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Hydrographic conditions off West Greenland during autumn 1980 and March 1981

by

M. Stein
Bundesforschungsanstalt fuer Fischerei
Institut fuer Seefischerei
Hamburg, Federal Republic of Germany

Introduction

During the annual groundfish survey off West Greenland, NAFO Division 1D, 1E and 1F, RV ANTON DOHRN performed hydrographical observations along NAFO Standard Sections Cape Farewell, Cape Desolation, Frederikshab, Fylla Bank and Lille Hellefiskebanke. The measurements were done by means of a CTD (KIEL Multisonde), the period of observations ranged from 25 November 1980 to 9 December 1980. Three months later RV ANTON DOHRN again surveyed the same area off West Greenland (2 March - 10 March 1981). Except the Cape Farewell Section the hydrographic work was accomplished along the same sections. The positions were chosen according to ICNAF Selected Papers No. 3, 1978. They are denoted by Sn with n specifying the station as obtained from the paper mentioned above. From the previous materials temperature sections were plotted. The figures from the autumn observations additionally contain information on the haline conditions along the sections. Based on the annual autumn observations mean values of temperature were calculated for standard layers along the Fylla Bank Section.

The thermohaline conditions

Figs. 1 to 5 show the thermohaline situation off West Greenland during the end of November and the beginning of December 1980, as well as the thermal stratification during the first decade of March 1981. Along the Cape Farewell Section the large amount of warm water (T > 5°C) indicates Irminger Water travelling northwards along the shelf break (fig. 1). Above the shelf the

fresh water of the polar component of the West Greenland Current was found. Figs. 2a, b show the thermal stratification along the Cape Desolation Section in autumn 1980 and March 1981. The temperature contour lines indicate a seasonal cooling of the upper water column which amounts nearly 2°C. From the salinity data of the March survey it is supposed here that the position of the 3°C isotherme more or less corresponds with the upper boundary of the Irminger Water. Above the Frederikshab Bank the polar water was found to be as cold as - 1.38°C in March 1981 (fig. 3b). The Influence of the Irminger component of the current which governed the water layers between 100m and 500m depth at the outer station S3 in autumn was considerably reduced in March (T > 4°C). On Fylla Bank (figs. 4a, b) the seasonal cooling amounted approximately 2°C. Calculations of the average temperature for the water layer 100m to 600m at S4 indicate that the autumn temperature was slightly above the average whereas the March mean value was about normal (STEIN, unpubl.). The temperature stratification on Lille Hellefiskebanke shows a rather homogenous surface layer both in autumn and in March. The temperature on the bank was below - 1°C or - 1.5°C in the near surface layer. The influence of the Irminger component was observed only at S6 in March whereas it was dominating the deep water parts of the section during autumn (figs. 5a, b).

Deviations of temperature on Fylla Bank

A comparison of the average temperature values at Standard Station 4 of the Fylla Bank Section with the 1980 autumn results was accomplished. The results are given in Table 1. They indicate that the upper 200m at this station were warmer than usual. Negative anomalies were found in the water layers below 200m. All deviations range within the margin of error of the mean value.

Conclusion

Between the end of November 1980 and the beginning of March 1981 a cooling of the upper water layer off West Greenland was observed along the Standard Oceanographic Sections. The cooling amounted about 2°C. This value is in good correspondence with the average curve of temperature established for the layer 100m to 600m of the Fylla Bank station 4. During autumn 1980 the Irminger component of the West Greenland Current ranged up to 0.4°C below the long-term average. The polar component was, however, 0.4°C warmer than usual.

Table 1: Deviations of temperature on Fylla Bank
Standard Oceanographic Station 4

Station 4: 63°53'N, 53°22'W

a) T °C

Depth range	Mean value x	Standard Dev.	Delta T.S (80 - x)
0 - 50	2.11	1.08	0.31
50 - 100	3.17	1.14	0.38
100 - 200	4.42	1.00	0.18
200 - 300	5.18	0.70	-0.35
300 - 400	5.31	0.49	-0.23
400 - 500	5.44	0.28	-0.28
0 - 500	4.51	0.69	0.04

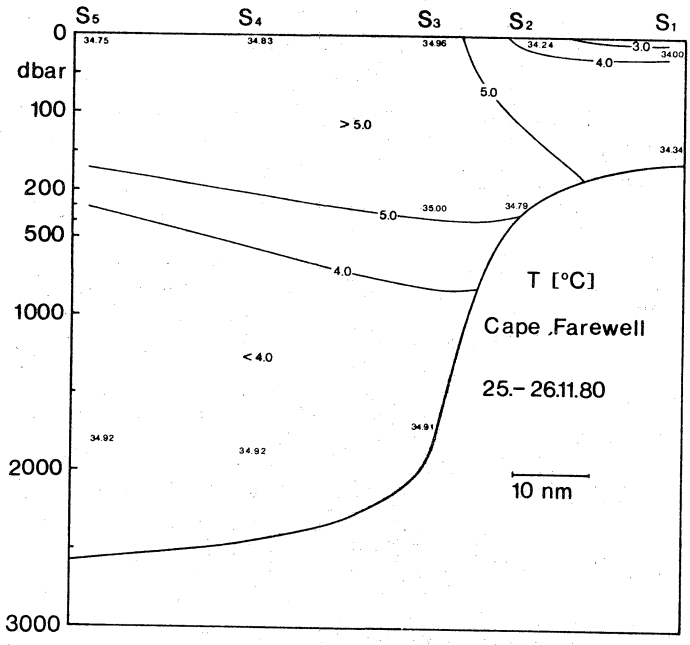

Fig. 1

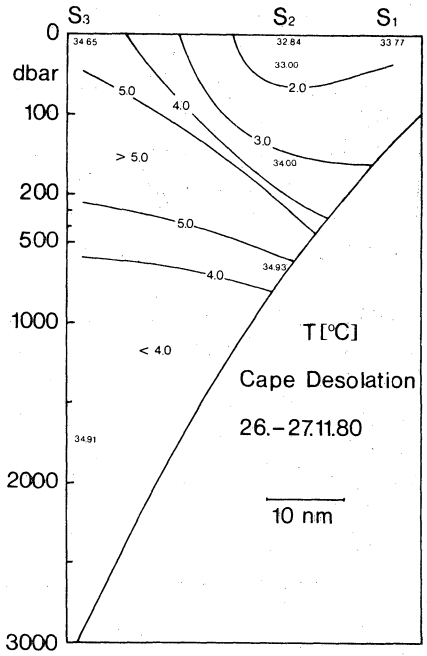

Fig. 2a

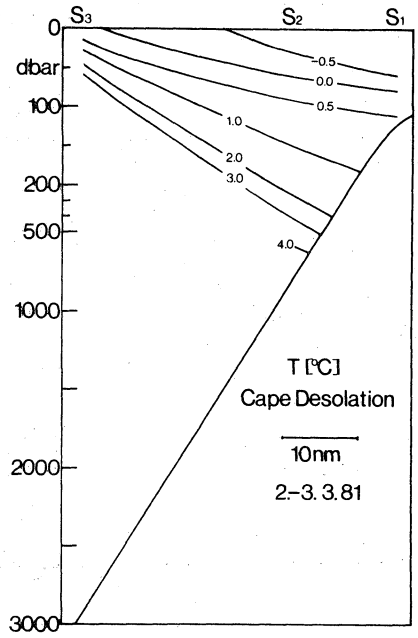

Fig. 2b

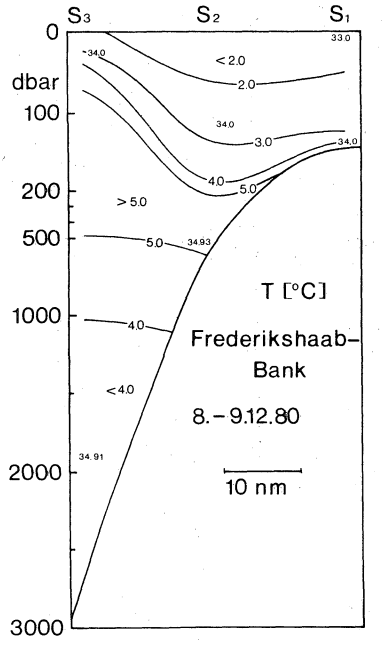

Fig. 3a

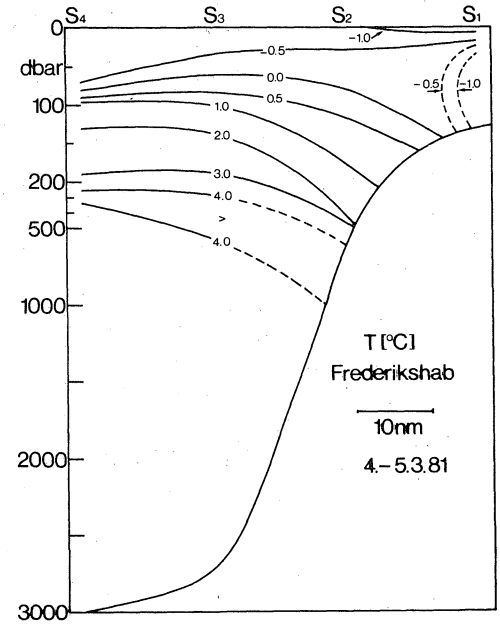

Fig. 3b

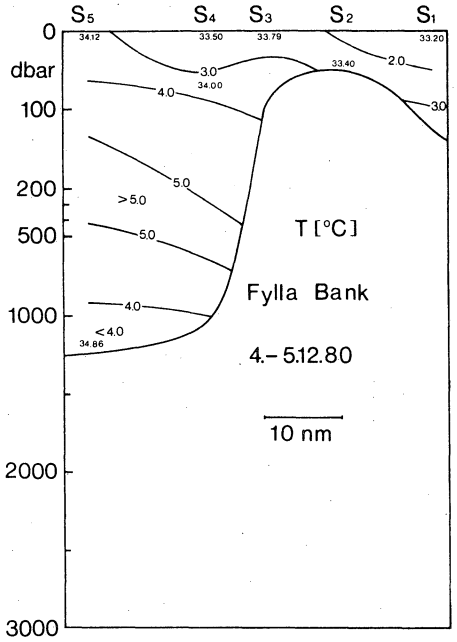

Fig. 4a

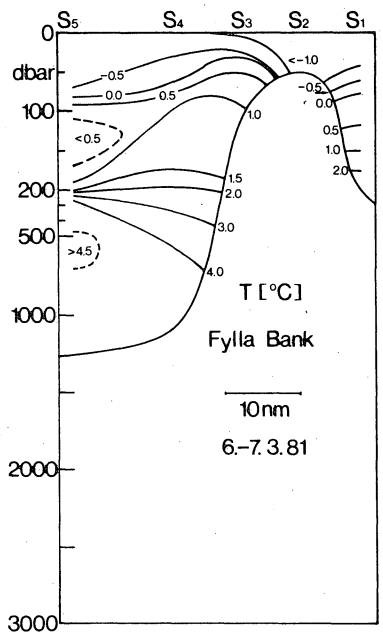

Fig. 4b

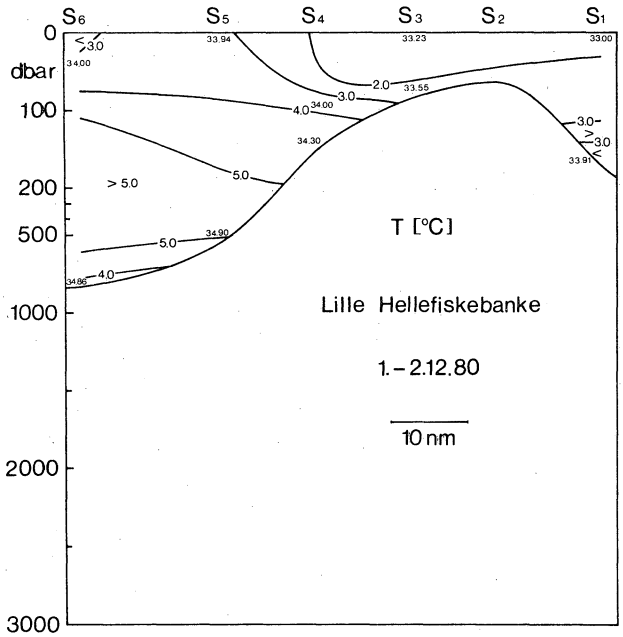

Fig. 5a

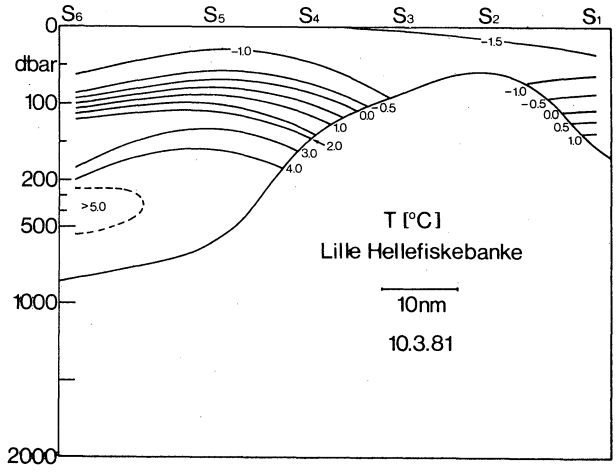

Fig. 5b