RECORDS OF RADIO AURORA AT SYOWA STATION, ANTARCTICA IN 1985

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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 1985 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

Hideo MAENO (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 seconds by turns.

The A-scope record was taken every 5 minutes, 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 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 μs
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

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(1-40) show typical examples of compiled data for 50 MHz radio aurora. In each figure, time variations of the echo range (RTI), half-power width of doppler spectrum (V) at a fixed range (300 km) and echo power (P) at 300 km range are displayed for both the GGS (geographic south direction) and GMS (geomagnetic south direction) antenna beams. Also shown in the figure are the geomagnetic H-component and 30 MHz CNA obtained at Syowa Station. The CNA level is calibrated at 5h UT with a few exceptional cases. Note that the slowly-varying, continuous curve in the V panel is not real but due to the interference from the receiver. The beginning and ending times of the observation are indicated on the top in each figure.

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
Jan. 1984 - Dec. 1984	Igarashi, K. Tanaka, T. Yamamoto, S.	113 (Ionosphere 34)	33	1986

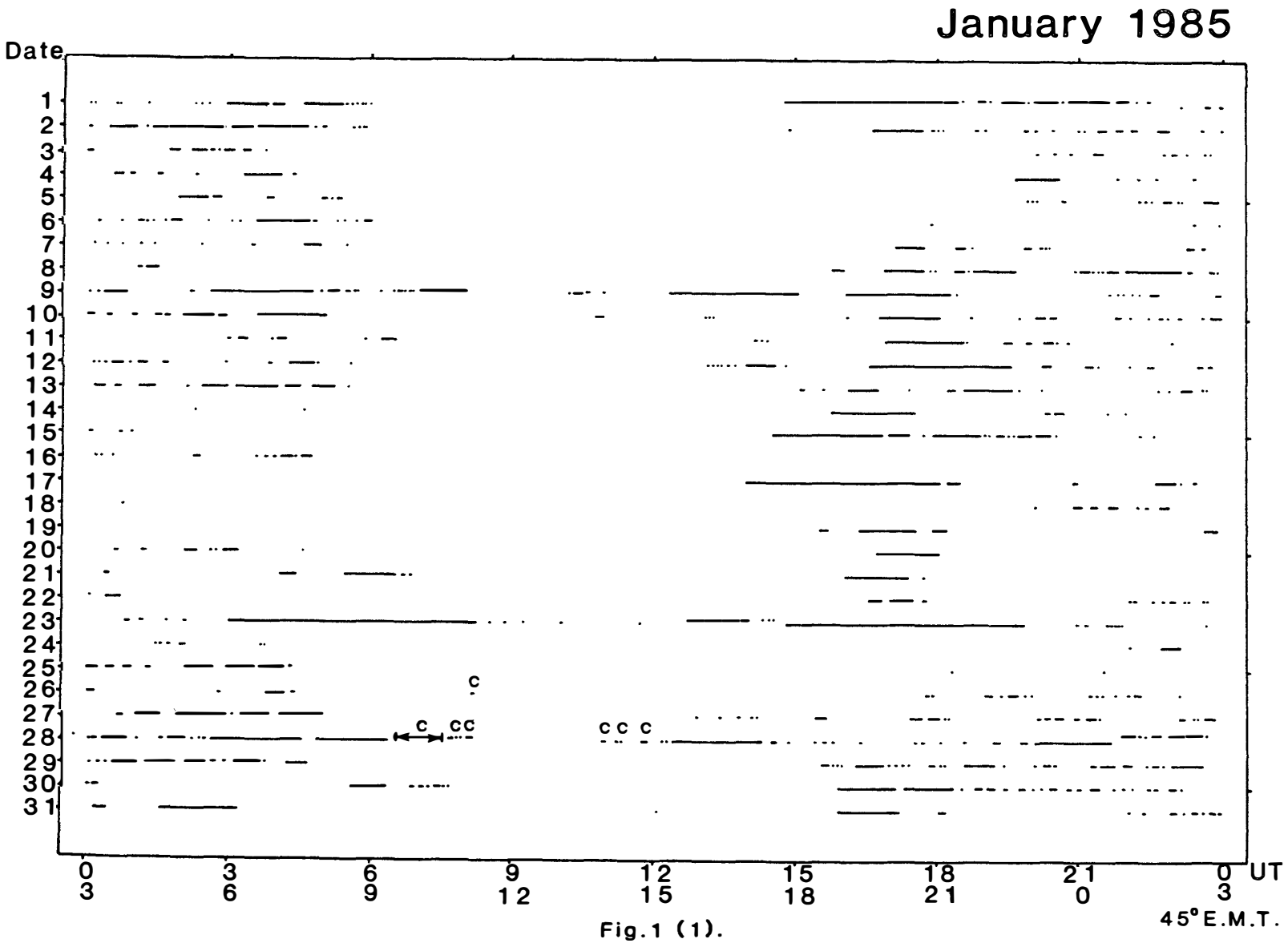
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Fig.1 (1).

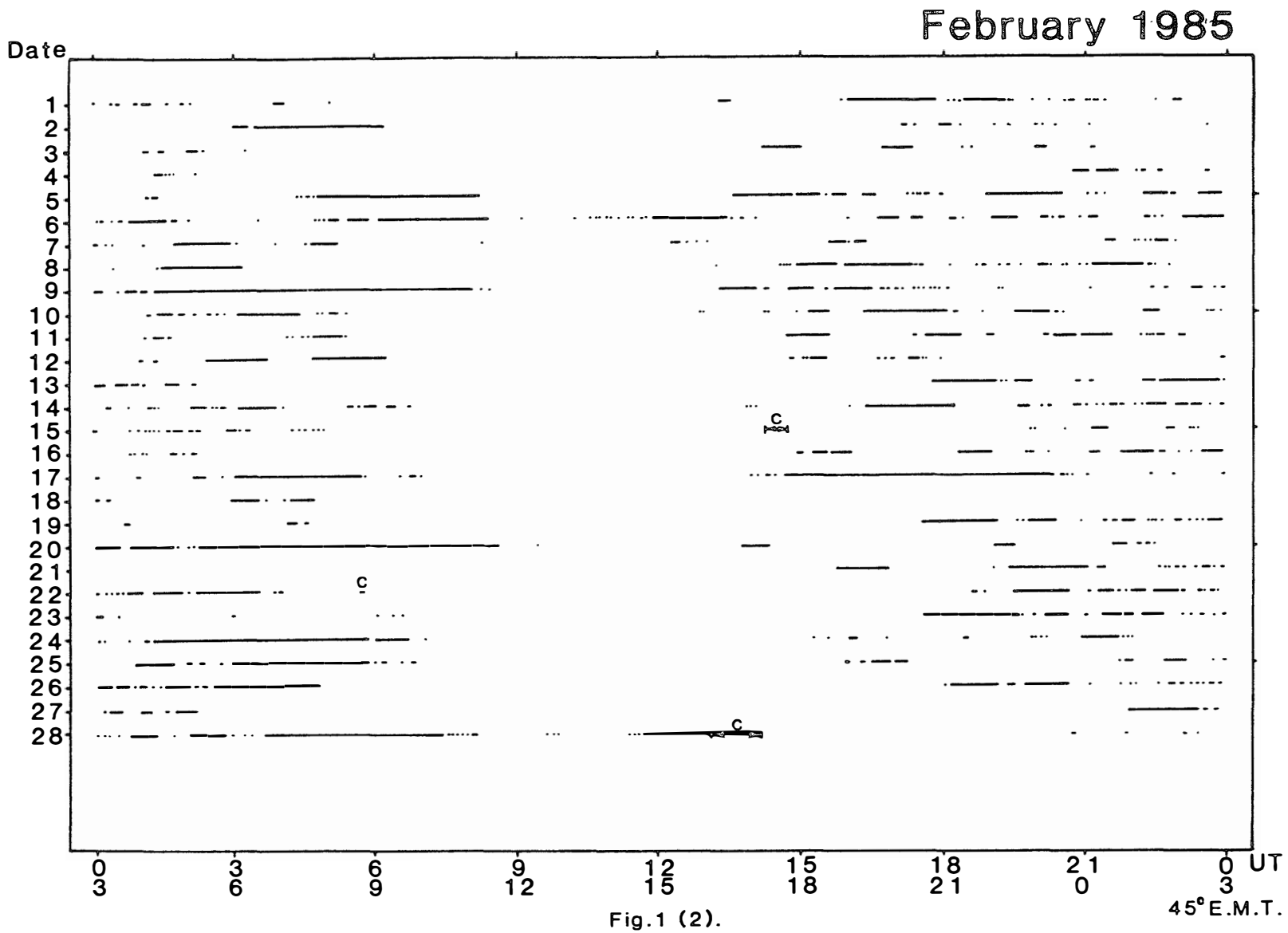
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Fig.1 (2).

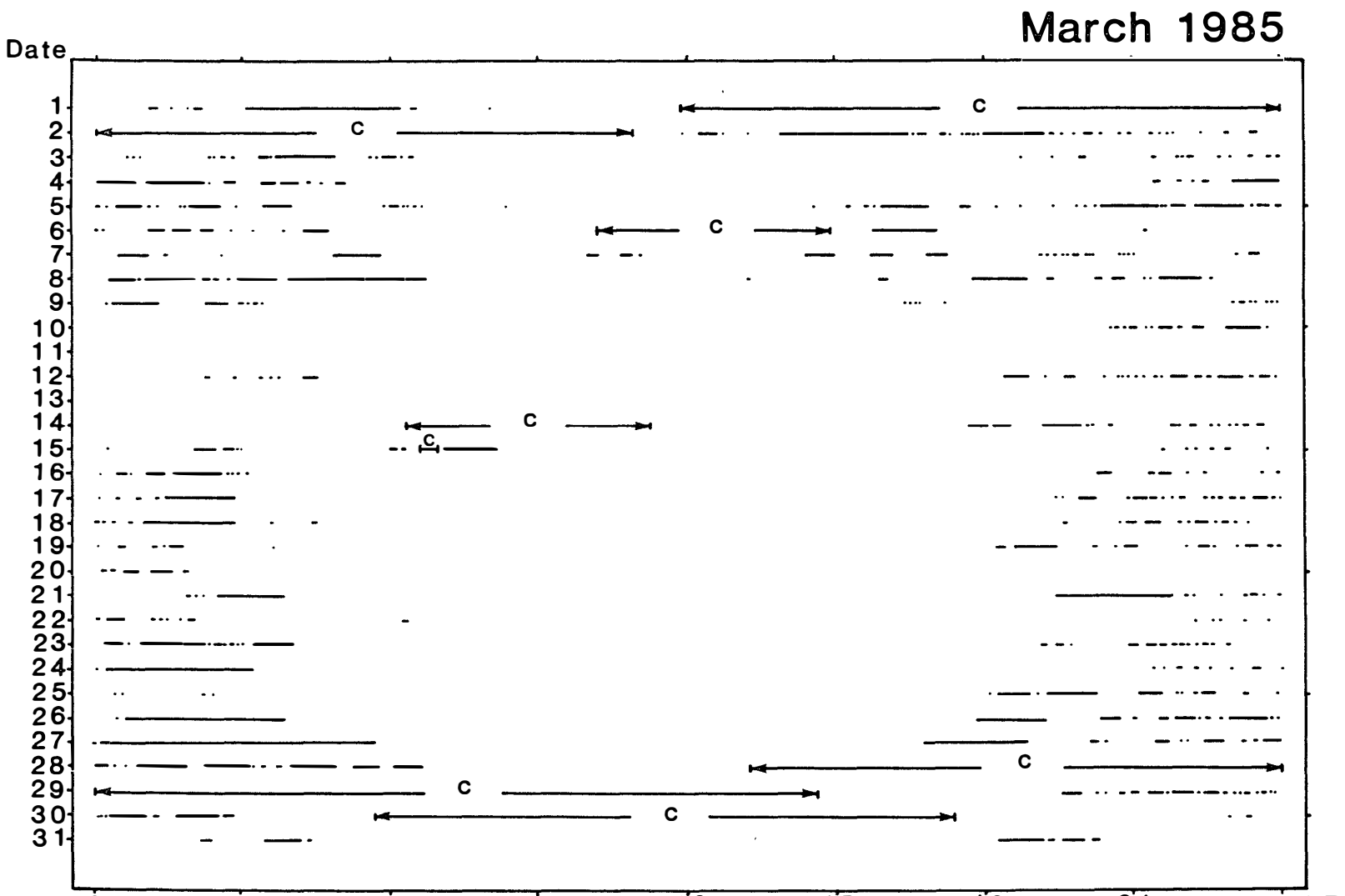
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Fig.1 (3).

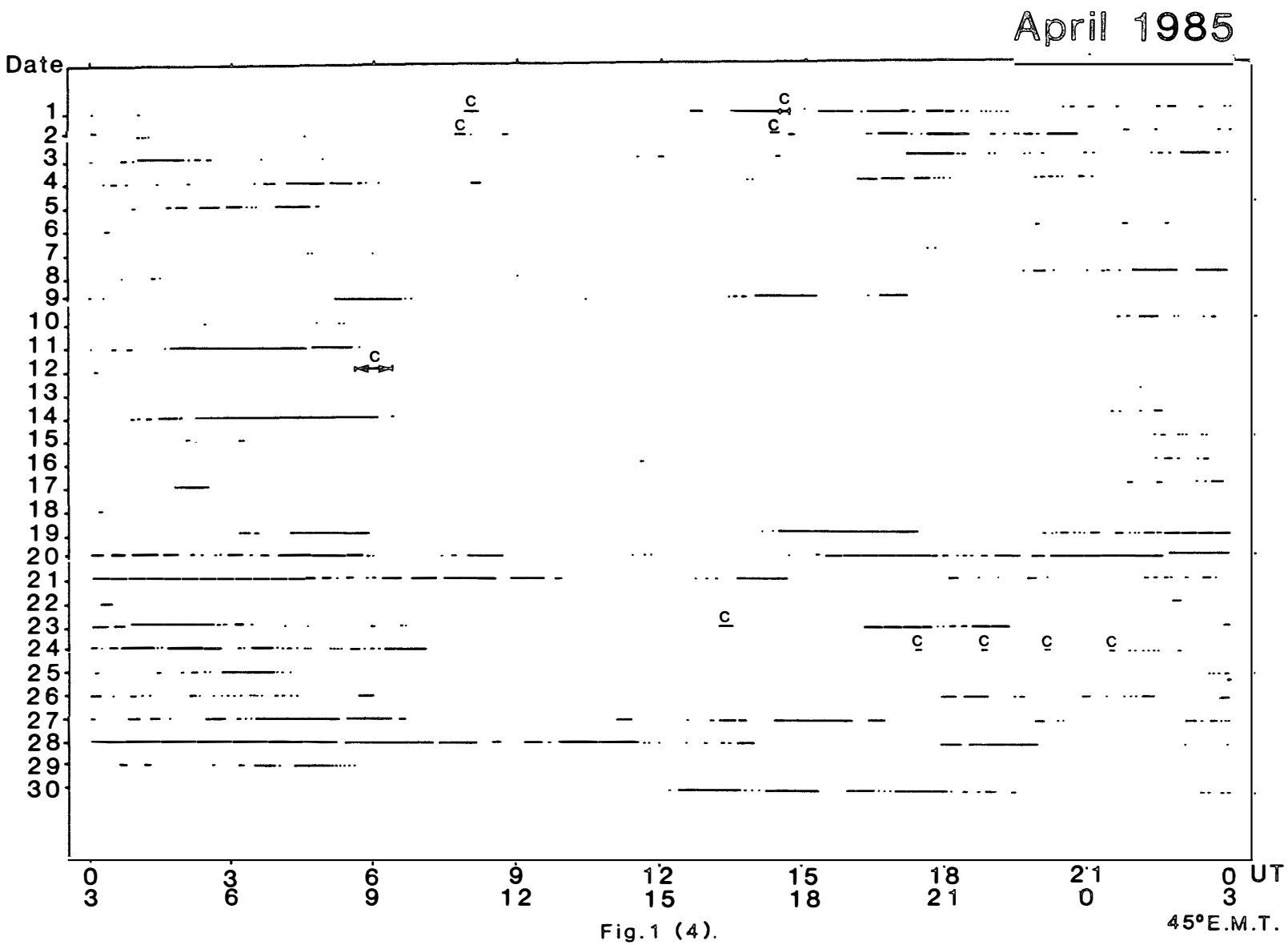
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Fig.1 (4).

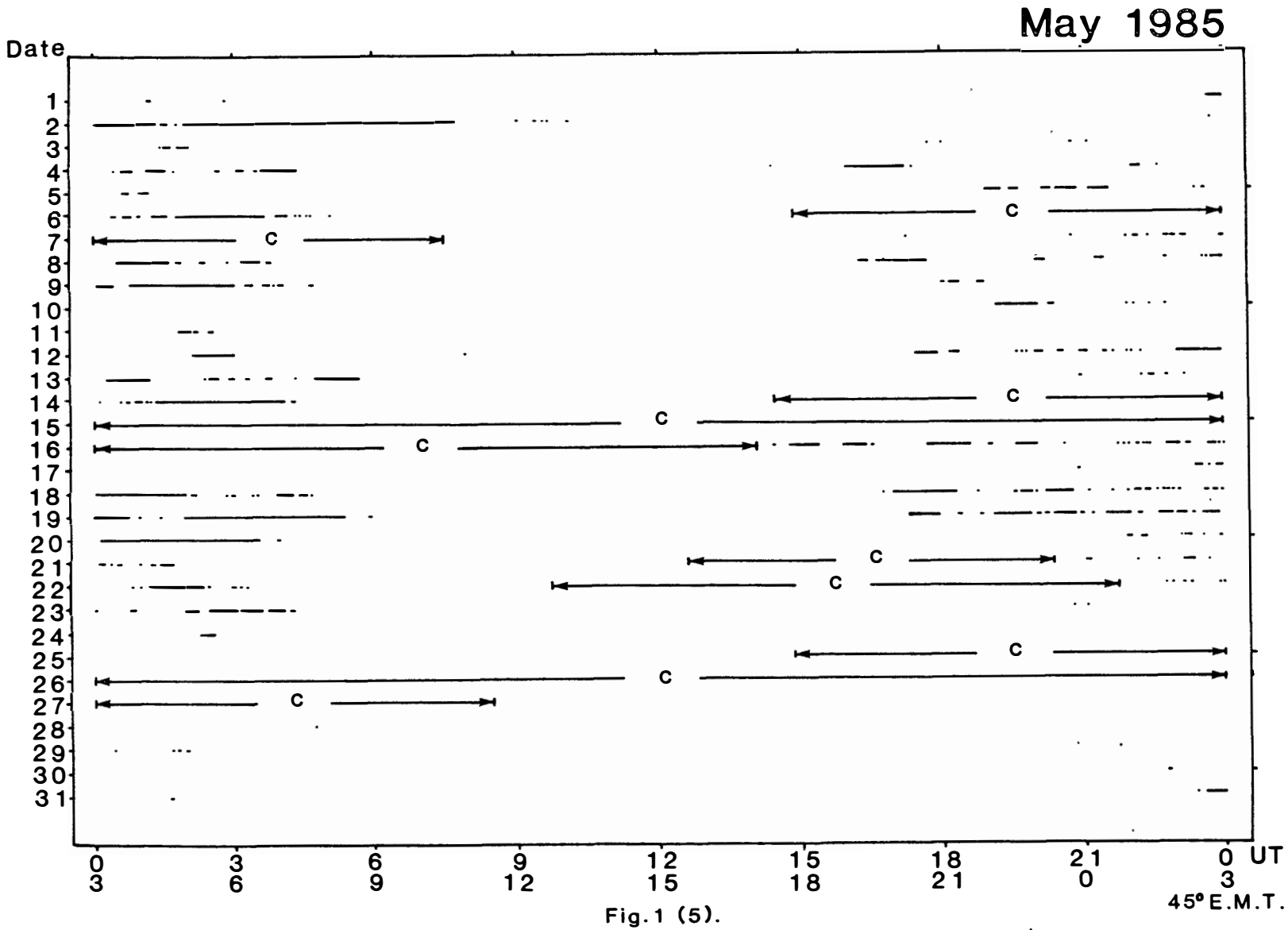
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Fig. 1 (5).

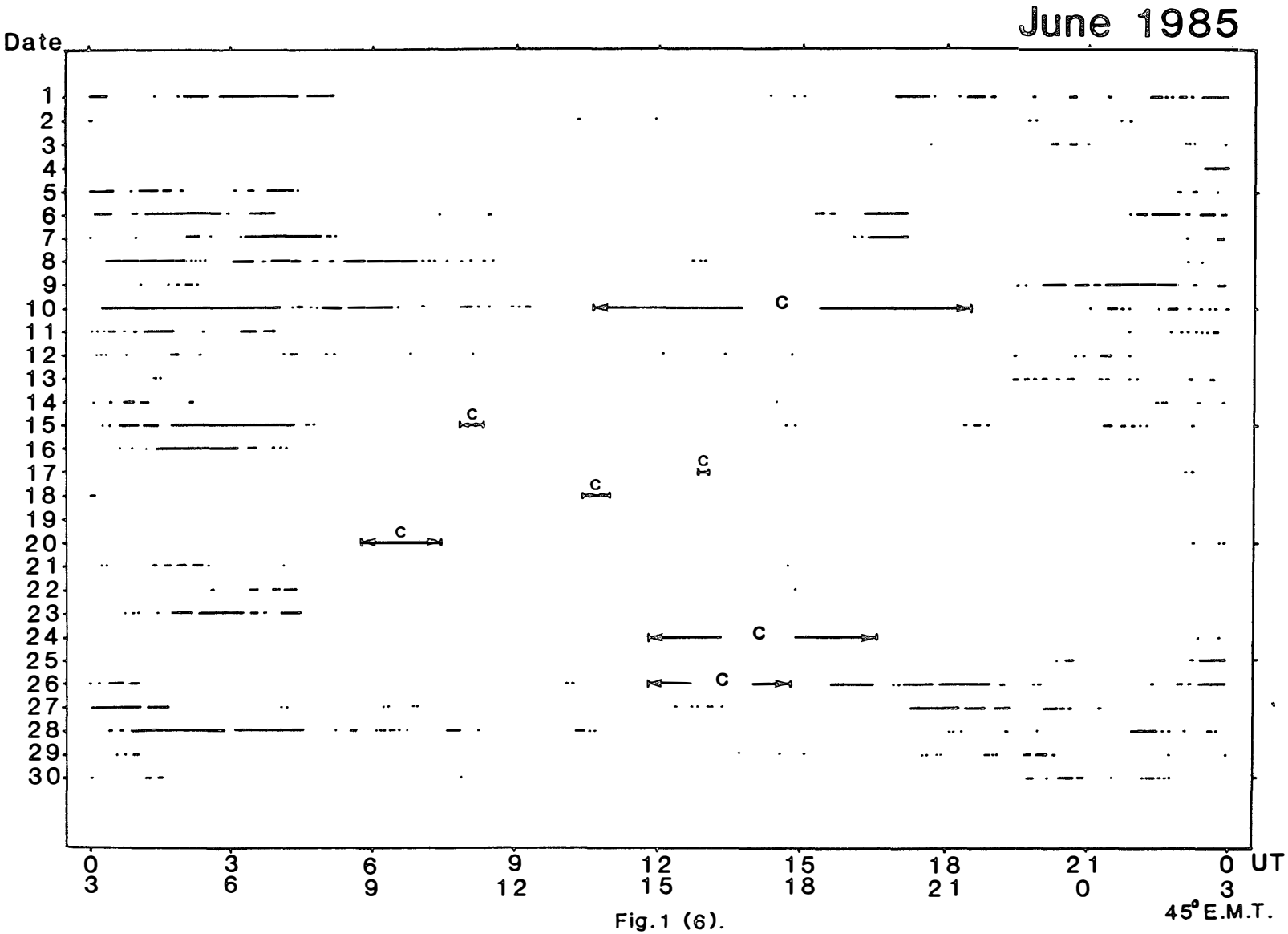
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Fig.1 (6).

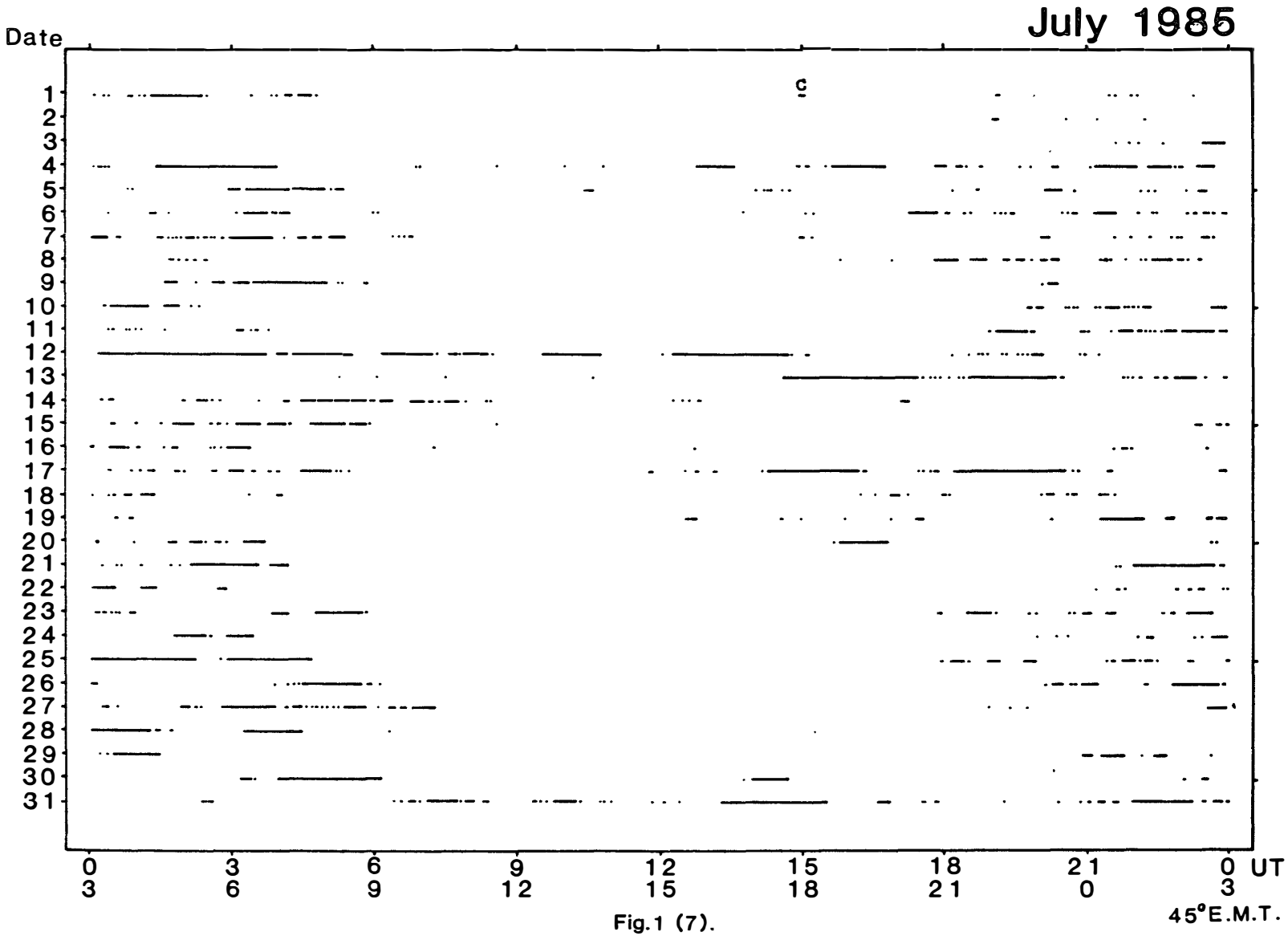
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Fig.1 (7).

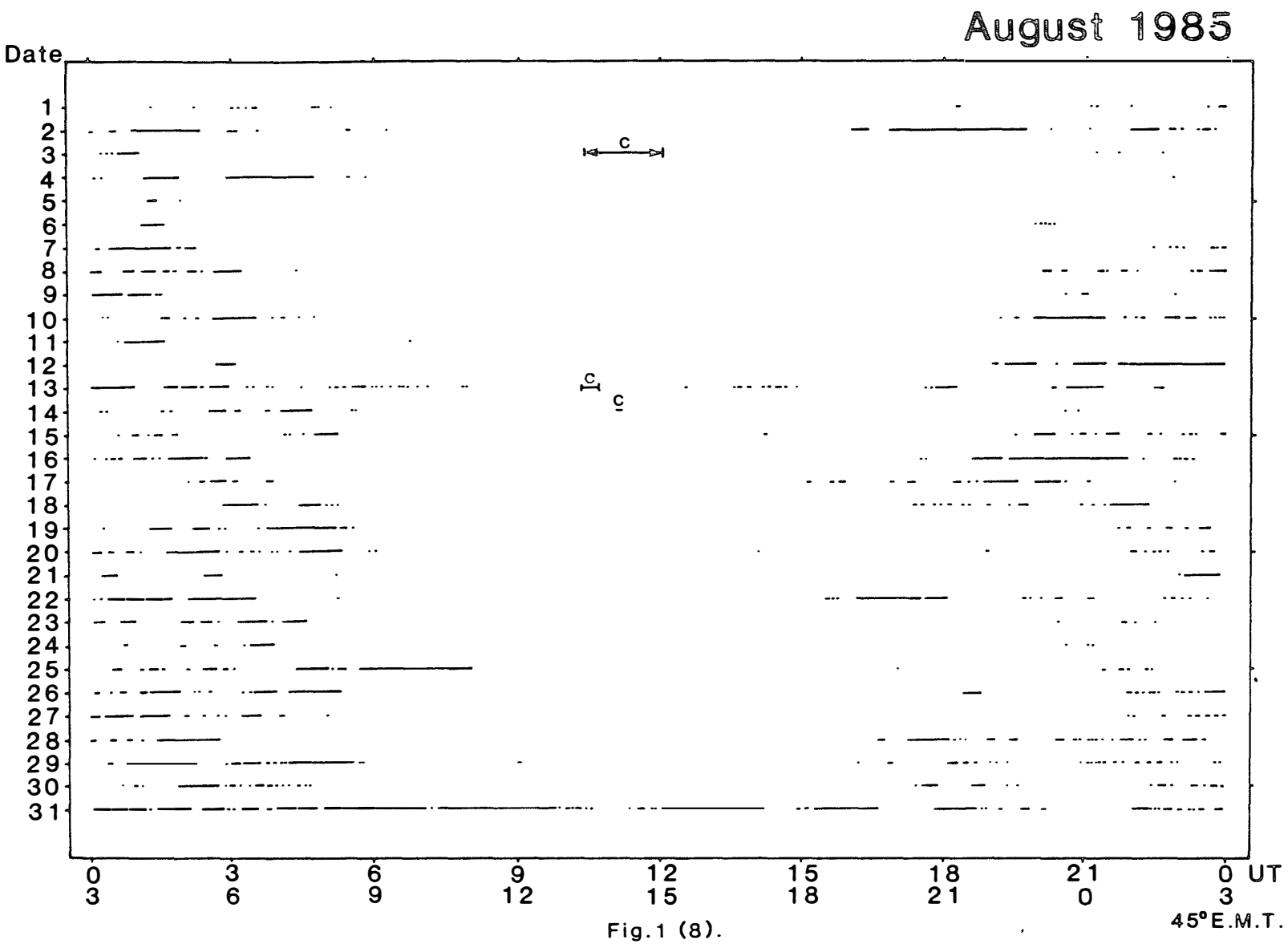
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Fig.1 (8).

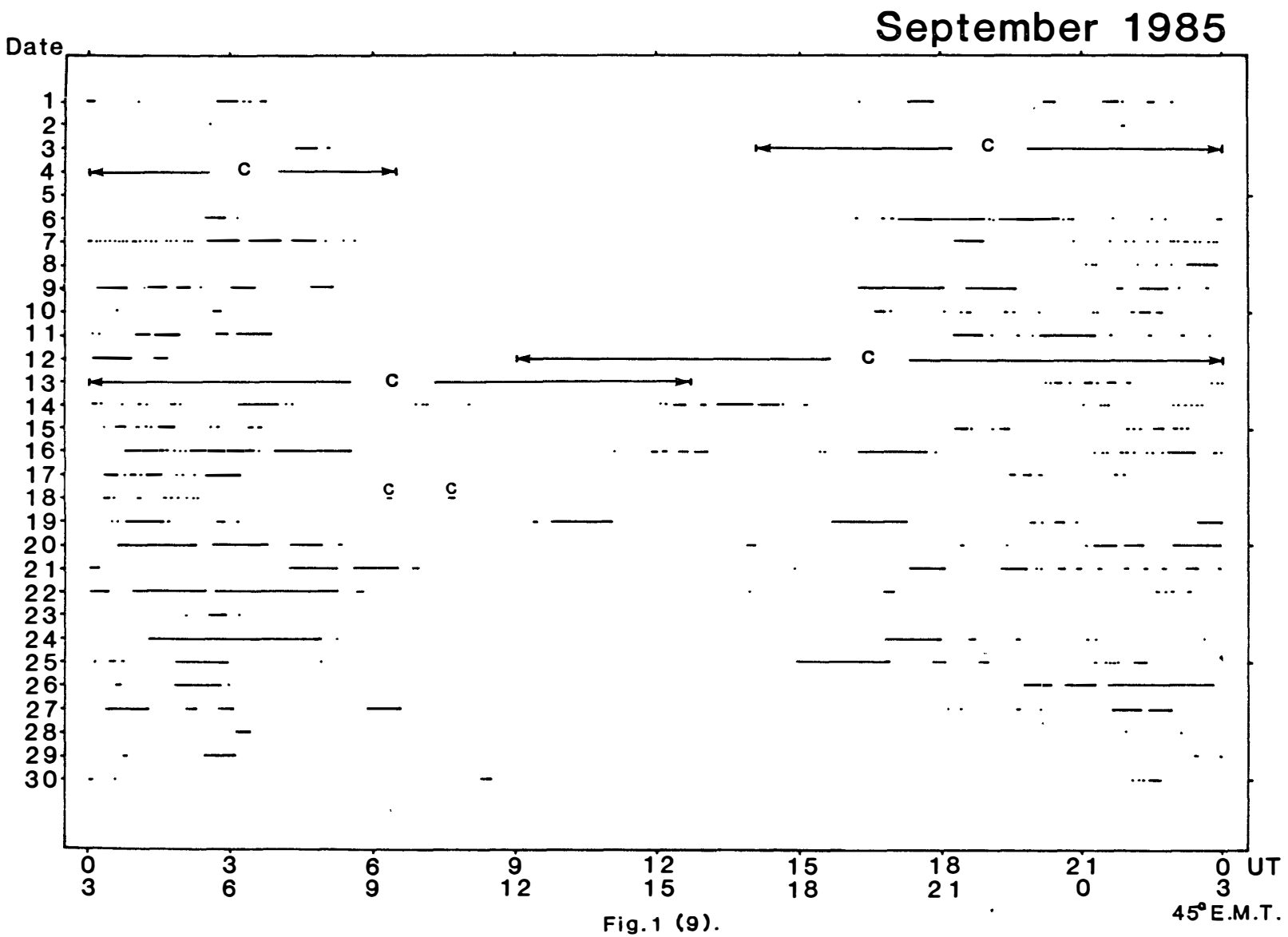
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Fig.1 (9).

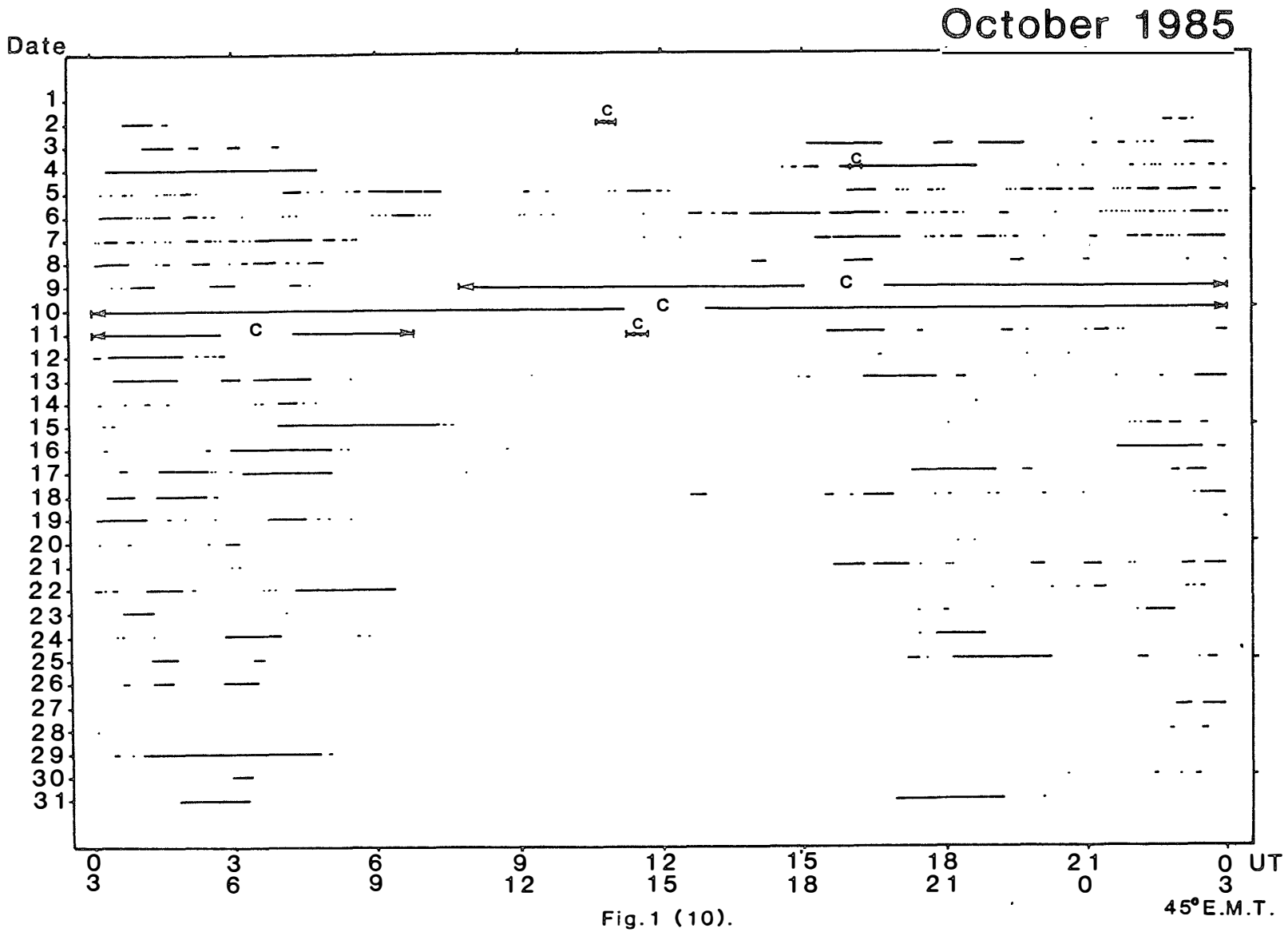
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Fig.1 (10).

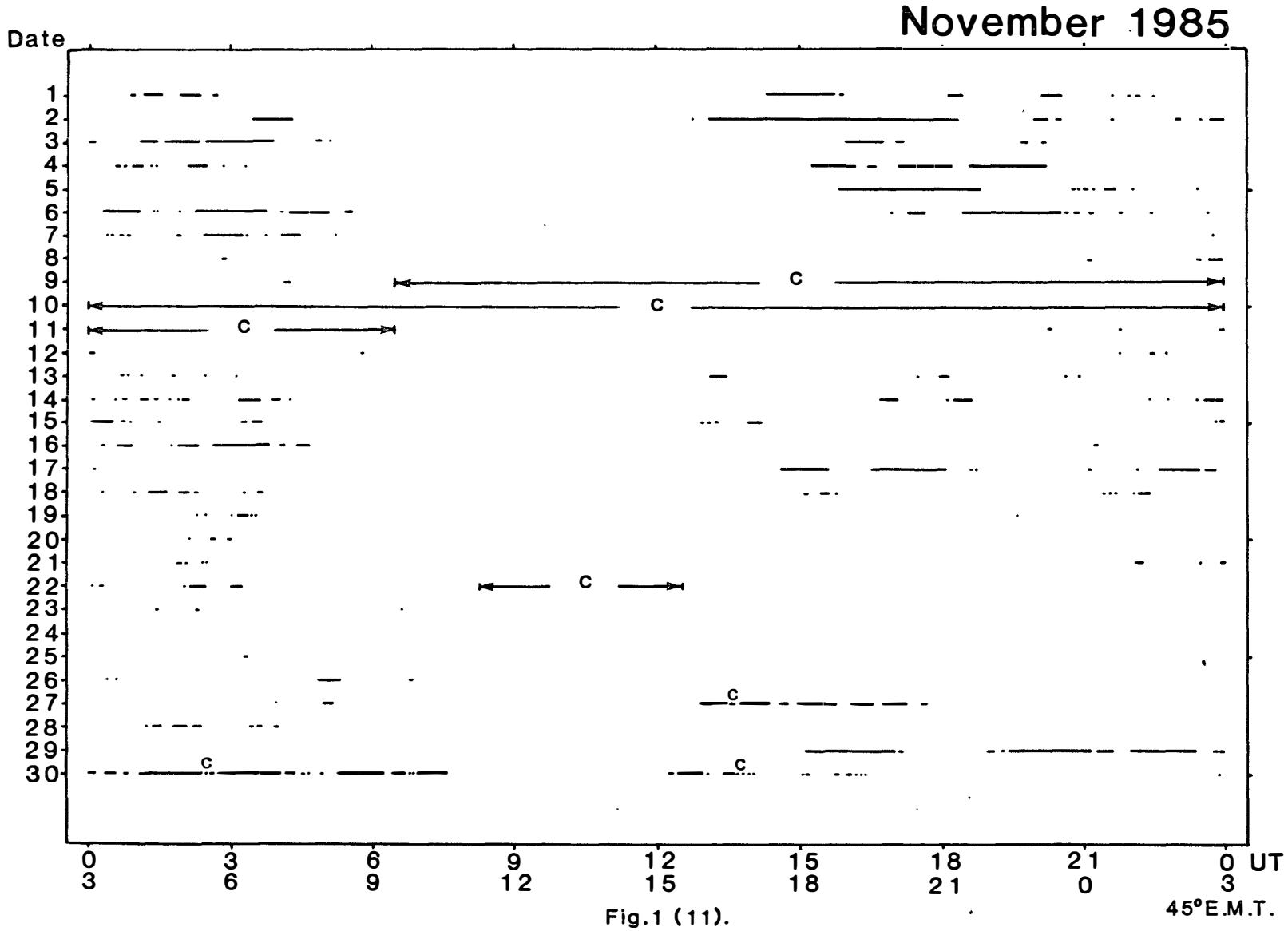
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Fig.1 (11).

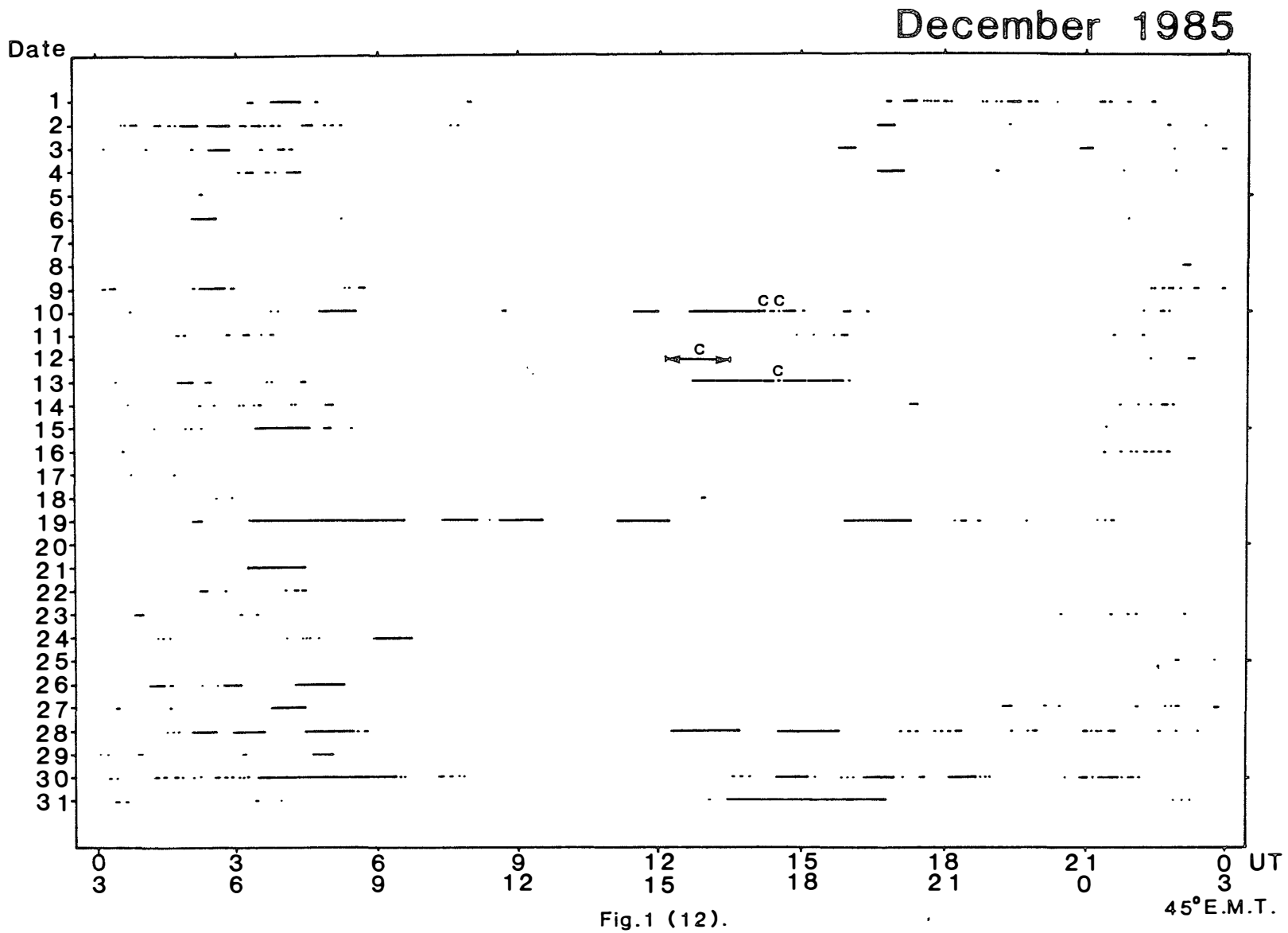
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Fig.1 (12).

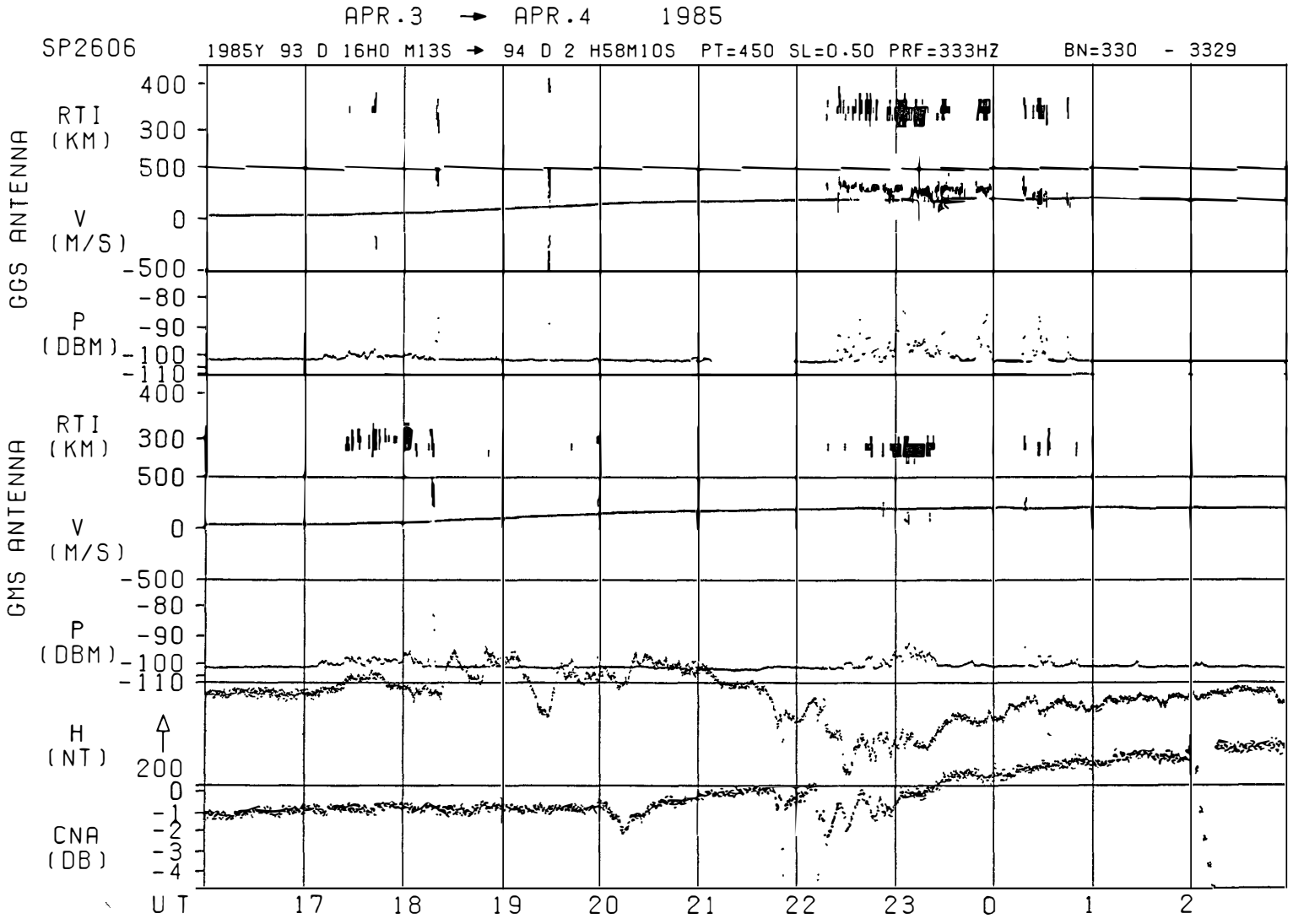
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Fig. 2(1)

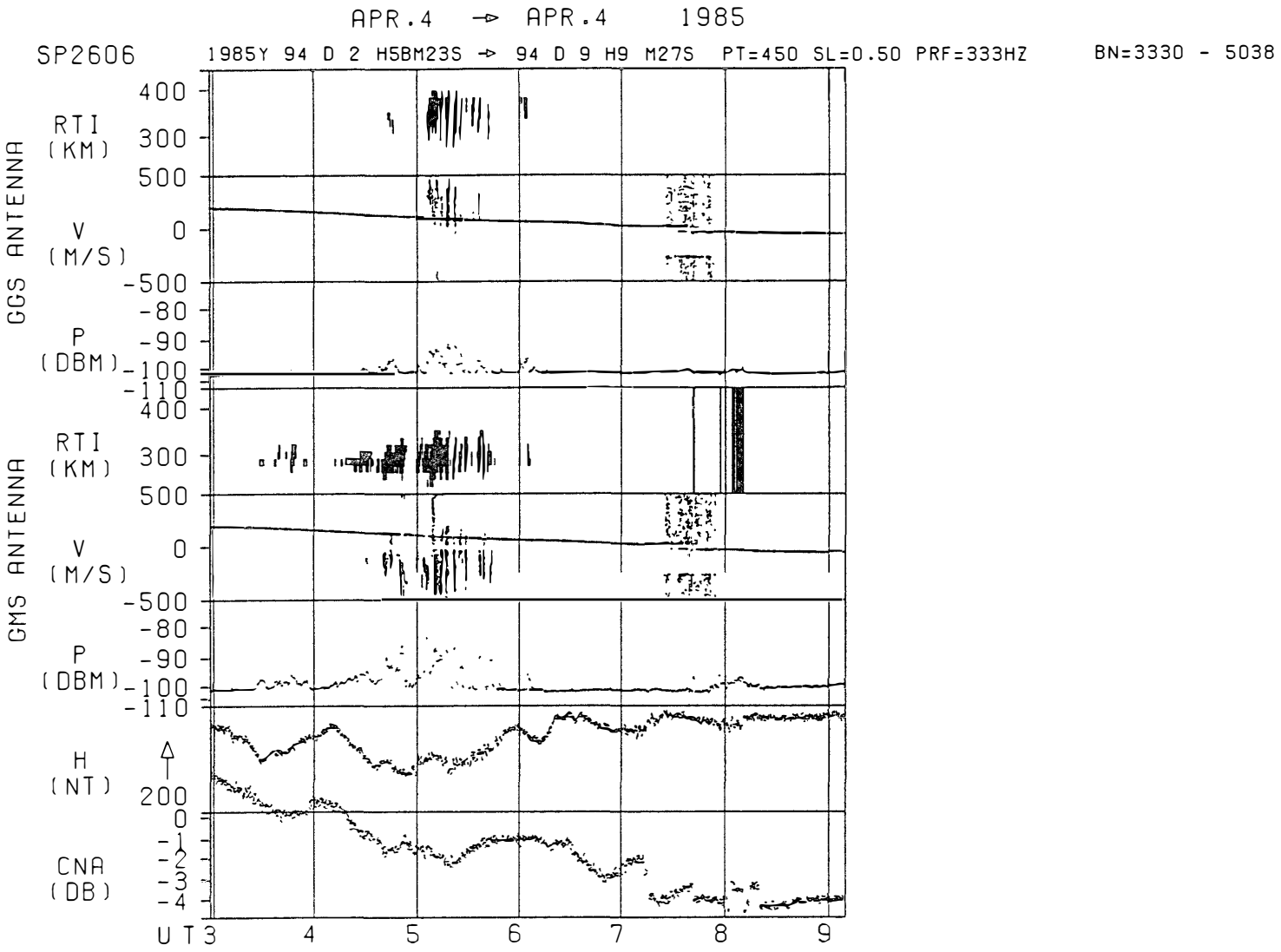
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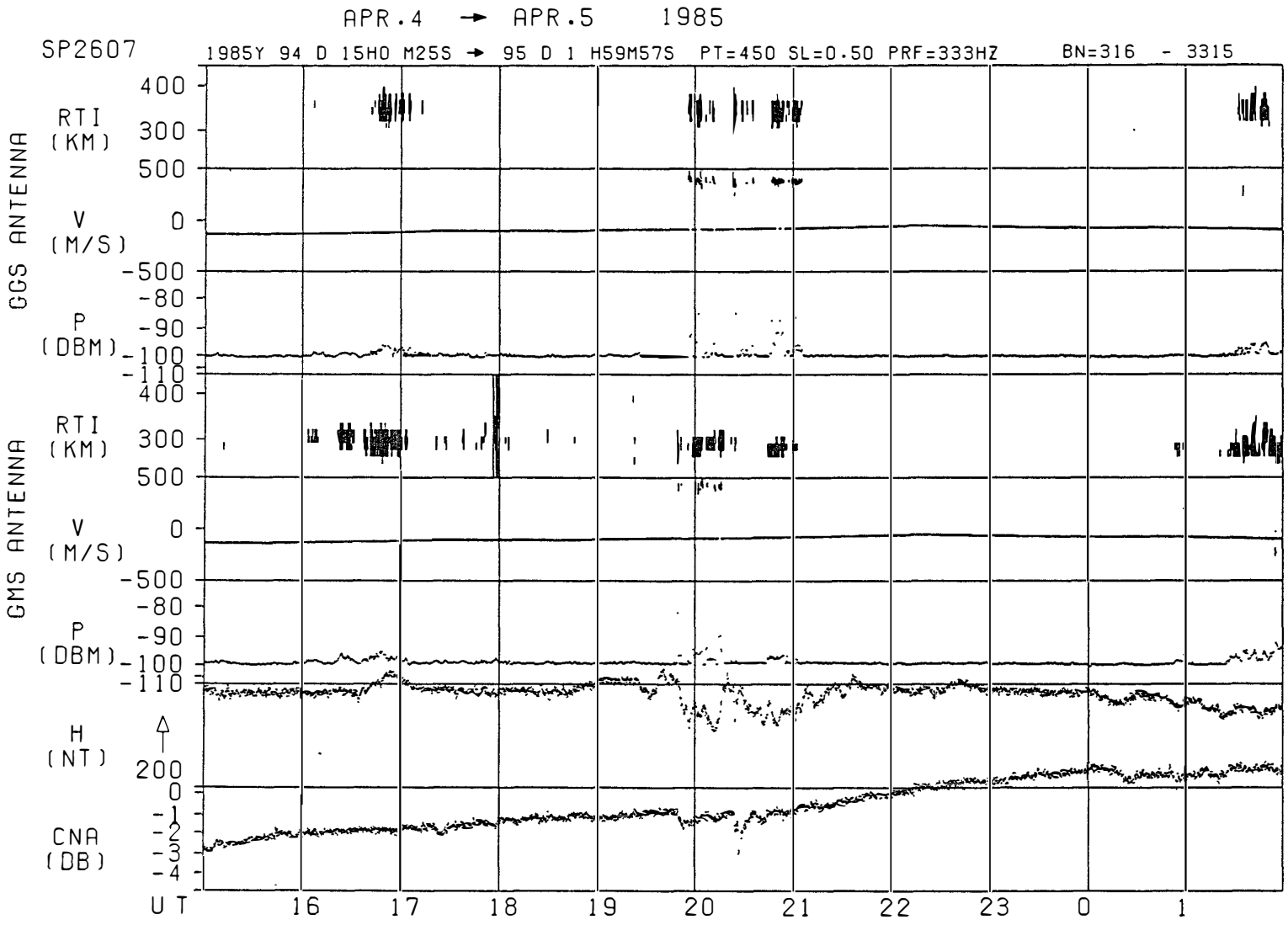
Fig. 2(2)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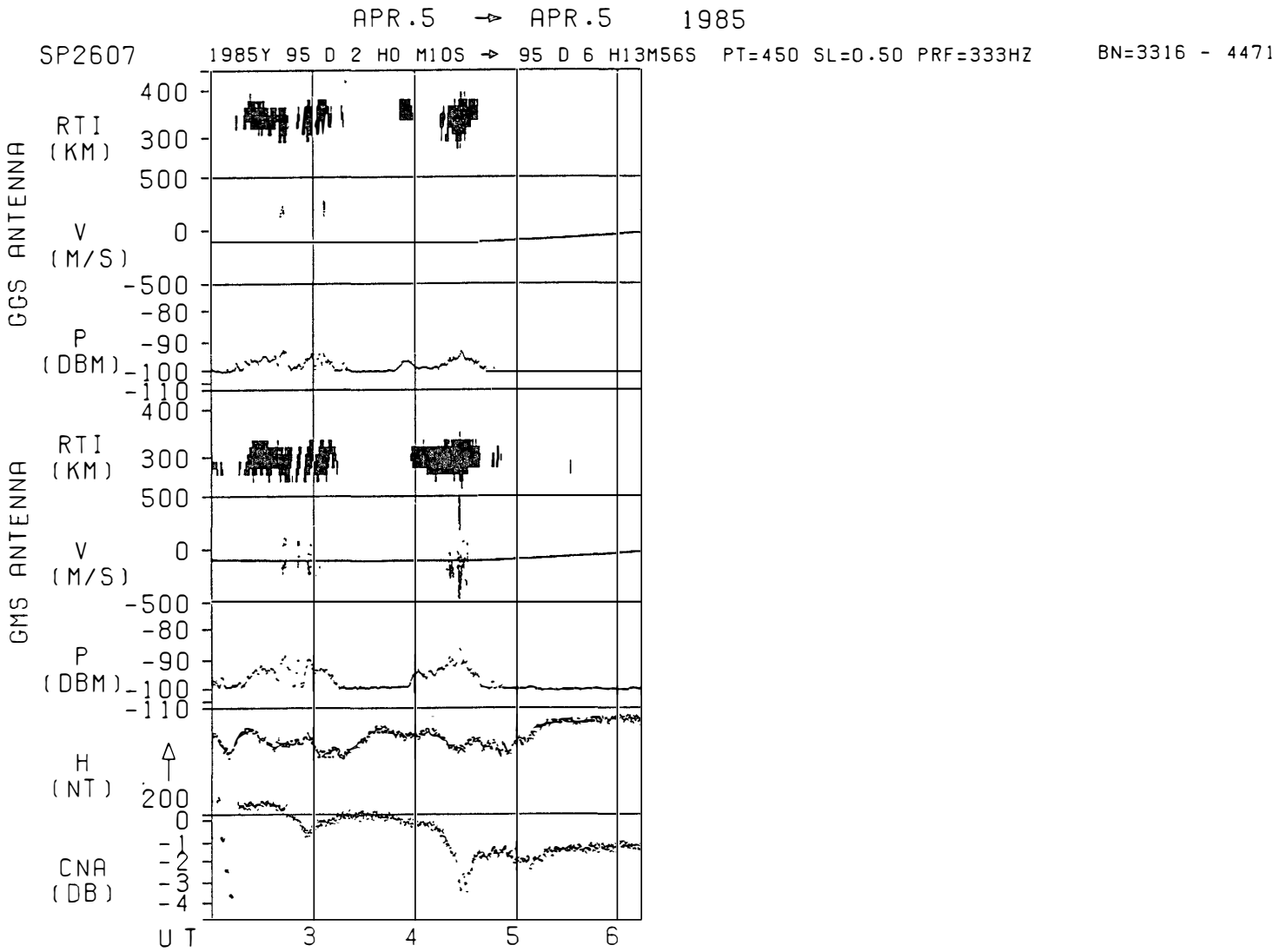
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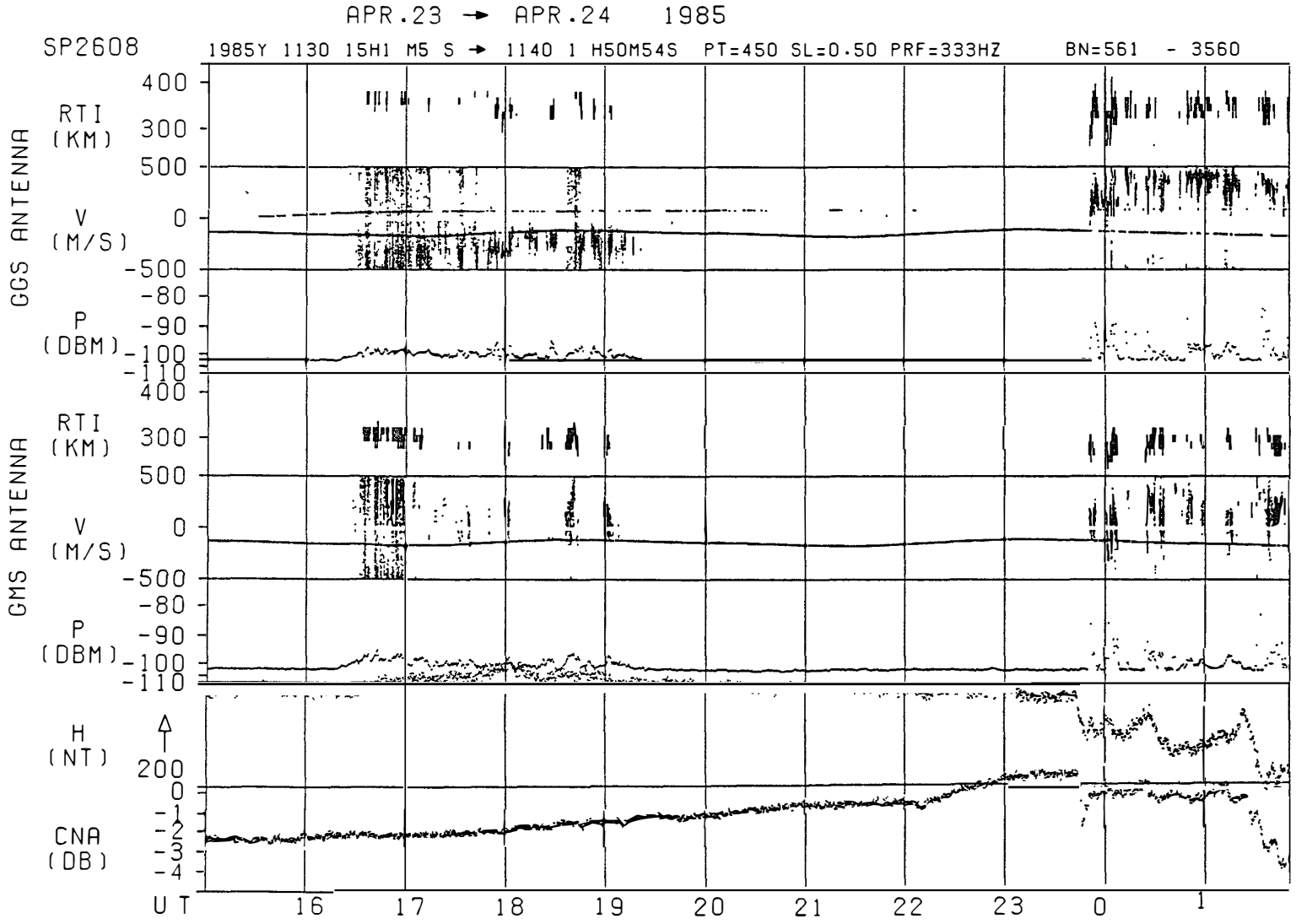
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Fig. 2(5)

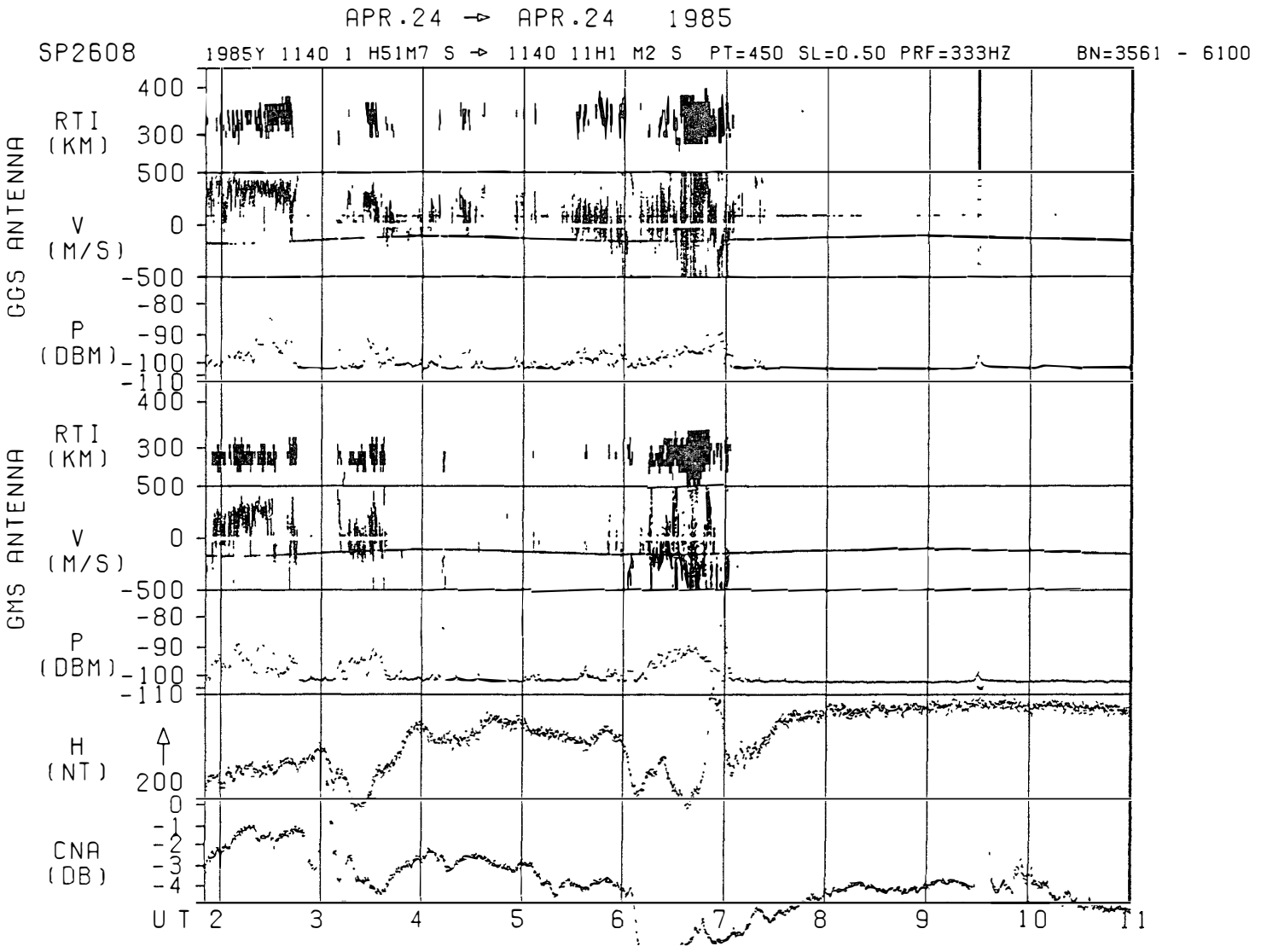
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Fig. 2(6)

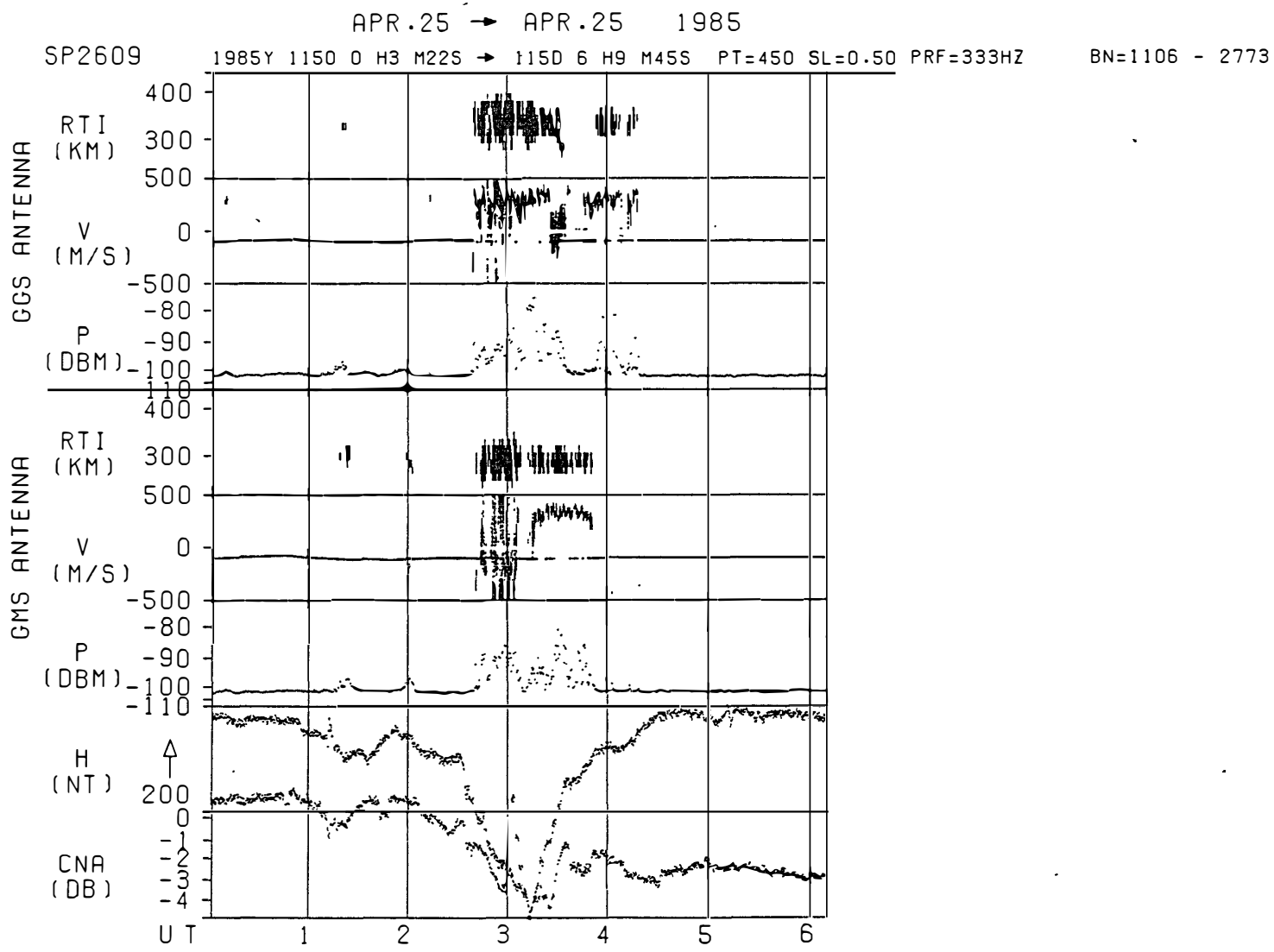
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Fig. 2(7)

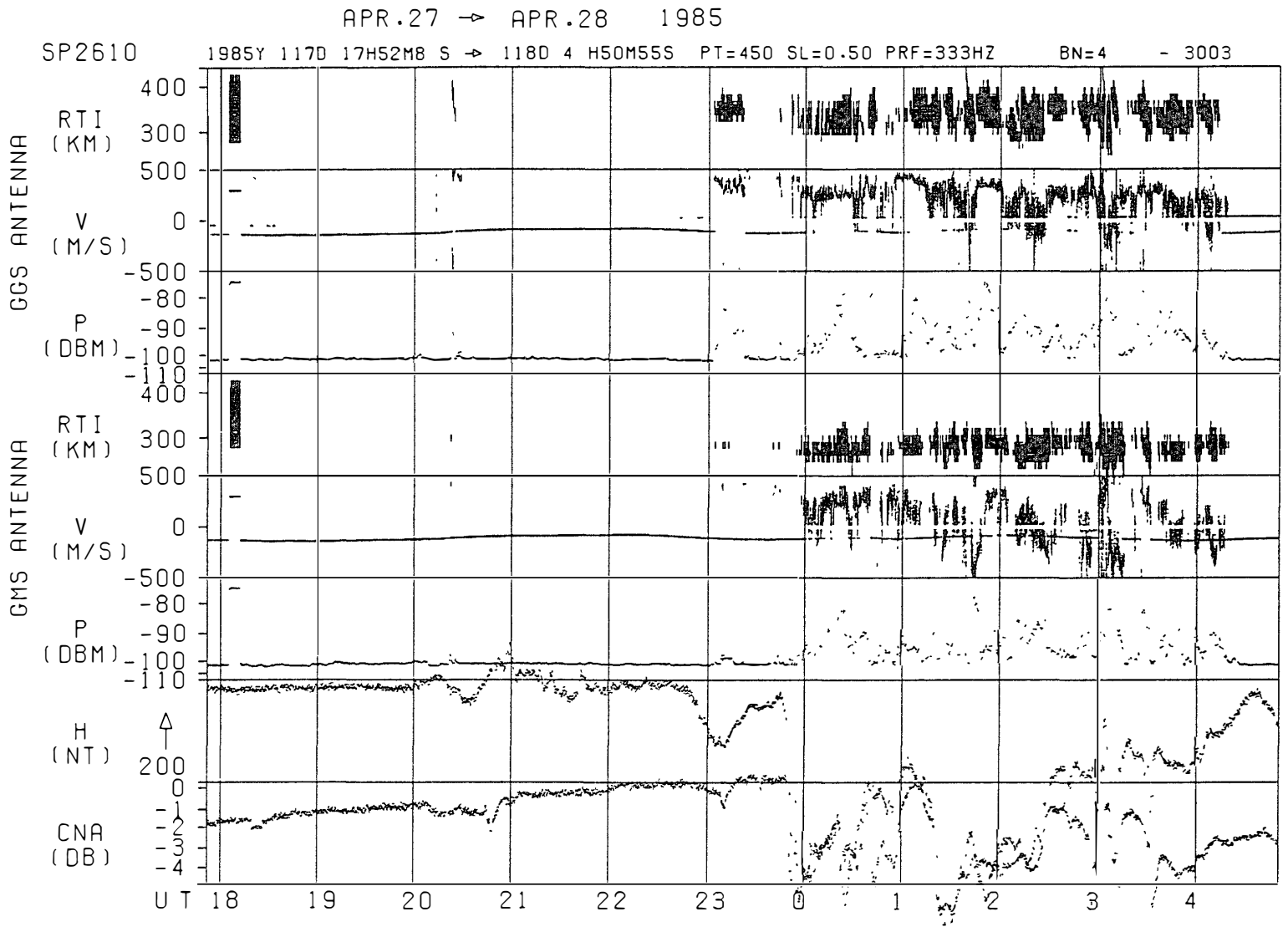
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Fig. 2(8)

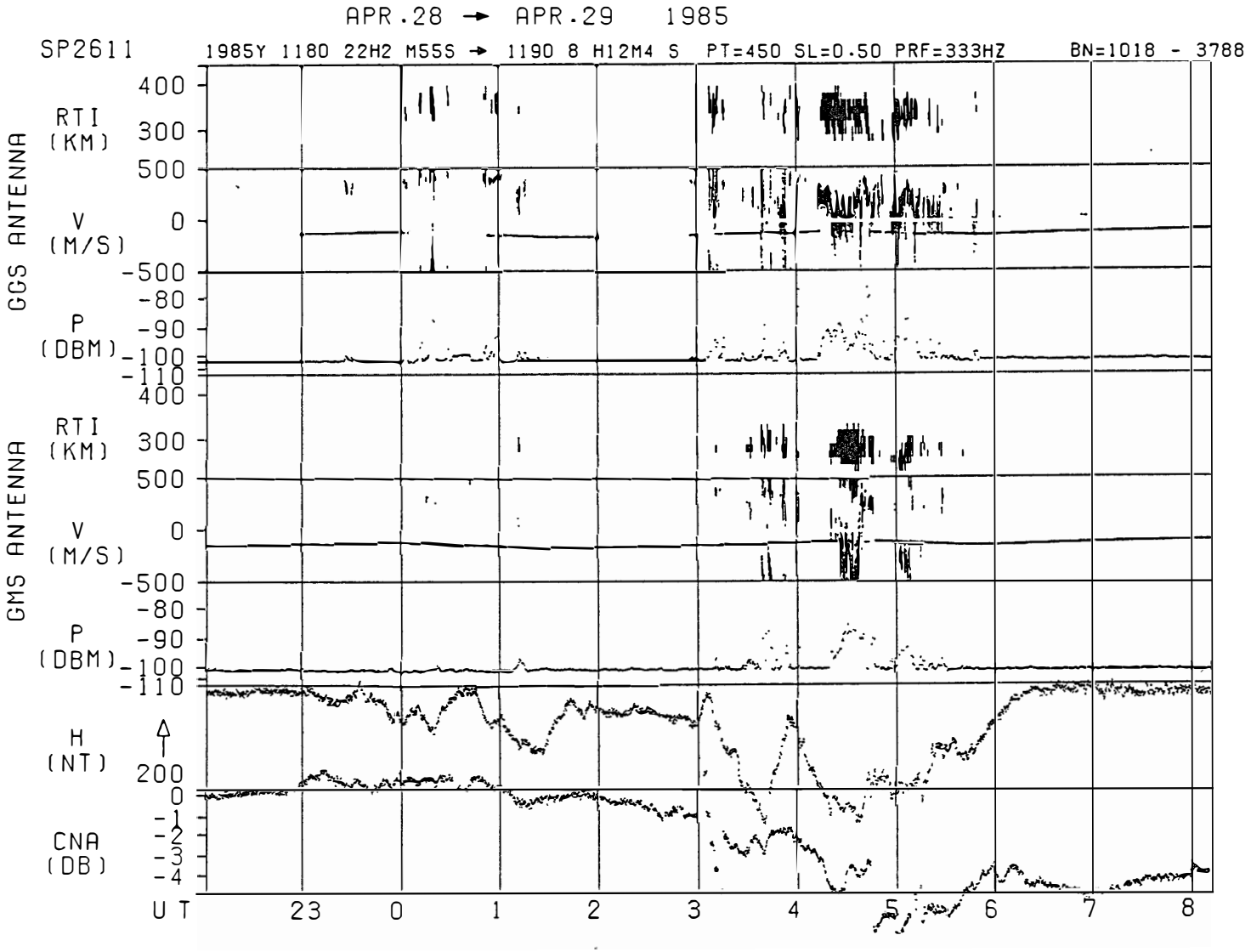
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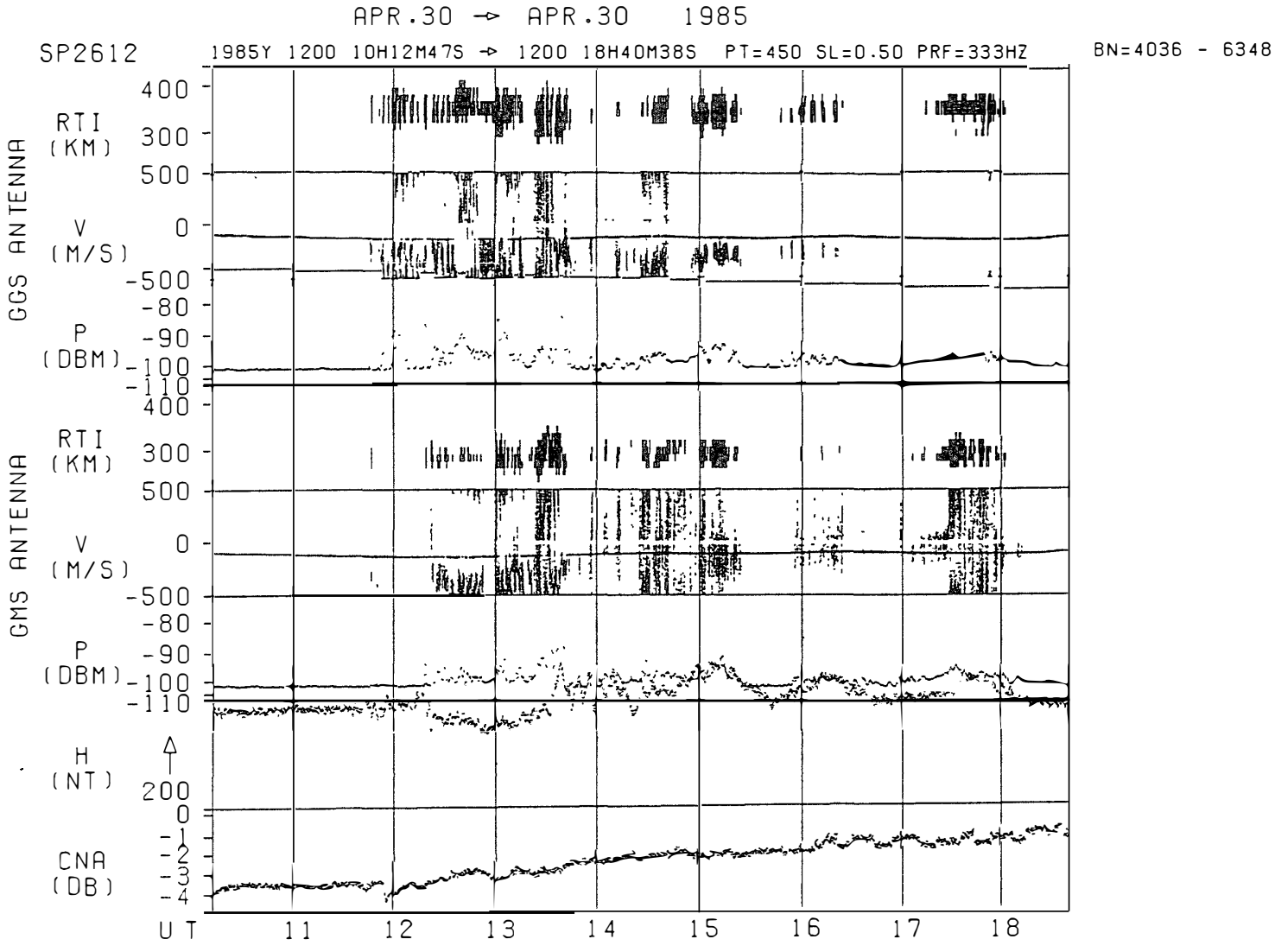
Fig. 2(9)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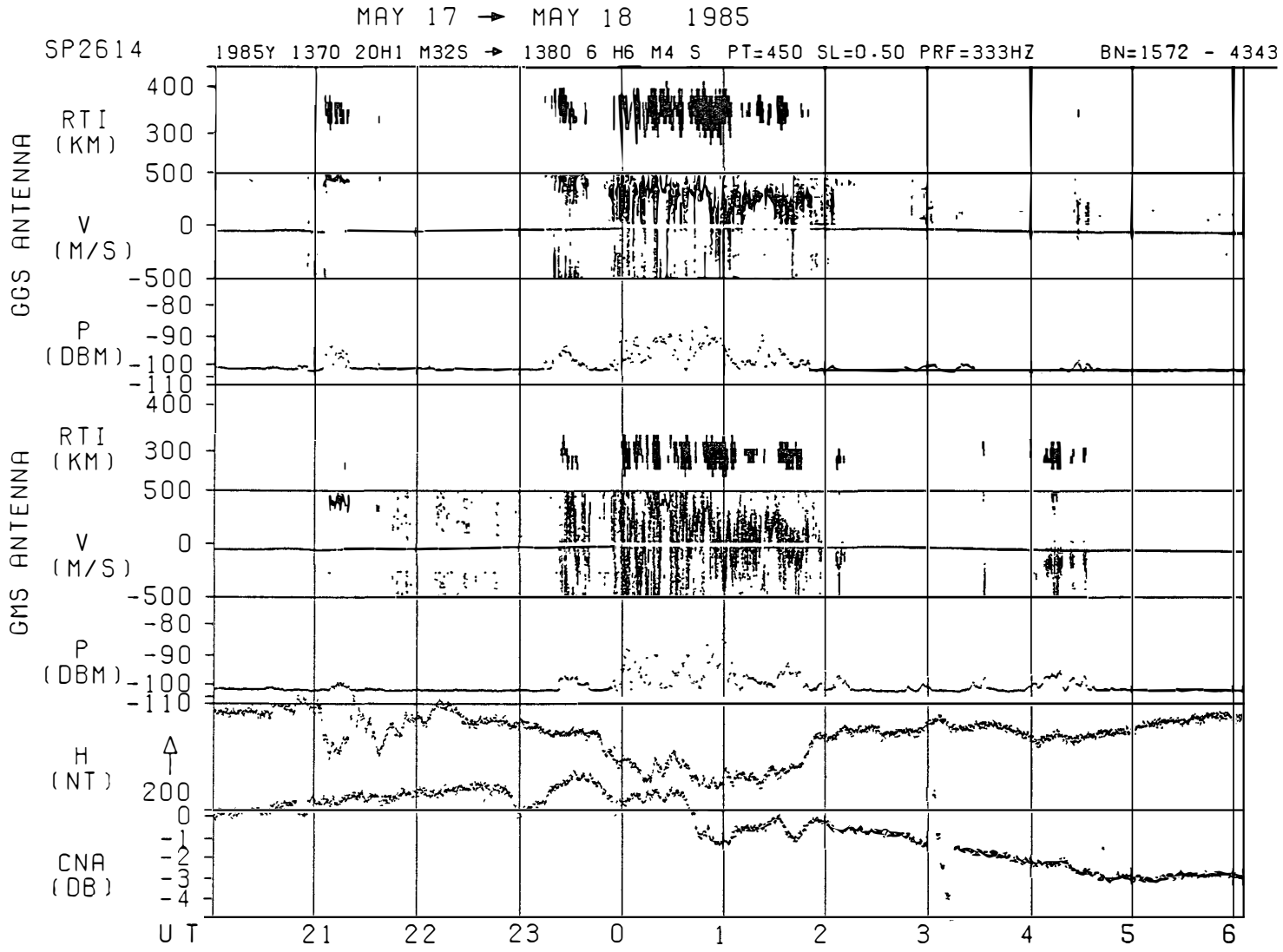

MAY 17 → MAY 18 1985
SP2614
1985Y 1370 20H1 M32S → 1380 6 H6 M4 S PT=450 SL=0.50 PRF=333HZ
BN=1572 - 4343
GGS ANTENNA
GMS ANTENNA
RTI (KM)
V (M/S)
P (DBM)
H (NT)
CNA (DB)
400
300
500
0
-500
-80
-90
-100
-110
200
-1
-2
-3
-4
UT
21
22
23
0
1
2
3
4
5
6

Fig. 2(11)

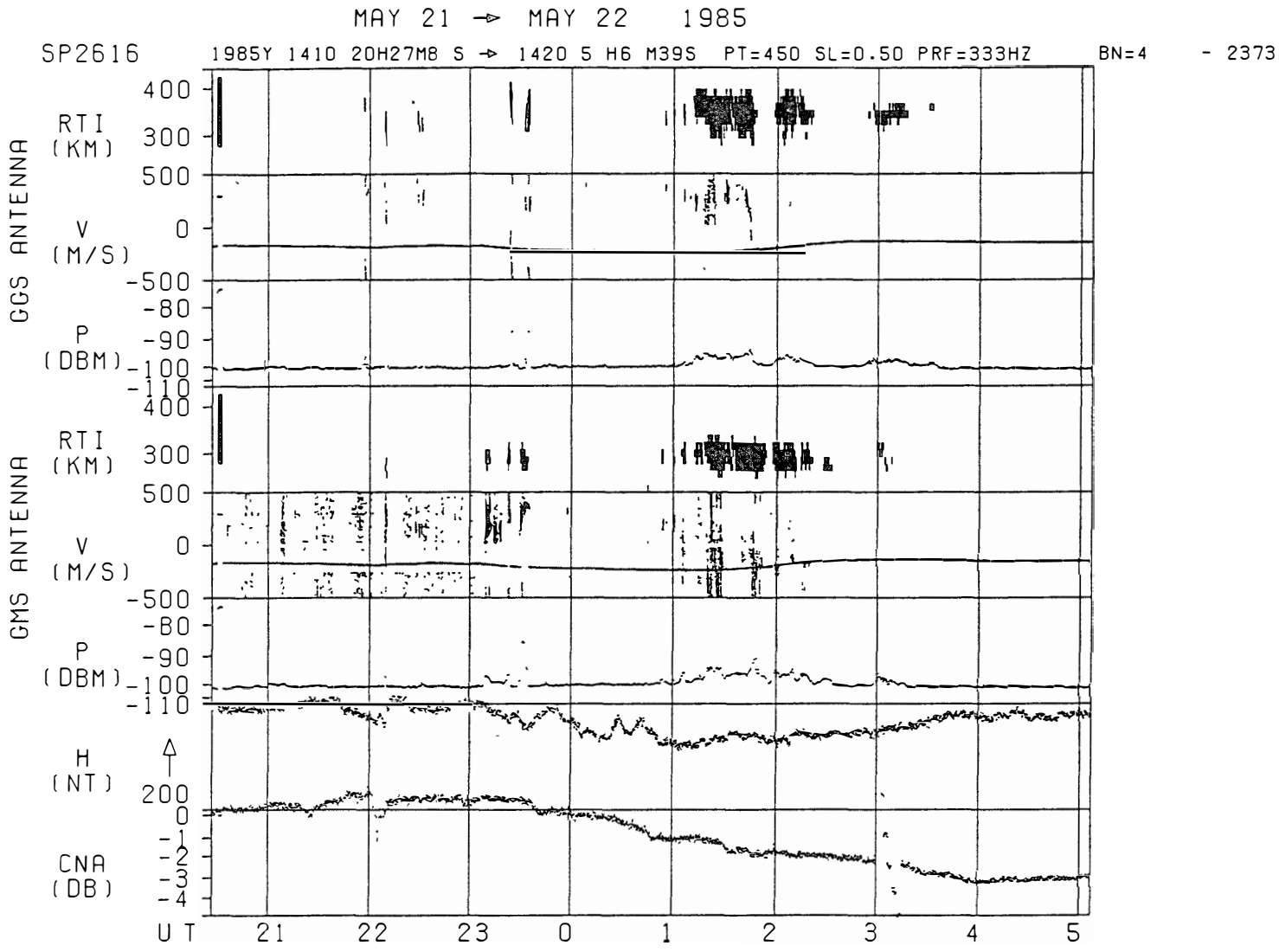

MAY 21 → MAY 22 1985
SP2616
1985Y 1410 20H27M8 S → 1420 5 H6 M39S PT=450 SL=0.50 PRF=333HZ
BN=4
- 2373
GGS ANTENNA
GMS ANTENNA
RTI (KM)
V (M/S)
P (DBM)
H (NT)
CNA (DB)
400
300
500
0
-500
-80
-90
-100
-110
200
-1
-2
-3
-4
UT
21
22
23
0
1
2
3
4
5

Fig. 2(12)

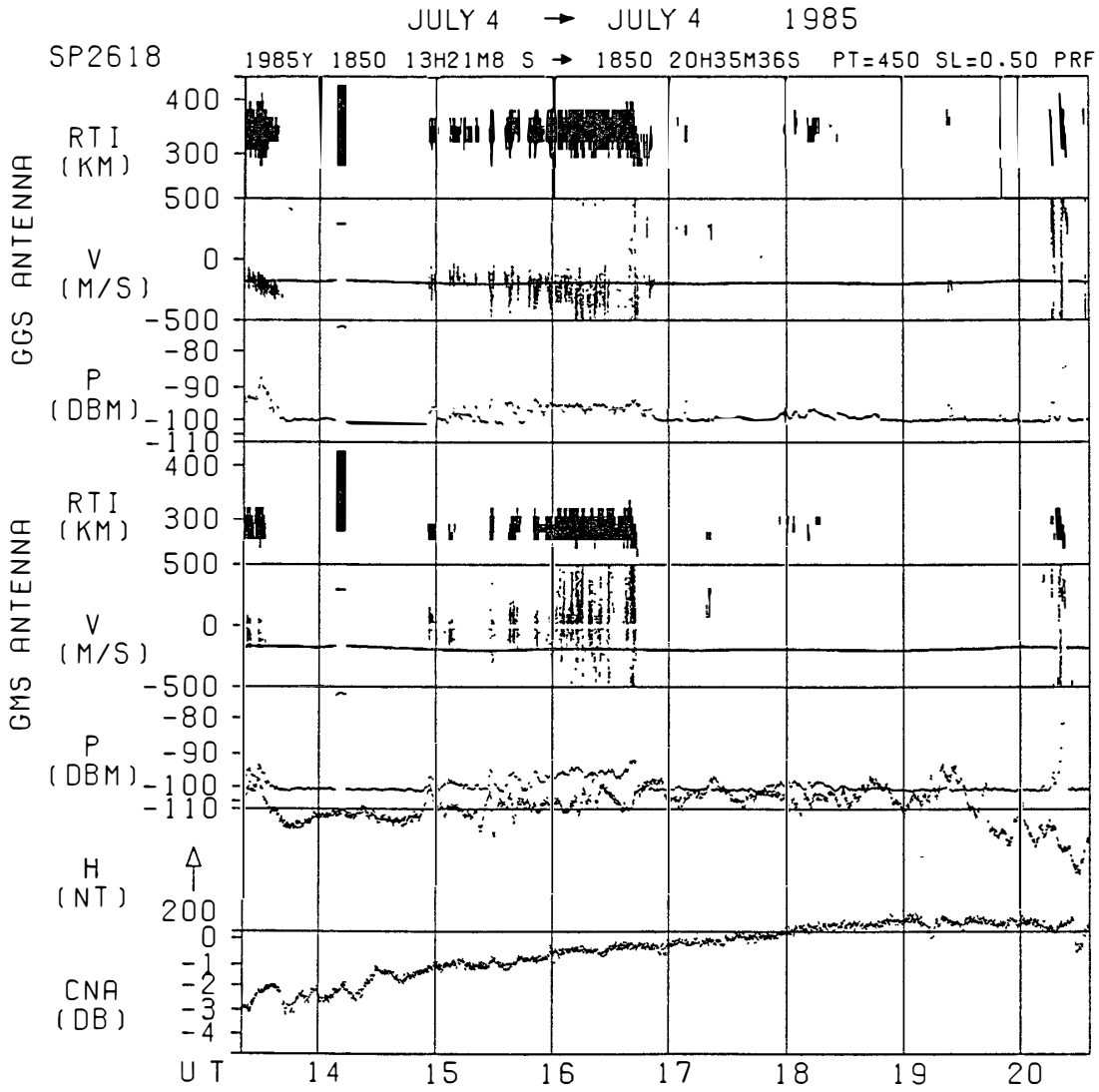

JULY 4 → JULY 4 1985
SP2618 1985Y 1850 13H21M8 S → 1850 20H35M36S PT=450 SL=0.50 PRF=333HZ BN=4 - 1981
GGS ANTENNA
GMS ANTENNA
RTI (KM)
V (M/S)
P (DBM)
H (NT)
CNA (DB)
400
300
500
0
-500
-80
-90
-100
-110
200
-1
-2
-3
-4
UT
14
15
16
17
18
19
20

Fig. 2(13)

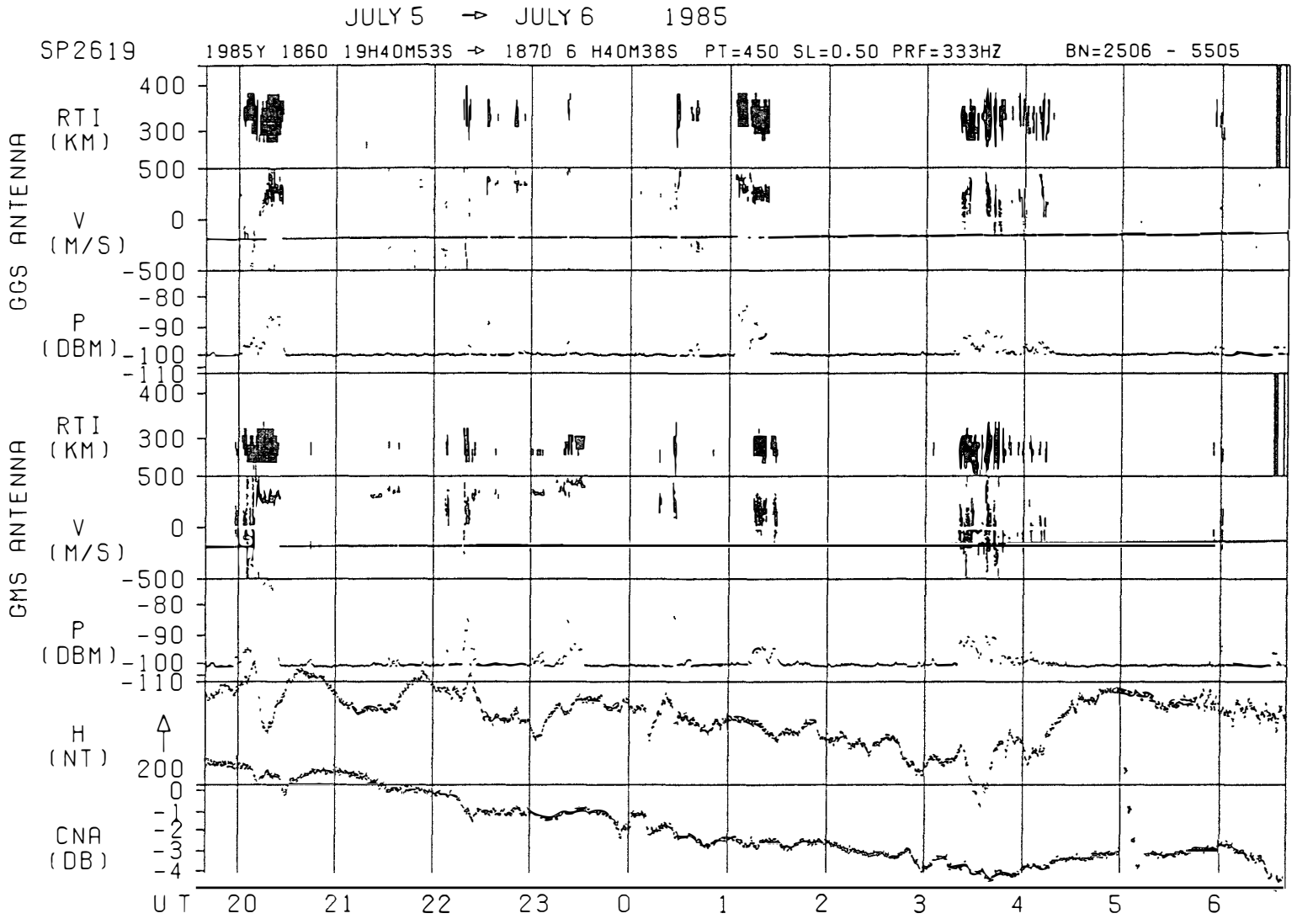

JULY 5 → JULY 6 1985
SP2619
1985Y 186D 19H40M53S → 187D 6 H40M38S PT=450 SL=0.50 PRF=333HZ
BN=2506 - 5505
GGS ANTENNA
GMS ANTENNA
RTI (KM)
V (M/S)
P (DBM)
H (NT)
CNA (DB)
400
300
500
0
-500
-80
-90
-100
-110
200
-1
-2
-3
-4
UT
20
21
22
23
0
1
2
3
4
5
6

Fig. 2(14)

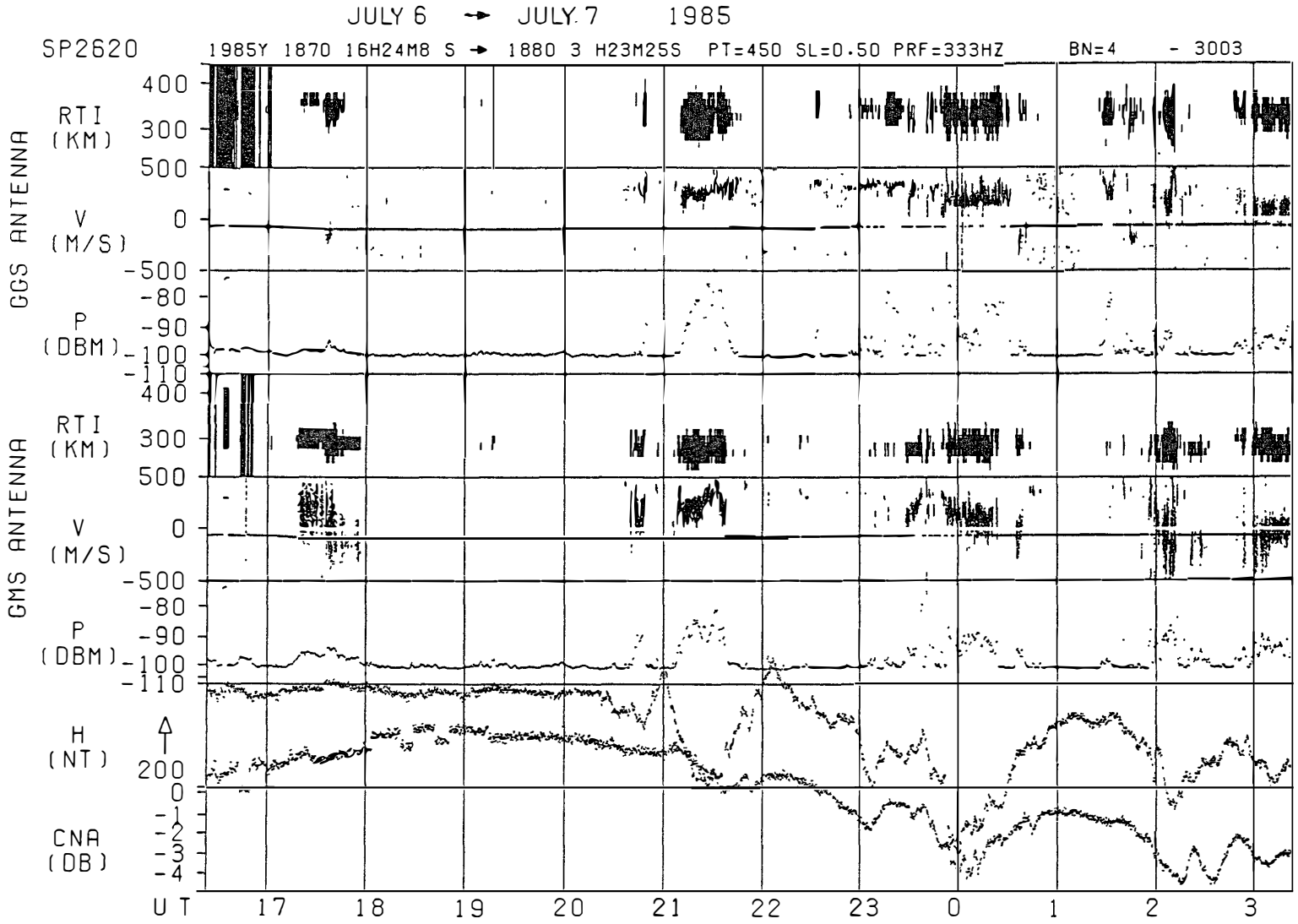

JULY 6 → JULY 7 1985
SP2620
1985Y 187D 16H24M8 S → 188D 3 H23M25S PT=450 SL=0.50 PRF=333HZ
BN=4 - 3003
GGS ANTENNA
GMS ANTENNA
RTI (KM)
V (M/S)
P (DBM)
H (NT)
CNA (DB)
400
300
500
0
-500
-80
-90
-100
-110
200
-1
-2
-3
-4
UT
17
18
19
20
21
22
23
0
1
2
3

Fig. 2(15)

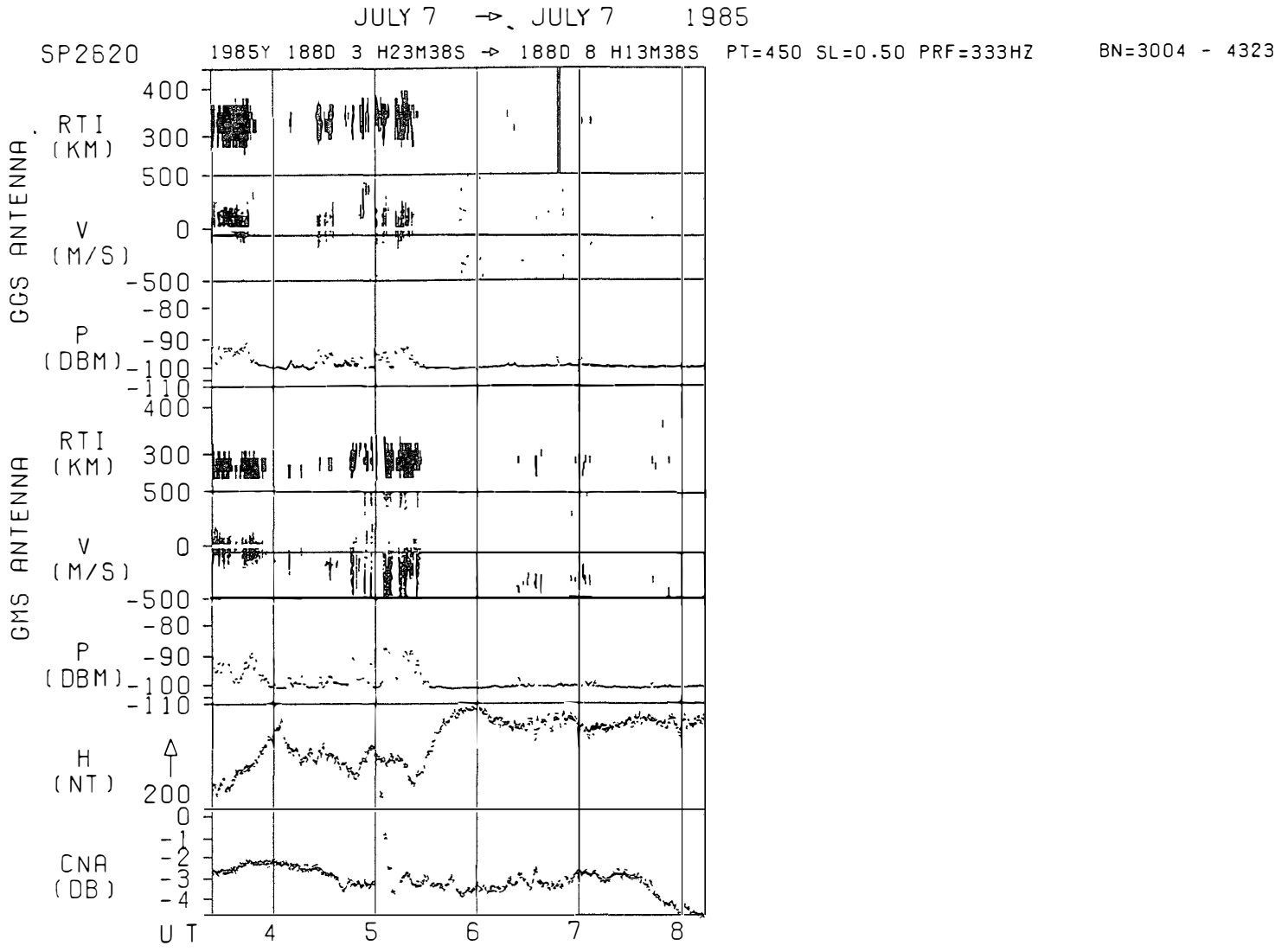

JULY 7 → JULY 7 1985
SP2620
1985Y 188D 3 H23M38S → 188D 8 H13M38S PT=450 SL=0.50 PRF=333HZ
BN=3004 - 4323
GGS ANTENNA
GMS ANTENNA
RTI (KM)
V (M/S)
P (DBM)
H (NT)
CNA (DB)
400
300
500
0
-500
-80
-90
-100
-110
200
-1
-2
-3
-4
UT
4
5
6
7
8

Fig. 2(16)

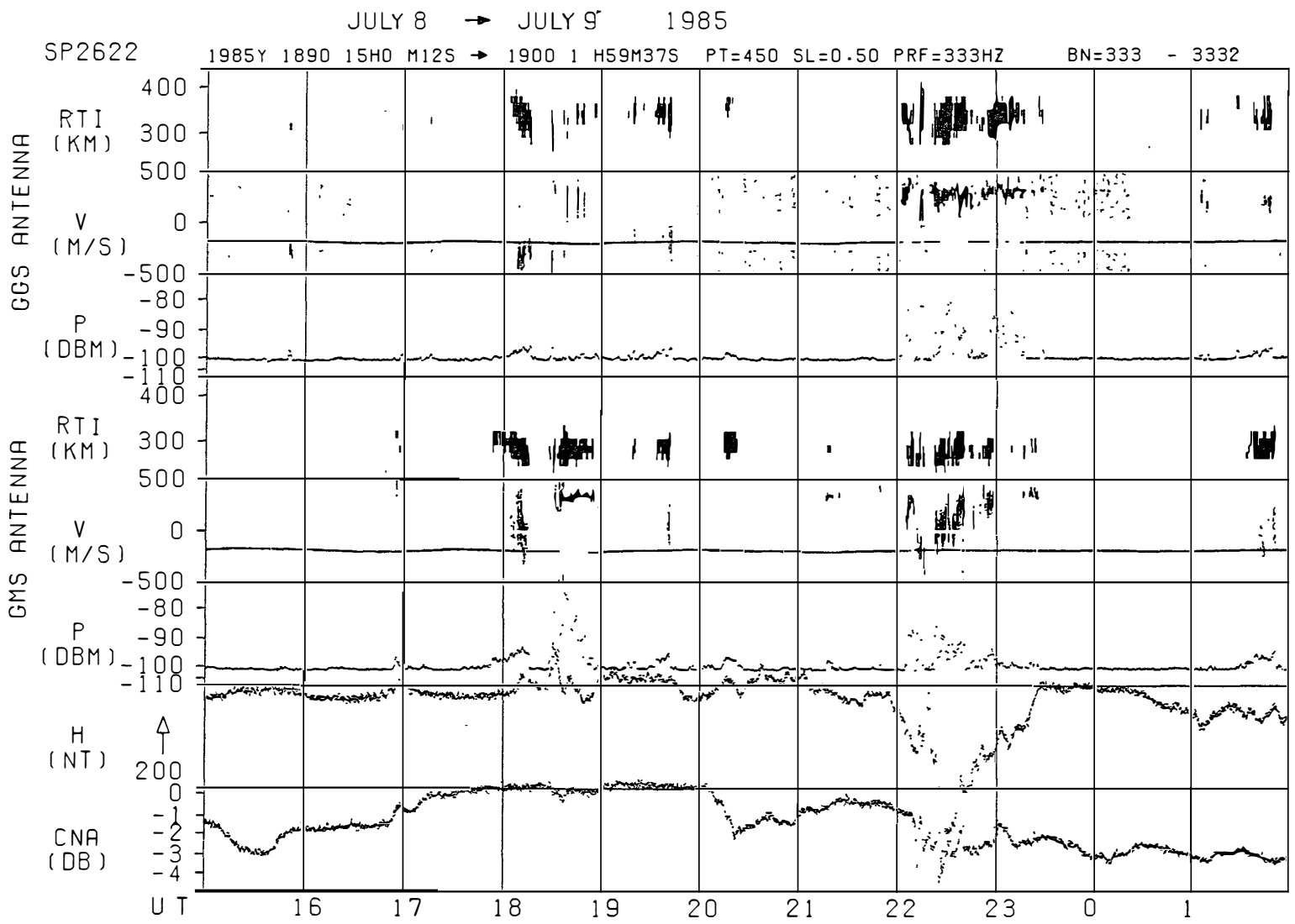

JULY 8 → JULY 9 1985
SP2622
1985Y 1890 15H0 M12S → 1900 1 H59M37S PT=450 SL=0.50 PRF=333HZ BN=333 - 3332
GGS ANTENNA
GMS ANTENNA
RTI (KM)
V (M/S)
P (DBM)
H (NT)
CNA (DB)
400
300
500
0
-500
-80
-90
-100
-110
200
-1
-2
-3
-4
UT
16
17
18
19
20
21
22
23
0
1

Fig. 2(17)

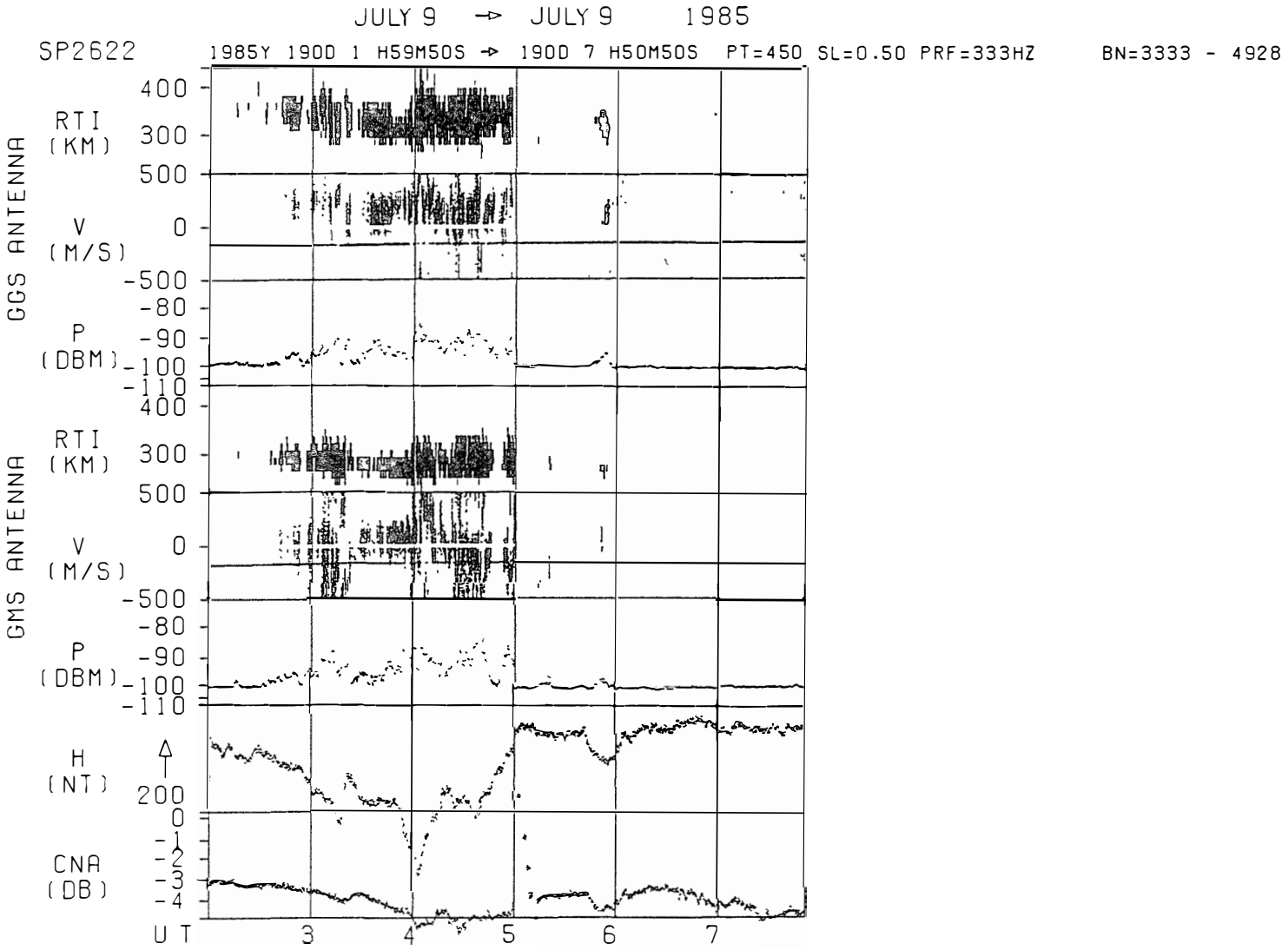

JULY 9 → JULY 9 1985
SP2622
1985Y 190D 1 H59M50S → 190D 7 H50M50S PT=450 SL=0.50 PRF=333HZ
BN=3333 - 4928
GGS ANTENNA
GMS ANTENNA
RTI (KM)
V (M/S)
P (DBM)
H (NT)
CNA (DB)
400
300
500
0
-500
-80
-90
-100
-110
200
-1
-2
-3
-4
UT
3
4
5
6
7

Fig. 2(18)

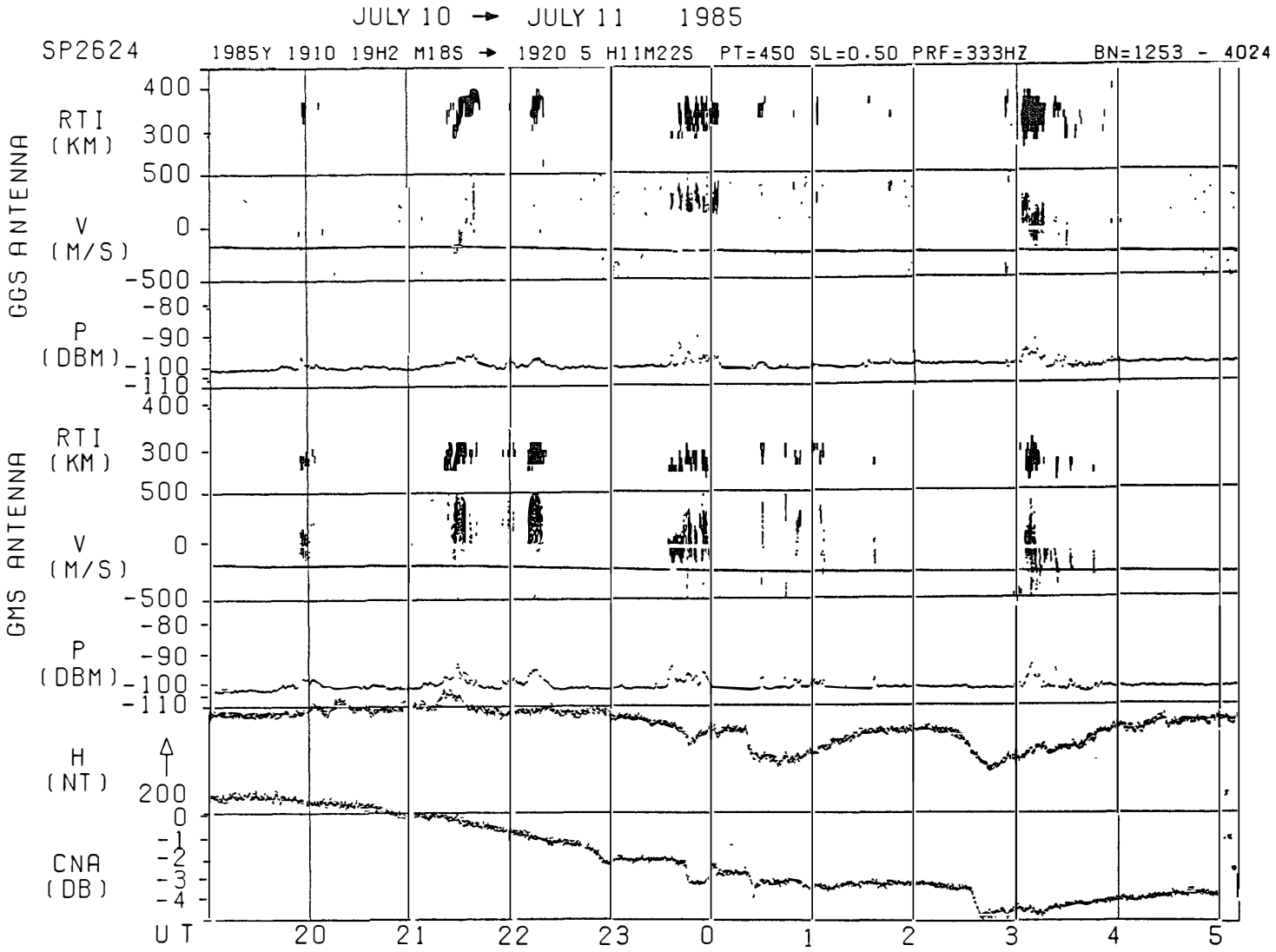

JULY 10 → JULY 11 1985
SP2624
1985Y 1910 19H2 M18S → 1920 5 H11M22S PT=450 SL=0.50 PRF=333HZ
BN=1253 - 4024
GGS ANTENNA
GMS ANTENNA
RTI (KM)
V (M/S)
P (DBM)
H (NT)
CNA (DB)
400
300
500
0
-500
-80
-90
-100
-110
200
-1
-2
-3
-4
UT
20
21
22
23
0
1
2
3
4
5

Fig. 2(19)

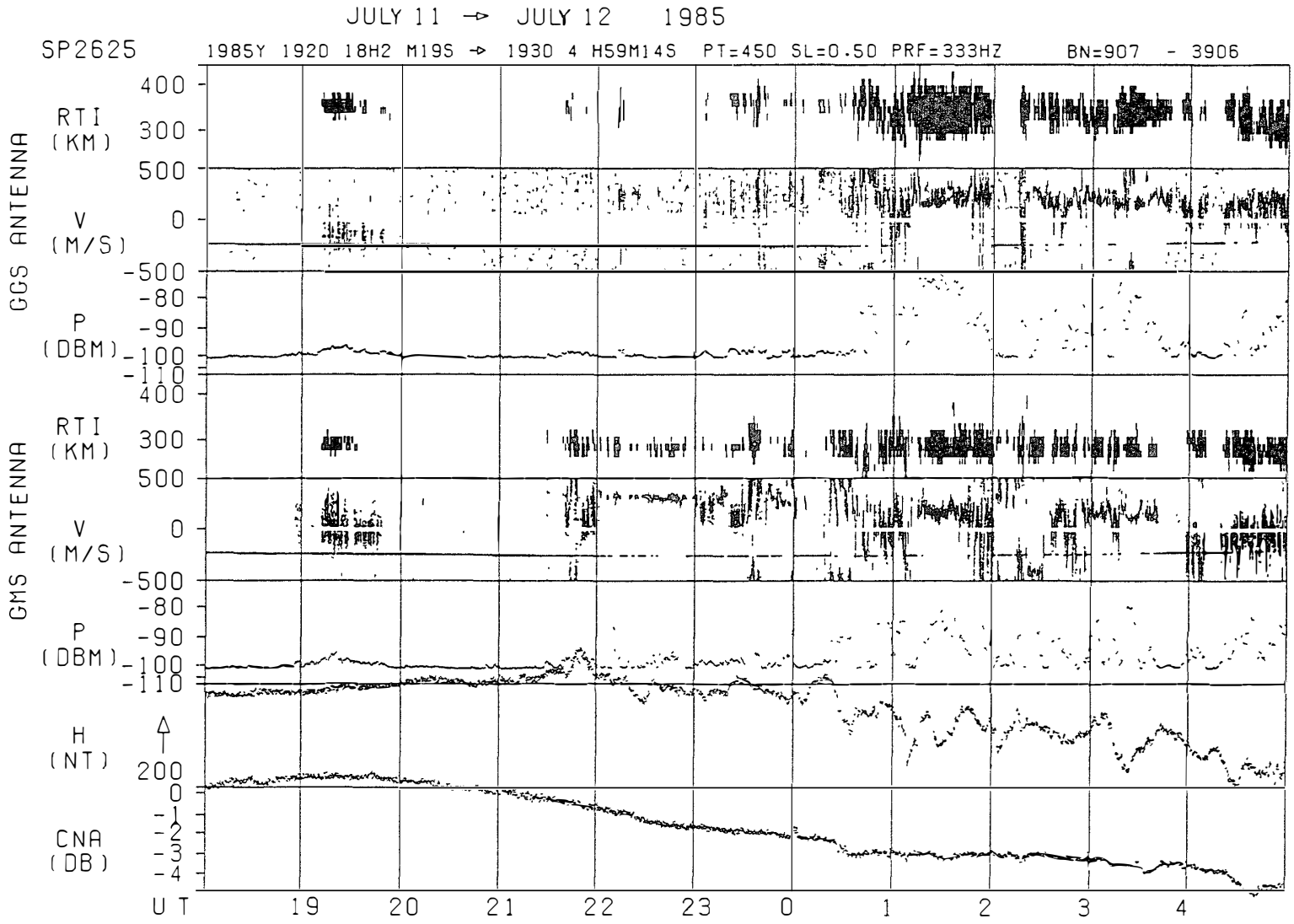

JULY 11 → JULY 12 1985
SP2625
1985Y 1920 18H2 M19S → 1930 4 H59M14S PT=450 SL=0.50 PRF=333HZ
BN=907 - 3906
GCS ANTENNA
GMS ANTENNA
RTI (KM)
V (M/S)
P (DBM)
H (NT)
CNA (DB)
400
300
500
0
-500
-80
-90
-100
-110
200
-1
-2
-3
-4
UT
19
20
21
22
23
0
1
2
3
4

Fig. 2(20)

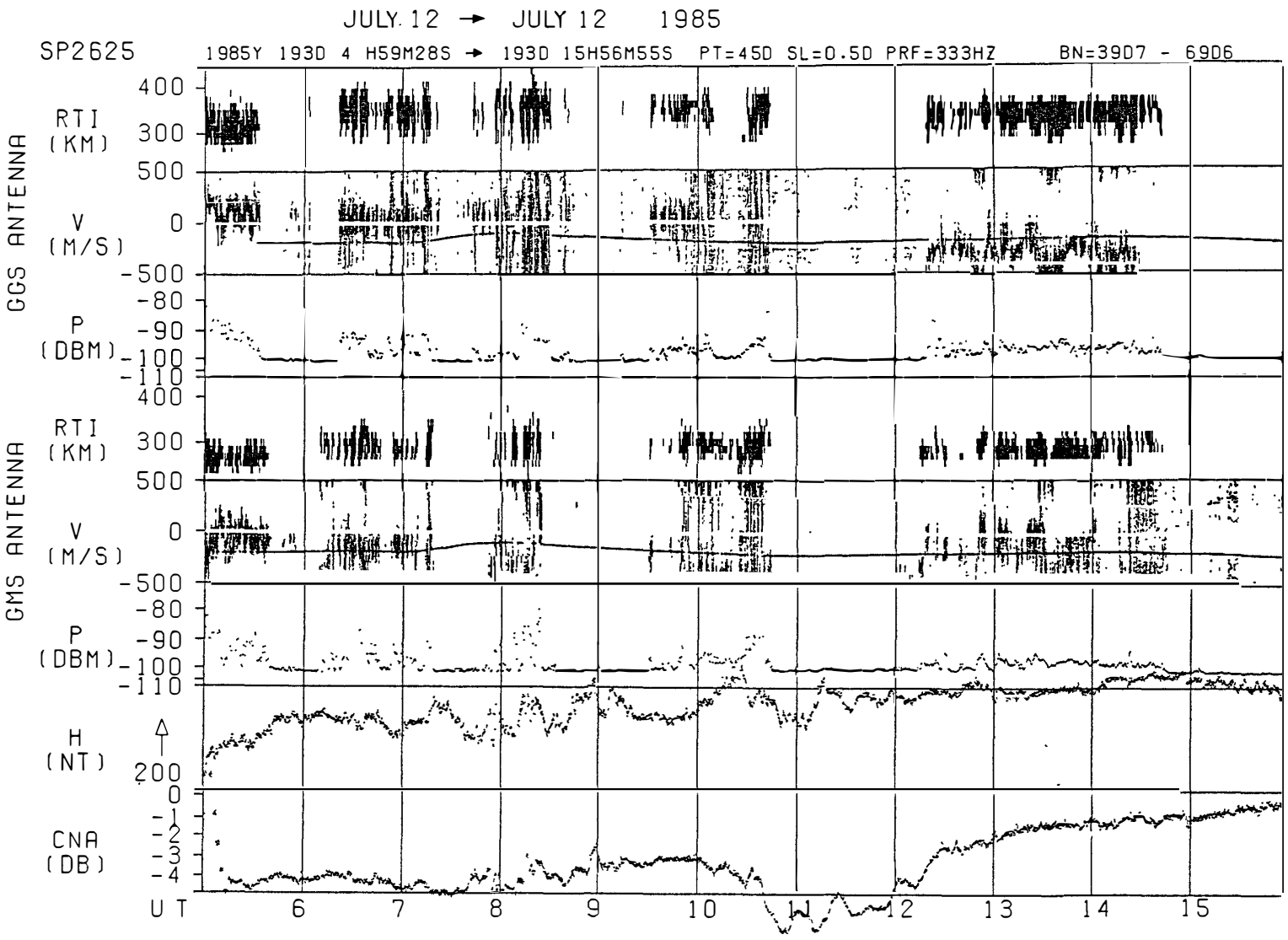

JULY 12 → JULY 12 1985
SP2625
1985Y 193D 4 H59M28S → 193D 15H56M55S PT=45D SL=0.5D PRF=333HZ BN=39D7 - 69D6
GGS ANTENNA
GMS ANTENNA
RTI (KM)
V (M/S)
P (DBM)
H (NT)
CNA (DB)
400
300
500
0
-500
-80
-90
-100
-110
200
-1
-2
-3
-4
UT
6
7
8
9
10
11
12
13
14
15

Fig. 2(21)

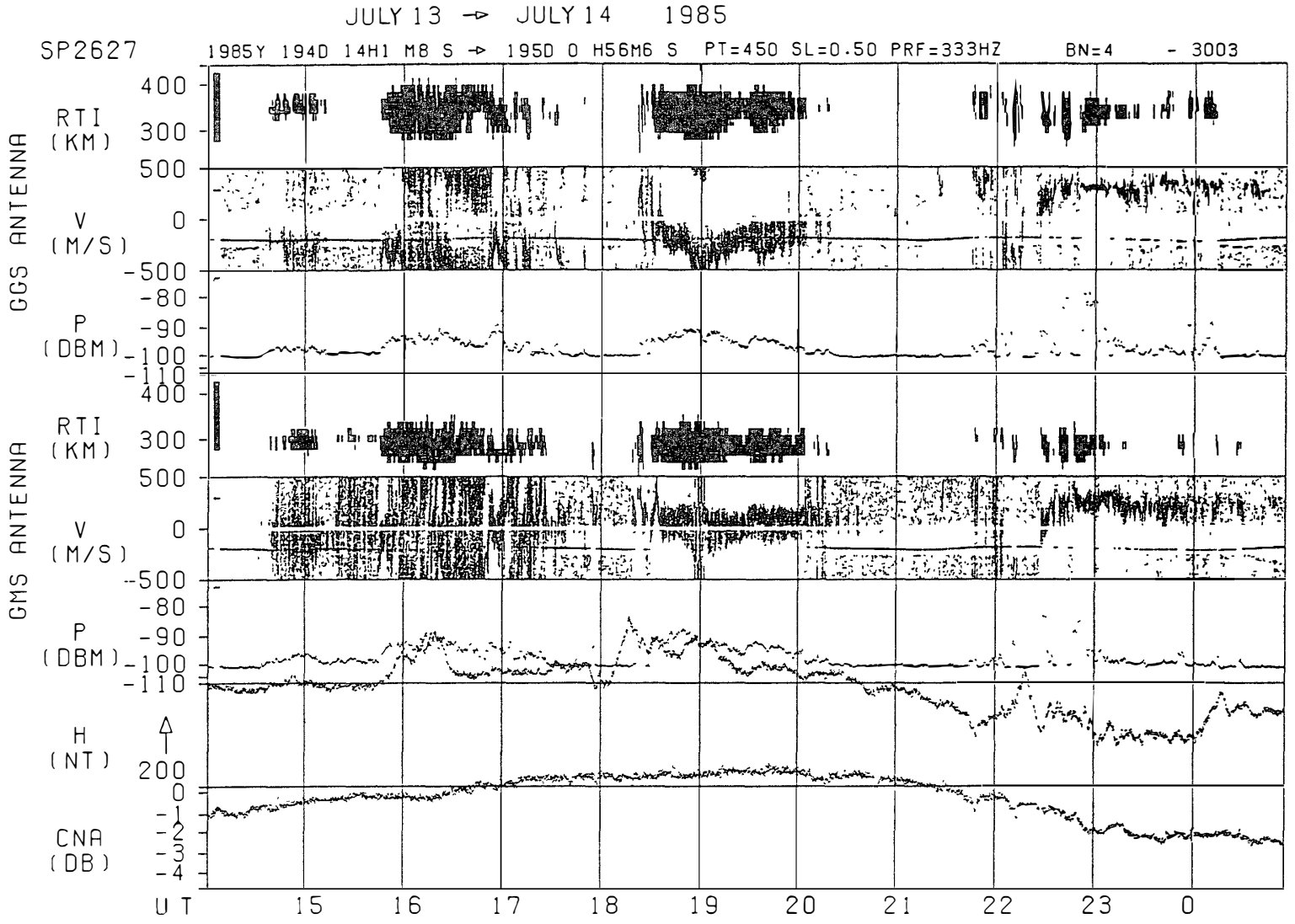

JULY 13 → JULY 14 1985
SP2627
1985Y 194D 14H1 M8 S → 195D 0 H56M6 S PT=450 SL=0.50 PRF=333HZ BN=4 - 3003
GGS ANTENNA
GMS ANTENNA
RTI (KM)
V (M/S)
P (DBM)
H (NT)
CNA (DB)
400
300
500
0
-500
-80
-90
-100
-110
200
-1
-2
-3
-4
UT
15
16
17
18
19
20
21
22
23
0

Fig. 2(22)

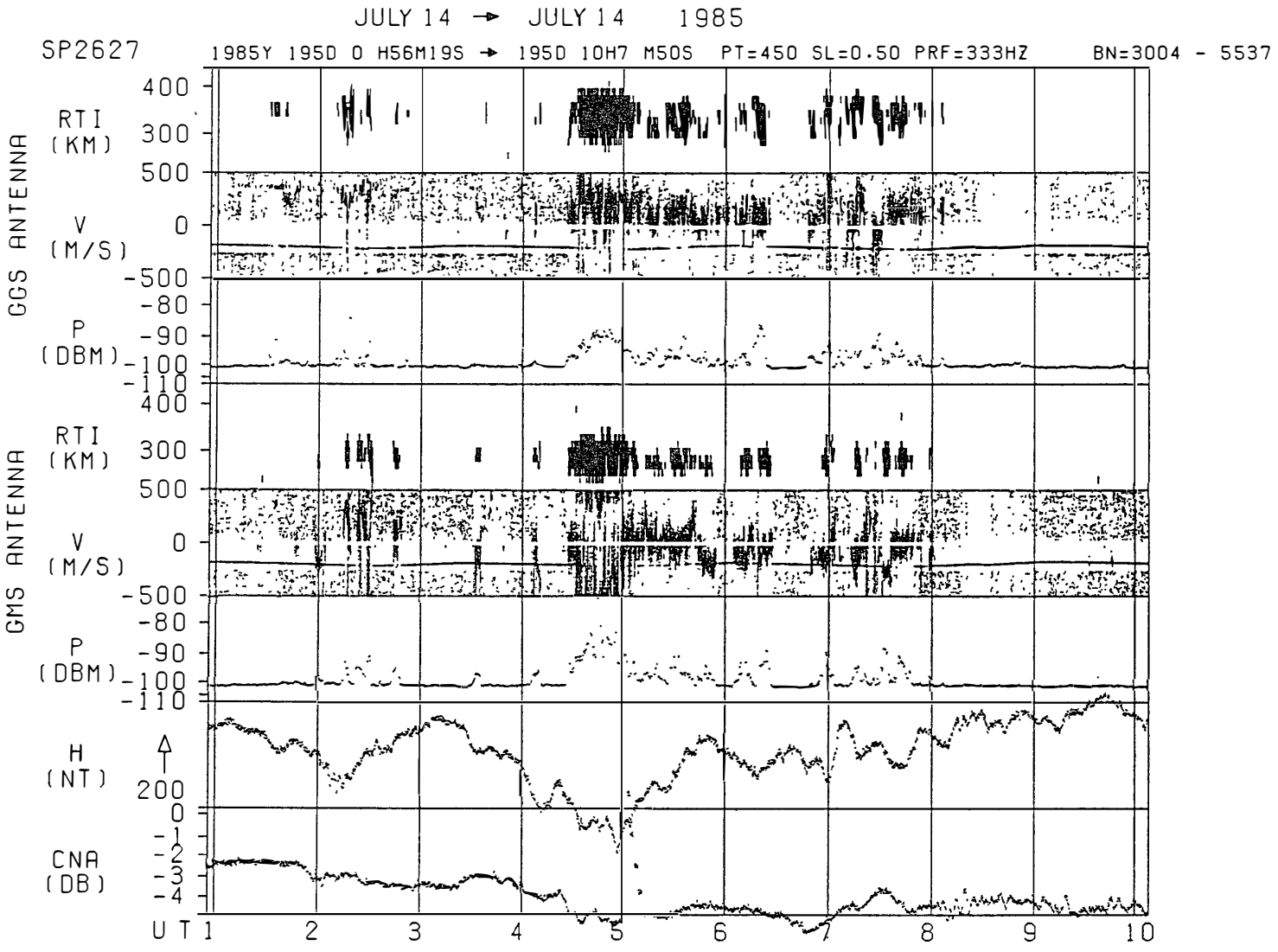

JULY 14 → JULY 14 1985
SP2627
1985Y 195D 0 H56M19S → 195D 10H7 M50S PT=450 SL=0.50 PRF=333HZ
BN=3004 - 5537
GCS ANTENNA
GMS ANTENNA
RTI (KM)
V (M/S)
P (DBM)
H (NT)
CNA (DB)
400
300
500
0
-500
-80
-90
-100
-110
200
-1
-2
-3
-4
UT 1 2 3 4 5 6 7 8 9 10

Fig. 2(23)

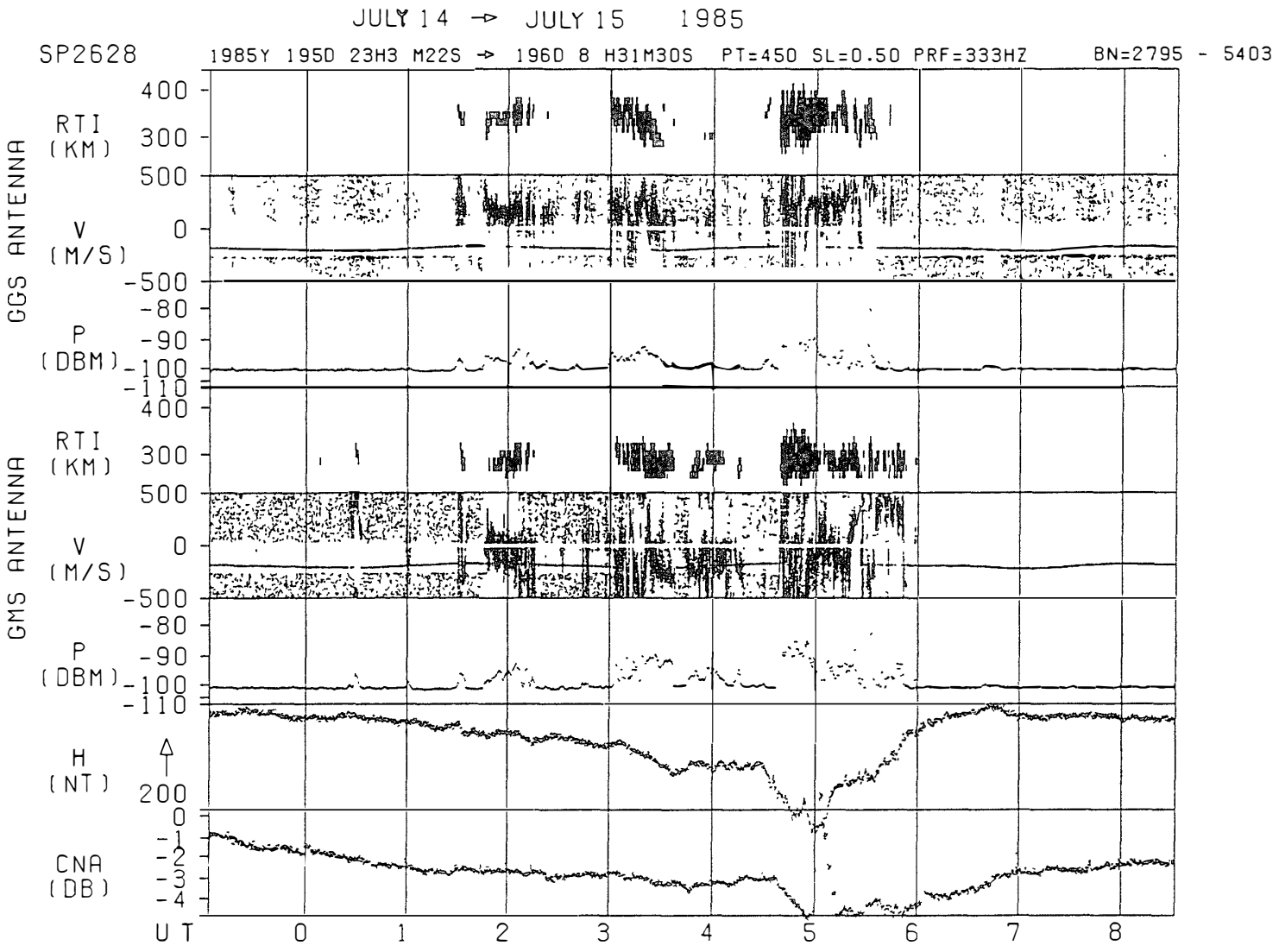

JULY 14 → JULY 15 1985
SP2628
1985Y 195D 23H3 M22S → 196D 8 H31M30S PT=450 SL=0.50 PRF=333HZ
BN=2795 - 5403
GGS ANTENNA
GMS ANTENNA
RTI (KM)
V (M/S)
P (DBM)
H (NT)
CNA (DB)
400
300
500
0
-500
-80
-90
-100
-110
200
-1
-2
-3
-4
UT
0
1
2
3
4
5
6
7
8

Fig. 2(24)

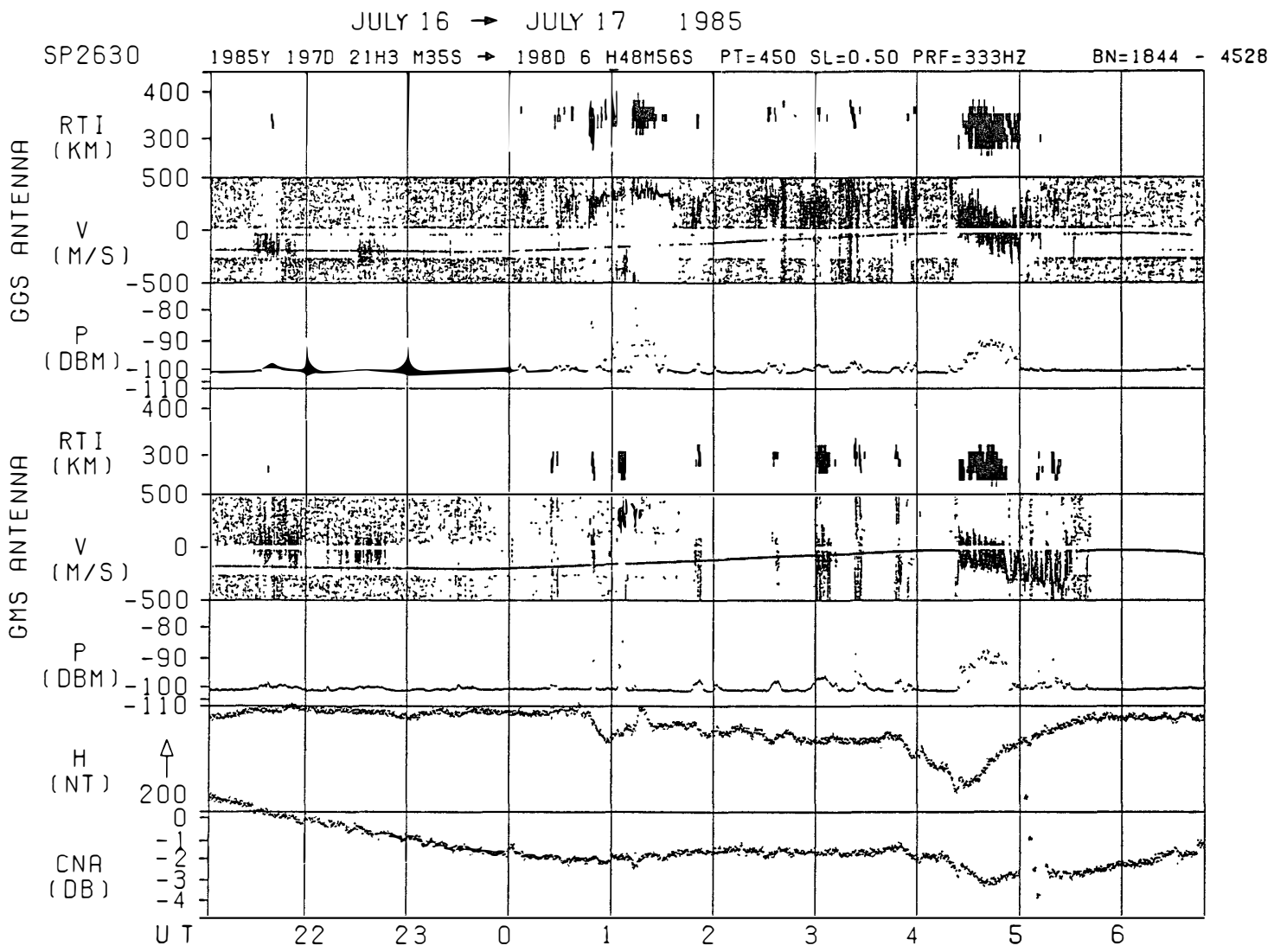

JULY 16 → JULY 17 1985
SP2630
1985Y 197D 21H3 M35S → 198D 6 H48M56S PT=450 SL=0.50 PRF=333HZ
BN=1844 - 4528
GGS ANTENNA
GMS ANTENNA
RTI (KM)
V (M/S)
P (DBM)
H (NT)
CNA (DB)
400
300
500
0
-500
-80
-90
-100
-110
200
-1
-2
-3
-4
UT
22
23
0
1
2
3
4
5
6

Fig. 2(25)

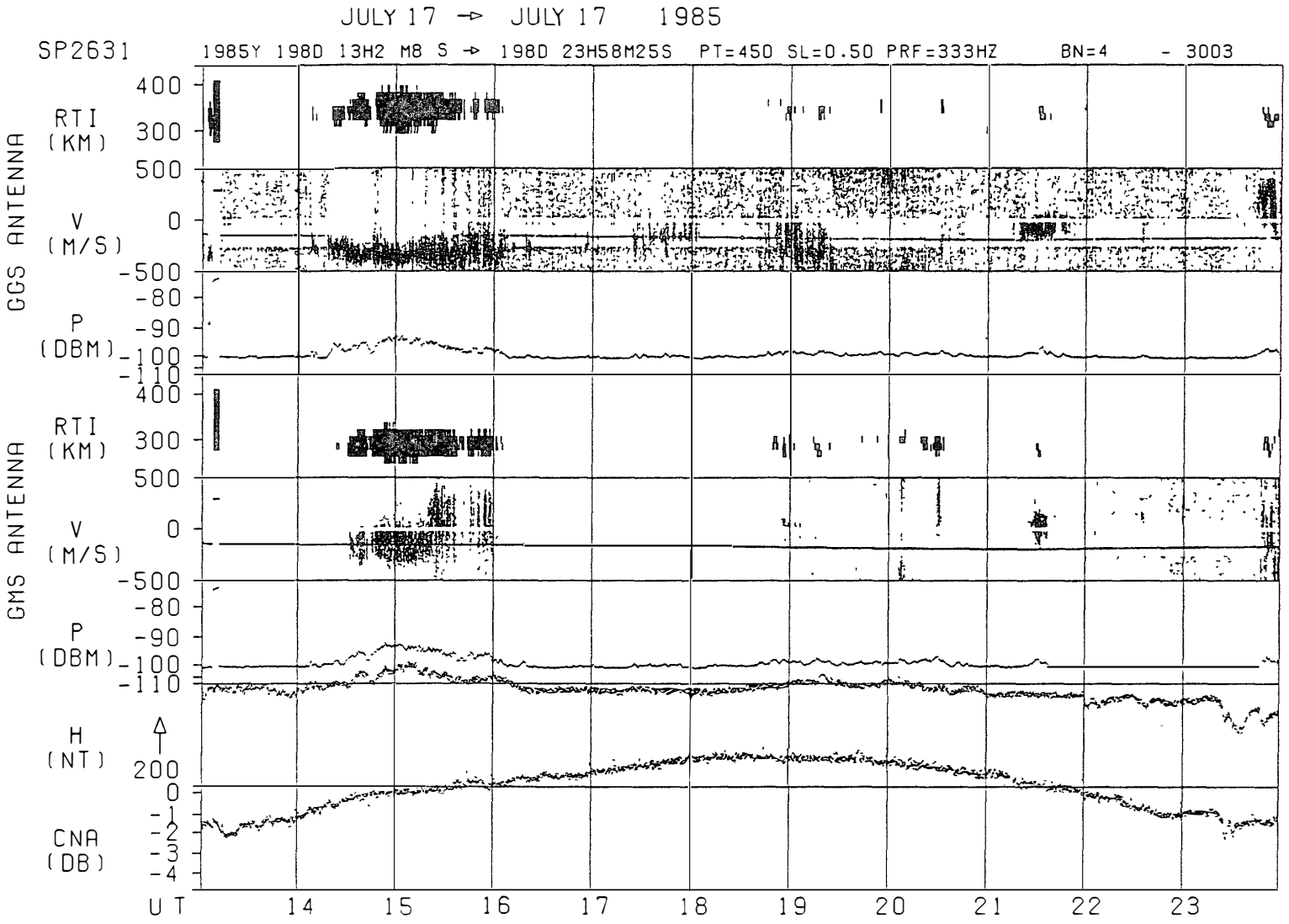

JULY 17 → JULY 17 1985
SP2631
1985Y 198D 13H2 M8 S → 198D 23H58M25S PT=450 SL=0.50 PRF=333HZ BN=4 - 3003
GGS ANTENNA
GMS ANTENNA
RTI (KM)
V (M/S)
P (DBM)
H (NT)
CNA (DB)
400
300
500
0
-500
-80
-90
-100
-110
200
-1
-2
-3
-4
UT
14
15
16
17
18
19
20
21
22
23

Fig. 2(26)

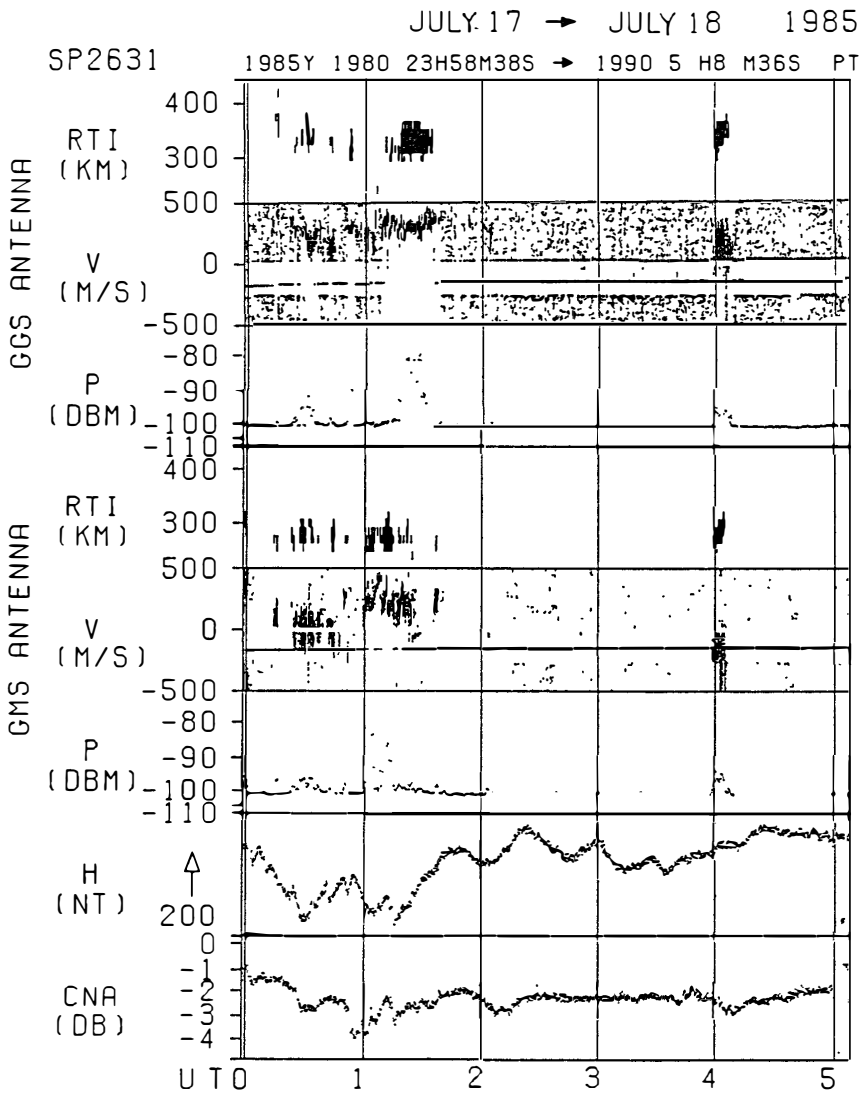

JULY 17 → JULY 18 1985
SP2631
1985Y 1980 23H58M38S → 1990 5 H8 M36S PT=450 SL=0.50 PRF=333HZ
BN=3004 - 4424
GGS ANTENNA
GMS ANTENNA
RTI (KM)
V (M/S)
P (DBM)
H (NT)
CNA (DB)
400
300
500
0
-500
-80
-90
-100
-110
200
-1
-2
-3
-4
UT
0
1
2
3
4
5

Fig. 2(27)

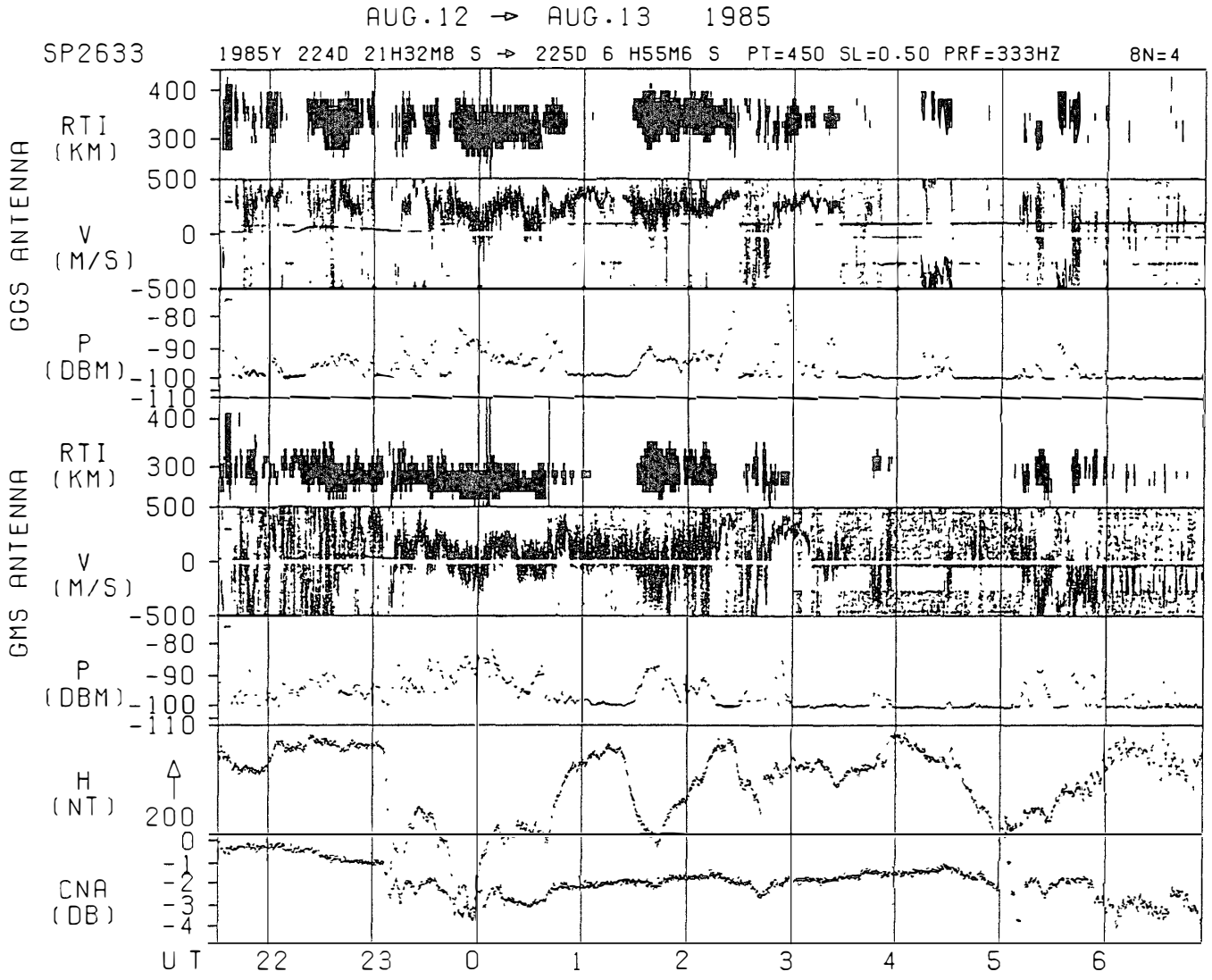

AUG.12 → AUG.13 1985
SP2633
1985Y 224D 21H32M8 S → 225D 6 H55M6 S PT=450 SL=0.50 PRF=333HZ
8N=4
- 2584
GGS ANTENNA
GMS ANTENNA
RTI (KM)
V (M/S)
P (DBM)
H (NT)
CNA (DB)
400
300
500
0
-500
-80
-90
-100
-110
200
-1
-2
-3
-4
UT
22
23
0
1
2
3
4
5
6

Fig. 2(28)

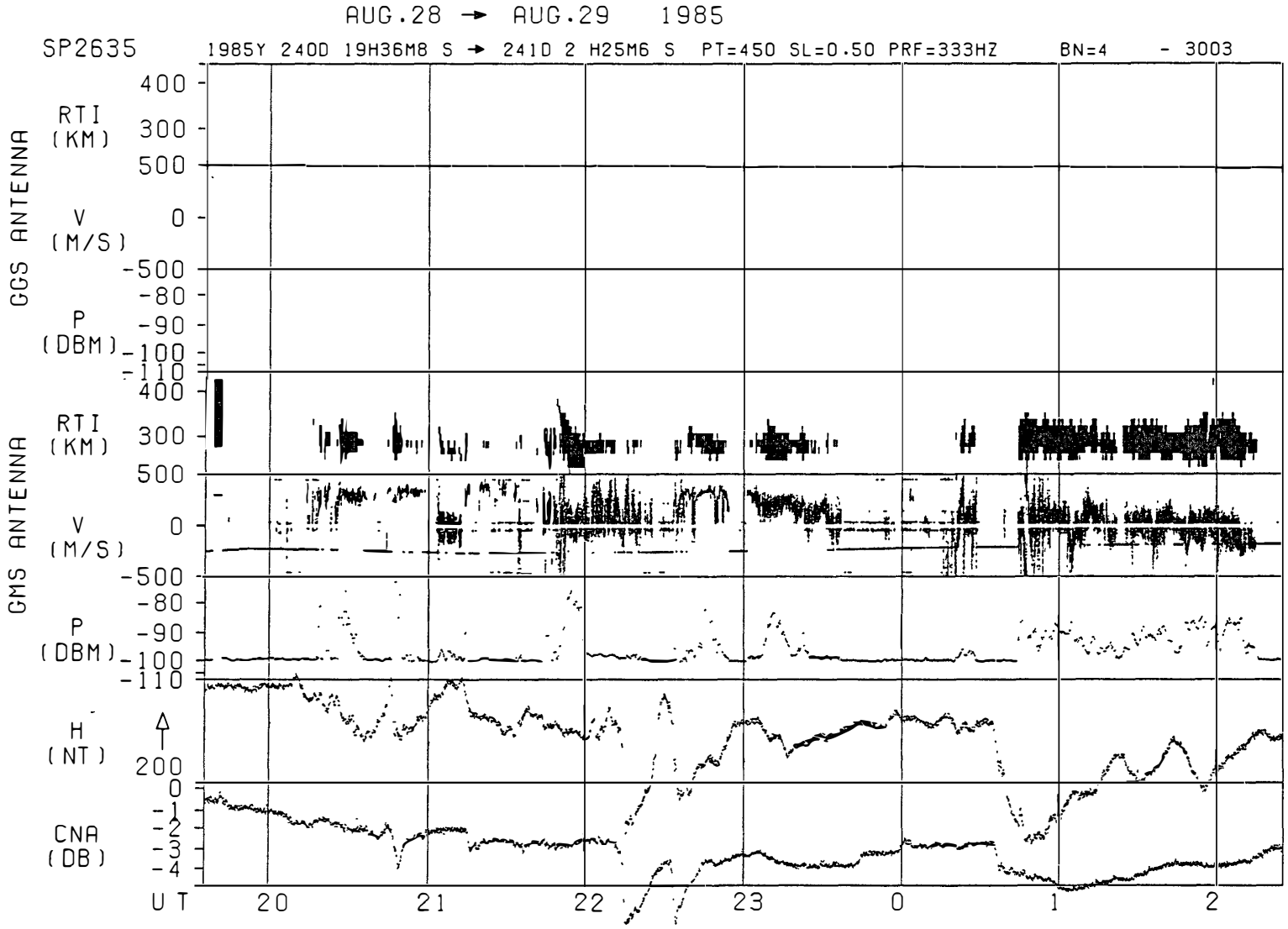

AUG.28 → AUG.29 1985
SP2635
1985Y 240D 19H36M8 S → 241D 2 H25M6 S PT=450 SL=0.50 PRF=333HZ
BN=4 - 3003
GGS ANTENNA
GMS ANTENNA
RTI (KM)
V (M/S)
P (DBM)
H (NT)
CNA (DB)
400
300
500
0
-500
-80
-90
-100
-110
200
-1
-2
-3
-4
UT
20
21
22
23
0
1
2

Fig. 2(29)

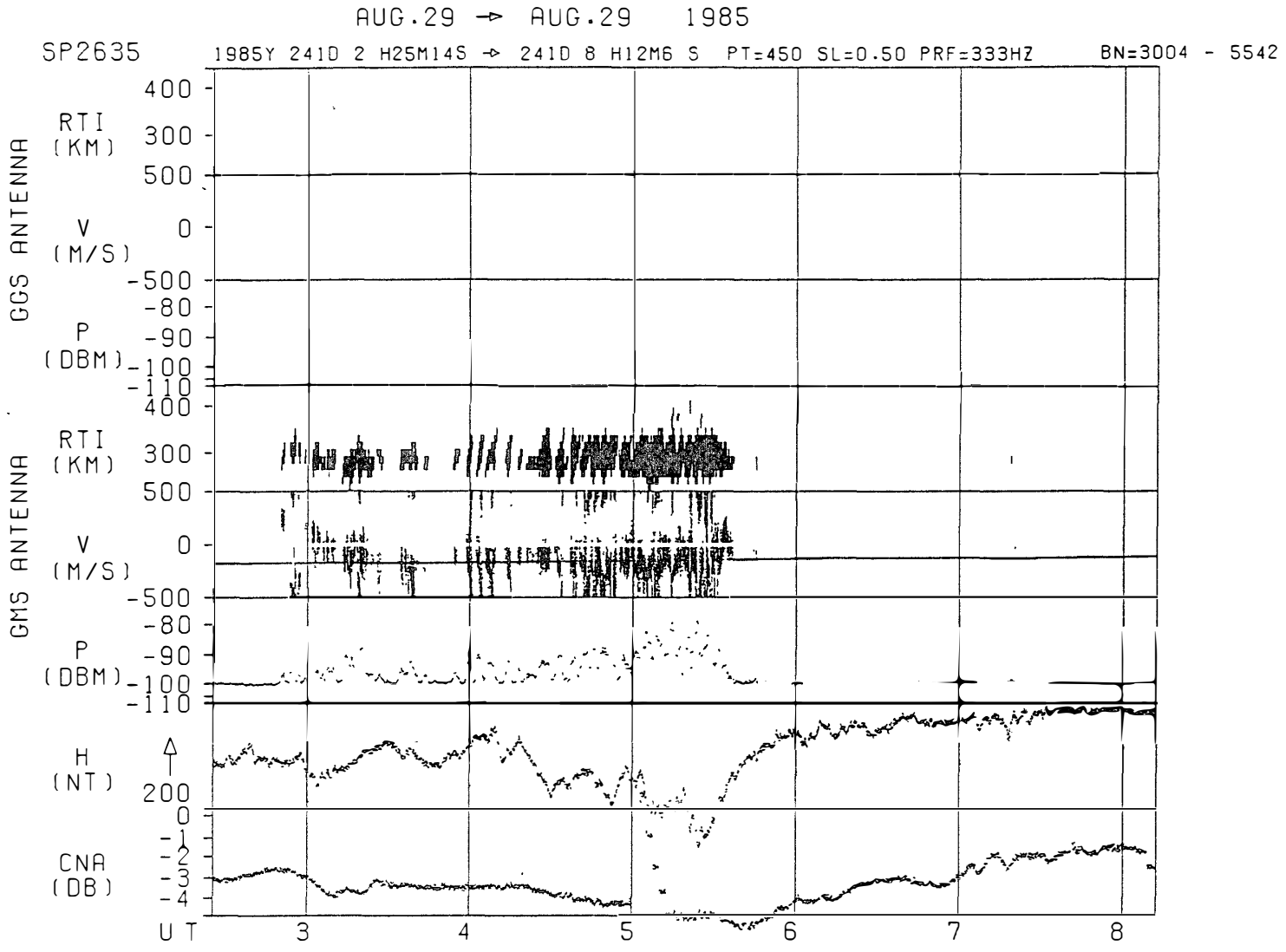
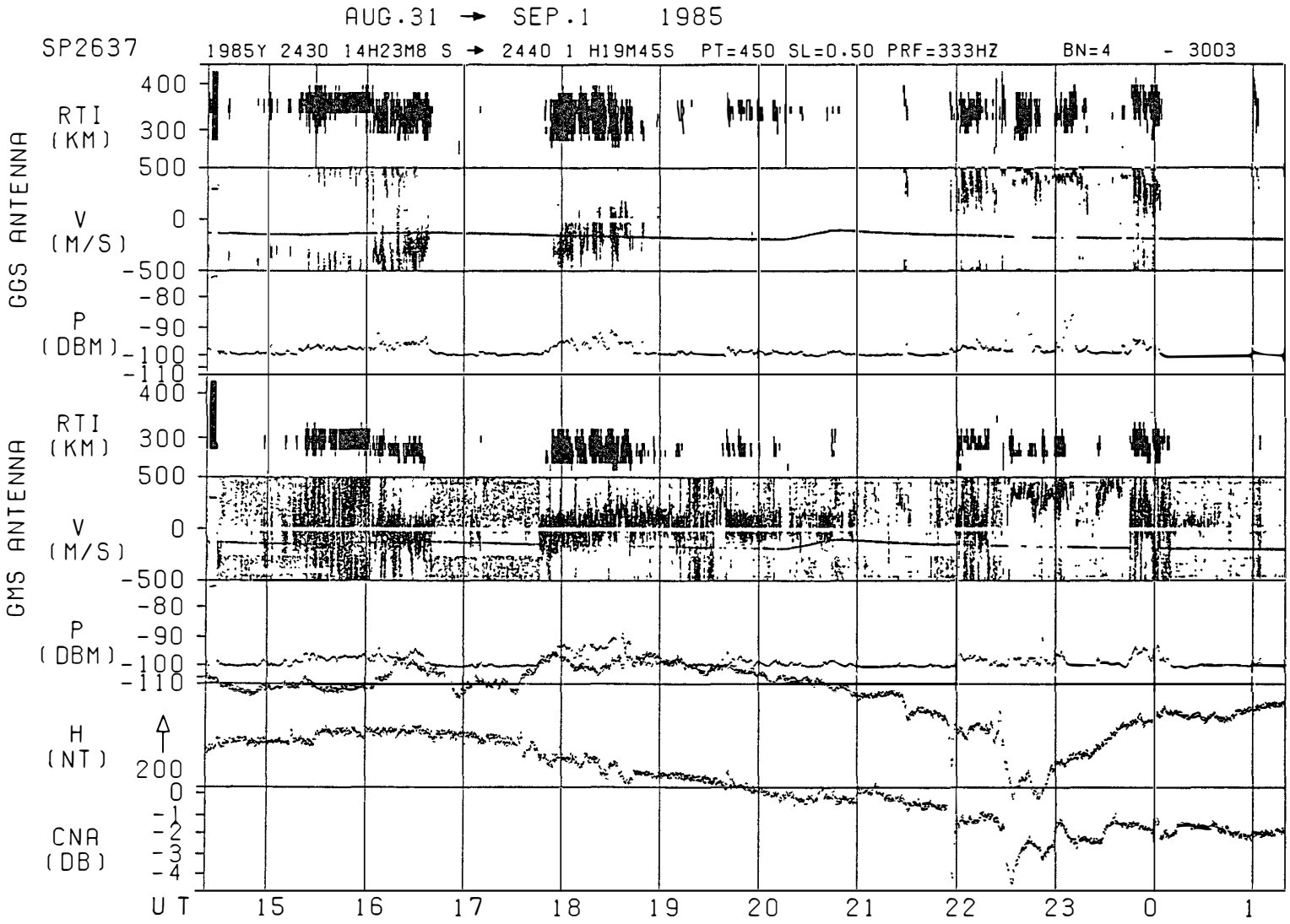

AUG.29 → AUG.29 1985
SP2635
1985Y 241D 2 H25M14S → 241D 8 H12M6 S PT=450 SL=0.50 PRF=333HZ
BN=3004 - 5542
GGS ANTENNA
GMS ANTENNA
RTI (KM)
V (M/S)
P (DBM)
H (NT)
CNA (DB)
400
300
500
0
-500
-80
-90
-100
-110
200
-1
-2
-3
-4
UT
3
4
5
6
7
8

Fig. 2(30)


AUG.31 → SEP.1 1985
SP2637
1985Y 2430 14H23M8 S → 2440 1 H19M45S PT=450 SL=0.50 PRF=333HZ BN=4 - 3003
GGS ANTENNA
RTI (KM)
400
300
V (M/S)
500
0
-500
P (DBM)
-80
-90
-100
-110
GMS ANTENNA
RTI (KM)
400
300
V (M/S)
500
0
-500
P (DBM)
-80
-90
-100
-110
H (NT)
200
0
CNA (DB)
-1
-2
-3
-4
UT
15
16
17
18
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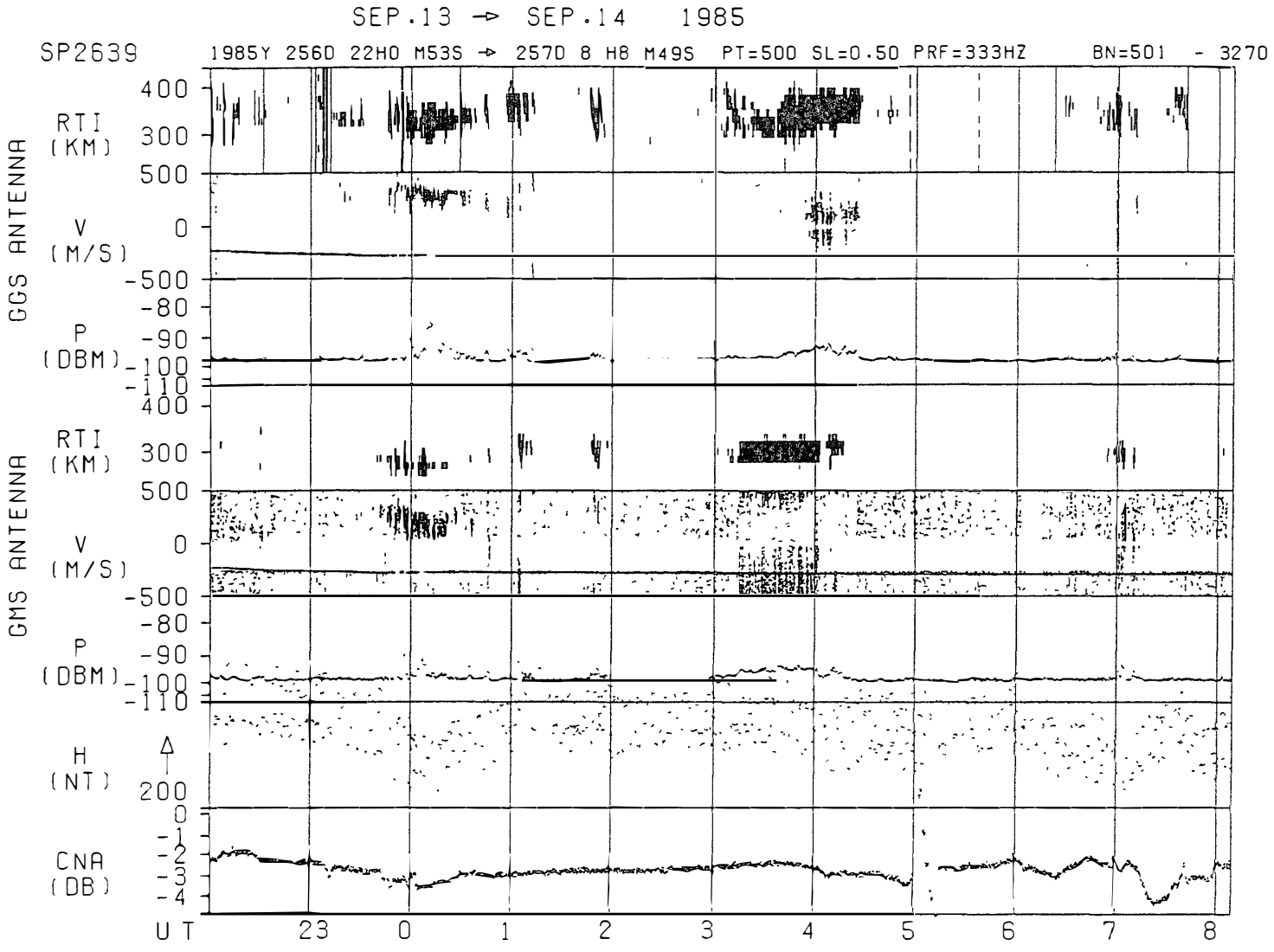
21
22
23
0
1

Fig. 2(31)


SEP.13 → SEP.14 1985
SP2639
1985Y 256D 22H0 M53S → 257D 8 H8 M49S PT=500 SL=0.50 PRF=333HZ
BN=501 - 3270
GGS ANTENNA
GMS ANTENNA
RTI (KM)
V (M/S)
P (DBM)
H (NT)
CNA (DB)
400
300
500
0
-500
-80
-90
-100
-110
200
-1
-2
-3
-4
UT
23
0
1
2
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5
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7
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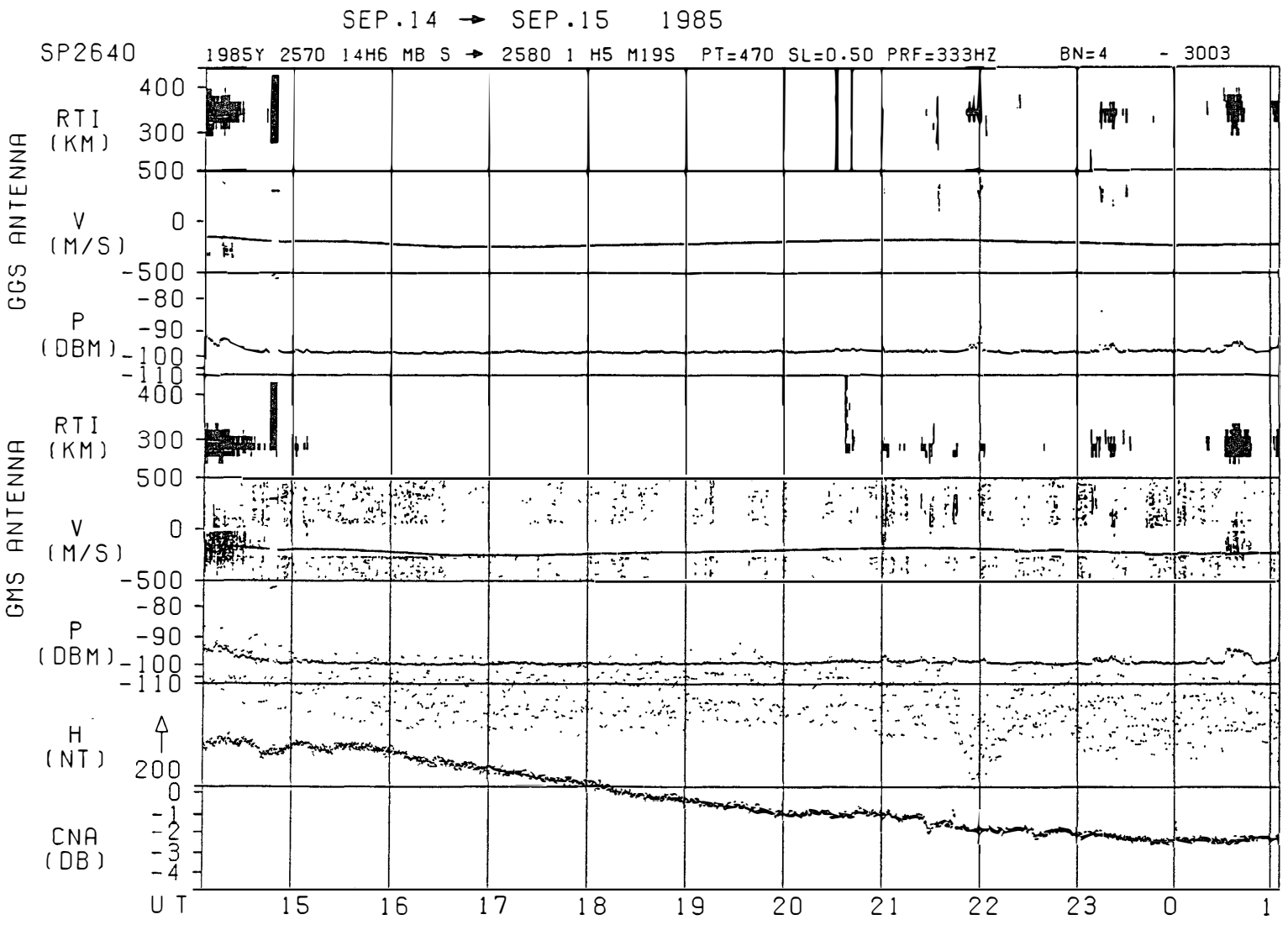
Fig. 2(32)


SEP.14 → SEP.15 1985
SP2640
1985Y 2570 14H6 MB S → 2580 1 H5 M19S PT=470 SL=0.50 PRF=333HZ BN=4 - 3003
GGS ANTENNA
RTI (KM)
400
300
500
V (M/S)
0
-500
P (DBM)
-80
-90
-100
-110
GMS ANTENNA
RTI (KM)
400
300
500
V (M/S)
0
-500
P (DBM)
-80
-90
-100
-110
H (NT)
200
0
CNA (DB)
-1
-2
-3
-4
UT
15
16
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18
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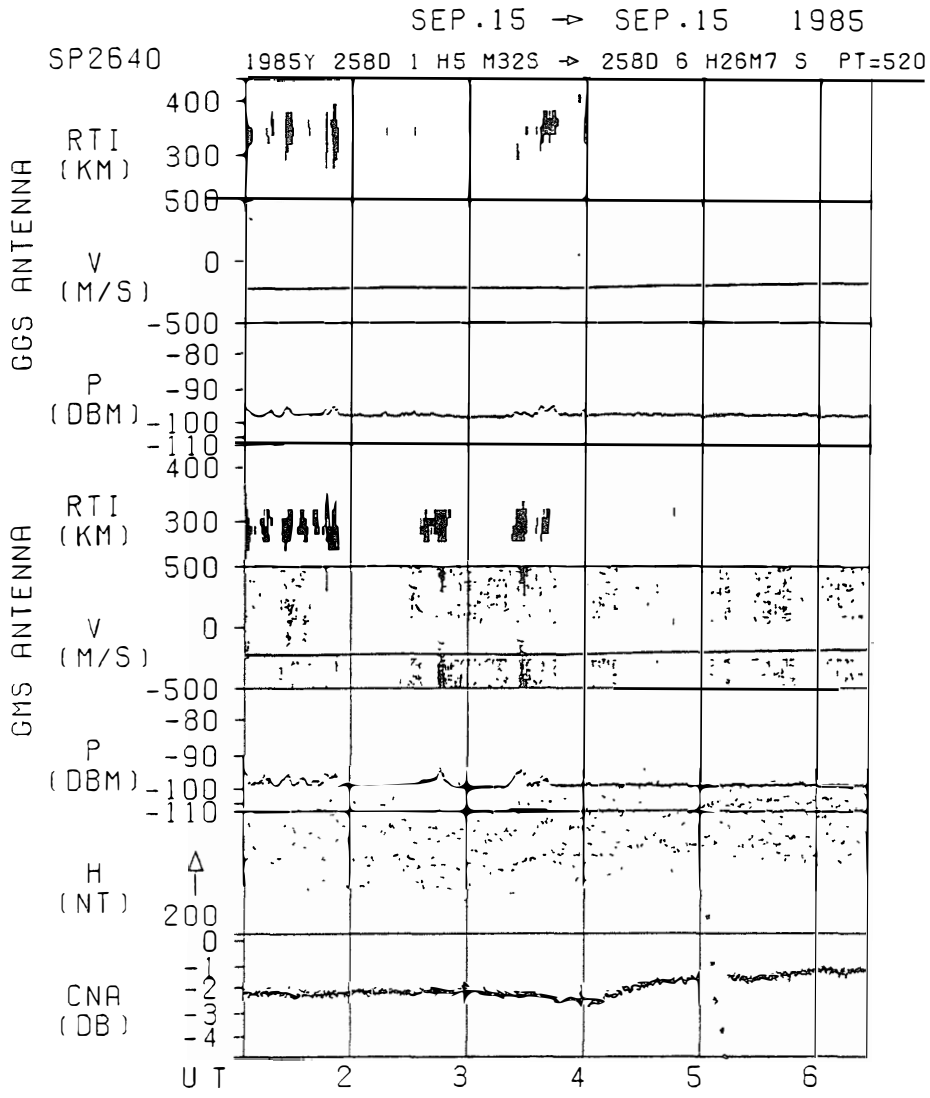
20
21
22
23
0
1

Fig. 2(33)


SEP.15 → SEP.15 1985
SP2640
1985Y 258D 1 H5 M32S → 258D 6 H26M7 S PT=520 SL=0.50 PRF=333HZ
BN=3004 - 4463
GGS ANTENNA
GMS ANTENNA
RTI (KM)
V (M/S)
P (DBM)
H (NT)
CNA (DB)
400
300
500
0
-500
-80
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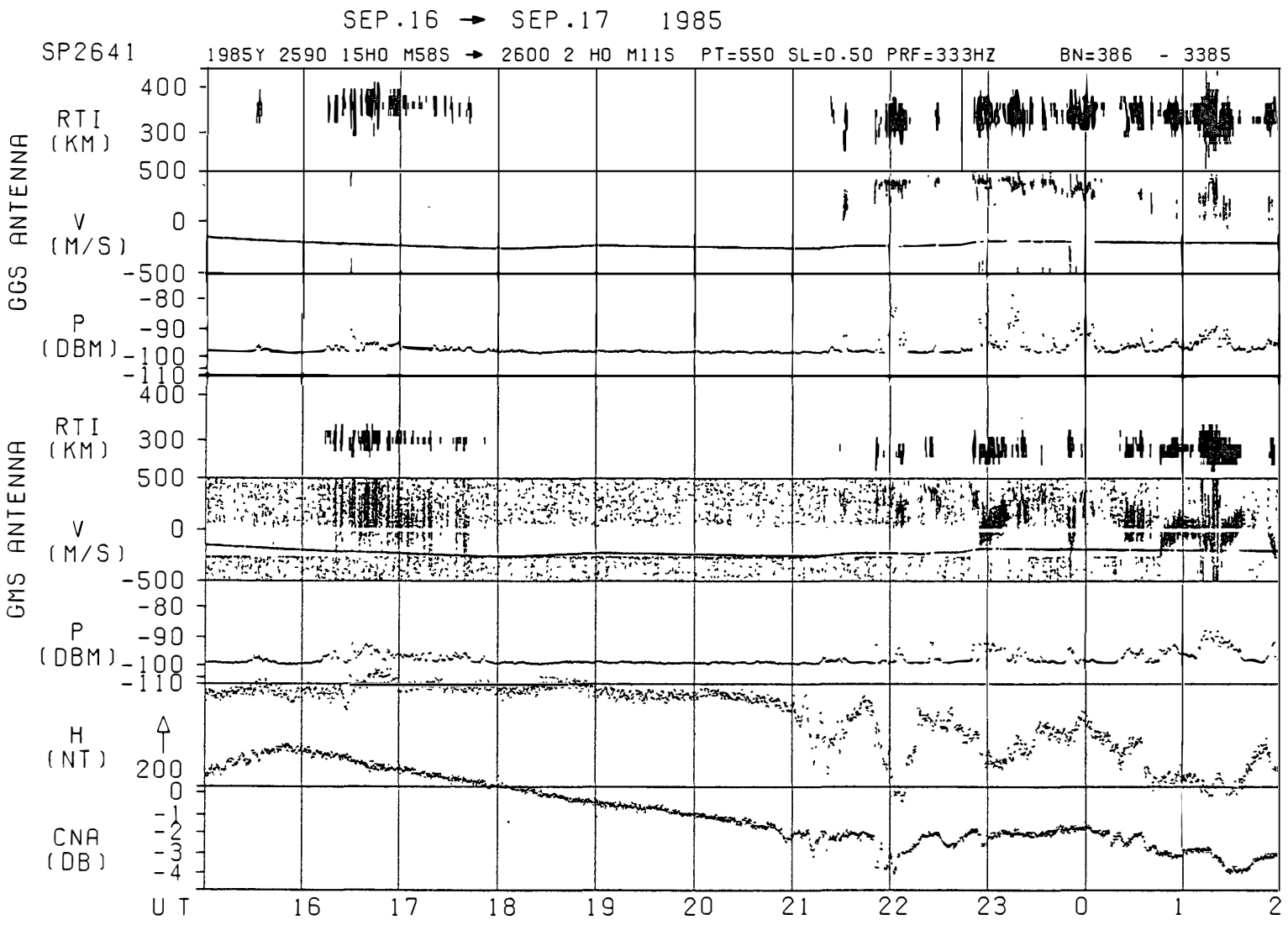
-100
-110
200
-1
-2
-3
-4
UT
2
3
4
5
6

Fig. 2(34)


SEP.16 → SEP.17 1985
SP2641
1985Y 2590 15H0 M58S → 2600 2 H0 M11S PT=550 SL=0.50 PRF=333HZ BN=386 - 3385
GGS ANTENNA
GMS ANTENNA
RTI (KM)
V (M/S)
P (DBM)
H (NT)
CNA (DB)
400
300
500
0
-500
-80
-90
-100
-110
200
-1
-2
-3
-4
U T
16
17
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19
20
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23
0
1
2

Fig. 2(35)

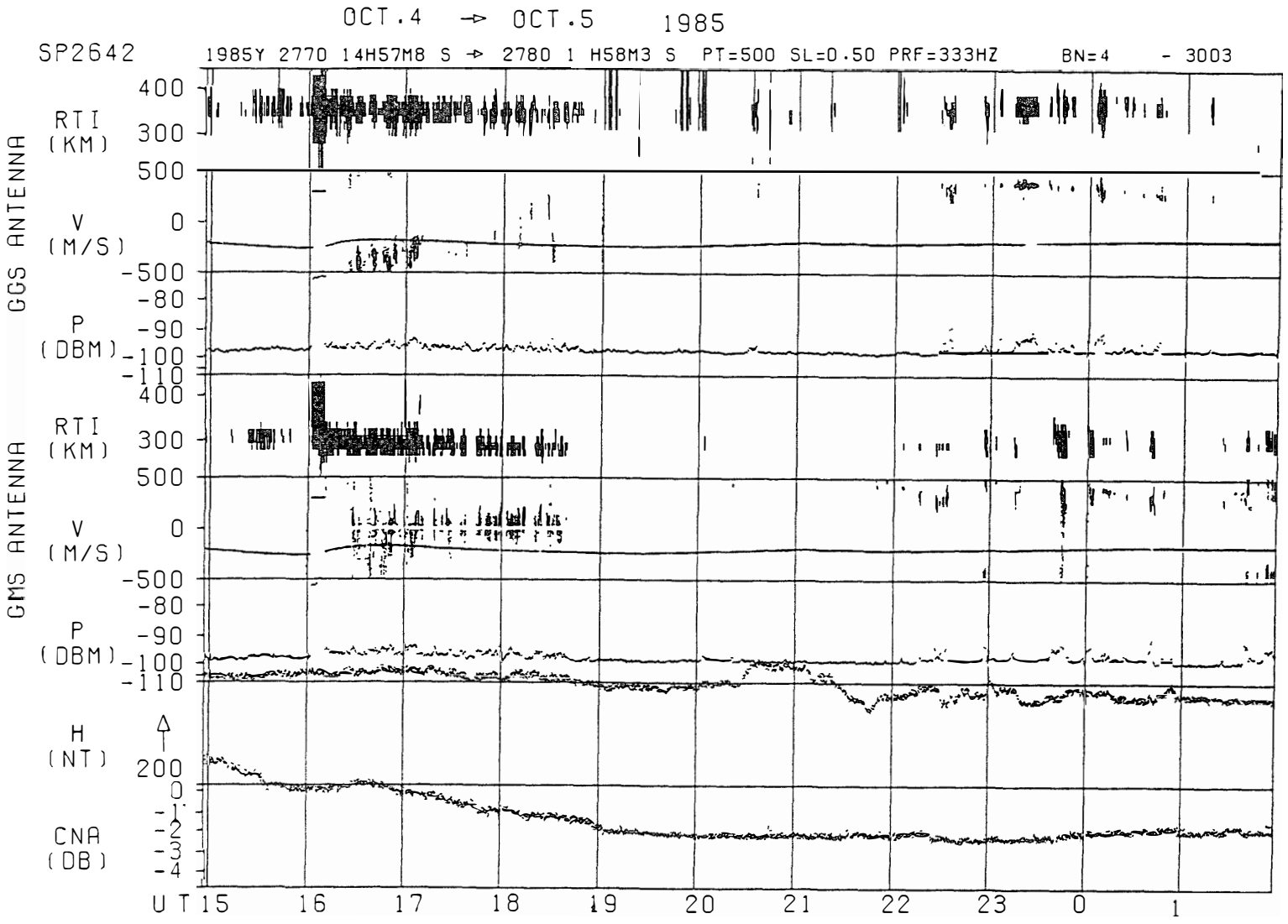
OCT.4 → OCT.5 1985
SP2642
1985Y 2770 14H57M8 S → 2780 1 H58M3 S PT=500 SL=0.50 PRF=333HZ BN=4 - 3003
GGS ANTENNA
GMS ANTENNA
RTI (KM)
V (M/S)
P (DBM)
H (NT)
CNA (DB)
400
300
500
0
-500
-80
-90
-100
-110
200
-1
-2
-3
-4
UT 15 16 17 18 19 20 21 22 23 0 1

Fig. 2(36)

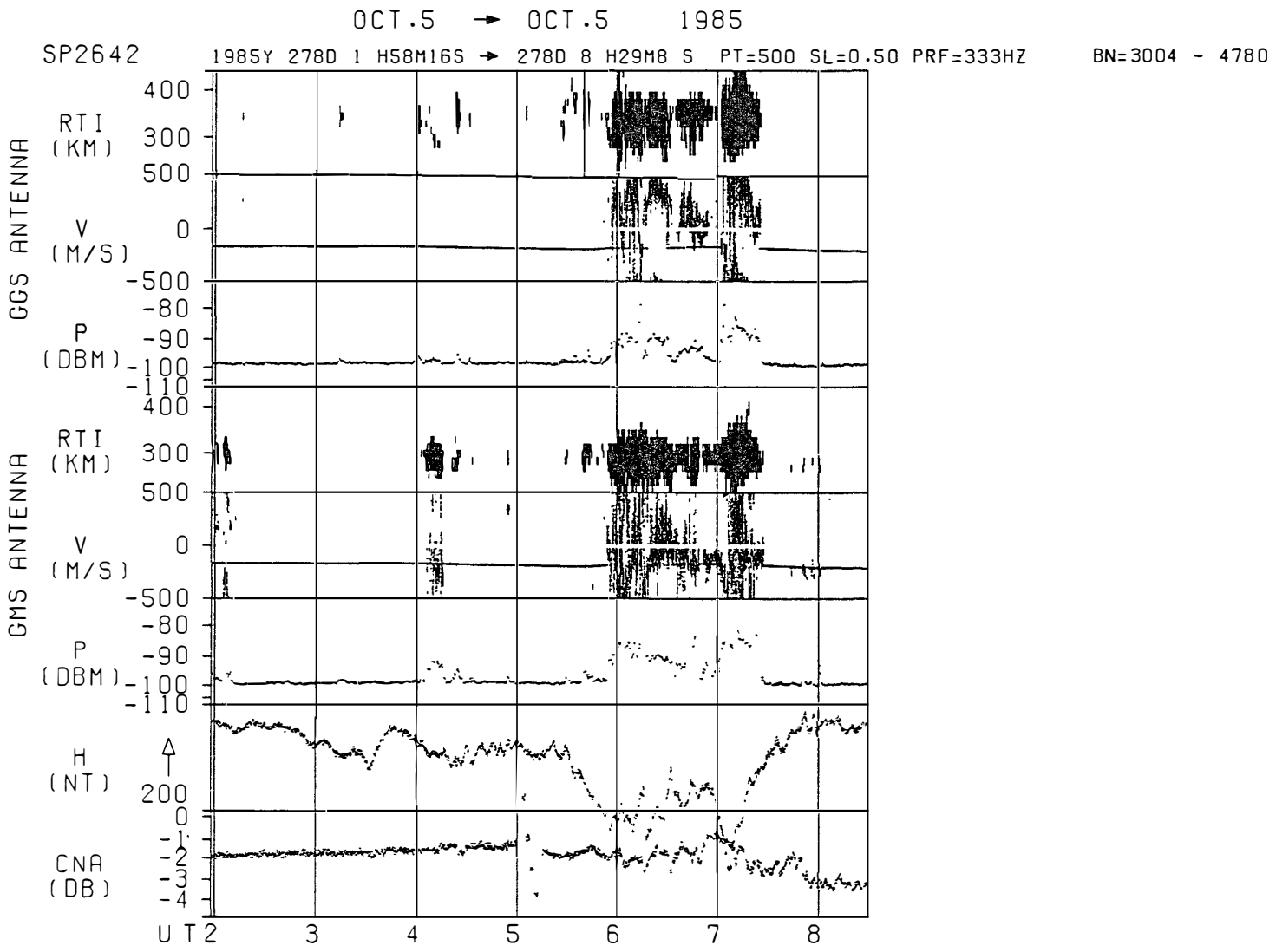
OCT.5 → OCT.5 1985
SP2642
1985Y 278D 1 H58M16S → 278D 8 H29M8 S PT=500 SL=0.50 PRF=333HZ
BN=3004 - 4780
GGS ANTENNA
GMS ANTENNA
RTI (KM)
V (M/S)
P (DBM)
H (NT)
CNA (DB)
400
300
500
0
-500
-80
-90
-100
-110
200
-1
-2
-3
-4
UT 2 3 4 5 6 7 8

Fig. 2(37)

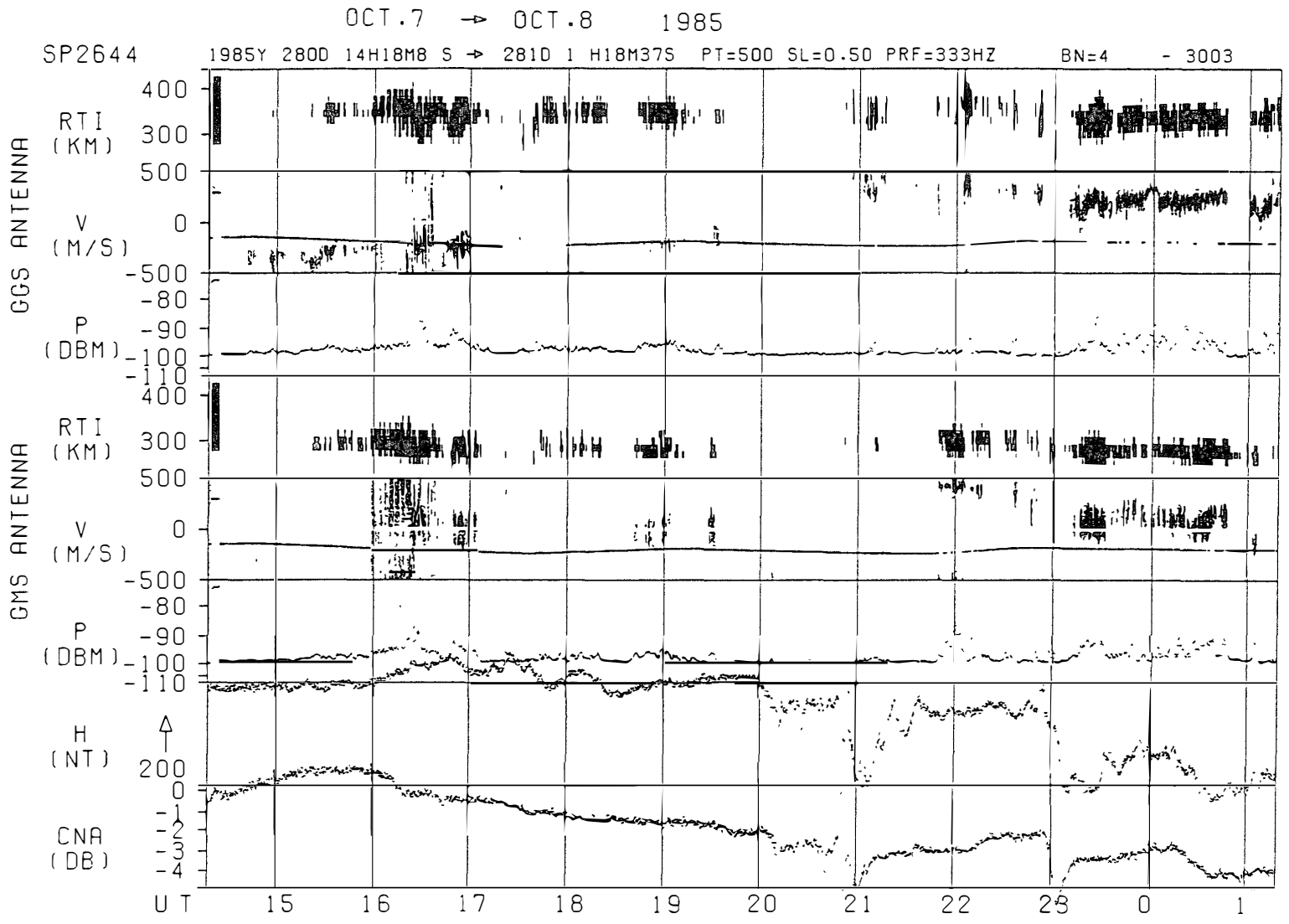
OCT.7 → OCT.8 1985
SP2644 1985Y 280D 14H18M8 S → 281D 1 H18M37S PT=500 SL=0.50 PRF=333HZ BN=4 - 3003
GGS ANTENNA
GMS ANTENNA
RTI (KM)
V (M/S)
P (DBM)
H (NT)
CNA (DB)
400
300
500
0
-500
-80
-90
-100
-110
200
-1
-2
-3
-4
UT
15
16
17
18
19
20
21
22
23
0
1

Fig. 2(38)

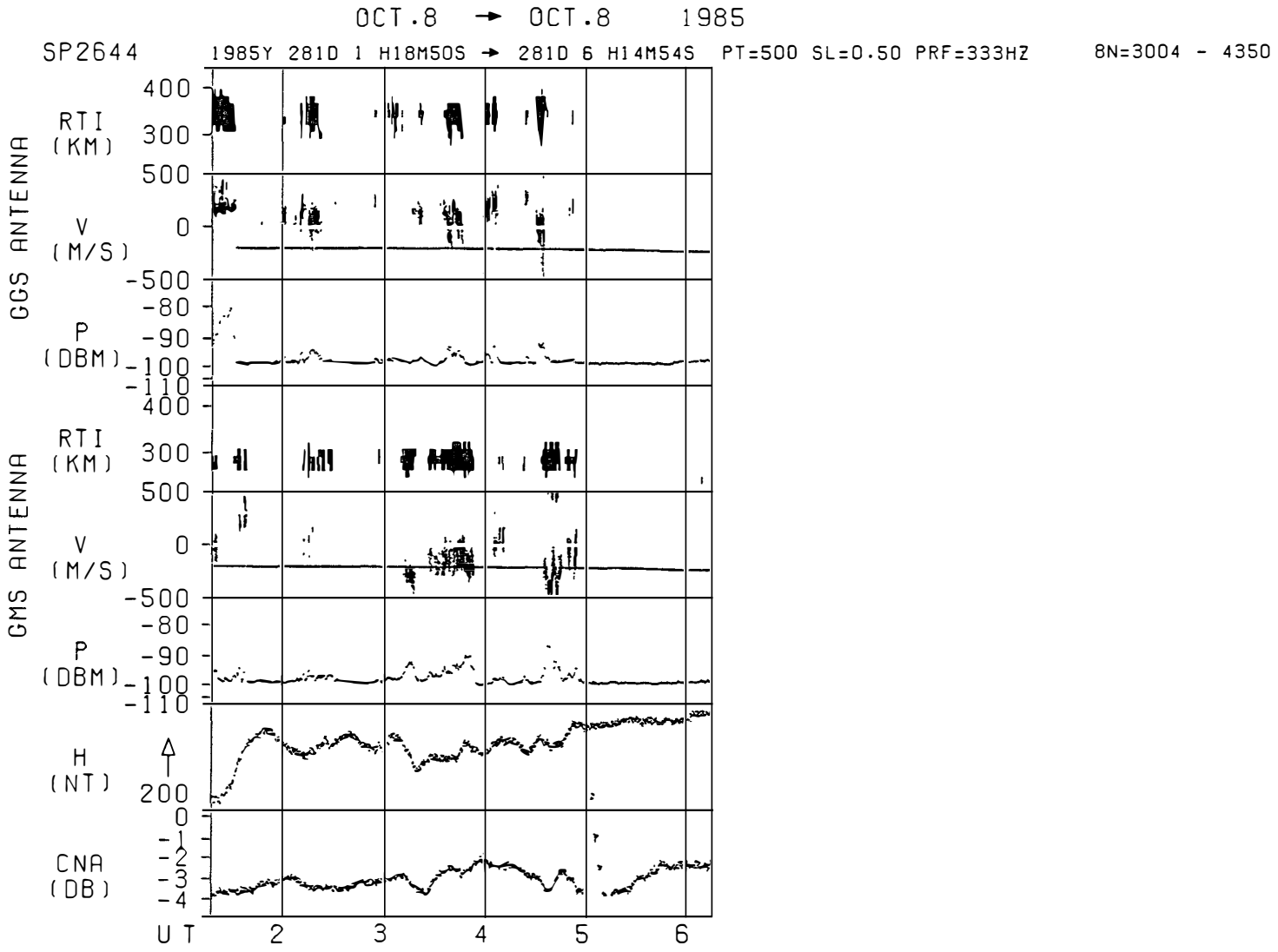
OCT.8 → OCT.8 1985
SP2644
1985Y 281D 1 H18M50S → 281D 6 H14M54S PT=500 SL=0.50 PRF=333HZ
8N=3004 - 4350
GGS ANTENNA
GMS ANTENNA
RTI (KM)
V (M/S)
P (DBM)
H (NT)
CNA (DB)
400
300
500
0
-500
-80
-90
-100
-110
200
-1
-2
-3
-4
UT
2
3
4
5
6

Fig. 2(39)

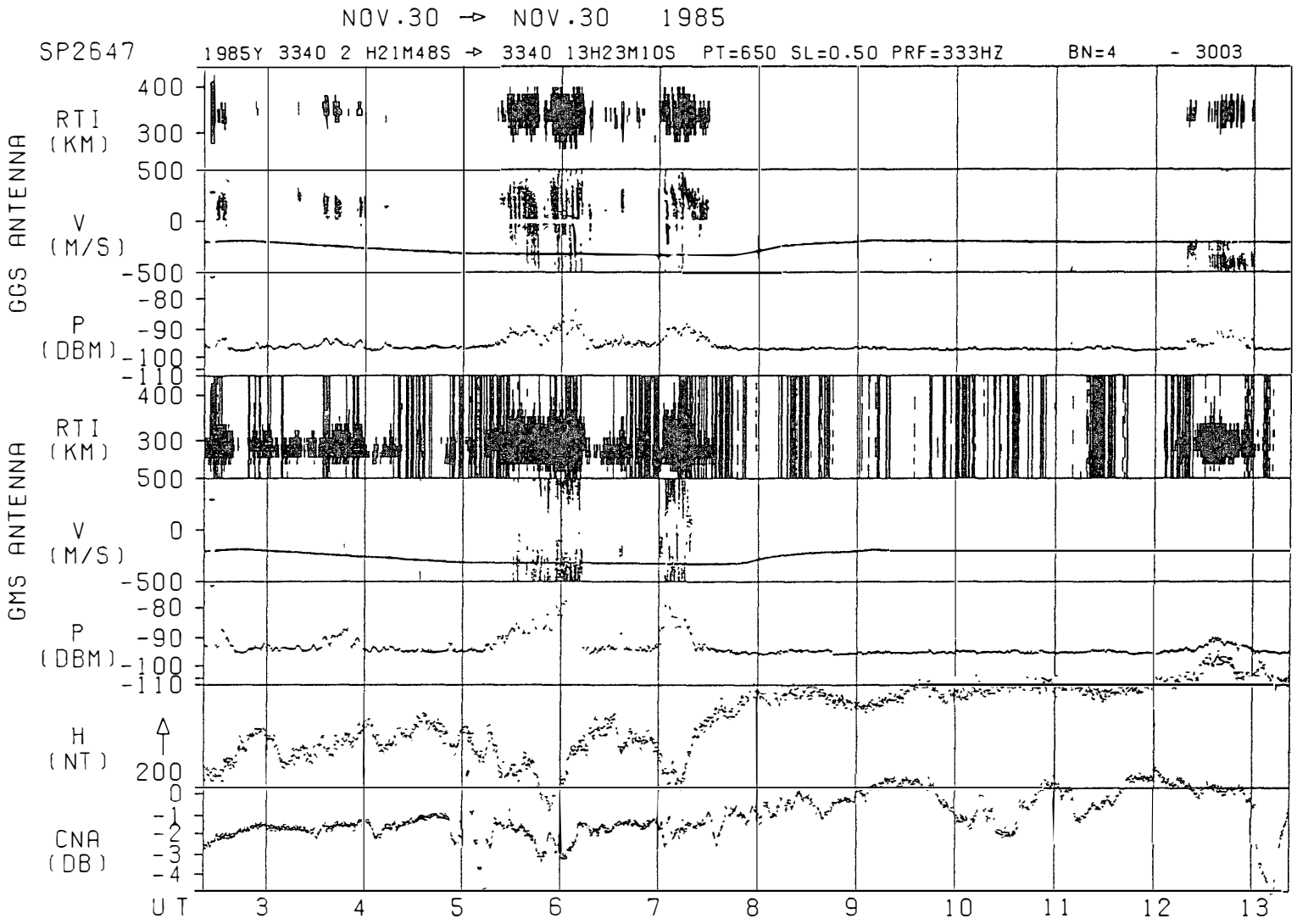
NOV.30 → NOV.30 1985
SP2647
1985Y 3340 2 H21M48S → 3340 13H23M10S PT=650 SL=0.50 PRF=333HZ
BN=4
- 3003
GGS ANTENNA
GMS ANTENNA
RTI (KM)
V (M/S)
P (DBM)
H (NT)
CNA (DB)
400
300
500
0
-500
-80
-90
-100
-110
200
-1
-2
-3
-4
UT
3
4
5
6
7
8
9
10
11
12
13

Fig. 2(40)