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SEISMOLOGICAL BULLETIN OF SYOWA STATION, ANTARCTICA, 1985

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(National Institute of Polar Research, Itabashi-ku, Tokyo 173)

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°00'31.7"S in latitude and 39°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

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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

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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 malfunctiong 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.

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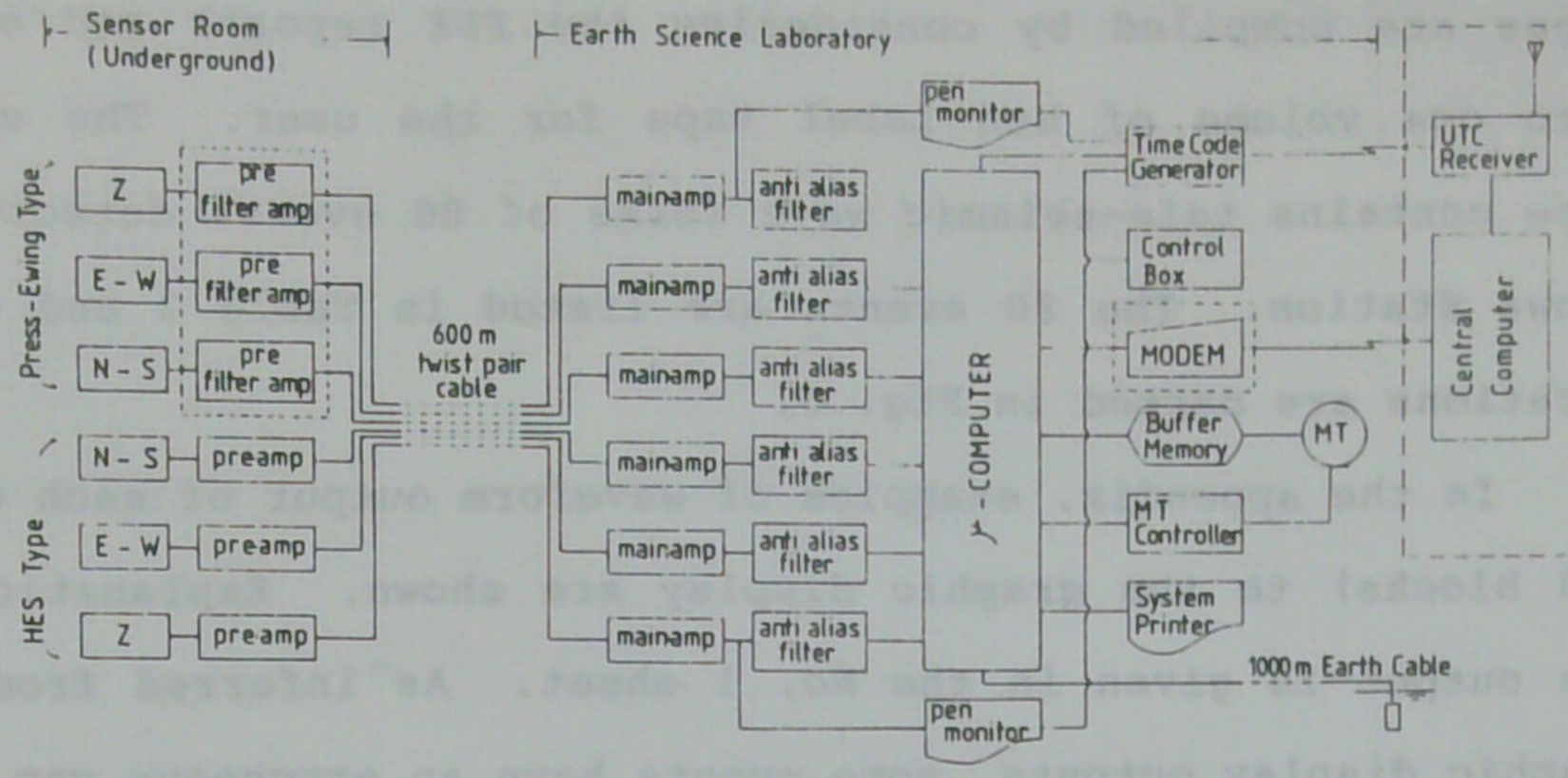


Fig. 1. The seismic observation system at Syowa Station.

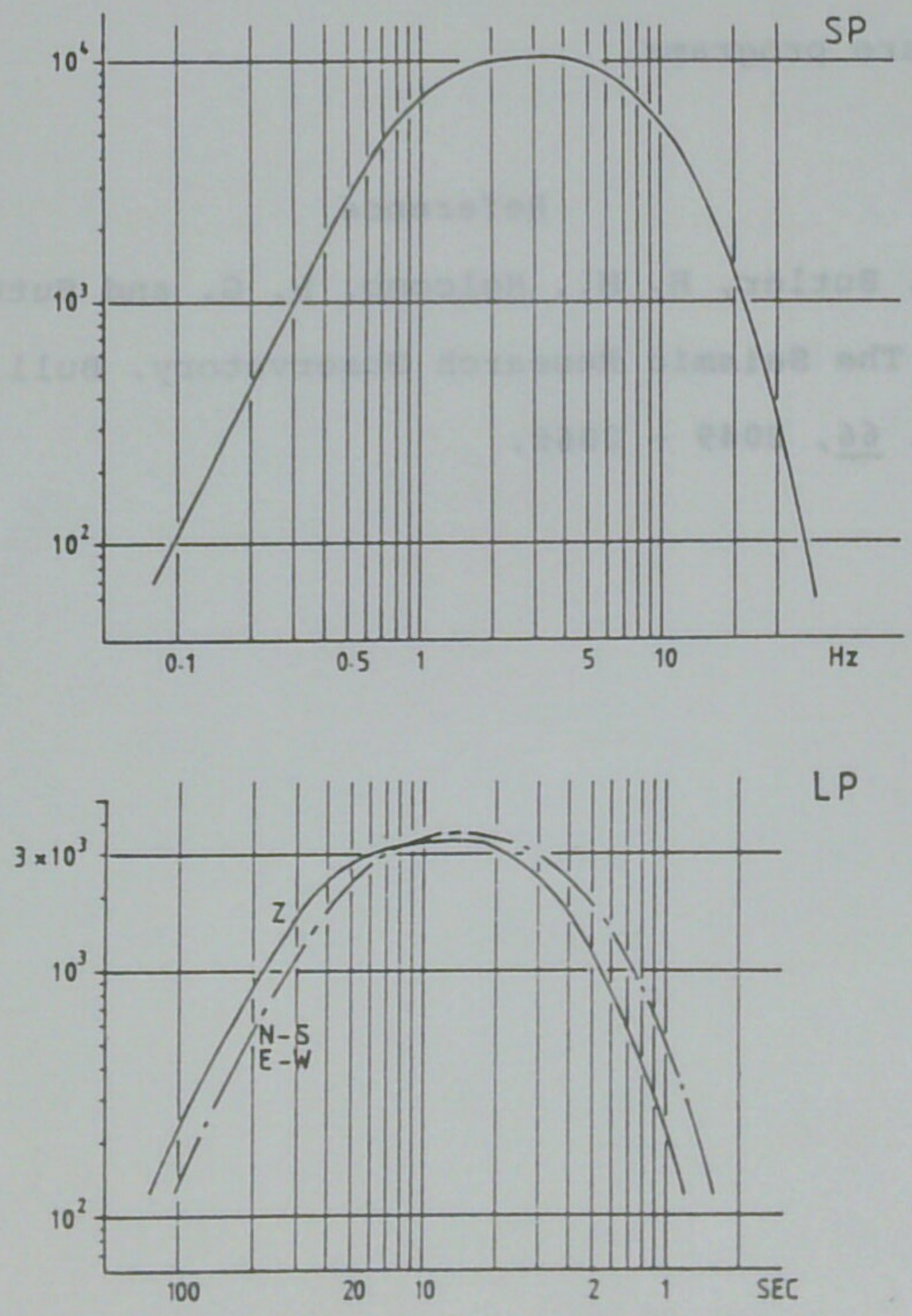


Fig. 2. Over-all frequency responses of the short-period and the long-period seismographs.

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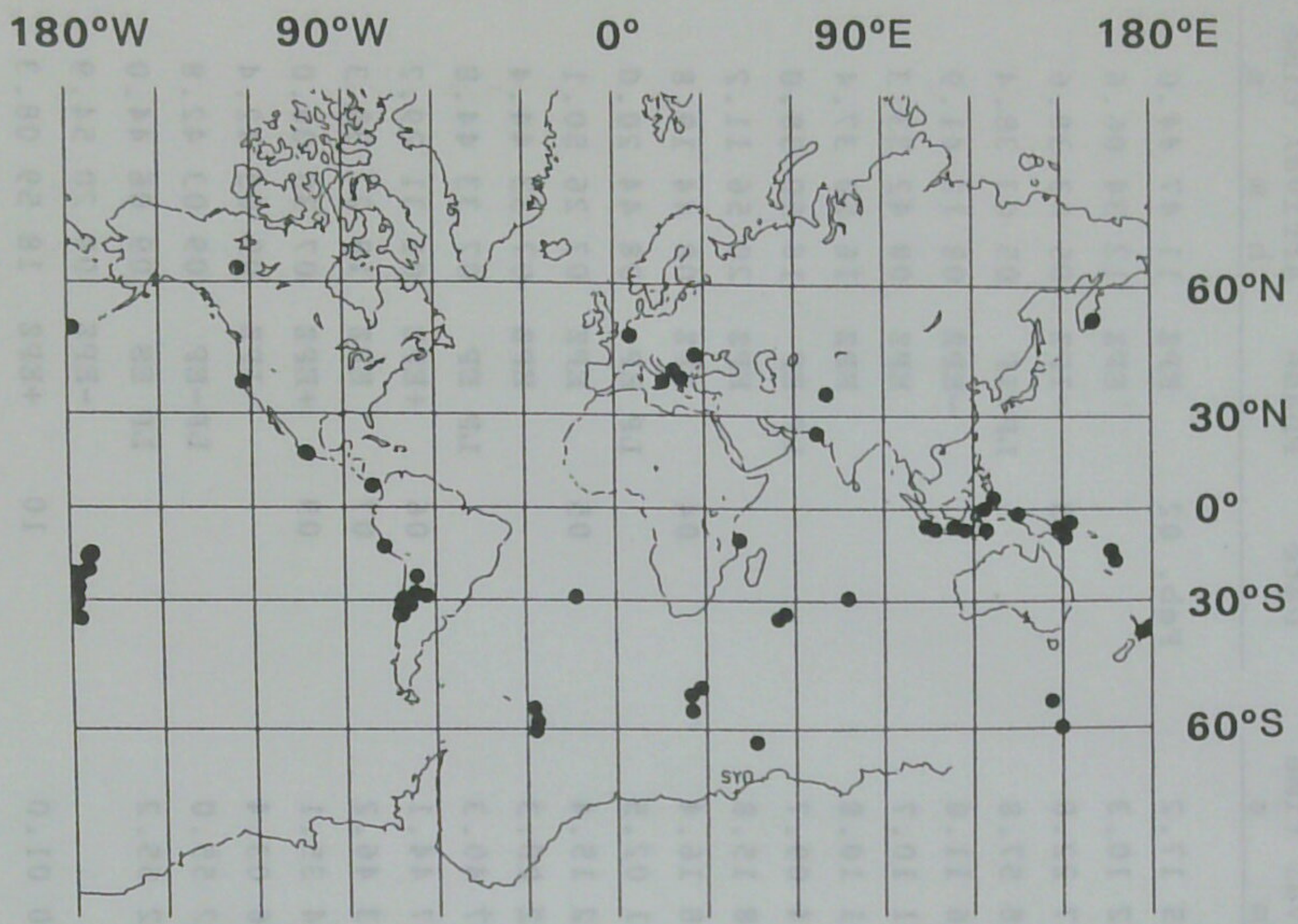


Fig. 3. Epicenters of the 80 events.

Table 1. Read-out data.

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

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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

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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

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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
	EPZ	22 18 30.7
07	+EPZ	03 43 30.6
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
10	EPZ	03 11 12.5
	+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
	EPZ	18 55 21.6
12	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
	LP-IP	14 28 48.0
	LP+LR	14 43 26.4
17	EPZ	00 49 14.1
	EXZ	02 54 49.8
18	EPZ	11 24 53.3
	-EPZ	17 11 05.4
	LP+EP	17 11 05.6
	LP IXZ	17 11 34.0
19	+EPZ	07 18 30.1
	-IPZ	08 27 29.8
	LP+IPZ	08 27 30.0
	-IPZ	18 20 18.1
	LP+IPZ	18 20 18.4
	LP+IXZ	18 48 26.0
	+EXZ	18 48 27.0
	EPZ	20 22 33.6
21	EPZ	10 28 49.0

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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
	EPZ	15 43 38.6
04	-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 43.8
	EPZ	01 20 32.0
	EPZ	23 18 06.7
	LP-EPZ	23 18 06.8
06	+EPZ	02 52 42.4
	LP-EPZ	02 52 42.8
	LP-LRZ	03 16 05.2
	EPZ	08 04 09.2
	-EPZ	14 39 41.8
	LP+IPZ	14 39 42.0
	EPZ	14 59 27.5
08	-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
	EPZ	21 33 53.1
	EPZ	21 47 57.8
11	EPZ	03 10 29.0
	-EPZ	11 23 19.8
	EPZ	11 45 24.4
12	-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

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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
	LP+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

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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	EPZ	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
	+FPZ	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

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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

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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	44.0
	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

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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
	LP+IPZ	11	01	33.2
22	+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
	EPZ	10	22	57.6
	LP+EPZ	10	22	57.6
	LP+LRZ	10	58	26.0
29	+EPZ	02	44	05.8
	LP-EPZ	02	44	06.2
30	+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
	LP-EPZ	17	17	03.2
	EPZ	21	36	31.9
02	EPZ	06	11	05.5
	-EPZ	20	52	34.7
	LP+IPZ	20	52	34.7
03	EPZ	21	20	34.6
04	+IPZ	12	44	46.8
	LP EPZ	12	44	47.2
	EPZ	15	26	10.2
	LP-EPZ	15	26	10.4
05	+IPZ	15	44	05.4
	LP+IPZ	15	44	05.6
	LP-IXZ	15	49	18.0
06	-EPZ	12	12	56.3
	LP+IPZ	12	12	56.4
	LP+ISZ	12	13	57.6
07	EPZ	00	02	24.3

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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
	EPZ	13	53	31.3
10	-IPZ	14	17	10.6
	LP+IPZ	14	17	11.2
	EPZ	18	55	21.4
	LP-EPZ	18	55	22.0
11	-IPZ	19	41	36.0
	LP+IPZ	19	41	36.8
12	+IPZ	02	25	21.6
	LP-IPZ	02	25	22.0
	EPZ	20	37	42.4
	LP EXZ	20	38	48.0
13	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
16	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
	LP-IPZ	18	23	36.4
26	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
	LP+LRZ	14	58	06.0
	+IPZ	16	42	04.4
	EPZ	21	03	01.4
30	+EPZ	19	25	31.4
31	+IPZ	21	59	20.8
	LP-IPZ	21	59	20.8
	LP+ISZ	22	01	17.6
	EXZ	22	27	20.8
Nov. 01	-EPZ	08	15	31.3
	LP EPZ	08	15	31.6
	EXZ	20	02	14.3
05	EXZ	08	27	44.2
06	+IPZ	08	21	29.3
	LP-IPZ	08	21	29.4
	LP+LRZ	08	30	34.0
	EPZ	11	55	00.2
07	-IPZ	19	23	51.5

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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
	FPZ	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

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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

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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 Date	h	m	s	Geographic coordinates Latitude	Longitude	Region	Depth (km)	Magnitude (Mb)	(Ms)	Epicentral distance (degree)	Azimth (degree)
1	01/04	02	17	34.7	26.057 S	177.518 W	South of Fiji Islands	133 D	5.3		81.279	33.255 SE
2	01/10	19	29	39.9	39.345 N	16.294 E	Southern Italy	10 G	4.6		109.601	161.053 SW
3	01/11	14	41	58.5	0.196 N	123.582 E	Minahassa Peninsula	189	5.9		88.021	95.679 SE
4	01/18	15	00	09.0	29.374 S	70.793 W	Central Chile	83 D	5.7		69.623	60.620 SW
5	02/03	04	50	55.2	20.547 S	174.099 W	Tonga Islands	57 D	5.8		87.325	31.332 SE
6	02/03	16	46	39.7	53.460 S	24.912 E	South of Africa	10 G	5.0		16.864	148.660 SW
7	02/05	07	41	25.9	5.096 S	151.380 E	New Britain Region	166	5.1		92.886	67.830 SE
8	02/09	08	59	32.0	51.967 S	28.242 E	South of Africa	10 G	5.0		17.748	156.561 SW
9	03/03	22	46	56.8	33.107 S	71.737 W	Near Coast of Central Chile	33 N	5.5		66.438	58.347 SW
10	03/03	23	38	31.4	32.738 S	71.215 W	Near Coast of Central Chile	33 N	6.3	6.4	66.621	58.939 SW
11	03/03	22	47	07.2	33.135 S	71.871 W	Near Coast of Central Chile	33 N	6.7	7.8	66.453	58.222 SW
12	03/04	08	39	39.9	34.027 S	71.670 W	Near Coast of Central Chile	33 N	5.1		65.562	58.034 SW

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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

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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

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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

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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

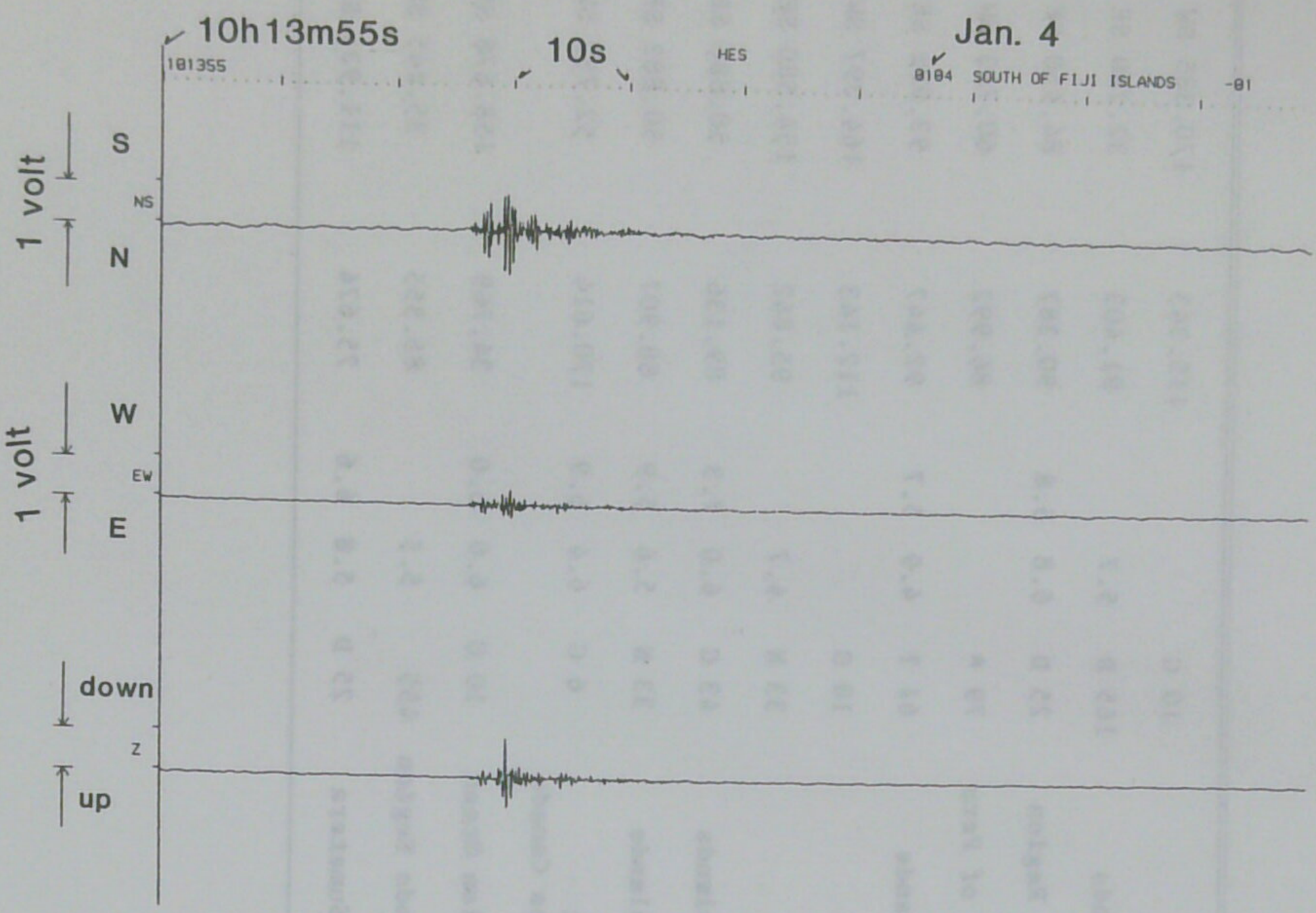
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68	11/29	10	54	01.3	46.084 N	27.022 E	Romania	10 G			115.343	170.385 SW
69	11/30	03	04	18.8	16.366 S	174.197 W	Tonga Islands	165 D	5.7		91.403	32.260 SE
70	12/06	22	26	25.5	1.636 S	134.910 E	West Irian Region	25 D	5.8	5.8	90.387	84.450 SE
71	12/09	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	Talaud 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 Terrytories 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

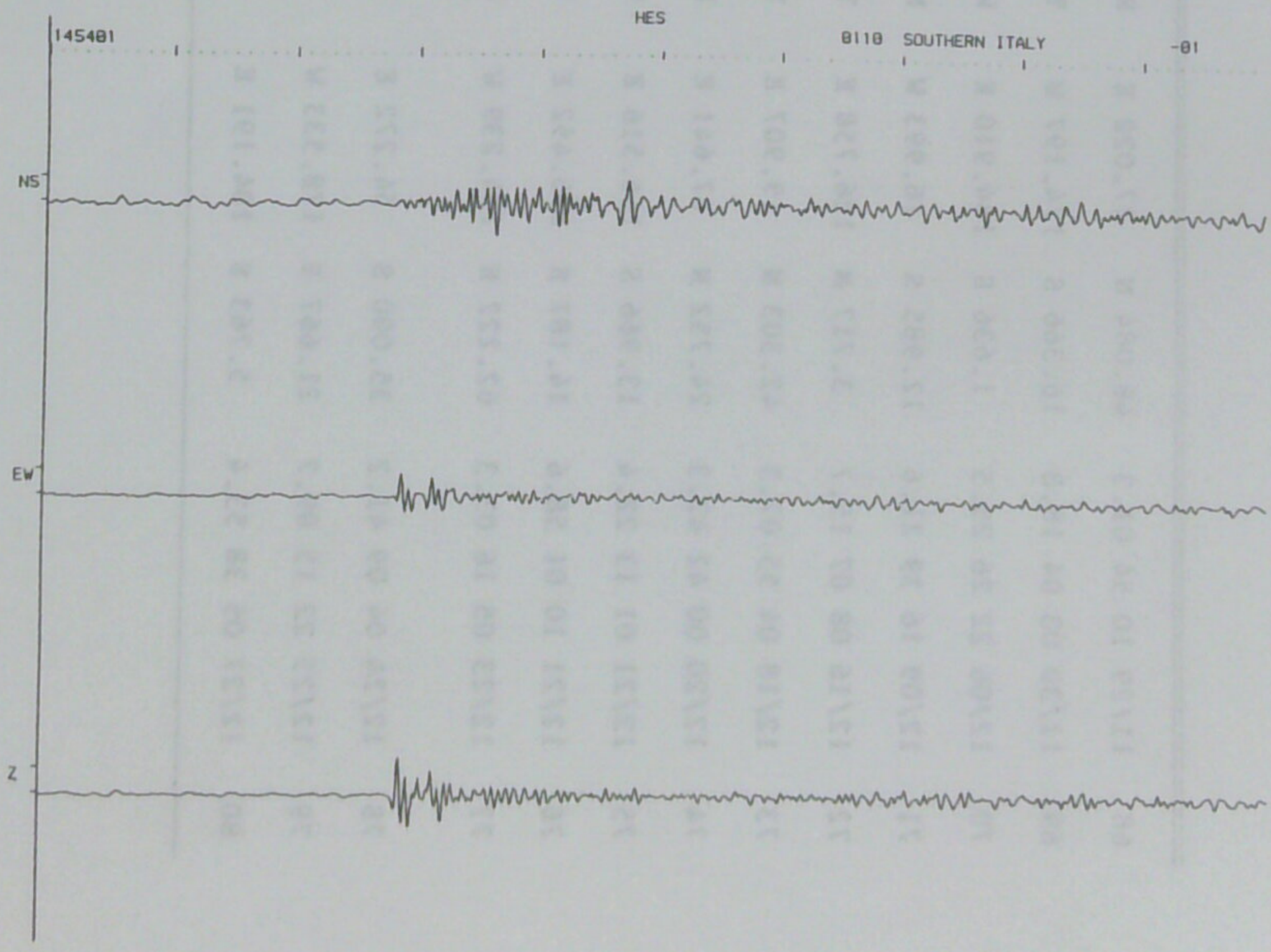
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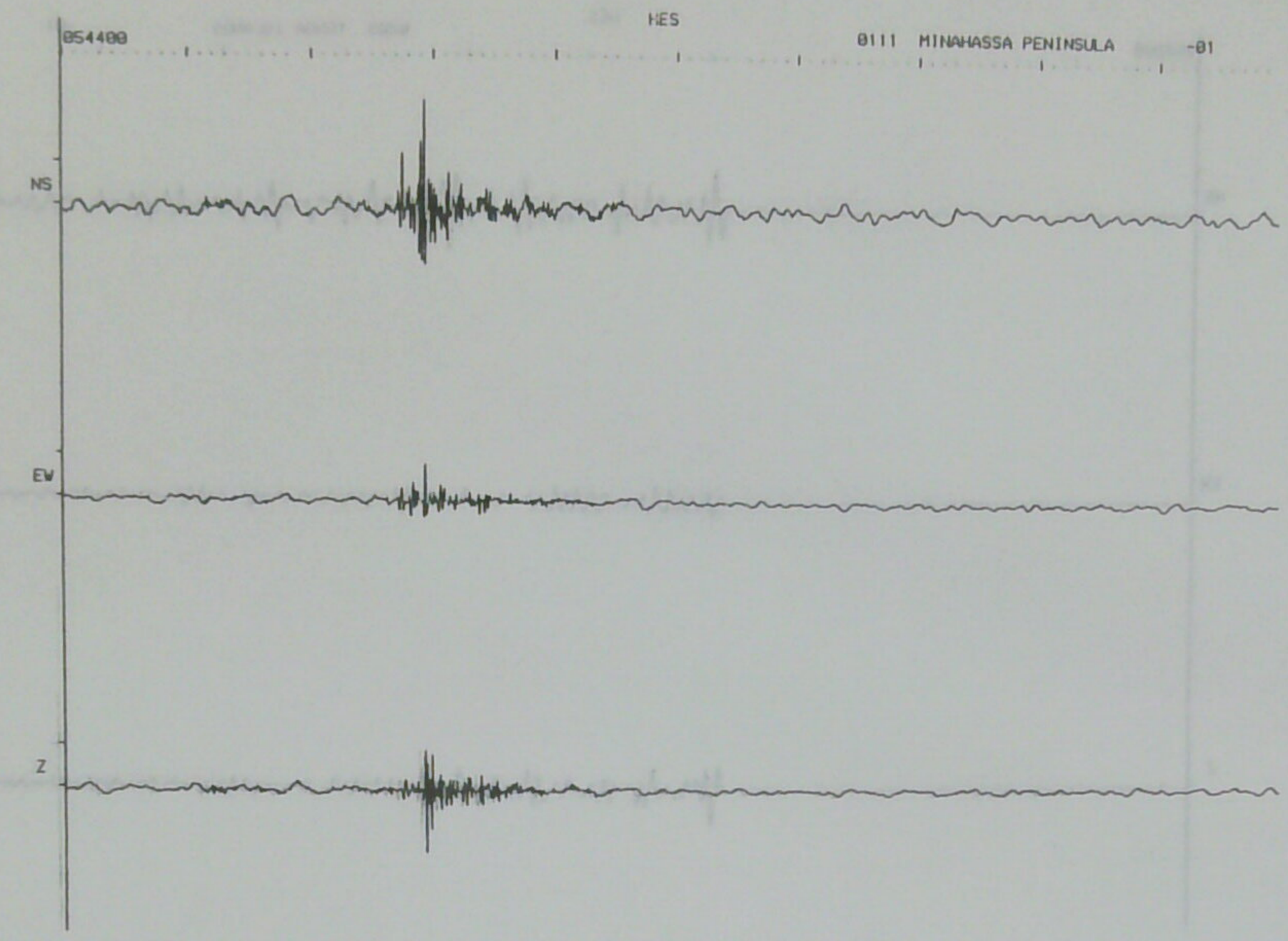


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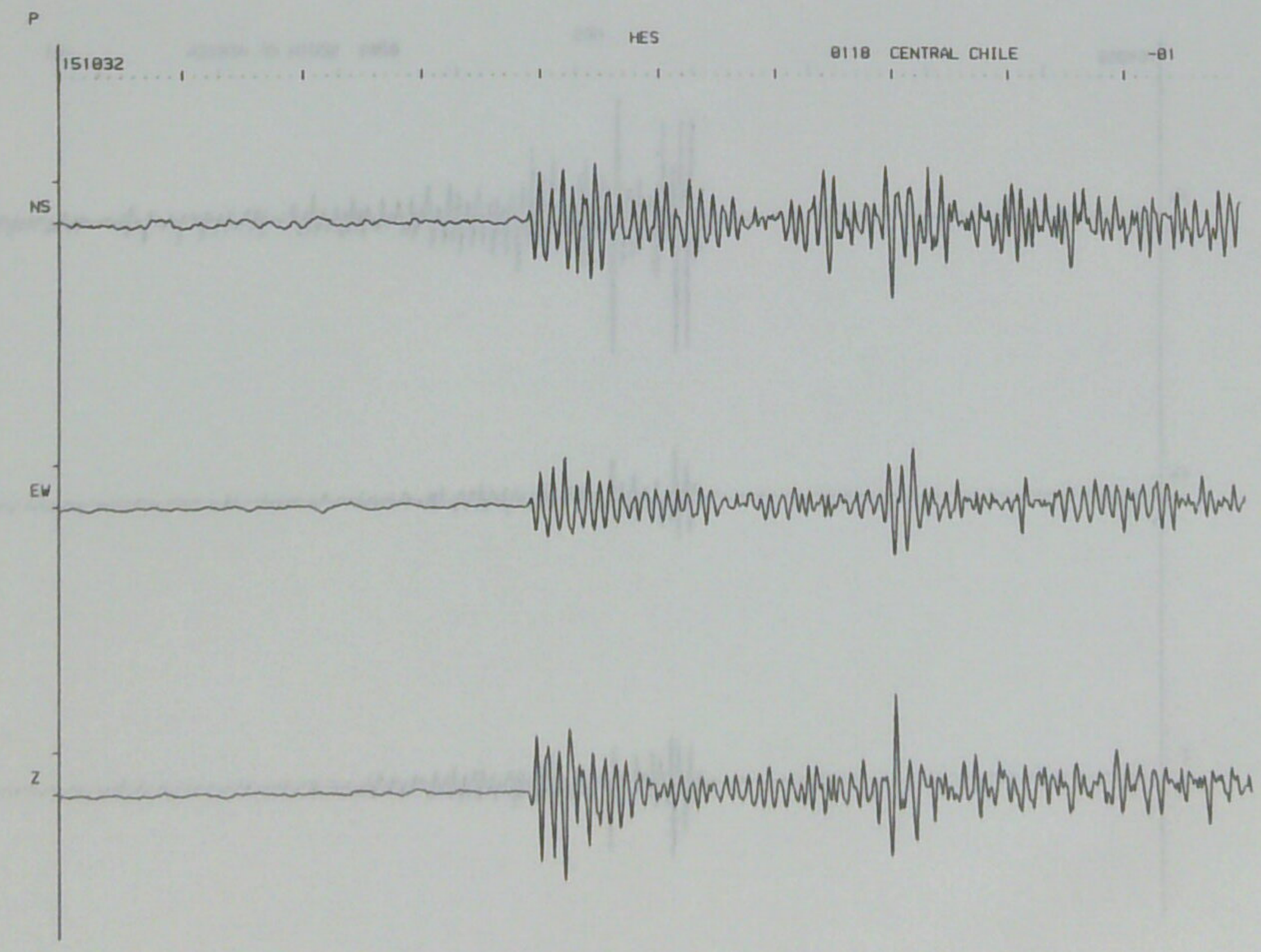


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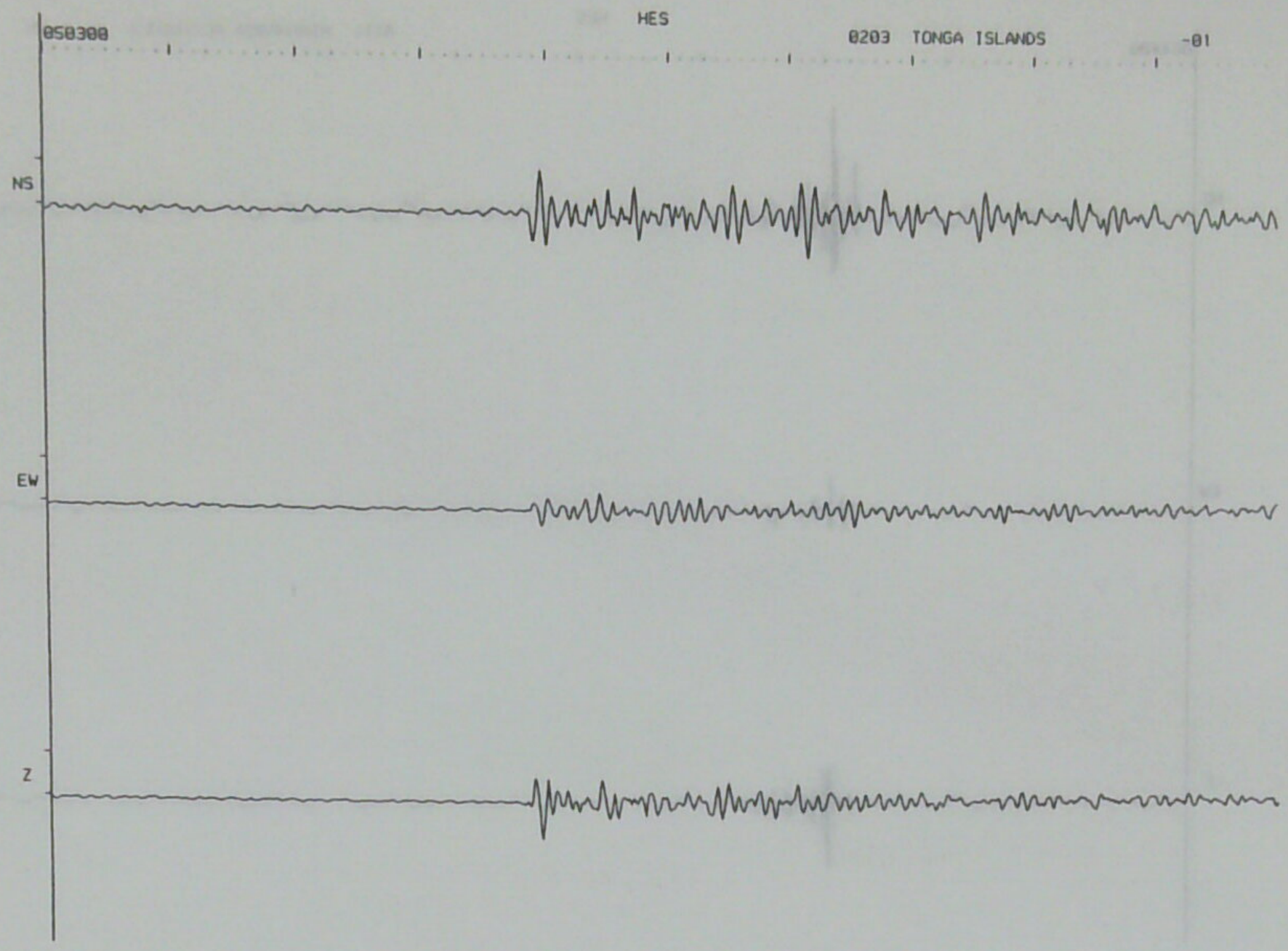


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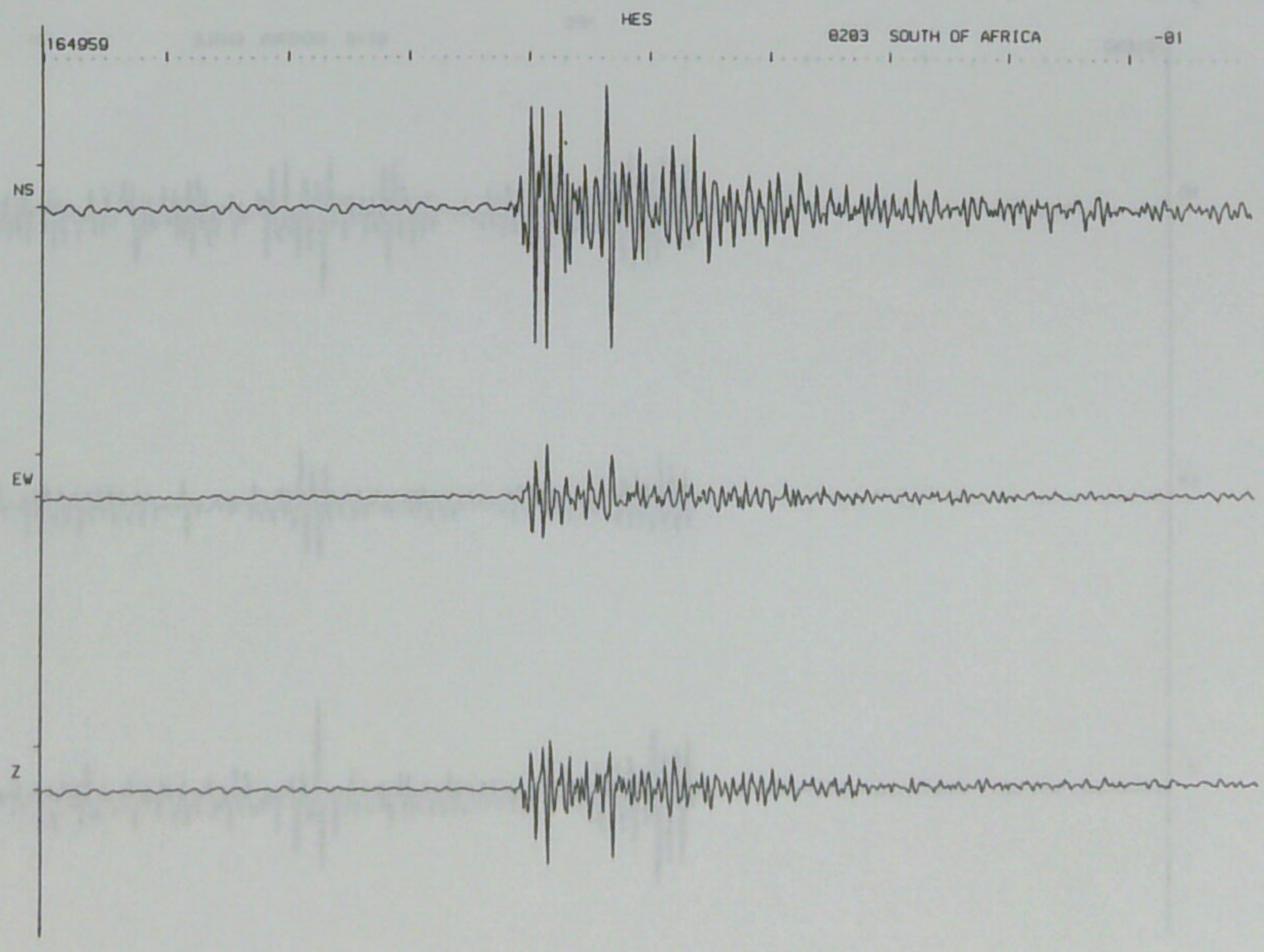


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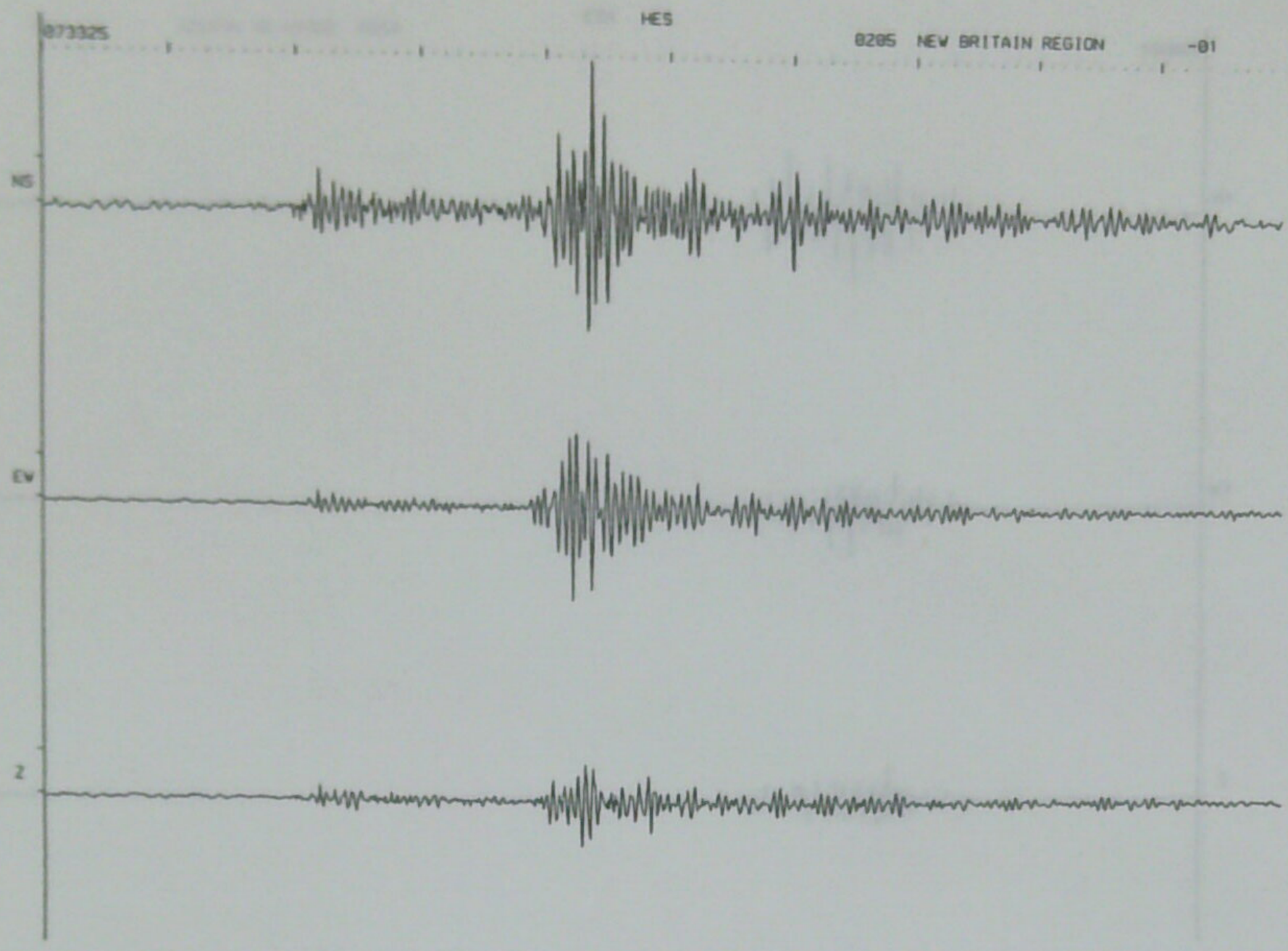


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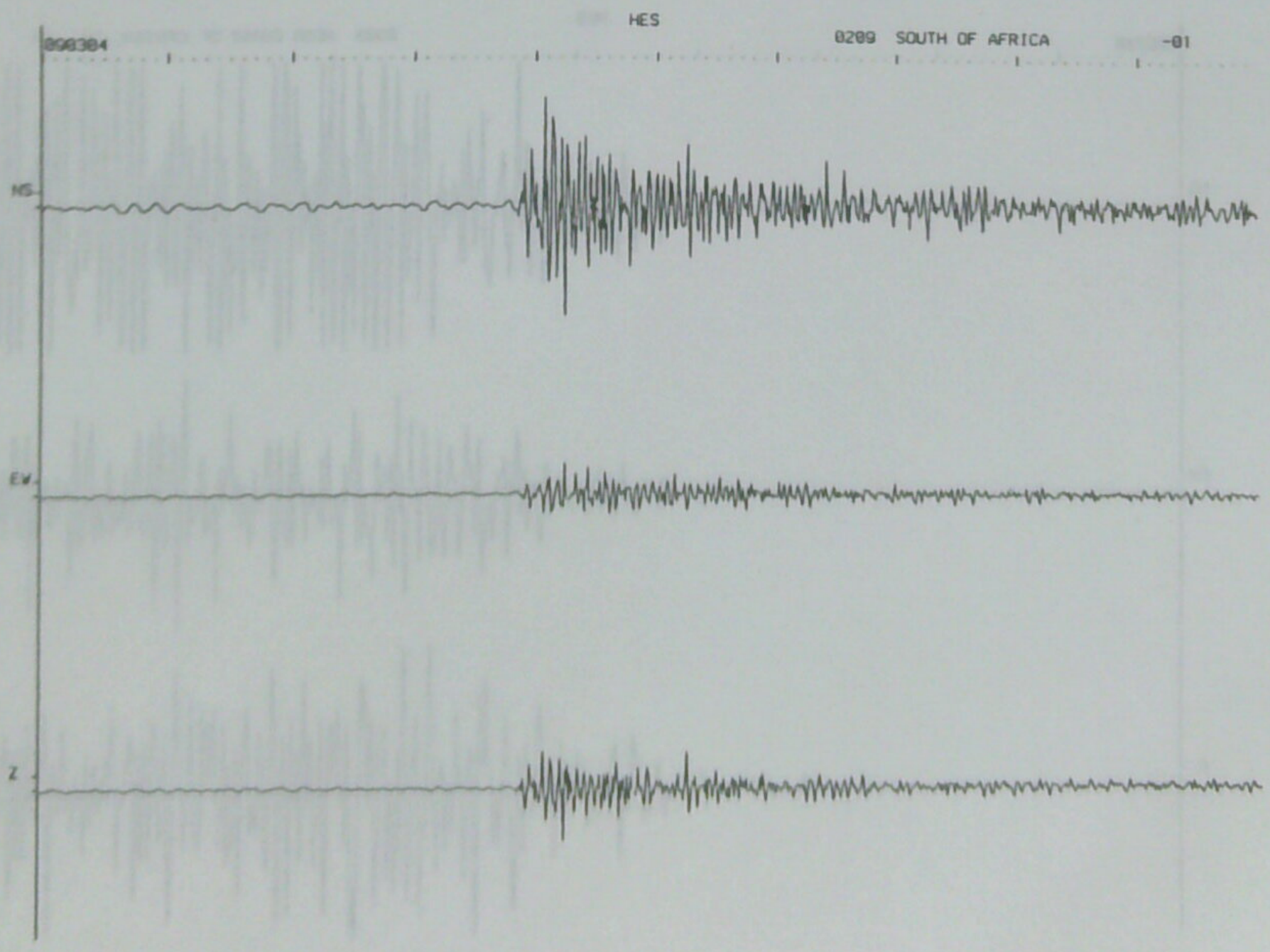


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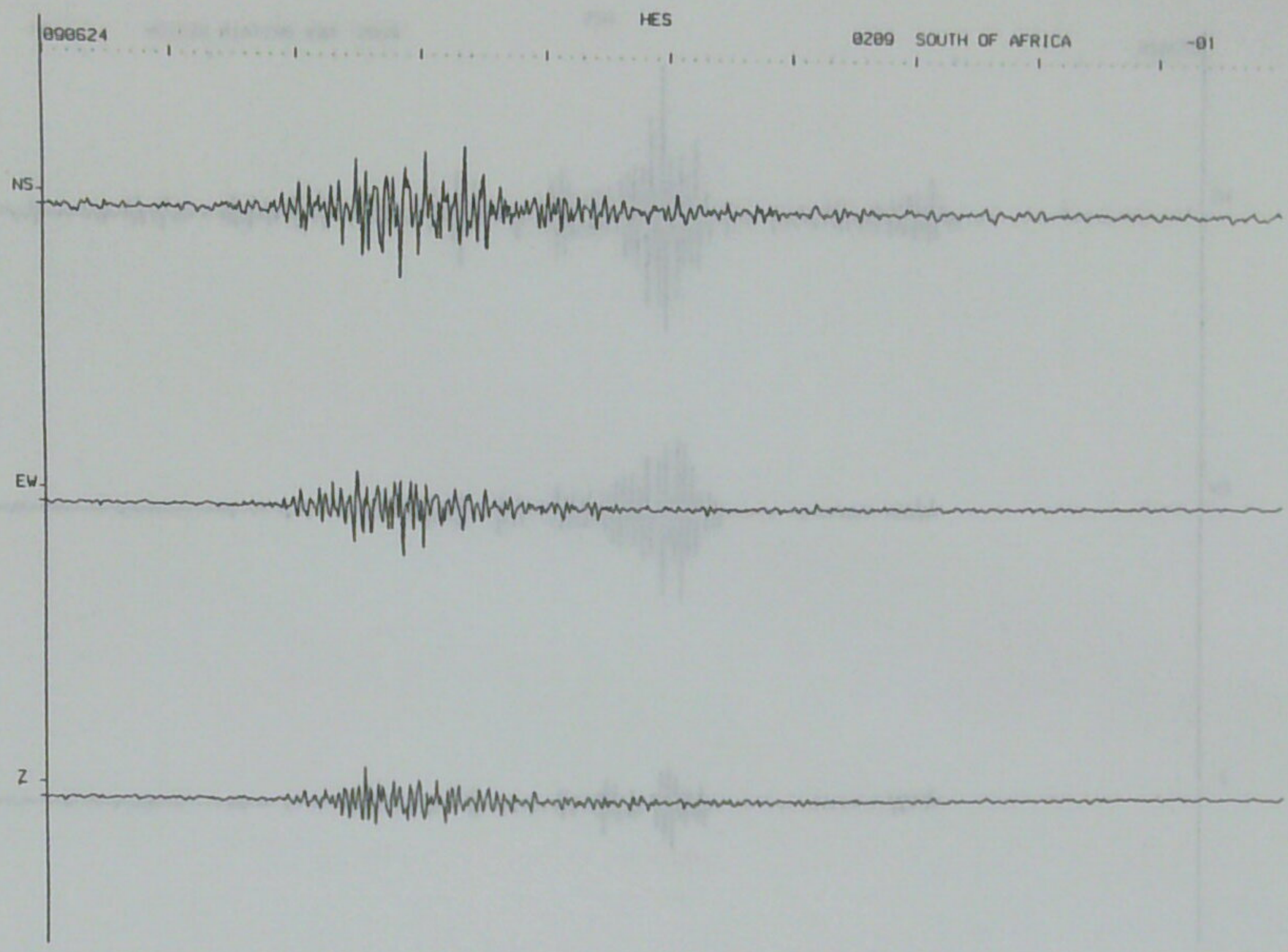


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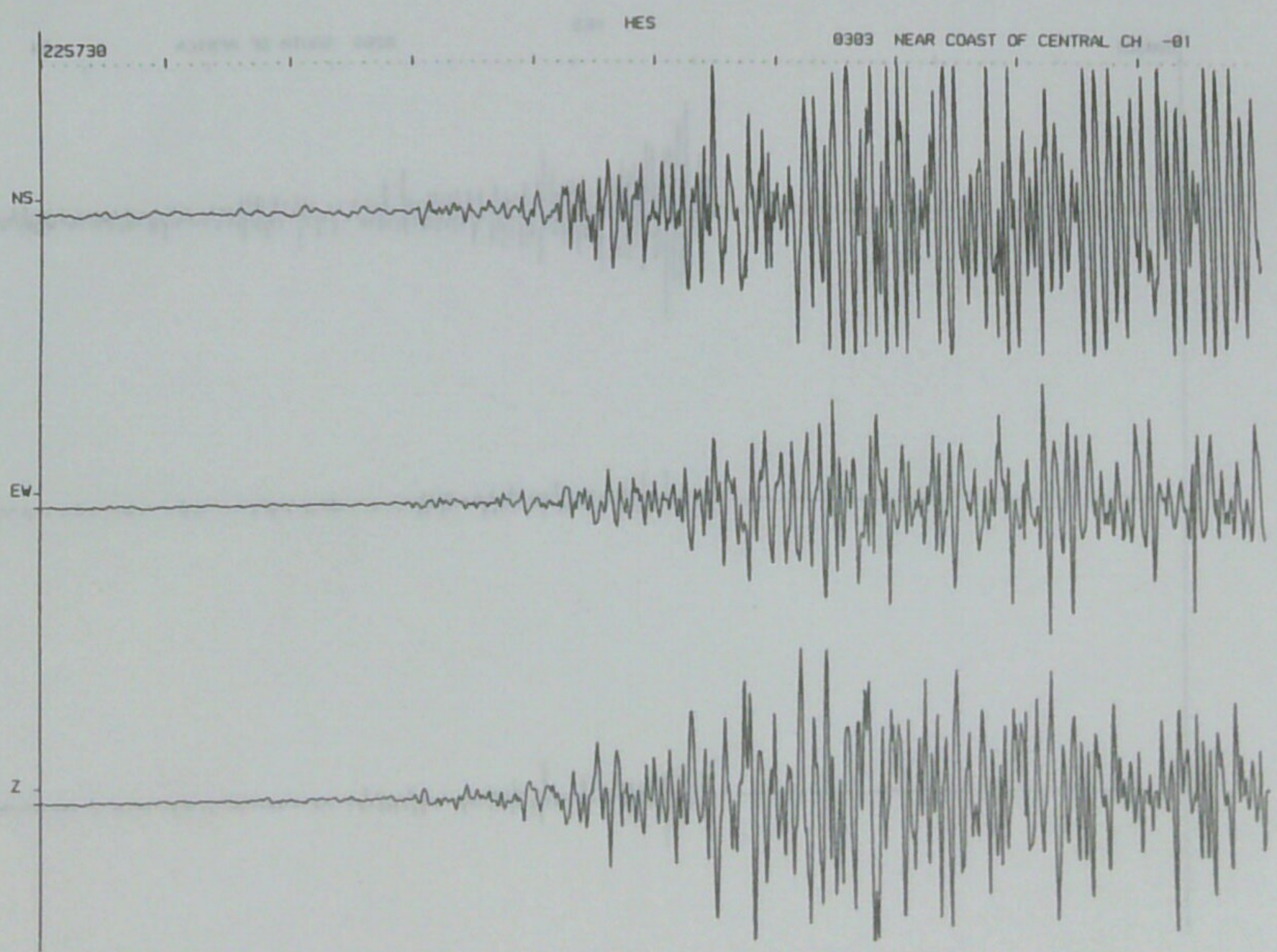


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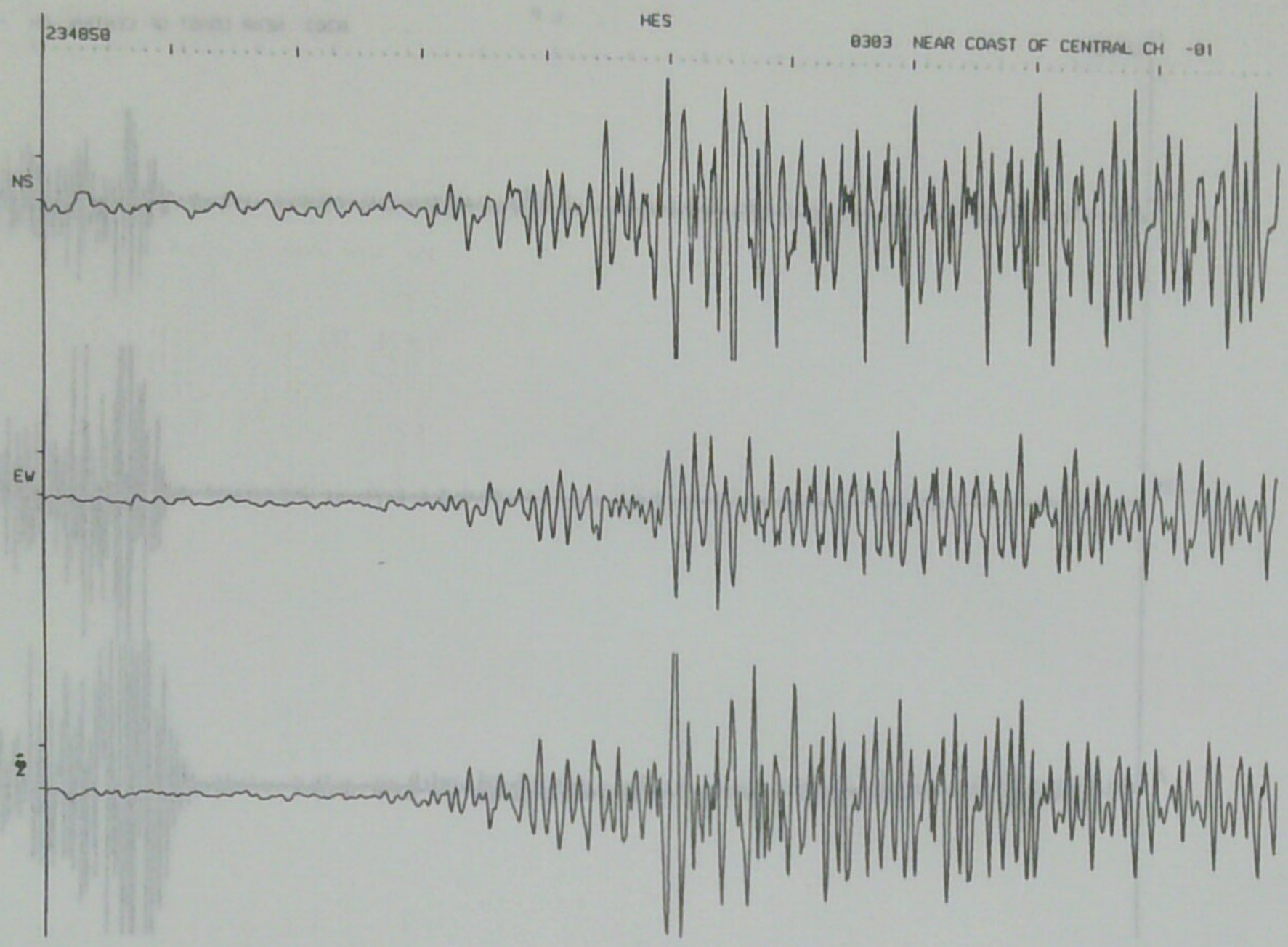


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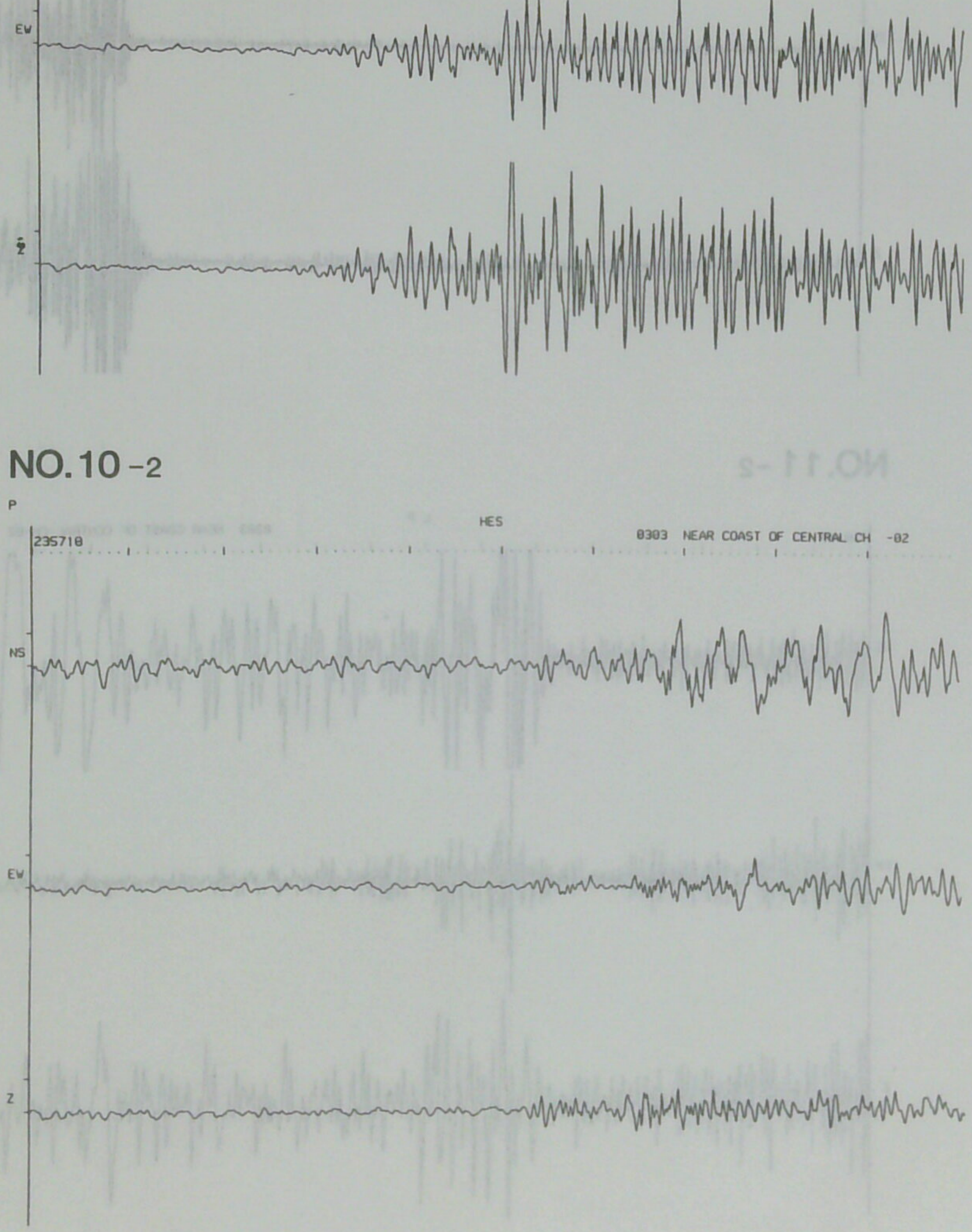


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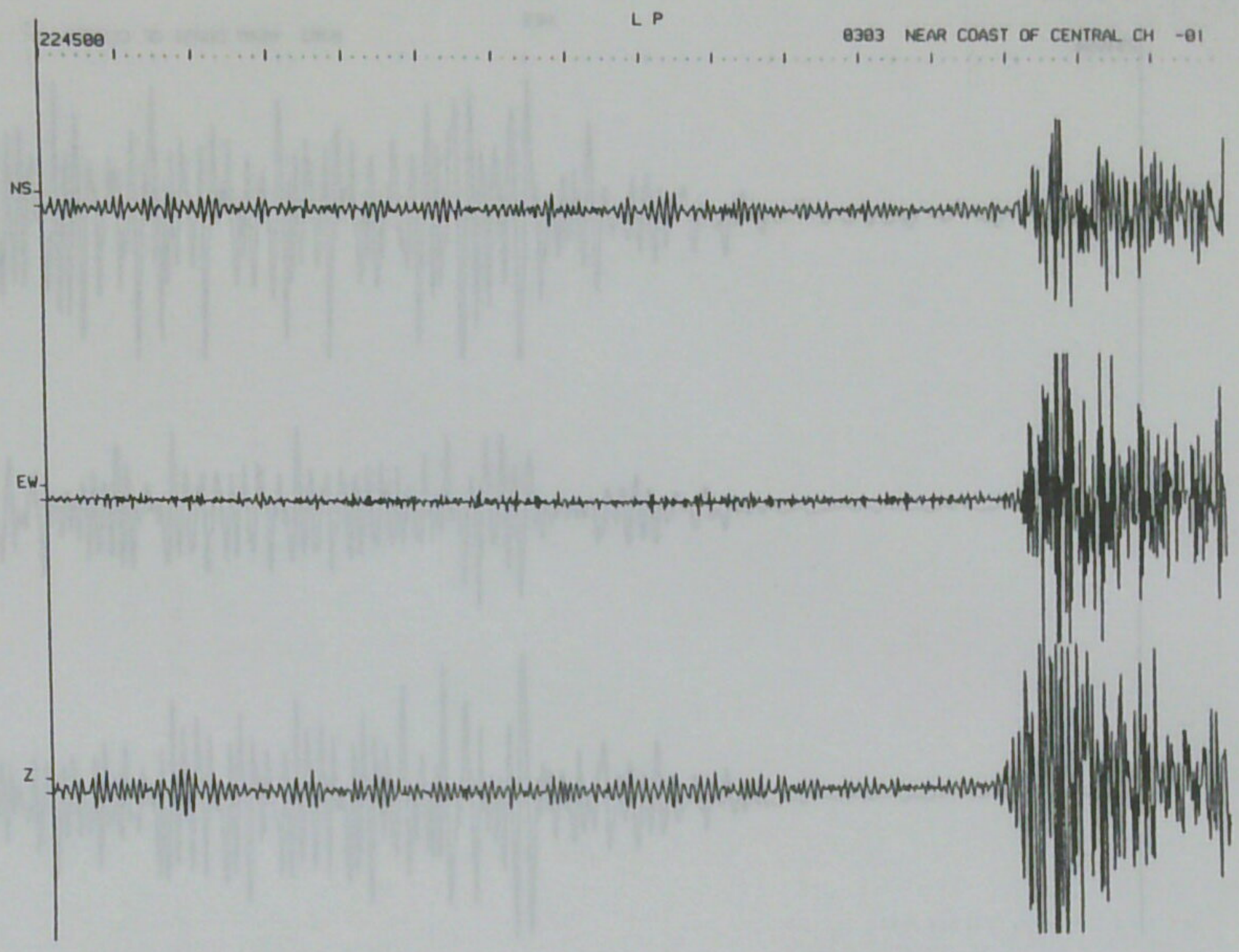


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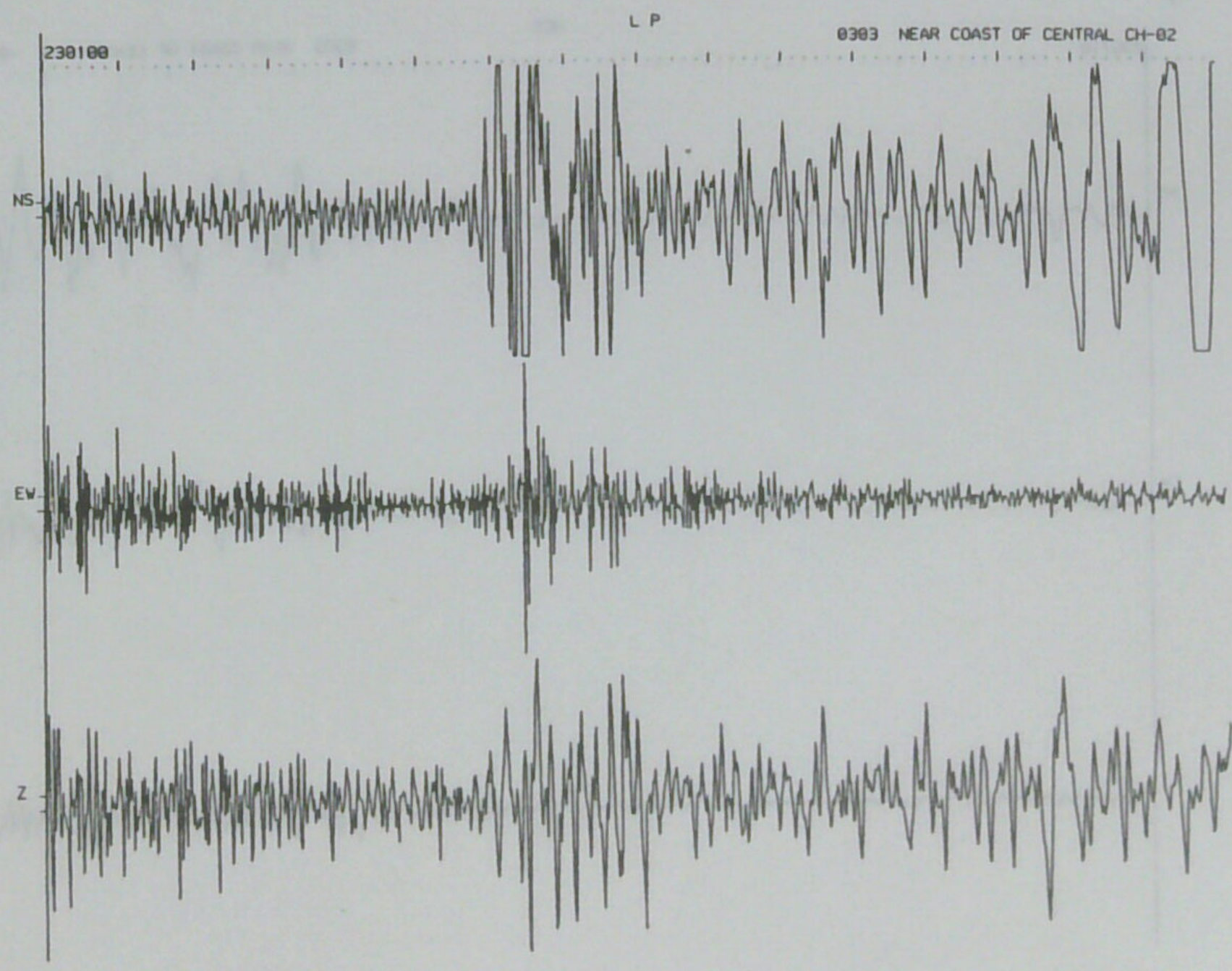


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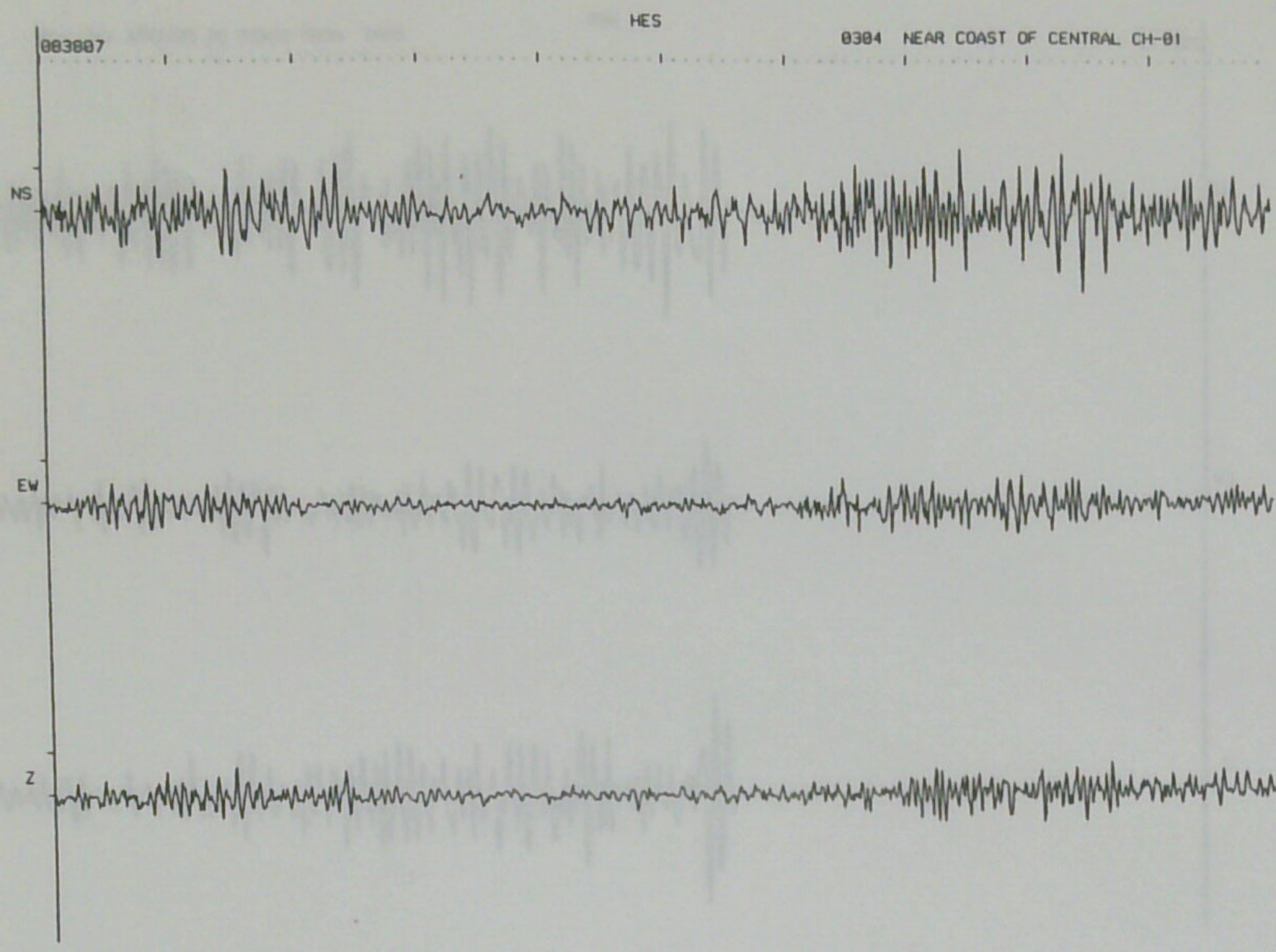


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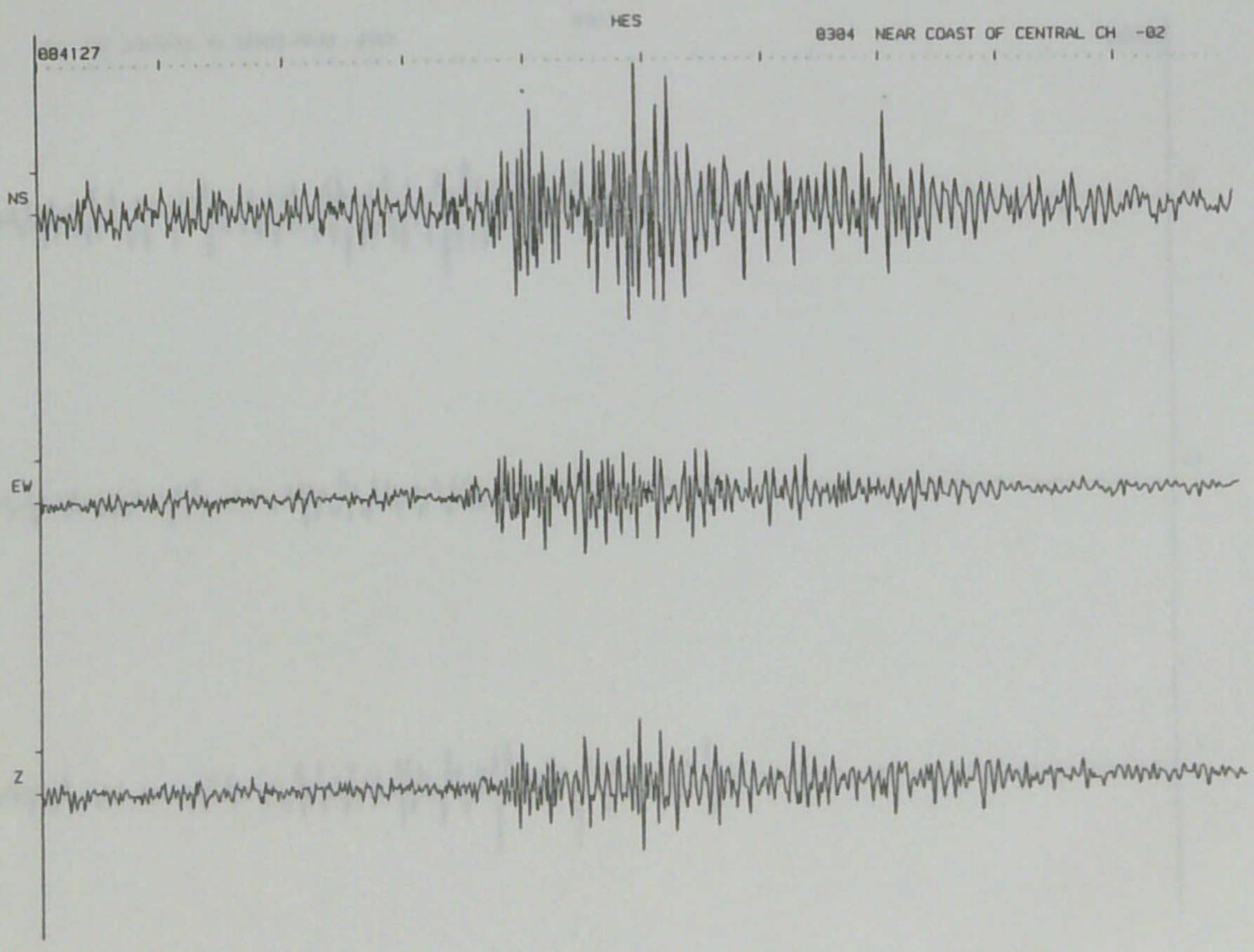


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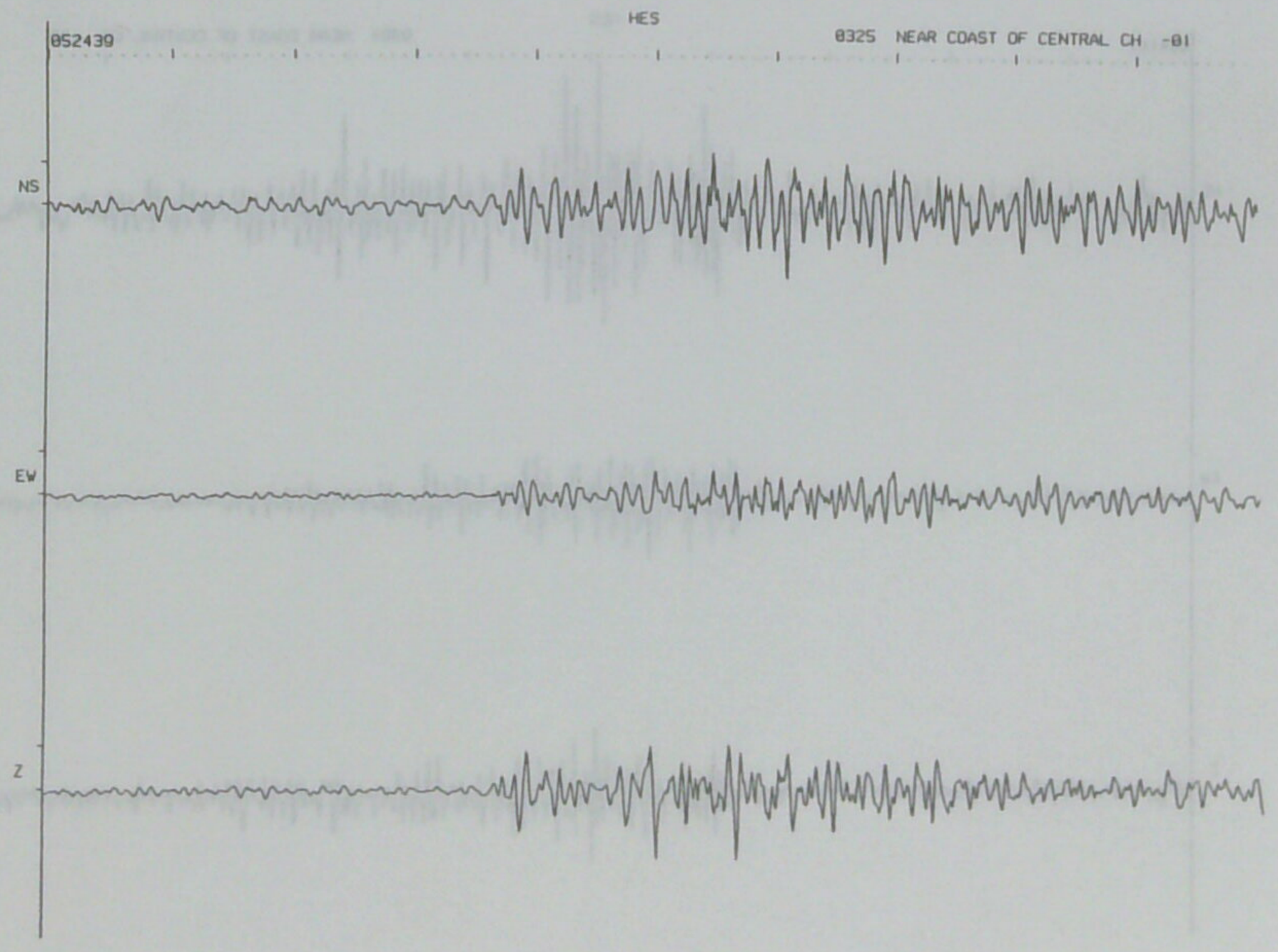


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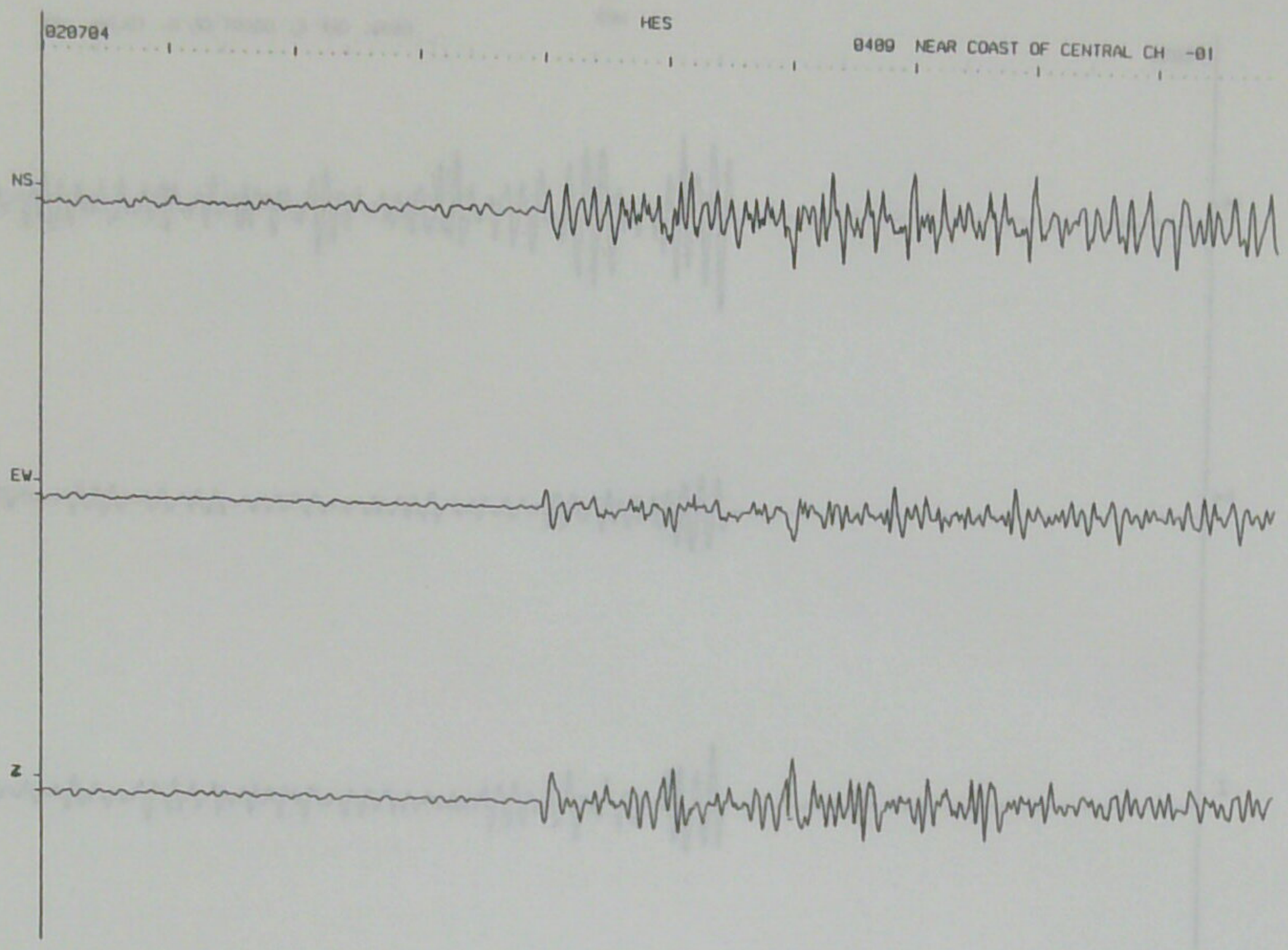


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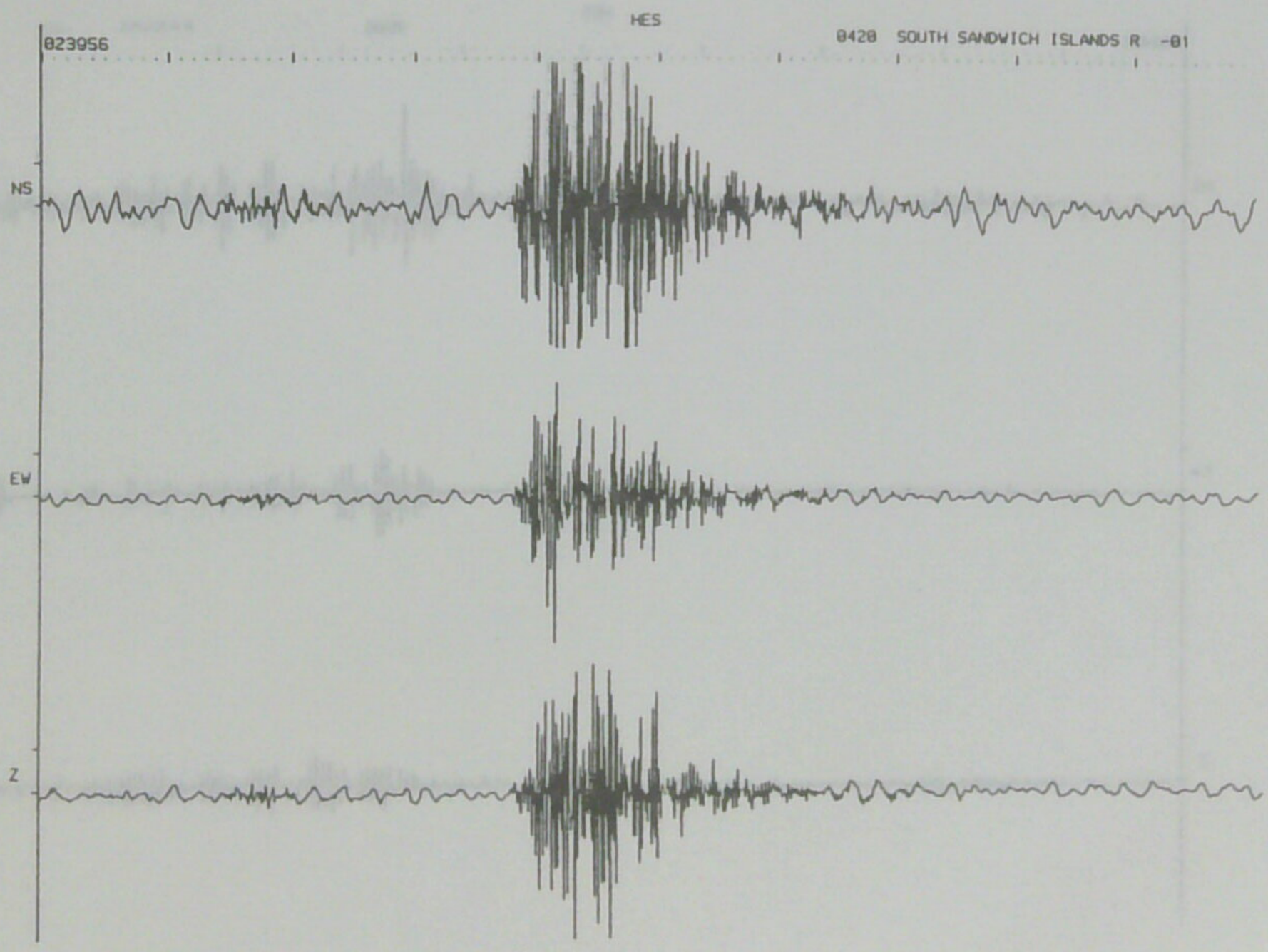


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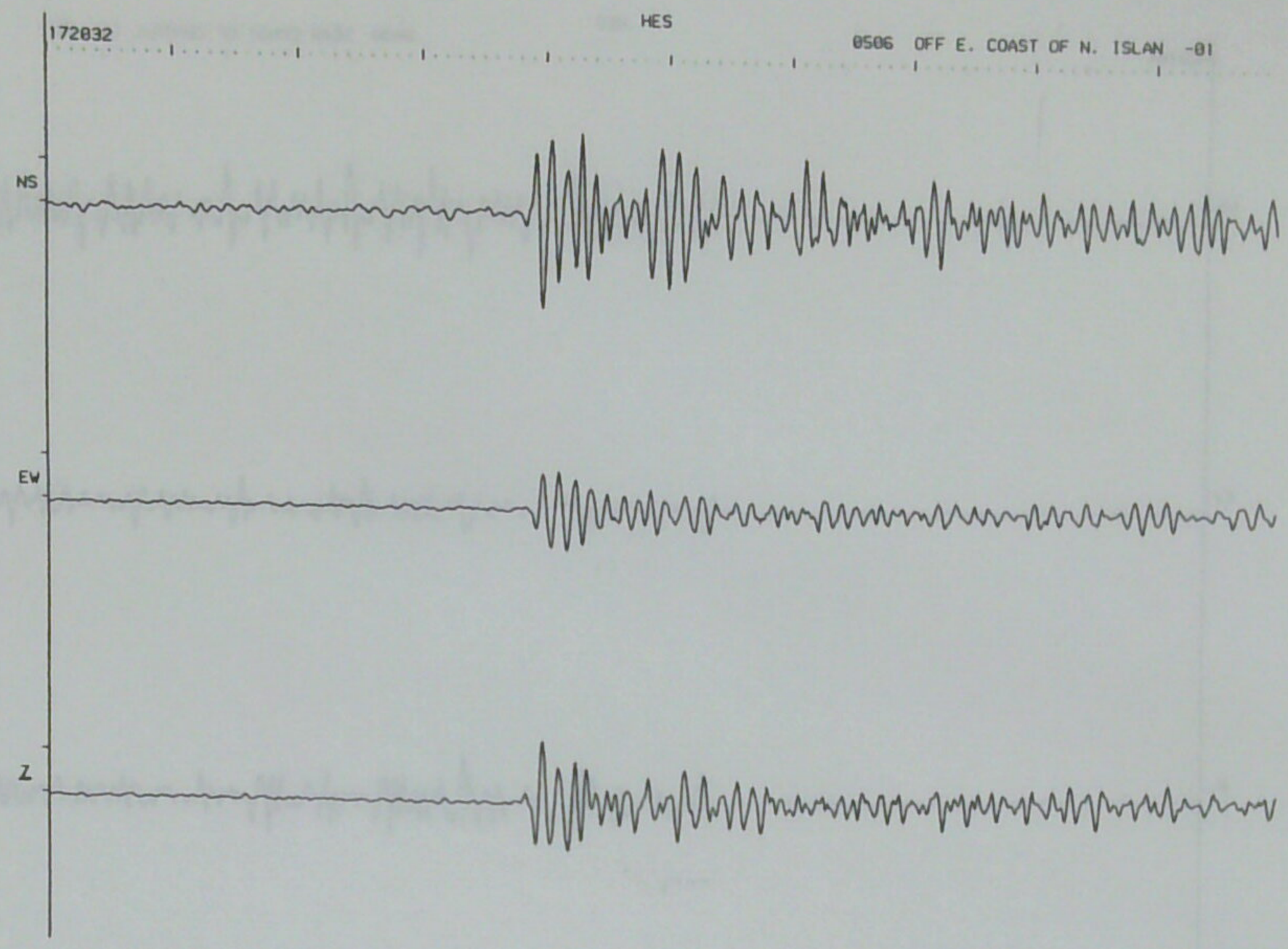


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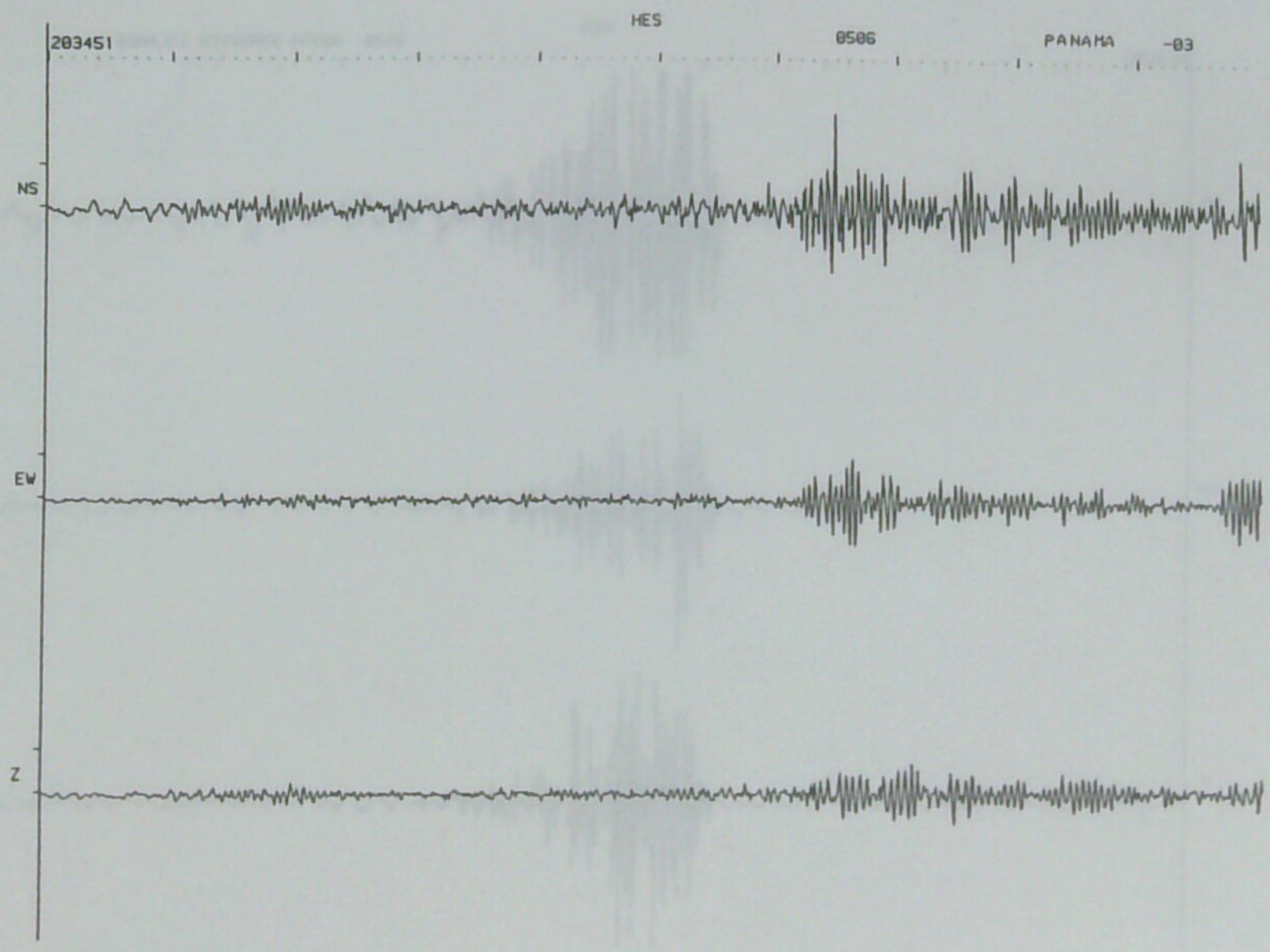


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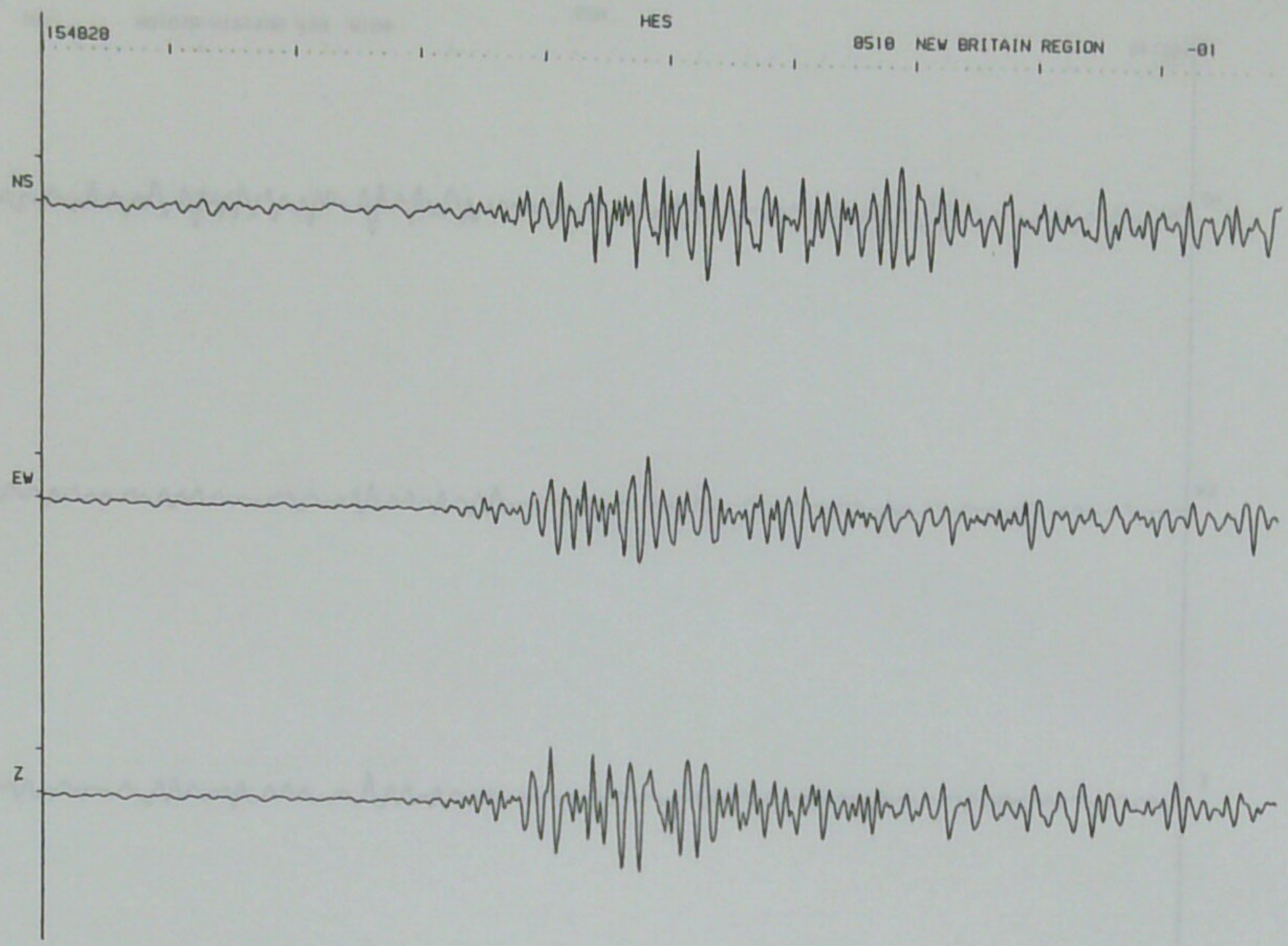
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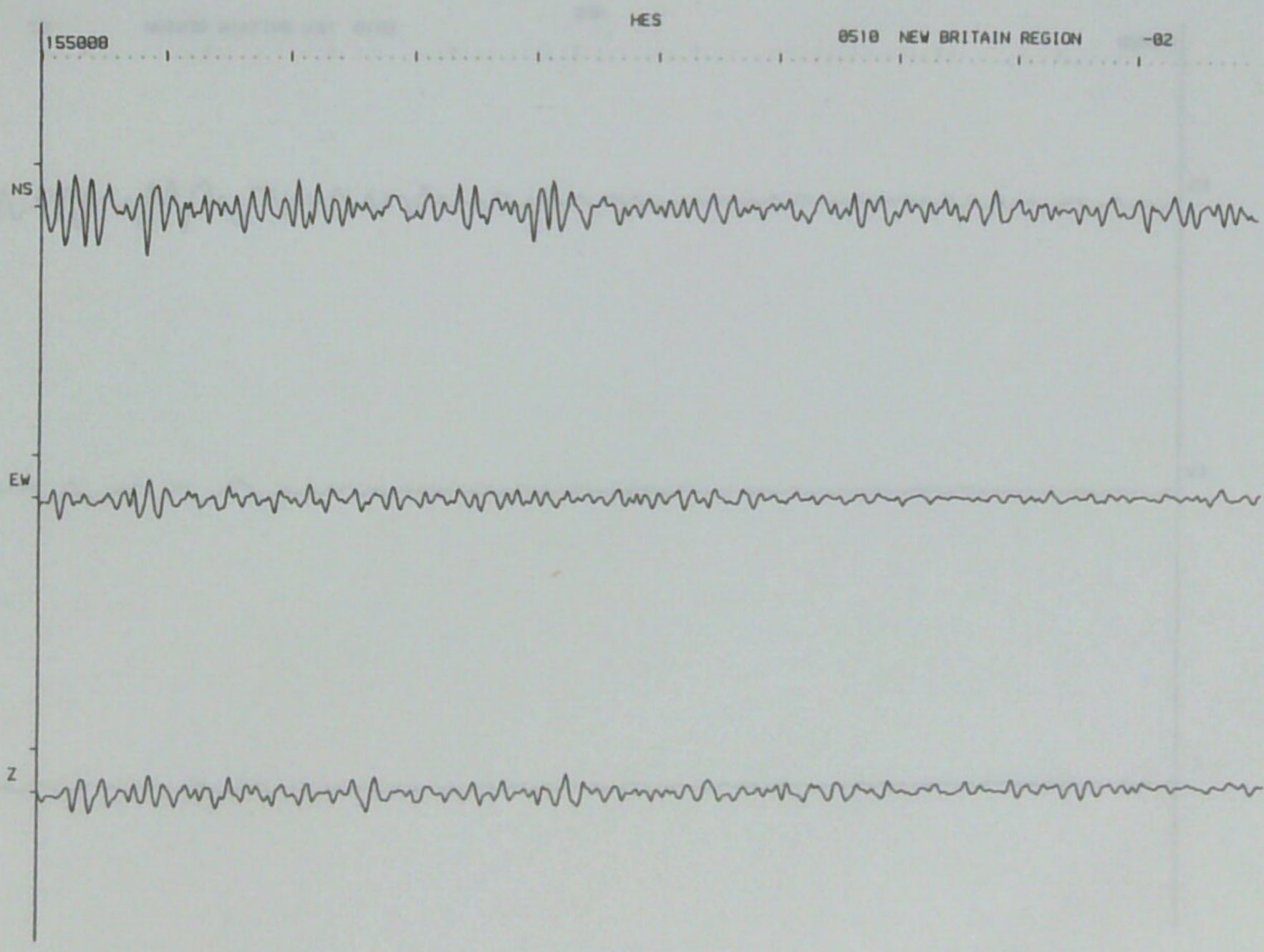
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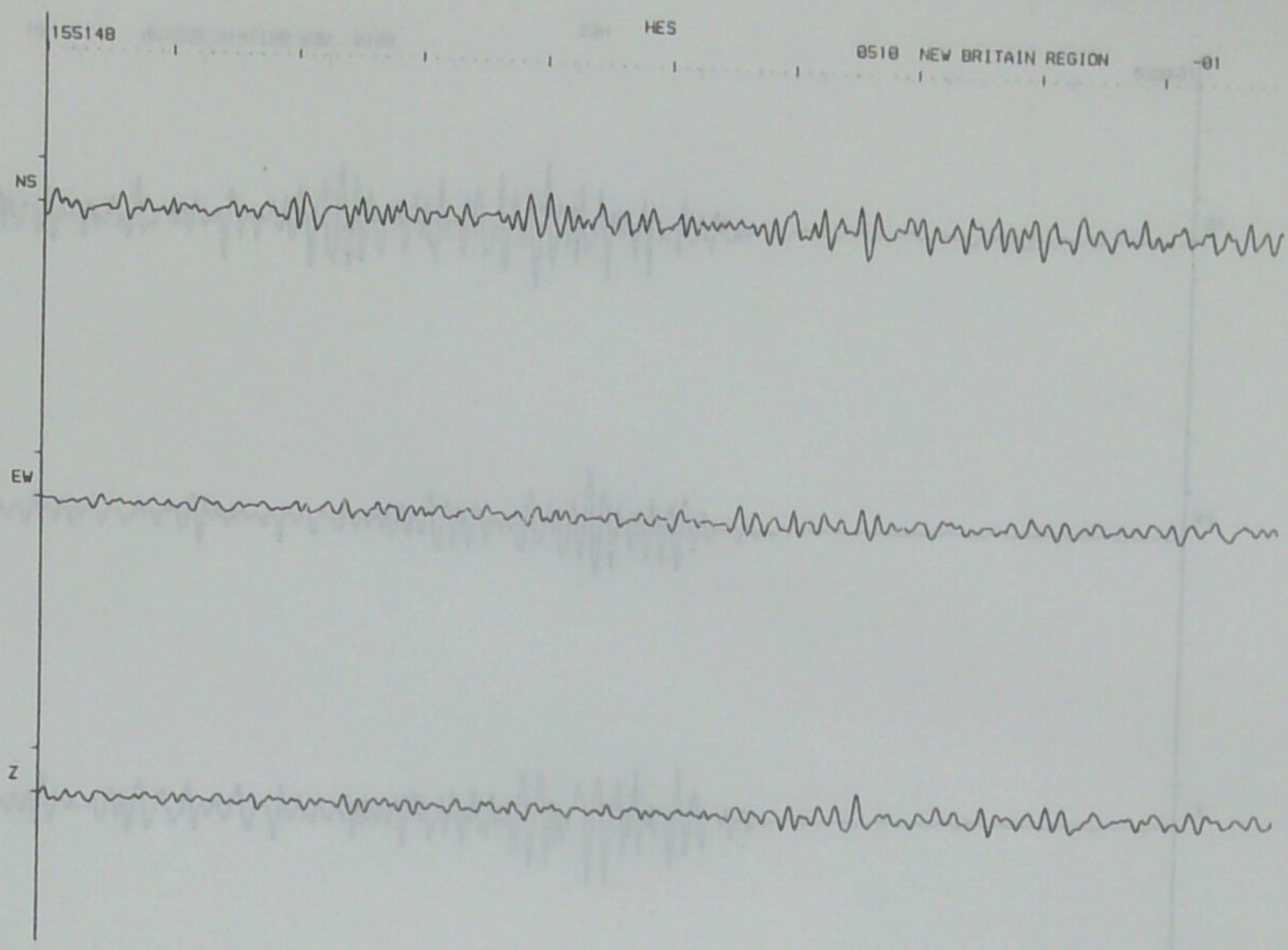

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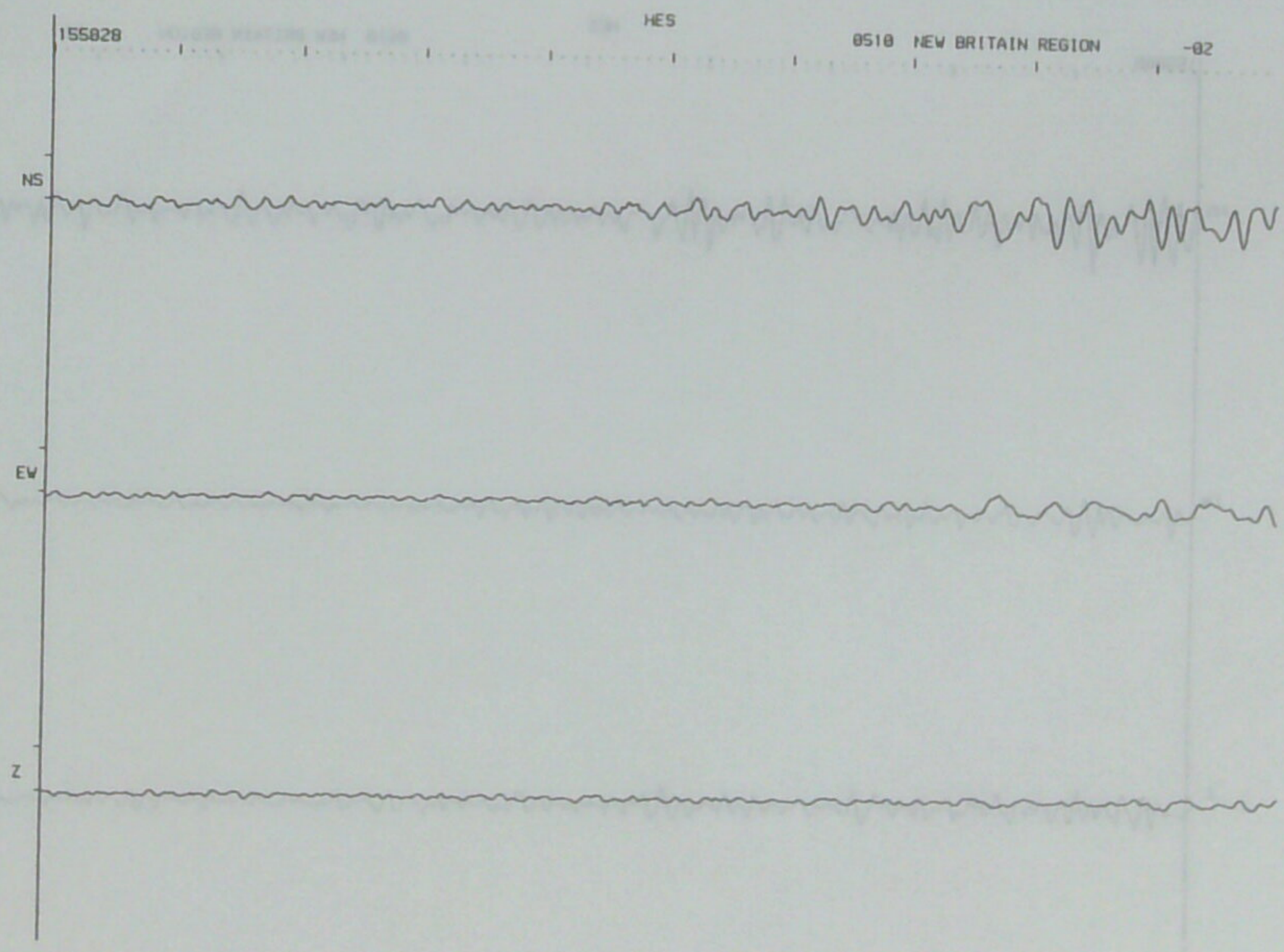

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International Seismological Centre

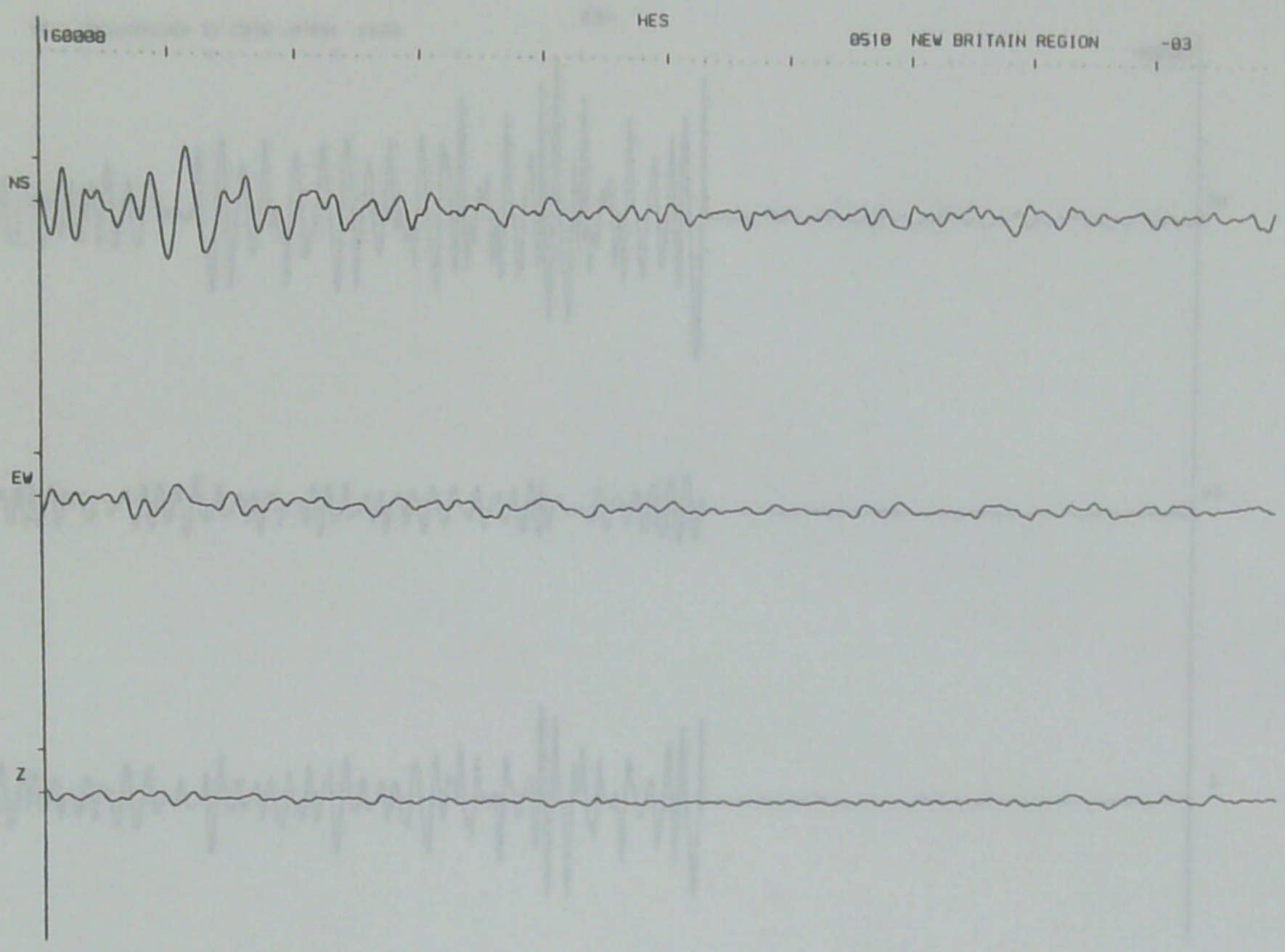
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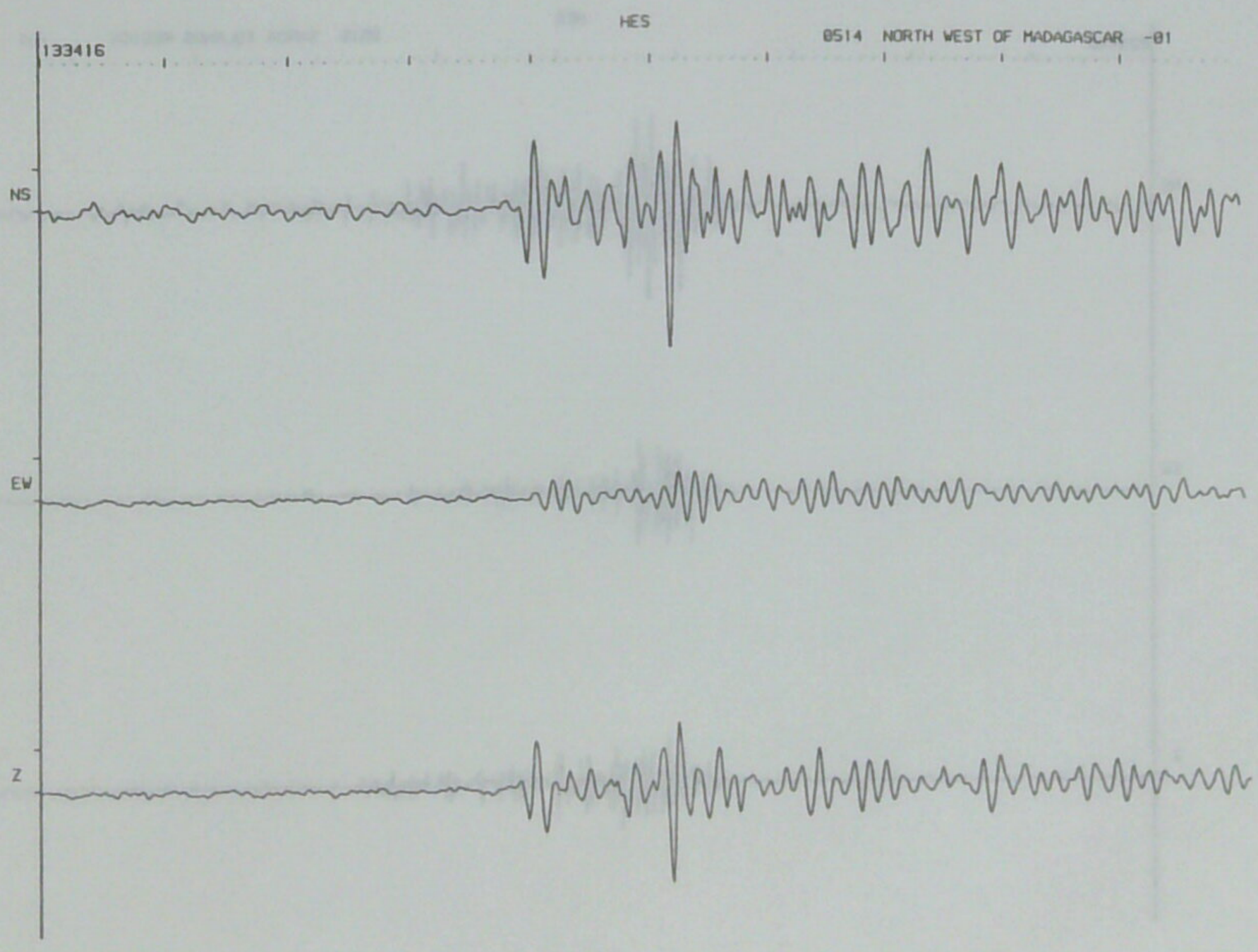
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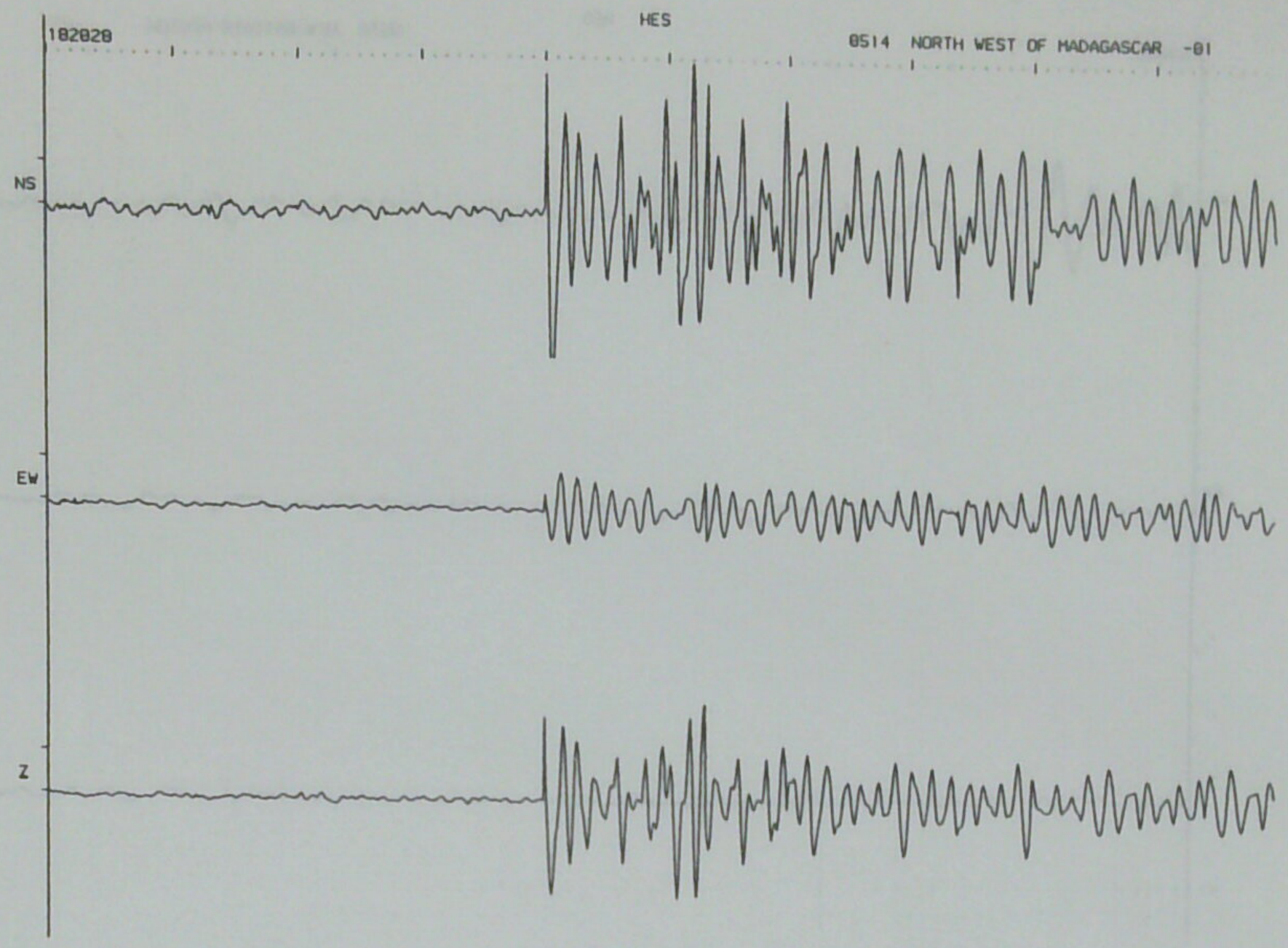

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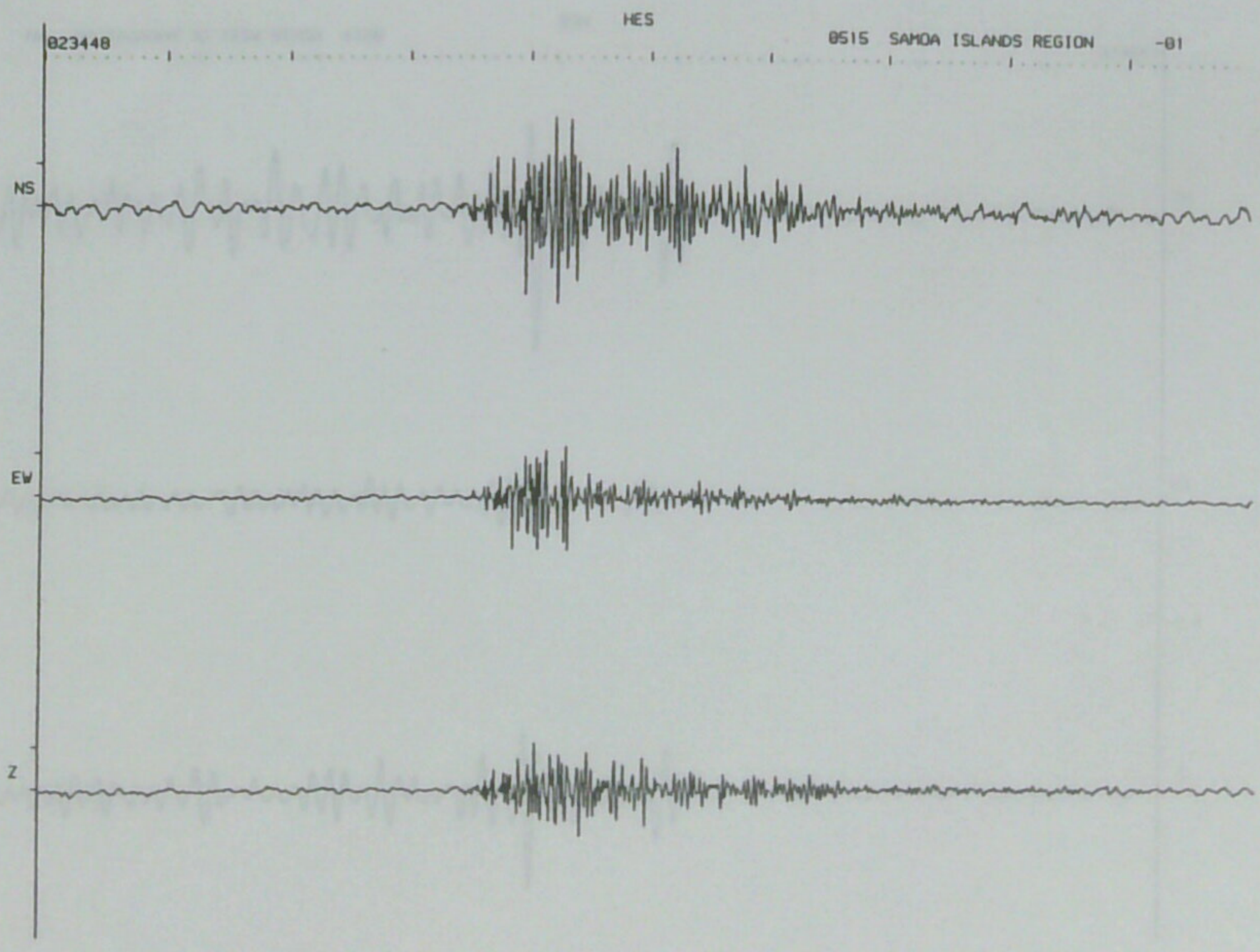

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International Seismological Centre

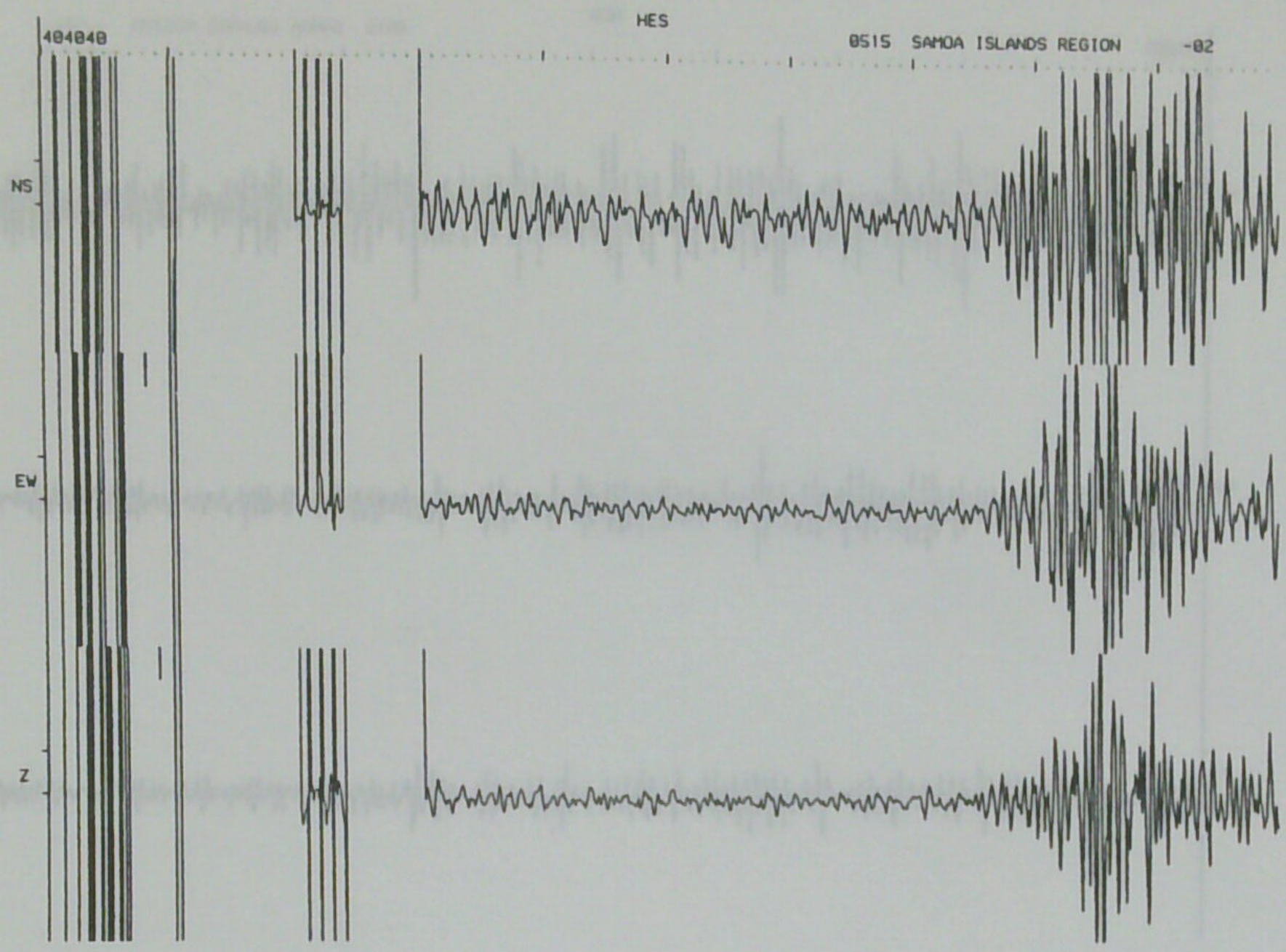
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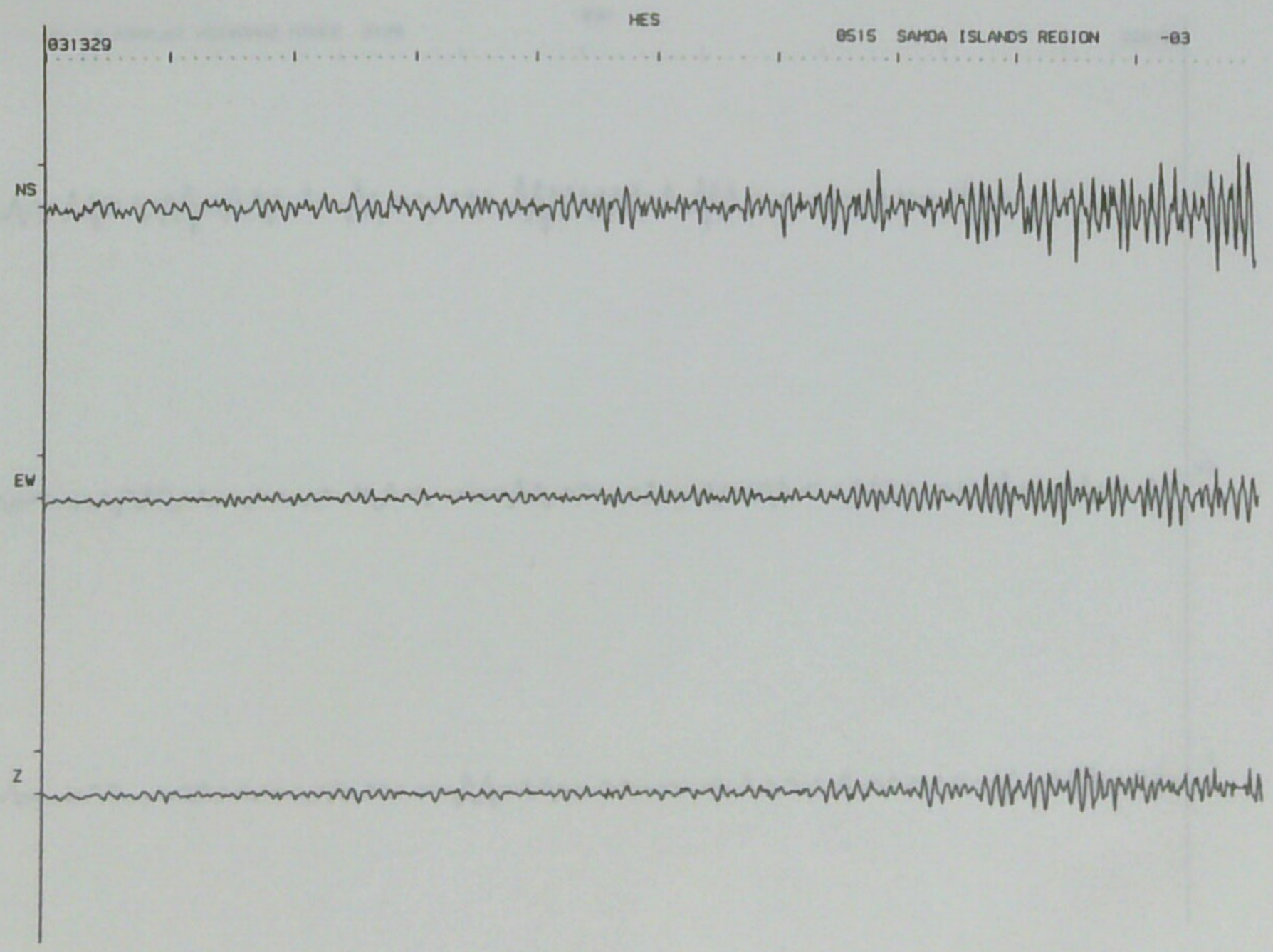
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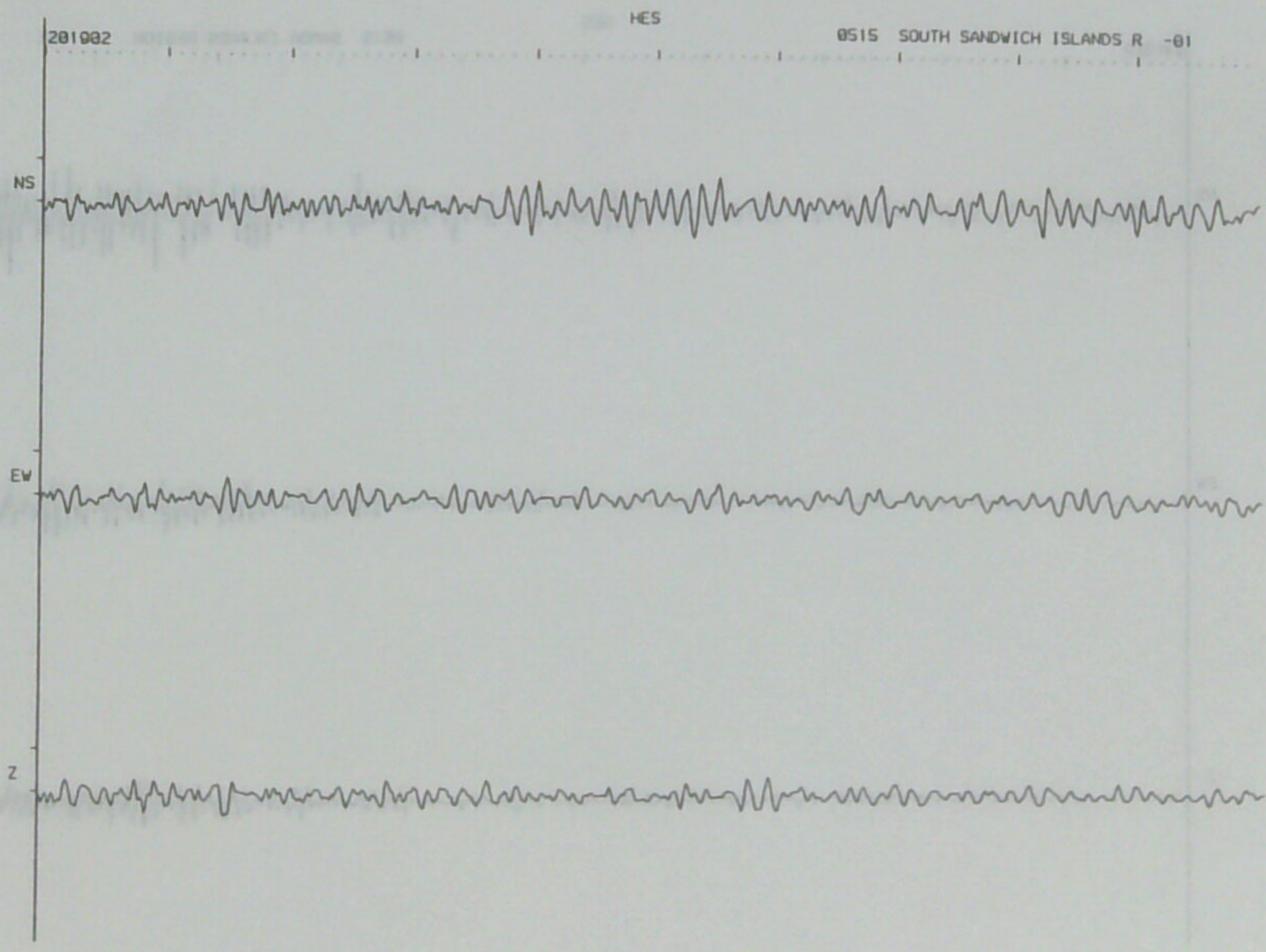

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International Seismological Centre

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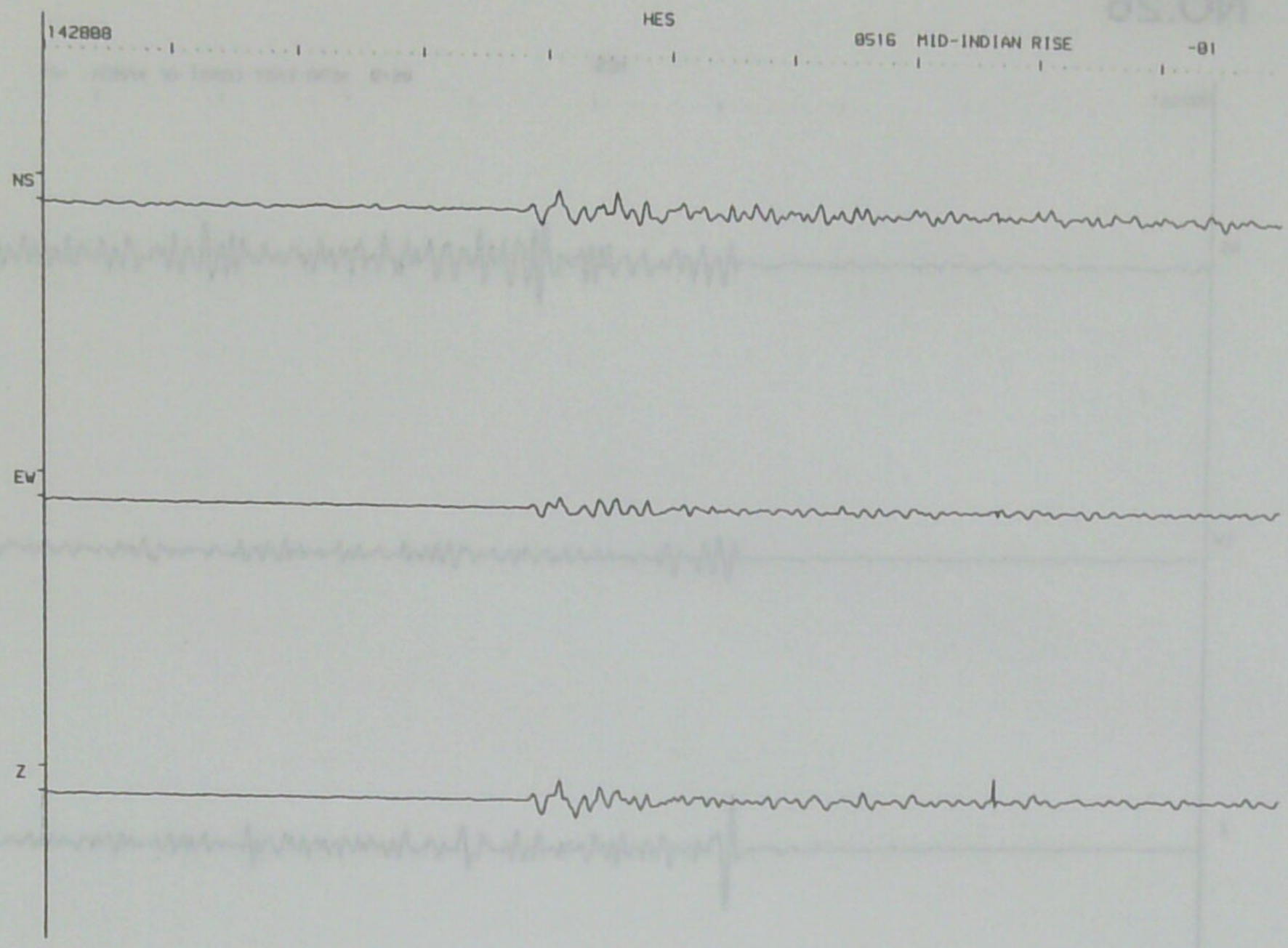


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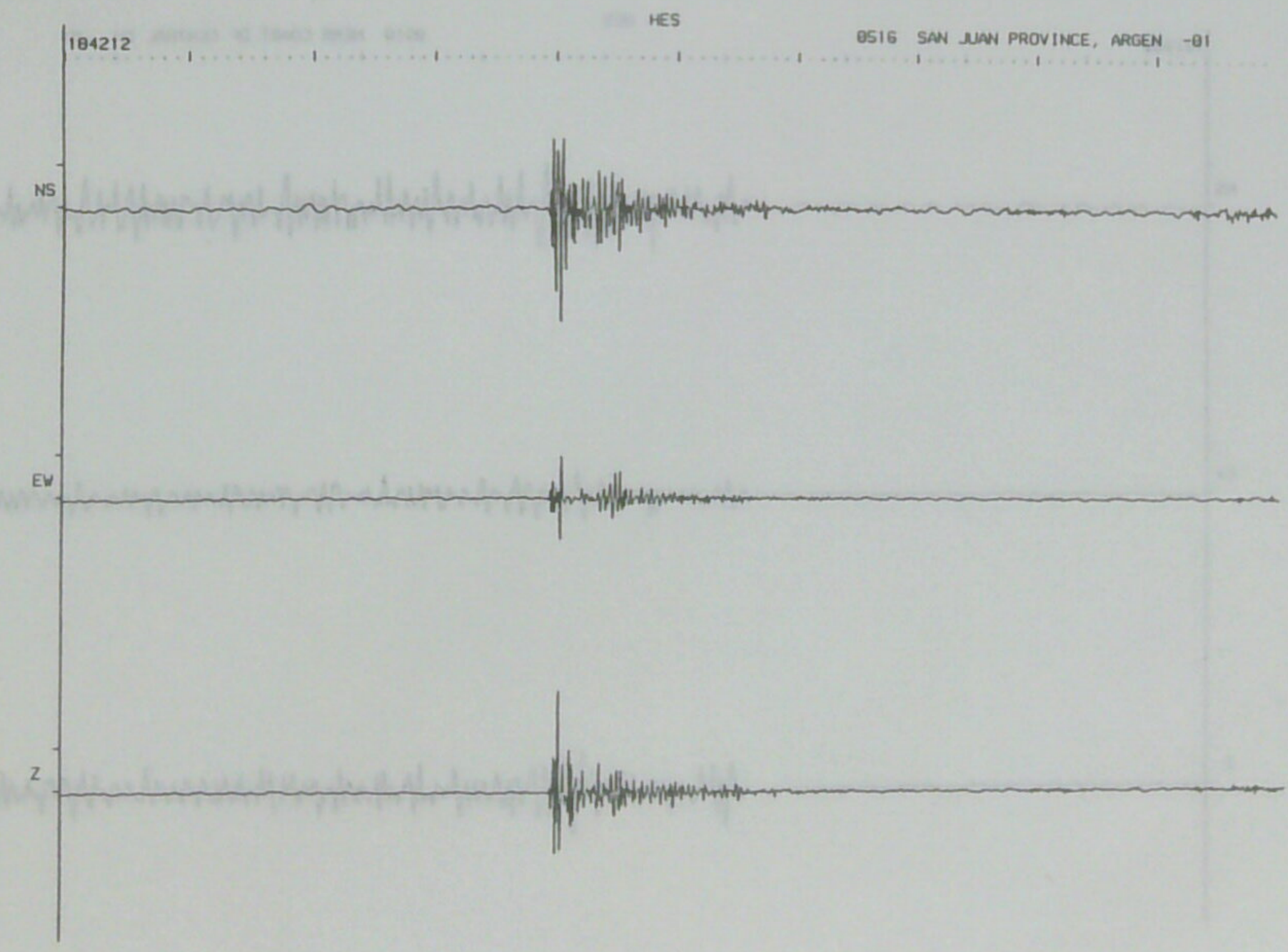


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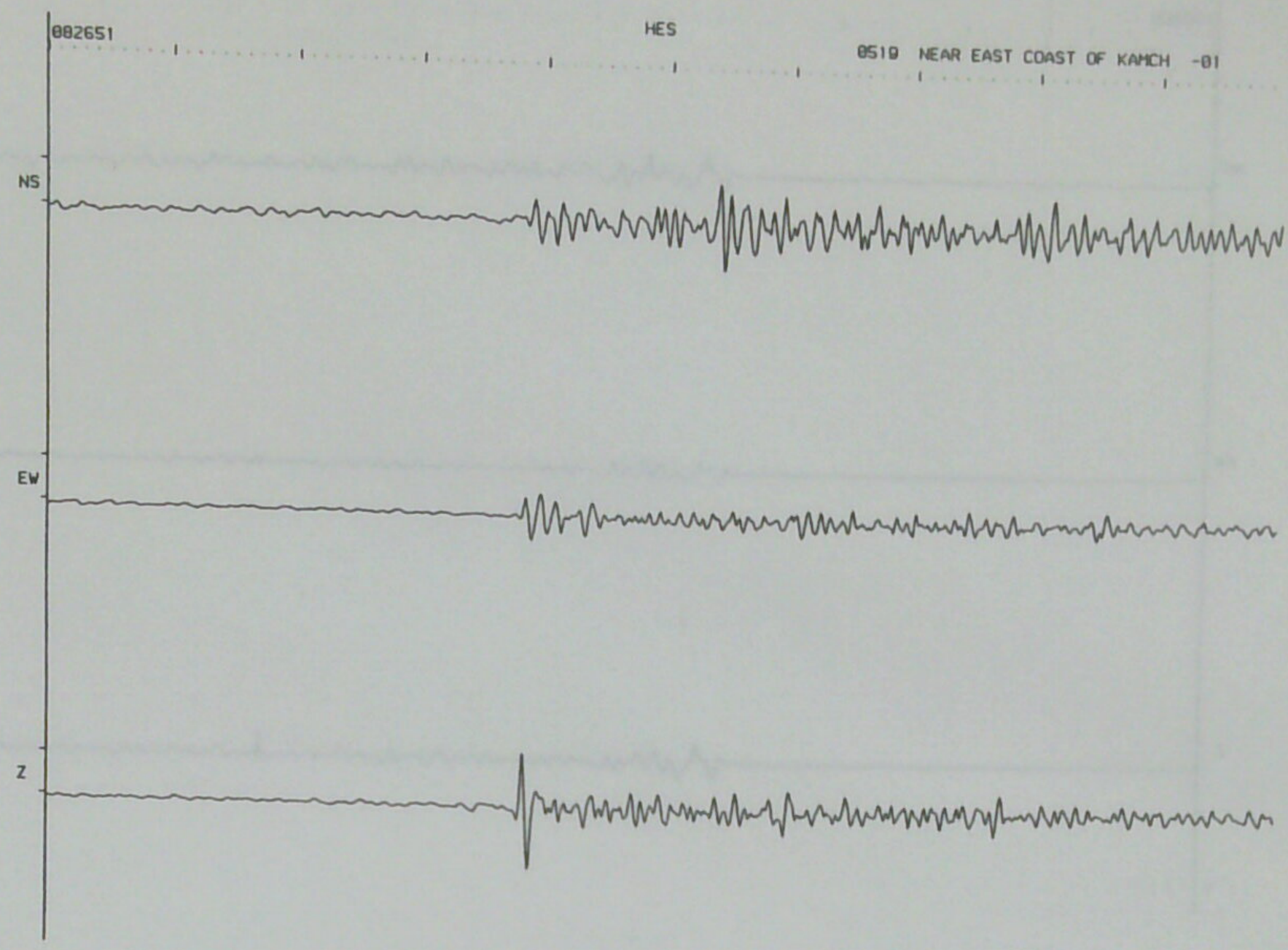


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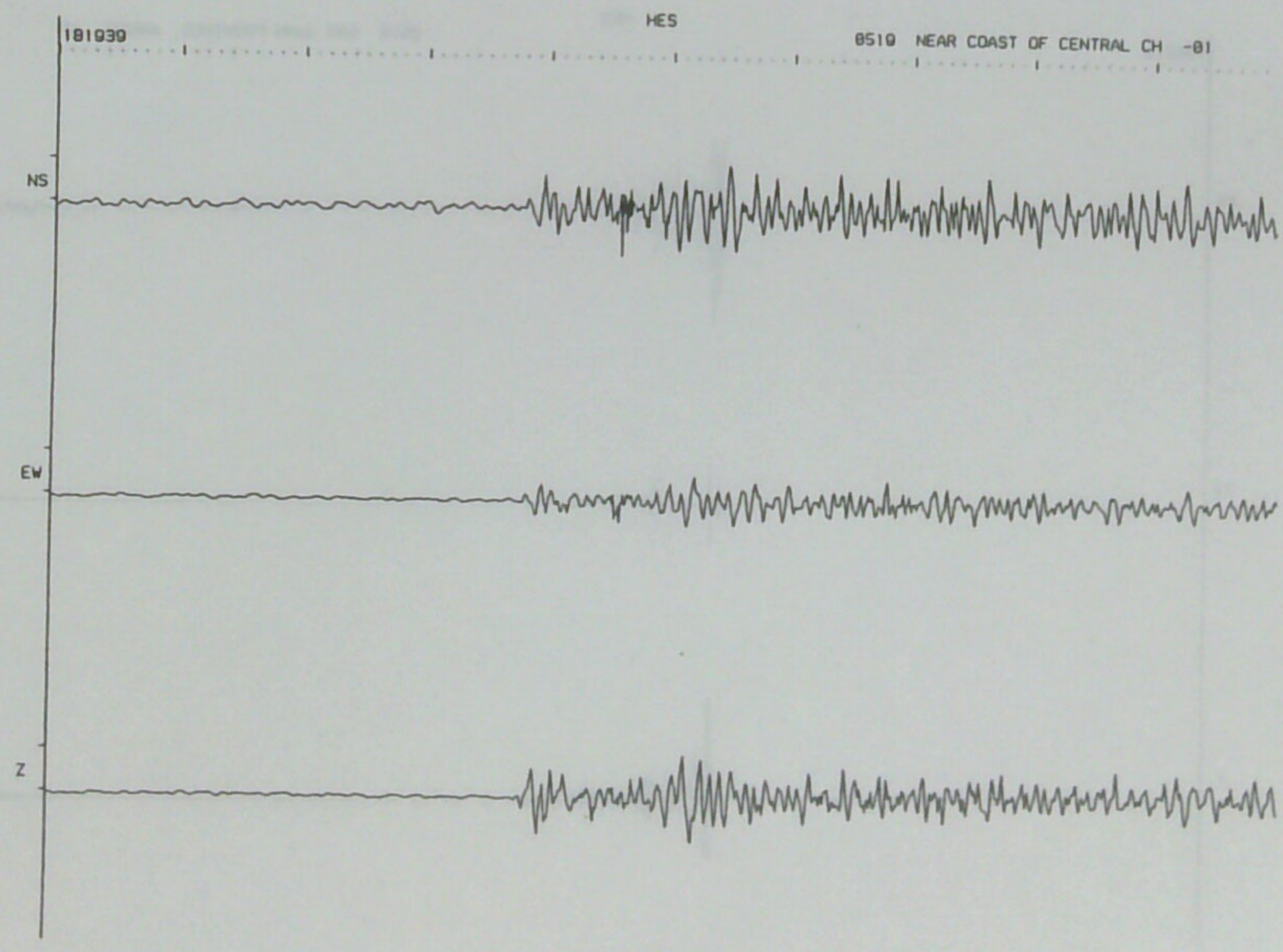


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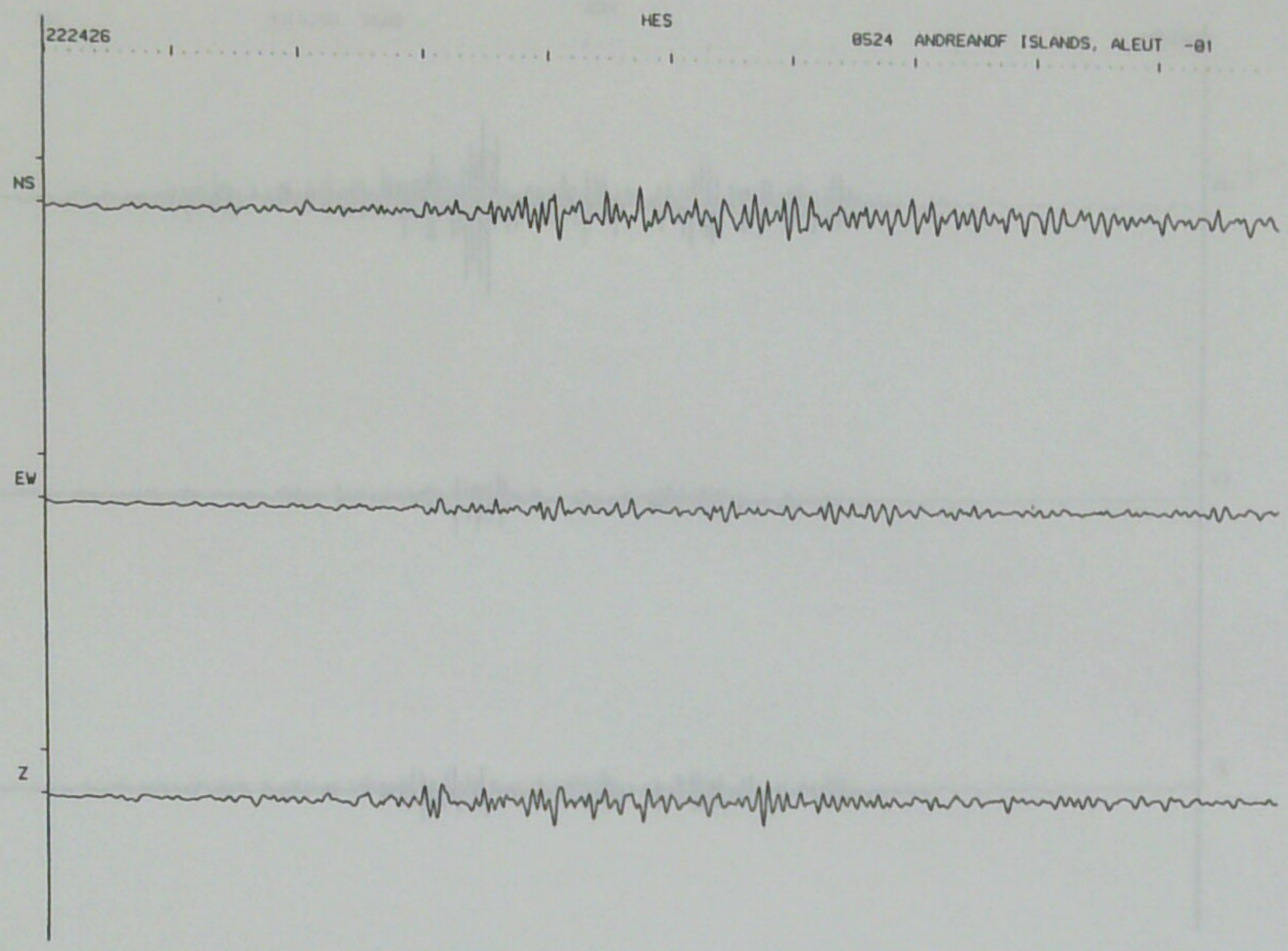


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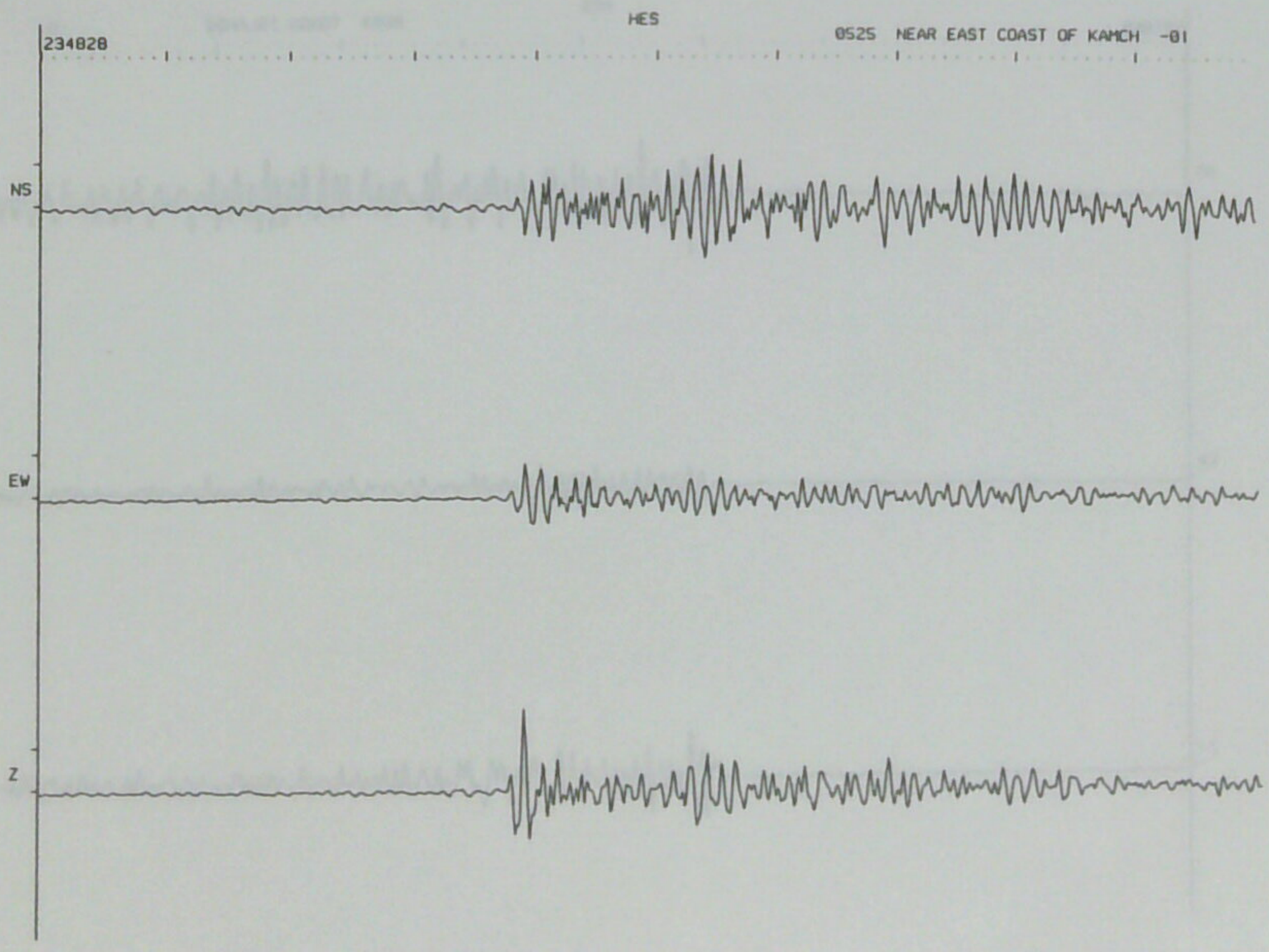


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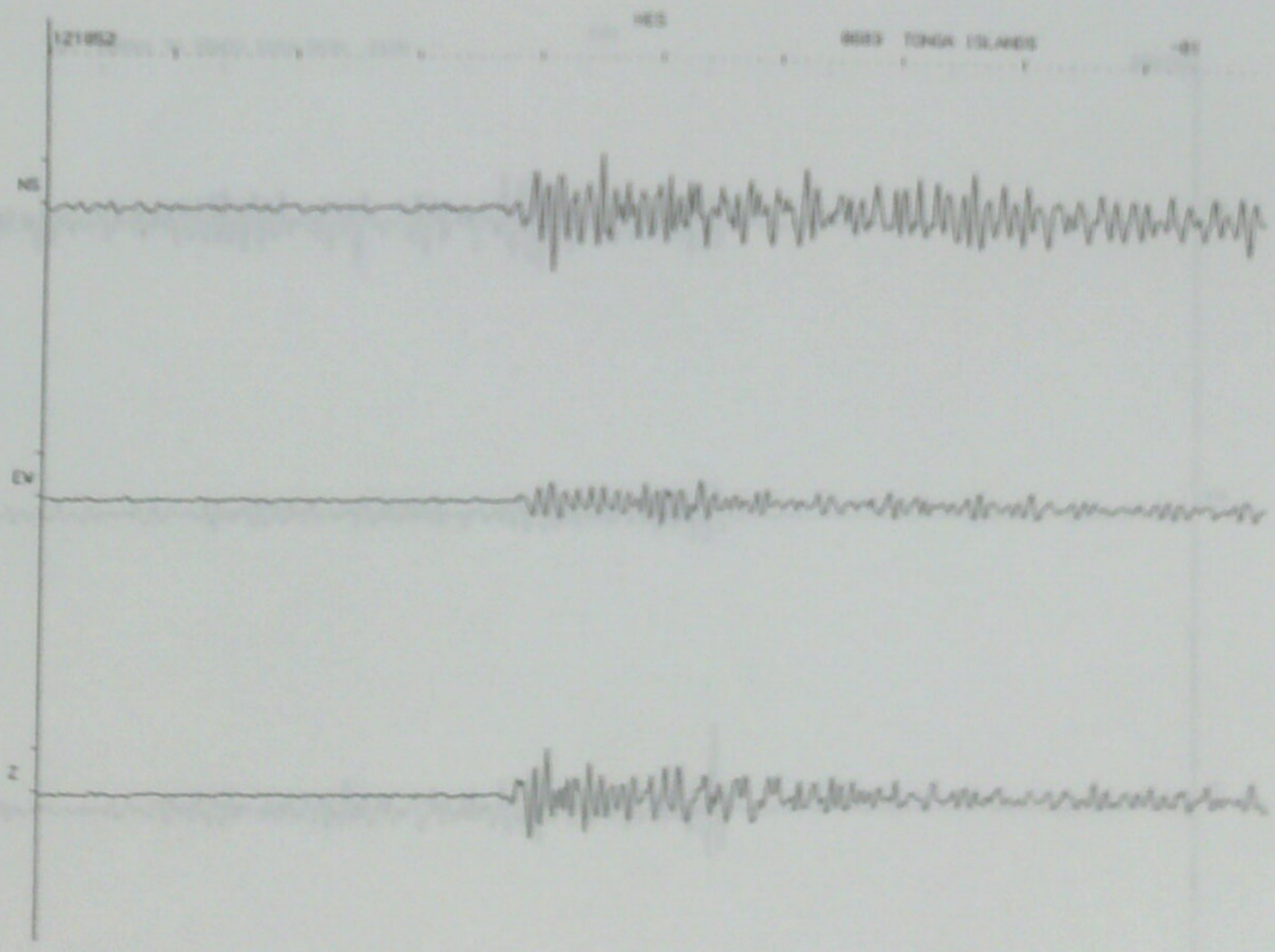


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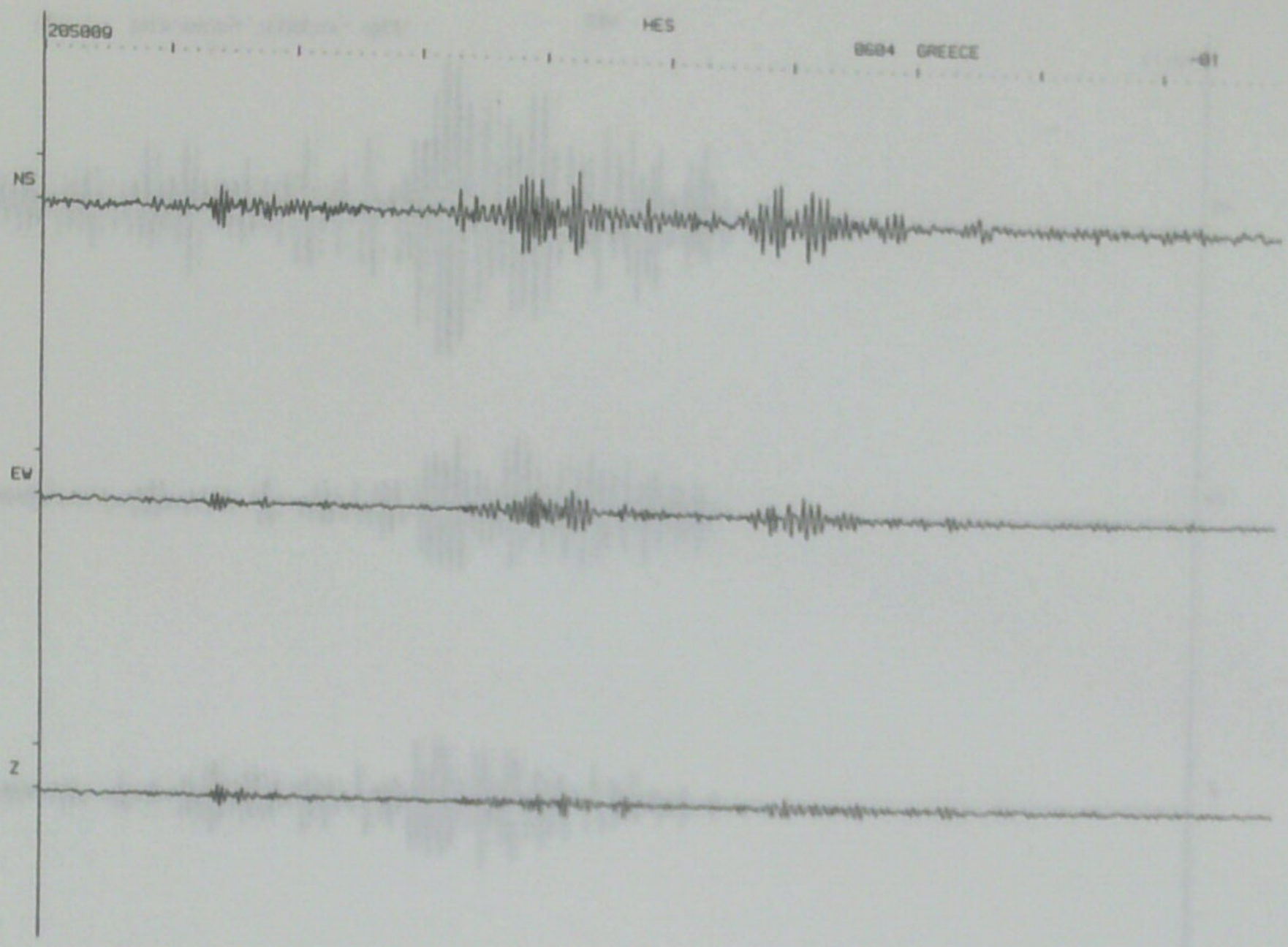


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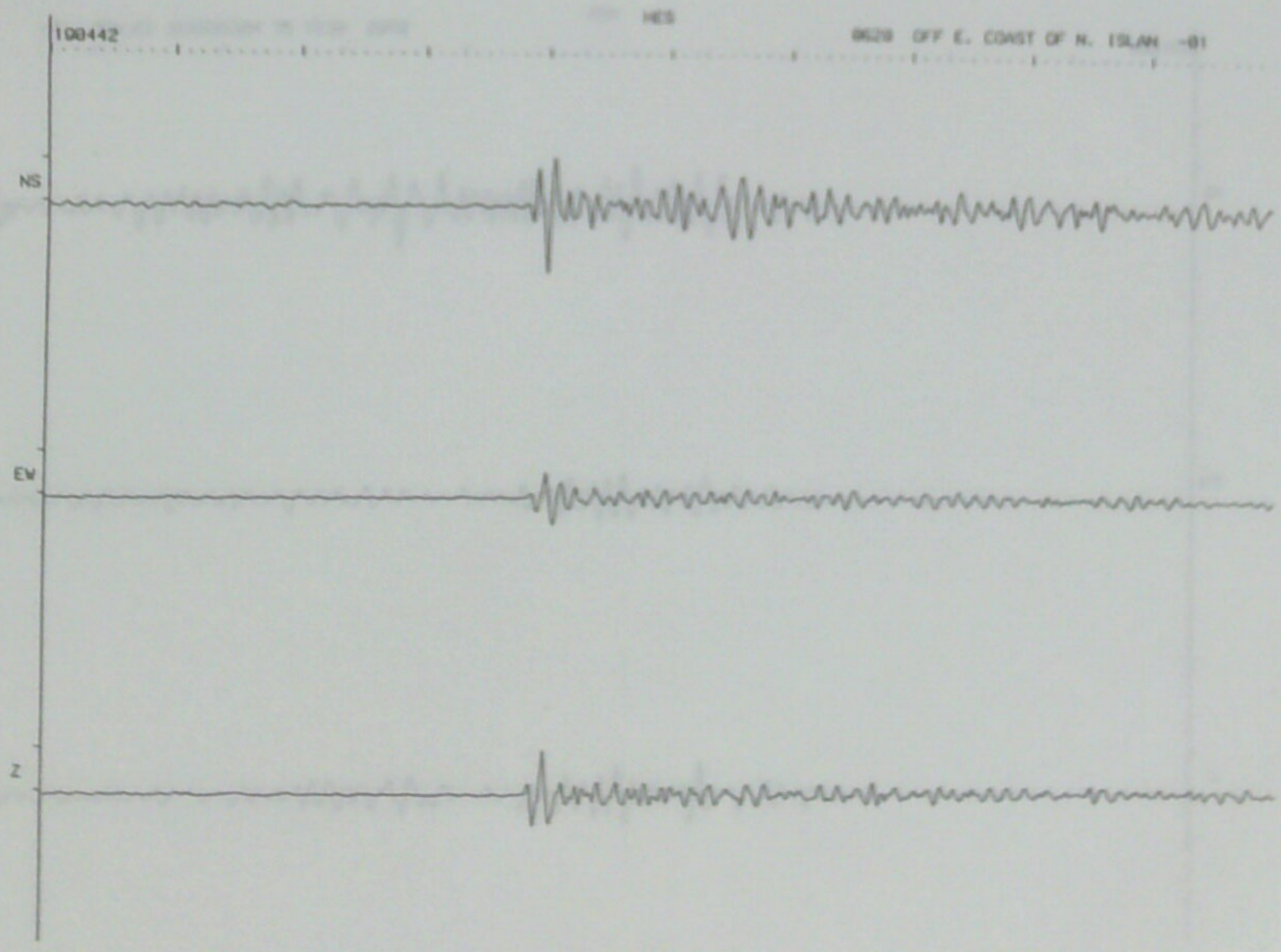


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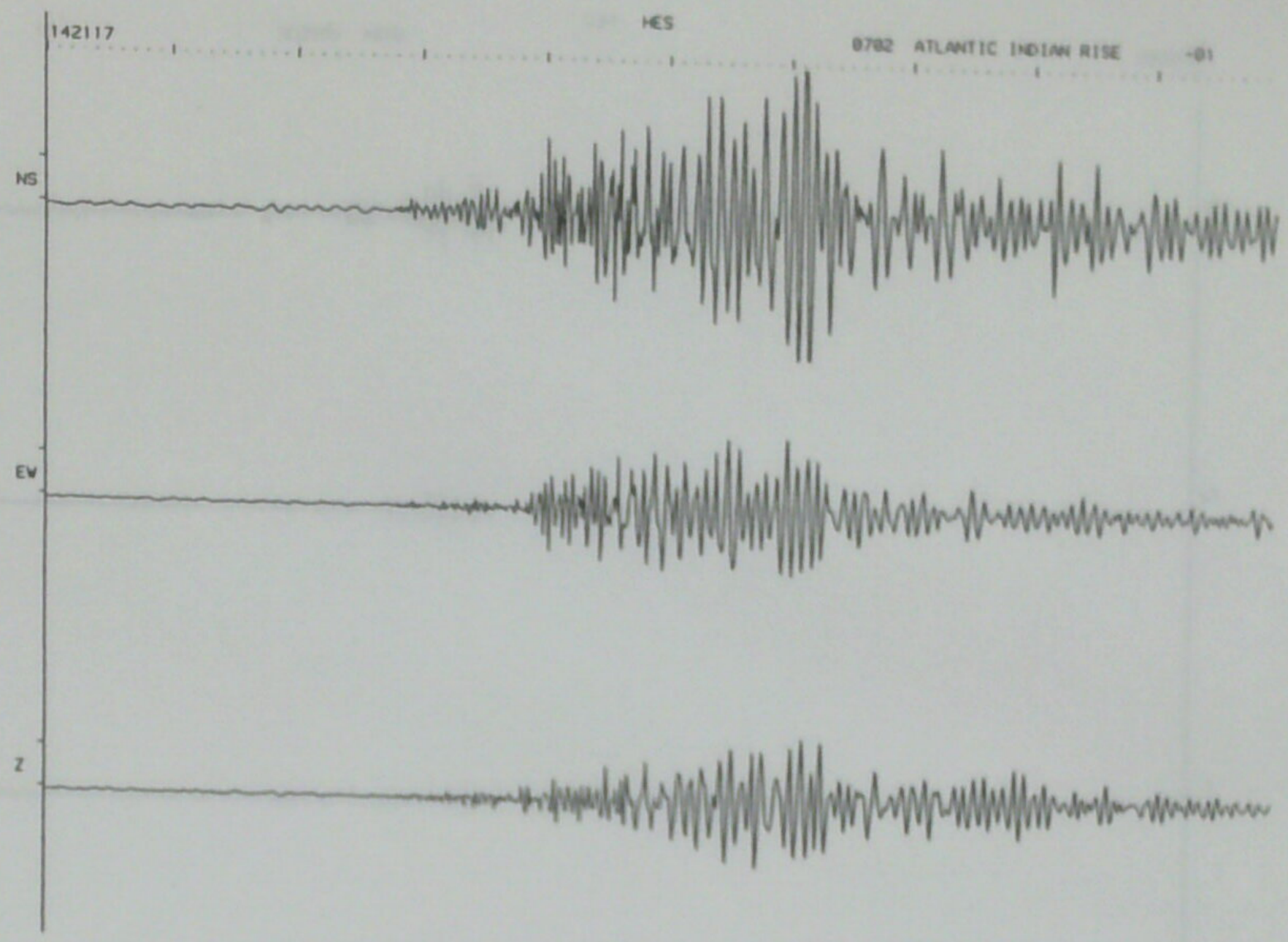


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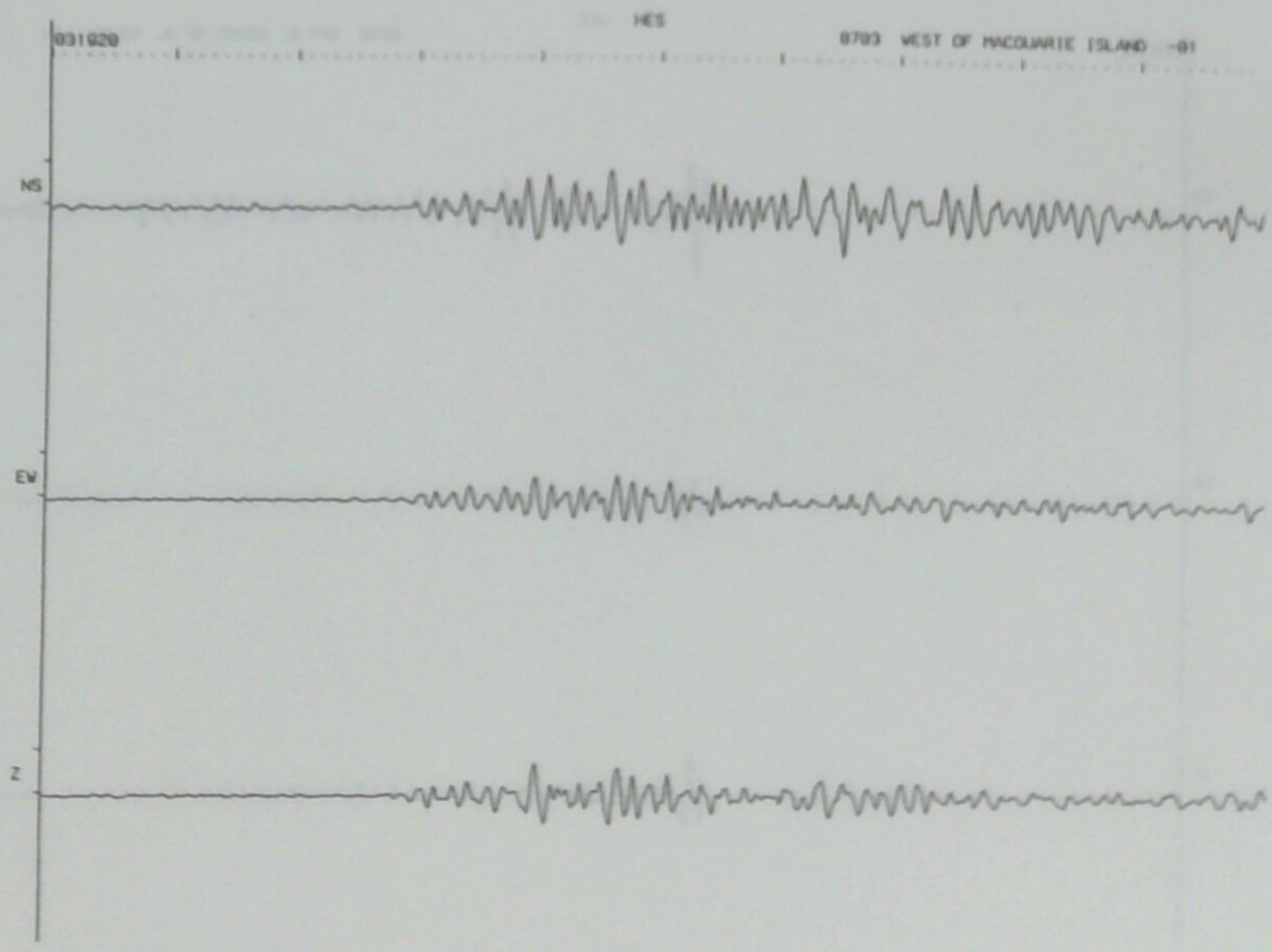


International Seismological Centre

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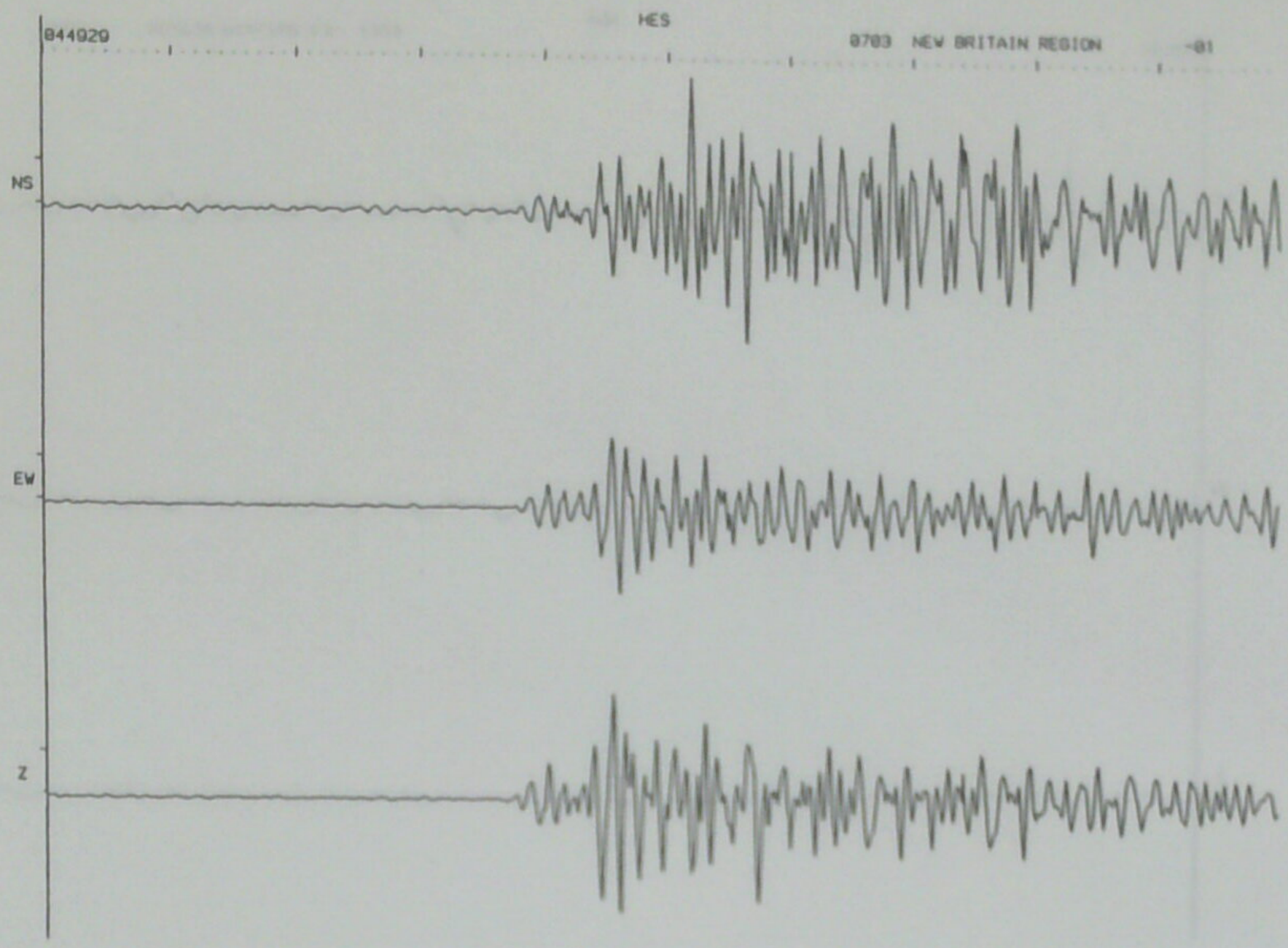


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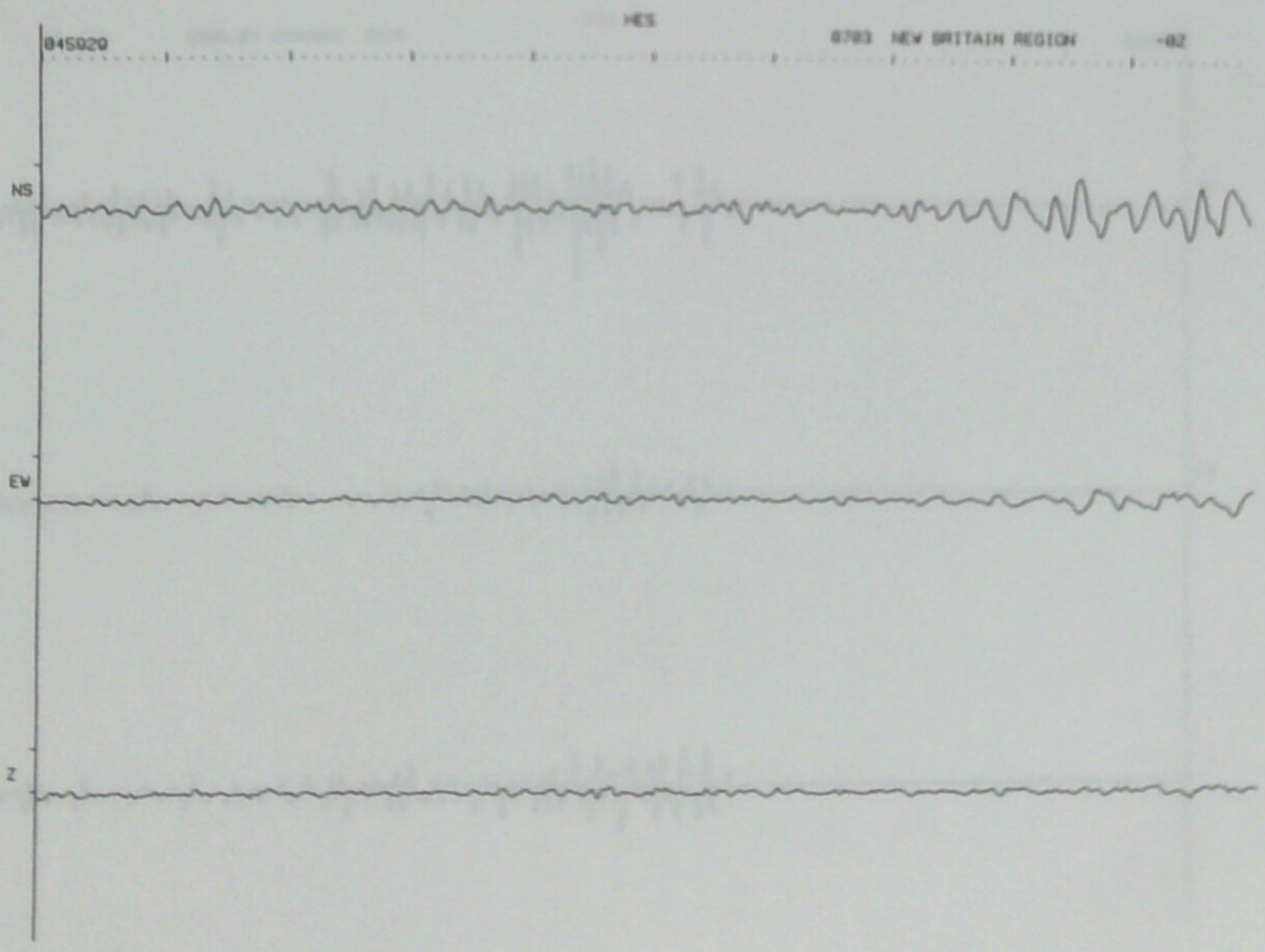


International Seismological Centre

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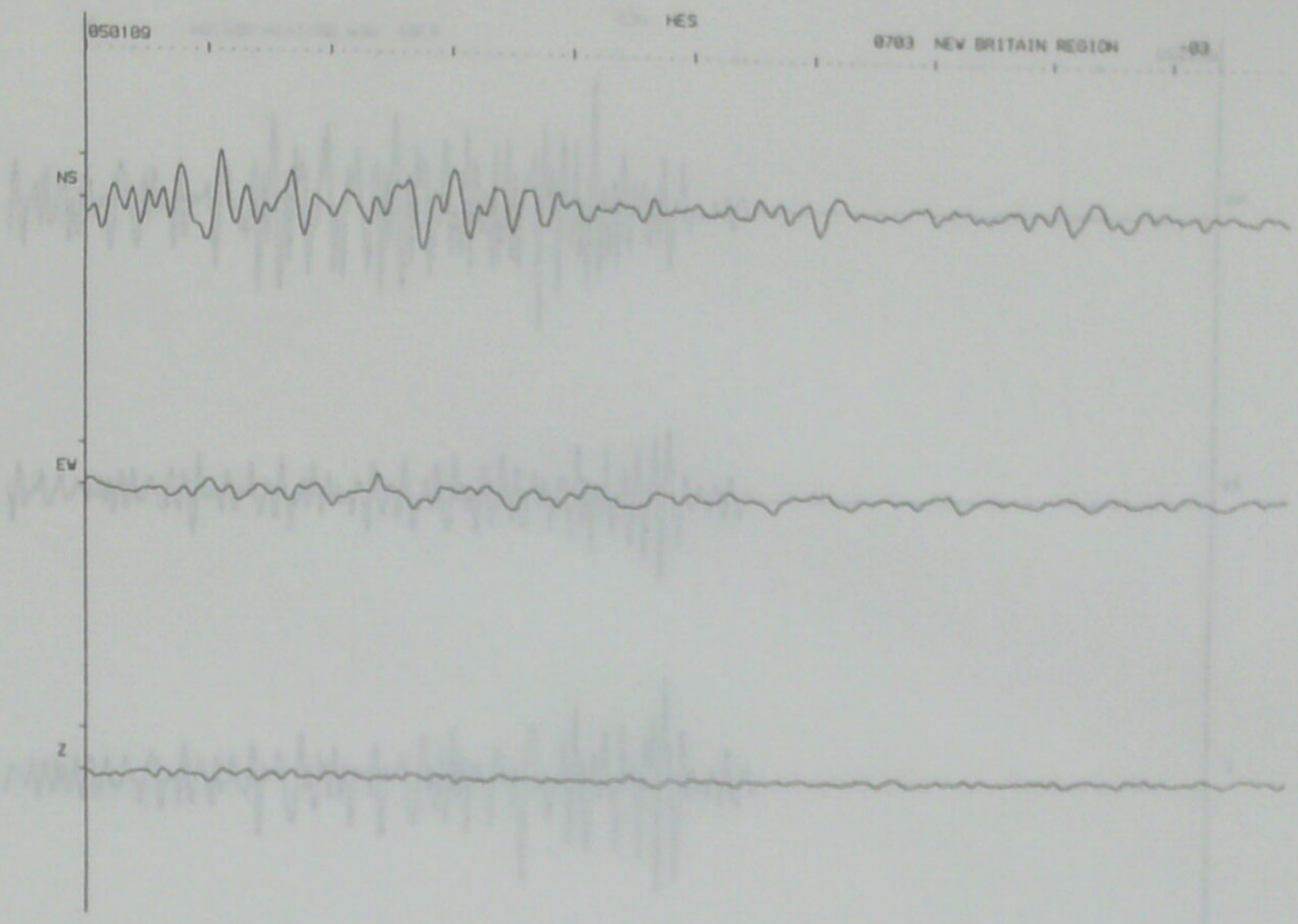


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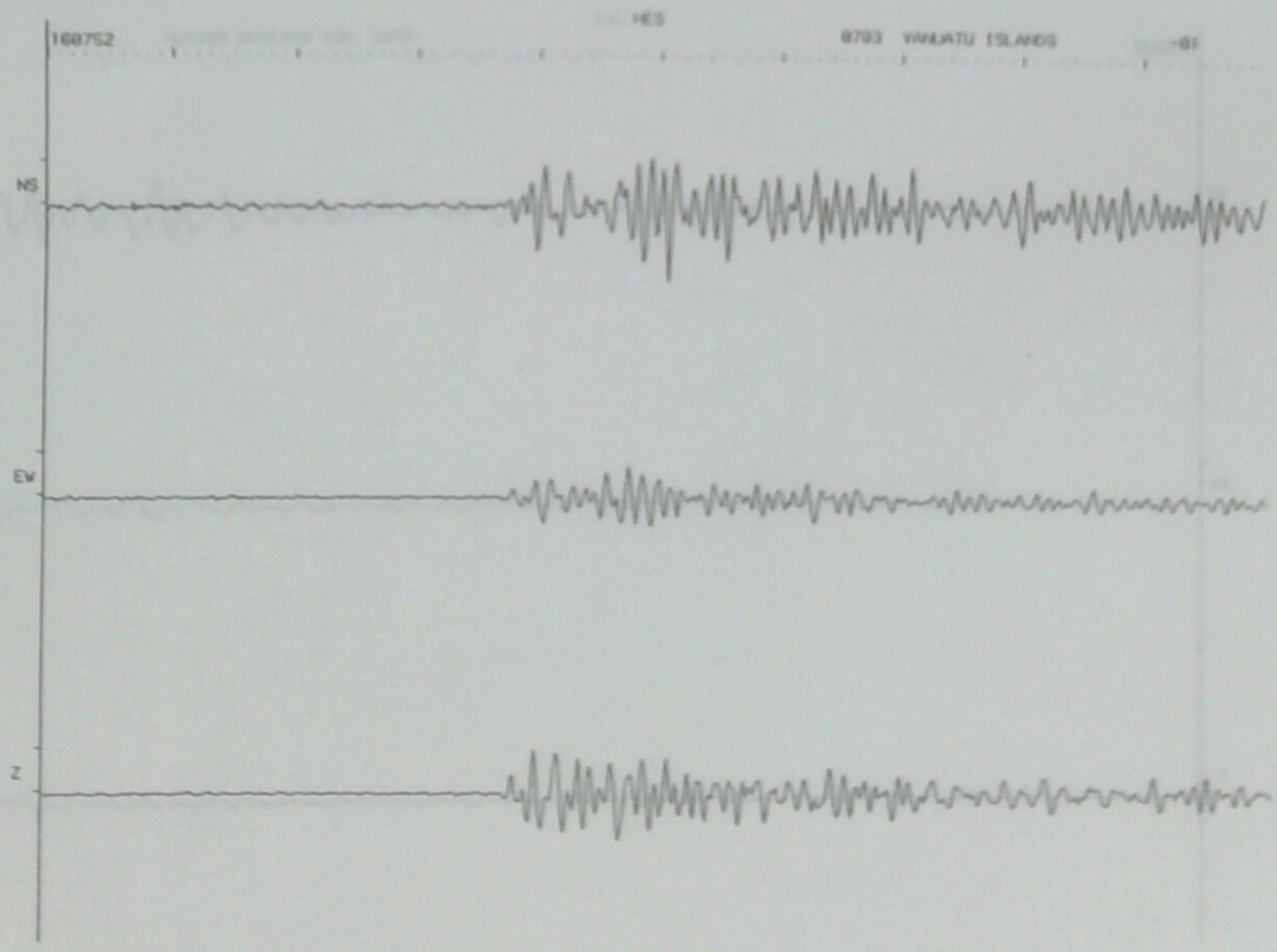


International Seismological Centre

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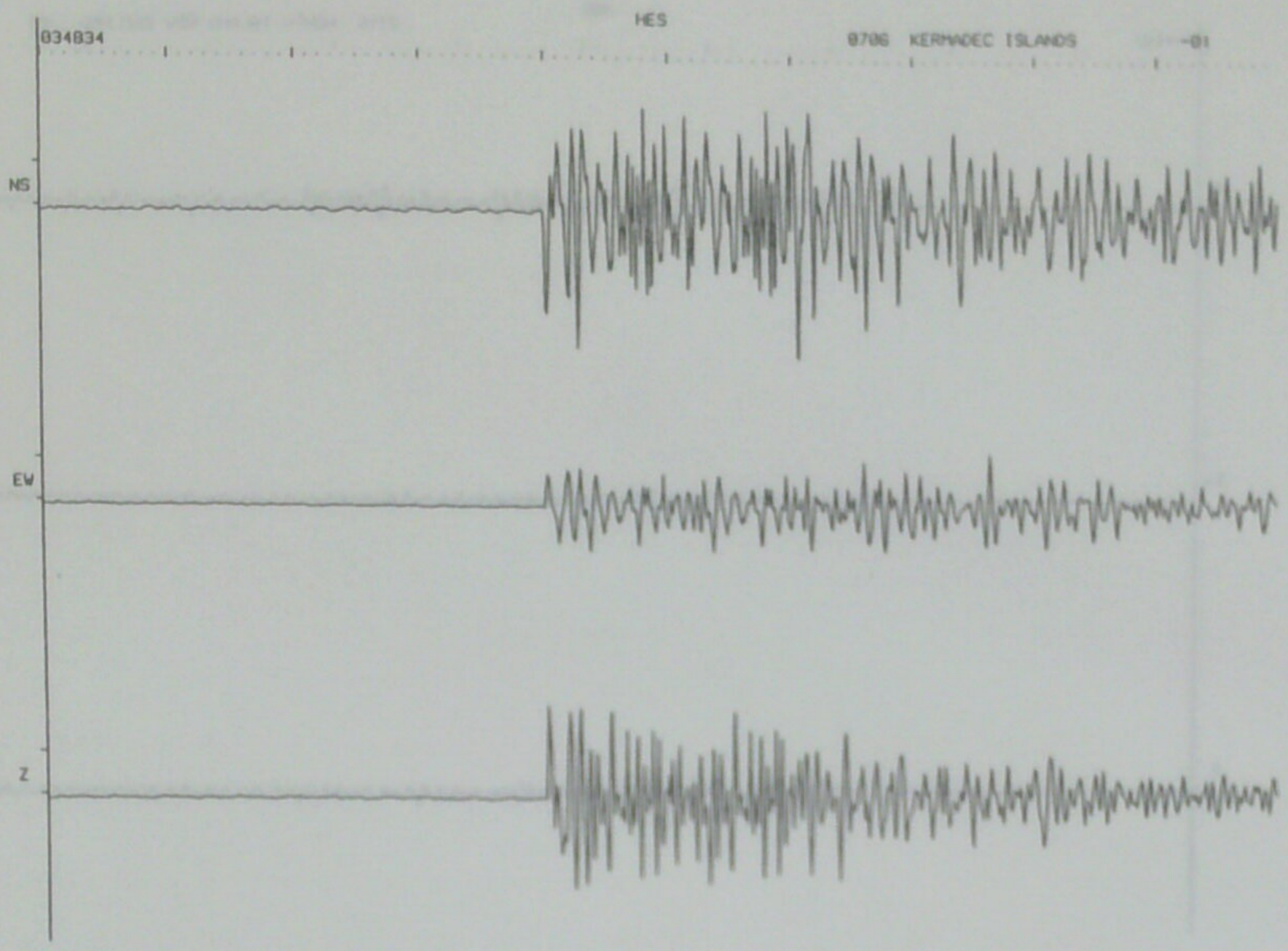


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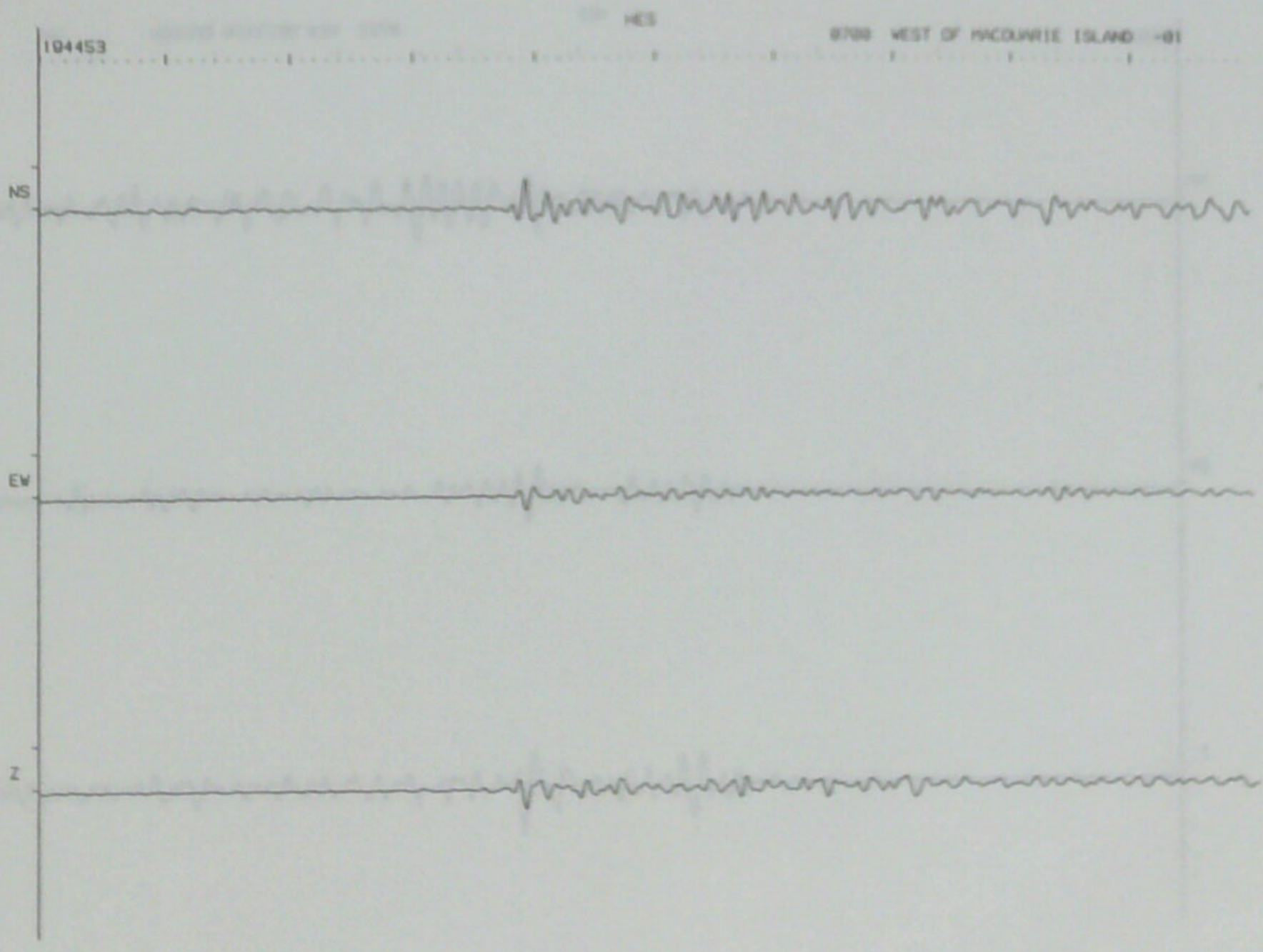


International Seismological Centre

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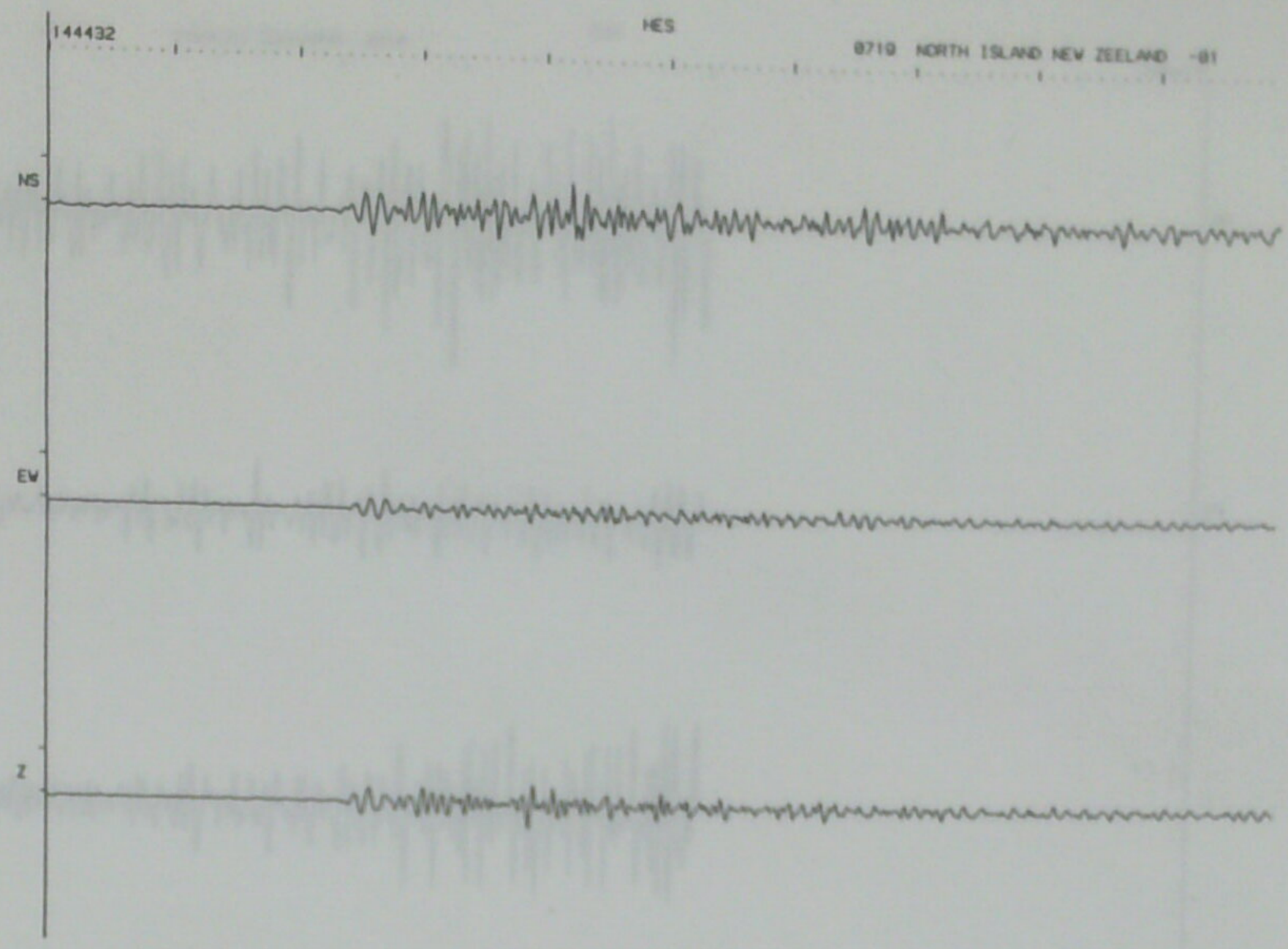


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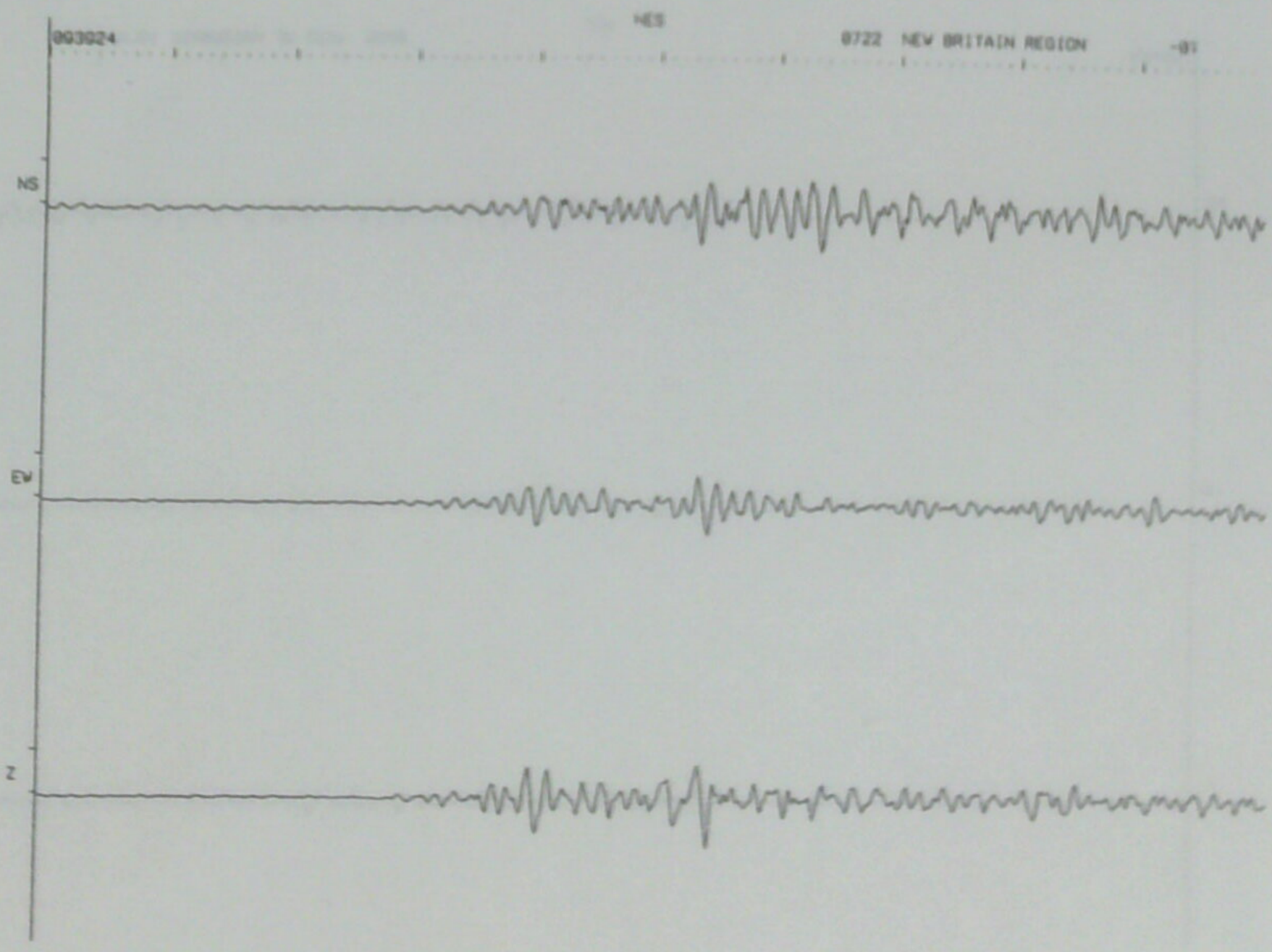


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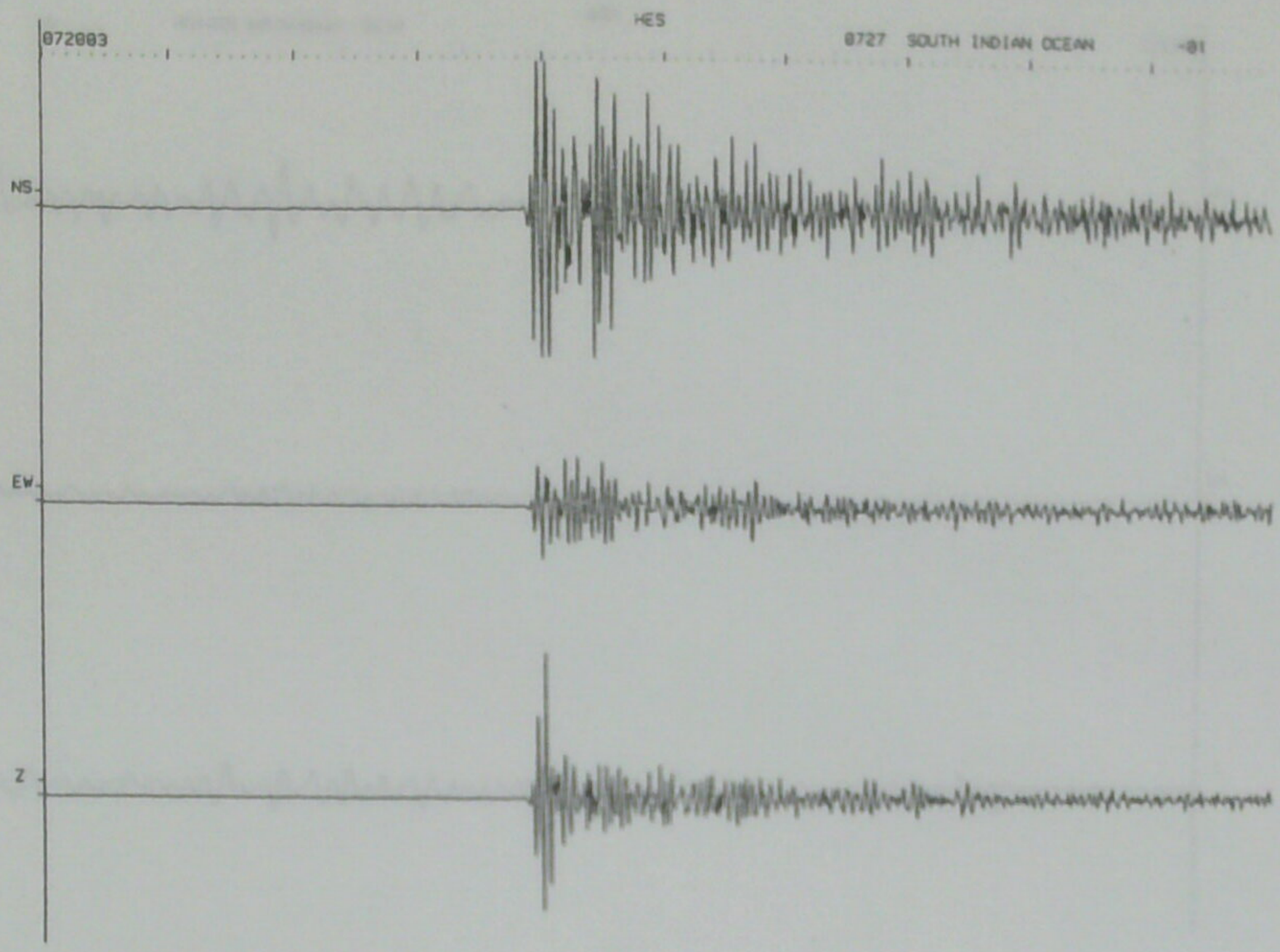


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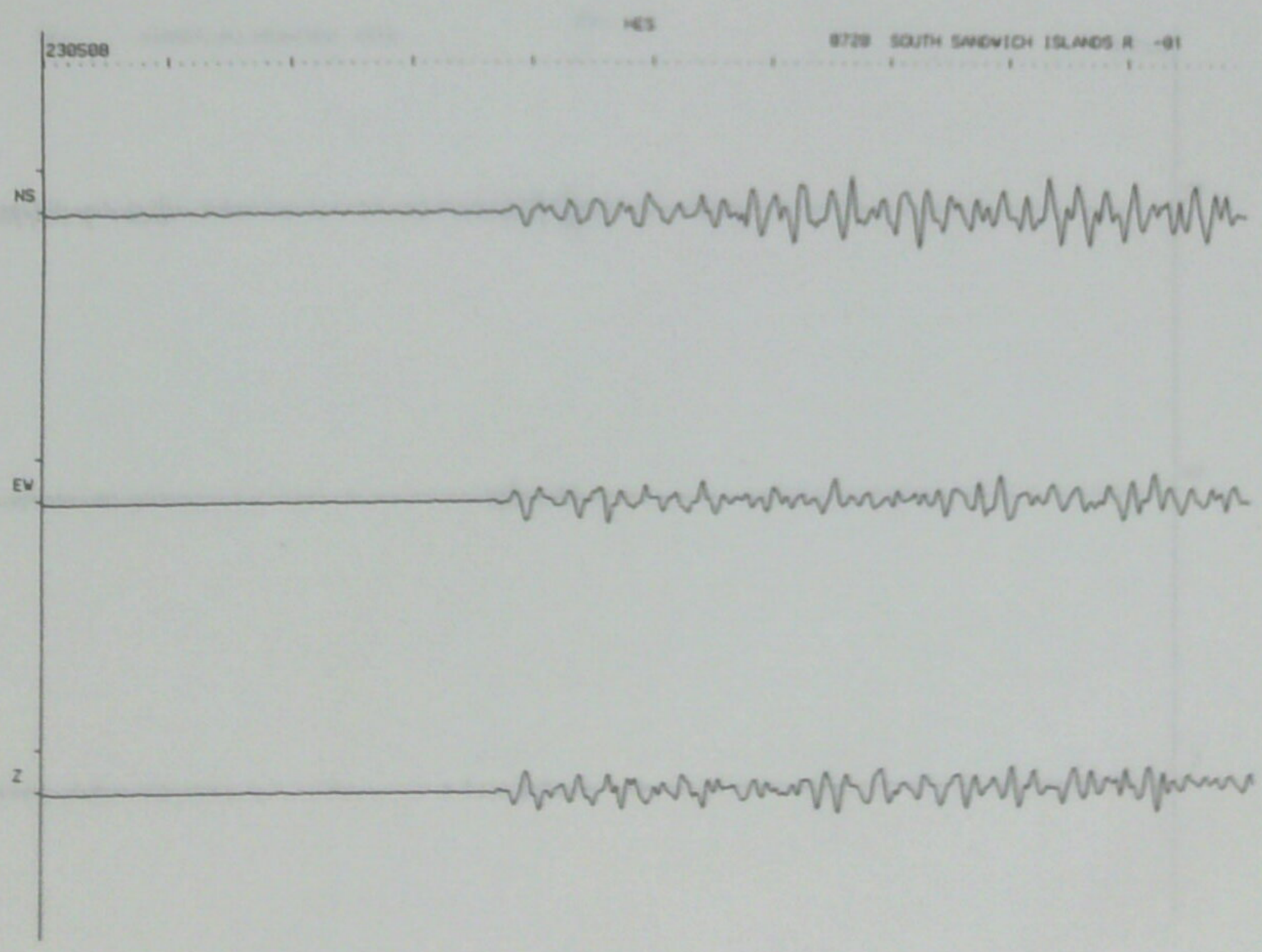


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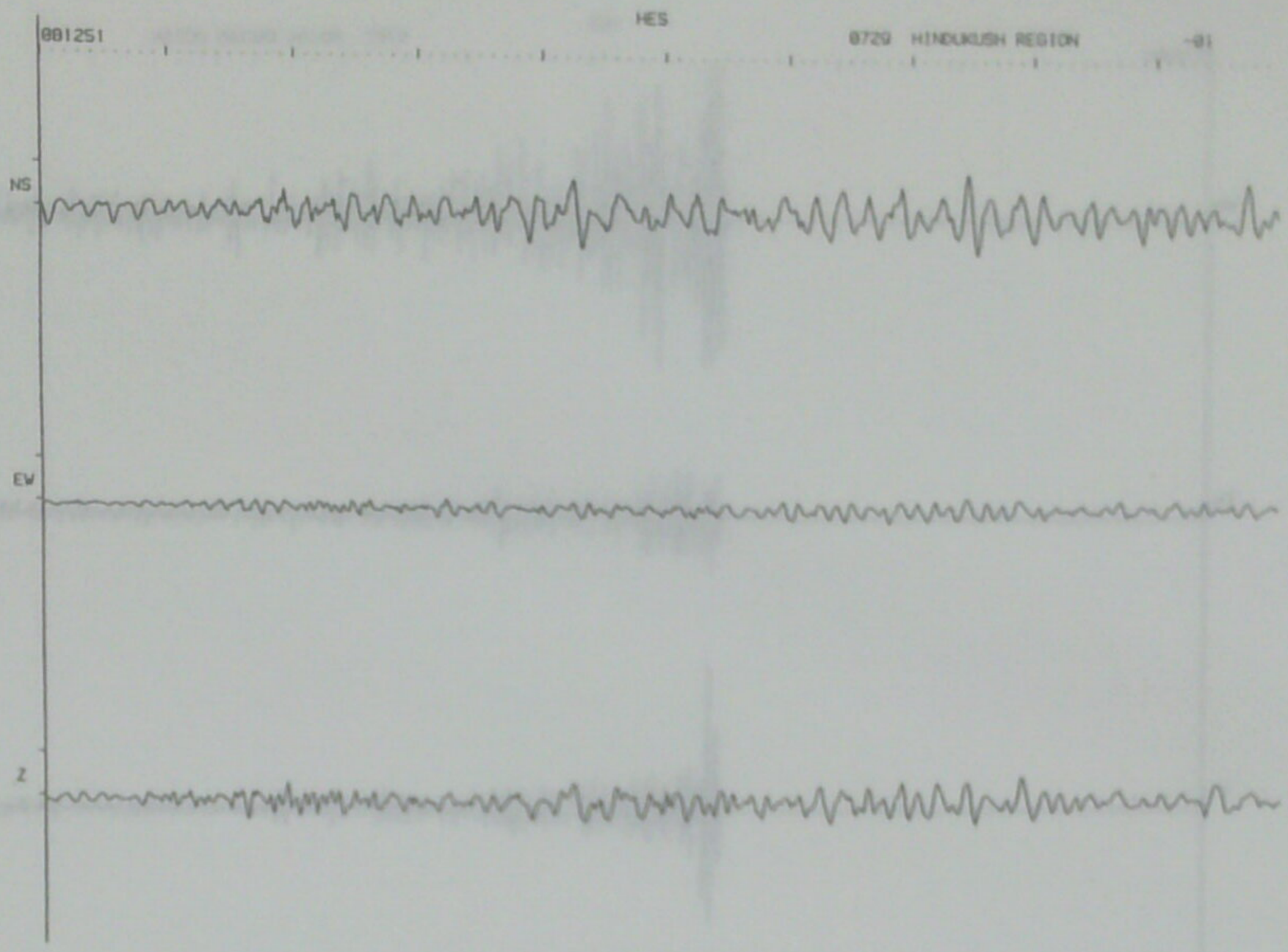


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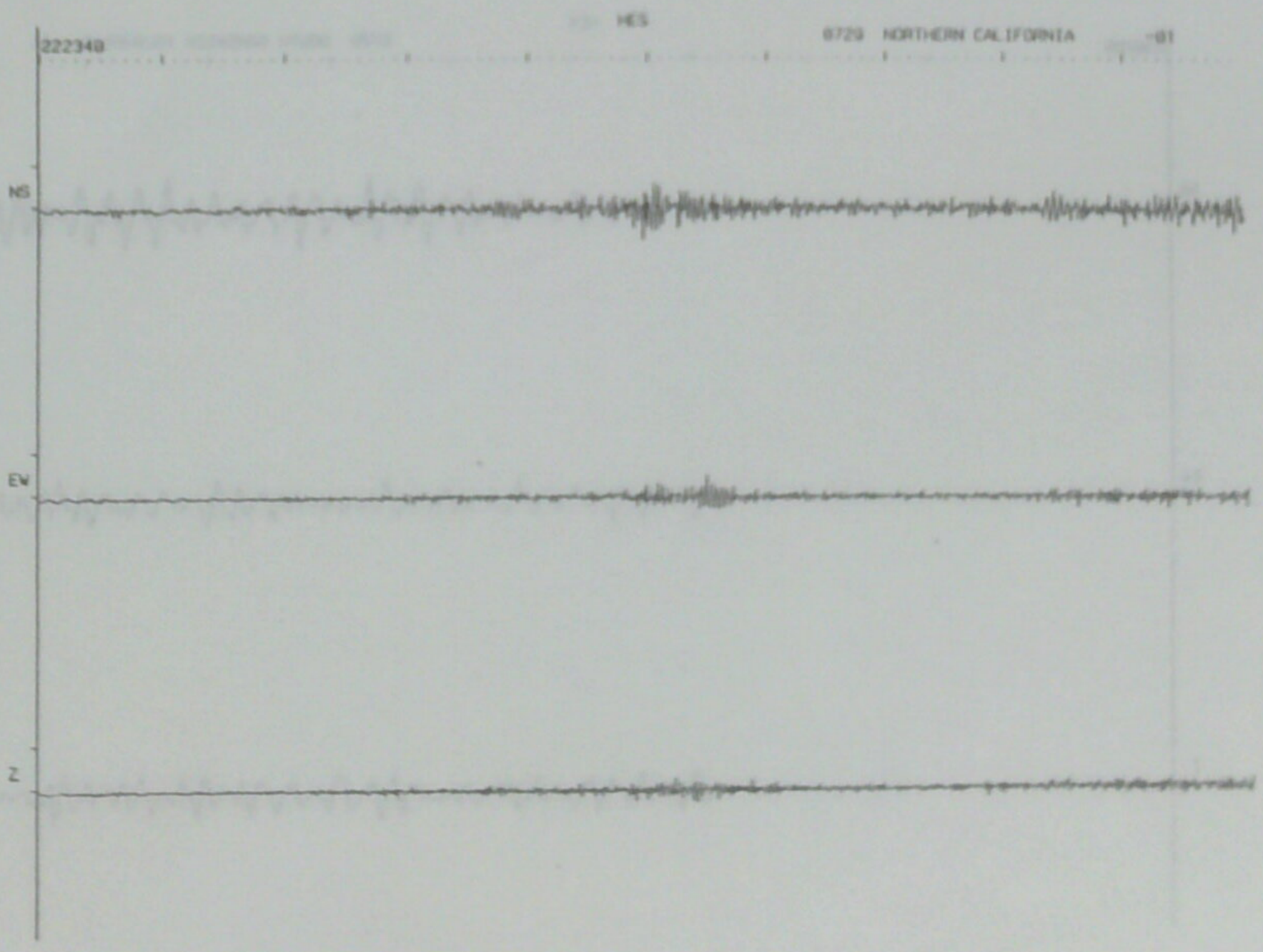


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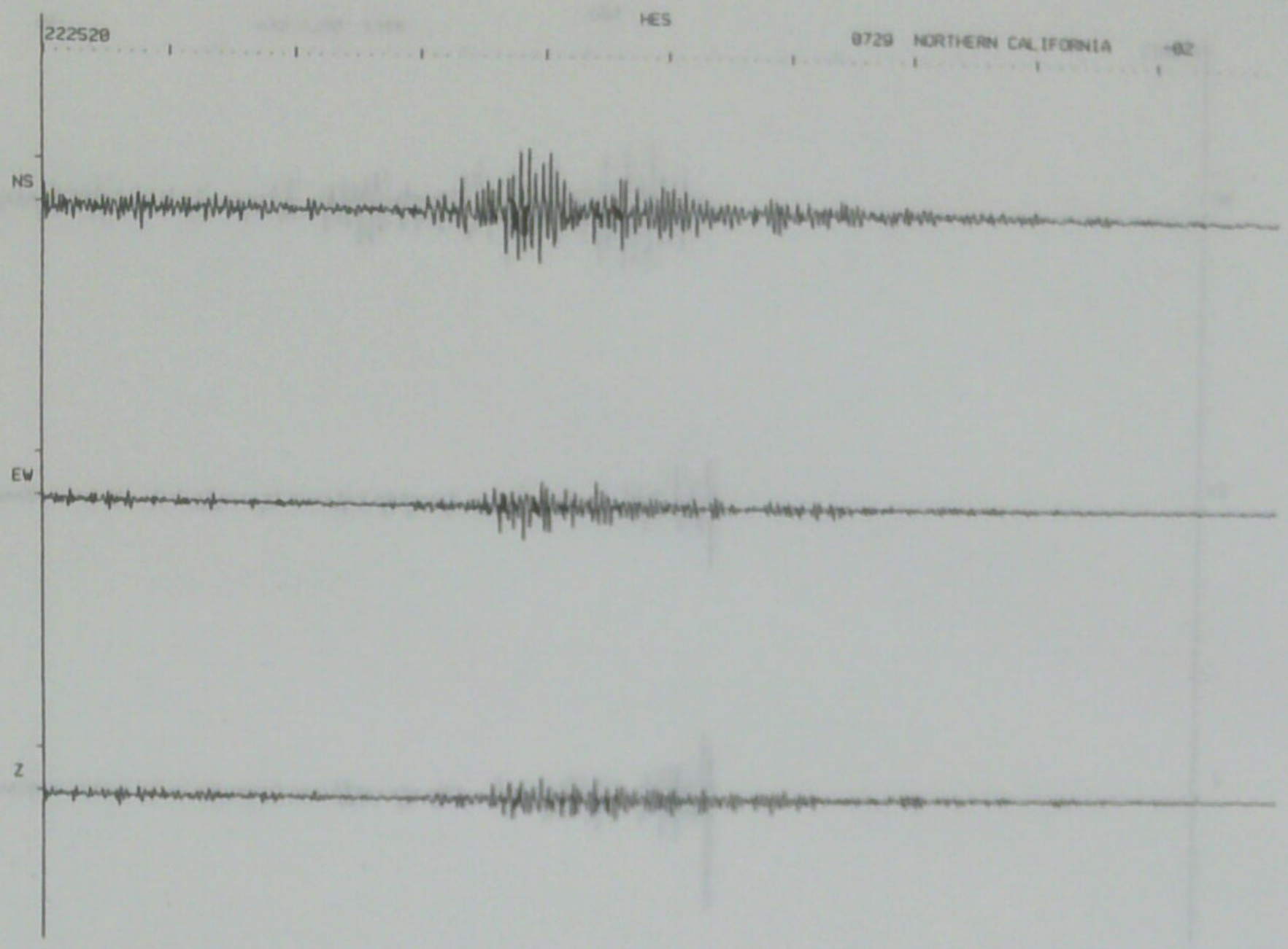


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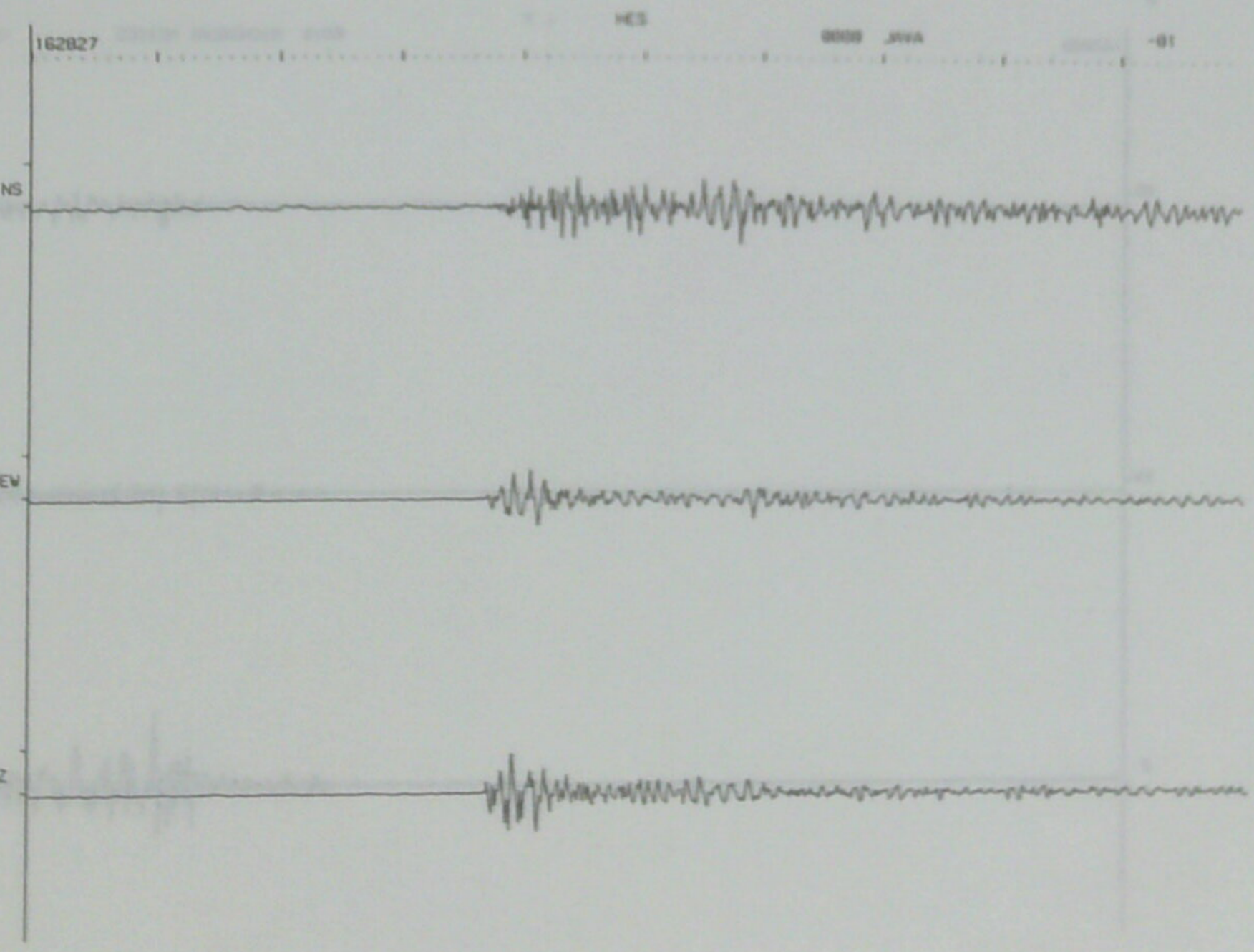


International Seismological Centre

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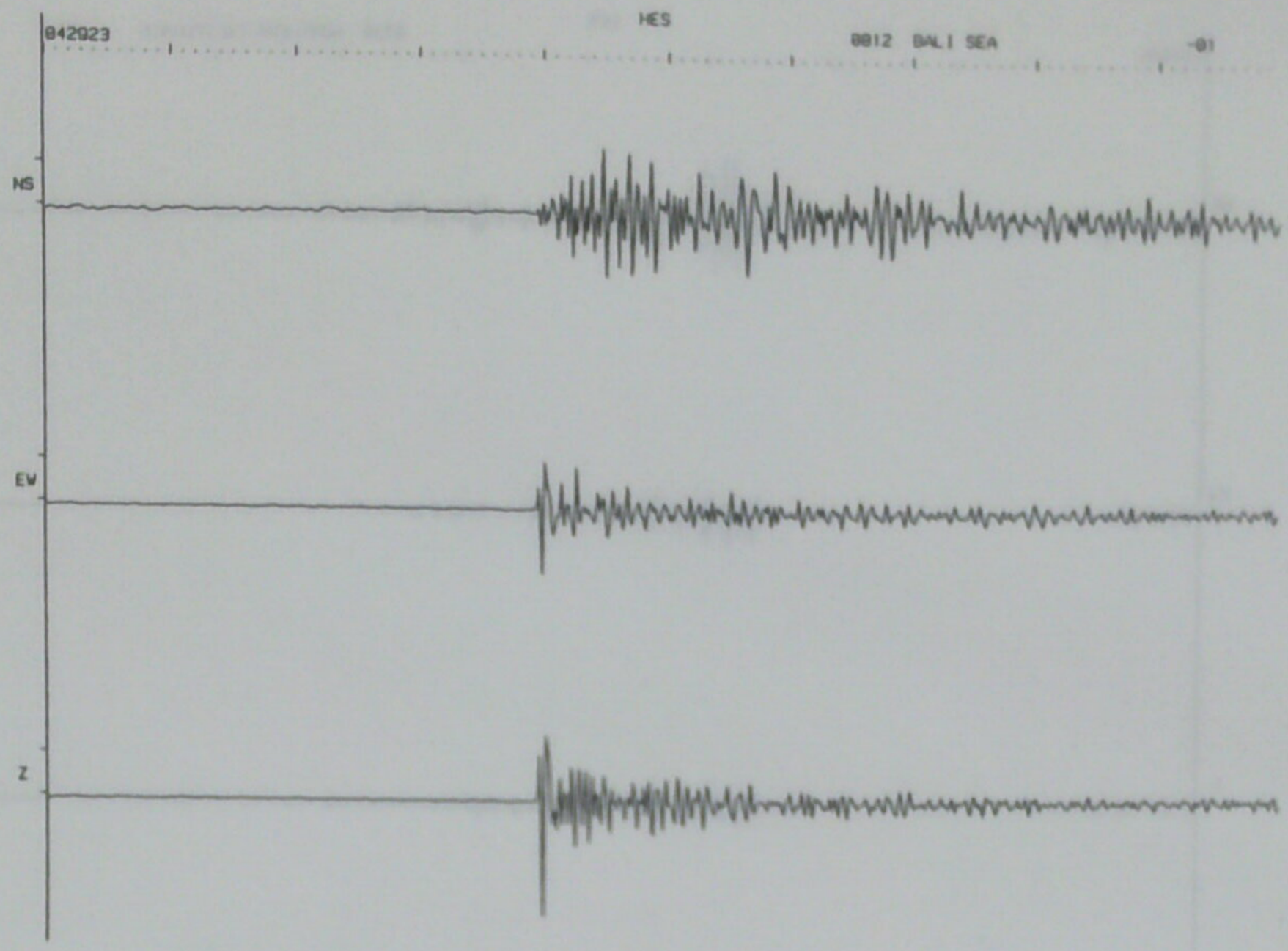


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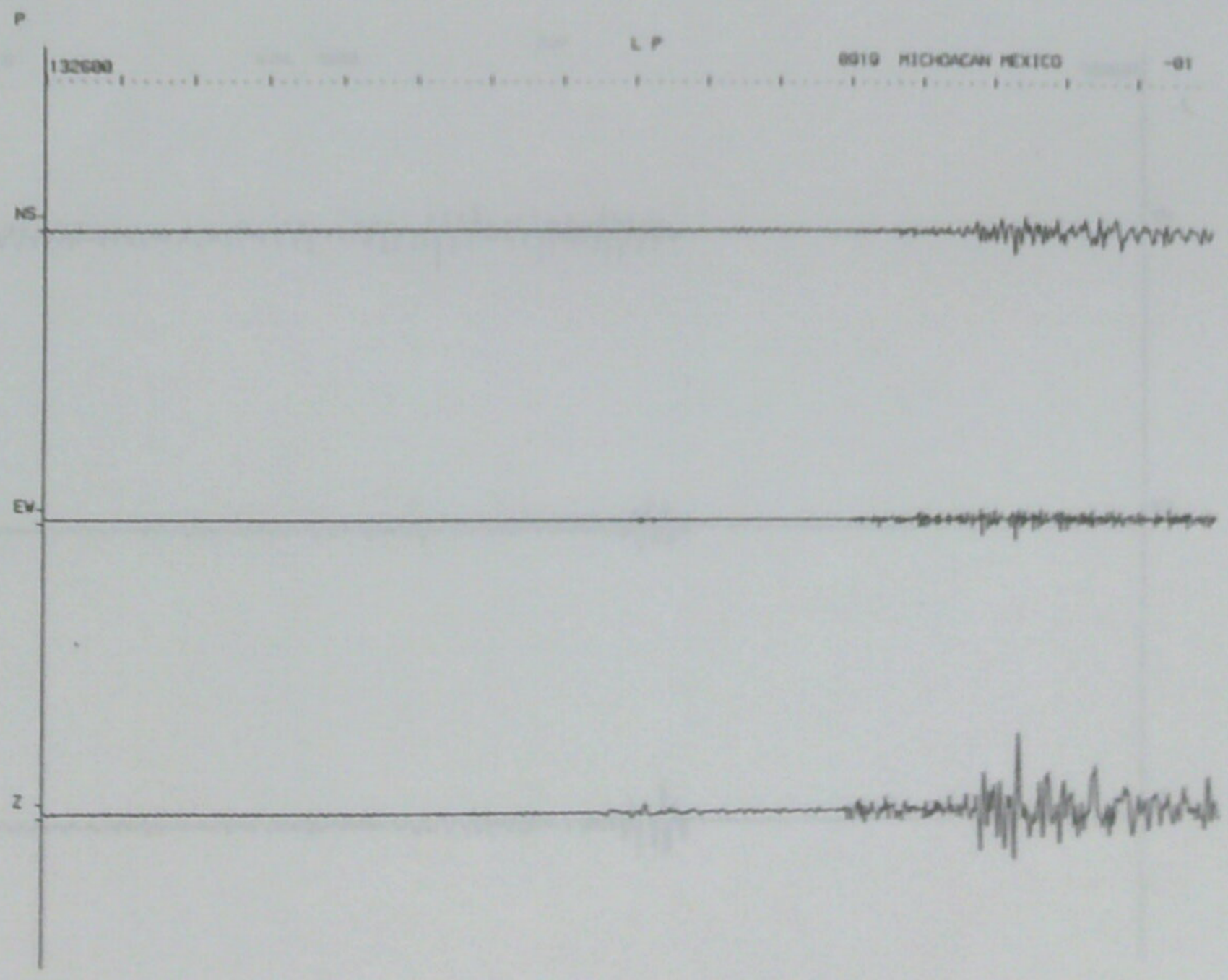


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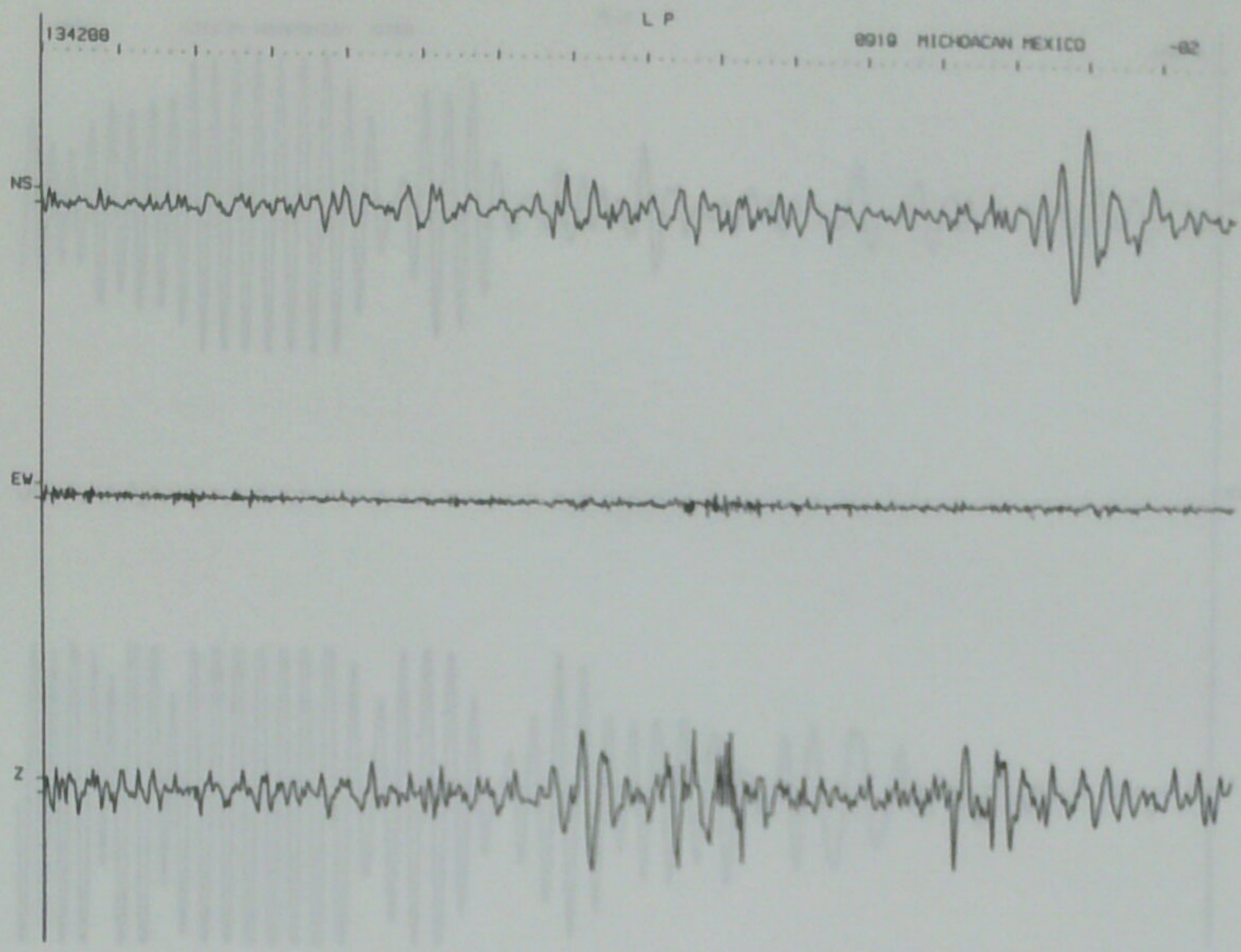


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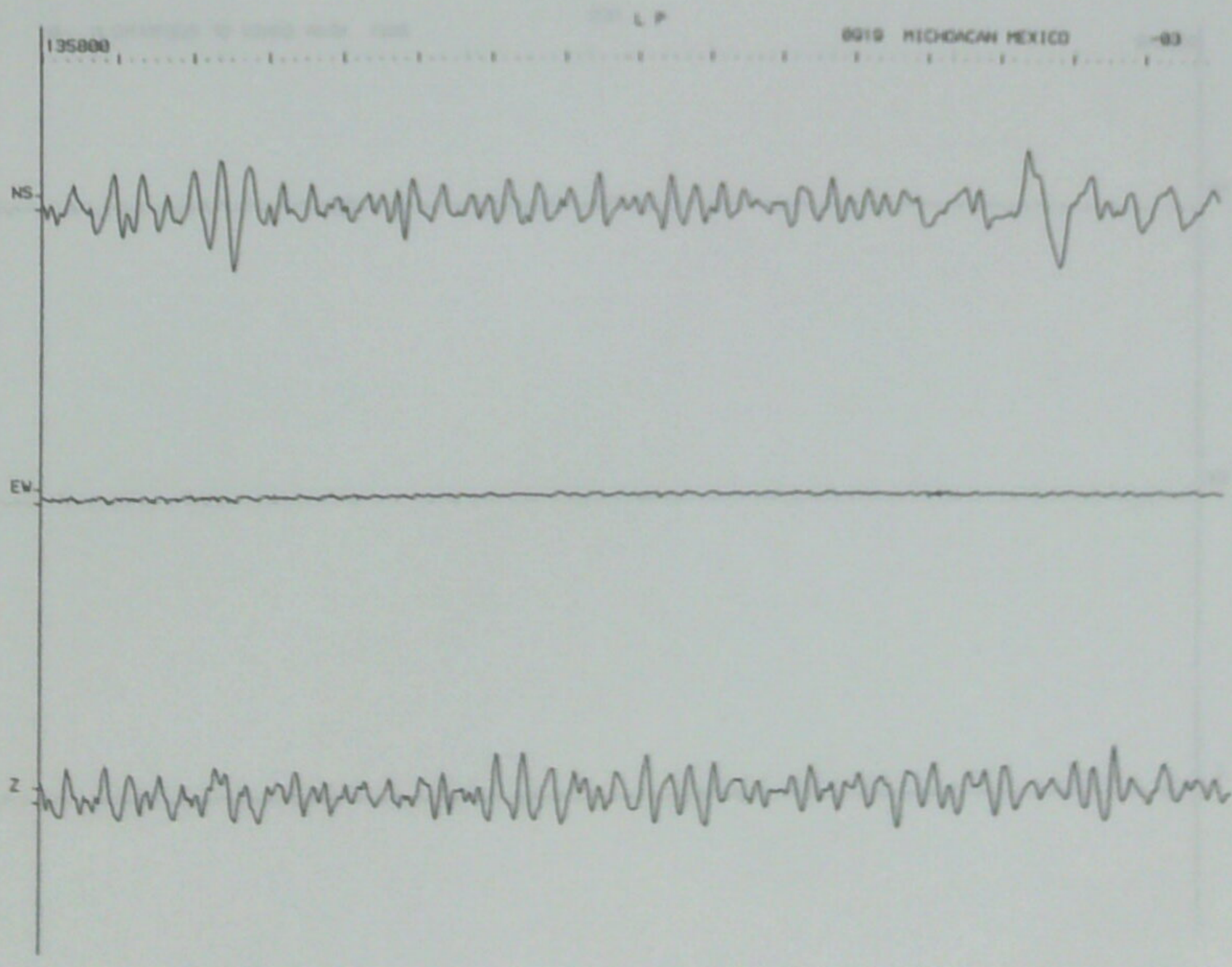


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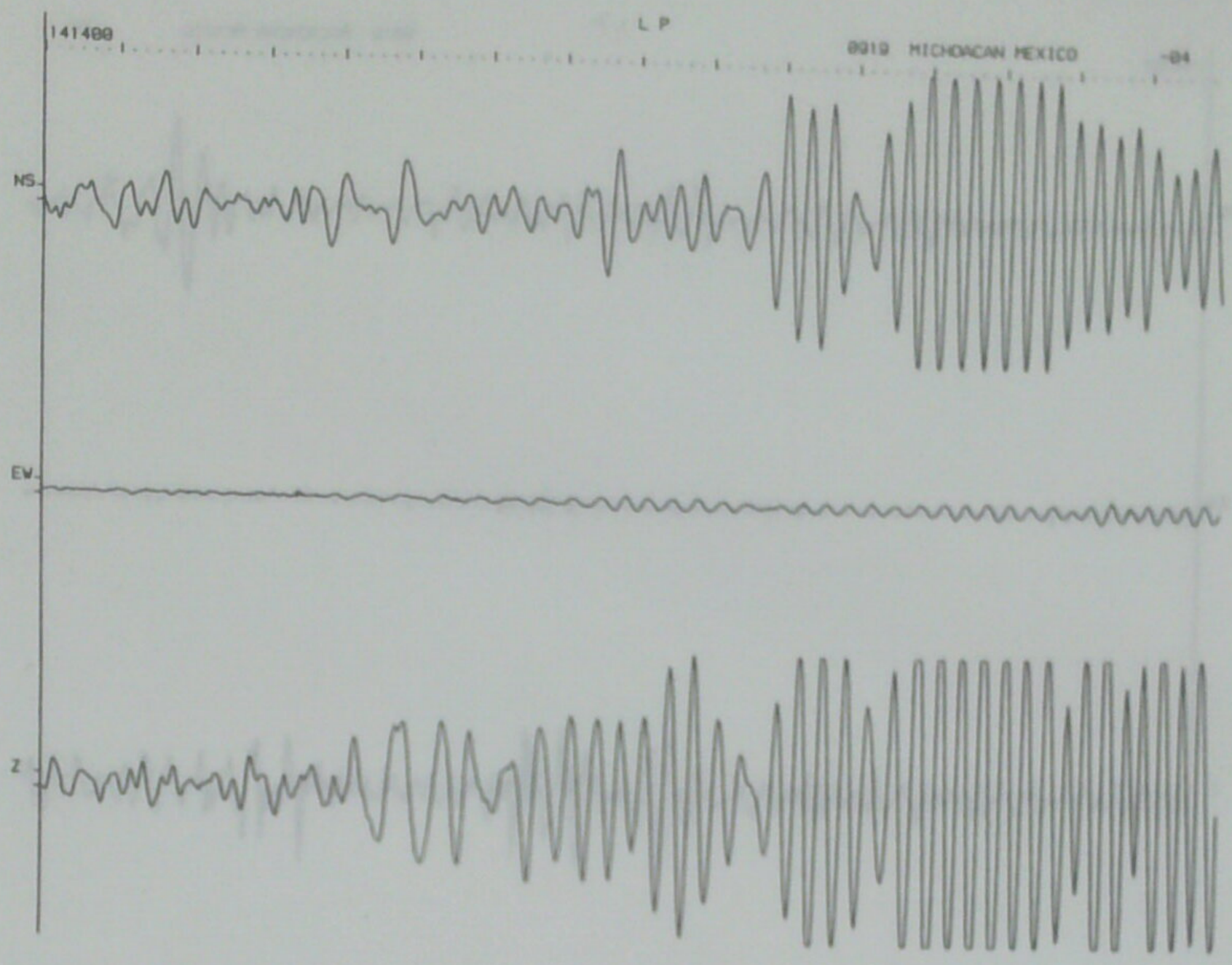


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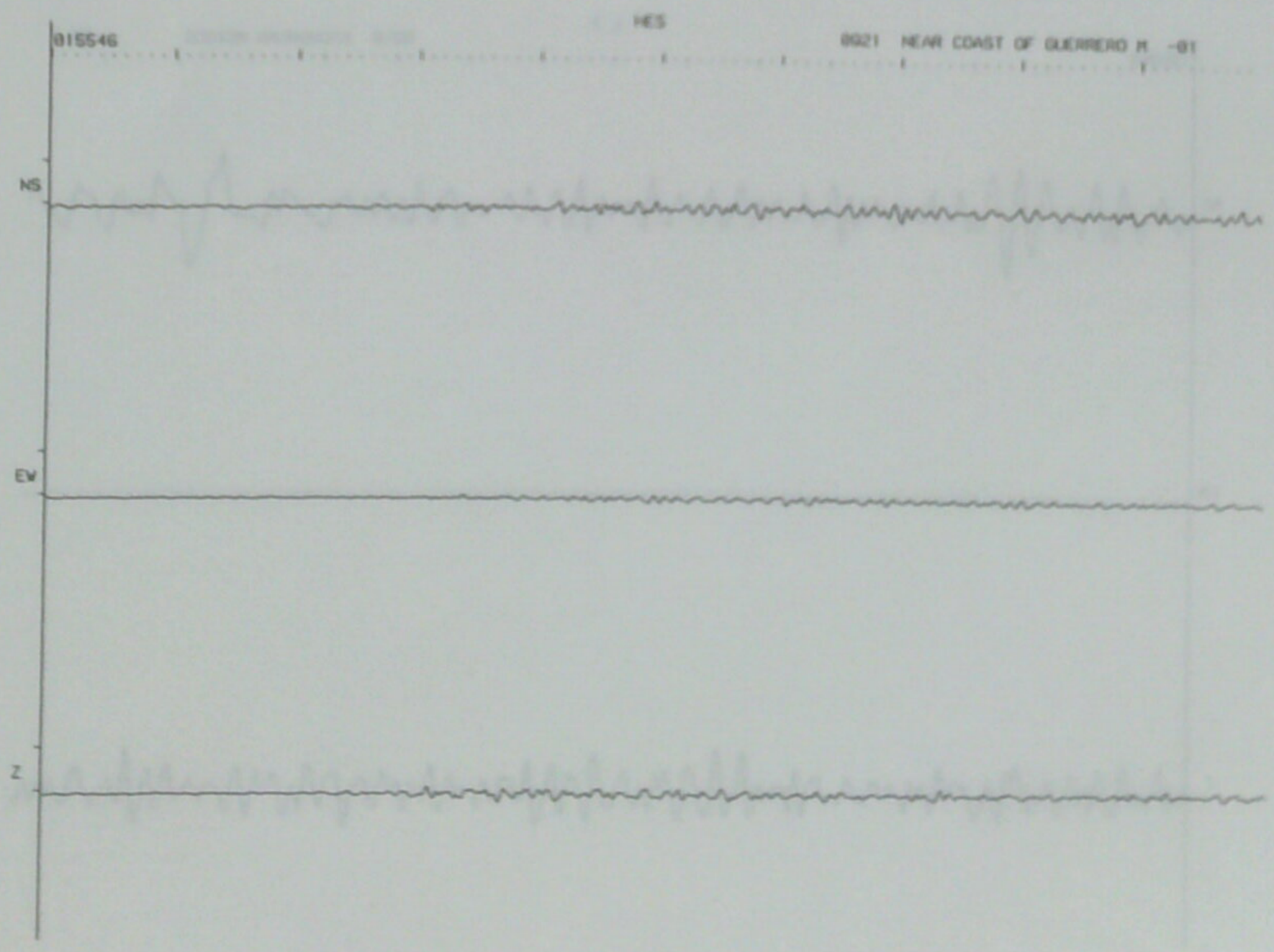


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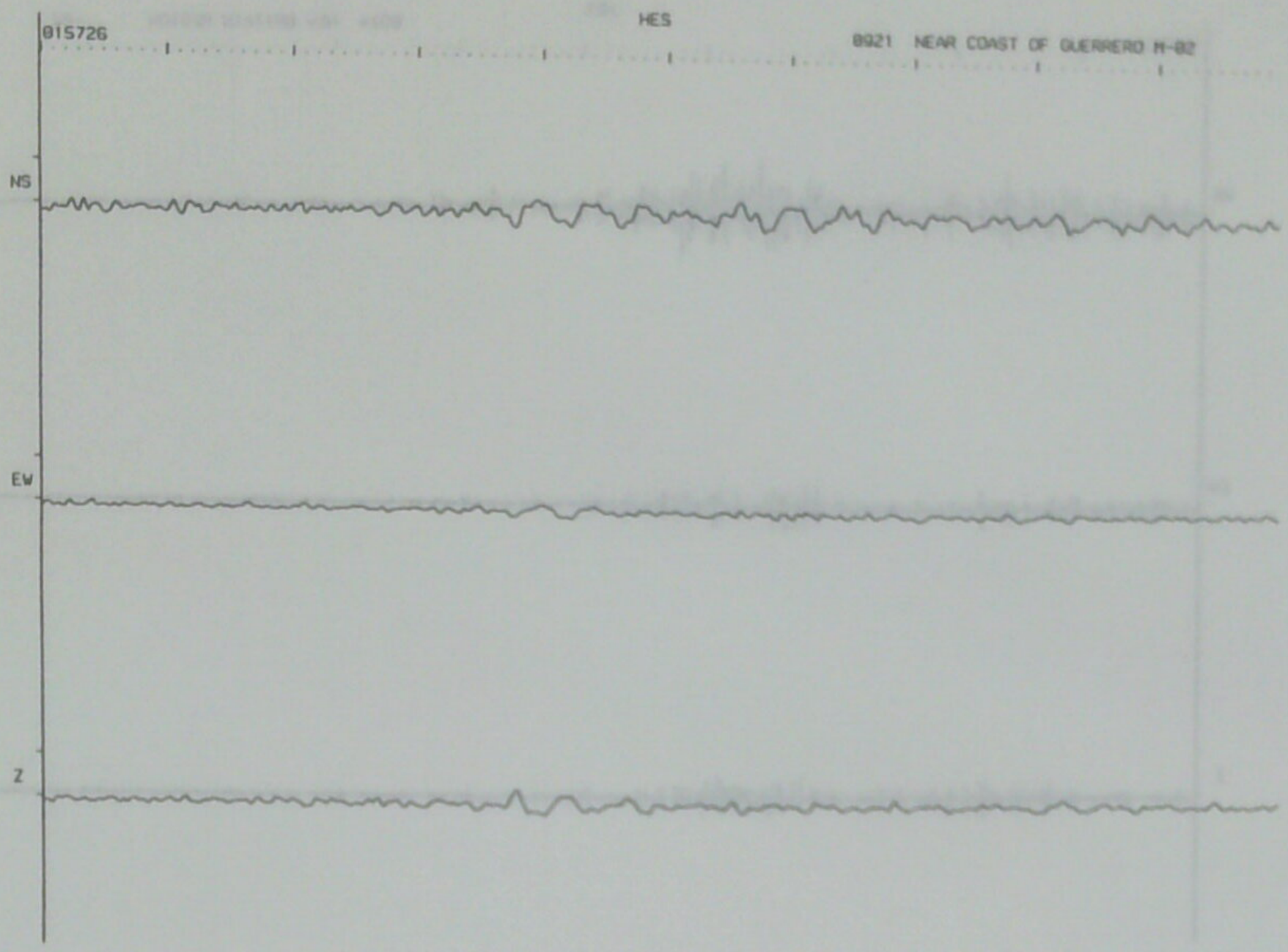


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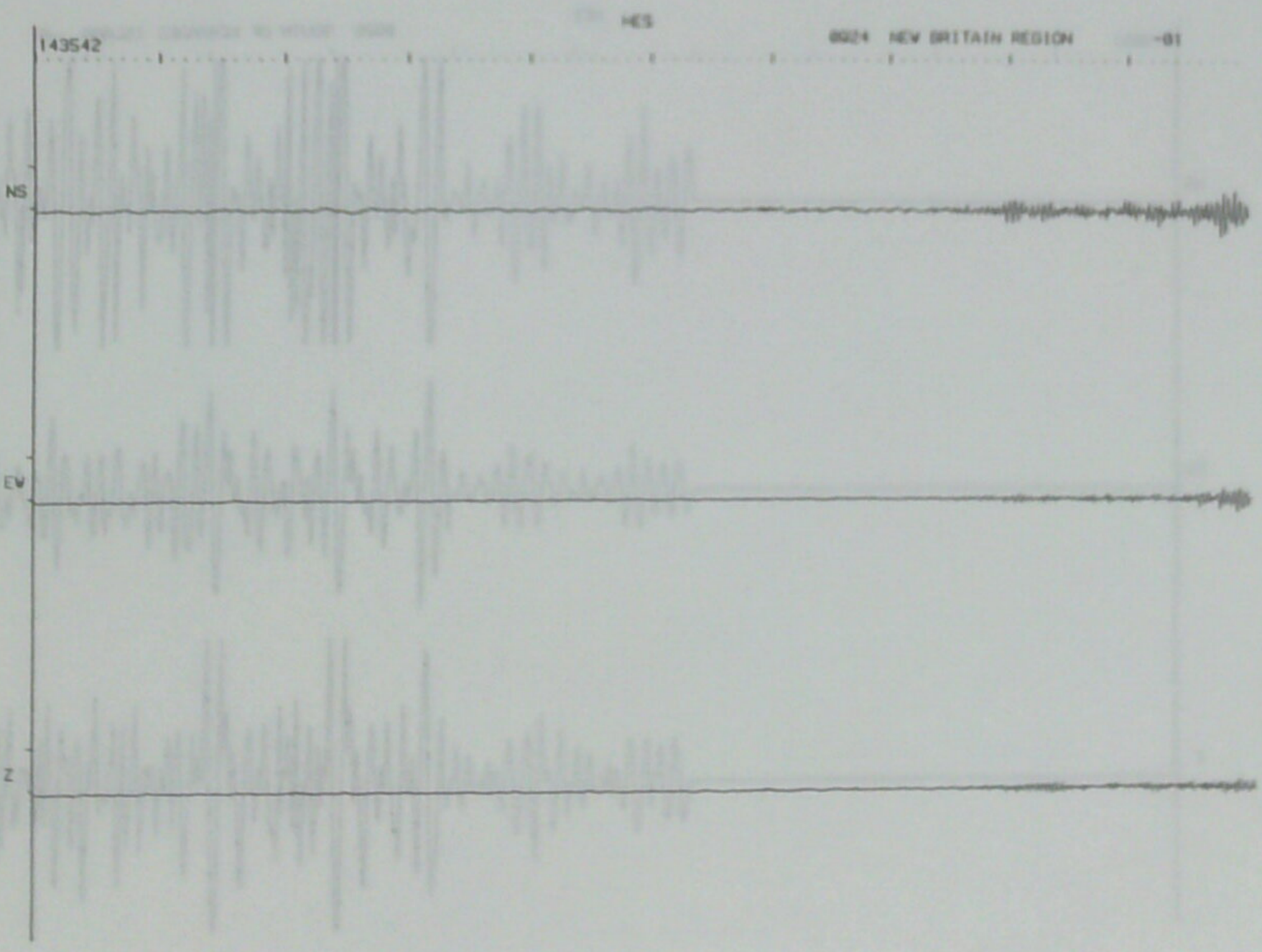


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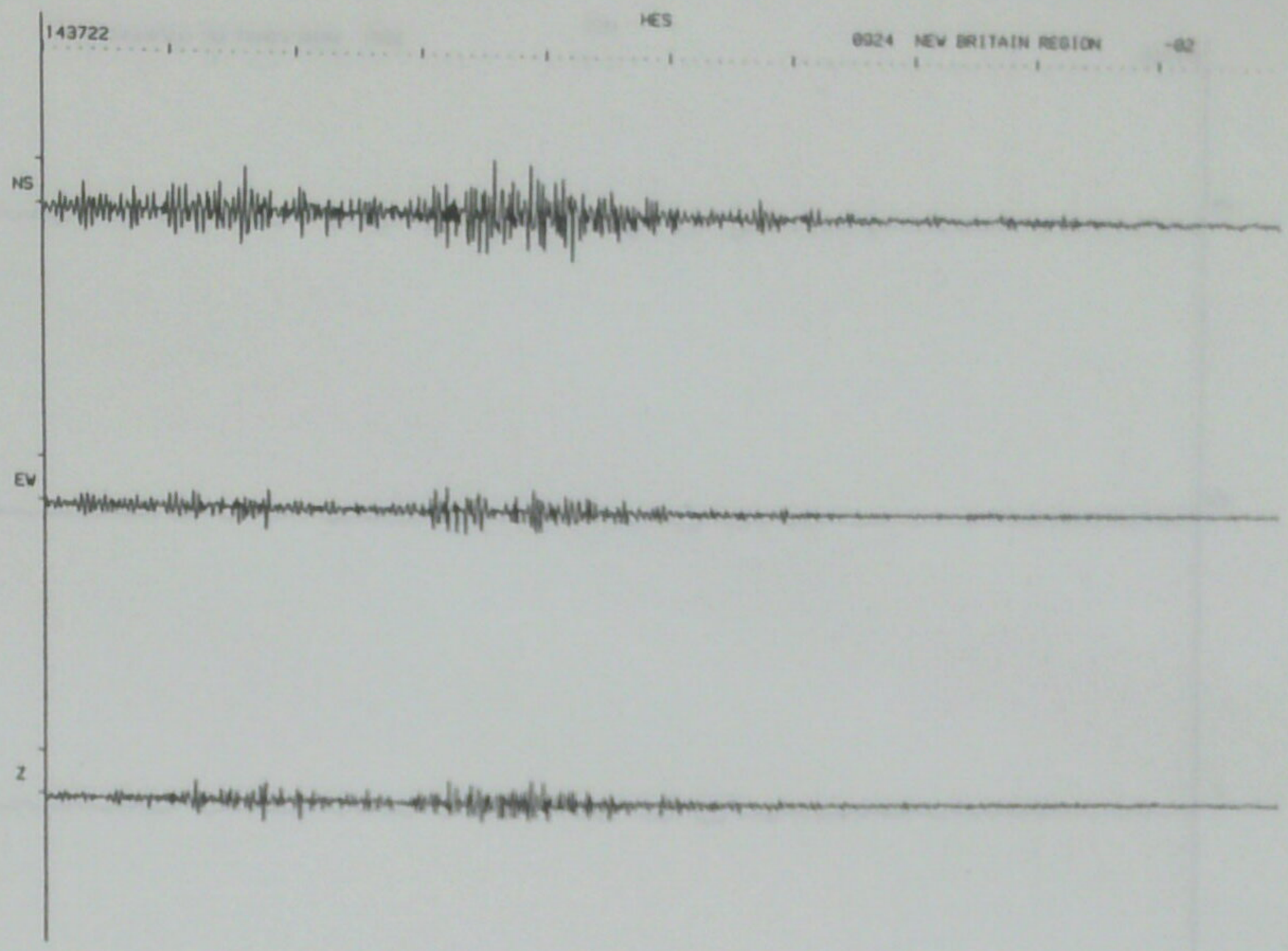


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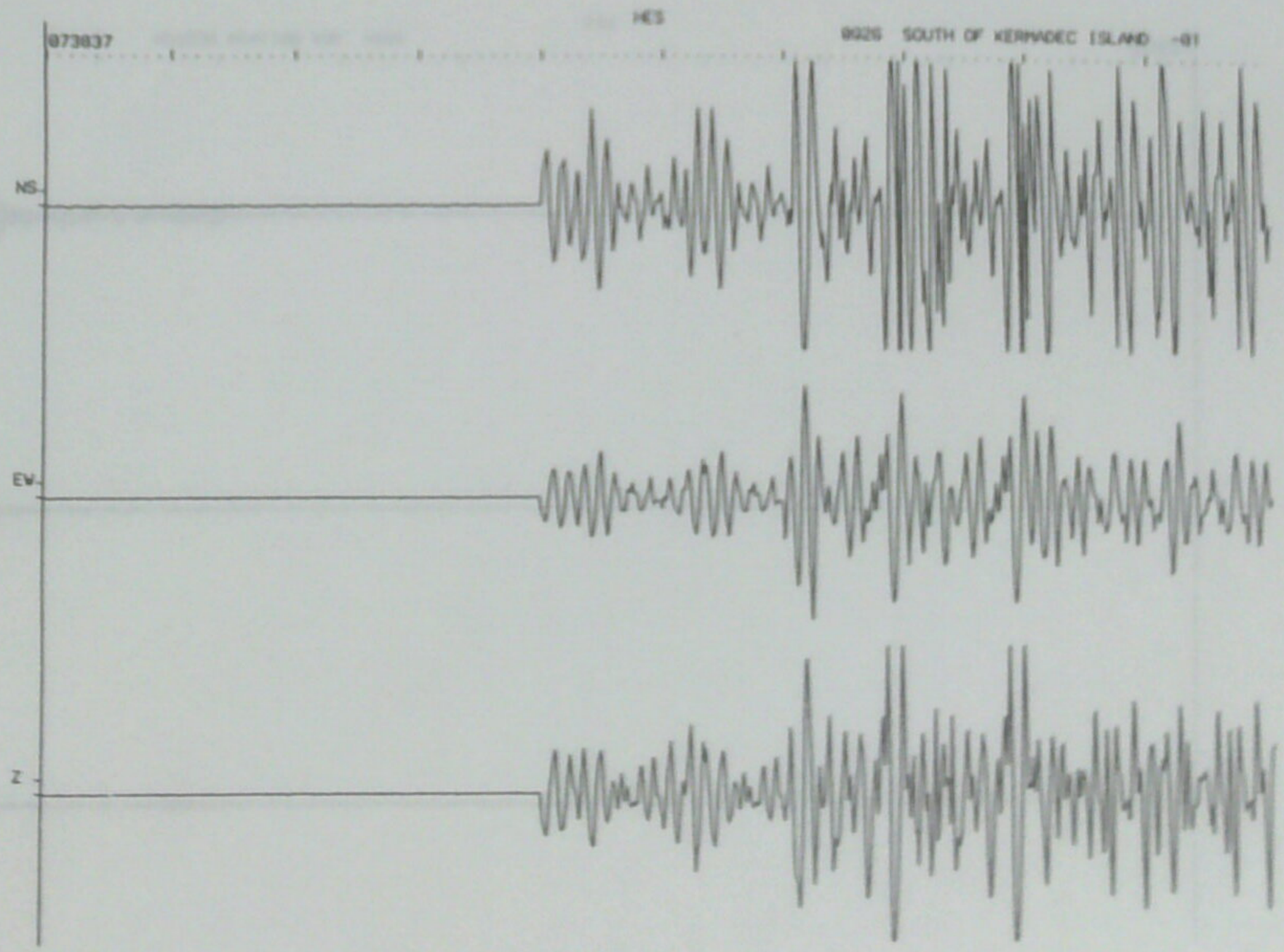


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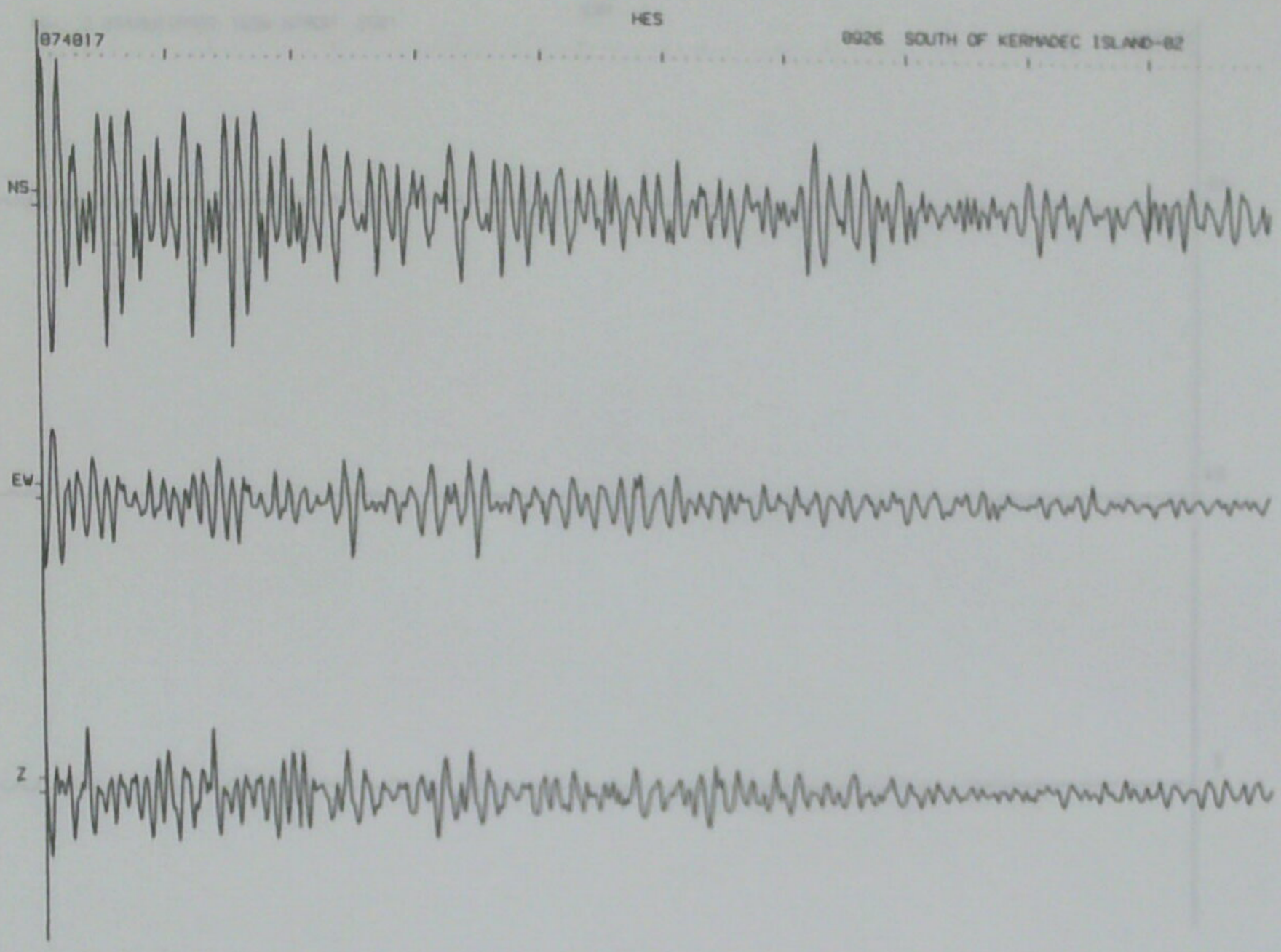


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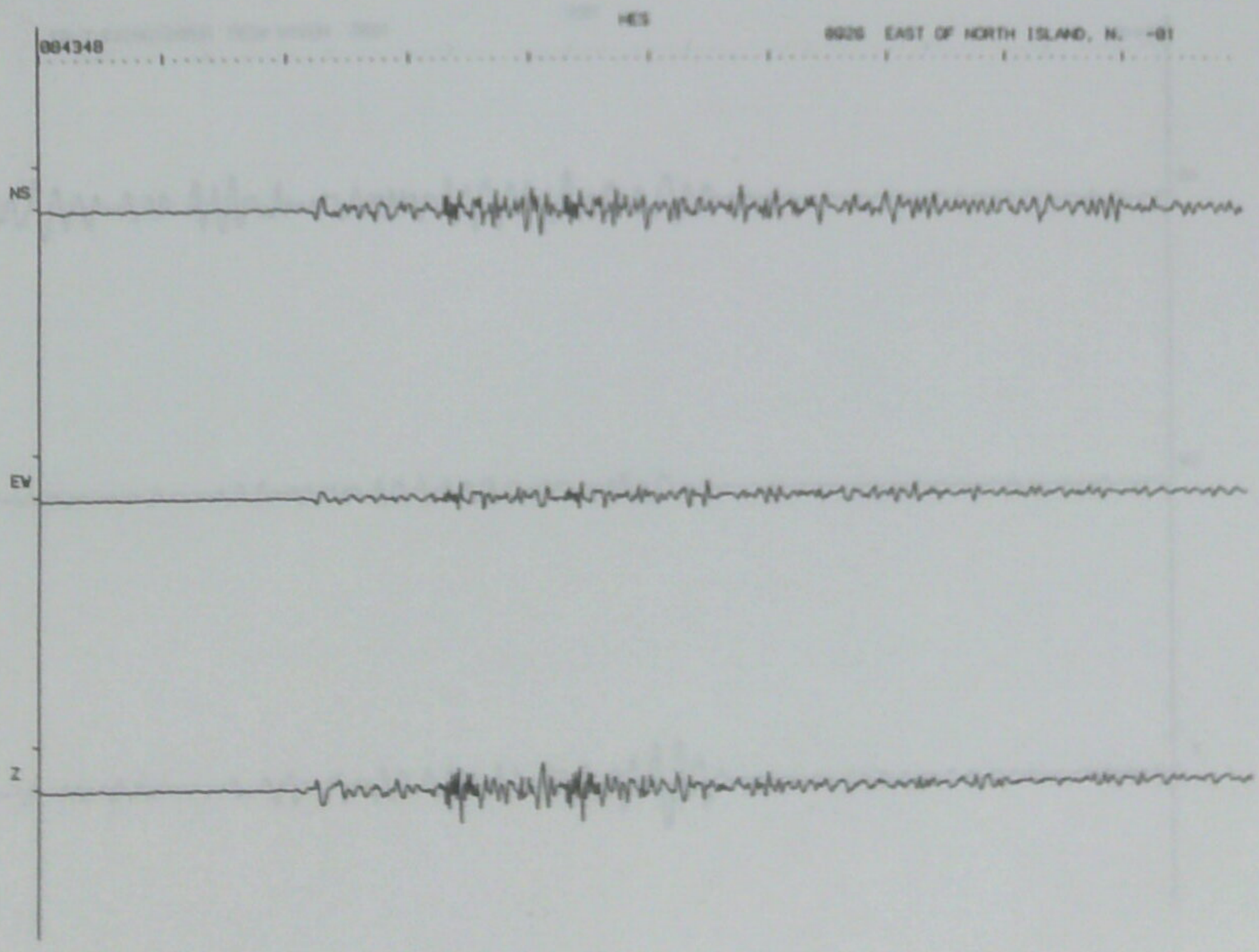


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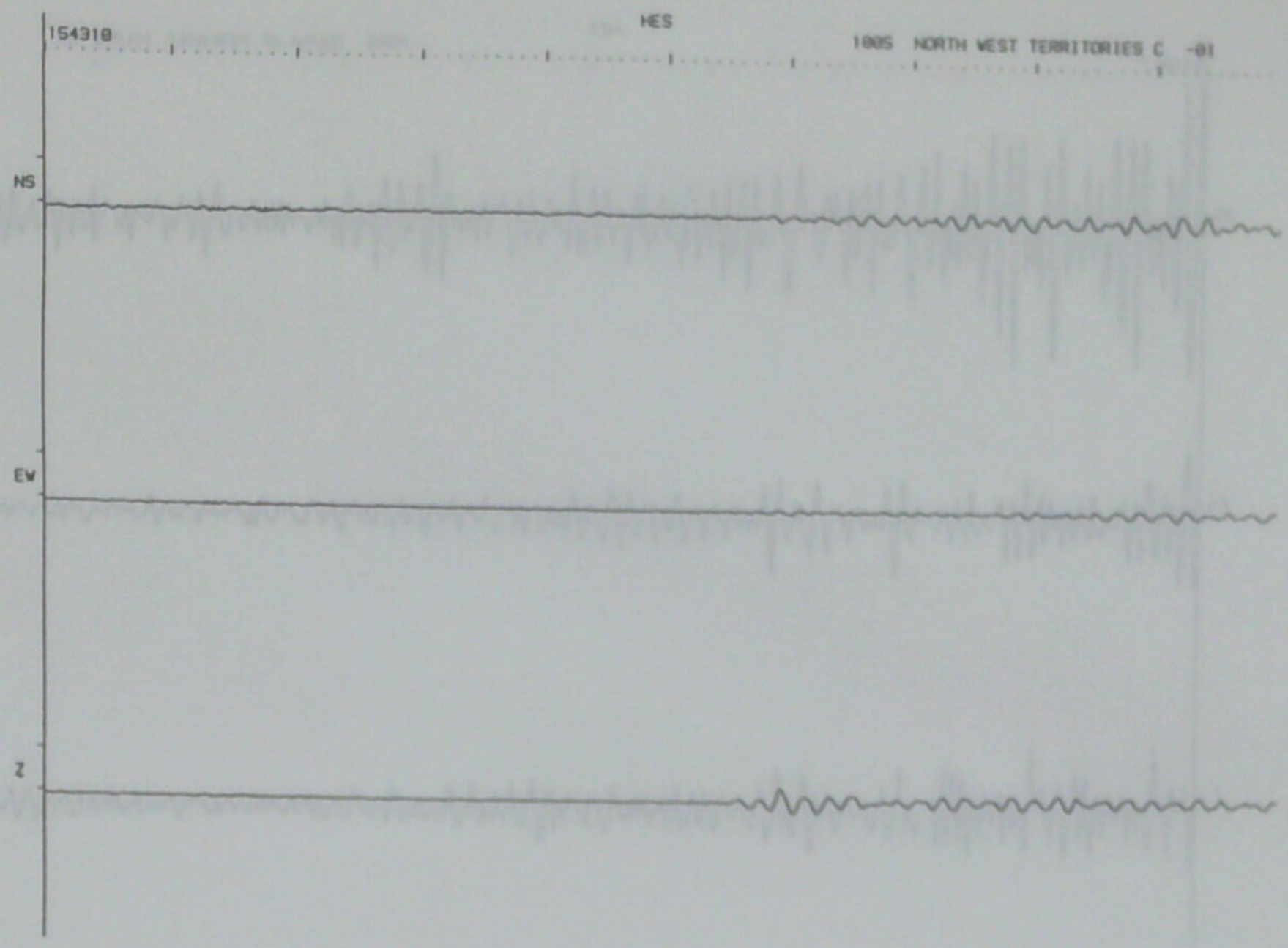


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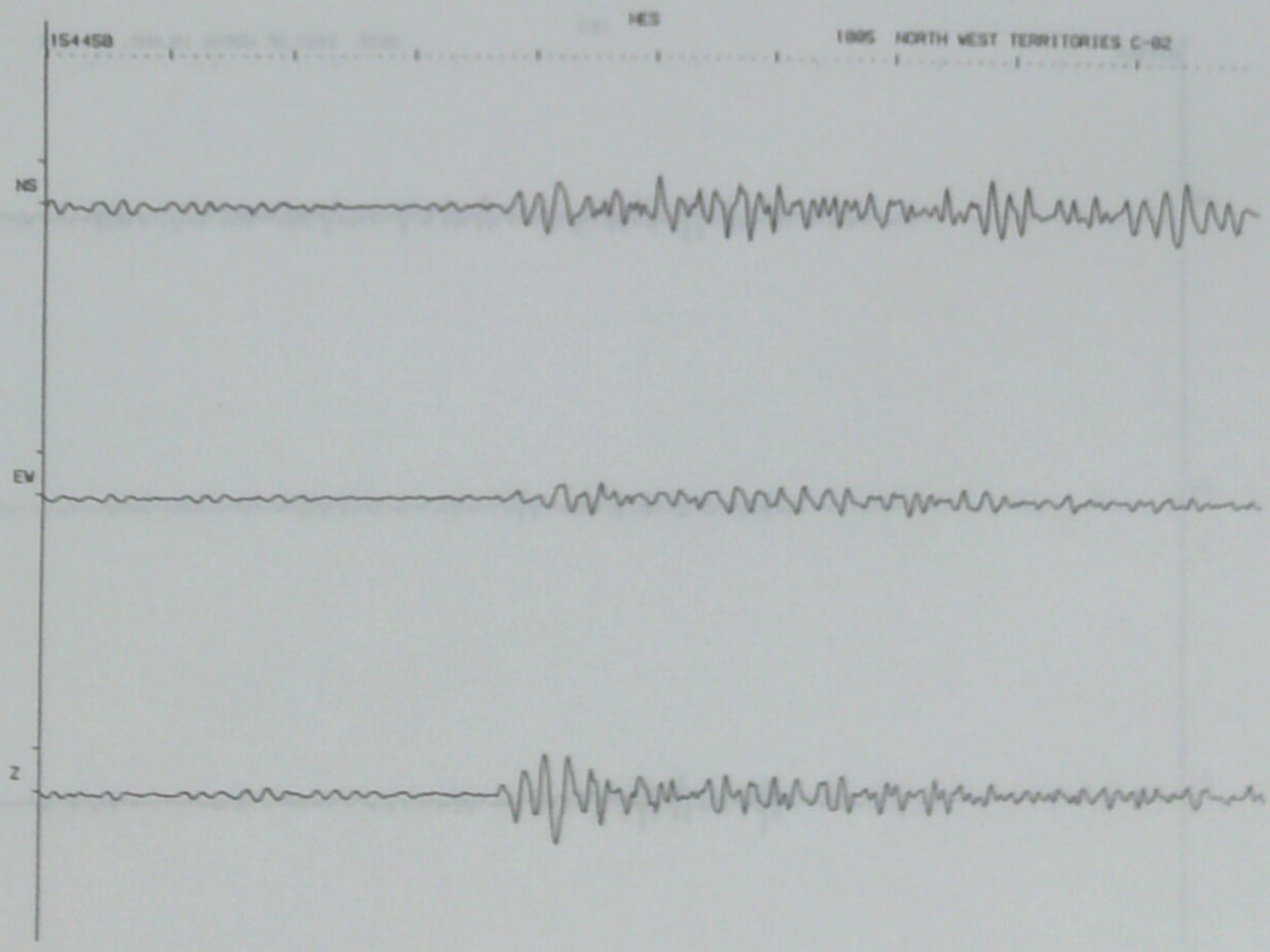


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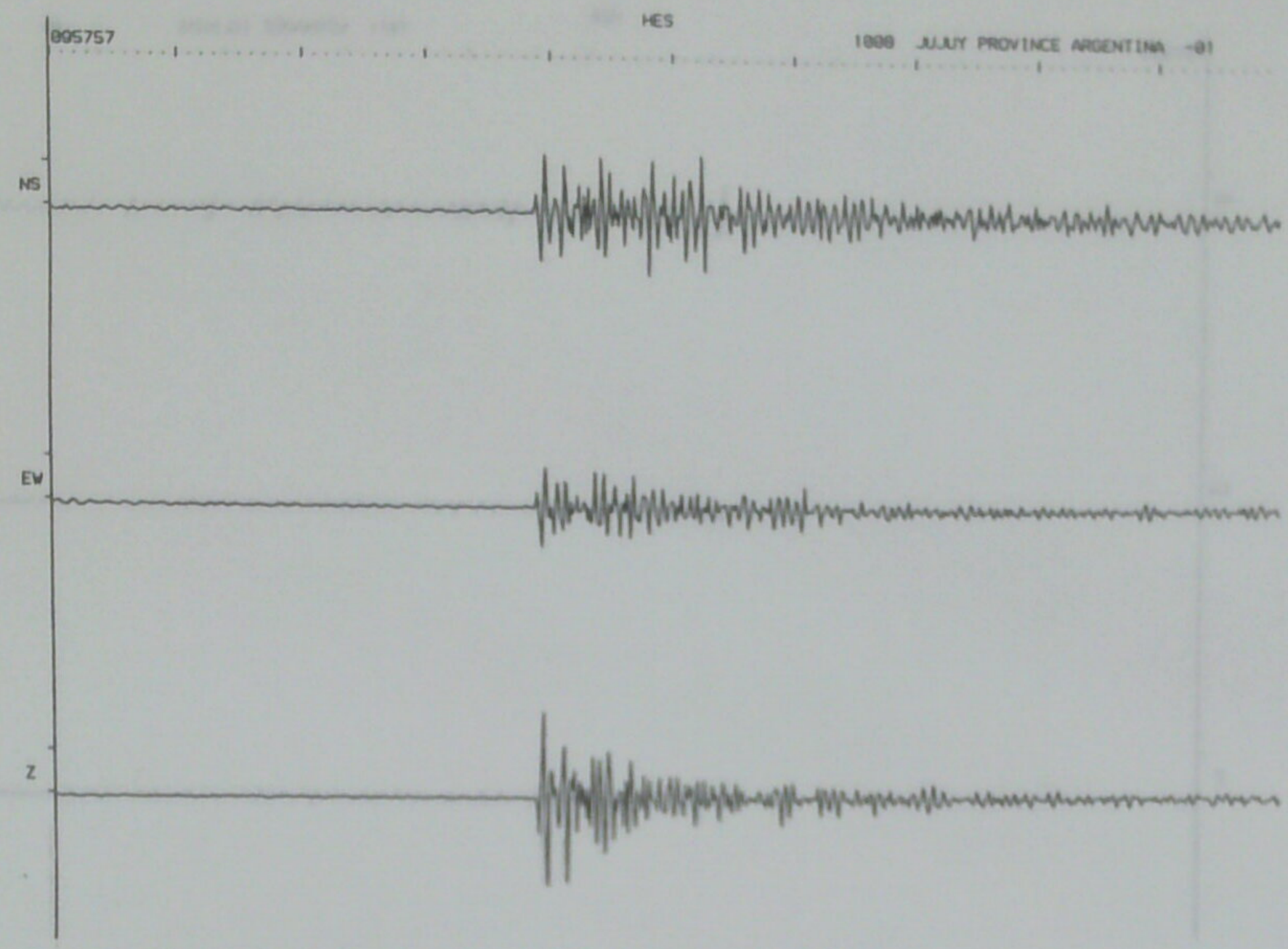


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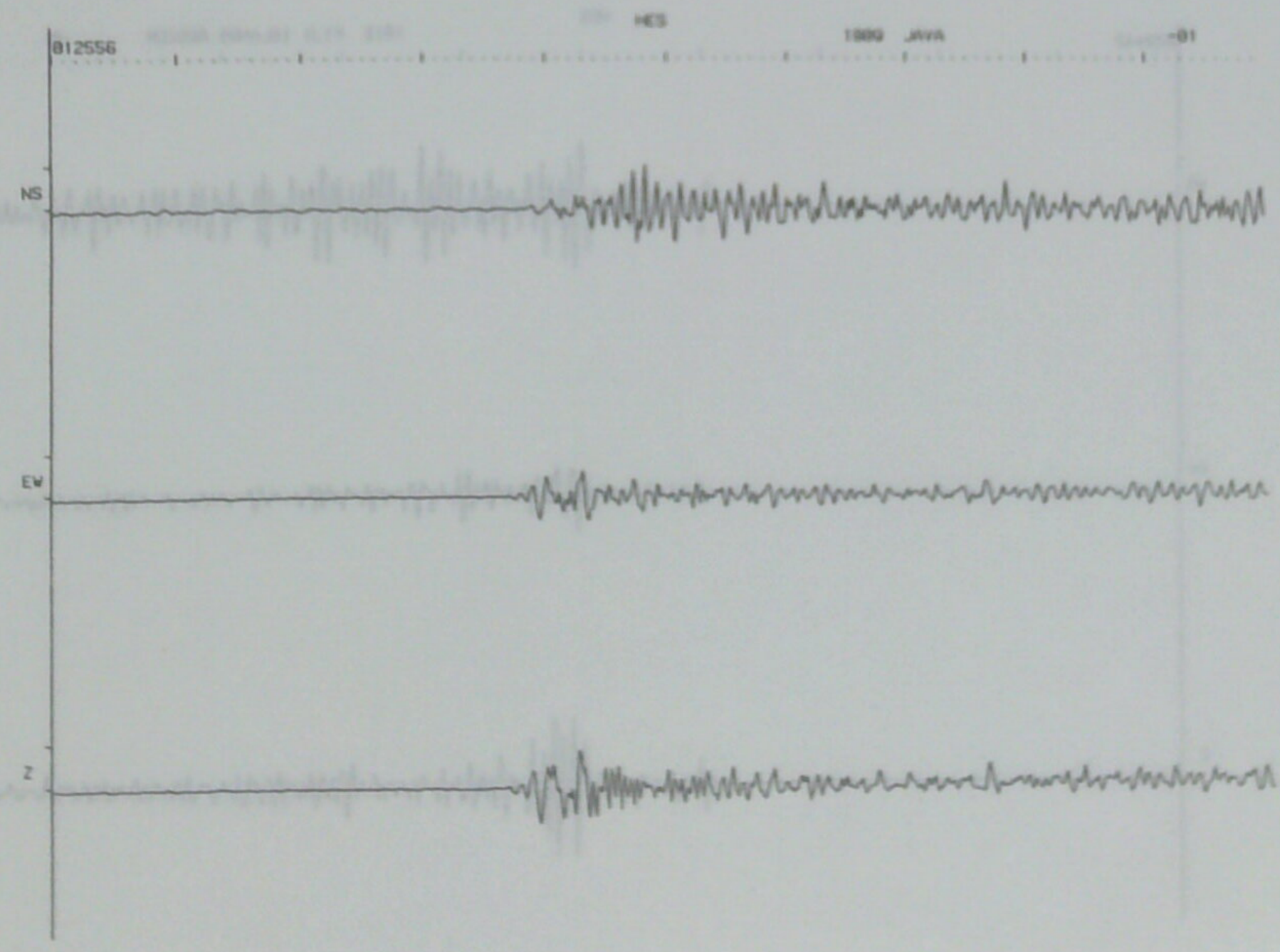


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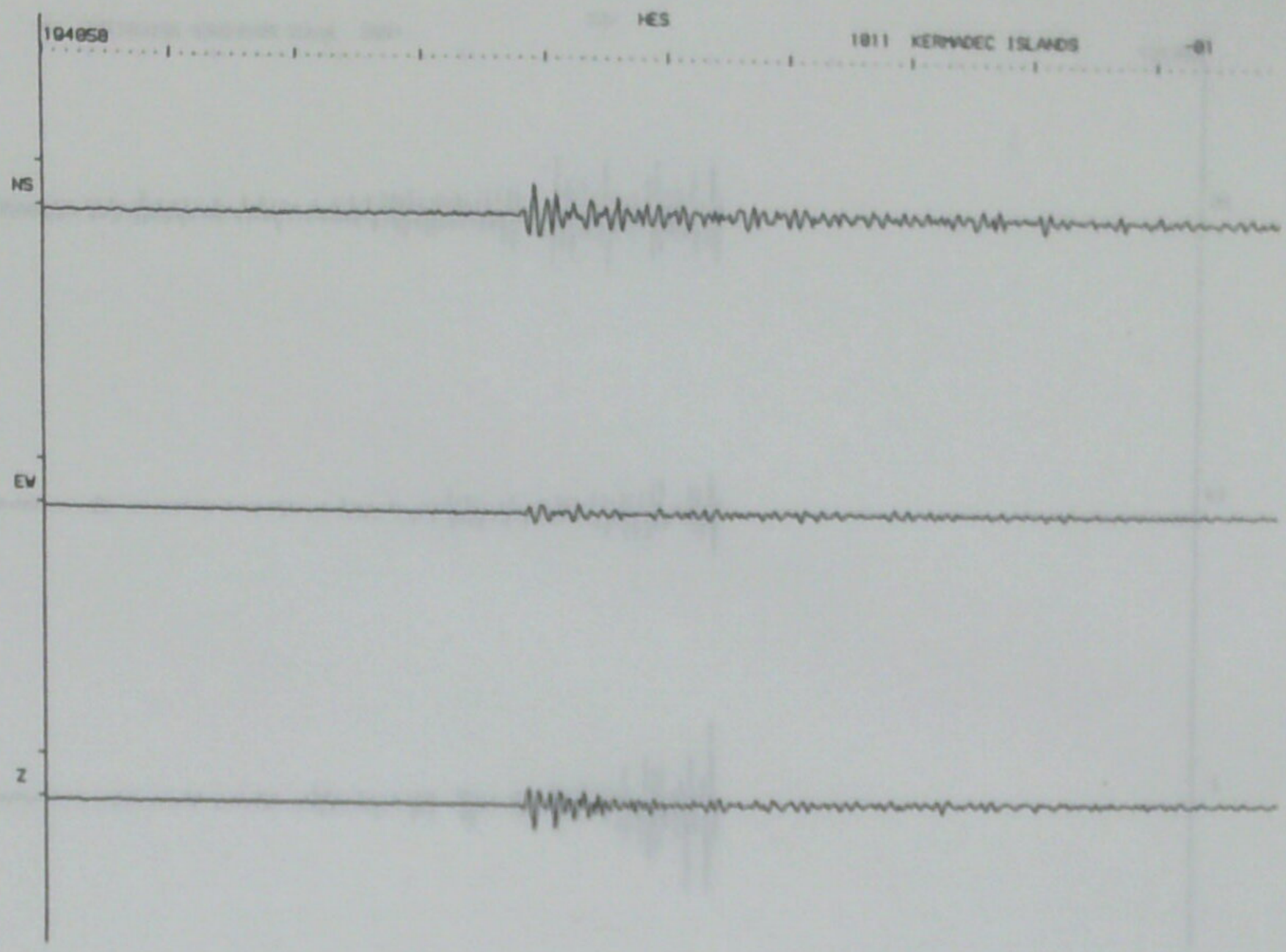


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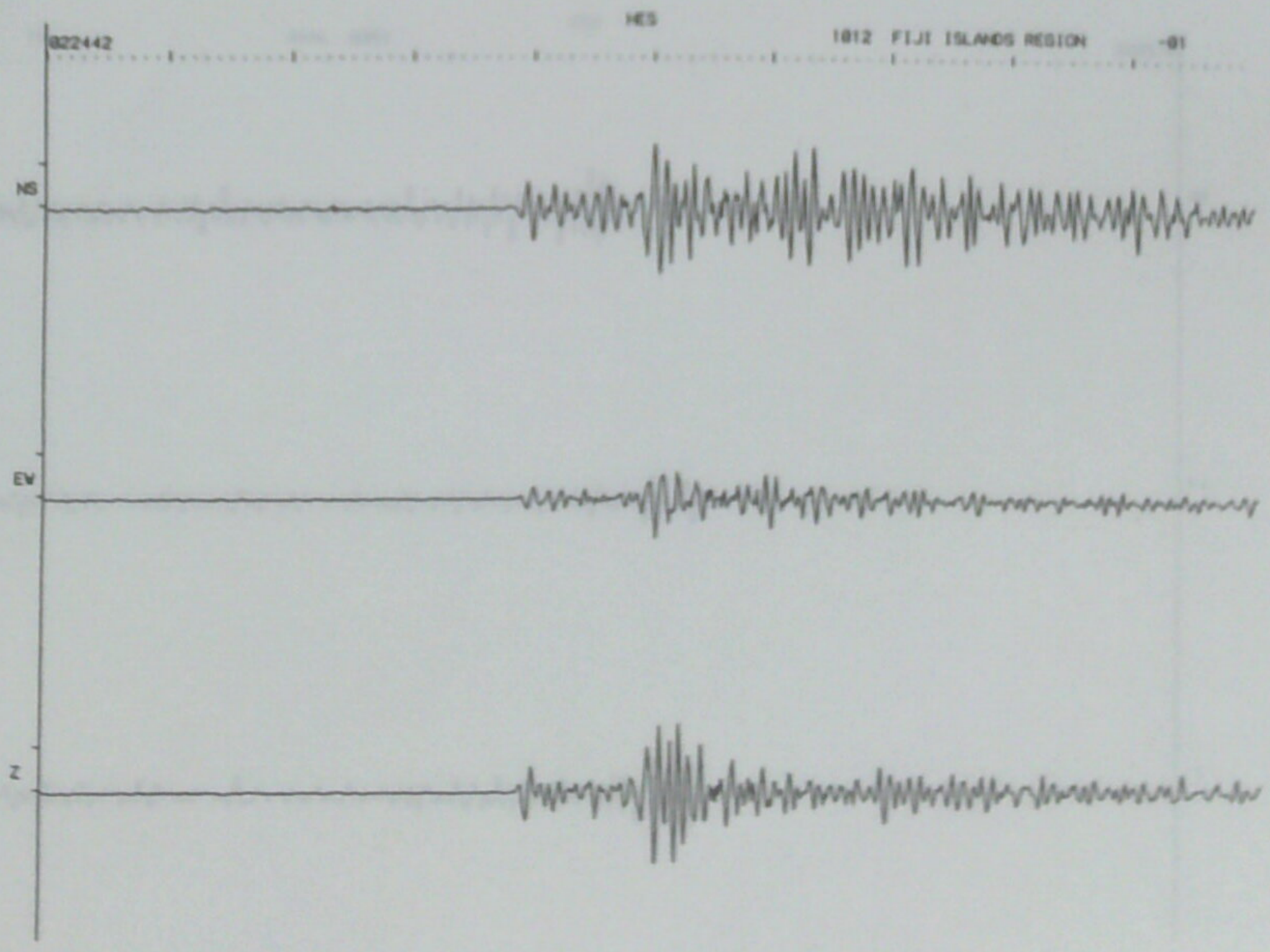


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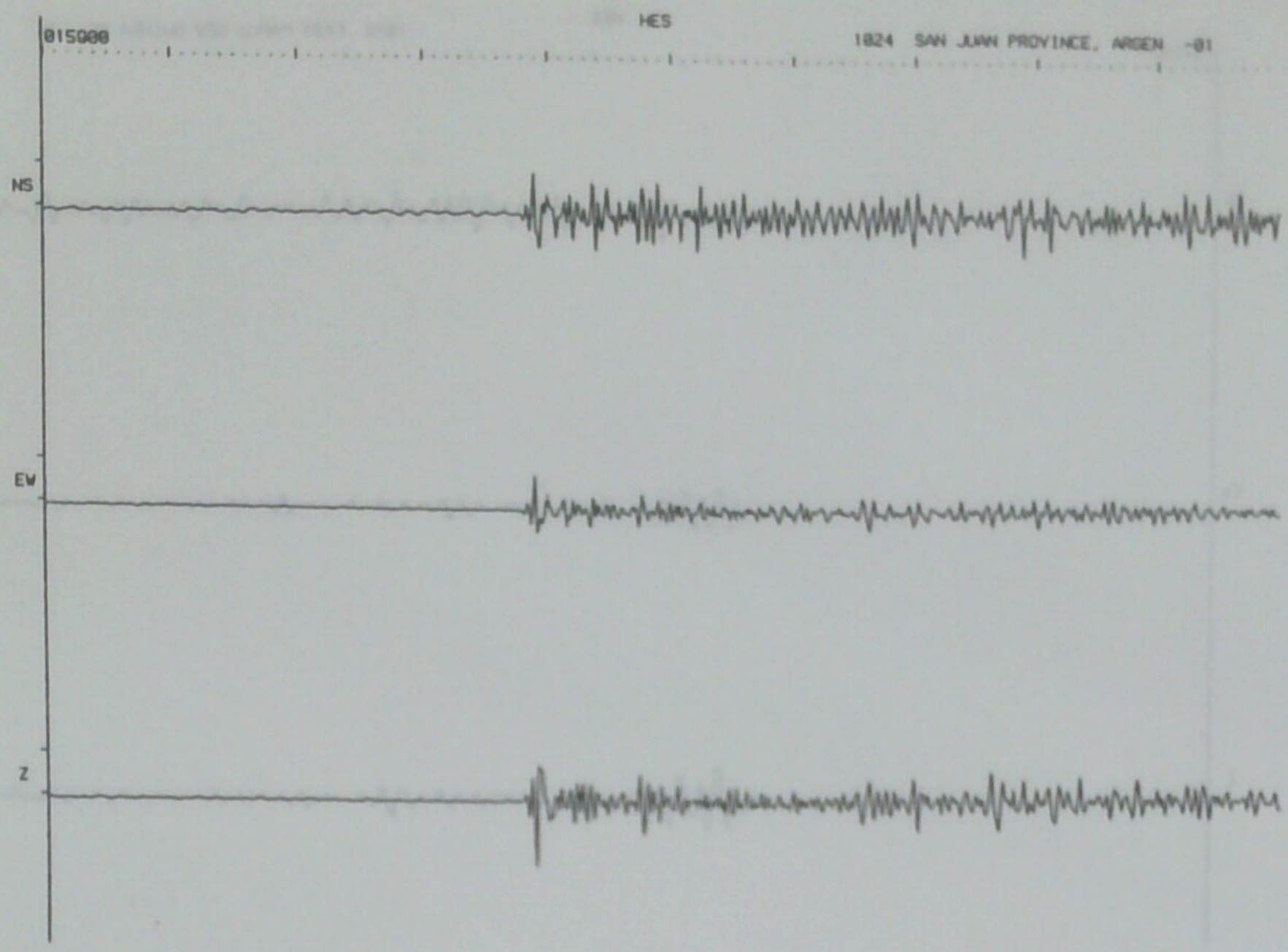


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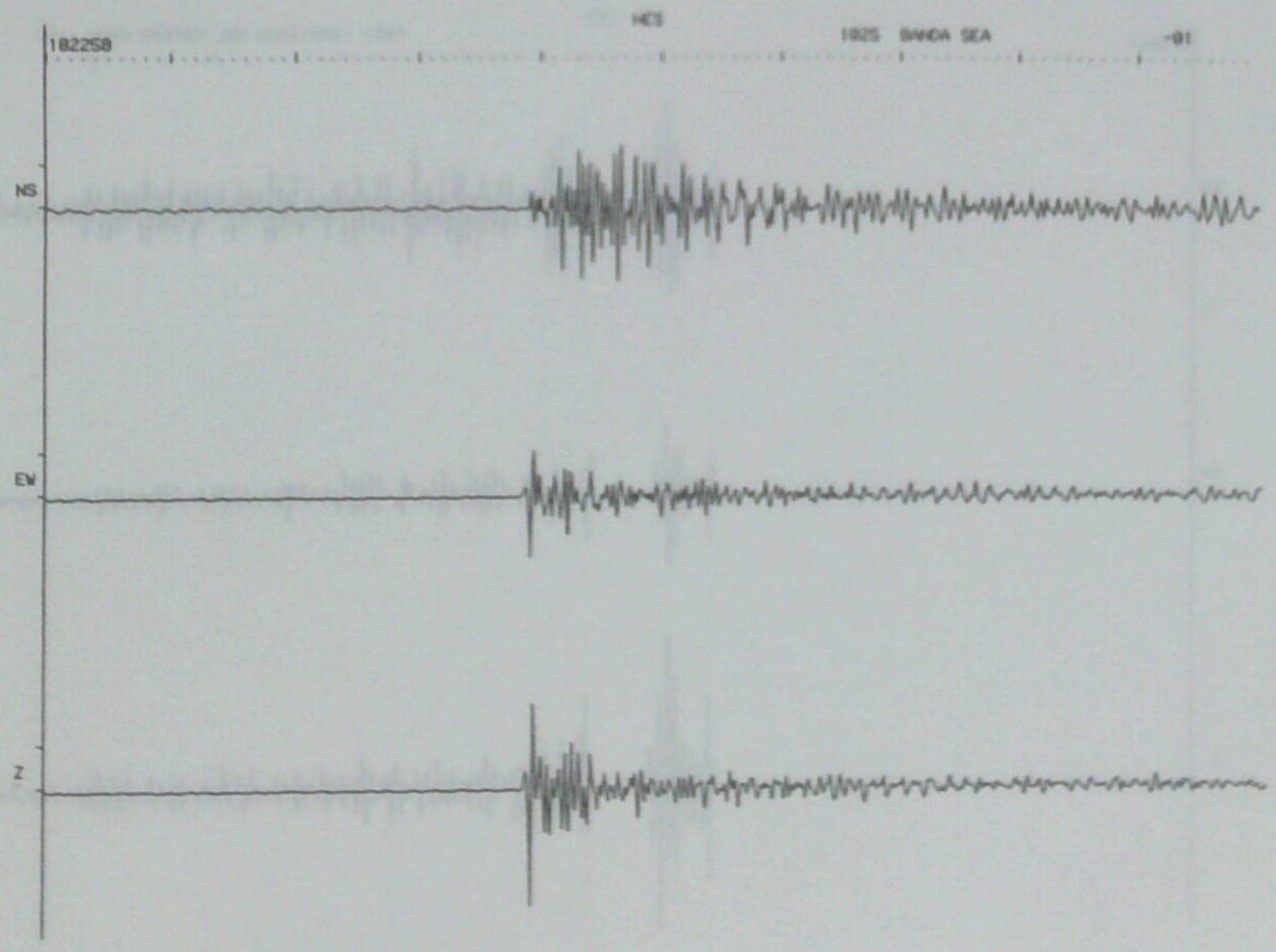


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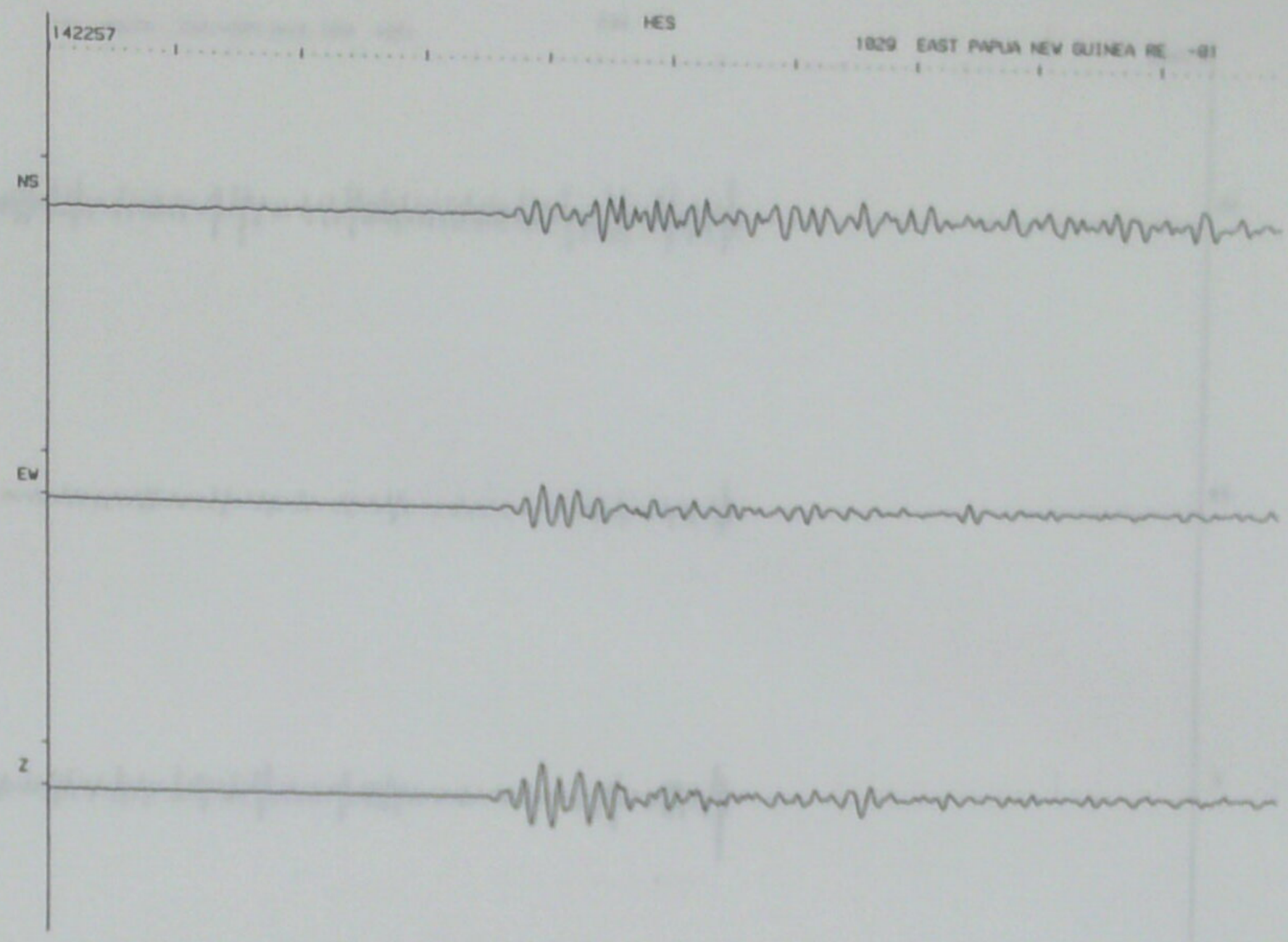


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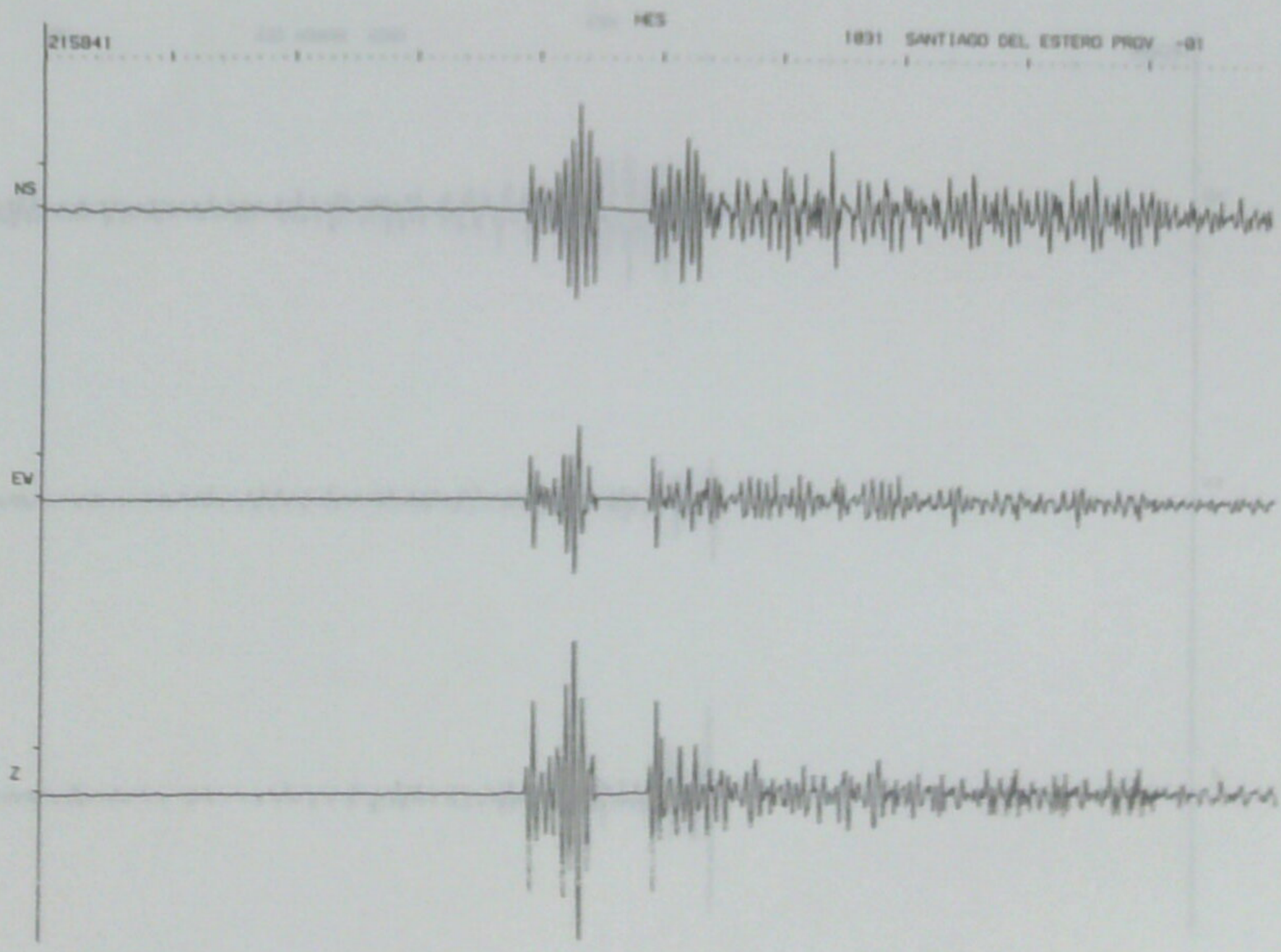


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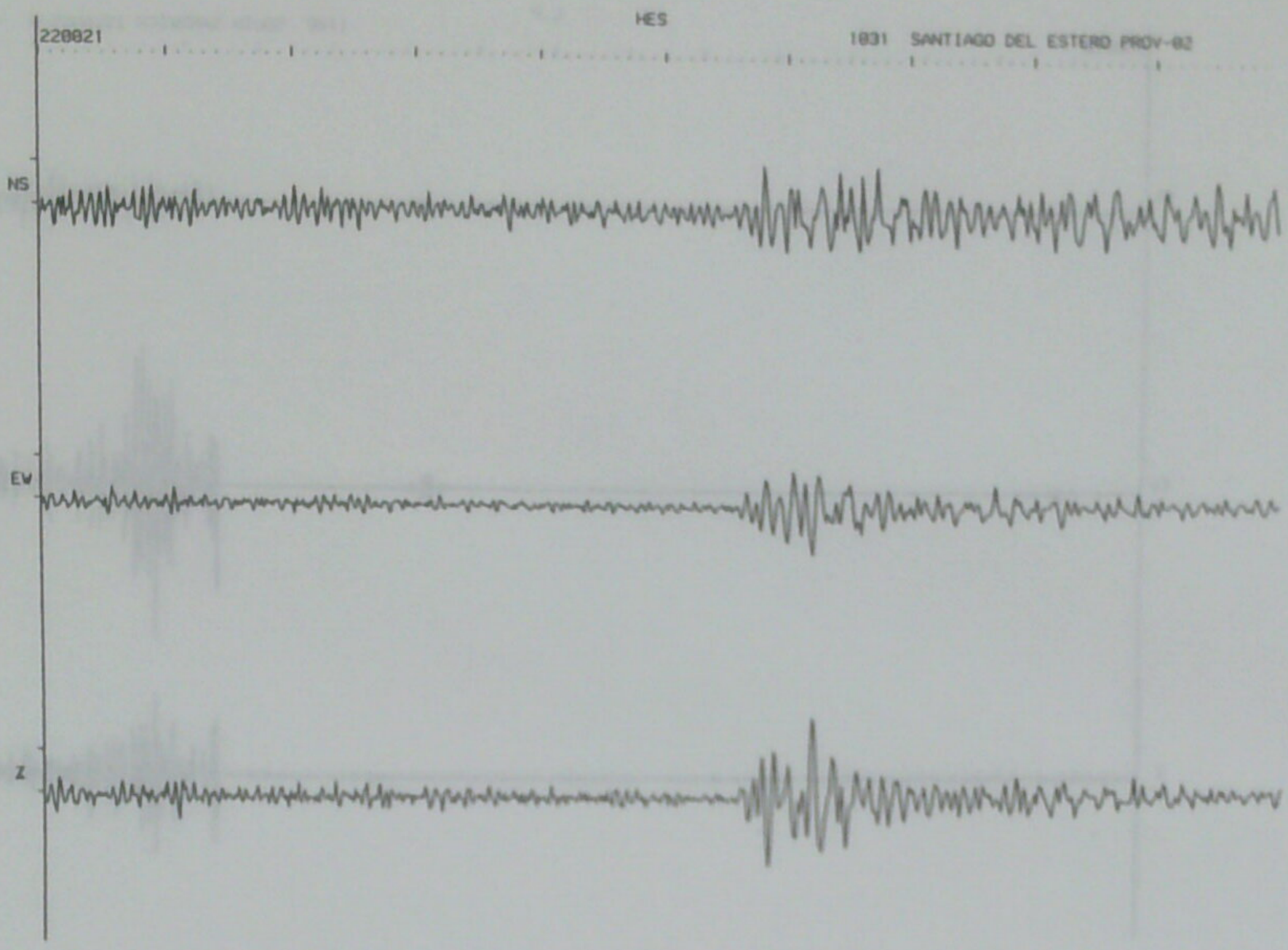


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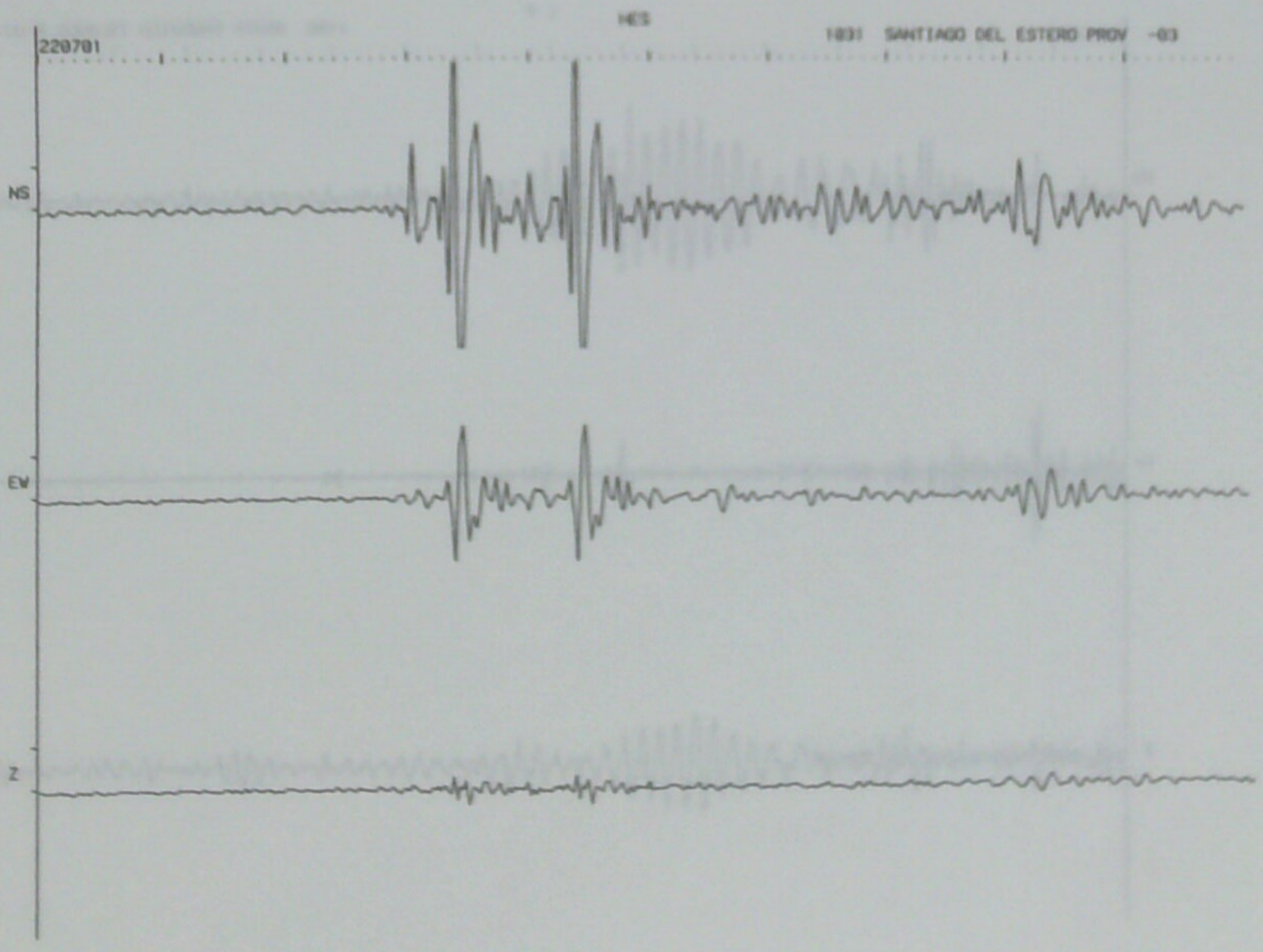


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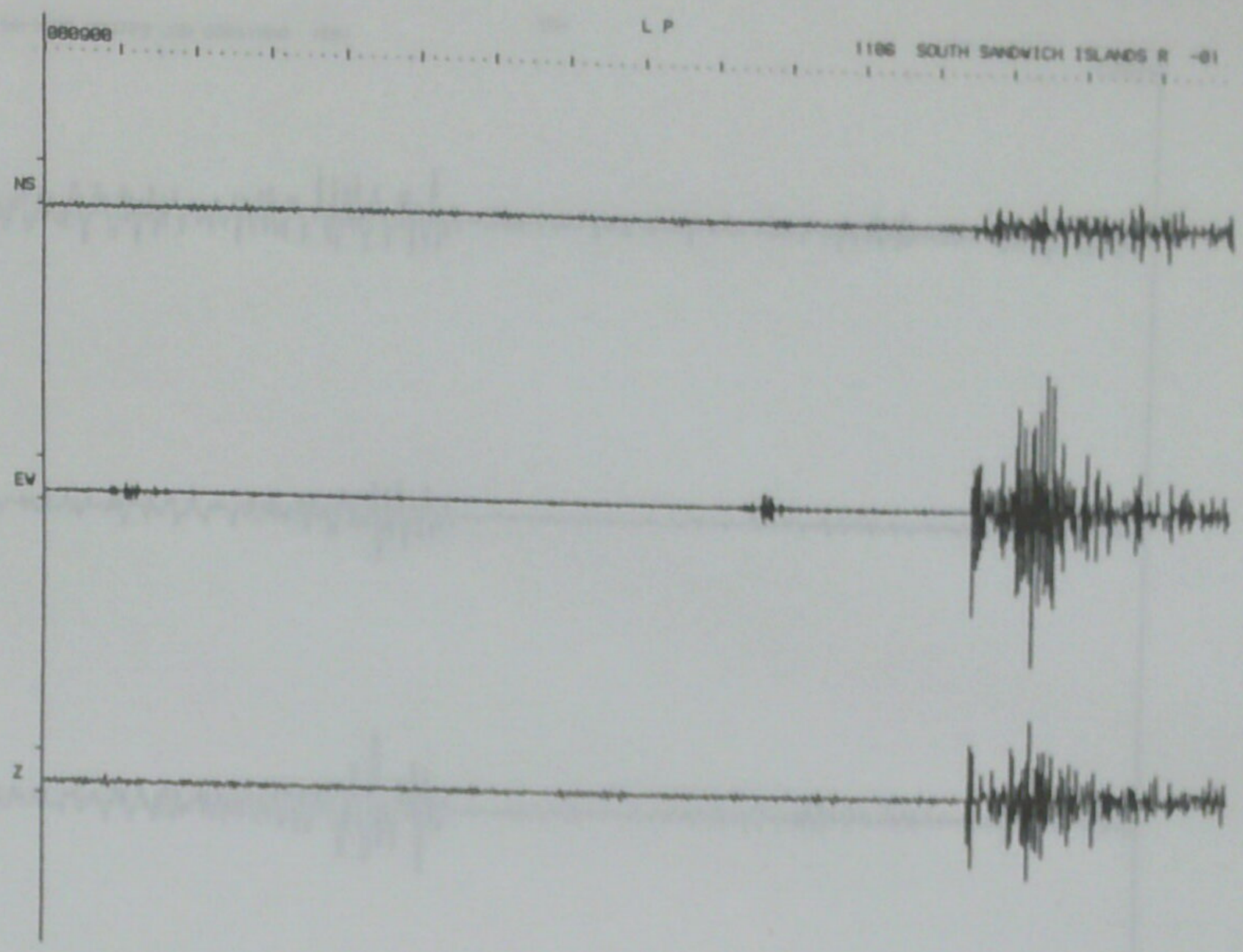


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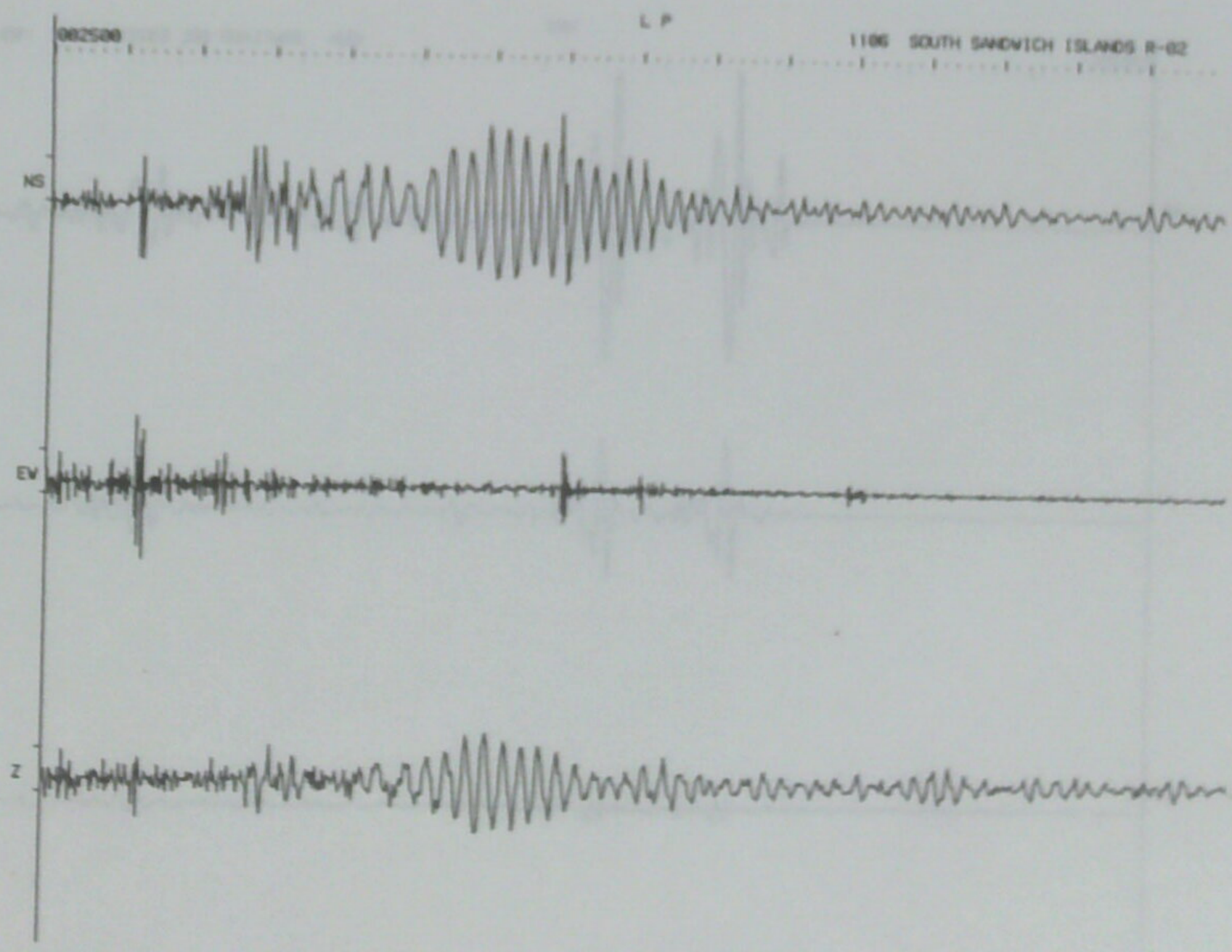


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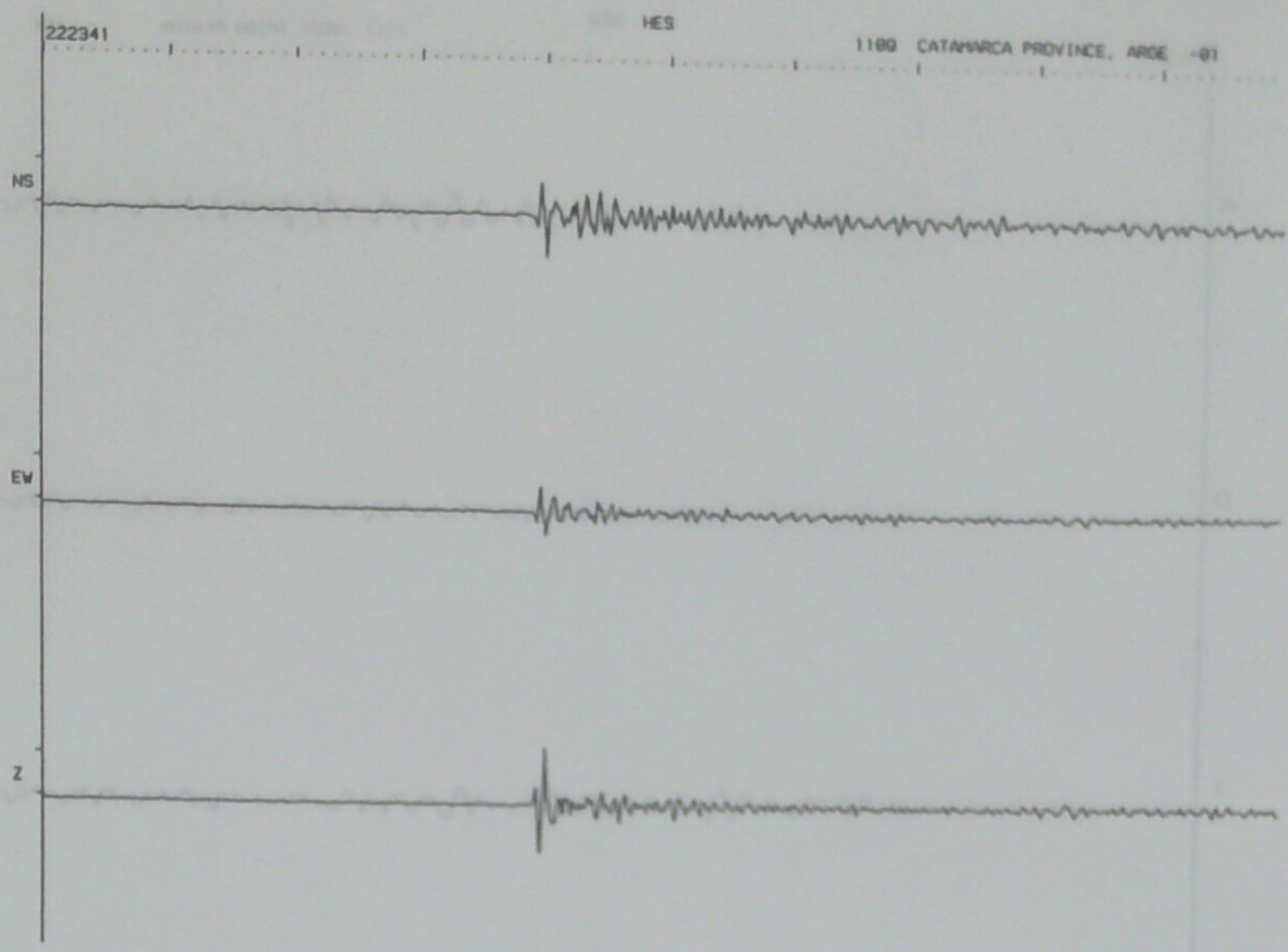


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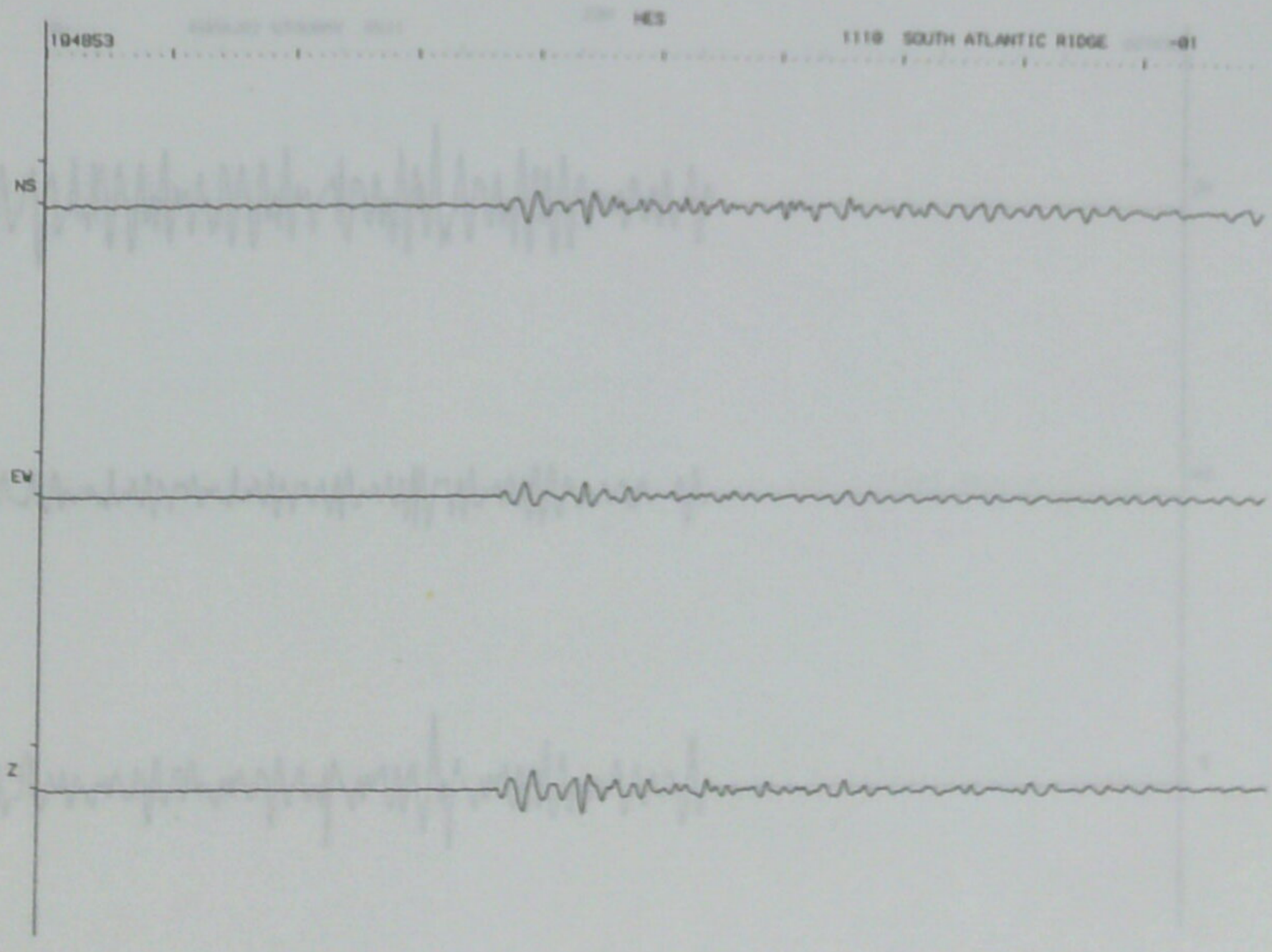


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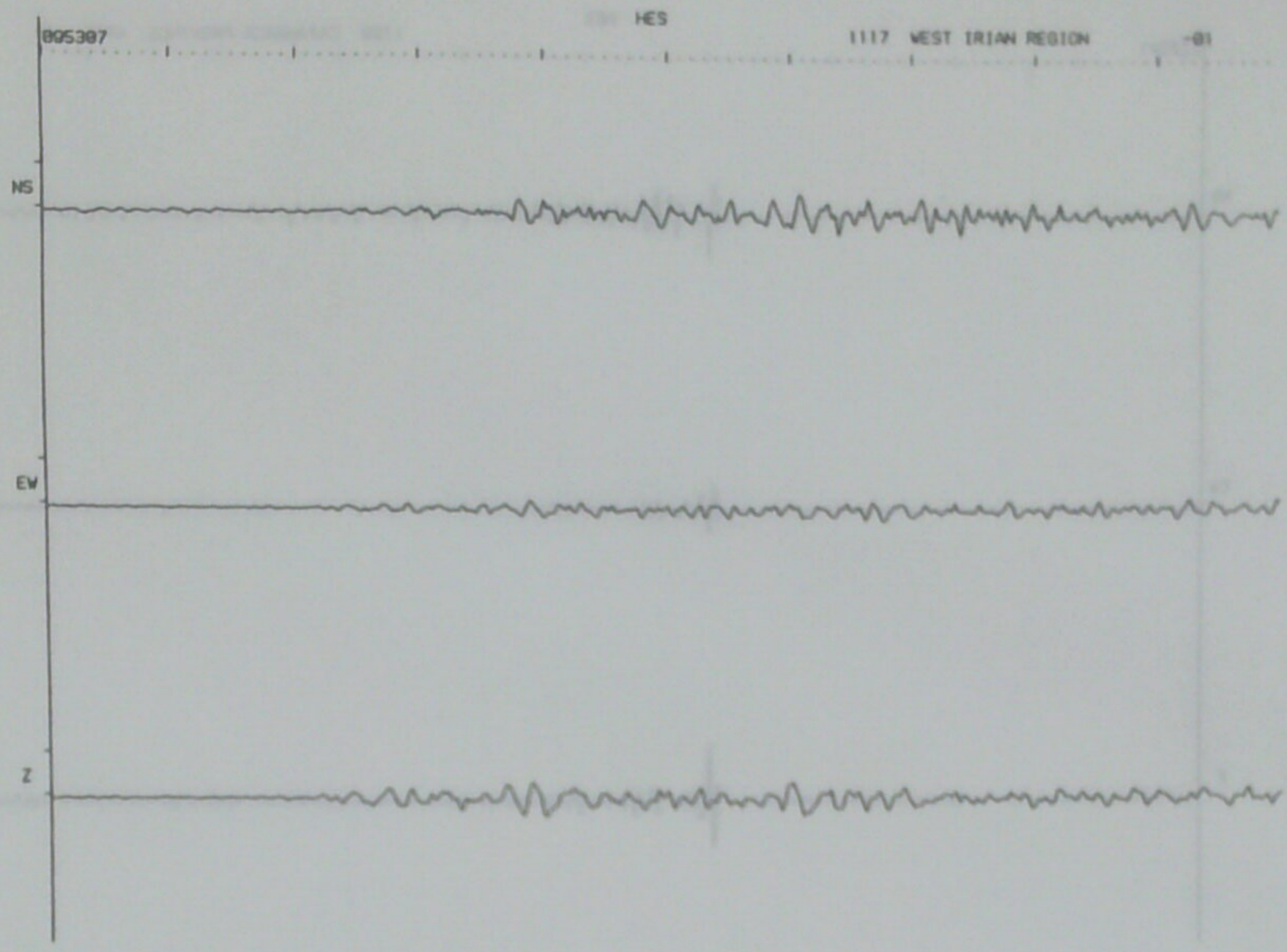


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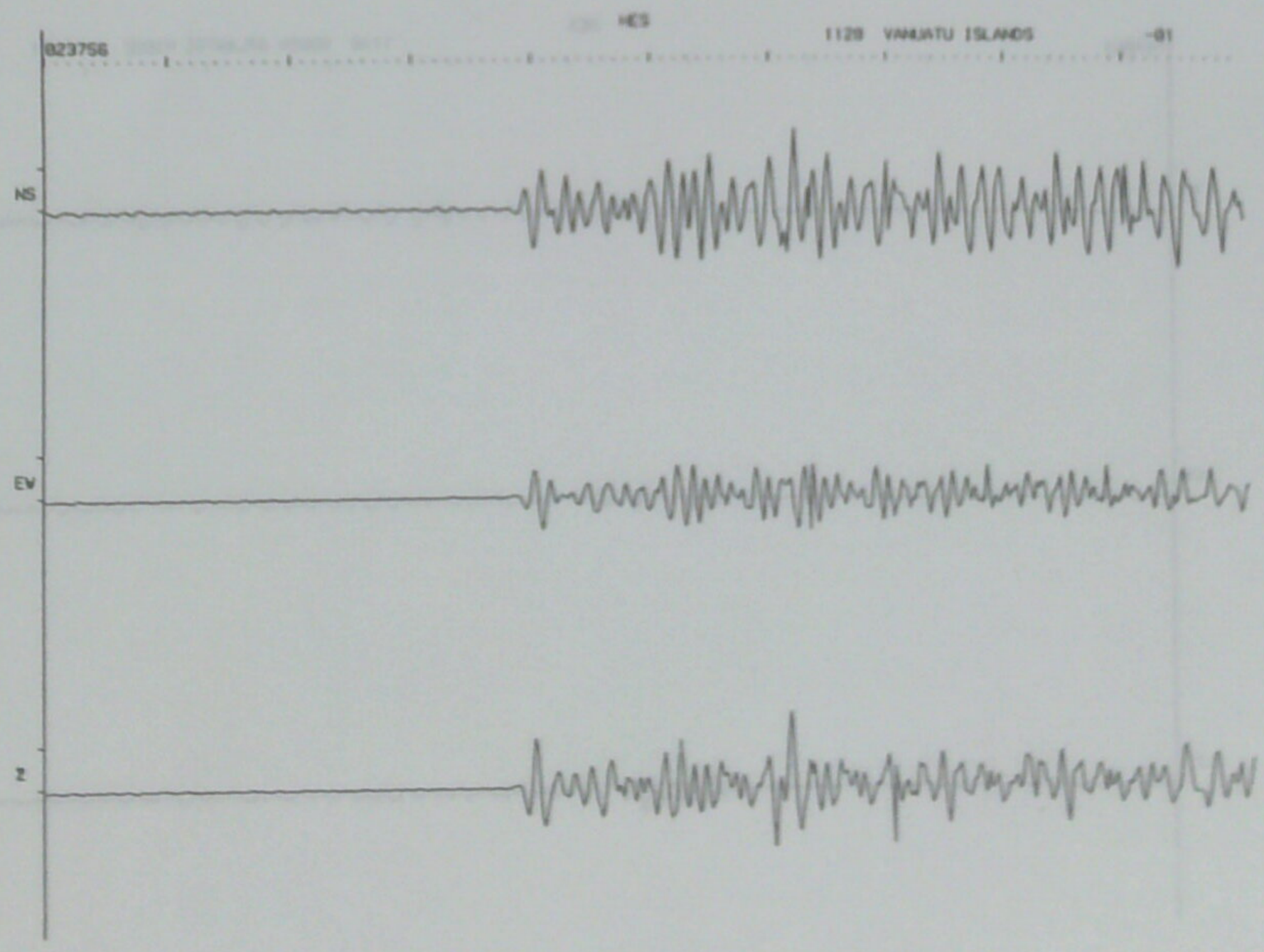


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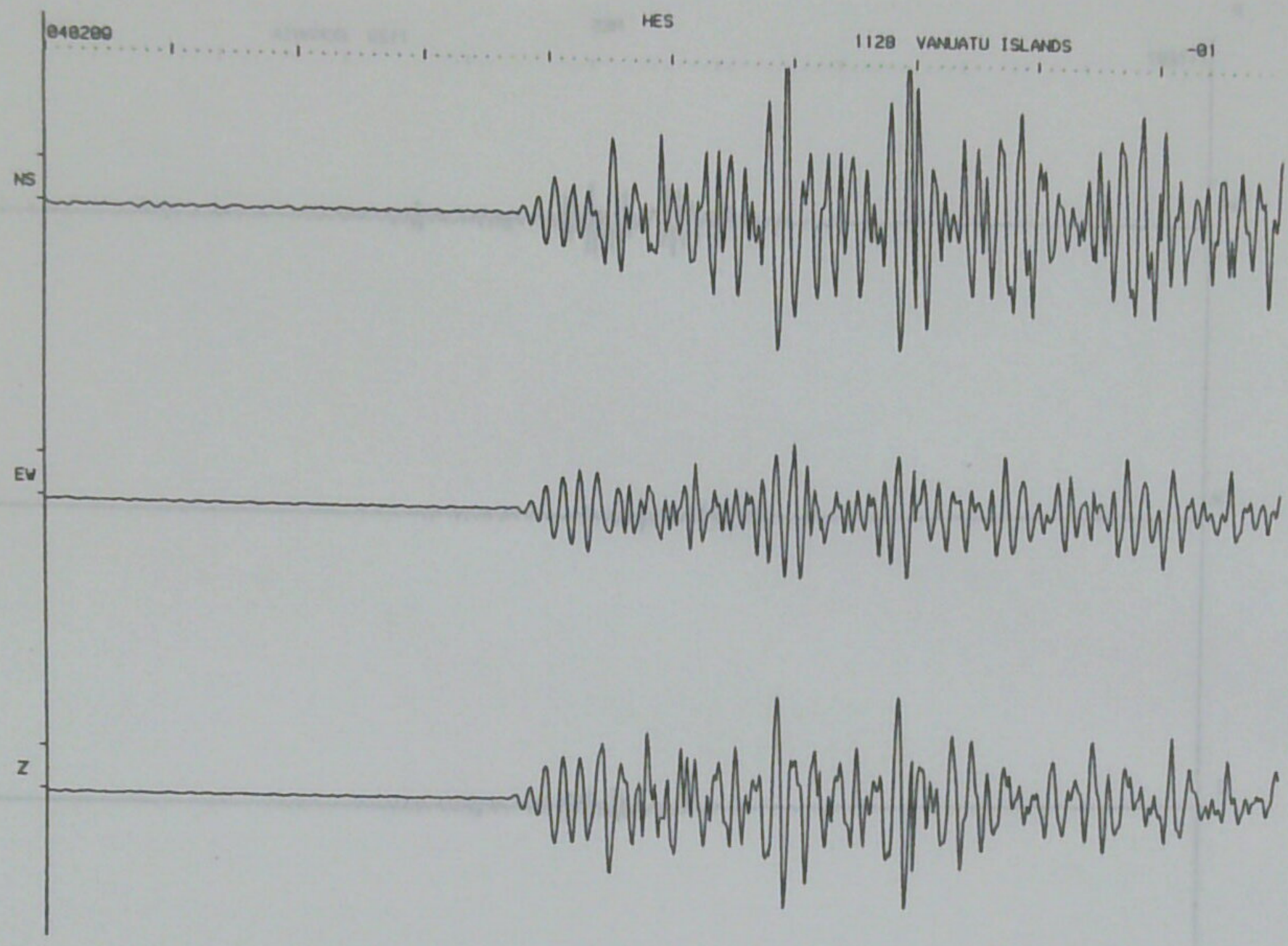


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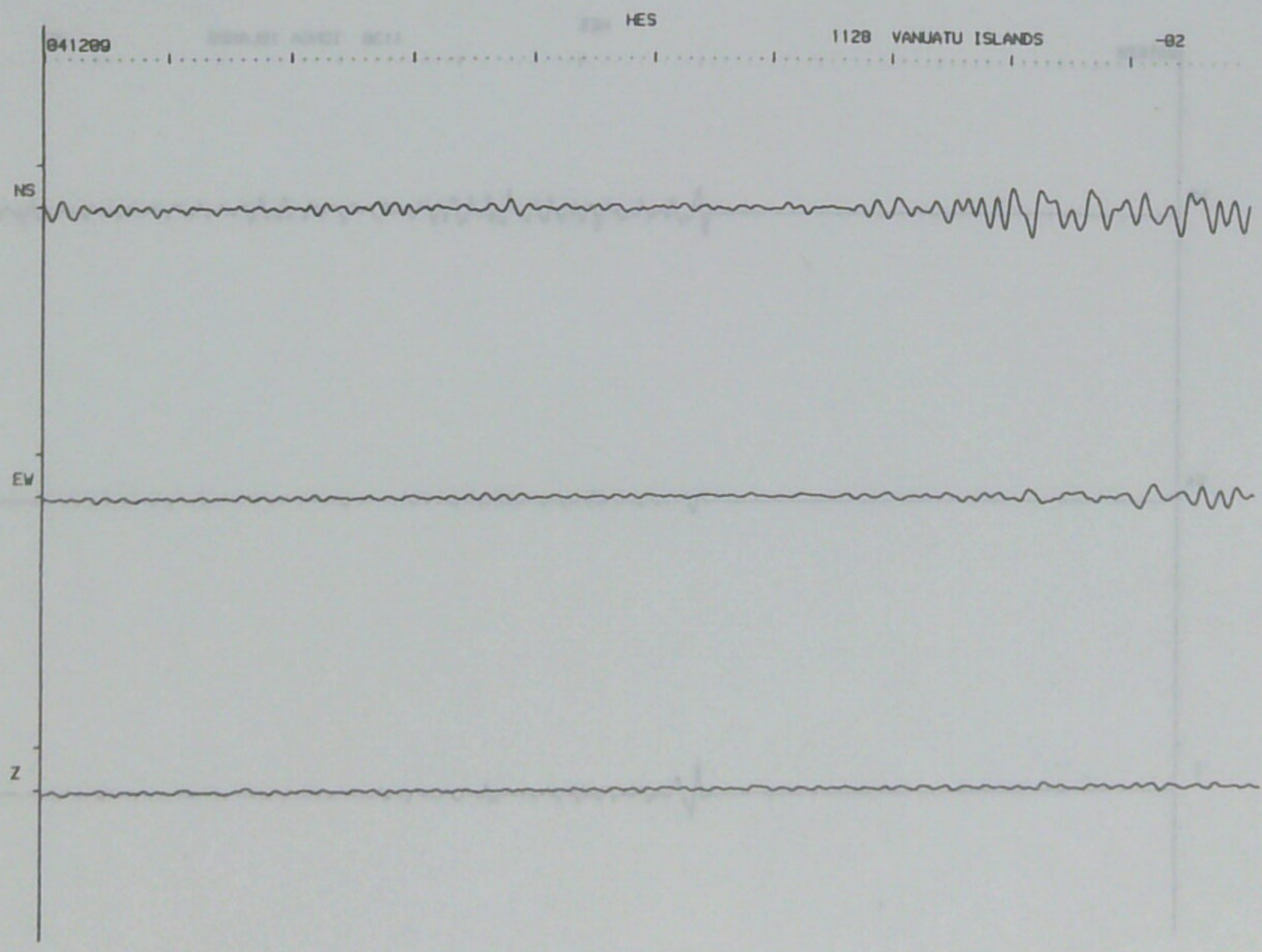


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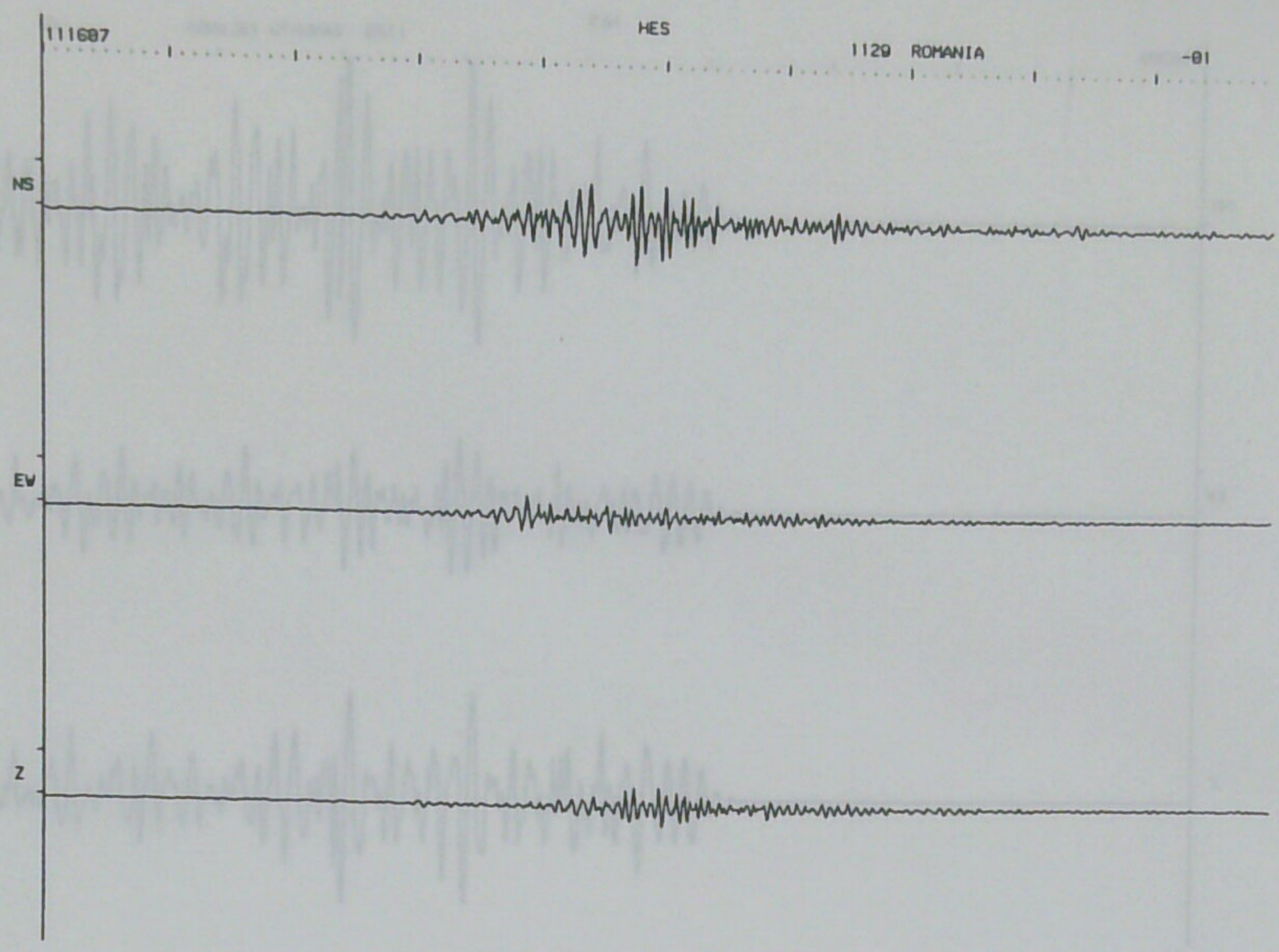
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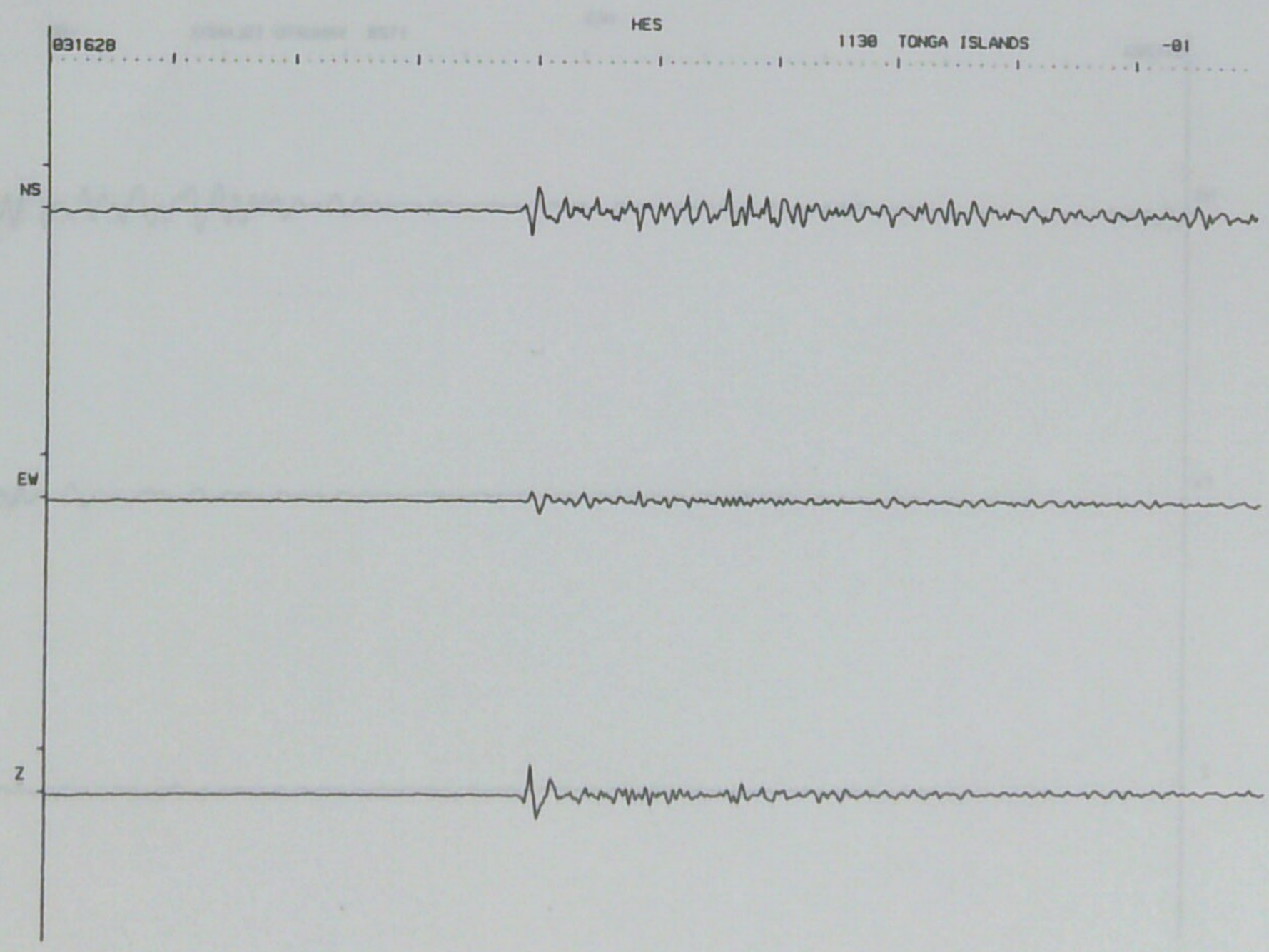
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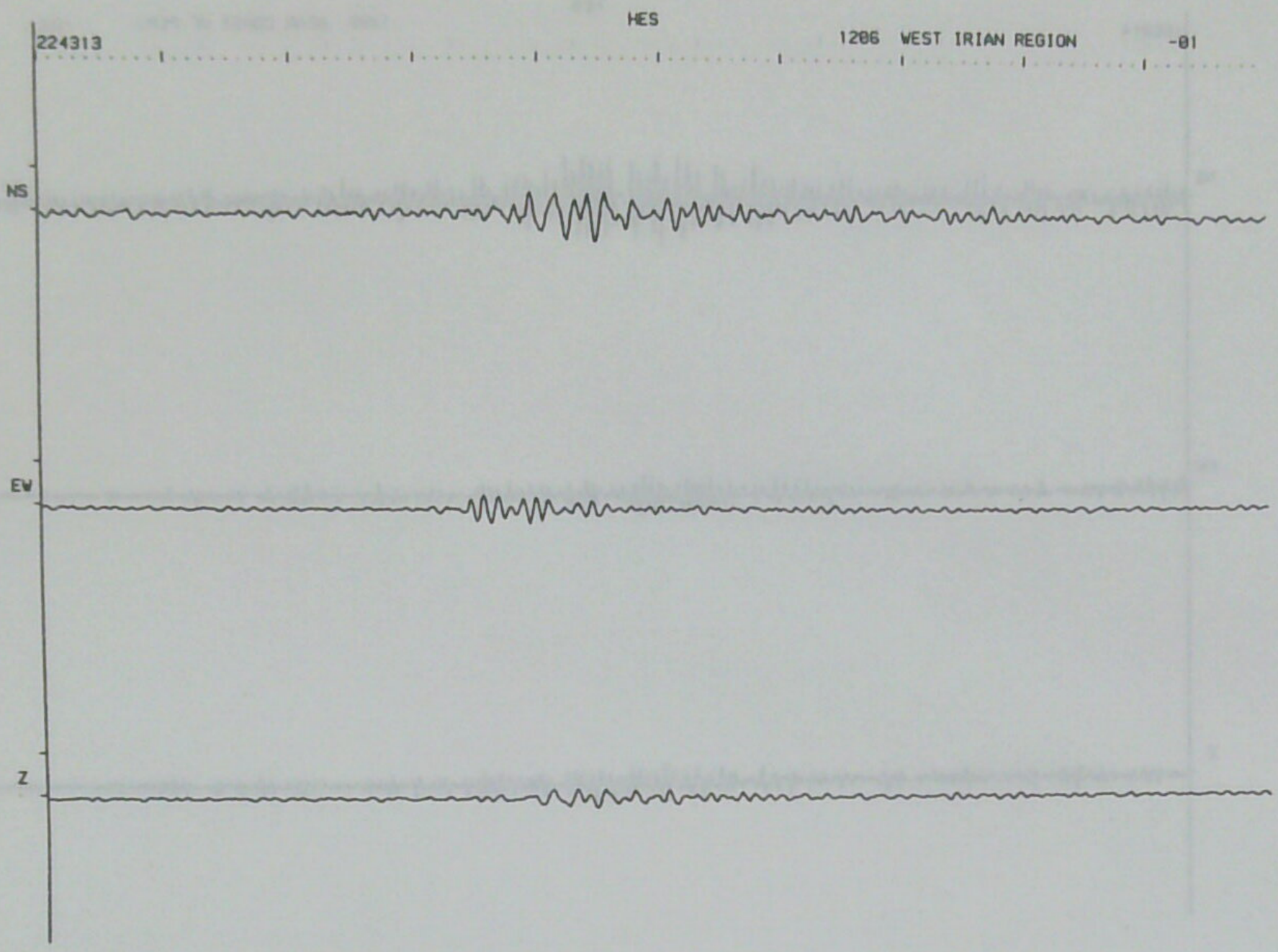

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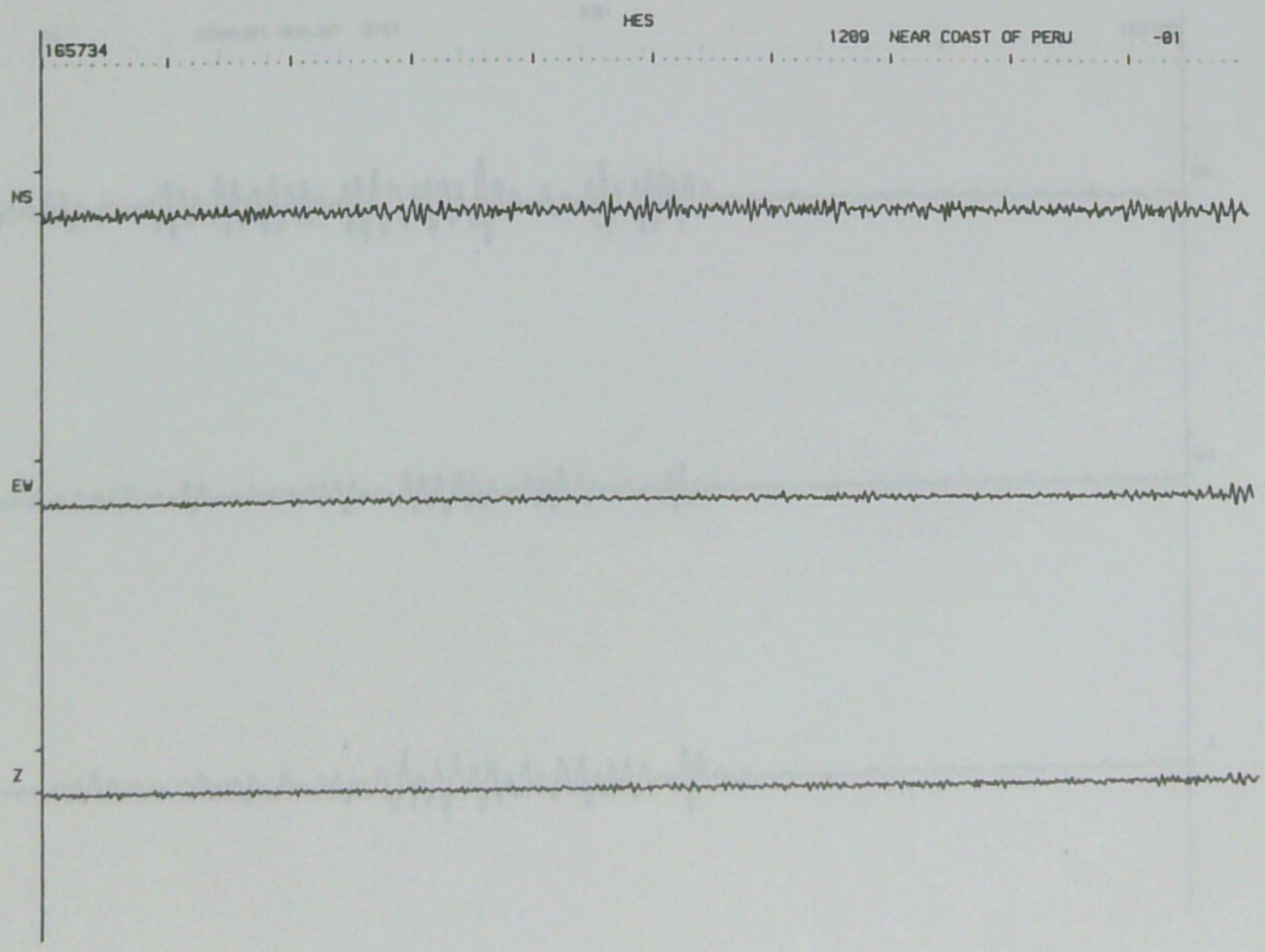

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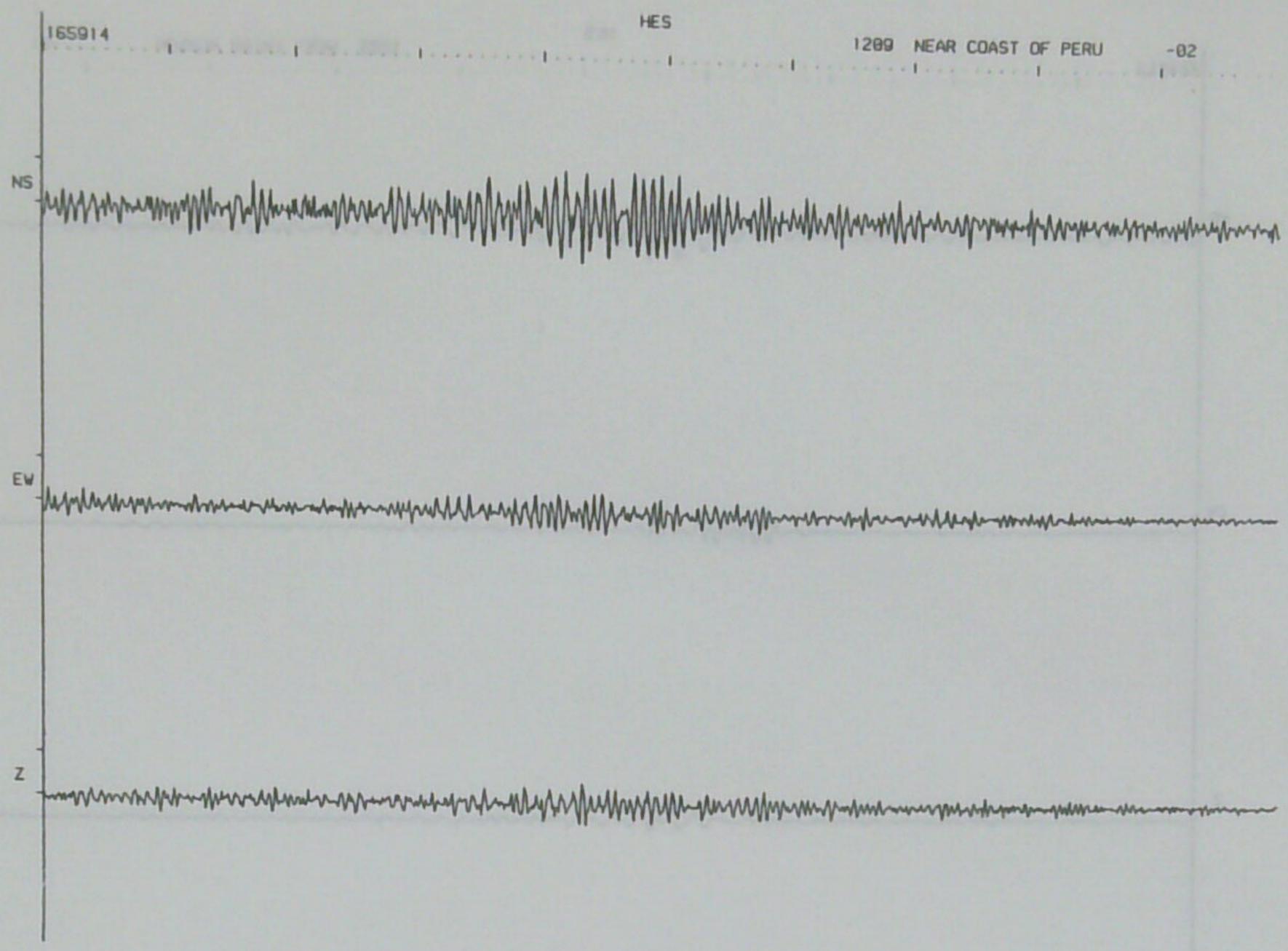


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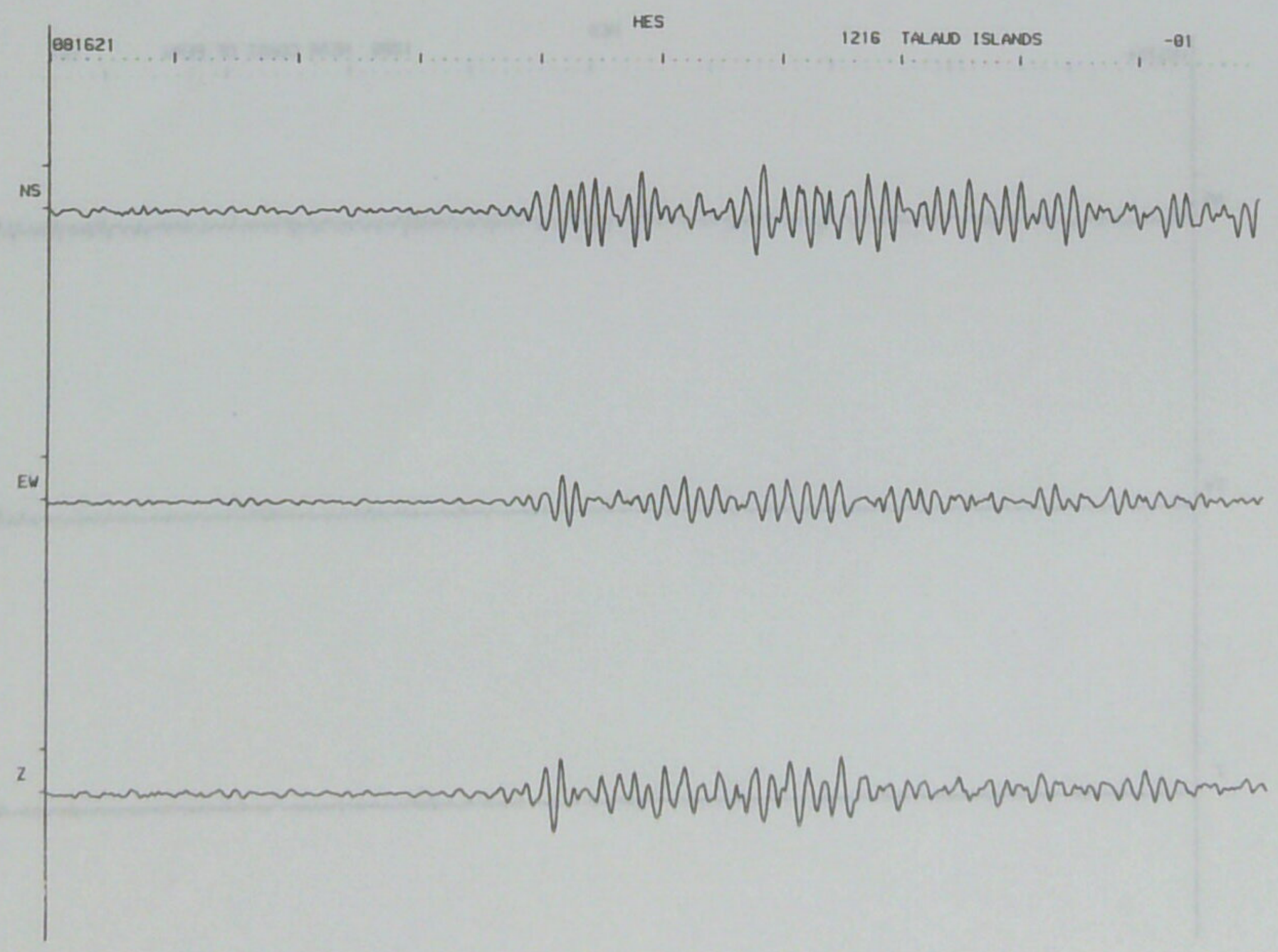


International Seismological Centre

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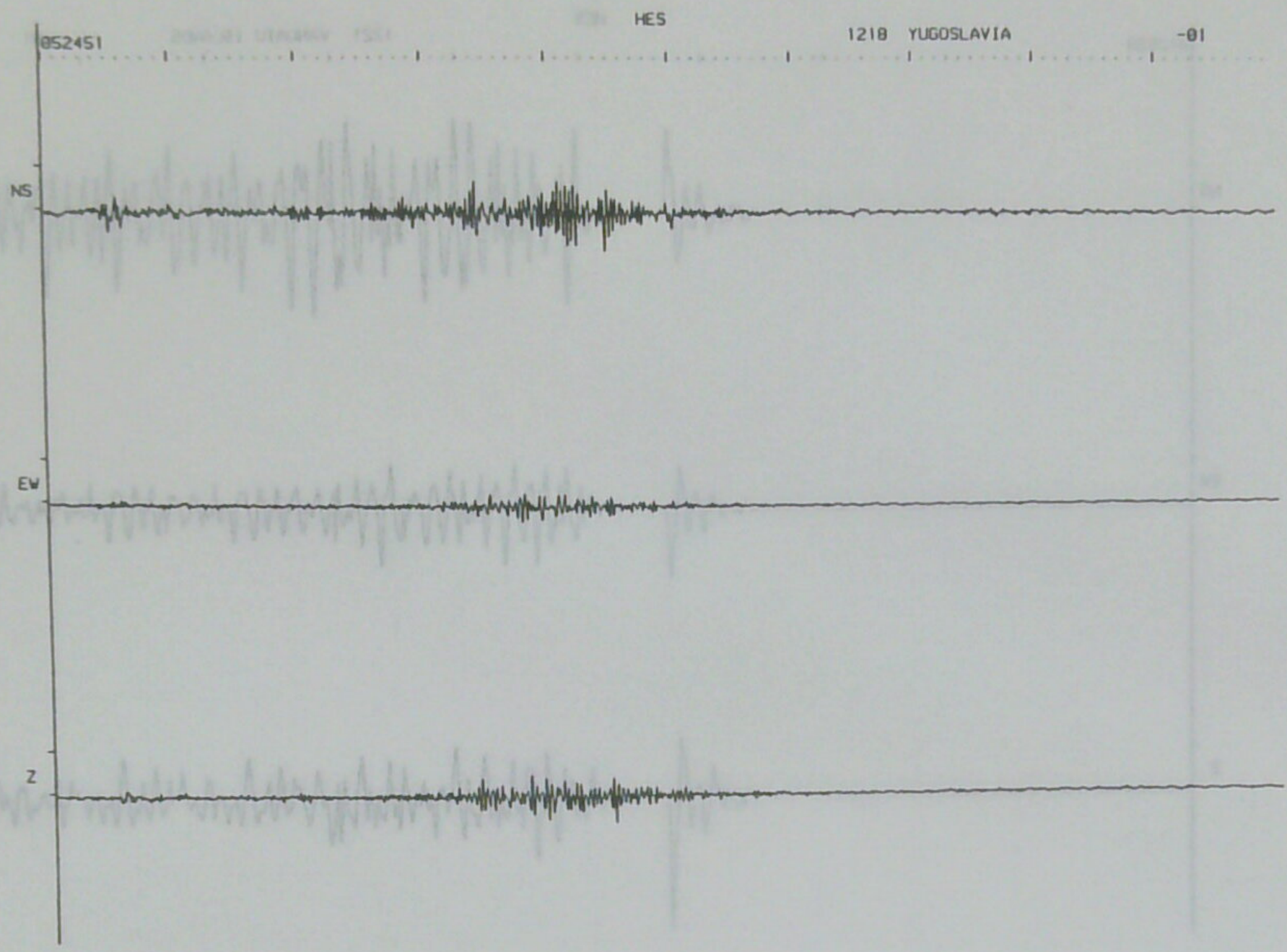


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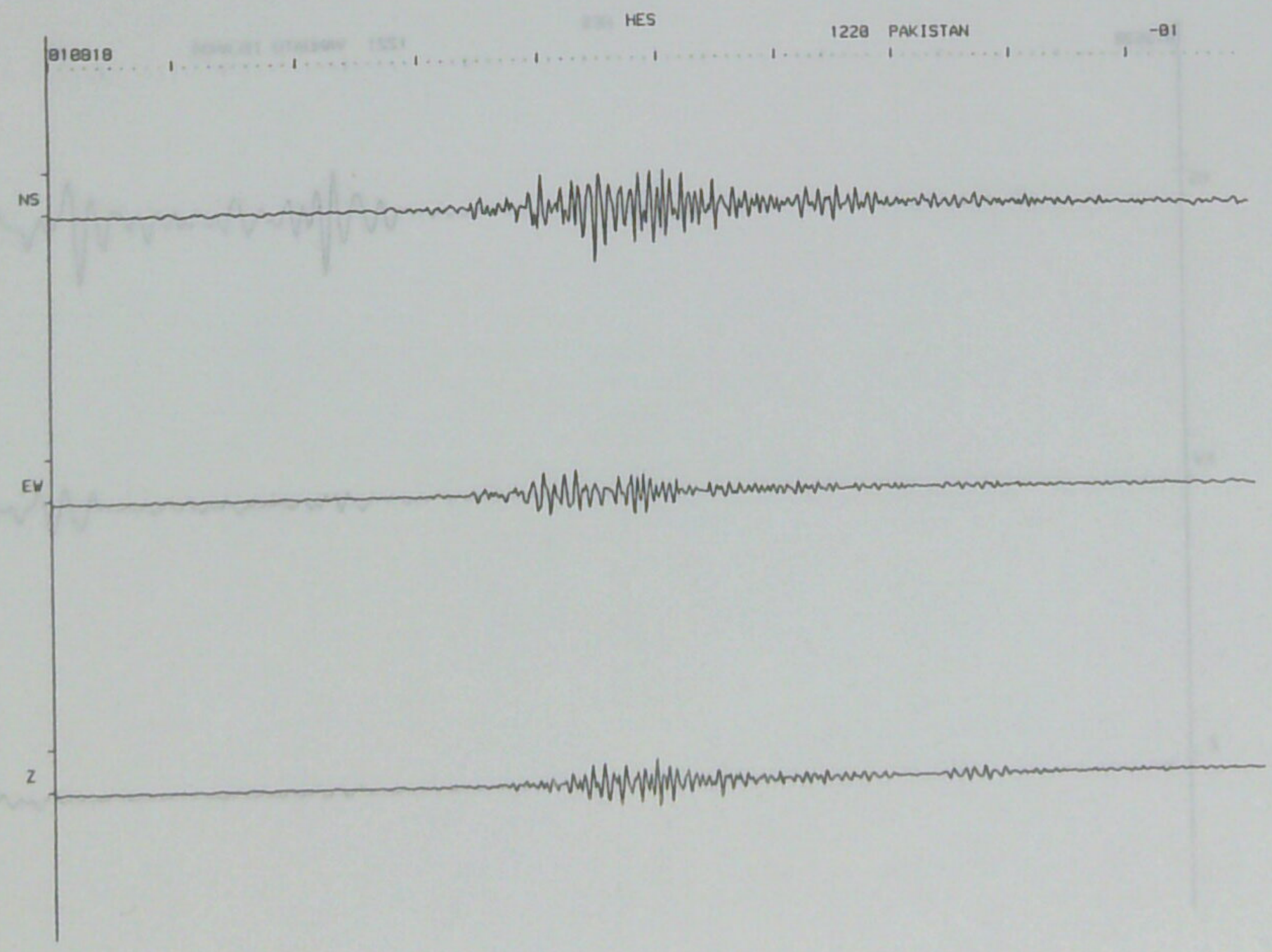


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NO.73

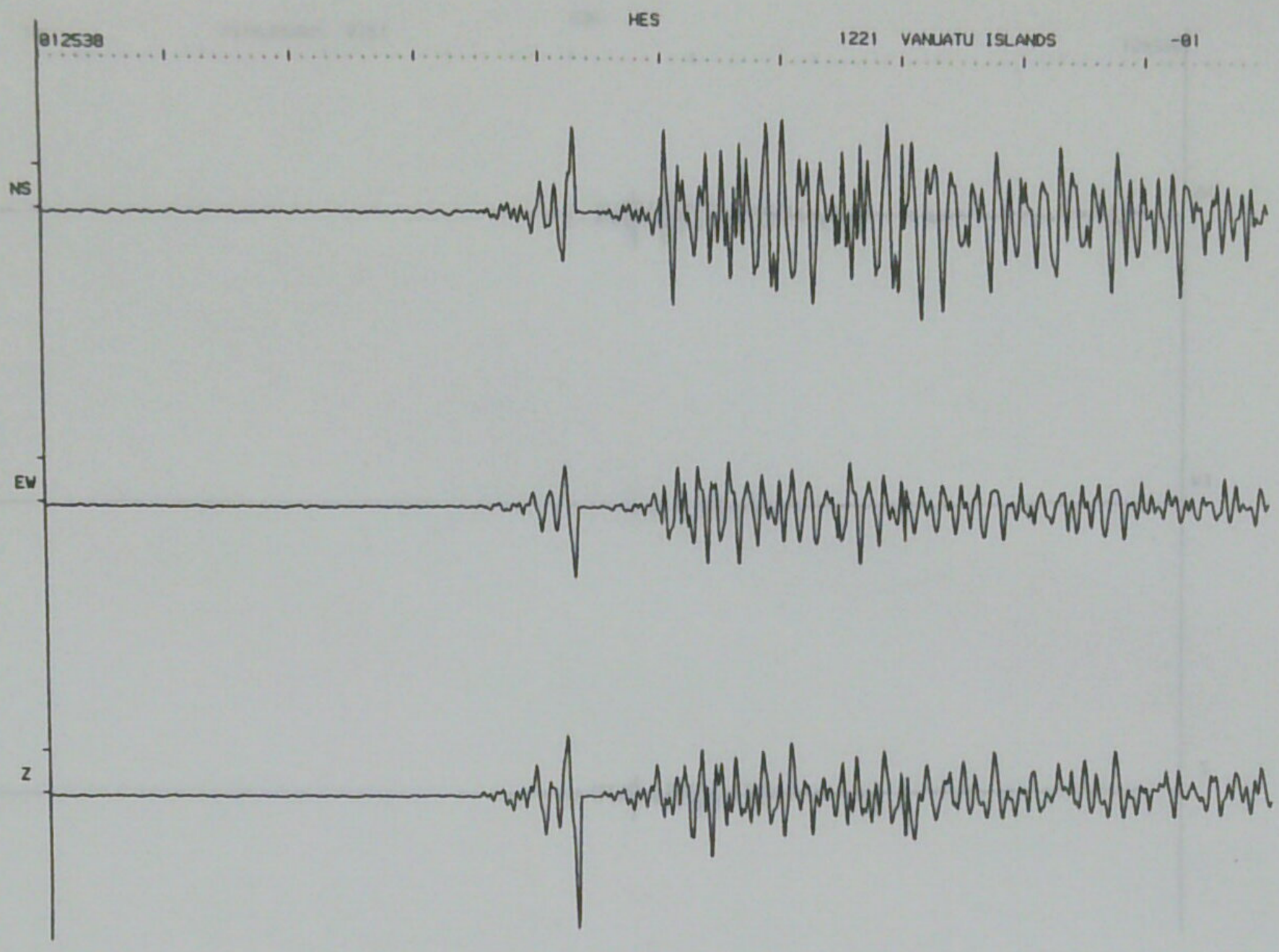


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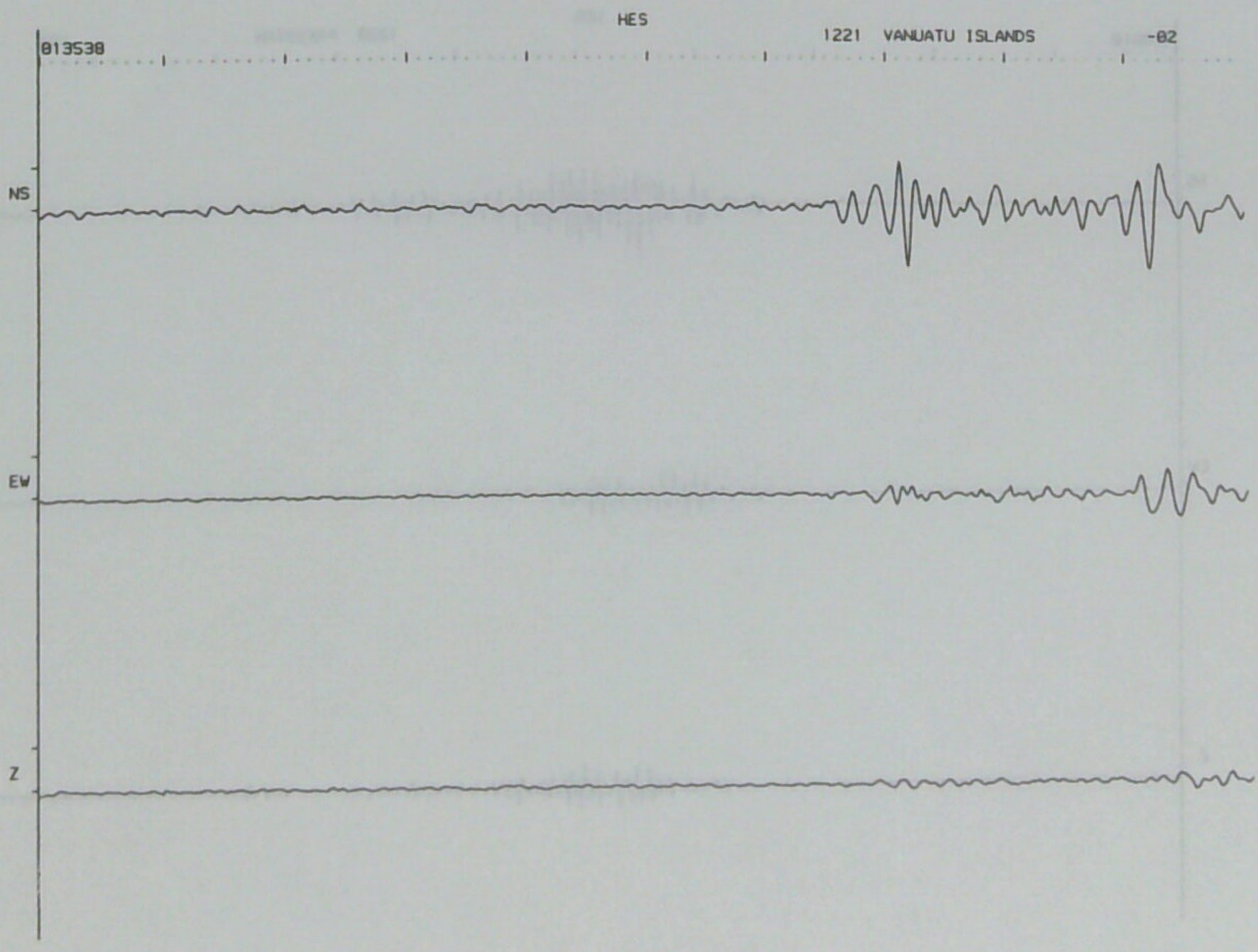


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NO.75 -1

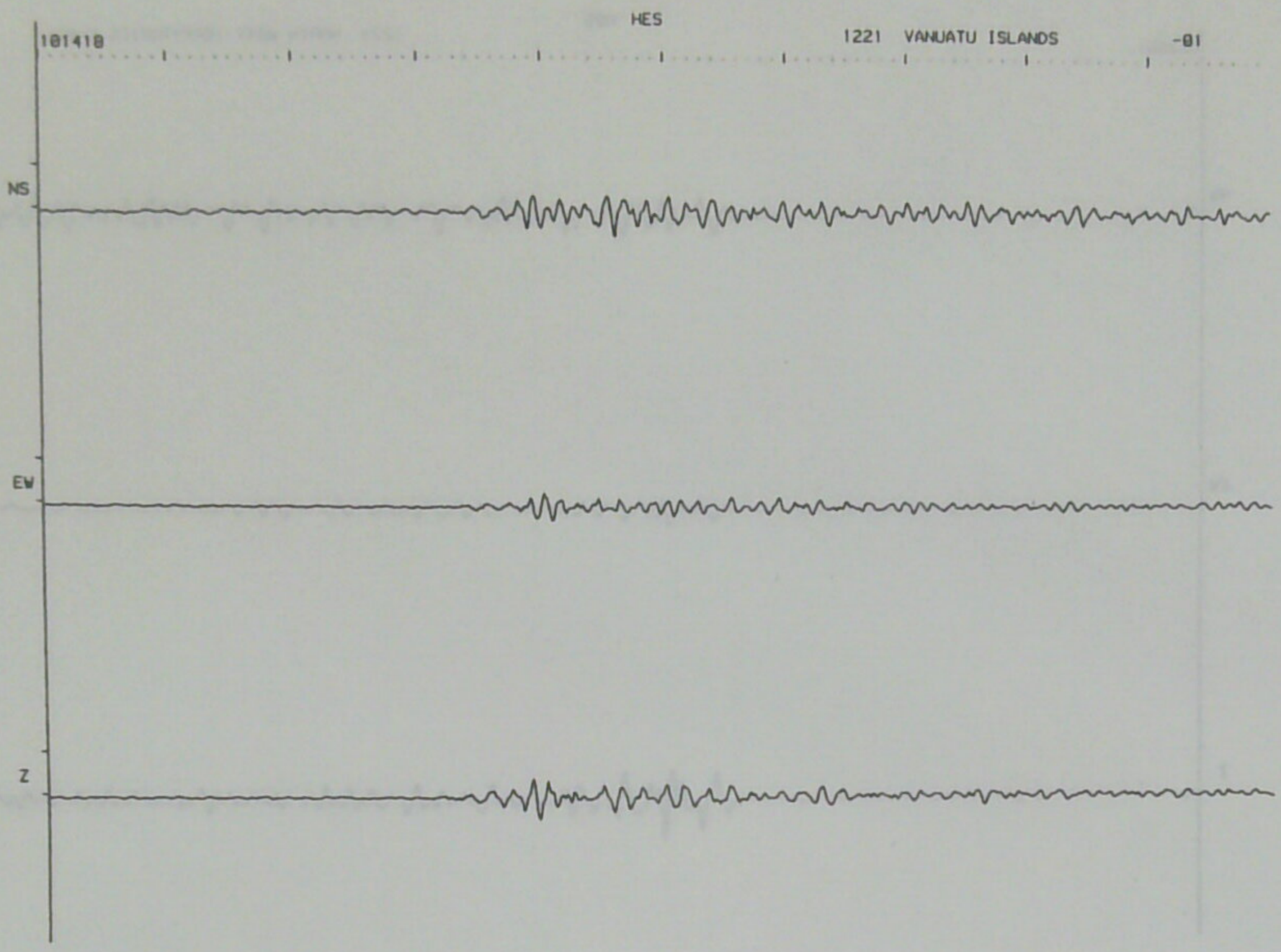


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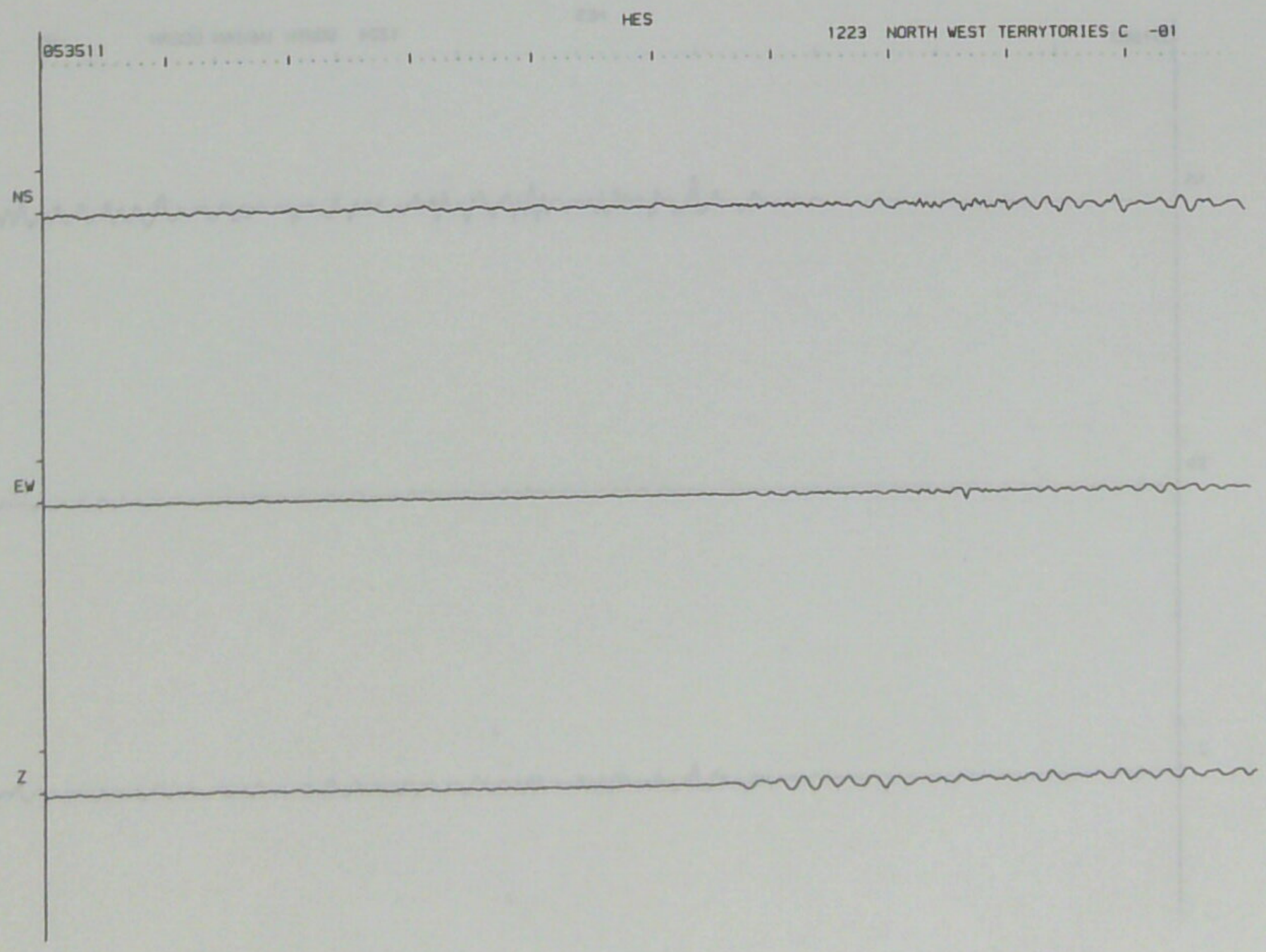


International Seismological Centre

NO.76

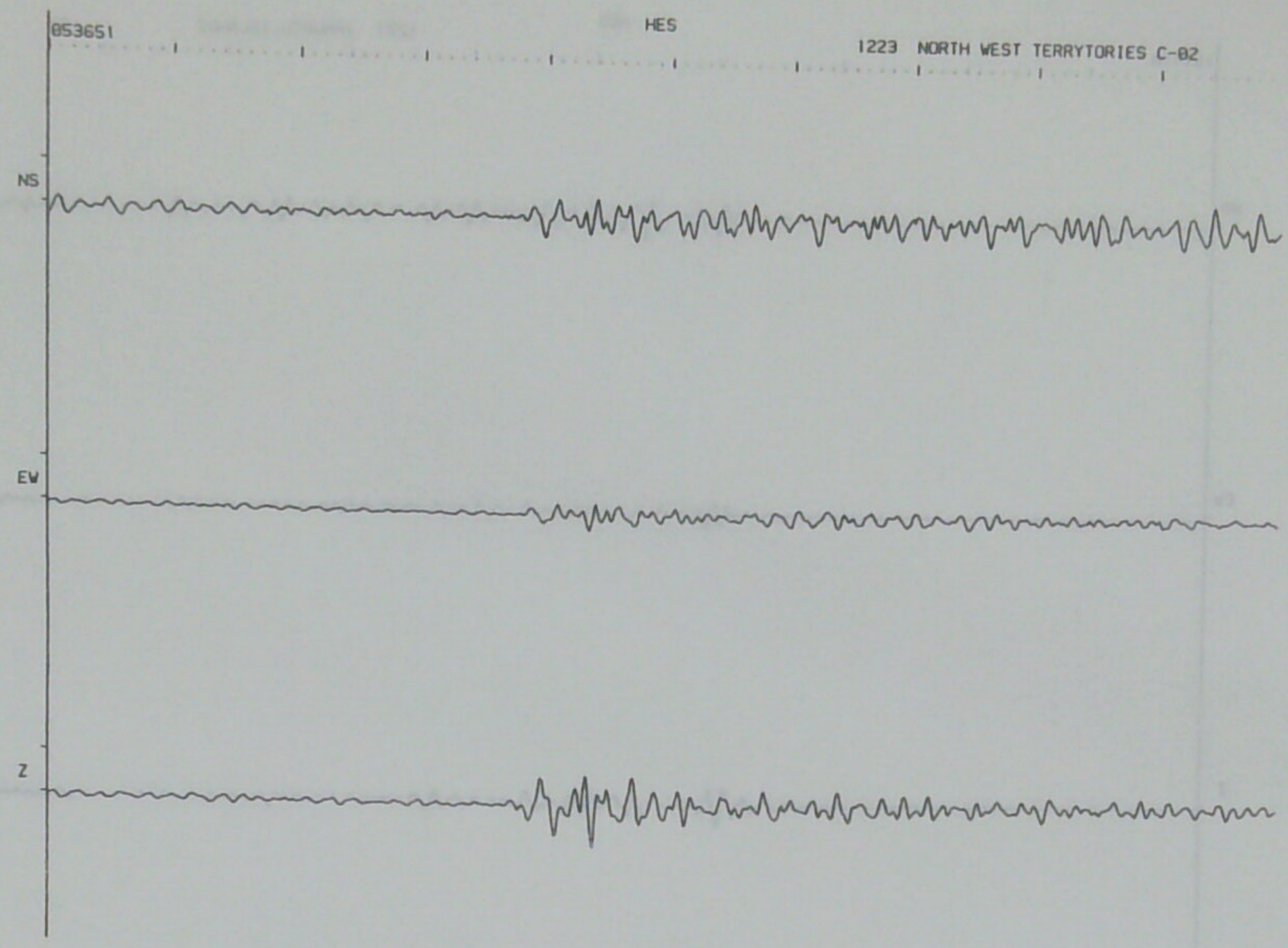


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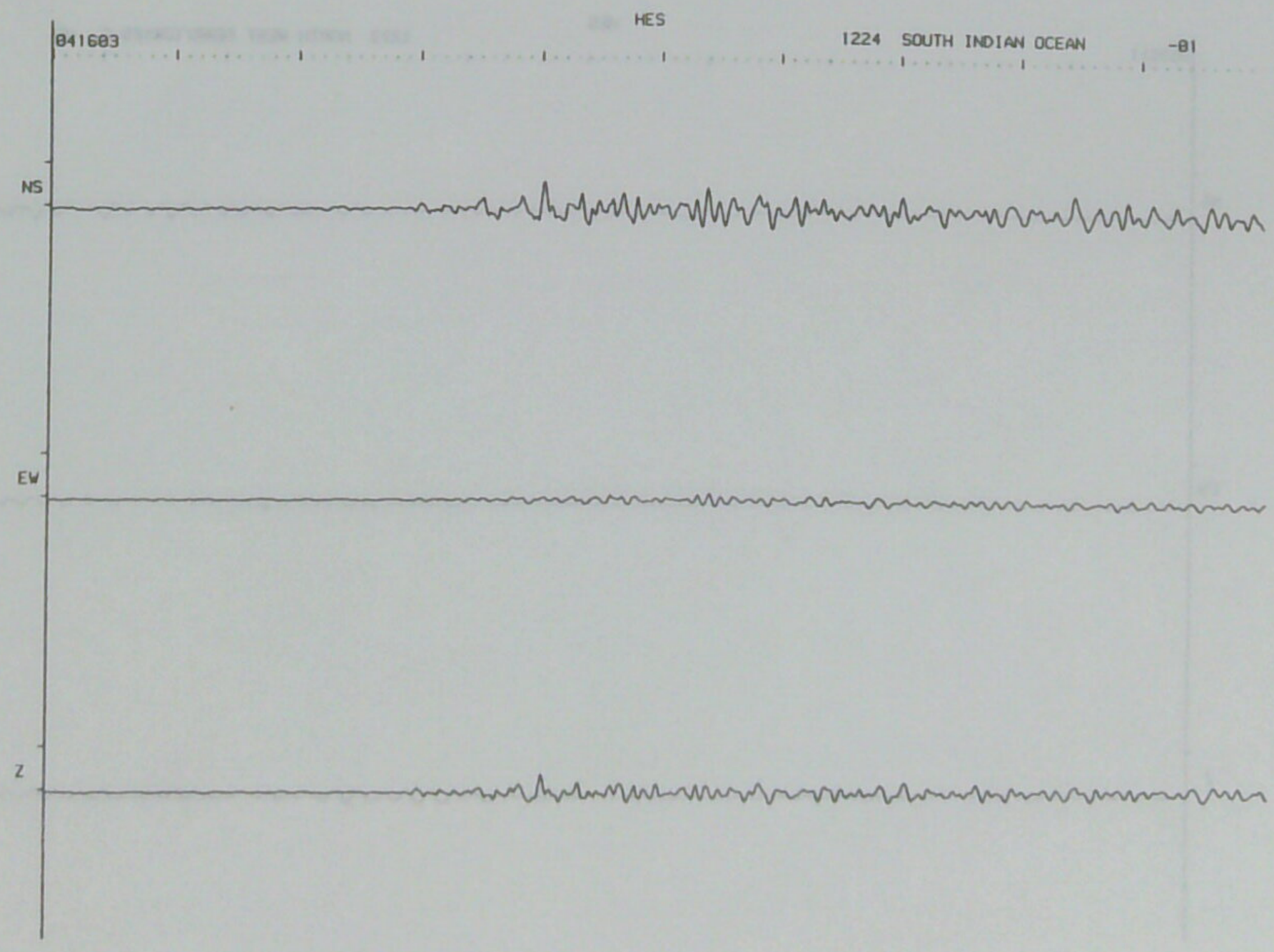


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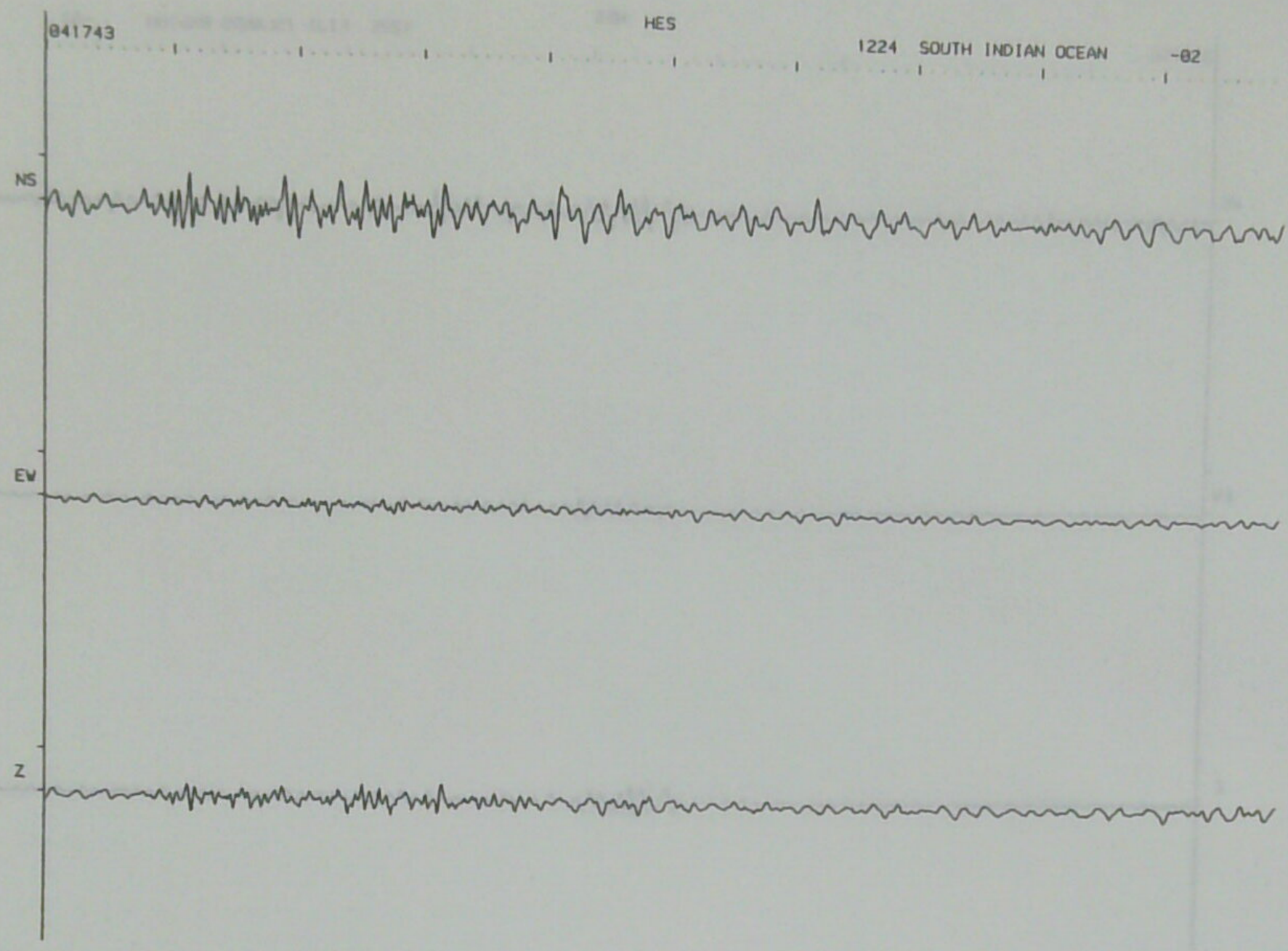


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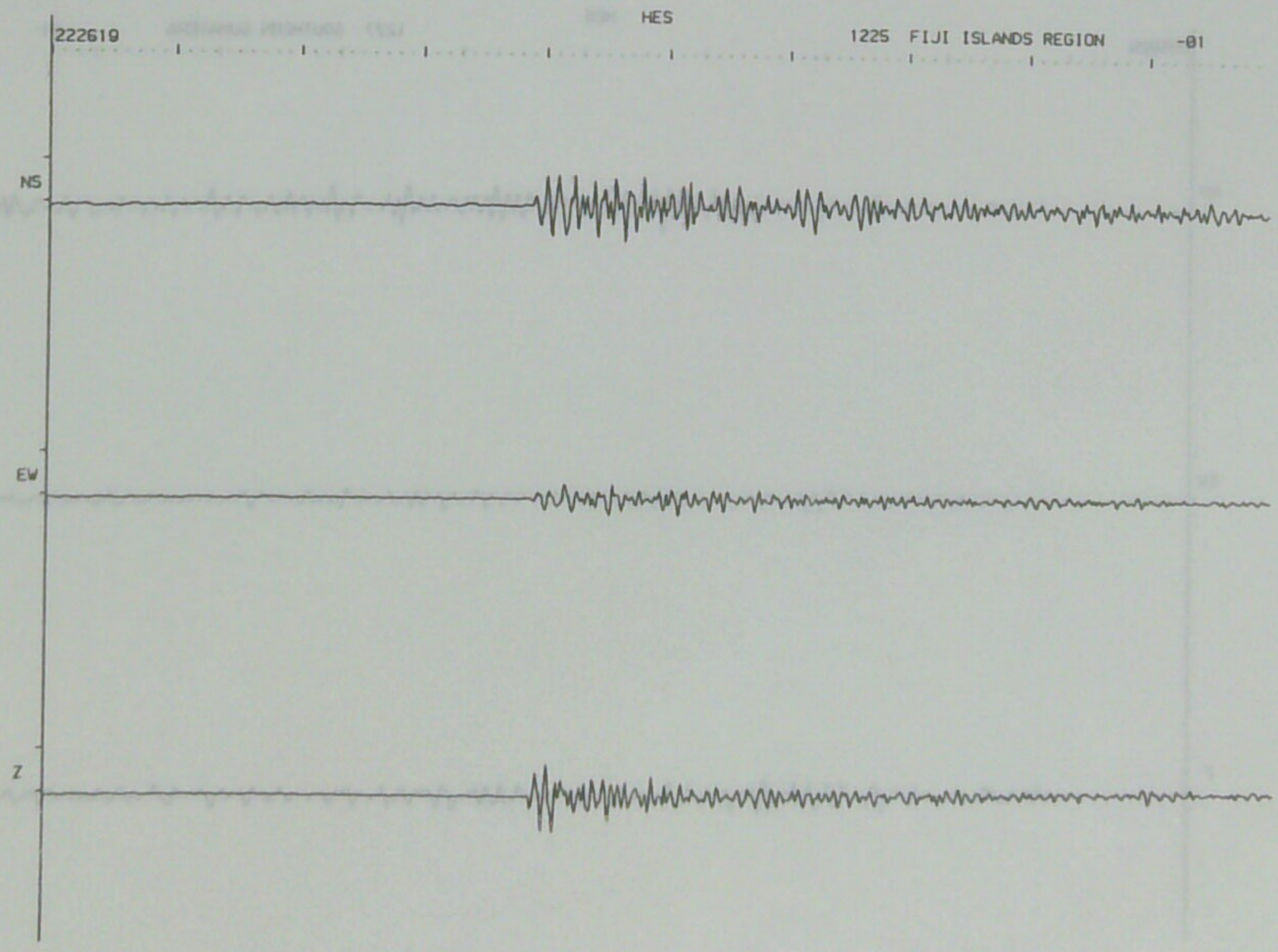


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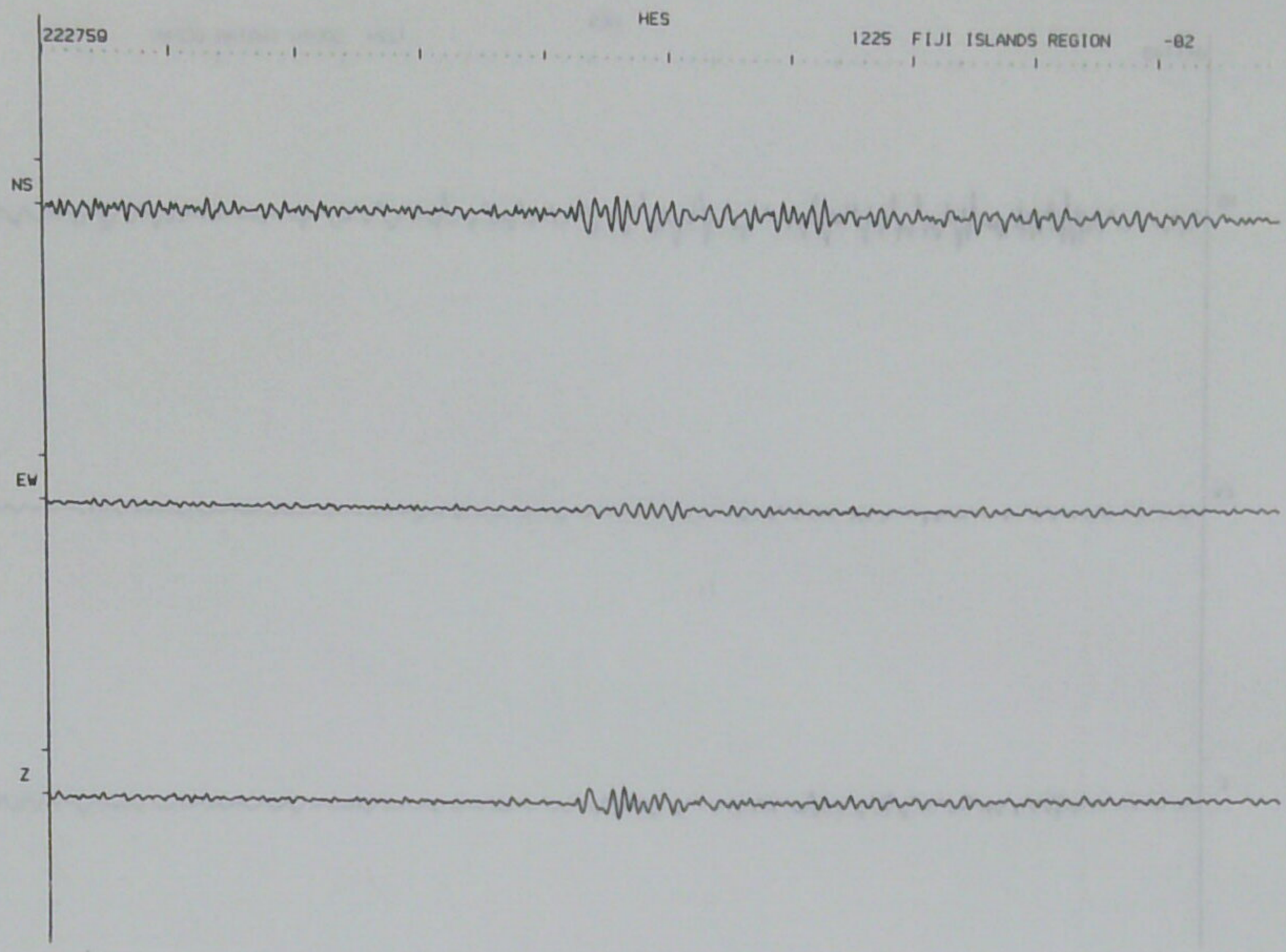


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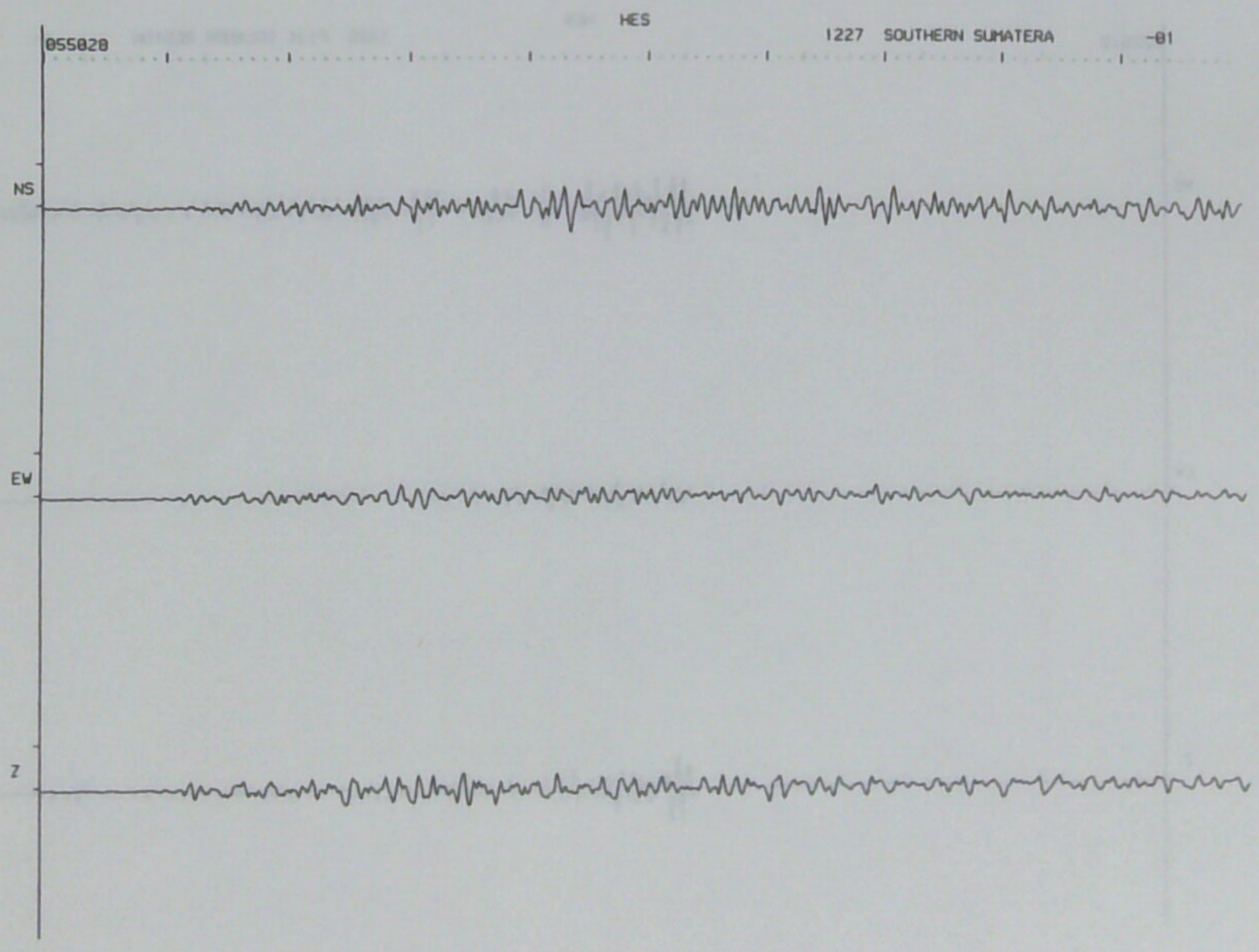


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NO.79 -2



NO.80



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JARE DATA REPORTS

No. 4 (Seismology 1)	Seismological bulletin of Syowa Station, Antarctica, 1959–1962 and 1967–1968	March 1969
No. 6 (Seismology 2)	Seismological bulletin of Syowa Station, Antarctica, 1968–1969	March 1970
No. 9 (Seismology 3)	Seismological bulletin of Syowa Station, Antarctica, 1969	November 1970
No. 12 (Seismology 4)	Earthquake interpretations at Syowa Station, Antarctica,	July 1971
No. 16 (Seismology 5)	Seismological bulletin of Syowa Station, Antarctica, 1970	March 1972
No. 19 (Seismology 6)	Seismological bulletin of Syowa Station, Antarctica, 1971	March 1973
No. 21 (Seismology 7)	Seismological bulletin of Syowa Station, Antarctica, 1972	February 1974
No. 31 (Seismology 8)	Seismological bulletin of Syowa Station, Antarctica, 1973	March 1976
No. 34 (Seismology 9)	Seismological bulletin of Syowa Station, Antarctica, 1974	March 1976
No. 38 (Seismology 10)	Seismological bulletin of Syowa Station, Antarctica, 1975	March 1977
No. 43 (Seismology 11)	Seismological bulletin of Syowa Station, Antarctica, 1976	February 1978
No. 49 (Seismology 12)	Seismological bulletin of Syowa Station, Antarctica, 1977	March 1979
No. 54 (Seismology 13)	Seismological bulletin of Syowa Station, Antarctica, 1978	March 1980
No. 59 (Seismology 14)	Seismological bulletin of Syowa Station, Antarctica, 1979	January 1981
No. 72 (Seismology 15)	Seismological bulletin of Syowa Station, Antarctica, 1980	March 1982
No. 83 (Seismology 16)	Seismological bulletin of Syowa Station, Antarctica, 1981	March 1983
No. 92 (Seismology 17)	Seismological bulletin of Syowa Station, Antarctica, 1982	March 1984
No.106 (Seismology 18)	Seismological bulletin of Syowa Station, Antarctica, 1983	March 1985
No.115 (Seismology 19)	Seismological bulletin of Syowa Station, Antarctica, 1984	March 1986