are too numerous to name in this short report.

Albert H. Jackman
Department of Geography
Western Michigan University
Kalamazoo, U.S.A.

REFERENCES

[1]Gruening, E. 1953. Alaska: progress and problems. *The Scientific Monthly,* July: 3-12.

[2]Rogers, G. W. 1971. Wilderness and development. In: G. S. Harrison, editor. *Public Policy: Current Problems and Issues.* Institute of Social, Economic, and Government Research, University of Alaska, pp. 223-32.

[3]Herr, P. B. 1960. The regional impact of highways. *Urban Land,* 19(2): 3-8.

[4]Bucksar, R. G. 1970. The squatter on the resources frontier. *Arctic,* 23(3): 202-04.

[5]Lotz, J. R. The squatters of Whitehorse: a study of the problems of new northern settlements. *Arctic,* 18(3): 173-88.

[6]Hill, R. M. 1972. The Dempster Highway — benefits to the Arctic. Unpublished paper presented to Northern Resources Conferences, Whitehorse, Y.T., April 5-7, 1972.

[7]Woodward, H. W. 1970. Northern road program. Arctic Transport, *Proceedings of the Arctic Transportation Conference, Yellowknife, N.W.T., December 8 and 9, 1970,* 2: 151-79.

[8]Territorial Lands Act: Territorial Land Use Regulations, P.C. 1971-2287, 2 November 1971. *Canada Gazette* Part II, Vol. 105, No. 22, 24/11/71, SOR/DORS/71-580.

[9]Lotspeich, F. B. 1971. Environmental guidelines for road construction in Alaska. *Environmental Protection Agency Alaska Water Laboratory, College, Alaska, Report* No. 1610 GOI 09/71. 127 pp.

Physical Oceanographic Observations in Baffin Bay and Davis Strait*

INTRODUCTION

During February 1972, scientific personnel operating from the *Louis S. St. Laurent* obtained the first winter oceanographic temperature and salinity data from Baffin Bay[1]. Six oceanographic stations were occupied: one in central Baffin Bay; a second in eastern Baffin Bay southeast of the first; and a cross-section of 4 stations in southern Davis Strait (Fig. 1).

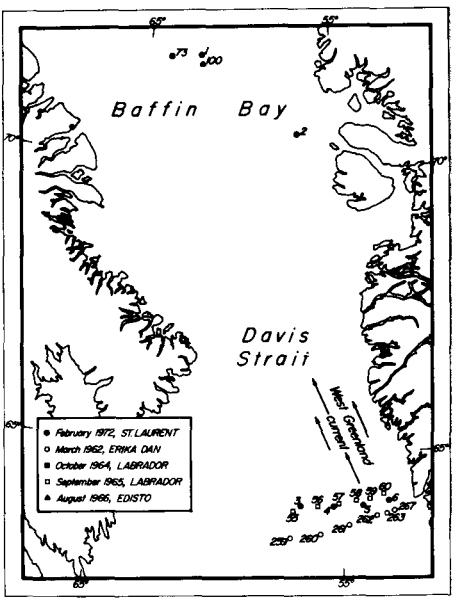


FIG. 1. Geographical locations of oceanographic stations occupied in Baffin Bay and Davis Strait during February 1972 and locations of the stations used in the text for purposes of comparison.

The temperature and salinity data were obtained using discrete samples from Knudsen bottles, equipped with deep-sea reversing thermometers, and an *in situ* recording salinity/temperature/depth unit (STD). Temperatures and salinities determined from the discrete water samples were used to calibrate the STD and correct it for drift, while the STD was used to detect fine structure in the vertical distributions of temperature and salinity. Salinities are felt to be accurate to ± 0.05‰, the advertised accuracy of the STD unit, except in the 0-200 m. deep layer at station 1; presence of ice within the Knudsen bottles during decanting of salinity samples, coupled with malfunctioning of the STD, created errors leading to a salinity accuracy of only about ± 0.3‰ in that case. Irregularities in the vertical distribution of salinity between 0 and 200 m. depths at station 1 (Fig. 2) may therefore not be real.

The temperatures presented below (Figs. 2 and 3) were those obtained from the reversing thermometers. They are considered accurate to ± 0.02°C.

*Contribution No. 170 of The Institute of Marine Science, University of Alaska.

Inasmuch as data obtained during February 1972 were hardly adequate in themselves for deductions concerning the oceanography of the Baffin Bay region, they are presented here in comparison with summer data from the same region (Figs. 1 to 3).

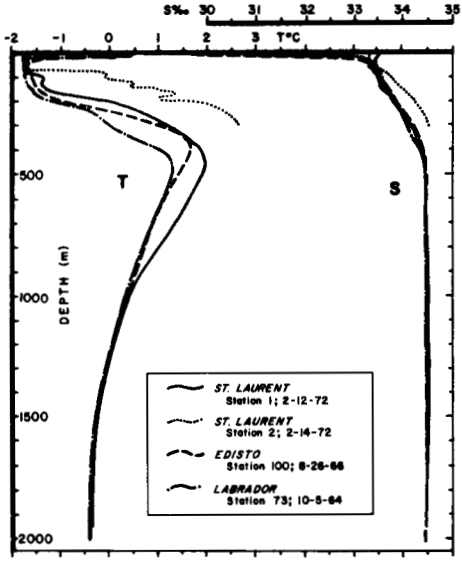


FIG. 2. Vertical profiles of temperature and salinity at: February 1972 oceanographic stations 1 and 2 in central and eastern Baffin Bay; and 2 stations occupied in central Baffin Bay during previous summers.

BAFFIN BAY

The vertical distribution of temperature below the near surface (0 to 30 m.) layer at station 1 was similar to that observed at the 2 indicated summer stations in the same region. The vertical distribution of salinity below a 0 to 100 m. deep near-surface layer was similar at all 3 stations during both winter and summer. Differences in observed maximum temperature at the 400 to 500 m. deep warm core, differences in thickness of the Atlantic Water layer as defined by the 0°C. isotherm, and differences in salinity at the warm core each fall within the ranges of year-to-year summer variations detected farther north[2]. These differences therefore fall within the normal variations encountered in the region and are felt to be insignificant within the context of possible seasonal variations.

Near-surface temperatures in February 1972 were lower (−1.8°C.) than those observed at the summer stations (−1 to > 0°C.), which may be attributed to winter surface cooling. Salinities within the 0 to 100 m. deep layer were higher at station 1 (> 33.5‰) than at the 2 observed summer stations (< 31‰). This salinity difference can be accounted for approximately by the presence, in this layer, of salt excluded from newly formed sea ice. One metre of ice, a reasonable thickness on the basis of shipboard observations made during February 1972, having a salinity of 5‰ would have excluded adequate salt into the underlying water to account for the observed salinity difference.

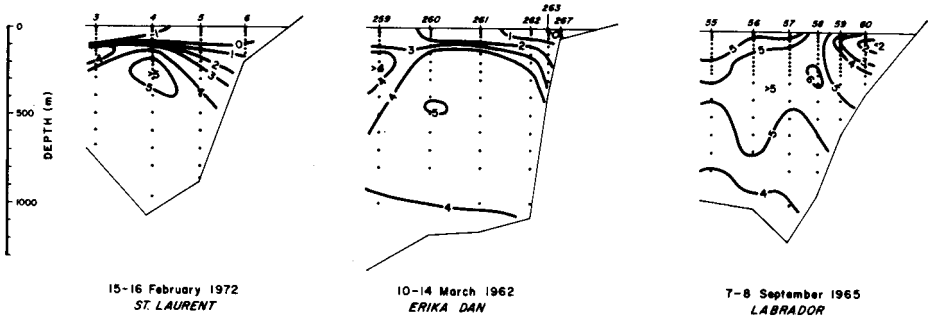
The 0 to 100 m. deep layer at station 2 was characterized by a vertical temperature and salinity structure similar to that at station 1, reflecting the effects of the same cooling and freezing processes that had modified that layer at station 1. No summer stations were available from the immediate area of station 2 for comparison, but the high subsurface (below 100 m.) temperatures and salinities observed at station 2 compared with those at station 1 may be accounted for qualitatively by the closer proximity of station 2 to the source of the warm (> 0°C.) higher salinity water, namely, Davis Strait (see below).

While it is impossible to form a firm conclusion on the basis of the two oceanographic stations occupied during February 1972, the above comparison suggests that the temperature and salinity structures in central and southeastern Baffin Bay, below the near-surface convective layer, undergo no significant seasonal variations.

SOUTHERN DAVIS STRAIT

The oceanographic cross-section occupied during February 1972 lies nearly coincident with sections occupied during winter 1962 and summer 1965 (Figs. 1 and 3), and may be compared with those sections. While there were some differences in the details of the vertical temperature and salinity structures for the 3 times of occupation of the section, the gross structures remained unchanged.

The vertical temperature distribution was characterized by a warm (5° to 6°C.) 300 to 500 m. deep core. The 0 to 100 m. deep near-surface layer exhibited lower temperatures (0 to < −1°C.) during the winters than during September 1965 (3° to 5°C.), which may be qualitatively accounted for by the effects of winter cooling. Occurrence of near-surface temperatures lower during February 1972 than during March 1962 may have been a consequence of the unusual harshness of the winter of 1972[1], which would have been expected to result in more intense surface cooling leading to lower water temperatures.



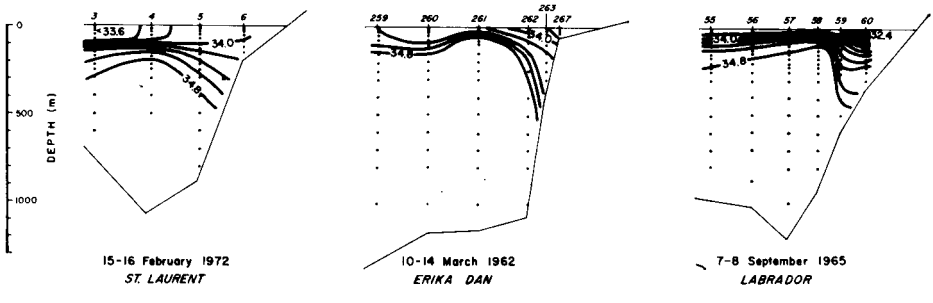


FIG. 3. Vertical distribution of temperature and salinity in southern Davis Strait during winter 1972, winter 1962 and summer 1965.

The vertical distribution of salinity was characterized by a constant salinity increase from the surface downwards, with maximum salinities higher than 34.8‰ having been observed near the bottom. Near-surface (0 to 100 m.) salinities were lower during September 1965 (32.4 to 33.8‰) than during the 2 winter occupations, with lower salinities having been observed during February 1972 (33.6 to 33.8‰) than during March 1962 (34.0 to 34.4‰). The vertical homogeneity of the near-surface layer observed during February 1972 was consequent to vertical convective mixing due to cooling; its presence, as compared to lack of such a layer during March 1962, may have been due to the unusual severity of the winter of 1972 and would thus have correlated with the relatively low near-surface water temperatures observed at that time. Low near-surface salinities (< 32.4‰) in the eastern portion of the section during September 1965 were probably a consequence of admixture of fresh water from terrestrial sources.

It has long been recognized[3] that the West Greenland Current is responsible for northward advection of the warm (> 0°C.) subsurface water layer into Baffin Bay (Fig. 1). This Current was bracketed by the southern Davis Strait cross-sections. The northward flow across the section is indicated by the slopes of the isohalines, which approximate the isopycnals at the observed low water temperatures. Maximum northward current speeds are seen to have been occurring on the eastern shelf regions, with possible southerly flow occurring in the western portions of the sections. The northward flow appeared to be less concentrated areally during February 1972 than during March 1962 or September 1965, but overall magnitude of the northerly flow appeared to be invariant during the 3 occupations of the section. No attempt was made to compute the geostrophic transport through the sec-

tion, since variations in the dynamic height were of the same order of magnitude as errors in their determination and it was, moreover, impossible to obtain a consistent reference level for dynamic computations.

CONCLUSIONS

While it is not possible to draw quantitative conclusions from the small amount of available information, it appears that the deep vertical distributions of temperature and salinity in central and southeastern Baffin Bay and Davis Strait may not undergo significant seasonal variation. Observed near-surface variations may be accounted for qualitatively by a combination of winter cooling, freezing and convective mixing and summer meltwater addition.

The apparent constancy of flow through Davis Strait is of particular interest. It has been demonstrated[2] that for sufficient heat to be present in the water column for prevention of ice formation in the open lead in northern Baffin Bay known as the North Water, northerly flow of warm water ($> 0°C.$) would have to be greater than observed during the summer months. That this does not appear to be the case strengthens the hypothesis, most recently advanced by Dunbar[4], that the open water is due to a southward advection of ice by winds and currents rather than by heat from the water column preventing formation of the ice.

ACKNOWLEDGEMENTS

Acknowledgement is given to the Canadian Ministry of Transport for making the Coast Guard Ship *Louis S. St. Laurent* available to the Arctic Institute's Baffin Bay-North Water Project for the winter cruise. Direct support was provided by the Defence Research Establishment Ottawa; the Defence Research Board of Canada under contract 02 GR-7090021; and the U.S. National Science Foundation under contract NSF C-653.

Robin D. Muench
Institute of Marine Science
University of Alaska
H. E. Sadler
Defence Research Establishment
Ottawa

REFERENCES

[1]Sater, J. E. 1972. A winter scientific reconnaissance of the North Water. *Arctic,* 25(2): 151-52.

[2]Muench, R. D. 1971. The physical oceanography of the northern Baffin Bay region. *The Baffin Bay — North Water Scientific Report* No. 1. 150 pp.

[3]Kiilerich, A. B. 1939. The *Godthaab* Expedition 1928, a theoretical treatment of the hydrographical observation material. *Meddelelser om Grønland,* 78(5): 1-148.

[4]Dunbar, M. 1971. Winter ice reconnaissance in Nares Strait, 1970-71. *DREO Technical Note* No. 71-34, 29 pp.

On the Oceanography of Makinson Inlet

On completion of observations in Nares Strait from the CCGS *Louis S. St. Laurent* during August 1971, the opportunity arose to make a quick reconnaissance in Makinson Inlet. This inlet, which provides a sea-level passage from the North Water area through the coast range of eastern Ellesmere Island, has recently been the object of some interest because of possible commercial and strategic developments. However, nothing was known of its bathymetry or oceanography except for a line of soundings run by CCGS *Labrador* in 1966. Since all of the oceanographic party with the exception of the author had already left the ship, the investigation could only be superficial, but with the assistance of Dr. Fritz Müller, and Mr. Ken de la Barre of the Institute, a few preliminary observations were made.

The ship entered the inlet (see Fig. 1) at 0800 local time on 2 September 1971 after working through a belt of loose polar pack about 3 miles wide which lay north-south off the entrance. Within the inlet only small, scattered floes were seen, due possibly to the strong westerly winds which continued the whole time the ship was in the area. On the way up the inlet a line of soundings was maintained and a series of shoreline photographs was taken. The ship reached Swinnerton Point, where the inlet divides into 2 arms, at about 1100 local time but no investigation of the arms was made since the survey barge was not available. On the way down the inlet, 4 oceanographic stations were occupied and Knudsen bottle samples were taken for temperature, salinity and dissolved oxygen content. Bathythermograph slides were also obtained.

Since there is no sill in the main section of the inlet the classic fiord structure cannot develop and the results obtained indicate that the inlet, from the fork seaward, is from the oceanographic point of view merely a section of northern Baffin Bay. The T-S curves in Fig. 2 show that there are two main layers, one below 300 m. and a second between 100 and 200 m. These layers match