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REPORT OF JOINT RUSSIAN/NORWEGIAN AERIAL SURVEYS IN THE BARENTS SEA IN SEPTEMBER 2001

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REPORT OF JOINT RUSSIAN/NORWEGIAN AERIAL SURVEYS IN THE BARENTS SEA IN SEPTEMBER 2001

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Introduction

The distribution of harp seals in the Barents Sea has been recorded based on incidental sightings from Norwegian and Russian research vessels, Norwegian fishing and coast guard vessels, from Russian aerial surveys (Haug *et al*. 1994), and from satellite tagged seals (Erling Nordøy, University of Tromsø, pers. commn.). However, possible overlap in the distribution of harp seals and capelin in early autumn has not been studied. Data on potential harp seal predation on capelin are important in multispecies modelling. Therefore, in September 2001, aerial surveys aimed to study possible overlap between harp seals and capelin were conducted simultaneously with the annual joint Norwegian/Russian acoustic survey of pelagic fish in the Barents Sea. Two Norwegian and two Russian research vessels took part in the survey which covered most of the Barents Sea (Anon. 2001).

Material and Methods

The Russian research aircraft Antonov-26 (AN-26) ”Arktika” (Fig. 1) was used to carry out aerial surveys in the central and northern parts of the Barents Sea during the period 11-23 September. The purpose was to determine possible overlap in distribution of harp seals and capelin. Five surveys were carried out to different areas in the Barents Sea and one survey to areas north of Svalbard (Fig. 2). Due to fog and winds from the south and southwest in the period 11-20 September it was not possible to carry out surveys in the areas were capelin was observed to be abundant during the shipborne capelin survey. One attempt was made on16 September in the area between Bjørnøya and Hopen Island but the flight was interrupted due to fog (Fig.3). That was also the case on 18 September in the eastern part between Novaja Zemlja and Franz Josef Land. The surveys on 21 and 22 September were conducted under good visibility but in parts of the surveyed areas it was quite windy (mainly about 5-7 m/s, but some times less, about 1-4 m/s) (Table 1; Fig. 3). The surveys on17 September north of Svalbard and on 23 September east of Hopen were, however, conducted during optimal weather conditions (see Table 1).

The flight altitudes varied between 80 and 220 m, but were mainly about 100 m. The altitude was about 200 m in surveys carried out during good weather conditions. The average speed was 320 km/h. Data on flown distance and distance between transects are presented in Table 1.

The surveys were carried out with four observers, two on each side of the plane. The strip width that was visually well covered on each side varied between 100 and 200 m depending on the altitude, and within that strip it was usually possible to obtain the

number and to detect the species of marine mammals. The detection of marine mammals from the plane is dependent on the visibility and the wind speed. Normally, in good weather conditions, it is possible to detect seals on a distance of about 2 km from the plane. However, when it is optimal visibility and calm weather, marine mammals can be observed as dark contrast spots up to a distance of about 10 km.

Brief information about AN-26' research equipment

During the aerial surveys the following tecnical research equipment were used:

1. Synthetic Aperture Radar (SAR-4) with electromagnetic wavelength radiation 4 cm was used to obtain information on distribution of various hydrodynamic inhomogeneous characteristics on the sea surface (oceanographic fronts, eddies, slicks, etc.), other things on the sea surface, including birds, marine mammals and pelagic fish. The radar covered a strip width of 2-6 km, depending on the altitude, on the rigth side of the aircraft. Successful detection by the SAR-4 is dependent on low wind speed and waveheight less than 0.5 m.
2. IR-radiometer was used for measurements of sea surface temperature (SST) along the flight transects.
3. LIDAR (Light Detecting And Ranging) is a remote sensing tool which works by sending a laser pulse from the aircraft. The light passes through the water and bounces back off any objects or particles it encounters. The strength of the returning pulse can be used to distinguish large and small objects.The time taken to receive the reflected signal indicates the range or depth of the object. The average depth of the LIDAR beam penetration was about 30 m.
4. Video- and photo equipment were used in order to document observations of marine mammals, seabirds, fish schools, oceanographic fronts, eddies, slicks, etc. Unfortunately, high quality images were not obtained during the present surveys.

All data from remote sensing and visual observation were recorded in real time and position on a computer onboard the aircraft. Data on SST were analysed during the surveys and maps including the distribution of SST were made (Fig. 7). After each aerial survey analyses of data on remote sensing and visual observations were made. All observations from each survey were presented in maps using a geographical information system (GIS).

Results and Discussion

Data on observations of marine mammals (including polar bears and unidentified seals and whales) are presented in Table 2. Harp seals were observed only on 17 and 23 September, where, respectively, 8 seals were seen close to the pack-ice edge (Fig. 5) and 3 seals were seen east of Hopen Island (Fig. 6). The harp seals observed on 23 September were in an area where also capelin was abundant and capelin schools were observed from the aircraft. In that area also 32 dolphins, 4 killer whales, 1 humpback whale and 2 unidentified whales were observed. Dolphins were observed also north of Bjørnøya on 16 September (Fig. 4). North of Svalbard 12 white whales, 2 polar bears (on the pack ice), 1 walrus and 1 unidentified whale were observed on 17 September.

Harp seals were not observed to be abundant in areas where capelin were abundant or supposed to be abundant during the aerial surveys. The almost total lack of harp seal

observations in the southern parts of the covered areas suggest that harp seals are not important predators on capelin in the central and southern areas of the capelin distribution during September. This is also supported by the fact that no harp seals were observed from the research vessels in the southern and central areas of the shipborne capelin survey. However, some large groups of harp seals (more than one thousand animals) were observed 1-2 October from the the Research vessel" Johan Hjort" south and southeast of Kvitøya (at the following positions: N79°26'/ E32°59'; N79°31'/ E33°00' and N79°46'/ E37°02') (Harald Gjøsæter, Institute of Marine Research, Bergen, pers.commn.). This was around the northern edge of the capelin distribution (Anon. 2001). The observations were made about one week after the aerial surveys had finished. The area where seals were seen was not covered by the aerial surveys due to difficult weather conditions. Questions about when the overlap between capelin and harp seals starts in the fall, the size of the area where they overlap and the potential numbers of harp seals feeding on capelin in that area and period are still not answered and remain to be further investigated.

The planned aerial survey next autumn will be during the period from approximately 15 September to 7 October. The annual joint Norwegian/Russian acoustic survey of pelagic fish in the Barents Sea will start early in September and last to early October. This year the vessels will start in the northern parts of the Barents Sea and proceed southwards, which will give us information about the geographical distribution of capelin and potential observations of harp seals in the northern parts of the area before we start the aerial survey. Based on that information and experience obtained during last year survey, the investigations will hopefully be more optimal and result in data that make it possible to estimate the potential harp seal consumption of capelin in that period.

Acknowledgement

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Table 1. Data on transects, altitudes, wind and weather conditions for aerial surveys conducted by AN-26 “Arktika” in the period 16-23 September 2001.

Date	Flown distance (miles)	Distance between transects (miles)	Altitude (m)	Wind		Comments (weather conditions)
				Speed (m/s)	Direction	
16.09.01	380	30	100-120	0-5	S, SW	Mainly fog, mist and haze (about 75% of the survey)
17.09.01	810	30	125-190	0-4	SW, W, NW	Mainly fine; some times snow (less than 5% of the survey)
18.09.01	430	75	80-110	7-10	S, SW	Mainly fog, mist and haze (about 90% of the survey)
21.09.01	490	30	85-220	1-7	NW, N, NE	Fine and snow (about 50%)
22.09.01	640	30	170-220	5-7	N, NNW	Mainly fine; some times snow (about 10% of the survey)
23.09.01	860	30	170-210	0-5	SSE, SSW, SW,NW	Mainly fine; some times snow and rain (less than 10% of the survey)

Table 2. Observations of marine mammals during the aerial surveys conducted by AN-26 "Arktika" in the period 16-23 September 2001.

Date	Time, Moscow (hours and min.)	Position		Species (including unidentified)	Number
		Latitude	Longitude		
16.09.01	17.10	75°54'	19°29'	Dolphin	10
	17.12	75°52'	19°27'	Dolphin	5
	17.15	75°48'	19°25'	Dolphin	4
17.09.01	16.18	82°17'	19°58'	Polar bear	1
	16.25	82°30'	20°35'	Polar bear	1
	16.26	82°30'	20°50'	Seal	1
	16.27	82°30'	21°11'	Harp seal	1
	17.29	81°18'	27°58'	Unidentified whale	1
	18.05	82°45'	28°52'	Walrus	1
	18.13	82°45'	31°41'	Harp seal	2
	18.27	82°08'	31°58'	Harp seal	1
	19.22	82°40'	36°01'	Harp seal	2
	19.39	83°00'	39°19'	Harp seal	2
	20.01	81°59'	39°59'	Beluga	10
	20.02	81°58'	40°00'	Beluga	1
	20.09	81°40'	40°01'	Beluga	1
18.09.01	No observations			Bad weather conditions (see Table 1)	
21.09.01	No observations			Restricted observation conditions (see Table 1)	
22.09.01	No observations			Restricted observation conditions due to wind (see Table 1)	
23.09.01	15.41	77°45'	25°39'	Unidentified whale	1
	16.25	77°15'	32°16'	Dolphin	23
	16.59	77°16'	25°47'	Humpback whale	1
	17.30	76°46'	27°41'	Minke whale	1
	17.36	76°46'	28°49'	Dolphin	9
	17.58	76°30'	32°30'	Harp seal	3
	18.42	76°15'	25°54'	Killer whale	4
	20.04	76°17'	30°15'	Unidentified whale	1

Fig. 1. The Russian research aircraft Antonov-26 (AN-26) ”Arktika”.

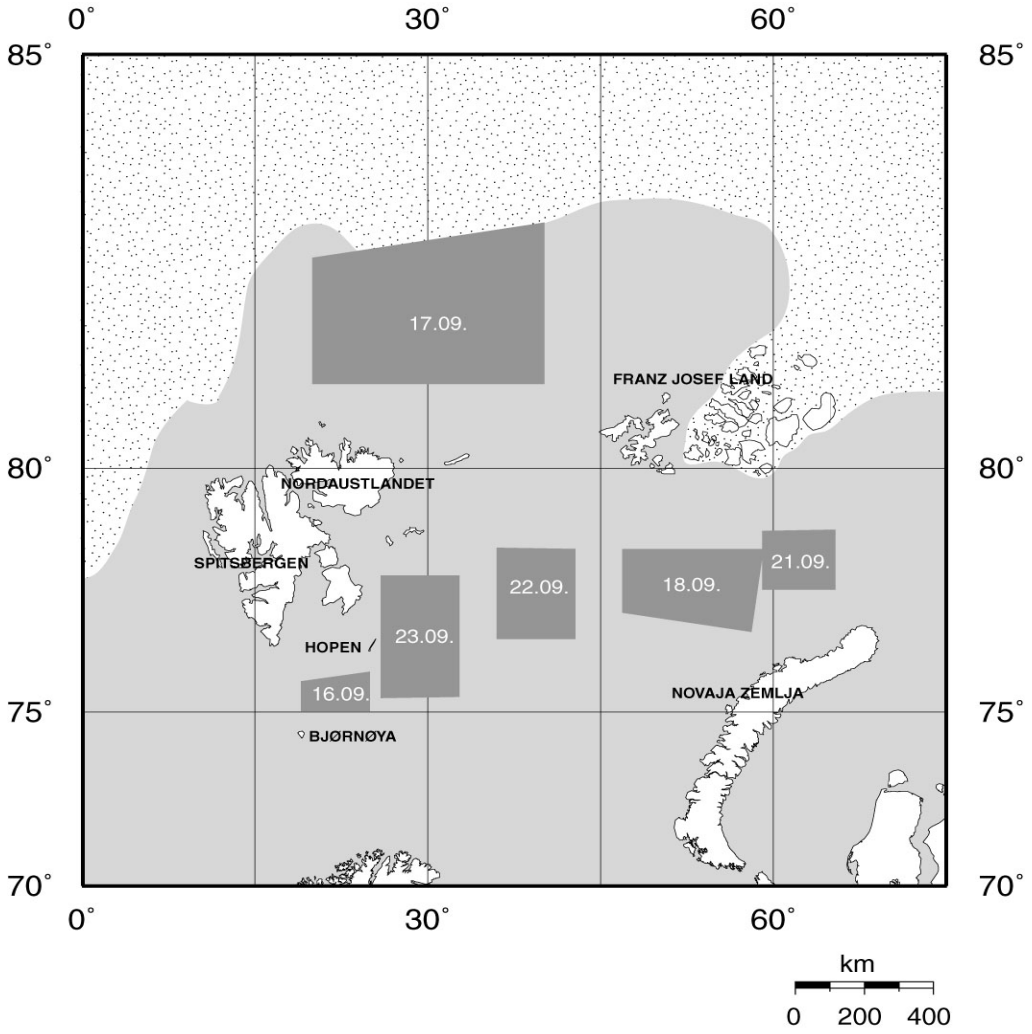

Figure 2. Map indicating the areas covered during the aerial survey conducted by AN-26 "Arktika" in the period 16-23 September 2001. The pack ice coverage is indicated in northern areas.

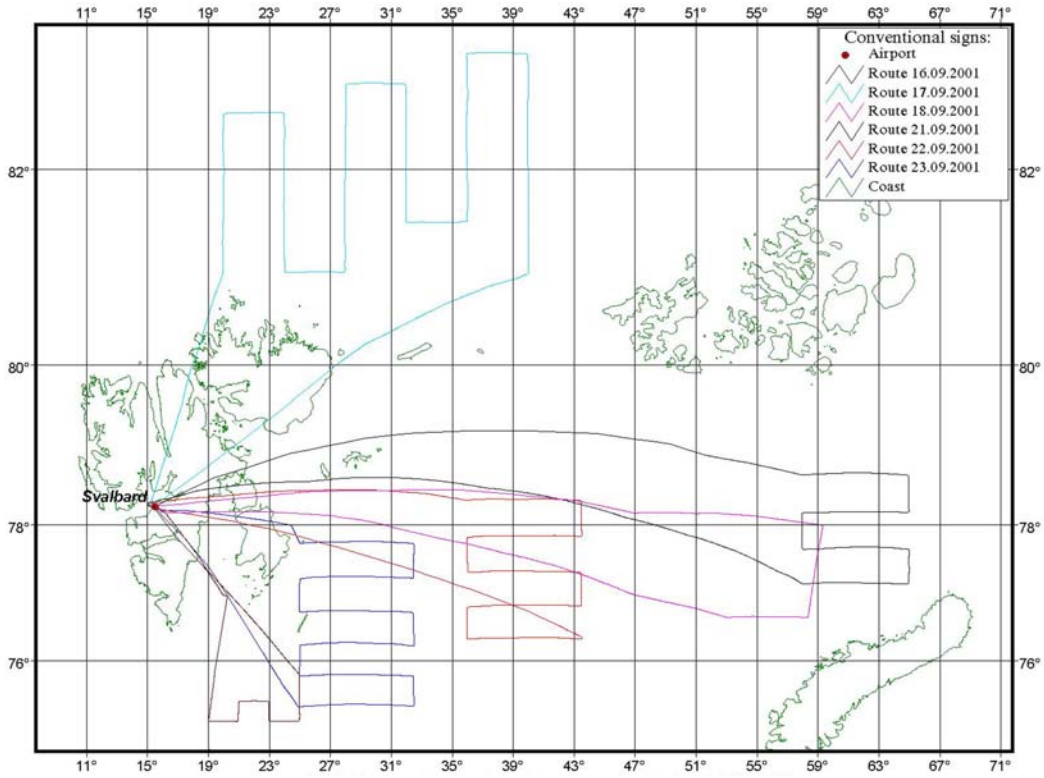

Fig. 3. Survey routes carried out by the aircraft AN-26 "Arktika" during the period 16-23 September 2001.

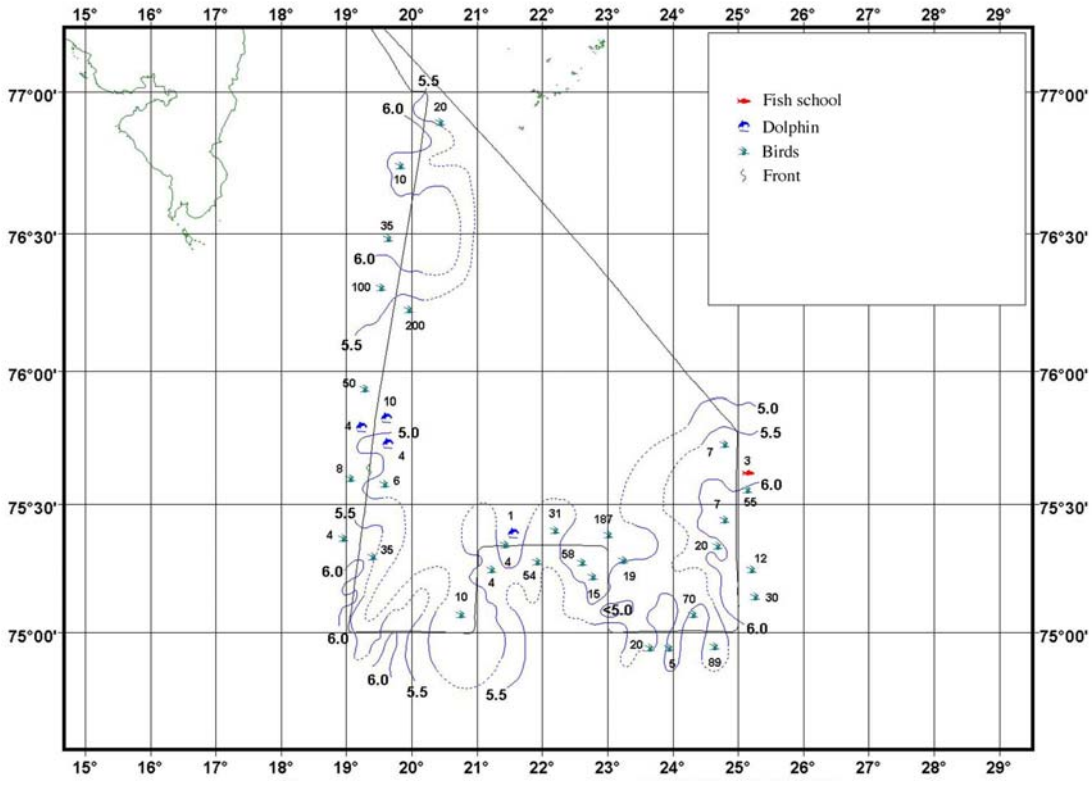

Fig. 4. Survey route carried out by the aircraft AN-26 "Arktika" on 16 September 2001.

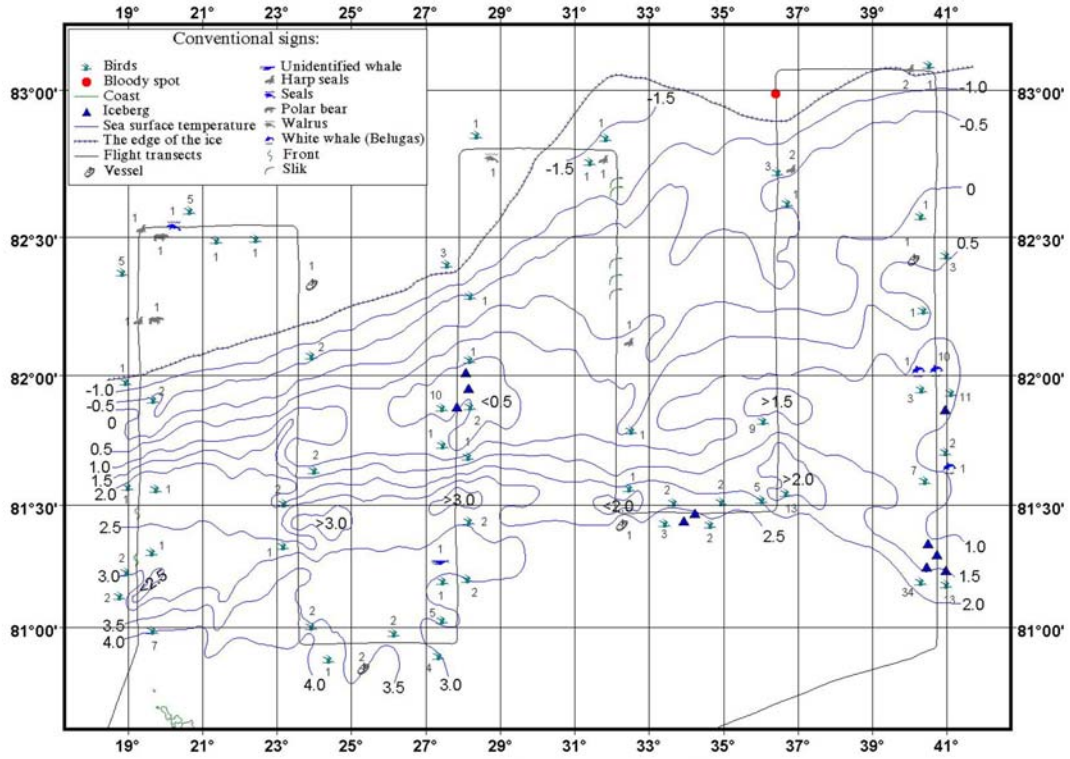

Fig. 5. Survey route carried out by the aircraft AN-26 "Arktika" on 17 September 2001. The observed vessels indicated here are most probably ice bergs.

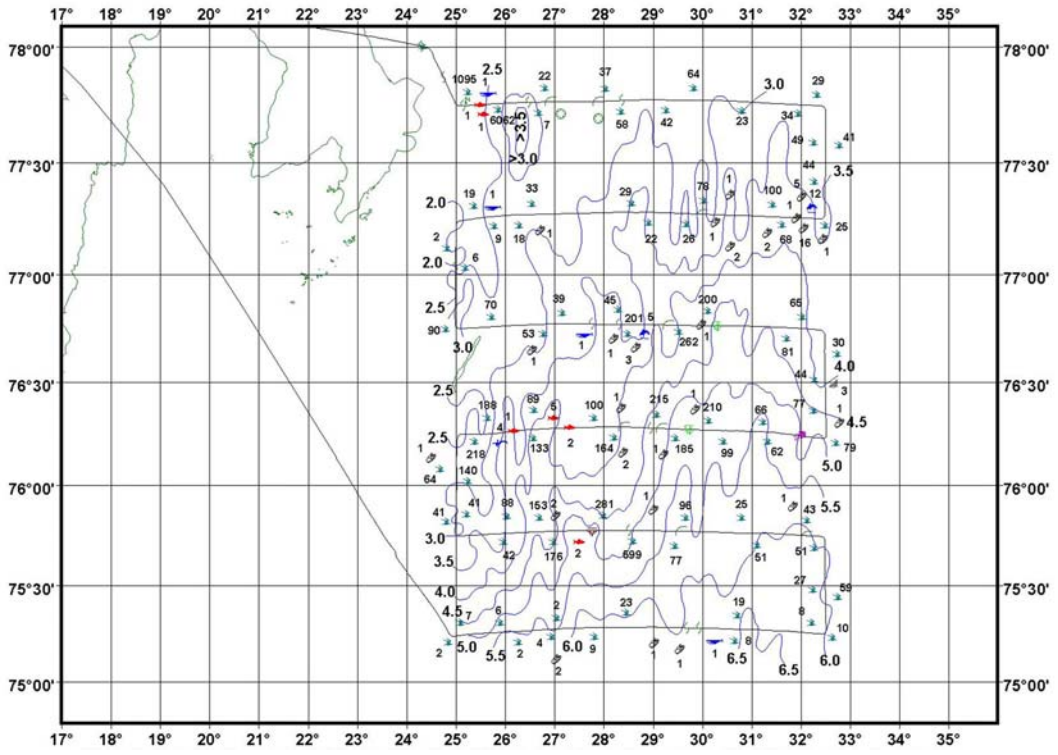

Fig. 6. Survey route carried out by the aircraft AN-26 "Arktika" on 23 September 2001. Legends according to Fig. 5.

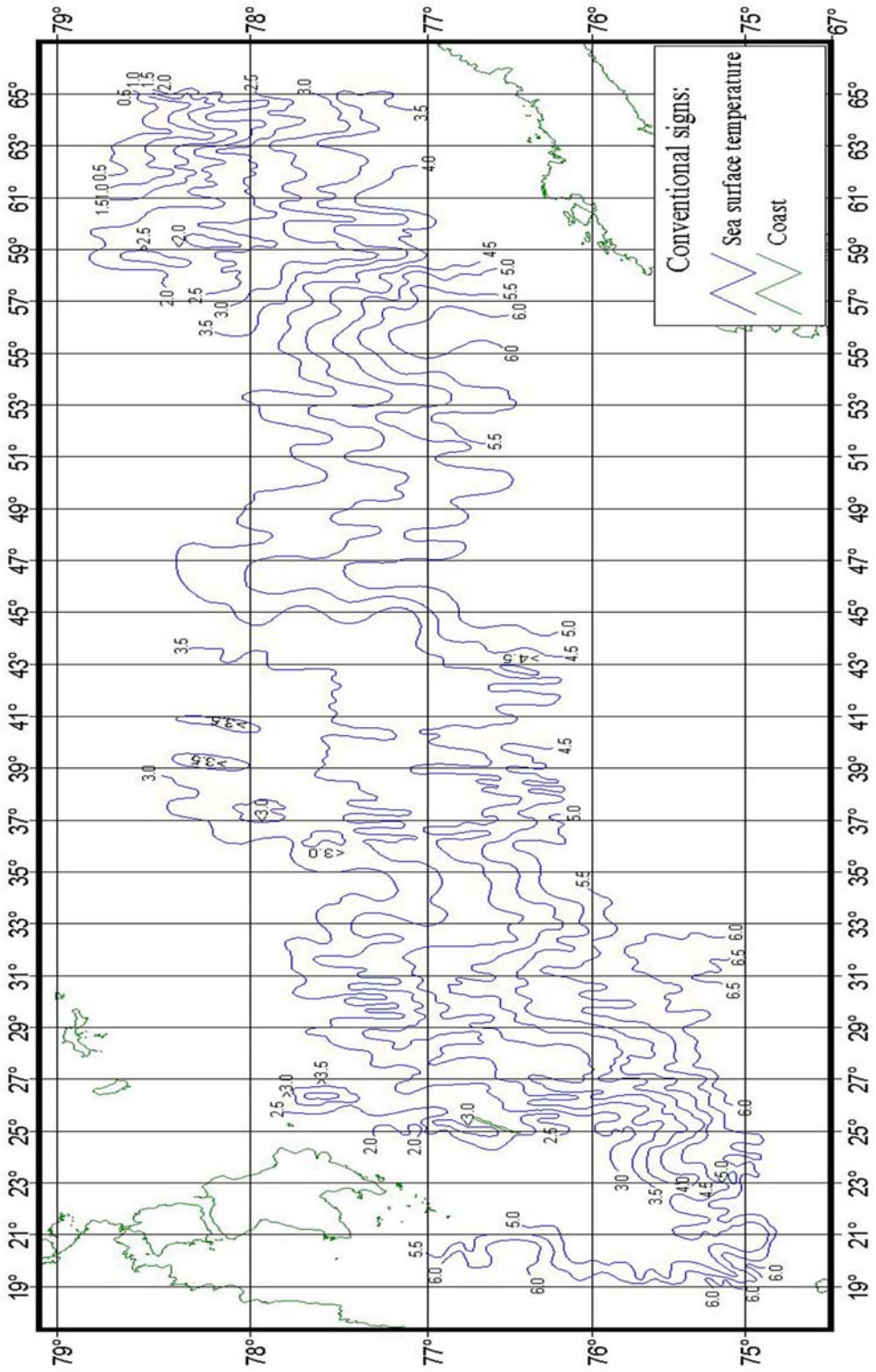

Fig. 7. Sea surface temperature based on data collected during the aerial surveys carried out 16, 18 and 21-23 September 2001.

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No. 2
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