

UPPER ATMOSPHERE PHYSICS DATA,  
SYOWA STATION, 1982

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1. Introduction

This data book summarizes upper atmosphere physics data measured by the "Upper Atmosphere Physics" monitoring system at Syowa Station in 1982. The items of data are as follows:

- 1) Geomagnetism: H, D and Z components of magnetic variation  
Total force of geomagnetic field  
K-index  
H, D and Z components of magnetic pulsation
- 2) ELF-VLF wave: Intensities at 0.35, 0.75, 1.2, 2, 4, 8,  
30, 60 and 95 kHz  
Wide-band spectrum in the frequency range  
less than 15 kHz
- 3) Ionosphere: Cosmic noise absorption at 30 MHz
- 4) Optical aurora: Auroral intensity of  $N_2^+$  4278 Å at  
three zenith angles (45° poleward, zenith  
and 45° equatorward)  
Meridian scanning record of OI 5577 Å and  
H $\beta$  4861 Å

The UAP (Upper Atmosphere Physics) monitoring system was installed at Syowa Station in January 1981. An outline of the system is given in Section 2. Section 3 presents

specifications of the data acquisition system and examples of computer plots. The recording periods are also listed in Section 3 for each of digital and analogue tapes. The format of the compiled digital data is given in Section 4. Magnetograms and f-t spectra of magnetic pulsations in the period of January 1 - December 31, 1982 are given in the appendix.

Digital tapes of the magnetograms are available to users on request. The request should be addressed to:

World Data Center C2 for Aurora  
National Institute of Polar Research  
9-10, Kaga 1-chome,  
Itabashi-ku, Tokyo 173, Japan

Digital and analogue data of other items are available to scientists who want joint study with us. The request should be addressed to:

Upper Atmosphere Research Division  
National Institute of Polar Research  
9-10, Kaga 1-chome,  
Itabashi-ku, Tokyo 173, Japan

## 2. UAP Monitoring System

For the last fifteen years upper atmosphere phenomena such as geomagnetic variations, ELF-VLF emissions, cosmic noise absorption, and optical auroras were observed by individual equipment and they were recorded on films, chart papers and analogue magnetic tapes. Therefore, when we use these data for

computer analysis, we have to convert them into digital data through complicated procedures. The best way to save these procedures is a systematic measurement of upper atmosphere phenomena and a digital recording on computer compatible tape in real time. Thus we developed a new system which comprises various kinds of sensors and data acquisition facilities. This system is called the Upper Atmosphere Physics (UAP) monitoring system. The system was constructed at Syowa Station in January 1981.

As shown in Fig. 1, this system comprises sensors and data acquisition facilities. The sensors for measuring weak natural electromagnetic waves such as ELF-VLF emissions, ULF magnetic pulsations and cosmic radio noise are set up at a remote station located about 5 km apart from Syowa Station in order to avoid interferences due to man-made electromagnetic noise. The sensors of fluxgate and proton magnetometers are set up about 150 m apart from the data processing building. The sensors of meridian scanning photometer and three-direction photometer are set up on the roof of the data processing building.

The data acquisition facilities are installed in the data processing building. The remote station and the data processing building are linked by VHF and UHF telemeters. All the outputs of the observation instruments are relayed by a switching matrix board and then they are delivered into MELCOM 70/25 computer system. The data acquisition system has both digital and analogue data recorders since analogue magnetic tapes are quite useful for recording wave phenomena in the high

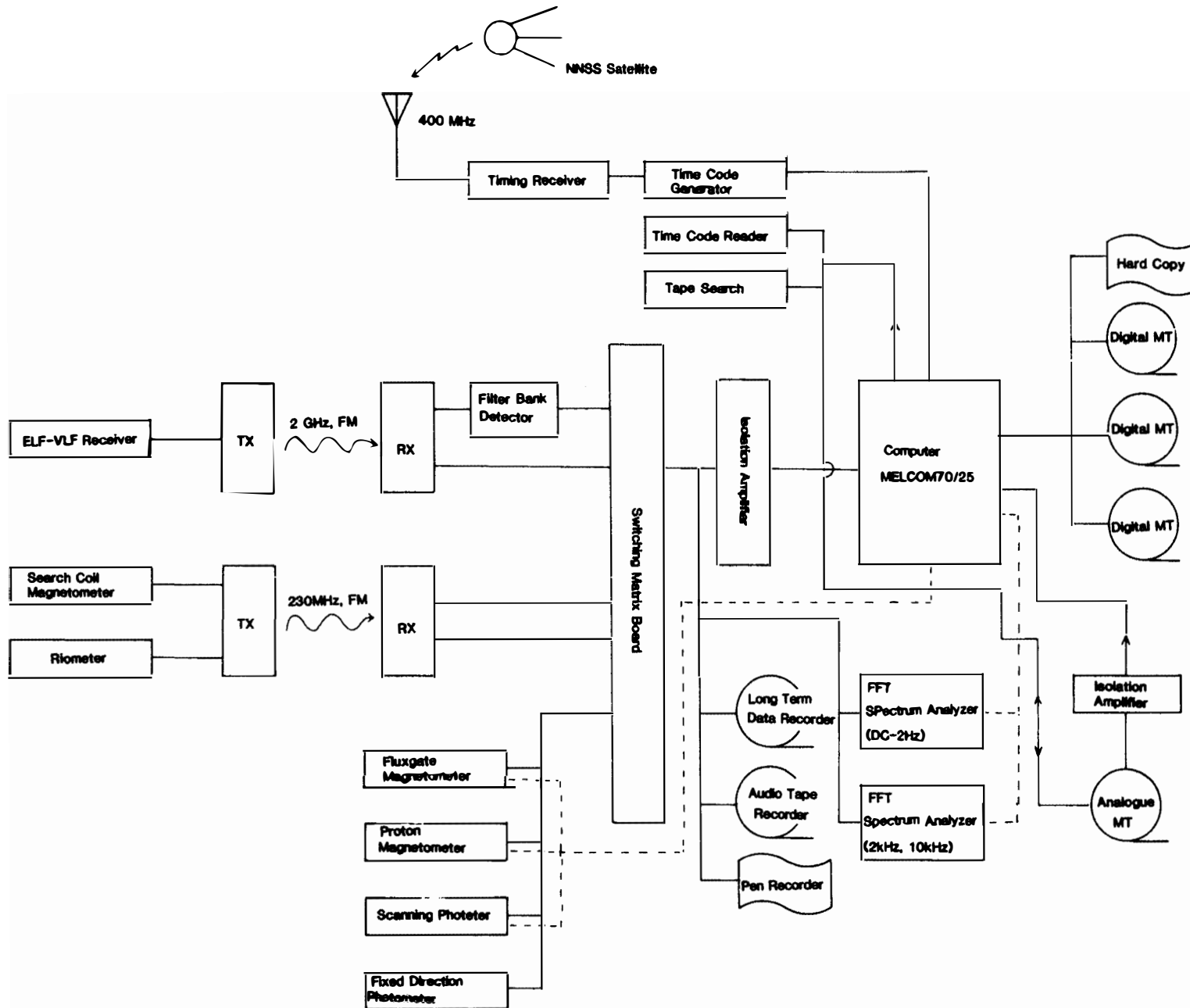


Fig. 1. Block diagram of the "Upper Atmosphere Physics" monitoring system.

frequency range. For example, one roll of standard 3600 ft audio tape can record VLF emissions up to 15 kHz over 6 hours, while recording time of standard 2400 ft digital tape is only 15 minutes. The data access to the analogue data recorders is controlled by a tape search unit being linked to the computer. The dynamic spectra of ULF magnetic pulsations and ELF-VLF emissions are obtained by two sets of FFT spectral analyzers. The output digital signals from the FFT spectral analyzers are supplied to the computer. All the data are recorded with universal time supplied from a clock/frequency standard unit. This unit consists of NNSS satellite timing receiver, rubidium frequency standard and time code generator. The time code generator supplies IRIG A, B, E and slow codes for the analogue data recorders and 36-bit time code to the computer. The absolute accuracy of these time codes is about 10 s. The computer is driven by 1 MHz clock signal from the rubidium standard.

### 3. Instrumentation and Data Format

#### 3.1. Geomagnetic variation

##### 3.1.1. Magnetogram

Magnetic variations are measured by a three axis fluxgate magnetometer. The range is  $\pm 1000$  nT, and the frequency response is DC-2 Hz. The noise level is less than 0.5 nT. Both the analogue and digital output signals are recorded on magnetic tapes. Sampling frequency of the digital data is 1 Hz.

Continuous computer plots of magnetogram in the period of Jan.1, 1982 to Dec.31, 1982 are given in the Appendix 1. In these plots positive sign of the H, D and Z components indicates northward, eastward and upward, respectively. One division of the vertical axis corresponds to 100 nT for the H, D and Z components. For strong magnetic disturbances outside the range of  $\pm 1000$  nT, the output level is saturated. Data gaps and incorrect data caused by system trouble are listed in Table 1. Other data errors are supplemented by the data which were digitalized from analogue data (36 sampling). The baseline of each component was measured during quiet time. The values of the baseline are listed in Table 2.

### 3.1.2. Total force of geomagnetic field

The total force of geomagnetic field (F) is continuously measured by a proton magnetometer. The range is 0 - 65000 nT, and the frequency response is 0.2 Hz. The noise level is less than 0.2 nT. The digital output signals are recorded on digital magnetic tapes with sampling frequency of 0.1 Hz. An example of computer plots of H, D, Z and F is given in Fig. 2.

### 3.1.3. K-index

As a measure of polar magnetic disturbances K-index was calculated from the standard magnetogram at Syowa. The standard magnetogram is recorded on chart paper with a recording speed of 5 cm per hour. The sensitivity of the H, D and Z components on chart paper is 118 nT/cm, 100 nT/cm, and

Table 1. The period of data gaps and incorrect data of magnetogram caused by system troubles.

START		STOP		COMPONENT	
DATE	TIME (UT)	DATE	TIME (UT)		
January	31	07:11	January 31	16:08	H, D, Z
February	8	06:17	February 8	20:47	H, D, Z
March	2	07:32	March 7	05:00	H, D, Z
April	26	18:00	April 27	10:13	H, D, Z
July	13	00:00	July 17	14:40	H, D, Z

Table 2. The values of the geomagnetic baseline.

DATA	T I M E (UT)	TOTAL INT ( nT )	HORIZONTAL INT (nT)	VERTICAL INT (nT)	DELINATION (nT)	DIPANGLE
FEB. 28 1982	10 h 25 <sup>m</sup>	44666	18968	40438	-46° 37.9'	-64 ° 52.2'
	10 31	44666	18961	40442	-46° 37.9'	-64 ° 52.8'
MAR. 6 1982	12 h 09 <sup>m</sup>	NO	DATA		-46° 32.2'	-64 ° 54.2'
	12 16	NO	DATA		-46° 32.1'	-64 ° 53.7'
APR. 16 1982	13 h 40 <sup>m</sup>	44595	18948	40370	-46° 32.6'	-64 ° 51.4'
	13 47	44594	18953	40366	-46° 33.0'	-64 ° 50.9'
	13 53	44595	18955	40366	-46° 33.2'	-64 ° 50.8'
MAY. 13 1982	12 h 24 <sup>m</sup>	44649	18985	40412	-46° 34.4'	-64 ° 50.2'
	12 32	44649	18986	40411	-46° 34.1'	-64 ° 50.1'
	12 44	44649	18980	40414	-46° 33.7'	-64 ° 50.6'
JULY. 4 1982	10 h 42 <sup>m</sup>	44635	19001	40388	-46° 34.1'	-64 ° 48.3'
	10 52	44635	19001	40388	-46° 34.3'	-64 ° 40.1'
	11 00	44634	19002	40383	-46° 34.0'	-64 ° 48.6'
AUG. 16 1982	12 h 20 <sup>m</sup>	44627	18994	40383	-46° 34.0'	-64 ° 48.6'
	12 26	44628	18991	40385	-46° 34.5'	-64 ° 48.9'
	12 32	44629	18993	40386	-46° 34.3'	-64 ° 48.8'
SEP. 10 1982	13 h 16 <sup>m</sup>	44645	18993	40404	-46° 33.4'	-64 ° 49.4'
	13 22	44643	18995	40400	-46° 33.6'	-64 ° 49.1'
	13 26	44640	18996	40397	-46° 33.1'	-64 ° 48.9'
NOV. 19 1982	11 h 24 <sup>m</sup>	44608	19066	40392	-46° 18.0'	-64 ° 41.8'
	11 34	44607	19069	40326	-46° 17.3'	-64 ° 41.5'
	11 44	44605	19066	40325	-46° 16.7'	-64 ° 41.7'
DEC. 1 1982	12 h 44 <sup>m</sup>	44594	19033	40329	-46° 18.4'	-64 ° 44.1'
	12 50	44595	19035	40329	-46° 18.4'	-64 ° 44.0'
	12 56	44596	19034	40330	-46° 18.3'	-64 ° 44.1'
DEC. 2 1982	12 h 50 <sup>m</sup>	44615	19078	40330	-46° 17.0'	-64 ° 41.0'
	12 57	44612	19071	40330	-46° 16.4'	-64 ° 41.5'
	13 04	44613	19068	40333	-46° 16.5'	-64 ° 41.8'

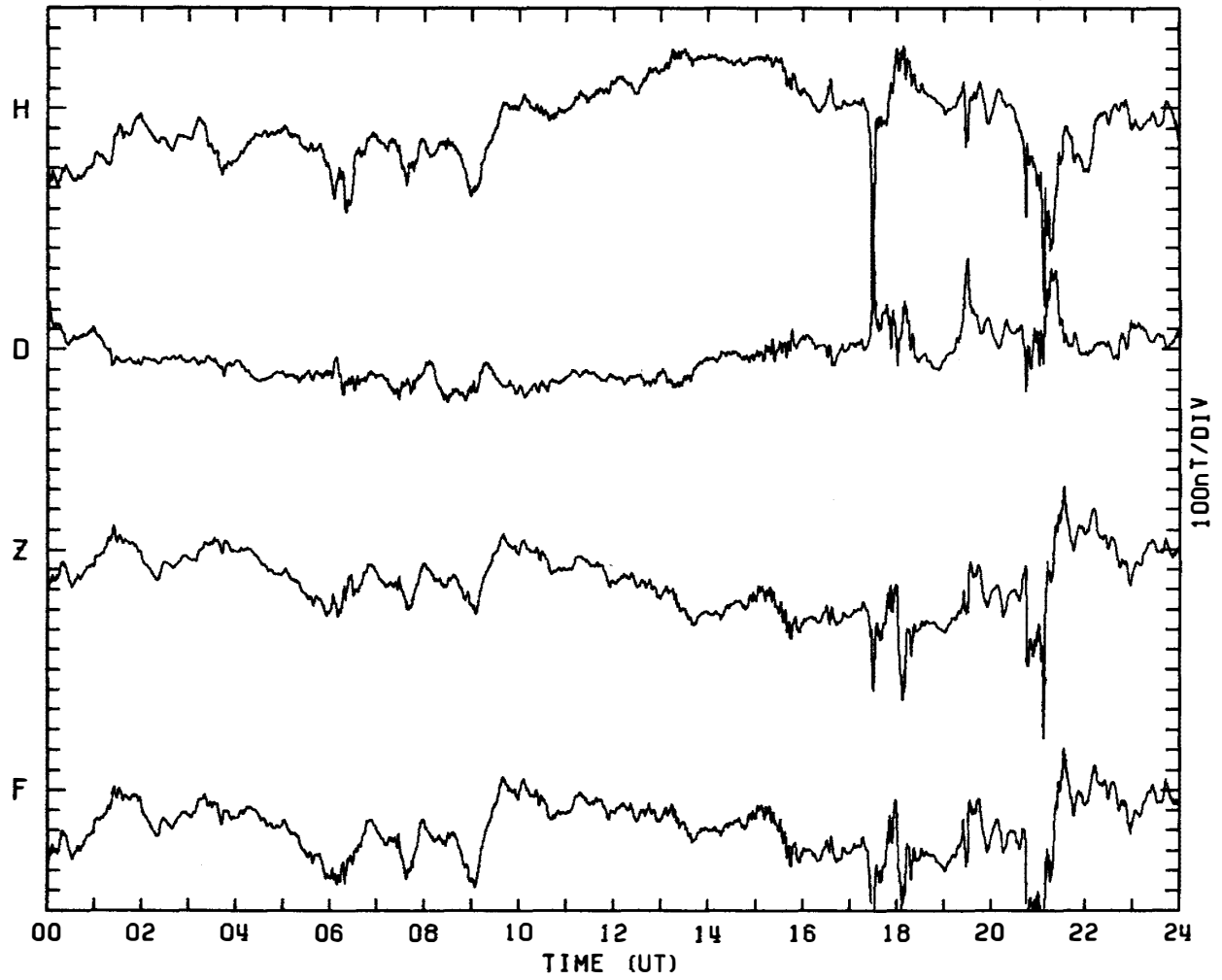


Fig. 2. Examples of computer plots of the H, D, Z and F of the geomagnetic variations on December 21, 1982.



111 nT/cm, respectively. From the maximum deviation of the H component from the baseline during each 3-hour interval, K-indices were calculated by using the following scale:

K-indices	Deviation in nT
0	0 - 25
1	25 - 50
2	50 - 100
3	100 - 200
4	200 - 350
5	350 - 600
6	600 - 1000
7	1000 - 1660
8	1660 - 2500
9	2500 and more

Table 3 lists K-indices at Syowa in the period of January 1 - December 31, 1982.

#### 3.1.4 ULF magnetic pulsations

The H, D and Z components of ULF magnetic pulsations are detected by a search coil magnetometer. The three search coil sensors use permalloy cores wound by copper wire (0.4 mm $\phi$ , 40000 turns). The dimensions of the permalloy core are 1 cm in diameter and 100 cm in length. The intensity range of the magnetometer is 0.001 - 5 nT/s, and the frequency range is 0.001 - 3 Hz. The search coil magnetometer is set at the remote station. The output signals from the telemetry receiver are supplied to both the analogue data recorder and the

Table 3. K-indices at Syowa Station in the period of January  
1 - December 31, 1982.

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.	DEC.
1	3323 3422	3334 5444	2221 4536	2201 2045	5242 2323	5432 1254	5343 2235	3221 2122	2110 1102	3311 1335	5323 3452	0011 0000
2	2211 3543	5575 4333	6567 3444	6541 2445	5523 2245	5542 2124	3441 1123	4313 3365	4421 0125	4343 223X	2213 4654	1000 1111
3	4422 3555	4354 3235	4212 2111	4543 2444	4442 3544	4421 1113	2310 1003	5543 2225	2432 2123	XXXX XXXX	5442 0000	2111 3312
4	4322 3233	4454 3355	2221 1114	4341 1254	3122 2312	4311 0013	3000 0000	3412 2224	3452 2235	XXXX 1111	1111 2122	4421 0113
5	2221 0111	4443 2444	4552 1012	3432 1133	3422 2131	3111 0011	0000 0000	3332 1214	4644 3225	3321 0101	3211 2131	2431 1111
6	4432 2233	3553 3444	2001 0001	4531 1334	3210 0001	3341 1111	0000 0322	4312 1233	5776 6455	3331 2242	3232 1211	2311 0100
7	4531 3344	5432 1133	0000 0000	4200 0001	2101 0012	3333 2211	4432 1322	5674 3311	7634 3465	5652 1312	3310 0002	1321 3354
8	4422 1343	4333 2342	3311 1232	0121 1134	4300 0002	0001 1124	2421 1113	1011 0000	4212 1113	5411 1343	1210 1221	4433 3332
9	3330 1113	3321 1012	4121 1344	4310 0113	4310 0011	3311 1000	4211 1111	0142 1335	3333 1454	3110 0104	2311 1111	2422 3312
10	3120 1133	2212 3433	4432 0113	3243 1134	2100 0001	2662 3313	4421 2110	5343 1224	3211 0003	3101 0124	2111 2123	2355 5444
11	3310 1121	4442 4534	3331 0232	5353 1244	3200 1011	5541 2335	2112 3333	3222 1442	4321 1214	3231 1133	4422 2224	3321 3354
12	3220 0001	3212 2244	3310 0223	1211 2121	2121 0000	5331 4435	4331 4435	3342 2134	4321 0024	3221 0144	3222 2223	2332 2311
13	0121 1110	6564 3446	5421 0013	3421 0002	2200 0022	5453 2266	4553 3766	3421 1122	4411 1114	5421 2345	5522 2232	2211 1223
14	1010 1122	3443 2253	2211 1242	0010 0000	1211 0000	3443 1243	7774 3367	2211 1023	2511 0143	4543 1233	3122 3222	2211 1123
15	3512 3333	2343 2301	4410 0002	0111 0112	4311 3444	3342 1425	7433 2254	2000 0002	1431 1013	2311 1111	2312 1233	3322 1111
16	3322 4354	2310 1000	3300 0013	2210 0321	4444 4444	4111 1121	3334 1415	1110 0003	2111 0123	2111 2223	2221 0013	1112 4435
17	4422 2311	0133 3444	1001 0113	1133 1011	4444 4444	1221 1100	5323 1013	3441 0024	2112 1111	3321 2234	1010 0132	4655 4334
18	3311 2346	4342 2236	3332 1224	1010 1224	4544 4444	0300 0010	4223 3112	4431 0222	5421 1143	3321 3333	2311 3323	4434 4343
19	3221 1111	3562 3245	3411 0012	1100 0113	5443 3334	0121 2235	4231 3115	3311 0023	3431 2234	4211 1244	2311 1222	3453 3223
20	3331 1112	3432 1233	0231 1112	3433 1114	3111 0111	4332 2122	6642 0003	4310 1234	3343 3215	4333 2111	1111 0124	2443 3445
21	2322 2543	3222 2124	1331 2335	5232 2246	1011 2103	2121 1112	2100 0115	5411 1112	4744 4346	4220 0222	3441 2353	4344 3656
22	4553 3445	3542 3454	5542 3331	6521 1000	1000 0000	3221 2245	3101 2201	5221 2144	7775 3435	4311 0001	3432 0111	4432 4312
23	3533 3443	4222 2355	1111 1000	1111 1112	2200 0000	3541 2123	4211 2114	4321 1225	5542 2144	0000 1111	1112 2544	2213 3433
24	4443 4335	4541 3226	0112 0222	3210 0132	0000 0001	3221 1024	5554 3645	5452 2123	4341 3214	1100 0222	3313 5456	3322 3242
25	4331 2122	3553 2232	4432 2122	4554 2121	0000 0004	4543 1000	5543 1133	4341 1224	2111 1231	2331 2222	4444 2334	2321 2321
26	3121 2133	4453 2244	3311 1103	0001 1015	3200 1134	0221 1225	4522 2124	4431 2124	1323 4545	4332 3203	2443 3313	3221 3121
27	4431 3334	2211 2213	5410 1000	0140 1345	3453 3445	4542 2145	4552 2223	4211 1122	5332 2435	2121 3154	3322 2323	2232 2224
28	3434 3322	3120 1131	0310 0000	5424 4324	6743 3334	5443 1325	4543 2233	2100 0124	5321 0111	2201 0124	6442 3244	4432 3355
29	1221 2443		1441 0122	4332 1244	3543 3234	4222 3115	5352 2112	4343 2345	3311 1111	4453 2324	3222 3564	4432 3234
30	6644 3322		3420 1114	4545 3235	5443 3335	4553 2134	2232 1224	4453 2235	0111 2234	5333 3334	3331 3210	4432 1242
31	4533 544X		4330 1224		5654 2345		3543 2223	3421 1124		3320 4344		3311 1111

computer. The sampling frequencies of the digital data are 1 and 2 Hz for H component and 1 Hz for D and Z components, respectively.

Examples of computer plots of wave forms are demonstrated in Fig. 3. Frequency-time (f-t) spectra of magnetic pulsations are easily reproduced from analogue magnetic tapes by using FFT (Fast Fourier Transformer) spectrum analyzer. Appendix 2 presents f-t spectra of the H component in the frequency range of DC - 1 Hz.

### 3.2. ELF-VLF emissions

The receiving site of natural ELF-VLF electromagnetic waves should be located far away from power line sources. Therefore, a telemeter link between the remote station and the receiving site is used in this new system. The remote station is located at West Ongul Island about 5 km far from Syowa Station.

The ELF-VLF receiving system at the remote station comprises triangle-shaped tree turn loop antenna (10 m in height, 20 m at the base), pre-amplifier and main amplifier. The gain of the pre- and main-amplifiers is 60 dB and 40 dB, respectively. The ELF-VLF signals selected from the telemetry signals are amplified. Then wave intensities at 0.35, 0.75, 1.2, 2, 4, 8, 30, 60 and 95 kHz are measured by 9-channel filter units. The sensitivity range of this system is  $10^{-17}$  -  $10^{-13}$  watts/m<sup>2</sup>.Hz, and the frequency range is 100 Hz - 100 kHz.

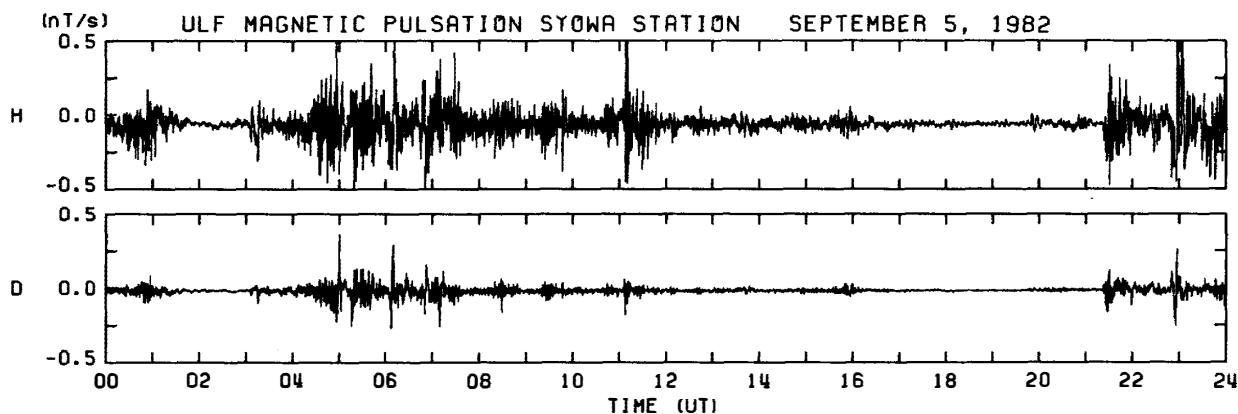


Fig. 3. Examples of computer plots of wave forms of the H and D components of ULF magnetic pulsations on September 5, 1982.

Table 4. Specifications of telemeters which link the remote station and the mother station.

	UHF telemeter	VHF telemeter
Modulation	PCM	FM
Carrier frequency	1859 MHz	240 MHz
Transmitter power	0.4 W	0.4 W
Antenna	Parabola(1 m $\phi$ )	Yagi(7 elements)
Max frequency deviation	200 kHz	125 kHz
VCO stability	better than 1%	better than 1%
VCO lineality	better than 1%	better than 1%
Carrier spurious	less than -30 dB	less than -30 dB

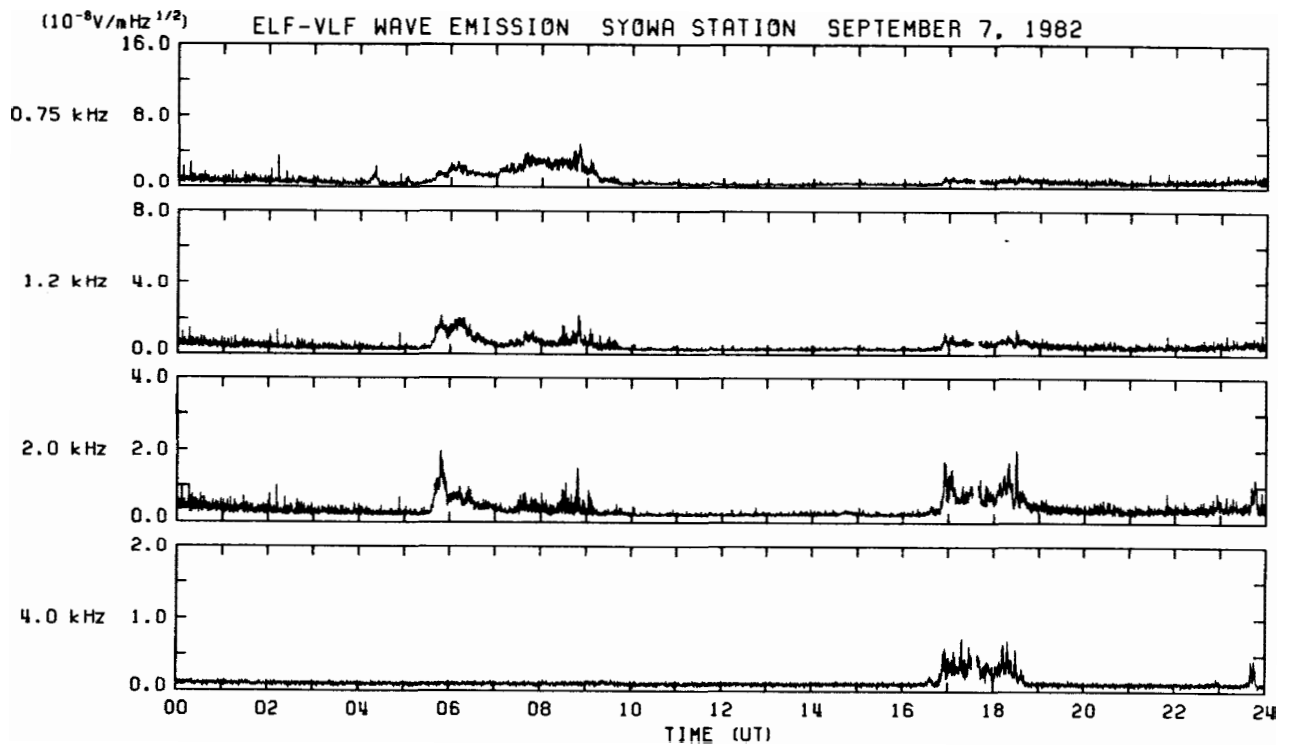


Fig. 4. Examples of computer plots of ELF-VLF wave intensities at 0.75, 2, 8 and 60 kHz on September 7, 1982.

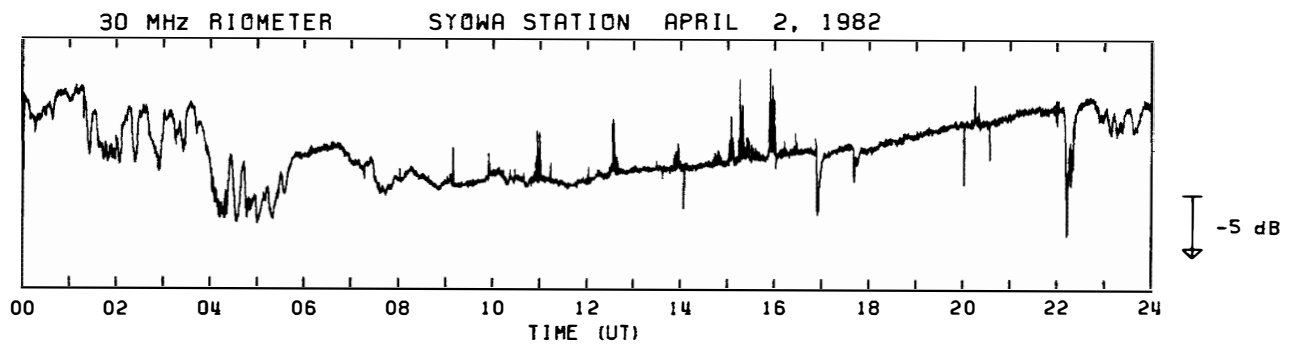


Fig. 5. Example of computer plots of cosmic noise absorption at 30 MHz on April 2, 1982.

The wide-band signals up to 15 kHz are recorded on audio tape recorders. The recording period of each audio tape is listed in Table 4. The wide-band signals are also supplied to FFT spectral analyzer and dynamic spectra in the frequency ranges 0.1 - 2 kHz and 0.1 - 10 kHz are calculated every 10 min. These dynamic spectral data are recorded on digital magnetic tapes. Output signals from the 9-channel filter units are recorded on digital magnetic tapes with sampling frequency of 0.5 Hz.

Demonstrated in Fig. 4 is an example of computer plots of ELF-VLF wave intensities. An example of frequency-time spectra reproduced from audio magnetic tapes is shown in Fig. 5. It is evident that there is no interference from power line radiation.

### 3.3. Cosmic noise absorption (CNA)

Cosmic noise absorption at 30 MHz is measured by La Jolla Science riometer. The riometer uses a pair of dipole antennas. The bandwidth and time constant of the receiver are 150 kHz and 0.25 s, respectively. The riometer is installed at the remote station. The riometer data are recorded on digital magnetic tapes with sampling frequency of 0.5 Hz. An example of computer plots is demonstrated in Fig. 5. Note that the routine observation of CNA at 30 MHz is performed at Syowa independently by another instrument. These data are recorded on chart paper and summarized by Kuratani *et al.*, 1985.

### 3.4. Auroral photometer

#### 3.4.1. Meridian scanning photometer

The interference filters select OI 5577 Å and H $\beta$  4861 Å emissions which are typical emission lines in electron and proton auroras, respectively. The interference filter for H $\beta$  tilts with 1 s period for measurement of doppler-shifted H $\beta$  emission. The field of view is 3° for 5577 Å and 5° for H $\beta$ . The scanning period from the poleward horizon to the equatorward horizon is 30 s. The sensitivity range is 20 R - 200 kR for 5577 Å and 1 - 1000 R for H $\beta$ . The meridian scanning photometer has digital interfaces to the computer. The meridian scanning data are recorded on digital magnetic tapes with sampling frequency of 1 Hz.

#### 3.4.2. Three-direction photometer

This photometer detects 4278 Å emission at three angles (zenith, 45° poleward and 45° equatorward). The field of view is 5°. The measurable intensity range is 100 R-200 kR. The output signals are recorded on digital magnetic tapes with sampling frequency of 1 Hz.

### 3.5. Telemetry system from remote station to mother station

ELF-VLF radio wave receiver, riometer and search coil magnetometer are located at the remote station. The output signals from these instruments are transmitted to recording site at Syowa. The VHF telemeter is used for CNA and the three components of ULF waves. Specifications of telemeters which link between a receiving site and a recording site are listed in Table 5.

Electric powers at the remote station are supplied by car batteries and dry air zinc batteries. The car batteries are charged up once a month by a diesel engine power generator with output power of 16 kVA.

### 3.6. Clock / frequency standard unit

The clock system comprises a timing receiver, a rubidium frequency standard and a time code generator. The timing receiver detects universal time signals transmitted at 400 MHz from the NNSS satellite. The absolute accuracy is about 10 s. The frequency standard with a rubidium oscillator is synchronized with the time pulse of the timing receiver. The stability of the frequency standard is higher than  $1 \times 10^{-11}$  s/day. The time code generator has both analogue code output (IRIG A, B, E and slow code) and BCD digital code.

## 4. Compiled Digital Tape Format

This defines data tape formats for compiled tapes (Edit tapes) from the original digital magnetic tapes on which upper



atmospheric data are recorded. Edit tapes are generated on FACOM/HITAC M-180 which is compatible to IBM computer. The DCB for this 9-track, 6250 BPI is RECFM=F(or FB), LRECL = 34, BLKSIZE = 20434, DEN = 4 (see Table 6).

On Edit tape 17 kinds of upper atmospheric data are recorded for every one second as shown in Table 7. Every observation data is recorded in the form of 2 bytes (A2) and a set of data for one second make a logical record (2 bytes x 17 = 34 bytes). An observation time which is expressed by 34 bytes and 10-minute data (600 one-second data sets) make a block the length of which is 20434 bytes. On the head of every block, the observation time is recorded in the form as shown in Table 8, which shows the start time of the block data. It is noted that every block starts on the 10th minute. One-day data sets (144 blocks) make one file and a tape mark is written between each blocks. One-month data files make one volume. The structure of Edit tape mentioned above is shown in Fig. 6.

An example how to read Edit tape is shown in the following:

```
INTEGER*2 TIME(4), DATA (17,600)
READ (10,100) TIME, DATA
100 FORMAT (4A2, 26X, 10(60(17A2)))
```

For co-researchers of NIPR it is permitted to use our M-180 computer system. NIPR has various kinds of softwares such as tape-to-tape copy, 6250 BPI to 1600 BPI conversion and copy, various kinds of display and spectrum analysis programs.

## Acknowledgments

It is a pleasure to acknowledge all the members of the 23rd Japanese Antarctic Research Expedition for their kind support in making the observations at Syowa Station in Antarctica. Valuable support in the data processing and compiling of this work by Dr. Y. Tonegawa is greatly appreciated. Thanks are also due to the members of Information Processing Center, especially Messrs. H. Sakurai and K. Uchida for their kind support in operating the FACOM/HITAC M-180 computer system. The UAP monitoring system has been accomplished by the constructive support of the Antarctic Computer Introducing Committee in NIPR.

## Reference

Kuratani, Y., Yamazaki, I. and Tanaka, T. (1985): Riometer records of 30 MHz cosmic noise at Syowa Station, Antarctica in 1983. JARE Data Rep., 99 (Ionosphere 31), 94p.

Table 5. The recording period of ELF-VLF wide-band signals recorded on audio tapes.

Tape Number	Start Time			Stop Time		
	Month	Day	Time (UT)	Month	Day	Time (UT)
5	2	11	04 00	2	11	10 00
6	2	11	10 00	2	12	04 00
7	2	12	04 00	2	12	10 00
8	2	12	10 00	2	15	04 00
9	2	15	04 00	2	16	04 00
10	2	16	04 00	2	16	10 00
11	2	16	10 00	2	17	10 00
12	2	17	10 00	2	18	04 00
13	2	18	04 00	2	19	10 00
14	2	19	10 00	2	20	04 00
15	2	20	04 00	2	21	04 00
16	2	21	04 00	2	21	07 00
17	2	21	10 00	2	21	16 00
18	2	23	04 00	2	21	10 00
19	2	23	10 00	2	24	04 00
20	2	24	04 00	2	24	10 00
21	2	24	10 00	2	26	04 00
22	2	26	04 00	2	26	10 00
23	2	26	10 00	2	27	08 00
24	2	27	08 00	2	27	10 00
306	2	28	04 00	2	28	10 00
307	2	28	10 00	2	28	16 00
25	3	1	04 00	3	3	00 00
26	3	3	00 00	3	3	06 00
27	3	3	06 00	3	3	12 00
28	3	3	12 00	3	3	18 00
29	3	3	18 00	3	3	24 00
30	3	4	00 00	3	4	06 00
31	3	4	08 30	3	4	12 00
32	3	4	12 00	3	4	18 00
33	3	4	18 00	3	4	24 00
34	3	5	00 00	3	5	06 00
35	3	5	06 00	3	5	12 00
36	3	6	00 00	3	6	06 00
37	3	6	06 00	3	6	12 00
38	3	6	12 00	3	6	18 00
39	3	6	18 00	3	6	24 00
40	3	7	00 00	3	7	06 00
41	3	7	06 00	3	7	12 00
42	3	7	12 00	3	7	18 00
43	3	7	18 00	3	7	24 00
44	3	8	06 00	3	8	12 00
45	3	8	12 00	3	8	18 00
46	3	8	18 00	3	8	24 00
47	3	9	00 00	3	9	06 00
48	3	9	06 00	3	9	12 00
49	3	10	06 00	3	10	12 00
50	3	10	12 00	3	10	18 00
51	3	11	00 00	3	11	06 00
52	3	11	06 00	3	11	12 00
53	3	11	18 00	3	11	24 00

Tape Number	Start Time			Stop Time		
	Month	Day	Time(UT)	Month	Day	Time(UT)
54	3	12	00 00	3	12	06 00
55	3	12	09 00	3	12	12 00
109	3	12	12 00	3	12	15 00
309	3	12	18 00	3	12	24 00
109	3	12	21 00	3	12	24 00
110	3	13	08 00	3	13	14 00
310	3	13	14 00	3	13	20 00
56	3	14	06 00	3	14	12 00
57	3	14	12 00	3	14	18 00
58	3	14	18 00	3	14	24 00
59	3	15	00 00	3	15	06 00
60	3	15	06 00	3	15	12 00
61	3	15	12 00	3	15	18 00
62	3	15	18 00	3	15	24 00
63	3	16	00 00	3	16	06 00
64	3	16	09 00	3	16	12 00
65	3	16	12 00	3	16	18 00
66	3	16	18 00	3	16	24 00
67	3	17	00 00	3	17	06 00
68	3	17	06 00	3	17	12 00
69	3	17	18 00	3	17	24 00
70	3	18	00 00	3	18	06 00
71	3	18	06 00	3	18	12 00
72	3	18	12 00	3	18	18 00
73	3	18	18 00	3	18	24 00
74	3	19	00 00	3	19	06 00
98	3	19	00 00	3	19	06 00
75	3	19	06 00	3	19	12 00
76	3	19	12 00	3	19	18 00
77	3	19	18 00	3	19	24 00
78	3	20	00 00	3	20	06 00
79	3	20	12 00	3	20	18 00
80	3	20	18 00	3	20	24 00
81	3	21	00 00	3	21	06 00
82	3	21	09 00	3	21	12 00
83	3	21	12 00	3	21	18 00
84	3	21	18 00	3	21	24 00
85	3	22	00 00	3	22	06 00
113	3	22	10 00	3	22	12 00
86	3	22	12 00	3	22	18 00
87	3	23	00 00	3	23	06 00
88	3	23	09 00	3	23	12 00
89	3	23	12 00	3	23	18 00
90	3	23	18 00	3	23	24 00
91	3	24	00 00	3	24	06 00
92	3	24	09 00	3	24	12 00
93	3	24	15 00	3	24	18 00
94	3	24	18 00	3	24	24 00
95	3	25	00 00	3	25	06 00
96	3	25	06 00	3	25	12 00
97	3	25	12 00	3	25	18 00

Tape Number	Start Time			Stop Time		
	Month	Day	Time (UT)	Month	Day	Time (UT)
308	3	25	18 00	3	25	24 00
99	3	25	21 00	3	27	24 00
99	3	26	03 00	3	26	06 00
100	3	26	07 30	3	26	12 00
101	3	26	12 00	3	26	18 00
102	3	26	18 00	3	26	24 00
103	3	27	00 00	3	27	06 00
111	3	27	06 00	3	27	12 00
112	3	27	12 00	3	27	15 00
112	3	27	21 00	3	27	24 00
104	3	30	18 00	3	30	24 00
105	3	31	00 00	3	31	06 00
106	3	31	10 00	3	31	12 00
107	3	31	12 00	3	31	18 00
108	3	31	18 00	3	31	24 00
406	4	1	00 00	4	1	03 00
114	4	1	06 00	4	1	12 00
115	4	1	12 00	4	1	15 00
116	4	1	18 00	4	1	24 00
117	4	2	06 00	4	2	12 00
118	4	2	19 00	4	2	22 00
119	4	3	06 00	4	3	12 00
120	4	3	12 00	4	3	18 00
121	4	4	21 00	4	4	24 00
122	4	5	00 00	4	5	06 00
121	4	5	11 00	4	5	14 00
123	4	5	14 00	4	5	17 00
124	4	5	18 00	4	5	24 00
123	4	6	11 00	4	6	12 00
125	4	6	12 00	4	6	18 00
126	4	6	18 00	4	6	24 00
127	4	7	06 00	4	7	09 00
128	4	7	12 00	4	7	15 00
128	4	7	21 00	4	7	24 00
129	4	8	18 00	4	8	24 00
130	4	9	10 00	4	9	12 00
131	4	9	12 00	4	9	18 00
132	4	9	18 00	4	9	24 00
407	4	10	06 00	4	10	12 00
133	4	10	12 00	4	10	18 00
134	4	10	18 00	4	10	24 00
135	4	11	00 00	4	11	06 00
136	4	11	06 00	4	11	12 00
137	4	11	12 00	4	11	18 00
138	4	12	09 00	4	12	12 00
139	4	12	12 00	4	12	18 00
408	4	13	00 00	4	13	06 00
140	4	13	06 00	4	13	12 00
141	4	13	12 00	4	13	18 00
142	4	13	18 00	4	13	24 00
409	4	14	00 00	4	14	06 00

Tape Number	Start Time			Stop Time		
	Month	Day	Time (UT)	Month	Day	Time (UT)
143	4	14	06 00	4	14	12 00
144	4	14	14 00	4	14	17 00
145	4	14	18 00	4	14	24 00
146	4	15	00 00	4	15	06 00
147	4	15	12 00	4	15	18 00
410	4	15	18 00	4	15	24 00
411	4	16	00 00	4	16	06 00
148	4	17	00 00	4	17	06 00
149	4	21	18 00	4	21	21 00
150	4	22	06 00	4	22	12 00
151	4	22	12 00	4	22	18 00
152	4	23	06 00	4	23	12 00
153	4	23	18 00	4	23	24 00
412	4	24	00 00	4	24	06 00
154	4	25	00 00	4	25	06 00
155	4	25	10 00	4	24	12 00
156	4	25	12 00	4	25	18 00
157	4	25	18 00	4	25	21 00
158	4	28	00 00	4	28	06 00
159	4	28	06 00	4	28	12 00
160	4	28	12 00	4	28	16 00
161	4	28	17 00	4	28	23 00
162	4	29	06 00	4	29	12 00
163	4	30	11 00	4	30	12 00
164	4	30	12 00	4	30	18 00
165	4	30	18 00	4	30	21 00
166	5	1	06 00	5	1	12 00
167	5	1	12 00	5	1	18 00
168	5	2	07 00	5	2	10 00
169	5	2	12 00	5	2	16 00
170	5	2	18 00	5	2	24 00
171	5	3	06 00	5	3	12 00
172	5	3	12 00	5	3	18 00
173	5	3	18 00	5	3	24 00
174	5	4	00 00	5	4	06 00
175	5	4	10 00	5	4	12 00
176	5	4	12 00	5	4	15 00
177	5	4	18 00	5	4	24 00
178	5	6	06 00	5	6	12 00
179	5	7	21 00	5	7	24 00
179	5	8	12 00	5	8	15 00
180	5	9	10 00	5	9	13 00
180	5	9	17 00	5	9	20 00
181	5	10	00 00	5	10	06 00
182	5	10	06 00	5	10	12 00
183	5	10	13 00	5	10	19 00
184	5	10	19 00	5	10	22 00
185	5	11	12 00	5	11	17 00
186	5	11	17 00	5	11	23 00
187	5	12	00 00	5	12	06 00
188	5	12	06 00	5	12	12 00

Tape Number	Start Time			Stop Time		
	Month	Day	Time (UT)	Month	Day	Time (UT)
189	5	12	12 00	5	12	18 00
190	5	13	18 00	5	13	24 00
191	5	14	00 00	5	14	06 00
192	5	14	15 00	5	14	18 00
193	5	17	00 00	5	17	06 00
194	5	17	06 00	5	17	12 00
195	5	17	12 00	5	17	18 00
196	5	17	18 00	5	17	24 00
197	5	18	00 00	5	18	06 00
198	5	18	10 00	5	18	12 00
199	5	18	12 00	5	18	18 00
311	5	18	18 00	5	18	24 00
200	5	19	00 00	5	19	06 00
201	5	19	09 00	5	19	12 00
202	5	19	12 00	5	19	16 00
203	5	19	18 00	5	19	24 00
204	5	20	09 00	5	20	12 00
205	5	20	15 00	5	20	21 00
206	5	21	00 00	5	21	06 00
313	5	21	06 00	5	21	09 00
207	5	22	12 00	5	22	15 00
207	5	22	21 00	5	22	24 00
208	5	24	10 00	5	24	12 00
208	5	24	21 00	5	24	24 00
209	5	24	12 00	5	24	15 00
210	5	25	15 00	5	25	18 00
210	5	26	04 00	5	25	07 00
211	5	26	07 00	5	26	12 00
212	5	27	10 00	5	27	16 00
213	5	28	07 00	5	28	12 00
214	5	28	12 00	5	28	15 00
214	5	28	21 00	5	28	24 00
215	5	30	13 00	5	30	16 00
216	5	30	18 00	5	30	24 00
217	5	31	06 00	5	31	12 00
312	5	31	12 00	5	31	15 00
218	5	31	18 00	5	31	24 00
312	5	31	21 00	5	31	24 00
219	6	1	06 00	6	1	09 00
219	6	1	18 00	6	1	21 00
220	6	1	21 00	6	1	24 00
221	6	2	00 00	6	2	06 00
222	6	2	06 00	6	2	12 00
223	6	2	12 00	6	2	18 00
224	6	2	18 00	6	2	24 00
225	6	5	18 00	6	5	24 00
226	6	12	18 00	6	12	24 00
227	6	13	00 00	6	13	06 00
228	6	14	00 00	6	14	06 00
229	6	14	18 00	6	14	24 00
230	6	16	00 00	6	16	06 00

Tape Number	Start Time			Stop Time		
	Month	Day	Time(UT)	Month	Day	Time(UT)
231	6	16	18 00	6	16	24 00
232	6	17	00 00	6	17	06 00
233	6	17	12 00	6	17	18 00
234	6	17	18 00	6	17	24 00
235	6	18	12 00	6	18	15 00
235	6	19	21 00	6	19	24 00
236	6	19	10 00	6	19	16 00
237	6	20	00 00	6	20	06 00
238	6	20	12 00	6	20	15 00
239	6	20	18 00	6	20	24 00
240	6	21	18 00	6	21	24 00
241	6	22	00 00	6	21	06 00
244	6	24	18 00	6	24	24 00
243	6	26	18 00	6	26	24 00
413	6	27	00 00	6	26	06 00
242	6	27	18 00	6	27	24 00
245	6	28	00 00	6	28	06 00
246	6	28	18 00	6	28	24 00
247	6	29	00 00	6	29	06 00
248	6	29	18 00	6	29	24 00
249	6	30	00 00	6	30	06 00
250	6	30	18 00	6	30	24 00
251	7	1	00 00	7	1	06 00
252	7	1	18 00	7	1	24 00
253	7	2	00 00	7	2	06 00
314	7	2	18 00	7	2	24 00
254	7	3	00 00	7	3	06 00
255	7	3	21 00	7	3	24 00
256	7	4	00 00	7	4	06 00
257	7	5	18 00	7	5	24 00
258	7	6	00 00	7	6	06 00
259	7	6	14 30	7	6	17 30
260	7	6	19 30	7	6	22 30
261	7	7	03 00	7	7	06 00
262	7	7	11 30	7	7	17 30
263	7	7	18 00	7	7	24 00
305	7	7	18 00	7	7	24 00
264	7	8	00 00	7	8	06 00
265	7	10	00 00	7	10	06 00
266	7	11	00 00	7	11	06 00
267	7	11	18 00	7	11	24 00
268	7	12	00 00	7	12	06 00
269	7	12	06 00	7	12	12 00
270	7	12	12 00	7	12	18 00
271	7	13	18 00	7	13	24 00
272	7	14	18 00	7	14	24 00
273	7	15	00 00	7	15	06 00
274	7	15	06 00	7	15	12 00
275	7	15	18 00	7	15	24 00
276	7	16	00 00	7	16	06 00
315	7	16	06 00	7	18	12 00



Tape Number	Start Time			Stop Time		
	Month	Day	Time (UT)	Month	Day	Time (UT)
277	7	18	12 00	7	18	15 00
316	7	18	18 00	7	18	24 00
277	7	18	21 00	7	18	24 00
278	7	19	18 00	7	19	24 00
279	7	20	18 00	7	20	24 00
280	7	21	18 00	7	21	24 00
281	7	23	18 00	7	23	24 00
282	7	25	06 00	7	25	12 00
283	7	25	14 00	7	25	17 00
284	7	25	18 00	7	25	24 00
285	7	26	18 00	7	26	24 00
286	7	27	00 00	7	27	06 00
287	7	27	06 00	7	27	12 00
288	7	27	12 00	7	27	18 00
289	7	27	18 00	7	27	24 00
290	7	28	00 00	7	28	06 00
291	7	28	06 00	7	28	12 00
292	7	28	12 00	7	28	18 00
293	7	28	18 00	7	28	24 00
294	7	29	00 00	7	29	06 00
295	7	29	08 00	7	29	12 00
296	7	29	18 00	7	29	24 00
297	7	30	00 00	7	30	06 00
298	7	30	06 00	7	30	12 00
299	7	30	12 00	7	30	18 00
300	7	30	18 00	7	30	24 00
301	7	31	00 00	7	31	06 00
302	7	31	06 00	7	31	12 00
303	7	31	12 00	7	31	18 00
304	7	31	18 00	7	31	24 00
317	8	1	18 00	8	1	24 00
318	8	2	06 00	8	2	12 00
319	8	2	12 00	8	2	18 00
320	8	2	18 00	8	2	24 00
321	8	3	00 00	8	3	06 00
322	8	3	06 00	8	3	12 00
323	8	3	18 00	8	3	24 00
324	8	4	00 00	8	4	06 00
325	8	4	06 00	8	4	12 00
326	8	4	12 00	8	4	18 00
327	8	4	18 00	8	4	24 00
328	8	5	00 00	8	5	06 00
329	8	5	06 00	8	5	12 00
330	8	5	18 00	8	5	24 00
331	8	6	18 00	8	6	24 00
332	8	7	00 00	8	7	06 00
333	8	7	06 00	8	7	12 00
334	8	7	12 00	8	7	18 00
335	8	8	06 00	8	8	12 00
336	8	8	12 00	8	8	18 00
337	8	8	18 00	8	8	24 00

Tape Number	Start Time			Stop Time		
	Month	Day	Time (UT)	Month	Day	Time (UT)
338	8	9	00 00	8	9	06 00
339	8	9	06 00	8	9	12 00
340	8	9	12 00	8	9	18 00
341	8	9	18 00	8	9	24 00
342	8	10	00 00	8	10	06 00
343	8	10	13 00	8	10	19 00
344	8	10	19 00	8	10	24 00
345	8	11	18 00	8	11	24 00
346	8	12	00 00	8	12	06 00
347	8	12	18 00	8	12	24 00
348	8	13	00 00	8	13	06 00
349	8	13	18 00	8	13	24 00
350	8	14	18 00	8	14	24 00
351	8	15	00 00	8	15	06 00
352	8	17	00 00	8	17	06 00
353	8	17	06 00	8	17	12 00
354	8	17	14 00	8	17	18 00
355	8	17	18 00	8	17	24 00
356	8	18	00 00	8	18	06 00
357	8	18	06 00	8	18	12 00
358	8	18	12 00	8	18	18 00
359	8	18	18 00	8	18	24 00
360	8	19	06 00	8	19	12 00
361	8	19	06 00	8	19	12 00
362	8	19	12 00	8	19	18 00
363	8	19	18 00	8	19	24 00
364	8	20	00 00	8	20	06 00
365	8	20	06 00	8	20	12 00
366	8	20	12 00	8	20	16 00
367	8	20	18 00	8	20	24 00
368	8	21	00 00	8	21	06 00
369	8	21	12 00	8	21	18 00
370	8	21	18 00	8	21	24 00
371	8	22	00 00	8	22	06 00
372	8	22	06 00	8	22	12 00
373	8	22	12 00	8	22	15 00
374	8	22	18 00	8	22	21 00
373	8	22	21 00	8	22	24 00
375	8	23	00 00	8	23	06 00
376	8	23	10 00	8	21	17 00
377	8	23	18 00	8	23	24 00
378	8	24	00 00	8	24	06 00
379	8	24	06 00	8	24	12 00
380	8	24	12 00	8	24	18 00
381	8	24	18 00	8	24	24 00
382	8	25	00 00	8	25	06 00
383	8	25	06 00	8	25	12 00
384	8	25	12 00	8	25	18 00
385	8	25	18 00	8	25	24 00
386	8	26	00 00	8	26	06 00
387	8	26	12 00	8	26	18 00

Tape Number	Start Time			Stop Time		
	Month	Day	Time (UT)	Month	Day	Time (UT)
388	8	26	18 00	8	26	24 00
414	8	27	00 00	8	27	06 00
389	8	27	12 00	8	27	18 00
390	8	27	18 00	8	27	24 00
391	8	28	00 00	8	28	06 00
392	8	28	06 00	8	28	12 00
393	8	28	12 00	8	28	15 00
394	8	28	18 00	8	28	24 00
395	8	29	00 00	8	29	06 00
396	8	29	10 00	8	29	12 00
397	8	29	12 00	8	29	18 00
398	8	29	18 00	8	29	24 00
399	8	30	00 00	8	30	06 00
400	8	30	06 00	8	30	12 00
401	8	30	12 00	8	30	15 00
402	8	30	18 00	8	30	24 00
403	8	31	00 00	8	31	06 00
404	8	31	06 00	8	31	12 00
405	8	31	18 00	8	31	24 00
415	9	1	00 00	9	1	06 00
416	9	1	06 00	9	1	12 00
417	9	1	12 00	9	1	18 00
418	9	1	18 00	9	1	24 00
419	9	2	00 00	9	2	06 00
420	9	2	10 00	9	2	12 00
421	9	2	12 00	9	2	18 00
422	9	2	18 00	9	2	24 00
423	9	3	00 00	9	3	06 00
424	9	3	06 00	9	3	12 00
425	9	3	18 00	9	3	24 00
426	9	4	06 00	9	4	12 00
427	9	4	12 00	9	4	18 00
428	9	4	19 00	9	4	24 00
429	9	5	00 00	9	5	06 00
430	9	5	06 00	9	5	12 00
431	9	5	12 00	9	5	18 00
432	9	6	00 00	9	6	06 00
433	9	6	06 00	9	6	12 00
434	9	6	12 00	9	6	18 00
435	9	7	10 00	9	7	16 00
436	9	7	16 00	9	7	19 00
436	9	7	21 00	9	7	24 00
437	9	8	00 00	9	8	06 00
438	9	8	07 00	9	8	13 00
439	9	8	12 00	9	8	18 00
440	9	8	18 00	9	8	24 00
441	9	9	00 00	9	9	06 00
442	9	9	18 00	9	9	24 00
443	9	10	00 00	9	10	06 00
444	9	10	10 00	9	10	12 00
445	9	10	21 00	9	10	24 00

Tape Number	Start Time			Stop Time		
	Month	Day	Time (UT)	Month	Day	Time (UT)
446	9	10	21 00	9	10	24 00
447	9	11	00 00	9	11	06 00
446	9	11	06 00	9	11	09 00
448	9	12	07 30	9	12	12 00
449	9	12	12 00	9	12	18 00
450	9	12	20 00	9	13	03 00
451	9	13	12 00	9	14	15 00
451	9	13	16 00	9	13	19 00
452	9	14	00 00	9	14	06 00
453	9	14	06 00	9	14	09 00
453	9	14	13 00	9	14	16 00
454	9	15	06 00	9	15	12 00
455	9	15	12 00	9	15	18 00
456	9	16	00 00	9	16	06 00
457	9	16	06 00	9	16	12 00
458	9	16	12 00	9	16	18 00
459	9	16	18 00	9	16	21 00
459	9	16	22 00	9	17	01 00
460	9	17	18 00	9	17	24 00
461	9	18	06 00	9	18	12 00
462	9	18	12 00	9	18	18 00
463	9	19	06 00	9	19	09 00
463	9	19	14 00	9	19	17 00
464	9	19	18 00	9	19	24 00
465	9	20	00 00	9	20	06 00
466	9	20	06 00	9	29	12 00
467	9	20	12 00	9	20	18 00
468	9	20	18 00	9	20	24 00
469	9	21	00 00	9	21	06 00
470	9	21	06 00	9	21	12 00
471	9	21	12 00	9	21	18 00
472	9	21	18 00	9	21	24 00
473	9	22	12 00	9	22	18 00
474	9	22	19 00	9	23	01 00
475	9	23	06 00	9	23	12 00
476	9	23	12 00	9	23	18 00
477	9	23	18 00	9	23	24 00
478	9	24	00 00	9	24	06 00
479	9	24	10 00	9	24	16 00
480	9	25	00 00	9	25	06 00
481	9	25	06 00	9	24	12 00
482	9	25	12 00	9	25	18 00
483	9	26	06 00	9	26	12 00
484	9	26	12 00	9	26	18 00
485	9	26	18 00	9	26	24 00
486	9	27	00 00	9	27	06 00
487	9	27	06 00	9	27	12 00
488	9	28	06 00	9	28	12 00
489	9	28	12 00	9	28	15 00
490	9	28	18 00	9	28	24 00
491	9	29	00 00	9	29	06 00

Tape Number	Start Time			Stop Time		
	Month	Day	Time (UT)	Month	Day	Time (UT)
492	9	30	18 00	9	30	24 00
493	10	1	18 00	10	1	24 00
494	10	5	06 00	10	5	12 00
495	10	5	18 00	10	5	21 00
495	10	6	09 00	10	6	12 00
496	10	6	12 00	10	6	18 00
497	10	8	06 00	10	8	12 00
498	10	9	00 00	10	9	06 00
499	10	9	06 00	10	9	12 00
501	10	10	00 00	10	10	03 00
500	10	10	06 00	10	10	12 00
501	10	10	12 00	10	10	18 00
502	10	12	12 00	10	12	18 00
503	10	12	19 00	10	12	24 00
504	10	13	06 00	10	13	12 00
505	10	13	12 00	10	13	18 00
506	10	17	10 00	10	17	13 00
506	10	18	10 00	10	18	13 00
507	10	19	06 00	10	19	12 00
538	10	19	06 00	10	19	12 00
508	10	19	12 00	10	19	18 00
509	10	20	00 00	10	20	06 00
510	10	20	12 00	10	20	15 00
539	10	21	10 00	10	21	12 00
510	10	21	12 00	10	21	15 00
511	10	26	09 00	10	26	15 00
512	10	27	09 00	10	27	15 00
513	11	08	09 00	11	08	15 00
514	11	11	09 00	11	11	15 00
515	11	12	06 00	11	12	12 00
516	11	18	06 00	11	18	09 00
516	11	18	10 00	11	18	13 00
517	11	21	18 00	11	21	24 00
518	11	22	00 00	11	22	06 00
519	11	22	06 00	11	22	12 00
520	11	22	12 00	11	22	18 00
521	11	22	18 00	11	22	24 00
522	11	23	06 00	11	23	09 00
522	11	24	06 00	11	24	09 00
523	11	24	09 00	11	24	12 00
524	11	24	18 00	11	24	24 00
526	11	25	12 00	11	25	18 00
525	11	25	18 00	11	25	21 00
525	11	26	09 00	11	26	12 00
527	11	26	12 00	11	26	18 00
528	11	26	18 00	11	26	24 00
529	11	27	07 00	11	27	13 00
530	11	27	12 00	11	27	18 00
531	11	27	18 00	11	27	21 00
532	11	28	00 00	11	28	06 00
531	11	28	06 00	11	28	09 00

Tape Number	Start Time			Stop Time		
	Month	Day	Time (UT)	Month	Day	Time (UT)
533	11	28	12 00	11	28	15 00
534	11	28	15 00	11	28	21 00
535	11	28	21 00	11	29	03 00
536	11	30	00 00	11	30	06 00
537	11	30	10 00	11	30	06 00
540	12	1	09 00	12	1	15 00
541	12	2	00 00	12	2	06 00
542	12	2	09 00	12	2	12 00
543	12	3	06 00	12	3	12 00
544	12	3	12 00	12	3	18 00
545	12	3	18 00	12	3	24 00
546	12	4	00 00	12	4	06 00
547	12	4	06 00	12	4	12 00
548	12	4	12 00	12	4	18 00
549	12	4	18 00	12	4	24 00
550	12	5	09 00	12	5	15 00
551	12	5	15 00	12	5	21 00
552	12	5	21 00	12	6	03 00
553	12	6	03 00	12	6	09 00
555	12	6	09 00	12	6	15 00
555	12	6	21 00	12	7	03 00
556	12	7	09 00	12	7	15 00
557	12	7	15 00	12	7	21 00
558	12	7	21 00	12	8	03 00
559	12	8	03 00	12	8	09 00
560	12	8	09 00	12	8	15 00
561	12	8	09 00	12	8	15 00
562	12	8	15 00	12	8	21 00
563	12	9	03 00	12	9	06 00
563	12	9	18 00	12	9	21 00
564	12	09	21 00	12	10	03 00
567	12	10	06 00	12	10	15 00
565	12	10	09 00	12	10	12 00
566	12	10	15 00	12	10	18 00
566	12	10	21 00	12	10	24 00
567	12	11	01 00	12	11	04 00
568	12	11	10 00	12	11	15 00
569	12	11	15 00	12	11	18 00
570	12	12	09 00	12	12	15 00
571	12	14	09 00	12	14	15 00
572	12	15	04 00	12	15	10 00
573	12	15	10 00	12	15	16 00
575	12	16	12 00	12	16	15 00
575	12	18	09 00	12	18	12 00
574	12	18	15 00	12	18	21 00
576	12	19	03 00	12	19	09 00
577	12	21	10 00	12	21	15 00
578	12	21	15 00	12	21	21 00
579	12	21	21 00	12	22	03 00
580	12	22	03 00	12	22	06 00
581	12	22	09 00	12	22	12 00

Tape Number	Start Time			Stop Time		
	Month	Day	Time(UT)	Month	Day	Time(UT)
580	12	22	10 00	12	22	13 00
581	12	22	13 00	12	22	16 00
582	12	25	03 00	12	25	09 00
583	12	25	09 00	12	25	15 00
585	12	30	10 00	12	30	16 00
584	12	30	16 00	12	30	19 00
584	12	30	21 00	12	30	24 00

Table 6. The tape format of the compiled digital tape.

Item	Specification
Track	9 tracks
Record density	6250 BPI
Record format	F (FB)
Block length	20,434 bytes (1byte=8 bits)
Record length (Logical record length )	34 bytes
Label	Non-label
Filing	Single volume/multi-file

Table 7. The data sequence in each logical record on the compiled digital tape.

Sequence	Observation items
1	VLF 750 Hz
2	VLF 2 Hz
3	VLF 4 kHz
4	VLF 30 kHz
5	VLF 350 kHz
6	VLF 1.2 MHz
7	VLF 8 kHz
8	VLF 60 kHz
9	VLF 90 kHz
10	CNA
11	Total magnetic field intensity
12	H-component of magnetic field
13	D-component of magnetic field
14	Z-component of magnetic field
15	H-component of ULF wave
16	D-component of ULF wave
17	Space

Table 8. The format of the observation time on the compiled digital tape.

Sequence	Items
1	Year (2 Bytes)
2	Total day (Jan. 1=1) (2 Bytes)
3	Hour (2 Bytes)
4	Minute (2 Bytes)
5	Space (26 Bytes)



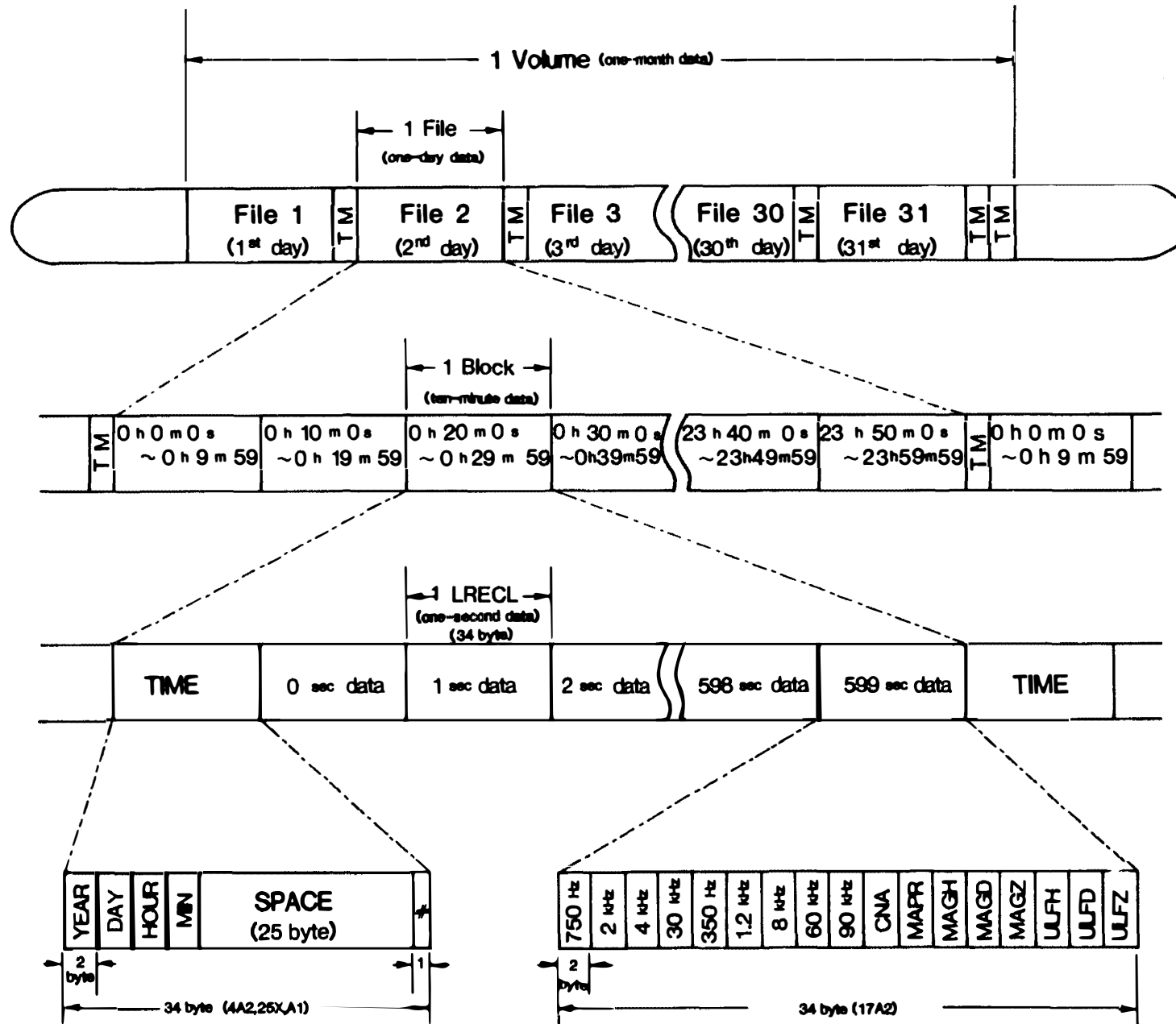


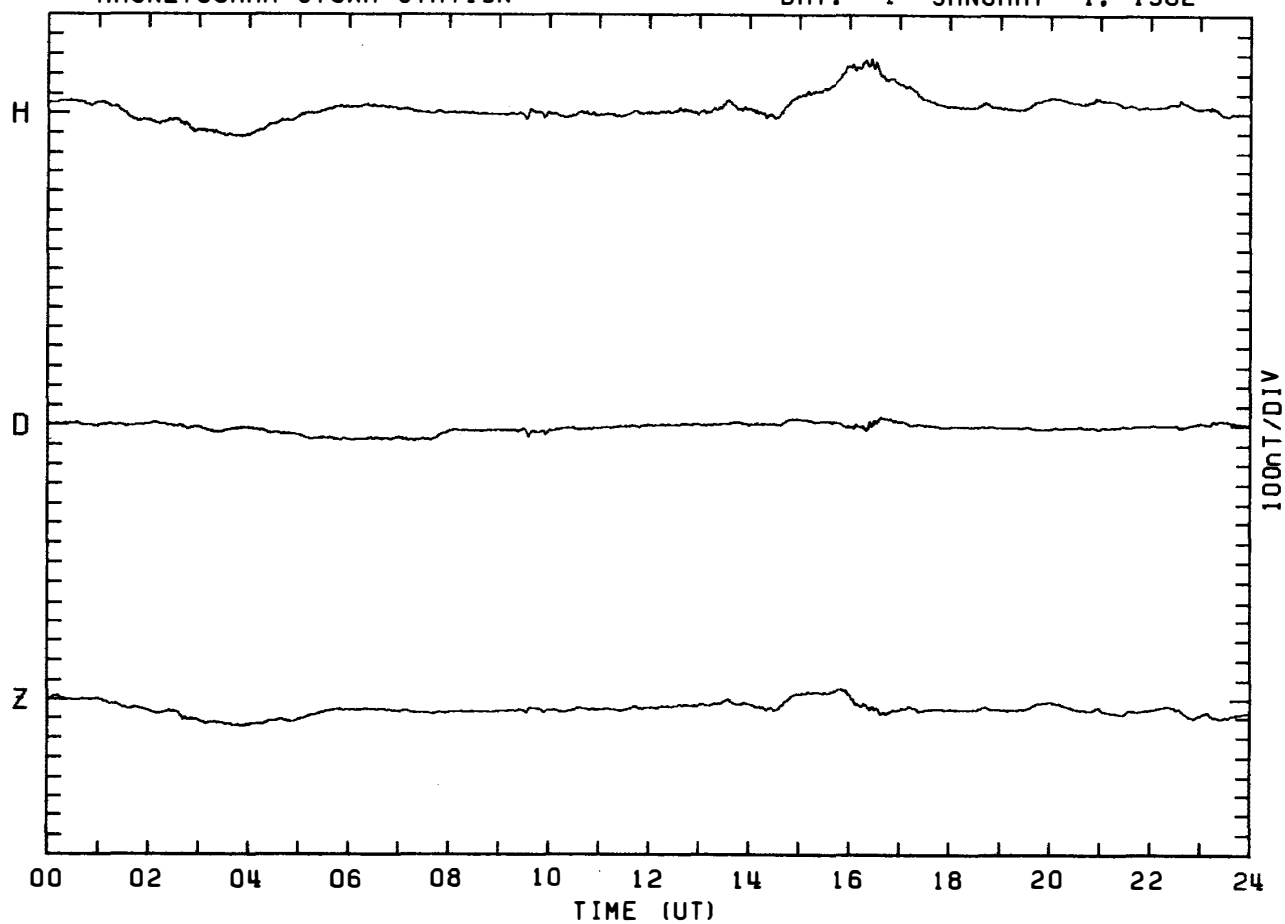
Fig. 6. The structure of the compiled digital tape format.

## Appendix 1

Continuous computer plots of magnetogram in the  
period of January 1 to December 31, 1982

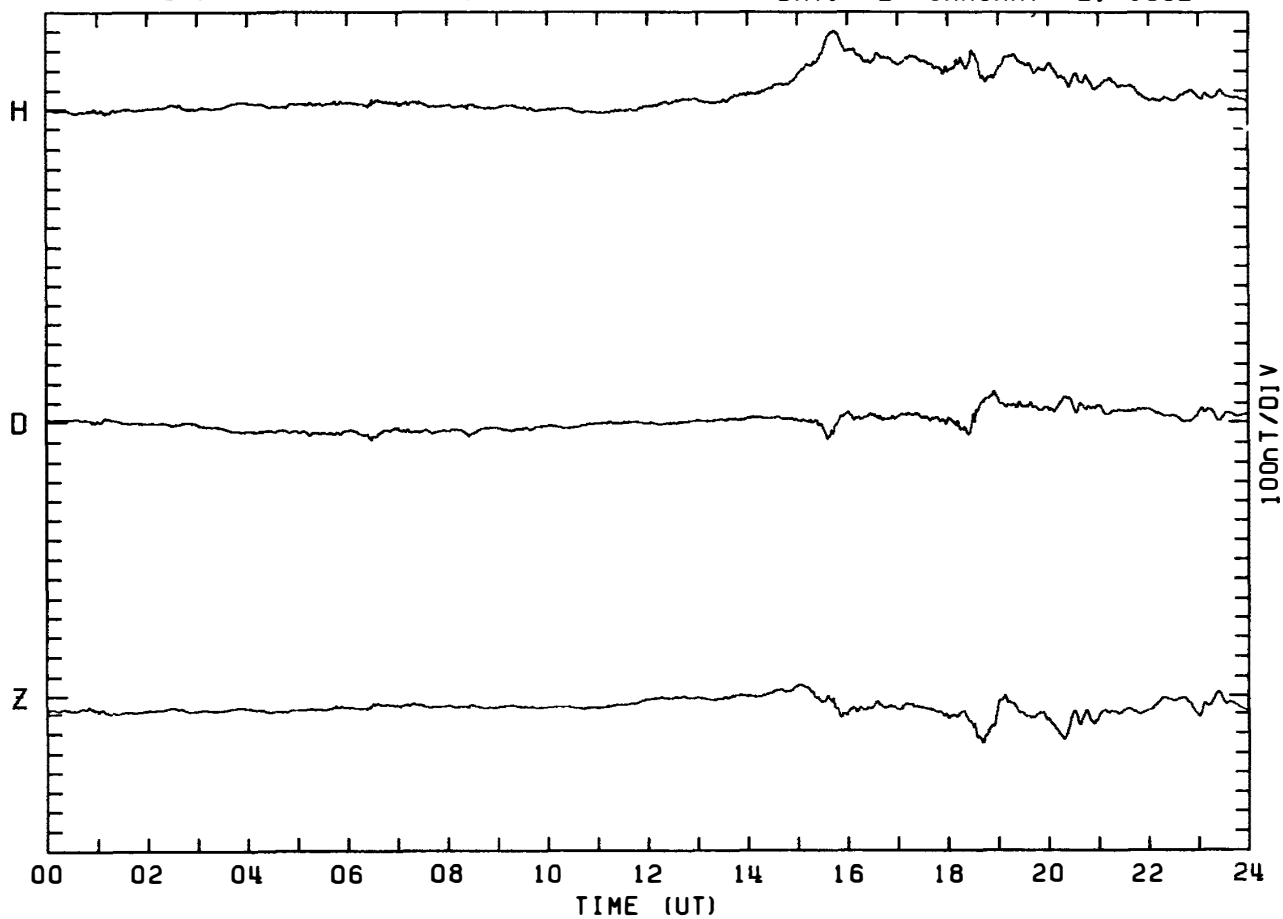
MAGNETOGRAM SYOWA STATION

DAY: 1 JANUARY 1, 1982



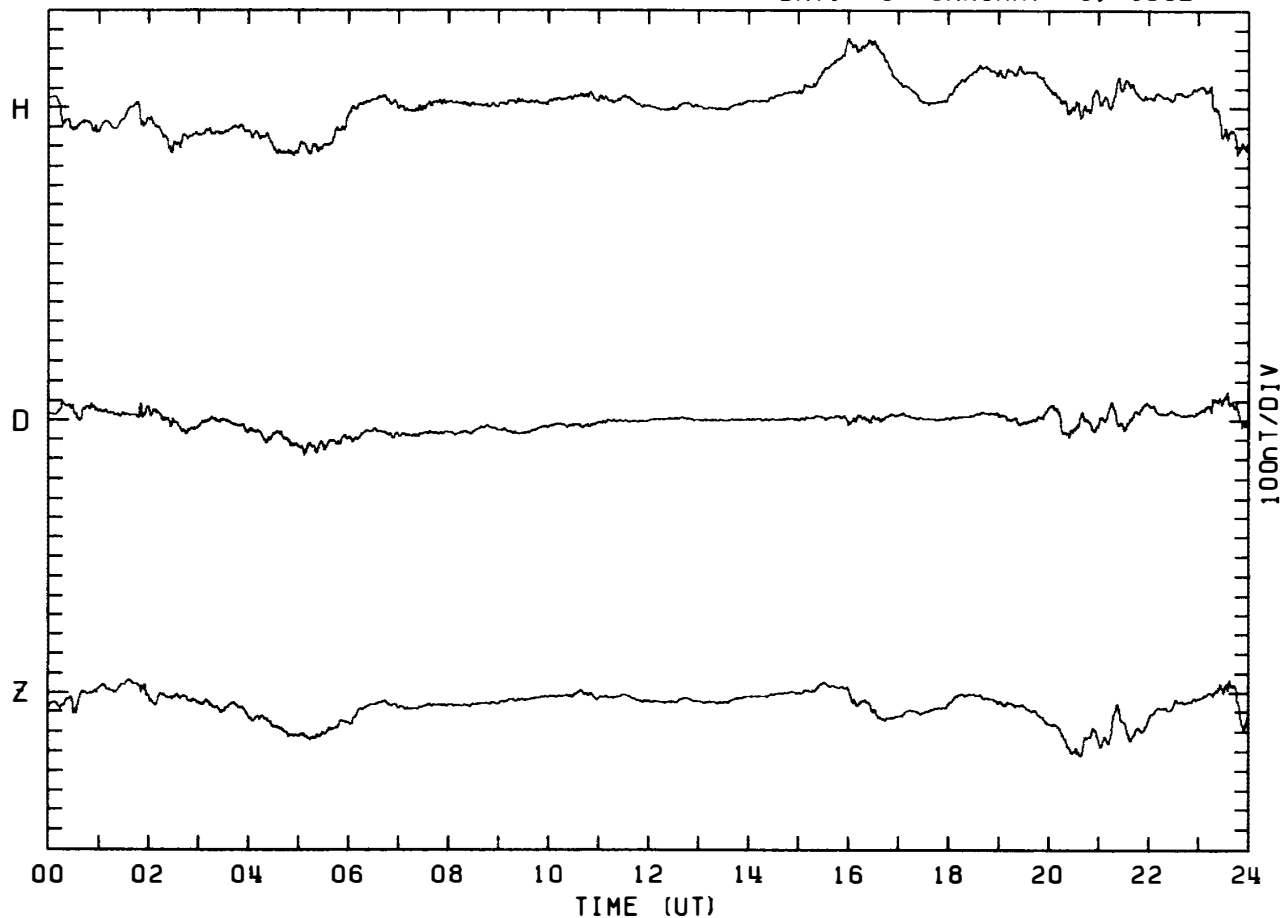
MAGNETOGRAM SYOWA STATION

DAY: 2 JANUARY 2, 1982



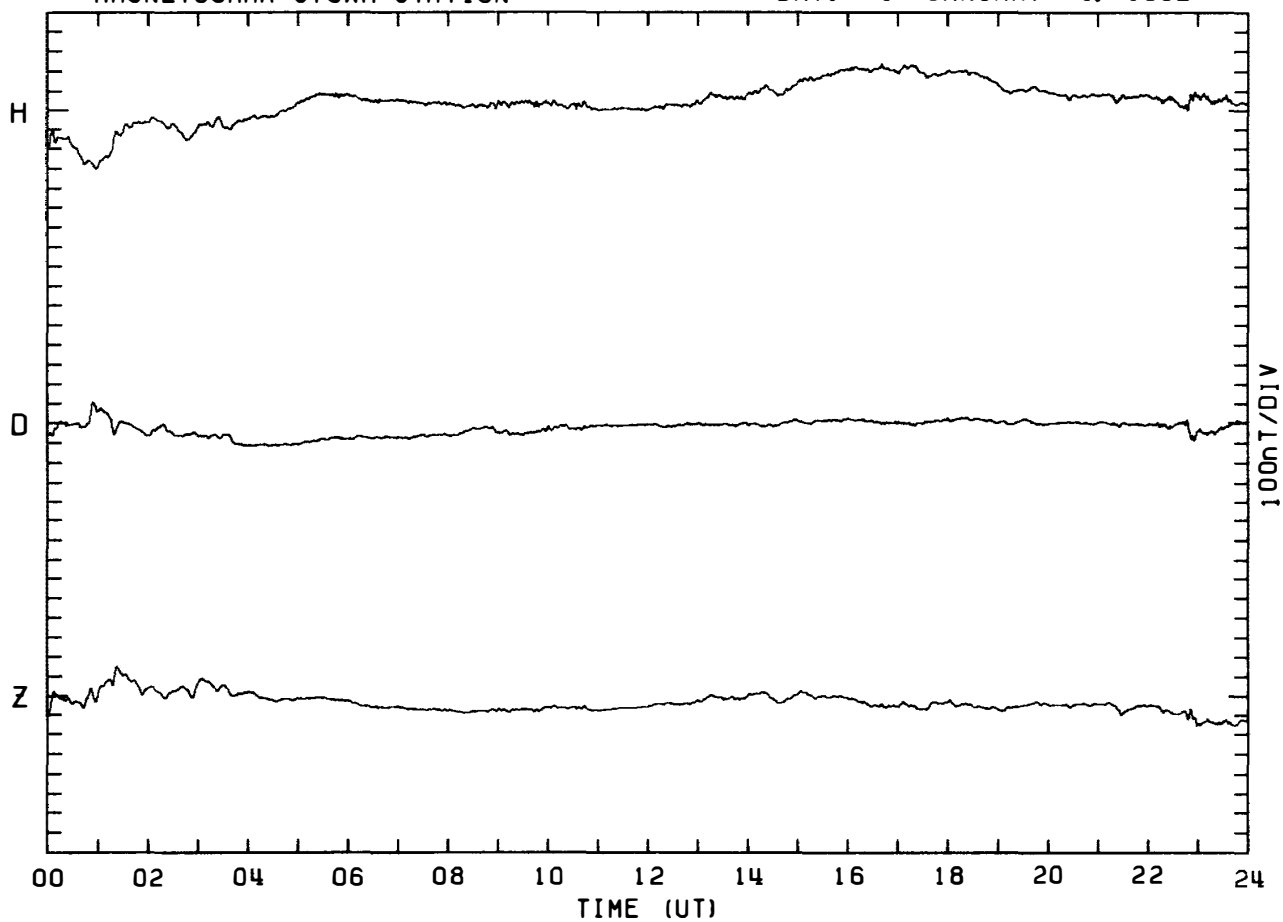
MAGNETOGRAM SYOWA STATION

DAY: 3 JANUARY 3, 1982



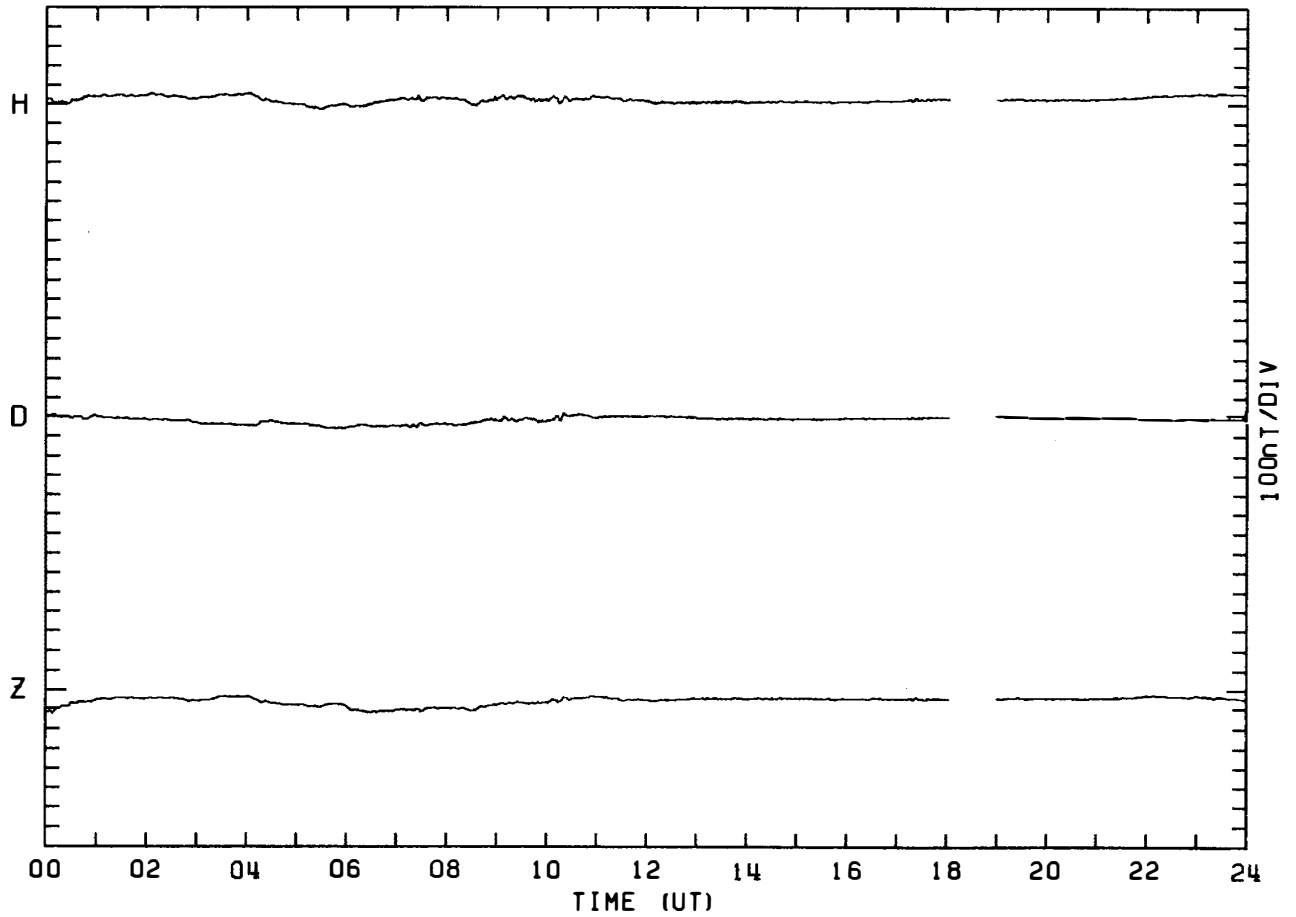
MAGNETOGRAM SYOWA STATION

DAY: 4 JANUARY 4, 1982



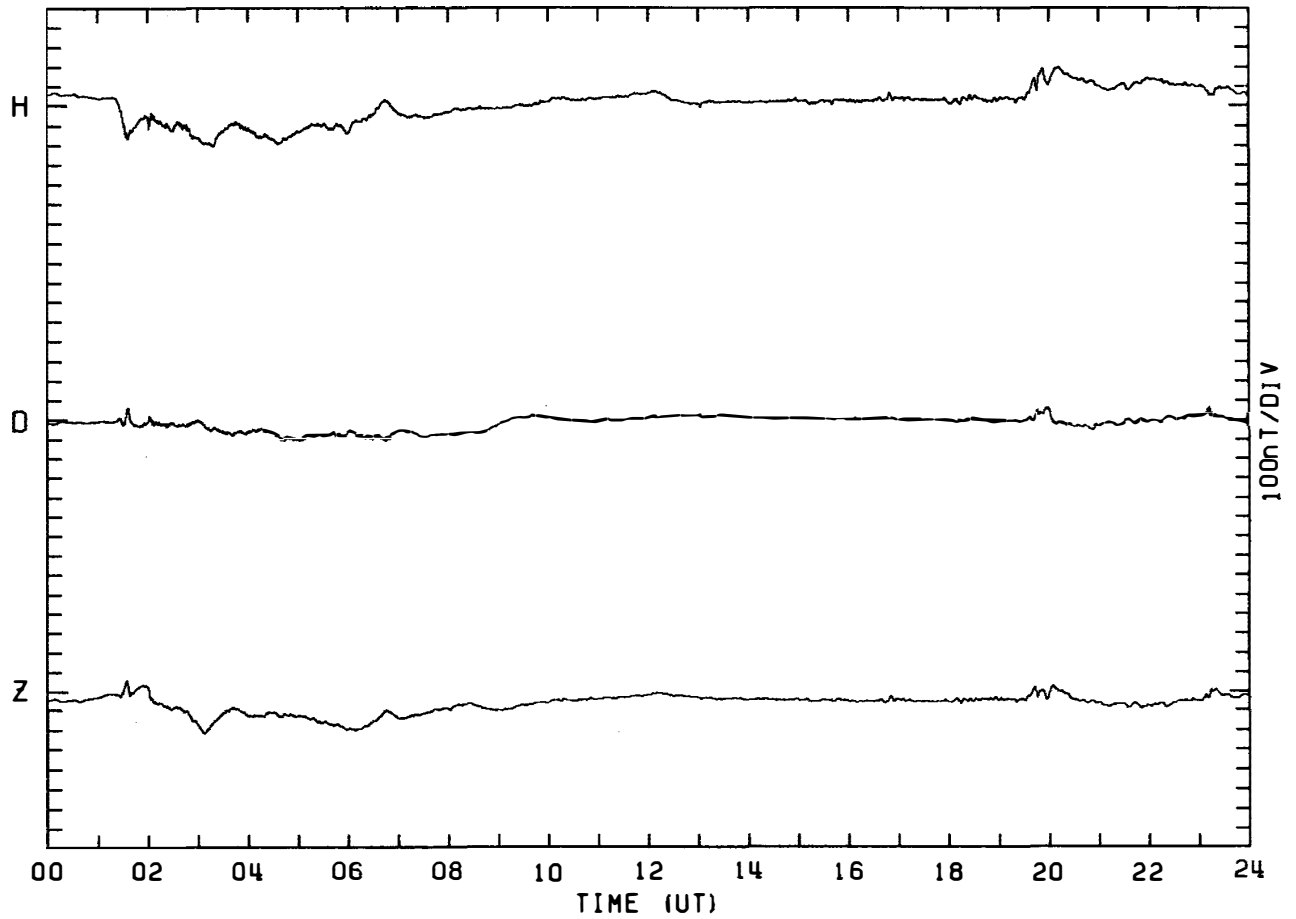
MAGNETOGRAM SYOWA STATION

DAY: 5 JANUARY 5. 1982



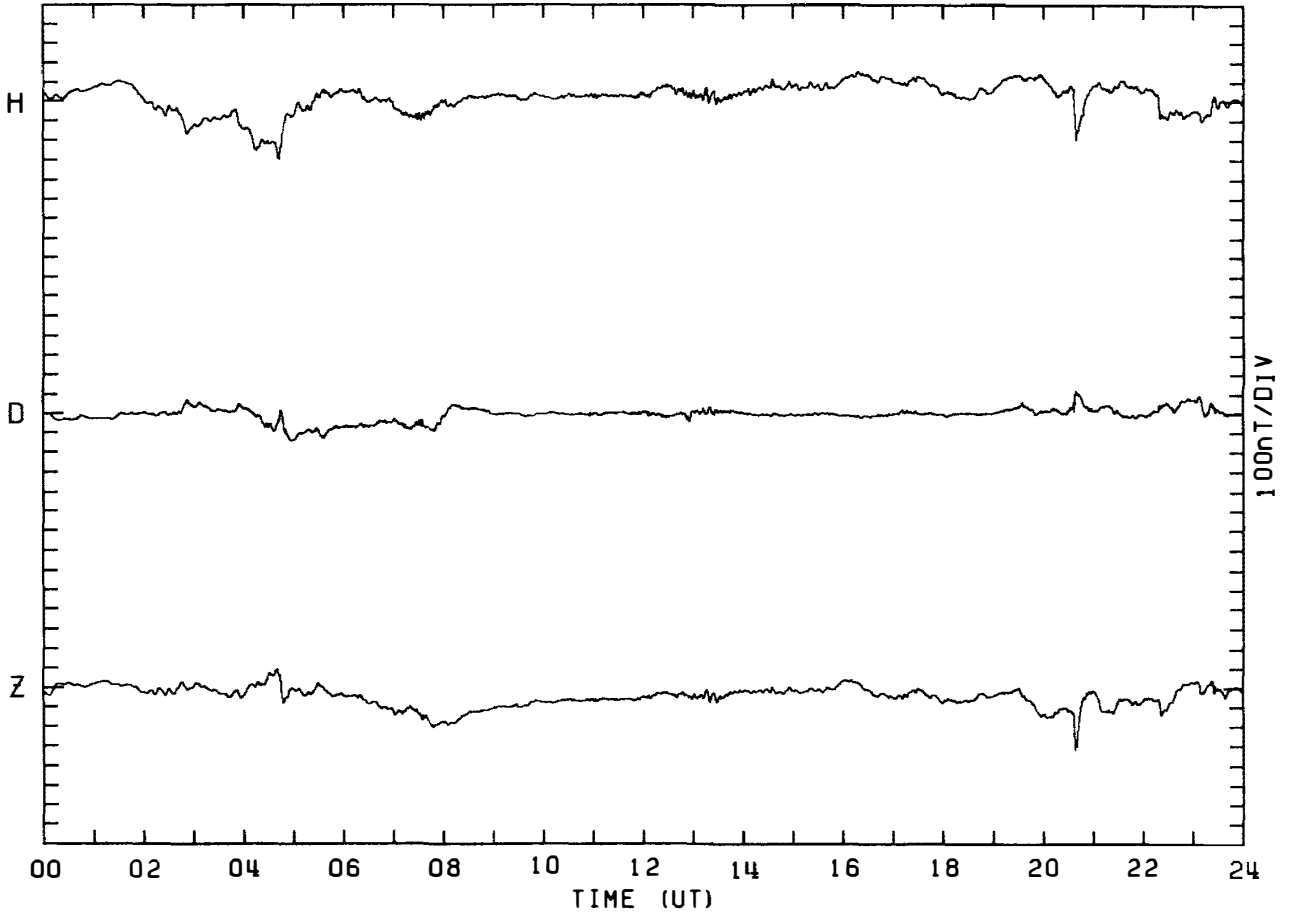
MAGNETOGRAM SYOWA STATION

DAY: 6 JANUARY 6. 1982



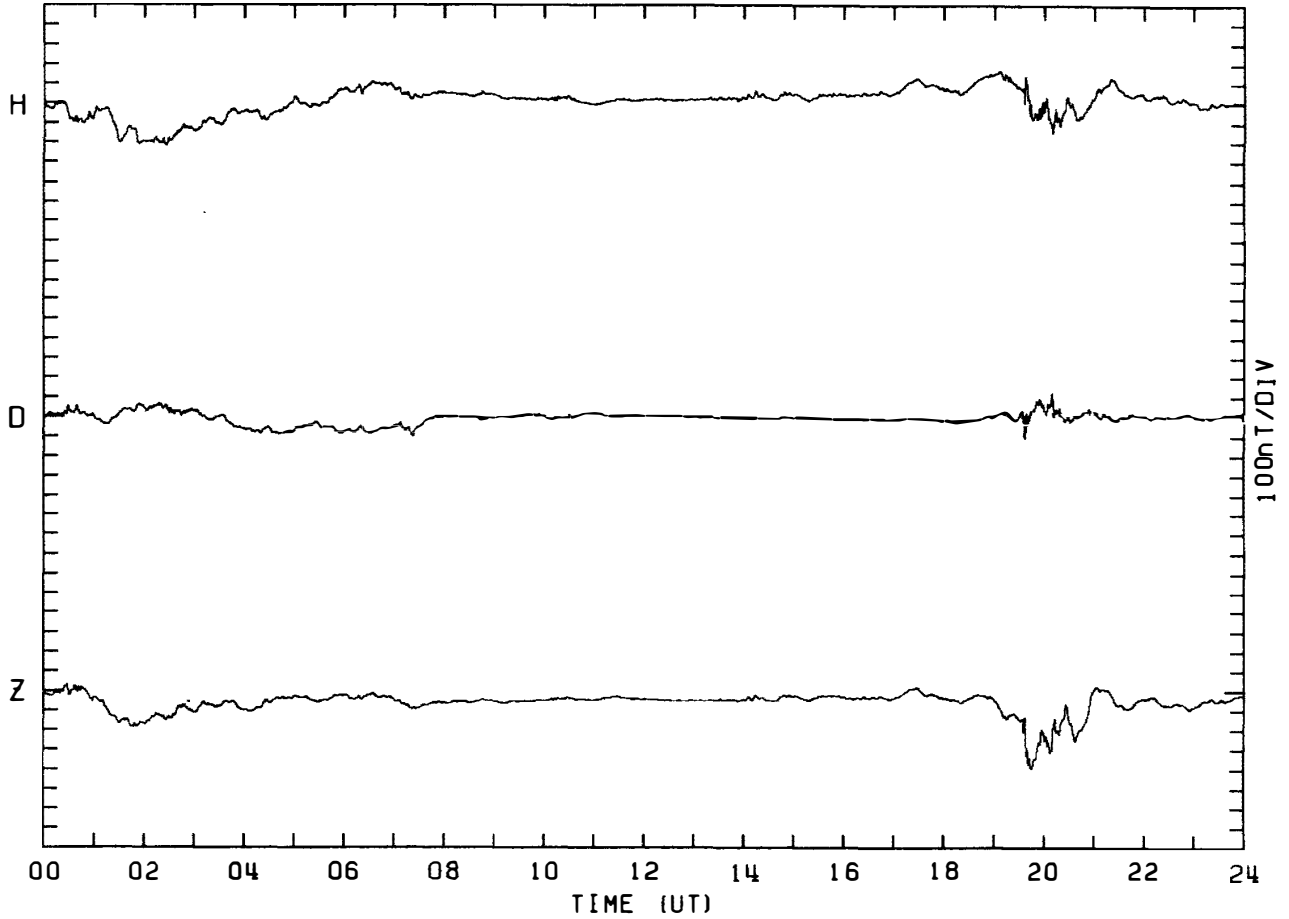
MAGNETOGRAM SYOWA STATION

DAY: 7 JANUARY 7, 1982



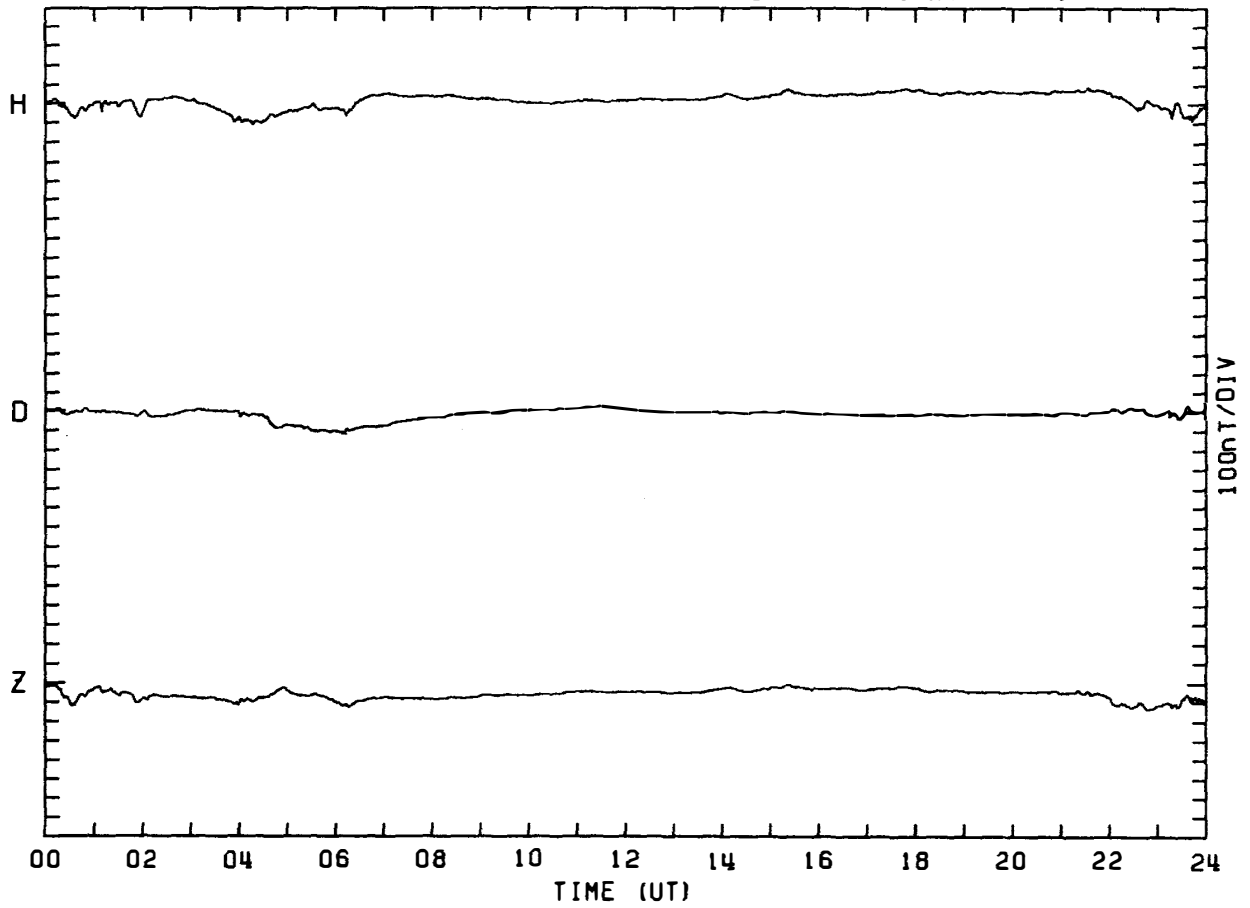
MAGNETOGRAM SYOWA STATION

DAY: 8 JANUARY 8, 1982



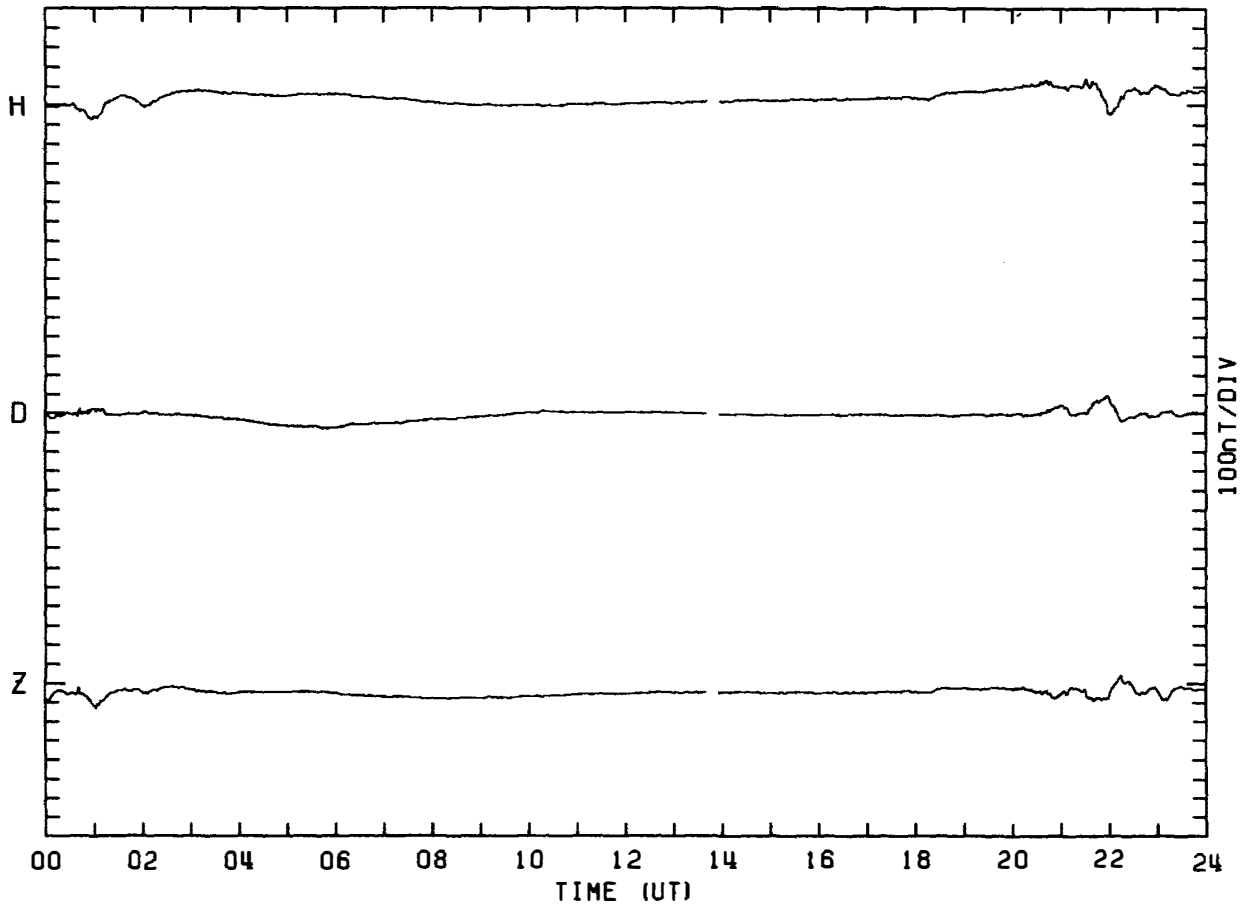
MAGNETOGRAM SYOWA STATION

DAY: 9 JANUARY 9, 1982



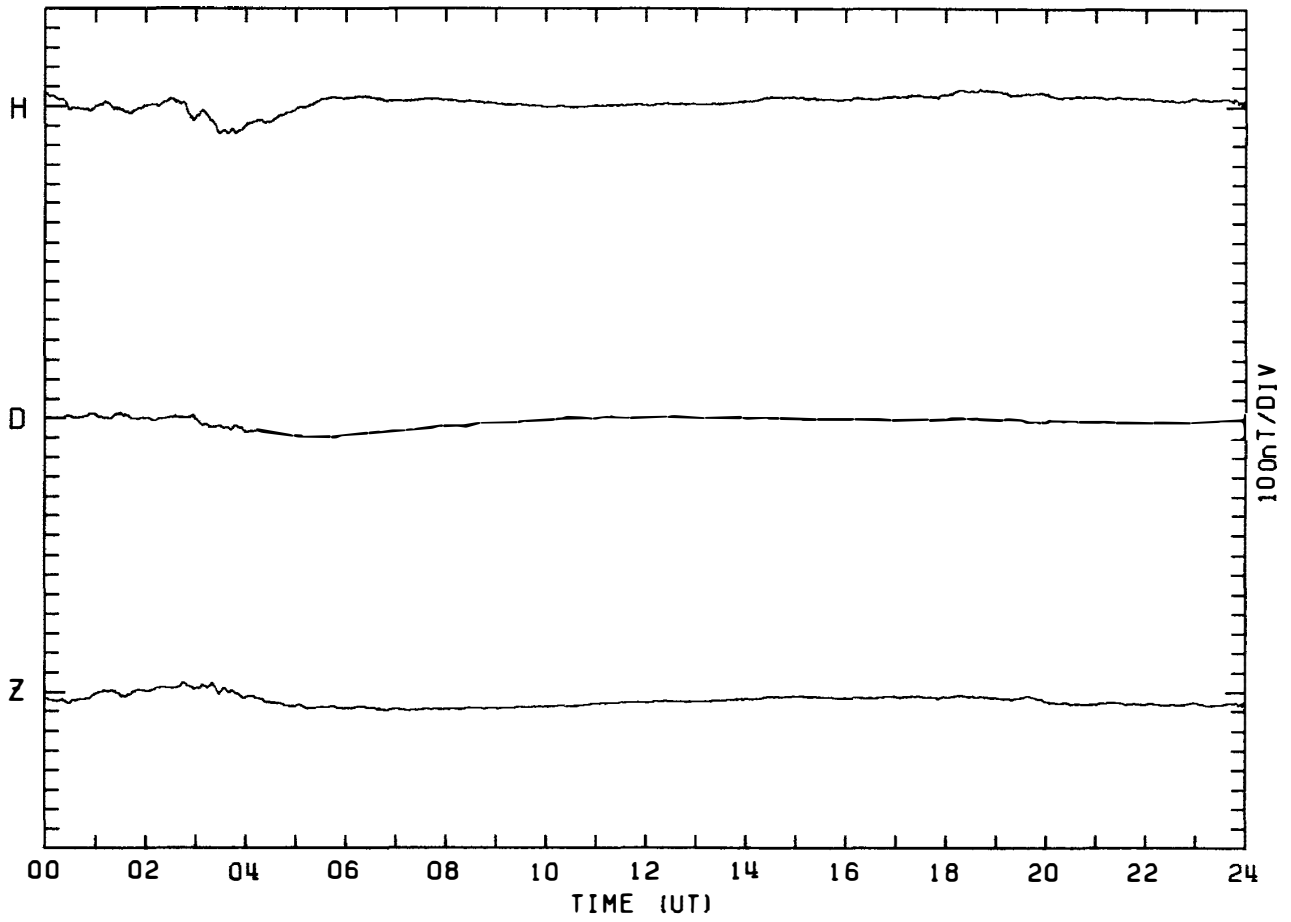
MAGNETOGRAM SYOWA STATION

DAY: 10 JANUARY 10, 1982



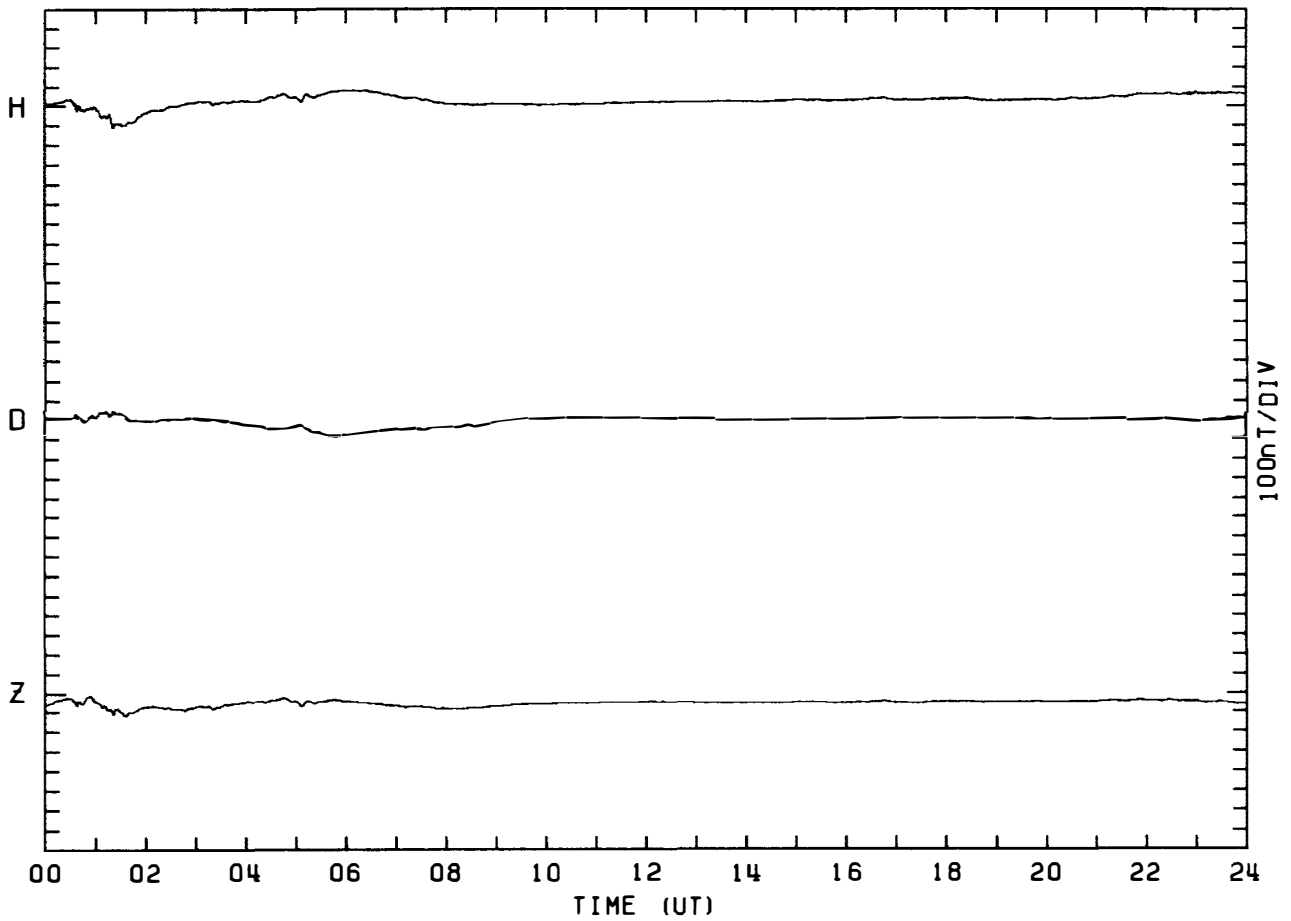
MAGNETOGRAM SYOWA STATION

DAY: 11 JANUARY 11, 1982



MAGNETOGRAM SYOWA STATION

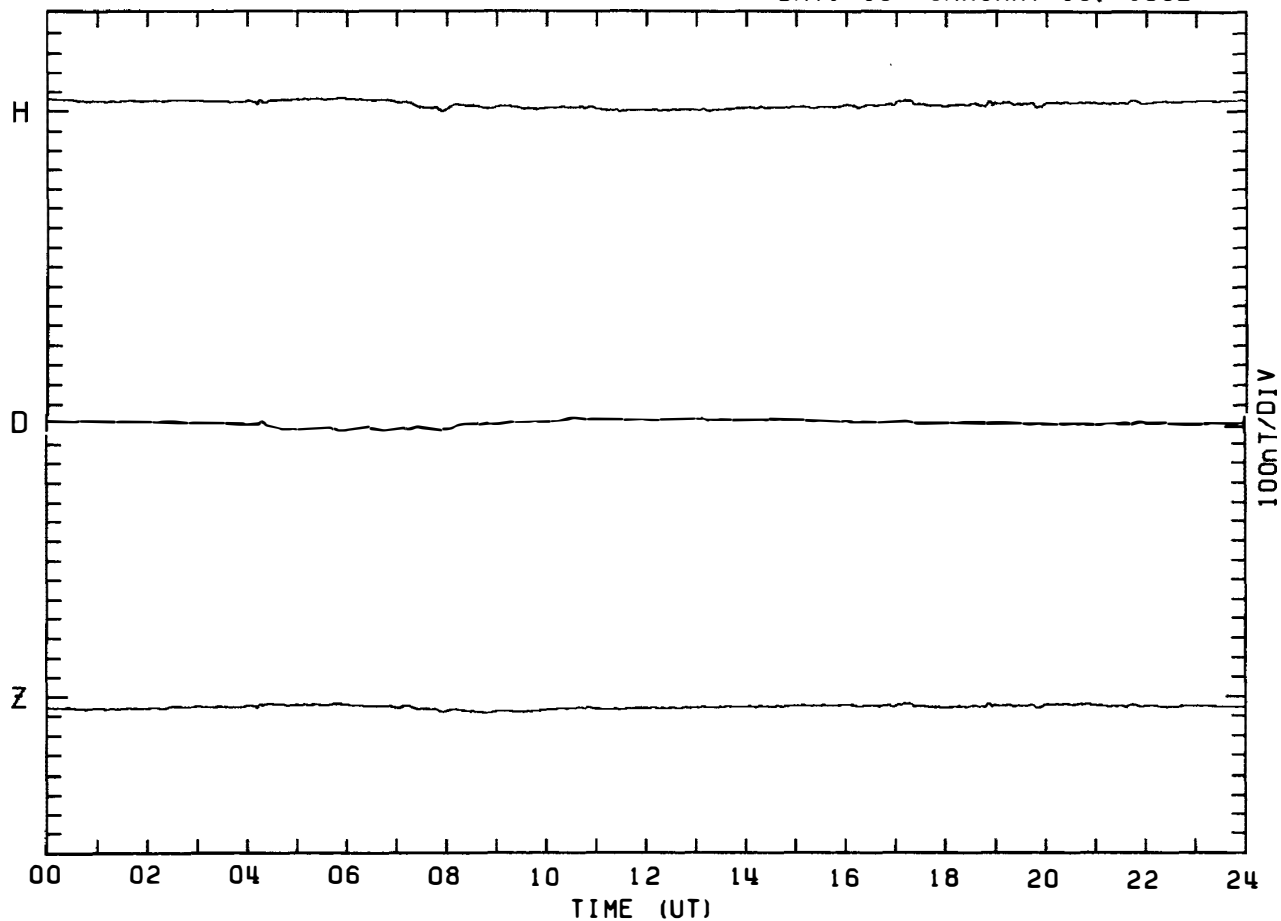
DAY: 12 JANUARY 12, 1982





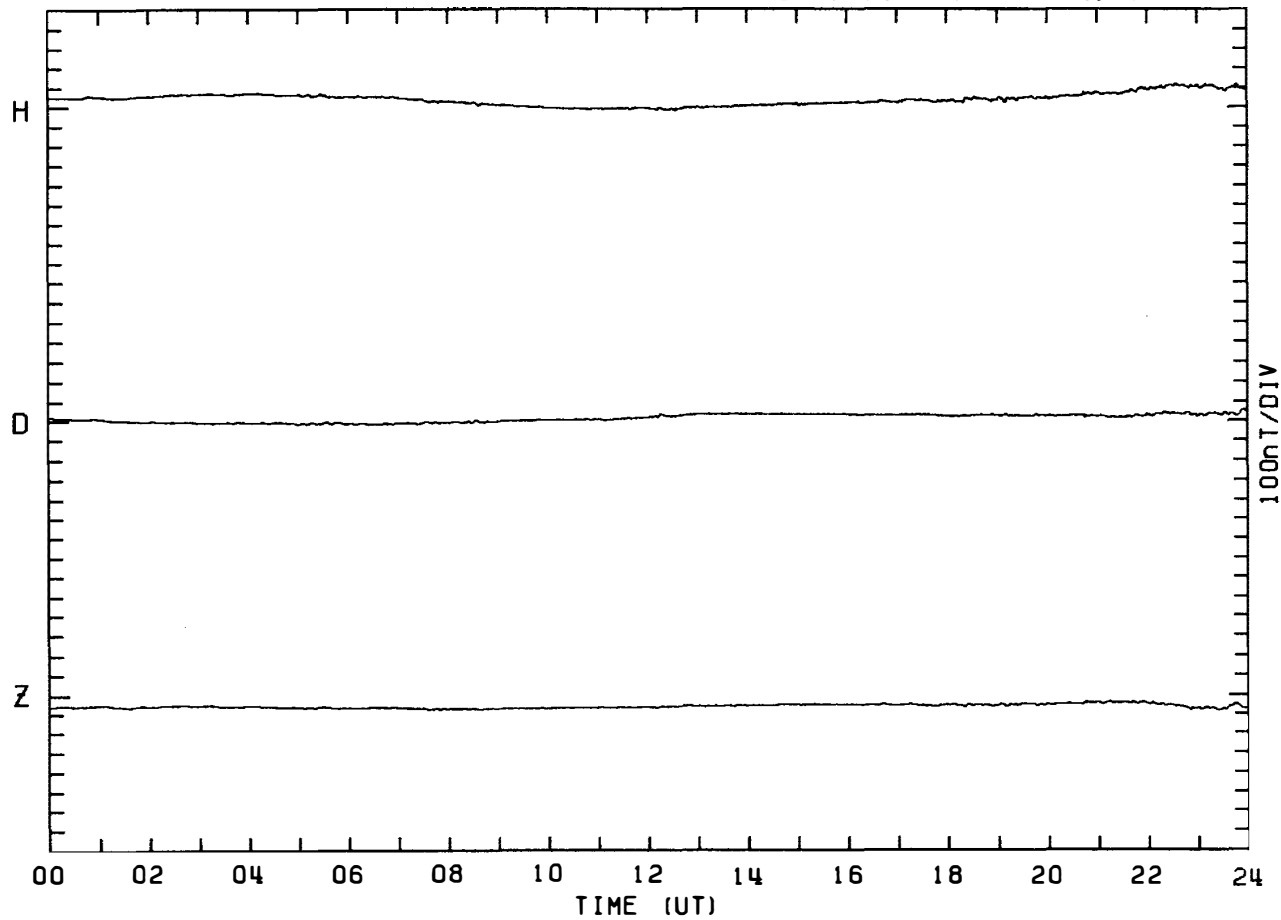
MAGNETOGRAM SYOWA STATION

DAY: 13 JANUARY 13, 1982



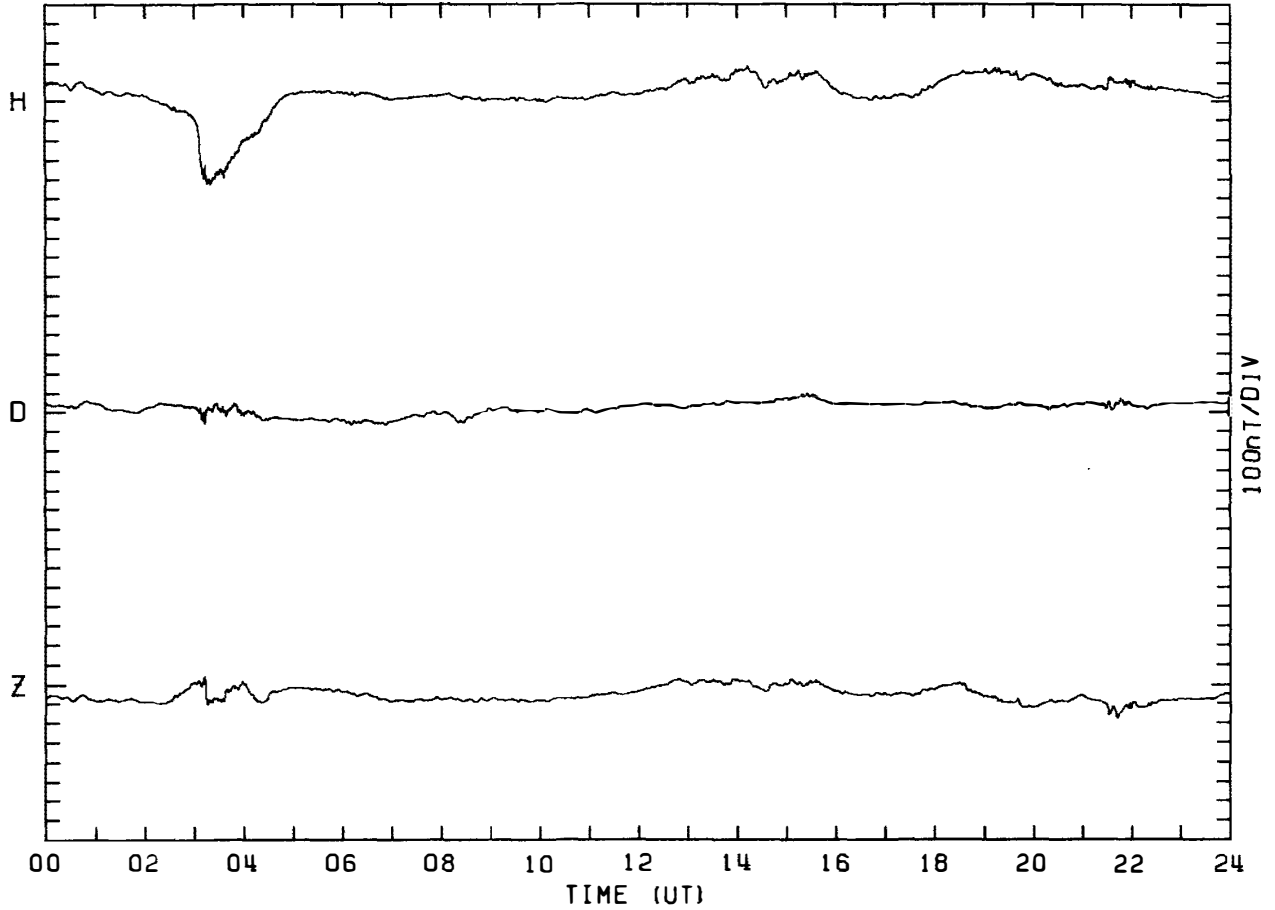
MAGNETOGRAM SYOWA STATION

DAY: 14 JANUARY 14, 1982



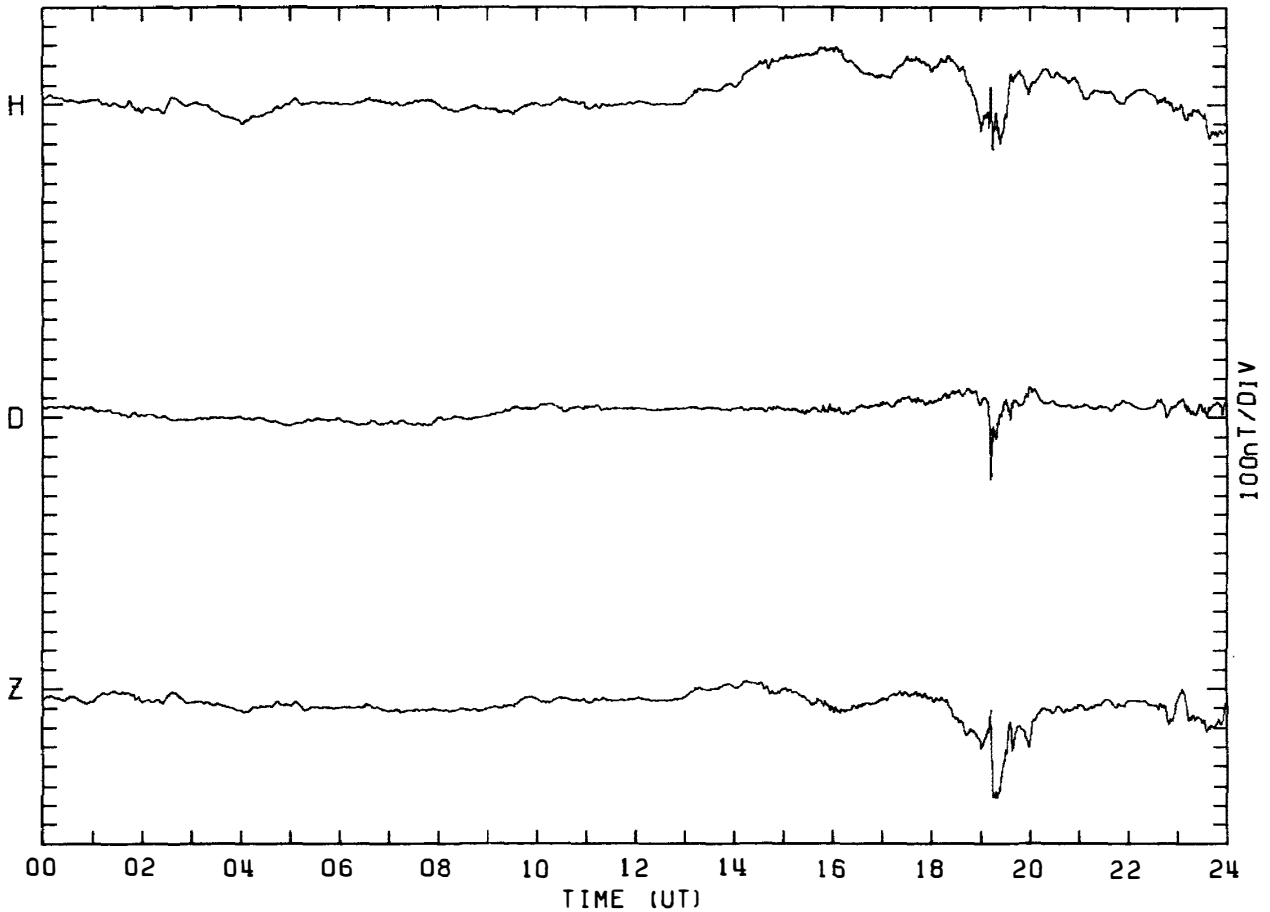
MAGNETOGRAM SYOWA STATION

DAY: 15 JANUARY 15, 1982



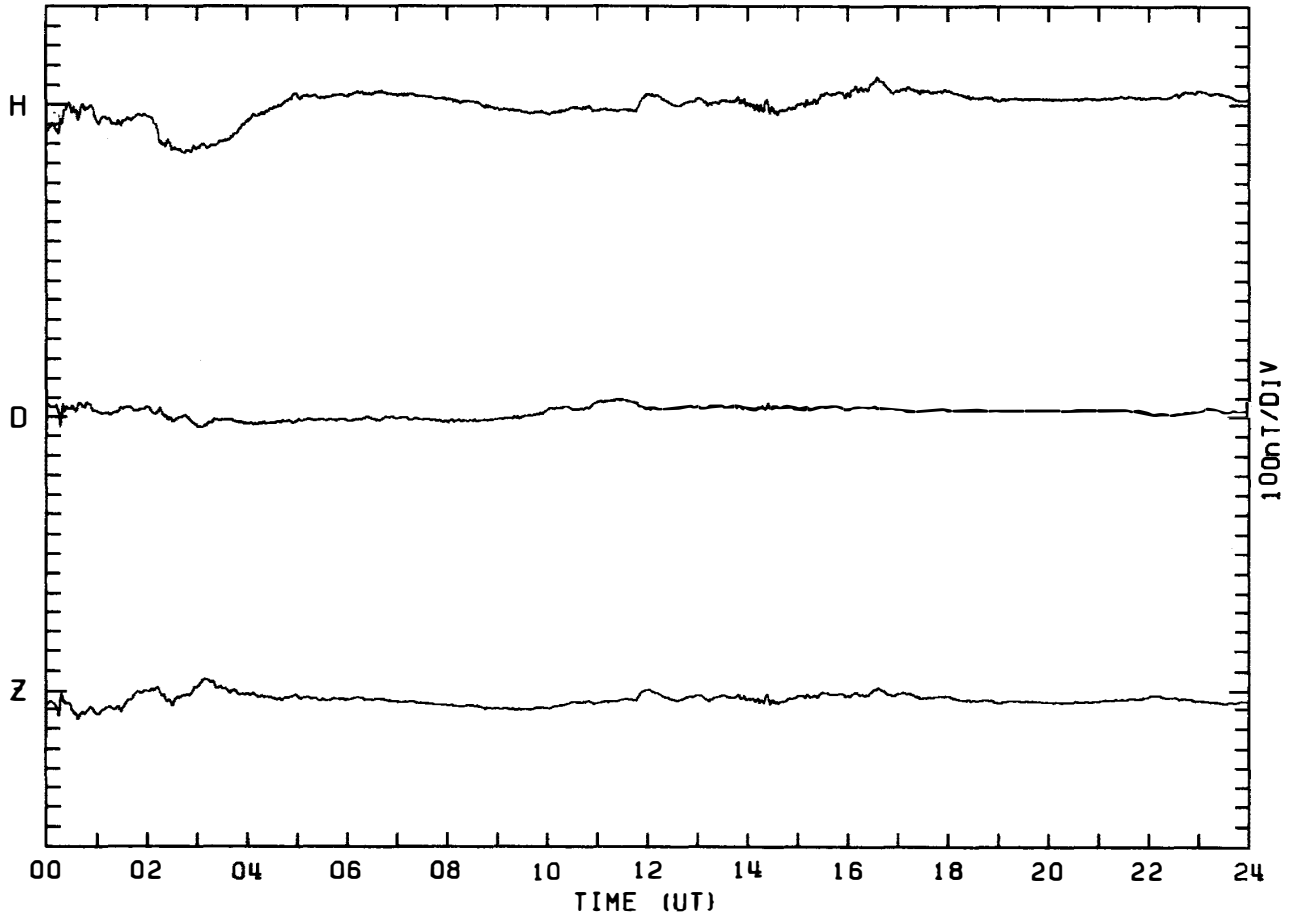
MAGNETOGRAM SYOWA STATION

DAY: 16 JANUARY 16, 1982



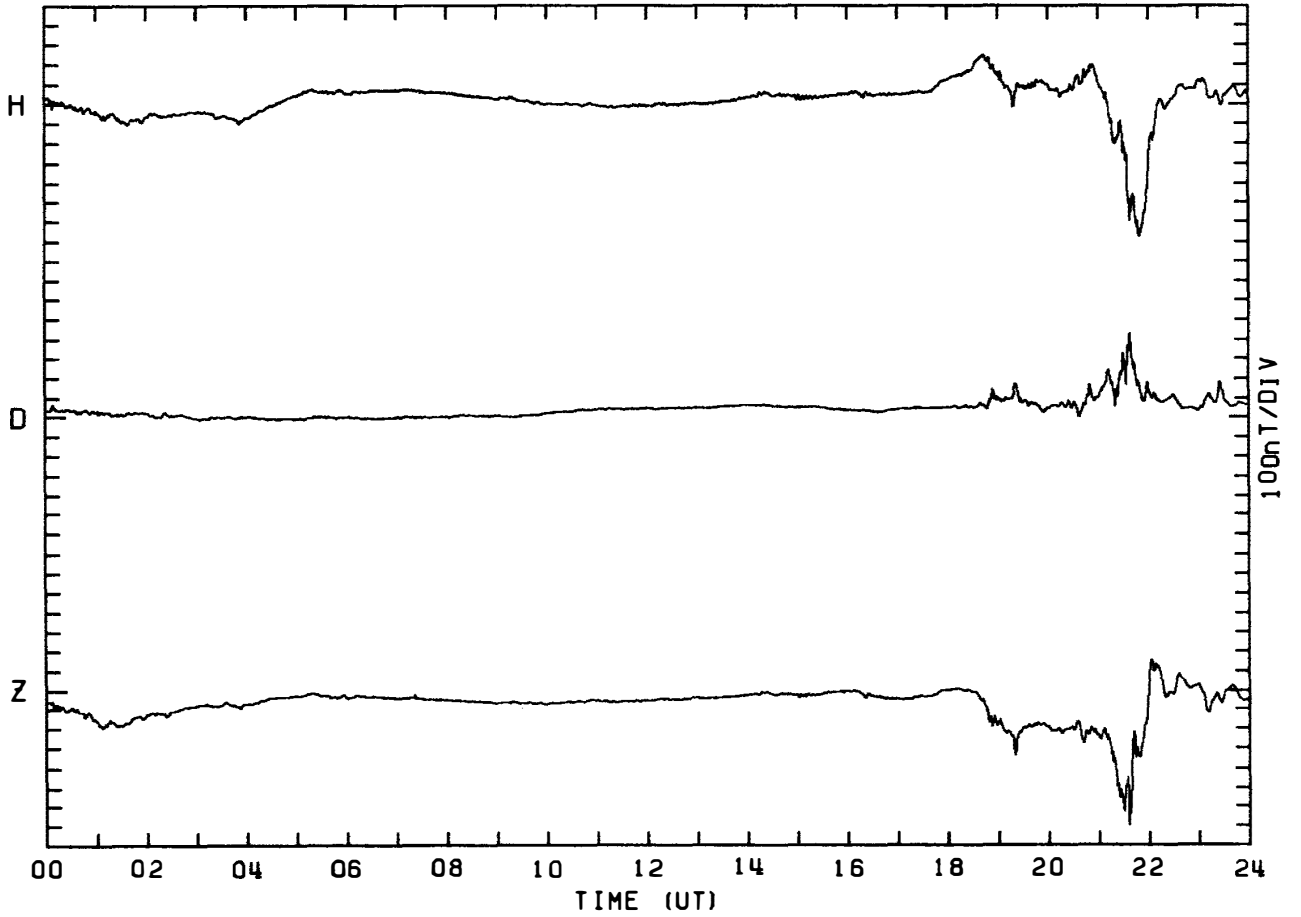
MAGNETOGRAM SYOWA STATION

DAY: 17 JANUARY 17, 1982



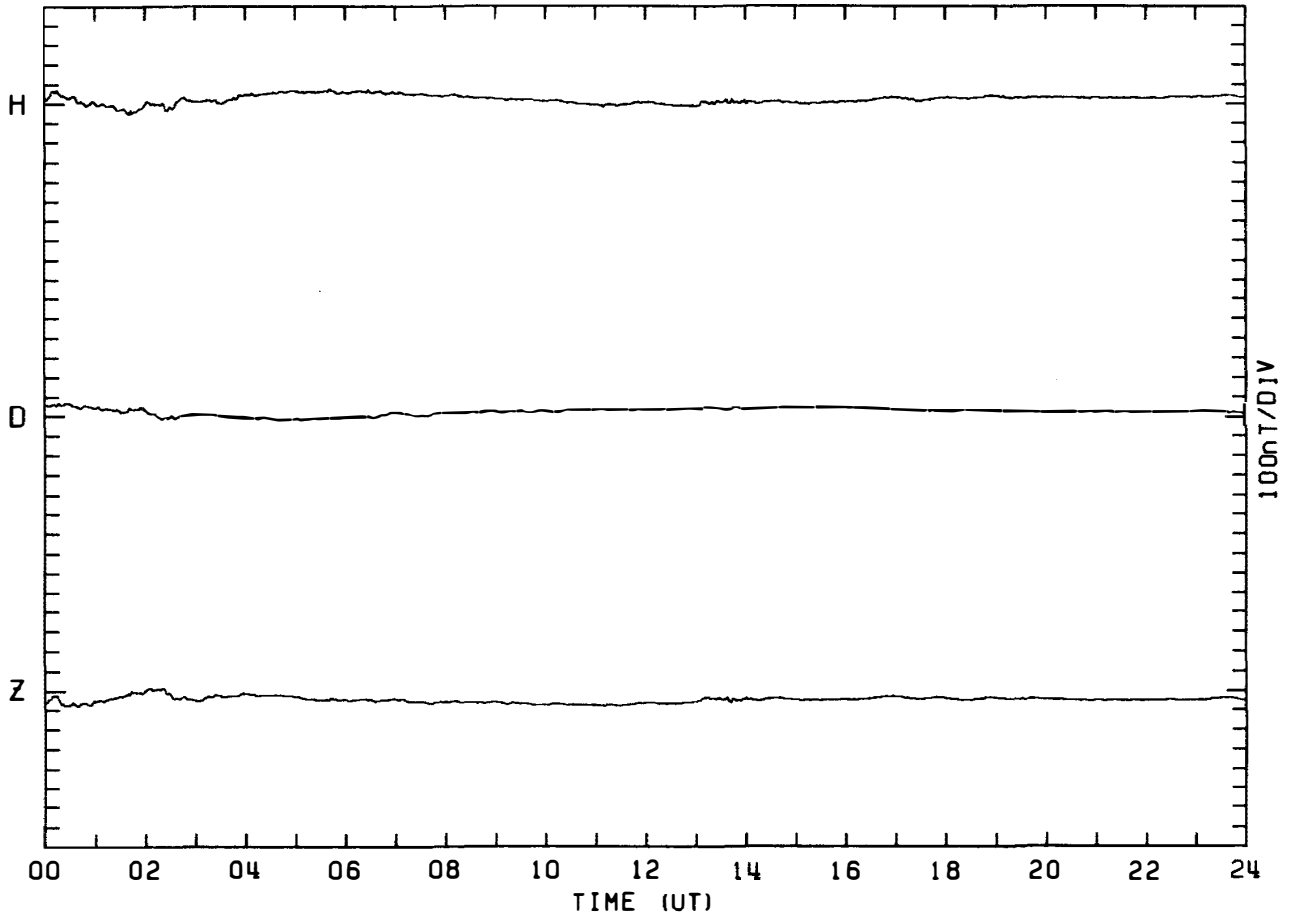
MAGNETOGRAM SYOWA STATION

DAY: 18 JANUARY 18, 1982



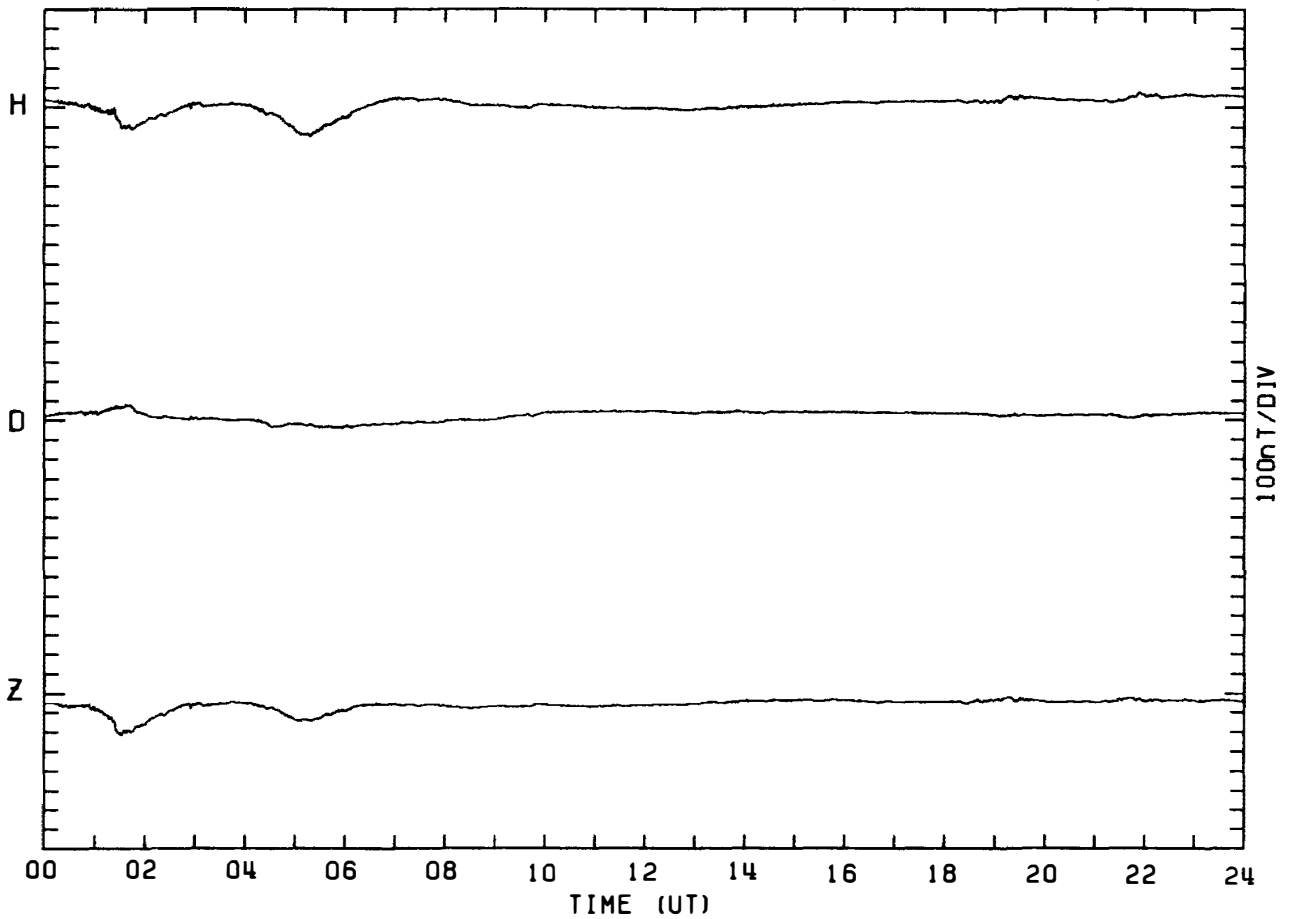
MAGNETOGRAM SYOWA STATION

DAY: 19 JANUARY 19, 1982



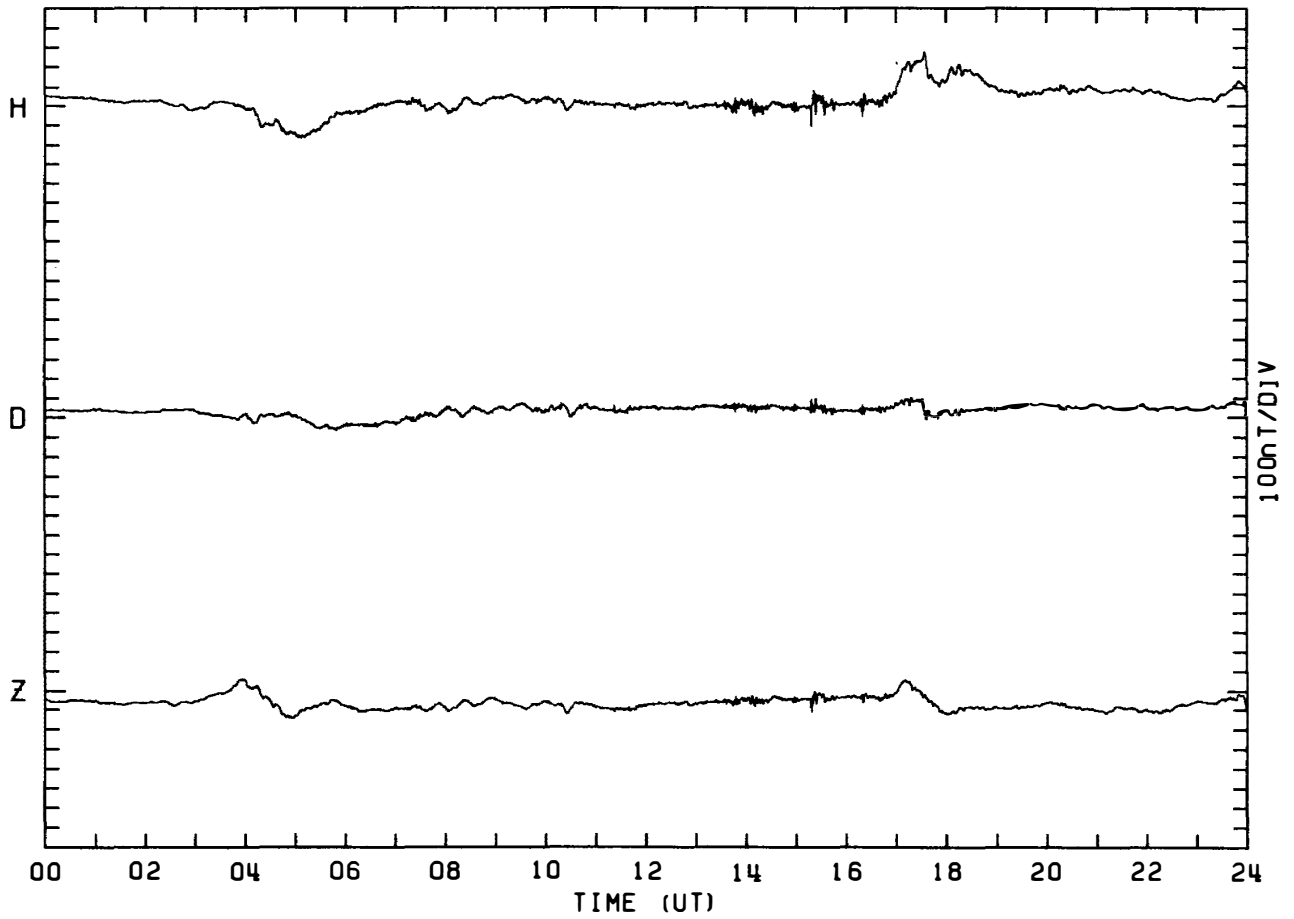
MAGNETOGRAM SYOWA STATION

DAY: 20 JANUARY 20, 1982



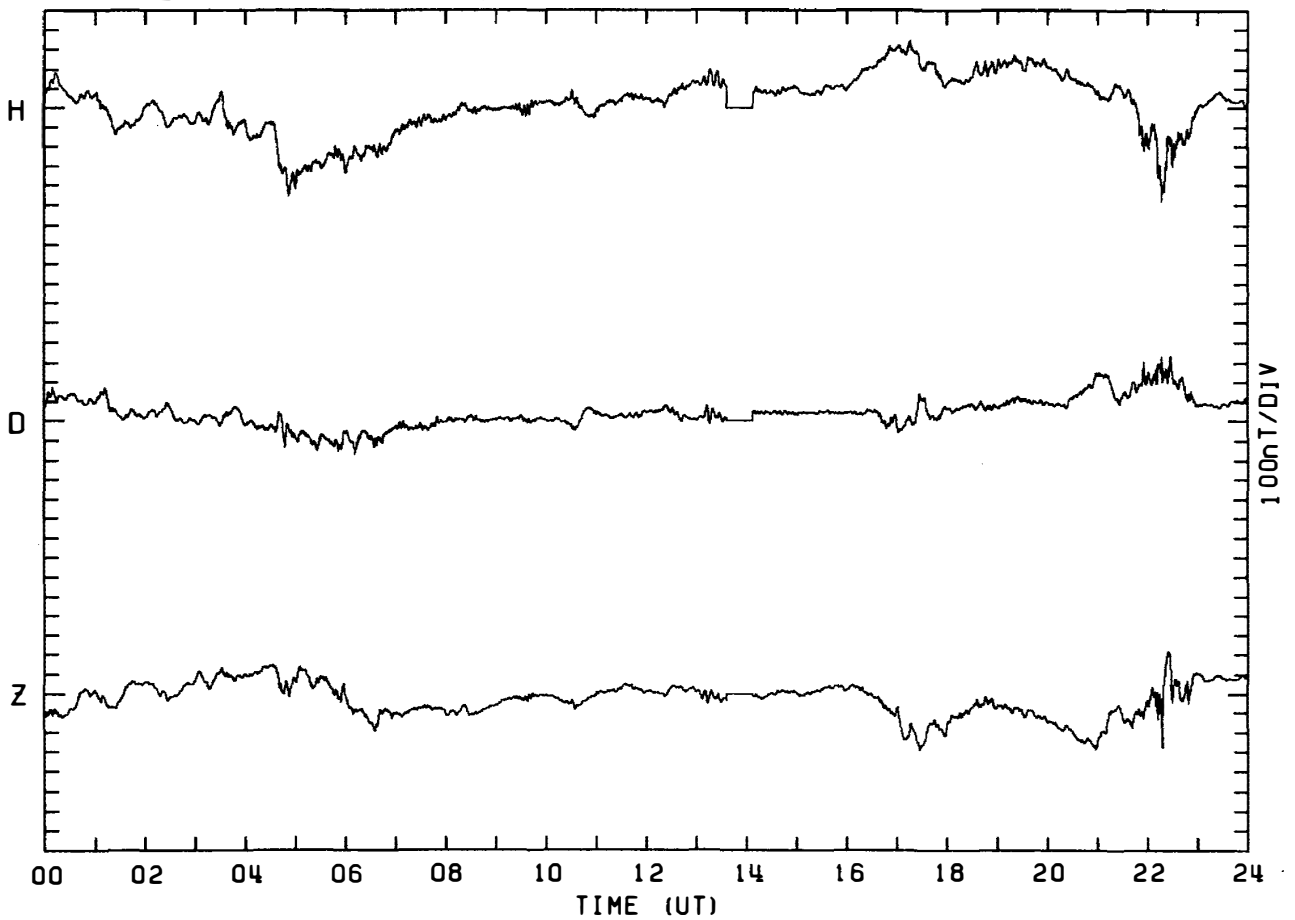
MAGNETOGRAM SYOWA STATION

DAY: 21 JANUARY 21, 1982



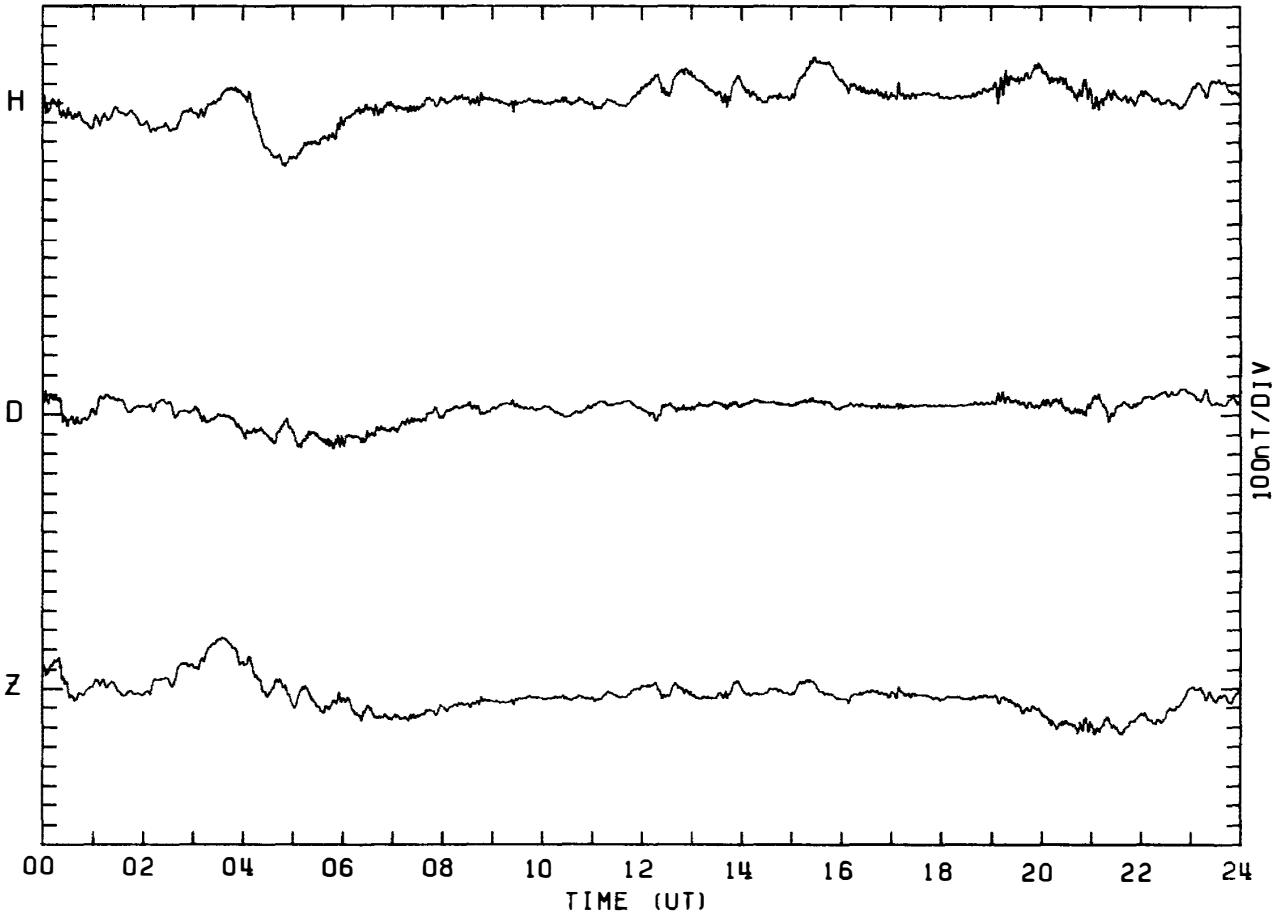
MAGNETOGRAM SYOWA STATION

DAY: 22 JANUARY 22, 1982



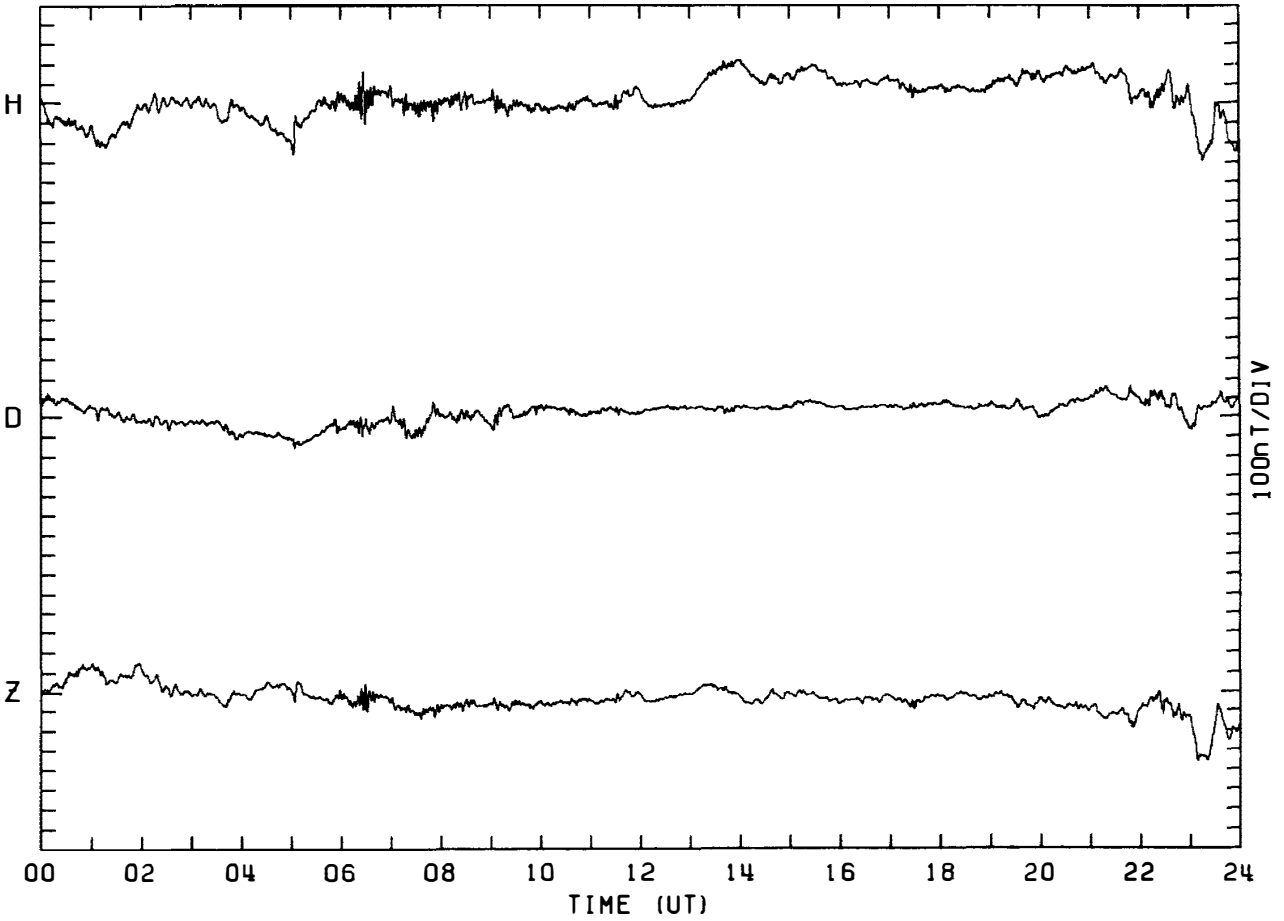
MAGNETOGRAM SYOWA STATION

DAY: 23 JANUARY 23. 1982



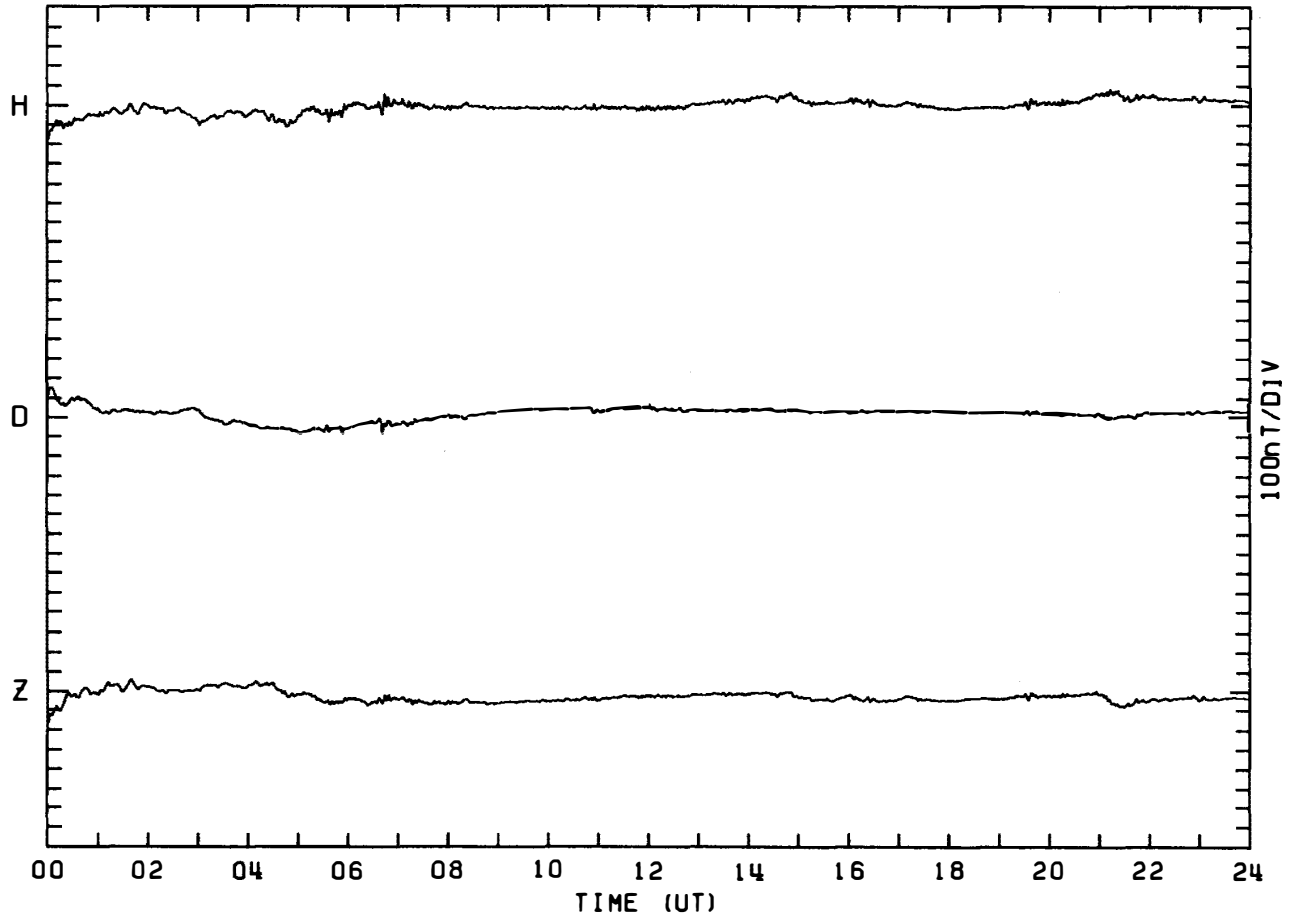
MAGNETOGRAM SYOWA STATION

DAY: 24 JANUARY 24. 1982



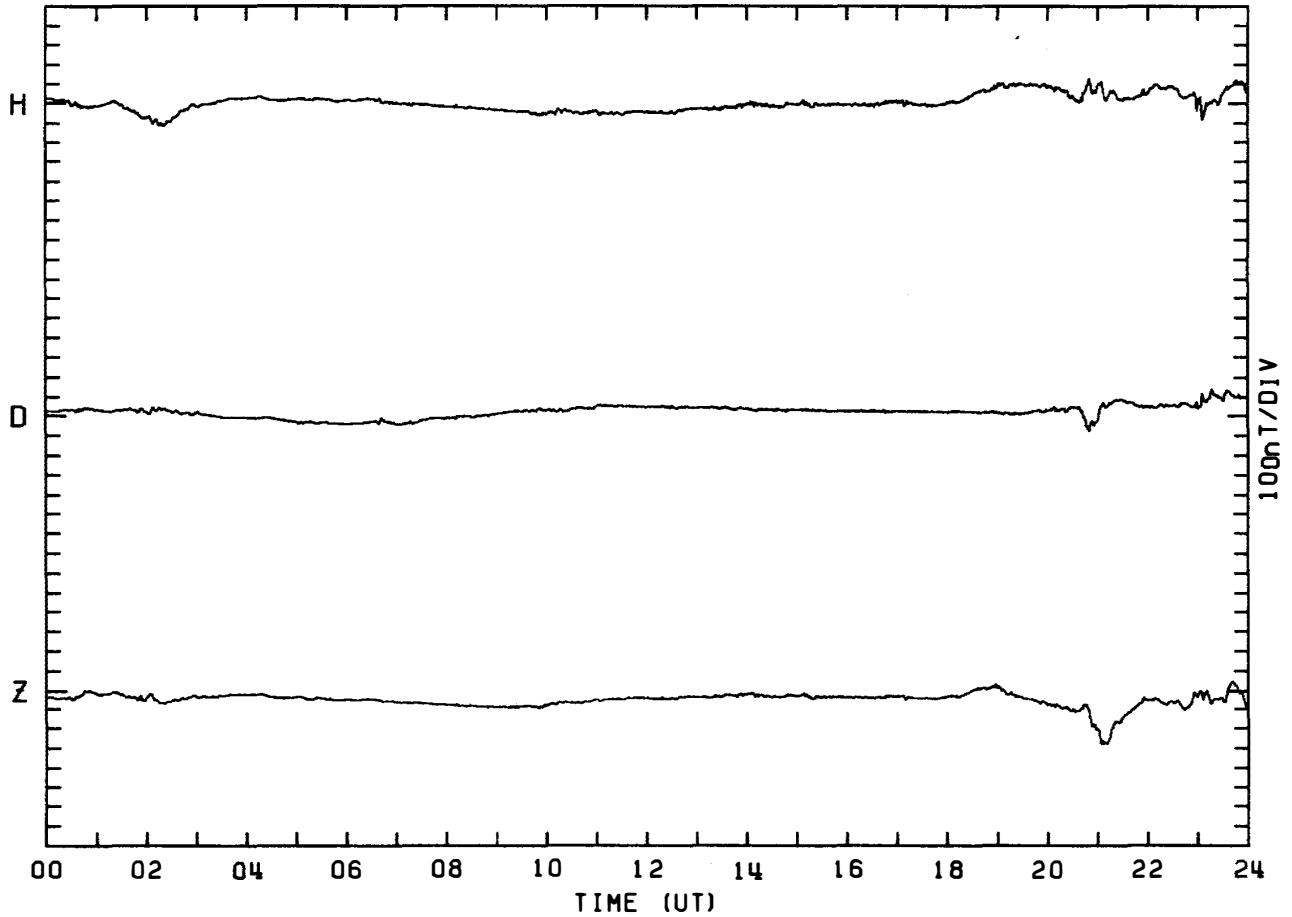
MAGNETOGRAM SYOWA STATION

DAY: 25 JANUARY 25, 1982



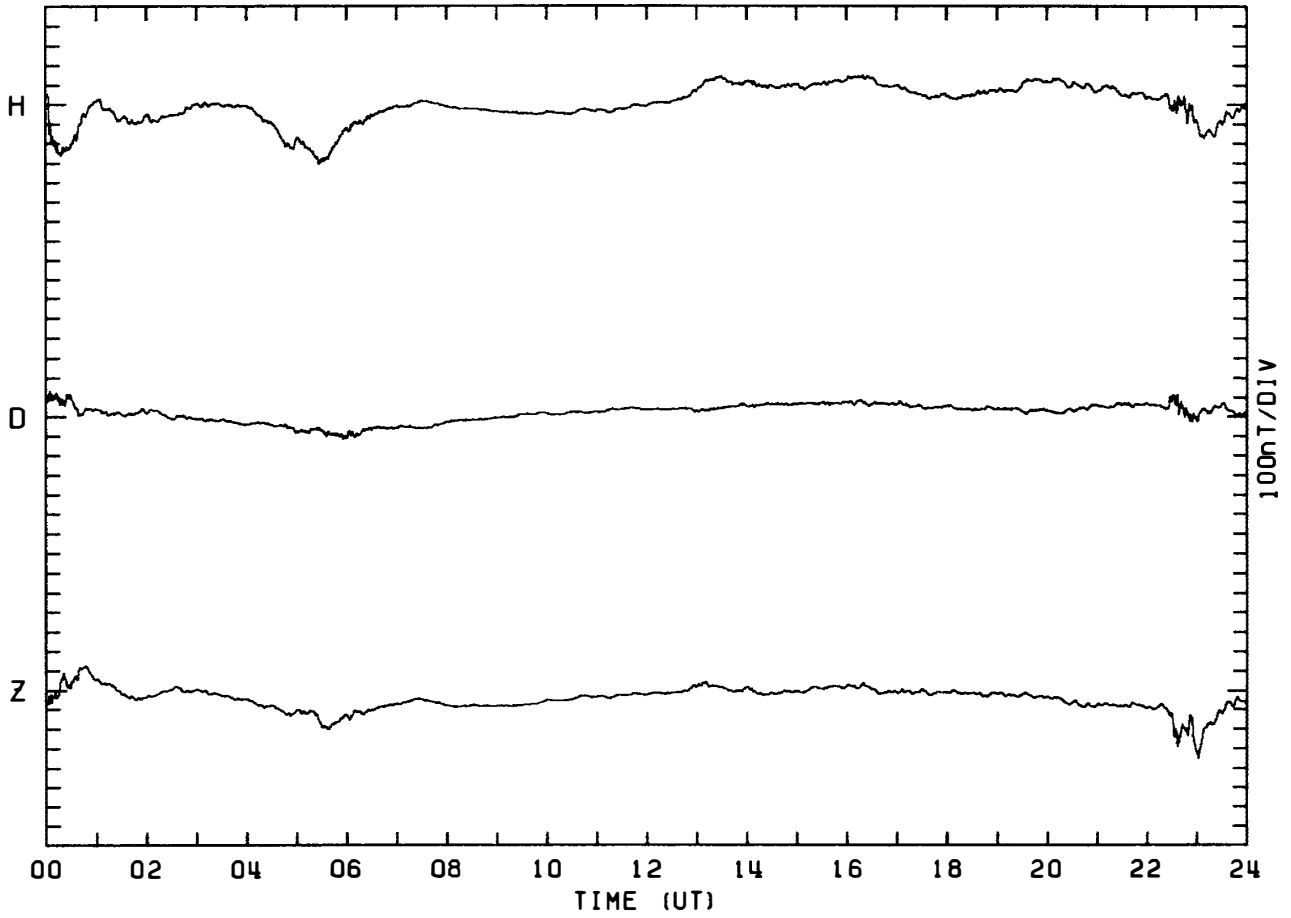
MAGNETOGRAM SYOWA STATION

DAY: 26 JANUARY 26, 1982



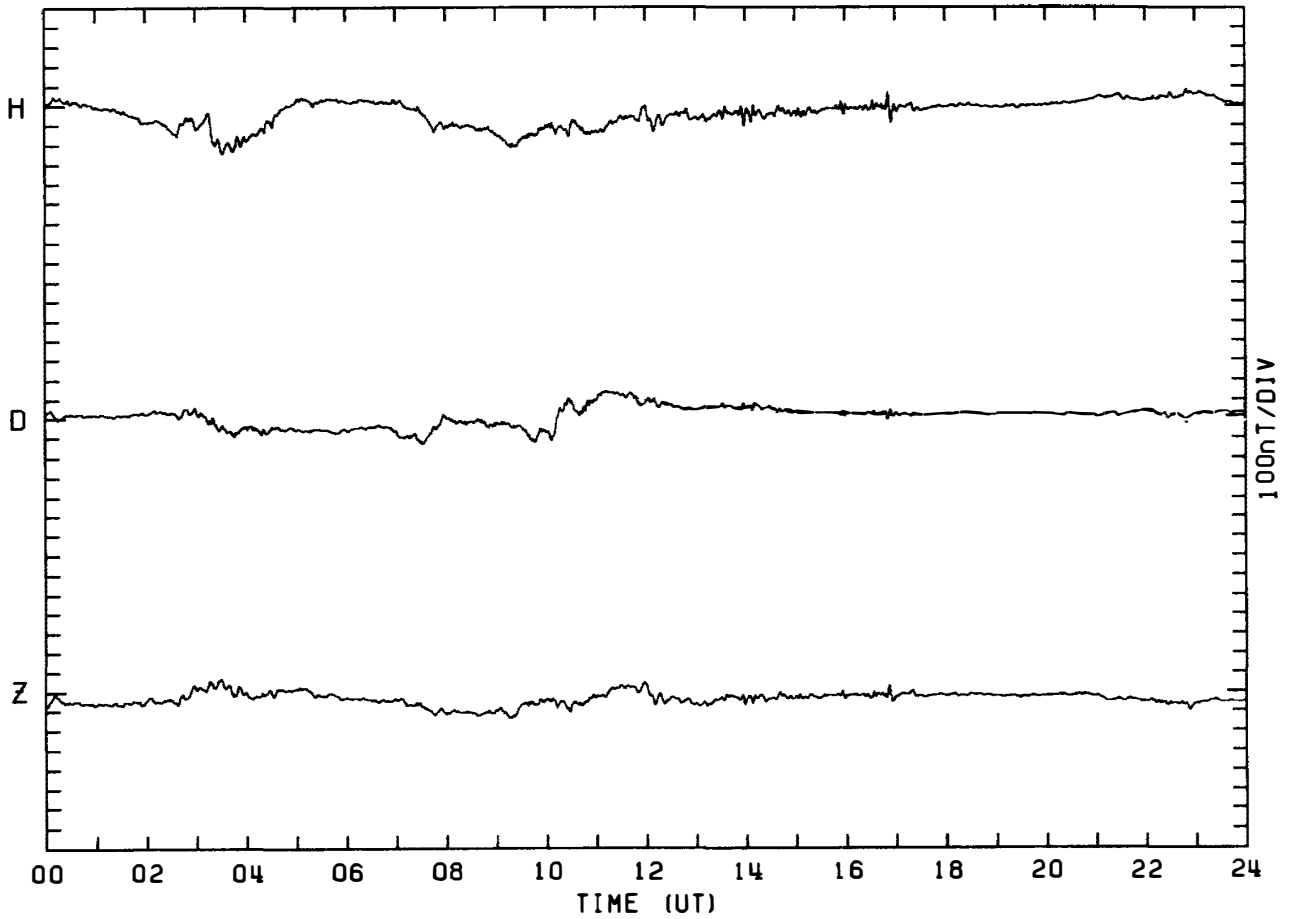
MAGNETOGRAM SYOWA STATION

DAY: 27 JANUARY 27, 1982



MAGNETOGRAM SYOWA STATION

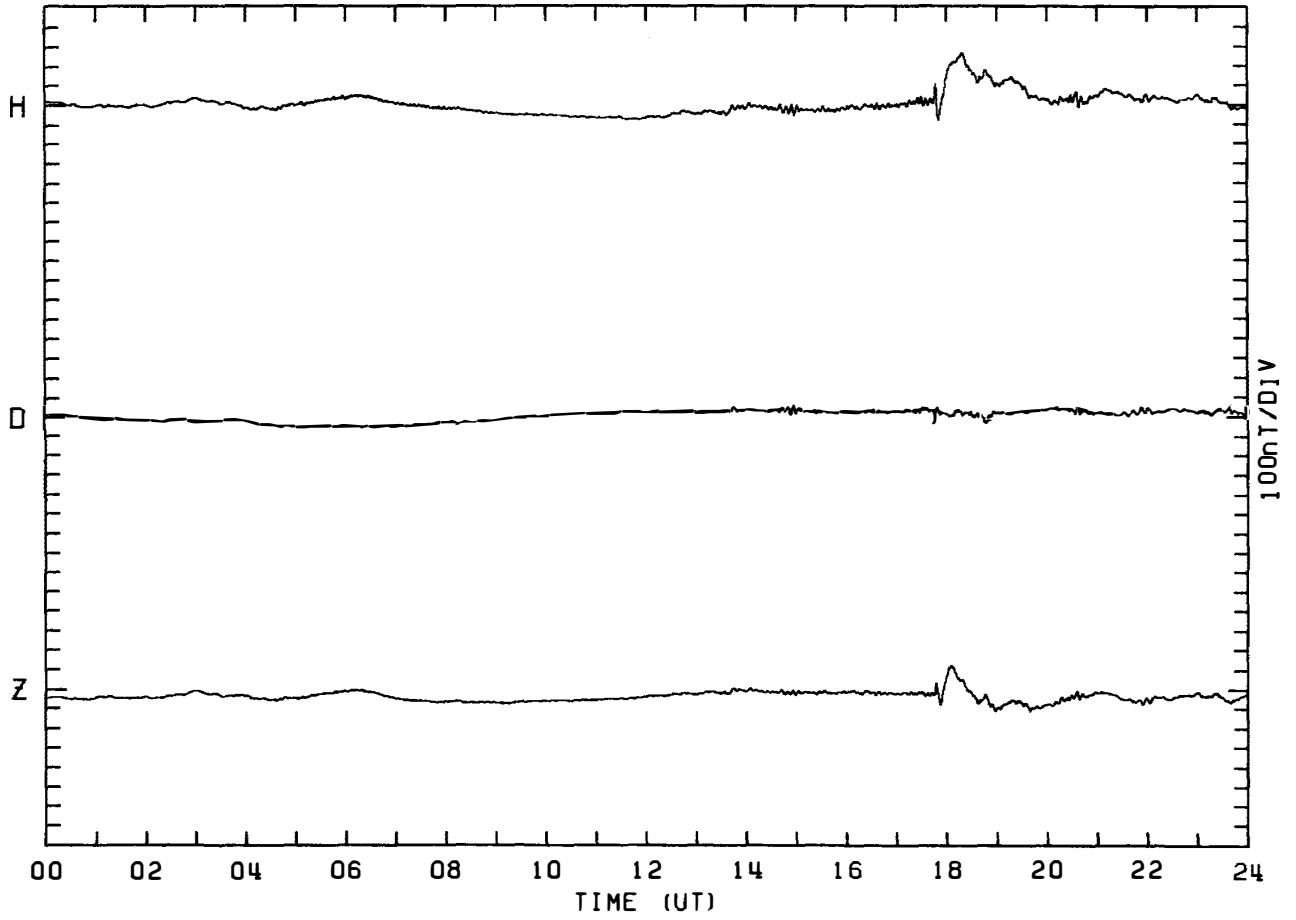
DAY: 28 JANUARY 28, 1982





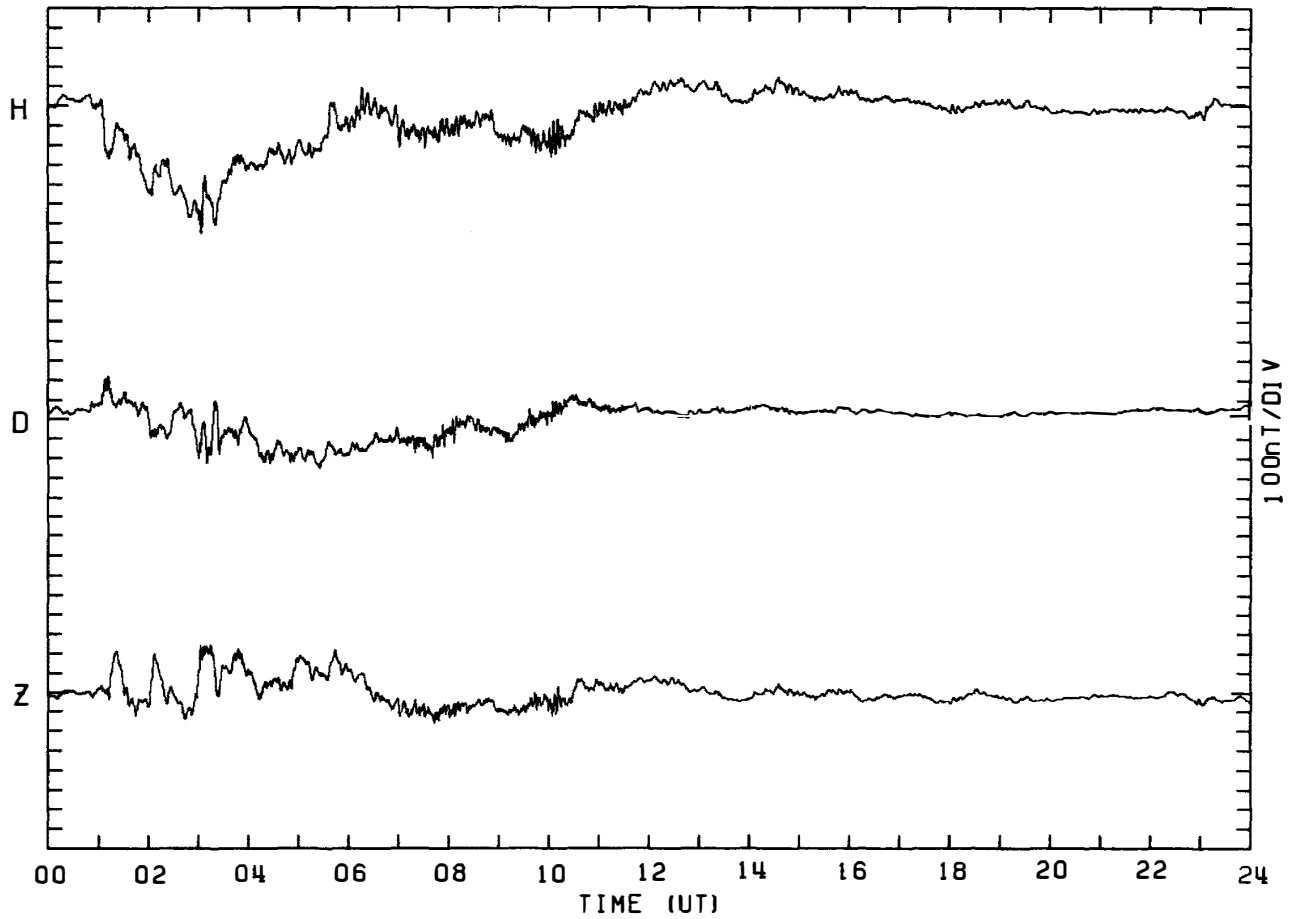
MAGNETOGRAM SYOWA STATION

DAY: 29 JANUARY 29, 1982



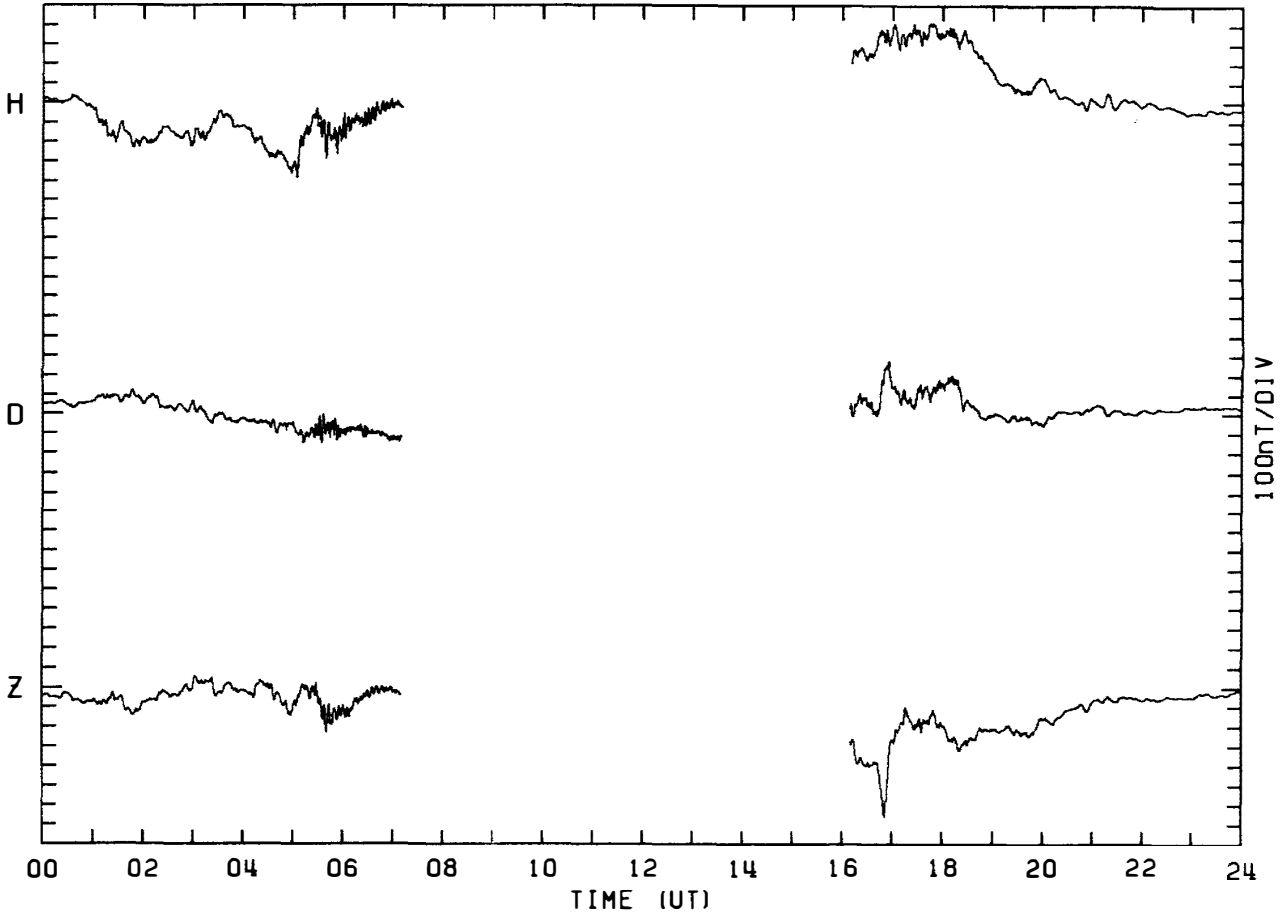
MAGNETOGRAM SYOWA STATION

DAY: 30 JANUARY 30, 1982



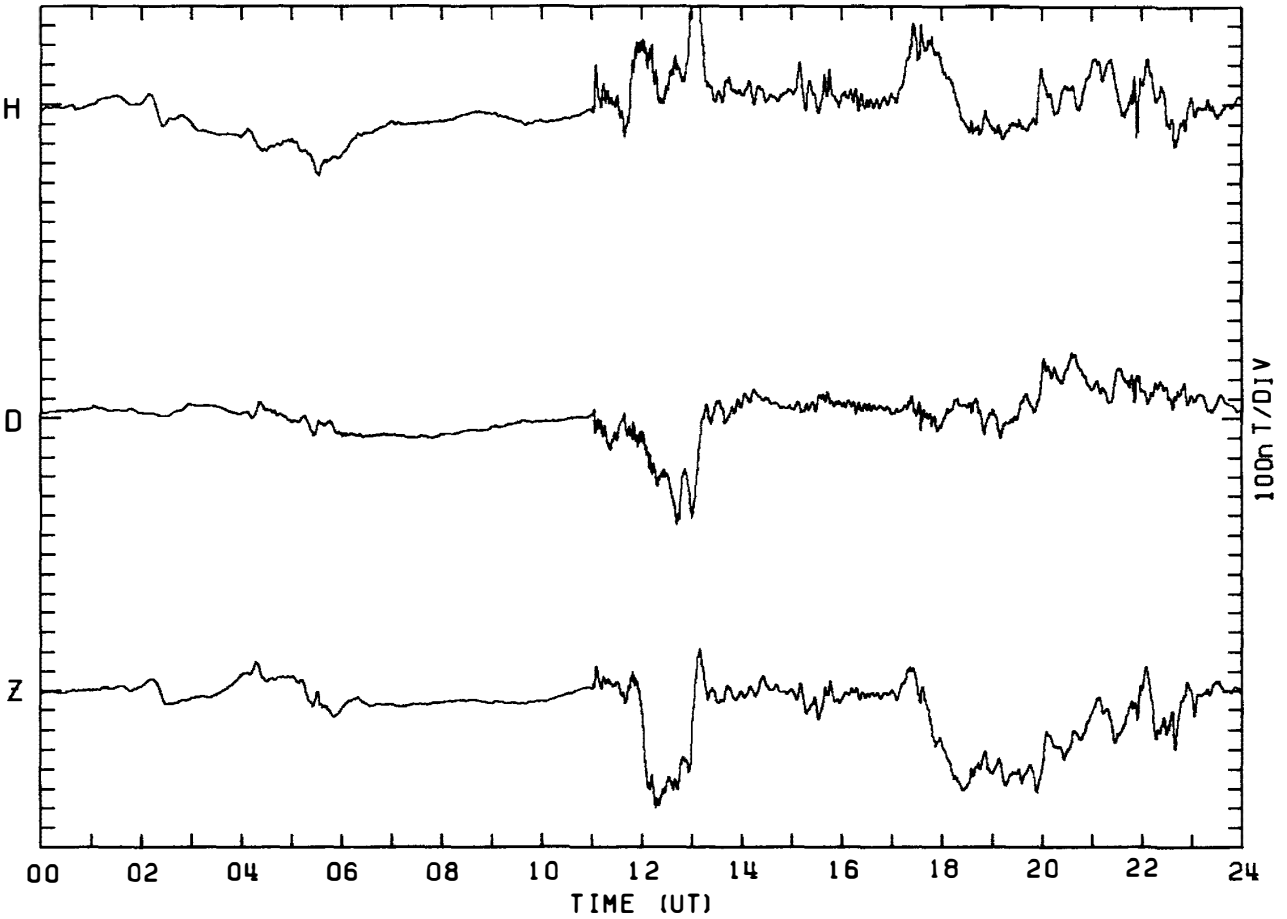
MAGNETOGRAM SYOWA STATION

DAY: 31 JANUARY 31, 1982



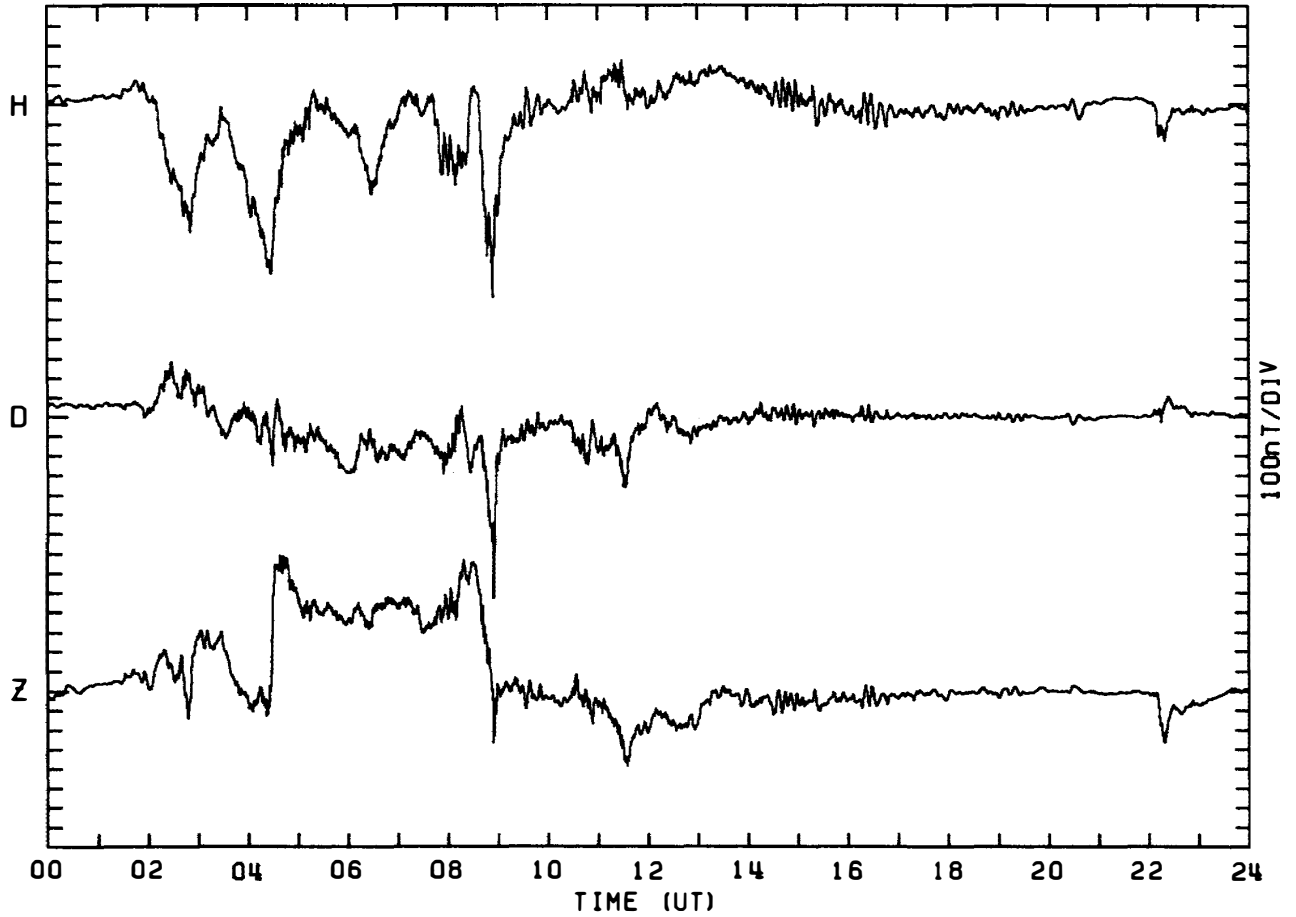
MAGNETOGRAM SYOWA STATION

DAY: 32 FEBRUARY 1, 1982



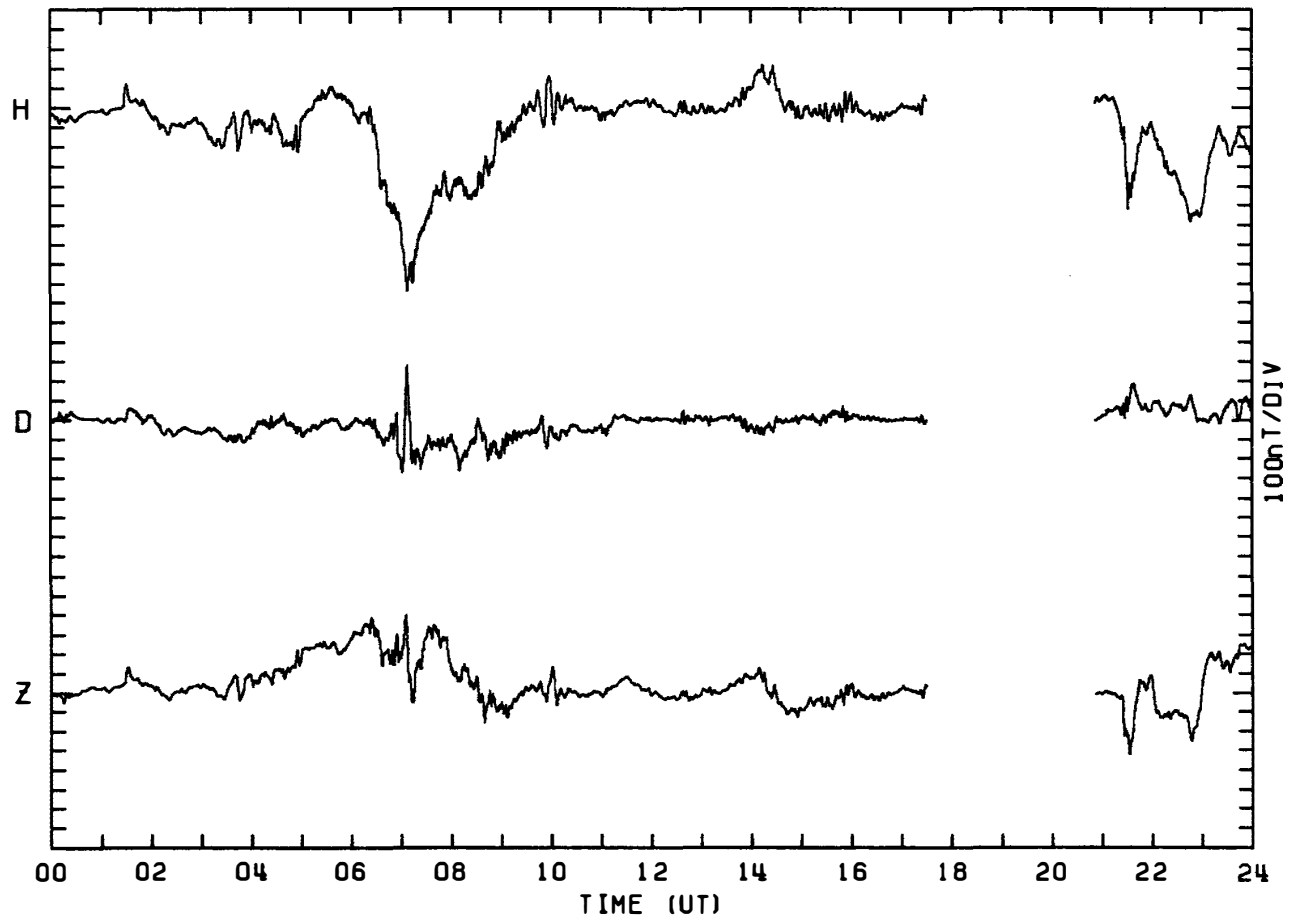
MAGNETOGRAM SYOWA STATION

DAY: 33 FEBRUARY 2. 1982



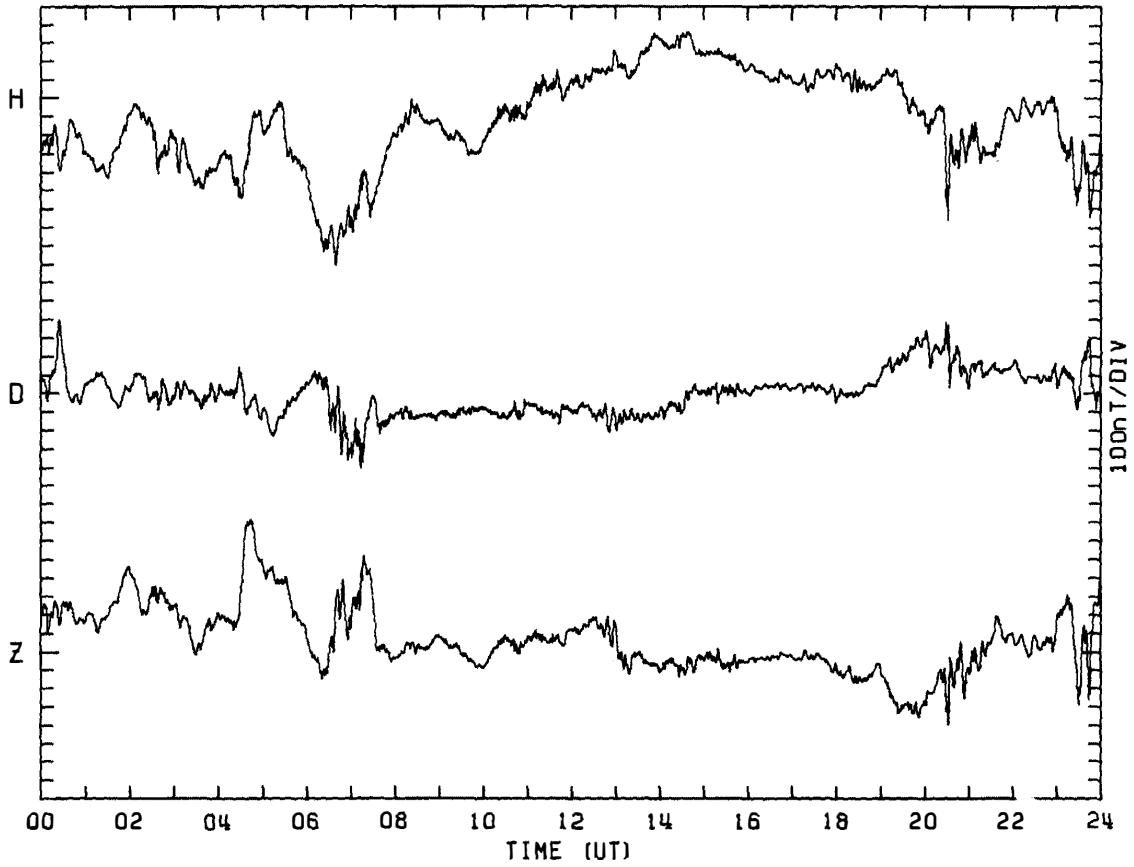
MAGNETOGRAM SYOWA STATION

DAY: 34 FEBRUARY 3. 1982



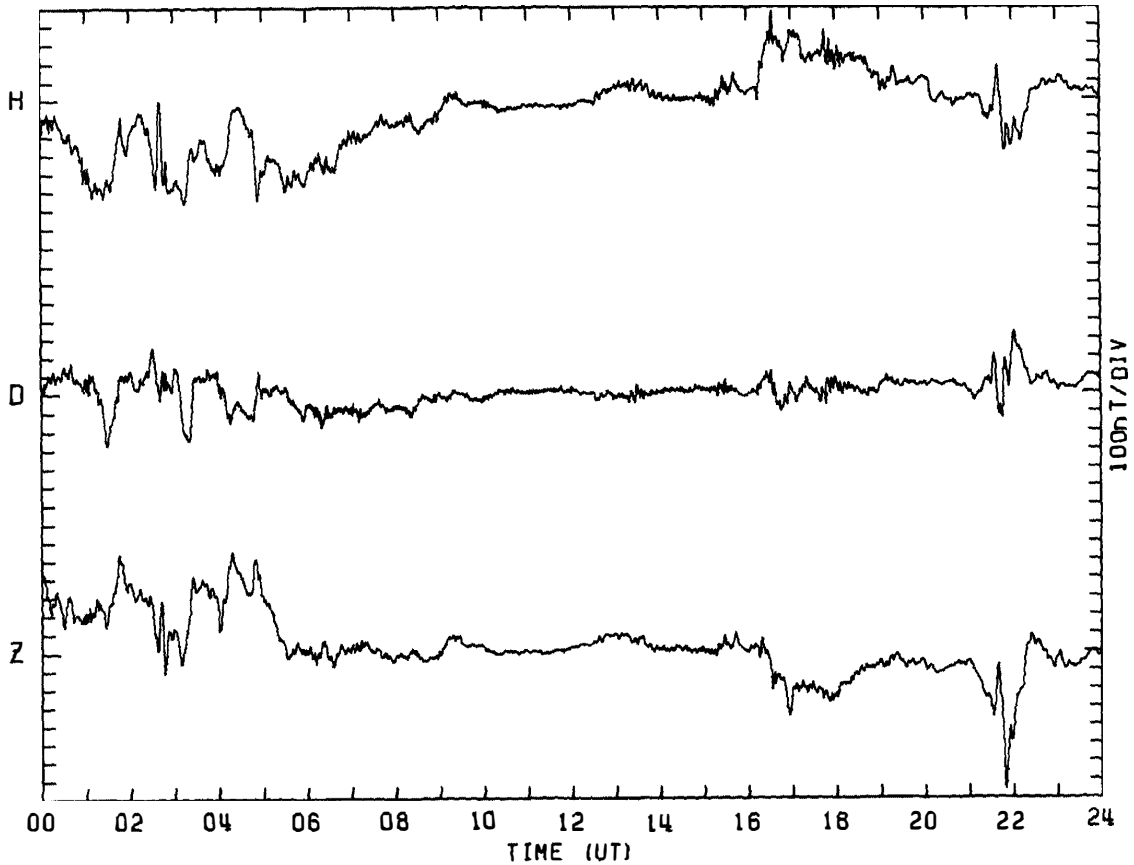
MAGNETOGRAM SYOWA STATION

DAY: 35 FEBRUARY 4, 1982



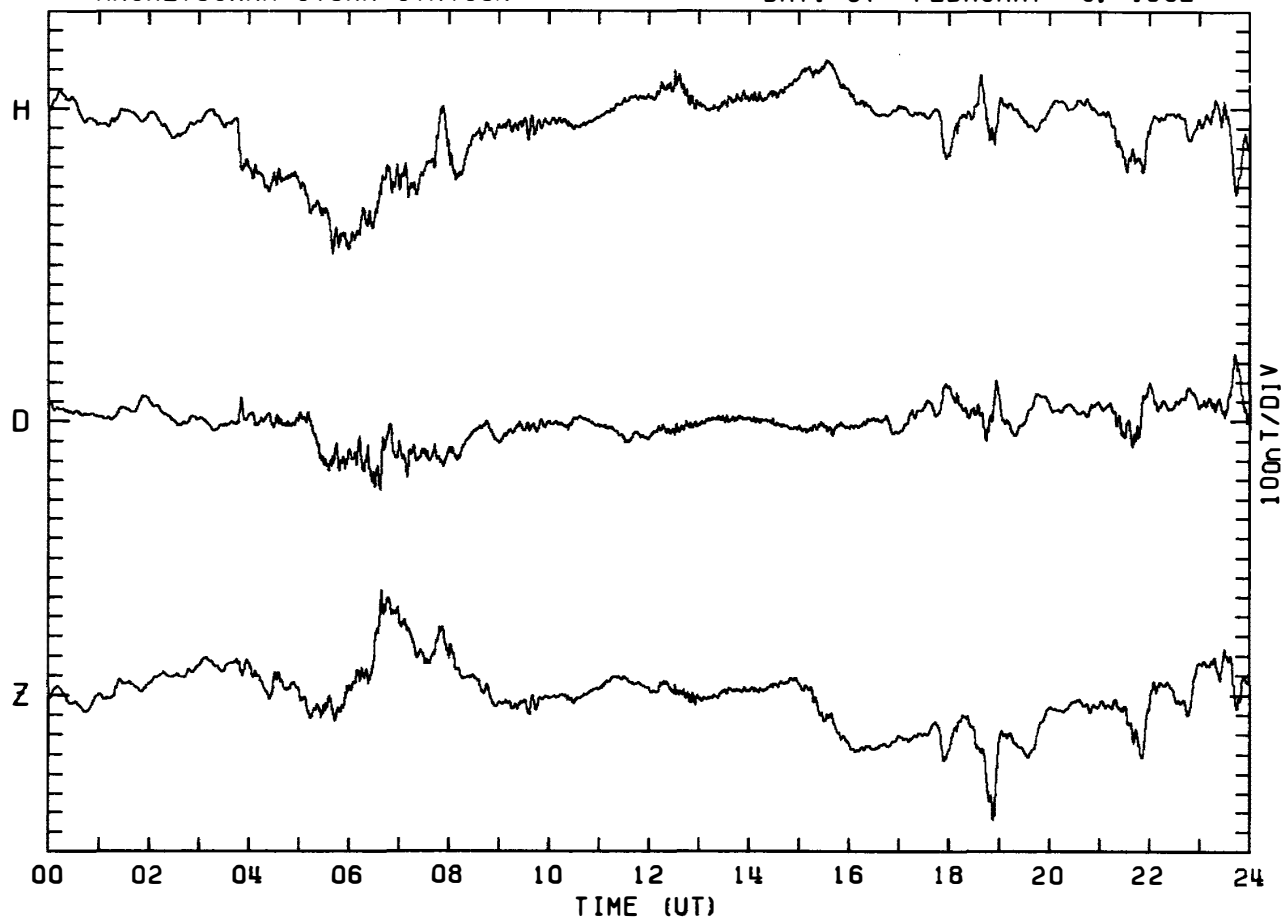
MAGNETOGRAM SYOWA STATION

DAY: 36 FEBRUARY 5, 1982



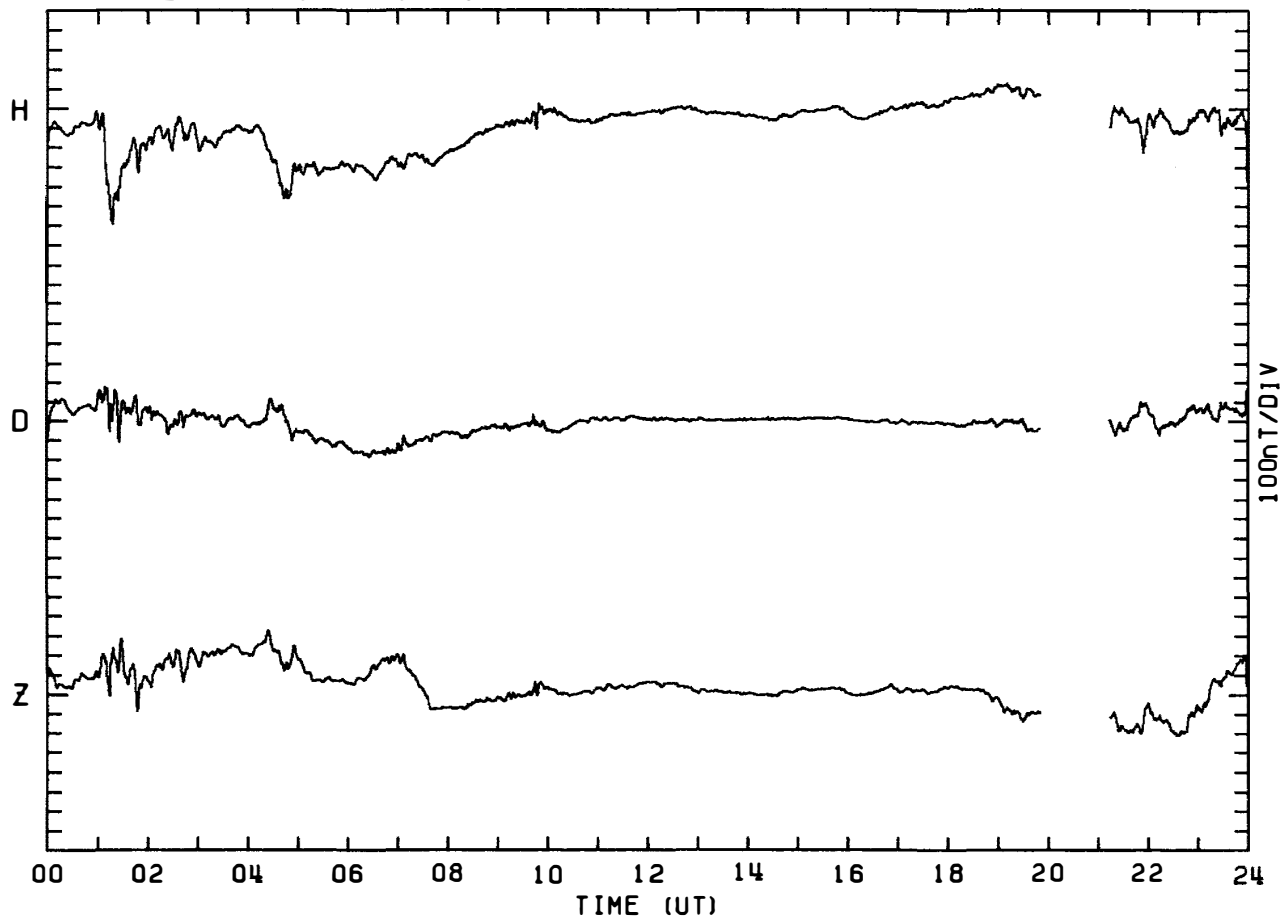
MAGNETOGRAM SYOWA STATION

DAY: 37 FEBRUARY 6. 1982



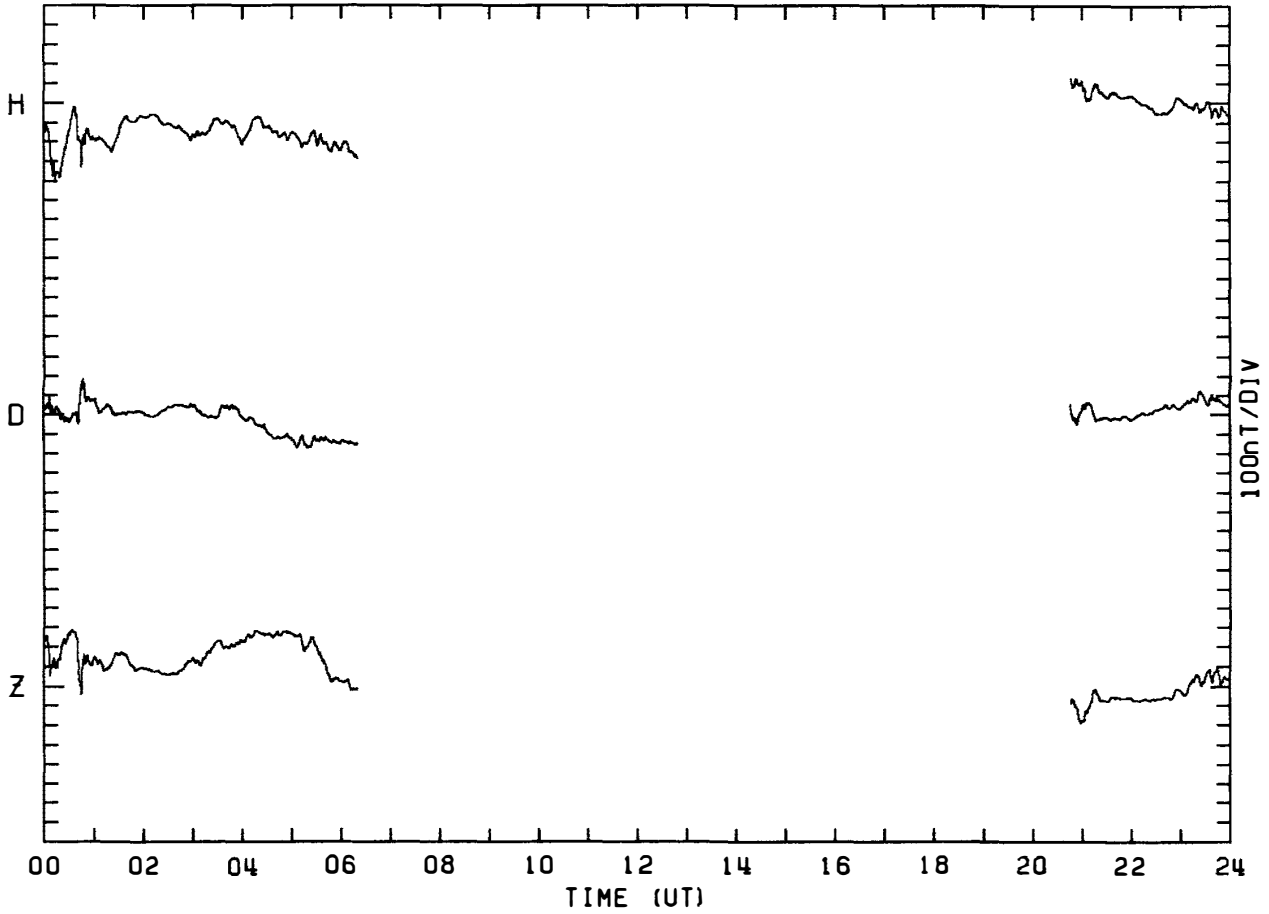
MAGNETOGRAM SYOWA STATION

DAY: 38 FEBRUARY 7. 1982



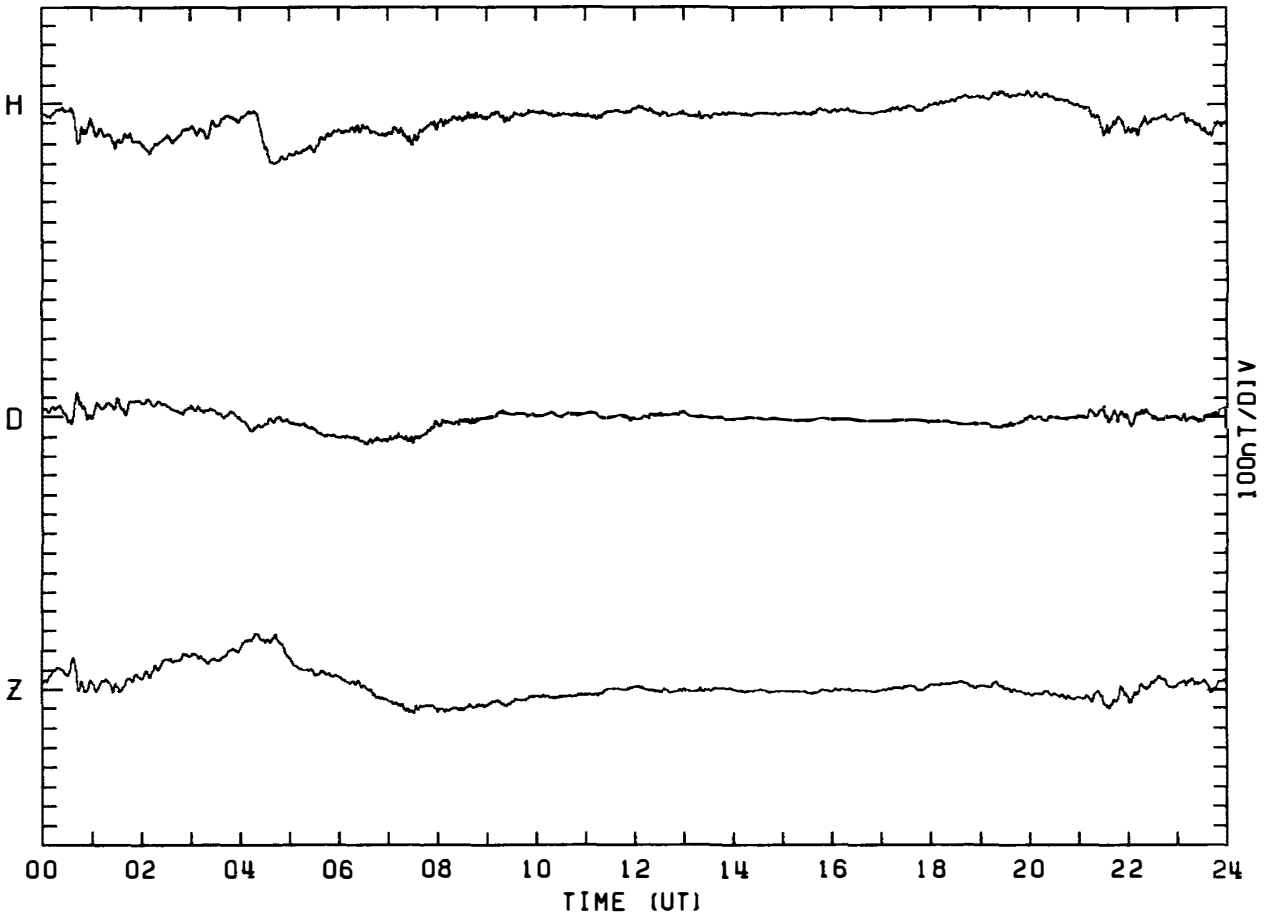
MAGNETOGRAM SYOWA STATION

DAY: 39 FEBRUARY 8. 1982



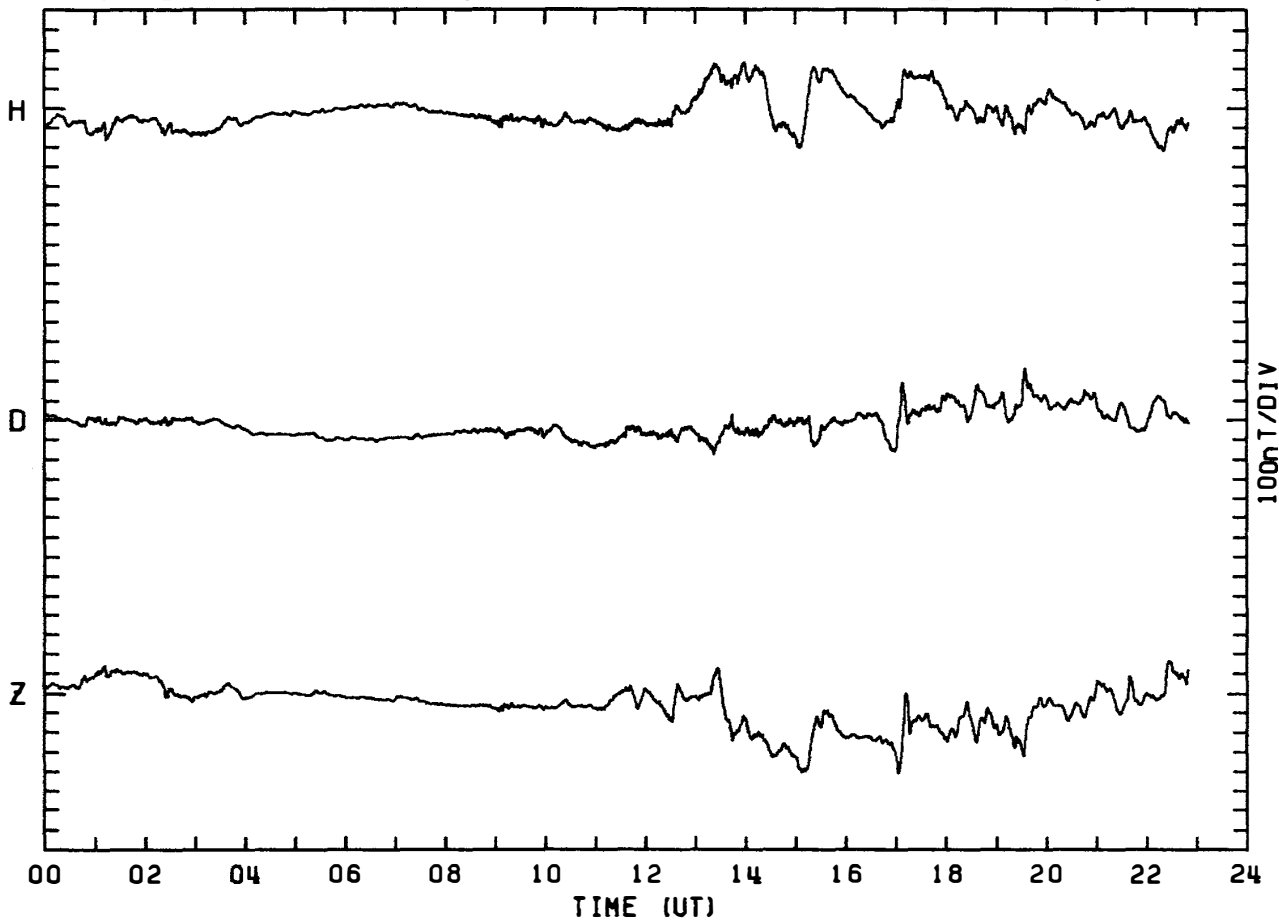
MAGNETOGRAM SYOWA STATION

DAY: 40 FEBRUARY 9. 1982



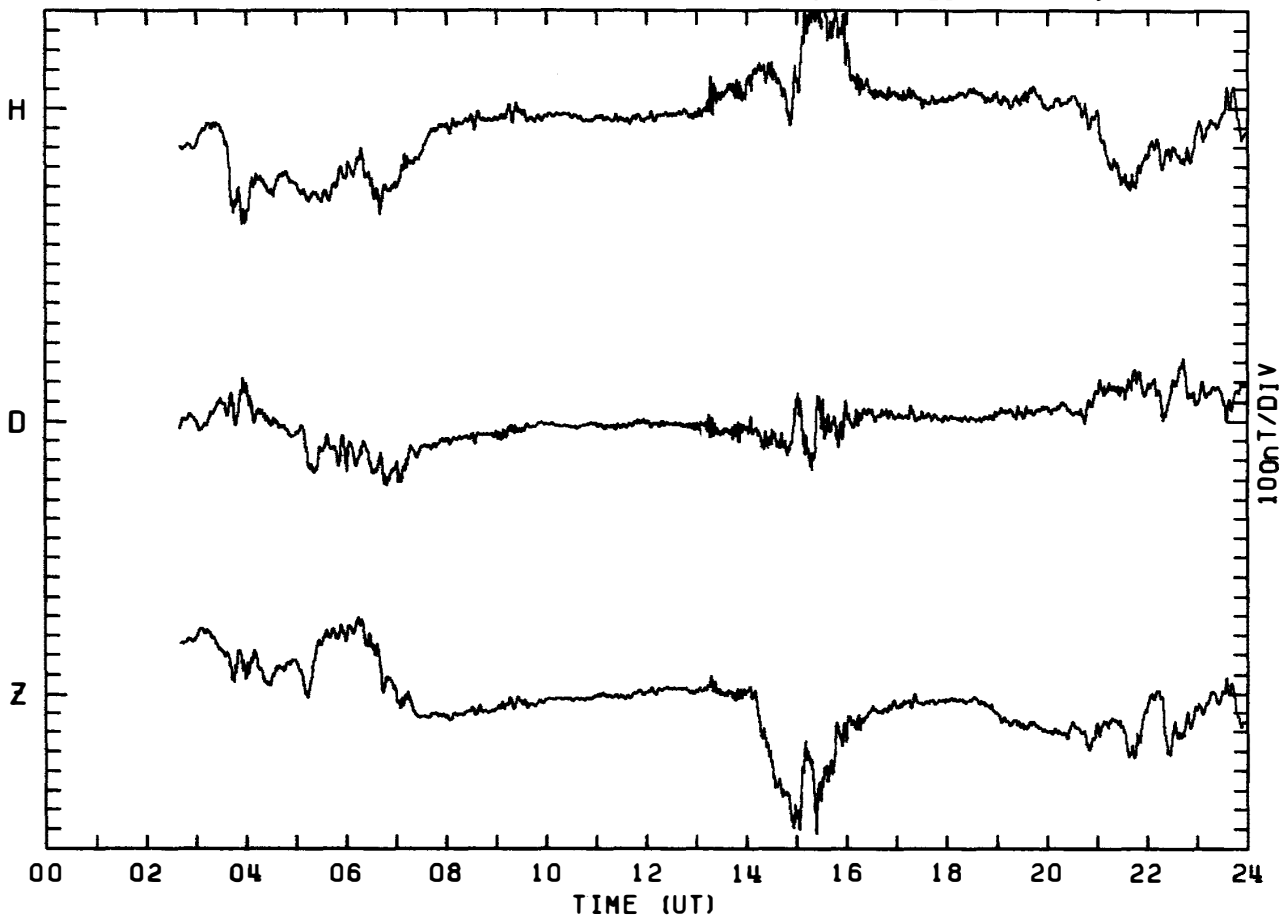
MAGNETOGRAM SYOWA STATION

DAY: 41 FEBRUARY 10. 1982



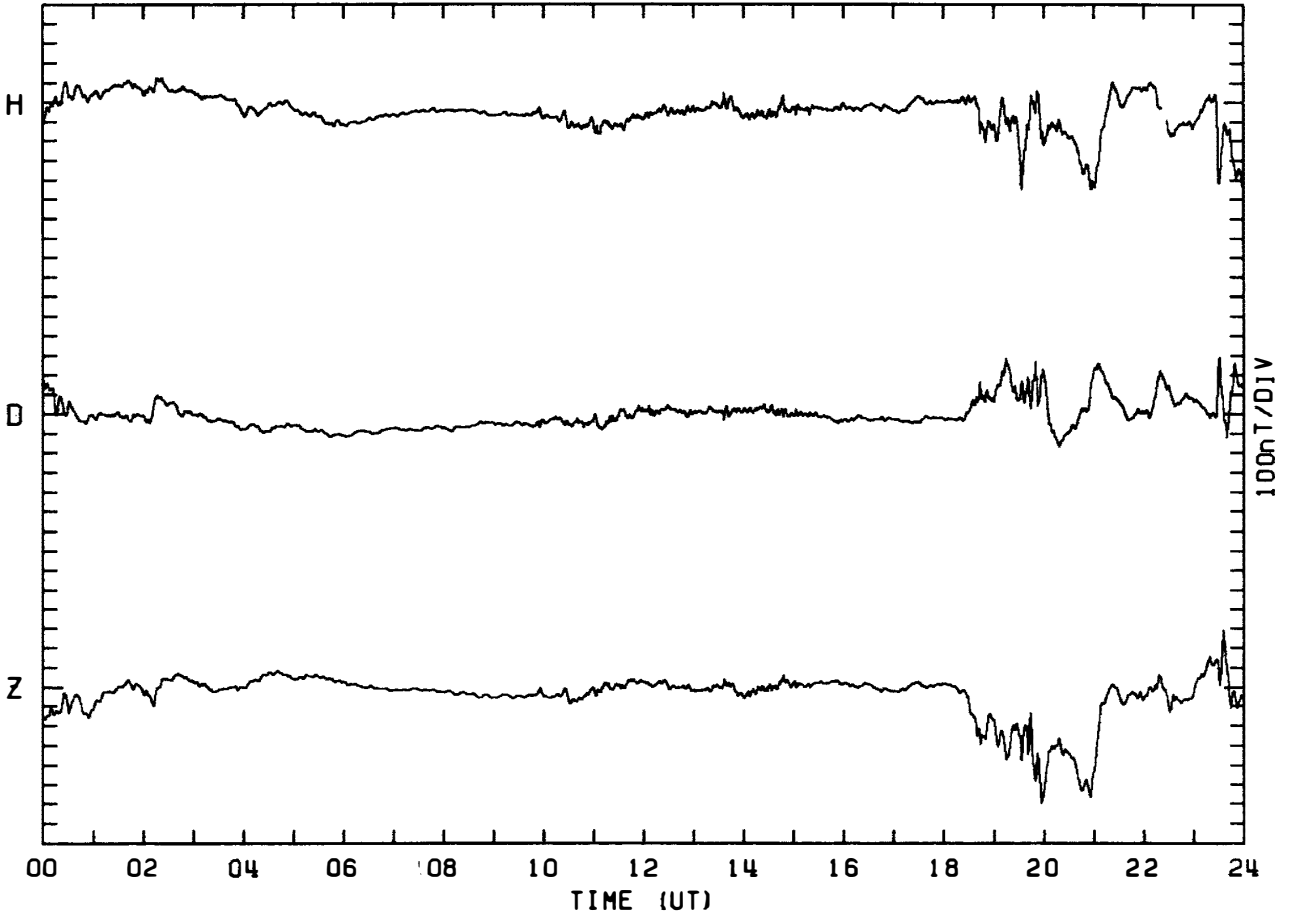
MAGNETOGRAM SYOWA STATION

DAY: 42 FEBRUARY 11. 1982



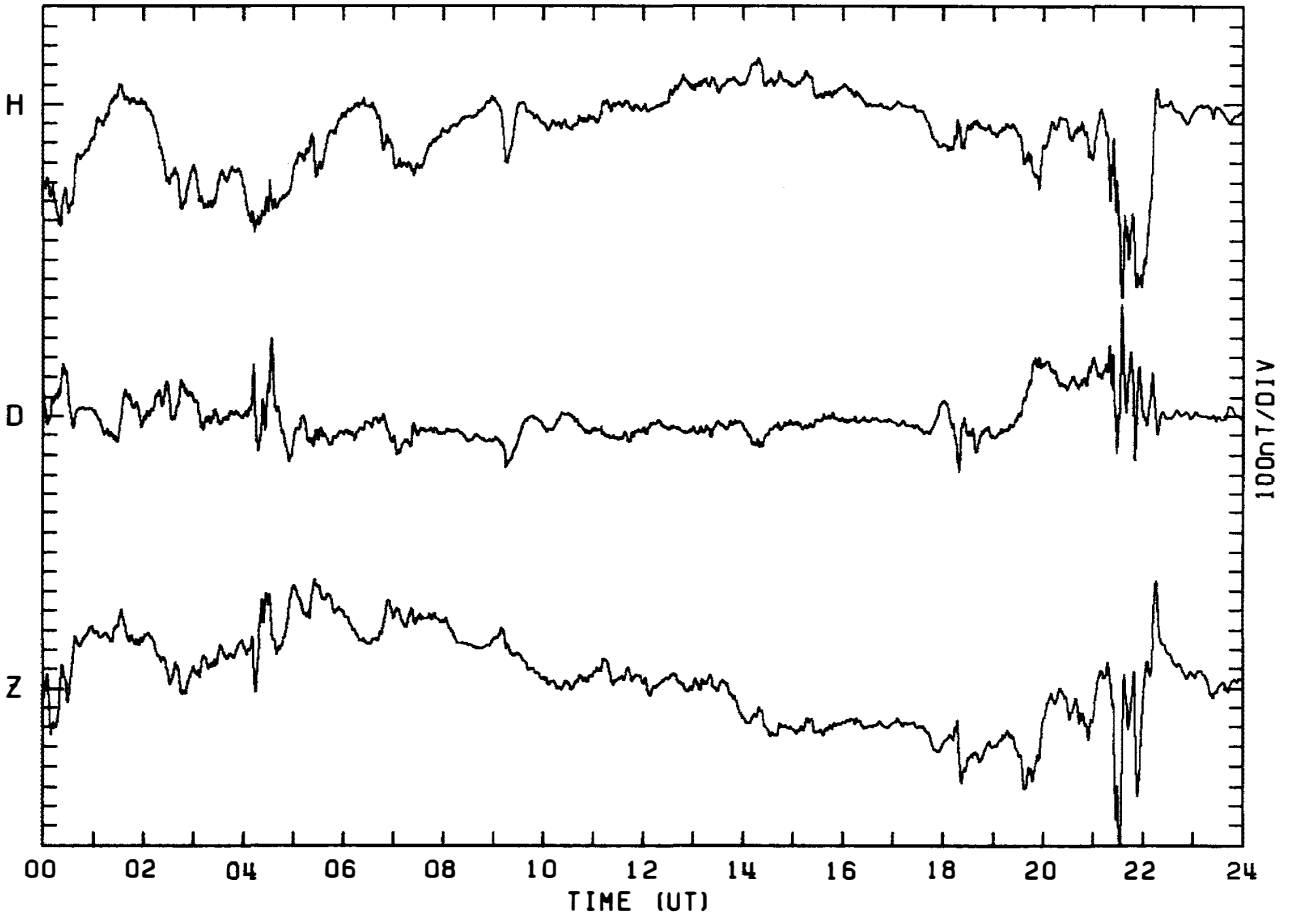
MAGNETOGRAM SYOWA STATION

DAY: 43 FEBRUARY 12, 1982



MAGNETOGRAM SYOWA STATION

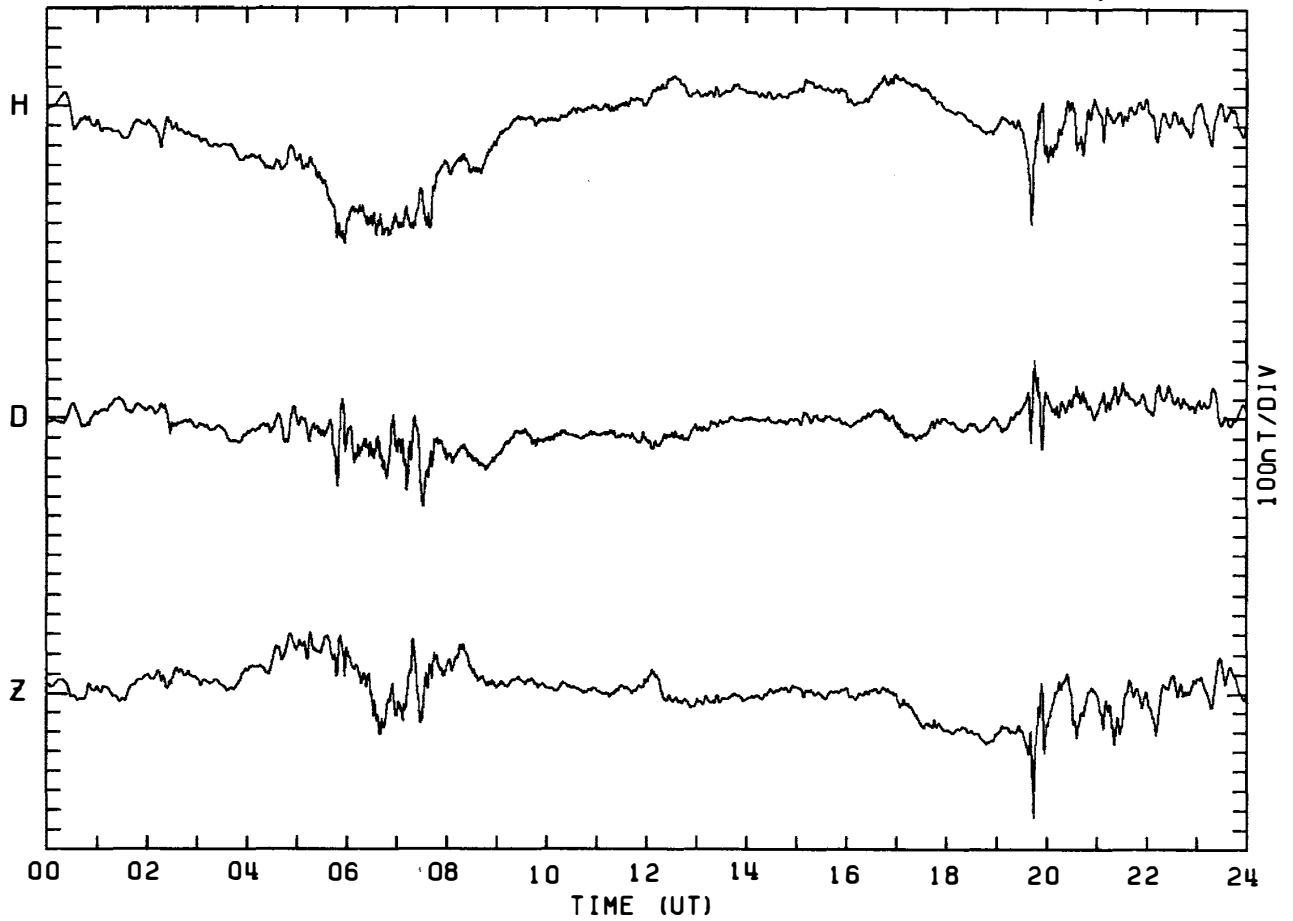
DAY: 44 FEBRUARY 13, 1982





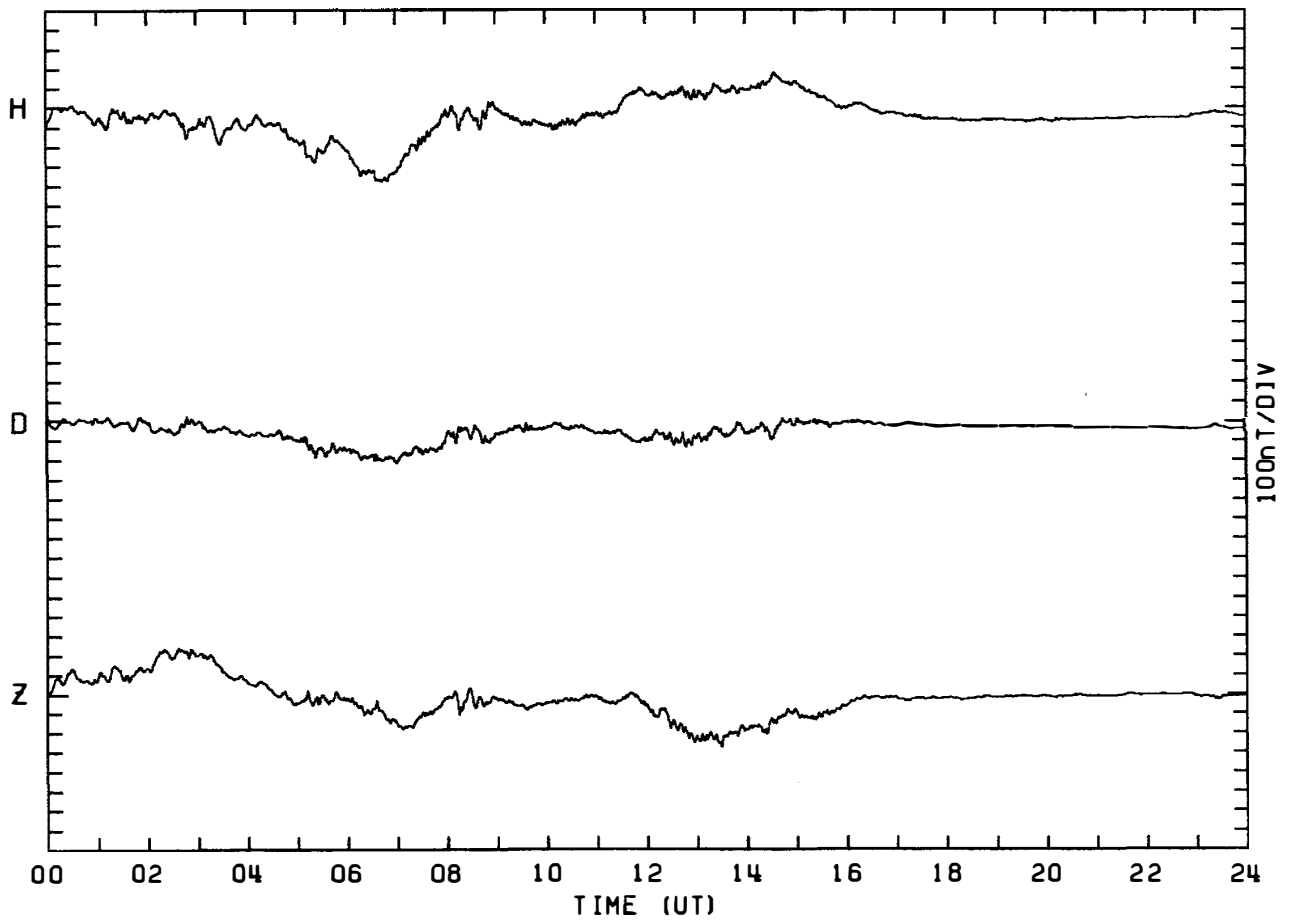
MAGNETOGRAM SYOWA STATION

DAY: 45 FEBRUARY 14, 1982



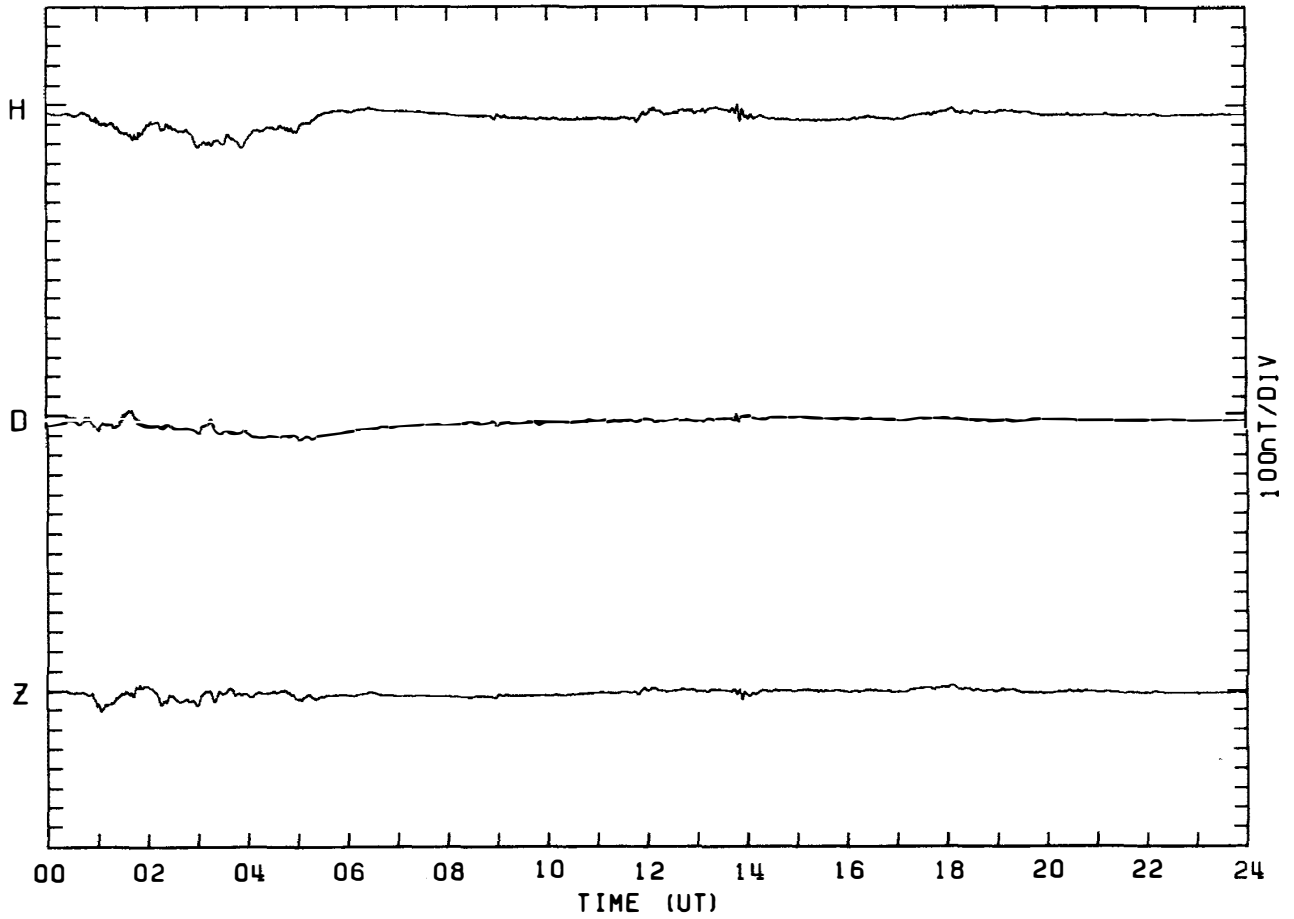
MAGNETOGRAM SYOWA STATION

DAY: 46 FEBRUARY 15, 1982



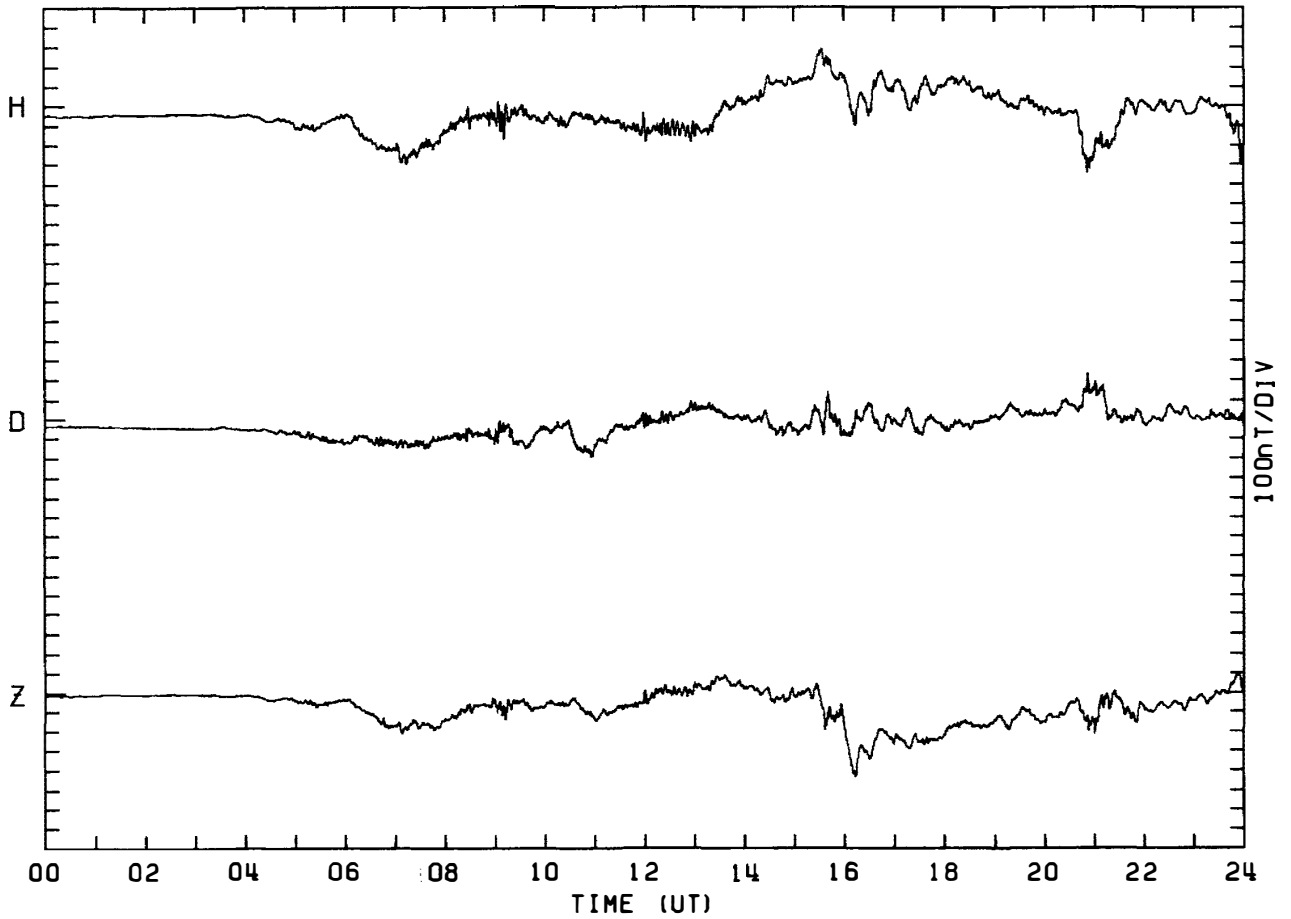
MAGNETOGRAM SYOWA STATION

DAY: 47 FEBRUARY 16, 1982



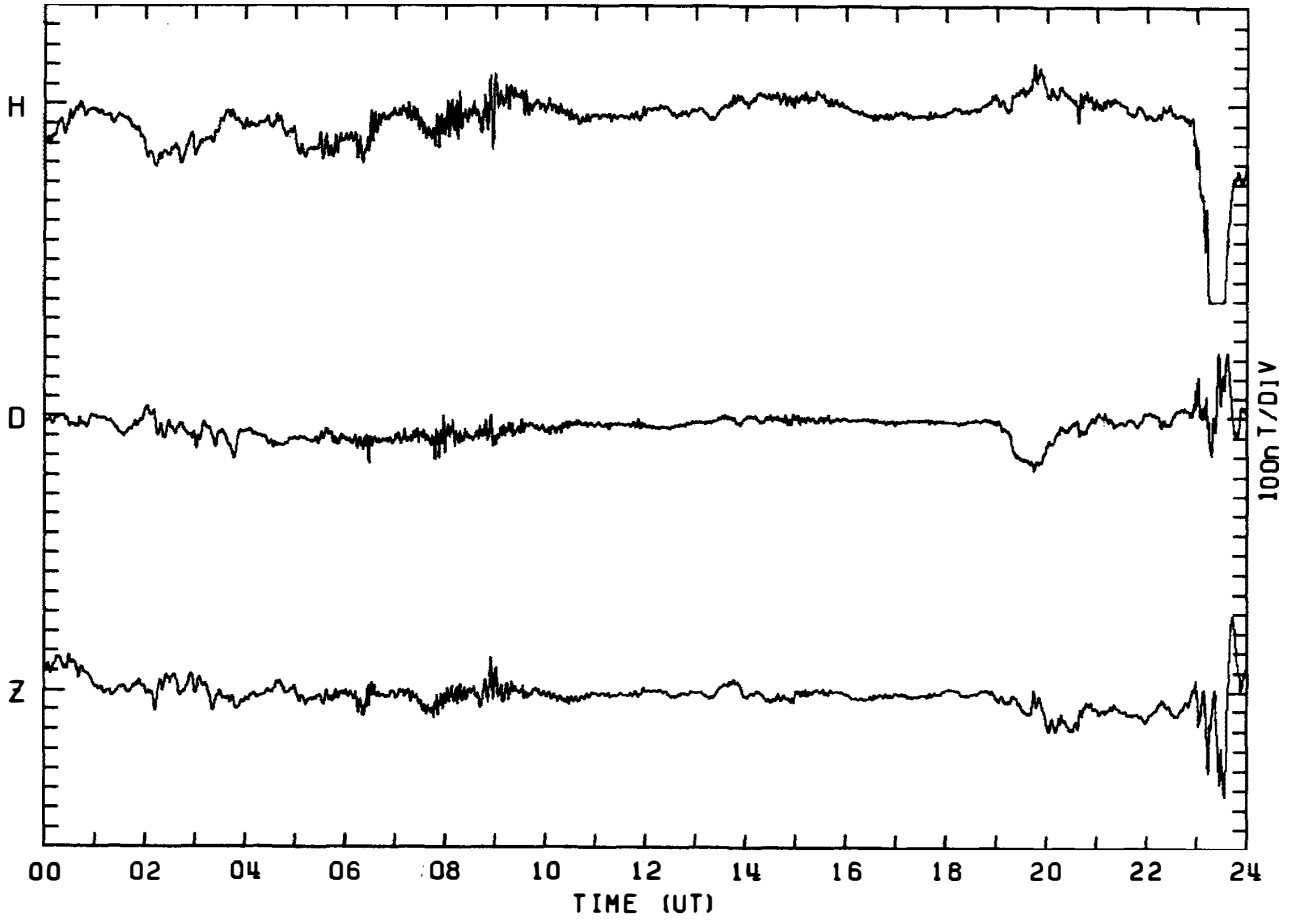
MAGNETOGRAM SYOWA STATION

DAY: 48 FEBRUARY 17, 1982



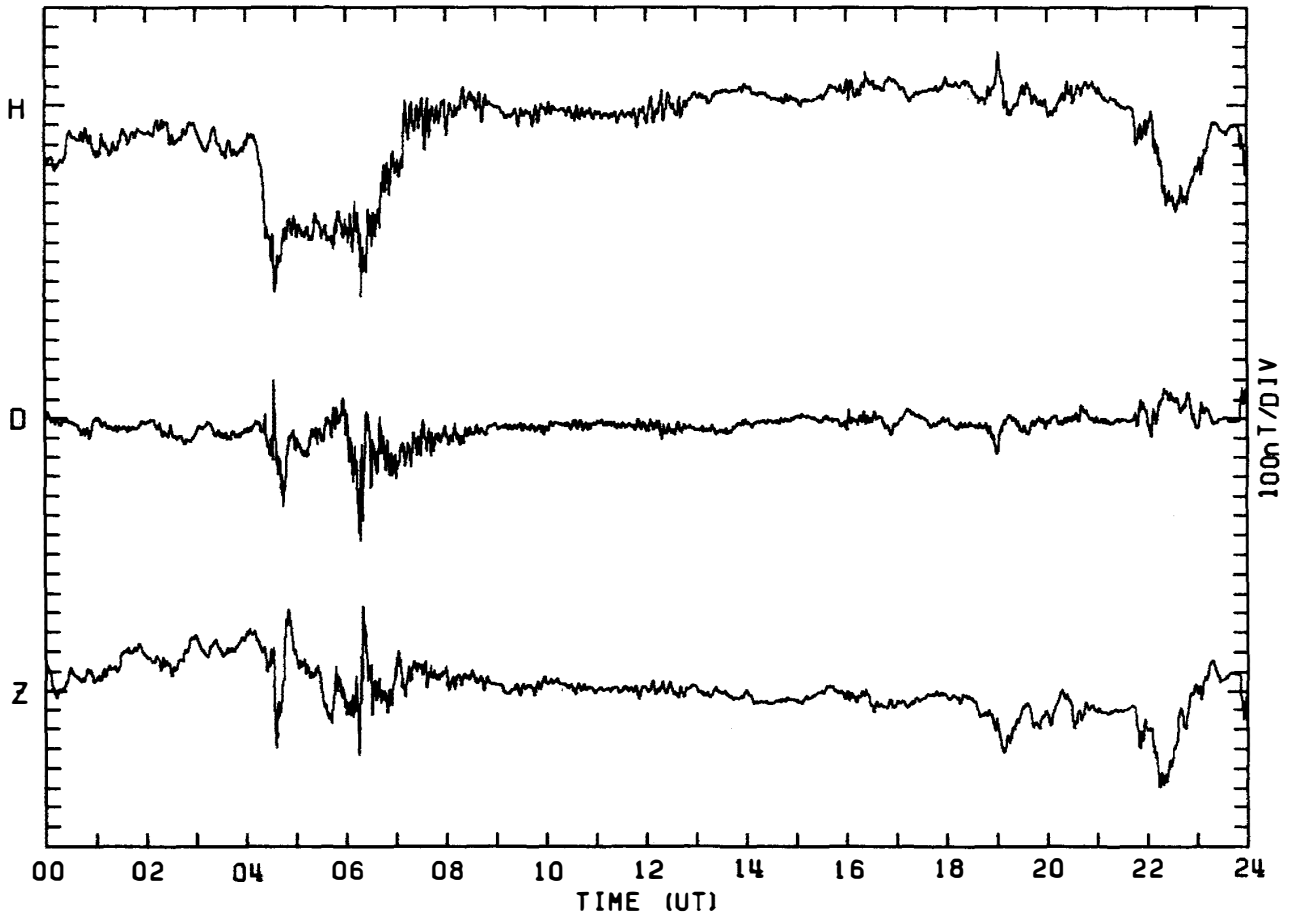
MAGNETOGRAM SYOWA STATION

DAY: 49 FEBRUARY 18. 1982



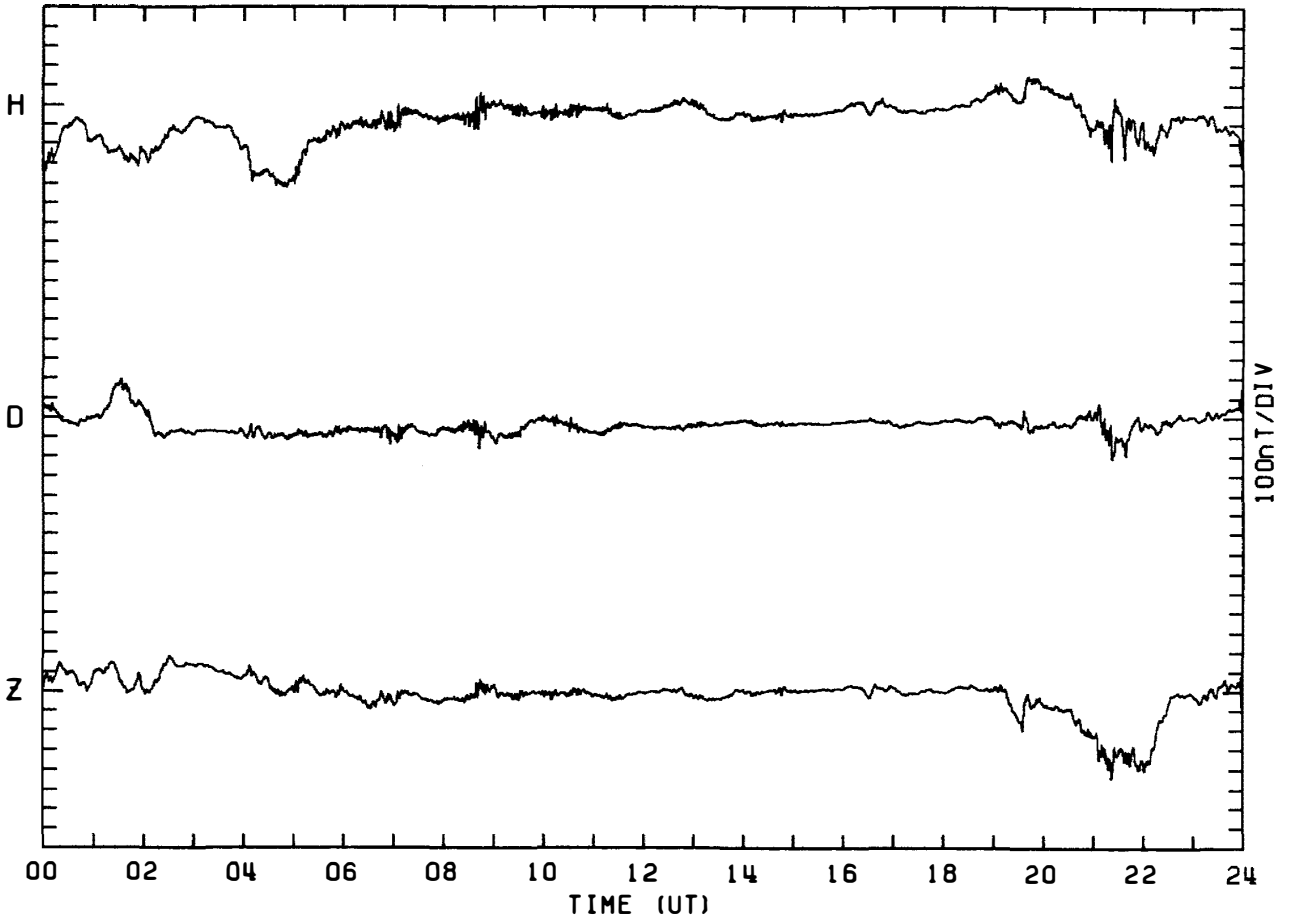
MAGNETOGRAM SYOWA STATION

DAY: 50 FEBRUARY 19. 1982



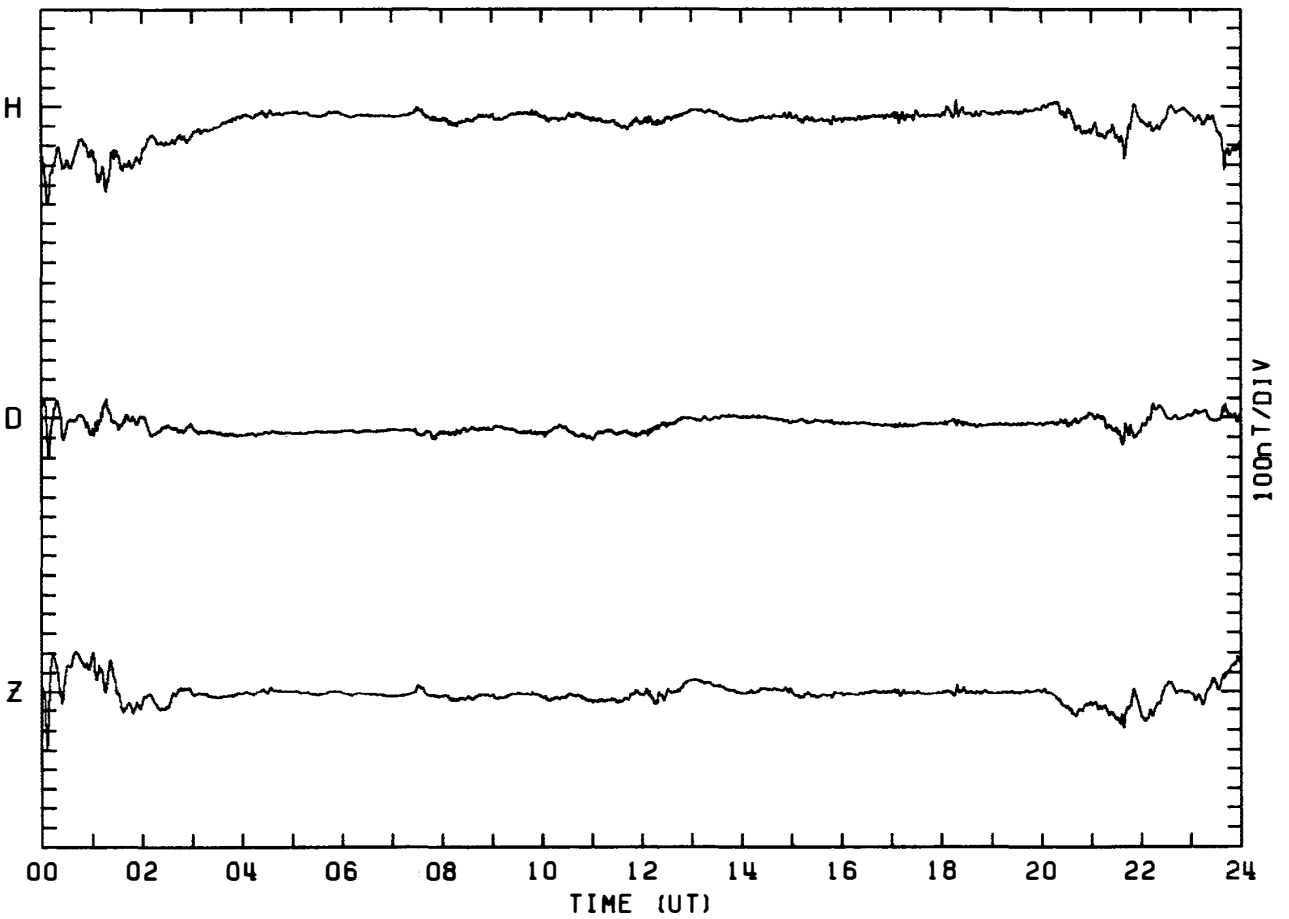
MAGNETOGRAM SYOWA STATION

DAY: 51 FEBRUARY 20, 1982



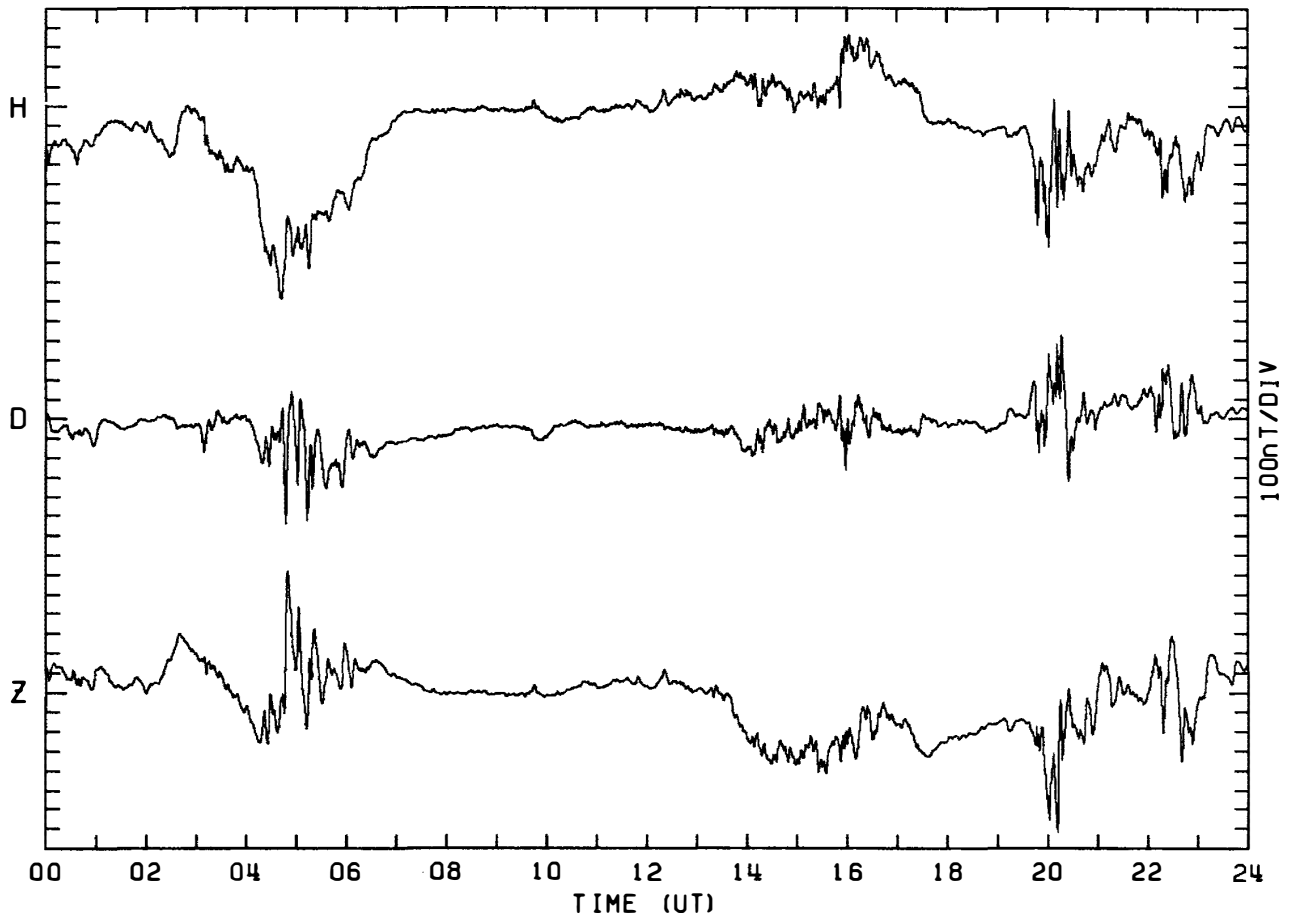
MAGNETOGRAM SYOWA STATION

DAY: 52 FEBRUARY 21, 1982



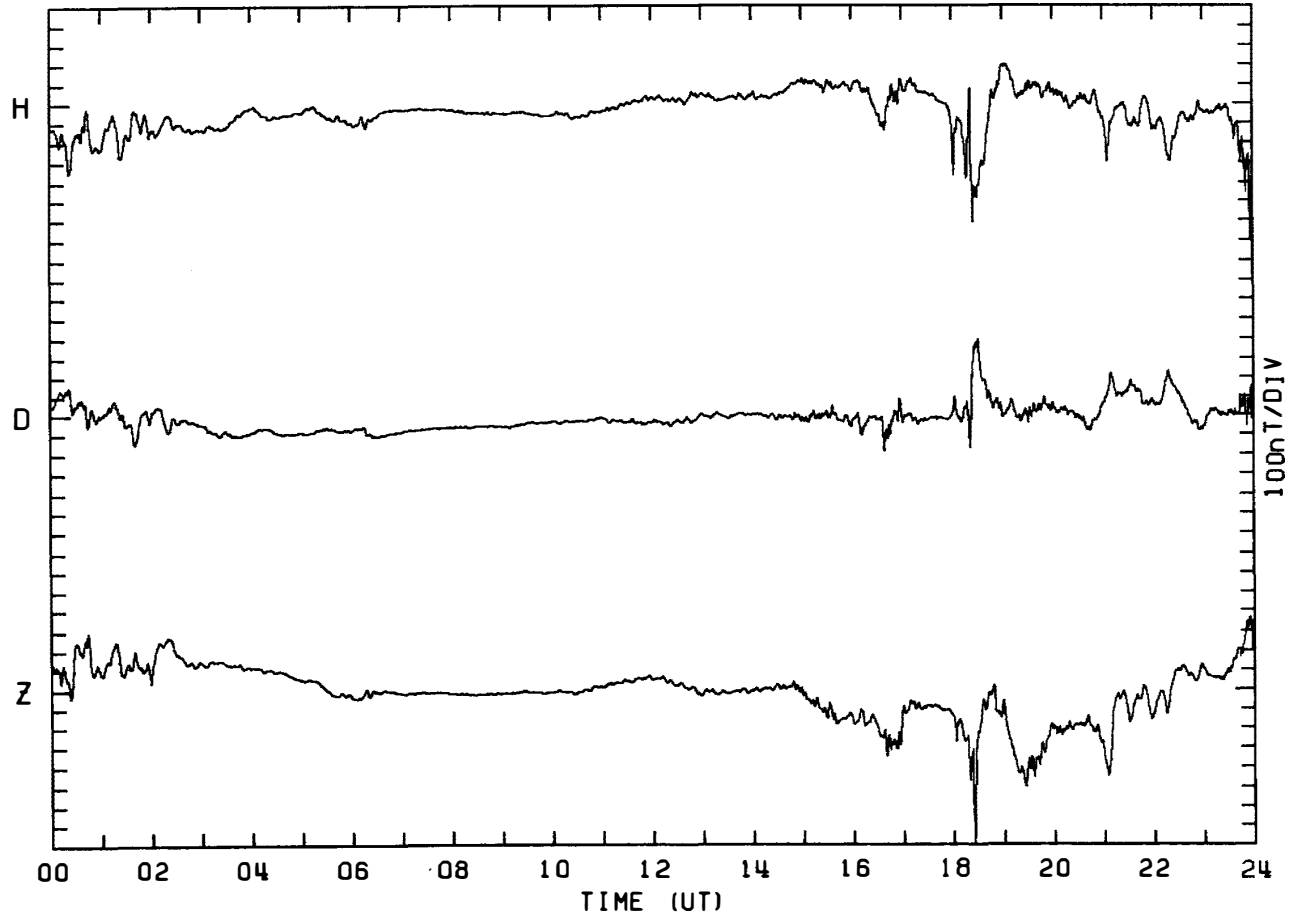
MAGNETOGRAM SYOWA STATION

DAY: 53 FEBRUARY 22, 1982



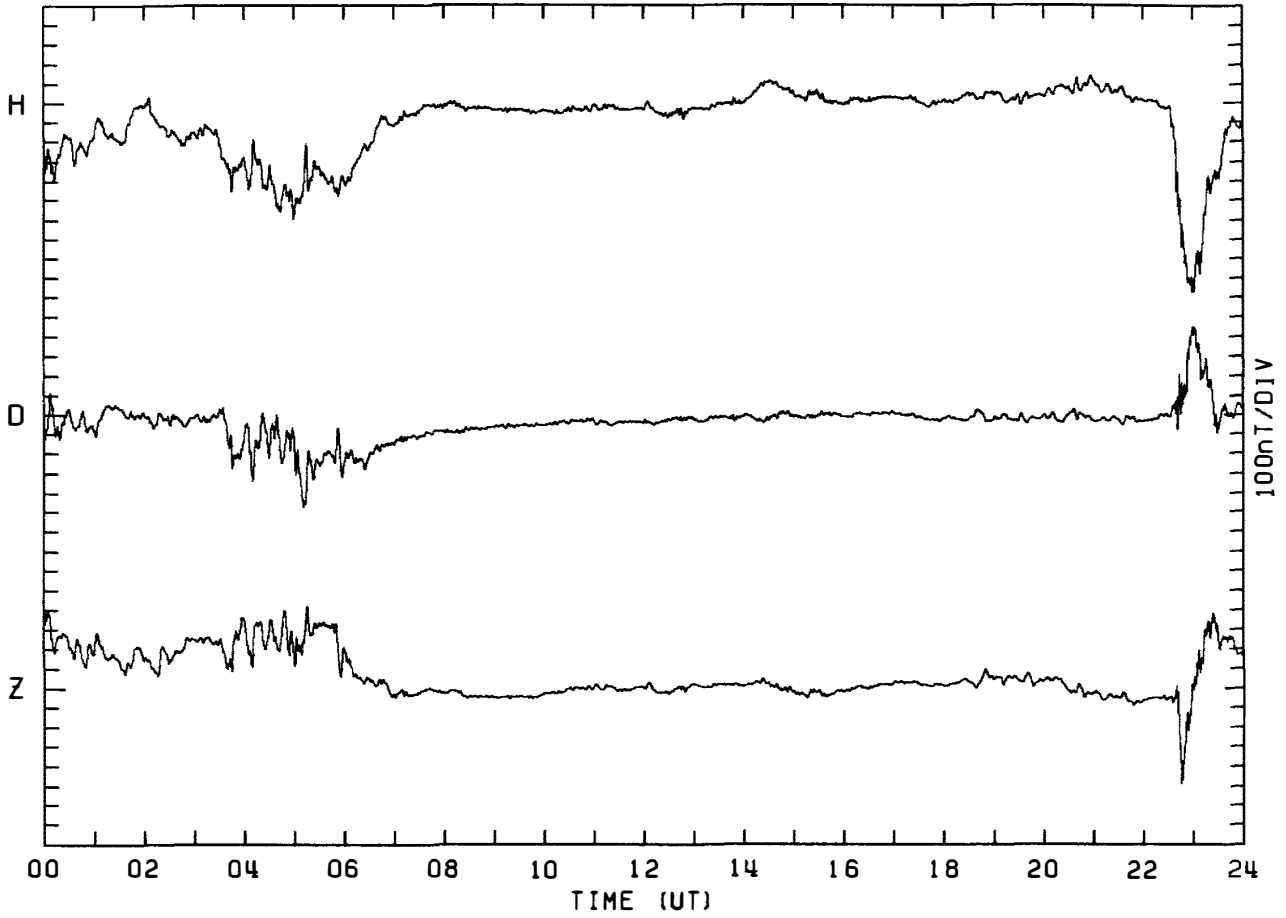
MAGNETOGRAM SYOWA STATION

DAY: 54 FEBRUARY 23, 1982



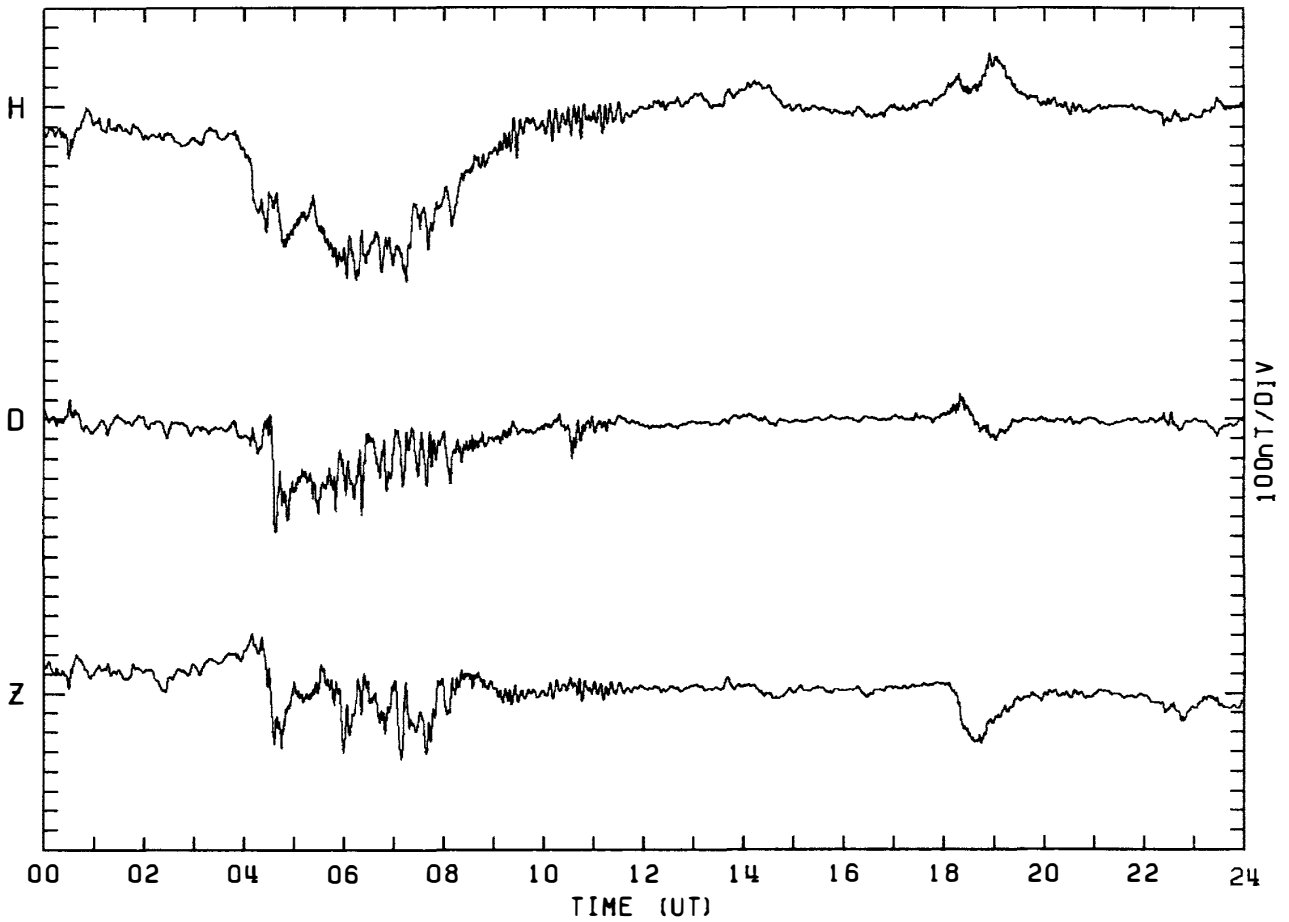
MAGNETOGRAM SYOWA STATION

DAY: 55 FEBRUARY 24, 1982



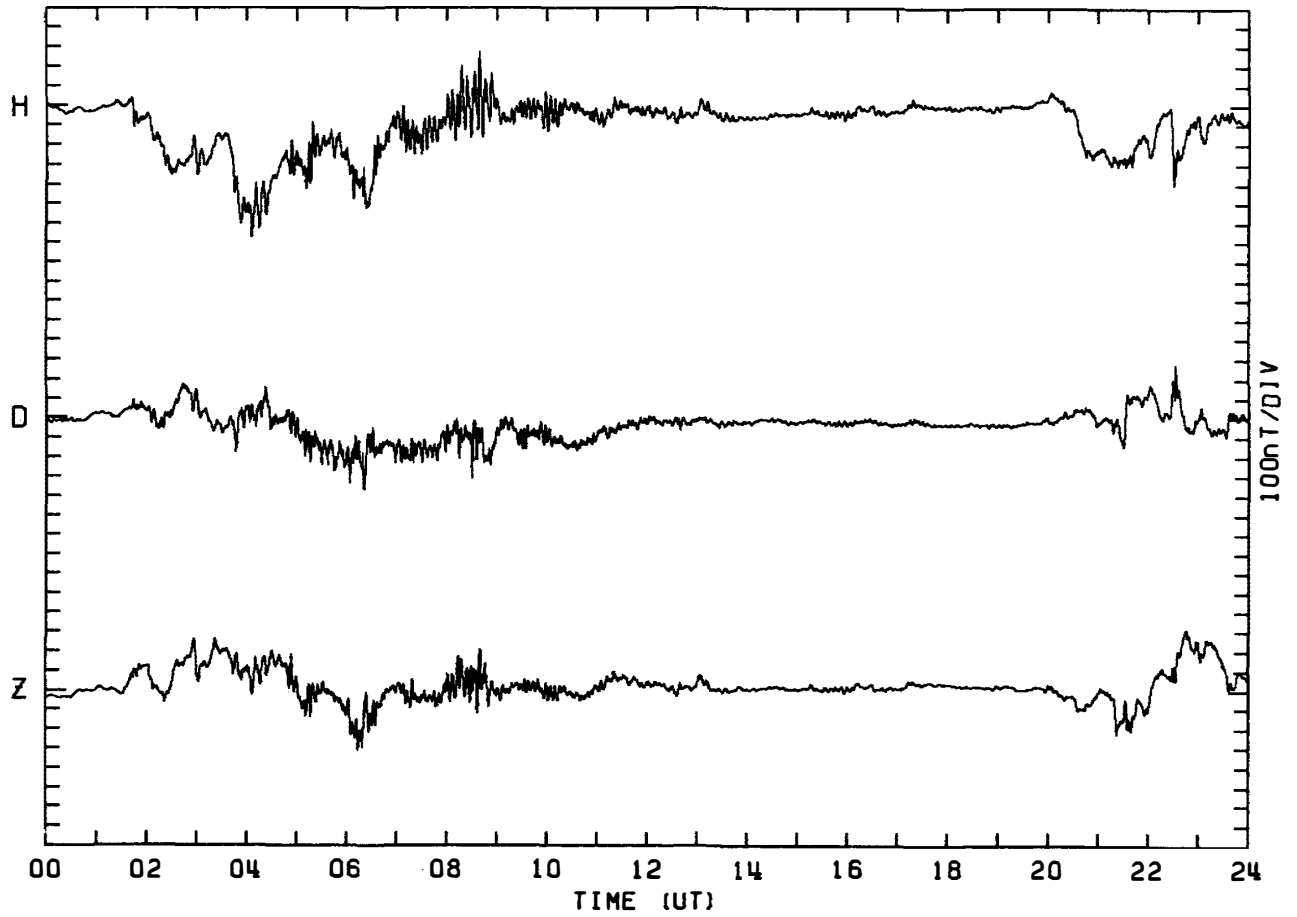
MAGNETOGRAM SYOWA STATION

DAY: 56 FEBRUARY 25, 1982



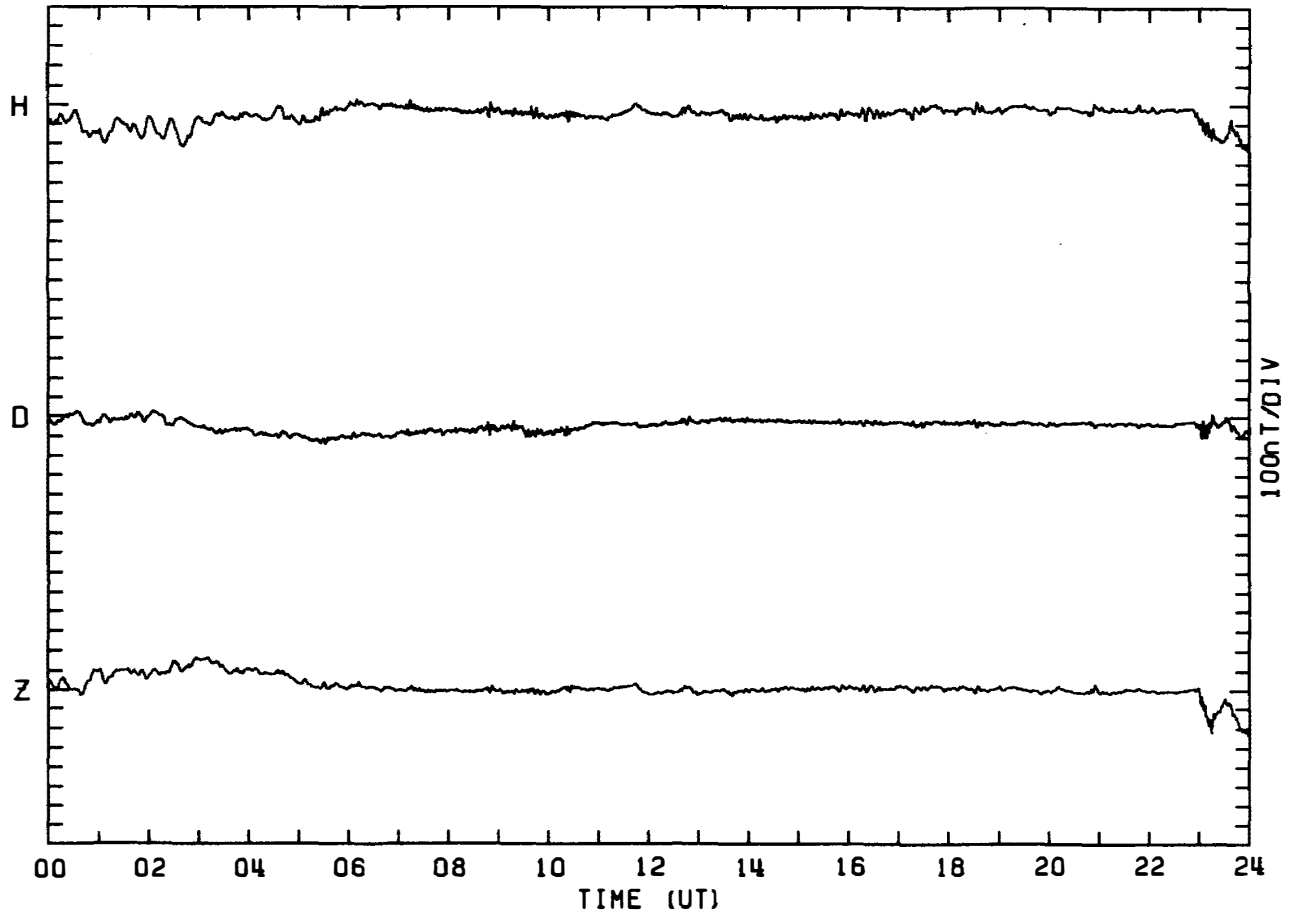
MAGNETOGRAM SYOWA STATION

DAY: 57 FEBRUARY 26, 1982



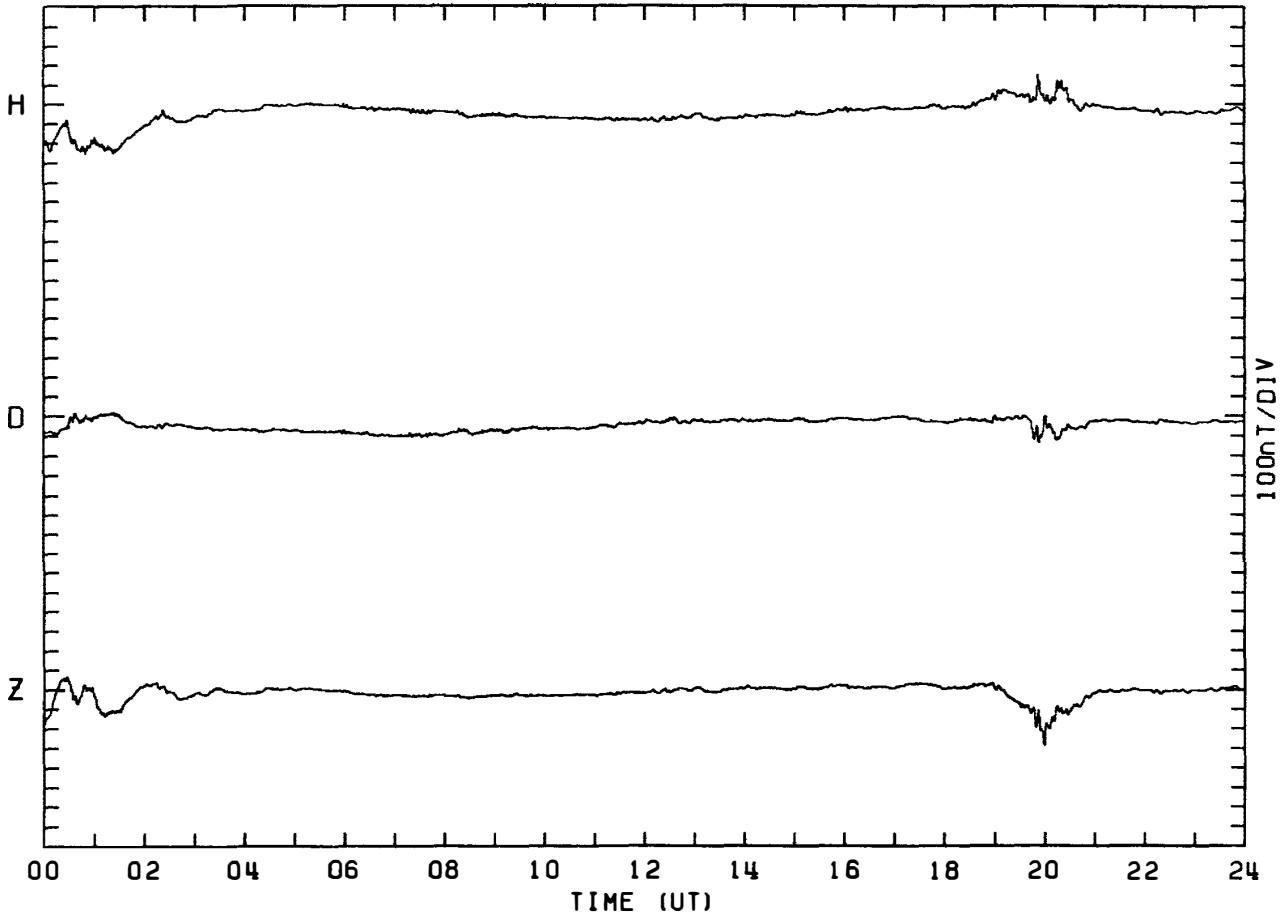
MAGNETOGRAM SYOWA STATION

DAY: 58 FEBRUARY 27, 1982



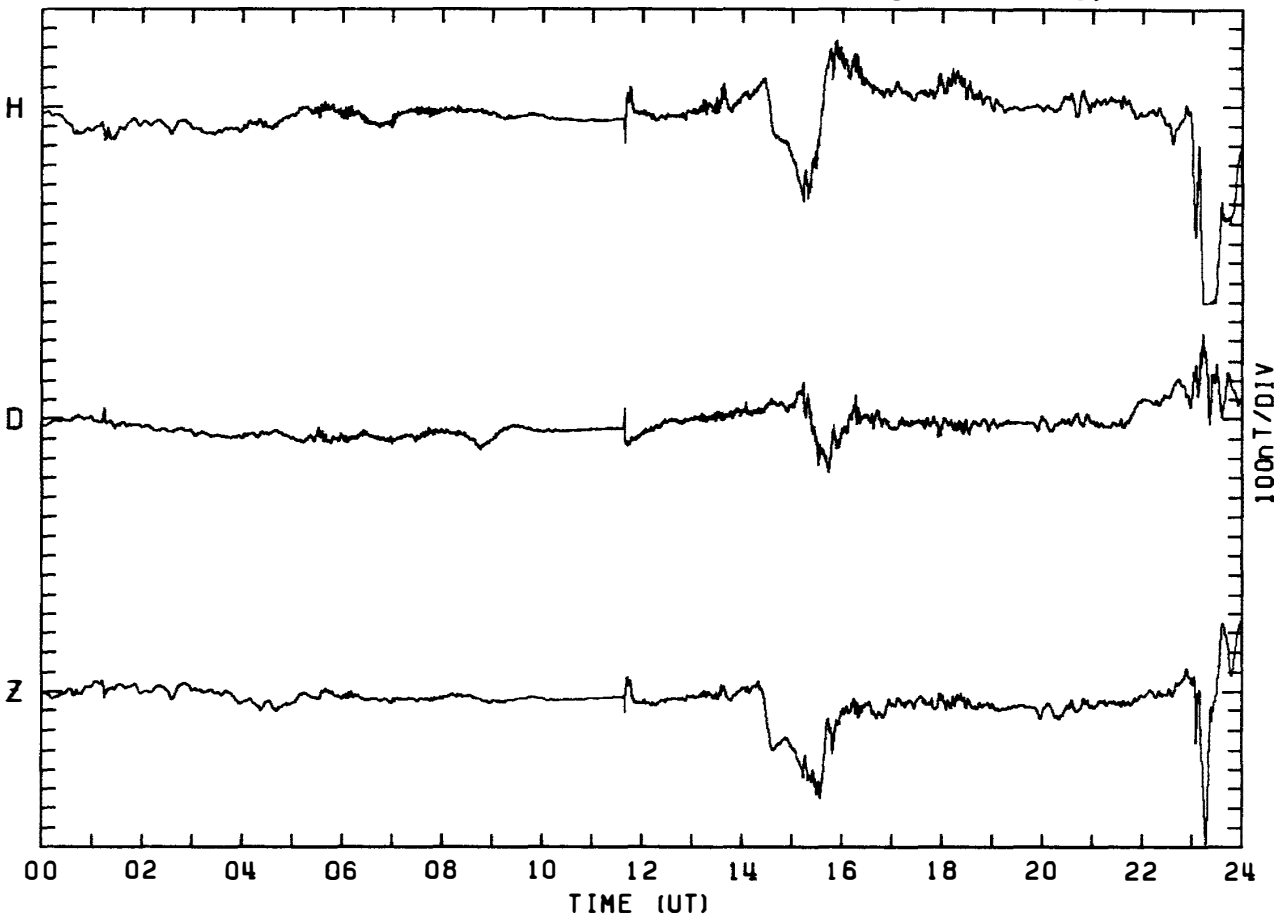
MAGNETOGRAM SYOWA STATION

DAY: 59 FEBRUARY 28, 1982



MAGNETOGRAM SYOWA STATION

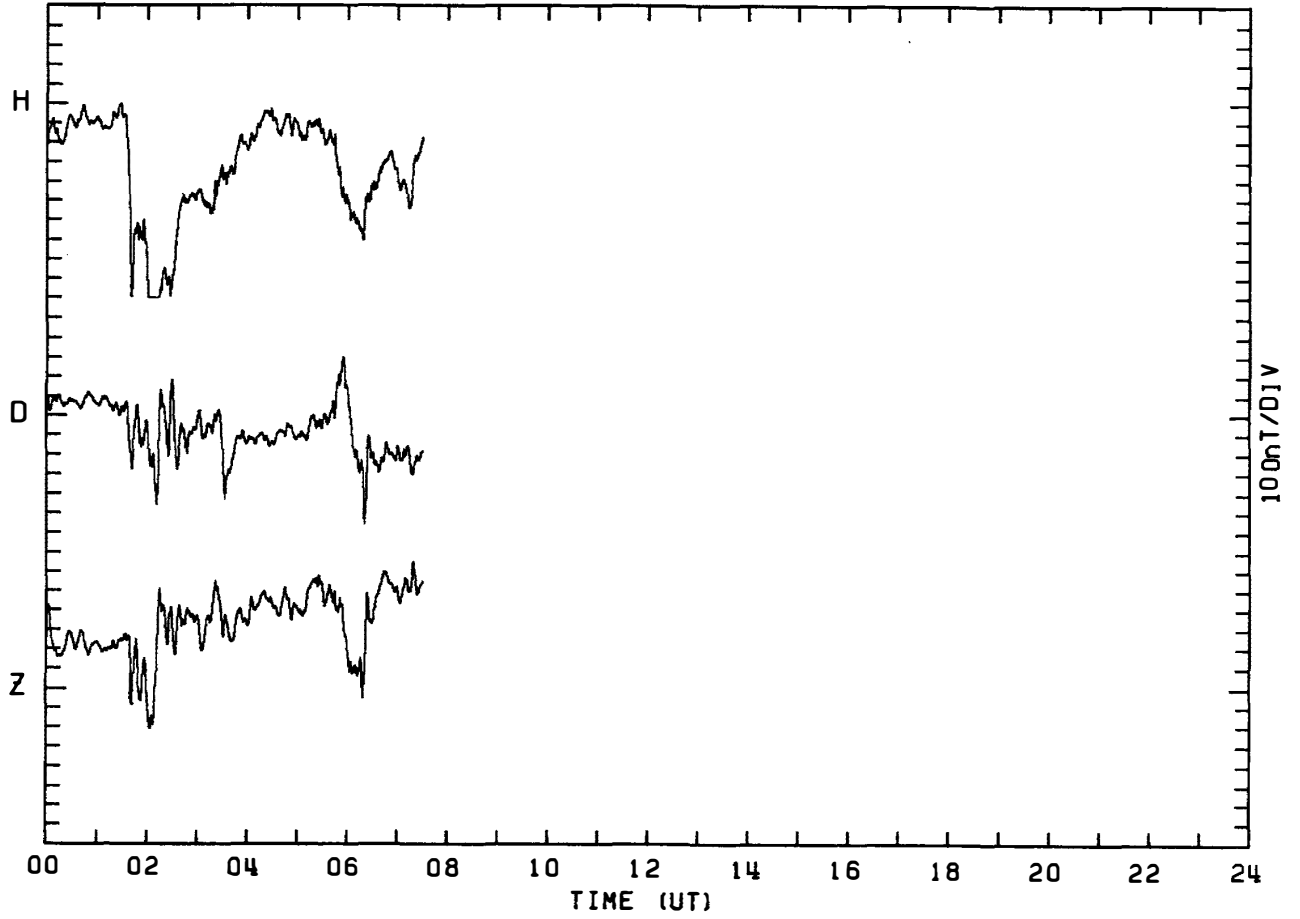
DAY: 60 MARCH 1, 1982





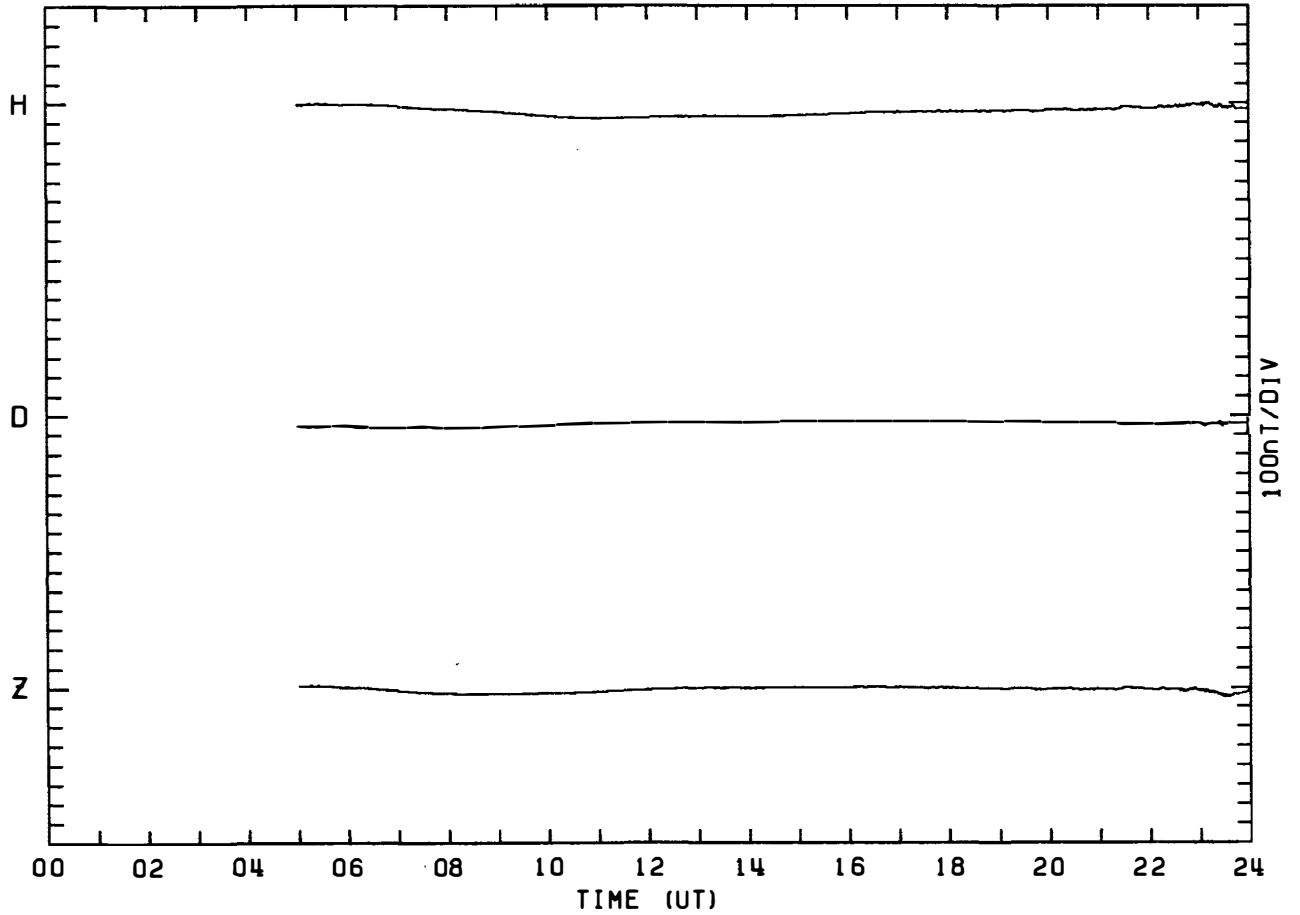
MAGNETOGRAM SYOWA STATION

DAY: 61 MARCH 2, 1982



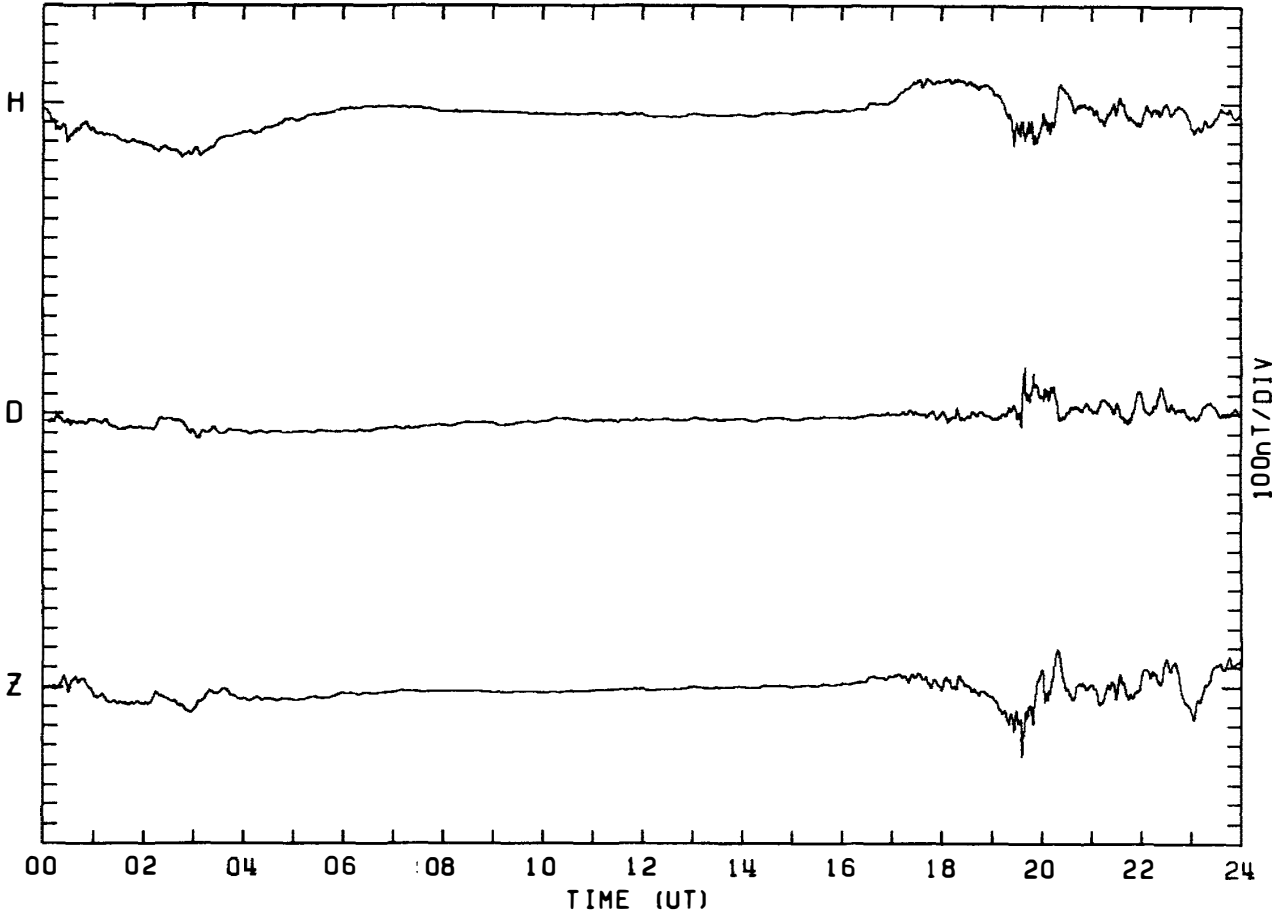
MAGNETOGRAM SYOWA STATION

DAY: 66 MARCH 7, 1982



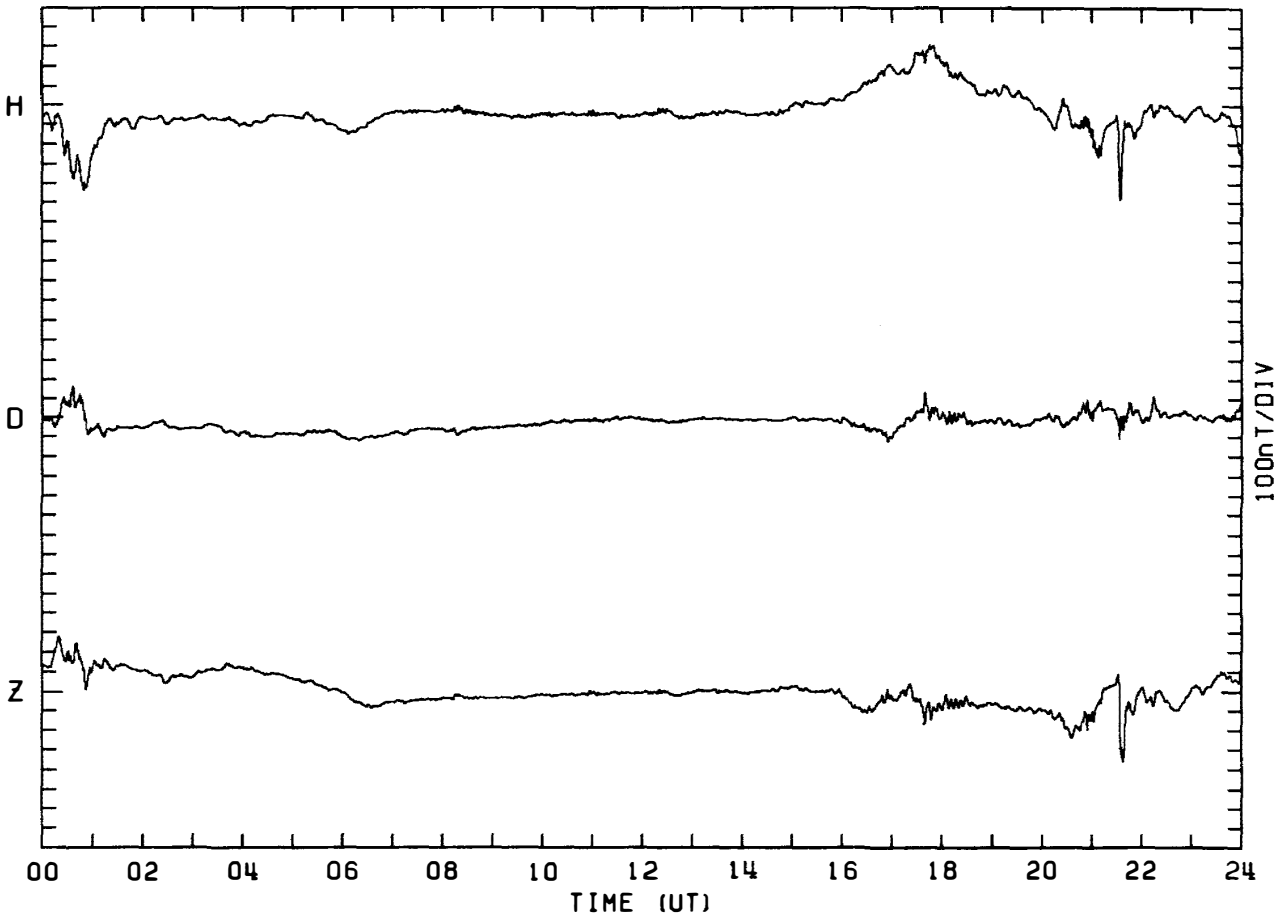
MAGNETOGRAM SYOWA STATION

DAY: 67 MARCH 8. 1982



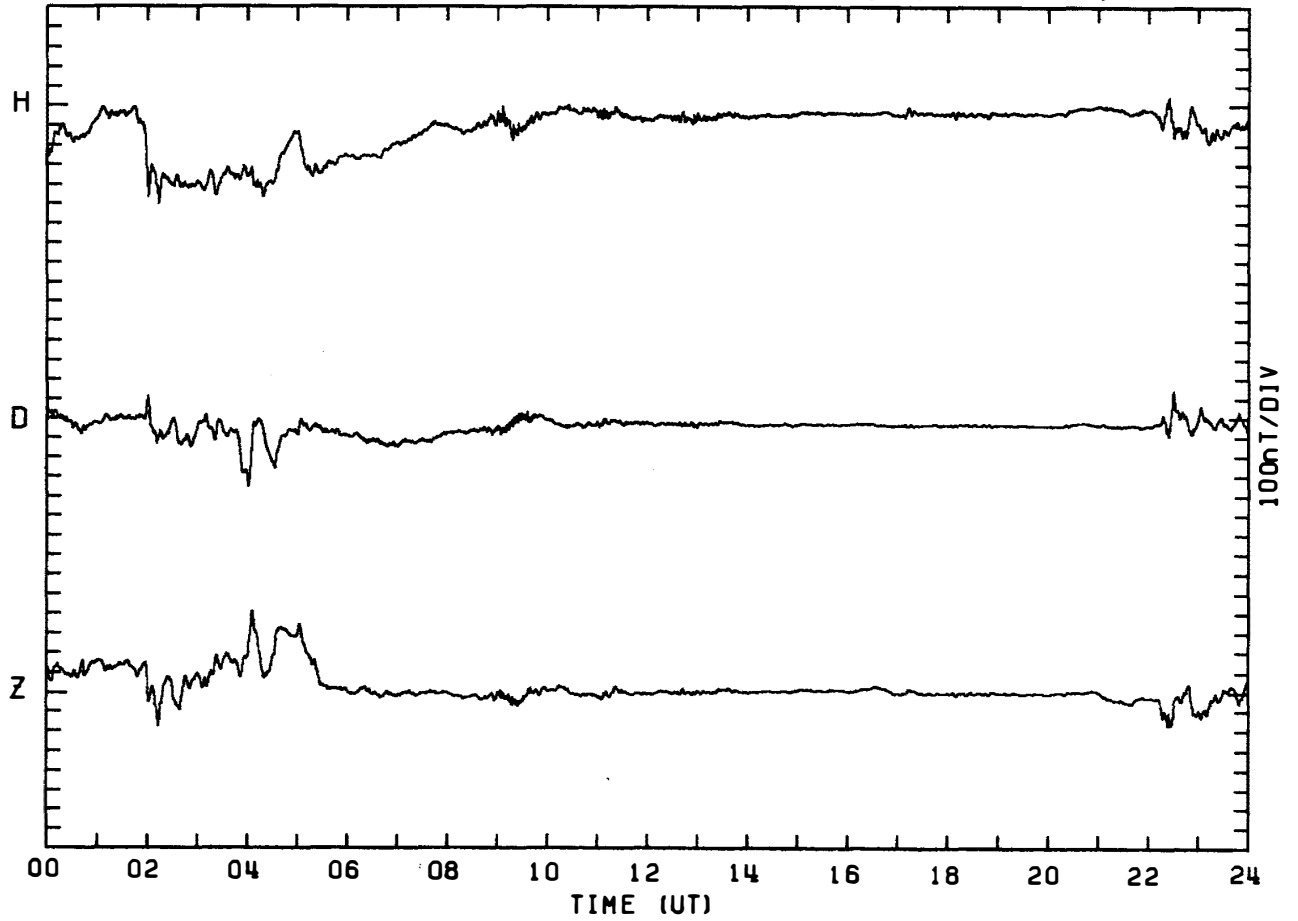
MAGNETOGRAM SYOWA STATION

DAY: 68 MARCH 9. 1982



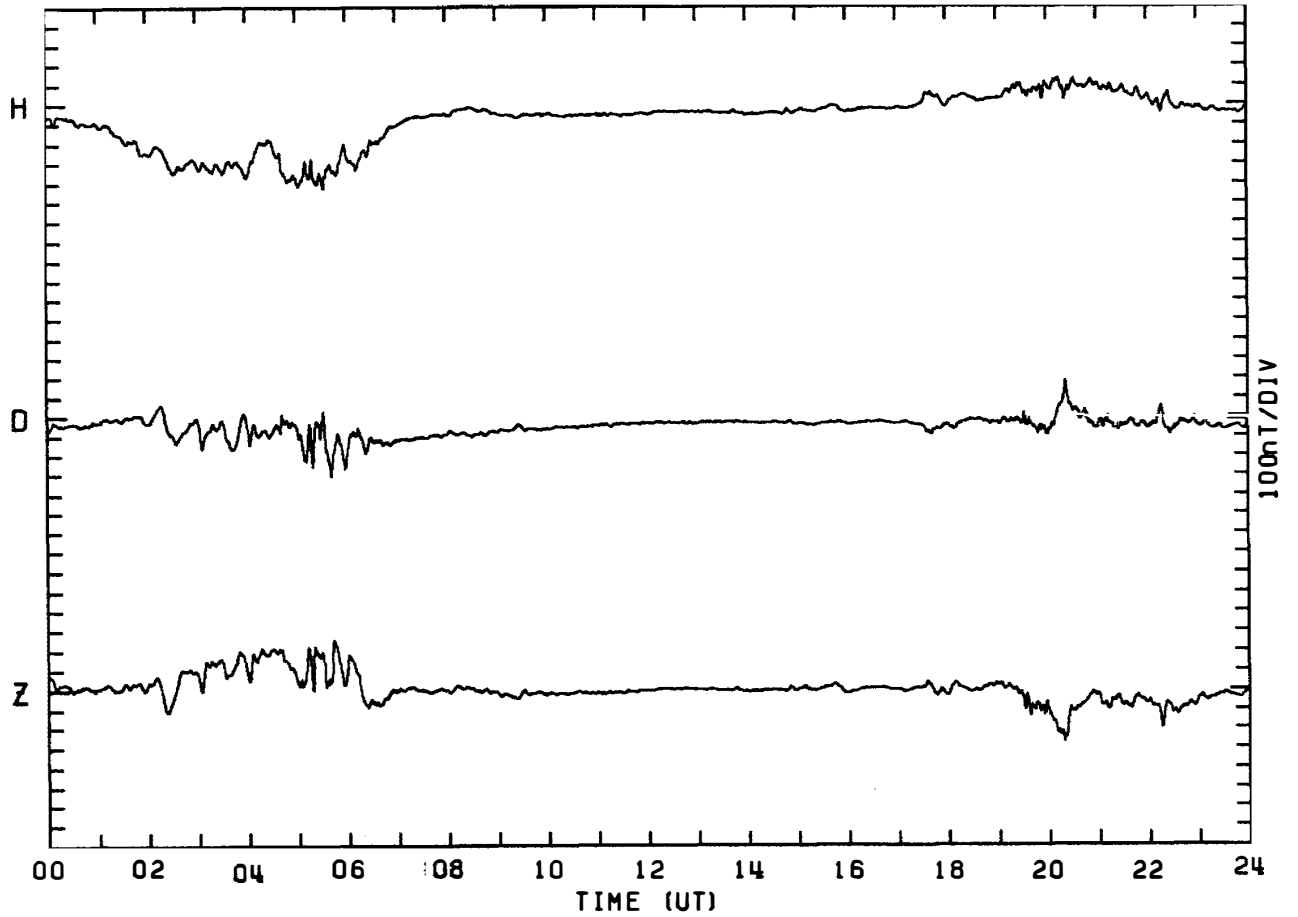
MAGNETOGRAM SYOWA STATION

DAY: 69 MARCH 10, 1982



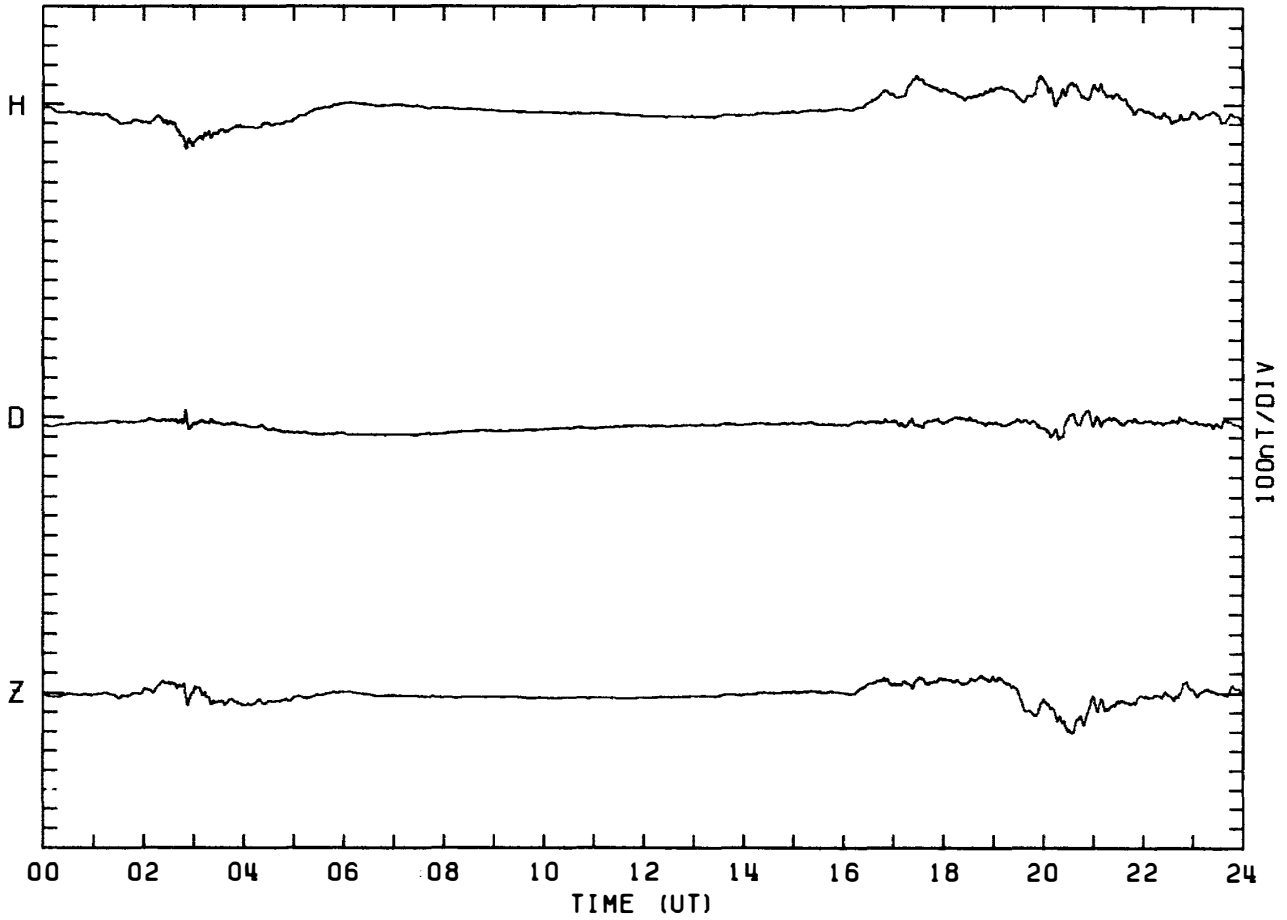
MAGNETOGRAM SYOWA STATION

DAY: 70 MARCH 11, 1982



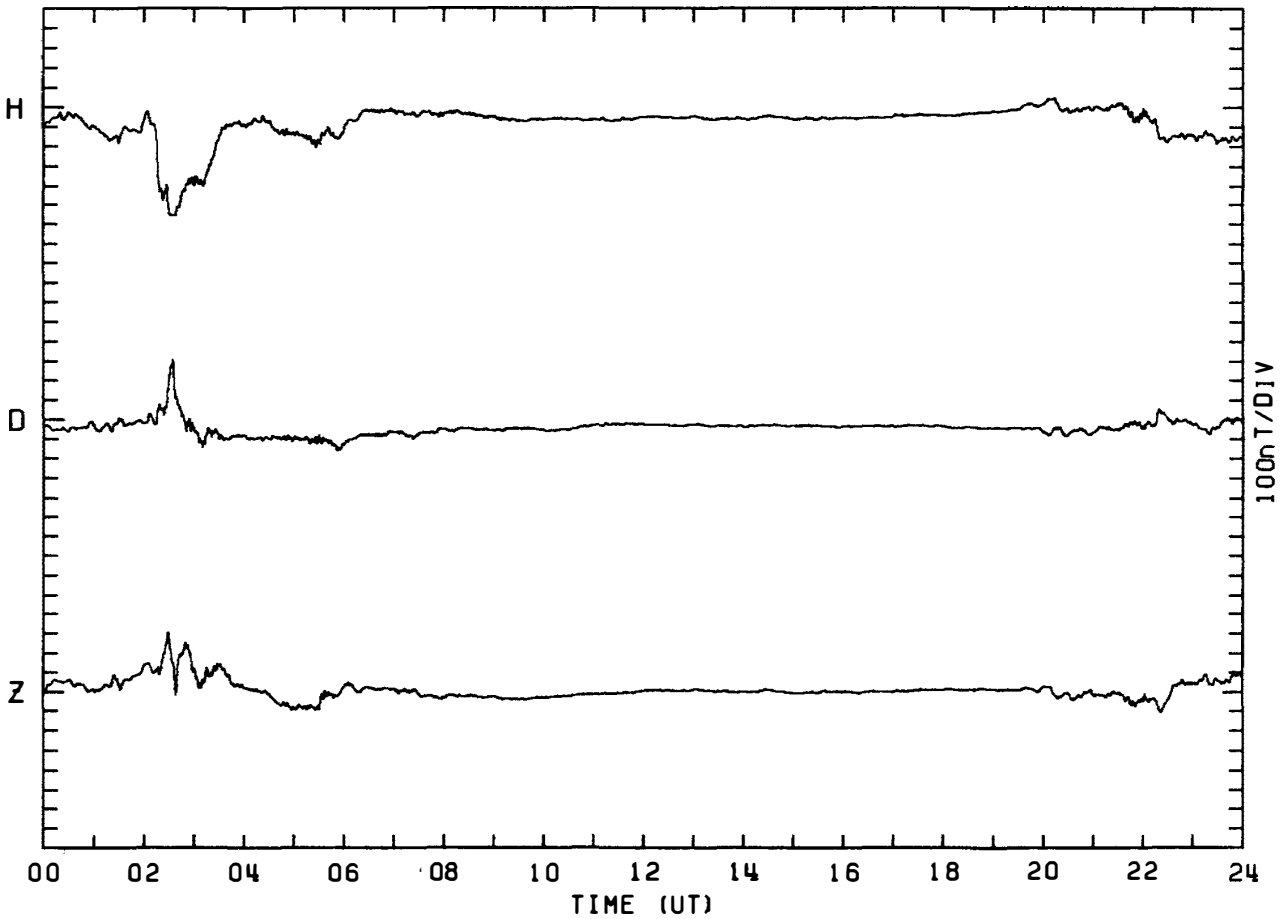
MAGNETOGRAM SYOWA STATION

DAY: 71 MARCH 12, 1982



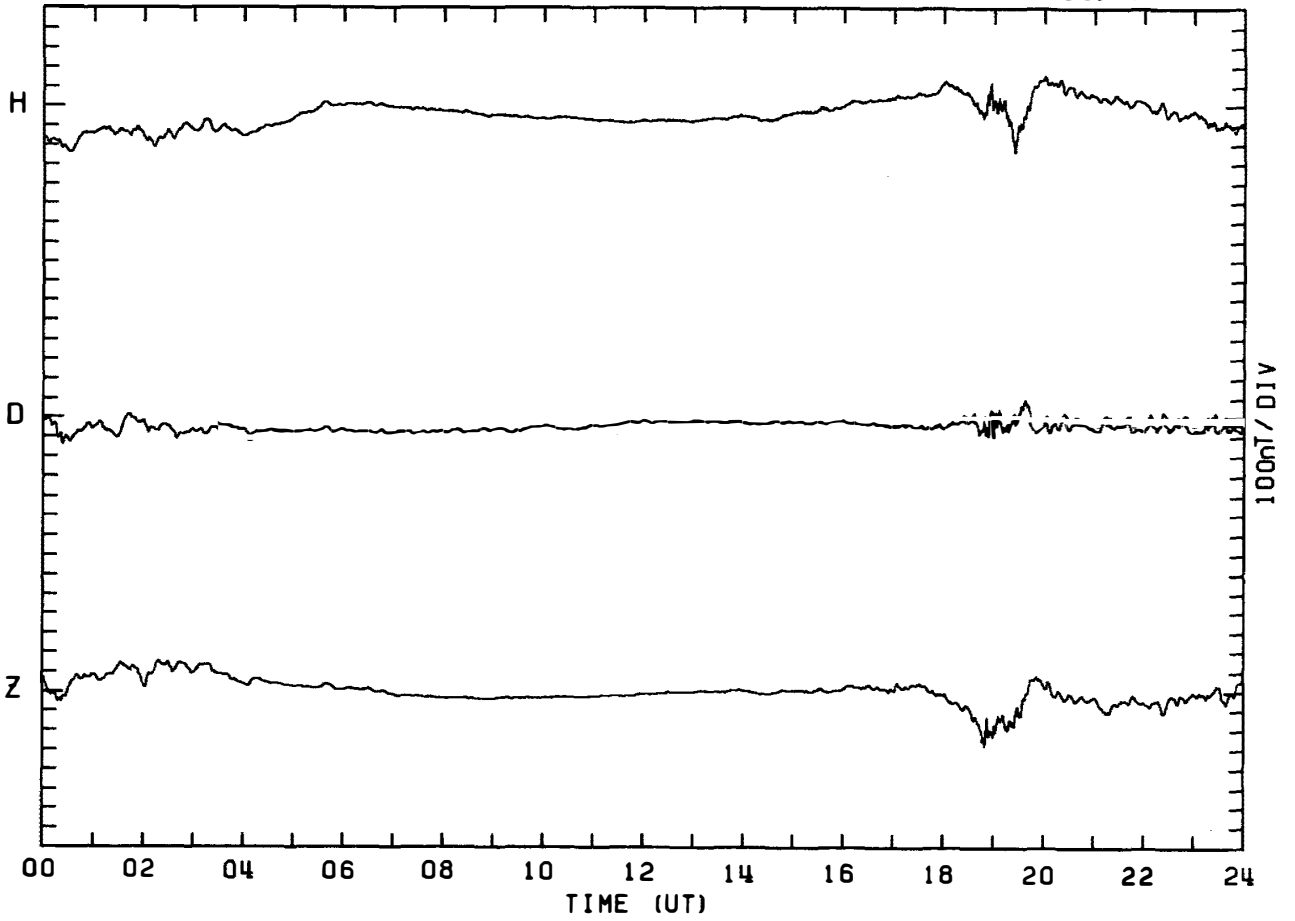
MAGNETOGRAM SYOWA STATION

DAY: 72 MARCH 13, 1982



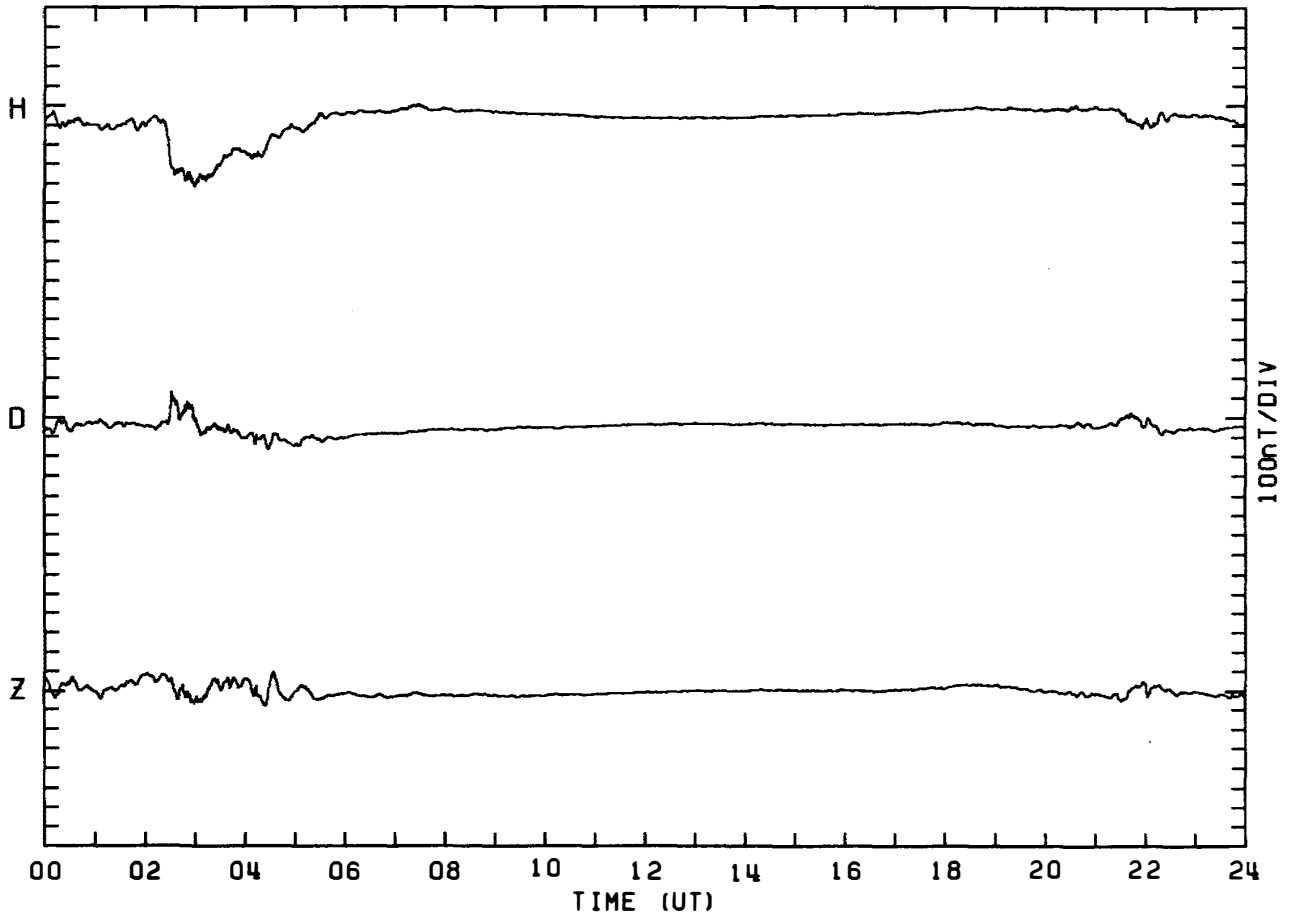
MAGNETOGRAM SYOWA STATION

DAY: 73 MARCH 14, 1982



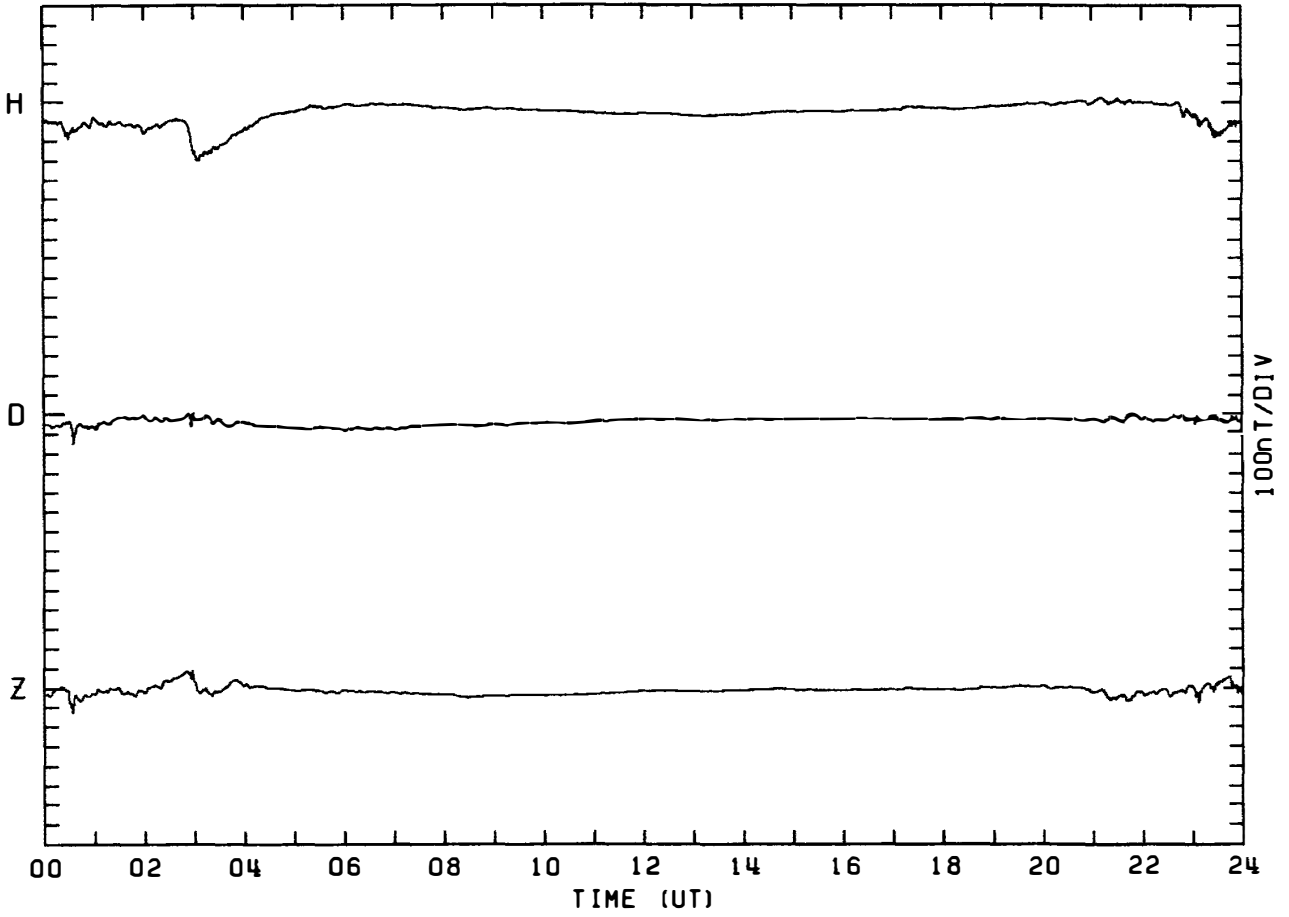
MAGNETOGRAM SYOWA STATION

DAY: 74 MARCH 15, 1982



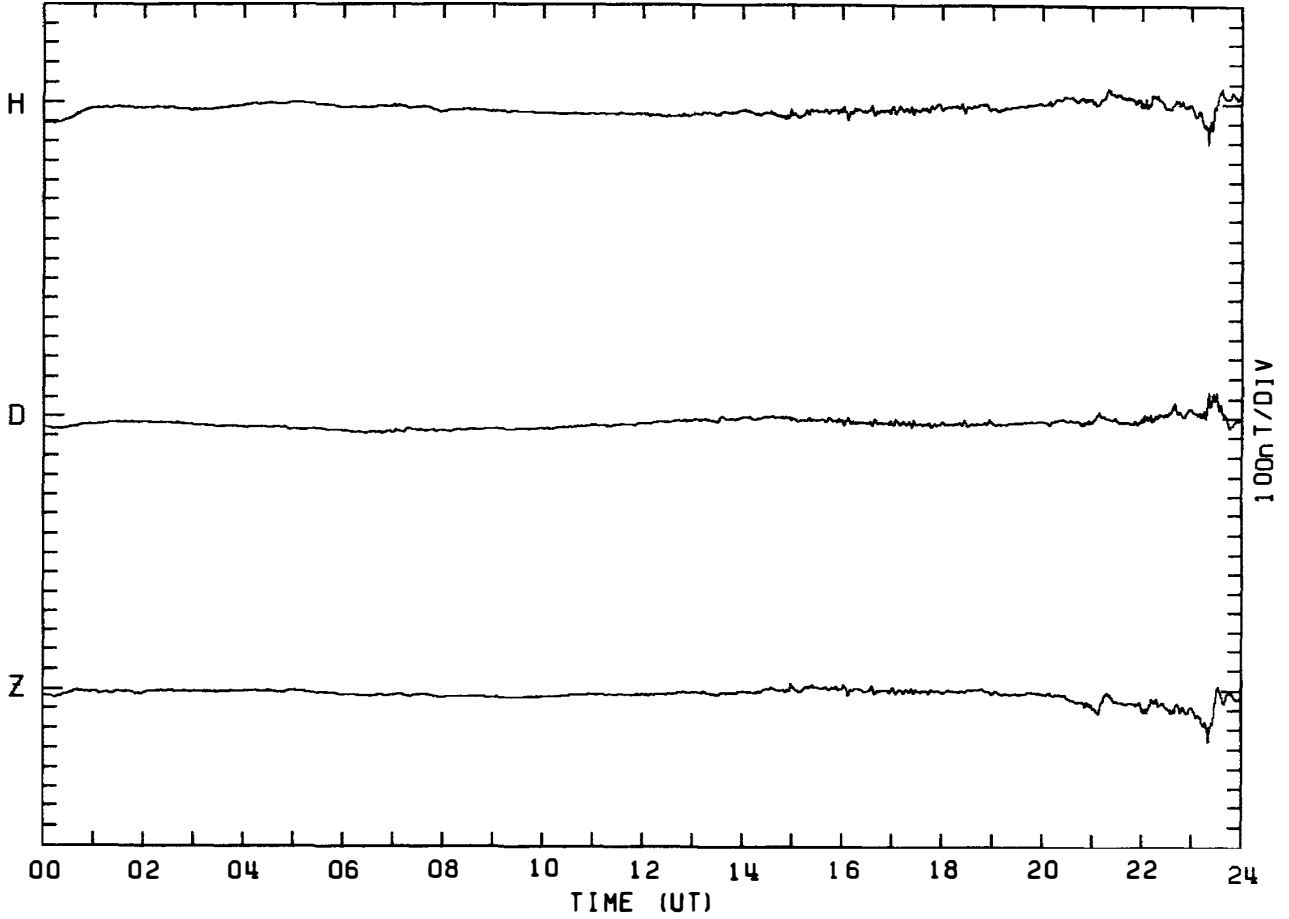
MAGNETOGRAM SYOWA STATION

DAY: 75 MARCH 16. 1982



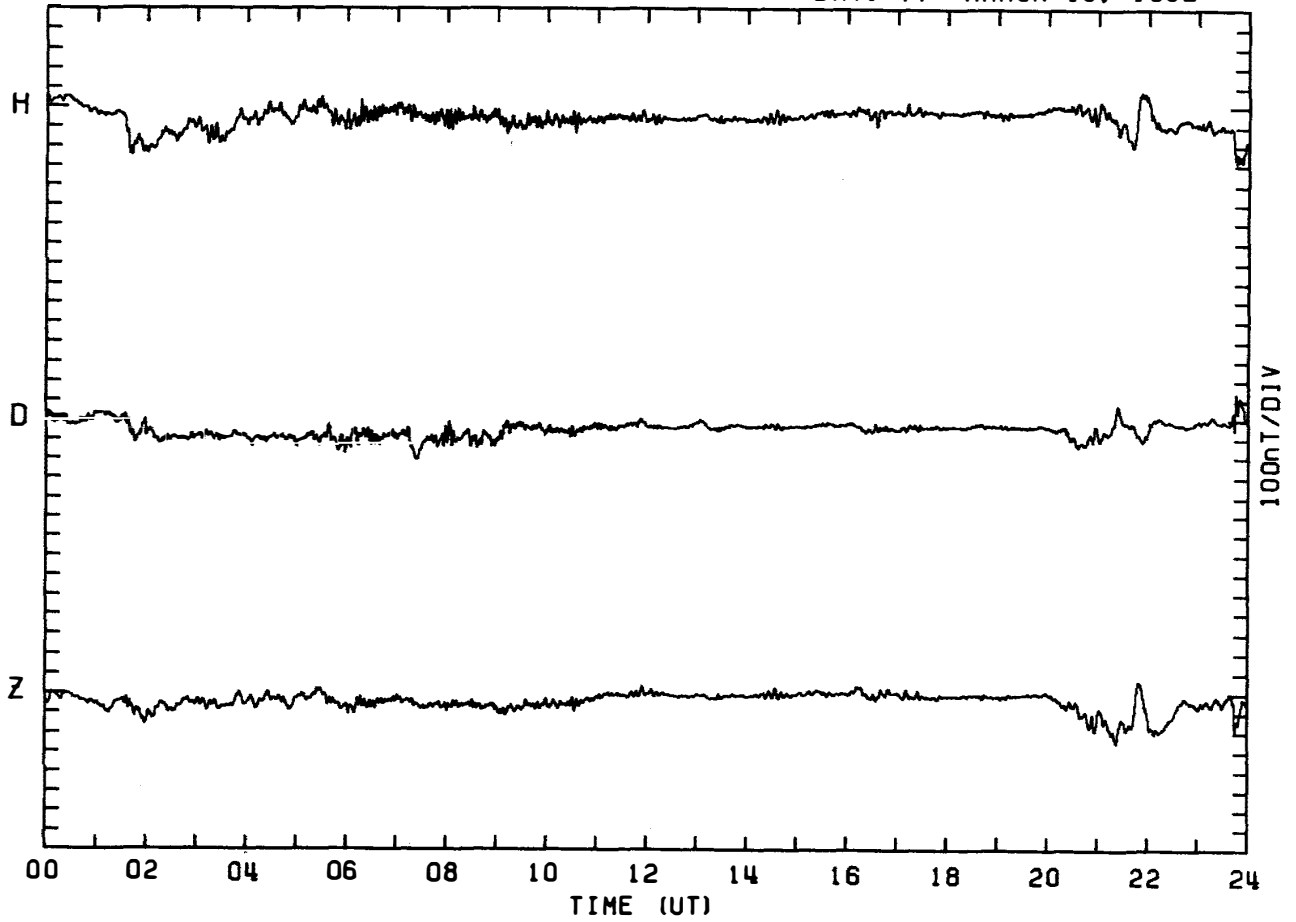
MAGNETOGRAM SYOWA STATION

DAY: 76 MARCH 17. 1982



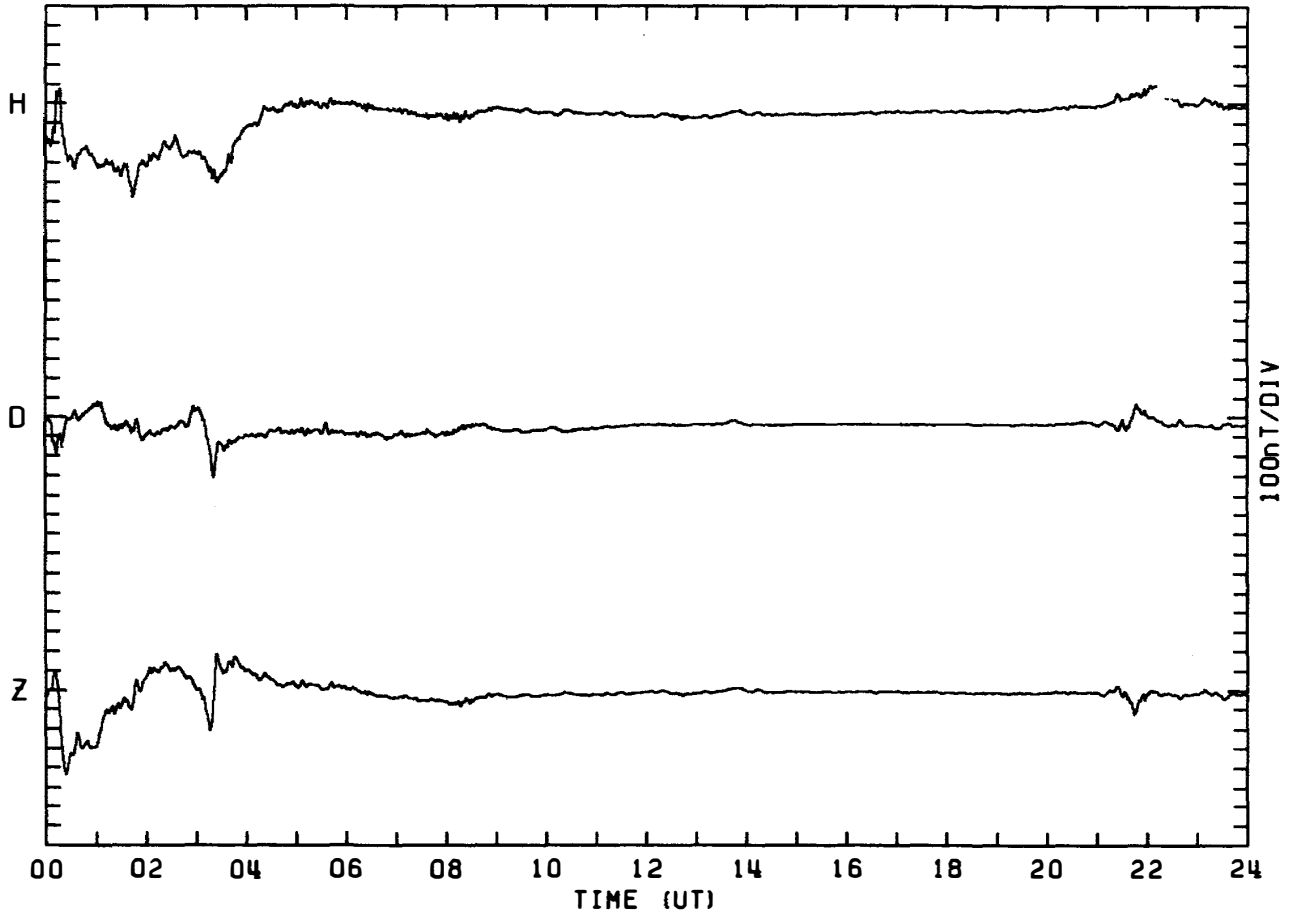
MAGNETOGRAM SYOWA STATION

DAY: 77 MARCH 18. 1982



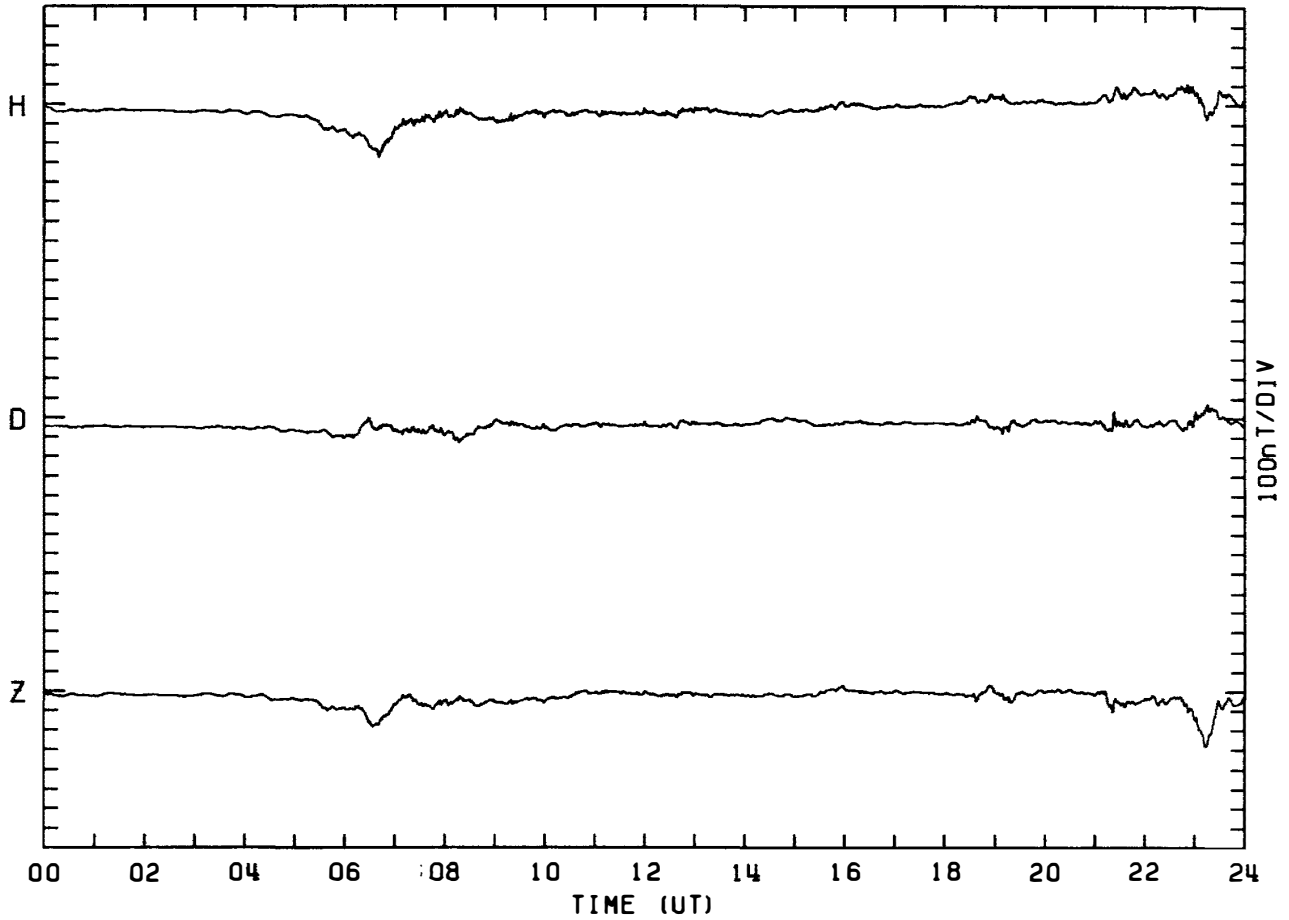
MAGNETOGRAM SYOWA STATION

DAY: 78 MARCH 19. 1982



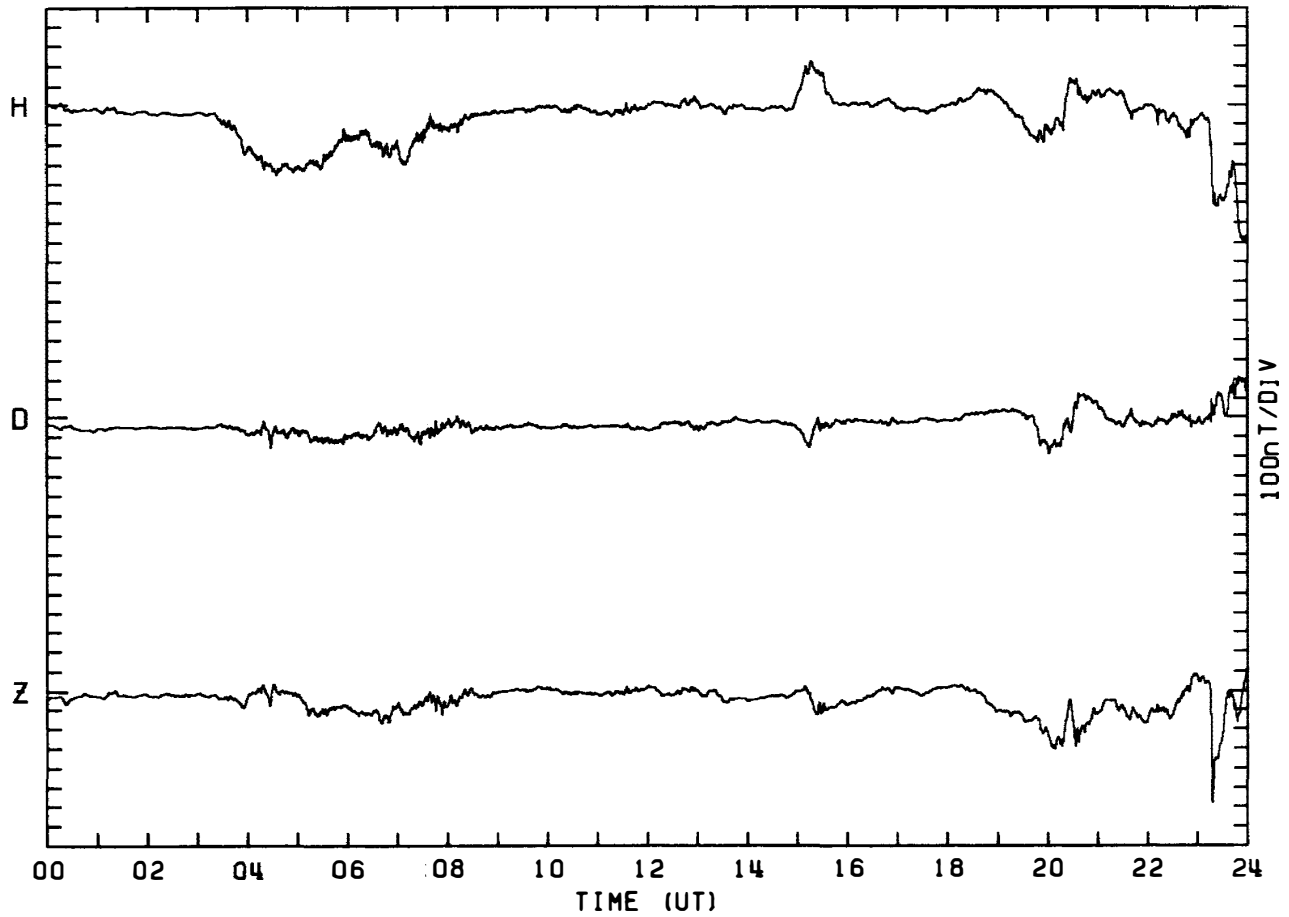
MAGNETOGRAM SYOWA STATION

DAY: 79 MARCH 20, 1982



MAGNETOGRAM SYOWA STATION

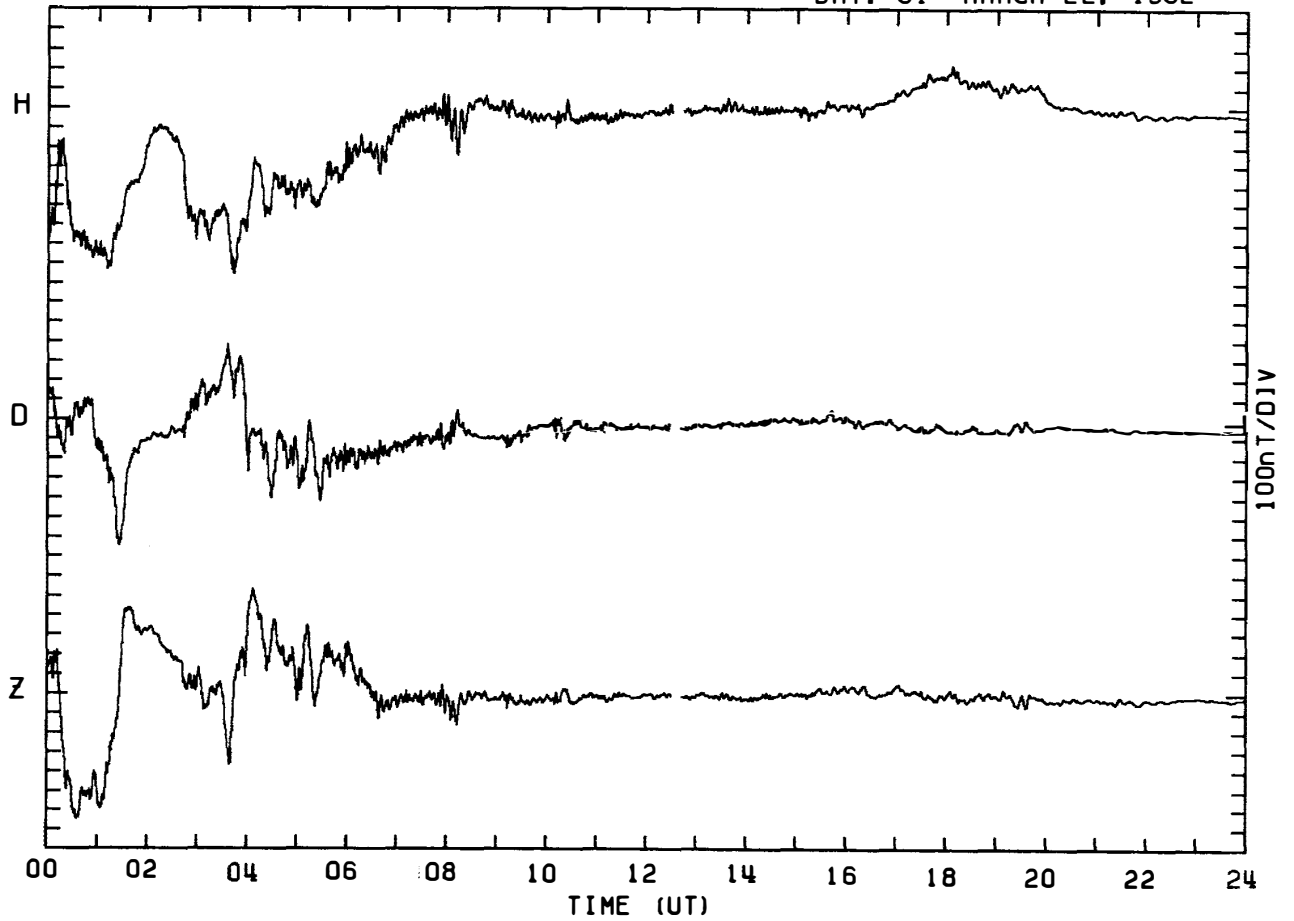
DAY: 80 MARCH 21, 1982





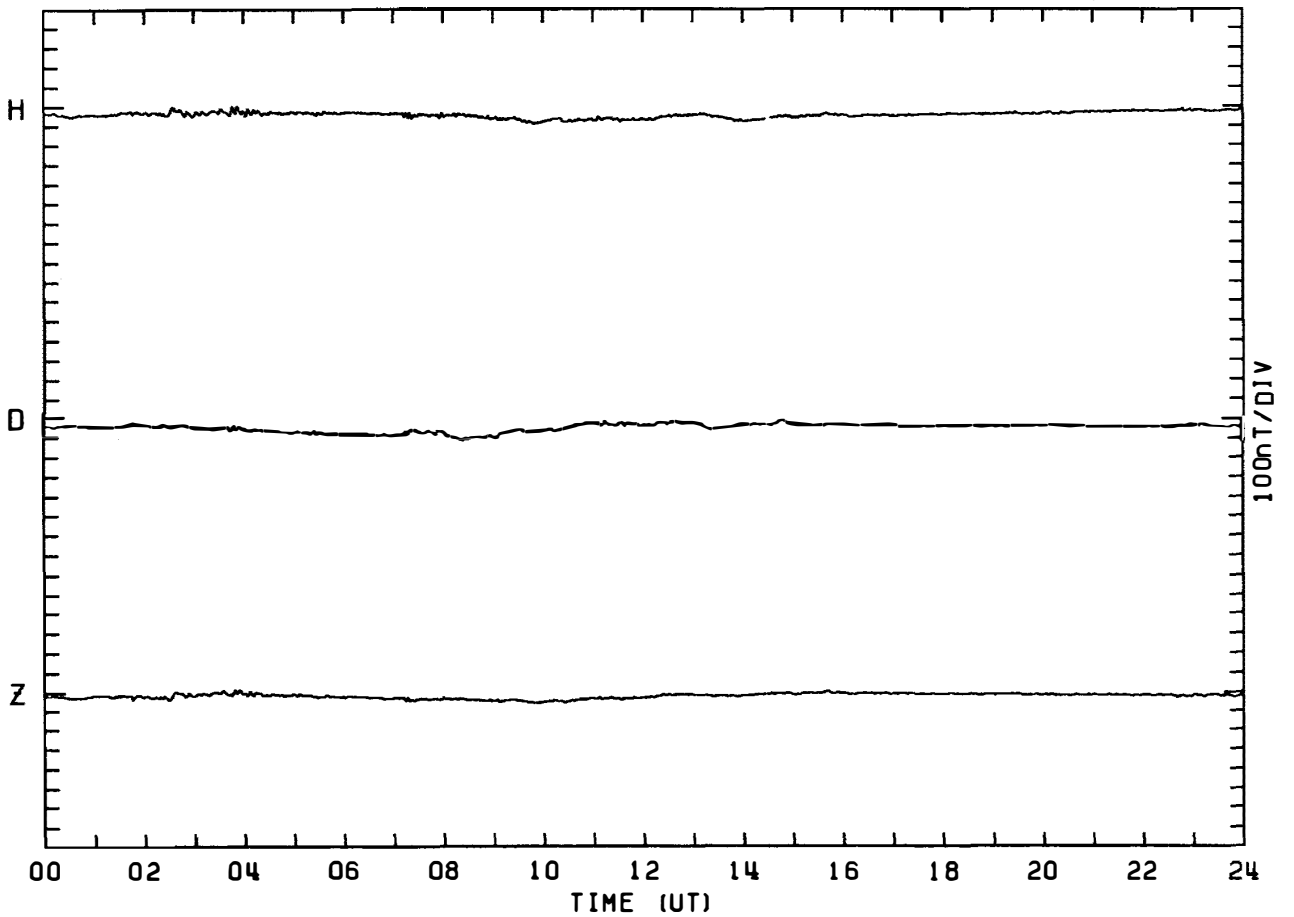
MAGNETOGRAM SYOWA STATION

DAY: 81 MARCH 22, 1982



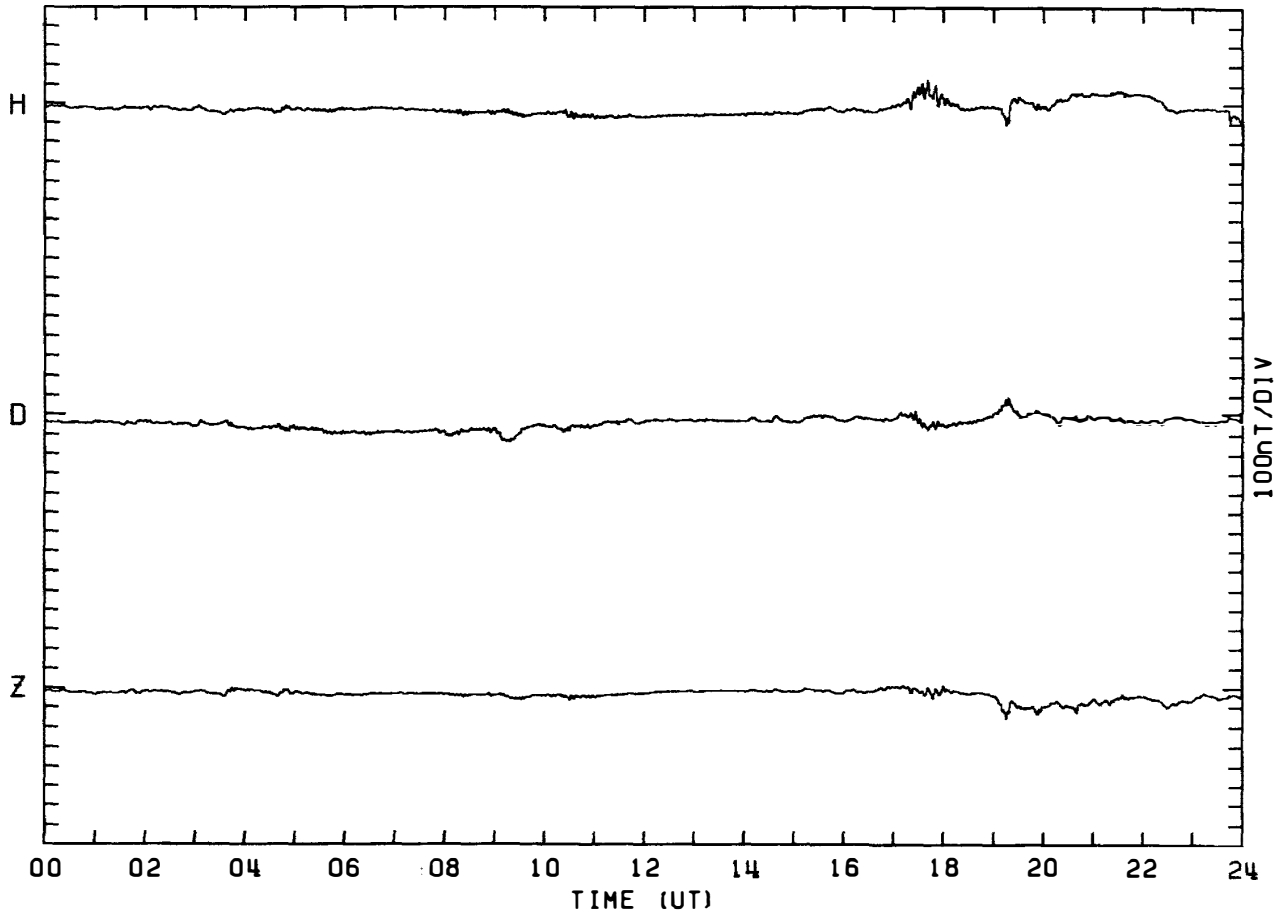
MAGNETOGRAM SYOWA STATION

DAY: 82 MARCH 23, 1982



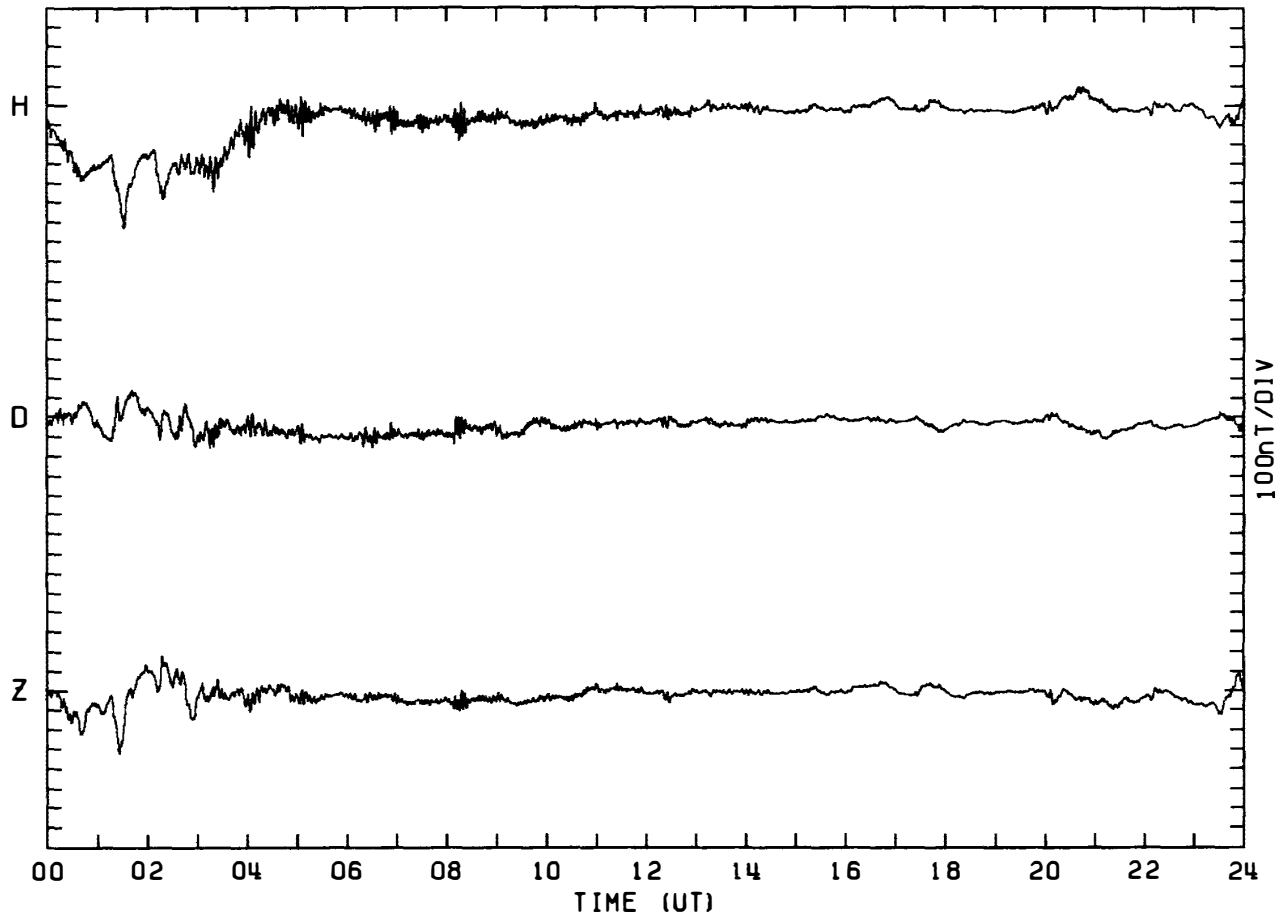
MAGNETOGRAM SYOWA STATION

DAY: 83 MARCH 24. 1982



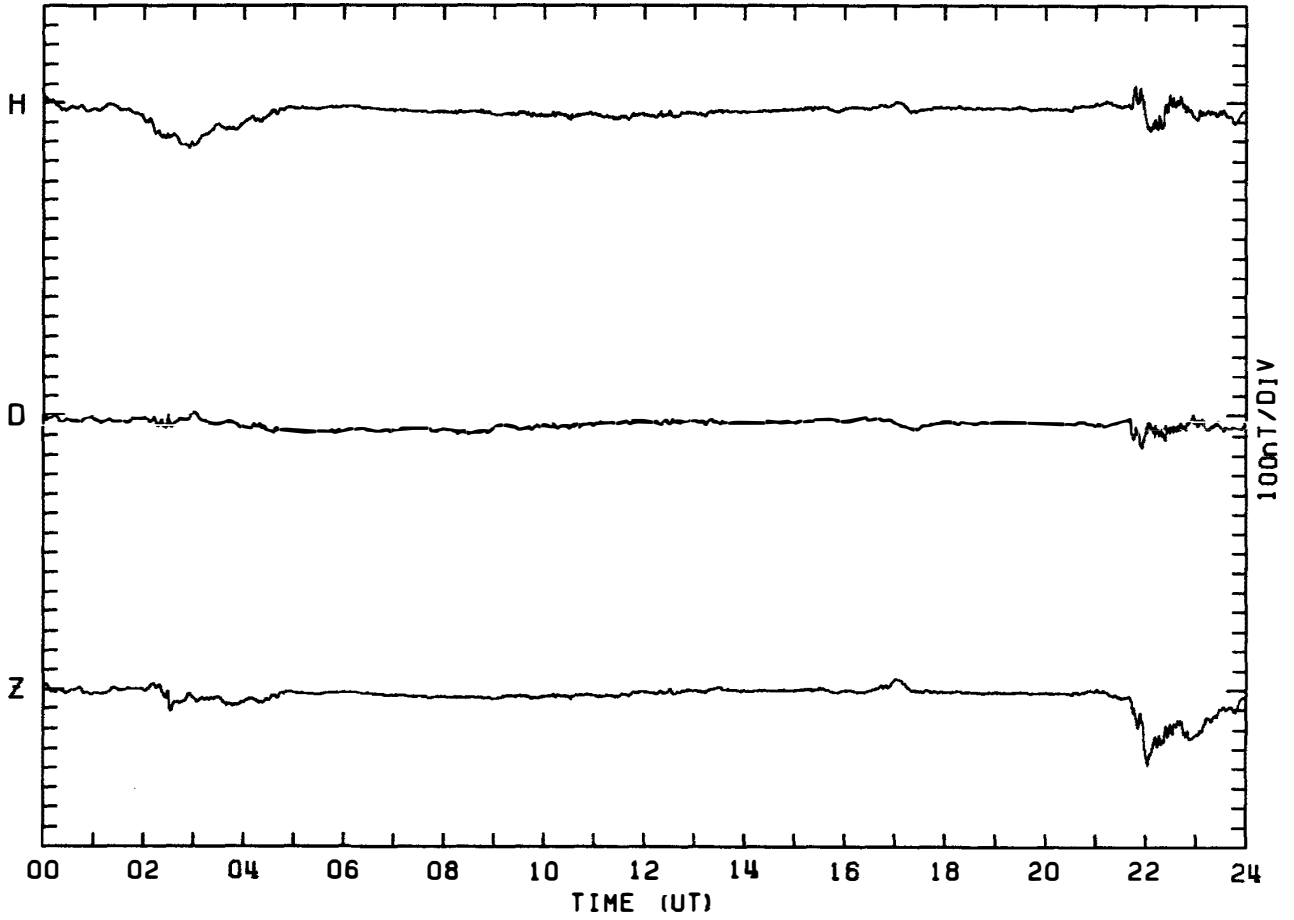
MAGNETOGRAM SYOWA STATION

DAY: 84 MARCH 25. 1982



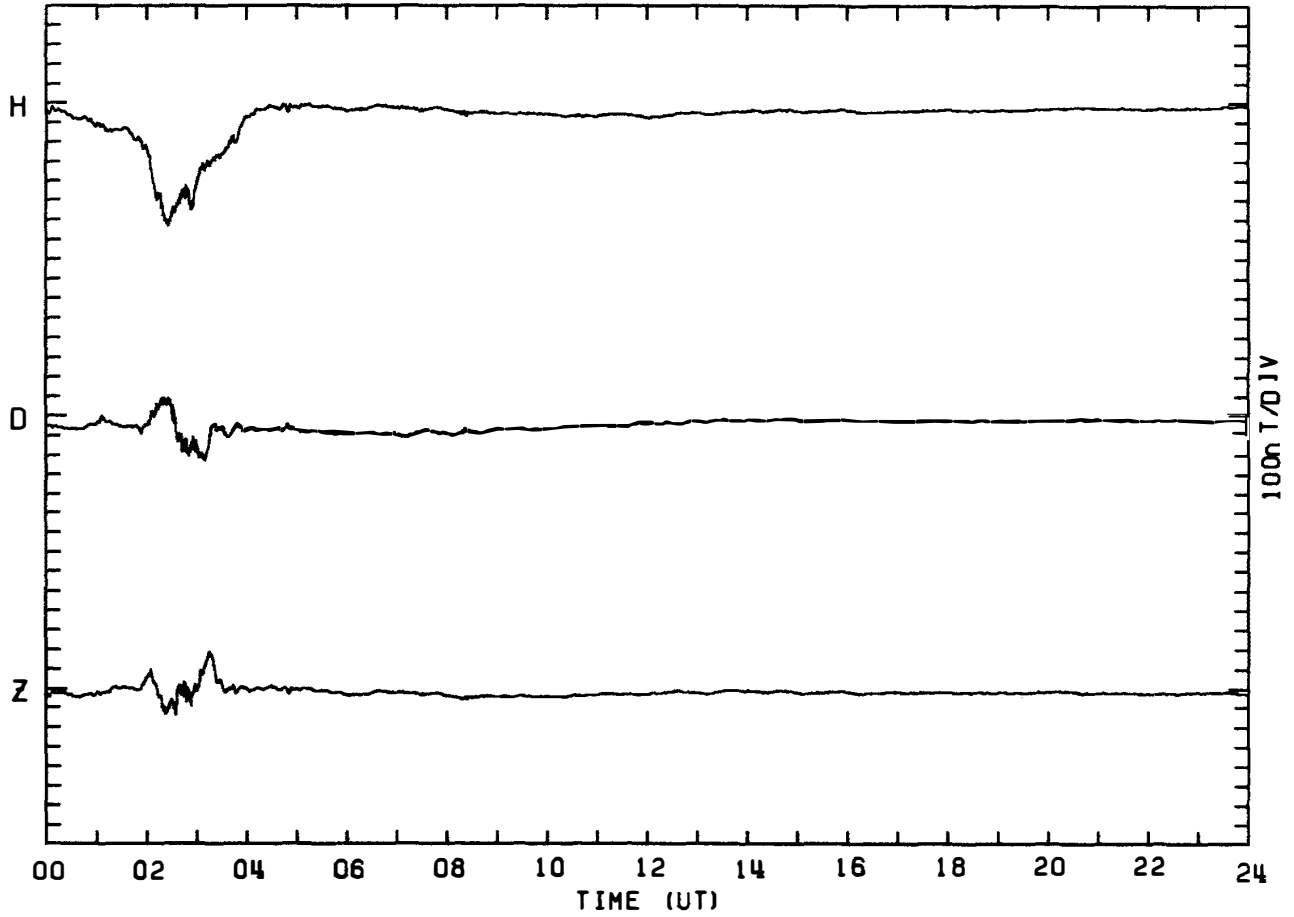
MAGNETOGRAM SYOWA STATION

DAY: 85 MARCH 26, 1982



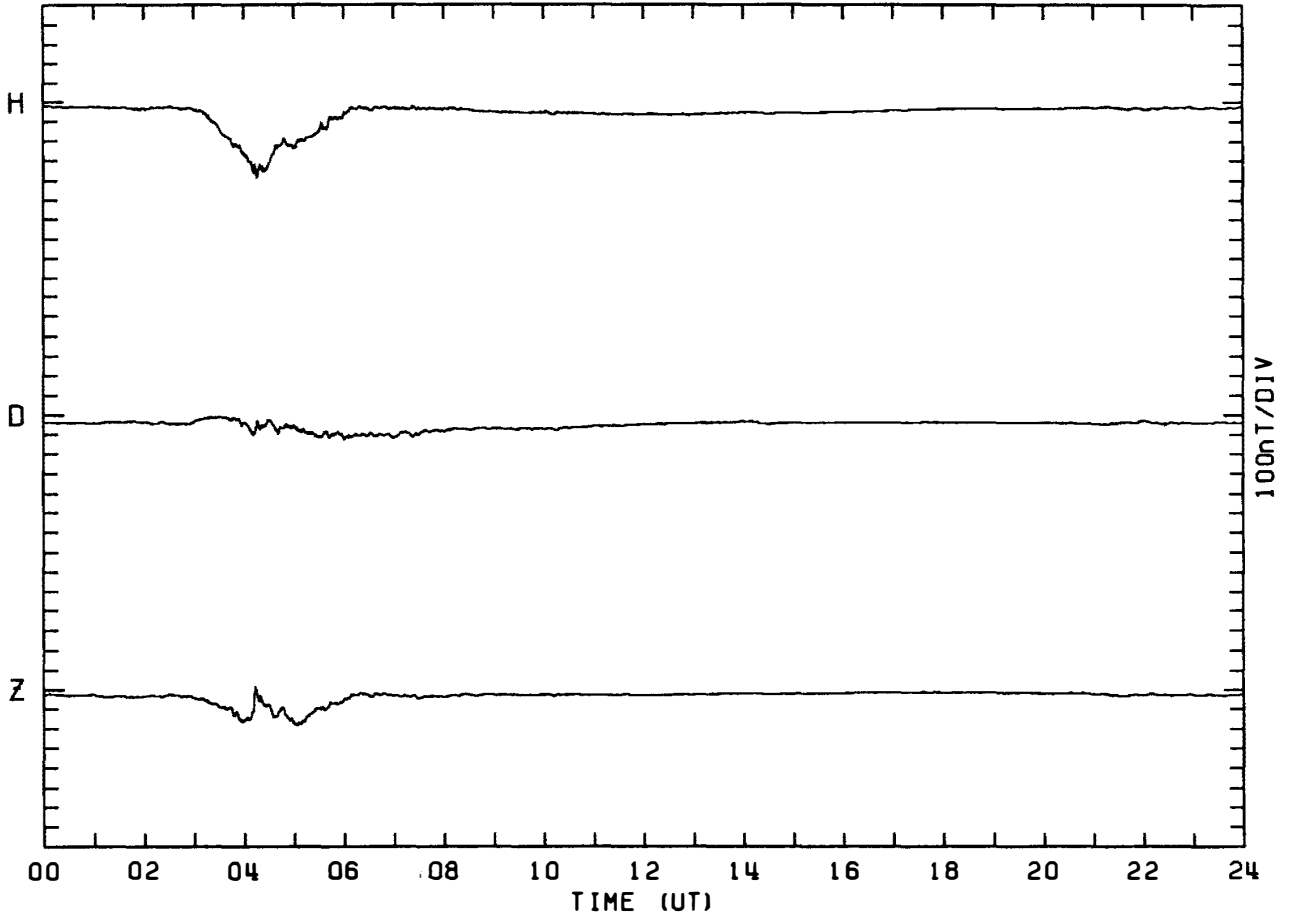
MAGNETOGRAM SYOWA STATION

DAY: 86 MARCH 27, 1982



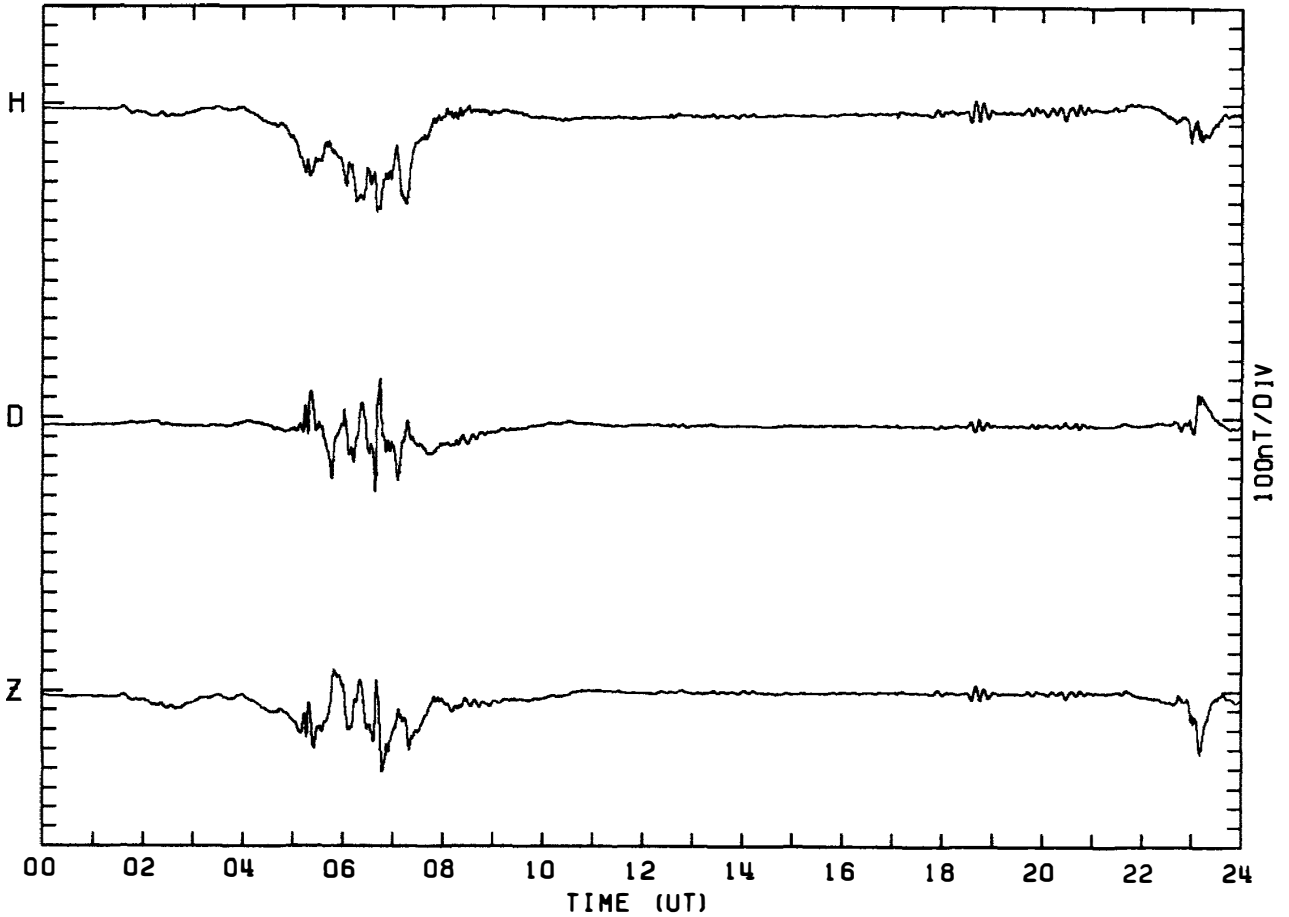
MAGNETOGRAM SYOWA STATION

DAY: 87 MARCH 28, 1982



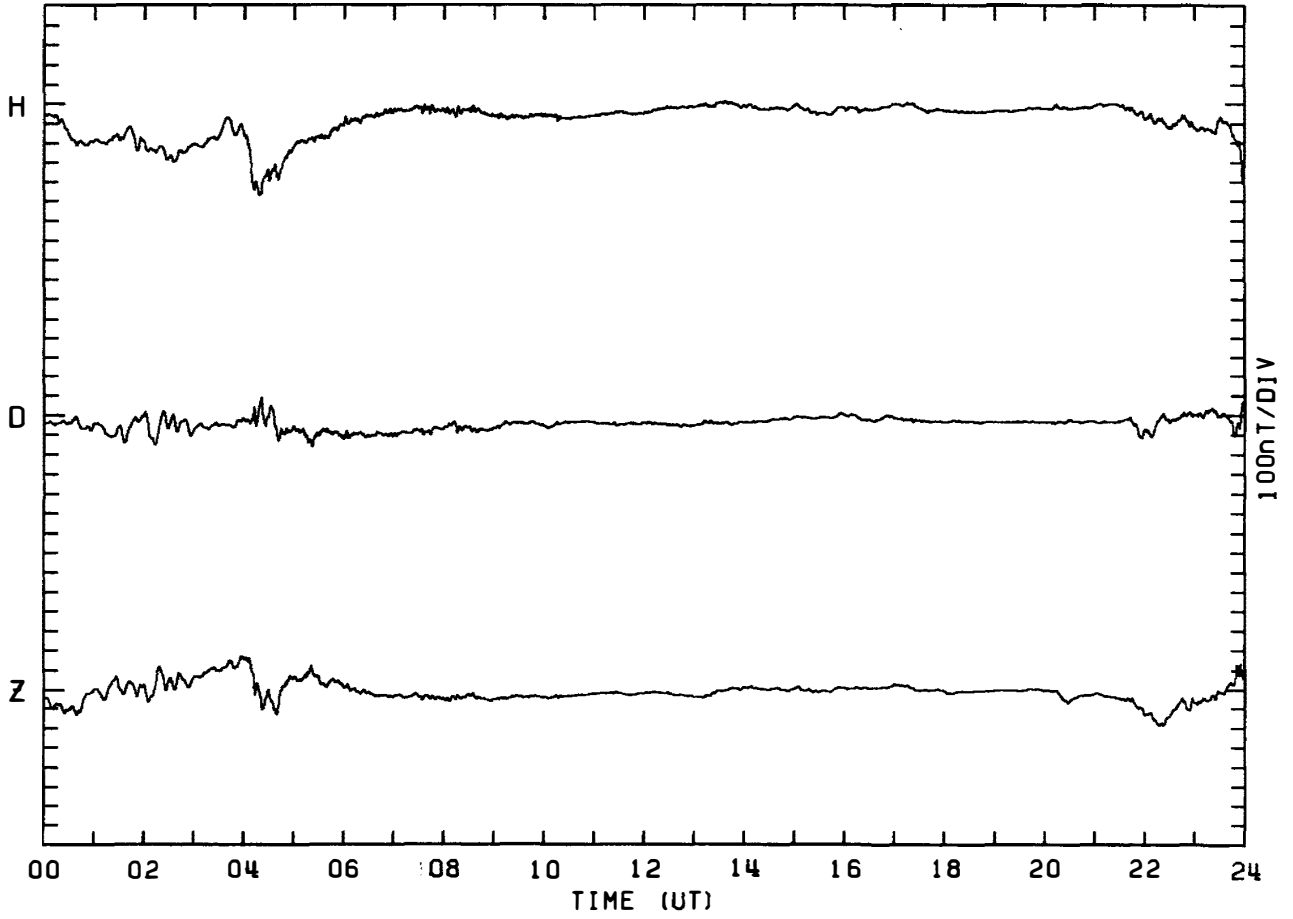
MAGNETOGRAM SYOWA STATION

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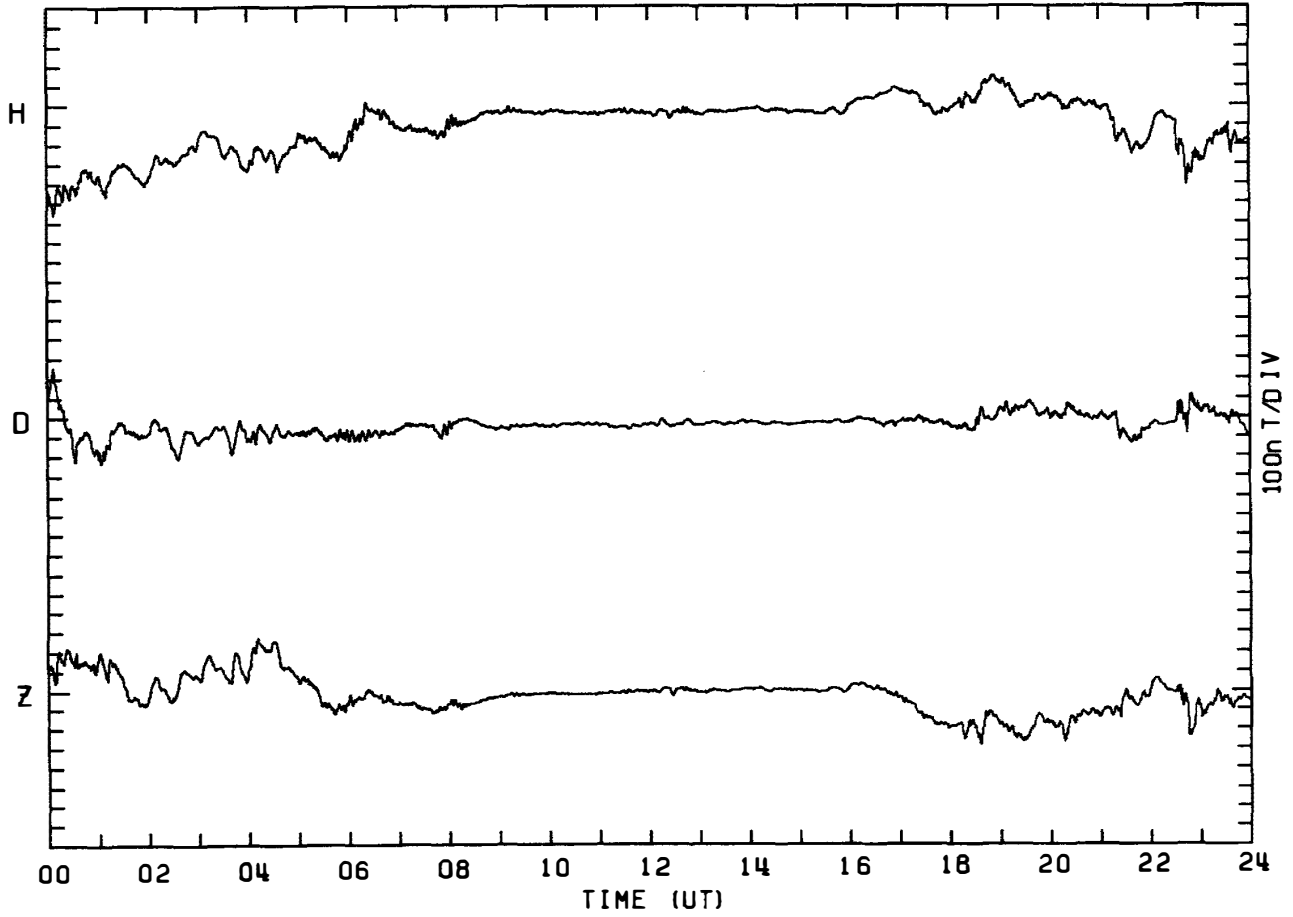
MAGNETOGRAM SYOWA STATION

DAY: 89 MARCH 30, 1982



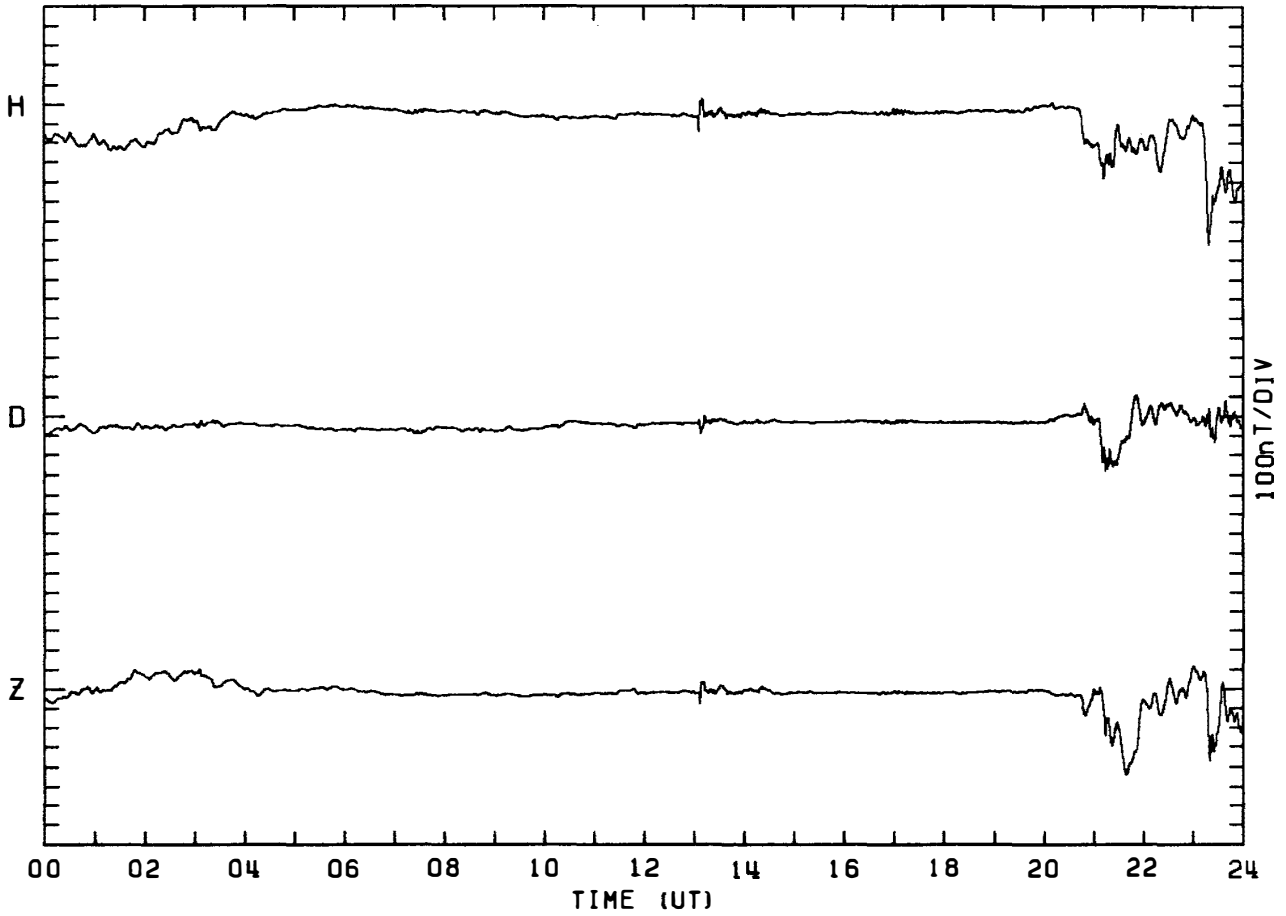
MAGNETOGRAM SYOWA STATION

DAY: 90 MARCH 31, 1982



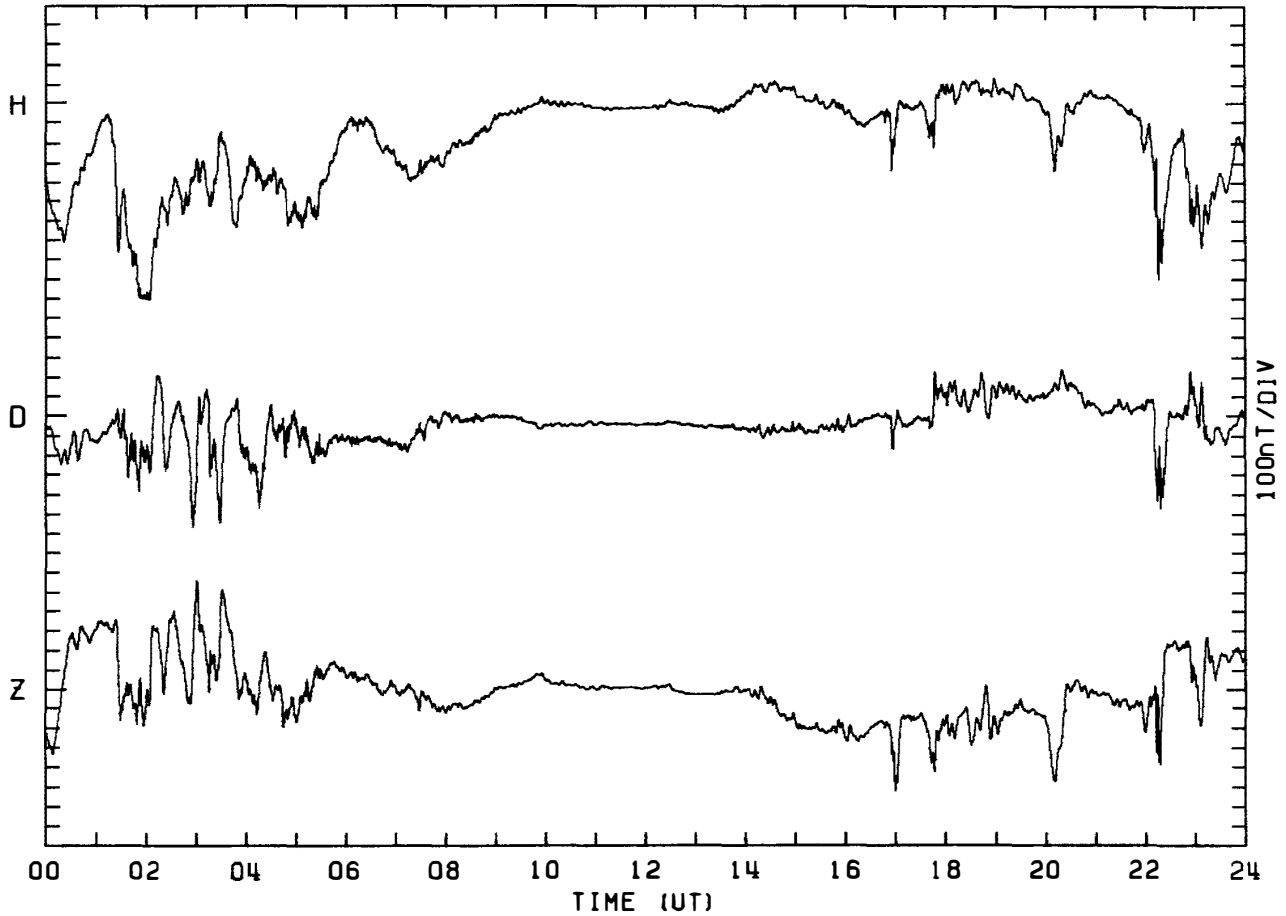
MAGNETOGRAM SYOWA STATION

DAY: 91 APRIL 1. 1982



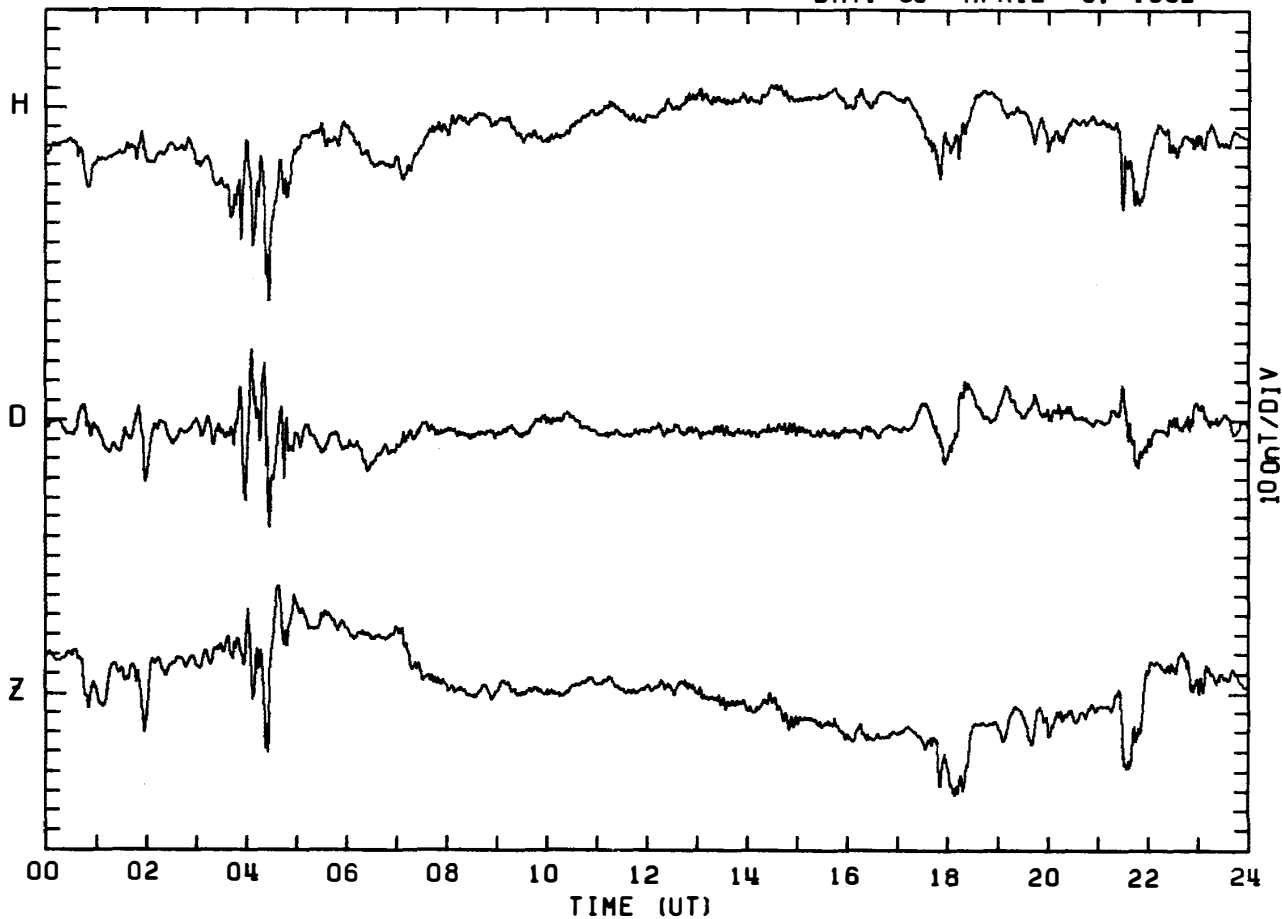
MAGNETOGRAM SYOWA STATION

DAY: 92 APRIL 2. 1982



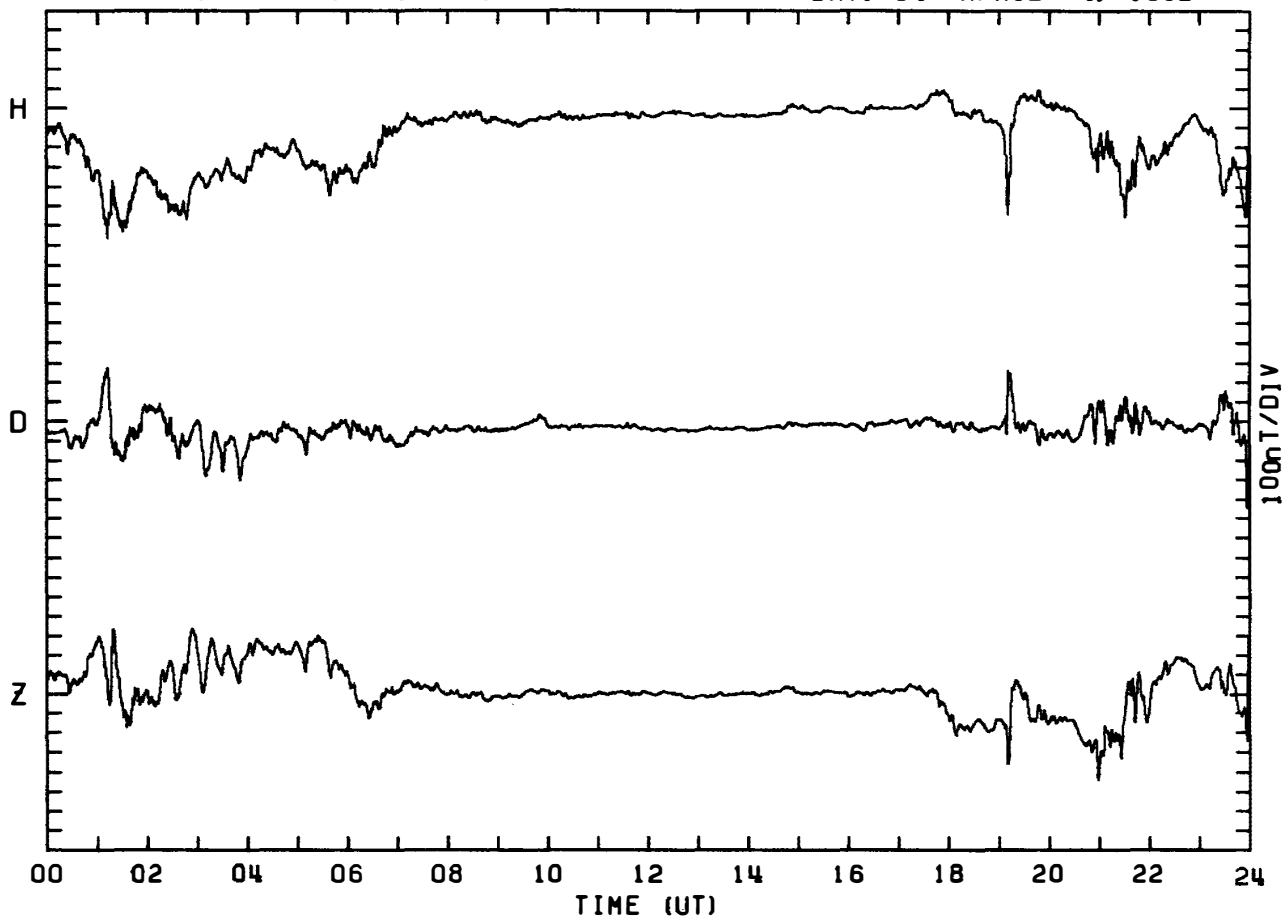
MAGNETOGRAM SYOWA STATION

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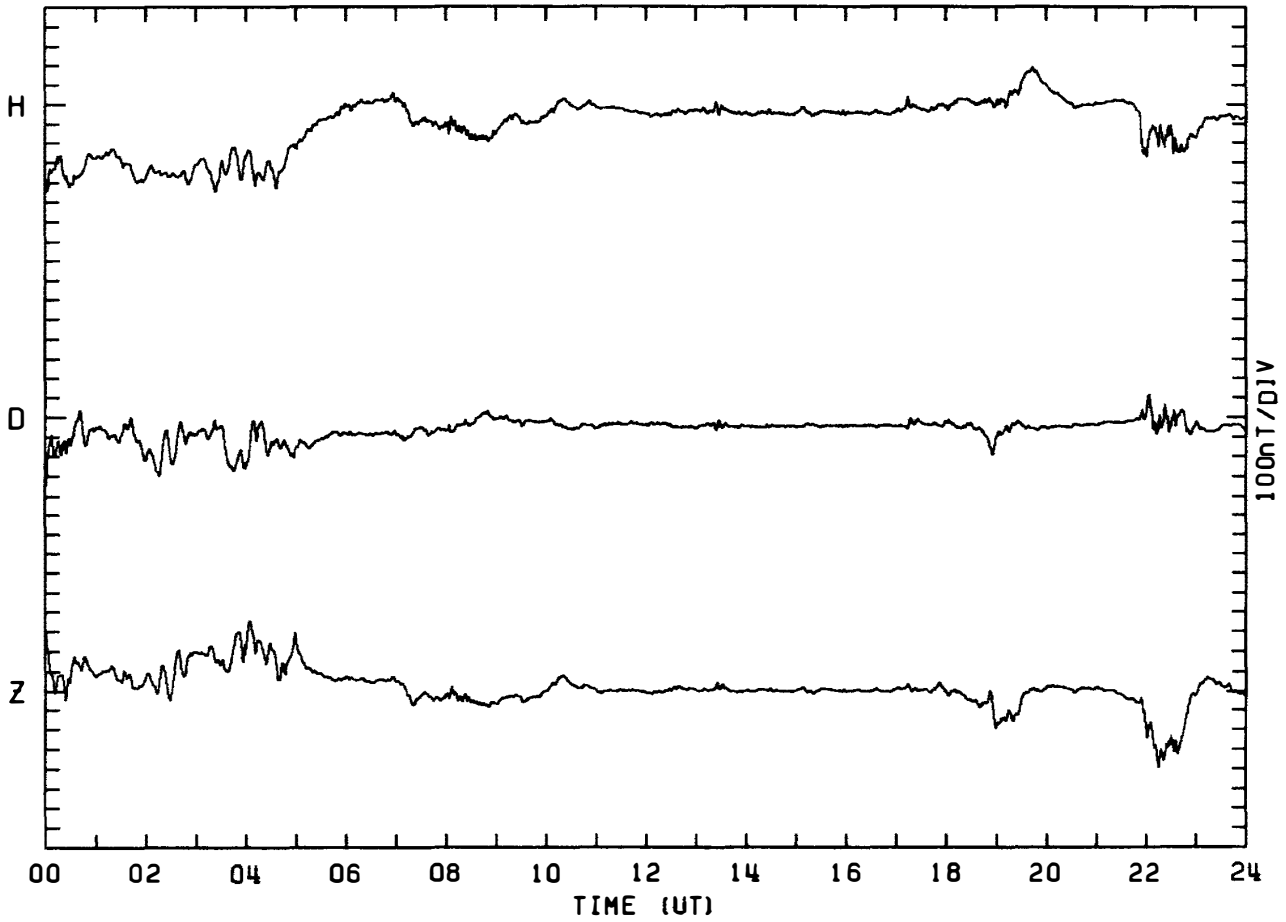
MAGNETOGRAM SYOWA STATION

DAY: 94 APRIL 4, 1982



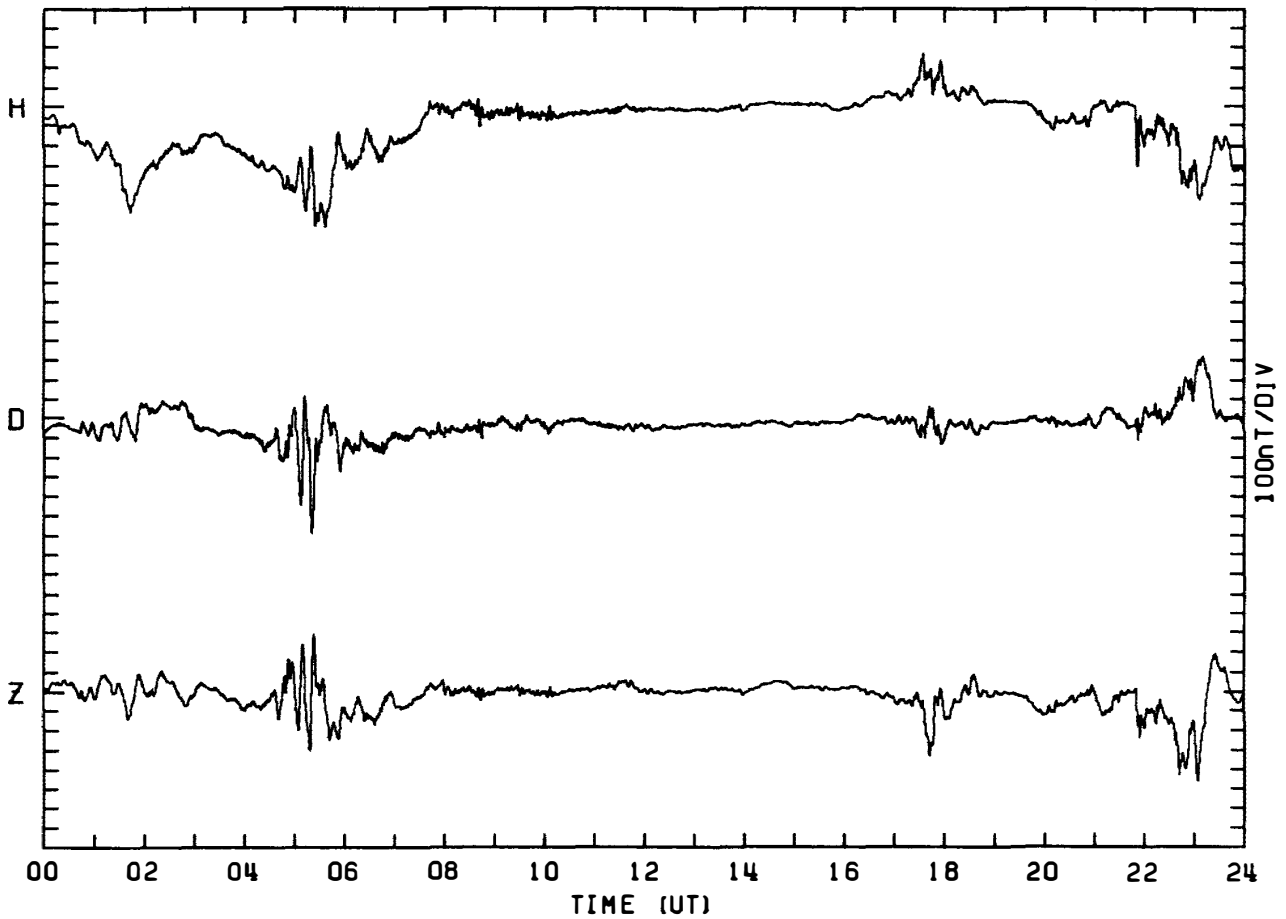
MAGNETOGRAM SYOWA STATION

DAY: 95 APRIL 5. 1982



MAGNETOGRAM SYOWA STATION

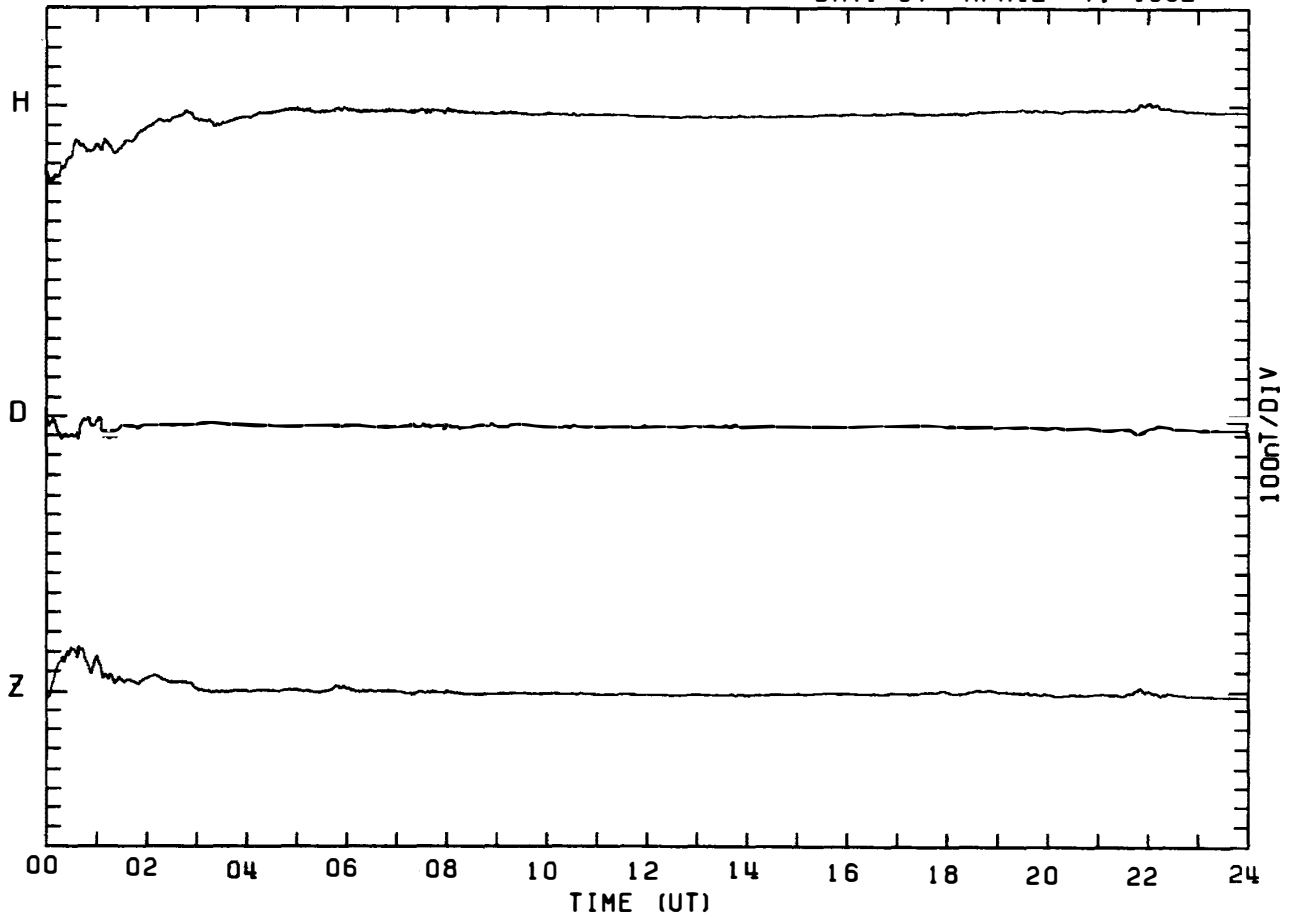
DAY: 96 APRIL 6. 1982





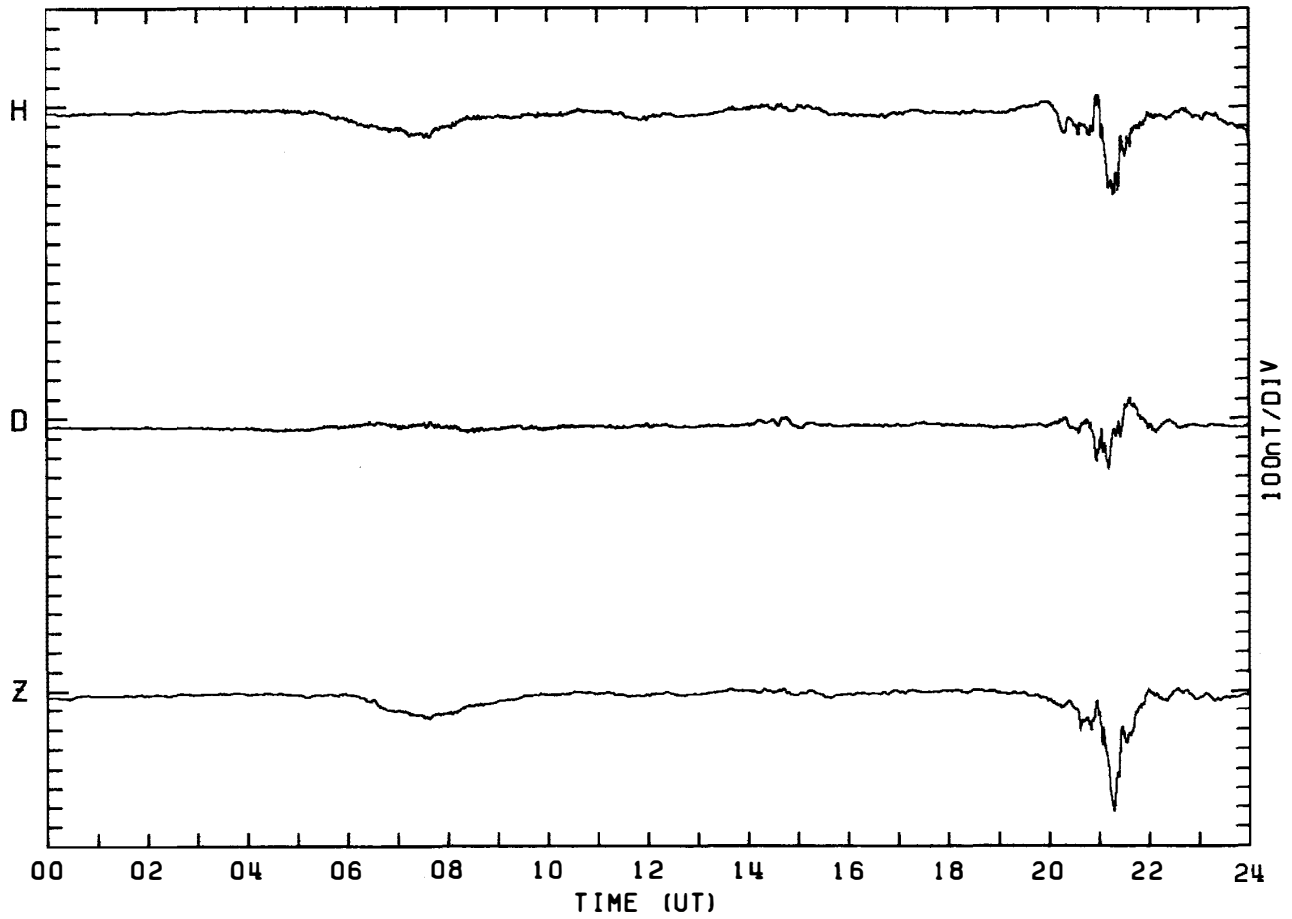
MAGNETOGRAM SYOWA STATION

DAY: 97 APRIL 7, 1982



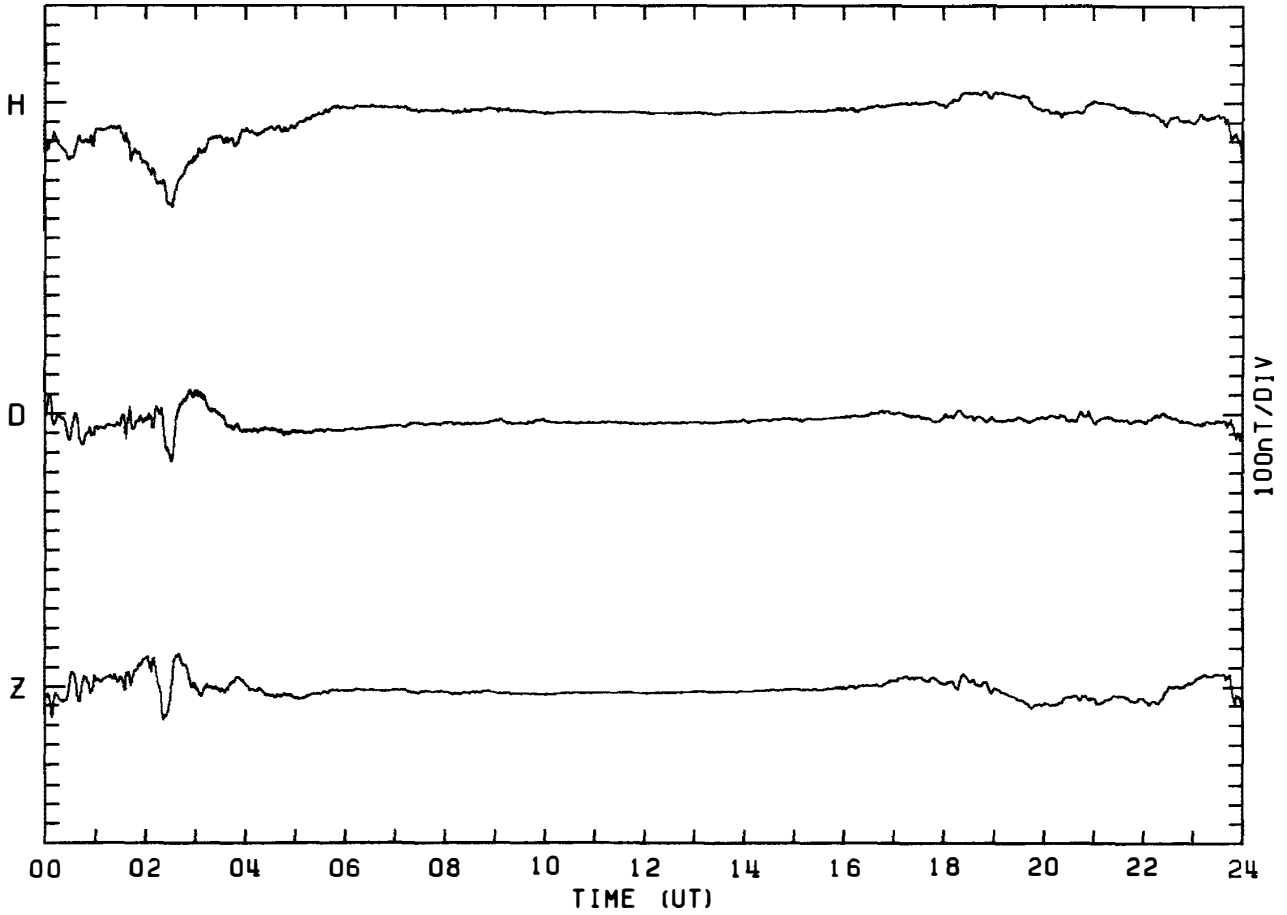
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DAY: 98 APRIL 8, 1982



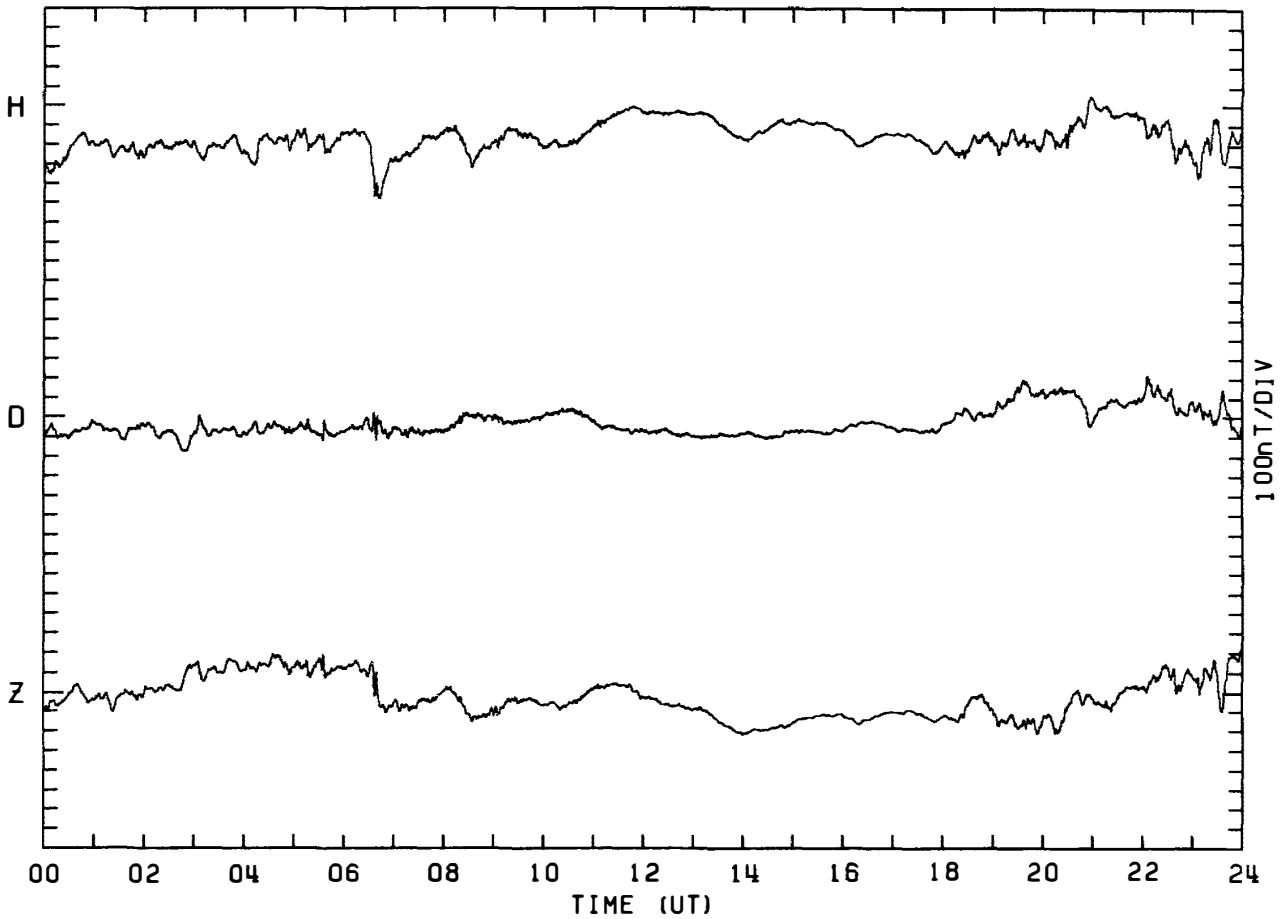
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DAY: 99 APRIL 9, 1982



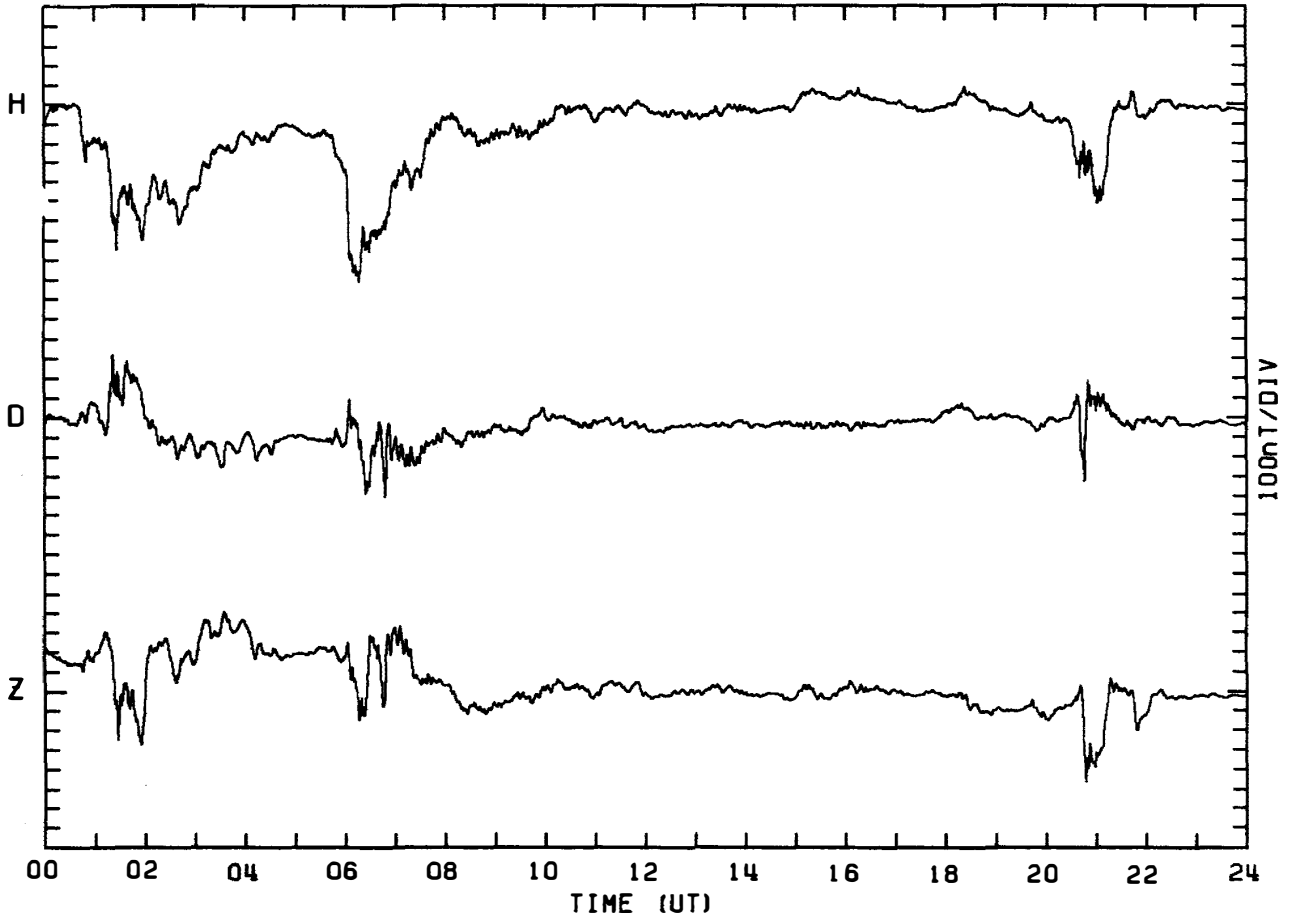
MAGNETOGRAM SYOWA STATION

DAY: 100 APRIL 10, 1982



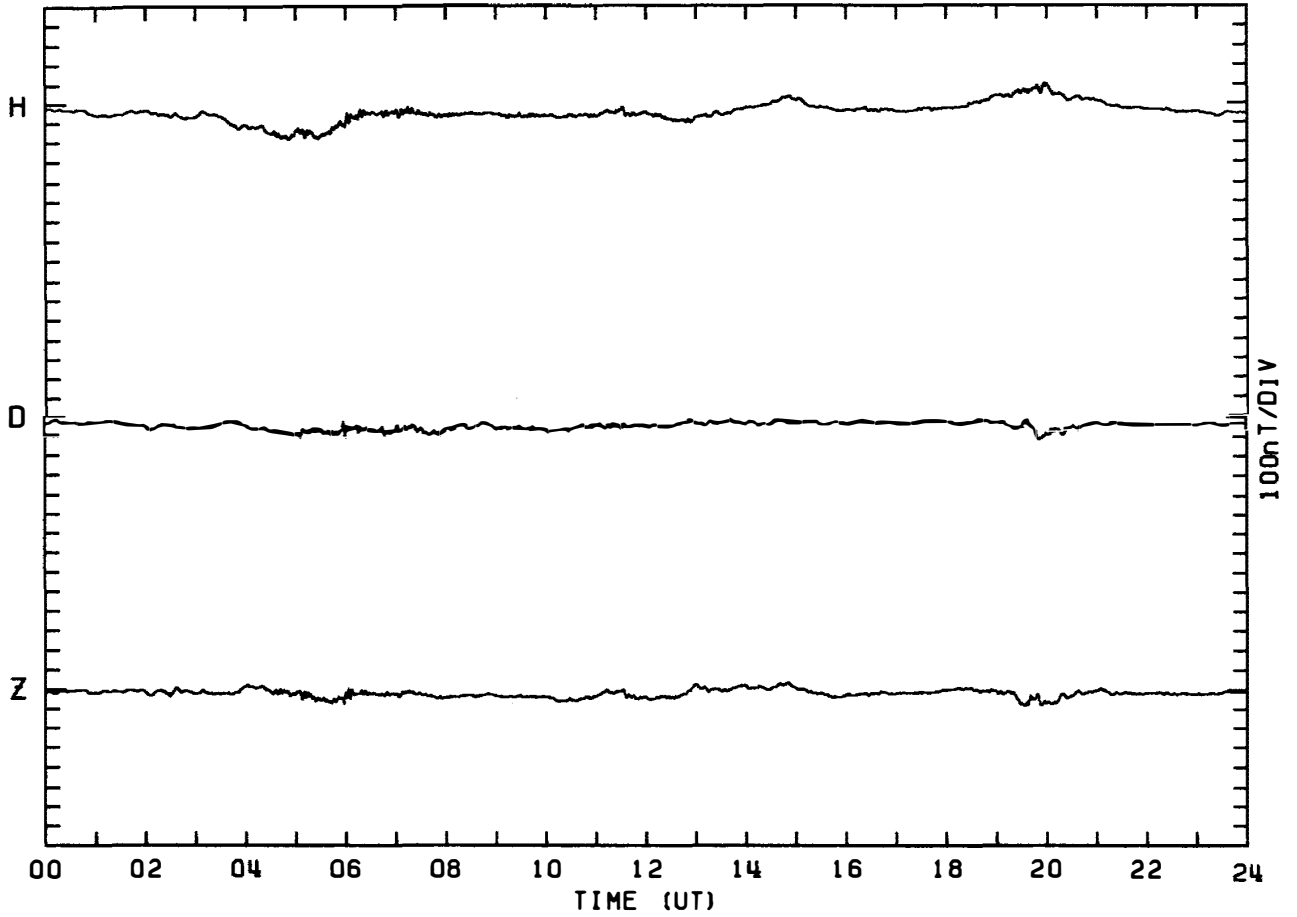
MAGNETOGRAM SYOWA STATION

DAY:101 APRIL 11. 1982



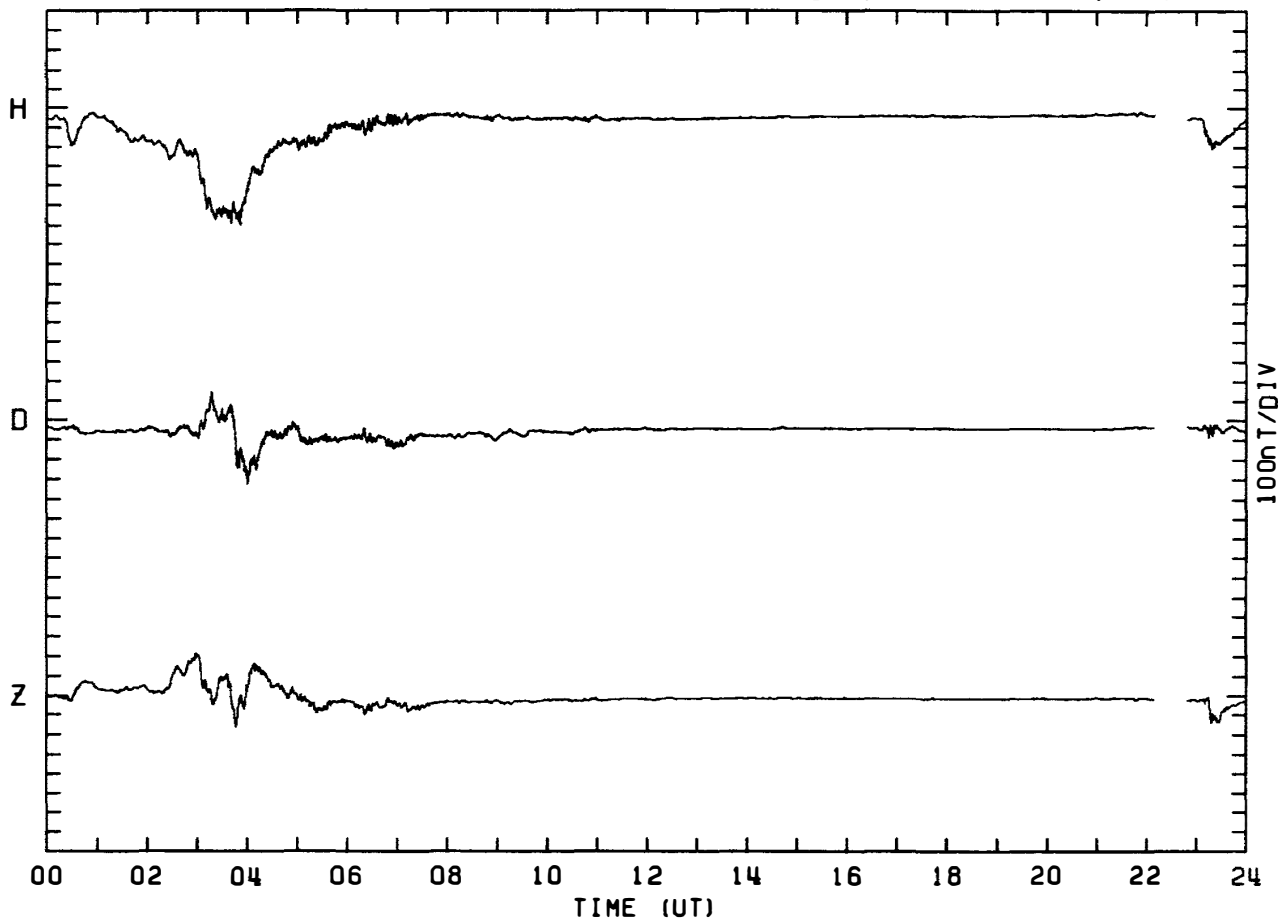
MAGNETOGRAM SYOWA STATION

DAY:102 APRIL 12. 1982



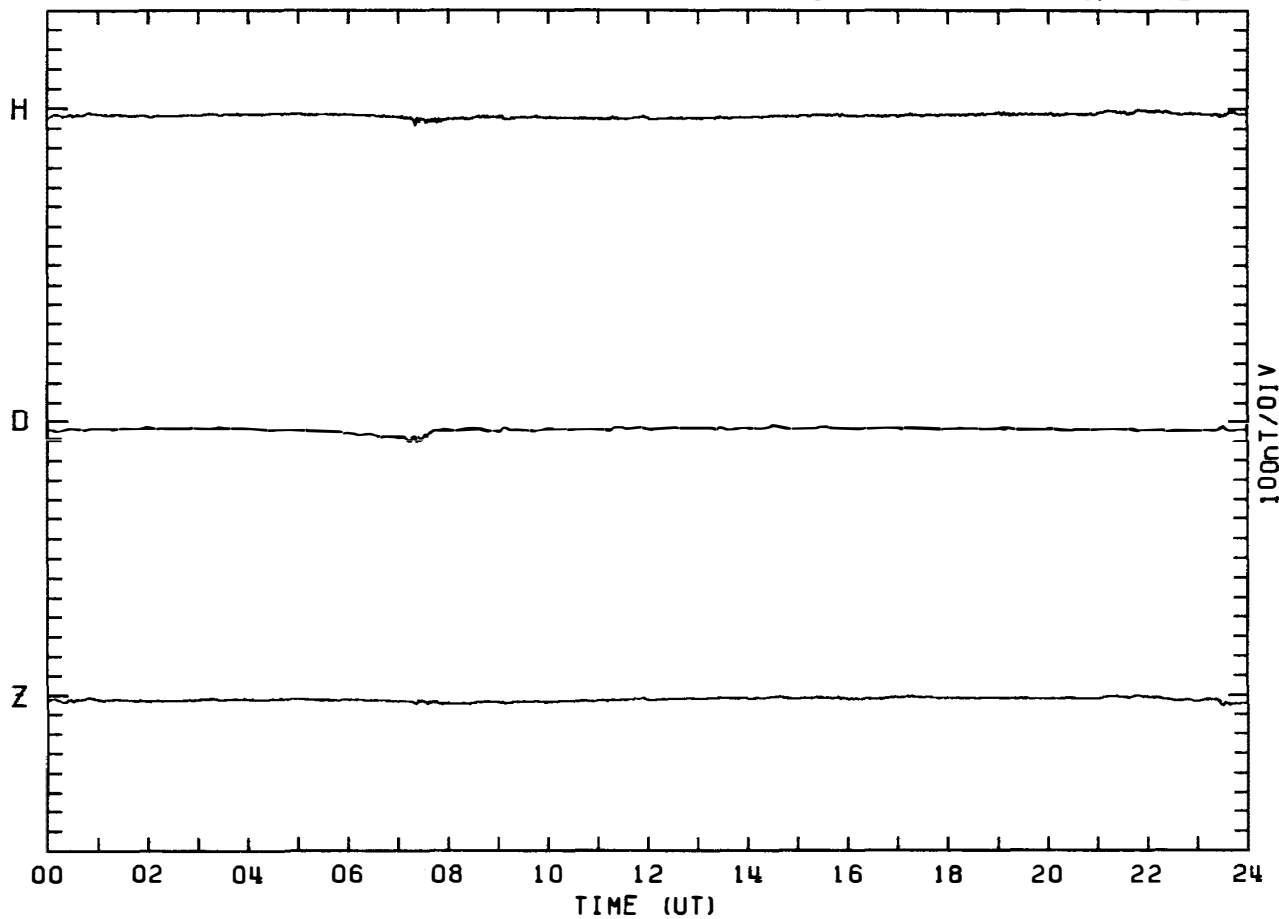
MAGNETOGRAM SYOWA STATION

DAY:103 APRIL 13. 1982



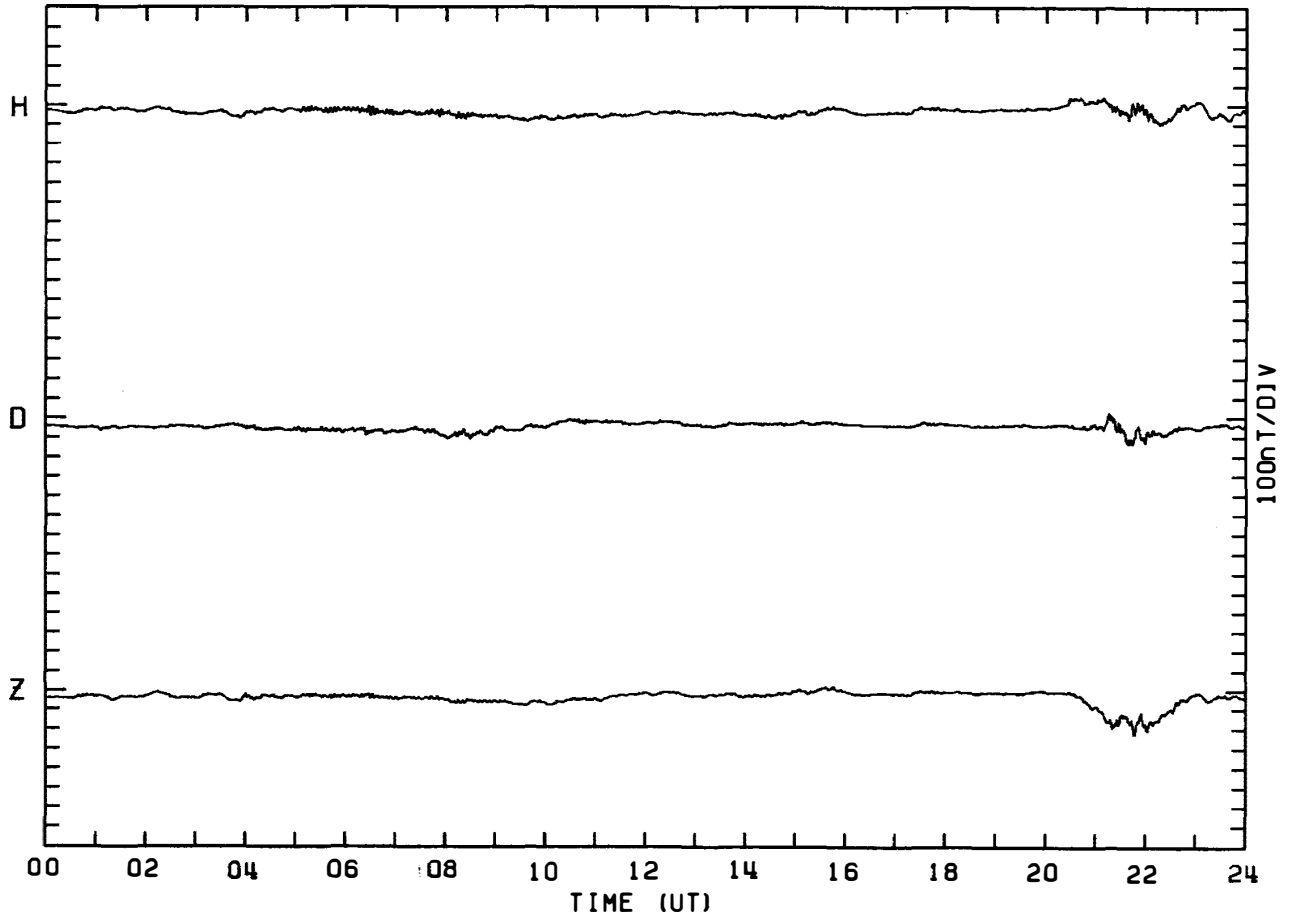
MAGNETOGRAM SYOWA STATION

DAY:104 APRIL 14. 1982



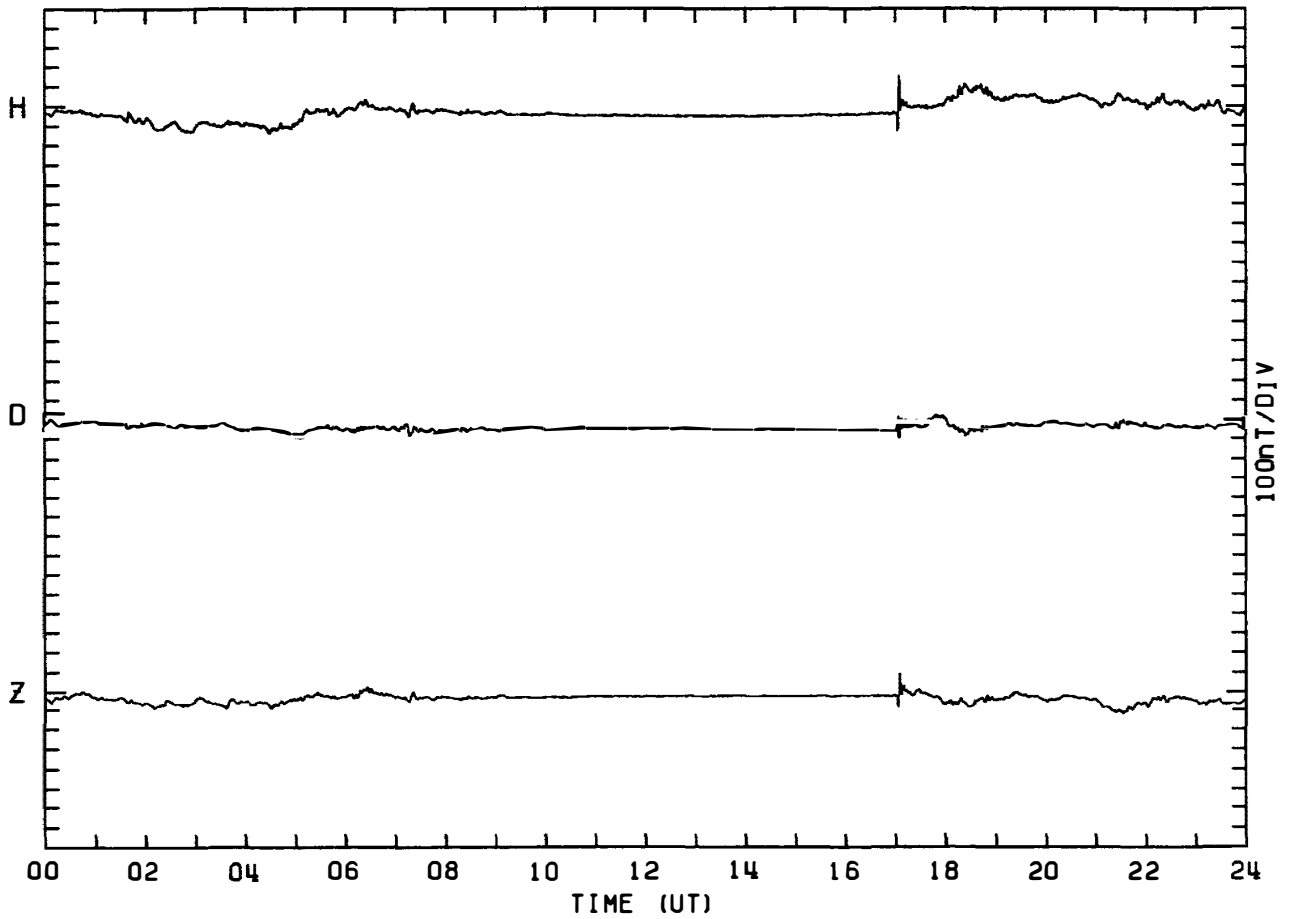
MAGNETOGRAM SYOWA STATION

DAY:105 APRIL 15, 1982



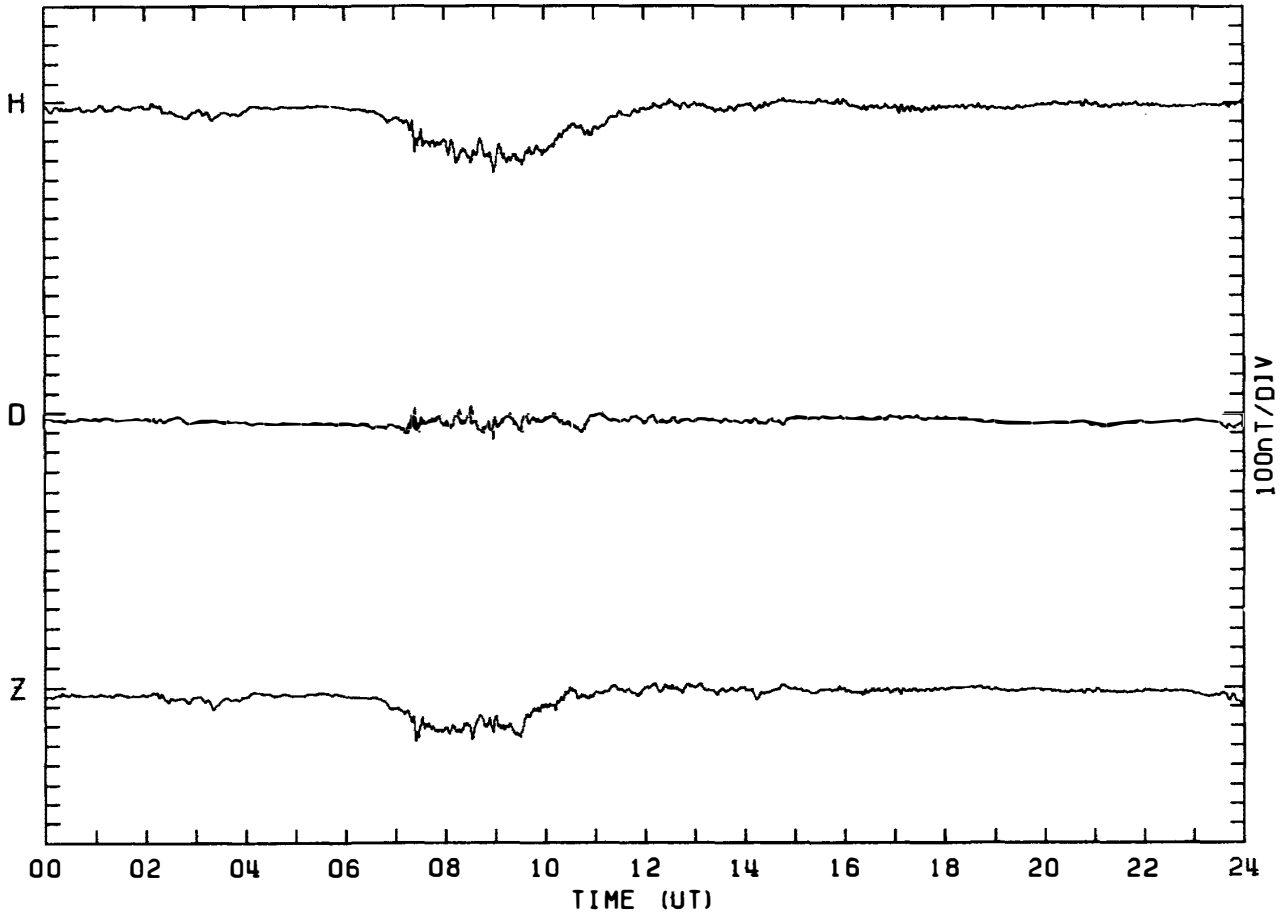
MAGNETOGRAM SYOWA STATION

DAY:106 APRIL 16, 1982



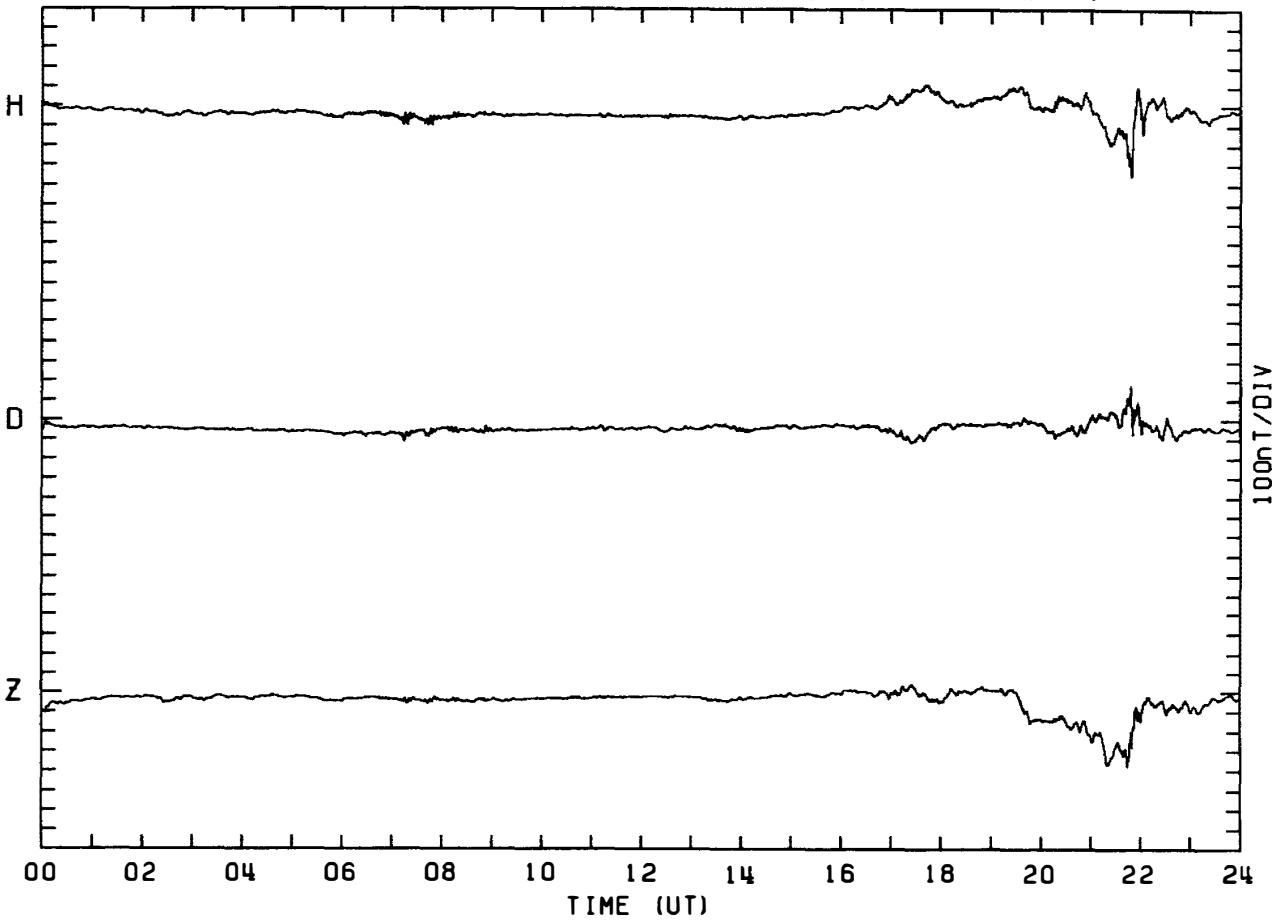
MAGNETOGRAM SYOWA STATION

DAY:107 APRIL 17, 1982



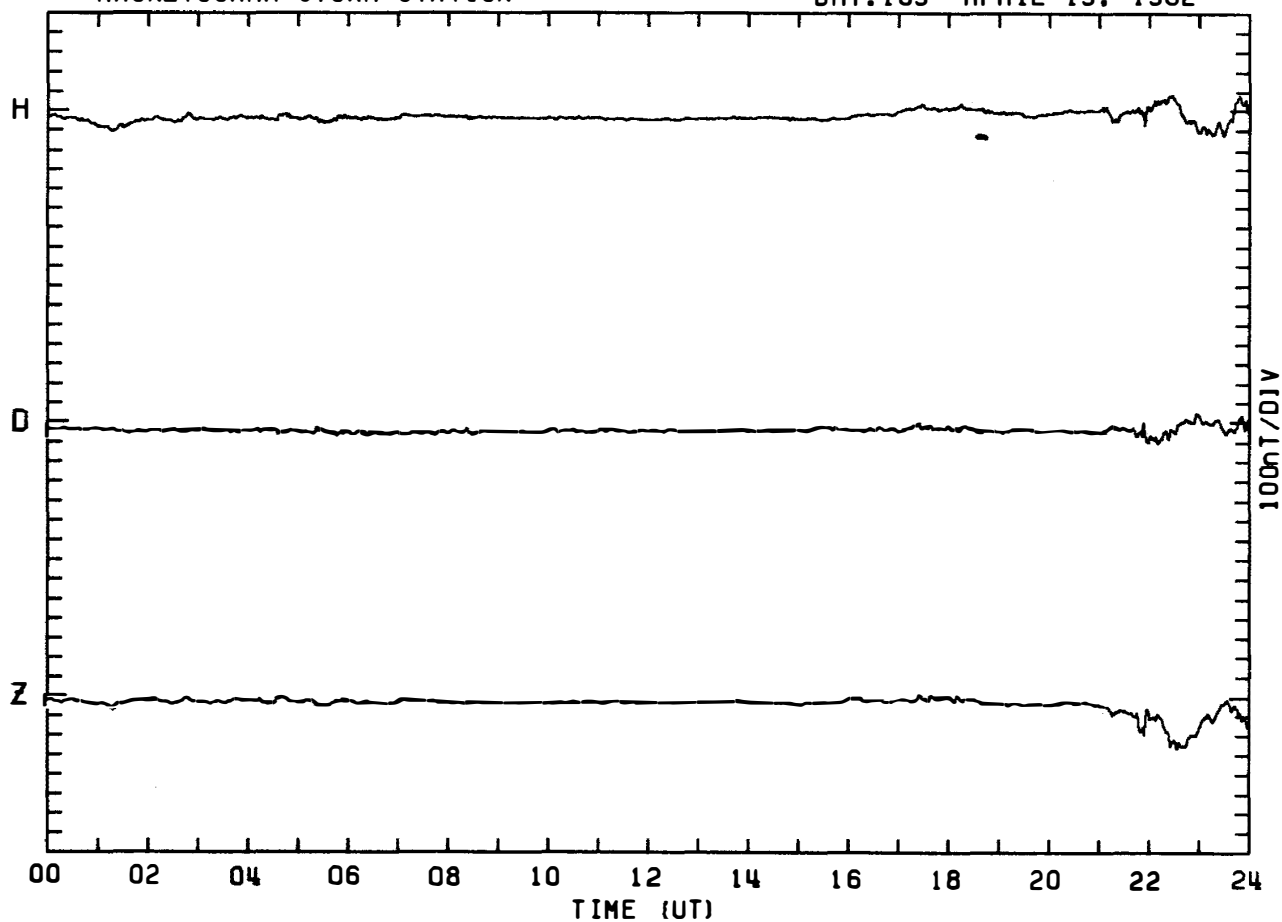
MAGNETOGRAM SYOWA STATION

DAY:108 APRIL 18, 1982



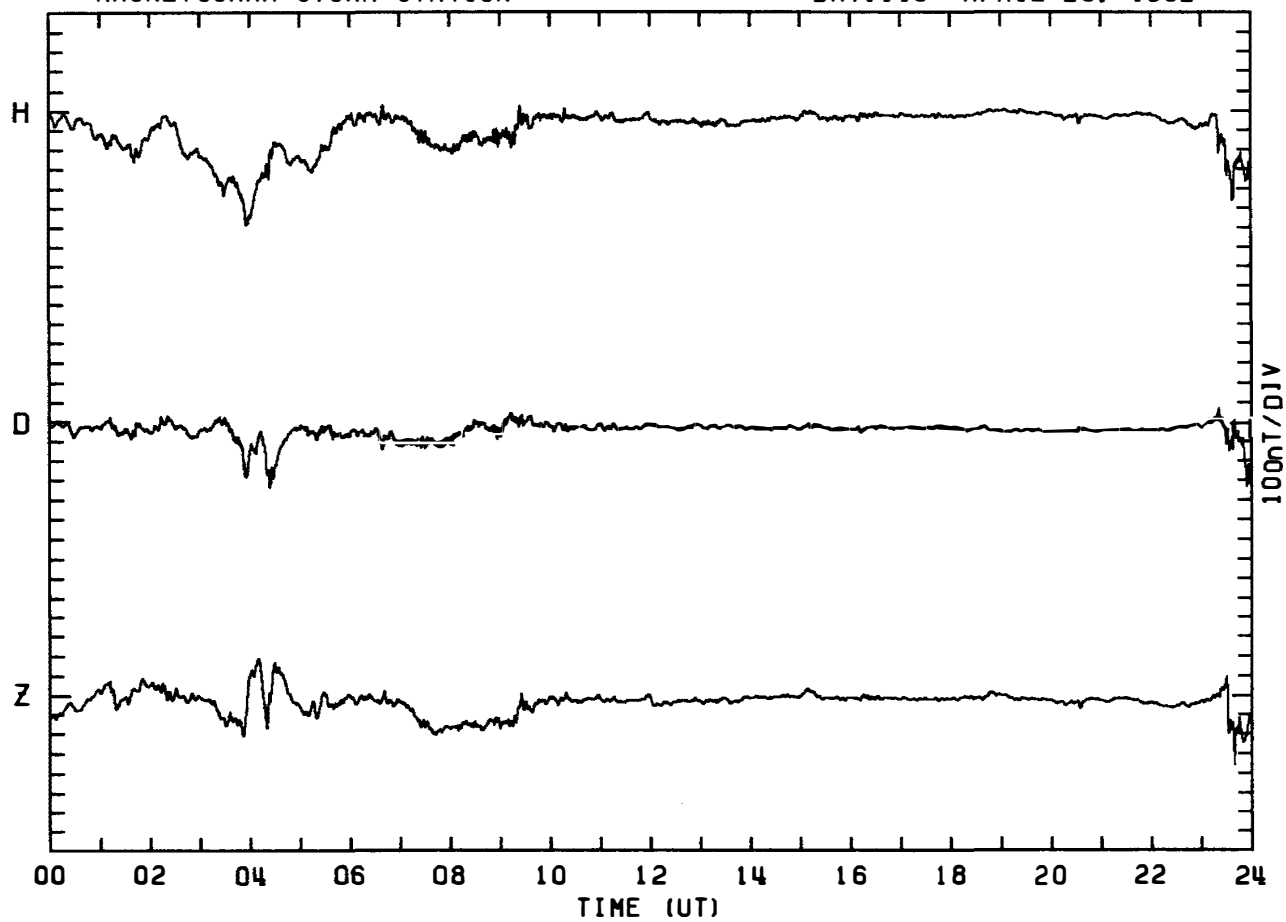
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DAY:109 APRIL 19, 1982



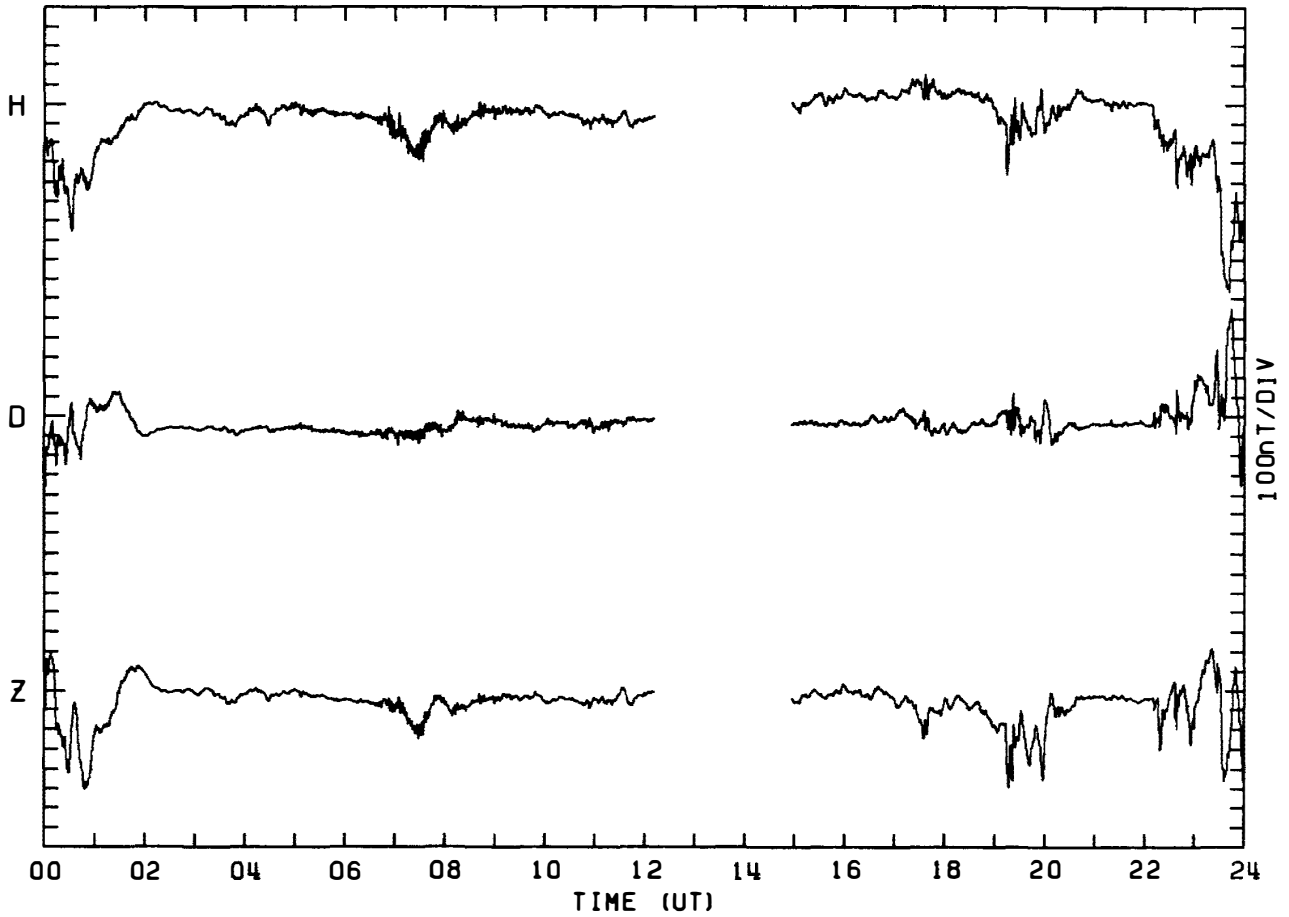
MAGNETOGRAM SYOWA STATION

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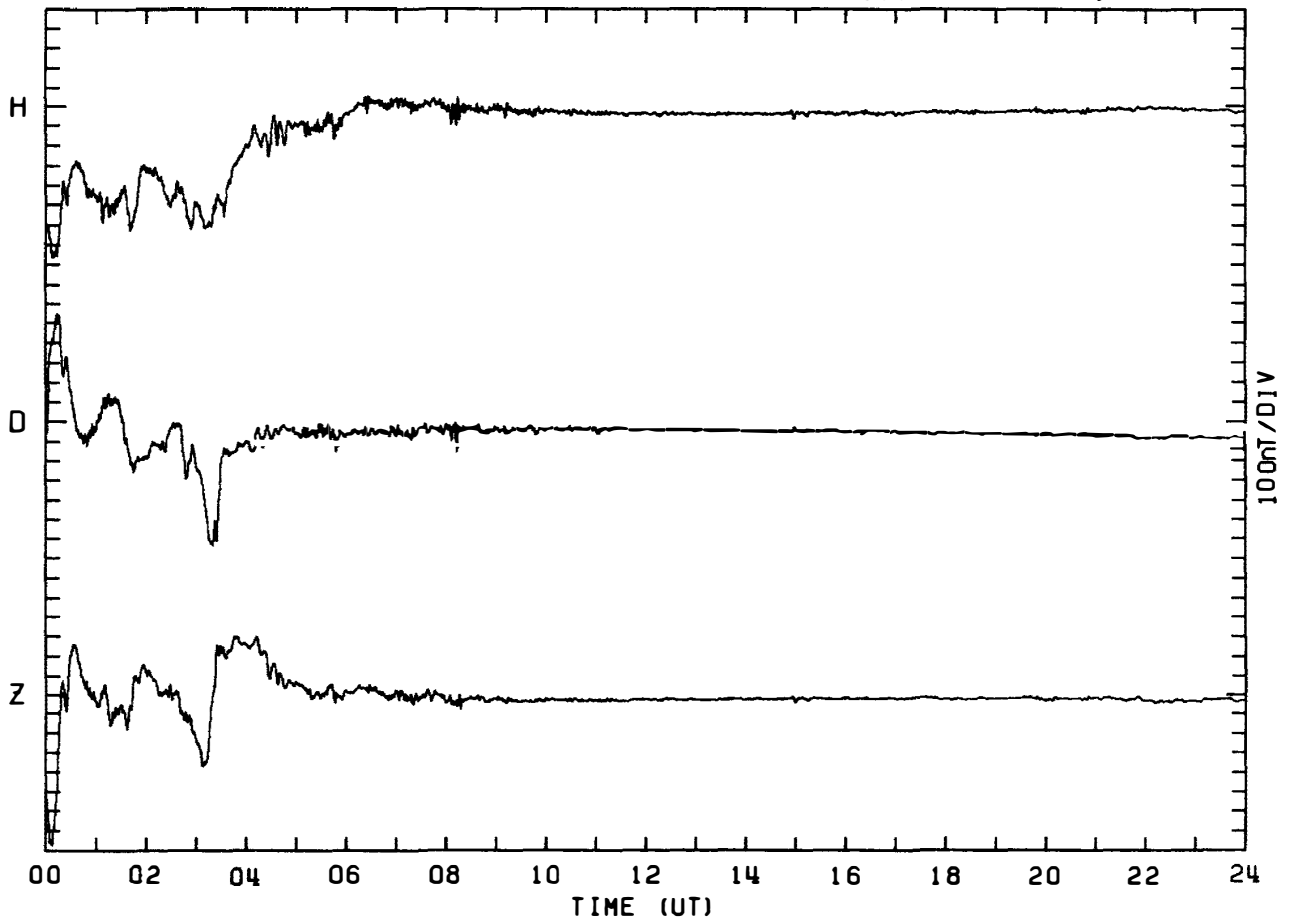
MAGNETOGRAM SYOWA STATION

DAY:111 APRIL 21, 1982



MAGNETOGRAM SYOWA STATION

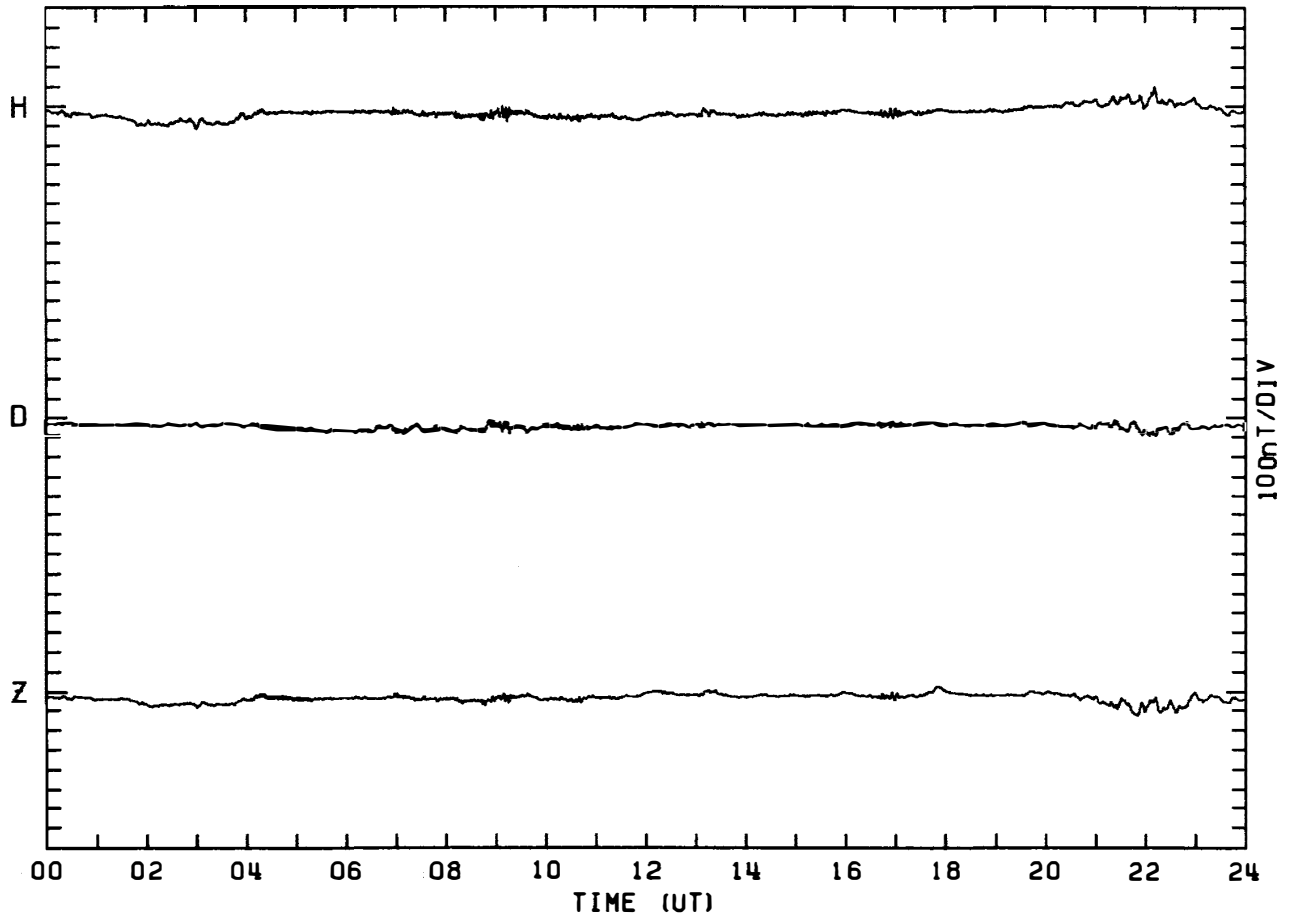
DAY:112 APRIL 22, 1982





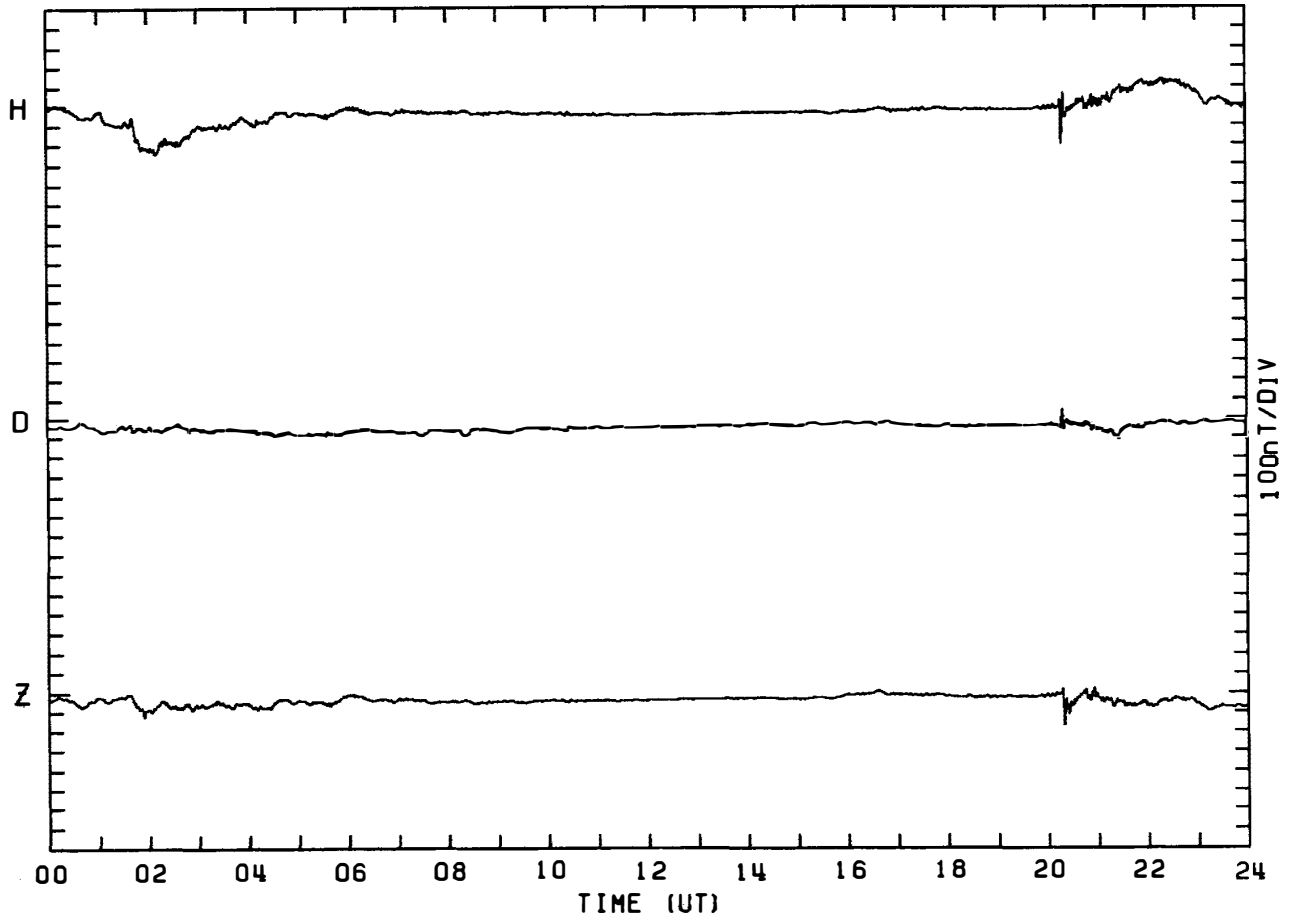
MAGNETOGRAM SYOWA STATION

DAY:113 APRIL 23. 1982



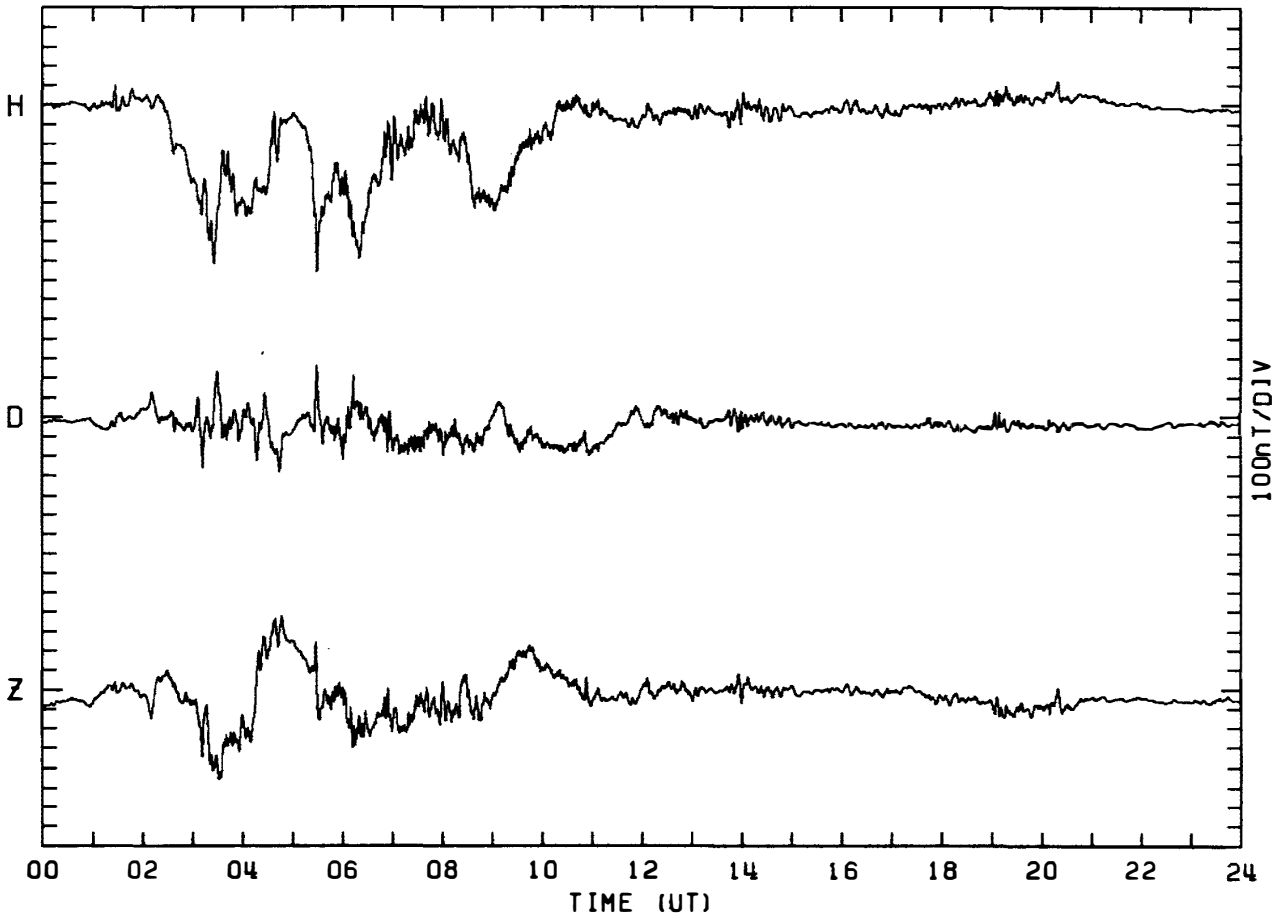
MAGNETOGRAM SYOWA STATION

DAY:114 APRIL 24. 1982



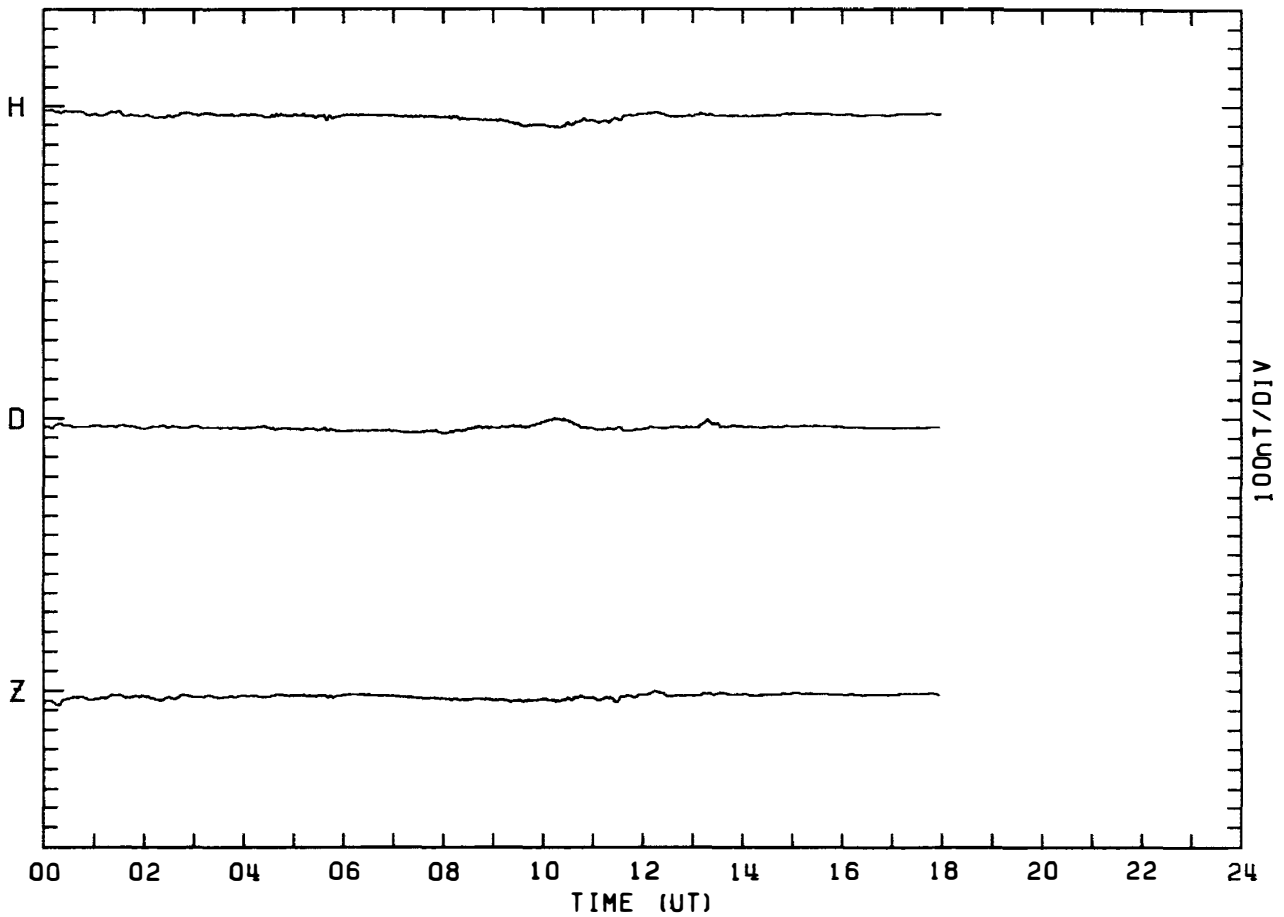
MAGNETOGRAM SYOWA STATION

DAY:115 APRIL 25, 1982



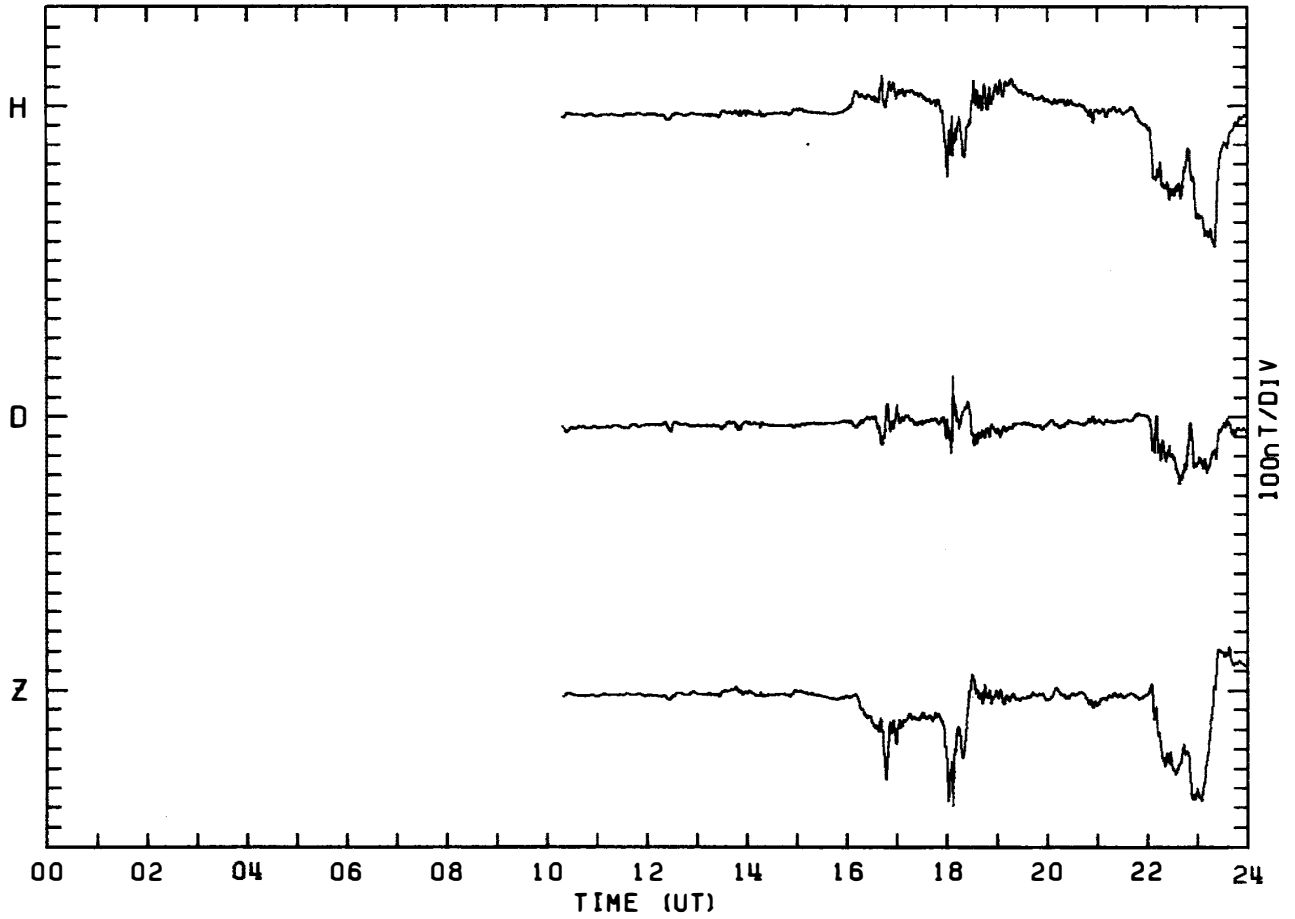
MAGNETOGRAM SYOWA STATION

DAY:116 APRIL 26, 1982



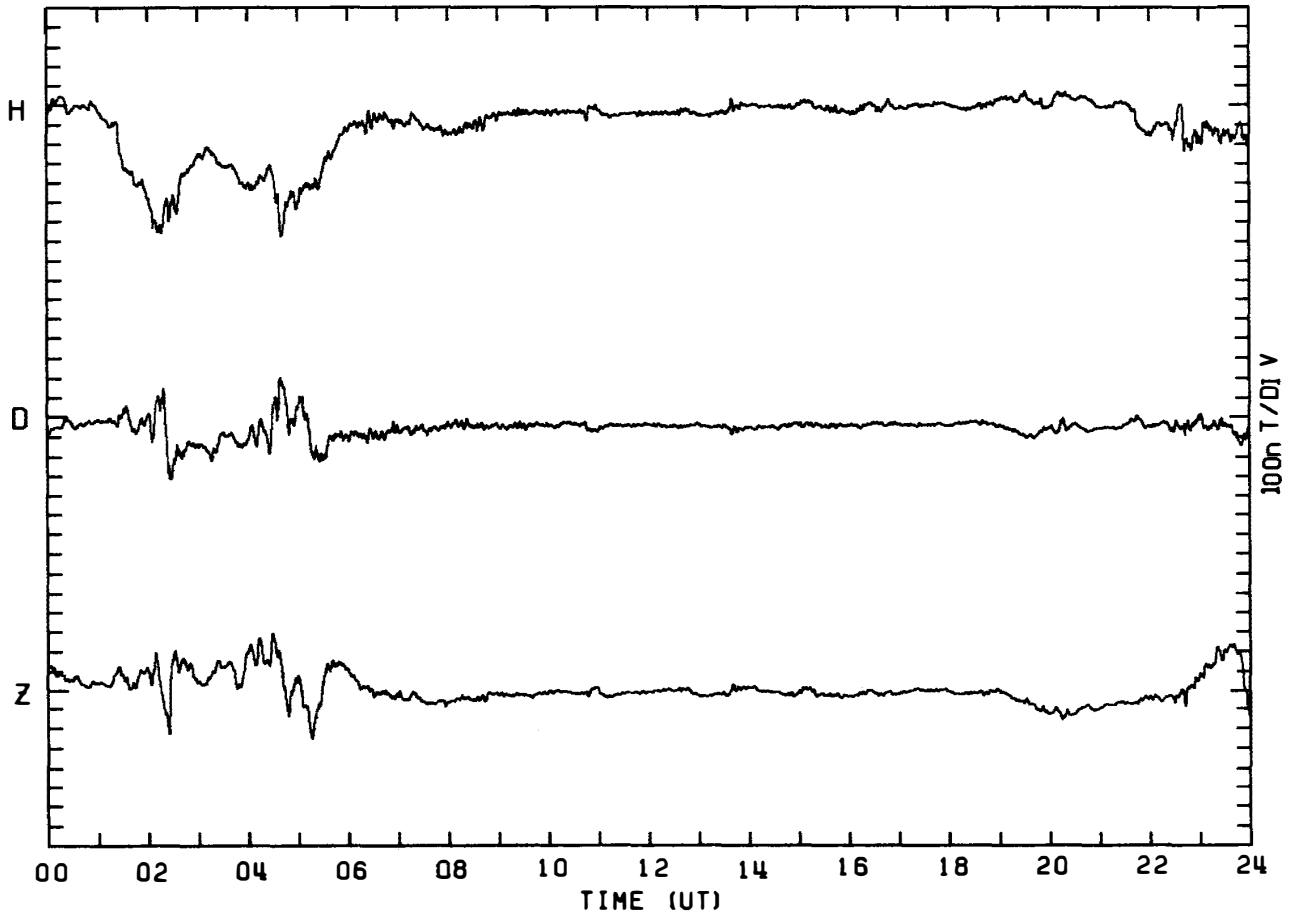
MAGNETOGRAM SYOWA STATION

DAY:117 APRIL 27, 1982



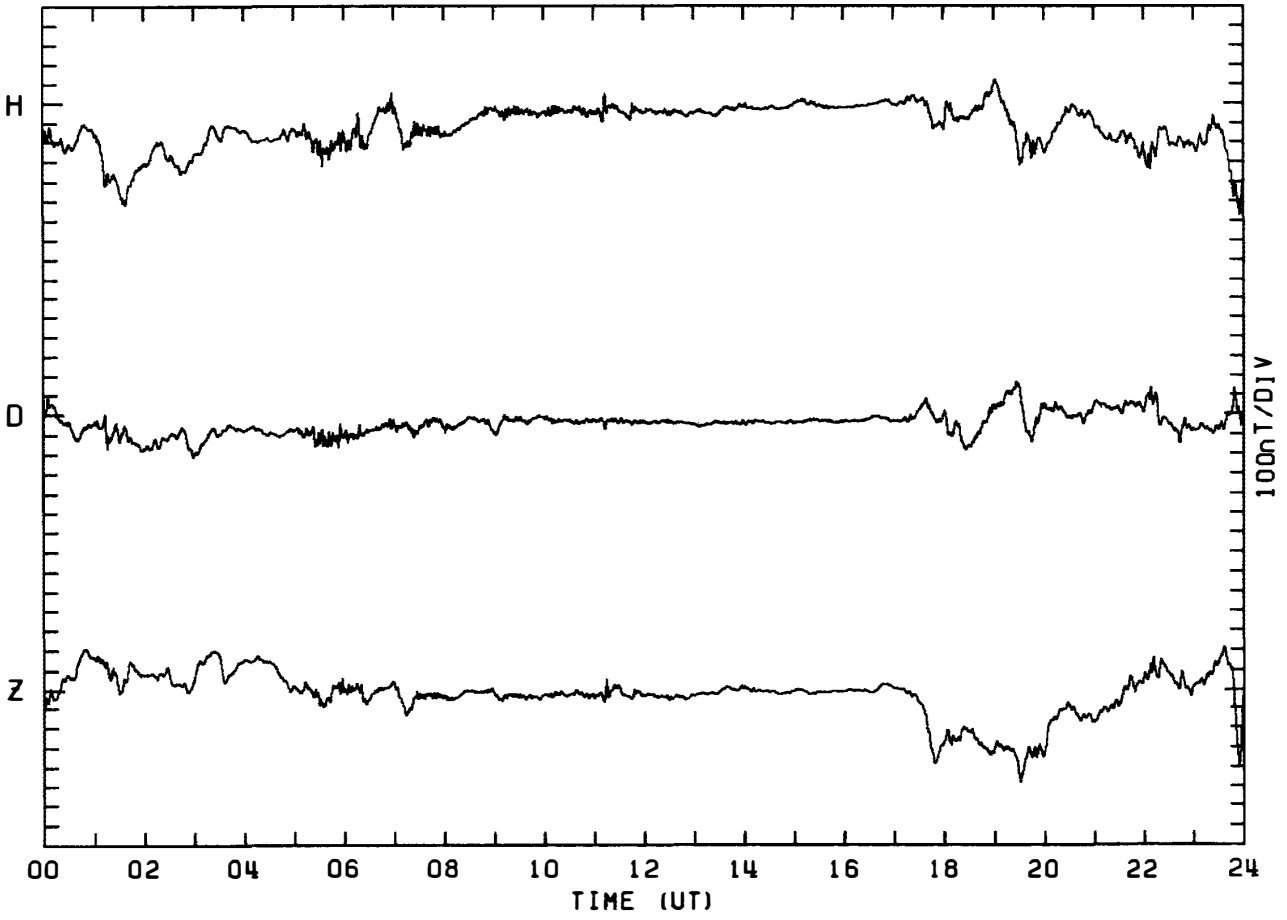
MAGNETOGRAM SYOWA STATION

DAY:118 APRIL 28, 1982



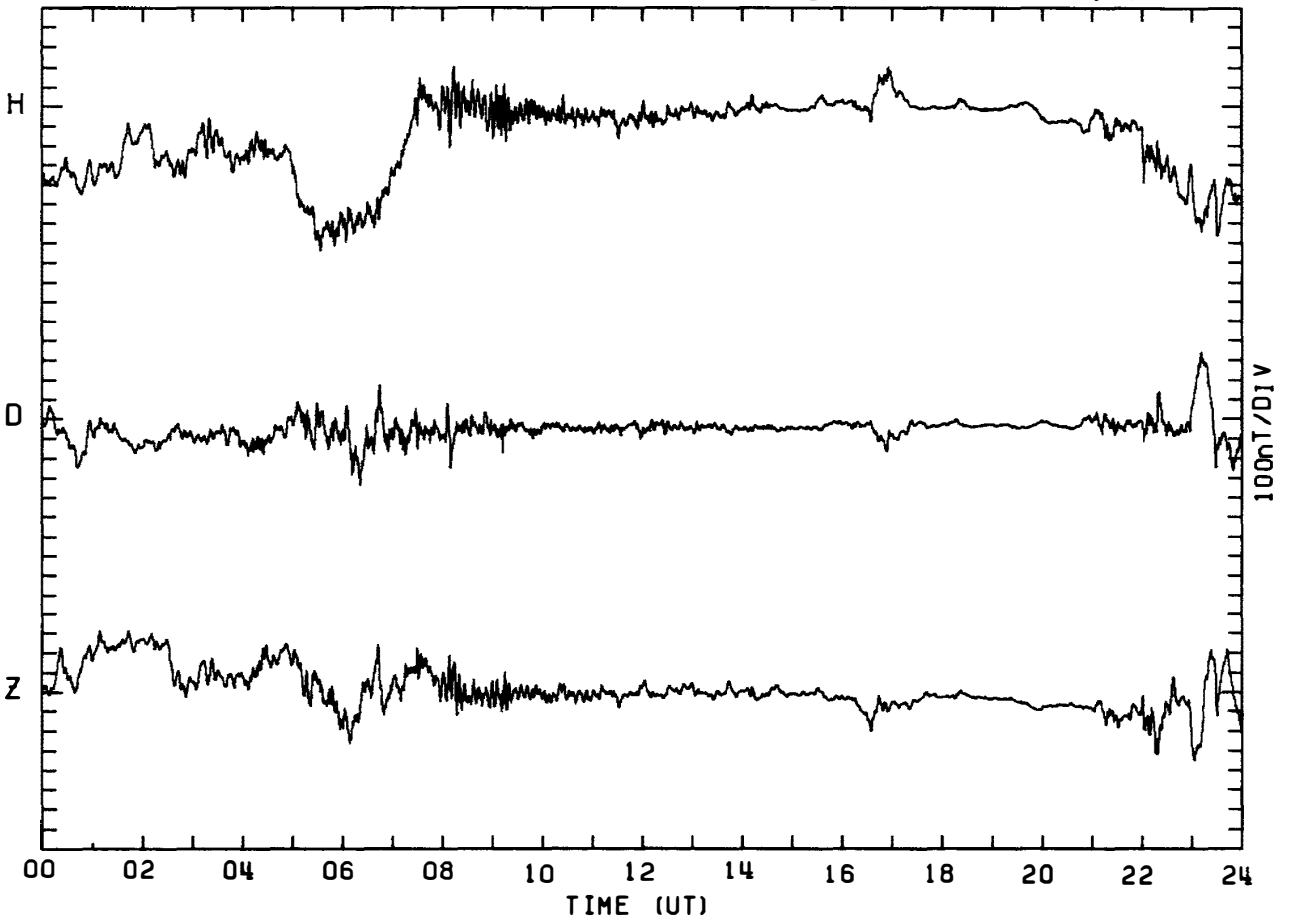
MAGNETOGRAM SYOWA STATION

DAY:119 APRIL 29, 1982



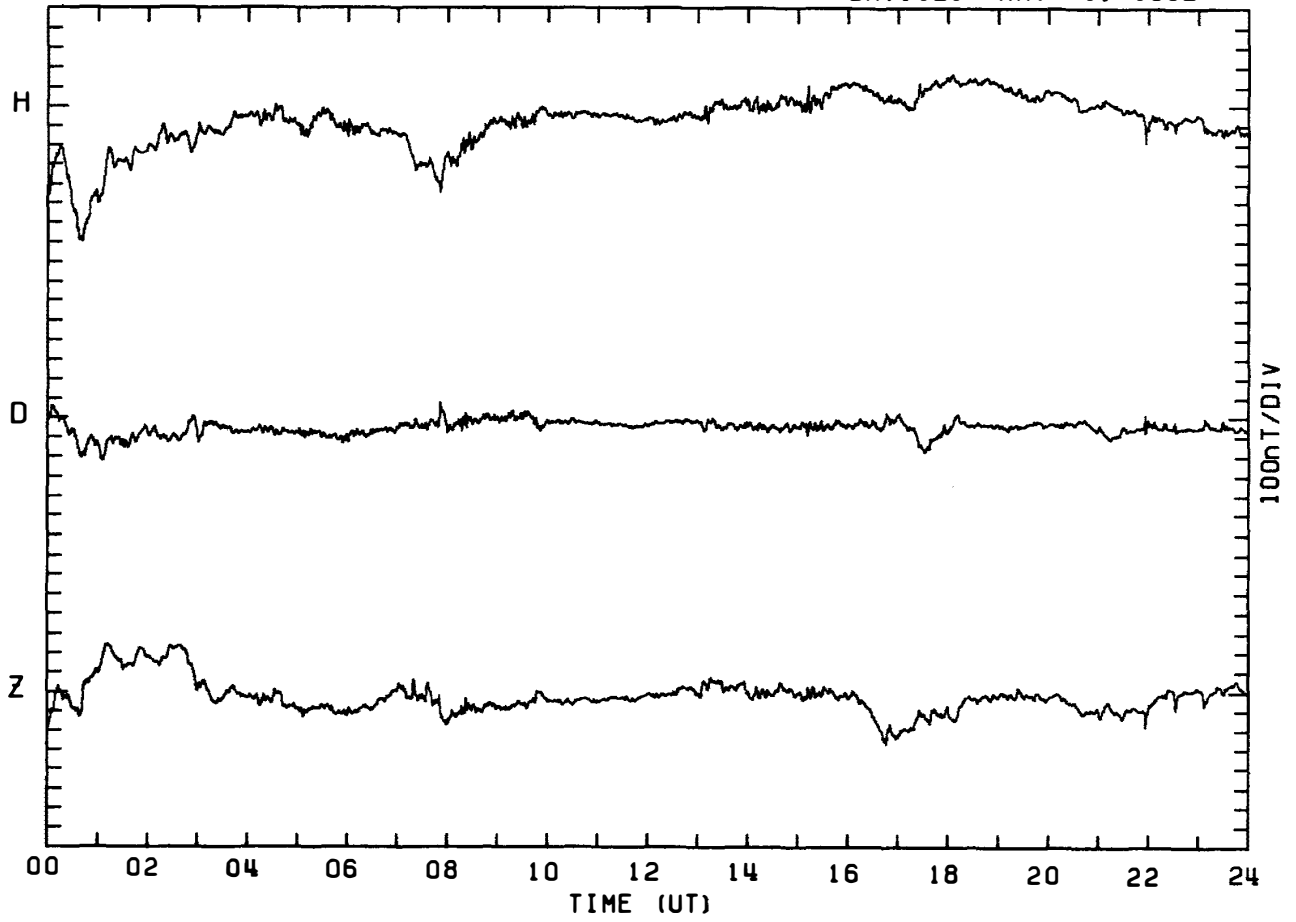
MAGNETOGRAM SYOWA STATION

DAY:120 APRIL 30, 1982



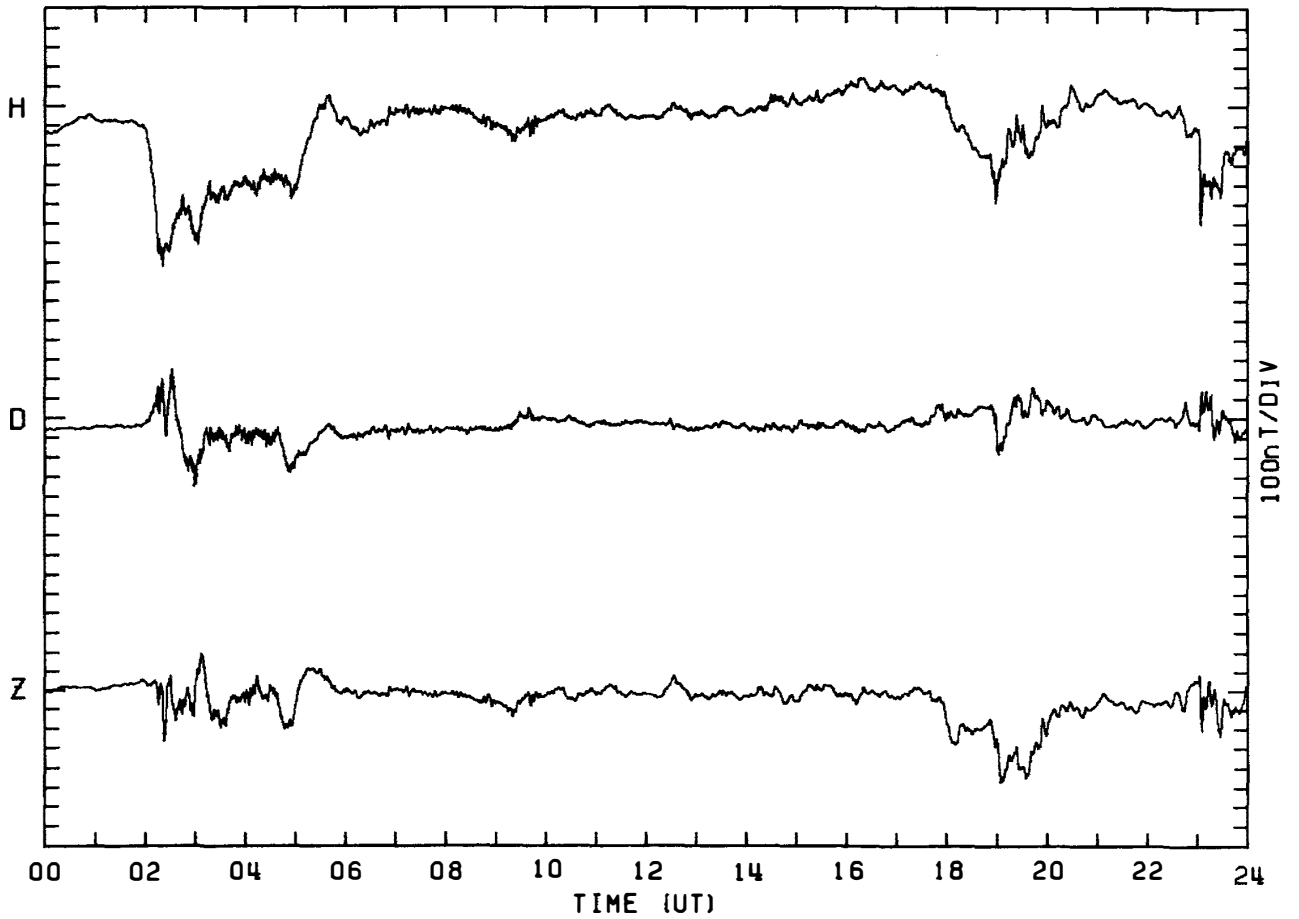
MAGNETOGRAM SYOWA STATION

DAY:121 MAY 1. 1982



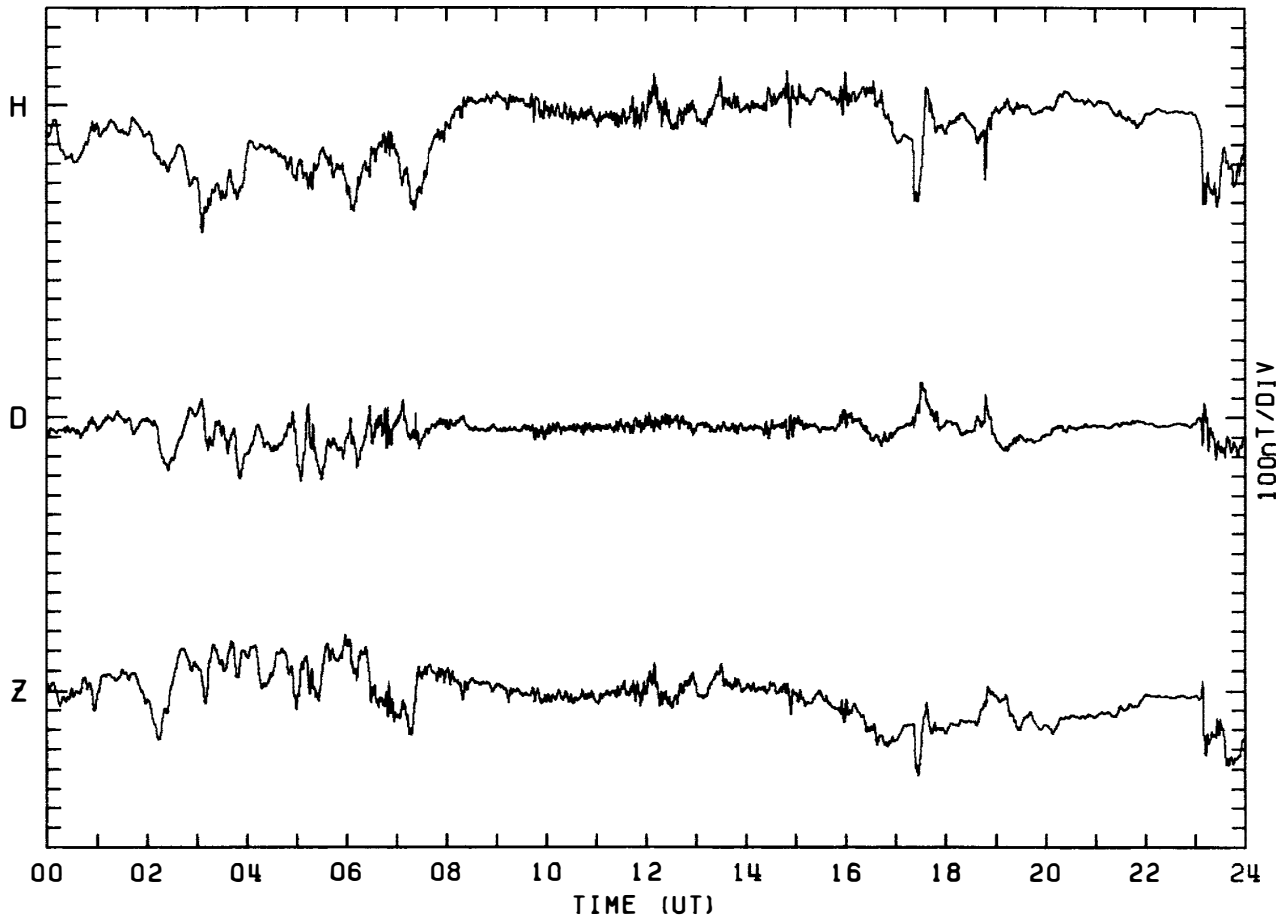
MAGNETOGRAM SYOWA STATION

DAY:122 MAY 2. 1982



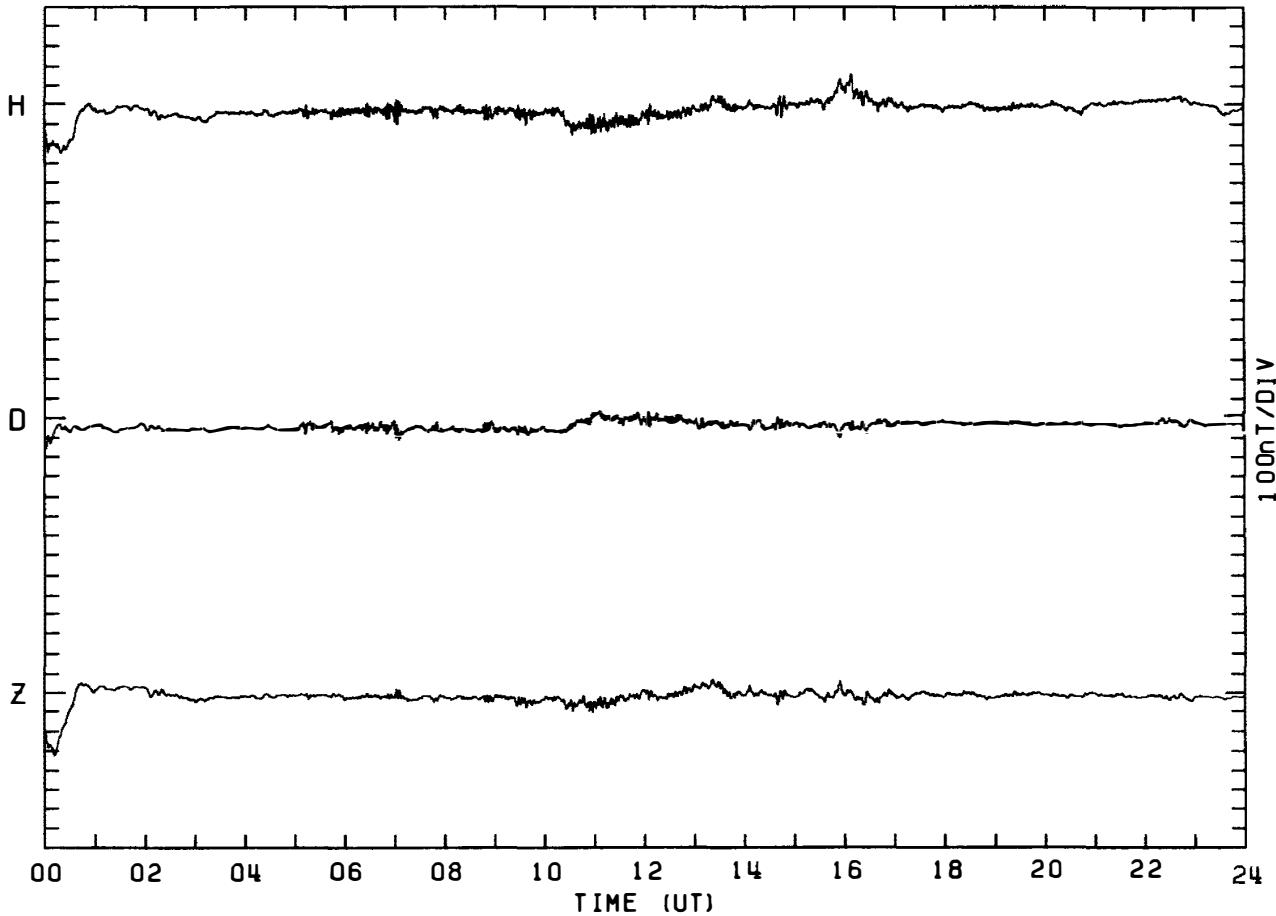
MAGNETOGRAM SYOWA STATION

DAY:123 MAY 3. 1982



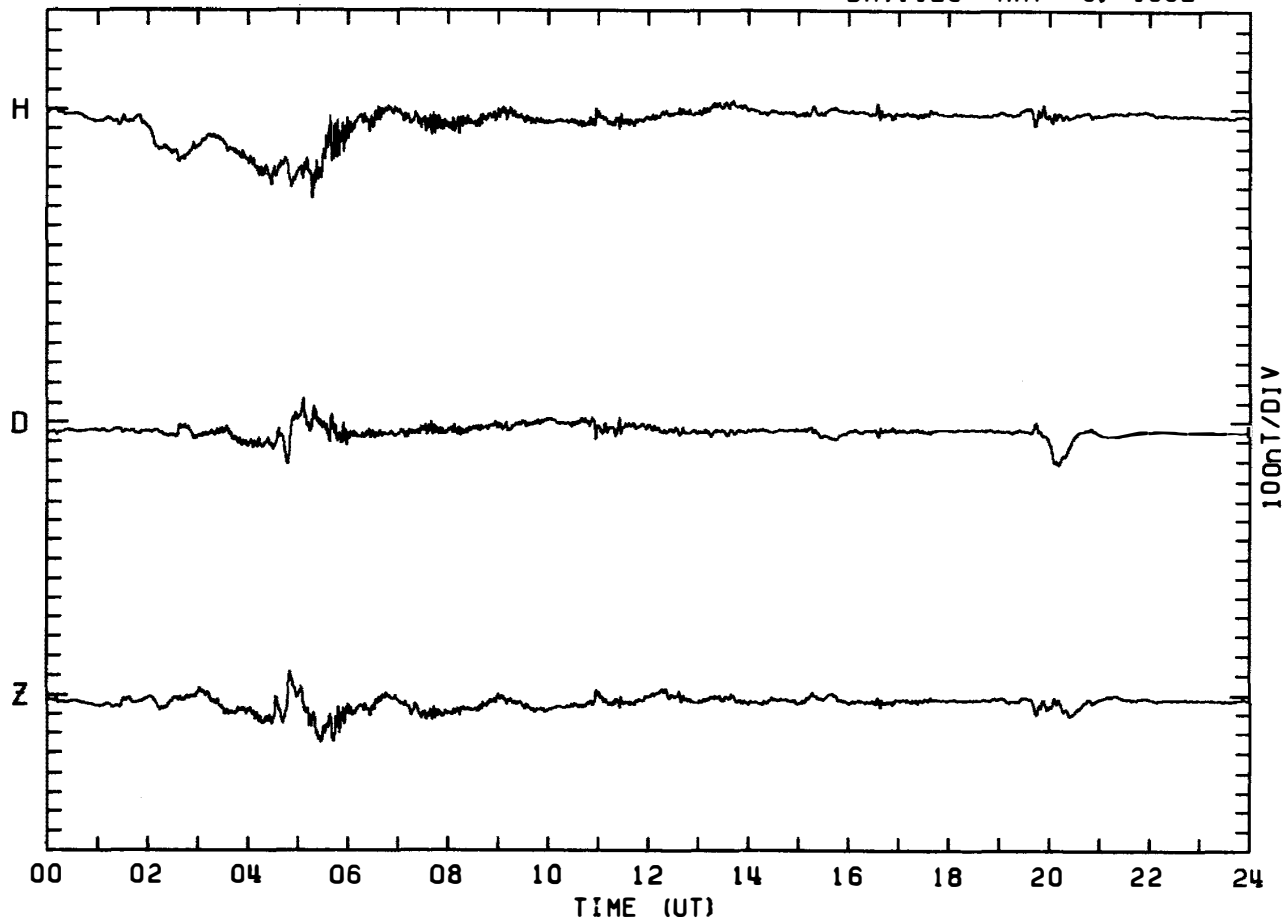
MAGNETOGRAM SYOWA STATION

DAY:124 MAY 4. 1982



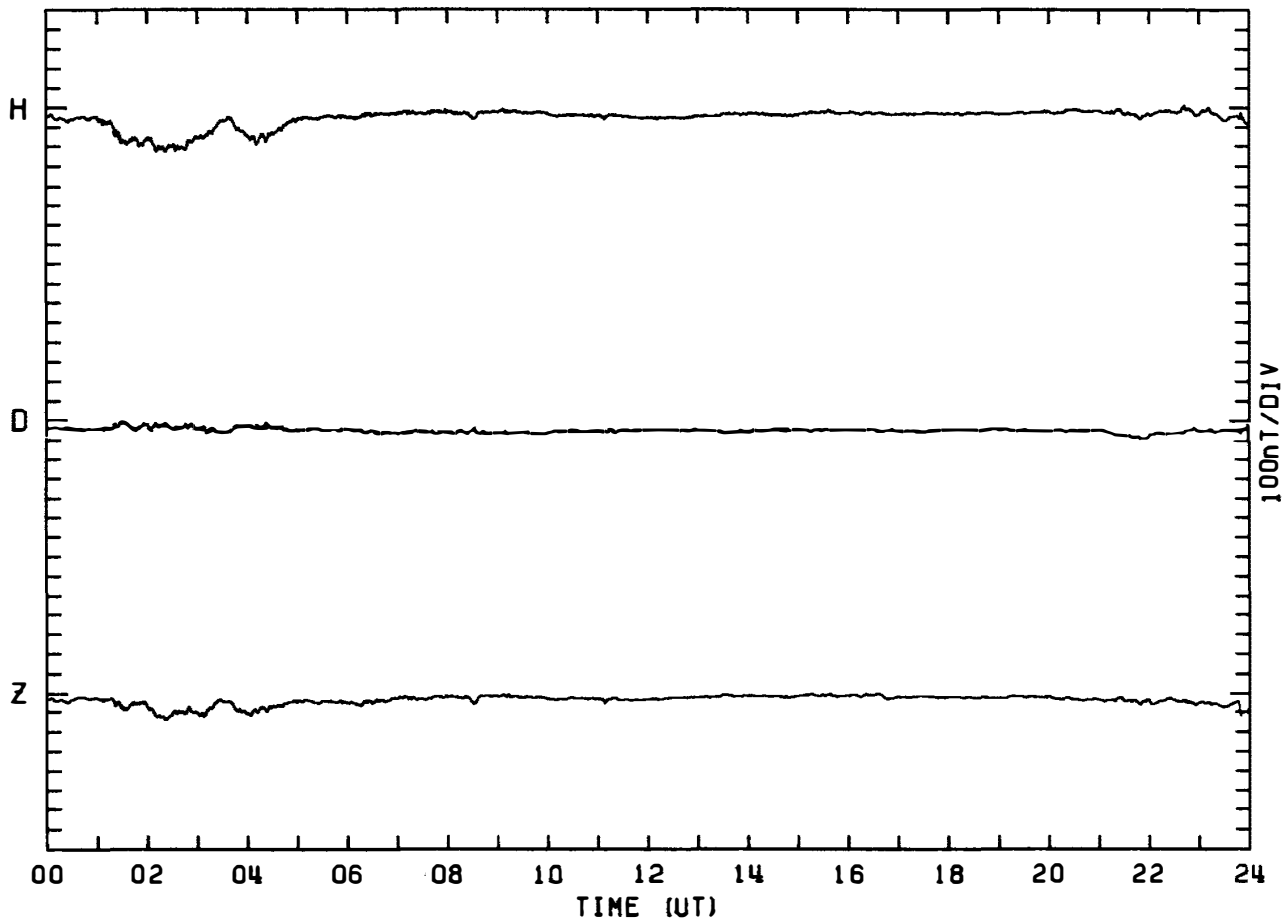
MAGNETOGRAM SYOWA STATION

DAY:125 MAY 5. 1982



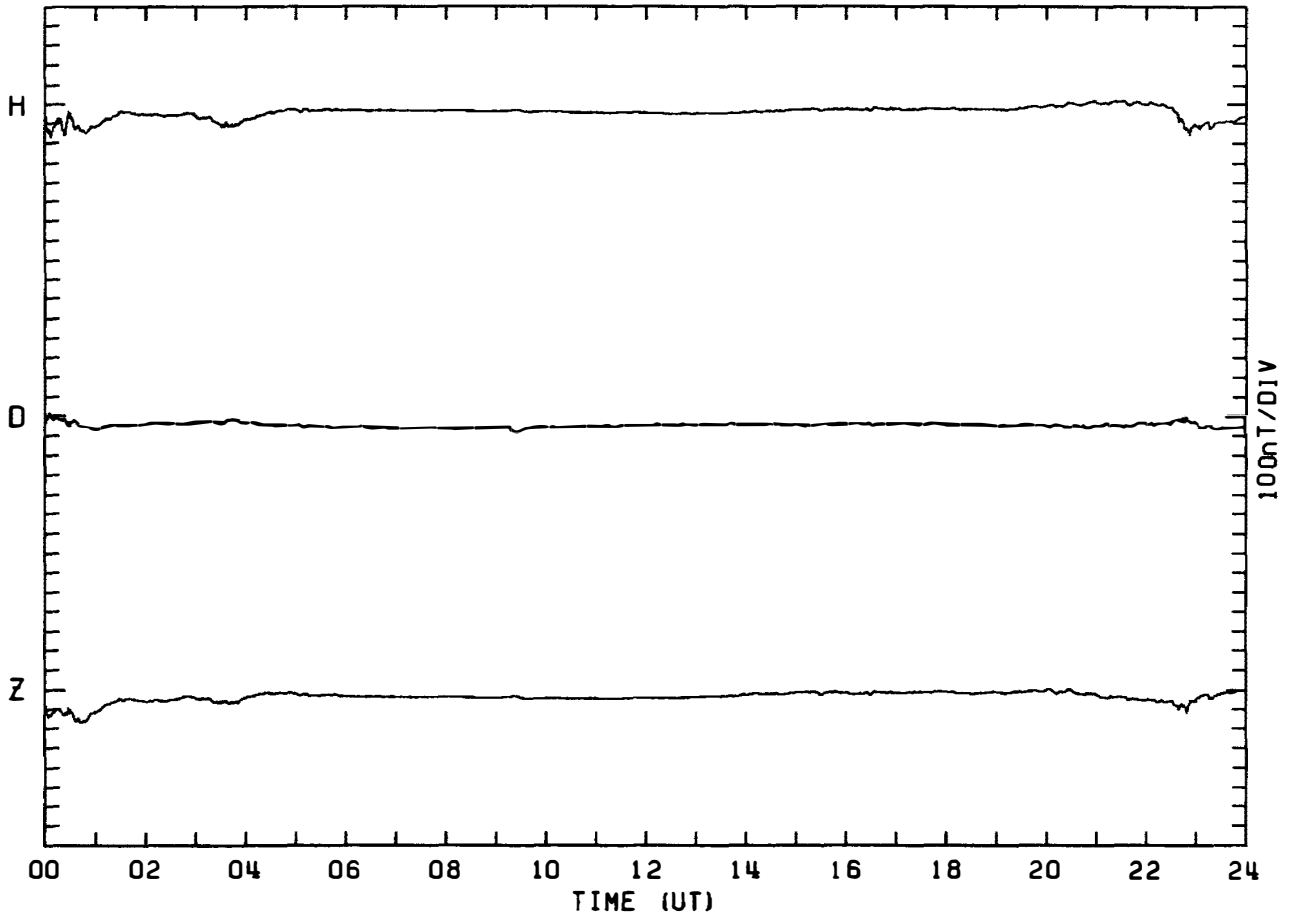
MAGNETOGRAM SYOWA STATION

DAY:126 MAY 6. 1982



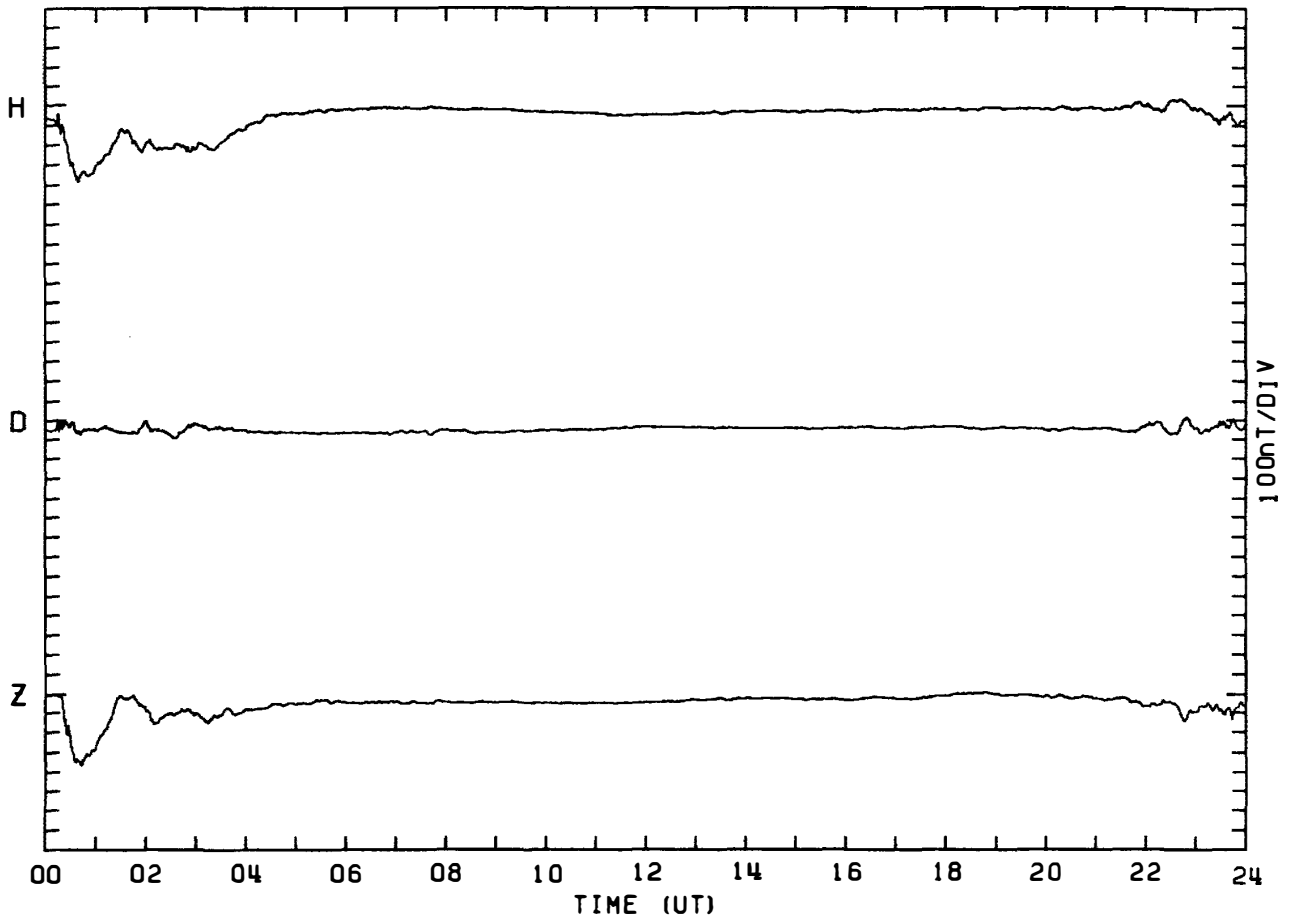
MAGNETOGRAM SYOWA STATION

DAY:127 MAY 7, 1982



MAGNETOGRAM SYOWA STATION

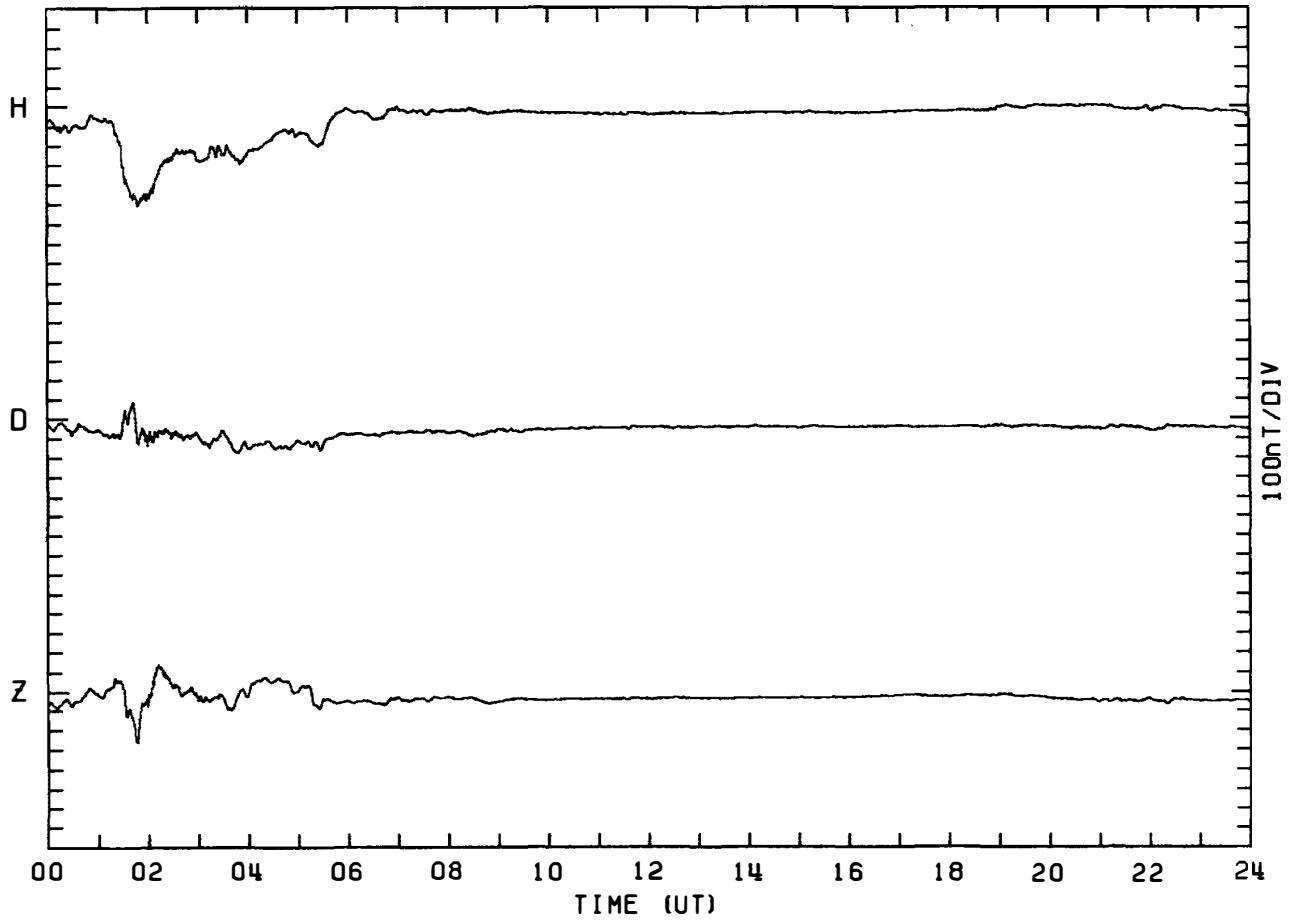
DAY:128 MAY 8, 1982





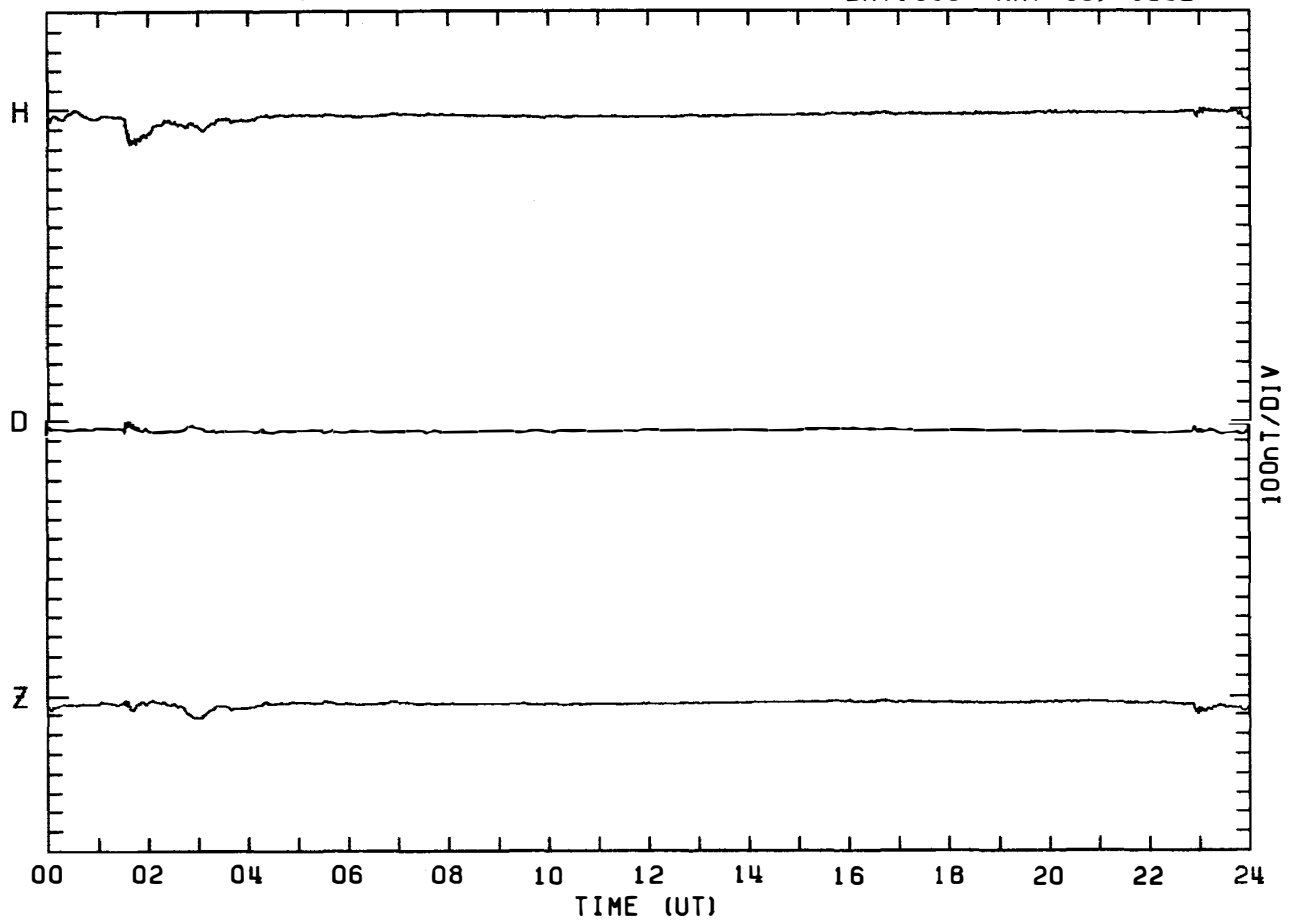
MAGNETOGRAM SYOWA STATION

DAY:129 MAY 9. 1982



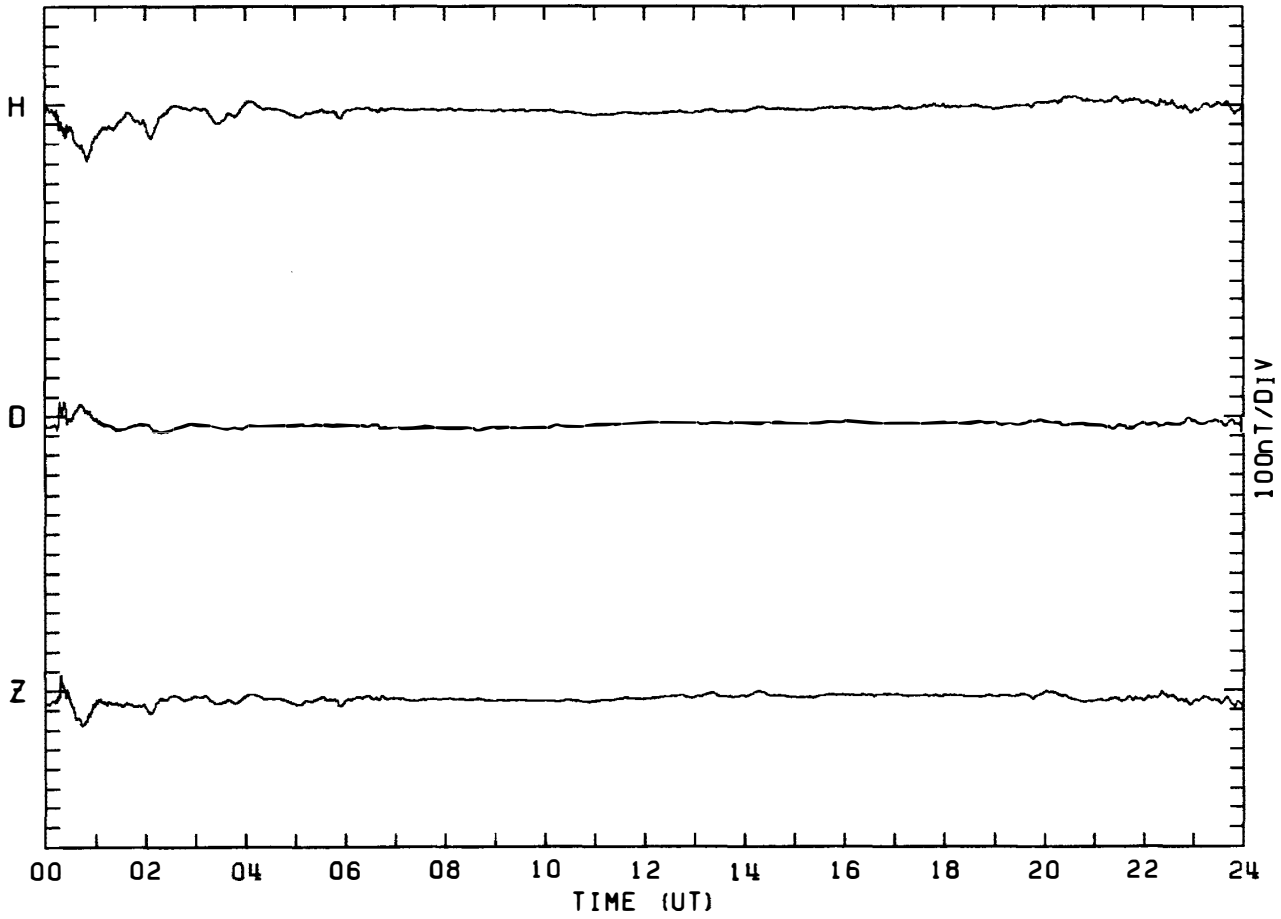
MAGNETOGRAM SYOWA STATION

DAY:130 MAY 10. 1982



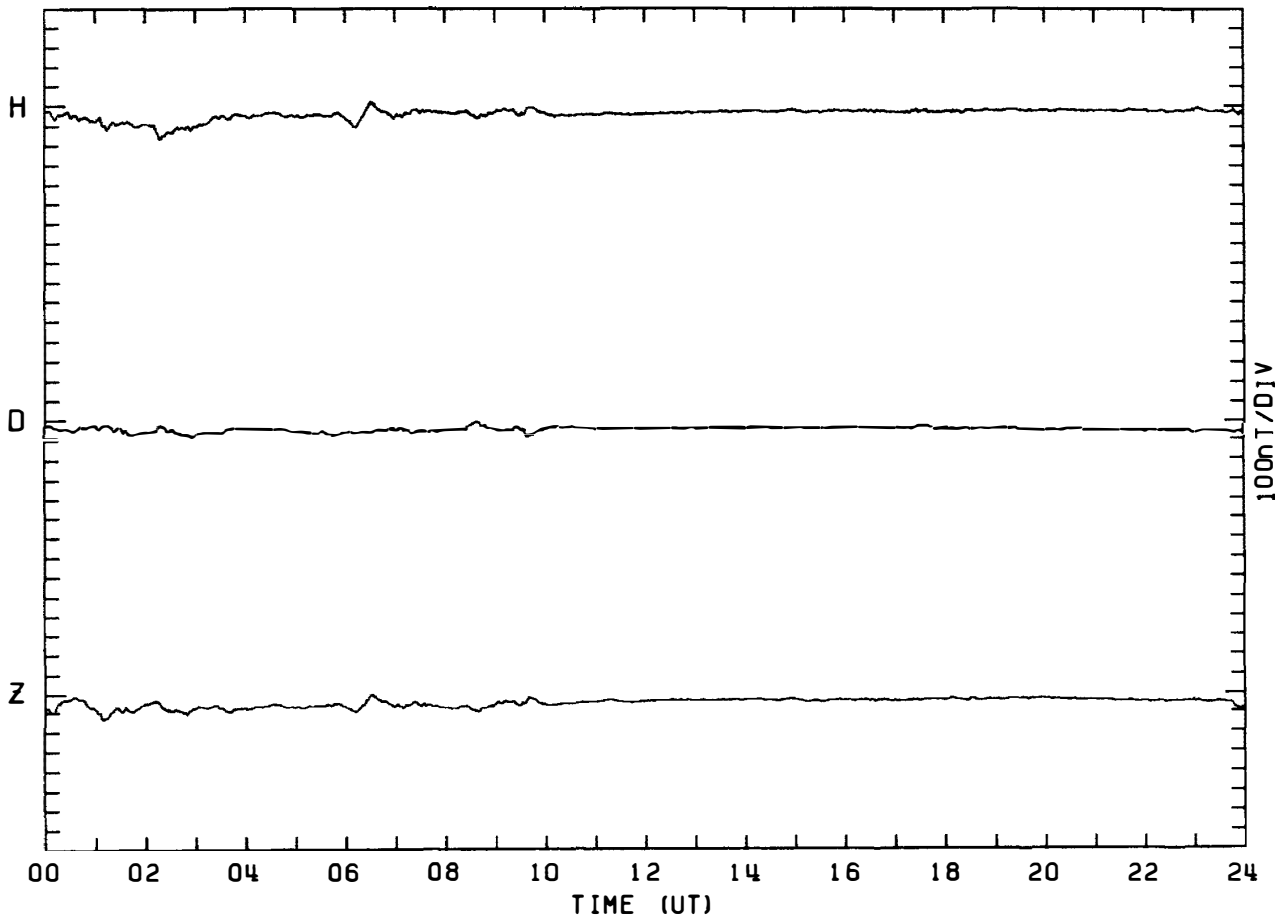
MAGNETOGRAM SYOWA STATION

DAY:131 MAY 11, 1982



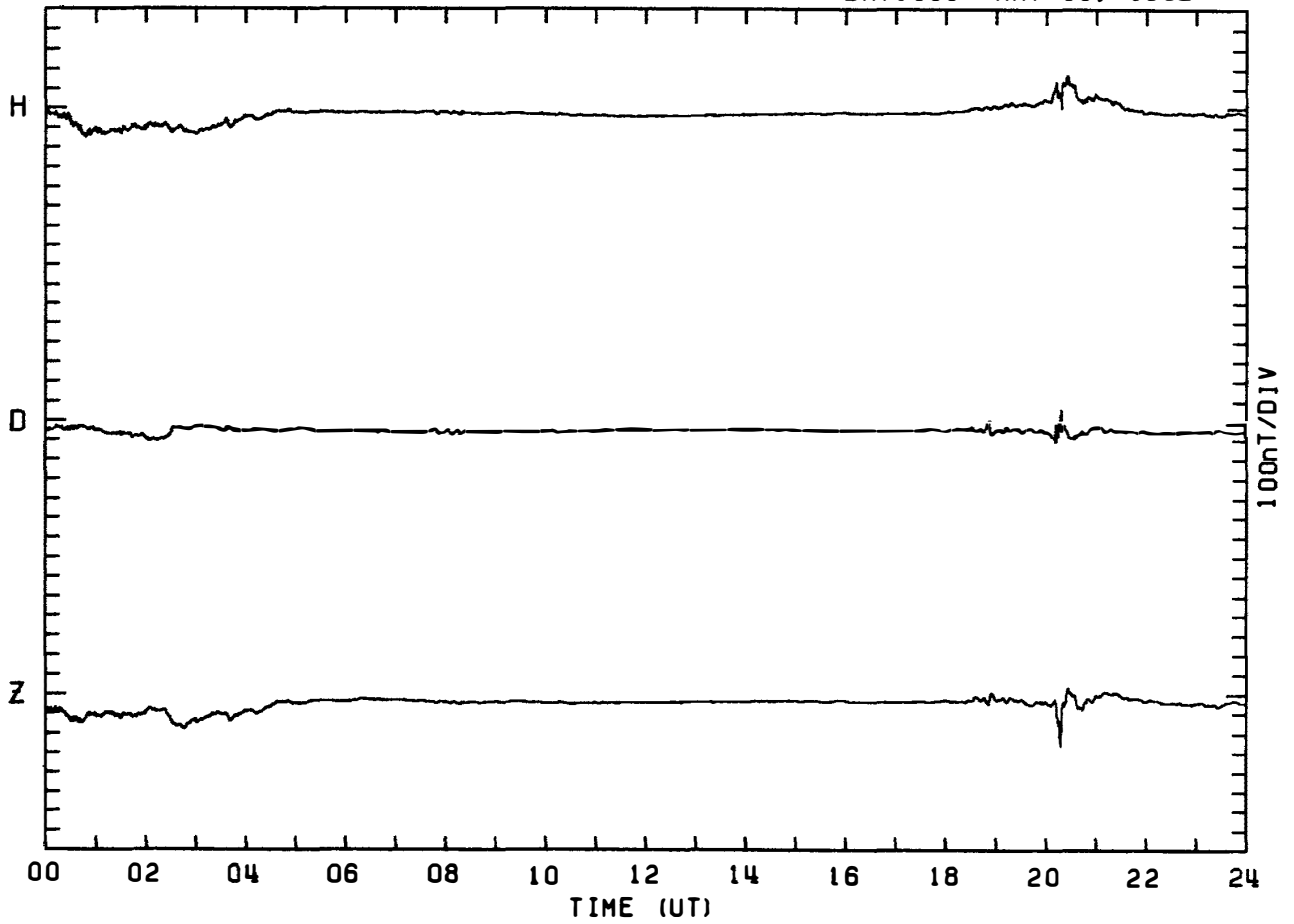
MAGNETOGRAM SYOWA STATION

DAY:132 MAY 12, 1982



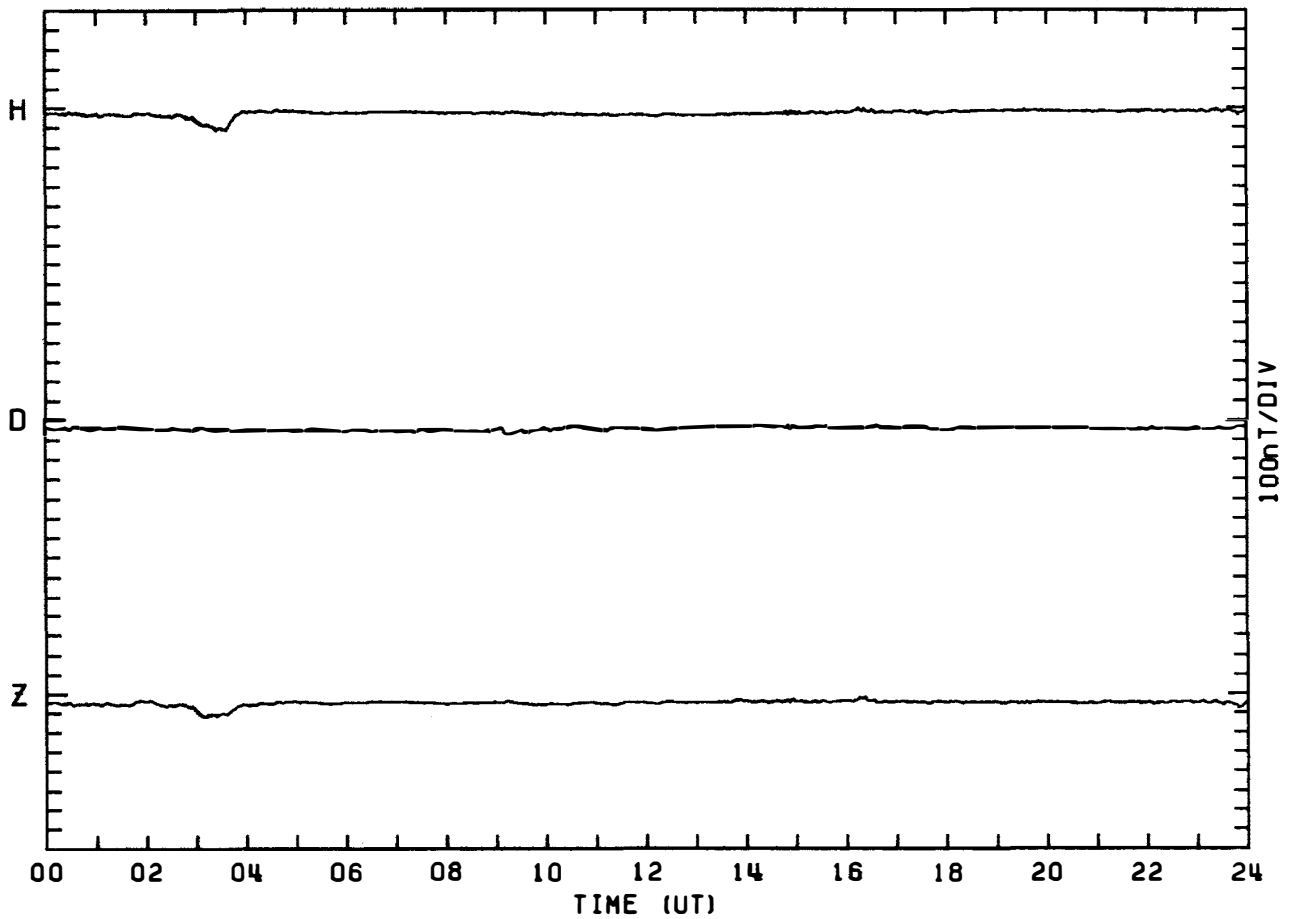
MAGNETOGRAM SYOWA STATION

DAY:133 MAY 13, 1982



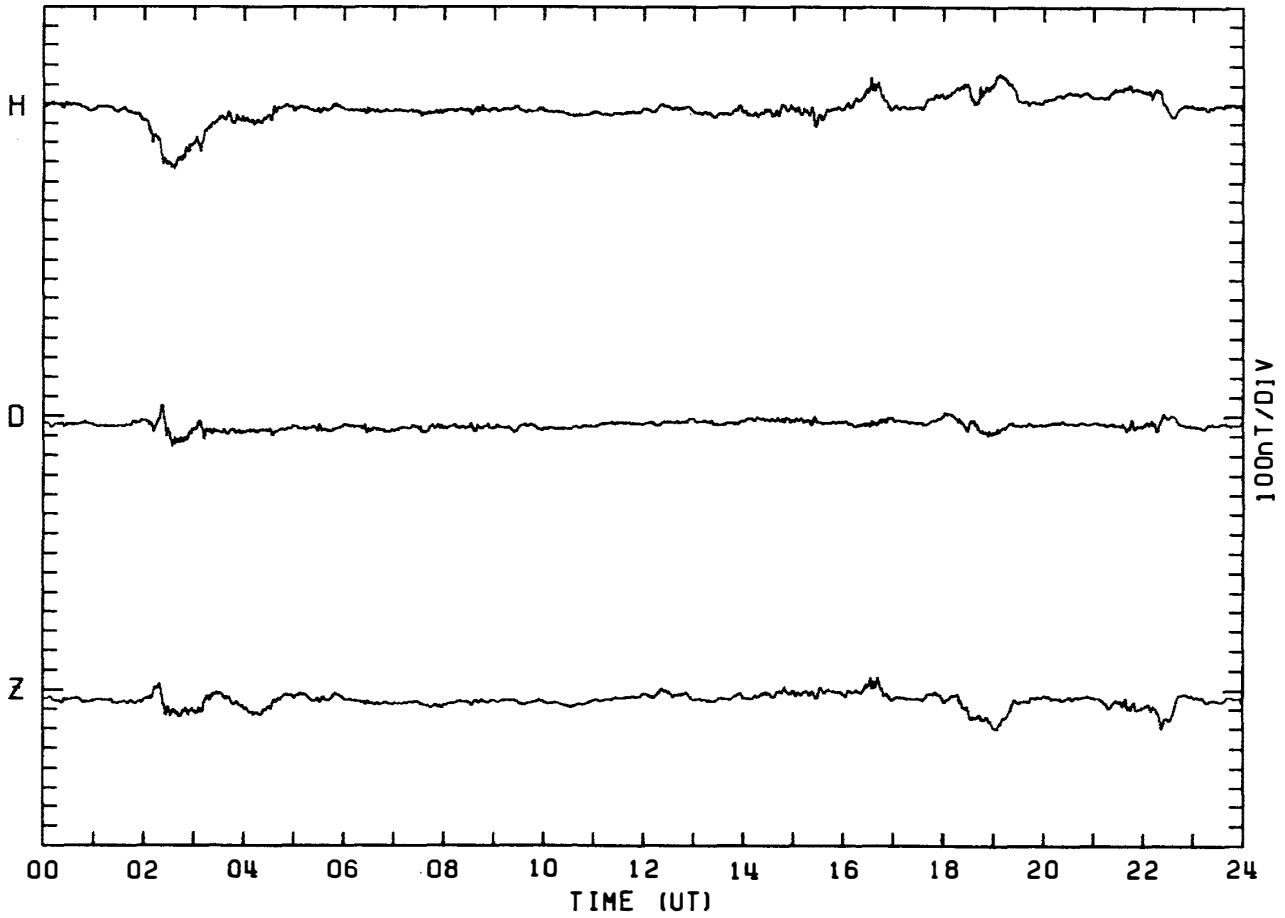
MAGNETOGRAM SYOWA STATION

DAY:134 MAY 14, 1982



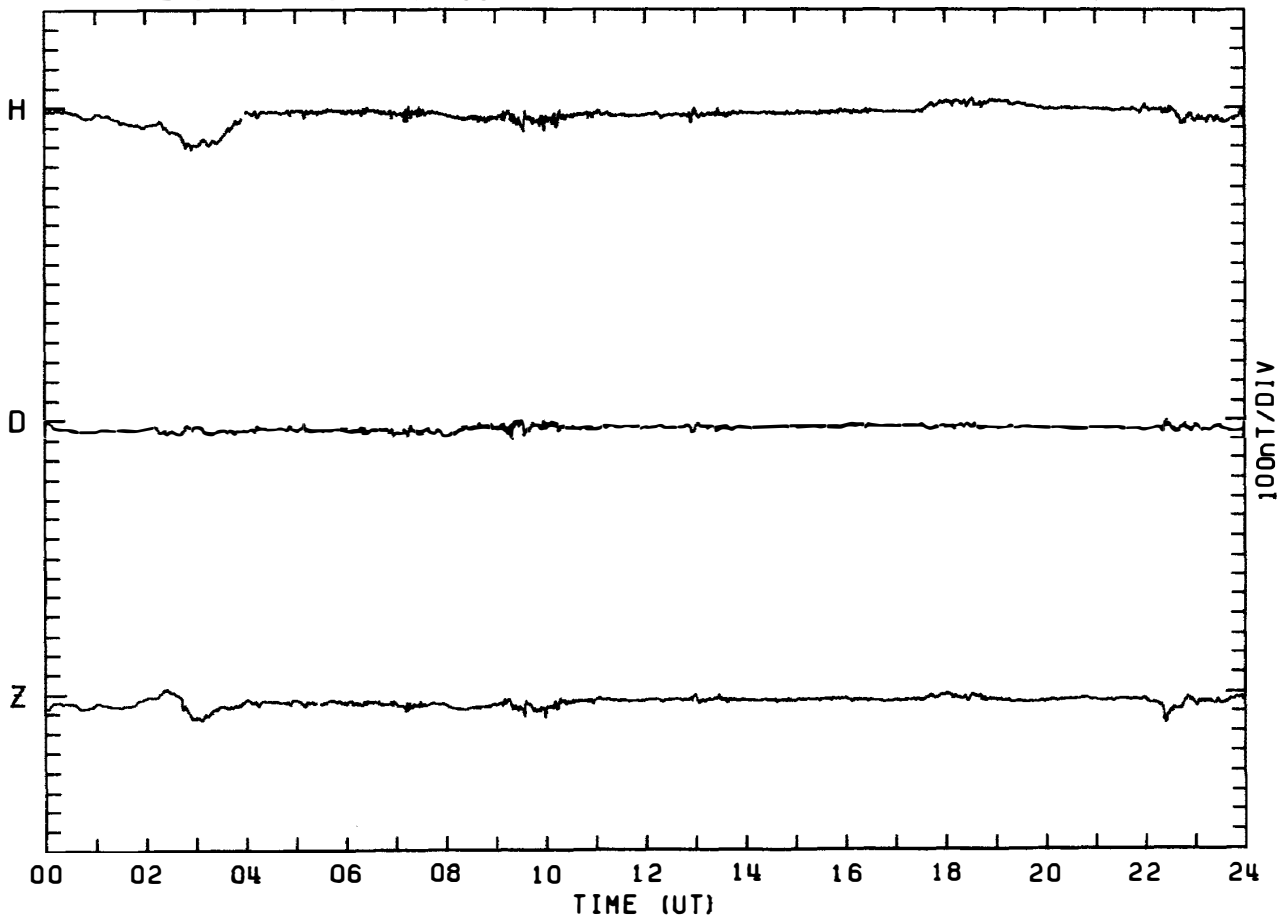
MAGNETOGRAM SYOWA STATION

DAY:135 MAY 15, 1982



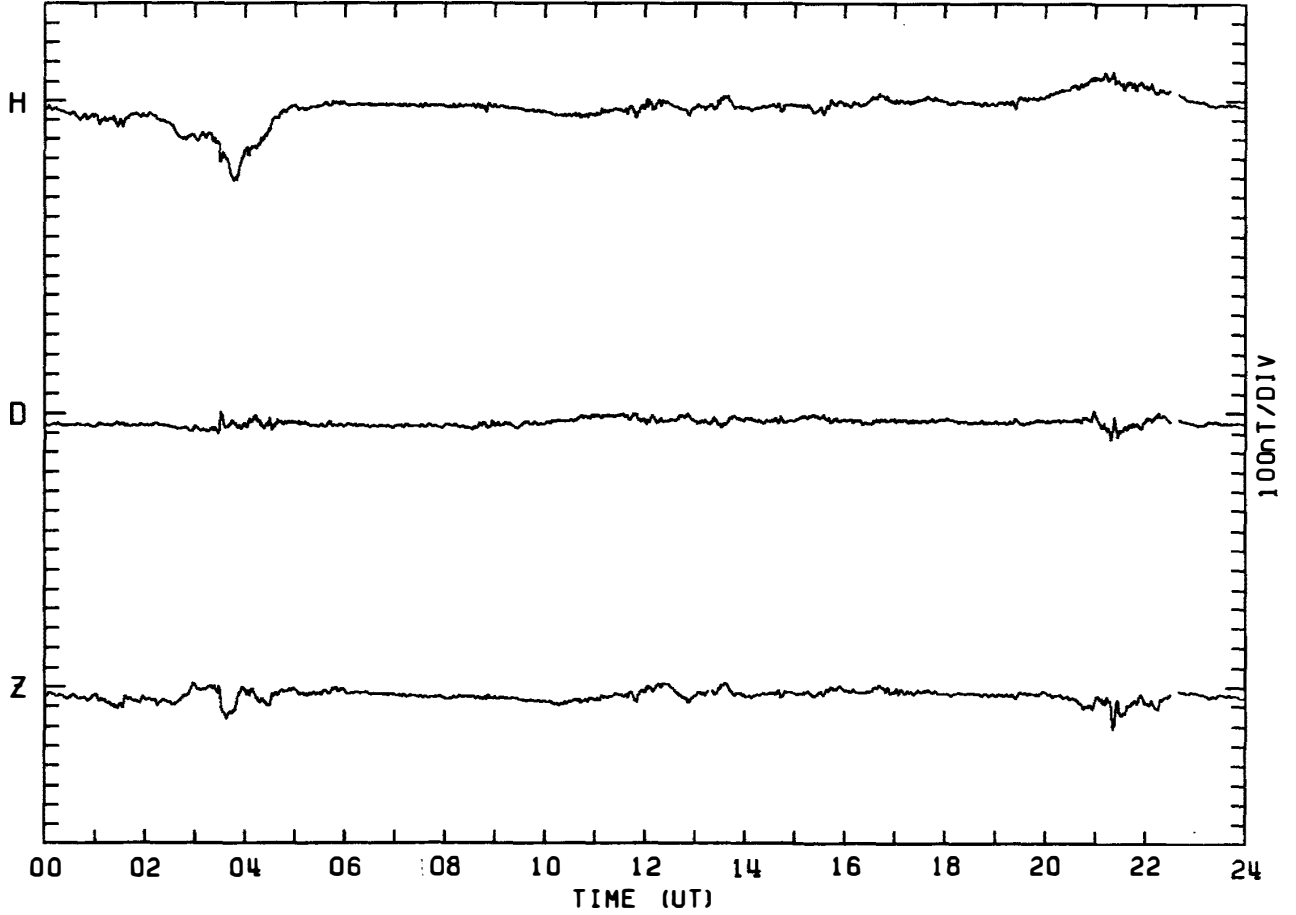
MAGNETOGRAM SYOWA STATION

DAY:136 MAY 16, 1982



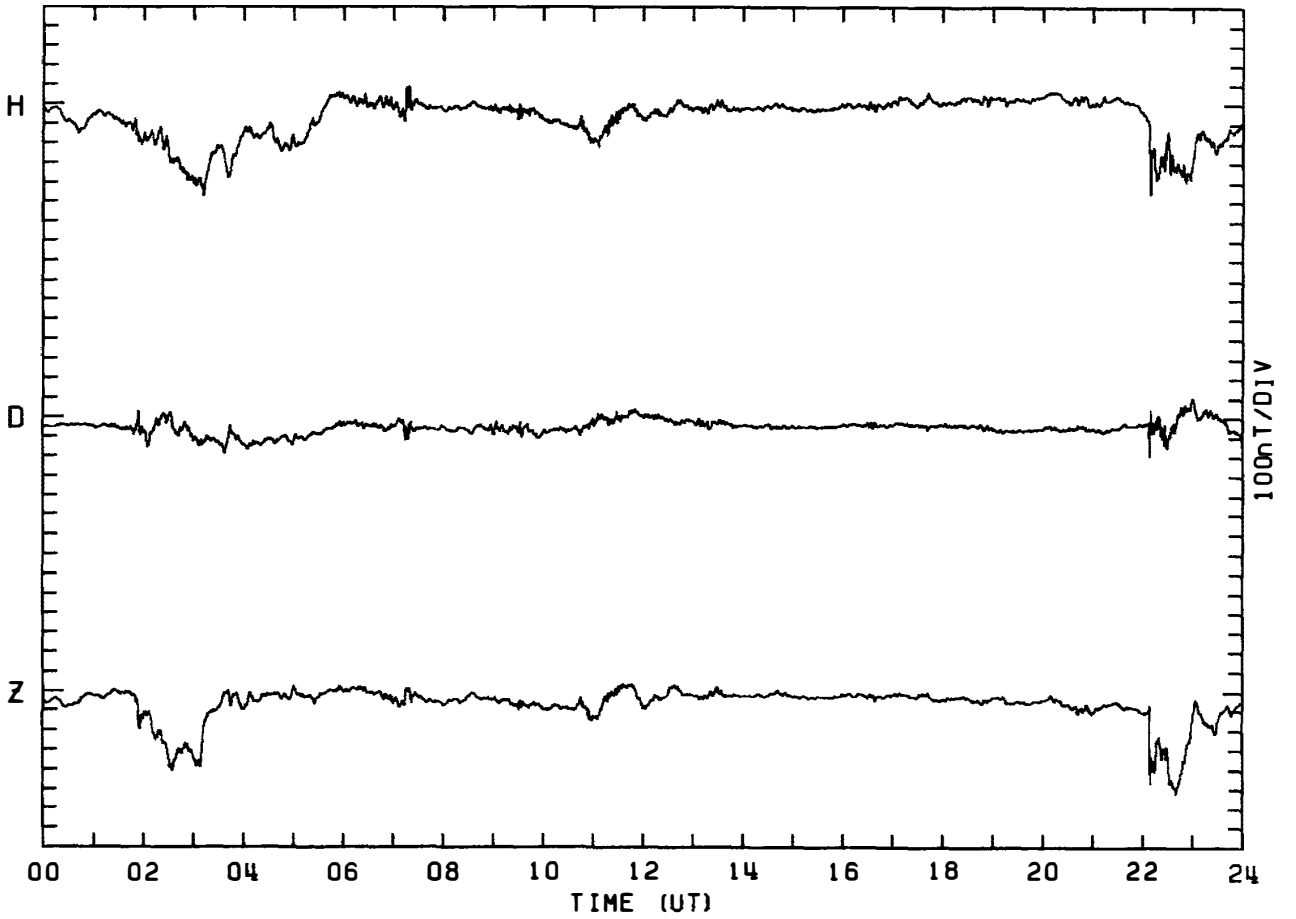
MAGNETOGRAM SYOWA STATION

DAY:137 MAY 17, 1982



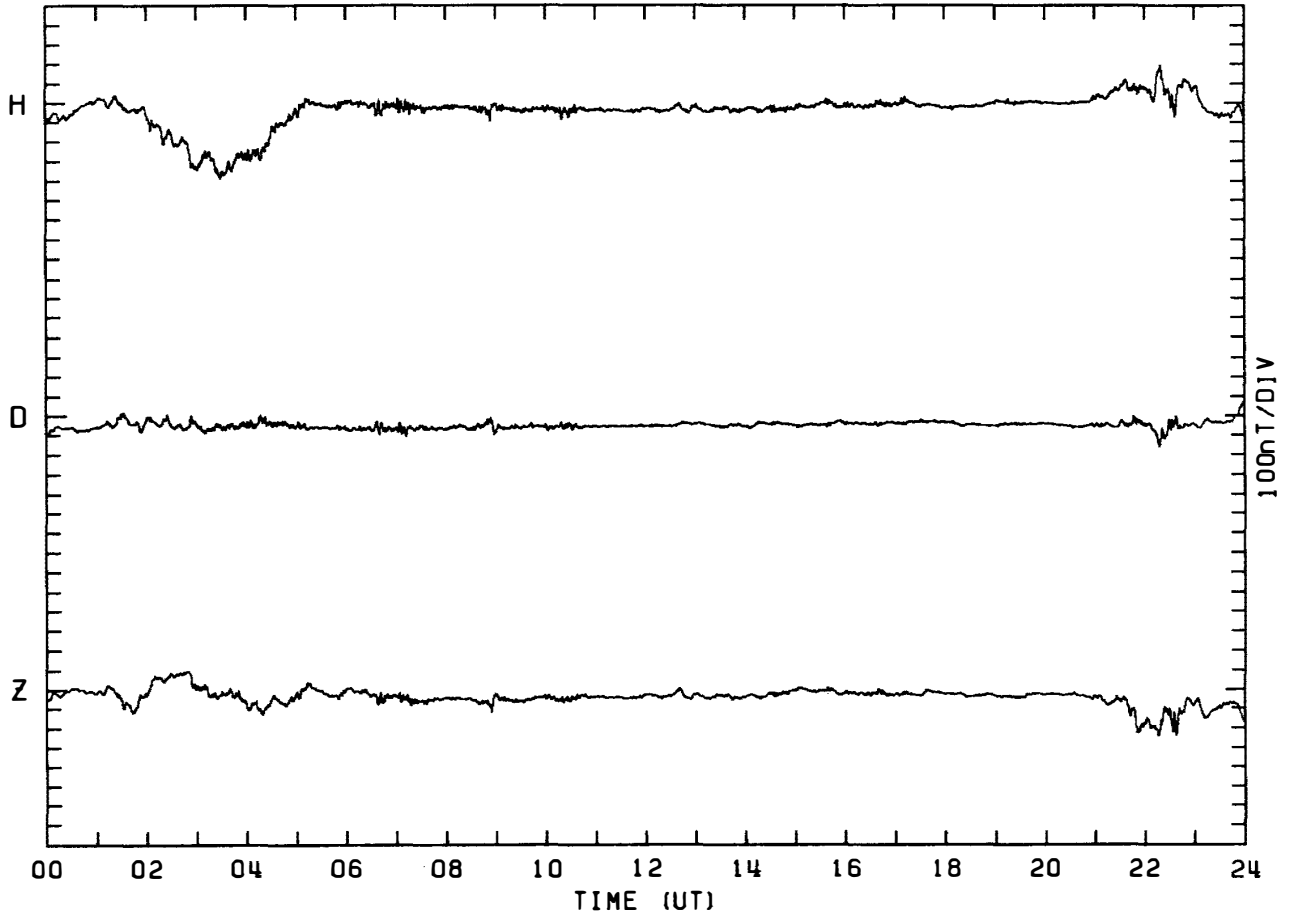
MAGNETOGRAM SYOWA STATION

DAY:138 MAY 18, 1982



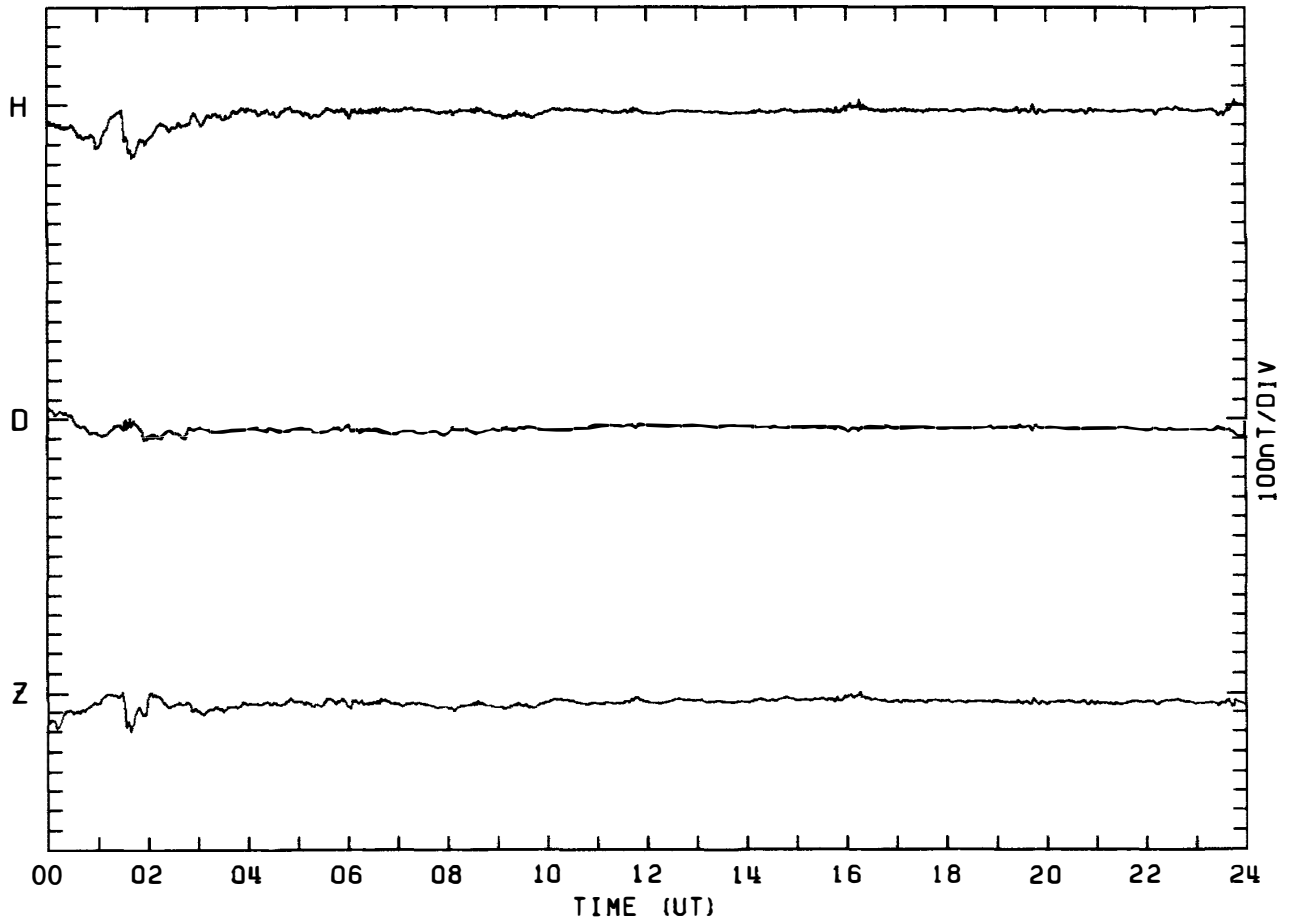
MAGNETOGRAM SYOWA STATION

DAY: 139 MAY 19, 1982



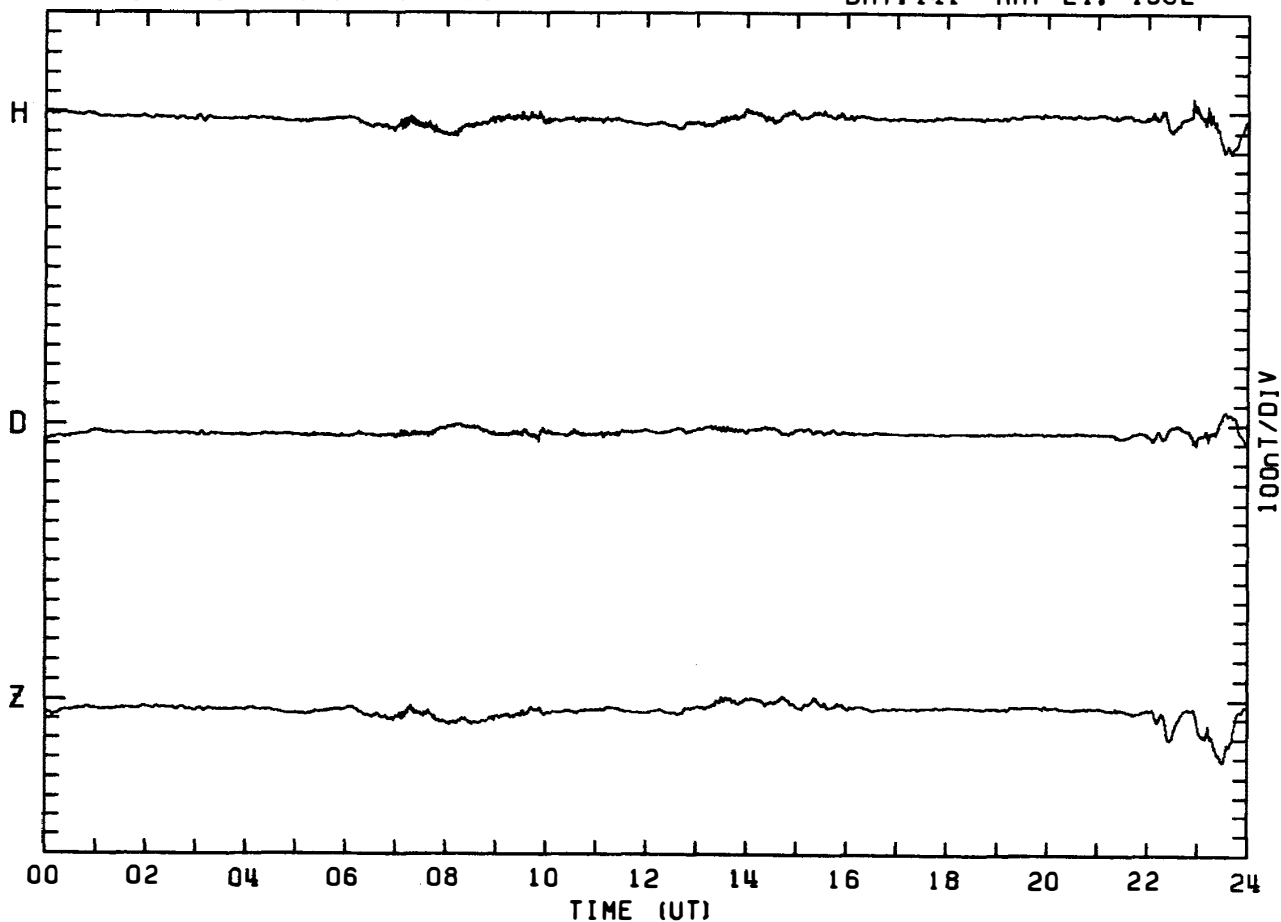
MAGNETOGRAM SYOWA STATION

DAY: 140 MAY 20, 1982



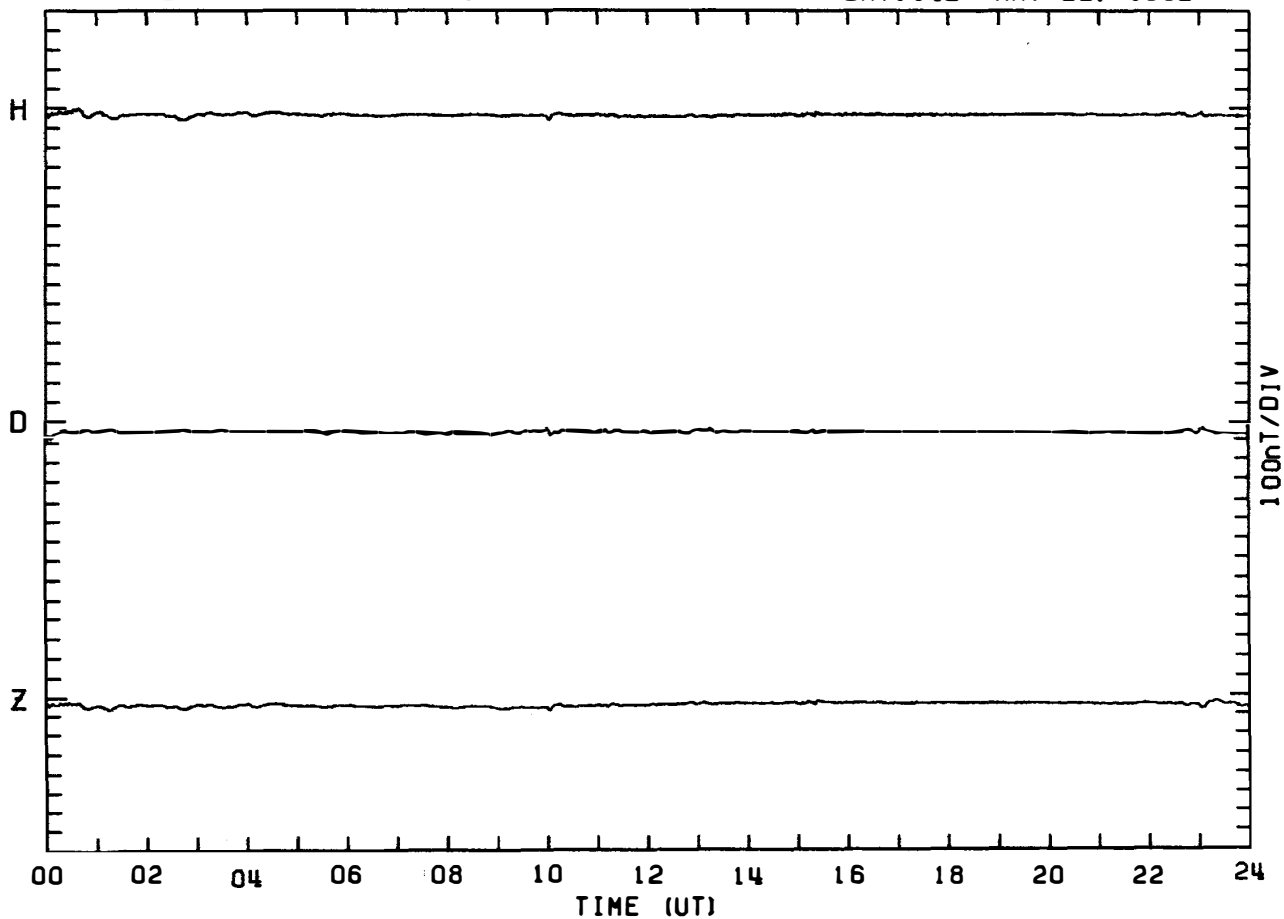
MAGNETOGRAM SYOWA STATION

DAY: 141 MAY 21. 1982



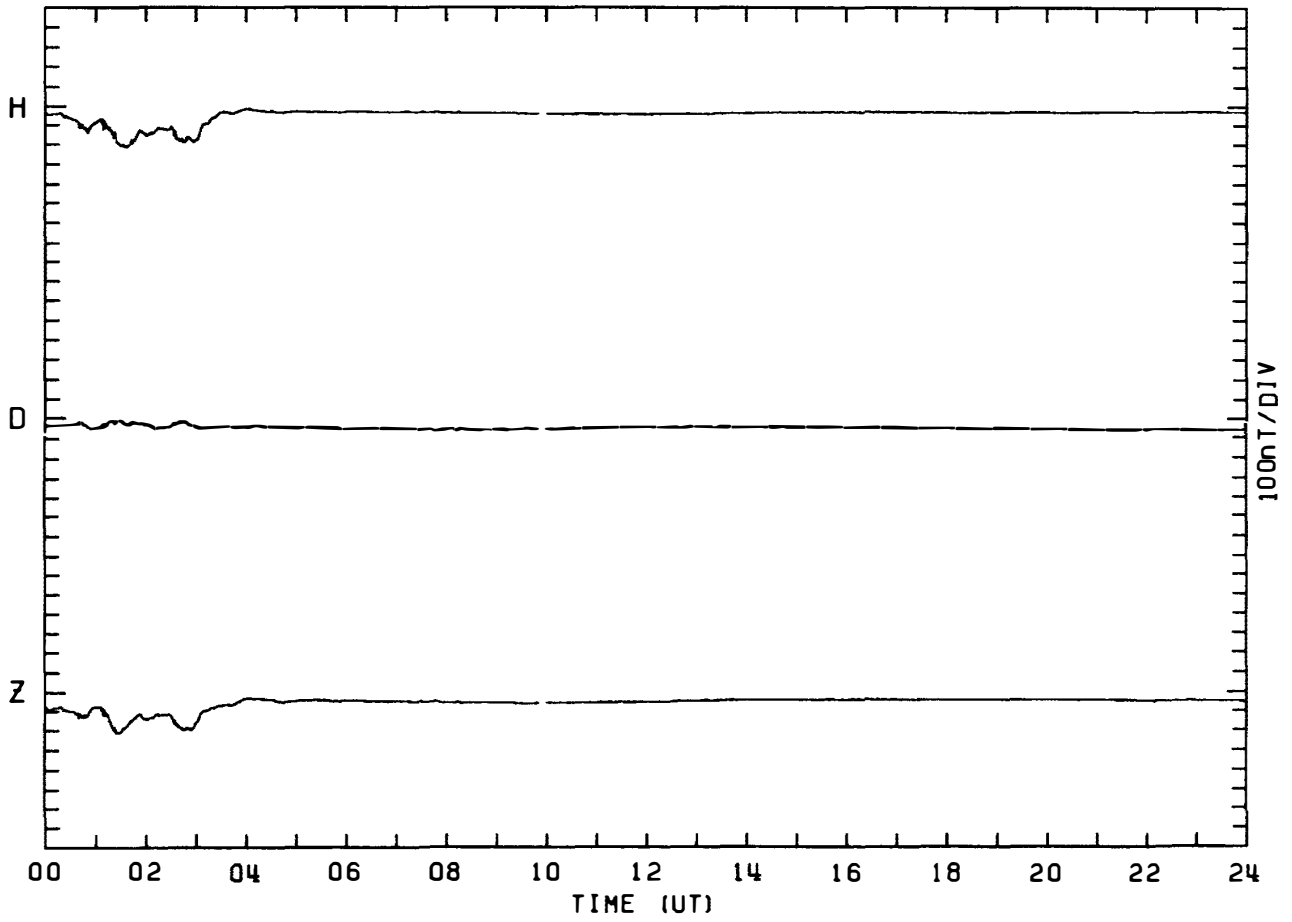
MAGNETOGRAM SYOWA STATION

DAY: 142 MAY 22. 1982



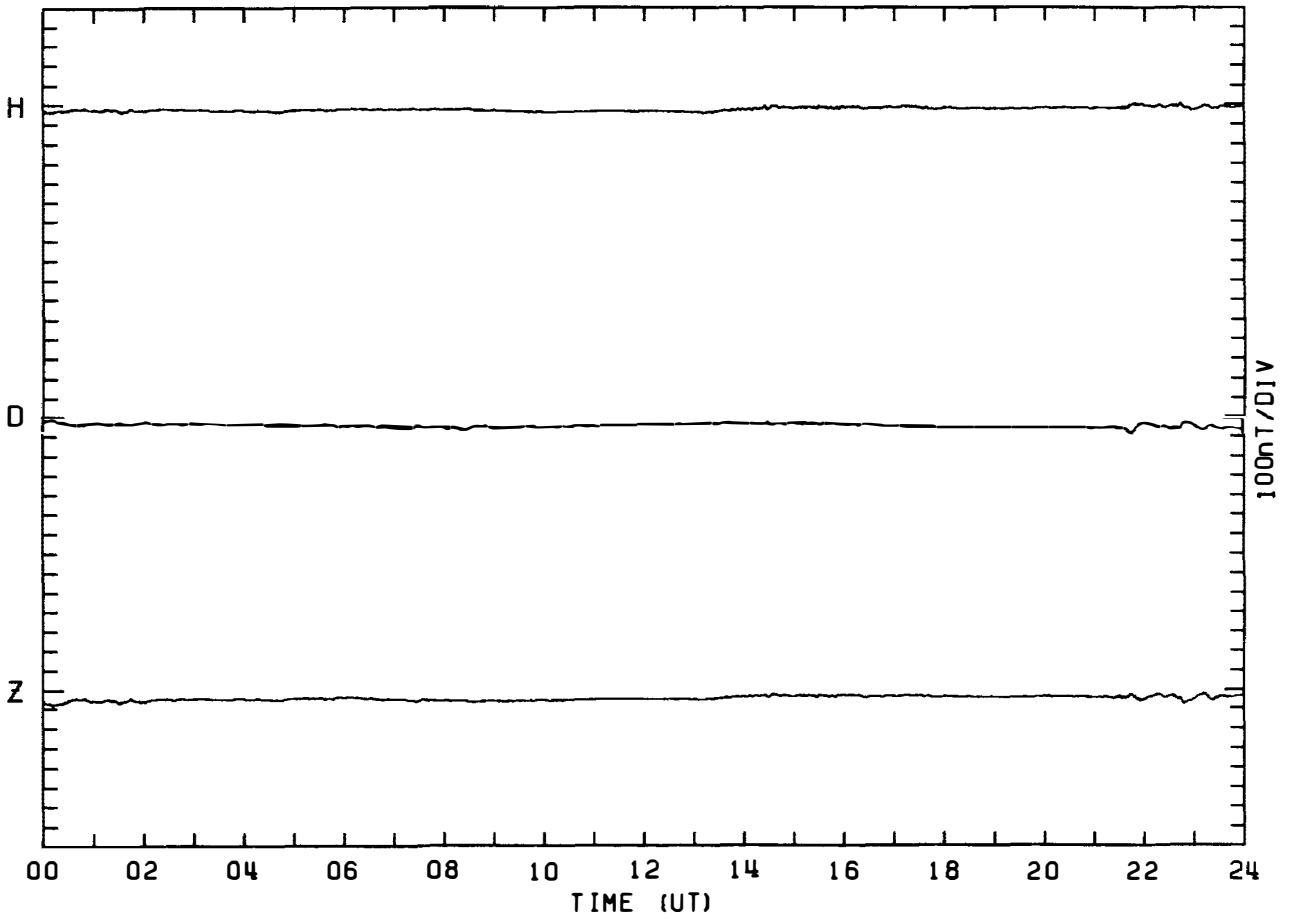
MAGNETOGRAM SYOWA STATION

DAY:143 MAY 23, 1982



MAGNETOGRAM SYOWA STATION

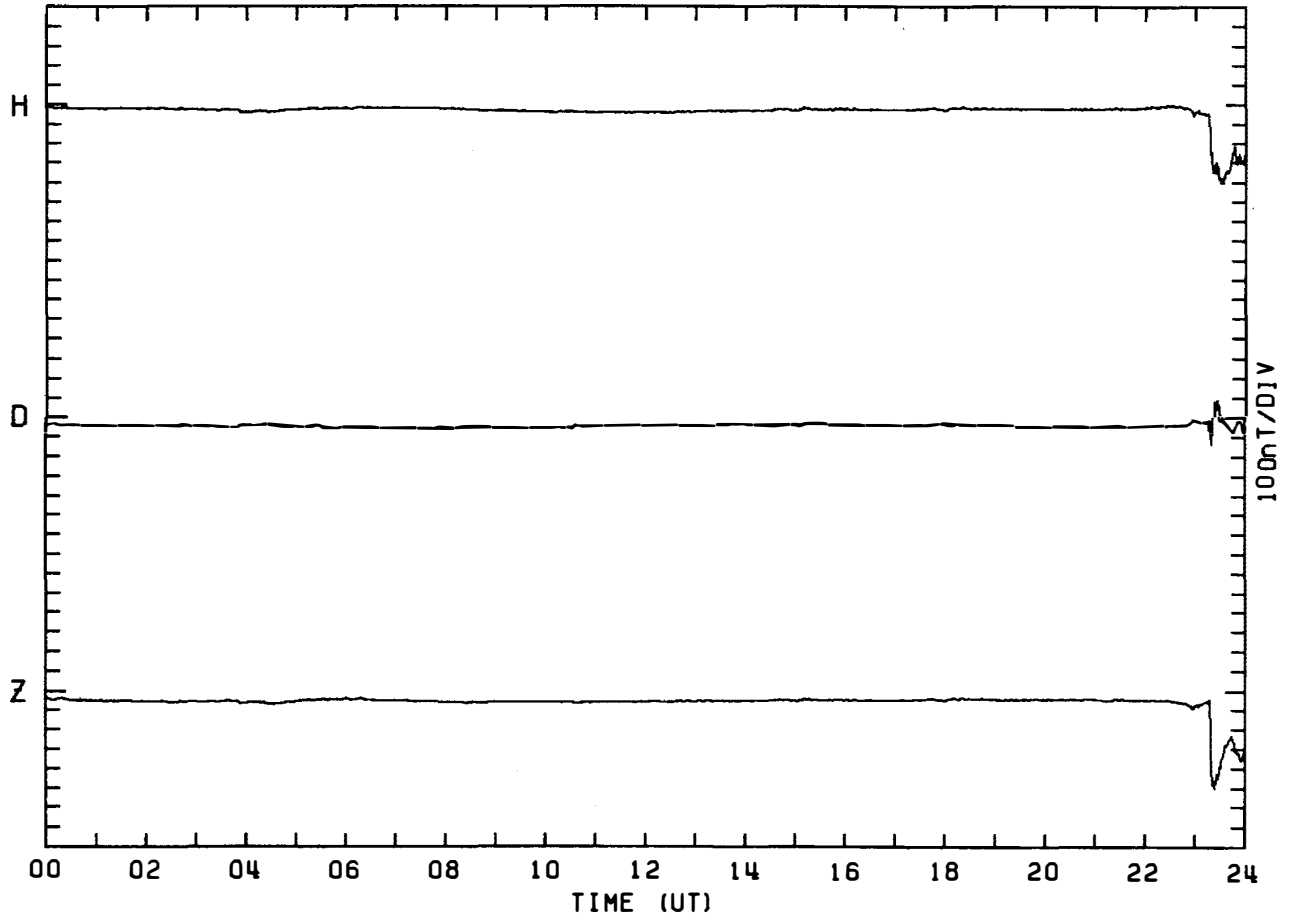
DAY:144 MAY 24, 1982





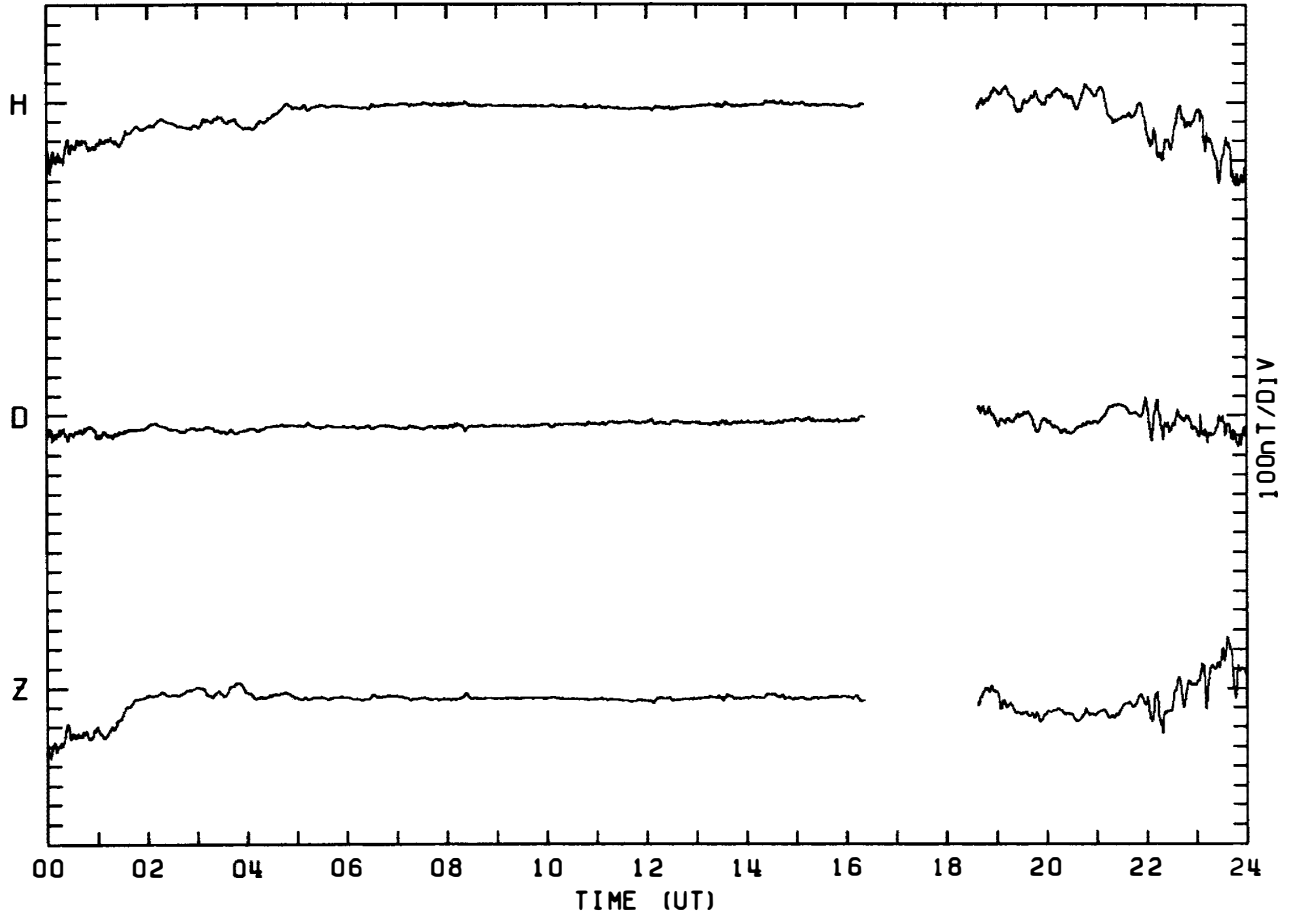
MAGNETOGRAM SYOWA STATION

DAY:145 MAY 25, 1982



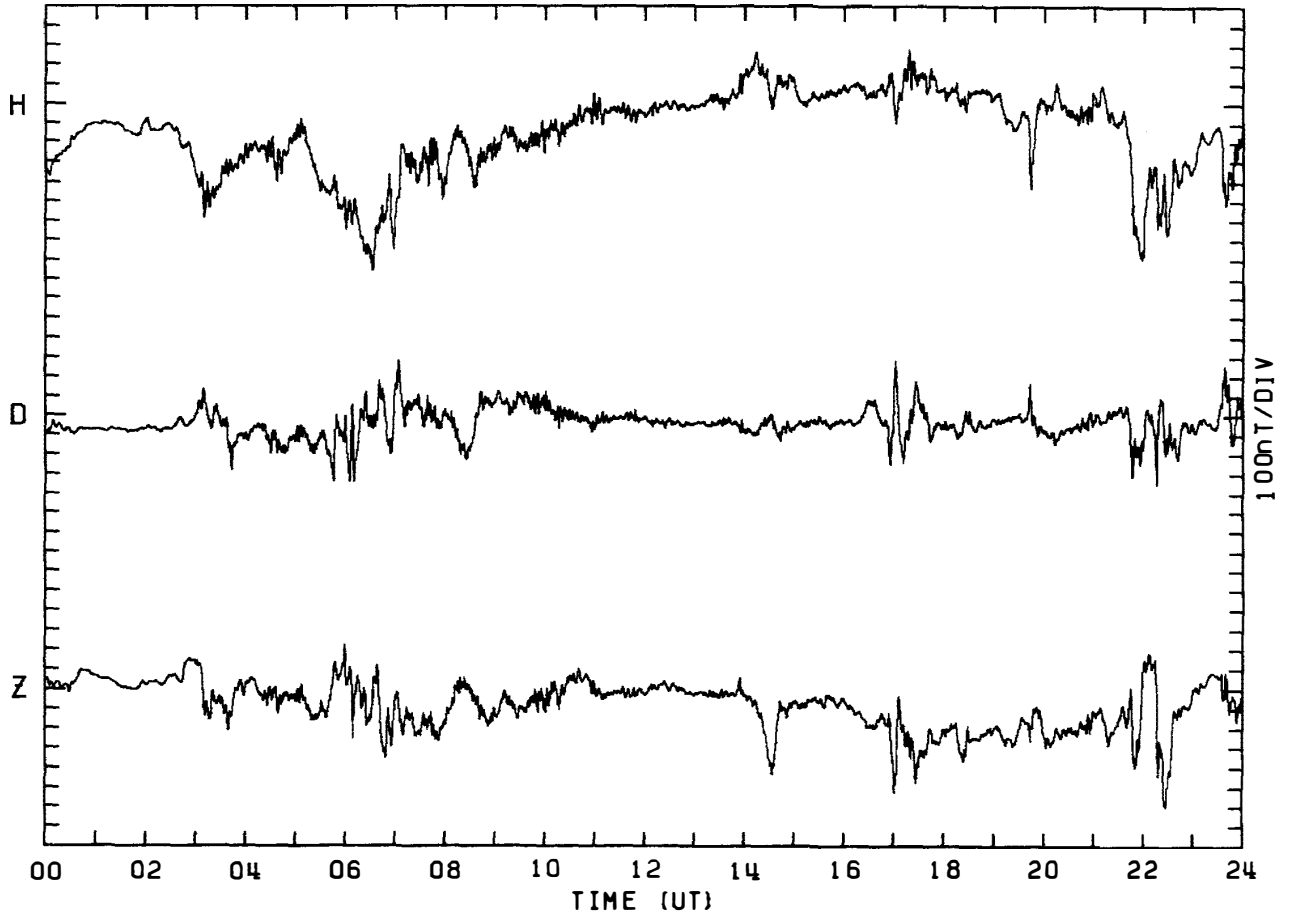
MAGNETOGRAM SYOWA STATION

DAY:146 MAY 26, 1982



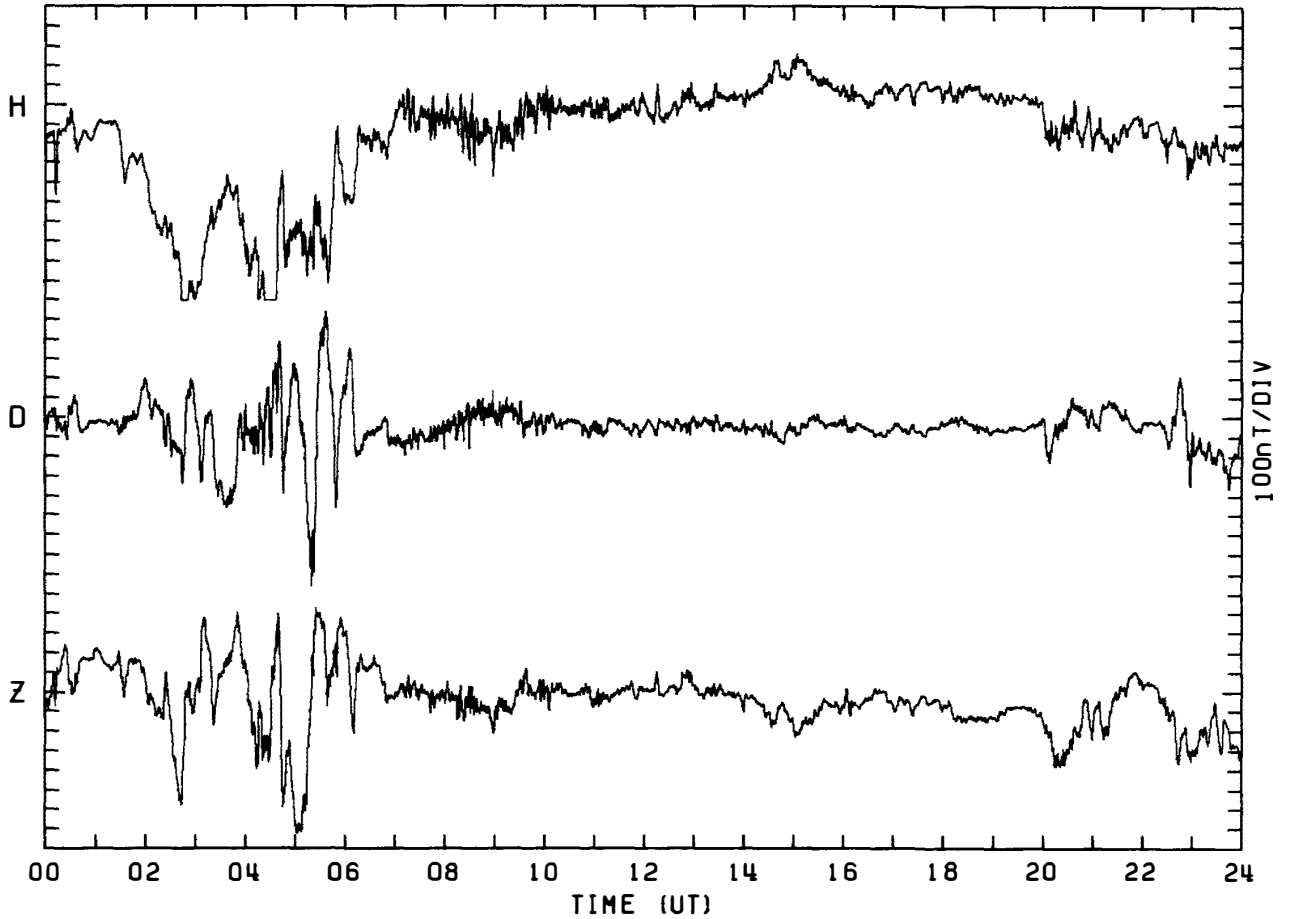
MAGNETOGRAM SYOWA STATION

DAY:147 MAY 27. 1982



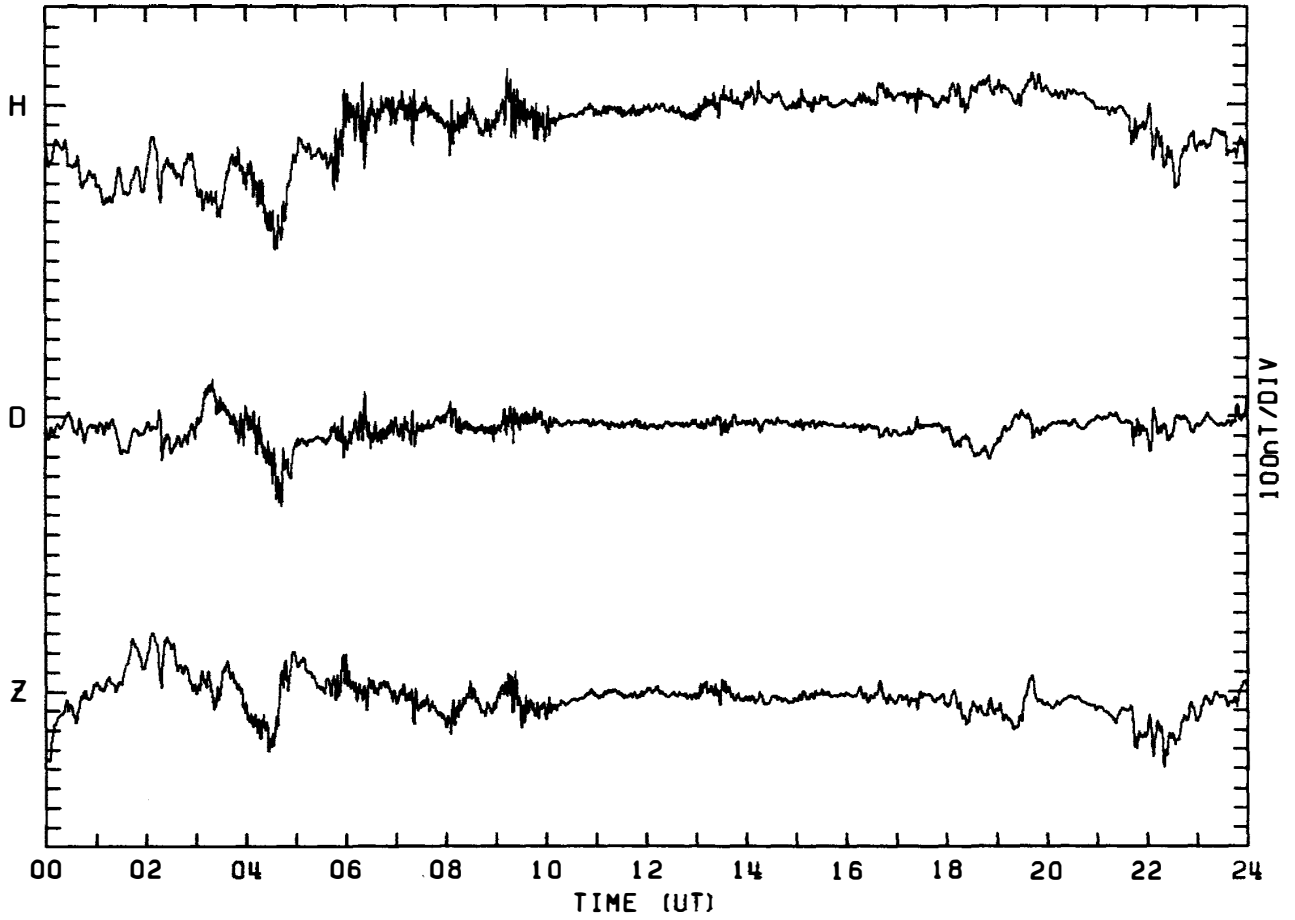
MAGNETOGRAM SYOWA STATION

DAY:148 MAY 28. 1982



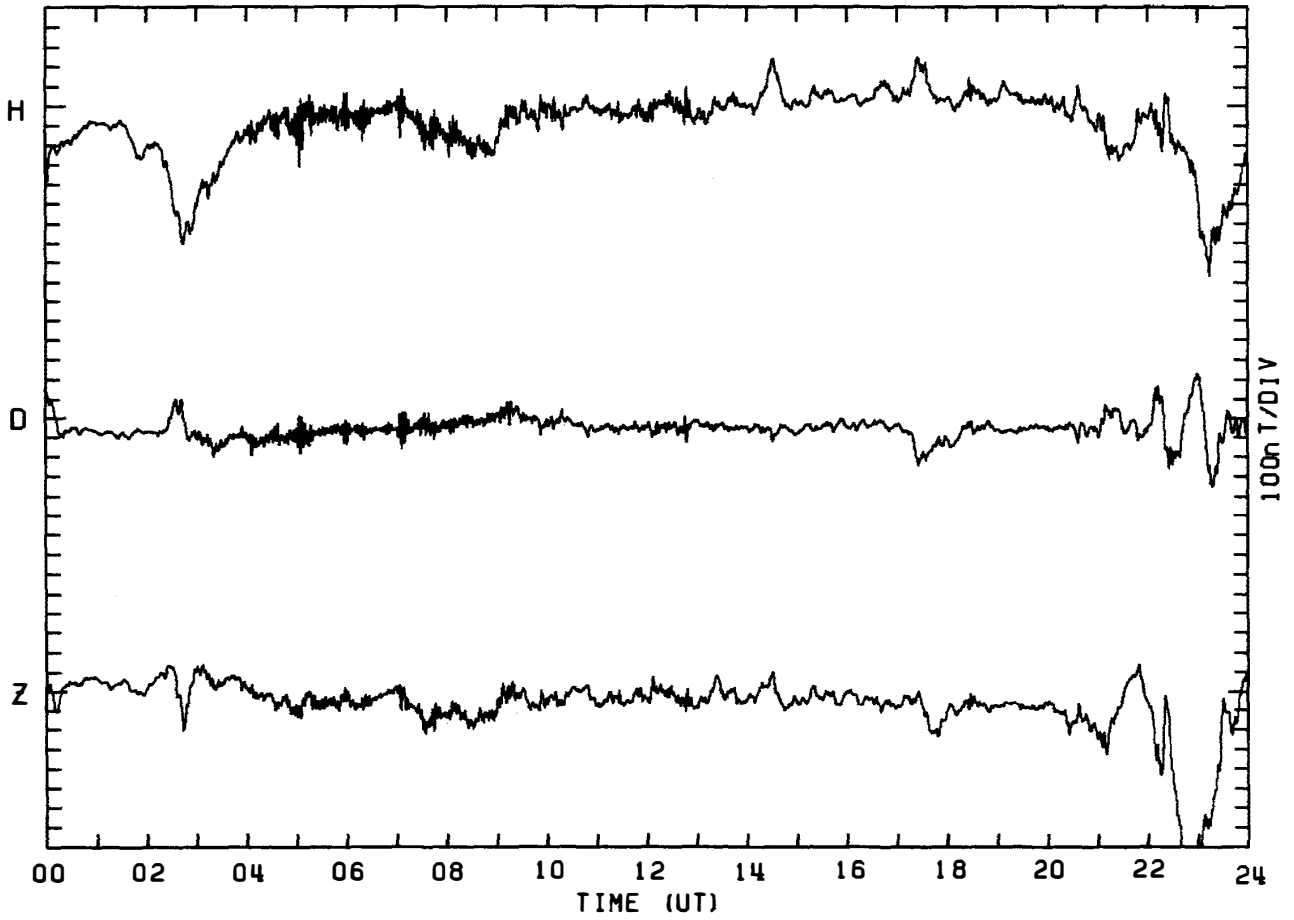
MAGNETOGRAM SYOWA STATION

DAY:149 MAY 29, 1982



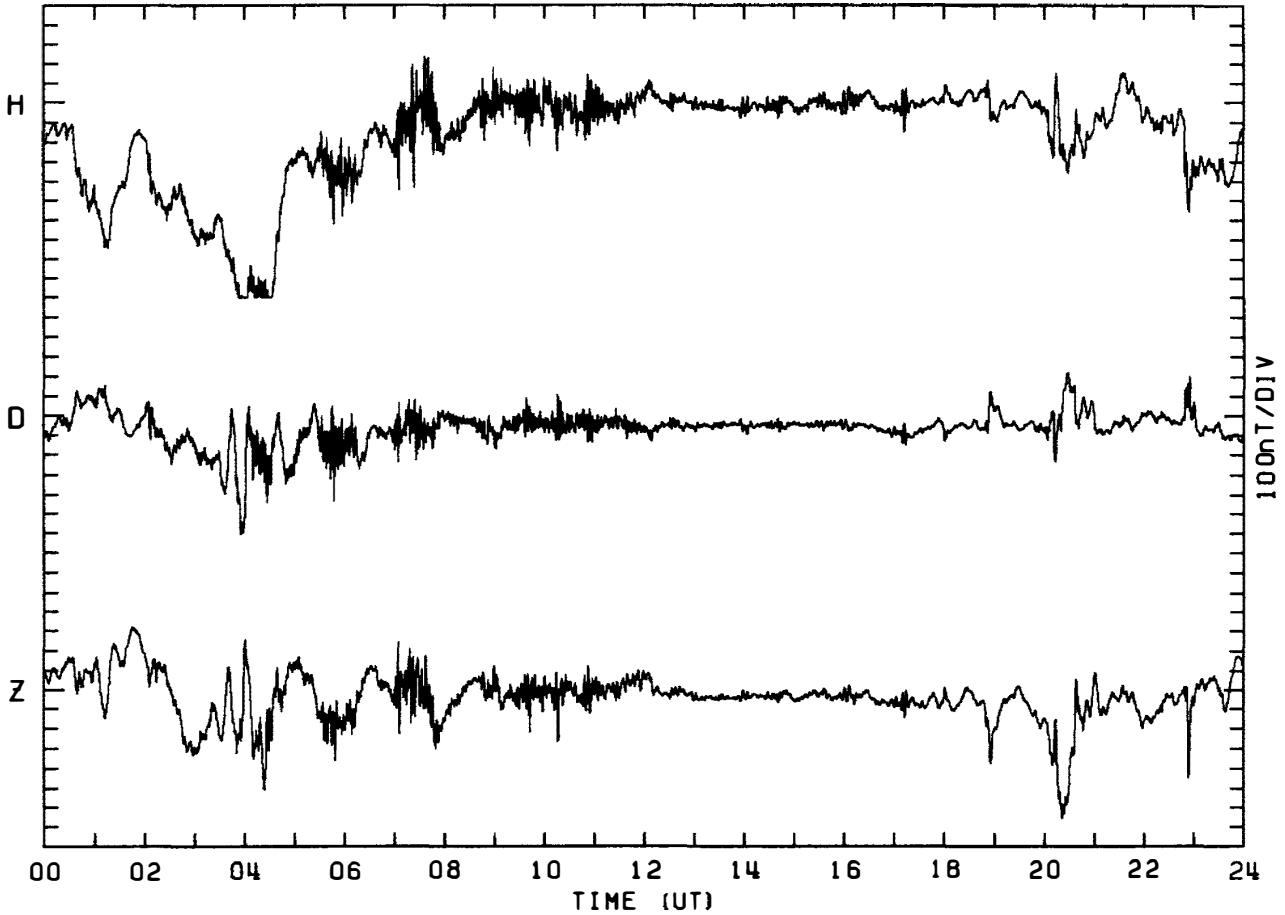
MAGNETOGRAM SYOWA STATION

DAY:150 MAY 30, 1982



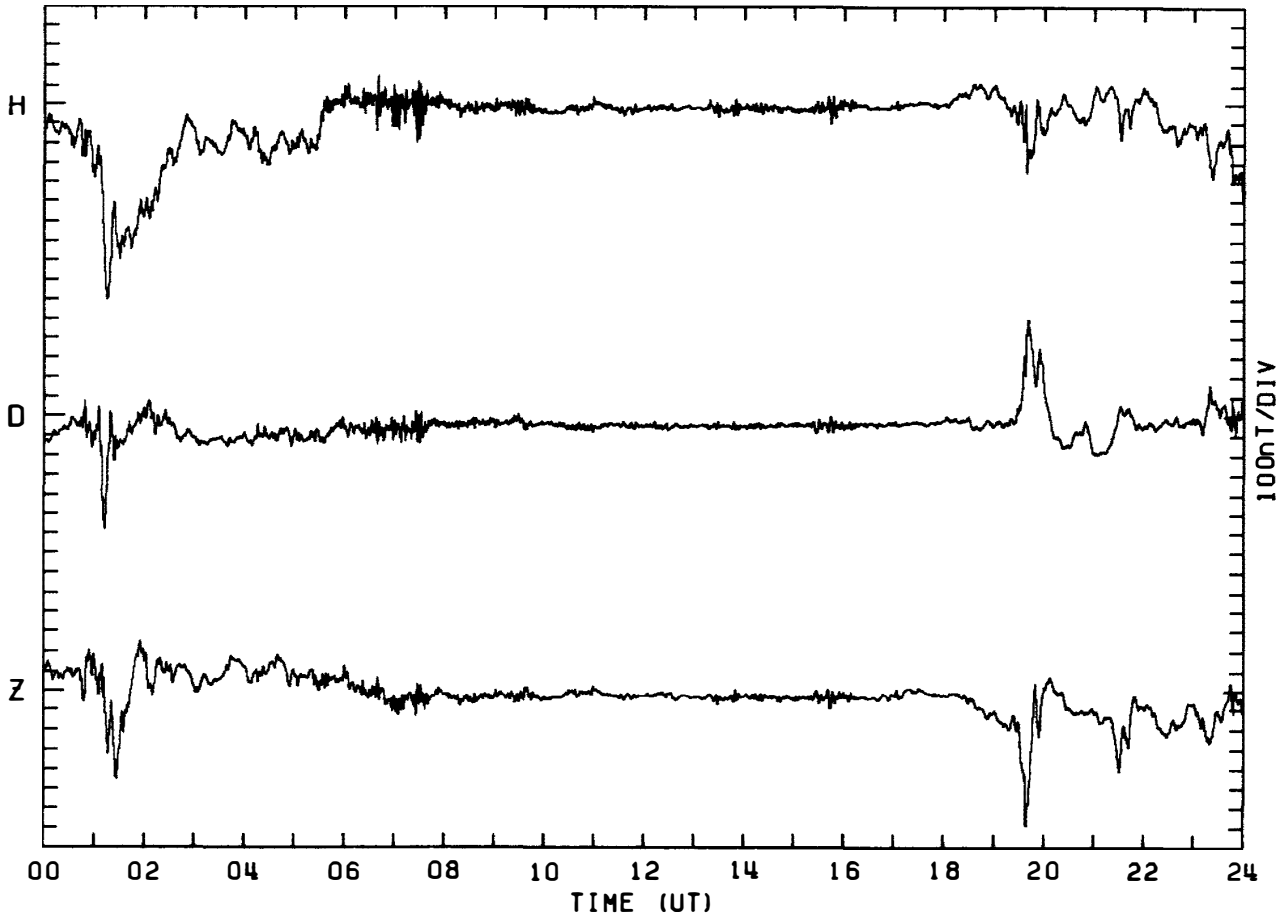
MAGNETOGRAM SYOWA STATION

DAY:151 MAY 31. 1982



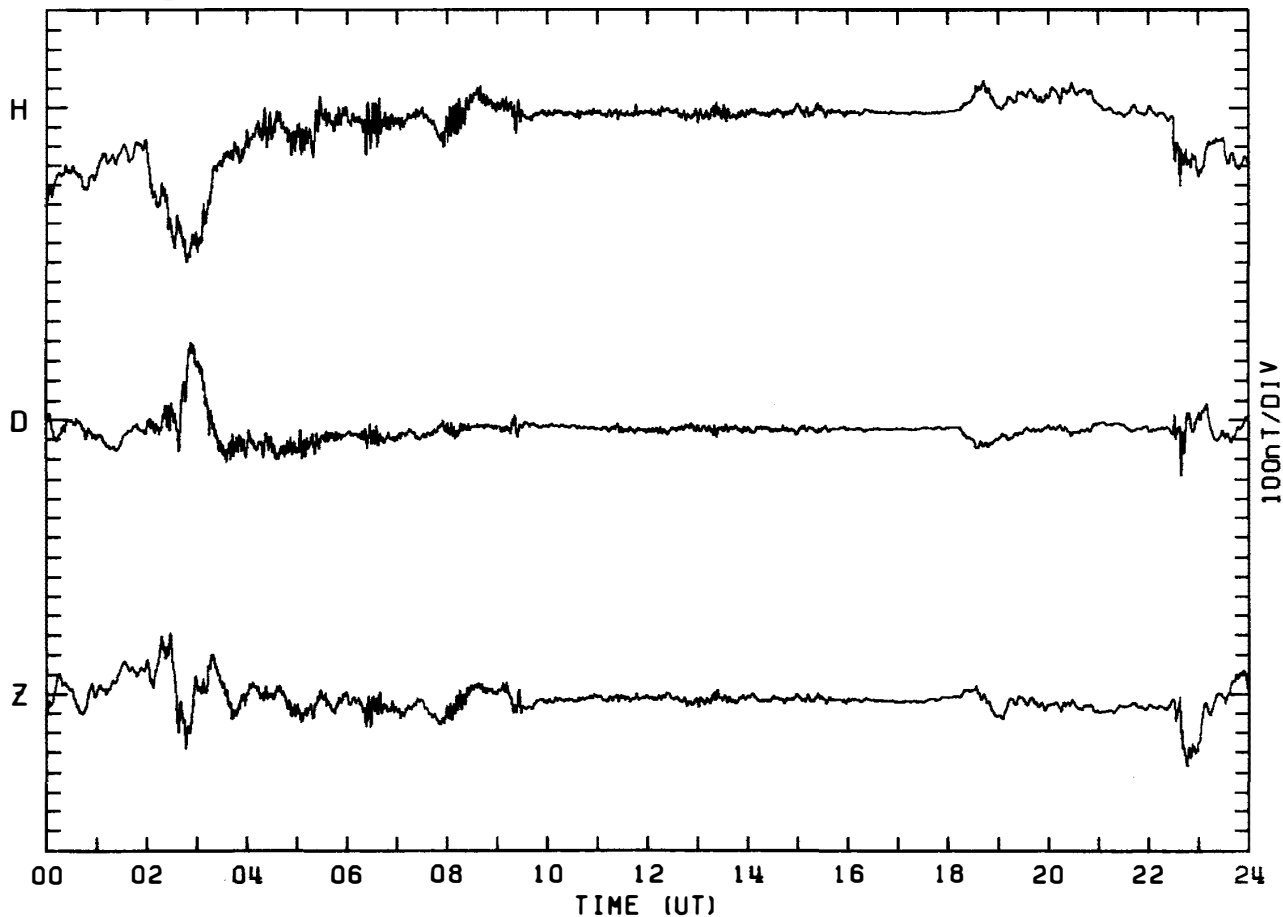
MAGNETOGRAM SYOWA STATION

DAY:152 JUNE 1. 1982



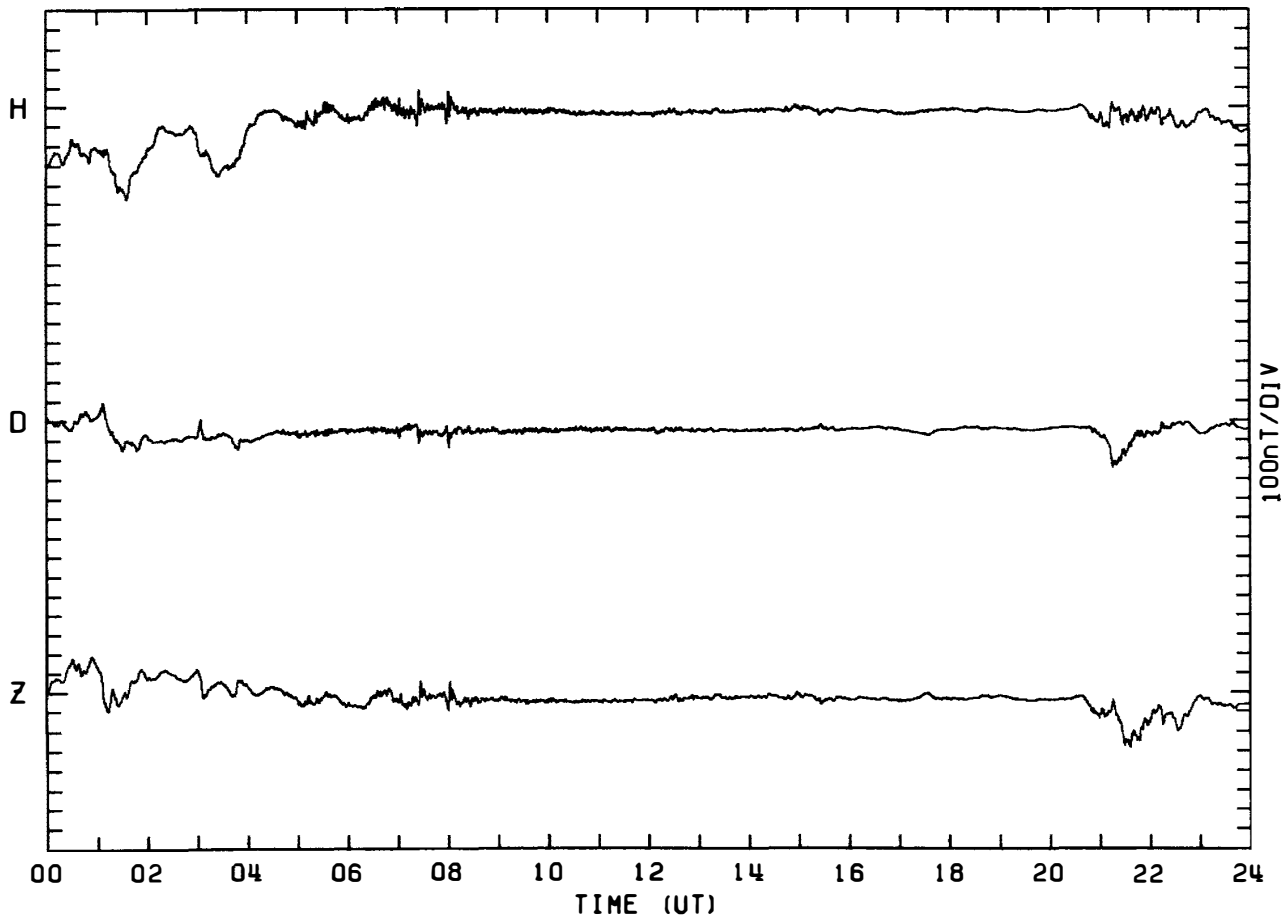
MAGNETOGRAM SYOWA STATION

DAY:153 JUNE 2. 1982



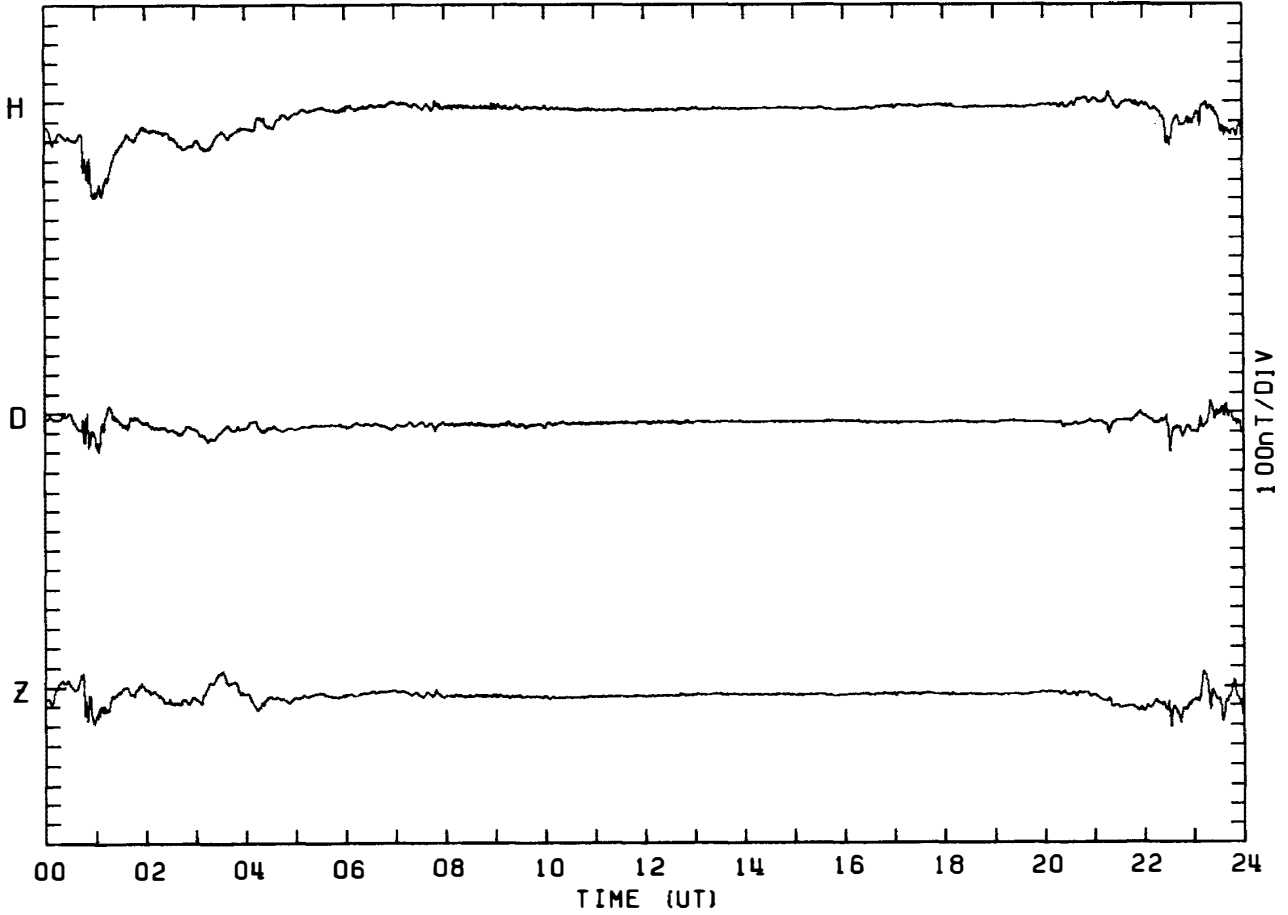
MAGNETOGRAM SYOWA STATION

DAY:154 JUNE 3. 1982



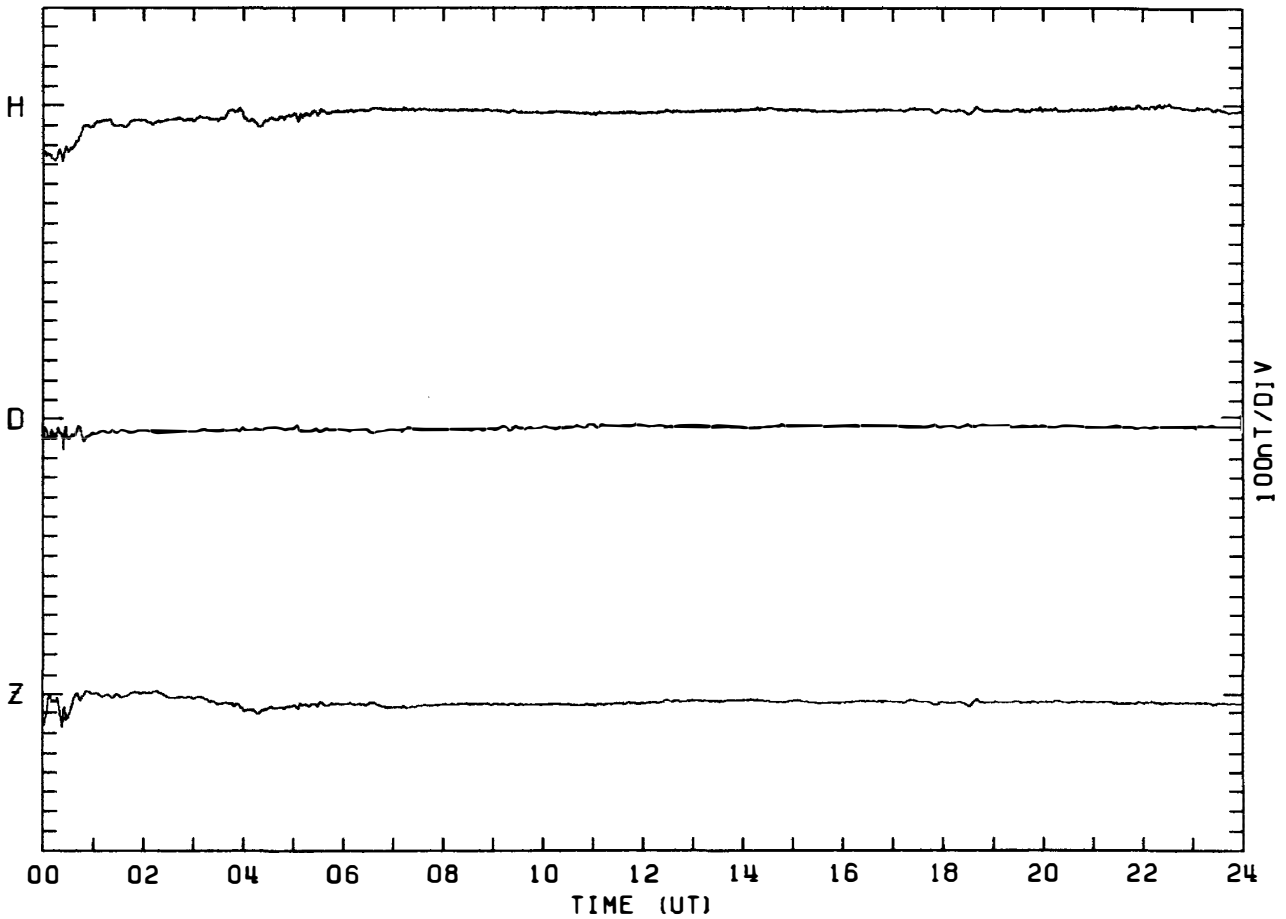
MAGNETOGRAM SYOWA STATION

DAY:155 JUNE 4, 1982



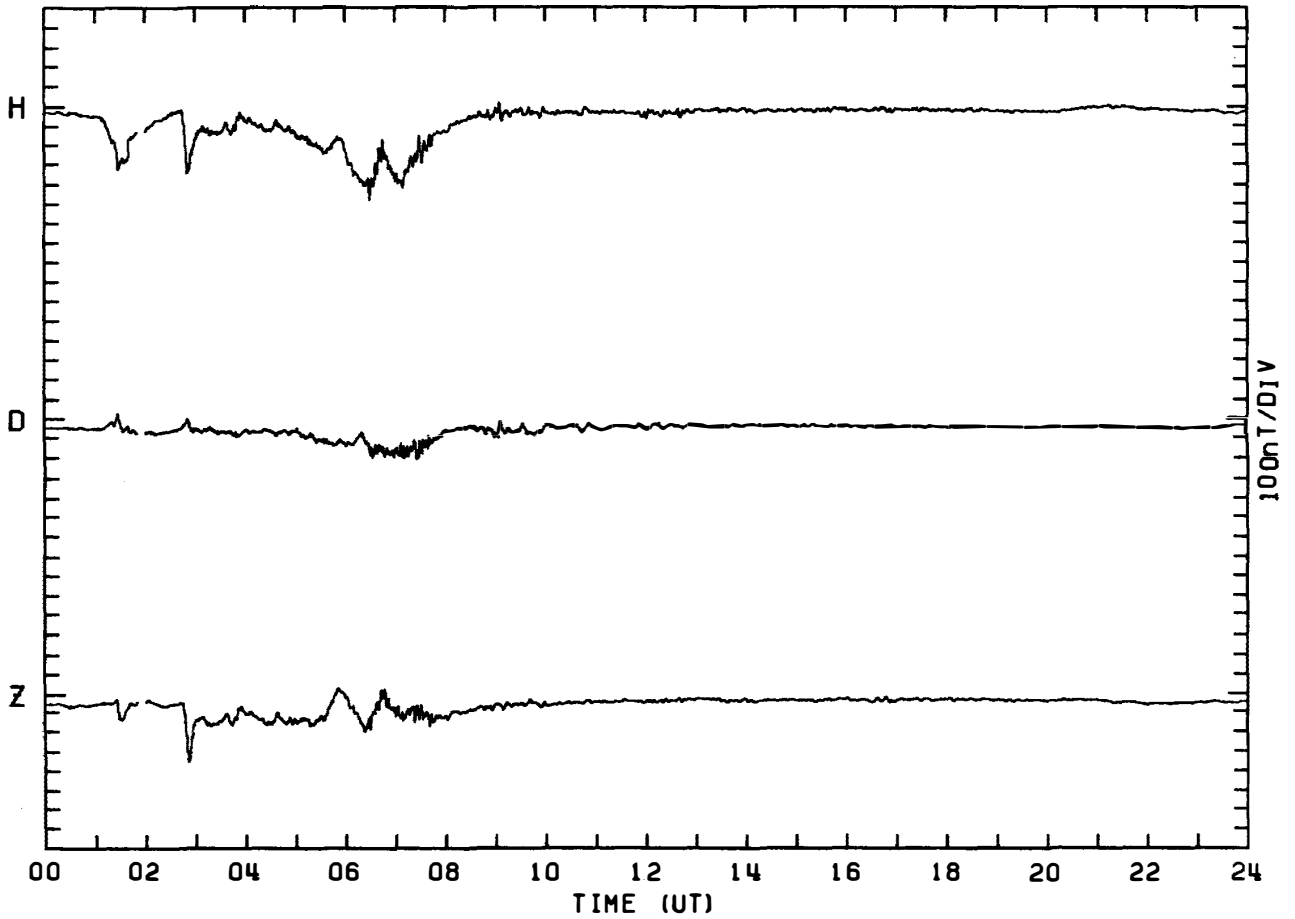
MAGNETOGRAM SYOWA STATION

DAY:156 JUNE 5, 1982



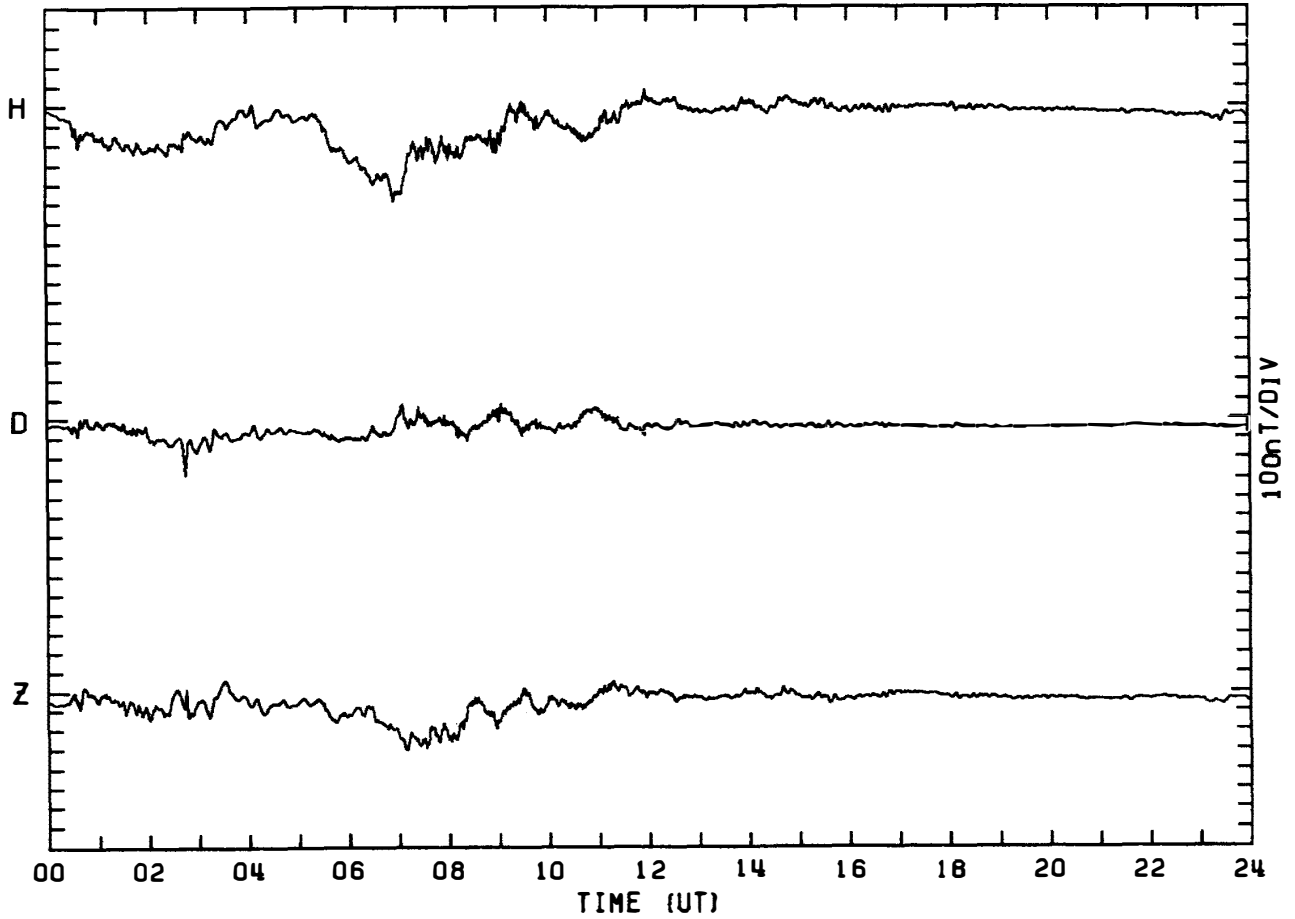
MAGNETOGRAM SYOWA STATION

DAY:157 JUNE 6. 1982



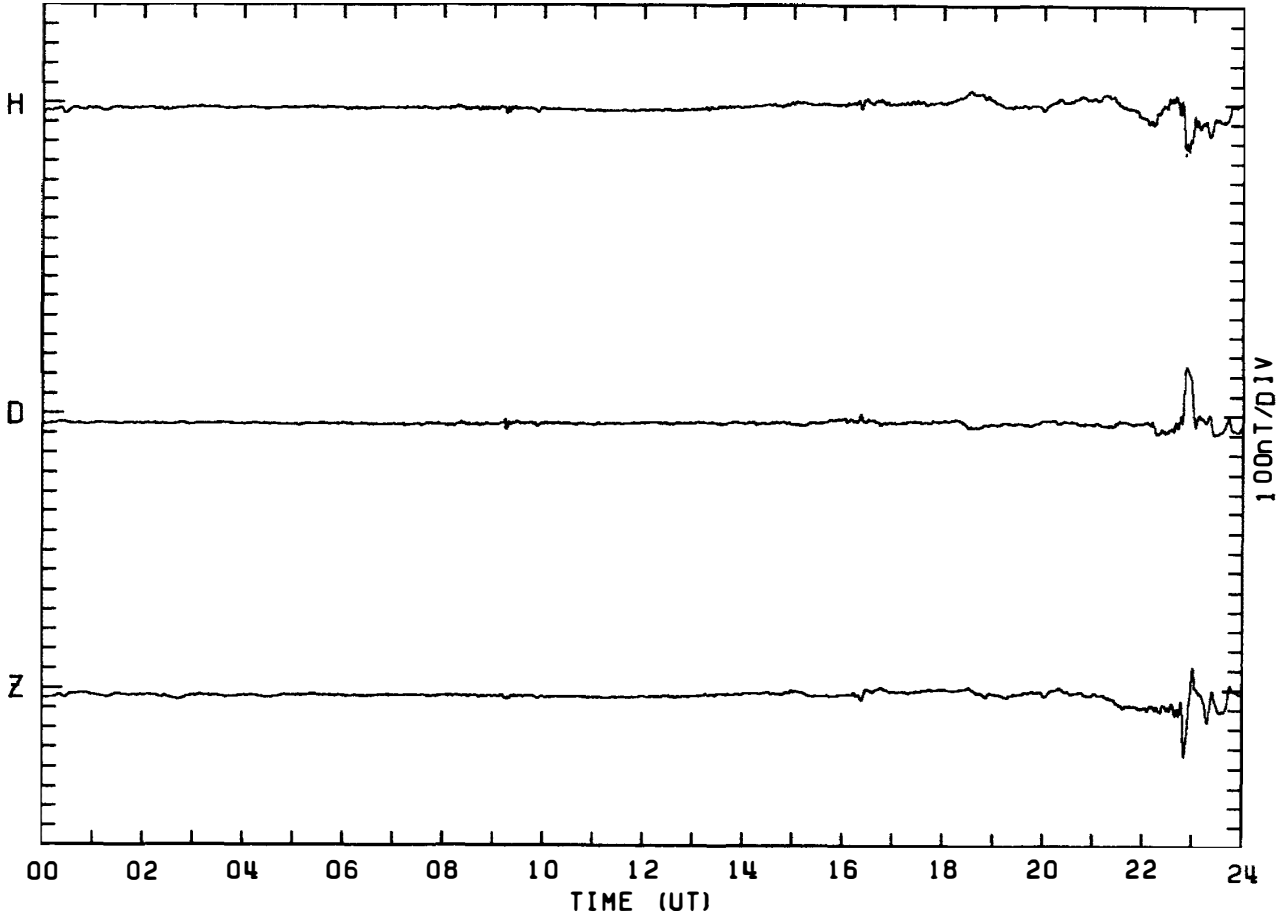
MAGNETOGRAM SYOWA STATION

DAY:158 JUNE 7. 1982



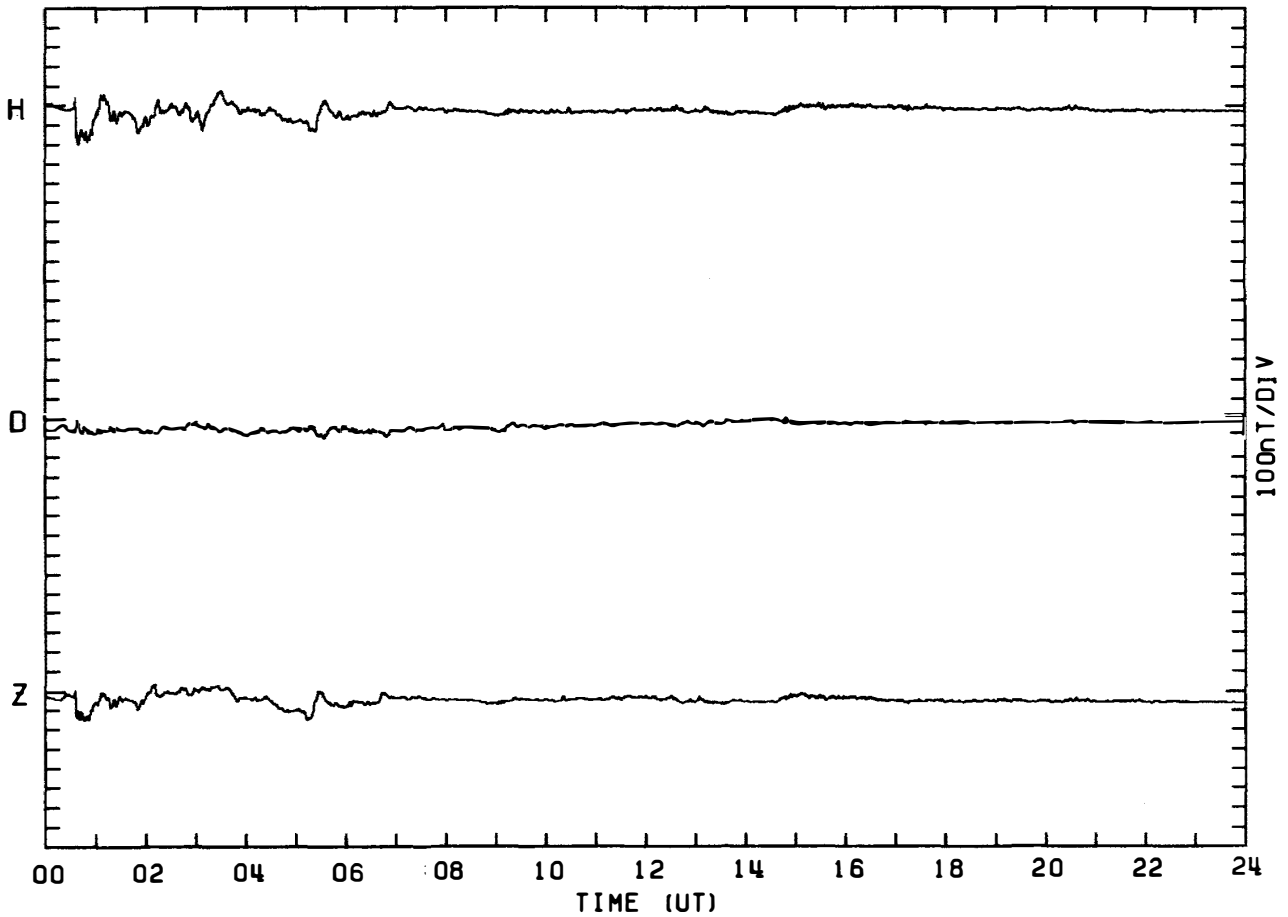
MAGNETOGRAM SYOWA STATION

DAY:159 JUNE 8, 1982



MAGNETOGRAM SYOWA STATION

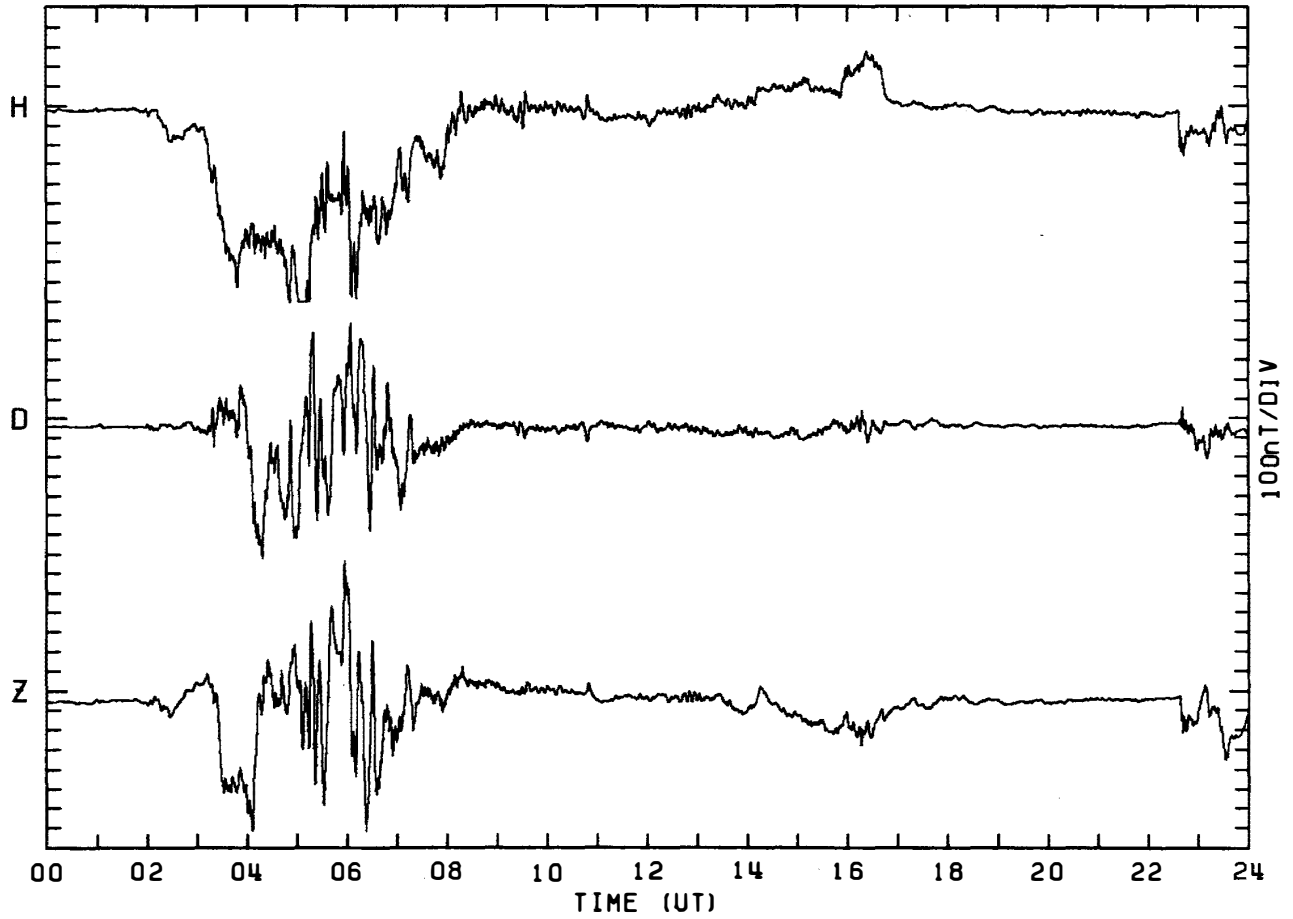
DAY:160 JUNE 9, 1982





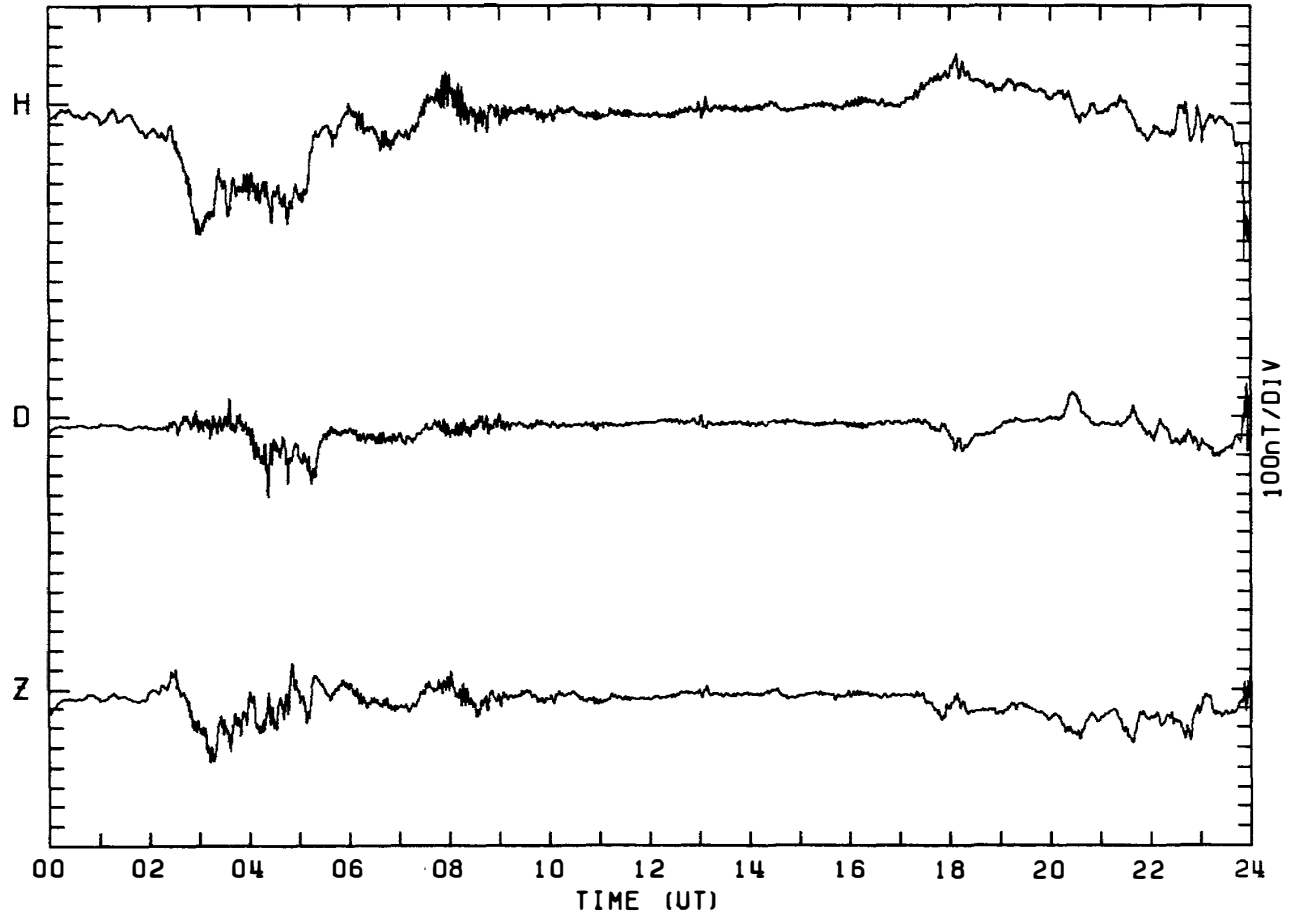
MAGNETOGRAM SYOWA STATION

DAY: 161 JUNE 10, 1982



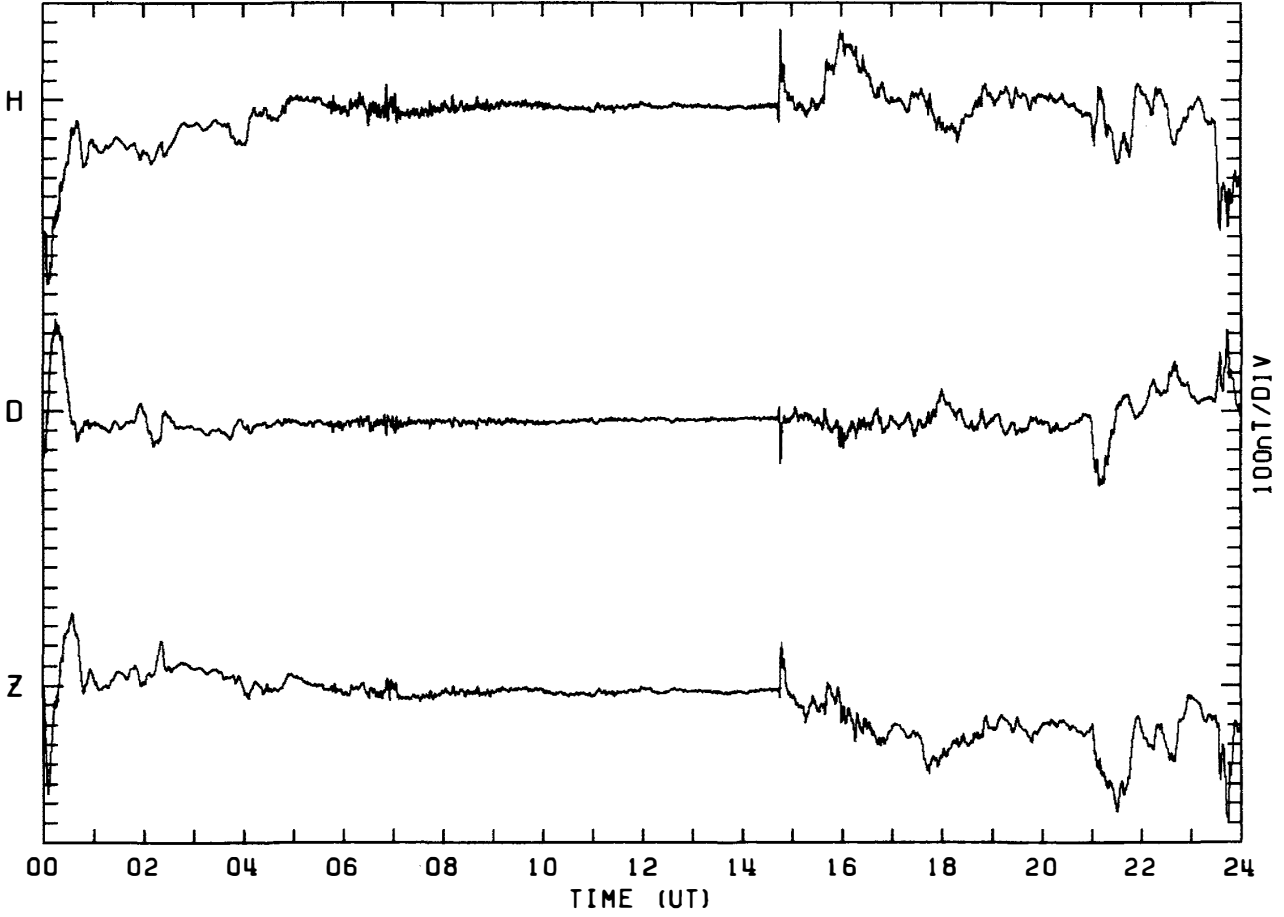
MAGNETOGRAM SYOWA STATION

DAY: 162 JUNE 11, 1982



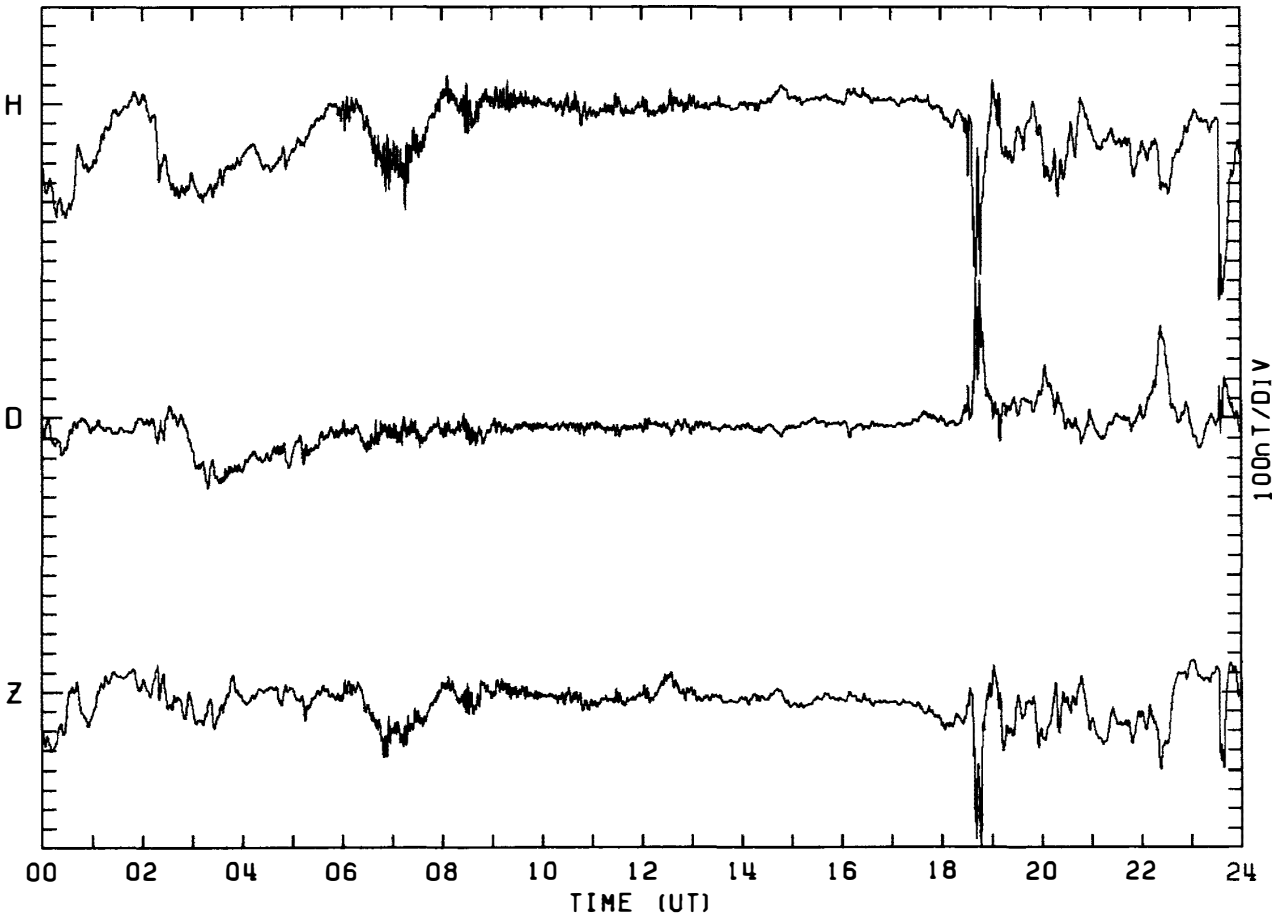
MAGNETOGRAM SYOWA STATION

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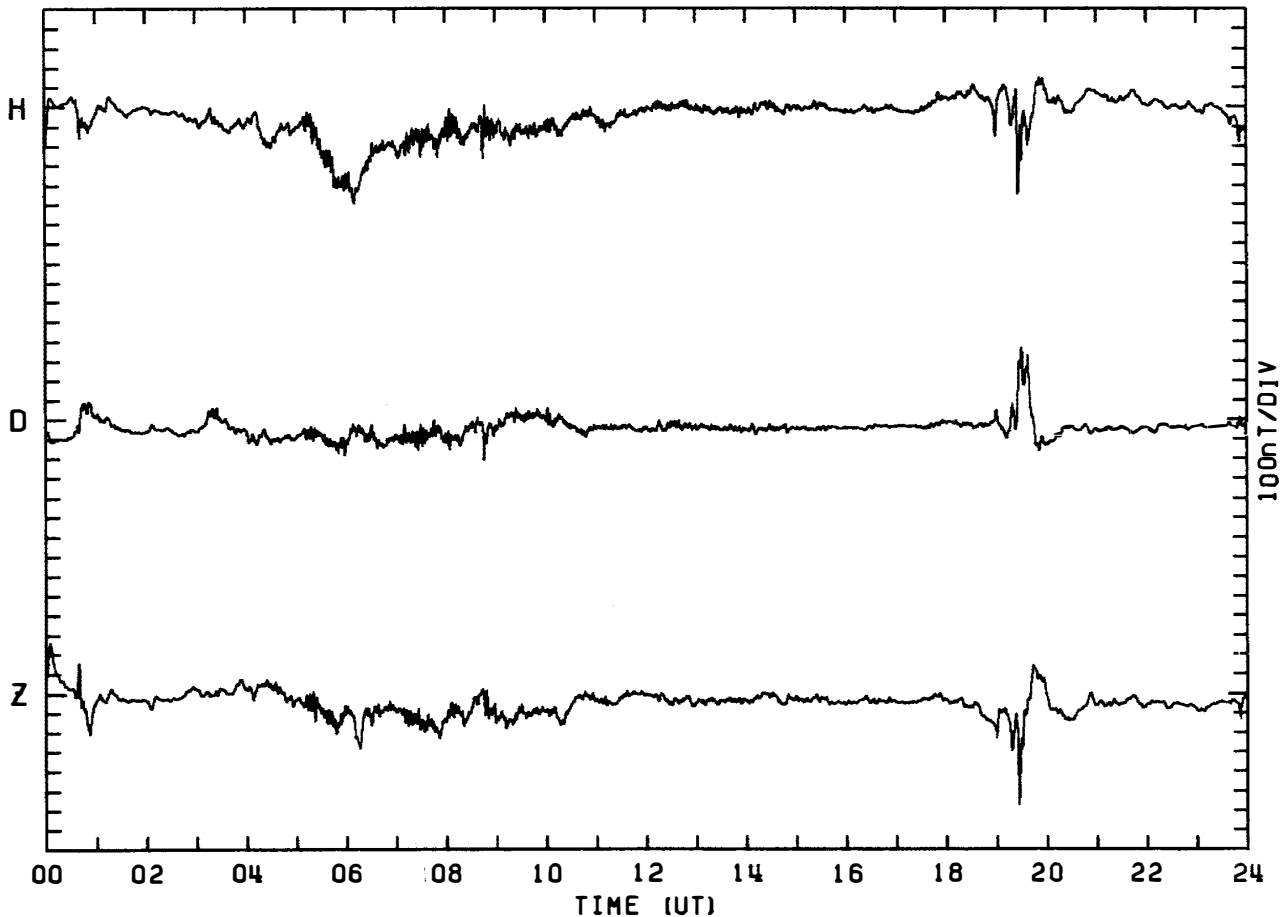
MAGNETOGRAM SYOWA STATION

DAY:164 JUNE 13. 1982



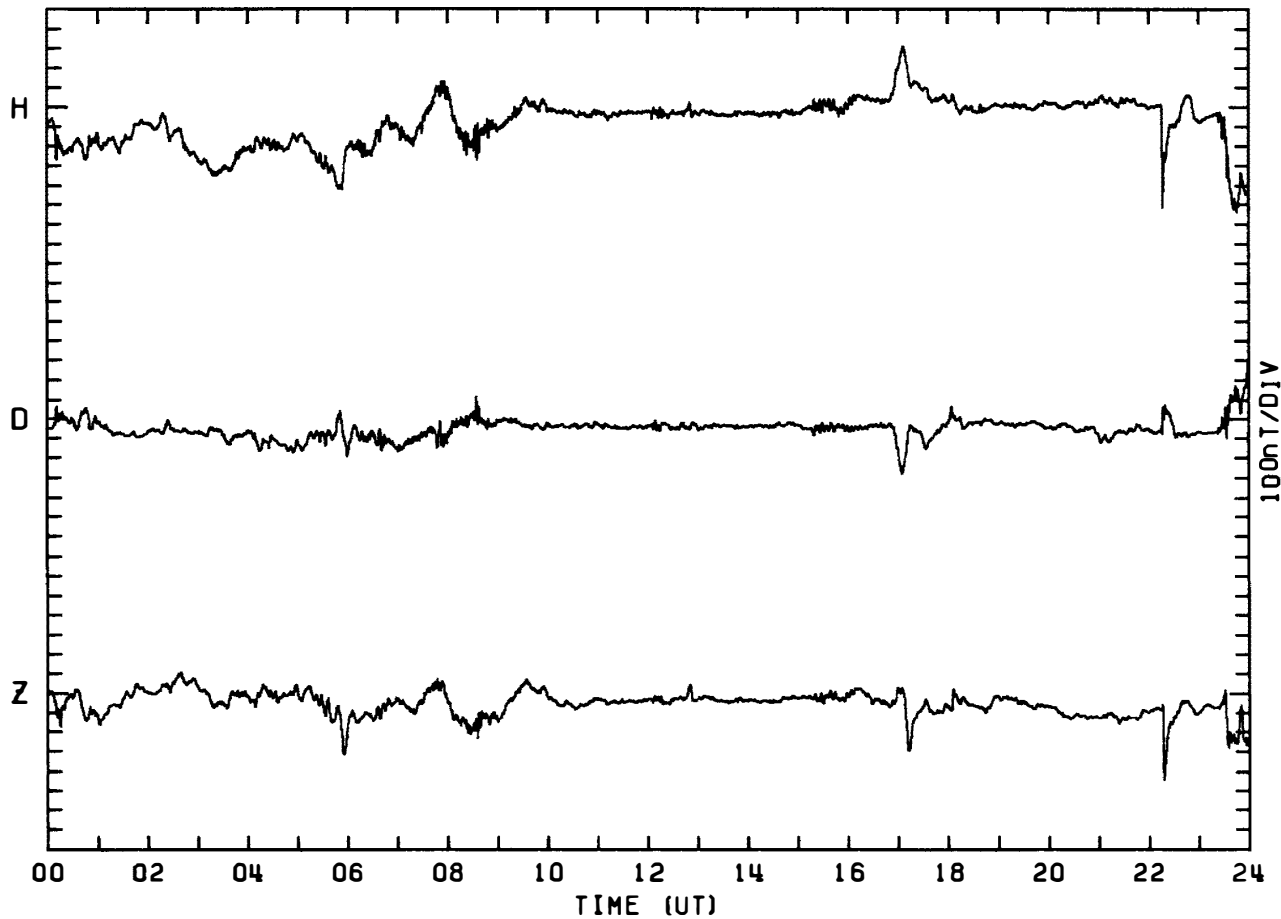
MAGNETOGRAM SYOWA STATION

DAY:165 JUNE 14. 1982



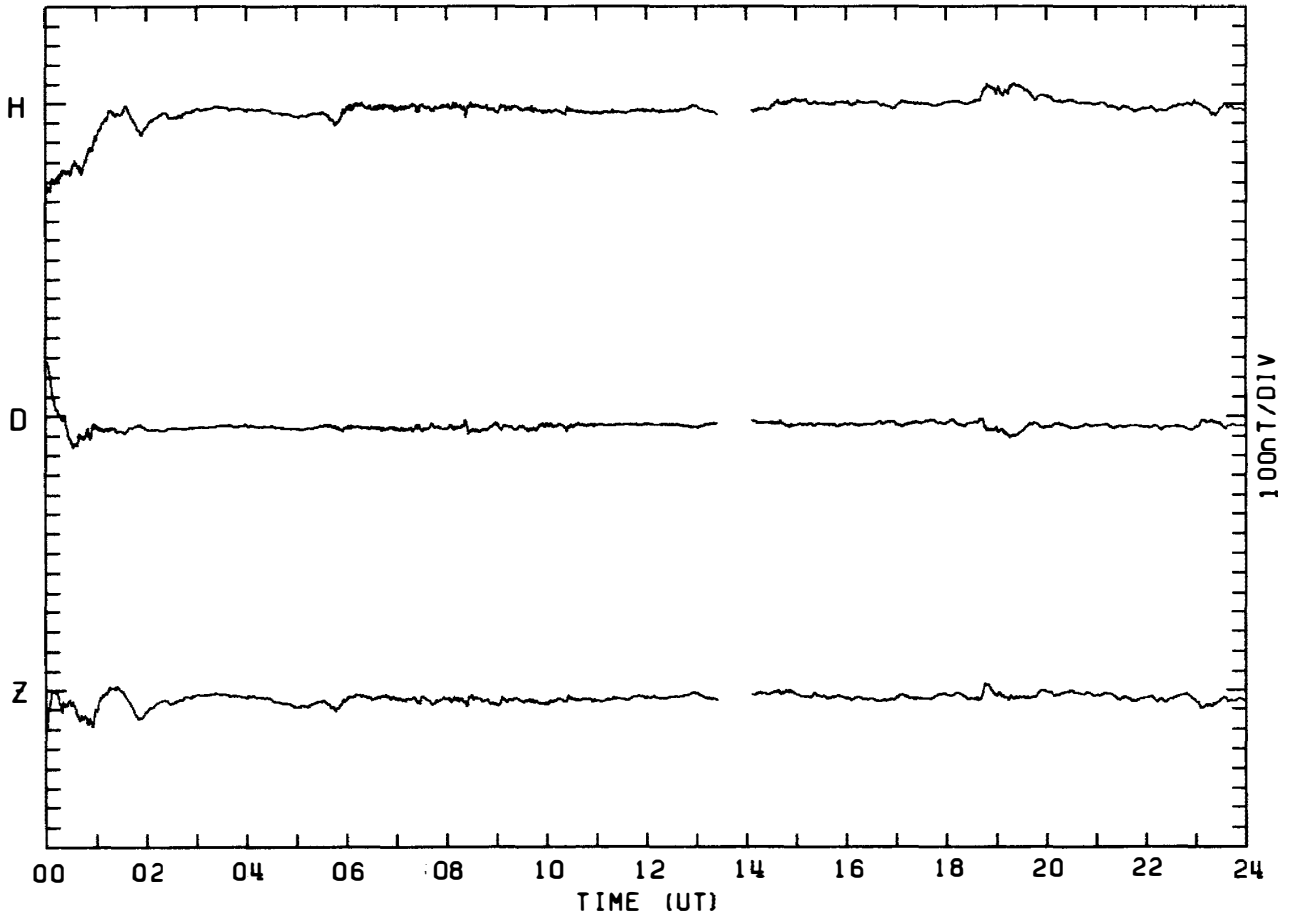
MAGNETOGRAM SYOWA STATION

DAY:166 JUNE 15. 1982



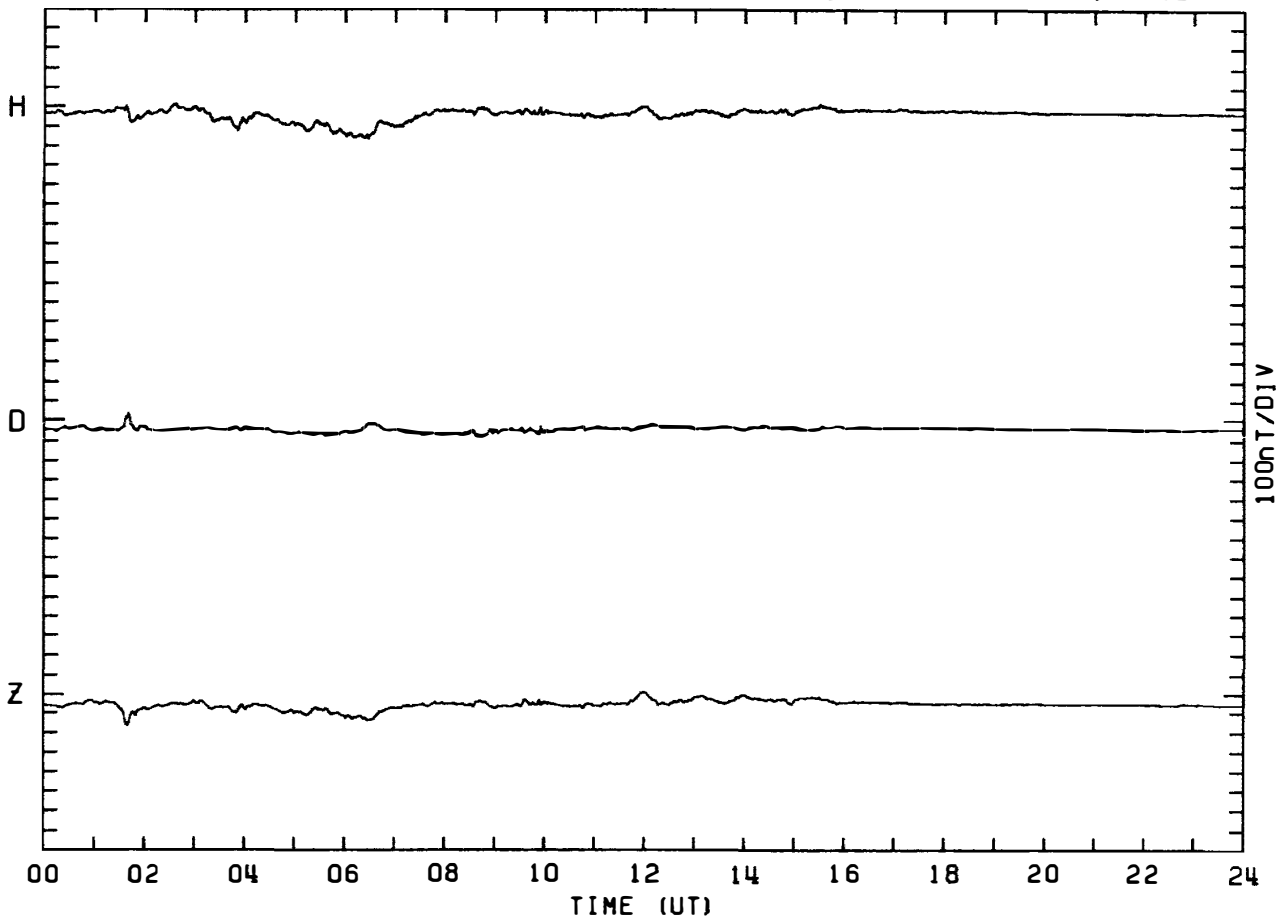
MAGNETOGRAM SYOWA STATION

DAY:167 JUNE 16, 1982



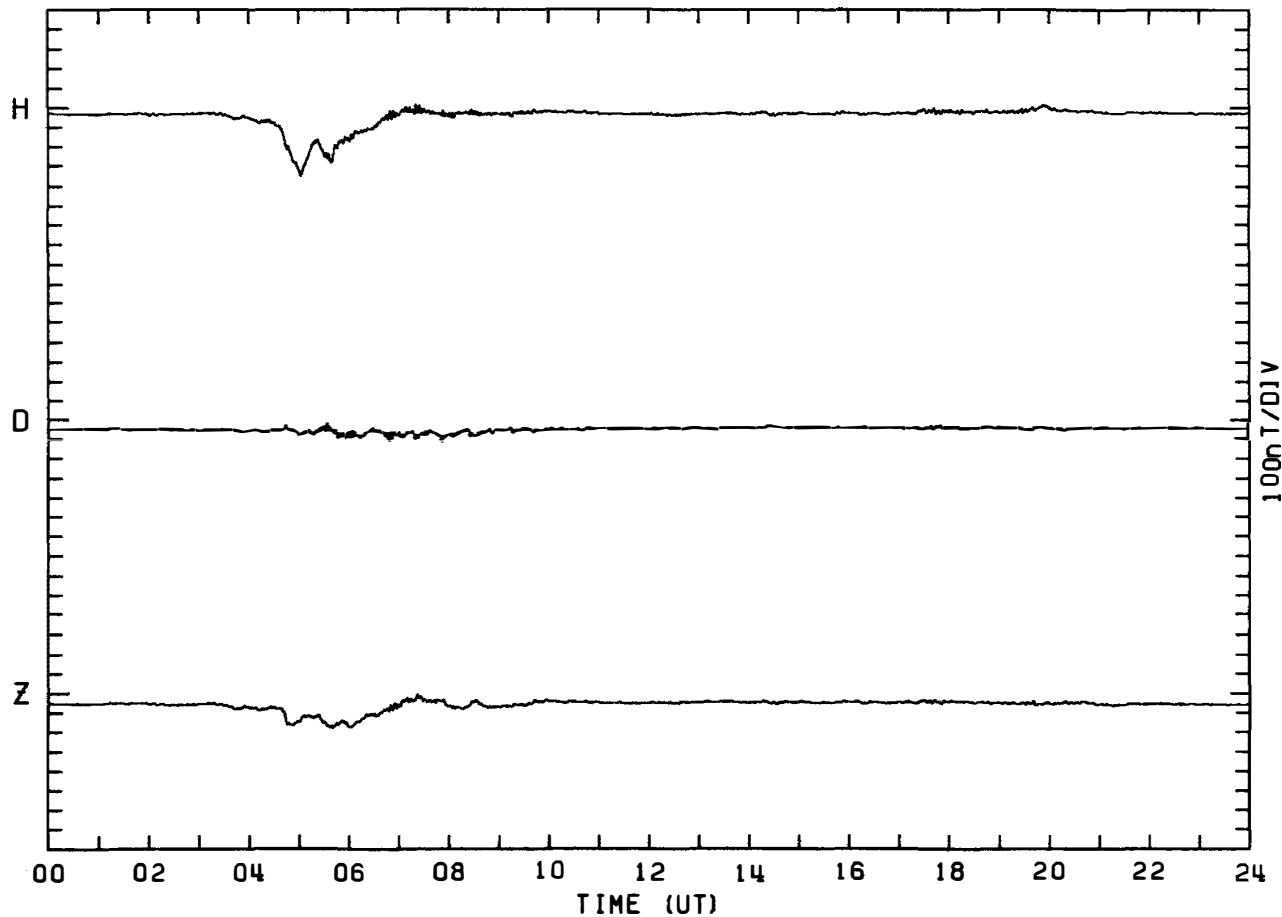
MAGNETOGRAM SYOWA STATION

DAY:168 JUNE 17, 1982



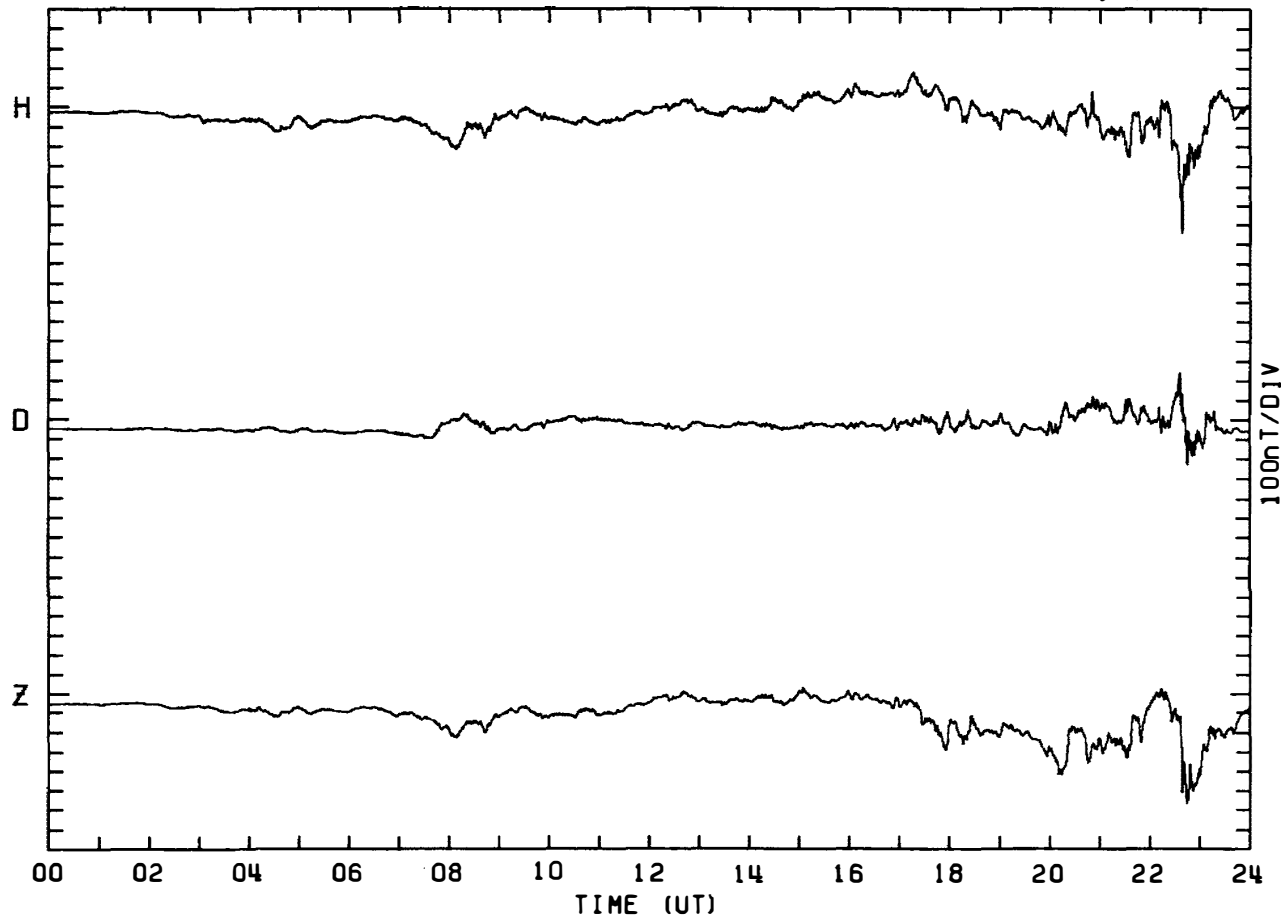
MAGNETOGRAM SYOWA STATION

DAY:169 JUNE 18. 1982



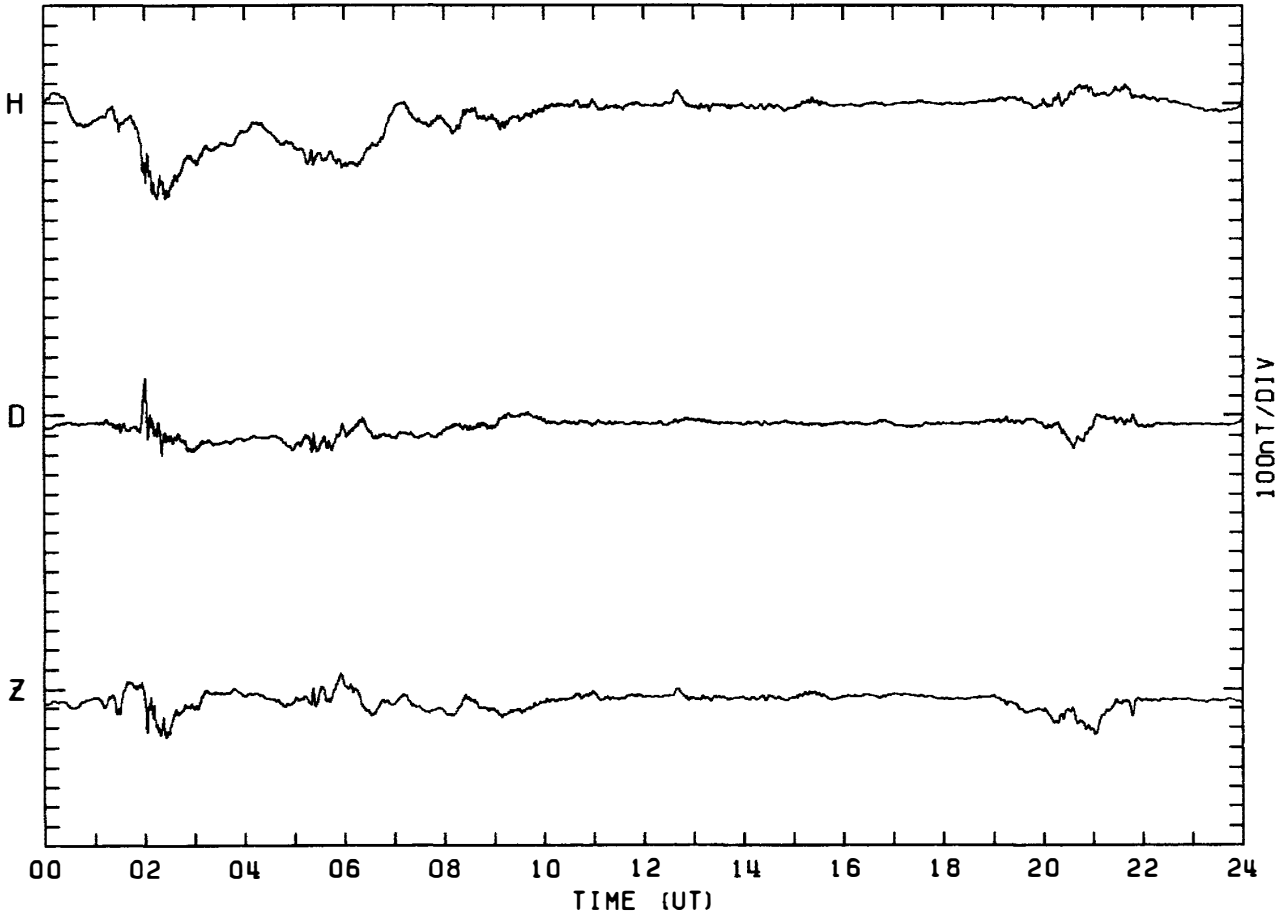
MAGNETOGRAM SYOWA STATION

DAY:170 JUNE 19. 1982



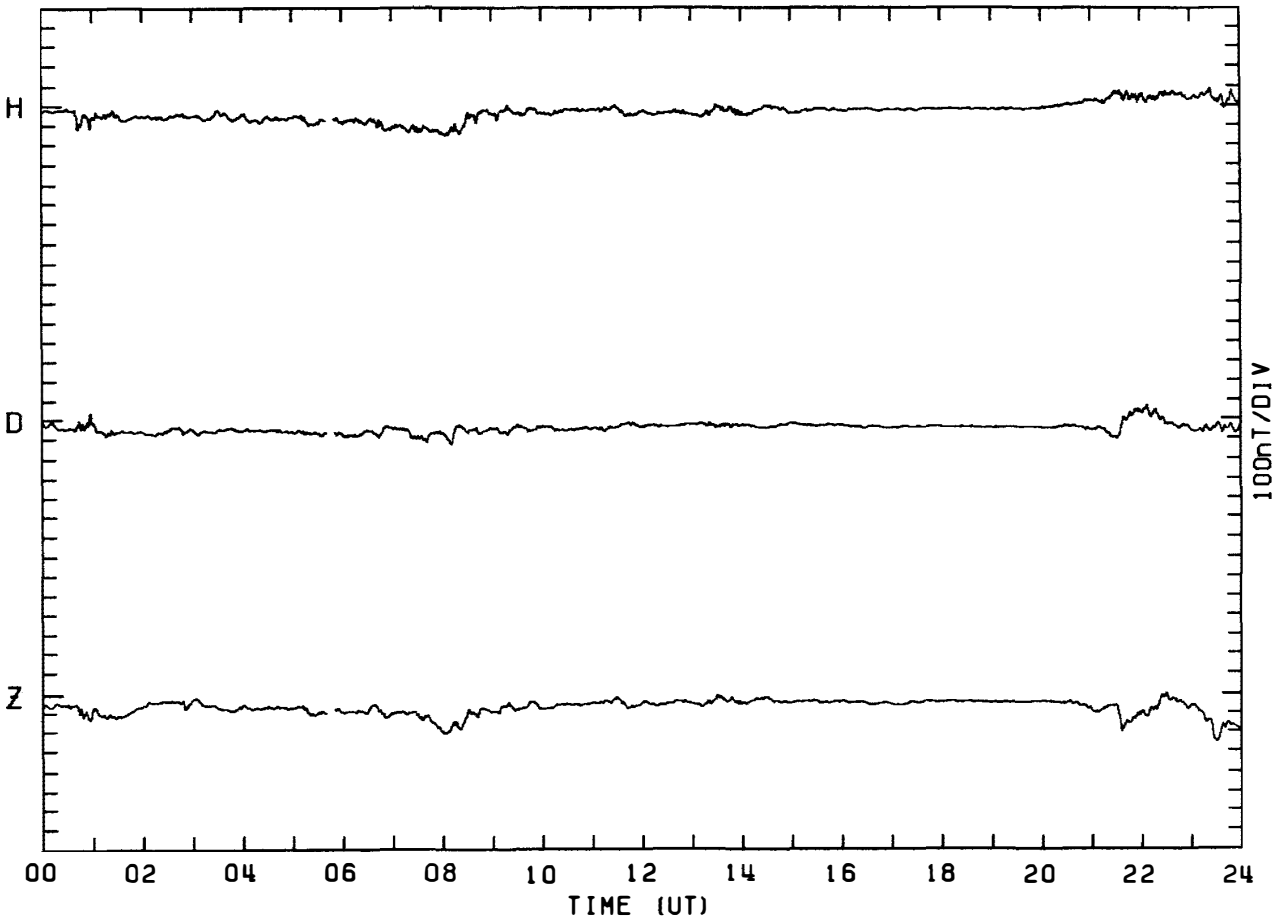
MAGNETOGRAM SYOWA STATION

DAY:171 JUNE 20, 1982



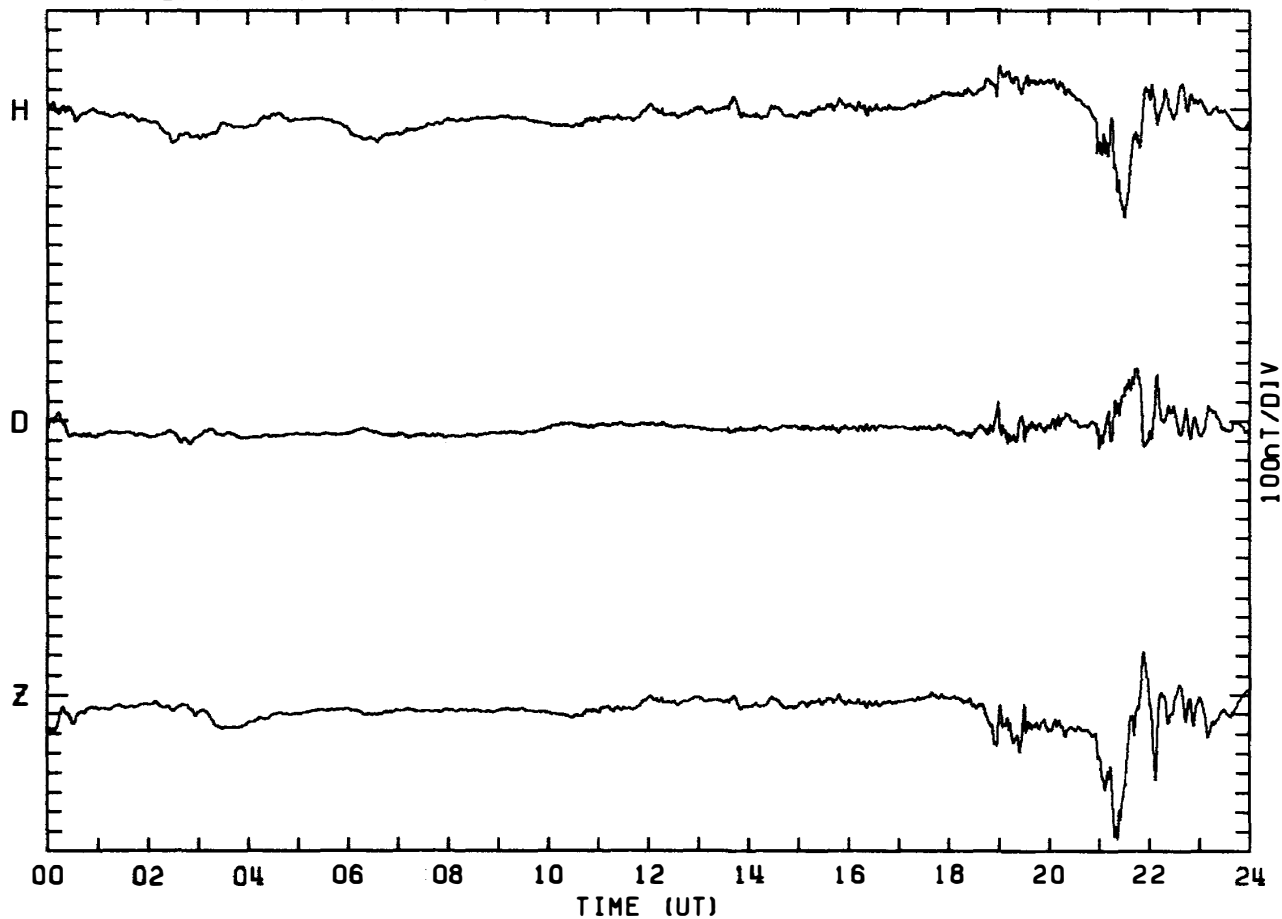
MAGNETOGRAM SYOWA STATION

DAY:172 JUNE 21, 1982



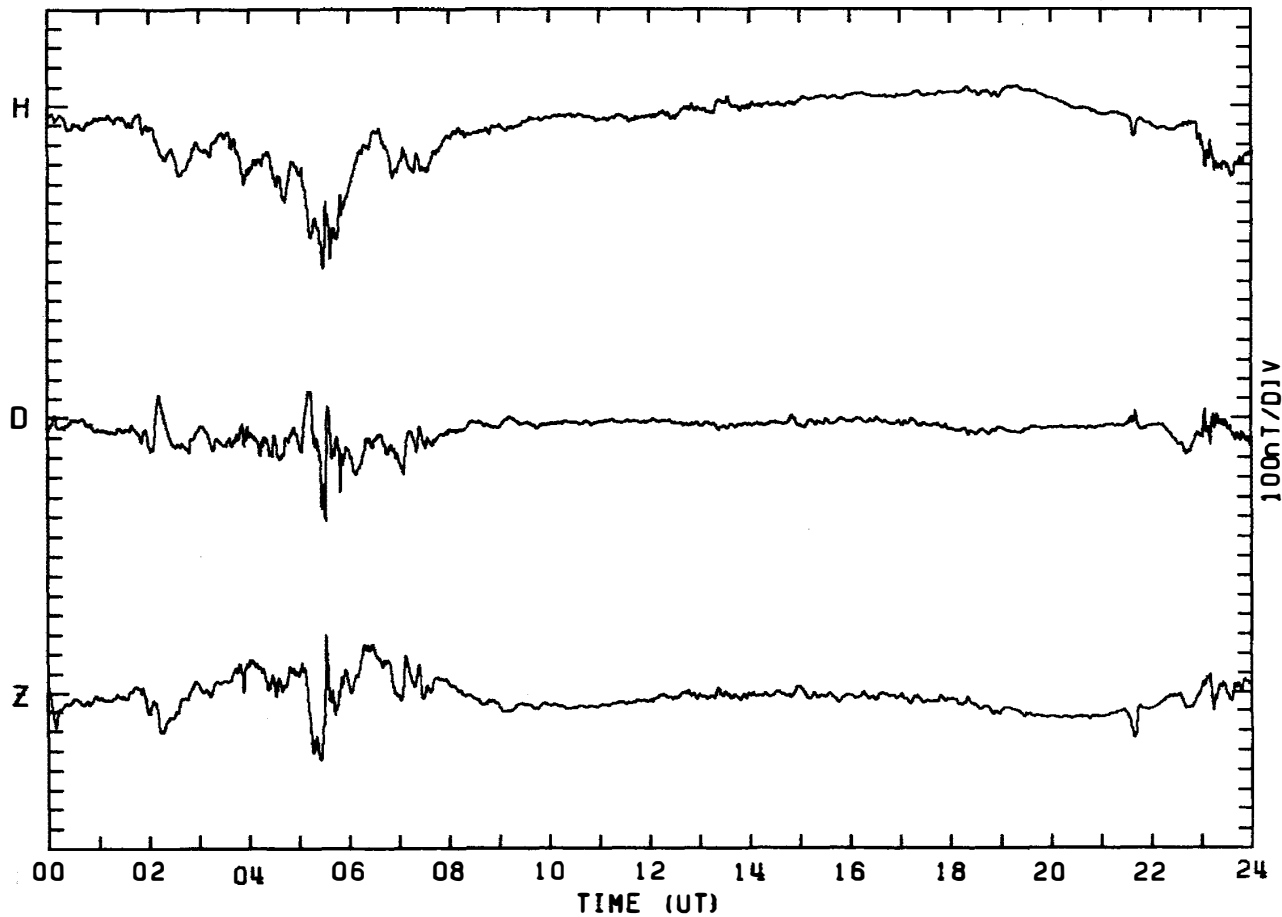
MAGNETOGRAM SYOWA STATION

DAY:173 JUNE 22, 1982



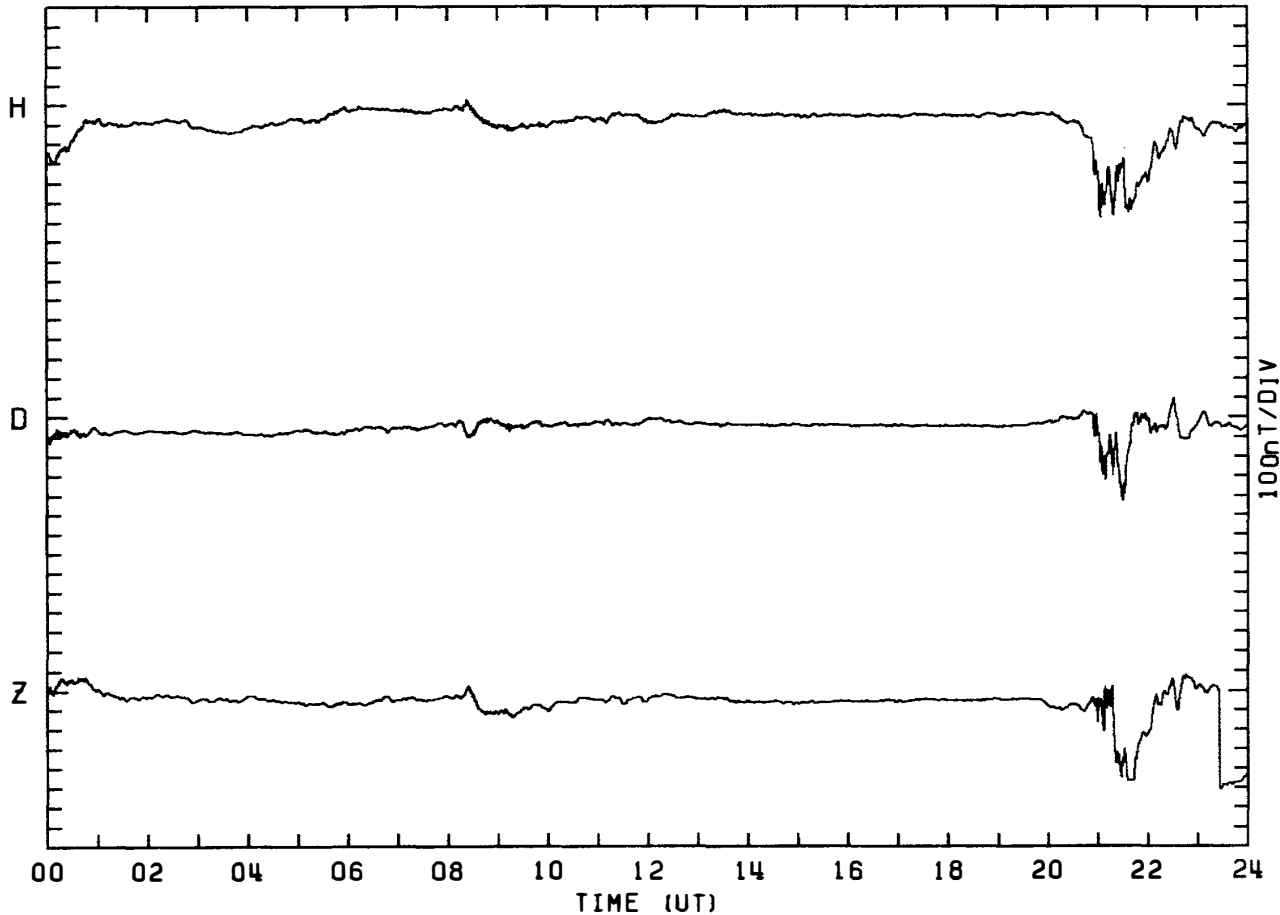
MAGNETOGRAM SYOWA STATION

DAY:174 JUNE 23, 1982



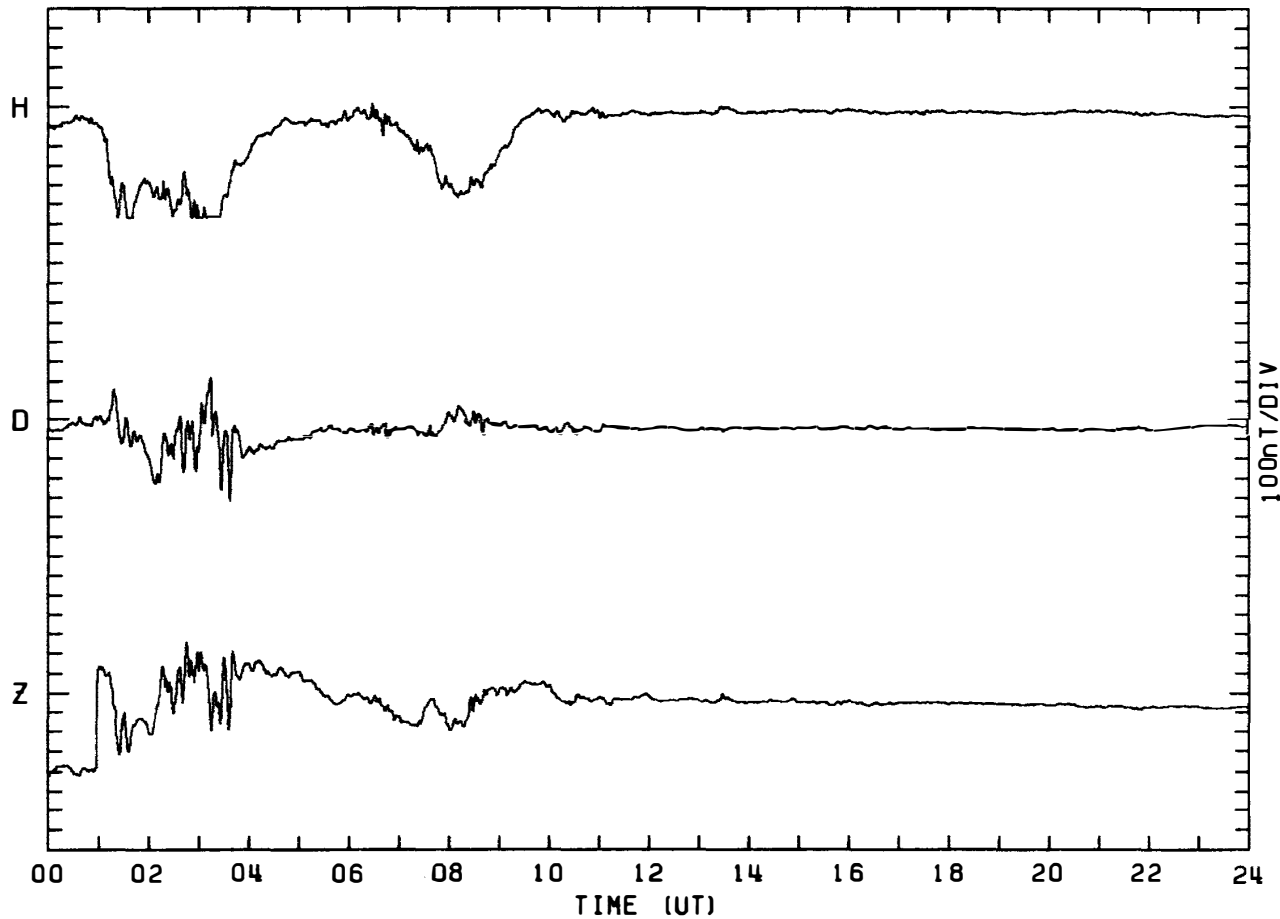
MAGNETOGRAM SYOWA STATION

DAY:175 JUNE 24. 1982



MAGNETOGRAM SYOWA STATION

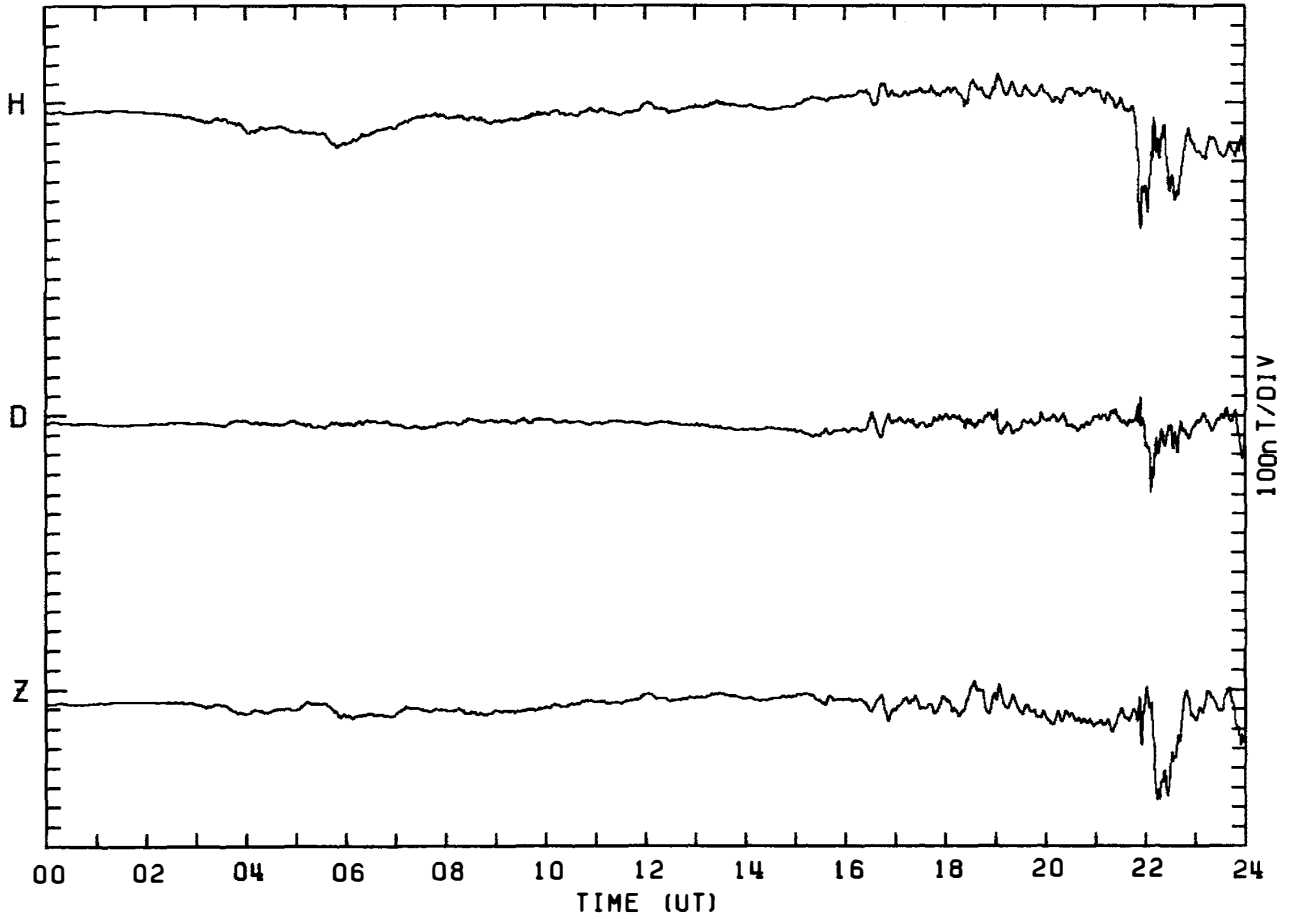
DAY:176 JUNE 25. 1982





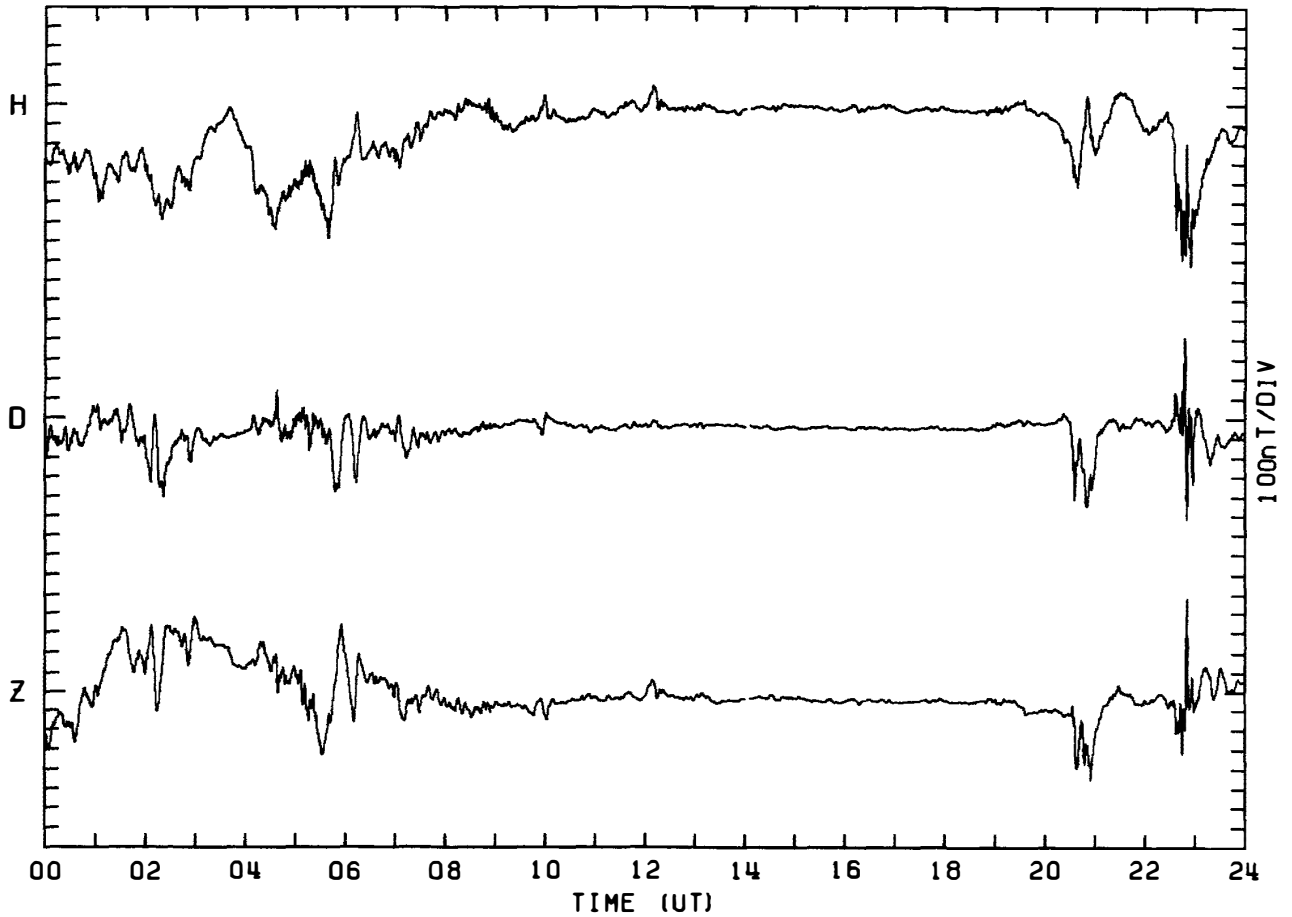
MAGNETOGRAM SYOWA STATION

DAY:177 JUNE 26, 1982



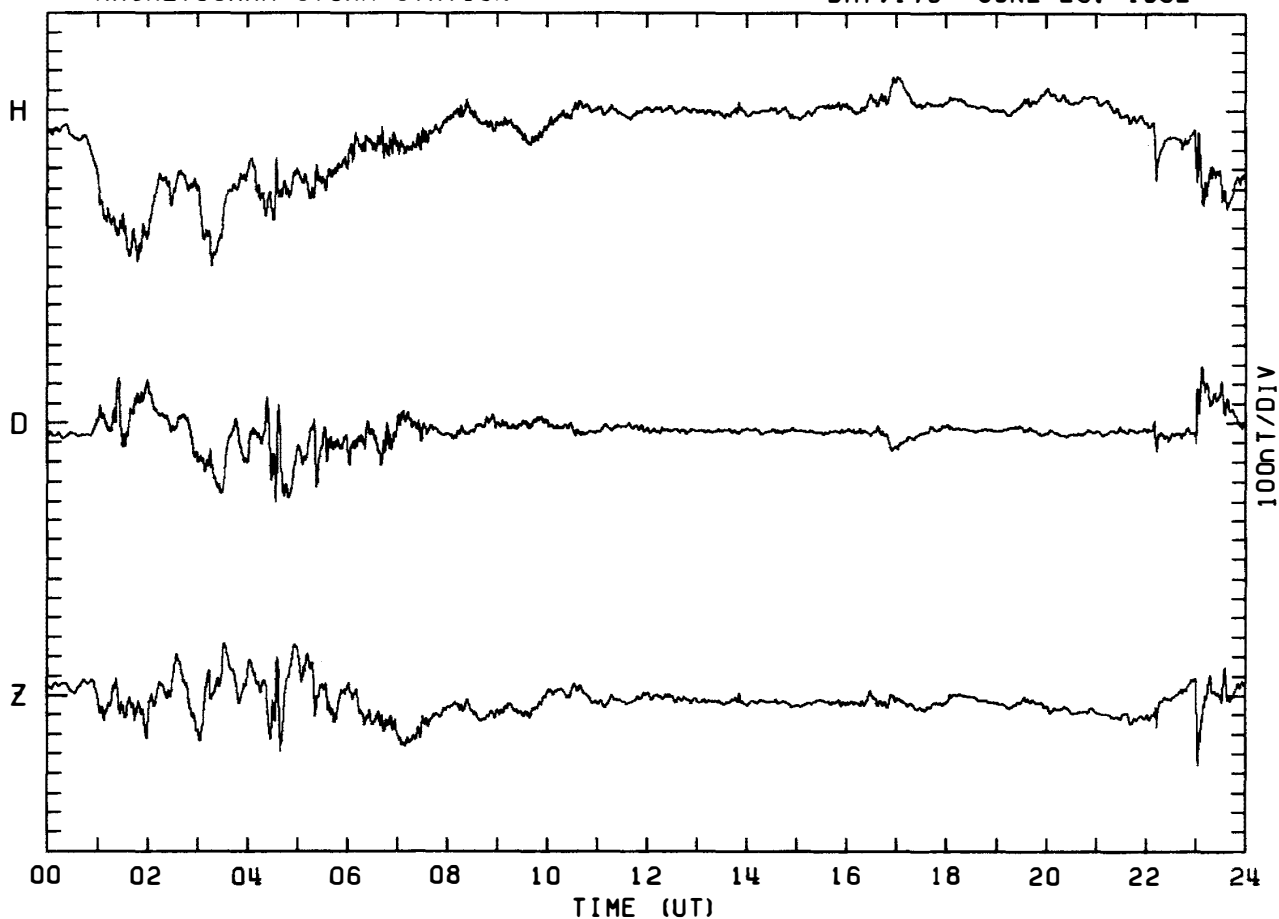
MAGNETOGRAM SYOWA STATION

DAY:178 JUNE 27, 1982



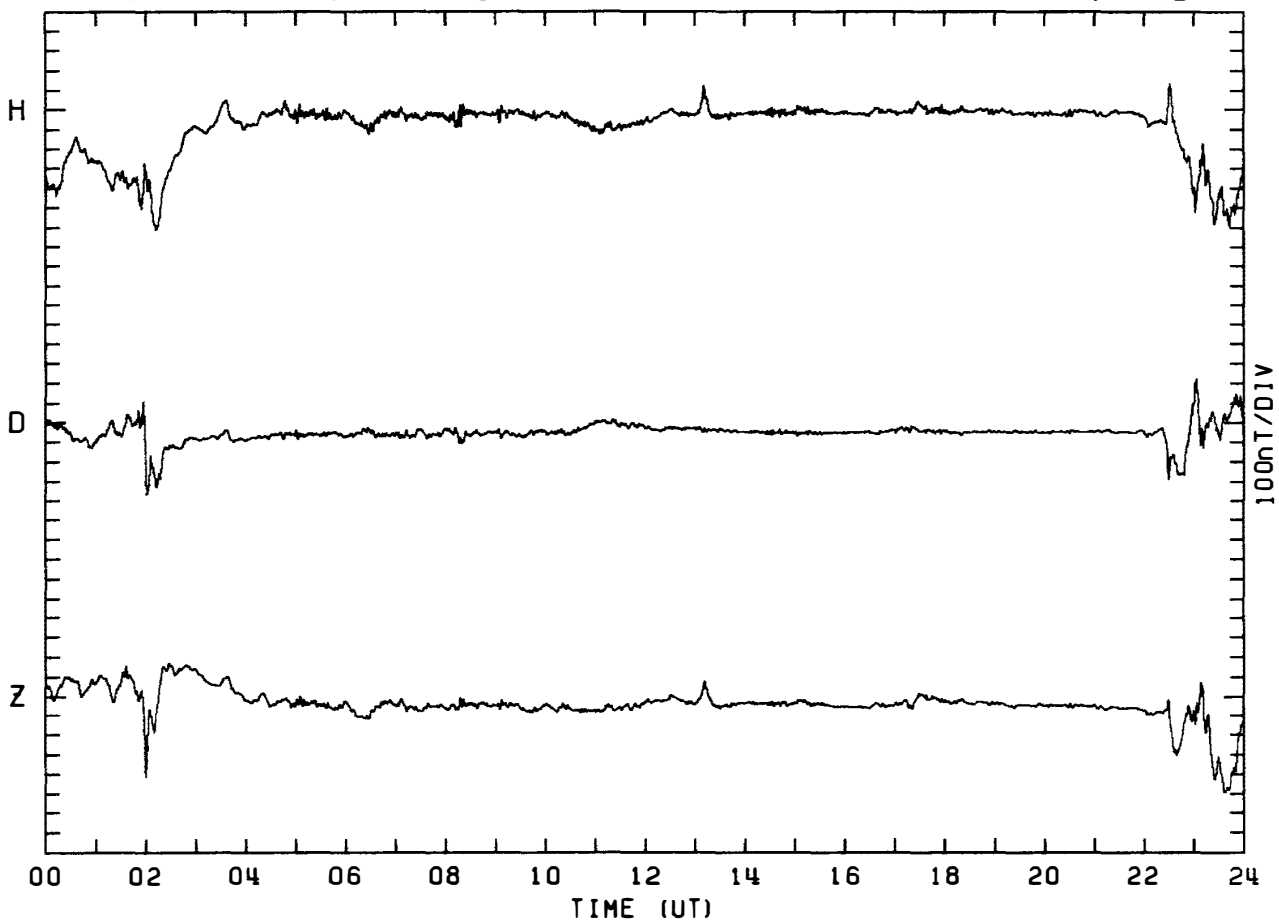
MAGNETOGRAM SYOWA STATION

DAY:179 JUNE 28, 1982



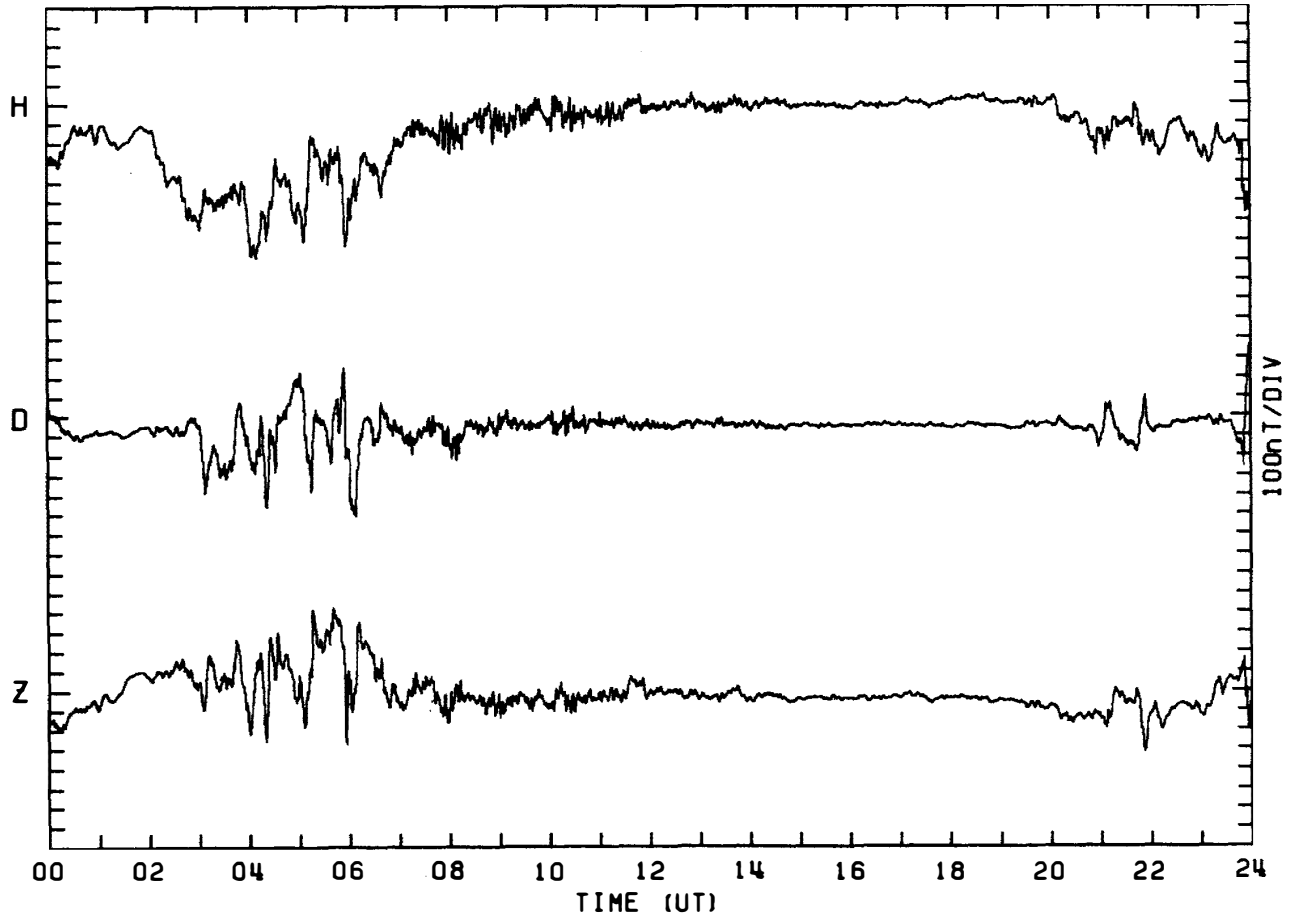
MAGNETOGRAM SYOWA STATION

DAY:180 JUNE 29, 1982



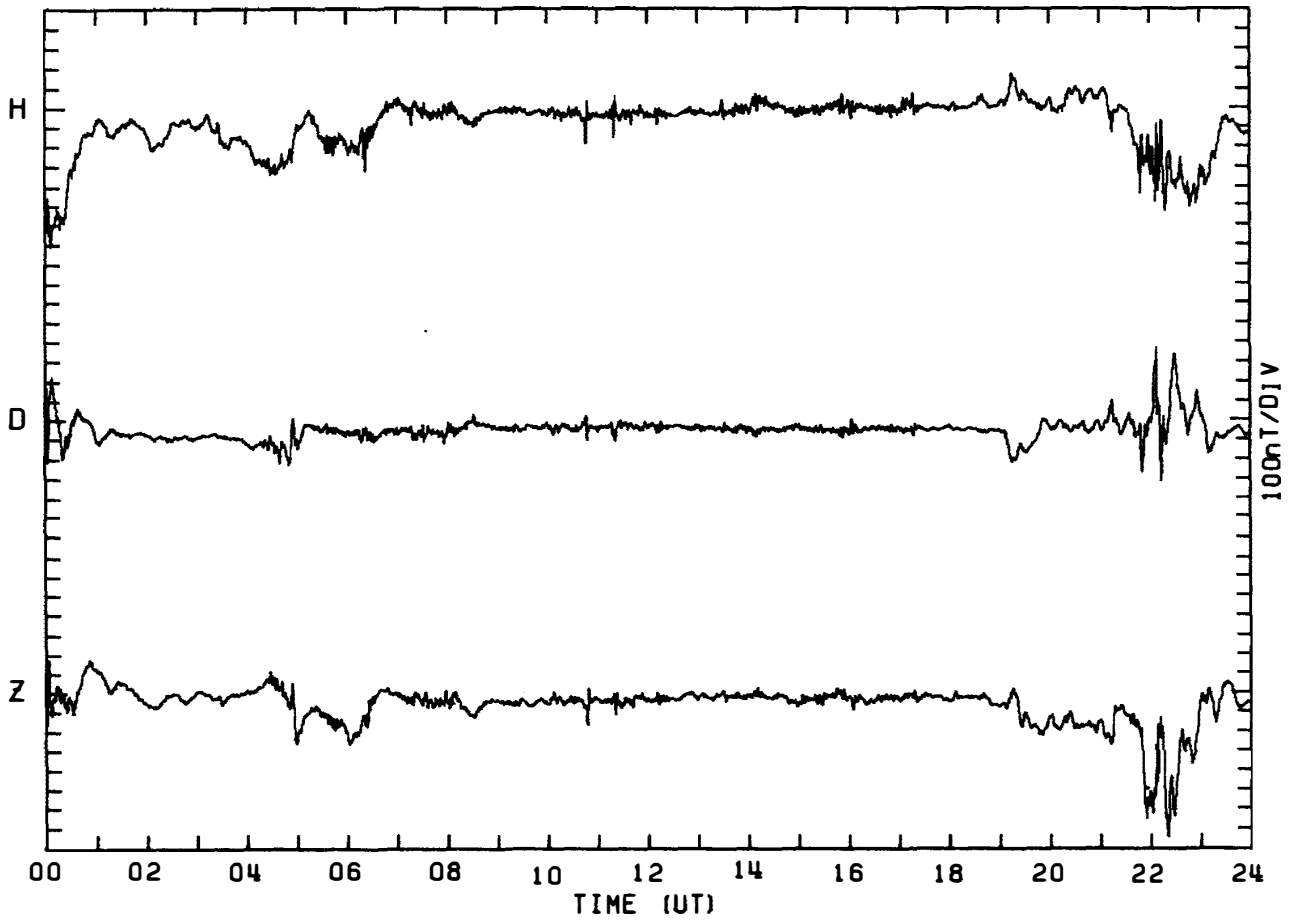
MAGNETOGRAM SYOWA STATION

DAY:181 JUNE 30. 1982



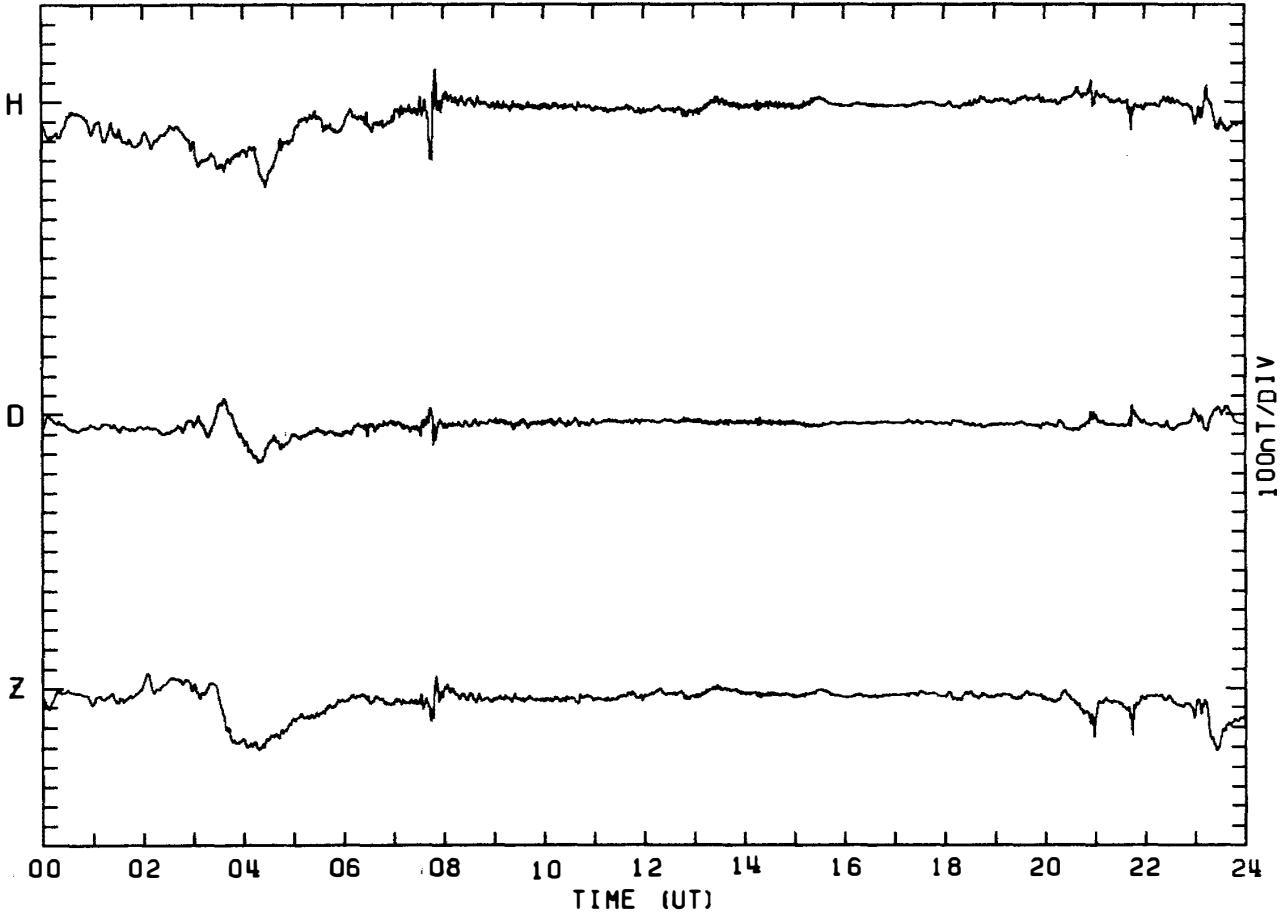
MAGNETOGRAM SYOWA STATION

DAY:182 JULY 1. 1982



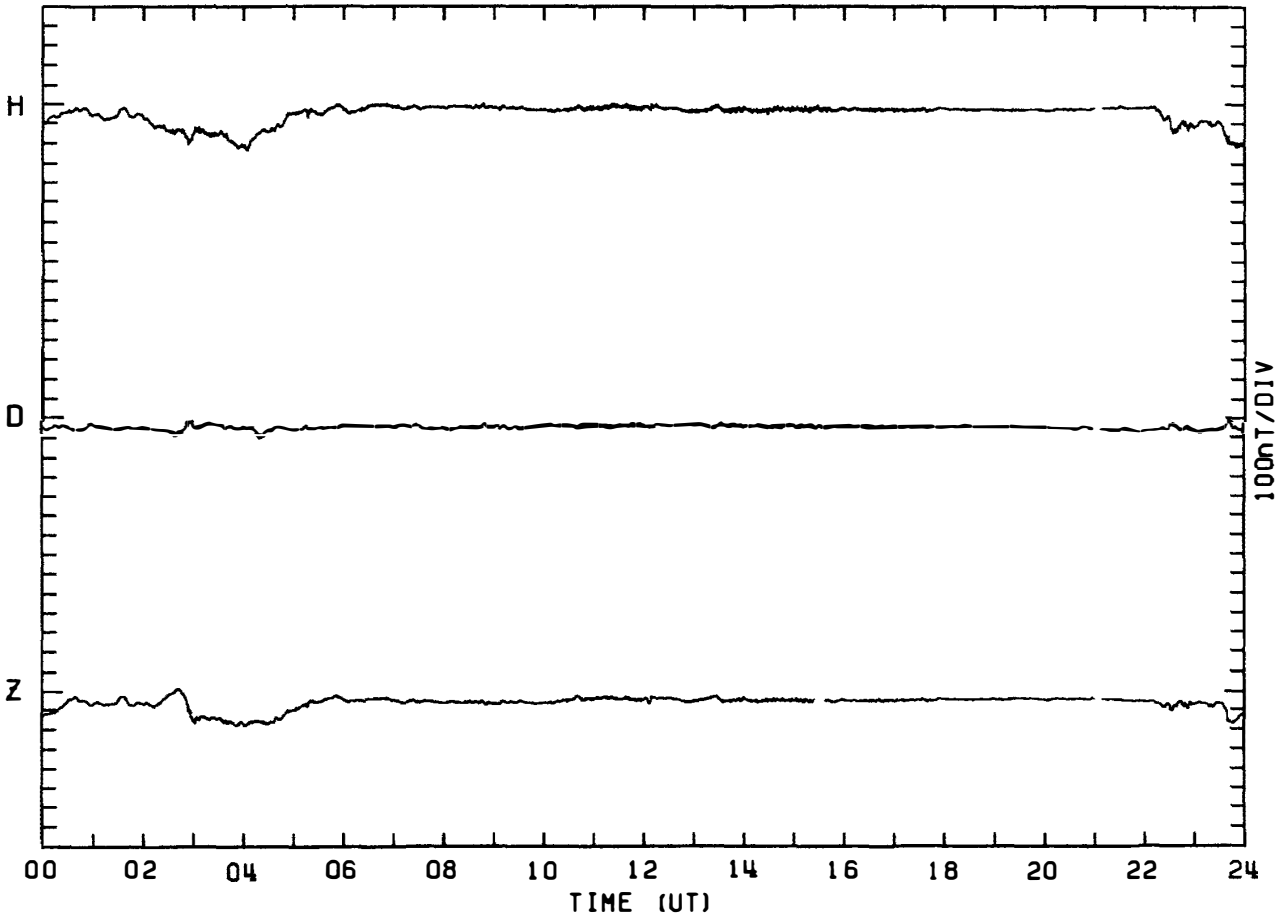
MAGNETOGRAM SYOWA STATION

DAY: 183 JULY 2, 1982



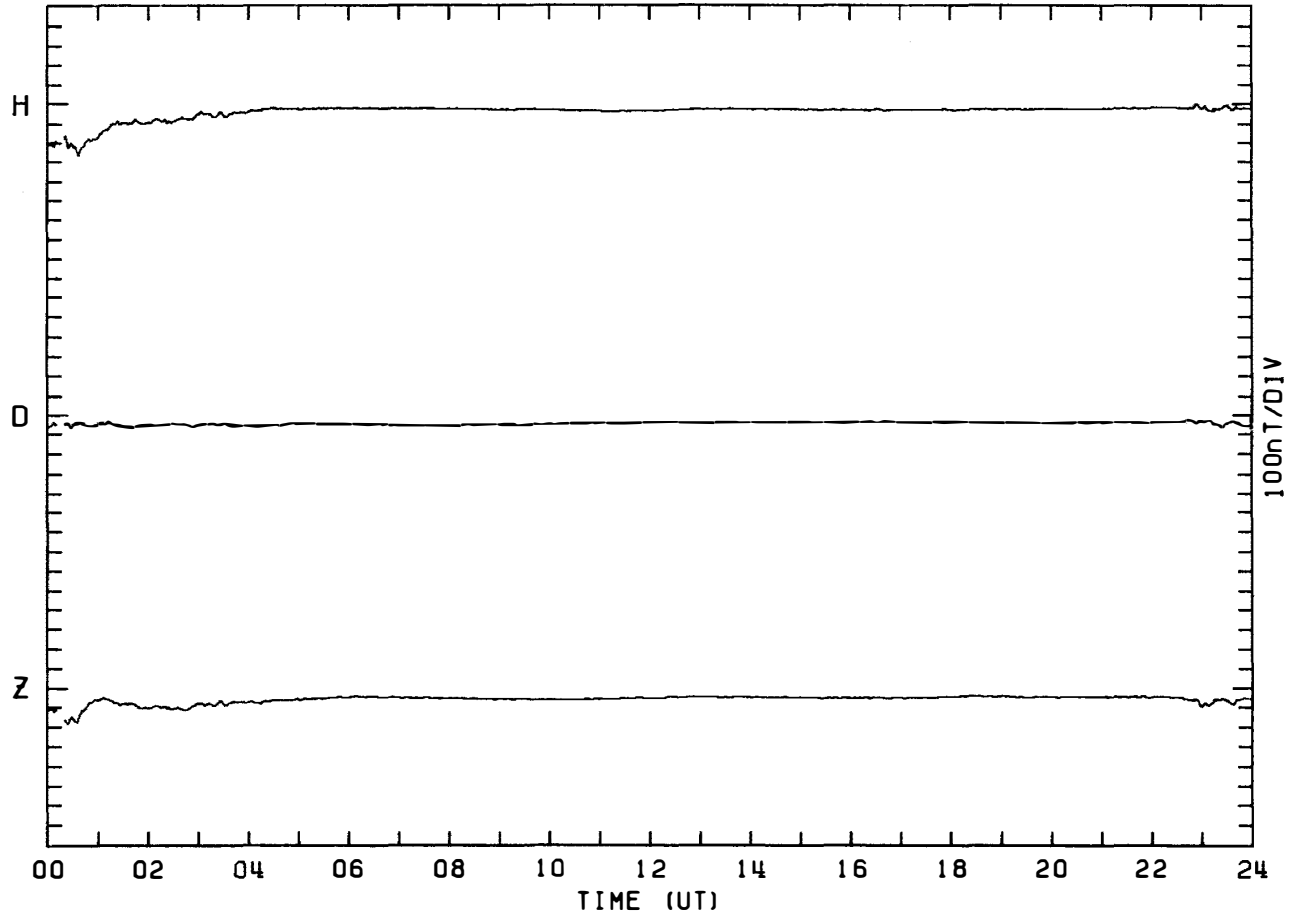
MAGNETOGRAM SYOWA STATION

DAY: 184 JULY 3, 1982



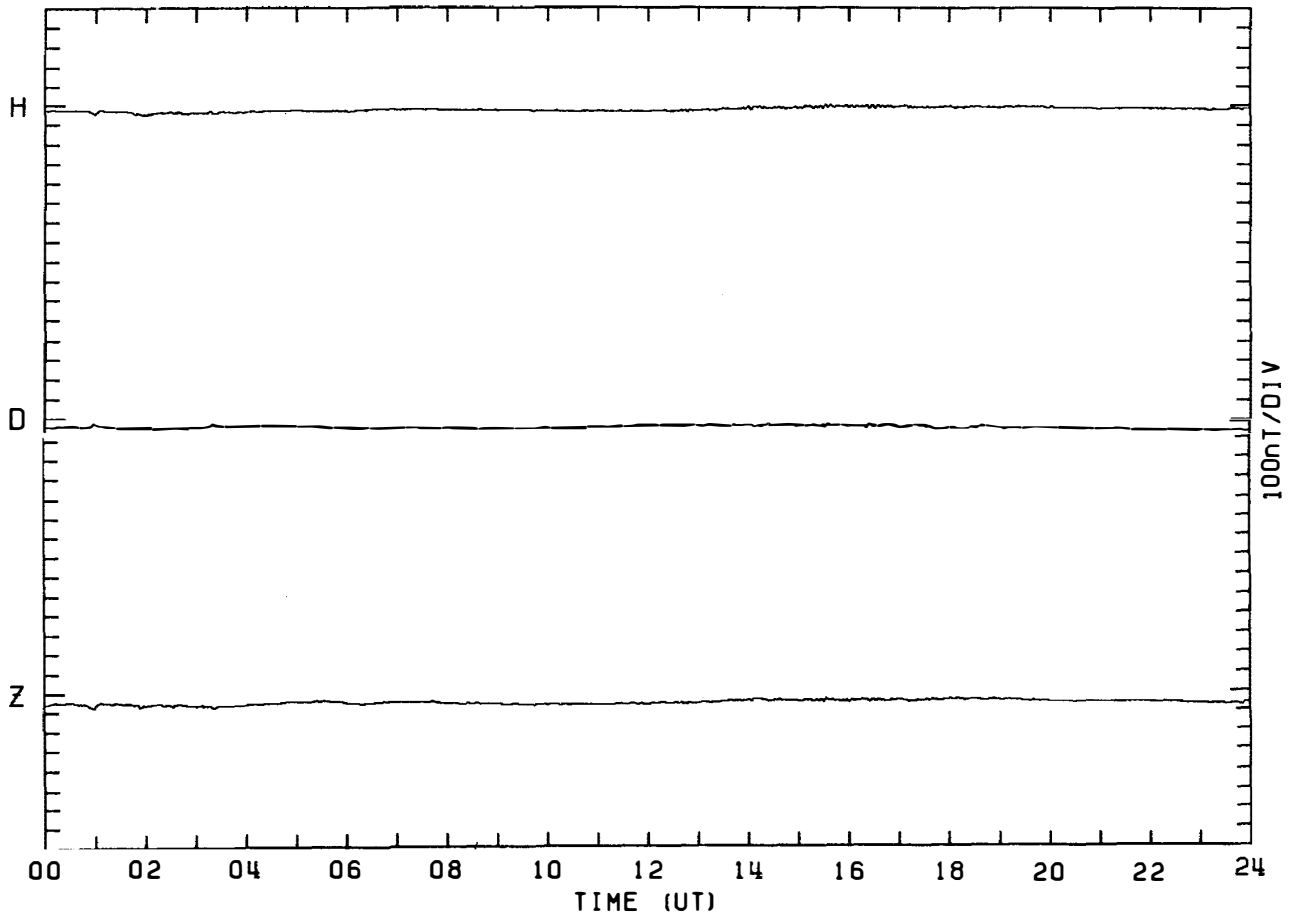
MAGNETOGRAM SYOWA STATION

DAY:185 JULY 4. 1982



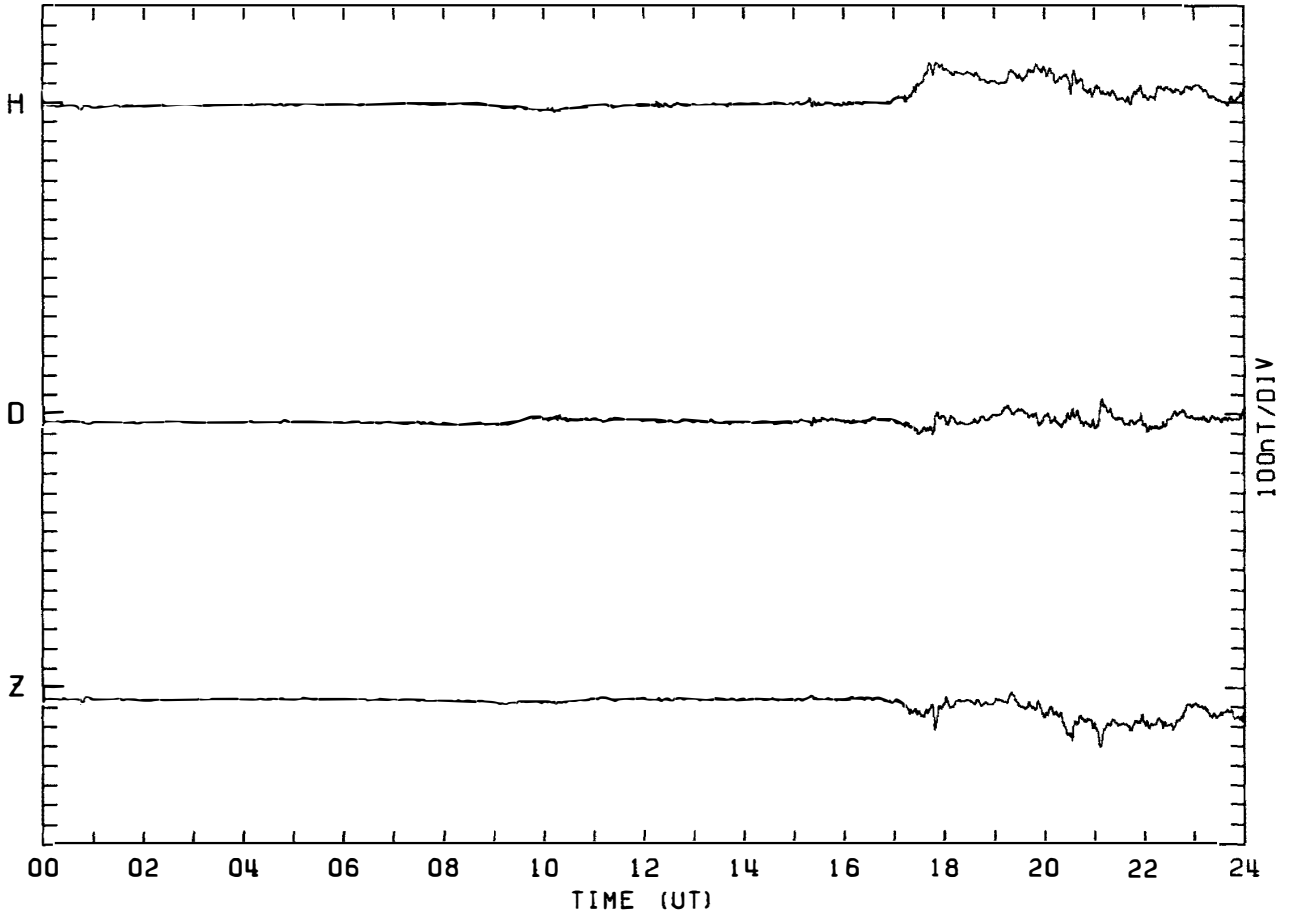
MAGNETOGRAM SYOWA STATION

DAY:186 JULY 5. 1982



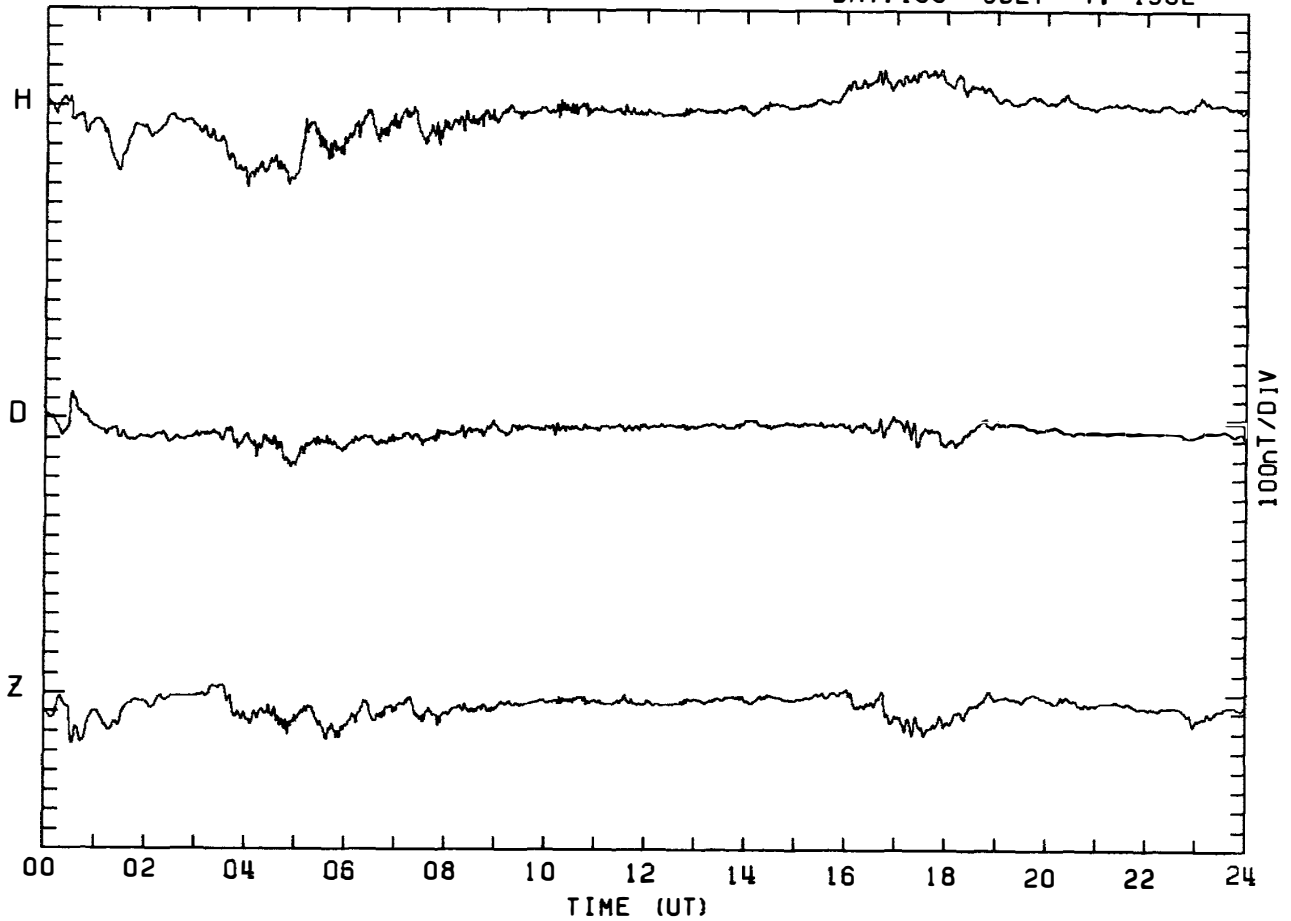
MAGNETOGRAM SYOWA STATION

DAY:187 JULY 6, 1982



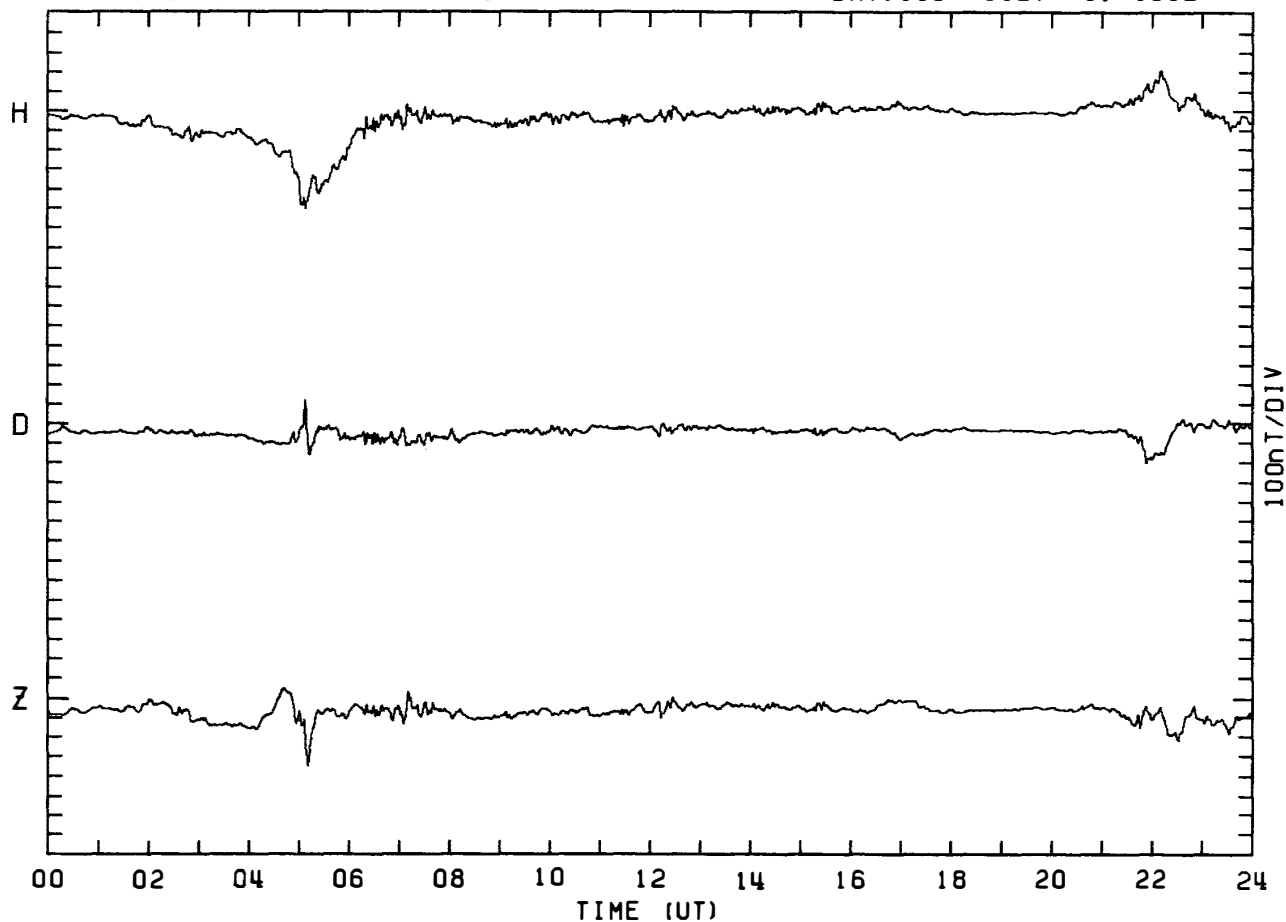
MAGNETOGRAM SYOWA STATION

DAY:188 JULY 7, 1982



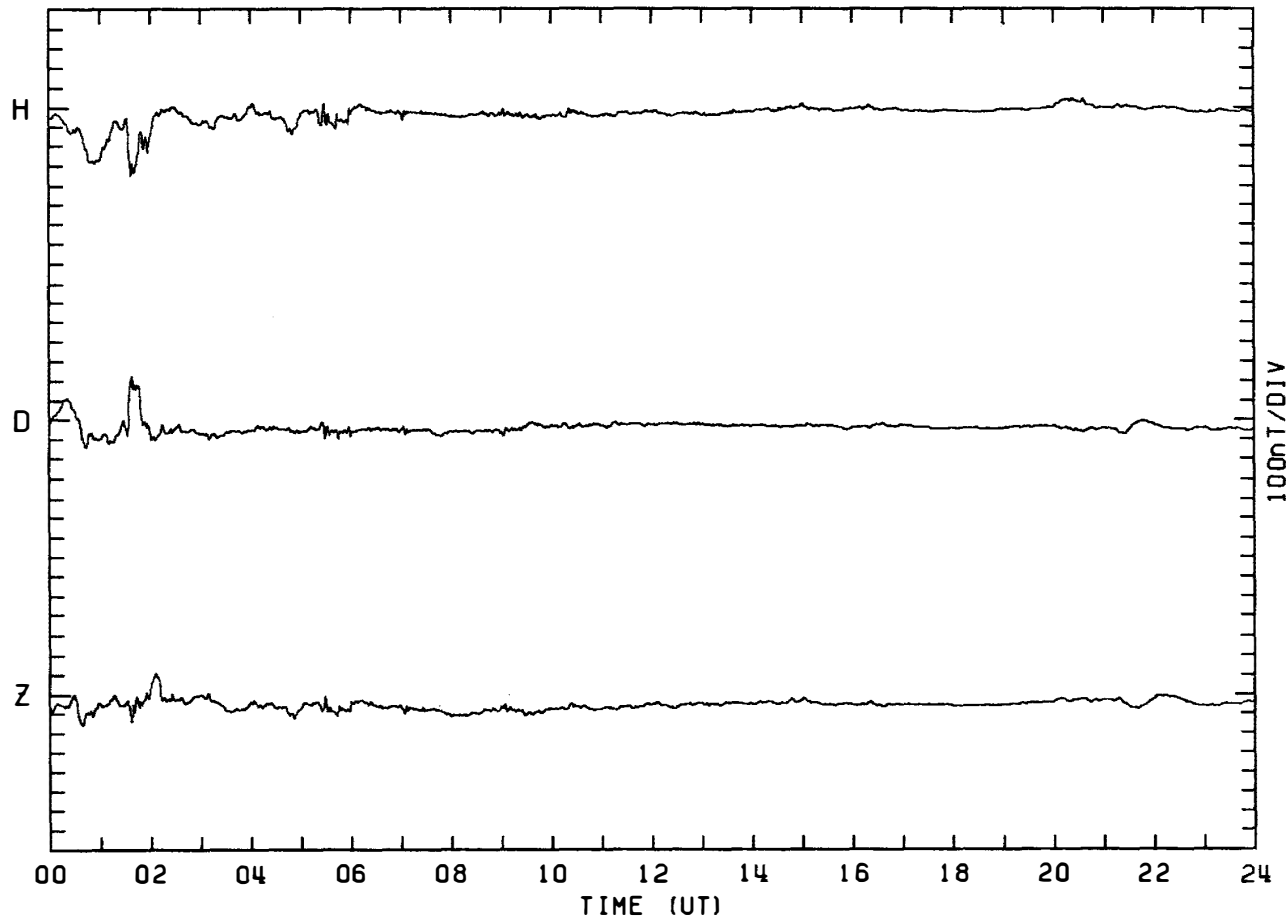
MAGNETOGRAM SYOWA STATION

DAY:189 JULY 8. 1982



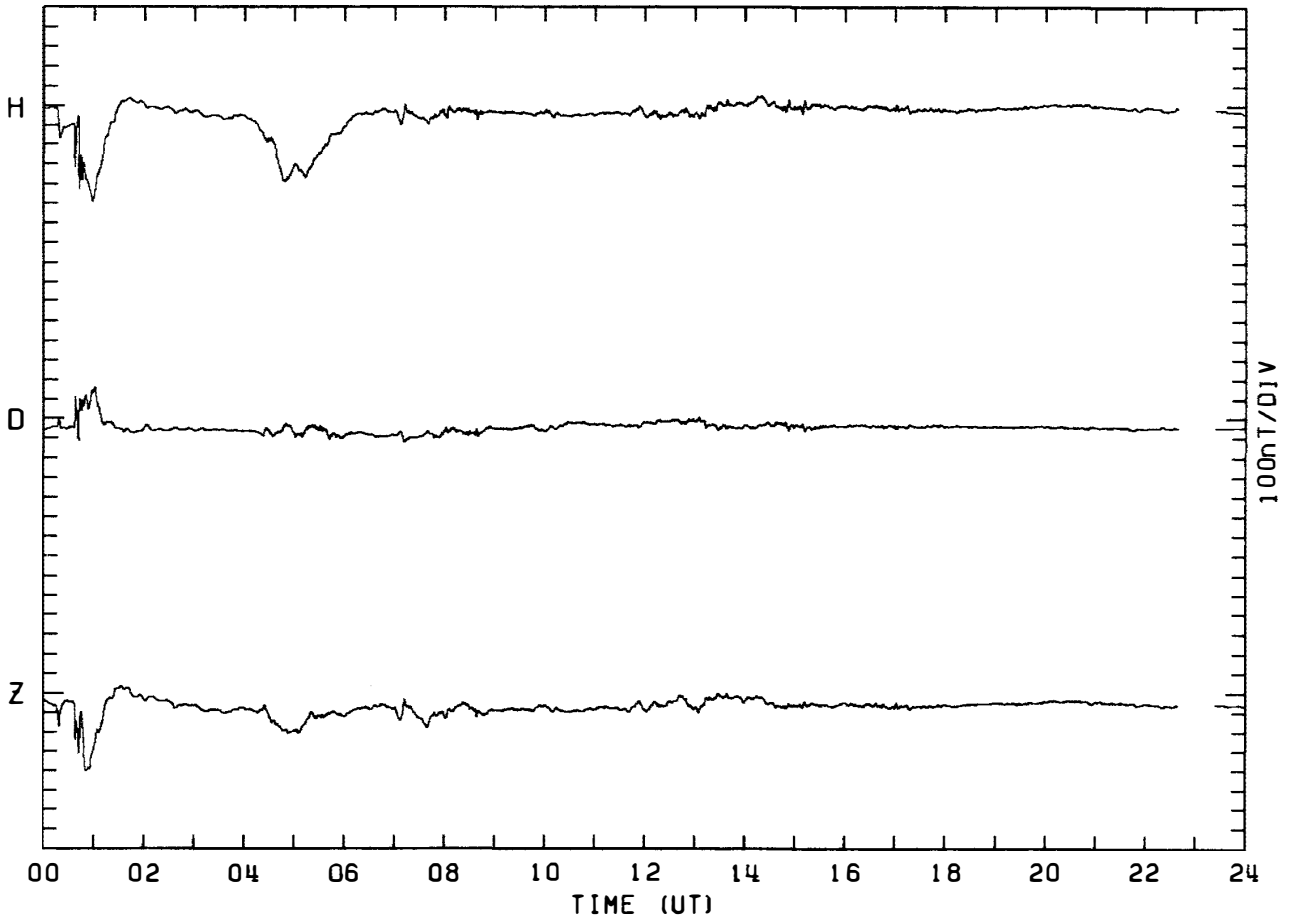
MAGNETOGRAM SYOWA STATION

DAY:190 JULY 9. 1982



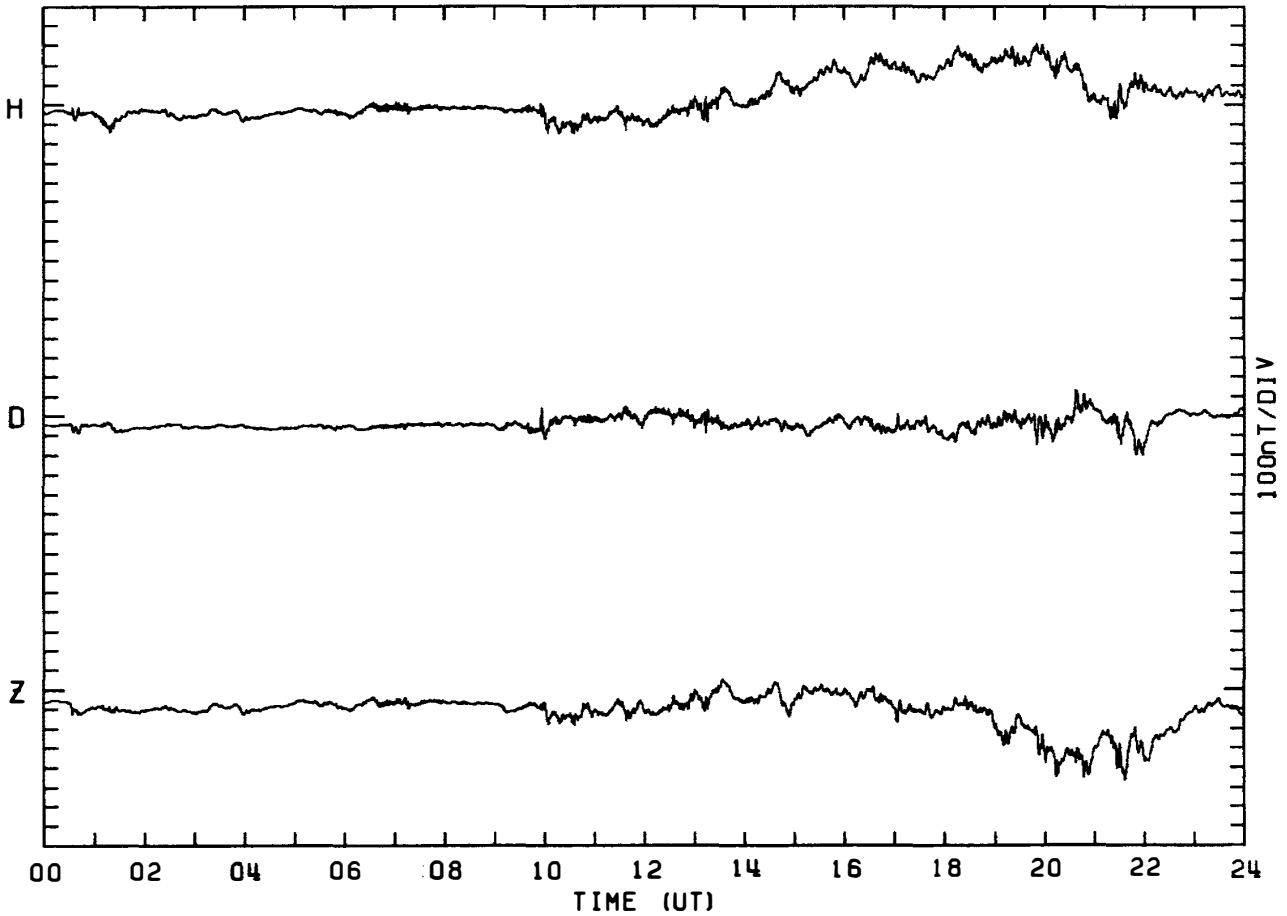
MAGNETOGRAM SYOWA STATION

DAY: 191 JULY 10, 1982



MAGNETOGRAM SYOWA STATION

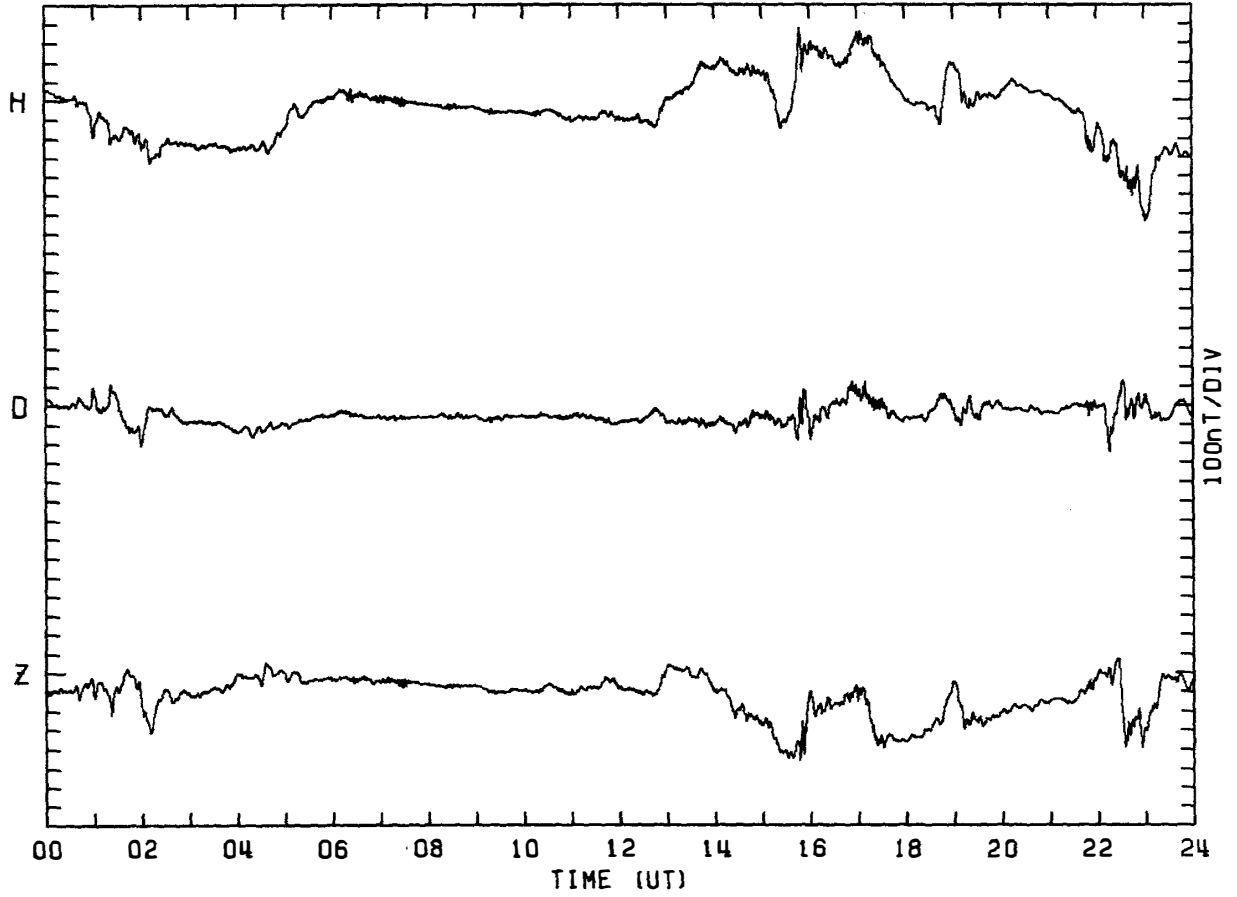
DAY: 192 JULY 11, 1982





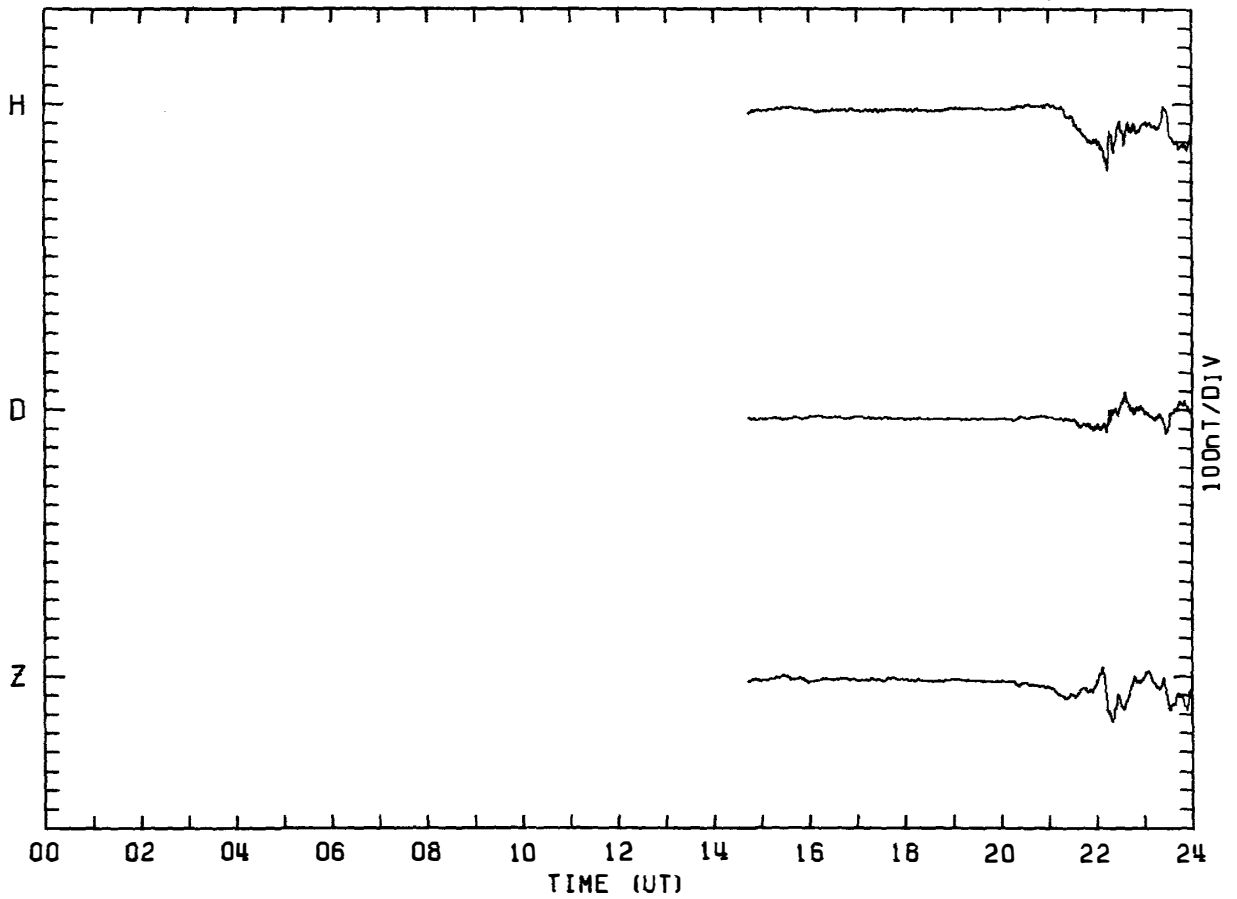
MAGNETOGRAM SYOWA STATION

DAY:193 JULY 12, 1982



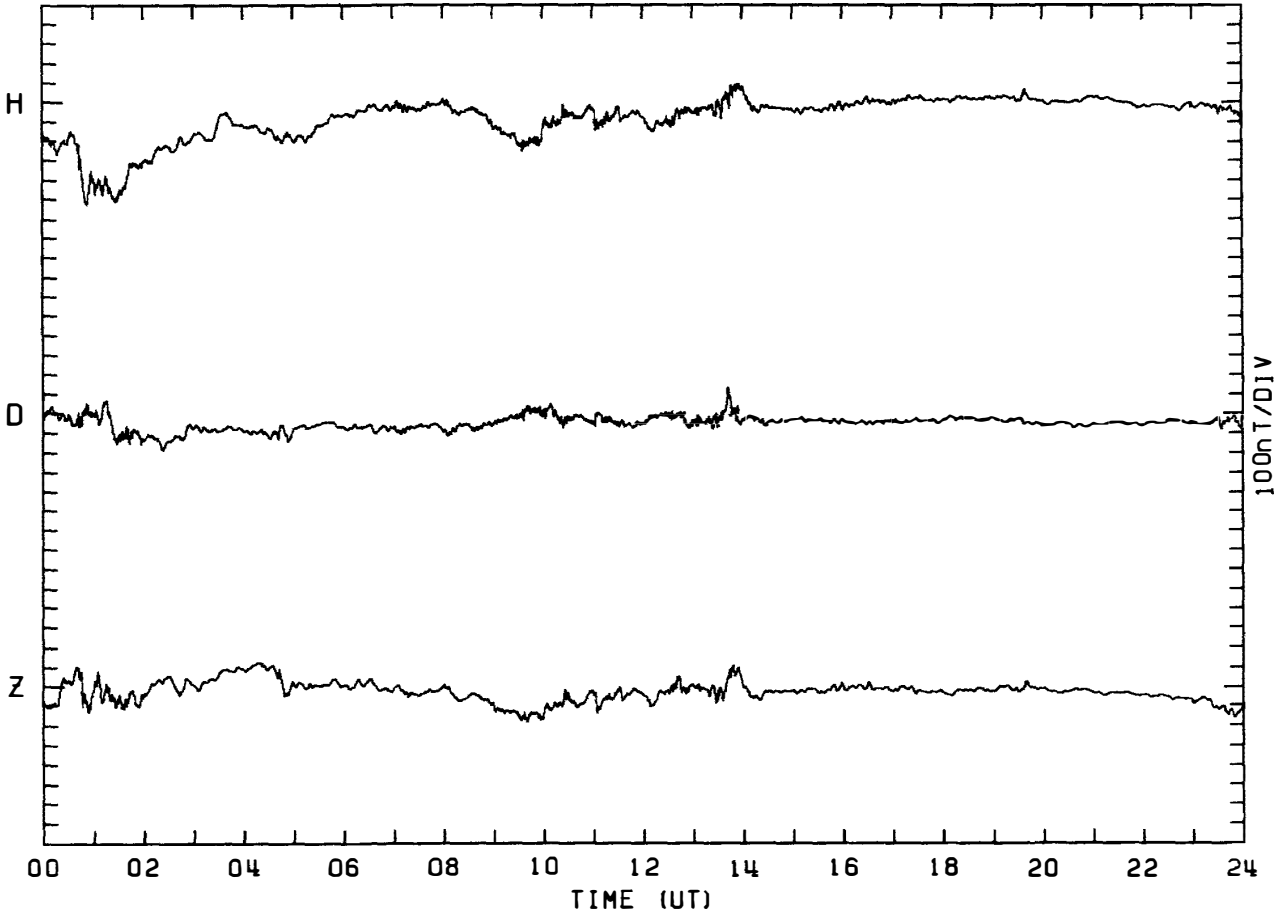
MAGNETOGRAM SYOWA STATION

DAY:198 JULY 17, 1982



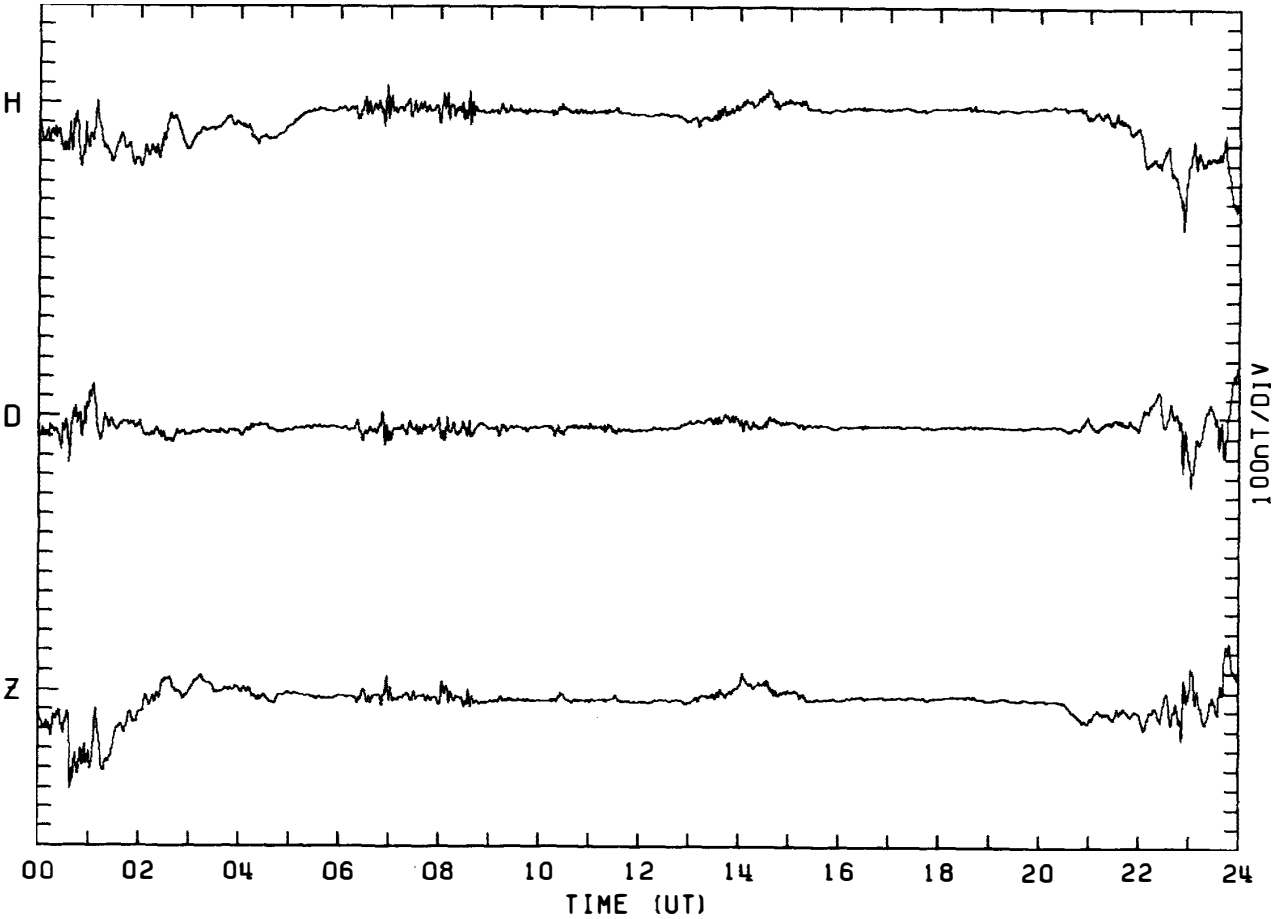
MAGNETOGRAM SYOWA STATION

DAY:199 JULY 18. 1982



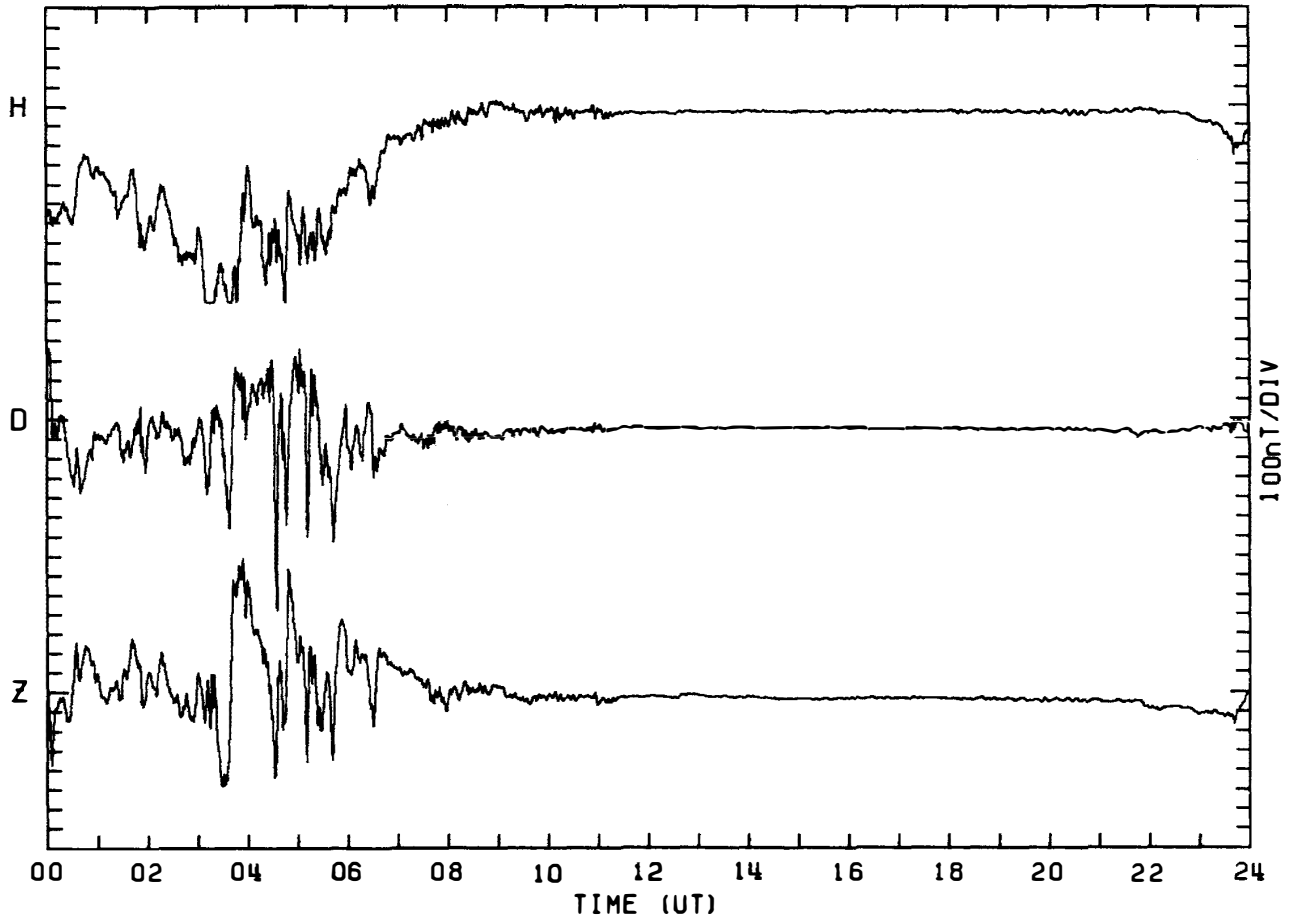
MAGNETOGRAM SYOWA STATION

DAY:200 JULY 19. 1982



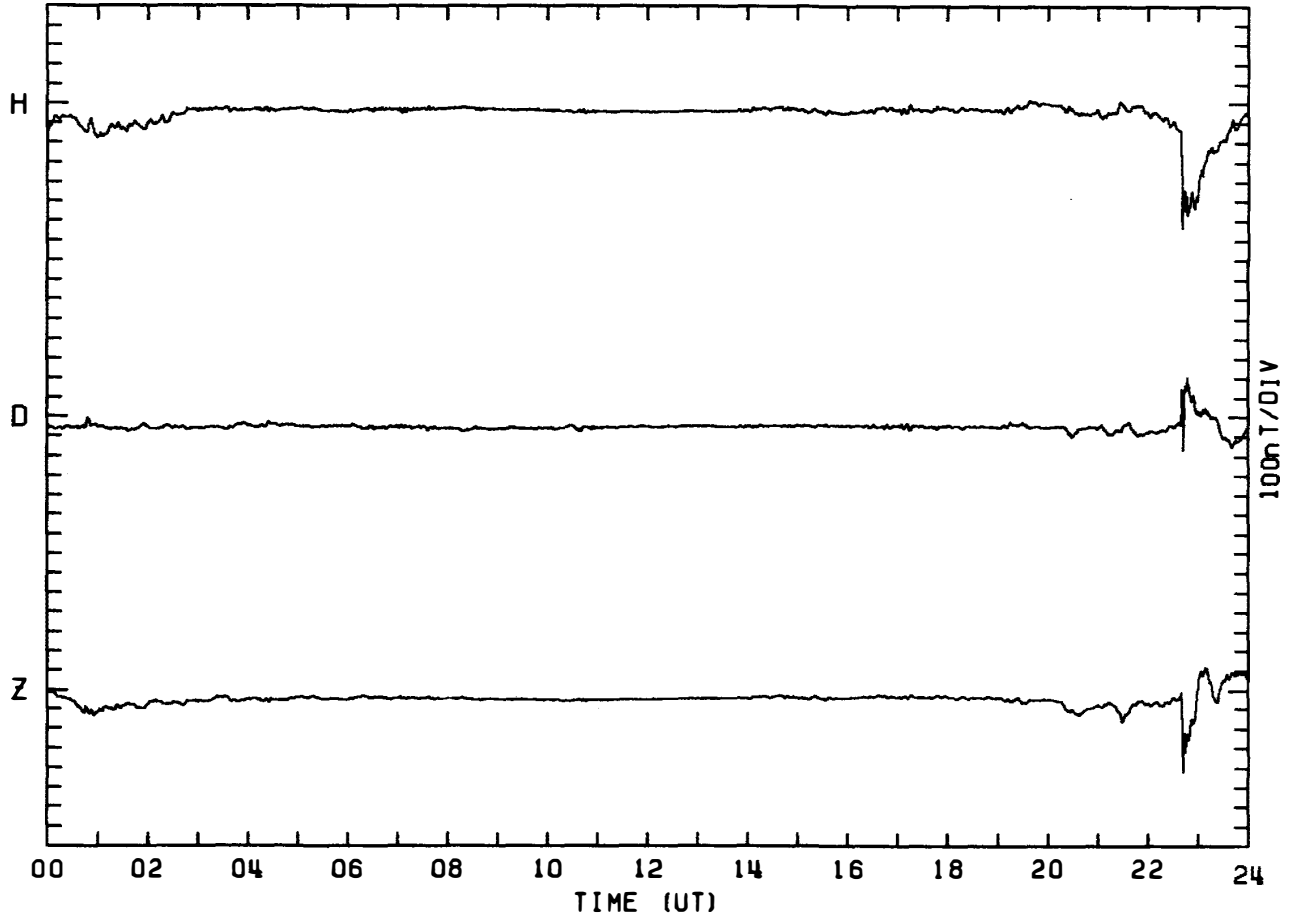
MAGNETOGRAM SYOWA STATION

DAY:201 JULY 20, 1982



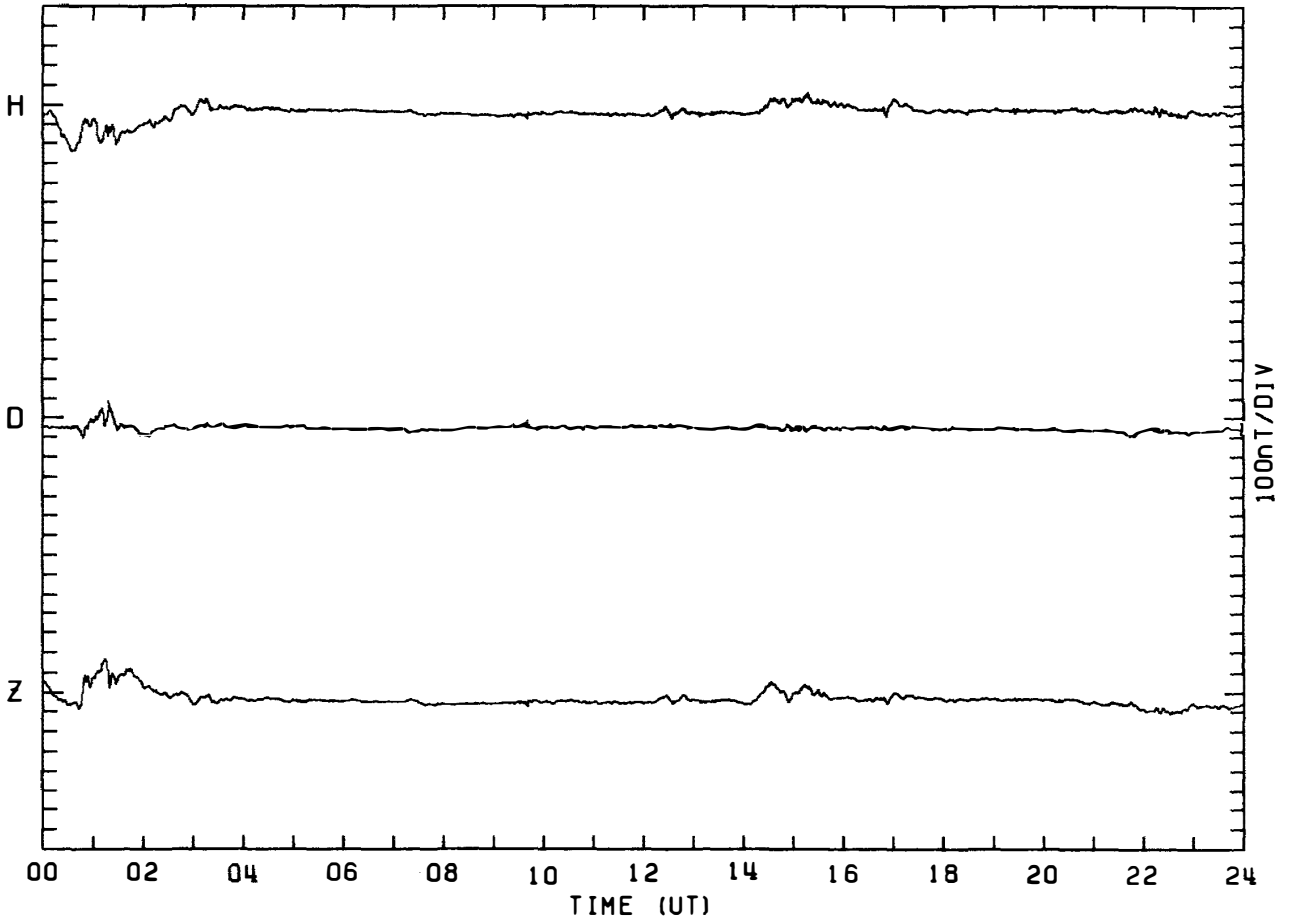
MAGNETOGRAM SYOWA STATION

DAY:202 JULY 21, 1982



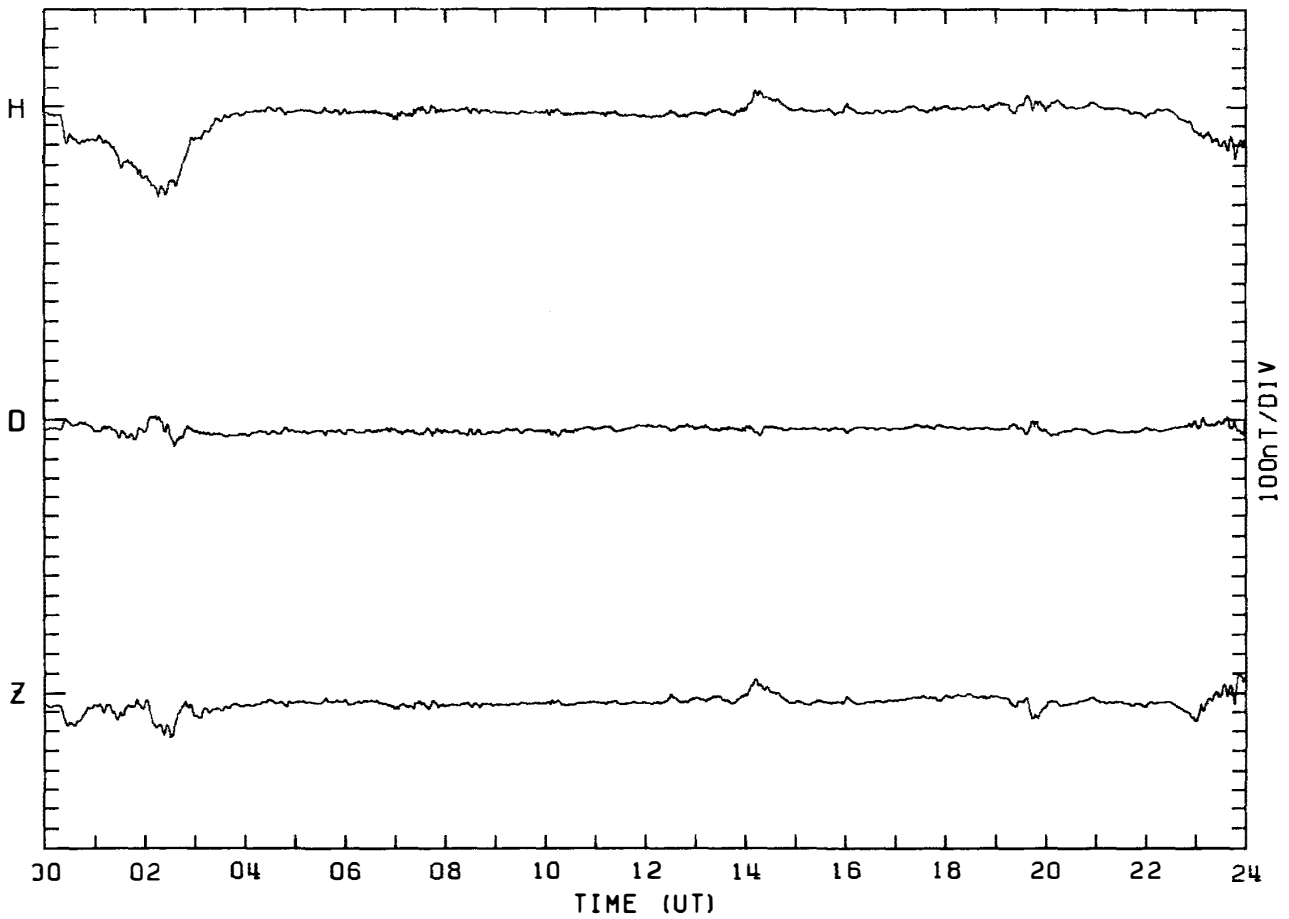
MAGNETOGRAM SYOWA STATION

DAY:203 JULY 22, 1982



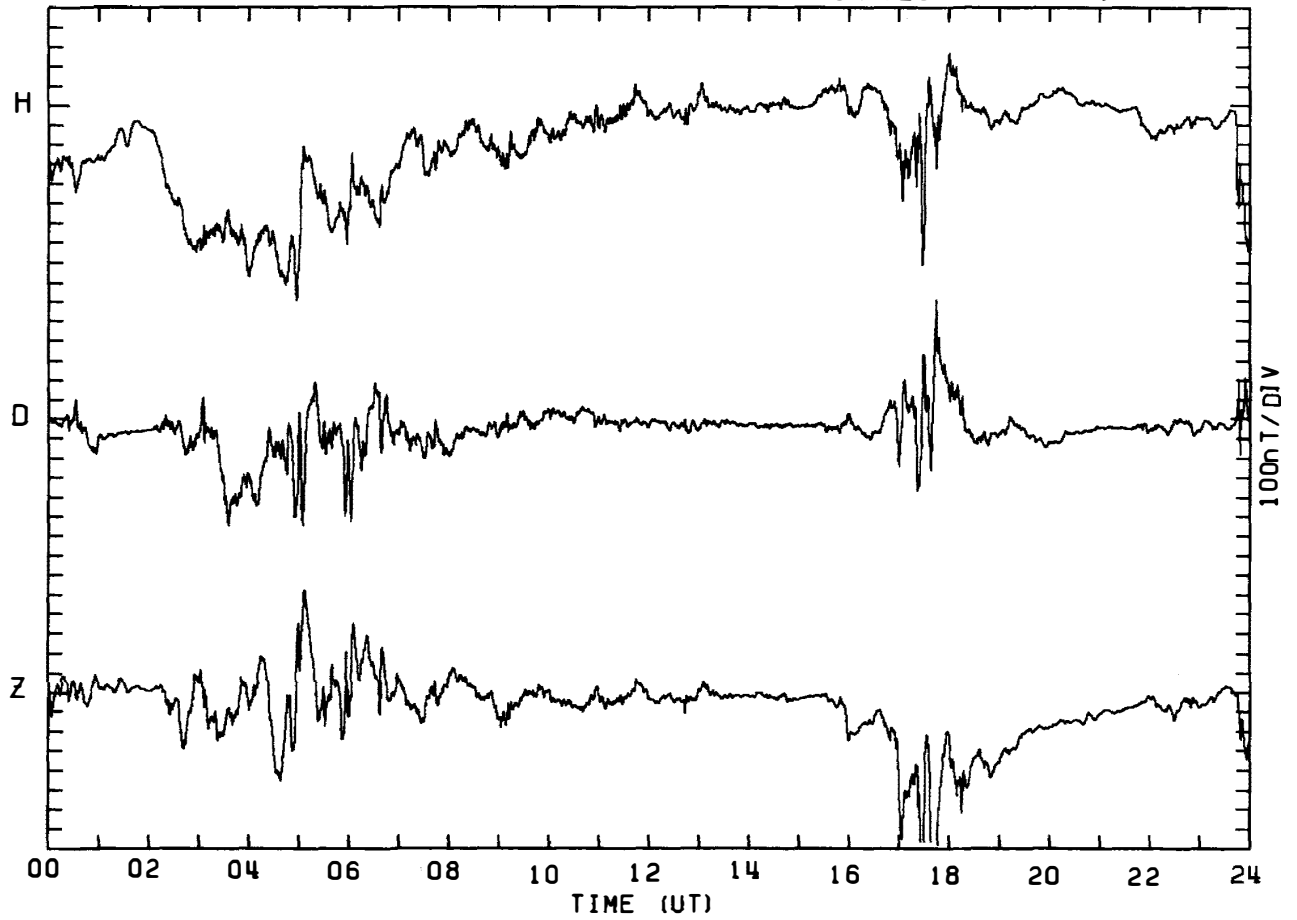
MAGNETOGRAM SYOWA STATION

DAY:204 JULY 23, 1982



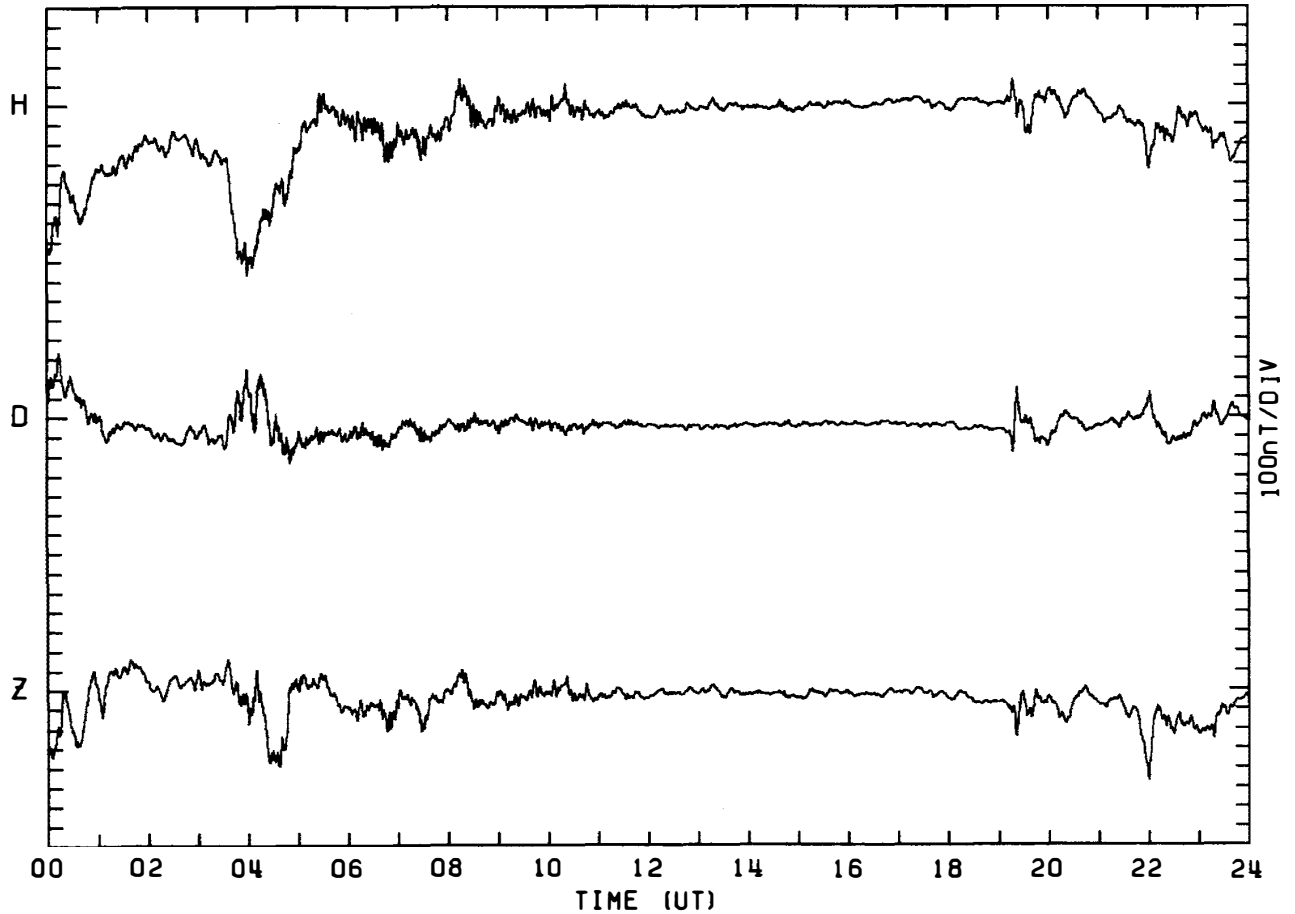
MAGNETOGRAM SYOWA STATION

DAY:205 JULY 24, 1982



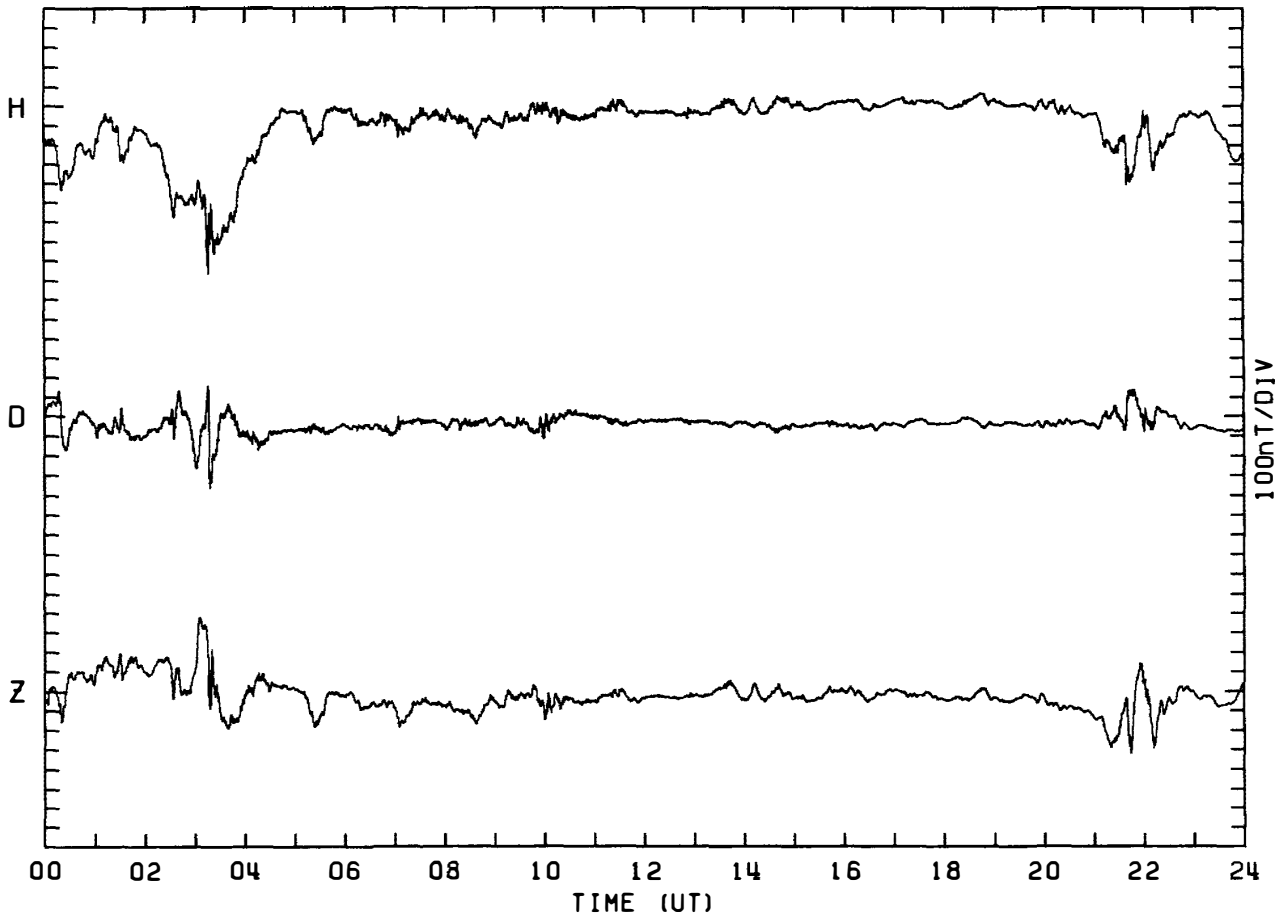
MAGNETOGRAM SYOWA STATION

DAY:206 JULY 25, 1982



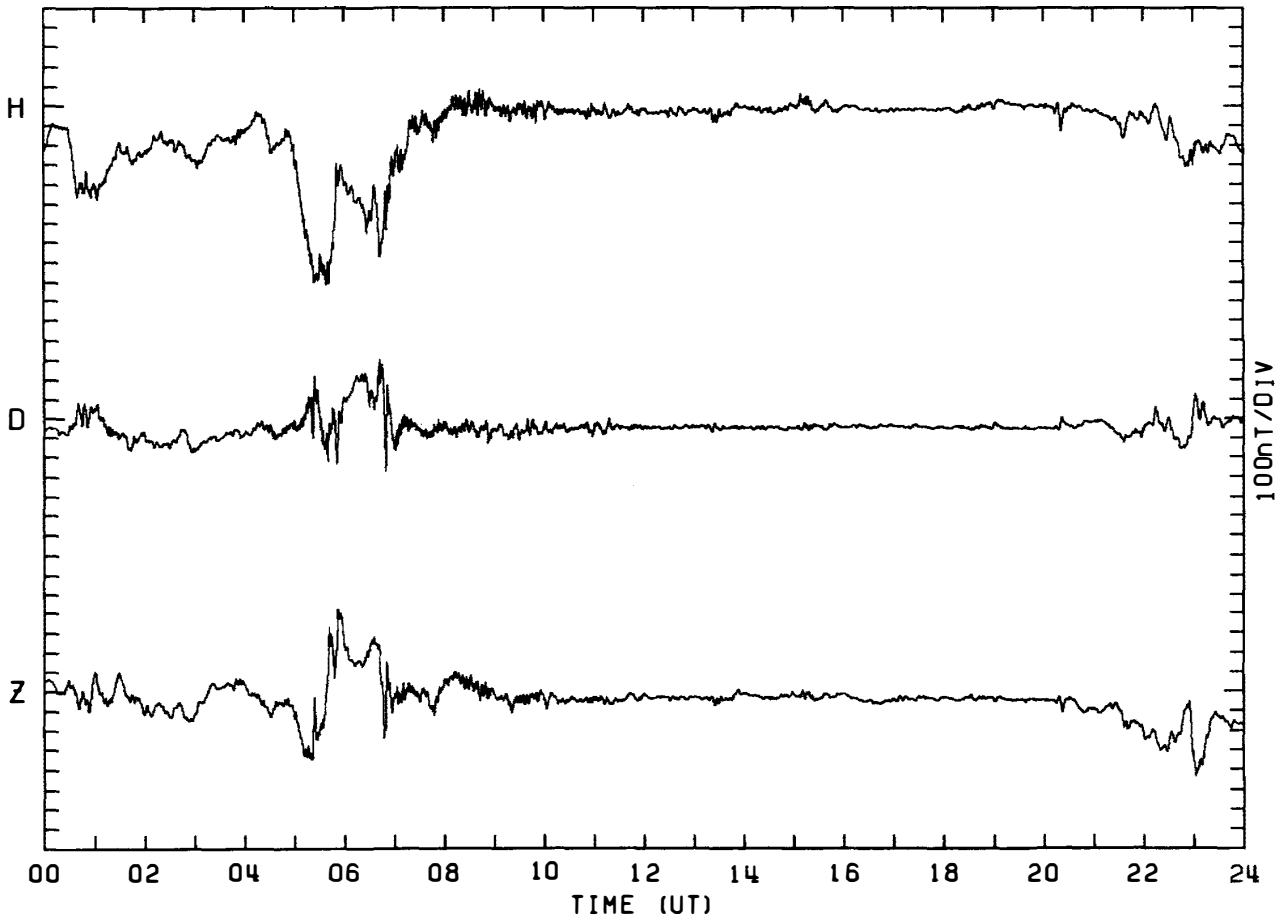
MAGNETOGRAM SYOWA STATION

DAY:207 JULY 26, 1982



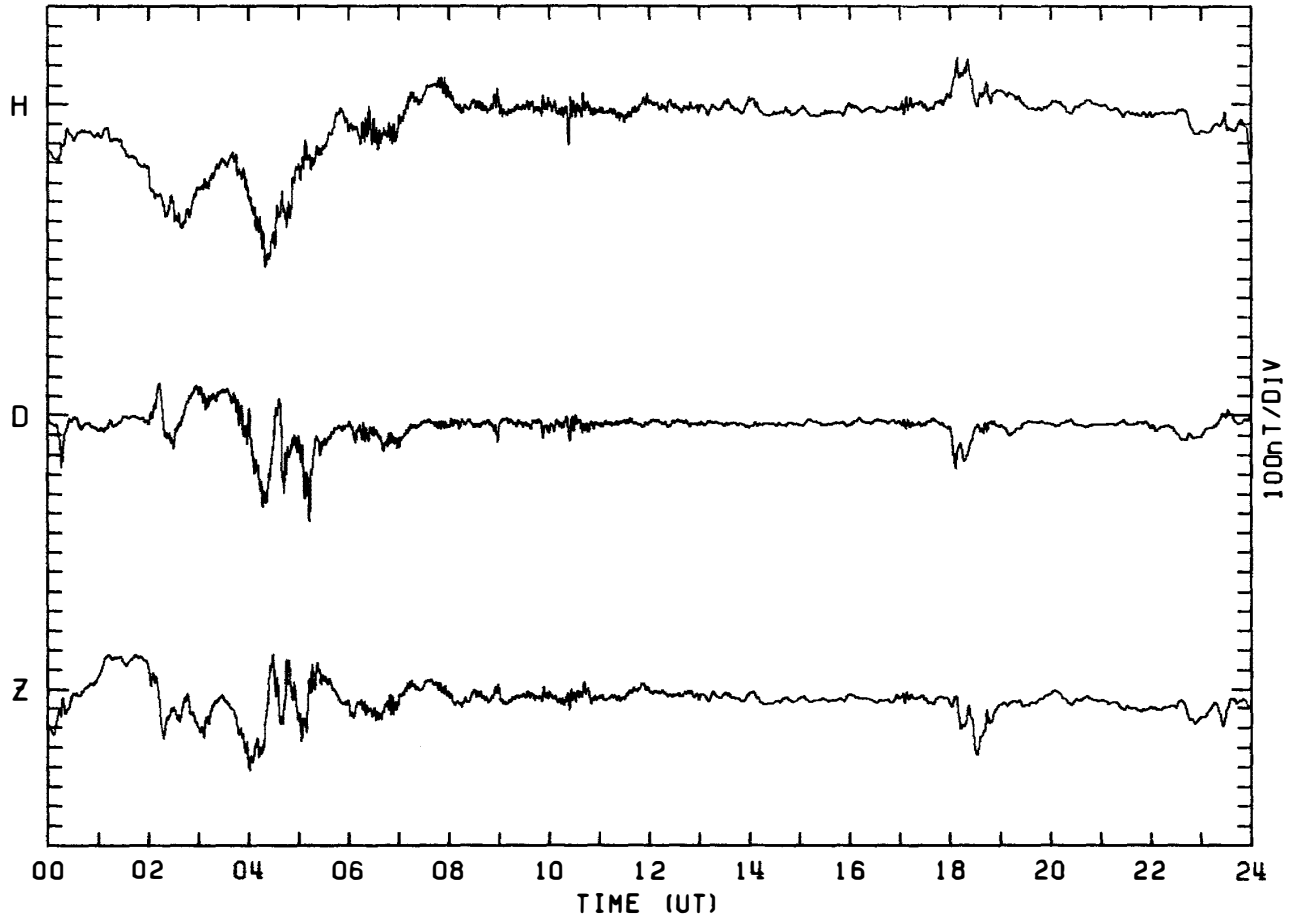
MAGNETOGRAM SYOWA STATION

DAY:208 JULY 27, 1982



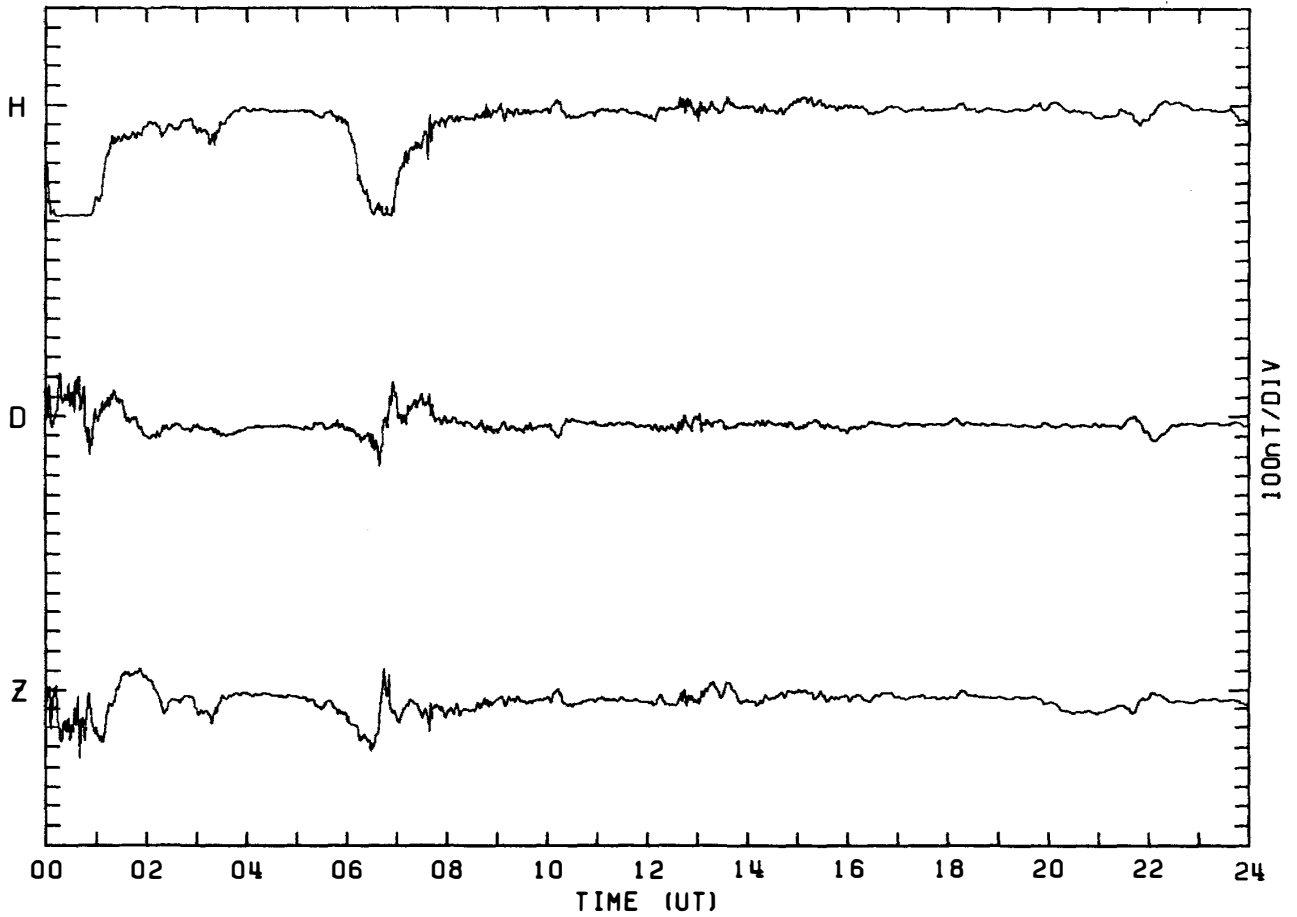
MAGNETOGRAM SYOWA STATION

DAY:209 JULY 28, 1982



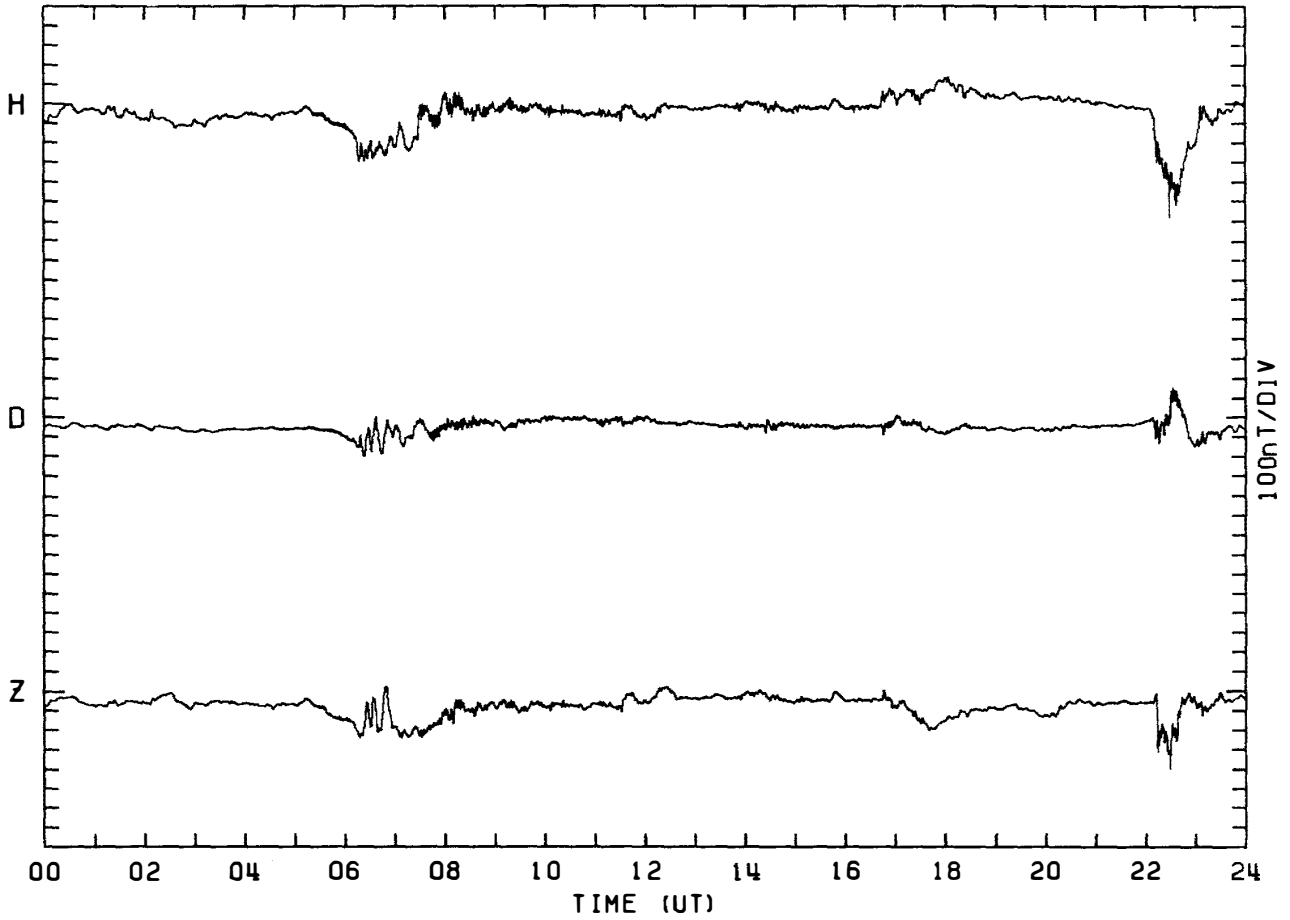
MAGNETOGRAM SYOWA STATION

DAY:210 JULY 29, 1982



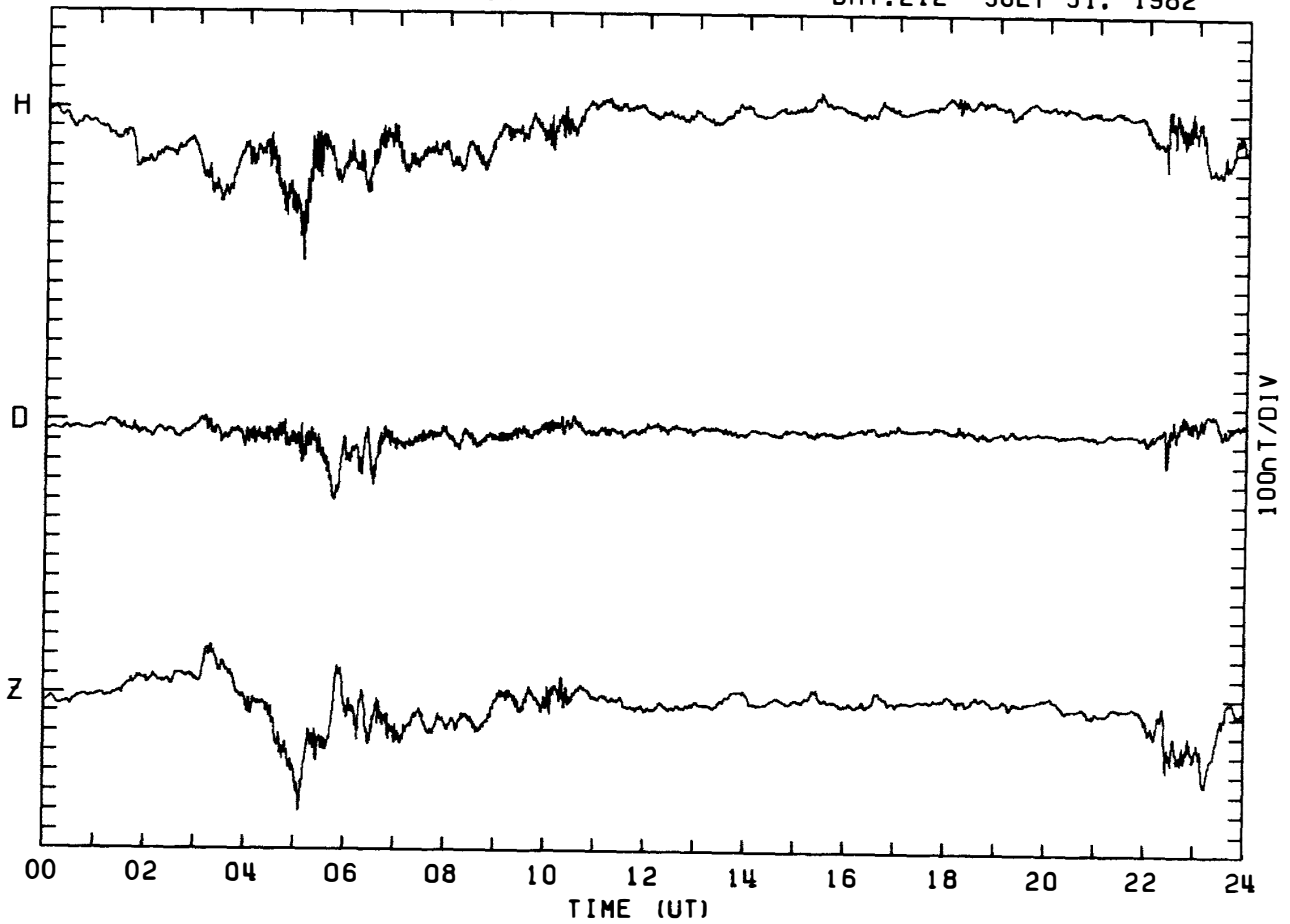
MAGNETOGRAM SYOWA STATION

DAY:211 JULY 30. 1982



MAGNETOGRAM SYOWA STATION

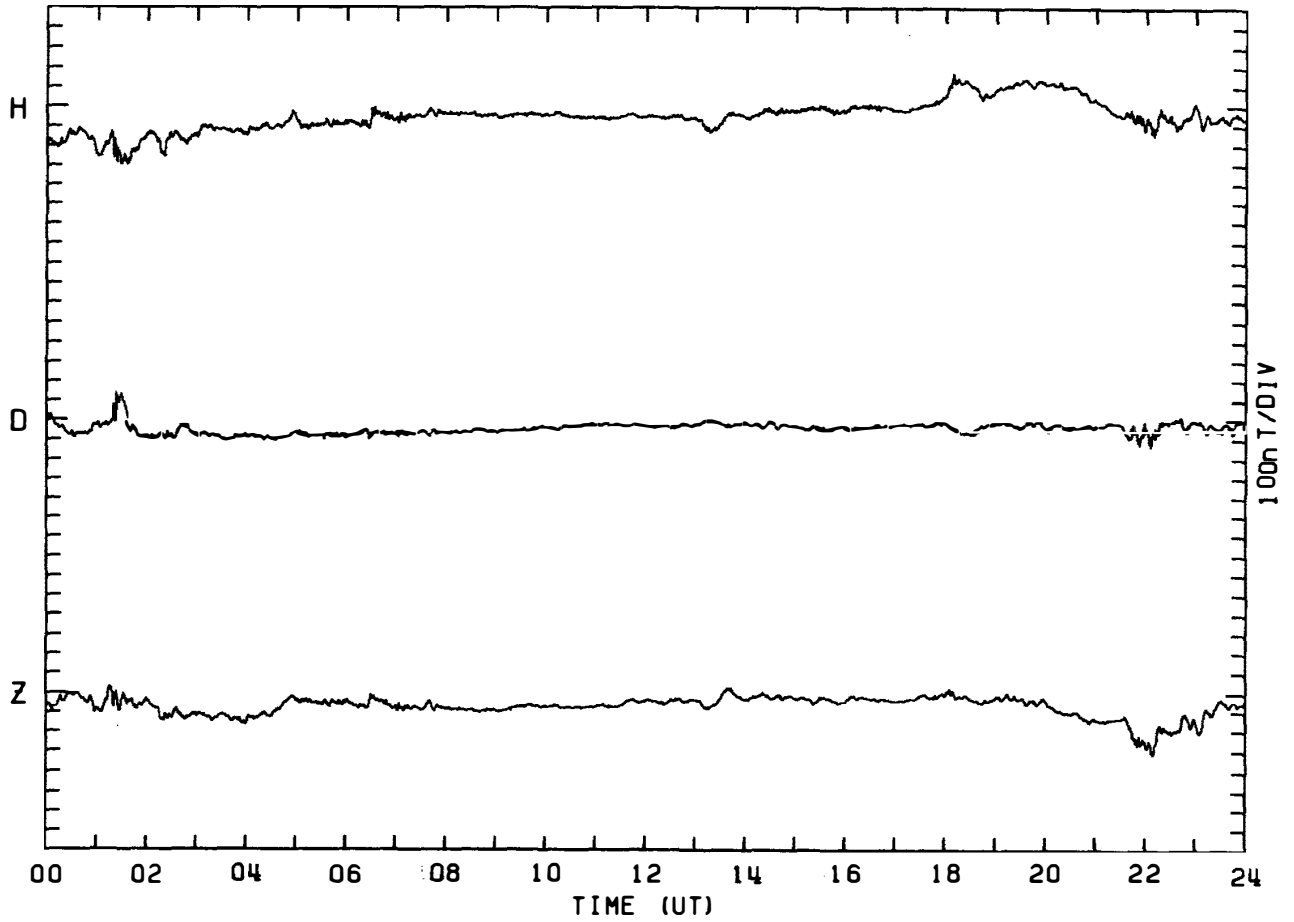
DAY:212 JULY 31. 1982





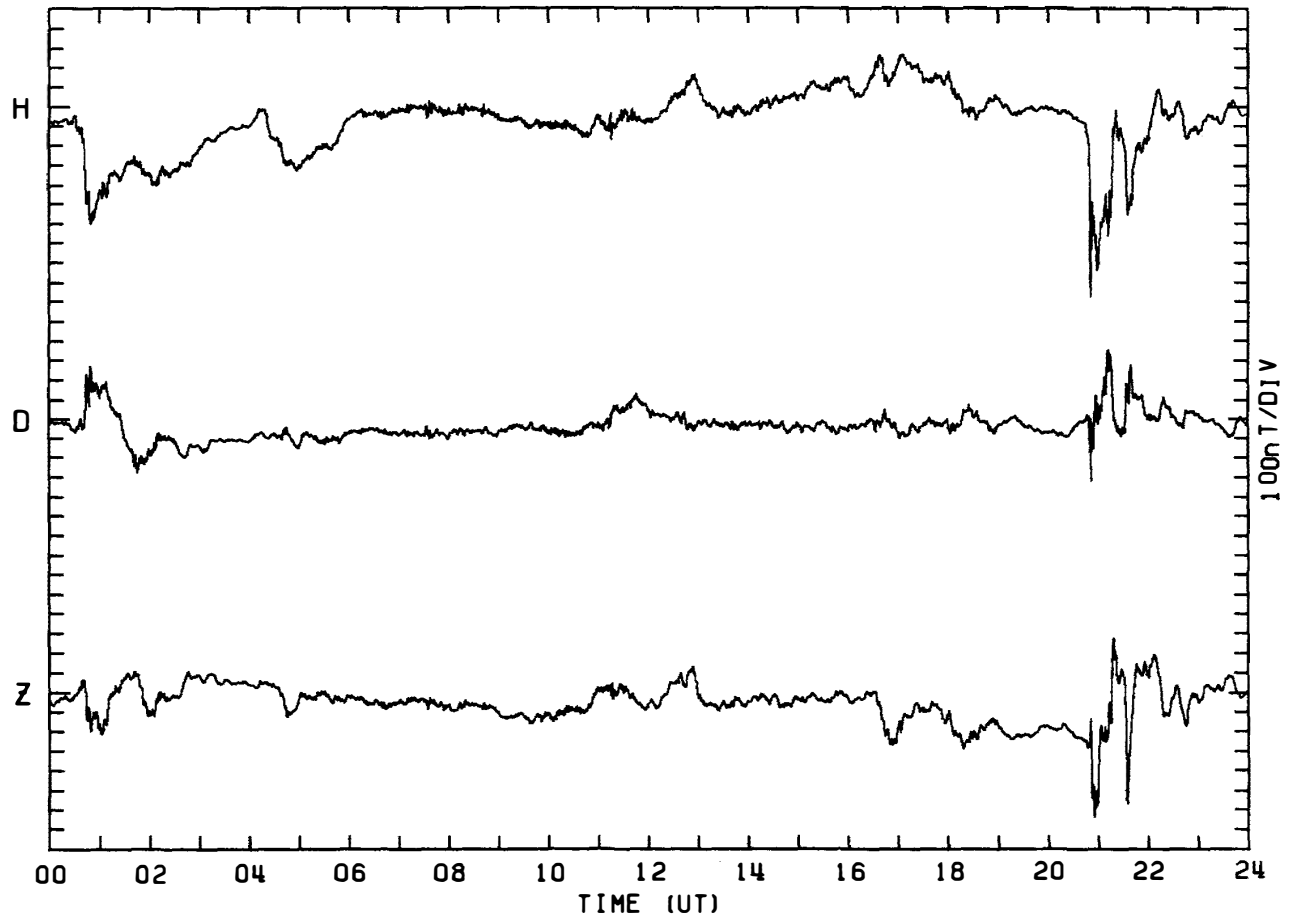
MAGNETOGRAM SYOWA STATION

DAY:213 AUGUST 1, 1982



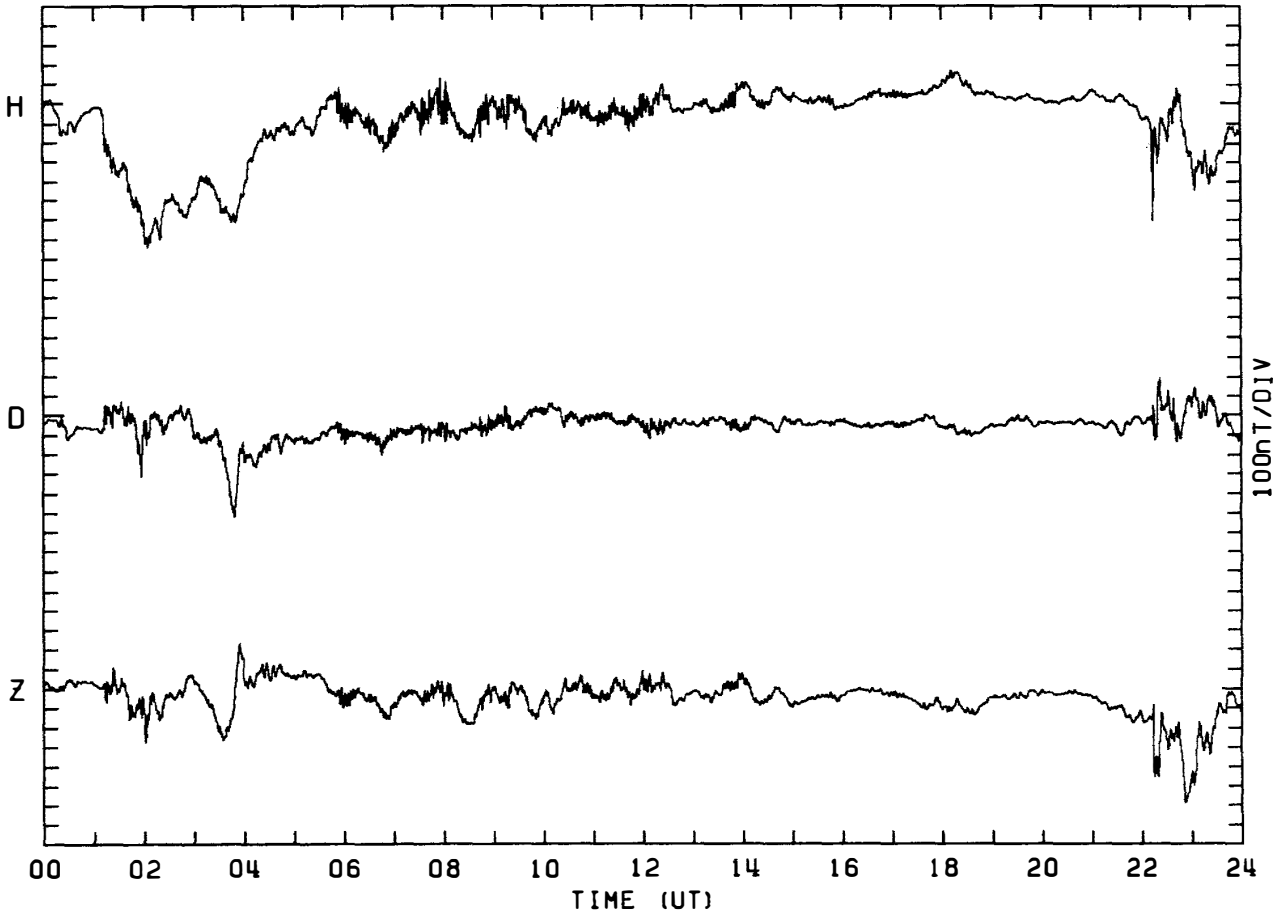
MAGNETOGRAM SYOWA STATION

DAY:214 AUGUST 2, 1982



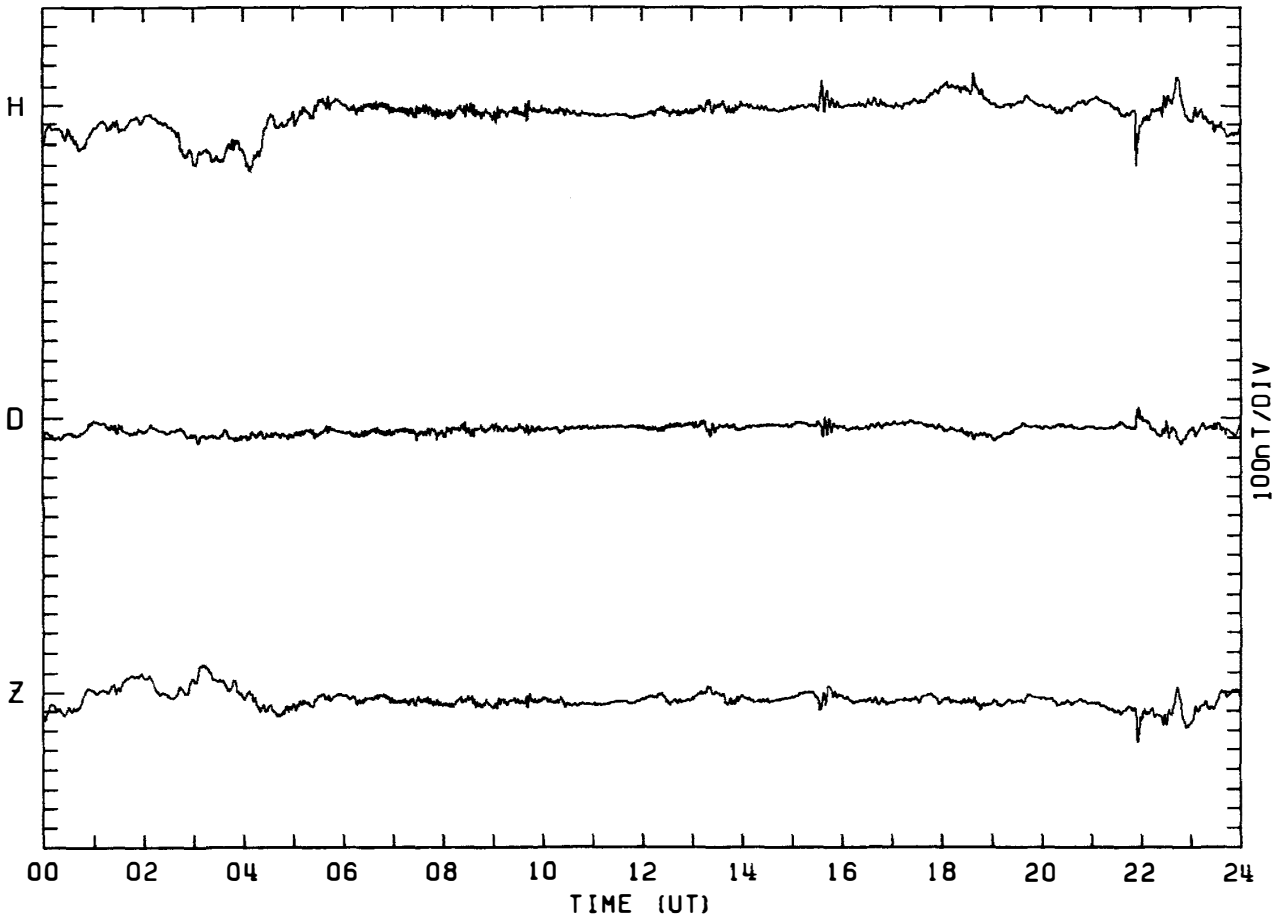
MAGNETOGRAM SYOWA STATION

DAY:215 AUGUST 3, 1982



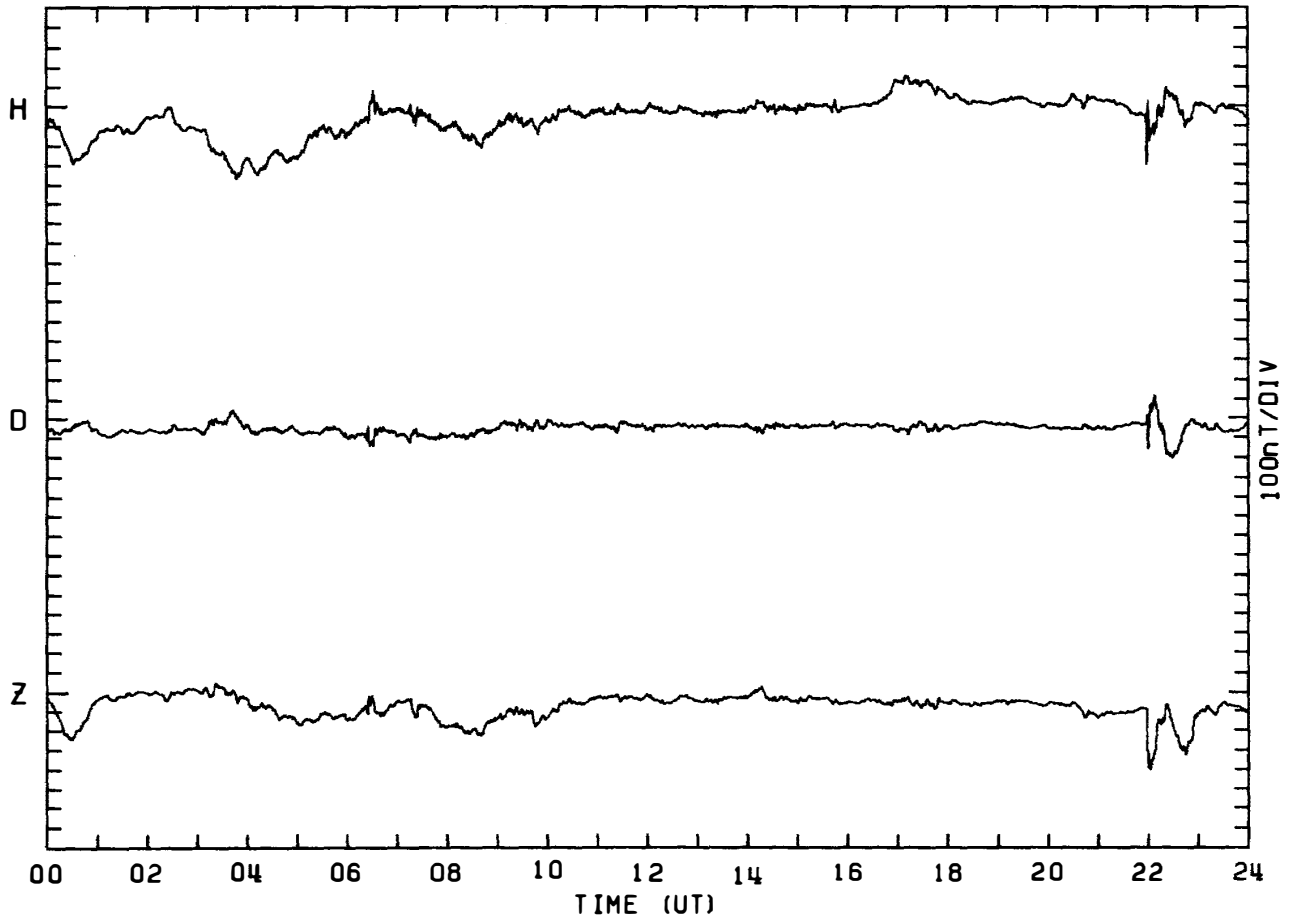
MAGNETOGRAM SYOWA STATION

DAY:216 AUGUST 4, 1982



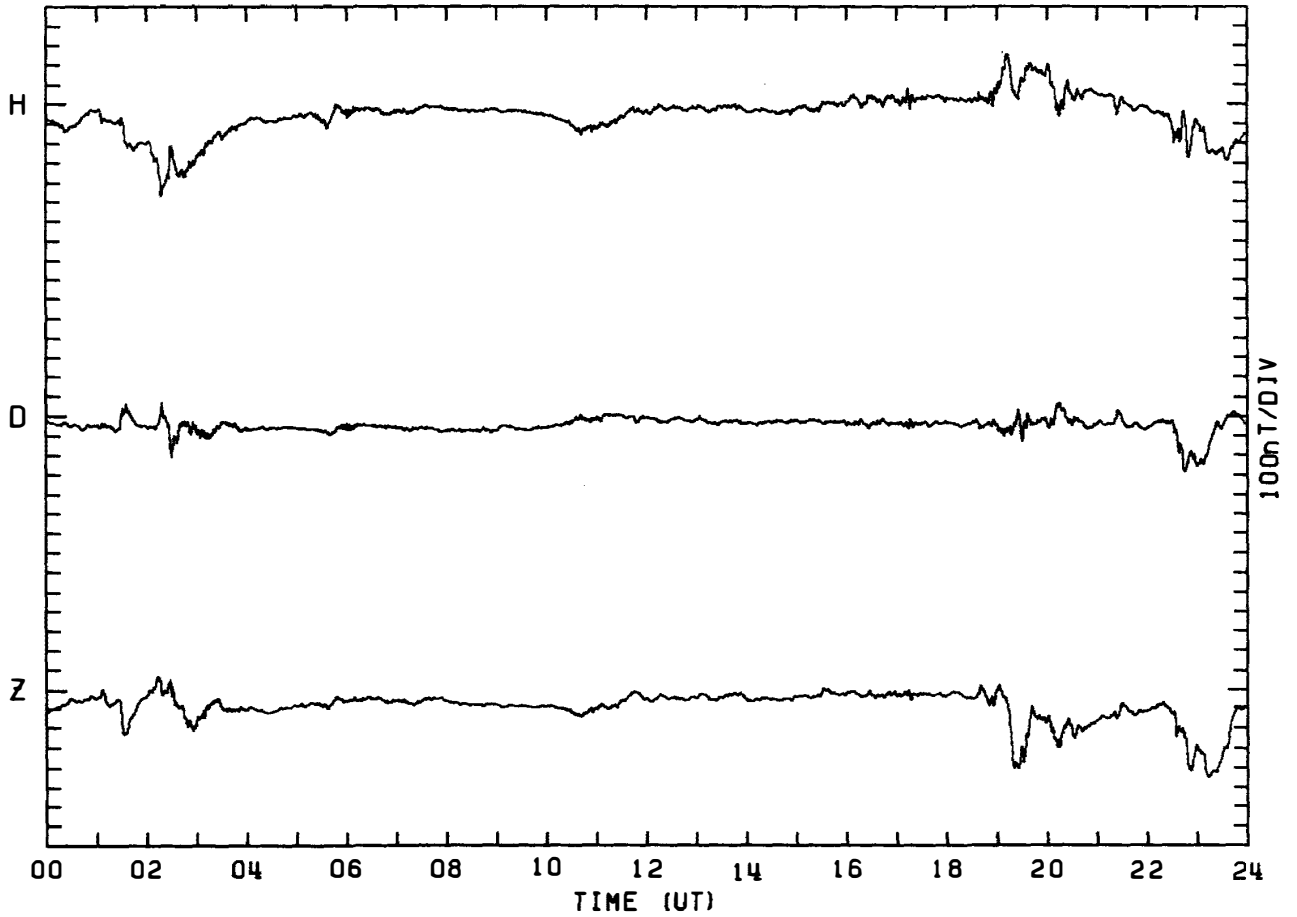
MAGNETOGRAM SYOWA STATION

DAY:217 AUGUST 5. 1982



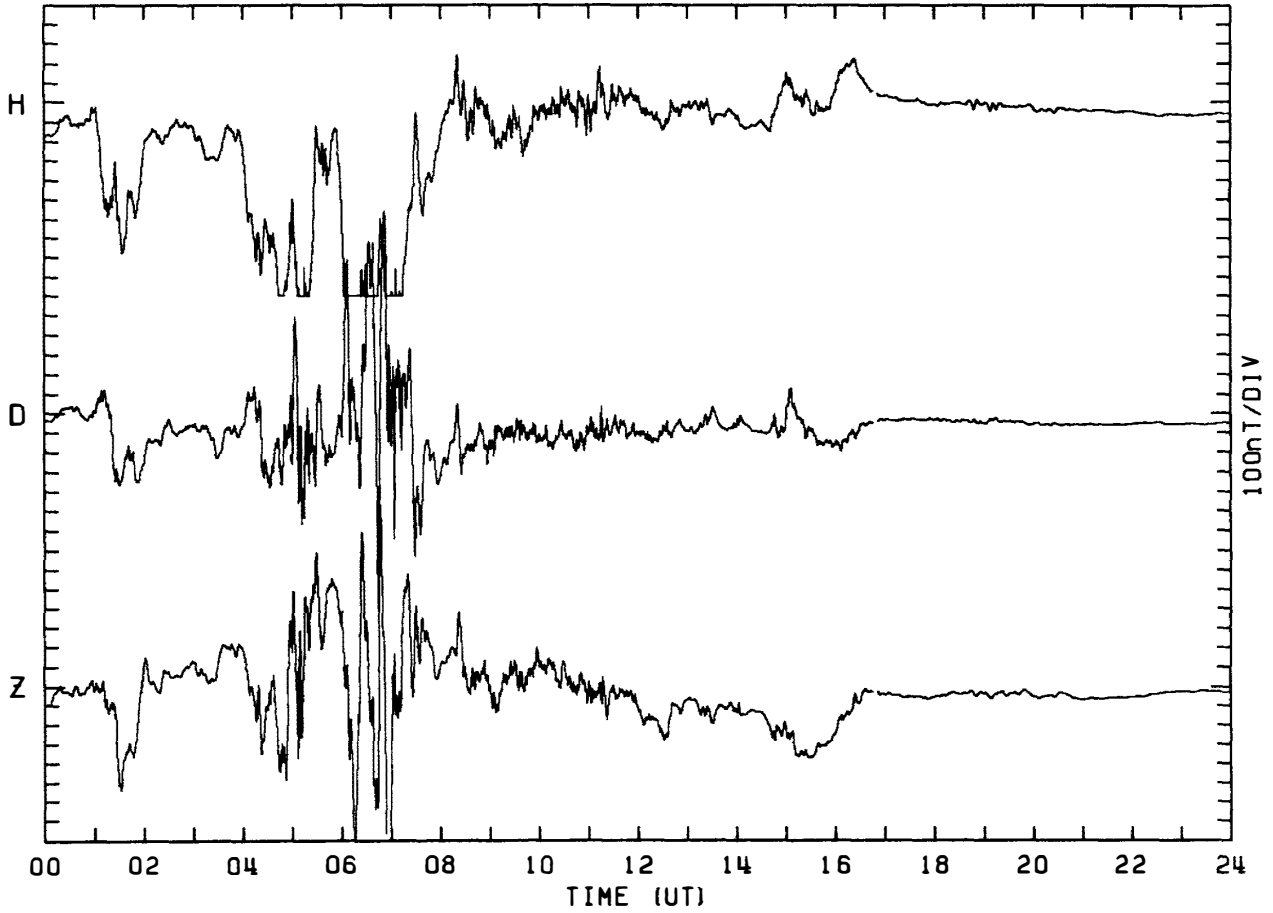
MAGNETOGRAM SYOWA STATION

DAY:218 AUGUST 6. 1982



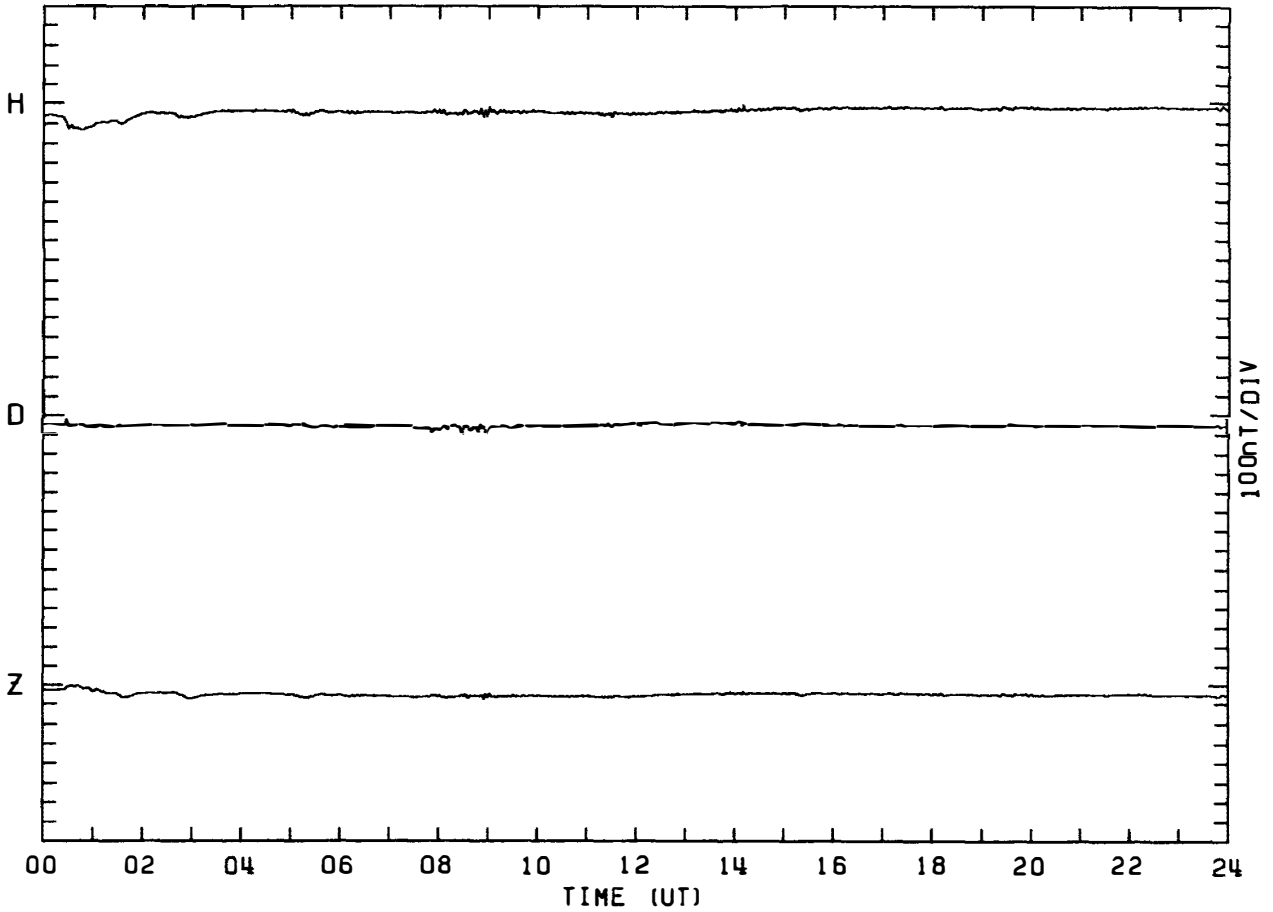
MAGNETOGRAM SYOWA STATION

DAY:219 AUGUST 7, 1982



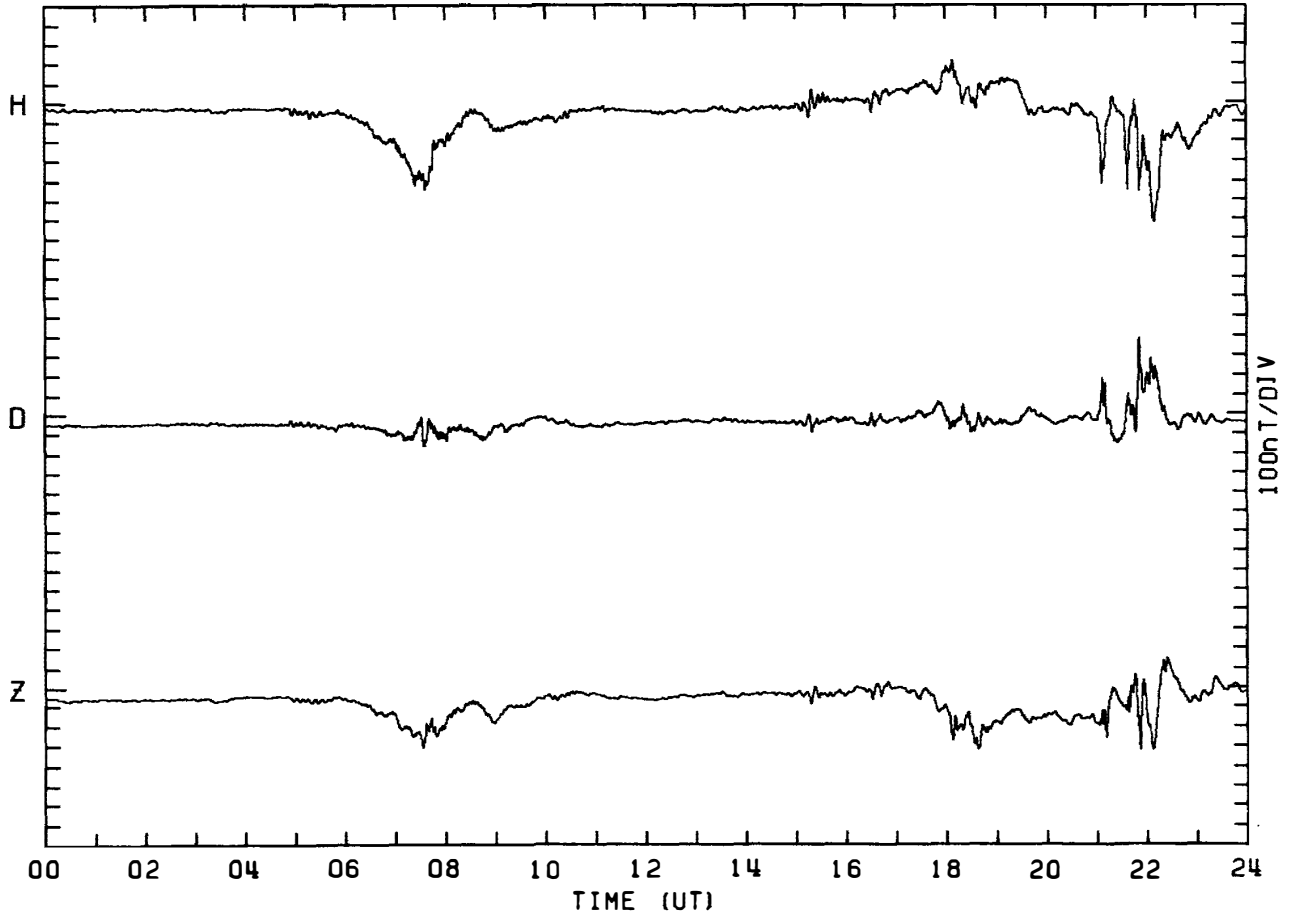
MAGNETOGRAM SYOWA STATION

DAY:220 AUGUST 8, 1982



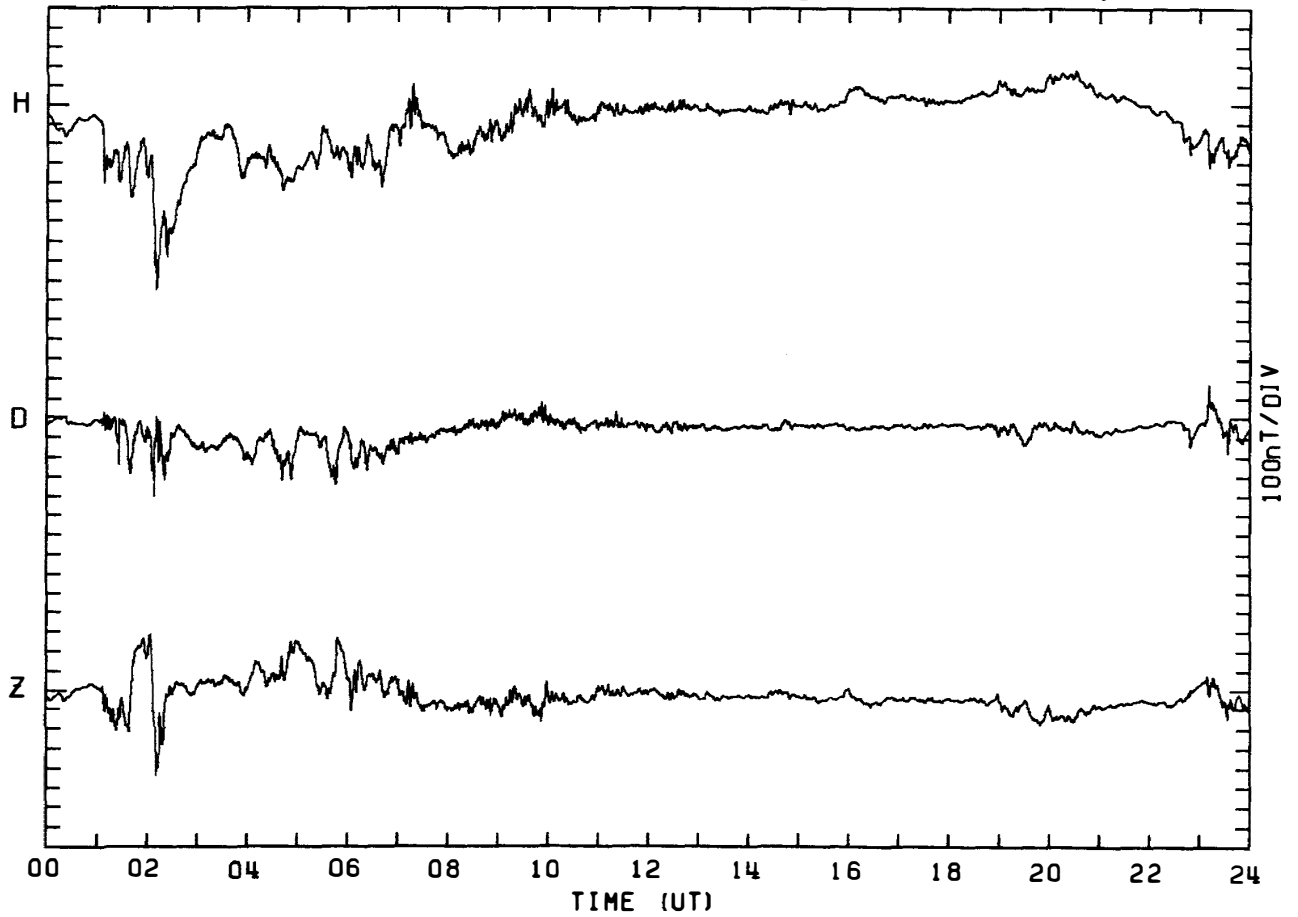
MAGNETOGRAM SYOWA STATION

DAY:221 AUGUST 9. 1982



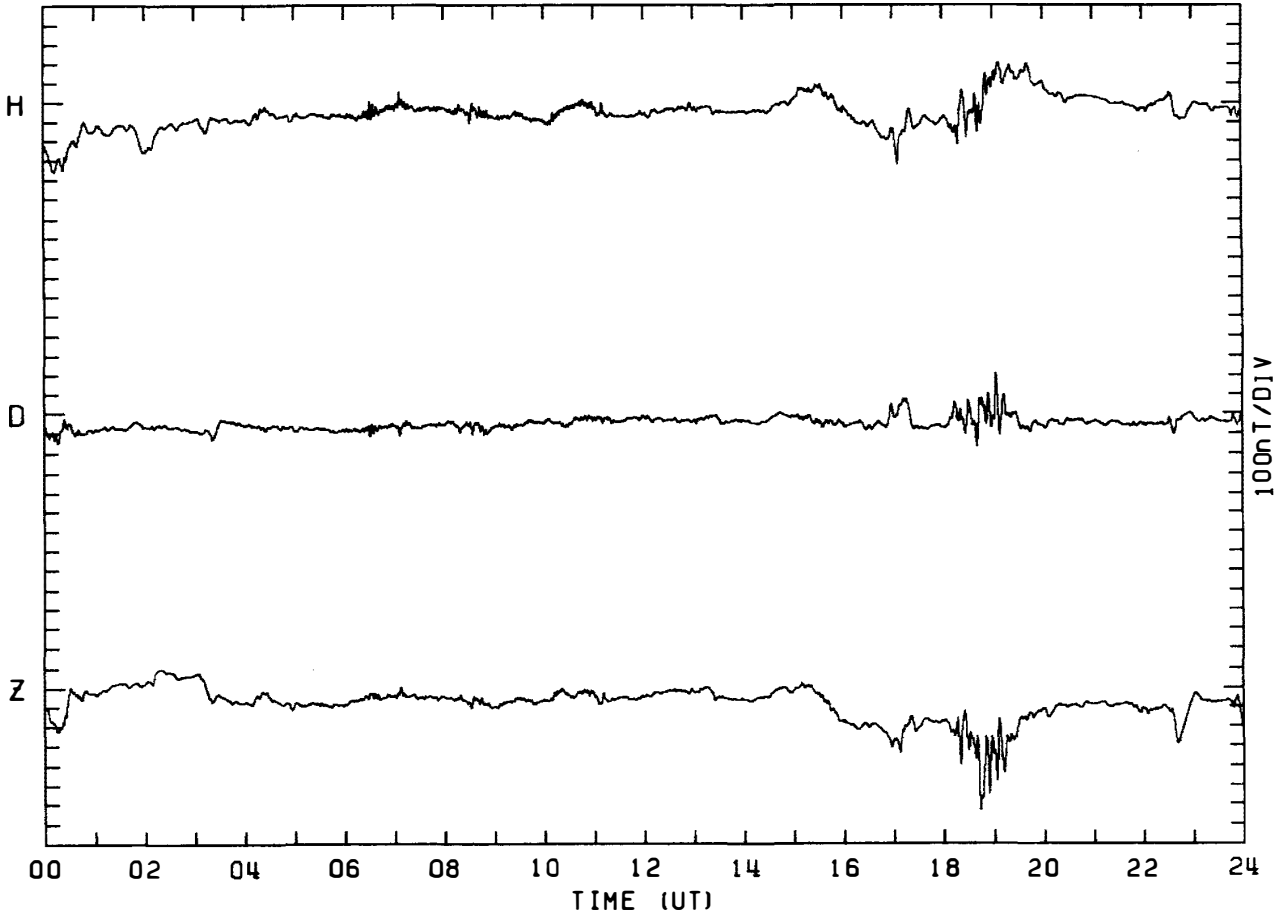
MAGNETOGRAM SYOWA STATION

DAY:222 AUGUST 10. 1982



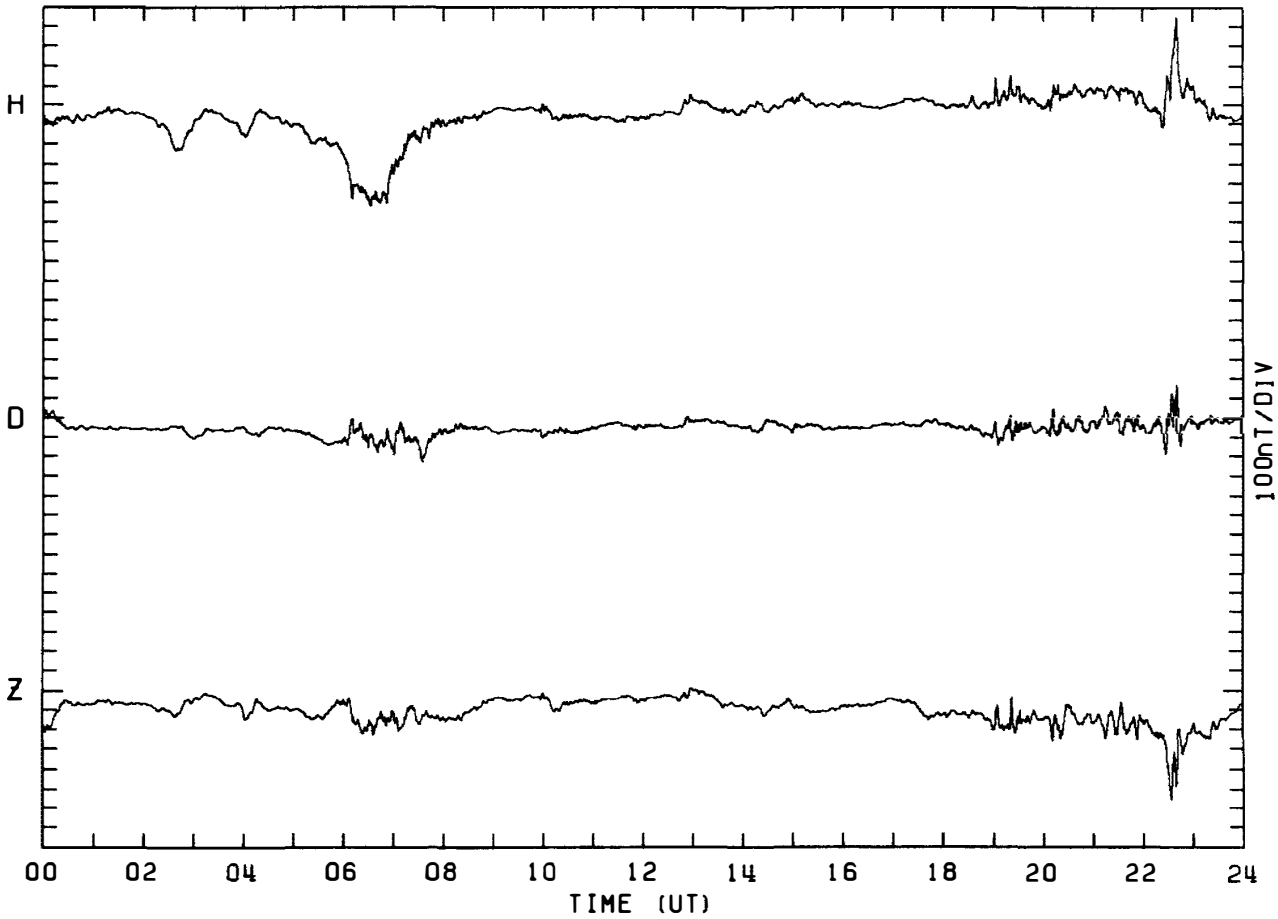
MAGNETOGRAM SYOWA STATION

DAY:223 AUGUST 11, 1982



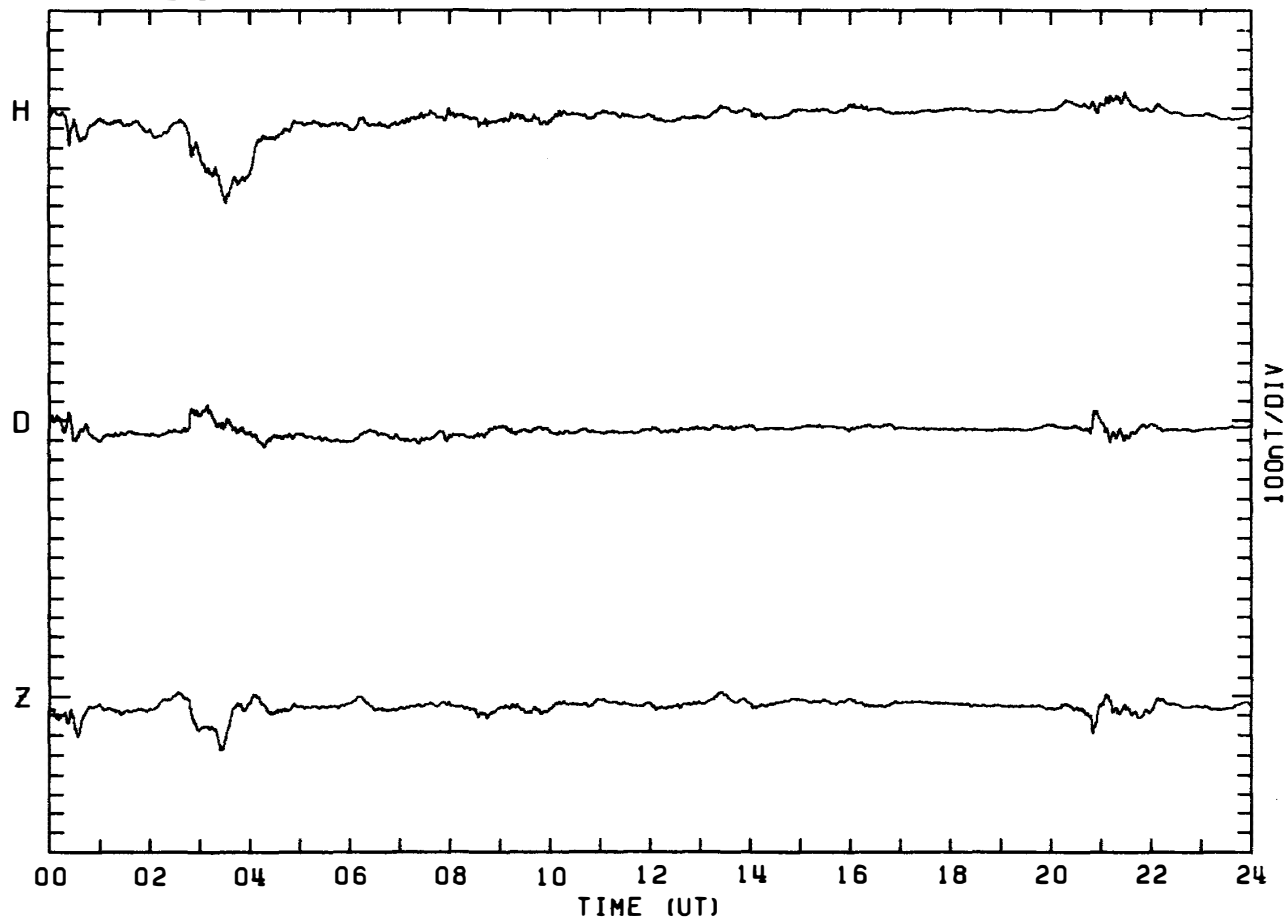
MAGNETOGRAM SYOWA STATION

DAY:224 AUGUST 12, 1982



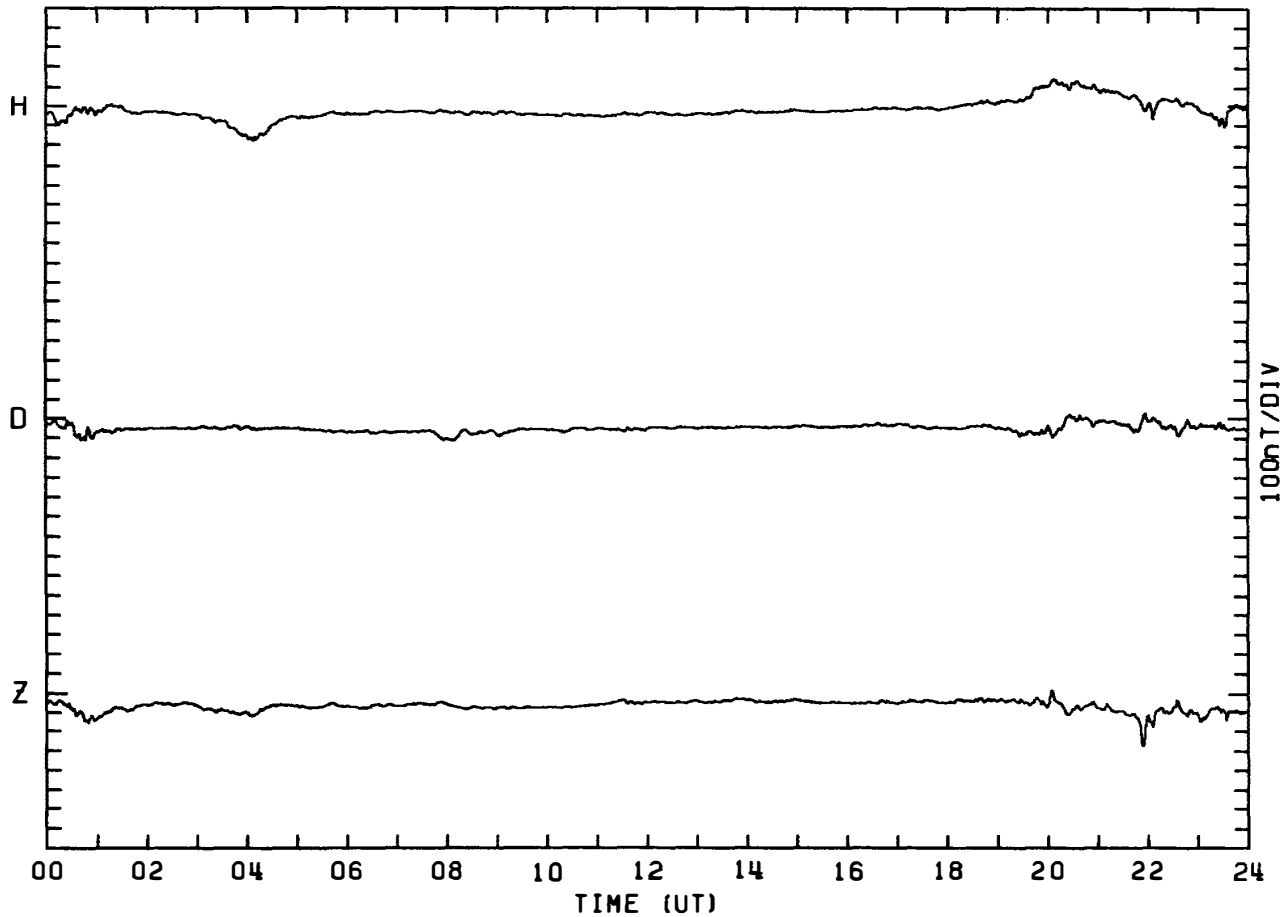
MAGNETOGRAM SYOWA STATION

DAY:225 AUGUST 13, 1982



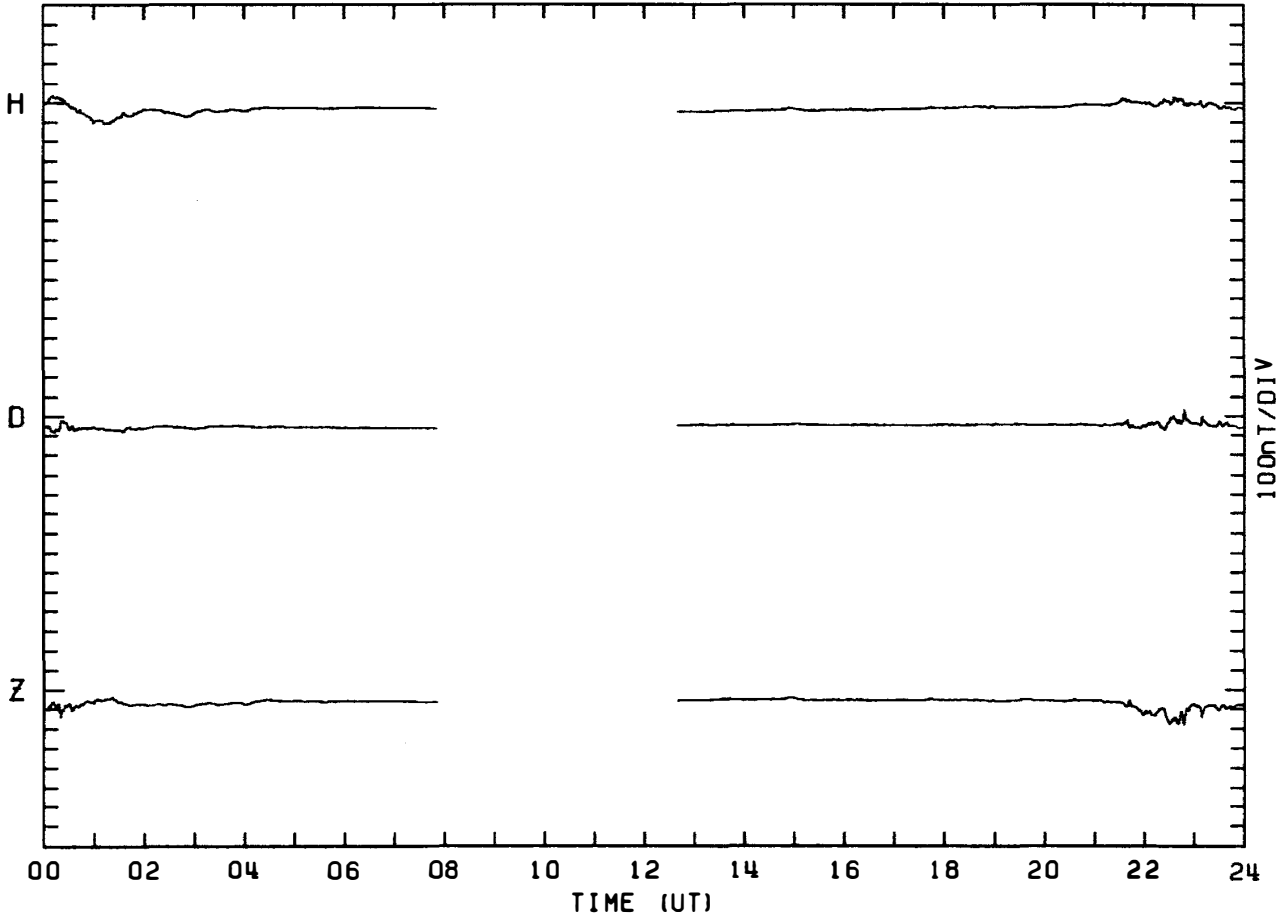
MAGNETOGRAM SYOWA STATION

DAY:226 AUGUST 14, 1982



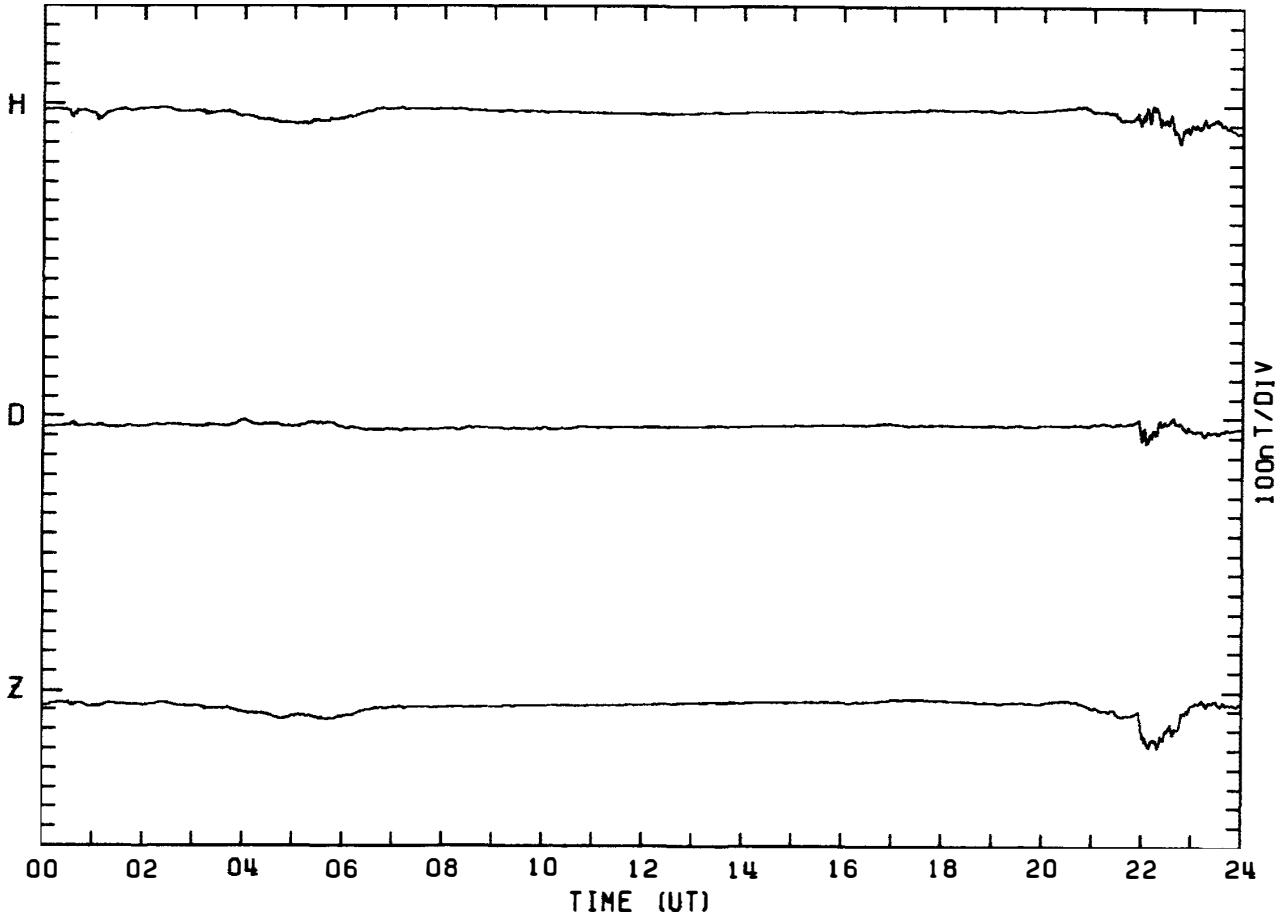
MAGNETOGRAM SYOWA STATION

DAY:227 AUGUST 15, 1982



MAGNETOGRAM SYOWA STATION

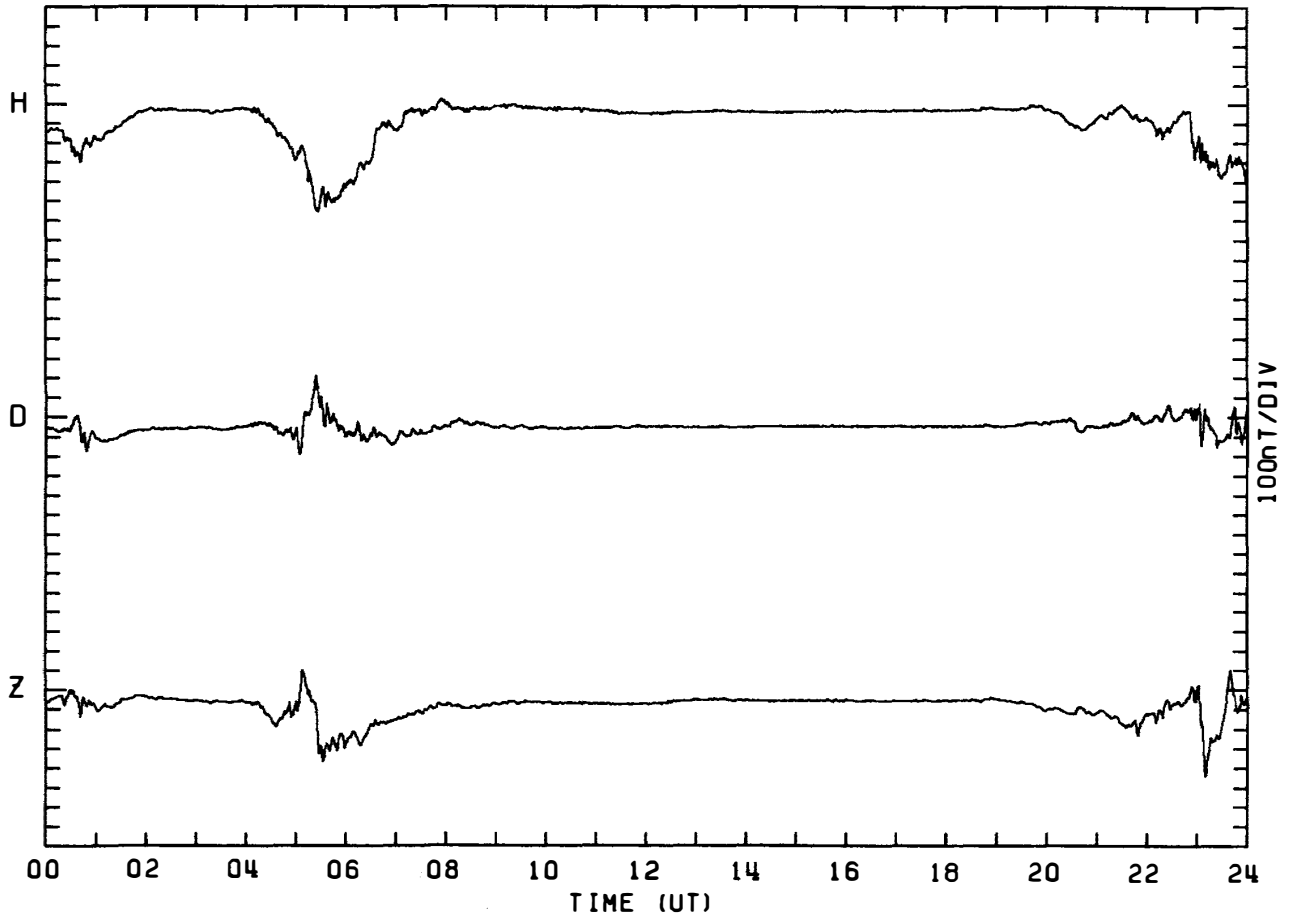
DAY:228 AUGUST 16, 1982





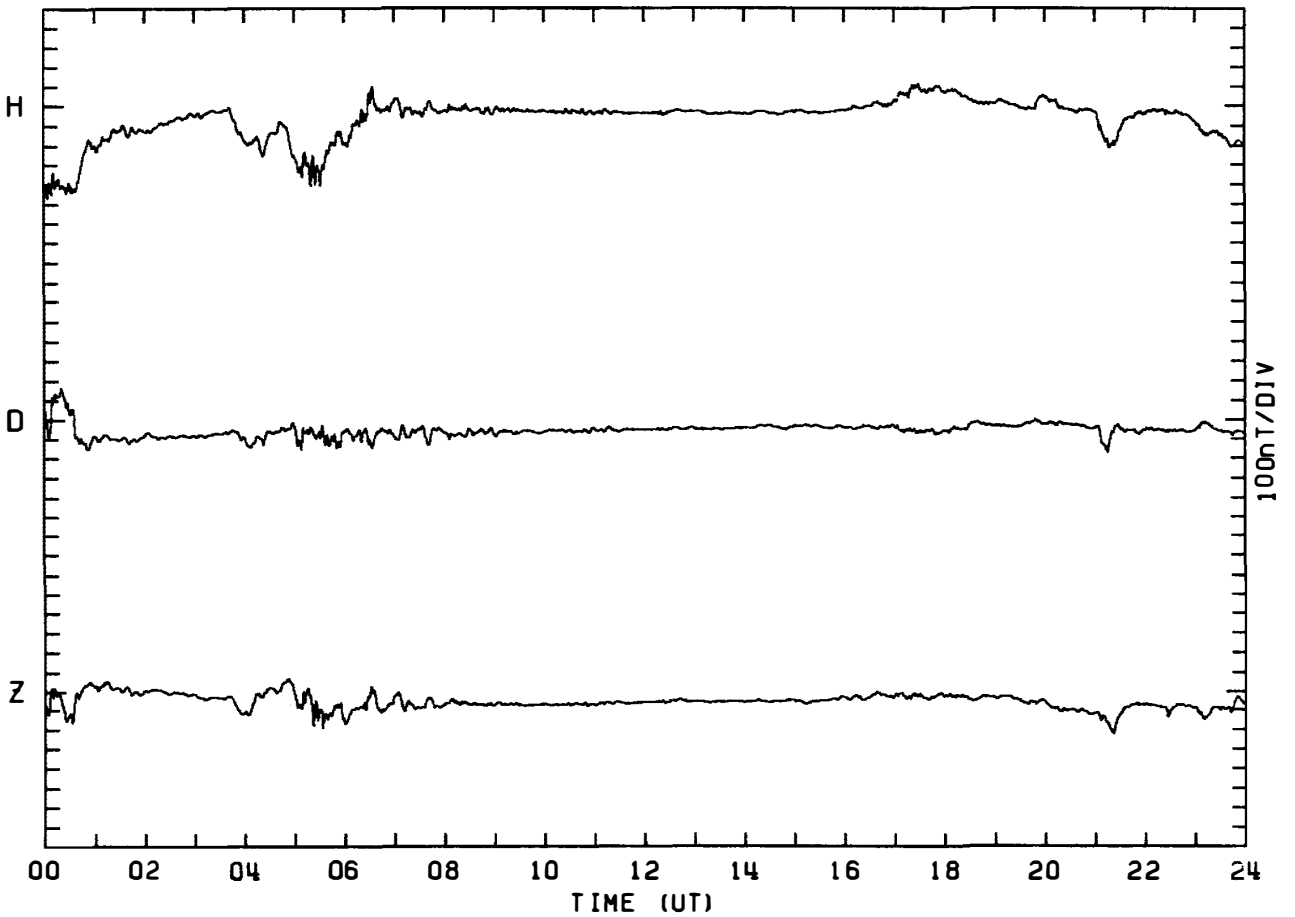
MAGNETOGRAM SYOWA STATION

DAY:229 AUGUST 17, 1982



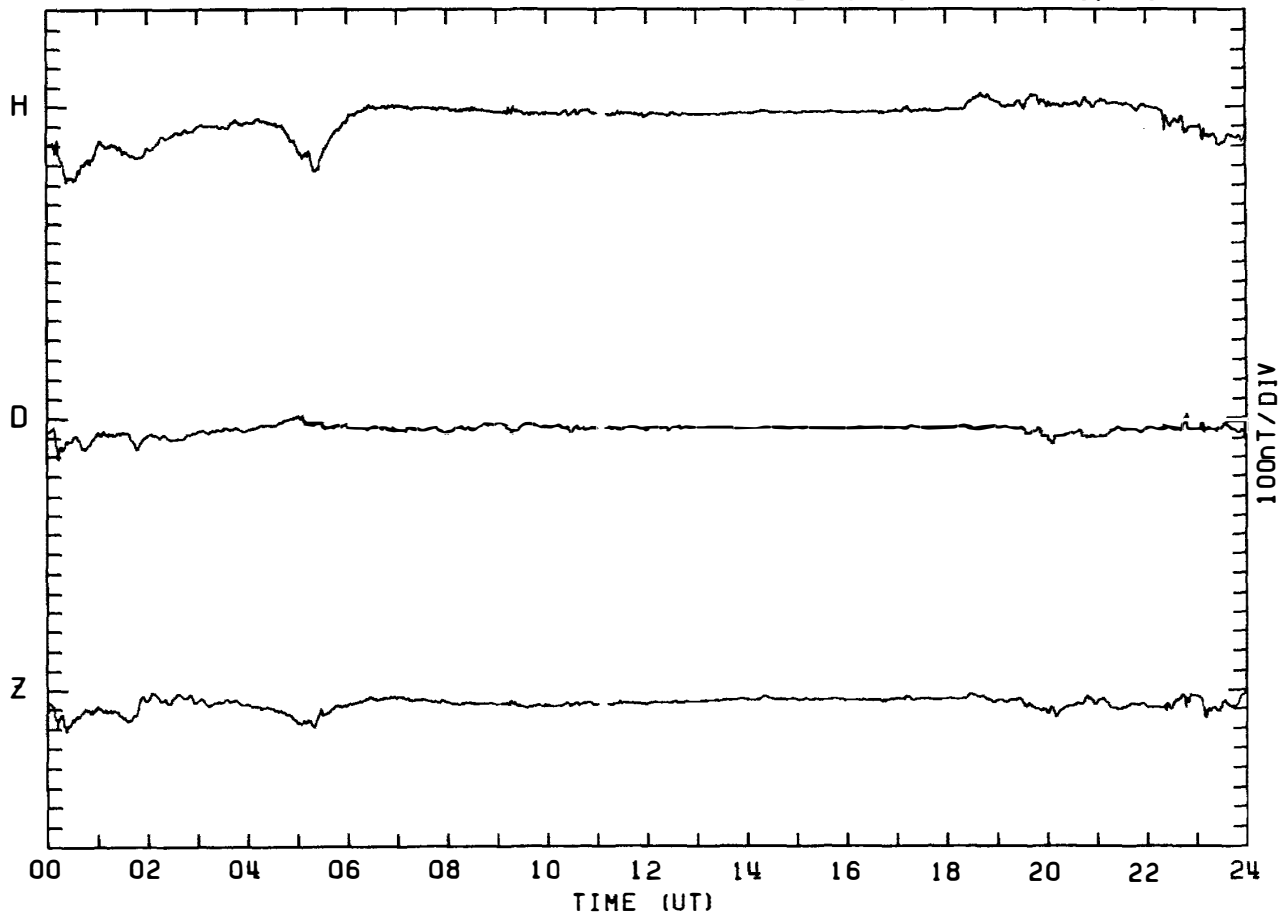
MAGNETOGRAM SYOWA STATION

DAY:230 AUGUST 18, 1982



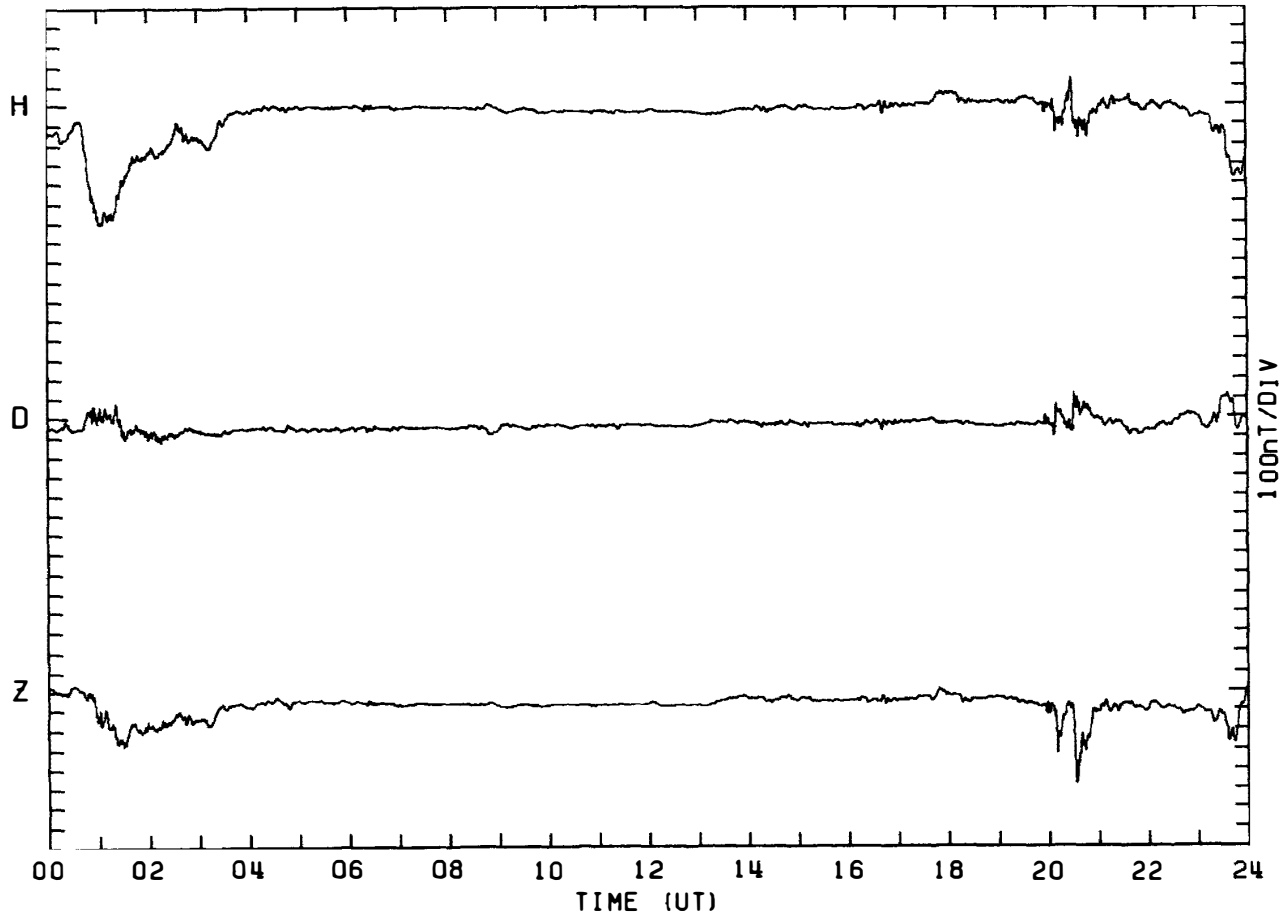
MAGNETOGRAM SYOWA STATION

DAY:231 AUGUST 19. 1982



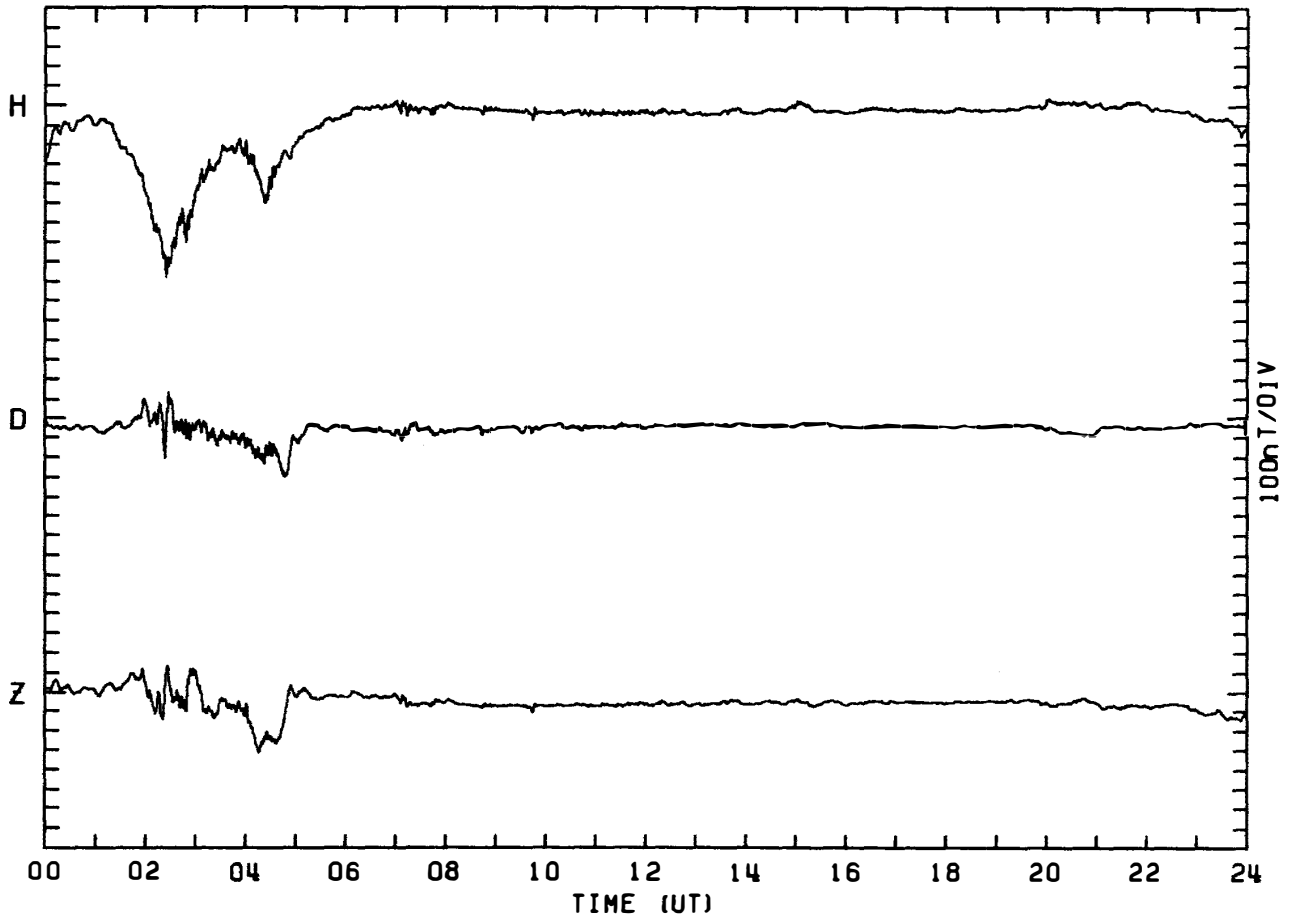
MAGNETOGRAM SYOWA STATION

DAY:232 AUGUST 20. 1982



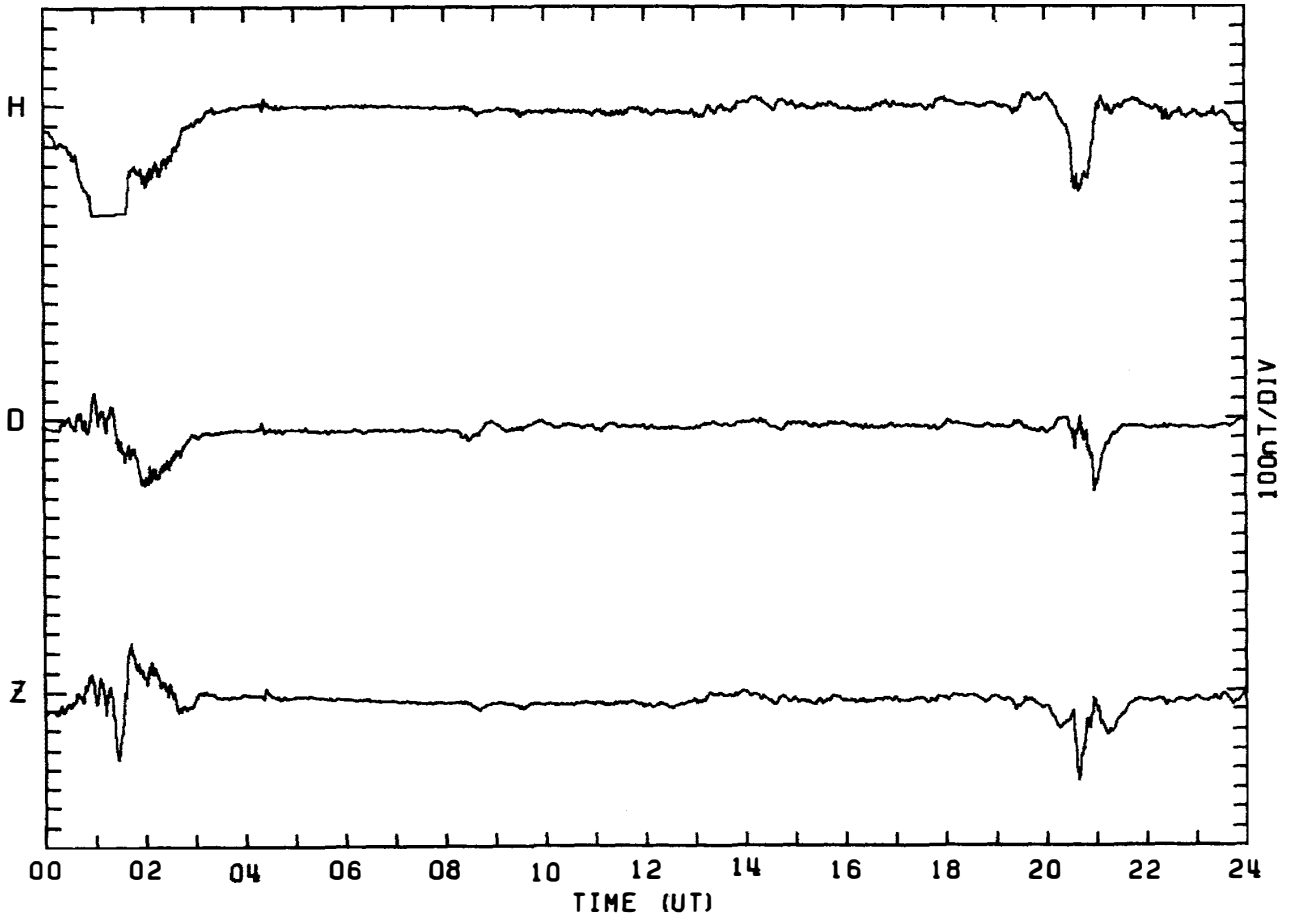
MAGNETOGRAM SYOWA STATION

DAY:233 AUGUST 21, 1982



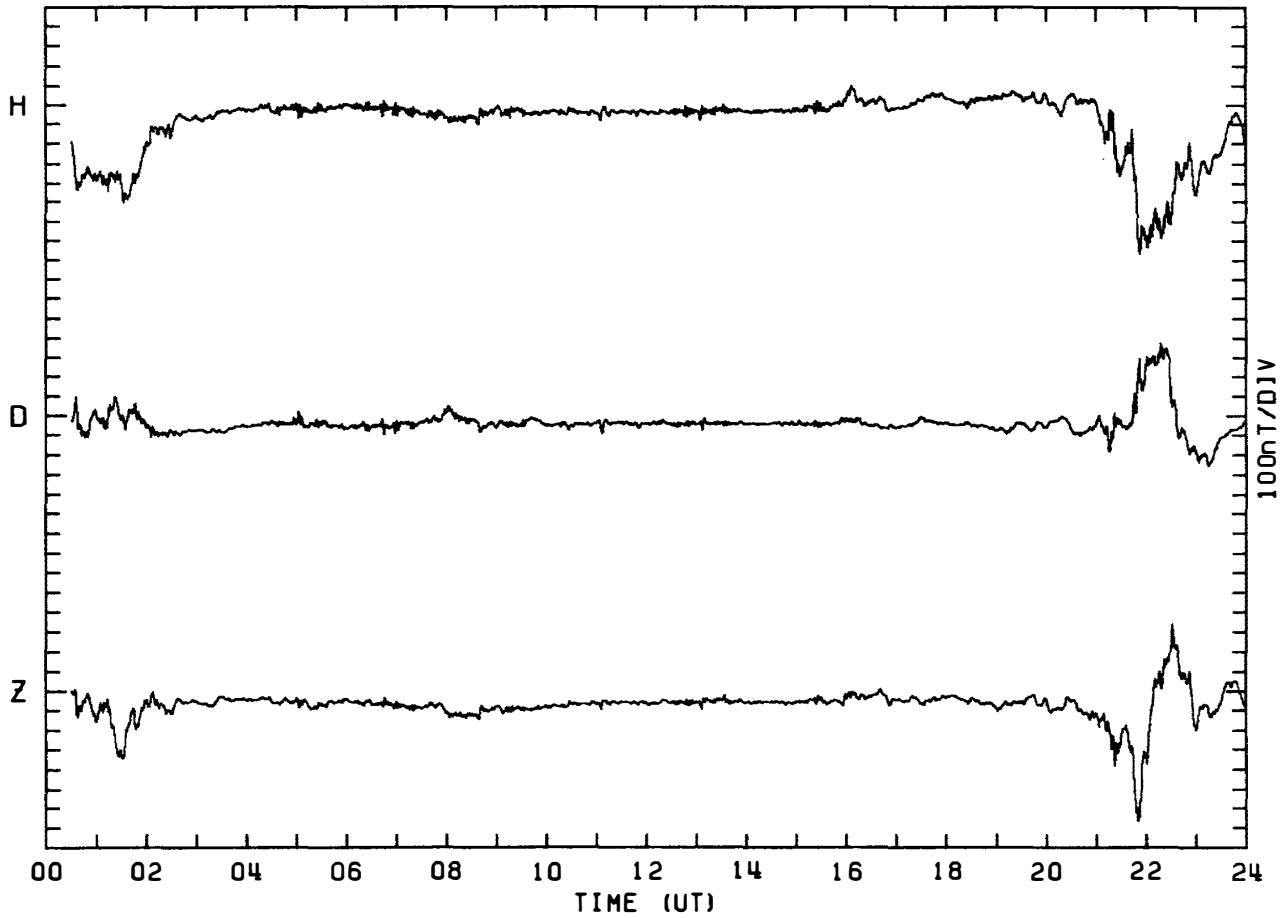
MAGNETOGRAM SYOWA STATION

DAY:234 AUGUST 22, 1982



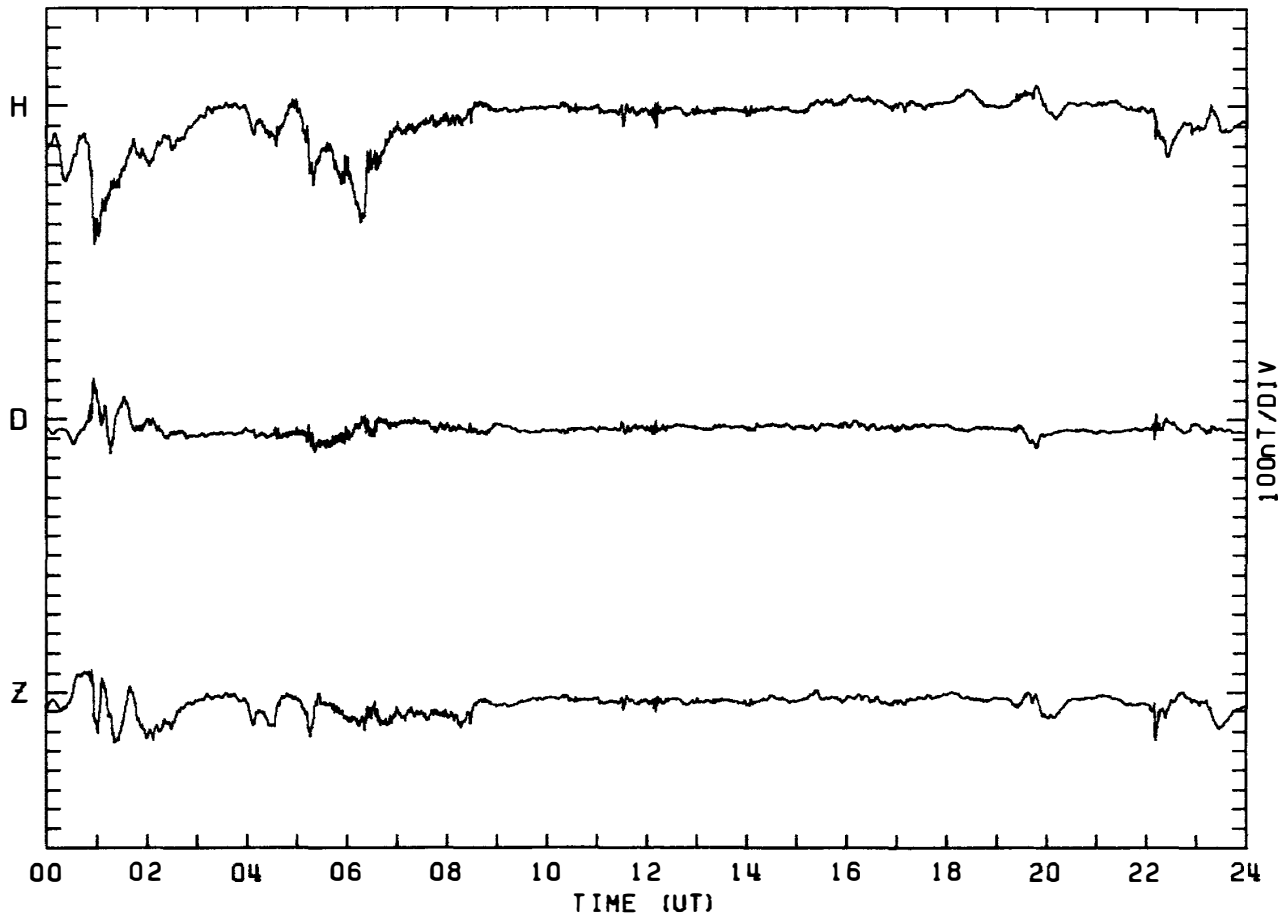
MAGNETOGRAM SYOWA STATION

DAY:235 AUGUST 23, 1982



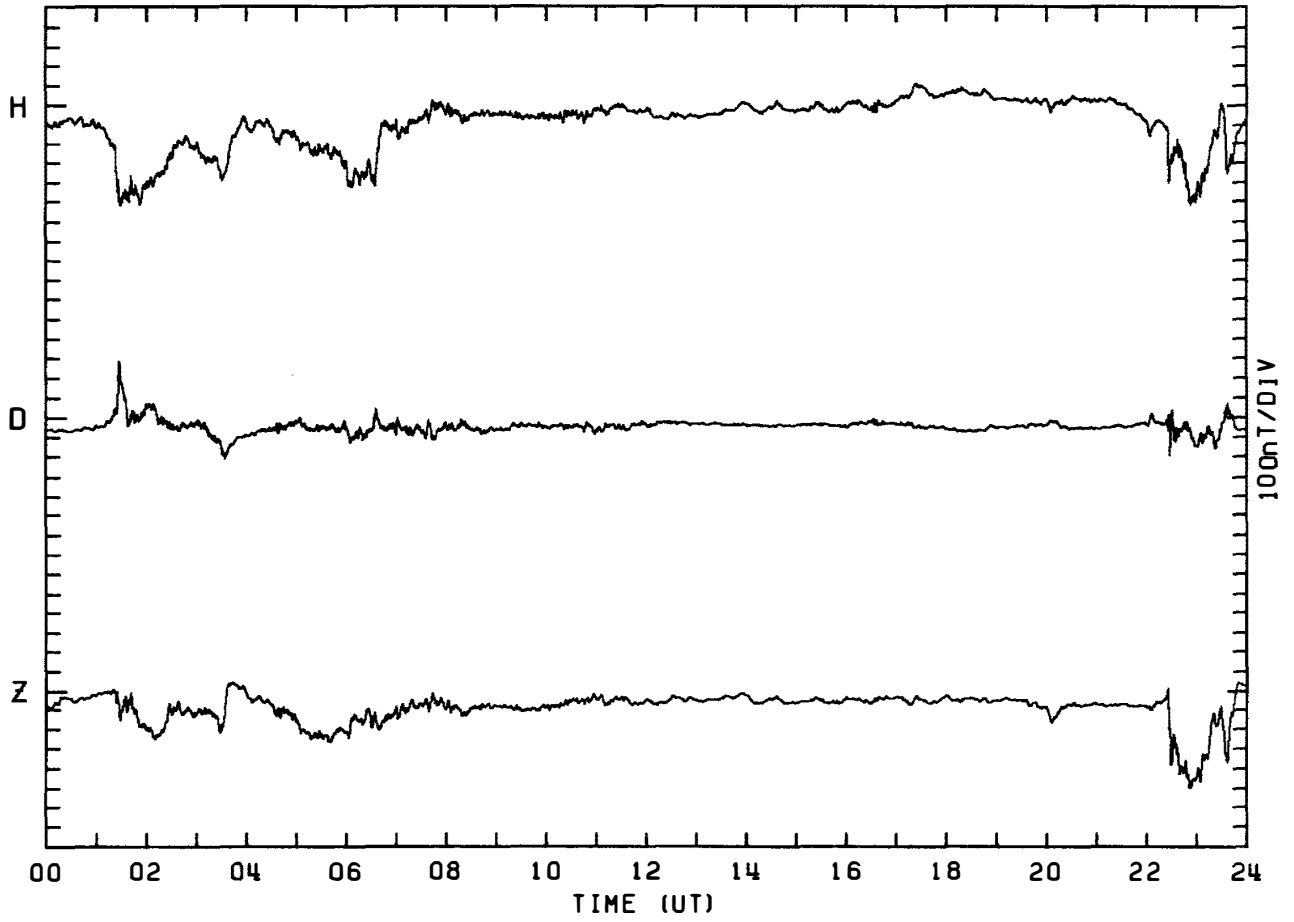
MAGNETOGRAM SYOWA STATION

DAY:236 AUGUST 24, 1982



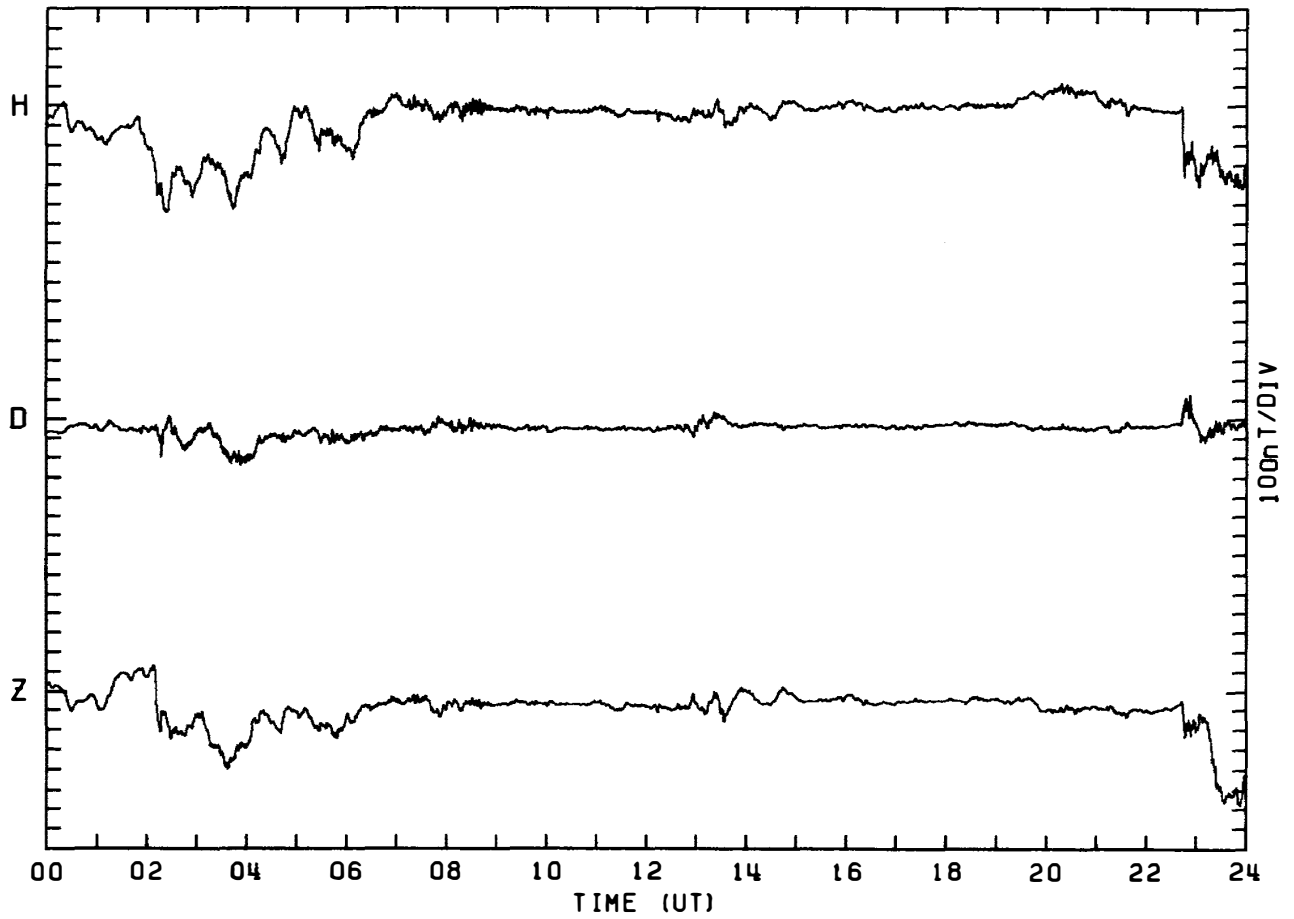
MAGNETOGRAM SYOWA STATION

DAY:237 AUGUST 25, 1982



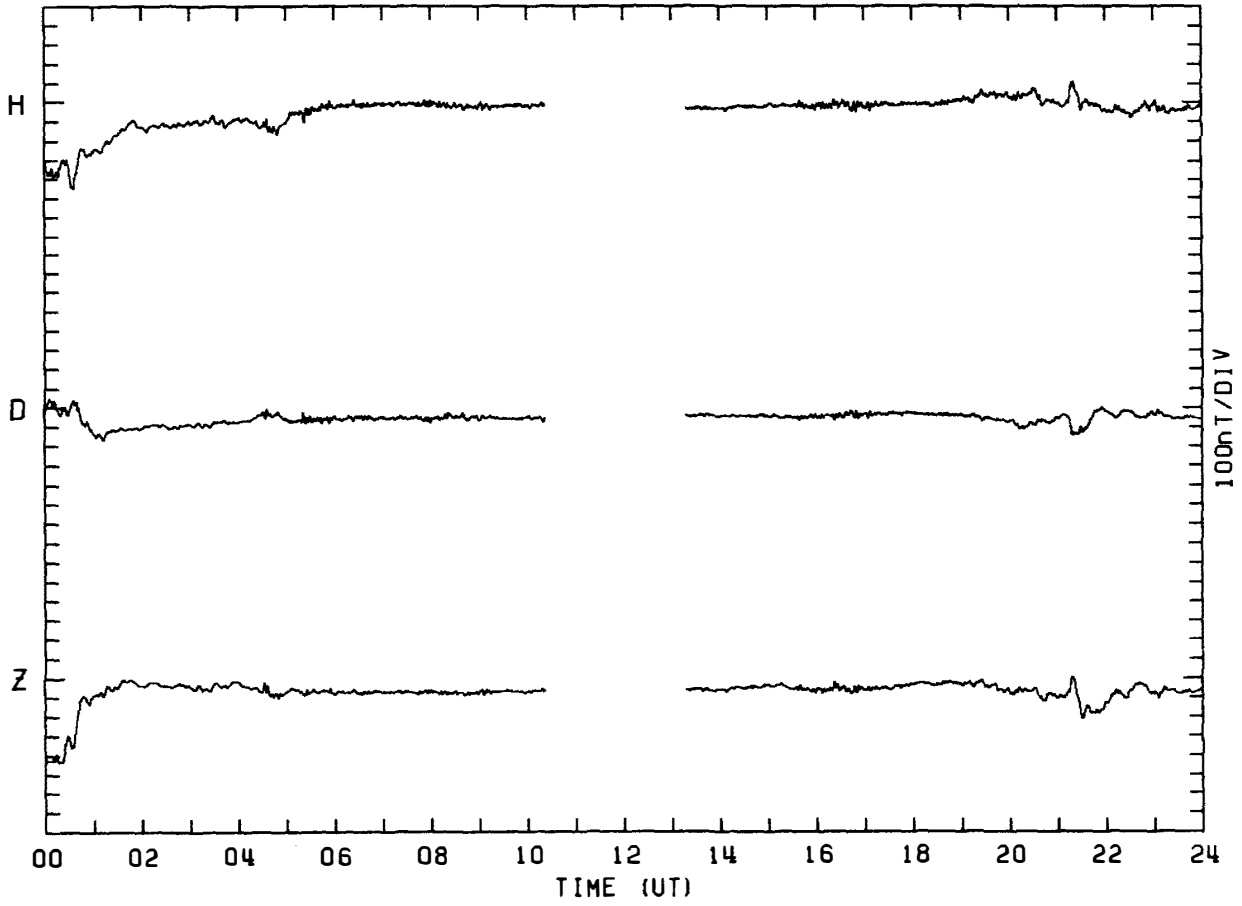
MAGNETOGRAM SYOWA STATION

DAY:238 AUGUST 26, 1982



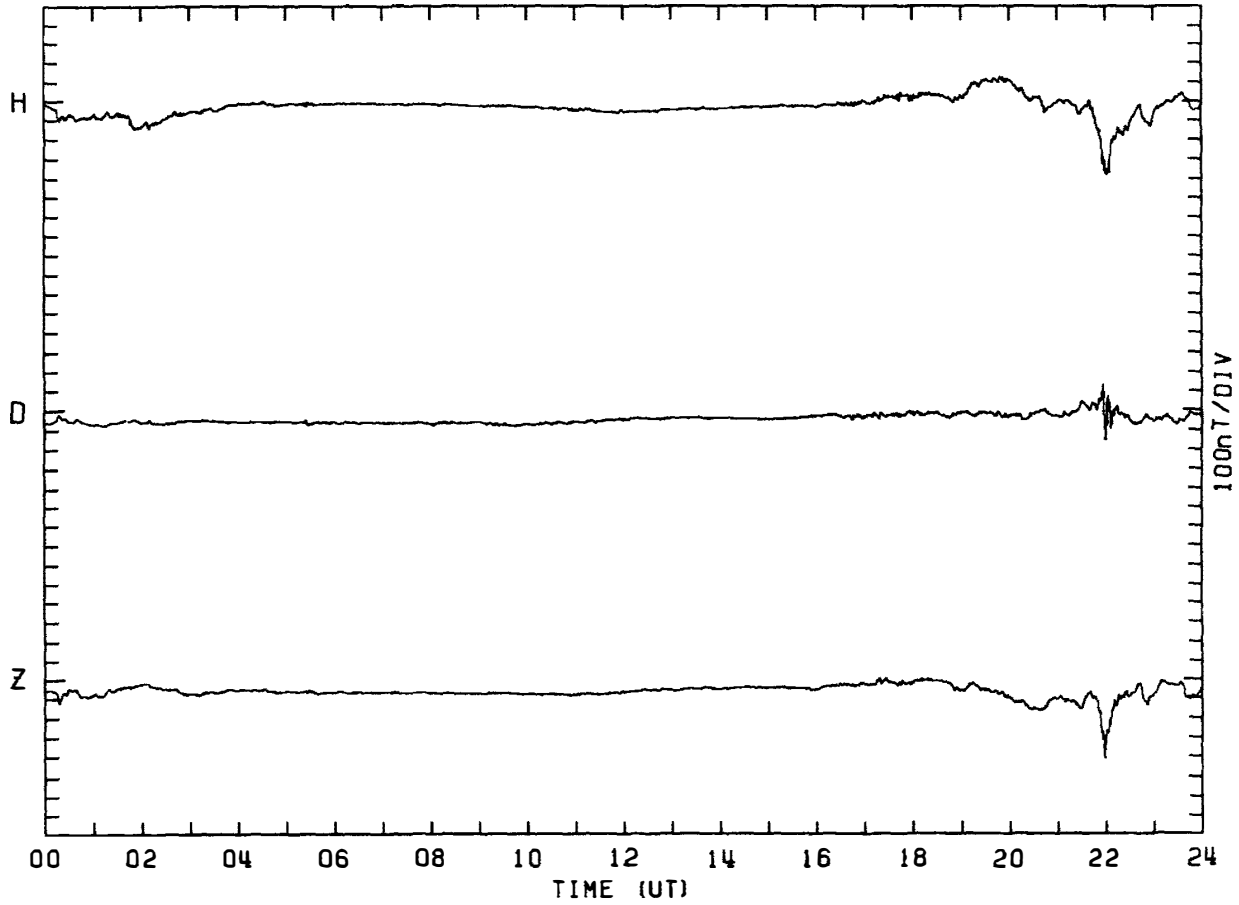
MAGNETOGRAM SYOWA STATION

DAY:239 AUGUST 27, 1982



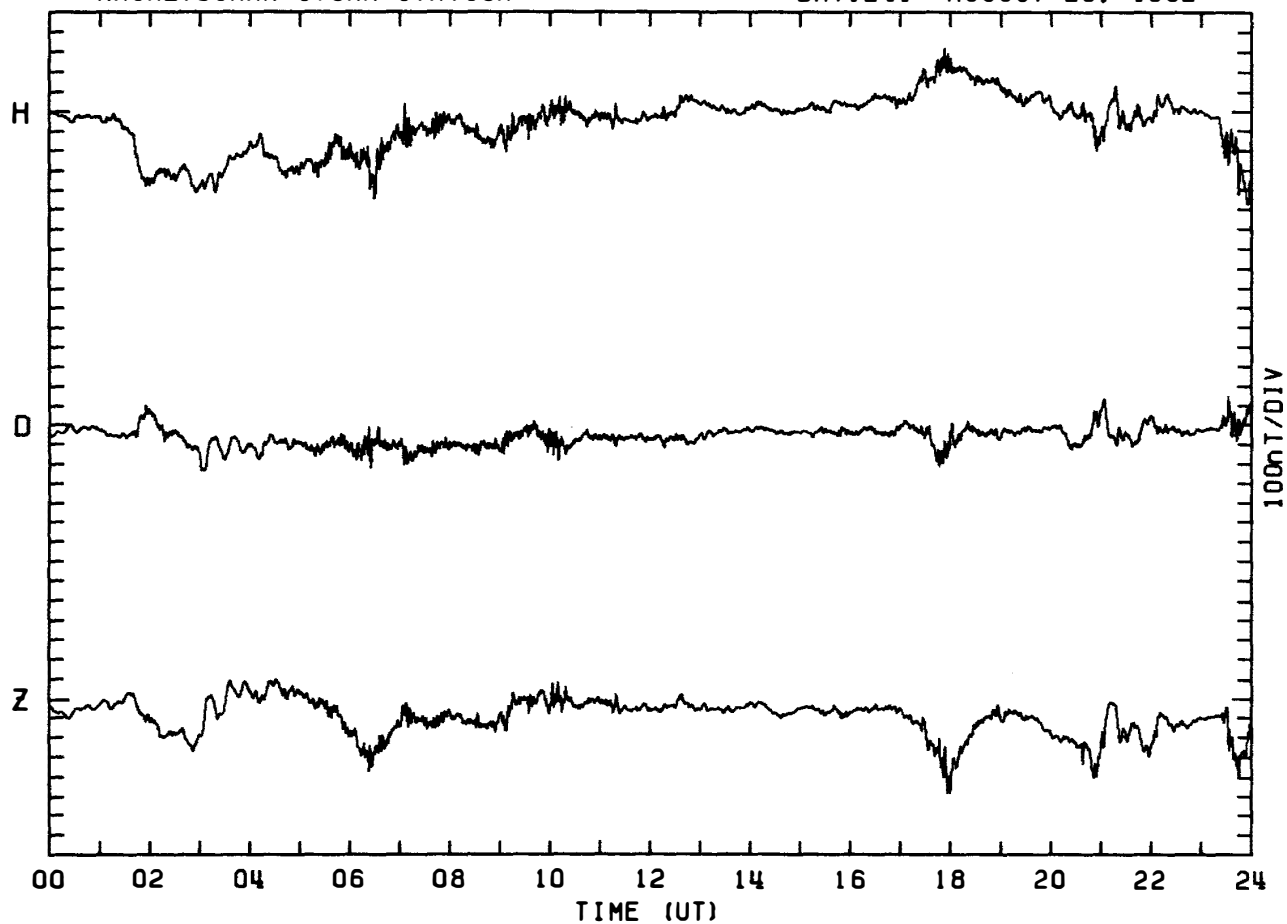
MAGNETOGRAM SYOWA STATION

DAY:240 AUGUST 28, 1982



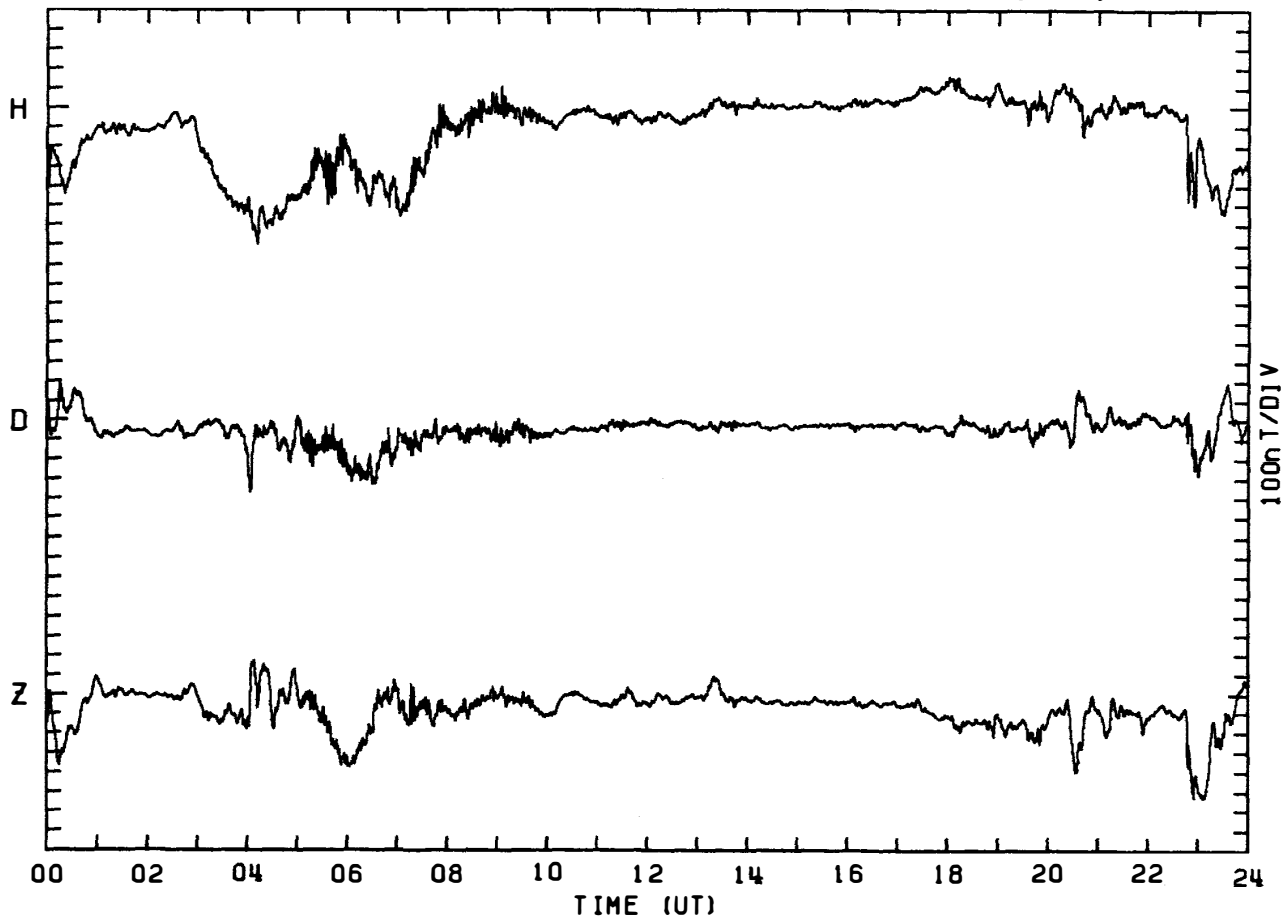
MAGNETOGRAM SYOWA STATION

DAY:241 AUGUST 29, 1982



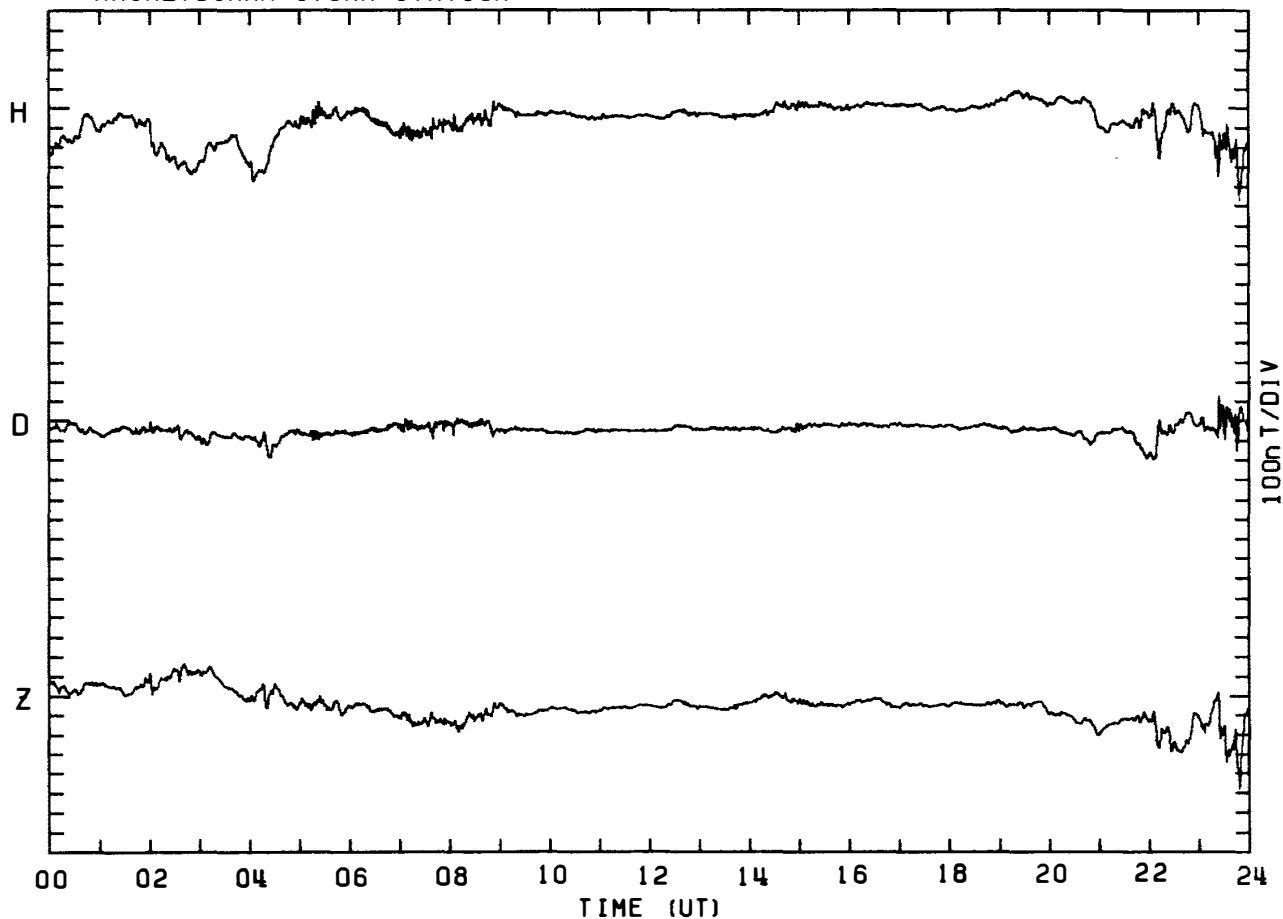
MAGNETOGRAM SYOWA STATION

DAY:242 AUGUST 30, 1982



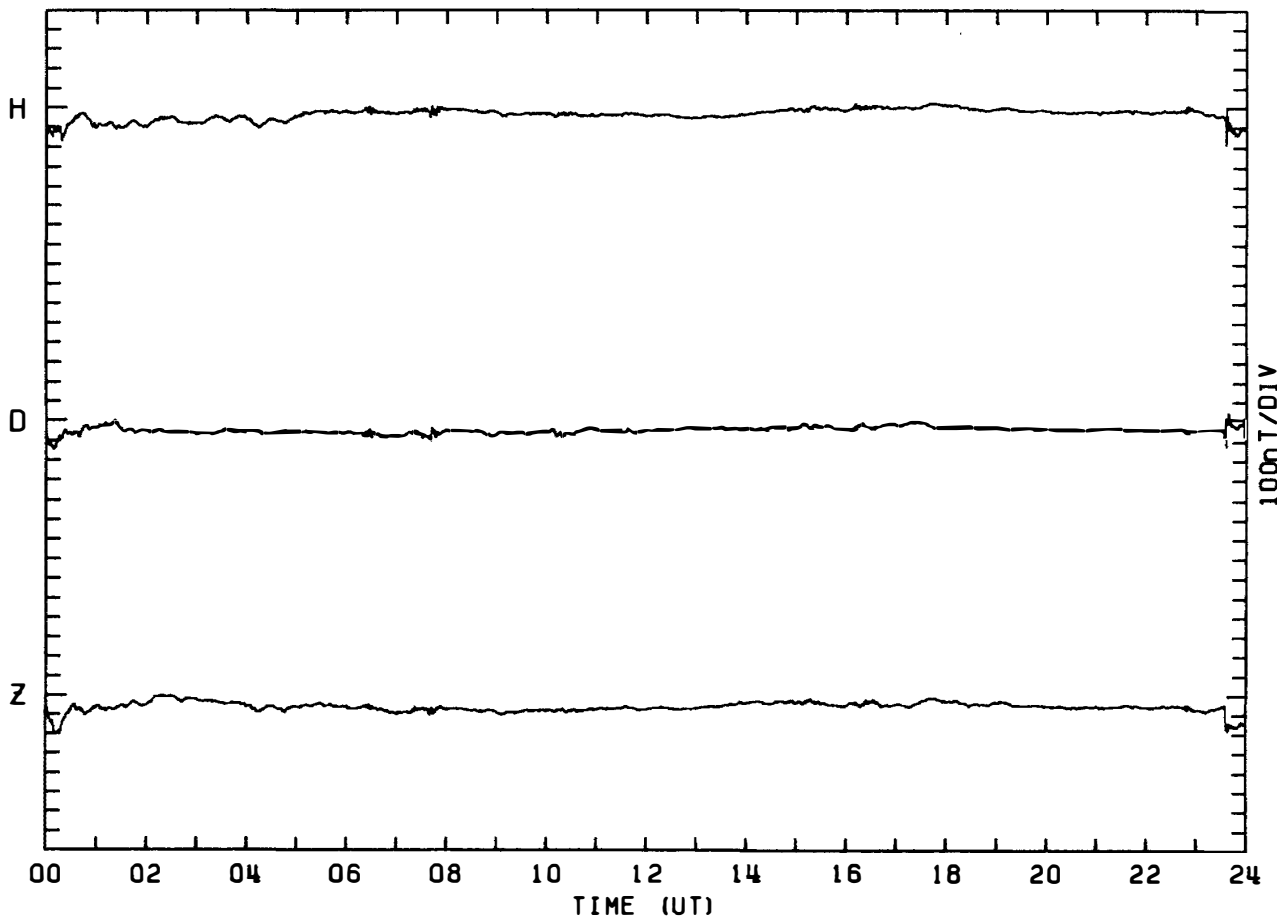
MAGNETOGRAM SYOWA STATION

DAY:243 AUGUST 31, 1982



MAGNETOGRAM SYOWA STATION

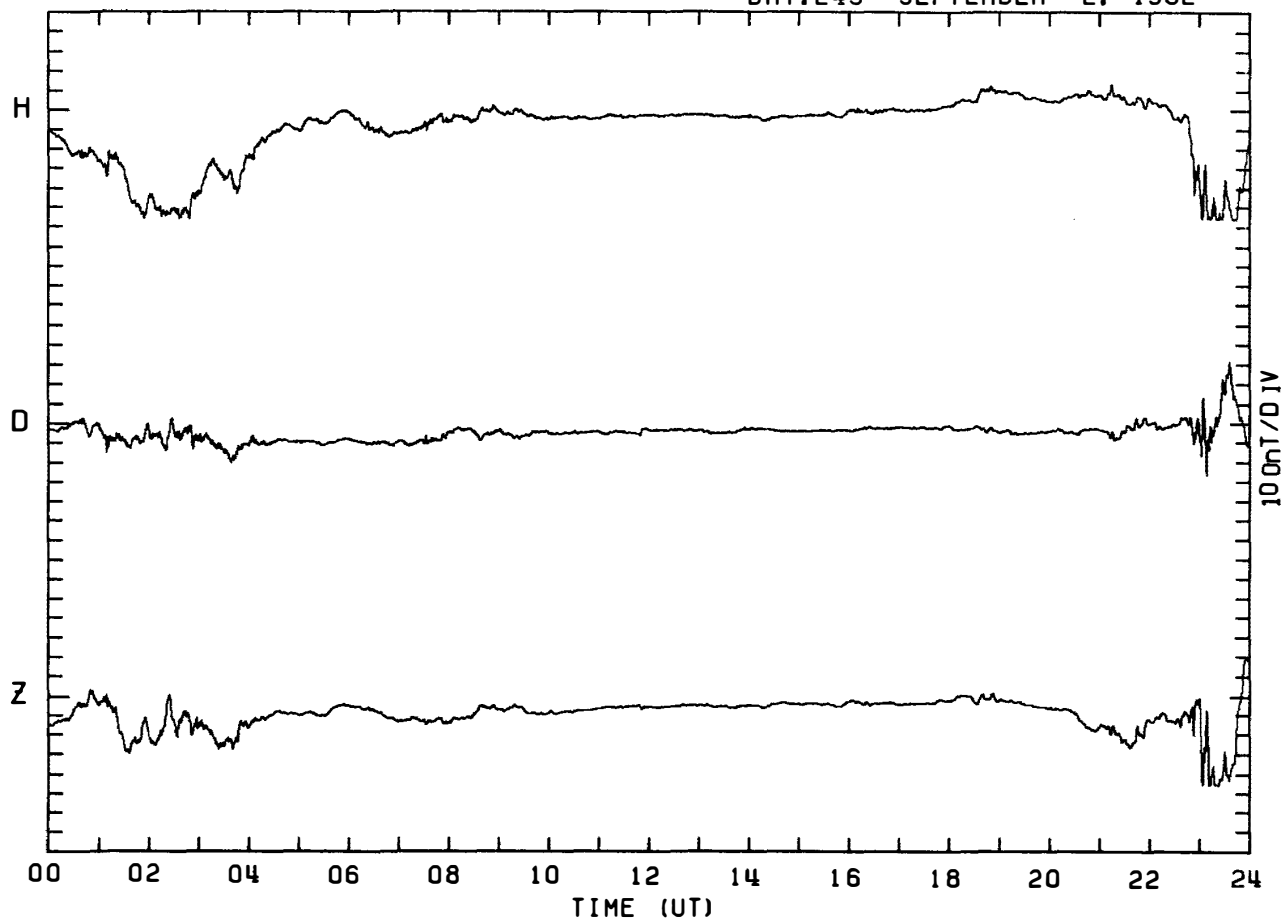
DAY:244 SEPTEMBER 1, 1982





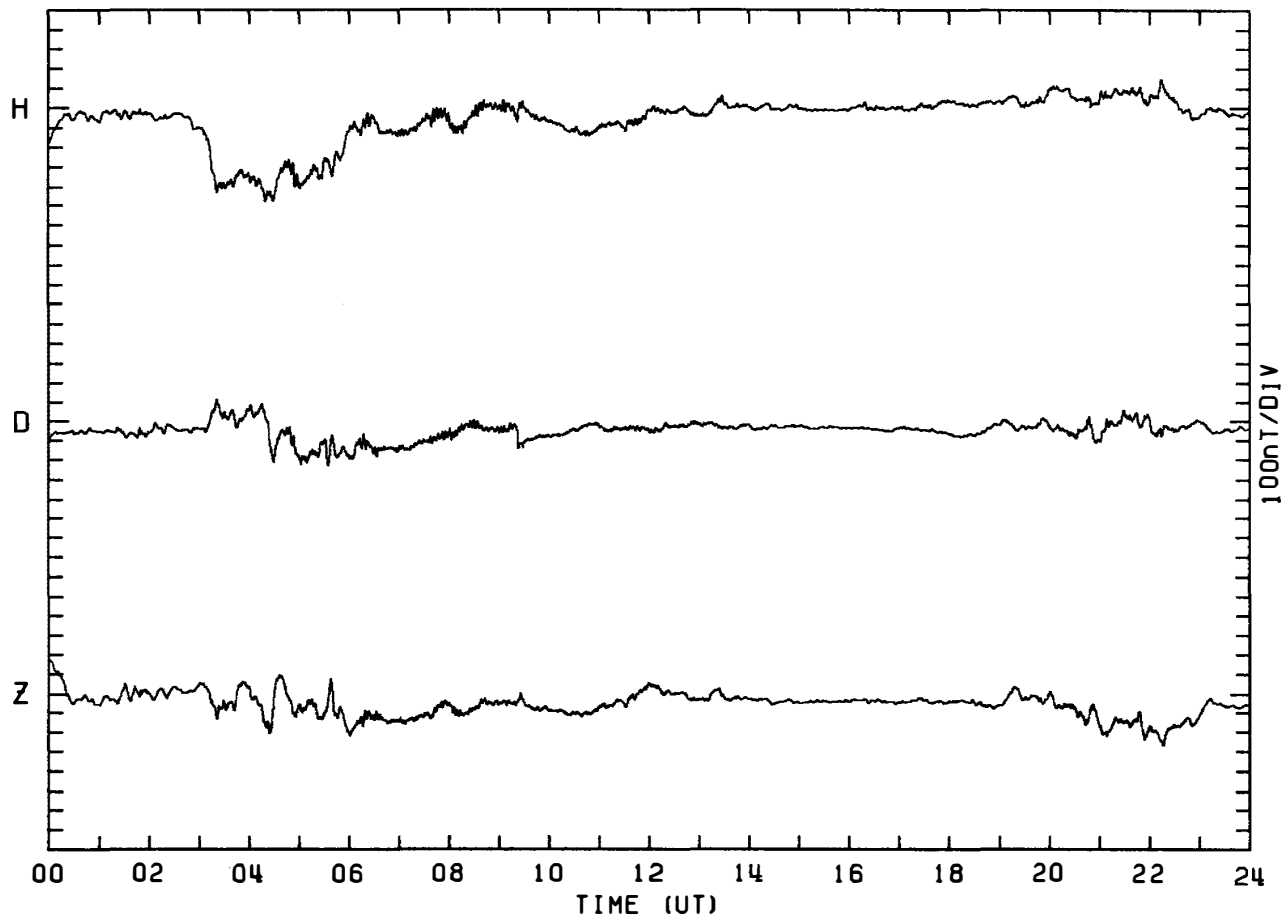
MAGNETOGRAM SYOWA STATION

DAY: 245 SEPTEMBER 2, 1982



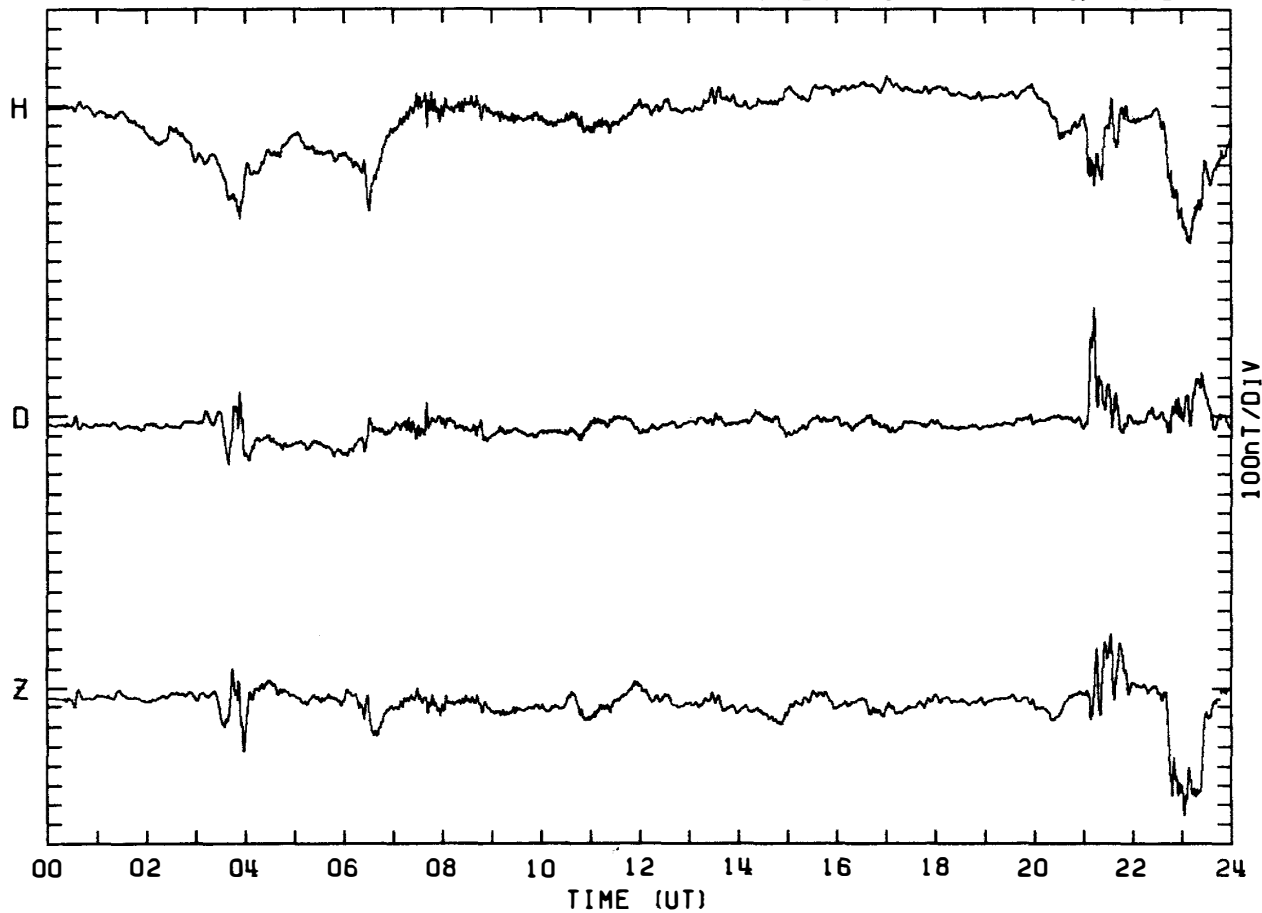
MAGNETOGRAM SYOWA STATION

DAY: 246 SEPTEMBER 3, 1982



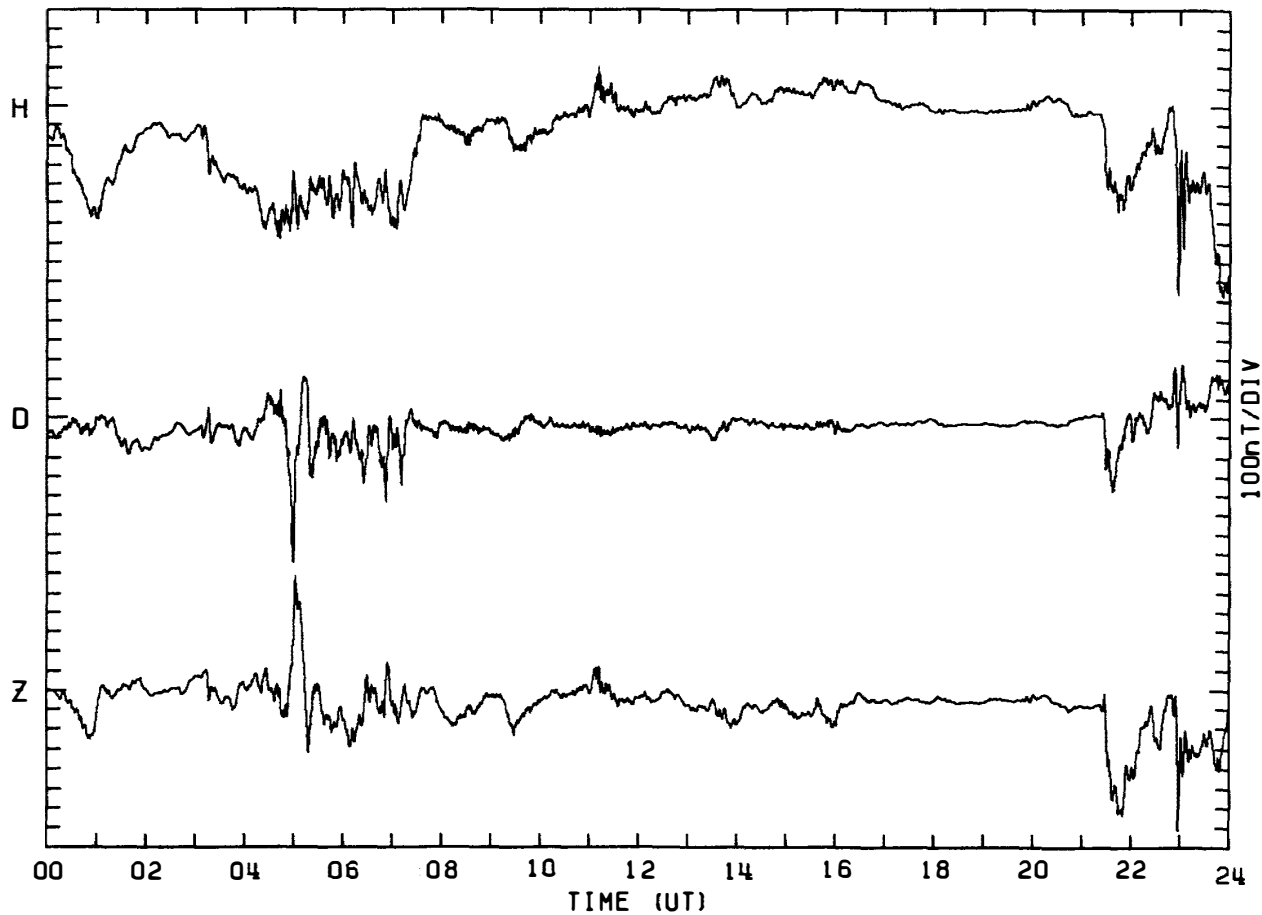
MAGNETOGRAM SYOWA STATION

DAY:247 SEPTEMBER 4. 1982



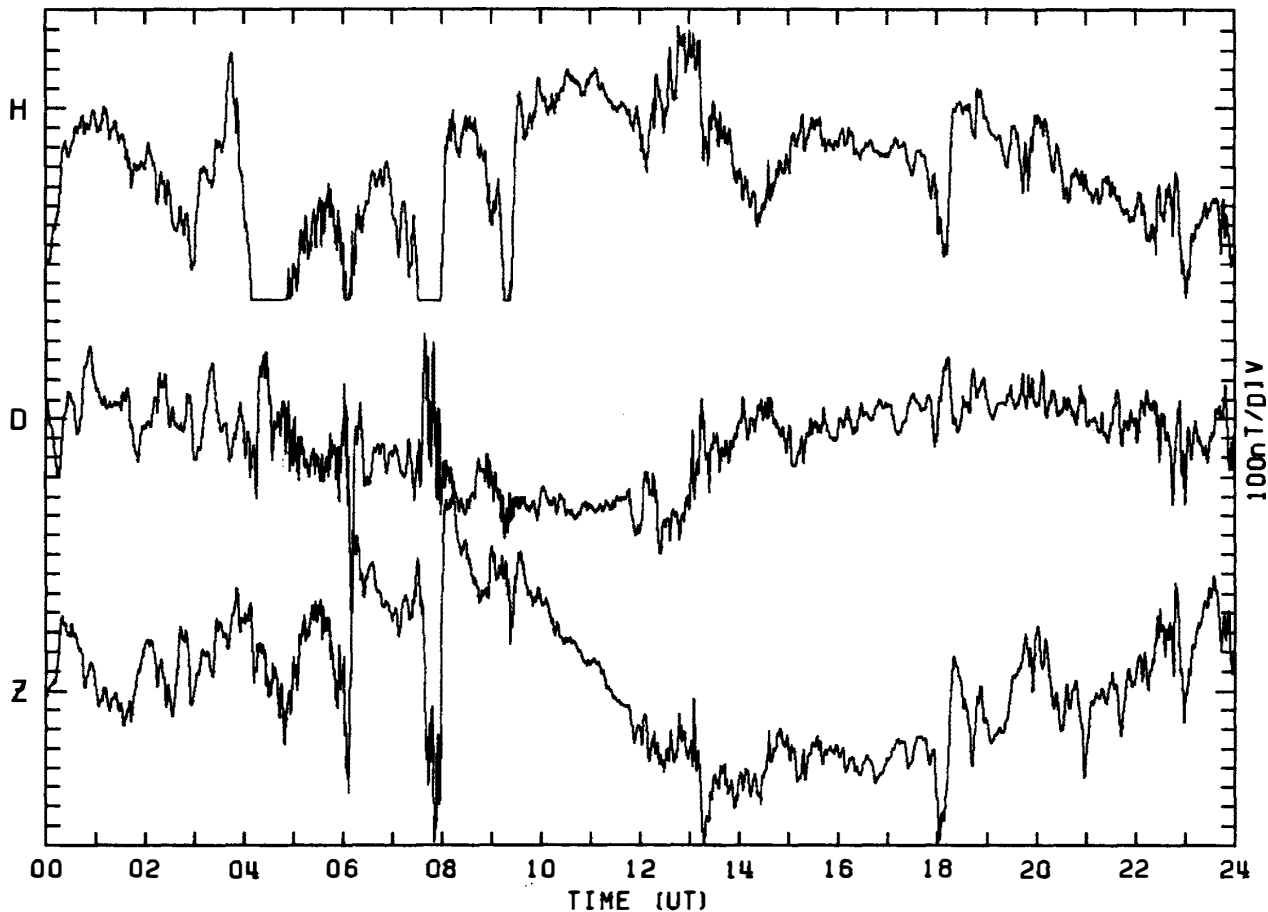
MAGNETOGRAM SYOWA STATION

DAY:248 SEPTEMBER 5. 1982



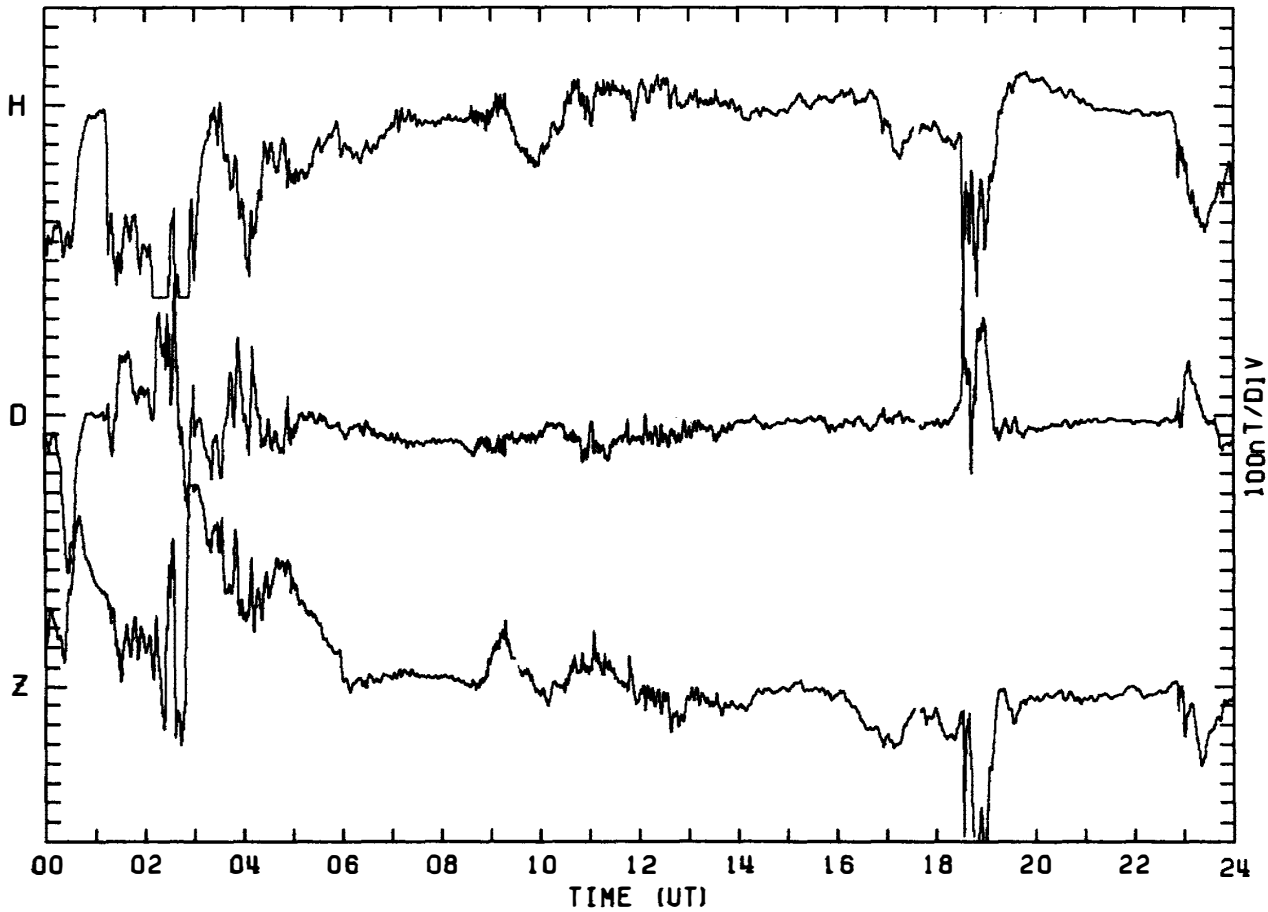
MAGNETOGRAM SYOWA STATION

DAY:249 SEPTEMBER 6. 1982



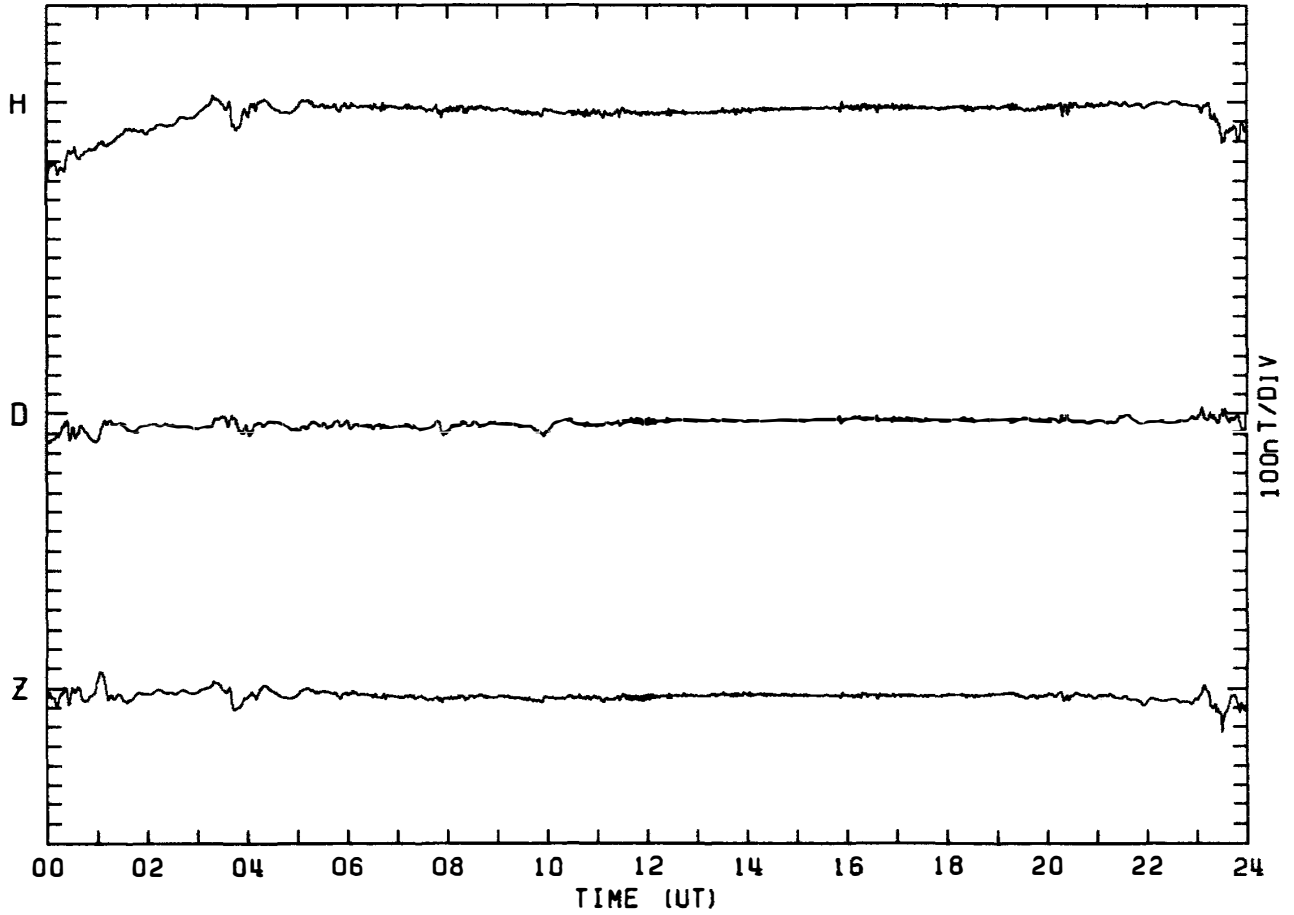
MAGNETOGRAM SYOWA STATION

DAY:250 SEPTEMBER 7. 1982



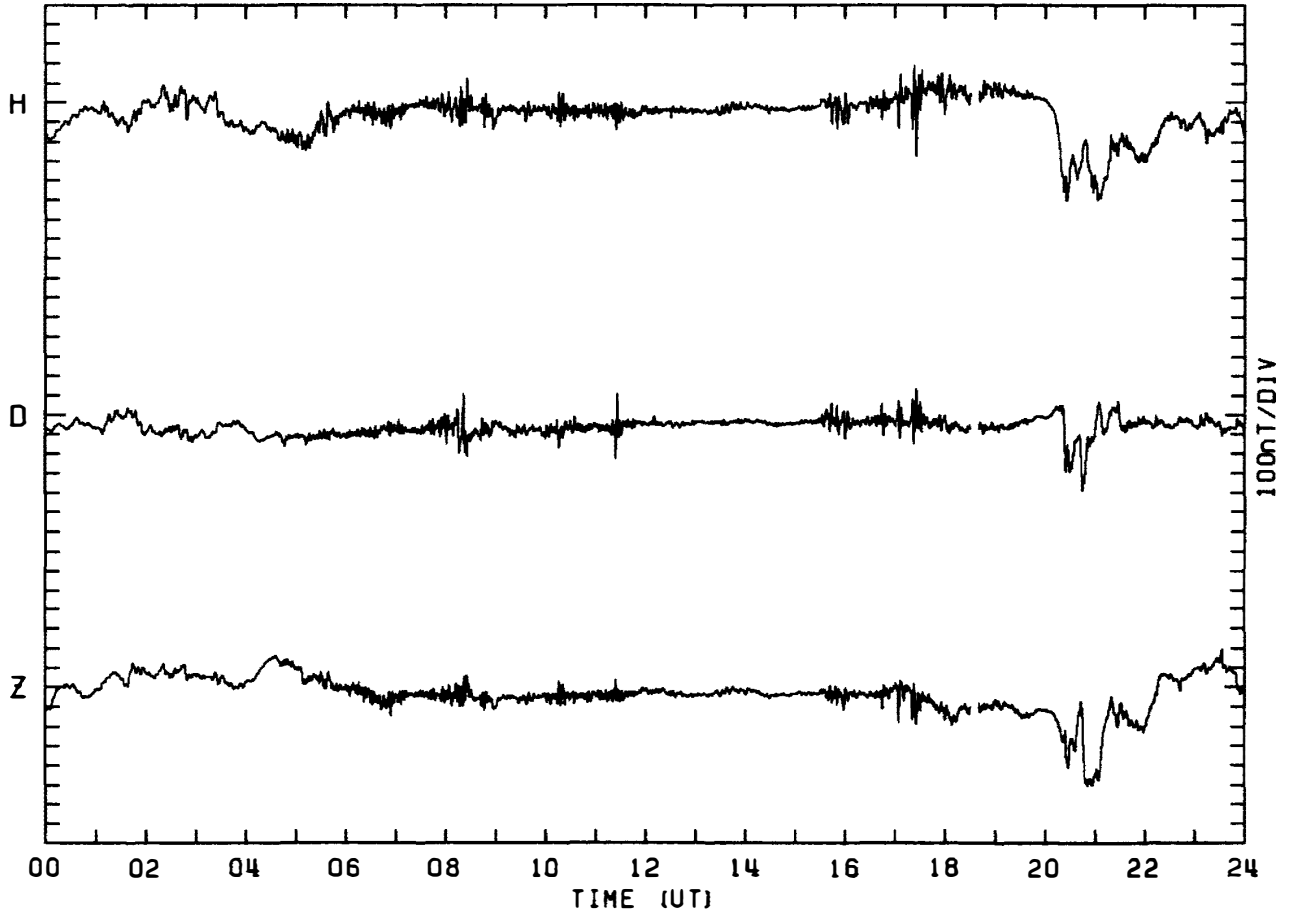
MAGNETOGRAM SYOWA STATION

DAY:251 SEPTEMBER 8. 1982



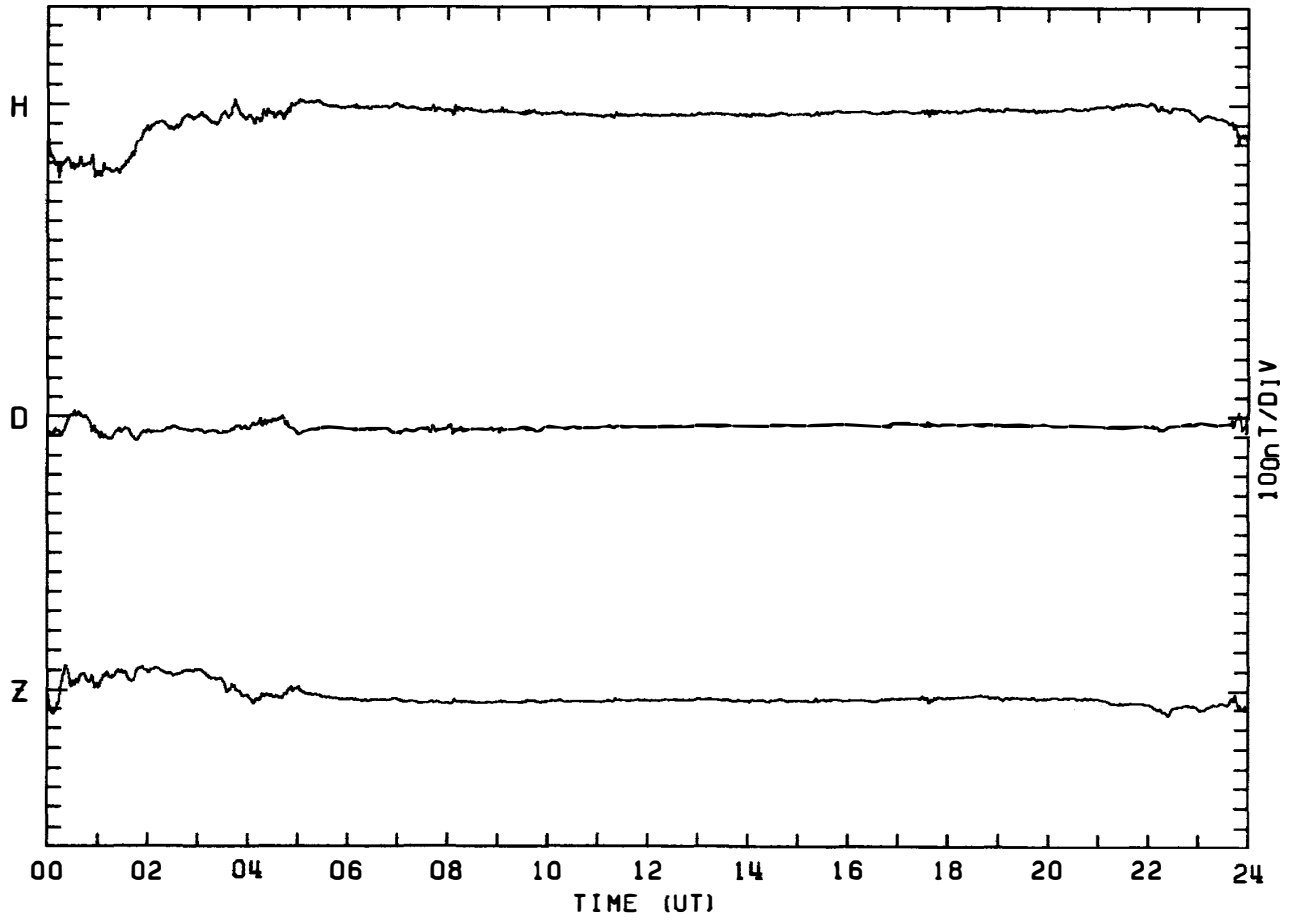
MAGNETOGRAM SYOWA STATION

DAY:252 SEPTEMBER 9. 1982



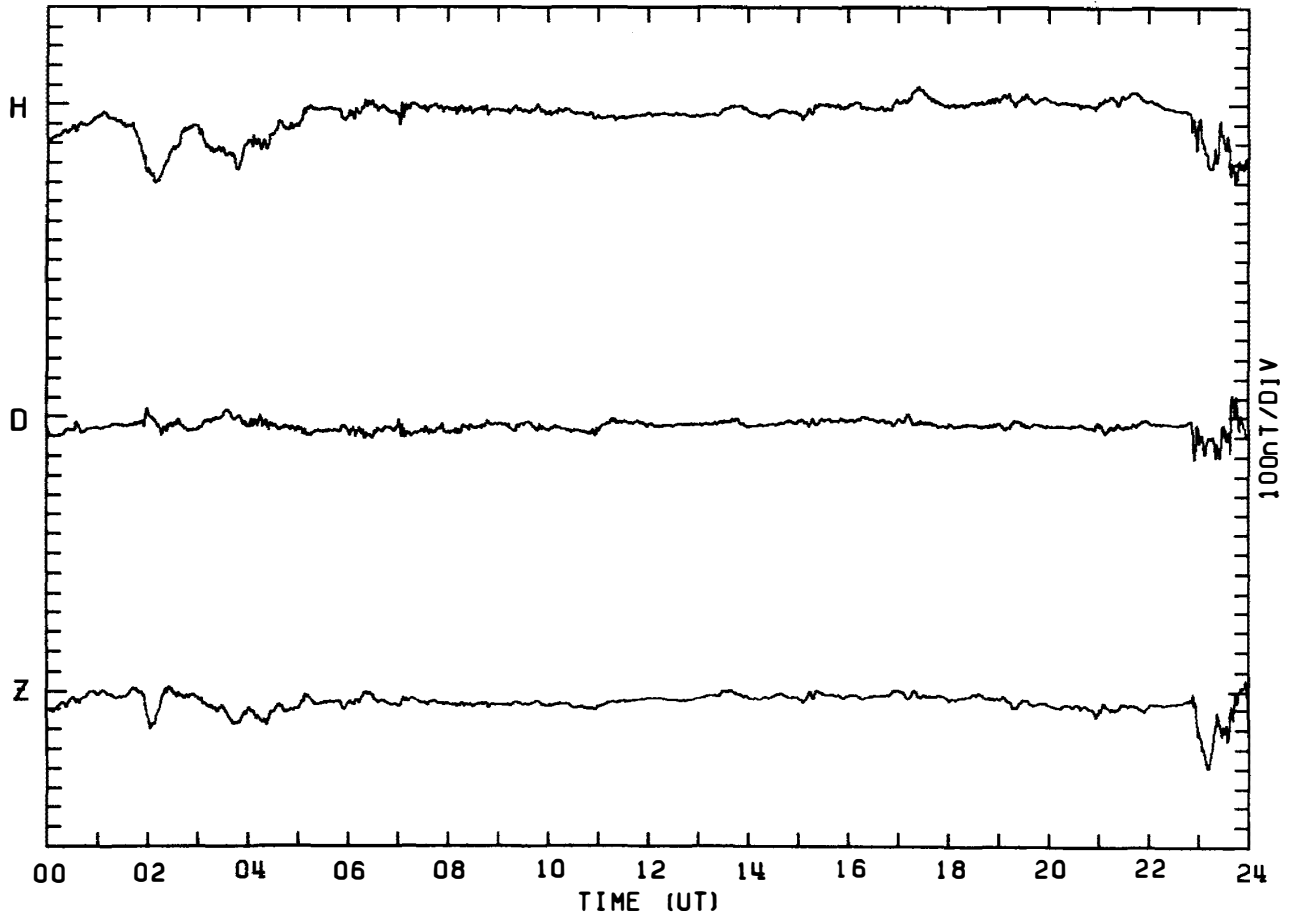
MAGNETOGRAM SYOWA STATION

DAY:253 SEPTEMBER 10, 1982



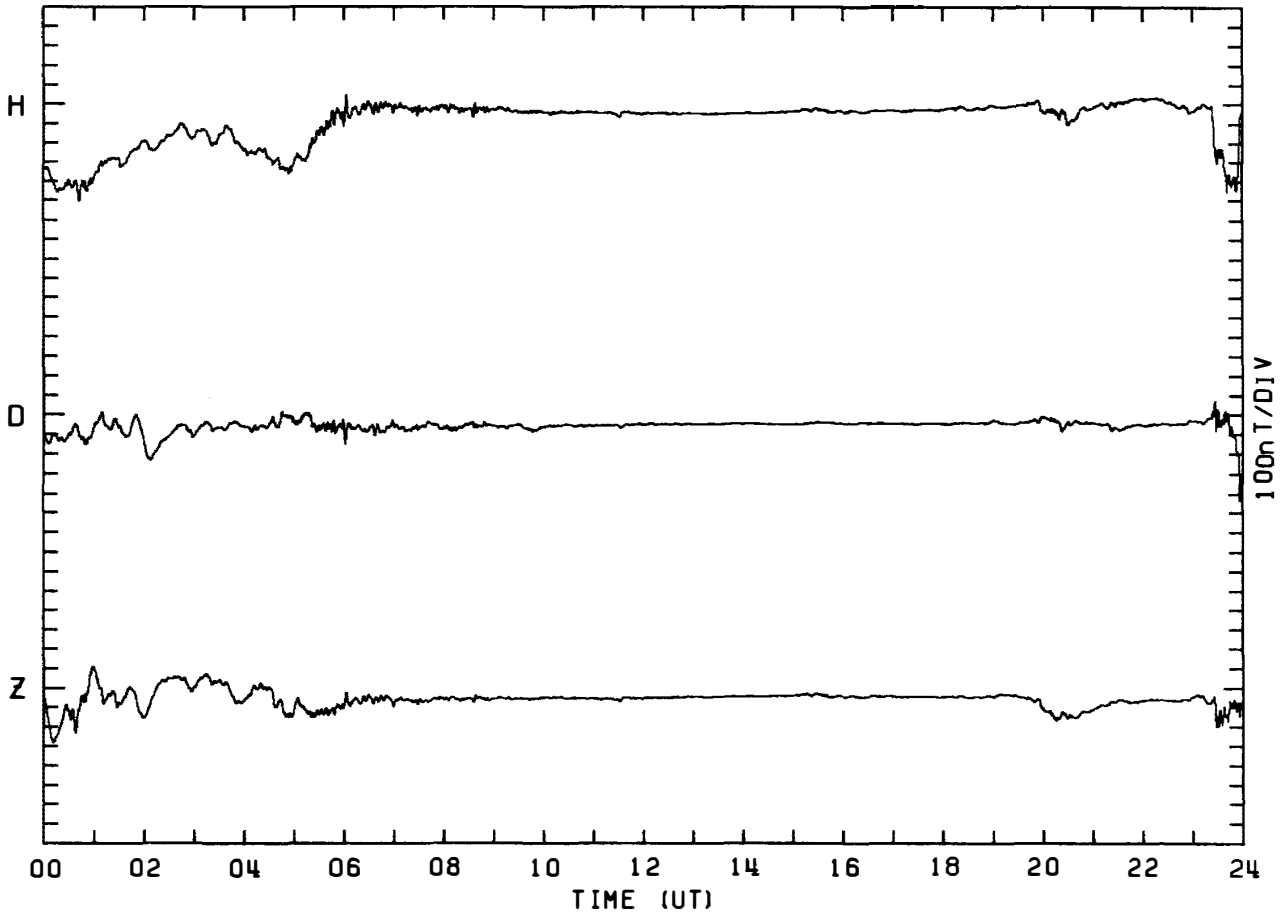
MAGNETOGRAM SYOWA STATION

DAY:254 SEPTEMBER 11, 1982



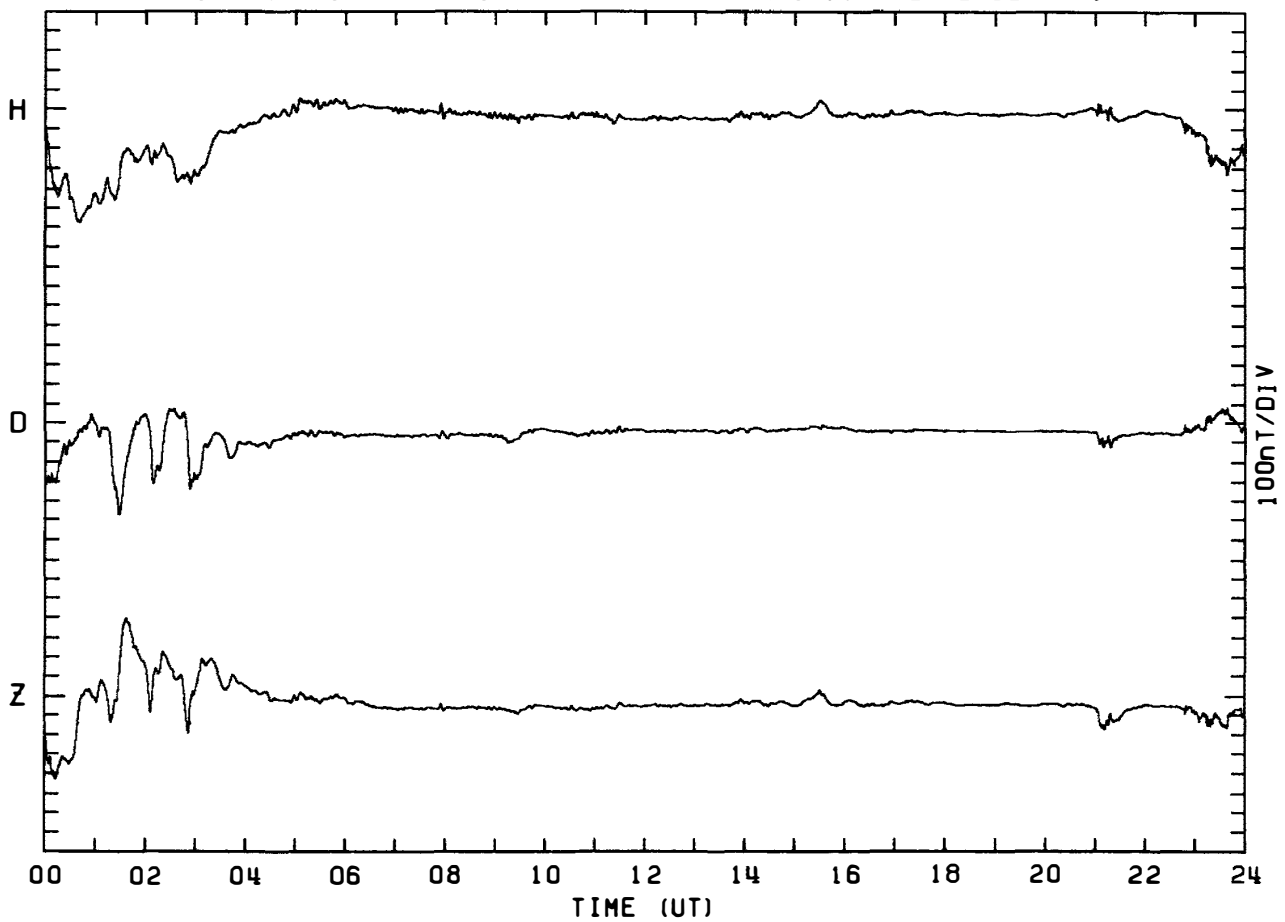
MAGNETOGRAM SYOWA STATION

DAY:255 SEPTEMBER 12. 1982



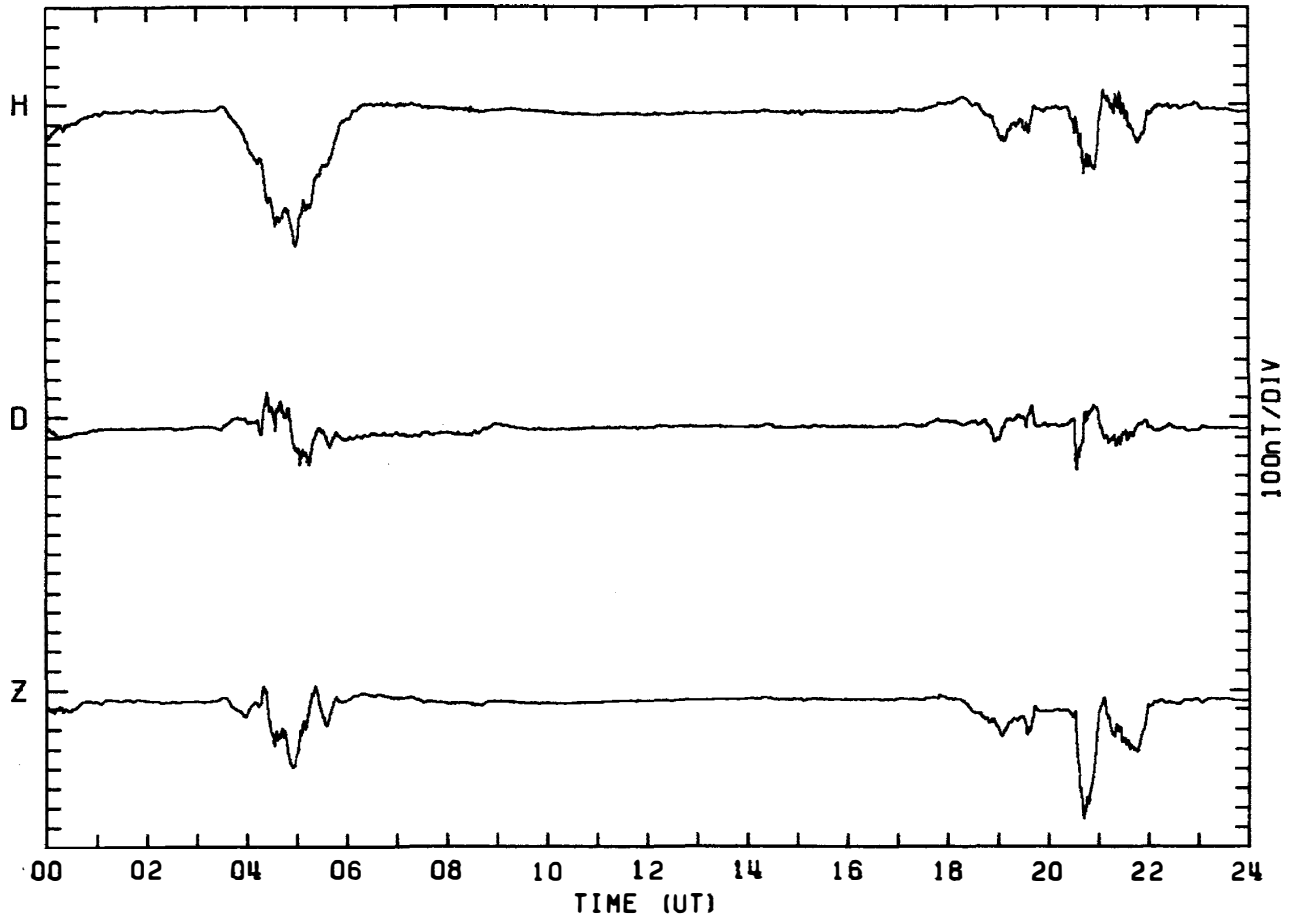
MAGNETOGRAM SYOWA STATION

DAY:256 SEPTEMBER 13. 1982



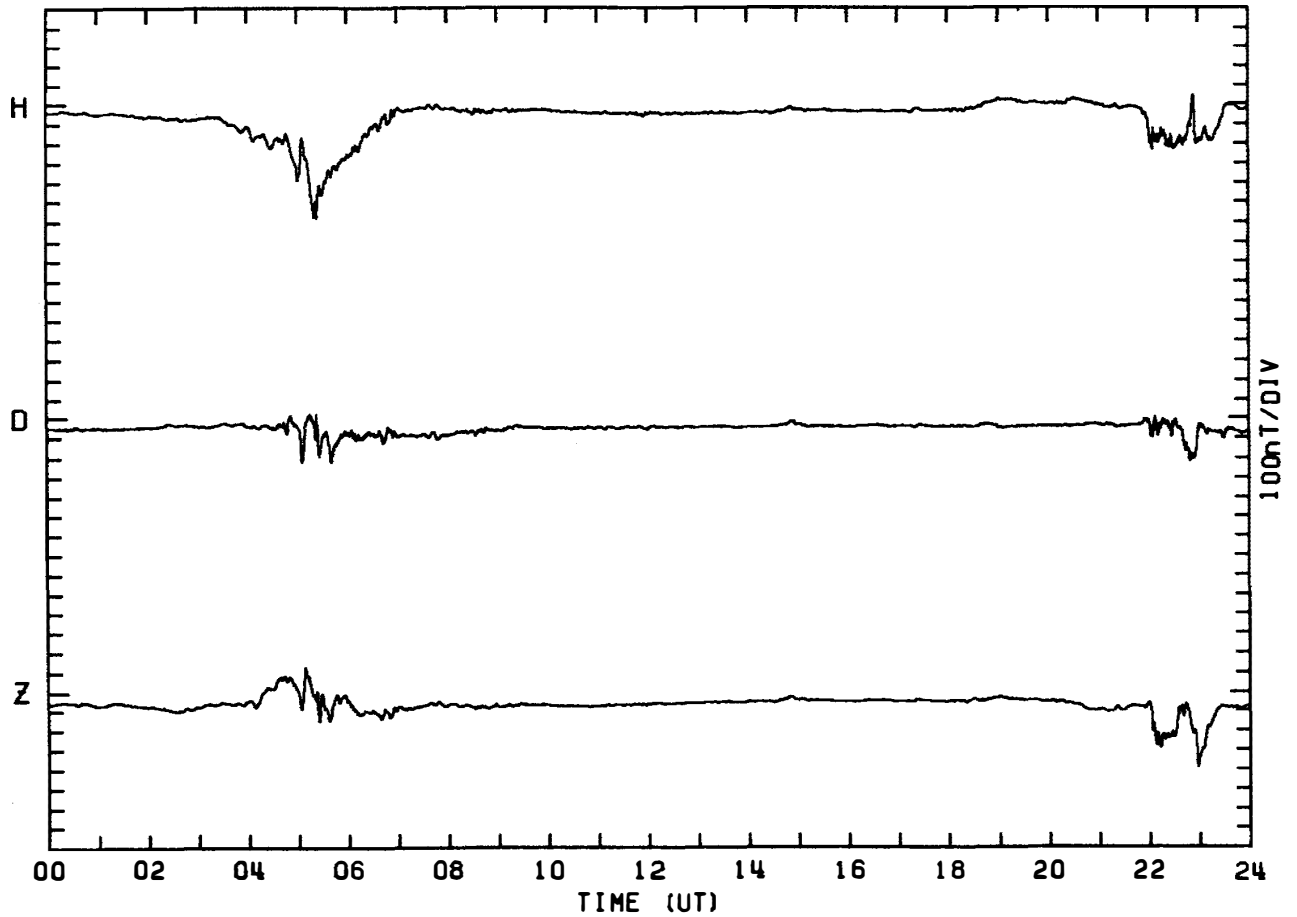
MAGNETOGRAM SYOWA STATION

DAY:257 SEPTEMBER 14, 1982



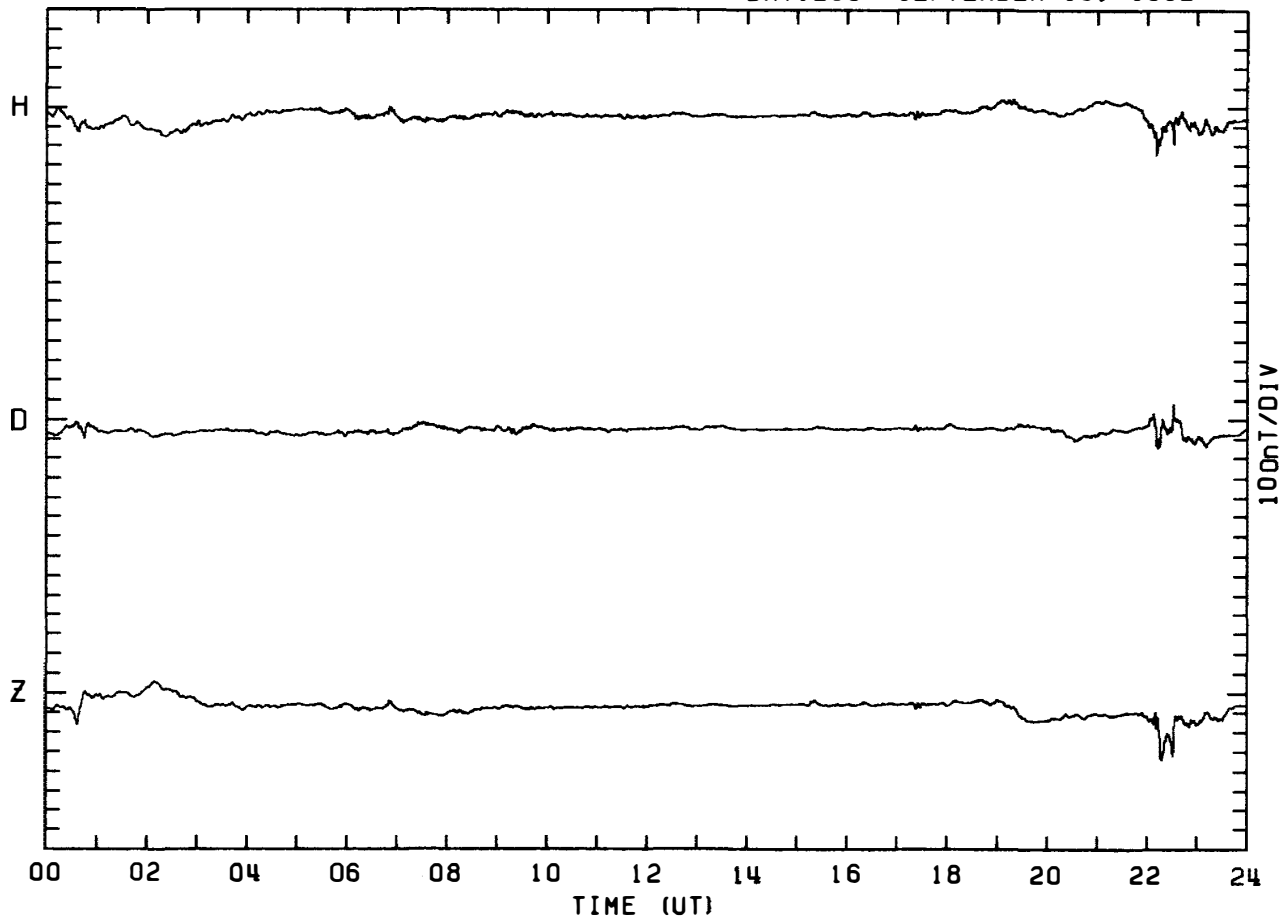
MAGNETOGRAM SYOWA STATION

DAY:258 SEPTEMBER 15, 1982



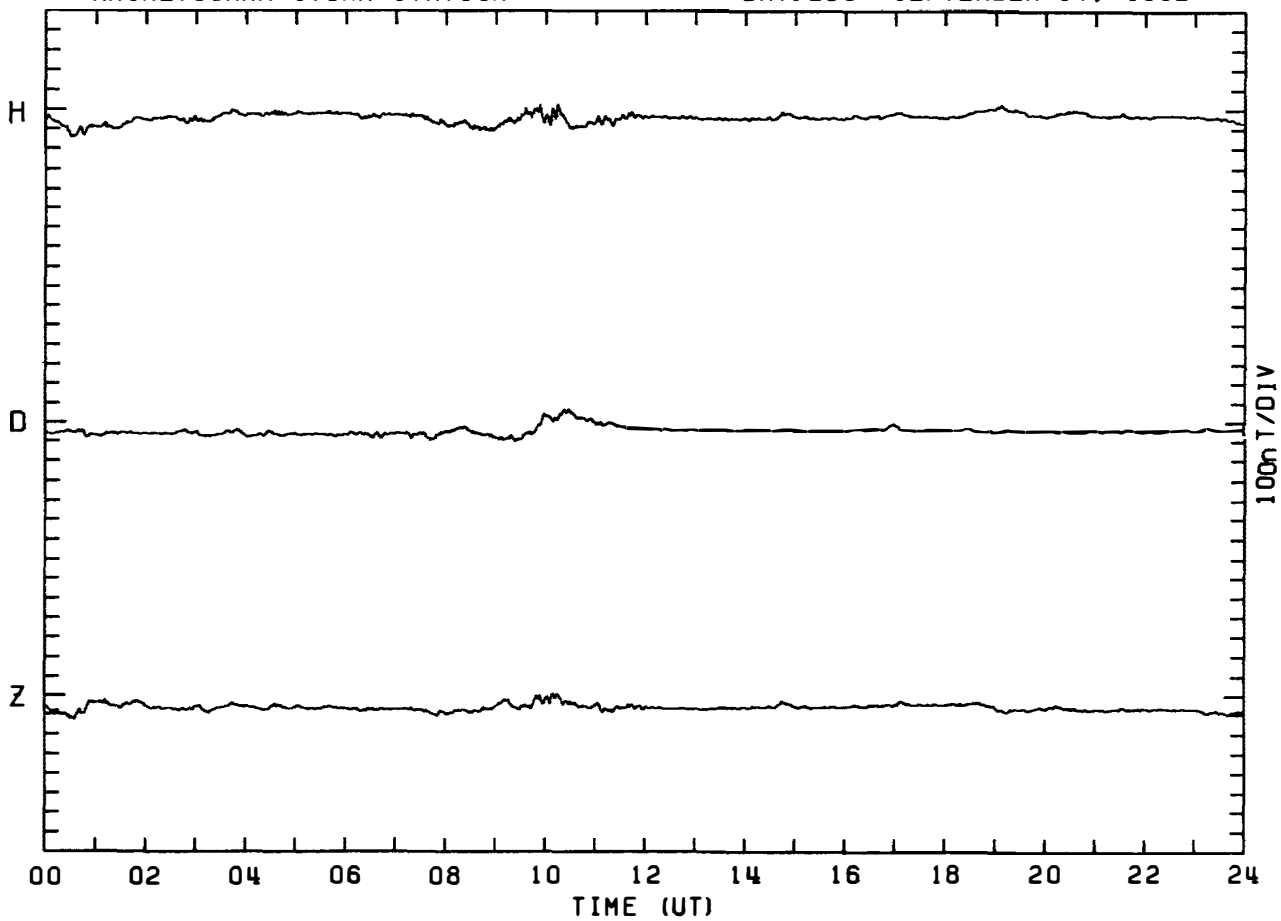
MAGNETOGRAM SYOWA STATION

DAY:259 SEPTEMBER 16, 1982



MAGNETOGRAM SYOWA STATION

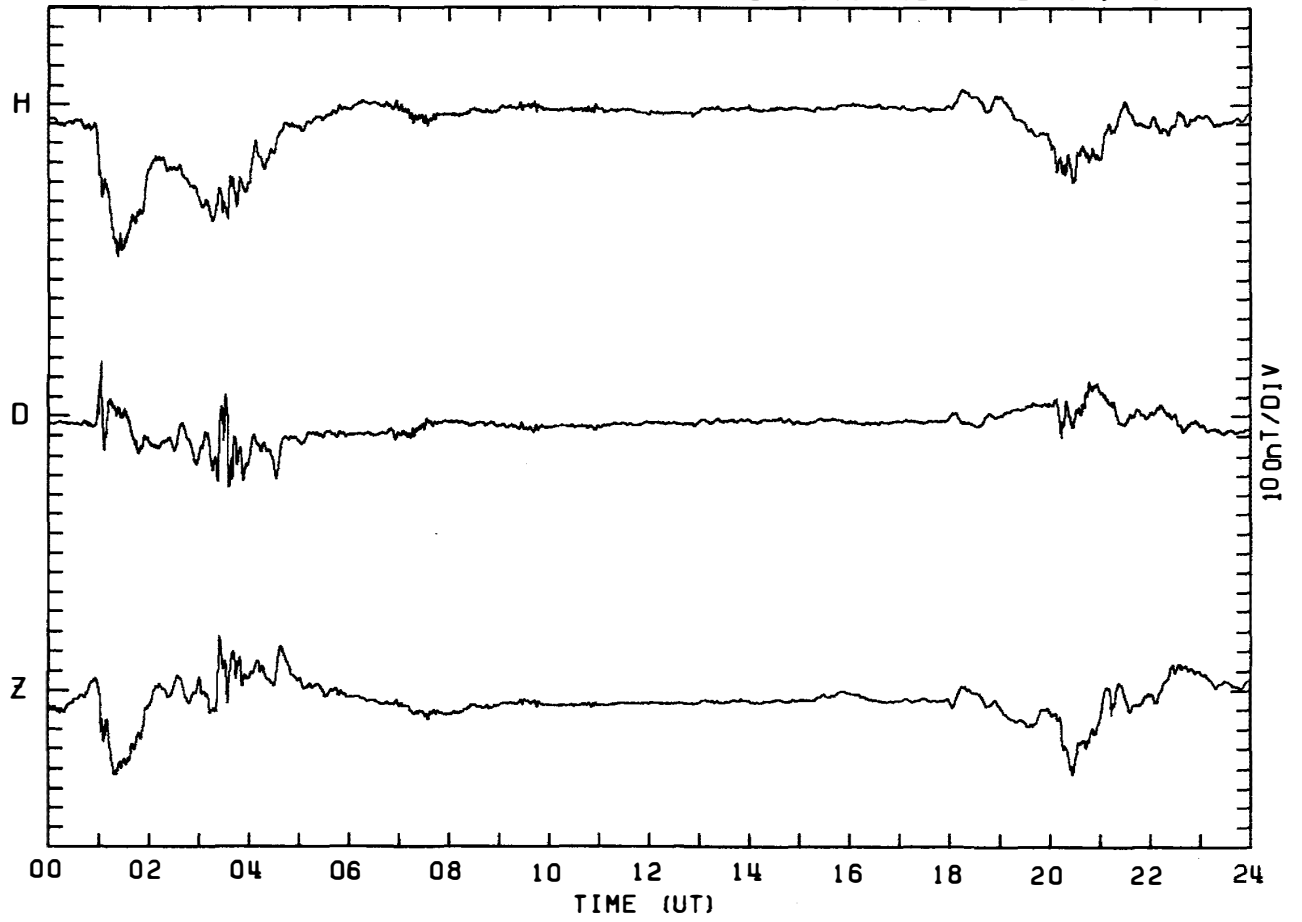
DAY:260 SEPTEMBER 17, 1982





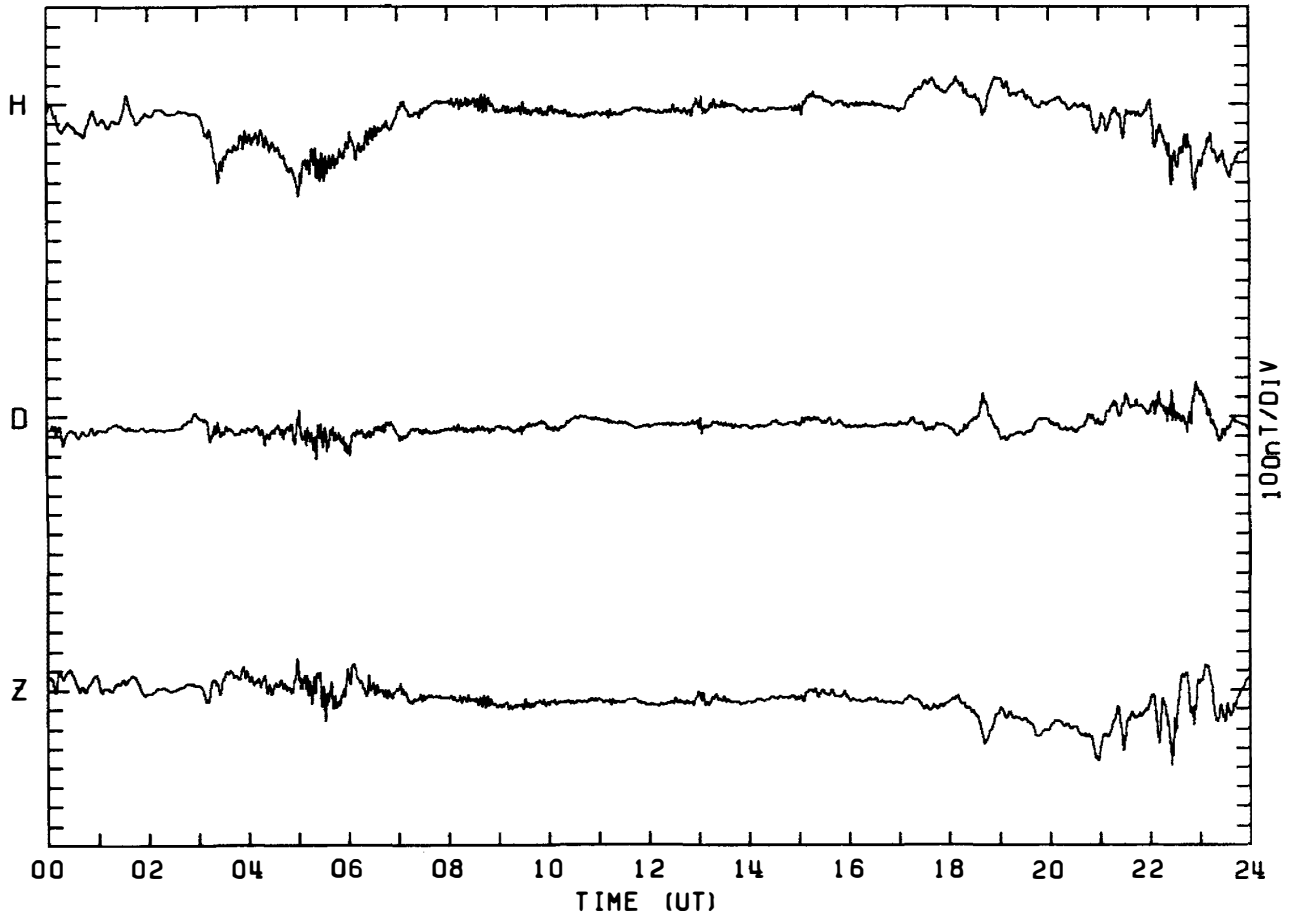
MAGNETOGRAM SYOWA STATION

DAY:261 SEPTEMBER 18. 1982



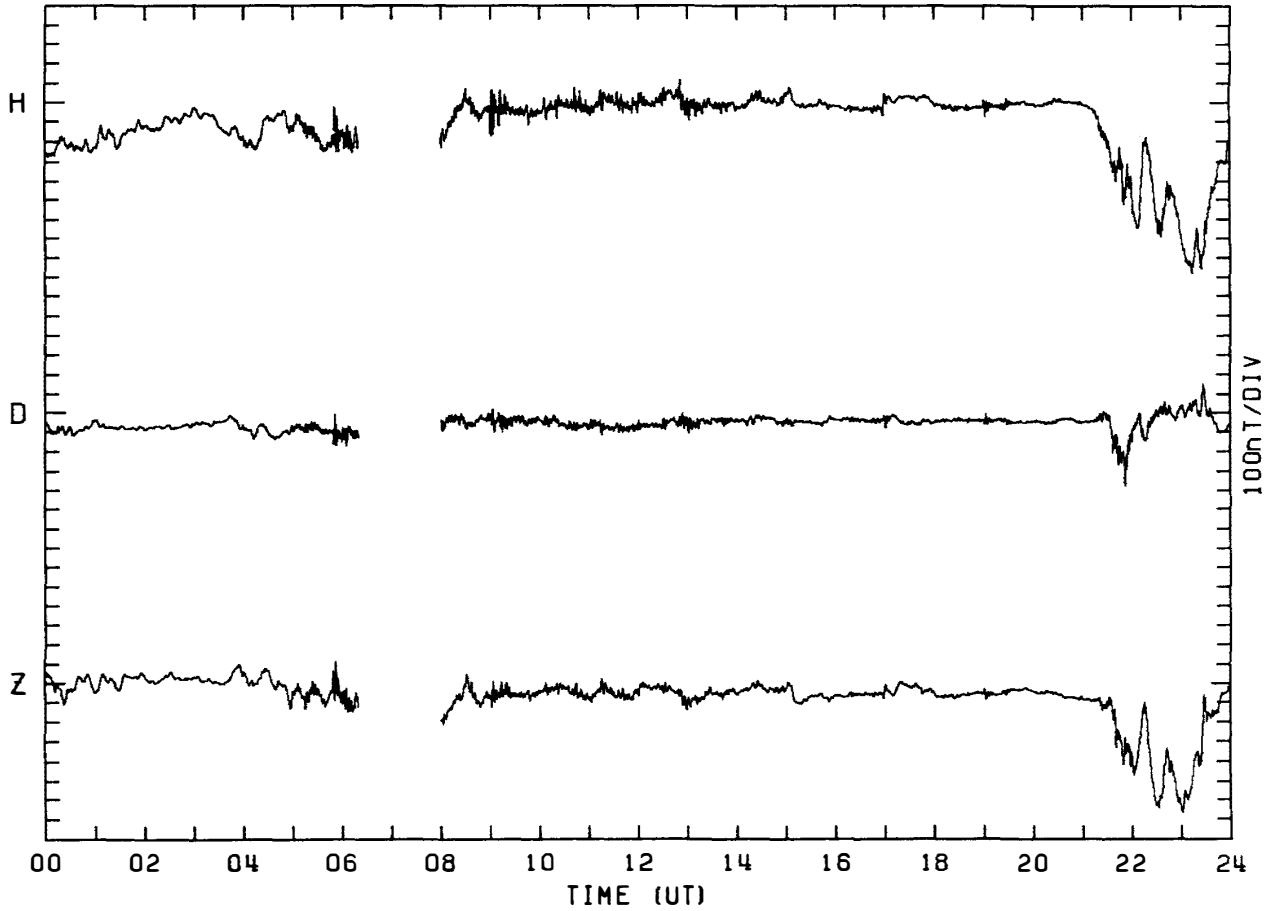
MAGNETOGRAM SYOWA STATION

DAY:262 SEPTEMBER 19. 1982



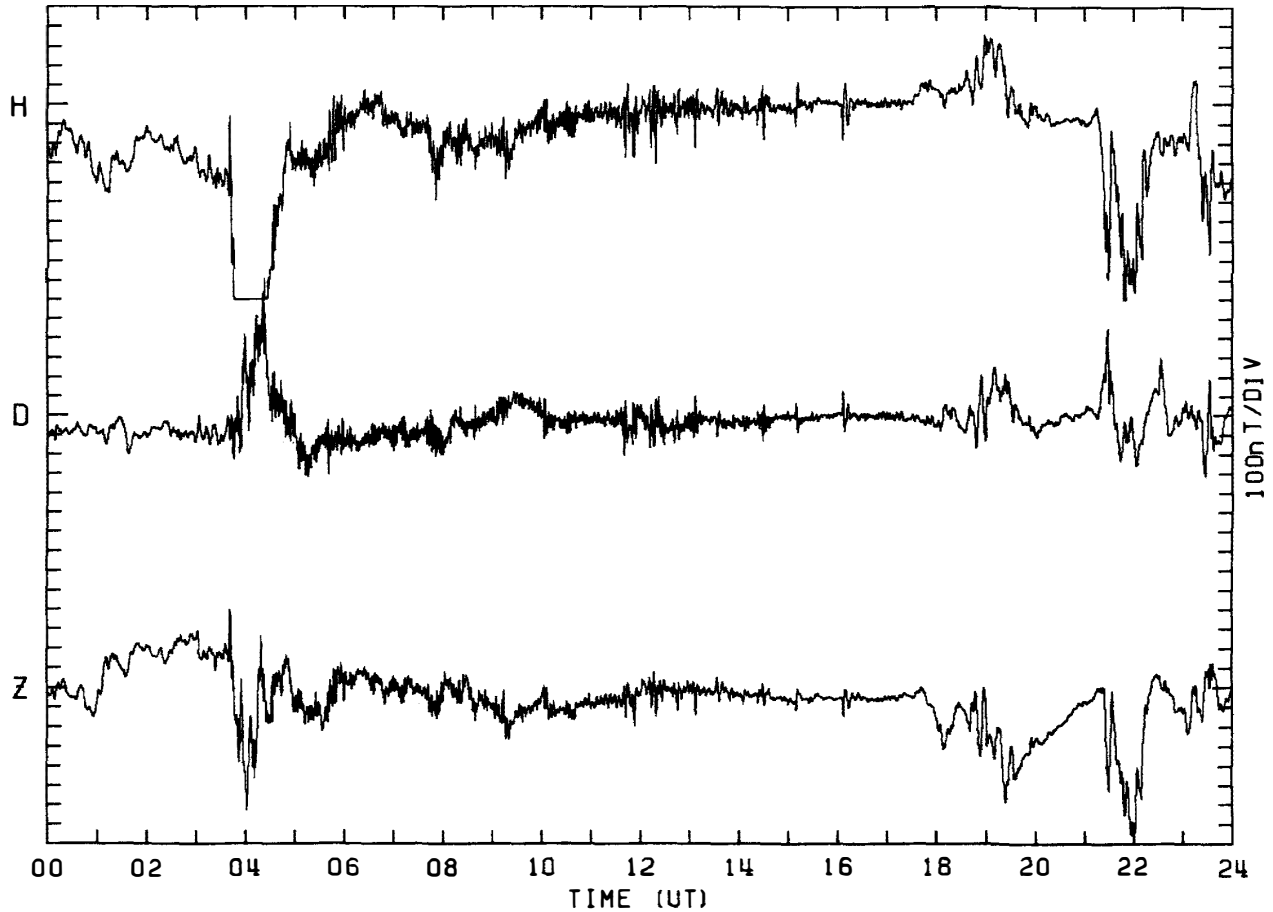
MAGNETOGRAM SYOWA STATION

DAY:263 SEPTEMBER 20, 1982



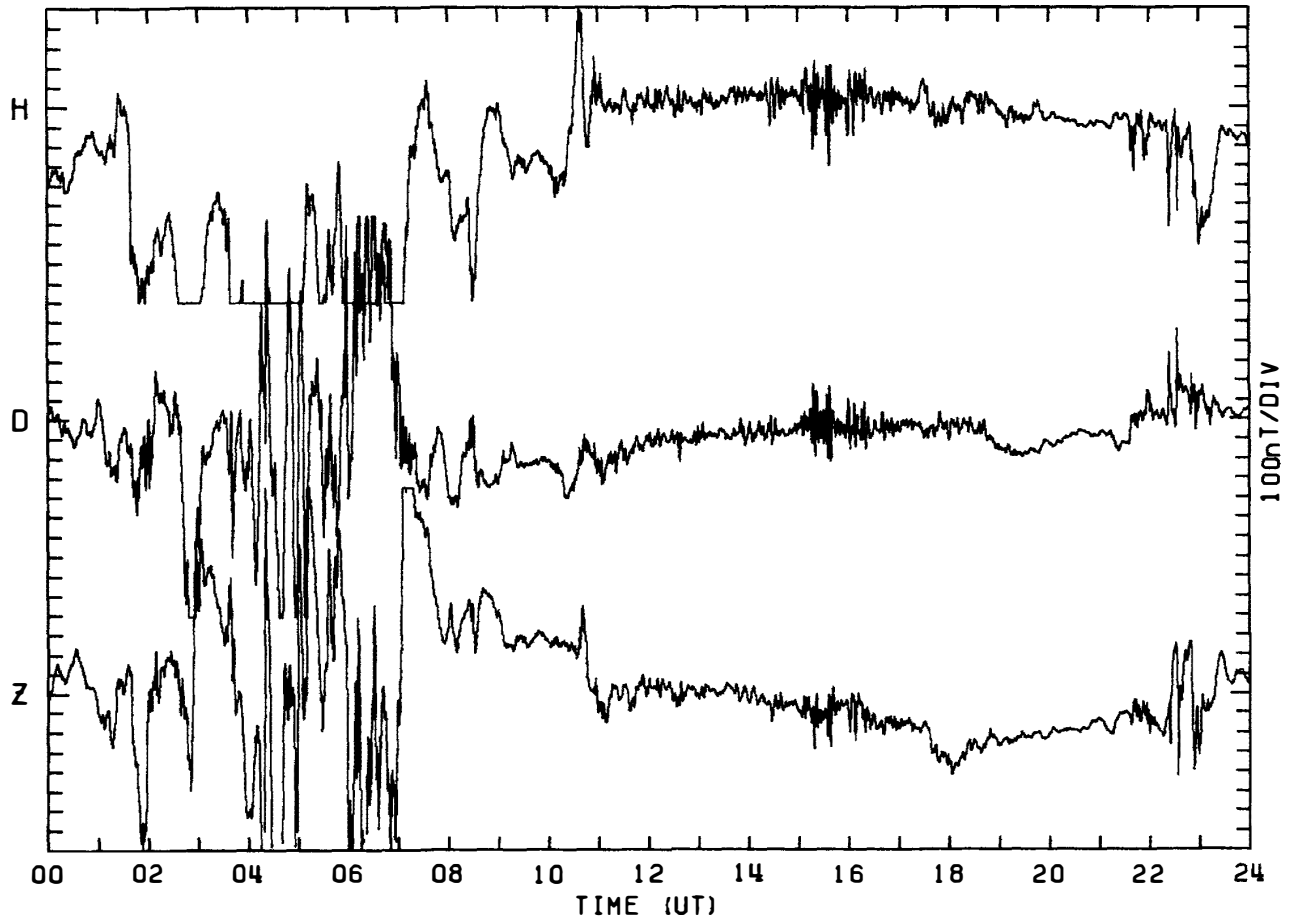
MAGNETOGRAM SYOWA STATION

DAY:264 SEPTEMBER 21, 1982



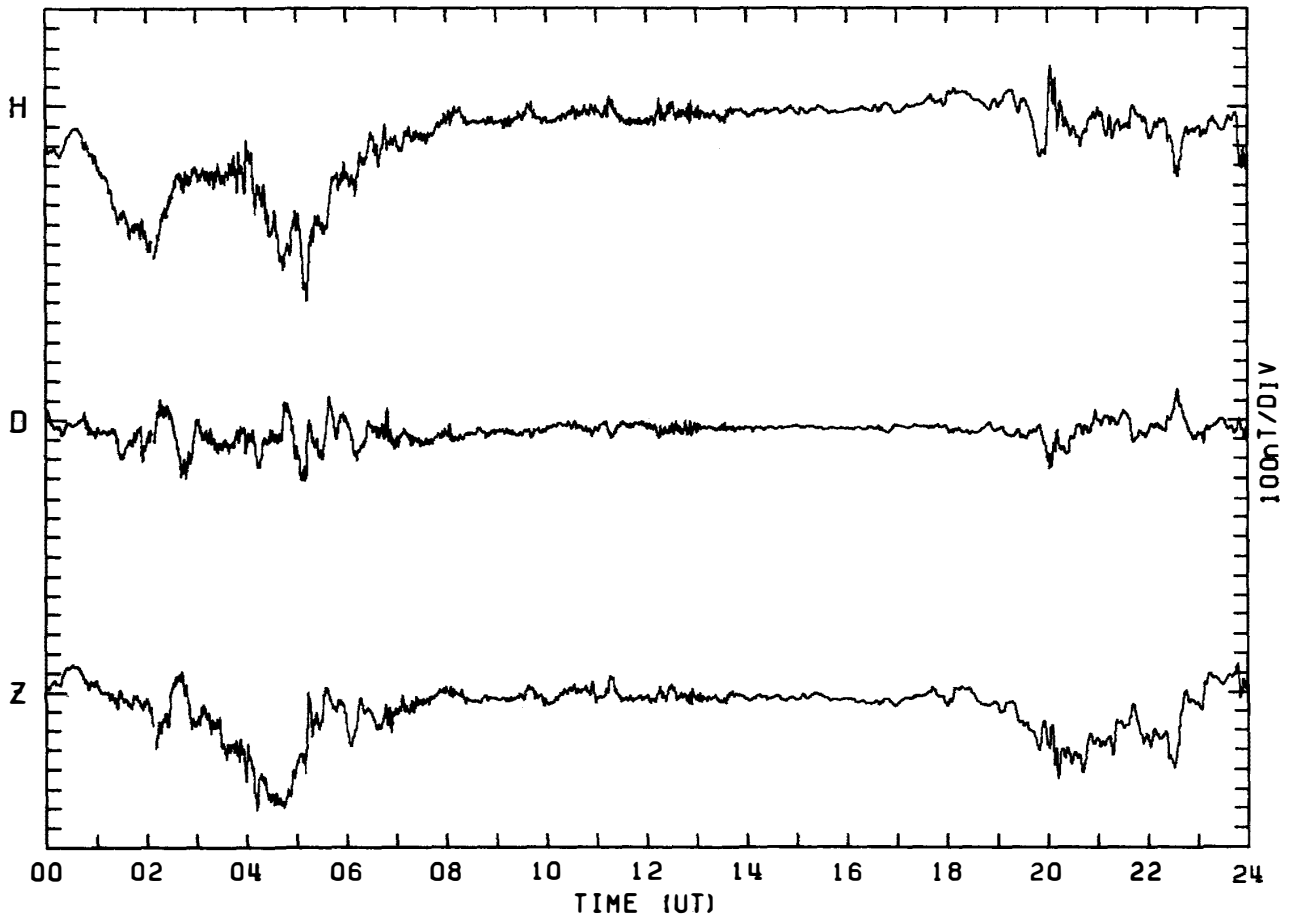
MAGNETOGRAM SYOWA STATION

DAY:265 SEPTEMBER 22. 1982



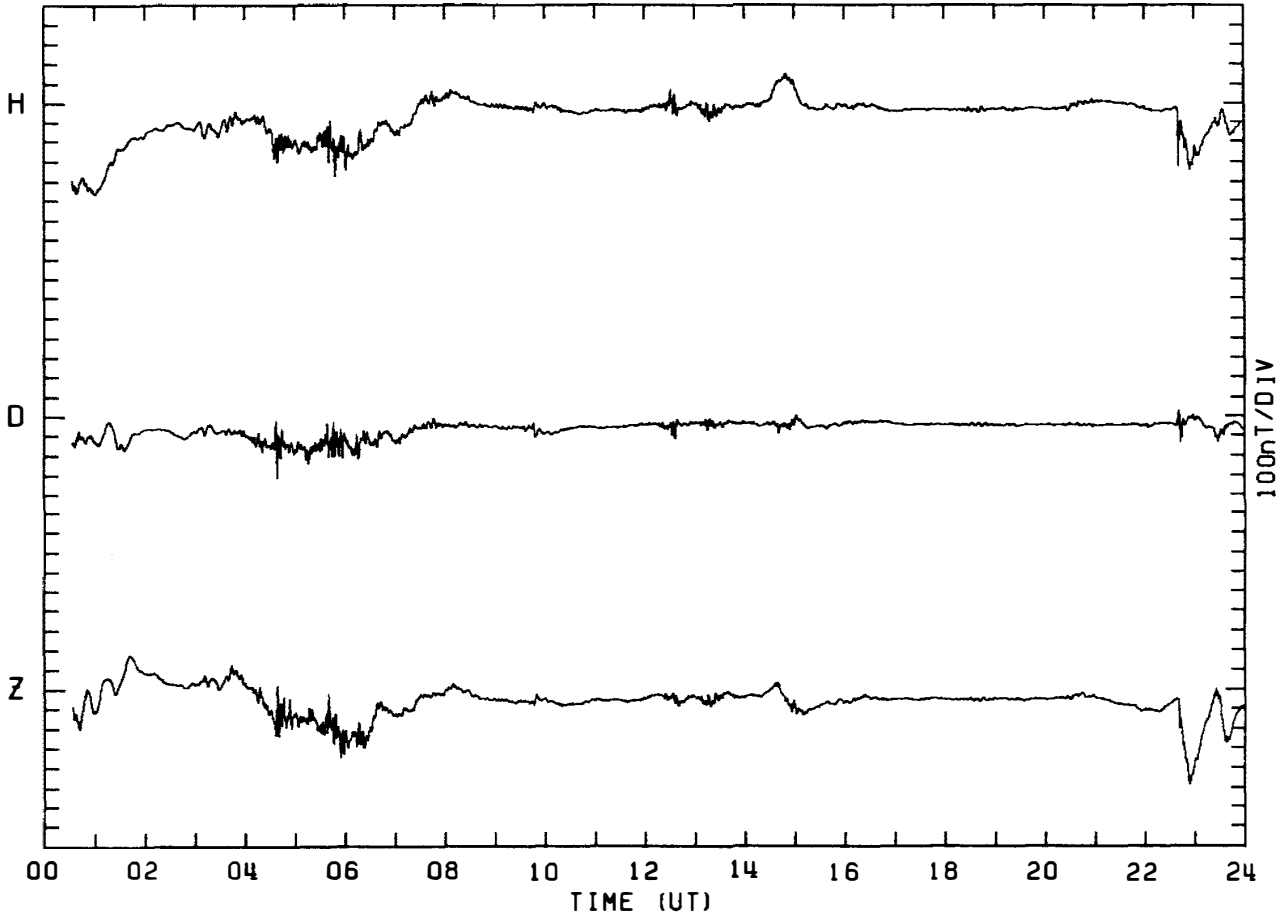
MAGNETOGRAM SYOWA STATION

DAY:266 SEPTEMBER 23. 1982



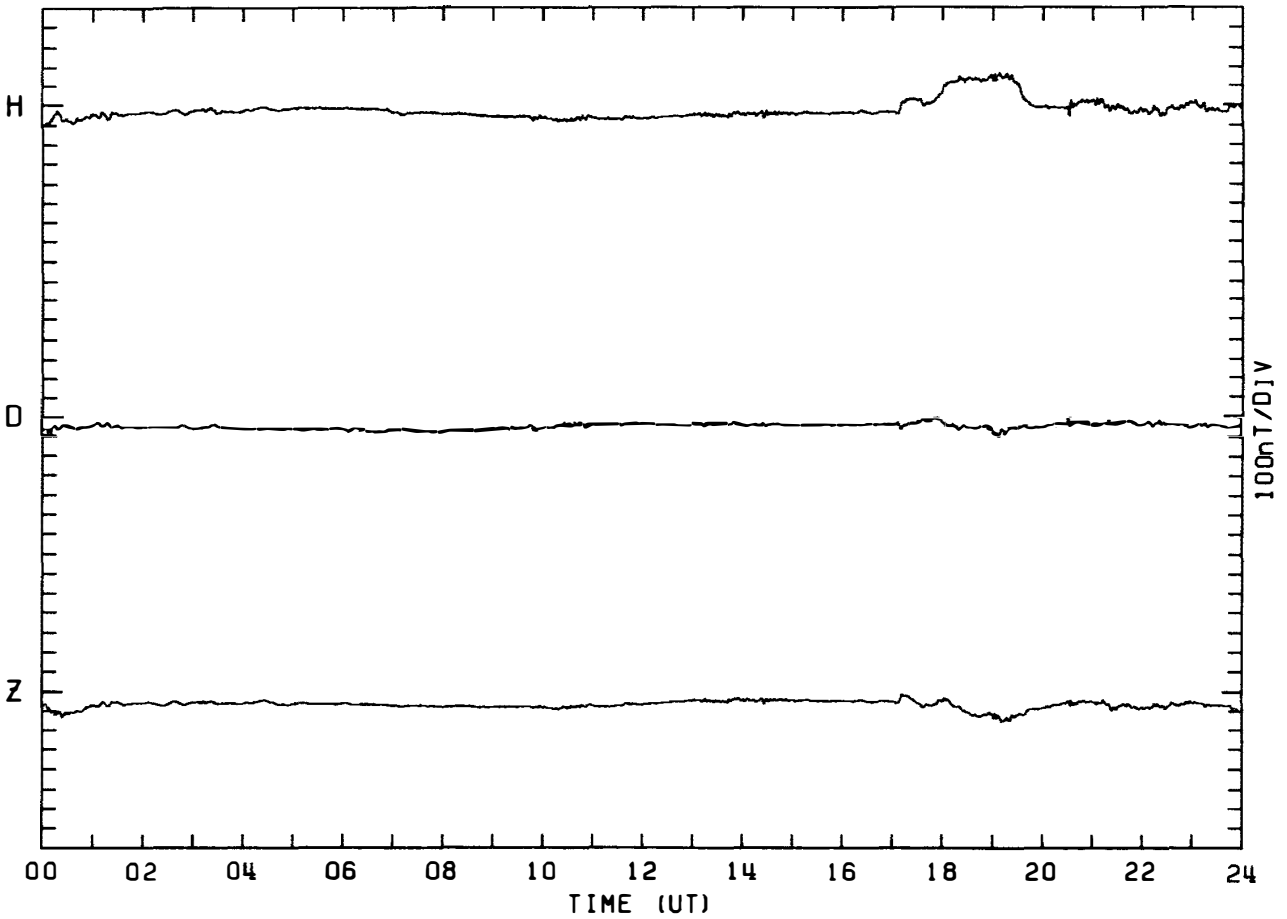
MAGNETOGRAM SYOWA STATION

DAY:267 SEPTEMBER 24, 1982



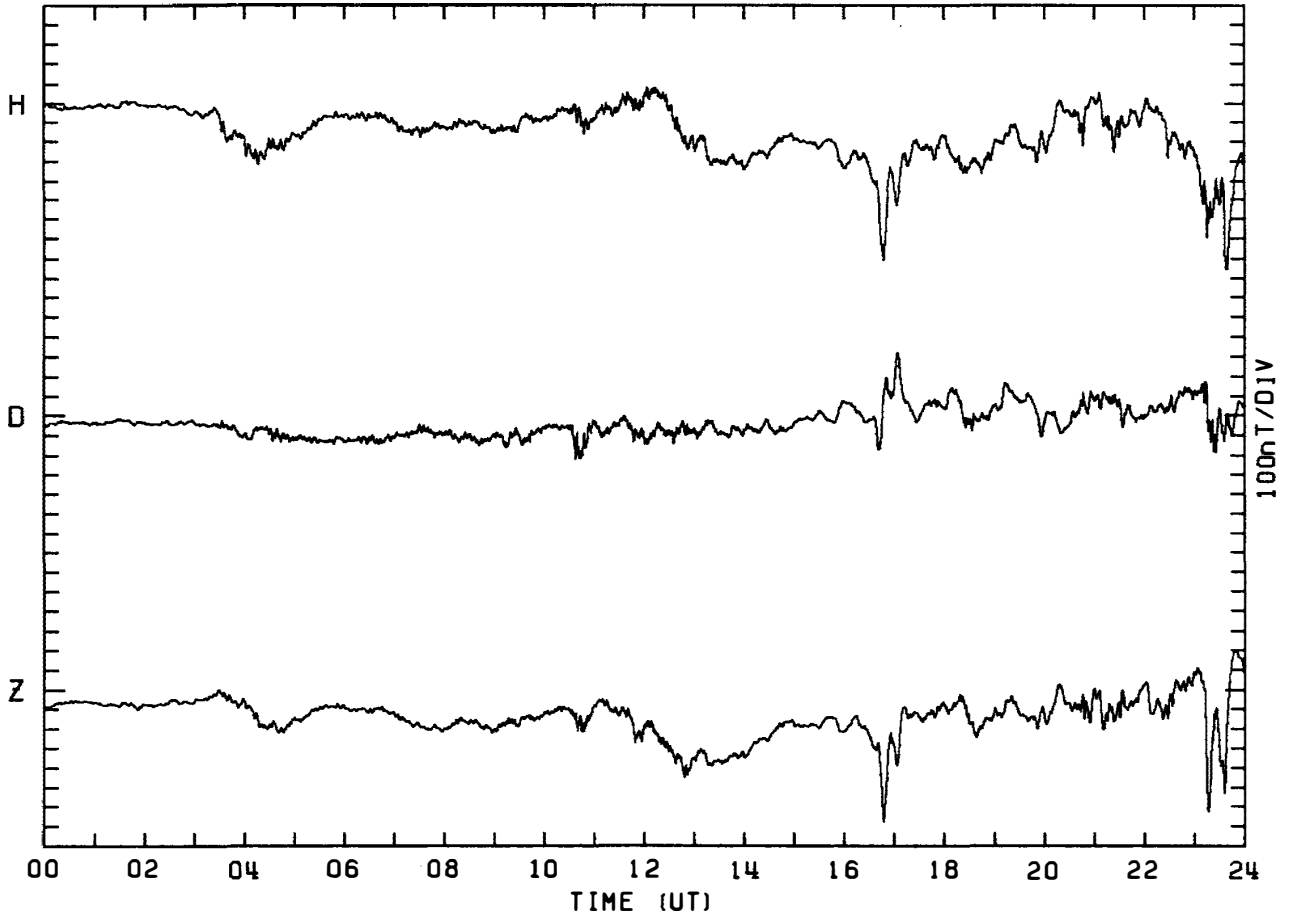
MAGNETOGRAM SYOWA STATION

DAY:268 SEPTEMBER 25, 1982



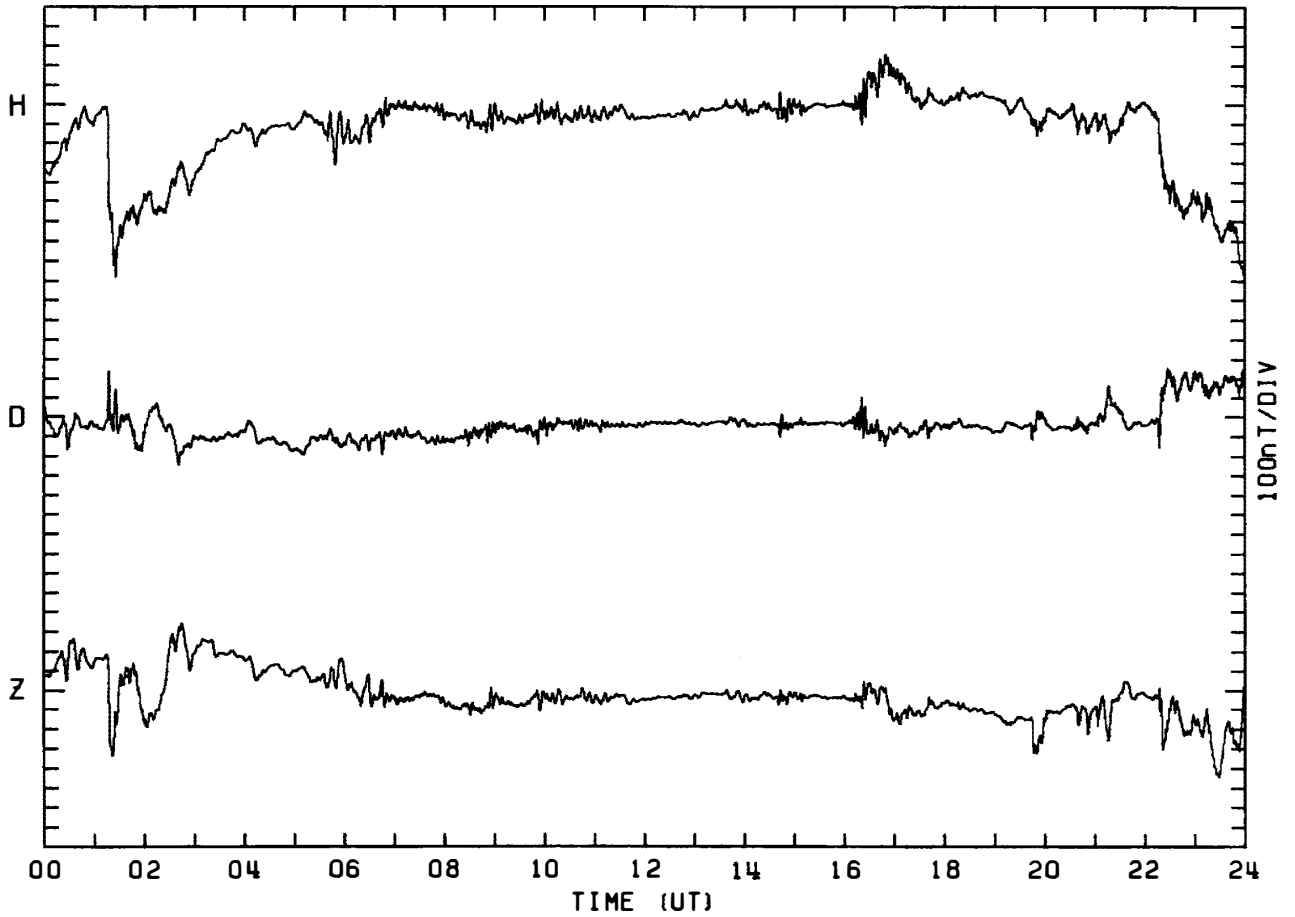
MAGNETOGRAM SYOWA STATION

DAY:269 SEPTEMBER 26, 1982



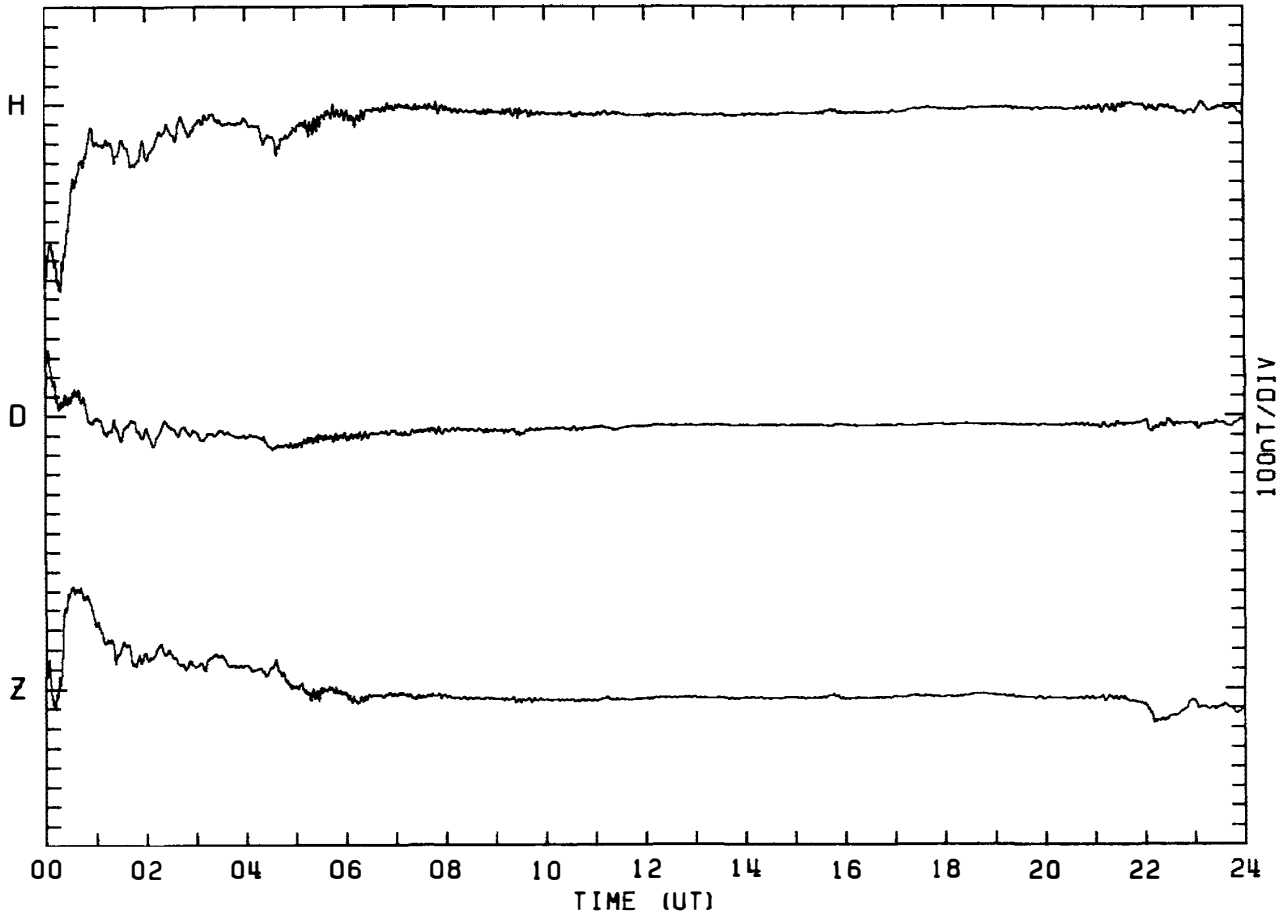
MAGNETOGRAM SYOWA STATION

DAY:270 SEPTEMBER 27, 1982



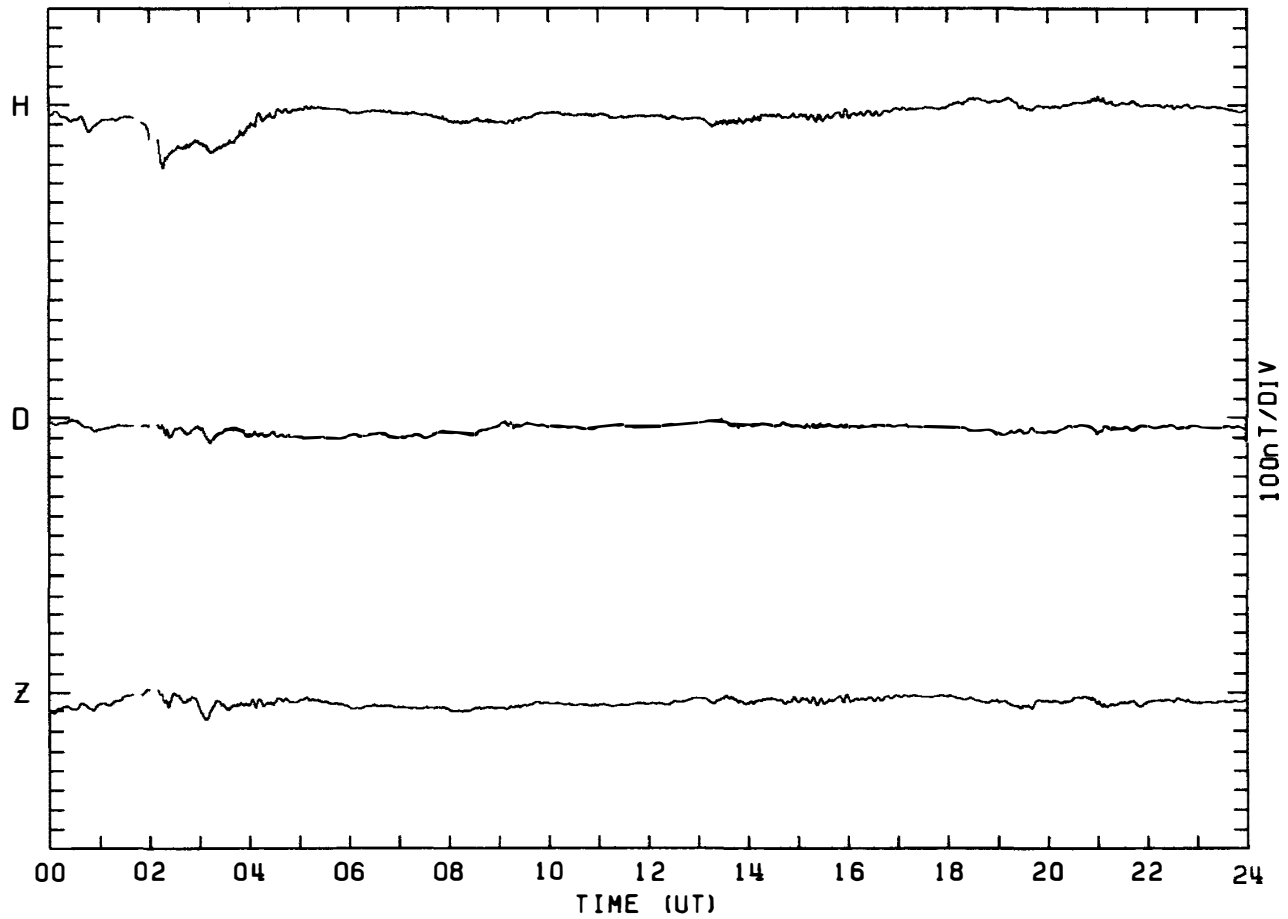
MAGNETOGRAM SYOWA STATION

DAY:271 SEPTEMBER 28, 1982



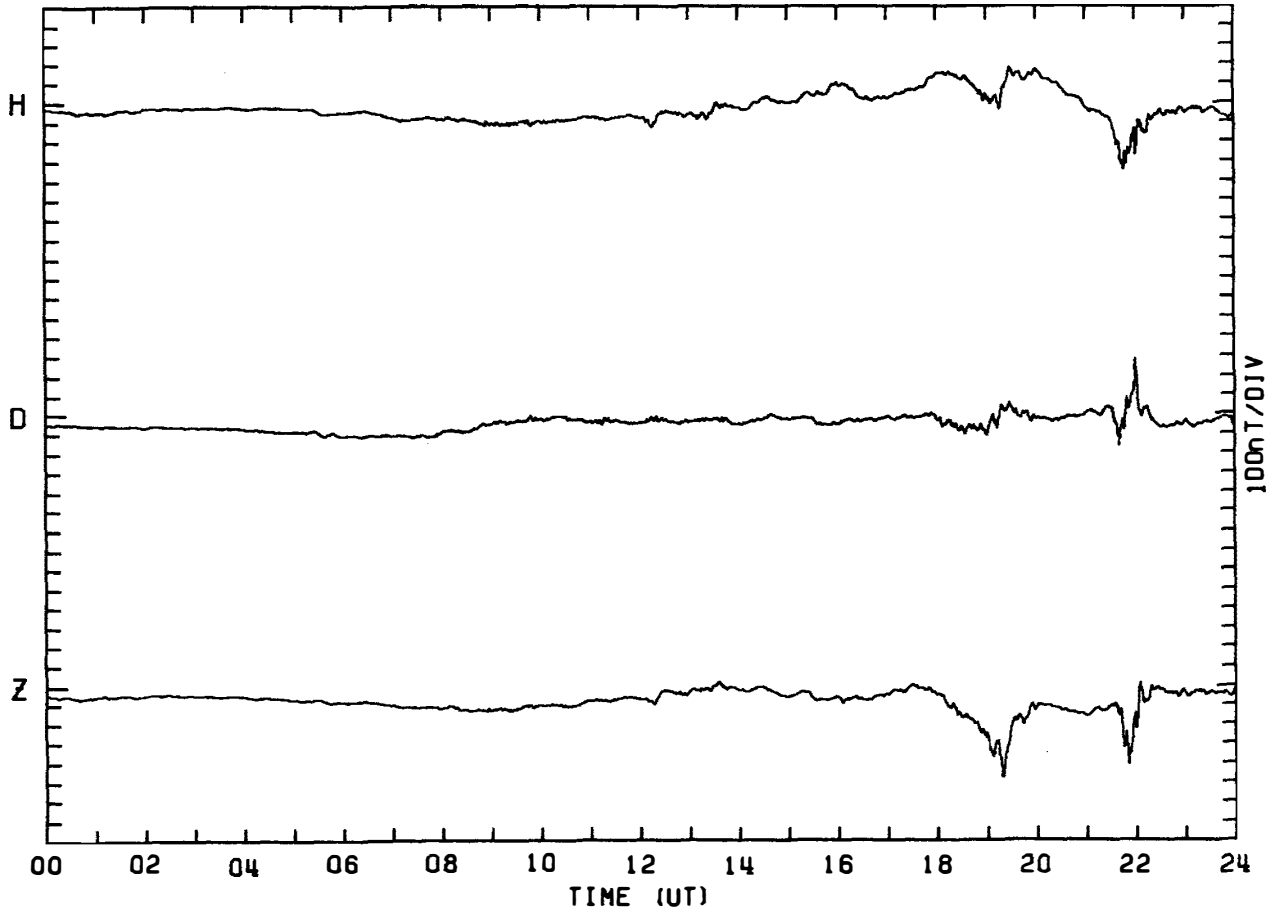
MAGNETOGRAM SYOWA STATION

DAY:272 SEPTEMBER 29, 1982



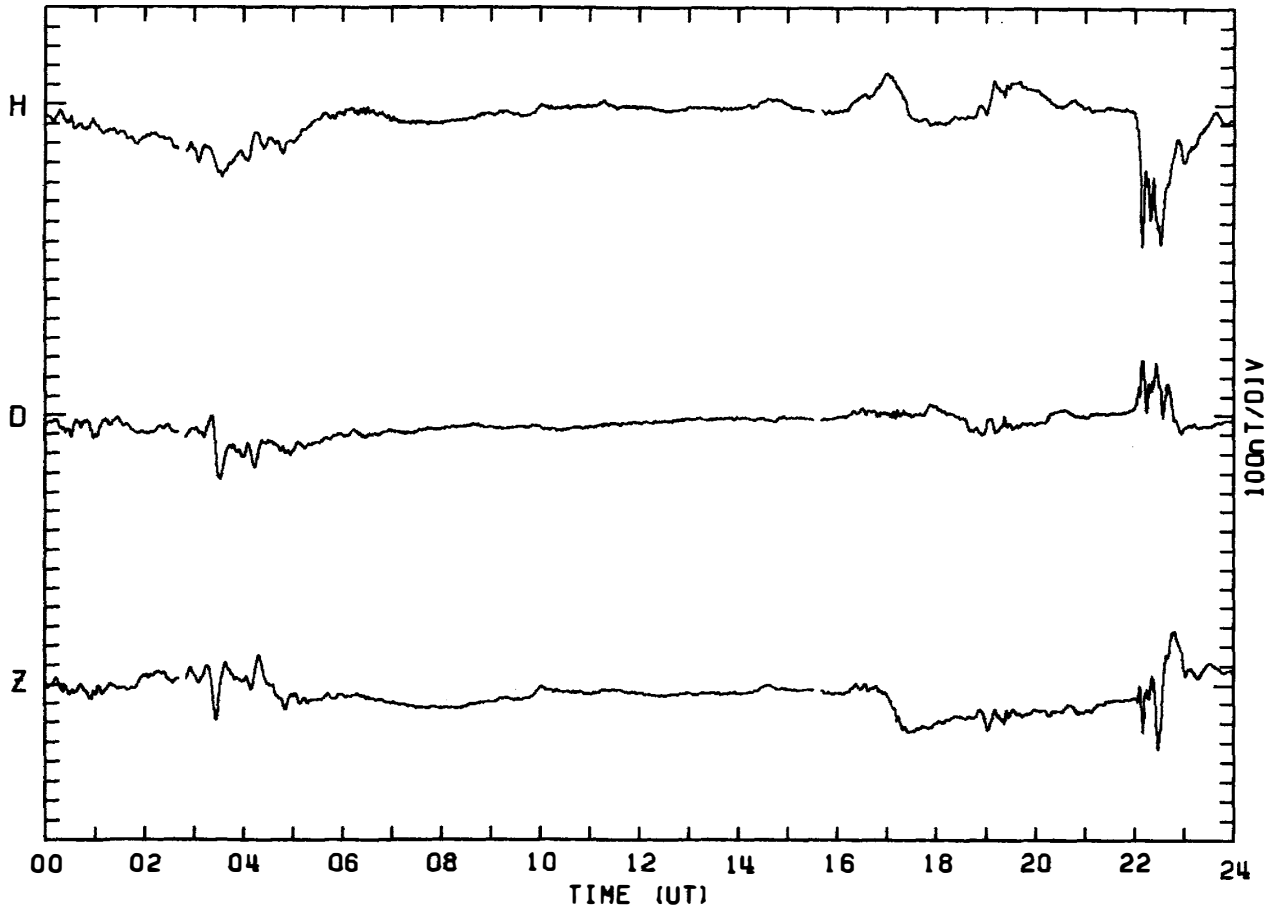
MAGNETOGRAM SYOWA STATION

DAY:273 SEPTEMBER 30, 1982



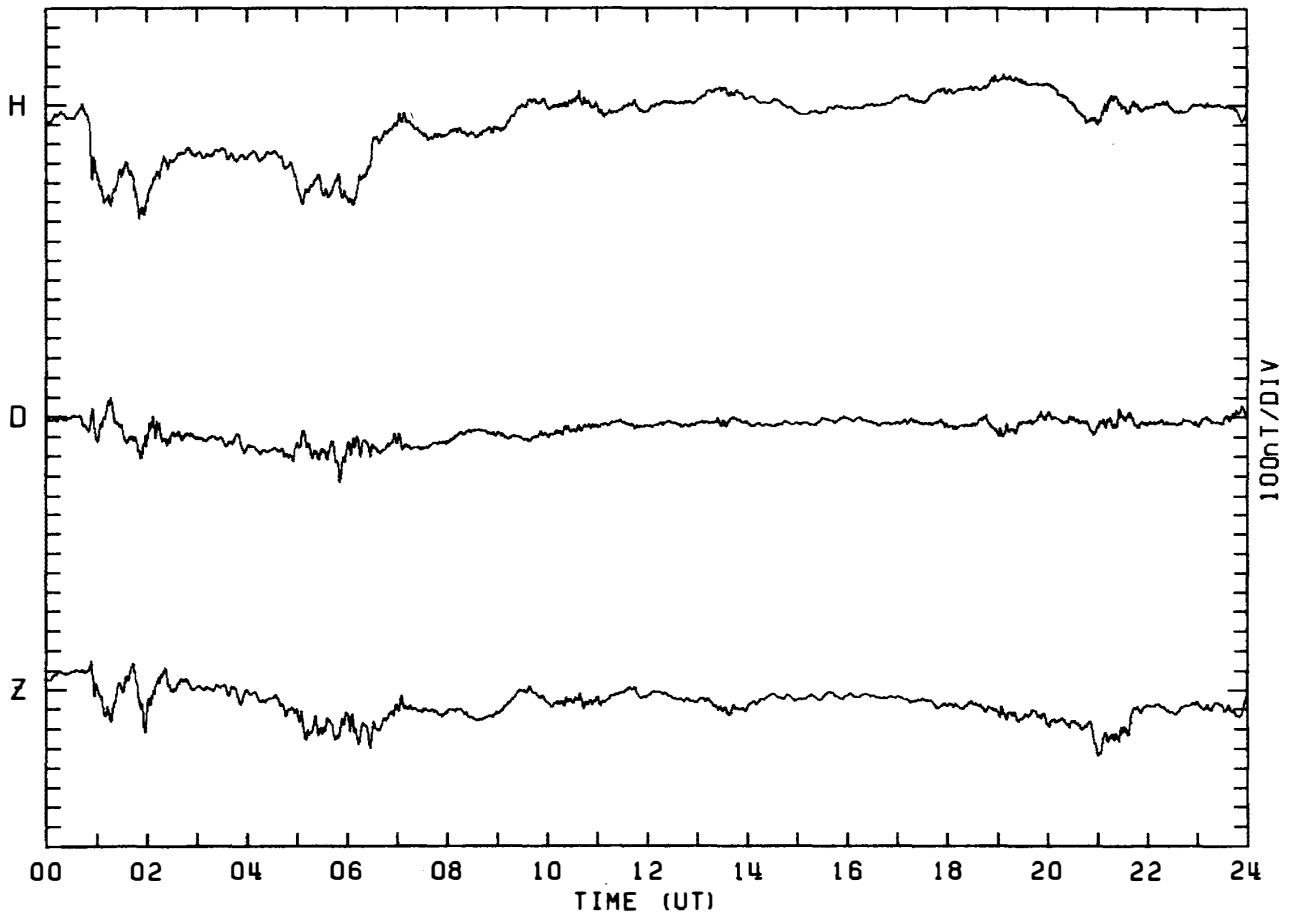
MAGNETOGRAM SYOWA STATION

DAY:274 OCTOBER 1, 1982



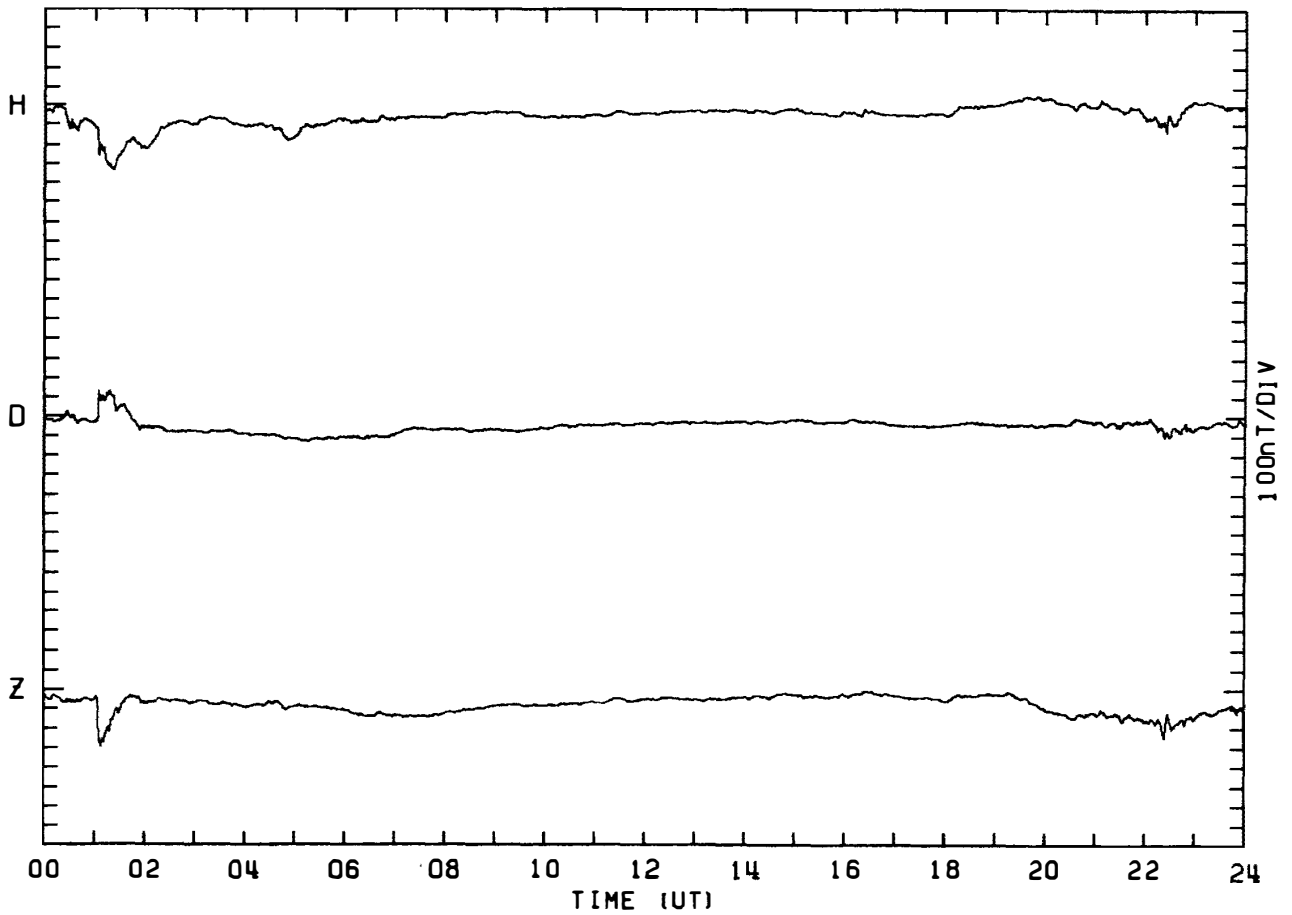
MAGNETOGRAM SYOWA STATION

DAY:275 OCTOBER 2, 1982



MAGNETOGRAM SYOWA STATION

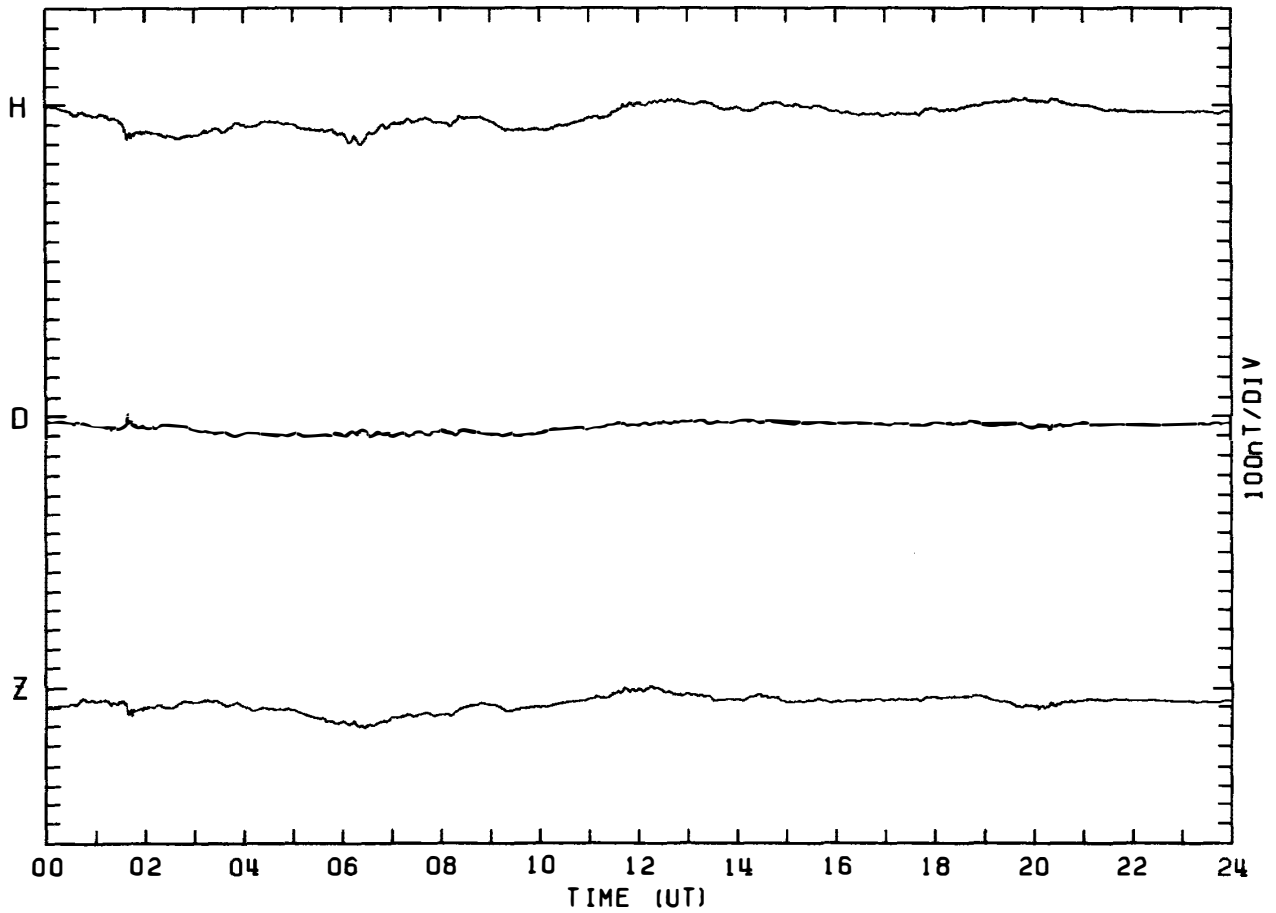
DAY:276 OCTOBER 3, 1982





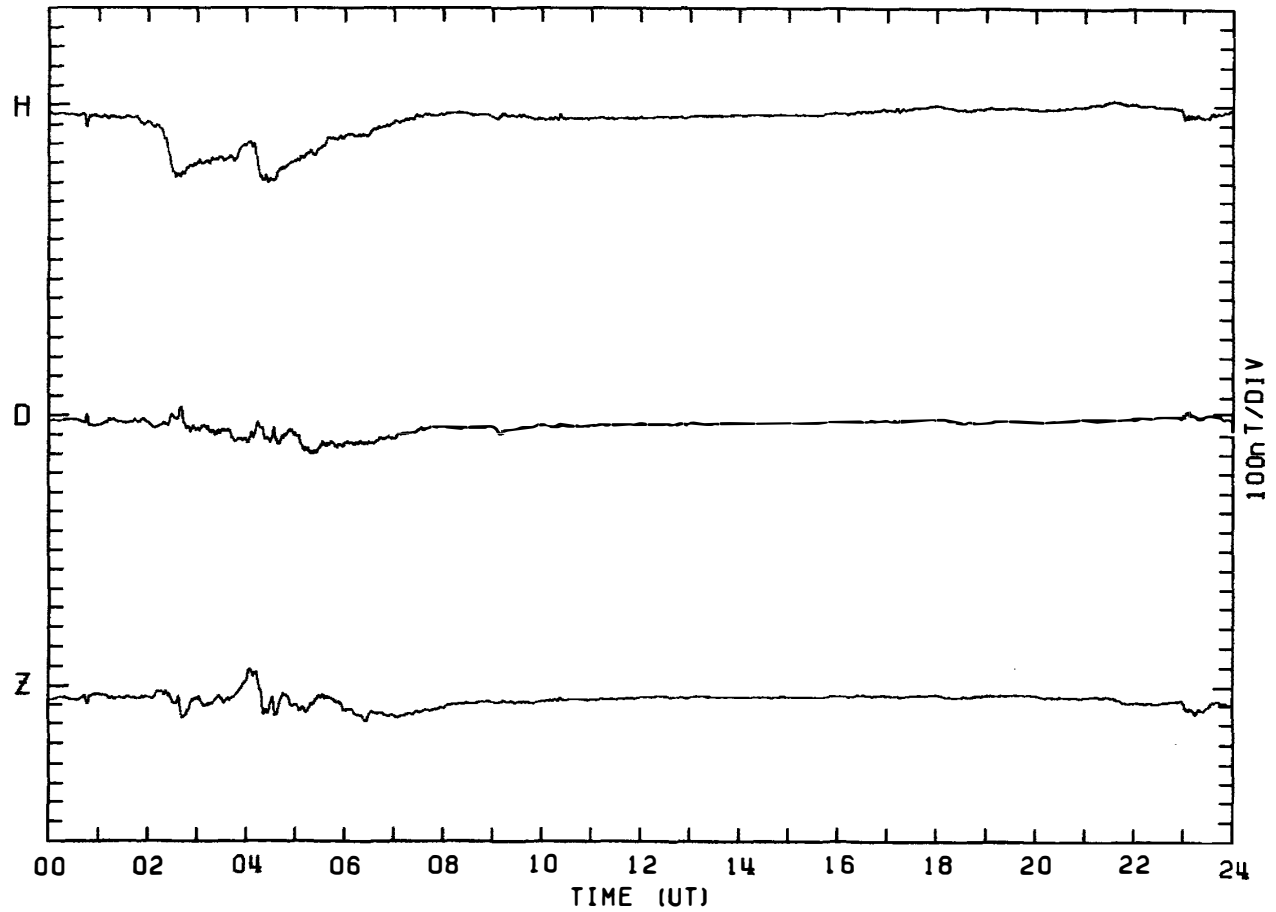
MAGNETOGRAM SYOWA STATION

DAY:277 OCTOBER 4, 1982



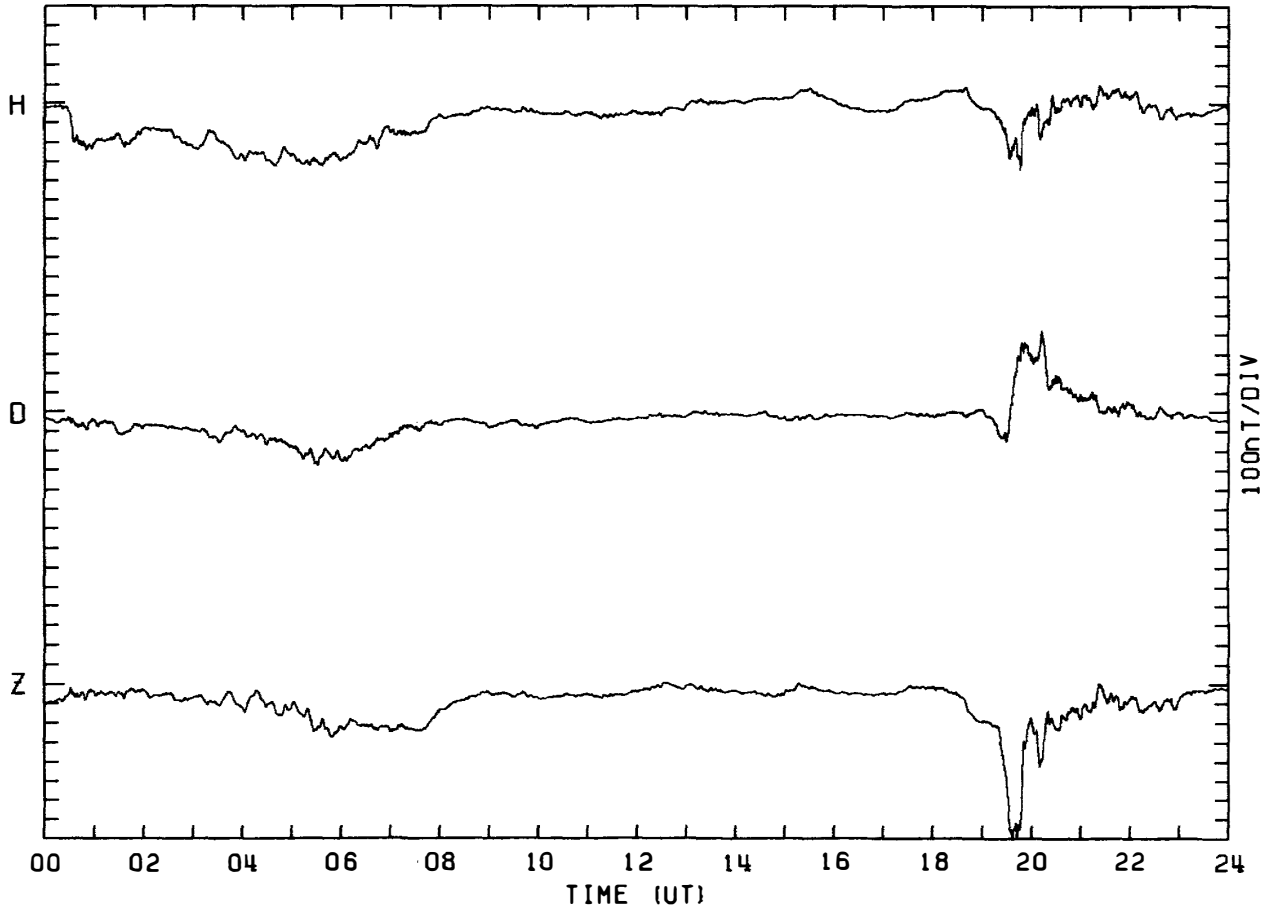
MAGNETOGRAM SYOWA STATION

DAY:278 OCTOBER 5, 1982



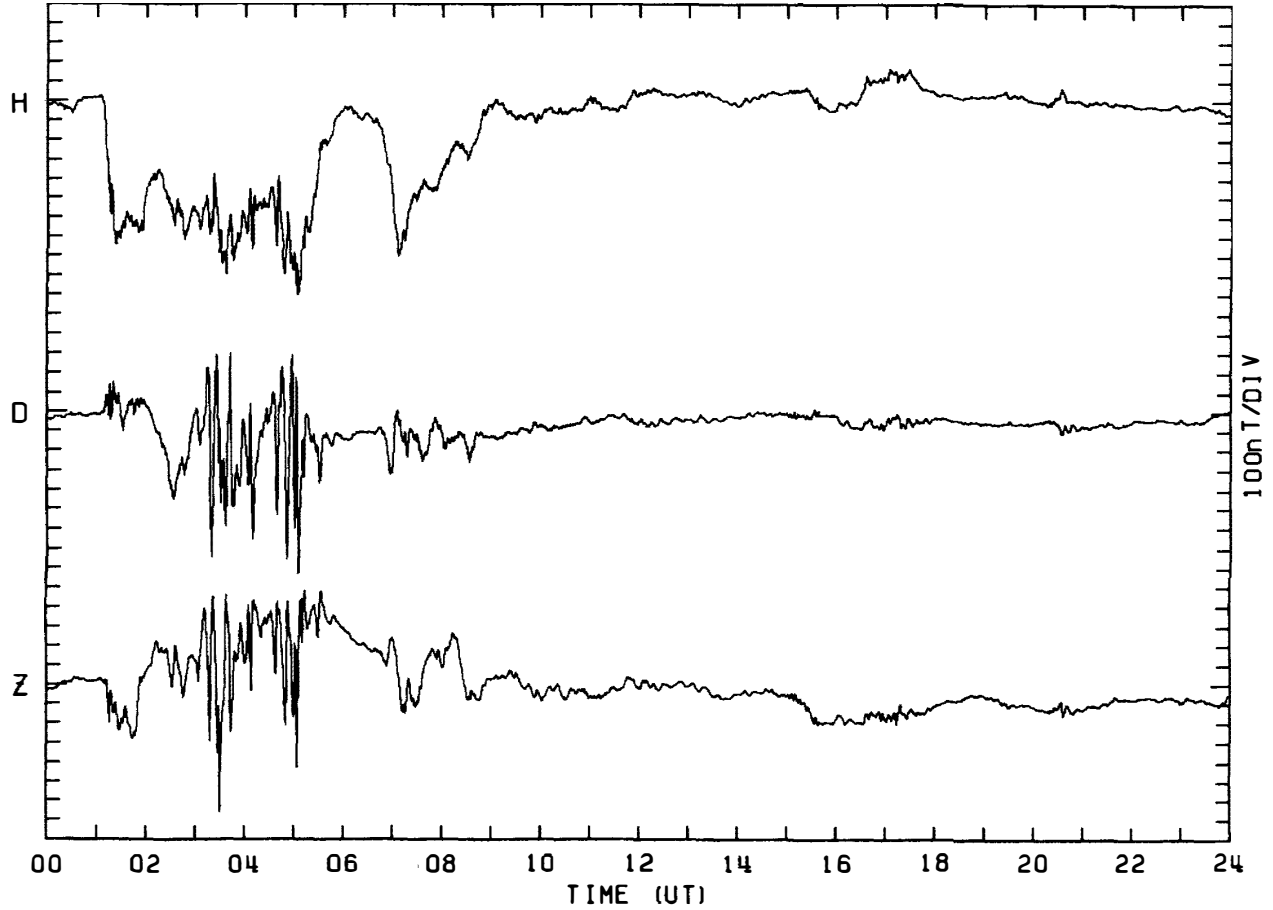
MAGNETOGRAM SYOWA STATION

DAY:279 OCTOBER 6, 1982



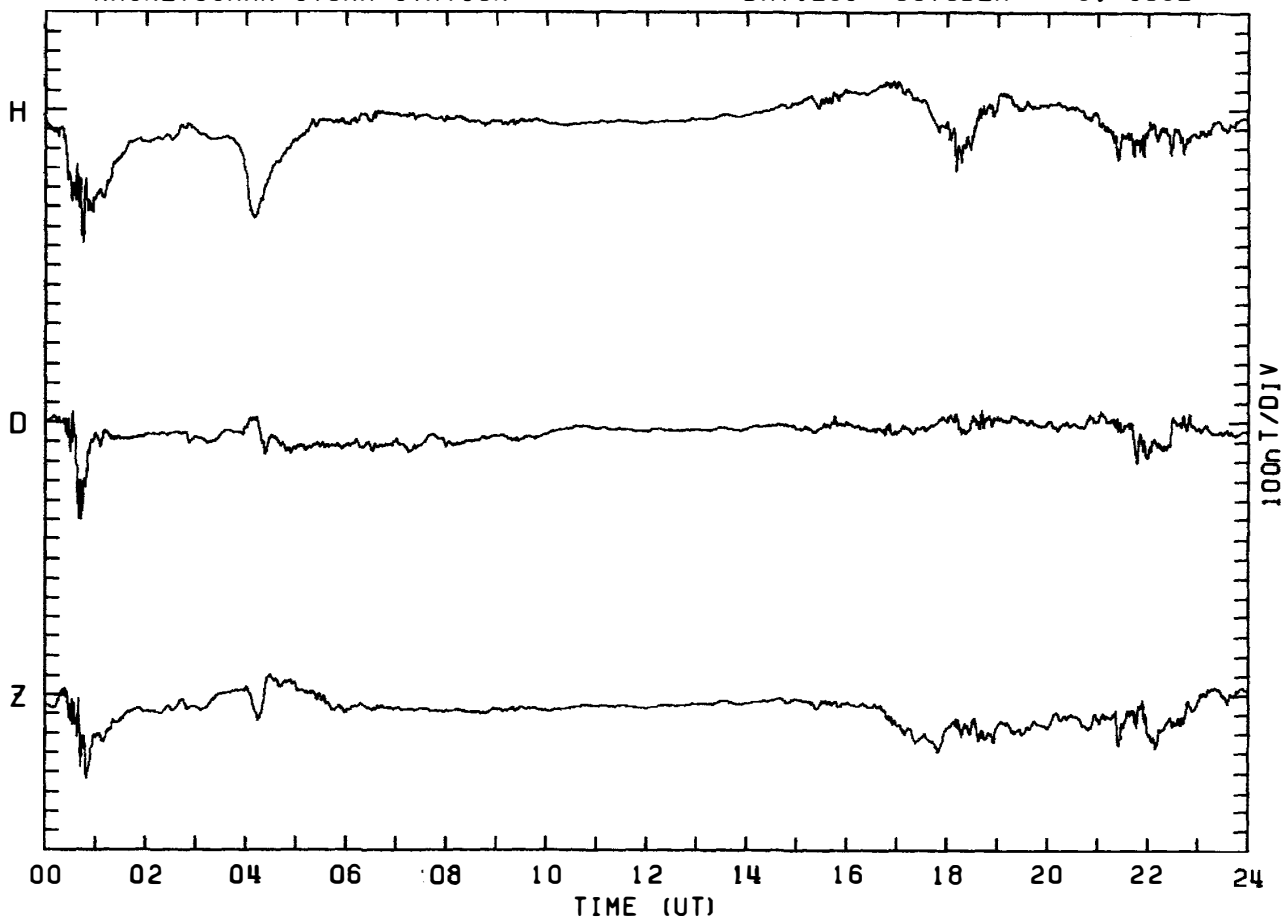
MAGNETOGRAM SYOWA STATION

DAY:280 OCTOBER 7, 1982



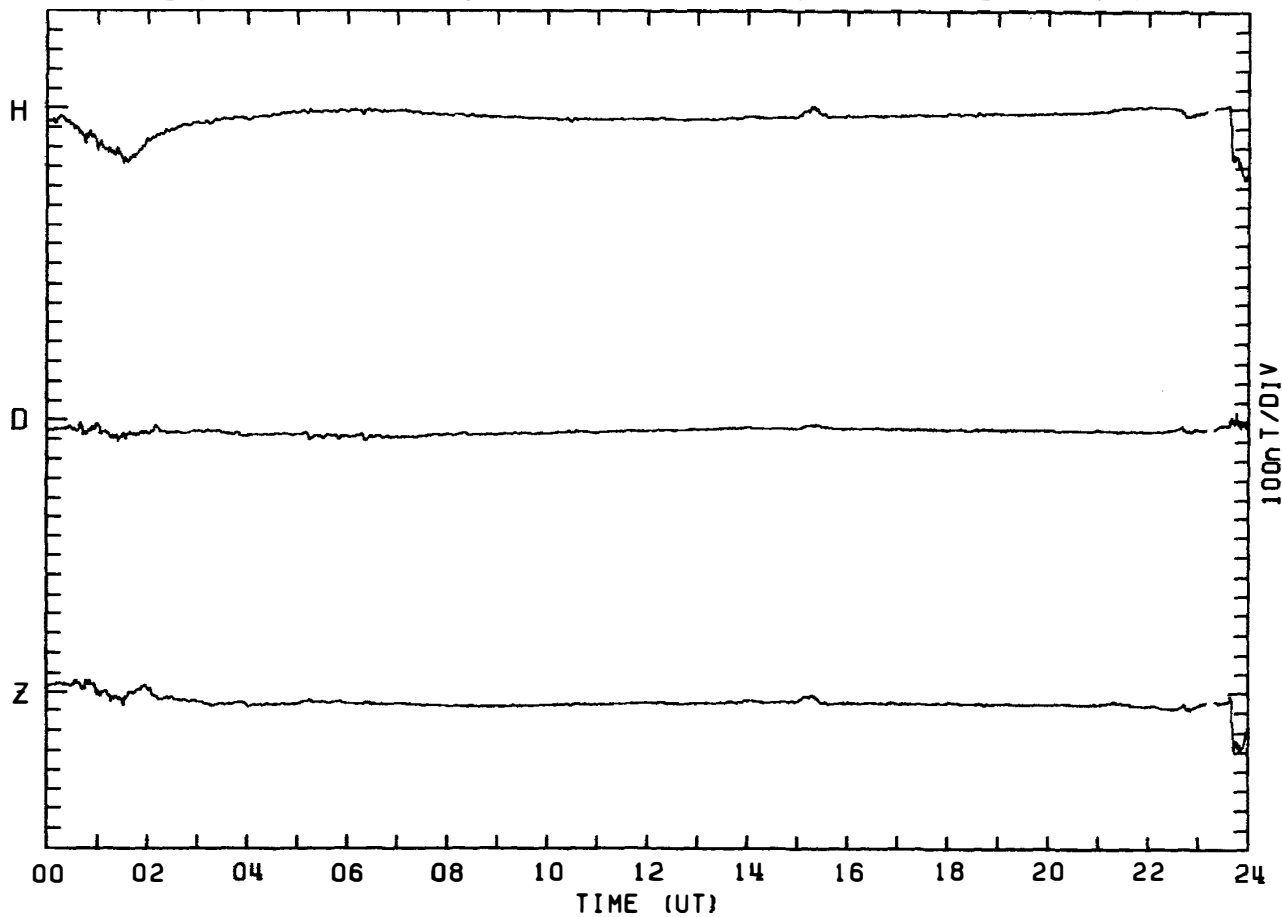
MAGNETOGRAM SYOWA STATION

DAY:281 OCTOBER 8. 1982



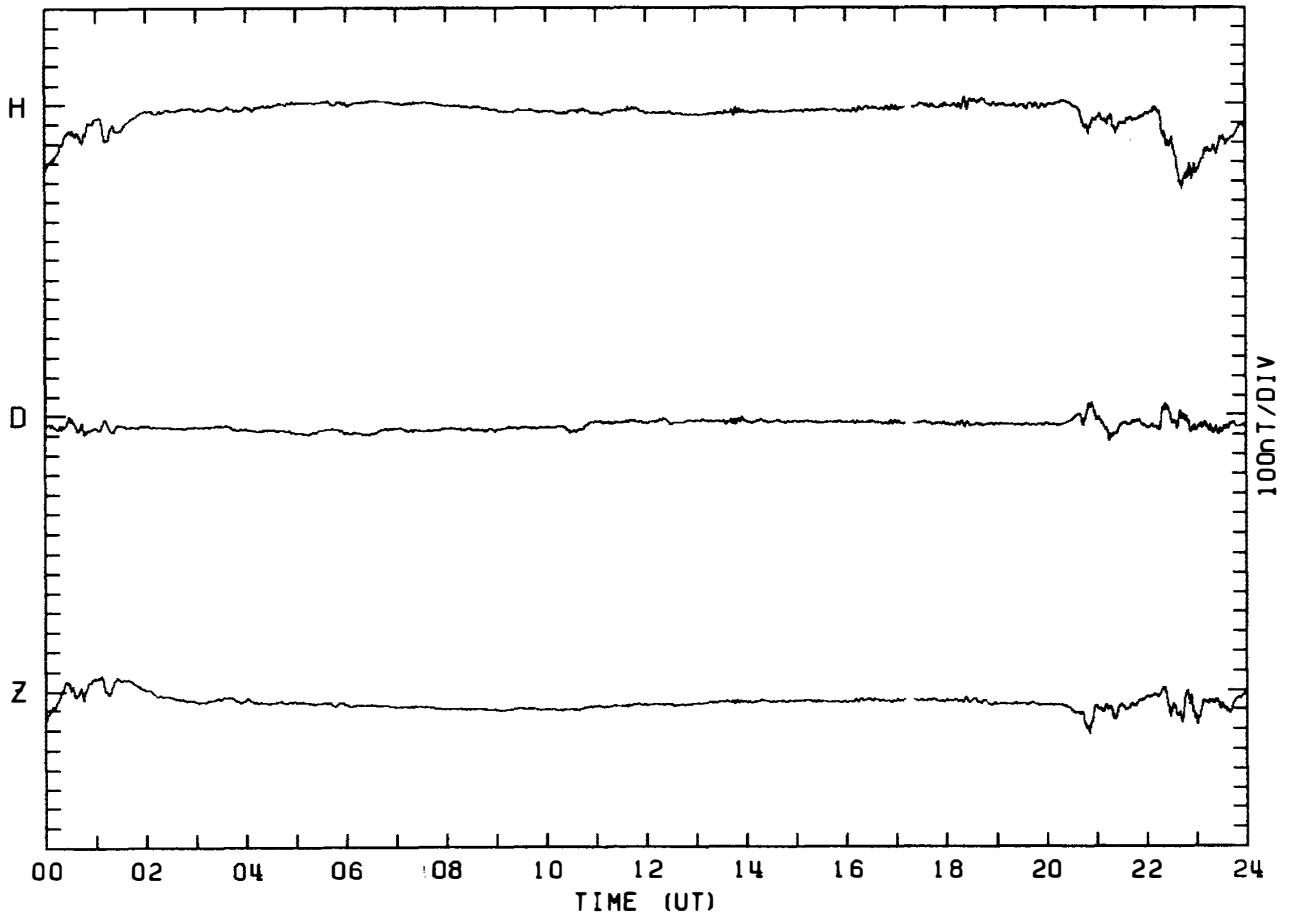
MAGNETOGRAM SYOWA STATION

DAY:282 OCTOBER 9. 1982



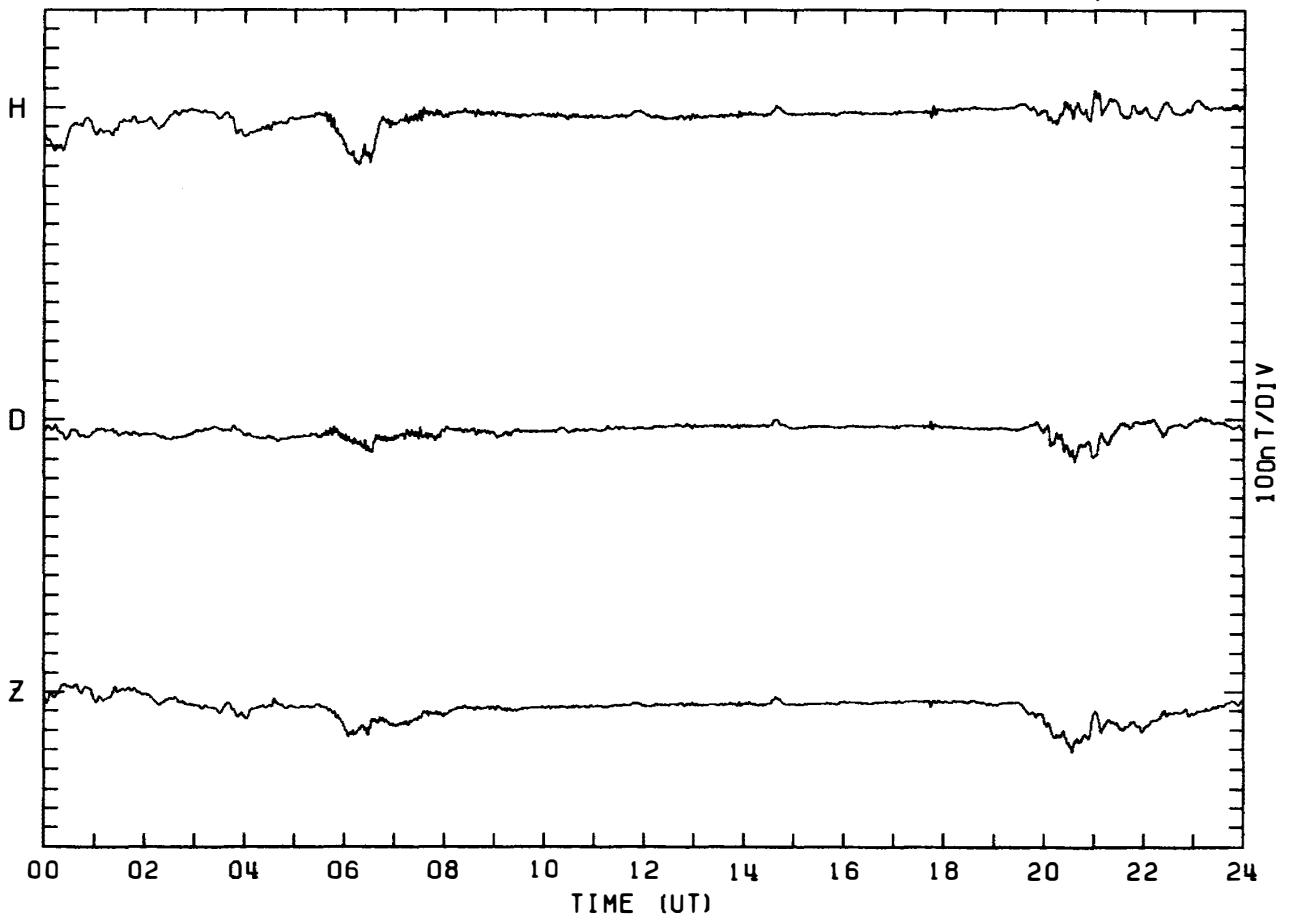
MAGNETOGRAM SYOWA STATION

DAY:283 OCTOBER 10, 1982



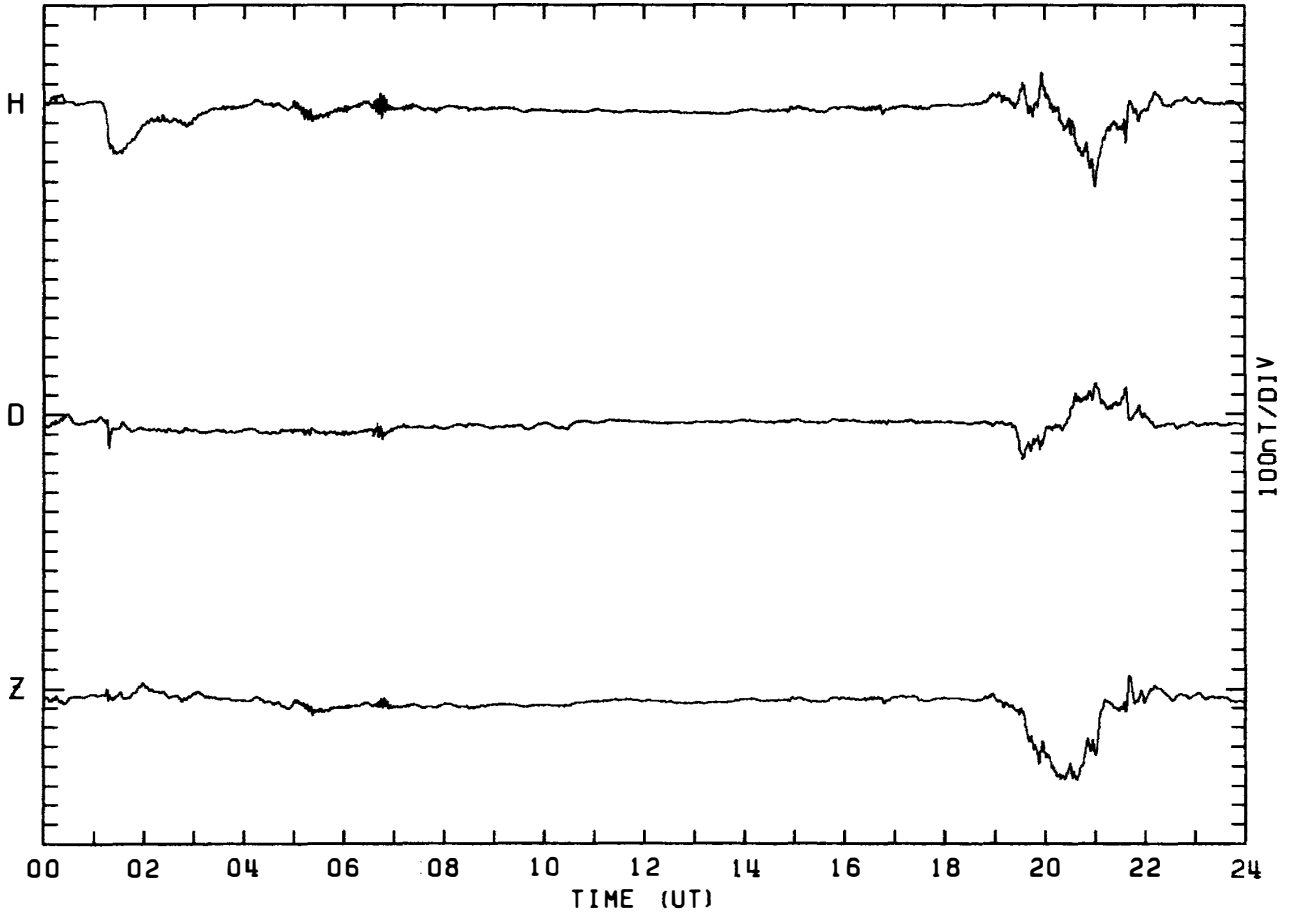
MAGNETOGRAM SYOWA STATION

DAY:284 OCTOBER 11, 1982



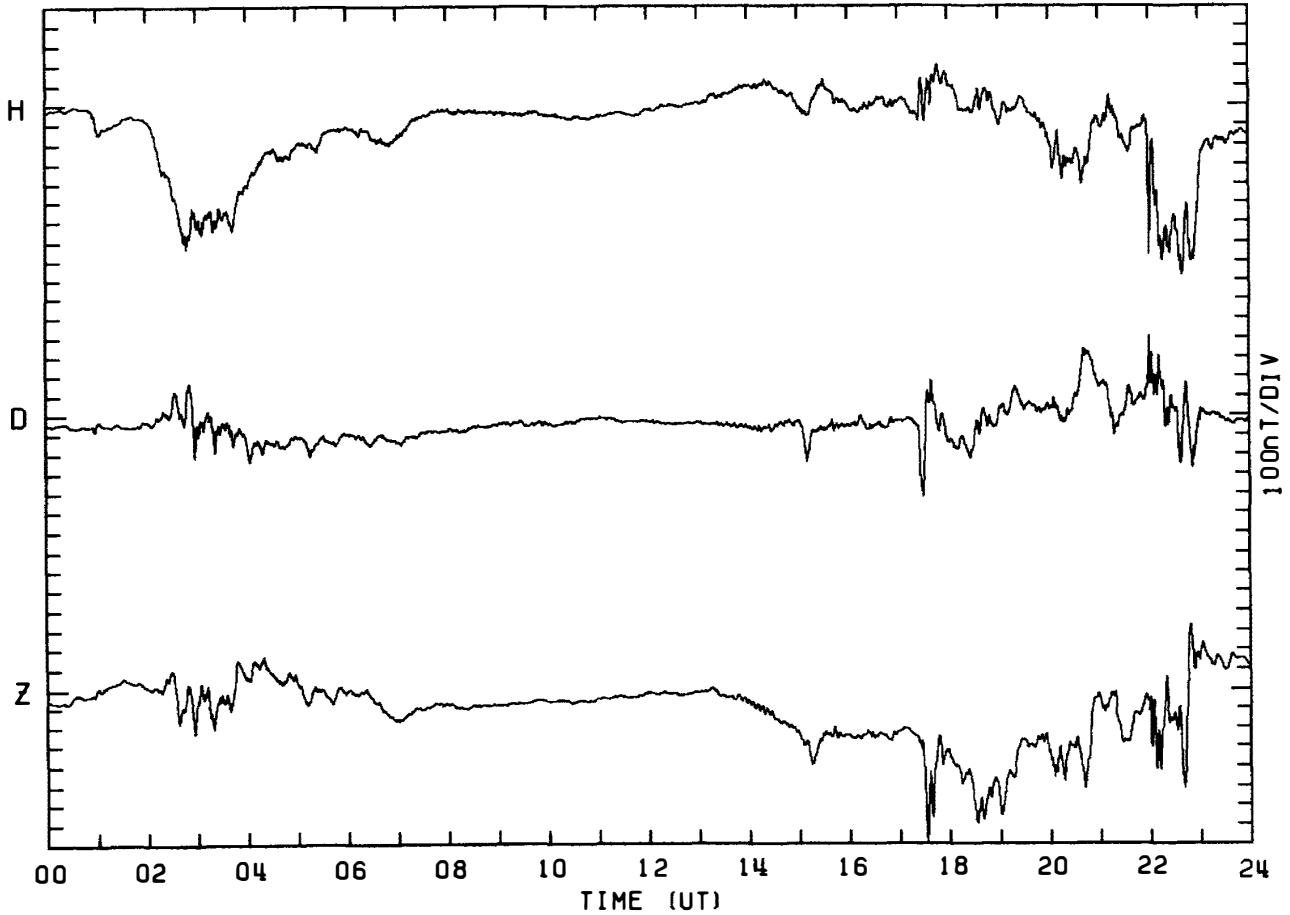
MAGNETOGRAM SYOWA STATION

DAY:285 OCTOBER 12, 1982



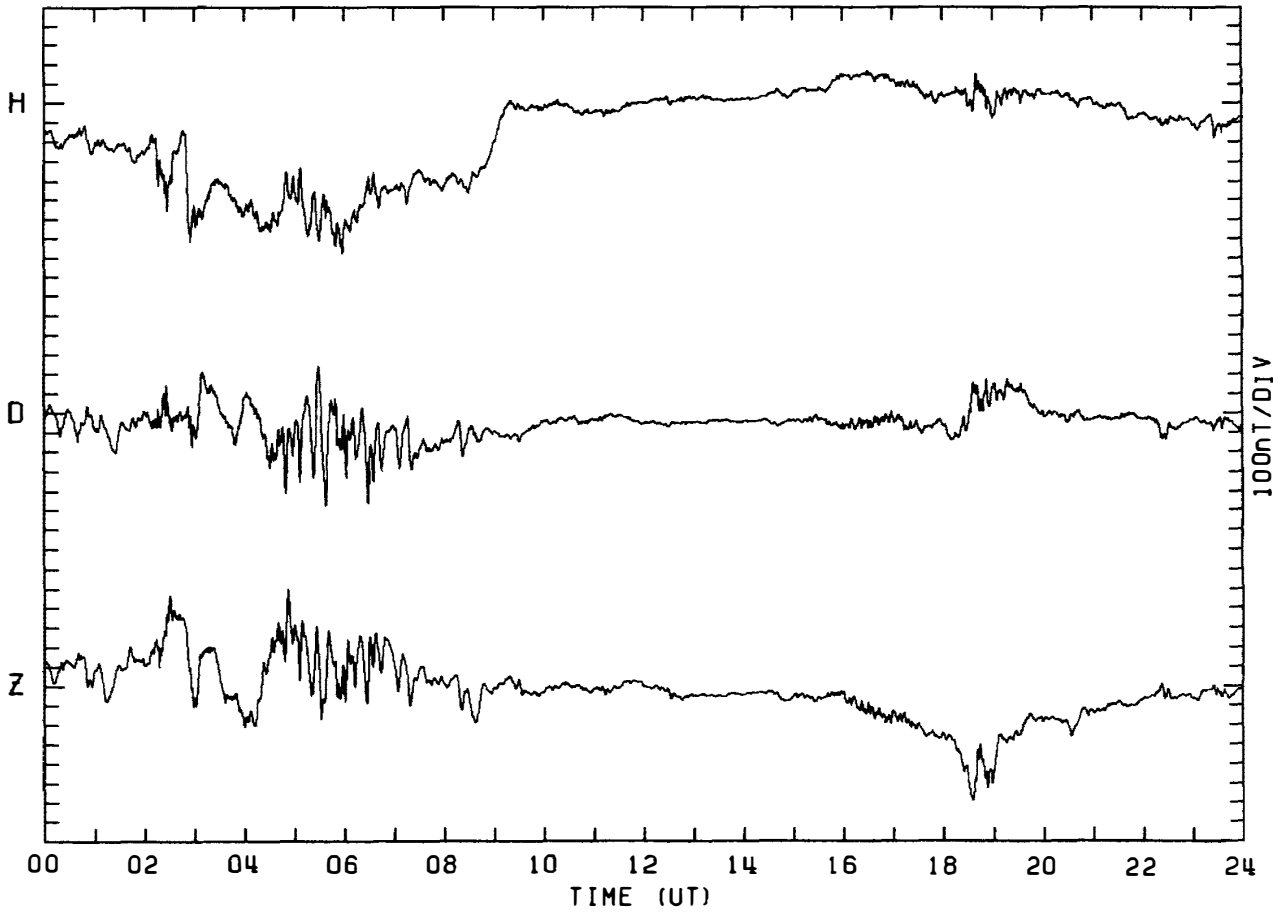
MAGNETOGRAM SYOWA STATION

DAY:286 OCTOBER 13, 1982



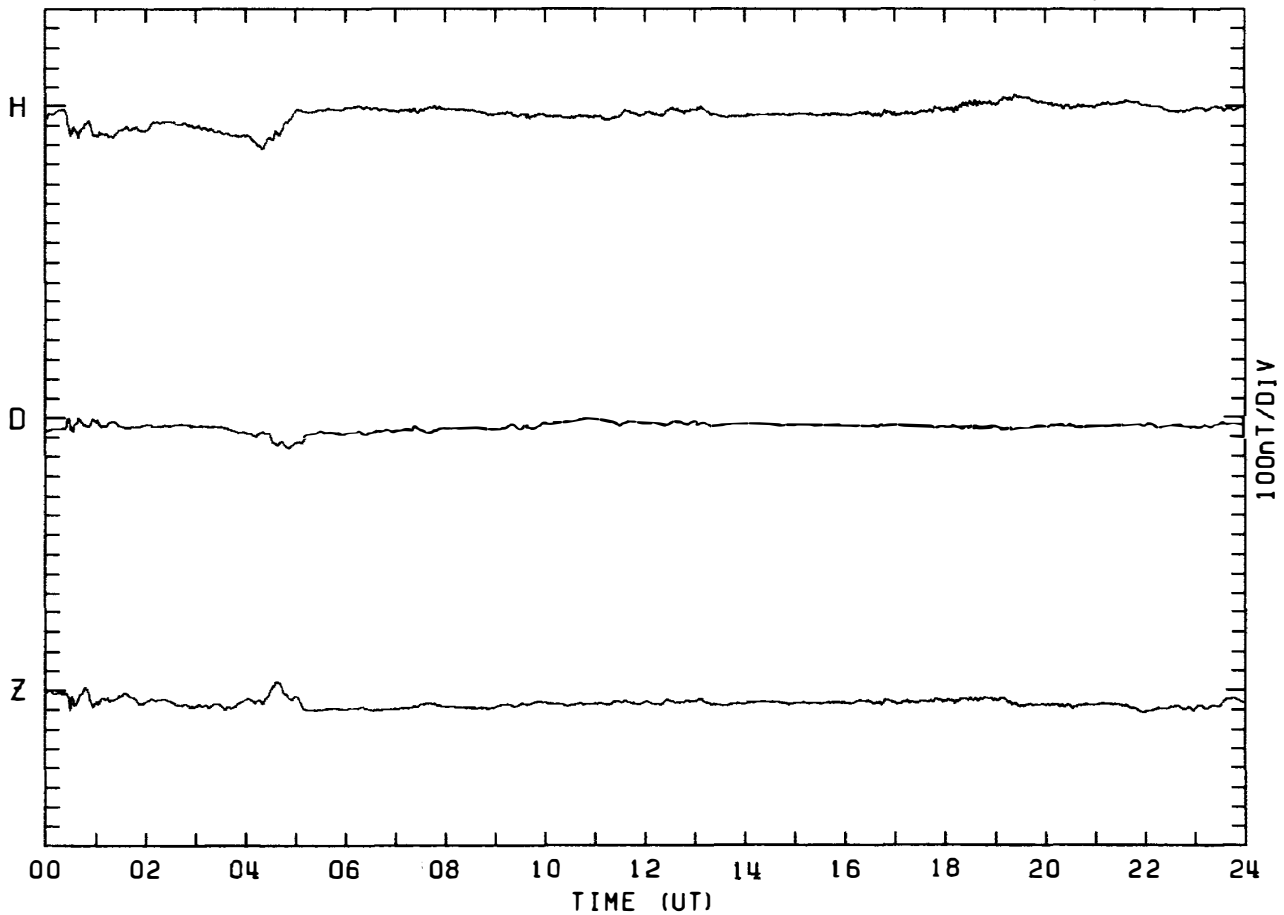
MAGNETOGRAM SYOWA STATION

DAY:287 OCTOBER 14. 1982



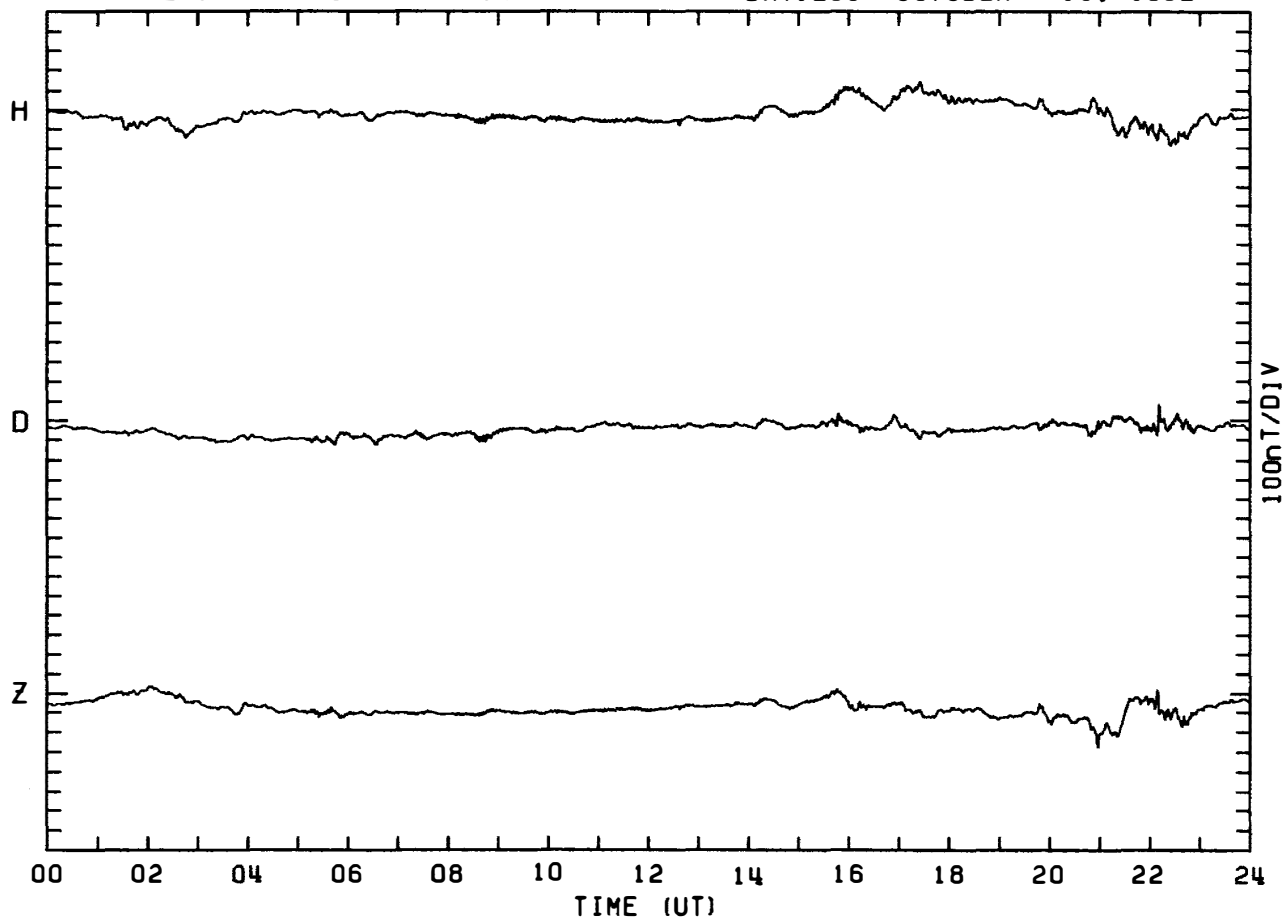
MAGNETOGRAM SYOWA STATION

DAY:288 OCTOBER 15. 1982



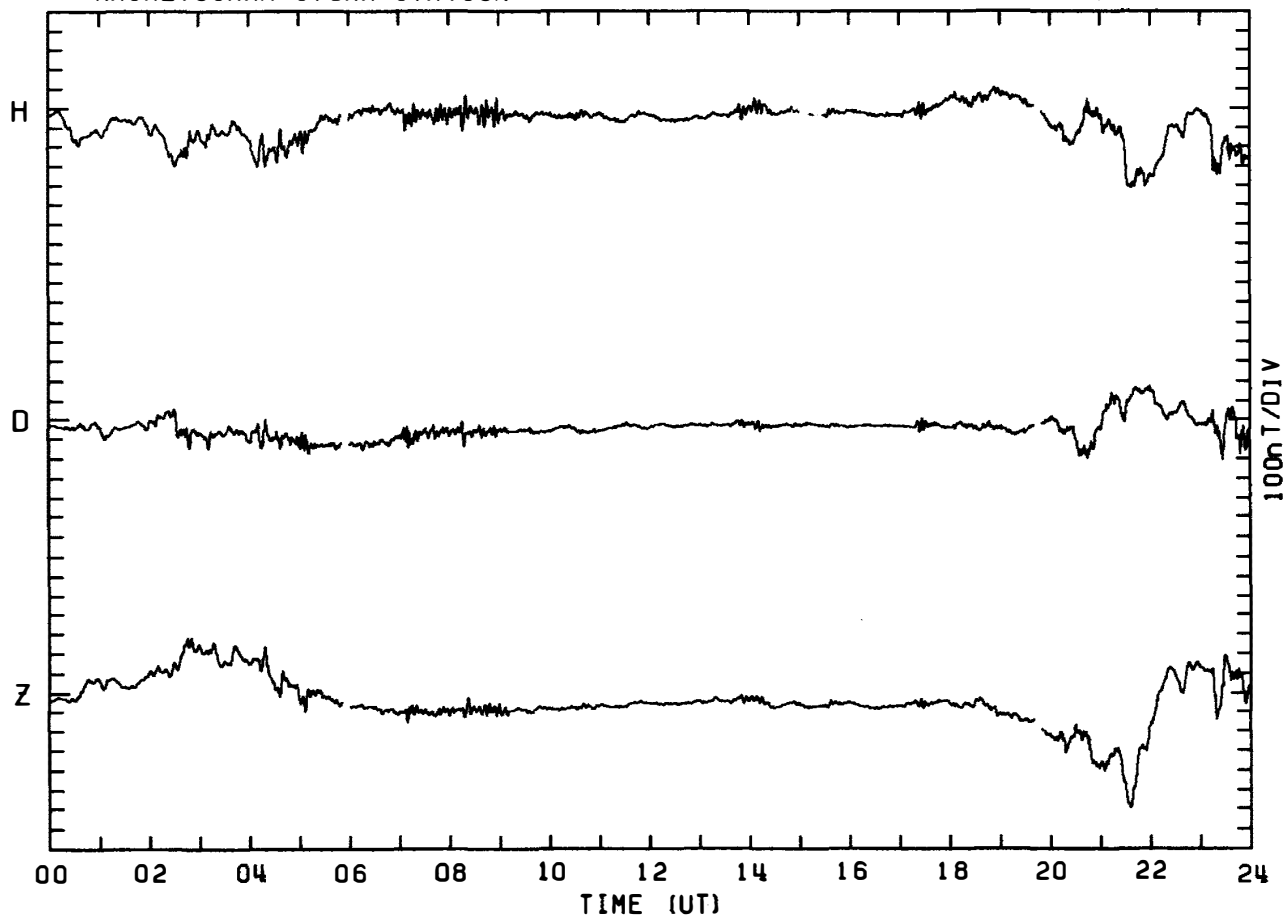
MAGNETOGRAM SYOWA STATION

DAY:289 OCTOBER 16, 1982



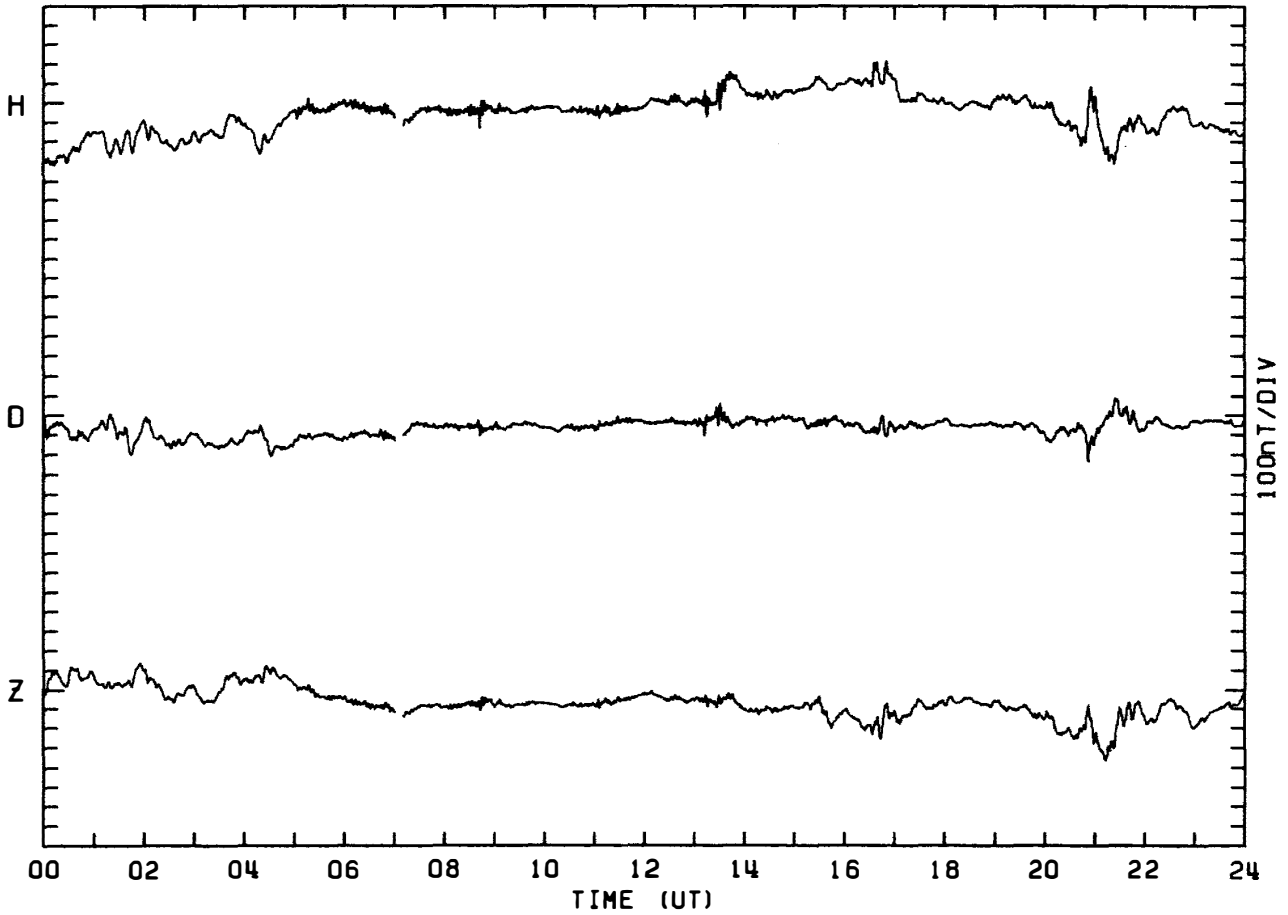
MAGNETOGRAM SYOWA STATION

DAY:290 OCTOBER 17, 1982



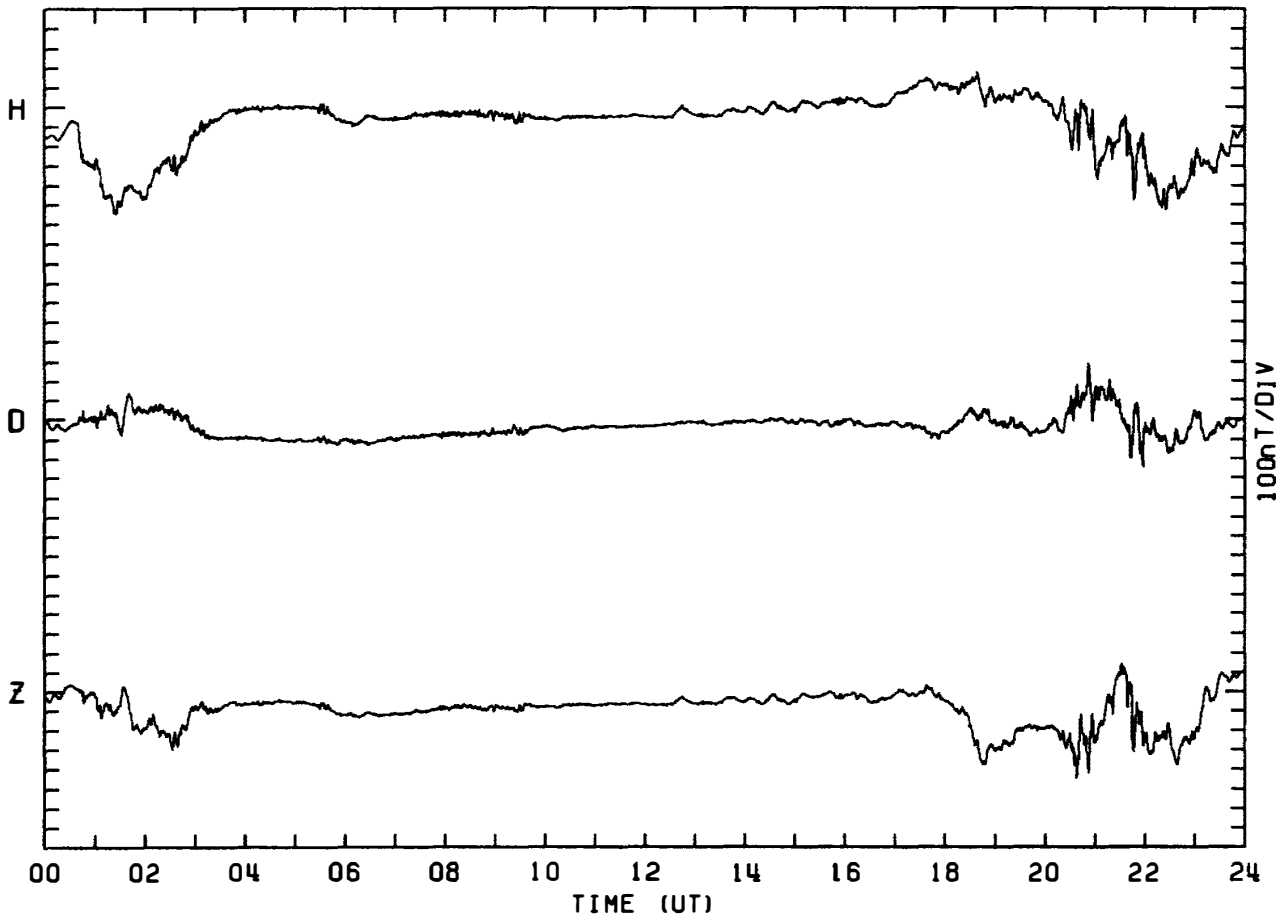
MAGNETOGRAM SYOWA STATION

DAY:291 OCTOBER 18. 1982



MAGNETOGRAM SYOWA STATION

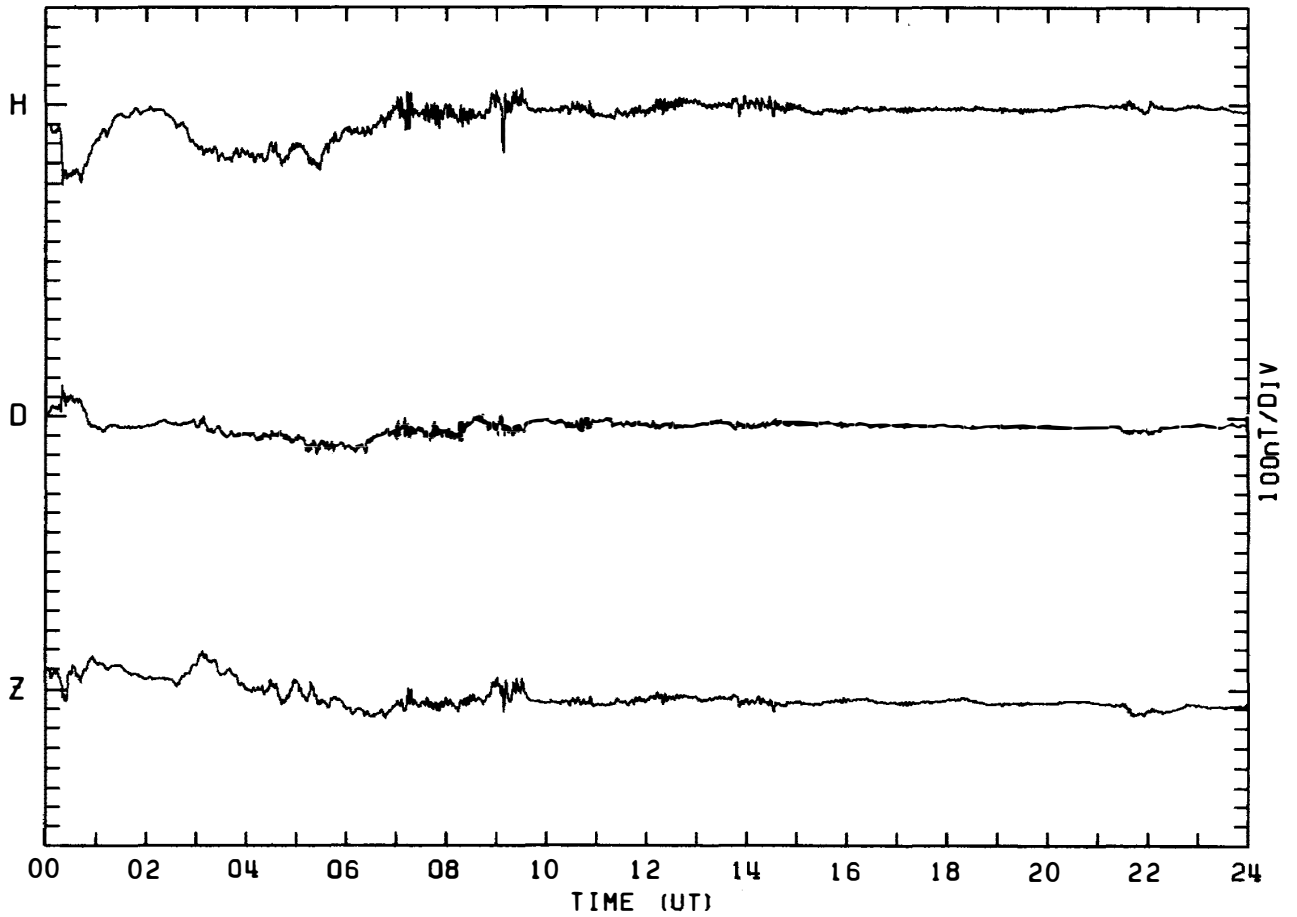
DAY:292 OCTOBER 19. 1982





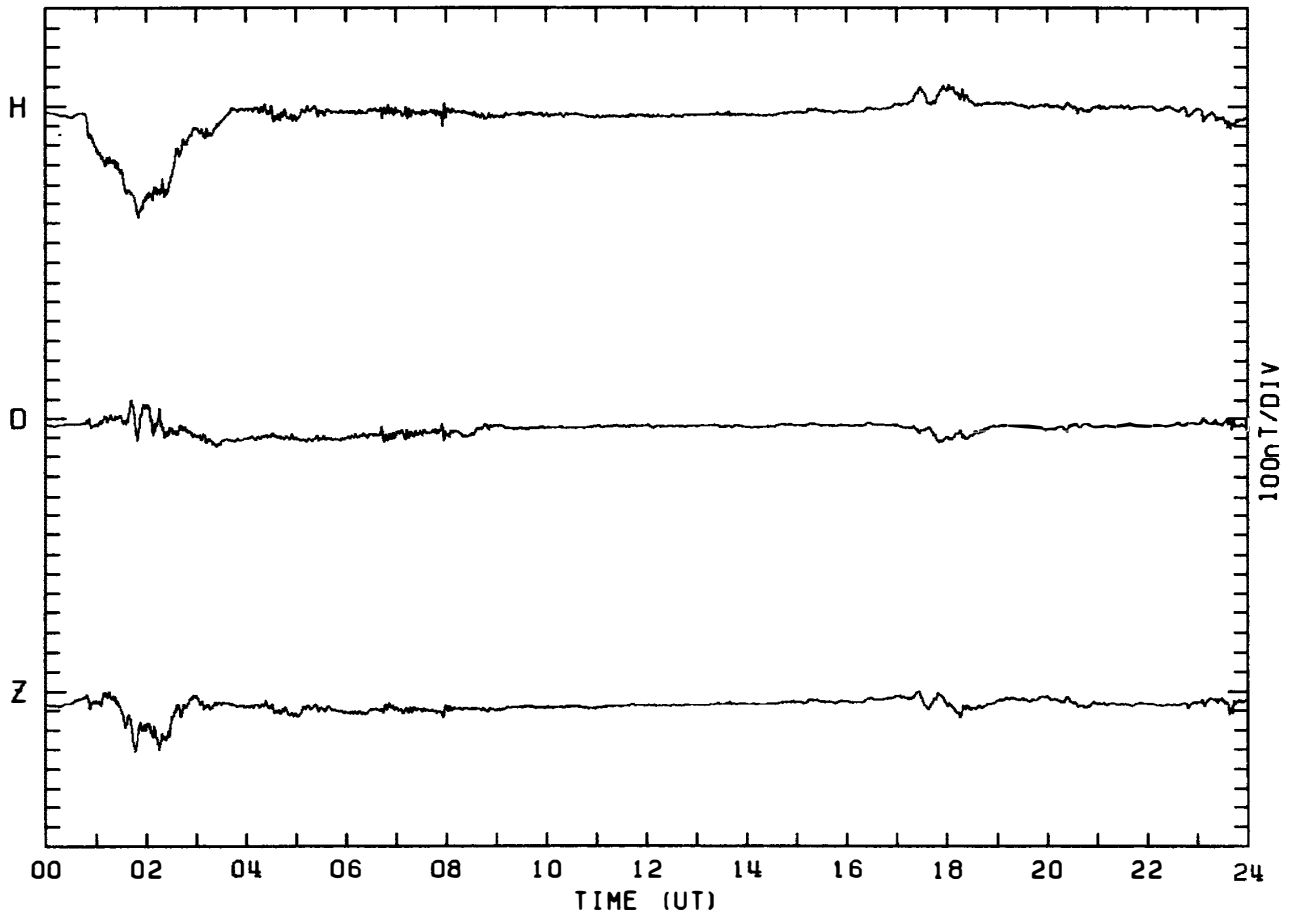
MAGNETOGRAM SYOWA STATION

DAY:293 OCTOBER 20, 1982



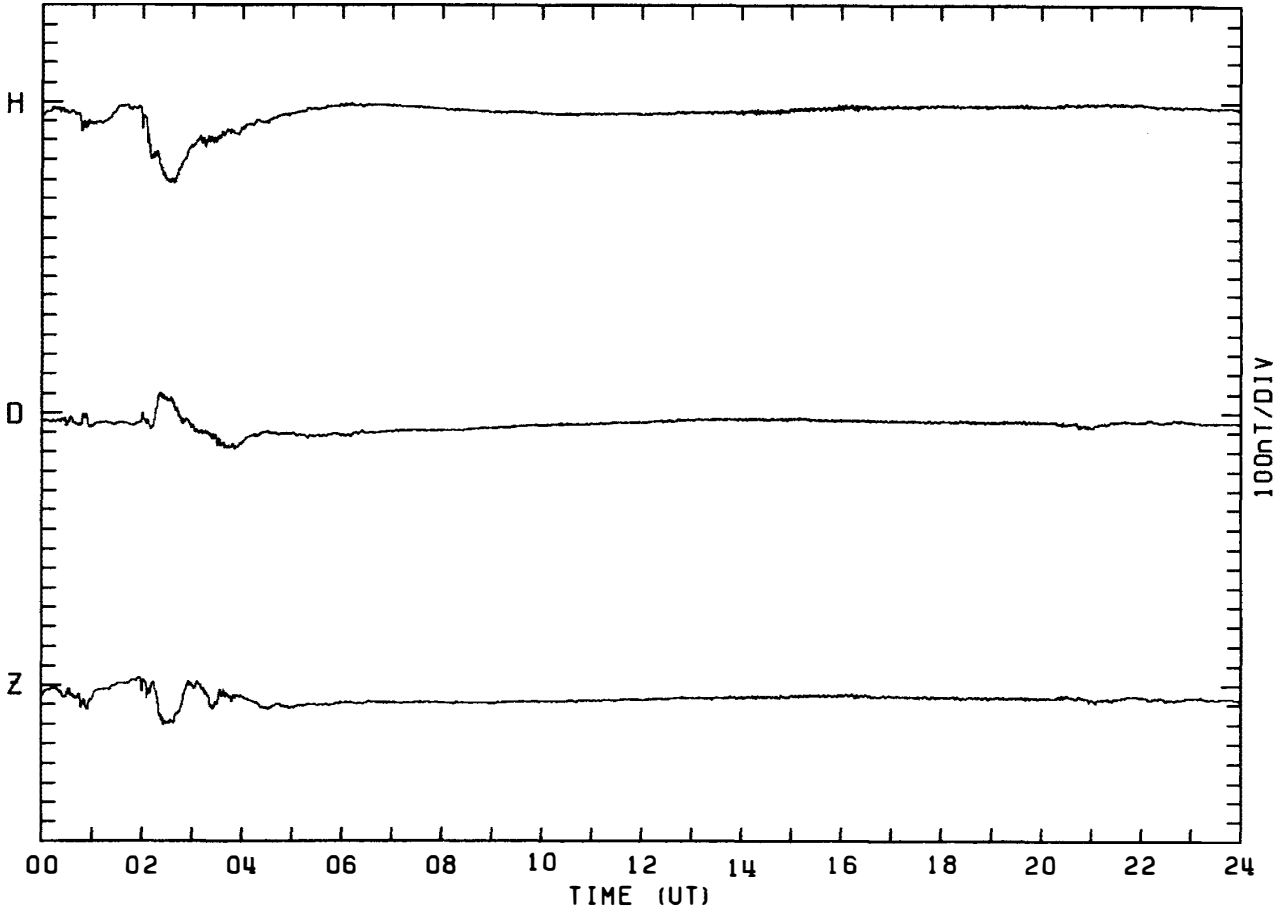
MAGNETOGRAM SYOWA STATION

DAY:294 OCTOBER 21, 1982



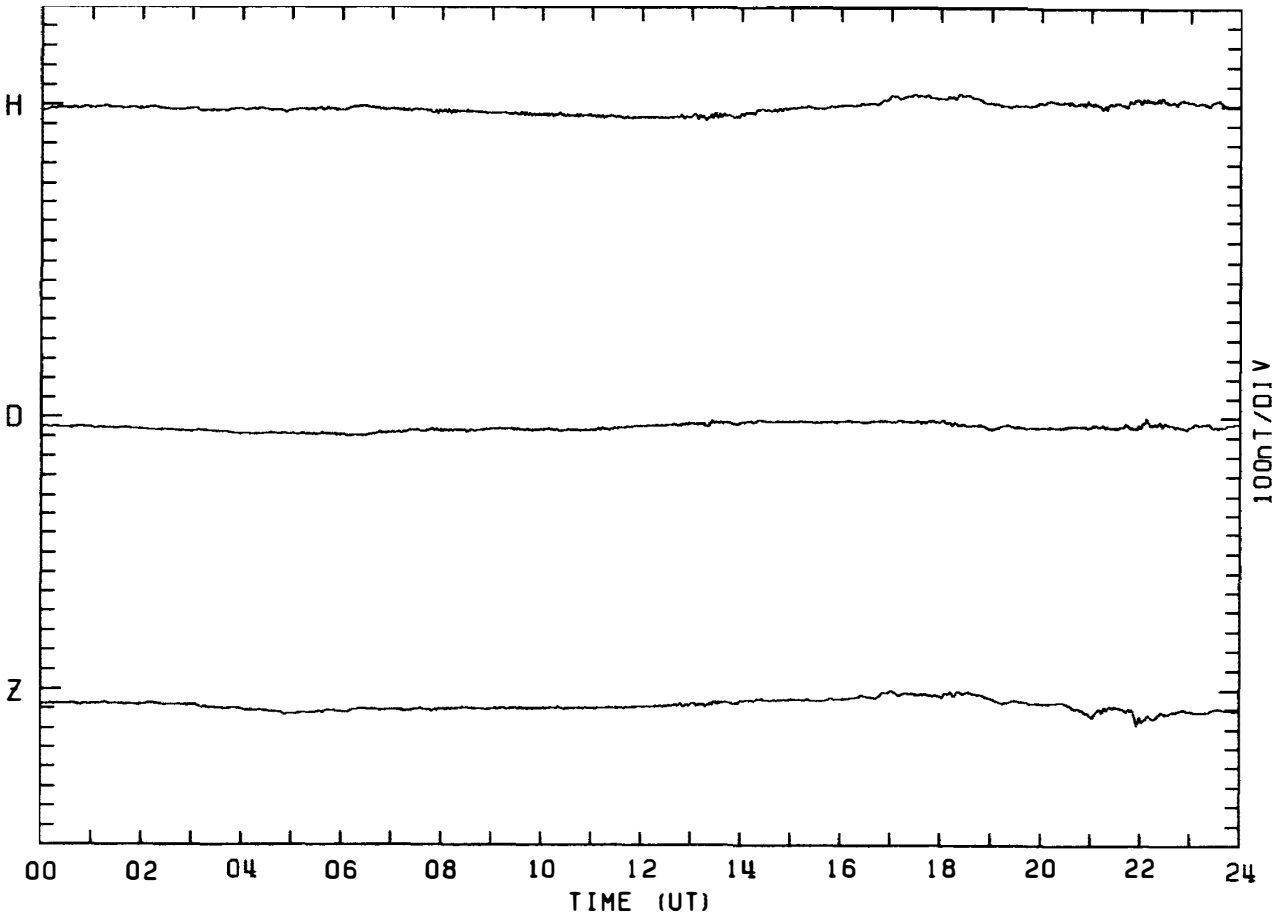
MAGNETOGRAM SYOWA STATION

DAY: 295 OCTOBER 22, 1982



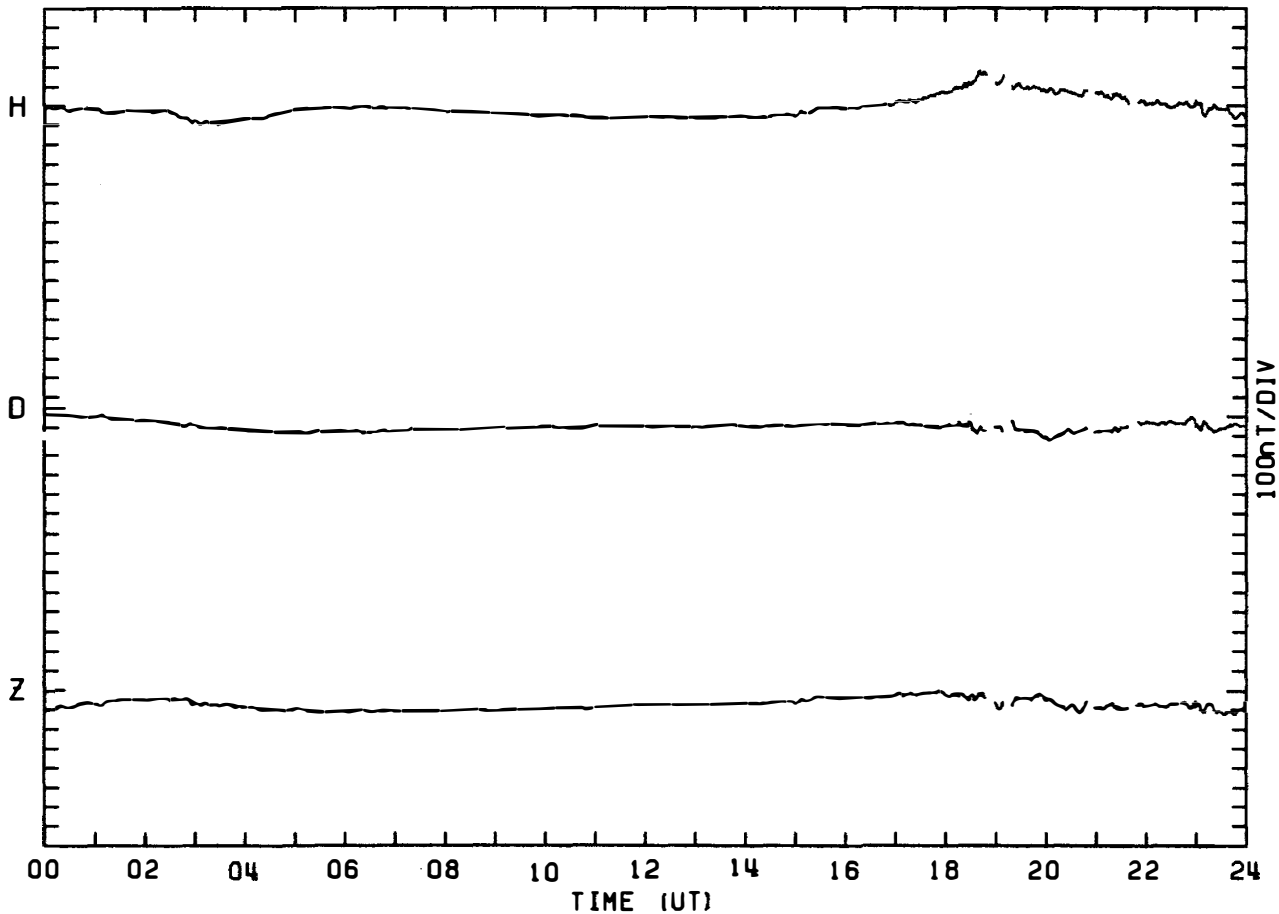
MAGNETOGRAM SYOWA STATION

DAY: 296 OCTOBER 23, 1982



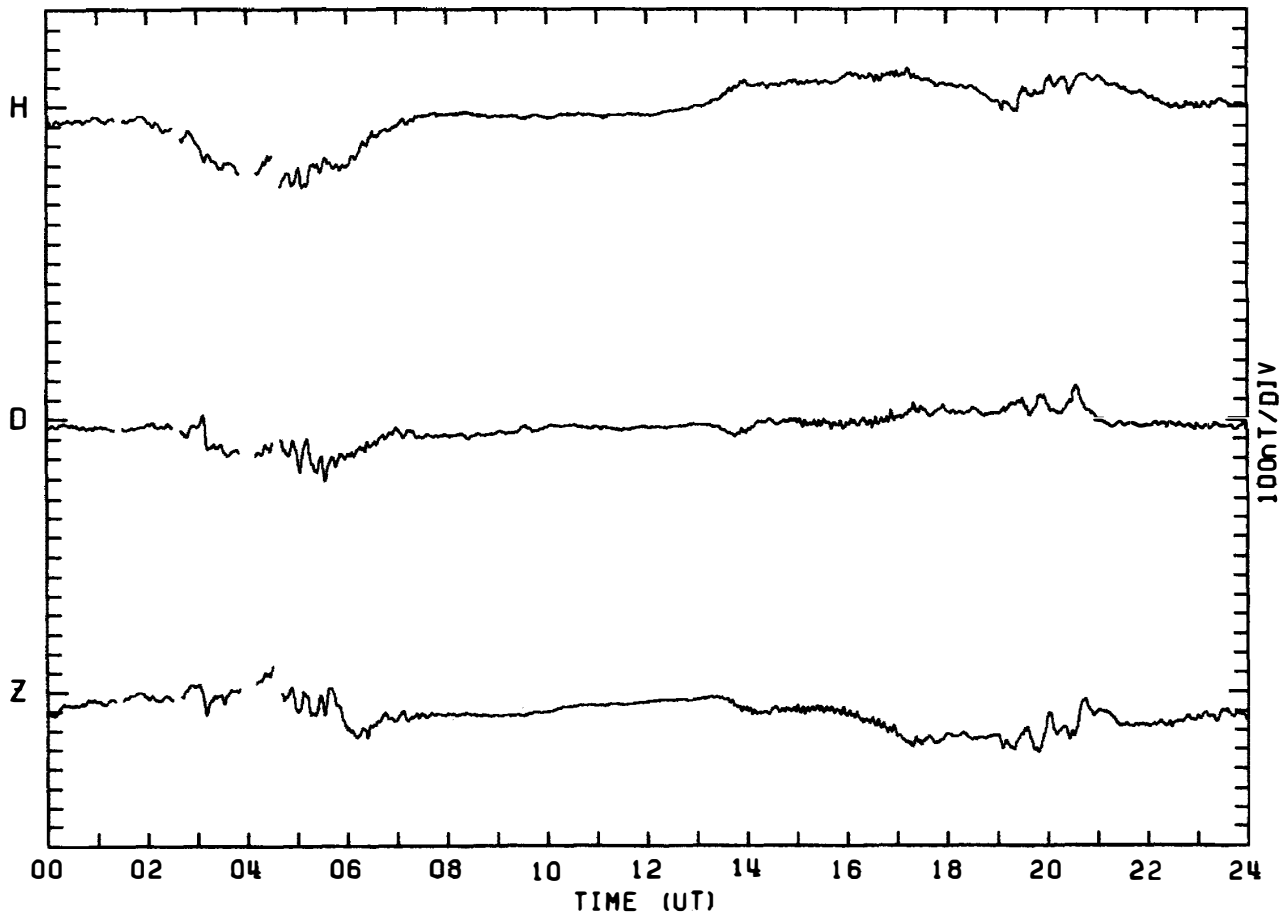
MAGNETOGRAM SYOWA STATION

DAY:297 OCTOBER 24. 1983



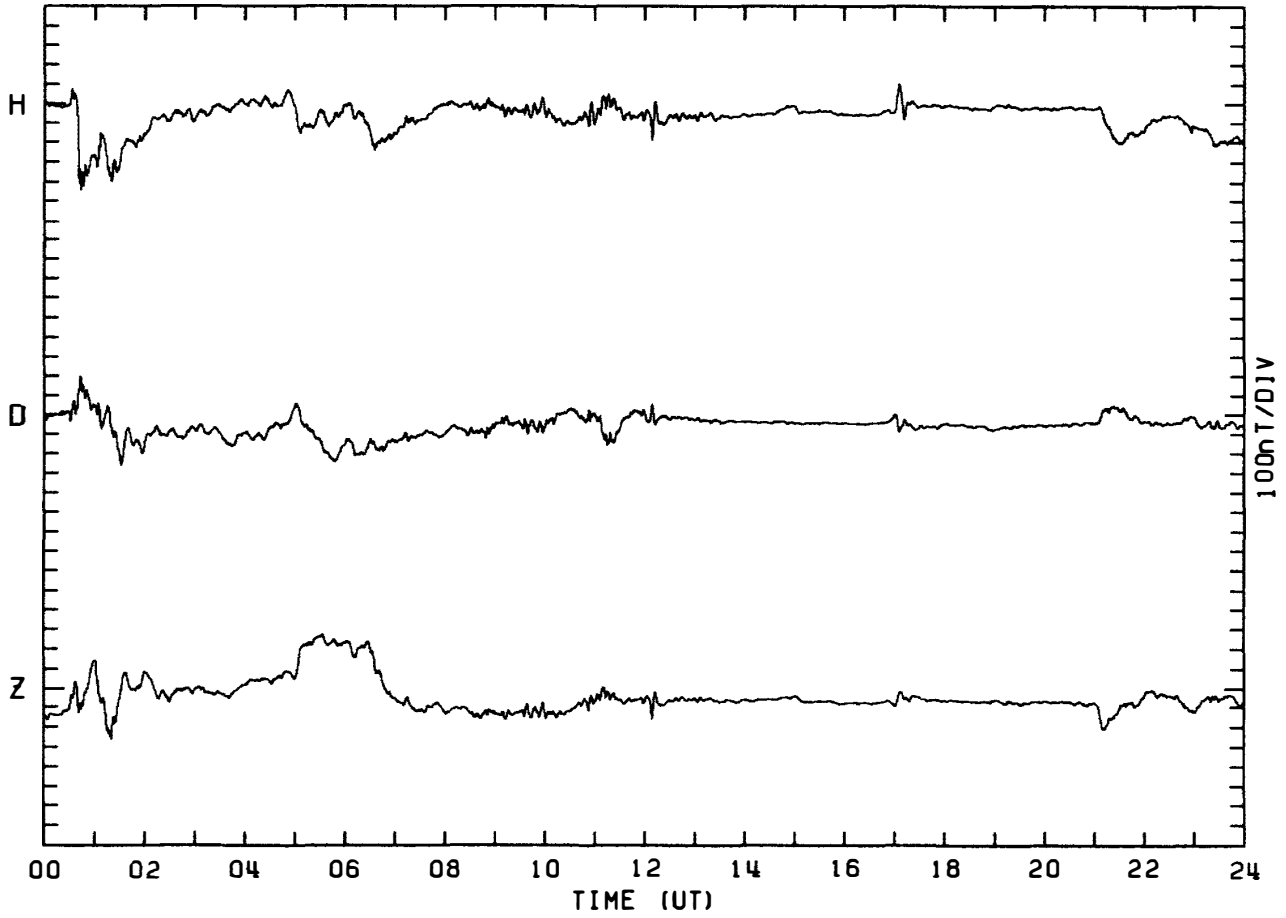
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DAY:298 OCTOBER 25. 1982



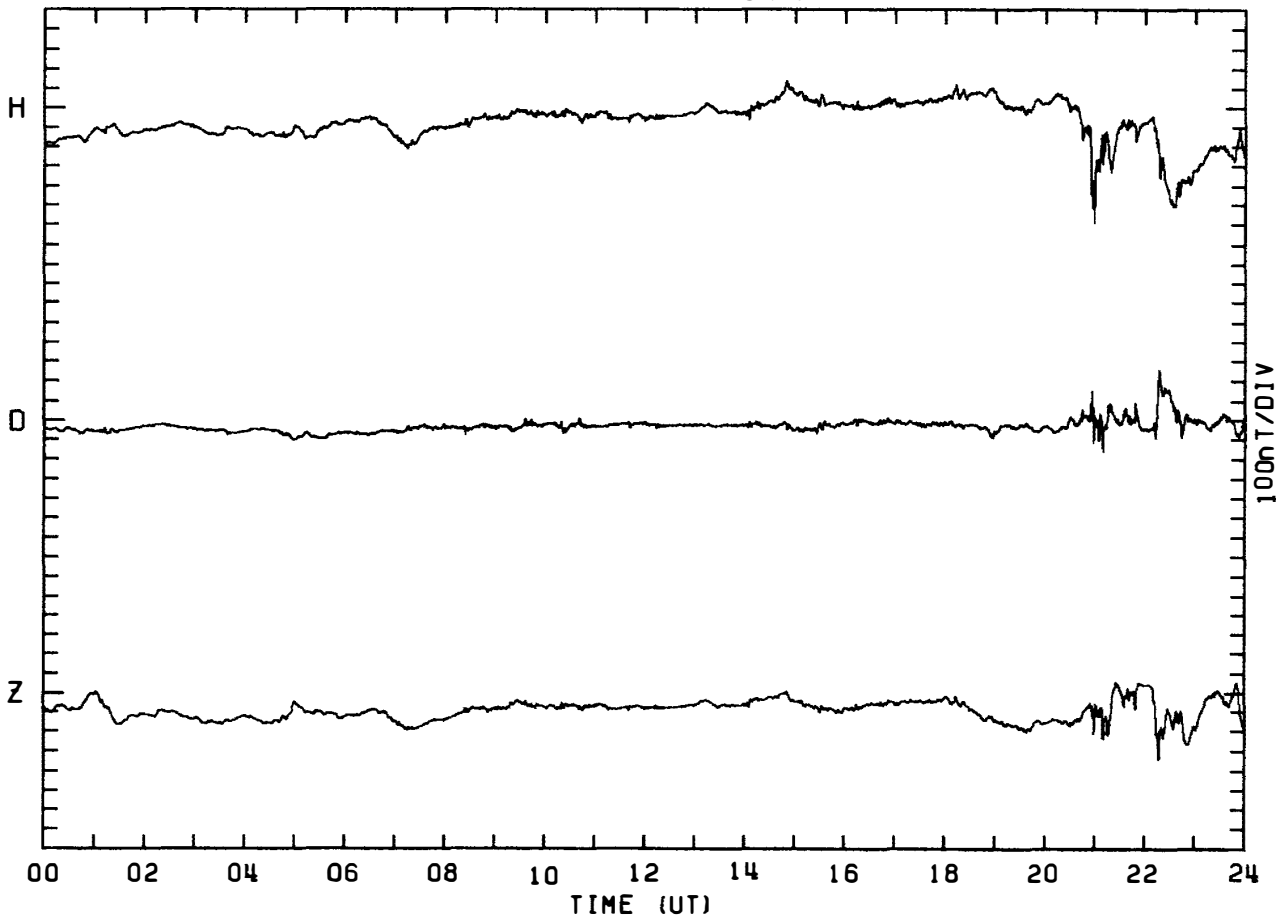
MAGNETOGRAM SYOWA STATION

DAY: 299 OCTOBER 26. 1982



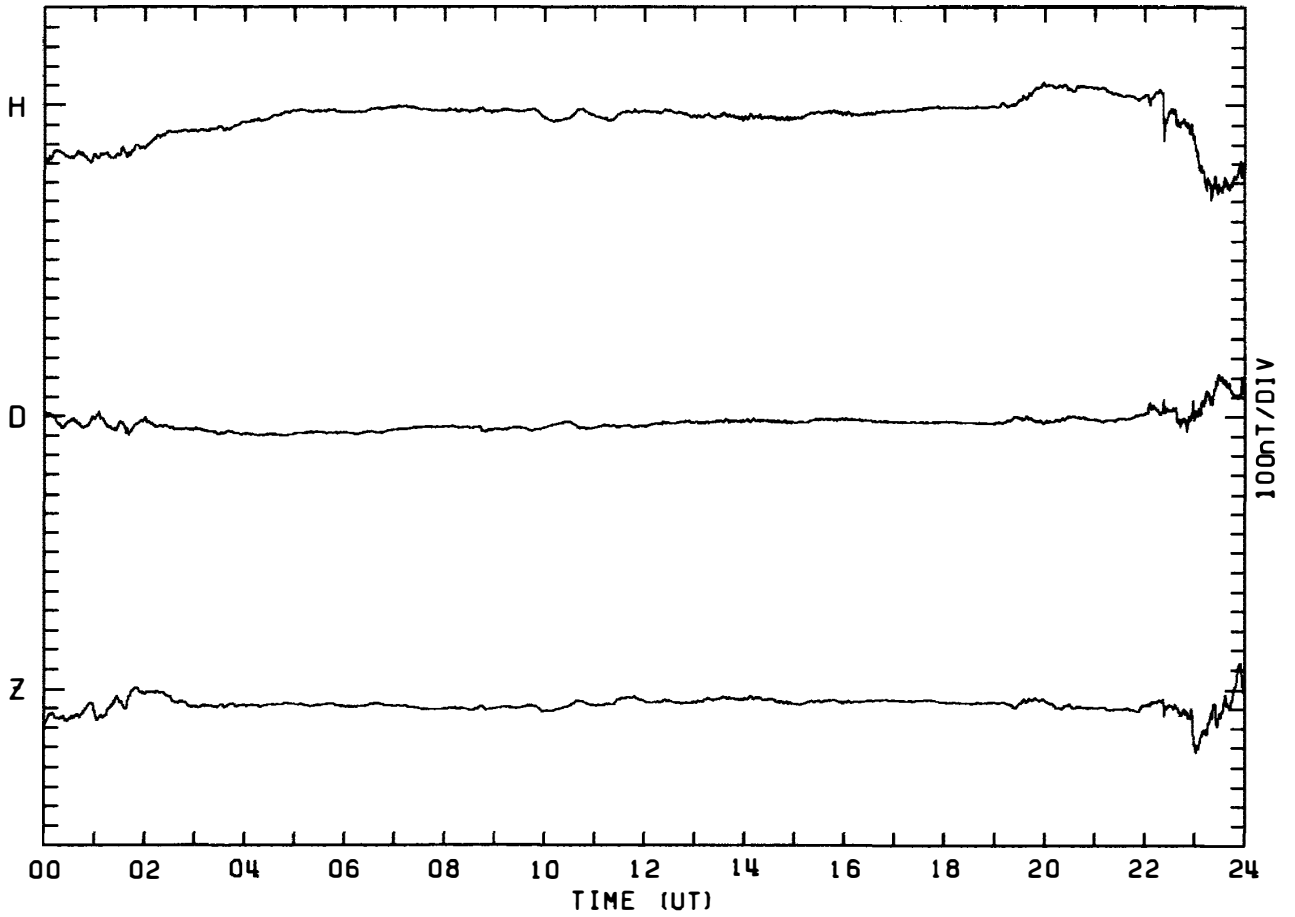
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DAY: 300 OCTOBER 27. 1982



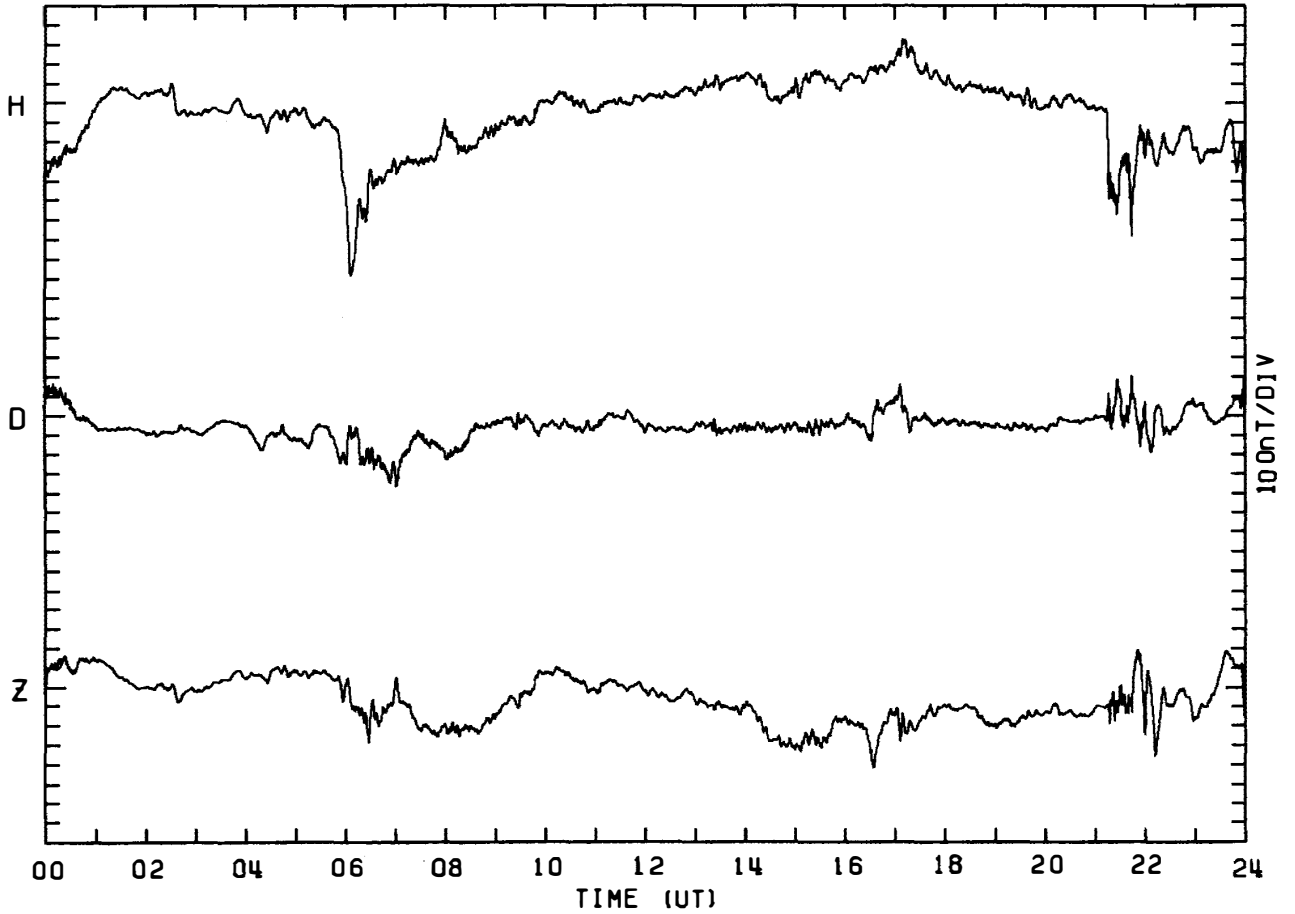
MAGNETOGRAM SYOWA STATION

DAY:301 OCTOBER 28, 1982



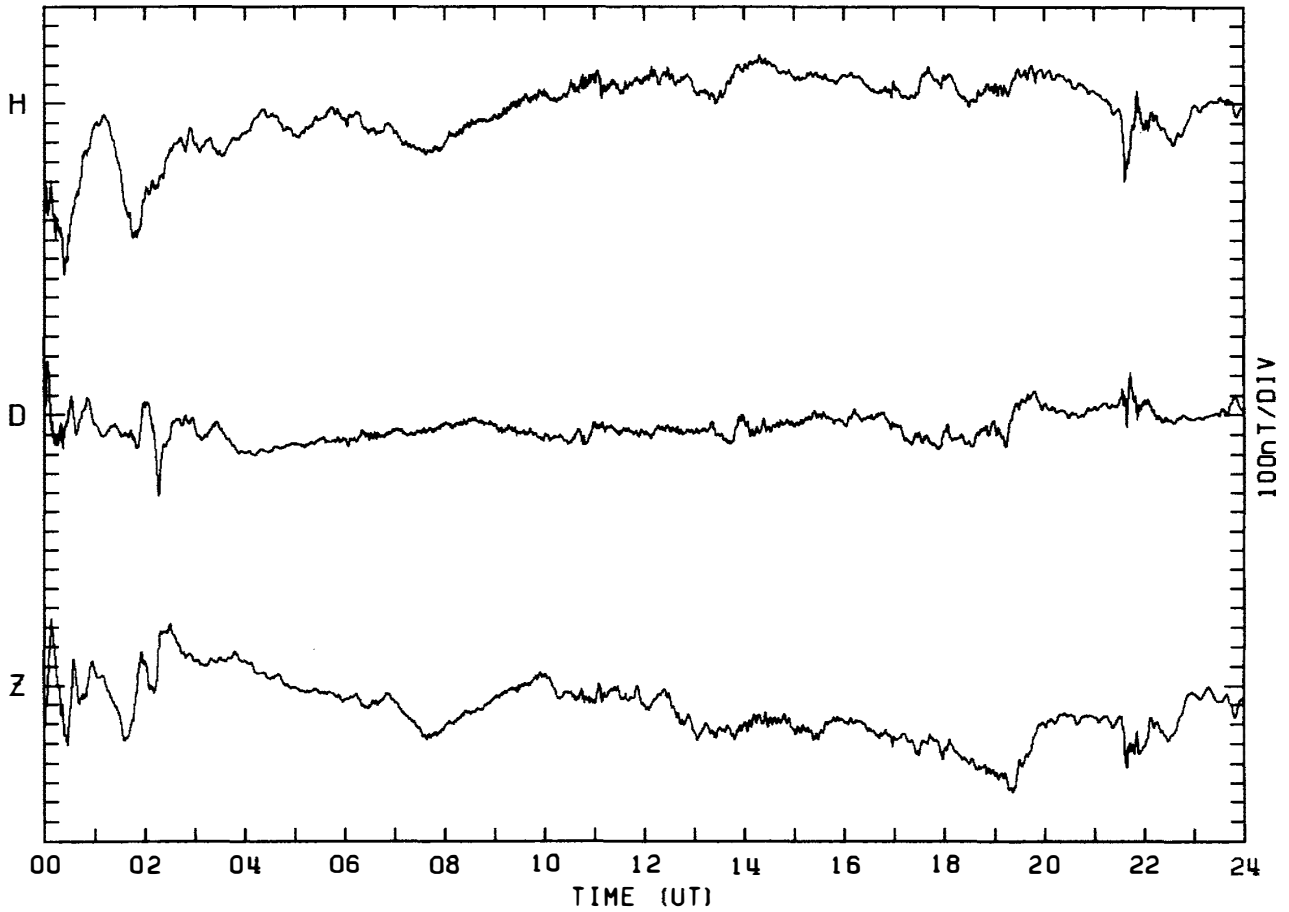
MAGNETOGRAM SYOWA STATION

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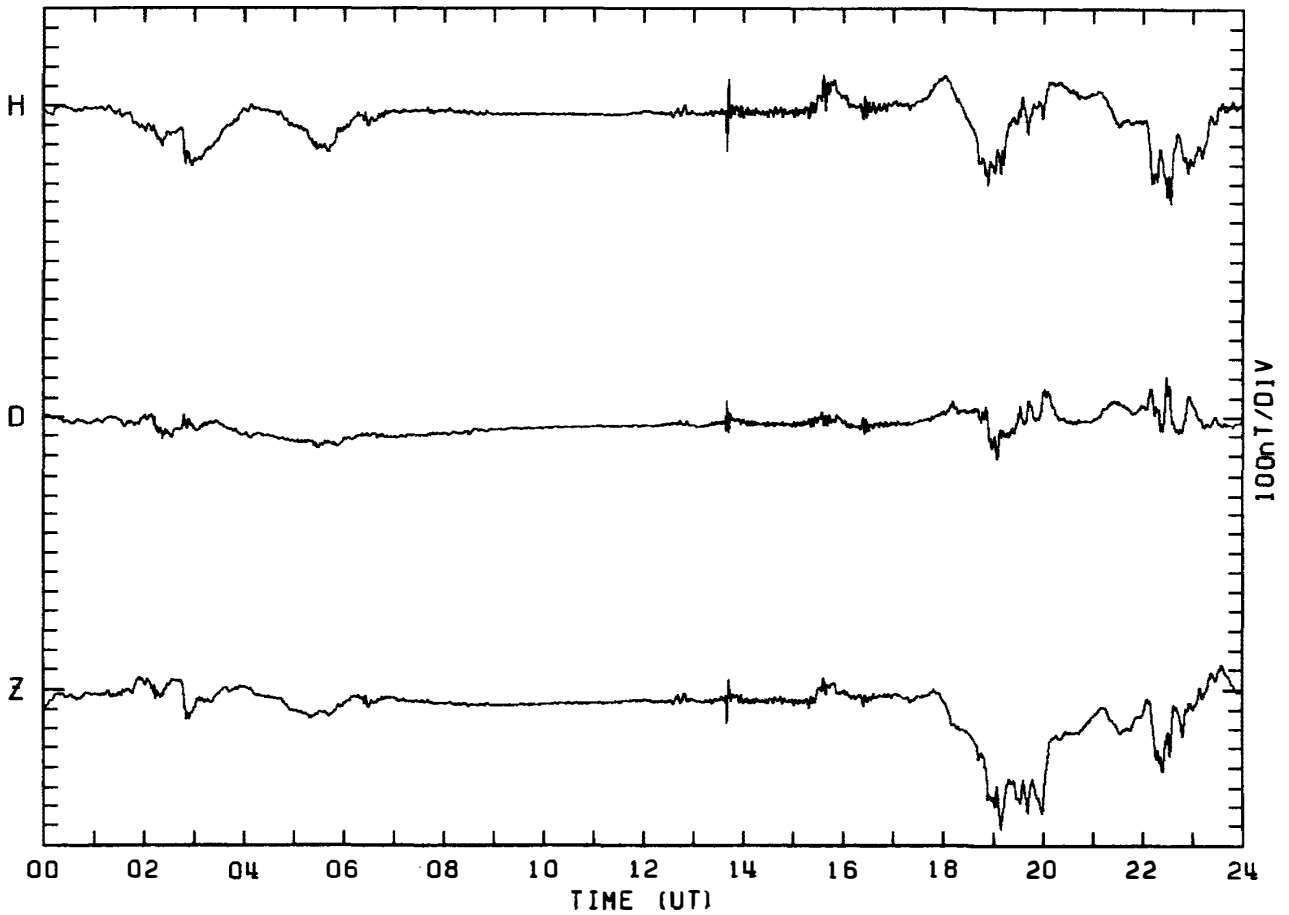
MAGNETOGRAM SYOWA STATION

DAY: 303 OCTOBER 30, 1982



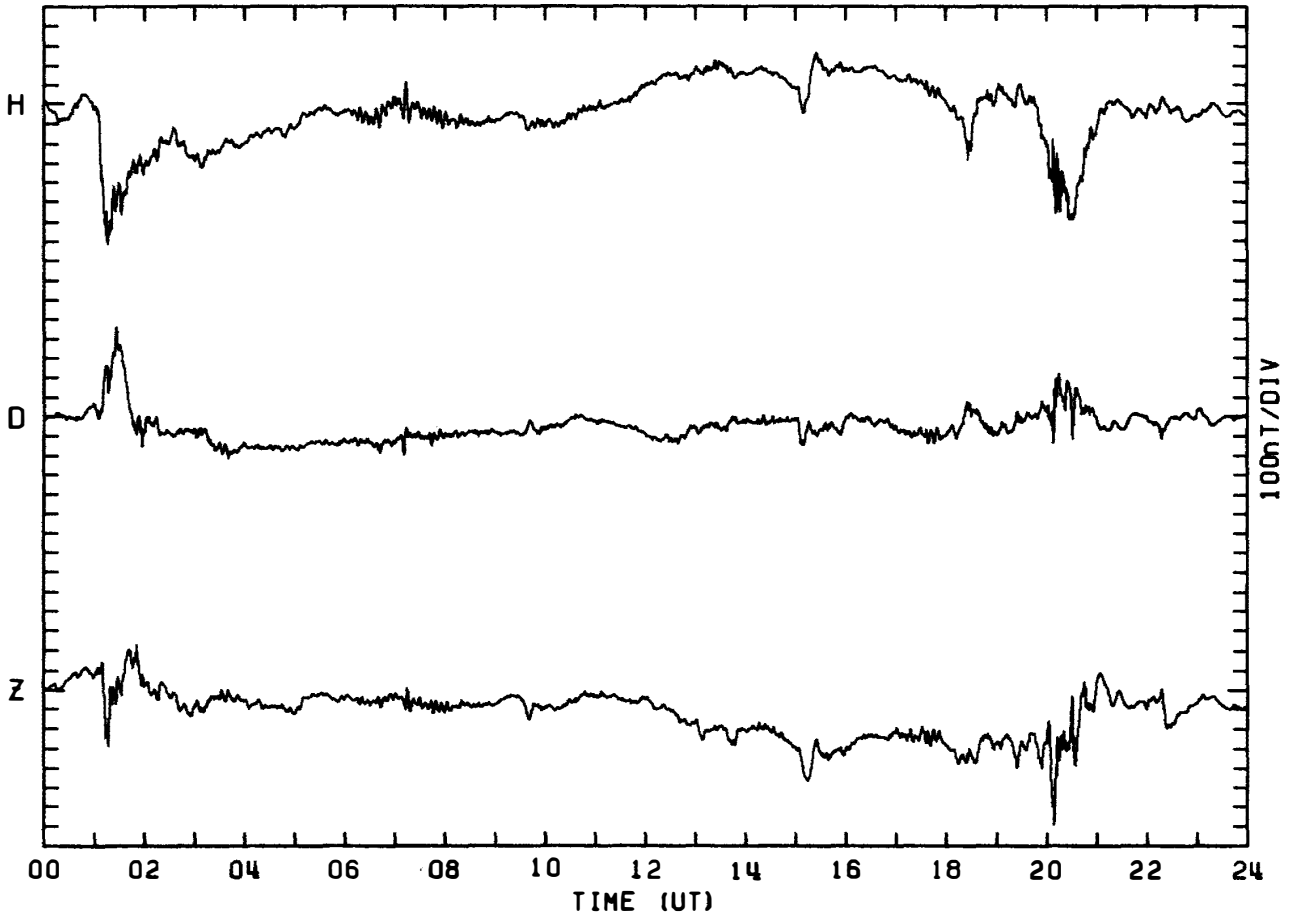
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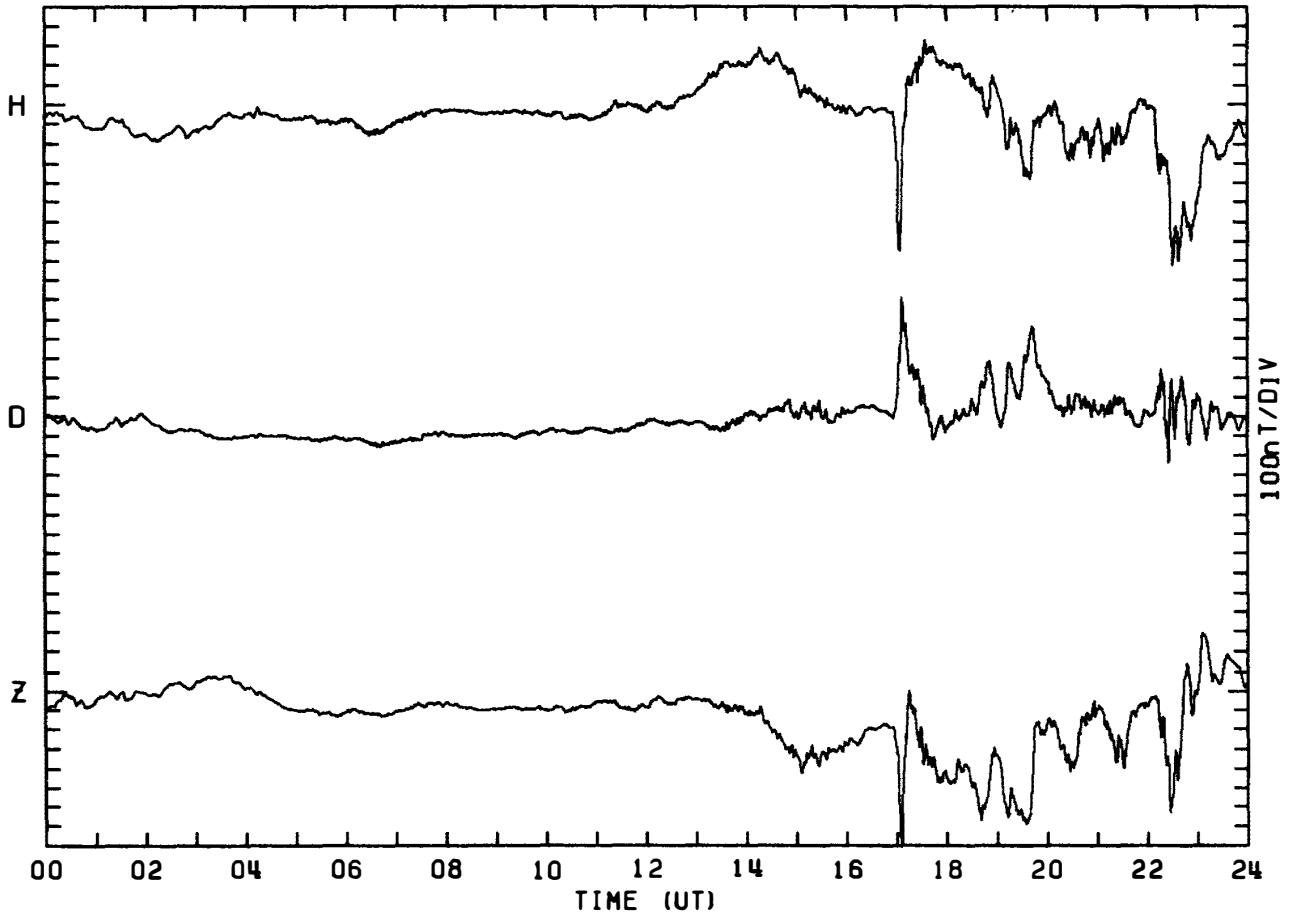
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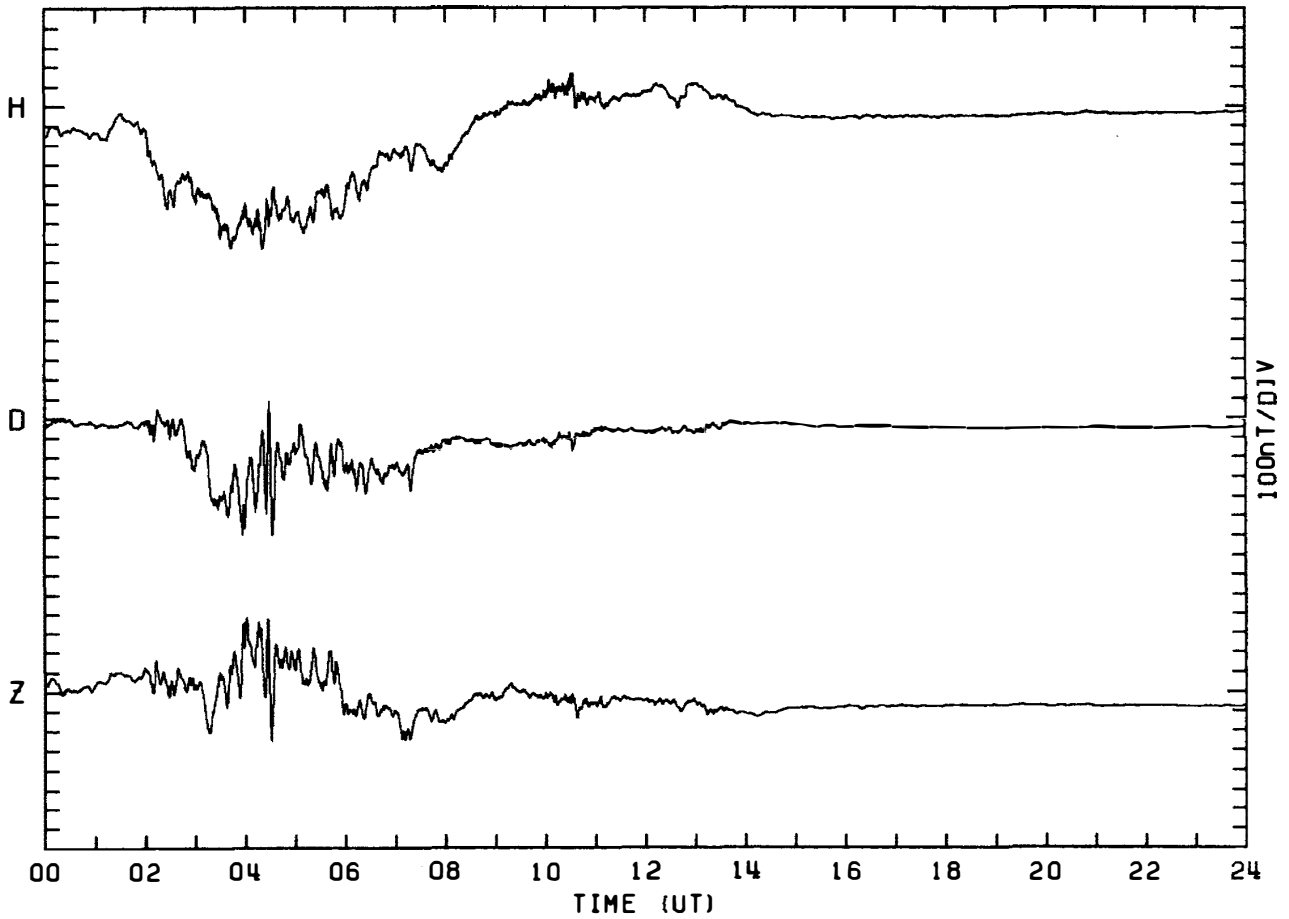
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DAY: 306 NOVEMBER 2, 1982



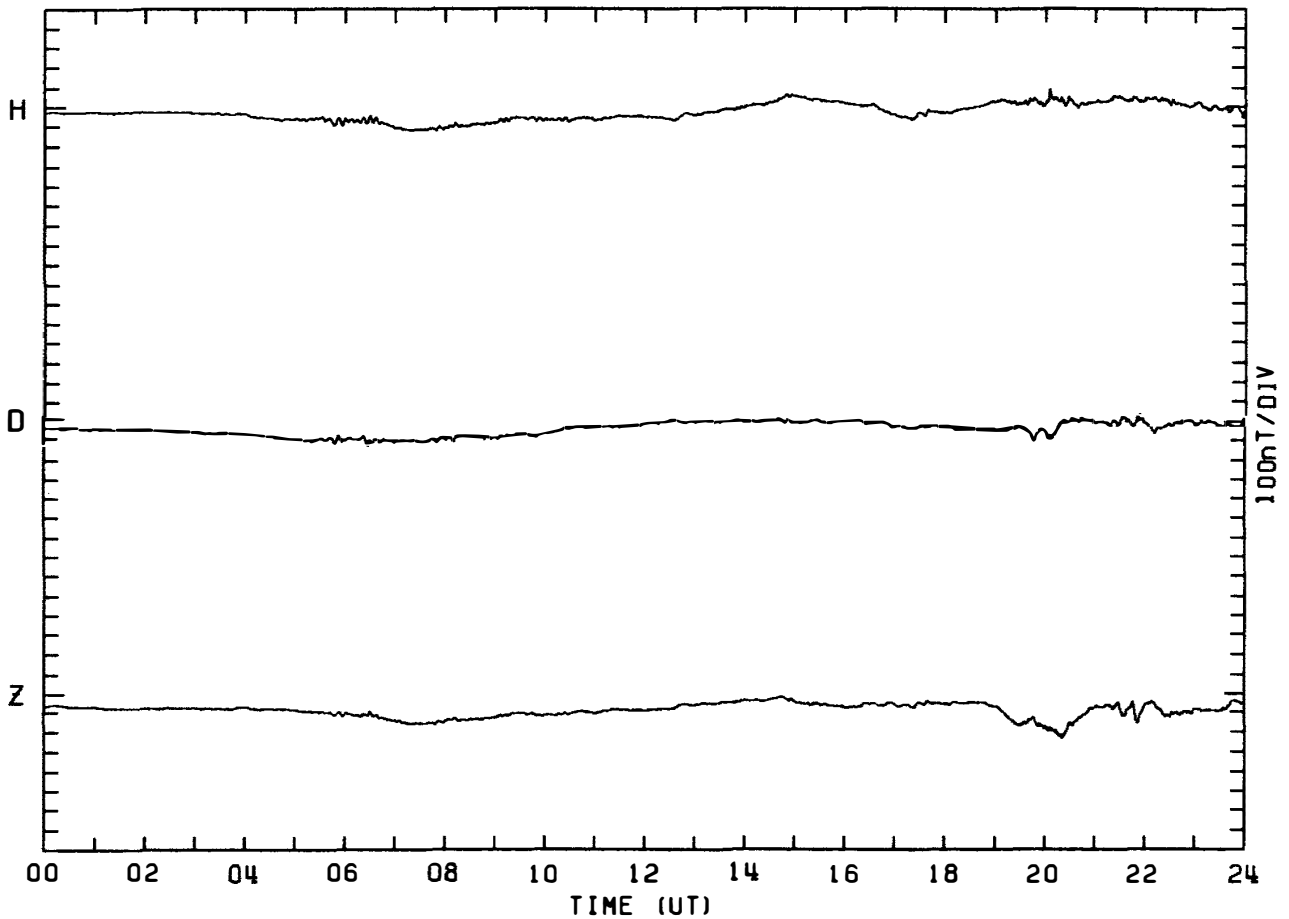
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DAY:307 NOVEMBER 3, 1982



MAGNETOGRAM SYOWA STATION

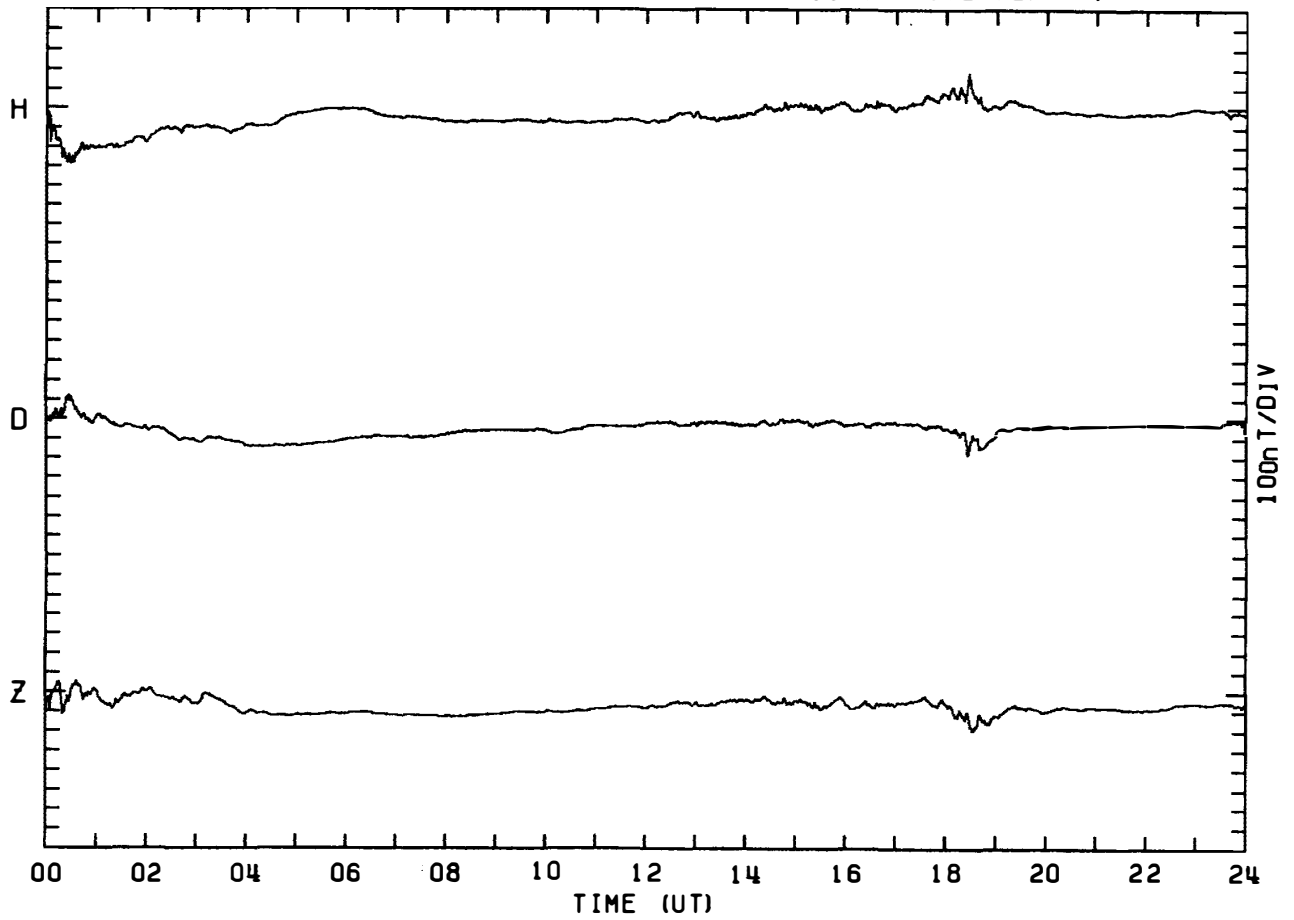
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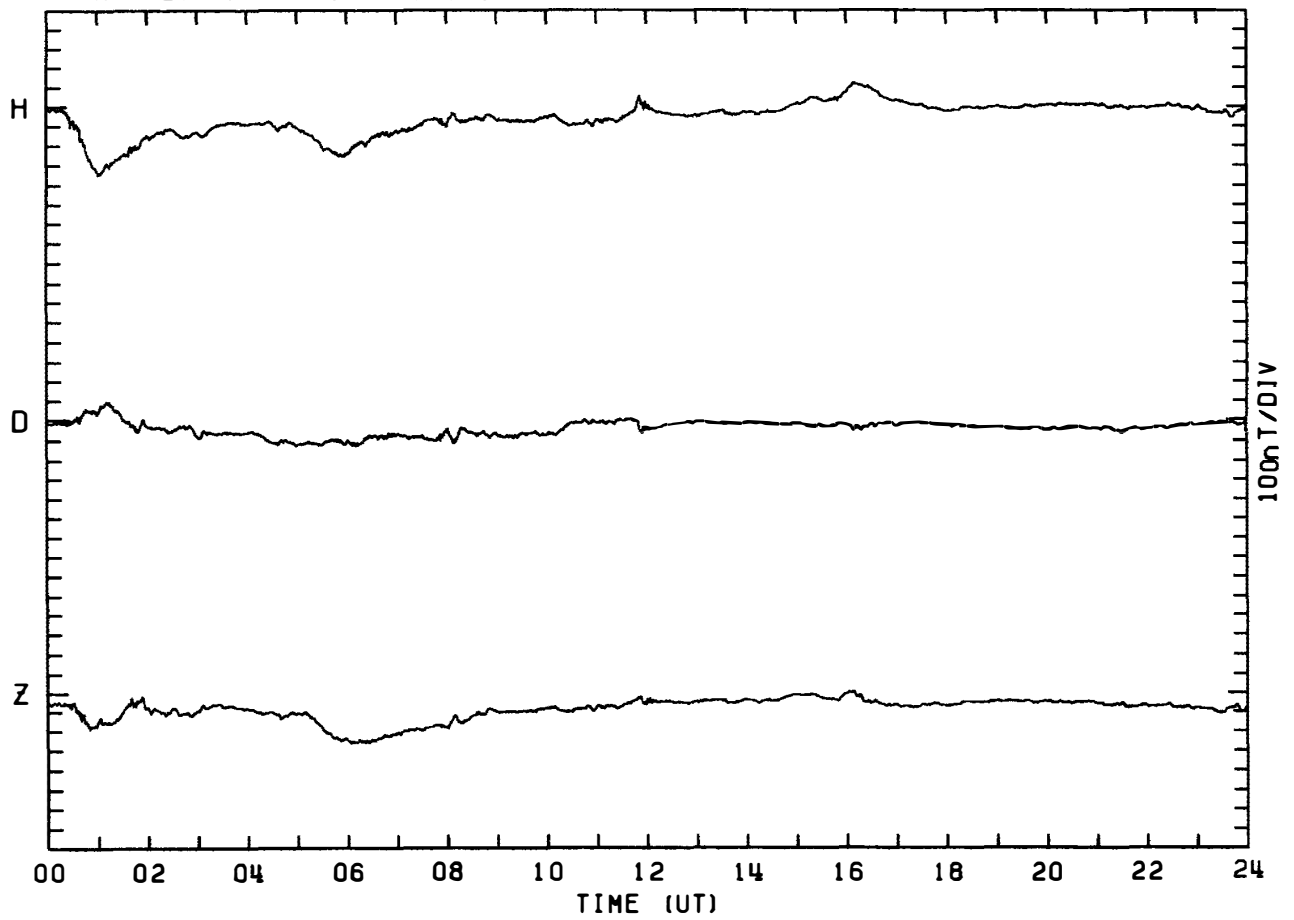
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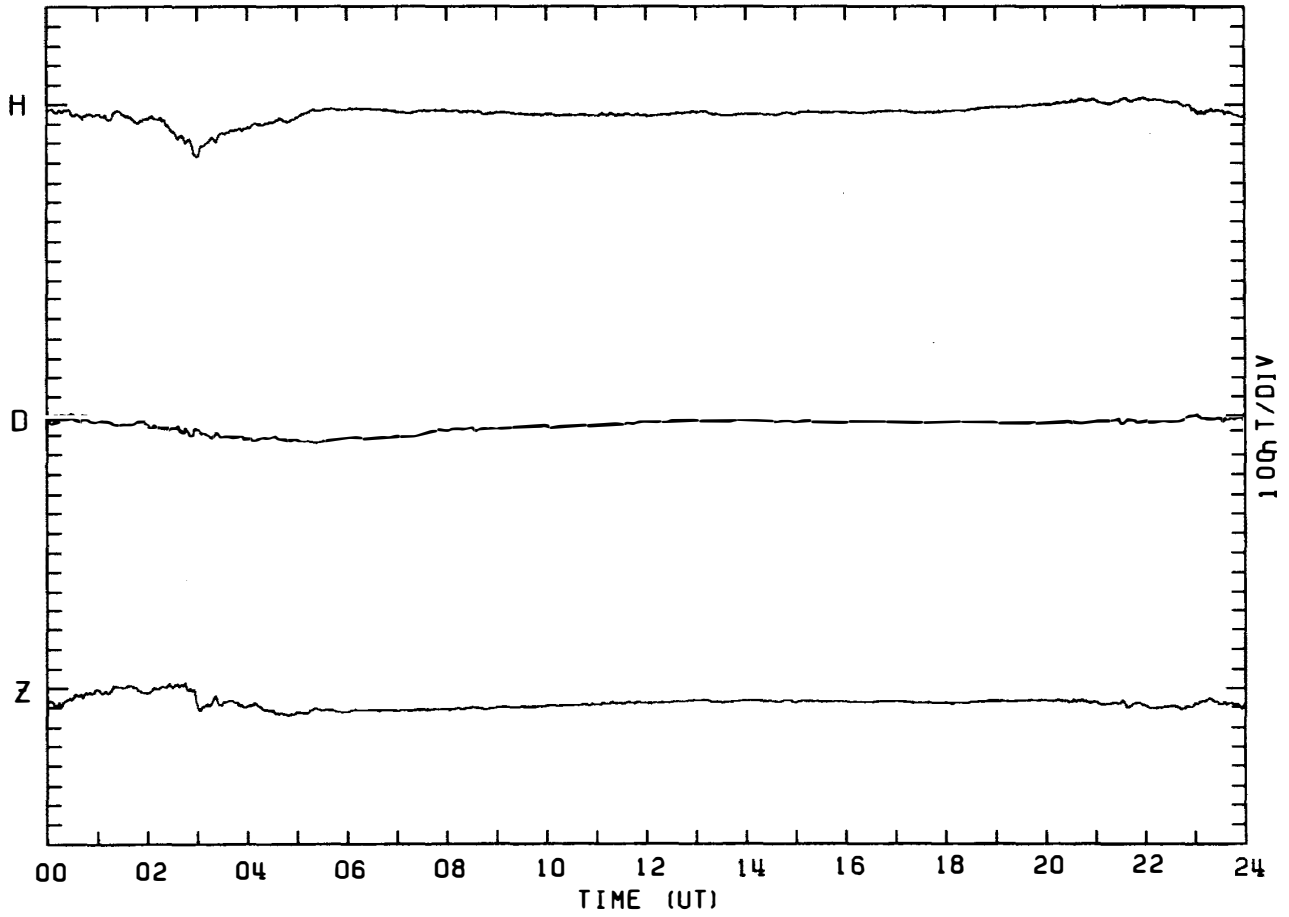
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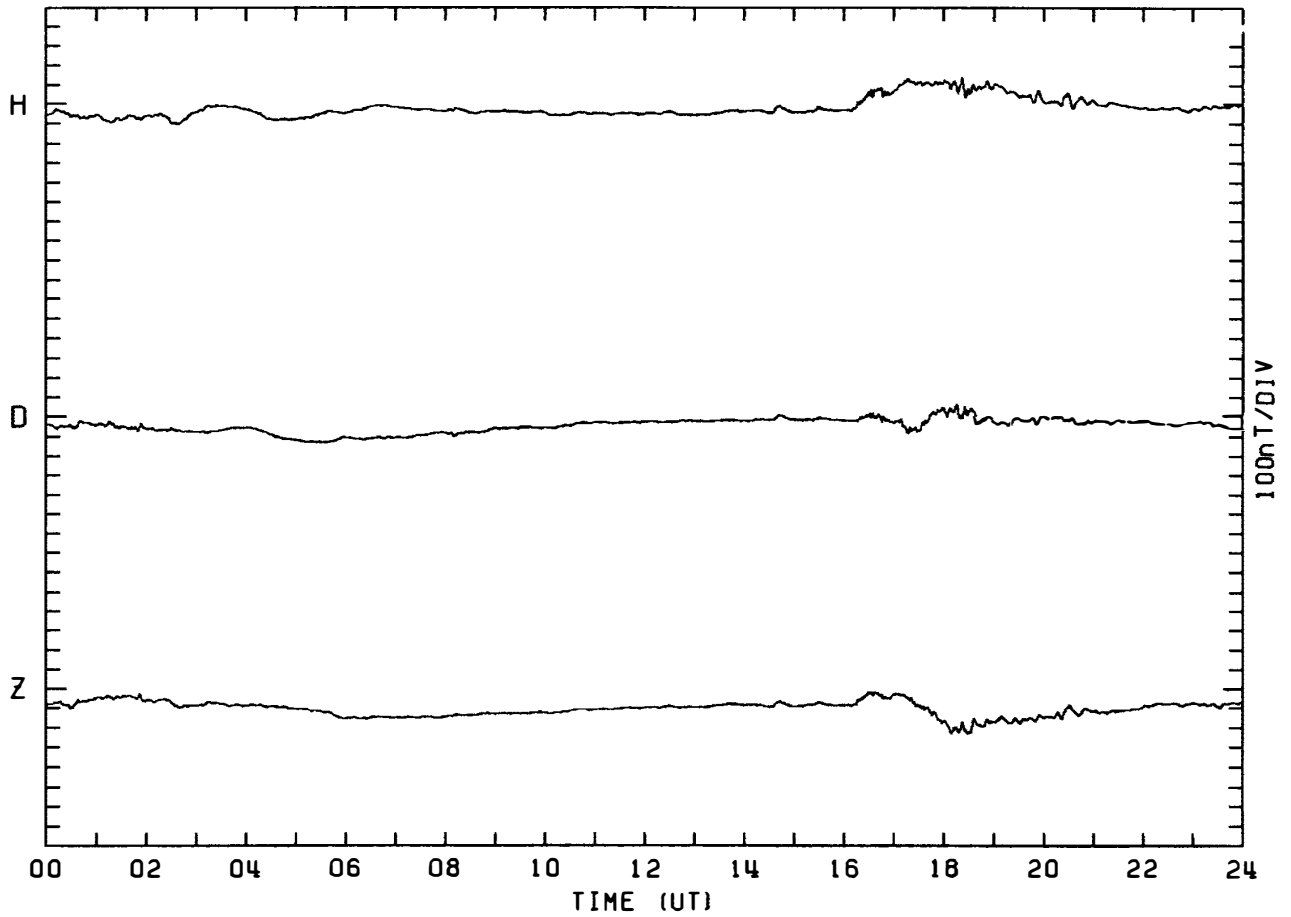
MAGNETOGRAM SYOWA STATION

DAY:311 NOVEMBER 7, 1982



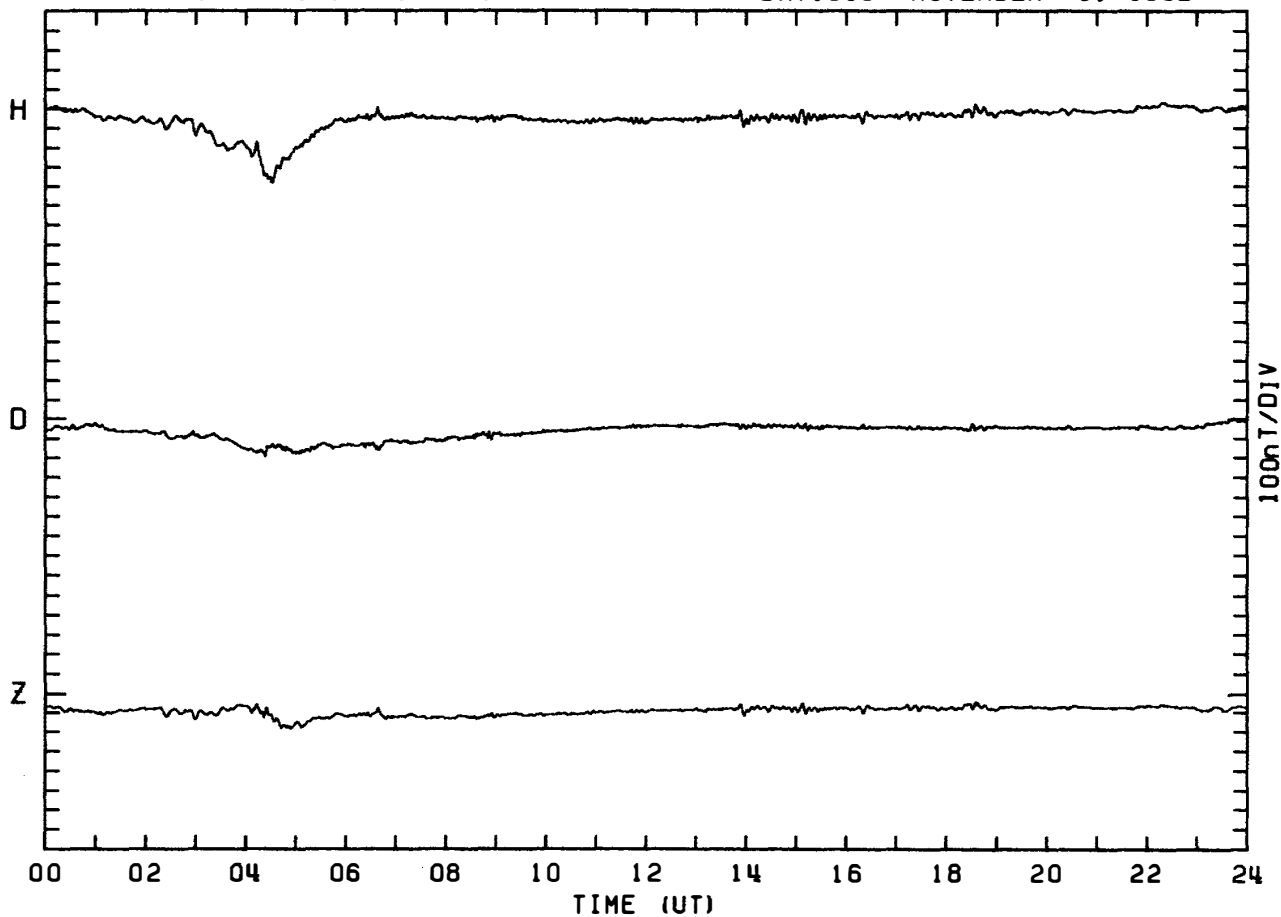
MAGNETOGRAM SYOWA STATION

DAY:312 NOVEMBER 8, 1982



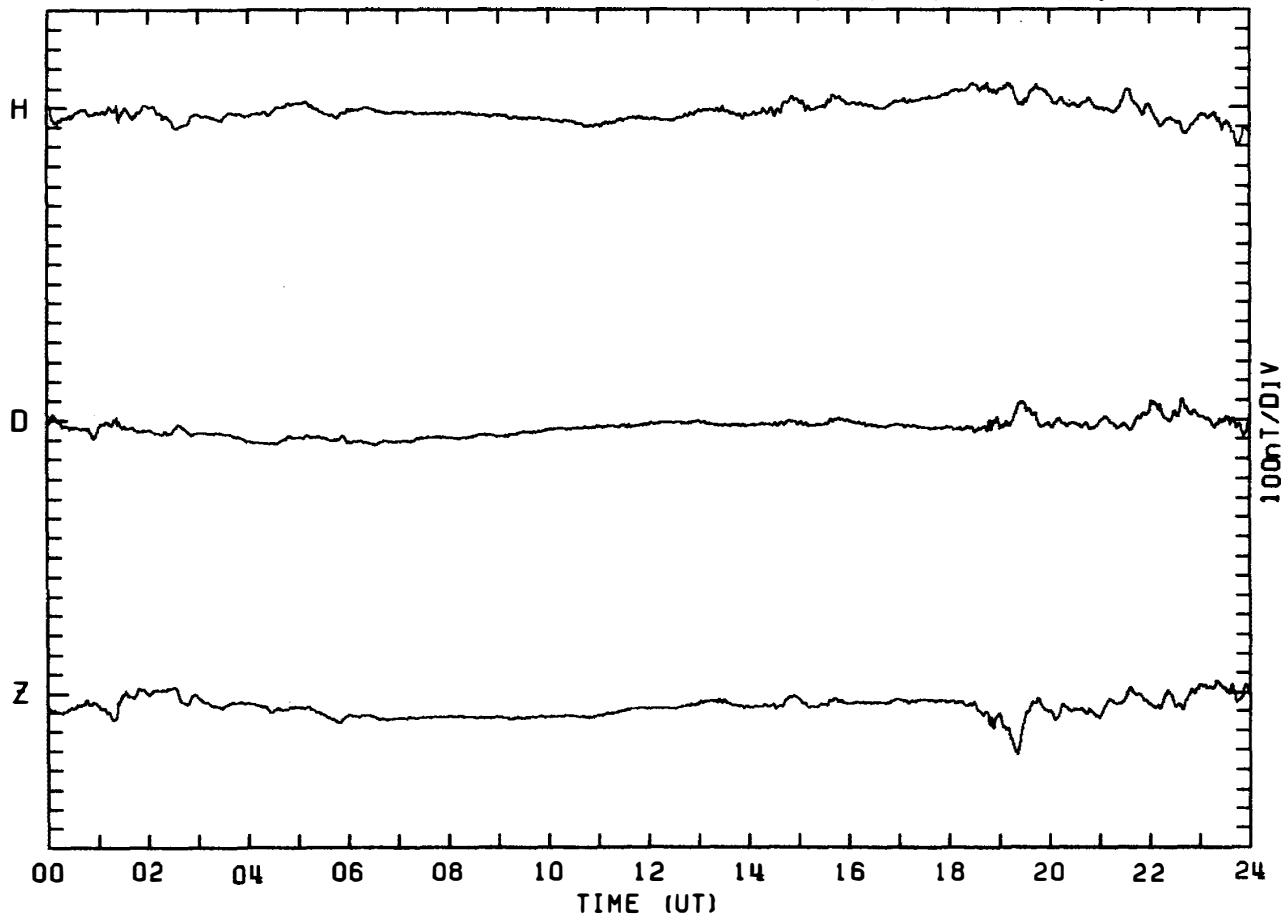
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DAY:313 NOVEMBER 9, 1982



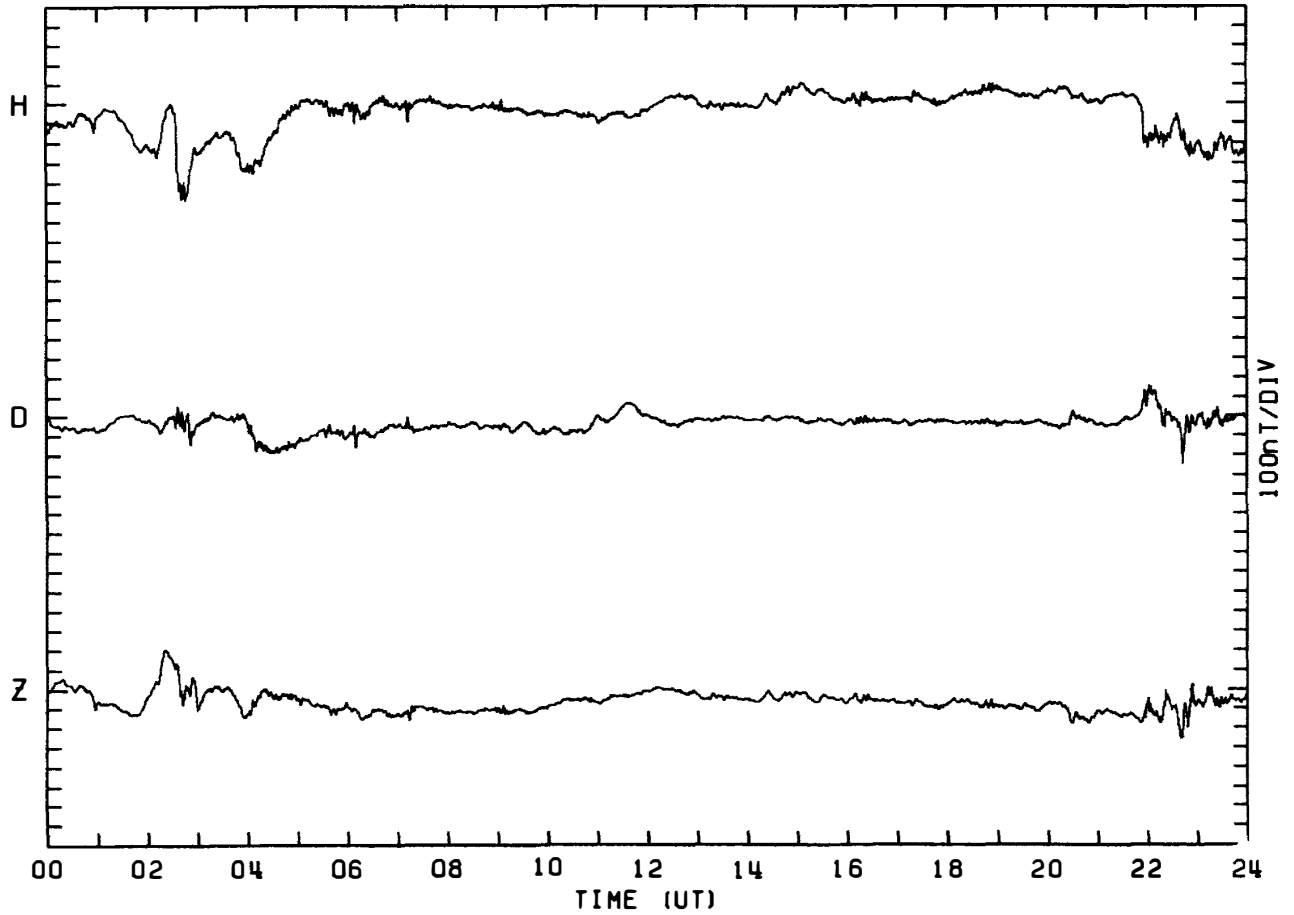
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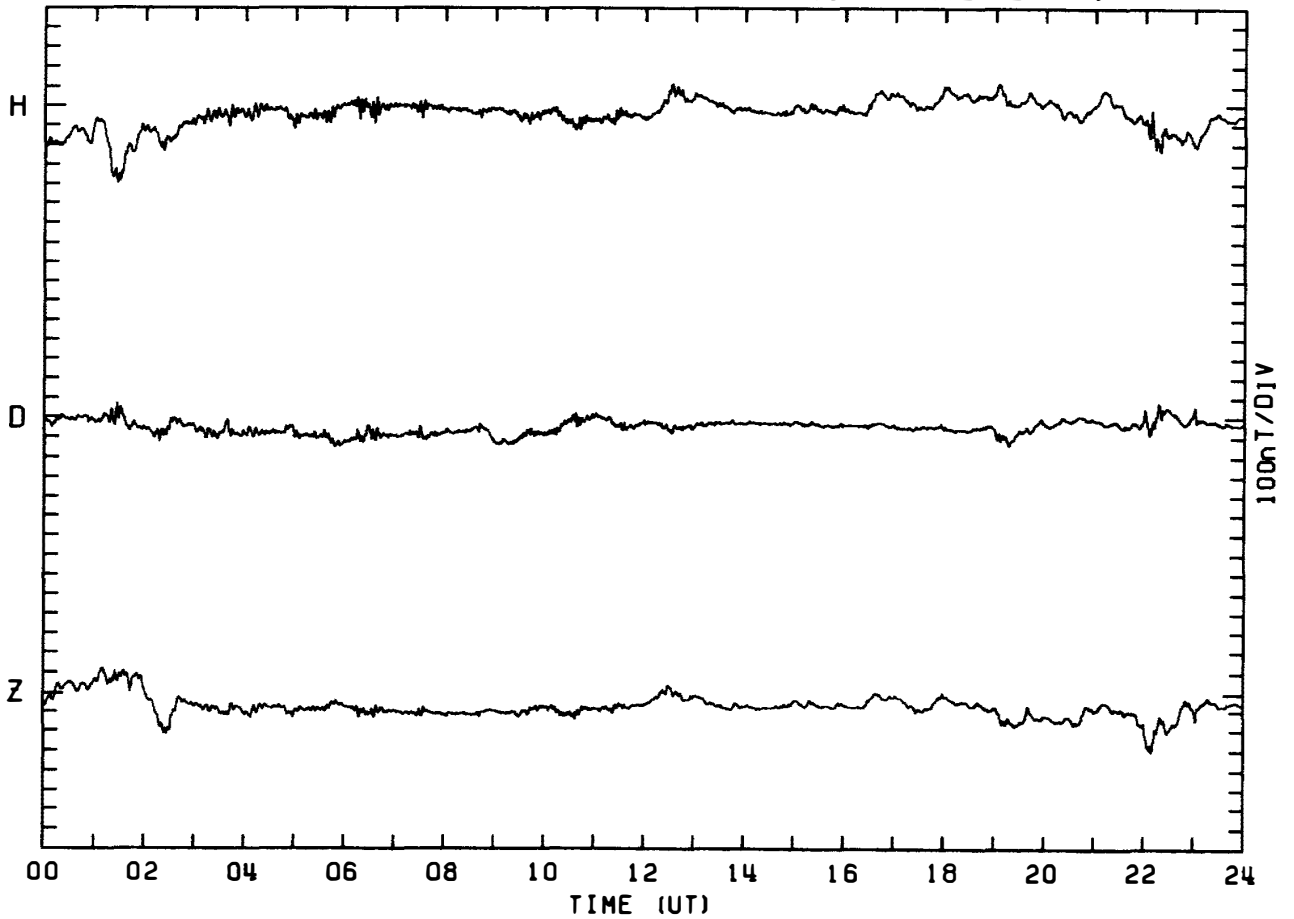
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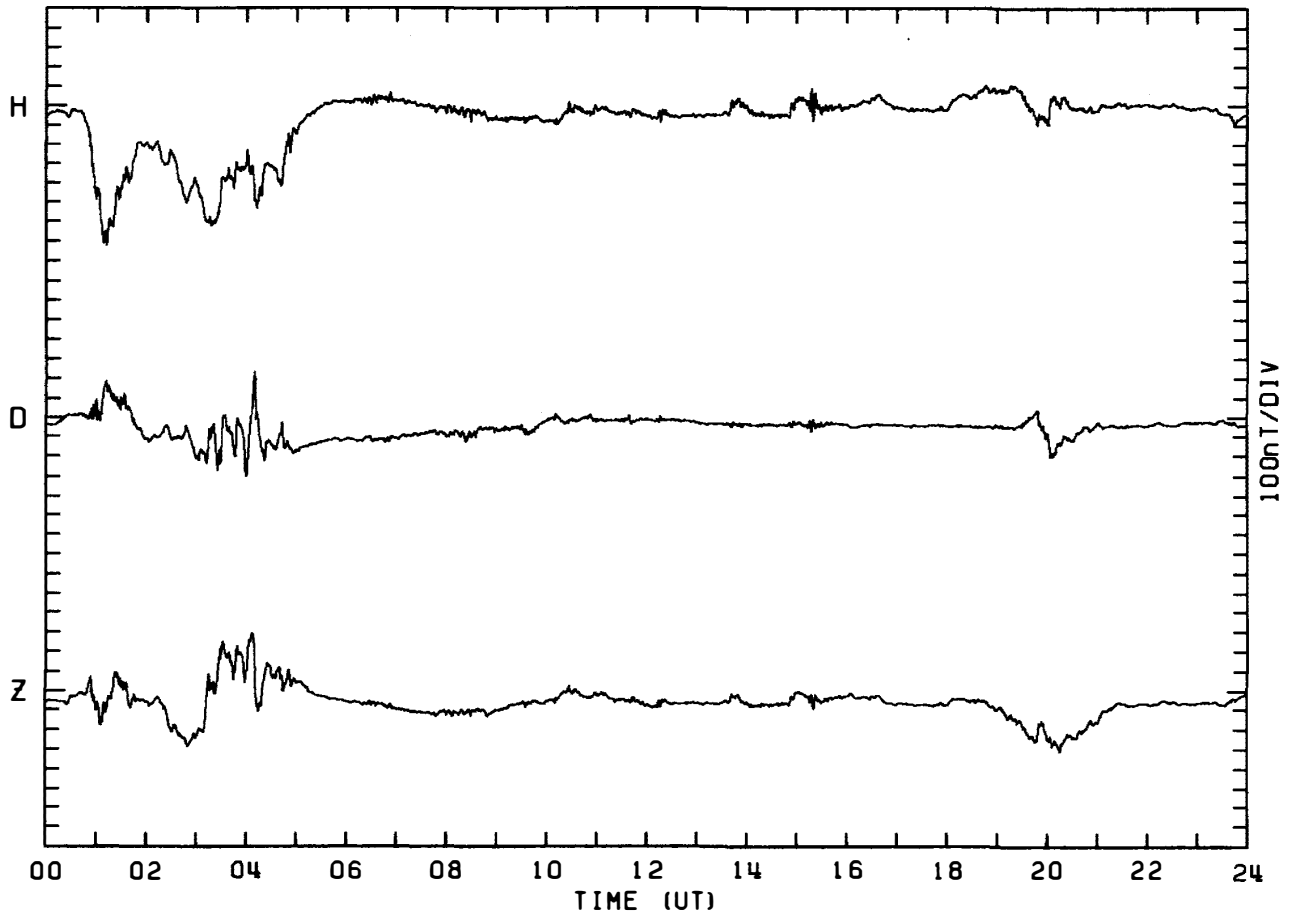
MAGNETOGRAM SYOWA STATION

DAY:316 NOVEMBER 12, 1982



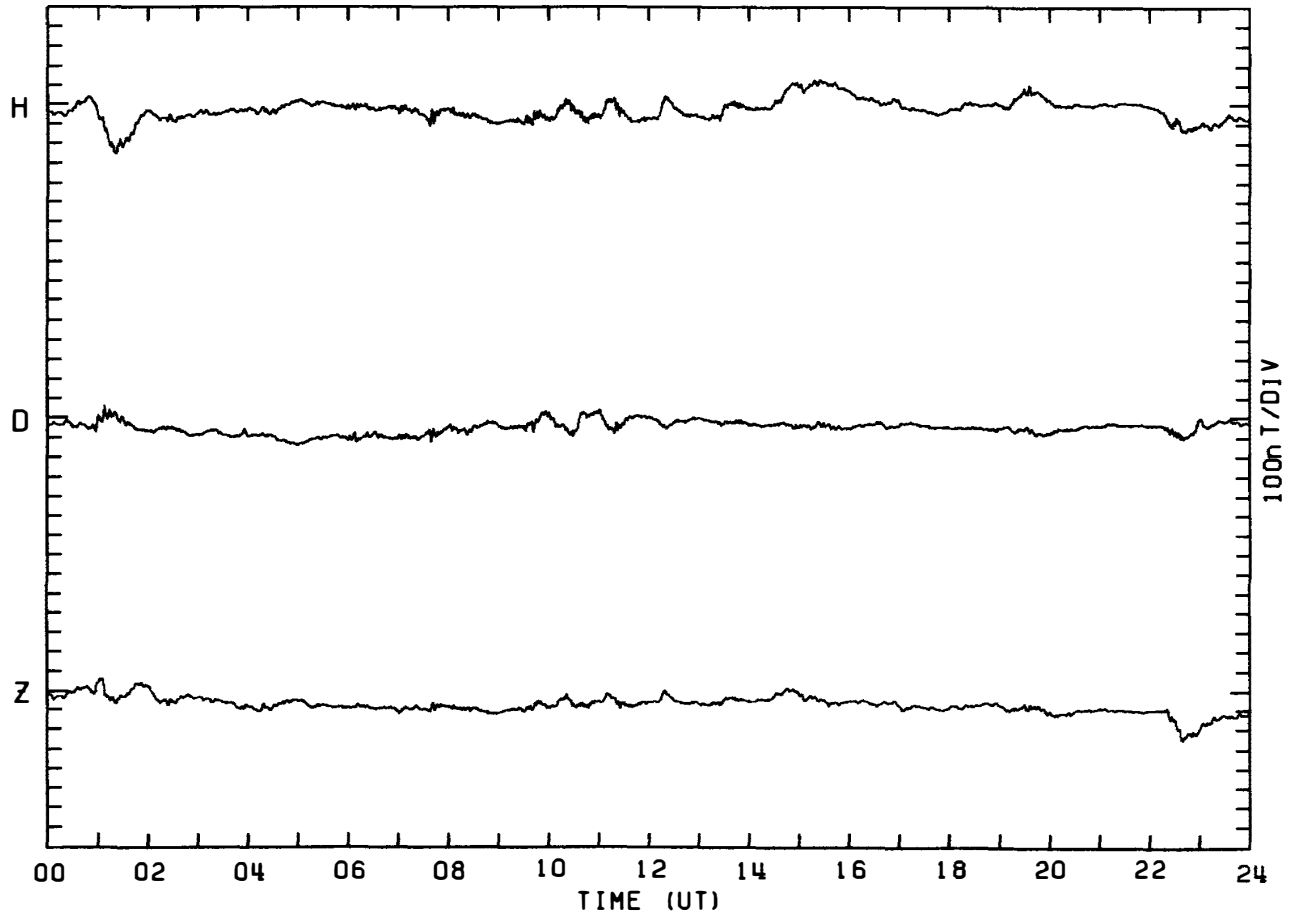
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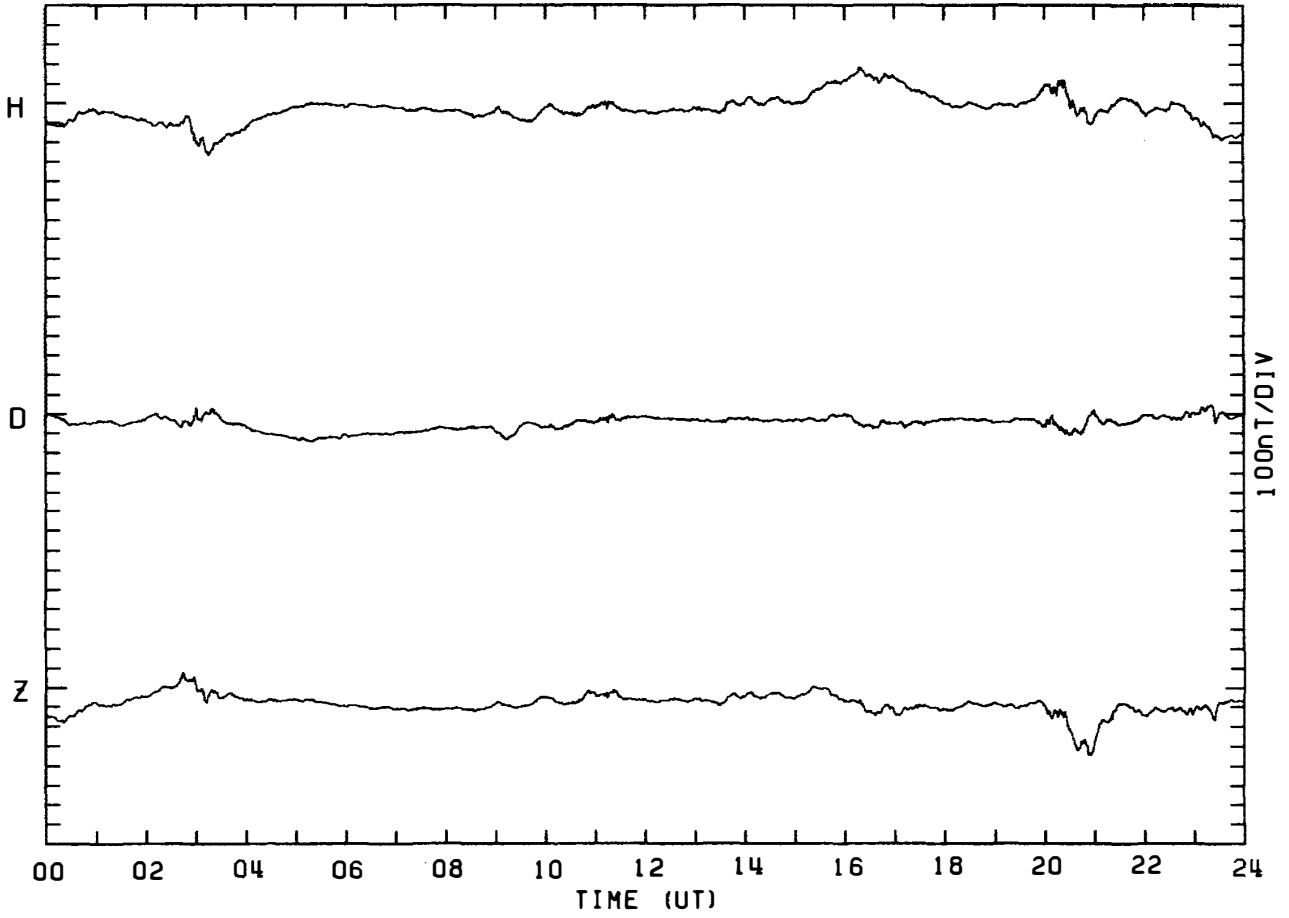
MAGNETOGRAM SYOWA STATION

DAY:318 NOVEMBER 14, 1982



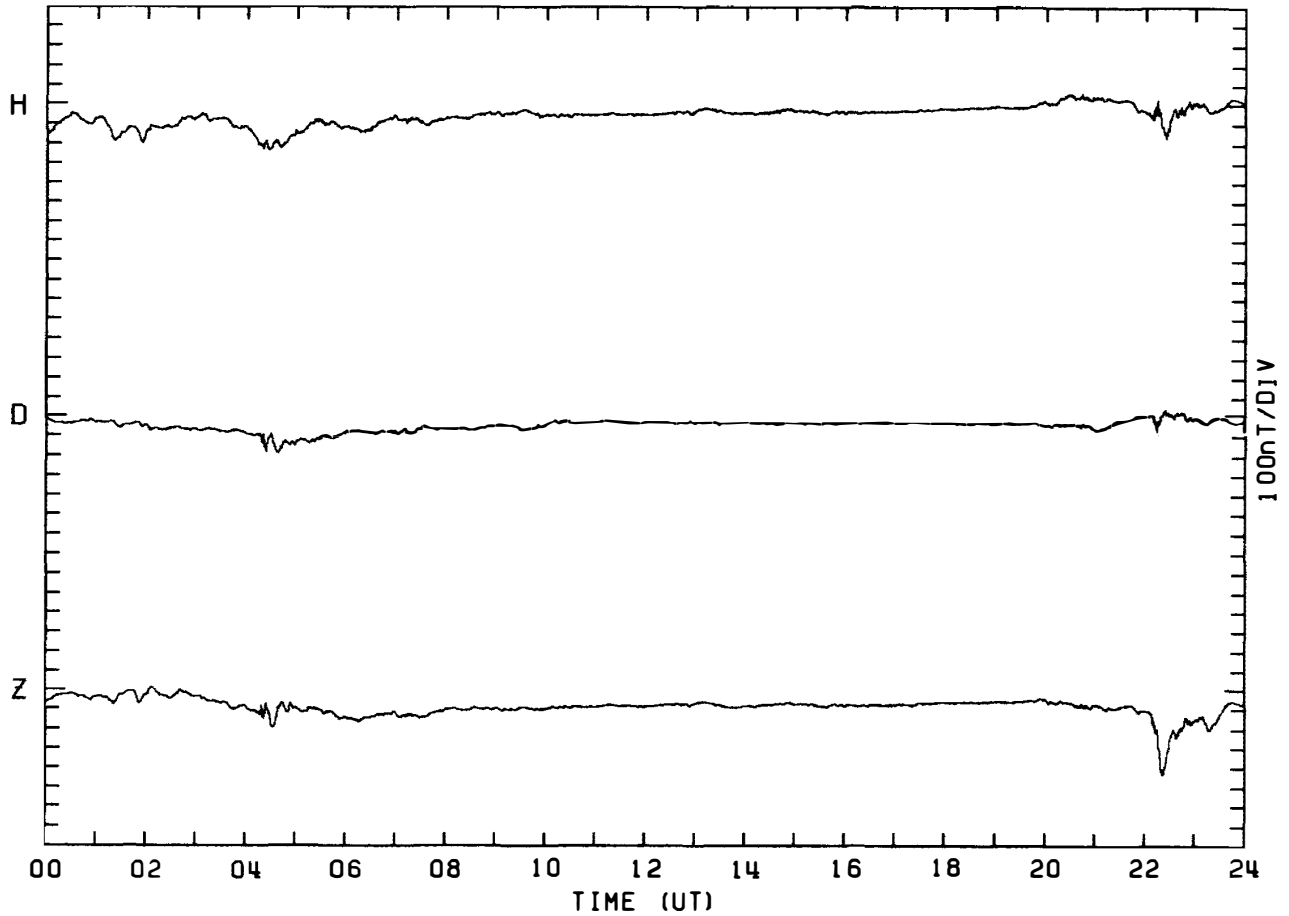
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DAY:319 NOVEMBER 15, 1982



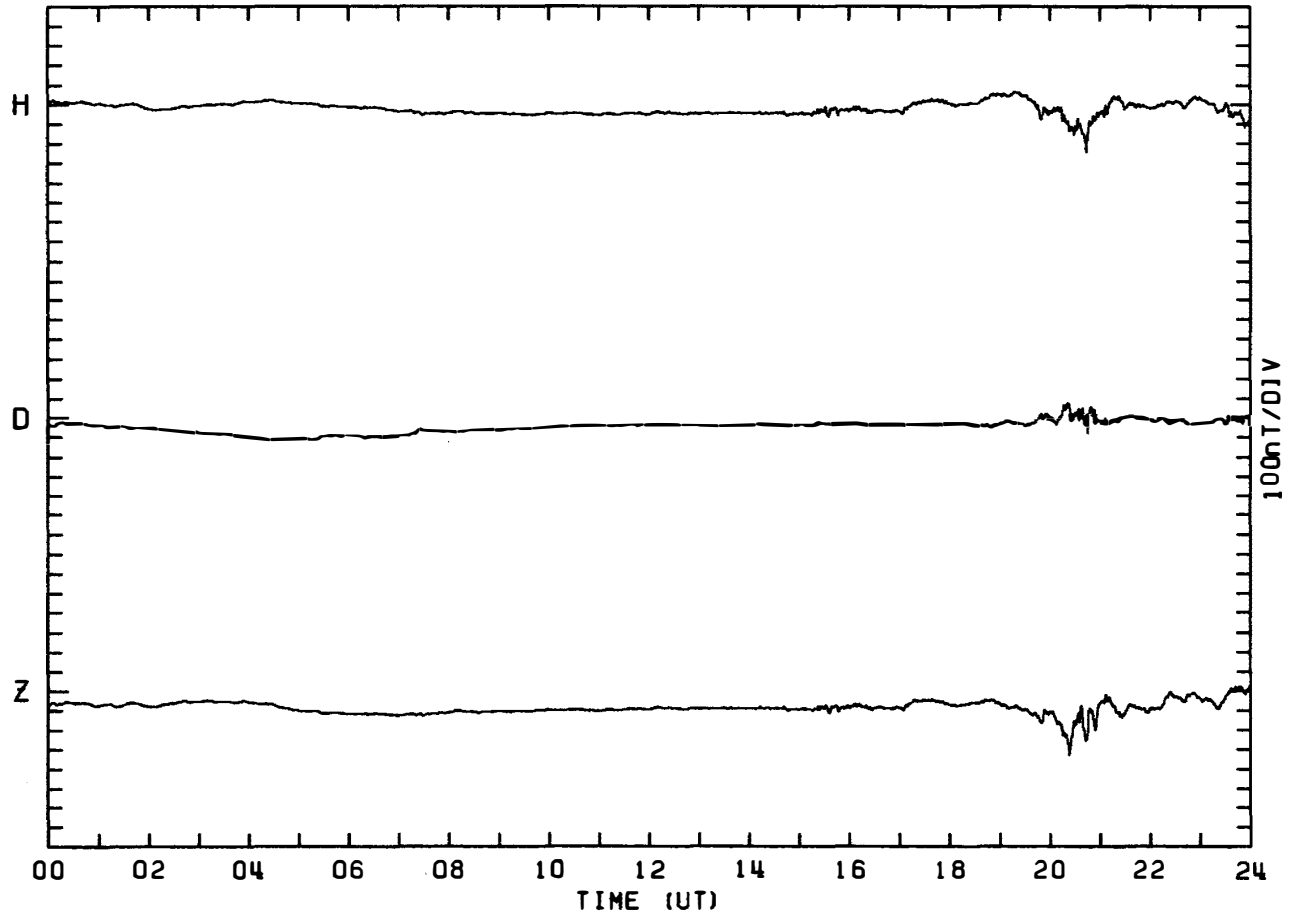
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DAY:320 NOVEMBER 16, 1982



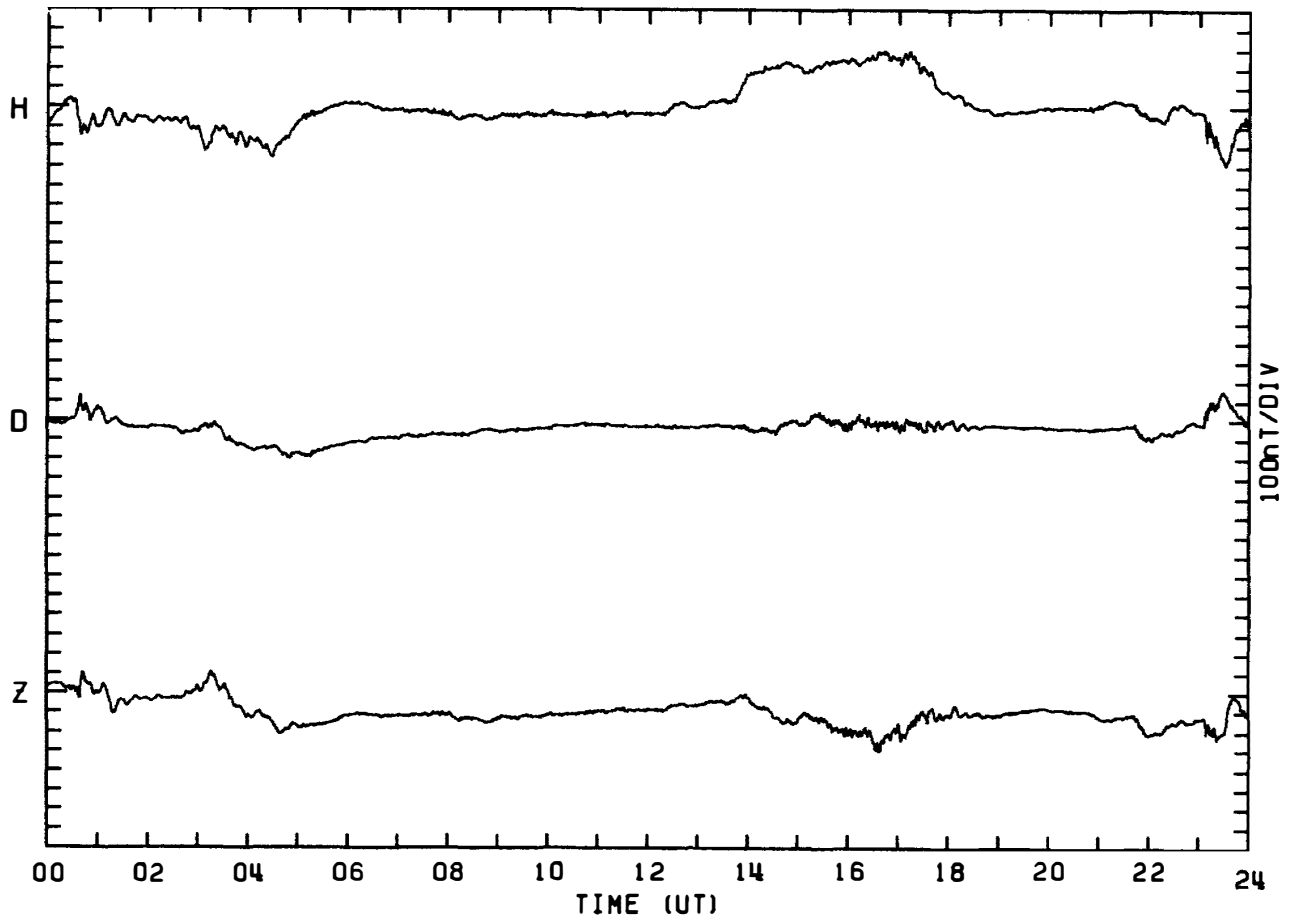
MAGNETOGRAM SYOWA STATION

DAY:321 NOVEMBER 17, 1982



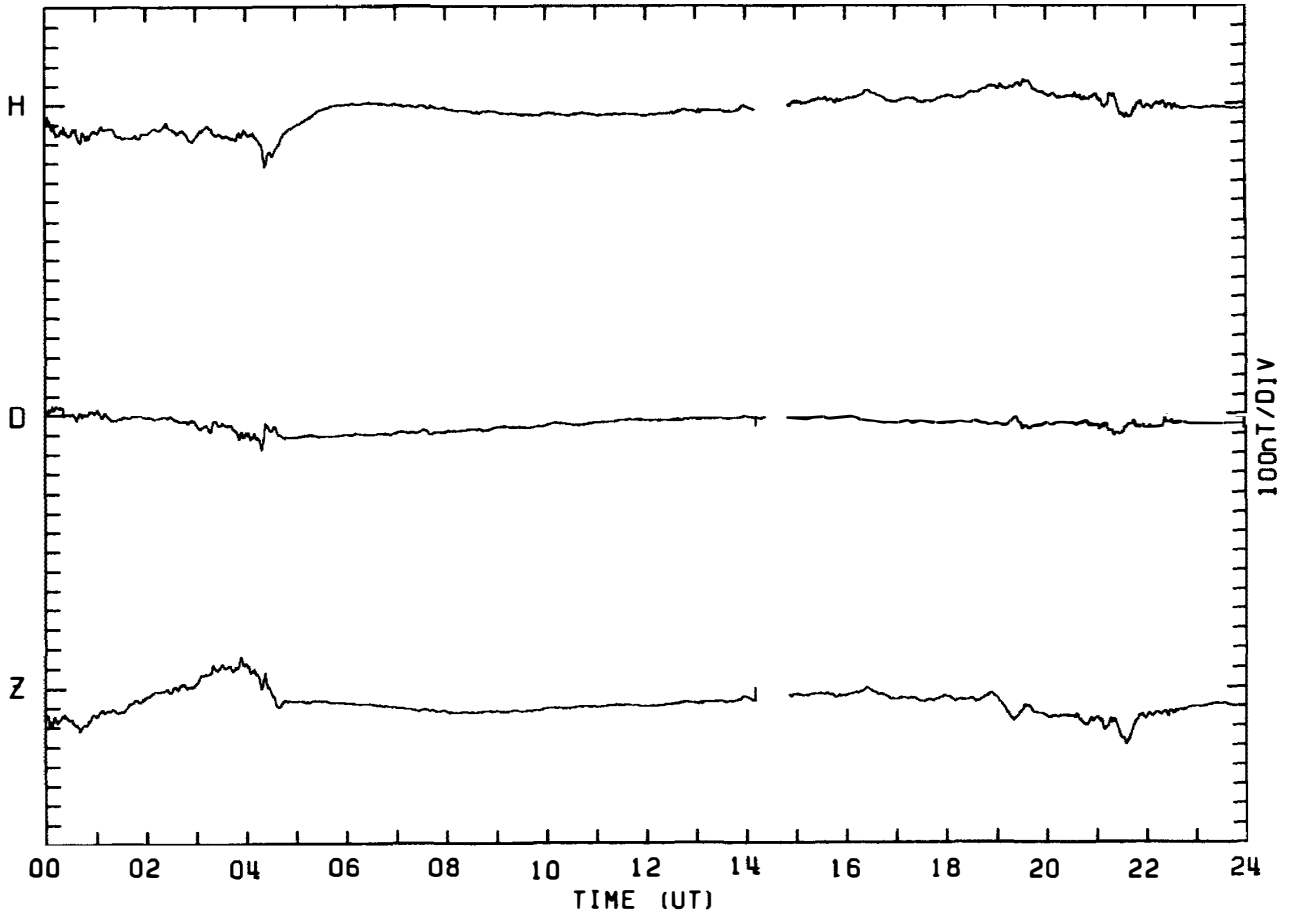
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DAY:322 NOVEMBER 18, 1982



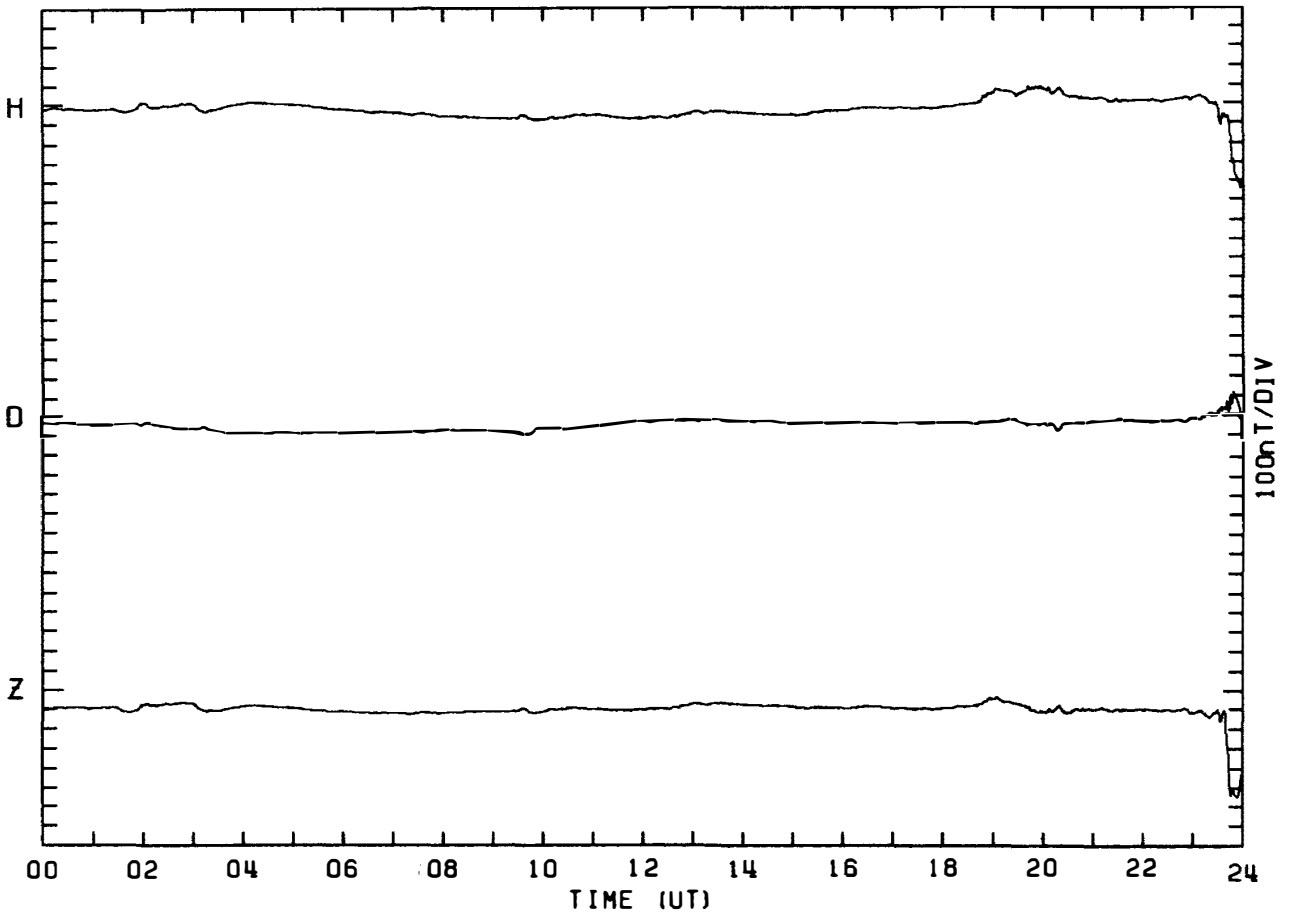
MAGNETOGRAM SYOWA STATION

DAY: 323 NOVEMBER 19, 1982



MAGNETOGRAM SYOWA STATION

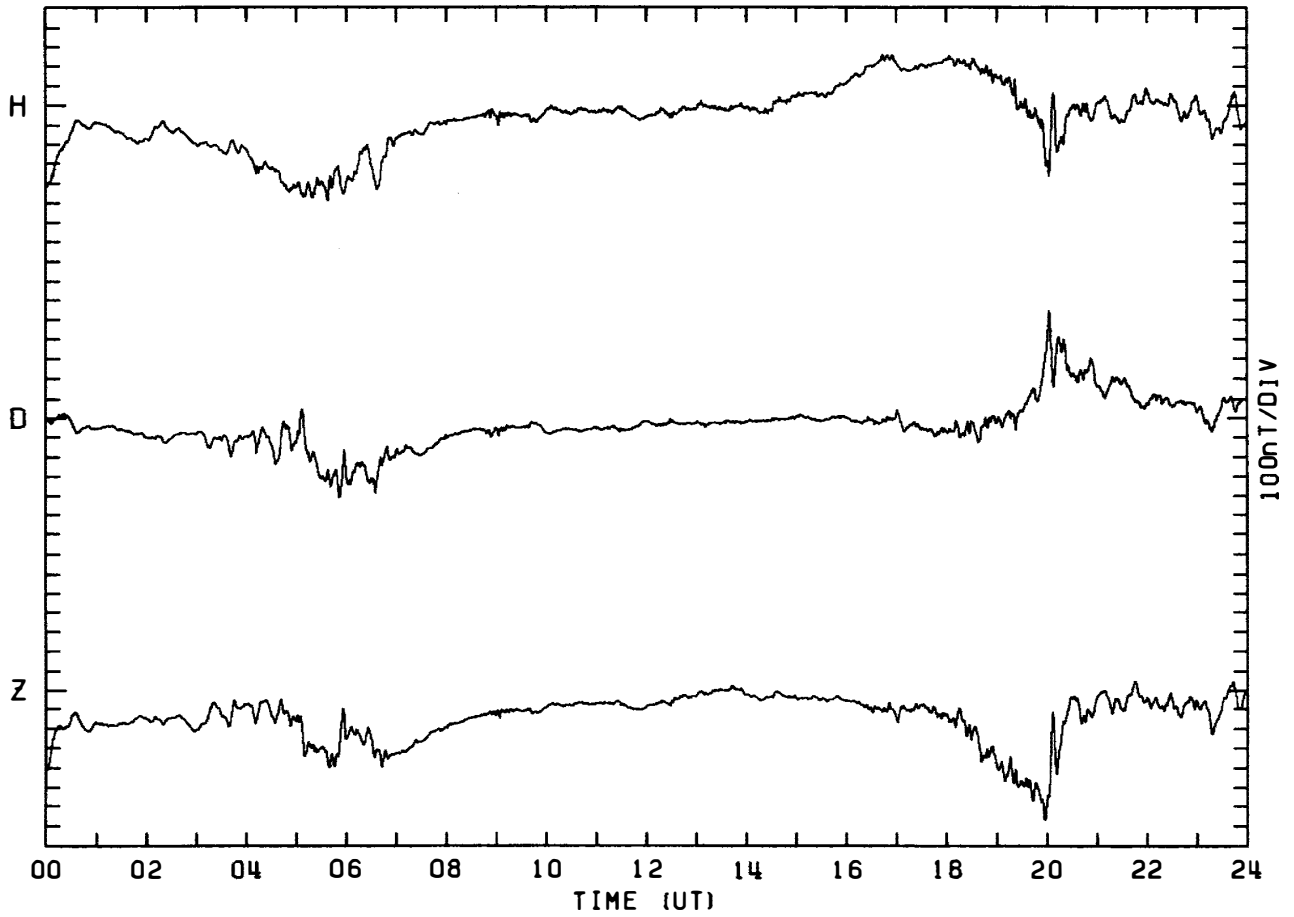
DAY: 324 NOVEMBER 20, 1982





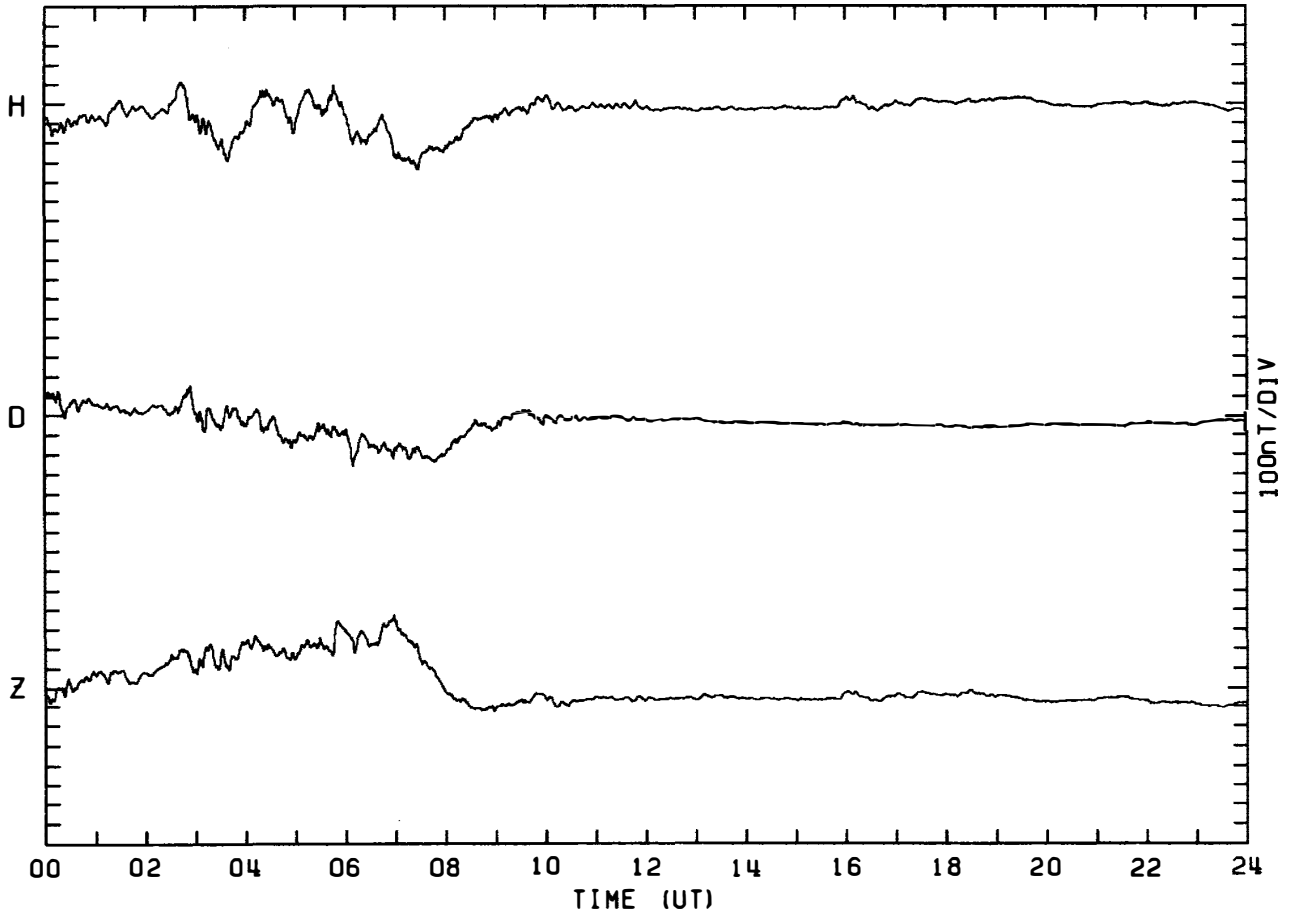
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DAY:325 NOVEMBER 21, 1982



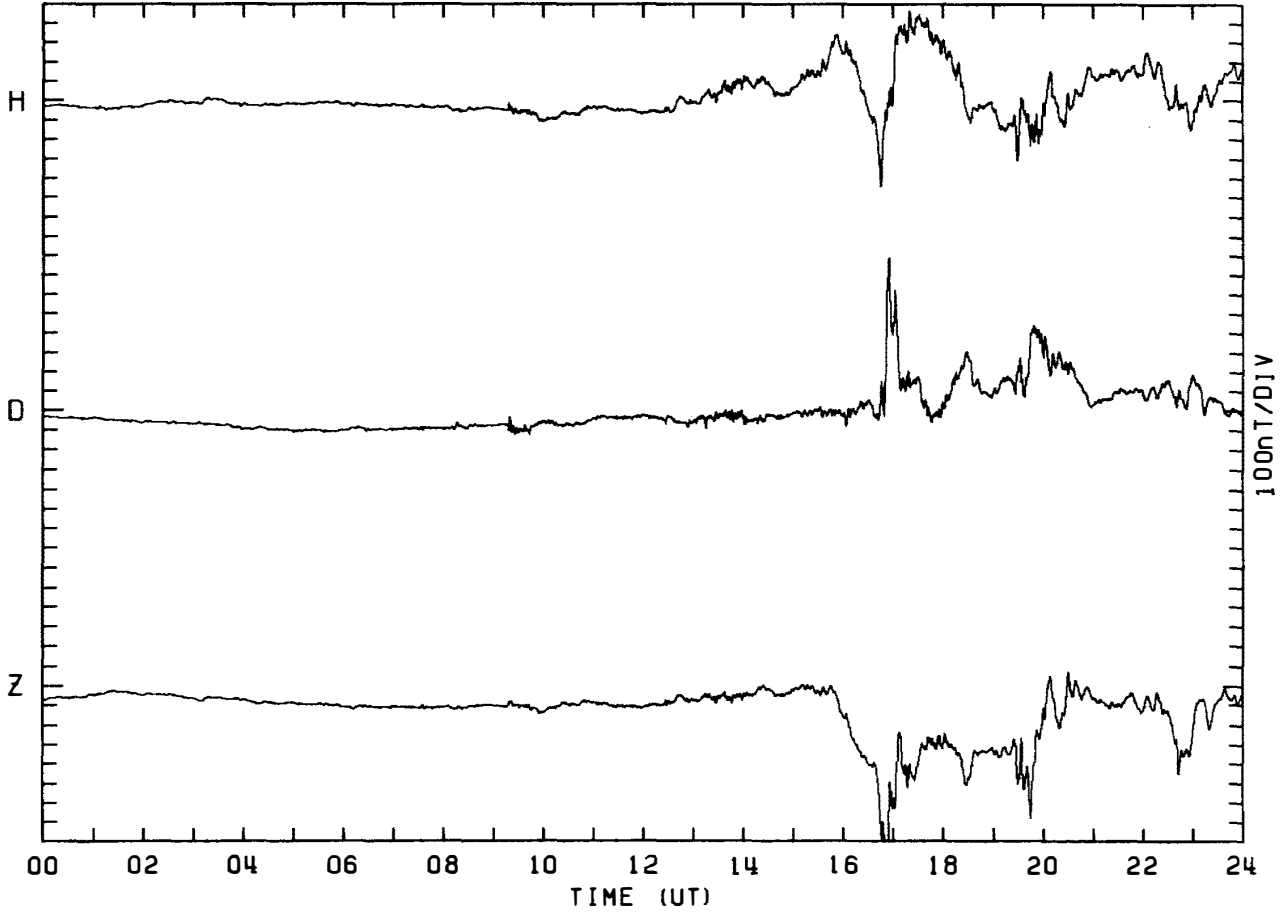
MAGNETOGRAM SYOWA STATION

DAY:326 NOVEMBER 22, 1982



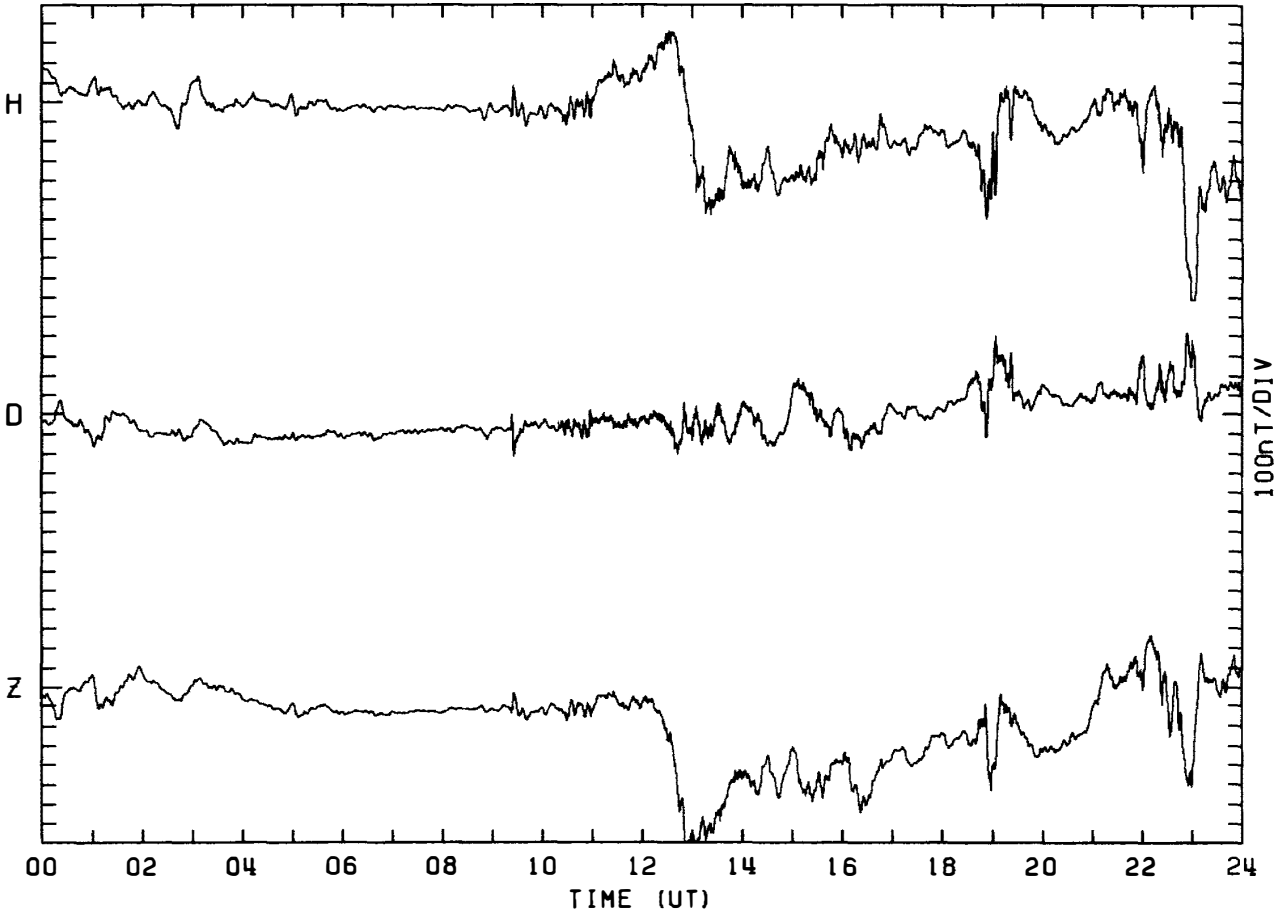
MAGNETOGRAM SYOWA STATION

DAY:327 NOVEMBER 23, 1982



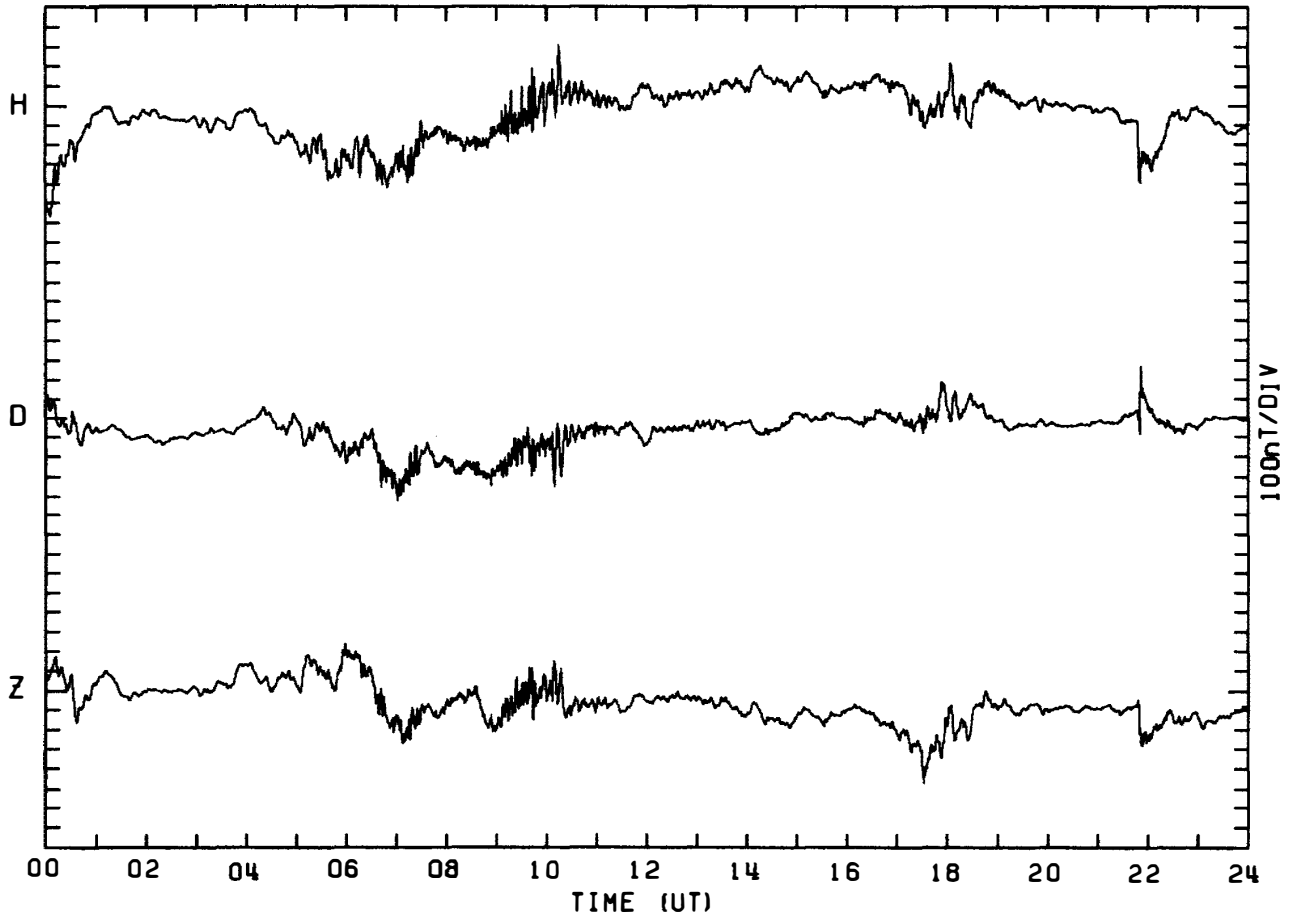
MAGNETOGRAM SYOWA STATION

DAY:328 NOVEMBER 24, 1983



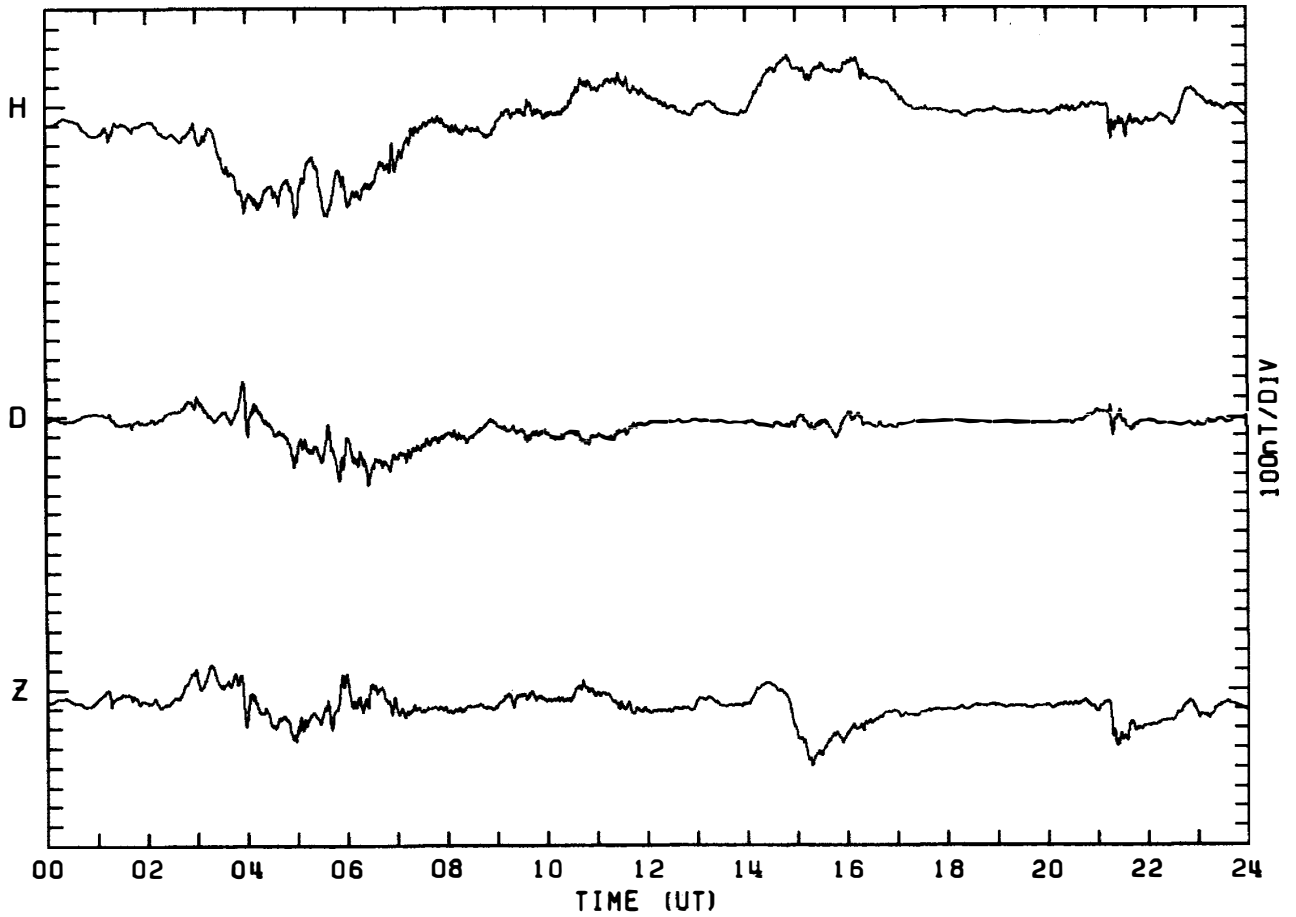
MAGNETOGRAM SYOWA STATION

DAY:329 NOVEMBER 25, 1982



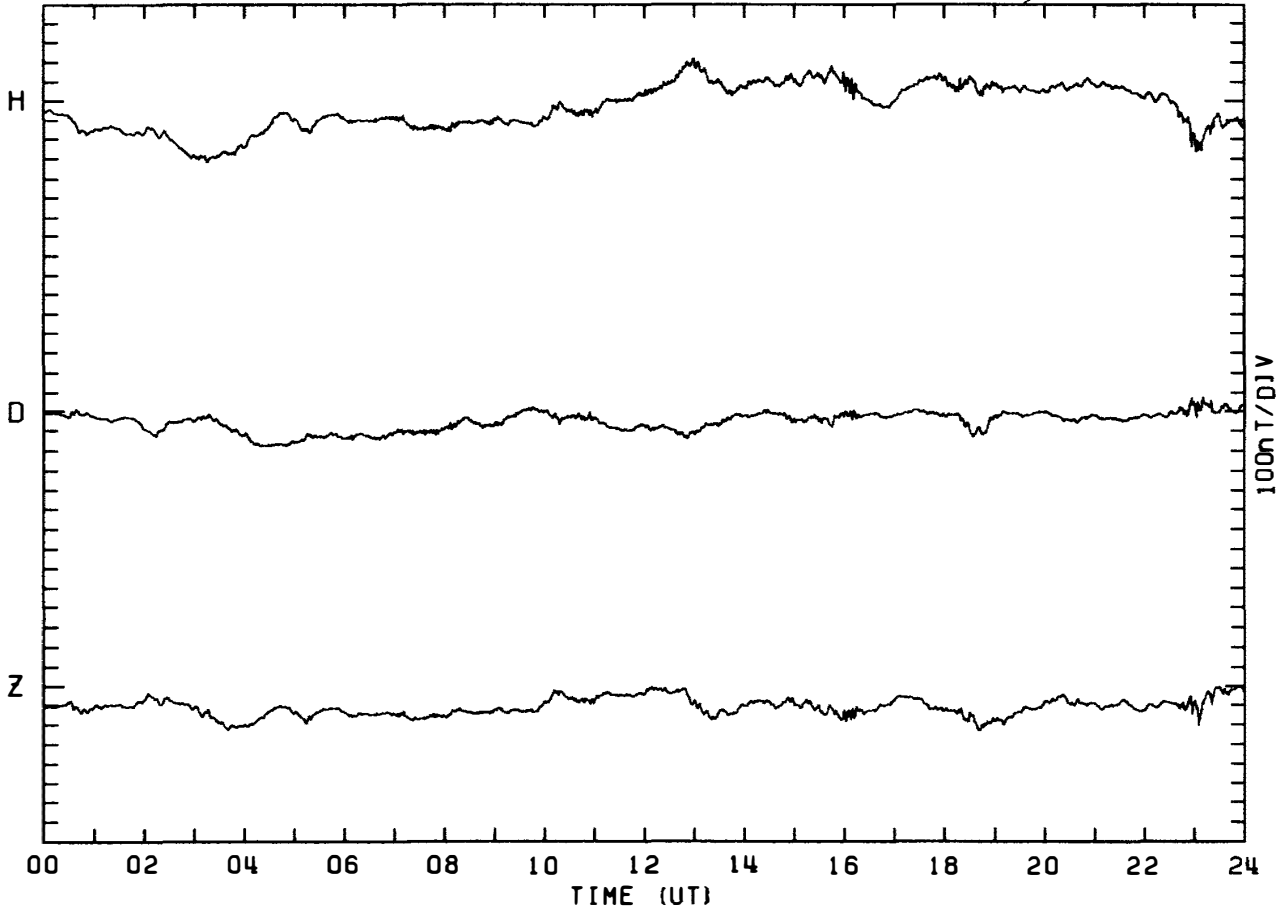
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DAY:330 NOVEMBER 26, 1982



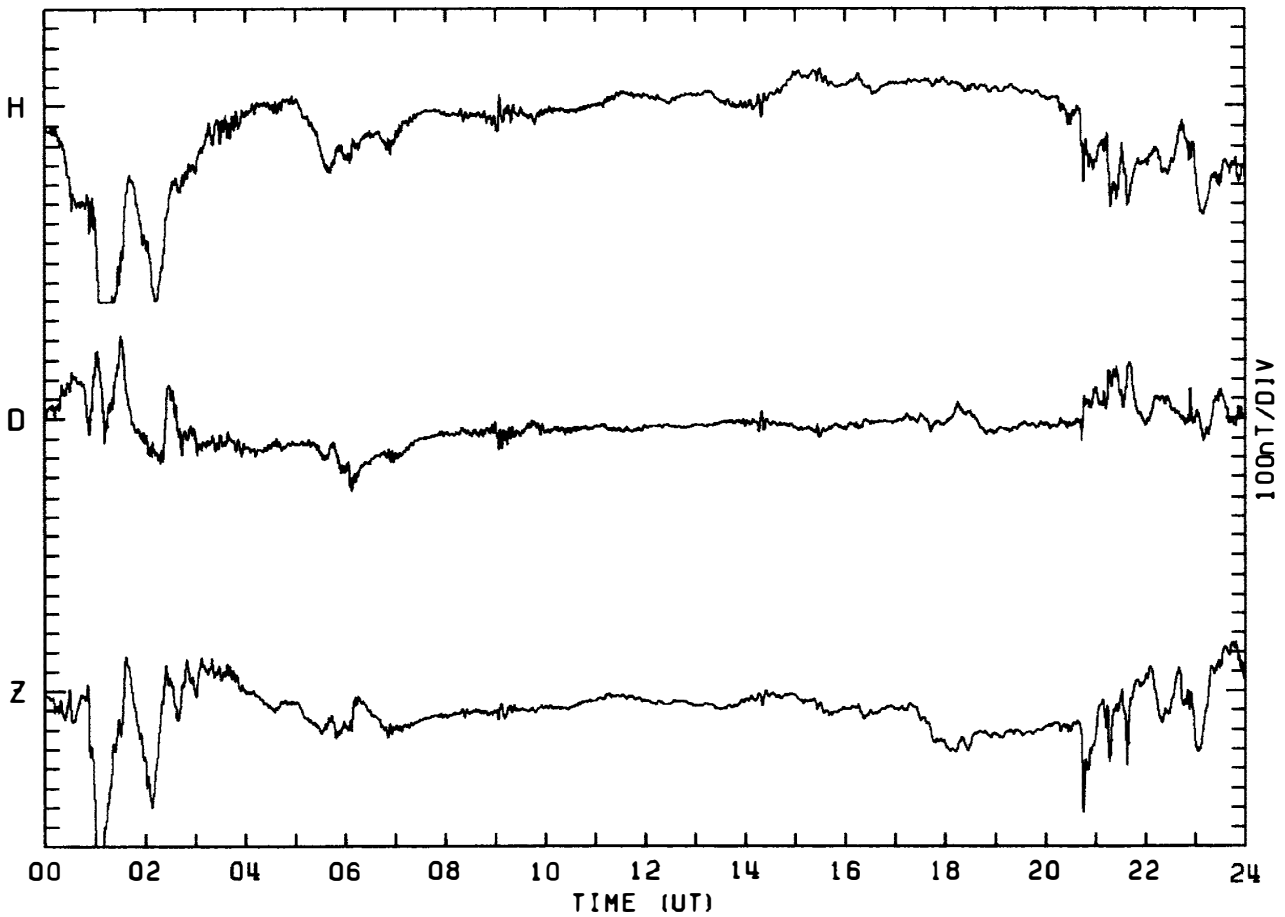
MAGNETOGRAM SYOWA STATION

DAY:331 NOVEMBER 27. 1982



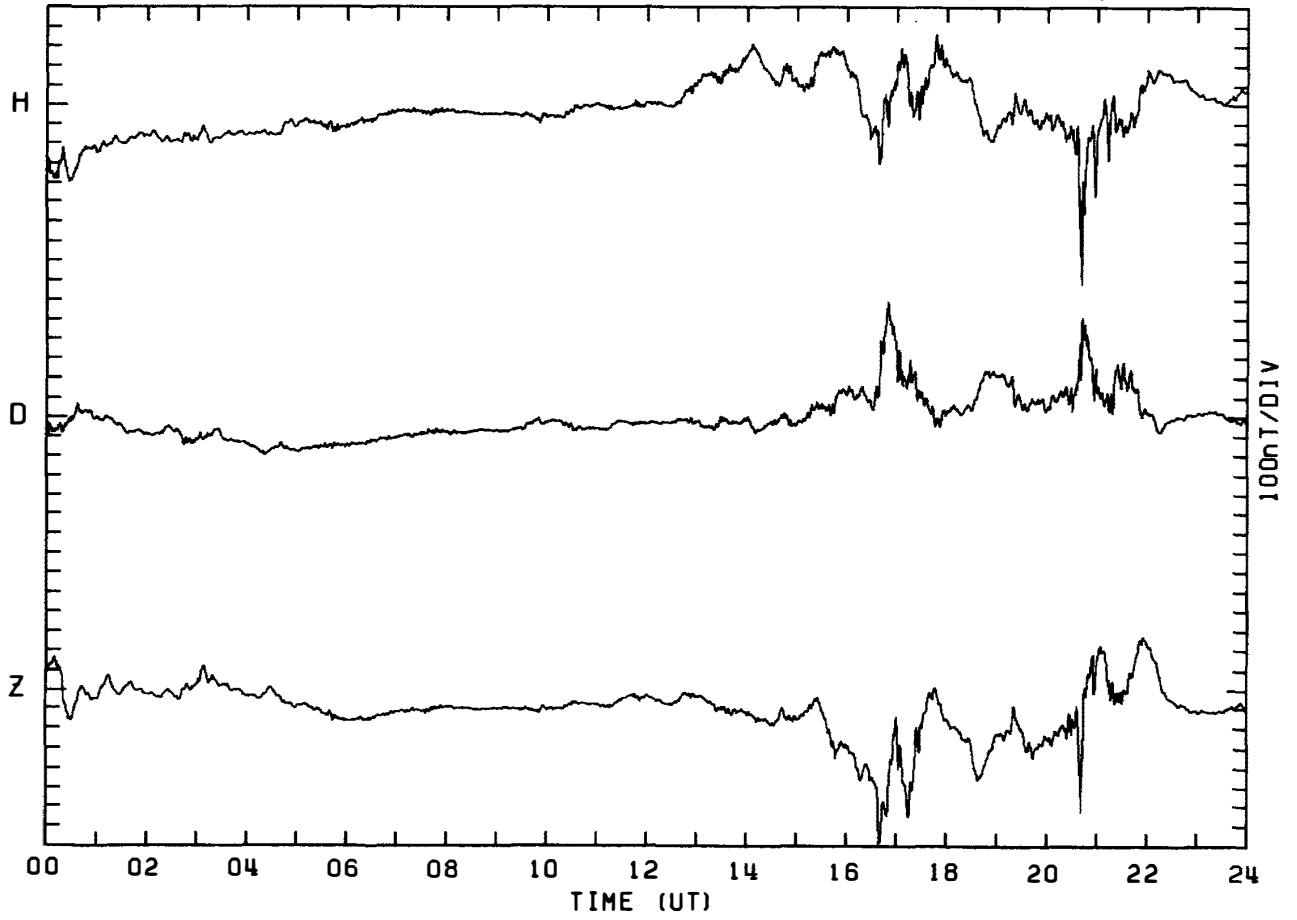
MAGNETOGRAM SYOWA STATION

DAY:332 NOVEMBER 28. 1982



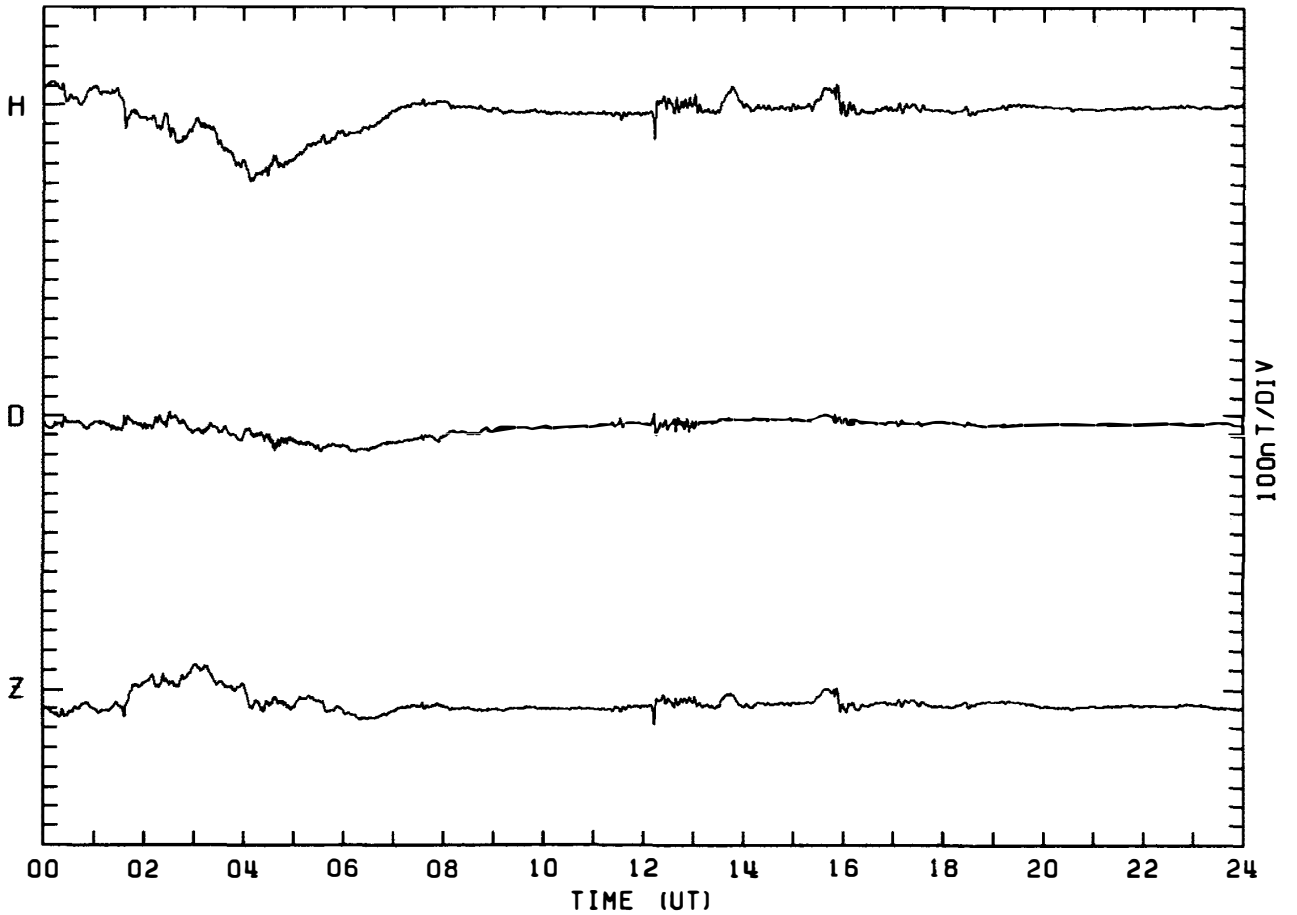
MAGNETOGRAM SYOWA STATION

DAY:333 NOVEMBER 29. 1982



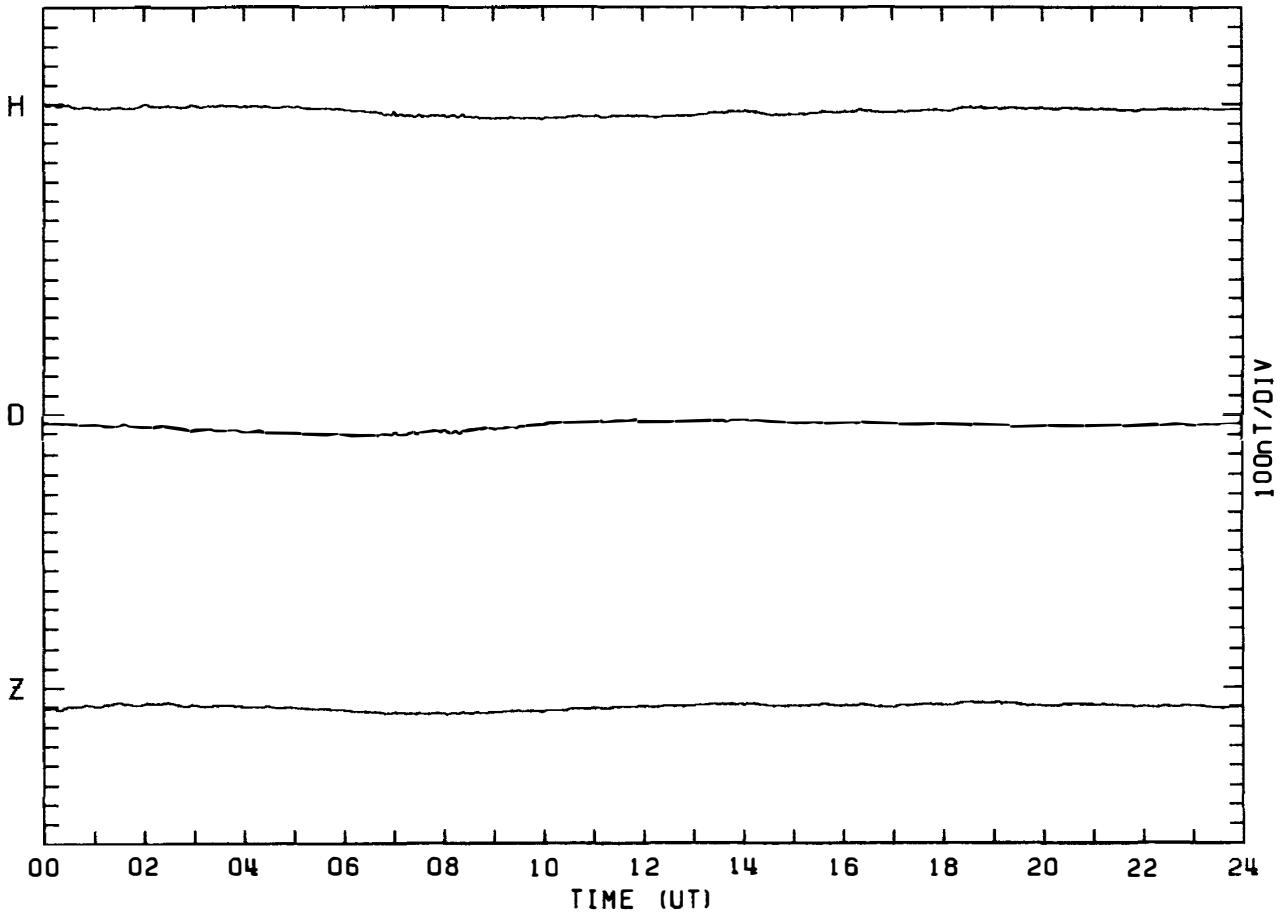
MAGNETOGRAM SYOWA STATION

DAY:334 NOVEMBER 30. 1982



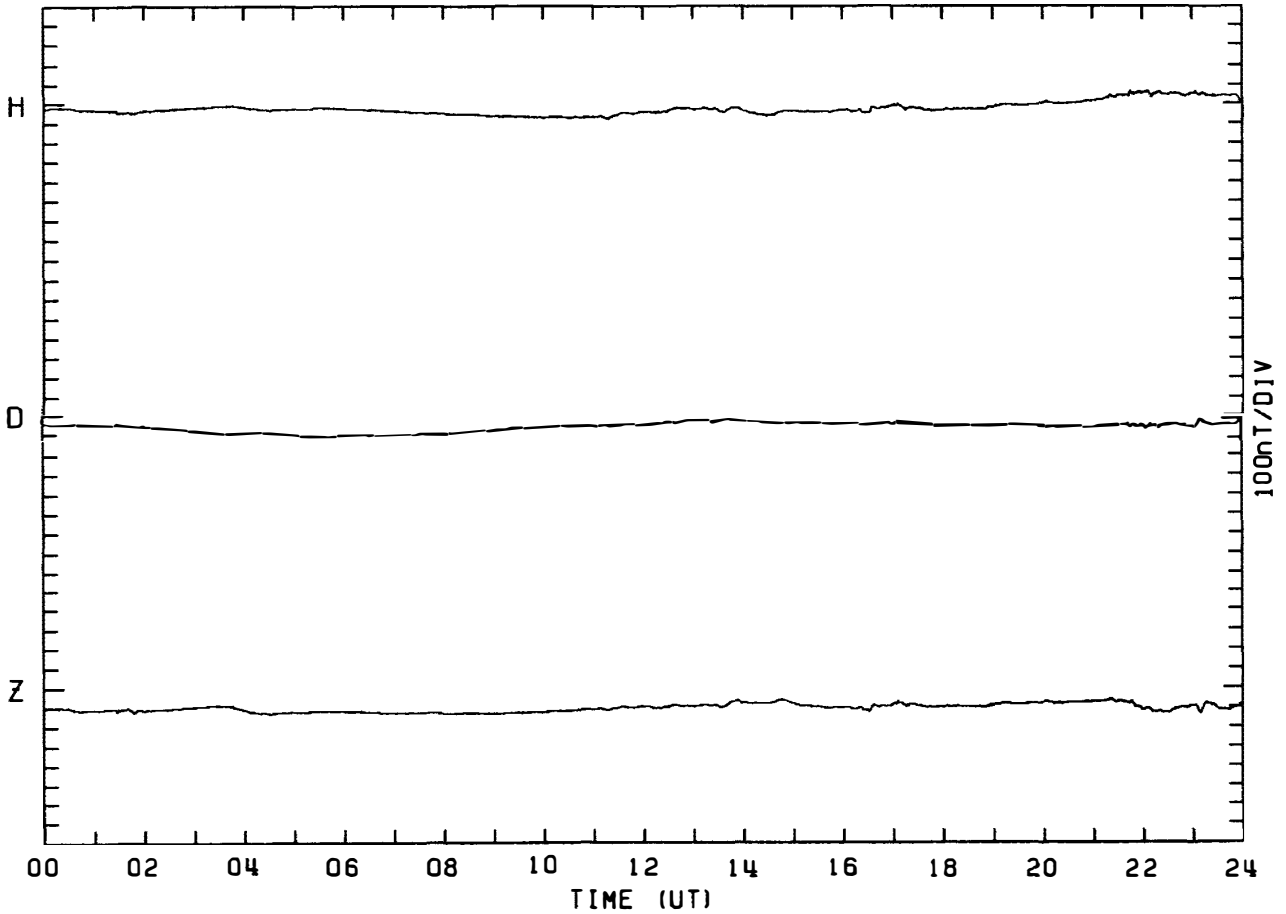
MAGNETOGRAM SYOWA STATION

DAY:335 DECEMBER 1, 1982



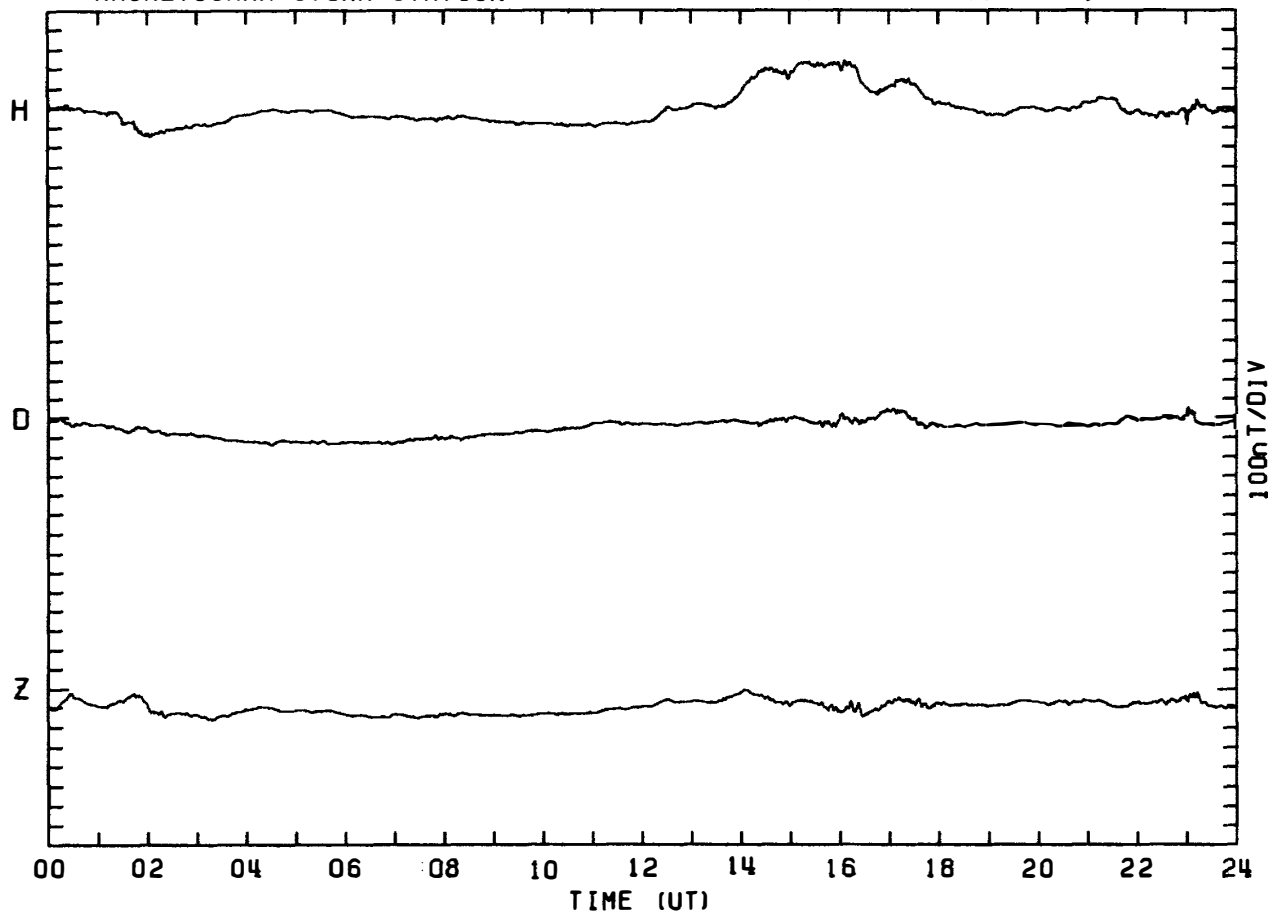
MAGNETOGRAM SYOWA STATION

DAY:336 DECEMBER 2, 1982



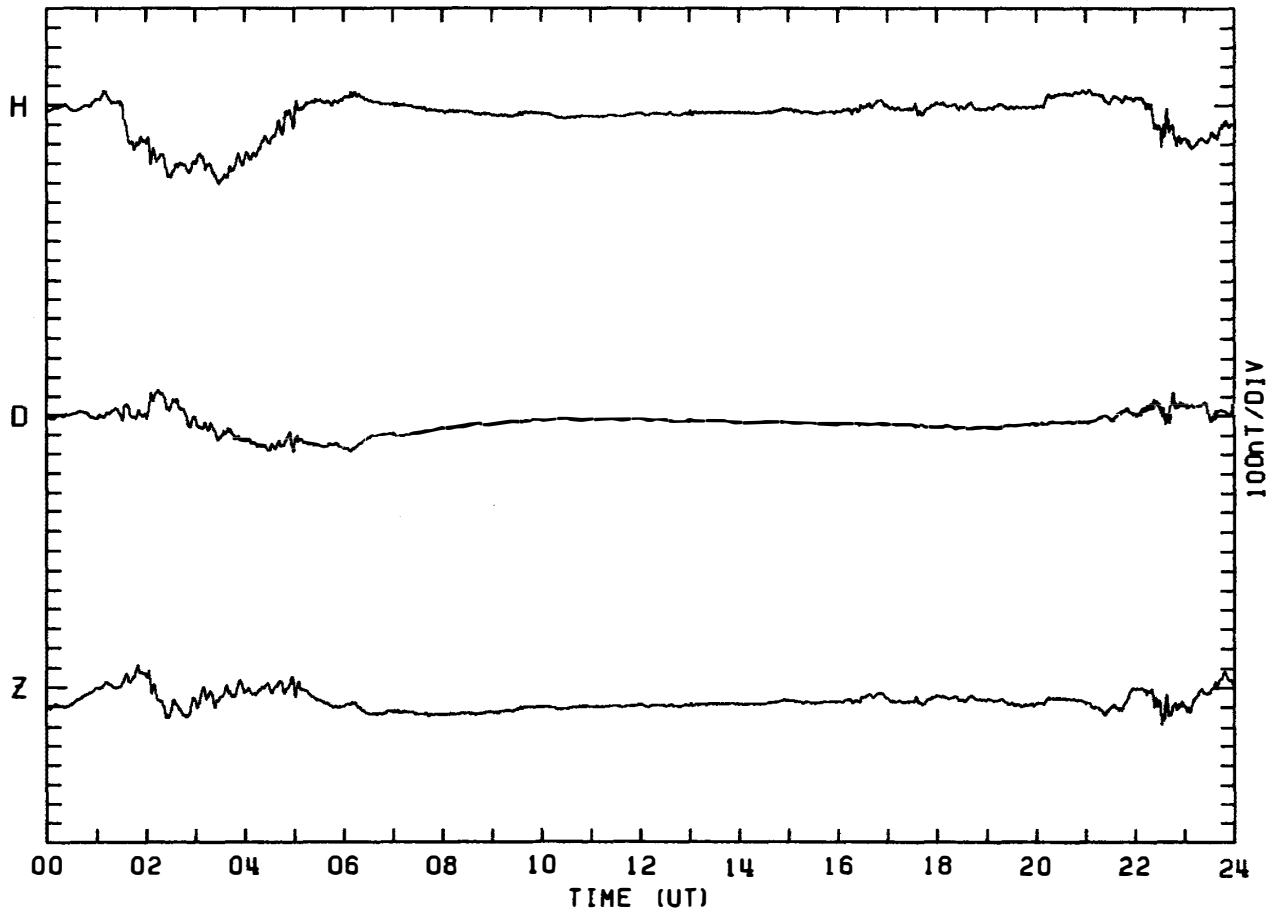
MAGNETOGRAM SYOWA STATION

DAY:337 DECEMBER 3, 1982



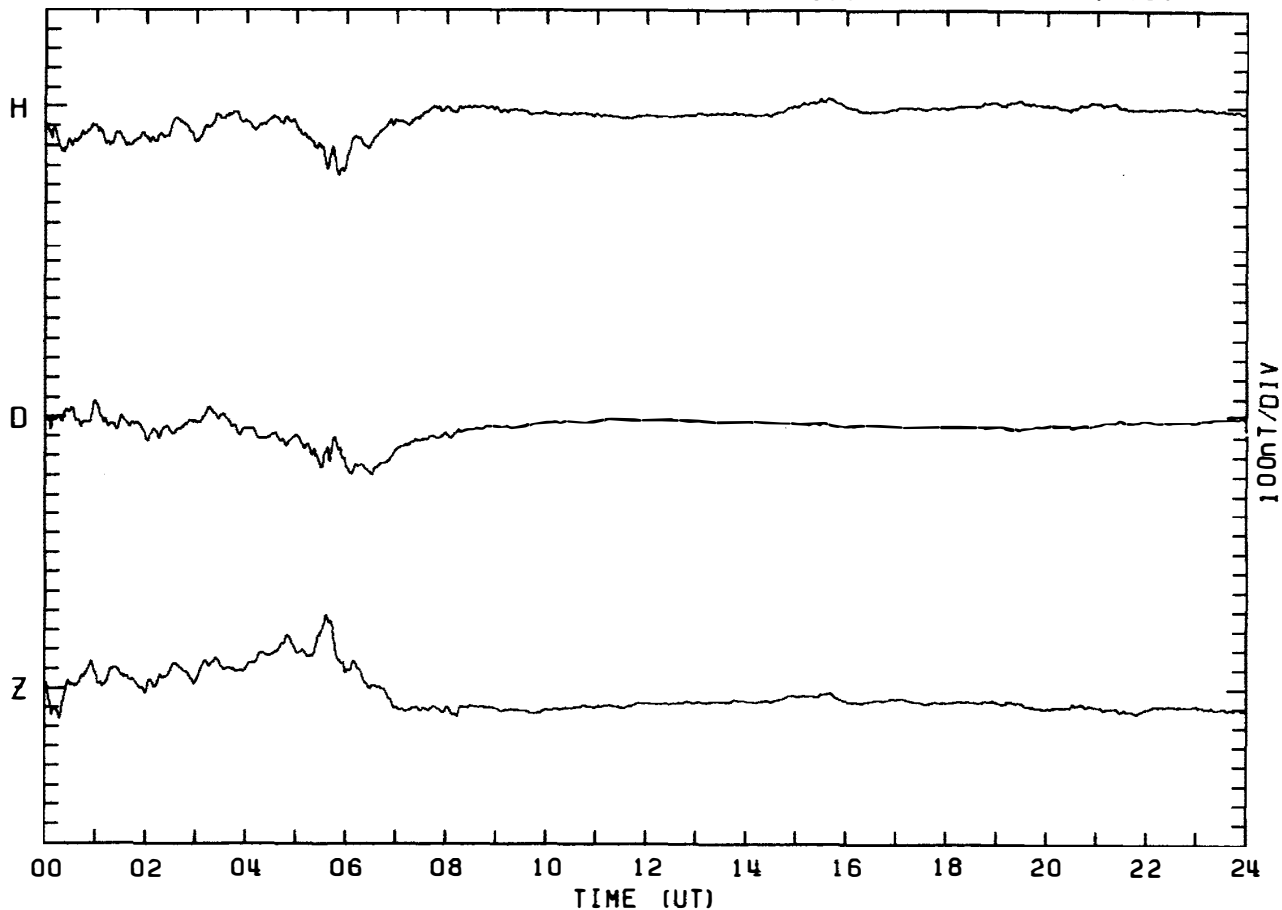
MAGNETOGRAM SYOWA STATION

DAY:338 DECEMBER 4, 1982



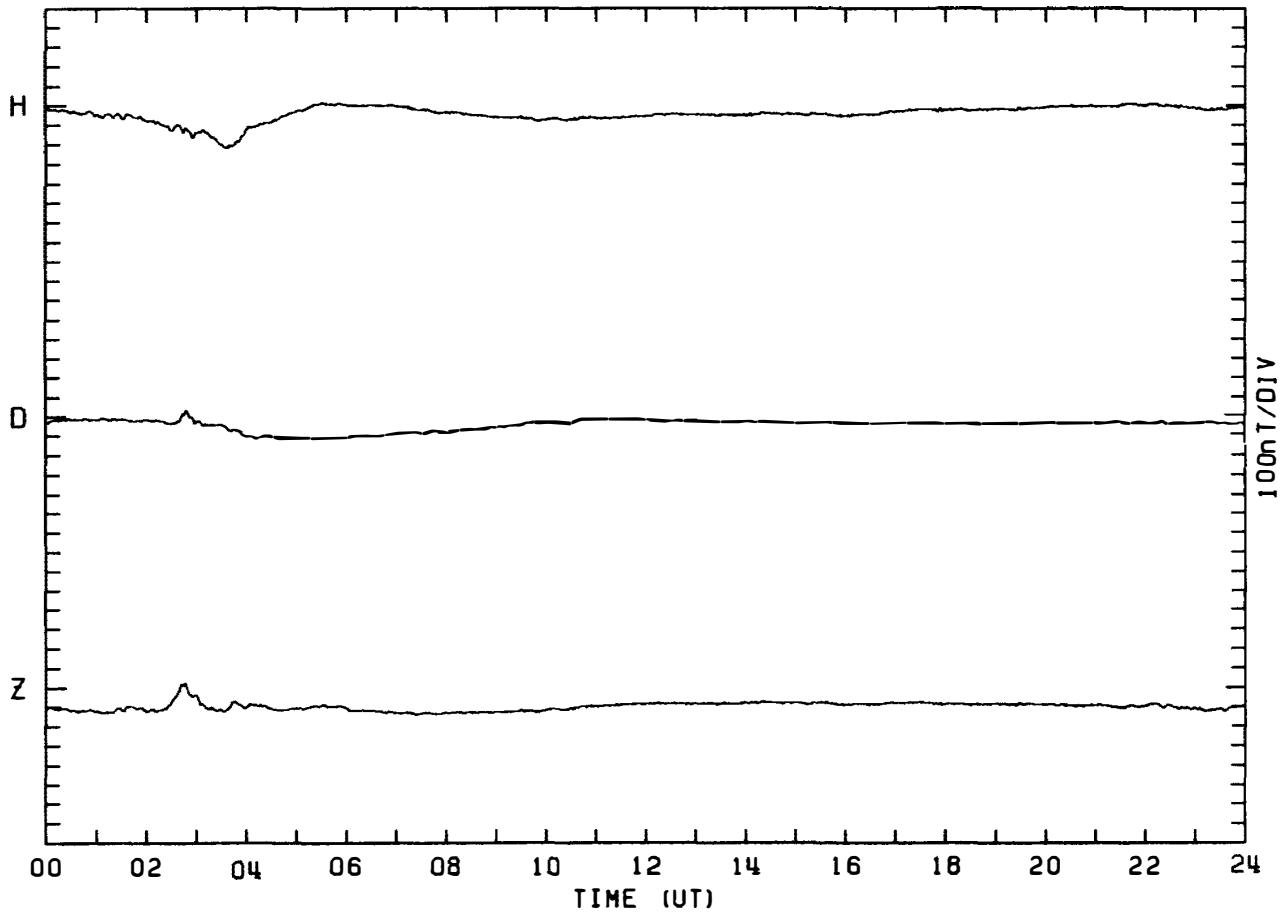
MAGNETOGRAM SYOWA STATION

DAY:339 DECEMBER 5, 1982



MAGNETOGRAM SYOWA STATION

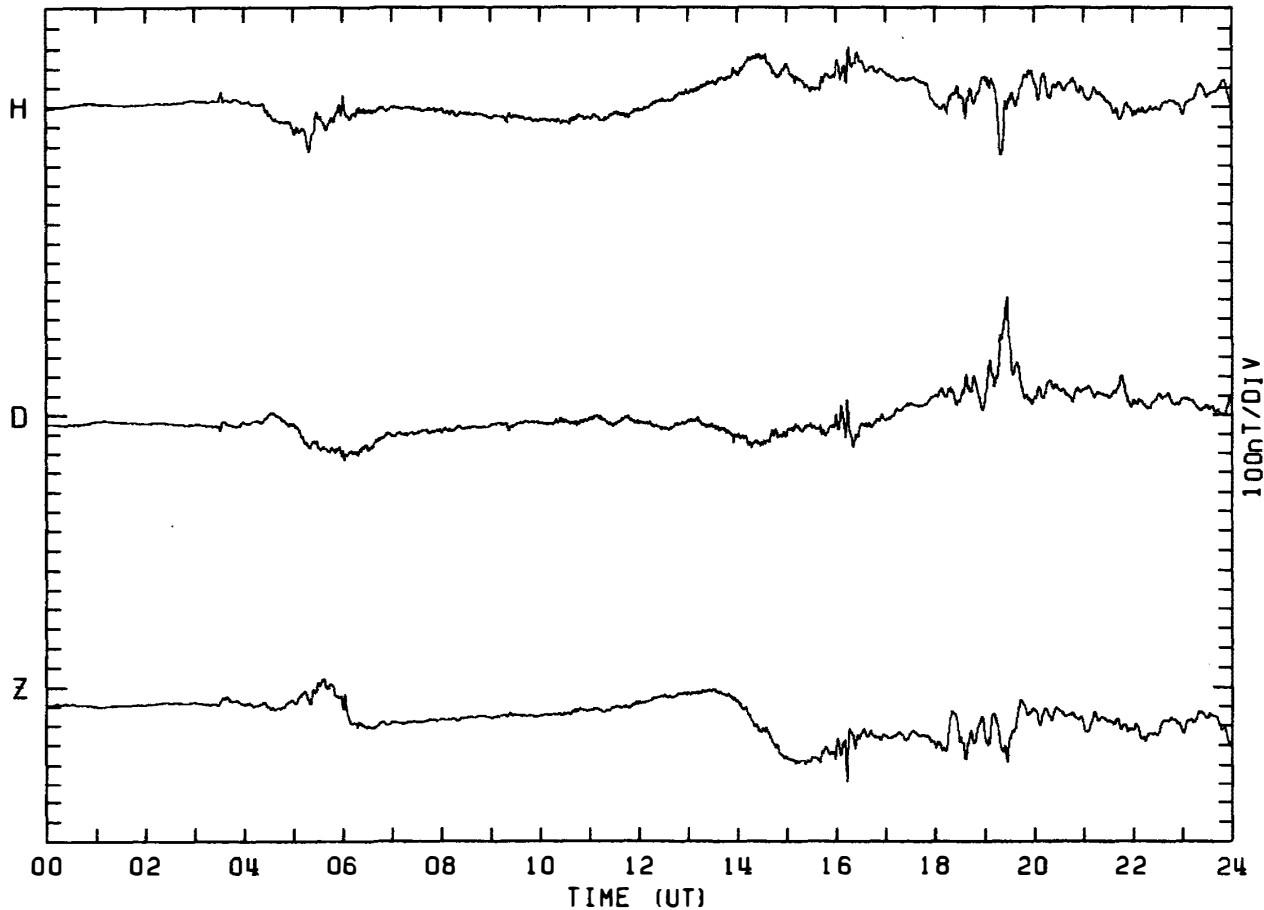
DAY:340 DECEMBER 6, 1982





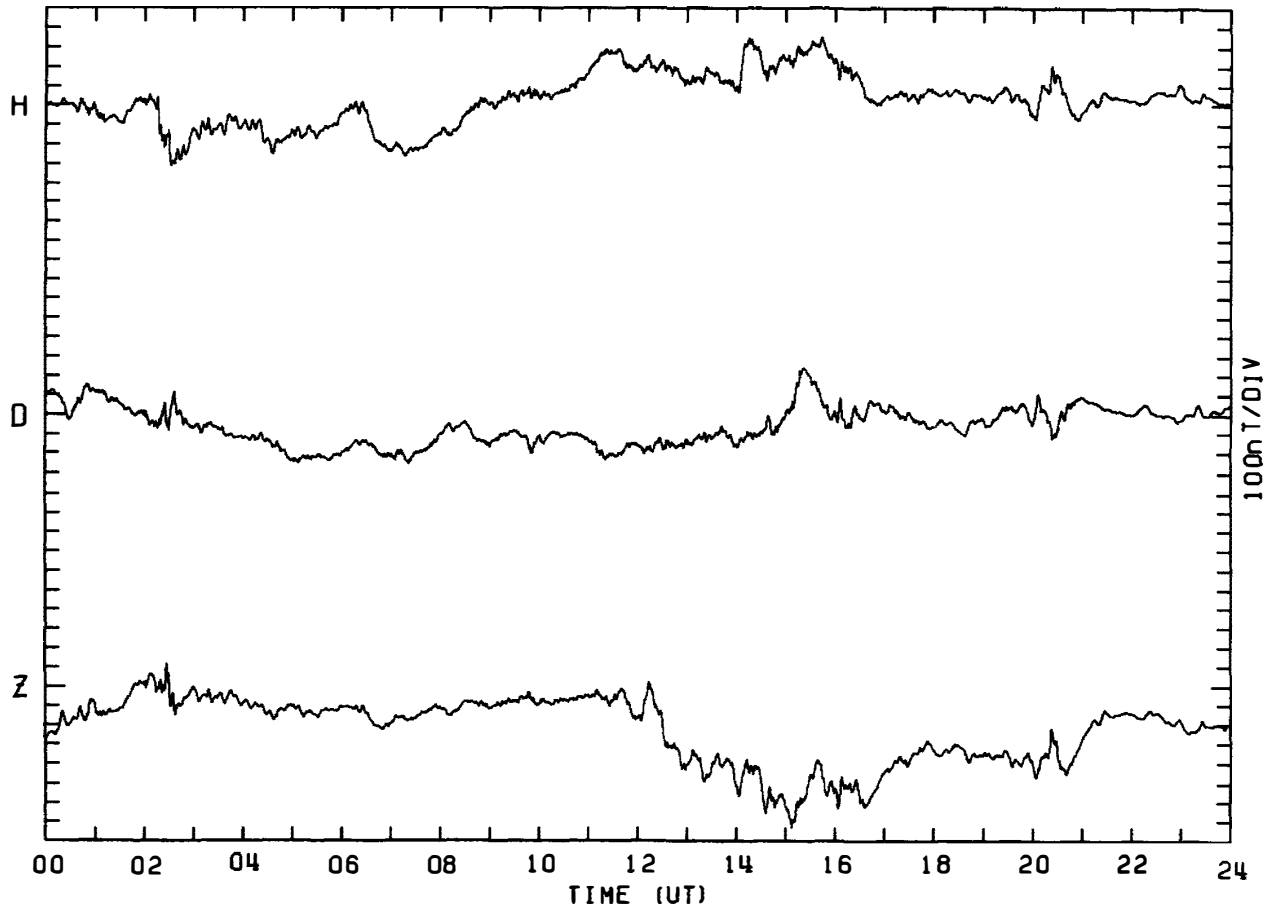
MAGNETOGRAM SYOWA STATION

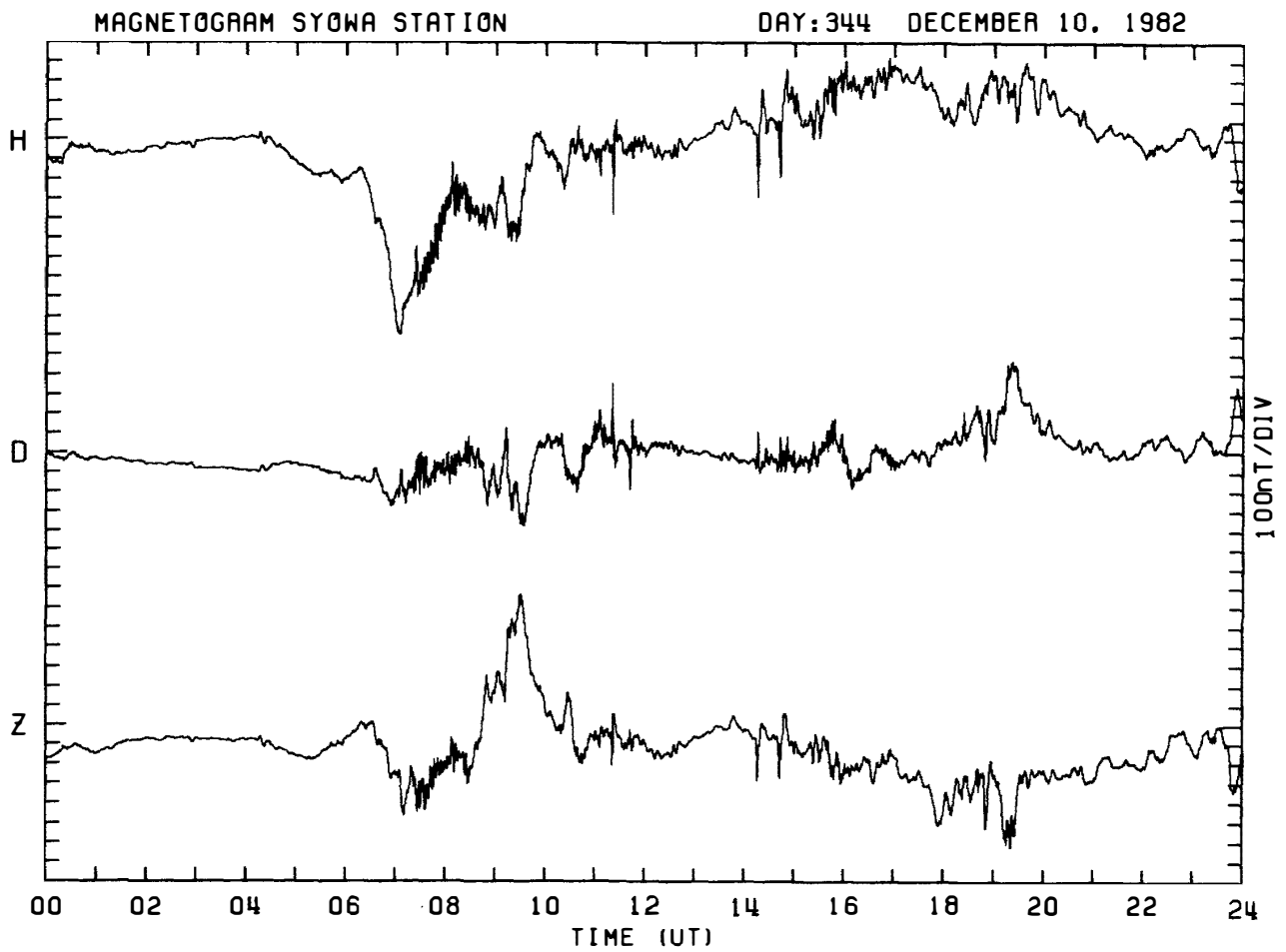
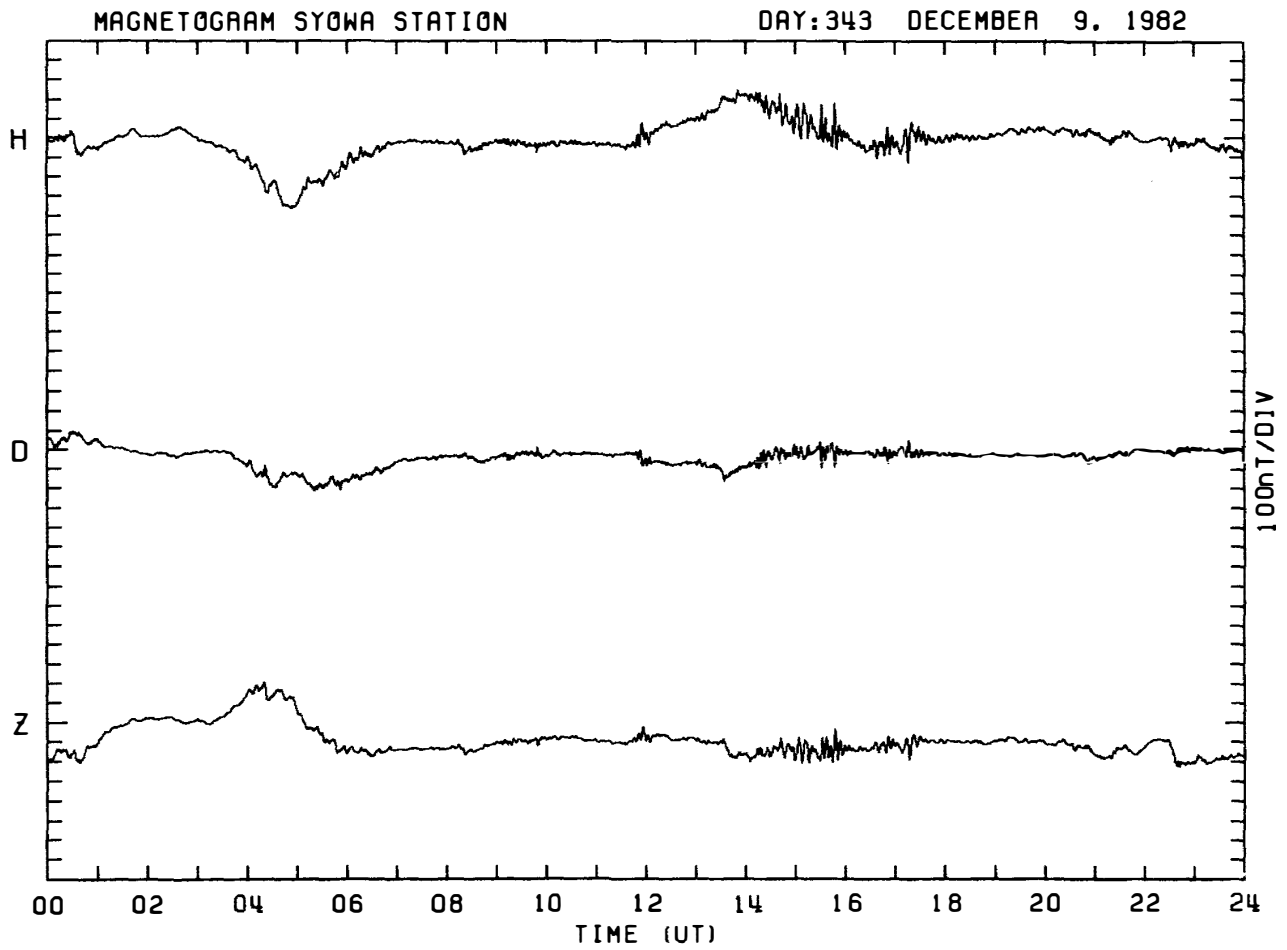
DAY:341 DECEMBER 7, 1982



MAGNETOGRAM SYOWA STATION

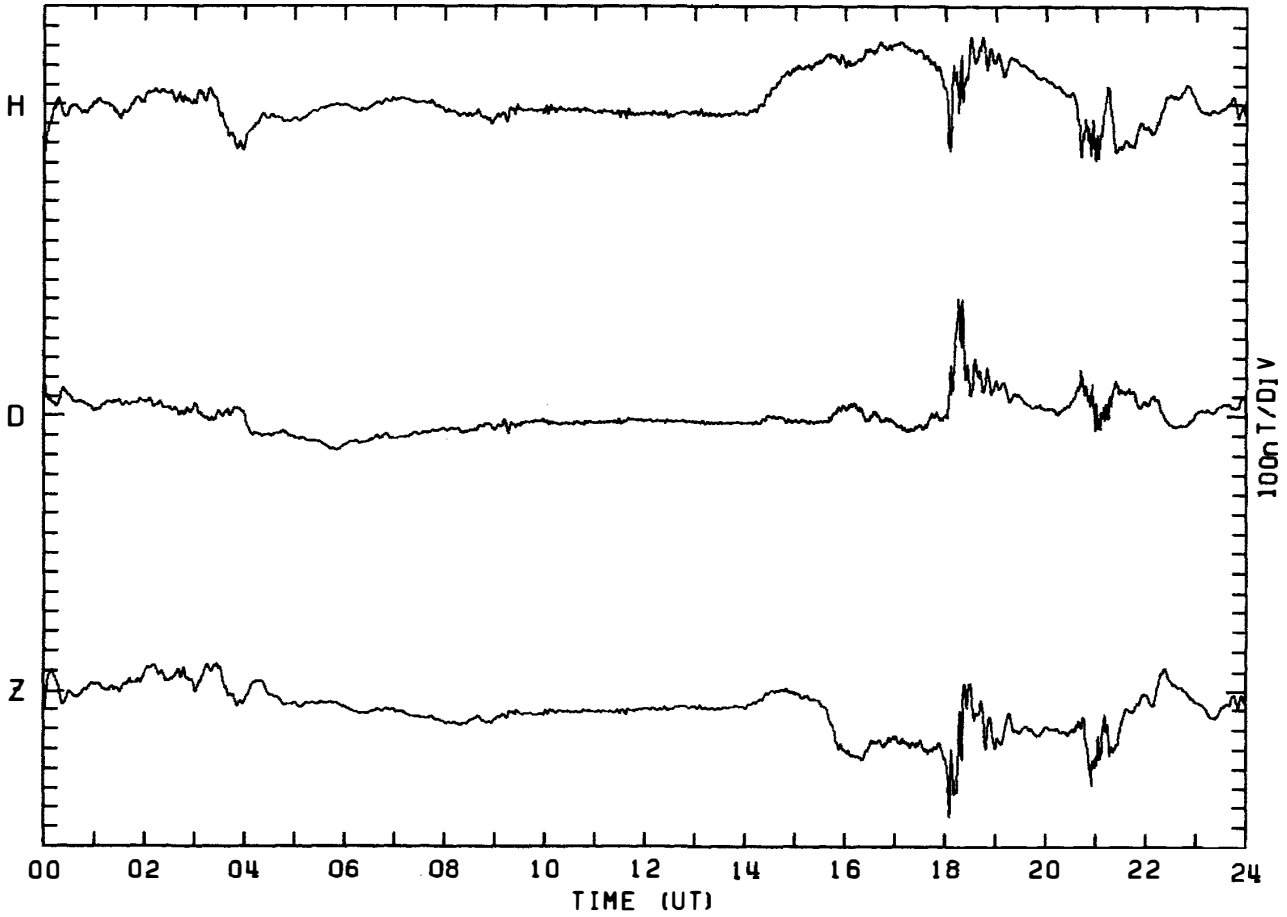
DAY:342 DECEMBER 8, 1982





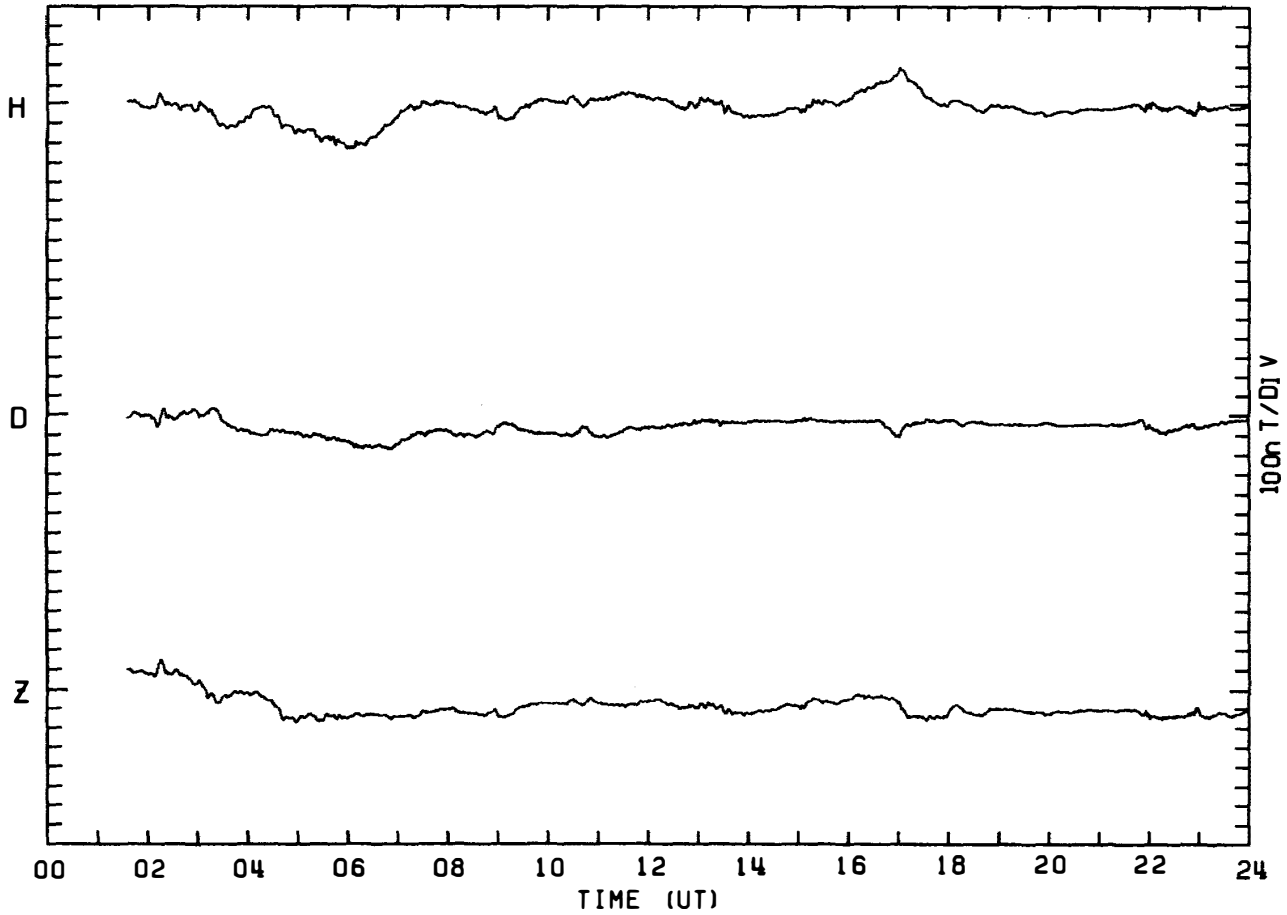
MAGNETOGRAM SYOWA STATION

DAY:345 DECEMBER 11, 1982



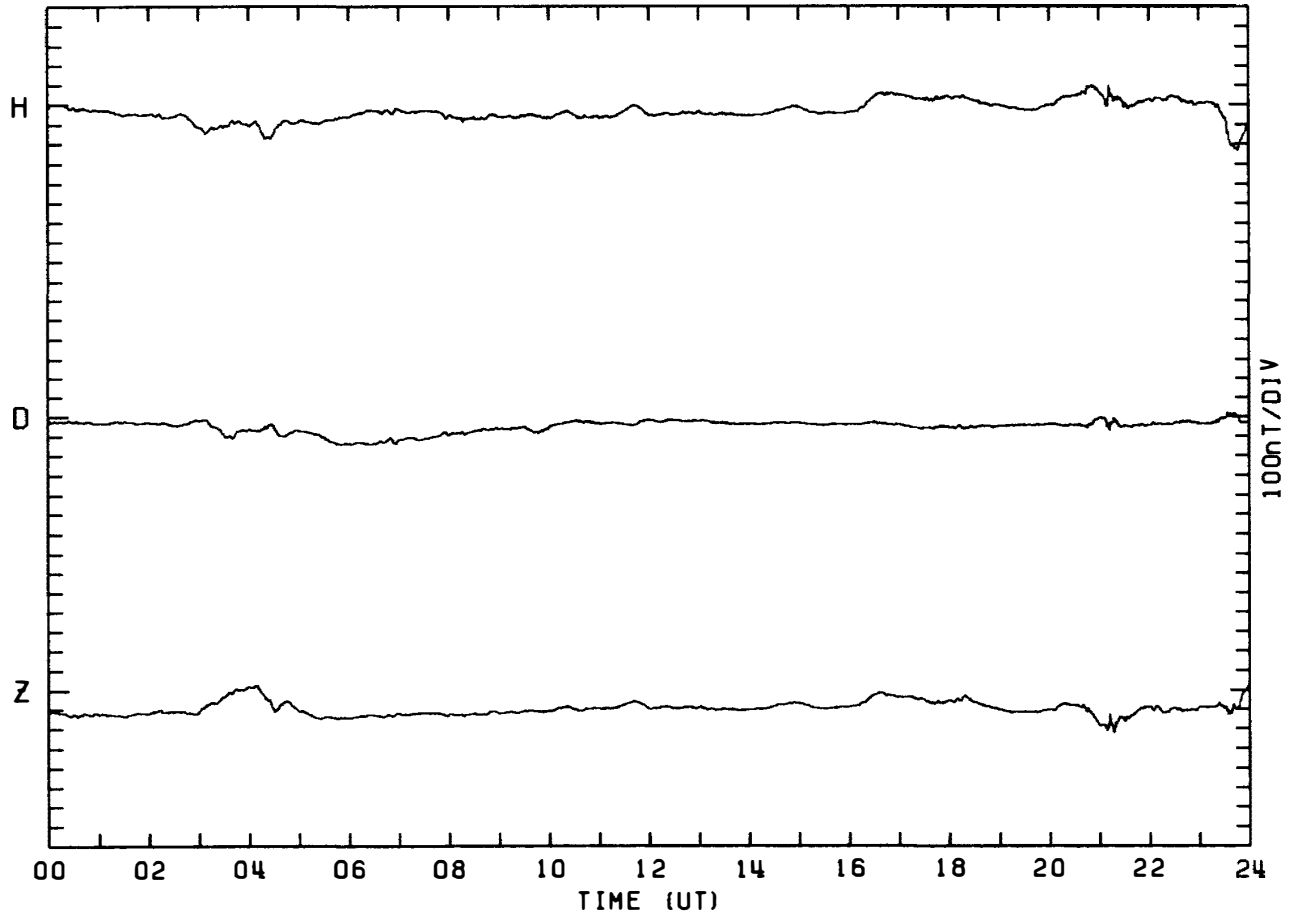
MAGNETOGRAM SYOWA STATION

DAY:346 DECEMBER 12, 1982



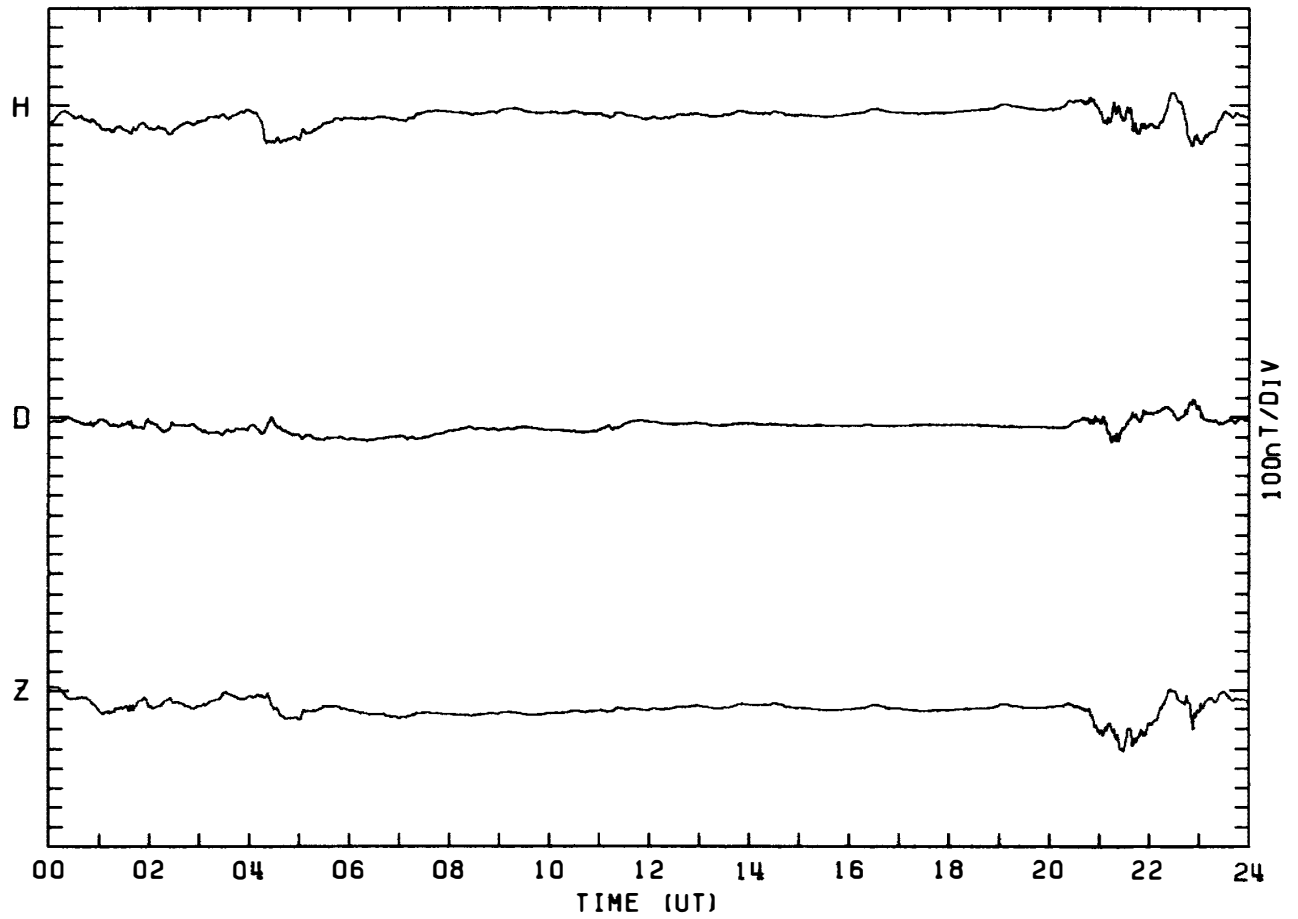
MAGNETOGRAM SYOWA STATION

DAY: 347 DECEMBER 13, 1982



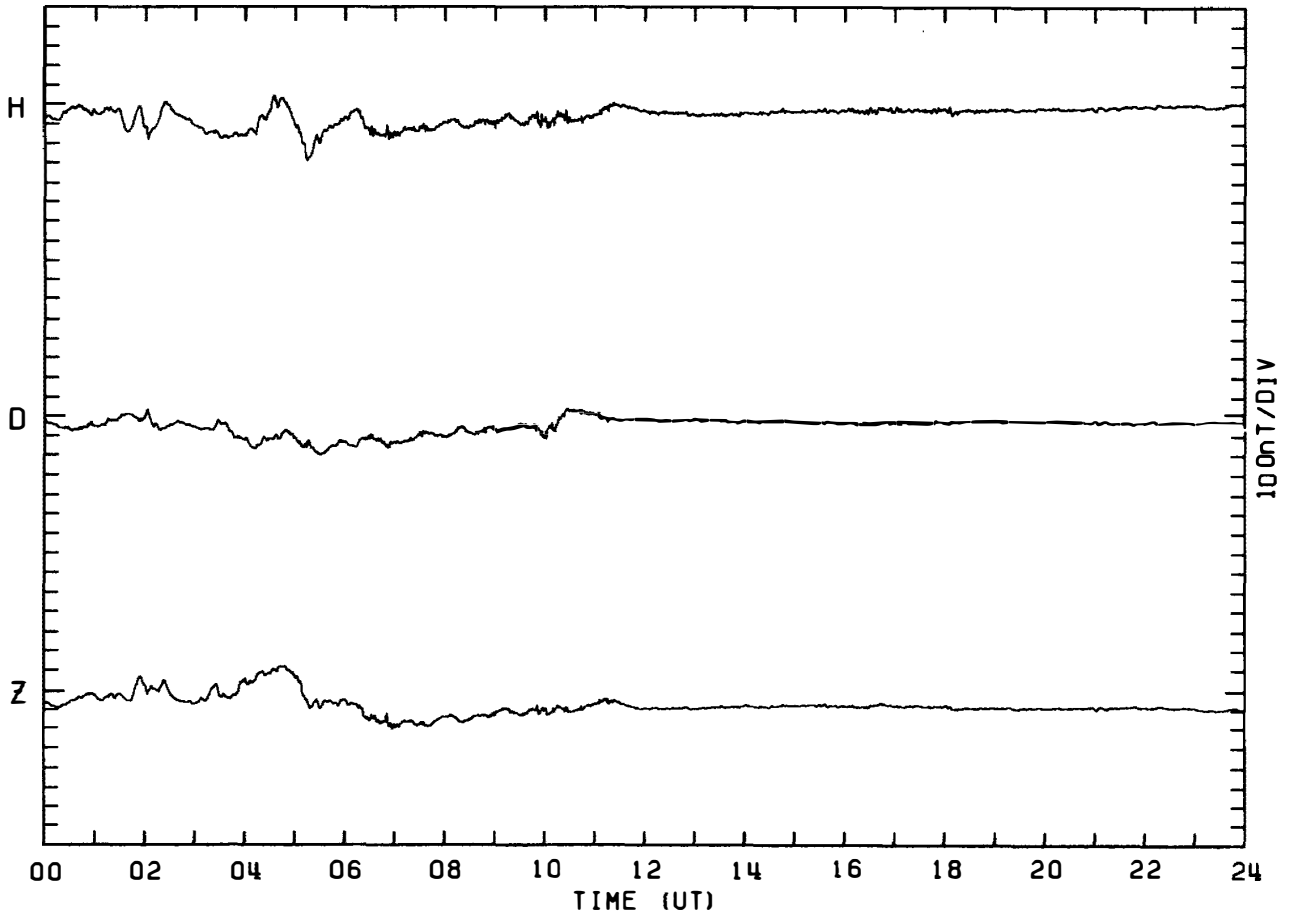
MAGNETOGRAM SYOWA STATION

DAY: 348 DECEMBER 14, 1982



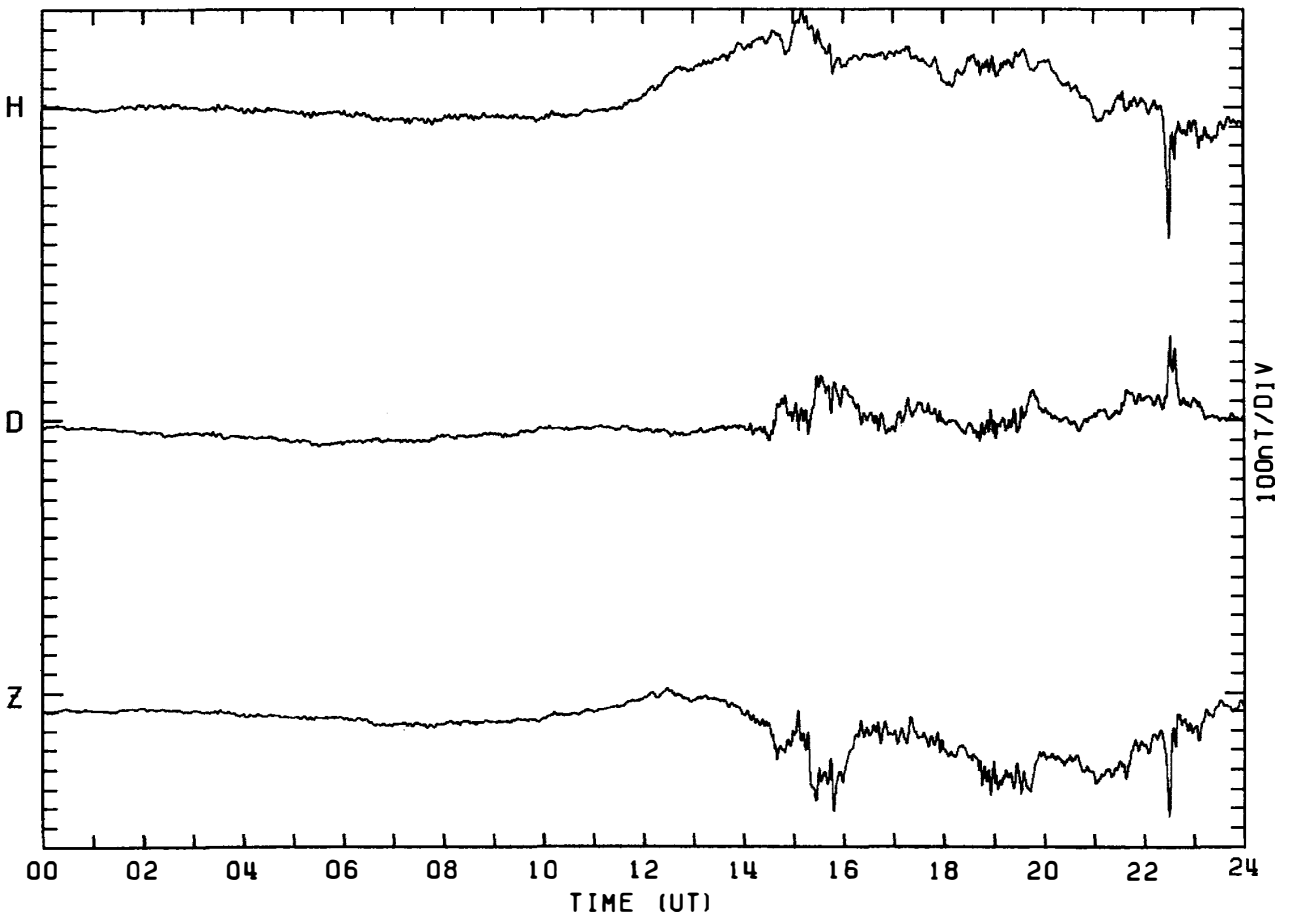
MAGNETOGRAM SYOWA STATION

DAY:349 DECEMBER 15, 1982



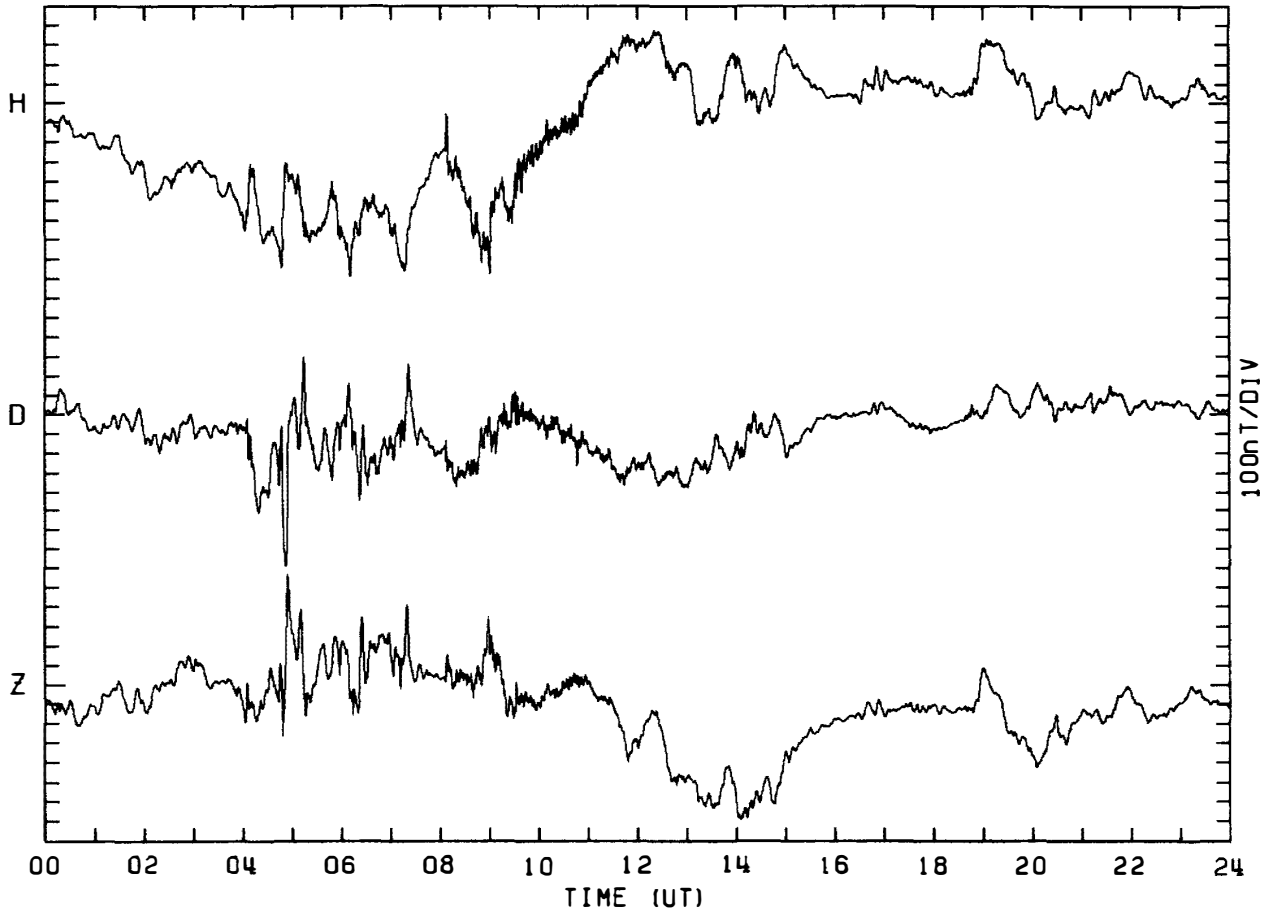
MAGNETOGRAM SYOWA STATION

DAY:350 DECEMBER 16, 1982



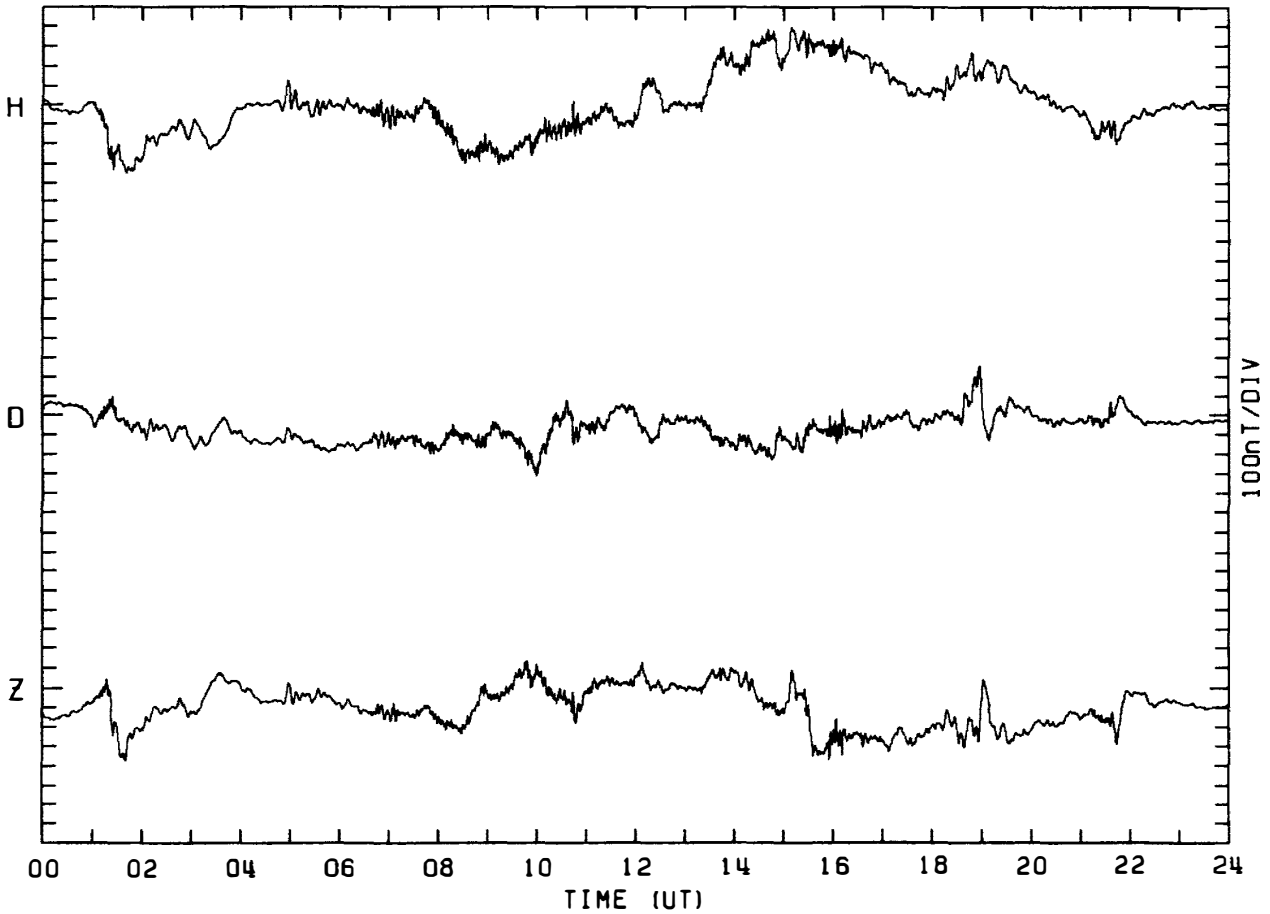
MAGNETOGRAM SYOWA STATION

DAY:351 DECEMBER 17, 1982



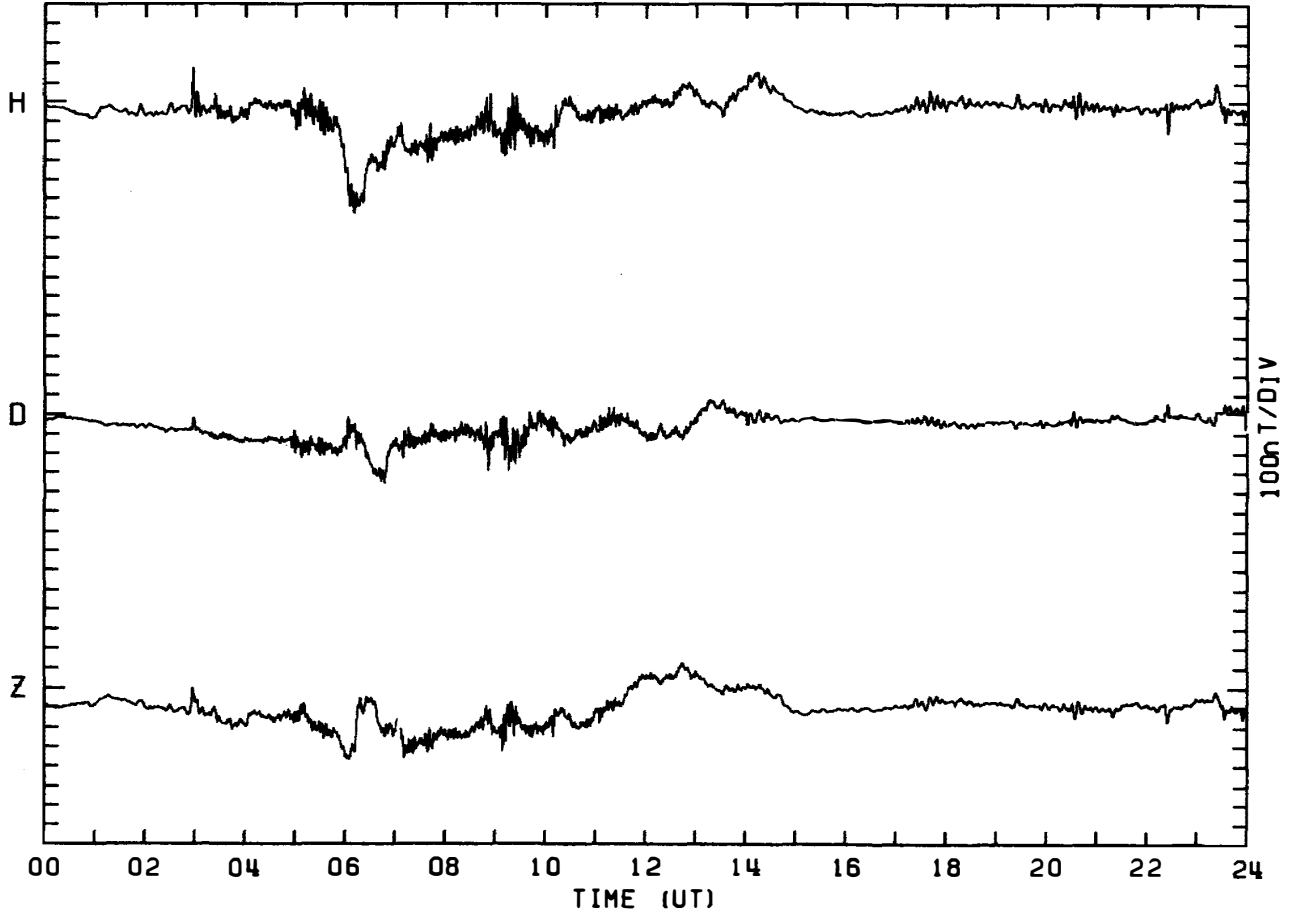
MAGNETOGRAM SYOWA STATION

DAY:352 DECEMBER 18, 1982



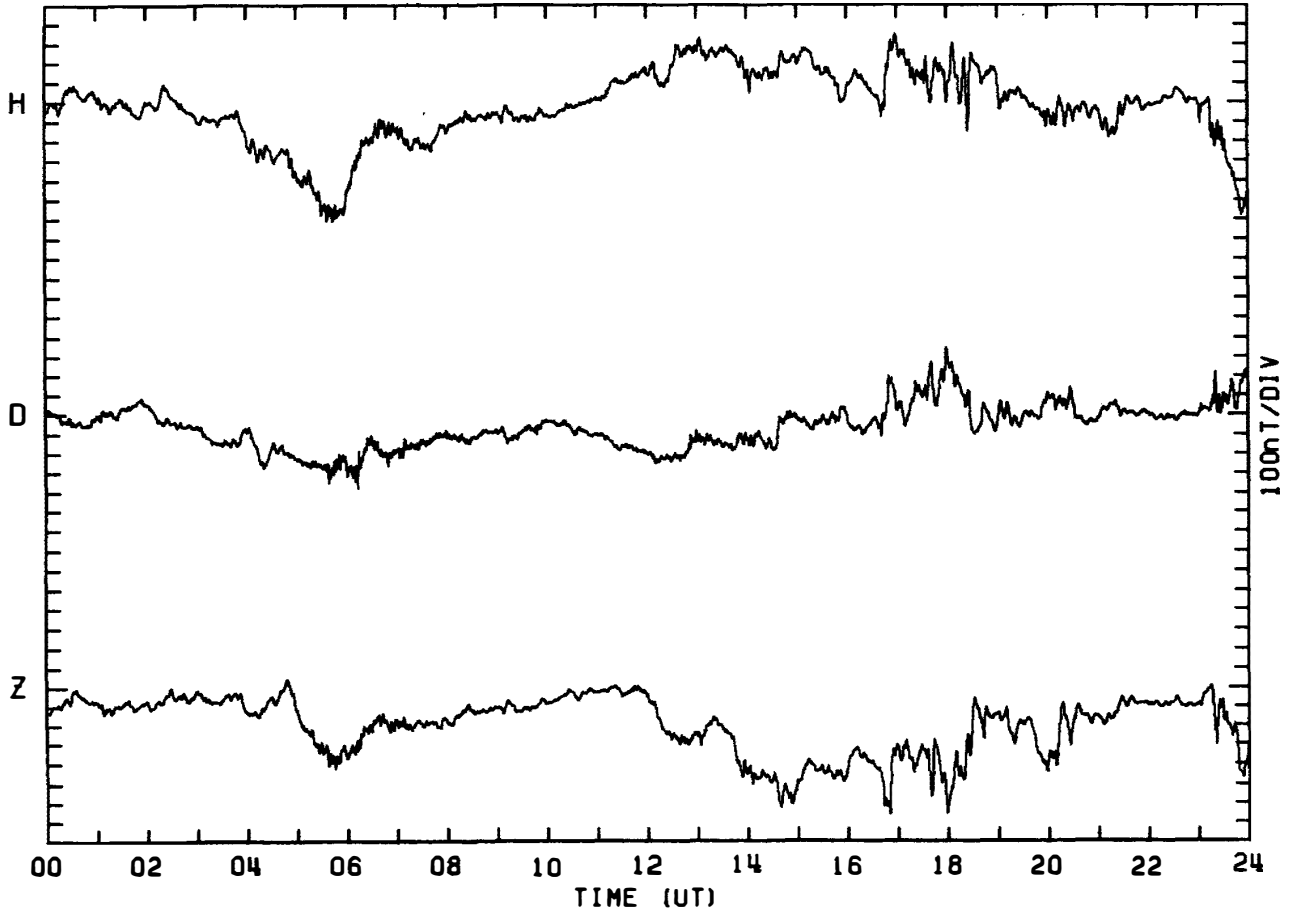
MAGNETOGRAM SYOWA STATION

DAY:353 DECEMBER 19. 1982



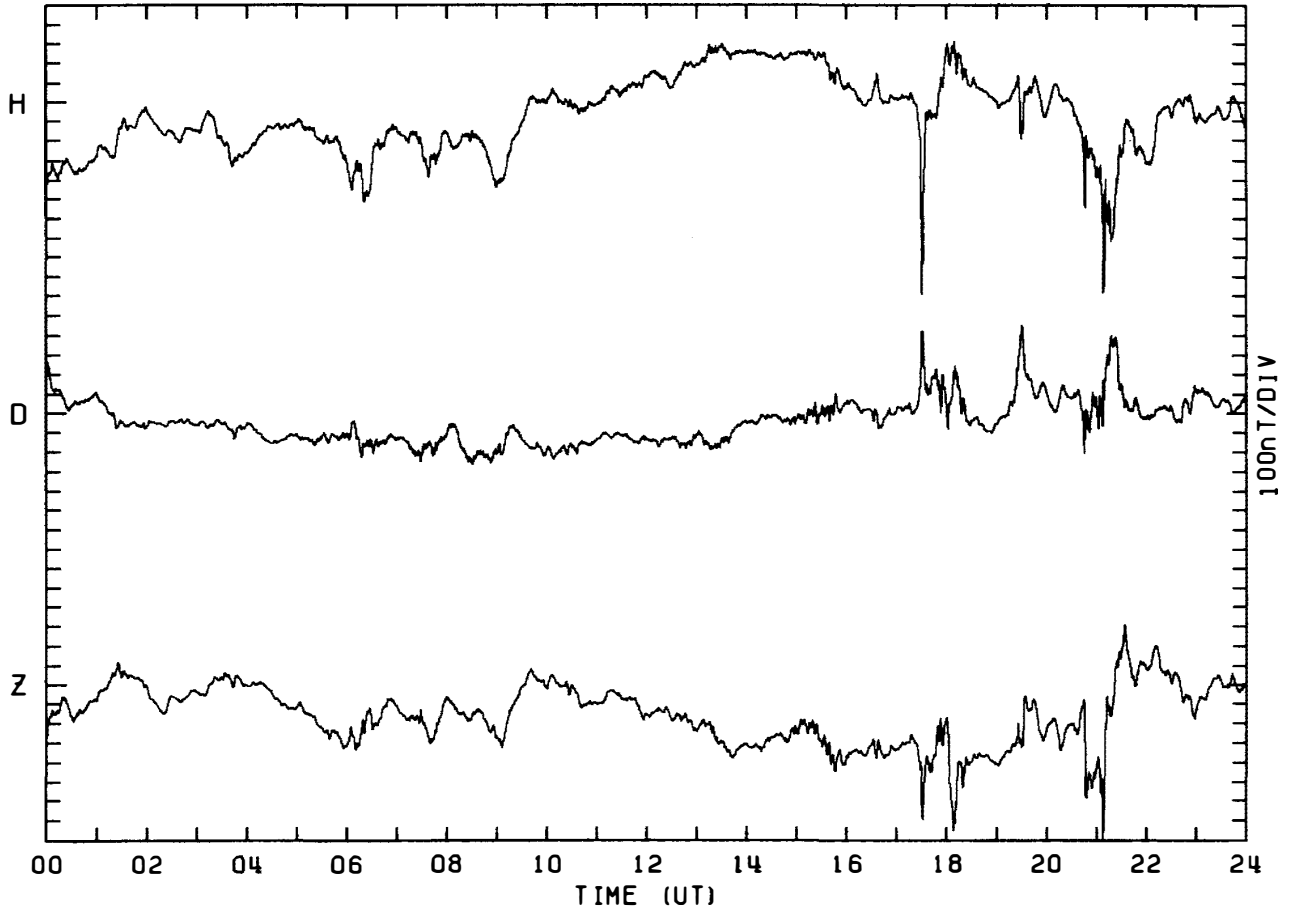
MAGNETOGRAM SYOWA STATION

DAY:354 DECEMBER 20. 1982



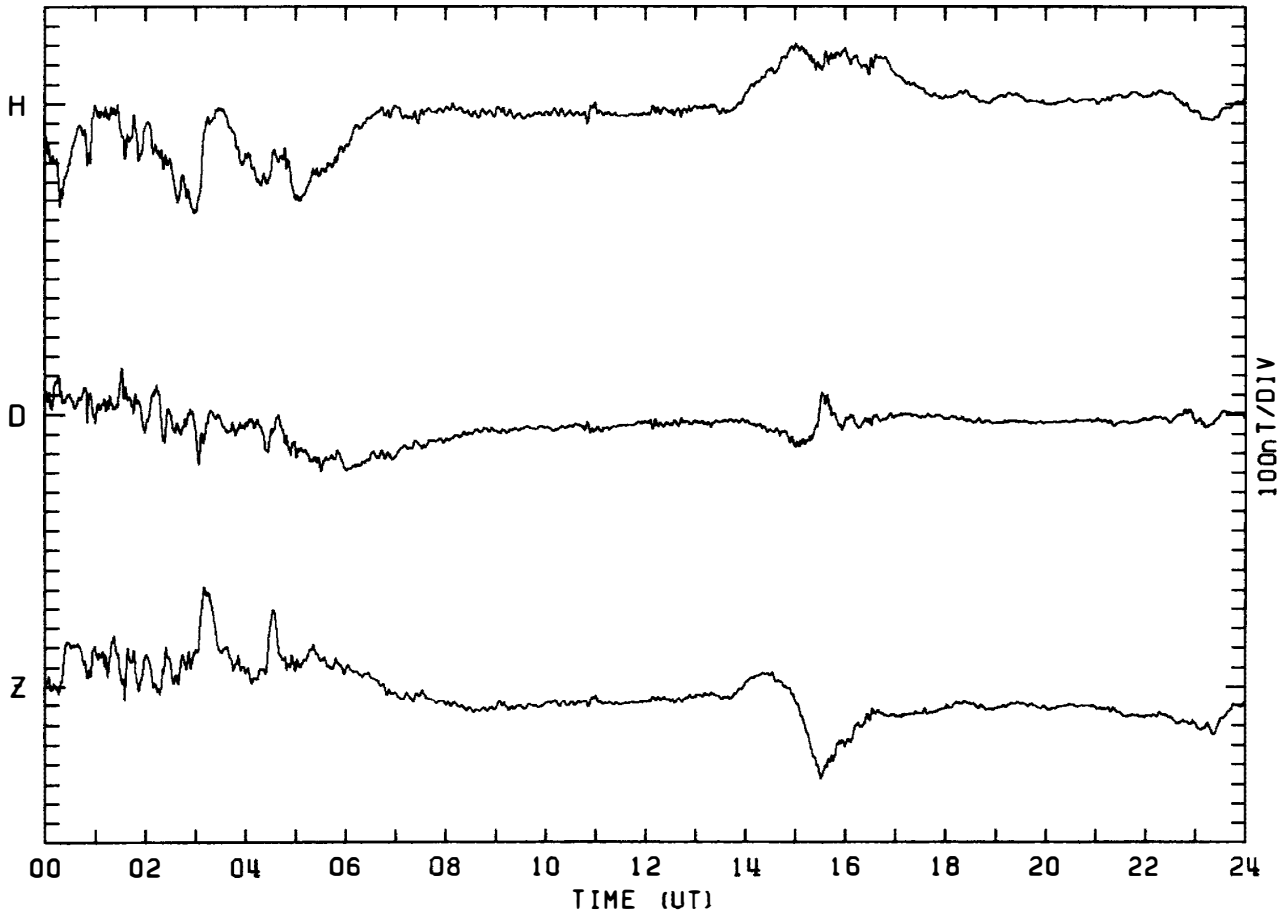
MAGNETOGRAM SYOWA STATION

DAY:355 DECEMBER 21, 1982



MAGNETOGRAM SYOWA STATION

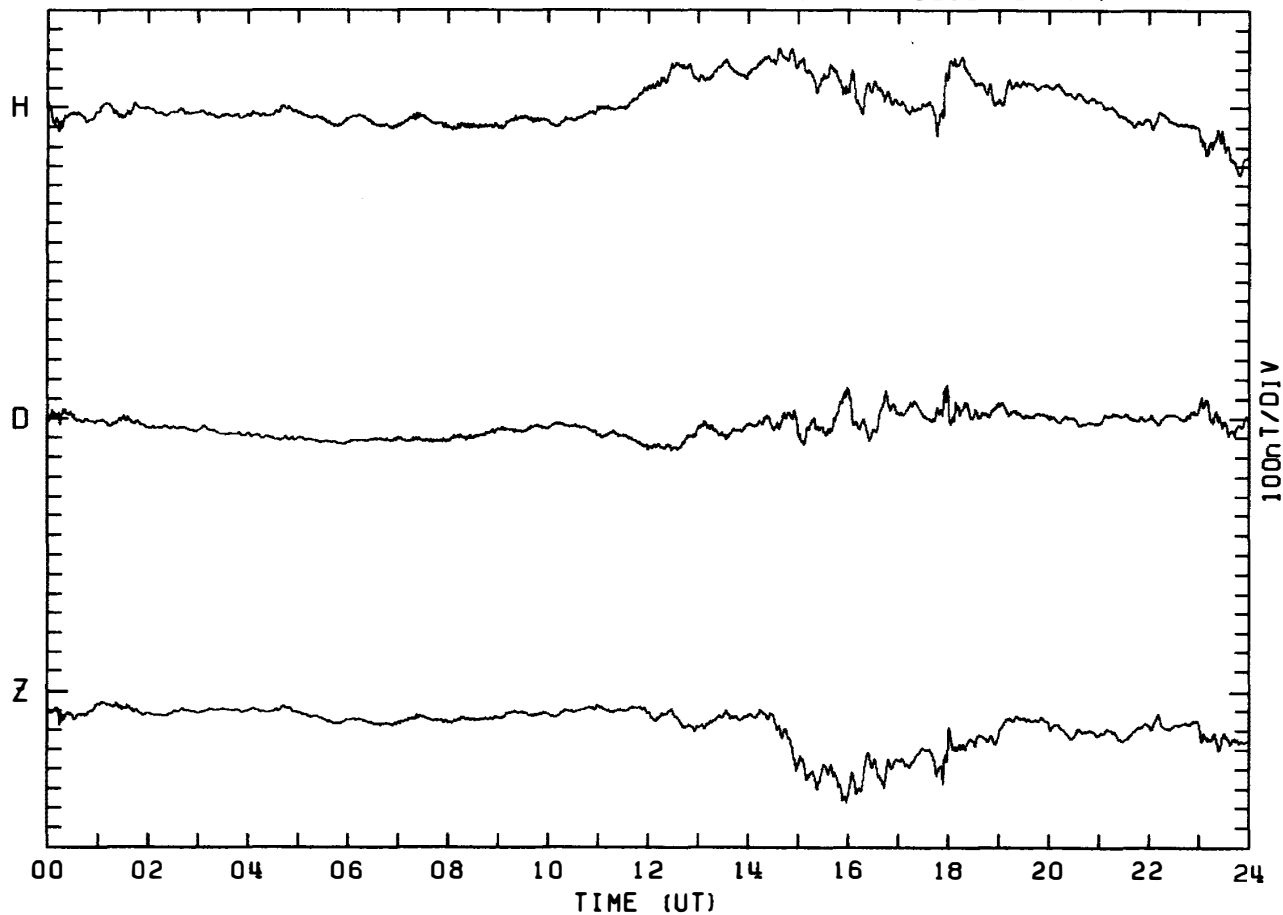
DAY:356 DECEMBER 22, 1982





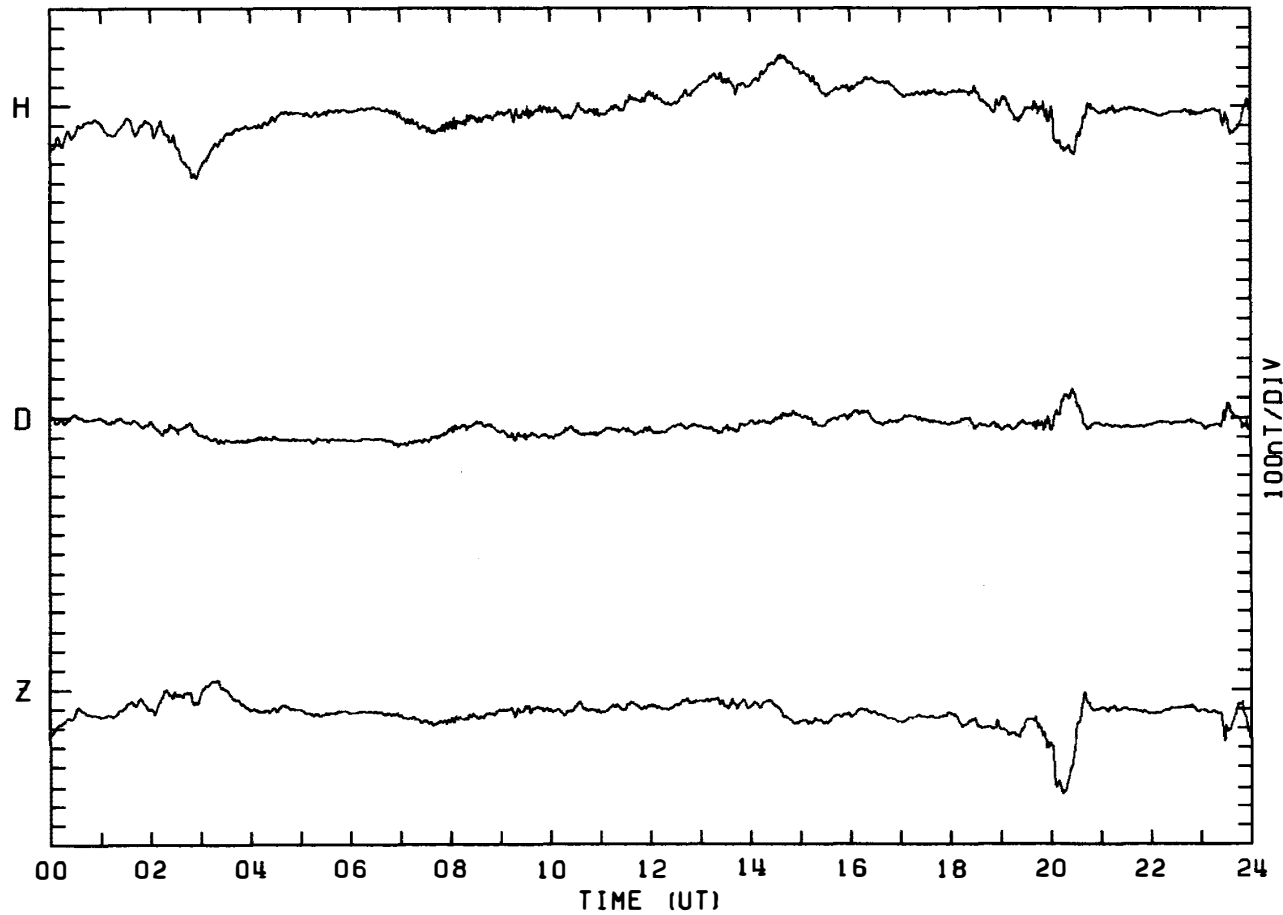
MAGNETOGRAM SYOWA STATION

DAY:357 DECEMBER 23, 1982



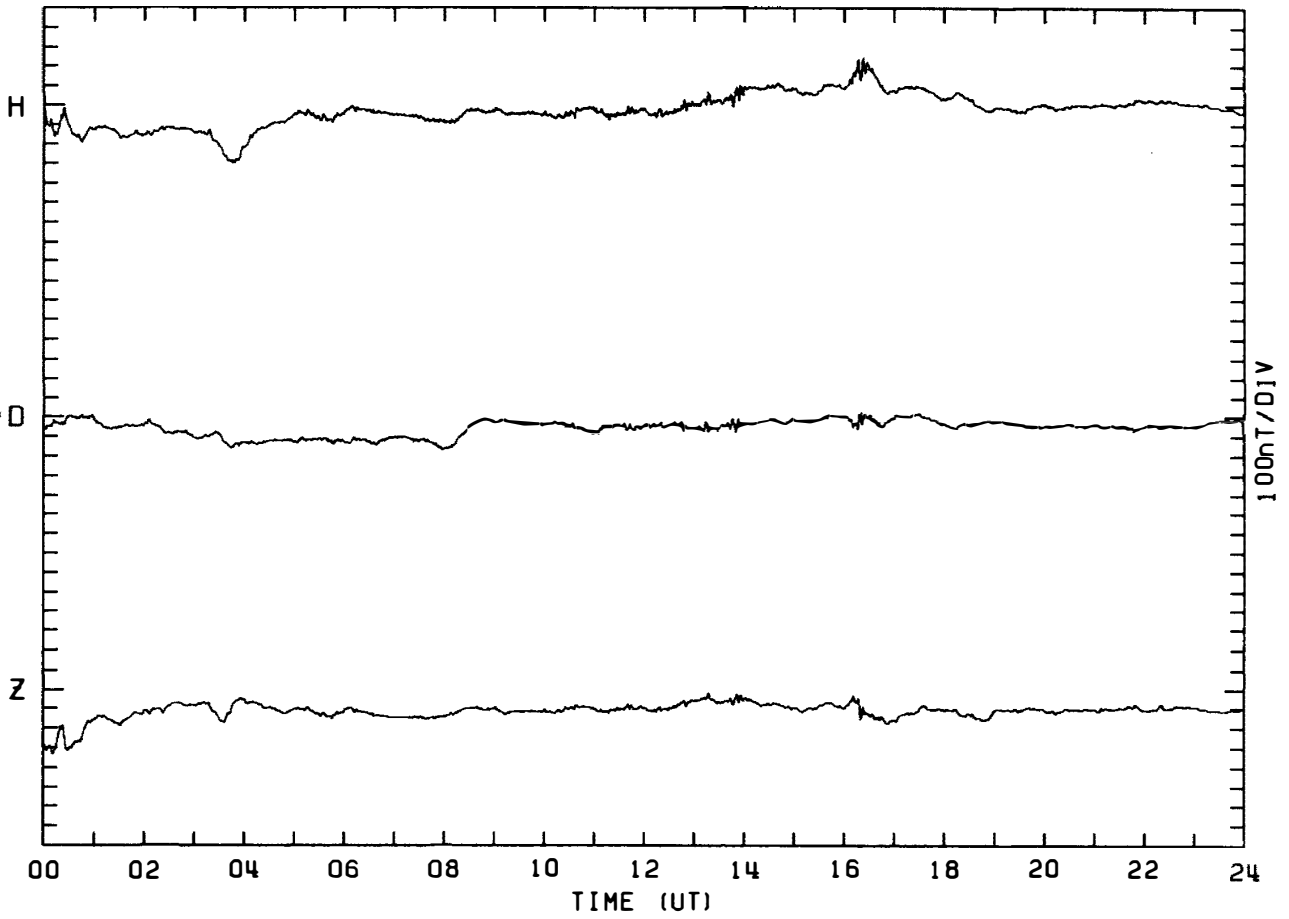
MAGNETOGRAM SYOWA STATION

DAY:358 DECEMBER 24, 1982



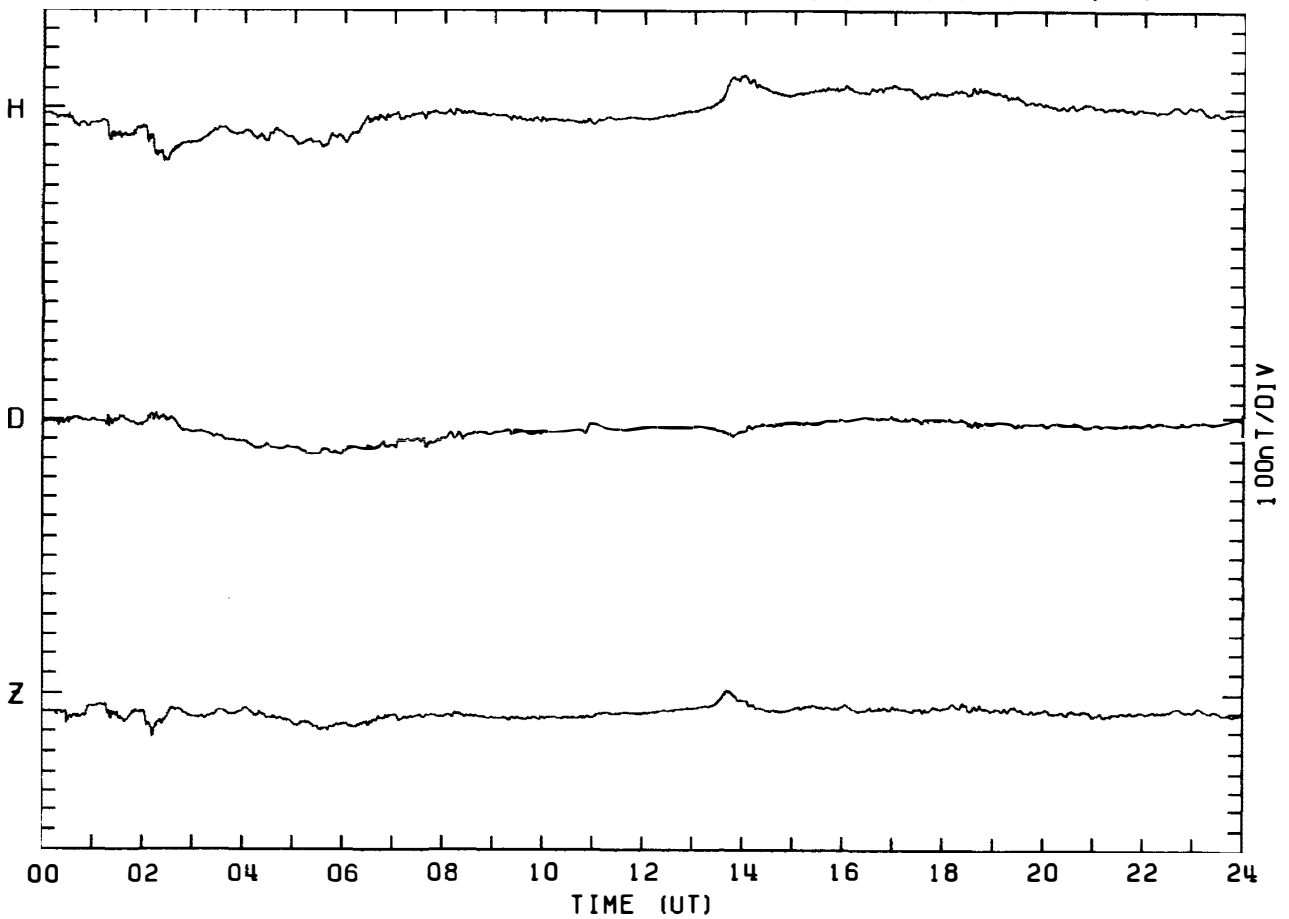
MAGNETOGRAM SYOWA STATION

DAY:359 DECEMBER 25, 1982



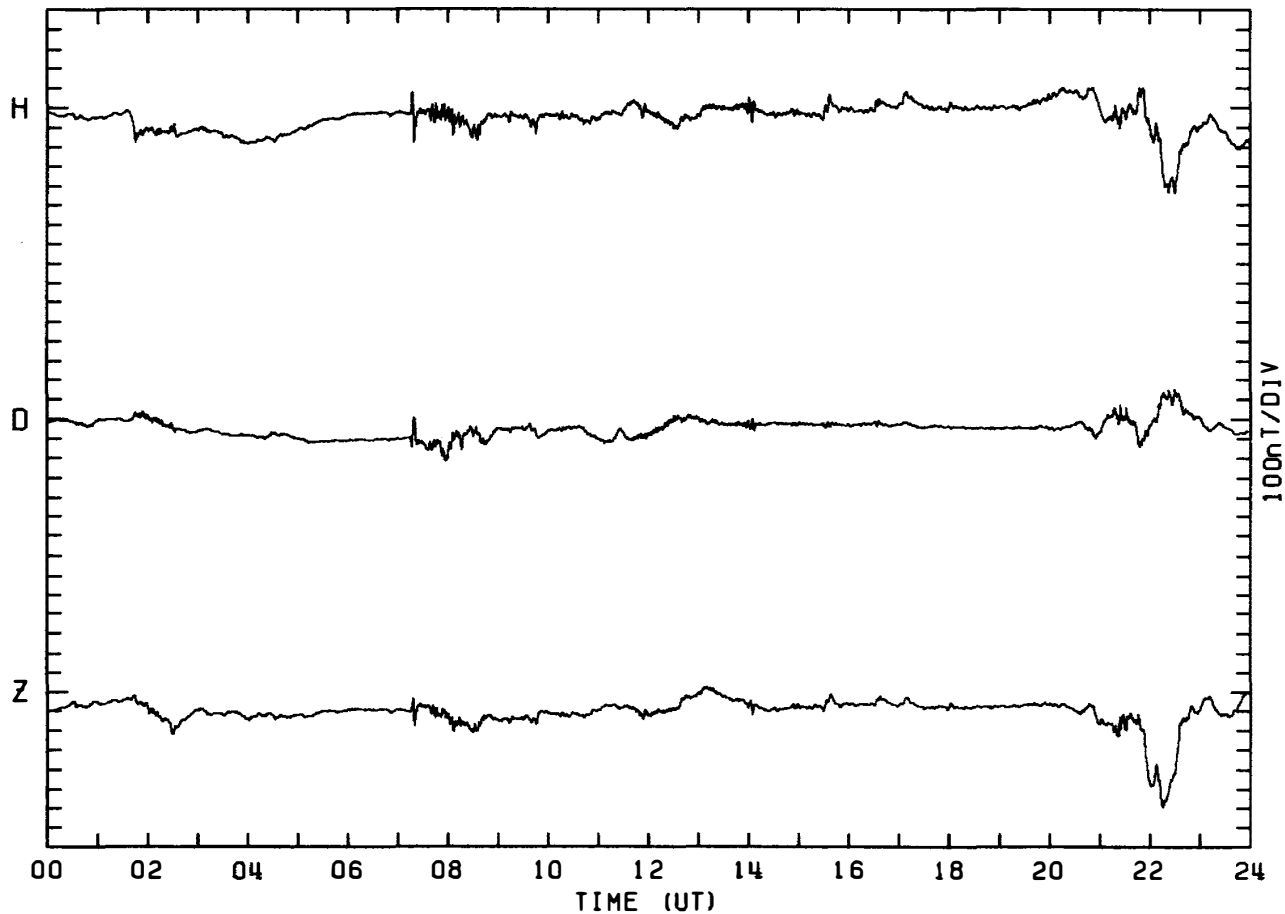
MAGNETOGRAM SYOWA STATION

DAY:360 DECEMBER 26, 1982



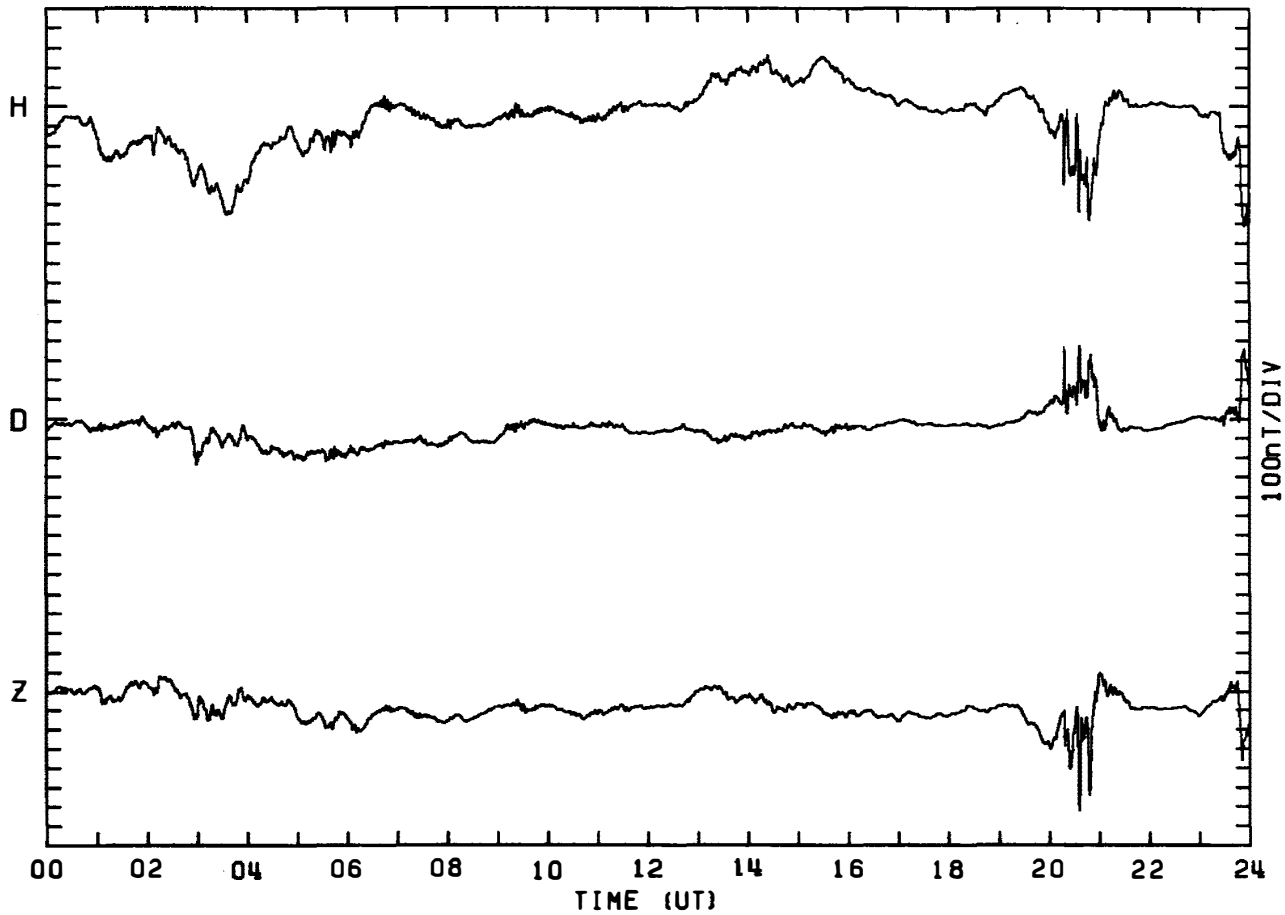
MAGNETOGRAM SYOWA STATION

DAY:361 DECEMBER 27, 1982



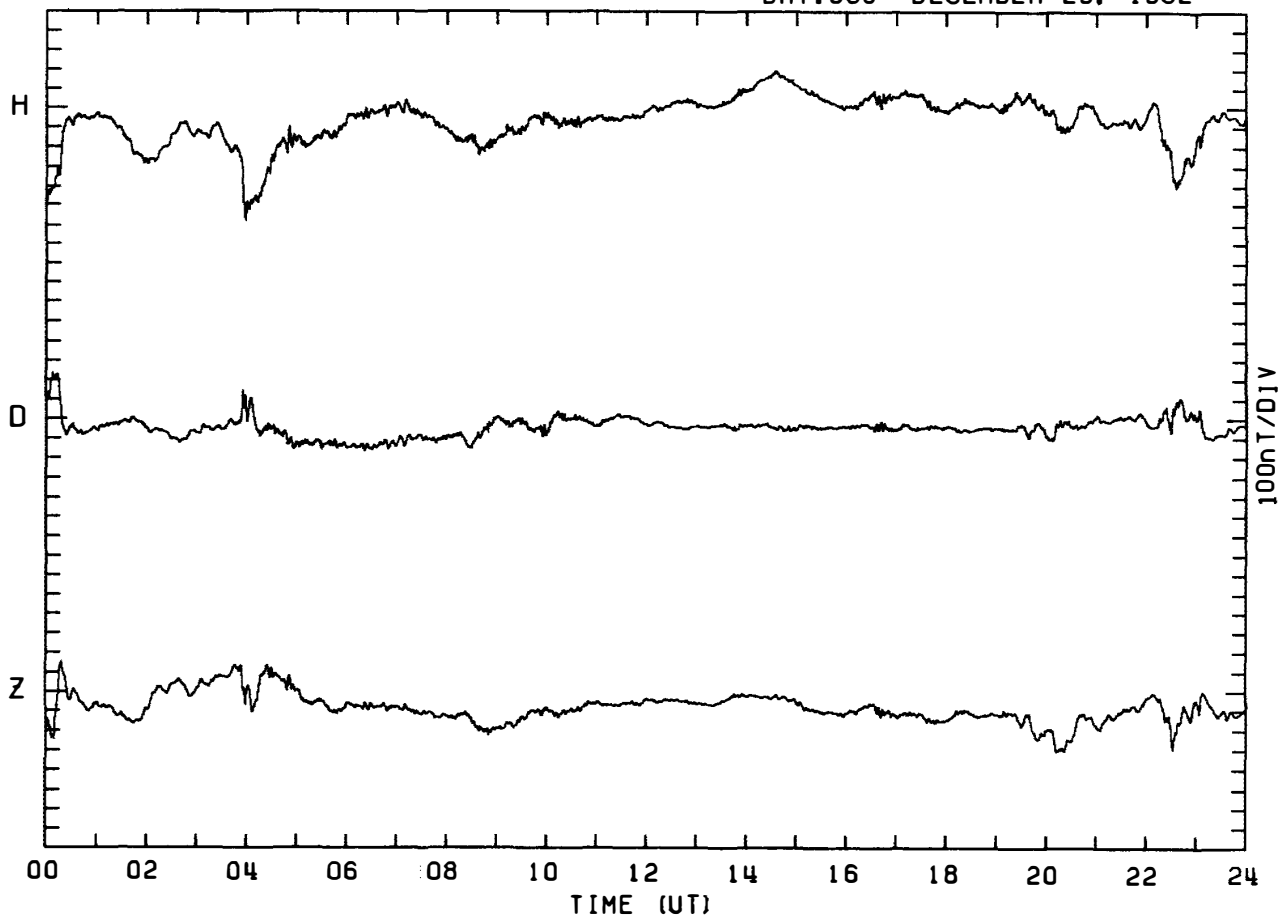
MAGNETOGRAM SYOWA STATION

DAY:362 DECEMBER 28, 1982



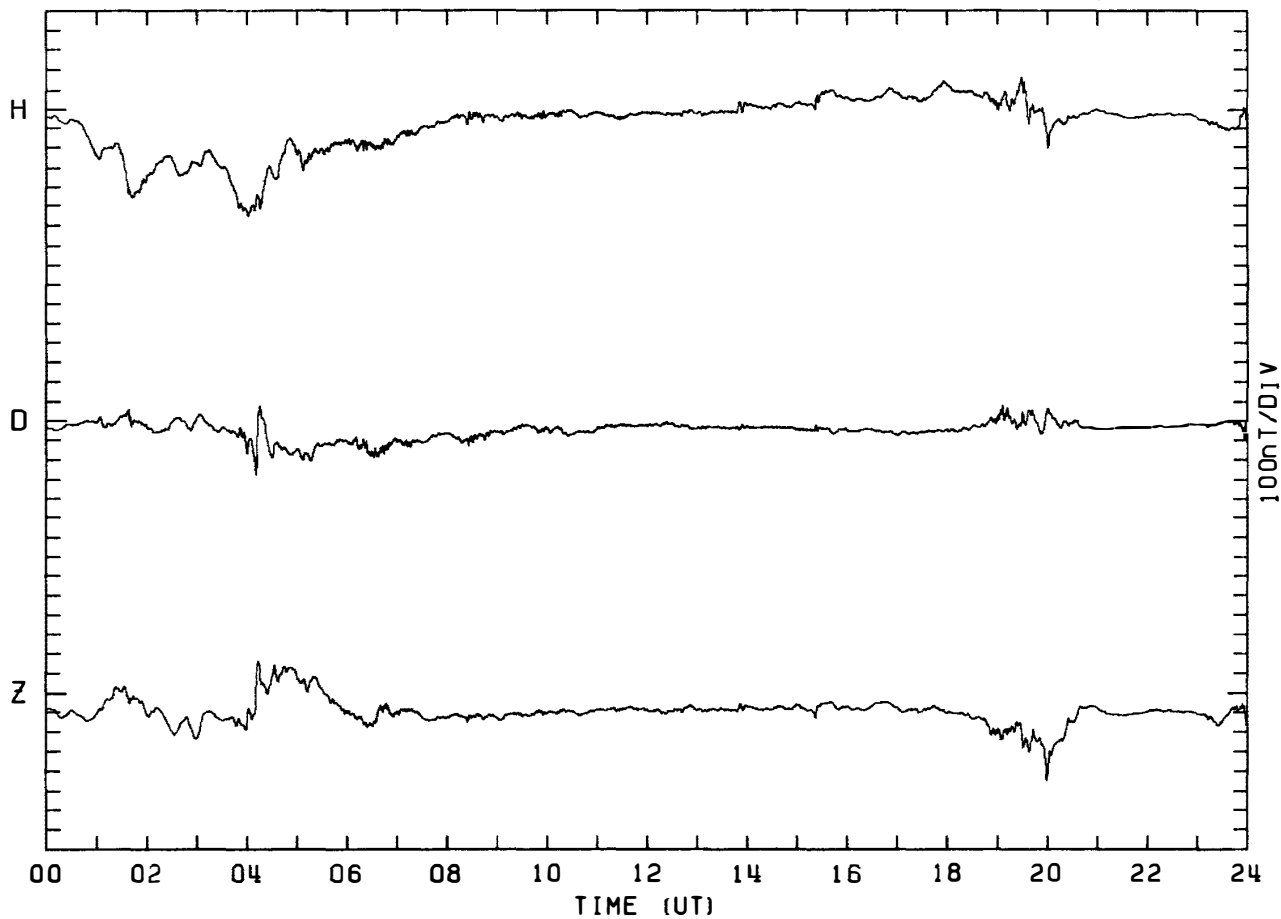
MAGNETOGRAM SYOWA STATION

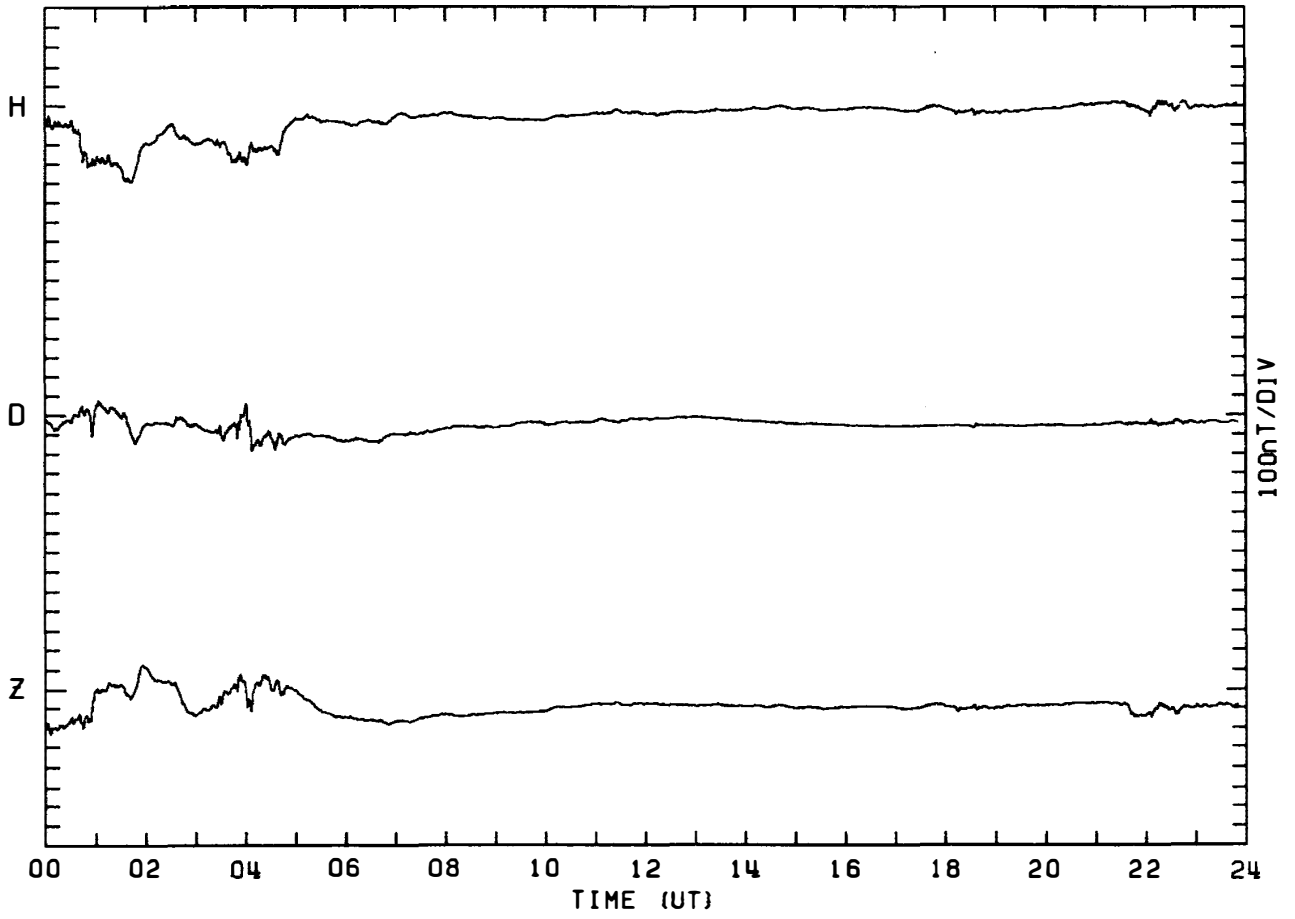
DAY:363 DECEMBER 29, 1982



MAGNETOGRAM SYOWA STATION

DAY:364 DECEMBER 30, 1982





## Appendix 2

Frequency-time spectra of the H component of magnetic  
pulsations in the frequency range of DC-1 Hz

