RECORDS OF RADIO AURORA AT SYOWA STATION, ANTARCTICA IN 1983

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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 1983 and characteristic examples of echo intensity-time variation.

Inquiries about details of the data should be addressed to:

Radio Research Laboratories

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. Observers

Takashi Tanaka (Radio Research Laboratories)

Ichirou Yamazaki (Radio Research Laboratories)

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 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 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 then 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(1-48) show typical examples of compiled data for 50 MHz radio aurora. These data exhibit time variations of doppler velocities (Vx, Vy, V), echo distributions in Range (RTI), maximum echo intensities (P), and the geomagnetic H component at Syowa Station.

The doppler velocity denoted by V means the velocity component along the direction of GGS beam at the point of maximum echo intensity, Vy along GMS beam i.e. the geomagnetic north-south component, and Vx the geomagnetic east-west component calculated from V and Vy assuming spatially homogenious plasma flow.

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

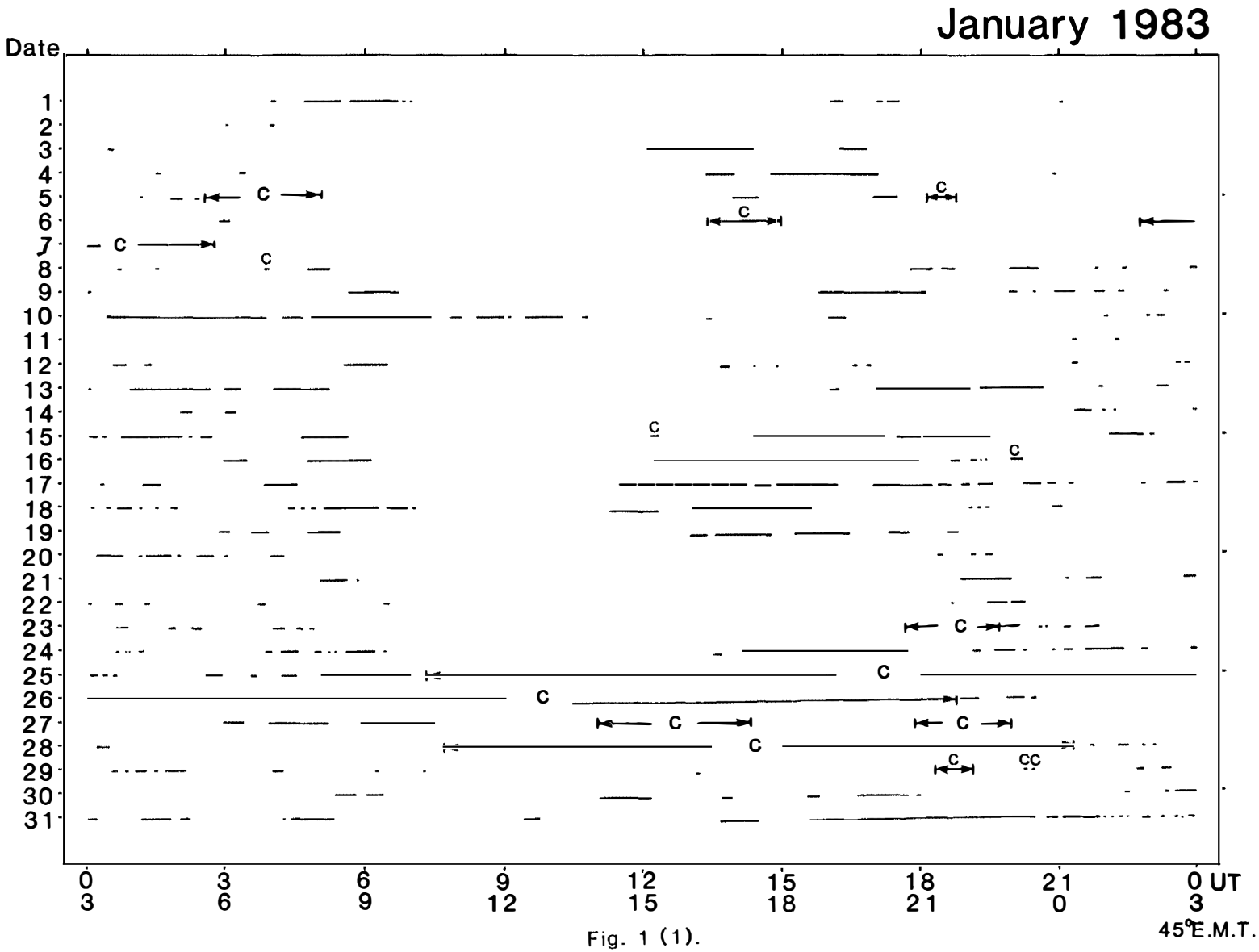
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Fig. 1 (1).

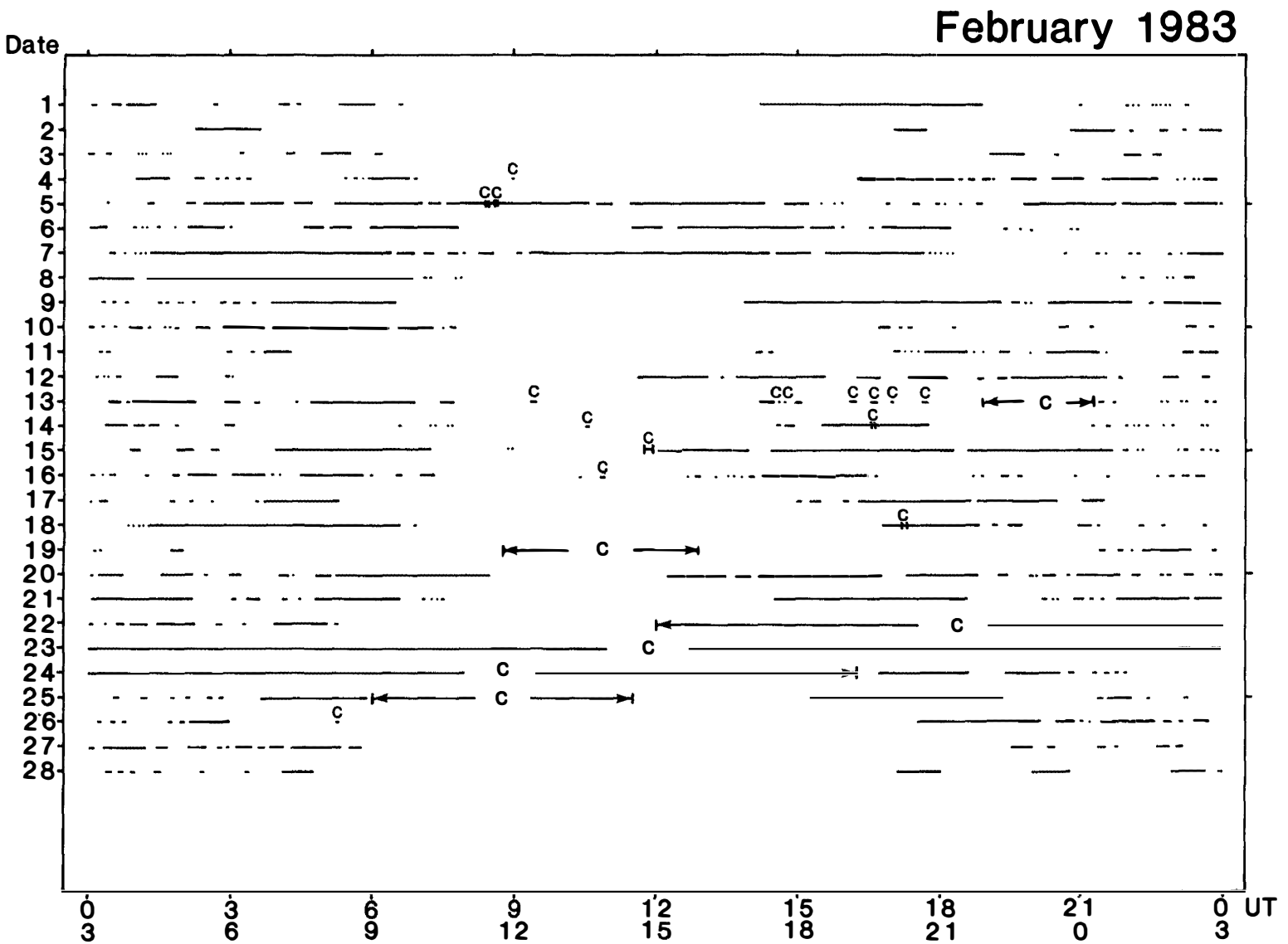
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Fig. 1 (2).

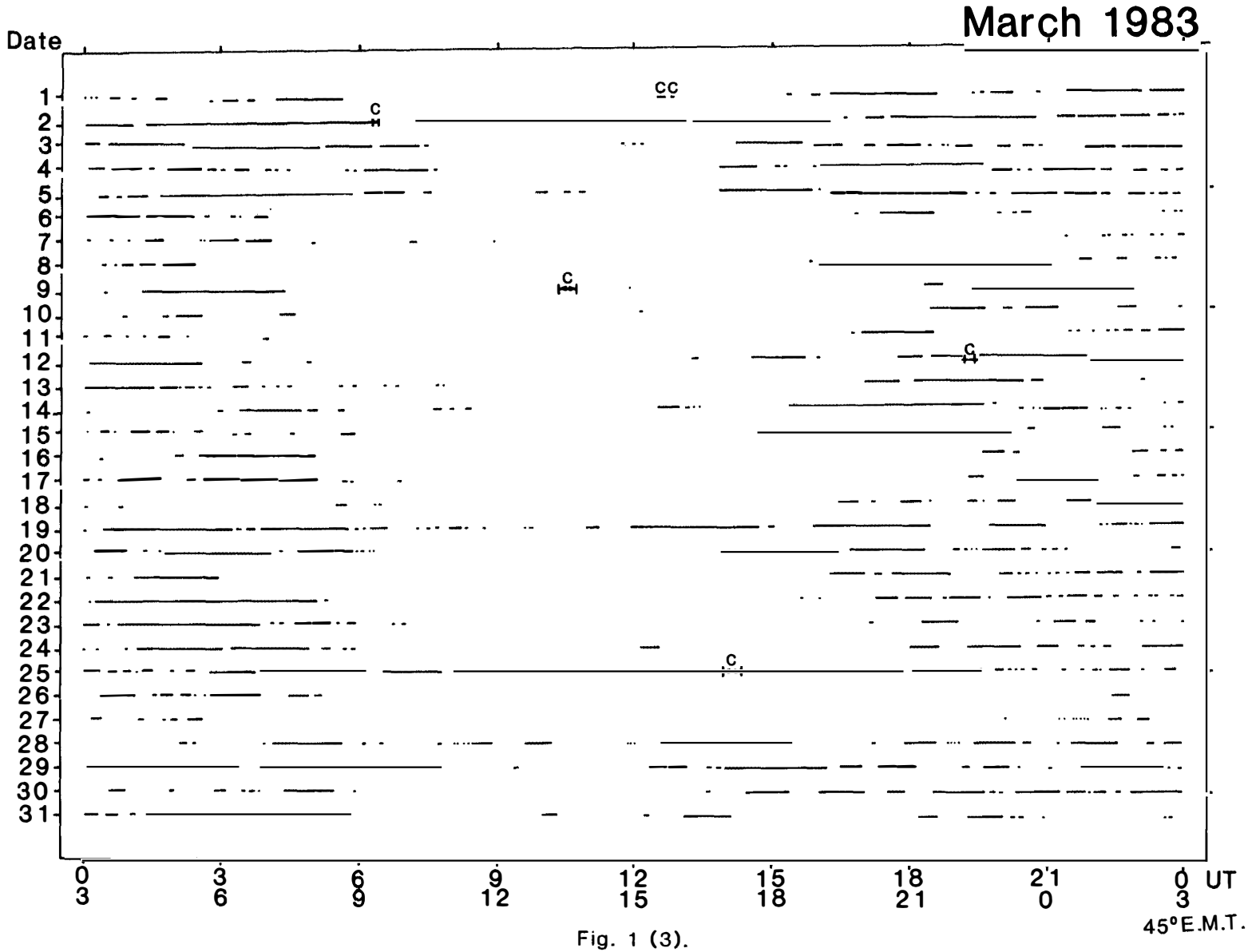
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Fig. 1 (3).

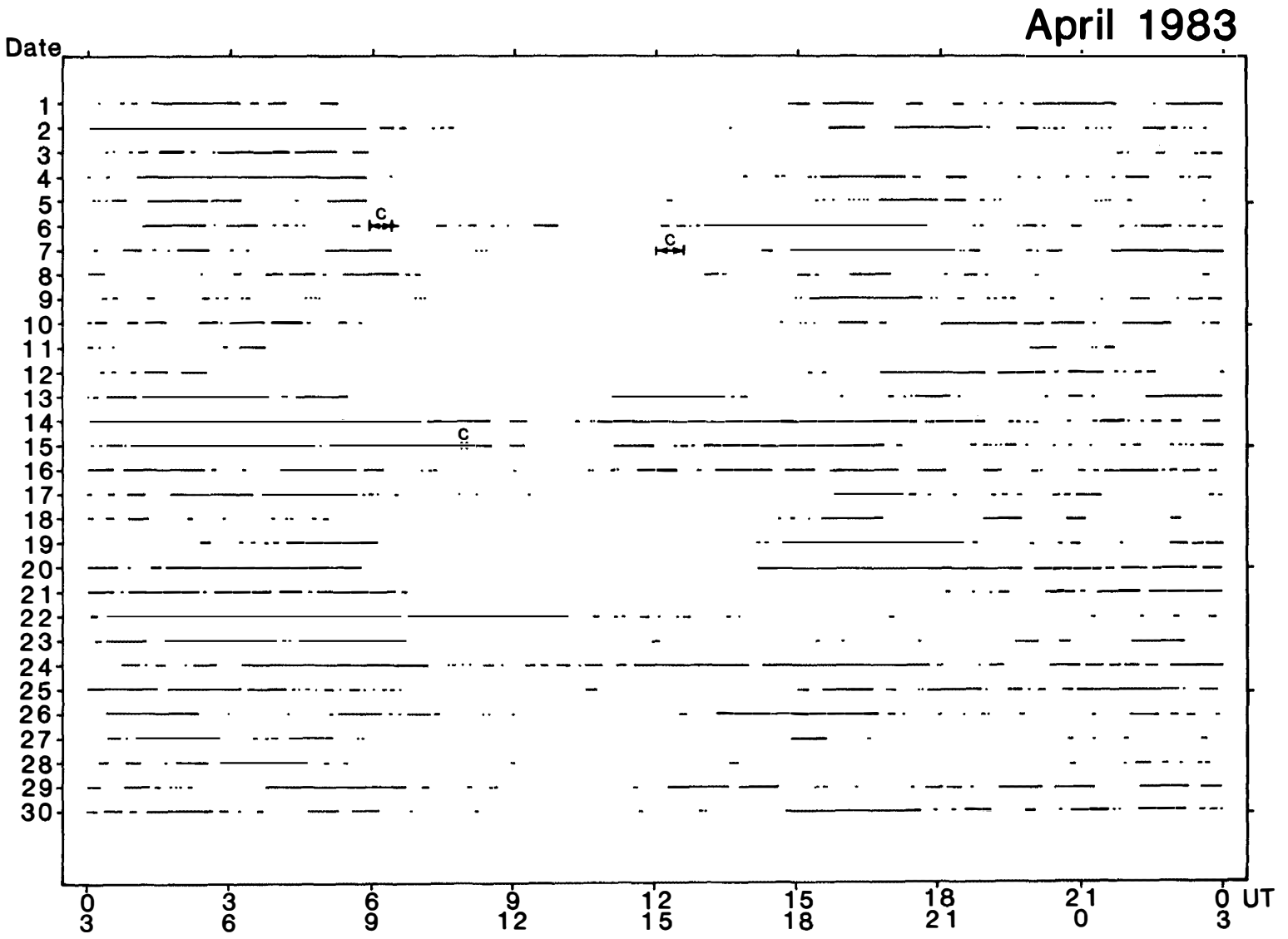
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Fig. 1 (4).

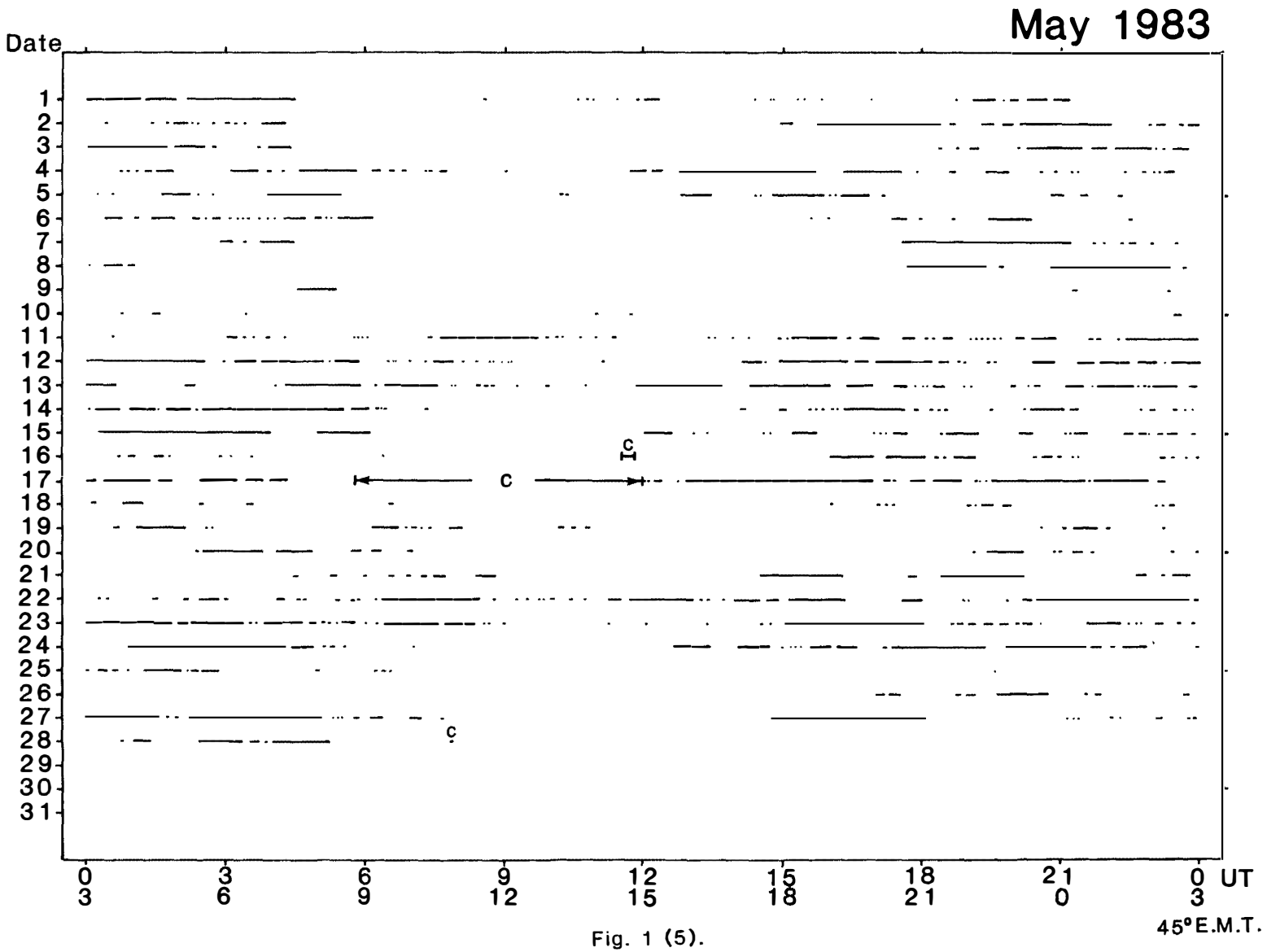
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Fig. 1 (5).

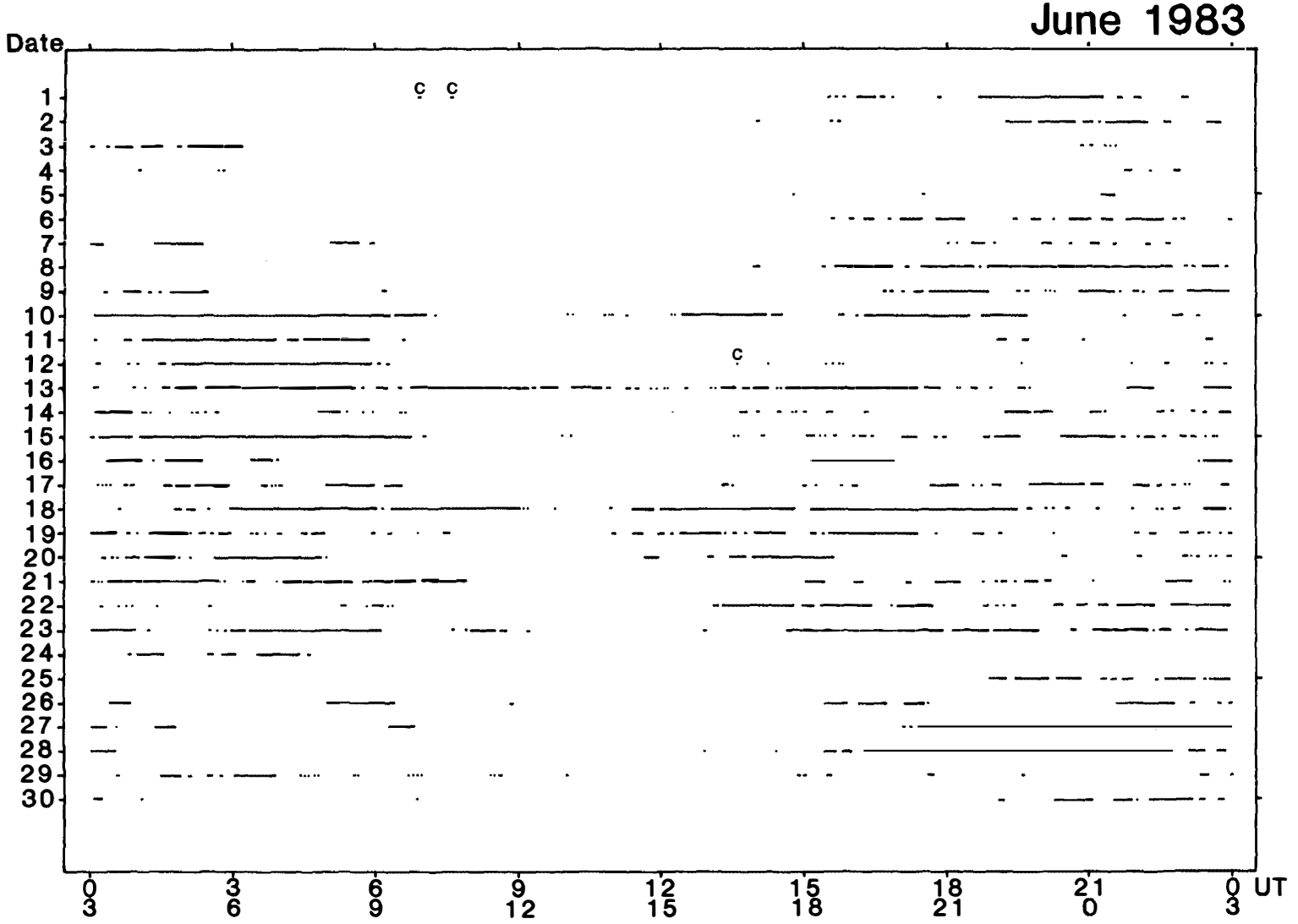
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Fig. 1 (6).

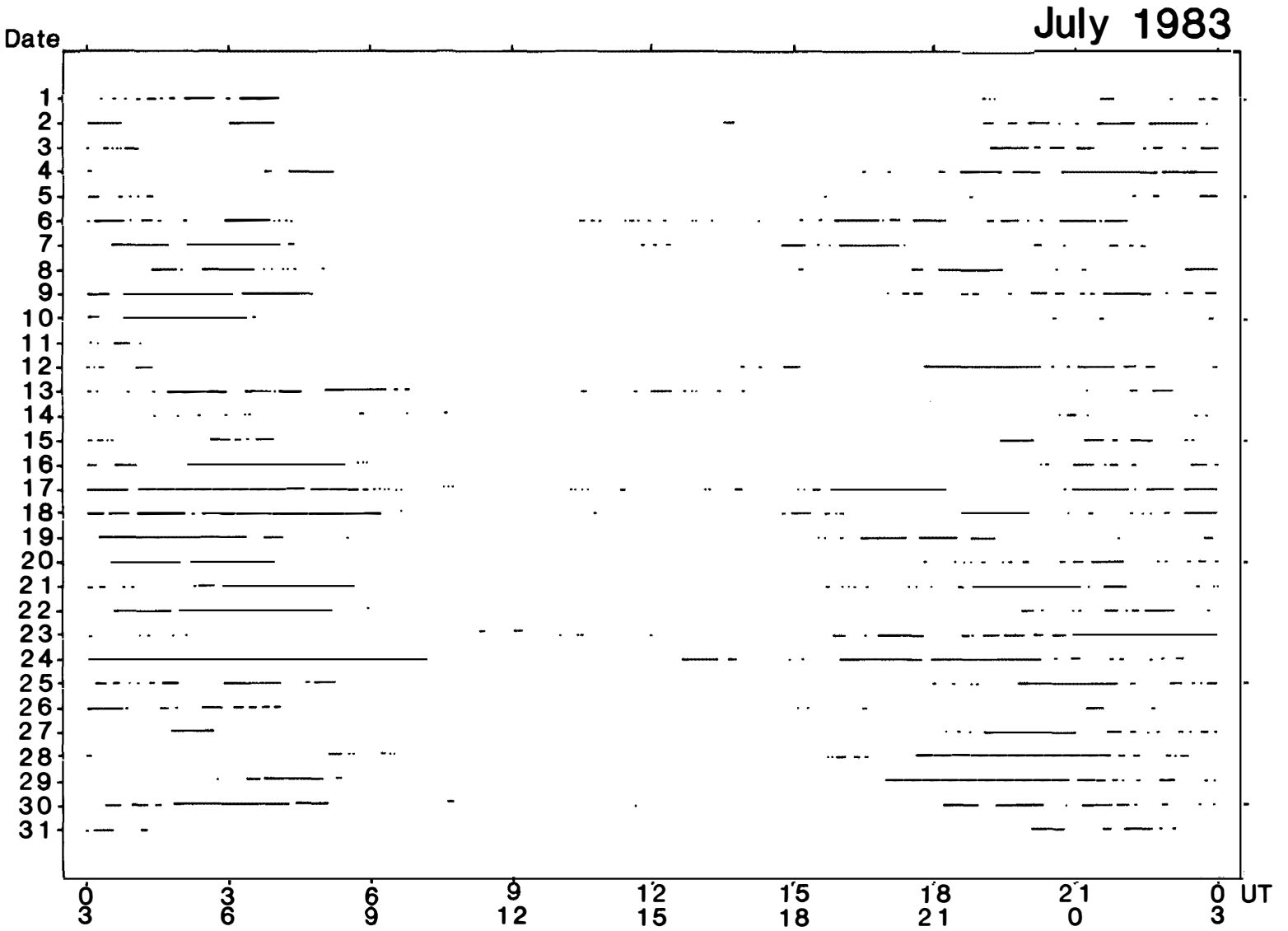
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Fig. 1 (7).

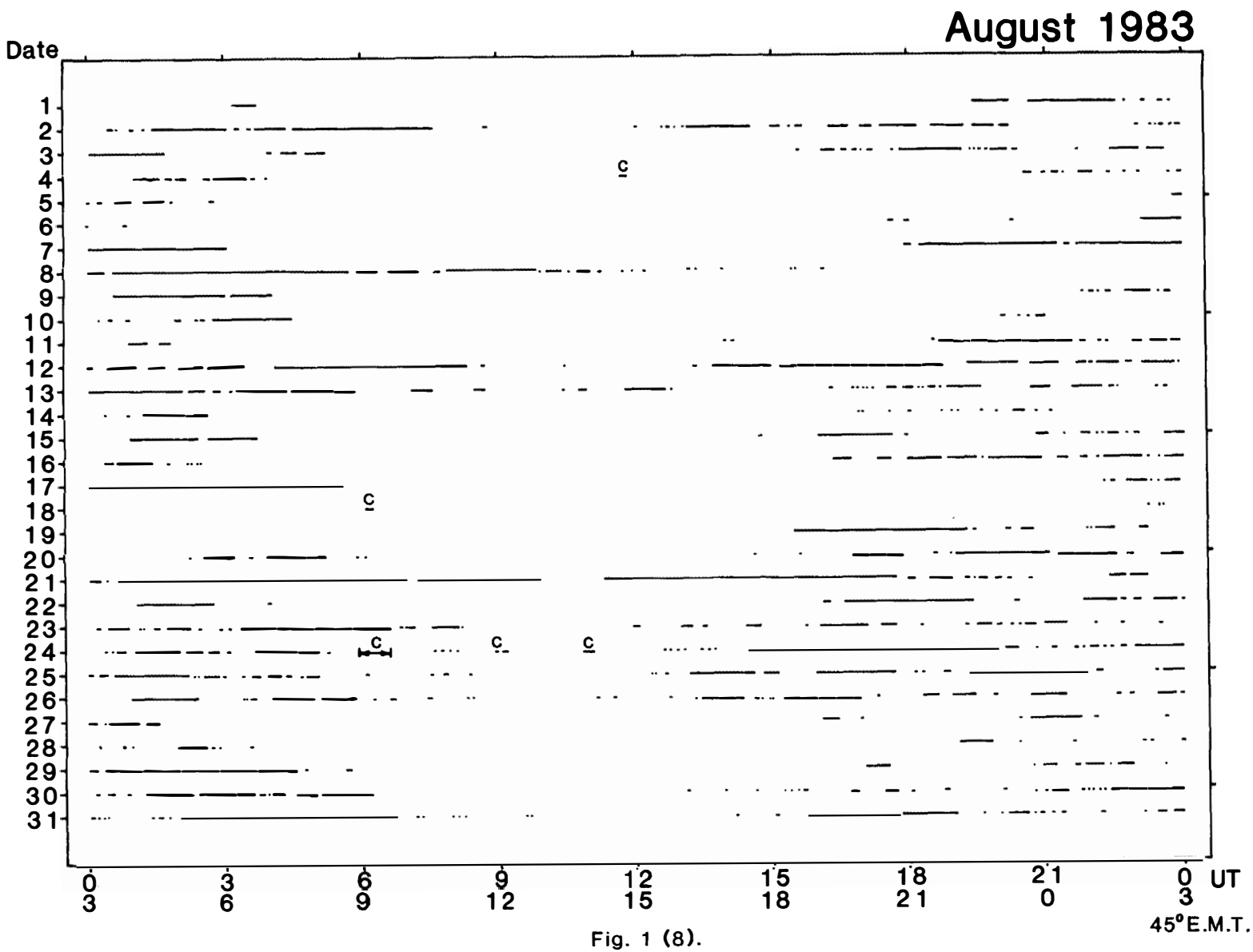
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Fig. 1 (8).

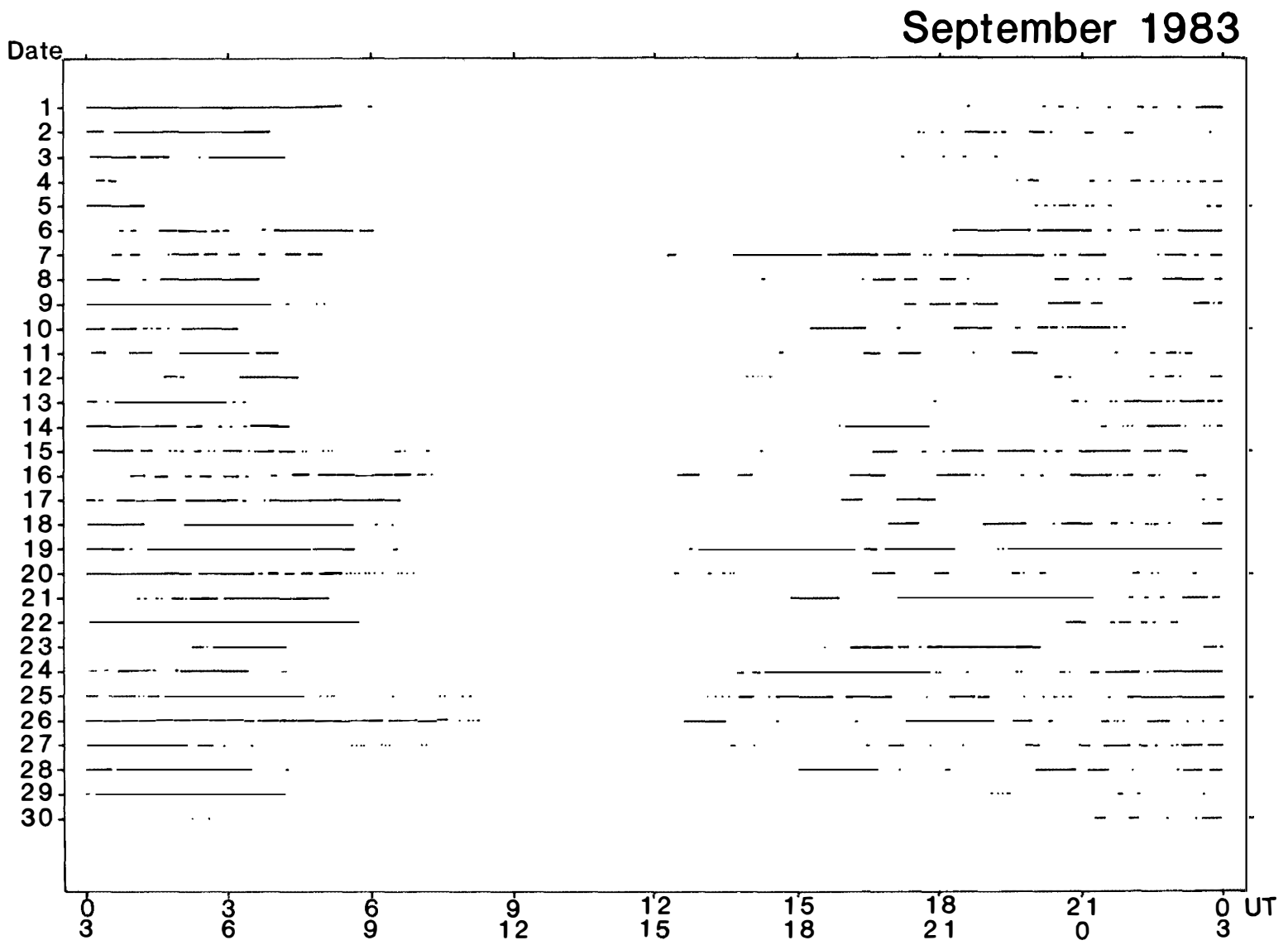
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Fig. 1 (9).

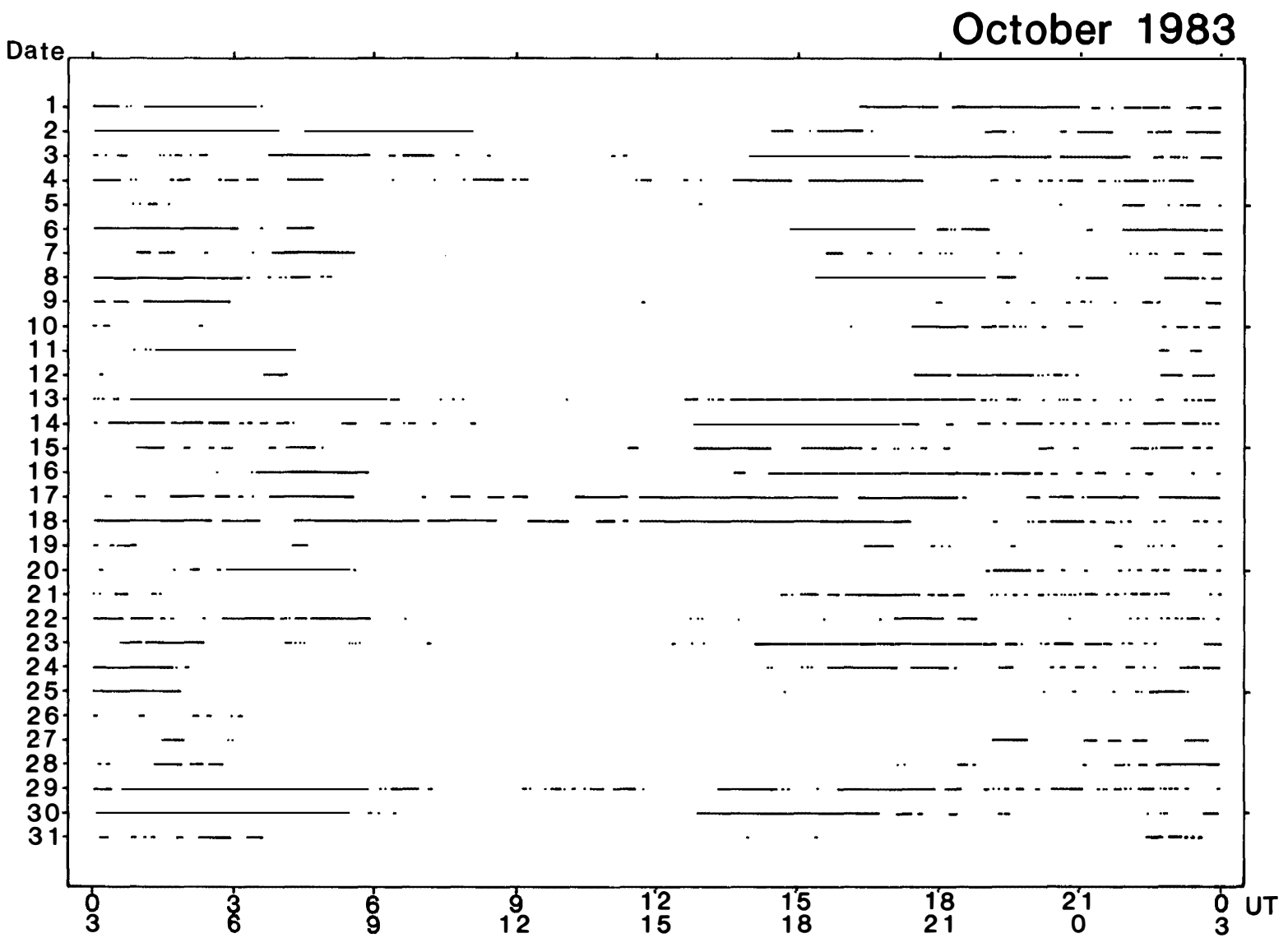
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Fig. 1 (10).

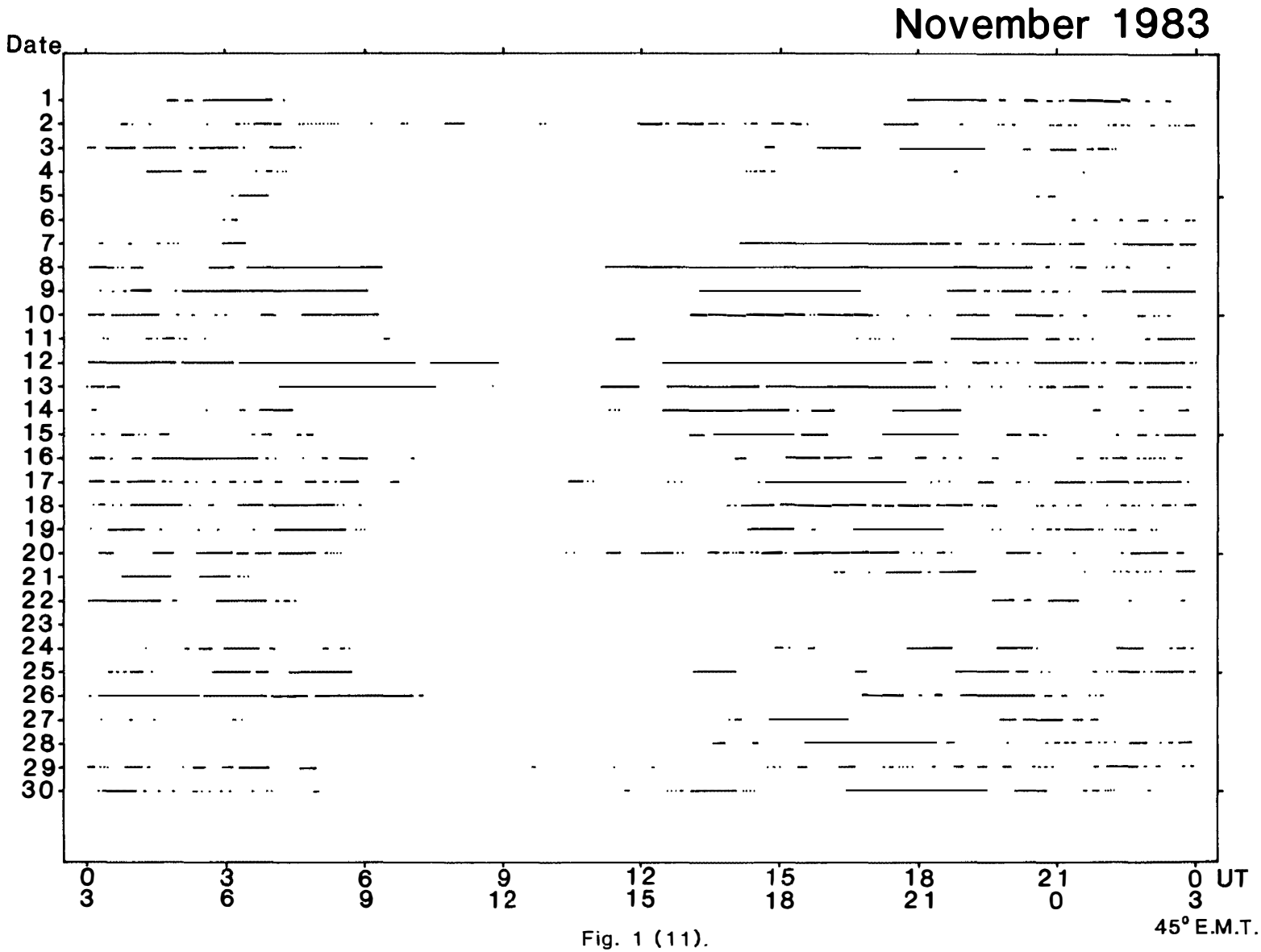
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Fig. 1 (11).

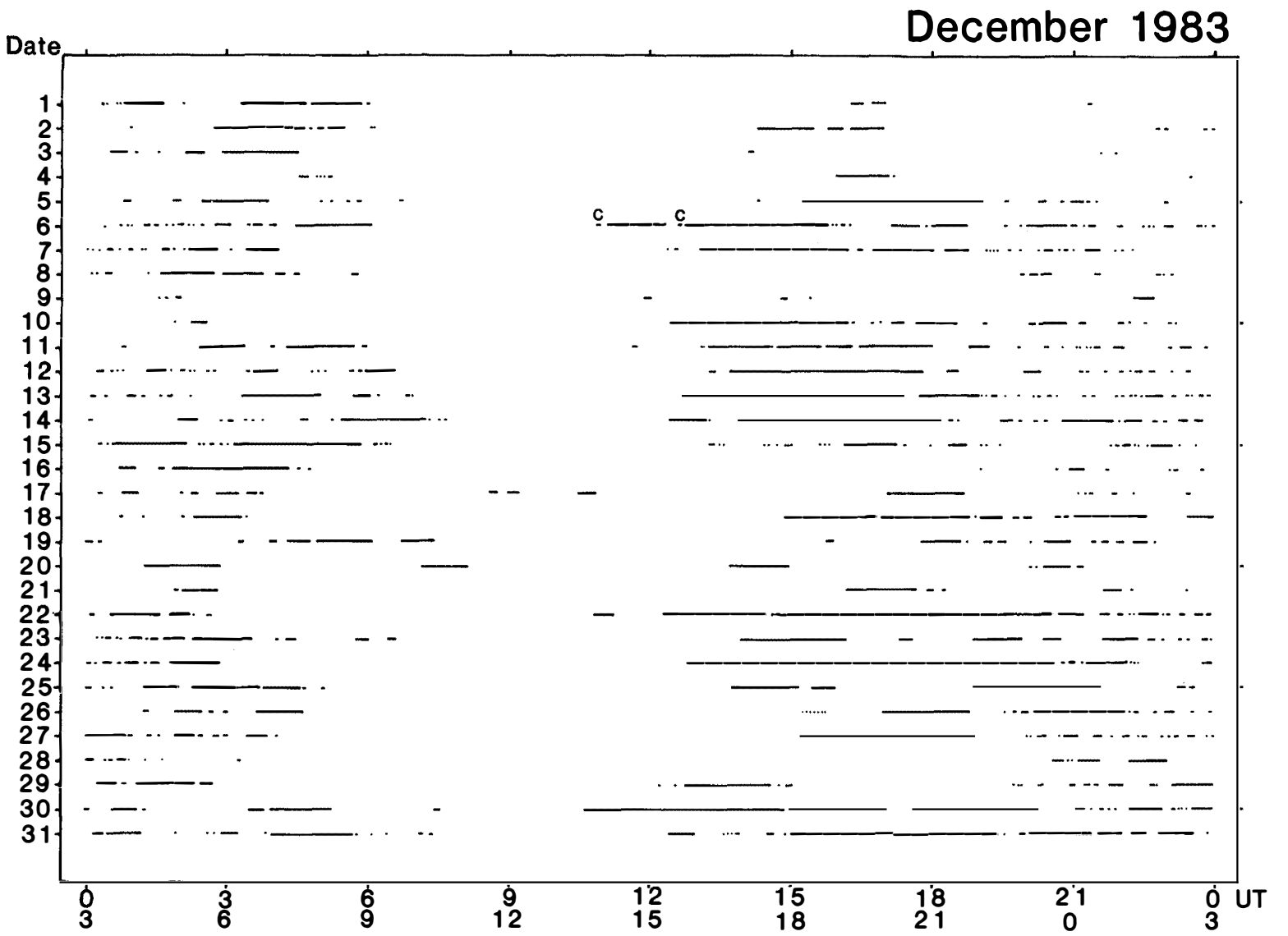
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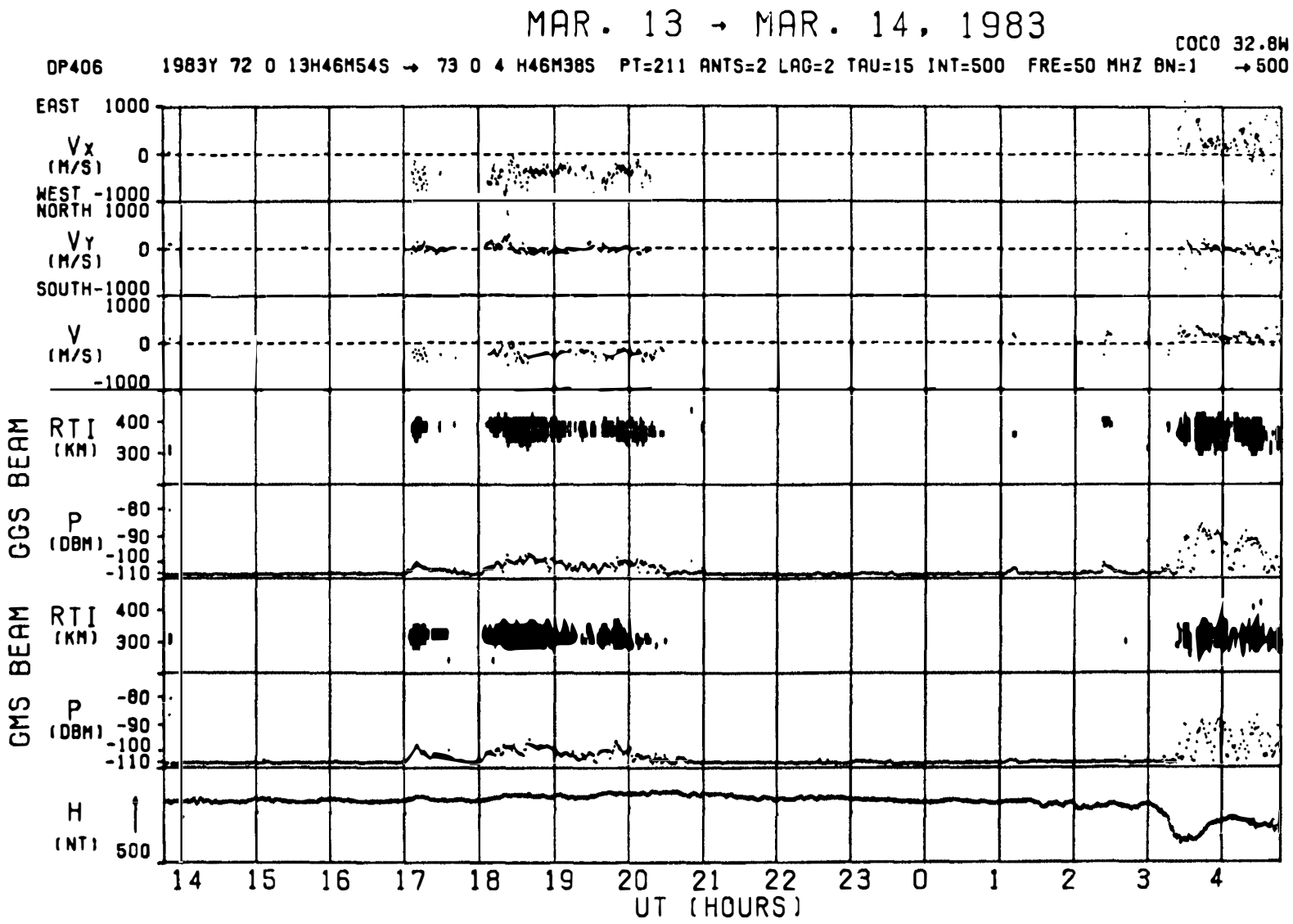
Fig. 1 (12).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NORTH 1000
Vy (M/S) 0
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V (M/S) 0
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RTI (KM) 400 300
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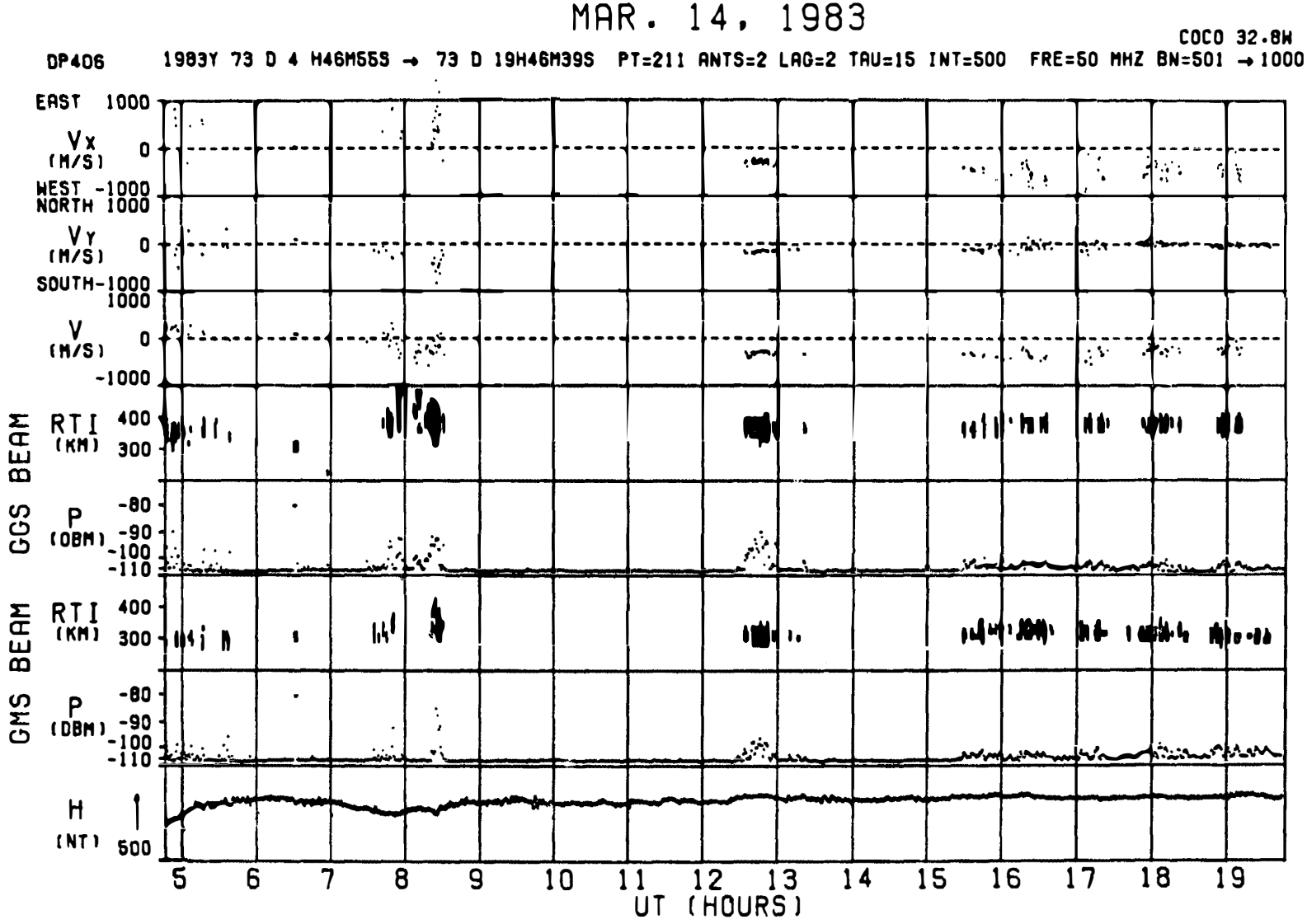
UT (HOURS)

Fig. 2 (1).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V (M/S) 0
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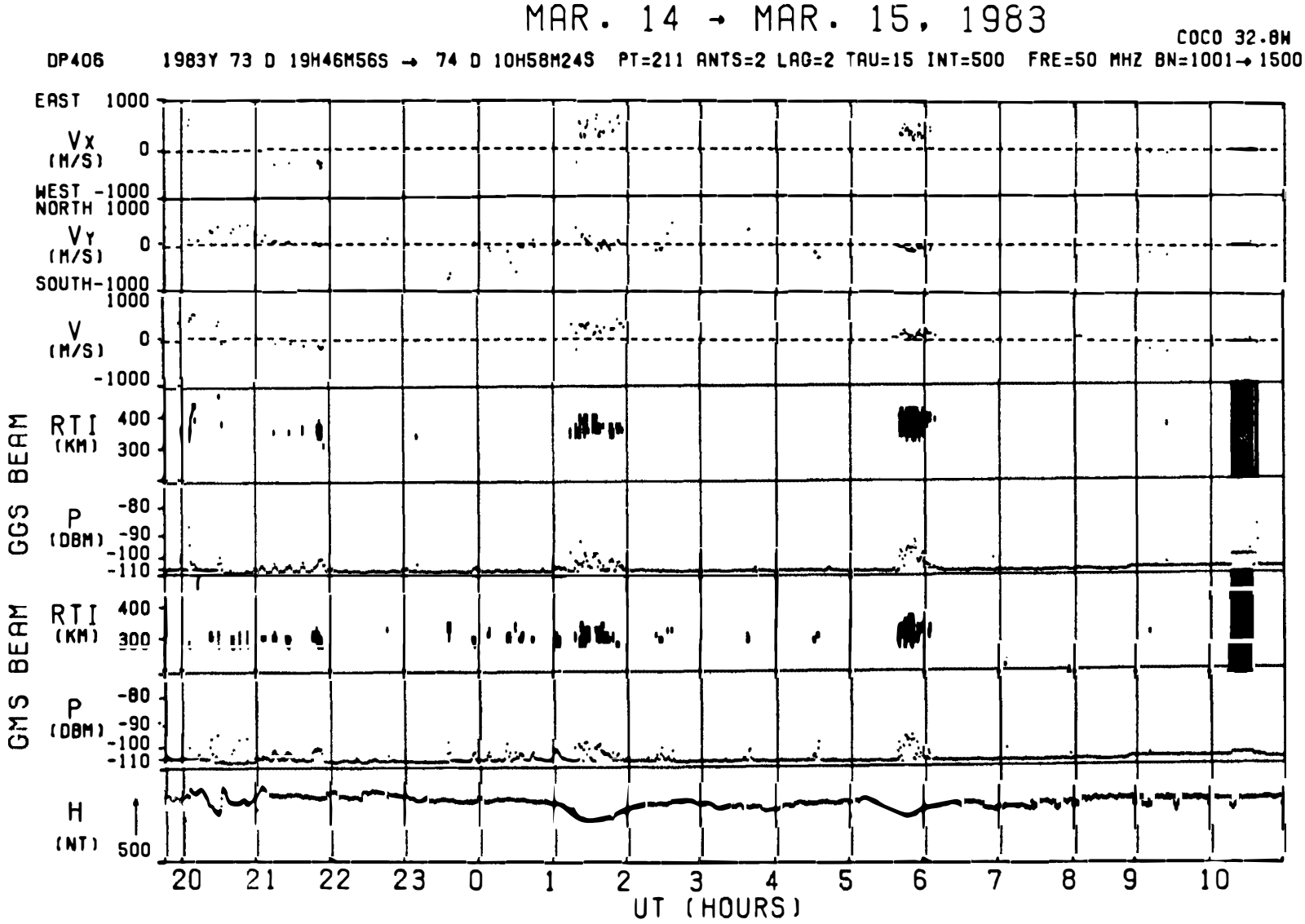
UT (HOURS)

Fig. 2 (2).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V (M/S) 0
-1000
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RTI (KM) 400 300
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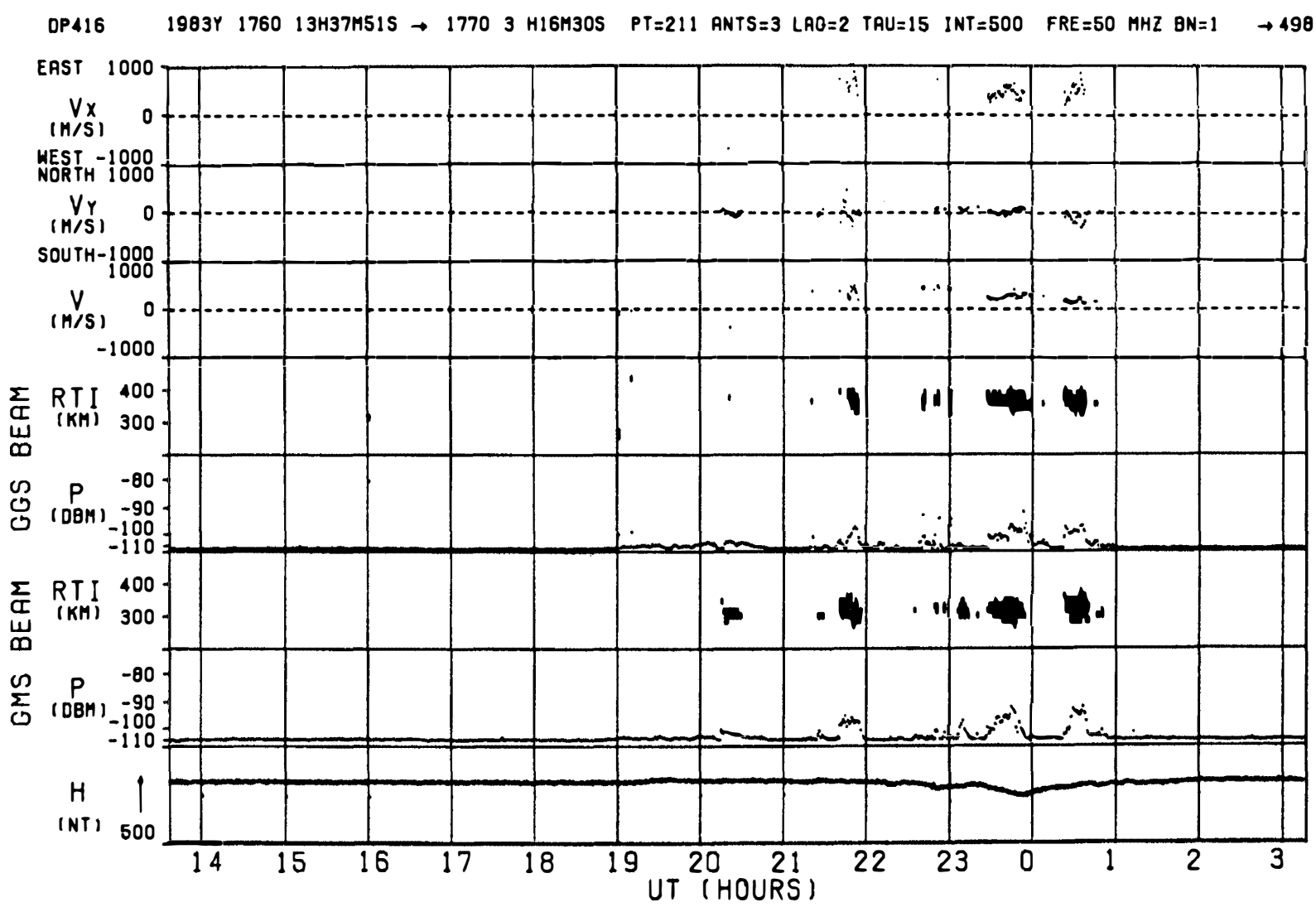
UT (HOURS)

Fig. 2 (3).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V (M/S) 0
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RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
GMS BEAM
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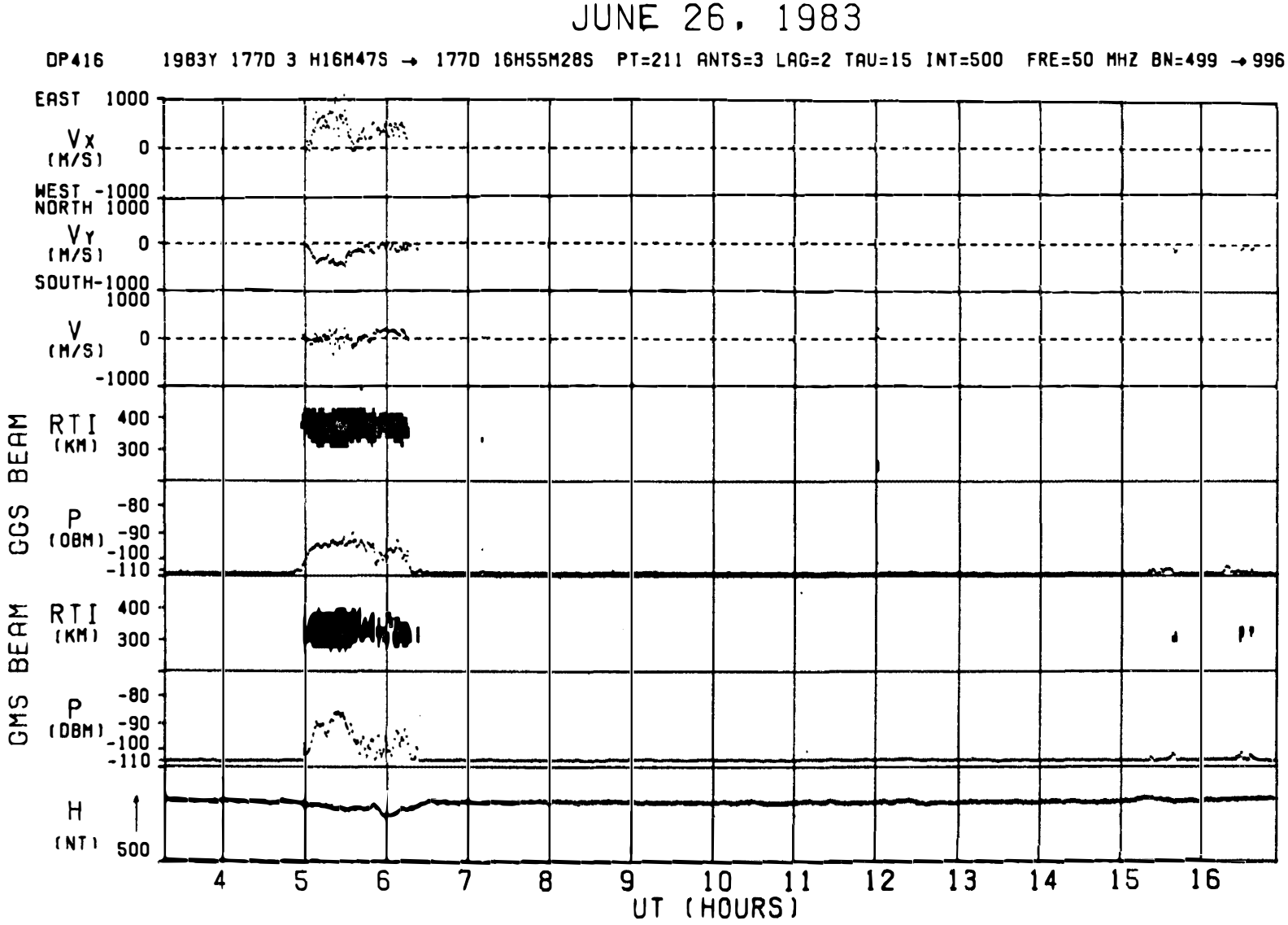
UT (HOURS)

Fig. 2 (4).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GMS BEAM
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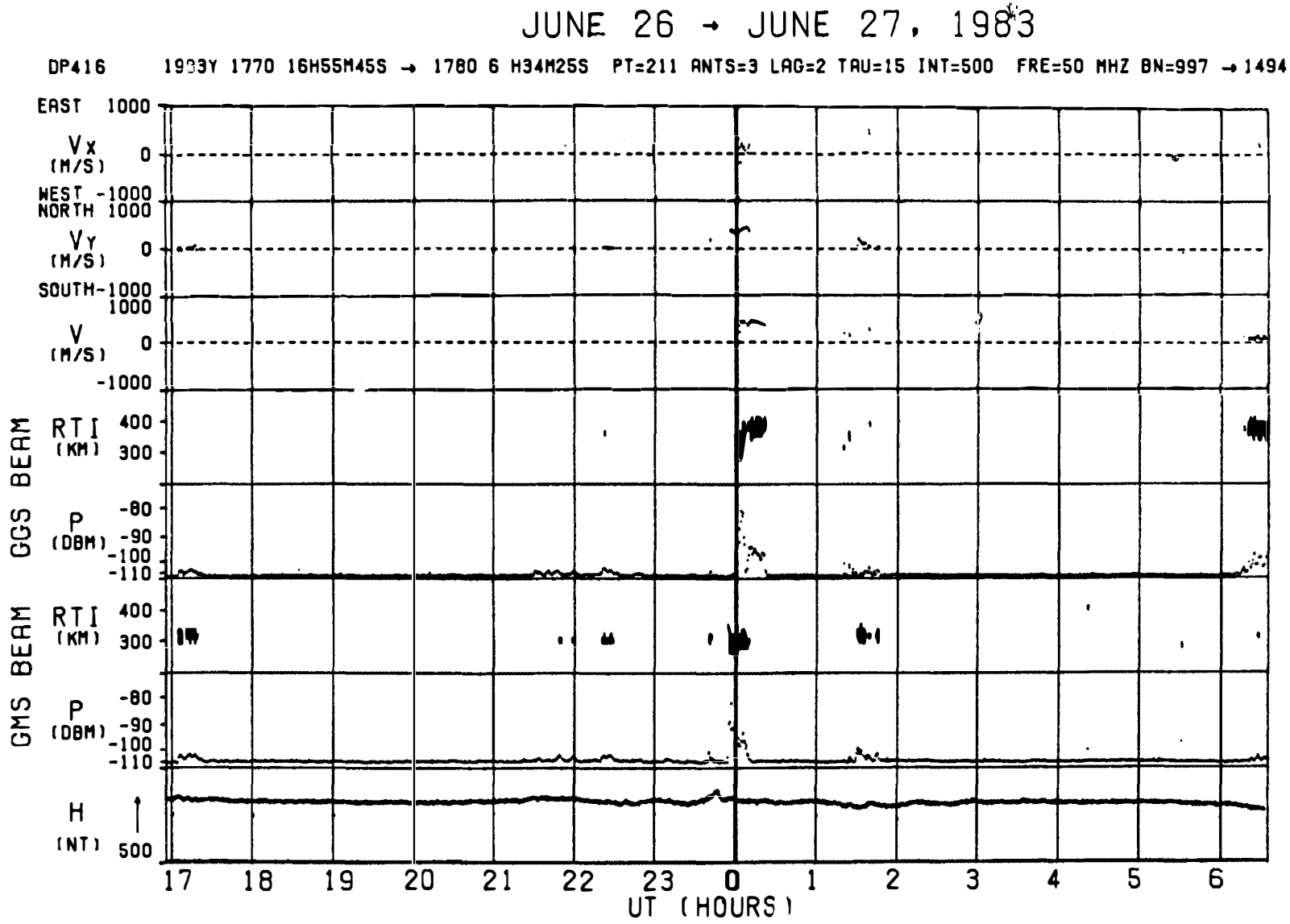
UT (HOURS)

Fig. 2 (5).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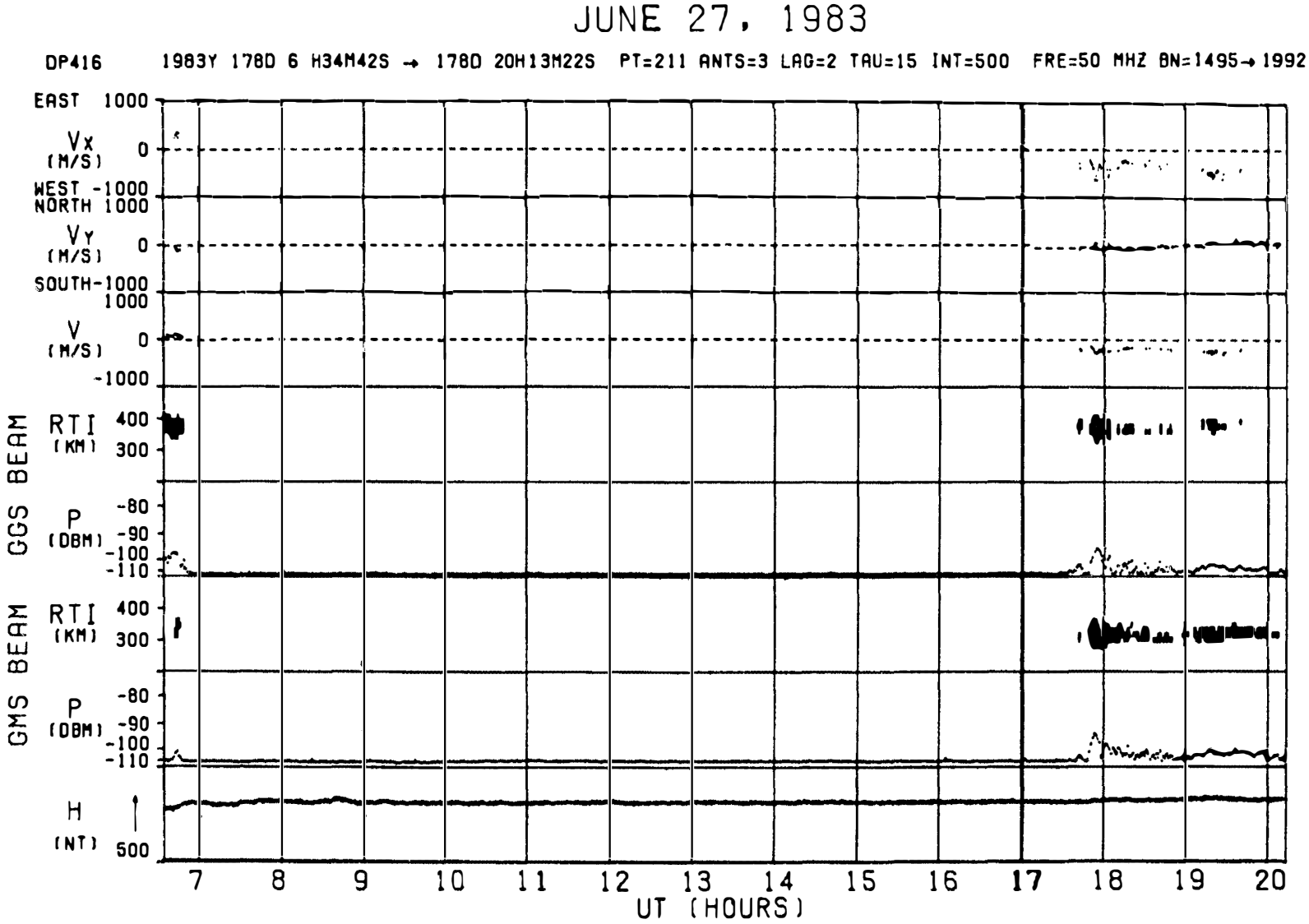
UT (HOURS)

Fig. 2 (6).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GMS BEAM
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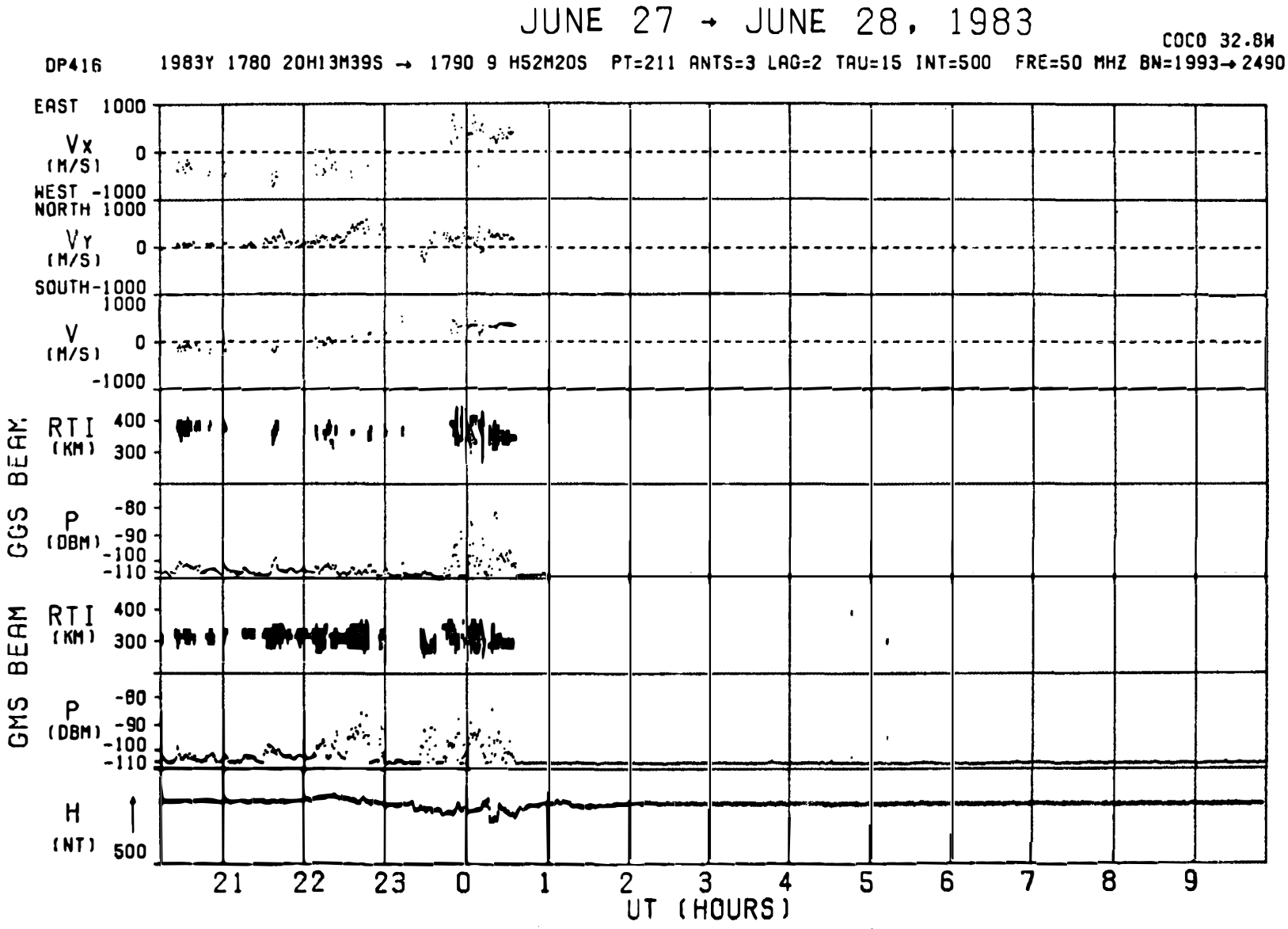
UT (HOURS)

Fig. 2 (7).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V
(M/S) 0
-1000
GGS BEAM
RTI
(KM) 400
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P
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GMS BEAM
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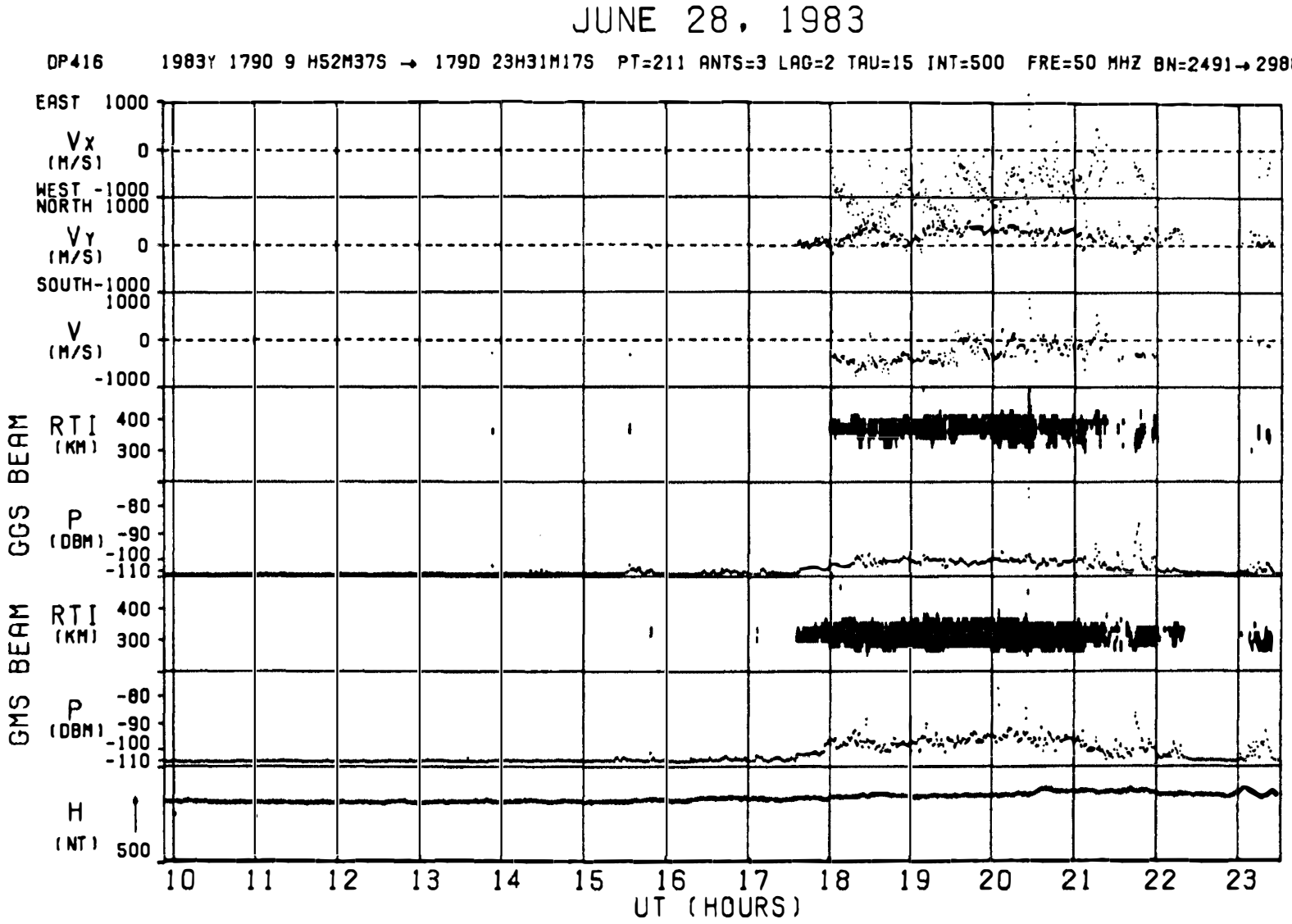
21 22 23 0 1 2 3 4 5 6 7 8 9
UT (HOURS)

Fig. 2 (8).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-1000
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RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
GMS BEAM
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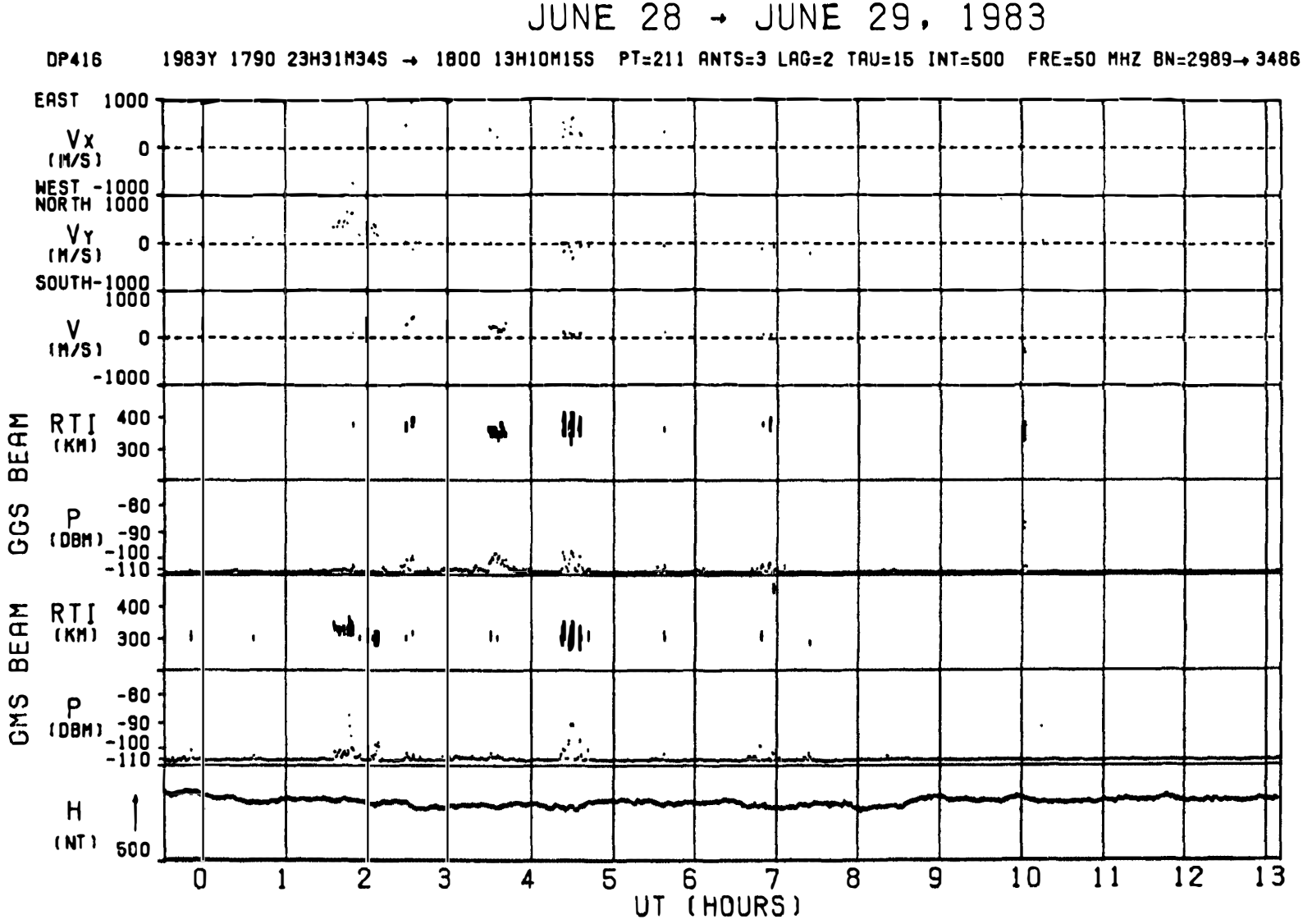
UT (HOURS)

Fig. 2 (9).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P (DBM) -80 -90 -100 -110
GMS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
H (NT) 500
0 1 2 3 4 5 6 7 8 9 10 11 12 13
UT (HOURS)

Fig. 2 (10).

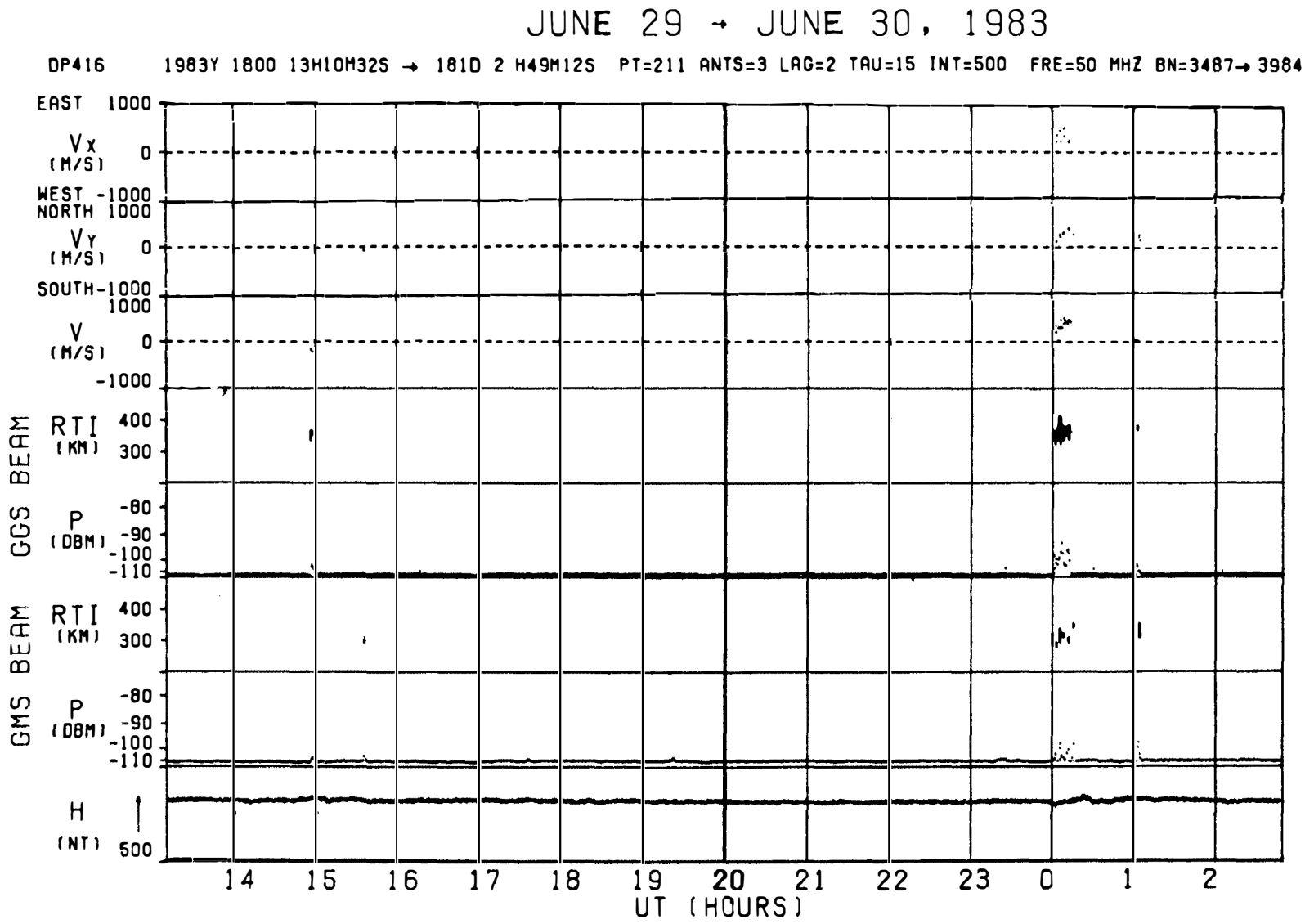
JUNE 29 → JUNE 30, 1983
DP416 1983Y 1800 13H10M32S → 181D 2 H49M12S PT=211 ANTS=3 LAG=2 TAU=15 INT=500 FRE=50 MHZ BN=3487→ 3984
EAST 1000
Vx (M/S) 0
WEST -1000
NORTH 1000
Vy (M/S) 0
SOUTH-1000
1000
V (M/S) 0
-1000
GGS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
GMS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
H (NT) 500
14 15 16 17 18 19 20 21 22 23 0 1 2
UT (HOURS)

Fig. 2 (11).

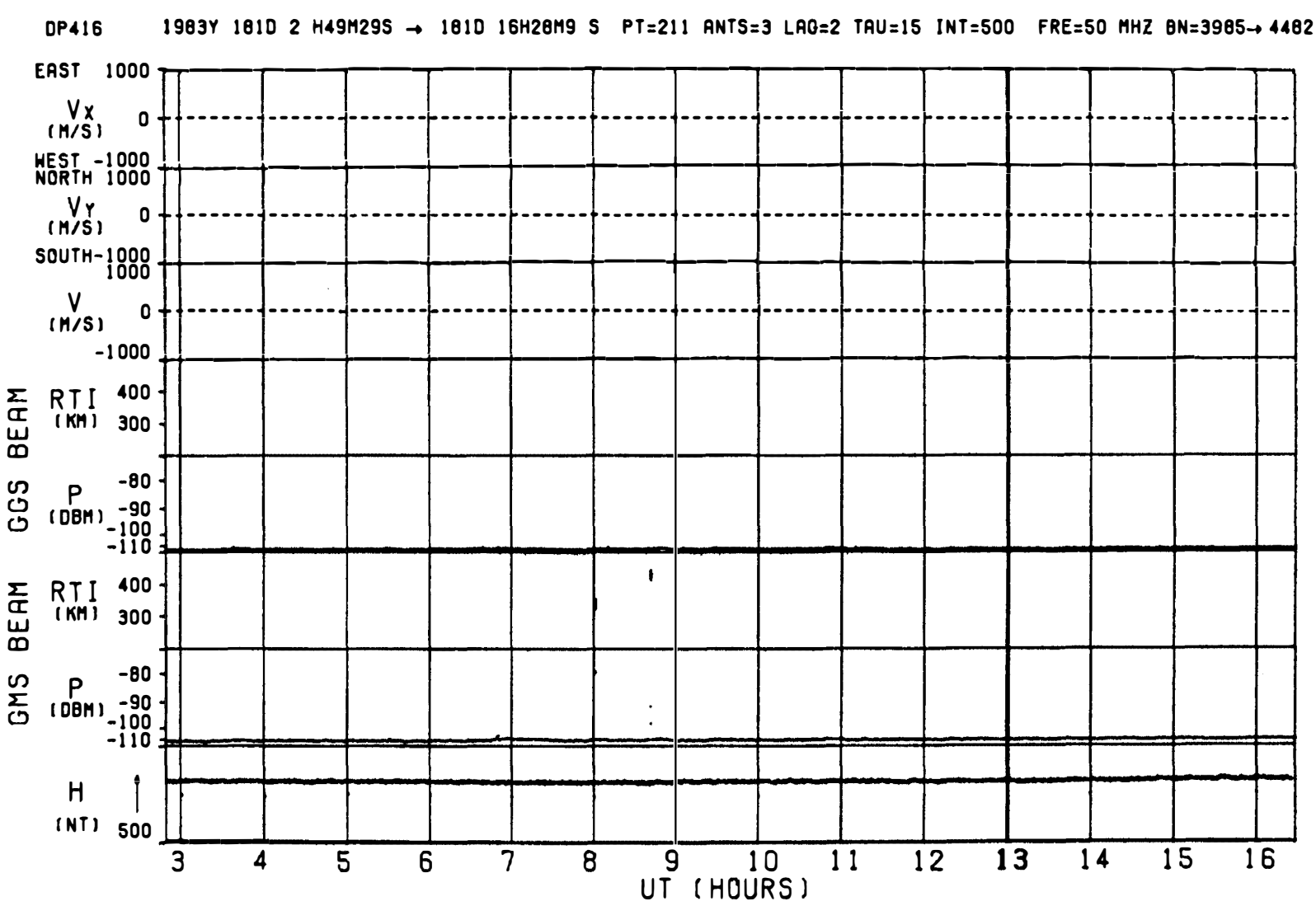
JUNE 30, 1983
DP416 1983Y 181D 2 H49M29S → 181D 16H28M9 S PT=211 ANTS=3 LAG=2 TAU=15 INT=500 FRE=50 MHZ BN=3985→4482
EAST 1000
Vx (M/S) 0
WEST -1000
NORTH 1000
Vy (M/S) 0
SOUTH-1000
1000
V (M/S) 0
-1000
GGS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
GMS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
H (NT) 500
3 4 5 6 7 8 9 10 11 12 13 14 15 16
UT (HOURS)

Fig. 2 (12).

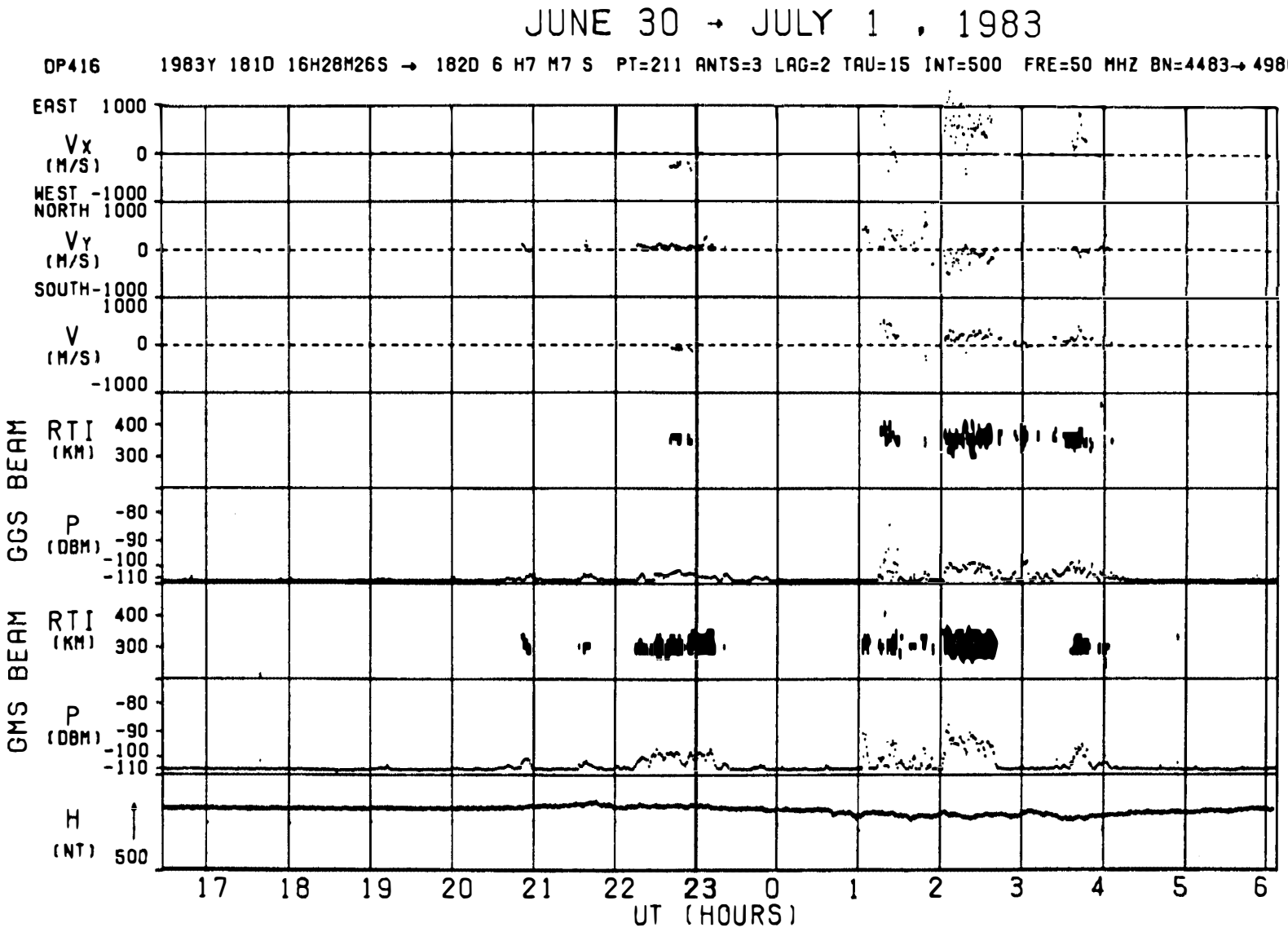
JUNE 30 → JULY 1 , 1983
OP416 1983Y 181D 16H28M26S → 182D 6 H7 M7 S PT=211 ANTS=3 LAG=2 TAU=15 INT=500 FRE=50 MHZ BN=4483→4980
EAST 1000
Vx (M/S) 0
WEST -1000
NORTH 1000
Vy (M/S) 0
SOUTH-1000
1000
V (M/S) 0
-1000
GGS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
GMS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
H (NT) 500
17 18 19 20 21 22 23 0 1 2 3 4 5 6
UT (HOURS)

Fig. 2 (13).

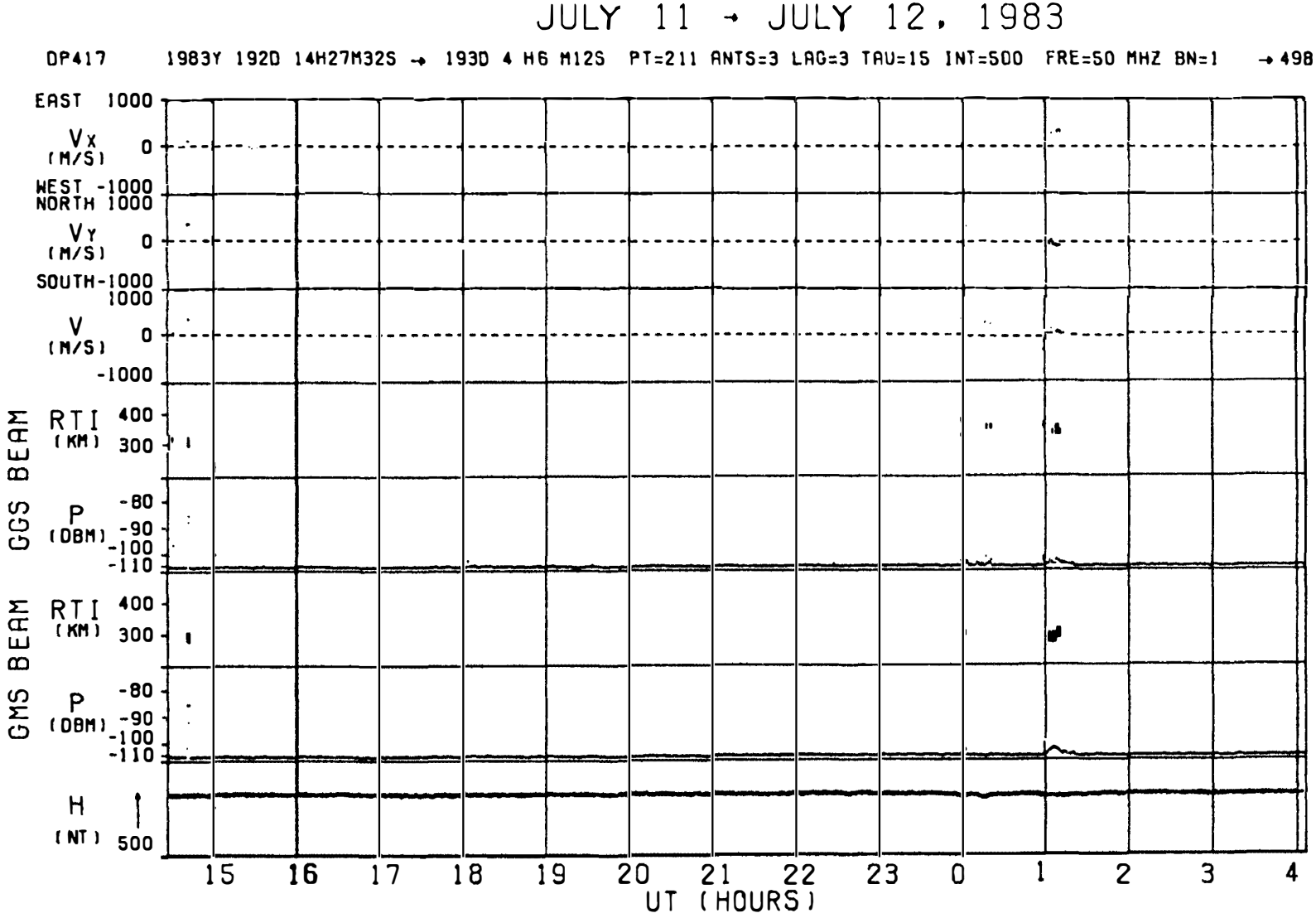
JULY 11 → JULY 12, 1983
DP417 1983Y 192D 14H27M32S → 193D 4 H6 M12S PT=211 ANTS=3 LAG=3 TAU=15 INT=500 FRE=50 MHZ BN=1 → 498
EAST 1000
Vx (M/S) 0
WEST -1000
NORTH 1000
Vy (M/S) 0
SOUTH-1000
1000
V (M/S) 0
-1000
GGS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
GMS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
H (NT) 500
15 16 17 18 19 20 21 22 23 0 1 2 3 4
UT (HOURS)

Fig. 2 (14).

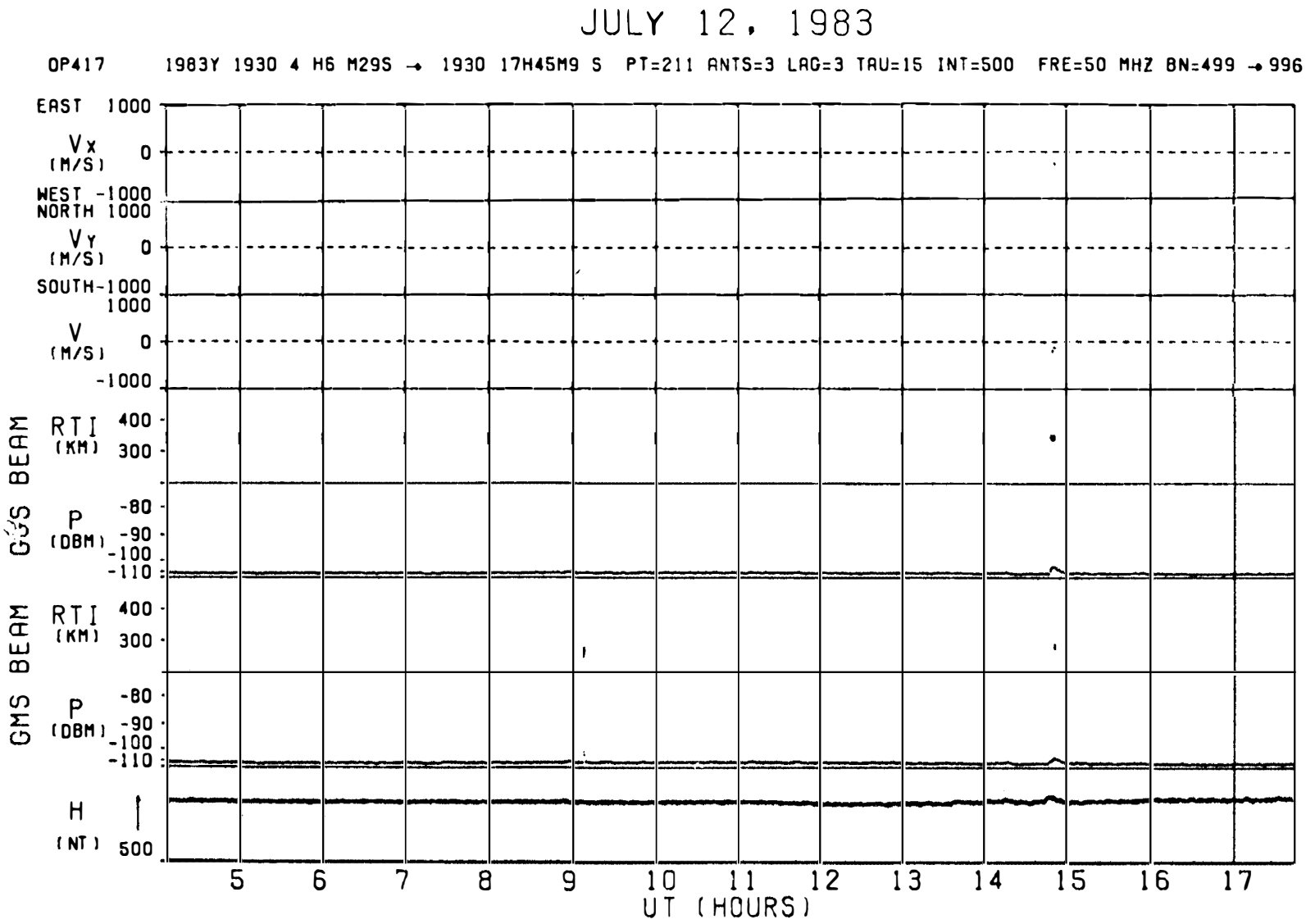
JULY 12, 1983
OP417 1983Y 1930 4 H6 M29S → 1930 17H45M9 S PT=211 ANTS=3 LAG=3 TAU=15 INT=500 FRE=50 MHZ BN=499 → 996
EAST 1000
Vx
(M/S) 0
WEST -1000
NORTH 1000
Vy
(M/S) 0
SOUTH-1000
1000
V
(M/S) 0
-1000
GMS BEAM
RTI
(KM) 400
300
P
(DBM) -80
-90
-100
-110
GMS BEAM
RTI
(KM) 400
300
P
(DBM) -80
-90
-100
-110
H
(NT) 500
5 6 7 8 9 10 11 12 13 14 15 16 17
UT (HOURS)

Fig. 2 (15).

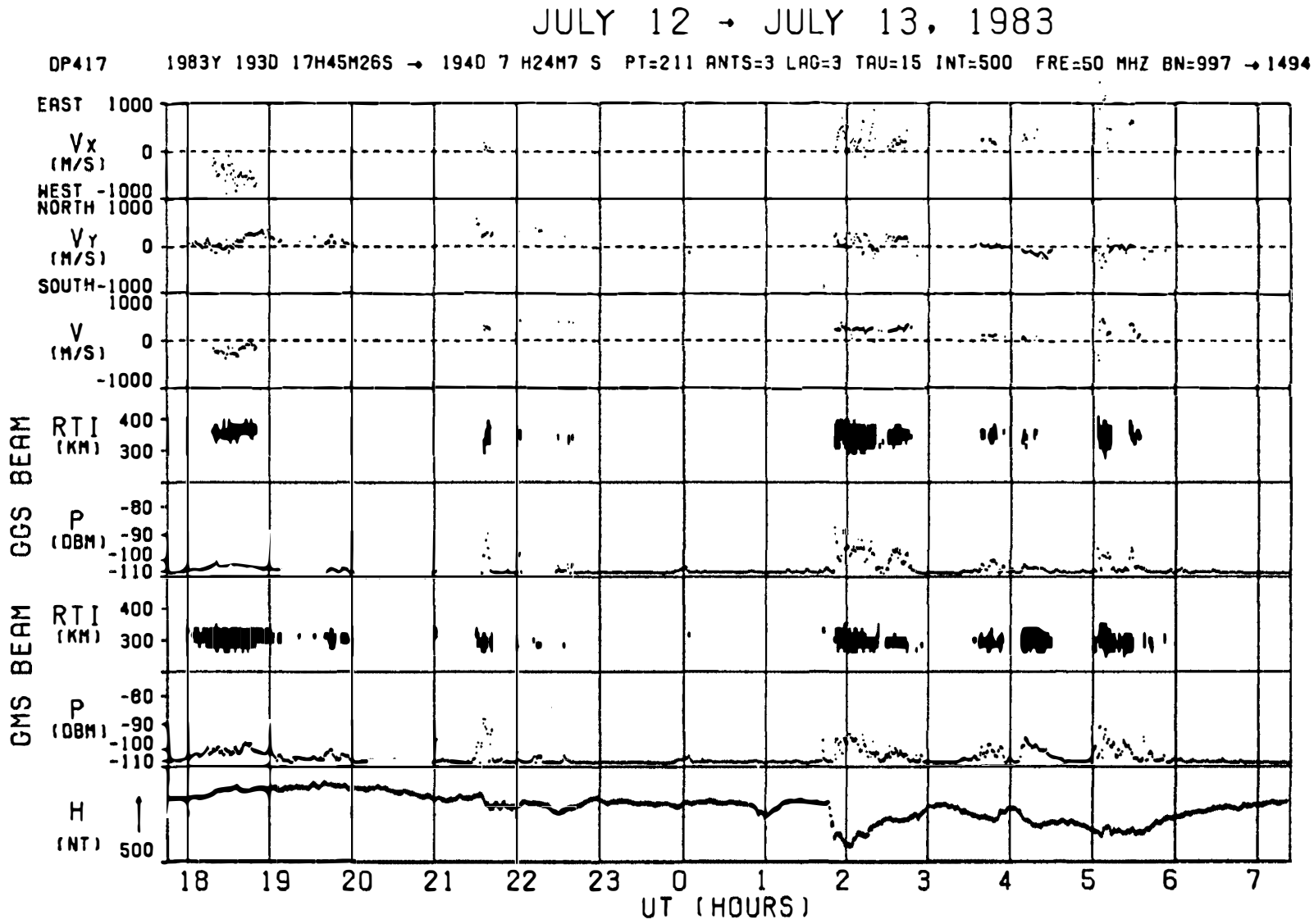
JULY 12 → JULY 13, 1983
DP417 1983Y 193D 17H45M26S → 194D 7 H24M7 S PT=211 ANTS=3 LAG=3 TAU=15 INT=500 FRE=50 MHZ BN=997 → 1494
EAST 1000
Vx (M/S) 0
WEST -1000
NORTH 1000
Vy (M/S) 0
SOUTH-1000
1000
V (M/S) 0
-1000
GGS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
GMS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
H (NT) 500
18 19 20 21 22 23 0 1 2 3 4 5 6 7
UT (HOURS)

Fig. 2 (16).

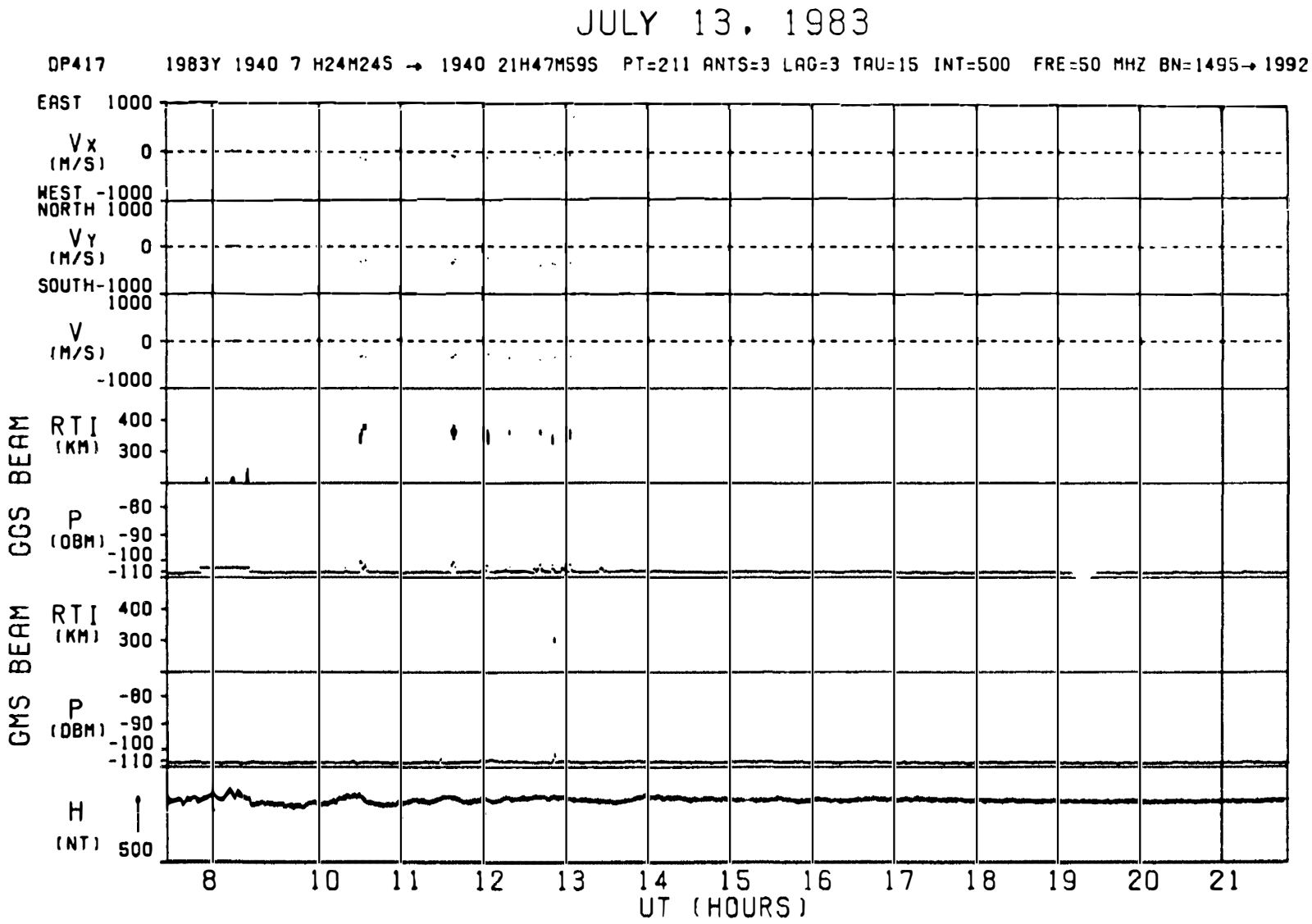
JULY 13, 1983
DP417 1983Y 1940 7 H24M24S → 1940 21H47M59S PT=211 ANTS=3 LAG=3 TAU=15 INT=500 FRE=50 MHZ BN=1495→1992
EAST 1000
Vx (M/S) 0
WEST -1000
NORTH 1000
Vy (M/S) 0
SOUTH-1000
1000
V (M/S) 0
-1000
GGS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
GMS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
H (NT) 500
8 10 11 12 13 14 15 16 17 18 19 20 21
UT (HOURS)

Fig. 2 (17).

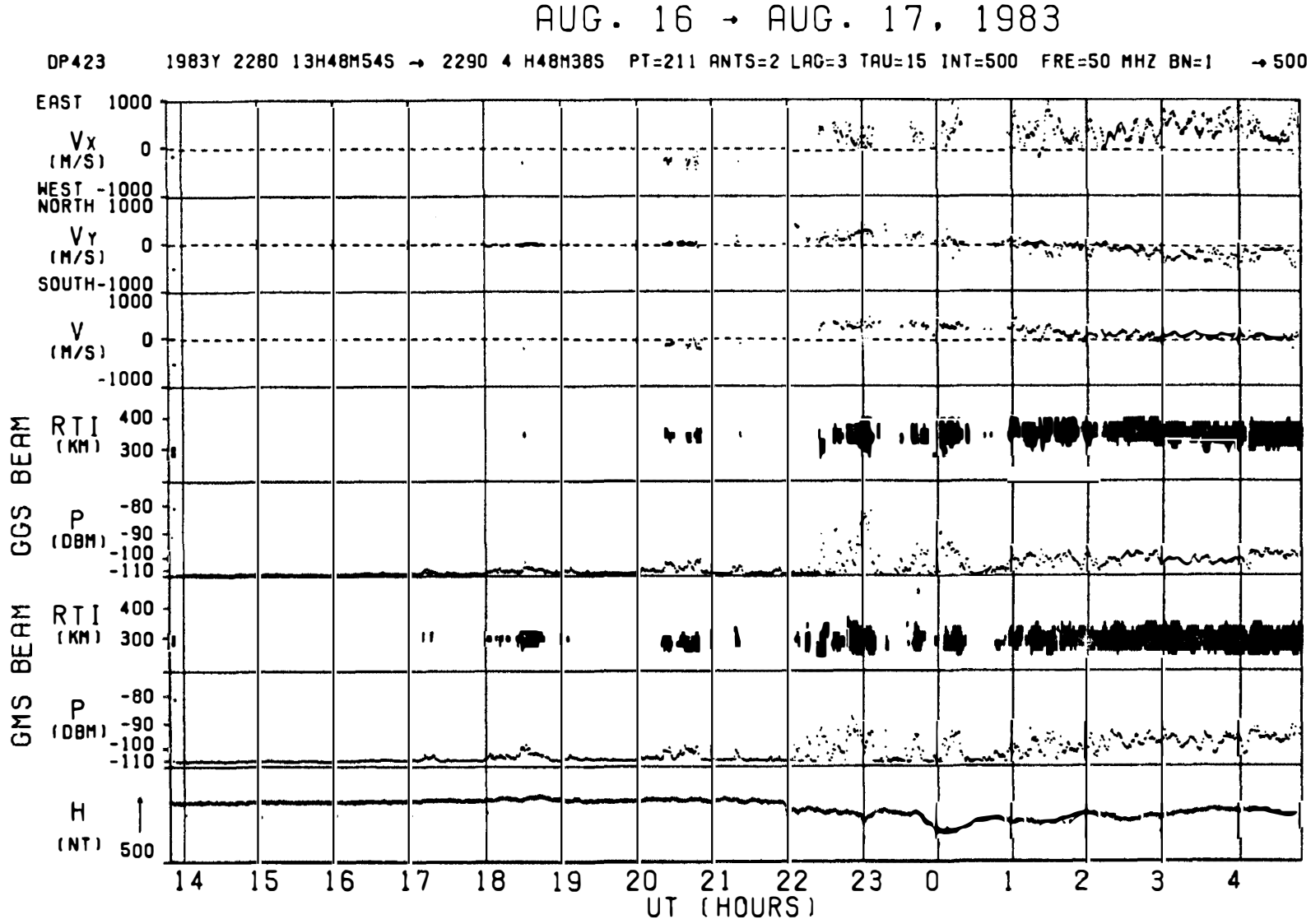
AUG. 16 → AUG. 17, 1983
DP423 1983Y 2280 13H48M54S → 2290 4 H48M38S PT=211 ANTS=2 LAG=3 TAU=15 INT=500 FRE=50 MHZ BN=1 → 500
EAST 1000
Vx (M/S) 0
WEST -1000
NORTH 1000
Vy (M/S) 0
SOUTH-1000
1000
V (M/S) 0
-1000
GGS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
GMS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
H (NT) 500
14 15 16 17 18 19 20 21 22 23 0 1 2 3 4
UT (HOURS)

Fig. 2 (18).

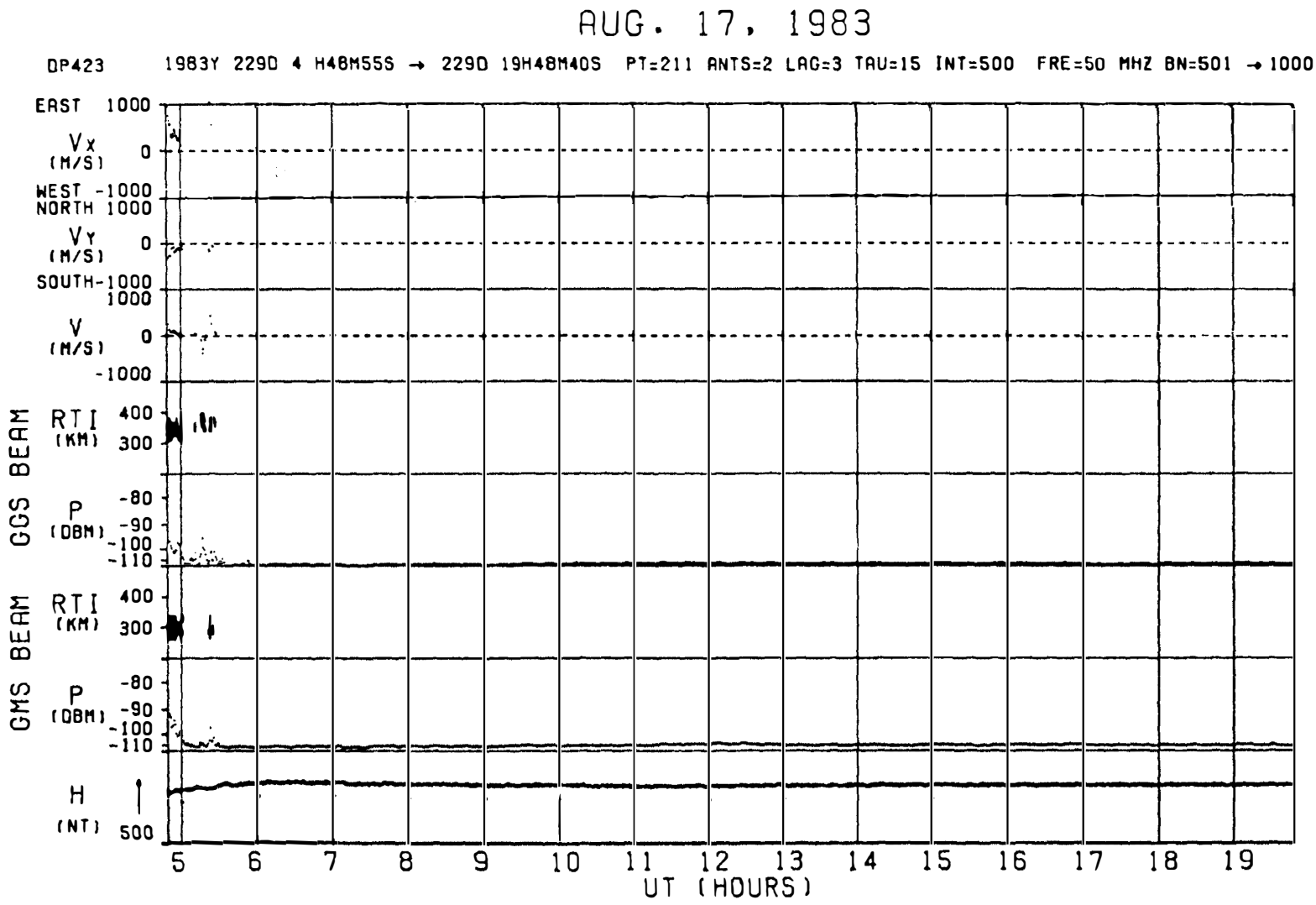
AUG. 17, 1983
DP423 1983Y 229D 4 H48M55S → 229D 19H48M40S PT=211 ANTS=2 LAG=3 TAU=15 INT=500 FRE=50 MHZ BN=501 → 1000
EAST 1000
Vx (M/S) 0
WEST -1000
NORTH 1000
Vy (M/S) 0
SOUTH-1000
1000
V (M/S) 0
-1000
GGS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
GMS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
H (NT) 500
5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
UT (HOURS)

Fig. 2 (19).

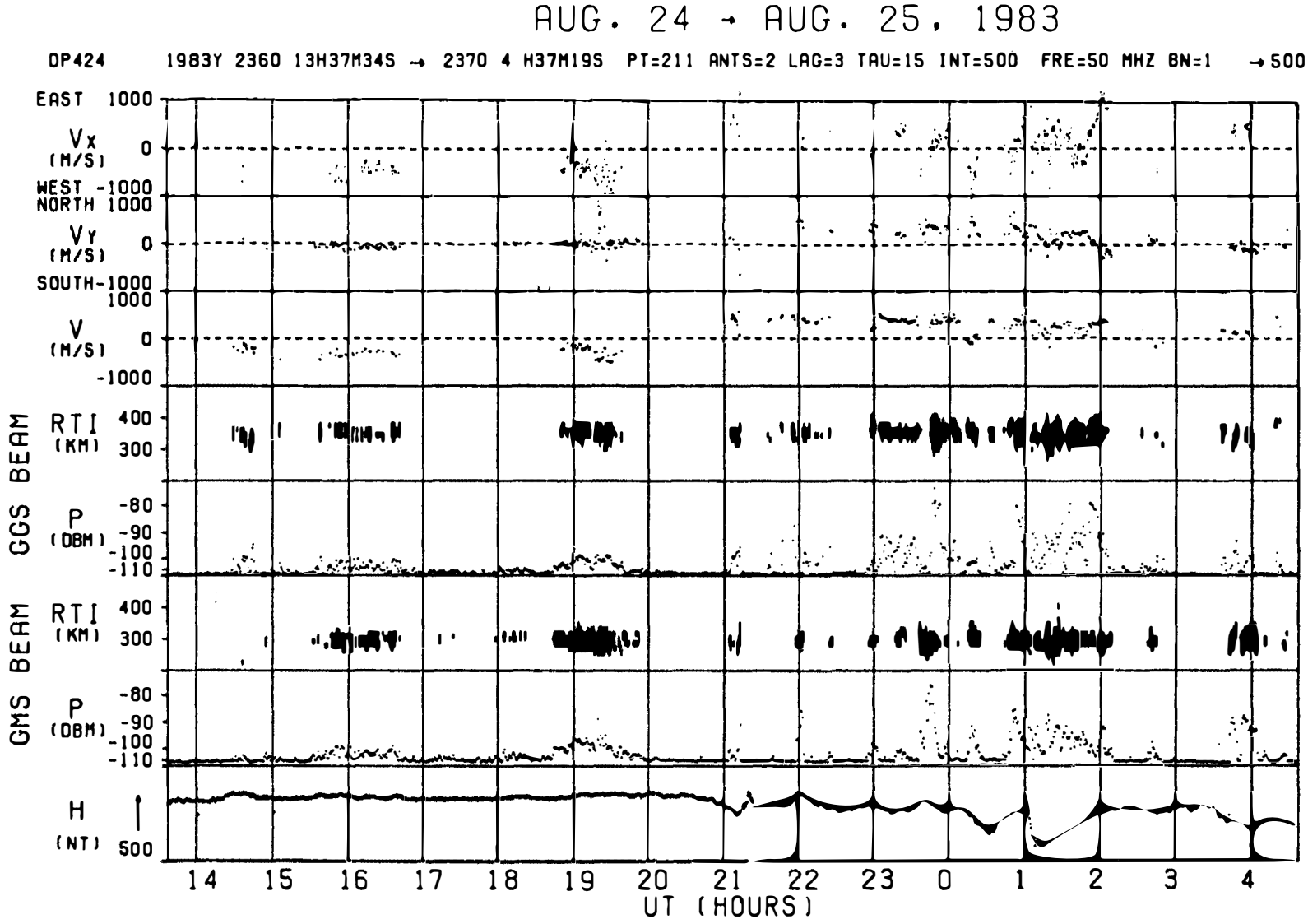
AUG. 24 → AUG. 25, 1983
OP424 1983Y 2360 13H37M34S → 2370 4 H37M19S PT=211 ANTS=2 LAG=3 TAU=15 INT=500 FRE=50 MHZ BN=1 →500
EAST 1000
Vx (M/S) 0
WEST -1000
NORTH 1000
Vy (M/S) 0
SOUTH-1000
1000
V (M/S) 0
-1000
GGS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
GMS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
H (NT) 500
14 15 16 17 18 19 20 21 22 23 0 1 2 3 4
UT (HOURS)

Fig. 2 (20).

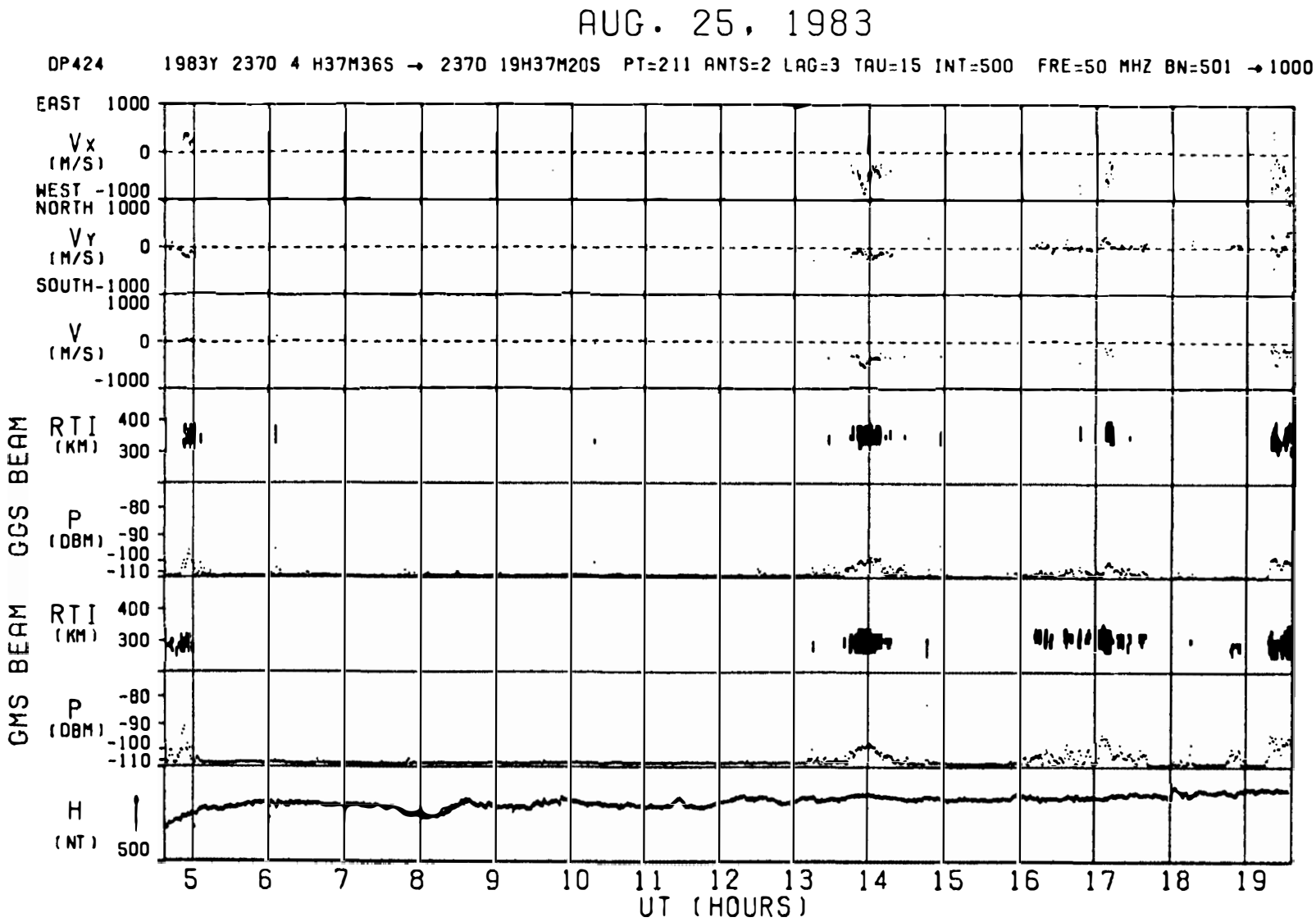
AUG. 25, 1983
DP424 1983Y 237D 4 H37M36S → 237D 19H37M20S PT=211 ANTS=2 LAG=3 TAU=15 INT=500 FRE=50 MHZ BN=501 → 1000
EAST 1000
Vx (M/S) 0
WEST -1000
NORTH 1000
Vy (M/S) 0
SOUTH-1000
1000
V (M/S) 0
-1000
GGS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
GMS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
H (NT) 500
5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
UT (HOURS)

Fig. 2 (21).

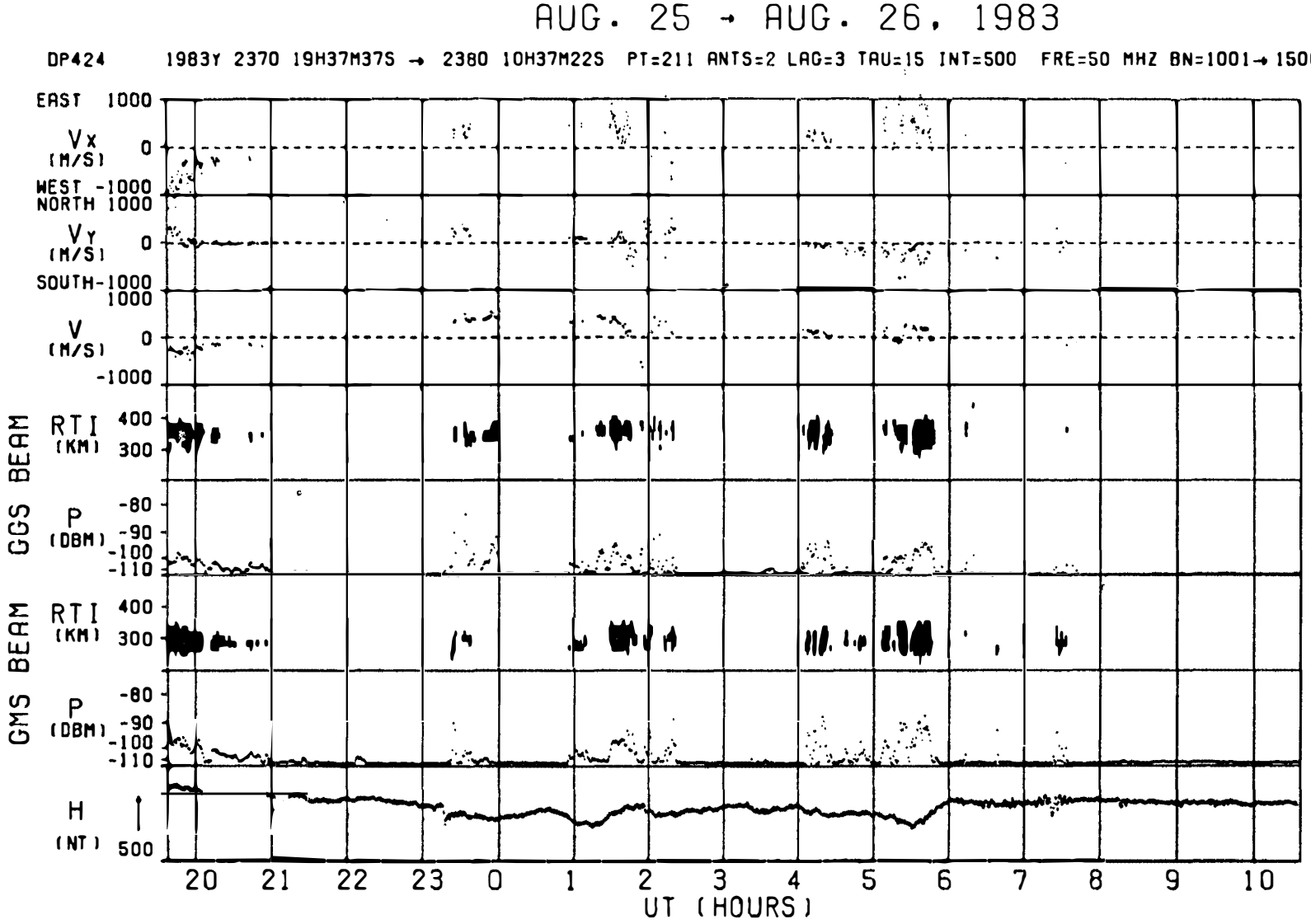
AUG. 25 → AUG. 26, 1983
DP424 1983Y 237D 19H37M37S → 238D 10H37M22S PT=211 ANTS=2 LAG=3 TAU=15 INT=500 FRE=50 MHZ BN=1001→1500
EAST 1000
Vx (M/S) 0
WEST -1000
NORTH 1000
Vy (M/S) 0
SOUTH-1000
1000
V (M/S) 0
-1000
GGS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
GMS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
H (NT) 500
20 21 22 23 0 1 2 3 4 5 6 7 8 9 10
UT (HOURS)

Fig. 2 (22).

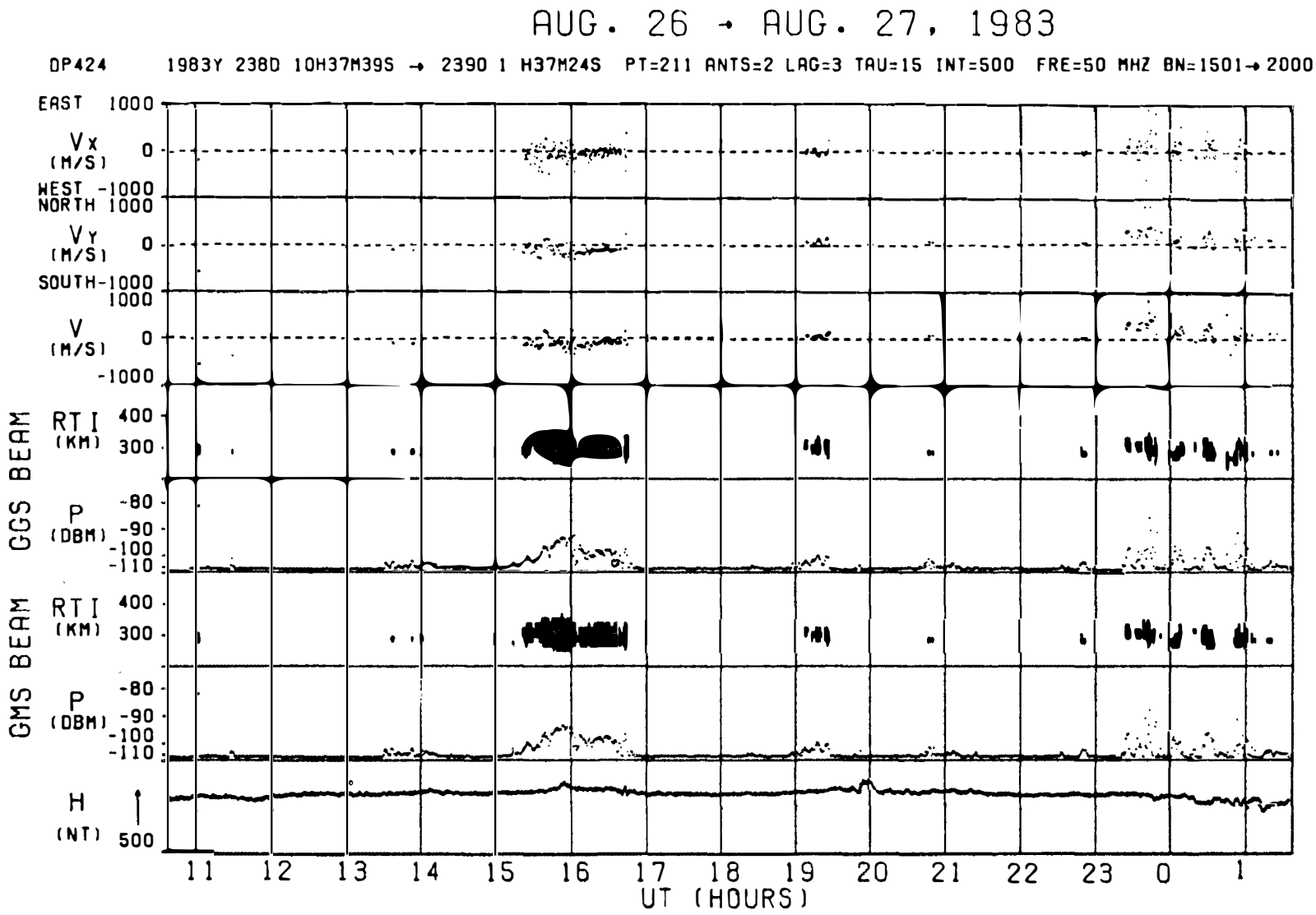
AUG. 26 → AUG. 27, 1983
DP424 1983Y 238D 10H37M39S → 2390 1 H37M24S PT=211 ANTS=2 LAG=3 TAU=15 INT=500 FRE=50 MHZ BN=1501→2000
EAST 1000
Vx (M/S) 0
WEST -1000
NORTH 1000
Vy (M/S) 0
SOUTH-1000
1000
V (M/S) 0
-1000
GGS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
GMS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
H (NT) 500
11 12 13 14 15 16 17 18 19 20 21 22 23 0 1
UT (HOURS)

Fig. 2 (23).

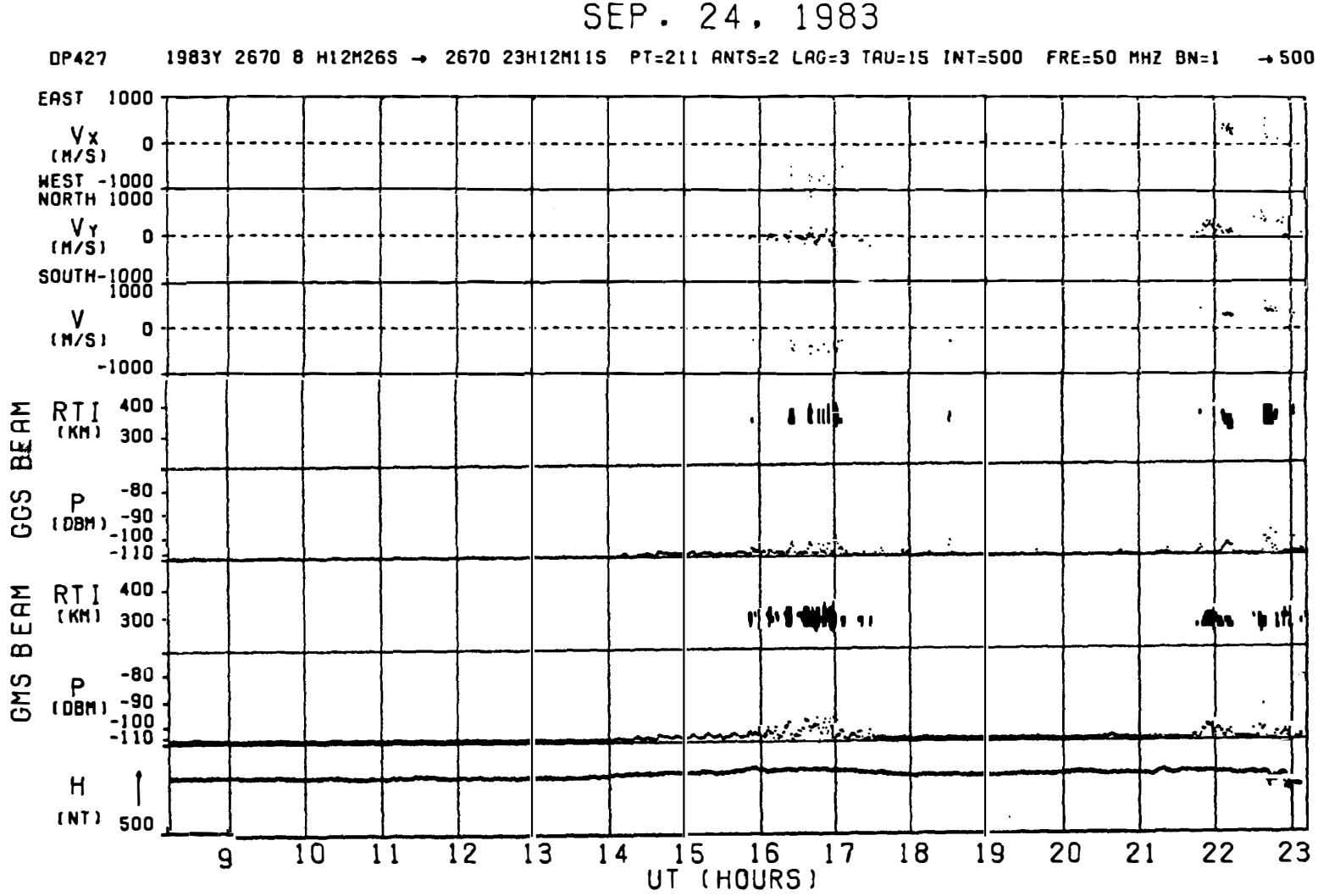
SEP. 24, 1983
DP427 1983Y 2670 8 H12M26S → 2670 23H12M11S PT=211 ANTS=2 LAG=3 TAU=15 INT=500 FRE=50 MHZ BN=1 → 500
EAST 1000
Vx (M/S) 0
WEST -1000
NORTH 1000
Vy (M/S) 0
SOUTH-1000
1000
V (M/S) 0
-1000
GMS BEAM GCS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
RTI (KM) 400 300
GMS BEAM
P (DBM) -80 -90 -100 -110
H (NT) 500
9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
UT (HOURS)

Fig. 2 (24).

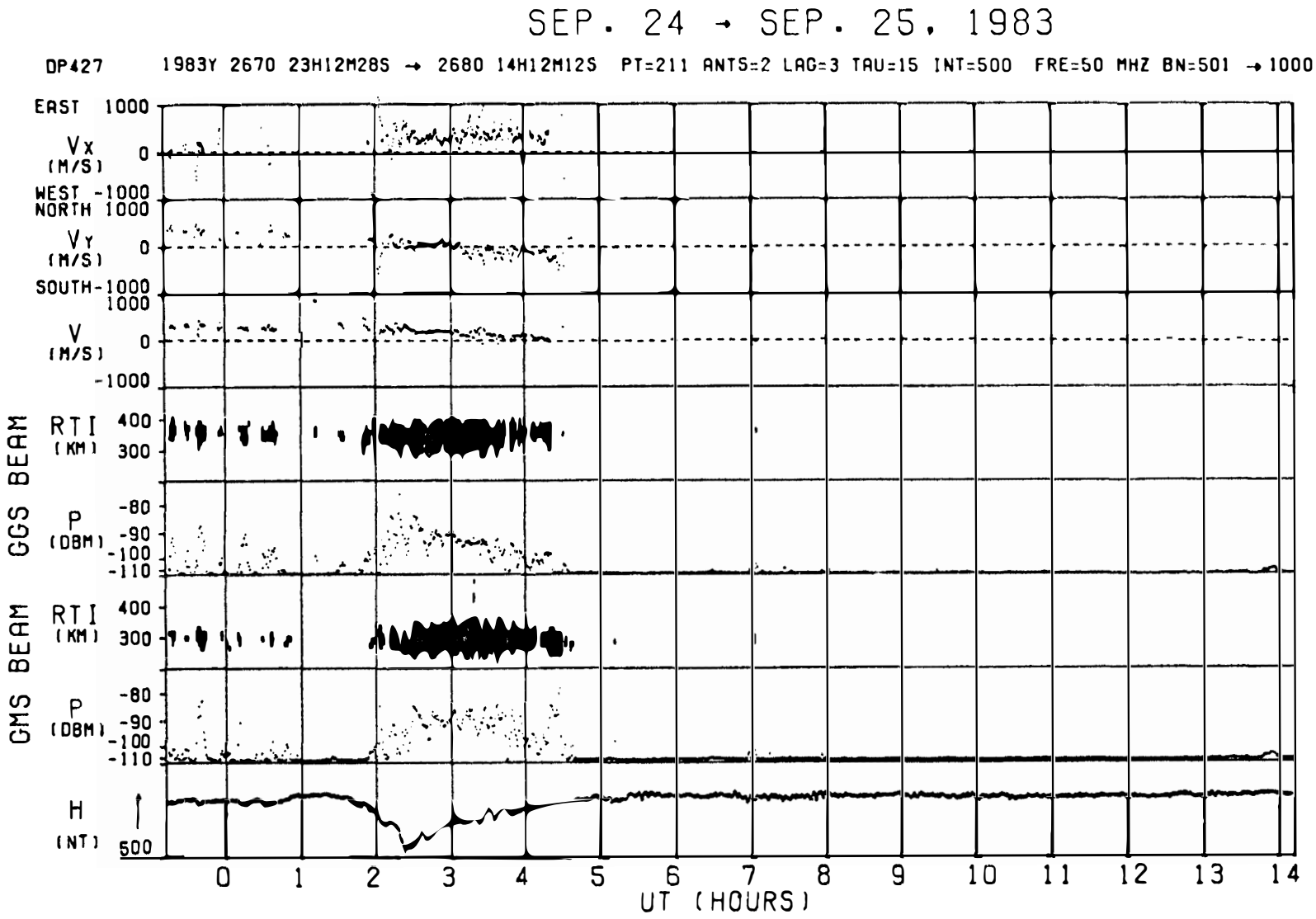
SEP. 24 → SEP. 25, 1983
DP427 1983Y 2670 23H12M28S → 2680 14H12M12S PT=211 ANTS=2 LAG=3 TAU=15 INT=500 FRE=50 MHZ BN=501 → 1000
EAST 1000
Vx (M/S) 0
WEST -1000
NORTH 1000
Vy (M/S) 0
SOUTH-1000
1000
V (M/S) 0
-1000
GGS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
GMS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
H (NT) 500
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14
UT (HOURS)

Fig. 2 (25).

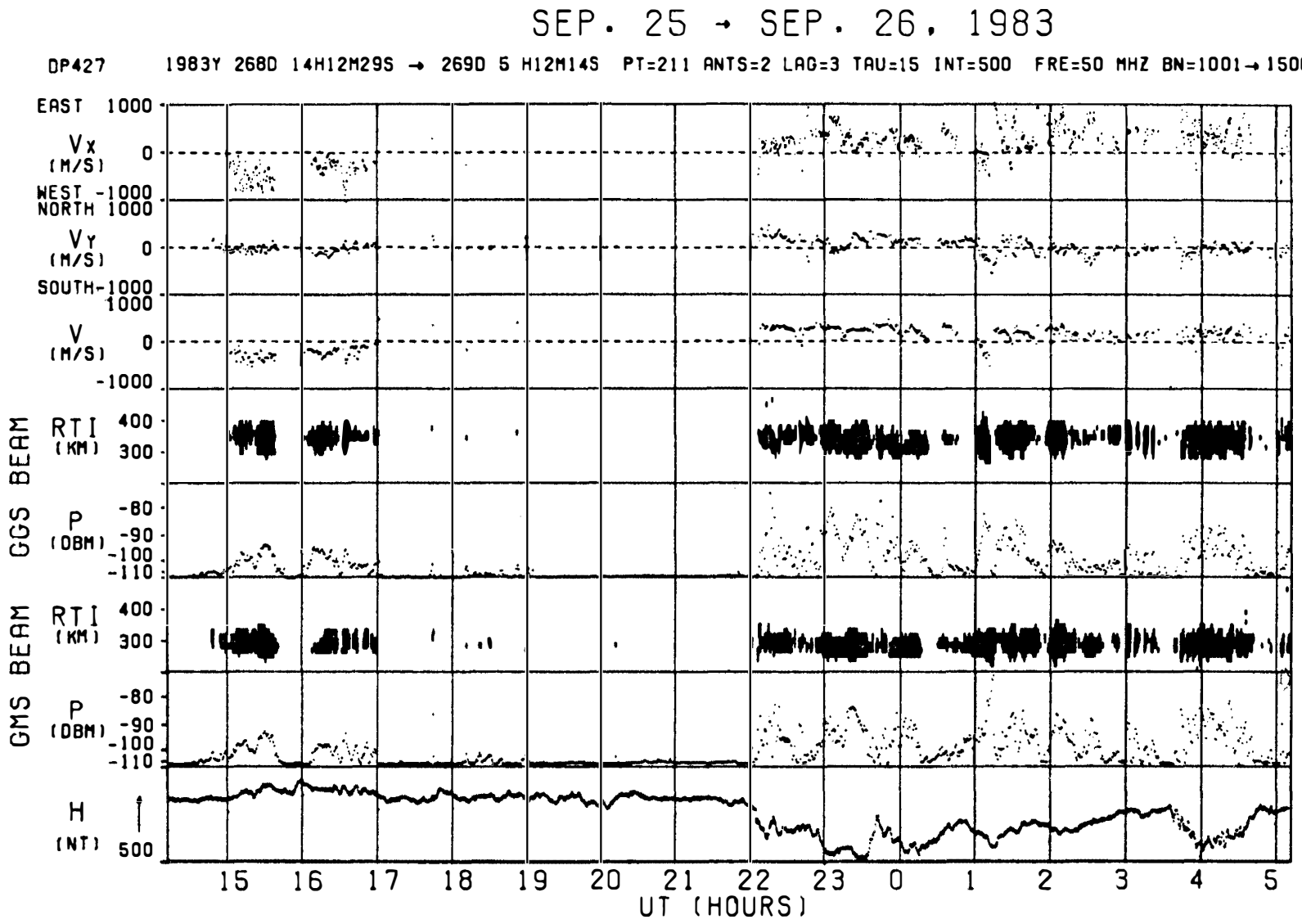
SEP. 25 → SEP. 26, 1983
DP427 1983Y 268D 14H12M29S → 269D 5 H12M14S PT=211 ANTS=2 LAG=3 TAU=15 INT=500 FRE=50 MHZ BN=1001→1500
EAST 1000
Vx (M/S) 0
WEST -1000
NORTH 1000
Vy (M/S) 0
SOUTH-1000
1000
V (M/S) 0
-1000
GGS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
GMS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
H (NT) 500
15 16 17 18 19 20 21 22 23 0 1 2 3 4 5
UT (HOURS)

Fig. 2 (26).

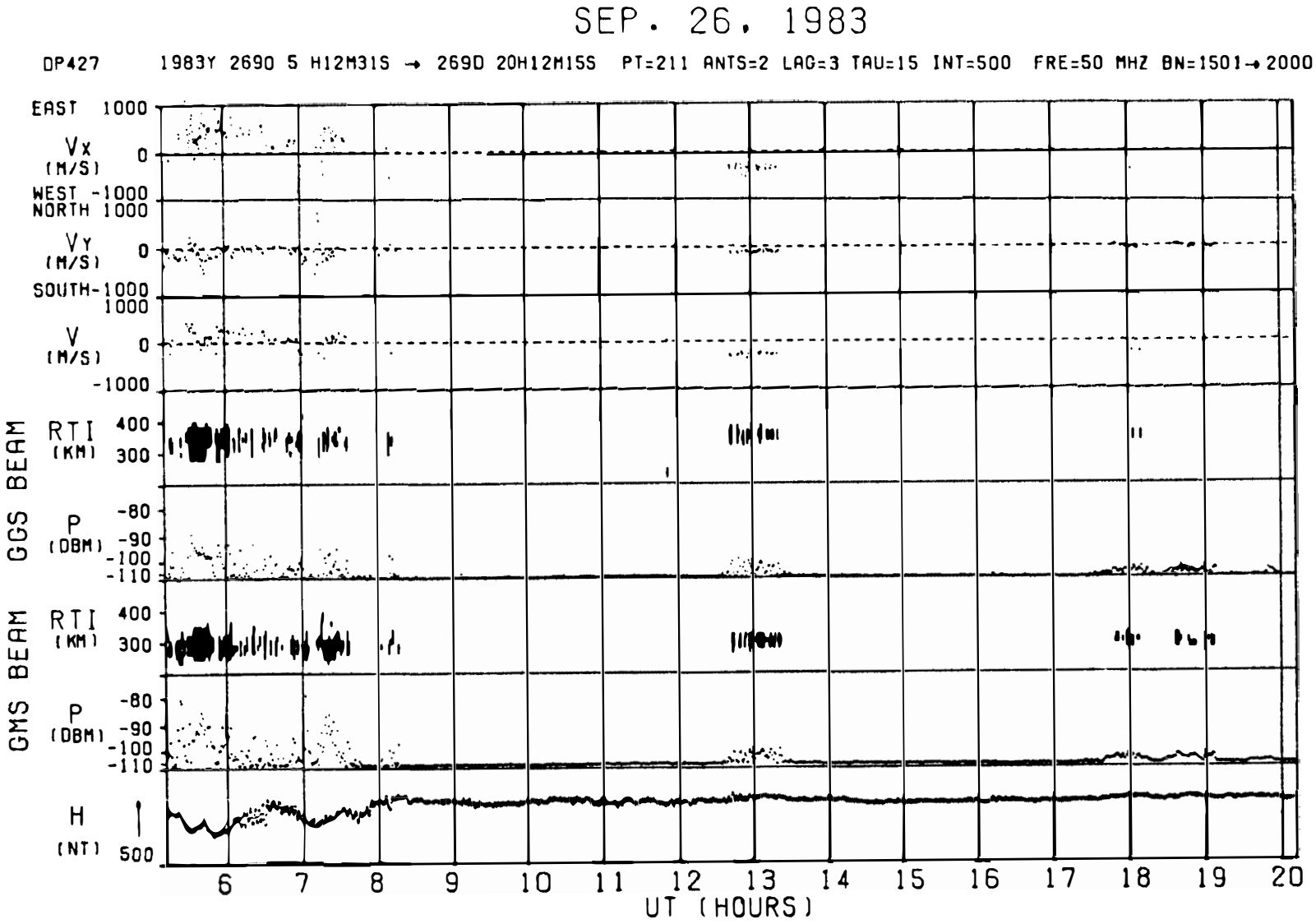
SEP. 26, 1983
DP427 1983Y 269D 5 H12M31S → 269D 20H12M15S PT=211 ANTS=2 LAG=3 TAU=15 INT=500 FRE=50 MHZ BN=1501→2000
EAST 1000
Vx
(M/S)
0
WEST -1000
NORTH 1000
Vy
(M/S)
0
SOUTH-1000
1000
V
(M/S)
0
-1000
GGS BEAM
RTI
(KM)
400
300
P
(DBM)
-80
-90
-100
-110
GMS BEAM
RTI
(KM)
400
300
P
(DBM)
-80
-90
-100
-110
H
(NT)
500
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
UT (HOURS)

Fig. 2 (27).

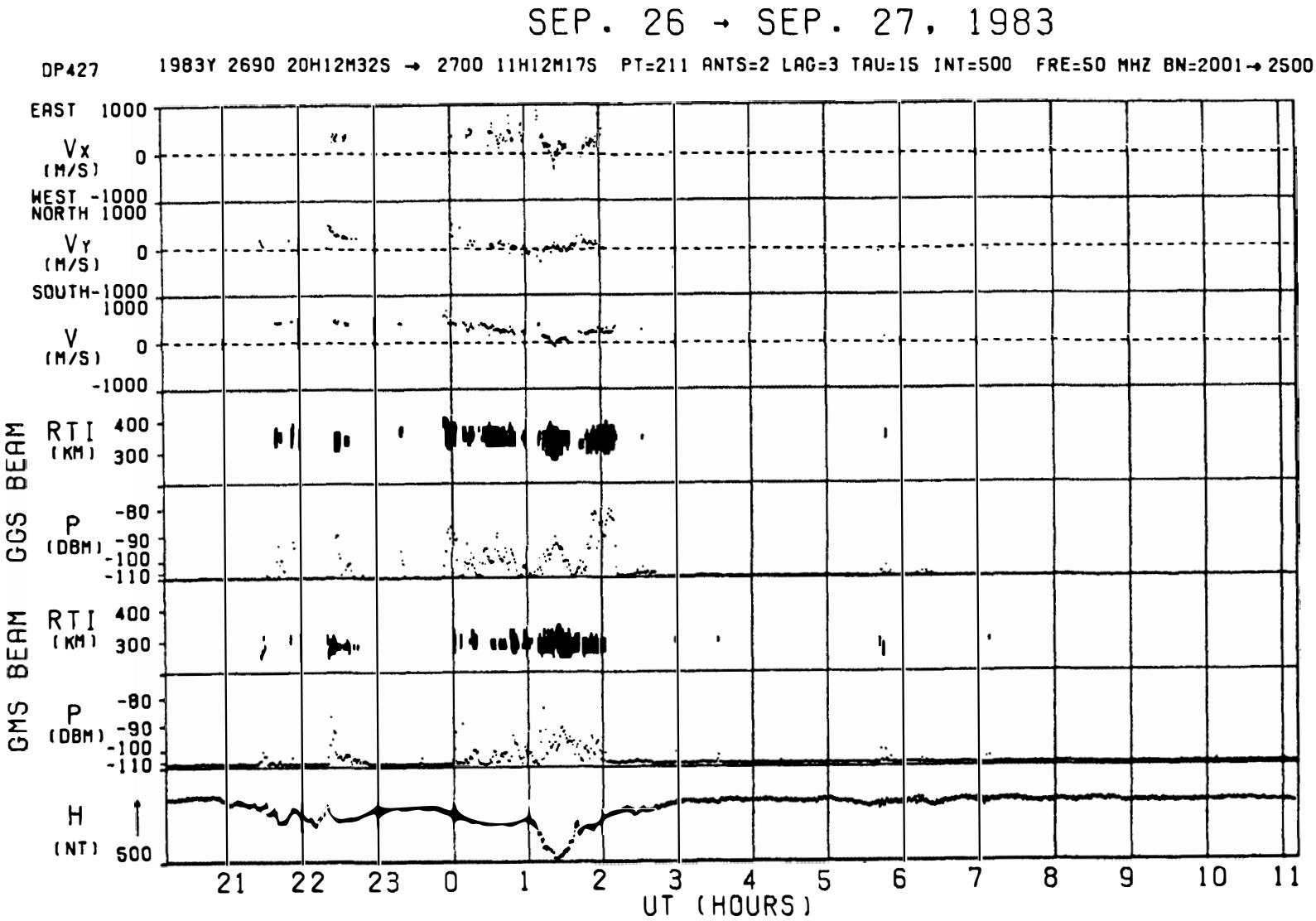
SEP. 26 → SEP. 27, 1983
DP427 1983Y 2690 20H12M32S → 2700 11H12M17S PT=211 ANTS=2 LAG=3 TAU=15 INT=500 FRE=50 MHZ BN=2001→2500
EAST 1000
Vx (M/S) 0
WEST -1000
NORTH 1000
Vy (M/S) 0
SOUTH-1000
1000
V (M/S) 0
-1000
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
GGS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
GMS BEAM
H (NT) 500
21 22 23 0 1 2 3 4 5 6 7 8 9 10 11
UT (HOURS)

Fig. 2 (28).

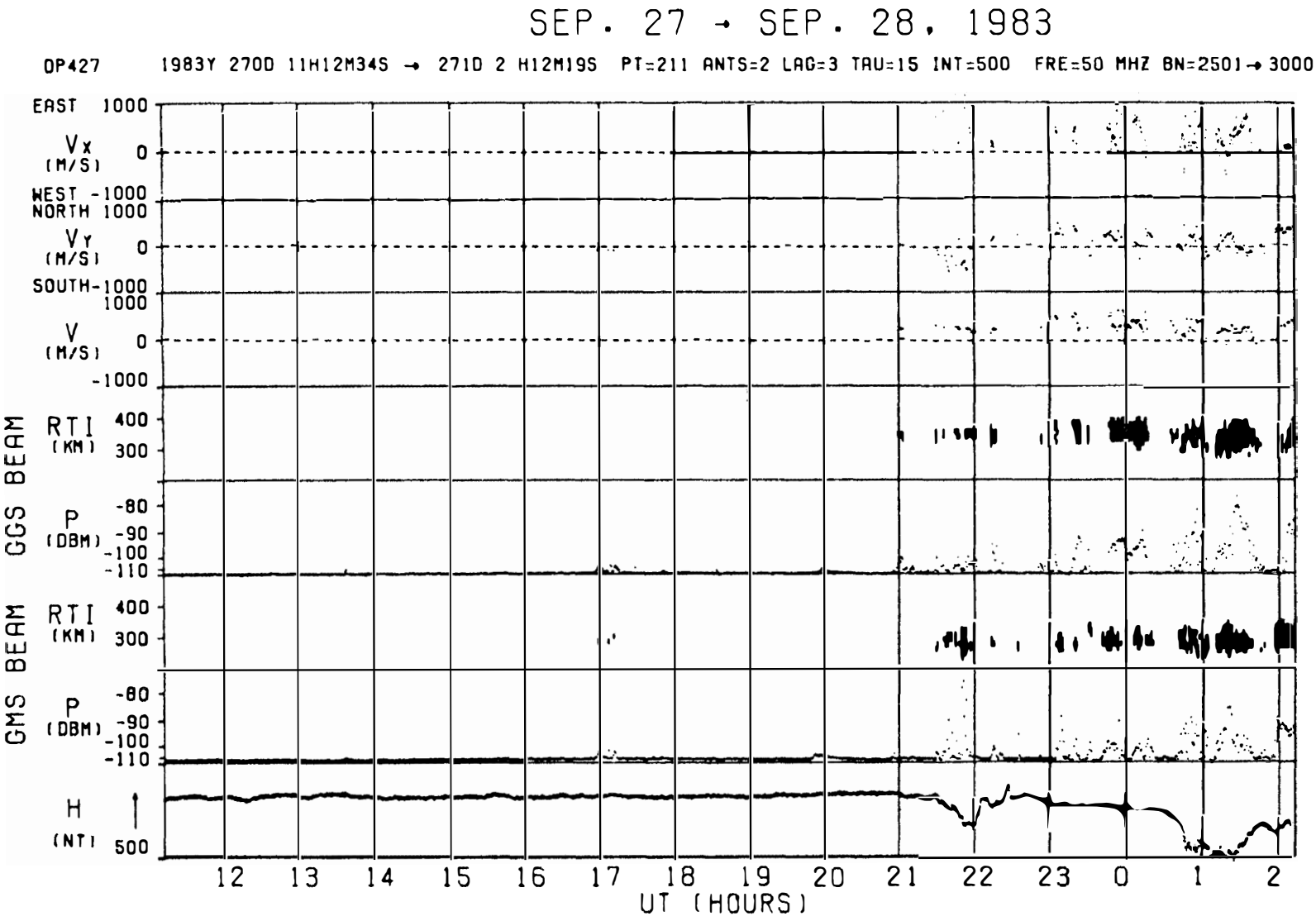
SEP. 27 → SEP. 28, 1983
OP427 1983Y 270D 11H12M34S → 271D 2 H12M19S PT=211 ANTS=2 LAG=3 TAU=15 INT=500 FRE=50 MHZ BN=2501→3000
EAST 1000
Vx (M/S) 0
WEST -1000
NORTH 1000
Vy (M/S) 0
SOUTH-1000
1000
V (M/S) 0
-1000
GGS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
GMS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
H (NT) 500
12 13 14 15 16 17 18 19 20 21 22 23 0 1 2
UT (HOURS)

Fig. 2 (29).

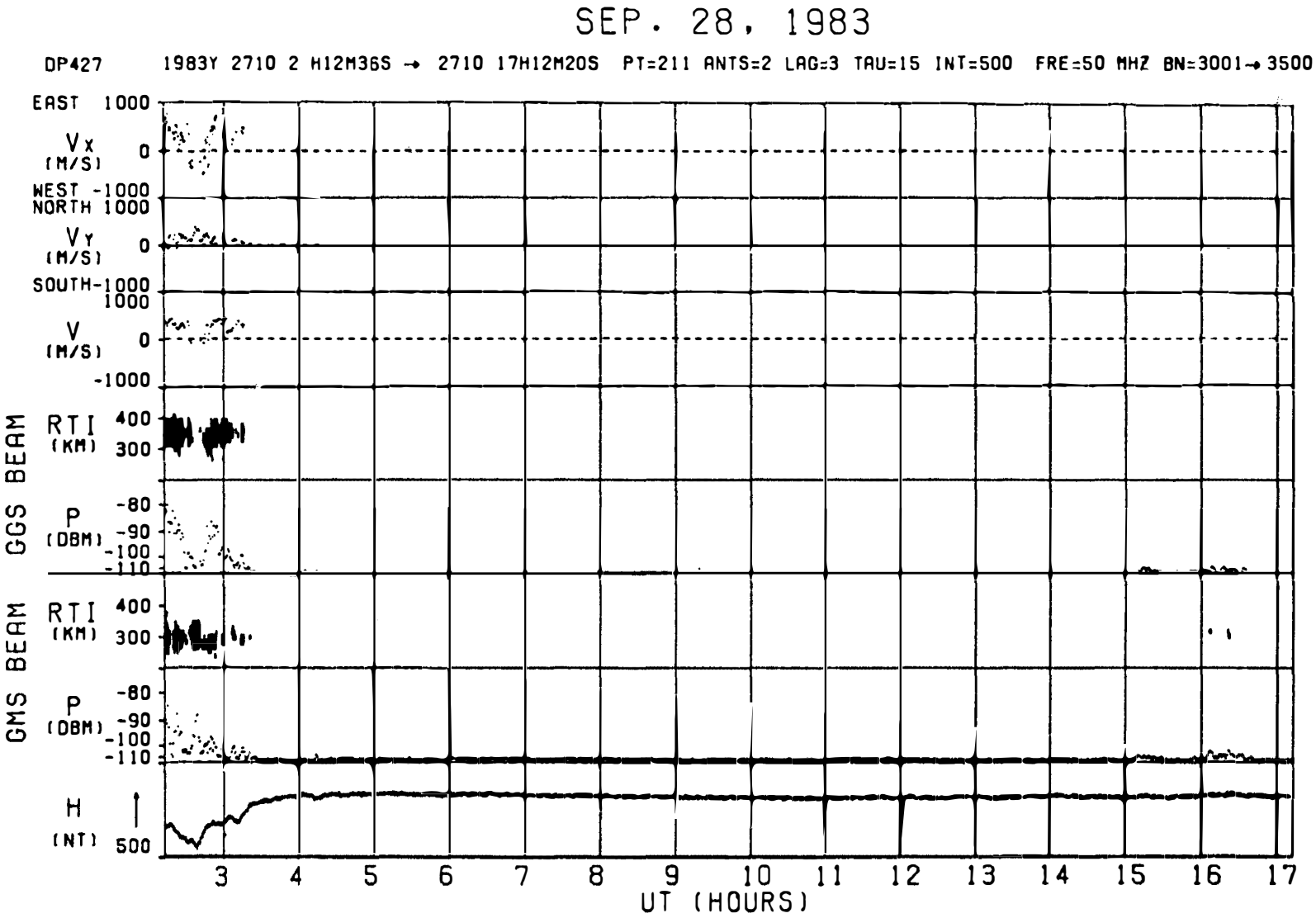
SEP. 28, 1983
DP427 1983Y 2710 2 H12M36S → 2710 17H12M20S PT=211 ANTS=2 LAG=3 TAU=15 INT=500 FRE=50 MHZ BN=3001→3500
EAST 1000
Vx (M/S) 0
WEST -1000
NORTH 1000
Vy (M/S) 0
SOUTH-1000
1000
V (M/S) 0
-1000
GGS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
GMS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
H (NT) 500
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
UT (HOURS)

Fig. 2 (30).

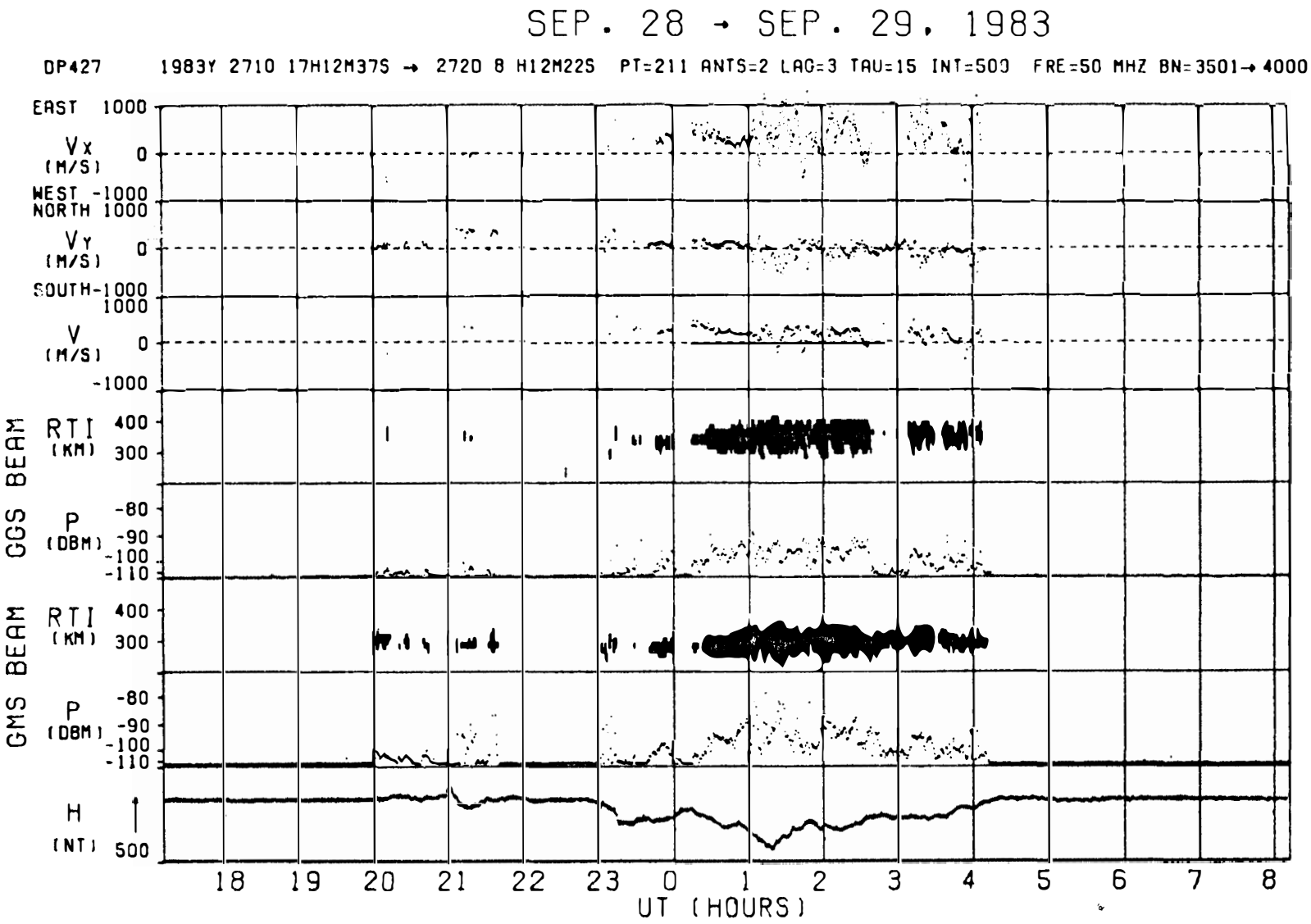
SEP. 28 → SEP. 29, 1983
DP427 1983Y 271D 17H12M37S → 272D 8 H12M22S PT=211 ANTS=2 LAG=3 TAU=15 INT=50D FRE=50 MHZ BN=3501→4000
EAST 1000
Vx
(M/S) 0
WEST -1000
NORTH 1000
Vy
(M/S) 0
SOUTH-1000
1000
V
(M/S) 0
-1000
GGS BEAM
RTI
(KM) 400
300
P
(DBM) -80
-90
-100
-110
GMS BEAM
RTI
(KM) 400
300
P
(DBM) -80
-90
-100
-110
H
(NT) 500
18 19 20 21 22 23 0 1 2 3 4 5 6 7 8
UT (HOURS)

Fig. 2 (31).

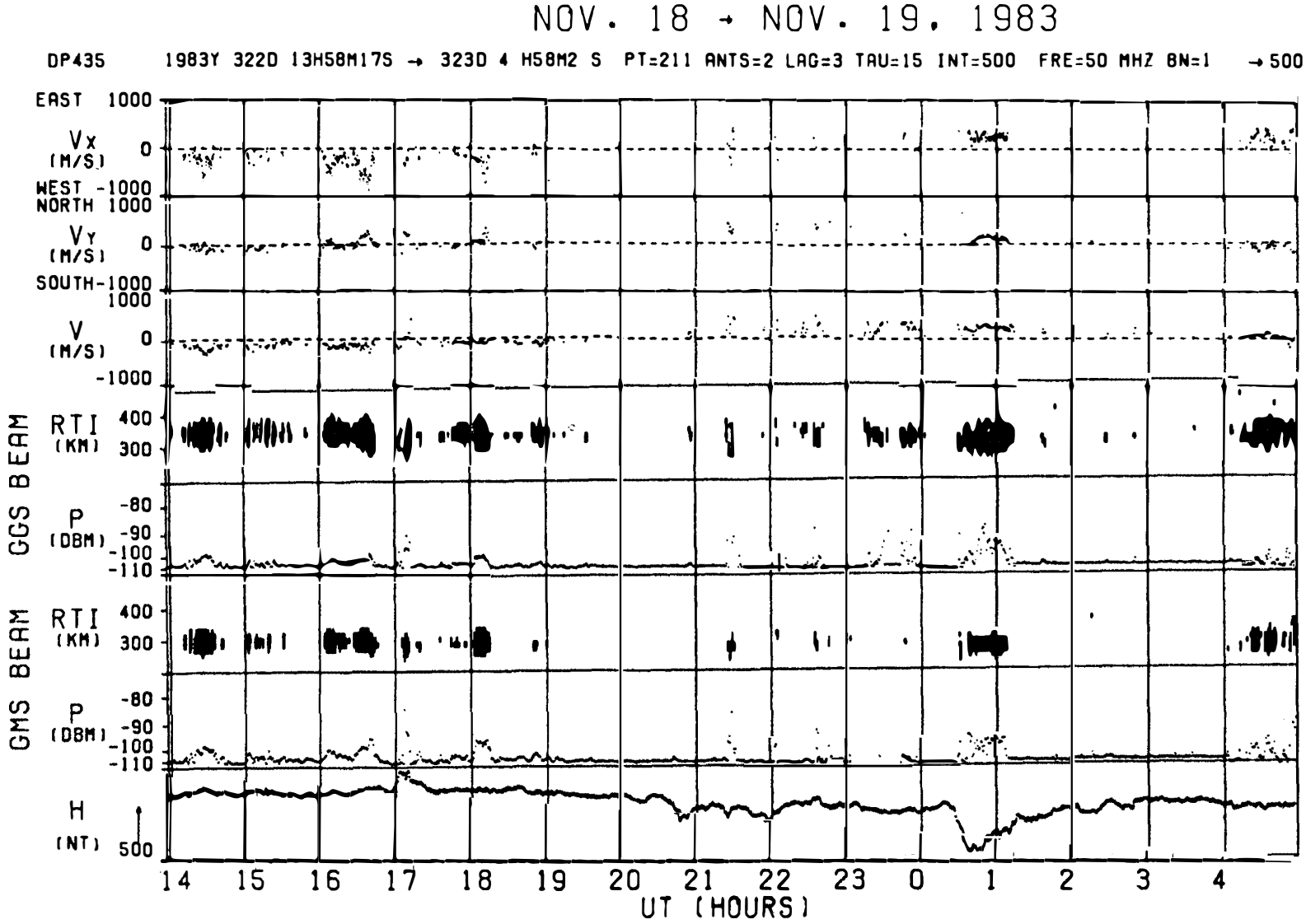
NOV. 18 → NOV. 19, 1983
DP435 1983Y 322D 13H58M17S → 323D 4 H58M2 S PT=211 ANTS=2 LAG=3 TAU=15 INT=500 FRE=50 MHZ BN=1 →500
EAST 1000
Vx (M/S) 0
WEST -1000
NORTH 1000
Vy (M/S) 0
SOUTH-1000
1000
V (M/S) 0
-1000
GGS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
GMS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
H (NT) 500
14 15 16 17 18 19 20 21 22 23 0 1 2 3 4
UT (HOURS)

Fig. 2 (32).

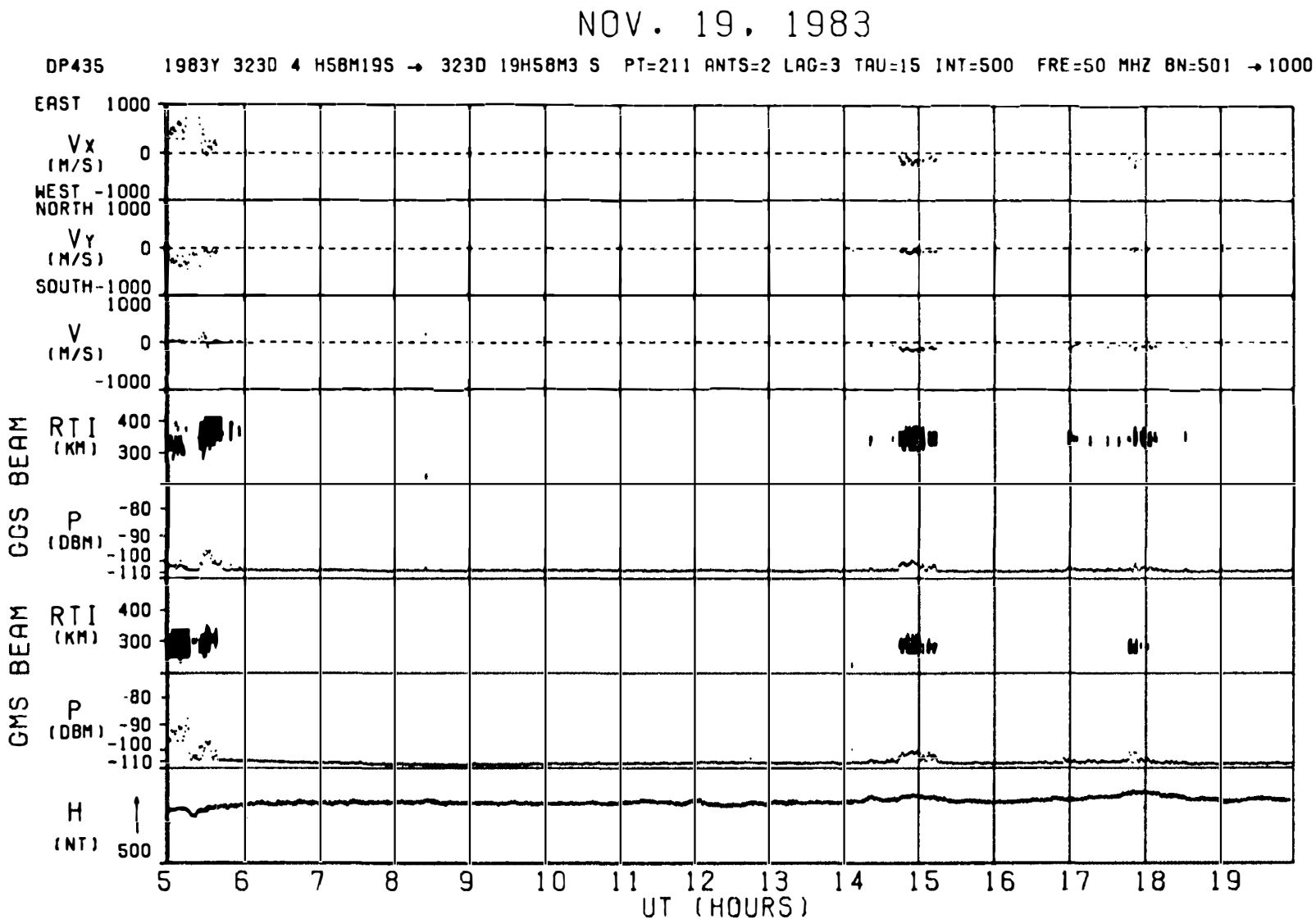
NOV. 19, 1983
DP435 1983Y 323D 4 H58M19S → 323D 19H58M3 S PT=211 ANTS=2 LAG=3 TAU=15 INT=500 FRE=50 MHZ BN=501 → 1000
EAST 1000
Vx
(M/S) 0
WEST -1000
NORTH 1000
Vy
(M/S) 0
SOUTH-1000
1000
V
(M/S) 0
-1000
GGS BEAM
RTI 400
(KM) 300
P -80
(DBM) -90
-100
-110
GMS BEAM
RTI 400
(KM) 300
P -80
(DBM) -90
-100
-110
H
(NT) 500
5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
UT (HOURS)

Fig. 2 (33).

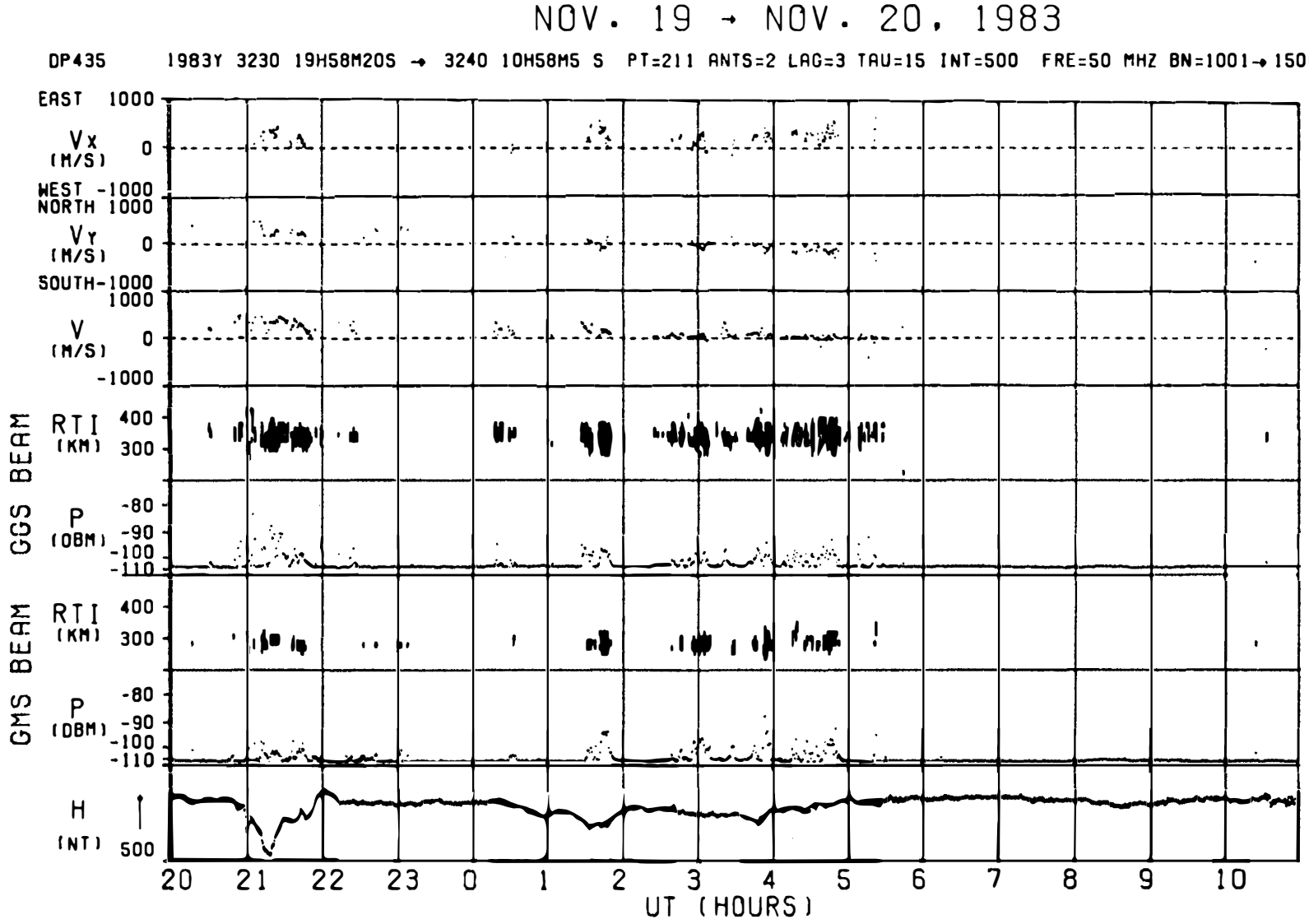
NOV. 19 → NOV. 20, 1983
DP435 1983Y 3230 19H58M20S → 3240 10H58M5 S PT=211 ANTS=2 LAG=3 TAU=15 INT=500 FRE=50 MHZ BN=1001→1500
EAST 1000
Vx (M/S) 0
WEST -1000
NORTH 1000
Vy (M/S) 0
SOUTH-1000
1000
V (M/S) 0
-1000
GGS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
GMS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
H (NT) 500
20 21 22 23 0 1 2 3 4 5 6 7 8 9 10
UT (HOURS)

Fig. 2 (34).

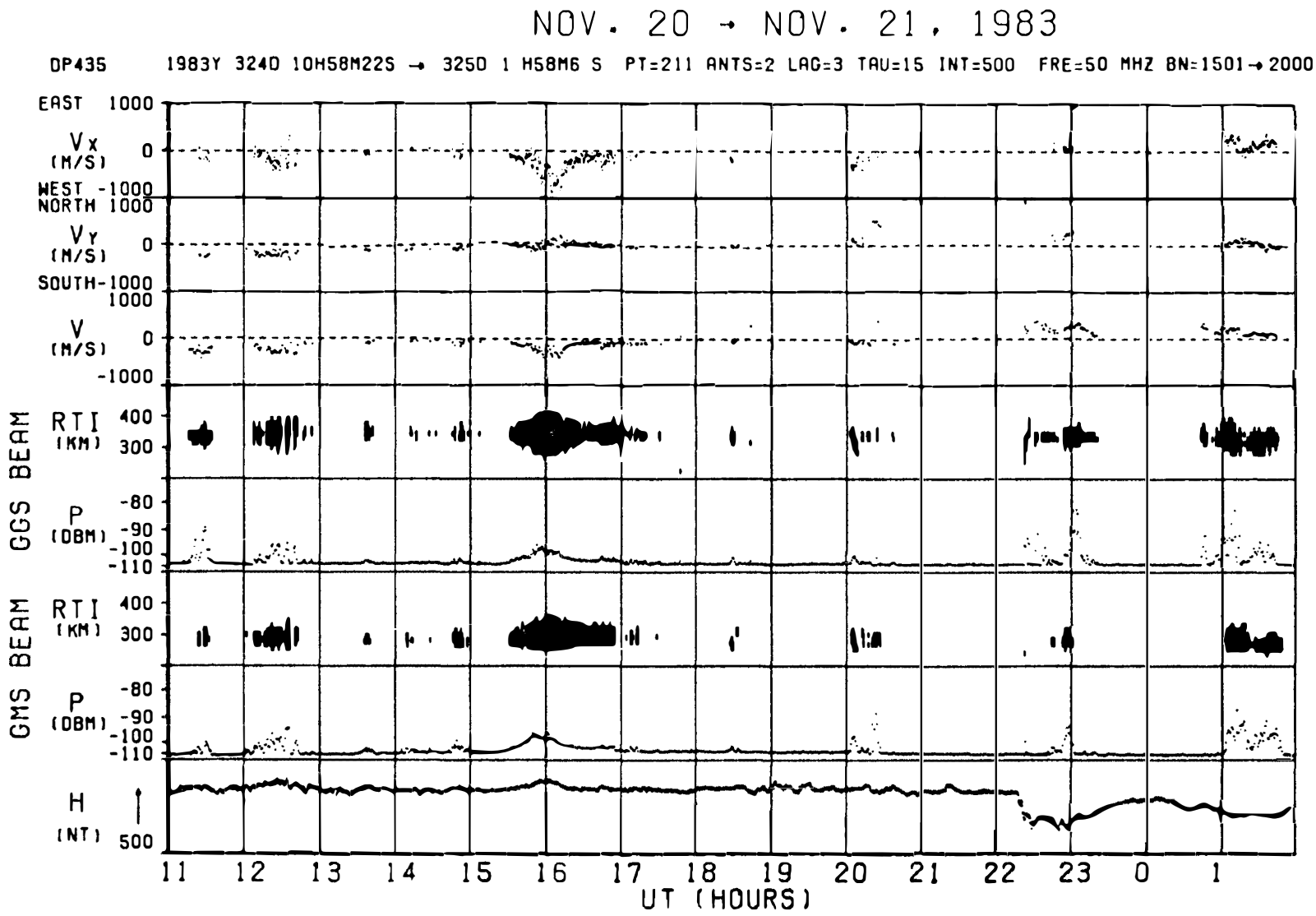
NOV. 20 → NOV. 21, 1983
DP435 1983Y 324D 10H58M22S → 325D 1 H58M6 S PT=211 ANTS=2 LAG=3 TAU=15 INT=500 FRE=50 MHZ BN=1501→2000
EAST 1000
Vx (M/S) 0
WEST -1000
NORTH 1000
Vy (M/S) 0
SOUTH-1000
1000
V (M/S) 0
-1000
GGS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
GMS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
H (NT) 500
11 12 13 14 15 16 17 18 19 20 21 22 23 0 1
UT (HOURS)

Fig. 2 (35).

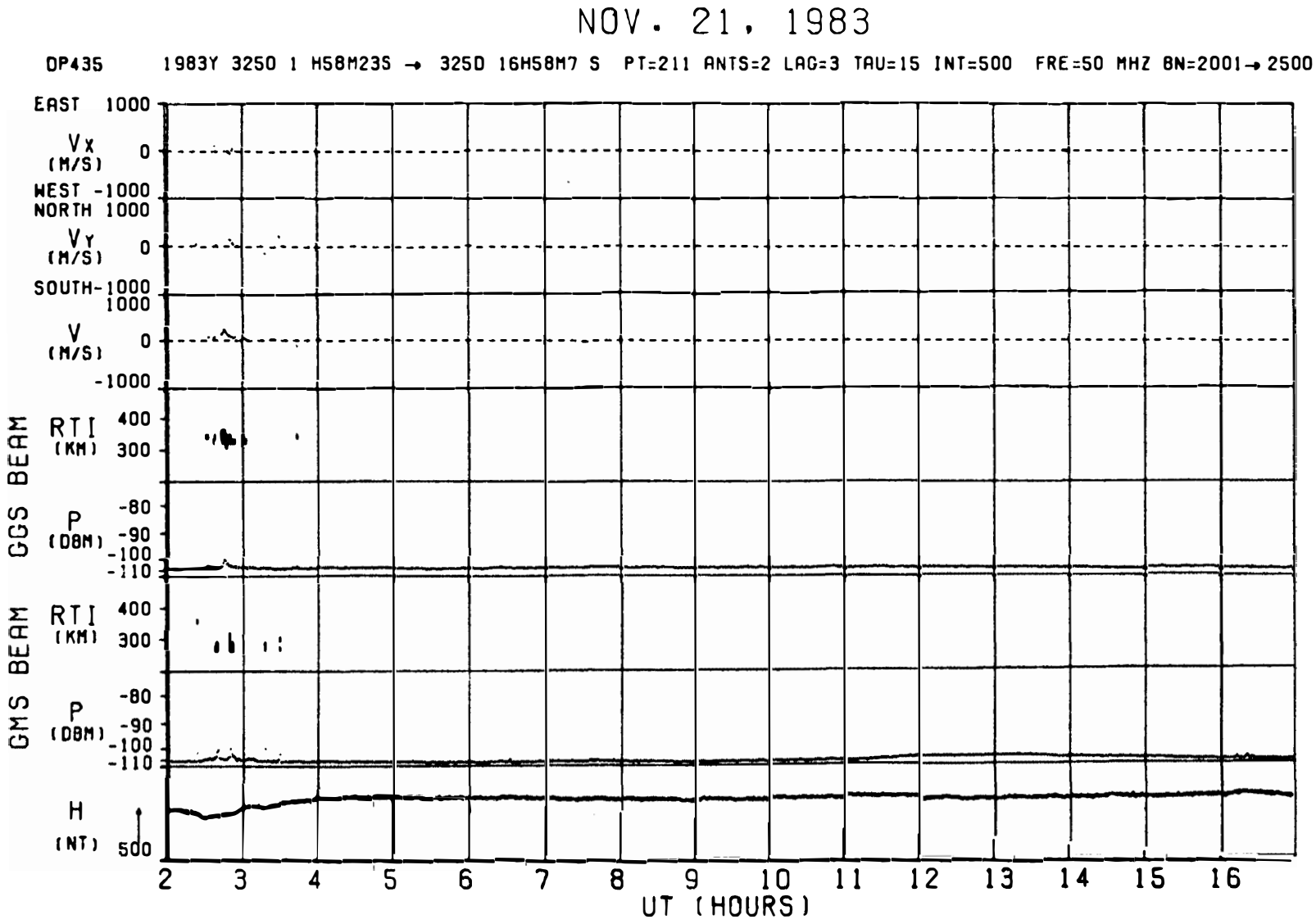
NOV. 21, 1983
OP435 1983Y 325D 1 H58M23S → 325D 16H58M7 S PT=211 ANTS=2 LAG=3 TAU=15 INT=500 FRE=50 MHZ BN=2001→2500
EAST 1000
Vx (M/S) 0
WEST -1000
NORTH 1000
Vy (M/S) 0
SOUTH-1000
1000
V (M/S) 0
-1000
GGS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
GMS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
H (NT) 500
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
UT (HOURS)

Fig. 2 (36).

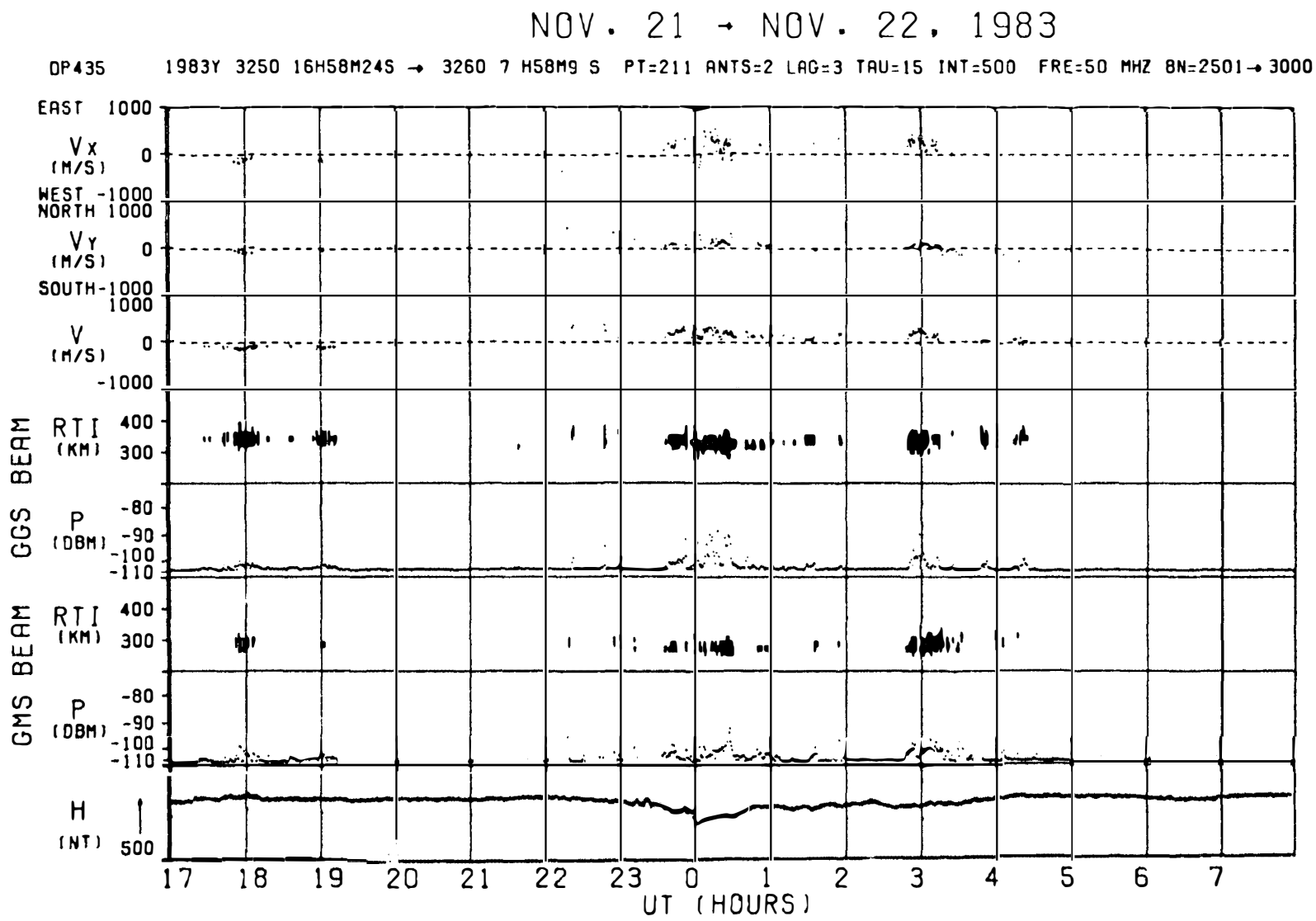
NOV. 21 → NOV. 22, 1983
OP435 1983Y 3250 16H58M24S → 3260 7 H58M9 S PT=211 ANTS=2 LAG=3 TAU=15 INT=500 FRE=50 MHZ BN=2501→3000
EAST 1000
Vx
(M/S) 0
WEST -1000
NORTH 1000
Vy
(M/S) 0
SOUTH-1000
1000
V
(M/S) 0
-1000
GGS BEAM
RTI
(KM) 400
300
P
(DBM) -80
-90
-100
-110
GMS BEAM
RTI
(KM) 400
300
P
(DBM) -80
-90
-100
-110
H
(NT)
500
17 18 19 20 21 22 23 0 1 2 3 4 5 6 7
UT (HOURS)

Fig.2 (37).

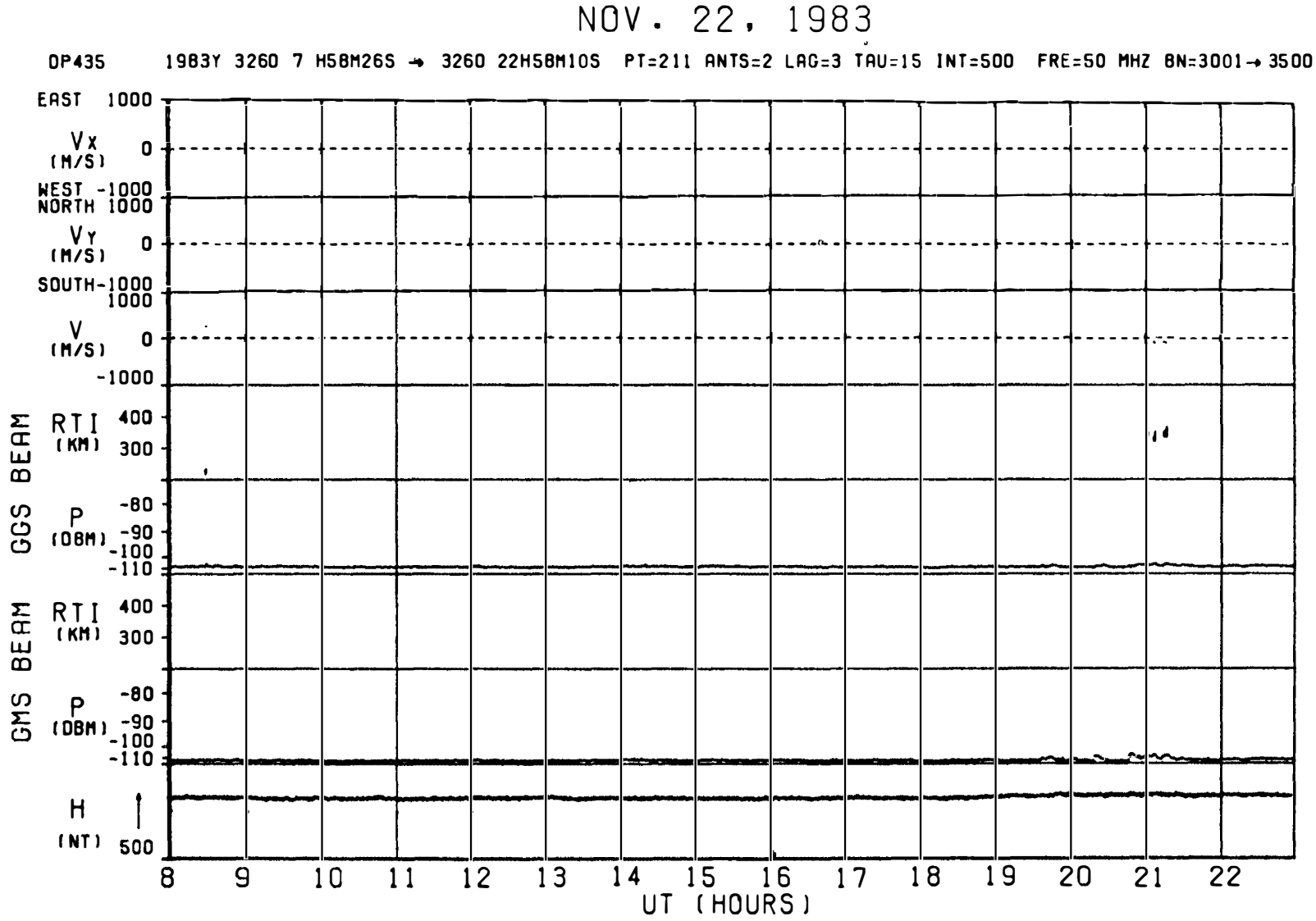
NOV. 22, 1983
OP435 1983Y 3260 7 H58M26S → 3260 22H58M10S PT=211 ANTS=2 LAG=3 TAU=15 INT=500 FRE=50 MHZ BN=3001→3500
EAST 1000
Vx (M/S) 0
WEST -1000
NORTH 1000
Vy (M/S) 0
SOUTH-1000
1000
V (M/S) 0
-1000
GGS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
GMS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
H (NT) 500
8 9 10 11 12 13 14 15 16 17 18 19 20 21 22
UT (HOURS)

Fig. 2 (38).

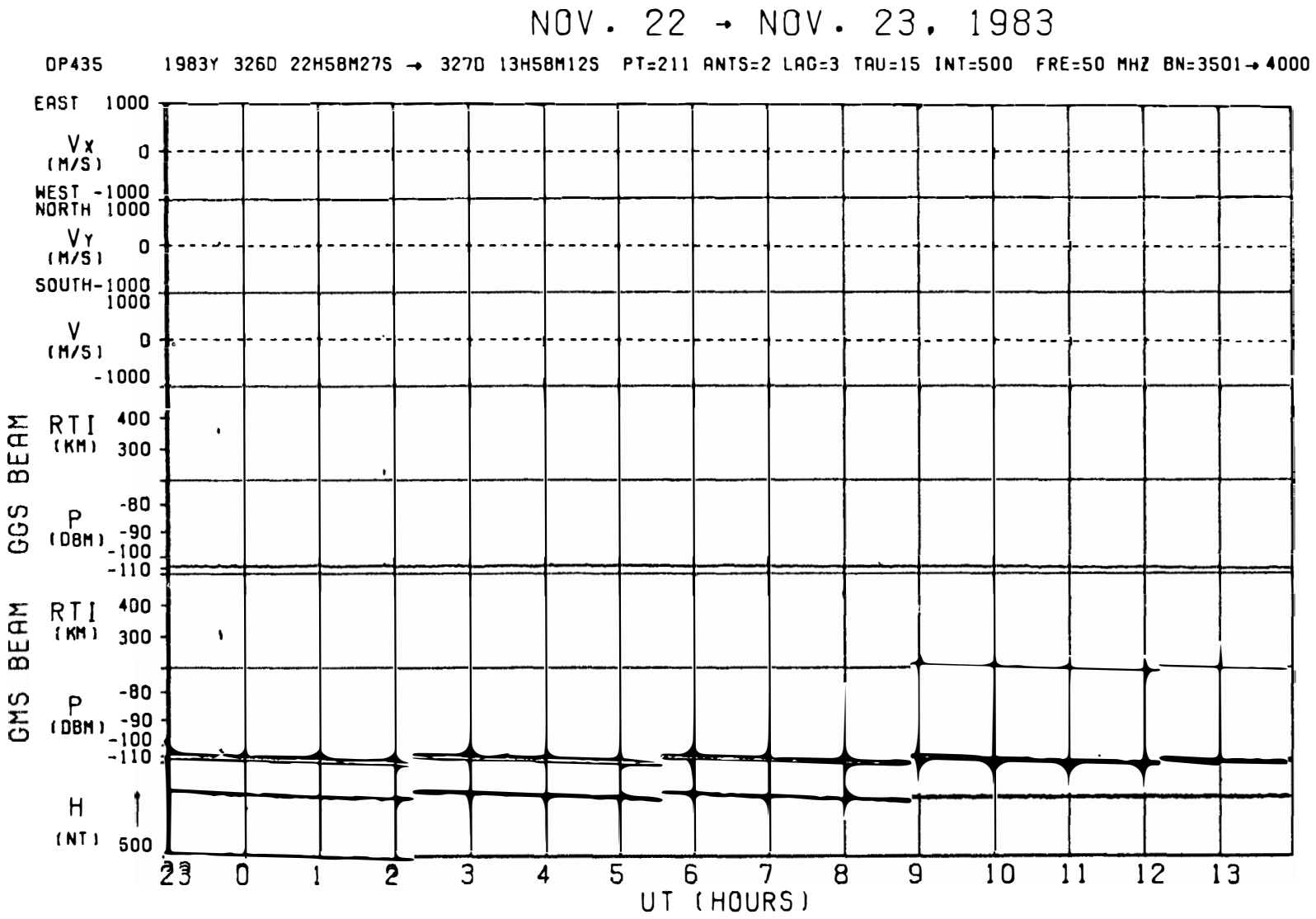
NOV. 22 → NOV. 23, 1983
DP435 1983Y 326D 22H58M27S → 327D 13H58M12S PT=211 ANTS=2 LAG=3 TAU=15 INT=500 FRE=50 MHZ BN=3501→4000
EAST 1000
Vx (M/S) 0
WEST -1000
NORTH 1000
Vy (M/S) 0
SOUTH-1000
1000
V (M/S) 0
-1000
GGS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
GMS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
H (NT) 500
23 0 1 2 3 4 5 6 7 8 9 10 11 12 13
UT (HOURS)

Fig. 2 (39).

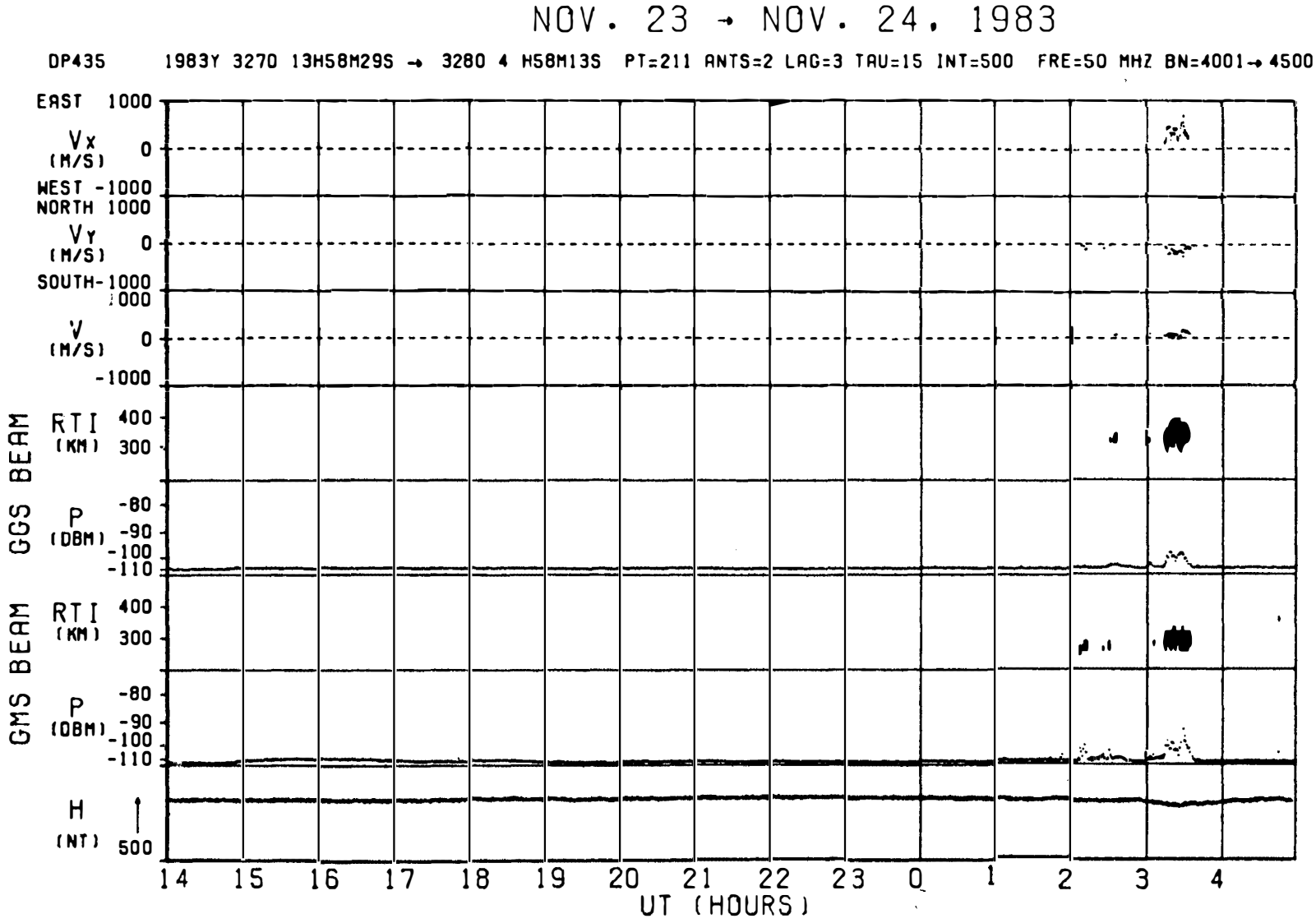
NOV. 23 → NOV. 24, 1983
DP435 1983Y 3270 13H58M29S → 3280 4 H58M13S PT=211 ANTS=2 LAG=3 TAU=15 INT=500 FRE=50 MHZ BN=4001→4500
EAST 1000
Vx (M/S) 0
WEST -1000
NORTH 1000
Vy (M/S) 0
SOUTH-1000
1000
V (M/S) 0
-1000
GGS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
GMS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
H (NT) 500
14 15 16 17 18 19 20 21 22 23 0 1 2 3 4
UT (HOURS)

Fig. 2 (40).

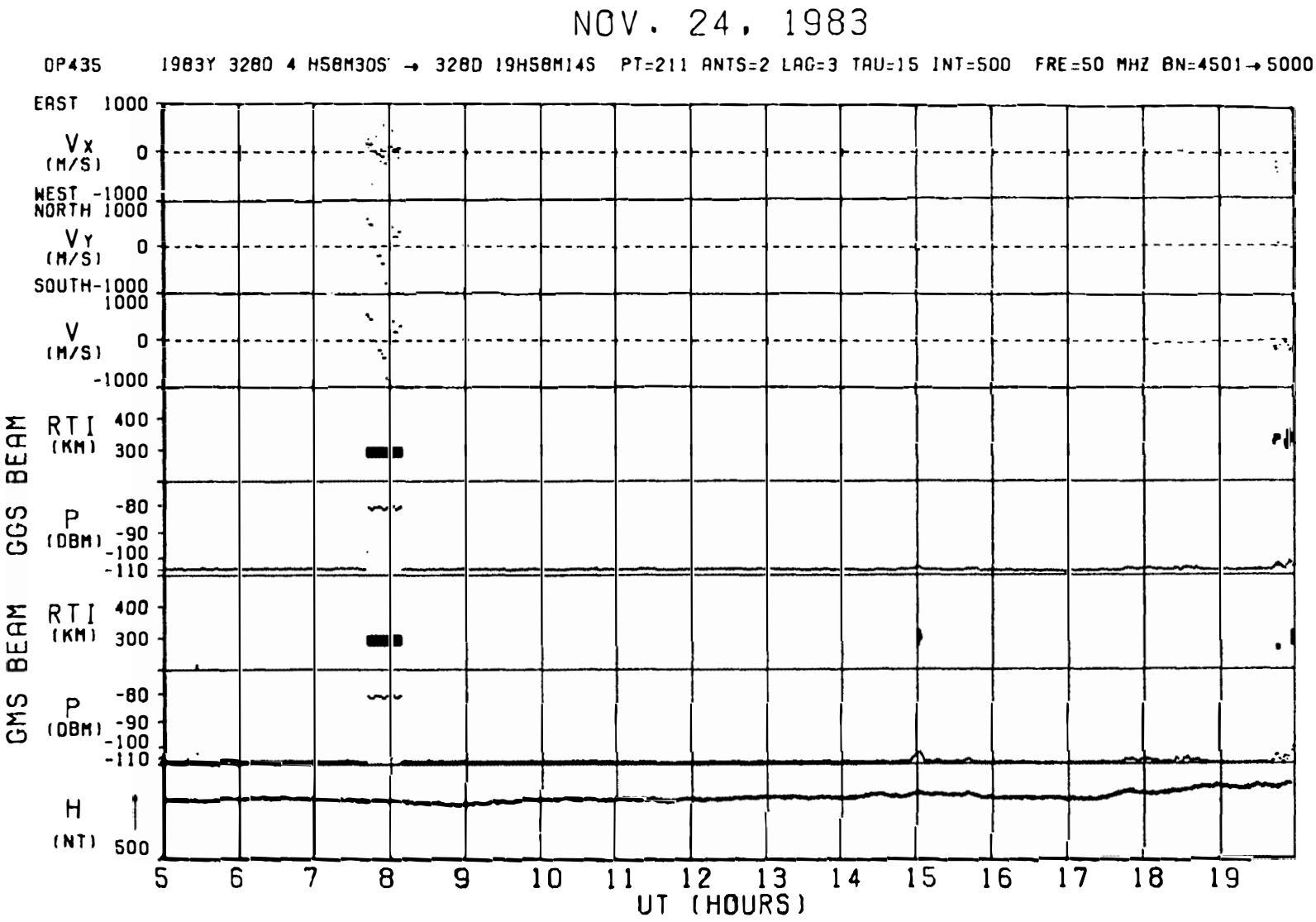
NOV. 24, 1983
OP435 1983Y 328D 4 H58M30S → 328D 19H58M14S PT=211 ANTS=2 LAG=3 TAU=15 INT=500 FRE=50 MHZ BN=4501→5000
EAST 1000
Vx (M/S) 0
WEST -1000
NORTH 1000
Vy (M/S) 0
SOUTH-1000
1000
V (M/S) 0
-1000
GCS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
GMS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
H (NT) 500
5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
UT (HOURS)

Fig. 2 (41).

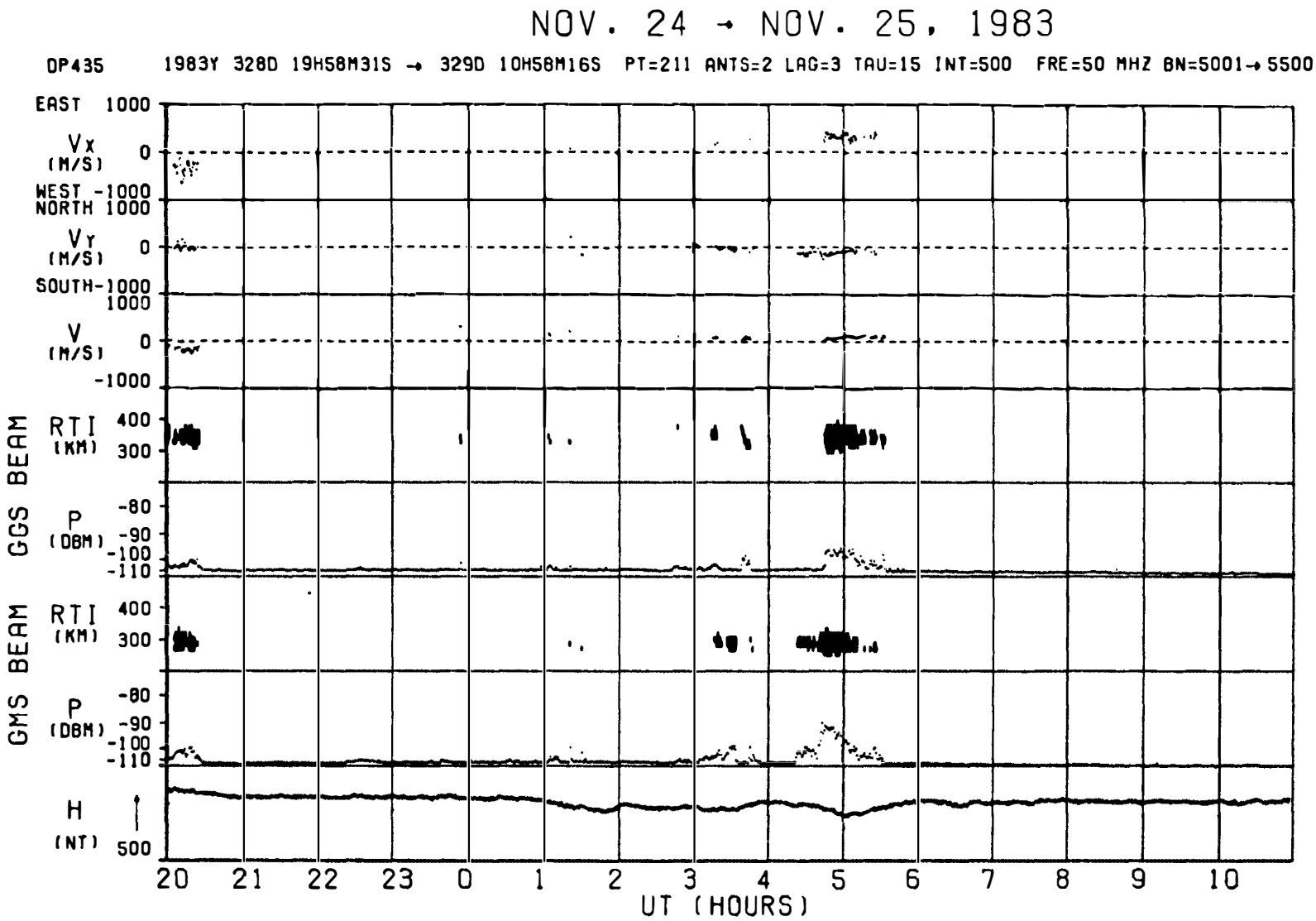
NOV. 24 → NOV. 25, 1983
DP435 1983Y 328D 19H58M31S → 329D 10H58M16S PT=211 ANTS=2 LAG=3 TAU=15 INT=500 FRE=50 MHZ BN=5001→5500
EAST 1000
Vx (M/S) 0
WEST -1000
NORTH 1000
Vy (M/S) 0
SOUTH-1000
1000
V (M/S) 0
-1000
GGS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
GMS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
H (NT) 500
20 21 22 23 0 1 2 3 4 5 6 7 8 9 10
UT (HOURS)

Fig. 2 (42).

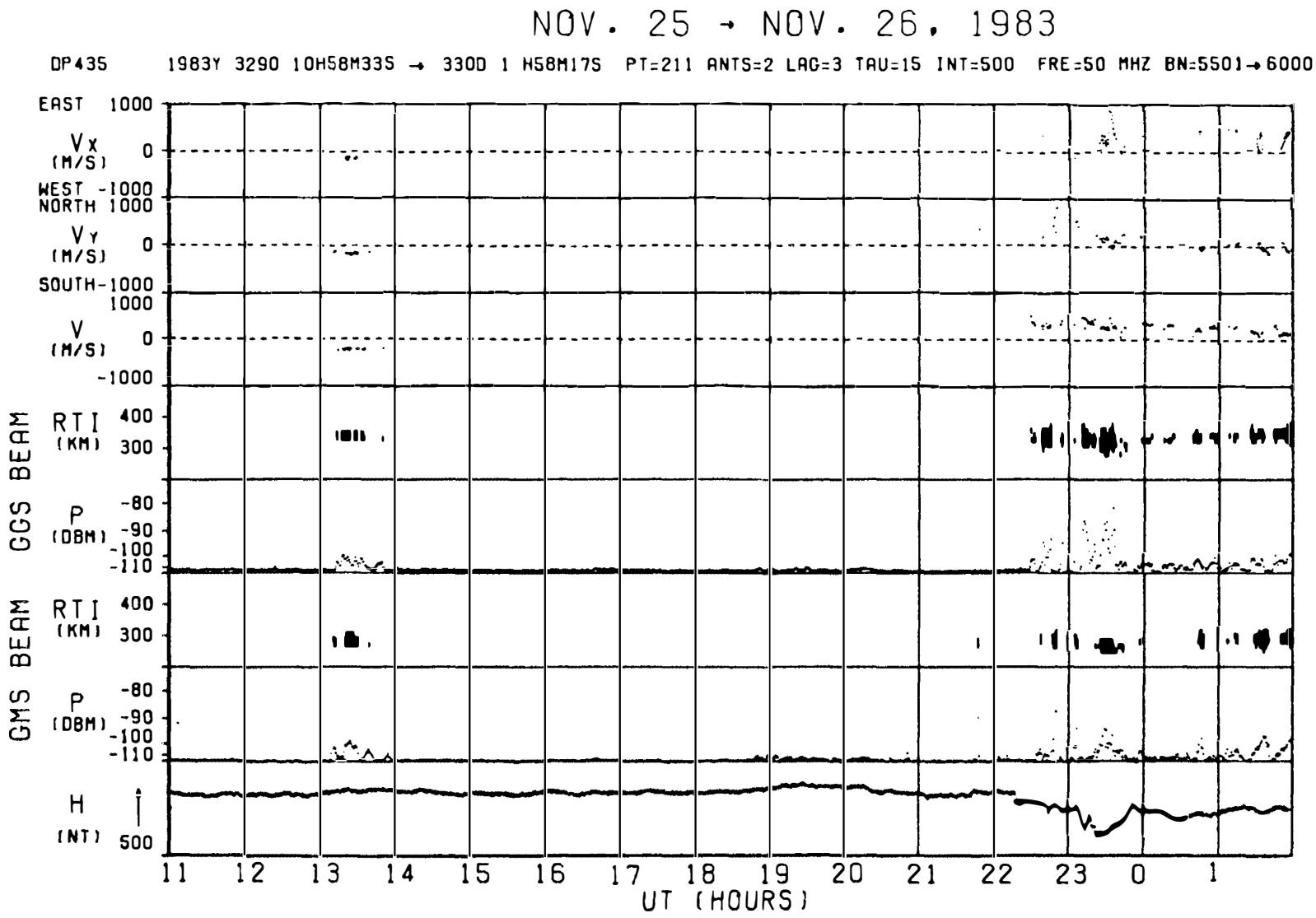
NOV. 25 → NOV. 26, 1983
DP435 1983Y 329D 10H58M33S → 330D 1 H58M17S PT=211 ANTS=2 LAG=3 TAU=15 INT=500 FRE=50 MHZ BN=5501→6000
EAST 1000
Vx (M/S) 0
WEST -1000
NORTH 1000
Vy (M/S) 0
SOUTH-1000
1000
V (M/S) 0
-1000
GMS BEAM CGS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
H (NT) 500
11 12 13 14 15 16 17 18 19 20 21 22 23 0 1
UT (HOURS)

Fig. 2 (43).

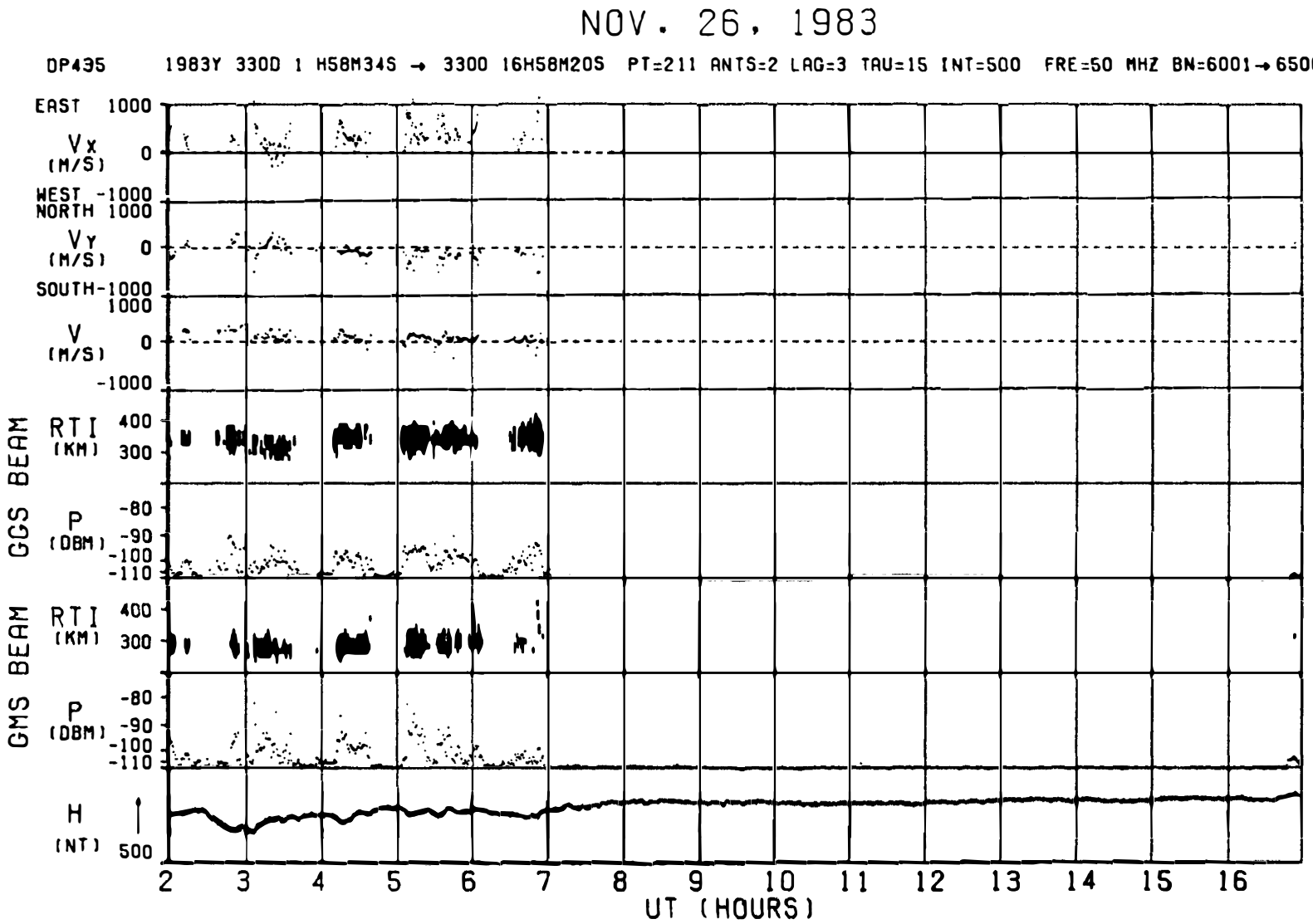
NOV. 26, 1983
DP435 1983Y 330D 1 H58M34S → 3300 16H58M20S PT=211 ANTS=2 LAG=3 TAU=15 INT=500 FRE=50 MHZ BN=6001→6500
EAST 1000
Vx (M/S) 0
WEST -1000
NORTH 1000
Vy (M/S) 0
SOUTH-1000
1000
V (M/S) 0
-1000
GCS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
GMS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
H (NT) 500
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
UT (HOURS)

Fig. 2 (44).

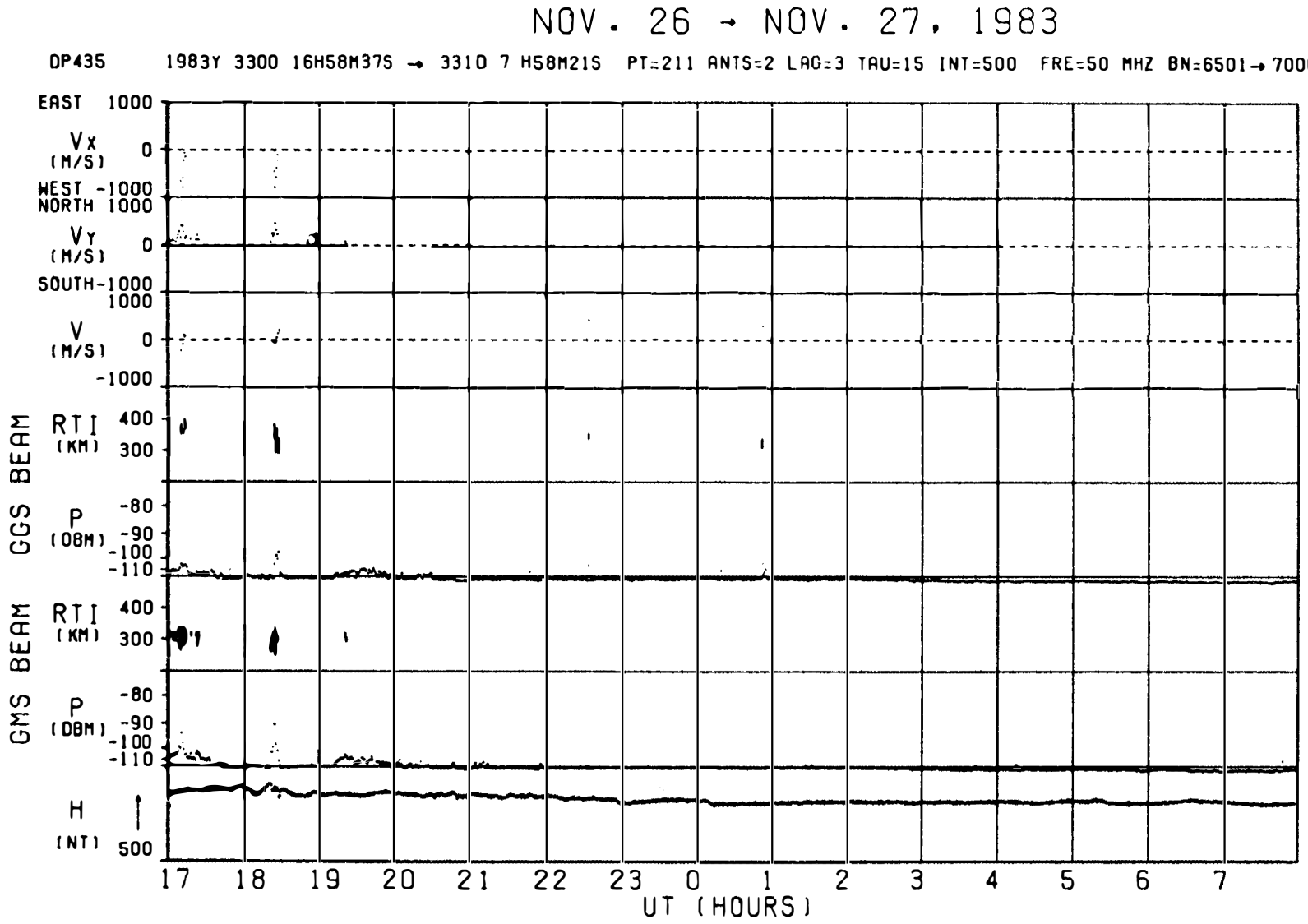
NOV. 26 → NOV. 27, 1983
DP435 1983Y 3300 16H58M37S → 3310 7 H58M21S PT=211 ANTS=2 LAG=3 TAU=15 INT=500 FRE=50 MHZ BN=6501→7000
EAST 1000
Vx (M/S) 0
WEST -1000
NORTH 1000
Vy (M/S) 0
SOUTH-1000
1000
V (M/S) 0
-1000
GGS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
GMS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
H (NT) 500
17 18 19 20 21 22 23 0 1 2 3 4 5 6 7
UT (HOURS)

Fig. 2 (45).

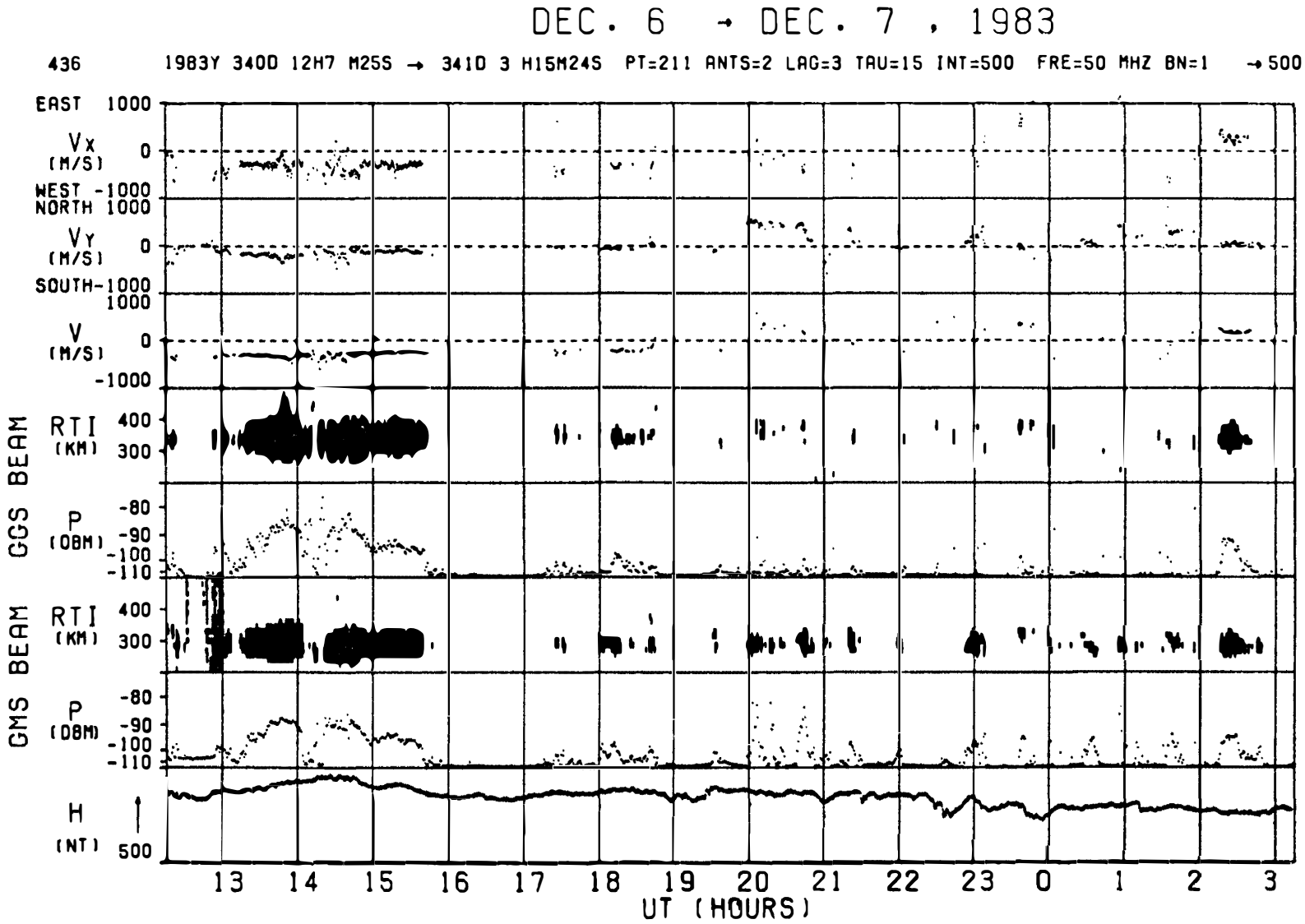
DEC. 6 → DEC. 7 , 1983
436 1983Y 340D 12H7 M25S → 341D 3 H15M24S PT=211 ANTS=2 LAG=3 TAU=15 INT=500 FRE=50 MHZ BN=1 →500
EAST 1000
Vx (M/S) 0
WEST -1000
NORTH 1000
Vy (M/S) 0
SOUTH-1000
1000
V (M/S) 0
-1000
GGS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
GMS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
H (NT) 500
13 14 15 16 17 18 19 20 21 22 23 0 1 2 3
UT (HOURS)

Fig. 2 (46).

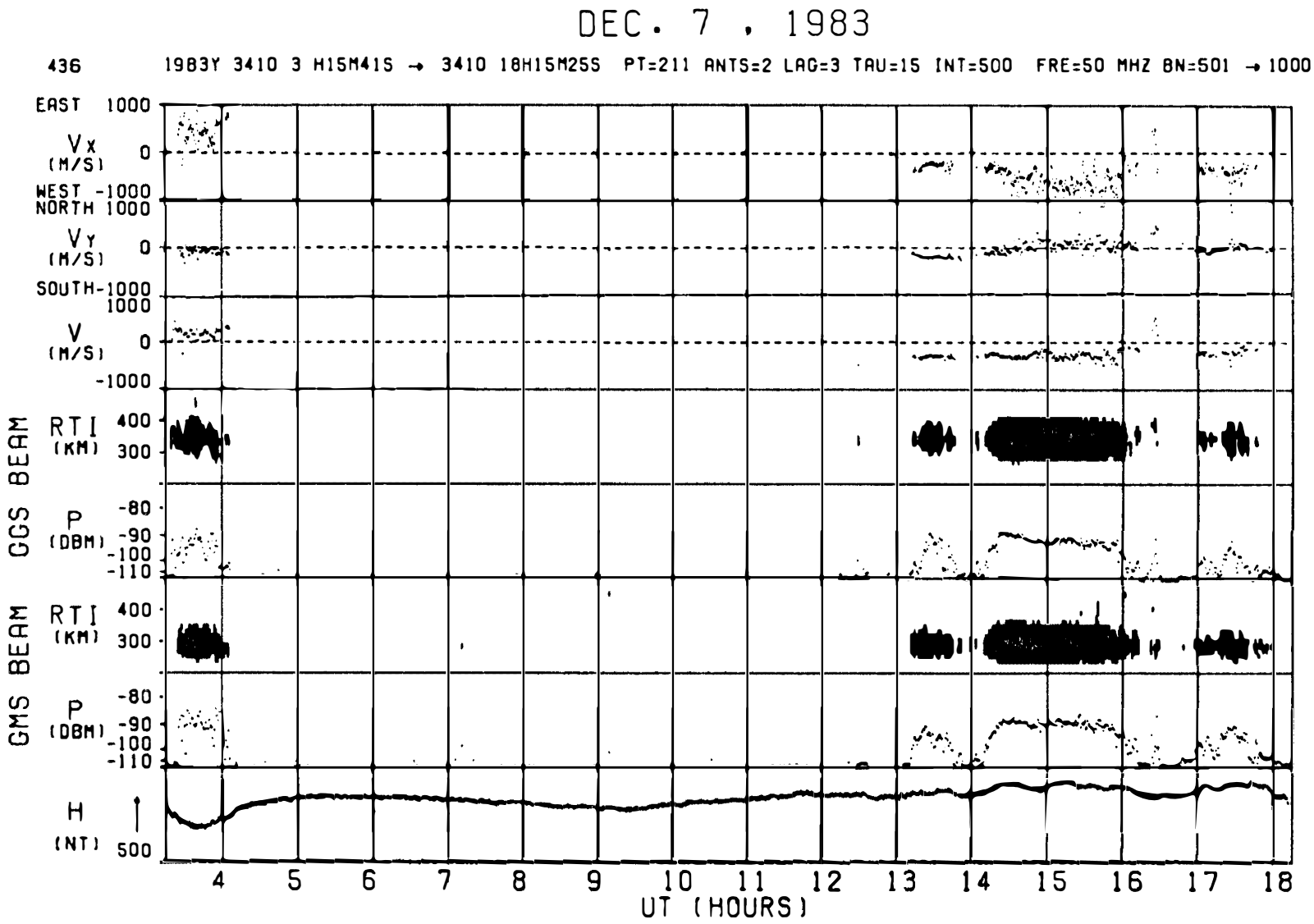
DEC. 7 , 1983
436 1983Y 3410 3 H15M41S → 3410 18H15M25S PT=211 ANTS=2 LAG=3 TAU=15 INT=500 FRE=50 MHZ BN=501 → 1000
EAST 1000
Vx (M/S) 0
WEST -1000
NORTH 1000
Vy (M/S) 0
SOUTH-1000
1000
V (M/S) 0
-1000
GGS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
GMS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
H (NT) 500
4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
UT (HOURS)

Fig. 2 (47).

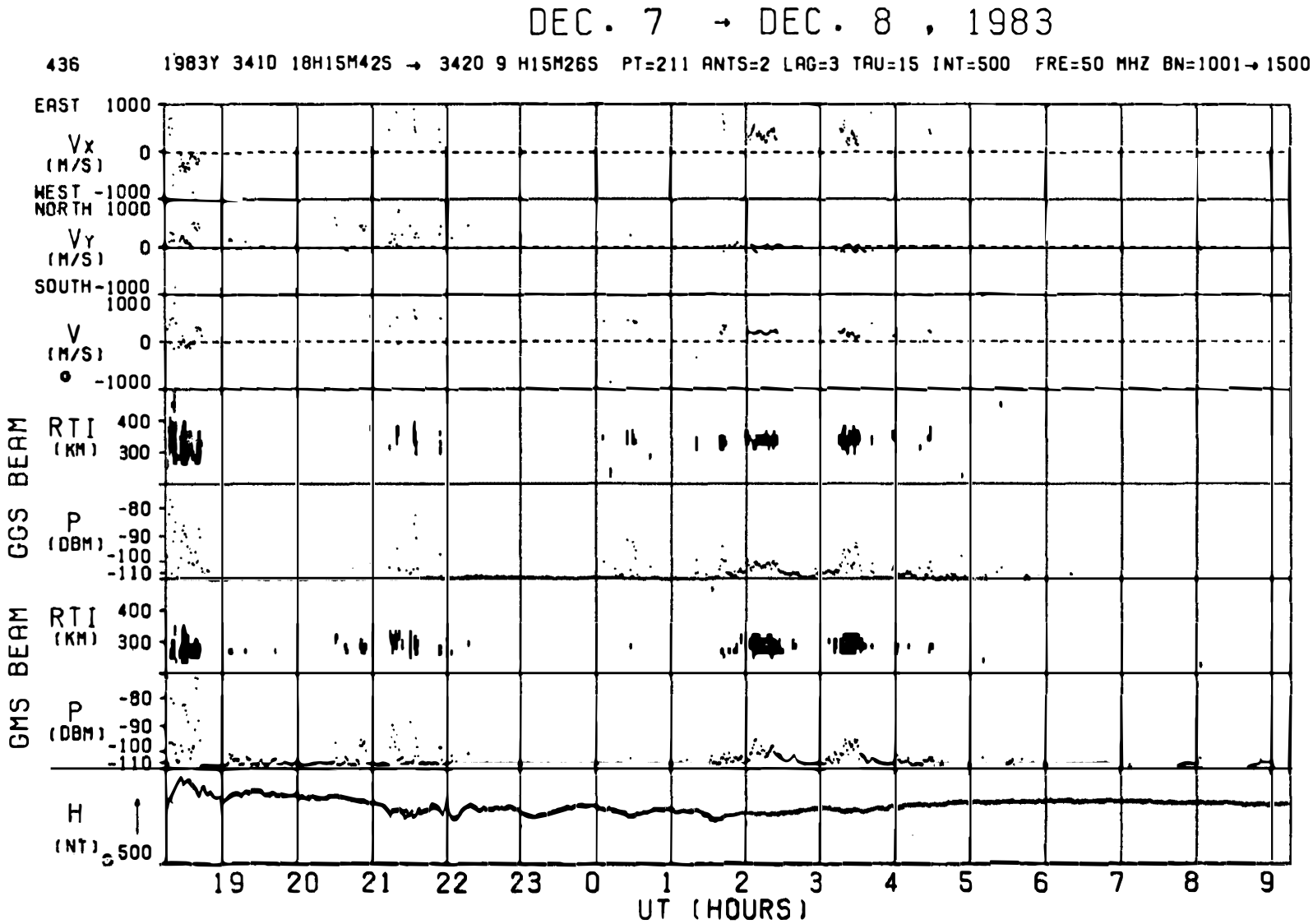
DEC. 7 → DEC. 8 , 1983
436 1983Y 341D 18H15M42S → 342D 9 H15M26S PT=211 ANTS=2 LAG=3 TAU=15 INT=500 FRE=50 MHZ BN=1001→1500
EAST 1000
Vx (M/S) 0
WEST -1000
NORTH 1000
Vy (M/S) 0
SOUTH -1000
1000
V (M/S) 0
-1000
GGS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
GMS BEAM
RTI (KM) 400 300
P (DBM) -80 -90 -100 -110
H (NT) 500
19 20 21 22 23 0 1 2 3 4 5 6 7 8 9
UT (HOURS)

Fig. 2 (48).