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Hydrographic conditions off West Greenland during autumn 1979

by

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Introduction

During the annual groundfish survey off West Greenland, NAFO Division 1D, 1E and 1F, RV "WALTHER HERWIG" completed parts of four standard oceanographic sections. This is the Cape Farewell Section, the Cape Desolation Section, the Frederikshaab Bank Section, and the Fyllas Bank Section. The measurements were done by means of a CTD (KIEL Multisonde). Methods of data processing are given elsewhere (e.g. CORNUS and STEIN, 1979; STEIN, 1980). In the previous paper the thermohaline situation off West Greenland will be discussed very shortly. Further information on stratification and transport of heat and volume will be available later (STEIN, in prep.). In addition, this paper deals with temperature and salinity changes on the Fyllas Bank.

The comparison of the 1979 results with previous observations is based on hydrographic data, collected during numerous groundfish surveys by German research vessels on the Fyllas Bank. The data base starts in 1963. The relevant mean values of temperature and salinity are given by STEIN, 1978 and STEIN, 1979.

Thermohaline conditions off West Greenland

Similar to the observations during November 1976 (STEIN, 1978) the water mass boarder between the colder arctic component of the West Greenland Current and the warmer offshore component of the West Greenland Current can be roughly delineated by the following T,S - characteristics:

1.0 °C, 33.0 ‰ for the polar component

5.0 °C, 35.0 ‰ for the warmer component.

As observed during November 1976, the contour lines of the 1.0 °C isotherme coincide with the 33.0 ‰ isohaline, and the 3.0 °C isotherme with the 34.0 ‰ isohaline. The position of the 5 °C isotherme more or less corresponds with the position of the 35.0 ‰ isohaline during the 1979 observations. This indicates rather fixed correlations between the temperature and salinity stratification off West Greenland. In contrast to the November 1976 findings the warm component of the West Greenland Current during the 1979 survey was slightly saltier in the core layer of the current.

#### Temperature and salinity changes on the Fyllas Bank

The amount of temperature and salinity changes on the Fyllas Bank is estimated at NAFO Standard Oceanographic stations 1 to 5 (see Tables 1 to 3). To specify the quality of the mean value the standard deviation is listed in the tables additionally. As for the deep stations of the Fyllas Bank section, stations 4 and 5, the standard deviation decreases with the depth, a fact which indicates the long-term stability of the deep water layers or the insensitiveness to seasonal changes, respectively.

As for the deep layers of the section ( below 100m ), on the slope of the Fyllas Bank a warming of the offshore component of the West Greenland Current may be observed during autumn 1979. In contrast to that, the outer station shows a cooling of nearly the entire water column which amounts in total -0.44 °C. However, as far as it concerns cooling or warming, it must be mentioned that only in the upper 100m of station 5 the  $\Delta T$  exceeds the deviation of the mean value.

Thus, it can be stated that according to our measurements in early November 1979 the thermal conditions on the Fyllas Bank were about normal. As for the haline conditions significant changes were only recorded in the deep layers of station 4.

References

- CORNUS, H.P.; STEIN, M., 1979: Antarctic Expedition of the Federal Republic of Germany 1977/78. Oceanographic Data Report Part I. Mitt. Inst. Seefisch. Hamburg (27): 1 - 381, I - XLIII, 1979.
- STEIN, M., 1978: Hydrographic conditions off West Greenland during November 1976. ICNAF Res. Doc. 78/VI/65.
- STEIN, M., 1979: Temperature observations on Fyllas Bank in Early December 1978. ICNAF Res. Doc. 79/VI/80.
- STEIN, M., 1980: Hydrographic conditions on Hamilton Inlet Bank (Div. 2J) in early December 1979. NAFO SCR Doc. 80/VI/58.
- STEIN, M., in prep.: Transports of heat and volume in the West Greenland Current during autumn 1979.

Table 1: Deviations of temperature and salinity at NAFO Standard Oceanographic stations 1, 2 and 3

Station 1: 64°01'N, 52°19'W			
a) T °C	Mean value x	Standard Dev.	Delta T,S (79 - x)
Depth range			
0 - 50	1.21	0.93	0.14
b) Salinity	32.44	0.77	0.38
Station 2: 63°58'N, 52°44'W			
a) T °C			
Depth range			
0 - 50	1.13	0.94	-0.04
b) Salinity	32.38	0.85	0.55
Station 3: 63°55'N, 53°07'W			
a) T °C			
Depth range			
0 - 50	1.53	0.97	0.08
b) Salinity	32.78	0.72	0.37

Table 2: Deviations of temperature and salinity at NAFO  
Standard Oceanographic station 4

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Station 4: 63°53'N, 53°22'W

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a) T °C

Depth range	Mean value x	Standard Dev.	Delta T,S (79 - x)
0 - 50	2.08	1.14	-0.77
50 - 100	3.13	1.20	-0.03
100 - 200	4.40	1.05	0.85
200 - 300	5.23	0.73	0.45
300 - 400	5.35	0.52	0.25
400 - 500	5.48	0.30	0
0 - 500	4.50	0.78	0.34

b) Salinity

Depth range	Mean value x	Standard Dev.	Delta T,S (79 - x)
0 - 50	33.09	0.55	0.22
50 - 100	33.67	0.52	0.34
100 - 200	34.21	0.45	0.66
200 - 300	34.65	0.32	0.41
300 - 400	34.85	0.21	0.23
400 - 500	34.94	0.15	0.16
0 - 500	34.42	0.24	0.33

Table 3: Deviations of temperature and salinity at NAFO  
Standard Oceanographic station 5

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Station 5: 63°48'N, 53°56'W

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a) T °C

Depth range	Mean value x	Standard Dev.	Delta T,S (79 - x)
0 - 50	2.38	0.57	-0.96
50 - 100	4.41	0.62	-0.65
100 - 200	5.50	0.59	0.30
200 - 300	5.61	0.63	-0.17
300 - 400	5.30	0.58	-0.25
400 - 500	5.04	0.52	-0.52
0 - 500	4.95	0.44	-0.44

b) Salinity

Depth range	Mean value x	Standard Dev.	Delta T,S (79 - x)
0 - 50	33.63	0.12	-0.06
50 - 100	34.41	0.13	-0.12
100 - 200	34.89	0.01	0.07
200 - 300	35.06	0.11	0.07
300 - 400	35.07	0.10	0.10
400 - 500	35.06	0.12	0.09
0 - 500	34.81	0.06	0.06