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Temperatures and salinities in the eastern Newfoundland area in 1972

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Introduction

The 6 standard monitoring hydrographic sections across the Labrador Current east of Newfoundland were taken by the *Cape Freels* at approximately the usual dates in July and August. Station 27, off Cape Spear was occupied monthly or oftener during the year. The 1972 section temperatures are compared with the lowest, average, and highest temperatures at each station and depth in the period 1951-65 at approximately the same dates (unpublished), also with temperatures at the same time of year in these sections in 1969-71 (Templeman 1970, 1971, 1972), and additionally for the Flemish Cap section in 1966-68 (Templeman 1967, 1968, 1969). Salinities are also compared with those of some of the previous years. In the sections, apart from the surface temperatures and salinities, the position of the decimal point in an inserted temperature or salinity indicates its level and position.

Sections across the Labrador Current in July-August

Temperatures

In 1972, the intermediate cold water of the Labrador Current was colder than in any previous year of observation and more extensive horizontally and often vertically, whereas the deep slope water on the eastern slopes of the area, attributable to the influence of the West Greenland Current, possessed temperatures usually close to the highest of former years for which records are available.

In the southern Labrador section (Section A) from off Seal Island across Hamilton Inlet Bank (Fig. 1A), more cold water, at a lower temperature below 0°C and especially below -1.0 and -1.5°C, was present than in any year of the 1951-65, 1969-71 periods for which the section is available. Very cold water extended farther seaward than in any previous year of the period. In the intermediate cold water layer, throughout the whole extent of the section from Station 51 to Station 57, at each station almost all the temperatures were lower than previously recorded. The volume of water below -1.5°C was about seven times as great as in the previous coldest year. Temperatures from 0 to -1.5°C extended to record depths on the seaward side of Hamilton Inlet Bank and farther seaward than in any previous year, but over the bank there was a shallow layer of higher than average temperatures. Surface temperatures were below average and in the 3 seaward stations were the lowest of the observation period. On the seaward slope of the bank in the deep water derived from the West Greenland Current, temperatures at 400 m and deeper were almost as high as the highest temperatures of the above period.

In Section B, in the Cape Bonavista section between Stations 43 and 50 (Fig. 2A), temperatures at the core of the intermediate cold water were lower and temperatures below -1.5°C extended farther seaward than in any year of the 1951-65, 1969-71 period. Surface temperatures were below average, at the most seaward stations close to the lowest temperatures of the period and at Station 50 the lowest of the period. The near bottom temperatures of the Northeast Newfoundland Shelf at the western Stations 45 and 46 were only a little below the average of the 1951-65 period and were lower than in 1970-71. Seaward on the shelf, near bottom temperatures were above average, a little lower than the highest of the 1951-65 period and below those of 1970-71. In the deep water of the continental slope at Stations 49B and 50, temperatures were above average, higher than in 1971 and only a little below the highest of the period of observation.

In the part of Section B extending southwards from Station 50, through Stations 35F-35 to the northern part of the Grand Bank (Fig. 2A[1]), which has only been done in recent years (but not in 1971), surface temperatures in the northern part of the section were much lower than those of 1969-70 but those of stations near the Grand Bank similar to those of 1969 and 1970. There was more water below -1°C and much more below -1.5°C than in these two years and the lowest temperatures were lower than those previously observed. Deepwater temperatures on the northern slope of the Grand Bank were lower than in 1970 and higher than in 1969.

In Section C from St. John's to Flemish Cap (Fig. 3A), surface temperatures were mostly close to the average of the 1951-65 period although a little lower than the average at some of the upwelling points east of the banks, and lower than in 1971. Temperatures in the coolest part of the Labrador Current were slightly lower in the Avalon Channel and especially east of the Grand Bank than in any year 1951-71. For the first time in this period water temperatures below 1°C (lowest -1.16°C) were present at Flemish Cap. Bottom temperatures in the Avalon Channel and especially at Station 28 were lower than any previously encountered in these sections. Bottom temperatures over the western part of the Grand Bank were below average but not as low as the lowest of earlier years, and bottom temperatures on the upper part of the eastern slope of the Grand Bank were lower than any previously found. Bottom temperatures on Flemish Cap were lower than any taken previously. In the deep water of Flemish Channel, temperatures on the western side were above average and on the eastern side mainly higher than any previously found. In the deep water east of Flemish Cap, temperatures were above average and generally close to the highest previously found.

In Section D from St. John's to the southeast slope of the Grand Bank (Fig. 4A), surface temperatures (except at Station 32) were a little below average and below those of 1971. Temperatures in the Avalon Channel and in the eastern branch of the cold water of the Labrador Current were slightly lower than any encountered in this section in 1951-65, 1969-71. Bottom temperatures over the Grand Bank were average and those of the Southeast Shoal a little above average. The temperatures of the deep water on the eastern slope of the Grand Bank, derived from the West Greenland Current, were above average and a little below the highest temperatures which were found in 1970.

In Section E extending along the southwestern edge of the Grand Bank at about 75 m (Fig. 5A), surface temperatures were close to the average of the 1951-65 period, except east of the Grand Bank where they were higher than average. Over the bank they were a little lower than in 1971 and east of the bank a little higher. Temperatures in the Haddock Channel were slightly lower, and in the eastern branch of the Labrador Current distinctly lower than in any previous year. Bottom temperatures over the Grand Bank at Stations 22 and 23 were a little higher and those at Stations 25 and 26 lower than the average. On the eastern slope of the Grand Bank, water with temperatures below 0°C extended a little more deeply than in any previous observation year and temperatures at all levels in the cold water of the eastern division of the Labrador Current touching the upper slope of the bank were lower than any previously found. An eastern division of the eastern branch of the cold water was present in Station 26H, only noted previously in 1971 but still farther east and slightly lower in temperature in 1972. This eastern division was present also in Sections C and D. In the deep slope water east of the bank, at and below 400 m, temperatures were above average and close to the highest of previous years of observation.

In Section F at about 275 m along the southwestern slope of the Grand Bank to St. Pierre Bank (Fig. 6A), surface temperatures were a little above the average for the 1951-65 period and some a little higher and others a little lower than in 1971. The lowest temperatures of the western branch of the Labrador Current were below average, close to but slightly higher than the lowest previously found. Core temperatures in the eastern branch of the Labrador Current were lower than any obtained previously for this section. Remarks for the division of the cold water under Station 26H and for the deep water of the eastern slope are similar to those from Section E since slope data from the same stations are included in both sections. The temperatures of the warmer central water over the slope (Station 17), derived from the slope water of the southwestern Grand Bank, were above average but about 2°C lower than the highest level which was found in 1971. Bottom temperatures at about 275 m across the slope of the bank were on the average higher than any previously found.

Salinities

In the Seal Island Section A (Fig. 1B), lower salinities (33.5‰) extended much more deeply than usual on the eastern slope of Hamilton Inlet Bank but there was an isolated area of somewhat higher salinity (and higher temperature) on the crest of the bank. Salinities of the deeper water on the eastern slope of the bank were higher than in 1971 and at Station 57 at the same level as in 1969 and 1970.

In the Bonavista Section B (Fig. 2B), salinities of the deeper water of the Northeast Newfoundland Shelf and its seaward slopes were mostly slightly lower than in 1971 and lower than in 1970. The deep-water salinities on the northern slope of the Grand Bank (Fig. 2B[1]) were considerably lower than in 1970 but considerably higher than in 1969.

In the St. John's-Flemish Cap Section C (Fig. 3B), salinities in the deepest part of the Avalon Channel were higher than in 1971 and lower than in 1970. Bottom salinities over the Grand Bank were slightly lower than in 1971 and still lower than in 1969-70. Salinities in the deeper part of the Flemish Channel were mostly little different from those of 1971 but considerably lower than those of 1970. Salinities over Flemish Cap and on its eastern slope were lower than in 1971 and much lower than in 1970.

In Section D from St. John's to the southeastern slope of the Grand Bank (Fig. 4B), salinities in the deeper water of the Avalon Channel were higher than in 1970, 1971 and a little lower than in 1969. Salinities in the deep water of 400 m and greater on the eastern slope of the Grand Bank were similar to or slightly lower than those of 1970 and slightly lower than those of 1969 and 1971.

In Section E at about 75 m along the southwestern slope of the Grand Bank (Fig. 5B), salinities in the deep water of 400 m and more to the east of the bank were only slightly lower than in 1969-71.

In Section F at 275 m along the southwestern slope of the Grand Bank to St. Pierre Bank (Fig. 6B), near-bottom salinities at the level surface were higher than in 1971.

Station 27, 1972

At Station 27 off Cape Spear (Fig. 7), surface temperatures in winter-spring 1972 were considerably below the 1950-62 average (Templeman 1965) and at this season also temperatures were lower to a greater depth than the average from the above period and in recent years from 1969-71. Also, throughout the year lower temperatures than usual occurred in the deep water. Summer and autumn surface and upper layer temperatures were close to the 1950-62 average and lower than in 1972 from June to September. Salinities in the deeper water were a little higher than in 1971.

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1971. Idem 1970. Ibid. 1971, Part III, p. 5-16.

1972. Idem 1971. Ibid. 1972, Part III, p. 19-25.

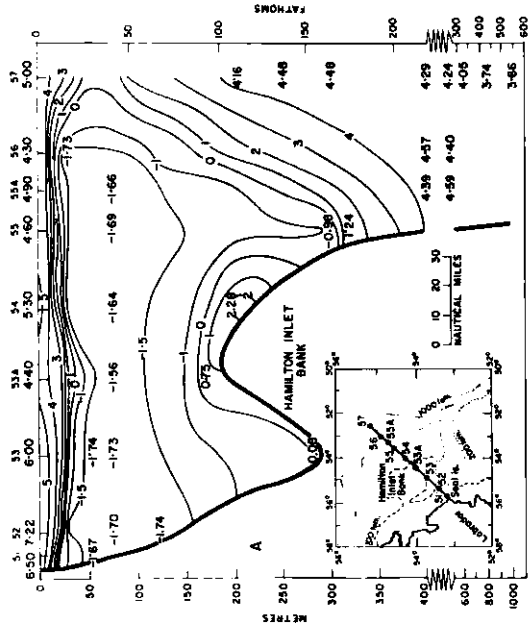

Fig. 1. Temperature (°C) above and salinity (‰) below, Section A, Seal Island-Hamilton Inlet Bank, 1-2 August 1972.

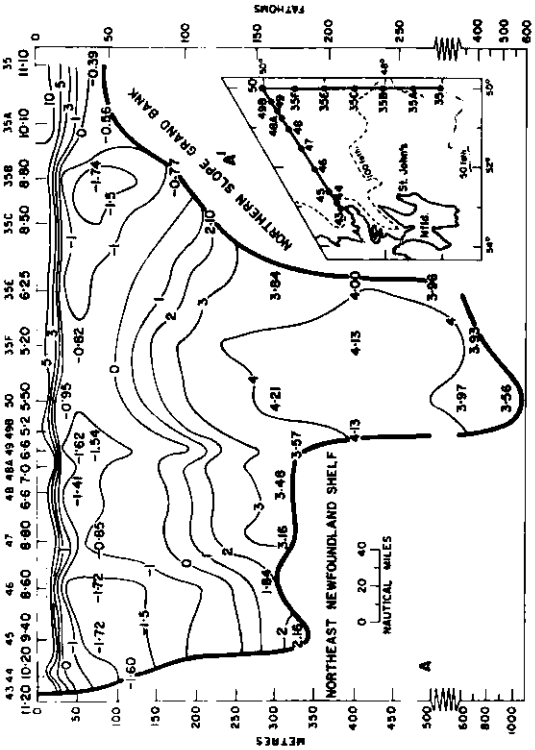

Fig. 2. Temperature (°C) above and salinity (‰) below, Section B, off Cape Bonavista, and southward to northern Grand Bank, 26-28 July 1972.

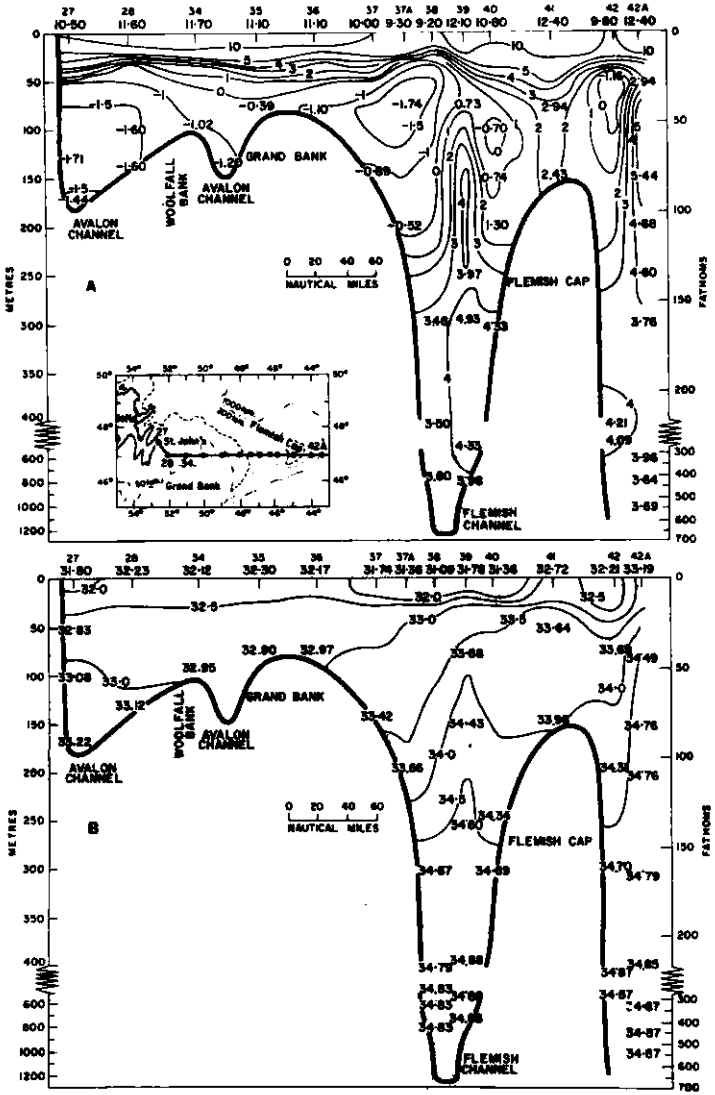

Fig. 3. Temperature (°C) above and salinity (‰) below, Section C, St. John's-Flemish Cap, 26-28 July 1972.

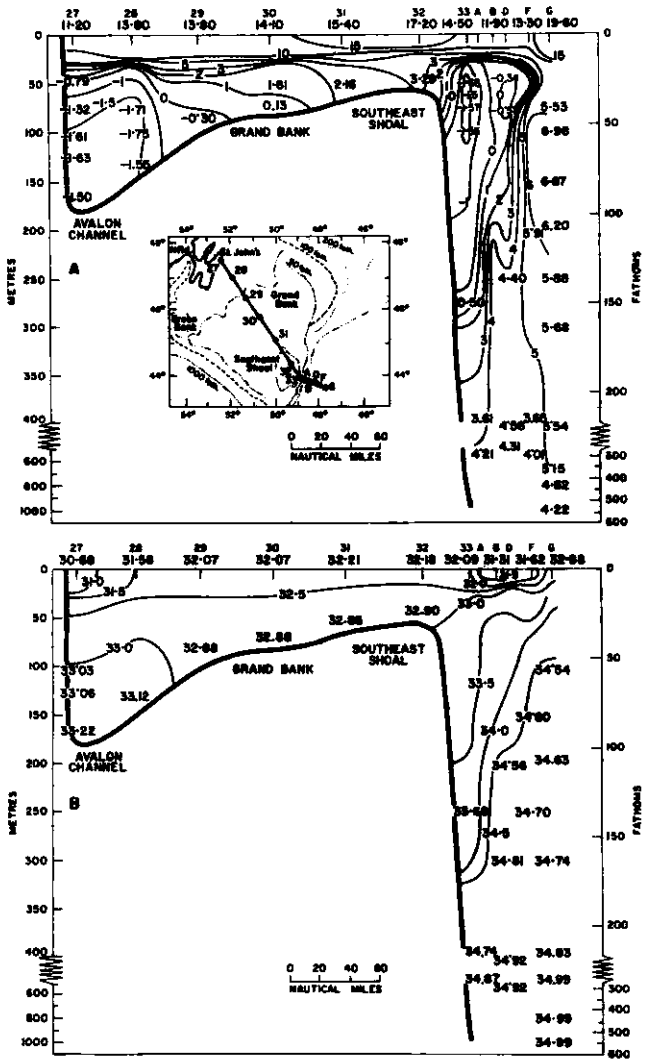

Fig. 4. Temperature (°C) above and salinity (‰) below, Section D, St. John's-SE slope Grand Bank, 19-20 August 1972.

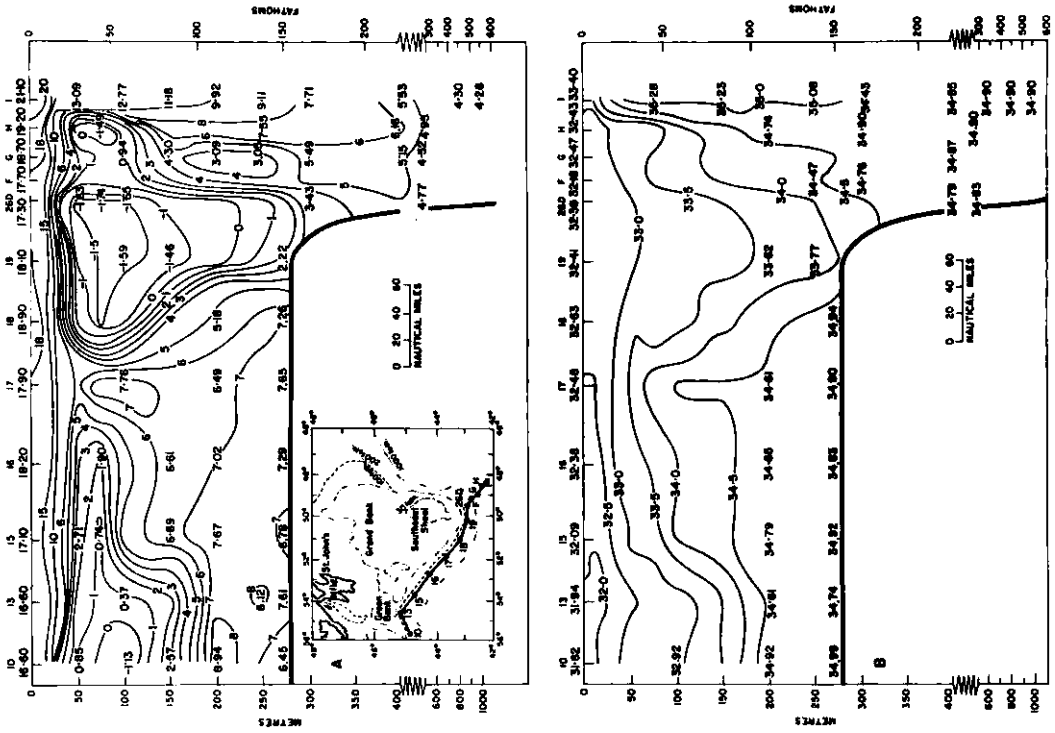

Fig. 6. Temperature (°C) above and salinity (‰) below, Section F, SW slope Grand Bank-St. Pierre Bank, 21-24 August 1972.

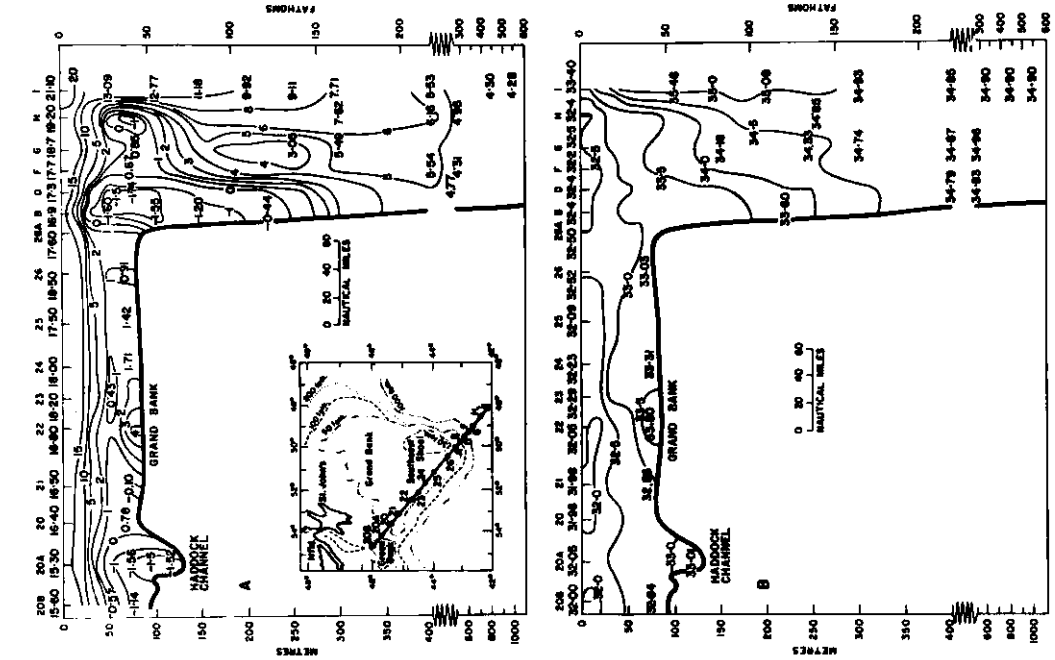

Fig. 5. Temperature (°C) above and salinity (‰) below, Section E, Green Bank-SE Grand Bank, 21-25 August 1972.

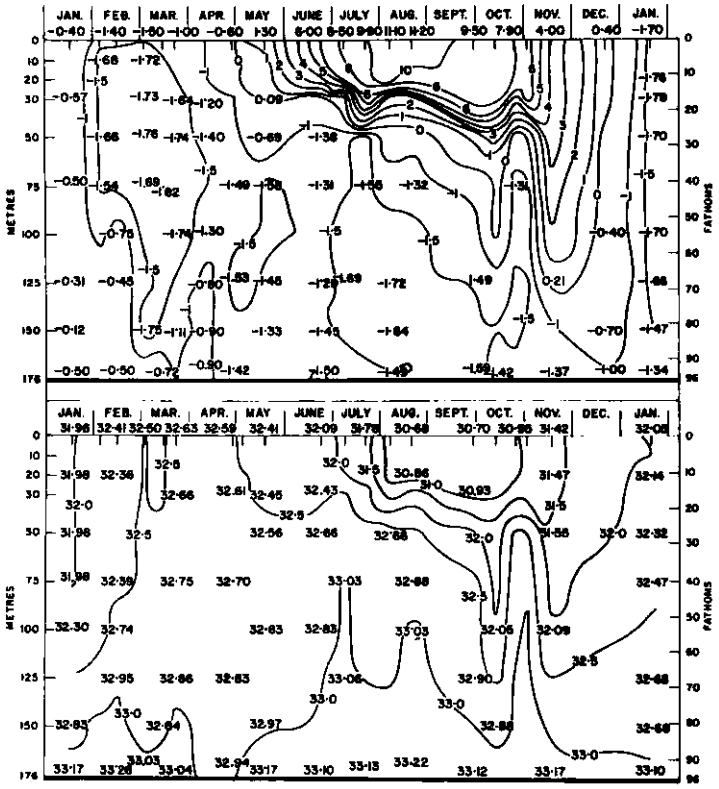

Fig. 7. Temperature (°C) above and salinity (‰) below, January 1972 to January 1973, from surface to bottom at Station 27 (see Fig. 3, 4, inset), 2 nautical miles off Cape Spear near St. John's.