

International Commission for



the Northwest Atlantic Fisheries

Serial No. 3504
(D.c.1)

ICNAF Res.Doc. 75/77

ANNUAL MEETING - JUNE 1975

Some peculiarities of temperature conditions of waters of the
West Greenland and Baffin Land Currents in 1974

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Abstract

Heat condition of waters of the West Greenland and Baffin Land Currents in 1974 is considered in this paper. The average temperature in different layers is analysed for the standard sections. Rather a strong cooling of waters on the Fyllas Bank in March is noted. In October-November 1974 waters in the 0-200 m layer were on the average by 1° warmer compared with normal for 1963-1974, whereas in deep layers (200-500 m) the water temperature corresponds to the level of relatively cold years.

Introduction

Heat condition of waters of the West Greenland and Baffin Land Currents in 1974 is analysed in the paper. Data were obtained on board the fishery research vessels "Perseus - III", "Zarnitsa", "Nikolai Kononov" when performing some oceanographic sections in different months of 1974 (Fig.1). These data were correlated with those obtained in previous years.

Method

The average water temperature on the sections was calculated for the 0-50, 0-200, 200-500, 0-500 m layers.

On section 8-A the average water temperature for the above layers was calculated for the sector $58^{\circ}40'N$ $46^{\circ}12'W$ - $59^{\circ}25'N$ $44^{\circ}30'W$.

The Atlantic (Irvinger) component of the West Greenland Current is characterized by this sector (Elizarov, 1962). The station with positions $59^{\circ}33'N$ $44^{\circ}10'W$ was taken to characterize the Arctic component of the current (Fig. 1)

The average water temperature on section 11-A was calculated for sector F (Fig. 1) $63^{\circ}44'N$ $54^{\circ}27'W$ - $64^{\circ}01'N$ $52^{\circ}20'W$, which characterizes, according to some data, the West Greenland Current (Burmakin and Svetlov, 1962; Kudlo, 1972; Smith et al., 1937). The most numerous data are available for the stations on this sector.

Results

Some features of distribution and changes in water temperature on section 11-A are presented in Table 1 and Fig. 2.

It is evident from these data that in November the waters of the Arctic component of the West Greenland Current were not pronounced, and waters with temperature higher than 4° predominated on the slope and shelf instead of them.

It is seen from Fig. 2A that in February cooling of waters on this section reached 50 m, while in March, due to the intensive processes of vertical winter circulation, there was rather a considerable decrease in water temperature also in deep layers, especially on the station closest to the shelf (Fyllas Bank). /Fig. 2B/.

In November (Fig. 2C) there were distinctly pronounced waters of the West Greenland Current; their temperature was higher than 5° . A wedge of warm waters nearly approached the cold waters of the Baffin Land Current.

Heat content of waters on section II-A in November 1974, compared with that of previous years, can be presented by the following data (Table 2).

As it is obvious from Table 2, in November 1974 the West Greenland Current waters in the 0-200 m layer were by 1.3°

warmer, while they were by 0.35° colder in the 200-500 m layer compared with long-term mean norm for 1963-1974. Compared with the relatively cold 1971 and 1972 (Herman, 1972; Herman, 1974), in November 1974 water temperature in the 0-200 m layer increased by $2.2-2.5^{\circ}$, whereas it was lower by $0.1-0.2^{\circ}$ in the 200-500 m layer.

Analysing data given in Table 2, it can be said that by the temperature conditions the state of water masses in the 0-200 m layer is close to that of the warm 1964 (Svetlov, 1966) and 1966, while in the 200-500 m layer it was close to the relatively cold 1963 and 1970.

The chart of water temperature at a depth of 50 m serves to illustrate the water mass distribution in November-December 1974 (Fig. 1). Cold waters of the Baffin Land Current (lower than -1°) predominate in the western part of the Canadian-Greenland Threshold. Those waters intruded into the stream of the warm West Greenland Current forming a core with the temperature below 1° . Besides, two separate cores of warm water with temperature above 4° were formed. The process of interaction of warm and cold waters is rather distinctly pronounced on sections 9-A and 10-A (Fig. 3). In November 1974 the water temperature on those sections was on the average 1° higher compared with the same period of 1971-1972.

Data on water temperature in the West Greenland Current to the south-west of Cape Farewell (section 8-A) for some years are adduced in Table 3.

From Table 3 it follows that in 1974 the water temperature in the Atlantic (Irminger) component of the West Greenland Current in all the layers mentioned above was on the average by 0.5° higher than that in the relatively cold 1970 and 1972 but it was found to be by $0.5-0.6^{\circ}$ lower compared with 1962-1968. Waters of that component were by 0.21° warmer, relative to the norm of 1962-1974, only in the 0-50 m layer, whereas in three remaining layers they were on the average colder by 0.3° .

In 1974 the Arctic component of the West Greenland Current was not pronounced on that section, while on the sector of its usual distribution there were warm waters with the temperature above 4°, which was on the average 1-2° higher than that in previous years, with the exception of 1964.

Conclusions

1. A strong cooling of waters was registered in March on section II-A (Fyllas Bank).

2. In October-November the water temperature in the 0-200 m layer on section II-A was by 1.3° higher than normal for 1963-1974, while on section 8-A it was close to normal of 1962-1974. Mean water temperature in the 200-500 m layer was lower than normal throughout and it corresponds to the level of the relatively cold 1971-1972.

3. In the winter period of 1974 cold waters of the Arctic component of the West Greenland Current were not registered along the coast of West Greenland.

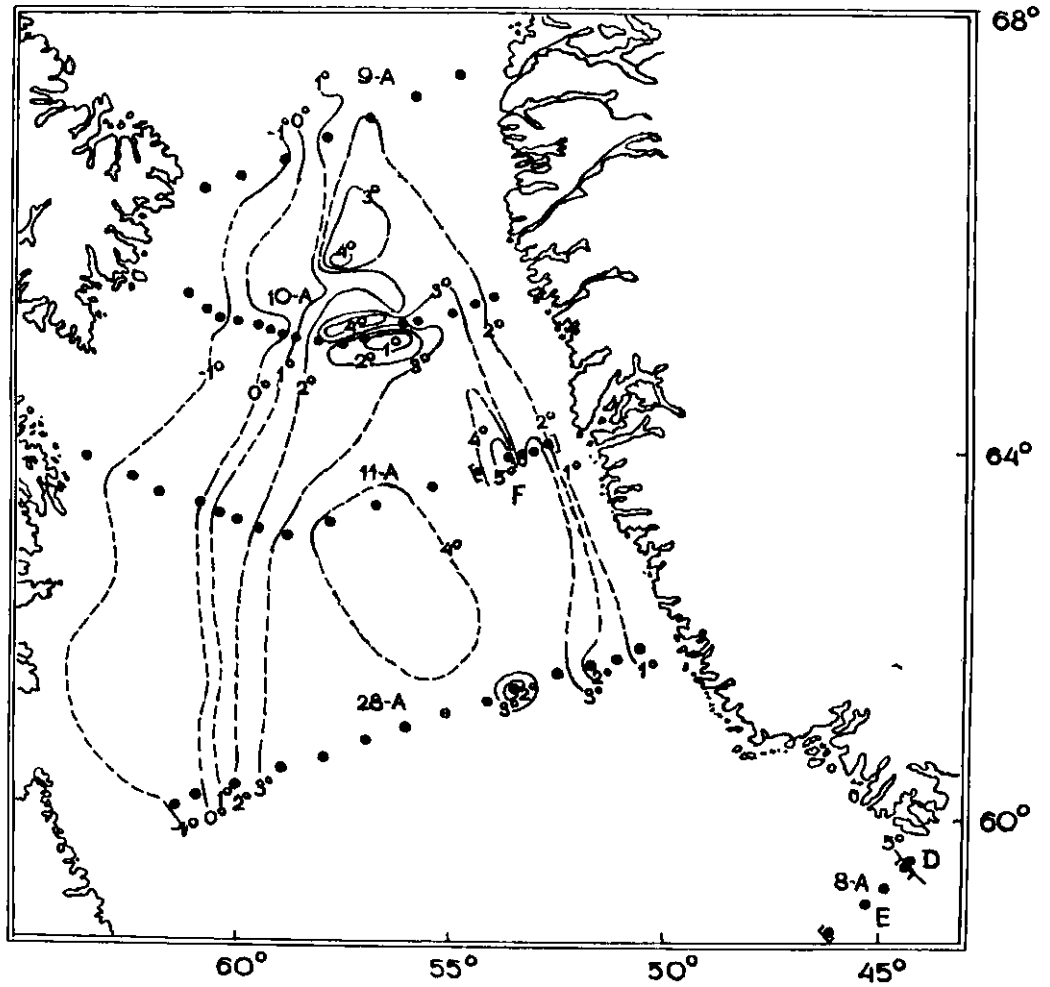


Fig. 1. Water temperature distribution at the 50 m depth on standard oceanographic sections in November-December 1974.

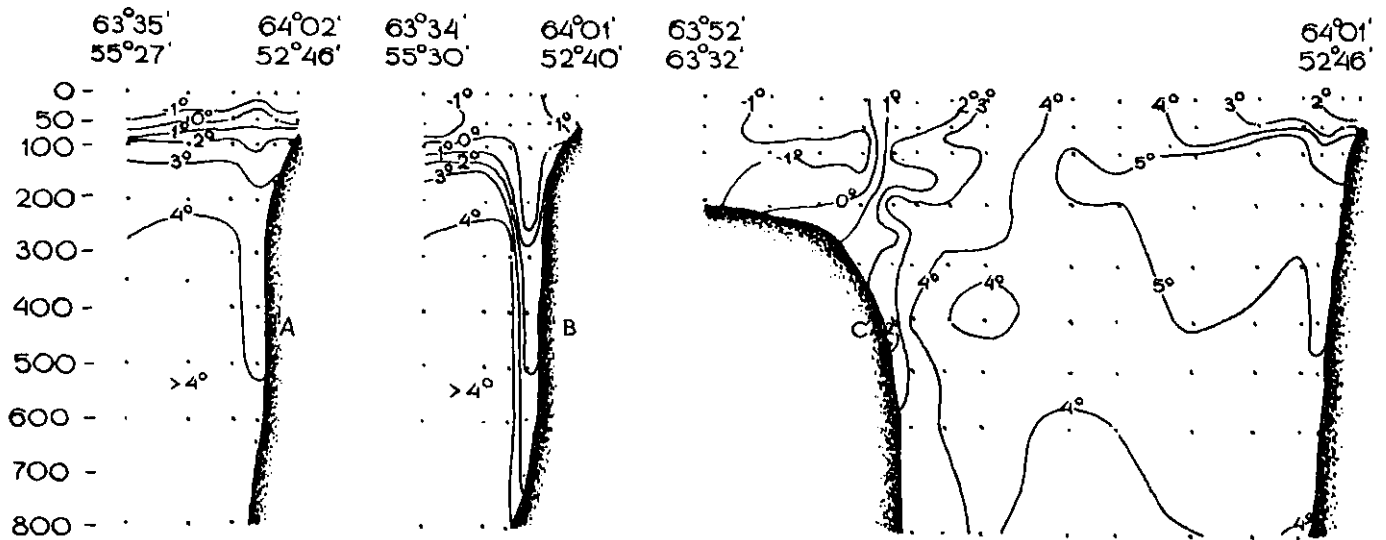


Fig. 2. Water temperature on section II-A in 1974.

- A - in February
- B - in March
- C - in November

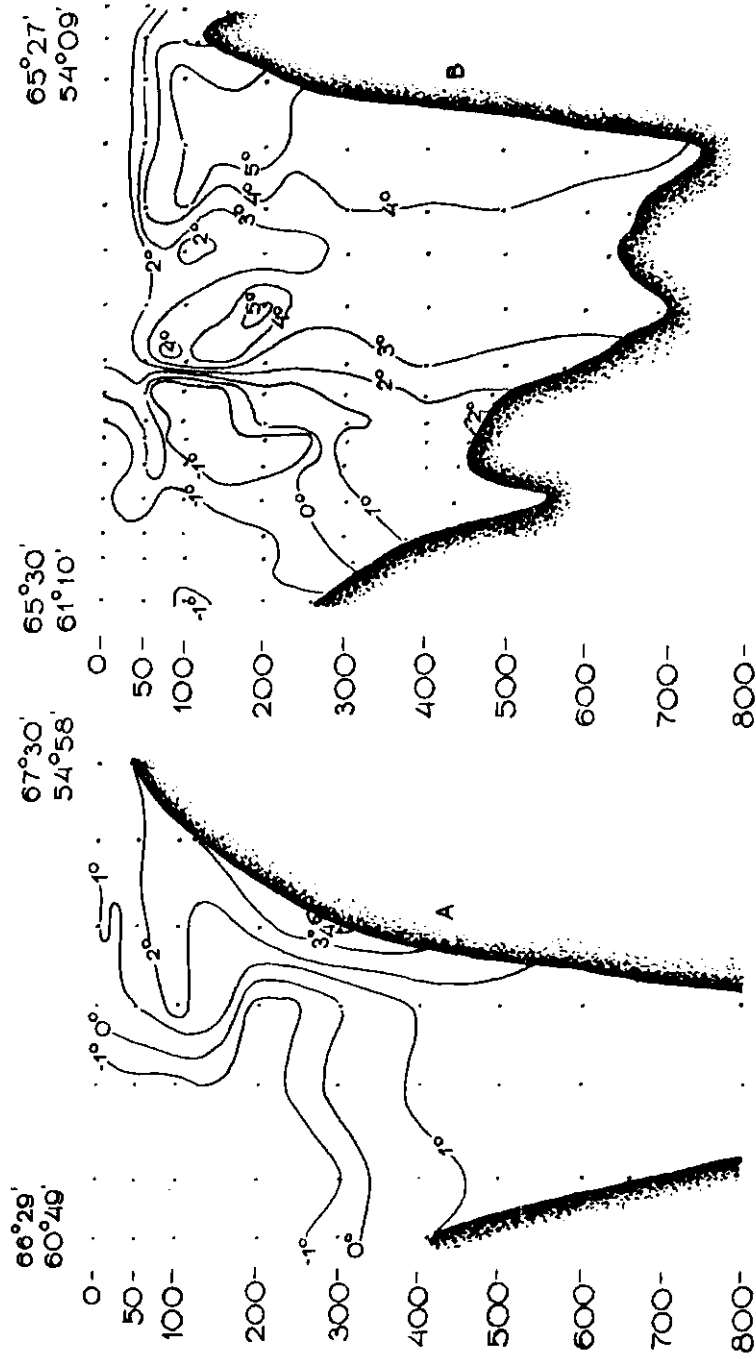


Fig. 3. Water temperature on sections 9-A(A) and 10-A(B) in November 1974.

Table 1. Average water temperature (°C) on section II-A

| Month | Layers, m | |
|----------|-----------|---------|
| | 0-200 | 200-500 |
| February | 1,36 | 4,20 |
| March | 0,62 | 3,79 |
| November | 4,32 | 4,98 |

Table 2. Average water temperature on section II-A (sector F) in November of various years

| Year | Layers, m | |
|--------------------------|-----------|---------|
| | 0-200 | 200-500 |
| 1963 | 2,89 | 4,80 |
| 1964 | 4,11 | 5,68 |
| 1965 | 2,18 | 5,83 |
| 1966 | 4,43 | 6,13 |
| 1967 | 3,18 | 5,26 |
| 1968 | 2,75 | 5,38 |
| 1970 | 2,40 | 4,98 |
| 1971 | 2,14 | 5,16 |
| 1972 | 1,84 | 5,08 |
| 1974 | 4,32 | 4,98 |
| Average for 1963-1974 | 3,02 | 5,33 |

Table 3. Mean water temperature on section 8-A in October of various years

| Year | Atlantic (Irminger) component of the West Greenland Current (E) | | | | Arctic component of the West Greenland Current(D) | |
|-----------------------|---|---------|-----------|---------|---|---------|
| | 0-50 m | 0-200 m | 200-500 m | 0-500 m | 0-50 m | 0-150 m |
| 1962 | 6,32 | 6,12 | 5,04 | 5,47 | 3,44 | 4,16 |
| 1963 | 4,96 | 5,45 | 5,26 | 5,43 | -0,11 | 0,15 |
| 1964 | 6,61 | 6,53 | 5,39 | 5,86 | 5,23 | 5,52 |
| 1966 | 6,59 | 6,27 | 5,60 | 5,87 | 2,60 | 3,25 |
| 1968 | 5,76 | 5,70 | 4,78 | 5,15 | -0,34 | - |
| 1970 | 2,85 | 4,11 | 5,07 | 4,69 | 0,26 | 1,22 |
| 1972 | 4,75 | 5,24 | 4,64 | 4,90 | 2,21 | 4,05 |
| 1974 | 5,64 | 5,57 | 4,64 | 5,01 | 4,22 | 4,59 |
| Norm for 1962-1974 | 5,43 | 5,62 | 5,04 | 5,29 | 2,27 | 3,27 |

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