RECORDS OF RADIO AURORA AT SYOWA STATION, ANTARCTICA IN 1984

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1. Introduction

Observation of ionospheric irregularities has been carried out at Syowa Station, Antarctica, by means of an auroral radar since March 1966. A report has been prepared which includes the periods of radio auroral echoes detected in 1984 and characteristic examples of echo intensity-time variation.

Inquiries about details of the data should be addressed to:

Radio 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 magnetic tape records of the intensity and doppler velocity of auroral radar echoes.

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 (Radio Research Laboratory)

4. Method of Measurement

The newly developed auroral doppler radars at the frequencies of 50 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). The radar beams were switched every 13-27 s by turns.

The A-scope record was taken every 5 min, while A'-scope record and the chart record of the echo intensity were made 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 mean doppler frequencies 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, 112 MHz
Peak power	: 15 kW
Pulse width	: 100 μs
Pulse repetition frequency	: 50 Hz
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

5. Explanation of Diagrams Contained in the Report

Figures 1(1-12) 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(1-17) show typical examples of compiled data for 50 MHz radio aurora. These data exhibit time variations of doppler velocity spectrums, mean doppler velocities (VEL), echo intensities (AMP), and the geomagnetic H component at Syowa Station.

The data denoted by GGS show results obtained by GGS beam (the geographic south direction) at the point of a fixed range, GMS by GMS beam (the geomagnetic south direction).

Bibliography relevant to

records of radio aurora at Syowa Station, Antarctica.

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
Jan. 1980 - Dec. 1980	Igarashi, K. Nozaki, K.	68 (Ionosphere 24)	28	1982
Jan. 1981 - Dec. 1981	Ose, M. Kurihara, N.	81 (Ionosphere 28)	28	1983
Jan. 1982 - Dec. 1982	Igarashi, K. Kuratani, Y.	88 (Ionosphere 30)	28	1984
Jan. 1983 - Dec. 1983	Igarashi, K. Tanaka, T. Yamazaki, I.	100 (Ionosphere 32)	64	1985

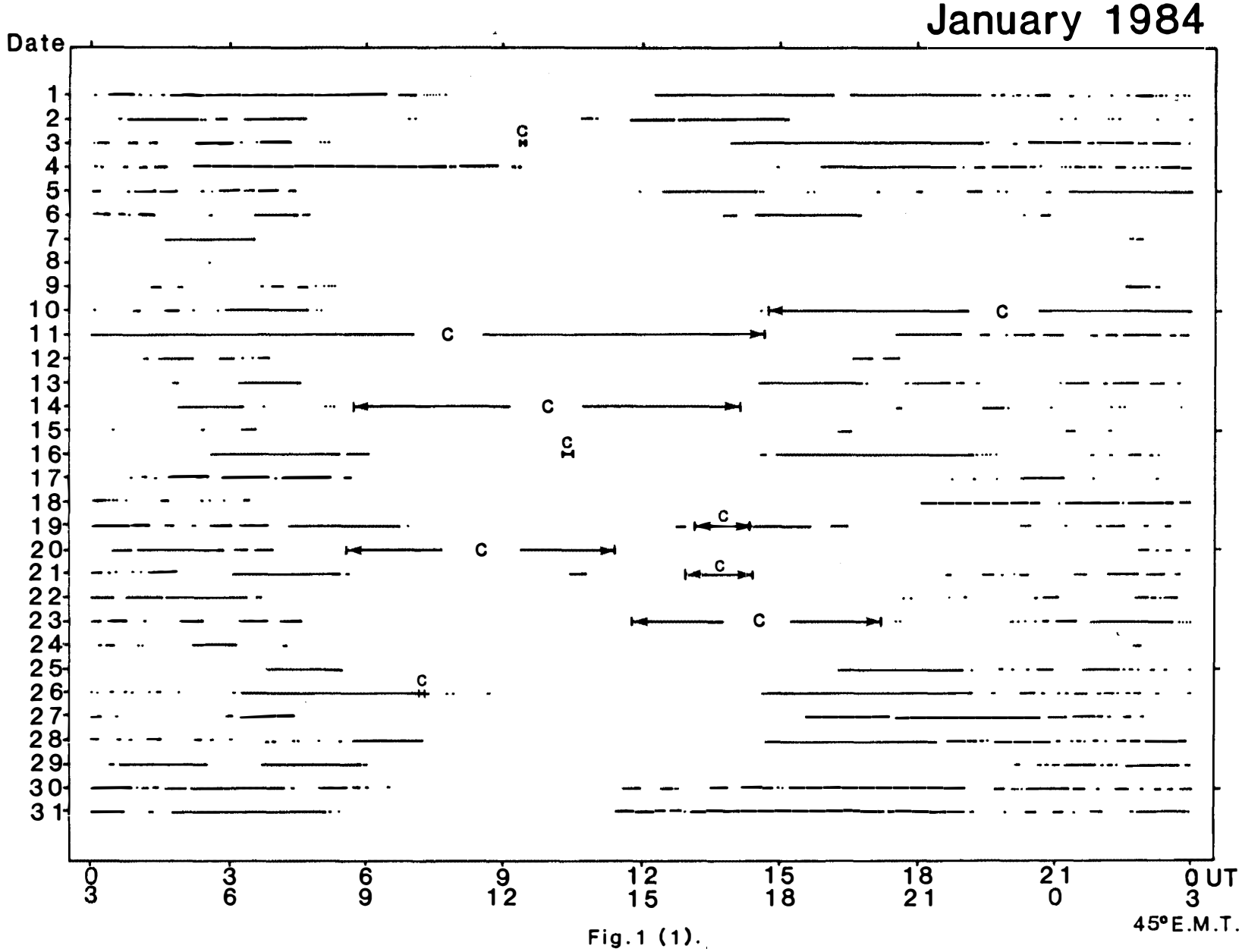
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Fig.1 (1).

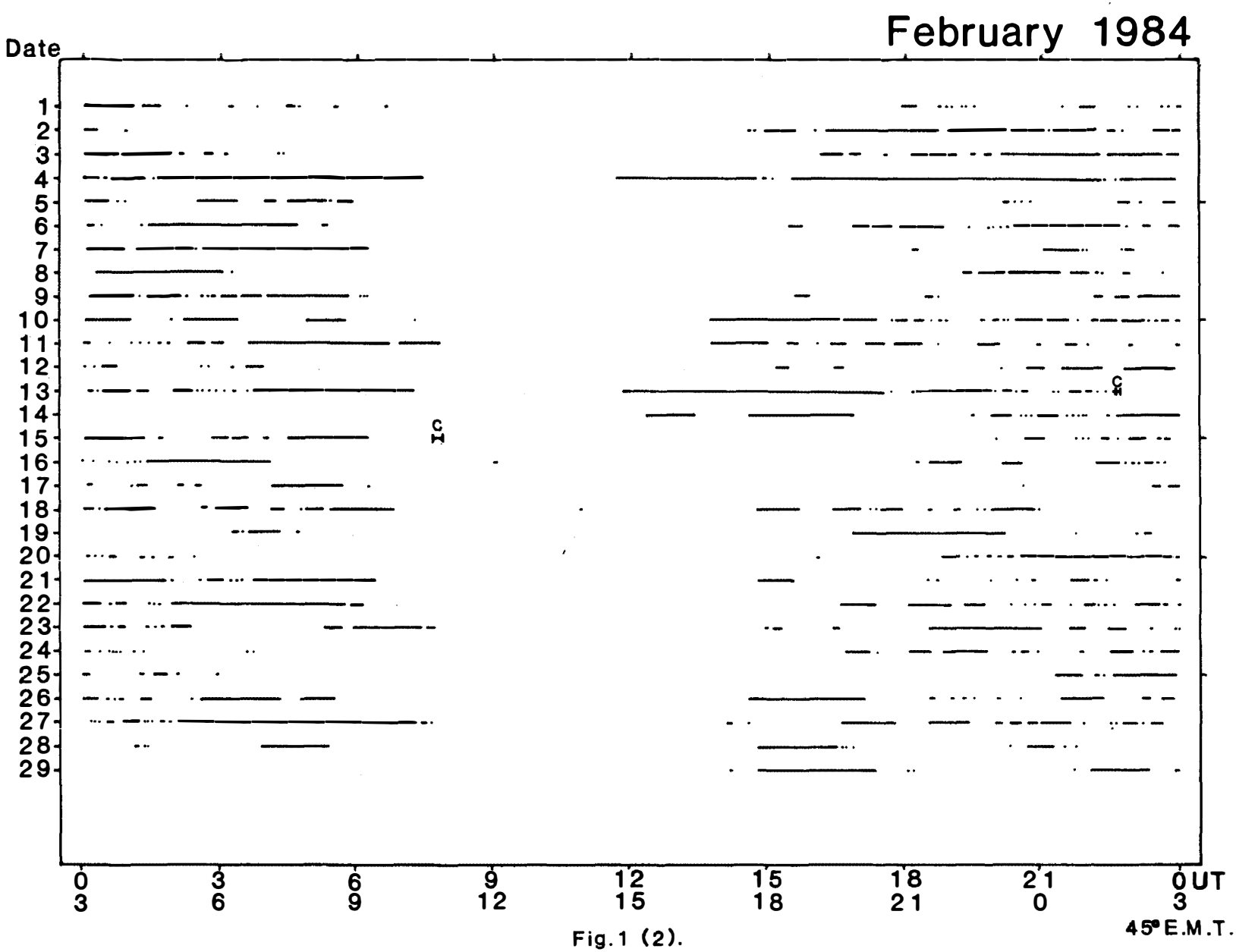
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Fig.1 (2).

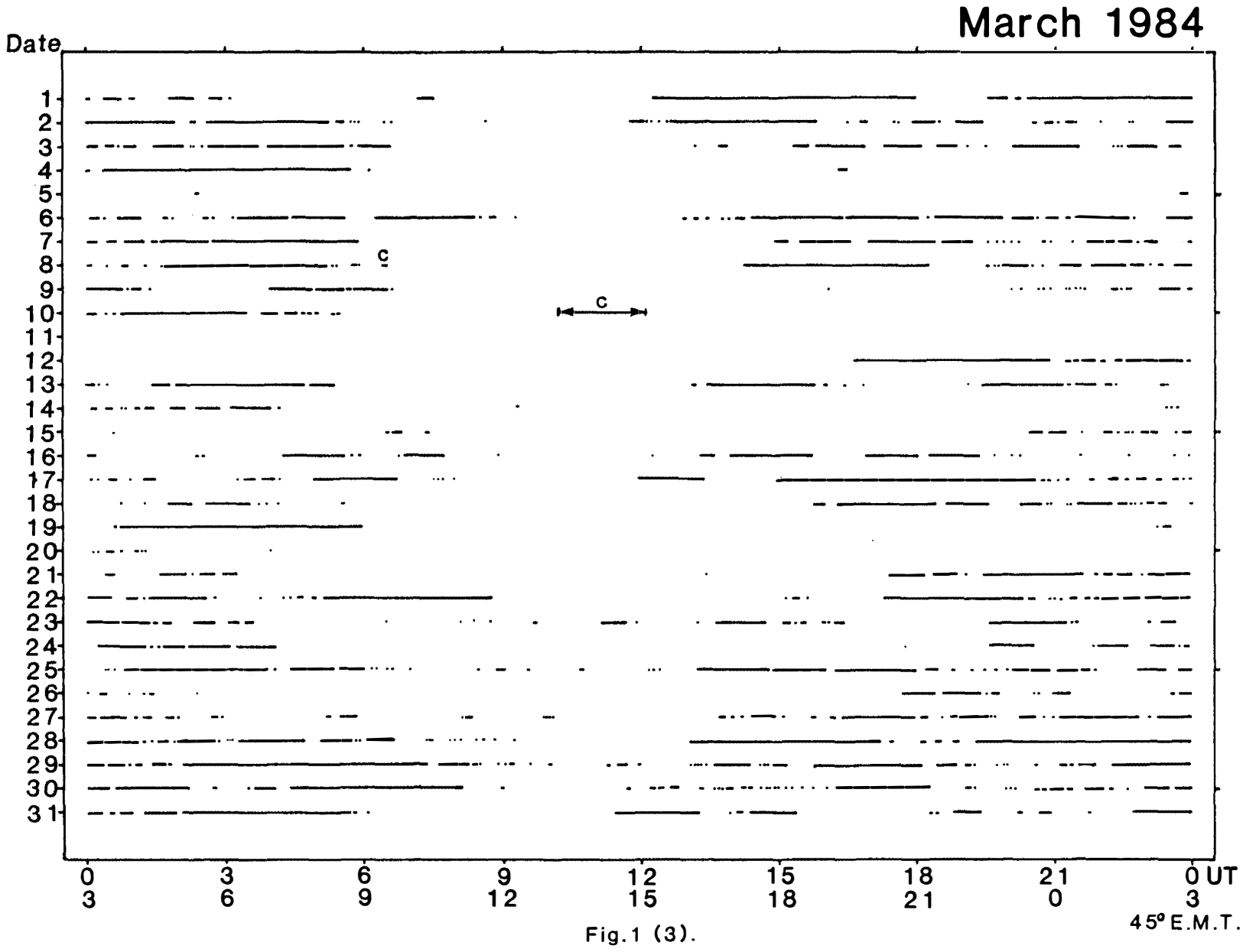
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Fig.1 (3).

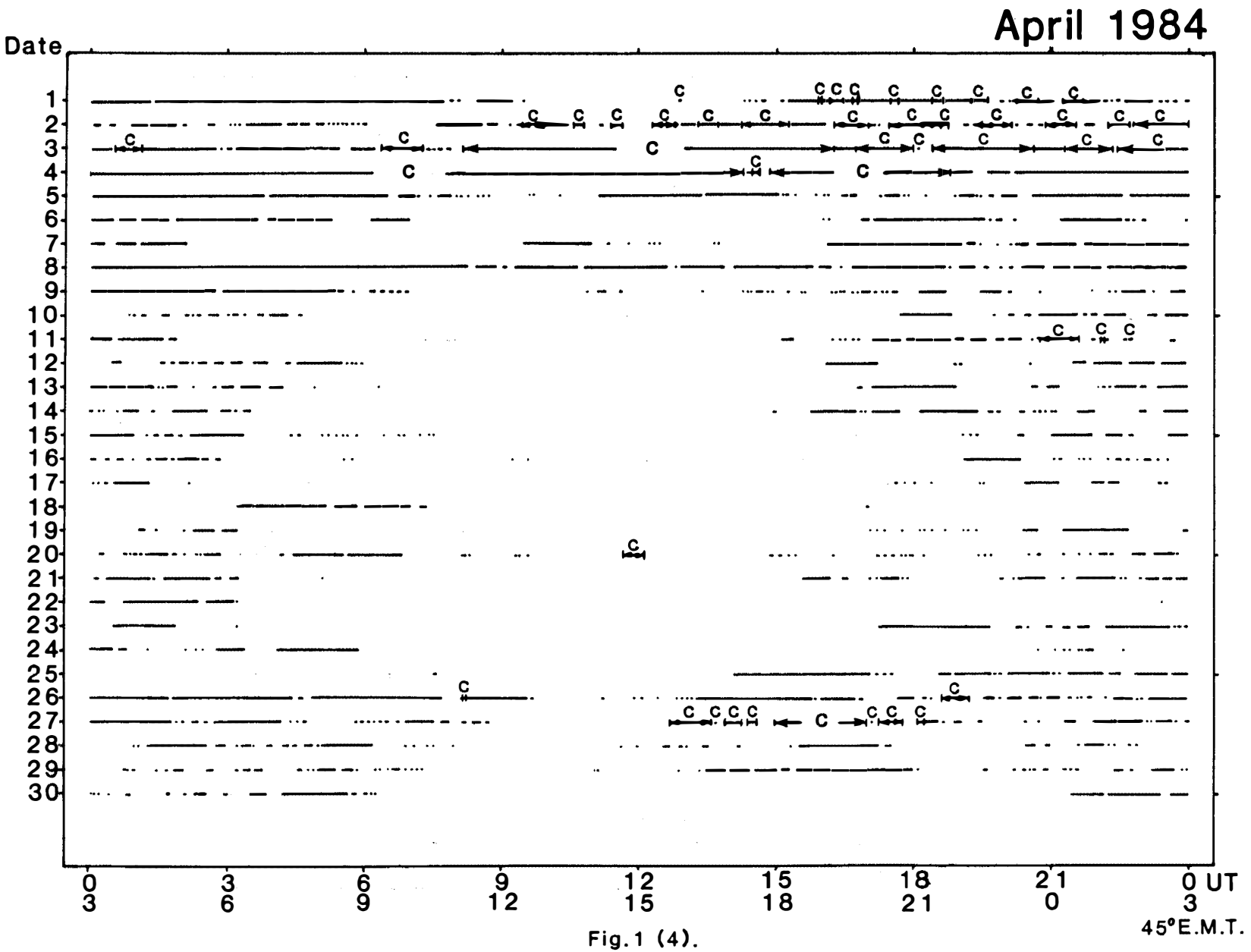
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Fig.1 (4).

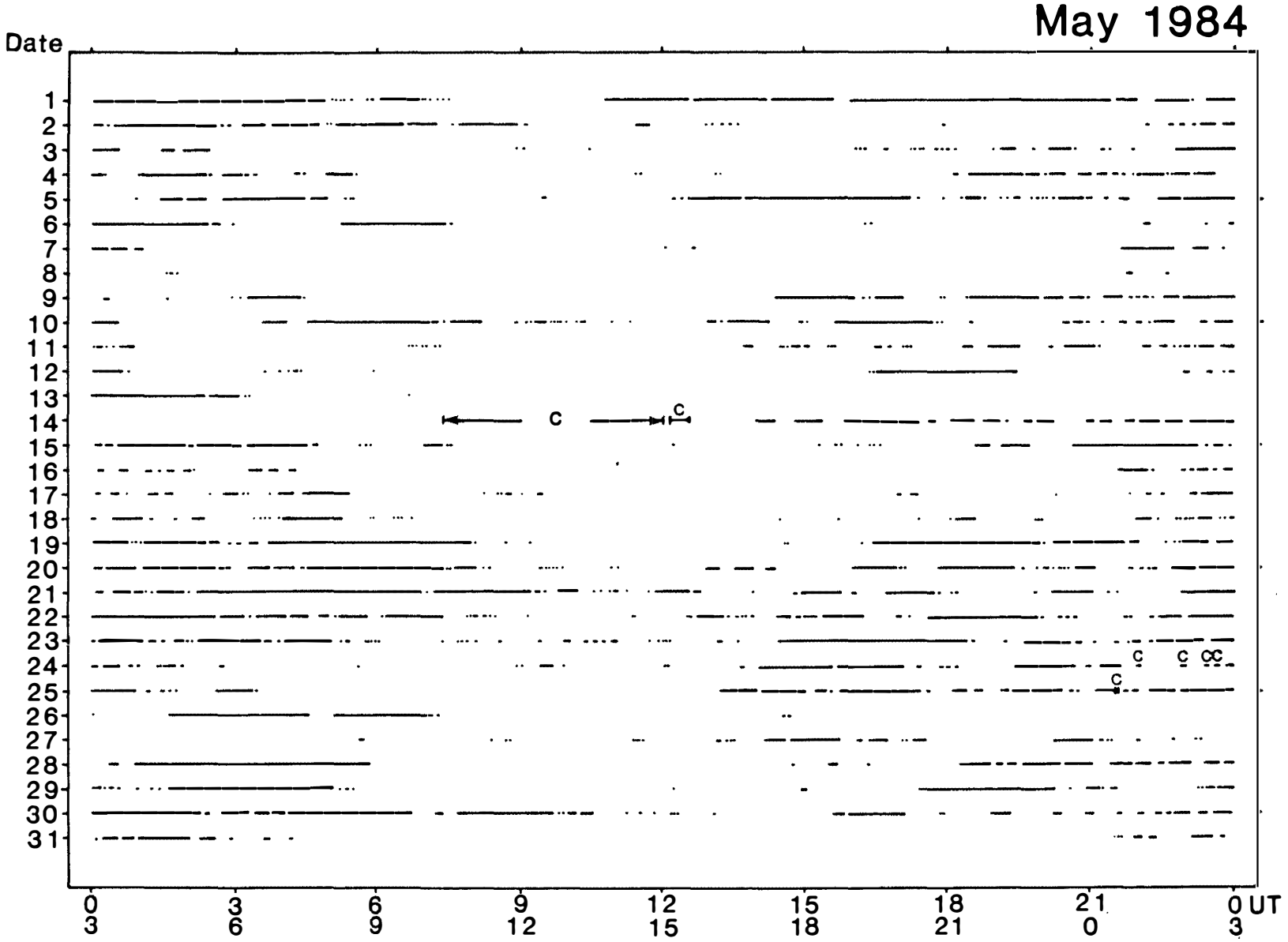
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Fig.1 (5).

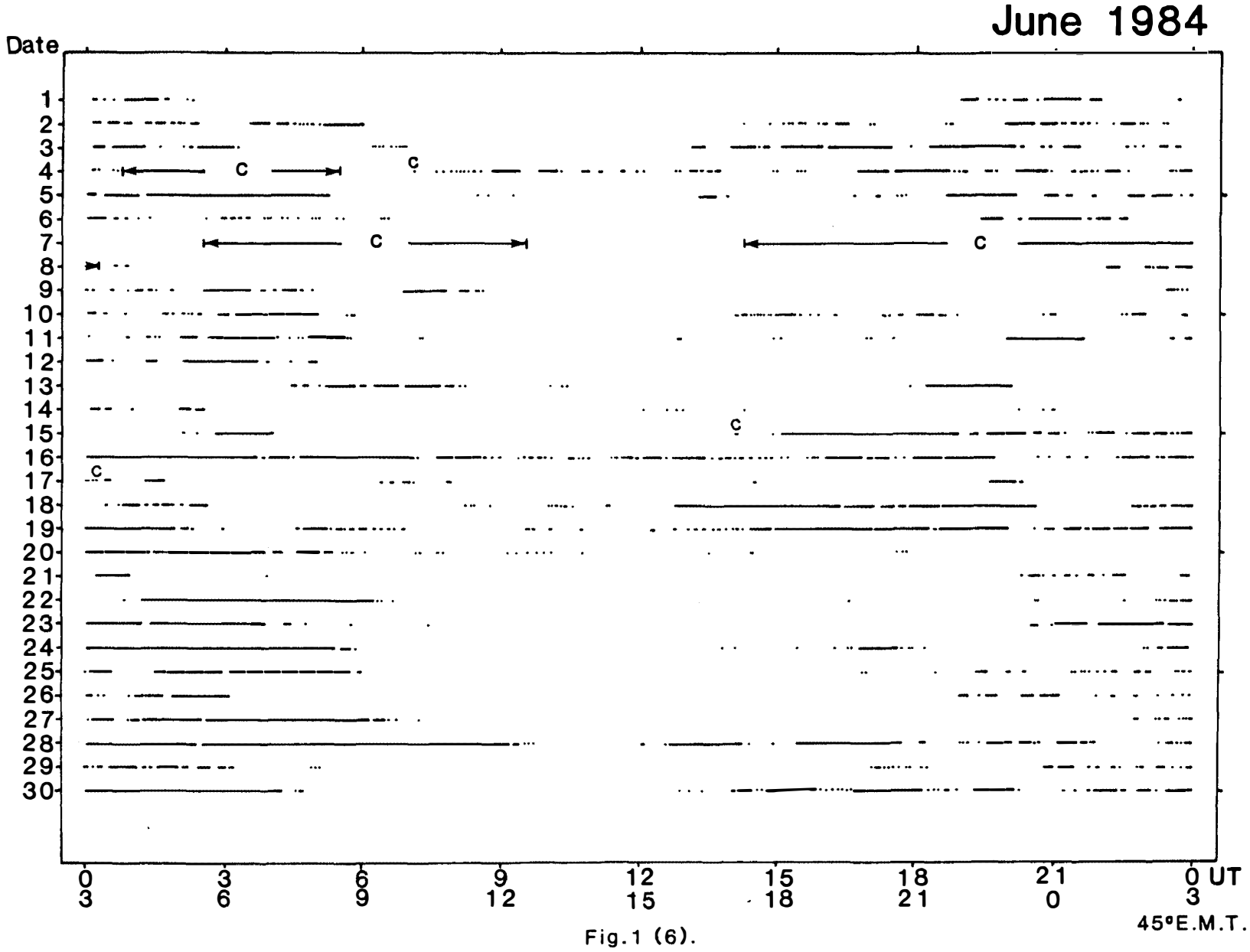
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Fig.1 (6).

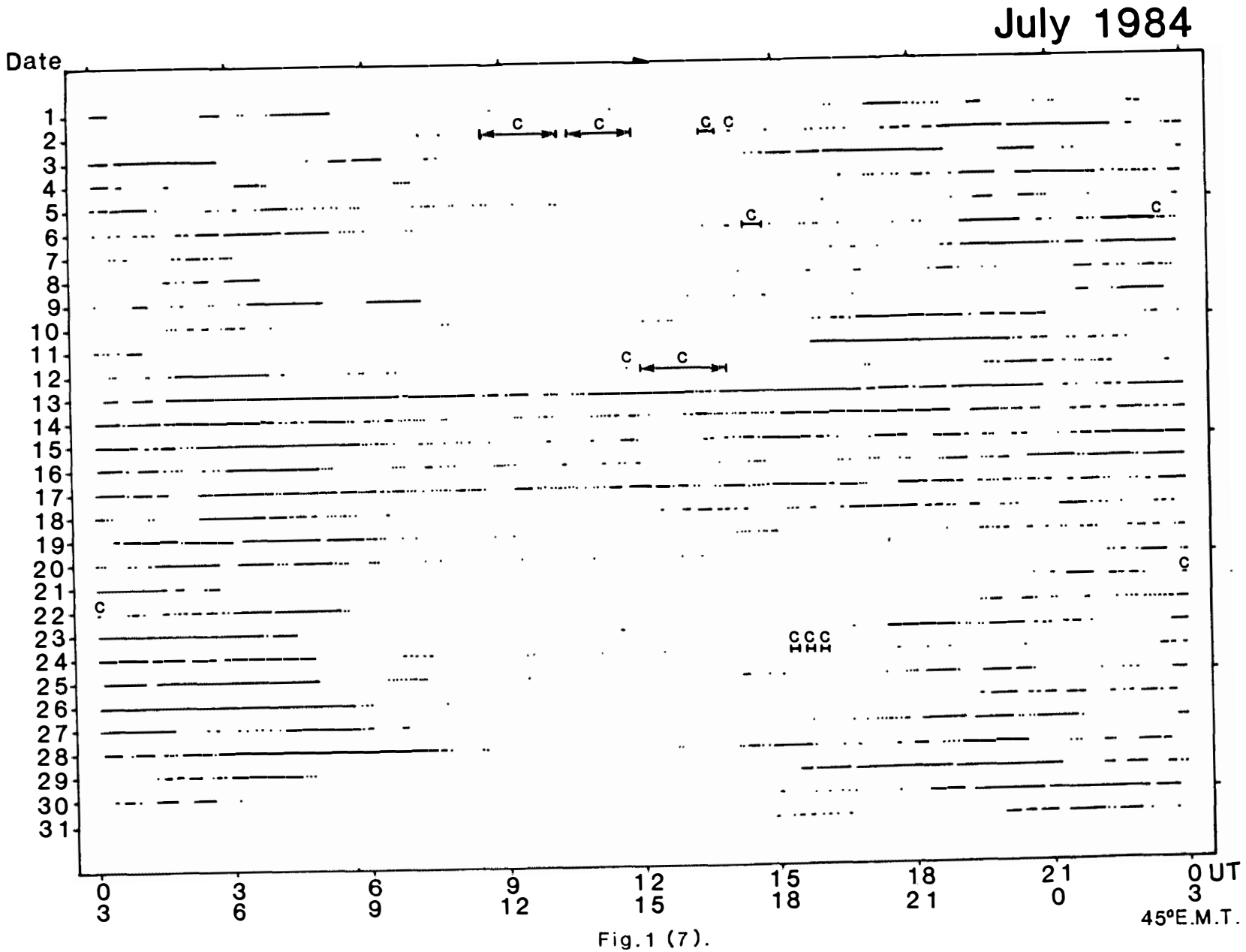
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Fig.1 (7).

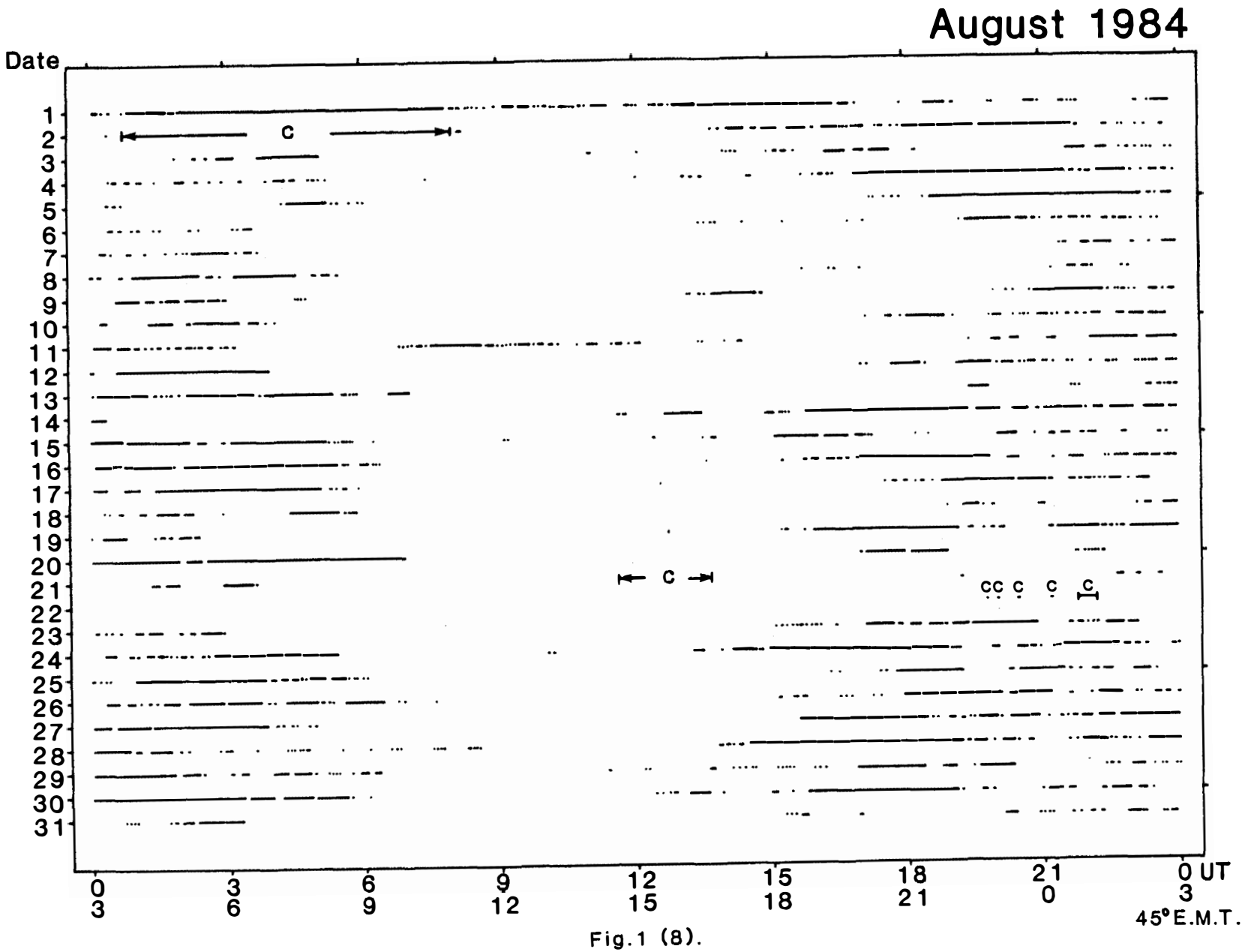
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Fig.1 (8).

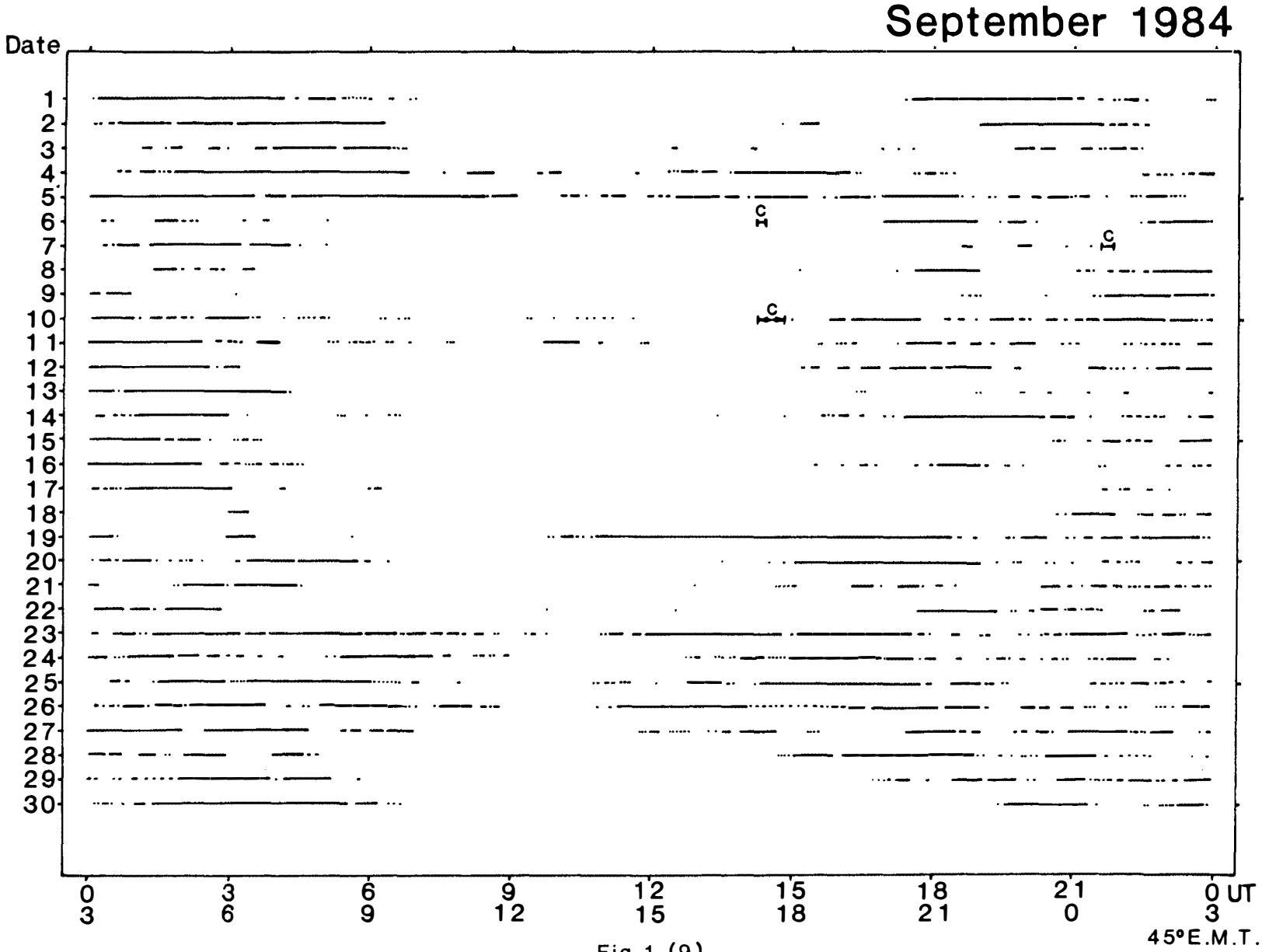
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Fig.1 (9).

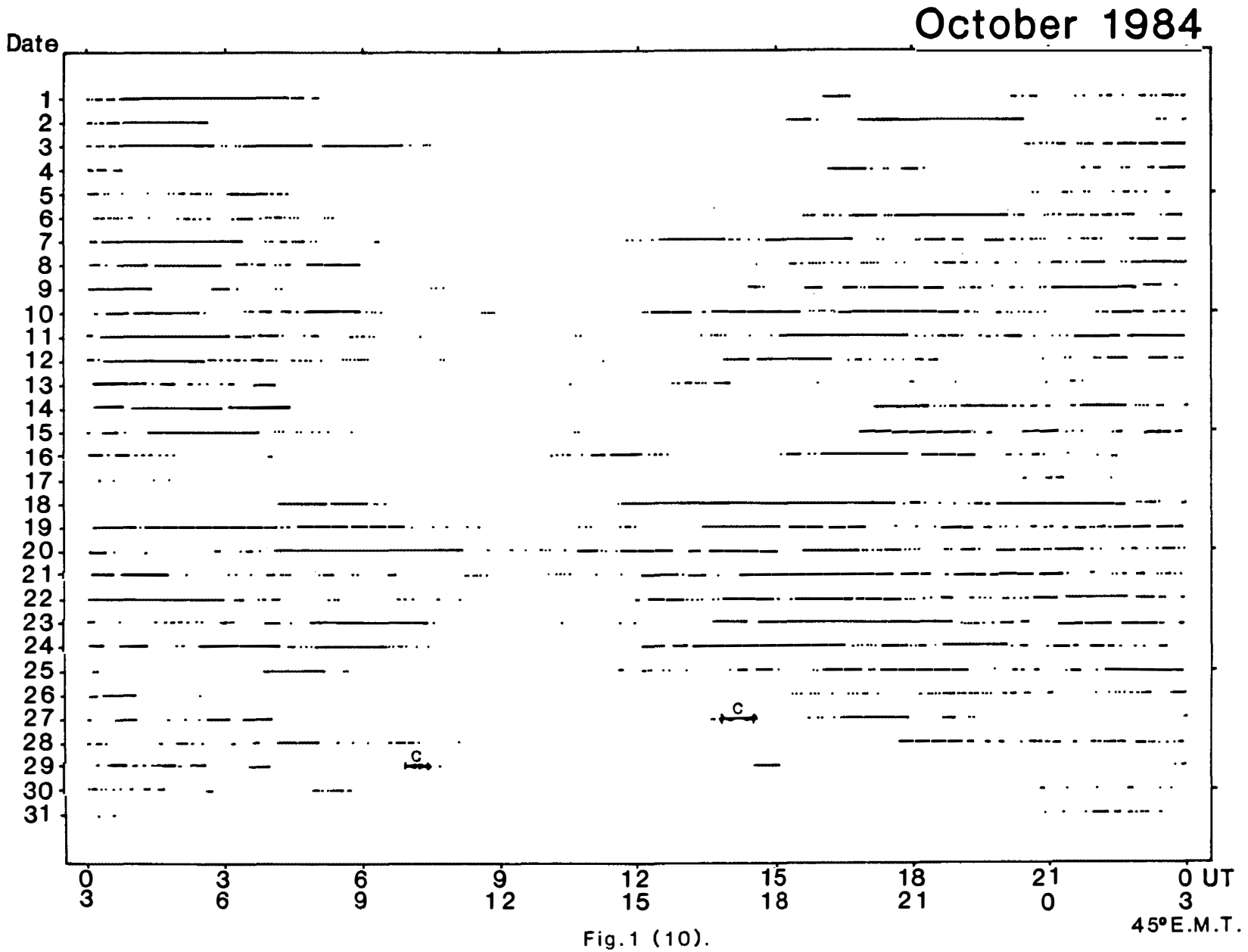
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Fig.1 (10).

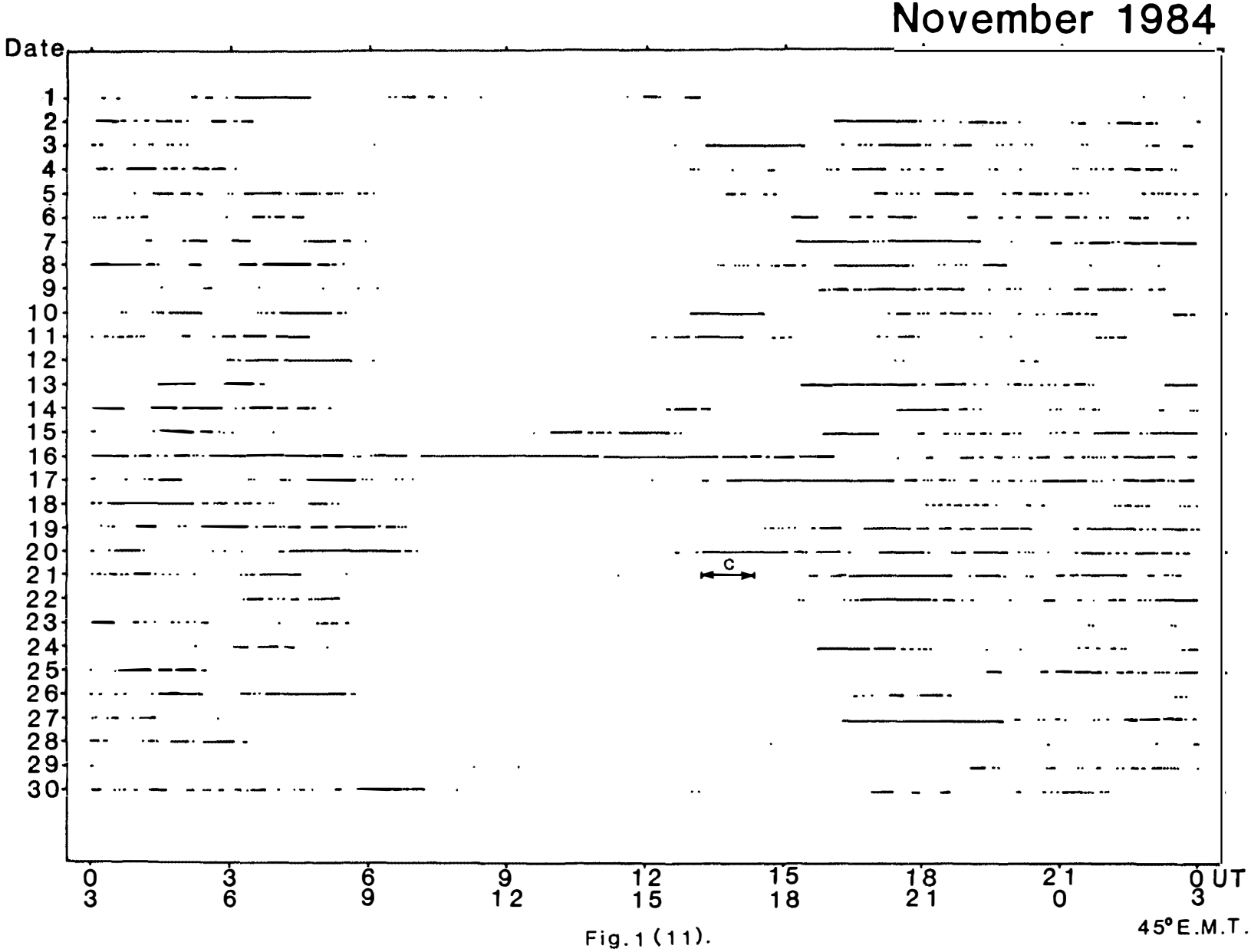
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Fig. 1 (11).

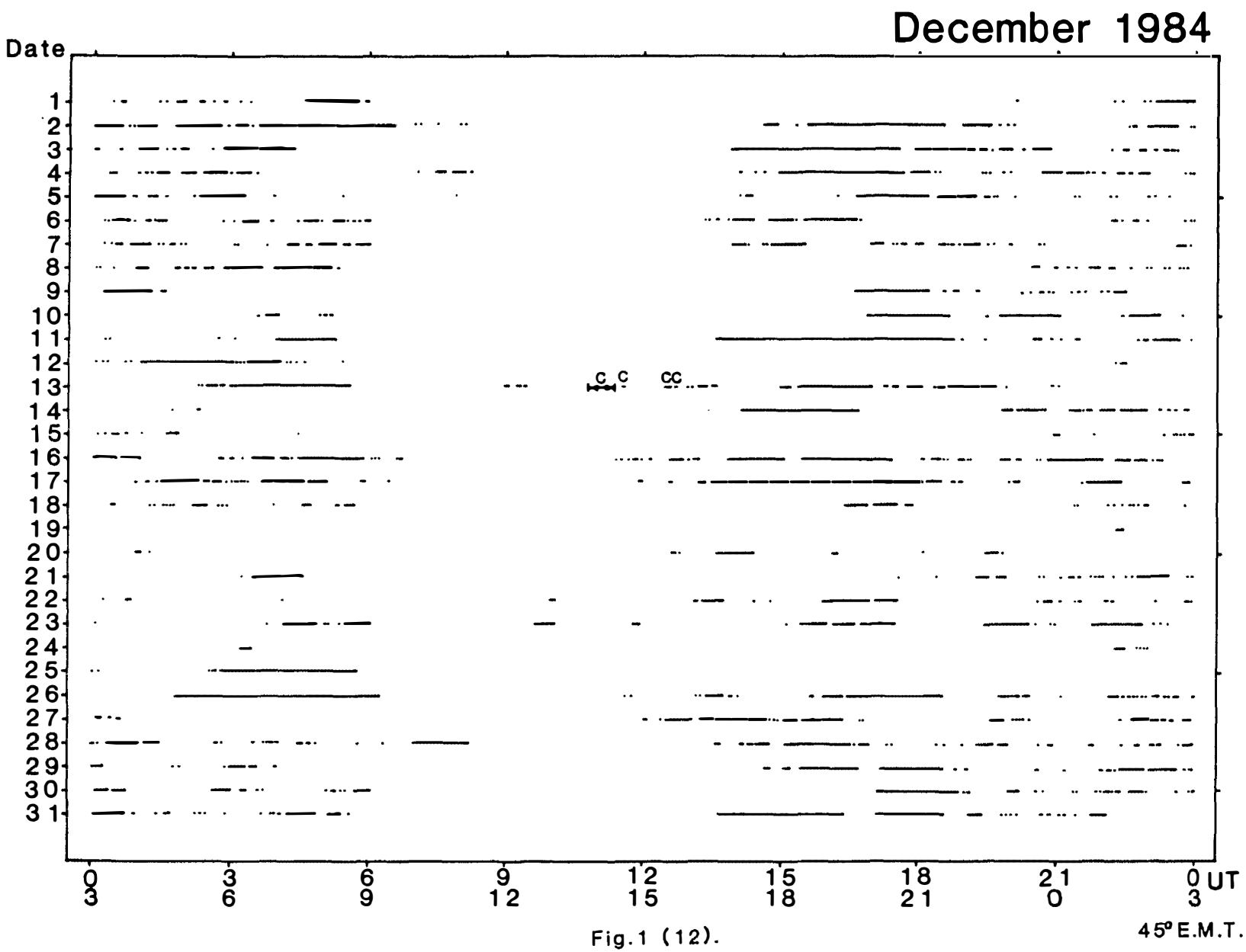
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Fig.1 (12).

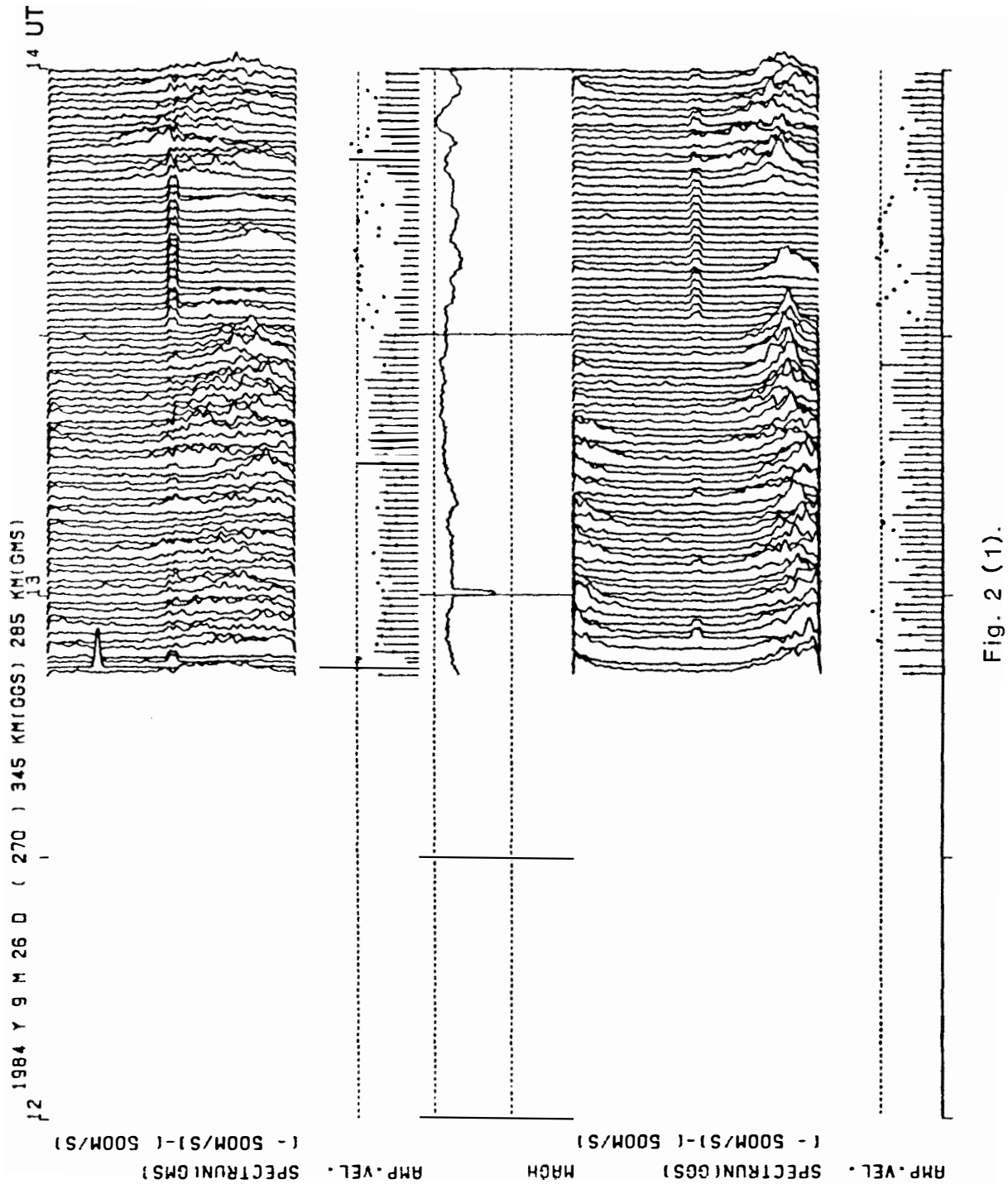
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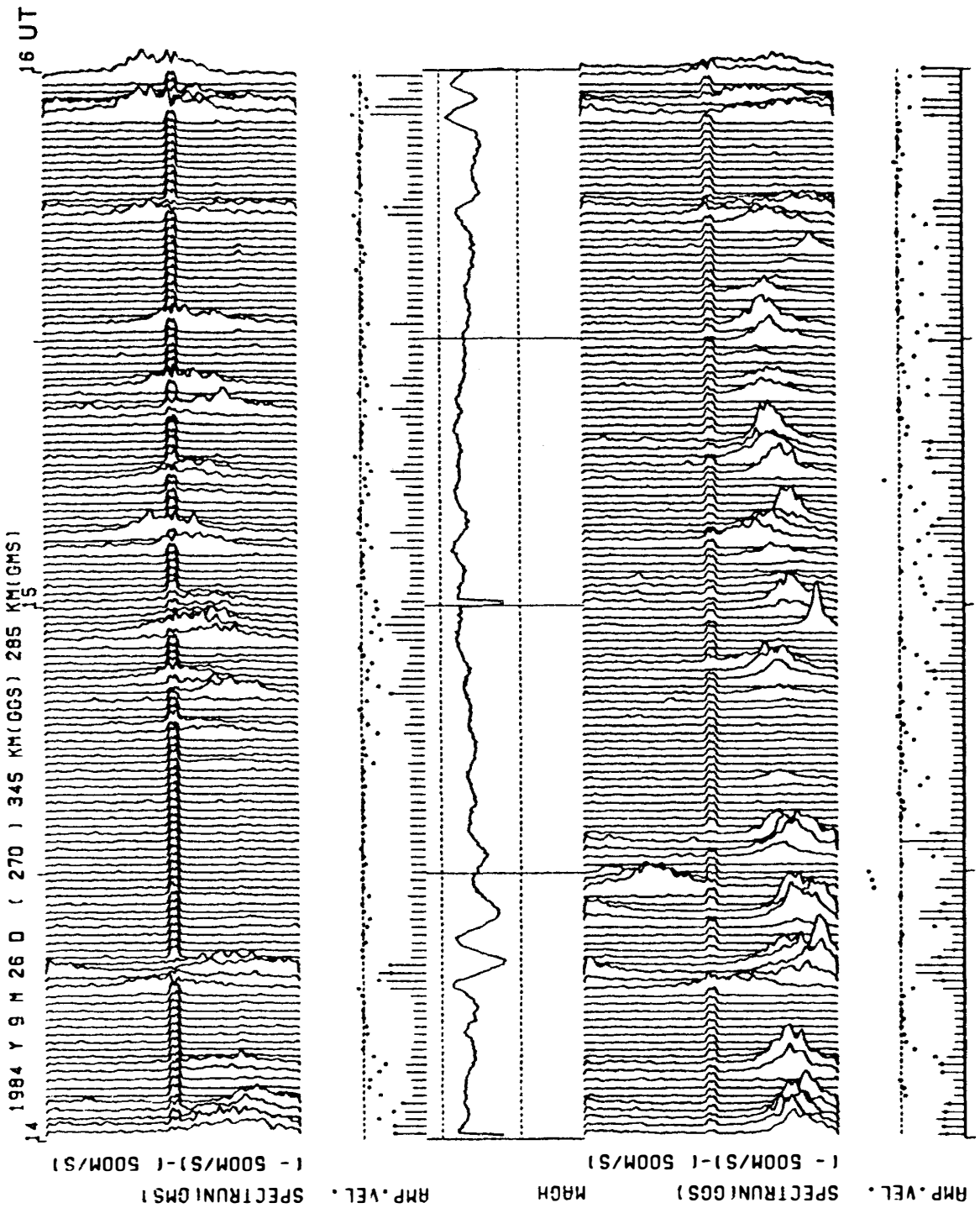
Fig. 2 (1).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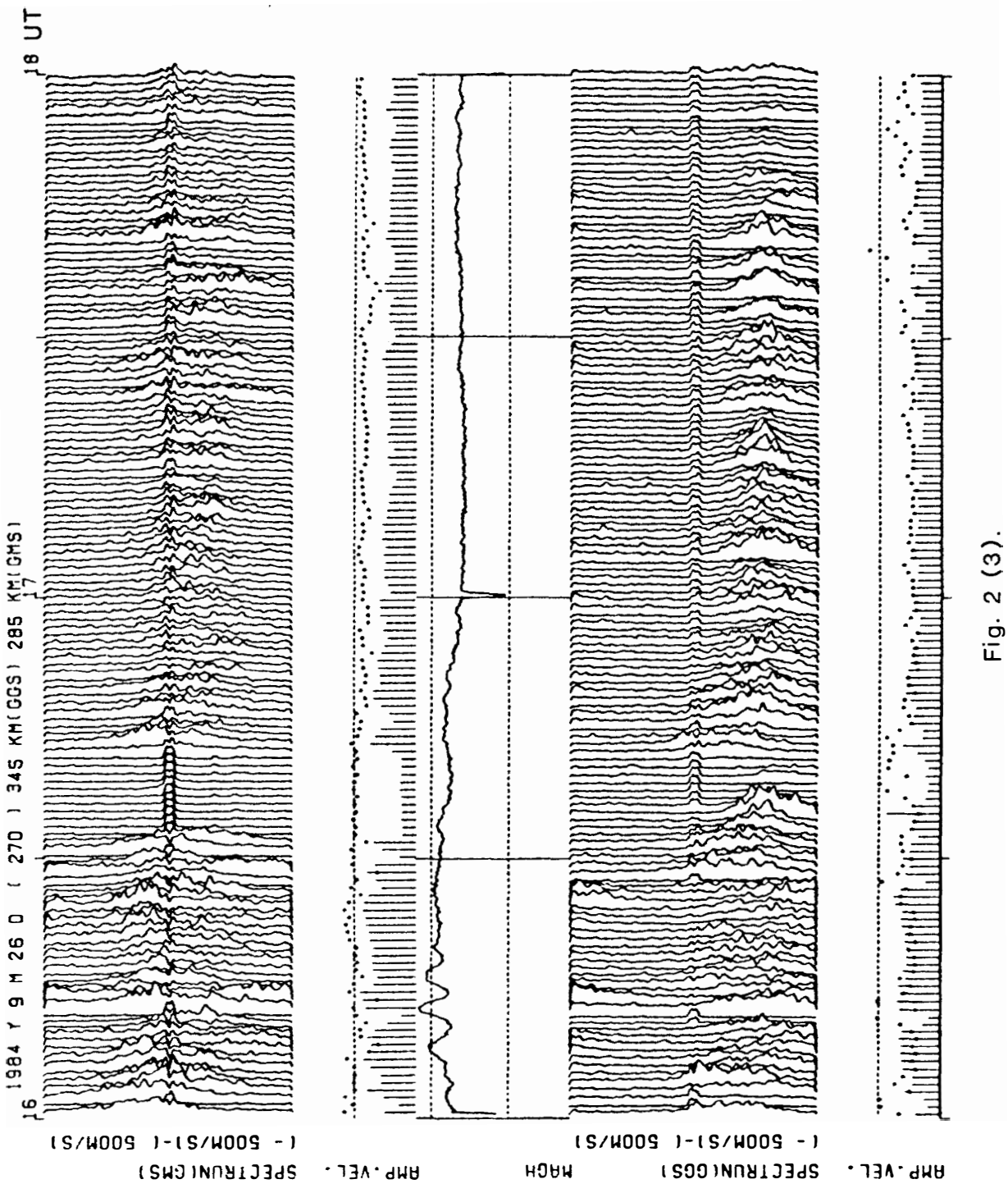
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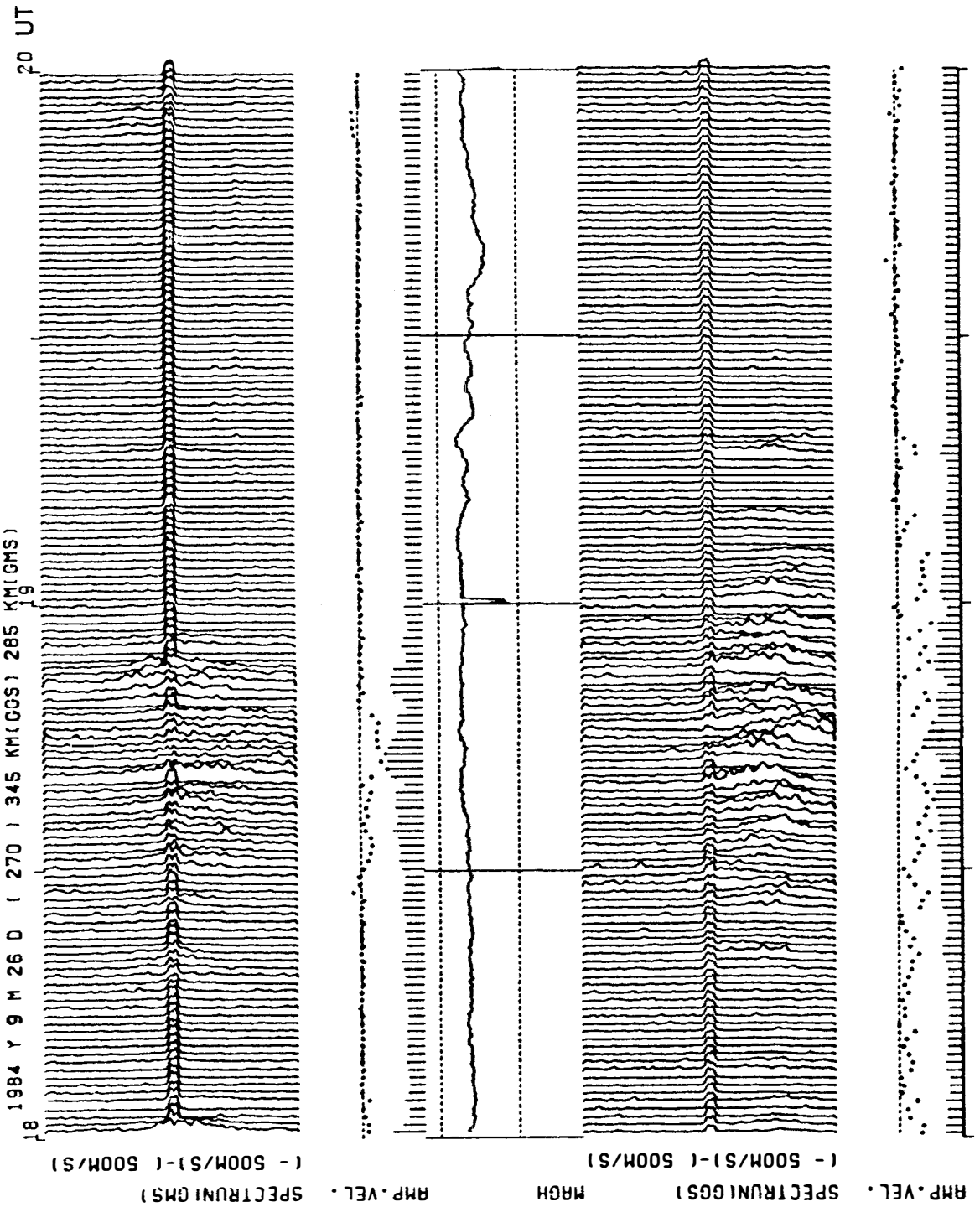
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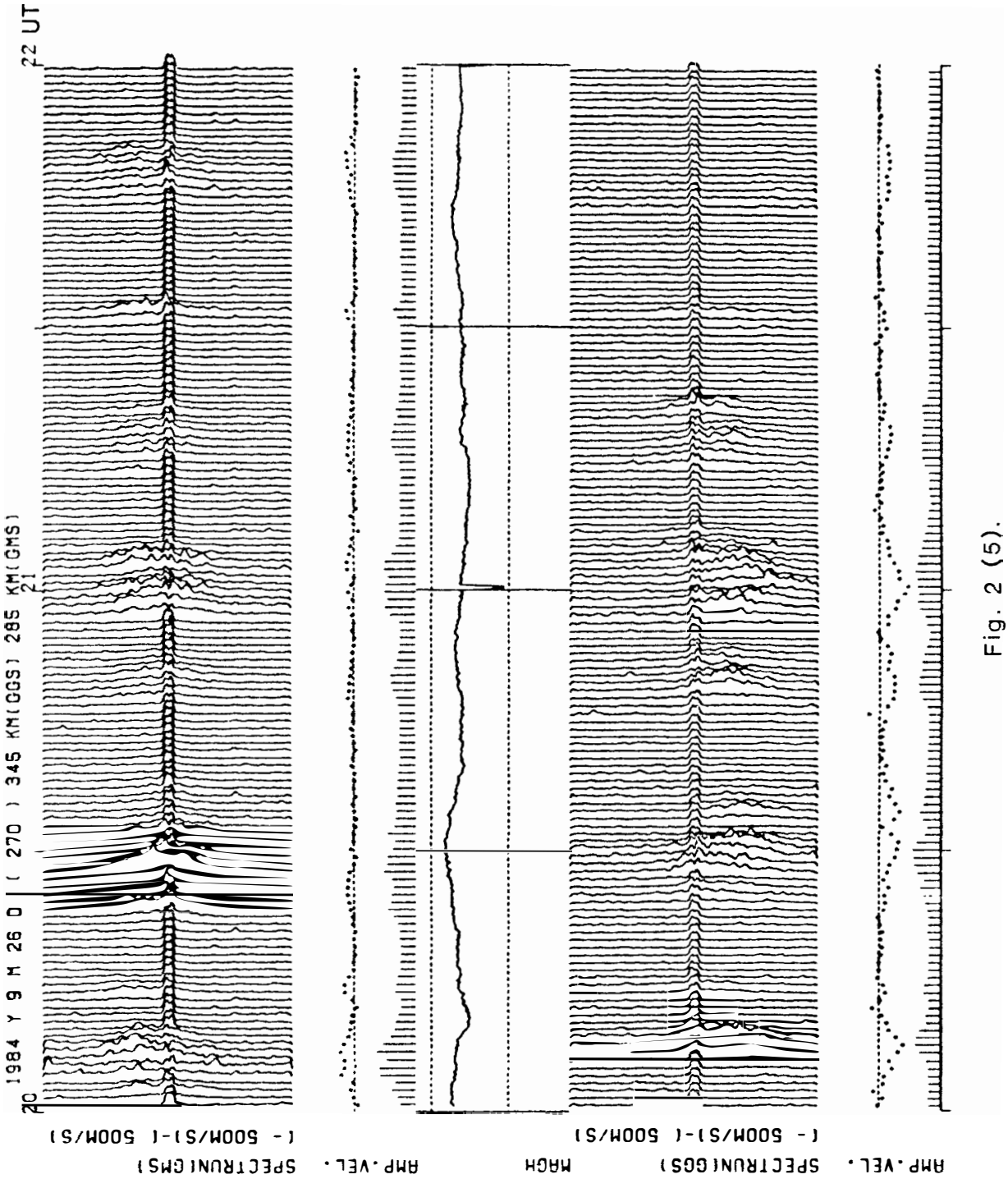
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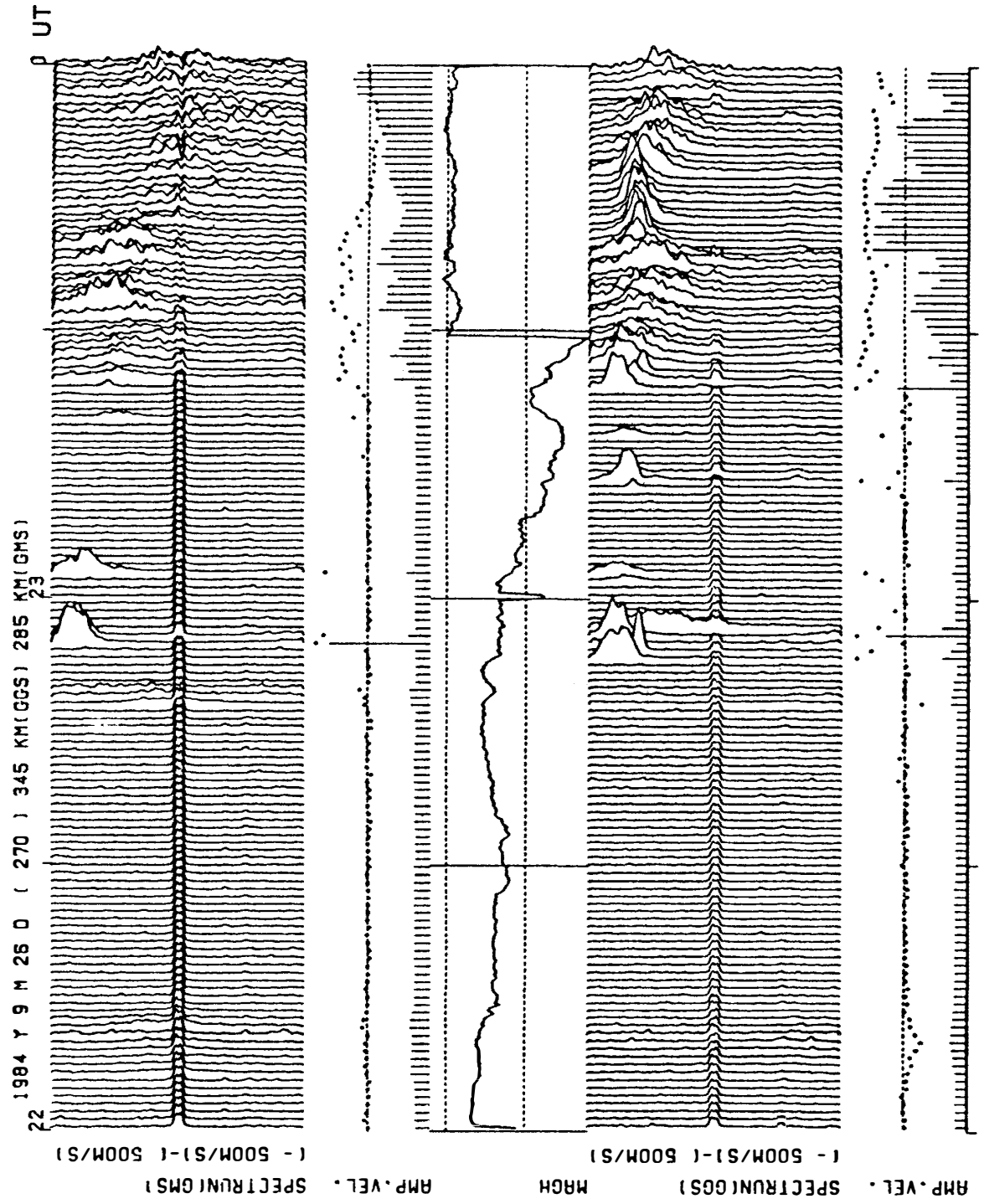
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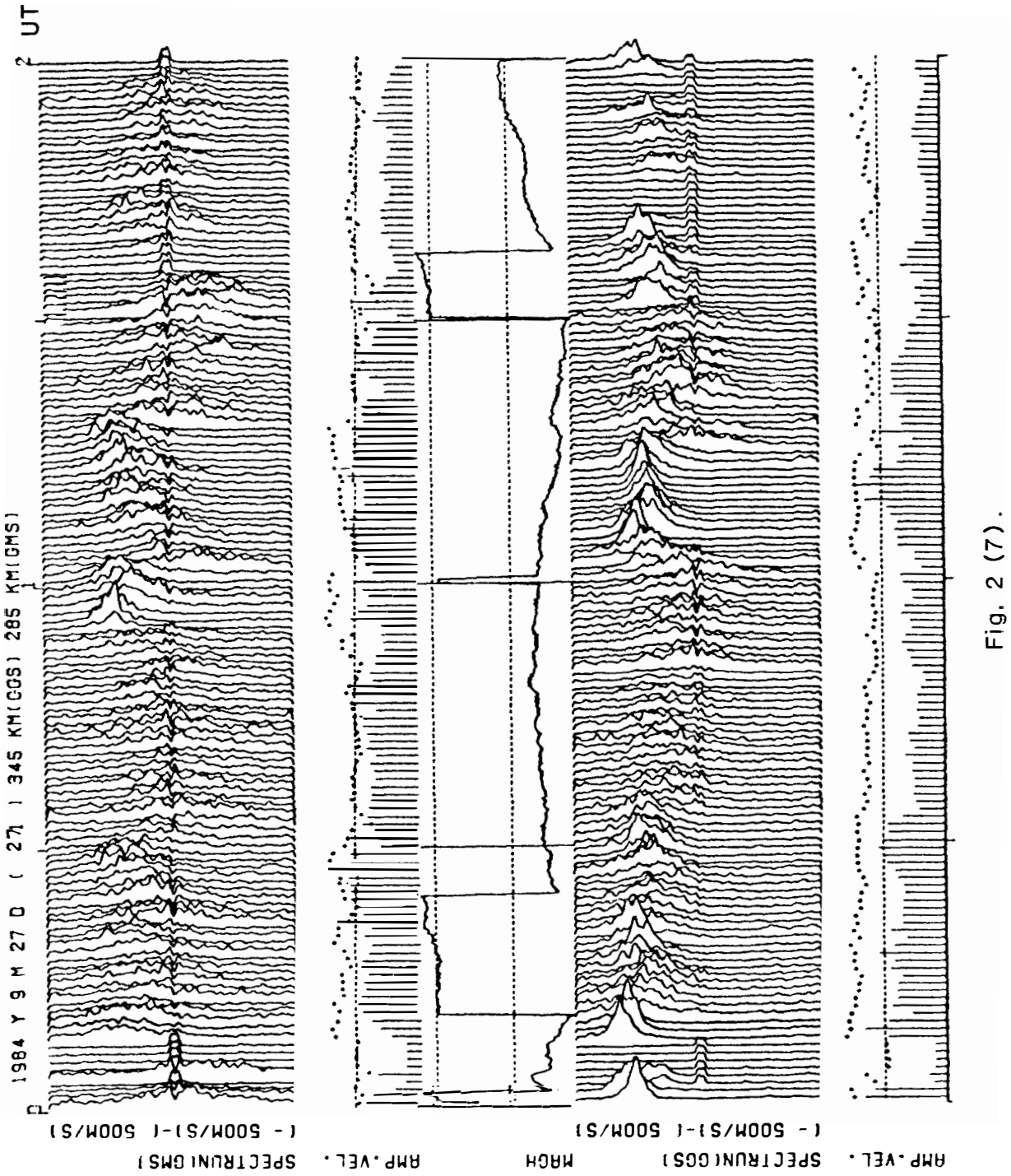
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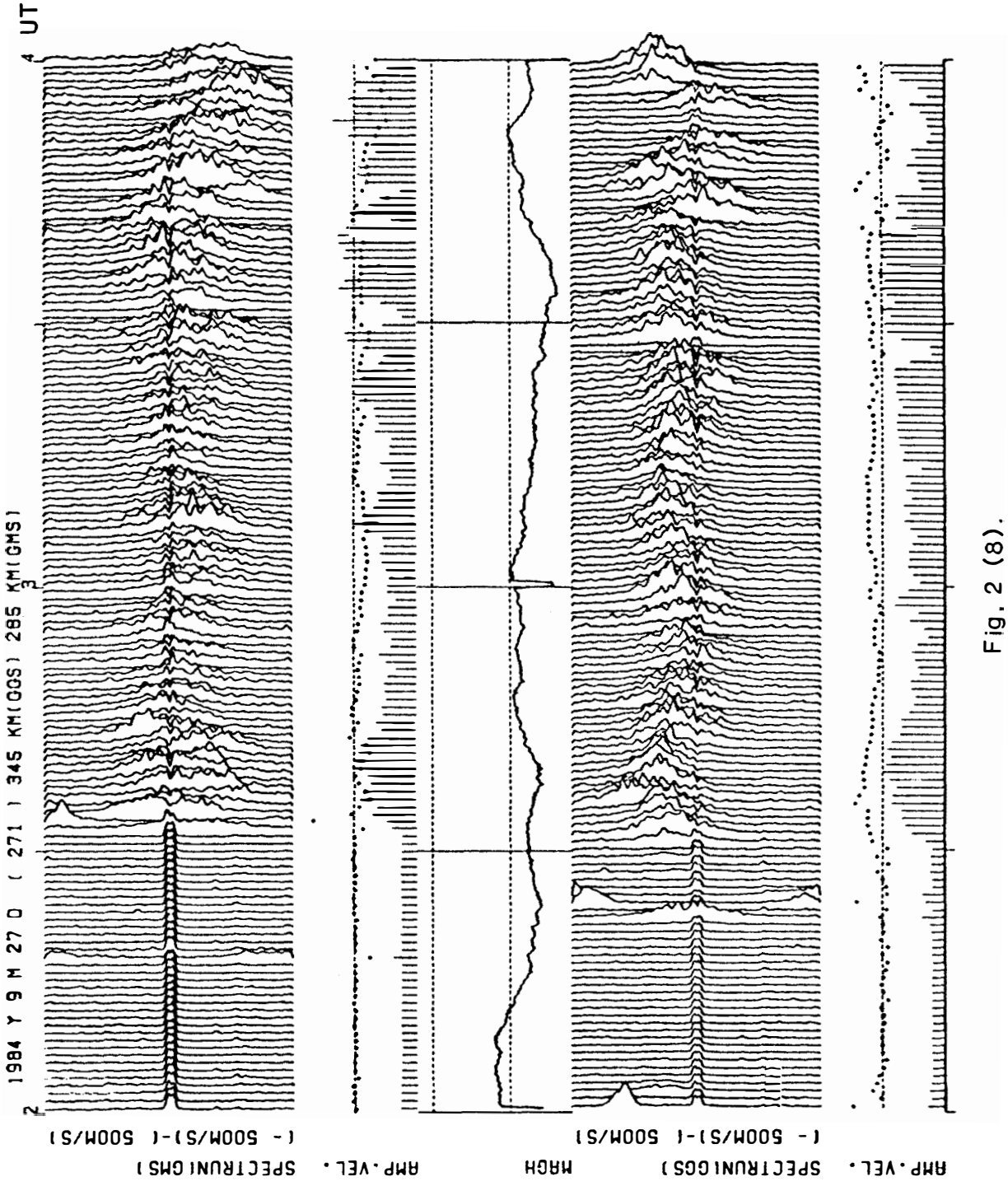
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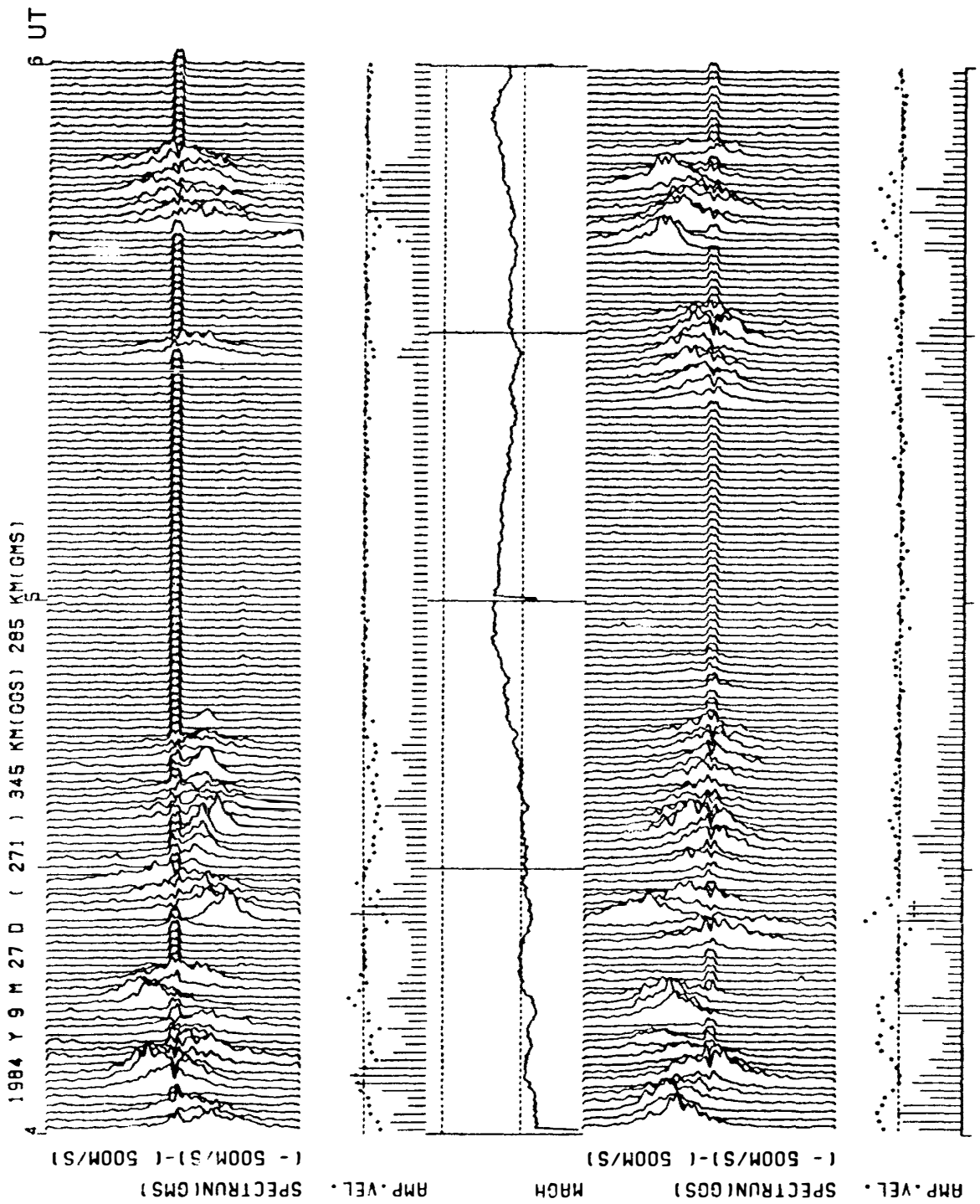
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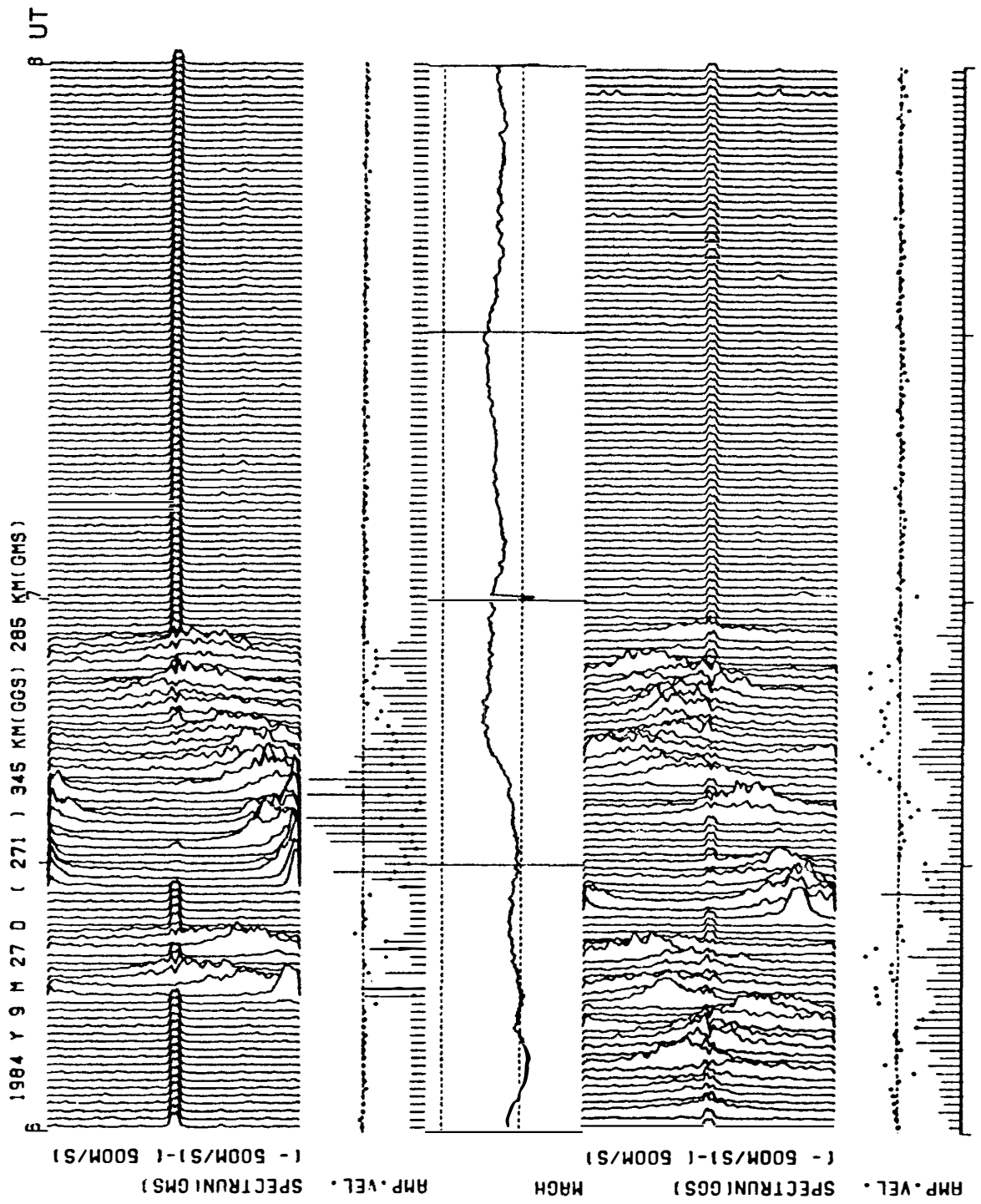
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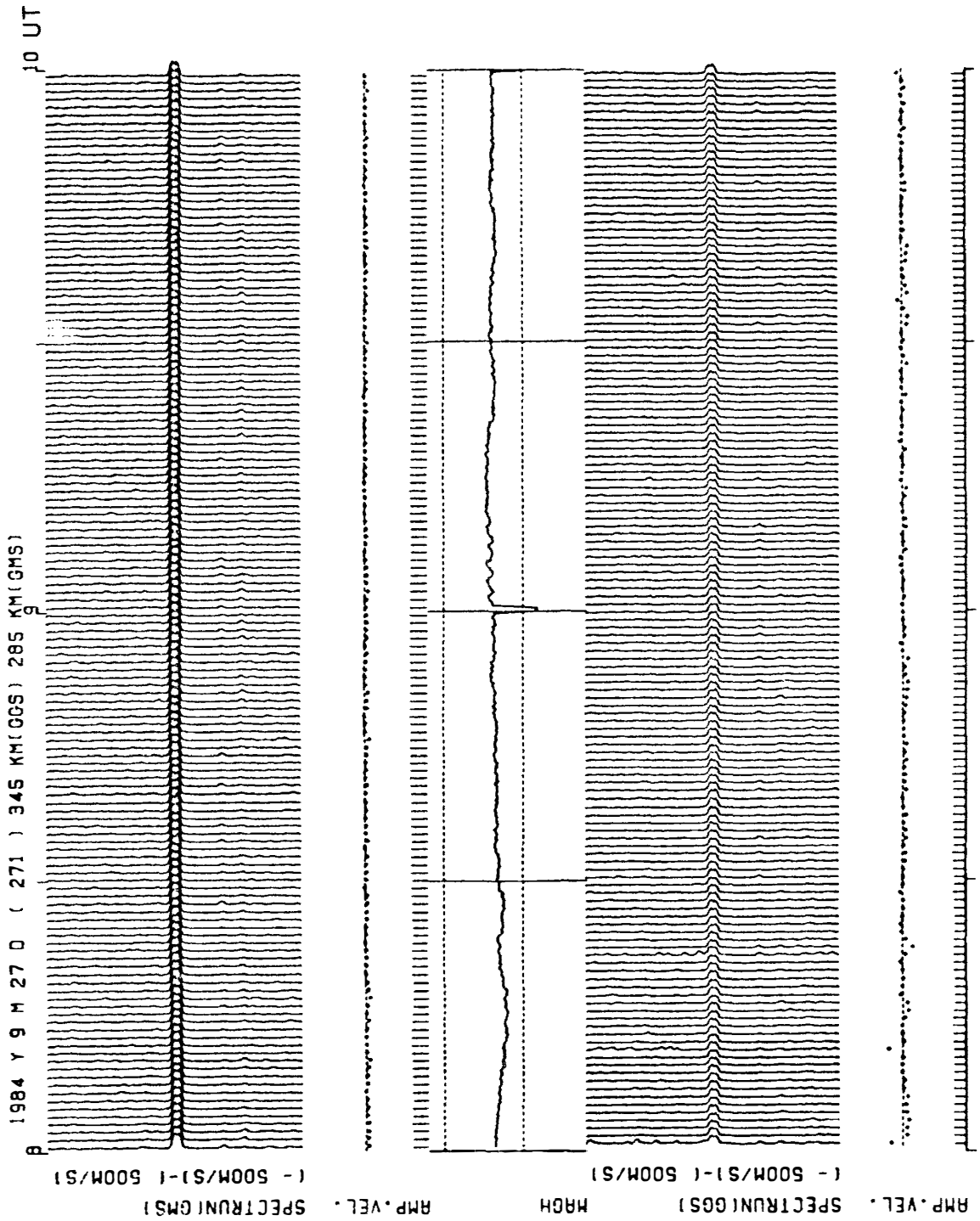
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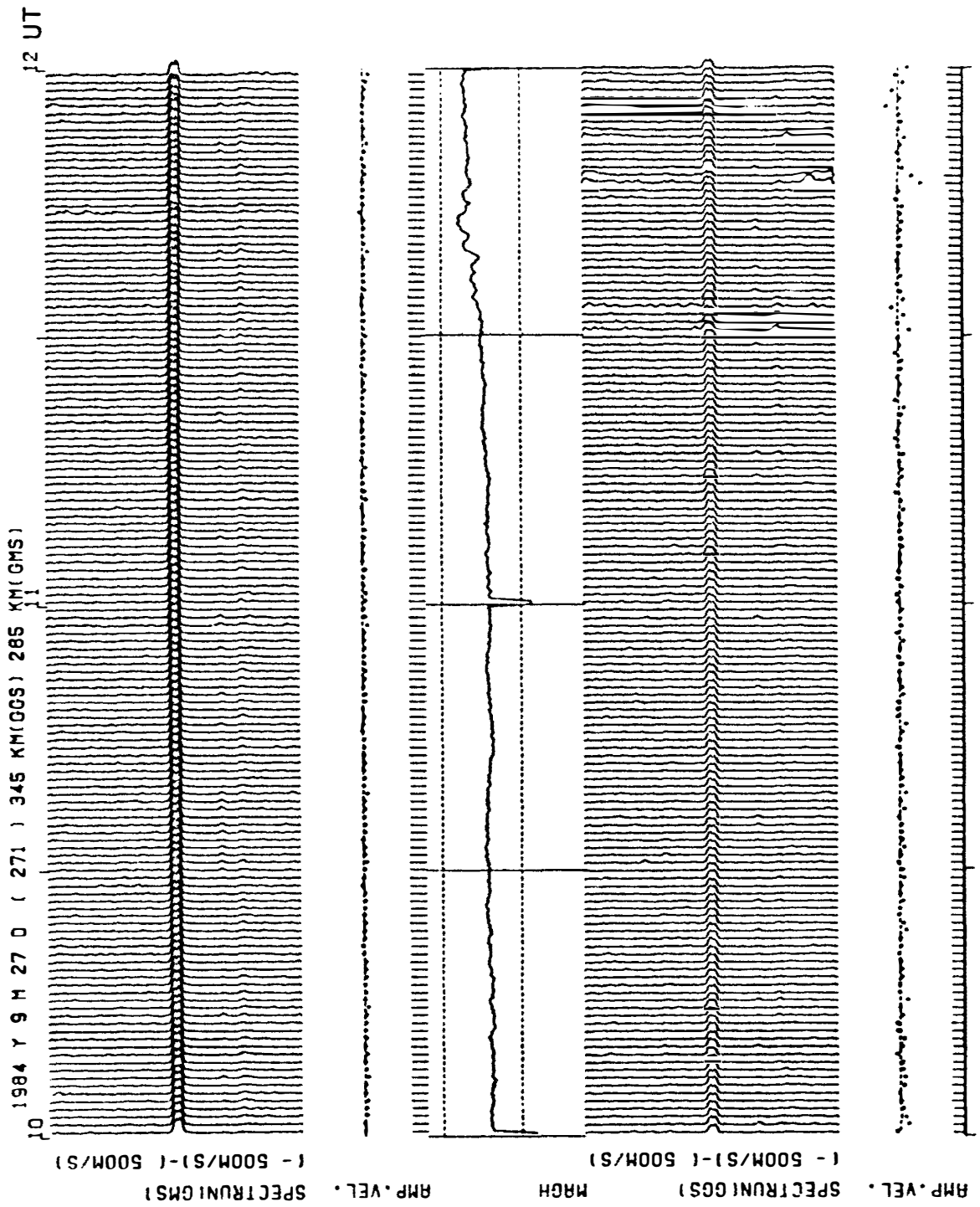
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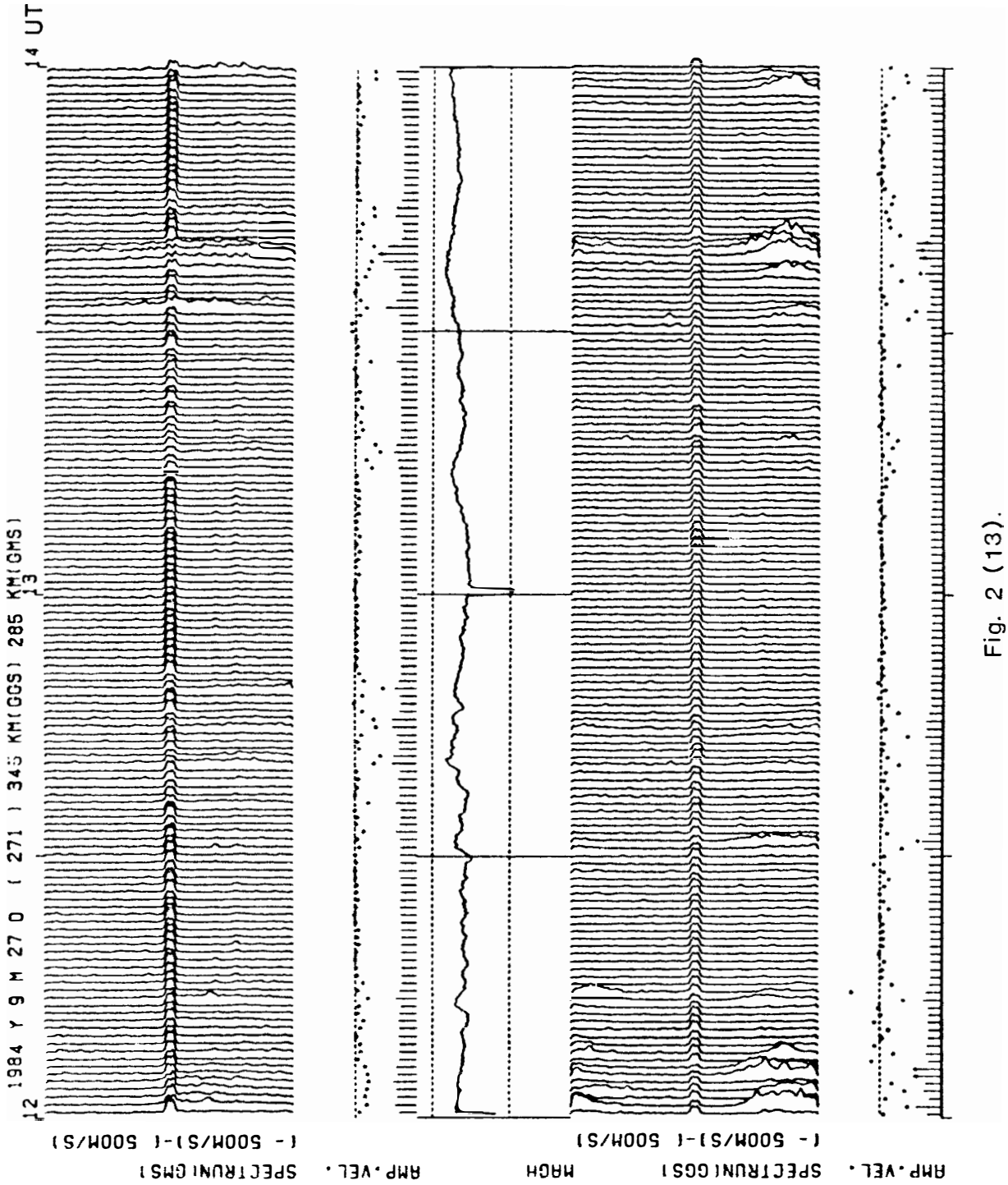
Fig. 2 (12).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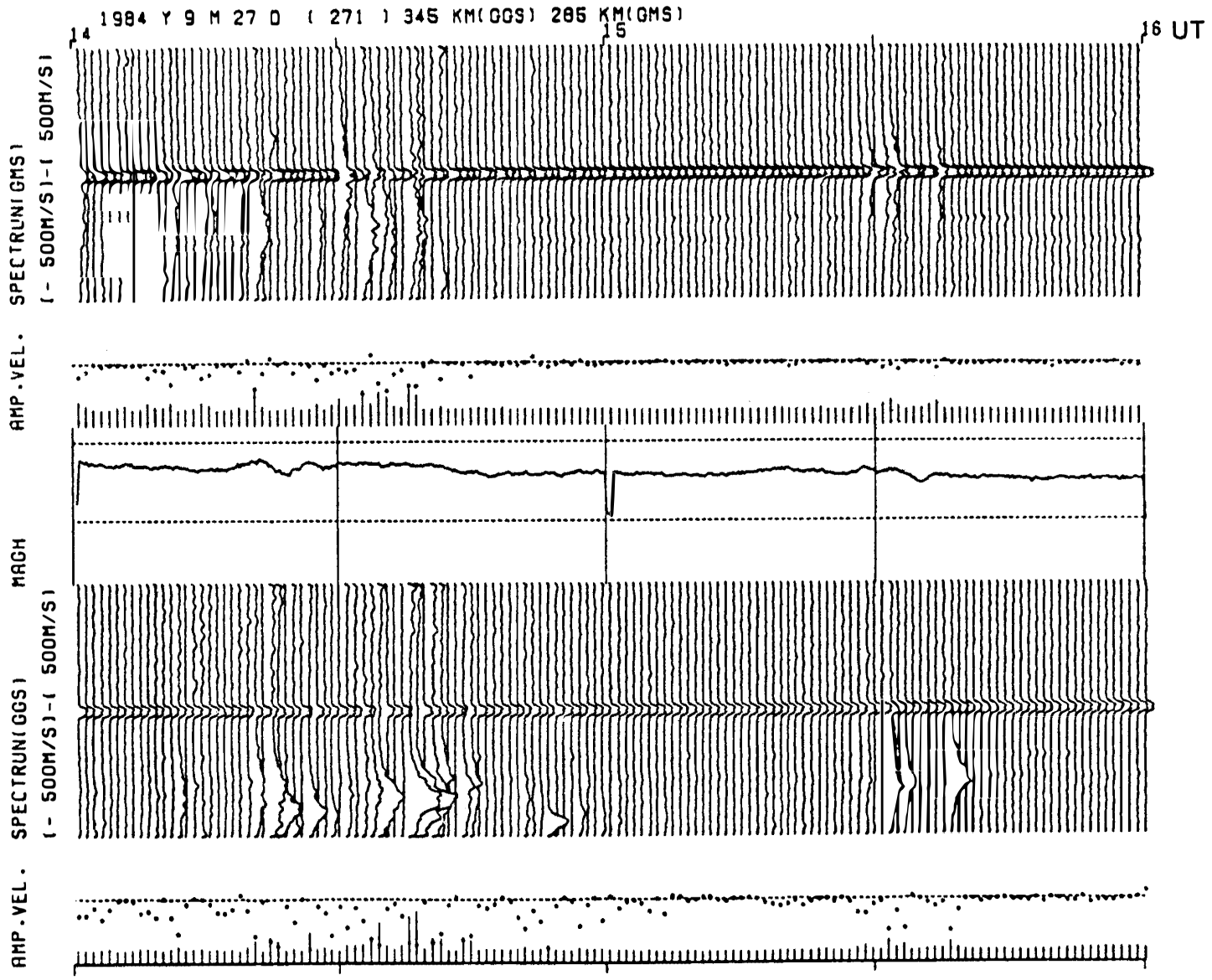
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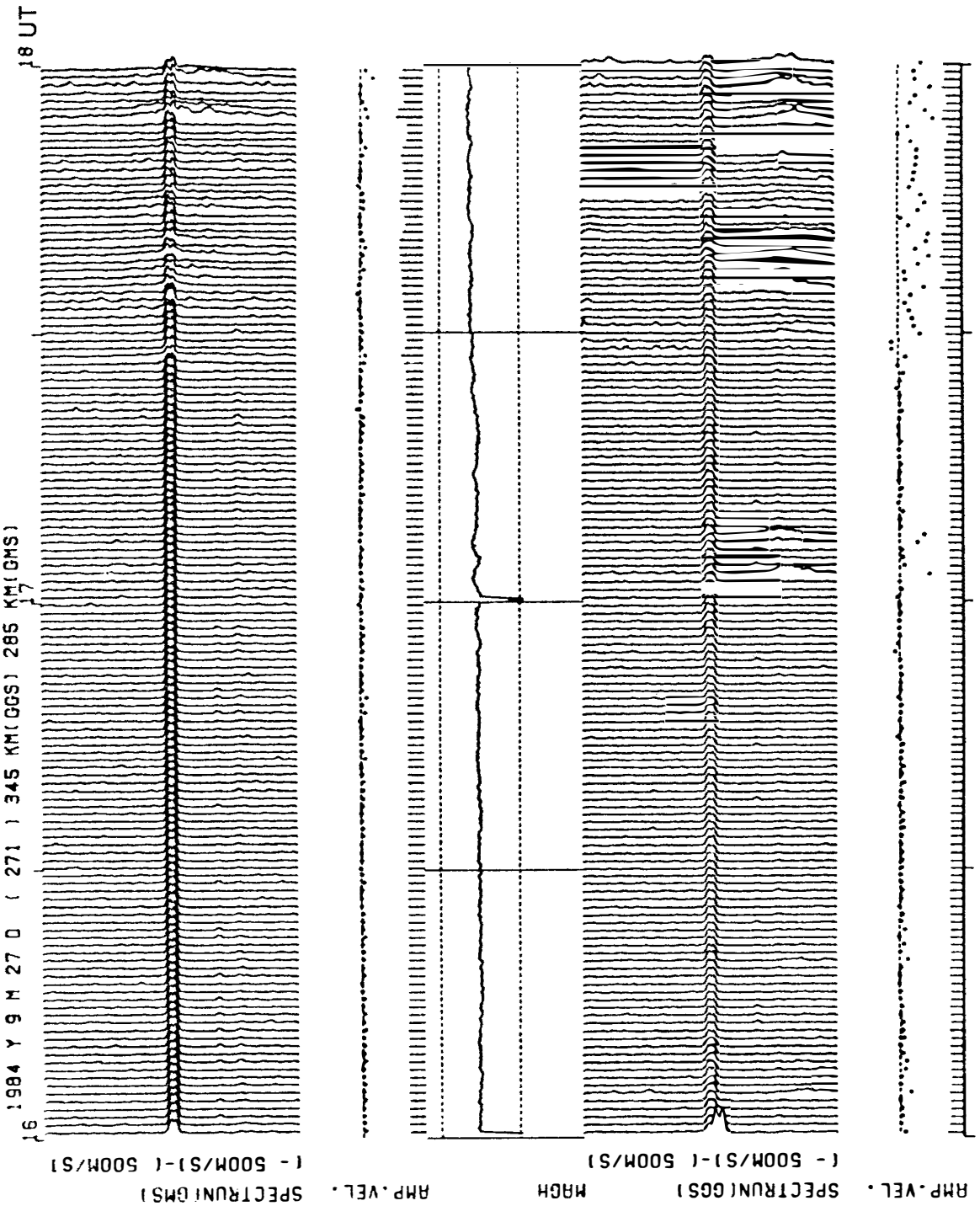
Fig. 2 (14).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AMP.VEL.

Fig. 2 (15).

1984 Y 9 M 27 D (271) 345 KM(OGS) 285 KM(OMS)
18
19
20 UT
SPECTRUM(GMS)
(- 500M/S)-(500M/S)
AMP.VEL.
MACH
SPECTRUM(GOS)
(- 500M/S)-(500M/S)
AMP.VEL.

Fig. 2 (16).

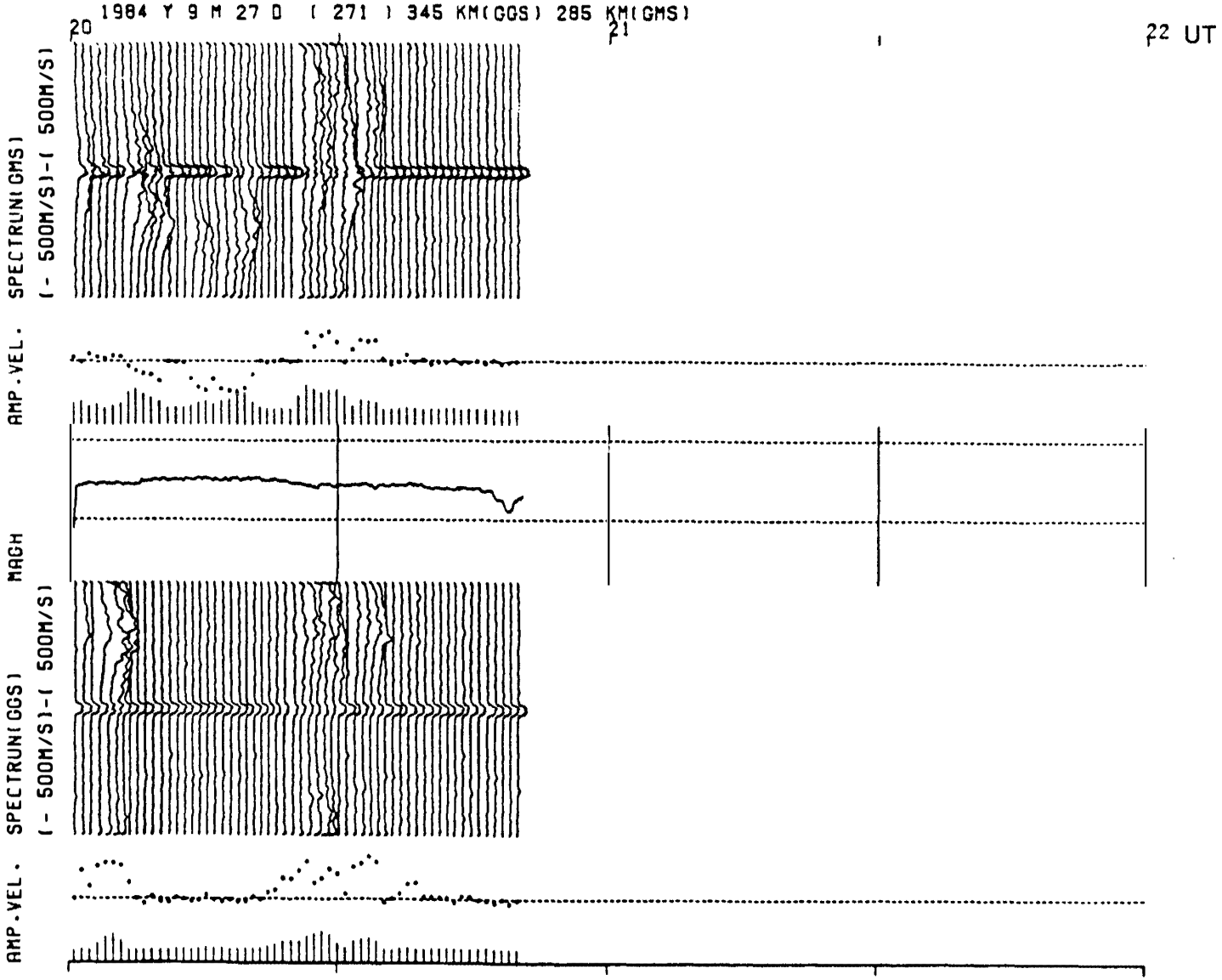
1984 Y 9 M 27 D (271) 345 KM(GGS) 285 KM(GMS)
20
21
22 UT
SPECTRUM(GMS)
(- 500M/S)-(500M/S)
AMP.VEL.
MAGH
SPECTRUM(GGS)
(- 500M/S)-(500M/S)
AMP.VEL.

Fig. 2 (17).