

# RECORDS OF RADIO AURORA AT SYOWA STATION,

ANTARCTICA IN 1989

Hideo MAENO and Shin-ichi YAMAMOTO

(Communications Research Laboratory, Koganei-shi, Tokyo 184)

## 1. Introduction

E-region ionospheric irregularities associated with polar disturbance events have been observed at Syowa Station, Antarctica, by auroral radars since March 1966. This report represents data obtained in 1989 for 50 MHz and 112 MHz radio aurora.

Inquiries about details of the data should be addressed to:

Communications Research Laboratory

Ministry of Posts and Telecommunications

2-1, Nukui-Kitamachi 4-chome, Koganei-shi

Tokyo 184, Japan.

Three kinds of data are available: a) 35 mm film records of radio auroral echo intensity with range (A-scope) and range-time intensity (A'-scope), b) chart records of the time variation of echo intensity, and c) digital MT.

## 2. Location

Syowa Station			
Geographic		Geomagnetic	
Latitude	Longitude	Latitude	Longitude
69° 00' S	39° 35' E	-70.0°	80.2 °

## 3. Observer

Shin-ichi YAMAMOTO (Communications Research Laboratory)

#### 4. Method of Measurement

The newly developed auroral doppler radars at the frequencies of 50 MHz and 112 MHz were installed at Syowa Station in 1982 and 1983, respectively. Each of the two radars has two antenna beams, one directed toward the geomagnetic south (GMS) and the other 32.8° west from the geomagnetic south (GGS). Other antenna (GGE) whose beams directed toward 47.0° east from the geomagnetic south was installed in 1988. The radar beams were switched every 13 seconds by turns. From March 31 to August 16, 1989, GGE antenna was used instead of GGS.

The A-scope record was taken every 5 minutes, while A'-scope record and the chart record of the echo intensity were obtained continuously throughout the day.

The radars were designed to measure the one dimensional distributions of intensities and doppler velocities of radio auroras generated by 3- and 1.34-m irregularities appearing in the disturbed E-region. The intensities and doppler frequency spectra of backscattered signals were stored on digital magnetic tapes after being processed by a mini-computer.

Characteristics of the radar system are as follows:

Frequency	: 50 MHz and 112 MHz
Peak power	: 15 kW
Pulse width	: 100 $\mu$ s
Pulse repetition frequency	: 50 Hz (333 Hz for spectrum observation)
Antenna	: Three 14-element coaxial collinear (two-way)
Antenna gain	: 25 dB
Antenna beamwidth	: 4° (half power) in horizontal plane
Receiver bandwidth	: 10 kHz
Receiver noise figure	: less than 4 dB
Display and recorder	: A-scope display, A'-scope display, pen and 6-channel dot recorder

The 50 MHz radar was operated from February 5, 1989 and before February 28, results of 112 MHz observation are reported. Data for the October event are also

presented in the report.

#### 5. Explanation of Diagrams Contained in the Report

Figures 1 (1 -1 3) show the periods of radio auroras and operation status of the auroral radar. Time in use is 45° EMT (= UT + 3 h). Symbols used in the figures are as follows:

—————	: occurrence of radio aurora
← — C — →	: no observation
Blank	: no radar echo

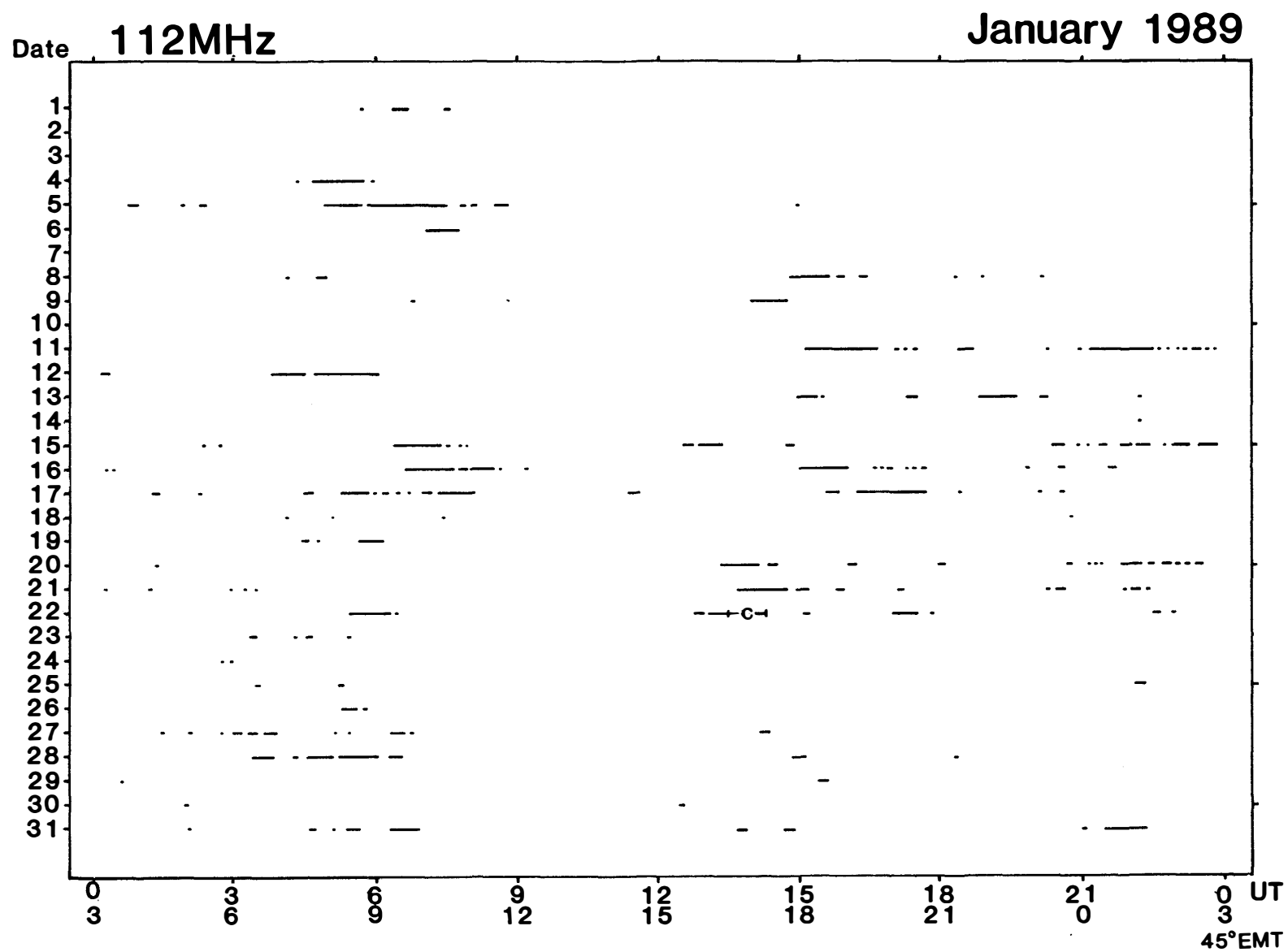
Figures 2(1 -24) show intensity and spectrum obtained by the 50 MHz radar during the October 1 989 event at Syowa Station with geomagnetic H-component. In these figures, upper half of the data shows results for GMS antenna at the range of 255 km and lower half of the data shows results for GGS antenna at the range of 315 km, together with geomagnetic field data in the middle panel.

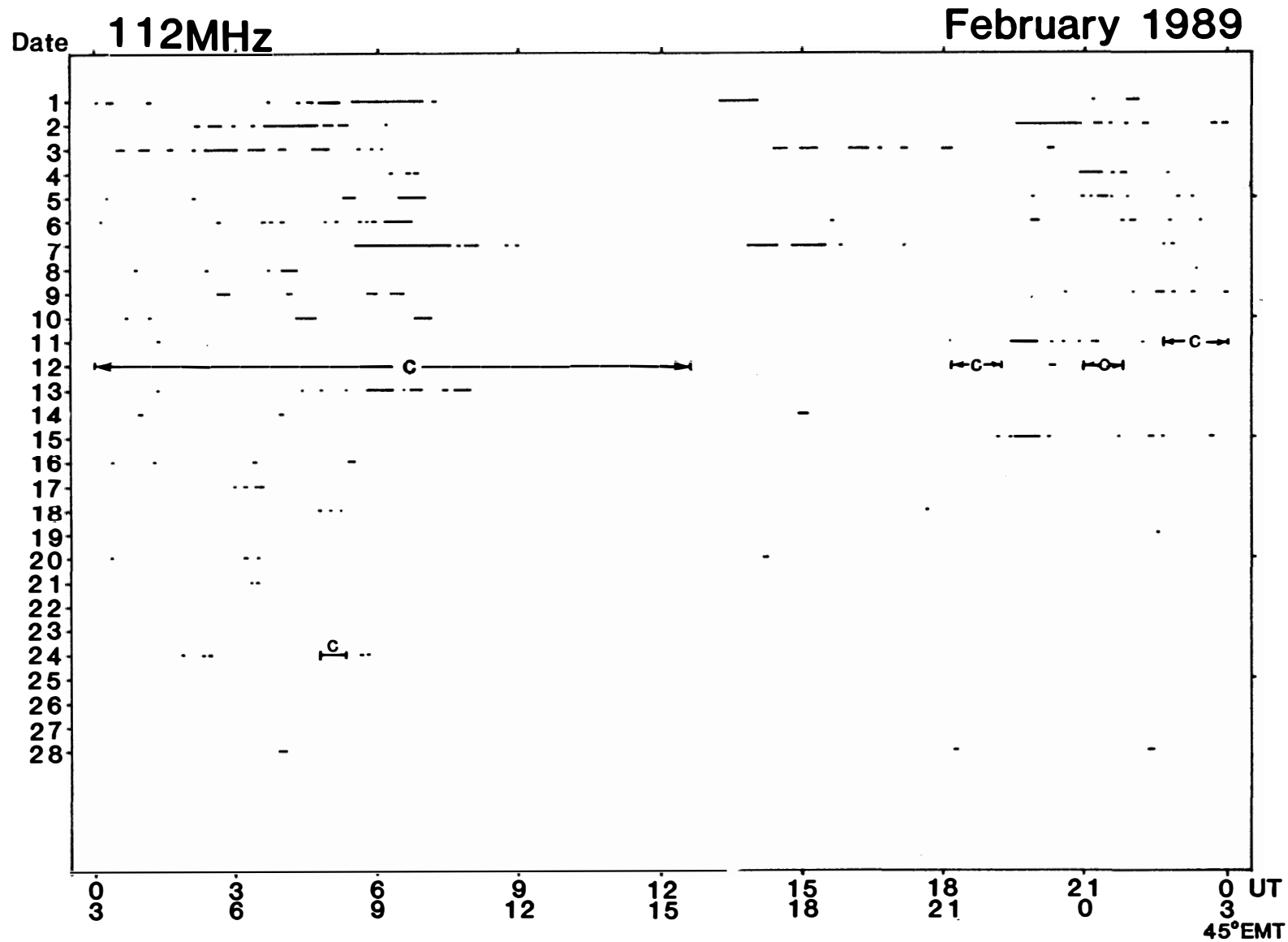
Bibliography relevant to  
RECORDS OF RADIO AURORA AT SYOWA STATION, ANTARCTICA (1)

Observing Period	Observers	Literature		
		JARE Data Reports		
		Volume	Pages	Year
Mar. 1966 - Jan. 1968	Ose, M. Hasegawa, S. Takeuchi, T. Nishimuta, I. Isobe, T.	5 (Ionosphere 2)	64	1969
Apr. 1970 - Feb. 1971	Shiro, I. Sakamoto, T.	15 (Ionosphere 6)	34	1972
Feb. 1972 - Dec. 1972	Isozaki, S. Miyazaki, S.	23 (Ionosphere 10)	22	1974
Feb. 1973 - Jan. 1974	Nishimuta, I. Yabuuma, H.	26 (Ionosphere 12)	23	1975
Mar. 1974 - Dec. 1974	Shiro, I. Yamazaki, I.	33 (Ionosphere 14)	89	1976
1975	Shiro, I. Sugiuchi, H. Komiya, N.	37 (Ionosphere 16)	105	1977
1976	Shiro, I. Yamakoshi, A. Sasaki, T.	42 (Ionosphere 18)	105	1978
Apr. 1978 - Dec. 1978	Igarashi, K. Tsuzurahara, S.	53 (Ionosphere 21)	23	1980
Jan. 1979 - Dec. 1979	Igarashi, K. Ojima, S. Komiya, N.	58 (Ionosphere 23)	28	1980
1980	Igarashi, K. Nozaki, K.	68 (Ionosphere 24)	28	1982
1981	Ose, M. Kurihara, N.	81 (Ionosphere 28)	28	1983
1982	Igarashi, K. Kuratani, Y.	88 (Ionosphere 30)	28	1984
1983	Igarashi, K. Tanaka, T. Yamazaki, I.	100 (Ionosphere 32)	64	1985
(cont.)				

Bibliography relevant to  
RECORDS OF RADIO AURORA AT SYOWA STATION, ANTARCTICA (2)

Observing Period	Observers	Literature		
		JARE Data Reports		
		Volume	Pages	Year
1984	Igarashi, K. Tanaka, T. Yamamoto, S.	113 (Ionosphere 34)	33	1986
1985	Igarashi, K. Maeno, H. Ogawa, T.	123 (Ionosphere 36)	56	1987
1986	Igarashi, K. Maeno, H. Suzuki, A.	134 (Ionosphere 38)	59	1988
1987	Maeno, H. Inamori, K.	146 (Ionosphere 40)	33	1989
1988	Maeno, H. Ohtsuka, A.	154 (Ionosphere 41)	34	1990





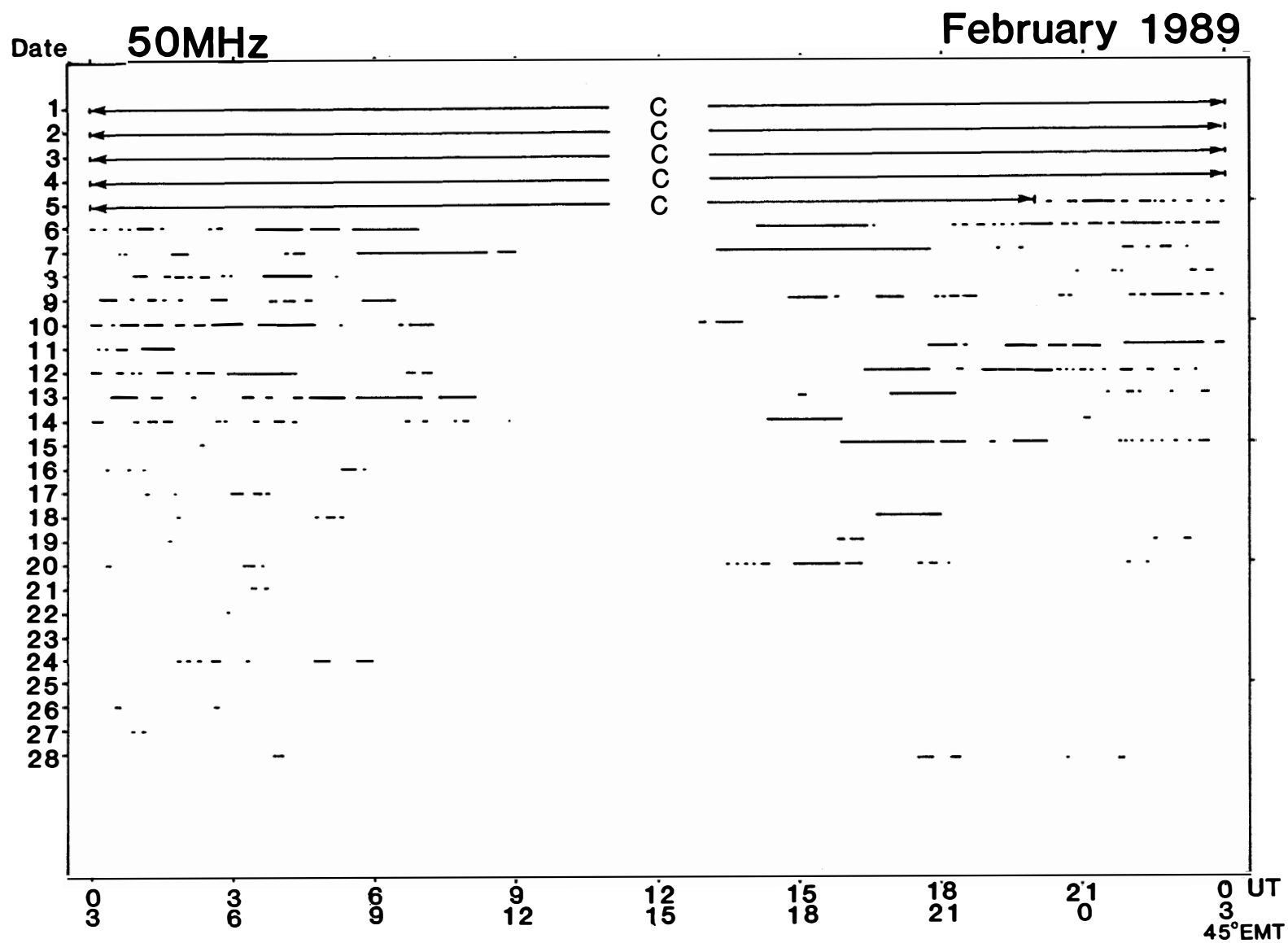


Fig.1 (3)



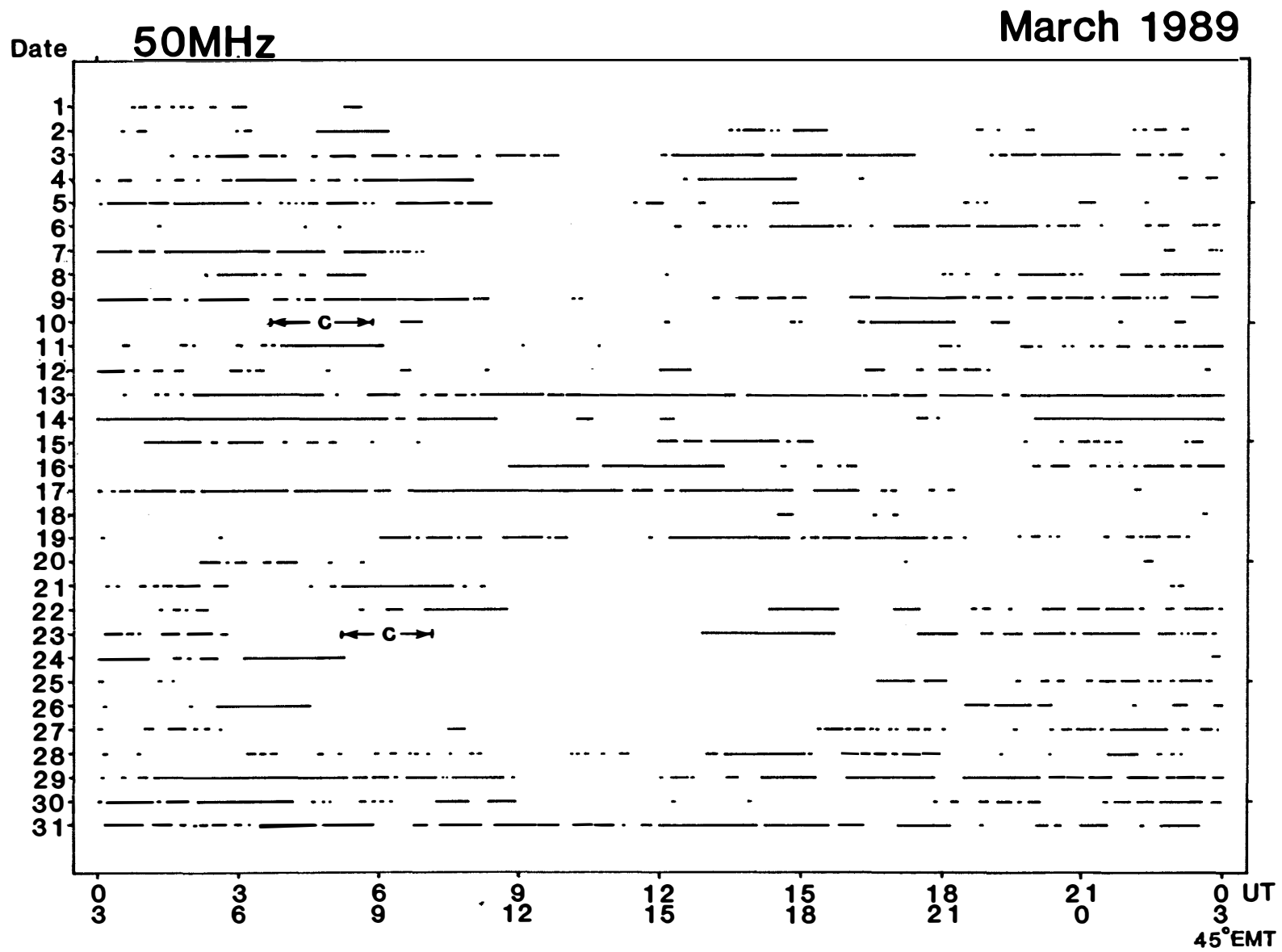


Fig.1 (4)

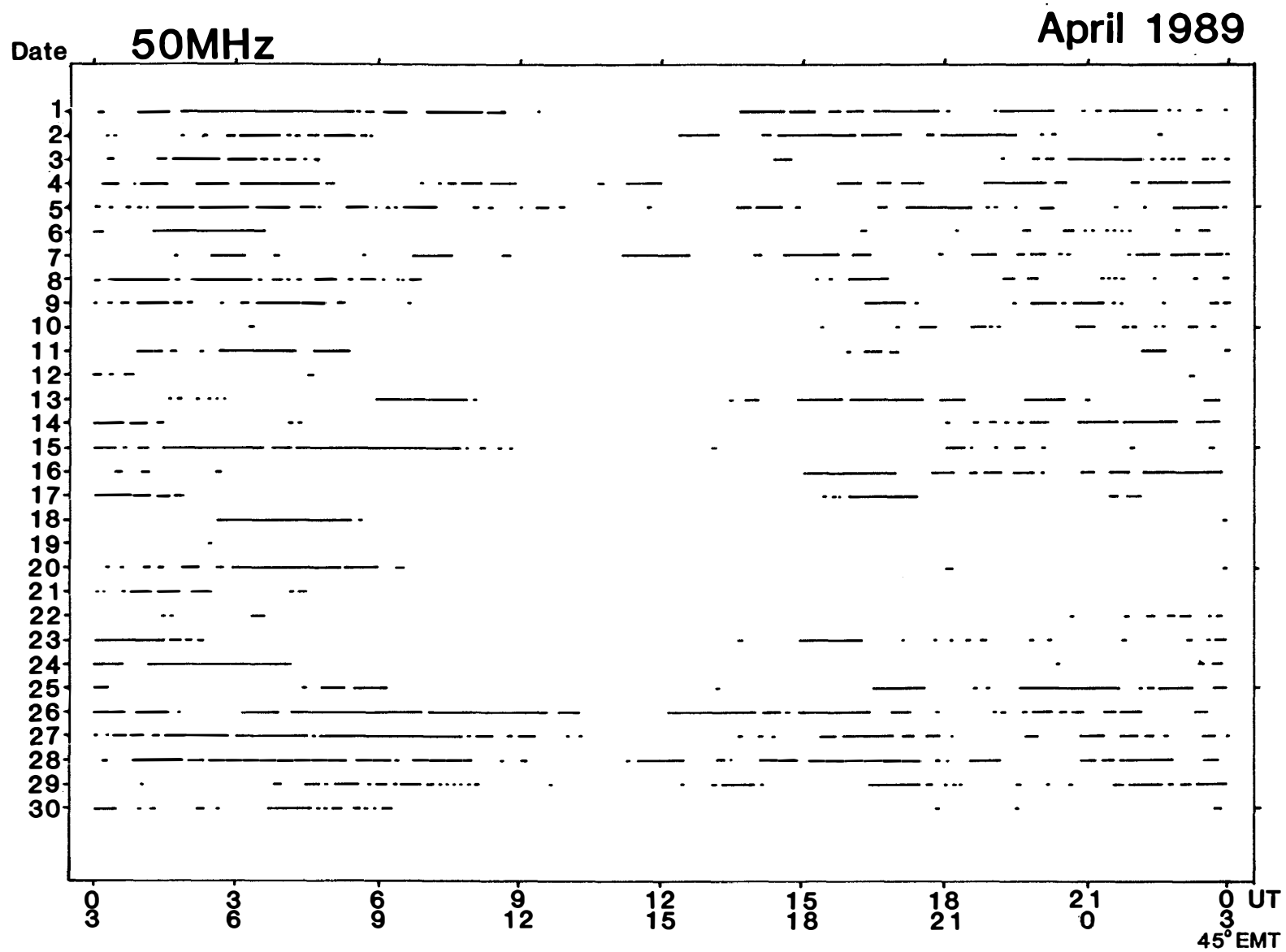


Fig.1 (5)

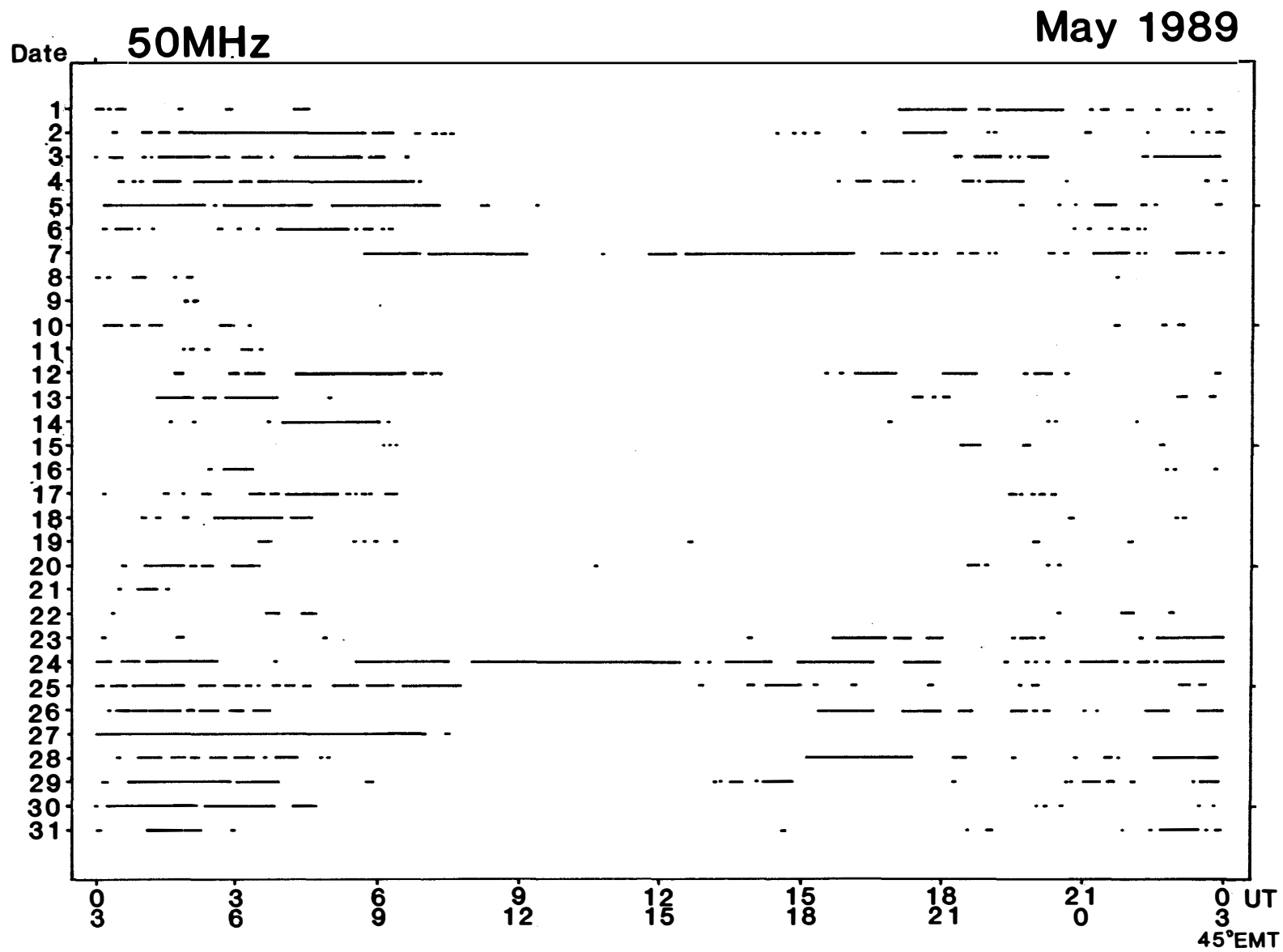


Fig.1 (6)

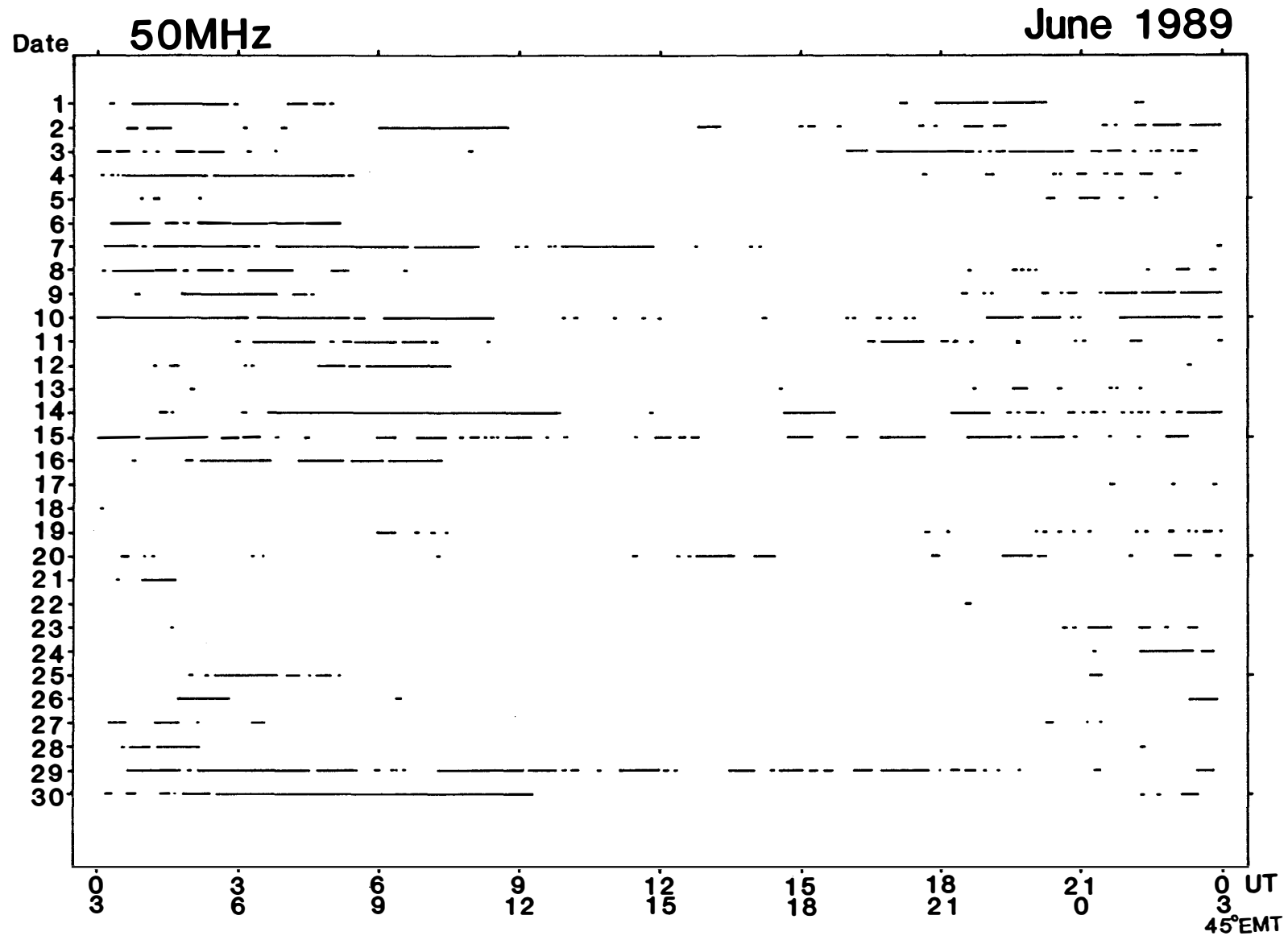


Fig.1 (7)

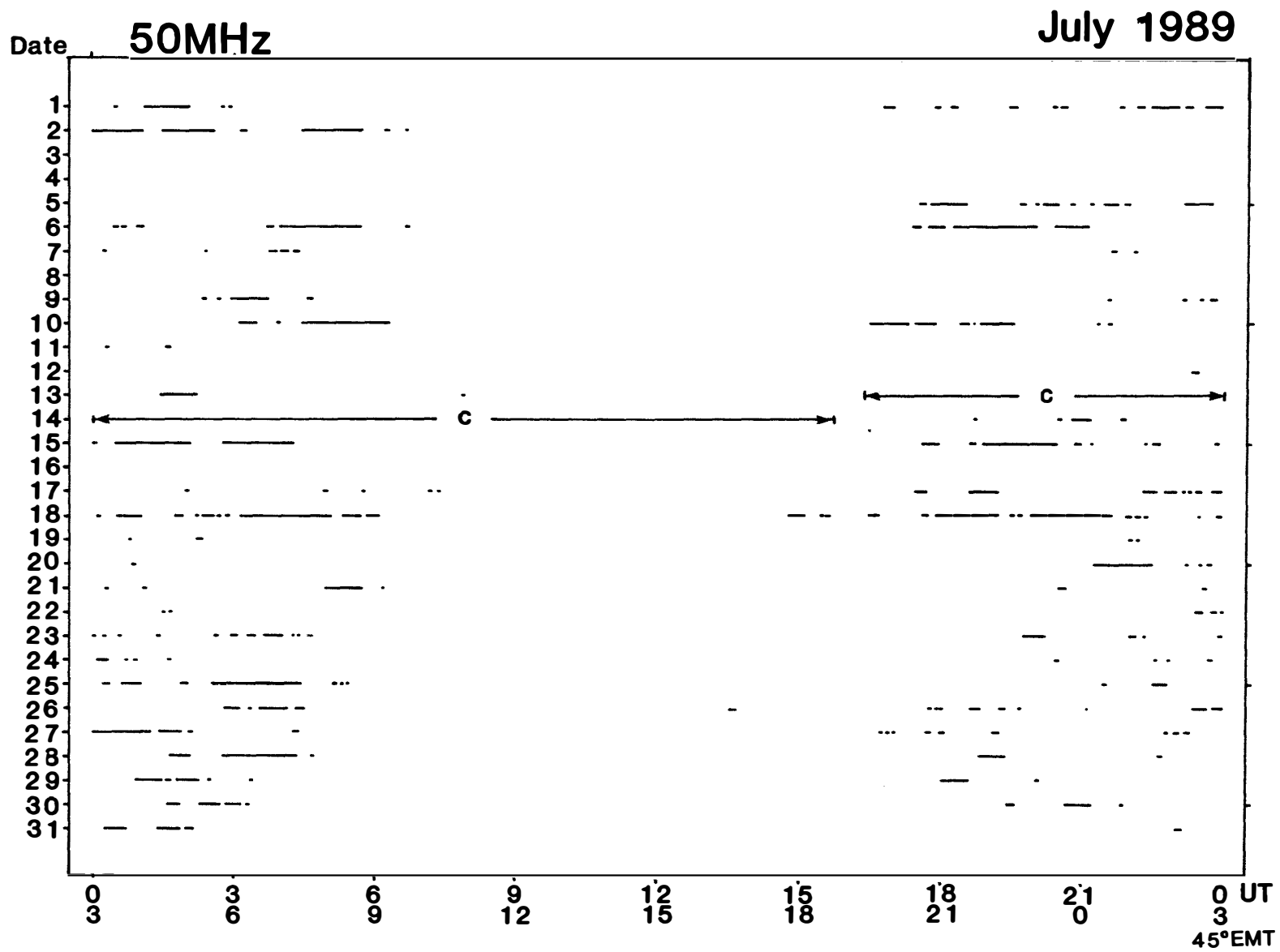


Fig.1 (8)

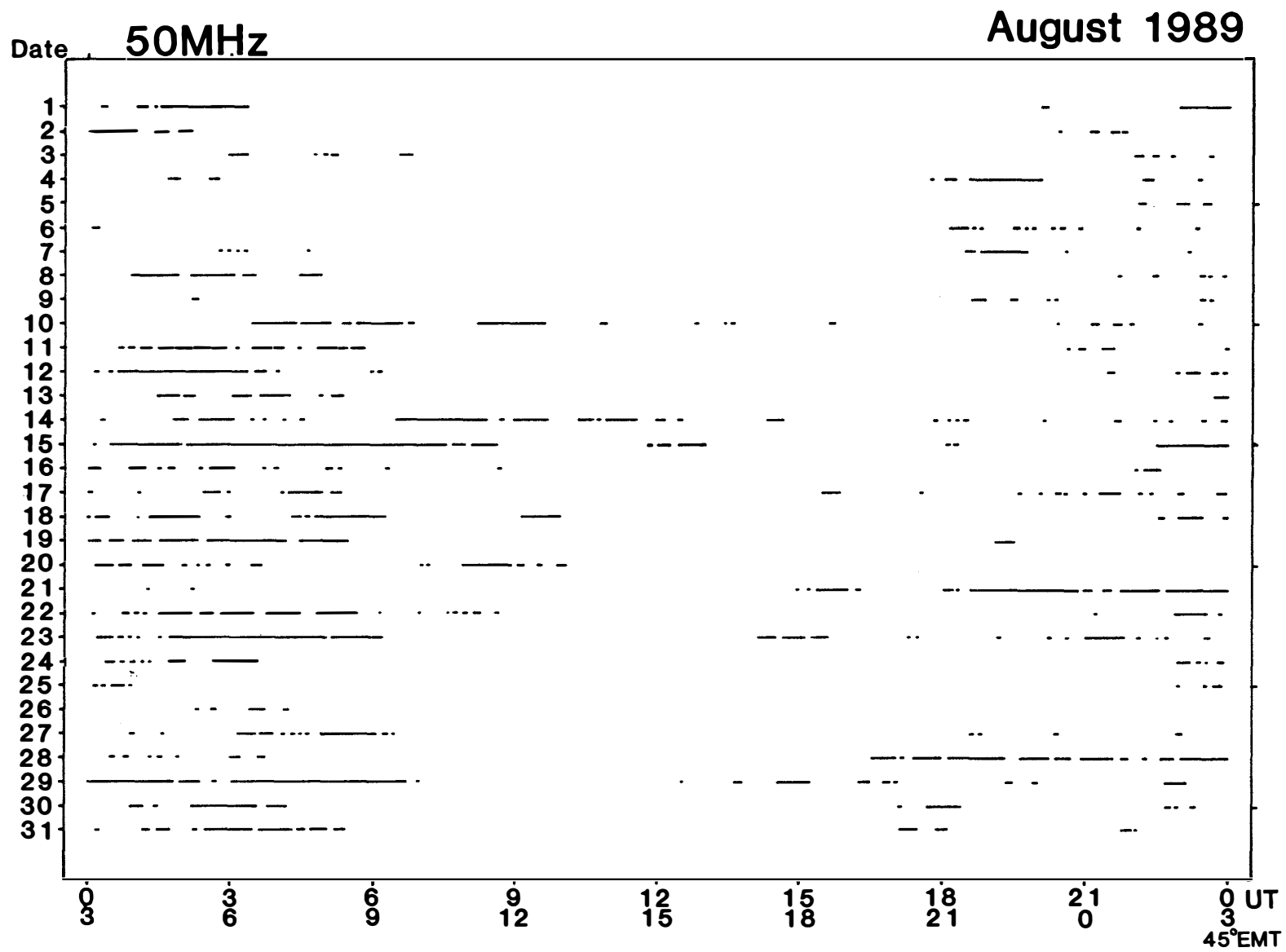


Fig.1 (9)

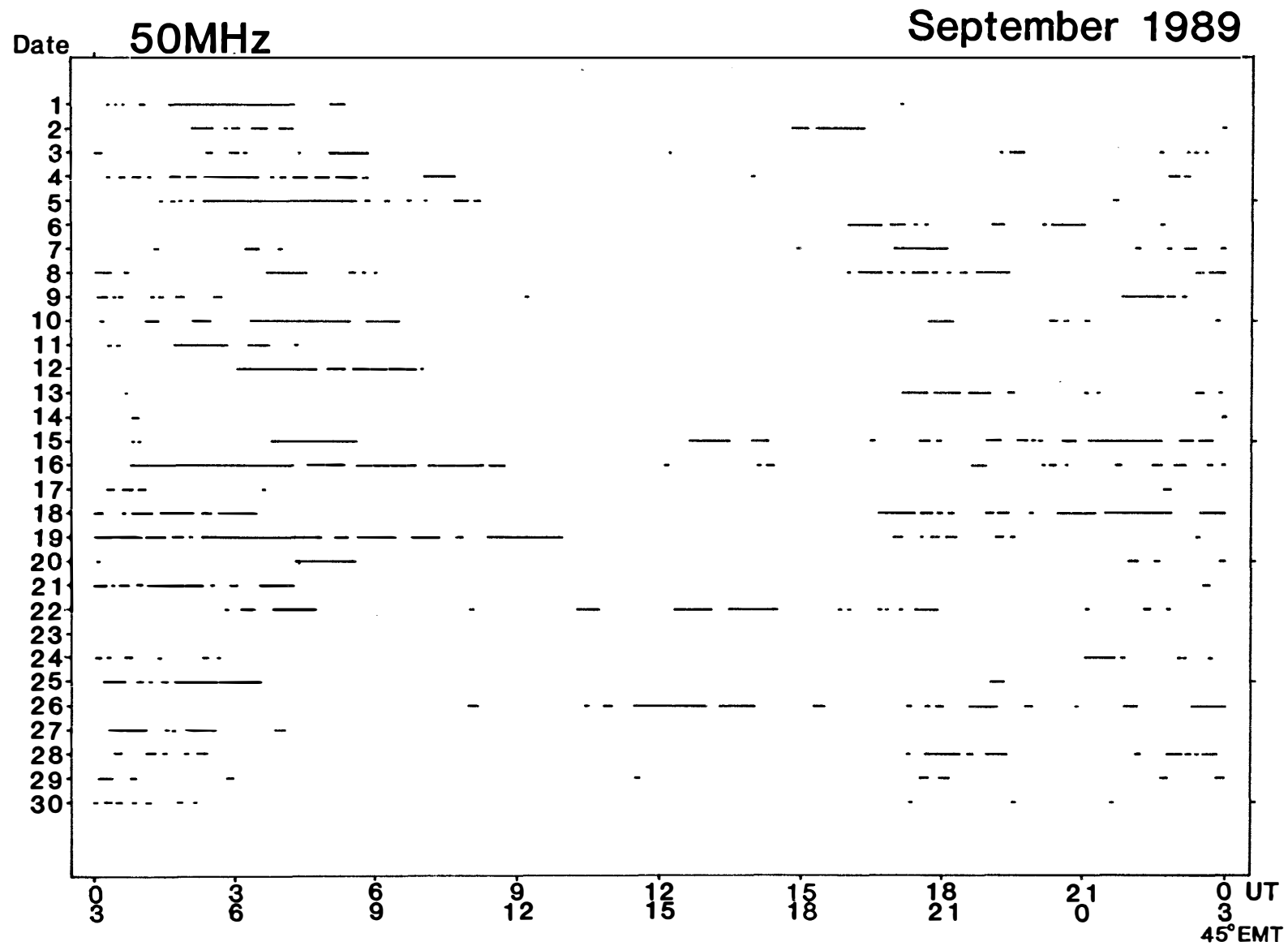


Fig.1, (10)

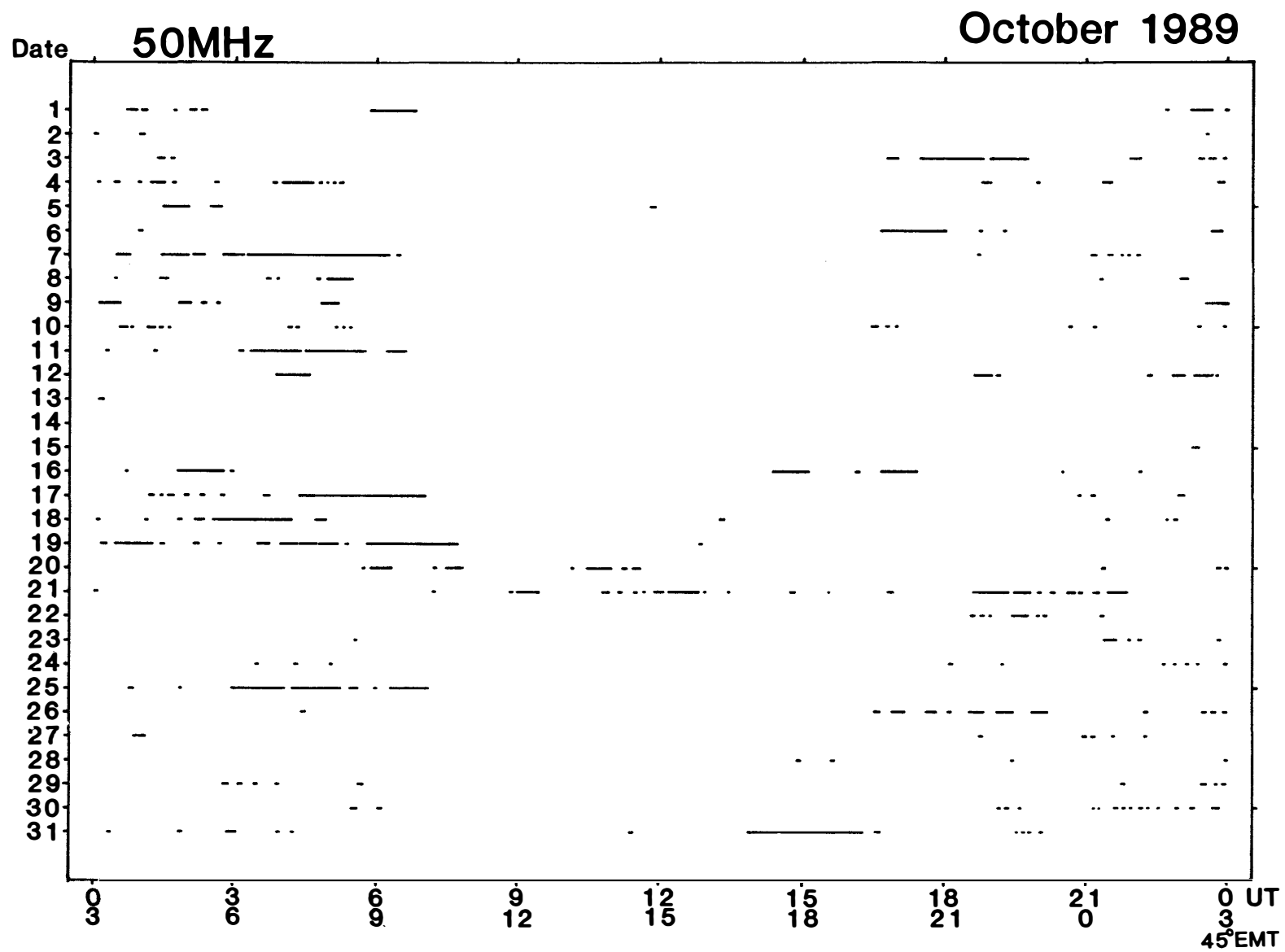


Fig.1 (11)



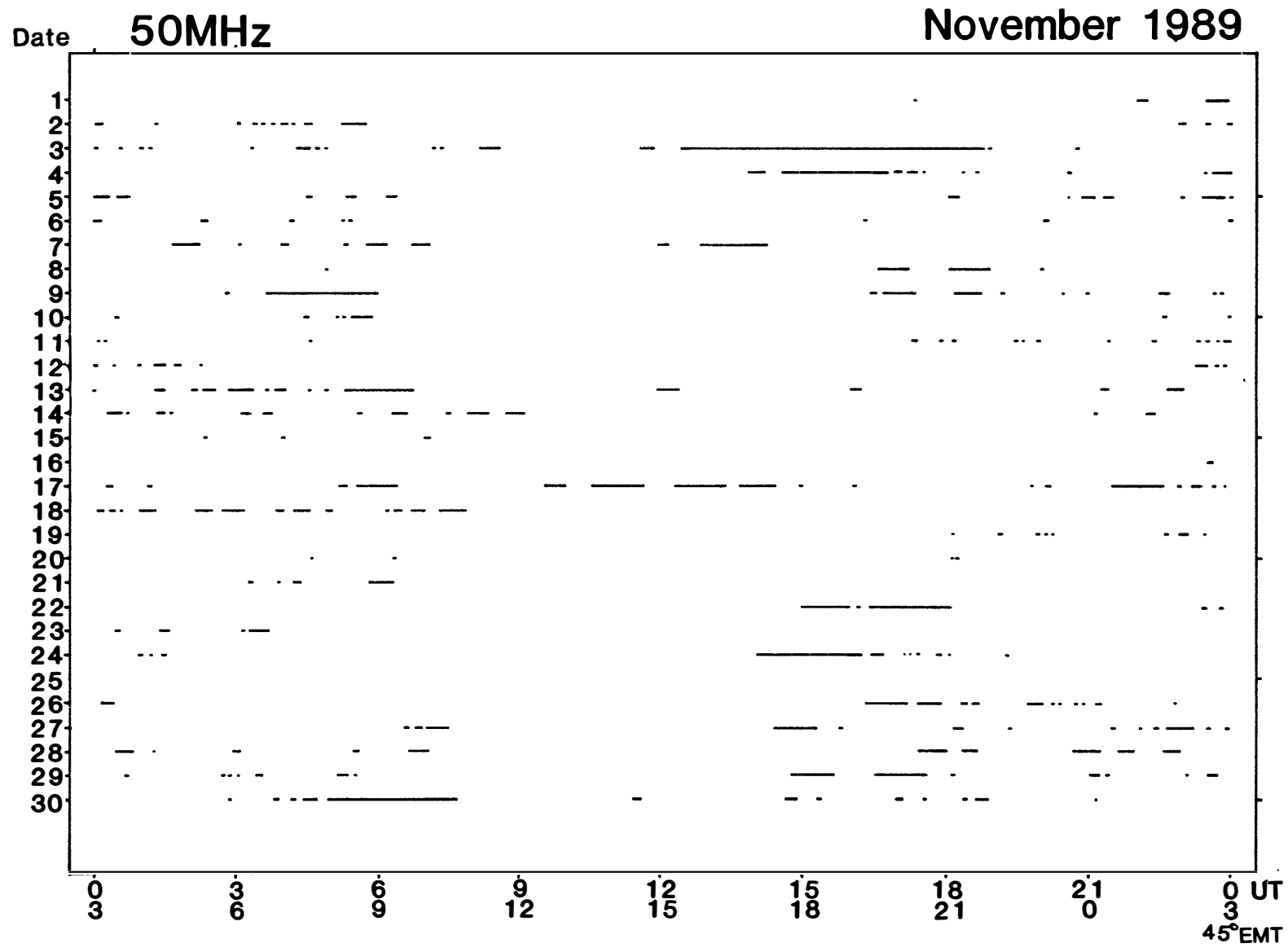


Fig.1 (12)

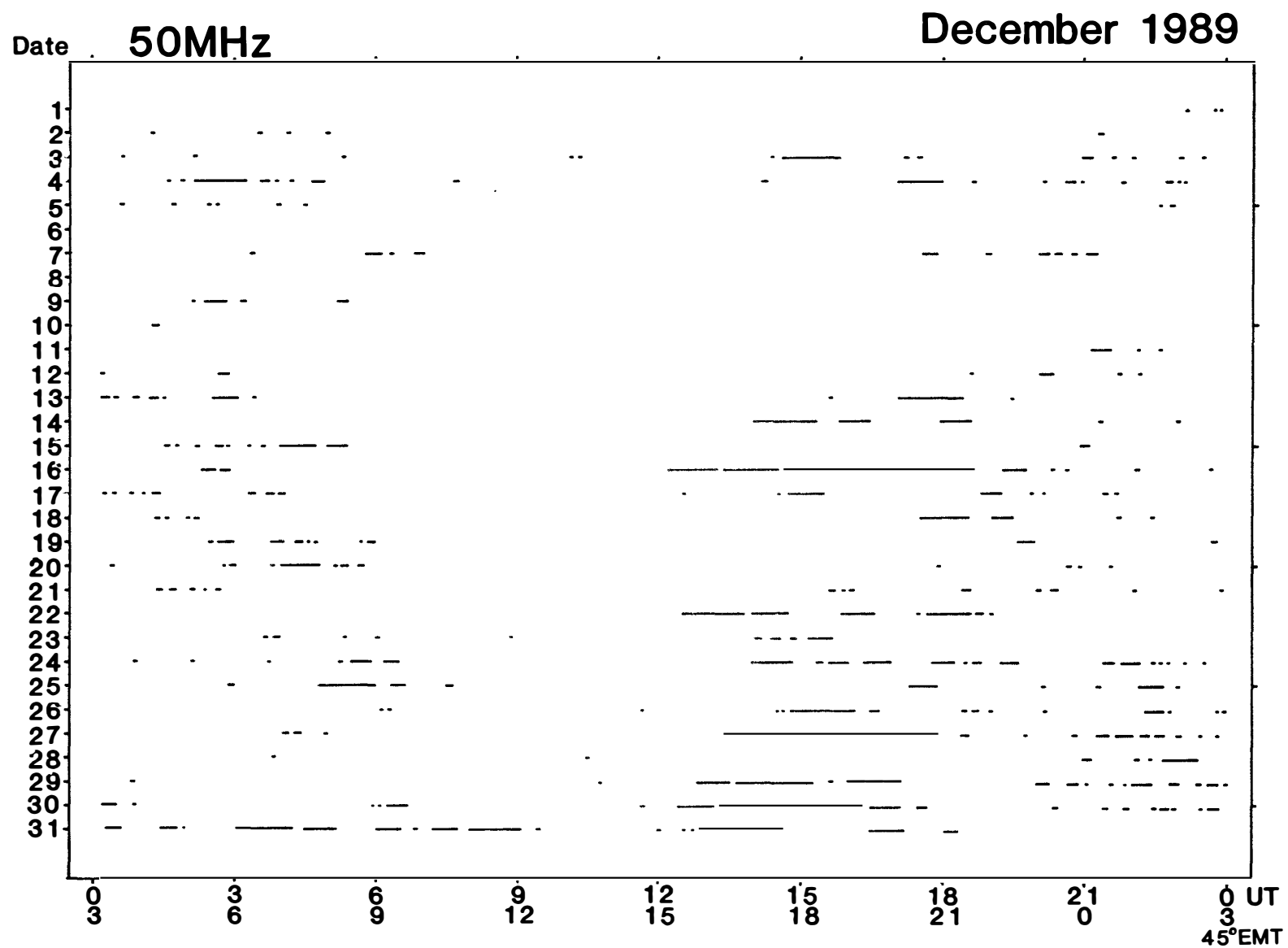


Fig.1 (13)

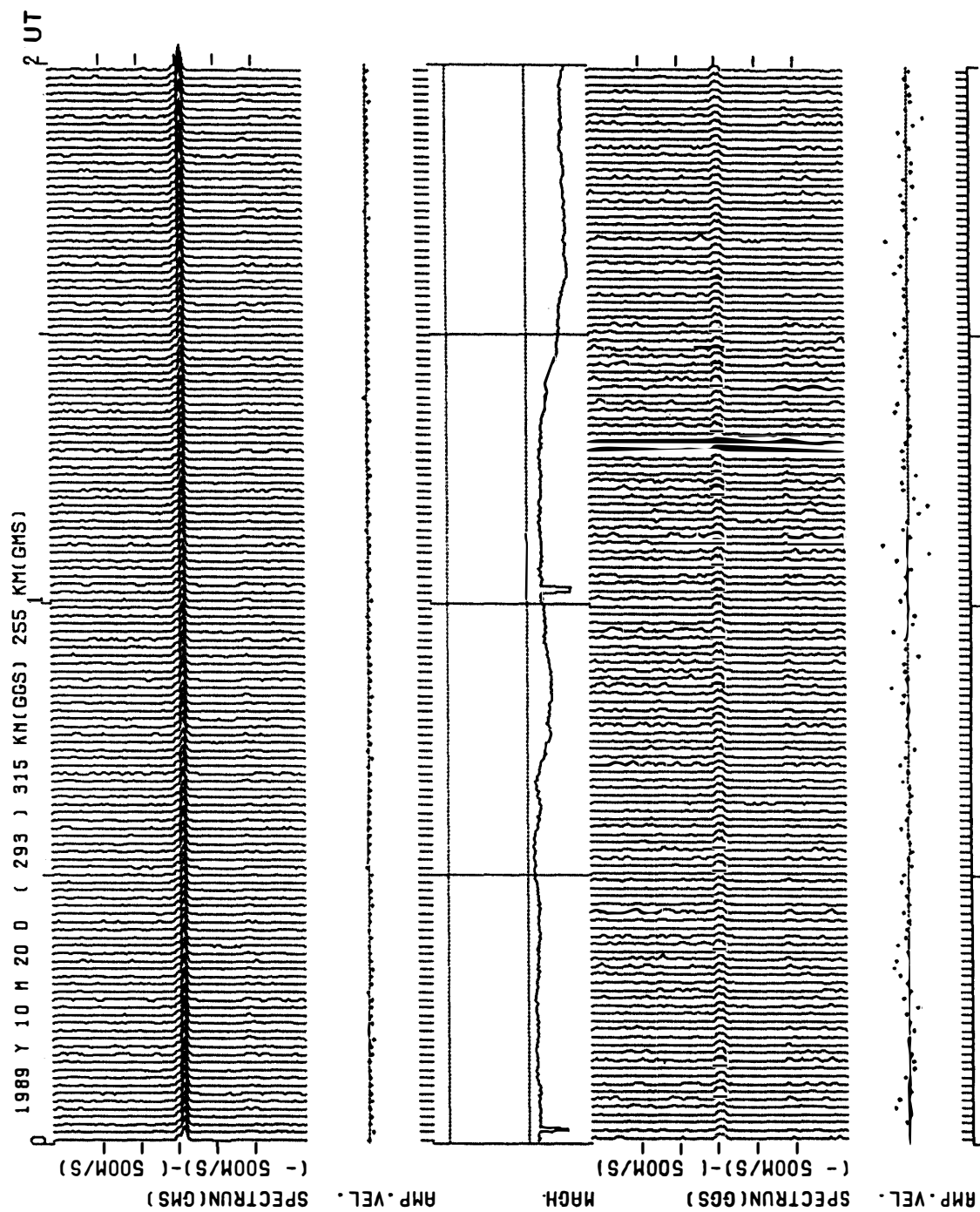


Fig.2 (1)

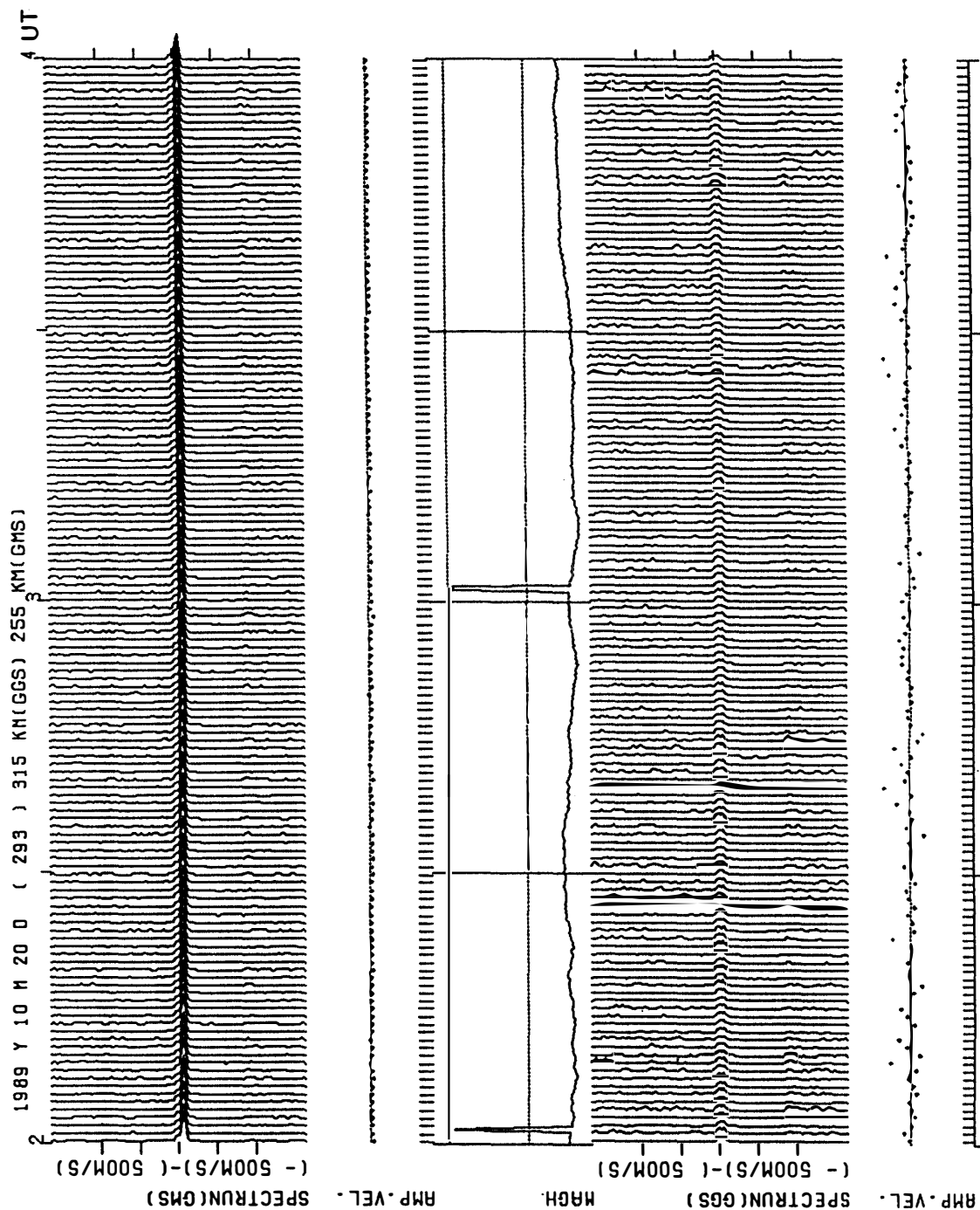


Fig.2 (2)

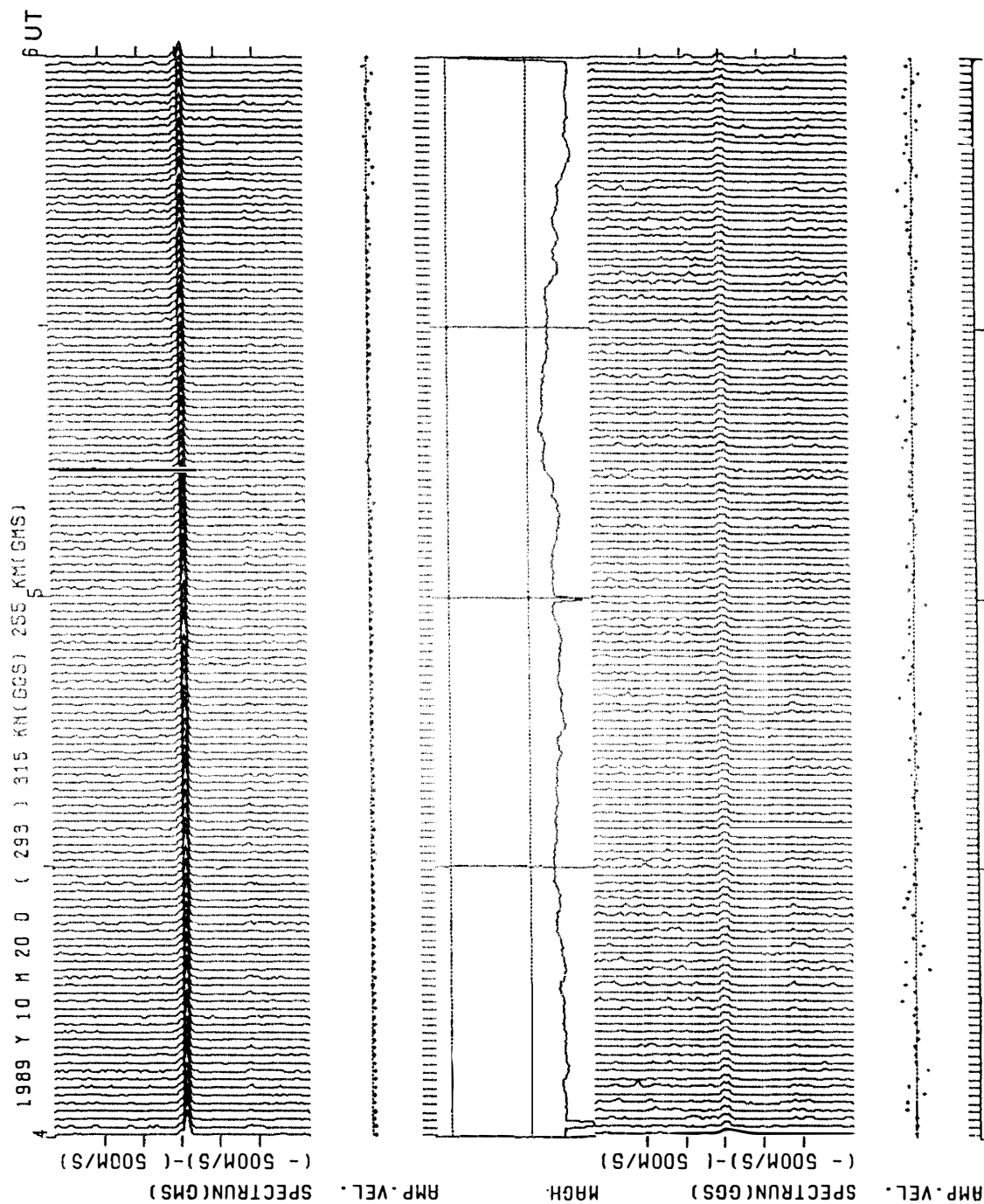


Fig.2 (3)

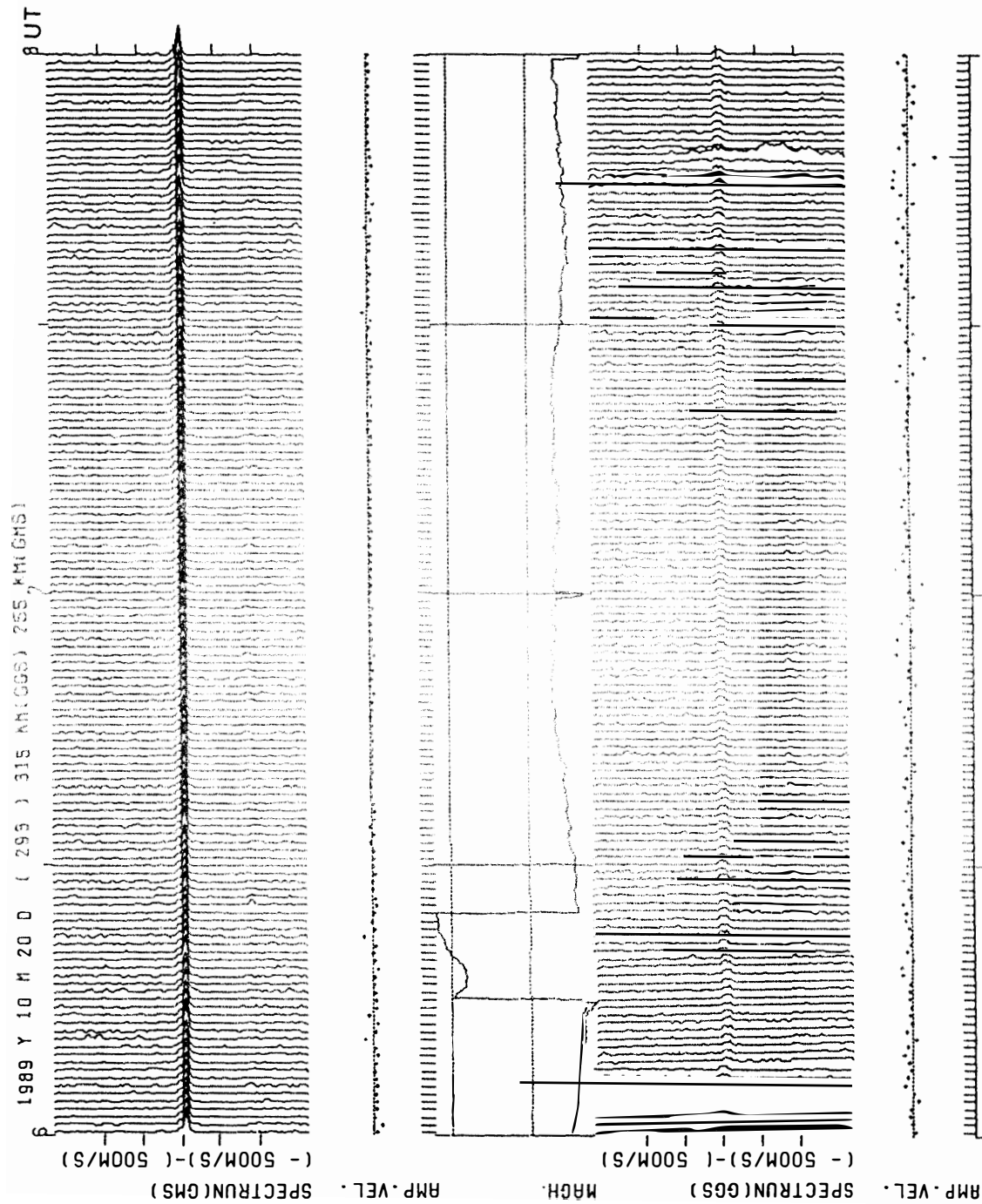


Fig.2 (4)

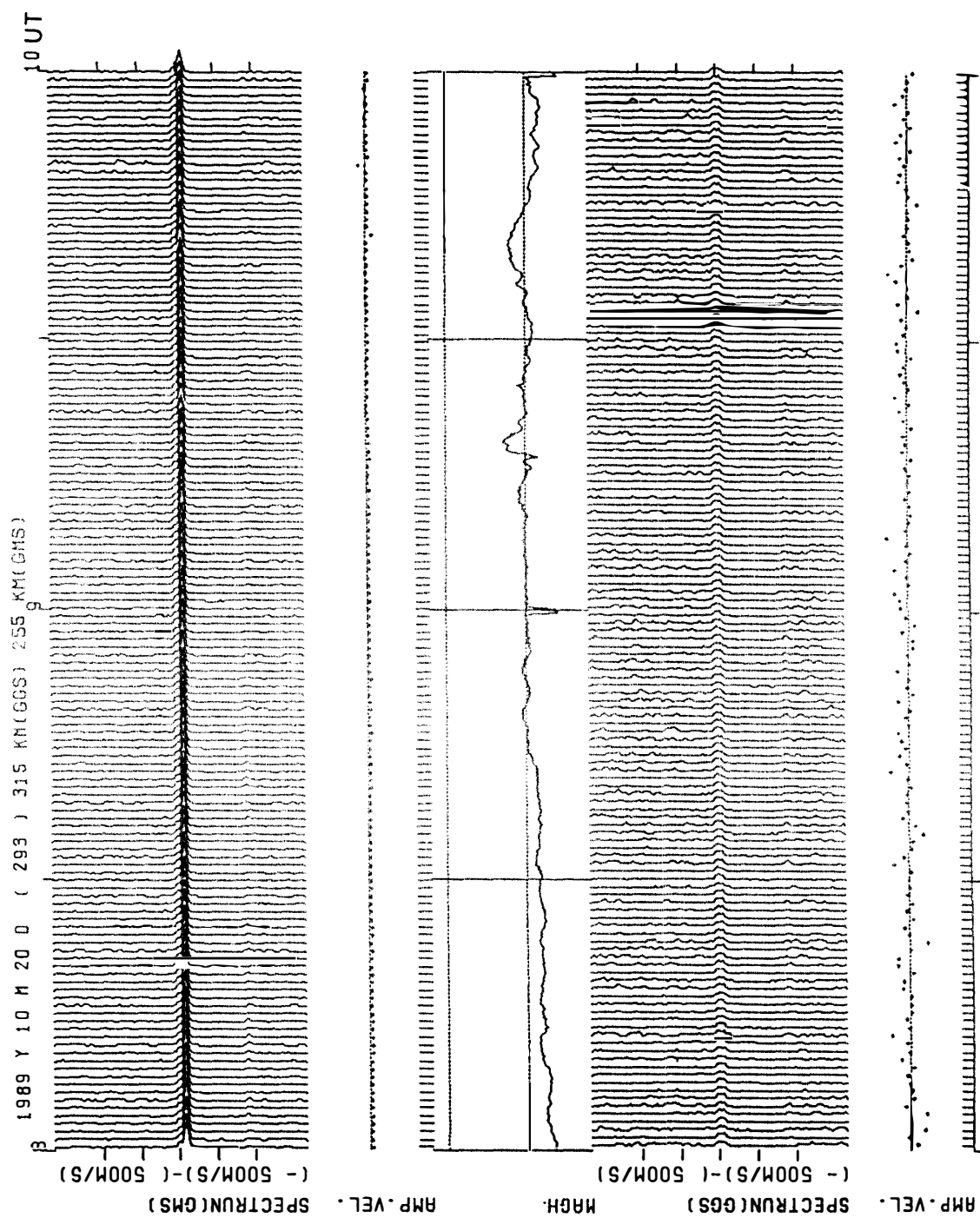


Fig.2 (5)

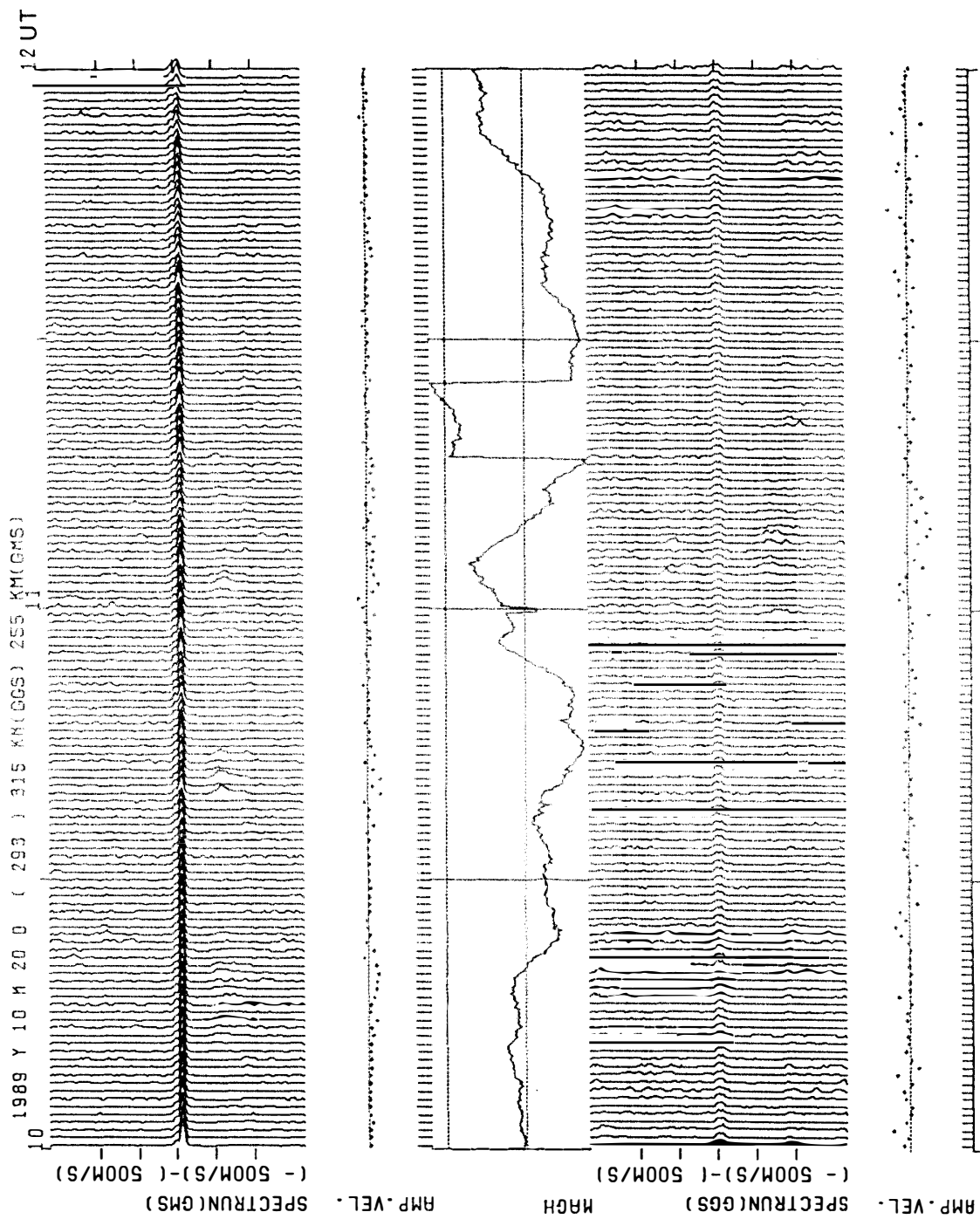


Fig.2 (6)



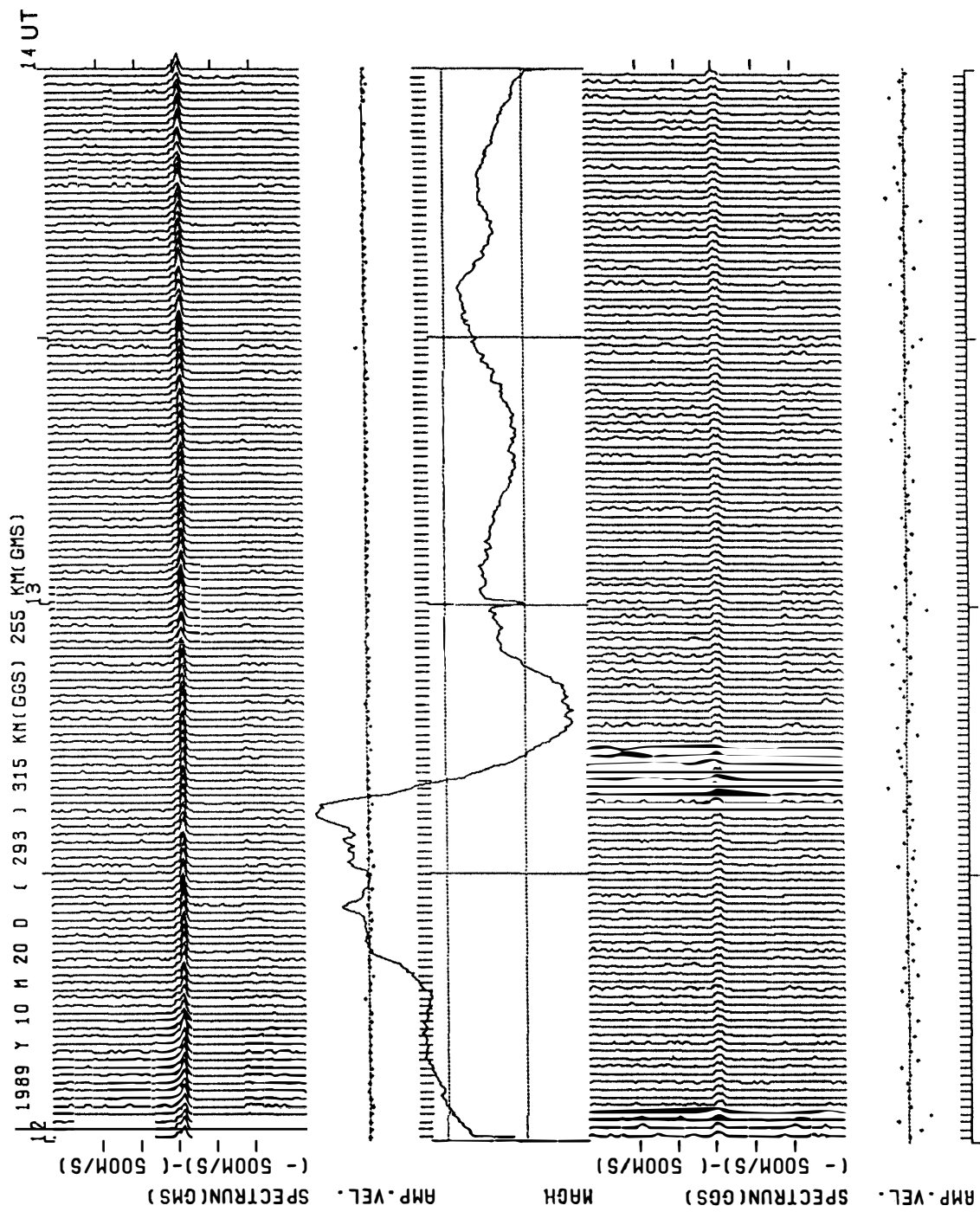


Fig.2 (7)

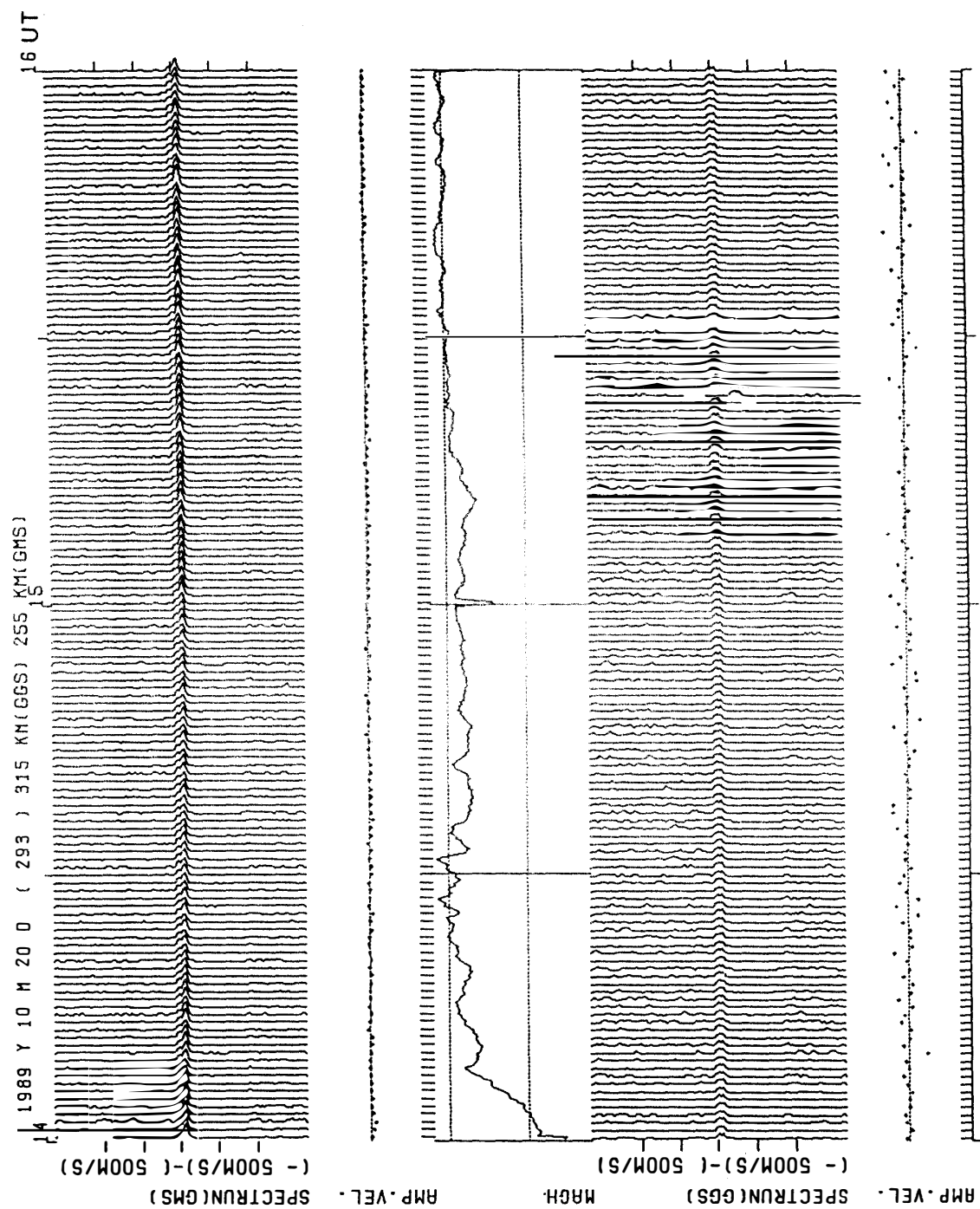


Fig.2 (8)

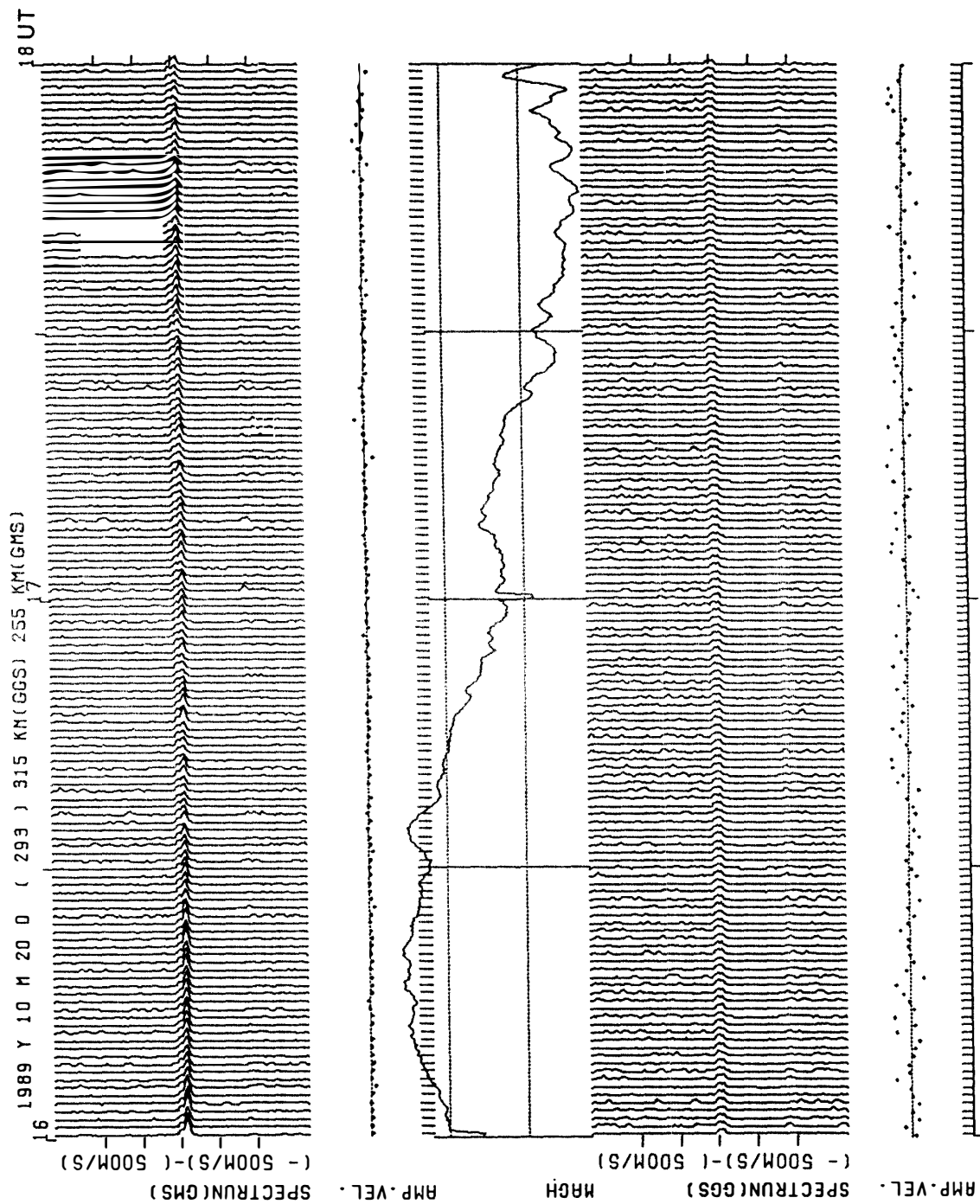


Fig.2 (9)

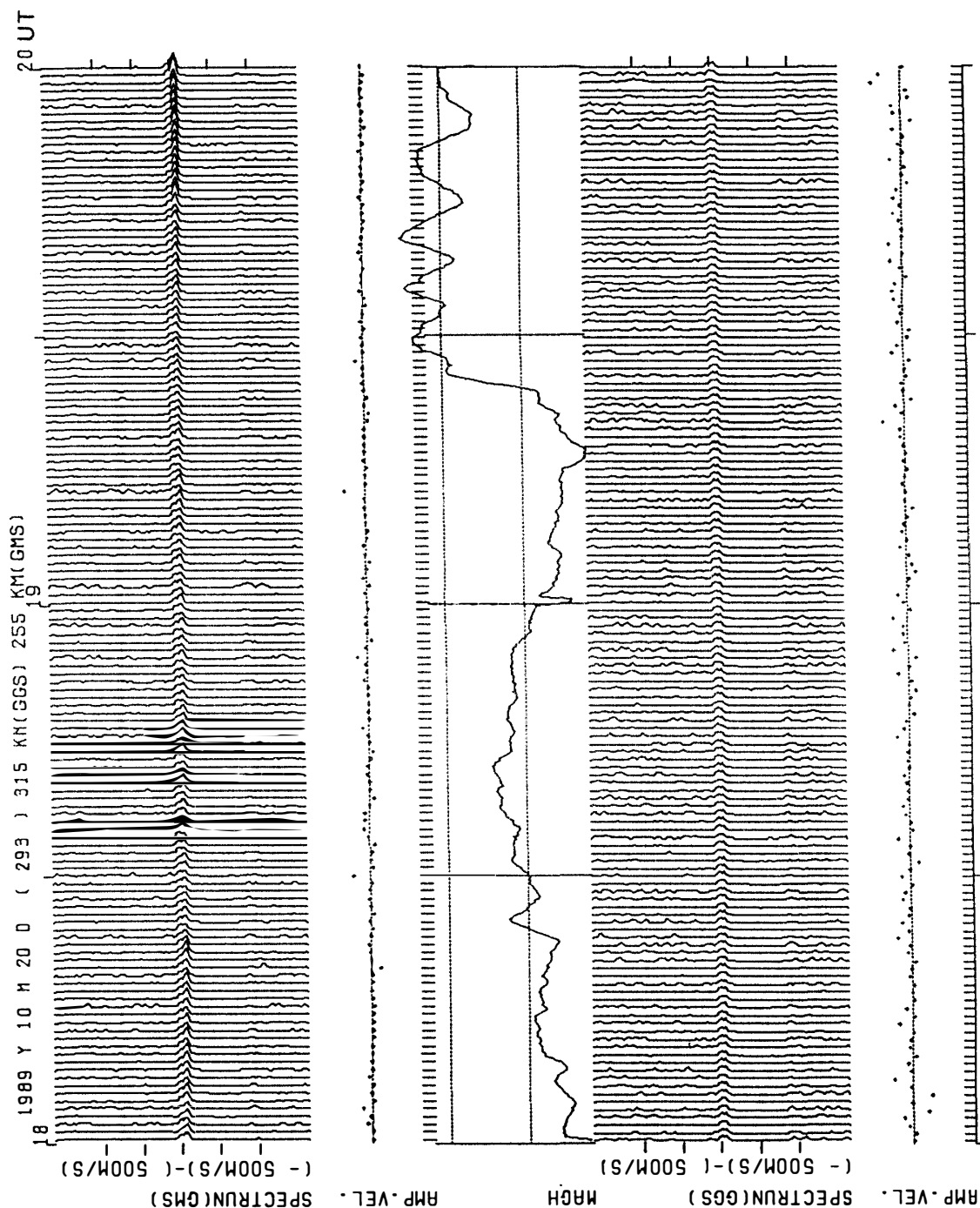


Fig.2 (10)

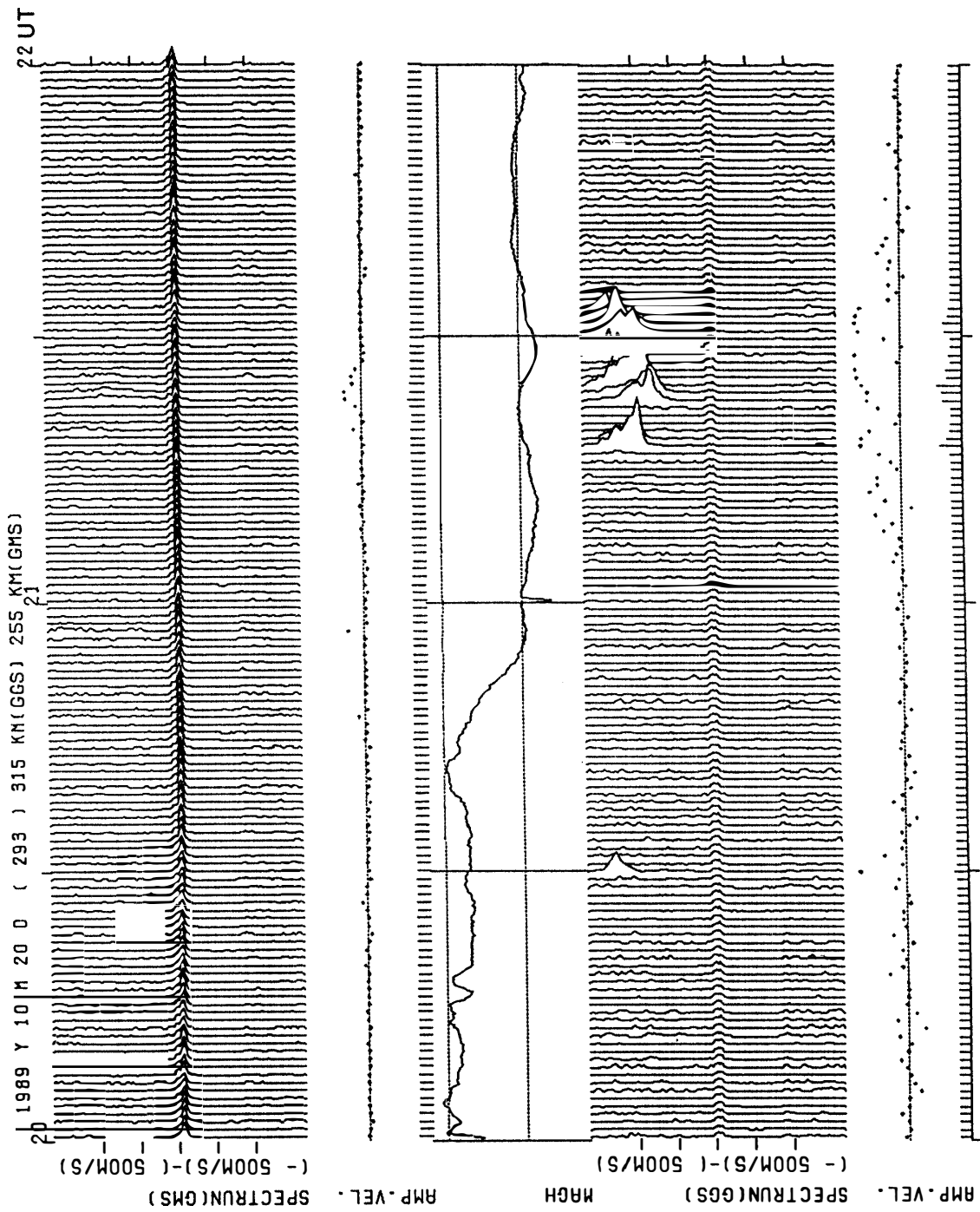


Fig.2 (11)

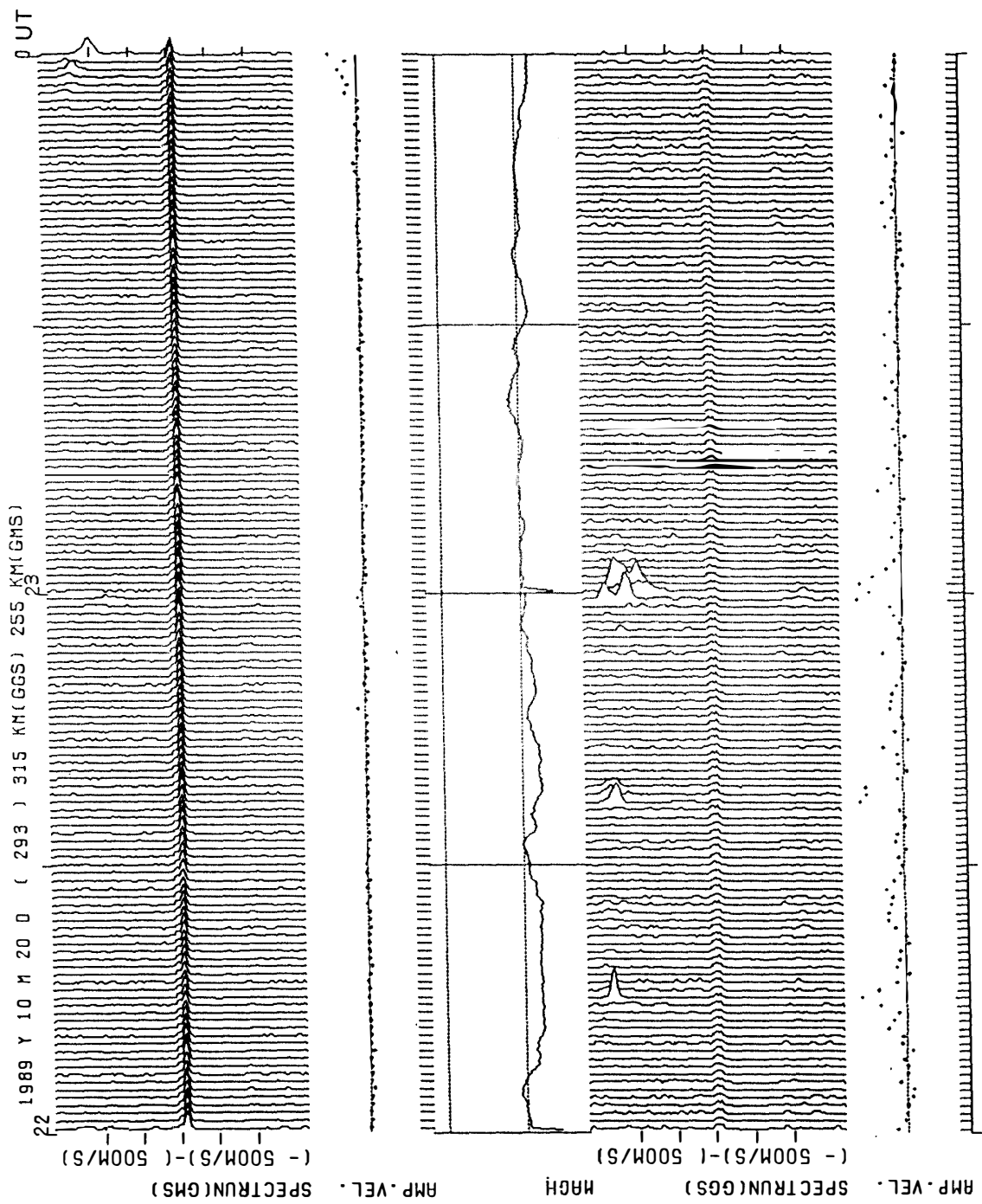


Fig.2 (12)

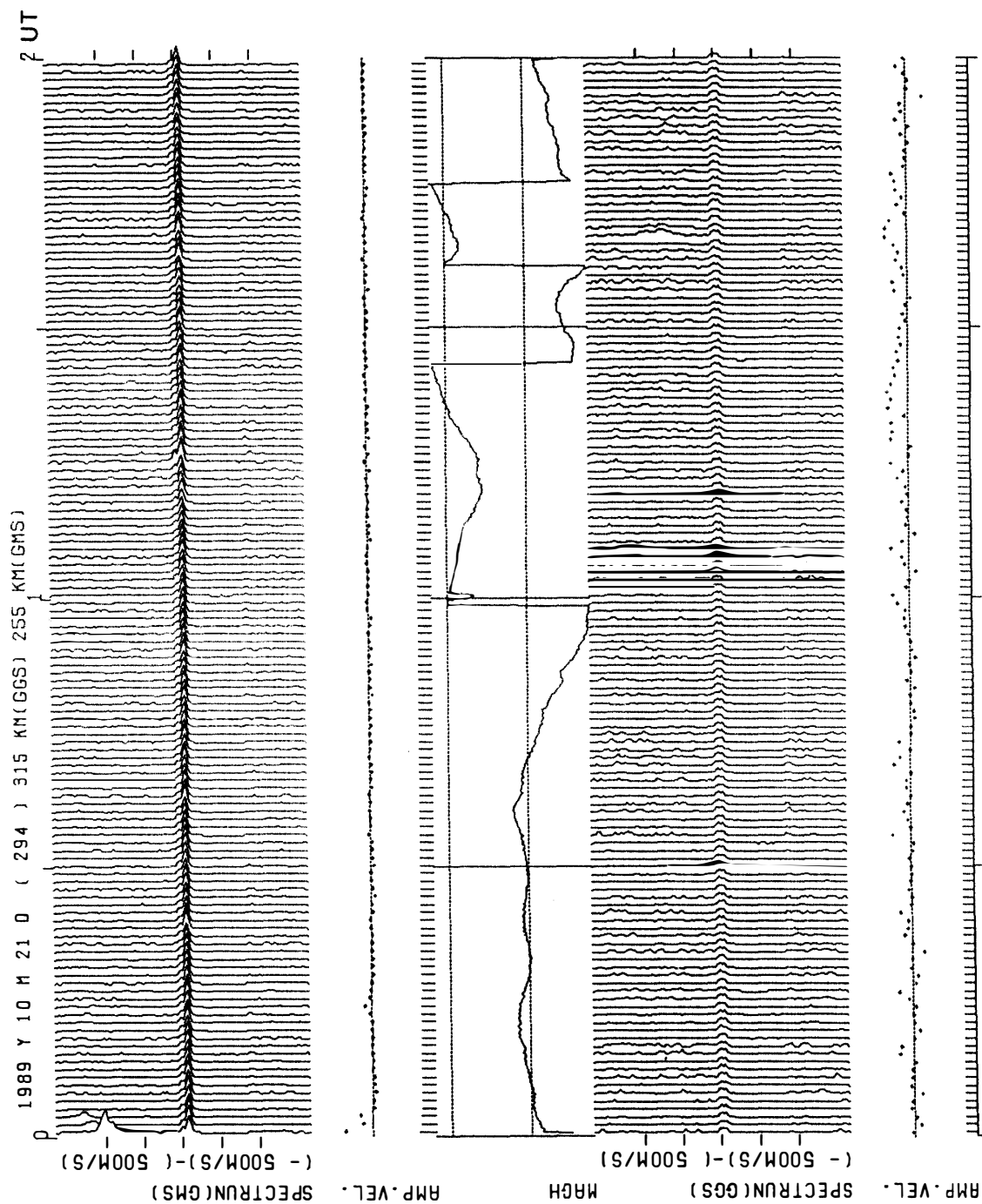


Fig.2 (13)

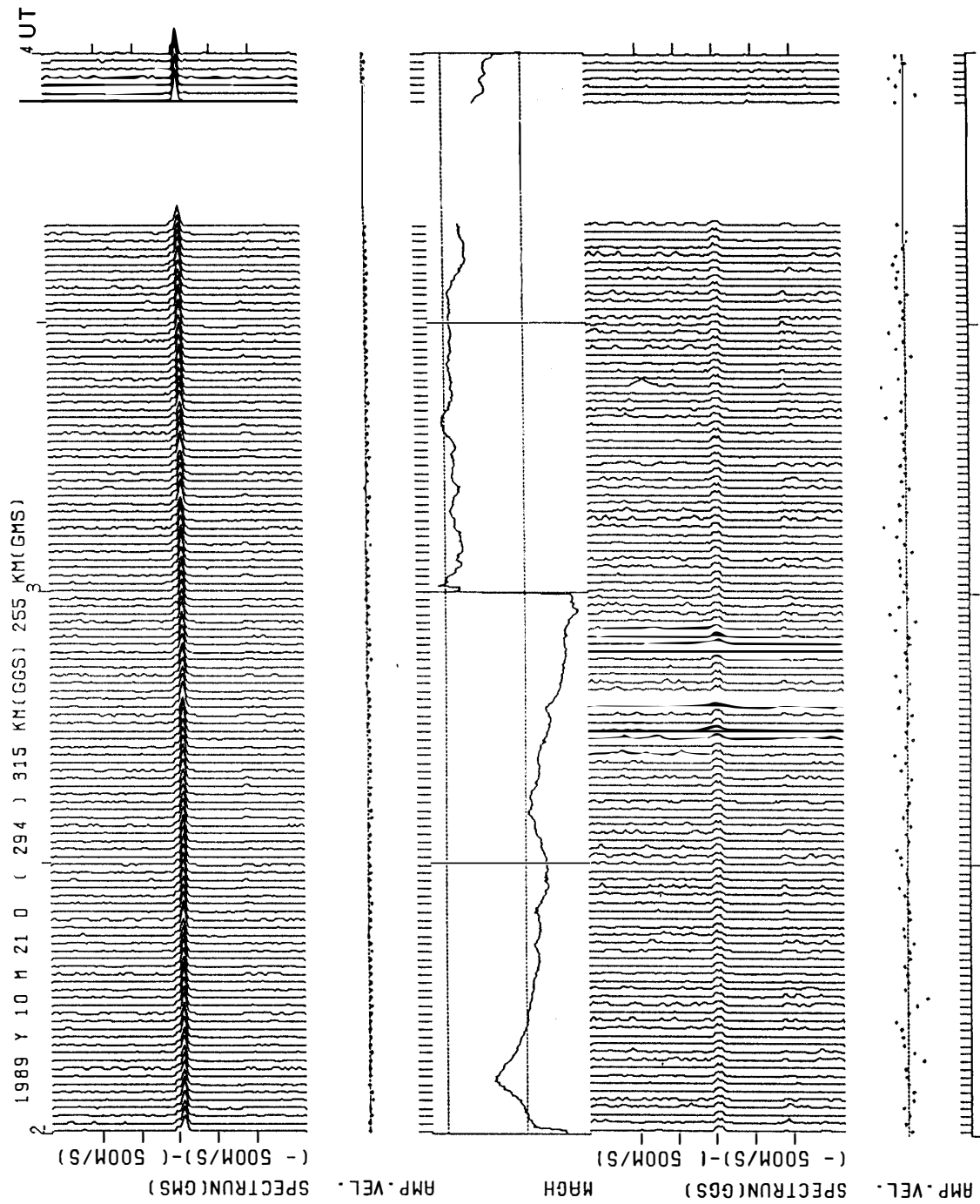


Fig.2 (14)



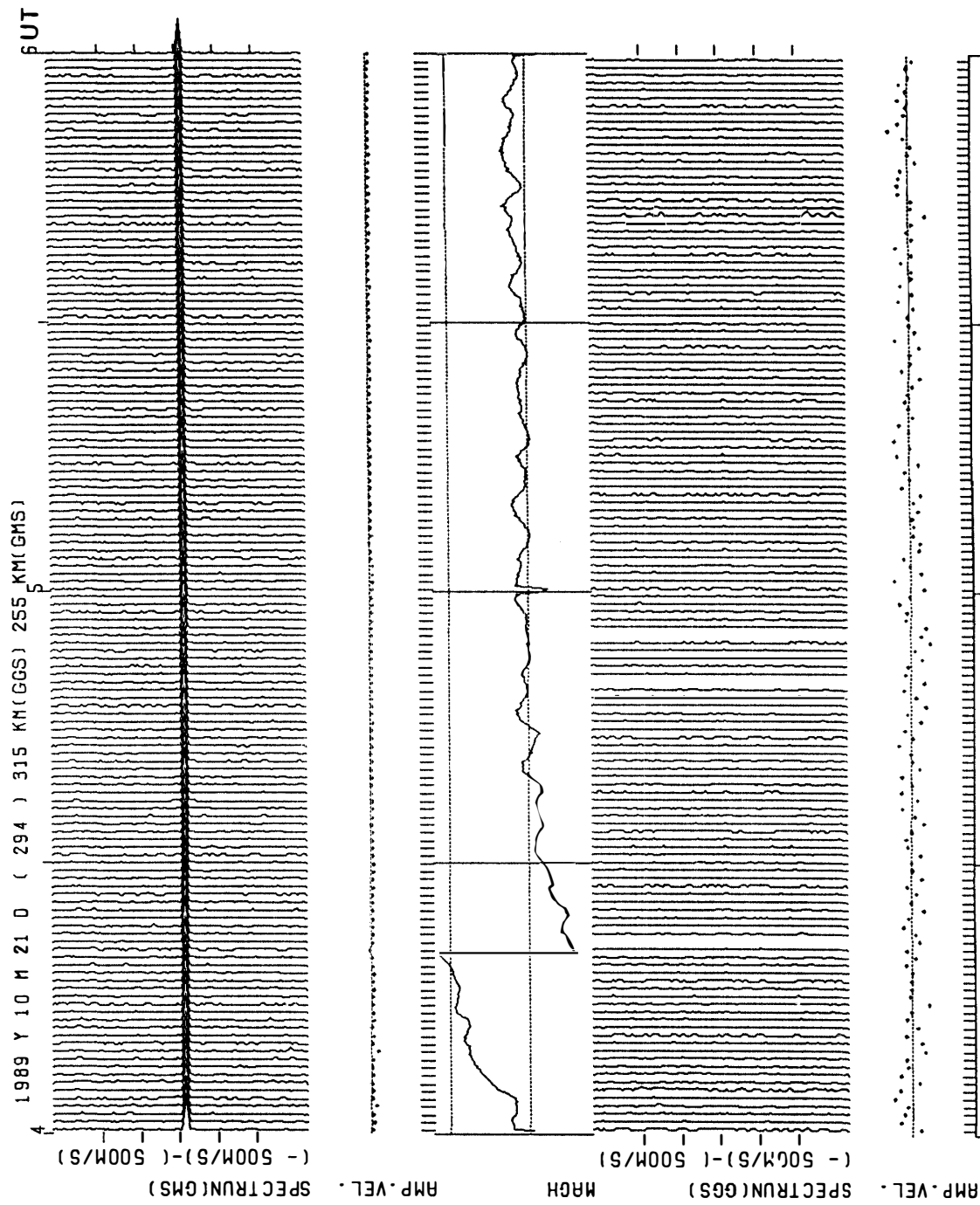


Fig.2 (15)

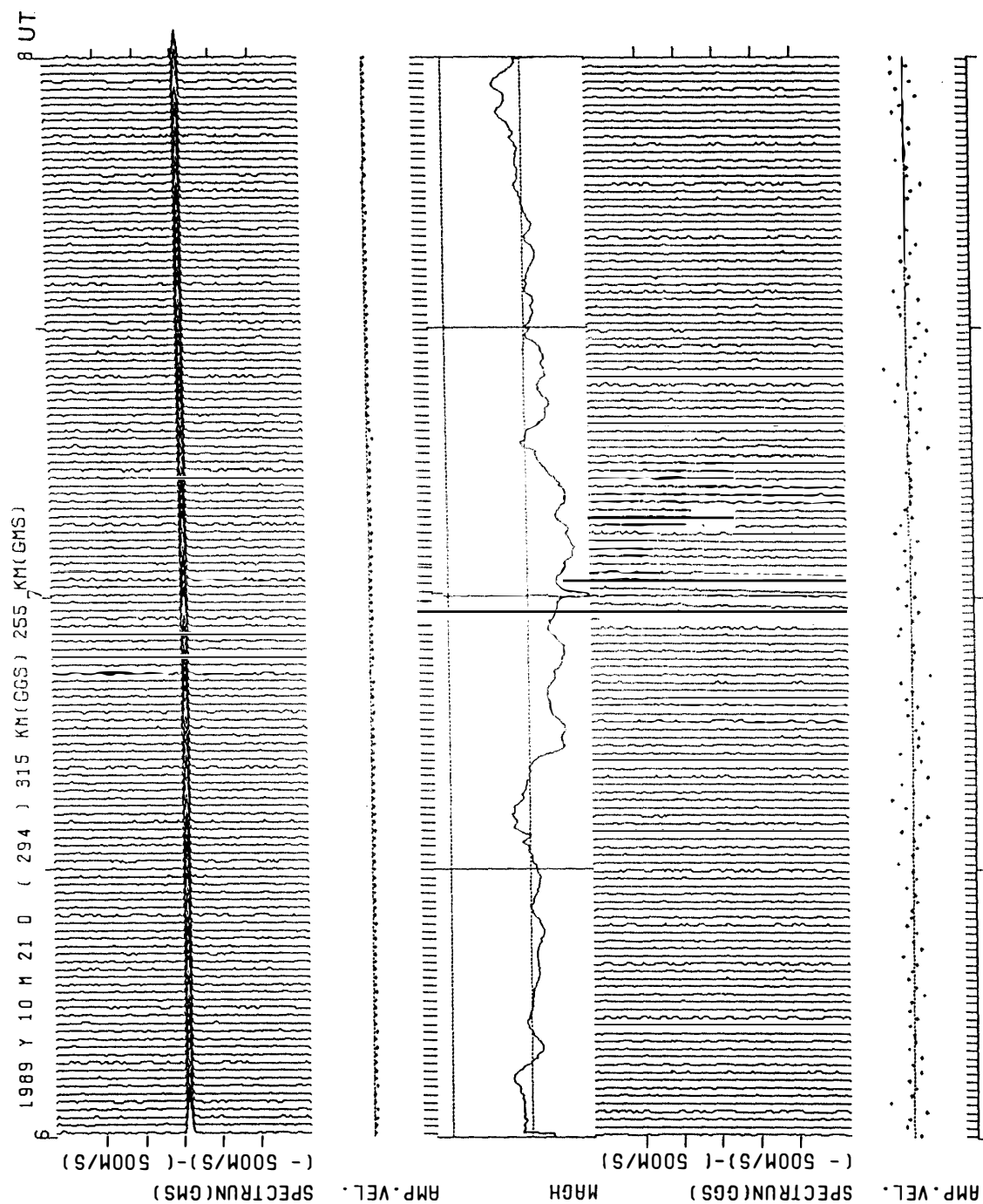


Fig.2 ( 16 )

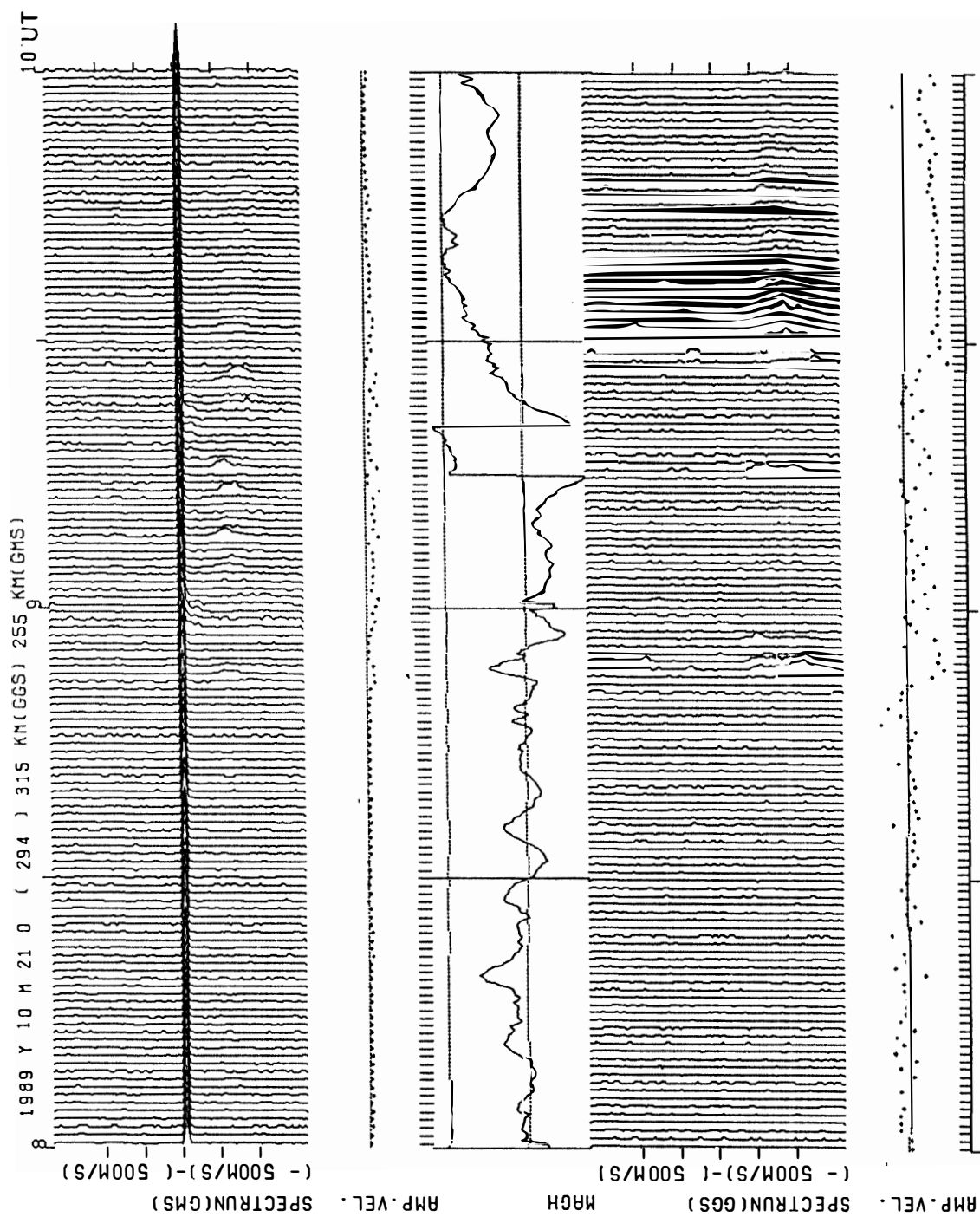


Fig.2 (17)

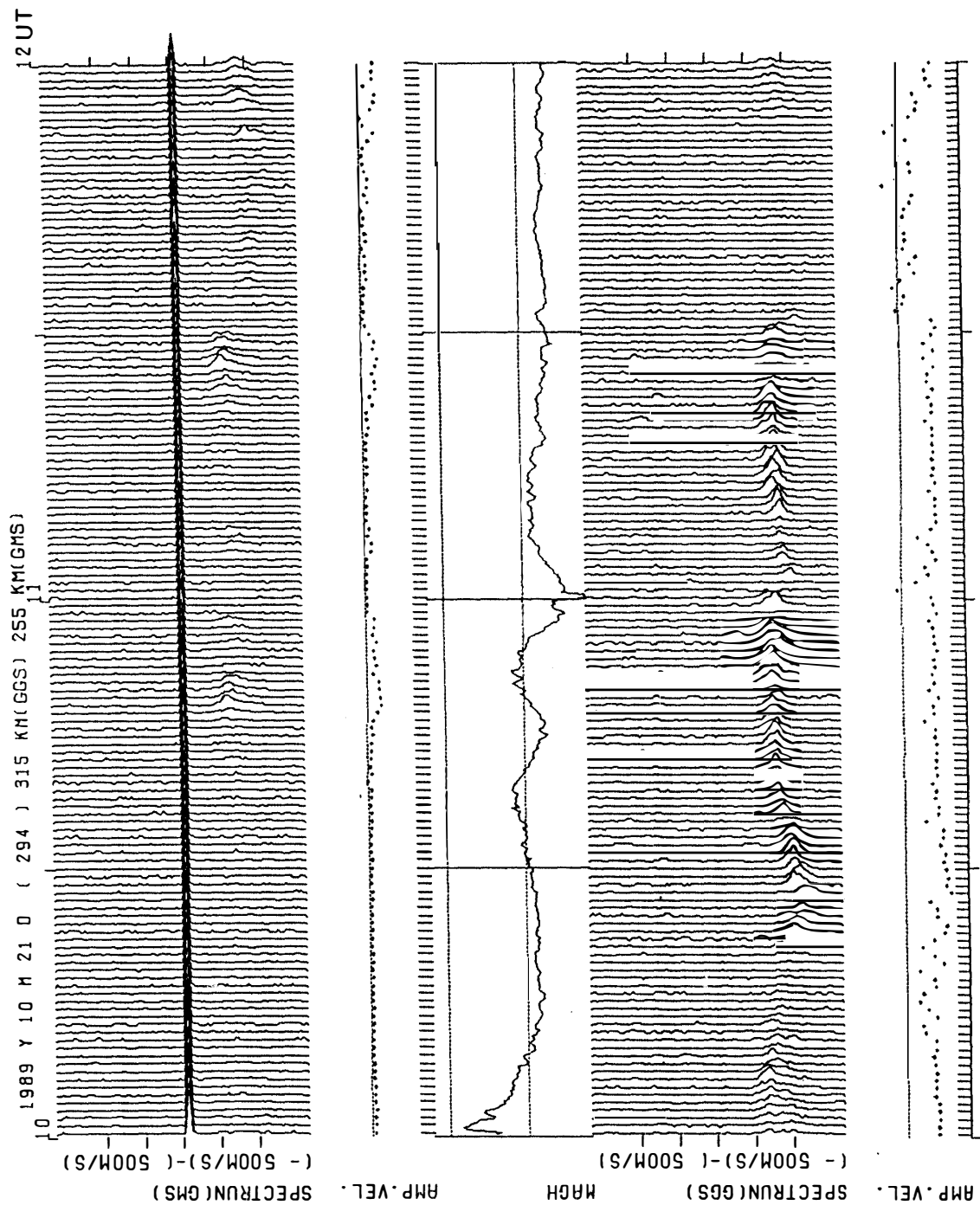


Fig.2 (18)

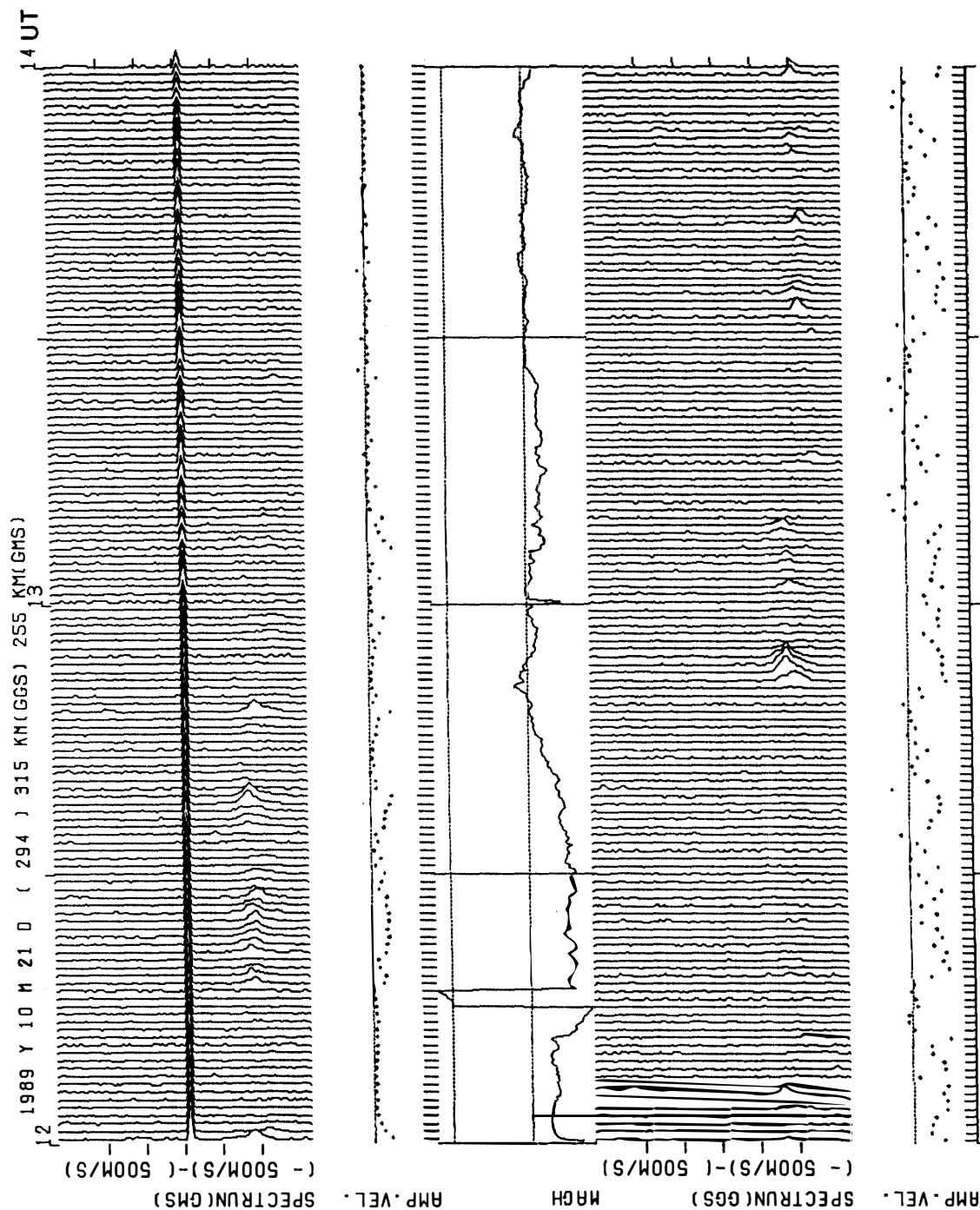


Fig.2 (19)

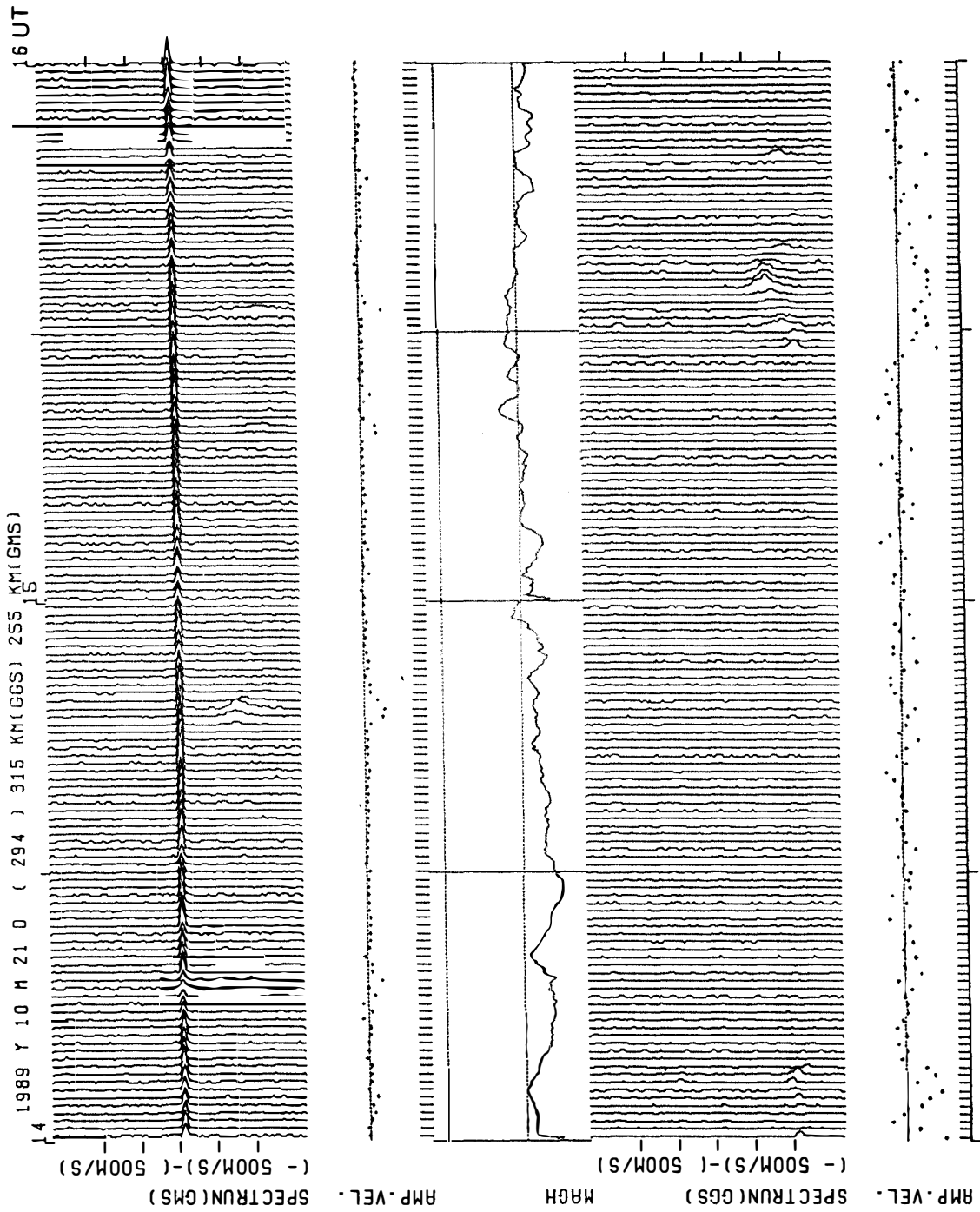


Fig.2 (20)

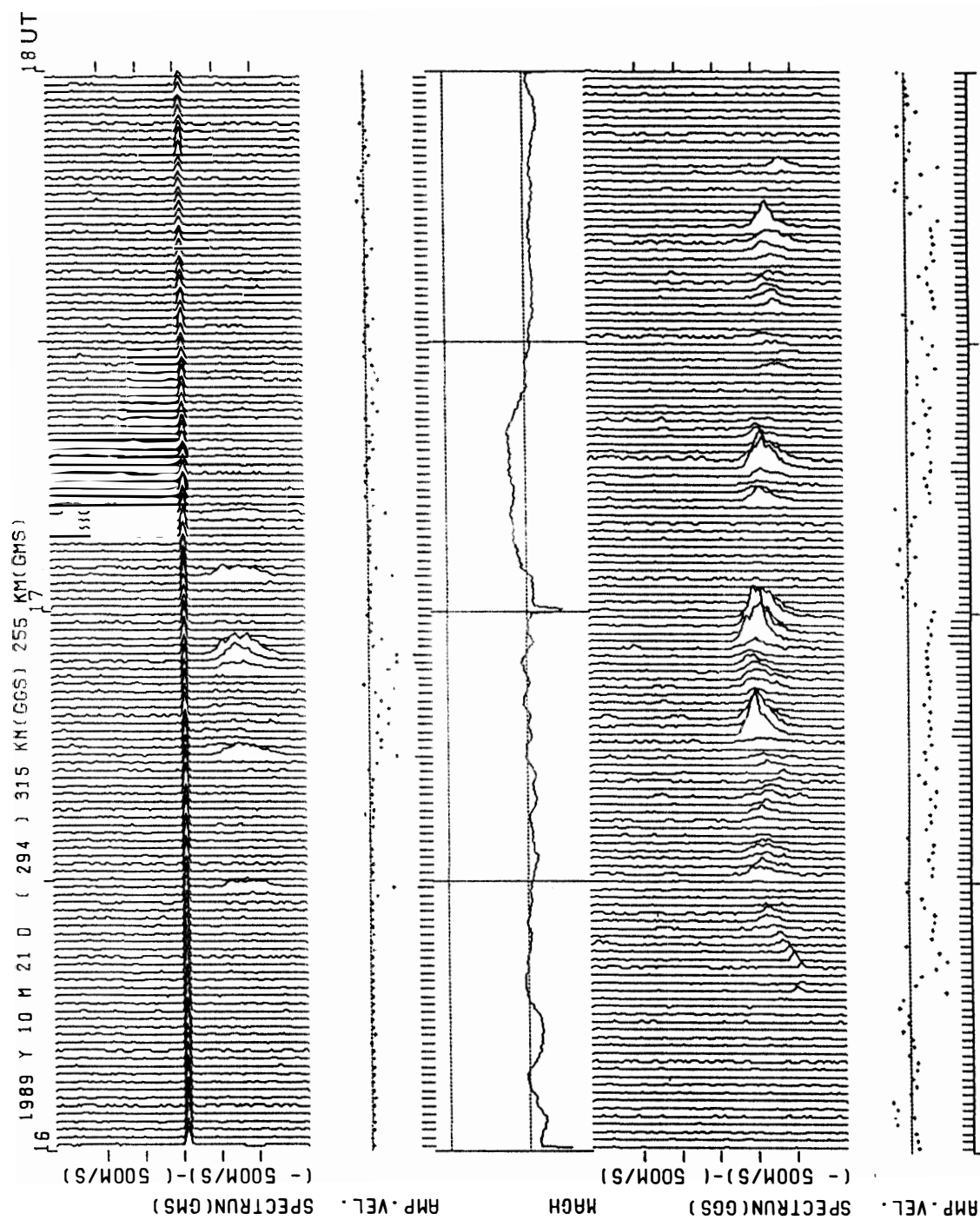


Fig.2 (21)

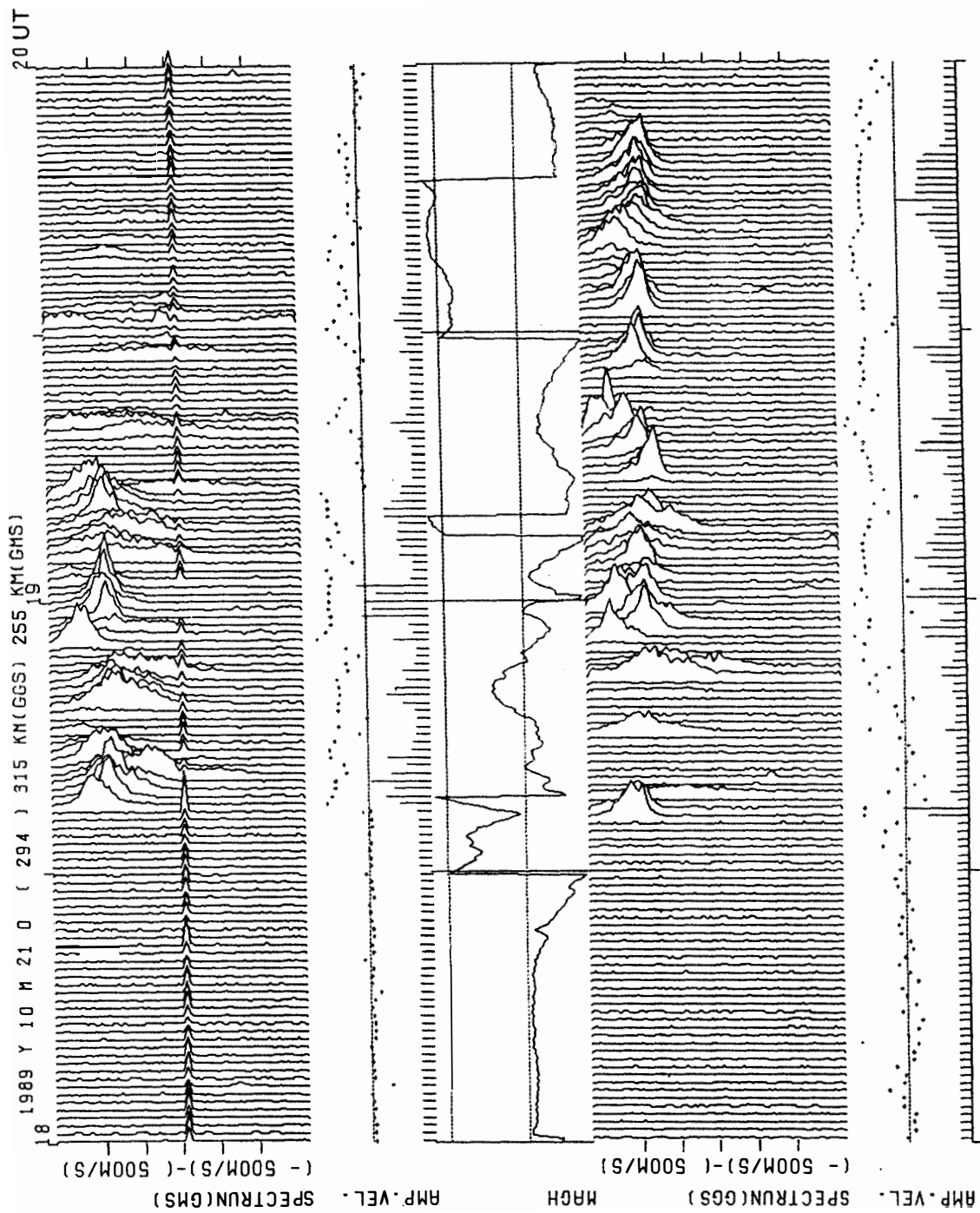


Fig.2 (22)



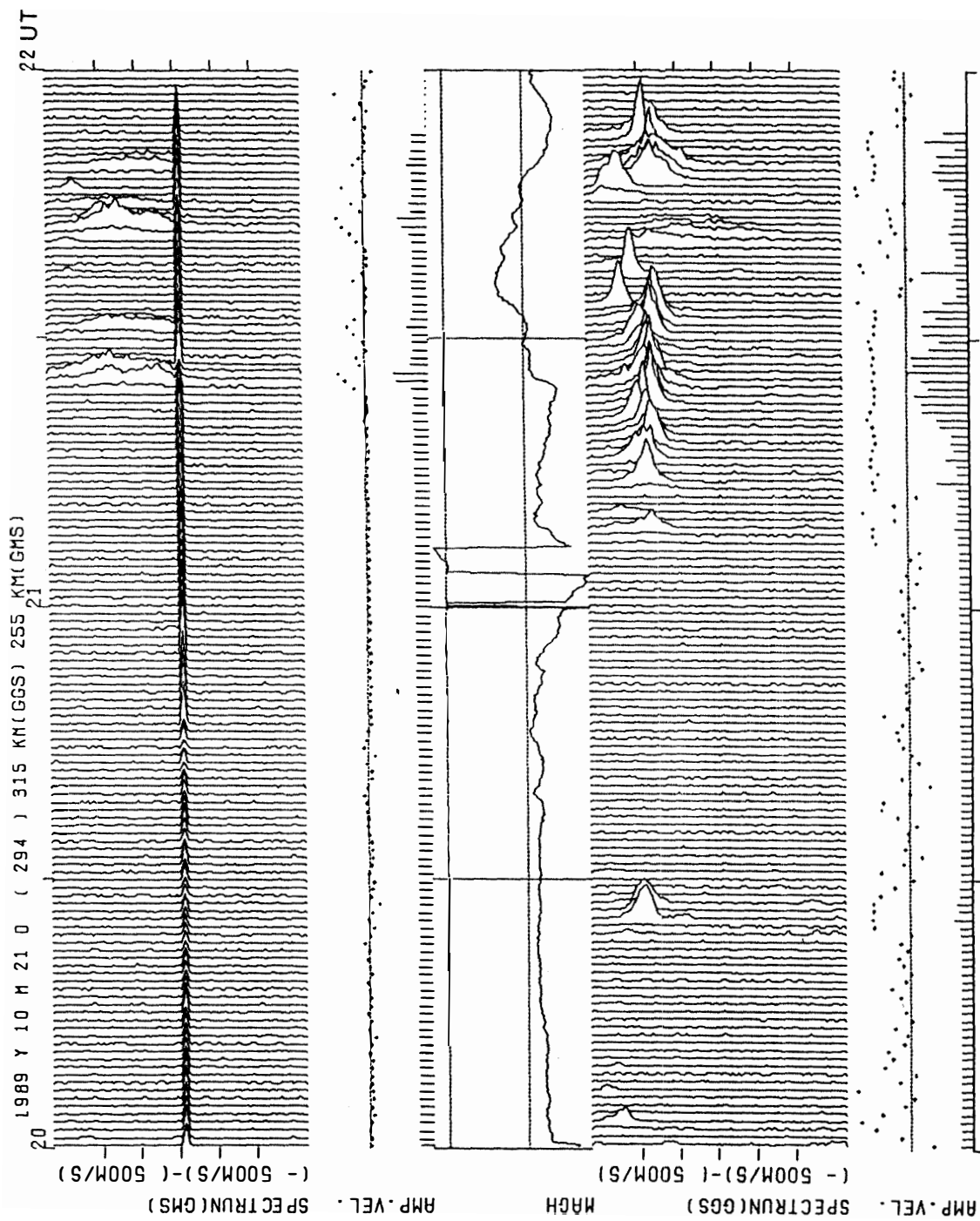


Fig.2 (23)

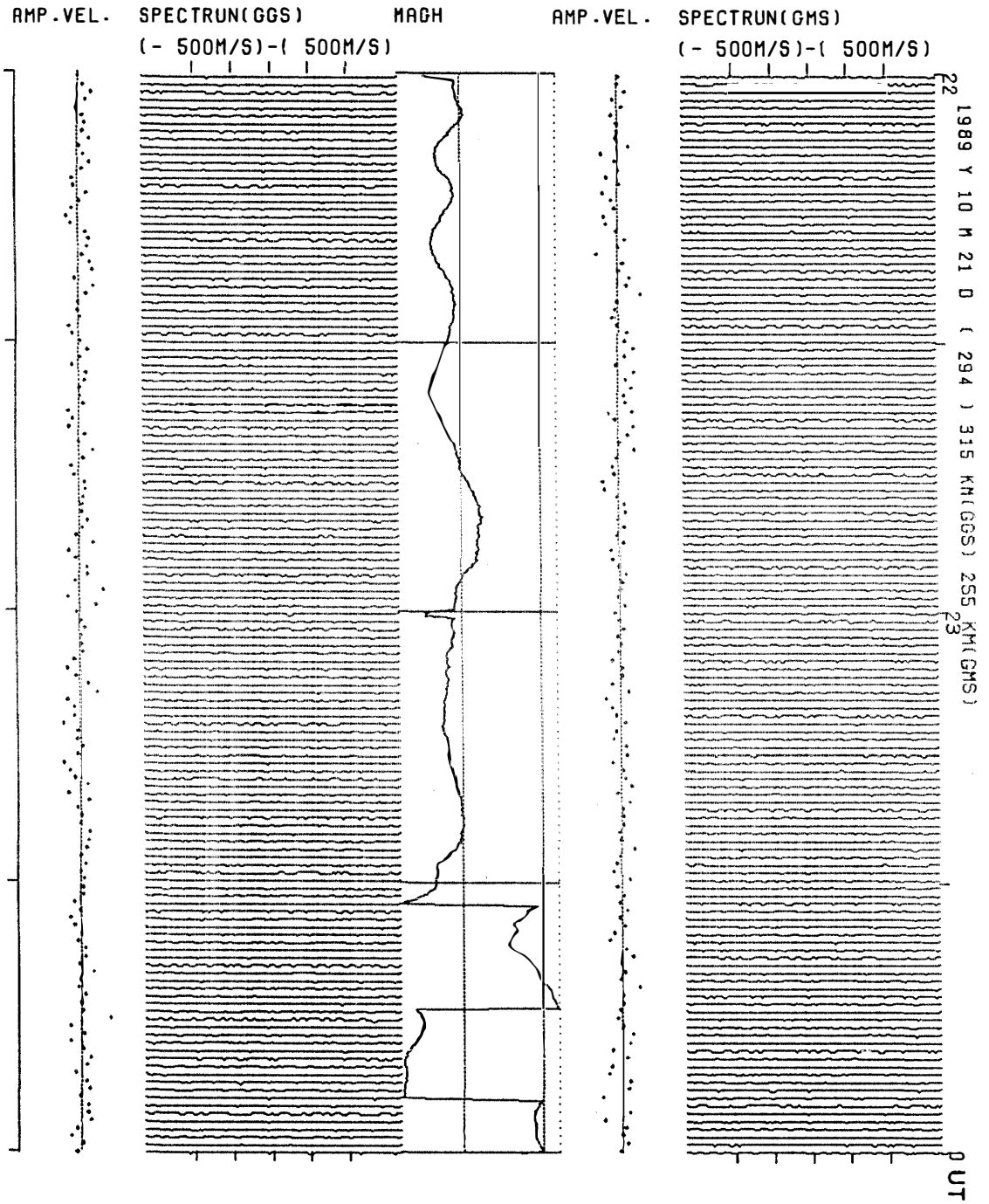


Fig.2 (24)