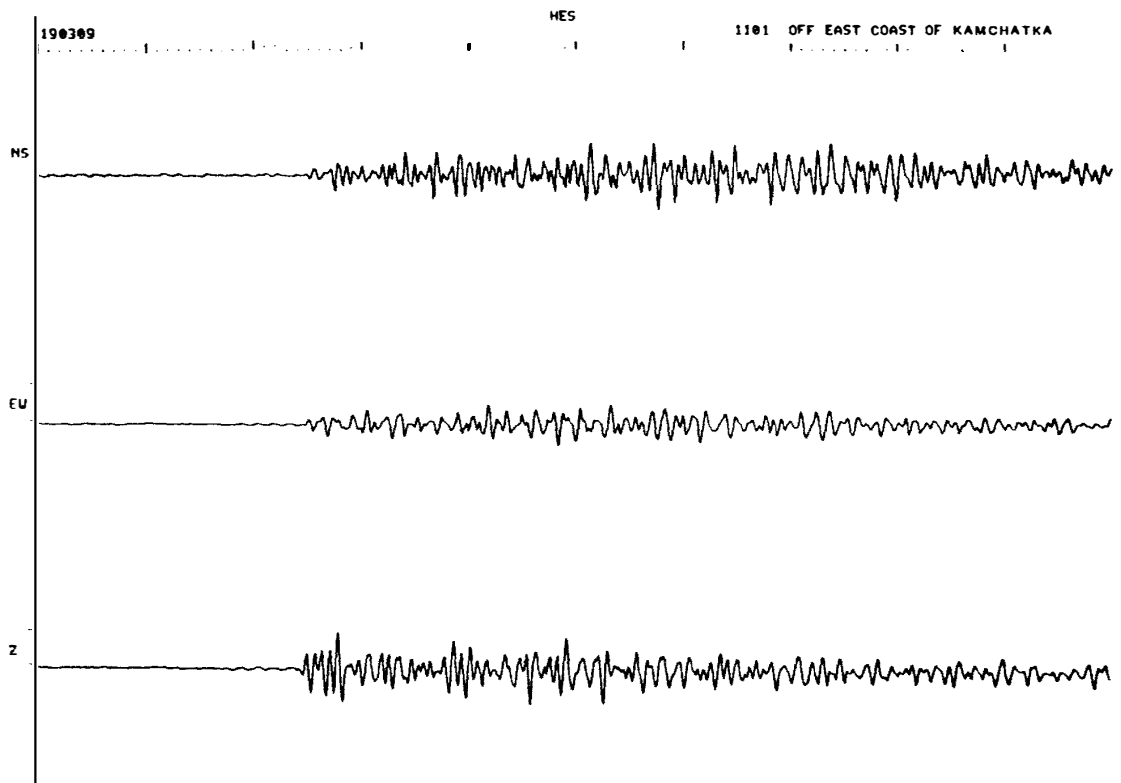
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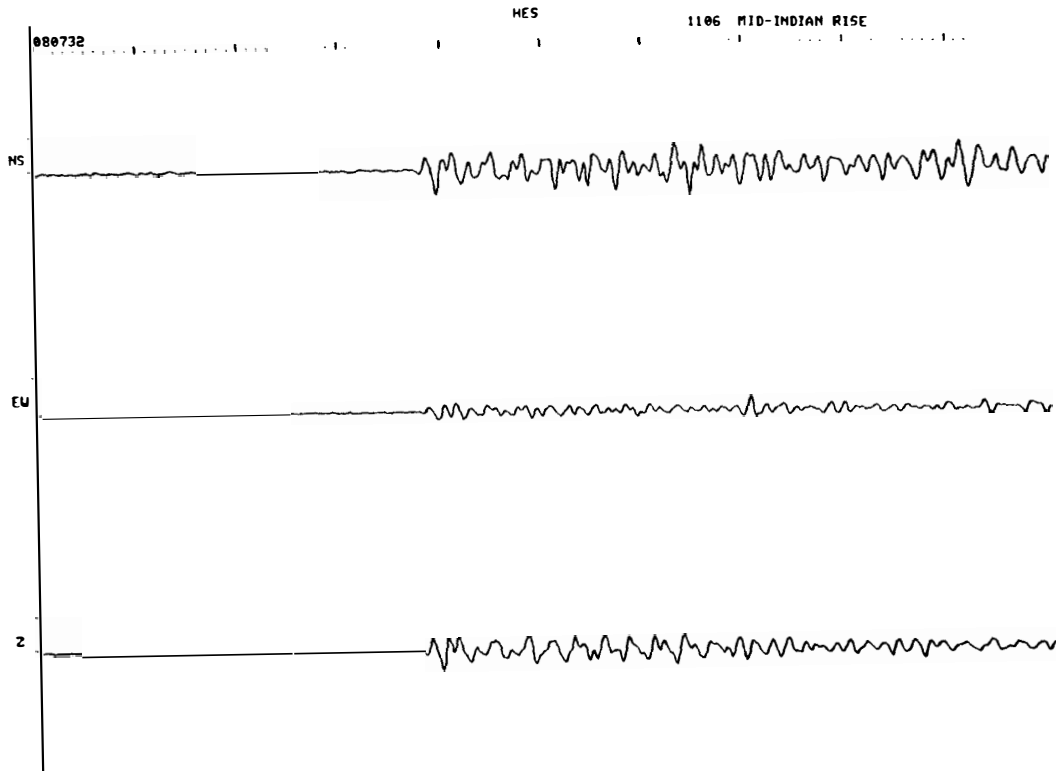
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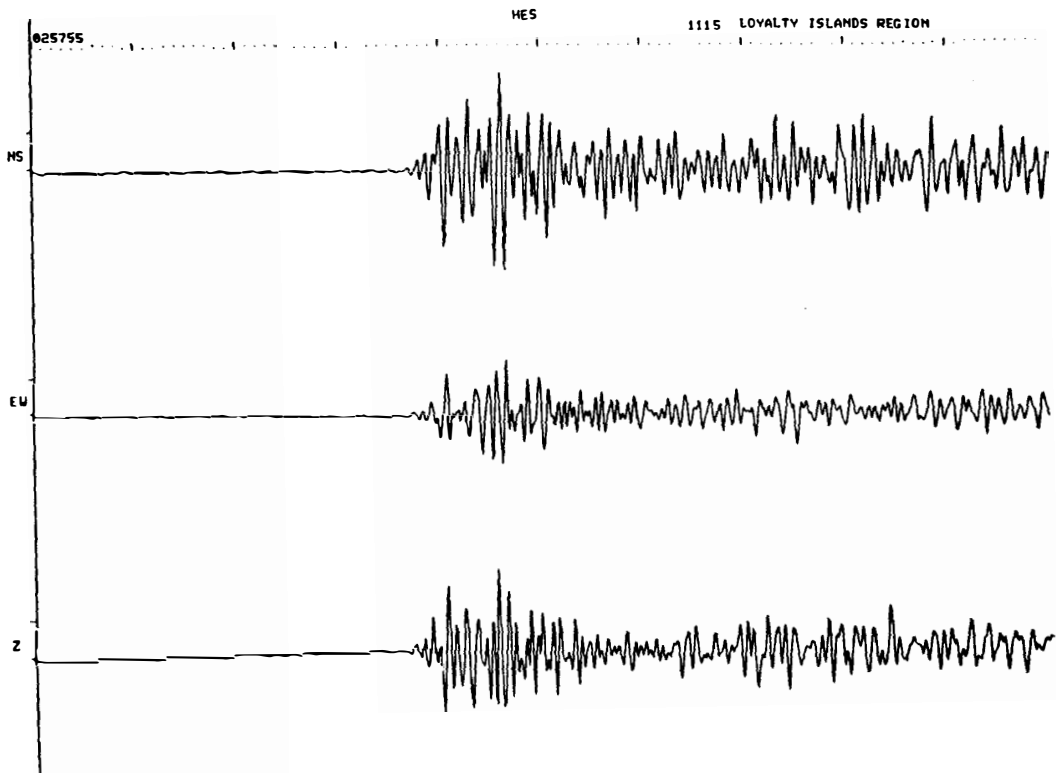
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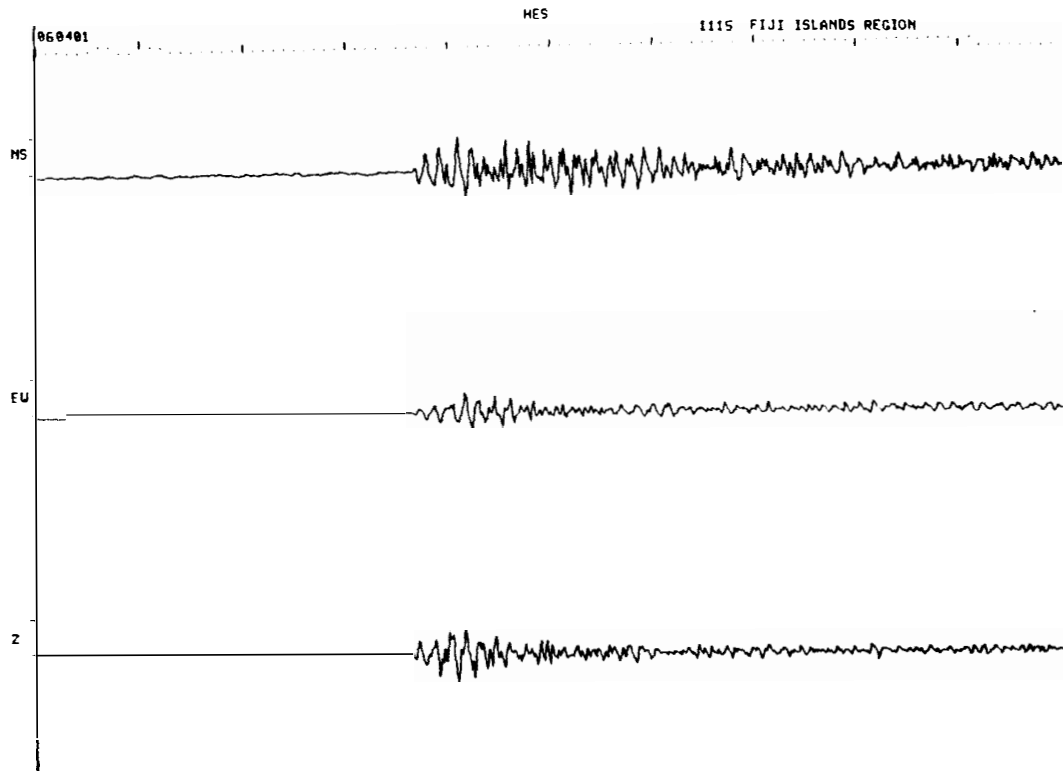
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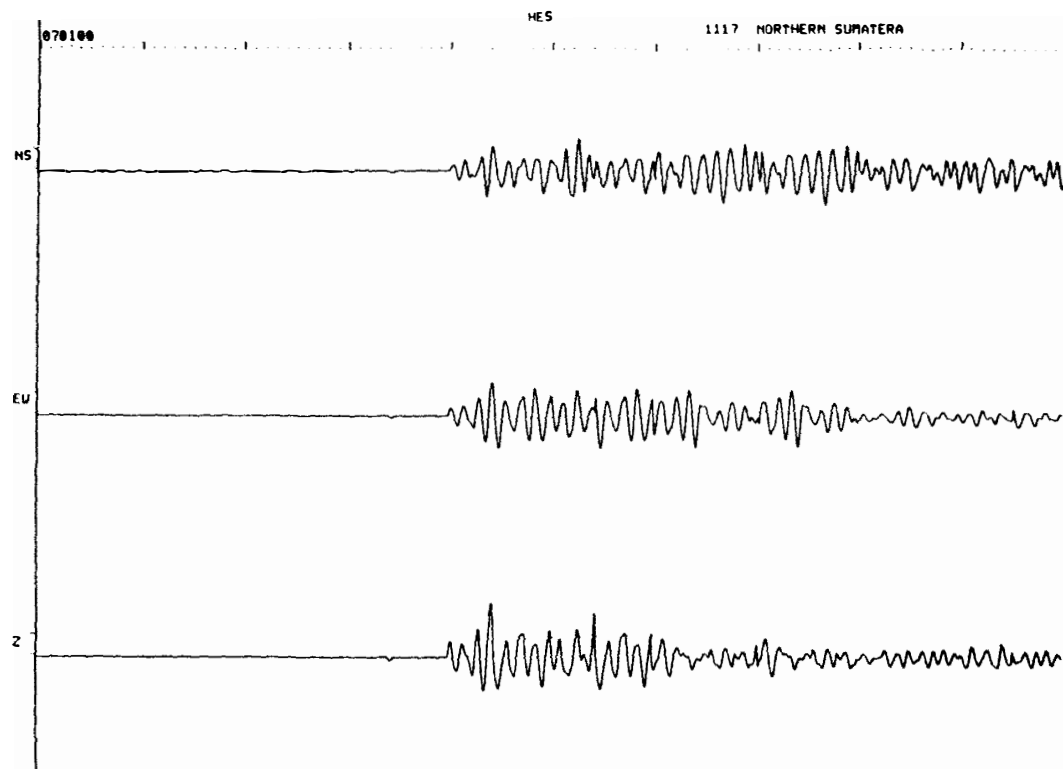
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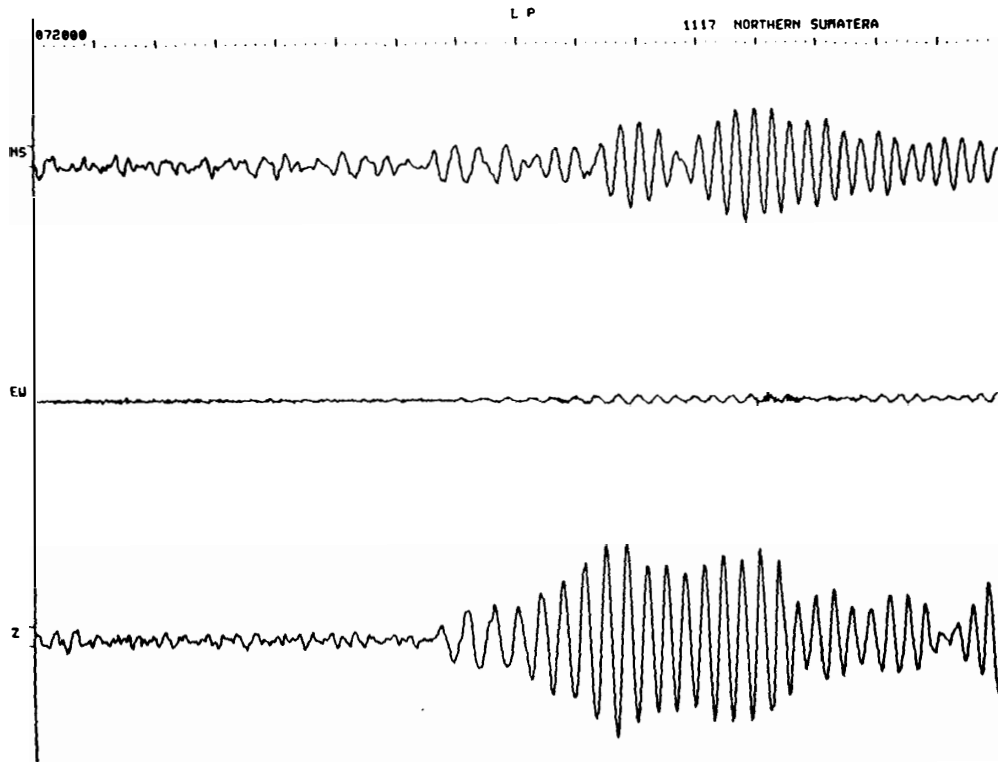
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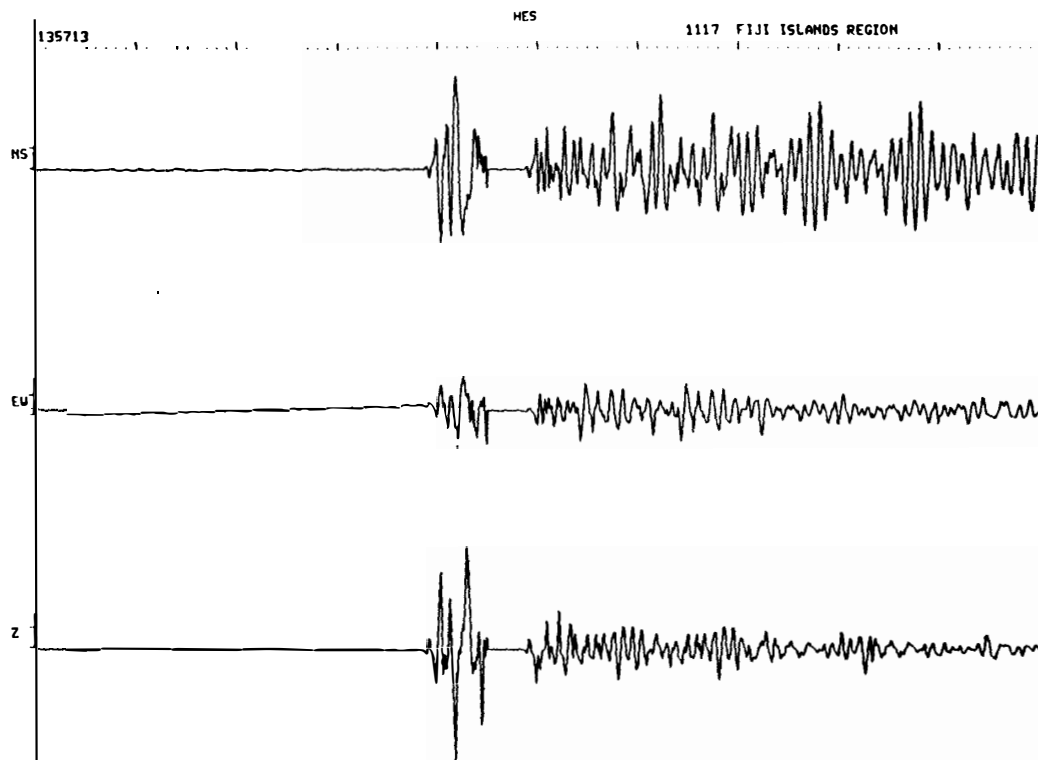
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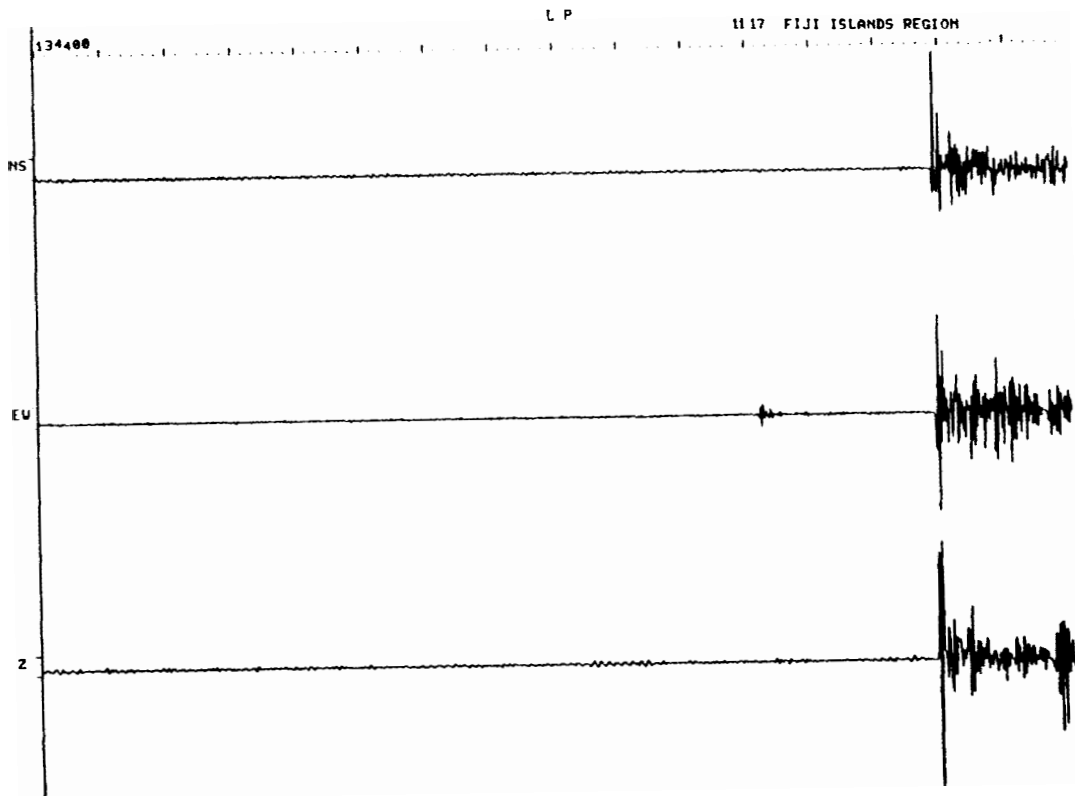
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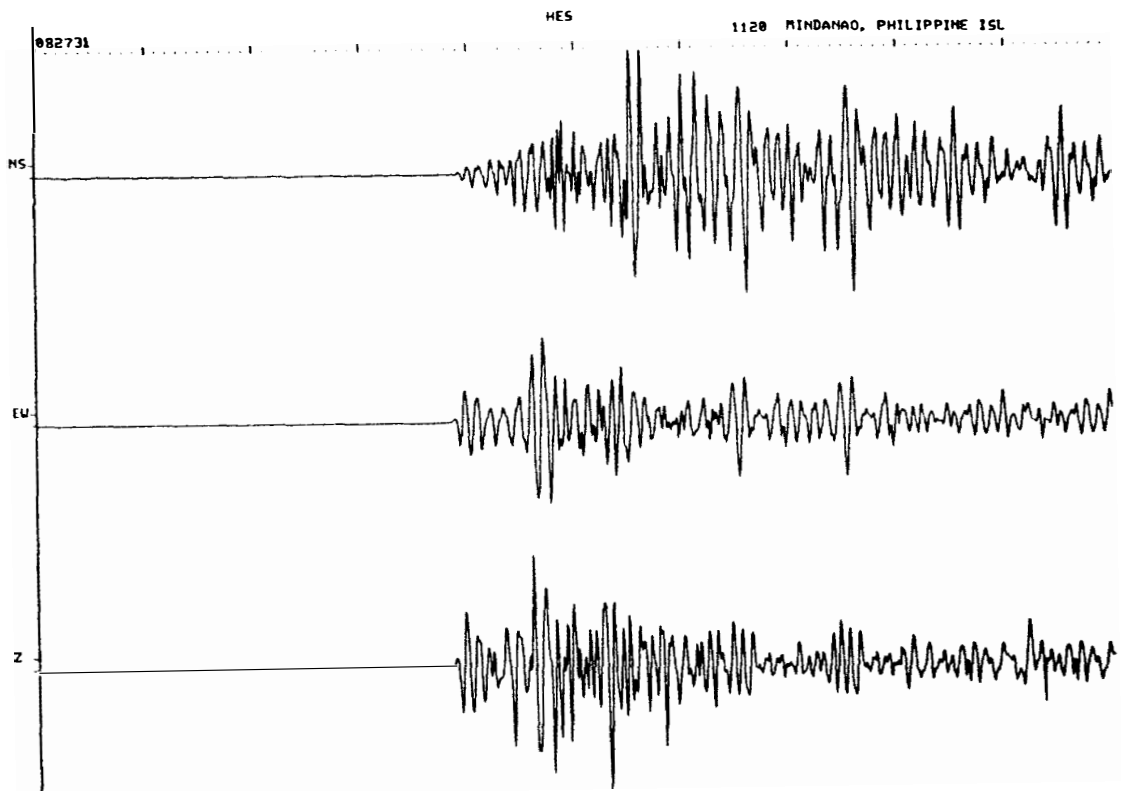
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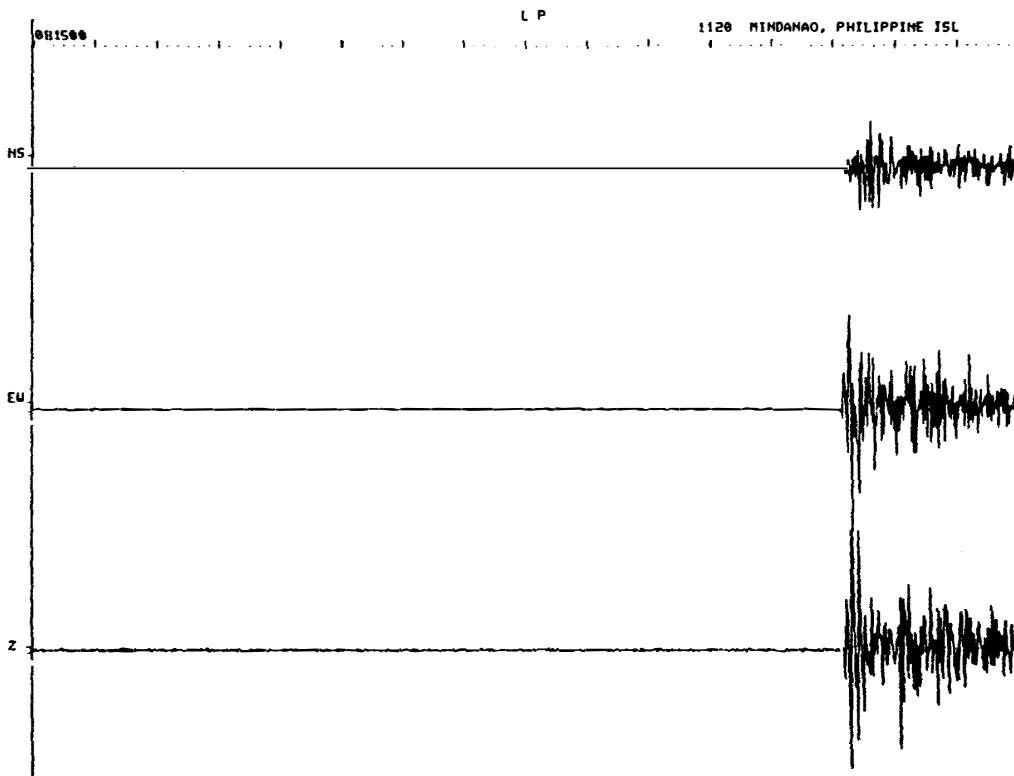
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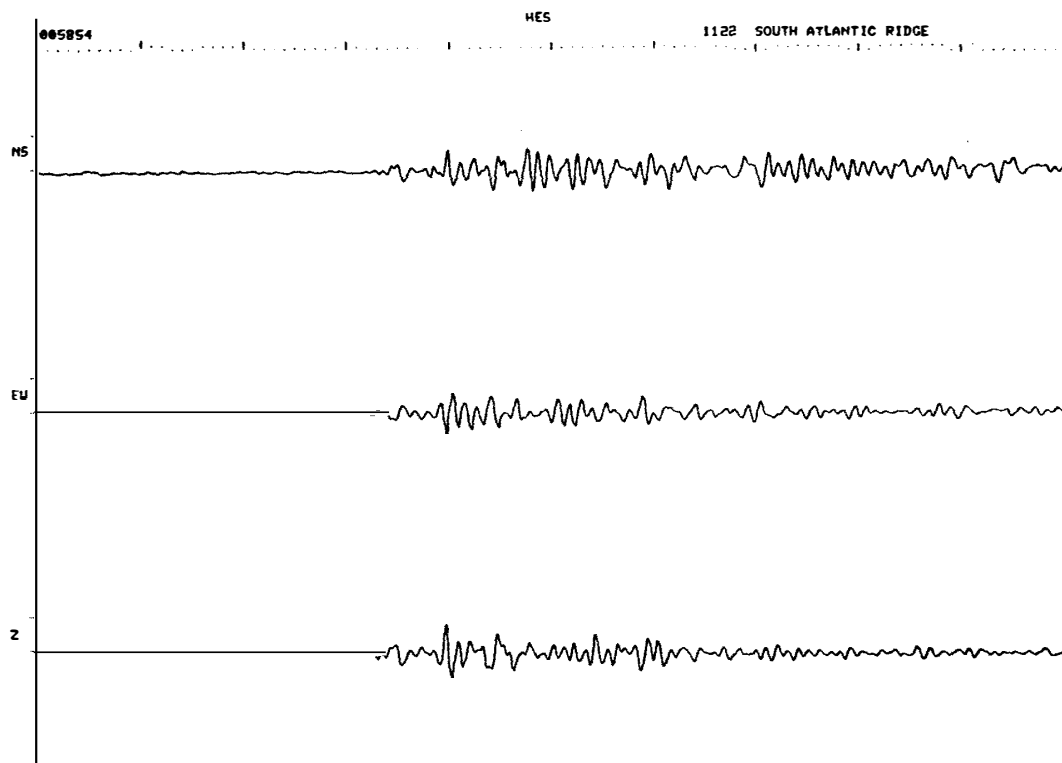
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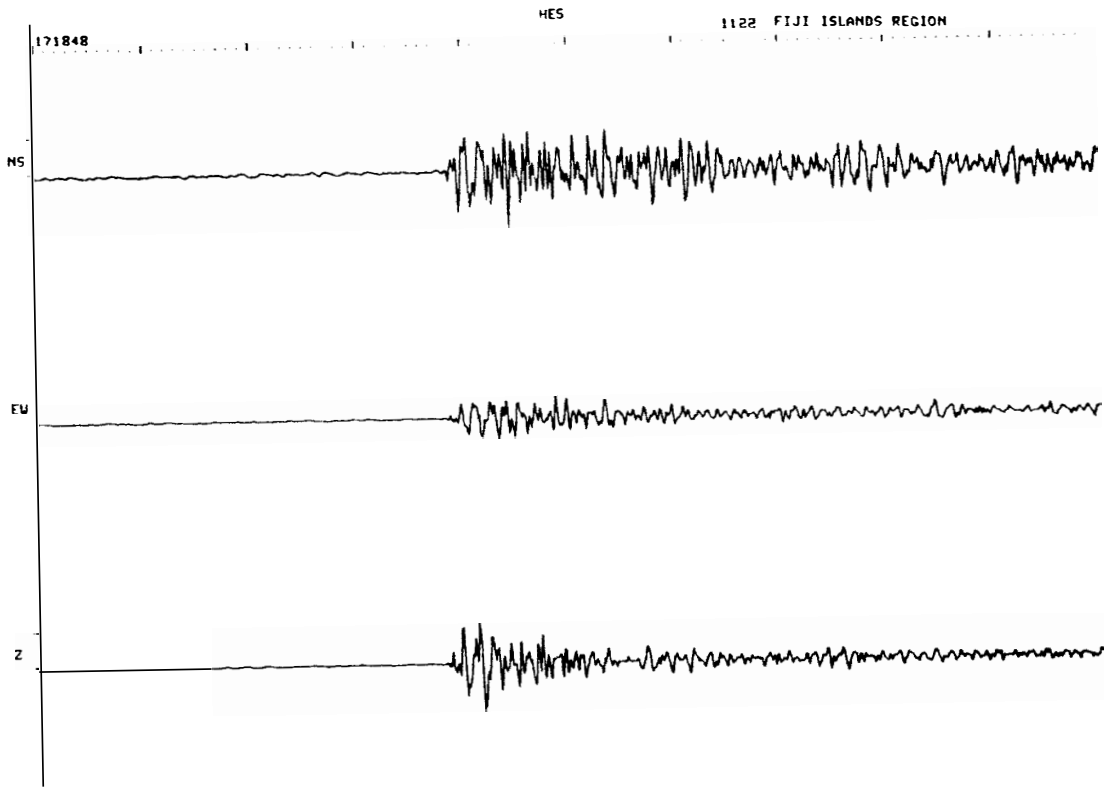
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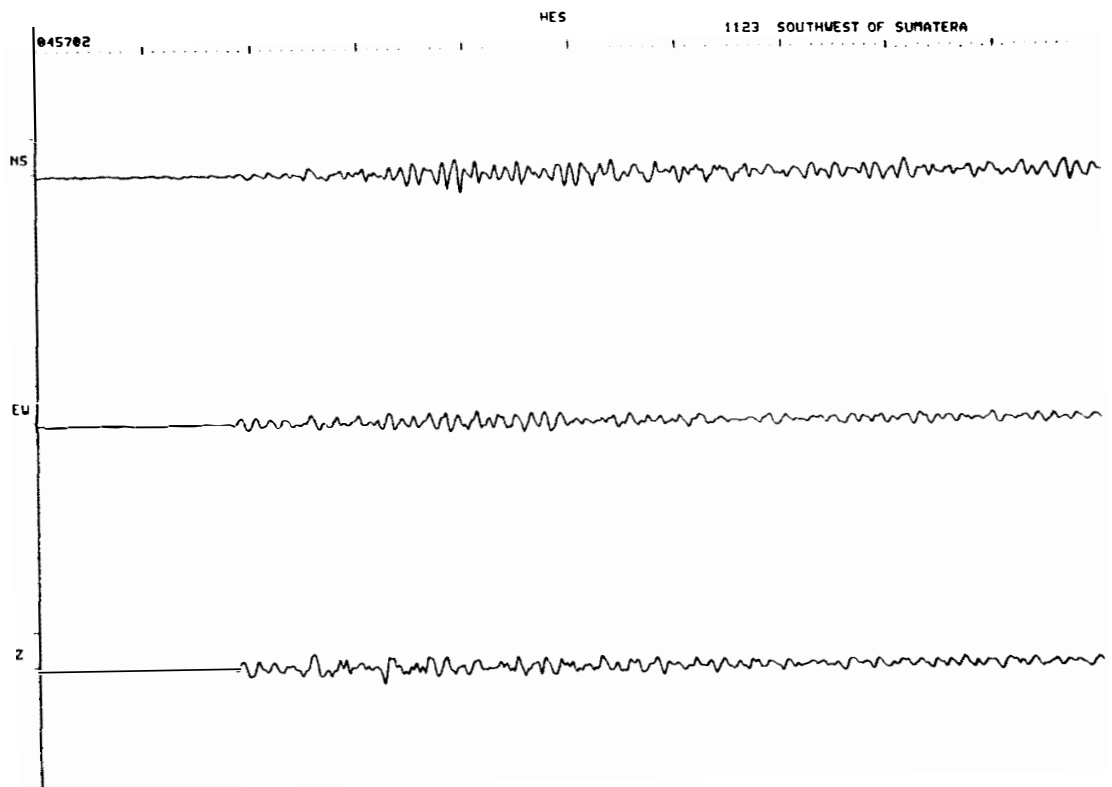
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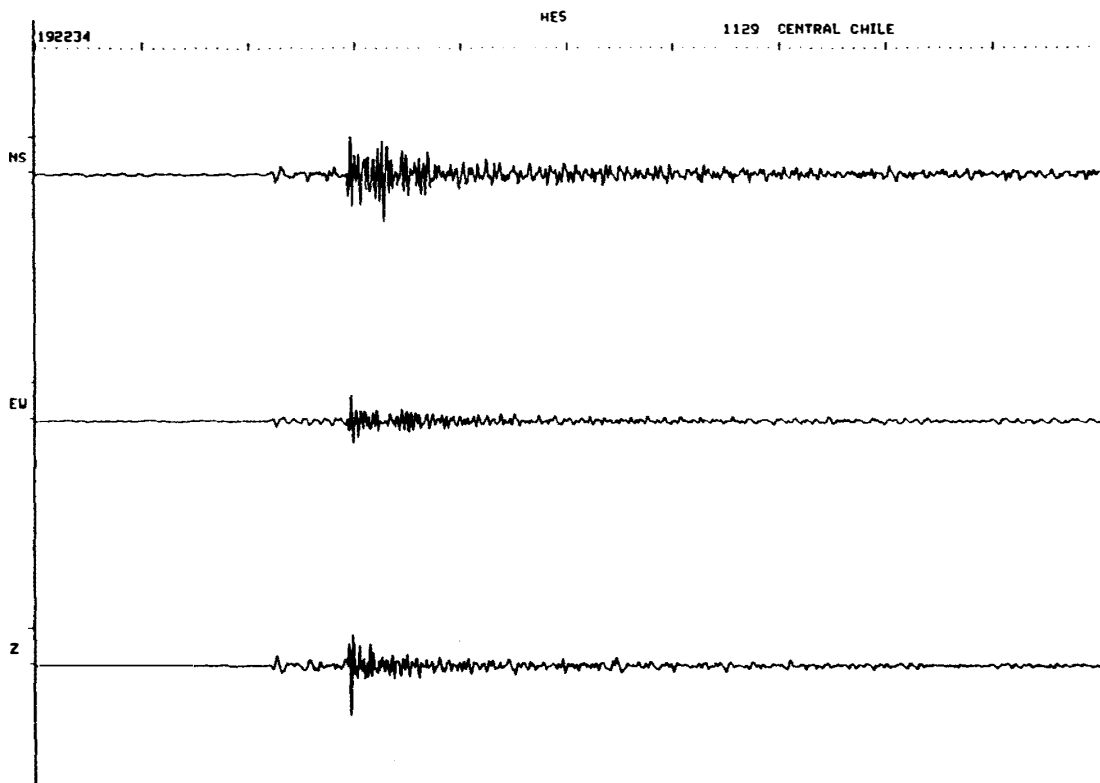
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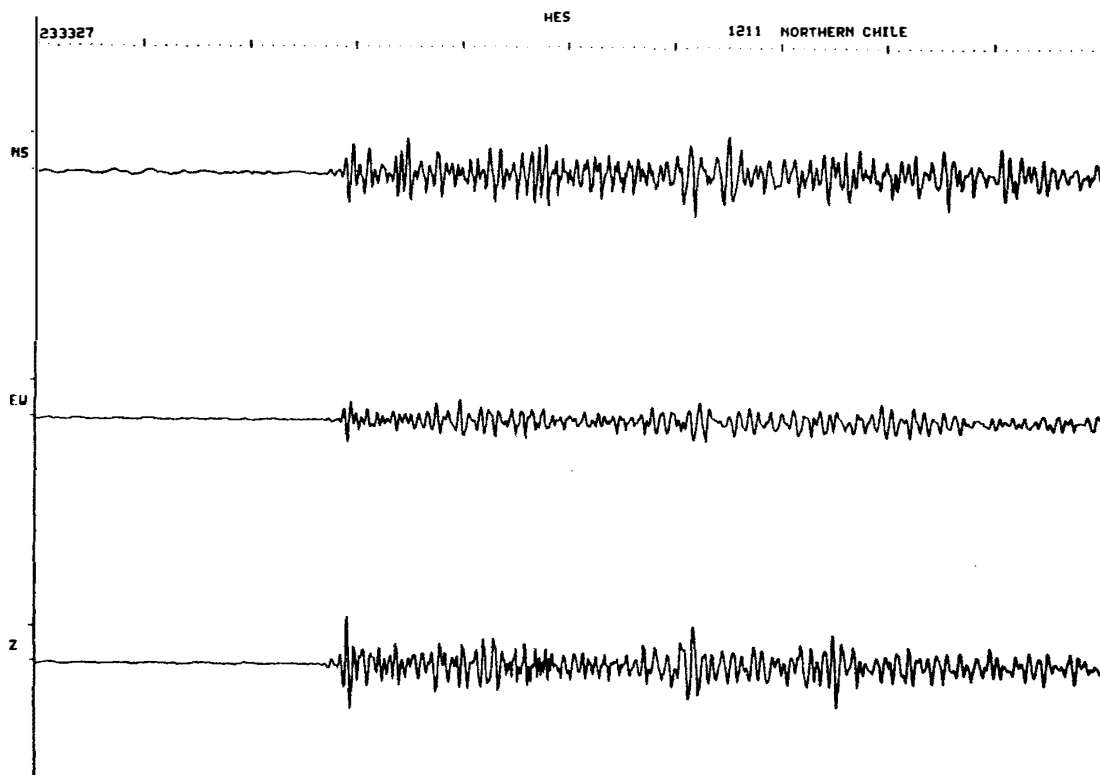
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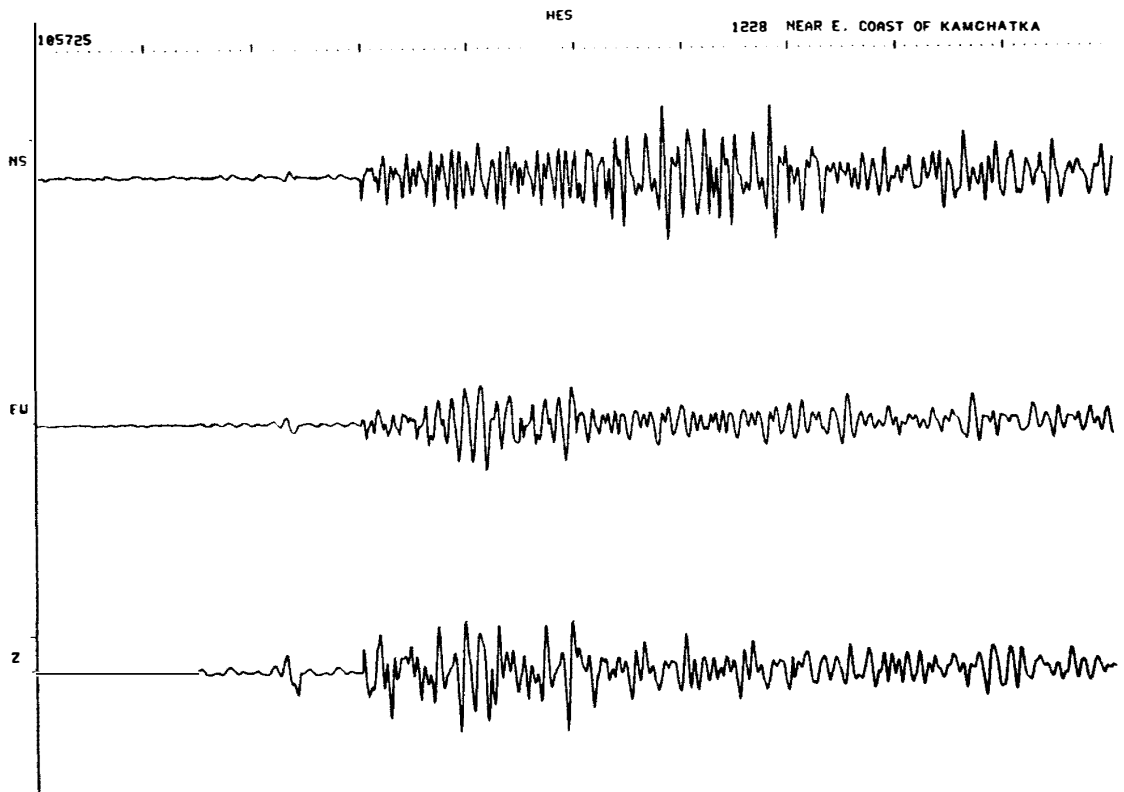
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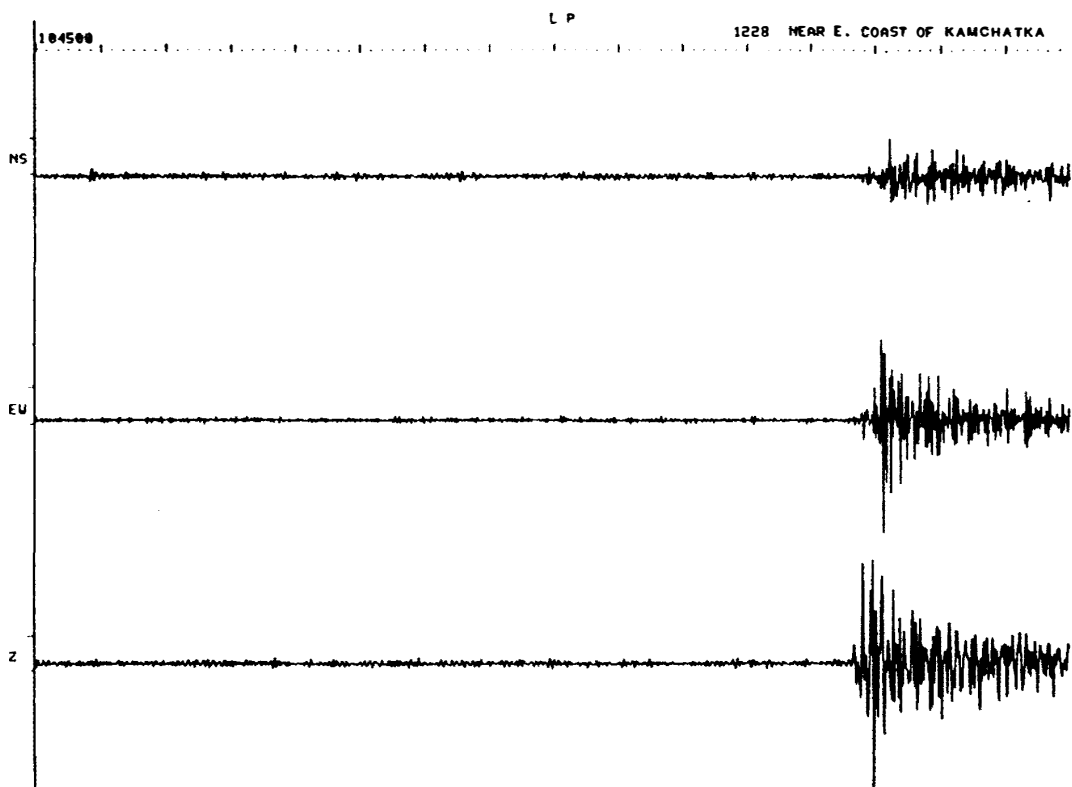
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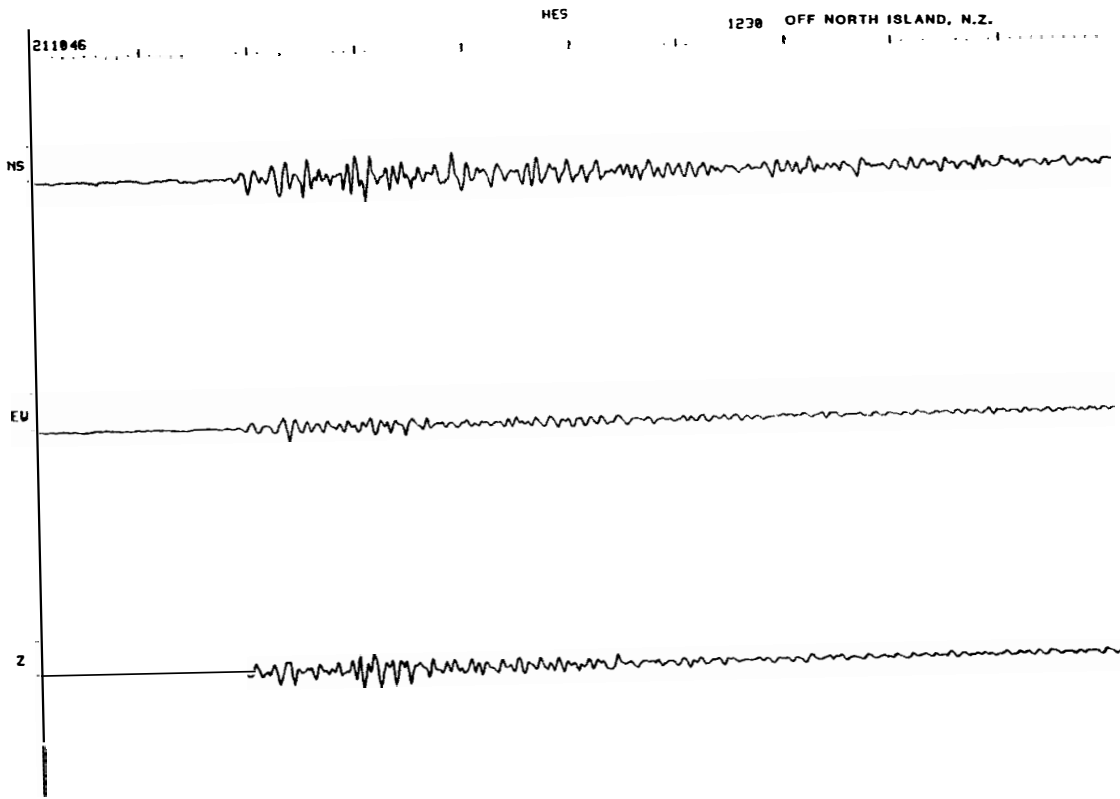
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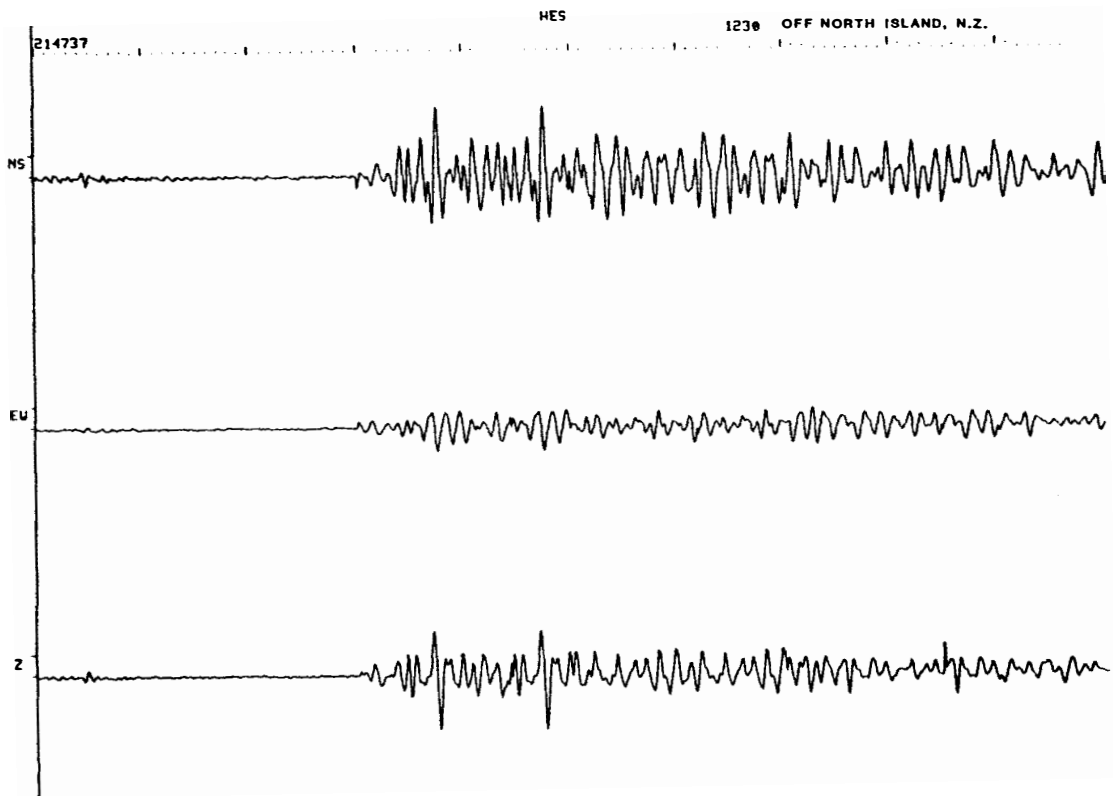
No.83



No.84



No.85



No.85

