

Northwest Atlantic



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Denmark (Greenland) Research Report for 1983

by

Erik Smidt

Grønlands Fiskeri - og Miljøundersøgelser
Copenhagen, Denmark

This report contains information on the fisheries by Greenland vessels and on research carried out by Greenland Fisheries Investigations (Grønlands Fiskeriundersøgelser*) in the NAFO Area and at East Greenland (ICES Subarea XIV) in 1983. Such work which is of minor direct interest to NAFO such as land-based environmental work is only just mentioned, although this kind of work is a major and increasing part of the institute's work. Various scientists in the institute have contributed to the report.

SUBAREA 0

Greenland vessels did not report any fishing in this Subarea in 1983.

Three of the stations operated in the photographic shrimp survey by the R/V ADOLF JENSEN in August were on the grounds adjacent to the shrimp grounds in Div. 1B. This survey was reported by P. Kanneworff at the Special Meeting of the Scientific Council in January 1984 (NAFO SCR Doc. 84/I/6).

SUBAREA 1

A. STATUS OF THE FISHERIES

1. General trends

Preliminary statistics for the fisheries in 1982, likely to be very close to final figures, are shown in Table 1.

The total nominal catch in 1983 was about 3% higher than the 1982 catch and nearly the same as in 1981. The total catch has been on this rather steady level over the last four years, but figures for individual species show greater fluctuations between years. The increase from 1982 to 1983 falls mainly on the major species cod by nearly 4,000 tons or 8%. Relatively higher increases were noted for the less important species redfish (+ 385%) and lumpsucker (+ 18%). The most noteworthy decrease was for the economically very important salmon fishery in which only 310 tons of the TAC of 1,190 tons were caught. The shrimp fishery maintained its high level of nearly 40,000 tons.

* By 1 April 1984 the institute changed name from

Grønlands Fiskeriundersøgelser to

Grønlands Fiskeri- og Miljøundersøgelser
(Greenland Fisheries and Environment Research Institute)

Table 1. Nominal catches (tonnes) by Greenland vessels ^y in Sub-area 1, 1983 (provisional figures), and the relative changes from 1982 to 1983.

Species	Nom. catch 1983 (provisional)	Percentage change from 1982
Cod	51,398	+ 8
Greenland cod	3,514	- 3
Redfish	1,396	+ 385
Wolffishes	2,427	- 13
Grenadiers	22	- 41
Greenland halibut	4,140	- 23
Halibut	538	- 9
Capelin	304	+ 192
Atlantic salmon	310	- 71
Arctic char	146	+ 30
Lumpsucker	2,889	+ 18
Herring	25	- 4
Industrial fish and fish not specified	5	- 98
Shrimp	39,608	0
Total	106,722 tons	+ 2.7%

^y including non-Greenland vessels in joint-venture arrangements.

The major part of the finfish catches in 1983 were taken in Div. 1D and 1E, the latter being the most important for the offshore trawl fishery, the former for the inshore fishery. For shrimp the most important divisions remain Div. 1B (especially offshore) and Div. 1A (especially inshore). Div. 1A also accounts for the major part of the fishery for Greenland halibut.

2. Cod

a) The fisheries

The nominal catch by Greenland vessels was about 8% above that in 1982 and 5% below that in 1981. The larger trawlers' catch again increased from about 21,000 tons in 1982 to about 31,000 tons in 1983. For the large state-owned trawlers, for which a haul-by-haul statistic is available, the overall catch per unit effort decreased from 2,212 kg/hour to 1,364 kg/hour. The increase in trawlers' total catch seems, therefore, to be due to a considerable increase in their cod directed effort.

The inshore fishery decreased further from about 26,000 tons to about 20,000 tons. The decrease was most pronounced in Div. 1D, 1E and 1F, while inshore catch in Div. 1B and 1C increased slightly. The extremely cold winters 1982/83 and 1983/84 are one of the reasons for the poor fishery (adverse effect by ice).

b) Forecast for 1984-85

At the time when this report was written the annual assessments of the cod stock in Subarea 1 had not yet been completed. However, some observations can be made from the catch composition.

The previously important 1973 year-class has now virtually disappeared from the stock, although individuals of this year class still occurs in Div. 1E-1F (and at East Greenland), especially in catches by long lines and gill nets. The fishery in 1983 has been based on the year-classes 1977 and 1979, the former dominating offshore catches in the first half of the year, especially in Div. 1E-

1F, the latter dominating the inshore fishery, especially in Div. 1B-1D. In the last half of the year the younger fish (1979 year-class) became more dominant also in the offshore fishery.

Samples from the offshore trawl fishery in the first quarter of 1984 indicate that the catches in 1984 will be greatly dominated by the 1979 year-class. The 1977 year-class may already have been fished down to a relatively low level. Since no new relatively strong year classes are expected to recruit in 1984 the 1984 catches are likely to be based nearly entirely on the 1979 year-class. The 1982 year-class is, hopefully, a relatively good one, but will not recruit until late in 1985 and during 1986. Thus, the fishery in 1984-85 seems to be faced with a relatively low stock dominated by 5-6 years old fish. The main fishery seems to be in Div. 1D although catches of larger fish (of the 1977 year-class) may attract some effort to Div. 1E-1F.

3. Shrimp

a) The fisheries

The total nominal catch of shrimp in Subarea 1 in 1983 by Greenland vessels was 39,600 tons, of which ab 32,000 were taken in the offshore area. The catch figures are thus similar to those of 1982.

As in 1982 did severe ice conditions early in 1983 hinder access to the main shrimp fishing areas west and north of Store Hellefiske Bank from January to May. In general the distribution of the offshore shrimp fishery was similar to the 1982 situation (NAFO SCS Doc. 84/I/9).

b) Forecast for 1984

The status of the offshore shrimp stock in Subarea 1 was assessed by the Shrimp Working Group of STACFIS in January 1984. It was advised that the overall 1984 TAC for the offshore grounds in Subarea 1 and adjacent parts of Subarea 0 should remain at the level advised for 1979-83 (29,500 tons).

4. Salmon

The reported nominal catch of salmon at West Greenland in 1983 is 310 tonnes, i.e. 74% below the quota of 1,190 tonnes.

The low catch at West Greenland in 1983 was possibly caused by several factors.

- 1: reduced stock abundance in Canada, and reduced abundance of the spring-run component in Scotland,
- 2: low sea temperatures at West Greenland 1983, which may have effected the catch rates and/or availability of salmon,
- 3: possible reduced fishing effort at West Greenland 1983, and
- 4: possible reduced marine survival of the Canadian 1982 smolt class.

5. Other fish

Landings of Greenland cod and Greenland halibut decreased slightly (by 3% and 23%, respectively) while the fishery for redfish increased by about 1100 tons (385%), primarily due to by-catches in the trawl fishery for cod in Div. 1E. Small quantities of Queen crab (*Chionoecetes opilio*) and scallop (*Chlamys islandicus*) are known to have been landed at Nuuk/Godthåb (Div. 1D) in an attempt to start new fisheries and industries. The exploratory fishing, especially for scallop, will be expanded in 1984.

B. SPECIAL RESEARCH STUDIES

I. ENVIRONMENTAL STUDIES

1. Hydrography

a) Water temperature

The temperature of the surface layer of the waters along the West Greenland coast has decreased considerably during the last years reaching a provisional minimum in 1983, Fig. 2.

The reason for these cold conditions shall mainly be sought in the presence of an extraordinary cold air mass over the central Davis Strait, especially during wintertime, Fig. 3. The result of this intensive cooling is negative temperature anomalies of 1-2°C

throughout the year, Figs 4-5, as well as a great extension of sea ice during the winter. Additionally the inflow of East Greenland water is more intense than normal, visualized by the water mass between 50-150 m of negative temperatures west of Fylla Bank in July, Fig. 6.

In the deep layer the temperature was about normal in July, while in November, the time of maximum inflow of Irminger water, it was markedly below normal, Fig. 7 where the layer between 200-600 m normally is occupied by water with temperatures above 5°C.

b) Salinity

In Figs 8-9 the salinity across the Fylla Bank in July and October is shown and Figs 10-11 show the surface salinities of the observation area from the same two periods.

In the surface layer the salinities were below normal, but slightly higher than in 1982.

In the deep layer the salinities were above normal throughout the year, which for November is inconsistent with the low temperatures observed.

c) Other hydrographic observations

In addition to the temperature and salinity observations also oxygen, phosphate, nitrate and nitrite were observed.

2. Plankton

Technical troubles with the plankton gears hampered the survey very much in 1983. Oblique stramin net hauls (diameter 2 m, mesh size 1 mm, 30 min. hauls, 225-m wire, speed about 2 n. miles/hour, max. fishing about 50 m) were made in July at only 3 stations in Disko Bugt and 8 stations in the southern Davis Strait at Sections II and III (see map in Fig. 1).

For comparison, the results from the years 1980-83 are presented in Table 2. Average preserved volume (ml) and average specimen numbers of copepods (mainly *Calanus*), and of larval gadoids (cod), Greenland halibut, sandeel, and of *Pandalus* are given. It is seen that generally the northern areas, especially Disko Bugt, are the most productive. Larvae of sandeel and *Pandalus* are concentrated mainly in the northern areas, while cod and Greenland halibut are limited almost to the southern Davis Strait.

Table 2. Zooplankton in July 1980-83 in the areas Disko Bugt (incl. Vaigat), northern Davis Strait (N), and southern Davis Strait (S). The areas are shown in Figure 1. For each area are given average total preserved volume (ml) and specimen numbers of copepods and the most important larvae per 30 min. net haul. r = less than one.

Area	Year	No. of samples	Volume ml	No. of copepods	Gadoids	No. of larvae		
						Greenl. halibut	Sandeel	Pandalus
Disko Bugt	1980	10	250	5260	r	-	530	410
	1981	12	100	4880	r	-	770	570
	1982	16	2280	245560	-	r	1450	2960
	1983	3	490	3320	-	-	3380	1230
Davis Strait	1980	7	410	9060	r	-	190	480
	1981	11	150	4030	r	-	325	90
	1982	11	320	39510	r	r	350	460
	1983	0						
Davis Strait S	1980	15	520	1400	3	18	1	40
	1981	15	130	220	r	8	1	30
	1982	12	520	3000	14	61	45	320
	1983	8	200	2230	5	10	150	80

3. Other environmental studies

The environmental studies section of the institute in 1983 undertook the following work related to the marine environment. Besides of these, studies on land and in freshwater were carried out.

a) The monitoring studies of the impact by heavy metals on the environment by the lead-zinc mine (the Black Angel mine) in Maarmorilik (North West Greenland) continued. Studies were undertaken in April and September.

b) The impact by heavy metals of the cryolite mine in Ivigtut (South Greenland) was studied in June.

c) Baseline studies of heavy metals in seawater, sediments and marine organisms were conducted at Nuuk, Paamiut and Uummanaq in areas not exposed to mining, towns and other human activity.

d) In order to evaluate the impact on marine mammals by underwater noise from possible future year round shipping in Baffin Bay and Davis Strait, studies of natural ambient noise were conducted in Baffin Bay and Lancaster Sound in June and in the Thule area in July.

II. BIOLOGICAL STUDIES

1. Cod

a) Eggs and larvae

As mentioned in B.I.2. the plankton in 1983 nearly failed. However, an average number of 5 cod larvae per half-hour stramin-net haul was found on standard sections II and III (8 samples) in Davis Strait. This is more than expected, the low water temperatures taken into consideration.

b) Occurrence of prerecruit cod

No specific research effort to observe cod of age-groups 1 and 2

(year-class 1982 and 1981, respectively) was made, and they did not occur in the commercial fishery observed. Cod of age-group 3 (year-class 1980) were observed at some occasions in the commercial fishery but not so frequently and not in such quantities that there are reasons to regard it as a relatively good one.

c) Cod in commercial landings

The offshore fishery by trawlers was fairly well sampled and showed strong predominance of the 1977 year-class in the first part of the year, especially in Div. 1E-1F. Later in the year the 1979 year-class became the predominant one, especially in Div. 1C-1D.

Apart from the pound-net fishery in Div. 1D the inshore fisheries were not very well sampled. The same two year-classes as in the offshore fishery (the 1977 and 1979 year-class) were predominant in the inshore fishery, although here with the 1979 year-class as the major one.

d) Tagging experiments

119 cod were tagged in Div. 1D.

2. Salmon

Samples were taken from commercial catches at the fish plants in Nuuk/Godthåb (Div. 1D) and Sisimiut/Holsteinsborg (Div. 1B) in co-operation with Canadian scientists. Altogether 1592 scale samples and som blood samples were taken for analyses of age and of continent origin.

3. Other fin fish

Samples of redfish by species (*S. marinus* and *mentella*) and of wolffishes (*A. lupus* and *minor*) were taken from trawlers' catches, and records of other by-catch species were made when sampling took place at sea.

4. Shrimp (*Pandalus borealis*)

As in previous years offshore shrimp surveys were mainly carried out around Store Hellefiske-Bank and west of Disko, while inshore investigations were limited.

Information on the distribution of the shrimp fishery and the catch rates was obtained from logbooks of Greenland trawlers together with reported catches of all nations fishing in SA 1 (NAFO SCR Doc. 84/I/9).

Biomass was estimated by bottom photography in the depth range 100-600 meters (NAFO SCR Doc. 84/I/6).

5. Crab (*Chionoecetes opilio*)

Samples from commercial fishing in Div. 1D were taken. Experimental fishing with traps was continued on inshore localities in Div. 1D.

6. Marine mammals

Sampling of material for age determination of harp seal and hooded seal was continued in West Greenland. Supplementary information on the food and state of nutrition of the seals was collected in Upernavik district.

Samples of minke whale and observations of this and other species of whales were obtained in June-August on a Norwegian whaling vessel in Davis Strait. Further observation on whales was made from a chartered vessel in Davis Strait in July.

In Scoresbysund district aerial surveys of narwhals and ringed seal were conducted in September, and information on hunting and occurrence of marine mammals was obtained from hunters in the district.

EAST GREENLAND

A. STATUS OF THE FISHERIES

Provisional figures for the Greenland fisheries in this area (ICES Subarea XIV) show a total of 1905 tons landed, a decrease of 5% from 1982. The decrease is due to a decrease in catches of cod (from 898 tons to 438 tons) while catches of shrimp increased from 1115 tons in 1982 to 1467 tons in 1983. Landings of species other than cod and shrimp were negligible.

B. SPECIAL RESEARCH STUDIES

The local fishery for cod in the Angmagssalik area, carried out mainly by pound nets, was sampled and studied, and 985 cod were tagged.

Sampling from catches of a commercial shrimp trawler took place in April.

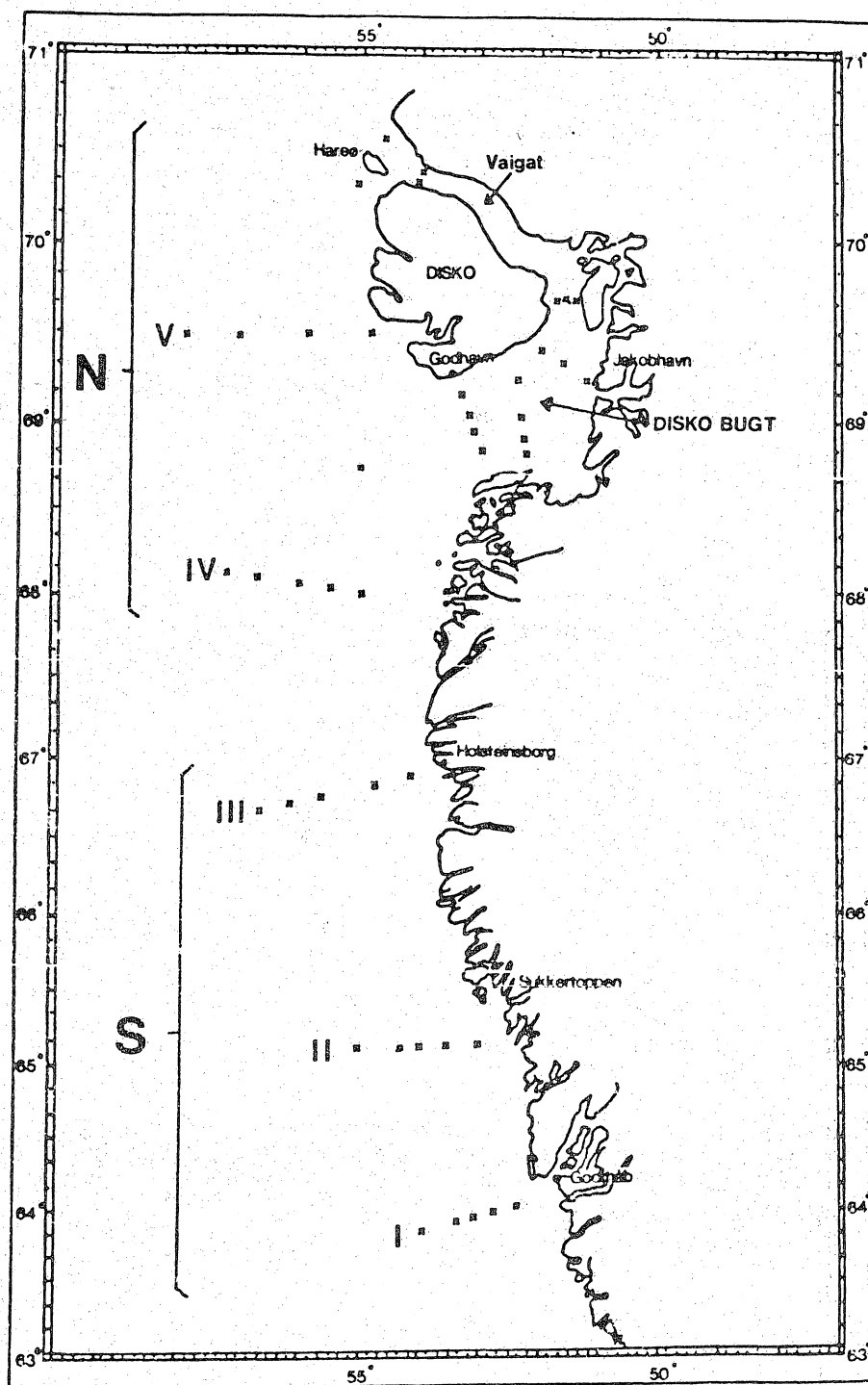


Figure 1. Oceanographic sections and stations for hydrography and plankton sampling in 1980-83. N and S indicate northern and southern Davis Strait.

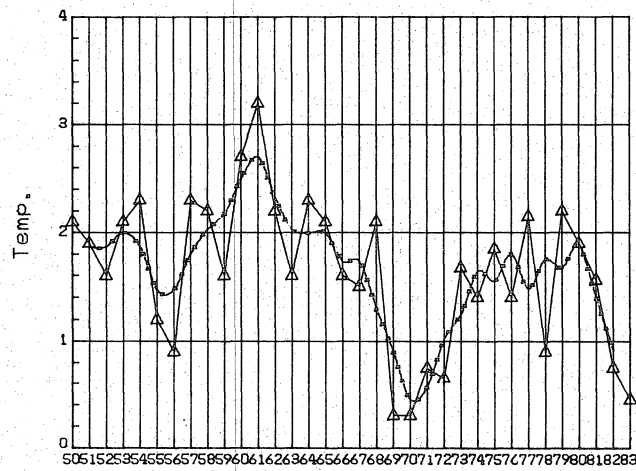


Figure 2. Mean temperature on top of Fylla Bank (40 m) by the middle of June. - actual observations, - - - 3 years running mean.

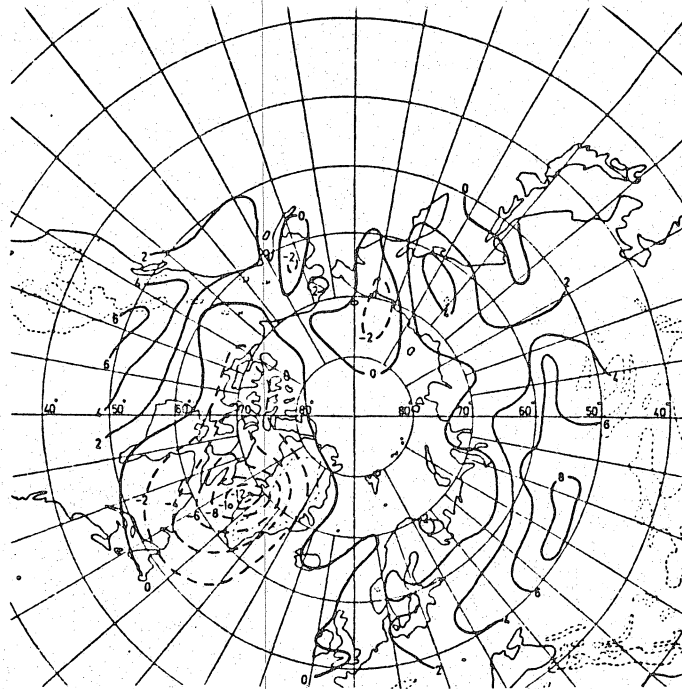
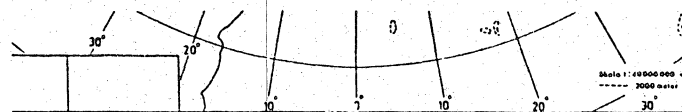


Figure 3. Anomalies of the mean air temperature of January-February 1983 in the arctic region.



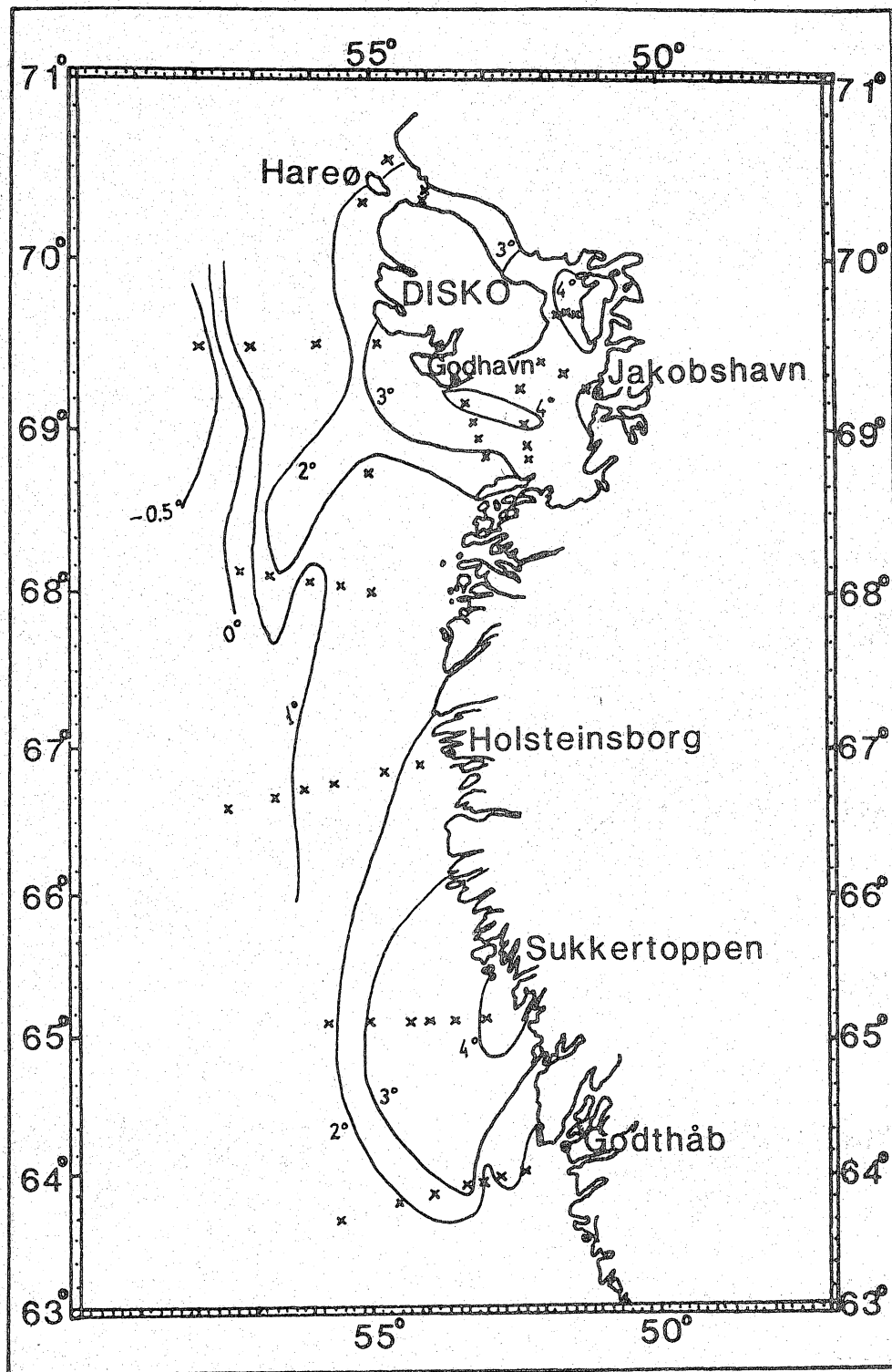


Figure 4. Surface temperature, July 1983.

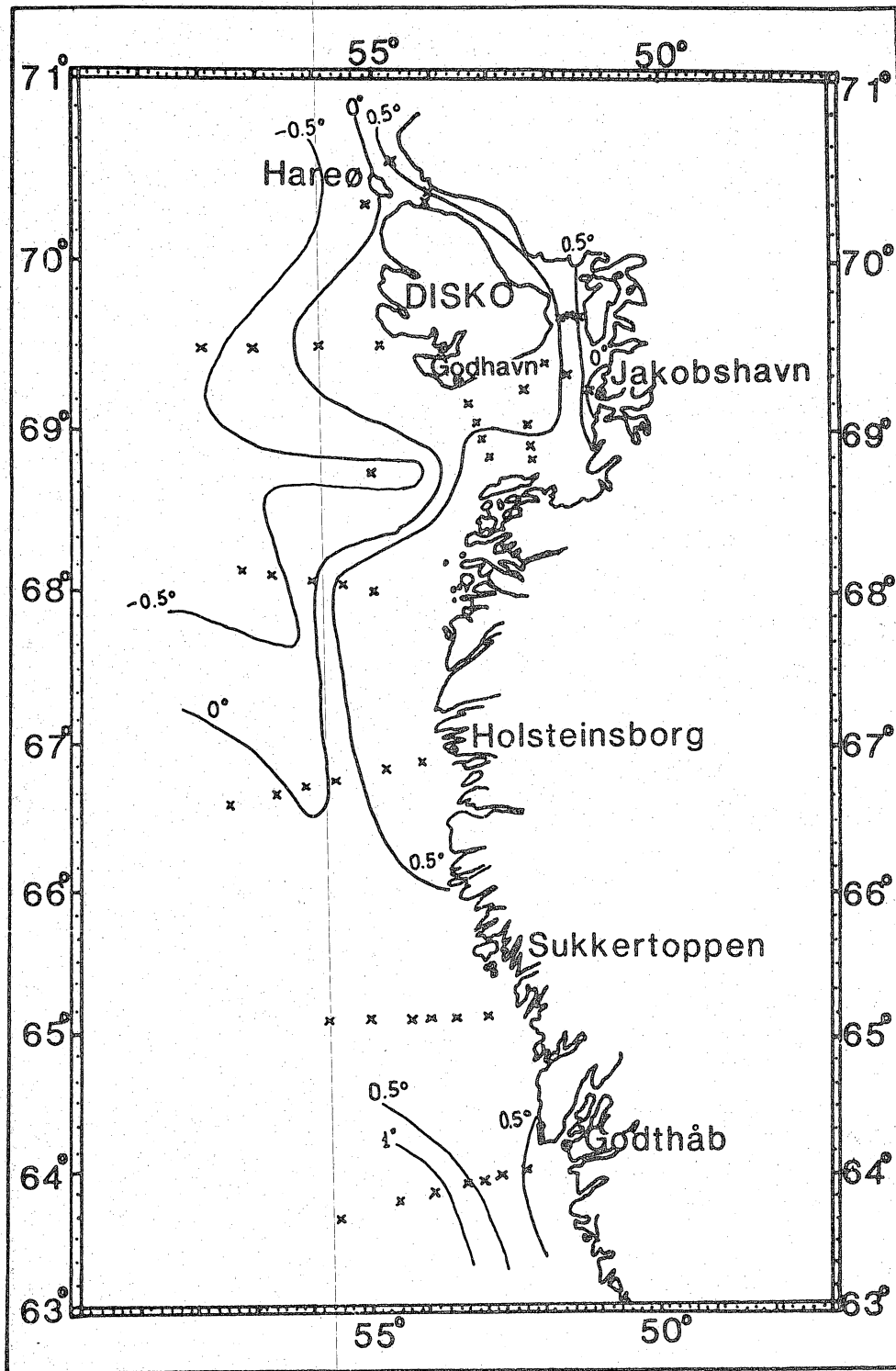


Figure 5. Surface temperature, October-November, 1983.

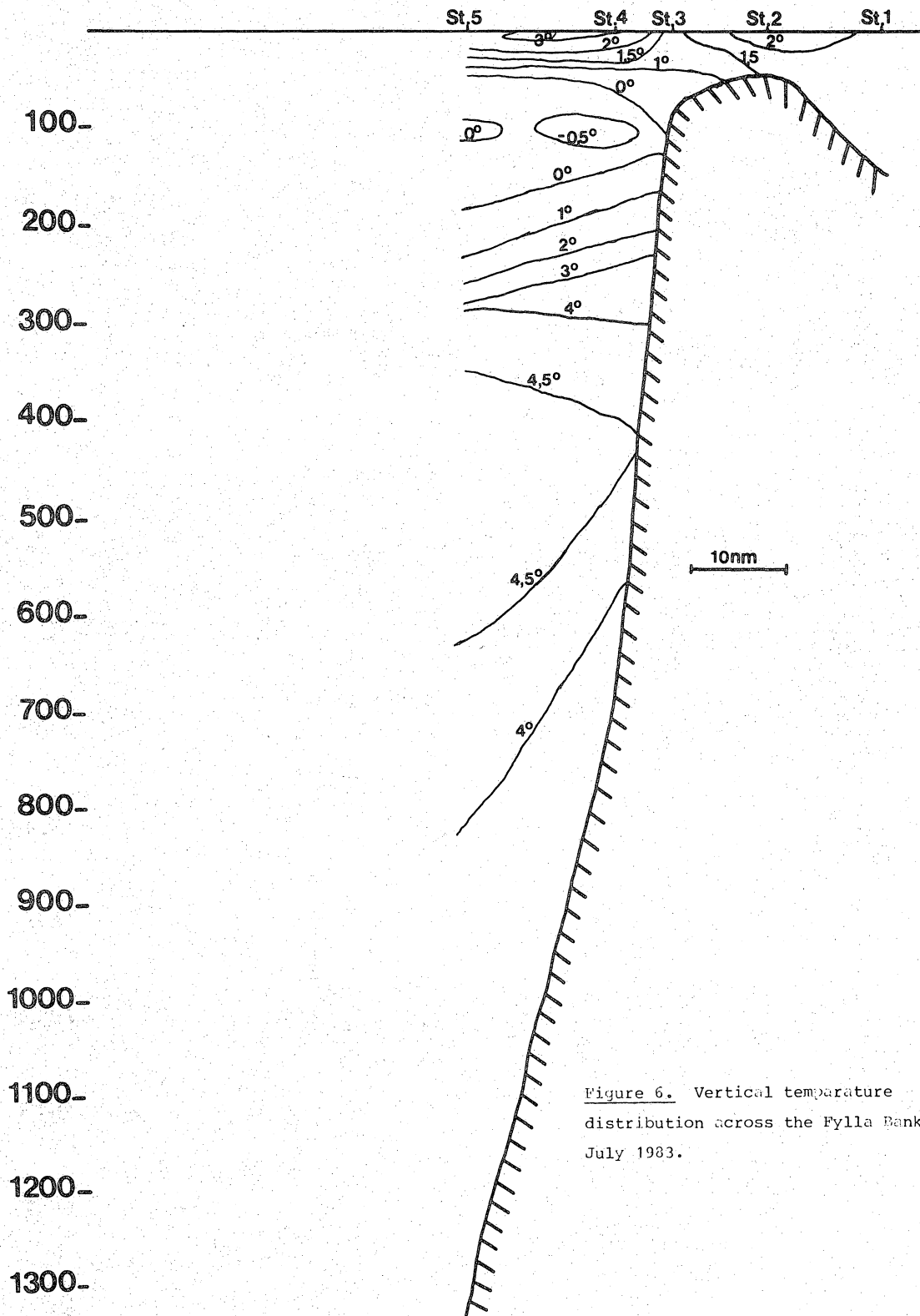


Figure 6. Vertical temperature distribution across the Fylla Bank, July 1983.

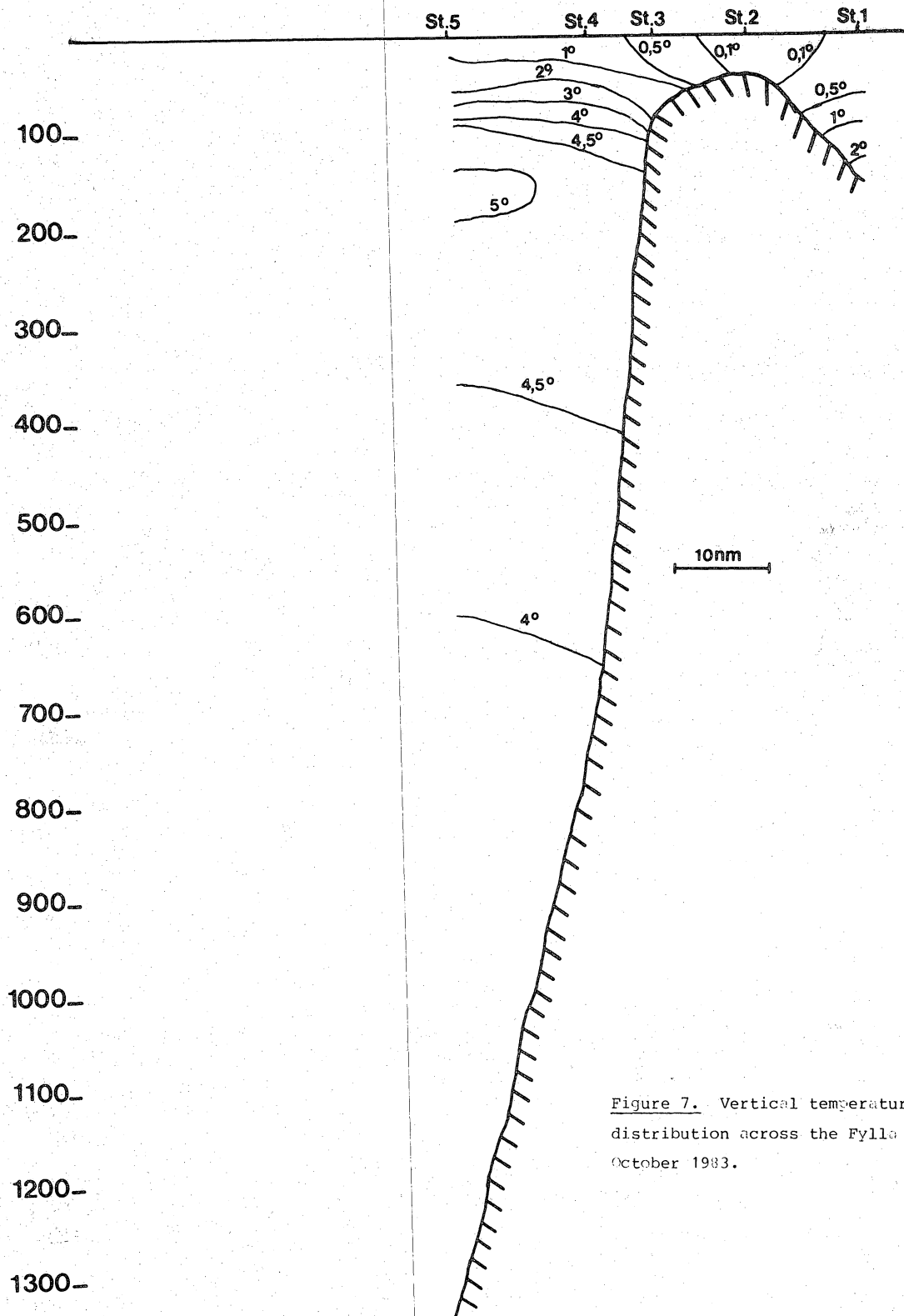


Figure 7. Vertical temperature distribution across the Fylla Bank, October 1983.

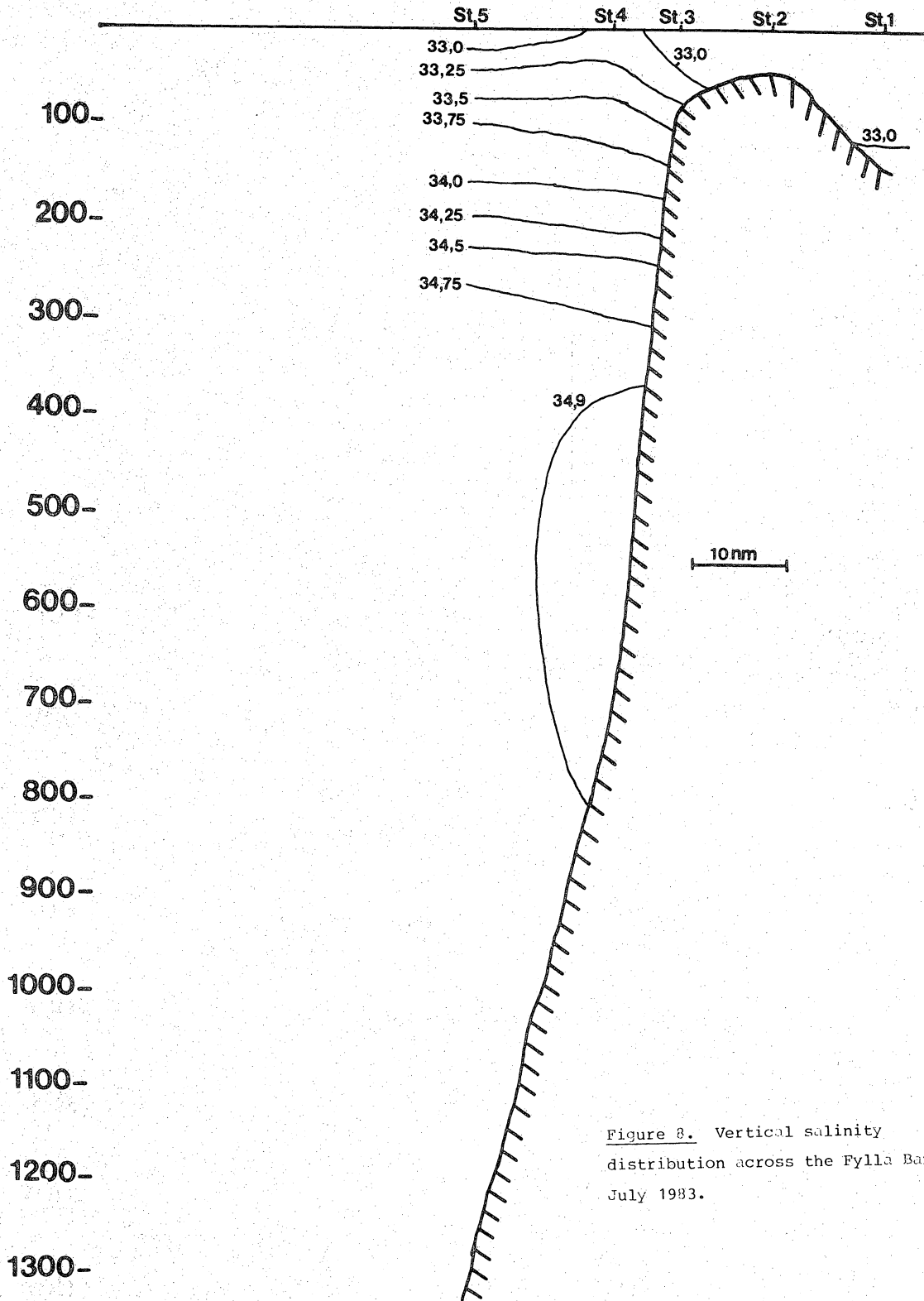


Figure 8. Vertical salinity distribution across the Fylla Bank, July 1983.

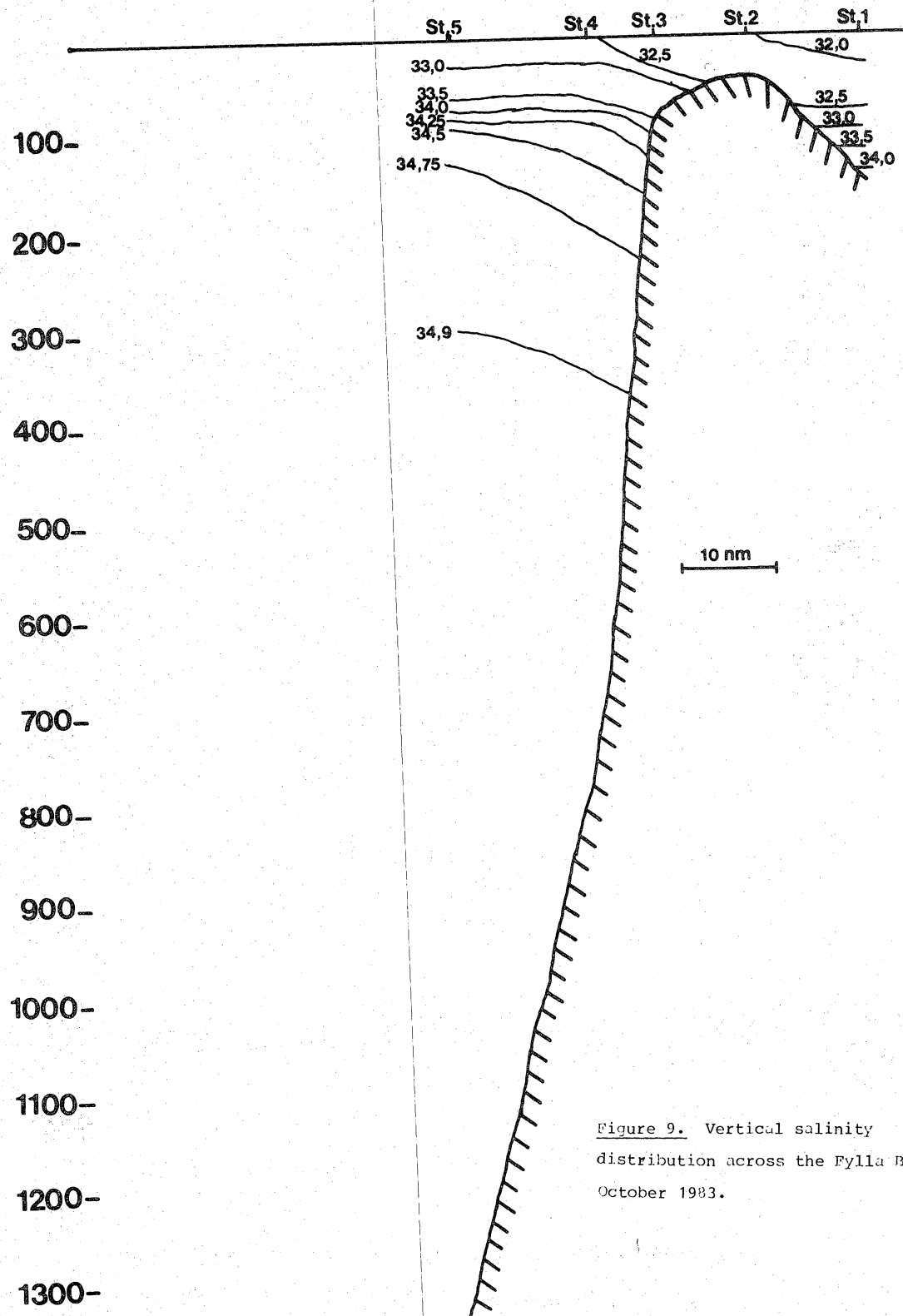


Figure 9. Vertical salinity distribution across the Fylla Bank, October 1983.

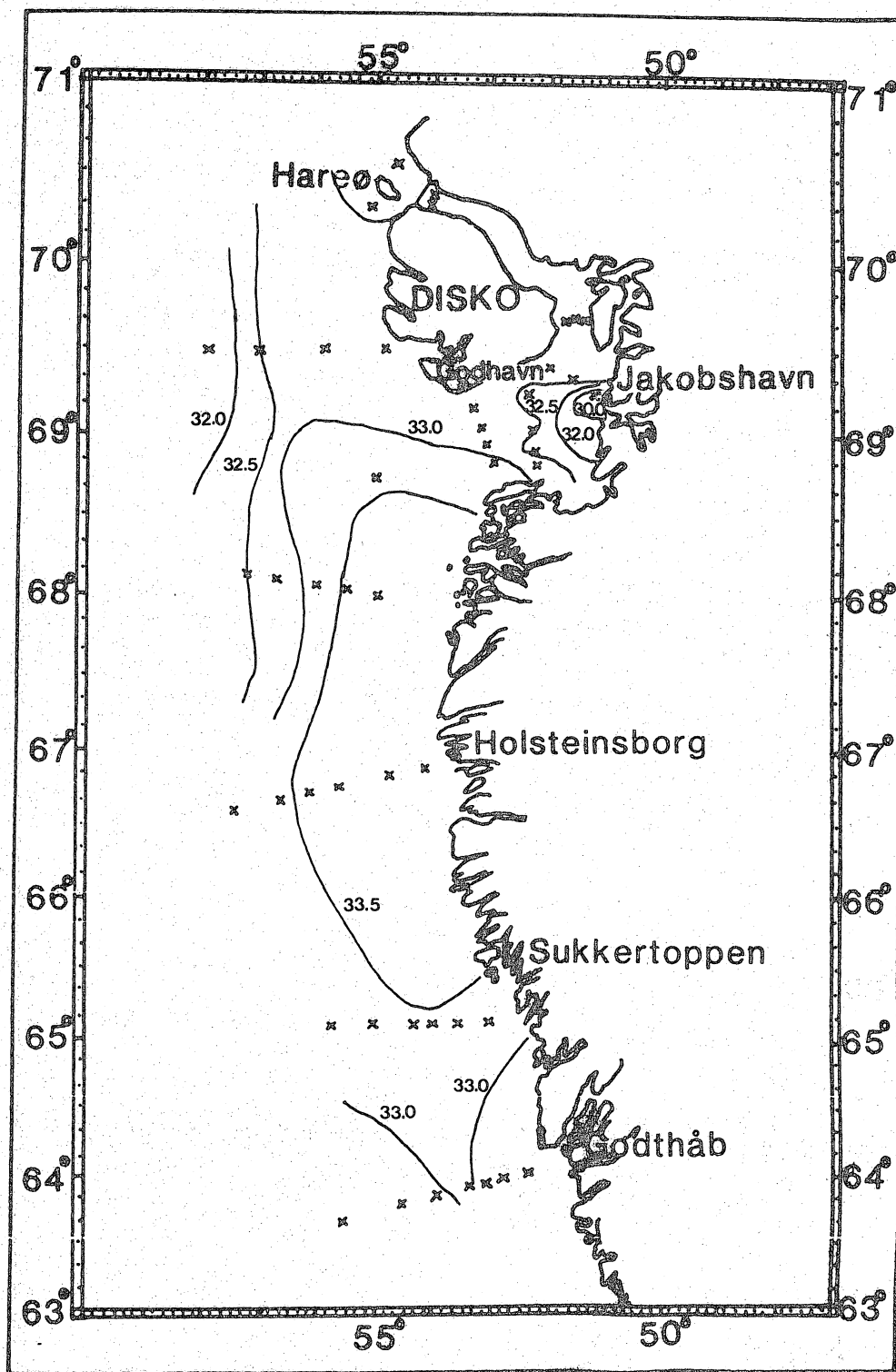


Figure 10. Surface salinities, July 1983.

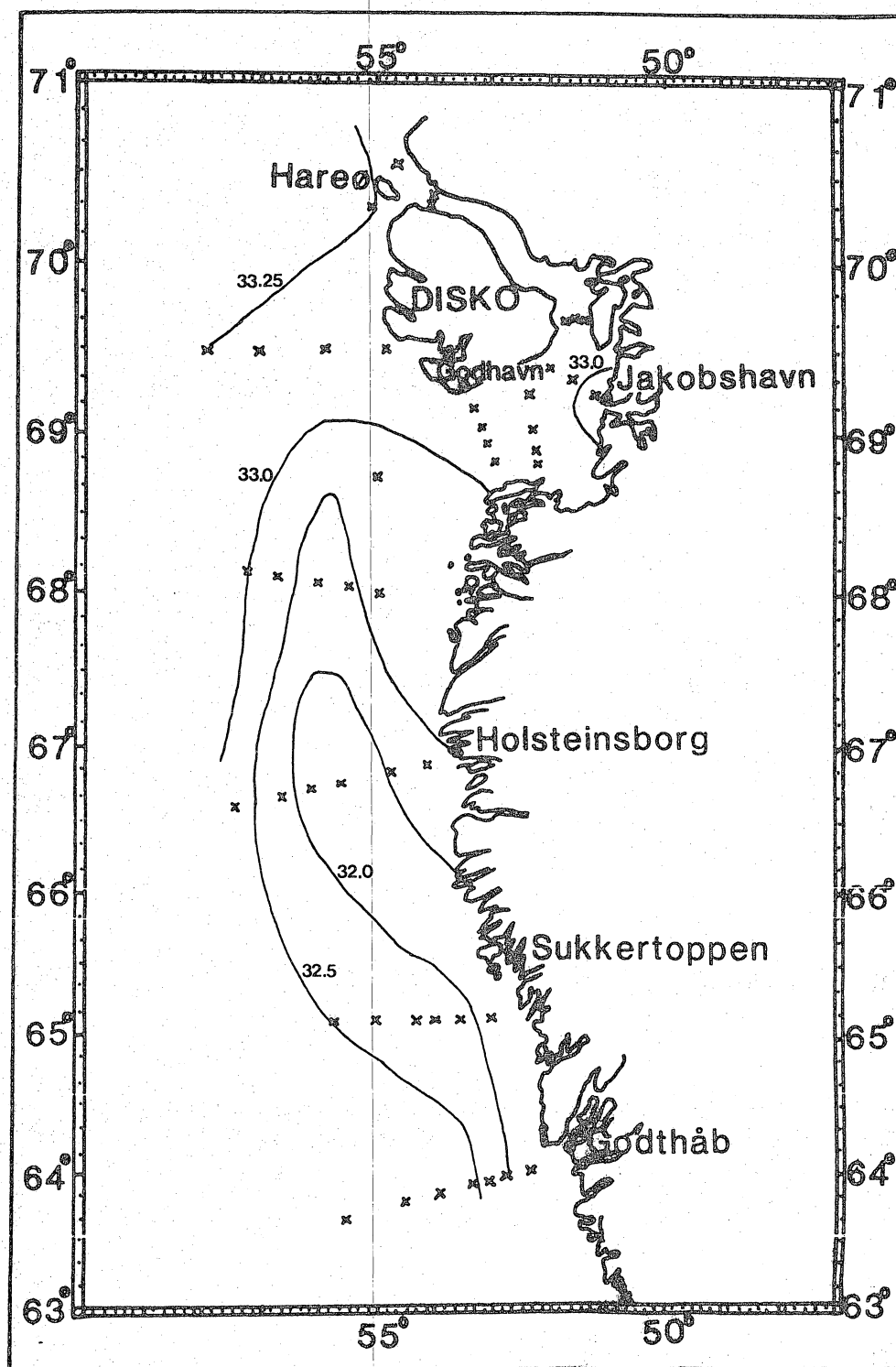


Figure 11. Surface salinities, October-November 1983.

