

RECORDS OF RADIO AURORA AT SYOWA STATION,
ANTARCTICA IN 1995 and 1996

Koji INAMORI, Kazuhiro OHTAKA and Kiyoshi IGARASHI
(Communications Research Laboratory, Koganei-shi, Tokyo 184)

1. Introduction

This report presents a summary of data obtained in the period from February 1995 to January 1996 with the auroral radar at Syowa Station, Antarctica.

Two kinds of data are available: a) chart records of the time variation of echo intensity and b) digital records of echo intensity and doppler velocity.

Inquiries about the data should be addressed to:

Antarctic Research Section
Communications Research Laboratory (CRL)
Ministry of Posts and Telecommunications
2-1, Nukui-Kitamachi 4-chome, Koganei-shi
Tokyo 184, Japan

TEL:+81-423-27-6886, FAX:+81-423-27-7618, e-mail: ichinose@crl.go.jp

2. Location

Syowa Station			
Geographic		Geomagnetic	
Latitude (Deg.)	Longitude (Deg.)	Latitude (Deg.)	Longitude (Deg.)
69.00 S	39.58 E	-70.13	82.04

3. Observers

Koji INAMORI and Kazuhiro OHTAKA (Communications Research Laboratory)

4. Equipment

The main parameters of the auroral radar at Syowa Station are shown in Table 1 (Igarashi *et al.*, 1996). In 1995 a new scanning-beam VHF auroral radar (50 MHz) was installed at Syowa Station. Five transmitting antennas, each having an azimuthal beam width of about 30 degrees, cover a wide area of about 160 degrees in azimuth. The outputs from four 5 kW solid-state power amplifiers are combined so that finally 20 kW peak power is available. Five Yagi antennas are switched, depending on the covered region of transmitting beam pattern. The receiving beam direction is scanned in 5 degree step by using two sets of array antennas with beam width of about five degree. The beam direction and observation region can be varied from one observed object to another. A plasma convection pattern is available every several minutes. Another auroral radar is operated at the frequency 112 MHz and antenna beam direction is fixed to the geomagnetic south. The specification of this radar is shown in the reference paper (Igarashi *et al.*, 1982).

Table 1. Specifications of the 50 MHz VHF auroral radar at Syowa Station

Site	Syowa Station (69°00' S, 39°35' E)
Type	Coherent pulse radar
Frequency	50.0 MHz
Peak power	20 kW
Pulse width	100 μ s (typical)
Pulse repetition frequency	50 Hz
Transmitting pulse pattern	Double pulse
Transmitting antenna	5 sets of 8 element Yagi antenna
Receiving antenna	Two sets of sixteen Yagi array antenna
Receiving beam width	5 degrees
Receiver bandwidth	10 kHz (typical)
Beam cover region	\pm 80 degrees in azimuth (directed toward geomagnetic south)
Signal processing	Intel 386 (16 MHz) class PC with DPS board
Data recording	Digital recording with 3.5 inch MO, and chart recording of echo intensity

5. Explanation of Diagrams

Backscattered power intensities observed with the 50 MHz and 112 MHz auroral radar were sampled every 1 second and stored by a digital data logger and plotted by a chart recorder. A series of figures show selected correlation plots of radio auroral intensities, magnetogram and riometer.

Another color plot shows RTI (Range Time Intensity) plots along the beam directed to 35 degree and 135 degree clockwise from the geomagnetic north direction. Echo intensity is recorded with 12 bit A/D converter. Color scale shows intensity. These digital data is available in the following periods.

Year	Month	Day
1996	September	1, 2, 3, 4, 5, 7, 8, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 29, 30
1996	October	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 17, 18, 19, 20, 23, 24
1996	November	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30
1996	December	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31
1997	January	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, 16, 17, 18

References

- Igarashi, K., Ogawa, T., Ose, M., Fujii, R. and Hirasawa, T. (1982): A new VHF Doppler radar experiment at Syowa Station, Antarctica. Mem. Natl Inst. Polar Res., Spec. Issue, 22, 258-267.
- Igarashi, K., Ohtaka, K., Kunitake, M., Tanaka, T. and Ogawa, T. (1995): Development of scanning-beam VHF auroral radar system (extended abstract). Proc. NIPR Symp. Upper Atmos. Phys., 8, 65-69.

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
(cont)				

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

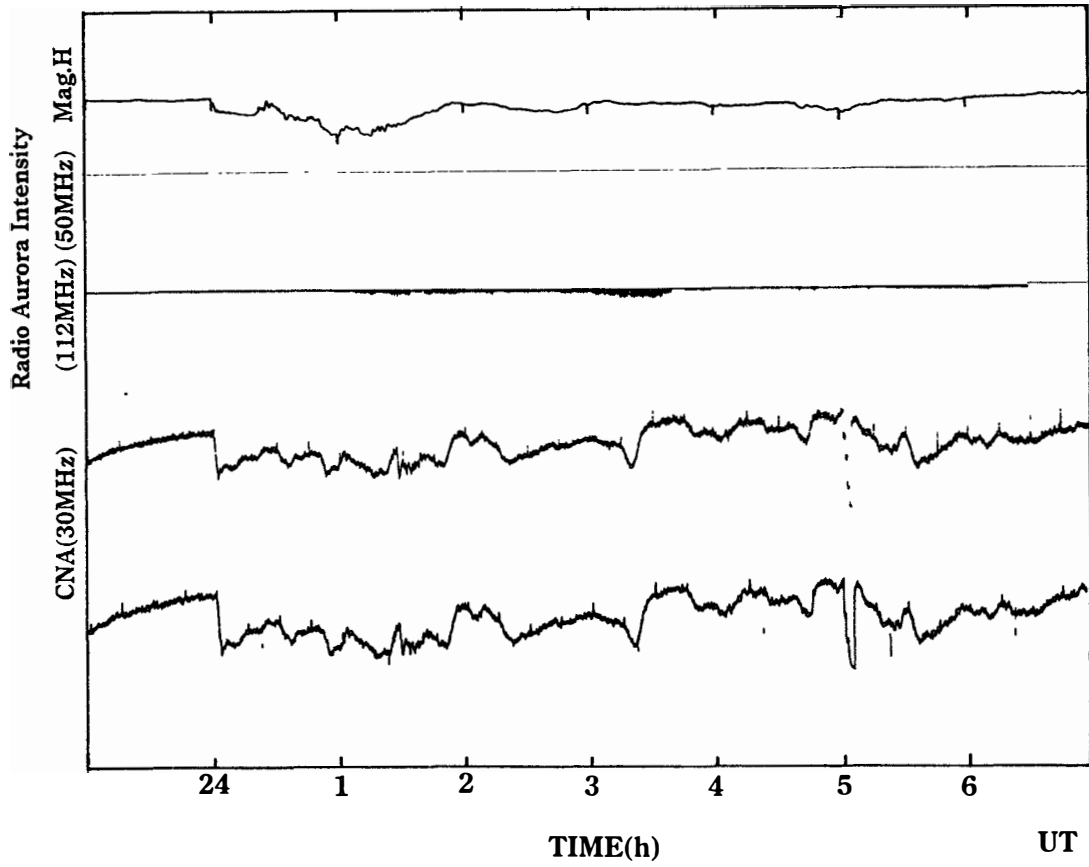
Observing Period	Observers	Literature		
		JARE Data Reports		
		Volume	Pages	Year
1982	Igarashi, K Kuratani, Y	88 (Ionosphere 30)	28	1984
1983	Igarashi, K. Tanaka, T Yamazaki, I.	100 (Ionosphere 32)	64	1985
1984	Igarashi, K Tanaka, T. Yamamoto, S.	113 (Ionosphere 34)	33	1986
1985	Igarashi, K. Maeno, 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
1989	Maeno, H. Yamamoto, S.	167 (Ionosphere 43)	42	1991
1990	Ohtaka, K. Igarashi, K.	175 (Ionosphere 46)	34	1992
1991	Nozaki, K. Igarashi, K.	188 (Ionosphere 48)	25	1993
1992	Kamata, M. Igarashi, K.	195 (Ionosphere 51)	151	1994
(cont.)				

Bibliography relevant to
 RECORDS OF RADIO AURORA AT SYOWA STATION, ANTARCTICA (3)

Observing Period	Observers	Literature		
		JARE Data Reports		
		Volume	Pages	Year
1993 1994	Yamaguchi, T. Iwasaki, K Igarashi, K	220 (Ionosphere 57)	18	1996

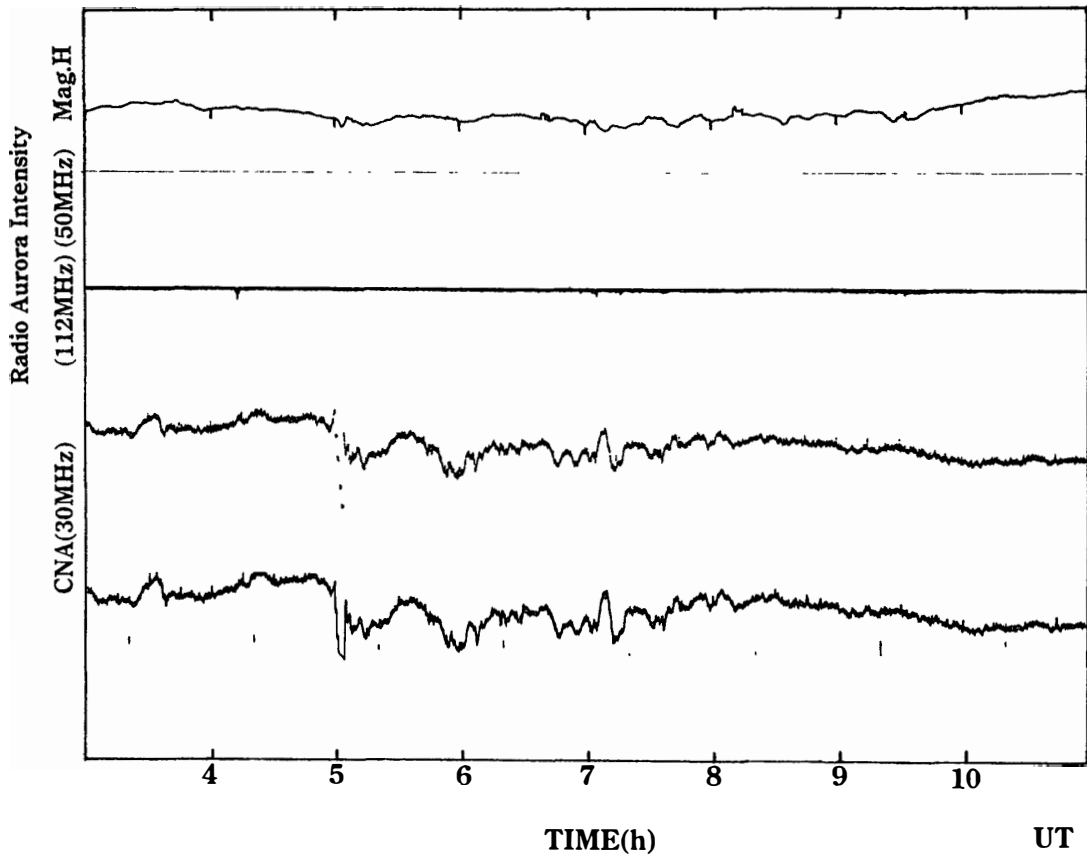
Syowa Station Auroral Radar

February 3. 1995



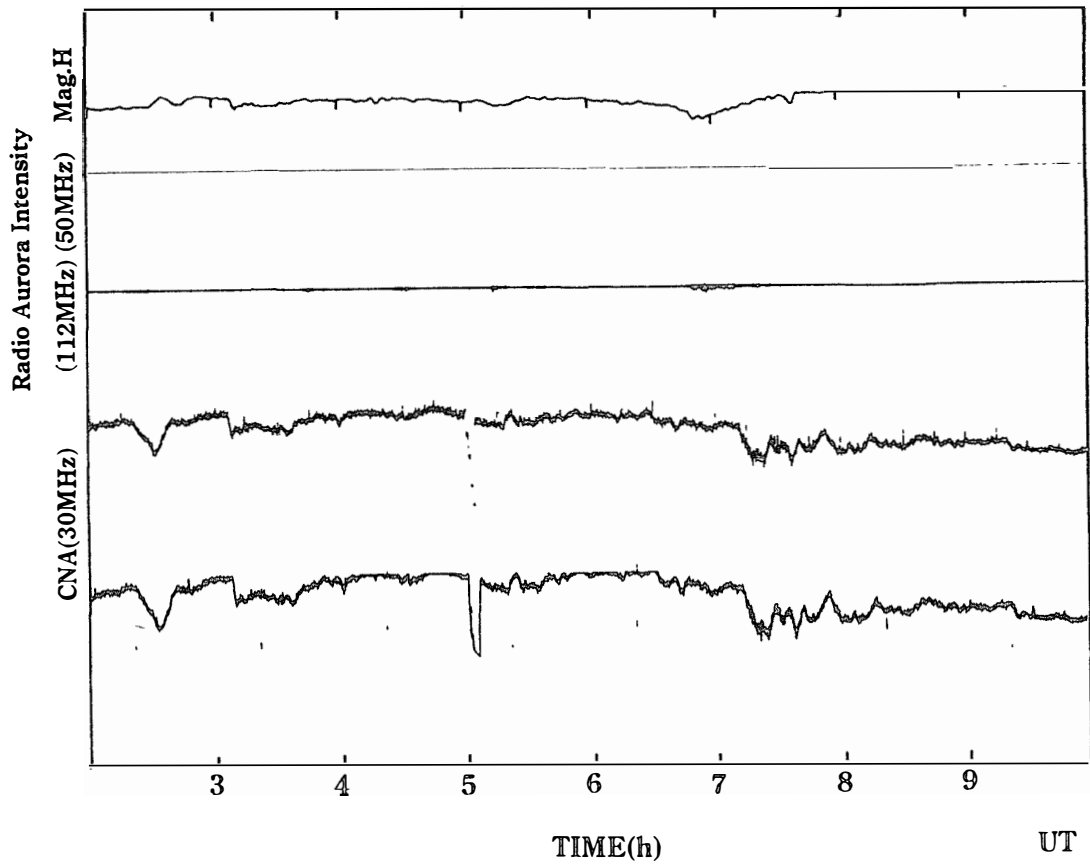
Syowa Station Auroral Radar

February 8. 1995



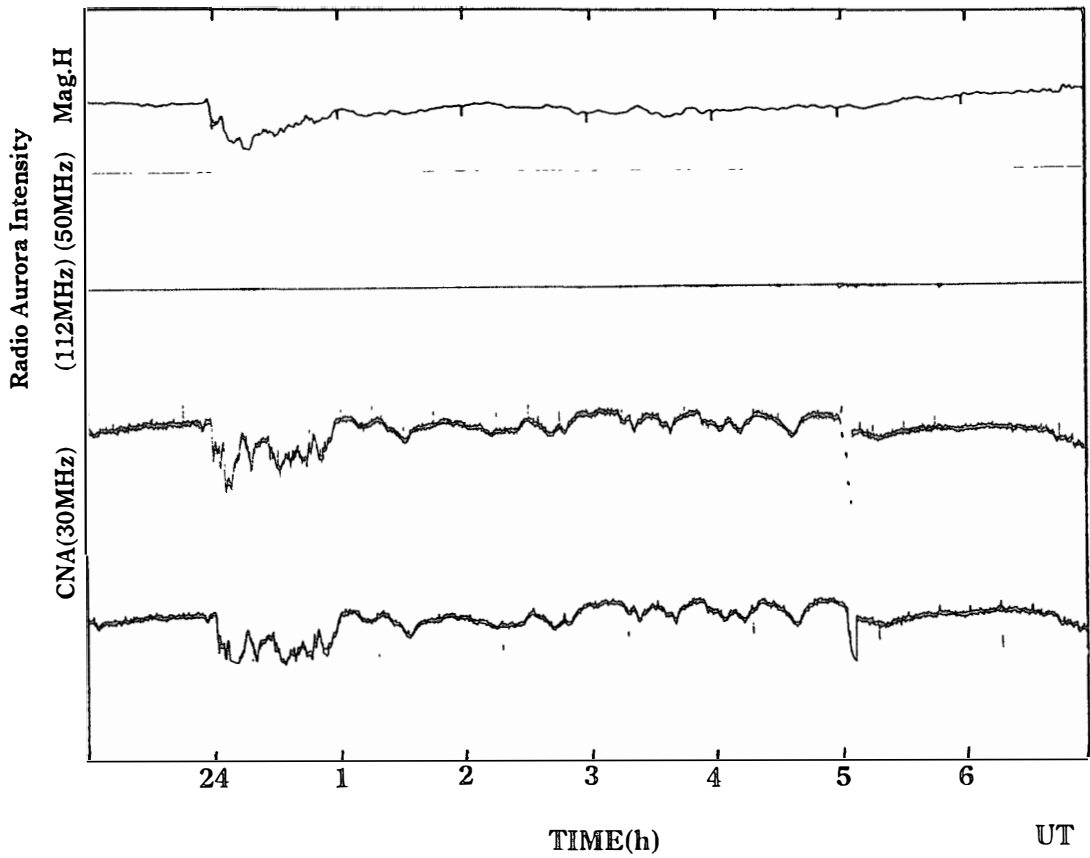
Syowa Station Auroral Radar

February 13. 1995



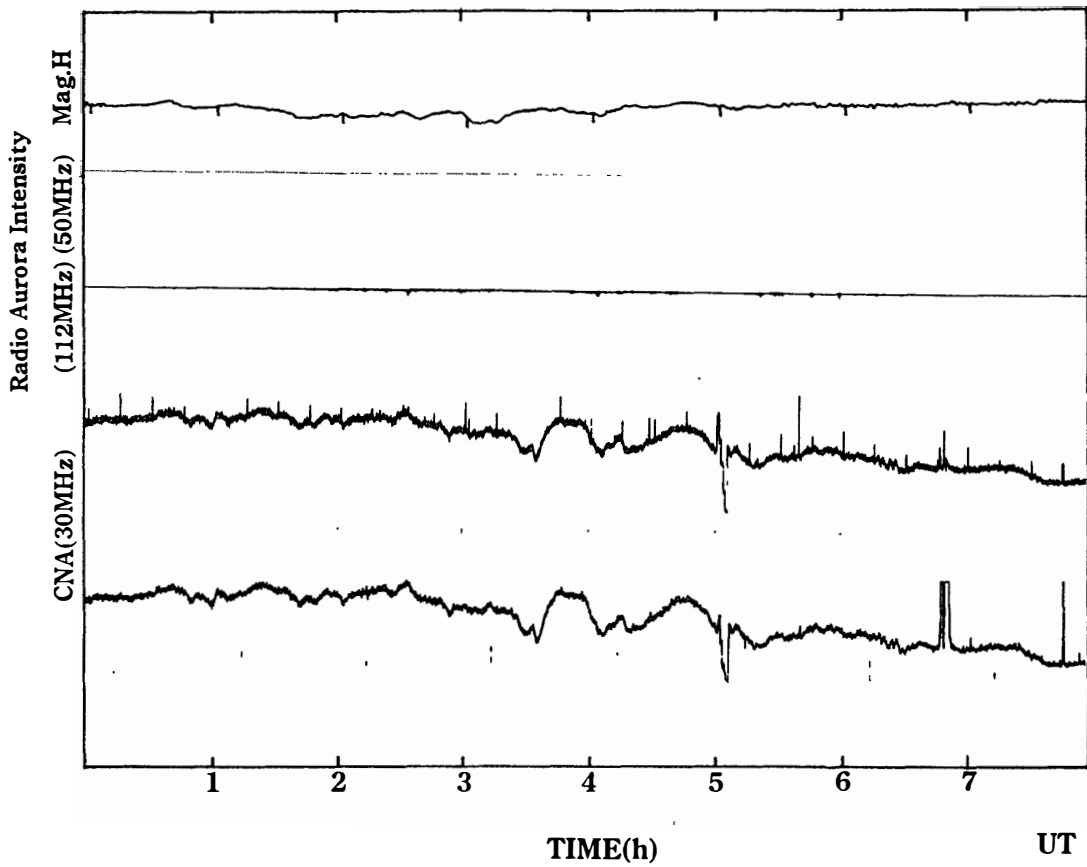
Syowa Station Auroral Radar

March 9. 1995



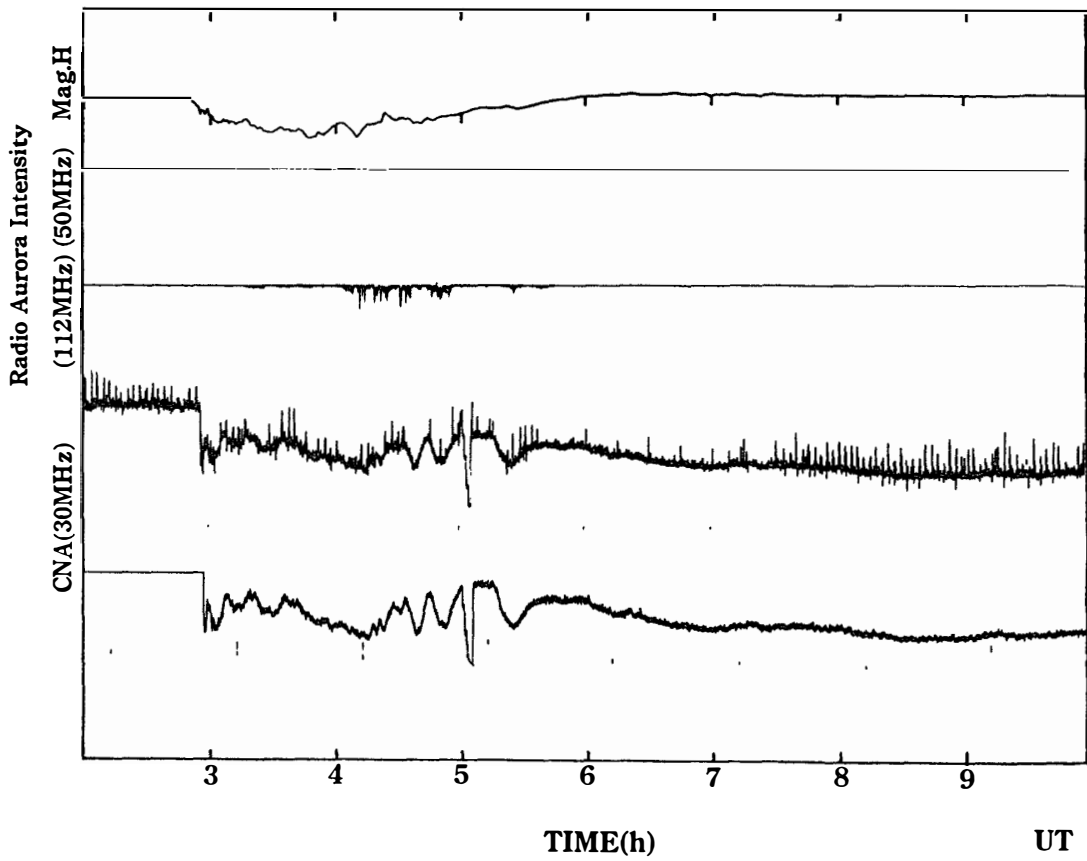
Syowa Station Auroral Radar

March 29. 1995



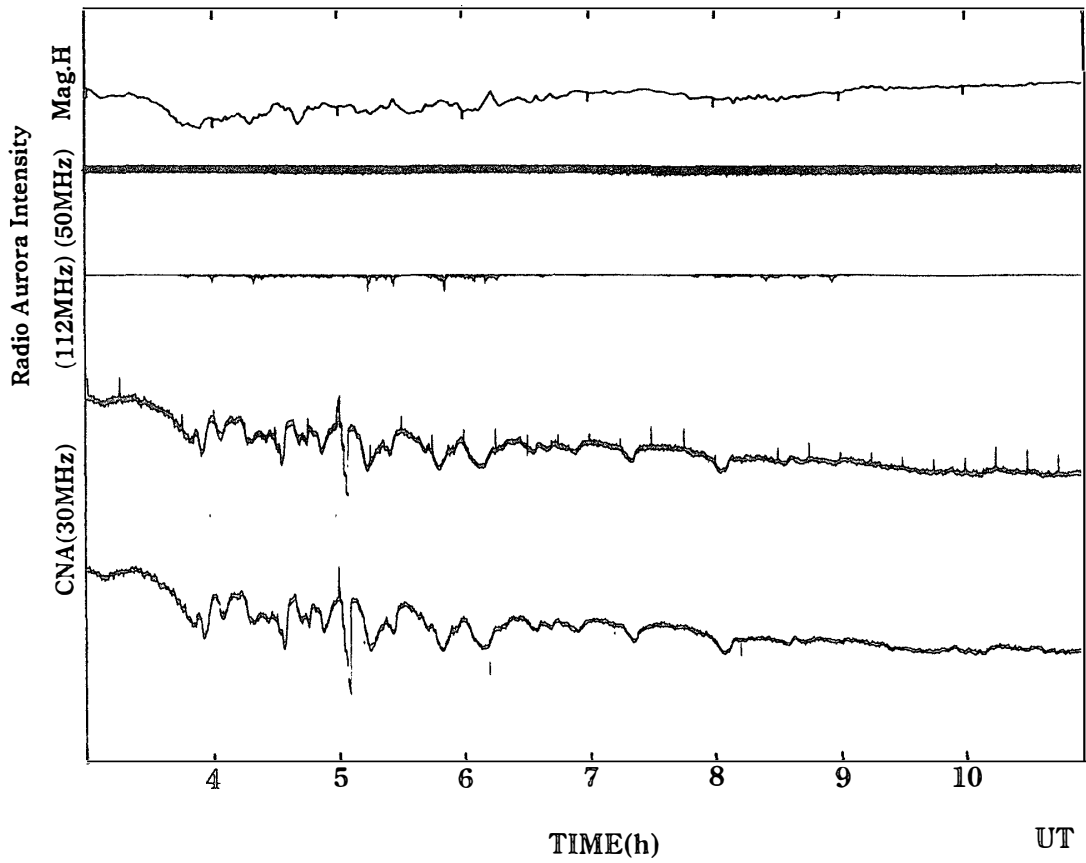
Syowa Station Auroral Radar

April 2. 1995



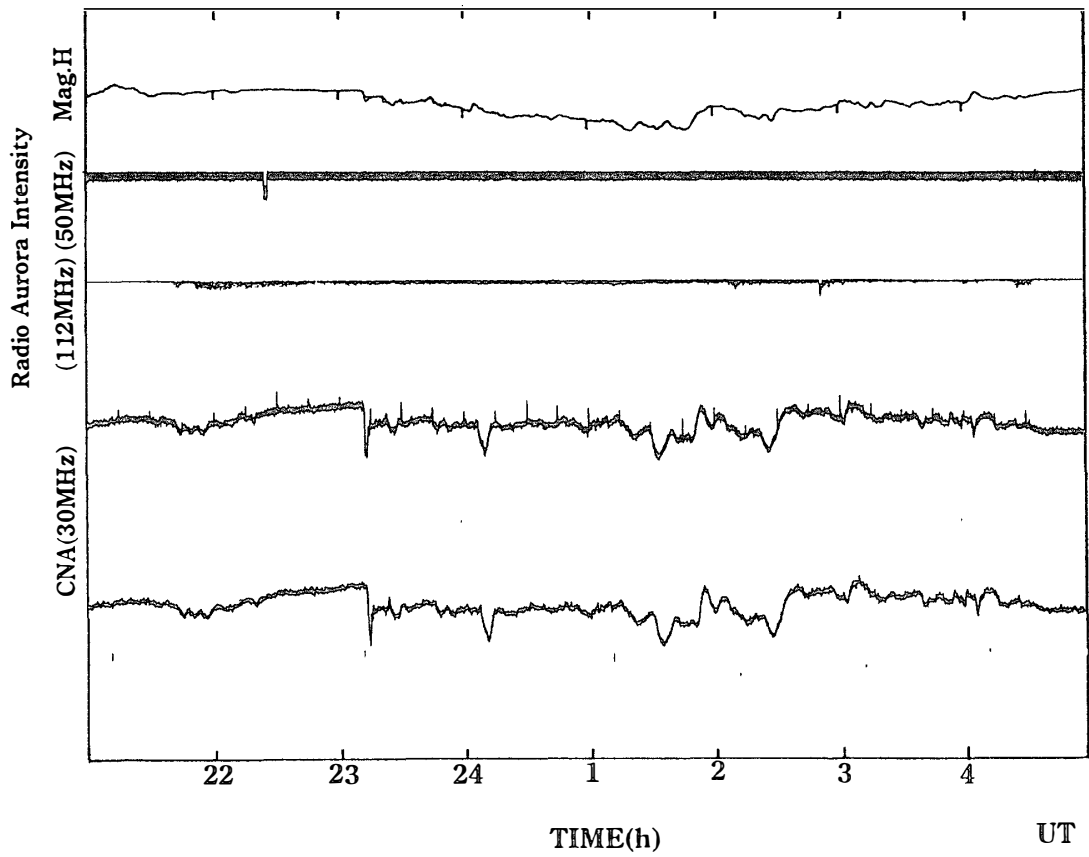
Syowa Station Auroral Radar

April 7. 1995



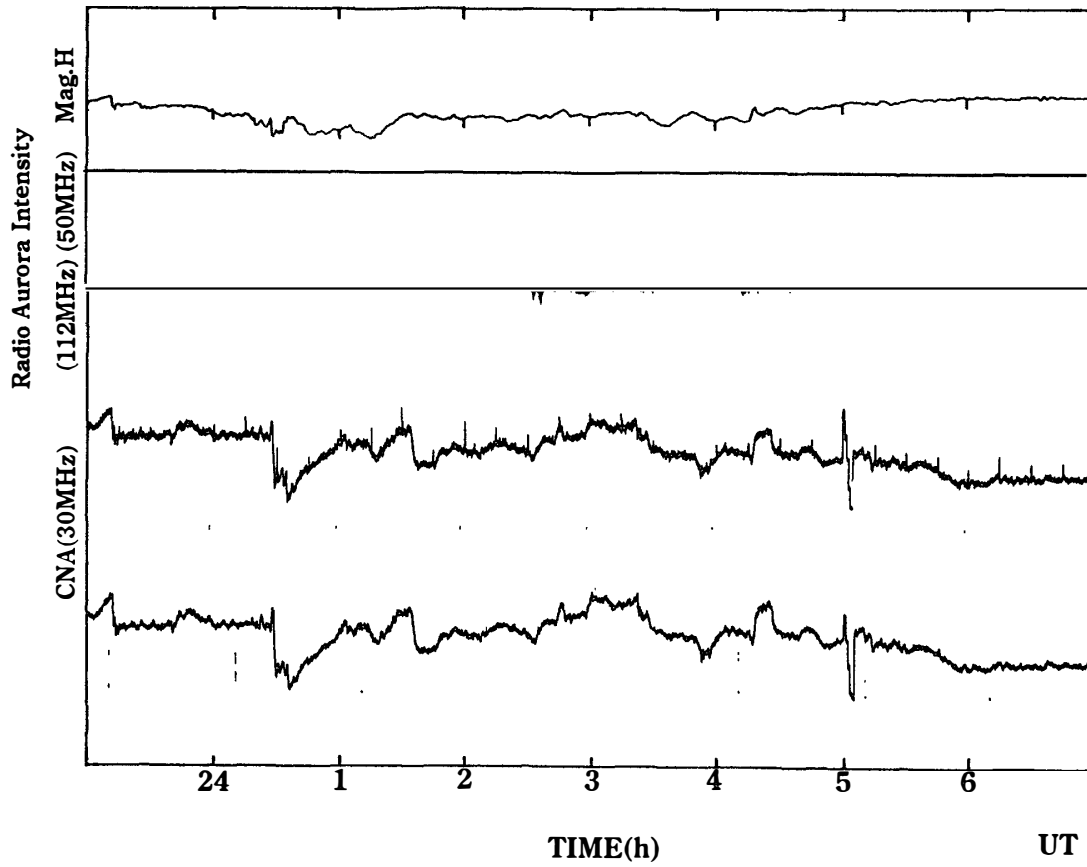
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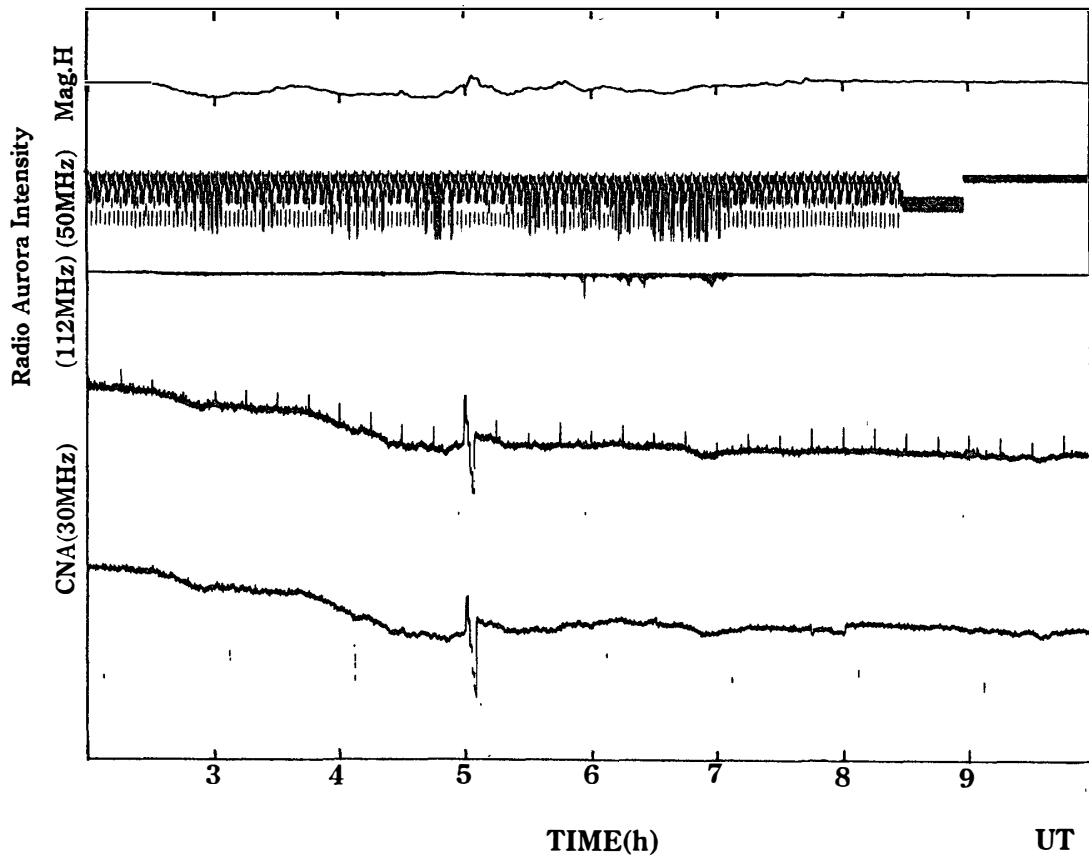
Syowa Station Auroral Radar

April 11. 1995



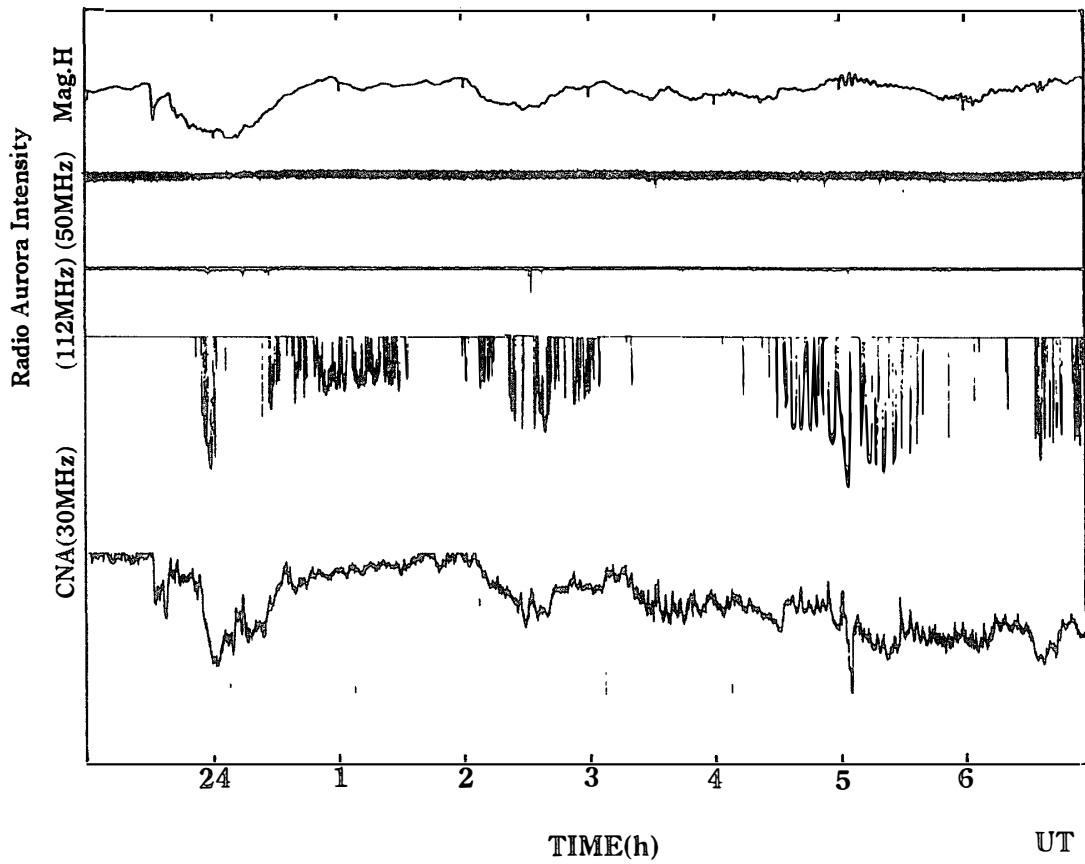
Syowa Station Auroral Radar

May 2. 1995



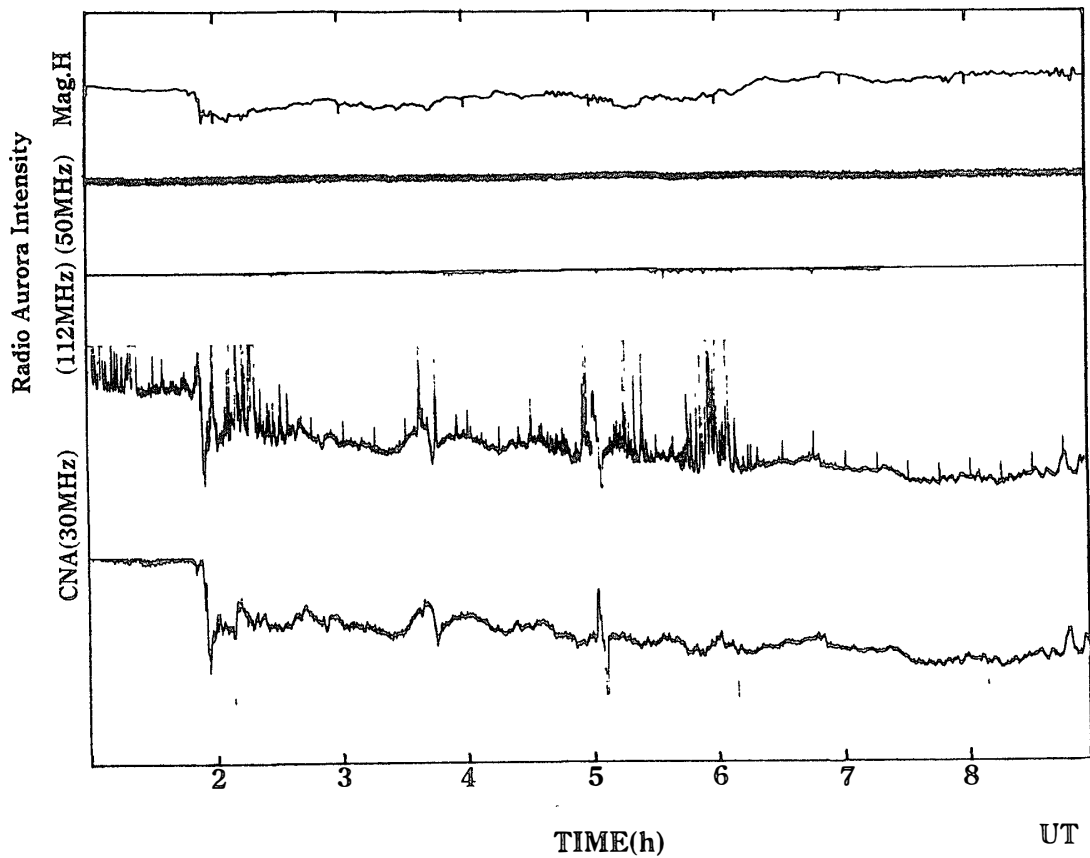
Syowa Station Auroral Radar

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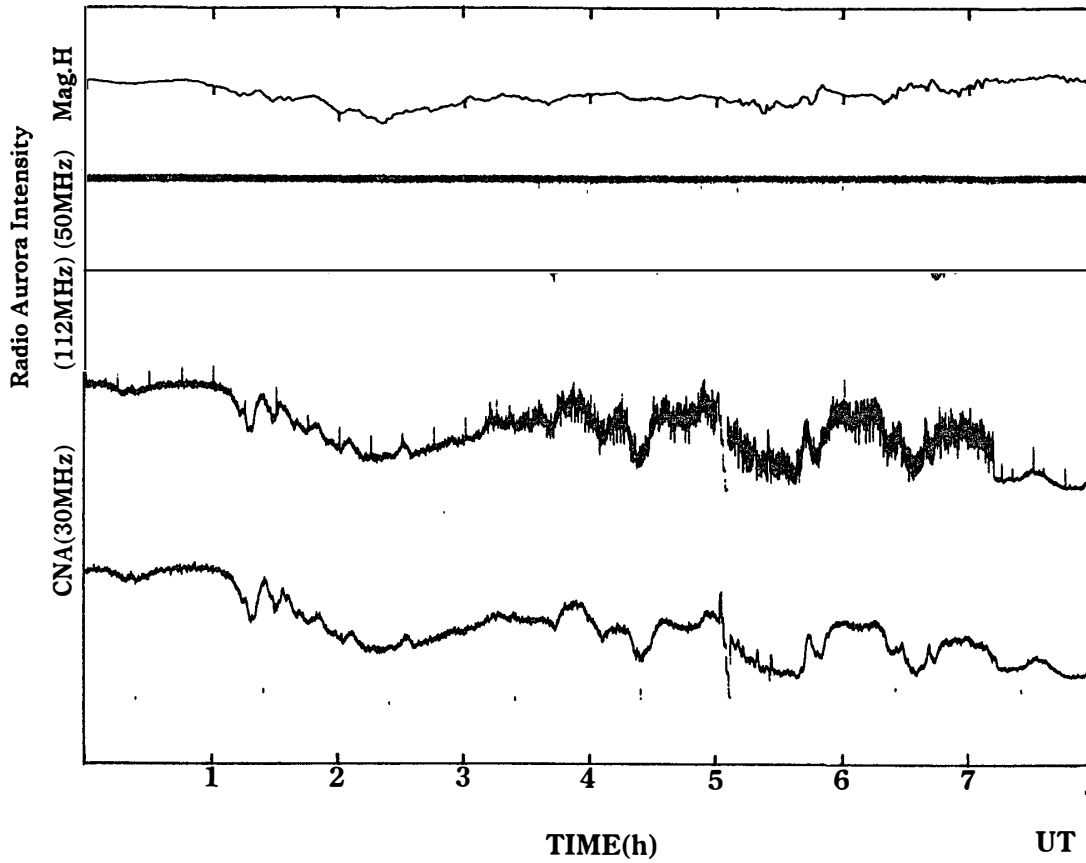
Syowa Station Auroral Radar

May 4. 1995



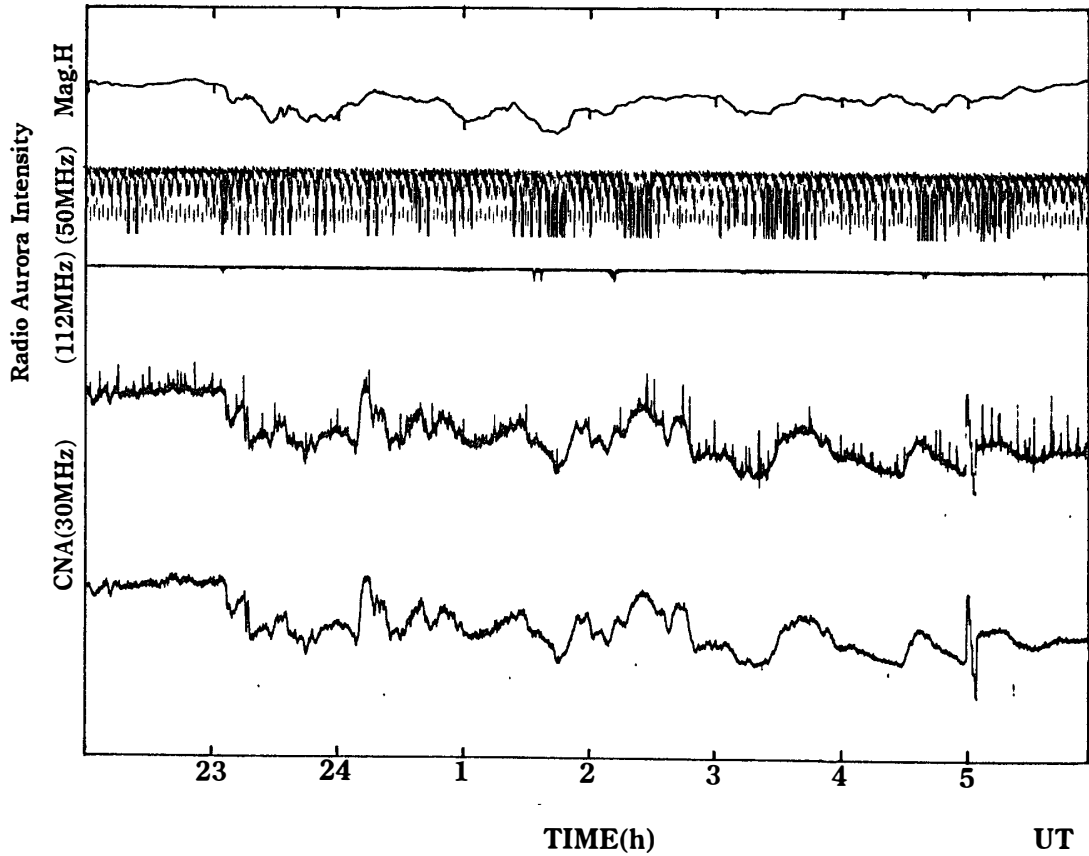
Syowa Station Auroral Radar

May 5. 1995



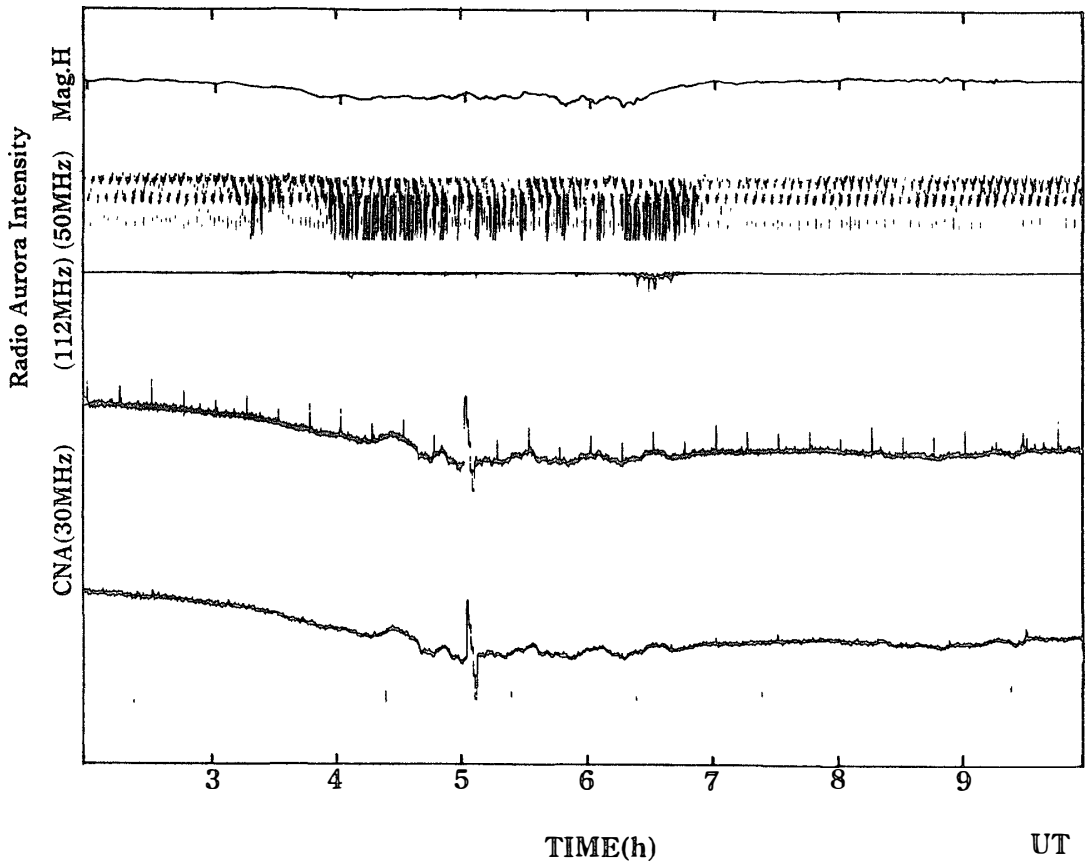
Syowa Station Auroral Radar

May 7. 1995



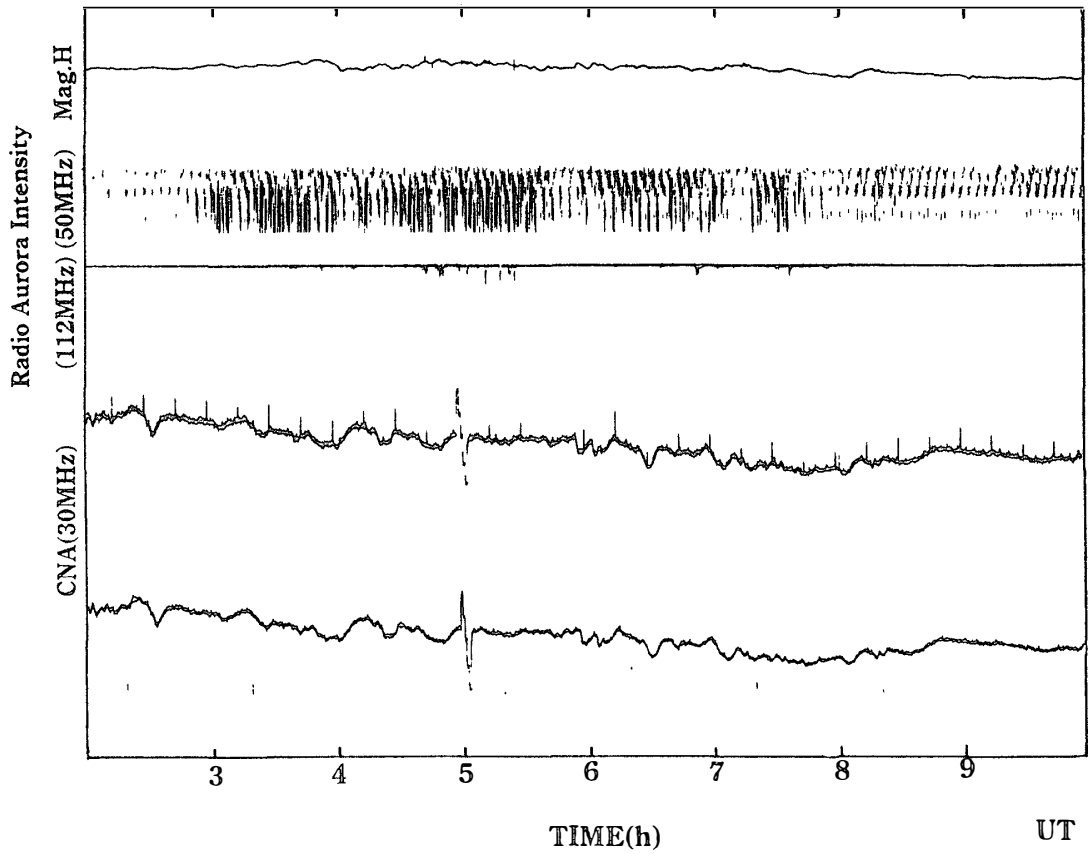
Syowa Station Auroral Radar

May 16. 1995



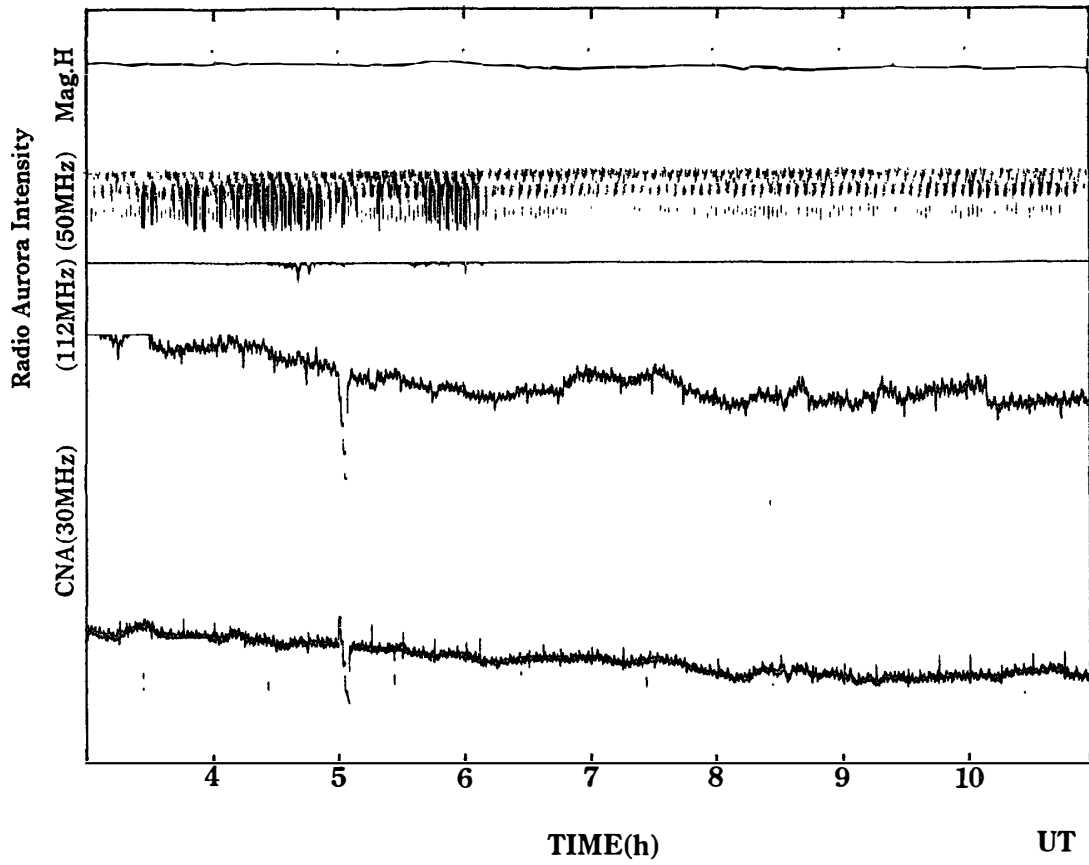
Syowa Station Auroral Radar

May 17. 1995



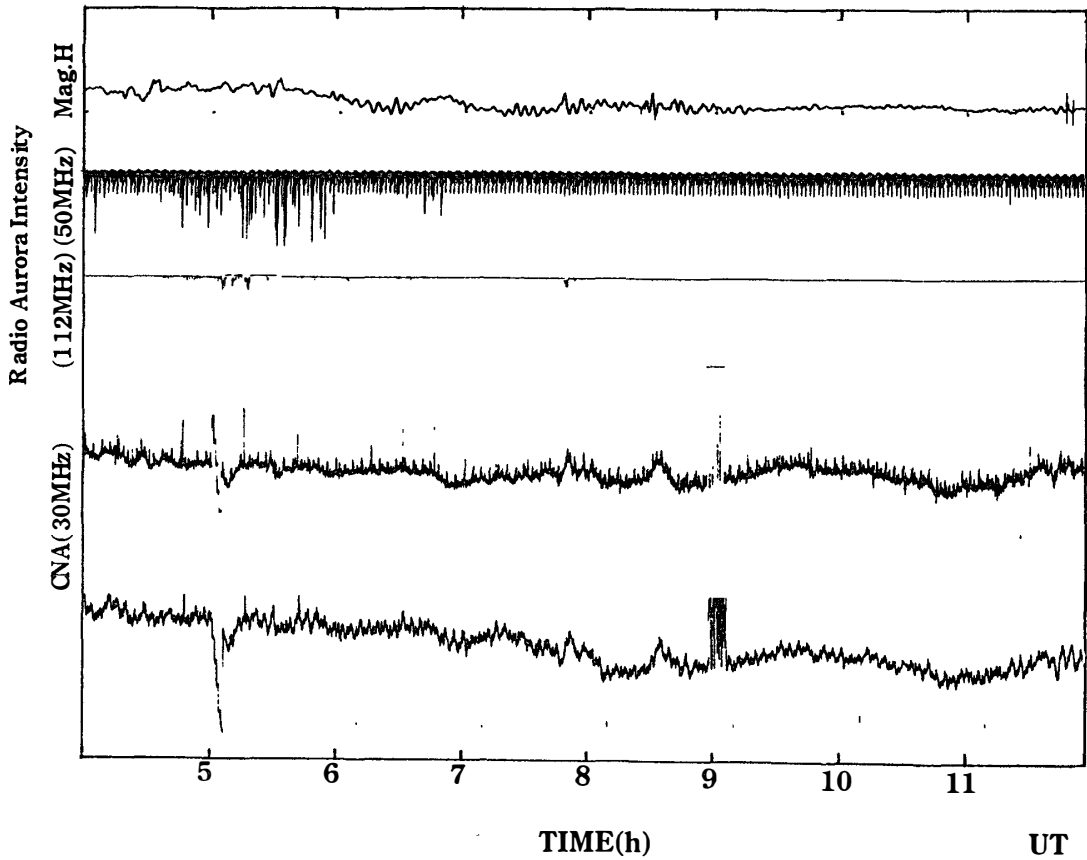
Syowa Station Auroral Radar

May 19. 1995



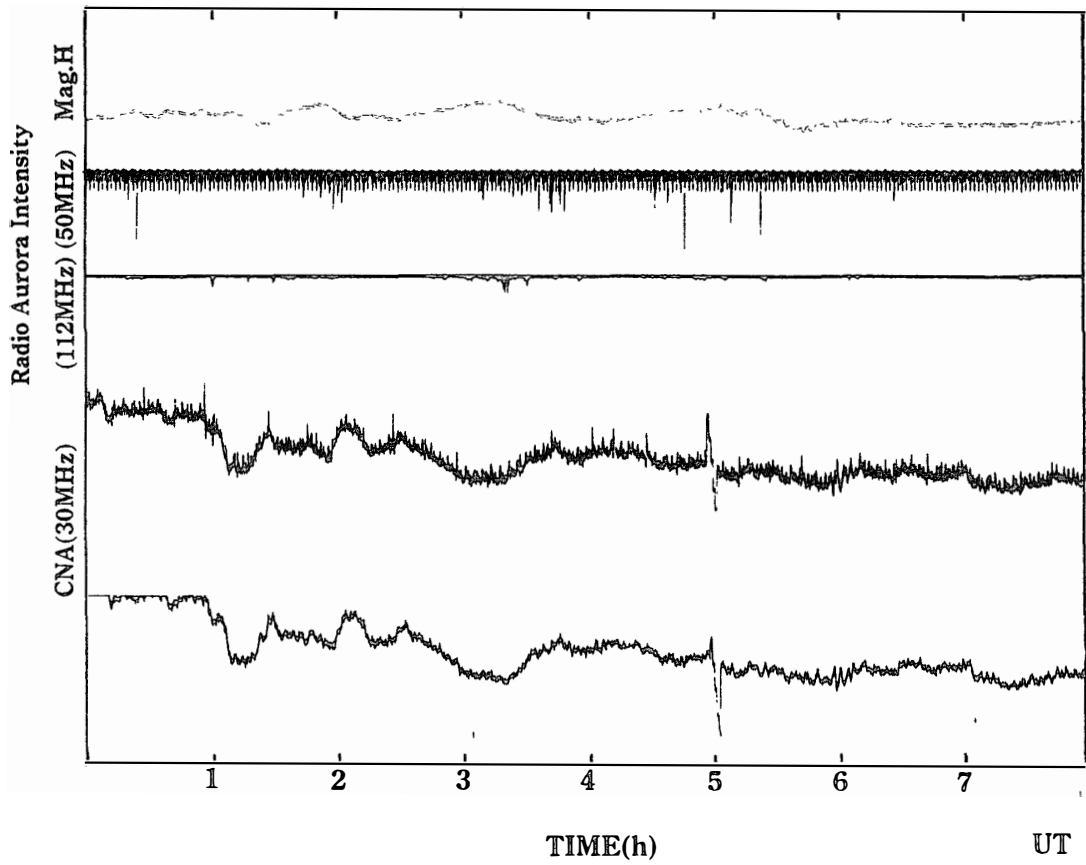
Syowa Station Auroral Radar

May 24. 1995



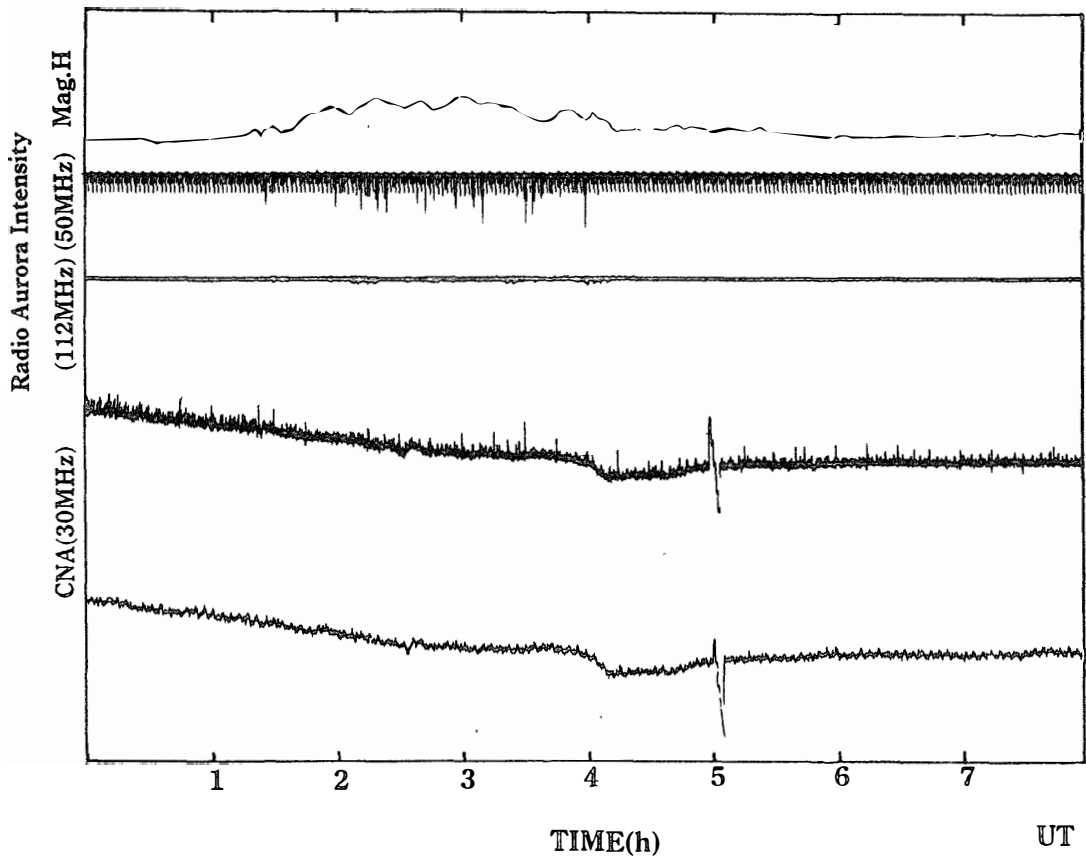
Syowa Station Auroral Radar

June 1. 1995



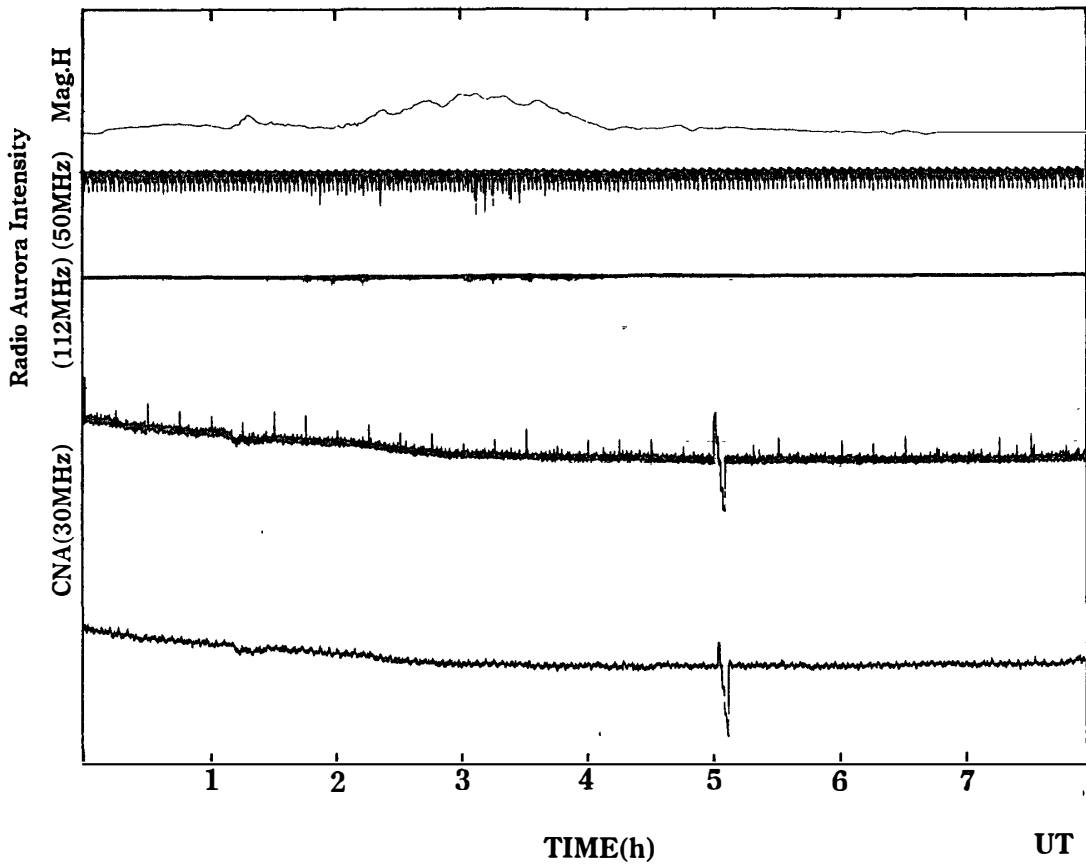
Syowa Station Auroral Radar

June 10. 1995



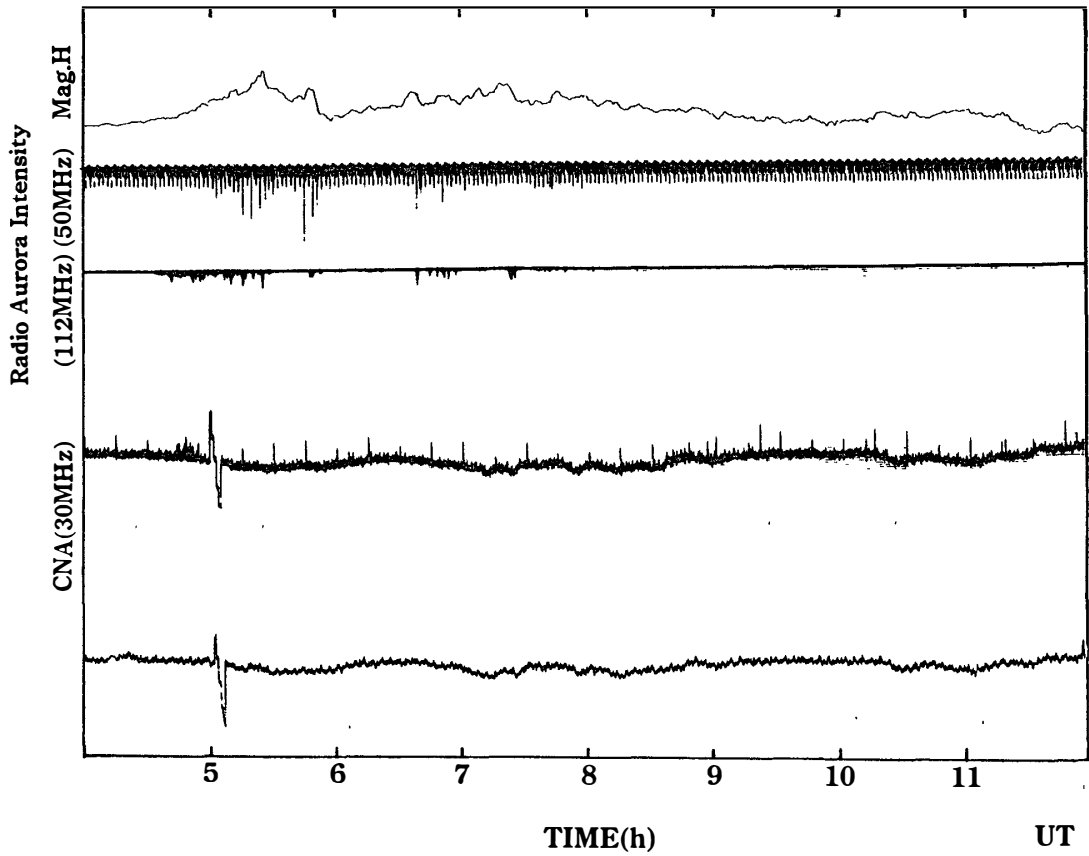
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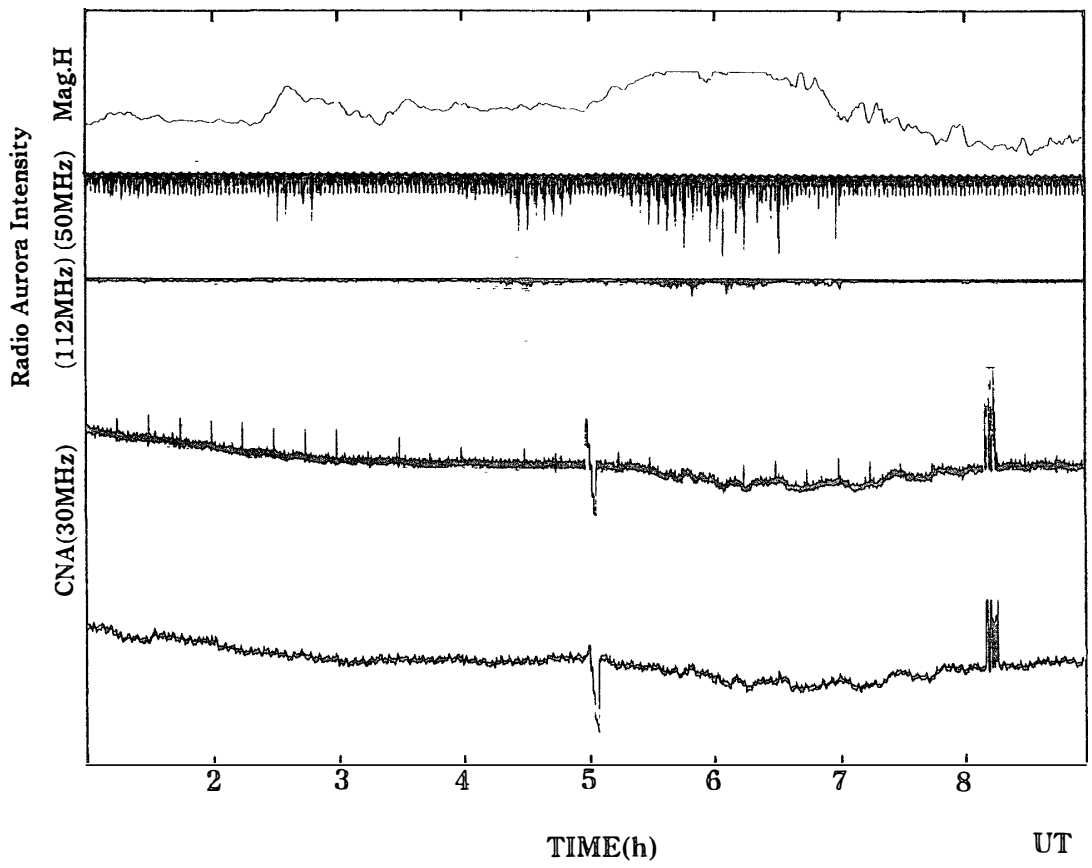
Syowa Station Auroral Radar

June 18. 1995



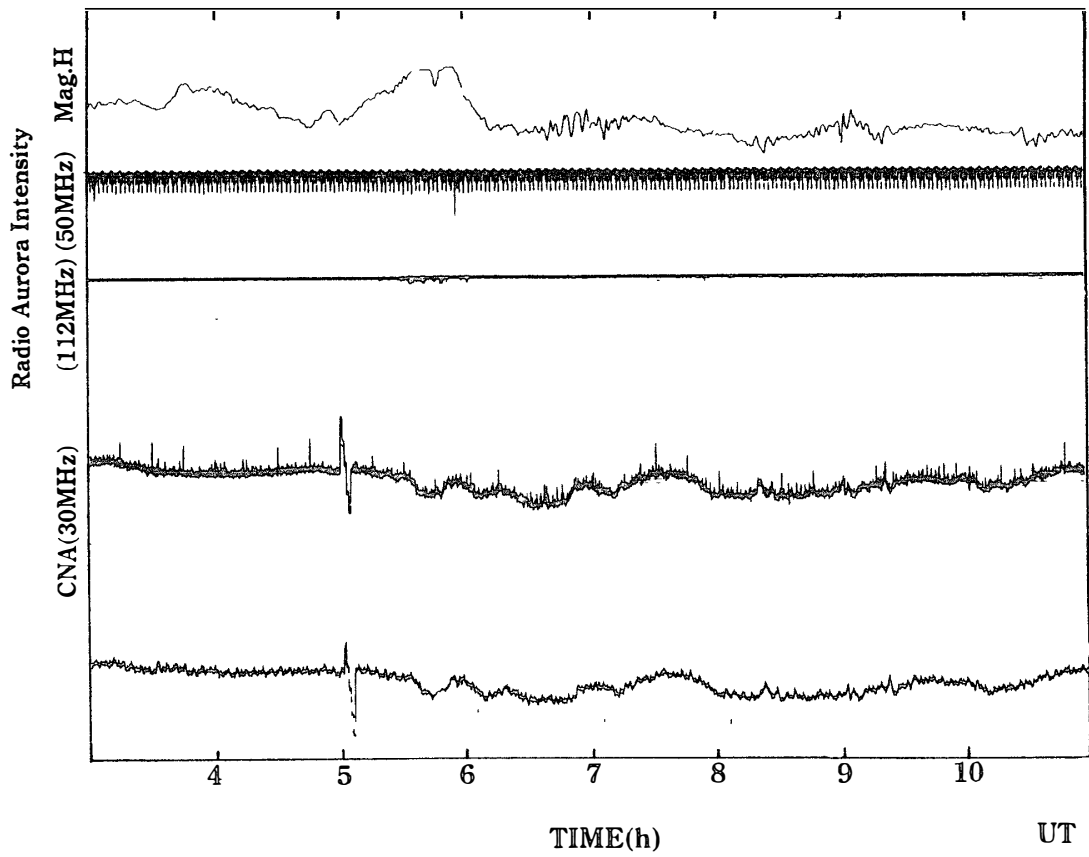
Syowa Station Auroral Radar

June 19. 1995



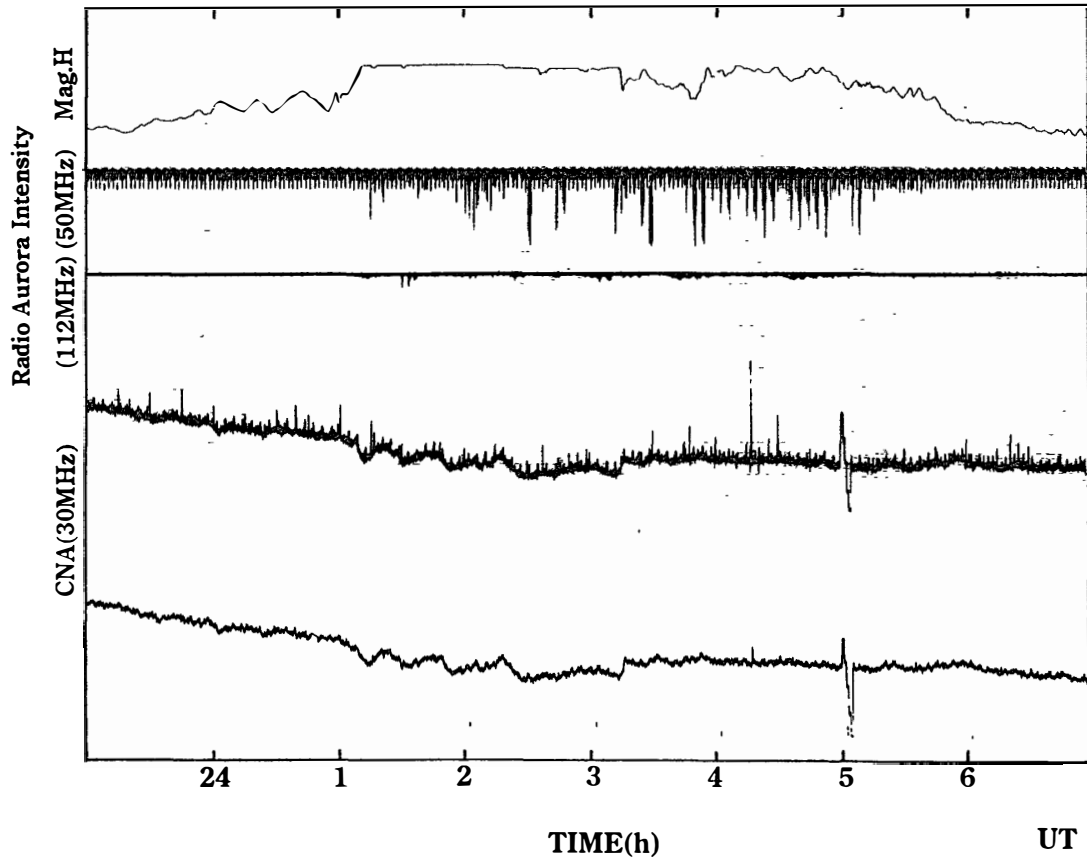
Syowa Station Auroral Radar

June 20. 1995



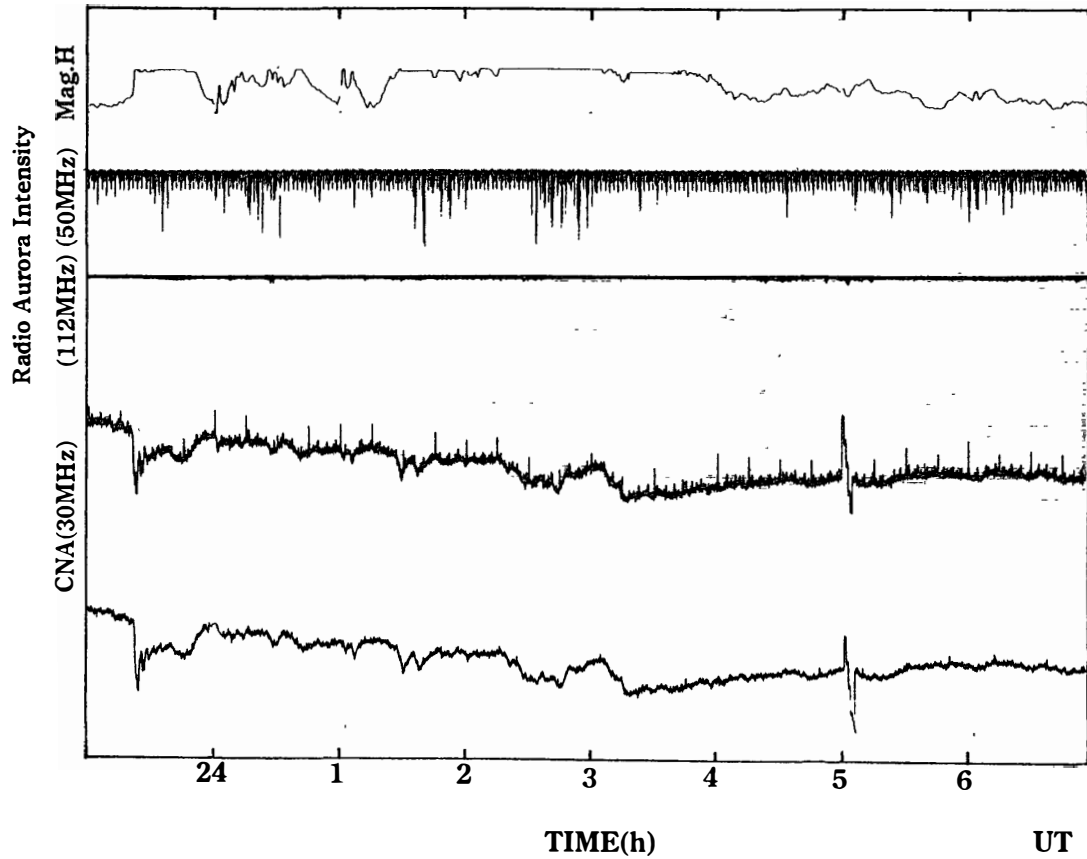
Syowa Station Auroral Radar

June 25. 1995



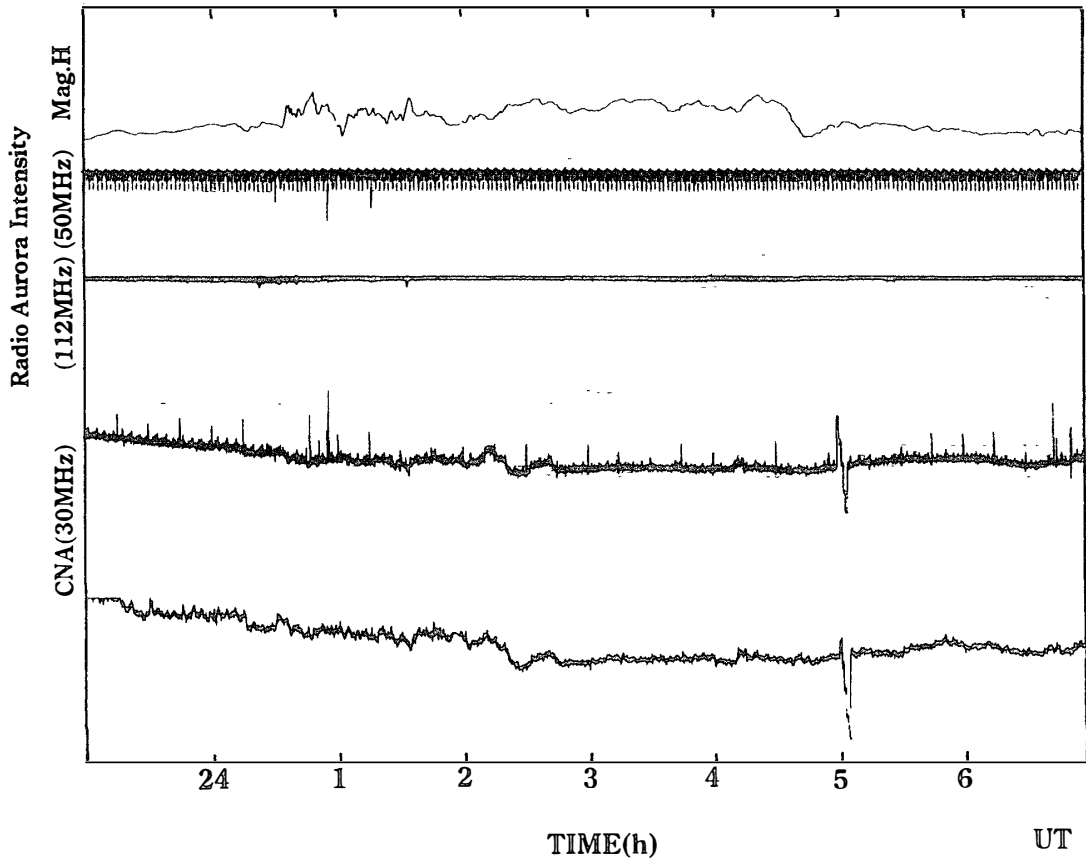
Syowa Station Auroral Radar

June 30. 1995



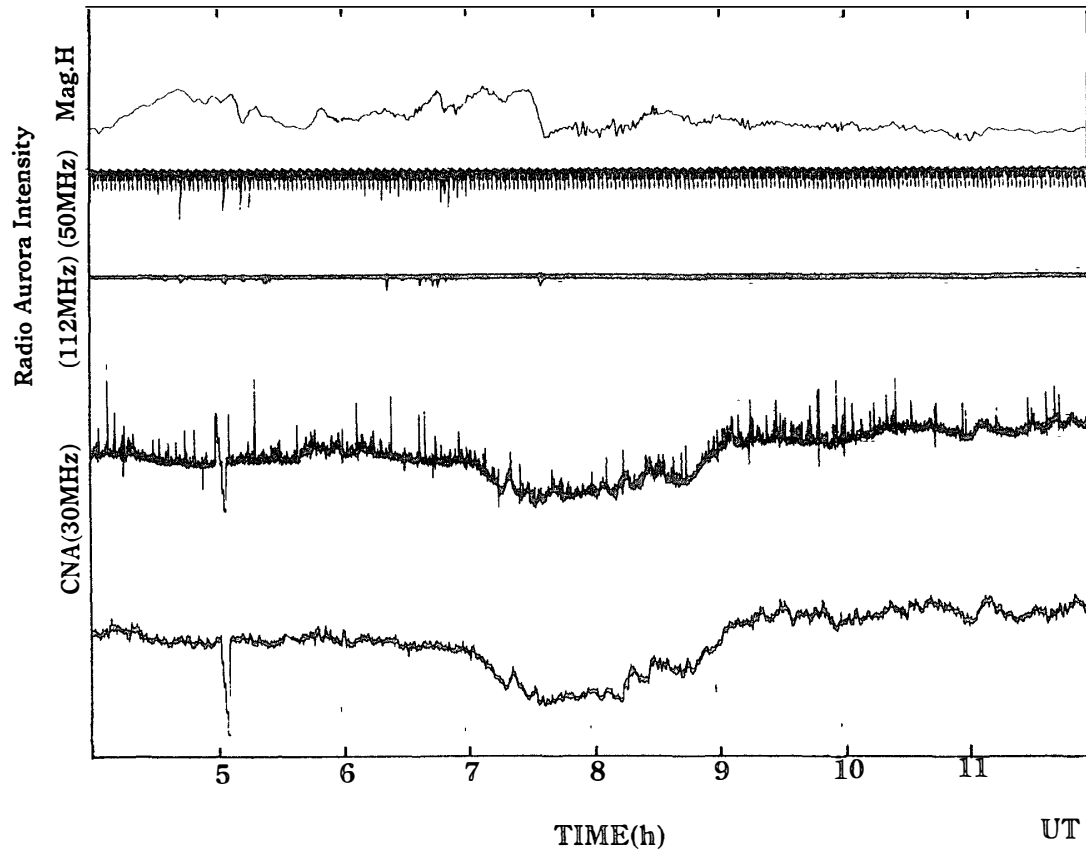
Syowa Station Auroral Radar

July 19. 1995



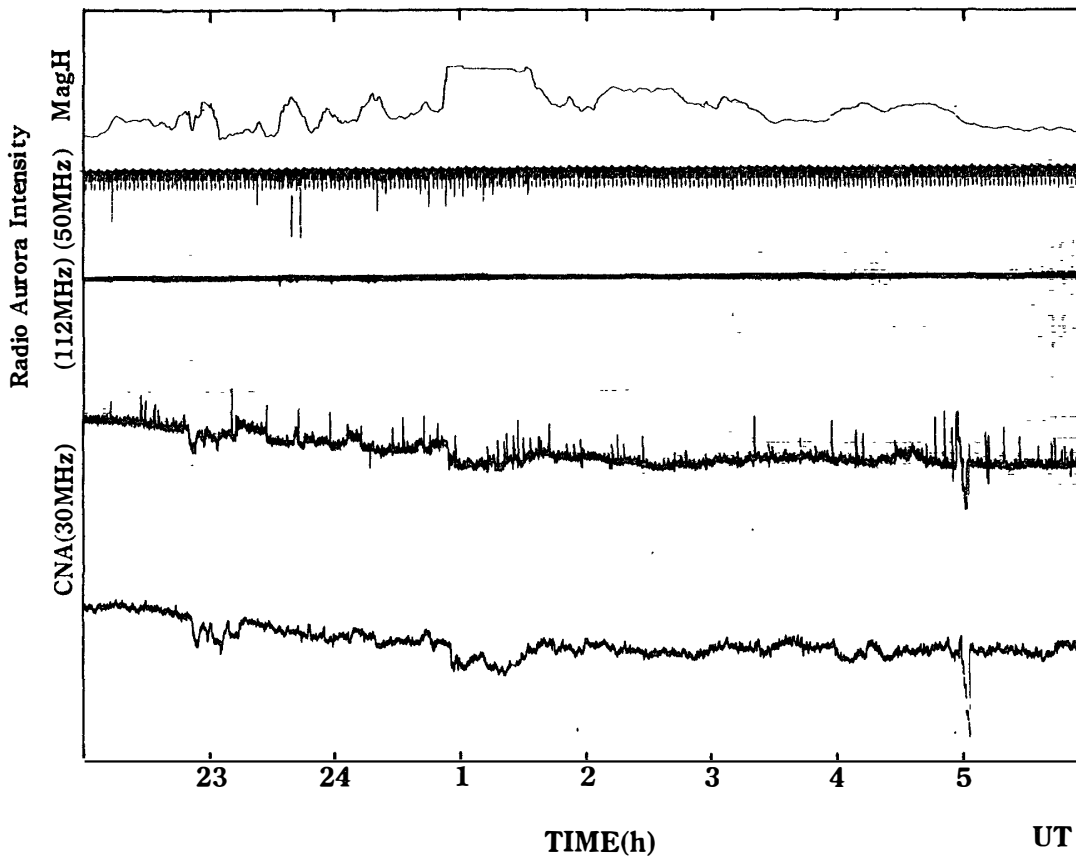
Syowa Station Auroral Radar

July 24. 1995



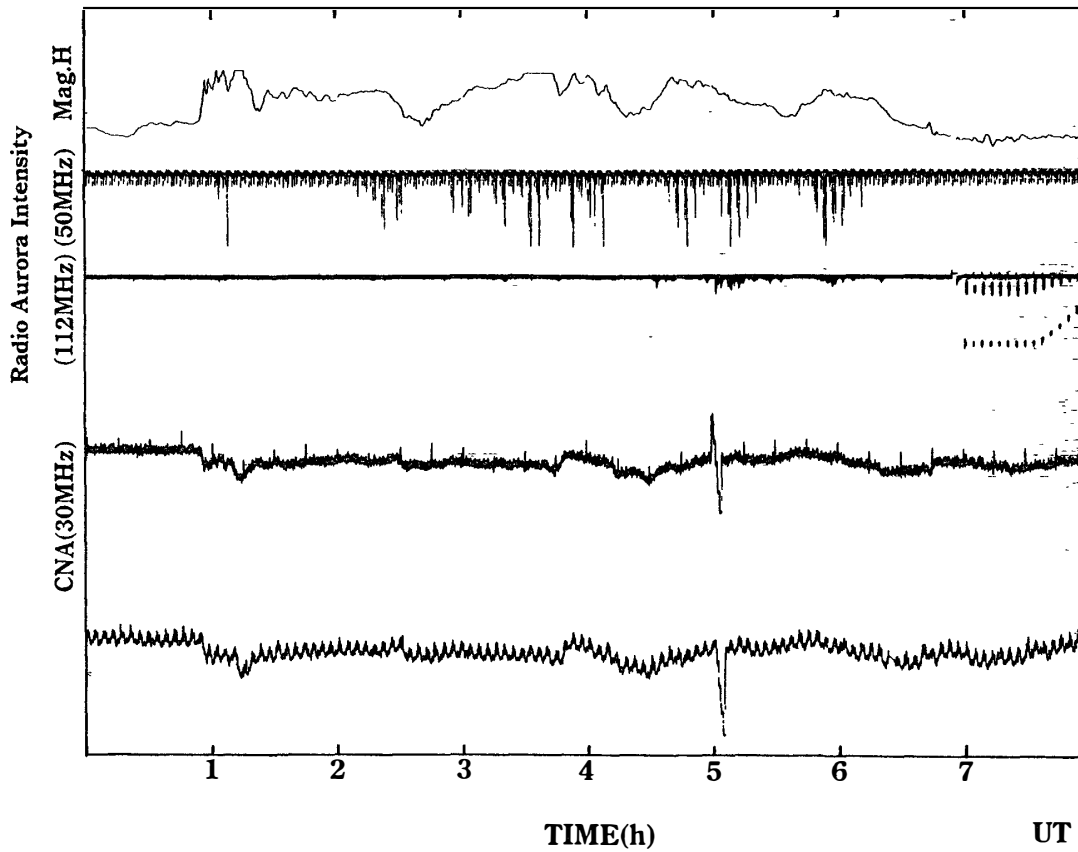
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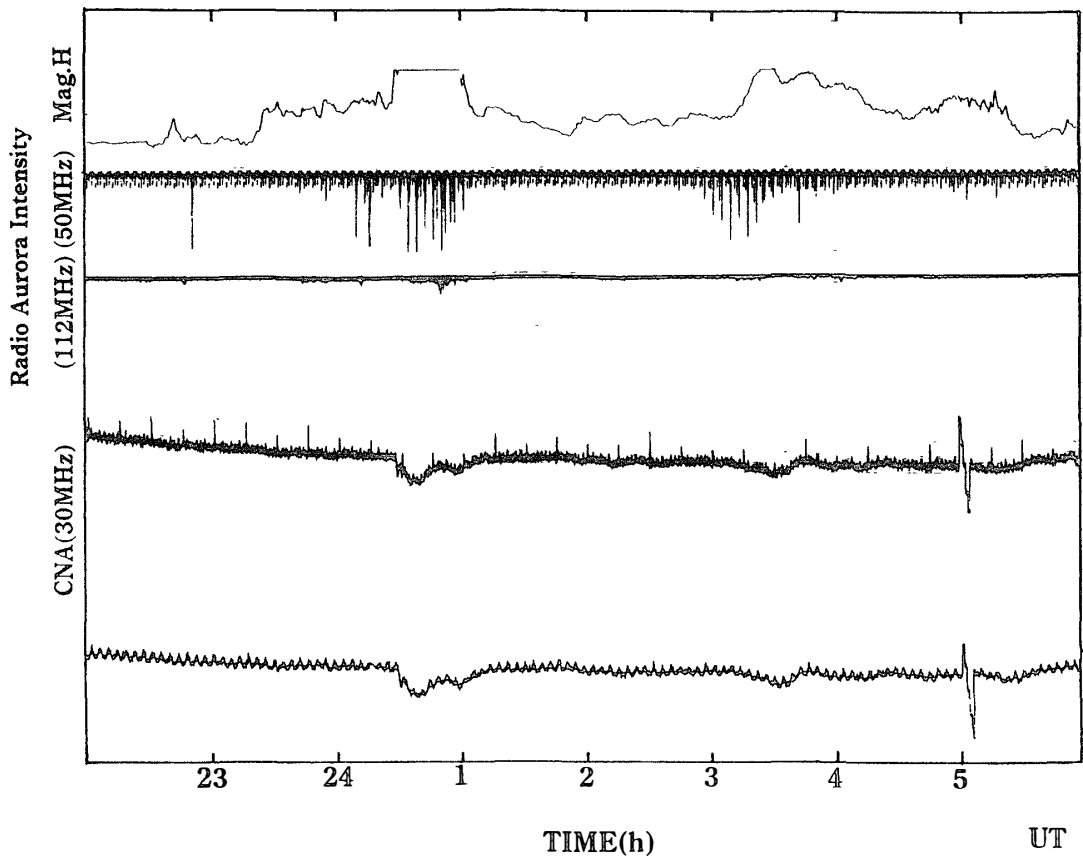
Syowa Station Auroral Radar

August 10. 1995



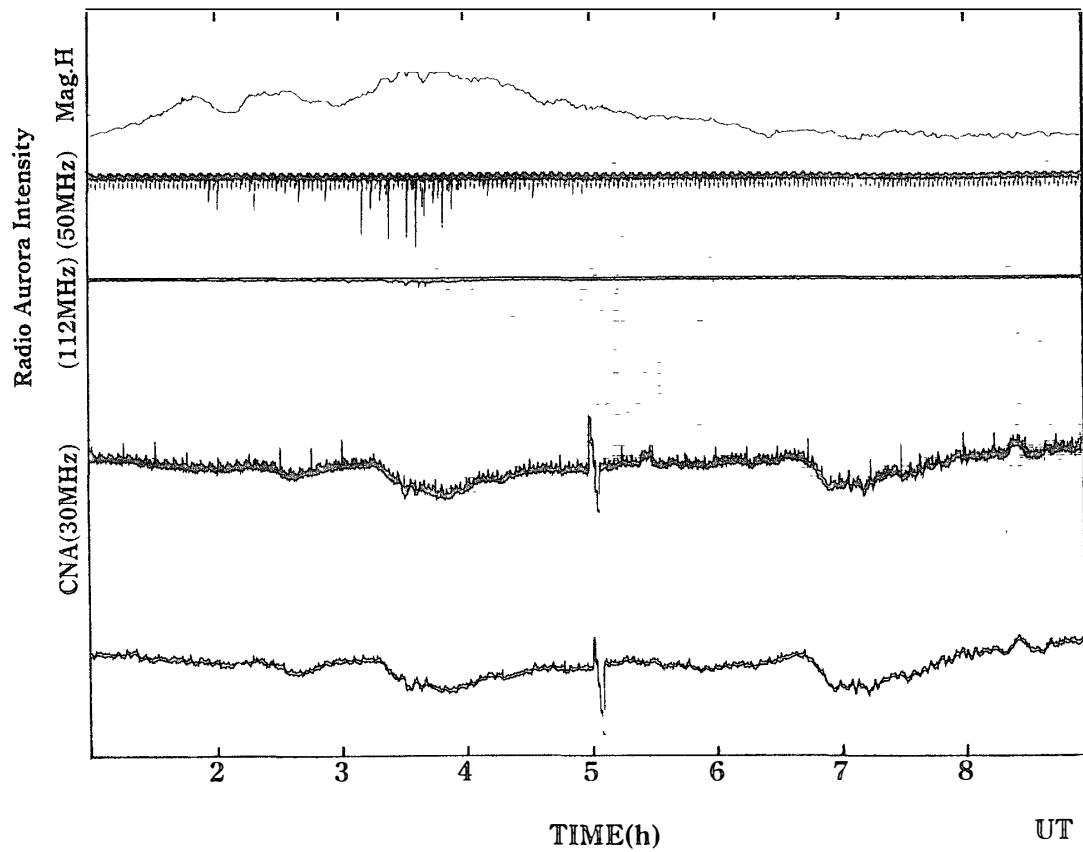
Syowa Station Auroral Radar

August 13. 1995



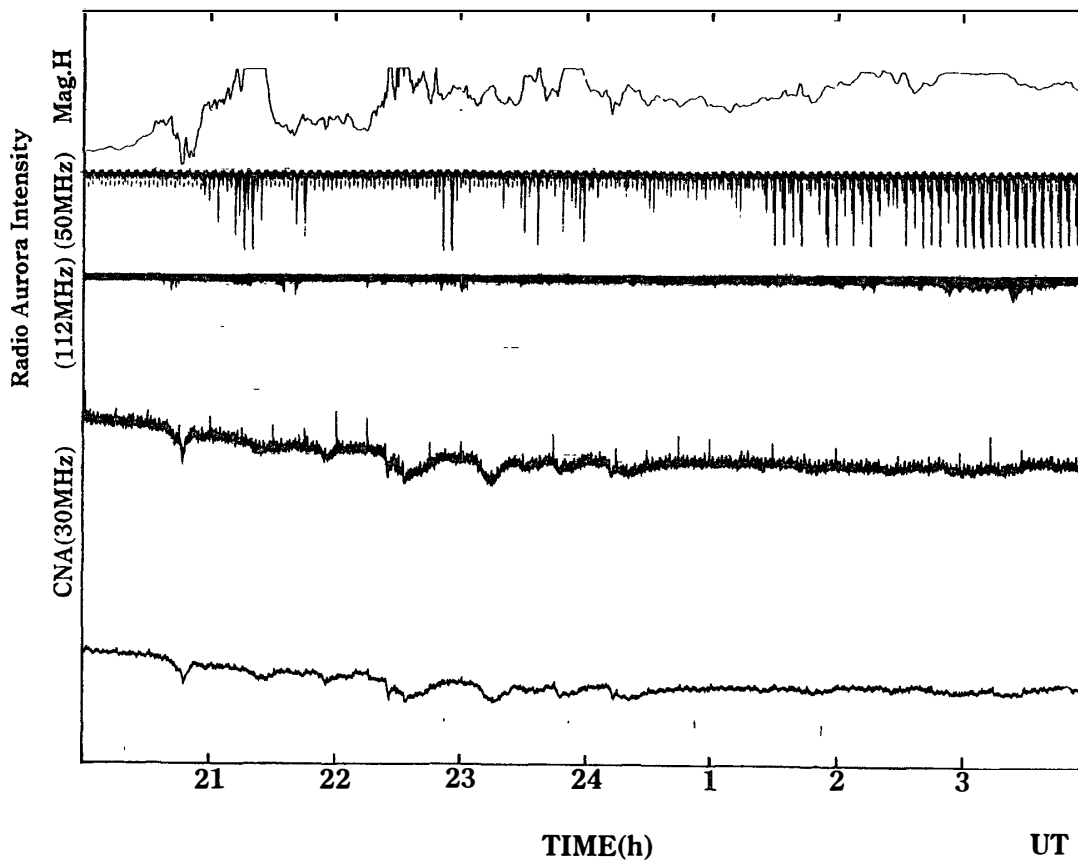
Syowa Station Auroral Radar

August 16. 1995



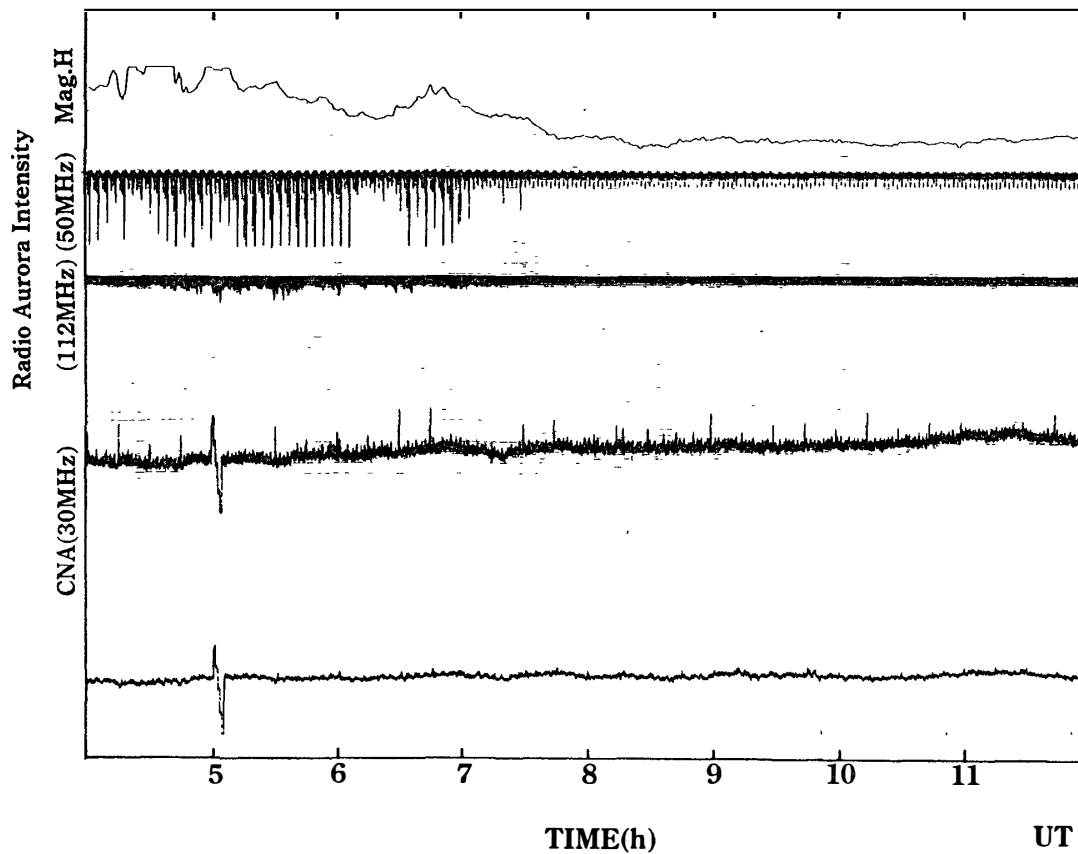
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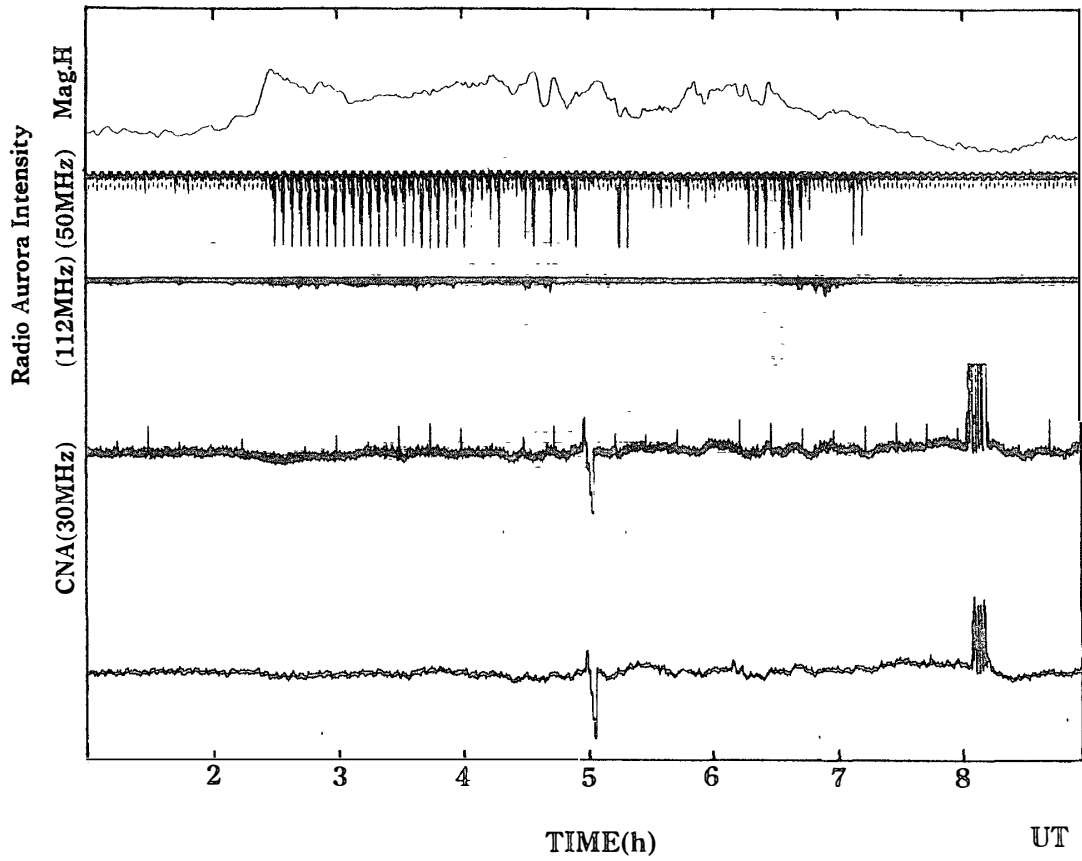
Syowa Station Auroral Radar

August 23. 1995



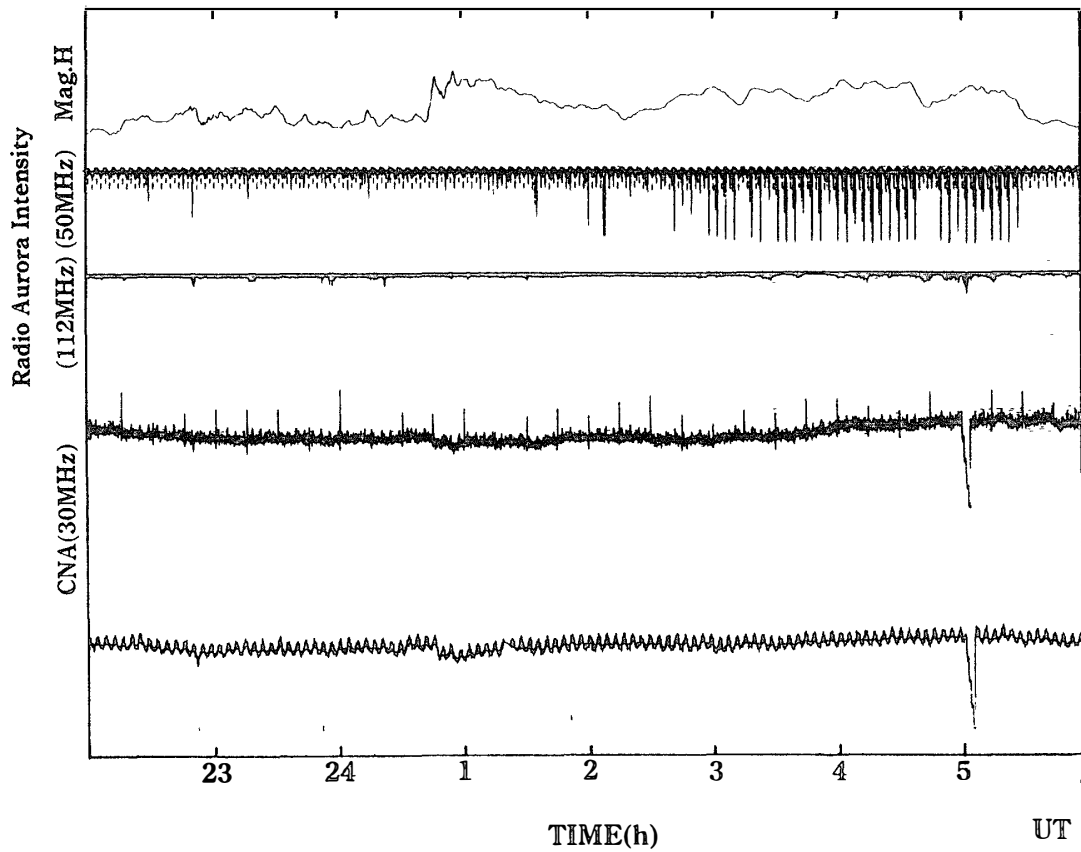
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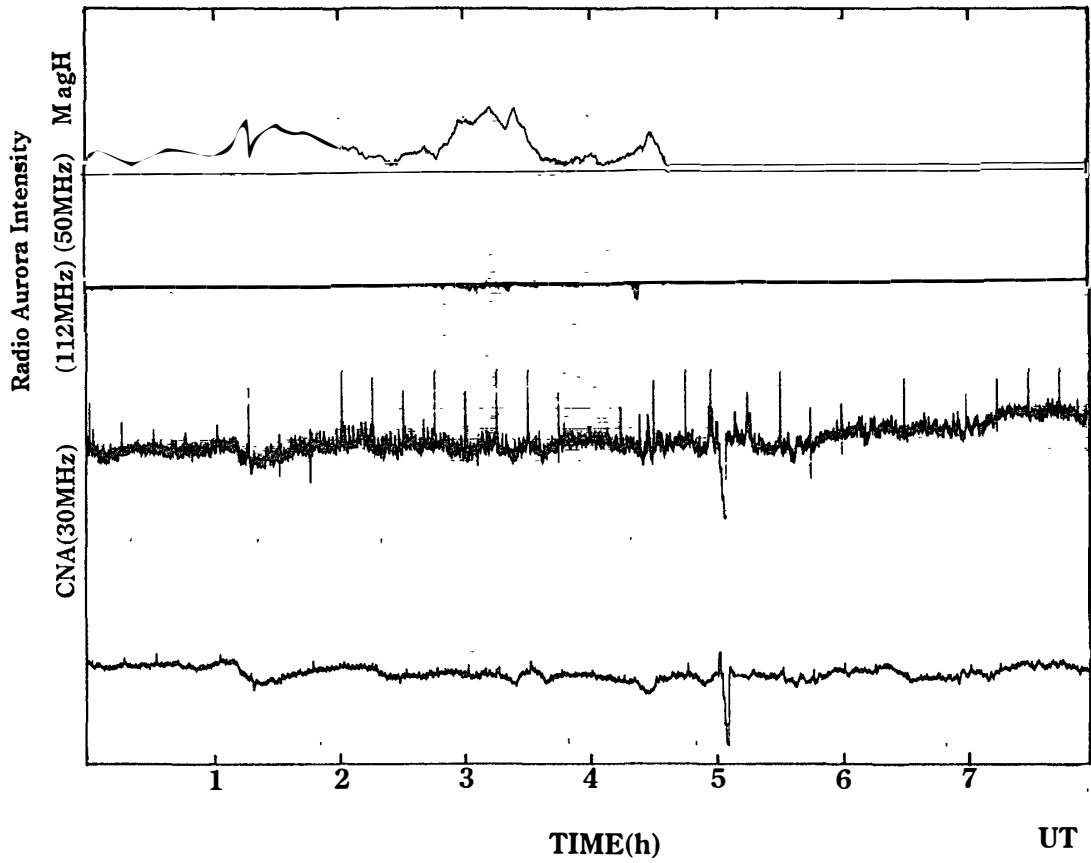
Syowa Station Auroral Radar

September 4. 1995



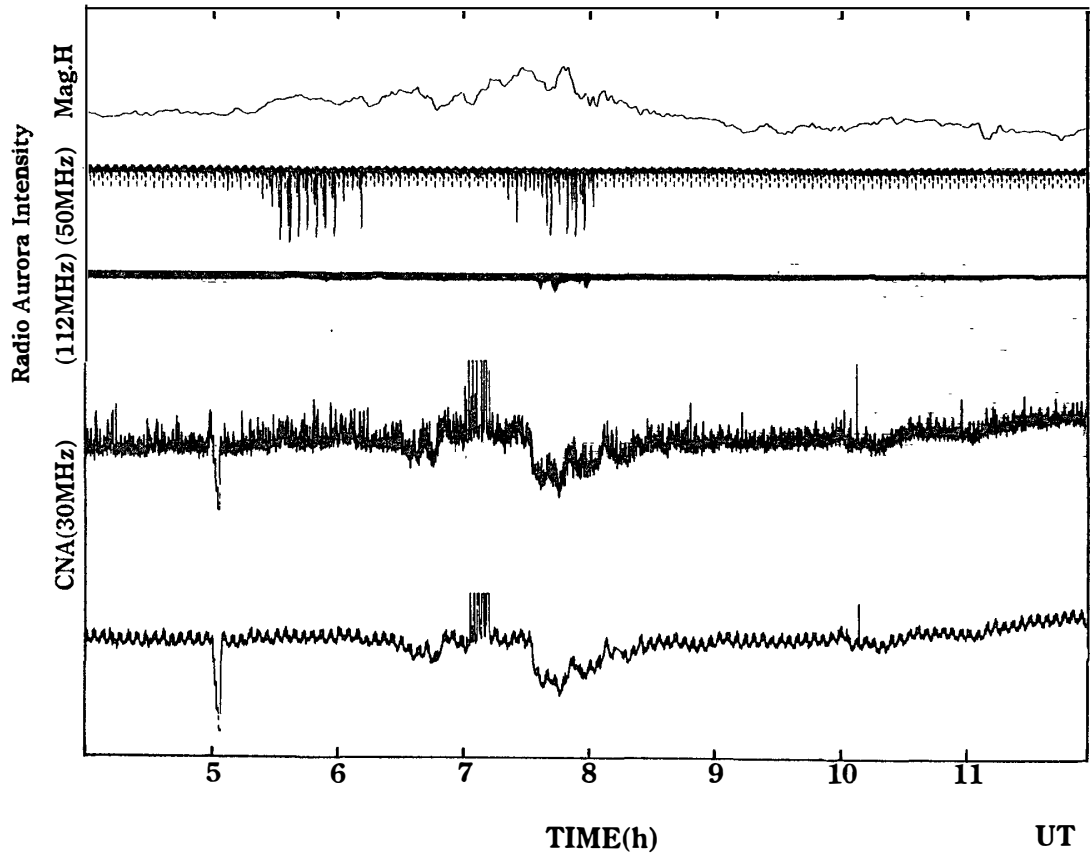
Syowa Station Auroral Radar

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Syowa Station Auroral Radar

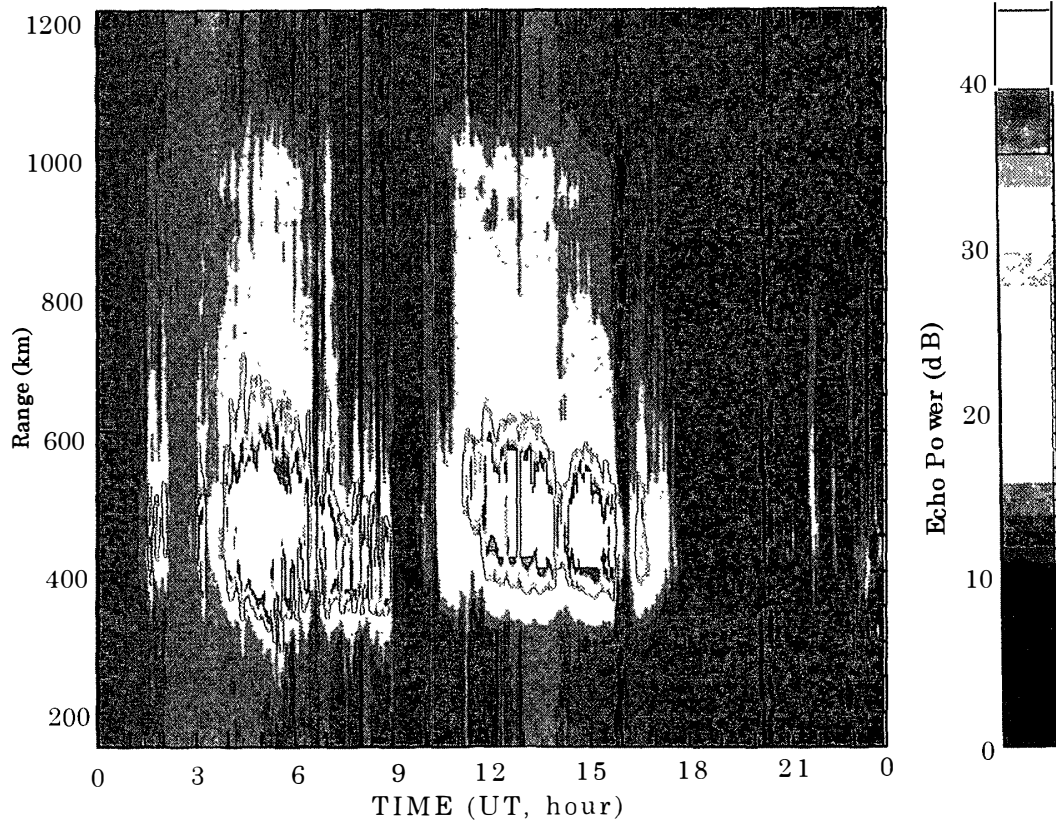
September 28, 1995



Echo Power of VHF Auroral Radar (STARS)

Beam Angle: 35 degree

January 13, 1996



Echo Power of VHF Auroral Radar (STARS)

Beam Angle: 135 degree

January 13, 1996

