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(D.c.1)ICNAF Res.Doc.70/49ANNUAL MEETING - JUNE 1970Hydrological Conditions in Labrador and Newfoundland Areas, 1969

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In 1969 oceanological observations in the ICNAF subareas 2 and 3 were carried out in the course of two cruises of the R/V "Persei-III".

1. During the 11 cruise of the R/V "Rossia" on determination of the abundance of young fish, which took place from April 3 up to August 2, all the standard sections going through the North Newfoundland, Grand, Flemish Cap and Saint-Pierre banks were carried out with the complex of observations (t , $S\%$, O_2). The position of the sections is given in Fig.1. In this figure in square brackets the stations are given, for which average temperatures were calculated.

2. In autumn during the 12 cruise of the R/V "Rossia" three main sections with observations of t , $S\%$, O_2 , PO_4-P and NO_3-N were made : 6-A, through the Flemish Cap-Grand Bank (along the parallel $47^\circ N$), 2-A along the meridian $50^\circ 15' W$ through the Gulf Stream, and 8-A from the Seal Islands at the Labrador up to the Cape of Farvel near Greenland.

3. At the end of July during the third cruise of the R/V "Persei-III" the observations of t , $S\%$, O_2 , PO_4-P and NO_3-N were carried out on section 8-A from Labrador to Greenland, as well as during the 12 cruise of the R/V "Rossia". In this cruise the main part of work was conducted on the Greenland - Canadian Ridge and at the Baffin Land.

Besides observations carried out on the standard sections in all the above mentioned cruises, temperature

and salinity were also measured at the stations during trawling, mainly in the surface and near-bottom layers.

In spring and summer 1969 the temperatures in near-bottom layers on the southern slopes of the Grand Bank were 2-3°C lower, than those in the previous year, that is about 1°C below the norm. This must be connected with the weakening of the intensity of the Gulf Stream. Last year in April-May the temperature, observed at the slope in the south of the Grand Bank, was higher than 10°C, whereas this year it hardly exceeded 6°C.

The position of the ^{surface} isotherm 5°C on the section 2-A along the meridian 50°15'W in May for the last three years at the southern extremity of the Grand Bank shows, that the Gulf Stream has again displaced after a considerable inflow on the slopes of the Grand Bank in 1968, and its position is about that of in 1967 (Table 1).

In June 1969 on the section 1-A, going through the South-Western slope of the Grand Bank, as well as on the section 2-A, the temperature was lower, than at the same time last year, mainly in the near-bottom layers (Table 2).

The average temperatures, obtained on the sections 3-A and 4-A, carried out in May and going through the South-Eastern slope of the Grand Bank, can be compared both with the temperatures obtained in the previous year and with the norm (Yelizarov, 1962) for the 0-200 m layer in 1936-1941, 1949-1958 (Table 3).

A considerable deviation of temperature from the norm towards an increase on the section 4-A in the 0-200 m layer can be explained by ~~westward~~ displacement of the North-Atlantic Current.

This year the inflow of the North-Atlantic Current into the Flemish Cap Channel was more intensive as compared with that of last year (see average temperatures on the section 6-A in April, Table 4).

Thus, in April 1969 positive anomalies of temperatures from +0.3 to +1.3 prevailed in all the layers, except near-bottom ones, in the Flemish Cap Channel, as compared to 1968.

In July in the area of Labrador (section 8-A, Table 5) the temperature was below the norm in the cold component of the Labrador Current, parts A and B, and higher than the norm in its warm component (part C).

As seen from Table 5, the temperatures of the whole Labrador Current (part ABC) in summer 1969 were nearly normal (the deviation from the norm makes up -0.04°C).

To judge by the conditions in autumn 1969, average temperatures of different layers of the cold component of the Labrador Current (the part AB of the section 8-A) this year are close to the temperatures of the same period in the previous year and are lower than the long-term average one by 0.5°C in the 0-200 m layer.

Further in Table 6 the temperatures of the cold component of the Labrador Current are given. They are estimated for November 1 according to the methods accepted by us earlier (Burmakin, 1969).

As it is evident from the data given in Table 6, in 1969 in the 0-200 m layer the temperature was the same as in 1968. However, in 1969 the surface layers cooled more considerably, than in the previous year. As compared with the long-term average temperature for the period 1958-1968, this year the temperature in the same layers was 0.87°C lower than that. At the same time the temperature in the near-bottom layers (200-500 m) was higher by 1.33°C as compared with that of the last year, and by 0.36°C as compared with the long-term average.

Thus, in late autumn 1970 the temperature of the surface layers was lower, and in the near-bottom layers it was higher, as compared with the one in late autumn 1969. The warming up of near-bottom waters takes place evidently due to short-term inflow of the eastern component of the Labrador Current on the slope of the Labrador shelf.

Besides, a certain warming up in the core of the Labrador Current is marked, as compared with the last year (the 50-200 m layer). This is indicative of its weakening.

Conclusions

In spring and summer 1969 on the South-Eastern and South-Western slopes of the Grand Bank and in the area of Labrador the temperature was lower than in the previous year, especially in the Main jet of the Labrador Current. The exception is the northern part of the South-Eastern slope (section 4-A) and the Flemish Cap Channel (section 6-A). In all the layers here, except the near-bottom ones, the temperature was 0.1-1.3°C higher than in the previous year. As compared with the long-term average, the temperature on the southern sections (3-A and 4-A) was higher, and the temperature at Labrador (section 8-A) was lower. Thus, in spring and summer 1969 both the North-Atlantic Current to the east of Grand Bank and the Labrador Current on the section 8-A were intensified.

The intensification of the Labrador Current could be traced on the eastern and southern slopes of the Grand Bank up to October.

In November 1969, on the contrary, in the core of the Labrador Current (the 50-200 m layer) and in the near-bottom layer, especially in the waters on the slopes, the temperature was higher, than at the same time last year. The comparison reveals, that the temperatures in the layers to 200 m were lower, and in near-bottom layers they were higher than the long-term average one.

References

1. YELIZAROV, A.A. On year-to-year fluctuations of intensity of the Labrador and West-Greenland Current and on possibility of forecasting temperature conditions in fishing areas of the north-western part of the Atlantic Ocean. Okeanologia, vol.2, vyp. 5, 1962.
2. BURMAKIN, V.V. Hydrological conditions in the Labrador and Newfoundland areas in 1968. ICNAF, Ann.Meet. Res. Doc. No. 37, 1968.

Table 1. The position of the isotherm 5°C on the section 2-A along the meridian 50°15'W in May, 1967-1969

Years	∴ 1967	∴ 1968	∴ 1969
N	42°40'	43°15'	42°39'

Table 2. Average temperatures by layers on the section 1-A in June 1968 and 1969

Date	Layers, m			
	∴ 0-50	∴ 50-100	∴ 100-200	∴ 200-500
15,06,1968	4,73	2,82	7,27	6,81
8,06,1969	5,33	2,91	3,42	2,75

Table 3. Average temperatures for the 0-200 m layer on the sections 3-A and 4-A on May 15, 1968, 1969 as compared with the norm

Years	Sections	
	∴ 3-A	∴ 4-A
1968	1.87	2.27
1969	0.80	3.46
Norm	0.28	1.66
Anomaly 1969	+0.52	+1.80

Table 4. Temperatures ($^{\circ}\text{C}$) of different layers on the section 6-A within H_1, G and H_2 (Fig. 1) in April 1968 and 1969

Layers	Date, anomaly	parts of the section		
0-50	14.04.1968	-0.17	0.66	4.03
	26.04.1969	0.40	1.82	5.36
	anomaly	+0.57	+1.16	+1.28
5 0-200	14.04.1968	0.02	2.30	4.37
	26.04.1969	0.23	2.42	4.94
	anomaly	+0.21	+0.12	+0.57
0-200	14.04.1968	-0.05	1.93	4.30
	26.04.1969	0.32	2.27	5.04
	anomaly	+0.37	+0.34	+0.74
200-500	14.04.1968	-	3.77	4.80
	26.04.1969	-	3.67	4.48
	anomaly	-	-0.10	-0.32

Table 5. Average temperatures of the water in the 0-200 m layer ($^{\circ}\text{C}$) on the section 8-A, as compared with the norm (Yelizarov, 1962)

Date	Parts of the section				
	A	B	G	AB	ABC
July 27-31 (observed)	-0.34	0.25	4.35	-0.10	1.17
Calculated for July, 15, 1969	-0.64	-0.05	4.05	-0.40	0.87
Norm 1936-1961	-0.28	0.15	3.64	0.09	0.91
Anomaly 1969	-0.36	-0.20	+0.41	-0.49	-0.04

Table 6. Average temperatures ($^{\circ}\text{C}$) of the cold component of the Labrador Current on the section 8-A (part AB) on November 1, 1969 as compared with those in 1968 and the long-term average

Layers, m	1968	1969	average 1958-68	anomaly 1969
0-50	2.29	0.82	1.69	-0.87
50-200	-0.18	0.56	0.71	-0.15
0-200	0.50	0.50	1.00	-0.50
200-500	0.31	1.64	1.28	+0.36

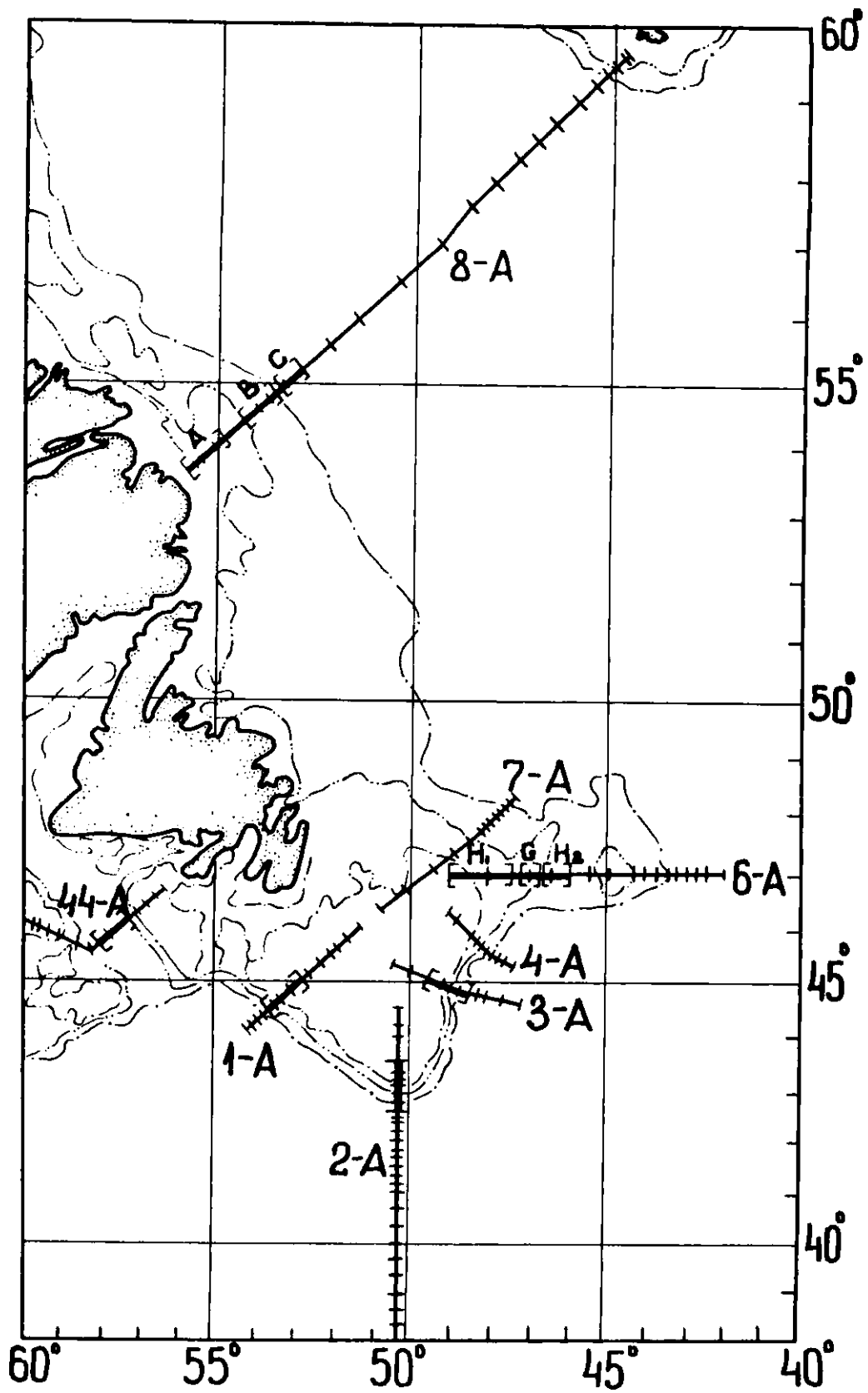


Fig. 1. The position of the standard hydrological sections in the areas of Labrador and Newfoundland.