FEDERAL SERVICE OF RUSSIA FOR HYDROMETEOROLOGY AND ENVIRONMENTAL MONITORING

Russian Federation State Research Center

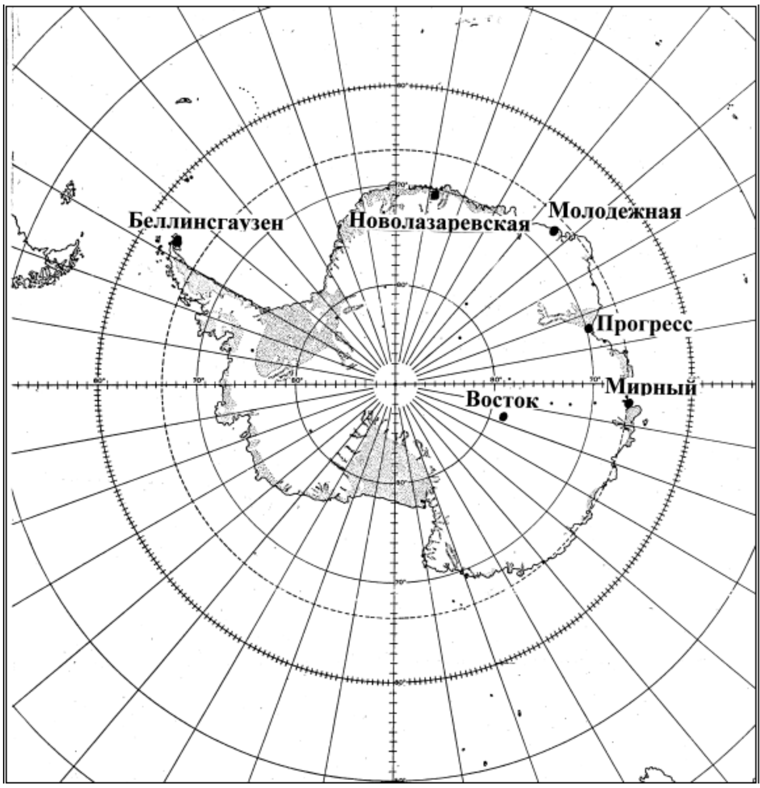
Arctic and Antarctic Research Institute

RUSSIAN ANTARCTIC EXPEDITION

STATE OF ANTARCTIC ENVIRONMENT

Operational data of Russian Antarctic stations

JULY-SEPTEMBER 2000



St. Petersburg

2001

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EDITED BY V.V. LUKIN

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CONTENT

PREFACE

The Bulletin is prepared on the basis of data reported from the Russian Antarctic stations in the on-line mode via the communication channels. Section I of this issue contains monthly averages and their anomalies of data, based on standard meteorological and actinometric observations and upper-air sounding and data of geophysical observations at the Russian Antarctic stations for the third quarter of 2000.

Standard meteorological observations are currently carried out at Mirny, Novolazarevskaya, Bellingshausen and Vostok stations. The upper-air sounding is undertaken at two Russian stations - at Mirny Observatory and at Novolazarevskaya station once a day at 00.00 UT. More frequent sounding is conducted at both stations during the International Geophysical Intervals (IGI) in accordance with the International Geophysical Calendar.

In the meteorological tables, the atmospheric pressure for the coastal stations is referenced to sea level whereas for the inland Vostok station located at a height of almost 3500 m, it is given at the station level.

As characteristics of the anomalous meteorological and upper-air parameters, the absolute anomalies (deviations from multiyear averages), ($f-f_{avg}$), normalized anomalies (same differences in σ_f fractions - ($f-f_{avg}$)/ σ_f) and relative anomalies f/f_{avg} are presented. The latter are typically given for the meteorological parameters that are characterized by a significant variability, for example, for the monthly precipitation sums and total radiation. The statistical characteristics necessary for calculation of anomalies were derived at the AARI Department of Meteorology for the period 1961-1990 as recommended by the World Meteorological Organization.

The geophysical observation data published in the Bulletin are collected at Mirny Observatory and Vostok station under the geomagnetic and ionosphere programs (magnetic and riometer observations and vertical ionosphere sounding (VIS)). The absolute geomagnetic field values (D, H and Z components) are presented in the tables (the declination is western at both stations (D_w) with a negative Z-component). Based on the results of riometer observations, the daily maximum radiowave absorption is given in decibels (at the 32 MHz operating riometer frequency). The conventional designations denote the “auroral absorption” (AA) and the “polar cap absorption” (PCA) events. Based on the results of vertical ionosphere sounding, daily f0 critical frequencies in the F2 layer for 00 UT and 12 UT are given. The Bulletin also publishes information on the magnetic activity index (PC-index), whose calculation is included to the geomagnetic observation program at Vostok station.

In addition to the observation data, the Bulletin contains brief overviews with an assessment of the anomalous state of the Antarctic environment based on actual data. Sections II and III are devoted to meteorological and synoptic conditions. The analysis of ice conditions in the Southern Ocean (Section IV) is performed using satellite data received at the Bellingshausen, Novolazarevskaya and Mirny stations and from observations at the coastal stations (Bellingshausen, Progress and Mirny). The anomalous character of ice conditions is assessed against the multiyear averages of the drifting ice edge location and the multiyear averages of the onset of different ice phases in the coastal areas adjoining the Antarctic stations. The information used was obtained at the AARI Ice Regime and Forecasting Department over the period 1971-1995.

Section V presents an overview of the total ozone (TO) level based on measurements at Mirny Observatory (the observations were resumed on August 10, 2000 after the end of polar night).

Section VI contains information on seismic observations undertaken in 1999 at Mirny Observatory and Novolazarevskaya that are stationary stations of the Geophysical Survey of the Russian Academy of Science (RAS GS). Primary data were delivered to the RAS GS in May 2000 after the return of the 44th winter RAE participants.

The last Section VII is traditionally devoted to the main directions and events of RAE logistics activity during the period under consideration.

RUSSIAN ANTARCTIC STATIONS IN OPERATION IN 2000

MIRNY OBSERVATORY

STATION SYNOPTIC INDEX	**89592**
METEOROLOGICAL SITE HEIGHT ABOVE SEA LEVEL	**39.9 m**
GEOGRAPHICAL COORDINATES	**φ = 66°33′ S; λ = 93°01′ E**
GEOMAGNETIC COORDINATES	**Φ = -76.8°; Δ = 151.1°**
BEGINNING AND END OF POLAR DAY	**7 December – 5 January**
BEGINNING AND END OF POLAR NIGHT	**No**

NOVOLAZAREVSKAYA STATION

STATION SYNOPTIC INDEX	**89512**
METEOROLOGICAL SITE HEIGHT ABOVE SEA LEVEL	**119 m**
GEOGRAPHICAL COORDINATES	**φ = 70°46′ S; λ = 11°50′ E**
BEGINNING AND END OF POLAR DAY	**15 November - 28 January**
BEGINNING AND END OF POLAR NIGHT	**21 May - 23 July**

BELLINGSHAUSEN STATION

STATION SYNOPTIC INDEX	**89050**
METEOROLOGICAL SITE HEIGHT ABOVE SEA LEVEL	**14.3 m**
GEOGRAPHICAL COORDINATES	**φ = 62°12′ S; λ = 58°56′ W**
BEGINNING AND END OF POLAR DAY	**No**
BEGINNING AND END OF POLAR NIGHT	**No**

VOSTOK STATION

STATION SYNOPTIC INDEX	**89606**
METEOROLOGICAL SITE HEIGHT ABOVE SEA LEVEL	**3488 m**
GEOGRAPHICAL COORDINATES	**φ = 78°27′ S; λ = 106°52′ E**
GEOMAGNETIC COORDINATES	**Φ = -89.3°; Δ = 139.5°**
BEGINNING AND END OF POLAR DAY	**21 October - 21 February**
BEGINNING AND END OF POLAR NIGHT	**23 April - 21 August**

PROGRESS STATION

METEOROLOGICAL SITE HEIGHT ABOVE SEA LEVEL	**64 m**
GEOGRAPHICAL COORDINATES	**φ = 69°23′ S; λ = 76°23′ E**
BEGINNING AND END OF POLAR DAY	**21 November – 21 January**
BEGINNING AND END OF POLAR NIGHT	**28 May - 16 July**

I. OBSERVATION DATA AT THE RUSSIAN ANTARCTIC STATIONS

JULY 2000

MIRNY OBSERVATORY

Monthly averages of meteorological parameters (f) and their deviations from multiye averages (f-f_{avg})

July 2000

Parameter	$f_{mon.avg}$	f_{max}	f_{min}	Anomaly f-f_{avg}	Normalized anomaly (f-f_{avg})/σ_f…	Relative anomaly f/f_{avg}
Sea level pressure , hPa	986	1007,4	970,2	0	0,0	
Air temperature, °C	-15,3	-4,6	-27,8	1,4	0,5	
Relative humidity, %	73			-1,2	-0,2	
Total cloudiness (sky coverage), tenths	6,7			0	0,0	
Lower cloudiness(sky coverage),tenths	3,3			0,3	0,2	
Precipitation, mm	257,3			187,2	3,8	3,7
Mean wind speed, m/s	13	29		0,3	0,2	
Prevailing wind direction, deg	112					
Total radiation, MJ/m^2	9			-0,3	-0,1	1,0
Total ozone content, DU	*					

*- No observations were done

Results of aerological atmospheric sounding (from CLIMAT-TEMP messages) *July 2000*

Isobaric surface, P, hPa	Isobaric surface height, H m	Temperature, T °C	Dew point deficit, D °C	Resulting wind direction, deg	Resulting wind speed, m/s	Wind stability parameter	Number of days without temperature data	Number of days without wind data
980	53	-15,1	3,9					
925	490	-15,5	4,8	90	13	98	1	1
850	1123	-18,9	4,2	85	12	92	1	1
700	2559	-23,2	5,5	71	6	54	1	1
500	4951	-37,8	5,4	24	4	31	1	1
400	6456	-48	5	356	4	29	1	1
300	8298	-60,4	4,2	341	5	33	1	1
200	10755	-70	4	302	8	54	1	1
150	12461	-71,3	3,9	286	11	77	1	1
100	14840	-74,7	3,9	283	19	90	2	3
70	16903	-77	4	277	25	94	5	7
50	18860	-78,8	3,8	270	36	94	13	9

Anomalies of standard isobaric surface heights and temperature *July 2000*

P, hPa	H-H_{avg}, m	(H-H_{avg})/σ_H	T-T_{avg}, °C	(T-T_{avg})/σ_T
850	12	0,3	0,3	0,2
700	10	0,2	-0,1	0,0
500	11	0,2	-0,1	0,0
400	9	0,1	-0,1	-0,1
300	4	0,0	-0,5	-0,4
200	-8	-0,1	-1,7	-1,2
150	-21	-0,2	-1,7	-1,1
100	-39	-0,4	-1,6	-0,9
70	-43	-0,3	-0,9	-0,4
50	-40	-0,3	-0,9	-0,4

Geophysics ***July 2000***

Geomagnetic observations

Mean monthly absolute geomagnetic field values

Declination	*86°41.6'W*
Horizontal component	*13947 nT*
Vertical component	*-57527 nT*

Baseline values of the main and backup stations ***July 2000***

Date	Main station			Backup station		
	D_w	H, nT	Z, nT	D_w	H, nT	Z, nT
03	-86°28.7'	13939	-57426	-88°00.8'	13202	-58815
07	-86°29.3'	13923	-57449	-88°00.3'	13193	-58821
12	-86°26.8'	13918	-57449	-88°00.4'	13198	-58820
17	-86°27.4'	13929	-57452	-87°59.4'	13195	-58825
23	-86°26.8'	13943	-57457	-88°00.6'	13189	-58818
28	-86°26.9'	13942	-57484	-87°59.3'	13188	-58832

Average variometer sensitivity

Main station, nT/mV			Backup station, nT/mm		
D_w, nT/mV; min/mV	H, nT/mV	Z, nT/mV	D_w, nT/mm; min/mV	H, nT/mm	Z, nT/mm
0.4831/0.1183	0.4814	0.4838	28.20/6.914	24.00	27.61

Ionospheric observations *July 2000*

Riometer observations			Vertical sounding		
Date	Type	A $_{max}$ dB	Date	f0F2(00 UT), MHz	f0F2(12 UT), MHz
01	-	0.2	01		
02	-	0.2	02		
03	-	0.2	03		
04	-	0.2	04		
05	-	0.4	05		
06	-	0.3	06		
07	-	0.2	07		
08	-	0.3	08		
09	-	0.5	09		
10	-	0.2	10		
11	-	0.4	11		
12	-	0.5	12		
13	PCA	0.7	13		
14	PCA	3.2	14		
15	PCA	4	15		
16	PCA	3.4	16		
17	PCA	2.6	17		
18	PCA	1.2	18		
19	PCA	1	19		
20	PCA	0.8	20		
21	PCA	0.6	21		
22	PCA	0.8	22		
23	PCA	0.7	23		
24	-	0.2	24		
25	-	0.1	25		
26	-	0.1	26		
27	-	0	27		
28	-	0.3	28		
29	-	0.3	29		
30	-	0.2	30		
31	-	0.1	31		

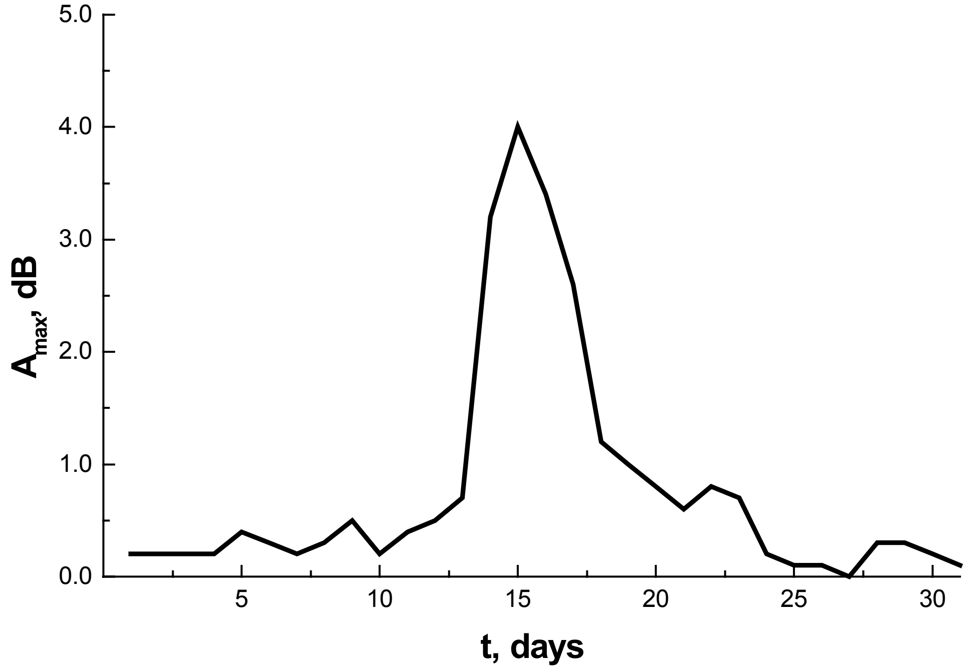

Fig. I.1. The maximum daily values of 32 MHz cosmic radiowave absorption, Mirny station, July 2000

NOVOLAZAREVSKAYA STATION

Monthly averages of meteorological parameters (f) and their deviations from multiyear averages ($f-f_{avg}$)

July 2000

Parameter	$f_{mon.avg}$	f_{max}	f_{min}	Anomaly $f-f_{avg}$	Normalized anomaly $(f-f_{avg})/\sigma_f$...	Relative anomaly f/f_{avg}
Sea level pressure , hPa	986,8	1003,3	950,1	-0,8	-0,1	
Air temperature, °C	-17,3	-3,4	-31,5	0	0,0	
Relative humidity, %	39			-11,4	-1,6	
Total cloudiness (sky coverage), tenths	6			0,5	0,4	
Lower cloudiness(sky coverage),tenths	1,4			0,3	0,3	
Precipitation, mm	6			-32,3	-0,7	0,2
Mean wind speed, m/s	9,3	40		-1,3	-0,6	
Prevailing wind direction, deg	135					
Total radiation, MJ/m^2	0			-2,0	-0,9	0,0

Results of aerological atmospheric sounding (from CLIMAT-TEMP messages) ***July 2000***

Isobaric surface, P, hPa	Isobaric surface height, H m	Temperature, T °C	Dew point deficit, D °C	Resulting wind direction, deg	Resulting wind speed, m/s	Wind stability parameter	Number of days without temperature data	Number of days without wind data
971	122	-16,9	10,3					
925	494	-17,4	9,1	109	12	94	0	0
850	1121	-21,5	8,4	97	14	95	0	0
700	2535	-26,9	6,7	102	8	77	0	0
500	4902	-40,3	4,4	107	1	9	0	0
400	6390	-50,6	4	267	3	23	0	0
300	8214	-62,3	3,7	265	5	36	0	0
200	10650	-71,6	3,4	256	6	57	0	0
150	12333	-74,6	3,4	248	9	76	1	1
100	14661	-79,7	3,2	249	12	85	1	1
70	16661	-83,3	3,1	255	14	89	1	1
50	18511	-86,3	3	260	17	92	2	2
30	21300	-87,6	3	262	21	93	7	9
20	23517	-87,1	3,3	263	25	94	14	9

Anomalies of standard isobaric surface heights and temperature *July 2000*

P, hPa	$H-H_{avg}$, m	$(H-H_{avg})/\sigma_H$	$T-T_{avg}$, °C	$(T-T_{avg})/\sigma_T$
850	-8	-0,2	-0,5	-0,3
700	-12	-0,3	0,4	0,2
500	-8	-0,1	-0,1	0,0
400	-8	-0,1	-0,2	-0,1
300	-11	-0,2	-0,1	-0,1
200	-13	-0,2	-0,1	-0,1
150	-20	-0,3	-1,1	-0,8
100	-39	-0,5	-1,9	-1,3
70	-55	-0,6	-1,8	-1,2
50	-107	-1,5	-2,4	-1,4
30	-133	-1,1	-2,2	-1,2
20	-96	-0,8	-1,8	-0,9

BELLINGSHAUSEN STATION

Monthly averages of meteorological parameters (f) and their deviations from multiyear averages ($f-f_{avg}$)

July 2000

Parameter	$f_{mon.avg}$	f_{max}	f_{min}	Anomaly $f-f_{avg}$	Normalized anomaly $(f-f_{avg})/\sigma_f$…	Relative anomaly f/f_{avg}
Sea level pressure , hPa	1004,2	1032,2	960,3	10,3	1,8	
Air temperature, °C	-3,6	3,3	-17,5	3	0,9	
Relative humidity, %	90			1,6	0,6	
Total cloudiness (sky coverage), tenths	8,3			-0,1	-0,2	
Lower cloudiness(sky coverage),tenths	7,5			0,4	0,4	
Precipitation, mm	48,5			-4,5	-0,2	0,9
Mean wind speed, m/s	5,6	27		-1,8	-1,4	
Prevailing wind direction, deg	360					
Total radiation, MJ/m^2	32			8,4	2,5	1,3

VOSTOK STATION

Monthly averages of meteorological parameters (f) and their deviations from multiyear averages ($f-f_{avg}$)

July 2000

Parameter	$f_{mon.avg}$	f_{max}	f_{min}	Anomaly $f-f_{avg}$	Normalized anomaly $(f-f_{avg})/\sigma_{f...}$	Relative anomaly f/f_{avg}
Station surface level pressure, hPa	621,5	644,5	605,6	0,4	0,1	
Air temperature, °C	-66,6	-44,7	-79,8	0,5	0,2	
Relative humidity, %	63			-5,6	-1,3	
Total cloudiness (sky coverage), tenths	2,5			-0,3	-0,3	
Lower cloudiness(sky coverage),tenths	0			0	0,0	
Precipitation, mm	0,6			-2,6	-1,0	0,2
Mean wind speed, m/s	2,9	17		-2,8	-3,1	
Prevailing wind direction, deg	CALM					
Total radiation, MJ/m^2	0					
Total ozone content, DU	*					

*- No observations were done

Geophysics ***July 2000***

Geomagnetic observations

Mean monthly absolute geomagnetic field values

Declination	*120°39.6'W*
Horizontal component	*13441 nT*
Vertical component	*-58221 nT*

Baseline values of the main and backup stations ***July 2000***

Date	Main station			Backup station		
	D_w	H, nT	Z, nT	D_w	H, nT	Z, nT
05	-120°26.3'	13435	-58318	-120°22.5'	13515	-58165
11	-120°27.2'	13417	-58317	-120°23.3'	13509	-58165
17	-120°34.5'	13403	-58348	-120°24.3'	13512	-58159
23	-120°33.2'	13405	-58350	-120°26.5'	13509	-58159
29	-120°33.0'	13401	-58349	-120°23.0'	13508	-58158

Average variometer sensitivity

Main station			Backup station		
D_W, nT/mV	H, nT/mV	Z, nT/mV	D_W, nT/mm	H, nT/mm	Z, nT/mm
0.387/0.0987	0.384	0.393	0.4880/0.255	0.4535	0.4706

Riometer observation					
date	type	A_{max}, dB	date	type	A_{max}, dB
01	-	0.4	17	PCA	0.6
02	-	0.4	18	PCA	0.5
03	-	0.4	19	-	0.4
04	-	0.3	20	-	0.3
05	-	0.3	21	-	0.2
06	-	0.2	22	AA	0.3
07	-	0.2	23	AA	0.3
08	-	0.2	24	-	0.2
09	-	0.3	25	-	0.2
10	-	0.3	26	-	0.3
11	-	0.2	27	-	0.2
12	-	0.2	28	-	0.3
13	-	0.4	29	AA	0.3
14	-	0.3	30	-	0.1
15	-	0.2	31	AA	0.4
16	PCA	0.5			

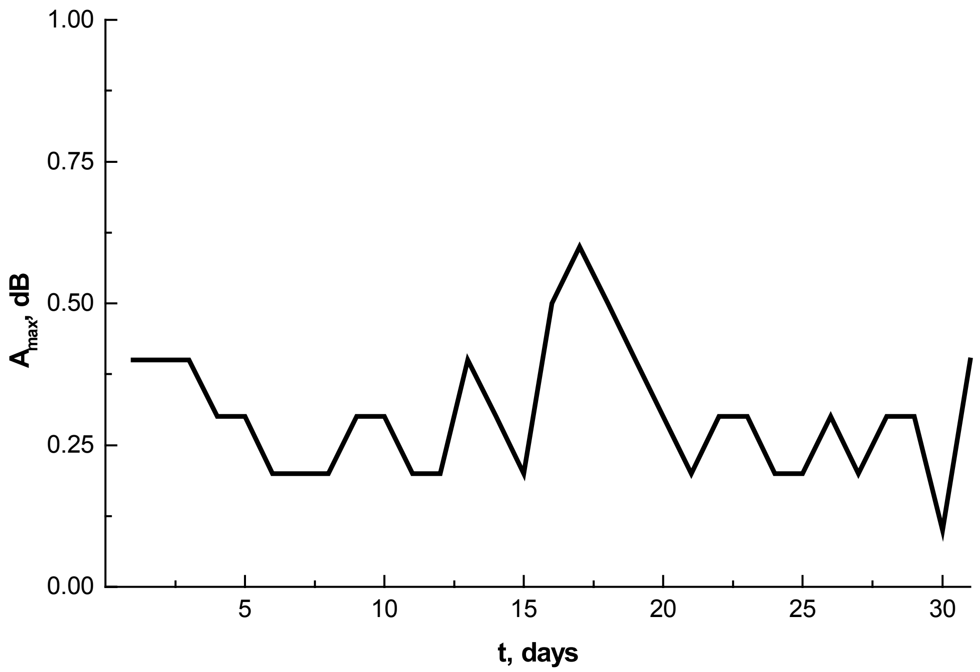

Fig. I.2. The maximum daily values of 32 MHz cosmic radiowave absorption, Vostok station, July 2000

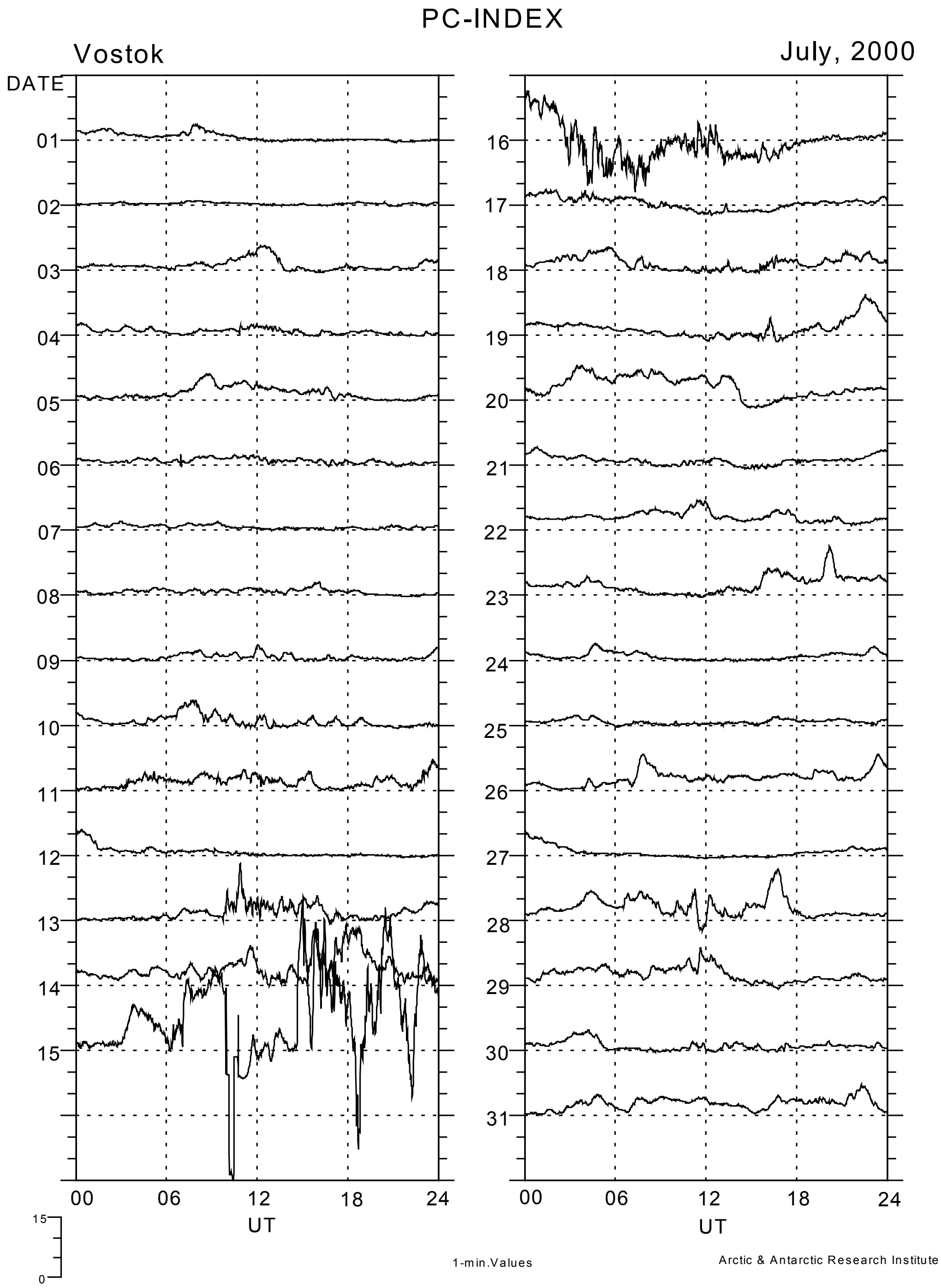
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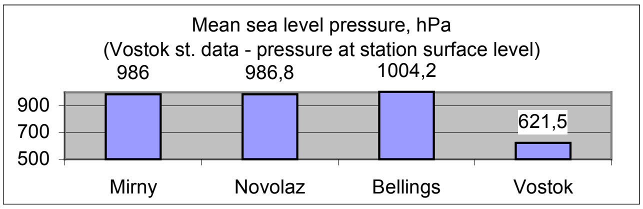
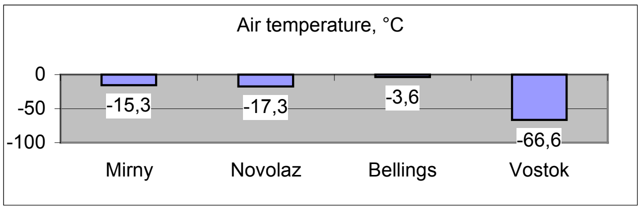
Fig. I.3.

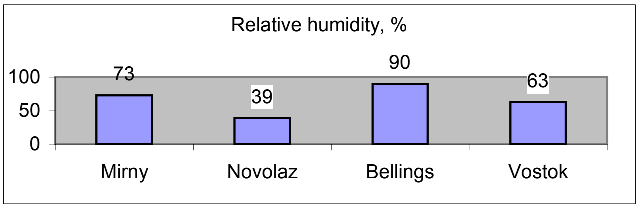
July 2000



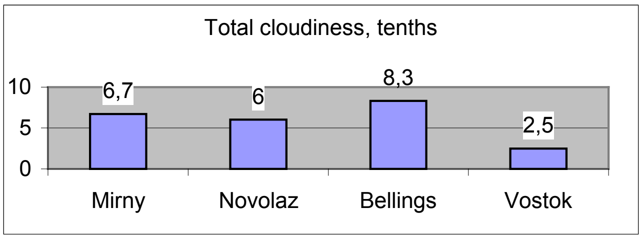
$(f-f_{avg})/\sigma_f$ 0,0   -0,1   1,8   0,1



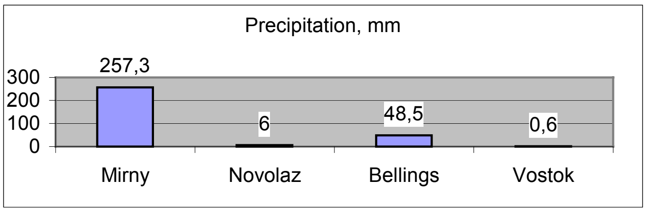
$(f-f_{avg})/\sigma_f$ 0,5   0,0   0,9   0,2



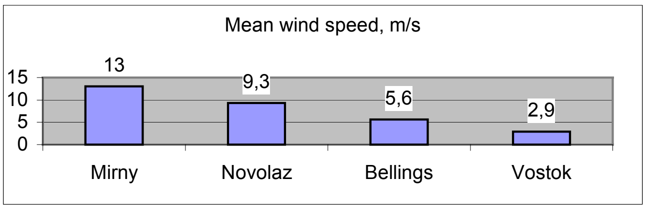
$(f-f_{avg})/\sigma_f$ -0,2   -1,6   0,6   -1,3



$(f-f_{avg})/\sigma_f$ 0,0   0,4   -0,2   -0,3



f/f_{avg} 3,7   0,2   0,9   0,2



$(f-f_{avg})/\sigma_f$ 0,2   -0,6   -1,4   -3,1

Fig. I.4. Comparison of monthly averages of meteorological parameters at the stations, July 2000

AUGUST 2000

MIRNY OBSERVATORY

Monthly averages of meteorological parameters (f) and their deviations from multiyear averages ($f-f_{avg}$)

August 2000

Parameter	$f_{mon.avg}$	f_{max}	f_{min}	Anomaly $f-f_{avg}$	Normalized anomaly $(f-f_{avg})/\sigma_f$…	Relative anomaly f/f_{avg}
Sea level pressure , hPa	983,3	1010,1	954,8	-1,1	-0,2	
Air temperature, ^{0}C	-14,6	-2,1	-31,4	2,6	0,8	
Relative humidity, %	88			15	3,4	
Total cloudiness (sky coverage), tenths	7,2			0,5	0,6	
Lower cloudiness(sky coverage),tenths	5,1			2,3	1,8	
Precipitation, mm	216,8			149,4	3,0	3,2
Mean wind speed, m/s	13,3	33		0,4	0,3	
Prevailing wind direction, deg	90					
Total radiation, MJ/m^2	60			-6,3	-1,0	0,9
Total ozone content, DU	219	252	183			

Results of aerological atmospheric sounding (from CLIMAT-TEMP messages)

August 2000

Isobaric surface, P, hPa	Isobaric surface height, H m	Temperature, T ^{0}C	Dew point deficit, D ^{0}C	Resulting wind direction, deg	Resulting wind speed, m/s	Wind stability parameter	Number of days without temperature data	Number of days without wind data
977	53	-15	2,3					
925	467	-14,7	3,5	92	16	98	0	0
850	1103	-18,2	3,1	80	14	98	0	0
700	2537	-23,7	5,2	64	9	79	0	1
500	4924	-38,6	4,6	31	7	55	0	0
400	6423	-48,8	4,3	7	6	42	0	0
300	8258	-61,3	4	348	7	49	0	0
200	10704	-71,1	3,9	310	8	60	0	0
150	12392	-73,6	3,8	297	12	75	1	1
100	14746	-76,5	3,8	282	18	88	3	4
70	16781	-77,9	3,7	278	26	93	8	8
50	18716	-77,7	4	276	34	95	11	9
30	21672	-75,8	4,6	270	50	97	16	9

Anomalies of standard isobaric surface heights and temperature

August 2000

P, hPa	$H-H_{avg}$, m	$(H-H_{avg})/\sigma_H$	$T-T_{avg}$, °C	$(T-T_{avg})/\sigma_T$
850	8	0,2	1,6	0,6
700	3	0,1	-0,1	0,0
500	0	0,0	-0,6	-0,3
400	-10	-0,1	-0,6	-0,3
300	-12	-0,1	-0,8	-0,5
200	-29	-0,3	-0,7	-0,3
150	-36	-0,3	-1,1	-0,4
100	-42	-0,4	-1,4	-0,5
70	-62	-0,4	-1,1	-0,3
50	-90	-0,5	-0,6	-0,1
30	-85	-0,3	0,3	0,0

Geophysics *August 2000*

Geomagnetic observations

Mean monthly absolute geomagnetic field values

Declination	*86°37.6′ W*
Horizontal component	*13952 nT*
Vertical component	*-57520 nT*

Baseline values of the main and backup stations *August 2000*

Date	Main station			Backup station		
	D_w	H, nT	Z, nT	D_w	H, nT	Z, nT
02	-86°29.3′	13932	-57474	-88°00.4'	13182	-58828
08	-86°28.7′	13949	57465	-87°59.7'	13191	-58822
13	-86°28.9'	13920	-57474	-88°01.4'	13195	-58819
18	-86°26.9'	13932	57452	-88°00.9'	13189	-58818
23	-86°29.0'	13939	-57458	-88°00.4'	13188	-58824
31	-86°29.1'	13932	-57449	-88°01.2'	13192	-58825

Average variometer sensitivity

Main station, nT/mV			Backup station, nT/mm		
D_w, nT/mV; min/mV	H, nT/mV	Z, nT/mV	D_w, nT/mm; min/mV	H, nT/mm	Z, nT/mm
0.4856/0.1188	0.4851	0.4836	28.43/6.940	23.99	27.62

Ionospheric observations *August 2000*

Riometer observations			Vertical sounding		
Date	Type	A_{max} dB	Date	f0F2(00 UT), MHz	f0F2(12 UT), MHz
01	AA	0.5	01		
02	-	0.1	02		
03	-	0.1	03		
04	-	0.2	04		
05	-	0.3	05		
06	-	0.4	06		
07	-	0.1	07		
08	-	0.1	08		
09	-	0.4	09		
10	-	0.2	10		
11	-	0.4	11		
12	AA	0.6	12		
13	AA	0.7	13		
14	AA	0.7	14		
15	AA	0.6	15		
16	AA	0.8	16		
17	-	0.3	17		
18	AA	0.9	18		
19	-	0.4	19		
20	-	0.3	20		
21	-	0.2	21		
22	-	0.2	22		
23	-	0.2	23		
24	-	0.3	24		
25	-	0.4	25		
26	-	0.3	26		
27	-	0.3	27		
28	AA	1.2	28		
29	-	0.5	29		
30	-	0.2	30		
31	-	0.2	31		

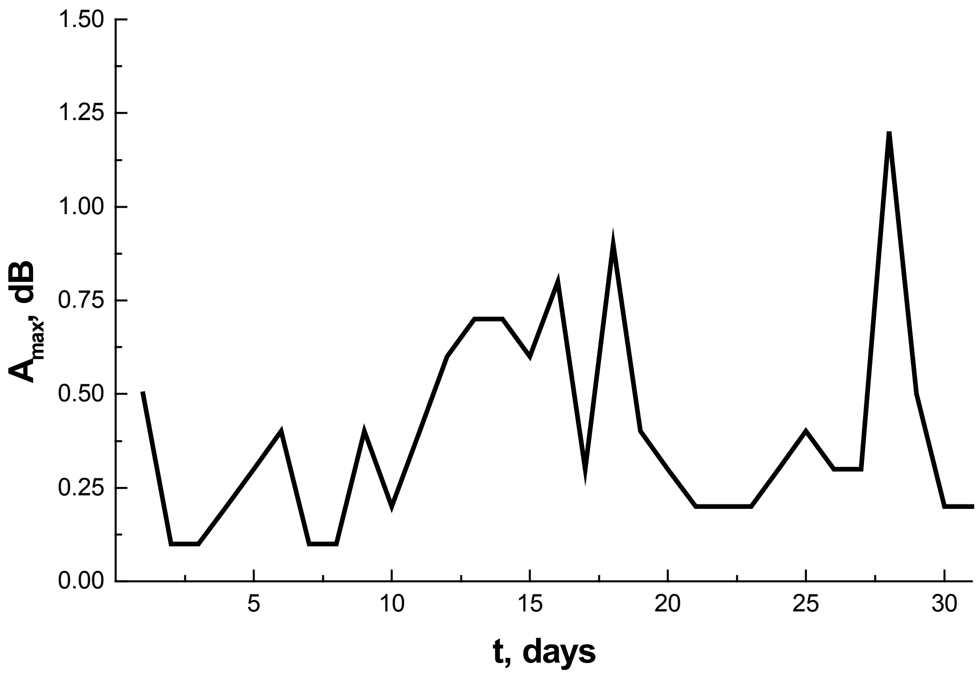


Fig. I.5. The maximum daily values of 32 MHz cosmic radiowave absorption, Mirny station, August 2000

NOVOLAZAREVSKAYA STATION

Monthly averages of meteorological parameters (f) and their deviations from multiyear averages ($f-f_{avg}$)

August 2000

Parameter	$f_{mon.avg}$	f_{max}	f_{min}	Anomaly $f-f_{avg}$	Normalized anomaly $(f-f_{avg})/\sigma_f$…	Relative anomaly f/f_{avg}
Sea level pressure , hPa	983	1002,1	954,1	-3,5	-0,6	
Air temperature, ^{0}C	-19,1	-4,8	-34,8	-0,8	-0,3	
Relative humidity, %	58			7,3	1,0	
Total cloudiness (sky coverage), tenths	6,9			1,5	1,2	
Lower cloudiness(sky coverage),tenths	1,9			1	1,3	
Precipitation, mm	51,7			9,3	0,2	1,2
Mean wind speed, m/s	10,6	33		0	0,0	
Prevailing wind direction, deg	112					
Total radiation, MJ/m^2	33			-1,0	-0,2	1,0

Results of aerological atmospheric sounding (from CLIMAT-TEMP messages)

August 2000

Isobaric surface, P, hPa	Isobaric surface height, H m	Temperature, T ^{0}C	Dew point deficit, D ^{0}C	Resulting wind direction, deg	Resulting wind speed, m/s	Wind stability parameter	Number of days without temperature data	Number of days without wind data
969	122	-19,3	7,3					
925	479	-18,8	6,8	110	13	96	3	3
850	1105	-21,9	6,6	100	16	93	3	3
700	2517	-27,5	6,1	93	10	72	3	3
500	4876	-41,3	5,4	73	5	35	3	3
400	6356	-51,6	4,7	60	5	26	3	3
300	8172	-63,2	4,2	14	3	15	3	3
200	10592	-73,9	3,8	282	3	27	3	3
150	12252	-77,5	3,6	281	6	51	3	3
100	14550	-81,7	3,5	273	9	80	4	4
70	16535	-84	3,4	271	12	86	7	8
50	18390	-85,5	3,3	270	17	87	9	9
30	21184	-86,2	3,2	270	24	94	11	9
20	23407	-83,7	3,2	272	29	93	18	9

Anomalies of standard isobaric surface heights and temperature

August 2000

P, hPa	$H-H_{avg}$, m	$(H-H_{avg})/\sigma_H$	$T-T_{avg}$, °C	$(T-T_{avg})/\sigma_T$
850	-8	-0,2	0,0	0,0
700	-8	-0,1	0,3	0,2
500	-6	-0,1	-0,4	-0,3
400	-11	-0,1	-0,6	-0,5
300	-16	-0,2	-0,6	-0,6
200	-29	-0,3	-1,4	-1,1
150	-48	-0,5	-2,0	-1,4
100	-78	-0,8	-2,5	-1,8
70	-126	-1,1	-2,3	-1,3
50	-179	-1,3	-2,5	-1,2
30	-251	-1,3	-3,4	-1,3
20	-300	-1,4	-3,1	-0,9

BELLINGSHAUSEN STATION

Monthly averages of meteorological parameters (f) and their deviations from multiyear averages ($f-f_{avg}$)

August 2000

Parameter	$f_{mon.avg}$	f_{max}	f_{min}	Anomaly $f-f_{avg}$	Normalized anomaly $(f-f_{avg})/\sigma_f$…	Relative anomaly f/f_{avg}
Sea level pressure , hPa	992,1	1008,4	960,1	0,1	0,0	
Air temperature, ^{0}C	-6,5	0,4	-18,9	0,2	0,1	
Relative humidity, %	85			-2,9	-1,0	
Total cloudiness (sky coverage), tenths	9,3			0,8	1,6	
Lower cloudiness(sky coverage),tenths	8,4			1,2	1,2	
Precipitation, mm	49,9			-18,3	-0,5	0,7
Mean wind speed, m/s	7,3	18		-0,5	-0,6	
Prevailing wind direction, deg	135					
Total radiation, MJ/m^2	103			16,6	2,1	1,2

VOSTOK STATION

Monthly averages of meteorological parameters (f) and their deviations from multiyear averages ($f-f_{avg}$)

August 2000

Parameter	$f_{mon.avg}$	f_{max}	f_{min}	Anomaly $f-f_{avg}$	Normalized anomaly $(f-f_{avg})/\sigma_f$…	Relative anomaly f/f_{avg}
Station surface level pressure, hPa	621,4	635	610,4	1,8	0,2	
Air temperature, ^{0}C	-66,9	-41,5	-81,7	1,1	0,3	
Relative humidity, %	64			-4,6	-1,1	
Total cloudiness (sky coverage), tenths	4,3			0,9	0,8	
Lower cloudiness(sky coverage),tenths	0			0	0,0	
Precipitation, mm	0,5			-2,6	-0,7	0,2
Mean wind speed, m/s	1,2	12		-4,4	-5,5	
Prevailing wind direction, deg	225					
Total radiation, MJ/m^2	5			2,8	1,6	2,4
Total ozone content, DU	*					

*- No observations were done

Geophysics *August 2000*

Geomagnetic observations

Mean monthly absolute geomagnetic field values

Declination *120°43.3'W*
Horizontal component *13461 nT*
Vertical component *-58217 nT*

Baseline values of the main and backup stations *August 2000*

Date	Main station			Backup station		
	D_w	H, nT	Z, nT	D_w	H, nT	Z, nT
05	-120°33.8'	13401	-58350	-120°23.6'	13508	-58158
11	-120°34.9'	13400	-58350	-120°25.1'	13507	-58158
17	-120°34.0'	13400	-58351	-120°24.0'	13506	-58159
23	-120°34.4'	13400	-58351	-120°24.3'	13506	-58159
30	-120°32.9'	13397	-58350	-120°23.0'	13504	-58158

Average variometer sensitivity

Main station			Backup station		
D_W, nT/mV; min/mV	H, nT/mV	Z, nT/mV	D_W, nT/mm; min/mm	H, nT/mm	Z, nT/mm
0.368/0.0940	0.383	0.390	0.4879/0.255	0.4528	0.4715

Riometer observations					
date	type	A $_{max}$, dB	date	type	A $_{max}$, dB
01	AA	0.4	16	AA	0.5
02	-	0.2	17	AA	0.5
03	AA	0.3	18	-	0.5
04	AA	0.4	19	-	0.5
05	AA	0.3	20	AA	0.4
06	-	0.2	21	AA	0.5
07	AA	0.5	22	-	0.2
08	AA	0.5	23	AA	0.5
09	-	0.3	24	-	0.2
10	AA	0.5	25	-	0.2
11	AA	0.5	26	AA	0.5
12	-	0.3	27	-	0.2
13	-	0.5	28	AA	0.5
14	-	0.4	29	-	0.2
15	AA	0.5	30	AA	0.4
			31	AA	0.6

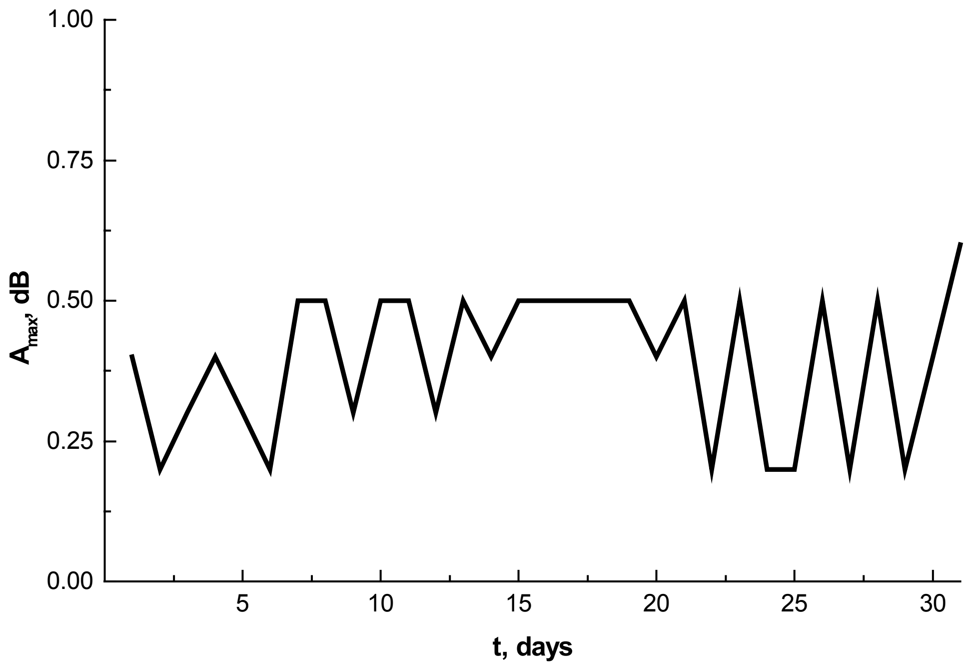


Fig. I.6. The maximum daily values of 32 MHz cosmic radiowave absorption, Vostok station, August 2000

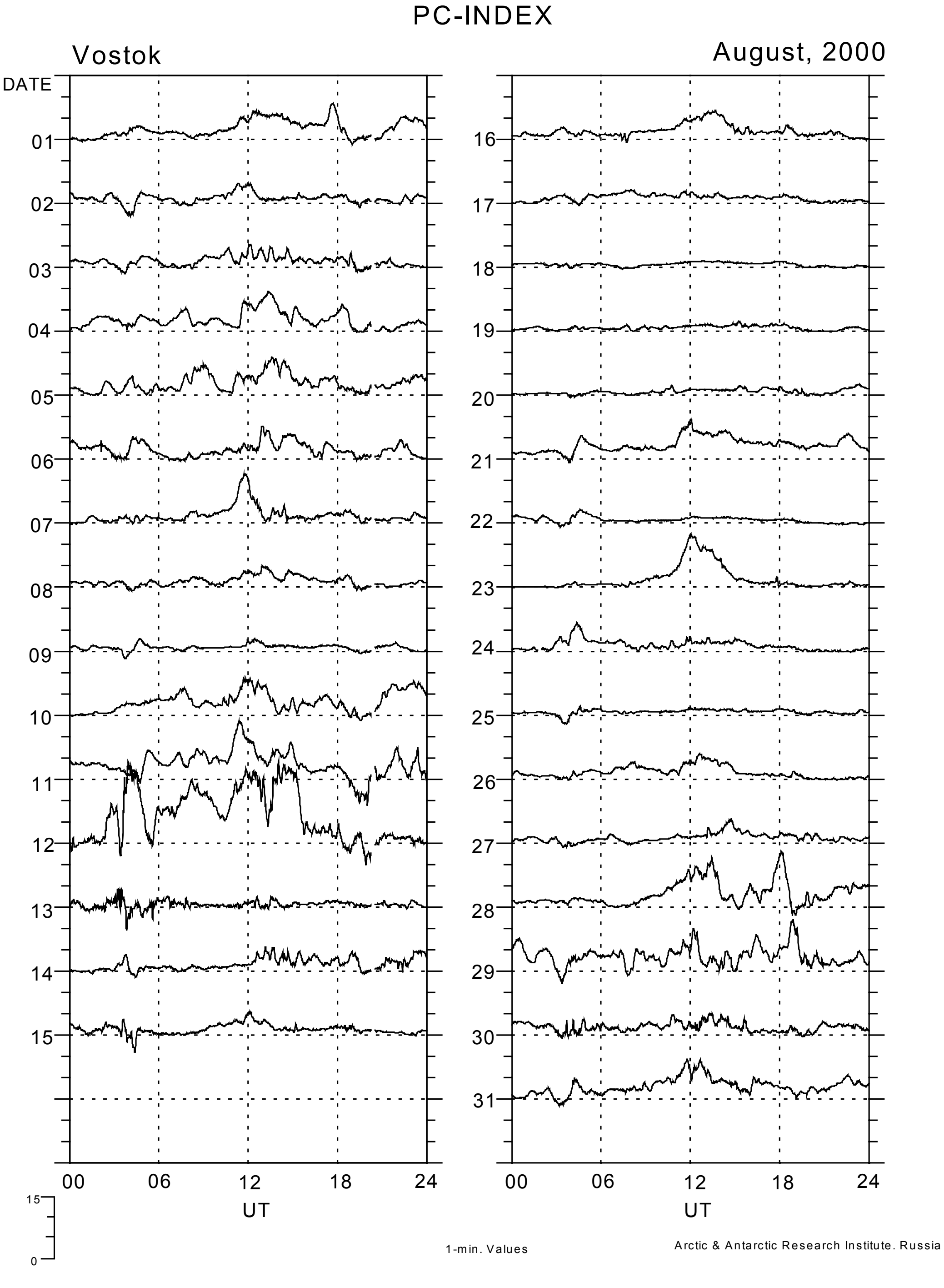

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Fig. I.7.

August 2000

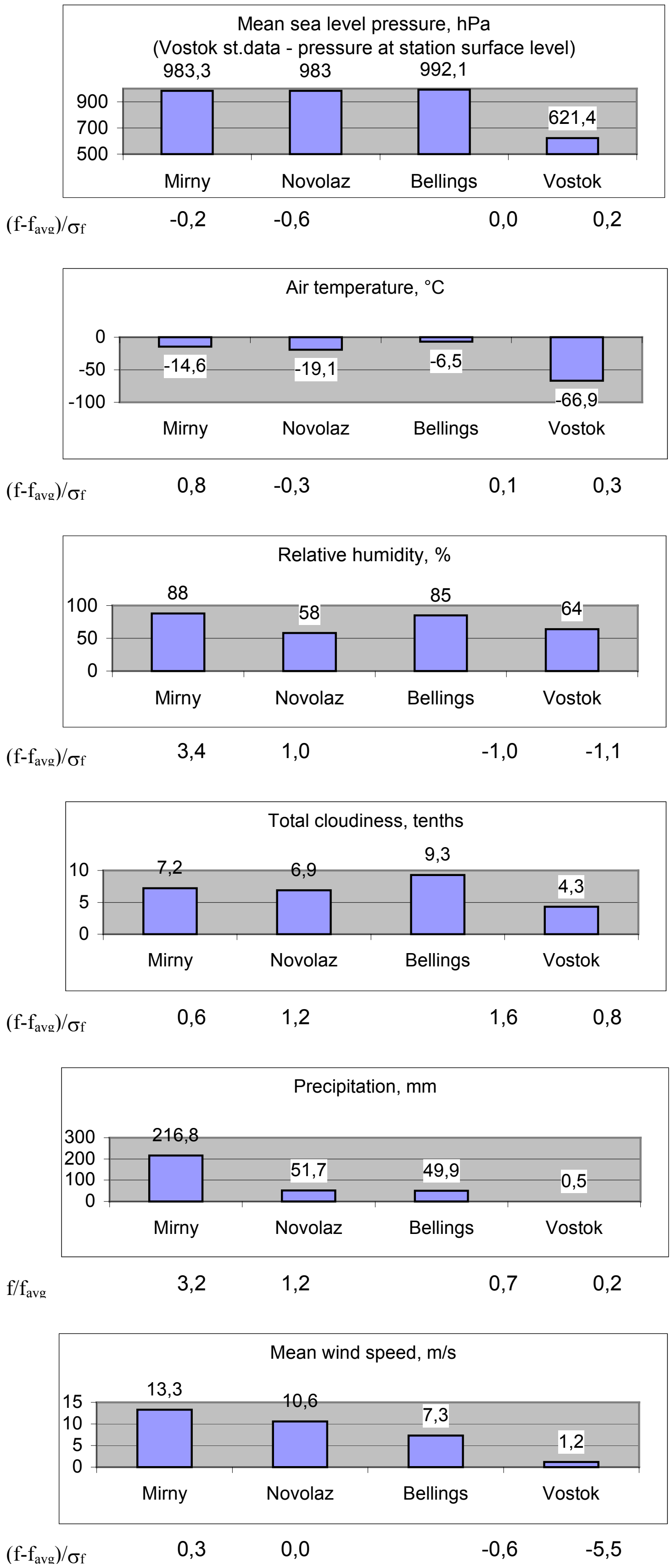


Fig. I.8. Comparison of monthly averages of meteorological parameters at the stations, August 2000 - September 2000

MIRNY OBSERVATORY

Monthly averages of meteorological parameters (f) and their deviations from multiyear averages ($f\text{-}f_{avg}$)

September 2000

Parameter	$f_{mon.avg}$	f_{max}	f_{min}	Anomaly $f\text{-}f_{avg}$	Normalized anomaly $(f\text{-}f_{avg})/\sigma_f$…	Relative anomaly f/f_{avg}
Sea level pressure , hPa	986	1006,9	942,5	3,9	0,8	
Air temperature, ^{0}C	-12,3	-2,2	-27,1	4,4	1,7	
Relative humidity, %	84			12,6	2,7	
Total cloudiness (sky coverage), tenths	6,9			0,4	0,4	
Lower cloudiness(sky coverage),tenths	5,2			2,4	2,0	
Precipitation, mm	66,6			5,7	0,1	1,1
Mean wind speed, m/s	10,3	31		-1,8	-1,2	
Prevailing wind direction, deg	90					
Total radiation, MJ/m^2	213			-10,0	-0,6	1,0
Total ozone content, DU	252	393	137			

Results of aerological atmospheric sounding (from CLIMAT-TEMP messages)

September 2000

Isobaric surface, P, hPa	Isobaric surface height, H m	Temperature, T ^{0}C	Dew point deficit, D ^{0}C	Resulting wind direction, deg	Resulting wind speed, m/s	Wind stability parameter	Number of days without temperature data	Number of days without wind data
978	53	-13,1	3					
925	474	-13,2	4,3	92	12	96	0	0
850	1113	-16,9	3,7	86	12	97	0	0
700	2578	-22,5	5,4	71	8	83	0	0
500	4957	-36,7	7,4	55	4	42	0	0
400	6469	-47,4	6,6	18	3	28	0	0
300	8316	-59,7	5,4	327	3	30	0	0
200	10788	-68	5	296	8	67	0	0
150	12508	-68,7	5	286	14	87	1	1
100	14938	-67,9	5,3	280	26	95	2	2
70	17098	-63,9	6,1	277	39	96	3	3
50	19199	-58,1	7,1	277	53	96	4	4
30	22588	-44,4	10,7	280	76	97	8	9
20	25444	-35,7	13,8	280	83	96	10	9
10	30268	-30,8	16,4	281	81	94	11	9

Anomalies of standard isobaric surface heights and temperature

September 2000

P, hPa	$H-H_{avg}$, m	$(H-H_{avg})/\sigma_H$	$T-T_{avg}$, °C	$(T-T_{avg})/\sigma_T$
850	24	0,6	2,2	1,1
700	51	1,2	0,8	0,5
500	35	0,6	1,0	0,6
400	43	0,6	0,7	0,4
300	42	0,6	0,3	0,3
200	53	0,6	1,2	0,7
150	61	0,7	1,8	0,7
100	93	1,1	2,5	0,7
70	139	1,4	4,8	0,9
50	195	1,4	8,3	1,4
30	445	1,9	16,4	2,4
20	725	2,0	19,3	2,5
10	963	1,9	11,2	1,5

Geophysics

September 2000

Geomagnetic observations

Mean monthly absolute geomagnetic field values

Declination	*86°44.5'W*
Horizontal component	*13968 nT*
Vertical component	*-57555 nT*

Baseline values of the main and backup stations *September 2000*

Date	Main station			Backup station		
	D_w	H, nT	Z, nT	D_w	H, nT	Z, nT
03	-86°27.4'	13937	57434	-88°02.2'	13188	58821
08	-86°27.9'	13922	57485	-88°02.1'	13193	58825
15	-86°29.0'	13936	57442	-87°59.6'	13182	58815
21	-86°28.2'	13961	57449	-88°01.4'	13194	58817
25	-86°26.6'	13913	57439	-88°01.0'	13187	58806
29	-86°27.0'	13926	57471	-88°02.6'	13185	58823

Average variometer sensitivity

Main station, nT/mV			Backup station, nT/mm		
D_w, nT/mV; min/mV	H, nT/mV	Z, nT/mV	D_w, nT/mm; min/mV	H, nT/mm	Z, nT/mm
0.4839/0.1186	0.4851	0.4876	28.50/6.940	23.99	27.56

Ionospheric observations *September 2000*

Riometer observations			Vertical sounding		
Date	Type	A_{max} dB	Date	f0F2(00 UT), MHz	f0F2(12 UT), MHz
01	AA	0.9	01		
02	-	0.2	02		
03	-	0.1	03		
04	-	0.3	04		
05	-	0.4	05		
06	-	0.2	06		
07	-	0.2	07		
08	-	0.2	08		
09	-	0.2	09		
10	-	0.3	10		
11	-	0.6	11		
12	PCA	1.2	12		
13	PCA	3.8	13		
14	PCA	1.7	14		
15	PCA	1	15		
16	PCA	0.6	16		
17	PCA	1	17		
18	-	0.6	18		
19	-	0.6	19		
20	-	0.2	20		
21	-	0.3	21		
22	-	0.2	22		
23	-	0.3	23		
24	-	0.3	24		
25	-	0.3	25		
26	-	0.3	26		
27	-	0.3	27		
28	-	0.4	28		
29	-	0.2	29		
30	-	0.2	30		

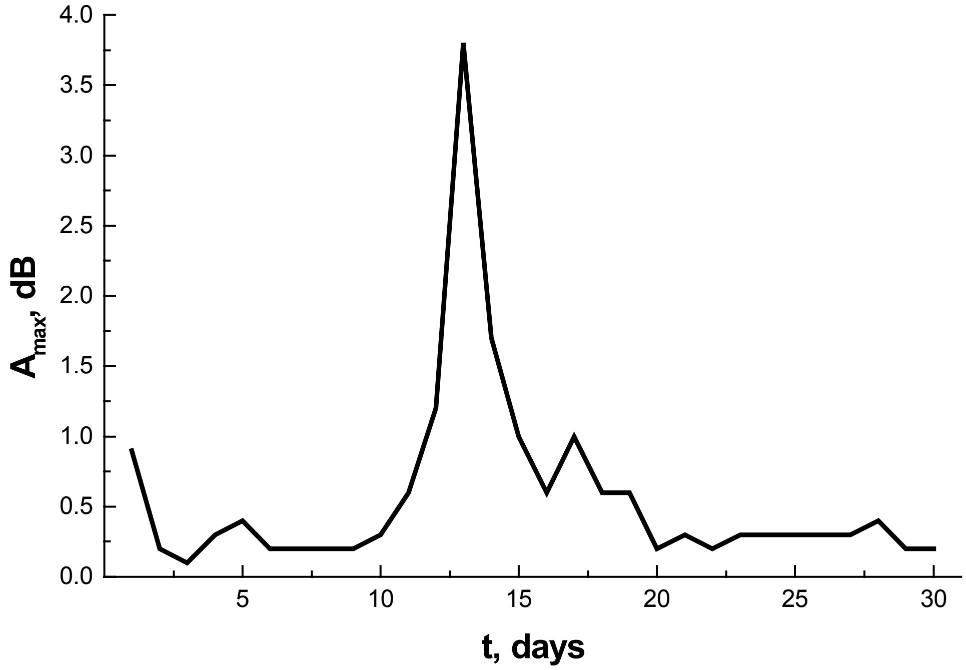


Fig. I.9. The maximum daily values of 32 MHz cosmic radiowave absorption, Mirny station, September 2000

NOVOLAZAREVSKAYA STATION

Monthly averages of meteorological parameters (f) and their deviations from multiyear averages ($f-f_{avg}$)

September 2000

Parameter	$f_{mon.avg}$	f_{max}	f_{min}	Anomaly $f-f_{avg}$	Normalized anomaly $(f-f_{avg})/\sigma_f$…	Relative anomaly f/f_{avg}
Sea level pressure , hPa	992,7	1011,4	969,1	8,5	1,8	
Air temperature, ^0C	-15,6	-5,8	-33,4	1,6	0,8	
Relative humidity, %	47			-4,1	-0,6	
Total cloudiness (sky coverage), tenths	7,6			2,2	2,2	
Lower cloudiness(sky coverage),tenths	2			1,2	1,3	
Precipitation, mm	8			-37,1	-0,7	0,2
Mean wind speed, m/s	9,5	29		-0,4	-0,2	
Prevailing wind direction, deg	112					
Total radiation, MJ/m^2	173			-1,0	-0,1	1,0

Results of aerological atmospheric sounding (from CLIMAT-TEMP messages)

September 2000

Isobaric surface, P, hPa	Isobaric surface height, H m	Temperature, T ^{0}C	Dew point deficit, D ^{0}C	Resulting wind direction, deg	Resulting wind speed, m/s	Wind stability parameter	Number of days without temperature data	Number of days without wind data
976	122	-16,1	9,2					
925	530	-16,7	7,8	107	12	92	0	0
850	1160	-20,5	7,2	96	12	89	0	0
700	2578	-26,6	6,3	85	5	52	0	0
500	4943	-40,3	5	314	3	23	0	0
400	6433	-49,9	4,4	303	7	46	0	0
300	8262	-61,7	3,8	299	9	52	0	0
200	10696	-72,9	3,5	289	10	61	0	0
150	12369	-75,7	3,4	279	11	75	0	0
100	14694	-78,5	3,4	275	14	87	0	0
70	16720	-79,4	3,3	275	18	92	1	2
50	18623	-78,9	3,5	278	24	94	3	4
30	21560	-73,7	3,9	283	35	95	6	6
20	23975	-64,8	4,9	286	47	94	8	9
10	28458	-44	9,1	292	73	94	19	9

Anomalies of standard isobaric surface heights and temperature

September 2000

P, hPa	$H-H_{avg}$, m	$(H-H_{avg})/\sigma_H$	$T-T_{avg}$, °C	$(T-T_{avg})/\sigma_T$
850	59	1,6	0,6	0,5
700	62	1,5	0,8	0,6
500	62	1,3	-0,2	-0,2
400	63	1,2	0,4	0,4
300	64	1,0	0,3	0,3
200	61	0,9	-0,6	-0,4
150	54	0,8	-0,8	-0,5
100	38	0,5	-1,2	-0,6
70	25	0,3	-1,2	-0,5
50	-10	-0,1	-0,7	-0,2
30	-46	-0,3	1,3	0,3
20	-87	-0,3	4,0	0,7
10	244	0,5	14,7	1,3

BELLINGSHAUSEN STATION

Monthly averages of meteorological parameters (f) and their deviations from multiyear averages ($f-f_{avg}$)

September 2000

Parameter	$f_{mon.avg}$	f_{max}	f_{min}	Anomaly $f-f_{avg}$	Normalized anomaly $(f-f_{avg})/\sigma_f$...	Relative anomaly f/f_{avg}
Sea level pressure , hPa	1001,6	1035,9	977,6	10,5	3,1	
Air temperature, ^0C	-6	1,3	-17,4	-1,6	-0,9	
Relative humidity, %	87			-1,7	-0,7	
Total cloudiness (sky coverage), tenths	8,9			0,1	0,2	
Lower cloudiness(sky coverage),tenths	8,3			0,4	0,6	
Precipitation, mm	51,8			-11	-0,5	0,8
Mean wind speed, m/s	8,7	21		0,7	0,7	
Prevailing wind direction, deg	112					
Total radiation, MJ/m^2	205			-8,9	-0,5	1,0

VOSTOK STATION

Monthly averages of meteorological parameters (f) and their deviations from multiyear averages ($f-f_{avg}$)

September 2000

Parameter	$f_{mon.avg}$	f_{max}	f_{min}	Anomaly $f-f_{avg}$	Normalized anomaly $(f-f_{avg})/\sigma_f$...	Relative anomaly f/f_{avg}
Station surface level pressure, hPa	624,3	648,5	608,5	6,3	1,4	
Air temperature, ^0C	-66,2	-39,2	-78	-0,5	-0,1	
Relative humidity, %	59			-10	-2,3	
Total cloudiness (sky coverage), tenths	4,8			0,9	0,9	
Lower cloudiness(sky coverage),tenths	0			-0,1	-0,5	
Precipitation, mm	4			1	0,4	1,3
Mean wind speed, m/s	3,5	10		-2	-2,2	
Prevailing wind direction, deg	248					
Total radiation, MJ/m^2	122			23,1	2,0	1,2
Total ozone content, DU	*					

*- No observations were done

Geophysics *September 2000*

Geomagnetic observations

Mean monthly absolute geomagnetic field values

Declination	*120°41.5'W*
Horizontal component	*13456 nT*
Vertical component	*-58196 nT*

Baseline values of the main and backup stations *September 2000*

Date	Main station			Backup station		
	D_w	H, nT	Z, nT	D_w	H, nT	Z, nT
04	-120°34.6'	13400	-58349	-120°24.8'	13509	-58157
10	-120°34.3'	13399	-58350	-120°24.3'	13506	-58158
16	-120°35.1'	13399	-58350	-120°25.5'	13506	-58158
22	-120°34.8'	13404	-58351	-120°24.8'	13507	-58159
28	-120°35.0'	13401	-58350	-120°26.2'	13504	-58160

Average variometer sensitivity

Main station			Backup station		
D_W, nT/mV; min/mV	H, nT/mV	Z, nT/mV	D_W, nT/mm; min/mm	H, nT/mm	Z, nT/mm
0.382/0.0976	0.383	0.392	0.4887/0.256	0.4541	0.4704

Ionospheric observations *September 2000*

Riometer observations					
date	type	A_{max}, dB	date	type	A_{max}, dB
01	AA	0.3	16	AA	0.6
02	AA	0.3	17	AA	0.5
03	-	0.2	18	-	0.2
04	-	0.5	19	-	0.2
05	-	0.4	20	-	0.3
06	-	0.3	21	AA	0.4
07	-	0.2	22	-	0.3
08	-	0.1	23	-	0.3
09	-	0.1	24	-	0.3
10	-	0.3	25	-	0.2
11	-	0.3	26	-	0.3
12	AA	0.6	27	AA	0.3
13	PCA	0.4	28	AA	0.3
14	PCA	0.2	29	-	0.3
15	AA	0.5	30	AA	0.2

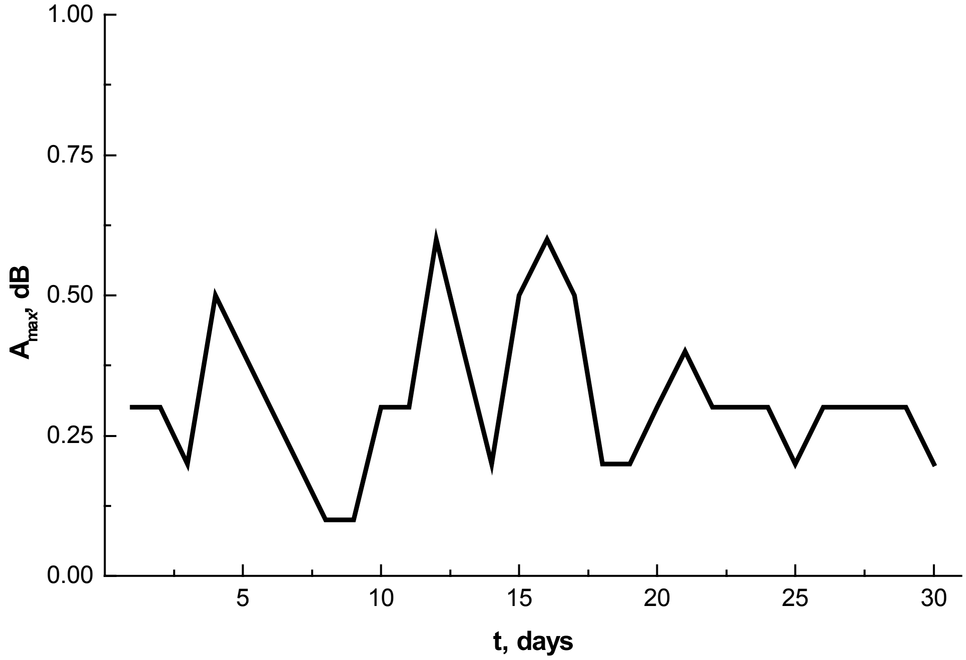
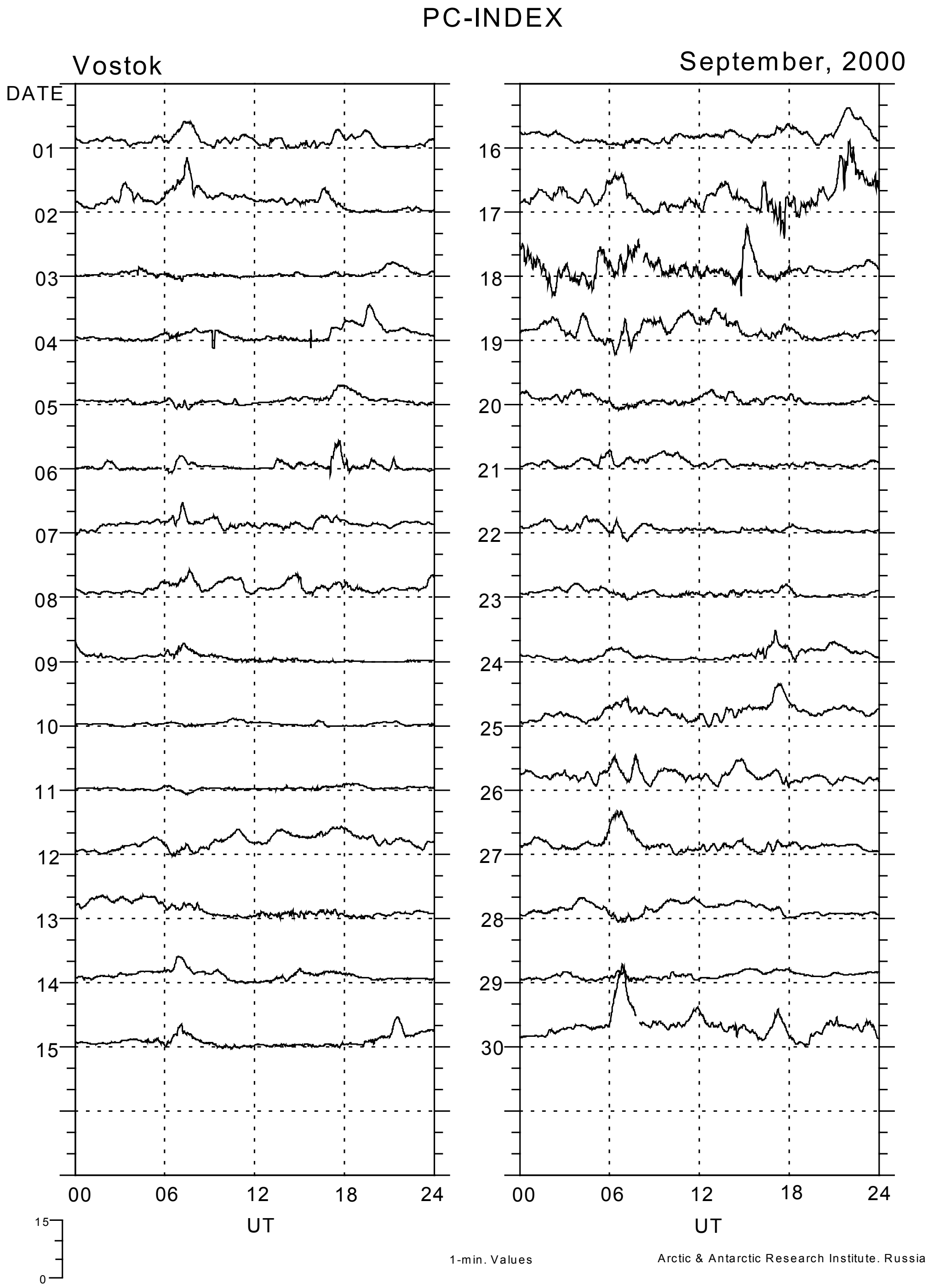


Fig. I.10. The maximum daily values of 32 MHz cosmic radiowave absorption, Vostok station, September 2000


PC-INDEX
Vostok
September, 2000
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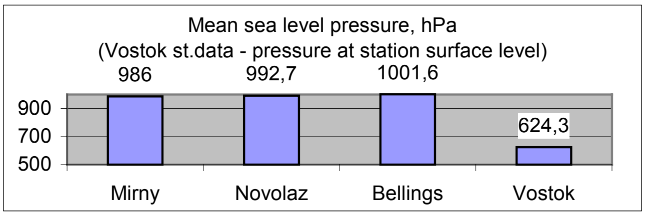
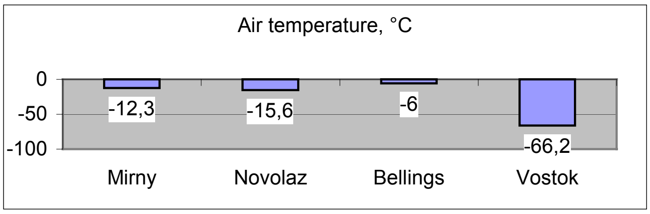
Arctic & Antarctic Research Institute. Russia

Fig. I.11.

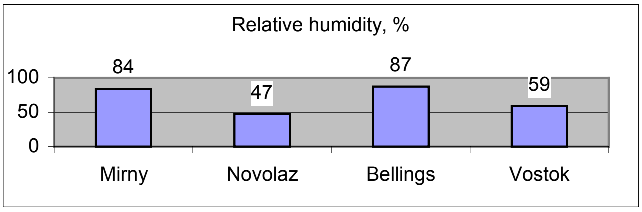
S e p t e m b e r 2 0 0 0



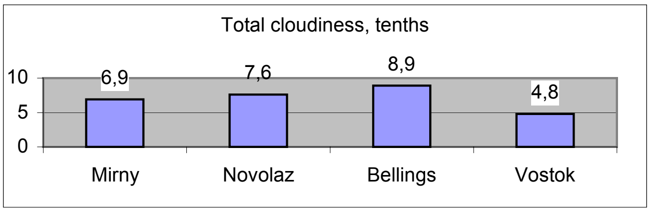
$(f-f_{avg})/\sigma_f$ 0,8 1,8 3,1 1,4



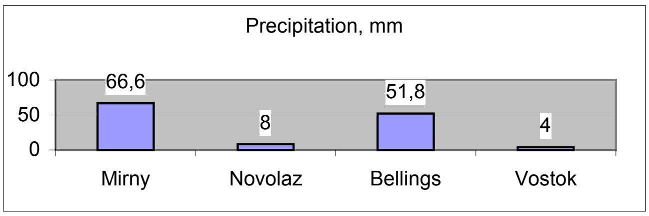
$(f-f_{avg})/\sigma_f$ 1,7 0,8 -0,9 -0,1



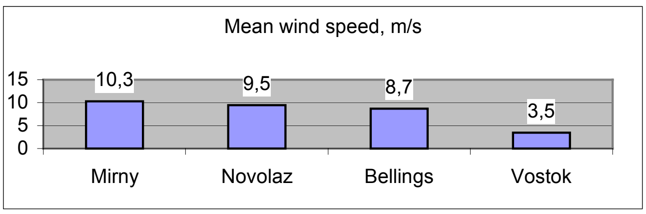
$(f-f_{avg})/\sigma_f$ 2,7 -0,6 -0,7 -2,3



$(f-f_{avg})/\sigma_f$ 0,4 2,2 0,2 0,9



f/f_{avg} 1,1 0,2 0,8 1,3



$(f-f_{avg})/\sigma_f$ -1,2 -0,2 0,7 -2,2

Fig. I.12. Comparison of monthly averages of meteorological parameters at the stations, September 2000

II. ANOMALOUS METEOROLOGICAL CONDITIONS IN JULY-SEPTEMBER 2000

The first month of the quarter under consideration was characterized by small above zero temperature anomalies in the coastal areas of East Antarctica (with the anomaly in Mirny comprising +1.4 ^{o}C (0.5σ), small below zero anomalies in the central areas (Polar plateau) and by a significant heat center on the Antarctic Peninsula. The temperature anomaly at Bellingshausen station comprised +3.0 ^{o}C (0.9σ). The temperature conditions of July-September are illustrated in Figure II.1, which presents the mean monthly maps of absolute surface temperature anomalies in the Southern polar area that were plotted using actual data contained in /1/ and multiyear averages in /2/.

In August, the area of below zero temperature anomalies moved from the inland areas to the Weddell Sea. The anomaly at Novolazarevskaya station, which happened to be at its periphery comprised -0.8 ^{o}C (0.3σ). However, the temperature anomalies were above zero in August over much of Antarctica.

In September, this situation was more pronounced with the above zero anomalies occurring actually over the entire mainland territory except for the northern part of the Antarctic Peninsula. One can see two quite intense heat centers on the map. The core of one of these centers is located in the coastal Indian sector zone of East Antarctica. The temperature anomaly in Mirny was +4.4 ^{o}C (1.7σ).

The second center with a temperature of up to +2.0 ^{o}C in its core was located above the Weddell Sea and the coastal areas of the Atlantic sector of Antarctica.

Figures II.3 to II.5 present an assessment of long-period changes of the monthly temperature averages of July-September. One can see that a significant temperature increase (of 2.9 ^{o}C) occurs in July and in September at Novolazarevskaya station from 1961 to 2000 and in July and August at Bellingshausen station from 1968 to 2000. The warming event at Mirny station is manifested in the August and September series. A below zero temperature trend at Bellingshausen station in September probably results from a series of below zero temperature anomalies at this station beginning from 1997.

The spatial distribution of surface air pressure anomalies during the third quarter of 2000 is presented in Figure II.2. The maps of anomalies reflect the circulation conditions of the Southern polar area (see section III of this Bulletin), namely, the development of ridges of the subtropic High above the Atlantic and Australian sectors, intense development of the surface Antarctic High and the dominance of positive surface air pressure anomalies. The most significant positive anomalies were observed in July and September above the Antarctic Peninsula. At Bellingshausen station, their values comprised +10.3 hPa and +10.5 hPa, respectively. Such high pressure anomalies were noted here for the first time over the entire observation period.

Multiyear variations of atmospheric pressure (Fig. II.3-II.5) at the Russian stations for July and August indicate that a negative trend during the period 1957-2000 occurs almost everywhere (except for Vostok station, August), while for September, a tendency towards increase is preserved, especially during the last decade.

The quantity of precipitation at the Russian stations during the period under consideration is non-uniform. Of interest is a significant precipitation in July and September at Mirny station (3.2-fold greater compared to the multiyear average).

References:

http://www4.ncdc.noaa.gov/ol/documentlibrary/datasets.html

Atlas of the Oceans. Southern Ocean. Ministry of Defense of the RF (in press)

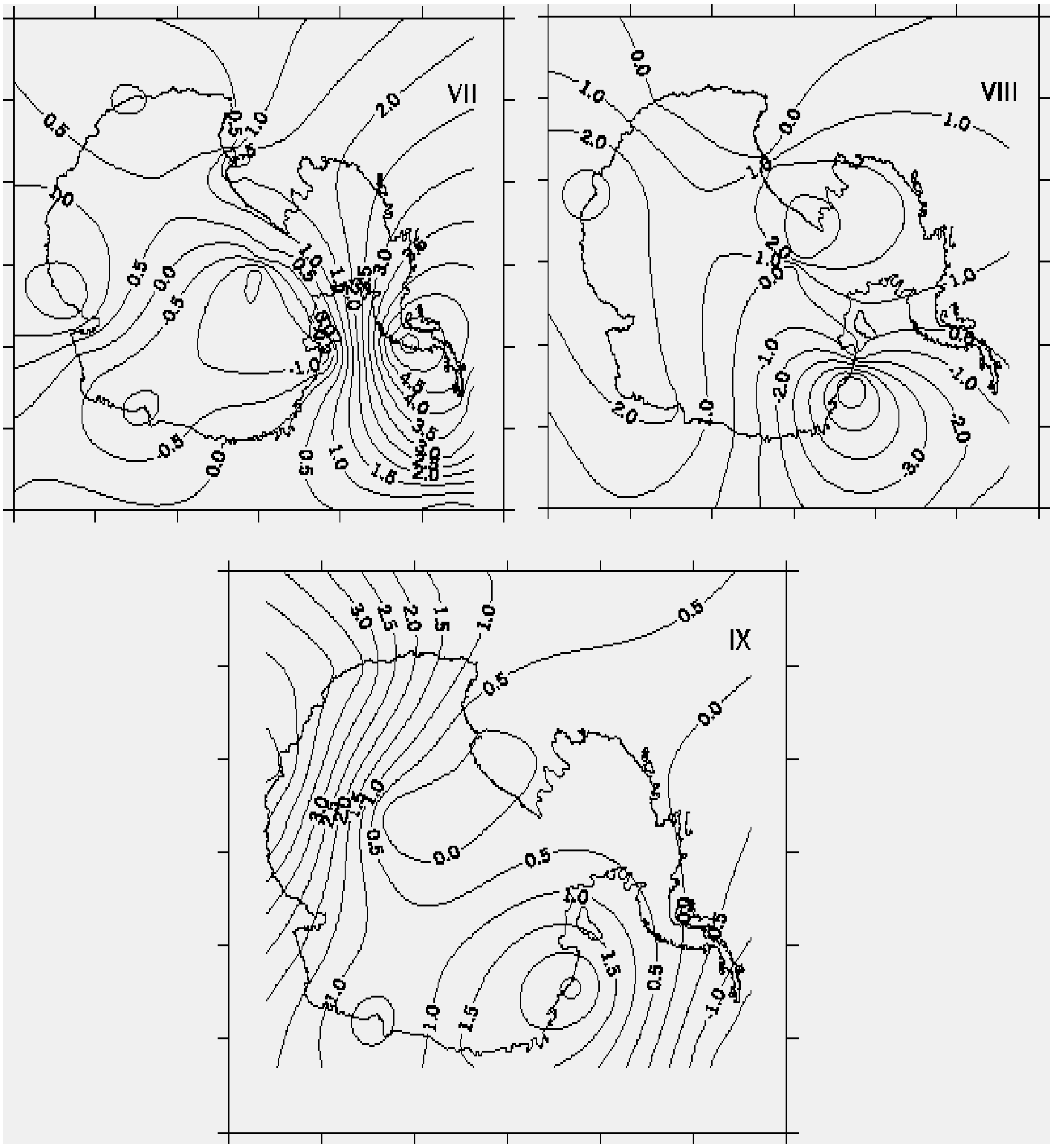


Fig. II.1. Spatial distribution of surface air temperature anomalies in the Southern polar area in July (VII), August (VIII) and September (IX) 2000 based on data of stationary and automated weather stations

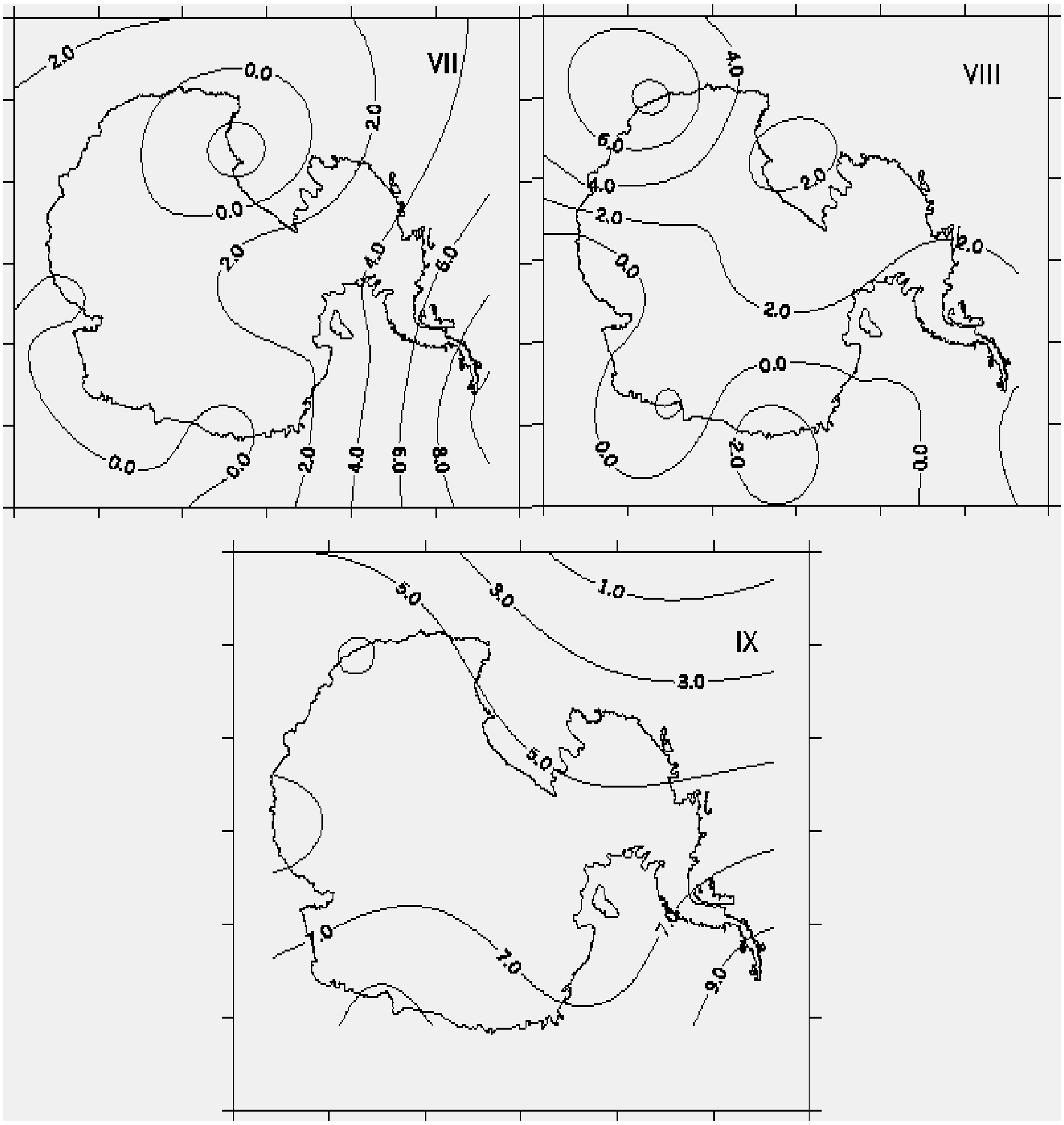
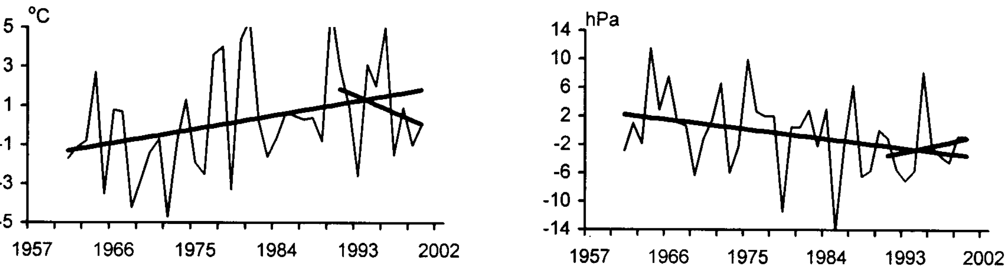
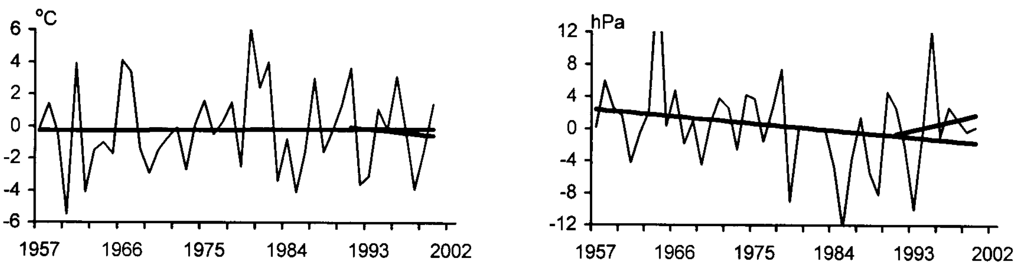


Fig. II.2. Spatial distribution of surface pressure anomalies in the Southern polar area in July (VII), August (VIII) and September (IX) 2000 based on data of stationary and automated weather stations

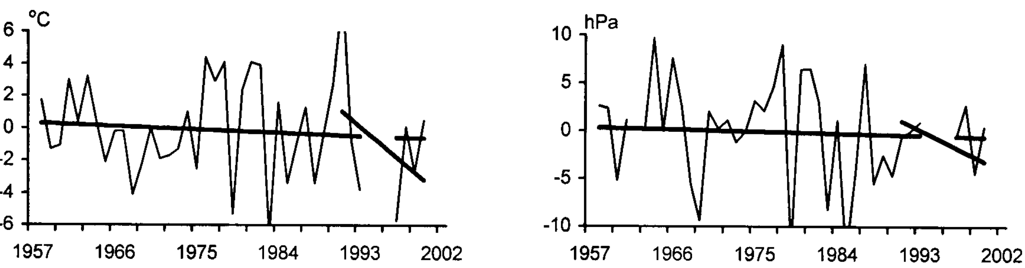
Novolazarevskaja



Mirny



Vostok



Bellingshausen

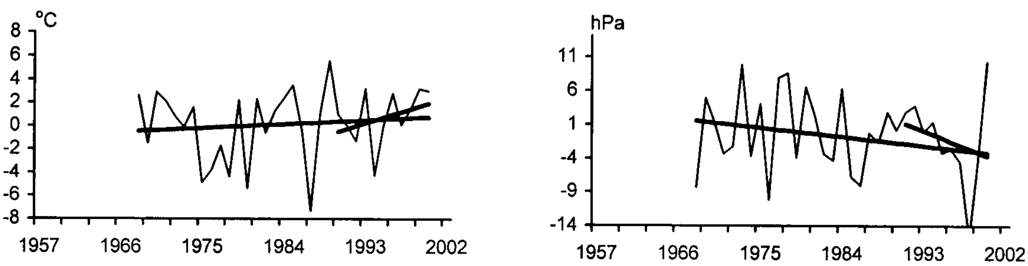


Fig. II.3. Interannual variations of air temperature and pressure anomalies at the Russian stations in July

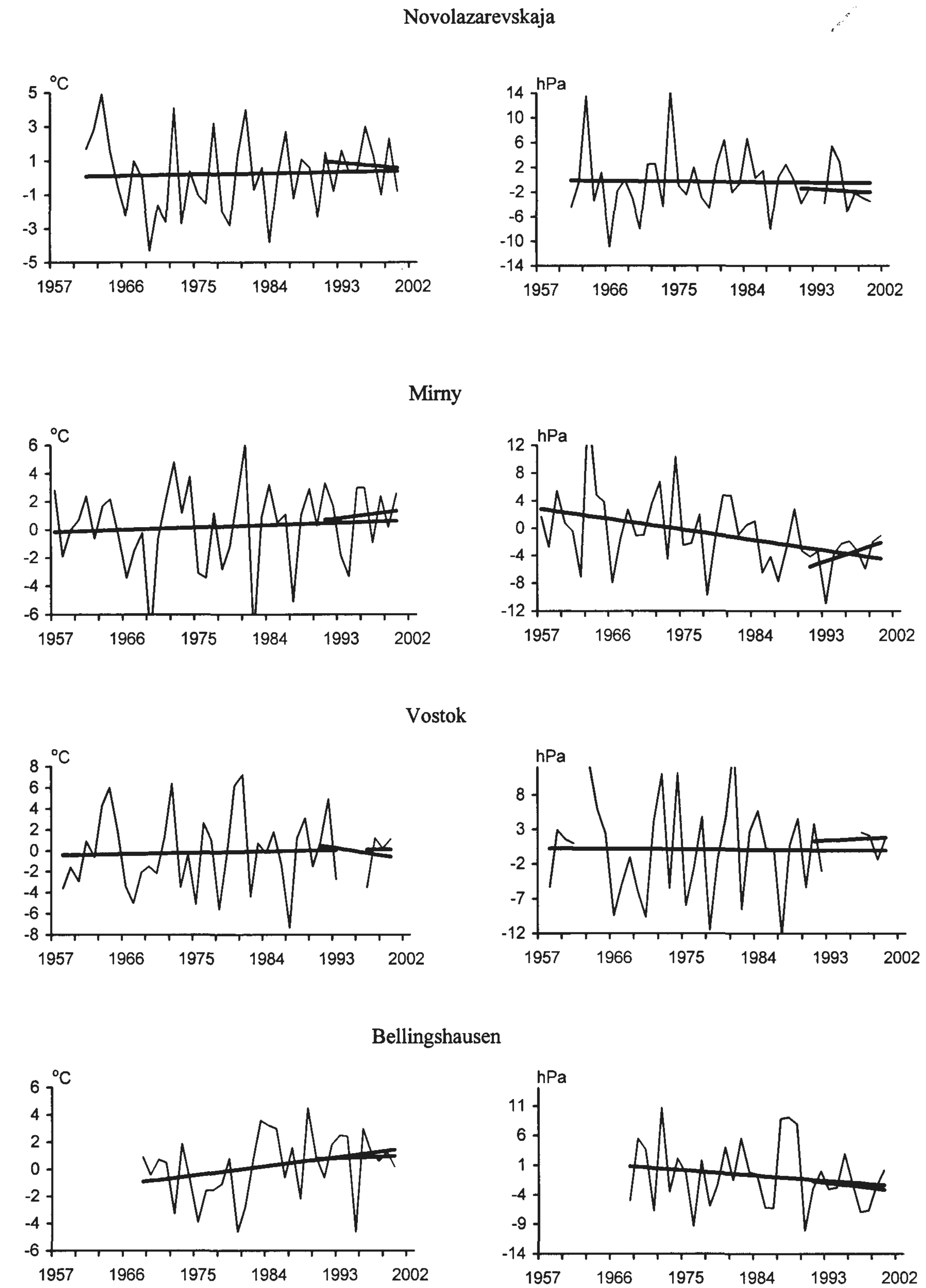


Fig. II.4. Interannual variations of air temperature and pressure anomalies at the Russian stations in August

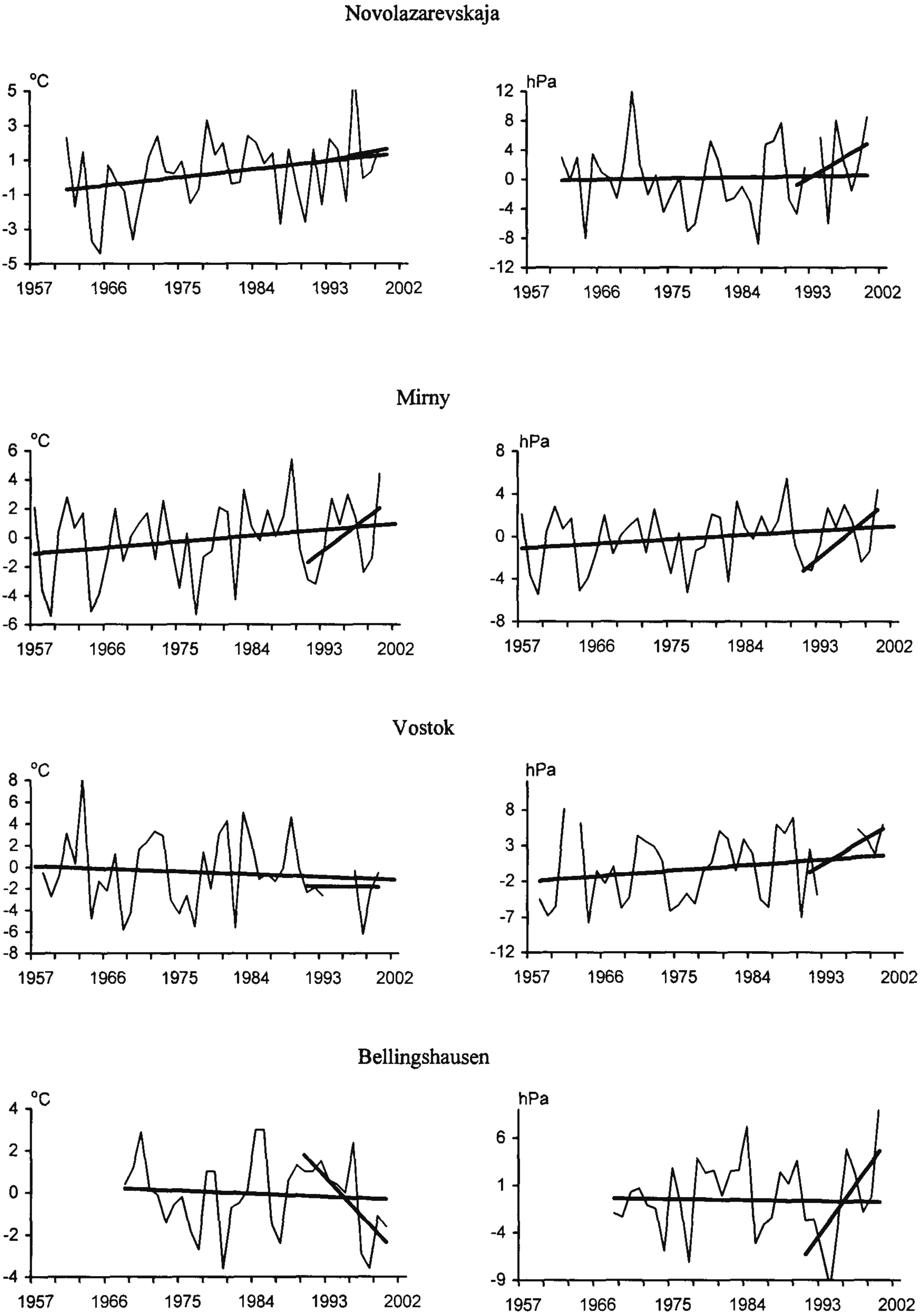


Fig.II.5. Interannual variation of air temperature and pressure anomalies at the Russian stations in September

III. REVIEW OF THE ATMOSPHERIC PROCESSES ABOVE THE ANTARCTIC IN JULY-SEPTEMBER 2000

The main peculiarity of the period under consideration was that the tendency for the less intense zonal circulation processes above the Southern Hemisphere was preserved. The decrease of the frequency of occurrence of zonal circulation features at the background of increased frequency of the M_a and M_b forms /1, 2/ has been already observed from February 2000 becoming quite significant in July-September (Table III.1). However, unlike the previous period with a slightly elevated frequency of occurrence of both meridional features, the M_a circulation form was much more active in July-September (4-7 days greater compared to the multiyear average) at some decrease of the M_b form frequency of occurrence (Table III.1). Thus, we can speak about the overwhelming dominance of the M_a atmospheric circulation form during the period under consideration.

Table III.1

Frequency of occurrence of the atmospheric circulation forms in the Southern Hemisphere and their anomalies in July-September 2000

Month	Frequency of occurrence (days)			Anomalies (days)		
	Z	M_a	M_b	Z	M_a	M_b
July	8	15	8	-3	4	-1
August	7	16	8	-4	7	-3
September	7	17	6	-6	7	-1

The development of ridges of the sub-tropic Highs was most frequent above the Atlantic and the Australian sectors of the Southern Hemisphere. The Antarctic High was intensely developed in July-September, its ridges combining from time to time with the ridges of the sub-tropic Highs. The positive surface air pressure anomalies above the inland regions of Antarctica comprised 2-10 hPa. A height trough predominated above the Indian Ocean sector of the hemisphere.

The meridional processes governed the most active development of cyclonic activity along the South African, Kerguelen and West Australian territories. This governed in turn, an anomalous export of warm humid air masses to the Antarctic coast and even to the continental dome.

The character of the atmospheric processes determined the structure of mean monthly thermal baric fields. The fields of anomalies of mean monthly pressure had a meridional form. Among the largest atmospheric pressure anomalies, one can note the July anomaly above the inland area of East Antarctica (about +10hPa) and the anomalies above the Antarctic Peninsula – about +8 hPa in July and about 13 hPa in September. The temperature anomalies above the Southern polar area were almost everywhere positive including the inland areas of Antarctica (see section II).

Active cyclonic activity above the southern polar area with frequent exits of cyclones to the Antarctic coast along the meridional trajectories governed the weather conditions during the entire period under consideration. Over most coastal areas of East Antarctica, snow storms with strong wind, snowfall and poor visibility was more frequent than usually. In many areas, the quantity of precipitation was much greater than on average. The influence of cyclonic activity was also observed above the inner continental areas where cyclones penetrated from the Mawson, D'Urville and Ross Seas.

As to the upper atmosphere processes, we can note an increase of the circumpolar vortex that was accompanied with more intensified westerly altitudinal flows (with wind speeds in August and September of more than 100 m/s at the heights greater than 20 km). There were cases of large stratospheric warming events in August and September.

References:

Dydina L.A., Rabtsevich S.V., Ryzhakov L.Yu., Savitsky G.B. Atmospheric circulation forms in the Southern Hemisphere. – AARI Proceedings, 1976, V. 330, p. 5-16.

Ryzhakov L.Yu. Some characteristics of the anomalous development of atmospheric circulation forms in the Southern Hemisphere at the cold time of the year. – AARI Proceedings, 1976, V. 330, p. 17-29.

IV. BRIEF OVERVIEW OF ICE PROCESSES IN THE SOUTHERN OCEAN IN JULY-SEPTEMBER 2000

In July-August, the ice cover expansion in the Atlantic and the Indian sectors of the Southern Ocean was slower. As a result, in September, at the time when the Antarctic circumpolar drifting ice belt achieves its maximum size, it was less developed compared to the multiyear average state (Fig. IV.1, Table IV.1).

A similarity with the previous winter of 1999 that was characterized in the indicated sectors by a decreased background ice cover extent, is also noted in the dates of development of ice processes in the vicinity of the Bellingshausen Scientific Base (Table IV.2). Here, the delay in the onset of the main ice phases was 1.5 - 2 months compared to the multiyear averages. Moreover, even a short-term freeze-up of Ardley Bay was absent while the width of the stable landfast ice in it was not greater than 100 m. However, in the area of the Progress station and Mirny Observatory, the landfast ice growth was exclusively intense (Table IV.3). This determined a significant thickness of landfast ice that was already in September 10 cm greater in the Progress station area, on average, and 20 cm in Mirny compared to the previous year.

Table IV.1

Latitudinal location of the external northern drifting ice edge in the Southern Ocean based on satellite ice data reviews from Novolazarevskaya and Mirny stations in September 2000

Longitude	Actual ice edge location	Multiyear average ice edge location
50˚W	60.9˚S	59.9˚S
40˚W	58.9˚S	58.1˚S
30˚W	58.8˚S	57.0˚S
20˚W	59.9˚S	56.9˚S
10˚W	58.6˚S	56.6˚S
0˚	55.8˚S	55.9˚S
10˚E	56.3˚S	55.3˚S
20˚E	55.3˚S	56.6˚S
30˚E	60.7˚S	58.7˚S
40˚E	60.6˚S	59.1˚S
50˚E	60.8˚S	59.1˚S
60˚E	60.3˚S	59.3˚S
70˚E	59.7˚S	59.1˚S
80˚E	59.4˚S	58.3˚S
90˚E	61.2˚S	59.5˚S
100˚E	61.6˚S	59.9˚S
110˚E	63.2˚S	60.6˚S
120˚E	63.9˚S	61.9˚S
140˚E	63.6˚S	62.3˚S
150˚E	62.2˚S	62.0˚S
160˚E	62.1˚S	62.1˚S
170˚E	62.2˚S	62.9˚S
180˚E	62.3˚S	63.8˚S

Table IV.2

Dates of the onset of main ice phases in the vicinity of Bellingshausen station (Ardley Bay) in winter of 2000

	Ice formation		Landfast ice formation		Freeze-up	
	First	Stable	First	Stable	First	Final
Actual	25.06	19.08	23.07	25.08	NO[1]	NO[1]
Multiyear average	09.05	08.06	11.06	13.06	03.07	07.07

[1]- Note: NO – Phenomenon not observed

Table IV.3

Landfast ice thickness (cm) in the areas of Russian Antarctic stations
from profile measurement data in July-September 2000

		Months		
		VII	VIII	IX
Mirny	Actual	113	132	147
	Multiyear average	101	119	137
Progress	Actual	144	155	163

Table IV.4

Snow depth (cm) on landfast ice in the areas of Russian Antarctic stations
from profile measurement data in July-September 2000

		Months		
		VII	VIII	IX
Mirny	Actual	18	37	24
Progress	Actual	6	0	0

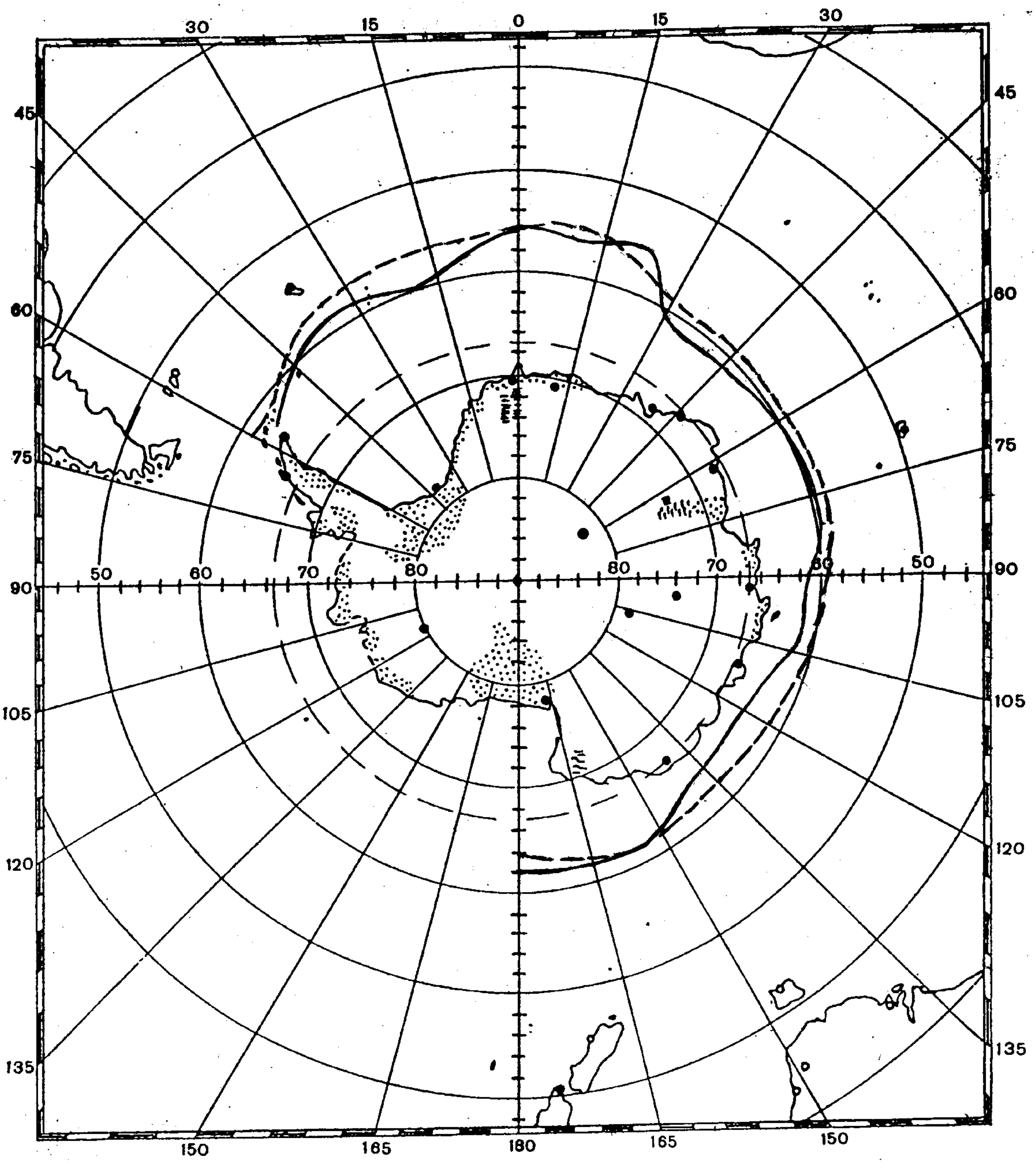


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Fig. IV.1. Actual (1) and mean multiyear (2) position of the external northern drifting ice edge in the Southern Ocean in September 2000 ——— - 1; – – – - 2.

V. TOTAL OZONE MEASUREMENTS AT MIRNY OBSERVATORY IN THE THIRD QUARTER OF 2000

Constant total ozone (TO) measurements in Mirny were resumed on August 10 after the end of polar night. Similar to the previous years, the TO values in August and September 2000 were below the averages obtained for the entire observation period. A significant TO decrease occurred during the polar night from 284 Dobson units in May to 218 Dobson units in August with an average for August becoming the second minimum value in the rank over the entire observation history in Mirny (after 216 Dobson units recorded in 1998). The monthly TO average in September increased compared to August comprising 252 Dobson units, however, sharp fluctuations of the ozone level were observed during this month that were much greater than in the previous years (see Fig. V.1). During the first and the last 10 days in September (September 7 and 21, 2000), very low TO values of 137 Dobson units were observed. This is the second TO minimum value in the rank for September in Mirny (with the absolute minimum of 127 Dobson units recorded on September 29, 1994). The TO measurement data in Mirny are confirmed by information of the US and Japanese investigators about a very extensive "ozone hole" observed in September above Antarctica whose area comprised 28.4 million km^2 on September 5 based on satellite data. The dramatic TO fluctuations during a month (from 137 Dobson units in the beginning and end of the month to 393 Dobson units on September 12) are probably due to a peripheral location of Mirny relative to the circumpolar vortex center and a possible inflow of more ozone rich air masses from the north. According to the analysis of the circulation processes (see section III), the meridional processes above Antarctica in September were anomalously developed with a stable outflow of air masses from temperate latitudes to the eastern coast that was most intense in the Indian Ocean sector.

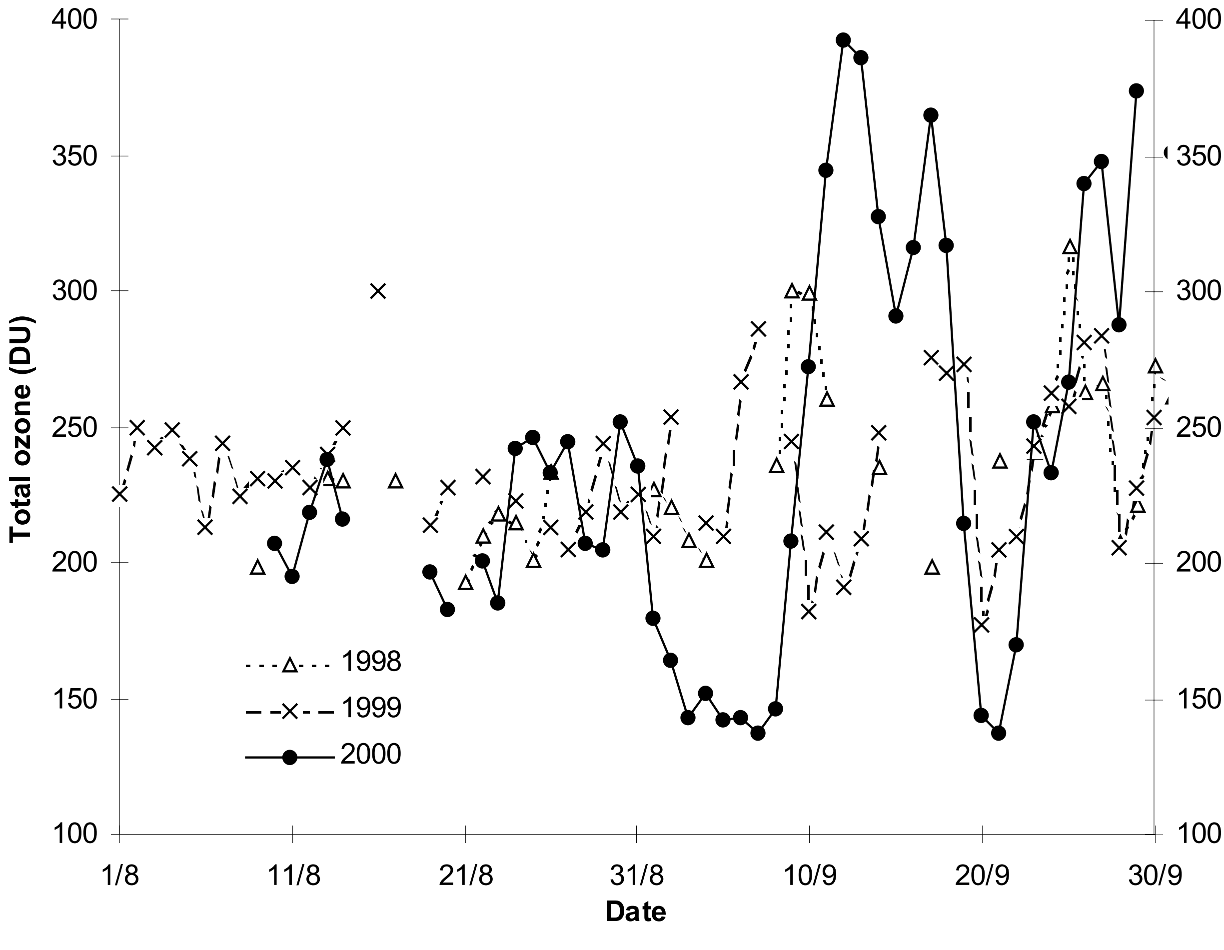


Fig. V.1. Daily total ozone averages at Mirny Observatory in the third quarter of 1998, 1999 and 2000

VI. SEISMIC OBSERVATIONS IN ANTARCTICA IN 1999

In 1999, seismic observations in Antarctica were continued at two stationary stations of the Geophysical Service of the Russian Academy of Science (RAS GS) in Mirny and at Novolazarevskaya.

Seismic observations at Mirny station (MIR) have been carried out from 1956. In 1962 in 3060 km east of Mirny station, observations were started at Novolazarevskaya station (NVL). These stations are included to the tele-seismic network of the RAS GS, whose main goal is to provide continuous monitoring in the Earth's seismic active zones, including Russia.

At present, the Antarctic seismic stations fulfill the following functions:

- monitoring of strong Earth's earthquakes with a magnitude of M>6;
- records of earthquakes in the seismic active zone around Antarctica;
- records of local phenomena in Antarctica including local earthquakes and fractures in the ice sheet.

The equipment of stations was represented for many years by a set of analogue instrumentation, namely, seismometers with a highly sensitive short-period channel (SKM-3) and a medium-period seismograph SKD with a decreased sensitivity channel. In May-July 1999, broadband digital equipment DASS was set up at the seismic Novolazarevskaya station. It was developed and manufactured by the Central Experimental Methodological Expedition (CEME) of RAS GS jointly with the scientific-production association "Geotex". It has a bandwidth of 0.04-5 Hz, quantization frequency of 20 readouts a second and a dynamic range of about 90 dB, which allowed passing to a more modern level of acquisition, storage and processing of seismic records.

A unique arrangement of seismometers on the monolith bedrock outcrops of a practically a-seismic continent remote from civilization, which creates a high level of noise, allows records of seismic waves from earthquakes occurring at significant distances from these stations. Earthquakes with a magnitude M=6 and greater are recorded at a distance of up to 165 degrees of latitude (about 18000 km). Highly sensitive equipment also allows following less intense earthquakes of the oceanic belt surrounding the continent at a distance of 15-25 degrees from the coast.

In 1999, processing of analogue seismological data at Mirny and Novolazarevskaya stations (before April 1999) envisaged identification of precise time signals, determination of time corrections and a final drawing of seismograms. The interpretation of the records of earthquakes consisted of the identification of seismic wave arrival, determination of time and accuracy of arrival, identification of seismic waves and determination of the main parameters of earthquakes. This work was undertaken in compliance with Instruction /1/. The results of interpretation were sent to the Information Processing Center (IPC) of RAS GS on a timely basis. These data were used in a summary processing of earthquakes to compile the operational catalogues and a Seismological Bulletin /2/. In addition, observations of the level of microseisms and separation of short-period fluctuations connected with the fractures of the Antarctic ice sheet using the SKM-3 records were carried out on a daily basis. The obtained seismograms were transferred to the archive of the Central Experimental Methodological Expedition of GS upon the return of the expedition.

The digital records of earthquakes at Novolazarevskaya station became computer-processed from August 1999. Data on earthquakes in the form of daily operational reports were transmitted by the communication channels to the IPC of the GS.

In 1999, 730 seismograms were received at Mirny station, with records of 757 earthquakes and individual arrivals and determination of the main parameters (time at the source and a magnitude) for 125 earthquakes. Data of Mirny station were used for summary processing of 198 earthquakes including 79 events with a magnitude of MPSP[1] ≥ 6.0 and 22 events with MPSP ≥ 6.5 (see Table VI.1). Records of short-period fluctuations related to the fractures of the ice sheet of Antarctica were identified on the seismograms. The distribution of these events by months is shown in Table VI.2.

The main parameters of strong earthquakes in Table VI.1 are taken from Bulletin /2/.

[1] The MPSP magnitude is a characteristic of the earthquake intensity, which is calculated from measurements of amplitudes and periods in the maximum phase of longitudinal wave P in the records of short-period instrumentation (SP –short period) corresponding to the international magnitude mb.

Table VI.1

Earthquakes with the MPSP ≥ 6.0 recorded by the Antarctic Mirny and Novolazarevskaya stations in 1999

No.	Date yy/mm/dd	Time at the source hh/mm/ss, s	Epicenter coordinates		Depth, h, km	MPSP magnitude	Epicentral distance to the station Δ, degrees	
			φ°	λ°			**MIR**	**NVL**
1	2	3	4	5	6	7	8	9
1	1999/01/09	03/05/36,6	44,397	147,262	112	6,2	-[2]	145,8
2	1999/01/12	02/32/27,8	26,788	140,260	459	6,3	-	127,4
3	1999/01/16	10/44/38,1	56,250	-147,383	10	6,2	150,6	162,9
4	1999/01/24	00/37/05,1	30,740	131,113	33	6,6	-	128,3
5	1999/01/24	08/00/08,8	-26,386	74,475	10	6,5	41,8	56,4
6	1999/01/25	18/19/15,9	4,537	-75,732	10	6,2	-	93,5
7	1999/01/28	08/10/01,6	52,915	-169,214	33	6,4	139,7	162,1
8	1999/01/30	03/51/08,8	41,784	88,479	46	6,0	-	124,7
9	1999/02/03	06/35/57,2	-6,034	104,283	33	6,0	-	85,2
10	1999/02/04	19/27/59,2	4,045	95,305	43	6,2	-	91,6
11	1999/02/06	21/48/01,9	-12,808	166,691	110	6,6	71,9	94,9
12	1999/02/08	16/22/50,6	-7,879	147,634	33	6,0	69,3	96,1
13	1999/02/12	17/44/54,1	44,938	149,338	56	6,2	-	146,9
14	1999/02/13	14/45/12,7	-3,450	144,937	33	6,0	72,5	99,8
15	1999/02/14	21/12/24,6	-15,451	168,017	33	6,2	-	92,4
16	1999/02/22	01/00/33,6	-21,381	169,743	33	6,1	65,3	86,8
17	1999/02/23	07/27/57,3	0,323	119,510	33	6,0	69,3	-
18	1999/02/25	18/58/28,9	51,604	104,979	10	6,0	-	138,5
19	1999/03/04	08/52/02,0	5,478	121,928	33	6,7	74,2	-
20	1999/03/05	00/33/35,0	-20,191	-68,838	10	6,0	-	68,0
21	1999/03/08	12/25/46,0	52,072	159,367	33	6,1	-	156,2
22	1999/03/18	17/55/43,2	41,280	142,923	33	6,2	-	141,7
23	1999/03/20	10/47/46,1	51,628	-177,725	33	6,4	135,5	160,3
24	1999/03/27	08/03/44,6	-9,626	112,835	33	6,0	58,4	84,6
25	1999/03/28	19/05/13,5	30,462	79,375	33	6,6	97,3	-
26	1999/04/02	17/05/47,1	-19,859	168,257	10	6,4	66,1	88,1
27	1999/04/03	06/17/21,5	-16,477	-72,637	106	6,3	96,5	72,8
28	1999/04/05	11/08/03,4	-5,532	149,577	141	6,3	72,1	98,9
29	1999/04/06	08/22/14,2	-6,385	147,115	33	6,1	70,5	-
30	1999/04/08	13/10/34,5	43,622	130,456	570	6,7	113,5	139,8
31	1999/04/13	10/38/46,1	-21,326	-176,421	143	6,5	70,9	88,0
32	1999/04/29	07/46/09,3	29,024	131,103	33	6,1	-	126,7
33	1999/05/06	23/00/53,2	29,521	51,899	33	6,1	100,7	-
34	1999/05/07	14/13/54,6	56,582	-152,843	33	6,2	148,7	-
35	1999/05/10	20/33/03,0	-5,105	150,936	142	6,5	73,0	-
36	1999/05/16	00/51/20,5	-4,379	152,592	61	6,2	74,3	-
37	1999/05/16	15/25/53,4	-2,566	138,216	53	6,8	71,2	-
38	1999/05/17	10/07/59,2	-5,116	152,948	44	6,2	73,7	-
39	1999/05/18	19/52/59,9	5,709	123,940	33	6,3	75,5	-
40	1999/06/15	20/42/05,9	18,530	-97,408	63	6,6	131,5	-
41	1999/06/18	10/55/26,1	5,509	126,590	33	6,4	75,9	-
42	1999/06/21	17/43/04,3	18,376	-101,621	63	6,4	130,9	-
43	1999/06/29	05/50/09,4	-9,396	147,863	33	6,1	67,9	-
44	1999/07/09	05/04/43,9	-6,403	154,848	33	6,0	73,2	-
45	1999/07/19	02/17/03,4	-28,527	-177,587	33	6,4	64,0	-
46	1999/07/26	01/33/16,8	-4,953	151,950	33	6,0	73,5	-
47	1999/08/12	05/45/00,6	-1,522	122,475	33	6,0	68,1	95,3
48	1999/08/14	00/16/47,9	-5,707	104,627	61	6,9	61,3	85,6
49	1999/08/17	00/01/37,4	40,849	30,013	10	6,4	117,3	112,1
50	1999/08/18	01/16/53,5	-37,208	177,198	191	6,0	54,3	71,8
51	1999/08/20	10/02/31,8	10,172	-83,986	82	6,2	123,7	101,5
52	1999/08/22	09/35/39,7	-40,597	-75,205	33	6,5	72,8	51,4
53	1999/08/22	12/40/46,2	-15,979	167,995	33	6,3	69,5	91,9
54	1999/08/26	07/39/30,1	-3,180	145,745	33	6,1	73,0	-
55	1999/08/28	12/39/46,3	-1,615	-77,511	33	6,0	-	88,3
56	1999/09/15	03/01/16,1	-20,602	-67,294	134	6,1	91,9	67,1

[2] "-" the result of processing this earthquake are absent in the station log

57	1999/09/17	14/54/50,4	-13,722	167,354	206	6,3	71,3	94,1
58	1999/09/18	21/28/28,9	51,283	157,529	23	6,2	127,2	155,0
59	1999/09/18	23/51/22,1	-19,689	169,537	33	6,2	66,8	88,5
60	1999/09/20	17/47/19,3	23,961	121,004	33	6,7	92,7	118,7
61	1999/09/20	17/57/17,1	23,941	121,184	33	6,3	92,7	118,8
62	1999/09/20	18/03/46,0	23,917	121,123	33	6,7	92,7	-
63	1999/09/20	18/11/54,3	23,927	121,193	33	6,4	92,7	-
64	1999/09/20	21/46/43,8	23,688	120,766	33	6,3	92,4	-
65	1999/09/21	11/49/48,1	44,923	149,792	39	6,1	-	147,0
66	1999/09/22	00/14/41,0	23,986	121,294	33	6,5	92,8	-
67	1999/09/22	00/49/43,6	23,857	121,130	33	6,0	92,6	-
68	1999/09/25	23/52/51,9	23,968	121,174	33	6,4	92,7	118,8
69	1999/09/30	16/31/12,6	16,061	-96,824	33	6,7	129,1	111,2
70	1999/10/02	21/08/42,9	40,511	142,963	33	6,1	-	141,0
71	1999/10/13	01/33/40,6	54,714	-161,237	33	6,1	144,0	163,6
72	1999/10/16	09/46/46,4	34,641	-116,319	10	6,5	143,7	134,6
73	1999/10/18	02/43/24,6	-56,102	-26,700	33	6,1	49,6	22,1
74	1999/10/24	04/21/42,4	44,720	149,360	42	6,1	-	146,7
75	1999/10/25	07/29/57,2	32,297	142,268	33	6,0	-	133,1
76	1999/10/25	20/31/33,8	-38,343	175,296	83	6,0	52,5	70,5
77	1999/11/01	17/53/00,7	23,476	121,543	33	6,5	92,3	118,5
78	1999/11/08	16/45/42,8	36,618	71,295	219	6,3	-	115,1
79	1999/11/11	18/05/42,6	1,435	100,246	197	6,3	68,0	90,8
80	1999/11/12	16/57/21,2	41,145	31,188	10	6,5	117,3	112,5
81	1999/11/15	05/42/47,4	-1,189	88,934	33	6,5	65,3	84,6
82	1999/11/17	03/27/41,1	-5,886	148,875	33	6,1	71,5	98,4
83	1999/11/18	14/27/43,5	0,648	125,995	33	6,2	71,0	98,4
84	1999/11/19	13/56/47,0	-6,255	148,628	33	6,1	71,1	97,9
85	1999/11/21	03/51/09,2	-21,444	-68,752	46	6,2	91,2	66,8
86	1999/11/26	02/56/08,2	-30,101	-177,541	33	6,0	62,6	79,2
87	1999/11/26	13/21/16,2	-16,417	168,340	33	6,3	69,2	91,5
88	1999/11/27	22/41/05,6	-4,540	153,038	33	6,2	74,3	-
89	1999/11/30	04/01/52,9	-18,724	-69,131	120	6,1	93,9	69,5
90	1999/12/04	07/45/02,0	3,343	128,009	34	6,1	74,1	-
91	1999/12/06	23/12/30,4	57,460	-154,577	33	7,1	148,6	165,5
92	1999/12/07	21/29/49,5	-16,215	-174,001	152	6,0	76,5	93,2
93	1999/12/11	18/03/37,8	16,017	119,699	33	6,8	84,7	110,9
94	1999/12/18	17/44/58,2	-2,363	139,670	33	6,0	71,8	-
95	1999/12/19	00/48/40,5	13,172	144,535	70	6,1	88,0	115,6
96	1999/12/21	14/15/02,3	-6,631	105,765	98	6,5	60,5	85,1
97	1999/12/24	19/26/06,2	-56,126	146,728	10	6,0	26,7	-
98	1999/12/25	18/38/51,4	-27,885	-176,609	33	6,0	64,9	81,4
99	1999/12/29	05/19/50,4	18,461	-101,343	90	6,2	131,0	-
100	1999/12/29	12/57/57,3	-23,667	-67,691	33	6,0	-	64,4
Total recorded in 1999							79 earthquakes	71 earthquakes

Table VI.2

Data on ice shears in 1999

Month	Number of shears recorded	
	Mirny	Novolazarevskaya
January	7	No data
February	10	No data
March	16	No data
April	19	No data
May	11	Station was not in operation
June	13	Station was not in operation
July	14	Station was not in operation
August	25	19
September	18	14
October	7	17
November	14	46
December	10	59

Using the analogue instruments of Novolazarevskaya station (from January 1 to April 30) 178 earthquakes and individual arrivals were recorded and the main parameters for 19 earthquakes were determined. During this period, data of Novolazarevskaya station were used for summary processing of 54 earthquakes at the RAS GS IPC, including 28 events with the MPSP ≥ 6.0 and 5 events with the MPSP ≥ 6.5 (see Table VI.1).

At Novolazarevskaya station, 826 earthquakes and individual arrivals were recorded and main parameters of 140 earthquakes were determined using a digital DASS station during the period August 4 to December 31, 1999. Data of the digital Novolazarevskaya station were used for summary processing of 108 earthquakes at the RAS GS IPC, including 43 events with the MPSP ≥ 6.0 and 11 events with the MPSP ≥ 6.5. Figure VI.1 (a, b) shows the examples of a digital record of two earthquakes at Novolazarevskaya that occurred in the seismic belt around Antarctica. The records of ice sheet fractures were also processed with a by-month distribution of these events presented in Table VI.2. An example of the digital record of ice sheet fractures is given in Figure VI.2 (a, b).

Most of epicenters of earthquakes recorded by Mirny and Novolazarevskaya stations are located in the Southern Hemisphere in the area of the Pacific Ocean seismic belt with a significant quantity in South America (see Figs. VI.3a, VI.3b). The South Sandwich Islands were the most seismically active area in 1999 where a series of earthquakes was recorded (the strongest with mb=5.5). The record of this event by broadband instruments of Novolazarevskaya station is presented in Fig. VI.1a.

Based on data of PIDC (Prototype International Data Center) in Arlington (USA), one seismic event with mb=3.5 occurred on January 31, 1999 in Antarctica on the Victoria Land coast. It was recorded by Vanda station (VNDA) located at a distance of 0.72° from the epicenter. The distance from the epicenter to Mirny station was 21.6° and to Novolazarevskaya station 30.9°. The Russian stations did not record this event due to insufficient sensitivity of analogue instruments that was used at that time at both stations.

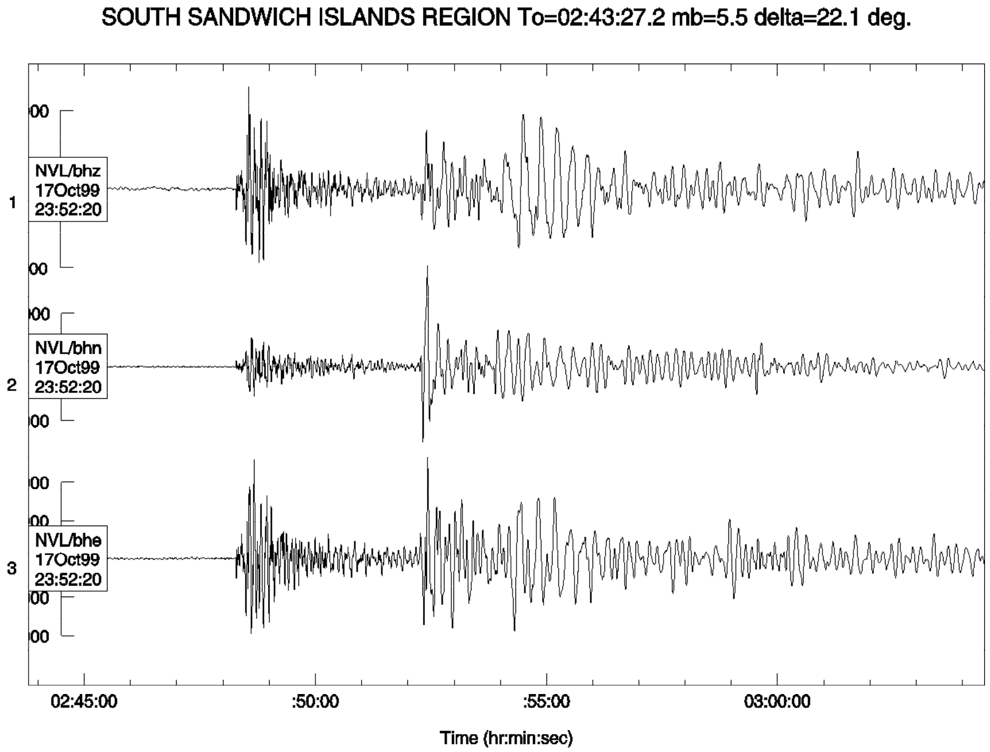
All observation data and the results of their processing obtained at Mirny and Novolazarevskaya stations are stored in the archive of the Central Experimental Methodological Expedition of the RAS GS and are available to a wide range of users.

References:

Kondorskaya N.V. (executive compiler) et al., 1981. Instruction on the order of observations and their processing at seismic stations of one common system of seismic observations of the USSR, M., Nauka.

Seismological Bulletin (every 10 days), 1999, RAS GS CEME.

a)



b)

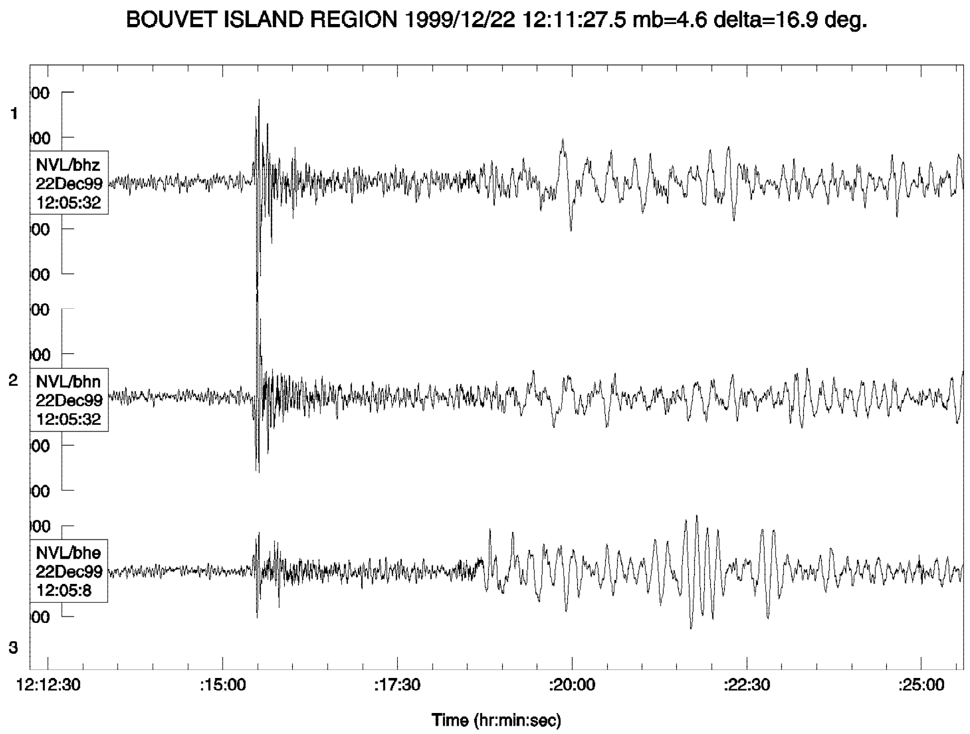
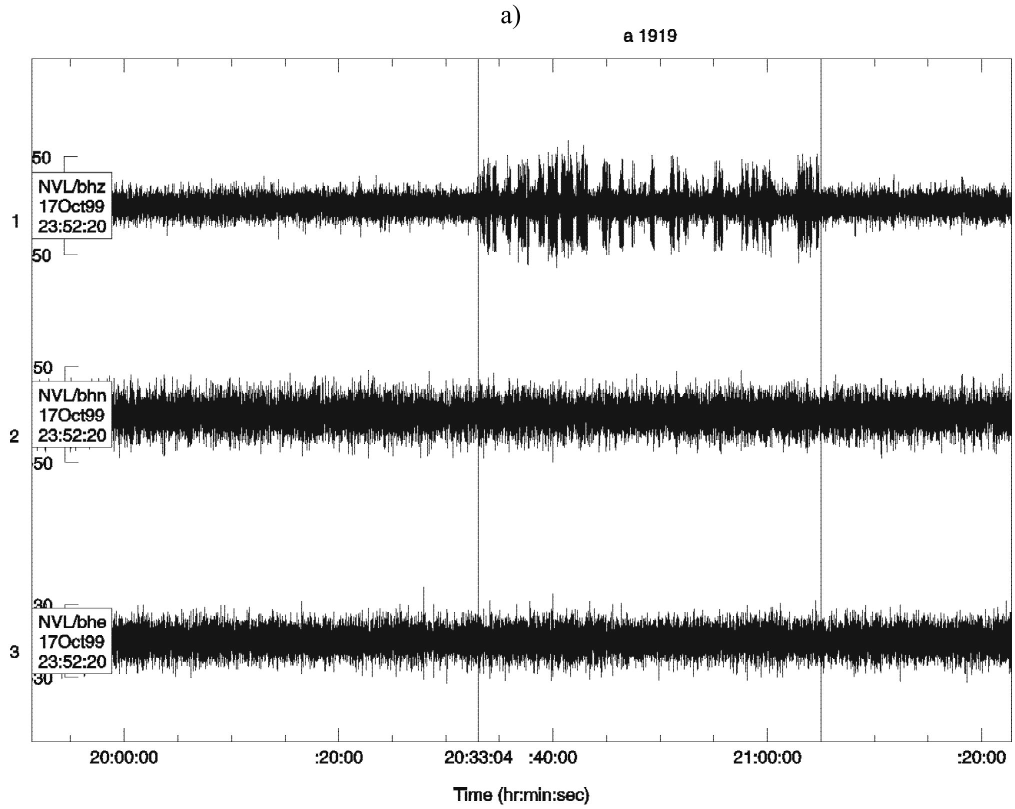


Fig. VI.1 (a, b). Examples of earthquake records by the digital Novolazarevskaya station that occurred within the seismic belt of Antarctica. Earthquake in the South Sandwich Islands on October 18, 1999 at 02:43:27.2, mb=5.5, $\Delta=22.1^o$, Earthquake in the Bouvet Islands on December 22, 1999 at 12:11:27.5, mb=4.6, $\Delta=16.9^o$.

a)



b)

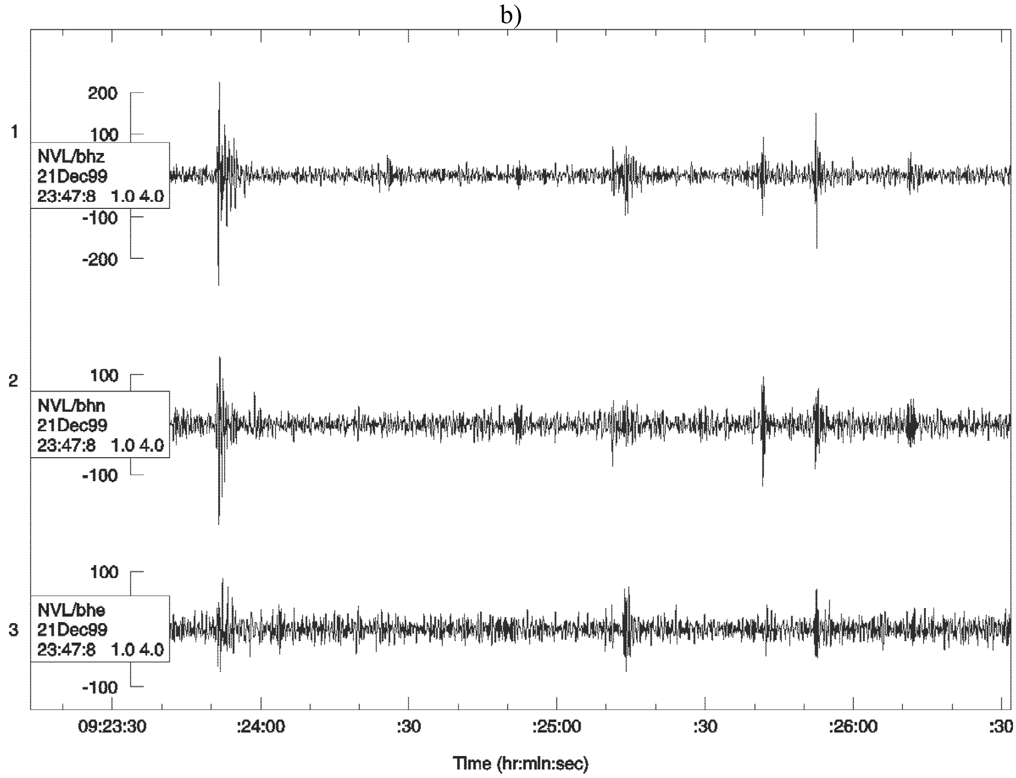
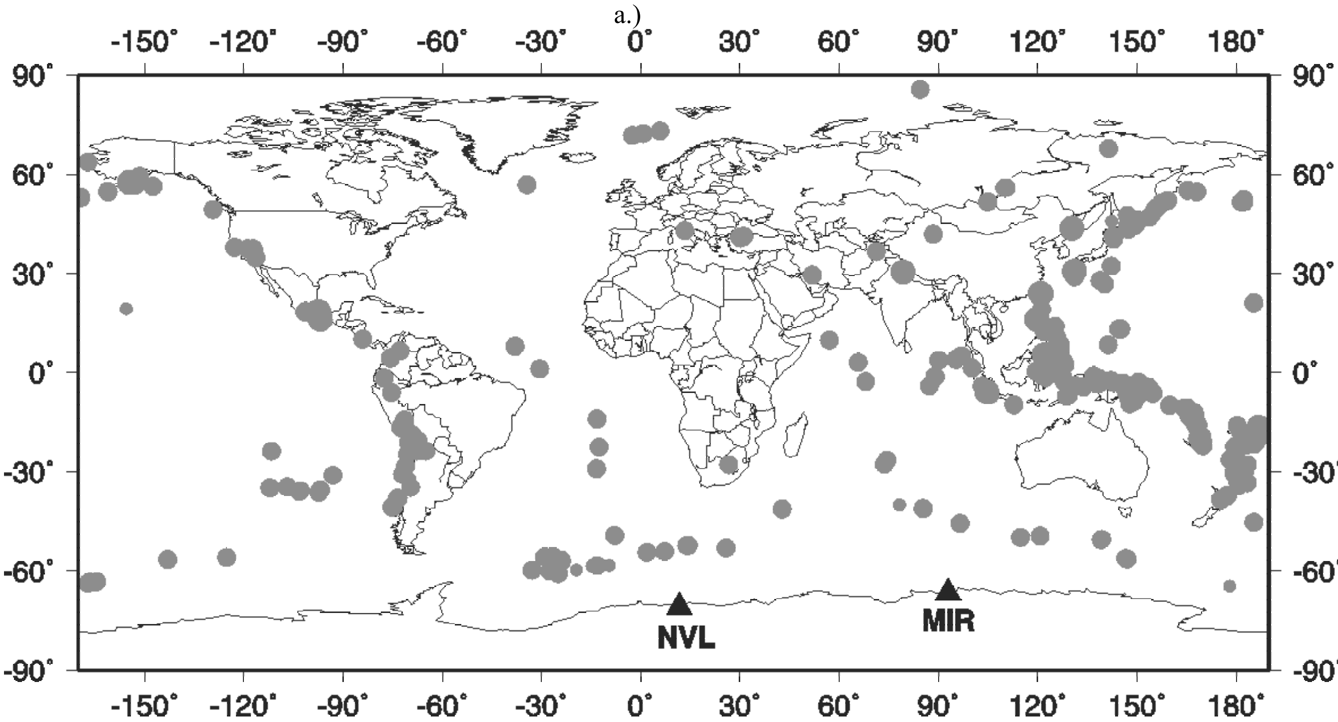


Fig. VI.2 (a, b). Examples of records of ice sheet fractures by the digital Novolazarevskaya station: a) October 18, 1999 , b) December 22, 1999

a.)



Conventional designations:

Epicenters of earthquakes ▲ **- Seismic stations**

MPSP magnitude

1 2 3 4

b)

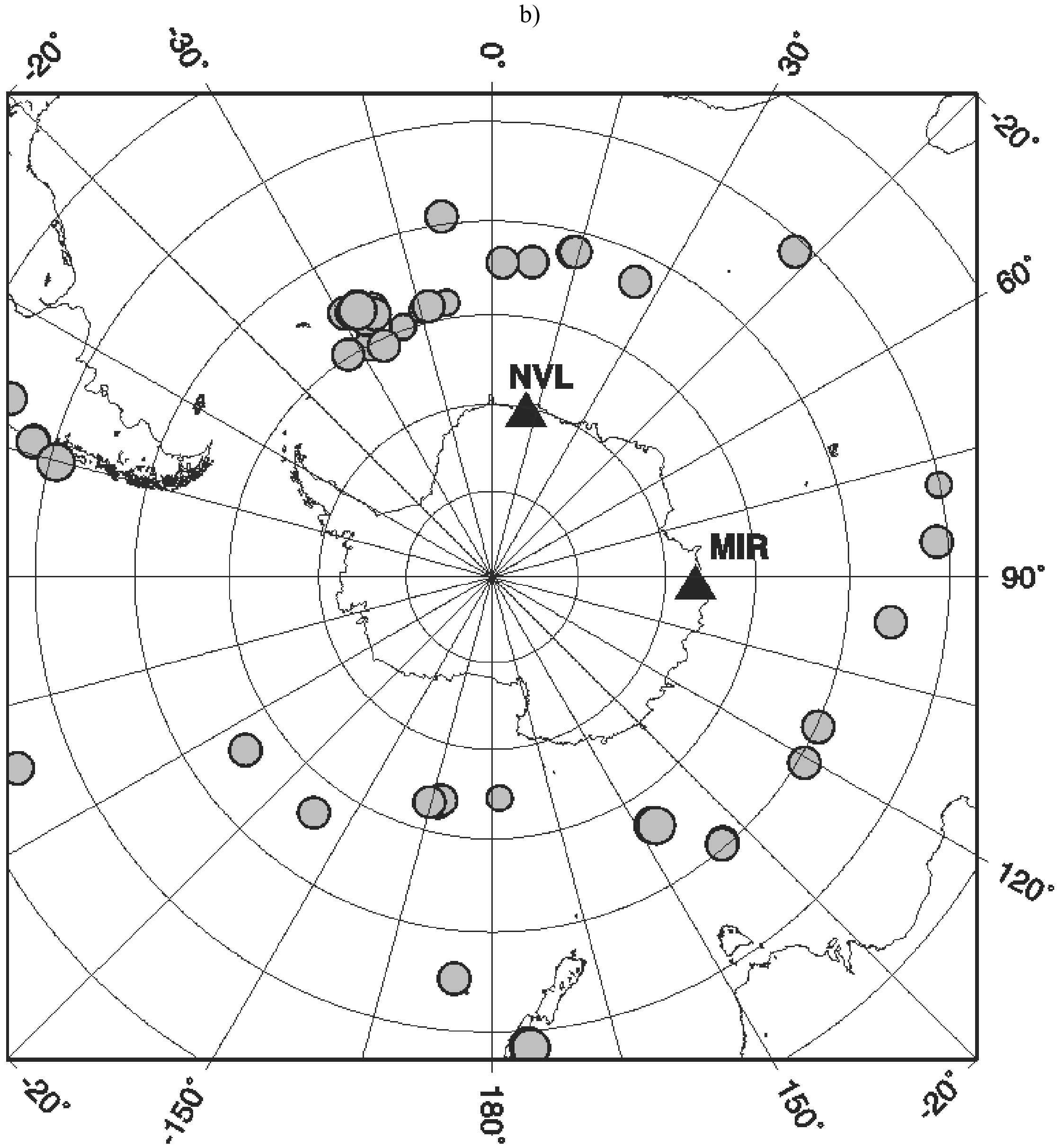


Fig. VI.3 (a, b). Maps of epicenters of earthquakes recorded by Mirny and Novolazarevskaya stations in 1999 on Earth, in the areas of the Antarctic seismic belt.

VII. MAIN EVENTS OF THE 45TH RAE IN JULY-SEPTEMBER 2000

July 2, 2000	Arrival of the research expedition vessel "Akademik Fedorov" to Bremerhaven (Germany) for repairs and preventive maintenance of the power plant and ship machinery.
July 25, 2000	Departure of the sledge-caterpillar traverse from Novolazarevskaya station to the ice barrier of the Lazarev Sea for diesel fuel unloaded from the "Akademik Fedorov".
August 1, 2000	Return of the sledge-caterpillar traverse with diesel fuel to Novolazarevskaya station.
August 3, 2000	End of repairs and preventive maintenance of the power plant and ship machinery of the "Akademik Fedorov". Departure of the "Akademik Fedorov" from Bremerhaven to Murmansk to participate in the arctic expedition.
August 25, 2000	Delivery along landfast ice to Mirny Observatory of 4 transportation vehicles unloaded from the "Akademik Fedorov" to Tokarev Island.
September 3, 2000	Departure of the support sledge-caterpillar traverse with 132 cubic meters of diesel fuel from o Mirny Observatory to the 200th km of the Mirny-Vostok Route to set up an intermediate fuel storage site to support the main traverse to Vostok station.
September 12, 2000	Departure of the next sledge-caterpillar traverse from Novolazarevskaya station to the ice barrier of the Lazarev Sea for diesel fuel.
September 11-15, 2000	XII Special Antarctic Treaty Consultative Meting in Hague (Netherlands). The Rohydromet in the Delegation of the Russian Federation was represented by the Deputy Head of Roshydromet Khodkin S.S., Deputy Head of the Administration for Federal Hydrometeorological Activities of the Arctic and Antarctic State Observation Network (URSA) Martyshchenko V.A., RAE Head Lukin V.V., RAE lead ecologist Pomelov V.N.
September 17, 2000	Return of the support sledge-caterpillar traverse from the 200th km of the Mirny-Vostok Route to Mirny Observatory. At the intermediate storage site of the route, 96 cubic meter of diesel fuel was left.
September 21, 2000	Return of the sledge-caterpillar traverse with diesel fuel to Novolazarevskaya station.