

Records of Radio Aurora at Syowa Station, Antarctica
in 1973

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1. Introduction

Observation of radio aurora by means of the rader with frequency of 112.2 MHz have been carried out at Syowa Station, Antarctica, since March 1966 by representatives from the Radio Research Laboratories.

This report has been prepared in order to make the data available to scientists who are interested in this field.

The records covering the period from February 1973 to January 1974, with the form of A-scope display on the 35mm film, are deposited in the Radio Research Laboratories.

Inquiries about the 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

2. Location

Syowa Station			
Geographic		Geomagnetic	
Latitude	Longitude	Latitude	Longitude
69°00'S	39°35'E	69.6°S	77.1°E

3. Observers

Ichizo NISHIMUTA (Radio Research Laboratories)

Hisashi YABUUMA (Radio Research Laboratories)

4. Method of measurement

The antenna was fixed with the direction of the magnetic south and an elevation angle of 25 degrees. The declination in the geomagnetic field at Syowa Station was $45^{\circ}50'$ in 1970.

The observation was continuously made at interval of 18:00 to 09:00 LT ($45^{\circ}\text{E}=\text{UT} + 3 \text{ hours}$) every day.

Characteristics of the equipments are as follows:

Antenna Rotatable 2 stacks of 8-element Yagi
Gain: 13.6 dB (in common with transmission and reception)

Polarization: horizontal

Main equipments Frequency: 112.2 MHz
Transmission power: $\sim 20 \text{ kW}$ (peak)
Pulse width: 50 - 100 sec (variable)
Repetition frequency: 50 Hz

Indicator and recorder

Maximum ranges: 1000 and 1500 km

A-scope: 5-inch cathode ray oscilloscope

1 step/min with 35 mm camera

An A-scope is one of indication methods on the plate of a cathode ray oscilloscope: Range and the intensity of reflecting radio wave are put on the abscissa and the ordinate, respectively.

5. Explanation of tables

Time interval of operation of the equipments and the appearance of radio aurora expressed in local time (45°E) are shown in Table 1 and Table 2, respectively.

The appearance of radio aurora is expressed by range and intensity of echo.

The intensity of echoes is expressed by the maximum and minimum signal level in dB during the observation.

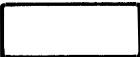
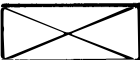


6. Explanation of figure

Aspect of hourly occurrence of radio aurora echoes observed at Syowa Station is shown in Figure 1.

The intensity of the radio aurora echoes is classified into four indices and the intensity is expressed by its maximum value in every hour.

The maximum intensity is valid even its observation is as short as a few minutes in an hour.

The criterion of the classification is as follows:

Index 0		: no echoes
Index 1		: 1 dB ~ 10 dB
Index 2		: 11 dB ~ 20 dB
Index 3		: more than 20 dB

N : no observation

Table 1. Time interval of operation of auroral rader at Syowa Station in 1973 to 1974.

Date	Observing time interval (45°E-MT)				Total observing time interval (h.m.)	Date	Observing time interval (45°E-MT)				Total observing time interval (h.m.)
	Starting time	Ending time	Starting time	Ending time			Starting time	Ending time	Starting time	Ending time	
1973						Mar. 14	00 00 - 09 00		18 00 - 19 41	11 56	
Feb. 1	00 00 - 09 00		18 00 - 23 59		14 59				22 44 - 23 59		
2	00 00 - 09 00		18 00 - 23 59		14 59	15	00 00 - 09 00		18 00 - 23 59	14 59	
3	00 00 - 09 00		18 00 - 23 59		14 59	16	00 00 - 09 00		18 14 - 23 59	14 45	
4	00 00 - 09 00		18 00 - 23 59		14 59	17	00 00 - 00 57		18 06 - 23 59	6 50	
5	00 00 - 09 00		18 00 - 23 59		14 59	18	00 00 - 07 00		18 00 - 23 59	12 59	
6	00 00 - 03 43		18 00 - 23 59		9 42	19	00 00 - 09 00		18 06 - 23 59	14 53	
7	00 00 - 09 00		18 09 - 23 59		14 50	20	00 00 - 09 00		18 00 - 23 59	14 59	
8	00 00 - 09 45		19 58 - 23 59		13 46	21	00 00 - 10 00		18 30 - 23 59	15 29	
9	00 00 - 08 11				8 11	22	00 00 - 08 00		18 00 - 23 59	13 59	
13			18 03 - 23 59		5 56	23	00 00 - 07 00		18 00 - 22 04	12 11	
14	00 00 - 09 00		18 00 - 23 59		14 59				22 52 - 23 59		
15	00 00 - 08 57		18 04 - 23 59		14 52	24	00 00 - 07 00		18 01 - 23 59	12 58	
16	00 00 - 09 00		18 00 - 23 59		14 59	25	00 00 - 09 00		18 01 - 23 59	14 58	
17	00 00 - 05 41		18 00 - 23 59		11 40	26	00 00 - 02 01		18 01 - 23 59	12 50	
18	00 00 - 09 00		18 00 - 23 59		14 59		02 09 - 07 00				
19	00 00 - 01 40		18 02 - 23 59		7 37	27	00 00 - 07 00		18 01 - 23 59	12 58	
20	00 00 - 09 00		18 00 - 23 59		14 59	28	00 00 - 07 31		18 03 - 23 59	13 27	
21	00 00 - 08 04				8 04	29	00 00 - 07 00		18 00 - 23 59	12 59	
23			18 11 - 23 59		5 48	30	00 00 - 08 00			8 00	
24	00 00 - 08 46		18 01 - 23 58		14 43						
25	00 00 - 09 00		18 01 - 23 52		14 51	Apr. 1			18 00 - 23 59	5 59	
27			18 09 - 23 59		5 50	2	00 00 - 07 00		18 00 - 23 59	12 59	
28	00 00 - 09 00		18 00 - 23 58		14 58	3	00 00 - 08 00			8 00	
Mar. 1	00 00 - 08 49				8 49	4			18 00 - 22 15	4 53	
2	00 55 - 09 00		18 00 - 23 59		14 14				23 21 - 23 59		
3	00 00 - 09 00				9 00	5	00 00 - 07 00		18 00 - 23 59	12 59	
4	00 07 - 06 00		21 06 - 23 59		8 46	6	00 00 - 08 00		18 00 - 23 59	13 59	
5	00 00 - 04 18				4 18	7	00 00 - 00 31			8 41	
6	08 55 - 09 00		18 01 - 23 59		6 03		00 50 - 09 00				
7	00 00 - 09 00		18 00 - 23 59		14 59	9			18 00 - 23 59	5 59	
8	00 00 - 02 54		22 04 - 23 59		4 49	10	00 00 - 02 13		18 00 - 23 59	9 12	
9	00 00 - 08 39		18 00 - 21 53		12 32	11	00 00 - 07 32		18 00 - 23 59	13 31	
10			18 10 - 23 59		5 49	12	00 00 - 06 28		18 05 - 20 01	10 03	
11	00 00 - 09 00		18 00 - 23 59		14 59				22 20 - 23 59		
12	00 00 - 01 27		17 54 - 23 59		7 32	13	00 00 - 08 00		18 00 - 23 59	13 59	
13	00 00 - 09 00		18 11 - 23 59		14 48	14	00 00 - 03 00		18 00 - 23 59	8 59	
						15	00 00 - 06 35		18 00 - 23 59	12 34	

Date	Observing time interval (45 ⁰ EMT)				Total observing time interval (h.m.)	Date	Observing time interval (45 ⁰ EMT)				Total observing time interval (h.m.)
	Starting time	Ending time	Starting time	Ending time			Starting time	Ending time	Starting time	Ending time	
Apr. 16	00 00 -	09 34	18 00 -	23 59	15 33	May 26	00 00 -	01 26	18 00 -	23 38	7 04
17	00 00 -	06 00	18 00 -	23 53	11 53	27	00 23 -	09 00	18 00 -	23 59	14 36
18	00 00 -	08 00	17 00 -	23 59	14 59	28	00 00 -	09 00	18 00 -	23 59	14 59
19	00 00 -	09 00	23 13 -	23 59	9 46	29	00 00 -	01 32	18 00 -	23 59	14 44
20	00 00 -	03 05			3 05		01 47 -	09 00			
26			18 06 -	23 59	5 53	30	00 00 -	09 00	18 00 -	23 59	14 59
27	00 00 -	09 00	18 00 -	23 59	14 59	31	00 00 -	01 00	18 00 -	23 59	14 55
28	00 00 -	09 00	18 00 -	22 40	13 40		01 04 -	09 00			
29			18 04 -	23 59	5 55						
30	00 00 -	09 00	18 00 -	23 59	14 59	June 1	00 00 -	09 00	18 00 -	23 52	14 52
May 1	00 00 -	00 50	18 00 -	23 59	14 44	2	00 00 -	09 00	18 00 -	23 59	14 59
	01 05 -	09 00				3	00 00 -	09 00	18 00 -	23 59	14 59
2	00 00 -	09 00	18 00 -	23 59	14 59	4	00 00 -	00 46	18 00 -	23 59	14 57
3	00 00 -	00 06	18 00 -	23 59	14 44		00 48 -	09 00			
	00 21 -	09 00				5	00 00 -	09 00	18 00 -	23 59	14 59
4	00 00 -	00 33	23 04 -	23 59	1 28	6	00 00 -	02 15	18 00 -	23 59	14 48
5	00 00 -	09 00	18 00 -	23 59	14 59		02 26 -	09 00			
6	00 00 -	09 00	18 00 -	23 59	14 59	7	00 00 -	09 00	18 00 -	23 59	14 59
7	00 00 -	09 00	18 00 -	23 59	14 59	8	00 00 -	00 35	18 00 -	23 59	14 54
8	00 00 -	09 00	18 00 -	23 59	14 59		00 40 -	09 00			
9	00 00 -	01 23	18 00 -	20 02	10 36	9	00 00 -	06 35			6 35
	01 49 -	09 00				10	04 21 -	09 00	18 00 -	23 59	10 38
10	00 32 -	09 00	18 00 -	23 51	14 19	11	00 00 -	07 32	18 00 -	23 59	13 31
11	00 00 -	09 00	18 00 -	23 59	14 59	12	00 00 -	07 15			7 15
12	00 00 -	09 00	18 00 -	23 16	14 16	13			18 00 -	23 59	5 59
13	01 09 -	09 00	18 00 -	23 59	13 50	14	00 00 -	09 00	18 00 -	18 16	9 16
14	00 00 -	09 00	18 00 -	23 59	14 59	16	01 32 -	09 00			7 28
15	00 09 -	09 00	18 00 -	23 59	14 50	17	02 00 -	08 52	18 00 -	23 59	12 51
16	00 00 -	09 00	18 00 -	23 59	14 59	18	00 00 -	09 00	18 00 -	23 59	14 59
17	00 00 -	08 53	18 00 -	23 59	14 52	19	00 00 -	08 52	18 00 -	23 59	14 51
18	00 00 -	09 00	18 00 -	23 59	14 59	20	00 00 -	09 00	18 00 -	23 59	14 59
19	00 00 -	00 26	18 00 -	23 59	6 25	21	00 00 -	06 20	18 00 -	23 59	12 19
20	00 00 -	09 00	18 00 -	23 59	14 59	22	00 00 -	09 00	18 00 -	23 59	14 59
21	00 00 -	08 51	18 00 -	23 59	14 50	23	00 00 -	08 55	18 04 -	23 59	14 50
22	00 00 -	09 00	23 37 -	23 59	9 22	24	00 00 -	09 00	18 00 -	23 59	14 59
23			18 00 -	23 59	5 59	25	00 00 -	08 52	18 00 -	23 59	14 51
24	00 00 -	08 52	18 00 -	23 59	14 51	26	00 00 -	09 00	18 00 -	23 59	14 59
25	00 00 -	09 00	18 00 -	23 59	14 59	27	00 00 -	08 52	18 00 -	23 59	14 51
						28	00 00 -	07 26			7 26

Date	Observing time interval (45 ^o EMT)				Total observing time interval (h.m.)	Date	Observing time interval (45 ^o EMT)				Total observing time interval (h.m.)
	Starting time	Ending time	Starting time	Ending time			Starting time	Ending time	Starting time	Ending time	
June 29	00 00 -	09 00	19 00 -	23 59	13 59	Aug. 10	00 00 -	08 51	18 00 -	23 59	14 50
30	00 00 -	10 00	20 00 -	23 59	13 59	11	00 00 -	09 00	18 00 -	23 59	14 59
July 1	00 00 -	10 51	18 00 -	23 59	16 50	12	00 00 -	01 04			1 04
2	00 00 -	09 00	18 00 -	23 59	14 59	13			18 00 -	23 59	5 59
3	00 00 -	08 52	18 00 -	23 59	14 51	14	00 00 -	08 00	18 00 -	22 35	12 35
4	00 00 -	09 00	18 00 -	23 59	14 59	15	00 20 -	08 53	18 00 -	23 59	12 52
5	00 00 -	08 51	19 00 -	23 59	13 50	16	00 00 -	09 00	18 09 -	23 59	14 50
6	00 00 -	10 00	18 00 -	23 59	15 59	17	00 00 -	07 52	18 00 -	23 59	13 51
7	00 00 -	08 48	18 00 -	23 59	14 47	18	00 00 -	08 00			8 00
8	00 00 -	09 00	18 00 -	23 59	14 59	19			18 00 -	23 59	5 59
9	00 00 -	08 50	18 10 -	23 59	14 39	20	00 00 -	08 53	18 00 -	23 59	14 52
10	00 00 -	08 00	18 00 -	23 59	13 59	21	00 00 -	09 00	18 00 -	23 59	14 59
11	00 00 -	08 52	18 00 -	23 59	14 51	22	00 00 -	08 50	18 12 -	23 59	14 37
12	00 00 -	09 00	19 00 -	23 59	13 59	23	00 00 -	09 00	18 00 -	23 59	14 59
13	00 00 -	05 43	18 00 -	23 59	11 42	24	00 00 -	08 53	18 00 -	23 59	14 52
14	00 00 -	09 00	19 00 -	23 59	13 59	25	00 00 -	09 00	18 00 -	23 59	14 59
15	00 00 -	08 41	18 07 -	23 59	14 33	26	00 00 -	08 53			8 53
16	00 00 -	09 00	17 52 -	23 59	15 07	27			23 51 -	23 59	8
17	00 00 -	07 52	18 00 -	23 59	13 51	28	00 00 -	09 00	18 00 -	23 59	14 59
18	00 00 -	08 11	19 00 -	23 59	13 10	29	00 00 -	08 52	18 00 -	23 59	14 51
19	00 00 -	02 03	18 00 -	23 59	8 02	30	00 00 -	09 00	18 00 -	23 59	14 59
20	00 00 -	09 00	18 00 -	23 59	14 59	31	00 00 -	09 54	20 03 -	23 59	13 50
21	00 00 -	08 52	18 00 -	23 59	14 51	Sep. 1	00 00 -	09 00	18 00 -	23 59	14 59
22	00 00 -	07 48	18 00 -	23 59	13 47	2	00 00 -	08 52	18 00 -	23 59	14 51
23	00 00 -	08 00			8 00	3	00 00 -	09 00	18 00 -	23 59	14 59
24	02 00 -	05 40	18 00 -	23 59	9 39	4	00 00 -	08 52	18 00 -	23 59	14 51
25	00 00 -	09 00	18 00 -	23 59	14 59	5	00 00 -	09 00	18 00 -	23 59	14 59
26	00 00 -	09 00	19 00 -	20 06	10 06	6	00 00 -	08 51	18 00 -	23 59	14 50
Aug. 1			18 00 -	23 59	5 59	7	00 00 -	09 00	18 00 -	23 59	14 59
2	00 00 -	09 00	18 00 -	23 59	14 59	8	00 00 -	00 47			47
3	00 00 -	08 52			8 52	9			18 00 -	23 59	5 59
4			18 00 -	23 59	5 59	10	00 00 -	09 13	18 00 -	23 59	15 12
5	00 00 -	09 00	19 00 -	23 59	13 59	11	00 00 -	08 45	21 40 -	23 59	11 04
6	00 00 -	08 51	19 00 -	23 59	13 50	12	00 00 -	09 00	18 00 -	23 59	14 59
7	00 00 -	10 00	18 00 -	23 59	15 59	13	00 00 -	08 52	18 00 -	23 59	14 51
8	00 00 -	08 51	19 00 -	23 59	13 50	14	00 00 -	09 00	18 00 -	23 59	14 59
9	00 00 -	10 00	18 00 -	23 59	15 59	15	00 00 -	08 50	18 00 -	23 59	14 49
						16	00 00 -	00 57	18 00 -	23 59	14 28

Date	Observing time interval (45 ^o EMT)				Total observing time interval (h.m.)	Date	Observing time interval (45 ^o EMT)				Total observing time interval (h.m.)
	Starting time	Ending time	Starting time	Ending time			Starting time	Ending time	Starting time	Ending time	
Sep. 16	01 28	- 09 00				Oct. 25	00 00	- 09 00	18 00	- 23 59	14 59
17	00 00	- 08 07	19 00	- 23 59	13 06	26	00 00	- 08 52	18 08	- 23 59	14 43
18	00 00	- 07 14	18 05	- 23 59	13 08	27	00 00	- 09 00	18 00	- 23 59	14 59
19	00 00	- 09 00	18 00	- 23 59	14 59	28	00 00	- 08 10	18 18	- 23 59	13 51
20	00 00	- 08 52			8 52	29	00 00	- 08 36			8 36
21			23 12	- 23 59	47	30			18 05	- 23 59	5 54
22	00 00	- 08 24	18 00	- 23 59	14 23	31	00 00	- 09 00	18 49	- 23 59	14 10
23	00 00	- 09 00	18 00	- 23 59	14 59						
24	00 00	- 08 52	18 00	- 23 59	14 51	Nov. 1	00 00	- 08 50	18 00	- 23 59	8 50
25	00 00	- 09 00	18 00	- 23 59	14 59	2	00 00	- 09 00	18 00	- 23 59	14 59
26	00 00	- 06 22	18 00	- 23 59	12 21	3	00 00	- 08 33	19 00	- 23 59	13 32
27	00 00	- 09 00	18 00	- 23 59	14 59	4	00 00	- 03 11			3 11
28	00 00	- 08 53	18 00	- 23 59	14 52	5			18 00	- 23 59	5 59
29	00 00	- 09 00	18 00	- 23 59	14 59	6	00 00	- 08 52	18 00	- 23 59	14 51
30	00 00	- 08 52	18 00	- 23 59	14 51	7	00 00	- 03 45	18 04	- 23 59	9 40
						8	00 00	- 03 59	23 40	- 23 59	4 18
Oct. 1	00 00	- 09 00	19 00	- 23 59	13 59	9	00 00	- 09 00	19 00	- 23 59	13 59
2	00 00	- 09 52	18 00	- 23 59	15 51	10	00 00	- 07 16	18 05	- 23 59	13 10
3	00 00	- 09 00	18 00	- 23 59	14 59	11	00 00	- 09 00	18 00	- 23 59	14 59
4	00 00	- 08 52			8 52	12	00 00	- 02 05	18 04	- 23 59	12 53
6			18 00	- 23 59	5 59		02 13	- 07 06			
7	00 00	- 09 00	18 00	- 20 53	11 53	13	00 00	- 09 00	18 00	- 23 59	14 59
8	00 06	- 08 51	18 00	- 23 59	14 44	14	00 00	- 08 52	18 06	- 23 59	14 45
9	00 00	- 09 00	18 00	- 23 59	14 59	15	00 00	- 05 23	21 28	- 23 59	7 54
10	00 00	- 08 52	18 00	- 23 59	14 51	16	00 00	- 08 37	18 00	- 23 59	14 36
11	00 00	- 09 00	18 00	- 23 59	14 59	17	00 00	- 09 00			9 00
12	00 00	- 08 52	18 00	- 23 59	14 51	20			18 00	- 23 59	5 59
13	00 00	- 09 00	18 00	- 23 59	14 59	21	00 00	- 08 52	19 00	- 23 59	13 51
14	00 00	- 08 53	18 00	- 23 59	14 52	22	00 00	- 04 16			4 16
15	00 00	- 08 00	18 00	- 23 59	13 59	23			18 00	- 23 59	5 59
16	00 00	- 03 27	18 00	- 23 59	9 26	24	00 00	- 08 51	18 00	- 23 59	14 50
17	00 00	- 09 00	18 00	- 23 59	14 59	25	00 00	- 09 00	18 00	- 23 59	14 59
18	00 00	- 08 51	22 46	- 23 59	10 04	26	00 00	- 07 51	18 00	- 23 59	13 50
19	00 00	- 09 00	18 00	- 23 59	14 59	27	00 00	- 00 16			16
20	00 00	- 08 52	18 00	- 23 59	14 51	28			18 00	- 21 13	3 13
21	00 00	- 09 00	18 00	- 23 59	14 59						
22	00 00	- 08 52	18 07	- 23 59	14 44	Dec. 1	02 07	- 08 53	18 00	- 23 59	11 45
23	00 00	- 09 00	18 00	- 23 59	14 59	2	00 00	- 03 02	20 52	- 23 59	6 09
24	00 00	- 08 50	18 42	- 23 59	14 07	3	00 00	- 08 52	18 03	- 23 59	14 48

Date	Observing time interval (45 ⁰ EMT)				Total observing time interval (h.m.)	Date	Observing time interval (45 ⁰ EMT)				Total observing time interval (h.m.)
	Starting time	Ending time	Starting time	Ending time			Starting time	Ending time	Starting time	Ending time	
Dec. 4	00 00 -	09 00	18 00 -	23 59	14 59	Dec. 23	00 00 -	09 00	18 00 -	23 59	14 59
5	00 00 -	08 52	18 00 -	23 59	14 51	24	00 00 -	08 51	18 00 -	23 59	14 50
6	00 00 -	09 00	18 00 -	23 59	14 59	25	00 00 -	09 00	18 00 -	23 59	14 59
7	00 00 -	08 51	18 00 -	23 59	14 50	26	00 00 -	08 52	18 00 -	23 59	14 51
8	00 00 -	09 00	18 00 -	23 59	14 59	27	00 00 -	09 00	18 00 -	23 59	14 59
9	00 00 -	08 52	18 00 -	23 59	14 51	28	00 00 -	08 50	18 00 -	22 27	13 17
10	00 00 -	09 00	18 00 -	23 59	14 59	30			18 00 -	23 59	5 59
11	00 00 -	08 52	18 00 -	23 59	14 51	31	00 00 -	08 50	18 00 -	23 59	14 49
12	00 00 -	09 00	18 00 -	23 59	14 59	1974					
13	00 00 -	08 51	19 50 -	23 59	13 00	Jan. 1	00 00 -	08 46	18 00 -	23 59	14 45
14	00 00 -	09 00	18 00 -	23 59	14 59	2	00 00 -	08 53	18 05 -	23 59	14 47
15	00 00 -	07 52	18 00 -	23 59	13 51	3	00 00 -	09 00	18 00 -	23 59	14 59
16	00 00 -	09 00	18 00 -	23 59	14 59	4	00 00 -	08 51	18 00 -	23 59	14 50
17	00 00 -	08 51			8 51	5	00 00 -	09 00	18 13 -	23 59	14 46
19			18 05 -	23 59	5 54	6	00 00 -	08 45	18 00 -	23 59	14 44
20	00 00 -	08 52	18 00 -	23 59	14 51	7	00 00 -	09 00	18 00 -	23 59	14 59
21	00 00 -	08 53	18 00 -	23 59	14 52	8	00 00 -	08 51	18 04 -	23 59	14 46
22	00 00 -	09 00	18 00 -	19 29	13 42	9	00 00 -	09 00	18 00 -	23 59	14 59
			20 46 -	23 59		10	00 00 -	08 52			8 52

Table 2. Appearance of radio aurora at Syowa Station
(Time interval in 45° East Meridian Time).

Date	Time interval	Range (km)	Intensity (dB)	Total time (m)	Date	Time interval	Range (km)	Intensity (dB)	Total time (m)
1973					Feb.18	05 05 - 05 15	300 - 320	5	11
Feb. 1	06 27 - 06 53	250 - 350	5 - 10	27	19	00 48 - 00 50	300	5	3
	07 43 - 08 58	250 - 350	5 - 40	76		01 03 - 01 04	280	5	2
2	18 58 - 20 20	250 - 350	5 - 15	83	20	00 53 - 00 58	300	5	6
3	00 12 - 00 49	250 - 300	5 - 40	38		01 04 - 01 05	300	5 - 10	2
	07 23 - 08 10	250 - 300	5 - 20	48		21 02 - 21 54	300 - 380	5 - 15	53
	21 05 - 21 15	250 - 300	5	11		22 05 - 22 06	370	5	2
	21 37 - 21 55	250	5 - 10	19		22 26 - 22 59	280 - 320	5 - 25	34
4	03 11 - 03 25	300	5	15		23 32 - 23 33	300	5	2
	05 40 - 05 45	270 - 300	5	6	23	18 12 - 18 53	300 - 400	5 - 10	42
5	01 02 - 01 03	280	5	2		22 14 - 22 18	300 - 350	15 - 35	5
	08 26 - 08 59	280 - 330	5 - 15	34		22 57 - 23 40	270 - 320	5 - 25	44
6	18 01 - 18 26	280 - 300	5 - 10	26	24	00 51 - 01 10	270 - 330	5 - 15	20
7	05 55 - 06 26	300	5	32		02 20 - 02 22	250	5	3
	07 03 - 07 22	300	5 - 10	20		04 23 - 05 17	250 - 300	5 - 20	55
8	00 48 - 00 51	330	5 - 10	4		06 39 - 06 53	250 - 300	5	15
	03 04 - 03 16	300	5	13		07 09 - 07 43	250 - 350	5 - 20	35
	03 40 - 03 47	300	5	8		08 14 - 08 45	270 - 300	5 - 15	32
	04 55 - 05 09	300	5	15		18 01 - 18 27	280 - 300	5	27
	07 09 - 07 17	300	5	9		18 43 - 19 23	300 - 350	5 - 10	41
	07 55 - 08 00	300 - 350	5	6		19 49 - 19 56	300	5	8
	08 14 - 09 26	300 - 350	5 - 25	71		20 47 - 20 59	280 - 300	5 - 10	13
	19 58 - 21 01	300	5 - 10	64		22 00 - 22 05	250 - 300	5 - 10	6
	21 16 - 21 26	300	5	11	24-25	23 15 - 00 08	250 - 300	5 - 30	54
9	03 13 - 03 42	270 - 300	5	30	25	00 31 - 00 37	250 - 300	5 - 15	7
	05 01 - 05 04	300	5	4		01 13 - 01 14	250 - 300	5 - 10	2
	07 01 - 07 24	300 - 350	5	24		01 33 - 01 35	280	5 - 10	3
	07 34 - 07 37	300 - 320	5	4		01 49 - 01 59	300	5	11
14	06 01 - 06 27	300	5 - 10	27		06 51 - 07 08	250 - 280	5	18
15	01 04 - 01 06	300 - 320	5	3		07 22 - 07 24	300	5	3
	01 43 - 01 46	300	5	4		07 52 - 08 21	270 - 300	5	30
	02 38 - 02 39	300	5	2		08 40 - 08 50	250 - 280	5	11
	02 48 - 03 11	280 - 300	5	24		18 34 - 19 04	270 - 300	5	31
	03 44 - 03 55	280 - 300	5	12		19 36 - 20 49	250 - 300	5 - 10	74
	04 13 - 04 14	300	5	2		21 37 - 22 48	250 - 350	5 - 35	72
	04 22 - 04 31	300	5 - 10	10	27	19 47 - 19 53	300	5	7
	07 44 - 08 24	300 - 320	5 - 20	41		22 49 - 22 55	280 - 300	5 - 10	7
18	03 31 - 03 44	300	5 - 10	15	28	03 17 - 03 25	270 - 300	5	9
	04 58 - 04 59	300	5	2		02 29 - 02 32	270	5 - 10	4

Date	Time interval	Range (km)	Intensity (dB)	Total time (m)	Date	Time interval	Range (km)	Intensity (dB)	Total time (m)
Mar. 2	01 08 - 01 17	250 - 280	5	10	Mar. 20	22 47 - 23 05	250 - 320	5 - 10	19
	02 01 - 02 03	270	5	3	23	01 26 - 01 31	300	5	6
	02 42 - 02 46	280	5	5		01 36 - 01 44	300 - 350	5 - 10	9
	03 39 - 03 58	270	5	20		04 02 - 05 53	280 - 380	5 - 25	112
	04 20 - 04 23	250 - 270	5	4		19 57 - 19 59	330 - 380	5	3
	05 03 - 05 58	250 - 280	5 - 10	56		20 22 - 20 44	300 - 380	5 - 10	23
	06 50 - 07 42	250 - 320	5 - 20	53		21 18 - 21 35	280 - 300	5 - 15	18
	08 05 - 08 18	250 - 270	5	14		21 56 - 22 00	350 - 400	5	5
	08 32 - 08 37	250 - 270	5	6	24	00 44 - 07 00	270 - 350	5 - 10	377
	19 01 - 19 06	250	5	6		21 07 - 21 45	300 - 370	5	39
	19 31 - 19 49	250 - 280	5	19		23 14 - 23 33	280 - 380	5	20
	22 23 - 22 45	250 - 280	5 - 15	23	24-25	23 52 - 01 09	280 - 330	5 - 10	78
22 56 - 23 38	250 - 270	5 - 10	43	25	01 22 - 06 17	280 - 800	5 - 15	296	
3	00 56 - 01 05	270 - 300	5	10		08 17 - 08 32	300 - 380	5 - 10	16
	05 40 - 06 30	230 - 270	5	51	25-26	23 47 - 01 56	280 - 680	5 - 10	130
	06 52 - 07 00	250	5	9	26	02 12 - 02 28	300	5	17
	07 08 - 07 09	280	5	2		03 05 - 03 36	280 - 300	5 - 10	32
4	05 24 - 05 51	280 - 300	5	28		04 32 - 04 45	300	5	14
7-8	22 24 - 00 52	400 - 600	5	149		06 32 - 06 51	300 - 330	5	20
9	05 40 - 05 46	300	5	7		18 16 - 18 22	800	5	7
16	01 41 - 02 00	650 - 700	5	20		18 33 - 18 37	800	5	5
	02 13 - 02 15	600 - 670	5	3	26-27	20 43 - 05 45	270 - 800	5 - 10	543
	02 28 - 02 35	570 - 680	5	8	27	06 10 - 06 45	280 - 370	5	36
	05 18 - 05 38	300 - 320	5 - 10	21		18 27 - 19 02	600 - 800	5	36
19	02 53 - 02 57	330 - 380	5 - 10	5	28	01 03 - 02 06	300 - 320	5 - 10	64
	08 19 - 09 00	320 - 350	5	42		02 27 - 02 28	280 - 320	5	2
	21 34 - 21 37	290 - 350	5	4		02 49 - 02 52	300	5	4
	22 32 - 23 08	280 - 300	5	37		03 10 - 03 21	300 - 320	5	12
	23 19 - 23 50	280 - 300	5	32		04 28 - 05 14	300 - 380	5	47
20	00 28 - 00 55	300 - 330	5 - 10	28		23 19 - 23 25	300 - 330	5	7
	01 24 - 01 33	300	5	10	29	01 11 - 02 08	300 - 320	5	58
	02 33 - 02 35	300	5	3		02 21 - 02 52	280 - 330	5	32
	02 45 - 02 48	300	5	4					
	03 10 - 03 18	300 - 350	5 - 10	9	Apr. 1-2	23 37 - 00 23	300 - 320	5	47
	04 05 - 04 46	300 - 400	5 - 10	42	2	01 32 - 01 40	300 - 320	5	9
	05 36 - 07 50	300 - 400	5 - 15	135		01 58 - 02 03	370	5	6
	08 46 - 08 58	300 - 400	5 - 10	13		02 47 - 03 00	300 - 320	5	14
18 00 - 18 49	300 - 350	5	50		04 54 - 05 57	300 - 370	5	64	
20 46 - 20 47	320	5	2	3	05 38 - 05 44	300 - 380	5 - 10	7	
21 36 - 21 45	300	5 - 10	10		07 08 - 07 14	320 - 380	5	7	

Date	Time interval	Range (km)	Intensity (dB)	Total time (m)	Date	Time interval	Range (km)	Intensity (dB)	Total time (m)
Apr. 3	07 25 - 08 00	300 - 380	5 - 10	36	May 15	03 34 - 05 49	630 - 700	5	136
7	07 27 - 07 28	580	5	2		18 47 - 22 10	620 - 700	5	204
	03 17 - 03 21	330	5	5	17	03 37 - 03 53	300 - 350	5	17
	04 50 - 04 58	330	5	9		04 05 - 04 12	340	5	8
	05 06 - 05 12	300 - 350	5	7		23 16 - 23 40	300 - 500	5 - 10	25
	05 17 - 05 28	320 - 350	5	12	18	02 57 - 02 58	350 - 370	5 - 10	2
	05 36 - 05 39	300 - 350	5	4		03 02 - 03 05	300 - 350	5	4
	06 02 - 06 31	300 - 480	5 - 10	30		03 31 - 03 37	340	5	7
	08 16 - 08 51	300 - 350	5 - 10	36		03 49 - 03 55	330	5	7
29-30	18 05 - 07 33	350 - 880	5	809		04 06 - 04 08	350	5	3
						23 46 - 23 47	500	5	2
May 1	02 27 - 02 29	300 - 350	5	3	19	00 35 - 00 58	300 - 450	5 - 10	24
	02 34 - 02 56	330 - 880	5	23		02 31 - 02 41	300 - 350	5	11
	03 01 - 03 10	880	5	10		02 51 - 02 57	300 - 350	5	7
1-2	18 02 - 01 03	330 - 880	5 - 10	422		06 18 - 06 19	330	5	2
2	07 02 - 07 11	650	5	10	20	00 04 - 00 09	300 - 380	5 - 15	6
	07 34 - 08 57	600 - 650	5	84		00 46 - 00 47	350	5 - 10	2
3	07 24 - 08 56	600 - 850	5	93		00 54 - 01 11	300 - 480	5 - 10	18
4	23 32 - 23 52	800 - 900	5	21		01 25 - 01 38	300 - 380	5 - 10	14
5	01 35 - 03 26	330 - 900	5	112		01 47 - 01 58	320 - 480	5 - 10	12
	05 32 - 05 37	300 - 350	5	6		02 47 - 02 49	320	5	3
	18 00 - 18 03	600 - 650	5	4		02 55 - 02 58	300 - 330	5 - 10	4
6	02 01 - 02 04	650 - 670	5	4		03 02 - 03 04	330 - 480	5	3
8	21 01 - 21 03	300 - 580	5	3	27	01 20 - 01 25	320 - 480	5	6
	21 47 - 21 55	600 - 800	5	9		01 47 - 01 55	300 - 340	5	9
9	02 07 - 02 08	350	5 - 10	2		02 04 - 02 10	280 - 480	5	7
	02 46 - 02 55	330 - 350	5 - 10	10	13	02 17 - 02 26	350 - 380	5 - 10	10
	18 17 - 18 37	580 - 800	5	21	14	03 29 - 03 42	300 - 500	5 - 15	14
10	00 46 - 01 39	730 - 800	5	54		05 05 - 05 11	350 - 480	5 - 10	7
	02 02 - 02 11	750	5	10		23 02 - 23 05	280 - 300	10 - 20	4
	02 32 - 02 41	700	5 - 10	10	15	07 04 - 07 11	300 - 350	5	8
	03 16 - 05 56	500 - 800	5 - 10	161		22 49 - 23 52	300 - 500	5 - 15	64
	19 35 - 20 12	600 - 680	5	38	16	01 08 - 01 13	300 - 350	5	6
	23 06 - 23 12	670 - 850	5 - 10	7		01 36 - 02 01	300 - 350	5 - 10	26
11	05 01 - 05 26	320 - 350	5	26		06 06 - 06 10	300 - 350	5	5
	07 16 - 07 21	300 - 350	5	6		06 31 - 06 38	300 - 320	5	8
13	01 40 - 01 42	350 - 380	5	3		08 46 - 08 49	300 - 350	5	4
14	18 31 - 21 48	600 - 800	5 - 10	198	17	02 09 - 03 21	300 - 350	5 - 10	73
15	01 01 - 01 34	650 - 700	5	34		05 51 - 05 58	300 - 350	5 - 15	8
	01 49 - 02 58	630 - 700	5	70		06 16 - 06 40	300 - 330	5 - 10	25

Date	Time interval	Range (km)	Intensity (dB)	Total time (m)	Date	Time interval	Range (km)	Intensity (dB)	Total time (m)
May 18	03 02 - 03 07	350	5	6	June 19	06 46 - 07 15	300 - 320	5 - 10	30
	04 39 - 04 58	300 - 350	5	20		08 19 - 08 32	280 - 330	5 - 10	14
21	02 16 - 02 19	300 - 350	5 - 10	4	21 53 - 22 02	300 - 330	5	10	
	04 33 - 04 36	300	5 - 15	4	22 51 - 23 02	300 - 400	5 - 15	12	
	04 49 - 04 55	300 - 350	5 - 10	7	23 27 - 23 35	280 - 350	5	9	
	06 10 - 08 40	280 - 330	5 - 30	151	20 05 04 - 05 20	300	5	17	
22	02 34 - 07 31	270 - 350	5 - 15	298	05 49 - 07 28	300 - 350	5 - 10	100	
24	00 56 - 00 58	300 - 330	5	3	07 58 - 08 24	280 - 320	5 - 10	27	
28	06 01 - 06 04	500	5	4	23 48 - 23 52	280 - 300	5	5	
					21 01 50 - 01 51	280	5	2	
June 9	05 28 - 06 11	250 - 300	5 - 10	44	02 13 - 02 16	300 - 330	5	4	
	06 27 - 06 34	250 - 300	5 - 10	8	24 03 22 - 03 31	300	5 - 10	10	
10	06 33 - 06 34	300	5	2	03 38 - 04 58	300 - 320	5 - 15	81	
	22 31 - 22 39	250 - 320	5 - 15	9	05 29 - 06 17	300 - 330	5 - 15	49	
	22 46 - 23 00	280 - 450	5 - 15	15	06 50 - 07 17	300 - 320	5 - 15	28	
	23 35 - 23 48	300 - 350	5 - 10	14	21 54 - 22 00	300 - 330	5	7	
11	00 01 - 01 17	280 - 730	5 - 25	77	28 05 37 - 06 45	280 - 380	5 - 10	69	
	04 17 - 04 27	320 - 350	5 - 10	11	29 02 01 - 03 08	270 - 330	5 - 10	68	
12	00 46 - 00 47	350 - 450	5 - 10	2	03 53 - 04 19	300 - 350	5 - 20	27	
	01 19 - 01 25	320 - 350	5 - 10	7	06 00 - 07 39	300 - 360	5 - 15	100	
	01 32 - 01 45	300 - 470	5 - 15	14	08 02 - 08 44	300 - 320	5 - 15	43	
	02 10 - 02 20	320 - 350	5 - 10	11	19 05 - 19 17	300 - 330	5 - 10	13	
	02 35 - 02 37	330	5	3	20 57 - 21 10	300 - 330	5	14	
	03 47 - 03 54	280 - 450	5 - 10	8	21 16 - 21 58	300 - 340	5	43	
	04 20 - 07 14	280 - 420	5 - 10	175	22 05 - 22 57	300 - 320	5	53	
13-14	23 46 - 00 12	270 - 330	5 - 10	27	30 02 17 - 03 03	300 - 330	5 - 15	47	
14	04 26 - 05 11	270 - 300	5 - 10	46	05 12 - 05 19	300	5	8	
	05 53 - 06 13	280 - 450	5 - 10	21	06 02 - 06 08	300 - 320	5	7	
16	01 32 - 09 00	210 - 520	5 - 10	449	06 35 - 06 50	300 - 330	5 - 10	16	
17	02 23 - 02 47	300 - 380	5 - 10	25					
	04 44 - 05 04	300 - 320	5 - 10	21	July 1 01 43 - 02 05	300 - 350	5 - 15	23	
17-18	23 55 - 01 14	880 - 900	5	80	03 28 - 03 42	300 - 350	5 - 10	15	
18	03 43 - 05 13	300 - 350	5 - 10	91	04 35 - 04 46	280 - 350	5	12	
	07 05 - 07 08	300	5	4	07 27 - 08 55	300 - 330	5 - 10	89	
	08 03 - 08 28	300 - 320	5 - 10	26	09 08 - 09 26	300 - 340	5 - 10	19	
	08 50 - 09 00	300 - 320	5 - 10	11	21 11 - 21 20	300	5	10	
	21 43 - 21 53	300 - 400	5 - 10	11	21 57 - 21 59	300	5	3	
19	02 46 - 02 59	270 - 350	5 - 15	14	22 06 - 22 29	280 - 300	5	24	
	03 07 - 04 09	280 - 340	5 - 15	63	2 03 42 - 04 01	300 - 330	5	20	
	04 41 - 05 50	300 - 330	5 - 10	70	05 25 - 05 42	300	5	18	

Date	Time interval	Range (km)	Intensity (dB)	Total time (m)	Date	Time interval	Range (km)	Intensity (dB)	Total time (m)
July 3	05 44 - 06 01	280 - 320	5	18	July 25	06 53 - 07 36	310 - 440	5 - 15	44
4	03 34 - 03 46	300 - 320	5 - 10	13		08 49 - 08 52	350	5	4
8	06 40 - 07 30	280 - 330	5 - 10	51	26	00 25 - 00 34	320 - 490	5	10
	18 00 - 19 13	270 - 330	5	74		03 09 - 03 55	300 - 460	5 - 10	47
9	01 13 - 01 32	300 - 350	5 - 20	20		05 22 - 07 01	330 - 430	5 - 10	100
	20 16 - 20 48	300 - 330	5	33		07 48 - 08 06	300 - 370	5	19
10	03 00 - 03 13	300 - 370	5	14					
	04 10 - 05 23	280 - 300	5 - 15	74	Aug. 1	23 26 - 23 53	320 - 450	5	28
11	03 48 - 04 24	300 - 320	5 - 10	37	2	02 47 - 02 52	350 - 460	5 - 10	6
	05 25 - 05 35	300	5 - 10	11		04 50 - 06 50	300 - 700	5 - 20	121
12	00 26 - 00 27	310	5 - 20	2	3	03 19 - 03 23	600 - 820	5 - 10	5
	04 14 - 04 21	320	5	8	8	03 59 - 07 00	350 - 800	5 - 20	182
	04 37 - 06 21	300 - 320	5 - 10	105	9	02 44 - 04 29	320 - 700	5 - 10	106
14	00 29 - 00 46	300 - 310	5	18		04 56 - 05 36	350 - 750	5 - 10	41
	04 29 - 06 24	290 - 400	5 - 15	116		06 33 - 06 48	350 - 450	5	16
15	03 01 - 08 36	280 - 380	5 - 35	336	10	03 31 - 04 18	330 - 750	5 - 20	48
	20 21 - 21 00	300 - 330	5	40	14	00 36 - 00 39	320	5 - 10	4
	22 18 - 23 20	280 - 300	5 - 15	63		01 48 - 01 52	340 - 380	5 - 10	5
16	01 27 - 03 10	290 - 370	5 - 25	104		02 26 - 02 29	340	5	4
	03 40 - 07 33	300 - 400	5 - 30	234		03 12 - 04 30	310 - 700	5 - 20	79
	22 25 - 22 36	280 - 300	5 - 35	12	15	03 49 - 03 59	430 - 700	5 - 15	11
	23 12 - 23 16	300	5	5	16	04 34 - 04 50	350 - 700	5 - 10	17
17	03 48 - 04 31	300 - 380	5 - 10	44	18	02 38 - 02 44	350 - 450	5	7
18	01 56 - 02 04	300 - 310	5	9	20	01 12 - 01 38	300 - 350	5 - 15	27
	02 30 - 04 22	300 - 380	5 - 10	113	21	06 51 - 07 59	300 - 350	5 - 20	69
	04 54 - 05 30	300 - 360	5 - 10	37	22	03 21 - 03 26	300 - 340	5	6
20	00 47 - 01 32	300 - 350	5 - 40	46		20 39 - 21 27	300 - 350	5 - 20	49
	04 34 - 06 18	300 - 350	5 - 10	105		22 12 - 23 24	300 - 350	5 - 10	73
20-21	21 24 - 00 13	300 - 370	5	170	23	00 50 - 01 50	290 - 470	5 - 40	61
21	02 29 - 02 55	300 - 350	5 - 15	27		03 35 - 05 12	280 - 350	5 - 15	98
	04 03 - 04 41	300 - 370	5	39		05 21 - 05 27	360	5	7
22	02 24 - 02 28	320	5 - 10	5		06 21 - 06 44	300 - 330	5 - 10	24
	02 41 - 03 11	300 - 380	5 - 15	31		07 17 - 07 33	270 - 350	5	17
	03 23 - 03 29	300 - 360	5	7		08 01 - 08 29	320 - 360	5 - 10	29
	04 46 - 04 54	300	5	9		18 05 - 19 48	300 - 370	5 - 10	104
	22 34 - 22 56	350 - 380	5	23		20 05 - 21 05	300 - 430	5 - 35	61
23	03 56 - 05 07	300 - 800	5 - 35	72		22 02 - 23 45	270 - 400	5 - 35	104
25	03 29 - 03 32	330 - 420	5 - 10	4	24	02 28 - 02 48	270 - 370	5 - 10	21
	03 38 - 05 21	300 - 440	5 - 15	104		03 11 - 04 02	280 - 360	5 - 10	52
	06 21 - 06 37	320 - 360	5 - 10	17		04 30 - 04 37	300 - 330	5	8

Date	Time interval	Range (km)	Intensity (dB)	Total time (m)	Date	Time interval	Range (km)	Intensity (dB)	Total time (m)
Aug. 24	06 12 - 06 21	300 - 370	5	10	Sep. 6	04 30 - 06 41	300 - 350	5	132
	06 35 - 06 40	300	5	6		19 01 - 20 06	320 - 370	5	66
	06 57 - 07 14	270 - 340	5	18	7	06 33 - 08 10	300 - 360	5	98
	07 43 - 07 48	310 - 340	5	6	8	00 04 - 00 14	320 - 380	5	11
	08 26 - 08 32	300 - 350	5 - 10	7		00 27 - 00 37	320 - 400	5 - 10	11
	21 57 - 22 09	300 - 350	5	13	9	19 43 - 19 46	300 - 320	5	4
	23 15 - 23 18	300 - 320	5 - 10	4		22 44 - 22 47	310	5	4
	23 32 - 23 56	300 - 470	5 - 15	25	9-10	22 49 - 01 03	270 - 390	5 - 15	135
25	01 04 - 02 18	280 - 350	5 - 40	75	10	01 47 - 02 29	300 - 360	5 - 10	43
	04 25 - 09 00	280 - 350	5 - 25	276		05 17 - 05 22	300	5	6
	19 31 - 19 53	300 - 360	5	23		22 02 - 22 43	290 - 360	5 - 15	42
26	23 11 - 23 21	280 - 300	5	11	11	03 12 - 06 25	280 - 400	5 - 20	194
	03 00 - 04 26	280 - 450	5 - 20	87		07 27 - 07 56	300 - 320	5	30
	05 18 - 05 42	290 - 340	5 - 10	25	12	01 39 - 01 41	310 - 350	5	3
	06 28 - 06 37	330 - 370	5	10		03 19 - 03 22	350 - 410	5 - 10	4
28	06 52 - 07 15	300 - 330	5	24		03 31 - 05 07	290 - 350	5 - 10	97
	07 44 - 08 35	300 - 360	5 - 10	52	13	21 22 - 21 30	300 - 320	5	9
	02 07 - 08 27	280 - 360	5 - 25	381		22 33 - 23 16	290 - 360	5 - 10	44
	18 02 - 18 56	300 - 360	5	55	14	01 47 - 01 50	330	5	4
	19 10 - 22 31	300 - 350	5	202		03 21 - 03 25	300 - 350	5	5
29	00 34 - 04 58	280 - 370	5 - 25	265		03 30 - 03 42	300 - 340	5	13
	05 14 - 05 18	300 - 330	5	5		06 26 - 06 30	320	5	5
	05 34 - 06 03	300 - 350	5 - 10	30	15	04 38 - 04 49	330	5	12
	21 20 - 21 43	300 - 320	5	24		20 57 - 21 00	310	5	4
30	23 05 - 23 11	330	5	7	16	01 29 - 03 33	300 - 400	5 - 40	125
	01 59 - 02 22	280 - 330	5 - 15	24		04 32 - 05 27	300 - 360	5 - 10	56
	07 09 - 08 28	300 - 330	5 - 10	80		05 58 - 07 16	300 - 350	5 - 10	79
31	23 15 - 23 29	300 - 330	5	15		07 51 - 09 00	300 - 370	5 - 10	70
	02 26 - 04 22	290 - 370	5 - 10	117	17	01 27 - 01 44	650 - 670	5	18
	05 05 - 05 13	300 - 360	5	9		03 08 - 04 29	300 - 900	5	82
	06 01 - 07 46	300 - 380	5 - 10	106		06 09 - 06 17	300 - 350	5	9
Sep. 1	04 54 - 05 04	300	5	11		07 15 - 08 07	300 - 370	5 - 10	53
	01 11 - 02 23	270 - 370	5 - 20	73	18	00 51 - 00 56	300 - 360	5 - 10	6
	00 17 - 01 24	280 - 360	5 - 15	68		03 00 - 03 03	310 - 350	5	4
	03 46 - 05 13	300 - 330	5 - 15	88		05 30 - 05 33	290 - 320	5	4
	02 51 - 03 55	290 - 370	5 - 10	65	20	05 34 - 05 43	300 - 330	5	10
	04 07 - 05 34	300 - 370	5	88		00 40 - 00 51	330 - 900	5	12
	06 18 - 07 28	300 - 360	5 - 15	71		03 15 - 03 20	300 - 380	5 - 10	6
	23 27 - 23 47	280 - 350	5	21		03 46 - 04 10	300 - 330	5	25
						05 18 - 05 26	310 - 380	5	9

Date	Time interval	Range (km)	Intensity (dB)	Total time (m)	Date	Time interval	Range (km)	Intensity (dB)	Total time (m)
Sep. 22	22 46 - 23 14	300 - 350	5 - 10	29	Oct. 3	02 37 - 02 55	330 - 600	5 - 10	19
23	00 09 - 00 16	330 - 480	5 - 10	8		03 31 - 08 54	300 - 700	5 - 20	324
	00 52 - 03 50	300 - 510	5 - 35	179	4	01 49 - 01 53	340 - 830	5 - 15	5
	04 22 - 09 00	300 - 450	5 - 20	280		02 25 - 02 32	450 - 600	5 - 10	8
	18 05 - 18 12	300 - 340	5 - 10	8	6	21 37 - 21 52	320 - 400	5	16
	18 28 - 18 31	320 - 350	5	4		23 06 - 23 12	290 - 350	5 - 10	7
	20 12 - 20 33	310 - 380	5 - 10	22	7	02 21 - 02 50	280 - 550	5 - 10	30
24	00 52 - 04 15	280 - 650	5 - 20	204		03 43 - 04 34	320 - 380	5	52
	06 01 - 08 12	300 - 450	5 - 15	132		05 53 - 06 01	350 - 370	5	9
	18 09 - 19 13	320 - 350	5 - 10	65	8	02 10 - 02 18	320 - 390	5 - 10	9
	19 31 - 20 33	300 - 450	5 - 10	63		02 43 - 03 04	330 - 450	5	22
25	00 08 - 01 53	310 - 750	5 - 40	106		03 45 - 04 09	310 - 470	5 - 10	25
	02 04 - 02 16	350 - 450	5 - 15	13		05 27 - 05 41	350	5	15
	02 39 - 02 42	350	5 - 10	4		05 56 - 06 03	370	5	8
	04 08 - 04 16	460	5 - 10	9		06 08 - 06 19	330 - 370	5	12
25-26	23 25 - 01 47	300 - 820	5 - 40	143	9	02 00 - 02 09	300 - 360	5	10
26	02 20 - 02 23	380	5	4		02 27 - 02 35	350	5	9
	02 27 - 02 39	300 - 500	5 - 10	13		03 17 - 03 26	320 - 360	5	10
	03 01 - 03 11	420 - 600	5	11		03 52 - 03 59	360	5	8
	05 53 - 06 21	330 - 600	5 - 20	29	9-10	23 09 - 00 27	250 - 480	5 - 40	79
	18 03 - 20 46	350 - 470	5 - 10	164	10	00 59 - 02 06	300 - 380	5 - 10	68
27	18 02 - 19 15	350 - 450	5	74		02 36 - 02 59	290 - 360	5 - 10	24
28	02 34 - 03 31	330 - 700	5 - 20	58		03 21 - 03 27	320 - 360	5	7
29	04 46 - 05 45	320 - 720	5 - 10	60		03 39 - 03 45	330 - 370	5	7
	06 13 - 06 23	360 - 470	5	11		04 06 - 04 16	320 - 360	5	11
30	01 53 - 02 23	350 - 730	5 - 10	31		05 01 - 05 12	290 - 370	5	12
	02 52 - 03 13	350 - 780	5 - 10	22		05 39 - 05 45	310 - 340	5	7
	03 26 - 03 29	700 - 800	5	4		05 53 - 05 57	300 - 350	5	5
						06 40 - 08 09	300 - 360	5 - 10	90
Oct. 1	01 41 - 03 34	330 - 460	5 - 15	114		18 33 - 19 14	340 - 370	5 - 10	42
	04 41 - 06 16	330 - 450	5 - 10	96		23 35 - 23 37	370	5 - 10	3
1-2	23 04 - 00 33	750 - 850	5	90	10-11	23 41 - 03 56	300 - 450	5 - 15	256
2	01 00 - 01 06	450	5	7	12	02 23 - 02 56	330 - 450	5 - 10	34
	01 50 - 01 57	350 - 600	5 - 10	8		03 25 - 03 31	350	5	7
	03 57 - 04 01	350 - 460	5	5		03 46 - 03 58	340 - 360	5	13
	04 29 - 04 35	430 - 460	5 - 10	7		07 27 - 08 38	300 - 420	5 - 10	72
	07 43 - 09 53	320 - 700	5 - 20	131	13	01 20 - 01 27	300 - 340	5	8
	22 30 - 22 39	350 - 450	5 - 20	10		01 52 - 06 28	280 - 450	5 - 15	277
	23 02 - 23 17	370 - 730	5 - 15	16	13-14	23 44 - 01 01	320 - 450	5 - 10	78
3	01 44 - 02 12	350 - 630	5 - 10	29	14	01 36 - 01 39	330	5 - 10	4

Date	Time interval	Range (km)	Intensity (dB)	Total time (m)	Date	Time interval	Range (km)	Intensity (dB)	Total time (m)
Oct. 15	04 03 - 05 15	300 - 380	5	73	Nov. 8	02 03 - 02 33	330 - 450	5	31
16	22 51 - 23 03	300 - 640	5 - 10	12	14	01 16 - 01 19	350	5	4
16-17	23 18 - 00 26	290 - 450	5 - 20	69	21	03 55 - 06 30	300 - 430	5 - 10	156
17	01 08 - 01 39	280 - 600	5 - 15	32		22 20 - 22 43	300 - 500	5 - 15	24
	04 18 - 07 29	270 - 450	5 - 20	192	22	00 01 - 00 51	300 - 470	5 - 25	51
	20 56 - 21 02	320 - 380	5 - 10	7		01 45 - 01 53	330 - 360	5	9
	22 37 - 23 05	290 - 360	5 - 25	29	24	21 44 - 22 39	300 - 380	5 - 15	56
18	00 06 - 00 11	310 - 340	5	6	25	00 10 - 01 01	290 - 600	5 - 35	52
	01 15 - 01 31	290 - 500	5 - 25	17		02 37 - 02 53	320 - 380	5	17
	03 39 - 03 43	340	5	5		03 45 - 04 14	320 - 380	5 - 10	30
19	01 34 - 01 49	330 - 380	5 - 10	16		06 06 - 06 53	300 - 470	5	48
	02 17 - 03 07	320 - 450	5 - 10	51		18 02 - 18 35	330 - 360	5	34
	08 34 - 08 51	330 - 360	5 - 10	18		23 08 - 23 19	310 - 470	5 - 10	12
	08 55 - 09 00	320 - 350	5	6	25-26	23 39 - 00 13	300 - 430	5	35
20	07 16 - 07 56	300 - 450	5 - 10	41	26	02 50 - 02 54	360 - 430	5	5
21	02 15 - 02 19	320 - 350	5	5		03 10 - 03 45	300 - 350	5	36
	02 47 - 03 05	320 - 450	5 - 10	19		06 55 - 07 02	330	5	8
	04 03 - 04 15	310 - 360	5 - 10	13		07 17 - 07 32	300 - 350	5	16
	04 50 - 05 01	320 - 360	5	12					
	21 20 - 21 24	350	5	5	Dec. 3	21 00 - 22 25	300 - 450	5	86
	22 37 - 22 47	320 - 380	5	11	4	01 35 - 01 45	300 - 390	5 - 10	11
	23 07 - 23 21	300 - 360	5 - 10	15		02 47 - 02 52	300 - 430	5	6
22	00 55 - 01 07	350 - 430	5 - 15	13		04 22 - 04 29	300	5	8
	01 20 - 01 29	350	5	10		18 37 - 20 13	300 - 450	5 - 10	97
	02 08 - 04 44	300 - 450	5	157	5	00 52 - 01 24	300 - 800	5 - 15	33
	05 39 - 05 50	300 - 350	5	12		03 26 - 03 39	330 - 450	5	14
	07 40 - 07 49	300 - 350	5	10		04 44 - 05 12	300 - 450	5	29
23	00 21 - 00 33	320 - 340	5	13		07 02 - 07 06	320 - 350	5	5
24	07 17 - 08 22	320 - 370	5	66	6	00 19 - 00 34	300 - 450	5 - 25	16
27	22 36 - 22 39	300 - 380	5 - 15	4		01 05 - 01 39	300 - 450	5 - 25	35
28	22 00 - 22 04	350	5 - 10	5		02 27 - 02 42	250 - 450	5 - 30	16
29	04 55 - 06 53	280 - 450	5 - 10	119		05 51 - 06 45	320 - 350	5	55
	08 19 - 08 36	320 - 370	5	18		08 01 - 08 35	250 - 380	5	35
31	00 16 - 00 38	330 - 350	5	23	8	05 48 - 06 36	300 - 350	5	49
	04 28 - 04 34	340	5 - 10	7	9	05 03 - 05 29	300 - 350	5	27
	06 14 - 09 00	300 - 460	5 - 15	167		07 11 - 07 25	320 - 370	5	15
						18 16 - 18 58	320 - 350	5	43
Nov. 5	23 51 - 23 54	340	5 - 10	4		19 02 - 19 39	350	5	38
6	01 36 - 03 07	300 - 430	5 - 10	92		20 41 - 21 42	300 - 350	5	62
7	01 36 - 01 59	300 - 350	5	24	10	00 06 - 02 29	300 - 680	5 - 15	144

Date	Time interval	Range (km)	Intensity (dB)	Total time (m)	Date	Time interval	Range (km)	Intensity (dB)	Total time (m)
Dec. 10	04 54 - 05 02	300 - 350	5	9	Dec. 23	06 38 - 06 47	300 - 320	5	10
11	02 16 - 03 28	300 - 450	5 - 10	73	1974				
	04 30 - 04 34	400 - 470	5 - 10	5	Jan. 2	03 43 - 04 08	270 - 330	5 - 15	26
13	06 29 - 07 11	300 - 450	5 - 10	43	3	07 16 - 07 26	280 - 300	5 - 10	11
17	07 29 - 08 10	300 - 350	5	42	4	02 42 - 03 22	260 - 290	5 - 10	41
19	20 47 - 21 10	280 - 370	5	24		22 44 - 22 55	260 - 300	5	12
20	06 52 - 08 07	280 - 410	5	76	5	03 31 - 03 37	270 - 400	5 - 15	7
	19 20 - 20 04	250 - 450	5	45		03 54 - 03 58	270 - 400	5 - 15	5
21	19 47 - 20 08	300 - 350	5 - 25	22		05 46 - 05 52	300	5 - 10	7
	22 03 - 22 06	350	5	4		08 05 - 08 49	300	5 - 10	45
22	00 41 - 00 51	300 - 550	5 - 10	11	6	01 58 - 02 03	260 - 290	5 - 10	6
	04 02 - 04 28	300 - 450	5 - 10	27		02 52 - 02 57	240 - 290	5 - 10	6
23	01 15 - 01 19	270 - 400	5 - 10	5		03 06 - 03 19	260 - 400	5 - 10	14
	01 33 - 01 36	300 - 800	5 - 10	4		07 31 - 07 36	270 - 300	5 - 10	6
	02 01 - 02 17	300 - 430	5 - 10	17	8	20 41 - 21 32	200 - 300	5 - 10	52
	03 07 - 03 13	310	5	7	10	07 31 - 08 51	260 - 300	5 - 20	81
	05 39 - 05 41	320	5	3					

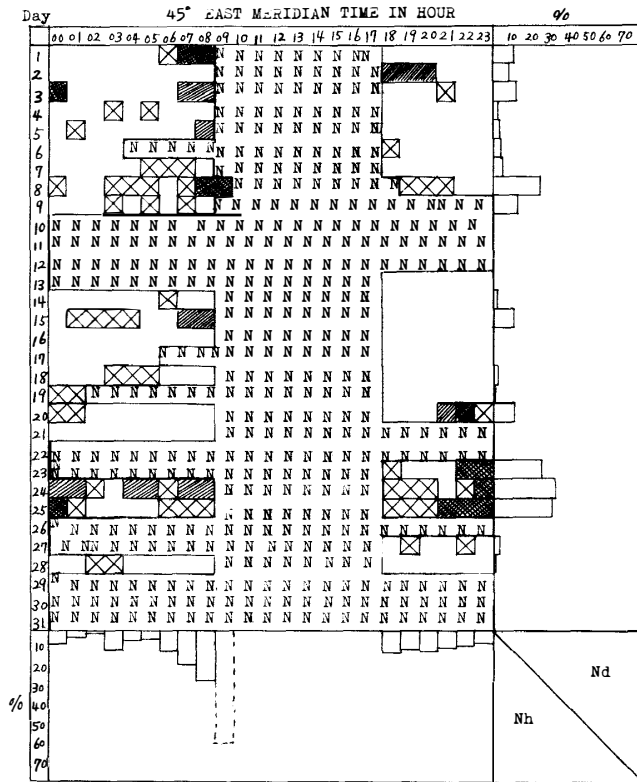


Fig. 1(a) February 1973

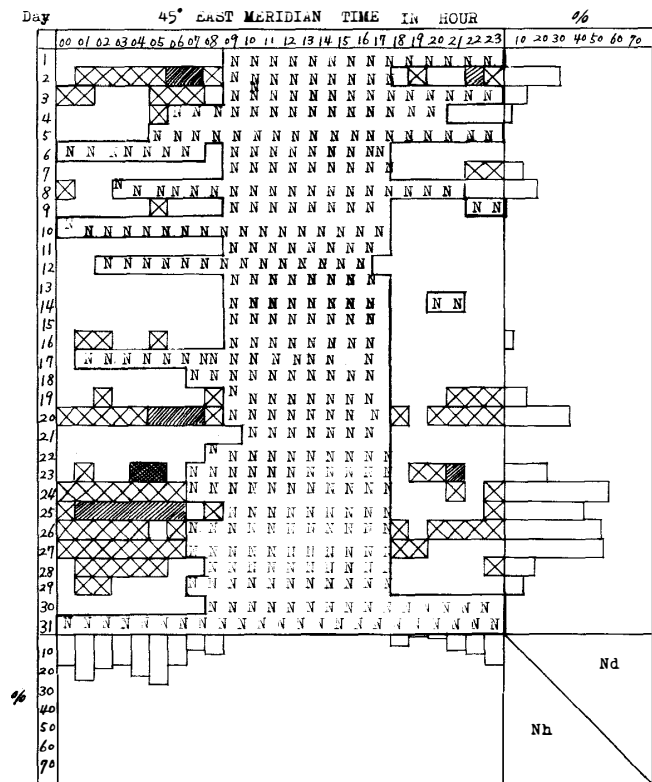





Fig. 1(b) March 1973

Note: Nd and Nh denote daily and hourly occurrence frequencies, together with the auroral echo intensity indices 1, 2, and 3, in the relevant month, respectively.

Index 1  Index 2  Index 3 

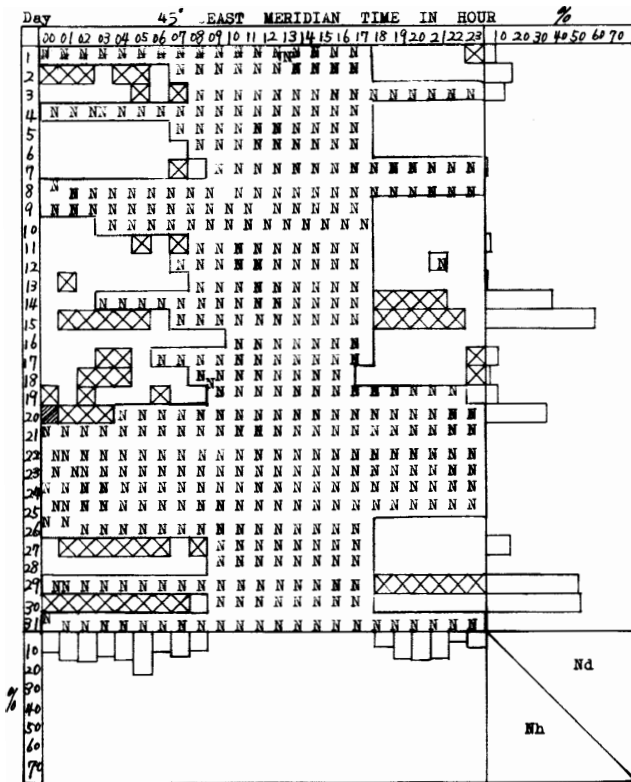


Fig. 1(c) April 1973

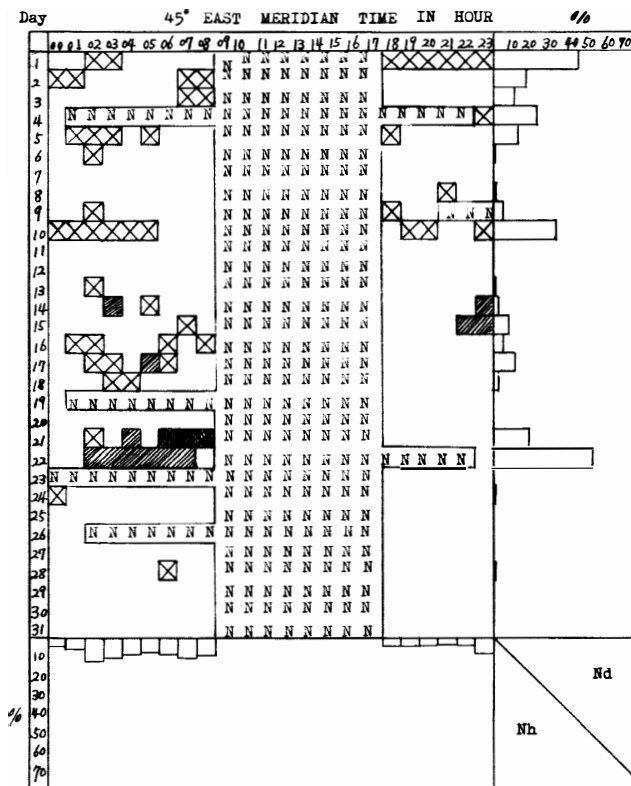





Fig. 1(d) May 1973

Note: Nd and Nh denote daily and hourly occurrence frequencies, together with the auroral echo intensity indices 1, 2, and 3, in the relevant month, respectively.

Index 1  Index 2  Index 3 

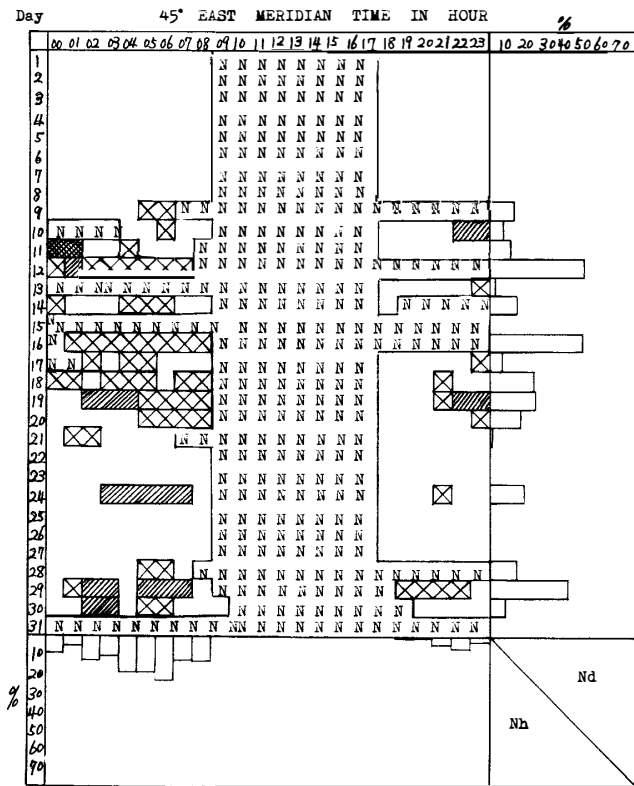


Fig. 1(e) June 1973

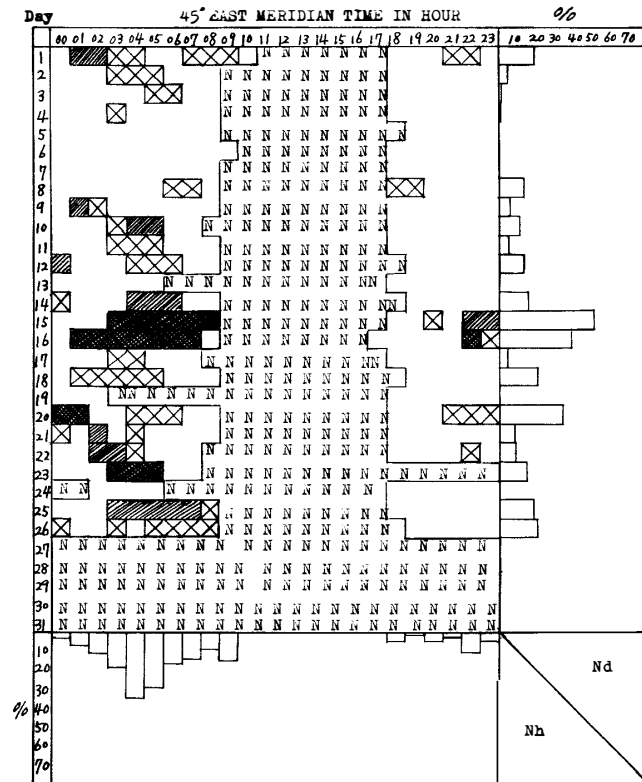





Fig. 1(f) July 1973

Note: Nd and Nh denote daily and hourly occurrence frequencies, together with the auroral echo intensity indices 1, 2, and 3, in the relevant month, respectively.

Index 1  Index 2  Index 3 

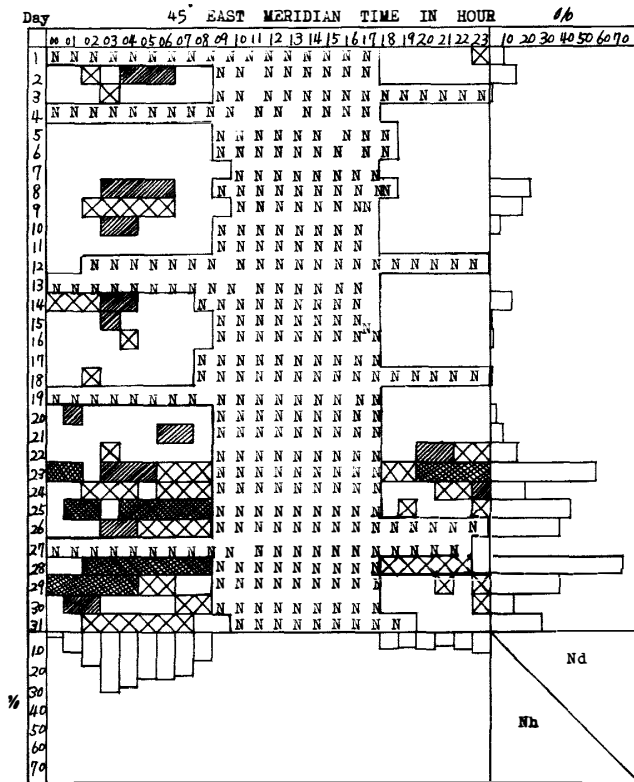


Fig. 1(g) August 1973

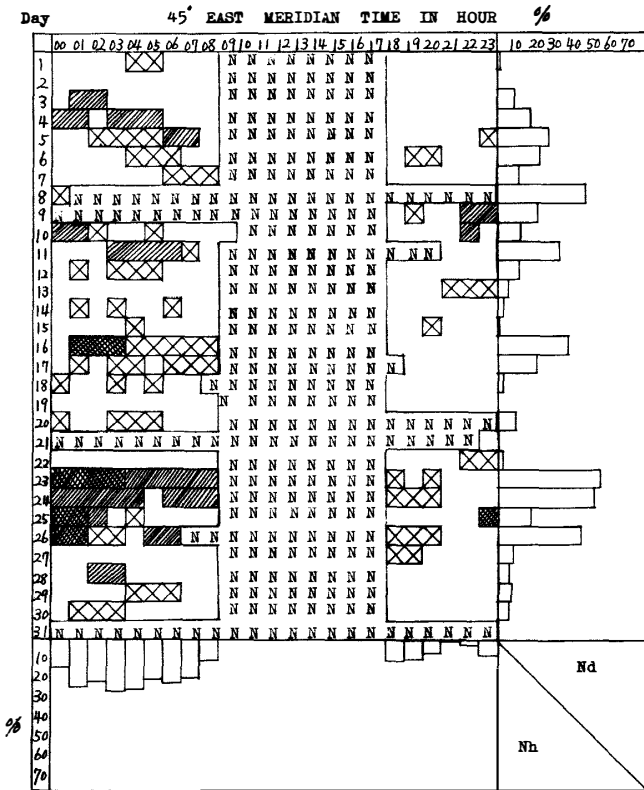





Fig. 1(h) September 1973

Note: Nd and Nh denote daily and hourly occurrence frequencies, together with the auroral echo intensity indices 1, 2, and 3, in the relevant month, respectively.

Index 1  Index 2  Index 3 

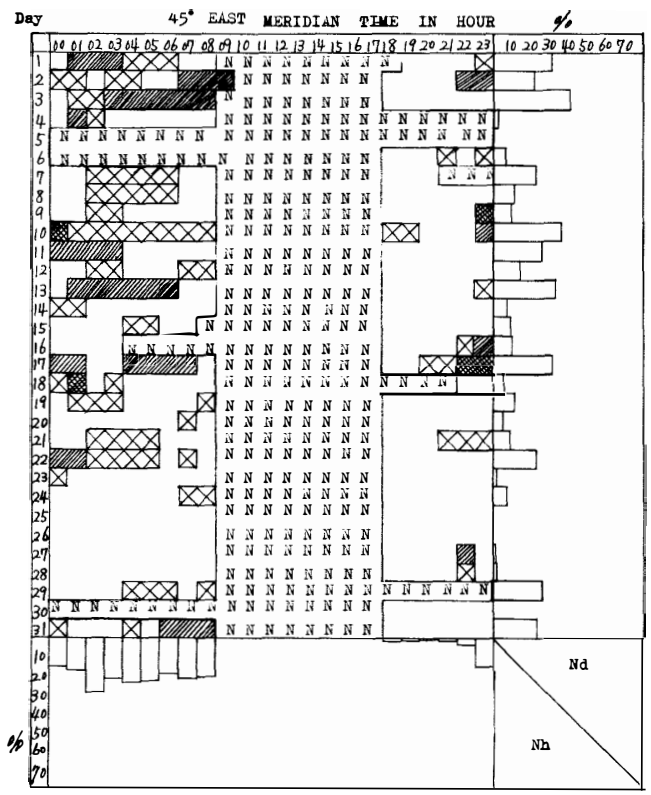


Fig. 1(i) October 1973

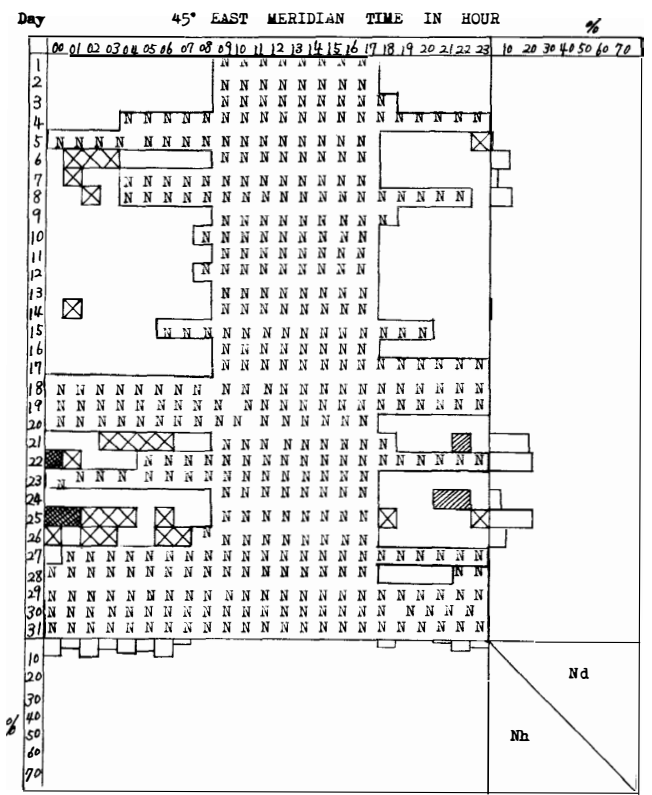





Fig. 1(j) November 1973

Note: Nd and Nh denote daily and hourly occurrence frequencies, together with the auroral echo intensity indices 1, 2, and 3, in the relevant month, respectively.

Index 1  Index 2  Index 3 

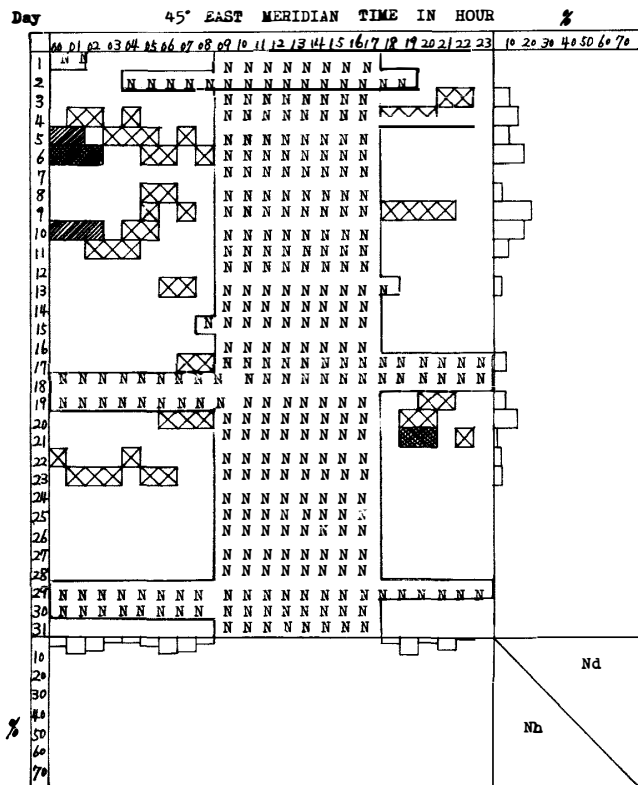


Fig. 1(k) December 1973

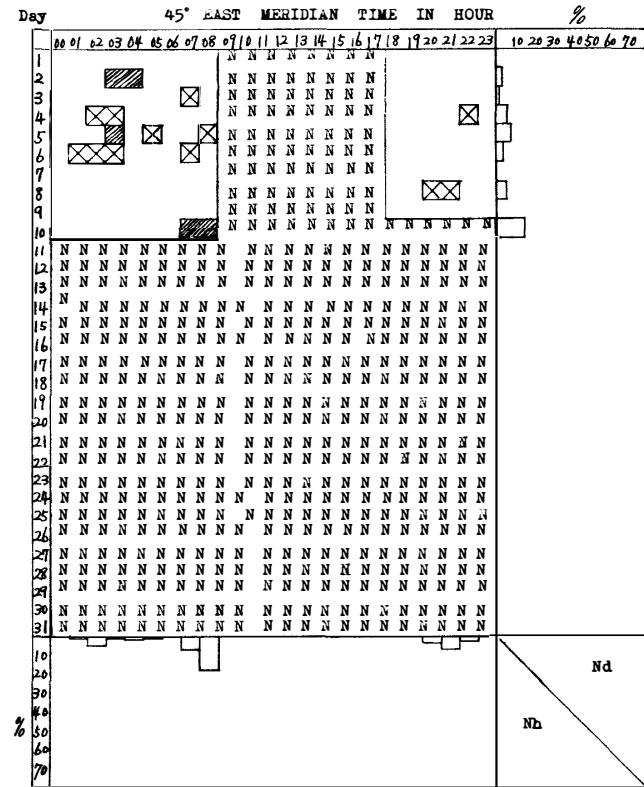




Fig. 1(l) January 1974

Note: Nd and Nh denote daily and hourly occurrence frequencies, together with the auroral echo intensity indices 1, 2, and 3, in the relevant month, respectively.

Index 1  Index 2  Index 3 