U. S. TREASURY DEPARTMENT
COAST GUARD

THE MARION AND GENERAL GREENE EXPEDITIONS TO DAVIS STRAIT AND LABRADOR SEA

UNDER DIRECTION OF
THE UNITED STATES COAST GUARD

1928–1931–1933–1934–1935

SCIENTIFIC RESULTS

PART 2

PHYSICAL OCEANOGRAPHY

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Bulletin No. 19

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CONTENTS

Chapter VIII

FIGURE 1.—BATHYMETRIC MAP OF THE NORTHWESTERN NORTH ATLANTIC.

INTRODUCTION

The appearance of this publication completes the series of United States Coast Guard Bulletin 19.[1]

The report is based on the observations of the *Marion* expedition, 1928, and amplified by the cruises of the *General Greene* to the Labrador Sea, 1931 and 1933 to 1935. In view of the similarity and intermixture between the waters north of Newfoundland and those around the Grand Banks, it has been deemed advisable to add an exposition of the latter based upon the researches of the International Ice Patrol, the observations of which are published in Coast Guard Bulletins 1–25.

The Coast Guard's material consists of temperature and salinity observations from surface and subsurface; the treatment centering on a portrayal of the distribution and correlation of these two physical characteristics and their dependent variables in vertical and horizontal planes. A few oxygen observations have also been made in order to examine the vertical motion in the deeper water of the Labrador Sea.

The prevailing circulation, as indicated by the dynamic topographic maps, the velocity profiles, and the velocities of the currents have been computed in accordance with generally accepted methods of present-day dynamic oceanography. Calculations of the volumes of the discharge, the cooling and warming effect of given water masses, and other influences have been recorded. The repetition of observations in many places, moreover, during a series of months and a series of years, affords opportunity to discuss variations and cycles. In this respect the Grand Banks region has been investigated in more detail than has the area north of Newfoundland, but even from the Grand Banks there are insufficient observations to describe accurately the annual cycle.

The three collaborators have been at one time or another associated with, or in active charge of, the scientific work which the United States Coast Guard has maintained in connection with the International Ice Observation and Ice Patrol.[2]

Acknowledgments

The Commandant of the United States Coast Guard, as chairman of the International Ice Patrol Board, as well as the other members, has through an appreciation of the scientific aspects of the ice-patrol work, afforded us the time to prepare this bulletin.

The appearance of the report is largely due to the efforts of Prof. Henry B. Bigelow, director, Woods Hole Oceanographic Institution. We wish to take this opportunity to acknowledge particularly Dr.

[1] Contribution No. 107 of the Woods Hole Oceanographic Institution.

[2] Those interested in a description of the methods employed to protect trans-Atlantic shipping from the ice menace are referred to Smith (1931).

Bigelow's interest in behalf of our work and also his unfailing counsel and advice. Commander Eigil Riis-Carstensen, Royal Danish Navy, leader of the *Godthaab* expedition 1928, has extended a helpful spirit of cooperation in order that a clear exposition of the physical oceanography of the Labrador Sea be attained. Officials of the Institut für Meereskunde have generously permitted us to make use of the results of the wintertime observations of the *Meteor* in the Irminger and Labrador Seas.

Acknowledgments are also made to Mr. C. O'D. Iselin for reading parts of the manuscript; to Dr. W. L. G. Joerg for advice and counsel on bulletin, part 3, of this series; and to members of the United States Coast Guard who have assisted with the actual work of preparing the paper. Institutions which have cooperated include the Woods Hole Oceanographic Institution; the American Geographic Society; the Institut für Meereskunde; and the Geophysical Institute, Bergen, Norway.

Chapter I

THE NORTHWESTERN NORTH ATLANTIC

DEFINITION AND GENERAL DESCRIPTION

The northwestern North Atlantic, as it is discussed here, is that portion of the western Atlantic Ocean embraced by the normal drift of Arctic ice; and, so defined, includes the waters around and on the Grand Banks, and northward, between North America and Greenland to the seventieth parallel of latitude. Observations in the areas closer to the sources of Arctic ice have not been undertaken by the Coast Guard. Information, therefore, on the oceanography of Baffin Bay and other tributaries as they affect our own investigations, has been drawn from previously published works.

The bathymetric features of the northwestern North Atlantic are shown on the frontispiece (fig. 1). The depth contours have been drawn from information contained on various navigational charts and from several other sources, such as Ricketts and Trask (1932); Defant (1931); Stocks and Wüst (1935), and Soule (1936).

Northwestward from the Newfoundland Basin to the sixty-third parallel the bottom rises gradually (more than 2,000 meters below the surface) to form, between Greenland and Labrador, the Labrador Basin. Continuing northward the basin grades upward more abruptly to depths slightly less than 700 meters in the region of Davis Strait Ridge where the slope is reversed, the bottom receding to form the Baffin Bay Basin with depths greater than 2,000 meters.

The sides of the Labrador Basin present an interesting contrast. Along the Greenland slope the basin rises steeply to a narrow continental shelf, while on the Labrador side a well-defined continental edge and wide coastal margin prevails.

Greenland's shelf from a narrow continental ledge along its southwestern coast broadens to the latitude of Davis Strait, where in places the 400-meter contour lies 80 miles offshore. This formation (Nielsen, 1928) is divided into three principal shoals, south to north—Fylla, Little Hellefiske, and Great Hellefiske Banks. The entrance to Baffin Bay places the deepest part of the channel through Davis Strait nearer the Baffin Land than the Greenland shore. The American shelf as bounded by the 400-meter contour broadens from a width of 70 miles off northern Labrador to a width of 180 miles off Newfoundland and thence southward, as the Grand Banks and Flemish Cap, it becomes one of the broadest of continental shelves.

The northeasterly extension of the 2,000-meter isobath (see frontispiece) between the Greenland slope and Reykjanes Ridge creates an eastern appendage and a heart-shaped form to the Labrador Basin. This eastern arm falls necessarily without the limits of our station observations, and is, therefore, referred to only as its waters (the Irminger Sea) affect our own regions under investigation.

The waters of the northwestern arm of the Labrador Basin usually referred to as Davis Strait, has often raised a doubt as to the extent of this body of water. Some maps, for example, print the legend Davis Strait from the southern entrance of Baffin Bay to a line from Cape Farewell to Newfoundland. The majority of cartographers, however, on recent maps, confine the name to the waters on the submarine ridge between Greenland and Baffin Land. The United States Geographic Board is also of the opinion that, strictly speaking, the waters of Davis Strait refer only to the narrowest part of the above waterway. If this definition be observed, and such appears to be best practice, there remains a relatively large sea expanse, bounded on the northeast by Greenland and on the southwest by Labrador and Newfoundland, for which no name prevails. The suggestion that this body of water be called the Labrador Sea appears both logical and of good precedent, and so this usage has been followed throughout the present paper.

Nearby waters to which occasional references are made include: Irminger Sea, Denmark Strait, and Greenland Sea. The prevailing circulation of the waters also requires frequent reference to the Irminger Current, East Greenland Current, West Greenland Current, Baffin Land Current, Labrador Current, Gulf Stream, and Atlantic Current. The fanning out of the Gulf Stream on reaching the longitude of the Grand Banks has necessitated another designation for the flow east of the fiftieth meridian—Atlantic Current.

Knowledge regarding the submarine configuration of the northwestern North Atlantic in its deepest parts, especially where it connects through the Labrador and Newfoundland Basins with the North American Basin, helps to explain broad questions of deep-water and bottom-water circulation. As a result of the echo soundings obtained by the *Meteor*, 1929–33, it was found that Reykjanes Ridge (Defant, 1931) extends much farther to the southwest of Iceland than had previously been believed. The configuration, as shown by the trend of the 4,000-meter isobath in the lower right-hand side of the frontispiece, suggests a topographic connection between Reykjanes Ridge and Flemish Cap. Wüst (1935), for one, was of the opinion that the deep water of the Labrador Basin was partially barred from the Newfoundland Basin and the North American Basin by a Newfoundland Ridge (i. e., a connection between the Reykjanes Ridge and Flemish Cap) at a depth of about 3,600 meters.[3] The *Meteor*, however, which in February and March 1935 ran a line of soundings from Cape Farewell southward to the fiftieth parallel as stated in a preliminary report by Dr. Böhnecke dated April 8, 1935, found only one isolated sounding of about 3,800 meters near the position of the suspected ridge.

In the summer of 1935 Soule (1936) on the United States Coast Guard cutter *General Greene* collected a total of 2,036 sonic soundings from the Labrador Basin and in the region of the Newfoundland Ridge hypothesized by Wüst (1933). A bathymetric map based upon all available soundings has been published by Soule (1936) and

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[3] His assumption of a Newfoundland Ridge was based on a difference in temperature of the bottom water as shown by the two following observations: British ship *Cambria*, latitude 51°34′ N., longitude 41°43′30″ W., depth 4,234 meters; t_s 1.83° C., t_p 1.46° C.; and an unnamed ship, from the records of the British Admiralty, latitude 49°49′ N., longitude 38°00′ W.; depth 4,005 meters; t_s 2.22° C., t_p 1.85° C., (where t_s is the temperature in situ and t_p is the potential temperature).

the important contours from this map in the questionable region have been incorporated in our frontispiece. As a result of the *General Greene's* survey it now can be definitely stated that there is no Newfoundland Ridge in the vicinity of the fiftieth parallel, but Reykjanes Ridge and Flemish Cap are separated by a tortuous channel deeper than 4,500 meters. This depression which lies closer to the American side of the Labrador Sea than the Greenland side can be followed with decreasing depths in a northwesterly direction for a considerable distance. Although there is no bar to the deeper circulation of the Labrador Sea, as formerly suspected, the winding and narrow features of the entering channel, however, may considerably restrict the freer movement of the bottom water and partially explain the temperature gradient recorded in footnote 3 (p. 2).

Secondary bathymetric features which have an important bearing on some of the subjects under discussion, and to which brief attention should be called, include a trough-like embayment across the American slope in the latitude of Hudson Strait, the 600-meter contour penetrating to within a few miles of Resolution Island. Another topographic feature is an elliptical depression about 60 miles long by 15 miles wide, its deepest parts more than 200 meters below the surrounding shoal, in latitude 56 N., longitude 59 W. (See frontispiece.) A larger and more irregularly shaped depression, but not so deep a scarp, is found farther south, about 120 miles northeast of Newfoundland. The Grand Banks, as bounded by the 100-meter contour, are separated from St. Pierre Bank, Green Bank, and Newfoundland by an equal number of channels, the one between Cape Race and the Grand Banks cutting to a depth of 100 meters below the main block of the Banks themselves. In practically every one of the seven sections across the Labrador shelf (figs. 50 and 51) the presence of a longitudinal depression is indicated.

HISTORY OF OCEANOGRAPHIC EXPLORATION

The northwestern North Atlantic witnessed the voyages of the Norse Vikings colonizing Greenland and reaching North American (Vinland) shores as early as 1000 A. D. Existing written accounts of the sea in the northwestern North Atlantic date from 1266, when a Norse expedition sailed northward in west Greenland waters to the region of Smith Sound. The first recorded crossing of the Labrador Sea was made by Martin Frobisher in 1576.

Surface temperature data from the northwestern North Atlantic, as material incidental to exploration, fisheries, and trade, together with accounts of ice, were made the subject of an oceanographic paper by Petermann (1867). He found evidence of a warm current from the Atlantic that reached even the headwaters of Baffin Bay.

In 1872 Bessels, a scientist on board the *Polaris* of the United States North Polar Expedition, recorded the first sub-surface temperatures in the northwestern North Atlantic. Bessels' (1876) observations from depths of several meters in Kane Basin, north of Baffin Bay, refuted the popular theory of Petermann of a warm Atlantic current.

In 1875 Moss, staff surgeon with Nares on H. M. S. *Alert* of the British North Polar Expedition, carried out a program of temperature observations at winter quarters and later in the nearby region of Smith Sound. Also in August of the same year H. M. S. *Valorous* returning home from Disko Island, Greenland, occupied three stations in the Labrador Sea, at which serial temperatures were secured, surface to bottom. Carpenter (1887) found evidence of the following: (*a*) A superheated surface layer in the Labrador Sea moving in a northward direction; (*b*) a neutral intermediate layer 1,000 fathoms in thickness; and (*c*) a cold bottom water of northern origin. Carpenter's bottom temperatures of 1.44° C., and 1.11° C., are approximately a degree too low, which, no doubt overemphasized his views of an Arctic influence.

Baron Nordenskiold's expedition in the *Sofia* to Greenland in the summer of 1883 afforded Dr. Axel Hamberg (1884) opportunity to take a series of oceanographic stations along the west coast of Greenland as far north as Cape York. Miller-Casella and Negretti and Zambra thermometers recorded temperatures in tenths. Hamberg reported the presence of a north flowing current off west Greenland and also pointed out that the Baffin Bay water column is divided into three strata—a surface layer of polar water; a middepth warm stratum; and, beneath, water with minimum temperature. Hamburg's survey, both from the accuracy of measurements and scope, was the most important oceanographic investigation of the northwestern North Atlantic up to that time.

In the summers of 1884, 1886, and 1889 Lt. C. F. Wandel (later Admiral) of the Royal Danish Navy, commanding the *Fylla*, carried out in connection with fisheries investigations in west Greenland waters a hydrographical survey. Six sections, extending out across the shelf distances of 30–75 miles, were made along a front from Godthaab to just north of Disko Island. A résumé of the *Fylla's* survey indicated (*a*) the Labrador current flowing southward contributes Arctic water to the Labrador Sea; (*b*) the East Greenland Current mixes with a current from the Atlantic along the west coast of Greenland and gives off branches into the Labrador Sea; (*c*) the West Greenland Current continues northward as far as the observations extended. In the light of subsequent investigations Wandel's description of Arctic and Atlantic water entering the Labrador Sea along the southwest coast of Greenland are surprisingly true to prevailing fact.

The Danish naval schooner *Ingolf*, during an oceanographic expedition in command of Captain Wandel (later Admiral) of the *Fylla*, reportedly visited the region of Davis Strait June 26 to July 26, 1895. Dr. Martin Knudsen, in charge of the hydrographic work, took a total of 15 stations of serial temperatures and salinities. Knudsen found (*a*) the warm subsurface water mass in the Labrador Sea is brought there by an extension of the Irminger Current which curves northward around Cape Farewell; (*b*) the subsurface waters of the Labrador Sea are colder than those of the same latitude in the Denmark Sea because of the chilling effect of the Labrador Current. Knudsen's observations of temperatures and salinities were much more accurate than previous records, but the temperatures from below 2,000 meters are in most cases about a degree too low, a fact which has been noted by Helland-Hansen (1930). The salinity of the water of the Labrador Sea below 3,000 meters averages close to 34.92‰ whereas Knudsen at stations 38 and 37 obtained 34.60 and 34.63‰, respectively. At Knudsen's station no. 22, however, in the bottom water southwest of Cape Farewell, 34.96‰ appears fairly accurate.

Based upon ships' log book records filed at the Deutsche Seewarte, Schott (1897) published an exposition of the waters of the Grand Banks and surroundings. In spite of the fact that the basic data were necessarily confined to observations that could be made from passing ships, Schott's paper is noteworthy, as it marks the beginning of oceanographic literature on this particularly interesting area.

During the summers of 1908 and 1909 the Greenland Trading Co.'s brig *Tjalfe* carried out fishery and hydrograpical work in west Greenland waters between the sixty-third and seventy-first parallels of latitude. The results of the physical observations, considered with data from other sources, have been reported by the *Tjalfe's* hydrographer, Dr. J. N. Nielsen (1928). This is the most detailed and complete oceanographic paper yet published on the northwestern North Atlantic. The following conclusions are put forward. (*a*) The Labrador and Denmark Seas, in mid-depths, are essentially of the same physical character; (*b*) the West Greenland Current, with a velocity of approximately 8 miles per day, leaves the coast in the latitude of Godthaab to join the Labrador Current; (*c*) the tidal flood current increases the velocity of the West Greenland Current, the ebb decreases the same; (*d*) the velocity of the surface currents around Greenland are greatly affected by the winds; (*e*) the extension of the East Greenland Current undergoes seasonal variation and along the southwest coast of Greenland disappears during autumn; (*f*) the effects of winter chilling of the surface layers of the Labrador Sea probably extends all the way to bottom, producing there the greater part of the bottom water of the North Atlantic; (*g*) the eastern part of Baffin Bay, beneath the surface, is filled with warm water that has come across Davis Strait Ridge from the Atlantic and this layer is thickest where it is pressed, by earth rotation, against the Greenland slope; (*h*) the surface layers of Davis Strait are negative in temperature throughout the year, and the warm water underneath can have no direct effect, therefore, to melt the ice which is superficial in draft. Our own observations in 1928 and subsequent years support with specific evidence many of the early conclusions and theories advanced as above by Nielsen.

In 1910 the waters of the northwestern North Atlantic in their southern and eastern sectors were explored by the *Michael Sars* North Atlantic Deep-Sea Expedition. Prof. B. Helland-Hansen (1930) was in charge of the physical work. The *Michael Sars* approached northward toward the Grand Banks running a line of stations near the fiftieth meridian toward St. John's, Newfoundland, and thence eastward in that latitude across the Atlantic. Serial observations of temperature and salinity taken surface to 3,000 meters portray in both sections the abrupt transitions that prevail along the North American slope. The large scale maps, as Helland-Hansen points out, will require many corrections as more and more detailed observations are compiled. This in fact has been proved as will be shown by our own contributions herein. One of the most important questions dealt with by Helland-Hansen is the source of supply of the North Atlantic bottom water. Helland-Hansen believes Arctic contributions are indicated in what few observations there are recorded from the deeper parts of the northwestern North Atlantic.

In 1913 the Grand Banks and Atlantic waters adjacent to Newfoundland received their first systematic study. Dr. D. J. Matthews (1914), on the steamship *Scotia*, carried out these investigations in connection with a service providing better protection for trans-Atlantic steamers against the menace of Arctic ice. Some of the main results of Matthew's summary are (*a*) the Labrador Current has salinities on the surface between 32.5 and 33.5‰ which increase with depth, while a temperature minimum as low as $-1.8°$ C., is to be found at depths of 50–75 meters; (*b*) the Labrador Current splits into three parts on the northern edge of the Grand Banks; (1) the westerly branch flows around Cape Race; (2) the middle and most important arm follows the eastern edge of the Grand Banks, probably diving under the Gulf Stream; and (3) the eastern arm flows eastward to the north of Flemish Cap; (*c*) the Grand Banks is dominated by no single definite current, the general tendency of the circulation appearing to be that of a great eddy with a slow southeastward drift; and finally (*d*) the velocities of the Labrador Current are as a rule relatively weak.

April 14, 1914, the United States Coast Guard in conjunction with its International Ice Observation and Ice Patrol service, inaugurated subsurface observations of temperature and salinity in the Grand Banks sector. The program except for the World War years, 1917 and 1918, has been continuous and gradually amplified.

The observations prior to 1922 were taken at unrelated positions and often separated by considerable intervals of time. During the ice season of 1922, and subsequently, the stations for observations have been located, for the most part, along lines normal to the Grand Banks slopes and as synoptic as the duties of the ice patrol ship permitted. The current maps constructed by means of these observations were found to be of such practical value both in following the movement of the icebergs and in providing a higher degree of protection for the transatlantic steamships (see Smith 1931, p. 175) that in 1931 the ice patrol cutter was relieved of the task of collecting subsurface observations by the addition of a third vessel to the service. Under the present program the oceanographic vessel occupies between 100 and 200 stations for observations during the normal ice season which constitute the data for three or four maps of the circulation around the Grand Banks. The selection of the particular sea area surveyed depends mostly upon the distribution of the icebergs at the time, but it usually embraces the slope waters and ranges in latitude from the vicinity of Flemish Cap to the Tail of the Grand Banks or even as far south as the fortieth parallel. The size of the area mapped and the extent of the deepest observation depends upon the urgency of the information; prior to 1931 the oceanographic work was much curtailed below what it is now on account of the necessary scouting duties of the ice patrol cutter itself. Since the assignment of an oceanographic vessel observations have been made to 1,000 meters depth and every second or third station in the deeper water is extended to 1,500 meters.

At the expiration of the 1935 ice season, Soule (1936), on the United States Coast Guard cutter *General Greene* (the oceanographic vessel of the International Ice Patrol), made a cruise to the southern part of the Labrador Sea and eastward as far as the fortieth meridian. Temperatures and salinities surface to bottom were collected from a large number of stations, and also oxygen determinations from a few, thus filling in a "blind spot" in the northwestern North Atlantic from the *Marion* expedition's survey on the west to the *Meteor's* on the east.

The station table data and scientific results of the above International Ice Patrol oceanographic work have all been published in the series of annual reports of the International Ice Patrol. (See Coast Guard bulletins 1–26.)

In 1914–15 Dr. Johan Hjort, in charge of a Canadian fisheries expedition, made a careful and methodical study of the shelf waters of Nova Scotia and Newfoundland. Sandstrom and Bjerkan (1916) have reported on the dynamics and physical character of the water. There are only a few features of direct importance to the present discussion.

In 1916 from July to November Dr. Thorild Wulff in charge of the hydrographical work of the II Thule Expedition took a total of 27 stations along the west Greenland slope from Disko Island to Wolstenholme Fjord in Smith Sound. The table data have been published in a short report by Martin Knudsen (1923).

For a number of years, especially since 1924, the French Government has carried out extensive studies in connection with the fishery industry of the Grand Banks and west Greenland banks. Le Danois (1924) in an exposition of his theory of "transgressions", summarizes the results of French investigations of the Grand Banks. The general distribution of temperature and salinity as shown in the one profile, page 42, is similar to that which has been later obtained in nearby localities by the Ice Patrol. Doubt has previously been raised, however, regarding Le Danois' temperature values of $-2°$ to $-4°$ C. obtained between Green and St. Pierre Banks. Subsequent observations both by ourselves and others indicate this to be an error; the lowest temperature reading ever obtained by the Ice Patrol in the coldest of the Arctic water being $-1.8°$ C.

Captain L. Beaugé of the French Naval Reserve, in command of the French hospital ships *Jeanne d'Arc* and *Ville d'Ys* has carried on the work of Le Danois and reported in a number of the issues of les Revues des Travaux' (Beaugé 1928 to 1933 inclusive) the results of as many annual investigations on the hydrology of the Grand Banks. The undulations in the boundary of "cod water" (3.5° C. and 33‰), caused by Atlantic intrusions over the southwest slope of the Grand Banks, are continually referred to, traced, and emphasized by Beaugé. Le Danois' theory of oceanic transgressions across continental slopes is applied and described as found annually for the Grand Banks region. So practicable may it be, Beaugé recommends the use of subsurface thermometers to fishermen so that they may locate the best places in which to fish.

These papers contain many interesting remarks on other Grand Banks hydrological features. For example an increase in the Arctic character of the bottom water, paradoxically, is attributed to a deficiency of Arctic water south of Newfoundland. The density wall, normally offshore in deep water, in this scheme is held to migrate in on to the bank itself, where cabbeling is free to supply an abnormal quantity of cold water directly to the bottom. An intensified Labrador Current, on the other hand, bars cabbeling and makes for unusually warm water and poor fishing on the Grand Banks. The Ice Patrol's observations, taken in spring and early summer and our own interpretations of the hydrology, differ materially from those of Beaugé's as will be discussed in subsequent pages. In this connection we have been unable to find station table data in concise and complete form accompanying Beaugé's text and figures. This makes comparisons much more difficult. In each of the summers of 1929, 1930, 1931, and 1932, Beaugé's Grand Banks studies were supplemented with a cruise to the west Greenland banks. Sections through the Labrador Sea have been made from the Strait of Belle Isle to the offing of Godthaab and to a depth of 300 meters. A comparison between 1929 and 1931 (the only 2 years for which both temperature and salinity profiles are shown) indicates that in 1931 a decrease in the Arctic water had taken place while Atlantic water >35‰ had appeared in surprising volume. These observations regarding the volume and salinity of Atlantic water do not agree with our own taken at about the same time and place across the Labrador Sea by the *General Greene*. The subject will be discussed further in the appropriate section.

In 1924 the Norwegian Government vessel *Michael Sars*, conducting a scientific study of whale population and fishing in the North Atlantic, carried out hydrographical investigations in Davis Strait. Martens (1929) reported the results of the observations made at 75 stations, about half of which were taken in west Greenland and Davis Strait waters. Martens concludes from a study of the sections between Iceland and Greenland and that across Davis Strait (*a*) Atlantic water of 6° C and >35‰ was a branch of the Irminger Current which flowed around Cape Farewell and into Davis Strait as far northward as the ridge and (*b*) an under current of warm water, 200 to 500 meters deep, flowed northward across Davis Strait Ridge, while above 200 meters cold water flowed in the opposite direction.

In June and July 1925 the Danish fisheries vessel *Dana*, carried out hydrographical investigations between Iceland and Greenland and also along the west coast of Greenland. Baggesgaard-Rasmussen and Jacobsen (1930) reported (*a*) the presence along the west coast of Greenland at 50 meters depth of water of −0.24° C. and 33.42‰ which was believed to be a mixture of east Greenland and Davis Strait waters; (*b*) farther north in west Greenland in latitude 65° to 68°30′, a temperature of −0.7° C. and 34.12‰, at 100 meters, indicated a mixture involving water from Baffin Bay; (*c*) the outer stations, 50–75 miles off the coast of west Greenland, with temperatures of 4° C and salinity 34.95‰, indicated the influence of the Irminger Current.

In July and August 1926 the auxiliary schooner yacht *Chance* carried out a brief but important oceanographic reconnaissance of the practically unknown subsurface waters of Labrador. Iselin (1930), leader of the expedition, has published an exposition based not only on the *Chance's* two sections across the Labrador shelf but including both a consideration of the *Michael Sars* section across Davis Strait and one taken northeast of Newfoundland by the *Scotia* in 1913. Some of Iselin's findings are (*a*) the Labrador Current is narrower than popularly supposed and is confined mostly to the continental edge; (*b*) an abrupt change from water of −1.5° C. and 33.5‰ to 4° C. and 34.5‰ occurred at the outer edge of the Labrador Current; (*c*) the margin of the Labrador Sea, where entered, had little indicated movement; (*d*) the slope current, fairly constant in character and volume, averaged 10 miles per day; (*e*) the Labrador Current, beneath the surface and throughout its length, remains surprisingly constant in temperature.

The supposed position and general characteristics of the Labrador Current and several other tentative opinions of Iselin, based on the two sections, have been borne out in several instances by our more detailed observations.

The same year of the *Marion* expedition, 1928, the Danish Government steam barkentine *Godthaab* carried out an oceanographic survey of Baffin Bay as well as the Labrador Sea. Commander Eigil Riis-Carstensen (1931) of the Royal Danish Navy, leader of the expedition, has written the narrative account, and the Conseil Permanent International (1929) carried the table data of stations, temperatures, and salinities. The hydrographical report of this expedition, the only thorough and systematic study of Baffin Bay, has not yet been published. The *Godthaab* and *Marion* expeditions prior to departure, and while cruising in the northwestern North Atlantic, were frequently in communication with each other regarding cooperation of their programs. The same good spirit of cooperation has been extended by the commander of the *Godthaab* expedition, for the purposes of interpreting our own results and questions which depend on factors in adjoining areas and he has given generous permission to use the station data contained in Bulletin Hydrographique (1929).

The summer of 1928 witnessed the entrance of still another oceanographic expedition, that of the nonmagnetic vessel *Carnegie* of the Department of Terrestrial Magnetism of the Carnegie Institution of Washington, D. C. This expedition took five stations en route across the northwestern North Atlantic. Like the *Godthaab's* the report of this survey has not yet been published, but reference to the station table data has been made through the permission of the director of the Department of Terrestrial Magnetism, Washington, D. C. The only station comparable with those of the *Marion*, *Carnegie's* station no. 12, is in good agreement with those nearby of the *Marion*.

During the summers of 1928 to 1930, inclusive, and in February, March, and the summer of 1933, the German research vessel *Meteor* carried out oceanographic work in the Denmark Sea as far as 500 miles southeast of Cape Farewell. Böhnecke (1930, 1931), Defant (1931, 1933), and Schulz (1934), have given preliminary accounts of surface water conditions and other hydrographical features. No report on the results of the February-March 1933 investigations has yet appeared. Böhnecke (1931) has also employed the *T–S* correlation to interpret other parts of the data. Some of the important findings have been (*a*) the Reykjanes Ridge, as bounded by the 2,000 meter isobath, extends farther southwest of Iceland than heretofore supposed (approximately 900 miles); (*b*) Atlantic water (the Irminger Current) extended closer toward Cape Farewell and in greater volume in 1928 than in 1930; (*c*) the Arctic water apparently was subject to greater variations during these years than was Atlantic water; (*d*) Arctic and Atlantic water mix along the outer edge of the East Greenland Current called the polar front; (*e*) sub-Arctic waters composed of Atlantic mixed water, mixed water from the polar front, and water from the Labrador Current all mix with Atlantic water along the fifty-first parallel of latitude in a so-called secondary polar front; (*d*) surface temperatures, salinities, and deduced circulation in the region appear to agree with the early hypotheses of Nansen.

The Newfoundland Fishery Research Laboratory located at Bay Bulls, Newfoundland, Harold Thompson, director, made two annual cruises with its research vessel during the period 1931 to 1935. The survey embraced the coastal waters from Hamilton Inlet southward to the Laurentian Channel including the off-lying Grand Banks to the continental edge. The oceanographic work consisted of temperatures and salinities collected surface to depths of 500 meters and the release of drift bottles. A record has thus been kept of the variation in Arctic water over the area during the period. (This information is contained in Newfoundland Fishery Research Laboratory, Annual Reports, 1931 to 1934.)

The new British hydrographical ship *Challenger* in 1932 took three hydrographical sections in the northwestern North Atlantic from surface to bottom. One was taken from the tail of the Grand Banks to St. John's, Newfoundland, another from St. John's eastward along the fiftieth parallel, and the third near Cape Harrigan and normal to the Labrador coast from shore into deep water. *Challenger* station number 8, northwest of Flemish Cap, latitude 49°51′, longitude 42°09′, with temperatures >10° C. and salinities >35‰ at depths down to 385 meters, is of special interest to us.

In September 1935 the *Atlantis*, oceanographic ketch of the Woods Hole Oceanographic Institution, ran two sections south from the Tail (8 stations) to about the fortieth parallel and another section (8 stations) along the fortieth meridian from latitude 40° to 50° N. Temperatures and salinities were secured from the surface to bottom. The physical results are referred to by Iselin (1936).

February and March 1935 witnessed another cruise of the German research vessel *Meteor* to the waters southwest of Iceland, the expedition being of unusual interest since it collected wintertime observations in a practically unknown region south of Cape Farewell long suspected of contributing at this time of year to the supply of bottom water of the North Atlantic. No published report of the scientific results has yet appeared, but through the courtesy of the director of the Institut für Meereskunde a copy of the temperature and salinity data has been placed at our disposal and is later discussed as it bears upon our data taken during summer only.

The Danish Meteorological Institute in its annual publication, the State of the Ice in Arctic Seas (Publikationer fra Det Danske Meteorlogiske Institut 1926), has published a series of 12 monthly mean surface temperature maps which embrace part of the northwestern North Atlantic region. Although there are no observations available from the surface or subsurface west and northwest of Cape Farewell from January to March, isothermal maps are presented. It is presumed that they are based upon the indications and trend of the nine monthly maps for which there are observations. The

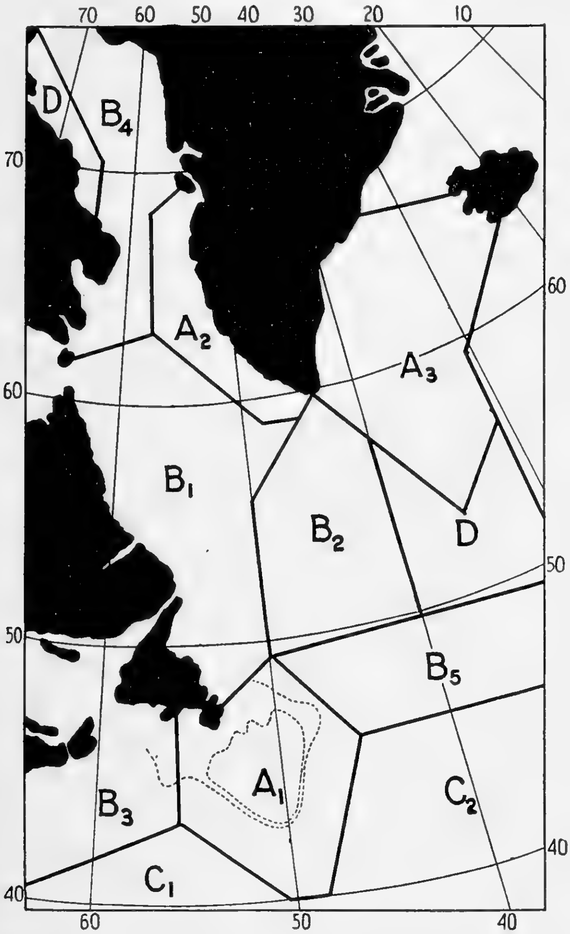

FIGURE 2.—The extent of oceanographic exploration of the northwestern North Atlantic. Areas A_1, A_2, and A_3, in order, have been more thoroughly explored than areas B_1 to B_5, or than areas C_1 to C_2, in similar order. Areas marked "D" have had little or no subsurface investigation. For oceanographic vessels and dates of surveys in the above areas see text (p. 12).

results so obtained are, of course, questionable, especially in view of the *Meteor's* March 1935 observations south of Cape Farewell. The *Meteor's* station surface temperatures, except for one station located in East Greenland Arctic water near Cape Farewell, are higher than those indicated by the surface isothermal maps published by the Danish Meteorological Institute (1926).

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It can be seen from the foregoing history that the waters of the northwestern North Atlantic can be divided with reference to the degree of their exploration. A list of the research vessels with the dates during which they have made physical oceanographic surveys in the areas shown on figures 2 is as follows:

A_1. *Michael Sars*, 1910; *Scotia*, 1913; United States Coast Guard (International Ice Patrol), 1914–35; French hospital ship, 1929–34; *Cape Aguhlas*, 1931–33; Canadian Fisheries, 1914–15; *Carnegie*, 1928; *Challenger*, 1932; *Atlantis*, 1935.

A_2. *Sofia*, 1883; *Fylla*, 1884–89; *Ingolf*, 1895, 1934; *Tjalfe*, 1908–9; *Michael Sars*, 1924; *Dana*, 1925; *Godthaab*, 1928; *Marion*, 1928; *General Greene*, 1931, 1933, 1934; French hospital ship, 1929–30–31–34.

A_3. *Sofia*, 1883; *Ingolf*, 1895; *Tjalfe*, 1908–9; *Dana*, 1925; *Meteor*, 1929–33–35; *Carnegie*, 1928; *Polaris*, 1932.

B_1. *Ingolf*, 1895; *Chance*, 1926; *Scotia*, 1913; *Godthaab*, 1928; *Carnegie*, 1928; French hospital ship, 1929–31–34; *Marion*, 1928; *General Greene*, 1931–33–34–35; *Challenger*, 1932.

B_2. *Meteor*, 1935; *General Greene*, 1935.

B_3. Canadian Fisheries, 1914–15; United States Coast Guard (International Ice Patrol), 1921–23.

B_4. *Sofia*, 1883; *Michael Sars*, 1924; *Gadthaab*, 1928; *Marion*, 1928.

B_5. *Atlantis*, 1931; *Michael Sars*, 1910; *Challenger*, 1932; *Scotia*, 1913.

C_1. *Atlantis*, 1932.

C_2. *Atlantis*, 1931, 1935; *Challenger*, 1932.

D. *Challenger*, 1932.

It should be added there is no sector from which there are today sufficient subsurface observations to give accurately the prevailing annual cycle.

Chapter II

INSTRUMENTS AND METHODS

A report of some of the oceanographic apparatus of the Marion Expedition 1928 is contained in the narrative of the cruise. (See Ricketts and Trask, 1932.

The subsurface temperatures were taken with deep-sea thermometers belonging to the International Ice Patrol and manufactured by Negretti & Zambra, Schmidt & Vossberg, and Richter & Wiese. Most of the instruments were of the Negretti & Zambra make with no auxiliary thermometer and graduated into two-tenths of a degree centigrade. The remainder of the supply were fitted with auxiliary thermometers, their main stems graduated in one-tenth of a degree centigrade. There were a sufficient number of these latter to pair with the former in each water bottle. Test certificates were available for all thermometers, and readings were corrected to the nearest one one-hundredth of a degree centigrade from prepared correction graphs in the usual manner.

The surface temperatures were taken with a dip bucket and a thermometer of known calibration, graduated into tenths of a degree centigrade. The corrected temperatures are so shown in the station tables.

As a result of the above-described methods, the record of temperatures contained in the 1928 station tables are considered accurate to within 0.03° C. An exception is to be noted, however, in the case of station 1016, the only deep-water station taken north of the Davis Strait Ridge. Proceeding downward at station 1016 the temperature dropped to a minimum at 60 meters and then immediately rose to a negative fraction which prevailed to bottom. Such a vertical distribution of temperature does not agree with that at several nearby stations taken by the Danish ship *Godthaab* (Conseil Permanent International, 1929) prior and subsequent to the date of station 1016. Nor do the *Marion's* temperatures agree with those of the typical summer-time column in Baffin Bay which is characterized by a positive temperatured mid-depth layer. The constant increase of salinity with depth at station 1016, on the other hand, precluded the most probable interpretation, that the water bottles may have tripped before reaching the recorded depths. A comparison between the temperatures at *Marion* station 1016 and *Michael Sars* station 46 and *Godthaab* stations 162 and 163 has permitted corrections to be made to some of those of station 1016, and, so qualified, they have been allowed to enter the dynamic calculations.

Water samples were stoppered in newly rubber-gasketed citrate bottles and all salinities were determined by means of electric conductivity. The two salinometers on board the *Marion* were constructed and calibrated at the United States Bureau of Standards, Washington, D. C., a description of the instruments having been published by Wenner, Smith, and Soule (1930). The adjustment of the variables were checked at least every 4 days, and often once or twice daily by means of two or more tests with water of known salinity. Frequent duplicate determinations of the salinity of samples was performed where there was any reason to doubt the reliability of any determination; also duplicate determinations were made of nearly every sample from depths greater than 1,200 meters. The precision of the salinity values, therefore, shown in the 1928 tables is believed to be equal to 0.02‰.

In addition to the temperature and salinity observations approximately 50 samples of the bottom from the shelves and slopes of the Labrador Basin were secured by means of a home-made sampler. A report of the scientific findings regarding the bottom collections has been published by Ricketts & Trask (1932).

The *Marion* was equipped with a fathometer, manufactured by the Submarine Signal Corporation, Boston, Mass., with which soundings were made at half-hour intervals and sometimes oftener. A description of the instrument and the methods employed in the bathymetrical survey have also been reported by Ricketts & Trask (1932).

The Greene-Bigelow water bottles gave us continual trouble and their unreliability necessitated unceasing vigilance to guard against errors entering the observations. The *Marion* received these instruments immediately on the expiration of Ice Patrol, where for the previous 3 months they had received hard usage. No time was available to give them the much-needed attention of a machine shop. The material, moreover, from which the bottles had been manufactured was entirely too soft and malleable to withstand the shocks and handling incident to field work. Despite continual repairs on board the bottles occasionally would fail to close after releasing the messengers or would sometimes, during rough seas and lively motion of the ship, release a messenger prematurely, thus necessitating the entire retaking of the observations at a station.

It was our practice, however, by pressing against the suspended wire, to feel and count the messengers as each one of the series tripped its respective bottle. If these did not check with the total number of bottles, then those depths not so recorded were retaken. In order to guard more carefully against faulty operation of the water bottles it was routine procedure for those responsible for the station observations to construct a temperature curve of the thermometer readings on cross-section paper before the ship was permitted to depart from the spot. If the temperature curve was found to contain any marked irregularities, those observations considered suspicious were immediately retaken and rechecked.

No unprotected thermometers were included in the 1928 equipment, and because of this fact particular attention at stations was given to the elimination, as much as possible, of the wire angle. It was found possible to maintain a nearly vertical wire with the *Marion* even during a gale of wind by a kick ahead, first on one motor and then on the other, as she fell off either side of "the eye" of the wind. The fact that the *Marion* possessed twin screws made this possible and reduced this source of error to a minimum.

The customary practice of spacing the water bottles on the wire was followed, viz, bottles were placed at shorter intervals, directly proportional to the depth of the most rapid change in the temperature and the salinity. The maximum depth of observation for the deeper stations was 3,100 meters, with 11 stations 2,000 meters or more, and 61 stations between 1,200 and 2,000 meters.

The thermometers on board the *General Greene* for the 1931 expedition totaled 25 as follows: 2 Richter & Wiese and 4 Negretti & Zambra with scales graduated into two-tenths of a degree centigrade. The remainder were of an older type divided into two-tenths of a degree and without auxiliary thermometers.

The Greene-Bigelow water bottles contained two thermometers each, old and new thermometers being paired together, the corrections for the instruments having auxiliaries being applied also to those without same. A comparison of all corrected temperatures showed a difference less than one one-hundredth of a degree centigrade in 34 percent of the observations. The average difference for all the temperature records was 0.03° C. The mean corrected temperatures of paired thermometers is shown in the 1931 station tables except where a difference greater than 0.04° C. occurred. In such cases only the corrected temperature from the thermometer equipped with the auxiliary has been printed.

The surface temperatures were obtained with thermometers having a scale divided into 0.1 of a degree centigrade, the length of 1 degree being 10 millimeters. The surface water was brought on deck by means of a metal dip bucket.

Salinities in 1931 were determined partly by means of the electric conductivity method on board or by means of titration. Faulty mechanical functioning of the electrical equipment necessitated recourse to titration of about 100 samples from stations 1220 to 1287 on board and titration of samples from stations 1288 to 1341 at the Woods Hole Oceanographic Institution on the return of the *General Greene*. Each sample was titrated twice, and if the difference in salinity exceeded 0.02‰ a third titration was made. Out of approximately 550 samples, stations 1220 to 1286, along the Labrador coast, 250 have been determined twice. At those stations where titrations have been made, the mean of the determinations by the salinometer and by titration, have been printed in the tables except where the difference exceeded 0.03‰, and in such cases titrated values only have been used.

There are about 300 salinities, stations 1220 to 1287, which have been determined by the salinometer only once, and it is, of course, impossible to tell the accuracy of these determinations. Salinity curves for each station, however, have been carefully constructed, and they do not show any marked irregularities in the deeper or higher strata, the salinities apparently agreeing very well with the checked values. The values of the salinities from stations 1254 and 1255 are higher by 0.10‰ to 0.15‰ than for stations 1253 and 1256. No extra samples unfortunately were retained from these stations. The salinities are obviously incorrect, and they have, accordingly, been stricken from the tables.

As in 1928 on the *Marion* the *General Greene* carried no unprotected thermometers in 1931. It was attempted, as far as possible, to eliminate the wire angle by maneuvering the vessel. There are only some few stations where the wire angle may have had any important influence on the observations. These stations are as follows:

Station no. 1293.—Estimated wire angle=15° (0–500 meters) and 25° (600–1,400 meters).

Station no. 1294.—Estimated wire angle=15° (0–500 meters) and 25° (800–1,600 meters).

Station no. 1312.—Estimated wire angle about 30°.

Station no. 1313.—Estimated wire angle about or more than 30°.

Station no. 1314.—About 15° (0–600 meters) and about 10° (800–2,000 meters).

Station no. 1326.—About 10°.

Station no. 1327.—About 10°.

Station no. 1328.—About 10°–15°.

The wire angle was taken into consideration for stations 1293, 1294, 1312, and 1313 and corrected in the sections of temperature, salinity, and velocity, and in the dynamic calculations for the current maps. This has been done simply by reducing the depths recorded by the meter wheel in proportion to the mean of the wire angles for the two first stations, and 30° for the two last-mentioned stations, the wire being considered as a straight line. Such a method is of course not accurate, but it seemed, by comparison between station curves, to give more reasonable values than the uncorrected observations. In the tables, however, for the four stations mentioned above, the values of temperature, salinity, density, and the result of the dynamic calculations are published for uncorrected depths, as measured by the meter wheels.

Approximately 1,800 soundings were taken on the 1931 cruise mostly by use of the fathometer. When on the continental shelves wire soundings were used to control the sonic ones.

A brief narrative of the *General Greene's* 1931 cruise is contained in United States Coast Guard Bulletin No. 21.

In 1933 Nansen water bottles and Richter & Wiese protected and unprotected reversing thermometers were used, all of the thermometers being equipped with auxiliary thermometers. Details of the methods employed in obaining and correcting observations are the same as for the 1933 season's work described by Soule (1934) (pp. 30–35). A series of timed trials indicated that the messengers descended at a rate of about 150 meters per minute. No bottles were reversed until at least 10 minutes after they were in place. Time taken for the messengers to travel from the surface to the first bottle was estimated using a speed of 200 meters per minute, and the time allowed after release of the messenger from the surface, before hauling in the bottles, was based on a messenger speed of 100 meters per minute.

The titration results gave abnormally high salinities, the values in some cases being as great as 35.30‰ with a small area southwest of Greenland having salinities of 35.20‰ or more from 200 to 2,000 meters. These values were so suspiciously high that several thorough attempts have been made to uncover some error. Copenhagen standard water of the batch P_{13} was used every day in the standardization of the silver nitrate solution, the reduction of the burette reading to salinities have been checked, the burette and pipette used have been examined, the potassium chromate solution used was checked by using it in other titrations, all with no explanation of the high salinities. The titrations were made within 24 hours after collection of the samples. The sample bottles were of the citrate of magnesia type and were well aged, having been used throughout the season and in most cases having been used the preceding season. In filling the sample bottles from Nansen bottles the sample bottle was half filled, shaken, emptied, and again half filled and emptied before filling with the sample. New rubber washers had been placed on all sample bottles just prior to the cruise. The main valves, air valve, and petcocks of the Nansen bottles were repeatedly inspected, and, as the temperatures are about normal, the Nansen bottles have reversed at the proper level. As the vertical temperature gradient in the laboratory is considerable and the samples are ordinarily stored on the deck, whereas the standard water is kept at a level about 3 feet above the deck, the thermal expansion effect was investigated by Mr. Alfred H. Woodcock of the Woods Hole Oceanographic Institution by experiment, standardizing the silver nitrate with Copenhagen water at room temperature and then measuring a refrigerated sample by titrating it several times as it warmed up to room temperature. As a result of this experiment it was concluded that the error due to this source was probably less than 0.05‰ in salinity and certainly less than 0.10‰.

A group of 42 samples, originally titrated immediately after collection in July 1933 and which had been brought back were then again titrated by Mr. Alfred H. Woodcock at Woods Hole in October. These results averaged 0.018‰ chlorine lower than the first results, 32 samples freshening, 9 samples being saltier, and 1 sample being the same. However, the samples were allowed to stand another 2 months and then were measured for a third time in December. The December titrations averaged 0.014‰ chlorine lower than the second measurements, 40 of the 42 samples being fresher and two being slightly saltier (0.001‰ and 0.002‰ chlorine) than found in October. We shall not discuss here the causes of this continued freshening which averaged more than 0.011‰ salinity per month for 5 months; but, whatever the causes, the second and third titrations, because of the relatively small salinity differences, throw no direct doubt upon the first titrations, or at least not upon the chlorine values found in the first titrations.

The fact that during the fall of 1932 Wilson and Thompson (1933) found a strong influx of salty water from the Atlantic in the deeper layers on the Grand Banks indicates a flooding of the Gulf Stream and suggests that the high salinities found in 1933 in the Labrador Sea are not beyond the bounds of possibility. The axis of the highest salinity water off the Greenland coast, according to the 1933 results, coincides very well in location with the usual high salinity axis and grades off to small anomalies on the Labrador side, thus making it impossible to deduct a constant amount from all the measurements without making the salinities on the Labrador side abnormally low. This lends credence to the 1933 observations; but because the salinities are so unusually high, and because there is not a corresponding increase in temperature, the salinities have not been used except for the construction of a dynamic topographic chart, and are not presented here in graphical form, but appear only in the tables.

In determining the depths of the observations in 1933 a combination of meter-wheel readings and unprotected reversing thermometers was used. The deepest bottle of a series carried one protected and one unprotected thermometer. At stations where two series were necessary, unprotected thermometers were attached to the uppermost, deepest, and middle bottles of the deep series. The depths indicated by these unprotected thermometers were used in conjunction with the meter-wheel readings to determine the depth of reversal for all the bottles. Whenever conditions seemed favorable, that is when there was little wind and a small wire angle, opportunity was taken to check the pressure coefficients of the unprotected thermometers. The pressure coefficients so obtained were based on the assumption of an accurate meter wheel and were consistently higher by about 3 percent than the coefficients given in the test certificates. These experimentally determined pressure coefficients were used in deriving the depths of reversal. However, it is probable that the pressure coefficients given in the test certificates are more accurate than the meter wheel. The listed depths of the observations therefore are probably too shallow by about 3 percent.

During July 1934 the *General Greene* ran two lines of oceanographic stations across the shelf northeast of Newfoundland and a complete traverse of the Labrador Sea from southern Labrador to Cape Farewell, Greenland. Nansen water bottles and Richter & Wiese reversing thermometers were again used. The same time intervals were allowed for the thermometers to attain temperature equilibrium, and the same messenger speeds of travel were used as in 1933.

A brief description of the details of the methods employed has been given by Soule (1935) (pp. 49–58). Provision was made for the determination of salinities by either the silver nitrate titration method or the electrical conductivity method. A new model Wenner salinity bridge was received during the season and was calibrated with titrated samples as described by Soule (1935). This new model embodied many of the improvements in construction recommended by Wenner, Smith, and Soule (1930). All routine measurements of salinity were made with the new salinity bridge and each sample was so measured twice. During the season, and on the cruise under discussion, a total of 2,570 measurements were made of half that number of samples. No two measurements of the same sample differed by more than 0.015‰ in salinity, so it was not necessary to measure any of them a third time. All measurements were referred to Copenhagen standard water of the batch P_{13}, the same batch being used throughout so that any variation in salt ratios which might possibly exist between different batches would not invalidate the calibration curve of the bridge. Copenhagen standard water was used for every series of measurements, and either Copenhagen standard or a substandard water was used in each cell once every 10 or 12 measurements. All titrations and the routine bridge measurements were made by the oceanographer's assistant.

As a result of careful comparisons of the simultaneous measurement of samples by both titration and new model salinity bridge methods the conclusion has been reached that at least under conditions existing on board the *General Greene* at sea the titration method is not sufficiently free from erratic results for the purposes of the International Ice Patrol and the new model bridge is looked upon as an essential instrument.

From the deeper layers in the vicinity southwest of Greenland for which the unusually high salinities were found in 1933, double samples were taken and were measured by silver nitrate titration in addition to the routine bridge measurements. Fourteen samples were so measured, each sample being titrated twice, the titration taking place within 48 hours after collection. In the case of 13 of the 14 samples no third titration was necessary and the titration values were consistently higher than the salinity bridge values, the differences ranging from 0.03‰ to 0.065‰ salinity with an average difference of 0.048‰ salinity. In the case of the remaining sample (Station 1764, 735 meters) the bridge gave 34.955‰ on July 14, the first titration gave 35.05‰ on July 14, and the second titration gave 34.99‰ on July 14. As there was insufficient silver nitrate solution prepared to make a third titration that day, the sample was set aside and titrated again on July 16, when a value of 34.96‰ was obtained. Not enough of the sample remained for a fourth titration.

The consistent discrepancy is somewhat puzzling. The persistence of the difference, in magnitude and sign, makes it improbable that the precision of the measurements is at fault. There seem but two remaining explanations—(1) that the calibration of the bridge was faulty and (2) that the relation of conductivity to total halogens was different here than elsewhere. The fact that the same batch of Copenhagen standard water was used for the measurements as for the calibration of the bridge leaves no doubt but that the calibration curve was correct at the salinity of the standard water. Further, because the salinity of the 13 samples in question covered but a small range of salinities (34.88‰ to 34.93‰ with an average of 34.912‰) very close to the salinity of the standard water (35.018‰) it does not seem possible that the calibration of the bridge was at fault. This leaves as probable only the possibilities that the conductivity varies among different tubes of the same batch of standard water or that the relation of conductivity to total halogens was different in this water than elsewhere.

The depths of the observations in 1934 were determined by the use of unprotected thermometers. Five such instruments were used in conjunction with protected thermometers. The shallow series always carried an unprotected thermometer on its deepest bottle. At stations where two series were necessary the deep series usually consisted of seven bottles, the uppermost, deepest, and alternate intermediate bottles being equipped with unprotected thermometers. The pressure coefficients given in the Physikalish-Technische Reichsanstalt test certificates for the instruments were used as given.

The dynamic computations for the stations occupied in 1928 and 1934 have been made by means of anomaly tables published by Sverdrup (1933); and for the years 1931 and 1933 after the manner described by Smith (1926). The dynamic heights for those stations shallower than the common reference depth have been computed by means of the method described by Helland-Hansen (1934) for all 4 years.

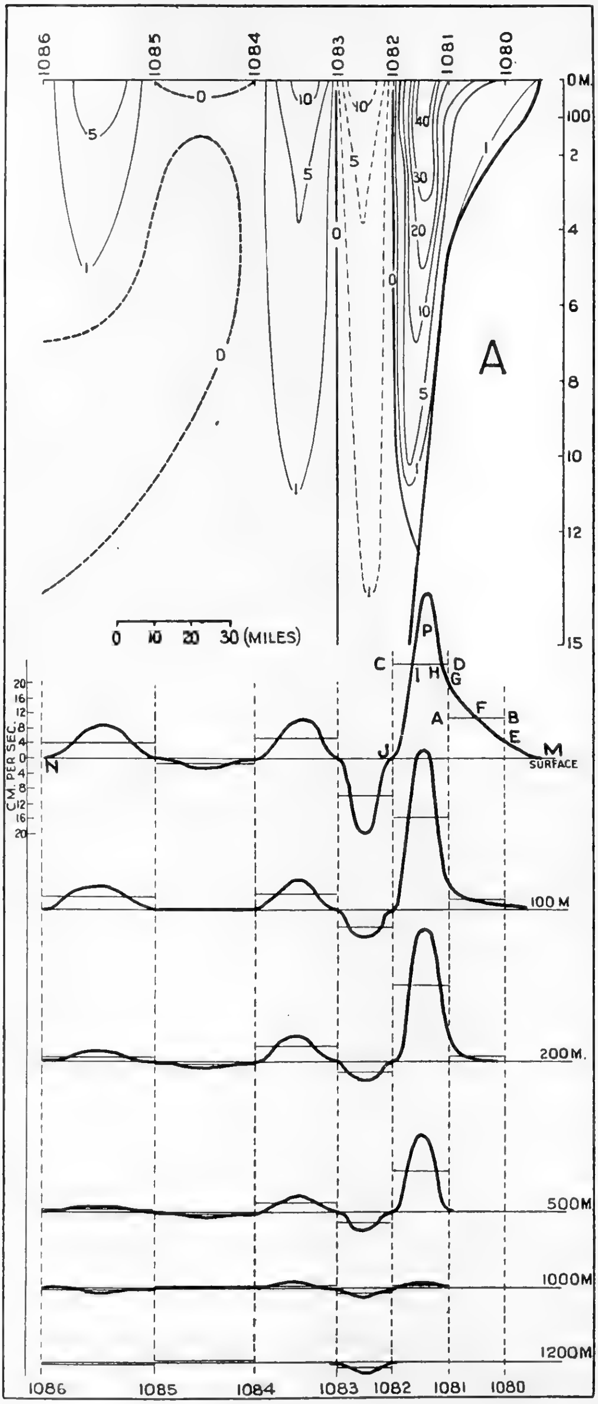

FIGURE 3.—An example of the method of construction of a velocity (current) profile.

The velocity of the current between any two points has been computed in the manner described by Smith (1926) (p. 31).

The extensive use of velocity profiles as illustrations in this paper justifies a description of the method of construction and also reference to the method of computing the volume of the current, or the transport, as it is often called, through any given vertical section.

A velocity profile is a representation in vertical cross section of the distribution of the components of velocity of the horizontal currents perpendicular to the plane of the section. Equal values of velocity are connected and expressed usually in terms of centimeters per second. As an example we have selected section A, figure 3, a section normal to the West Greenland Current taken off Cape Farewell, Greenland, September 2–3, 1928. (See station tables, stations 1080 to 1086 (pp. 219–220).)

It is assumed that the mean velocities between successive pairs of stations for a number of standard depths have been computed in accordance with the equation—

$$v=\frac{(E_A-E_B)}{2\omega \cdot L \cdot \sin \phi}$$

where (E_A-E_B) denotes the average slope of the isobaric surfaces between stations A and B; ω, the angular velocity of the earth; L, the distance between the stations, and ϕ, their mean latitude. These values of mean velocity are then plotted to scale against horizontal distance along the section and with regard to the direction of the component at right angles to the section, figure 3, as a series of parallel lines.

A smooth curve representing the velocity at any point on any one of the given levels, stations 1080 to 1086, may be substituted for the series of mean velocity lines, provided that (*a*) the curve be drawn in such a manner between adjacent stations that equal areas are formed on either side of the previously fixed lines of mean velocity and (*b*) that the curve be drawn flattest near the margin, and near the axis, of each indicated band. Between stations 1080 and 1081, figure 3, for example, the velocity curve is drawn so that the area *BEF* equals area *FAG*; and between stations 1081 and 1082 *DGH* and *ICJ* equal area *P*. The velocity curve *MN*, figure 3, is thus continued to include the remaining stations of the section, and similar curves are constructed for other levels.

The final step is to project the curve *MN*, and the curves for the other levels, on to their respective depths in a vertical plane and lastly to connect equal values of the same sign. The resulting illustration (see upper half of fig. 3) is referred to as a velocity profile.

In order to test the accuracy of the above-described method, the dynamic height of a station located midway between stations 1081 and 1082 was computed on the basis of temperatures and salinities interpolated from the profiles of these variables. The values of the mean velocity were then computed and plotted and the velocity curve for the surface was drawn as described. It indicated that the axis of the current lay closer to station 1082 than previously drawn but its velocity of 48 centimeters per second differed only 4 centimeters per second from the earlier determined value.

The question also arises as to how closely computed velocities agree with actual velocities where dynamic heights have been calculated to the nearest millimeter. From our experience it is doubtful whether the velocity lines on the profiles can claim a greater accuracy than 1 centimeter per second or, expressed in dynamic height for the mean latitude of the area investigated, this is equal to a slope of about 9 dynamic millimeters in a distance of 20 miles.

The volume of current, or the transport, through a given vertical section may be found either graphically from the sum of the products of cross-sectional areas and their mean velocities or by numerical integration in accordance with a method described by Jakhelln (1936).

Jakhelln's method, briefly, takes advantage of the fact that in the development of the equation of the volume of the current (i. e., the transport), the value of the distance between two stations appearing in both numerator and denominator, is eliminated.

$$U=\bar{v}\cdot z\cdot L \qquad (1)$$

where U is the net transport; $\bar{v}$ is the mean velocity, surface to a depth, z, where the current is assumed zero.

Further—

$$v\cdot z=\int_0^z v\cdot dz \qquad (2)$$

But—

$$v=\frac{(\Delta E_A-\Delta E_B)\cdot 10}{2\cdot\omega\cdot L\cdot\sin\phi} \qquad (3)$$

where E represents the anomaly of dynamic height. Substituting (3) in (1), results in the above-mentioned cancelation of L and

$$U=\frac{10}{2\omega\sin\phi}\cdot\int_0^z(\Delta E_A-\Delta E_B)dz \qquad (4)$$

or expressed in different form—

$$U=A\left[\int_0^z\Delta E_A dz-\int_0^z\Delta E_B dz\right] \qquad (5)$$

where $A=\frac{10}{2\omega\sin\phi}$. (For values of A, see Smith 1926, table VI.)

Since it is more convenient to deal with the values of the anomaly of specific volume ΔV than the anomaly of dynamic height, ΔE, we can from (5) express the equation in final form—

$$U=A\left[\int_0^z\int_0^z\Delta V_A dz^2-\int_0^z\int_0^z\Delta V_B dz^2\right] \qquad (6)$$

The practical application of Jakhelln's method to any two stations, A and B, is, first, to find the station anomalies of specific volume in the usual manner and then integrate the same, for each station, from the assumed common motionless depth to the surface. The difference between the two station integrals when divided by $2\omega\sin\phi$ (see table VI, Smith 1926), gives the value of the net volume of the current, or the net transport, normal to the plane of, and between, stations A and B.

It has been the practice in the present paper first to construct velocity profiles and then to make planimeter measurements of the

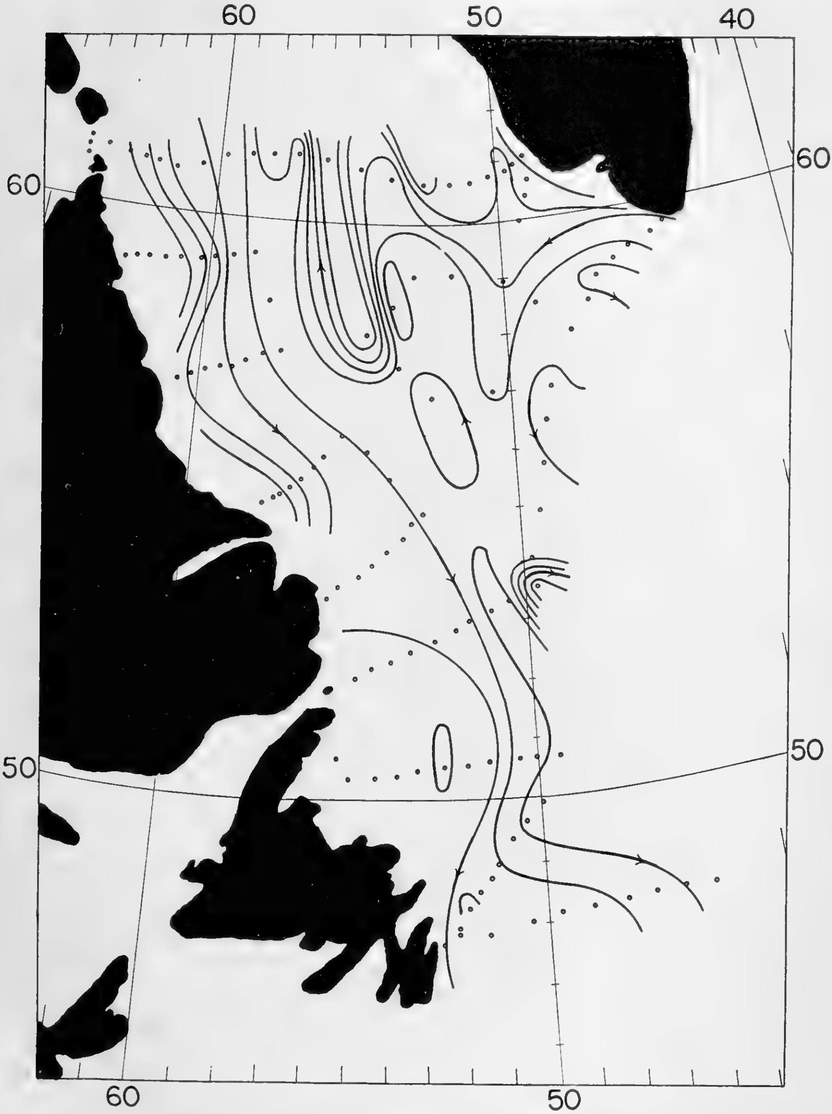

FIGURE 4.—An example of a transport map, each line representing a volume of current of 1,000,000 cubic meters per second. Based on General Greene's survey July 4–August 8, 1931.

volume of the separate bands of opposing flow as shown distributed on the particular profile. The net transport thus found has then been checked by employing the values at end stations, or between critical pairs of stations, of the section, in accordance with the above-described method of Jakhelln (1936). The difference in the values thus found by the two methods seldom exceeded 15 percent of the net transport, and this figure was considered immaterial. The net volume of the current, figure 3, was 4.41 $m^3/s \times 10^6$ by graphic method and 3.73 $m^3/s \times 10^6$ by Jakhelln's method. It should of course be borne in mind that Jakhelln's method (see also Werenskiold, 1935) gives results in terms of net volume or transport, and this, for example where the two given stations span the boundary of opposing currents, furnishes information in comparative terms only. Perhaps the best practice, although laborious, is, first, the construction of a velocity profile as earlier described, and, second, the computation of the volume of the various currents by integrating to the zero velocity lines as shown on the profile in accordance with the Jakhelln method. The determination of the transport through the several sections in the Labrador Sea the summer of 1931 have been combined in a so-called transport map. (See fig. 4, p. 23.) Ekman (1929) and Thorade (1933) have published similar maps for other regions of the North Atlantic.

It should be added that the construction of velocity profiles and the planimeter determination of velocity areas and volumes therefrom is essential, wherever the average temperature of the separate bands of currents and the rate of heat transport are desired. The algebraic sum of the several products of velocity by cross-sectional area by temperature represents the net rate of heat transfer through the section. The average temperature has been obtained by dividing this value for the rate of heat transfer by the net volume of flow. The average temperature of the slope band of the West Greenland Current in the Cape Farewell section A, figure 3, was 5.5° C. The rate of heat transfer is expressed in million-cubic-meter-degrees, centigrade-per-second. In the case of the slope band of the West Greenland Current at Cape Farewell September 2–3, 1928, figure 3, the rate of heat transfer was 17.5° C. $m^3/s \times 10^6$.

In computing the volume of current (transport) from velocity profiles, it is important that the profiles be drawn as accurately as possible. The velocity profiles described and used in this report are considered justifiable, if on no other basis than that they provide a means of computing the average temperature of, and the rate of heat transported by, ocean currents.

The salinity of the sea is, of course, free from many of the influences that act upon the temperature. A quantitative determination of the rate of salt transport similar to the above-described method of obtaining the rate of heat transport has been utilized as shown on p. 77.

Chapter III

THE CIRCULATORY SYSTEM AND TYPES OF WATER

When our data collected during the summer of 1928 from the Labrador Sea were substituted in Bjerknes' hydrodynamic formulae, a general cyclonic circulation of the upper water layers (the troposphere) was revealed.[4]

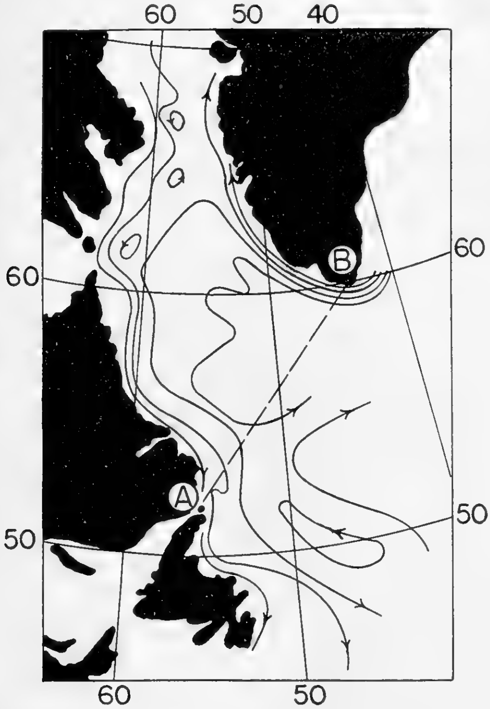

FIGURE 5.—The system of circulation of the upper water layers (troposphere) in the northwestern North Atlantic.

This consists of a northward flow along the Greenland slope, the West Greenland Current; a southward movement along the American side, the Baffin Land Current and the Labrador Current (cf. Riis-Carstensen 1931, p. 5), and a northward set, the Atlantic Current in the southern part of the Labrador Sea (fig. 5). The more cen-

[4] The circulation of the upper water layers has been determined by reference to the 1,500-decibar surface. This common depth best served the observational data, several stations offshore of the continental slopes not having been taken to greater depths than 1,500 meters. The computations indicated, however, that in certain regions, notably along the Greenland slope, appreciable motion prevailed even at 1,500 meters. It should be constantly borne in mind, therefore, that the Bjerknes' methods express results in terms of comparative motion only. If the state of rest or motion on a selected datum plane be incorrectly assumed, an error is introduced and the results in terms of direction and velocity of the currents consequently will be incorrect. In an area such as the northwestern North Atlantic, subject as it is to severe wintertime conditions and other equally important suspected influences, it is wise to challenge constantly the validity of assumptions required by the Bjerknes' method.

tral portions of the Labrador Sea partake of a slow cyclonic motion. The West Greenland Current in this scheme is really two flows in one—(*a*) the East Greenland Current and (*b*) the Irminger Current;[5] which in their extension around Cape Farewell become reenergized along the west coast of Greenland and are renamed for that region. The Labrador Current likewise is an extension of the Baffin Land Current and the West Greenland Current.

A vertical section of the Labrador Sea between points *A* and *B*, figure 5, shows that the greatest changes in physical character occur at the sides of the basin as represented by the line *M–N* (fig. 6). Three principal water types characterize the northwestern North

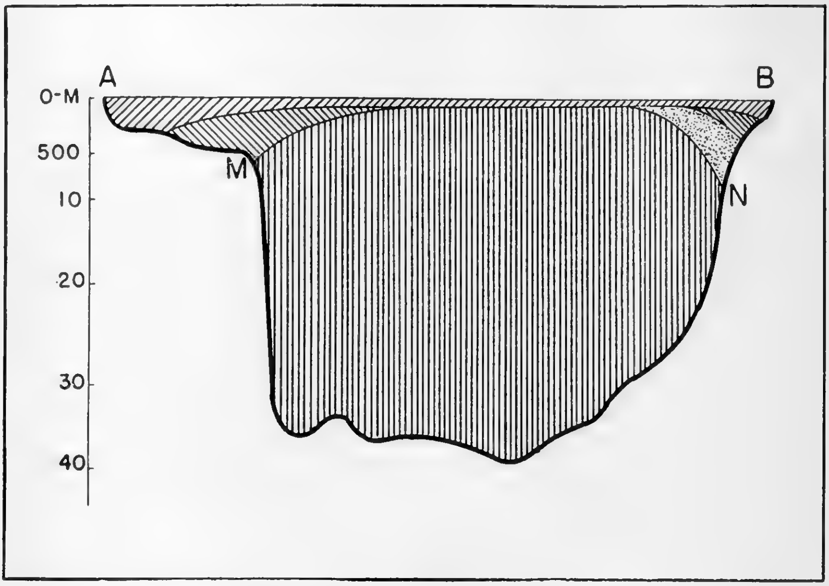

FIGURE 6.—A schematic vertical cross section of the Labrador Sea, Belle Isle to Cape Farewell. Coastal water. Arctic water. Atlantic water. Mixed Labrador Sea water.

Atlantic, viz, coastal, Arctic, and Atlantic. Their mixture (discussed in chap. VIII), with a remarkably small range of approximately 1° C. temperature and 0.06‰ salinity, fills approximately 90 percent of the Labrador Basin.

In assigning names to water masses in the sea it should always be remembered that values are comparative only. Variations in the mixing processes, as regards time and place, constantly prevail. This fact precludes any possibility of assigning definite limits of temperature and salinity. An interpretation of the circulation, based solely upon the relative proportions and degree of purity of a particular type of water present in a given mass, may often prove misleading. Detecting the presence of waters from known sources requires a thorough familiarity with the region investigated, particu-

[5] For a description of the general position and behavior of the East Greenland Current and Irminger Current east of Cape Farewell prior to entering the Labrador Sea see Nielsen (1928).

larly as to the range and degree of thermal and saline character of the mass where and when observed. In this respect the employment of temperature-salinity correlation graphs has been found helpful.

Atlantic water, for example, is found at certain times off the Tail of the Grand Banks with a temperature of 16° C., and a salinity of 36.00‰. Atlantic water off Cape Farewell at the same time, however, has, as might be expected, different criteria; a temperature of about 6° C., and a salinity of about 35.00‰. Vestiges of Atlantic water still farther north in the northern sector of the Labrador Sea can be traced where the temperature is only about 4° C., and a salinity of about 34.80‰.

The word "Arctic" has been used mainly to designate water, the temperature of which is so low as to indicate a far northern source. In the present case, where the area extends beyond the Arctic Circle itself, the term Arctic water is intended to signify water which has originally flowed from a more northern point than where the observation in question was made. Reflecting, therefore, the frigidity of its polar sources, Arctic water often has a minimum temperature as low as −1.7° C. Such water masses, when insulated by lighter layers, may be transported great distances without appreciable change in temperature, readings of −1.5° C. having often been observed in latitudes as low as 43° near the Tail of the Grand Banks, more than halfway from the Pole to the Equator. The salinity of Arctic water lies between that of Atlantic and coastal, and for that reason it is best identified by its temperature.

Coastal water naturally is in the lowest brackets of salinity. The term is associated primarily with land drainage and river discharge and later as such water expands seaward over shelves or banks or is transported along coastal slopes. Identification is most easily made during summer when coastal water from its lightness lies uppermost and thus absorbs greater quantities of solar radiation. Winter chilling, on the other hand, especially severe in the northwestern North Atlantic, may cool coastal water to temperatures approaching closely that of minimum Arctic character.

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Chapter IV

THE WEST GREENLAND SECTOR

THE SURFACE CURRENTS

The more critically ocean currents are examined, the more necessary it becomes to subclassify them geographically; for example, the East Greenland Current on passing through Denmark Strait is joined by a significant branch of the Irminger Current (see Baggesgaard-Rasmussen and Jacobsen, 1930; also Böhnecke, 1931), both streams merging in one parallel flow which so rounds Cape Farewell. Off the southwest coast of Greenland this composite current is further augmented by streams converging from the Labrador Sea. By the

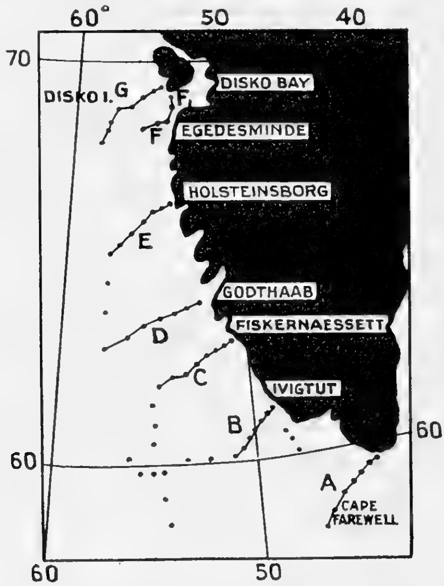

FIGURE 7.—The west Greenland sector (1928). Sections are as follows: A, Cape Farewell; B, Ivigtut; C, Fiskernaessett; D, Godthaab; E, Holsteinsborg; F, Egedesminde; F_1, Disko Bay; G, Disko Island.

time it has reached Fylla Bank, west Greenland (as will be proved later by the Coast Guard's observations), the original identifying character belonging to the East Greenland Arctic Current has been completely transformed to current of Atlantic character. It is obviously incorrect then to refer to the current throughout the west coast solely as an extension of the East Greenland Current. In order, therefore, to avoid confusion it seems best to designate the current from Cape Farewell northward as the West Greenland Current. A similar procedure has been followed in similar cases wherever the original current becomes considerably changed by significant tributaries.

West Greenland waters, at least south of Davis Strait, are dominated by this West Greenland Current. An exposition of the sector,

FIGURE 8.—The West Greenland Current on the surface, July 30–September 3, 1928. The velocities expressed in miles per day indicate the axis of maximum velocity.

therefore, centers mainly on a full description of this important stream.

During the period July 30 to September 3, 1928, the surface waters over and along the steepest part of the continental slope, Cape Farewell to Little Hellefiske Bank (fig. 8), were in northwesterly movement at velocities of 6 to 33 miles per day in the axis of the current. The Cape Farewell section (A) just outside of the slope current intersects a slowly rotating anticyclonic vortex approximately 35 miles in diameter. Further offshore a secondary band of northwesterly current was entered. It is conjectural whether this outer band was part of the West Greenland Current, split in this locality by this eddy, or was an unrelated stream. It appears from the general trend and direction of the dynamic isobaths on figure 122, page 167, however, that this current shown on the extreme southwestern end of the Cape Farewell section was approaching from the south and west, in contrast to the main portion of the West Greenland Current, which hugged the continental slope, rounding Cape Farewell from the north and east. The source of this outer band of current, which it is believed may have considerable significance in the general scheme of circulation for the entire Labrador Sea, is discussed on page 32. Regardless of its origin, however, it joined the trunk of the west Greenland stream as the latter increased to its maximum velocity of 33 miles per day off Ivigtut. (See fig. 8.) Immediately north of Ivigtut the current began to throw off branches along its outer side, all of which turned westward into the Labrador Sea. As Fylla Bank was approached the rate of flow diminished. Just north of Fylla Bank the West Greenland Current experienced major westward branching, the bulk of its surface waters being deflected here, probably by meeting the southern face of Little Hellefiske Bank.

Inshore portions of the West Greenland Current continued northward hugging the slope and flowing at the much reduced rate of 6 miles per day. Narrow bands of current, probably continuations of the more vigorous parts of the system, were found along the slopes of Great Hellefiske Bank. Such streams (fig. 8) entered Disko Bay entrance on the south and discharged on the north. A weak but appreciable set of West Greenland Current, more clearly distinguished in the Disko Island section (fig. 11) below the surface, flowed through Davis Strait Channel into Baffin Bay.

CROSS SECTIONS OF THE CURRENTS

A total of seven hydrographic sections taken during the summer of 1928 (fig. 7) more or less normal to the coast, and more or less equally spaced between Cape Farewell and Disko Island, afford a means of studying the West Greenland Current below the sea surface and along its course northward to the entrance of Baffin Bay.

The discussion in this and the following three chapters is limited to the circulation of the upper water layers (sometimes referred to as the troposphere), in the depth of which has been determined by reference to a common isobaric surface. It has been found for the west Greenland sector that motionless water (or nearly so) prevails usually between 1,500–2,000 meters. The 1,500-decibar level has served, therefore, for all practical purposes as the datum plane upon which the calculations of direction and velocity of the currents are based.

Cape Farewell.—A cross section of the West Greenland Current,[6] off Cape Farewell (fig. 9), shows, as does the surface map (fig. 8),

[6] For a description of the method employed in the construction of the velocity profiles see p. 21.

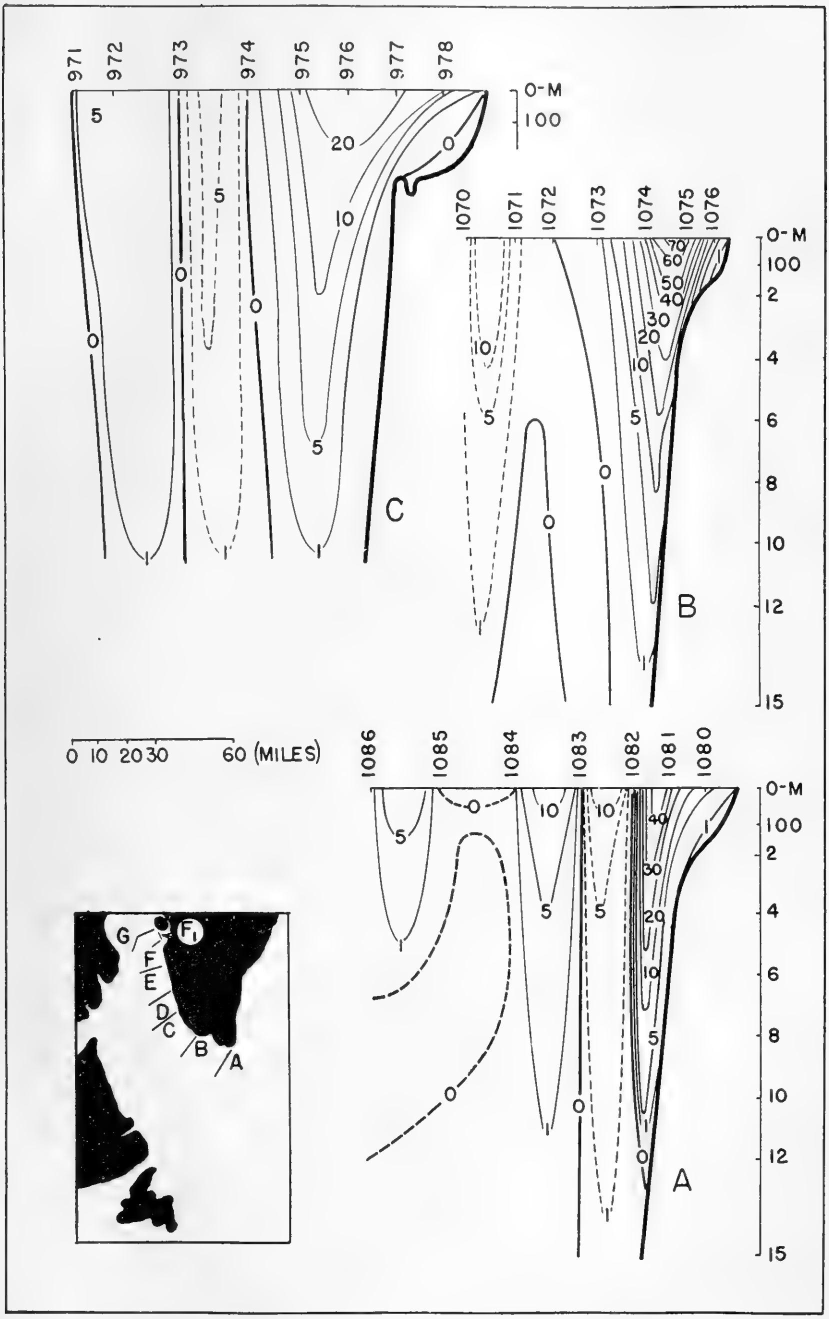

FIGURE 9.—Velocity profiles of the West Greenland Current expressed in centimeters per second. The solid lines represent northwesterly current and the broken lines southeasterly current. Section A, September 2–3, 1928; section B, August 27–28, 1928; section C, July 29–31, 1928.

that the main current hugged the continental slope and that an outer band was separated by a clockwise rotating eddy. The alternations in the directions of the flow as evidence throughout the section indicate the probable effect of the bottom configuration on the gradient current as it rounds Cape Farewell and is subsequently joined by other current from the Labrador Sea. The calculated volume of the trunk of the West Greenland Current which hugged the continental edge at Cape Farewell (fig. 8) was 3.2 million cubic meters per second; the vortex contained approximately 1 million cubic meters per second; and the converging set at the outer end of the section totaled nearly 2 million cubic meters per second.

Ivigtut.—One hundred and fifty miles farther along the current, off Ivigtut, the West Greenland Current (fig. 9) was found, as at Cape Farewell, hugging the continental edge. It had, however, increased greatly both in cross-sectional area and velocity; the 5-centimeter-per-second velocity curve here extended to a depth of nearly 1,200 meters. Offshore the section intersected a south-flowing band of 2.6 million cubic meters per second, evidently a branch of the slope current which had recurved southward and then westward into the Labrador Sea (cf. fig. 9 with fig. 8).

The calculated volume of the slope band of the West Greenland Current off Ivigtut, August 27–28, 1928, was 7.4 million cubic meters per second, or approximately double the slope band observed a week later off Cape Farewell. Reference to the surface current map (fig. 8) indicates that some of the discrepancy may be attributed to coastal current which flowed through the 10-mile gap between station 1080 and Cape Farewell. The fact that there is swift current here at times is confirmed by Soule who, in 1935, observed icebergs moving westward close under Egger Island, Cape Farewell, at an estimated rate of 4 knots per hour. Finally it was thought that the excess of transport off Ivigtut may have been partially due to current which entered from offshore between the two sections. A computation of the current there between stations 1070 and 1086, however, gave 2.7 million cubic meters per second but in a westerly direction away from the Greenland slope. Of course this does not preclude the possibility of a current from below 1,500 meters intersecting the Ivigtut profile above 1,500 meters, but this is contrary to our conception of the general circulation. It seems more likely, in view of the above, that the discrepancy noted in the computed volumes of the current at Ivigtut and Cape Farewell resulted from errors incident to the method and its application there.

Fiskernaessett.—This section (fig. 9, profile C) shows the slope band of the West Greenland Current as having a volume of 6.6 million cubic meters per second, or a reduction of about 15 percent from that at Ivigtut. The decrease in the volume of the current can safely be attributed to offshore branching which is clearly recorded on the surface current map between Ivigtut and Fiskernaessett. The offshore part of the Fiskernaessett section records alternate southeast and northwest flow, which the dynamic topographic map (fig. 122, p. 167) indicates was one single band of current which moved out into the Labrador Sea. The volume of this band amounted to 1.8 million cubic meters per second, leaving 5.8 million cubic meters per second to continue northward.

Godthaab.—The slope band of West Greenland Current which intersected this section was 5.3 million cubic meters per second, thus supporting previous computations, viz, that approximately 20 percent of the current branched offshore between Fiskernaessett and Godthaab. An appreciable reduction in the draft of the West Greenland Current also occurred between these two points along the slope (cf. figs. 9 and 10, profiles C and D). Additional westerly branching of the West Greenland Current is noted in the offshore end of the Godthaab section, where 1.8 million cubic meters per second recurved southward between stations 975 and 973. The slope band which remained to continue northward was consequently reduced to 3.5 million cubic meters per second or about one-half the volume of current found off Ivigtut.

Holsteinsborg.—The greatest and most striking decrease in volume of the slope band of the West Greenland Current took place between Godthaab and Holsteinsborg. (See fig. 10, p. 34.) The widening of the Greenland shelf and the continued shoaling of the bottom at the head of the Labrador Sea tended to deflect much of the West Greenland Current westward around the Labrador Basin. Those portions of the West Greenland Current which remained to follow the contour of the banks northward were also further reduced in draft. Thus the Holsteinsborg profile shows the 5-centimeter-per-second velocity line at a depth of 200 meters, in contrast to the draft of this current, Cape Farewell, to Fiskernaessett, of 1,100 meters.

The plane of the Holsteinsborg section intersected four separate bands of current, but reference to the surface current map (fig. 8) indicates that all these intersections belong to one and the same stream which, guided by the channel between Little Hellefiske and Great Hellefiske Banks, wound a northeasterly course. The net volume of the northerly current past Holsteinsborg was 1.25 million cubic meters per second, which, as can be seen, is only 25 percent of the transport which was found off Godthaab. This agrees, moreover with previous findings (p. 30) that major proportions of the slope current were deflected offshore between Godthaab and Holsteinsborg, probably by the southern face of Little Hellefiske Bank. The volume of the West Greenland Current so turned toward American shores was 1.95 million cubic meters per second, the bulk of the discharge being directed between stations 984 and 987.

No more impressive evidence is needed than this series of five velocity profiles, figs. 9 and 10 (see also fig. 12) to demonstrate the manner in which the West Greenland Current is distributed northward from Cape Farewell, only 15 percent of its volume reaching the entrance of Davis Strait.

Egedesminde.—This section (fig. 10, profile F), with a northerly transport of 1.3 million cubic meters per second, showed a slight increase from that off Holsteinsborg and thus reversed the trend which characterized the West Greenland Current for most of the west coast. Reference to the dynamic topographic map (fig. 122, p. 167) attributes the larger volume of flow off Egedesminde not to any swelling of the West Greenland Current but to water contributed locally by a counterclockwise eddy formed in the deep basin which extends southwestward from the entrance of Disko Bay. The eddy

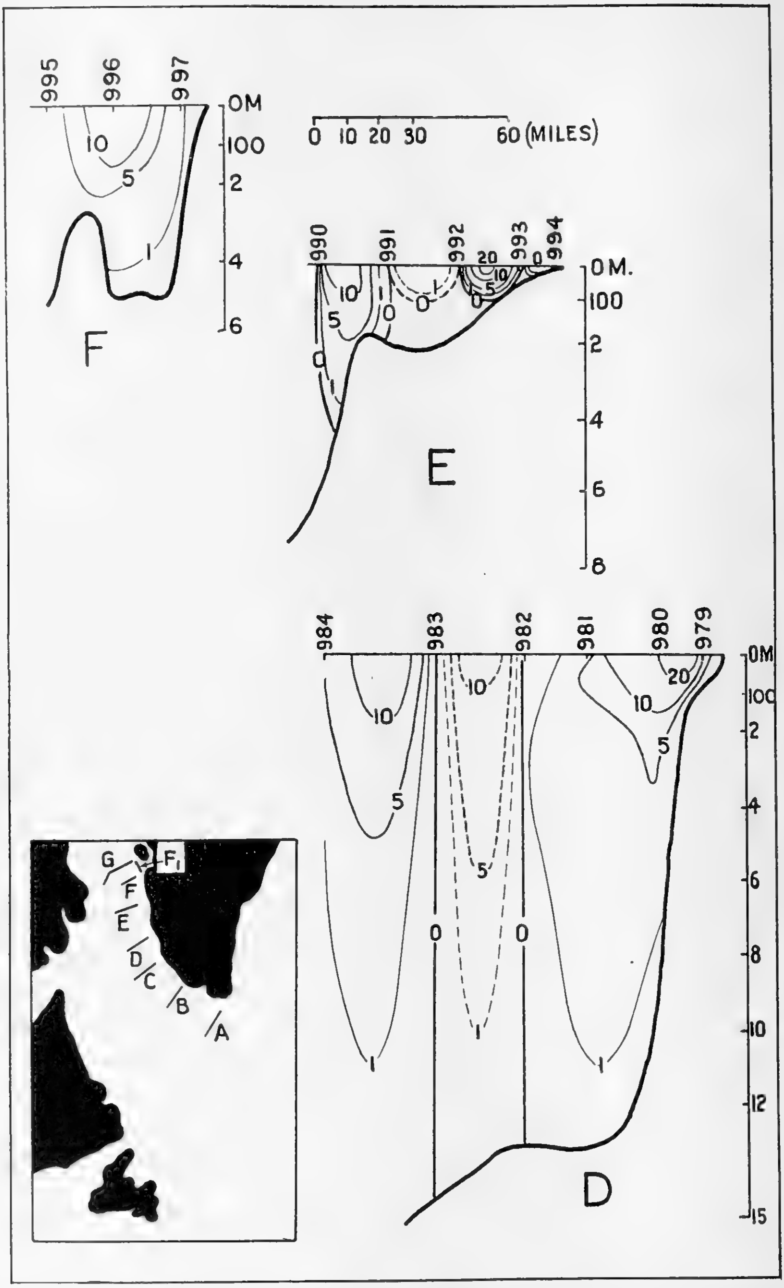

FIGURE 10.—Velocity profiles of the West Greenland Current expressed in centimeters per second. The solid lines represent northwesterly current and the broken lines southeasterly current. Section D, August 1–3, 1928; section E, August 4–5, 1928; section F, August 7, 1928.

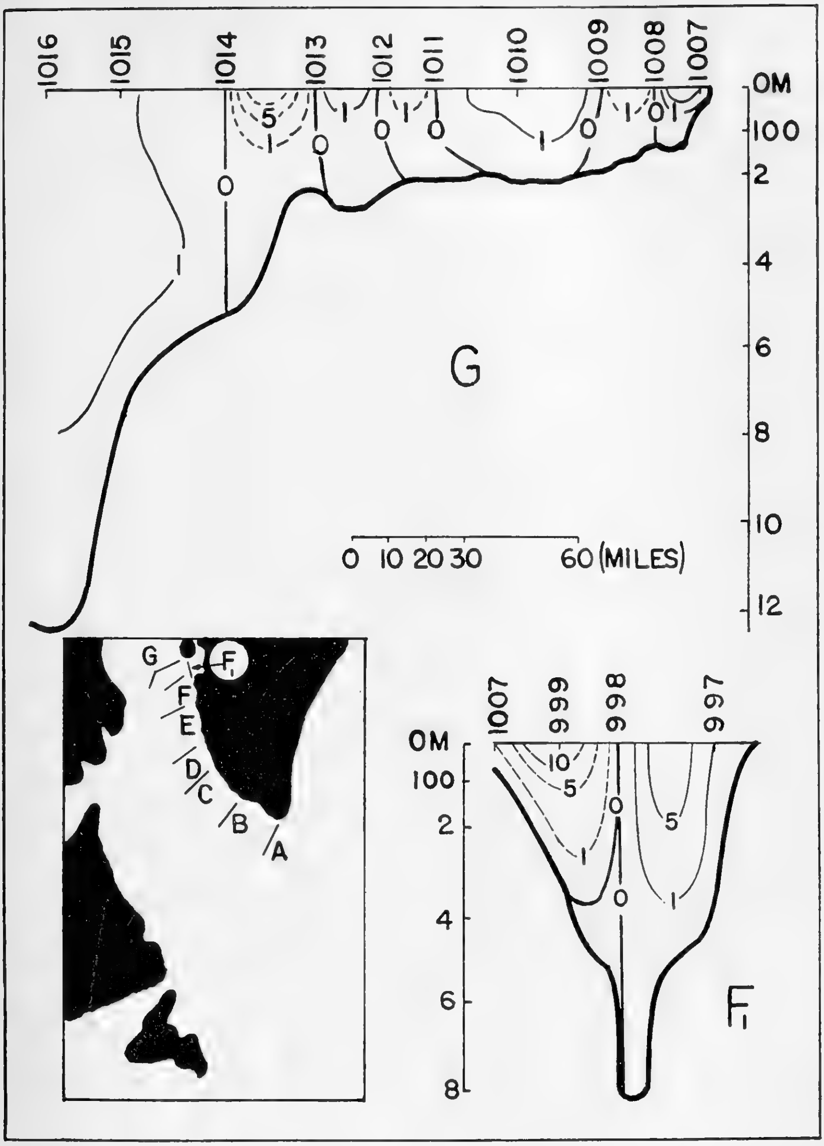

FIGURE 11.—Velocity profiles of the West Greenland Current expressed in centimeters per second. The solid lines represent northerly current and the broken lines southerly current. Section F_1, August 7, 1928; section G, August 13–14, 1928.

received water from northward in Baffin Bay, and station 995, located at the outer end of the Egedesminde section, showed this current as additional to the West Greenland Current from the south. On the other hand it should be noted from the current map (fig. 8), that part of the West Greenland Current revealed on the Holsteinsborg section followed Davis Strait Channel directly into Baffin Bay. The distribution of the 1.3-million-cubic-meters-per-second transport past the Egedesminde section is estimated as follows: One-third of the current entered Disko Bay as described in the next paragraph; about two-thirds of the remainder entered the aforementioned eddy; and about 0.3 million cubic meters per second flowed northerly across the mouth of Disko Bay and joined the bay discharge there.

Disko Bay.—This section embraced a band of West Greenland Current, 0.44 million cubic meters per second, which had hugged Great Hellefiske Bank and entered Disko Bay along the southern shore. A discharge, approximately equal to the indraft, filled the northern half of the bay's entrance. This band of westerly flowing current is of particular interest to the Ice Patrol because it transports many of the icebergs calved from Disko Bay glaciers out on the main pathways toward the North Atlantic. (See Smith 1931, p. 143).

Disko Island.—Our northernmost observations (except those in the Vaigat, not discussed here), section G (fig. 11), extended from the southwestern point of Disko Island diagonally out into Davis Strait. It was intended to make a complete traverse of Davis Strait, but, as related by Ricketts (1932), pack ice off Cape Dier, Baffin Land, stopped the *Marion* 30 miles short of the goal. If the bathymetric and station maps be consulted, they show that section G lies along the top of a ridge which juts out into Davis Strait. Stations 1014 to 1016 continue the section across the continental slope and into the deep water of the Baffin Bay Basin near its southern rim. Station 1016, with its deepest observation at 1,200 meters, most probably penetrated into sluggish bottom water and therefore permits a fairly accurate calculation of the currents farther inshore as shown on the velocity profile.

The alternation of direction of the components as shown by the successive areas bounded by the zero velocity lines on section G (fig. 11) when compared with the surface current map (fig. 8) indicates a band of winding current, probably the southern side of an eddy centered farther north in Baffin Bay. The main channel of Davis Strait, stations 1014 to 1016 (fig. 11) was filled with weak northerly current which totaled 0.9 million cubic meters per second in volume. If the velocity profile be compared with the corresponding temperature and salinity profiles (figs. 20 and 21, pp. 45–46), this band of northerly current is quite definitely identified as West Greenland Current which penetrated directly into Baffin Bay.

A résumé of the volume of flow (the transport) of the slope band of the West Greenland Current along the slope from Cape Farewell northward to Baffin Bay, expressed in millions of cubic meters per second for 1928, is contained in the following table:

Section	Volume of flow	Section	Volume of flow
Cape Farewell (A)	3.2	Holsteinsborg (E)	1.3
Ivigtut (B)	7.4	Egedesminde (F)	1.3
Fiskernaessett (C)	6.6	Disko Bay (F_1)	0.4
Godthaab (D)	5.3	Disko Island (G)	0.9

It can be seen from the above table that a constant diminution in the current from south to north was interrupted at Ivigtut, Egedesminde, and Disko Island. The increase in the current at Ivigtut was explained on page 32, as most probably due to contributions from the Labrador Sea. The volume of the West Greenland Current off Egedesminde, as previously explained, is misleading because of a supply from a Davis Strait eddy. (See fig. 8.) The volume of 0.9 million cubic meters per second recorded in the above table for the Disko Island section refers only to the band of West

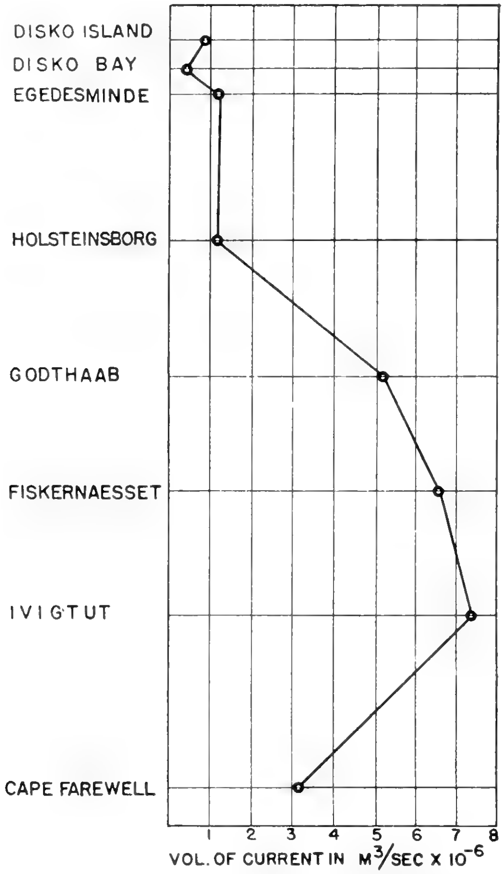

FIGURE 12.—The distribution of the volume of the West Greenland Current along the continental slope from Cape Farewell to the entrance of Baffin Bay, July 29–September 3, 1928.

Greenland Current which entered Baffin Bay between stations 1014–1016. This branch, which was last measured by the Holsteinsborg section, evidently skirted the Egedesminde and Disko Bay sections and followed the deeper channels through Davis Strait.

THE HORIZONTAL DISTRIBUTION OF TEMPERATURE AND SALINITY

The dual physical character of the water composing the West Greenland Current (see p. 26) does not become revealed until one examines the distribution of temperature and salinity.

At the surface the coldest water in the west Greenland sector in the summer of 1928 was found in two small widely separated areas as bounded by the 4° isotherm on figure 13—one near Cape Farewell and the other in Davis Strait about 100 miles west of

FIGURE 13.—Temperature at the surface July 30–September 3, 1928.

Disko Bay. The fact that this water was colder than that adjacent to it is good evidence that it flowed there in a current. Reference to the surface current map (fig. 8) identifies both of these pools as Arctic in origin—the one transported around Cape Farewell by the East Greenland Current and the other brought directly from the north by the Baffin Land Current. The degree of Arctic character, moreover, of the waters of the west Greenland sector at any given time of the year is determined directly by the extent and the magnitude of the above two salients intruding from opposite directions. Baggesgaard-Rasmussen and Jacobsen (1930) have likewise pointed out the difference in the origin of the two regional cold-water areas along the west coast of Greenland.

On the other hand the course of the 7° isotherm, near Godthaab, in 1928, appears to mark a central zone, freest from Arctic chilling of all the west coast. In truth the fairly large area off Godthaab with temperatures between 7 and 8 degrees, and which extended northward along the continental slope to the Holsteinsborg section, appears so warm as to suggest an Atlantic source. The warmest water region of all, however (9°), lay outside the more rapid currents, over the deeper water in the Labrador Sea.

If the surface temperature map (fig. 13) be superimposed on the surface current map (fig. 8), it is found that the tongue of coldest water embraced by the 4°, 5°, and 6° isotherms coincides with the axis of the West Greenland Current, the water warming 2° along its path, Cape Farewell to Fylla Bank. There the cooling influence of the east Greenland Arctic water, at least on the surface, appears to have been spent. The tendency of the cool water to keep to the slope in contrast to branching westward as was noted for much of the West Greenland Current indicates that the east Greenland Arctic water constituted some of the lightest surface layers of the West Greenland Current and occupied the inshore band.

Continuing northward, the temperature gradient on figure 13 reversed, with cooler and cooler water being entered until the 4° isotherm was reached on the border of the Baffin Land Current in Davis Strait. The position of the 5° isotherm, moreover, indicates that this Arctic influence made itself felt even as far south as Little Hellefiske Bank in the west Greenland sector. Both Little Hellefiske and Great Hellefiske Banks, in themselves, however, appear freer from Arctic intrusion, a condition previously remarked by Nielsen (1928), with solar radiation a more noticeable factor than along the deeper parts of the slope to the north and south.

The warmest water, with the exception of the Labrador Sea (fig. 13) was found in Disko Bay. Both of these regions, it will be noted, are outside the main paths of gradient currents, and undisturbed, the surface layers absorb a maximum amount of heat from the summer's sun.

Figure 14 indicates a uniform distribution of the salinity in the west Greenland sector which increased from a minimum near the shore (30.44‰ off Ivigtut), to >34.50‰, a maximum, near the 1,000-meter isobath of the slope. Such a distribution supports previous statements regarding the relative position of east Greenland, Arctic, and coastal water.

Paralleling the tongue of east Greenland Arctic water but approximately 20 miles offshore of it, we found at a depth of 100 meters, figures 15 and 16, a tongue of water of 6° temperature and >35‰ salinity—the warmest and saltest water of the entire region. Reference to the current map (fig. 8) unmistakably identifies this water as Atlantic in origin, an extension of the Irminger Current around Cape

Farewell. Comparison between figure 8 and the velocity profiles for the Godthaab and Holsteinsborg sections (fig. 10) shows that this warm and salty water, bounded by the 4° and 5° isotherms and the 34.50‰ isohaline, extended northwestward to the southern slopes of Little Hellefiske Bank where it probably turned westward.

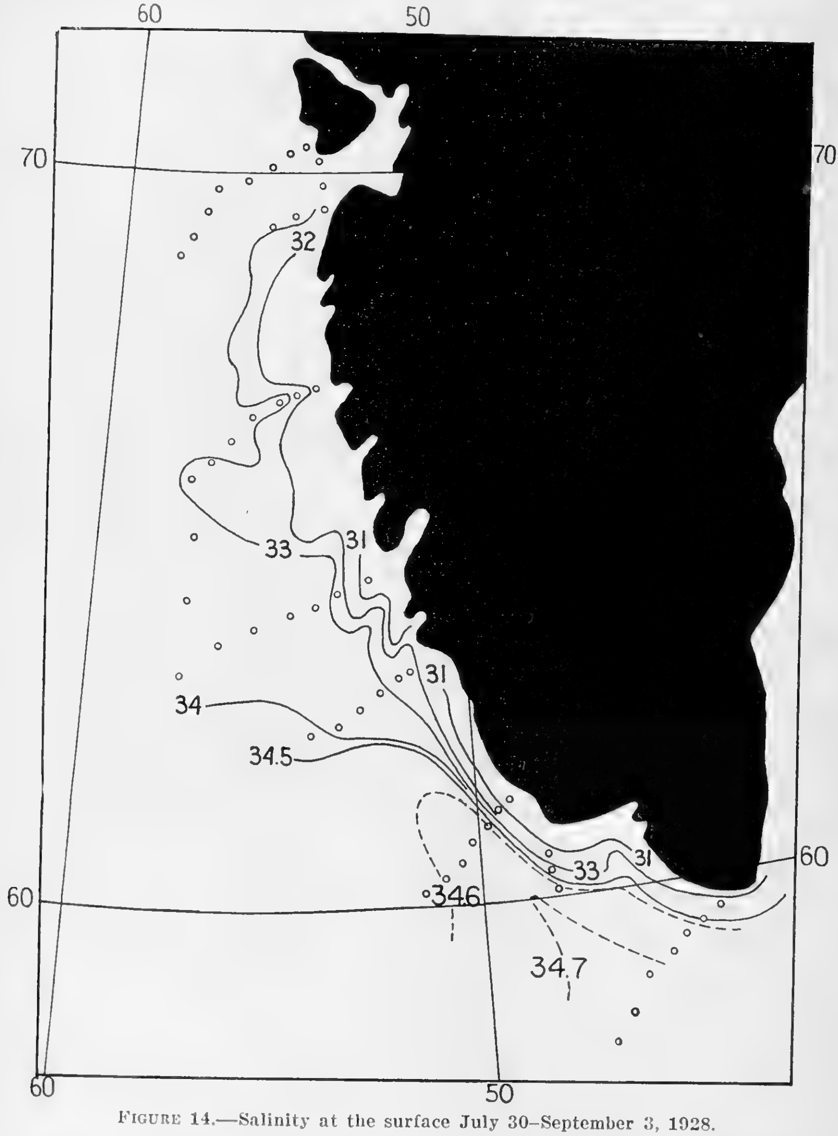

FIGURE 14.—Salinity at the surface July 30–September 3, 1928.

Inshore against the slope of Fylla Bank at the 100-meter level (fig. 15) lay vestiges of east Greenland Arctic water as marked by the 2° isotherm. The temperatures and salinities contained on the Holsteinsborg section at 100 meters (fig. 15 and fig. 16) indicate an area entirely different in physical character, with cooling and freshening which probably emanated from the Baffin Land Current.

The remaining 1928 maps for the 200-, 400-, and 600-meter levels (figs. 17–19) are particularly instructive in tracing the areas occupied by Atlantic water off the southwest coast of Greenland at these levels. Neither function alone, temperature nor salinity, can be accepted for all depths to mark the boundary of this water. It was

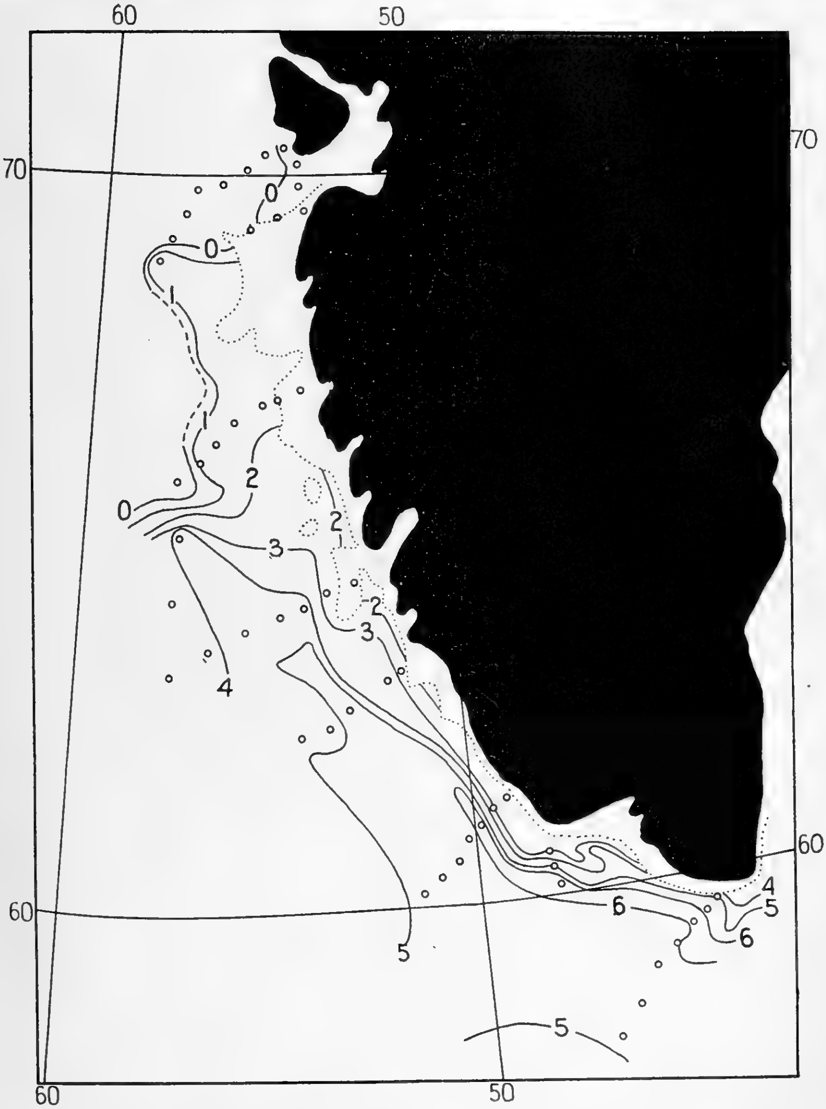

FIGURE 15.—Temperature at a depth of 100 meters July 30–September 3, 1928.

warmest (6°) at the 100-meter level, but saltiest, 35.10‰, on the 200-meter plane. For the same salinity (35‰) for an increase in draft from 100 meters to 400 meters the Irminger-Atlantic water cooled approximately 1.5° C., on its under side.

The areas enclosed by the critical isotherms and isohalines (figs. 17 to 19) indicate the manner in which the Atlantic water flows

FIGURE 16.—Salinity at a depth of 100 meters July 30–September 3, 1928.

northwestward in the Greenland sector and spreads out into the Labrador Sea.

THE VERTICAL DISTRIBUTION OF TEMPERATURE AND SALINITY

The vertical distribution of temperature and salinity 1928, in the seven hydrographical sections, Cape Farewell to Disko Island (figs. 20 and 21), emphasizes the evidence revealed on the horizontal projections. The east Greenland Arctic water northward to Godthaab, and more pronounced from Ivigtut to Godthaab than at Cape Fare-

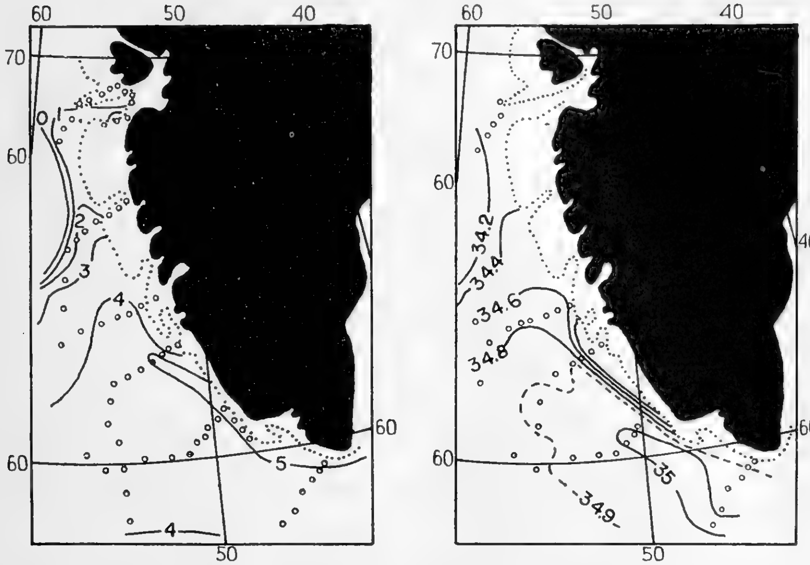

Figure 17.—Temperature and salinity at a depth of 200 meters July 30–September 3, 1928.

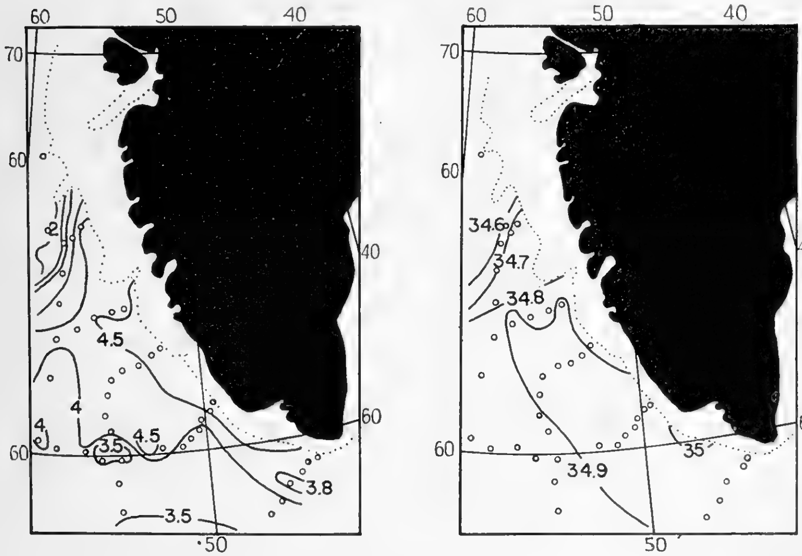

Figure 18.—Temperature and salinity at a depth of 400 meters July 30–September 3, 1928.

well, is clearly indicated in the coldest and freshest surface layers inshore. The frigid layer which is to be seen on the three northernmost profiles E to G (figs. 20 and 21) as represented by the isotherms at about 100 meters depth, indicates Arctic water which has penetrated to these points from a northern source, probably from Baffin Bay.

The positions of the isohalines representing the saltest water, on the other hand (fig. 20), indicated the Irminger-Atlantic water as it progressed from Cape Farewell to Godthaab, branched westward, and sank from the 150-meter level to about the 500-meter depth. It is estimated from these data that the axis of the Irminger-Atlantic water cooled approximately 1½° C., and freshened about 0.20‰. This process of mixing and sinking is discussed on page 175. The warmest and saltest water consistently found on the deeper parts of the shelf in the Holsteinsborg section, and northward, indicates Atlantic water much diluted from its passage into Davis Strait. The vertical position of such water in the northern sections when compared with the respective velocity profiles places it near the under side of the West Greenland Current. The distribu-

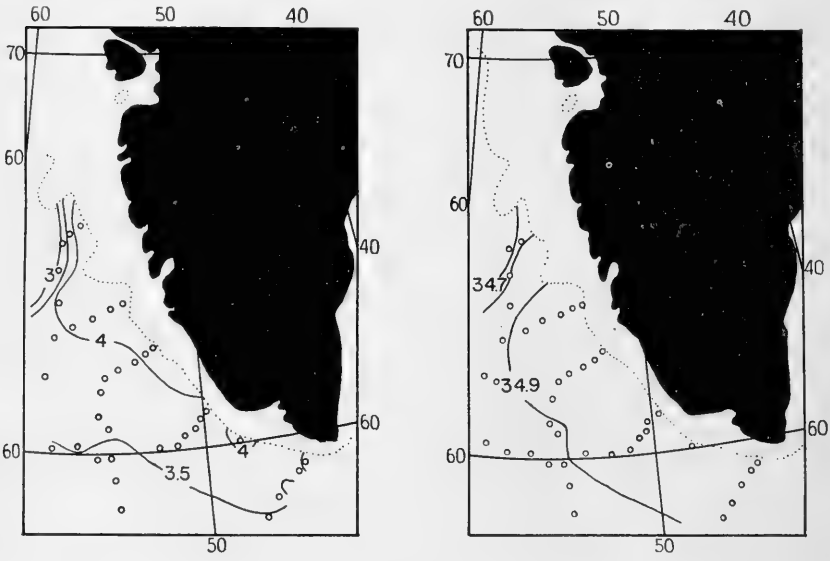

FIGURE 19.—Temperature and salinity at a depth of 600 meters July 30–September 3, 1928.

tion of temperature and salinity in the Disko Island section, section G (figs. 20 and 21), like the other sections to the south, supports the evidence of the velocity profiles, viz, an appreciable amount of West Greenland Current entered Baffin Bay.

The continuity and concentration of the Irminger-Atlantic water, as the subsurface illustrations generally reveal, was less pronounced off Cape Farewell at a point nearer its source than it was off Ivigtut. The east Greenland Arctic water was similarly distributed. The *Godthaab's* observations agree with the *Marion's* in this respect and thus indicate that the condition was not purely coincidental. The International Ice Patrol, similarly, has found lower temperatures on the southwest slope of the Grand Banks than upstream at the Tail of the Banks. The distribution of the Irminger-Atlantic water along the southwest slope of Greenland in 1931, however (figs. 32 and 33), was in accordance with the direction of the cur-

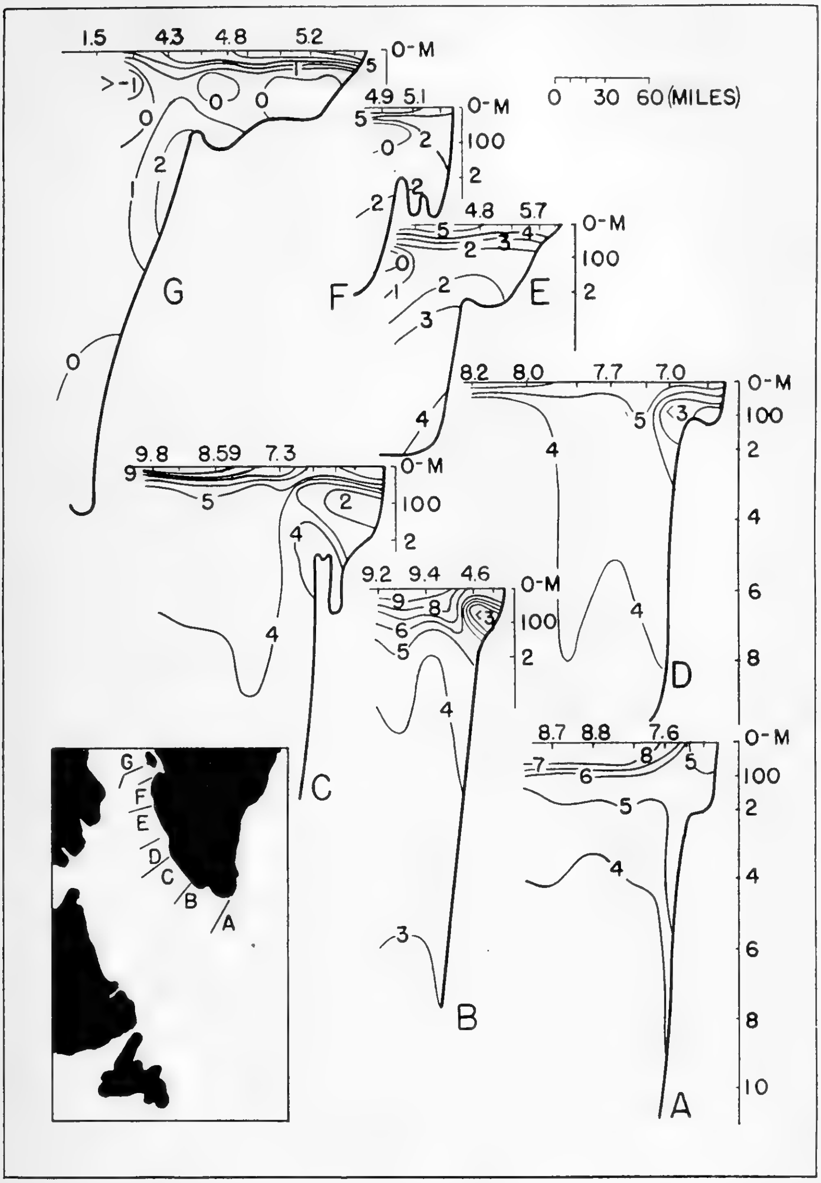

FIGURE 20.—Temperature profiles across the continental shelf July 30–September 3, 1928; A, Cape Farewell; B, Ivigtut; C, Fiskernaessett; D, Godthaab; E. Holsteinsborg; F, Egedesminde; F_1, Disko Bay; and G, Disko Island.

rent, that is, more concentrated and in greater volume at Cape Farewell than at Ivigtut.

The fact that the thermal and haline gradients were less steep at Cape Farewell than at Ivigtut in 1928 (figs. 20 and 21) strongly suggests a more active mixing of the West Greenland Current at times in the former, than in the latter, region.

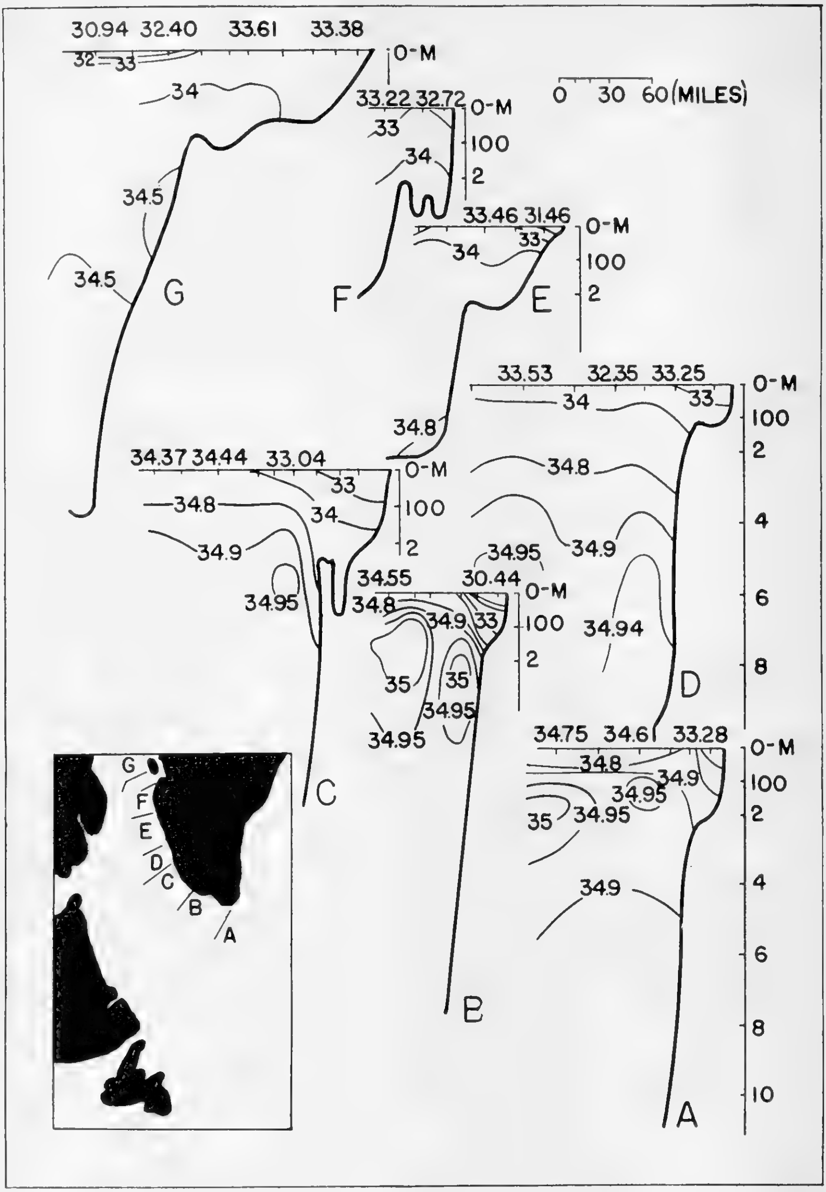

FIGURE 21.—Salinity profiles across the continental shelf July 30–September 3, 1928.

The turbulence noted at times off Cape Farewell appears most likely to be caused by the abrupt change in the direction of the continental slope and the consequent turning of the current to the right. Eddies apparently form (fig. 8) in this locality of rugged bottom topography and probably assist in splitting the West Greenland Current. At such times one branch hugs the slope and the other branch is deflected southwestward offshore. A more active mixing in the Cape Farewell region may also be contributed by an intensification of the offshore circulation, at which times a portion of the Atlantic current in the Labrador Sea may join the West Greenland Current setting northward toward Davis Strait.

A comparison between the relative positions of the coldest water and the saltest water and the position of the strong slope current off Ivigtut (fig. 22) continues to substantiate previous findings,

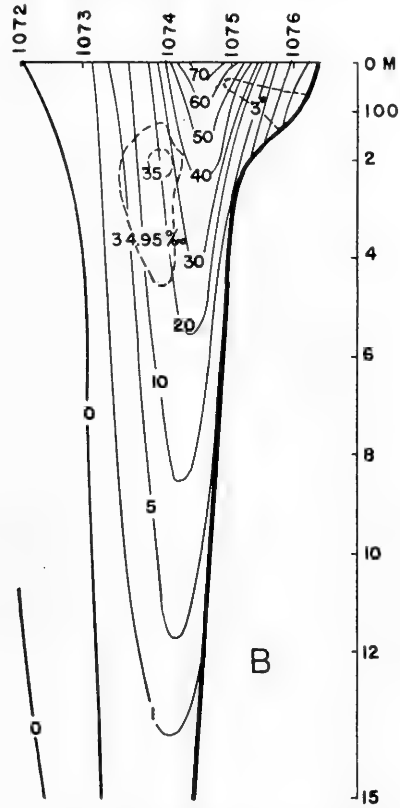

FIGURE 22.—The Ivigtut profile August 28, 1928. The relative positions of east Greenland Arctic water and Irminger-Atlantic water in the West Greenland Current are shown by the 3° C. isotherm and the isohalines greater than 34.95‰, respectively. The velocity lines represent northwesterly current expressed in centimeters per second.

namely that the West Greenland Current was composed of two types of water of opposite characteristics; (*a*) inshore in the surface layers as marked by temperatures <3.0° C., east Greenland Arctic water; and, (*b*), farther offshore and about 100 meters deeper, as embraced by salinities >34.95‰, Irminger-Atlantic water.

It will be noted that in none of the Coast Guard's surveys has water as salt as 35.00‰ been found west of Cape Farewell on the sea surface. The axis of greater than 35.00‰ water, wherever present, immediately north and west of Cape Farewell, has been concentrated about 100 to 150 meters below the sea surface. If the Irminger-Atlantic water be traced upstream, however, the upper side as marked by the 35.00‰ isohaline, often intersects the sea surface (see Böhnecke, 1931) east and north of Cape Farewell in the vicinity of the thirty-seventh meridian. This again strongly suggests the sinking of Irminger-Atlantic water. (See p. 175.)

That two homogeneous bodies of water free from outside influences mix in ratio to their physical properties of temperature and salinity is well known. This correlation when plotted graphically forms a straight line between the points typical of the components of the

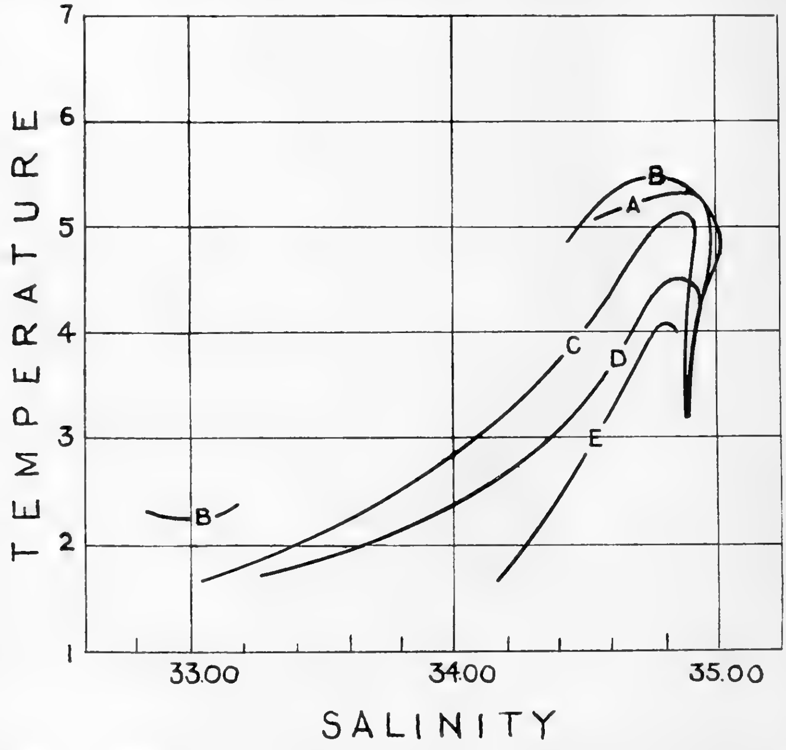

FIGURE 23.—Temperature-salinity correlation curves of the West Greenland Current, Cape Farewell to Hosteinsborg, the summer of 1928.

mixture. In all of our correlation graphs (figs. 23, 49, 65, 66, 76, and 100) the temperature-salinity data have been plotted by sections, the resulting curves representing, therefore, each the temperature-salinity correlation of the current at that particular cross section. The continuity of the curves is directly proportional to the distance between stations of the given section; the greater the number the stations the more accurate the temperature-salinity curve. The West Greenland current, for example, is illustrated by a series of curves on figure 23, the letter on each curve referring to the corresponding section as shown on figure 7. The lower left portion of the curves represents east Greenland Arctic water, and the upper right Irminger-Atlantic water. The more vertical part of the curves from the upper inflection point downward is indicative of the deepest water embraced in the observations. This lower point may be regarded as a third component of the West Greenland Current, the mixing between the Irminger-Atlantic water and this deep water being indicated by the curves. Corroboration of the loss of heat from the warm core of the West Greenland Current with northward progress is furnished by the continually lower inflection points on the correlation curves, A to E (fig. 23). A similar progression of the curves at the point of greatest salinity indicates a continual freshening of the Irminger-Atlantic water. The resulting density as indicated by the inflection points representative of Irminger-Atlantic water, curves A to E (fig. 23) increased approximately 0.04, Cape Farewell to Holsteinsborg. The mixing and cabbeling of the current as a whole is further discussed in chapter VIII, p. 175.

As a final analysis of the slope band of the West Greenland Current, the average temperature and the rate of heat transfer at the eight sections, A to G, are given in the table below, and expressed in million cubic meter degrees centigrade per second. The method of obtaining these values is explained in chapter II, page 24.

West Greenland Current

Section	Average temperature (°C.)	Rate of heat transfer	Section	Average temperature (°C.)	Rate of heat transfer
Cape Farewell (A)	5.5	17.5	Holsteinsborg (E)	3.0	3.9
Ivigtut (B)	6.0	44.4	Egedesminde (F)	2.3	3.0
Fiskernaessett (C)	4.2	27.7	Disko Bay (F_1)	2.7	1.1
Godthaab (D)	4.1	21.7	Disko Island (G)	0.5	0.5

The table shows that the average temperature progressively decreased as the West Greenland Current flowed northward, except in the offing of Ivigtut and Disko Bay. The swelling of the current at Ivigtut, and the consequent increase in heat transfer, has been previously explained. The higher average temperature in the Disko Bay section is attributed directly to solar warming of that shallower-water locality.

The marked reduction in the rate of heat transfer to be noted in the last four sections of the above table is attributed to the great proportion of the current which left the Greenland slope near Godthaab (see p. 33) and carried its heat toward American shores.

The slope band of the West Greenland Current with a maximum of 44.4 million cubic meter degrees centigrade, per second at Ivigtut transported 0.5° C. $m^3/s \times 10^6$ or only about 1 percent of its heat into Baffin Bay. The heat transported into Baffin Bay based on the *Godthaab's* observations (p. 53) was 1.4 million cubic meter degrees centigrade per second. This higher value is due to the higher average temperature, the *Godthaab's* stations being located in deeper and warmer water than those of the *Marion*. An average temperature of 1.0° C. and a heat transport of 1.0 million cubic meter degrees centigrade per second is considered representative of the West Greenland Current entering Baffin Bay.

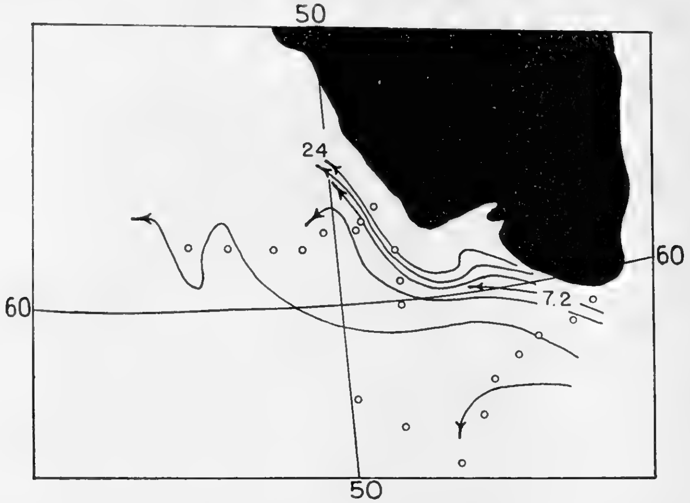

FIGURE 24.—The West Greenland Current on the surface, July 27–August 2, 1931. Velocities expressed in miles per day.

ANNUAL VARIATIONS

The question whether or not the oceanographic conditions already described in this chapter as existing in west Greenland waters in 1928 prevail during most summers can be answered, at least for southwestern Greenland, by the Coast Guard's surveys repeated there in 1931, 1933, and 1934, and also by further comparisons with other published observations.

Currents.—The surface current maps for each of the Coast Guard's surveys, when compared with the similar map for 1928 (fig. 8) indicate that variations of considerable magnitude occur in the surface current off southwest Greenland. The branching of the West Greenland Current away from the slope at Cape Farwell in 1931, a feature which is more clearly revealed in the velocity profiles than in the surface current maps, represents an important departure from the other years. If the velocity profiles (figs. 27 to 29) be compared with the surface current maps (figs. 24 to 26) it will be noted that in 1931 the volume of slope band of the West Greenland Current at Cape Farewell was 3.98 million cubic meters per second, and this was separated from the slope itself by 0.3 million cubic meters per second of counter current. Off Ivigtut a few days earlier the slope band was calculated at 2.42 million cubic meters per second. Although the velocity at Ivigtut exceeded that at Cape Farewell a smaller transport resulted at the former place because of the current's decrease in width and draft. In the summer of 1933 the slope band at Cape Farewell, amounting to 6.52 million cubic meters per second, was split by a subsurface counter current of 0.76 million cubic meters per second volume. Off Ivigtut, however, the West Greenland Current swelled to 12.1 million cubic meters per second; the largest transport recorded

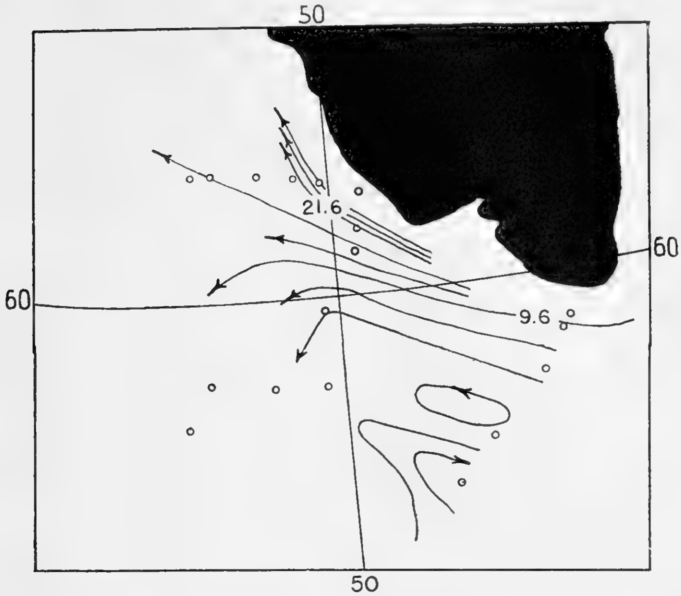

FIGURE 25.—The West Greenland Current on the surface, July 2–14, 1933. Velocities expressed in miles per day.

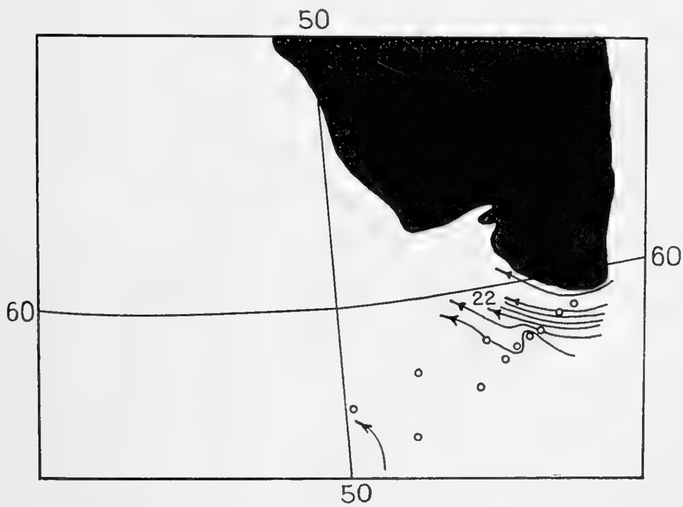

FIGURE 26.—The West Greenland Current on the surface, July 12–15, 1934. Velocities expressed in miles per day.

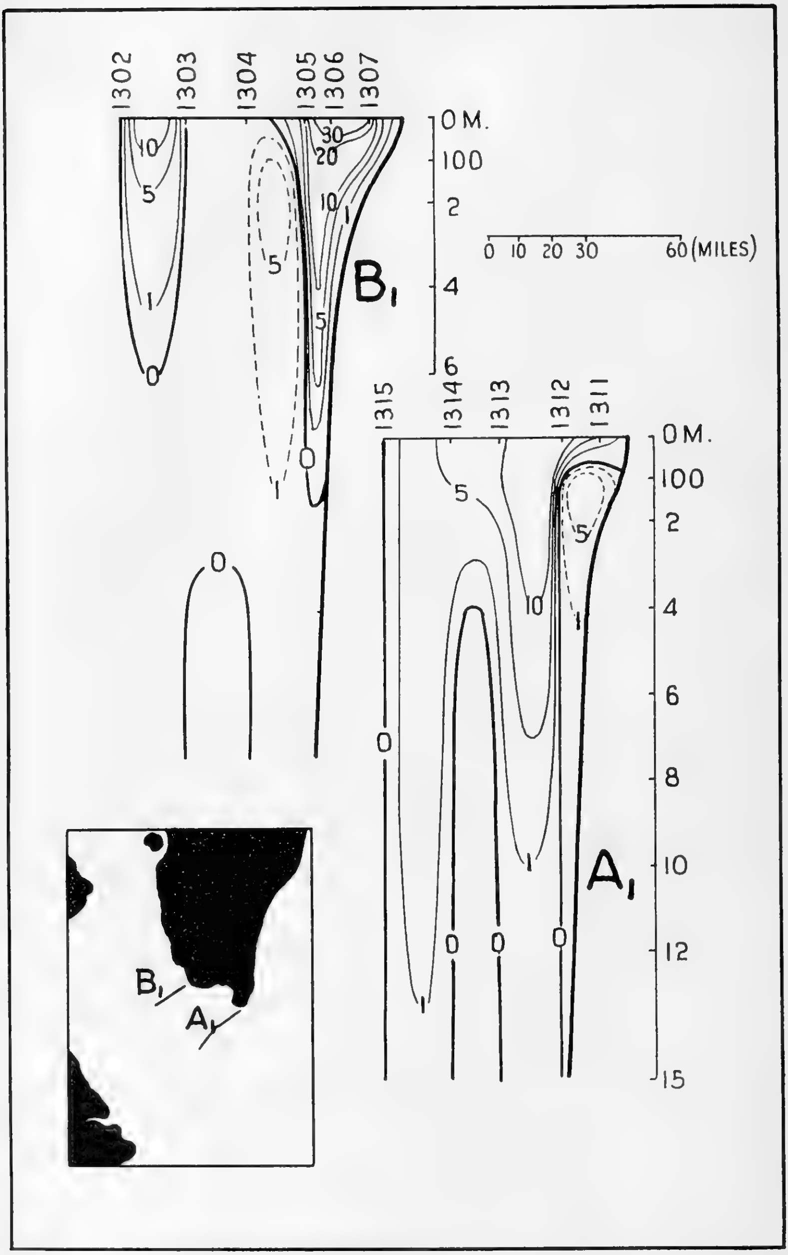

FIGURE 27.—Velocity profiles of the West Greenland Current expressed in centimeters per second. The solid lines represent northerly current and the dashed lines southerly current. Section A_1, August 1–2, 1931; section B_1, July 28, 1931.

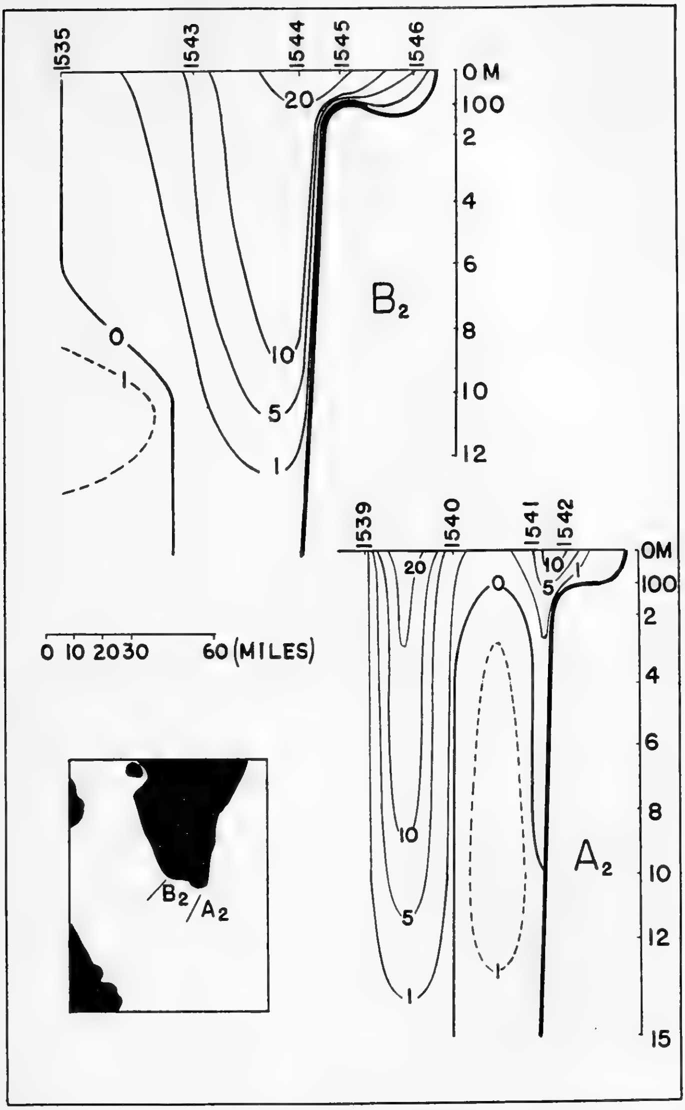

FIGURE 28.—Velocity profiles of the West Greenland Current expressed in centimeters per second. The solid lines represent northerly current and the dashed lines southerly current. Section A_2, July 9, 1933; section B_2, July 7–13, 1933.

for the west Greenland sector. In 1934 the slope band at Cape Farewell was 3.71 million cubic meters per second. In order to obtain further comparisons the volume of the West Greenland Current was computed from the observations of the *Godthaab* (see Conseil Permanent International, 1929); the observations of the *Meteor* (unpublished); and the observations of the *General Greene* (see Soule, 1936).

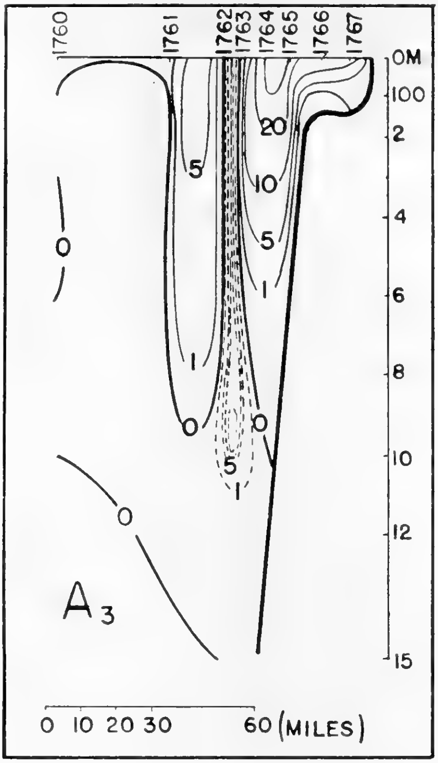

FIGURE 29.—Velocity profile of the West Greenland Current expressed in centimeters per second. The solid lines represent northerly current and the dashed lines southerly current. Section A_3, July 12–13, 1934.

The above data on the slope band of the west Greenland current may be summarized as follows:

CAPE FAREWELL SECTION [1]

Date	Width (miles)	Average velocity	Velocity on axis	Volume of flow
May 1928				4.0 m³/sec.×10⁶.
August–September 1928.	24	10.0 miles per day	15.0 miles per day	3.2 m³/sec.×10⁶.
July–August 1931	95	2.8 miles per day	7.2 miles per day	3.7 m³/sec.×10⁶.
July–August 1933	80	4.8 miles per day	9.6 miles per day	5.8 m³/sec.×10⁶.
July 1934	36	10.8 miles per day	22.0 miles per day	3.7 m³/sec.×10⁶.
March 1935				7.5 m³/sec.×10⁶.
August 1935				8.5 m³/sec.×10⁶.

IVIGTUT SECTION [1]

Date	Width (miles)	Average velocity	Velocity on axis	Volume of flow
August 1928	40	19.0 miles per day	33.0 miles per day	7.4 m³/sec.×10⁶.
October 1928				7.8 m³/sec.×10⁶.
July 1931	22	13.4 miles per day	24.0 miles per day	2.4 m³/sec.×10⁶.
July 1933	66	12.0 miles per day	21.6 miles per day	12.1 m³/sec.×10⁶.

[1] See station maps, figs. 153 to 155 herein, and Conseil Permanent International, 1929, for difference in geographical positions of the sections.

It is seen from the above table that the width, velocity, and consequent transport of the West Greenland Current vary considerably from year to year. The close agreement between the *Meteor's* and *General Greene's* Cape Farewell observations March to August 1935, as well as the *Godthaab's* and *Marion's* Ivigtut observations, regarding the volume of current, August to October 1928, indicate that the variations in the transport of the West Greenland Current sometimes are of long periods. A doubling of the volume of the West Greenland Current along the southwest coast of Greenland is noted in 2 of the 3 years (1928 and 1933). It is also interesting to note from the table that the summer which recorded the deficiency in volume of current off Ivigtut, 1931, also marked a major branching of the current off Cape Farewell, as shown on the dynamic topographic map for that year (fig. 123, p. 167). The foregoing suggests that the summers of 1928 and 1933, on the one hand, and the summer of 1931, on the other, represent two distinct types of the system of circulation off West Greenland. According to this view, the slope band in some summers increases in volume between Cape Farewell and Ivigtut, while in other summers the West Greenland Current may branch southwestward at Cape Farewell, as much as two-thirds of its volume mixing offshore in the Labrador Sea.

Temperature and salinity.—The relative positions of, and areas occupied by, Atlantic and Arctic water, and the values of the temperature and the salinity in the maps and sections for 1931, 1933, and 1934 (figs. 30 to 35) do not differ materially from those described for 1928.

In order to compare one summer with another and also consecutive months of a single summer, the minimum temperatures of the east Greenland Arctic water and the maximum temperatures of the Atlantic water of the West Greenland Current have been arranged in table form:

EAST GREENLAND ARCTIC WATER—CAPE FAREWELL

(Average minimum summer temperature, 0.6°; average depth, 33 meters)

Date	Vessel	Station	Depth (meters)	Temperature
May 1928	Godthaab	3	75	−0.25
July 1934	General Greene	1767	24	−.13
July 1925	Dana	VII 23	25	.26
July 1931	General Greene	1311	0	.75
July 1933	do	1542	0	2.02
September 1909	Tjalfe	137	90	<1.00
September 1928	Marion	1080	20	[1] 4.30

[1] Not included as conjectured to be outside East Greenland Arctic Water.

EAST GREENLAND ARCTIC WATER—IVIGTUT

(Average minimum summer temperature, 0.82°; average depth, 60 meters)

June 1928	Godthaab	28	75	0.20
July 1931	General Greene	1307	50	−.27
July 1925	Dana	VII 10	75	.09
July 1933	General Greene	1546	50	−.10
August 1928	Marion	1076	100	2.30
October 1928	Godthaab	186	10	2.70

ATLANTIC WATER—CAPE FAREWELL

(Average maximum summer temperature, 5.85°; average depth, 130 meters)

Date	Vessel	Station	Depth (meters)	Temperature
May 1928	Godthaab	6	50	5.49
June 1925	Dana	VI 5	200	3.96
July 1933	General Greene	1540	113	5.39
July 1931	do	1313	100	7.60
July 1934	do	1765	147	6.65
August 1928	Marion	1083	100	5.85
September 1909	Tjalfe	140	200	>6.00

ATLANTIC WATER—IVIGTUT

(Average maximum summer temperature 5.70°; average depth, 135 meters)

Date	Vessel	Station	Depth (meters)	Temperature
June 1925	Dana	VI 6	300	4.03
July 1931	General Greene	1303	100	5.53
July 1933	do	1549	98	5.39
August 1928	Marion	1074	100	6.00
October 1928	Godthaab	183	75	7.58

The tables show that the Atlantic water, both in temperature and salinity, remains more constant, summer to summer, than does the temperature and salinity of the Arctic water. This fact was also noted by Böhencke (1931) for the same latitudes off the east coast of Greenland. The constancy of the maximum salinity of the Atlantic water off the southwest slope of Greenland was remarkable, it varying only 0.03‰ for the three summers, viz. 1928, 35.10‰; 1931, 35.07‰; and 1934, 35.07‰. The saltest water reported from the west Greenland section by the *Godthaab* in 1928 was 35.07‰.

That variations occur, however, in the average minimum and the average maximum temperatures of the West Greenland Current and also in its volume has been demonstrated. Helland-Hansen (1934) has found that similar important variations take place in the discharge of the Atlantic Current along the Norwegian coast and also that they correlate with certain climatic variations in Scandinavia as well as with the area of pack ice in the Barents Sea.

In the case of the West Greenland Current, which is composed of both Arctic and Atlantic water, it is more instructive to include consideration of its average temperature and its rate of heat transfer than simply to compare volumes alone or to compare a series of isolated observations. We have, therefore, expanded the table on page 54 in accordance with the method described in chapter II. The average temperature and the rate of heat transfer of the slope band of the West Greenland Current, expressed in million cubic meter degrees centigrade per second, varied as follows:

CAPE FAREWELL SECTION

Date	Volume of flow	Average temperature (°C.)	Rate of heat transfer
May 28–30, 1928	4.0 $m^3/sec.\times10^6$	4.1	16.4
Sept. 2–3, 1928	3.2 $m^3/sec.\times10^6$	5.5	17.5
Aug. 1–2, 1931	3.7 $m^3/sec.\times10^6$	5.3	19.6
July 8–9, 1933	5.8 $m^3/sec.\times10^6$	4.2	24.4
July 13–14, 1934	3.7 $m^3/sec.\times10^6$	5.1	18,9
Mar. 8, 1935	7.5 $m^3/sec.\times10^6$	4.0	30.0
Aug. 19–20, 1935	8.5 $m^3/sec.\times10^6$	5.0	42.5

IVIGTUT SECTION

Date	Volume of flow	Average temperature (°C.)	Rate of heat transfer
Aug. 27-28, 1928	7.4 m³/sec.×10⁶	6.0	44.4
July 28, 1931	2.4 m³/sec.×10⁶	3.1	7.4
July 13-14, 1933	12.1 m³/sec.×10⁶	4.2	50.8
Oct. 8-9, 1928	7.8 m³/sec.×10⁶	5.4	42.1

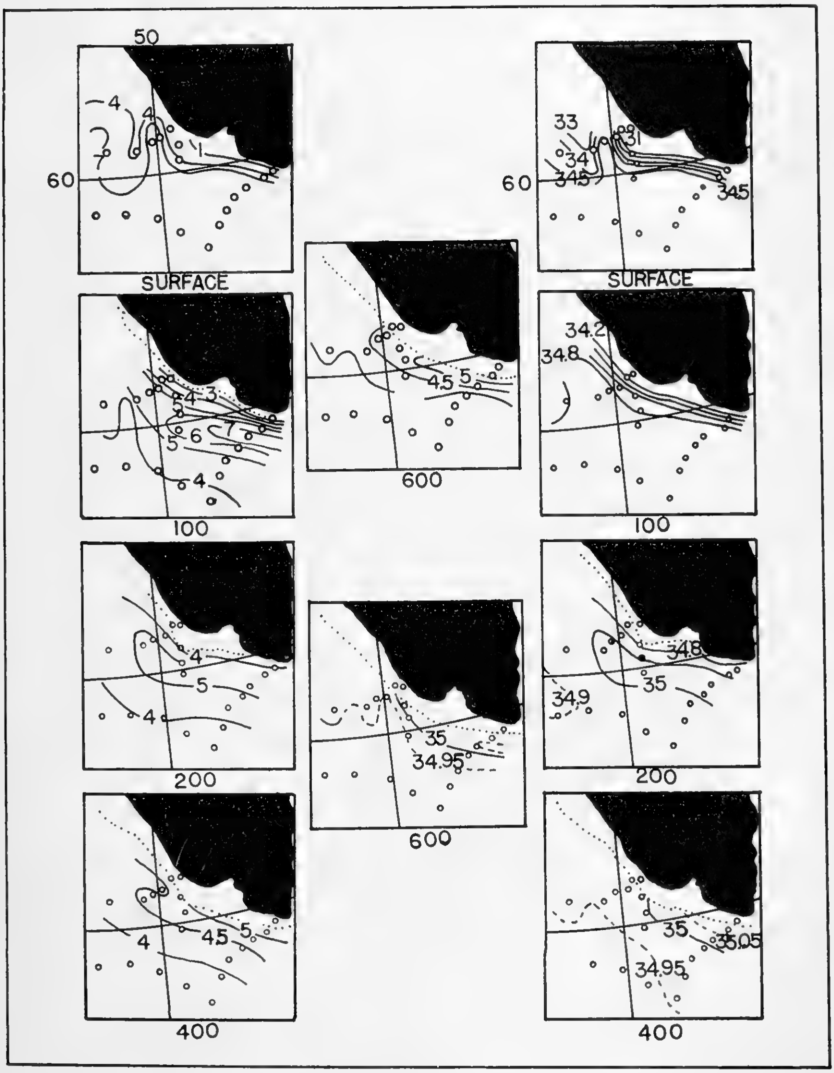

FIGURE 30.—Temperature and salinity at the surface, 100, 200, 400, and 600 meters July 27–August 4, 1931

The above table shows that the West Greenland Current [7] transported more heat per second past Cape Farewell in 1935 than in any other summer for which there is record. The additional heat was, moreover, due not to a higher mean temperature but to a more voluminous current. At Ivigtut more heat was carried in 1933 than in any other year, but there are only data there from three summers with which to make comparisons. The greatest variation in the rate of heat transfer is noted for the summer of 1931 at Ivigtut when it amounted to only about 25 percent of any of the other summers. This deficiency is described above (p. 54) as arising not from lower temperature of the current itself, as can be seen from the table of average temperatures, but to major branching at Cape Farewell.

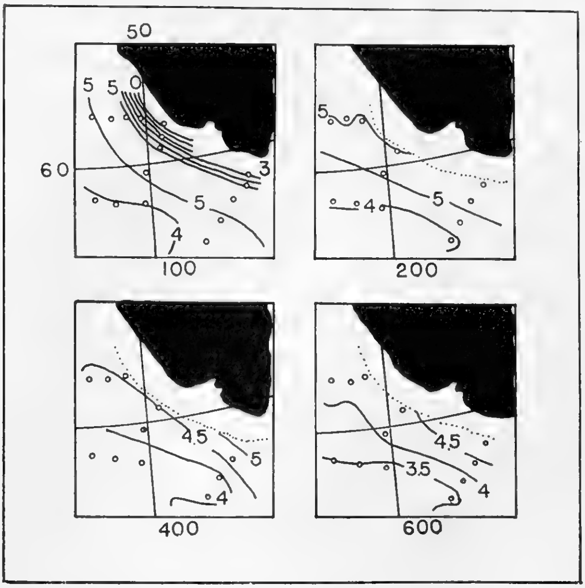

FIGURE 31.—Temperature at 100, 200, 400, and 600 meters July 9–14, 1933

Variations in the rate of heat transport of the West Greenland Current may have many far-reaching effects. That such variations do occur is proved by the quantitative observations included in the foregoing table, but as to the range of such variations and what correlations exist between them and related factors—climatic, biological, and glaciological—the data are yet scanty. It may be more than simply coincidental, for example, that contemporary with the deficit in 1931 of the rate of heat transported northward into Davis Strait and toward blockaded iceberg glaciers (Smith, 1931) only 13 icebergs that spring were recorded south of Newfoundland.

In this connection it should be mentioned that the method of iceberg forecasting developed by Smith (1931) and tested by the Coast

[7] Böhnecke (1931) found the Irminger Current in Denmark Strait more voluminous in 1928 than 1930.

Guard during the past several years is based solely on meteorological factors. From the beginning it was realized that there were other factors, and we suspect that two of these are (*a*) the rate of heat supply of the West Greenland Current and (*b*) the degree of branching of the West Greenland Current into the Labrador Sea. The former may affect the icebergs near their source and the latter may affect them on their journey southward.

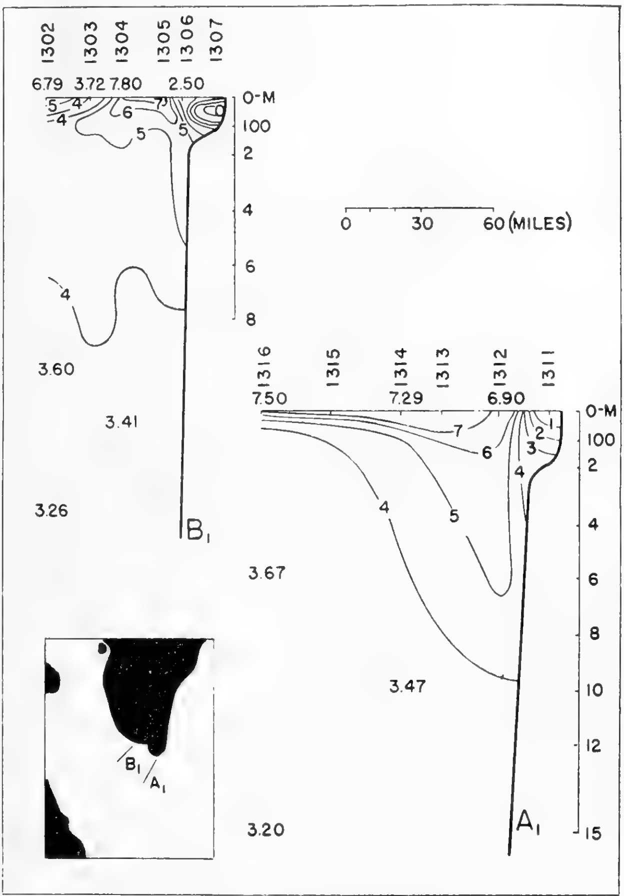

FIGURE 32.—Temperature profiles across the continental shelf, A_1, August 1–2, 1931; B_1, July 28, 1931

In commenting on the East Greenland Polar Current along the west coast of Greenland Nielsen (1928) points out that, if negative temperature is to be accepted as the index of such water, then often in autumn the extension of the East Greenland Current northward of Cape Farewell along the west coast dwindles and disappears. Naturally during summer in sub-Arctic zones higher temperatures prevail in the upper water layers than at other times of the year. Ac-

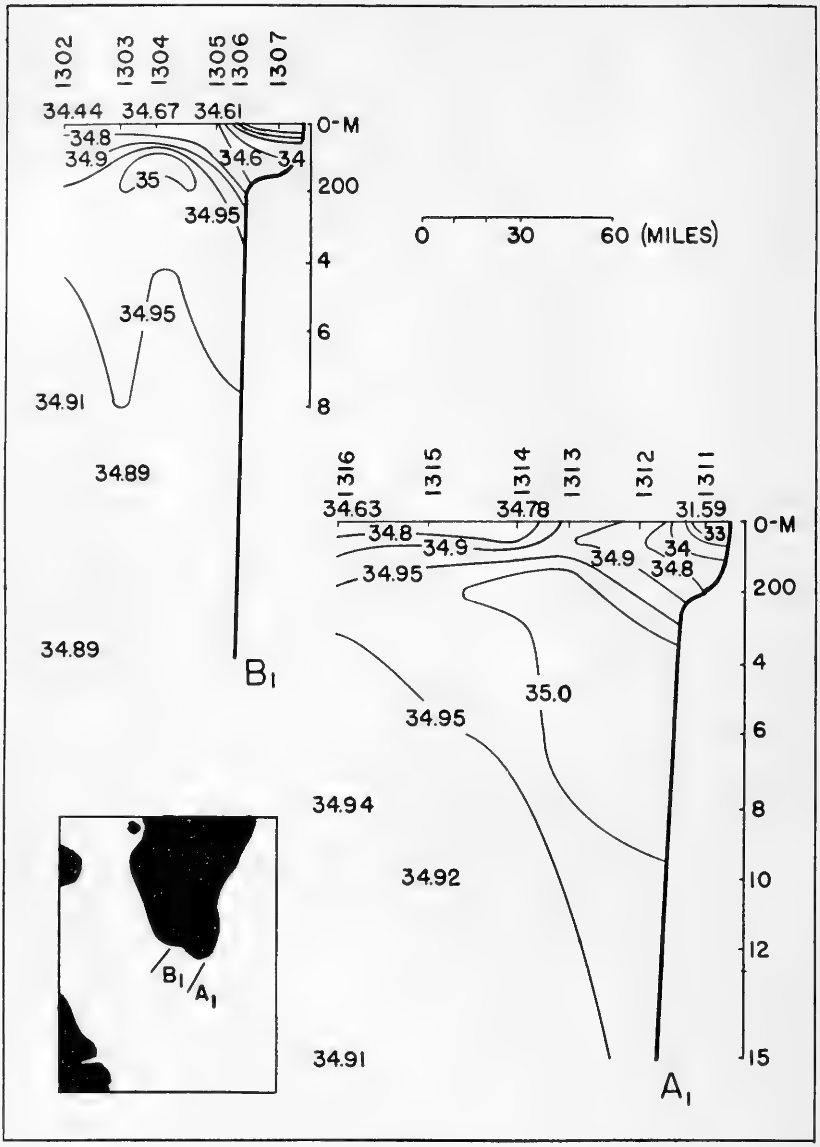

FIGURE 33.—Salinity profiles across the continental shelf, A_1, August 1–2, 1931; B_1, July 28, 1931

cordingly, the tongue of coldest water along the southwest coast of Greenland shown by our observations, even if positive in temperature (see fig. 15), has been considered by us as representing the East Greenland Current, and, if so defined, it cannot be said to disappear from the west coast. According to this view east Greenland Arctic water suffers major diminution near Fylla Bank, and, while there is a northerly set even to Disko Bay, the proportion of original constituents are probably very small. The designation of West Greenland Current for the northerly set along the west coast of Greenland avoids any opportunity for a misunderstanding on this point.

Nielsen's (1928) statement that the East Greenland Polar Current may carry ice as far north as Egedesminde is believed in error. The ice referred to was probably "vestis" (see Smith, 1931, p. 44), which in severe winters drifts eastward across Davis Strait and

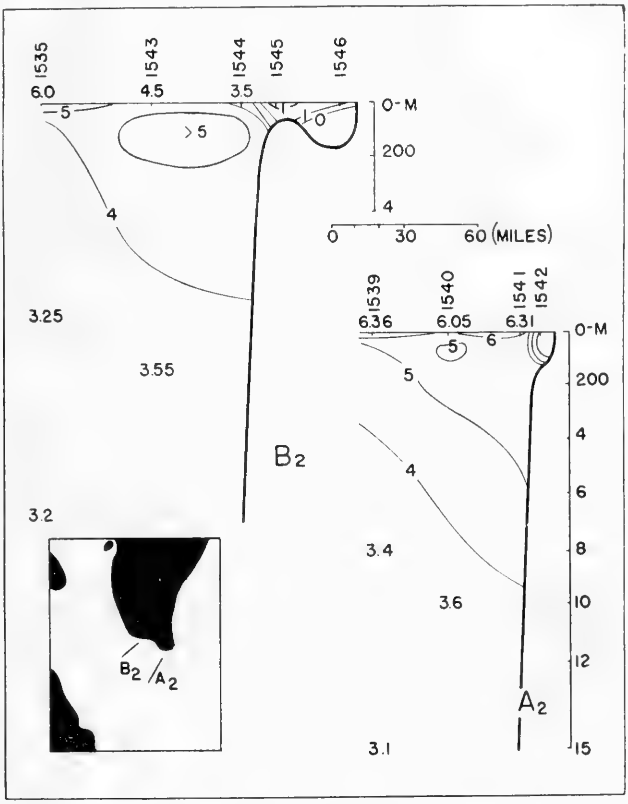

Figure 34.—Temperature profiles across the continental shelf, A_2, July 9, 1933; B_2, July 7–13, 1933

has been reported on the Greenland coast even as far south as Holsteinsborg.

The *Dana's* and *Godthaab's* sections of temperature extending from Godthaab out into the Labrador Sea (Baggesgaard-Rasmussen and Jacobsen, 1928) and (Conseil Permanent International, 1929), when compared with the corresponding section of the *Marion* (fig. 20, p. 45), reveals that east Greenland Arctic water does not always hug the slope as might be inferred from the *Marion's* observations but may often be present in one of the several branches of the West Greenland Current which turn westward into the Labrador Sea.

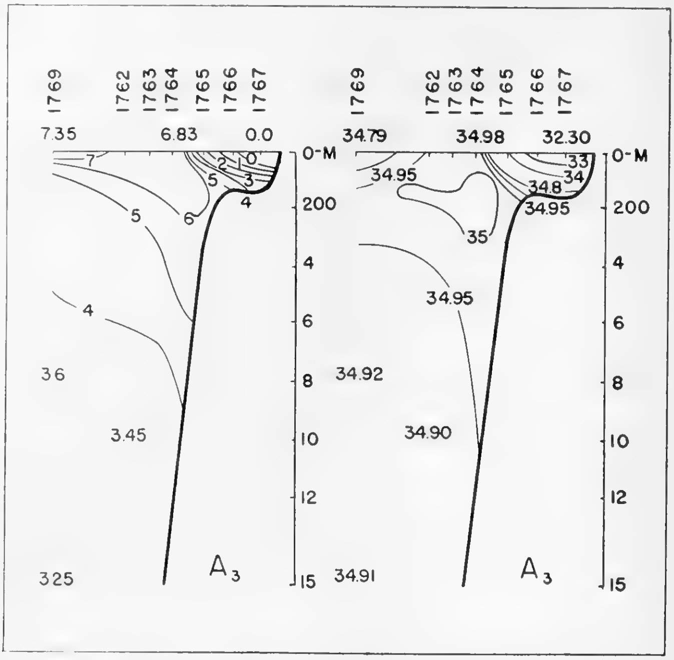

FIGURE 35.—Temperature and salinity profiles across the continental shelf at Cape Farewell, July 13–14, 1934

ANNUAL CYCLES

While there are several years' data with which to trace annual variations of temperature and salinity in the west Greenland sector for summer and early autumn there have been until recently very few surface or subsurface observations collected during other periods of the year essential to learn the annual cycle. The information available now is contained in a section running southward from Cape Farewell. The observations there have been collected at the following times: *Meteor*, March 1935; *Godthaab*, May 1928; and *Marion*, September 1928.

A comparison of the vertical distribution of the temperature, salinity, and density off Cape Farewell at the end of winter, again the latter part of spring, and finally at the end of summer (fig. 36) indicates that throughout the year cold low-salinity water (east Greenland-Arctic) prevails in the surface layers next to the coast, while farther offshore at deeper levels persists warmer, saltier water (Irminger-Atlantic).

The extent to which the system of circulation in the northwestern North Atlantic is affected by wintertime conditions has heretofore been speculative. That the West Greenland Current, however, prevails throughout the year is apparent from a comparison of the March to September profiles (fig. 36) one with another. The computed volume of the West Greenland Current at Cape Farewell in

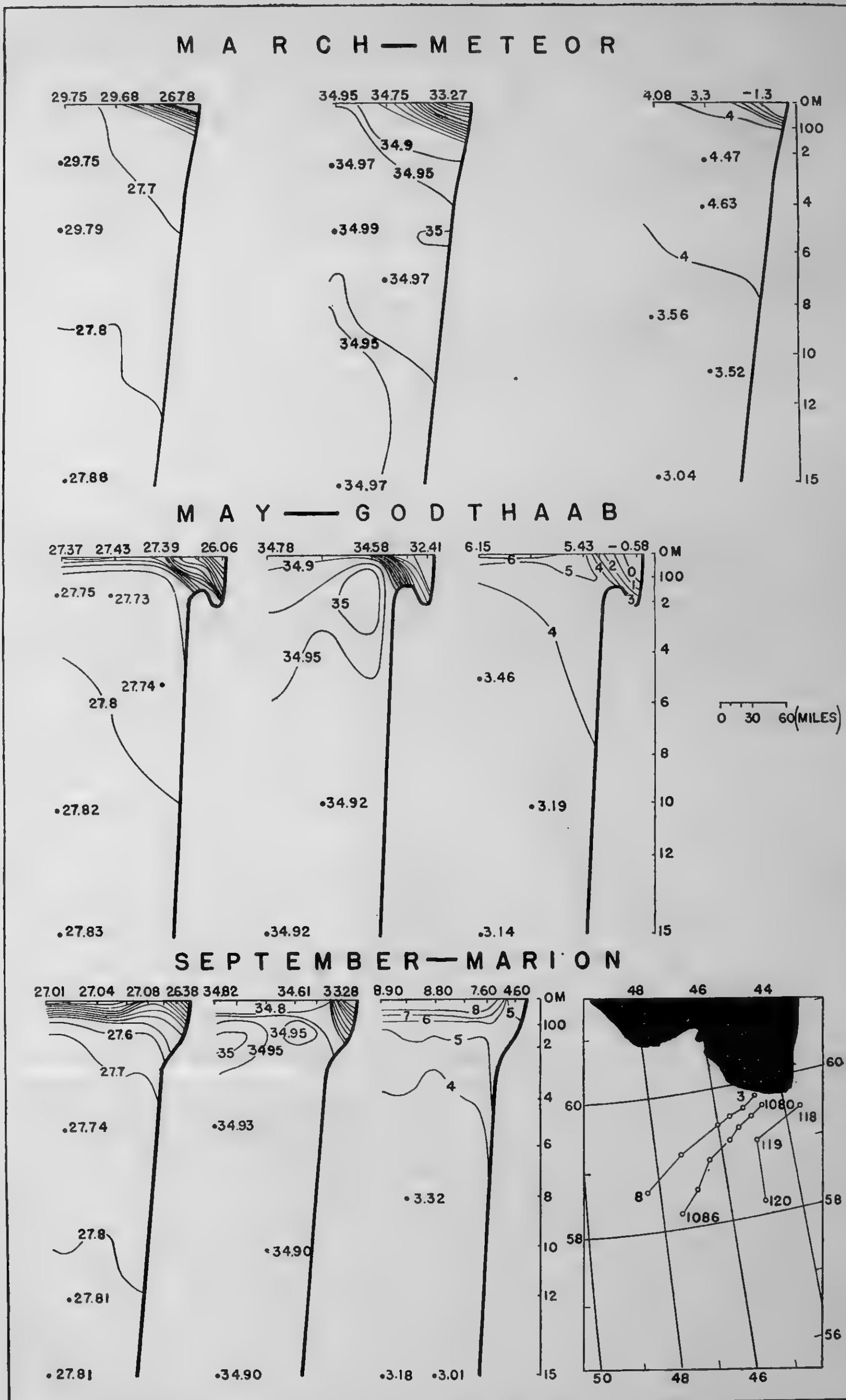

FIGURE 36.—Temperature profiles across the continental shelf at Cape Farewell, March 1935 and May and September 1928.

March 1935 of 7.5 million cubic meters per second when compared with volumes found there in August 1935 and also during several other summers proves that the West Greenland Current is apparently not seasonal, or, if seasonal, that effect is masked by greater variations noncyclic in character.

The effects of winter chilling of the surface layers, and consequent convectional mixing, are, however, plainly visible (fig. 36), where the temperature and salinity gradients of May and September were completely erased by March. The sections furnish information on the annual temperature range of the surface layers outside the shelf off Cape Farewell. The temperature in the axis of the Irminger-Atlantic current probably rises from a minimum in February of about 4° C. to a maximum of slightly over 8° C. in September. In the fresher water near the coast it probably ranges from −1.3° C. at the end of winter to around 3.0° C. or 4.0° C. at the end of summer. The May section of the *Godthaab* apparently recorded a point about midway of the annual cycle.

The average temperature and the rate of heat transfer of the West Greenland Current off Cape Farewell at the three seasons was computed as follows:

Annual thermal cycle of the West Greenland Current (Cape Farewell)

Date	Volume of flow	Average temperature	Rate of heat transfer
Mar. 7–8, 1935	7.5	4.0	30.0
May 28–30, 1928	4.0	4.1	16.4
Sept. 2–3, 1928	3.2	4.4	17.5

Despite the winter chilling of the surface layers of the West Greenland Current, the table shows that in some winters, at least, the current transports more heat into the Labrador Sea than it does at other times of a year.

The higher average temperature of the deeper parts of the current in March 1935 was also accompanied, according to the salinity profile (fig. 36), by a correspondingly higher salinity. Warm, salty water apparently mixed and sank to greater depths off Cape Farewell in March 1935 than in any of the summers for which there is record.

A more thorough internal mixing during winter below the frictional influence of the wind may have been due to convectional currents, but an examination of the density profile reveals generally a fair stability. The stability of any column in the section, 0–1,500 meters, was greatest closest to Cape Farewell and decreased directly with the distance from the coast. Farthest out from the shore (*Meteor's* station 120, fig. 36) the density was uniformly 27.75, surface to 220 meters, but below there the density progressively increased with depth to 27.88 at 1,500 meters. The maximum depth, therefore, to which convectional chilling was directly and actively penetrating around Cape Farewell March 7–8, 1935, was probably about 220 meters. Wintertime convectional currents are, however, believed to have assisted salty water downward to depths of 1,200 and 1,500 meters at *Meteor's* station 120, prior, however, to the time of, and upstream from the place of, the actual taking of the observations. The depth of vertical convection farther offshore is discussed in chapter VIII.

No wintertime observations have ever been taken northward of Cape Farewell in the west Greenland sector, but an indication of the annual cycle is contained in the Ivigtut sections of the *Marion* and *Godthaab*. The *Marion* ran the Ivigtut section the last few days of August 1928, and the *Godthaab* repeated the survey the first week in October (fig. 37). The close proximity of the two sections in geographical position and the recorded constancy of the West Greenland Current during the interval of about 5 weeks lend accuracy to a direct comparison between relative heat values as follows:

Ivigtut section

Date	Volume of flow	Average temperature (°C.)	Rate of heat transfer
Aug. 27–28, 1928	7.4 $m^3/sec. \times 10^6$	5.96	44.1
Oct. 8–9, 1928	7.8 $m^3/sec. \times 10$	5.40	42.1

The rate of heat transfer of the West Greenland Current August 28 to October 9, 1928, without appreciable change of the volume of flow diminished 2.0 million cubic meter degrees centigrade per second in a period of about 5 weeks. This decline in the rate of heat supply is attributed directly to the seasonal cooling of the surface layers.

A table recording in more detail the volume of the West Greenland Current, previously depicted on the velocity profiles, and described in this chapter is appended herewith.

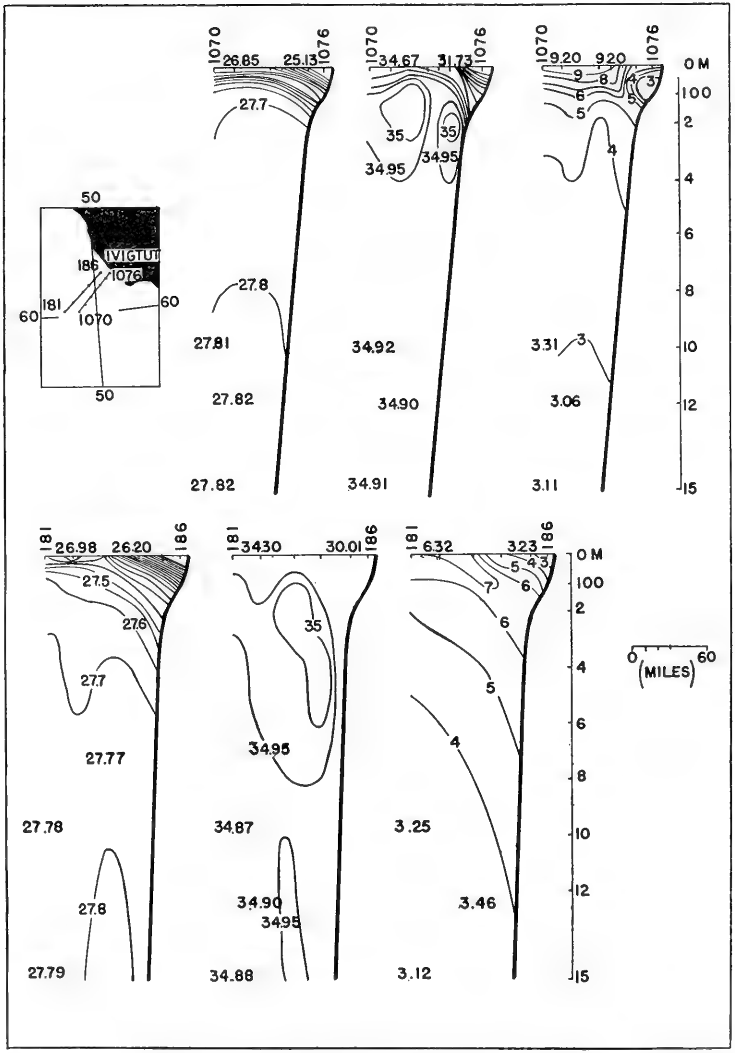

FIGURE 37.—Temperature profiles across the continental shelf at Ivigtut, August and October, 1928. *Marion*, stations 1070–1076; *Godthaab*, stations 181–186.

Volume of West Greenland current

[Millions cubic meters per second]

Section and position	1928			1931		
	South	North	North	South	North	North
Section A:						
Offshore	1.66	3.98	....	....	....	....
Slope	1.11	} 3.20	....	0.30	3.98	....
Shelf	....					
Total	2.77	7.18	4.41	.30	3.98	3.68
Section B:						
Offshore	2.60	....	....	.35	.48	....
Slope	....	} 7.40	....	....	2.42	....
Shelf	....					
Total	2.60	7.40	4.80	.35	2.90	2.55
Section C:						
Offshore	1.85	3.00	....	....	....	....
Slope	....	} 6.65	....	....	....	....
Shelf	....					
Total	1.85	9.65	7.80	....	....	....
Section D:						
Offshore	1.80	2.00	....	....	....	....
Slope	....	} 5.32	....	....	....	....
Shelf	....					
Total	1.80	7.32	5.52	....	....	....
Section E:						
Slope	....	1.12	....	....	....	....
Shelf	.07	.20	....	....	....	....
Total	.07	1.32	1.25	....	....	....
Section F:						
Slope	....	} 1.29	....	....	....	....
Shelf	....					
Total	....	1.29	1.29	....	....	....
Section F_1:						
Slope	} .44	.44	....	....	....	....
Shelf						
Total	.44	.44	....	....	....	....
Section G:						
Slope	....	.93	....	....	....	....
Shelf	1.29	....	....	....	....	....
Total	1.29	.93	[1] 1.36	....	....	....

Section and position	1933			1934		
	South	North	North	South	North	North
Section A:						
Offshore	....	6.52	....	1.55	0.36	....
Slope	0.76	}	....	....	3.71	....
Shelf	....					
Total	.76	6.52	5.76	1.55	4.07	2.52
Section B:						
Offshore	.48		....	....	....	....
Slope	....	} 12.57	....	....	....	....
Shelf	....					
Total	.48	12.57	12.09	....	....	....

[1] South.

Chapter V

THE DAVIS SECTOR

THE SURFACE CURRENTS

The name, "Davis Strait", is used here for the narrow part of the waterway which separates Greenland and Baffin Land (p. 2). The bathymetric map of this region (fig. 38) shows the two basins, Labrador and Baffin, connected by a winding channel, which, as marked by the 600 meters isobath, averages 40 miles in width and with a threshold depth of 675 meters. Because all exchanges between the Labrador Sea and Baffin Bay necessarily have to pass across this sill, particular investigation has been devoted to the Davis Strait sector. Besides the Coast Guard's data, the *Godthaab* expedition's observations, Riis-Carstensen (1936), and the *Michael Sars*' observations, Martens (1929) have also been utilized. For the geographical position of the stations see figure 38. In constructing the series of dynamic topographic maps shown in figure 39, *Godthaab's* station number 162, latitude 67°48.5′ north, longitude 60°48′ west, was selected as the datum station for the surveyed area, except for *Marion* stations 986 to 994, which have been referred to *Marion* station 984, latitude 63°10′ north, longitude 56°32′ west. The dynamic heights for the above stations, similar to those of the Coast Guard, have been computed in accordance with the anomaly tables published by Sverdrup (1933) and the method referred to by Helland-Hansen (1934).

It will be recalled from this theorem that if motionless water is correctly assumed at the selected level (usually a deep level between two deep-water stations), all motion is accounted for even at the bottom of the shoalest stations. An important step in the method, however, is the correct determination or portrayal of the distribution of the anomaly of specific volume along the bottom of the shoal water stations in the section. That errors in the dynamic height and the computed velocity at shoal water stations may result from the above source was demonstrated in our work when a common inshore station was approached along two converging sections. For example, the computed dynamic heights of station 45, based upon the distribution of specific volume in a vertical plane passed through station 42 and another plane passed through station 46, were 1,454.874 dynamic meters and 1,454.900 dynamic meters, respectively. A similar discrepancy arose in the computed dynamic heights of station 168 which were 1,454.879 and 1,454.823 dynamic meters by different approaches. The difference in the first case when expresesd in terms of motion introduces an error of 1.7 centimeters per second, which is not great, but in the second case the difference represents a current of 7.3 centimeters per second, which is relatively significant. When the dynamic values for each one of the stations in the Davis Strait sector were plotted, and a topographic map at-

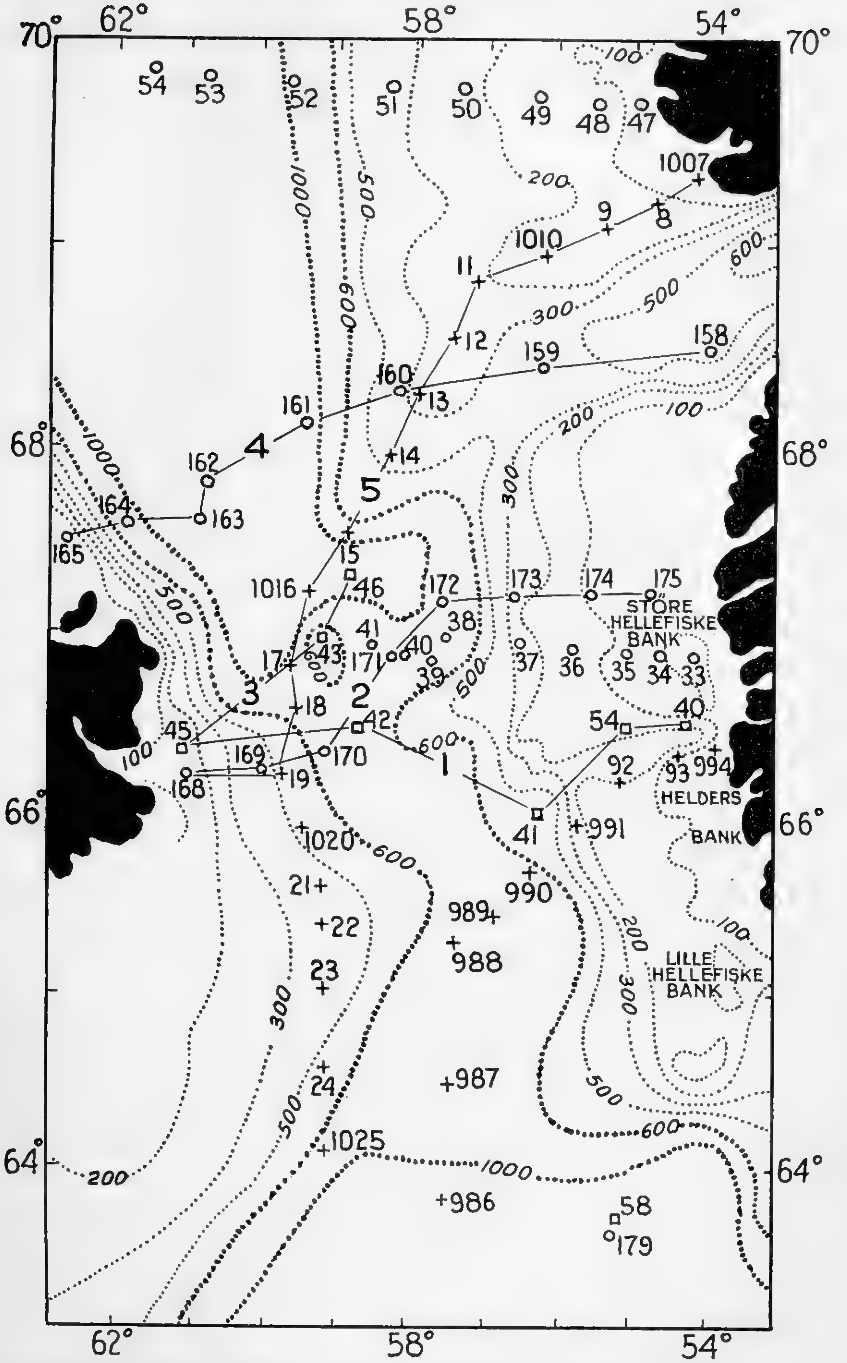

FIGURE 38.—The Davis Strait sector: □ *Michael Sars* stations, 1924; + *Marion* stations, 1928; ○ *Godthaab* stations, 1928.

tempted, it was immediately perceived, moreover, that the dynamic values of adjacent stations not in the same section exhibited undue irregularities. Similar conditions appearing at the 500 meter level (a depth beyond the seasonal influence in this type of water), indicated that errors were probably introduced by incorrect assumptions as to the distribution of anomaly of specific volume. It must be admitted, however, that the time embraced by the observations taken by three separate expenditions easily affords opportunity for both seasonal and secular changes of considerable magnitude, and it must be realized that in a waterway, such as Davis Strait, wide and rapid fluctuations are to be expected. Consequently the dynamic topographic maps shown here can present only the outstanding features of circulation through the strait.

The most striking feature as shown on figure 39 is the vigorous south-flowing band which dominates the western side of the strait, penetrating downward there more than 500 meters—the so-called Baffin Land Current. This stream was widest and most rapid at the surface, showing a maximum calculated velocity of 26 centimeters per second (12.5 miles per day) over the slope between Cape Kater and Cape Dier. The velocity decreased inversely with the depth, a velocity of 6 centimeters per second (2.9 miles per day) being recorded at the 500-meter level.

The eastern side of Davis Strait, figure 39, shows a weak but widespread drift of water northward. From the surface down to the 200-meter level this movement was given continuity by narrow bands of more rapid current which reflected the outline of the west Greenland banks in this sector. The northerly set in the surface layers constituted importations to many coastal estuaries and to Disko Bay where the indraft along the Egedesminde shore partially compensated for the discharge past Godhavn.

Below 200 meters (see 500 meters, fig. 39), northerly current filled the eastern half of the Davis Strait Channel and continued northward into Baffin Bay. The current at the 500-meter level with a mean velocity of approximately 3 centimeters per second (1.5 miles per day), according to figure 39, appeared stronger and more enduring than the similarly directed movement in the upper layers. The fact that this current at 500 meters was composed of water much warmer and more saline than its surroundings (see figs. 42 and 44) positively identifies it as that part of the West Greenland Current which had continued farthest northward along the Greenland slope. It is our conjecture that this current represents the main source of supply of the well-known warm intermediate layer of Baffin Bay and partially compensates for the discharge of the Baffin Land Current in the west.

The eddies and swirls noted at every one of the levels of the Davis Strait Channel (fig. 39) are believed characteristic features of the circulation which continually develop as a result of the mixing along the margins of dissimilar types of water.

Many Disko Bay icebergs (mostly from Jacobshavn and Torsukatak glaciers) as previously pointed out (p. 36) are borne out of the bay in the discharge which hugs the Disko Island slope. (See surface current map, fig. 39, and velocity profile F_1, fig. 11.) The

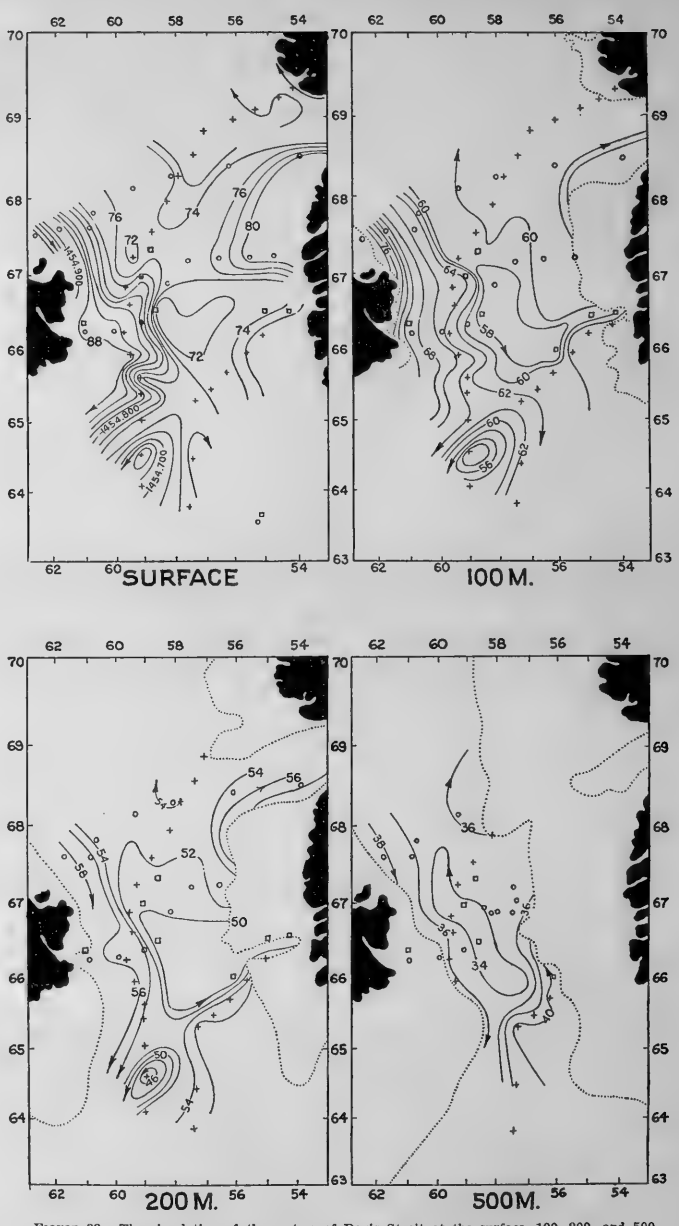

FIGURE 39.—The circulation of the waters of Davis Strait at the surface, 100, 200, and 500 meters, expressed in anomalies of dynamic height above the 1,500-decibar anomaly suface.

dynamic topographic map of Baffin Bay (fig. 126, p. 170) indicates that many of the Disko Bay icebergs are carried northward with the current through the Vaigat. Once outside the coastal estuaries and headlands, as indicated by the slope currents (fig. 126), the icebergs follow a generally cyclonic circuit of Baffin Bay. There is no evidence from the dynamic topographic maps that icebergs in the southern part of Baffin Bay drift directly across to the Baffin Land Current. The *Marion* on her track between Disko Island and Cape Dier sighted no icebergs out in the central part of Davis Strait.

CROSS SECTIONS OF THE CURRENTS

The stations shown on figure 38 have been grouped into a total of five cross sections of the currents in the Davis Strait sector as shown on figure 40. All of the velocity profiles with little exception emphasize the main features of the circulation described in the horizontal projections. The Baffin Land Current with velocity lines ranging from 5 to 20 centimeters per second in the heart of the current appears on all the profiles, filling the western half of Davis Strait. The West Greenland Current, much weaker, with velocity lines varying from 1 to 5 centimeters per second, prevailed in the eastern half of the strait. A band of northbound Greenland coastal current is also to be noted in each one of the profiles. The southerly current, which appears at stations 161 to 159 on profile 4, and stations 1014 to 1013, profile 5 (fig. 40), refers to the discharge from Disko Bay which the plane of the section intersected at an acute angle. The successive areas of alternate northerly and southerly current recorded on the right side of profile 5 (fig. 40) probably refer to a single band of winding current which followed the trend of Disko Island Bank.

The dynamic gradient resulting from the warmer and fresher waters in over the Greenland banks accounts for the northerly movement of the surface layers [8] on the east side of Davis Strait. It is quite certain after studying the distribution of temperature and salinity across Davis Strait (see fig. 44) that the same dynamic factors extend down over the edge of the Greenland slope and result in northerly motion of the deeper water there. The higher temperature and salinity of the band of current centered at 500 meters on the Greenland slope (see fig. 40, profiles 1, 2, and 5) has already been identified as Irminger-Atlantic portions of the West Greenland Current. Previous published statements have pointed out that this warm water is forced up over the Davis Strait Ridge as an undercurrent to Baffin Bay. The impression of an undercurrent has probably been much accentuated by the behavior of the Baffin Land Current, which, being the more vigorous and lighter, often floods eastward in the surface layers, overriding the West Greenland Current. This appears to be the most logical explanation at present for the position of the currents depicted in profile 1 (fig. 40), and also for the notion that Atlantic water penetrates northward into Baffin Bay as an undercurrent only.

[8] Nielsen (1928) identified surface water in Disko Bay which had been encountered earlier in a wide area over Great Hellefiske Bank more than a hundred miles southward.

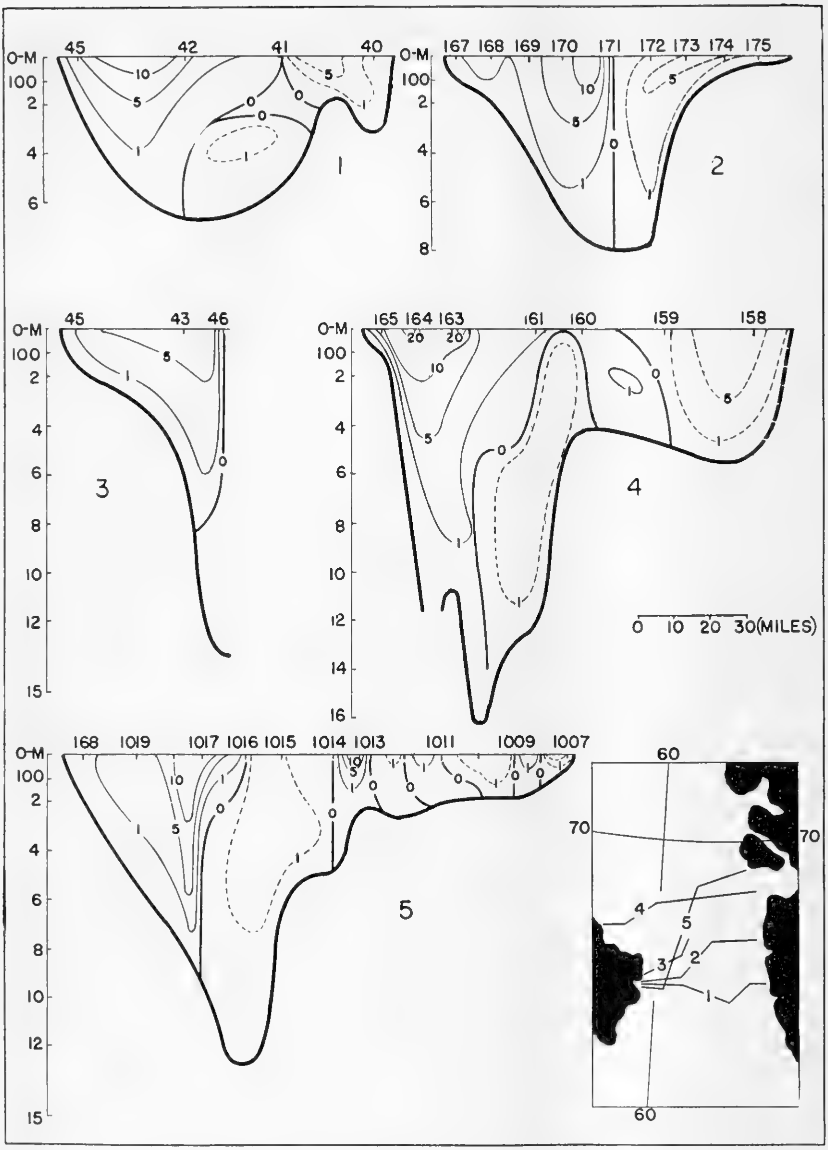

FIGURE 40.—Five velocity profiles across Davis Strait expressed in centimeters per second. The solid lines represent southerly current and the broken lines northerly current. (1) *Michael Sars*, August 16–18, 1924; (2) *Godthaab*, September 17–19, 1928; (3) *Michael Sars*, August 9–13, 1924; (4) *Godthaab*, September 12–14, 1928; (5) *Marion*, August 13–17, 1928.

The velocity profiles are particularly valuable in revealing the volume of the exchanges across the Davis Strait Ridge. These are contained in the following table expressed in millions of cubic meters per second:

Volume of flow

[Millions of cubic meters per second]

	Baffin Land Current (south)	West Greenland Current (north)
Section 1	1.92	0.61
Section 2	2.68	1.12
Section 3	1.78	----------
Section 4	4.29	1.87
Section 5	2.55	.93
Average	2.64	1.13

The table shows that the volume of flow of the Baffin Land Current through section 4 much exceeded that through any of the other sections. Reference to the station map (fig. 38) indicates that section 4 crossed the deep water in the southern end of Baffin Bay about 60 miles north of the shallowest part of Davis Strait Ridge. It is possible that the Baffin Land Current is subject to considerable fluctuation in volume, but the added fact that the three other cross sections of the Baffin Land Current taken over the ridge itself recorded a volume of current that varied little from 2 million cubic meters per second supports the conjecture that the Baffin Land Current is notably constant in rate of transport. In view of the foregoing it seems most probable that significant under portions of the Baffin Land Current on meeting the rise of the bottom, at the south end of the bay, are deflected to the left following around the side of the basin. Making suitable allowances, therefore, for the larger volume of the Baffin Land Current recorded farther northward in the bay, the normal volume of the discharge across Davis Strait Ridge into the Labrador Sea is placed at 2 million cubic meters per second.

The average rate of transport of the West Greenland Current through Davis Strait according to the table is 1.13 million cubic meters per second. Section 3, as can be seen from the station map (fig. 38), did not extend more than halfway across Davis Strait and therefore furnishes no information on the volume of the West Greenland Current. If the total volume of northward flow is about equally divided between the inshore surface layers and the deeper slope band, it agrees well with previous computations made of the West Greenland Current at points farther south. (See p. 65.)

It is concluded from the foregoing that the average rate of exchange of the water between Baffin Bay and the Labrador Sea is in the ratio of about 2 to 1, and the West Greenland Current through Davis Strait definitely fails, therefore, to maintain the renewal of Baffin Bay water.

HORIZONTAL DISTRIBUTION OF TEMPERATURE AND SALINITY

The distribution of temperature at 75 meters (fig. 41) reflects the courses of the two main currents through Davis Strait—the frigid Baffin Land Current, on the one hand, and the northward drift of the Greenland shelf waters on the other. The area of warmest water recorded in the lower right-hand corner of figure 41 marks the upper layers of the West Greenland Current which have been further heated by the summer's sun. Little or no indication of the penetration of the West Greenland Current into Baffin Bay is to be found on figure 41. This strengthens the conjecture previously advanced that the more important inflow to Baffin Bay follows along the deeper part of the Greenland slope and joins the intermediate layers north of the ridge. The blanket-like layer of

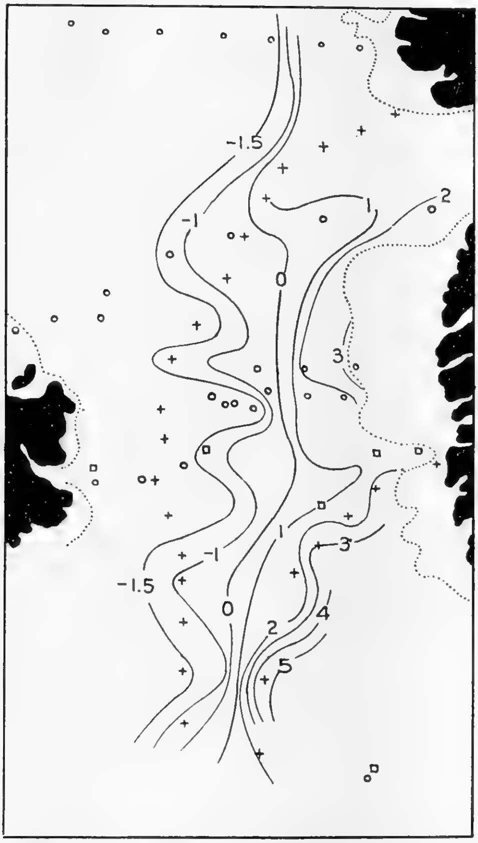

Figure 41.—The temperature at 75 meters.

frigid water at 75 meters as marked by the $-1.5°$ C. isotherm on figure 41 is spread completely across to the Disko Island slope. This suggests an eastward flooding of the Baffin Land Current which as interpreted by these observations overrode the warm current from the south. Such behavior of the surface currents in the Davis Strait sector are believed common, especially in winter when it is well known that pack ice is carried, partly by wind and partly by current, over to the Greenland coast.

The strongest evidence that the previously described exchanges of water through Davis Strait are divisible longitudinally into a cold, fresh current on the west and a warmer, saltier one on the east is contained in the temperature and salinity maps for the 500-meter level (fig. 42). There is also a suggestion in the form and position of the isotherms and the isohalines near the 100-meter isobath at the southern end of Baffin Bay (fig. 15) that the Baffin Land Current at times spreads southeasterly in the surface layers toward Great Hellefiske Bank and may even dam temporarily the northward set of the Greenland waters.

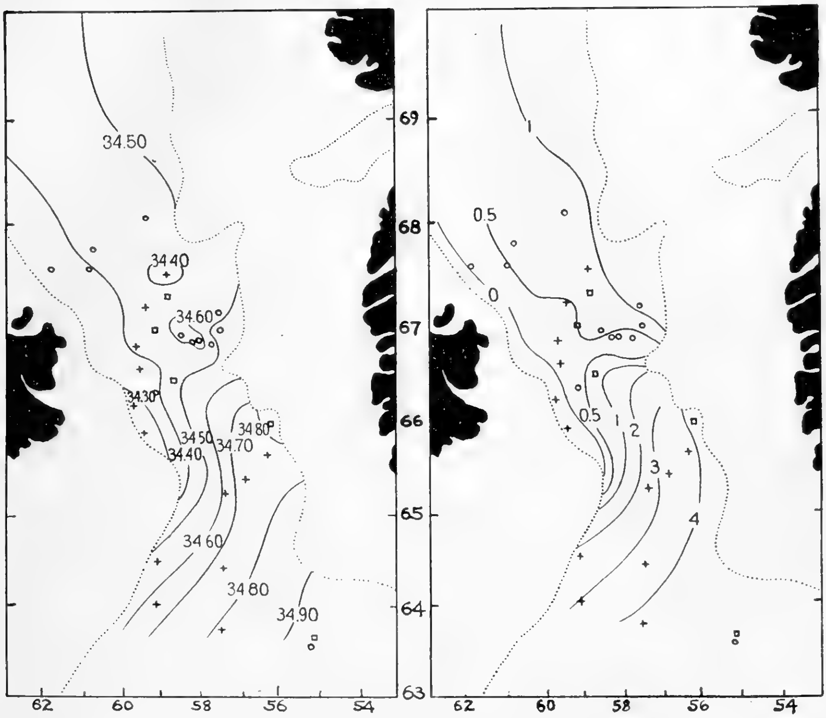

FIGURE 42.—The temperature and salinity at 500 meters.

VERTICAL DISTRIBUTION OF TEMPERATURE AND SALINITY

Martens (1929) has published cross sections of the temperature and salinity taken along the top of the ridge and has given a clear exposition of what are regarded as normal conditions. Two sections only of temperature and salinity, therefore, are presented here—*Marion's* section 5 and *Godthaab's* section 2, both of which illustrate interesting features of the above variables.

Marion's section 5 (fig. 43), following southwesterly along the edge of Disko Island Bank, intersected typical banks water. The intermediate and bottom water, with temperatures below 0° C., were probably reminiscent of winter chilling. The warmest and saltiest water, according to the profile, is noted at a depth of 400 meters on the Greenland slope. Arctic water with temperatures less than 0° C. from station 1015 southward filled the surface layers to a depth of 250 meters. Below that, and most pronounced on the bottom, temperatures as high as 2° C., and salinities of 34.50‰, indicate that even as far north as *Marion's* station 1021, in latitude 65°–37′, longitude 59°05′, west Greenland water sometimes is found under

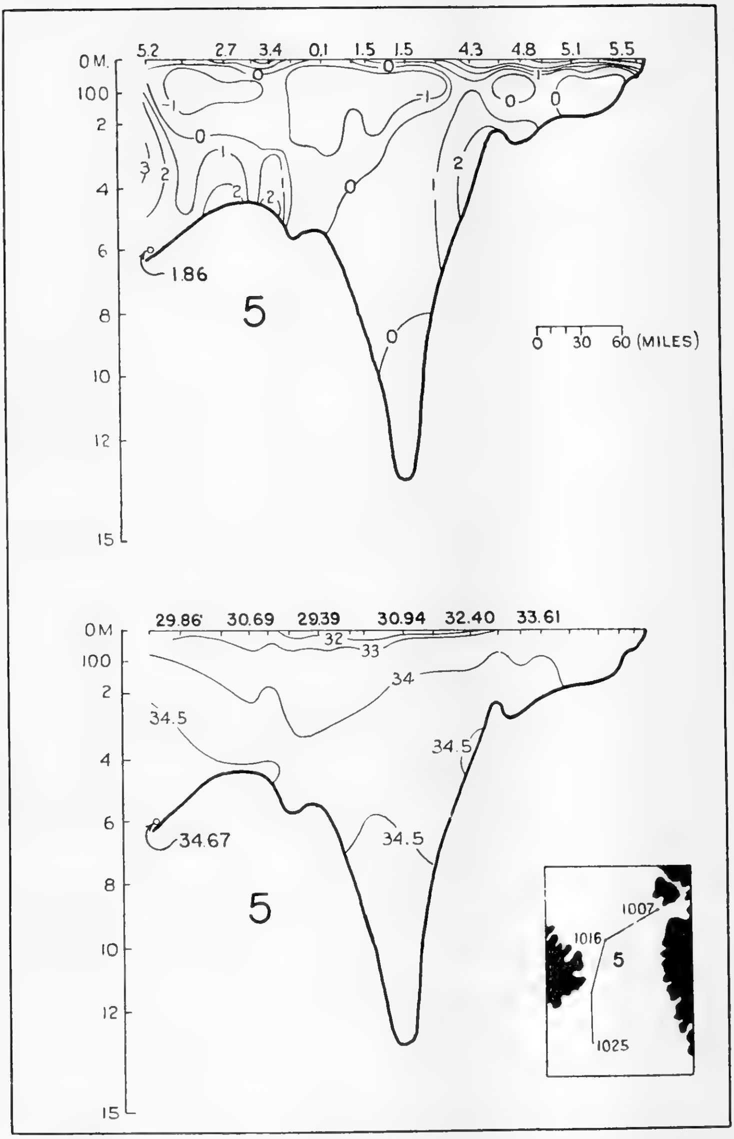

FIGURE 43.—The vertical distribution of temperature and salinity across Davis Strait August 13–17, 1928, as shown by *Marion's* stations 1007–1025.

the Arctic water on the Baffin Land shelf. The negative temperatures and salinities about 34.50‰ noted in section 5 (fig. 43), below depths of 800 meters, represent true Baffin Bay bottom water that is barred from the Labrador Sea by the Davis Strait Ridge.

Section 2 (fig. 44), based on the *Godthaab's* observations, follows the shoaler part of the ridge across Davis Strait. The temperature profile is the more interesting as it more clearly delineates the currents. The water less than −1.0° C., which rested against the Baffin Land slope, represents the heart of the Baffin Land Current. The

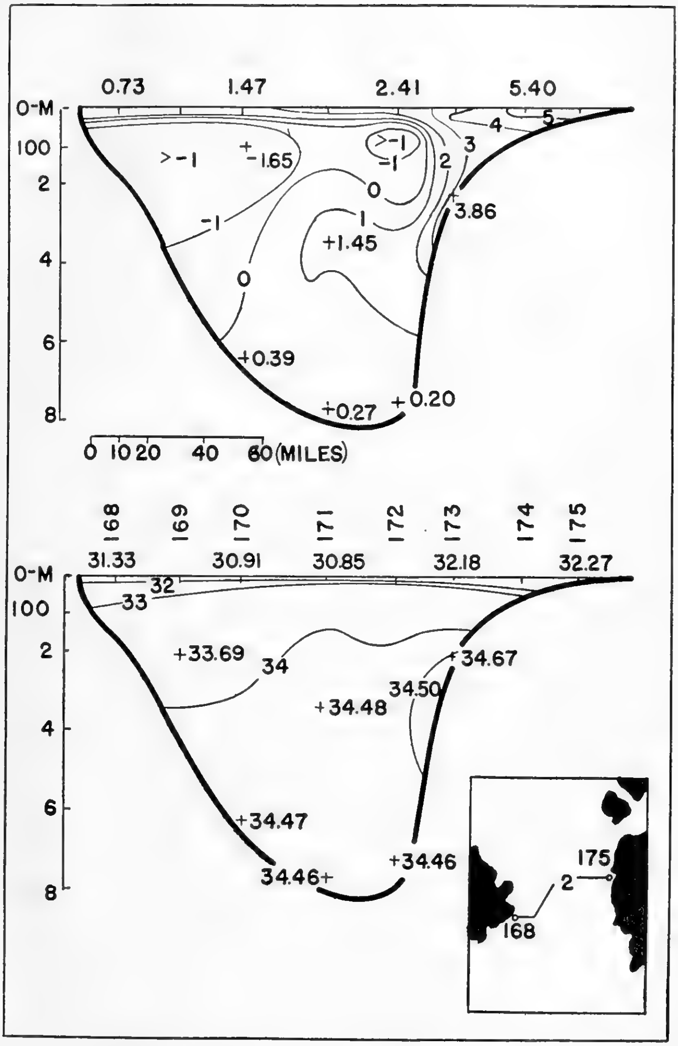

FIGURE 44.—The vertical distribution of temperature and salinity across Davis Strait September 17–19, 1928, as shown by section 2, *Godthaab's* stations 168–175.

core of −1.0° water centered at 100 meters, station 172, however, when compared with velocity profile 2 (fig. 40) is found to have a northerly component. This apparent inconsistency is due to the presence of a cyclonic eddy previously described on page 71. The core of water warmer than 1.0° C., which filled the eastern side of the channel around the 400-meter depth, marks Irminger-Atlantic water of the West Greenland Current. In its passage of 600 miles along the Greenland slope this water, solely through mixing, lost approximately 4° C. of its temperature and 0.50‰ of its salinity in a period of 3 months after passing Cape Farewell. The salinity profile (fig. 44) records two reservoirs of fresh water, one on either side of Davis Strait, the larger of which hugged the American side. Solely on the basis of such a distribution, currents normal to the section are predicated for Davis Strait with the more voluminous flow on the Baffin Land side.

A north-south temperature profile through Davis Strait (fig. 45) emphasizes the shearing action of the currents—a southerly com-

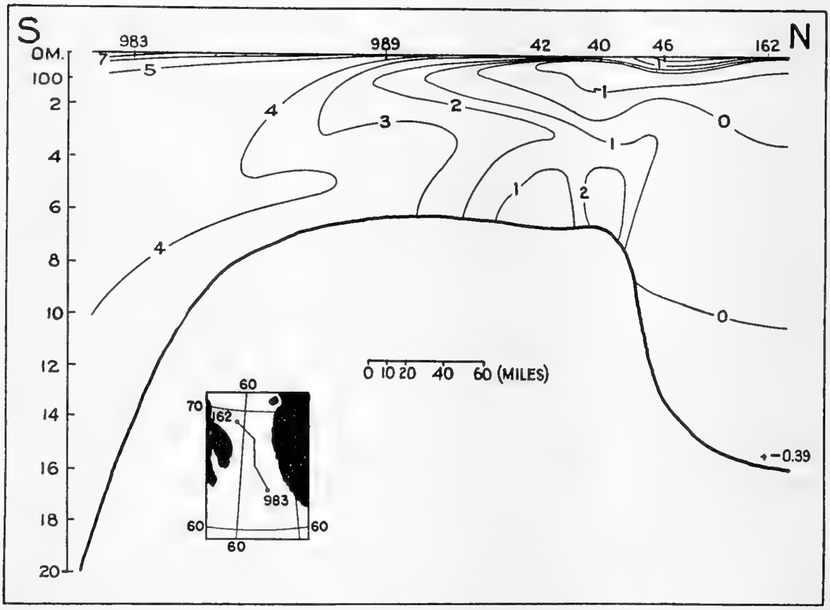

FIGURE 45.—The vertical distribution of temperature longitudinally through midchannel of Davis Strait. (For station identification, see fig. 38.)

ponent dominated the upper layers to a depth of nearly 300 meters and a northerly component prevailed from there to the bottom. In this manner cold water spread southward in the surface layers and warmer water worked northward into Baffin Bay. Practically identical salinity but higher temperature of the channel stream across Davis Strait Ridge marked this branch of the West Greenland Current as an eventual supply of Baffin Bay.

The extent of the production and propagation of the bottom water of Baffin Bay is of particular interest to us, inasmuch as such water may indirectly affect the deeper water of the Labrador Basin. That a great part of the bottom water of Baffin Bay is probably formed by the intermixture of Atlantic and Arctic masses in the northern part of the bay is the opinion of Commander Riis-Carstensen expressed in a letter to one of us. The oxygen distribution of Baffin Bay (fig. 148, p. 187) indicates that bottom water is renewed at a very slow rate. Baffin Bay bottom water (as cold as −0.39° C. and with uniform salinity ca 34.49‰ below the level of Davis Strait sill (figs. 142 and 143) is, of course, directly barred from the much warmer water of the Labrador Sea. The eventual displacement of even the deepest layers in Baffin Bay, however, most probably takes place through upwelling and mixing with lighter water in the bay itself and thus escapes as Baffin Land Current.

A computation of the rate of heat transported by the Baffin Land Current and the West Greenland Current across the Davis Strait Ridge through section 2 (fig. 40) has been made from the *Godthaab's* observations, stations 167–175.

	Average temperature (°C)	Rate of heat transfer (°C m³/s × 10^{-6})
Baffin Land Current	−0.6	−1.6
West Greenland current	1.2	1.4

The fact that the *Godthaab's* section 2 was taken in September 1928 only a short distance from section 1 (fig. 38) made by the *Michael Sars* in August 1924 affords a good opportunity also to learn what annual variations, if any, occur in the waters of Davis Strait. The sections to which reference is made have been published by Martens (1929) and Riis-Carstensen (1936). A comparison between the two profiles shows that the north and south currents occupied similar relative positions. It is surprising, therefore, to find on comparing summertime temperature profiles that the slope band of the West Greenland Current was much warmer and saltier in 1924 than in 1928. The actual figures taken in the heart of the current, at 500-meters depth on the Greenland slope, are—

Year	° C.	‰
1924	4.08	34.88
1928	1.20	34.48

The temperature and salinity of the Baffin Land Current for the two summers, on the other hand, was nearly constant.

The transport of salt through Davis Strait based on the observations of stations contained in section 2 (fig. 40) was—

	Average salinity (‰)	Rate of salt transport (Kg./sec.) ×10^{-6}
Baffin Land Current	34.01	91.1
West Greenland Current	34.32	38.4
Net south salt transport		52.7

Although the West Greenland Current was of higher average salinity than the Baffin Land Current, the much greater volume of the latter resulted in more salt being transported out of Baffin Bay across the Davis Strait Ridge than entered there. A net south rate of salt transport of 52.0 million kilograms per second was obtained based on the observations of the *Michael Sars* as contained in section 1 (fig. 40). Assuming, therefore, a salt balance is being maintained in Baffin Bay, the above deficit indicated through Davis Strait must be compensated by an excess through Lancaster Sound, Jones Sound, and Smith Sound.

It appears from the foregoing that the branch of the West Greenland Current through Davis Strait is subject to considerable variation in temperature. Similar variations in temperature at mid-depths in the West Greenland Current farther south (p. 58) suggest they are related. The fact that the above differences are greatest at depths of 400 and 500 meters eliminates the wind and other surface elements as directly involved factors. Even the variations in the volume of the West Greenland Current noted around Cape Farewell are often probably reflected in excesses or deficits of heat imported to Baffin Bay. The abnormal scarcity of ice in Baffin Bay reported by Bartlett (1936) corresponds well with the excess in the rate of heat supply (p. 63) past Cape Farewell March to August 1935.

It should be added in conclusion that the above remarks apply to the behavior and character of the currents in summer. But it seems logical that the rate of exchanges and the circulation through Davis Strait might be less active in winter when most of the sea in this region is ice covered. Insofar as the West Greenland Current is concerned, however, evidence has been presented (p. 63) which refutes any apparent semblance of seasonal character. What actually happens in the 8 months outside of summer in the region of Davis Strait is wholly unknown.

CHAPTER VI

THE AMERICAN SECTOR

The American sector is the term applied here to the shelf and slope waters embraced by the U. S. Coast Guard's surveys north of St. John's, Newfoundland, during the years 1928, 1931, 1933, and 1934. The 1928 observations, upon which the discussion is based, were made along a series of sections, H to Q, as shown on figure 46.

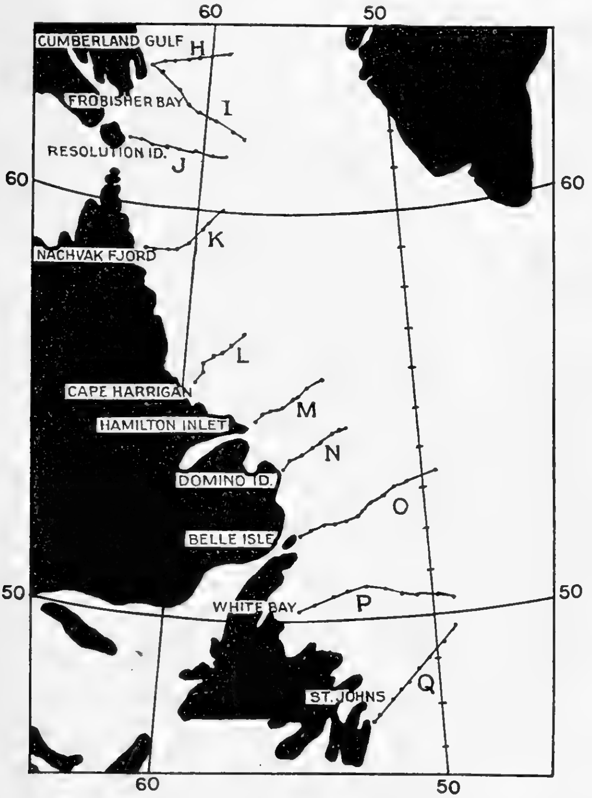

FIGURE 46.—The American sector, 1928. Sections are as follows: H, Cumberland Sound; I, Frobisher Bay; J, Resolution Island; K, Nachvak Fjord; L, Cape Harrigan; M, Hamilton Inlet; N, Domino Island; O, Belle Isle; P, White Bay; and Q, St. John's.

The American sector embraces two principal slope currents—the Baffin Land Current and the Labrador Current. This division of the south flowing waters along the American continental slope, from Ellesmere Land to the Grand Banks, into two currents, differs materially from the previous classifications. As a rule, the flow over this entire range is considered as pertaining to one current, the Labrador.

It will be demonstrated, however, that the Arctic current shortly after crossing Davis Strait Ridge is joined by a branch of the West Greenland Current of greater volume. The union of these two streams so fundamentally alters the physical character of the current south of this point that a new designation is necessitated. The junction of the Baffin Land and West Greenland Currents not far south of the Davis Strait Ridge may be said to represent, therefore, the source region of the Labrador Current.

THE SURFACE CURRENTS

The surface waters of the American sector, July 22 to September 11, 1928, were in southward motion at velocities ranging from 5 to 38 miles per day in the axis of the currents.[9] The surface current map (fig. 47) reveals that the inshore margin of the Labrador Current entered along the northern shores of the many bays and gulfs which indent the American coast line, but such circuitous arms sooner or later rejoined the trunk stream in the form of discharges out of the southern sides of the same estuaries. Especially noticeable are the major openings in the American littoral of Hudson Strait and the Strait of Belle Isle. Considerable quantities of Labrador Current entered along the Baffin Land side of Hudson Strait by rounding Resolution Island and also by passing through Gabriel Strait. Icebergs, according to Smith (1931), have been carried by this inflow for a distance of 150 miles where, near Big Island, they nearly all recurve and drift out past Cape Chidley, Labrador.

Continuing down the coast, the Labrador Current followed an easy sinuous course which exhibited two major bends—the one between Cape Harrigan and Cape Harrison, Labrador, and the other between Cape Bauld and Funk Island, Newfoundland. The Coast Guard's observations in the Labrador and Newfoundland areas indicate that more bergs strand along the American coast opposite these bends than elsewhere. The Labrador Current also received continual contributions from the streams which in summer form copious discharges from the many lakes and fiords. This reservoir of fresh water along the inshore side of the current plus the water released by melting drift ice doubtless compensates for the continual salting which the current receives along its outer side.

On meeting the northern face of the Grand Banks in the latitude of St. John's the Labrador Current was split, and the slope band continued down the east side of the Grand Banks, while an inshore branch followed the gully past Cape Race. It is the latter stream which is responsible for the icebergs (Smith 1931, p. 151) often reported in the vicinity of Cape Race.

The offshore margin of the Baffin Land Current, as it emerged from Baffin Bay the summer of 1928, was bounded by cyclonic vortices as shown on figure 47. These were displaced, however, in the margin of the Labrador Current, Hudson Strait to Hamilton Inlet, by bands of current converging from the Labrador Sea. On the dynamic

[9] It will be noted that the velocity values shown on fig. 47 differ in most cases from those published by Smith (1931, fig. 96). The velocity values shown on the latter illustration represent the average velocity of a given band of current, while in fig. 47 the values represent the maximum velocities in the axis of the currents. The recalculation of the dynamic heights in accordance with methods described on p. 19 has also modified the stream lines of the currents from those earlier recorded.

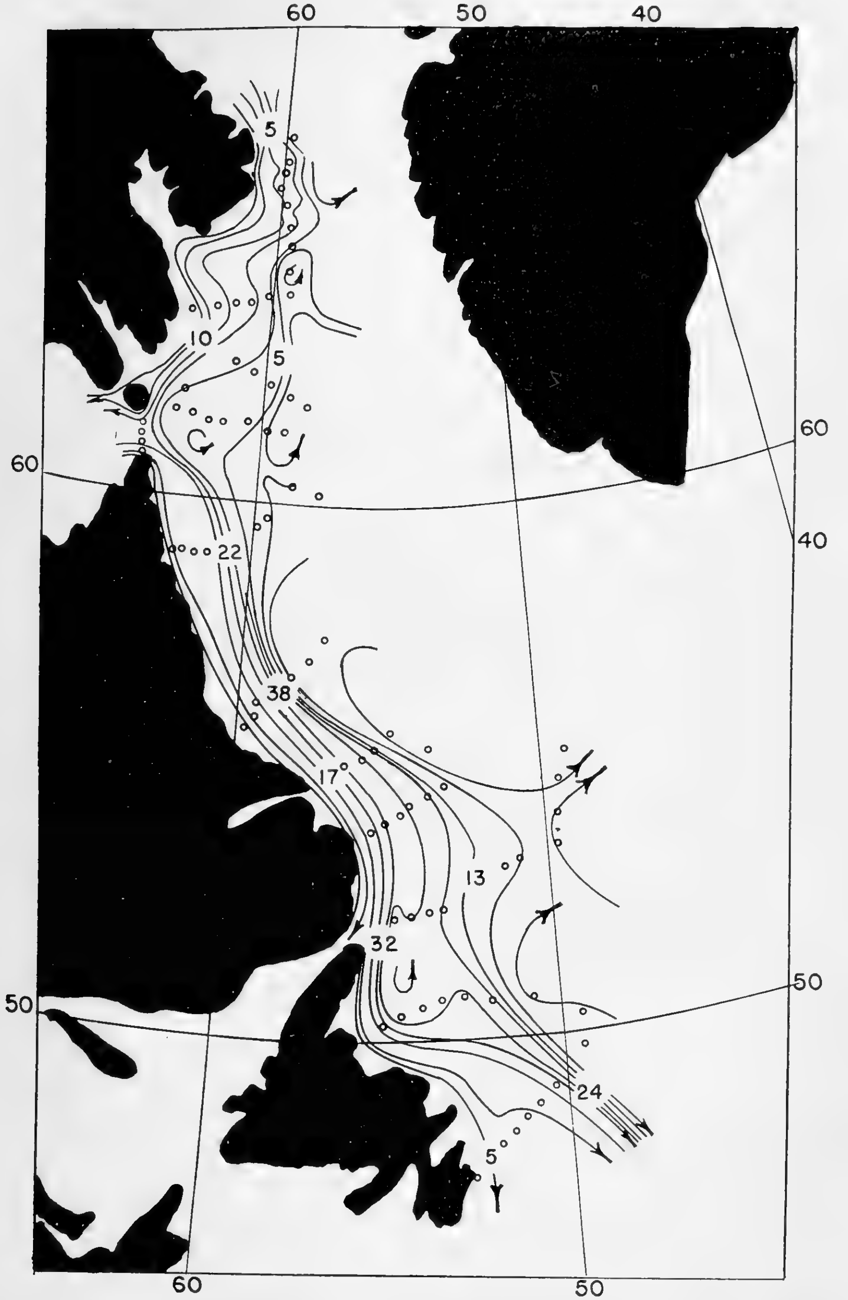

FIGURE 47.—The Labrador Current, July 22–September 11, 1928. The velocities shown in miles per day indicate the axis of maximum flow.

topographic map of the Labrador Sea (fig. 122, p. 167) these several tortuous streams are traced to the West Greenland Current, which, as emphasized in chapter IV, branched westward toward the American shore, the bulk of the West Greenland contribution in 1928, as indicated on figure 47, met the American slope between latitudes 68° and 65°, where the Corolian force steepened the dynamic gradient and accelerated the slope current. One of the most important branches of the West Greenland Current, described on page 33, as parting from the slope off Godthaab, is the same as that shown on figure 47, as joining the Baffin Land Current on the Baffin Land slope, in the vicinity of latitude 64°. Although relic traces of Irminger-Atlantic water were found as far north as 65° 37′ (p. 42), they apparently formed no continuous current and, therefore, the more southern position is held to have marked in 1928 the source region of the Labrador Current. The point of junction of the Baffin Land Current and the West Greenland Current is probably subject to considerable fluctuation along the Baffin Land slope from the Davis Strait Ridge southward. The physical character and the distribution of velocity of the currents before and after forming the Labrador Current are discussed further in vertical cross section, on page 83.

The farthest offshore observations, which are located in the lower right-hand part of figure 47, indicate the presence of a northerly countercurrent. Had the 1928 survey been extended a little farther offshore in this region, more definite statements regarding the circulation there could be made. In the light of subsequent Coast Guard observations (p. 170) it can be stated, however, that in 1928 outer portions of the Labrador Current in the vicinity of latitude 53°, longitude 50°, joined in an easterly set with a branch of the Atlantic Current.

Two areas marking weak currents are noted near Hudson Strait on figure 47, the one due east of the strait and the other extended for about 150 miles southward of Hudson Strait along the coast. In the first case the continuation of the Hudson Strait trough across the continental shelf forms an embayment of deeper water around which, in 1928, the currents were turned cyclonically. The free area along the coast south of Hudson Strait is also attributed to the shelf contour; the bottom being flat and near the surface caused the more rapid currents to sweep out around the steepest inclination of the slope.

A third region of weak circulation was located over a broad depression in the continental shelf southeast of Belle Isle, around which a cyclonic eddy was developed.

An interesting feature of the Labrador Current in 1928 was the apparent tendency as revealed by the streamlines (fig. 47) to group themselves in two bands—the one over the inshore portion of the continental shelf and the other over the steepest part of the slope. The banding may have been due to (*a*) the bottom configuration, one of the chief features of the Labrador shelf being a series of longitudinal folds which are to be seen in many of the cross sections (figs. 48, 50 and 51); or (*b*) the separate sources of the Labrador Current; or (*c*) a combination of (*a*) and (*b*). The Baffin Land Current as described (p. 68) was a relatively shallow, frigid stream which, holding to the shelf, deflected much of its waters into Hudson Strait. Those portions of the Baffin Land Current which continued directly down the Labrador coast (fig. 47) were joined by an outflow from the south side of Hudson Strait. This stream constituted the inshore band of the Labrador Current throughout the remainder of its length. The outer belt, on the other hand, impinging in about latitude 63° in 1928, prevailed along the continental edge as far south as the observations extended off St. John's. This band of the Labrador Current, reflecting its West Greenland source as shown on page 45, was much warmer, deeper, and more rapid than the inshore one. The banding of the Labrador Current and its effect on the drift of icebergs has been discussed by Smith (1931).

It will be noted that the velocities of the Labrador Current in 1928 were much greater south of Hudson Strait than north of that latitude. The acceleration of the current is attributed to the convergence of the West Greenland Current from the east as well as the discharge from Hudson Strait on the west. Land drainage from the Hudson Bay Basin alone indicates that the discharge through Hudson Strait probably exceeds the inflow. Tangible evidence of such contributions is to be observed in the increase of the stream lines on the current map (fig. 47) just south of Hudson Strait. A computation of the volume of the currents through Hudson Strait, based on stations 1285–1287 taken by the *General Greene* in 1931, gave a net discharge of about 1.0 million cubic meters per second. The fact, however, that these stations did not completely span the strait on the north and also that the inflow through Gabriel Strait was unaccounted for, causes us to estimate the net discharge to have been 0.5 million cubic meters per second.

In conclusion it may be stated that the surface waters of the Labrador Current are collected from the following principal sources: The West Greenland Current, the Baffin Land Current, Hudson Strait, and the Strait of Belle Isle. On the other hand, the Labrador Current discharges as follows: into Hudson Strait; into the Strait of Belle Isle; eastward into the Labrador Sea, south of the latitude of Hamilton Inlet; southward past Newfoundland; and throughout its length through cabbeling along its offshore side. (See p. 175.)

CROSS SECTION OF THE CURRENTS

In order to make a systematic study, the 1928 observations have been grouped in a series of ten vertical cross sections, H to Q (fig. 46), more or less equally spaced between Cumberland Gulf, Baffin Land, and St. John's, Newfoundland.

Cumberland Gulf.—A section of the Baffin Land Current in the offing of Cumberland Gulf on the point of being joined by a branch of the West Greenland Current is represented by H (fig. 48). The profile shows that below the surface the south-flowing current was divided into two bands by a wall of dead water. In the outer band the 5-centimeter-per-second-velocity line extended to a depth of approximately 300 meters, but there was weak southerly current even down to 600 meters. This draft undoubtedly marks the depth of the sill of Davis Strait over which the current had recently passed. If the velocity lines on section H (fig. 48) be compared with those on other profiles taken farther south, it reveals the Baffin Land

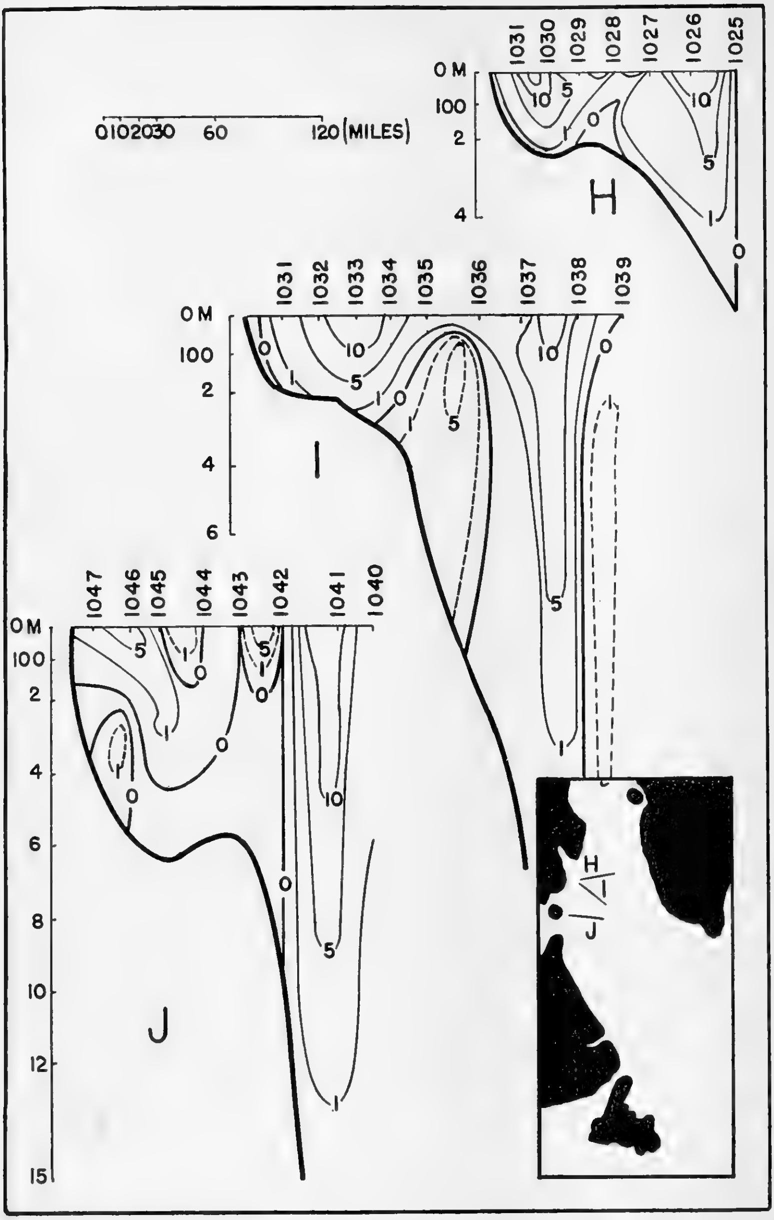

FIGURE 48.—Velocity profiles of the Labrador Current expressed in centimeters per second. The solid lines represent southerly current and the broken lines northerly current. Section H, August 17–18, 1928; section I, August 18–19, 1928; section J, August 19–20, 1928.

Current as much shallower than the Labrador Current. The computed volume of the inner band was 1.0 million cubic meters per second and of the outer band 1.5 million cubic meters per second, the total volume corresponding quite closely to that recorded farther north through the Davis Strait sections.

Frobisher Bay.—Section I (fig. 48) was taken 2 days following section H and at a point on the slope 50 miles farther south. A striking difference will be noted if the two sections be compared. The volume of the shelf current (sec. I, fig. 48), of 1.7 million cubic meters per second, remained practically unaltered, but the outer band of the current bounded by the 1 centimeter-per-second line, had increased in draft from 300 to 1,200 meters and in consequence a volume of 3.3 million cubic meters per second, about double the volume of the current farther north. This deepening and swelling of the south flowing current between Cumberland Gulf and Frobisher Bay was due to the Baffin Land Current being joined by significant portions of the West Greenland Current. The net volume of the westerly set between stations 984 and 986 (fig. 153, p. 202) was computed as 1.9 million cubic meters per second. If this sum be added to the volume of the Baffin Land Current through the Cumberland Gulf section, it closely equals the computed volume of the flow through the Frobisher Bay section. Subsequent examination of the temperature and salinity profiles and maps of this region (p. 99) also reveals a sharp contrast in the physical character of the abutting Baffin Land and West Greenland Currents.

The temperature and salinity correlation curves for sections H and I (fig. 49) also reveal the difference in derivation of the water composing the current there. The right-hand portion of curve I with a maximum temperature of 4.1° C., and a salinity of 34.86‰, indicates the relatively greater contribution of the West Greenland Current at this point on the Baffin Land slope than farther north off Cumberland Gulf.

Finally, to dispel any doubt as to the difference in derivation of the currents recorded by the two sections, one need only regard their respective rates of heat transfer. It is, of course, well known that the Baffin Land Current is essentially frigid in character; a computation of the average temperature of the current past Cumberland Gulf was 0.3° C., and the rate of heat transfer was 0.5 million cubic meter degrees centigrade per second. After being joined by the West Greenland Current, however, and known as the Labrador Current (sec. I) the average temperature was 4.2° C., and the rate of heat transfer mounted to 22.9 million cubic meter degrees centigrade per second. The only possible source of so much warmth in this part of the sea is the West Greenland Current.

Consideration of the foregoing and other computations on the volume of the West Greenland Current and the Baffin Land Current indicate that they combine in proportions of approximately 3 to 2, respectively.

A core of northerly countercurrent not reaching up to the surface and amounting to 1.3 million cubic meters per second does not materially alter the main features noted on the Frobisher Bay section.

Resolution Island.—Section J (fig. 48) taken August 19–20, 1928, about 50 miles south of section I, shows that the shelf current proceeding southward decreased both in velocity and volume, the computed transport being 0.6 million cubic meters per second. The surface current map (fig. 47) reveals that a large proportion of the shelf current recorded on section I passed through Gabriel Strait and was, therefore, missed on our Resolution Island section. The swelling of the slope band, on the other hand, to 4.2 million cubic meters per second was largely due to an eddy (fig. 47) which intersected the outer end of the Resolution Island section.

Nachvak.—The distribution of velocity August 25–26, 1928, off Nachvak Fiord, Labrador, section K, fig. 50, indicates weak eddy currents prevailed over the shelf, but a band of stronger current, 1.3

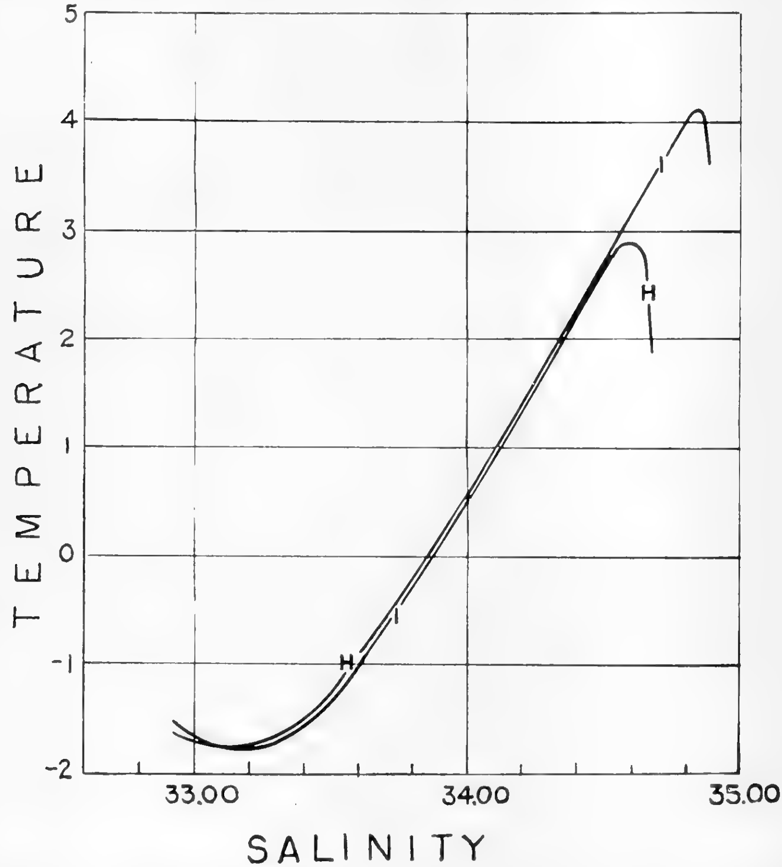

FIGURE 49.—Temperature-salinity correlation curves of the Labrador Current, sections H and I.

million cubic meters per second, hugged the continental edge. The slope band off Nachvak which coresponds to the shelf band off Resolution Island had increased to double the volume of the latter. It is traced (fig. 47) partly to Baffin Land Current and partly to discharge from Hudson Strait. The fact that lower salinities prevailed in this band of current than in the corresponding band off Resolution Island (figs. 62 and 63) also supports the above view. Continuing offshore along section K a relatively wide belt of weak northerly current is crossed before entering the outer band of the Labrador Current. The presence of so much northerly current may have been

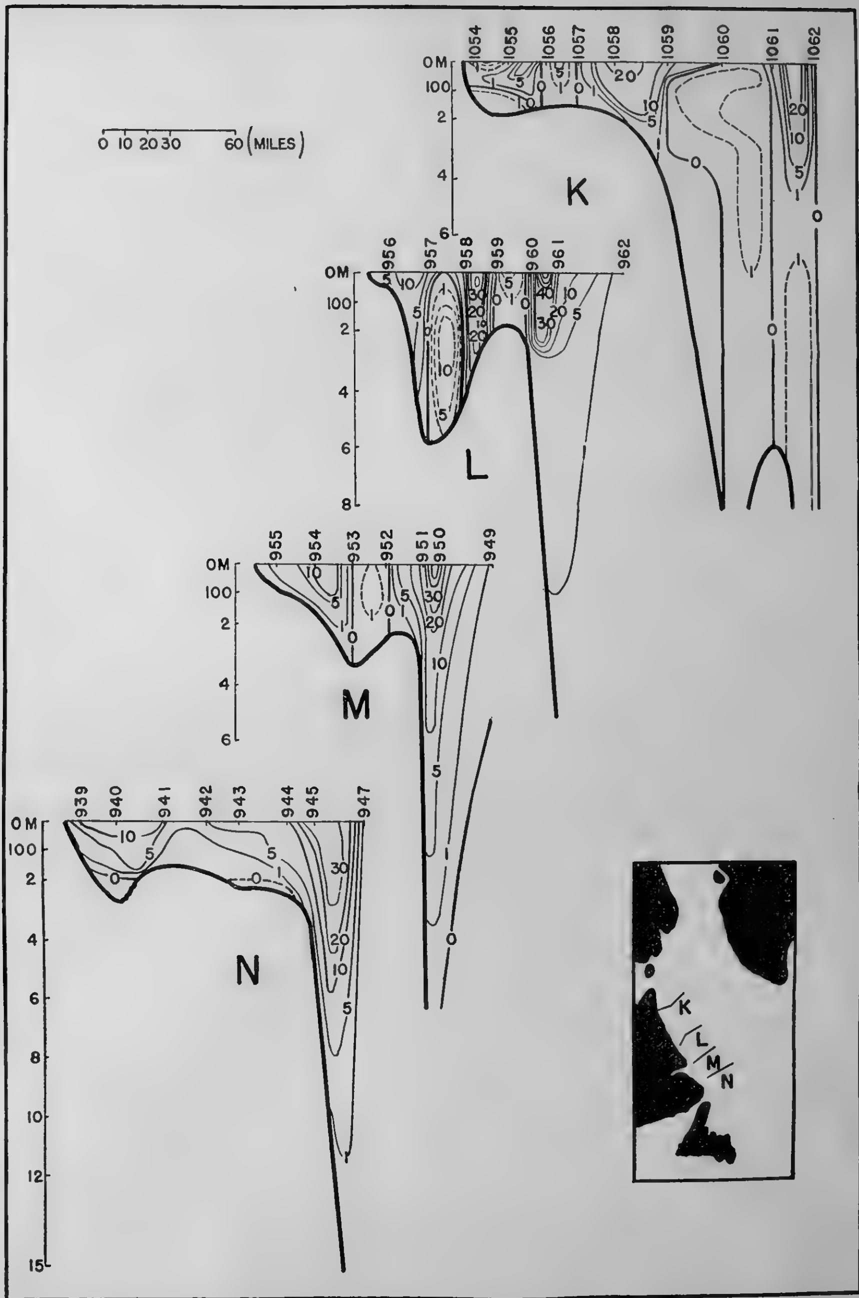

FIGURE 50.—Velocity profiles of the Labrador Current expressed in centimeters per second. The solid lines represent southerly current and the broken lines northerly current. Section K, August 25–26, 1928; section L, July 25–26, 1928; section M, July 24–25, 1928; and section N, July 22–23, 1928.

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the result of the bottom topography in this vicinity, but its effect on the Labrador Current was to split the stream which characteristically hugs the steepest part of the slope and to reduce its draft materially. In consequence only 2.4 million cubic meters per second was transported southward or about a 50 percent reduction of that found farther north for the Labrador current. The interruption in the constancy of transport of the Labrador Current in the offing of Hudson Strait and the Strait of Belle Isle has also been remarked (p. 80).

Cape Harrigan.—A characteristic banding but an appreciable increase in the velocity of the Labrador Current from that farther north is shown on section L (fig. 50). It should be remarked, however, that the observations off Cape Harrigan were taken nearly a month prior to those of the adjacent northerly sections. The shelf band remained fairly constant in volume of flow but the slope band rose to 4.7 million cubic meters per second. This increase is attributed (fig. 47) to converging current (West Greenland Current) from out in the Labrador Sea.

Hamilton Inlet.—Downstream again, approximately 60 miles, section M was taken 2 days prior to section L. Shelf and slope bands were computed as 0.6 and 4.2 million cubic meters per second, respectively. The draft of the slope band of about 1,200 meters, as recorded by the 1-centimeter-per-second-velocity line, suggests that along this section of the American slope the Labrador Current may penetrate to depths even greater than 1,500 meters.

Domino Island.—A reduction in the velocity but a widening of the Labrador Current was found 60 miles farther downstream at section N (fig. 50) taken off Domino Island July 22–23, 1928. The inner and outer current belts were computed as 1.0 and 4.1 million cubic meters per second, similar to the distribution found off Hamilton Inlet.

Belle Isle.—Continuing southward another cross section of the Labrador Current section O (fig. 51) was made September 5–8, 1928. There was, therefore, an interval of about 6 weeks between the time of running the Domino Island and the Bell Isle sections. The net volume of flow of the Labrador Current off Belle Isle of 2.6 million cubic meters per second was about 50 percent less than that farther north off Domino Island. Examination of the surface current map (fig. 47) indicates that the decrease in the southward component of transport was partly due to countercurrent which pressed in against the slope between stations 1097 and 1098. This eddy, probably part of a backwash associated with the Atlantic Current farther offshore, apparently deflected much of the Labrador Current in toward Belle Isle as noted by the streamlines on figure 47. A shallow but relatively large depression in the Newfoundland shelf located between sections O and P, around which the Labrador Current was turned cyclonically, is also believed to have contributed to a deficiency of southward transport.

White Bay.—The presence of the above-described eddy in the form of a northerly component is also to be noted between stations 1115 and 1117 on section P (fig. 51). The slope band of the Labrador Current was disrupted here off the Strait of Belle Isle in similar manner to that in which the slope band was split off Hudson Strait.

The net volume of the Labrador Current southward through section P in consequence was reduced to 0.8 million cubic meters per second.

St. John's.—Section Q (fig. 51) was the tenth and southernmost profile taken by the *Marion* in the American sector in 1928. The slope band of the Labrador Current at this point had accelerated, deepened, and, with a computed volume of 4.4 million cubic meters per second, resumed its mid-Labrador proportions. The inshore belt of 0.8 million cubic meters per second discharged most of its contents through the gully between the Grand Banks and Cape Race.

A résumé of the discharge of the Labrador Current in 1928 is shown by the following table:

Section and current band	Volume flow $(m^3/s \times 10^{-6})$			Section and current band	Volume flow $(m^3/s \times 10^{-6})$		
	South	North	South (net)		South	North	South (net)
Section H:				Section M:			
Slope	1.5			Slope	4.2		
Shelf	1.0			Shelf	0.6	0.1	
Total	2.5	0	2.5	Total	4.8	0.1	4.7
Section I:				Section N:			
Slope	3.3			Slope	4.1		
Shelf	1.7	1.3		Shelf	1.0	0.1	
Total	5.0	1.3	3.7	Total	5.1	0.1	5.0
Section J:				Section O:			
Slope	4.2			Slope	3.6		
Shelf	0.6	0.3		Shelf	2.9	3.0	
Total	4.8	0.3	4.5	Total	6.5	3.0	3.5
Section K:				Section P:			
Slope	2.4			Slope	2.1		
Shelf	0.2	0.7		Shelf	1.0	1.9	
Total	2.6	0.7	1.9	Total	3.1	1.9	1.2
Section L:				Section Q:			
Slope	4.7			Slope	4.4		
Shelf	1.4	0.8		Shelf	0.8	0.3	
Total	6.1	0.8	5.3	Total	5.2	0.3	4.9

The above table shows that the net mean discharge of the Labrador Current, not including the apparent deficit in the volume of the current at sections K and P, during the summer of 1928 was 4.3 million cubic meters per second.

One of the most interesting features revealed by the velocity profiles was the division of the Labrador Current generally into a slope band and a shelf band, although such a grouping was less positively suggested by the streamlines on the surface current map. The proportions of inner to outer band for the 10 sections, H to Q, was 1 to 3; or, in other words, approximately 75 percent of the water transported by the Labrador Current was contained in the slope band. Consideration of the proportions of the banding and the previously described proportions of the components (p. 85) indicates that some Arctic water is embraced in the slope band.

A shelf and slope band characteristic of the Labrador Current are underlying features which no doubt exert their influence on the drift of the Arctic ice. The much colder water inshore of the continental

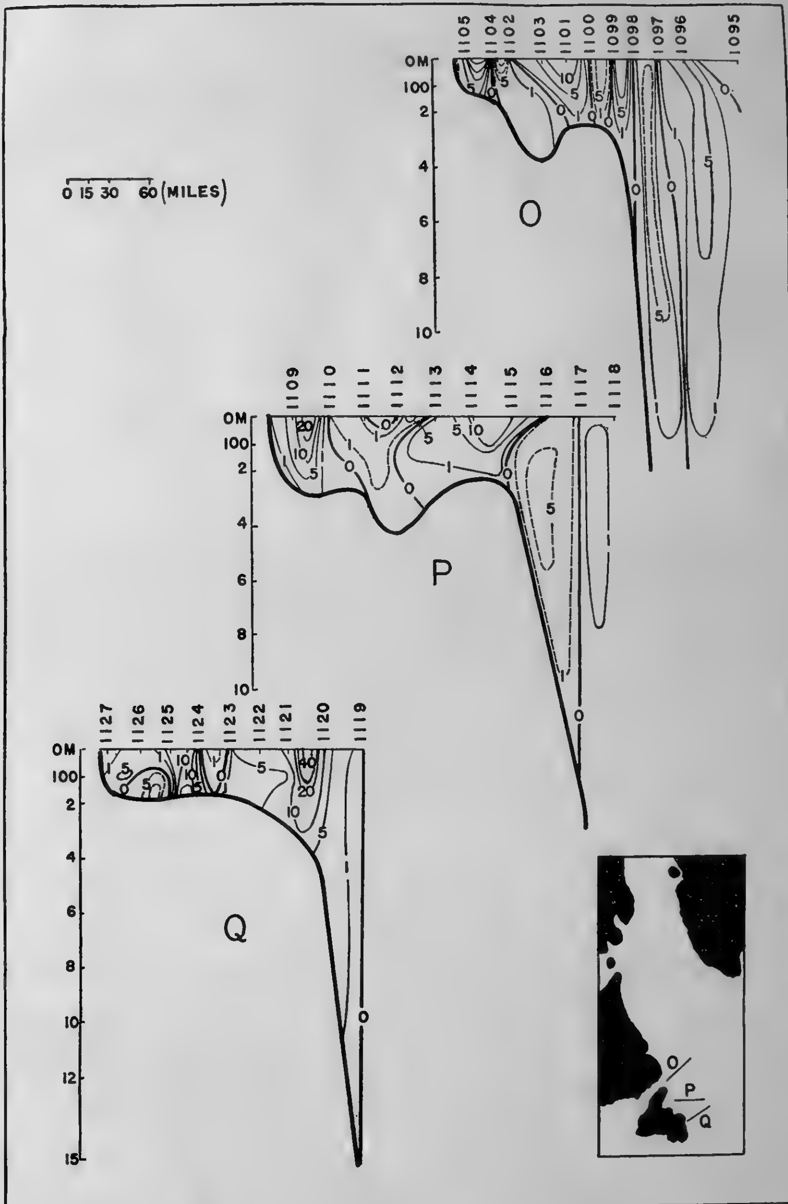

FIGURE 51.—Velocity profiles of the Labrador Current expressed in centimeters per second. The solid lines represent southerly current and the broken lines northerly current. Section O, September 5–8, 1928; section P, September 8–9, 1928; and section Q, September 10–11, 1928.

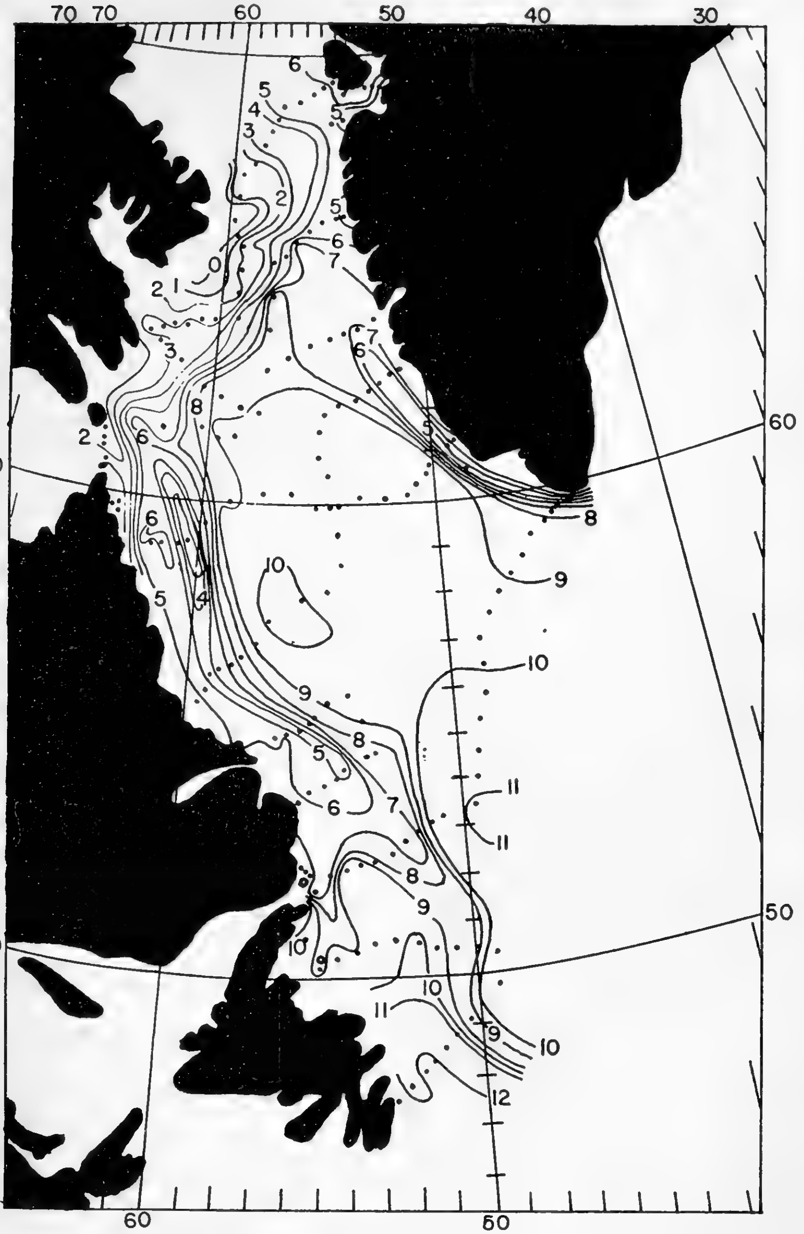

FIGURE 52.—Temperature at surface July 19–September 11, 1928.

edge largely relegates the drift of that pack ice which eventually gets south of Newfoundland, to the shelf band of the current. Icebergs, on the other hand, capable of surviving in relatively warm water for much longer periods than pack ice constitute a greater menace to the North Atlantic shipping lanes because of the velocity of the slope band of the Labrador Current.

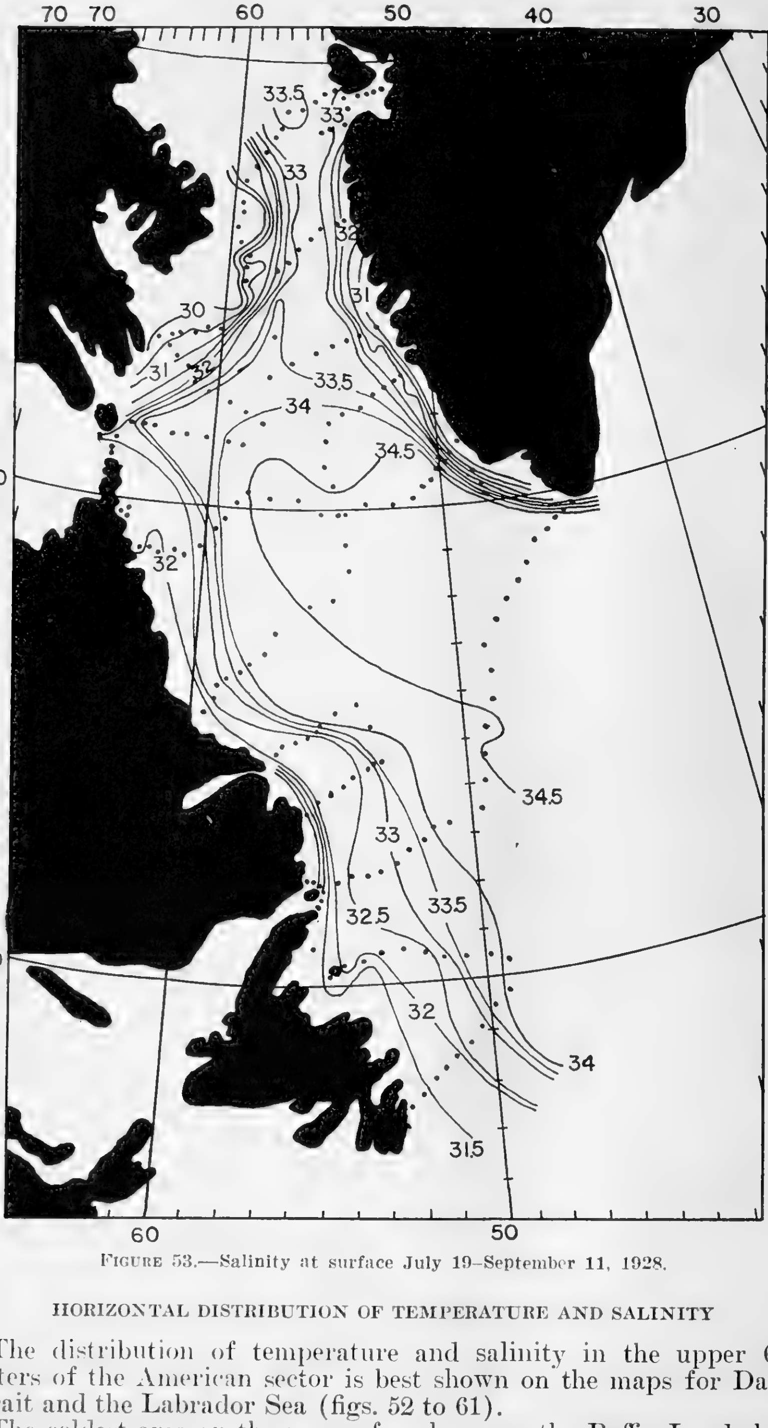

FIGURE 53.—Salinity at surface July 19–September 11, 1928.

HORIZONTAL DISTRIBUTION OF TEMPERATURE AND SALINITY

The distribution of temperature and salinity in the upper 600 meters of the American sector is best shown on the maps for Davis Strait and the Labrador Sea (figs. 52 to 61).

The coldest area on the sea surface lay over the Baffin Land shelf and slope, where temperatures as low as 0° C., were found in August.

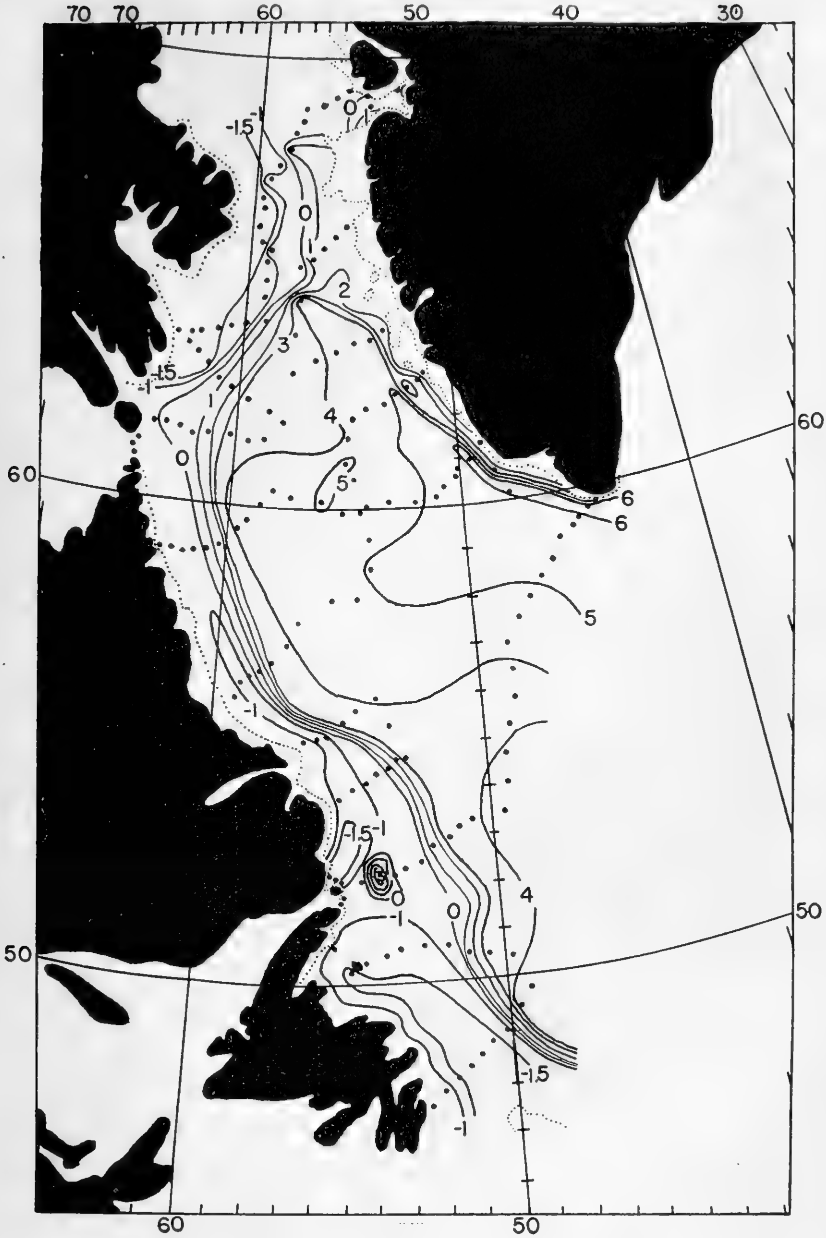

FIGURE 54.—Temperature at 100 meters July 19–September 11, 1928.

That this water was the result of melting sea ice encountered in that locality by the *Marion* is further supported by the salinity map (fig. 53), the freshest water coinciding with the minimum temperature.

The warmest surface water with temperatures of 12° C., and higher was found over the Newfoundland shelf in the lattude of St. John's

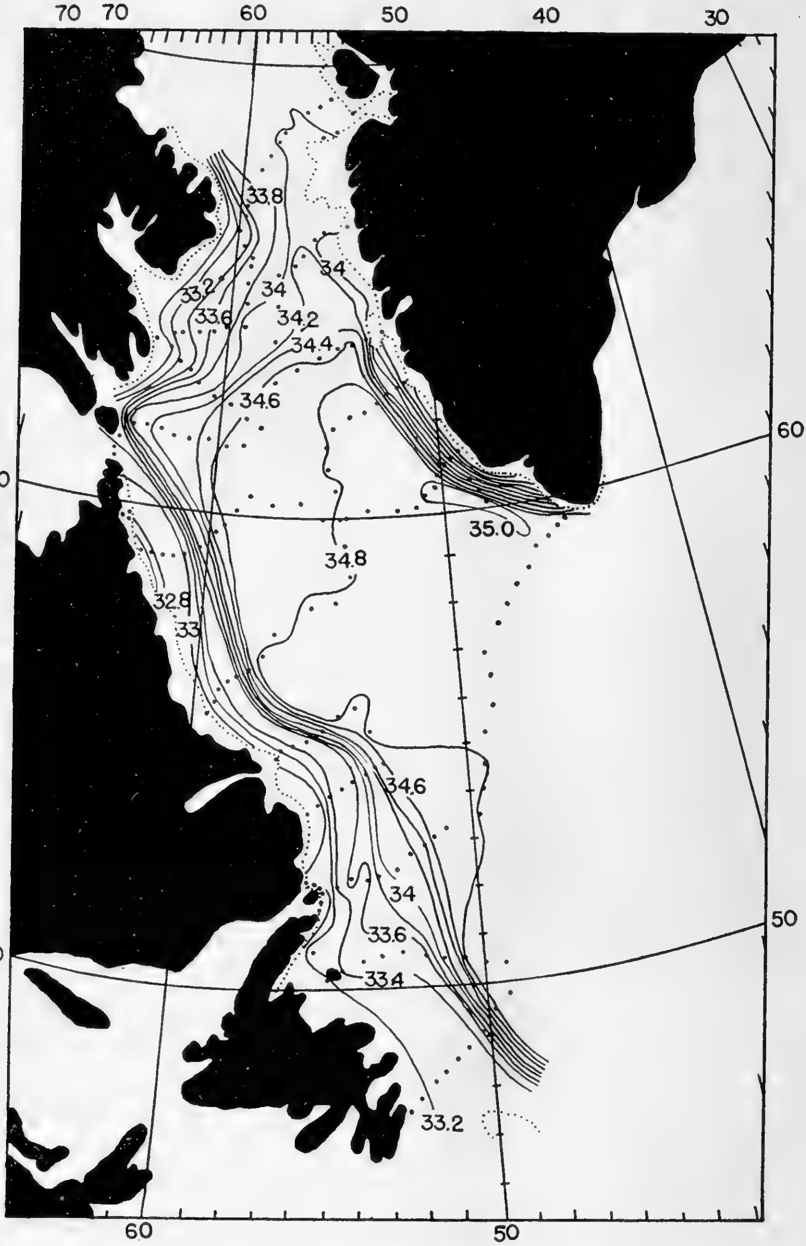

FIGURE 55.—Salinity at 100 meters July 19–September 11, 1928.

This area was also relatively fresh, indicating quite plainly that an offshore expansion of the surface layers occurs here at times during summer. In this connection it should be noted that the observations south and east of the Strait of Belle Isle were made approximately 6 weeks subsequent to those immediately north of that region, and consequently due allowance must be made for that fact. Two other

FIGURE 56.—Temperature at 200 meters July 19–September 11, 1928.

warm areas, both of which lay outside of the American slope, are revealed by the surface temperature map (fig. 52)—the one off southern Labrador and the other off middle Labrador. The former, undoubtedly, is a reflection of the Atlantic Current and the latter the result of solar warming in a locality free from active circulation.

FIGURE 57.—Salinity at 200 meters July 19–September 11, 1928.

A narrow strip of water colder than its surroundings is recorded over the continental edge on the surface temperature map extending from Hudson Strait to the Strait of Belle Isle. This, of course, is the reflection of the axis of the coldest subsurface water of the Labrador Current. The warmer area off Nachvak Fiord, enclosed by 6° and 7° isotherms, coincides (fig. 47) with the shelf locality of weak currents.

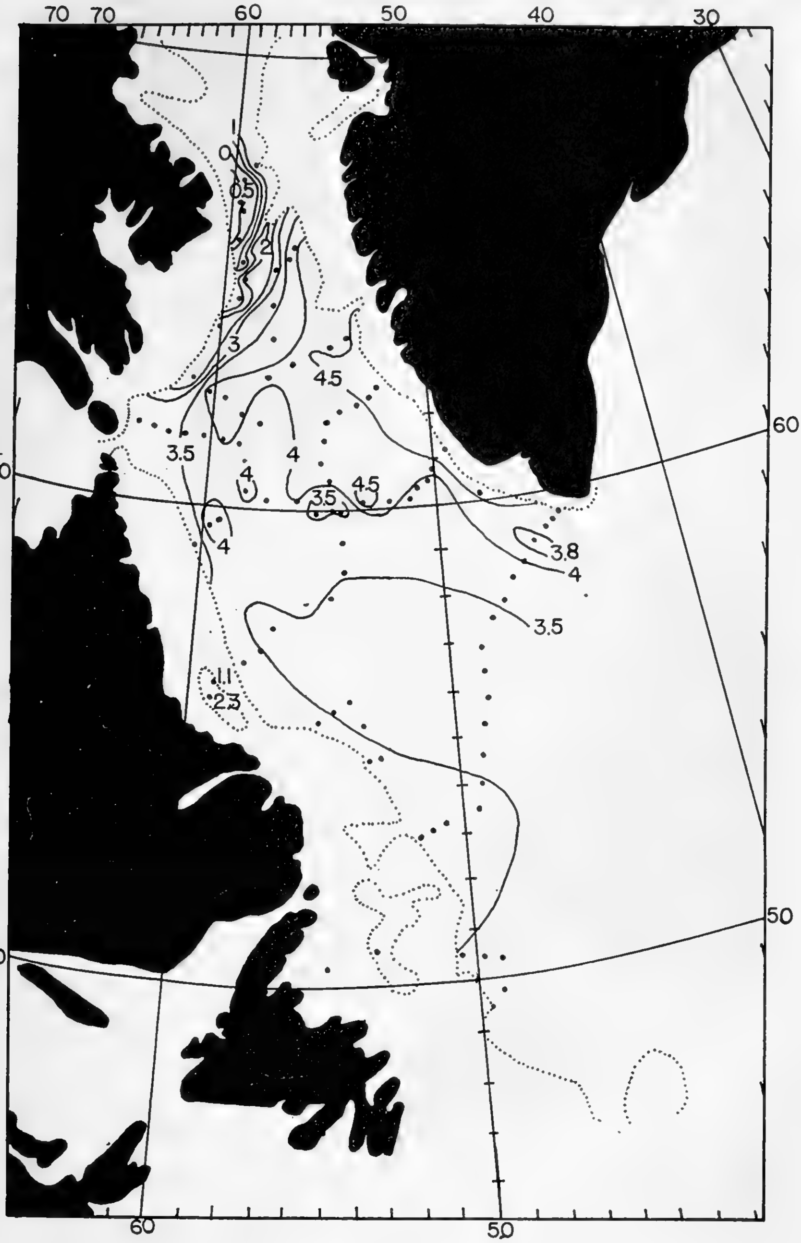

FIGURE 58.—Temperature at 400 meters July 19–September 11, 1928.

At a depth of 100 meters water colder than −1.0° C. transported by the Labrador Current was found throughout the length of the American shelf except in the offing of Hudson Strait and the Strait of Belle Isle. These interruptions in the otherwise uniform distribution of the Arctic water north of the Grand Banks indicate a disruptive effect of the warmer discharges from both of these openings.

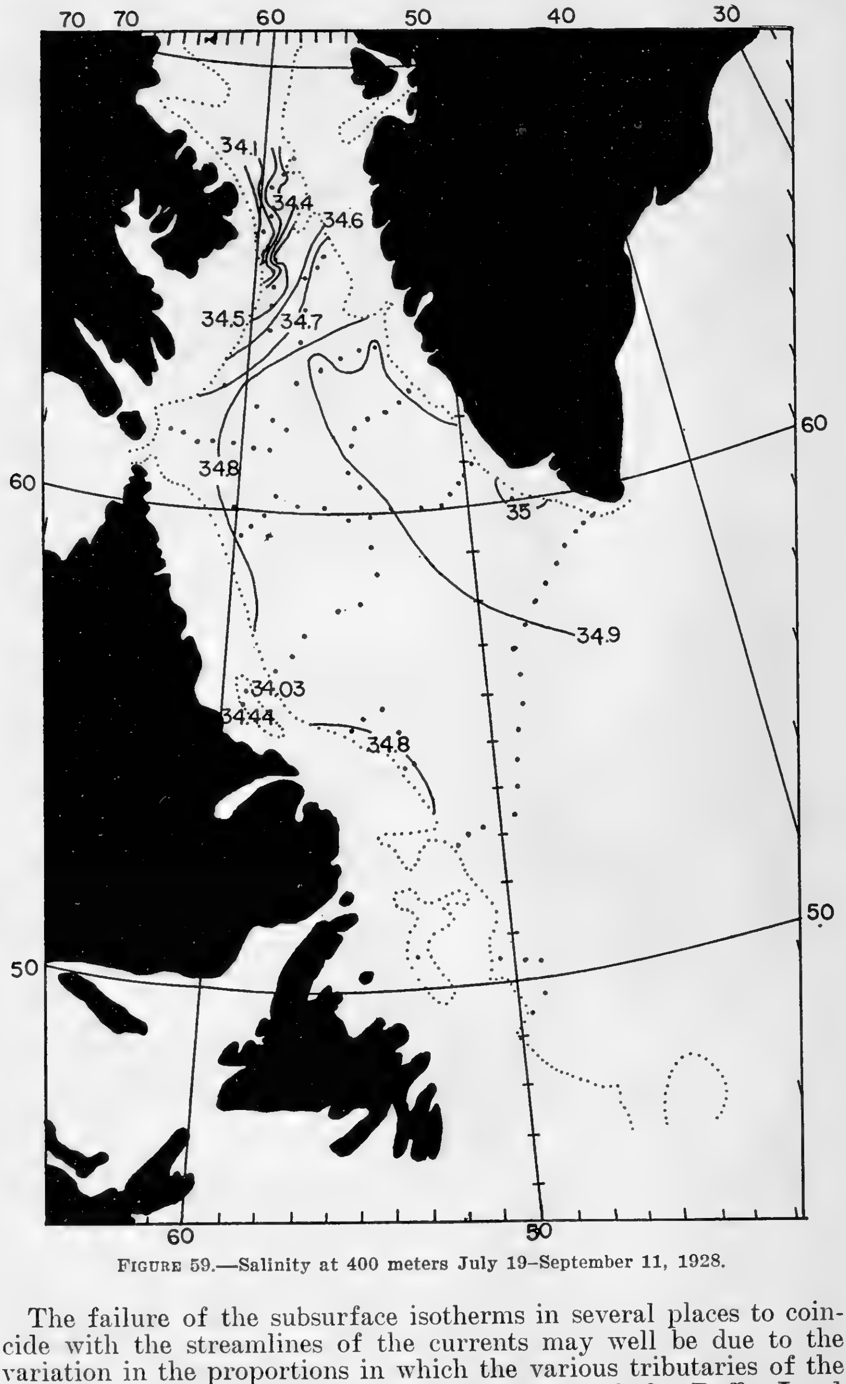

FIGURE 59.—Salinity at 400 meters July 19–September 11, 1928.

The failure of the subsurface isotherms in several places to coincide with the streamlines of the currents may well be due to the variation in the proportions in which the various tributaries of the Labrador Current mix. A partial damming of the Baffin Land Current, for example, by a southerly gale in the region of the Davis

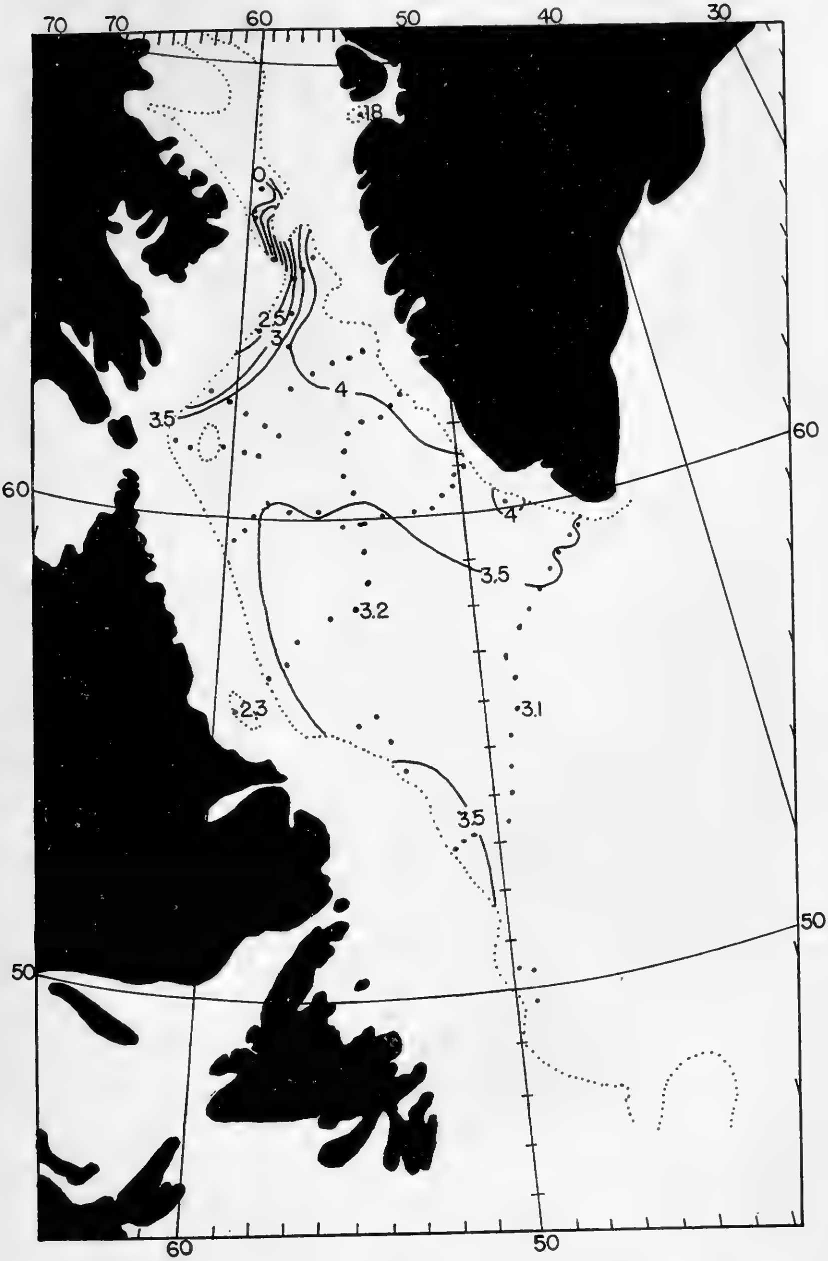

Figure 60.—Temperature at 600 meters July 19–September 11, 1928.

Strait Ridge might be reflected later along the course in a correspondingly warmer and saltier Labrador Current.

The presence of frigid water of $-1.5°$ C., at a depth of 100 meters over the Newfoundland shelf in September clearly emphasizes the small interchange of heat of subsurface waters on journeys as great as 2,000 miles in length.

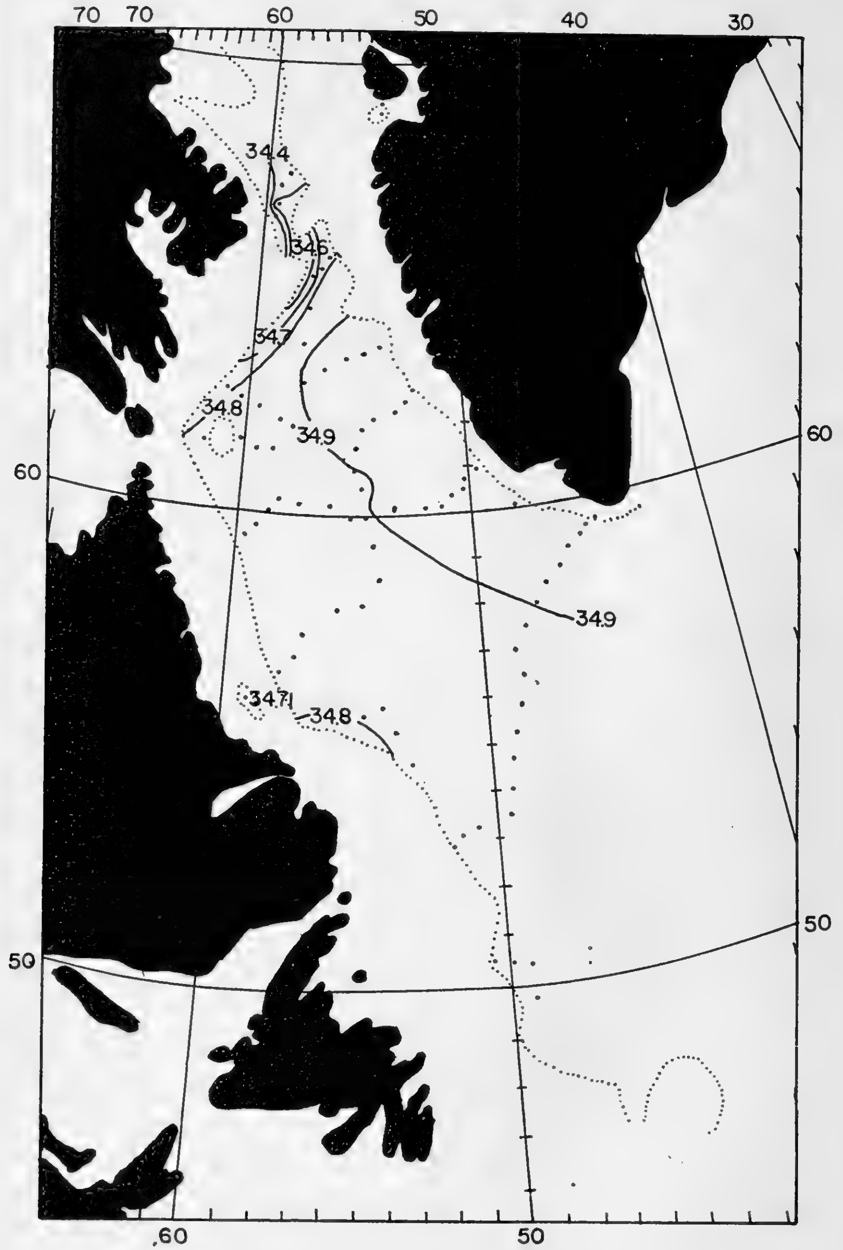

FIGURE 61.—Salinity at 600 meters July 19–September 11, 1928.

Attention is particularly invited to the position of a salient formed by both the 4° isothern and the 34.8‰ isohaline (figs. 54 and 55) off southern Labrador in the vicinity of latitude 55° N., longitude 50° W. The distribution of temperature and salinity, corresponding to the circulation (fig. 47), indicates a convergence of cool, low-salinity surface layers from the Labrador slope with the inshore

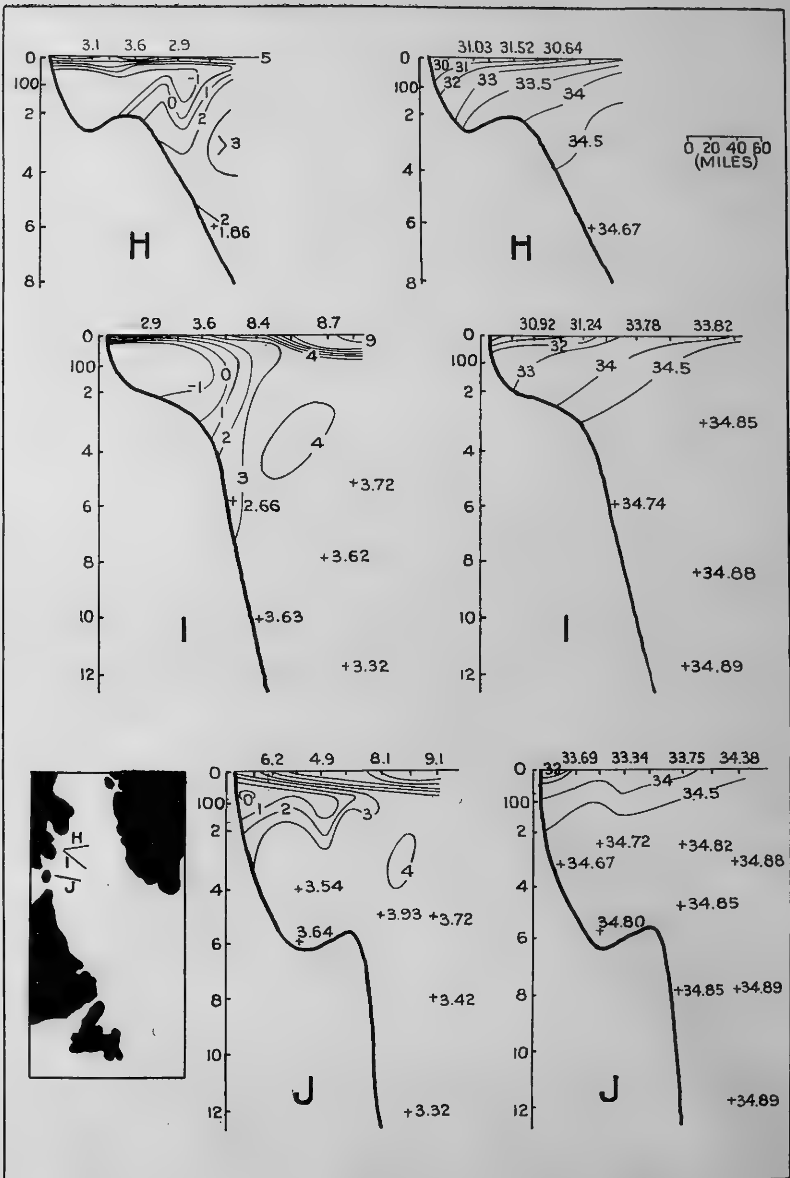

FIGURE 62.—Temperature and salinity profiles across the continental shelf and slope August 17–20, 1928. Section H, Cumberland Gulf; section I, Frobisher Bay; and section J, Resolution Island.

margin of the outer countercurrent. The combined set of this mixed water in 1928, easterly near the fifty-fifth parallel of latitude, corresponds well with the surface circulation farther offshore as reported by Soule (1936).

The temperature and salinity maps of the 200- and 400-meter levels (figs. 56 to 59) indicate the presence of water from the West Greenland Current near the American slope. This feature is especially pronounced in the 400-meter temperature map (fig. 58) in the offing of Hudson Strait. The drift of this water southward along the American slope (figs. 58 and 60) is also indicated in the band of higher temperatures at 400 and 600 meters along the American slope than adjacently offshore in the Labrador Sea.

A strong temperature and salinity gradient is to be noted along the Baffin Land slope at depths of 400 to 600 meters (figs. 58 to 61) where the underside of the Baffin Land current and the West Greenland Current abut.

The temperature and salinity maps for the 200-, 400-, and 600-meter levels all record pools of water colder and saltier than their surroundings in the depressions of the Labrador shelf. This indicates that offshore water floods in over the shelf, where it becomes pocketed and is chilled later during winter. The fact that intrusions of the slope water are occasional is indicated in the survival of the above-mentioned relics as late as midsummer. The two most obvious means of transportation of the deeper slope water in over the continental shelf are (*a*) a lateral bending of the current temporarily in over the shelf, or (*b*) a screwing of the current.

VERTICAL DISTRIBUTION OF THE TEMPERATURE AND SALINITY

The vertical distribution of temperature and salinity in the 10 sections, H to Q, already discussed, is illustrated on figures 62 to 64.

Probably the most impressive feature common to all the profiles is the shelf of frigid water which extended from near the coast out to the continental edge. Except for a thin, isolated surface film and an undercutting by the warmer isotherms on the continental edge, the shelf column is dominated by frigid water. The shallowness of the shelf waters in the American sector, and also their location north of the fiftieth parallel of latitude, might easily ascribe the low temperatures to local winter chilling. Reference, however, to the series of corresponding profiles of velocity (figs. 48, 50, and 51), as well as to the surface current map (fig. 47), conclusively establishes most of the minimum temperatured water as a transport first of the Baffin Land Current and then of the Labrador Current from points farther north.

An equally striking feature common to the profiles is the distribution of the salinity across the shelf, the isohalines sloping upward from inshore near the bottom to near the surface over the continental edge. This position of the isohalines portrays primarily a reservoir of river discharge and other land drainage which expands offshore across the shelf in the light surface layers. Melting sea ice, usually more abundant along the coast in these latitudes than farther out to sea, also probably augments the supply. On the other hand the salinity profiles, H, J, and O, record water in on the bottom of the slope which is saltier than that shown on any of the other profiles. Where the depth of the shelf below the sea surface is as great as 600 meters as off Resolution Island, Baffin Land (section J, fig. 62), bottom water as salty as 34.7‰ was found. When such evidence is compared with that contained on the horizontal projections, where relic pools of salty water were noted in many of the shelf depressions, it all strongly suggests that the removal of low-salinity surface water is more or less compensated by intrusions of West Greenland Current water over the bottom. That such movements occur in the shelf column, with a component lateral to the main transport of the Labrador Current, appears reasonable, but the fact that such currents are not directly measurable, or revealed on the dynamic topographic maps, indicates that, if they do actually exist, they must be weak, irregular, and transitional. It must be realized, nevertheless, that any picture of the circulation based solely upon the distribution of the temperature and the salinity is not conclusive, and whether or not the Labrador Current at times has torsional as well as translatory motion, merits further investigation.

During the summer of 1928 water colder than 2° C. extended to a depth of 500 meters on the Baffin Land slope as shown on sections H and I (fig. 62). As previously remarked in the discussion of the temperature charts, this is the under side of the Baffin Land Current. The further fact that water as cold as this was not found farther south off Hudson Strait, section J, at a depth greater than 250 meters indicates considerable mixing occurred at these levels on the Baffin Land slope between the Baffin Land Current and the warmer West Greenland Current. The fact that the core of coldest water in sections J and K was warmer than the corresponding water shown in the sections both north and south indicates either more extensive warming there by the West Greenland Current or that the water in question came from sources other than the Baffin Land Current. Reference to the surface current may (fig. 122, p. 167) indicates that the higher temperatures off Resolution Island resulted from the West Greenland Current, while those off Nachvak Fiord were contributed from Hudson Strait. Much of the Baffin Land Current water at times apparently makes the circuit into Hudson Strait.

Attention is particularly invited to the relatively warm, salty water found on the Baffin Land slope as shown by the temperatures higher than 4° C., and salinities of 34.86 to 34.89‰, at the outer end of sections I, J, and K (figs. 62 and 63). When these profiles are compared with corresponding velocity profiles and also with the temperature and salinity maps, the source of the warm salty water is traced toward Greenland.

The water of the slope current, Frobisher Bay to mid-Labrador at depths below the seasonal influence, was found to be warmer than the slope current at similar levels farther south, an apparently paradoxical fact that as the water in the slope band moves southward it cools. Incidentally this introduces a new conception of the Labrador Current which heretofore has been regarded primarily as an icy stream from the far north.

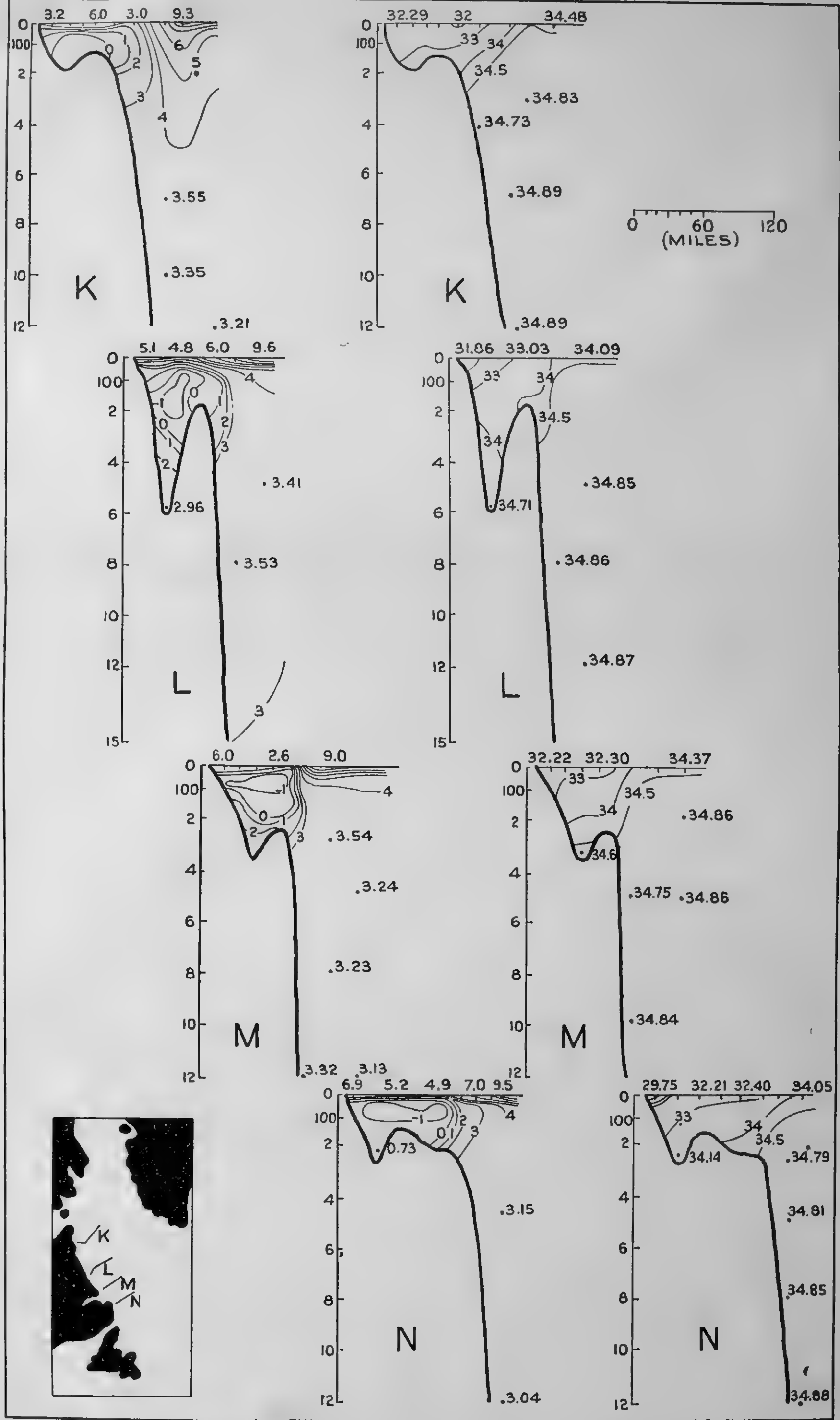

FIGURE 63.—Temperature and salinity profiles across the continental shelf and slope July 22–August 26, 1928. Section K, Nachvak Fjord; section L, Cape Harrigan; section M, Hamilton Inlet; section N, Domino Island.

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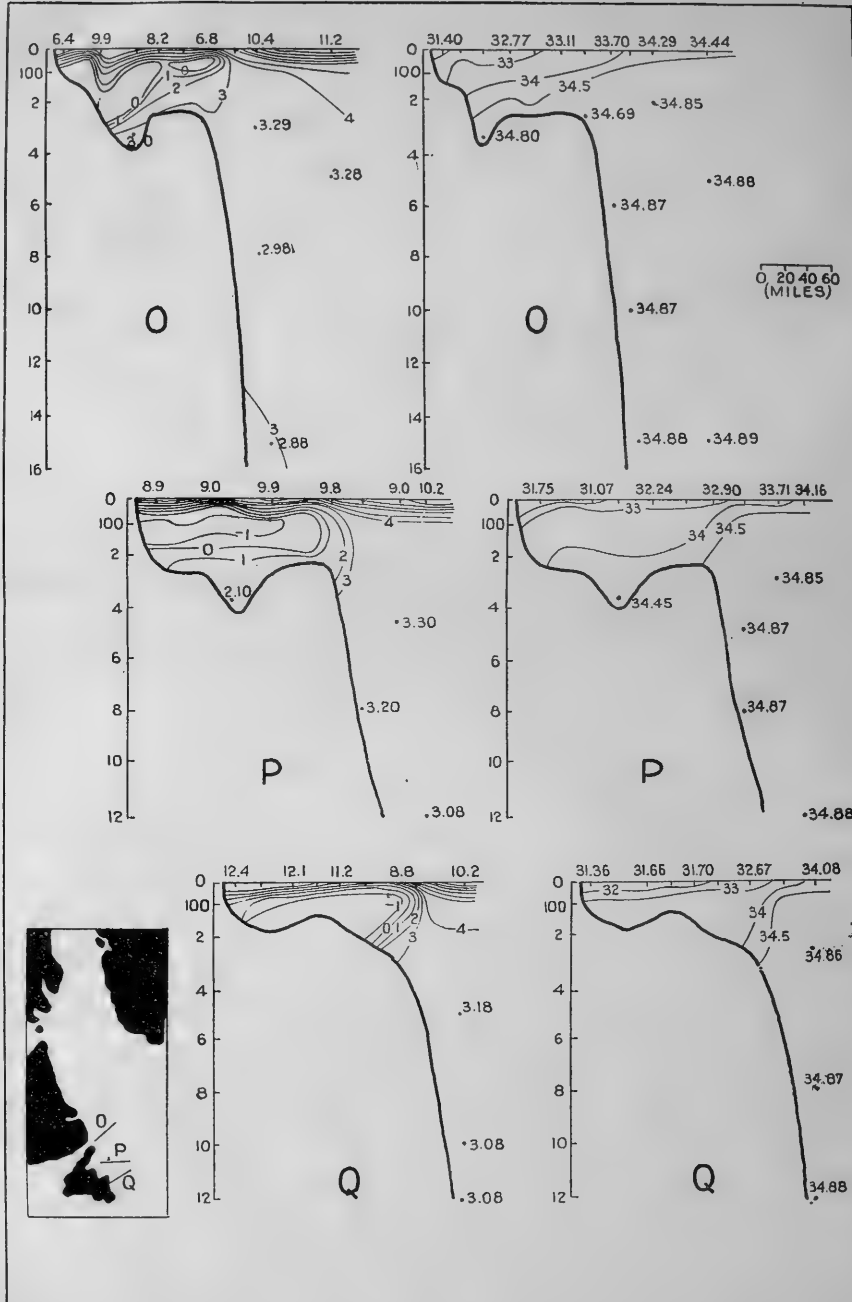

FIGURE 64.—Temperature and salinity profiles across the continental shelf and slope September 5-11, 1928. Section O, Belle Isle; section P, White Bay; and section Q, St. John's.

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If the temperature profiles of the Labrador Current for 1928 be superimposed on the velocity profiles and the average temperature of the current, Frobisher Bay to St. John's, computed in accordance with the method described (p. 24) we obtain the following values:

	° C.
Shelf band	1.5
Slope band	4.0

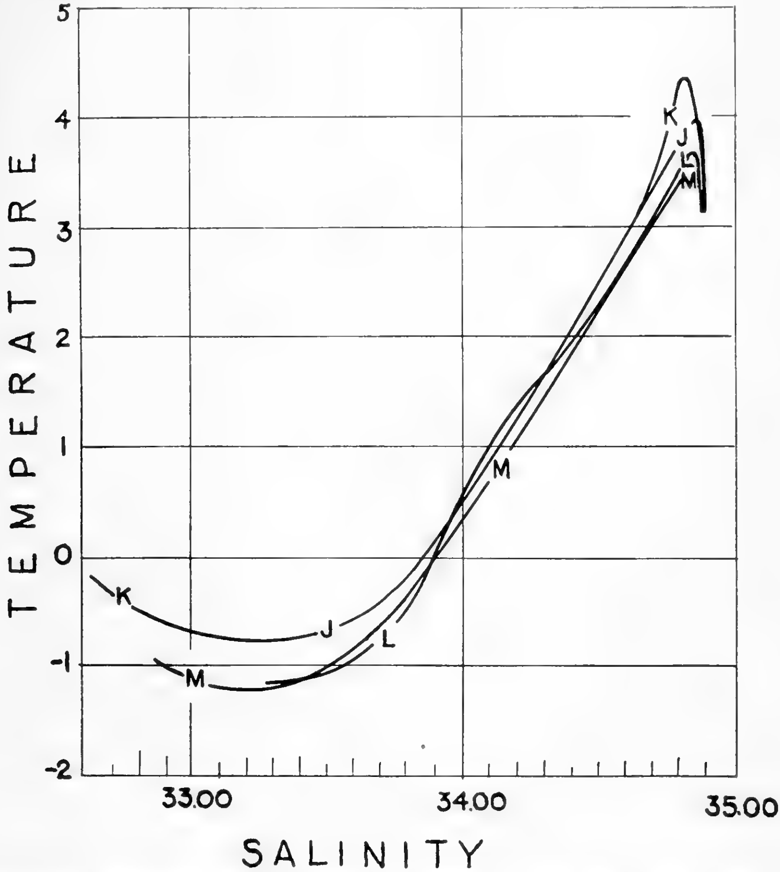

FIGURE 65.—Temperature-salinity correlation curves of the Labrador current, Resolution Island to Hamilton Inlet, the summer of 1928.

If the proportions of shelf to slope band of 1 to 3 be accepted then an average temperature for the whole current was approximately 3.4° C. The average rate of heat transfer of the Labrador Current the summer of 1928 was 14.6 million cubic meter degrees centigrade per second (see p. 173).

Temperature-salinity correlation curves for the sections in the American sector, 1928 figs. (65 and 66), assist to identify the components which constitute the Labrador Current. Two inflection points near the end portions of the curves are a common feature. The lower left inversion with an approximate value of temperature of −1.75° C., and 33.14‰ salinity, represents typical Arctic water, and the upper right inversion is representative of west Greenland water. Along the straighter part of the curves fall the correlation points indicative of the Labrador Current.

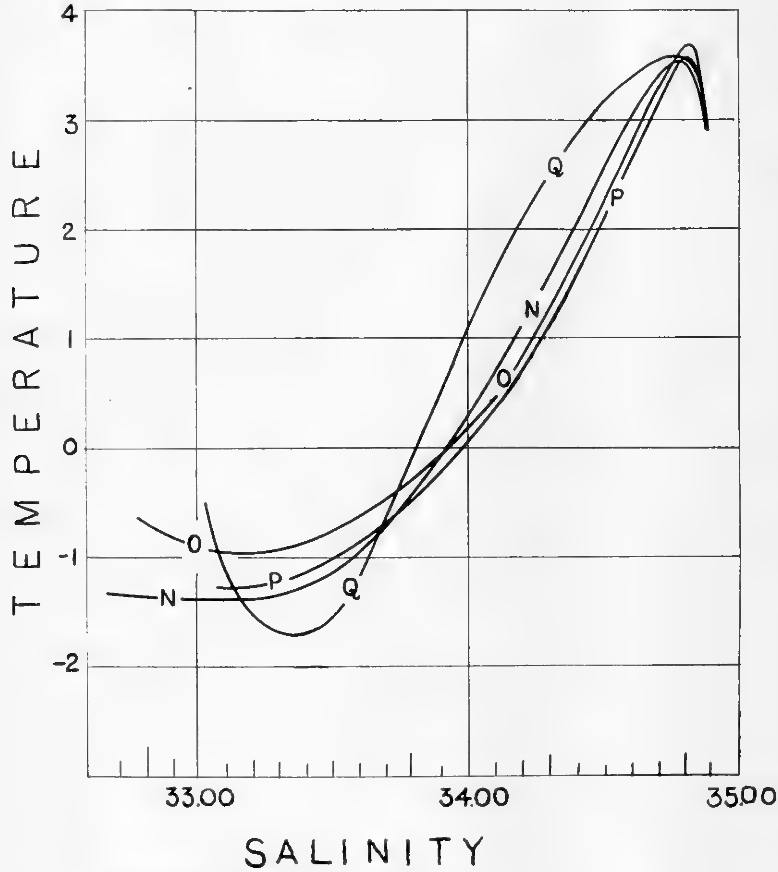

FIGURE 66.—Temperature-salinity correlation curves of the Labrador Current, Domino Island to St. John's, the summer of 1928.

ANNUAL VARIATIONS

The question whether or not the oceanographic conditions in the American sector already described in this chapter as existing in 1928 prevail during most summers can best be answered by the U. S. Coast Guard's surveys made there in 1931, 1933, and 1934.

In can be seen by comparing figures 67, 68, and 69 with figure 47 that the surface extent of the Labrador Current remains fairly constant summer to summer. The previously described sinuous form of the Labrador Current, with inshore bends opposite Cape Harrigan and White Bay, and also offshore salients opposite Nachvak Fiord and Domino Island, is established on all the surface current maps. The division of the Labrador Current into an inshore band over the continental shelf and an outer band over the continental edge is also portrayed on all the surface current maps but not so noticeably on the map for 1933.

Attention is also called to the north flowing Atlantic Current which was found just outside the continental slope off the Strait

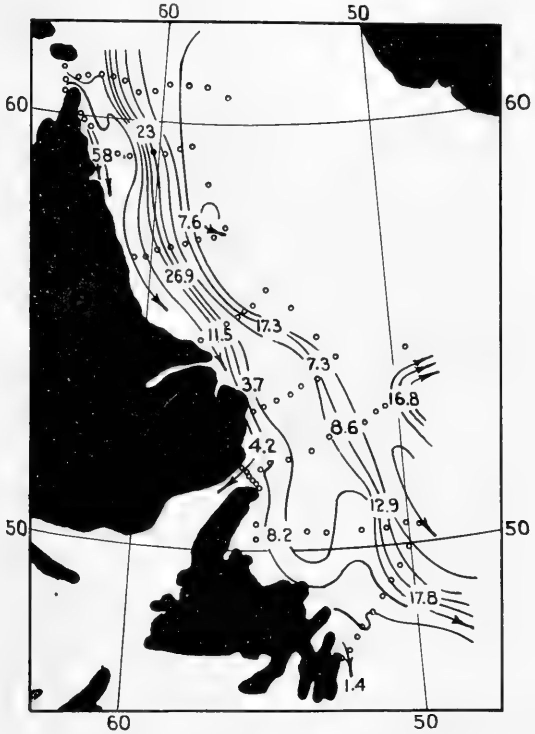

FIGURE 67.—The Labrador Current on the surface the summer of 1931. Velocities expressed in miles per day in axis of current.

of Belle Isle in both the summers of 1931 and 1934 (figs. 67 and 69) but not in 1933. The fact that this had a volume in its margin alone greater than the Labrador Current merits particular emphasis regarding its significance to the circulation of the Labrador Sea.

The surface current maps show one point quite definitely, viz, that variations in the velocity occur throughout the length of the Labrador Current. Such a behavior of the current is not especially surprising when one appreciates the many vagaries and fluctuating factors to which the surface layers are continually subjected.

In order to obtain an idea representative of the velocity of the shelf and slope bands of the Labrador Current along its course, the

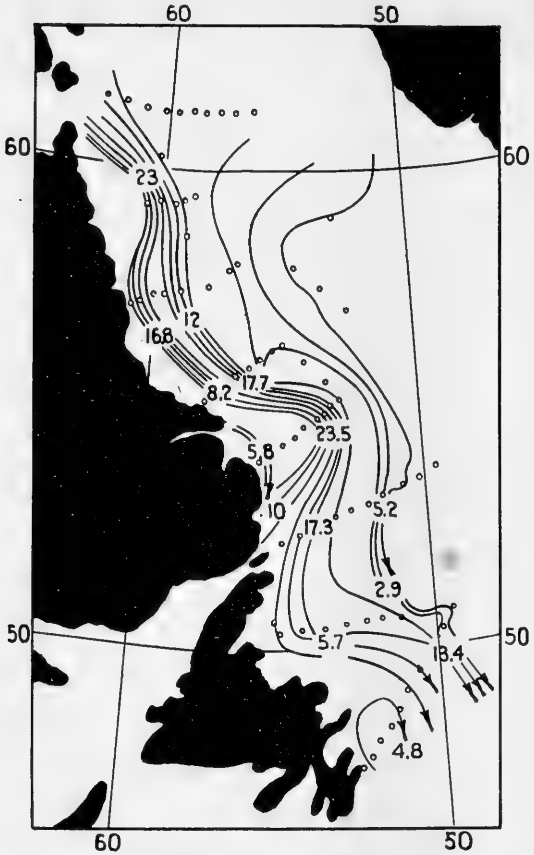

FIGURE 68.—The Labrador Current on the surface the summer of 1933. Velocities expressed in miles per day in axis of current.

velocity over a common width of 20 miles, was measured near the axis of each band at several points.

Surface velocity, Labrador Current

[Miles per day]

	1928		1931		1933		1934	
	Shelf	Slope	Shelf	Slope	Shelf	Slope	Shelf	Slope
Section K	6.0	12.0	1.3	15.1	0	12.0	--------	--------
Section L	7.2	17.5	4.9	10.3	0	9.1	--------	--------
Section M	8.4	10.0	4.2	9.6	0	21.1	--------	--------
Section N	8.2	8.2	6.2	6.2	0	14.9	6.2	14.9
Section O	12.4	3.1	4.3	4.3	8.6	10.8	--------	--------
Section P	7.7	11.0	5.4	8.9	6.2	10.0	8.4	15.0
Section Q	3.4	10.0	2.3	7.0	2.2	7.9	2.2	9.1
Average	7.6	10.3	4.1	8.8	5.6	12.3	4.2	13.0

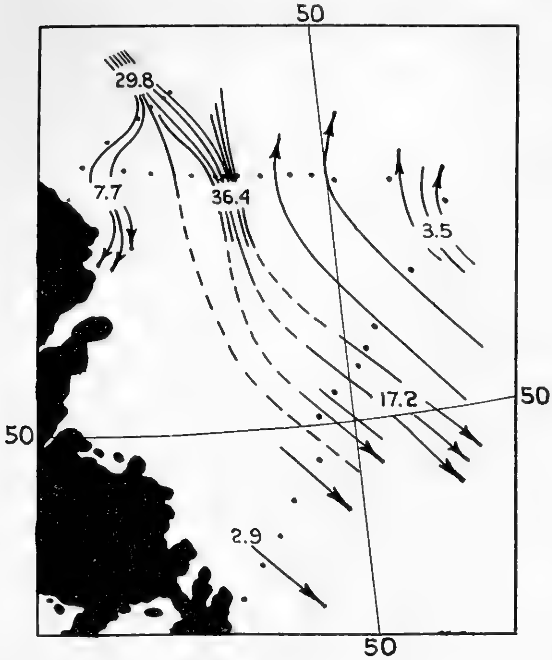

FIGURE 69.—The Labrador Current on the surface the summer of 1934. Velocities expressed in miles per day in axis of current.

The table shows that the average surface velocity of the shelf band of the Labrador Current, for the summers recorded, ranged from 7.6 to 4.1 miles per day. And for the slope band the velocity ranged from 13.0 to 8.8 miles per day. The shelf band and the slope band, therefore, for all of the years, average 5.4 and 11.1 miles per day, or a final average of 8.2 miles per day for the Labrador Current as a whole.[10]

The above figures agree well with the general knowledge regarding the drift of the icebergs from the dates of the breakup of the fast and pack ice in Baffin Bay and along the Labrador coast to the appearance of the ice south of Newfoundland. It is not difficult to trace the spring crop of bergs which constitute the danger to the North Atlantic steamship lanes. If not unduly hindered, they probably spent the previous winter in the vicinity of Cape Dyer, Baffin Land, and the second previous winter in Melville Bay and northern Baffin Bay.[11] Their calving from the glacier the summer of that year checks well with our scanty knowledge of the currents in the far north and of the vicissitudes which the icebergs experience along their drifts.

[10] Iselin (1930) estimated the average surface velocity of the Labrador Current was 10 miles per day.

[11] The thousands of bergs observed by Bartlett (1935) off Devon Island, Aug. 20–25, 1934. probably were released from West Greenland ice-fiords the previous summer. The International Ice Patrol reported a total of 872 icebergs south of Newfoundland the season of 1935, a heavy ice year.

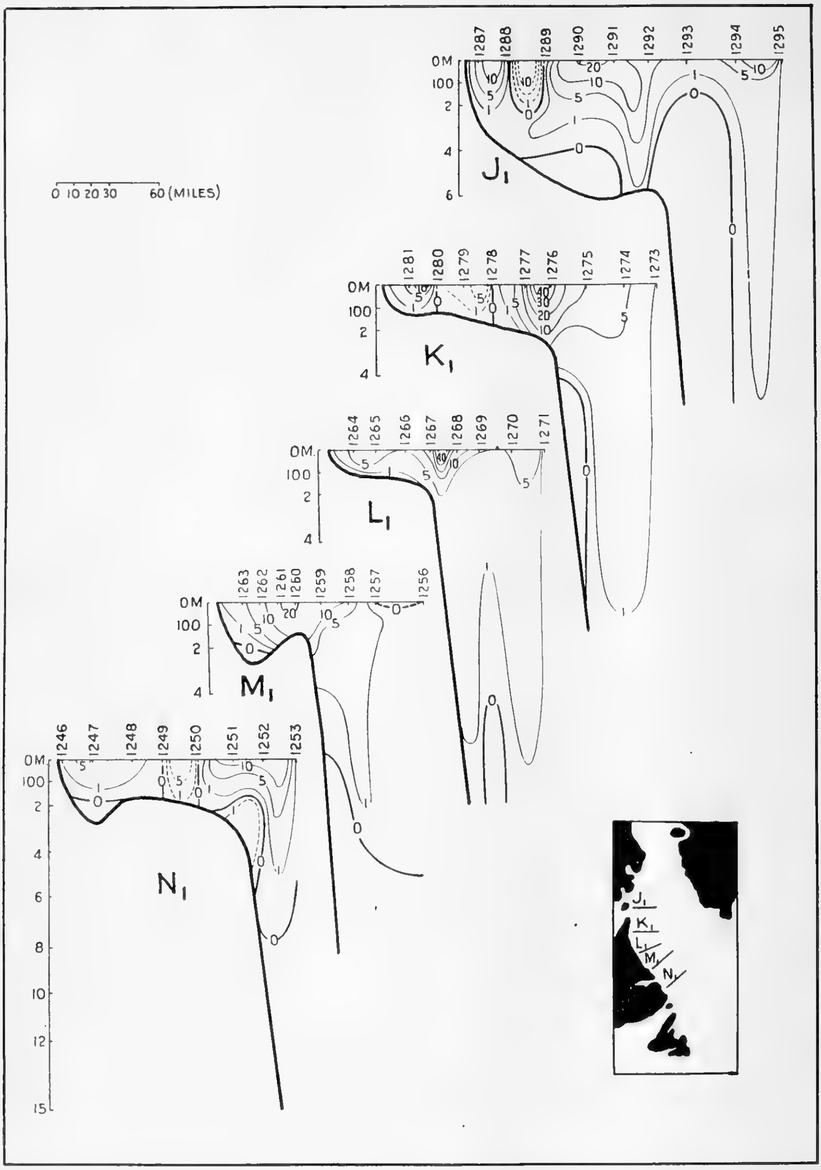

FIGURE 70.—Velocity profiles of the Labrador Current expressed in centimeters per second. The solid lines represent southerly current and the broken lines northerly current. Section J_1, July 24–26, 1931; section K_1, July 17–18, 1931; section L_1, July 15–16, 1931; section M_1, July 12–13, 1931; and section N_1, July 10–11, 1931.

Additional quantitative information as to normal conditions in the Labrador Current, and variations therefrom, is contained in a series of velocity profiles—8 for 1931, 7 for 1933, and 3 for 1934 (figs. 70 to 74). If the profiles shown on figures 70 to 74 be compared with

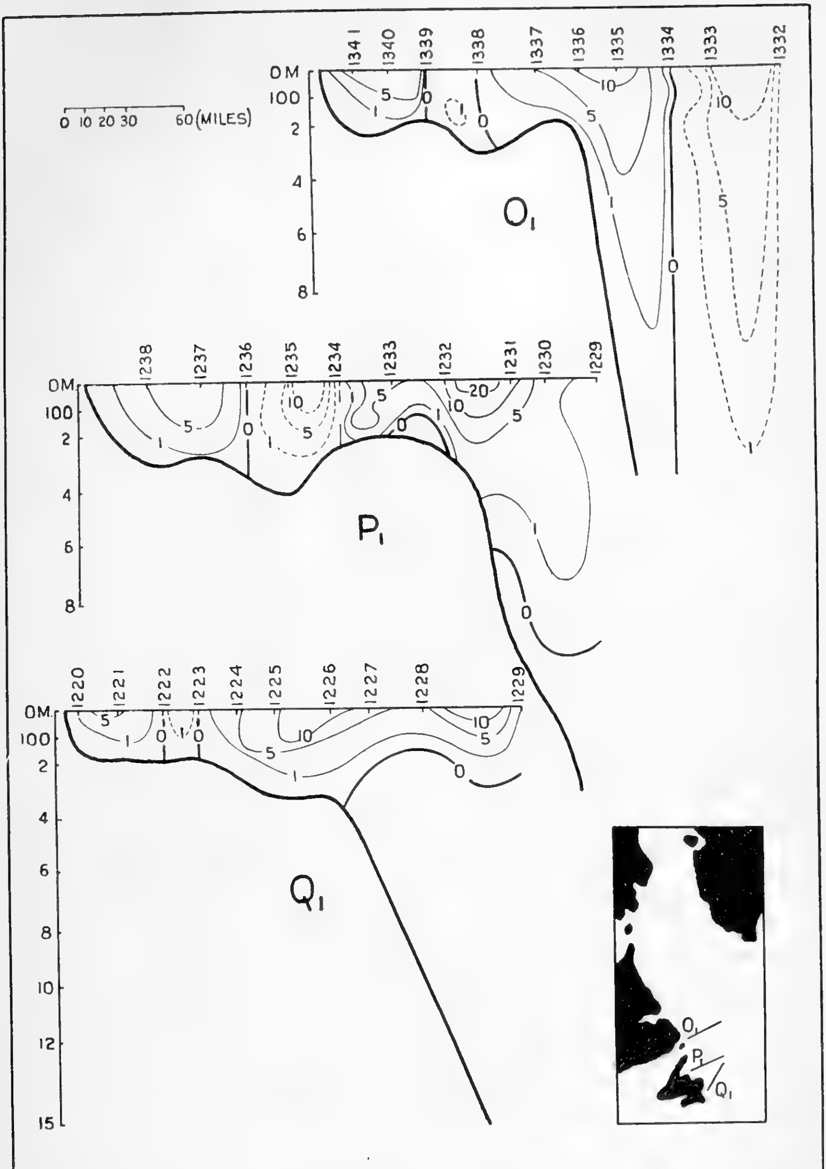

FIGURE 71.—Velocity profiles of the Labrador Current expressed in centimeters per second. The solid lines represent southerly current and the broken lines northerly current. Section O_1, August 7–8, 1931; section P_1, July 6–7, 1931; and section Q_1, July 4–6, 1931.

the corresponding sections (figs. 48, 50, and 51) it will be found that they are nearly similar and support many of the statements which were based on the 1928 observations alone. For example, the division of the Labrador Current below the surface into a shelf and a slope band is a characteristic feature of nearly all the profiles. The 1933 surface current map (fig. 68), it will be recalled, did not exhibit a banding of the current, but below the surface it was so divided, as figures 72 and 73 prove. Corroboration of the junction of West

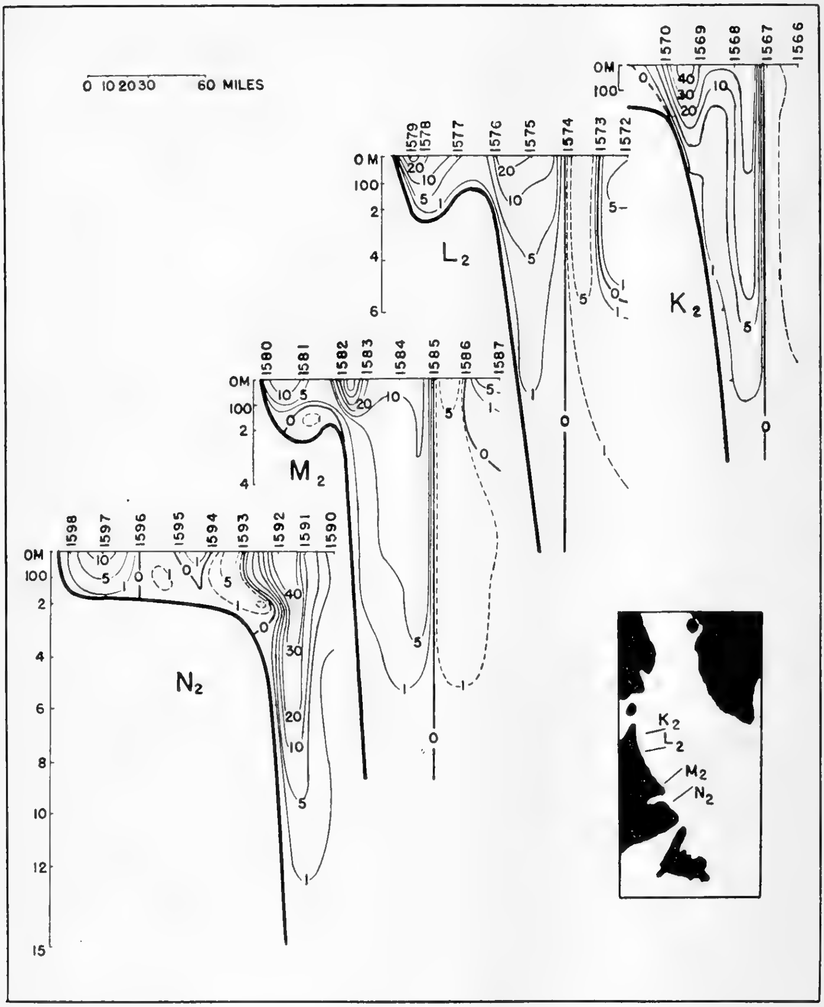

FIGURE 72.—Velocity profiles of the Labrador Current expressed in centimeters per second. The solid lines represent southerly current and the broken lines northerly current. Section K_2, July 18, 1933; section L_2, July 19–20, 1933; section M_2, July 21–22, 1933; and section N_2, July 23–24, 1933.

Greenland Current and Baffin Land Current to form Labrador Current is shown by the northernmost section in 1931 off Resolution Island. The west Greenland band of deep current, with relatively high temperature and salinity is shown at the offshore end of the profile (sec. J_1, fig. 70) as having already joined the southward flow in the American sector. The volumes of this band of the current for

1928 and 1931 of 4.8 and 4.5 million cubic meters per second agree well.

A comparison of corresponding velocity profiles for the summers available also reveals that the Labrador Current was probably deeper

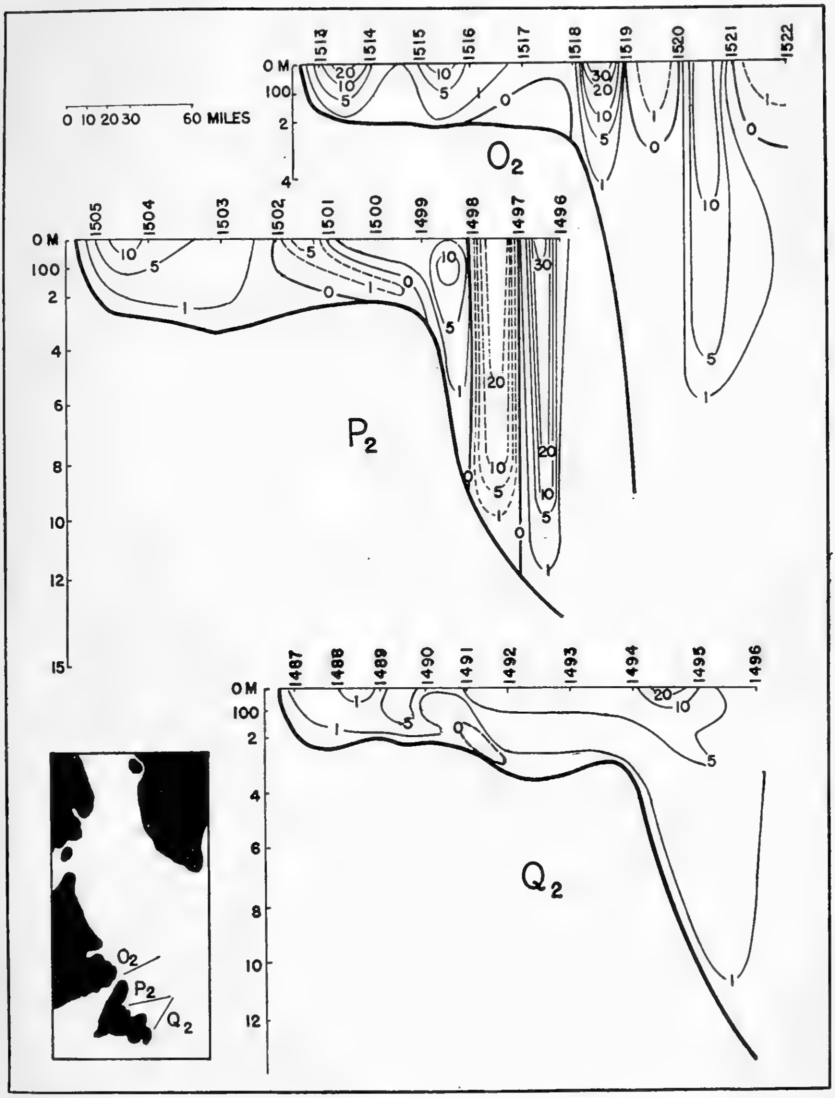

FIGURE 73.—Velocity profiles of the Labrador Current expressed in centimeters per second. The solid lines represent southerly current and the broken lines northerly current. Section O_2, June 30–July 2, 1933; section P_2, July 28–29, 1933, and section Q_2, July 26–28, 1933.

on the mid-Labrador slope than it was either north or south of this zone. This appears consistent, moreover, when it is recalled that it is the deepest section of the West Greenland Current in the offing of Ivigtut and Fiskernaessett which contributed water to the slope

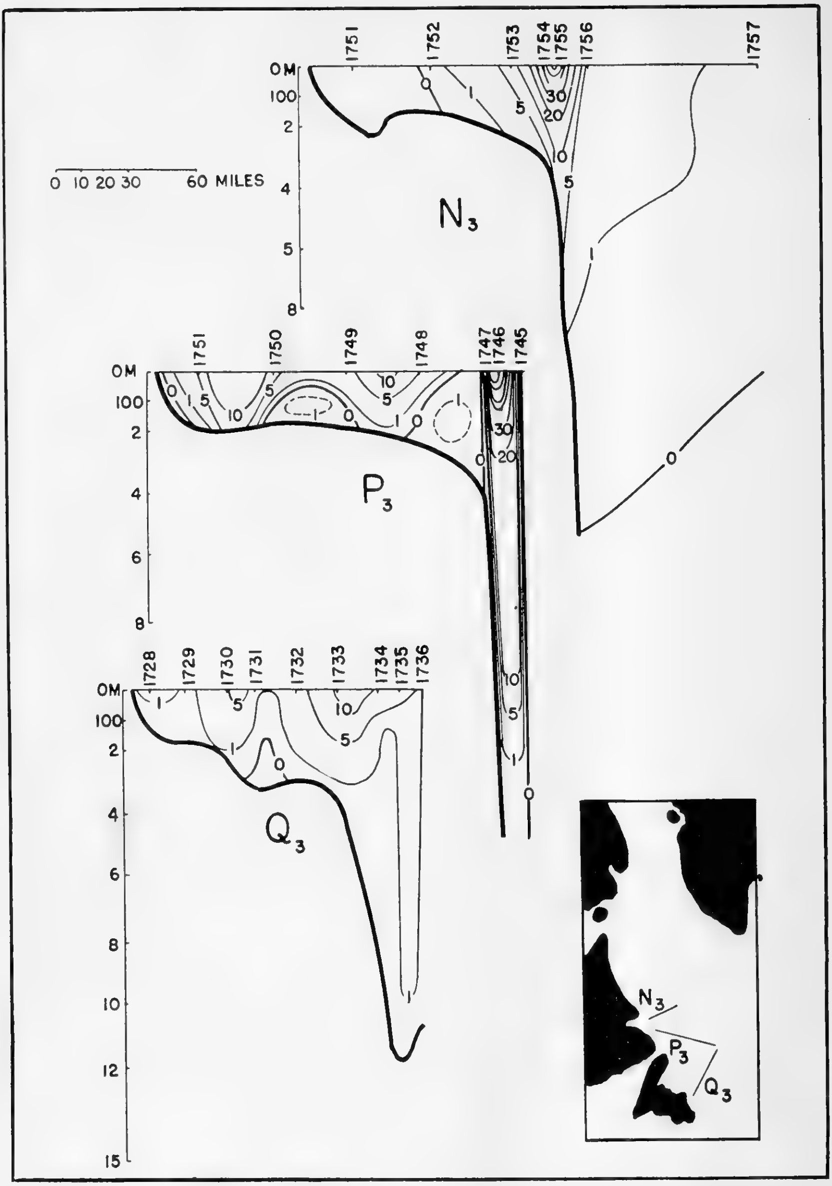

FIGURE 74.—Velocity profiles of the Labrador Current expressed in centimeters per second. The solid lines represent southerly current and the broken lines northerly current. Section N_3, July 10–11, 1934; section P_3, July 9–10, 1934; and section Q_3, July 3–7, 1934.

band of the Labrador Current at mid-Labrador. The West Greenland Current north of the latitude of Hudson Strait is shallower than farther south because of the lesser bottom depths there.

A comparison of the average draft of the current as shown by the 1-centimeter-per-second-velocity lines on the several profiles indicates that the Labrador Current was shallower in 1931 than in any of the other years. This agrees also with the variations noted for the above period off Cape Farewell and Ivigtut, when a deficit was recorded there in the volume of the West Greenland Current.

The profiles for the few summers recorded indicate in general a decrease in the transport of the current near the latitude of Belle

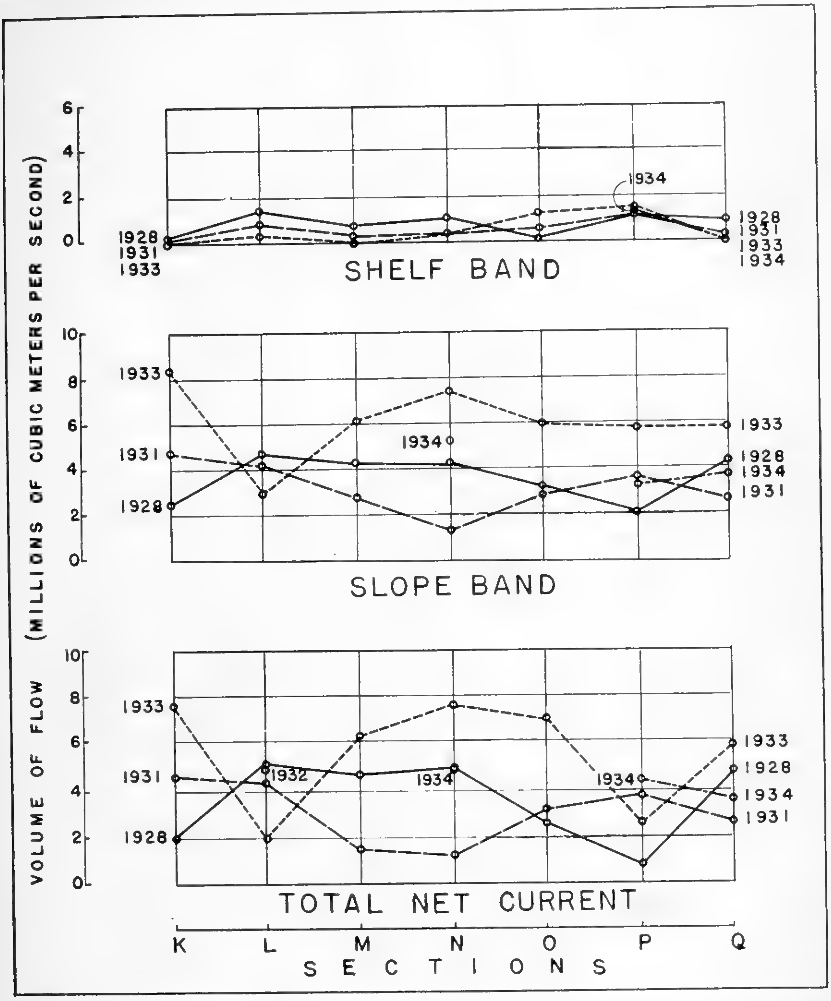

FIGURE 75.—The volume of the shelf band, the slope band, and the total net southerly flow of the Labrador Current, sections K to Q, expressed in millions of cubic meters per second.

Isle. This is attributed partly to the influence of the Strait of Belle Isle and the uneven topography of the Newfoundland shelf and partly to countermovements associated with the Atlantic Current. The volume of the inshore margin of the Atlantic Current which intersected the offshore end of section O (fig. 71) in 1931 has been computed as 5.6 million cubic meters per second. The observations in 1933 did not extend out to the margin of the Atlantic Current but if section P_3 (1934, fig. 74) had been drawn so as to have included station 1739, it would also have shown the margin of the Atlantic Current. The margin was computed to have contained 7.8 million cubic meters per second. This set, as earlier described on page 82, is a mixture of subtropical Atlantic water and returning water of the Labrador Current.

In some of the velocity profiles, especially those for 1933, a third band of current has been revealed somewhat offshore of the continental slope. It is believed that this represents a local, temporary condition only, in which a whorl in the Labrador Current intersected

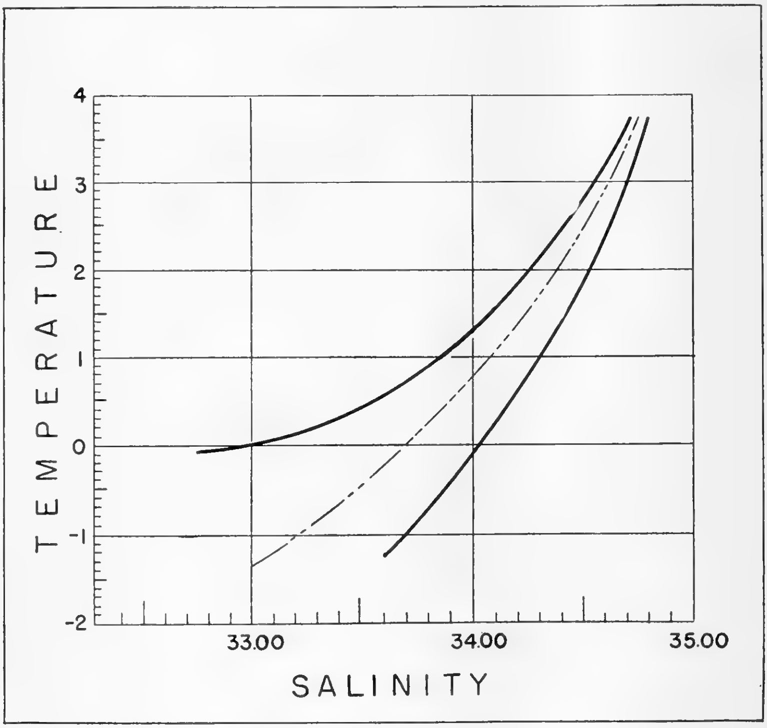

FIGURE 76.—Temperature-salinity correlation of the Labrador Current in the American sector the summer of 1931.

the plane of the section. Such departures often reflecting an excess or deficit in the computed volume of the north-south components should, of course, be discounted, each case being judged on its particular merits at the time and place.

A table, recording in more detail the volume of the bands of Labrador Current and intersected eddies, is appended at the end of this chapter.

The Labrador Current (see table p. 127) averaged greatest volume in 1933 and smallest in 1931, varying from 5.4 million cubic meters per second to 3.4 million cubic meters per second. The excess of current in 1933, as shown on figure 75, was mostly confined to the slope band which from its derivation points to a swelling in the west Greenland portion of the Labrador Current rather than an increase in the Baffin Bay discharge. This is substantiated by the excess in volumes recorded in 1933 (p. 54) for the West Greenland Current off Cape Farewell and Ivigtut.

The deficit of Labrador Current in 1931 along the American slope is corroborated also (p. 50) by the fact that much of the West Greenland Current off Cape Farewell branched out into the Labrador Sea and was thus lost that summer to the Labrador Current. Attention has already been called to the great scarcity of icebergs south of Newfoundland in 1931, a total of 13 compared with the average number of 420.

As a further analysis of the components of the Labrador Current, temperature-salinity correlation curves have been drawn based upon all 1931 observations below a depth of 50 meters in the Labrador Current of the American sector. The two solid lines embrace the pattern of the temperature-salinity plots, the greater distance between the two curves near the bottom of the graph signifies a consistent scattering of the correlation points in the cold low-salinity water and a concentration in the higher temperature and salinity brackets. The broken line is illustrative of the mean temperature-salinity correlation for all the sections in the American sector the summer of 1931. The lower left-hand portion of this curve represents the Baffin Land Current component and the upper right-hand the West Greenland Current component. A point about halfway along the broken line may be taken as representative of the division between the mixture. A computation of the average volumes of the current for the American sector in 1931 with reference to this boundary results in 2.1 million cubic meters per second for the West Greenland Current water and 1.4 million cubic meters per second for the Baffin Land Current water. These proportions of 3 to 2 correspond to previous estimates of the composition of the Labrador Current based on the observations of 1928. (See p. 85.)

The horizontal distribution of temperature and salinity, surface to 600 meters, in the American sector during the summers of 1931, 1933, and 1934 is portrayed on figures 77 to 86. When these are compared with figures 52 to 61, the temperature and salinity maps for 1928, good agreement in the general form and position of the isotherms and isohalines is observed. The resemblance between the 1928 and 1931 surface isotherms and isohalines is especially striking, the 1928 temperatures in the American sector being generally about 1° C. lower than those in 1931. A minimum temperature about −1.5° C. was found on the American shelf in all of the summers. A feature common to all of the 400- and 600-meter temperature maps is a band of water warmer than its surroundings which extended southward along the American slope to the latitude of Belle Isle. This is undoubtedly the thermal influence of the west Greenland water in the slope band of the Labrador Current which, as remarked on page 100, was cooled as it progressed southward.

Attention is especially called to the distribution of temperature and salinity at a depth of 100 meters in the latitude of Belle Isle just offshore of the continental edge (fig. 84). Temperatures of

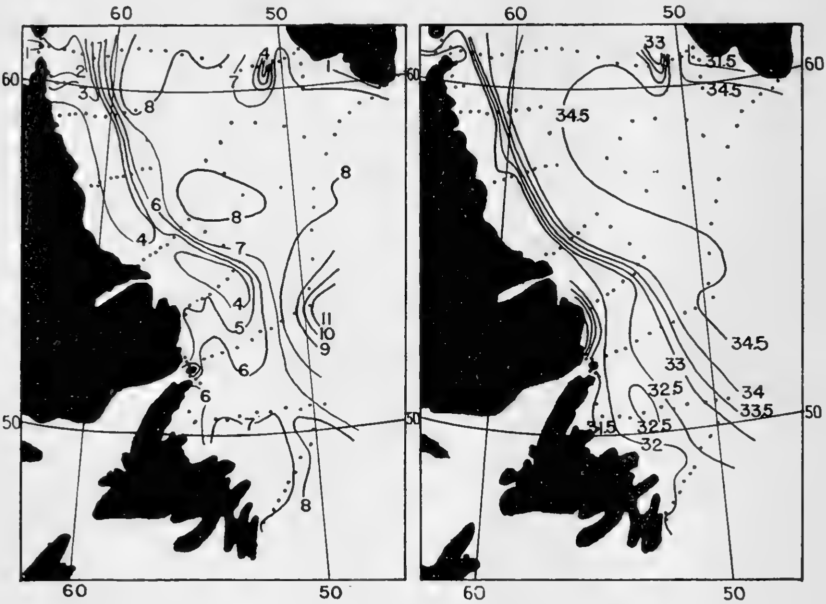

FIGURE 77.—Temperature and salinity at the surface July 4–August 8, 1931.

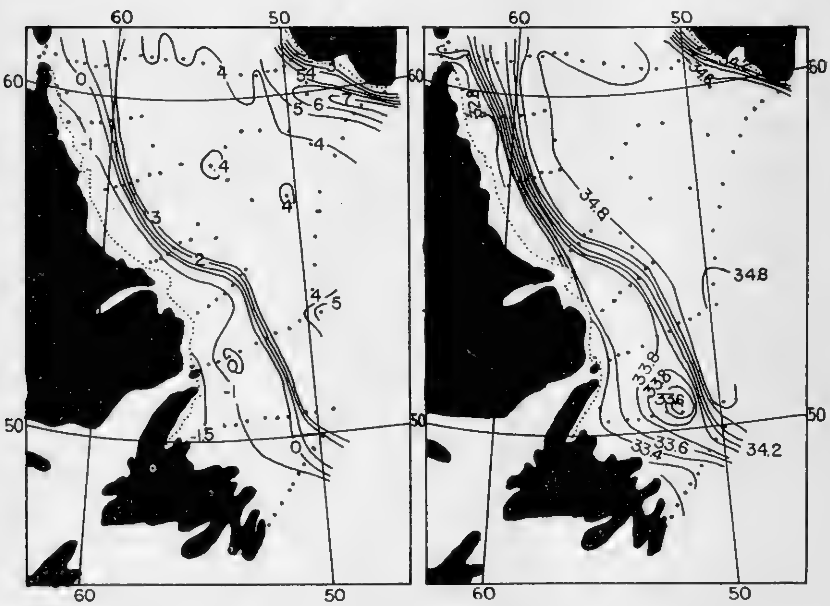

FIGURE 78.—Temperature and salinity at 100 meters July 4–August 8, 1931.

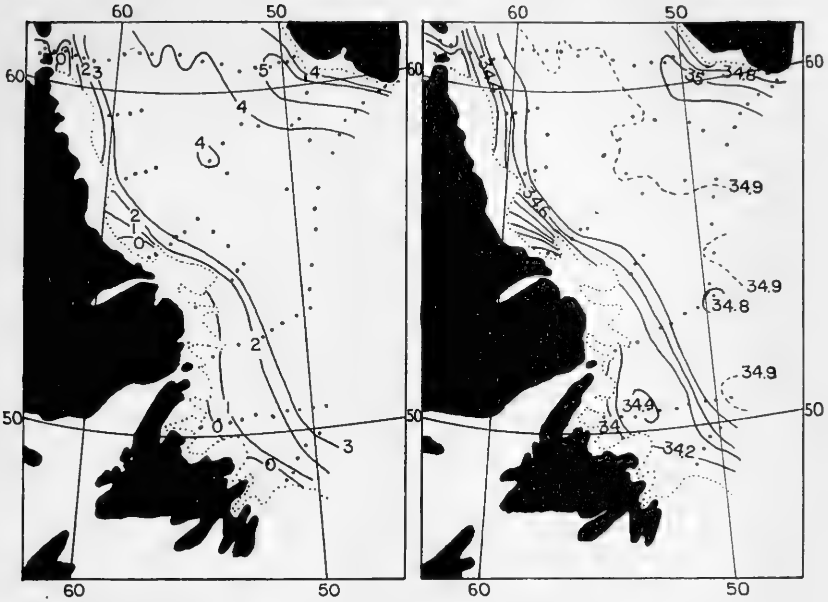

FIGURE 79.—Temperature and salinity at 200 meters July 4–August 8, 1931.

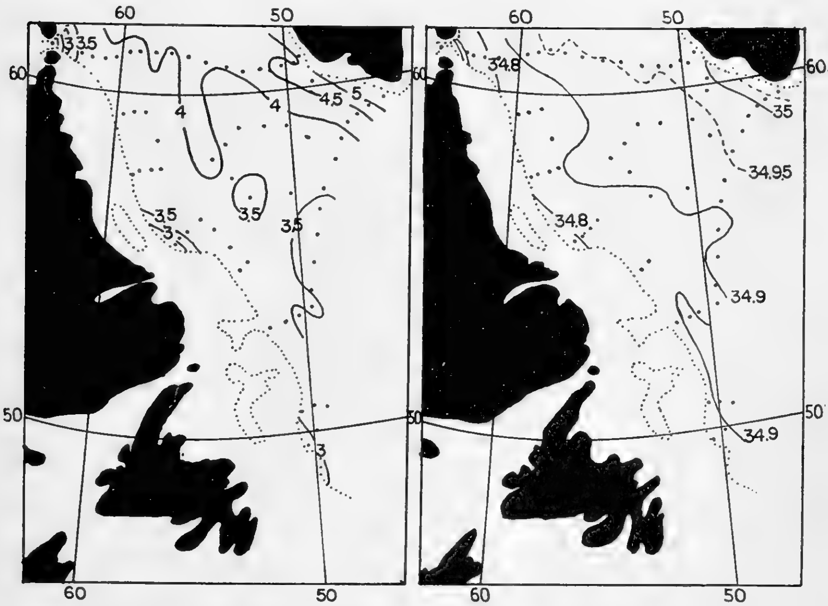

FIGURE 80.—Temperature and salinity at 400 meters July 4–August 8, 1931.

7° C., and salinities of 34.90‰ were found in this locality, where on the current maps and the velocity profiles, north-flowing countercurrent has previously been described. This region, therefore, is unmistakably associated with currents coming from farther south in the Atlantic.

The vertical distribution of temperature and salinity for the summers of 1931, 1933, and 1934 is depicted on figures 87 to 92. The same outstanding features noted in the 1928 sections are seen here, viz, the shelf of frigid water and the upward inclination of the isohalines coast to continental edge.

The 1931 profiles in both the northern and southern regions of the American sector, recording saltier water than the profiles in

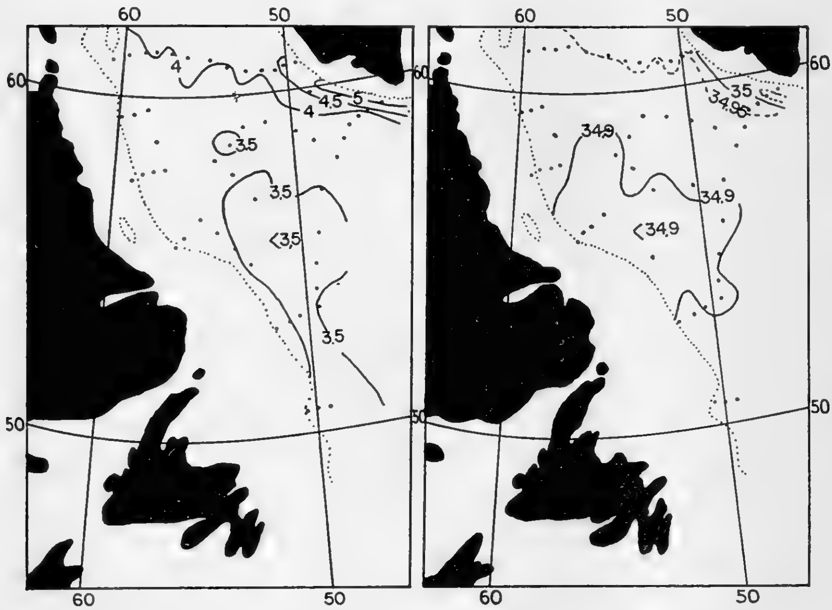

FIGURE 81.—Temperature and salinity at 600 meters July 4–August 8, 1931.

between, indicate first the influence of the West Greenland Current in the north and later the Atlantic Current in the south. The saltier water in 1931 than in any of the other summers, as revealed by a comparison of all of the salinity profiles, corroborates the surface current map (fig. 123, p. 167), viz, the West Greenland Current set more directly across the Labrador Sea the summer of 1931 than in any of the other summers.

If the corresponding temperature and velocity profiles for the "N" sections be superimposed on each other and the average temperature and the rate of heat transfer for the Labrador Current be computed in accordance with the methods explained (p. 24), these values afford a means of comparison between the summers investigated.

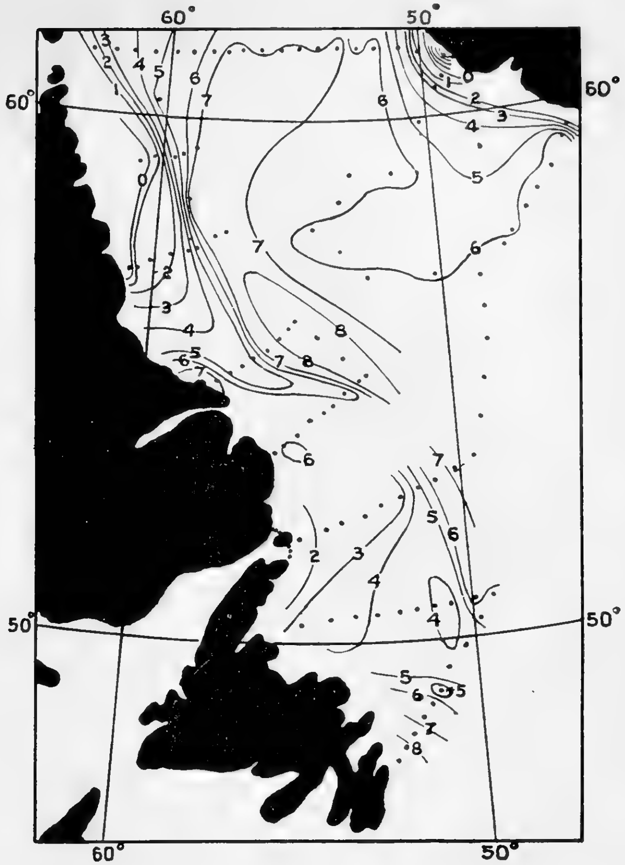

FIGURE 82.—Temperature at the surface June 26–July 24, 1933.

Average temperature and rate of heat transfer of Labrador Current

Year	Volume current ($m^3/s \times 10^{-6}$)			Average temperature			Rate heat transfer ($°cm^3/s \times 10^{-6}$)		
	South (net)	North (net)	South (net)	South (net)	North (net)	South (net)	South (net)	North (net)	South (net)
1928	5.11	0.05	5.06	3.26	1.04	--------	16.7	0.1	16.6
1931	1.62	.31	1.31	1.51	0.63	--------	2.4	0.2	2.2
1933	7.93	.33	7.60	3.27	3.00	--------	25.9	1.0	24.9
1934	5.31	.28	5.03	2.74	—1.11	--------	4.5	—0.3	14.8
1935	4.22	--------	4.22	2.76	--------	--------	11.6	--------	11.6
Averages	4.84	0.19	4.64	2.7	0.89	--------	14.2	0.2	14.0

The Labrador Current averaged highest in temperature, according to the above table, during the summers of 1933 and 1928, and lowest in temperature the summer of 1931. The greatest volume of the Labrador Current occurring in the year 1933 combined with the high temperature resulted in a rate of heat transfer that exceeded any of the other summers.

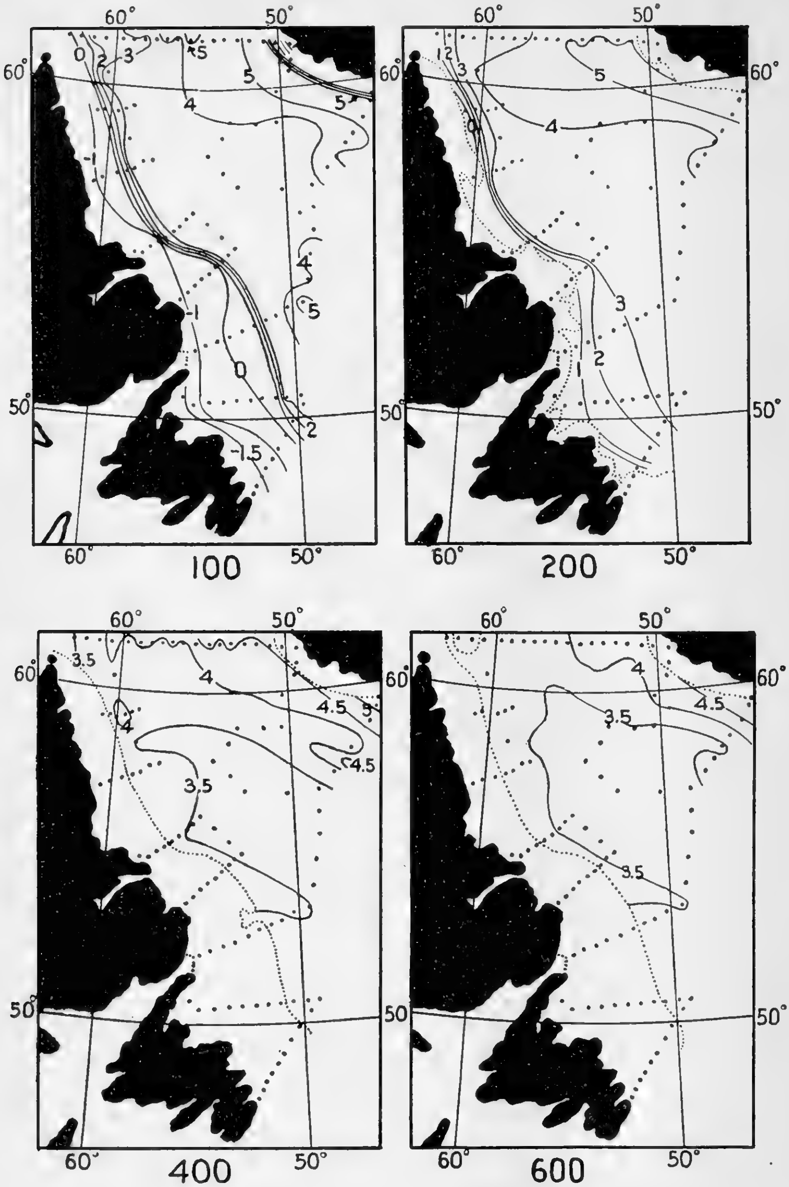

FIGURE 83.—Temperature at 100, 200, 400, and 600 meters June 26–July 24, 1933.

It is instructive to note that the annual variations in the average temperature are of less magnitude in the Labrador Current, the temperatures of which are relatively low, than in the West Greenland Current, where they are relatively high.

In order to establish more firmly in mind normal summertime conditions and to learn more of the degree of annual variations, reference is made to subsurface observations other than the U. S. Coast Guard's. These are practically all contained, as noted in chapter I, viz, Matthews (1914); Iselin (1930); and Conseil Permanent International (1929) and (1933). In each one of the *Scotia's* three slope stations, between Belle Isle and St. John's, the water at mid-depths averaged about a half-degree Centigrade colder than similar slope stations taken at about the same time of the year in 1928, 1931, 1933,

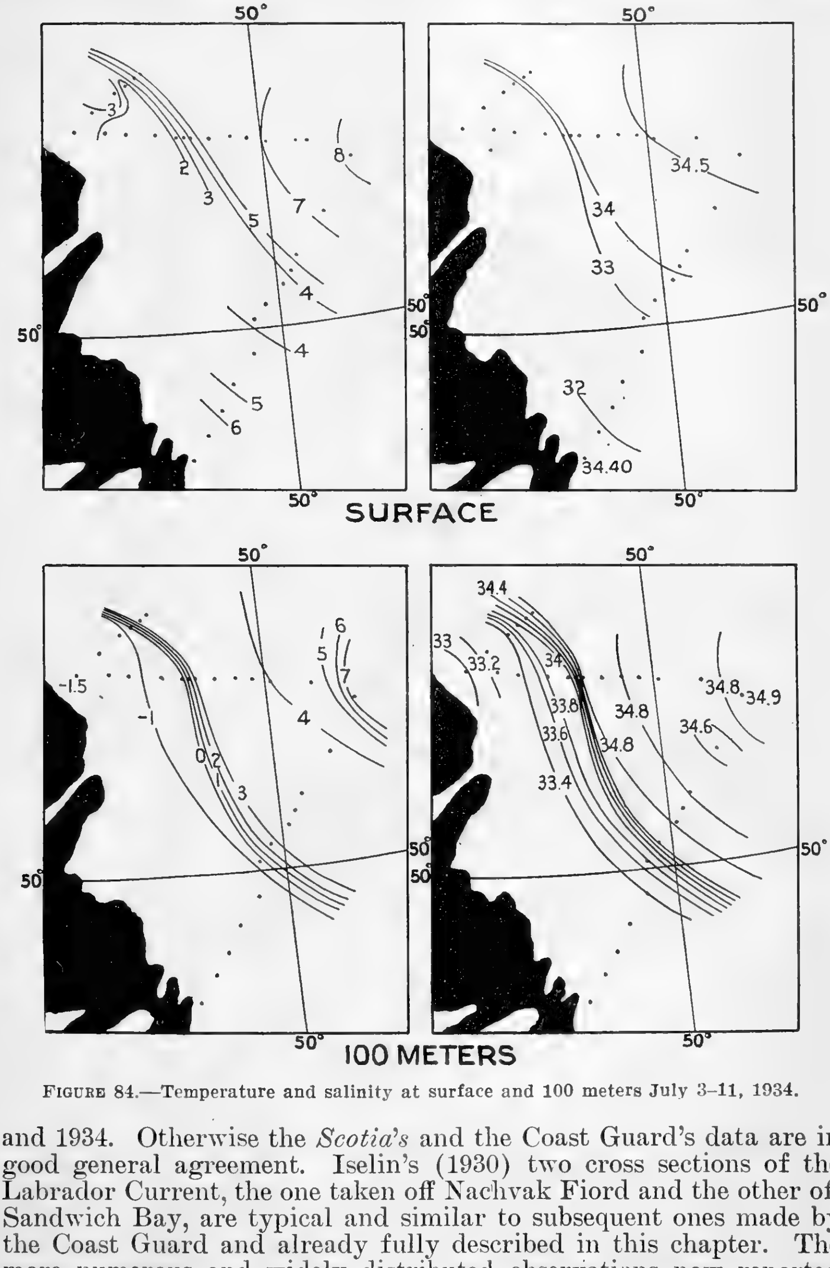

FIGURE 84.—Temperature and salinity at surface and 100 meters July 3–11, 1934.

and 1934. Otherwise the *Scotia's* and the Coast Guard's data are in good general agreement. Iselin's (1930) two cross sections of the Labrador Current, the one taken off Nachvak Fiord and the other off Sandwich Bay, are typical and similar to subsequent ones made by the Coast Guard and already fully described in this chapter. The more numerous and widely distributed observations now reported permit amplifications to be made particularly with regard to the

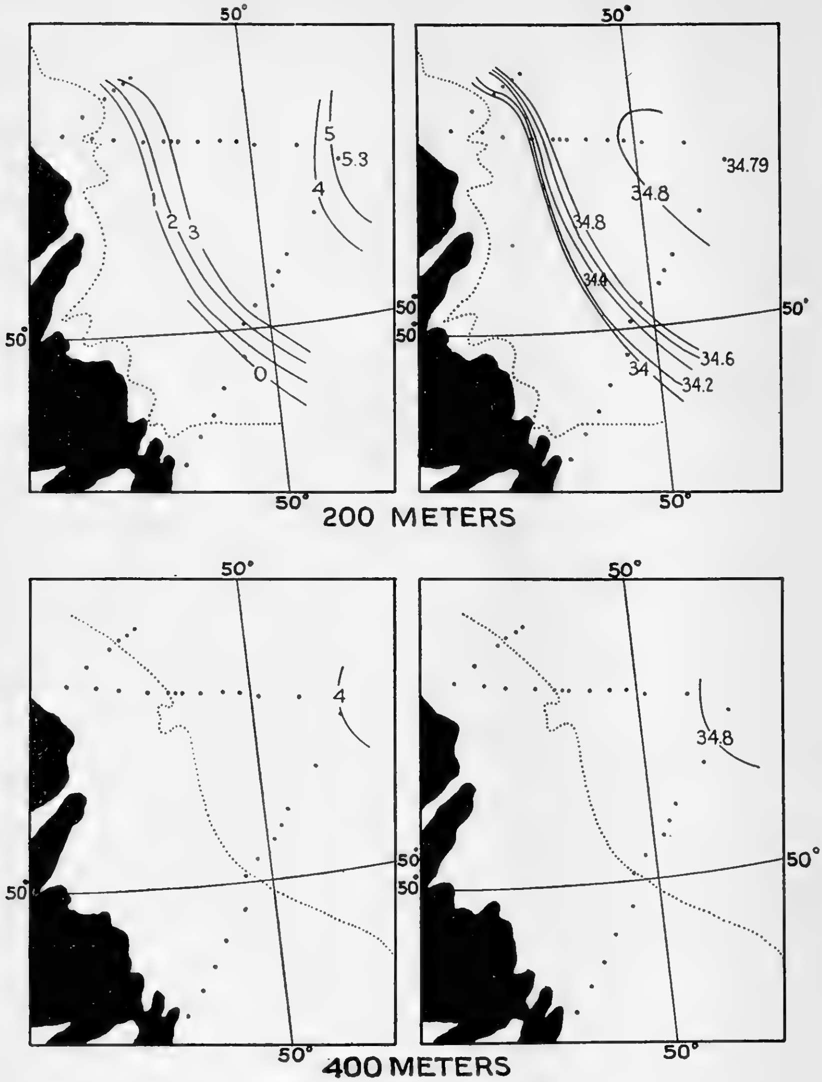

FIGURE 85.—Temperature and salinity at 200 and 400 meters July 3–11, 1934.

Labrador Current itself. The smaller proportion of the total volume of the Labrador Current, as reiterated, is frigid in character, the major quantities being none other than an extension of the West Greenland Current around the periphery of the Labrador Sea.

The *Godthaab's* observations in the American sector (Conseil Permanent International, 1929) support the general distribution of temperature and salinity described above. The net volume of the Labrador Current, according to the *Godthaab's* observations, was computed as 3.5 million cubic meters per second off Resolution Island and 5.9 million cubic meters per second off Cape Harrigan. This corresponds with previously recorded figures of the U. S. Coast Guard of 4.6 and 4.1 million cubic meters per second off Resolution

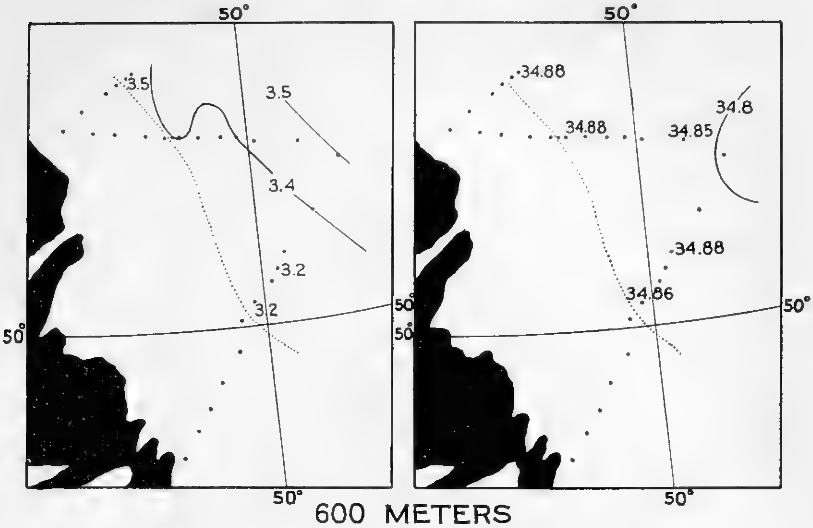

FIGURE 86.—Temperature and salinity at 600 meters July 3–11, 1934.

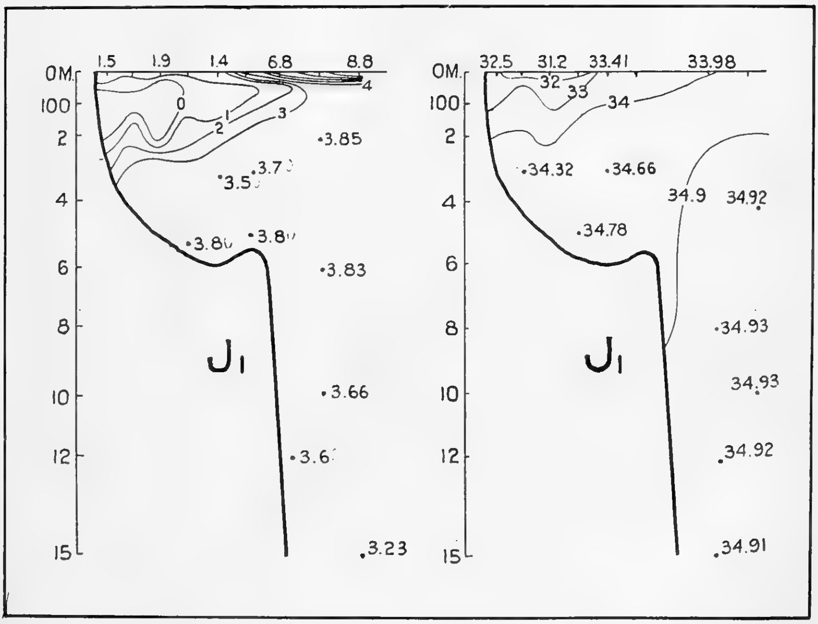

FIGURE 87.—Temperature and salinity profiles across the continental shelf and slope July 24–26, 1931. Section J_1, Resolution Island.

Island, and 4.7, 2.8, and 4.9 million cubic meters per second off Cape Harrigan.

The *Challenger's* observations (Conseil Permanent International, 1933) show no departures of any consequence in the Labrador Current from those published and described herein. A computed transport of 4.9 million cubic meters per second off Cape Harrigan, section L (fig. 50), also agrees well with our results.

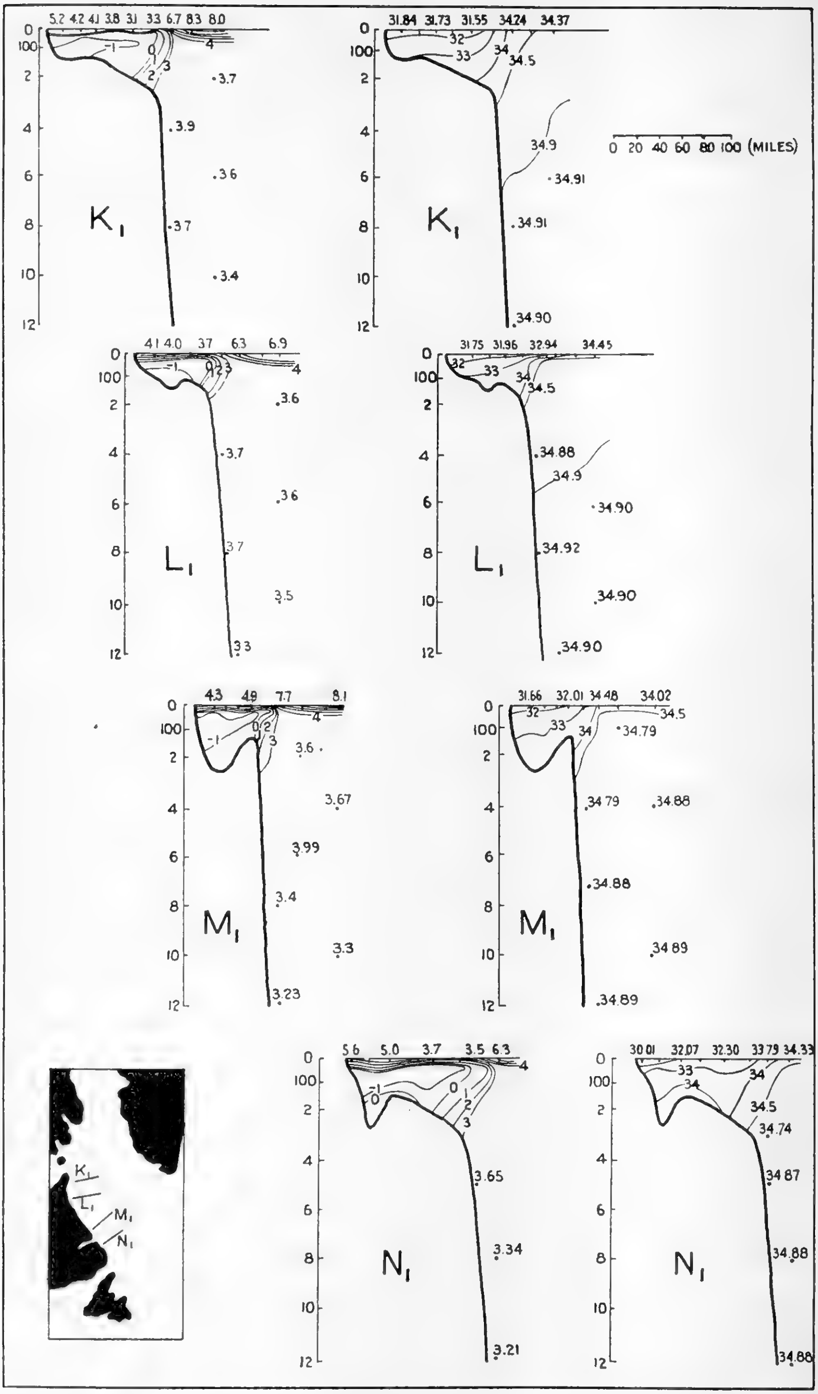

FIGURE 88.—Temperature and salinity profiles across the continental shelf and slope July 10–18, 1931. Section K_1, Nachvak Fiord; section L_1, Cape Harrigan; section M_1, Hamilton Inlet; and section N_1, Domino Island.

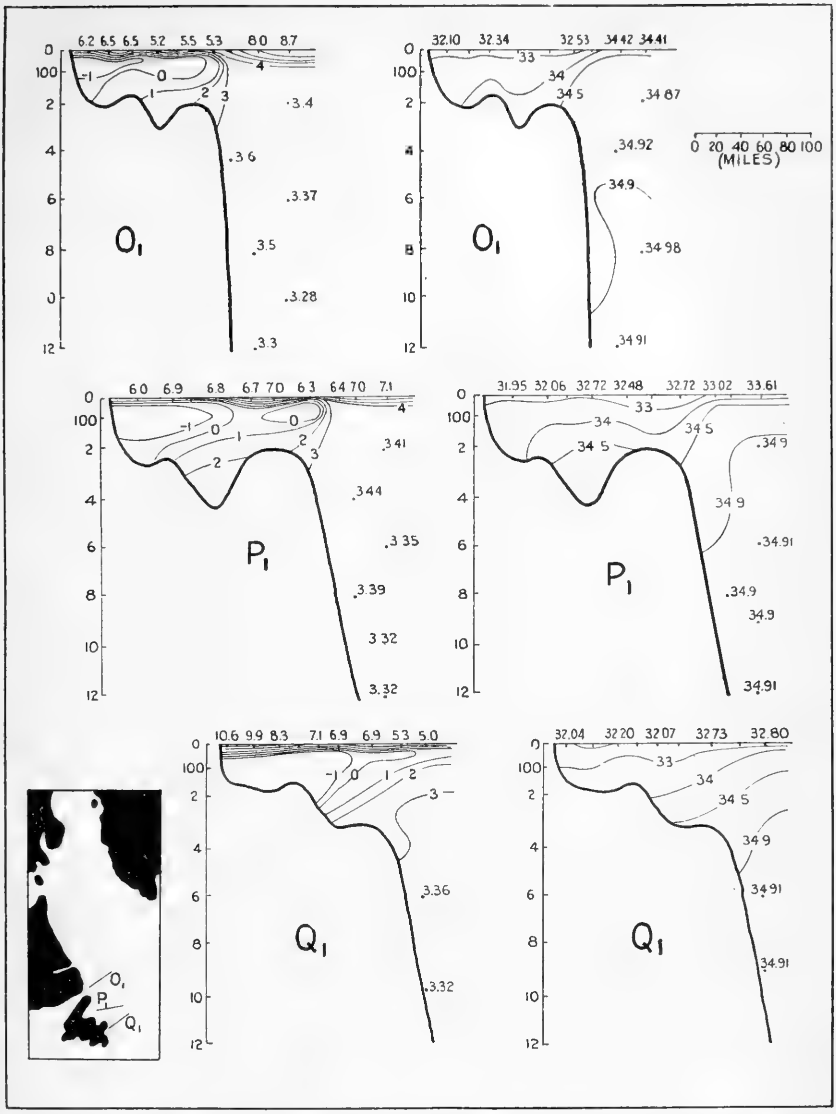

FIGURE 89.—Temperature and salinity profiles across the continental shelf and slope July 4–August 8, 1931. Section O_1, Belle Isle; section P_1, White Bay; and section Q_1, St. John's.

ANNUAL CYCLE

The Labrador Current has been referred to by some as an overflow from melting sea ice and summer land drainage from the regions of Baffin Bay and the Arctic Archipelago. A point, however, well established by the present observations was the source of the two principal tributaries of the Labrador Current, viz, the West Greenland Current and the Baffin Land Current which joined in the ratio of about 3 to 2. The wintertime observations of the *Meteor*, 1935 (p. 10) when compared with the U. S. Coast Guard's summertime surveys indicate that the West Greenland Current off

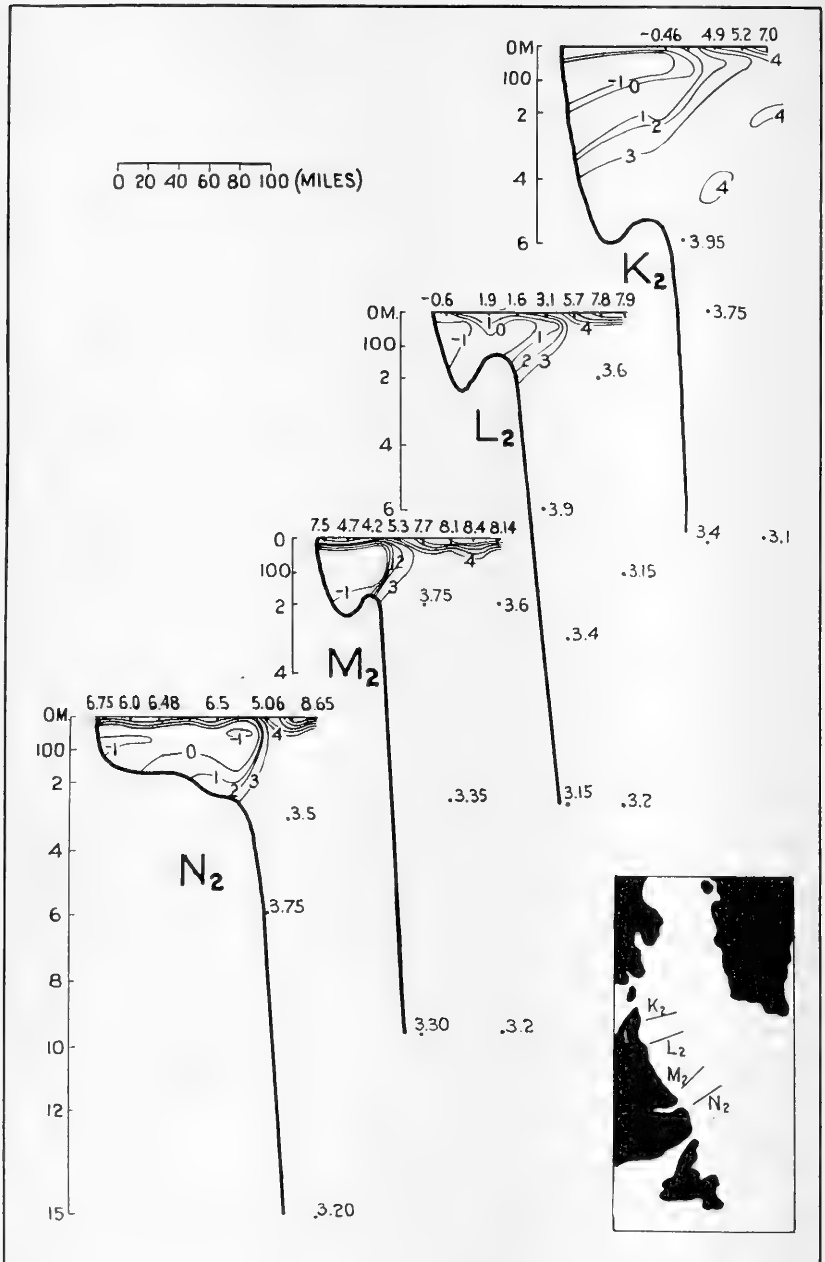

FIGURE 90.—Temperature profiles across the continental shelf and slope July 15–24, 1933. Section K_2, Nachvak Fiord; section L_2, Cape Harrigan; section M_2, Hamilton Inlet; and section N_2, Domino Island.

Cape Farewell exhibited no apparent seasonal cycle. The smaller tributary across Davis Strait according to the *Godthaab's* observations (p. 71), as late in the year as September, was flowing with only slightly diminished volume. The *Marion* (p. 88) also found a nor-

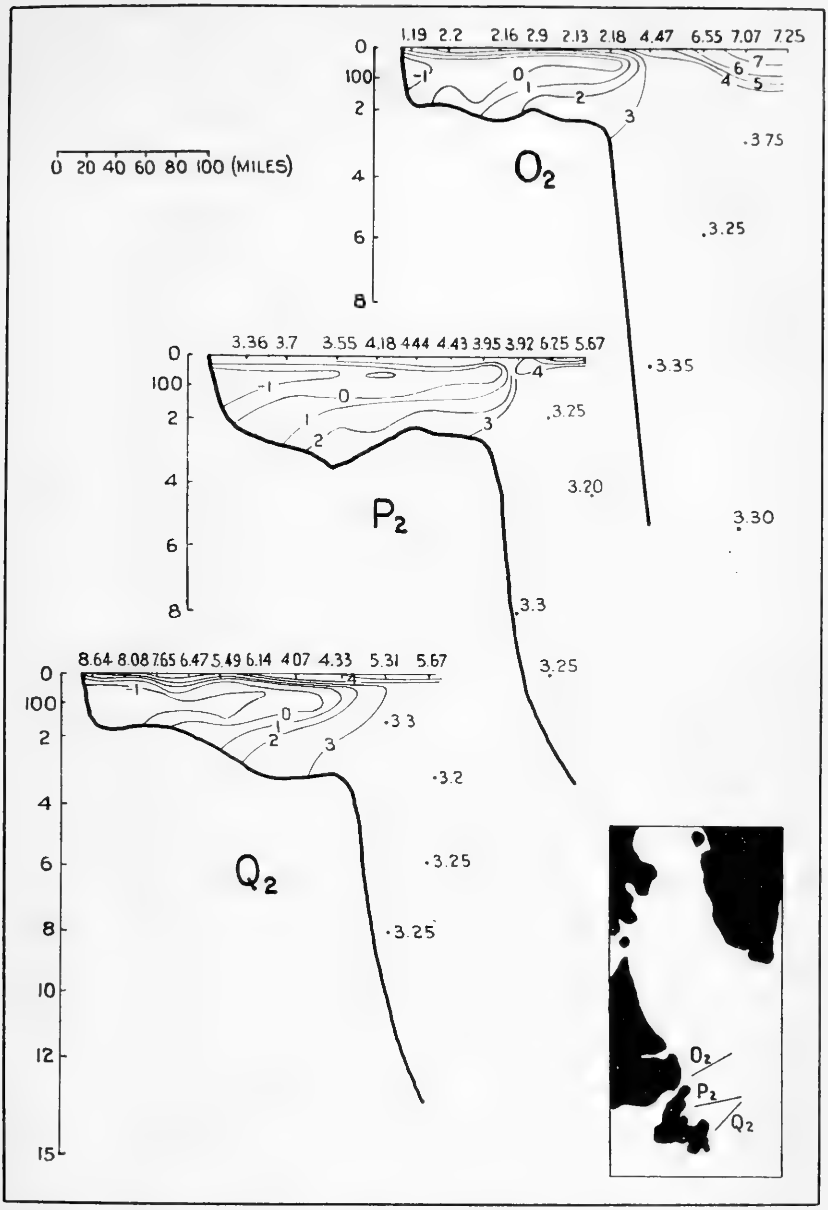

FIGURE 91.—Temperature profiles across the continental shelf and slope June 26–July 2, 1933. Section O_2, Belle Isle; section P_2, White Bay; and section Q_2, St. John's.

mal discharge of the Labrador Current off Resolution Island in late August and again off St. John's in early September. No early spring or winter observations allowing cross sections of the Labrador Current there have ever been collected. There is no direct evidence, therefore, on the time, place, or extent of the current sufficient to construct a reliable picture of the annual cycle. Further remarks on the subject are contained in chapter VII, page 140.

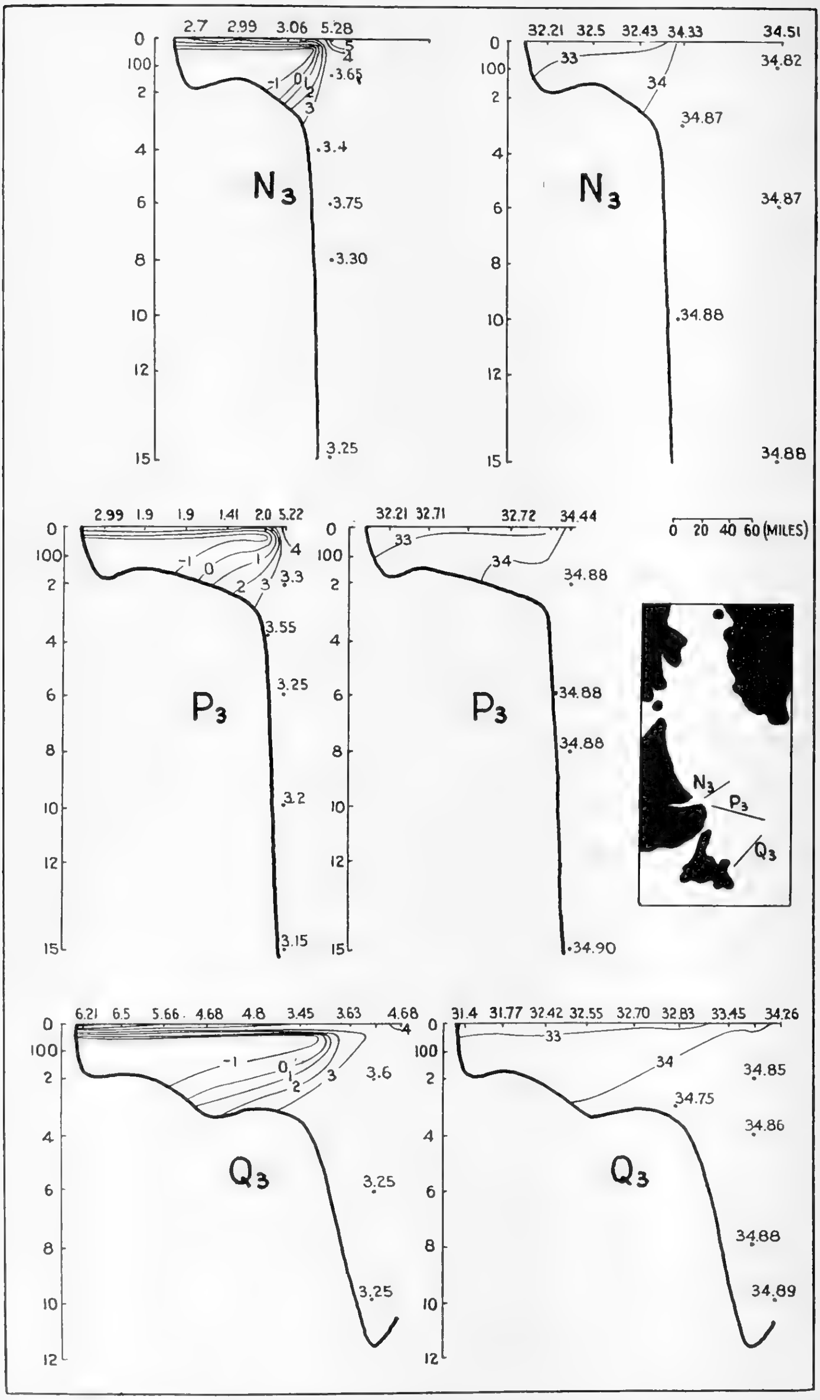

FIGURE 92.—Temperature and salinity profiles across the continental shelf and slope July 3–11, 1934. Section N_3, Domino Island; section P_3, White Bay; and section Q_3, St. John's.

Volume of Labrador Current

[Millions cubic meters per second]

Section and position	1928			1931		
	South	North	South (net)	South	North	South (net)
Section H:						
Offshore						
Slope	1.55					
Shelf	1.04					
Total	2.59		2.59			
Section I:						
Offshore						
Slope	3.26	1.26				
Shelf	1.70					
Total	4.96	1.26	3.70			
Section J:						
Offshore				1.21		
Slope	4.21			2.79		
Shelf	.62	.27		.48	0.42	
Total	4.83	.27	4.56	4.48	.42	4.06
Section K:						
Offshore						
Slope	2.45	.67		4.75		
Shelf	.22			.19	.20	
Total	2.67	.67	2.00	4.94	.20	4.74
Section L:						
Offshore						
Slope	4.66			4.10		
Shelf	1.41	.80		.25		
Total	6.07	.80	5.27	4.35		4.35
Section M:						
Offshore					.01	
Slope	4.24			2.78		
Shelf	.60	.09				
Total	4.84	.09	4.75	2.78	.01	2.77
Section N:						
Offshore						
Slope	4.15			1.32		
Shelf	.96	.05		.30	.31	
Total	5.11	.05	5.06	1.62	.31	1.31
Section O:						
Offshore	3.57				[1] 5.62	
Slope	2.80	3.00		2.81		
Shelf	.08	.85		.58	.07	
Total	6.45	3.85	2.60	3.39	.07	3.31
Section P:						
Offshore						
Slope	2.06	1.87		3.70		
Shelf	1.04	.43		1.03	.81	
Total	3.10	2.30	.80	4.73	.81	3.92
Section Q:						
Offshore						
Slope	4.39			2.52		
Shelf	.85	.31		.22	.07	
Total	5.24	.31	4.93	2.74	.07	2.67
Average			4.3			3.4

[1] Margin of Atlantic current not included in averages.

Volume of Labrador Current—Continued

[Millions cubic meters per second]

Section and position	1933			1934		
	South	North	South (net)	South	North	South (net)
Section K:						
Offshore		0.38				
Slope	8.02					
Shelf						
Total	8.02	.38	7.64			
Section L:						
Offshore	.35	1.79				
Slope	2.79					
Shelf	.74					
Total	3.88	1.79	2.09			
Section M:						
Offshore	.13	1.59				
Slope	6.07					
Shelf	.35	.03				
Total	6.55	1.62	4.93			
Section N:						
Offshore						
Slope	7.45			5.31		
Shelf	.48	.33			0.28	
Total	7.93	.33	7.60	5.31	.28	5.03
Section O:						
Offshore	4.46	.18				
Slope	1.62	.12				
Shelf	1.28					
Total	7.31	.30	7.01			
Section P:						
Offshore	4.70	4.28			[1] 7.78	
Slope	1.13			3.40		
Shelf	1.27	.26		1.26	.14	
Total	7.10	4.54	2.56	4.66	.14	4.52
Section Q:						
Offshore						
Slope	5.90			3.81		
Shelf		.01				
Total	5.90	.01	5.89	3.81		3.81
Average			5.4			4.4

[1] Margin of Atlantic current not included in averages.

Chapter VII

THE GRAND BANKS SECTOR

The Grand Banks sector is defined as the region south and east of Newfoundland which embraces the Labrador Current. The discussion refers particularly to the eastern slope of the Grand Banks along which the Labrador Current carries icebergs farthest south into the North Atlantic. A frigid branch of the Labrador Current often prevails between the Grand Banks and Cape Race and may extend southwestward to the continental edge. Also cold water from the Labrador Current continually spread in over the bottom of the Grand Banks for considerable distances where the configuration favors such incursions. The shallowness of the Grand Banks waters permits no satisfactory dynamic topographic maps, and the primary circulation is indicated mainly by the boundary surfaces of temperature and salinity. Illustrations of the distribution of temperature and salinity over the Grand Banks have not been included since they have already been published by Smith (1924).

THE SURFACE CURRENTS

The system of prevailing circulation of the surface layers in the Grand Banks sector is shown on the composite dynamic topographic map of the surface relative to 1,500 decibars (fig. 126, p. 70). When this chart is compared with the distribution of temperature and salinity, horizontal and vertical (figs. 96 to 99), it indicates that the Labrador Current flows southward along the eastern slope of the Grand Banks, to the vicinity of the Tail, where practically all of it turns eastward, joining the Atlantic Current. In this manner much of the Labrador Current water returns and may even complete a circuit of the Labrador Sea. Throughout the course of the Labrador Current in the Grand Banks sector, branches are turned back along the outer side and as in the American sector it loses water through cabbeling along its offshore side. Although this process contributes some northern water to the upper levels of the North Atlantic (see Iselin, 1936, fig. 57), the major compensating return to the system as a whole is concentrated at deeper levels and in the manner as explained in chapter VIII.

The inshore margin of the Atlantic Current crossing the fifty-second meridian follows near the 4,000-meter isobath around the Grand Banks to the vicinity of the forty-fourth parallel, where the border of the current bends inshore across the forty-eighth meridian and then recurves south of Flemish Cap.

Cyclonic eddies are often found along the boundary of the Labrador Current and the Atlantic Current, one particularly east of the Tail of the Grand Banks near latitude 42°–30′, longitude 49°–00′, and the other west of the Tail in the vicinity of longitude 51°–30′.

The development and position of these vortices in the mixing zone continually varies, but they may be easily recognized on many of the dynamic topographic maps (figs. 102 to 121), and are also reflected in the drifts of the icebergs.

As the position of the two principal currents continually change according to the described system (fig. 126), so also does the surface velocity vary. The slope band of the Labrador Current over the 200-meter contour along the eastern slope of the Grand Banks often may become constricted to a width of 6 miles when velocities in the axis have attained 110 centimeters per second. In bands of the Gulf Stream and the Atlantic Current, only the borders of which lie within the region of the Grand Banks sector, velocities more regularly reach 80 to 100 centimeters per second. The Labrador Current apparently is subject to greater fluctuations in the Grand Banks sector than farther north or than the Atlantic Current. The average surface velocity of the Labrador Current is estimated to differ little from that found farther north in the American sector, 8.2 miles per day (18 centimeters per second).

A departure in the course of the surface currents from that described above, and which has particular significance for the International Ice Patrol, has been indicated during the period 1900–30 by the phenomenal drifts of icebergs in the western North Atlantic Ocean. (See Smith, 1931, pp. 160–166.) Such rare drifts appear to originate between longitudes 49° and 46°–50′ in the Grand Banks sector, and thence proceed southerly and sometimes finally westerly. But if this track be plotted (fig. 93) it does not coincide with the streamlines of the Atlantic Current, south of the Grand Banks, nor with the southern branch of the Atlantic Current which is commonly believed to follow the trend of the 4,000-meter isobath (fig. 93) southeasterly to about latitude 38° longitude 43° between which position and the mid-Atlantic Ridge the current turns southwesterly.

The *Michael Sars* observations, on the other hand, stations 64 to 70, June 24–30, 1910 (fig. 93), clearly indicate a southerly direction to the Atlantic Current south of the Grand Banks. The current was easterly between stations 70 and 68 with a volume of 40.3 million cubic meters per second, but between stations 68 and 64 it had westerly direction and a net volume of approximately 2 million cubic meters per second. Reference to the respective dynamic heights of the latter pair of stations shows that from the surface to a depth of about 550 meters the Atlantic Current ran westerly but below that easterly. It probably closely paralleled the plane of the stations.

Reference to the back of the United States Hydrographic Office Pilot Chart of the North Atlantic Ocean for the month of July 1935 indicates the general course of the southward branch of the Atlantic Current on the sea surface, and the general trend and bounds have been plotted on our figure 93. It will be seen that southwesterly surface currents often prevail as far west as latitude 35° longitude 60°, the center of the great Atlantic eddy apparently lying northwest of this position. The remains of an iceberg from the Grand Banks was sighted by the steamer *Baxtergate* (and the report verified) June 5, 1926, latitude 30°–20′, longitude 62°–32′, near Bermuda.

The foregoing strongly suggests, therefore, that portions of the Atlantic Current to depths as great as 500 meters sometimes turn southward in the North Atlantic as far west as the fiftieth meridian, and this band of current is traceable downstream even to the region of Bermuda. Rarely icebergs discharged at the southernmost turning point of the Labrador Current may be caught in the above stream and carried great distances south and west in the North Atlantic Ocean.

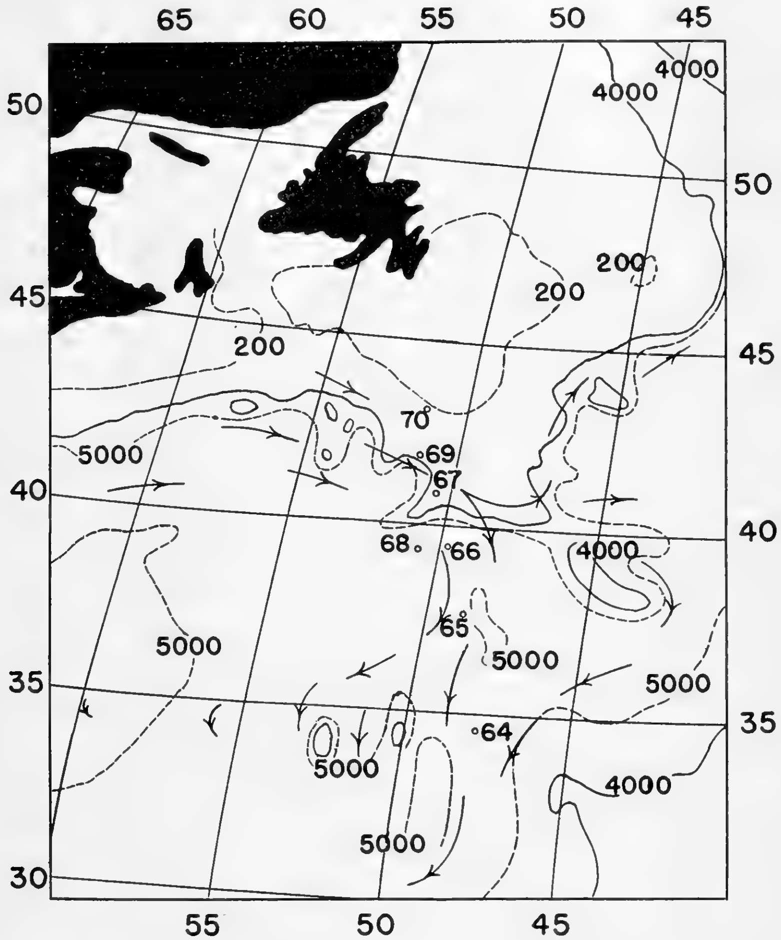

FIGURE 93.—The surface currents south of the Grand Banks.

In this connection the marked branching of the Gulf Stream on reaching the longitude of the Grand Banks, and the further distribution of its waters as Atlantic Current, has been computed from the few existing subsurface observations, as follows:

Atlantic Current

	$m^3/s \times 10^{-6}$
Northern branch which enters Labrador Sea	14.4
Southern branch which turns along mid-Atlantic Ridge	15.8
Middle branch which continues eastward	10.1
Volume of the Gulf Stream crossing fiftieth meridian	40.3

The primary circulation over the Grand Banks themselves as interpreted from the distribution of the temperature and salinity (fig. 94) is based mainly upon the United States Coast Guard's surveys (Smith, 1924, pp. 100–134) and that of the *Scotia* (Matthews, 1914, pp. 30–32). The above observations indicate that the Labrador Current fans out and loses draft on meeting the northern slope of the Grand Banks, the inshore branch of which, subject to considerable variation, turns back in the vicinity of the fifty-fifth

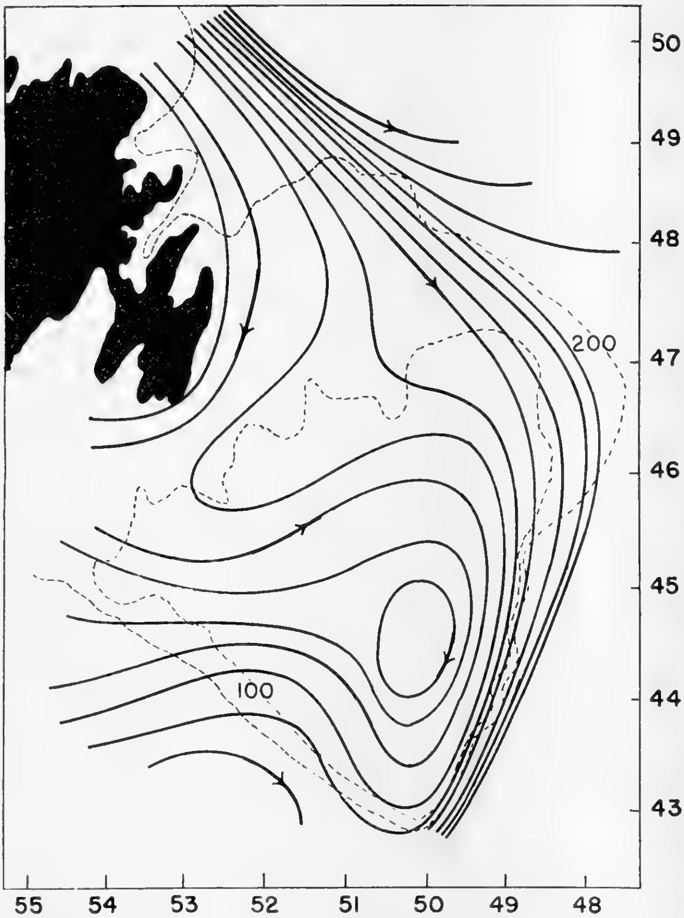

FIGURE 94.—The primary circulation over the Grand Banks.

meridian and joins with coastal water (most pronounced in the surface layers) in slow eastward progress. The colder, saltier Labrador water slides to the bottom while the coastal water spreads out in the surface layers. There are continual coastal contributions which accumulate in the more central parts of the Grand Banks at a maximum in summer, flooding that column surface to bottom and giving it low salinity character although it is actually about 200 miles from the nearest land. This water mass normally centered near latitude 44°–30′, longitude 50°–00′ (fig. 94) is intermittently cooled and

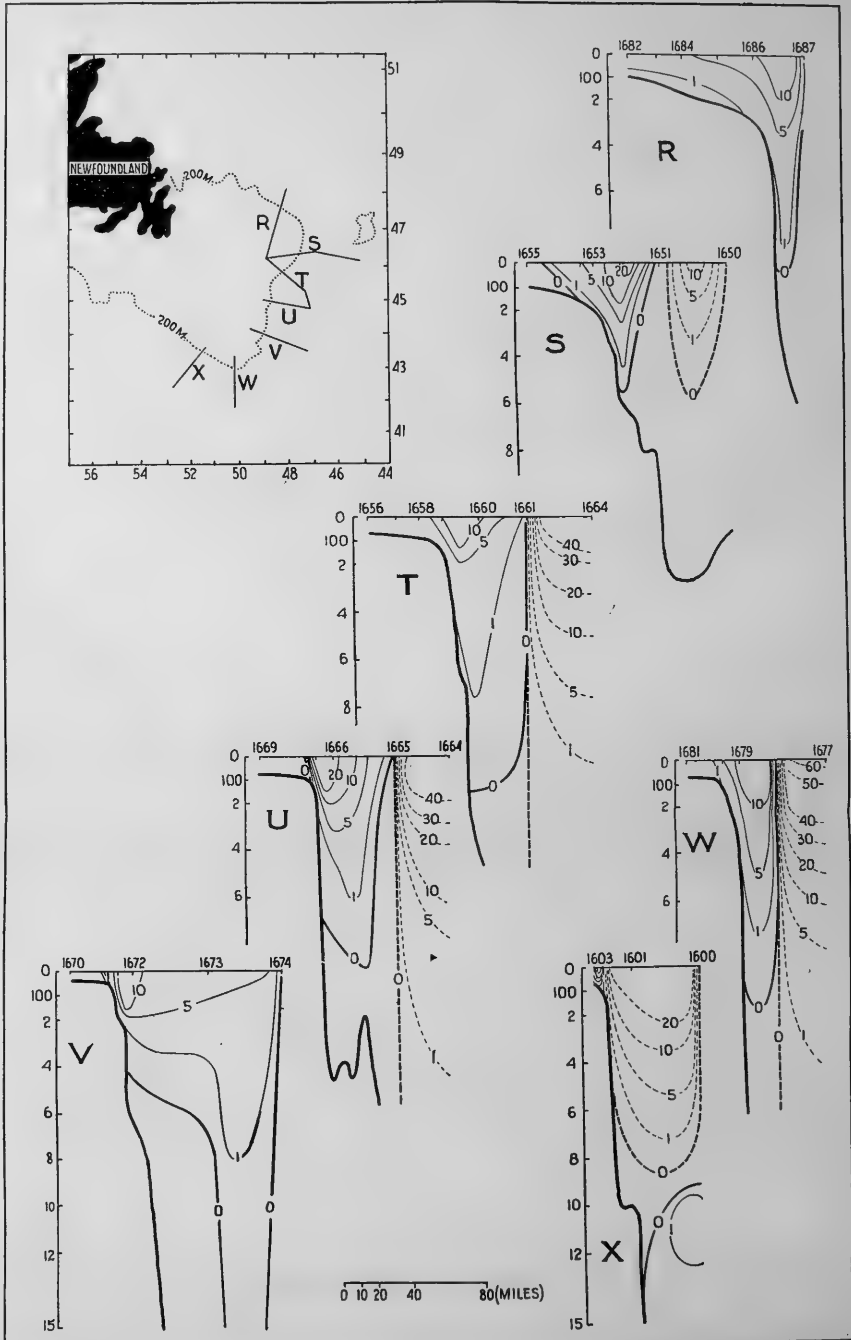

FIGURE 95.—Velocity profiles of the currents around the Grand Banks April to June 1934 and expressed in centimeters per second. The solid lines represent southerly current and the broken lines northerly current, except in sections W and X, where they refer to west and east directions, respectively. Section R, June 12–13; section S, May 19–20; section T, May 20–22; section U, May 22; section V, May 23; section W, may 24–25; and section X, April 19–20.

salted by a flooding of the Labrador Current past Cape Race. An increase of the coastal supply accompanied by a diminution in the Labrador Current renews the coastal character of the central Grand Banks reservoir.

Another important movement of the waters over the Grand Banks occurs when the border of the Gulf Stream floods in toward the southwest slope bringing warm and salty water to the surface layers there.

Superimposed on the above primary circulation are the rotary clockwise tidal currents and the annual temperature cycle, the range of the latter of which is great in the shallow banks' column. (See Smith, 1922, stations 140–142, for subsurface winter temperatures on the Grand Banks; also Smith, 1924, p. 148.) The drift of icebergs in over the Grand Banks has been described by Smith (1931).

CROSS SECTIONS OF THE CURRENTS

A total of seven velocity sections taken at fairly equal distances along the eastern and southern slopes of the Grand Banks from the forty-eighth parallel around to a point about 60 miles northwest of the Tail are shown on figure 95. The profiles are based on the synoptic observations made from the United States Coast Guard cutter *General Greene*, May 17–25, 1934. In addition, section R was taken June 12–13 and section X, April 19–20. (For station table data, see Soule, 1935.) In the aggregate these velocity profiles may be compared with the map of the surface currents (fig. 117) and the corresponding vertical sections of temperature and salinity (figs. 98 and 99).

A feature common to practically all of the velocity profiles (fig. 95) is their division each into two bands of alternately directed current. Reference to the horizontal and vertical sections of temperature and salinity, as well as to the maps of the surface currents (fig. 117), demonstrates conclusively that the inshore band represents Labrador Current and the offshore band Atlantic Current. Unlike the sections farther north, the Labrador Current is contained in a single band centered over the steepest part of the slope.

Particular attention is called to the decrease in the volume of the Labrador Current between sections W and X, where on the latter profile, stations 1603 to 1602, the westbound current was very diminutive. The vicinity of the Tail of the Banks represents, as stated previously, the terminus of the Labrador Current.

The axis of the cold current was centered over the steepest part of the continental slope, and it had a mean draft of 950 meters. A marked decrease in the draft of the Labrador Current was noted upon its crossing the Flemish Cap Ridge, but subsequently it deepened (in places along the Grand Banks slope as great as 1,500 meters), yet not to the depths which it averaged upstream in the American sector. The depth of the Atlantic Current on the other hand was in most places probably greater than 1,500 meters.

Section R.—It will be recalled that the net average volume of the Labrador Current through the St. John's section, July 3–7, 1934 (p. 128), was 3.8 million cubic meters per second. The northernmost profile in the Grand Banks section (sec. R, fig. 95), taken about 3 weeks prior to the St. John's, and 120 miles south of it, recorded a volume of 2.7 million cubic meters per second. Reference to the position of the two sections indicates that section R did not extend offshore so far as section Q, and it is probable, therefore, that a small portion of the southerly current was missed. This fact nor the difference in time fails to explain, however, the marked decrease of about 30 percent in the volume of the Labrador Current in the above passage.

Section S.—Proceeding southward about 60 miles, two bands of alternately directed current intersected the section between the Grand Banks and Flemish Cap. The slope band represents the Labrador Current with a volume of 1.1 million cubic meters per second. The offshore band was Atlantic Current.

Although the observations composing sections R and S were not synoptic, the decrease in the volume of the southbound current from 2.7 to 1.1 million cubic meters per second strongly suggests an eastward branching. If the course of the current, St. John's to Flemish Cap, as shown on figure 126, page 170, be compared with the velocity at Q, R, and S, it is estimated that the distribution of the Labrador Current on reaching the northern part of the Grand Banks was as follows:

Labrador Current	$m^3/s \times 10^{-6}$	Percent
Past Cape Race	0.4	10
Eastward just north of Flemish Cap	2.0	45
Southward between Grand Banks and Flemish Cap	2.0	45
Volume of Labrador Current in American sector	4.4	100

The spreading and shallowing of the Labrador Current on meeting the Grand Banks' promontory and the resulting distribution along the above routes is probably subject to considerable variation. The fluctuation in the Cape Race branch from 10 percent of the whole in 1928 to 20 percent in 1934 is quite illustrative of the behavior.

Section T.—A volume of 1.5 million cubic meters per second indicates that little change had occurred in the Labrador Current between sections S and T. The margin of the Atlantic Current embraced by stations 1661 to 1664 had a volume of 8.4 million cubic meters per second.

Section U.—Continuing only 40 miles southward the volume of the cold current increased to 2.2 million cubic meters per second. This flooding is explained on the surface current map (fig. 117) where Labrador Current from in on the bank recurved out into deep water.

Section V.—About 60 miles downstream from section U, the volume of the south-flowing band increased to a maximum of 4.1 million cubic meters per second. If reference be made to the corresponding temperature and salinity profiles (figs. 98 and 99), it will be perceived that the additional discharge was due to an indraft of the Atlantic Current. The Labrador Current alone is estimated to have been 2 million cubic meters per second in volume.

Section W.—The Labrador Current at the Tail of the Grand Banks discharged at the rate of 1.6 million cubic meters per second. The

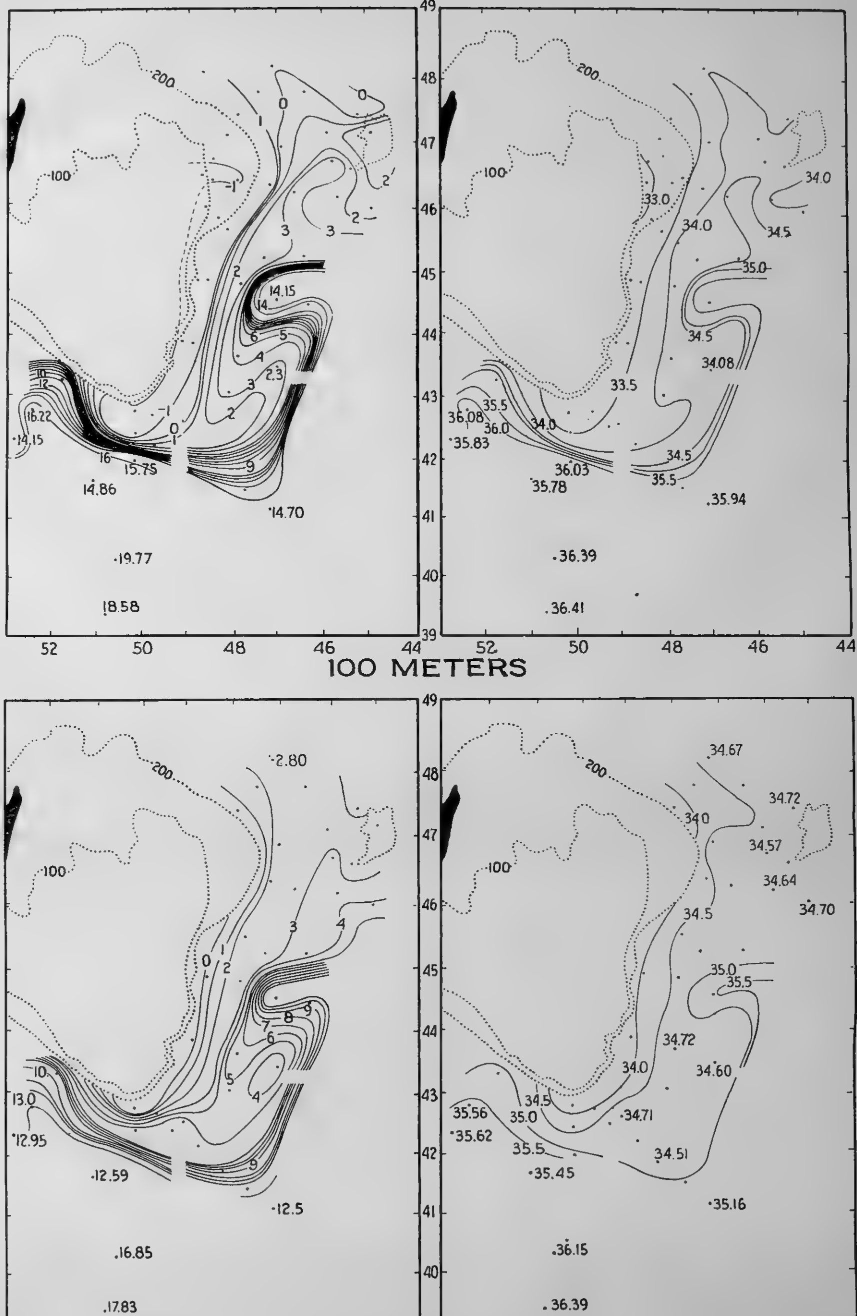

FIGURE 96.—Temperature and salinity at 100 and 200 meters around the Grand Banks May 17–25, 1934, except the line of five stations southeast from the Tail which were taken April 30–May 1, 1926; and the three stations along the fifty-first meridian, which were taken by the *Michael Sars*, June 27–29, 1910.

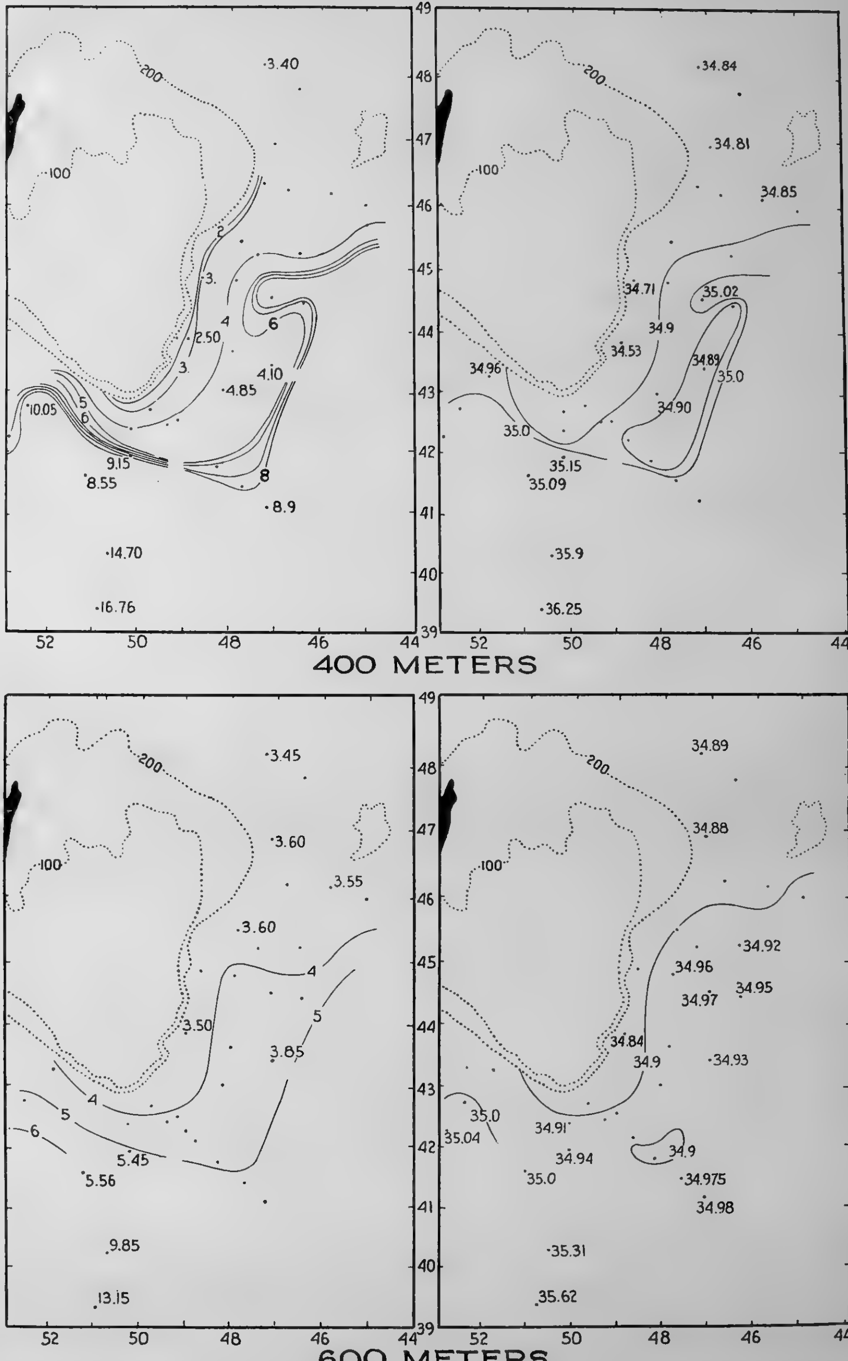

FIGURE 97.—Temperature and salinity at 400 and 600 meters around the Grand Banks. The station observations were taken on the same dates as shown for figure 96.

inshore margin of the Atlantic Current had a volume of 9.6 million cubic meters per second.

Section X.—This section, located normal to the southwest slope of the Grand Banks about 60 miles northwest of the Tail, illustrates the diminutive proportions to which the Labrador Current shrank, with a computed volume of only 0.12 million cubic meters per second. Practically all of the cold current, except that which sank below the depth of our observations, was turned back with the Atlantic Current in the vicinity of the Tail. The Atlantic Current recorded a volume of 6.6 million cubic meters per second.

The foregoing set of seven velocity profiles (fig. 95) is believed to be quite representative quantitatively of the Labrador Current along the east side of the Grand Banks. Expressed in millions of cubic meters per second it was as follows:

Grand Bank sections

R	2.7	U	2.2	W	1.6
S	1.1	V	4.1	X	0.1
T	1.5				

The table shows that the average volume of the Labrador Current in the Grand Banks sector the spring of 1934 was approximately 2 million cubic meters per second. Earlier computations of the volume of the Labrador Current by Smith (1931) gave 3.2 million cubic meters per second, which is probably somewhat too large, but the above difference in no way alters the conclusions based upon such quantitative data.

HORIZONTAL DISTRIBUTION OF TEMPERATURE AND SALINITY

The distribution of temperature and salinity around the Grand Banks for the 100-, 200-, 400-, and 600-meter levels is represented on figures 96 and 97. The maps have been constructed from the United States Coast Guard's station observations 1536 to 1681 taken May 17–25, 1934. (See Soule, 1935.) In order to obtain a more accurate picture of conditions southeast of the Tail, the observations from Coast Guard stations 571–576 taken April 30–May 1, 1926 (see Smith, 1926) have been utilized. Also in order to indicate the continuity of the temperature and the salinity in the borders of the Atlantic Current below the surface, the *Michael Sars*' stations 67–69 (see Helland-Hansen, 1930), which are located along the fifty-first meridian, have been plotted.

The similarity between the horizontal distribution of temperature and salinity and the map of the surface currents (fig. 117) is striking. Frigid low-salinity water, less than −1.0° C., wrapped itself around the Grand Banks slope as far south as the Tail, while offshore at similar levels salty water warmer than 14° C., is traceable as far north as the forty-fifth parallel. Another feature common to both figures 96 and 97 is the rapid decrease in the thermal and saline gradients with an increase in depth; 17 isotherms on the 100-meter projection, for example, are replaced by only 2 on the 600-meter level. The small differences between the temperatures and the salinities of the farthest offshore observations of the Coast Guard and those farther south in the axis of the Atlantic Current is good evidence that this is a similar type of water. The increase in the difference between the Coast Guard's data and the *Michael Sars*' data, with proportional increase in depth, on the other hand, testifies to the shoaling of the Atlantic Current with approach toward its borders.

VERTICAL DISTRIBUTION OF TEMPERATURE AND SALINITY

The same foregoing stations, with the exception of those of the *Michael Sars*, have been utilized to construct the vertical sections. These temperature and salinity profiles correspond section for section to the velocity profiles already discussed (p. 133). Labrador Current of low salinity and temperature hugged the Atlantic slope of the Grand Banks while adjacently offshore lay salty warm water of the Atlantic Current. The draft of the Labrador Current as indicated by the above sections agrees well with the average depth of 950 meters obtained from the velocity profiles.

The presence of sub-Arctic intermediate water corresponding to that defined by Wüst (1935) and found by Iselin (1936, p. 47), is evident at depths of 400 to 600 meters as represented on the salinity sections T and U (fig. 99). Reference to the corresponding velocity profiles (fig. 95) establishes the motion of this water, with its principal component, as northerly. It is our view that this is mixed water formed by cabbeling along the boundaries of the Labrador Current and the Atlantic Current (see p. 183).

The relatively small area of cool water on the southwest edge of the Grand Banks, as marked by the 3° and 4° isotherms (section X, fig. 98), is corroborative evidence of the very small proportions of sub-Arctic water which continue as far westward as this point from the Tail along the continental slope. The northern border of the Gulf Stream in the deep water between the Grand Banks and the Nova Scotian Banks often lies as far north as latitude 43°–30′ in the vicinity of the fifty-fourth meridian. (See Smith, 1923, stations 178 and 209; also Bjerkan, 1919, stations 16, 17, 74, and 75.) A cold, low-salinity discharge from the Laurentian Channel apparently displaces the Gulf Stream southward in longitudes 56° and 57°, and thus accentuates a warm salient in longitudes 53° and 54°. This characteristic northward encroachment of the Gulf Stream appears to dam the westward flow of the Labrador Current. Small quantities of Labrador Current from around the Tail may, at times, escape along the continental slope past the above barrier (Smith, 1924, stations 353 and 354) and join other small tributaries such as the occasional extensions of the Labrador Current across the shelf southwest of Cape Race (Smith, 1924, p. 92) or a more pronounced and constant tongue of cold water from the Laurentian Channel (Bjerkan, 1919, station 12). Such intermittent contributions probably result in cooling and freshening the surface layers in the slope water as they mix with the margin of the Gulf Stream system (see Iselin, 1936, fig. 57). No direct extension of the Labrador Current to the coast of the United States has been emphasized by Bigelow (1927, pp. 825–836).

There is little evidence in the deepest temperature and salinity observations in the Grand Banks sector (figs. 98 and 99) of the cold water which was indicated on our Labrador Sea sections as draining out along the American slope (p. 184). This movement has prob-

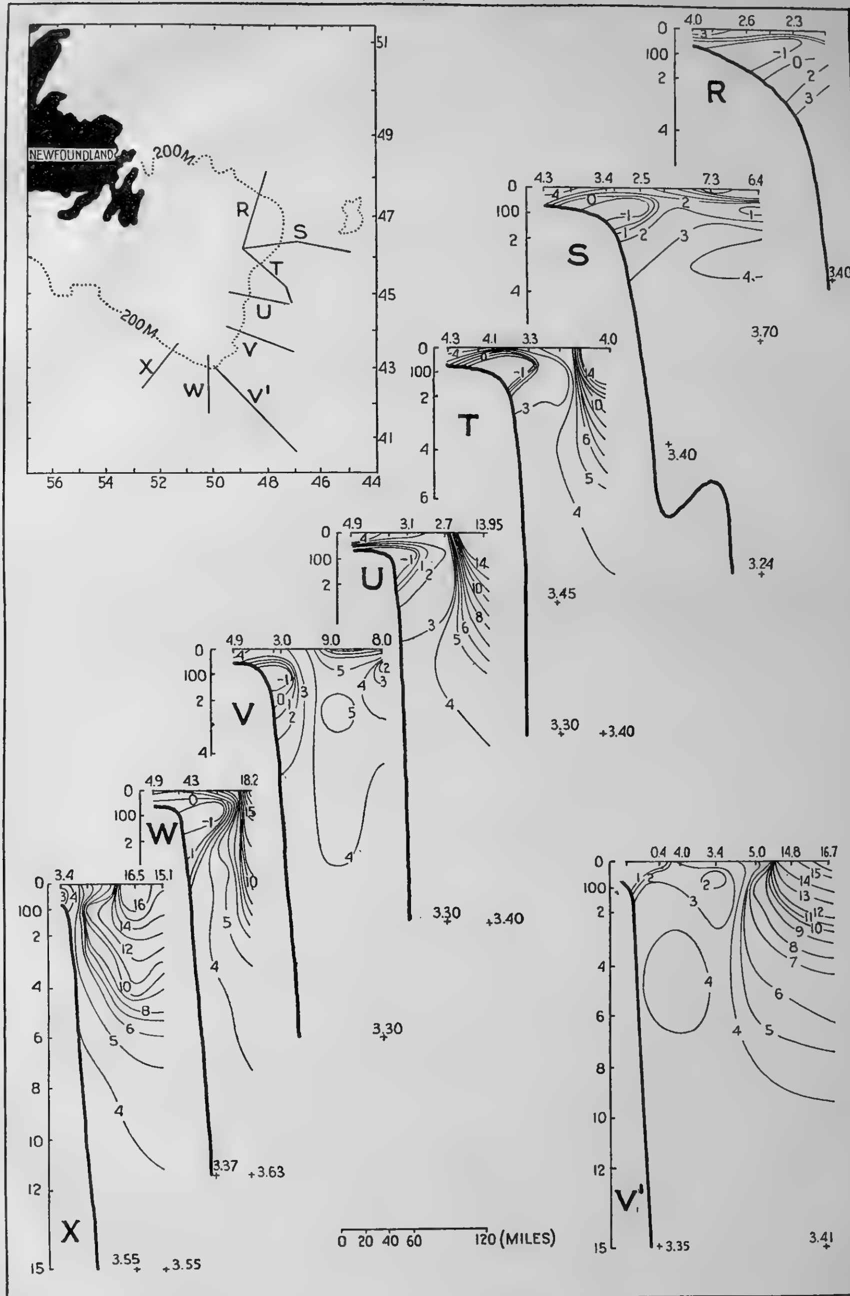

FIGURE 98.—Temperature profiles across the Grand Banks slopes. Section R, May 17–18, 1934; section S, May 19–20, 1934; section T, May 20–22, 1934; section U, May 22, 1934; section V, May 23, 1934; section W, May 24–25, 1934; section X, April 19–20, 1934; section V', April 30–May 1, 1926.

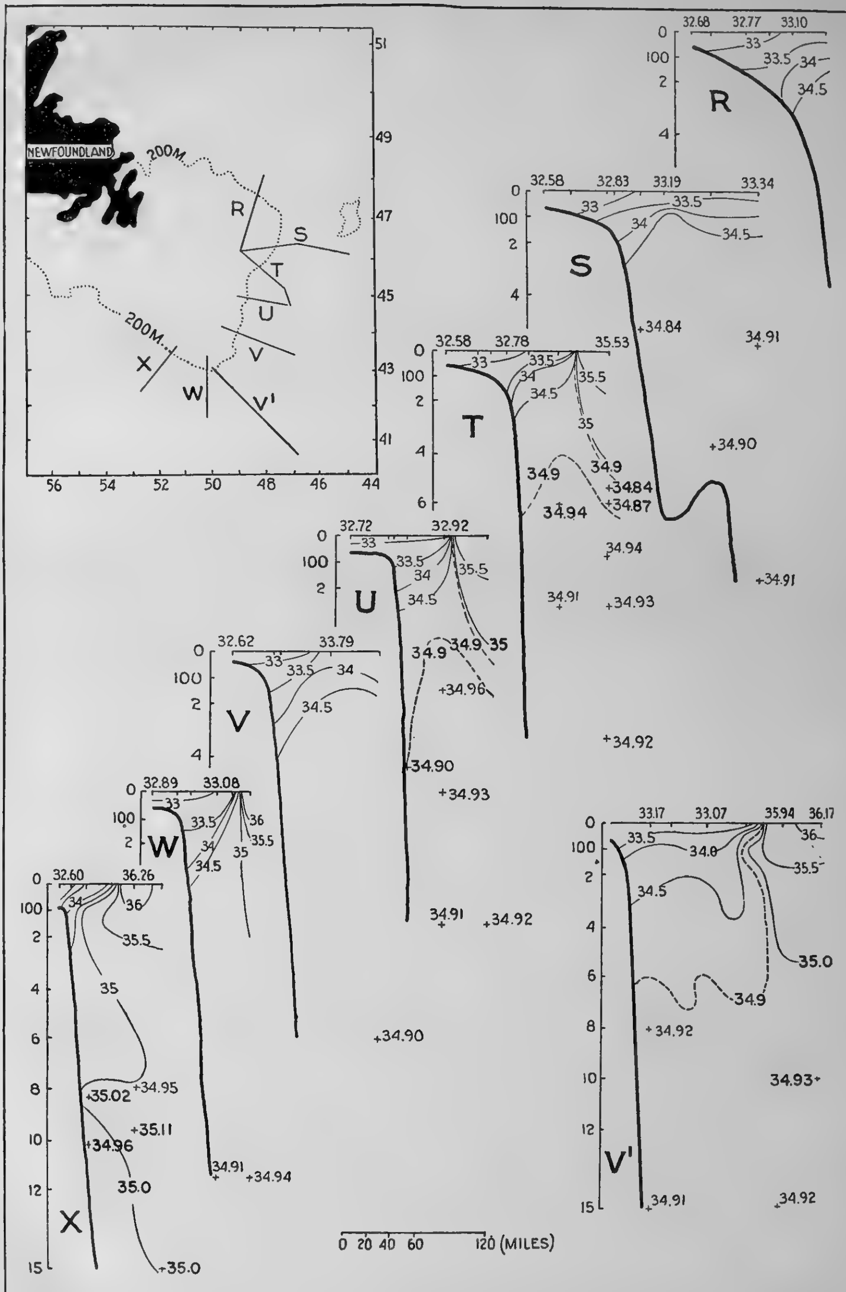

FIGURE 99.—Salinity profiles across the Grand Banks slopes. The station observations were taken on the same dates as shown for figure 98.

ably been missed since the ice-scouting duties of the Ice Patrol have never afforded time to explore depths in the Grand Banks sector greater than 1,500 meters. *Michael Sars* stations 69 and 70 at the Tail of the Grand Banks (Helland-Hansen, 1930) do indicate, however, the southerly continuation of the deep water described in chapter VIII.

A striking feature of the profiles, best illustrated on sections T, U, and W (figs. 98 and 99) where the isotherms and isohalines surface to 300 meters on the scale of the drawings lie nearly vertical, is the abutment of Arctic and Atlantic water. A similar distribution of the temperature and the salinity, but not quite so well defined, has been noted in the Greenland sector, where two different types of water flank each other. These convergences illustrate cabbeling (p. 175), the angle being greatest in the zone of greatest changes in temperature and salinity. The temperature convergence, most clearly marked in the surface layers during the colder part of the year, is commonly known as the cold wall. (See 10° C., isotherm on profiles T, U, and W, fig. 98.) If the temperature profiles be compared with the corresponding ones of velocity (fig. 95), it will be found that the cold wall lay an average of 20 miles offshore of the boundary between the Labrador and Atlantic Currents. This condition is believed to be more apparent than real; observations taken at closer intervals across the two streams would probably reveal a coincidence between the distribution of temperature, salinity, and resulting motion.

Along the boundary of the Atlantic and Labrador Currents, as shown by several of the intersecting sections of density (Smith, 1926, p. 30), relatively light water often collects in the surface layers to depths of 20 or 30 meters. Whether or not these shallow pools are the result of an indraft initiated by intense cabbeling along the density wall is a question which remains for future investigation.

Temperature-salinity correlation curves for the sections in the Grand Banks sector (fig. 100) correspond in general features to those (figs. 65 and 66) for the American sector. The flatter part of the curve is again representative of the Labrador Current, while the end portions beyond points I and II are typical of the Labrador Current's principal components. Point I, with an approximate temperature value of −1.5° C., and a salinity of about 33.32‰ (slightly warmer and saltier than typical Arctic water in the American sector) represents typical Arctic water in the Grand Banks sector. Continuation of the curves (fig. 100) upward and to the left is representative of the correlation in banks and coastal water. Continuation of the curves from point II upward to the right gives graphs which parallel those representative of the correlation found in Atlantic water. Naturally these given lines lie to the left of a curve representative of the axis of the Gulf Stream since the Grand Banks sector embraces only the northern margin of that current system.

ANNUAL VARIATIONS

In order to show the variation in the position of the Labrador Current and the Atlantic Current in the Grand Banks sector, a series of 20 dynamic topographic maps, 1000–0 decibars (figs. 102–121) are appended to this chapter. The station table data upon which they are based are contained in the United States Coast Guard Ice Patrol Bulletins, 1922–36. In the earlier part of the period when the subsurface observations did not extend to 1,000 meters, resort has been made to extrapolation.

Smith (1931), in order to point out the paths along which icebergs most frequently drift, grouped the above maps (appended to this

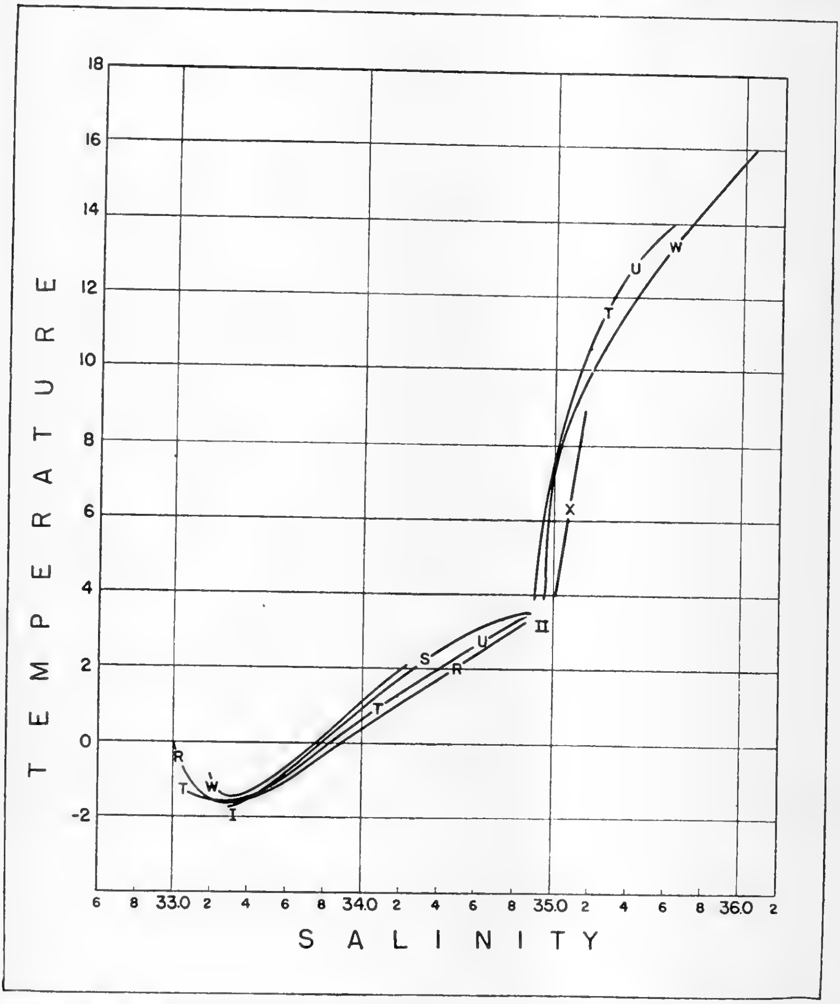

FIGURE 100.—Temperature-salinity correlation curves in the Grand Banks sector the spring of 1934

chapter) into several characteristic types of circulation in the Grand Banks sector as follows: [12]

(*a*) A swelling of the Labrador Current in the Grand Banks sector is often accompanied by an extension of its terminus as far west as the fifty-third meridian. At such times it may hug closely

[12] The agreement between the isobaths shown on the dynamic topographic maps and the actual iceberg drifts has been confirmed by the Ice Patrol and reported by Smith (1931).

to the continental slope (fig. 113), or it may project southwesterly past the Tail (fig. 115), or run nearly south (fig. 117). Another characteristic type of the circulation west of the Tail which persisted for over 2 months the spring of 1926 is featured by a cyclonic eddy (figs. 105, 106, 107, and 109). The system west of the Tail, on the other hand, may be completely altered in appearance by the encroachment of the Atlantic Current toward the southwest slope (figs. 102, 116, and 117).

(*b*) The Labrador Current sometimes meets the Atlantic Current in such a manner that a cold-water salient extends southeasterly from the Tail along the 4,000-meter isobath as far as latitude 41°, longitude 47°. This course of the currents appears to favor the formation of a cyclonic eddy which may travel about southeast of the Tail as shown on figures 106, 107, and 115. An apparent weakening of the Labrador Current may be the cause of the retreat of this eddy to the northward along the eastern slope of the Grand Banks (figs. 105, 112, 117, 118, and 120).

(*c*) The previously described intrusion of the Atlantic Current between the forty-fourth and forty-fifth parallels on the east side of the Grand Banks is one of the most constant features of the circulation (figs. 102, 109, 110, 112, 116, 117, 120, and 121). This development of the Atlantic Current during the latter part of the iceberg season and the consequent deflection of the ice from the main steamship tracks has occasionally been a determining factor in the discontinuation of the Ice Patrol for that season.

(*d*) The Labrador Current upon crossing the Flemish Cap Ridge often gives off a small branch southeastward between the northern border of the Atlantic Current and Flemish Cap (figs. 112 and 116).

(*e*) The system of circulation at the junction of the Labrador Current and the Atlantic Current sometimes becomes very complex as attenuated sinuous tongues of superficial current interlace. The cold southwesterly current, for example, which intersected the plane of the *Michael Sars'* section south of the Grand Banks in June 1910 (Helland-Hansen, 1930), indicated a system of circulation similar to that shown on figures 109 and 110. The surface temperature maps compiled fortnightly by the Ice Patrol during the ice season, each based upon hundreds of temperature reports from passing steamers, indicate that narrow tongues and occluded pools of warm and cold surface water from the two main currents sometimes extend considerable distances on both sides of the boundary as marked by the dynamic topographic maps. The more closely the subsurface observations are taken in the active mixing area, it is safe to state, the more complex the currents will be revealed there.

The variation in the volume of the Labrador Current and the Atlantic Current in the Grand Banks sector (1910–35) is shown by the table on page 143. The computed volumes of the Labrador Current during the earlier part of the period are not so accurate as the values shown for the later years when the station's observations were taken at much closer intervals. The series unfortunately is not of sufficient length or continuity to determine whether or not a correlation exists between the volume of the Labrador Current and the number of icebergs south of Newfoundland. If there be any direct relation, it apparently is masked by frequent and irregular fluctuations, which, as might be expected near the turning point of a discharge, are greater than farther upstream in the trunk. The volume of the Atlantic Current according to the table also shows considerable variation, but this of course is due to the position of the stations, some sections extending deeper into the margin of the warm, salty stream than others. The values are recorded in order to demonstrate that the Grand Banks sections in most cases intersect the Atlantic Current itself and not a secondary tongue or eddy.

ANNUAL CYCLE

The bulk of the subsurface observations that have been made in the Grand Banks sector have occurred in spring and summer. A few stations, however, have been taken by the ice observation cutter during winter (Smith, 1922, 1923). The United States Coast Guard also made a brief physical survey of the waters around the Grand Banks in October 1923 (Smith, 1923). The *Challenger* ran a line of stations across the Grand Banks in November 1932 (Conseil Permanent International, 1933), and the *Atlantis* a line of stations south of the Tail of the Grand Banks in September 1935 (Conseil Permanent International, 1936). These data, although scanty for the colder months of the year, provide a basis, however, for describing the annual cycle.

The only two winter surface temperature maps of the Grand Banks sector, February 19–March 11, 1921, and February 19–20, 1922 (Smith, 1922 and 1923), record temperatures less than 32° F., and thus indicate that the Labrador Current at the time extended southward along the east side of the Grand Banks to the vicinity of the Tail. In fact, the isotherms on the two above maps, when due allowance is made for the annual cycle of insolation, correspond in their main features to those on the maps of the Ice Patrol's large collection for spring and summer. Corroboration that the Labrador Current was present in the Grand Banks sector in the winter of 1922 is found in the computed volume of the cold current, between stations 172 and 173 (Smith, 1923, p. 70) of 6.2 million cubic meters per second. This figure based upon only two stations is believed somewhat inaccurate, since it is about double the average volumes previously found.

The dynamic topographic map for October 21–26, 1923 (fig. 105), when compared with the distribution of temperature and salinity (Smith, 1923), clearly shows that the Labrador Current with negative temperatures in its axis flowed southward in autumn around the Grand Banks to slightly west of the Tail. The computed volume of the cold current was 3.4 million cubic meters per second near the forty-fourth parallel and 2.9 million cubic meters per second at the Tail, discharges which according to the table (p. 143) agree with the volumes of the Labrador Current at other times of the year. The computed volume of the cold current at the Tail of the Grand Banks from observations in November 1932 and also in September 1935 tend to corroborate the foregoing.[13]

Reference has already been made (p. 63) to the strength of the West Greenland Current as found by the *Meteor* around Cape Farewell the winter of 1935 and also to the major proportions of the West

[13] Smith (1924, p. 65) reported the drift of an iceberg southward around the Tail of the Grand Banks in August and September 1923.

Greenland Current which enter into the composition of the Labrador Current. Again in late August 1928 the *Marion* found the Labrador Current to be flowing with a volume of 4.6 million cubic meters per second. At the rate of 8.2 miles per day this discharge should have reached the Grand Banks sector the following December. Thus the evidence contained in the above quantative data strongly indicates that the Labrador Current prevails in the Grand Banks sector the year round.

If, on the other hand, an acceleration of the dynamically induced circulation occurs in the northern part of the Labrador Sea as hypothesized (p. 186), it would probably cause a subsequent augmentation of the Labrador Current reaching its maximum in the Grand Banks sector the following May.

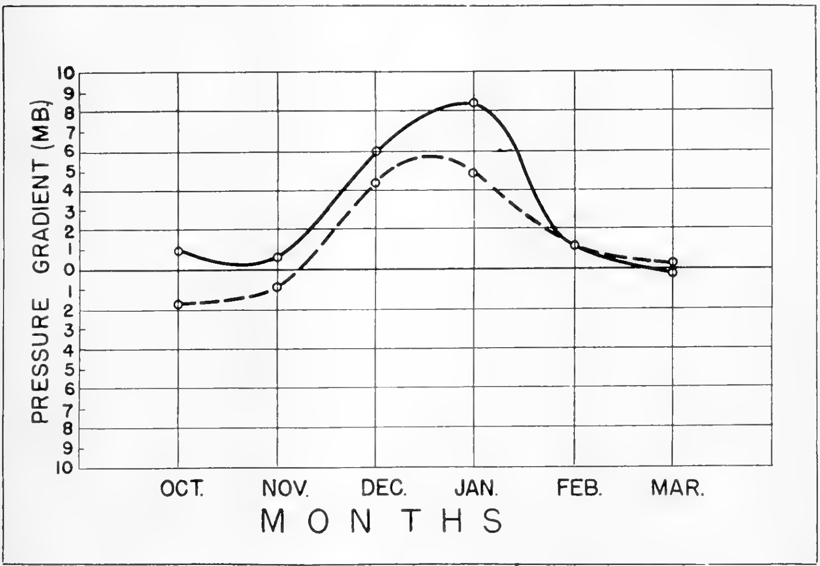

FIGURE 101.—The normal atmospheric pressure gradient, October to March, over the Labrador Sea. The solid line represents the Belle Isle-Julianehaab gradient and the broken line the Nain-Ivigtut gradient.

The seasonal change both in the velocity and the direction of the prevailing winds over the Labrador Sea appears to be one of the most logical factors, if a spring freshet of the Labrador Current is a reality. Fig. 101 indicates that the prevailing winds, which produce a tangential wind current, the main component of which is southerly, attain their maximum effect in January. If a current is thus formed, it will proportionately augment the prevailing dynamic current which has been found there in summer and described as the Labrador Current. At the rate of 8.2 miles per day, the estimated velocity of the summertime current, such a flood wave would appear in the Grand Banks sector in April and May. This coincides with the date of the commonly supposed spring freshet.

The foregoing raises the broad question whether or not such currents as the East Greenland and the Labrador exhibit a seasonal variation. There is a well-established view that the Labrador Current swells to maximum volume in the spring and dwindles or disappears from the Grand Banks region in the fall and winter. The underlying factor is attributed to summertime insolation with the consequent release of water from melting snow and ice, the Labrador Current acting as a freshet overflows southward deeper into the North Atlantic.[14] But a spring freshet in the Grand Banks sector, considering the distances from the source region and the rate of transport of such a flood wave, comes much too early to connect with summer or even vernal warming.

The common impression that the Labrador and the East Greenland Currents display a seasonal variation may have been largely abetted by the drift of the sea ice and the icebergs south of Newfoundland, a well-known phenomenon which is subject to a conspicuous annual cycle. Any marked correlation between the abundance of sea ice south of Newfoundland and vernal warming is discountenanced, however, by the fact that the seasonal maximum of the former precedes the latter. The cycle in the sea ice is traceable apparently to a seasonal rate of production during winter and the consequent southward drift from its source. The sequence of events is quite in harmony, moreover, with a uniform velocity of the currents previously described.

The seasonal cycle of icebergs south of Newfoundland which reaches a maximum usually in May is also somewhat too early to be caused by a freshet of the cold current predicated on vernal warming. The iceberg cycle, on the other hand, as proven by Smith (1931), correlates with the cycle of the pack ice, and is believed primarily dependent upon a "fence" of pack ice along the Labrador coast during late winter and early spring. This also is a condition obviously quite unrelated to a cyclical phase, if any, in the Labrador Current. An annual cycle of the Labrador Current based upon the cyclical drift of pack ice and icebergs south of Newfoundland is, therefore, in view of the above, considered a delusion.

The impression that Arctic currents, noticeably their southern extensions, dwindle and in many places disappear during late summer and autumn, may have been gained from the temperature of the water. Naturally different temperature criteria for the axis of the cold current must be employed during late summer and autumn than at other times due purely to solar warming and mixing to which the upper layers are subject. The East Greenland polar constituent of the West Greenland Current, for example, along the coast north of Cape Farewell, often loses its negative character in late summer, yet comparison between the velocity and temperature profiles proves its presence nevertheless. Higher average subsurface temperatures were noted in the axis of the Labrador Current in Grand Banks sector by Smith (1924, p. 102) and attributed not to any slacking in the cold current but primarily to a milder 1923–24 winter.

Surface temperature maps of the Grand Banks sector compiled by the Ice Patrol in June and July have proved quite misleading regard-

[14] Bigelow (1927) found that the Nova Scotian Current experiences freshet characteristics when during a few weeks in spring it flows into the Gulf of Maine.

ing the circulation, when, due to solar warming, the presence of the Labrador Current is more or less screened from view. This condition is accentuated in summer as still warmer surface water of the Atlantic Current is spread in toward the Grand Banks' slopes by the prevailing southwesterly winds.

The seasonal range in minimum temperature of the Labrador Current in the Grand Banks sector may be wide. Temperatures as low as −1.6° C., have been recorded at a depth of 100 meters, and as high as 2.9° C., at 150 meters along the east side of the Grand Banks in the axis of the cold current. The seasonal range of the temperature of the Labrador Current has been commented upon by Smith (1924, pp. 160–165).

The minimum wintertime temperatures over the Grand Banks, surface and bottom, are approximately −0.3° C. and −0.8° C., respectively. The Grand Banks column at the end of winter is usually in thermal homogeneity except where the Labrador Current has intruded on the bottom. The maximum surface temperature recorded by Smith (1924, p. 148) was 13.2° C., but a summer temperature more commonly attained is 11.0° C. The maximum bottom temperature was approximately 2.0° C., but such relatively high temperatures may often be displaced even during summer by negative-temperatured water from the Labrador Current.

The Grand Banks sector, embracing as it does the discharge of the Labrador Current, subject to wide and rapid fluctuations, even ceasing to flow at times, represents a very poor field to determine the question of an annual cycle. The quantitative data on the Labrador Current, at least up to the present, fail to reveal any annual cycle in its flow. If an annual cycle does exist, it is probably relatively slight, being outweighed by shorter irregular pulsations.

Volume of Labrador Current and Atlantic Current in Grand Banks sector

Millions of cubic meters per second

Section	R		S		T		U		V		W		X	
Year and month	LC	AC	LC	AC	LC	AC	LC	AC	LC	AC	LC	AC	LC	AC
1910, June													0.6	40.3
1922:														
February					6.2	12.0								
May											3.3	24.8		
1923, October									3.4	34.5	2.9	21.3		
1926, May											6.0	12.7		
1927, June														
1931, June	4.2						3.6	4.1						
1932:														
April			3.4											
November										35.0	3.9			
1934:														
April					1.8	6.7					1.2		.1	6.6
May			1.1		1.5	8.4	3.1				1.6	9.6		
June	2.7		1.5		1.5						1.0			
1935:														
April					2.1	11.8	3.7				1.1			
May					4.1	8.9					3.9	16.3		
June							4.5	7.4						
July			1.5											
September											4.0	31.8		

DYNAMIC TOPOGRAPHIC MAPS
GRAND BANKS SECTOR
1922–1935

(Figures 102–121)

FIGURE 102.—Dynamic topography 1,000–0 decibar surface, April 11–May 5, 1922.

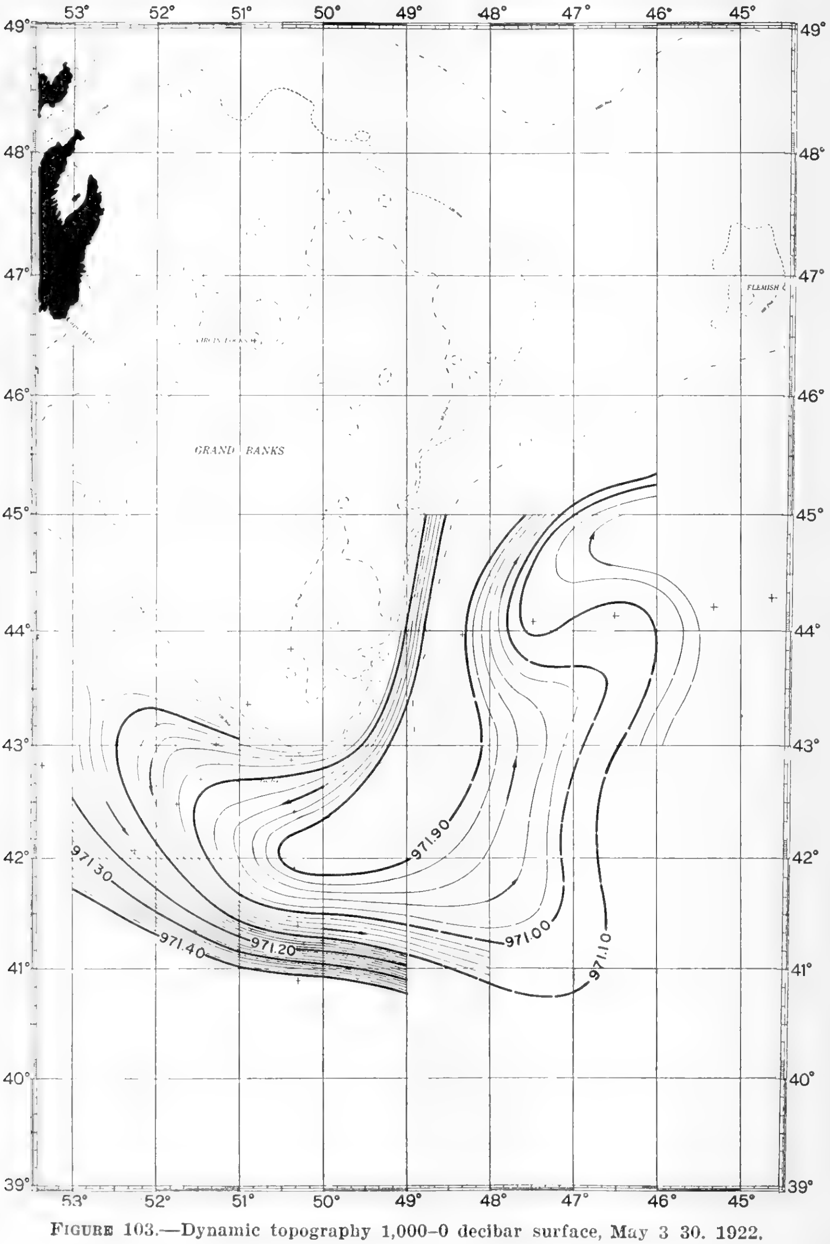

FIGURE 103.—Dynamic topography 1,000–0 decibar surface, May 3 30. 1922.

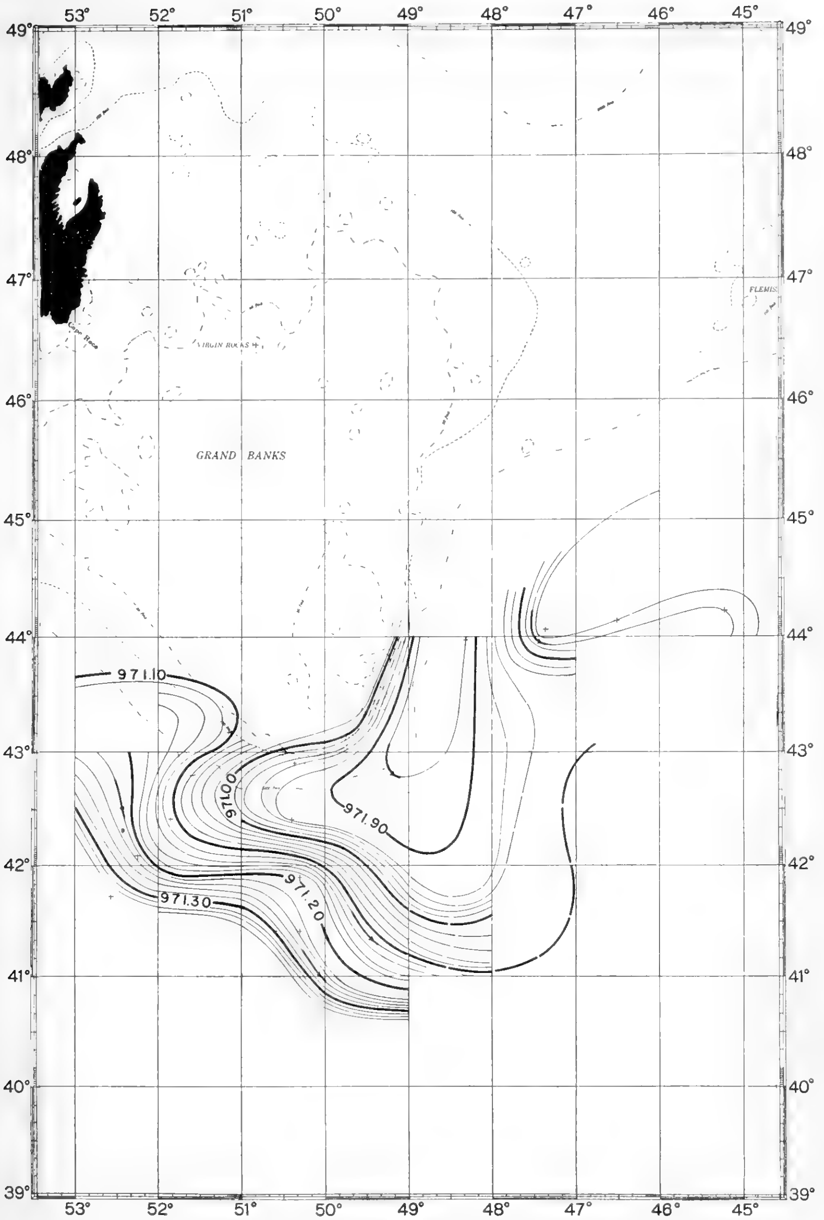

FIGURE 104.—Dynamic topography 1,000–0 decibar surface, May 23–June 18, 1922.

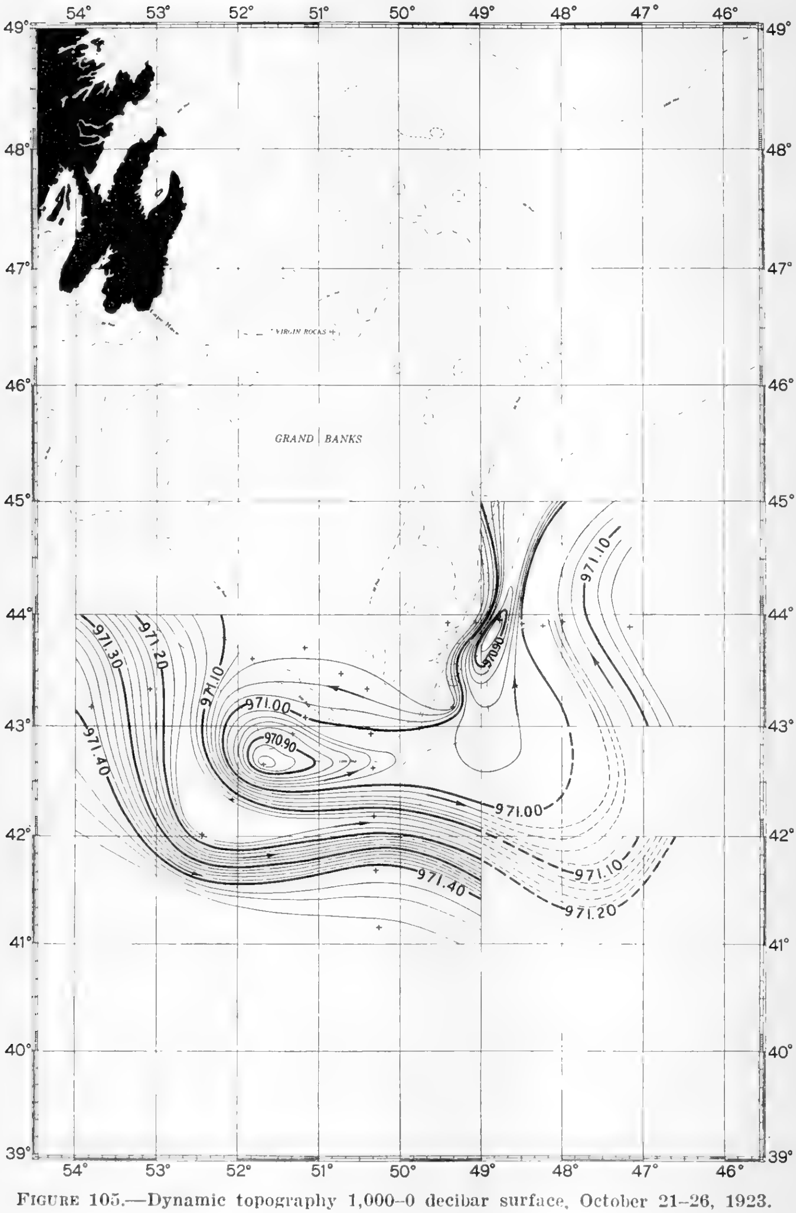

FIGURE 105.—Dynamic topography 1,000–0 decibar surface, October 21–26, 1923.

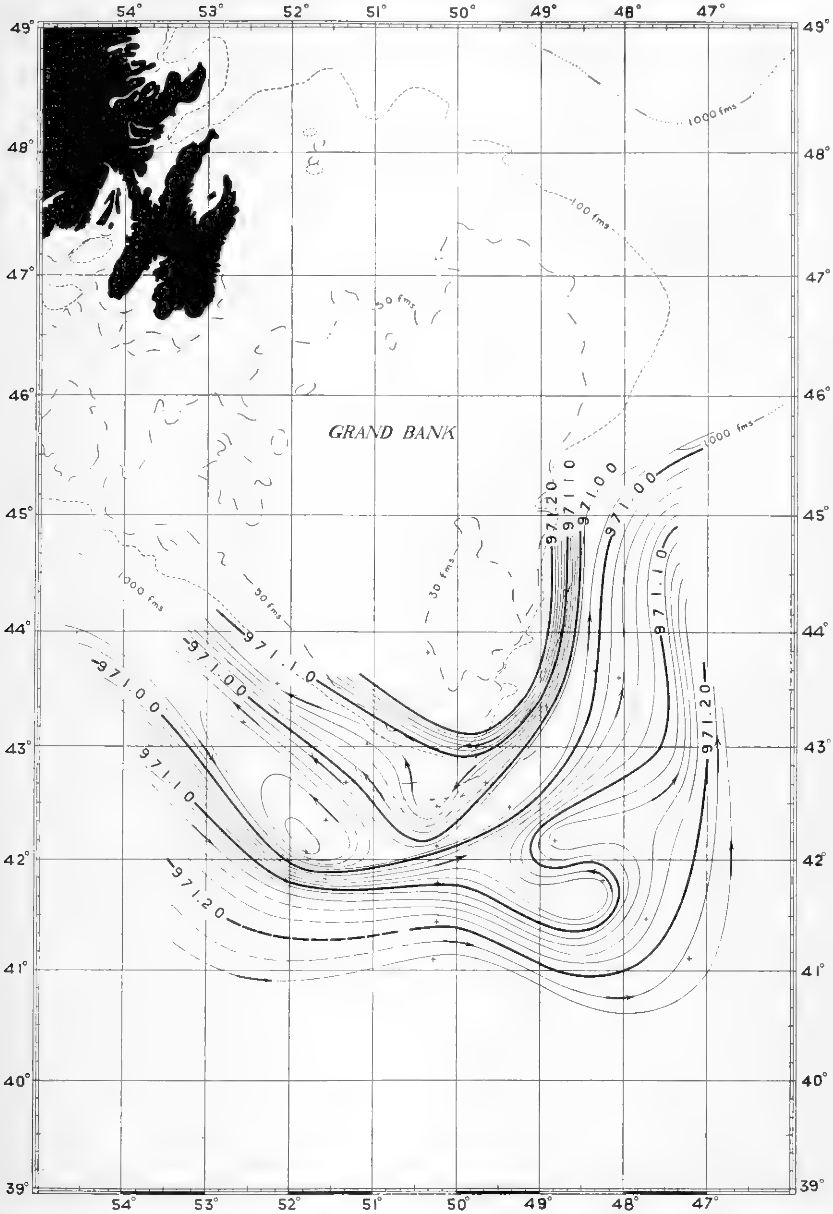

FIGURE 106.—Dynamic topography 1,000–0 decibar surface, April 29–May 5, 1926.

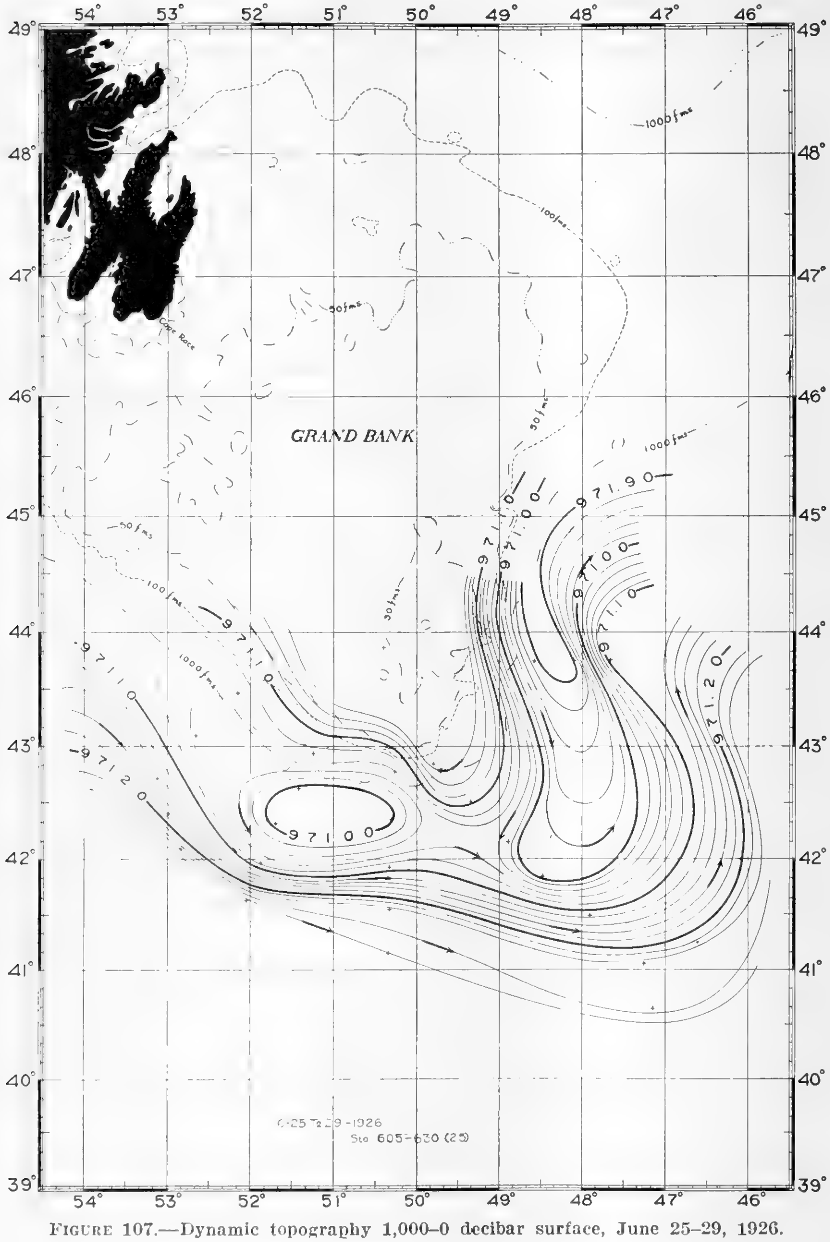

FIGURE 107.—Dynamic topography 1,000–0 decibar surface, June 25–29, 1926.

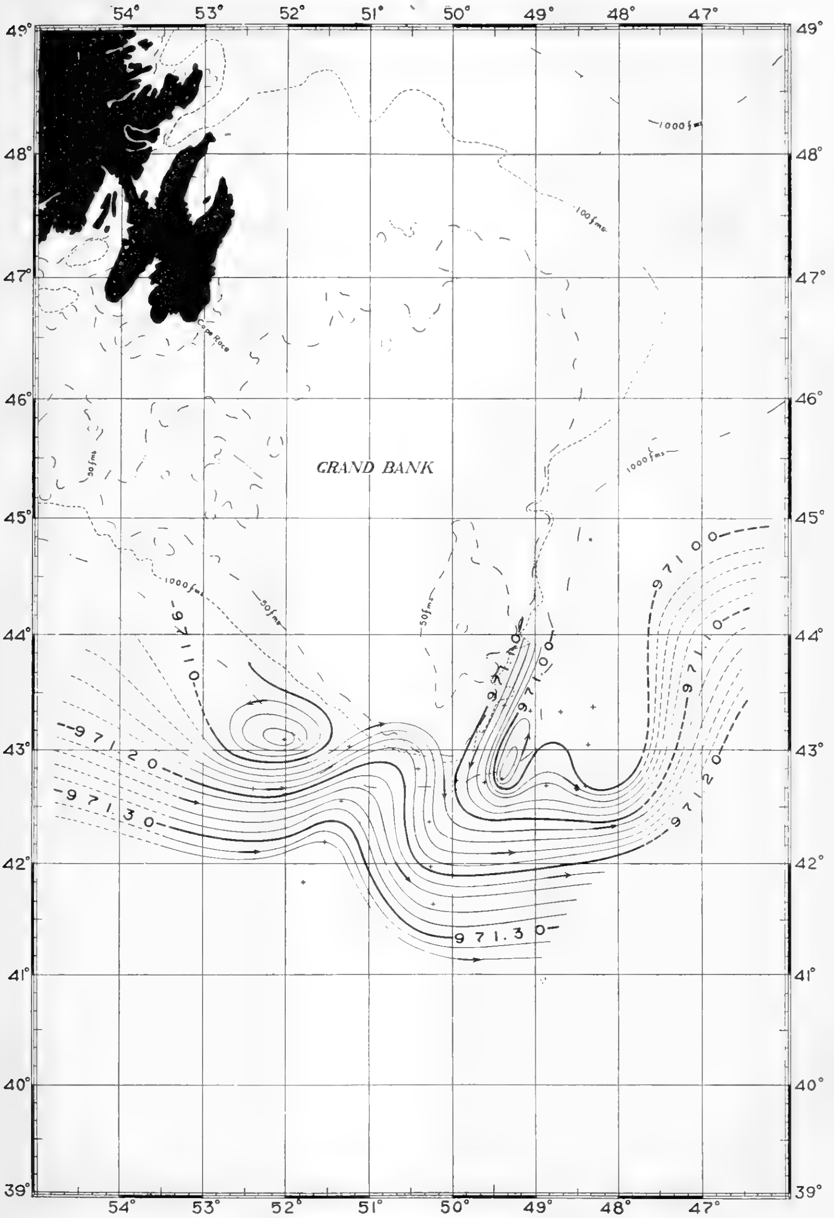

FIGURE 108.—Dynamic topography 1,000–0 decibar surface, April 6–10, 1927.

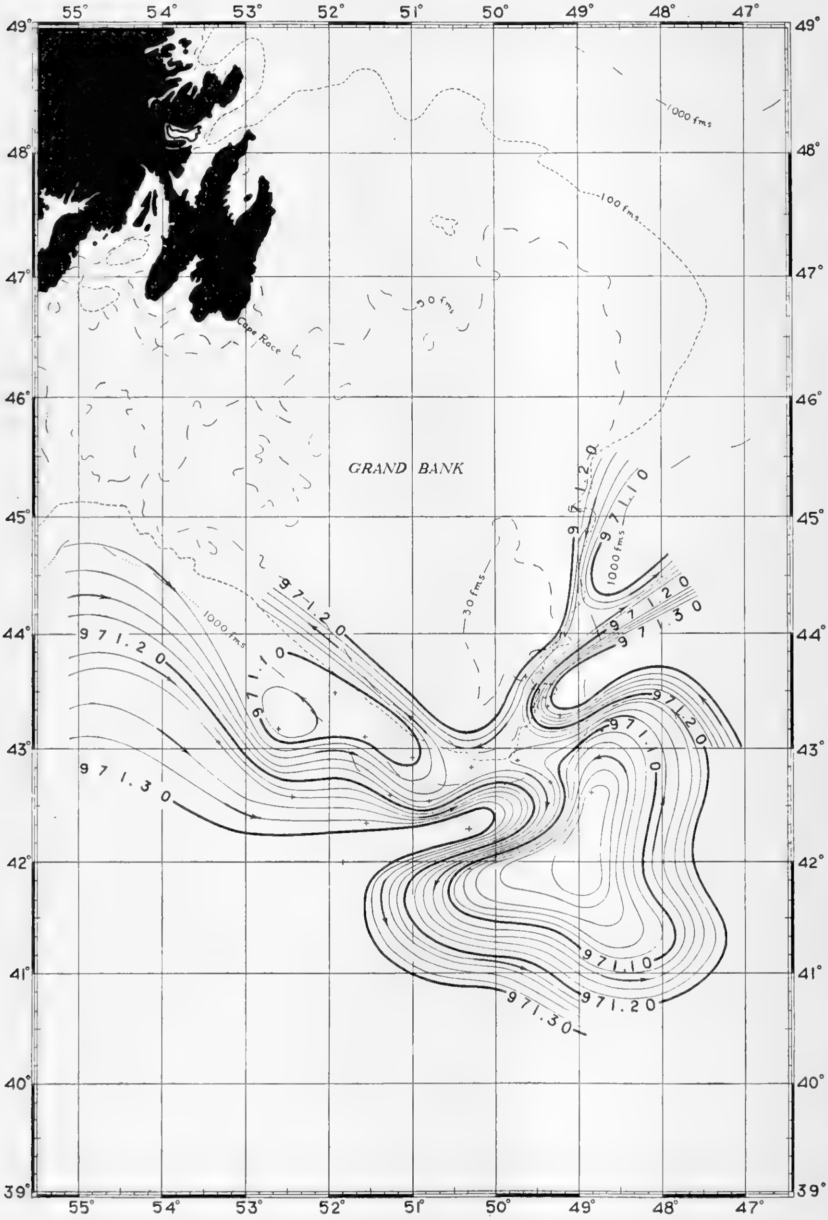

FIGURE 109.—Dynamic topography 1,000–0 decibar surface, April 21–25, 1927.

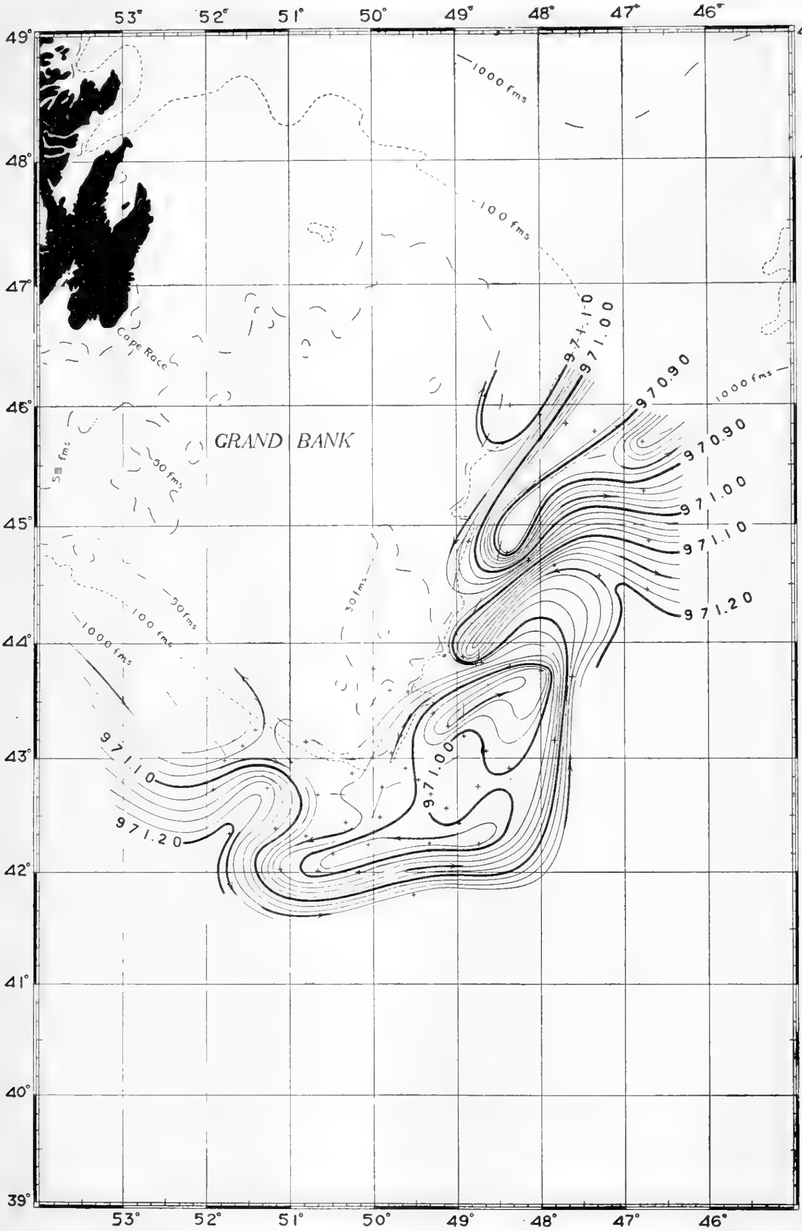

FIGURE 110.—Dynamic topography 1,000–0 decibar surface, May 10–18, 1927.

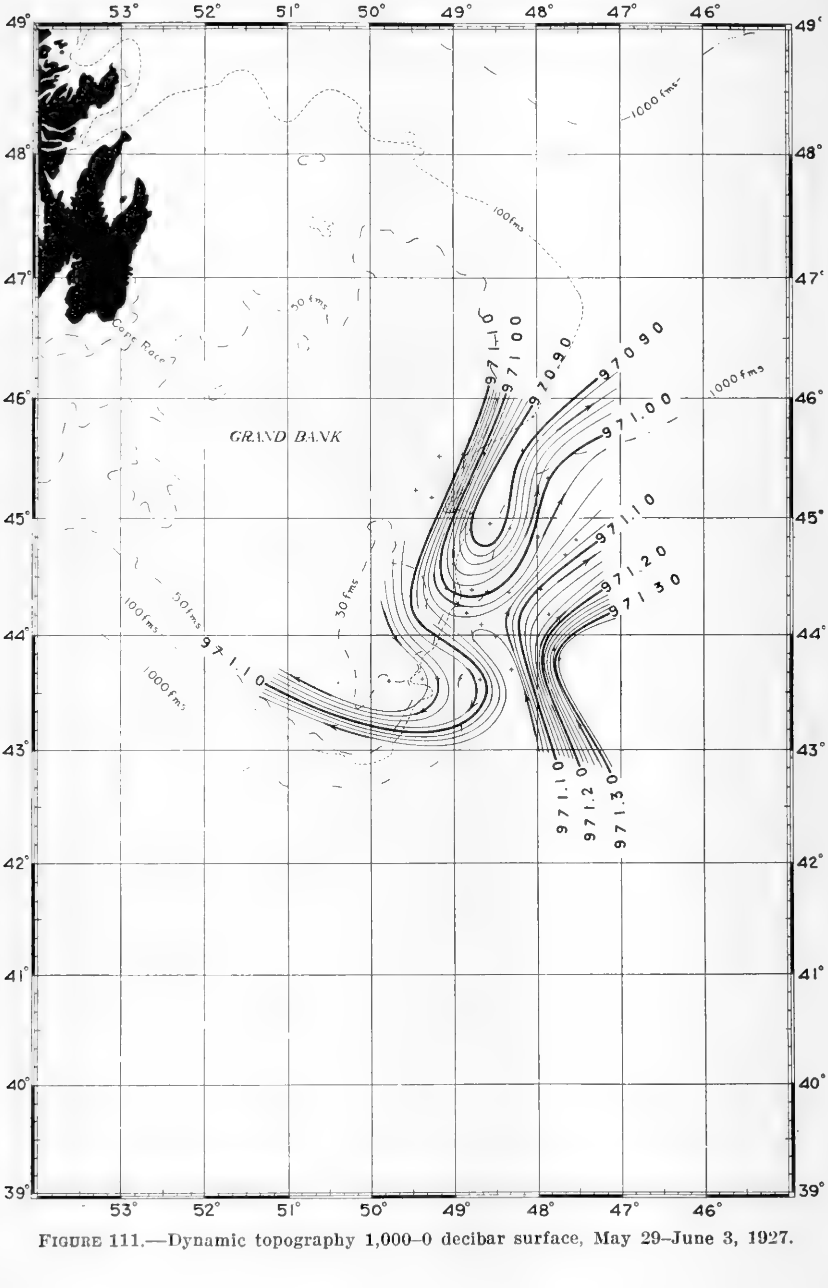

FIGURE 111.—Dynamic topography 1,000–0 decibar surface, May 29–June 3, 1927.

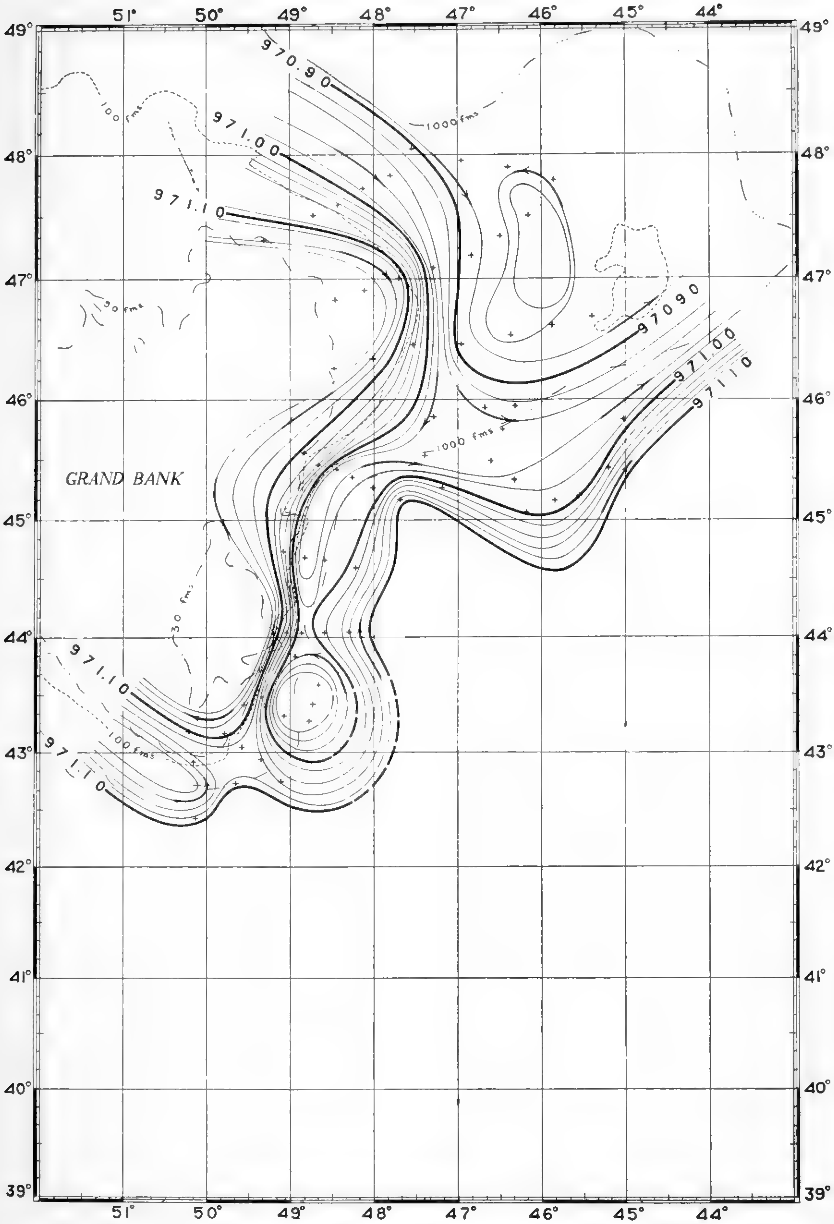

FIGURE 112.—Dynamic topography 1,000–0 decibar surface, June 9–21, 1927.

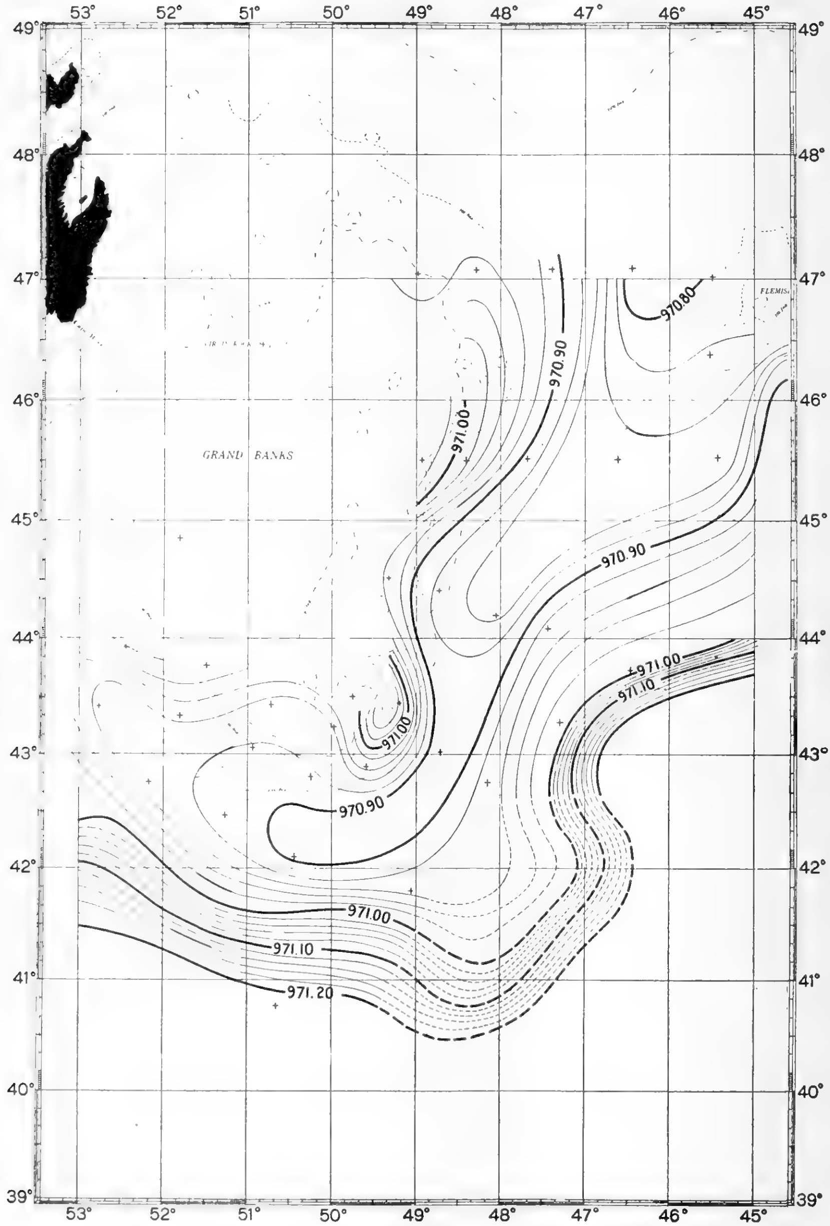

FIGURE 113.—Dynamic topography 1,000–0 decibar surface, April 19–May 5, 1932.

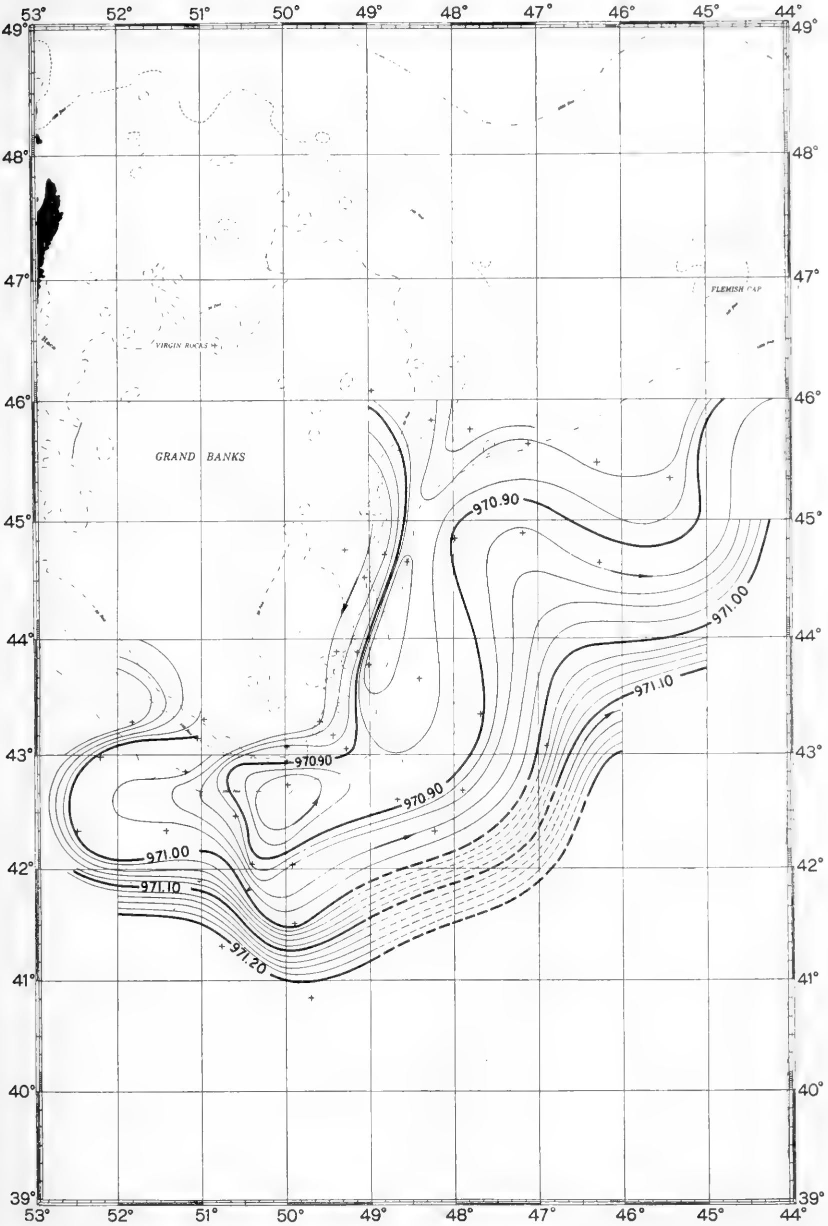

FIGURE 114.—Dynamic topography 1,000–0 decibar surface, May 21–29, 1932.

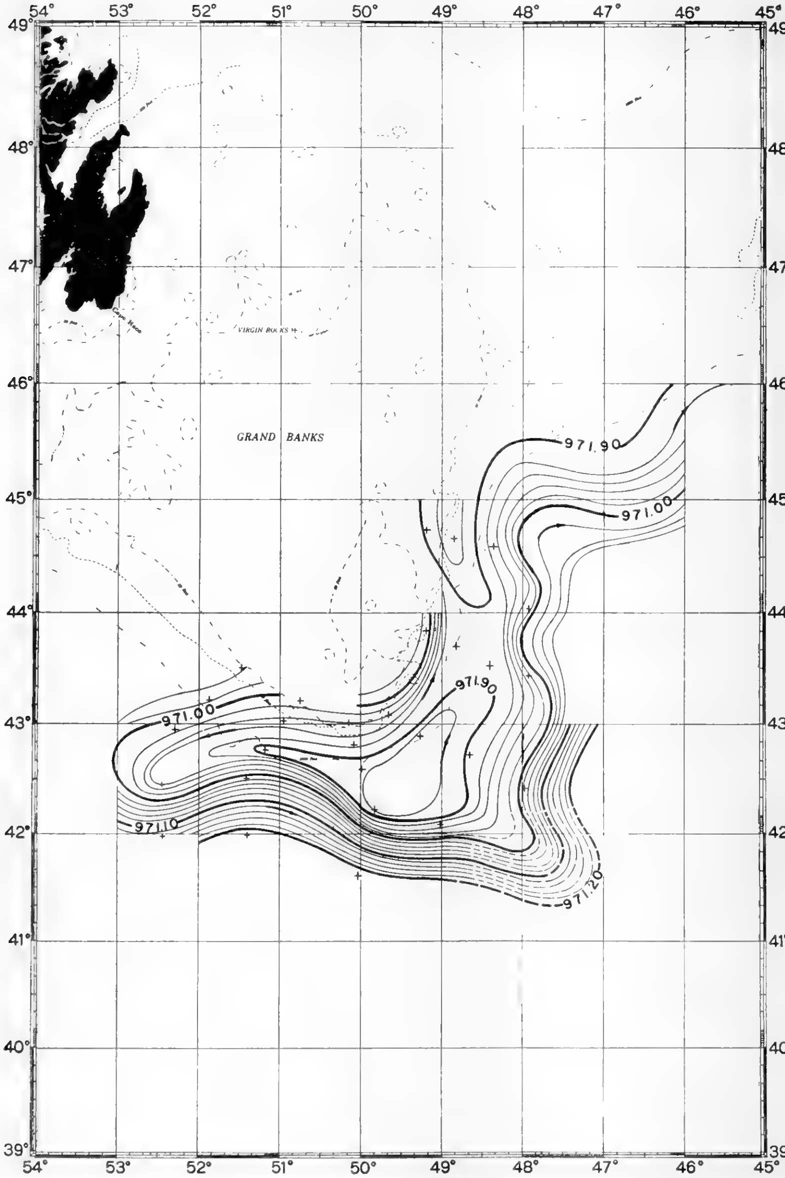

FIGURE 115.—Dynamic topography 1,000–0 decibar surface, June 13–19, 1932.

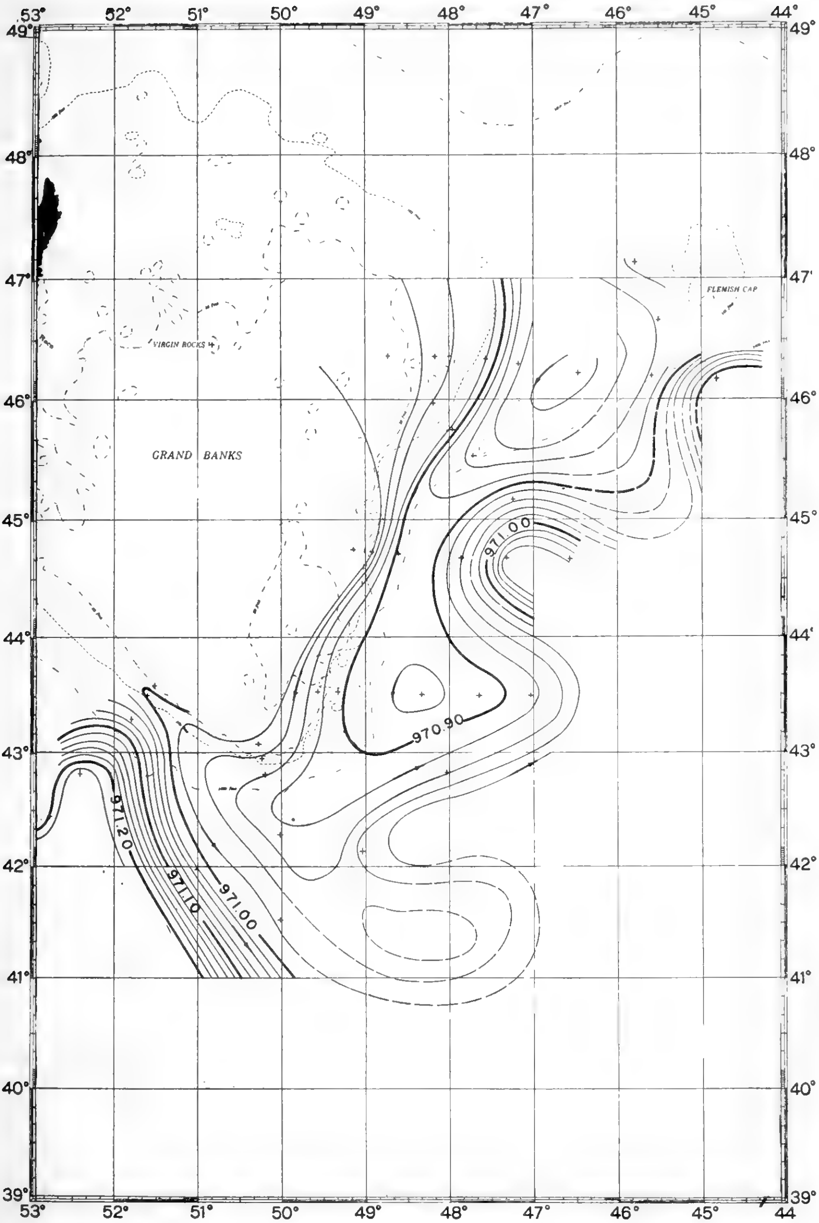

FIGURE 116.—Dynamic topography 1,000–0 decibar surface, April 19–26, 1934.

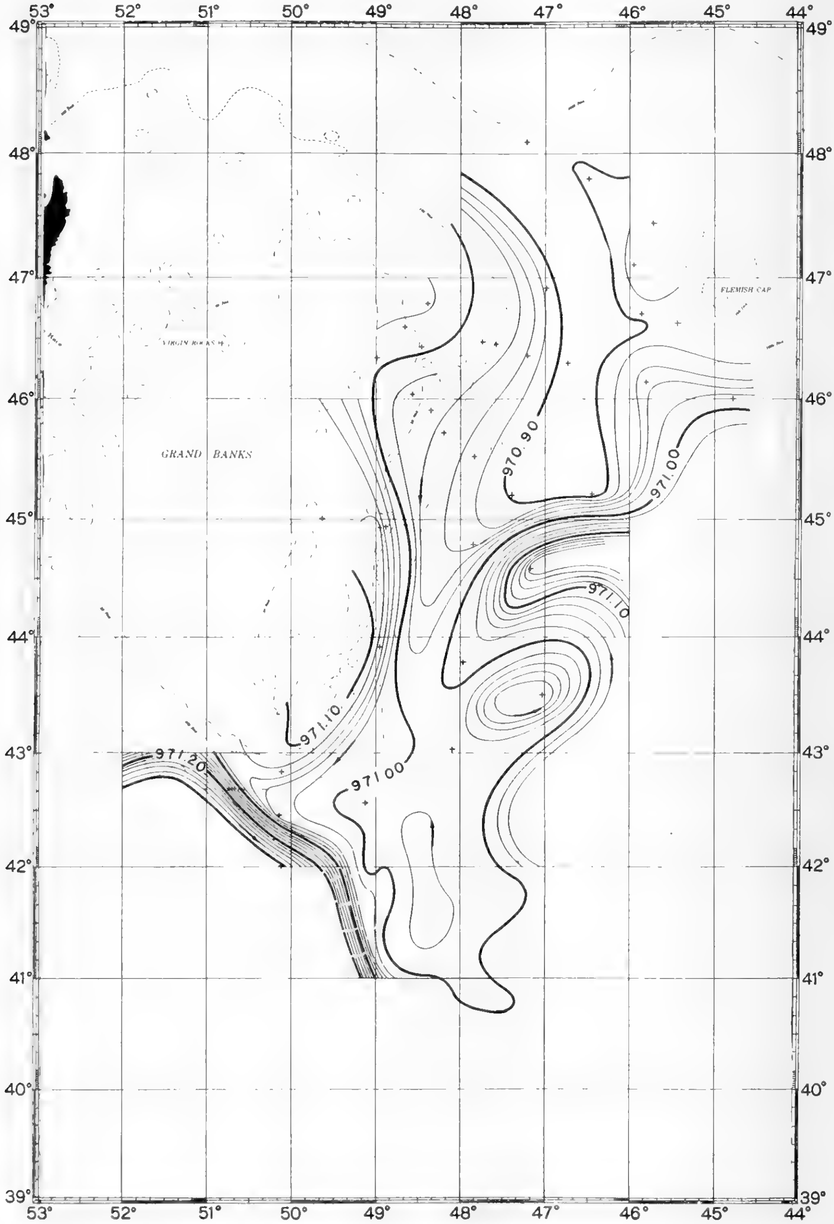

FIGURE 117.—Dynamic topography 1,000–0 decibar surface, May 17–25, 1934.

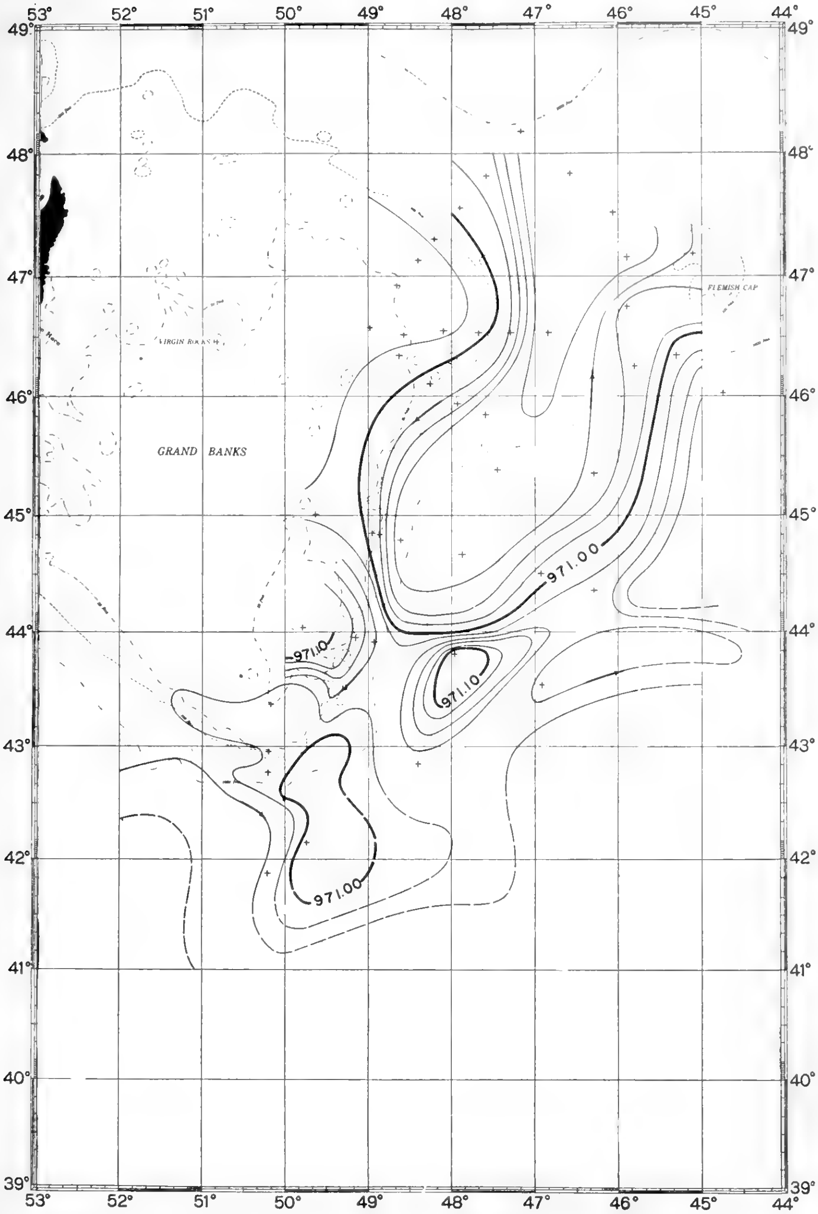

FIGURE 118.—Dynamic topography 1,000–0 decibar surface, June 12–21, 1934.

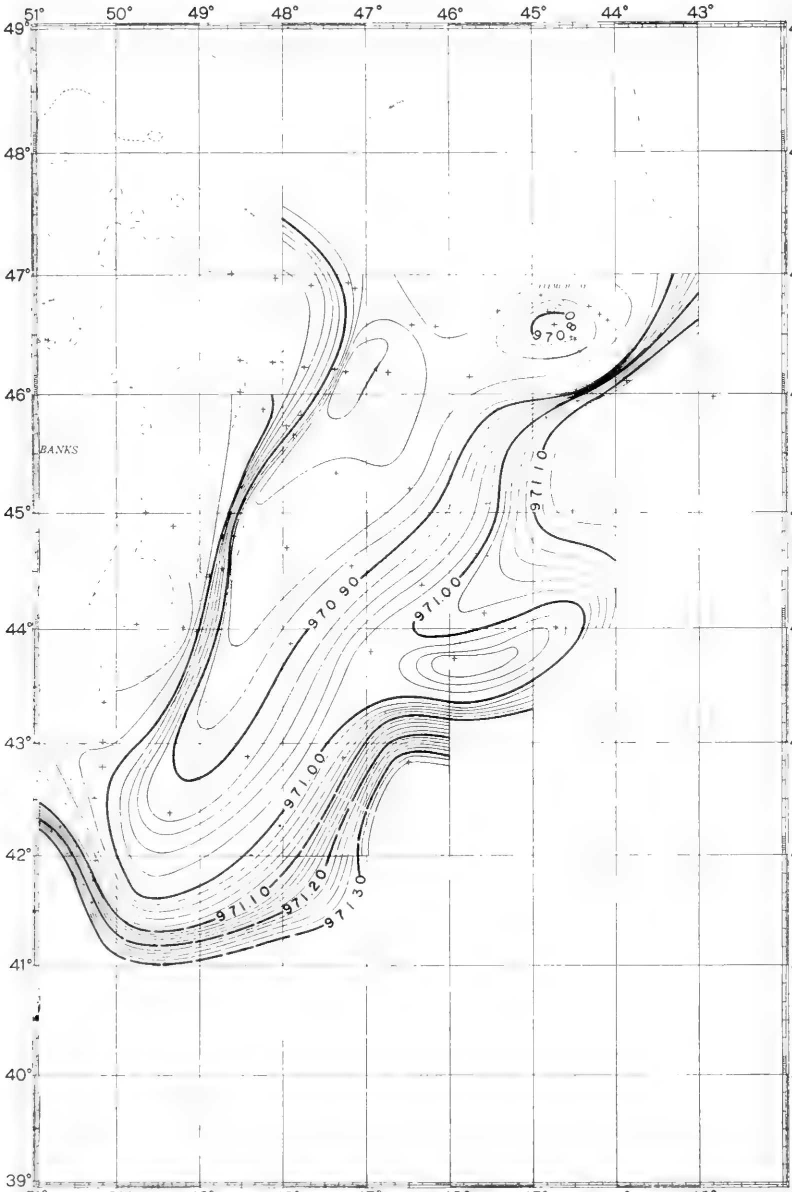

FIGURE 119.—Dynamic topography 1,000–0 decibar surface, April 10–20, 1935.

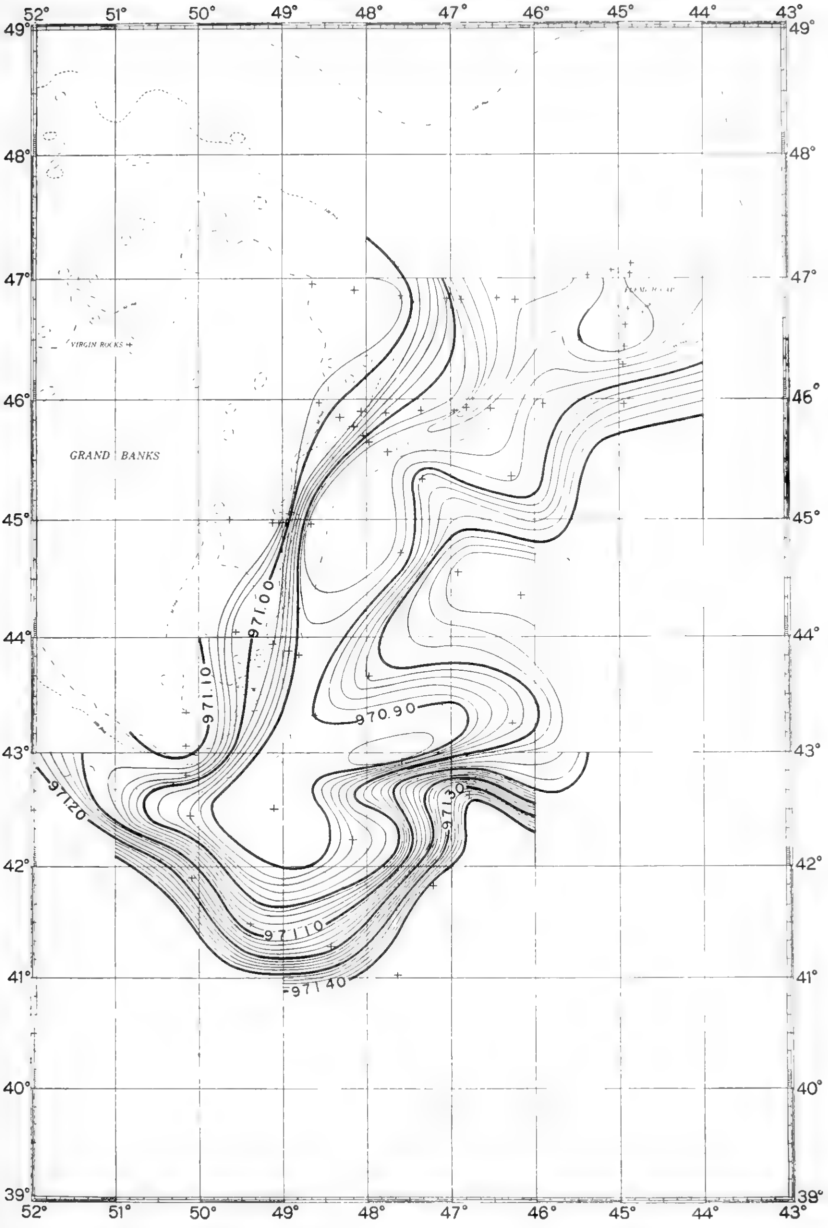

FIGURE 120.—Dynamic topography 1,000–0 decibar surface, May 8–18, 1935.

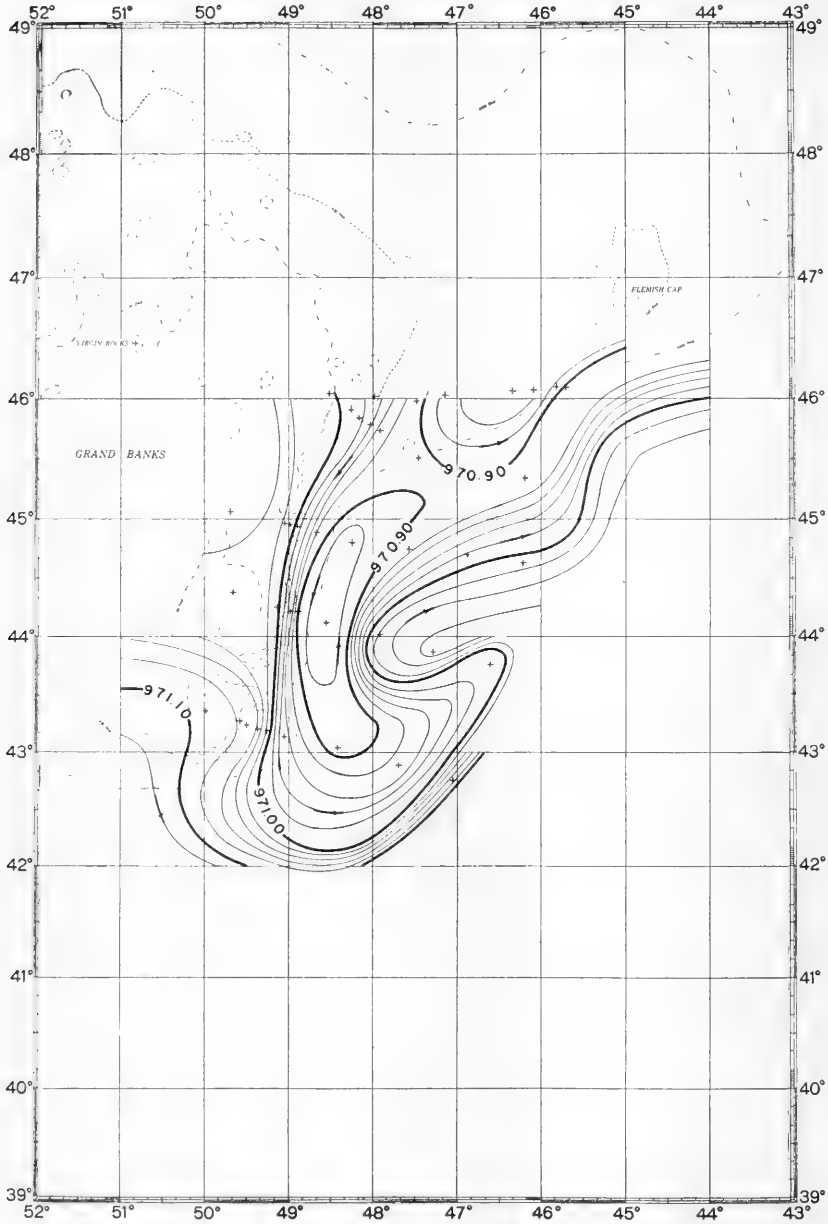

FIGURE 121.—Dynamic topography 1,000–0 decibar surface, June 4–10, 1935.

FIGURE 122.—Dynamic topography 1,500–0, decibar surface, July 22–September 11, 1928.

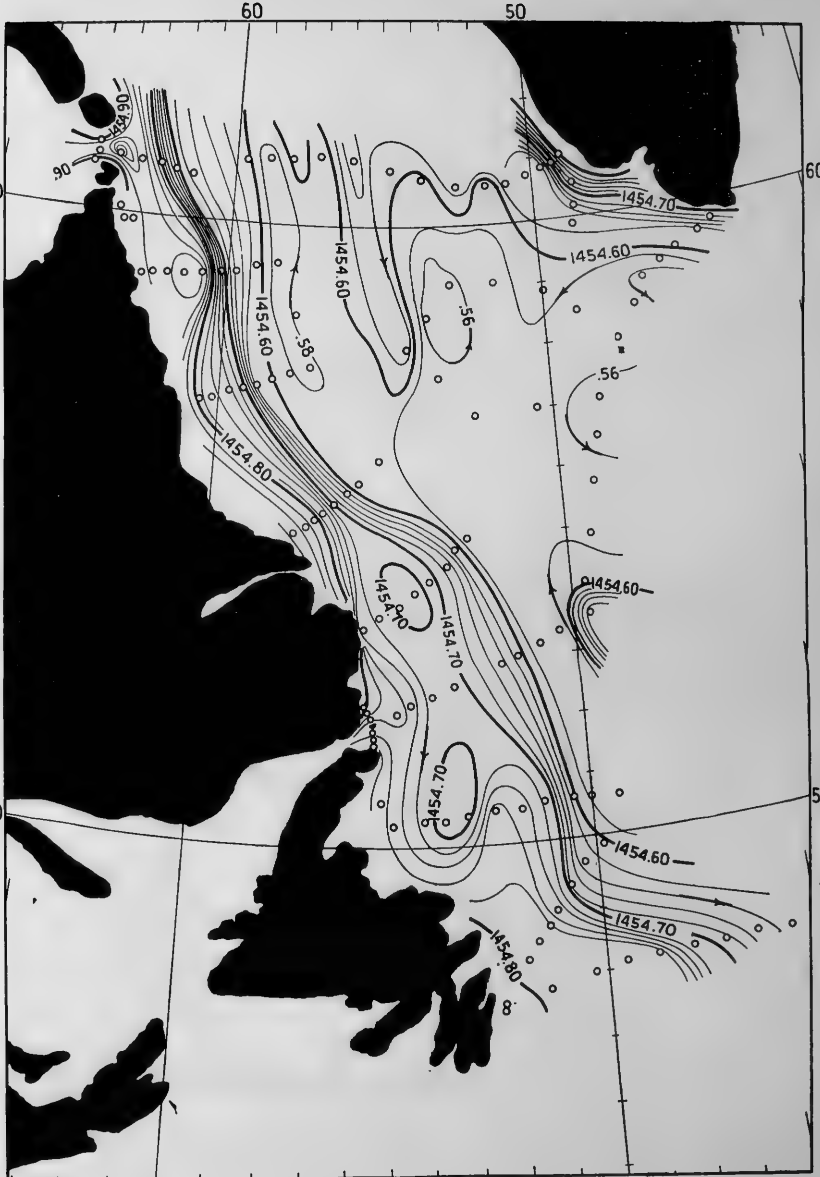

FIGURE 123.—Dynamic topography 1,500–0 decibar surface, July 4–August 8, 1931.

Chapter VIII

THE LABRADOR SEA

The discussion in previous chapters has been devoted to the circulation and physical character of the waters in the shelf and slope regions and has been largely confined to the upper levels, the troposphere. The present chapter treats the offshore waters between Greenland and Labrador and southward to the vicinity of the fiftieth parallel and with special attention to the deeper levels, the stratosphere.

SURFACE CIRCULATION

In figure 122 is shown the dynamic topographic chart of the surface with respect to 1,500 decibars based on the *Marion* observations taken in 1928. The more rapid currents immediately offshore of the Greenland and Labrador coasts and in the vicinity of Davis Strait have been illustrated and discussed in chapters IV, V, and VI. Figure 122 shows these currents and their interrelation as well as the more slowly moving current in the central part of the area. An area of weak current is shown southwestward of Cape Farewell and the northward and eastward flowing borders of the Atlantic Current is just discernible in about latitude 54° N., longitude 50° W. Immediately south of this is what is probably the northern end of the closed whorl between the Labrador Current, the Atlantic Current margin, and Flemish Cap. Regarding the drift of east Greenland bergs which reach Cape Farewell, reference is made to Smith (1931, pp. 74–78).

Figure 123 represents the dynamic topographic map of the surface with respect to 1,500 decibars resulting from the survey made by the *General Greene* in 1931. In this year the northwestern corner of the Atlantic Current margin extended farther to the north and west and was more pronounced than in 1928. The closed whorl found in 1928 between the Atlantic Current and the Labrador Current was not disclosed by the 1931 observations and probably was situated southeastward of the limits of the survey. A notable feature in 1931 was the branching and eastward recurving of a portion of the Irminger Current south of Cape Farewell as indicated by the course of the 1,454.56 isobath in that locality. (See p. 51, ch. IV.)

The dynamic topographic map of the surface with respect to 1,500 decibars obtained by the *General Greene* in 1933 is shown in figure 124. The high salinities observed in the central area (see ch. II) account for the more rapid circulation offshore of the usual boundaries of the Labrador Current. Neither the closed whorl between the Labrador Current and the Atlantic Current nor the northwestern border of the Atlantic Current were present within the limits of the survey unless that portion of the map eastward of longitude 50° W.

southwest of Cape Farewell is to be interpreted as a direct contribution of Atlantic Current water to the outer margins of the Irminger Current.

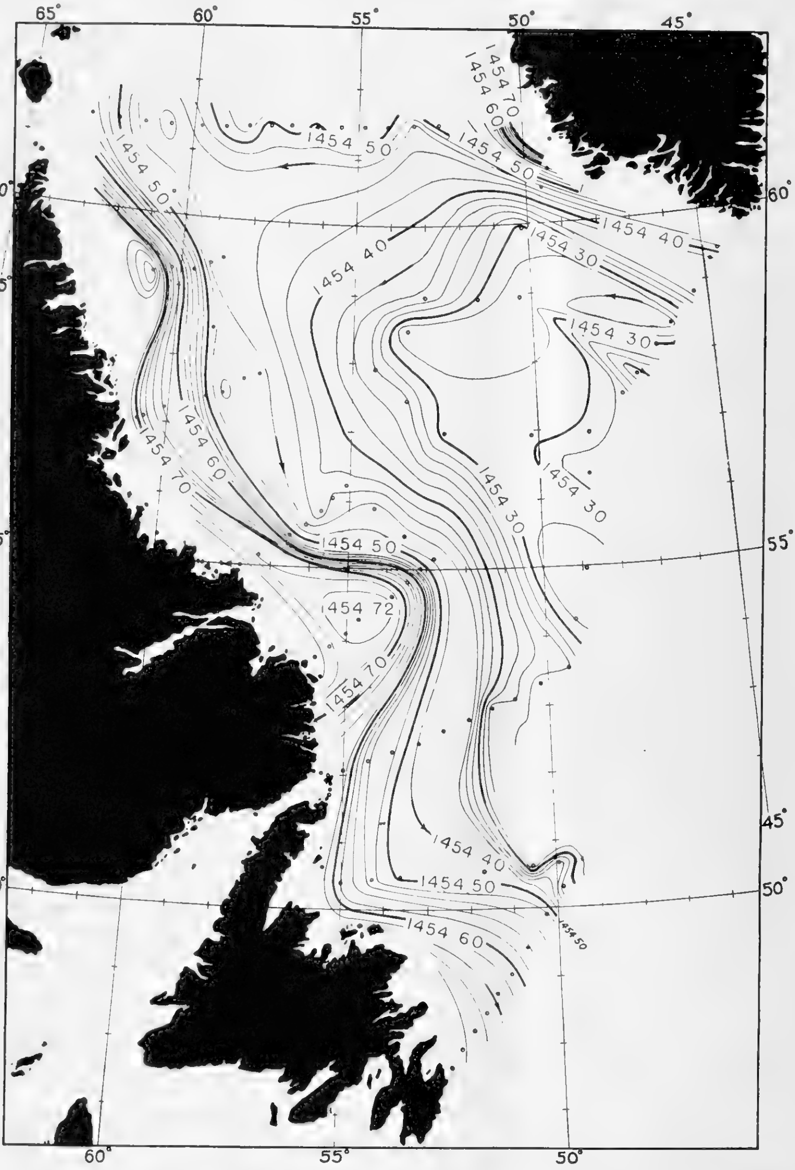

FIGURE 124.—Dynamic topography 1,500–0 decibar surface, June 26–July 24, 1933.

In figure 125 is shown the dynamic topographic map of the surface with respect to 1,500 decibars resulting from the 1934 observations obtained by the *General Greene*. It will be noted that the measurements extend farther to the eastward between latitudes 50° 55° than in the earlier surveys. These easternmost stations disclose the borders of the Atlantic Current flowing in well-developed

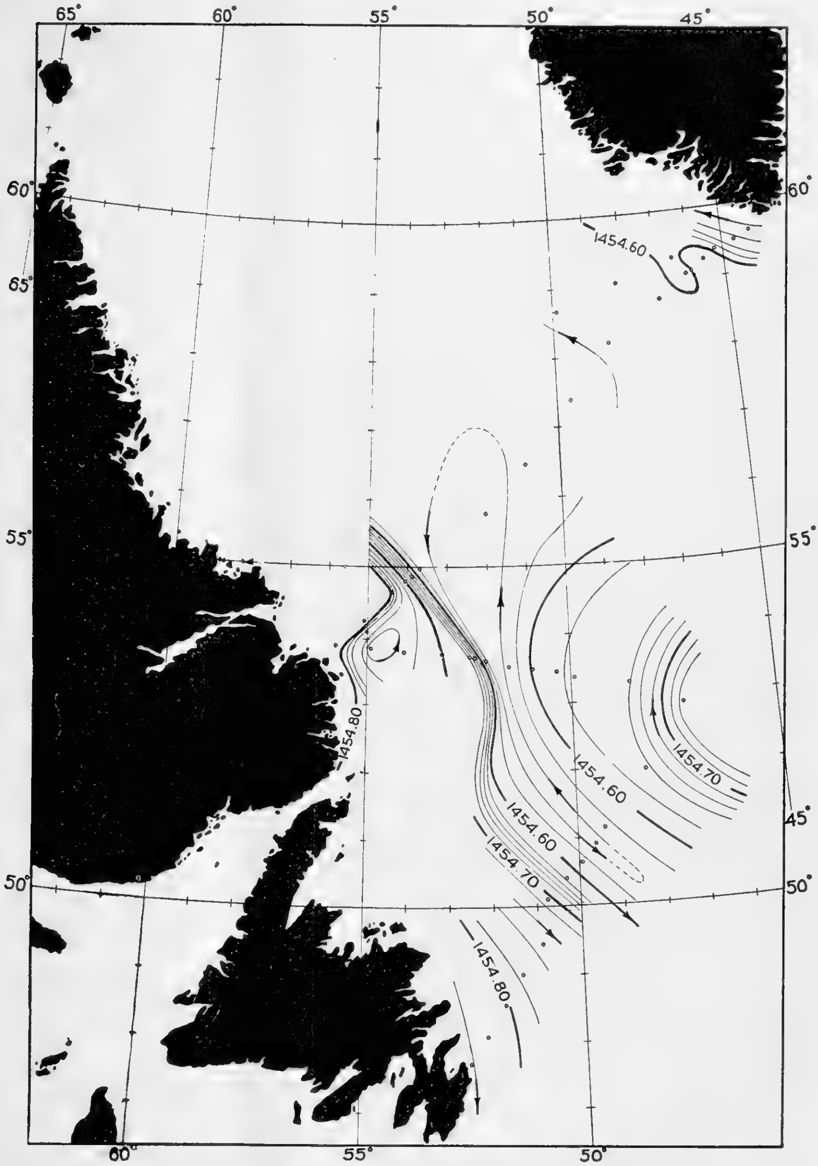

FIGURE 125.—Dynamic topography 1,500–0 decibar surface, July 3–15, 1934.

strength. The closed whorl between the Atlantic and Labrador Currents is more elongated than in the previous maps and can be traced as far northward as about 58° N. This figure again brings up the possibility that in some years water from the margins of the

Atlantic Current may be contributed directly to the offshore borders of the West Greenland Current.

Figure 126 is a composite dynamic topographic map of the entire region from Smith Sound southward to the Tail of the Grand Banks. The Baffin Bay part is based on the observations of the *Godthaab* made in 1928. From Davis Strait to the line between Cape Farewell and Newfoundland the map is based upon the 1928 *Marion* observations. From this line southeastward to Flemish Cap the observations of the *General Greene* taken on the 1935 post-season cruise have been used and that part of the map in the vicinity of the Grand Banks is based upon observations taken during May 1935 by the *General Greene*. Blank strips separate the various areas described above. The common reference level is the 1,500-decibar surface. It must be remembered that figure 126 is a composite combining observations from different seasons and different years, not strictly comparable but with this reservation in mind it is useful in gaining a more complete picture of the current system as a whole and of the interrelation of the component parts of that system. Figures 127 and 128 are similarly constructed composite horizontal sections of temperature and salinity at a depth of 100 meters in summertime.

The subsurface circulation obtaining in 1928 is illustrated in figures 129 and 130, which are dynamic topographic maps of the 600- and 1,000-decibar surfaces, respectively, referred to the 1,500-decibar surface. The major patterns of the surface circulation seen in figure 122 are reflected in the course of the dynamic isobaths at the 600-decibar surface. Most notable, perhaps, in figure 129 is the illustration of the contribution of the West Greenland Current to Baffin Bay over Davis Strait Ridge. Figure 130 demonstrates the weak but cyclonic character of the circulation in the intermediate water, with the center of the basin in less active circulation than the borders.

SUMMARY OF SURFACE CIRCULATION

The surface circulation of the Labrador Sea is summarized as follows: The East Greenland Arctic Current and a western branch of the Irminger Current on rounding Cape Farewell are renamed the West Greenland Current which flows northwestward. The West Greenland Current branches, part crossing Davis Strait Ridge into Baffin Bay and a part flowing westward south of the Davis Strait Ridge and joining Arctic water flowing southward out of Baffin Bay to produce the Labrador Current. The Labrador Current, composed of about three parts west Greenland water to two parts of Baffin Bay water, flows southerly along Labrador and Newfoundland and the eastern edge of the Grand Banks, eventually turning in a general northeasterly direction along the northwestern borders of the Atlantic Current. From the northern edge of the Grand Banks to the Tail of the Banks parts of the Labrador Current are turned back to the northward. The northernmost of these returned branches forms a closed whorl between the trunk of the Labrador Current, Flemish Cap, and mixed waters of the borders of the Atlantic Current which water flows northward and eastward extending as far as 55° north.

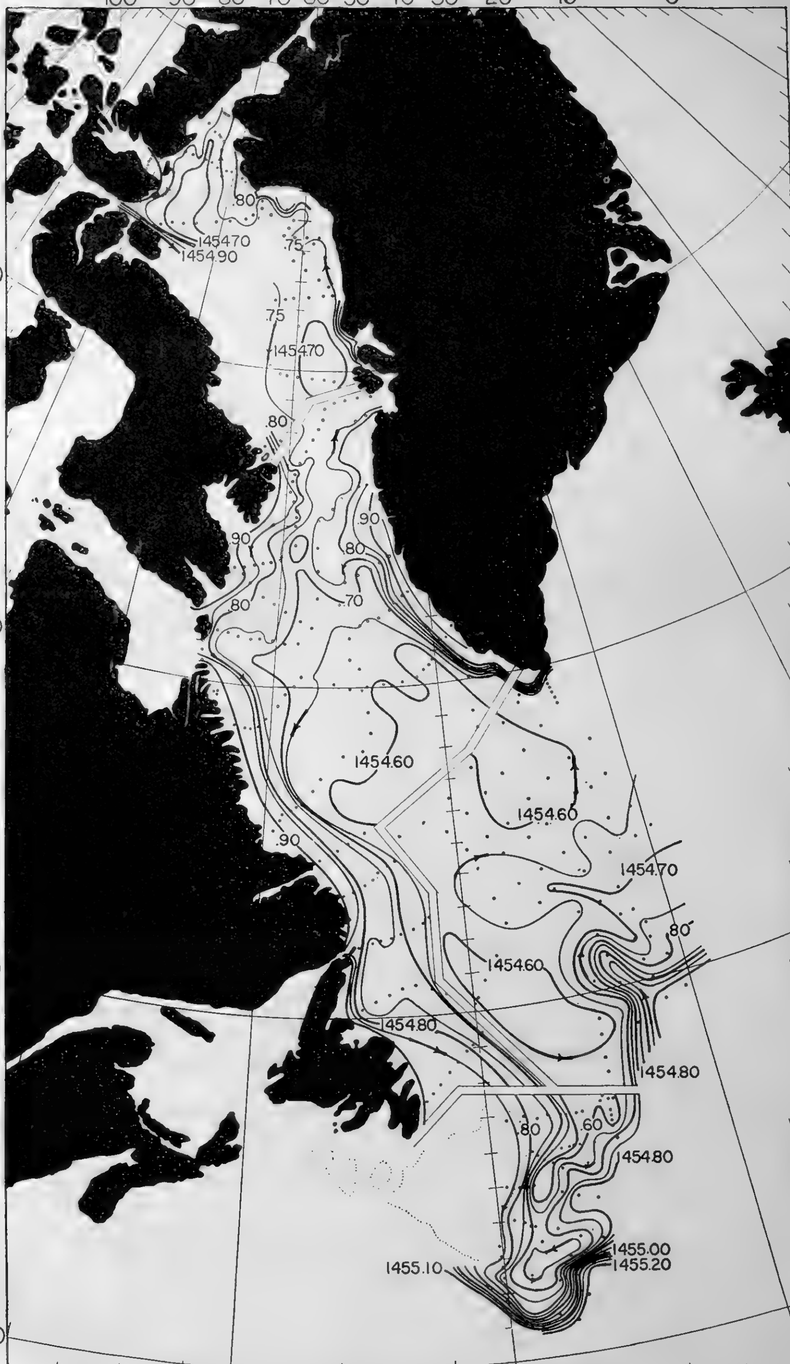

FIGURE 126.—Dynamic topography 1,500–0 decibar surface (composite, 1928–35).

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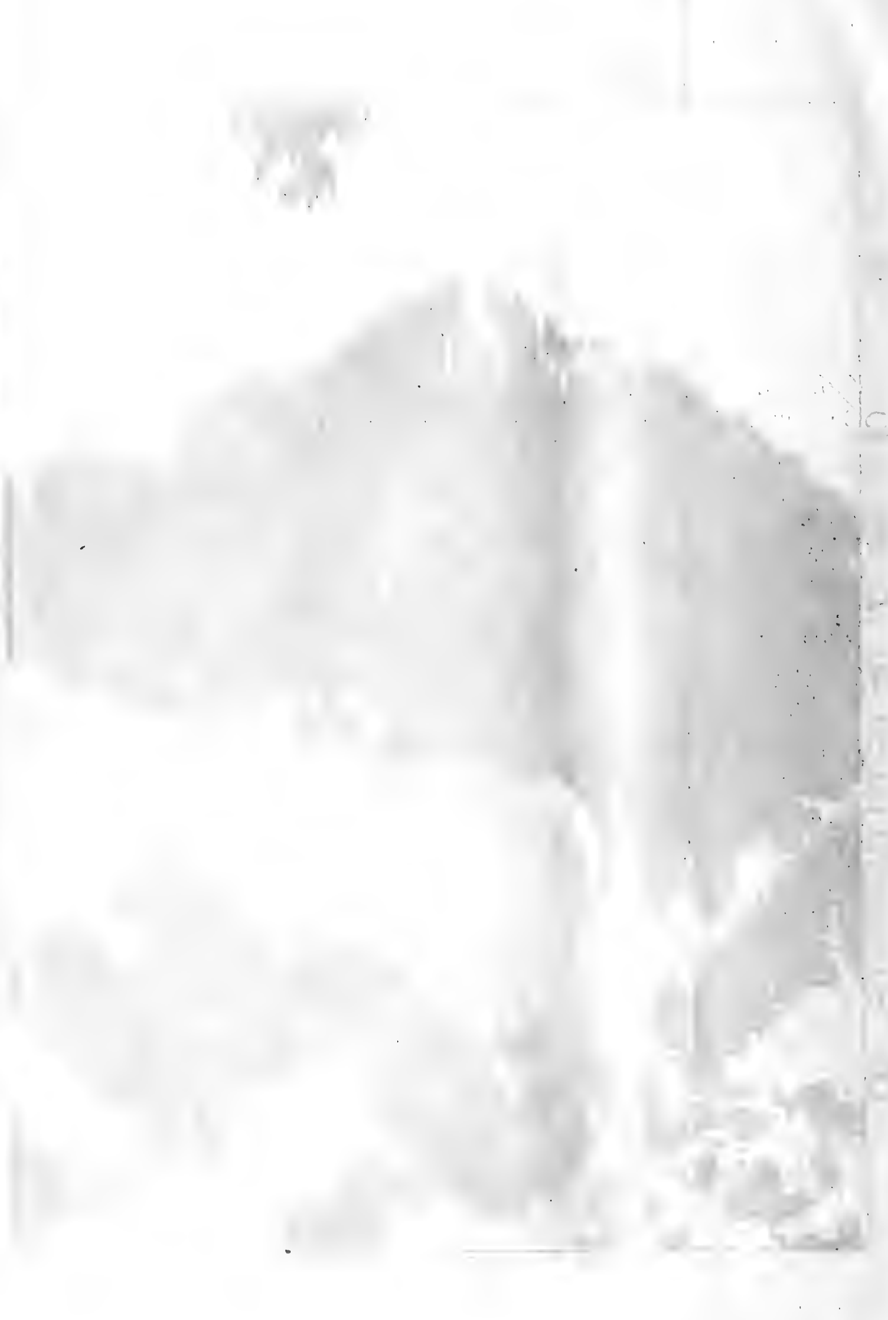

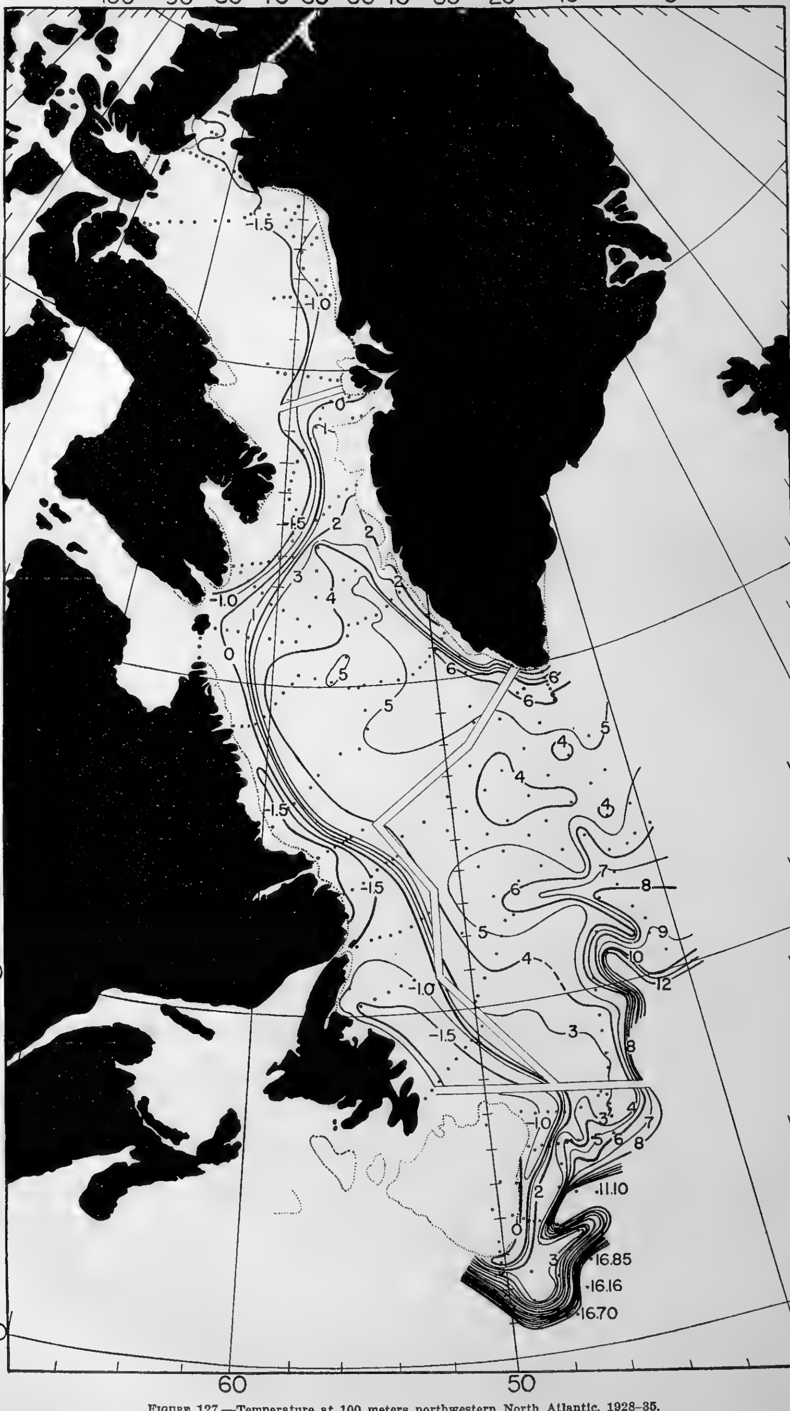

FIGURE 127.—Temperature at 100 meters northwestern North Atlantic, 1928–35.

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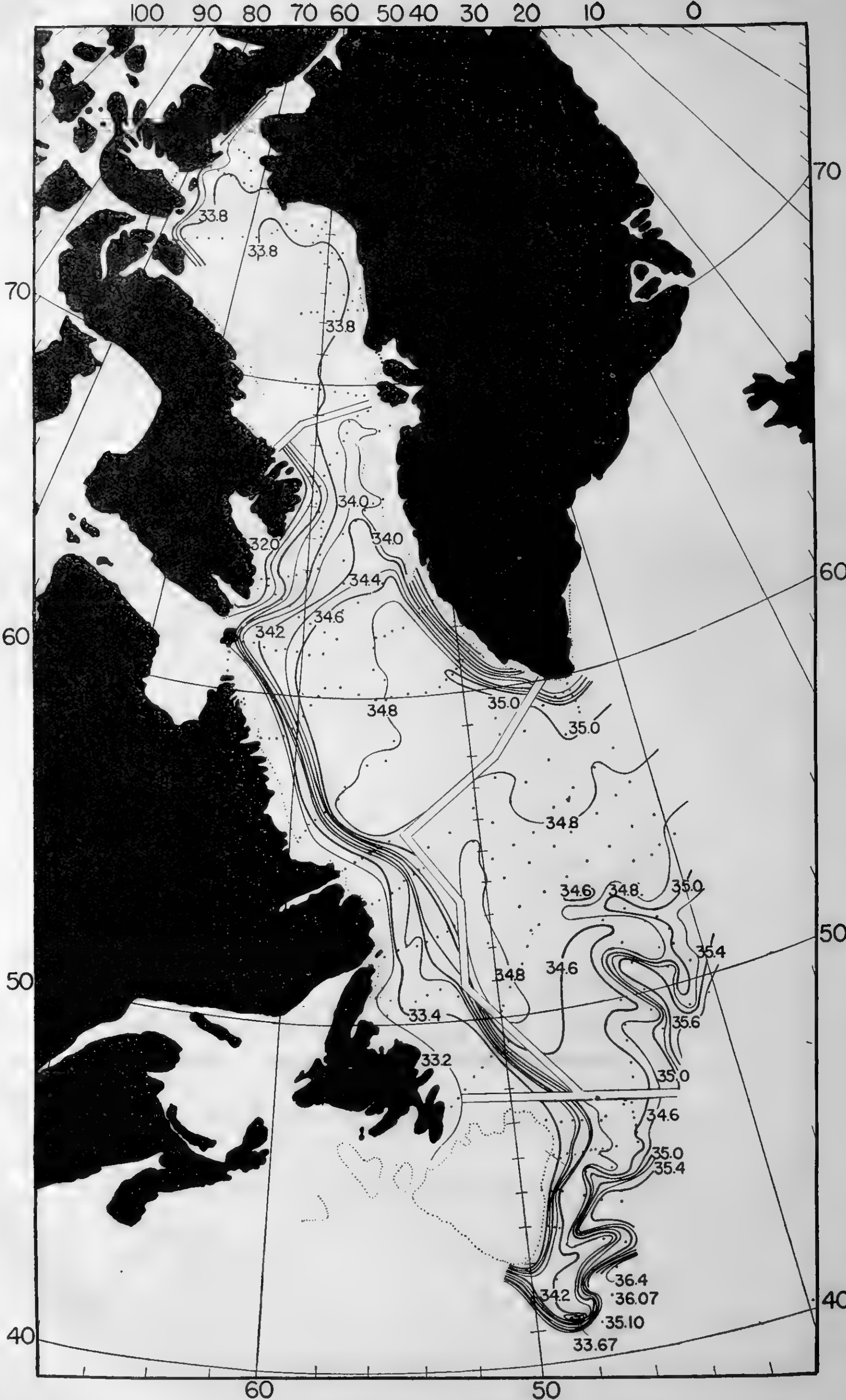

FIGURE 128.—Salinity at 100 meters northwestern North Atlantic, 1928–35.

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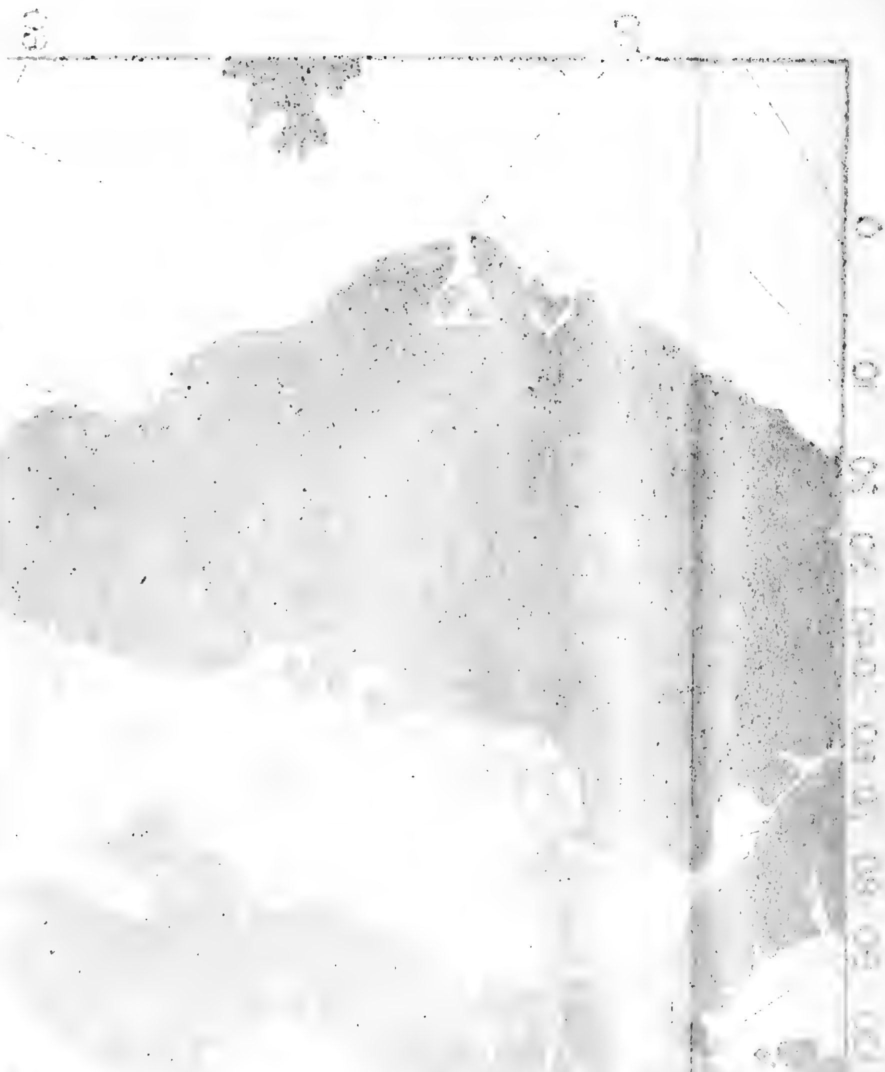

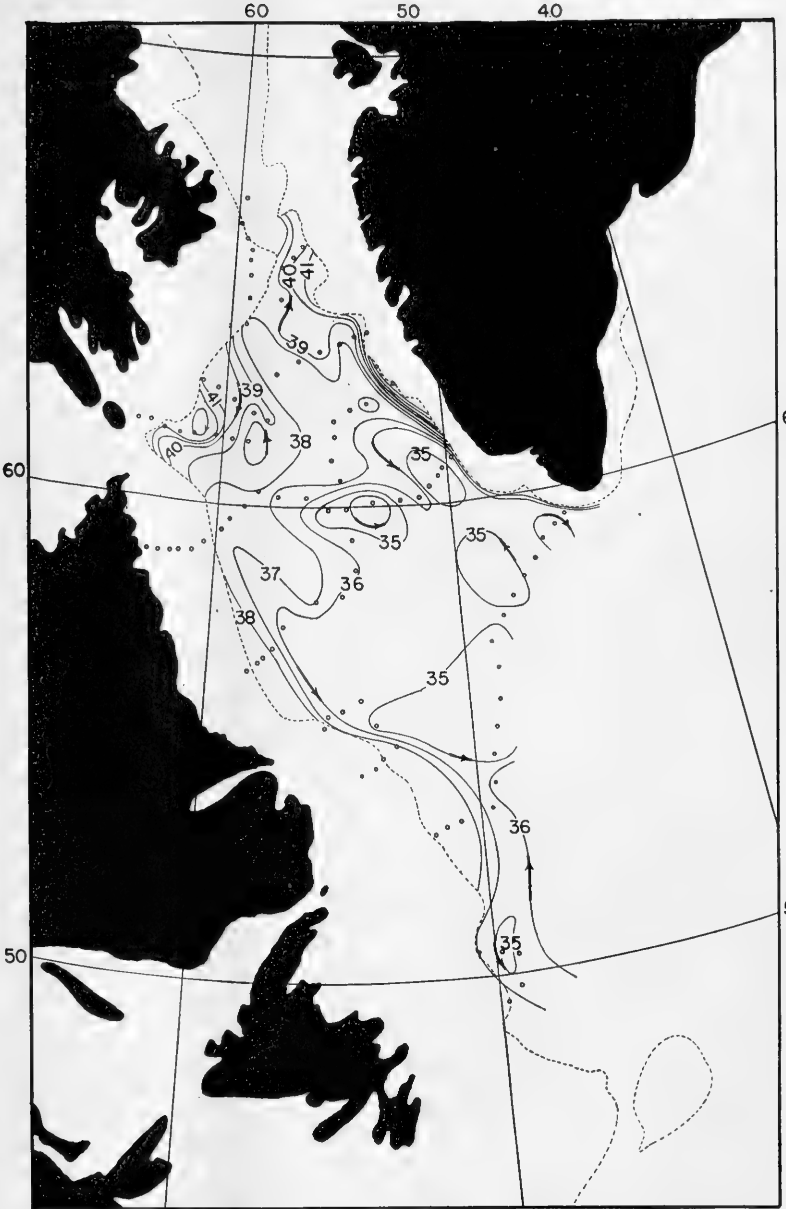

FIGURE 129.—Dynamic topography 1,500–600 decibar surface, July 22–September 11, 1928.

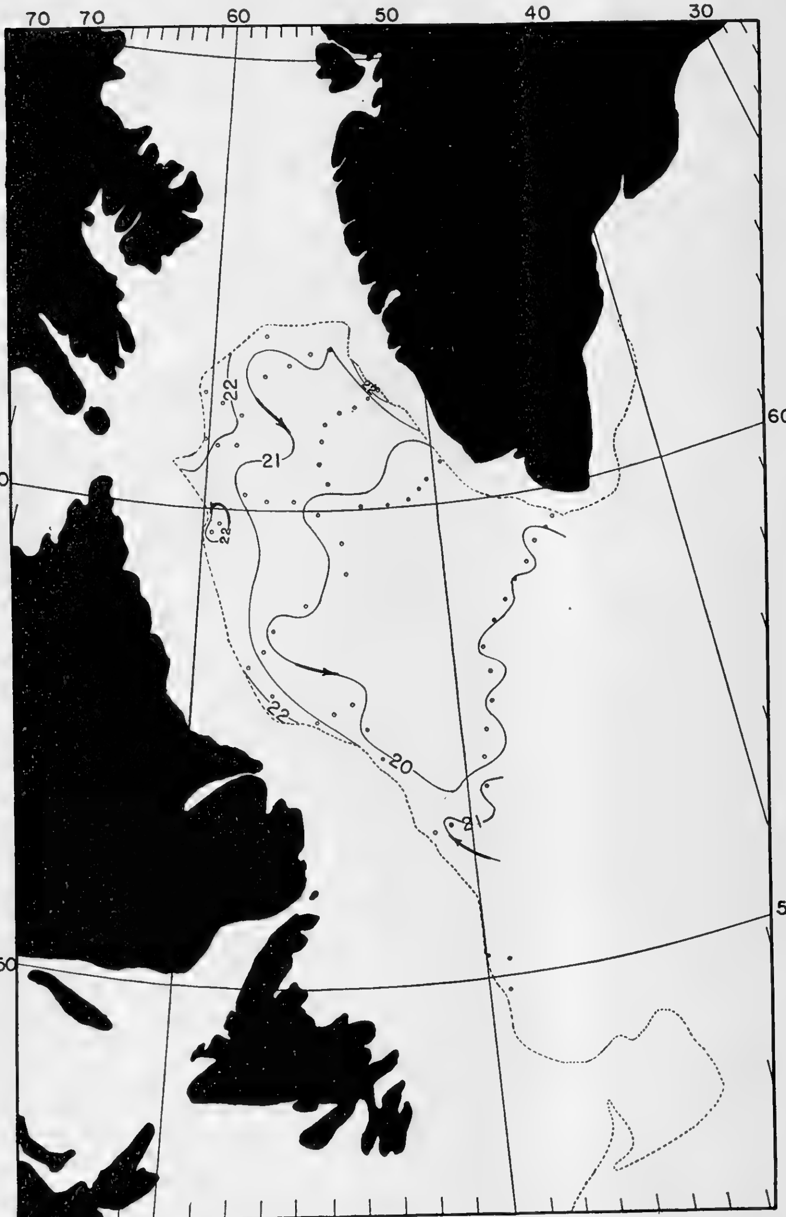

FIGURE 130.—Dynamic topography 1,500–1,000 decibar surface, July 22–September 11, 1928.

EXCHANGE OF WATER IN BAFFIN BAY

The volumes of flow derived from velocity profiles and described in chapters IV, V, and VI are represented schematically in figure 131. These investigations require certain conclusions which not only support the picture of the circulation which is represented here but offer opportunity of estimating the exchange of water in Baffin Bay. It was found that in 1928 about 1.0 million cubic meters per second was being contributed to Baffin Bay by the West Greenland Current at Davis Strait. The southward flow of the Baffin Land Current amounted to about 2.0 million cubic meters per second, thus indicating that the net contribution to Baffin Bay through Smith, Jones, and Lancaster Sounds was about 1 million cubic meters per second subject to correction for precipitation and evaporation.

EXCHANGE OF WATER, LABRADOR SEA

Similarly the inflow to and outflow from the Labrador Sea may be balanced as follows:

	$m^3/s \times 10^{-6}$
Inflow:	
West Greenland Current (average Cape Farewell)	5.0
Baffin Land Current	2.0
Hudson Bay discharge (net)	0.5
Total	7.5
Outflow:	
West Greenland Current to Baffin Bay	1.0
Labrador Current (average South Wolf Id.)	4.6
Total	5.6

The fact that a part of the West Greenland Current is contributed to and included in the listed volume of the Labrador Current does not affect the above totals. Neglecting evaporation and precipitation, then, the above totals indicated an unbalanced excess of inflow over outflow of about 1.9 million cubic meters per second. The foregoing strongly suggests that about 1.9 million cubic meters per second of West Greenland Current sinks into depths below 1,500 meters (the reference surface of the dynamic computations) and eventually flows out of the Labrador Sea at deeper levels into the North Atlantic, thus maintaining a quantitatively balanced system of circulation.

EXCHANGES OF HEAT IN LABRADOR SEA

In the summer of 1928 the heat transported to the Labrador Sea by currents was as follows:

	$°C\ m^3/s \times 10^{-6}$
West Greenland Current off Cape Farewell	17.5
Baffin Land Current at Davis Strait	—1.2
Hudson Bay discharge (net)	0.5
Total	16.8

while the current-borne heat leaving the Labrador Sea was—

West Greenland Current to Baffin Bay	0.5
Labrador Current	14.6
Total	15.1

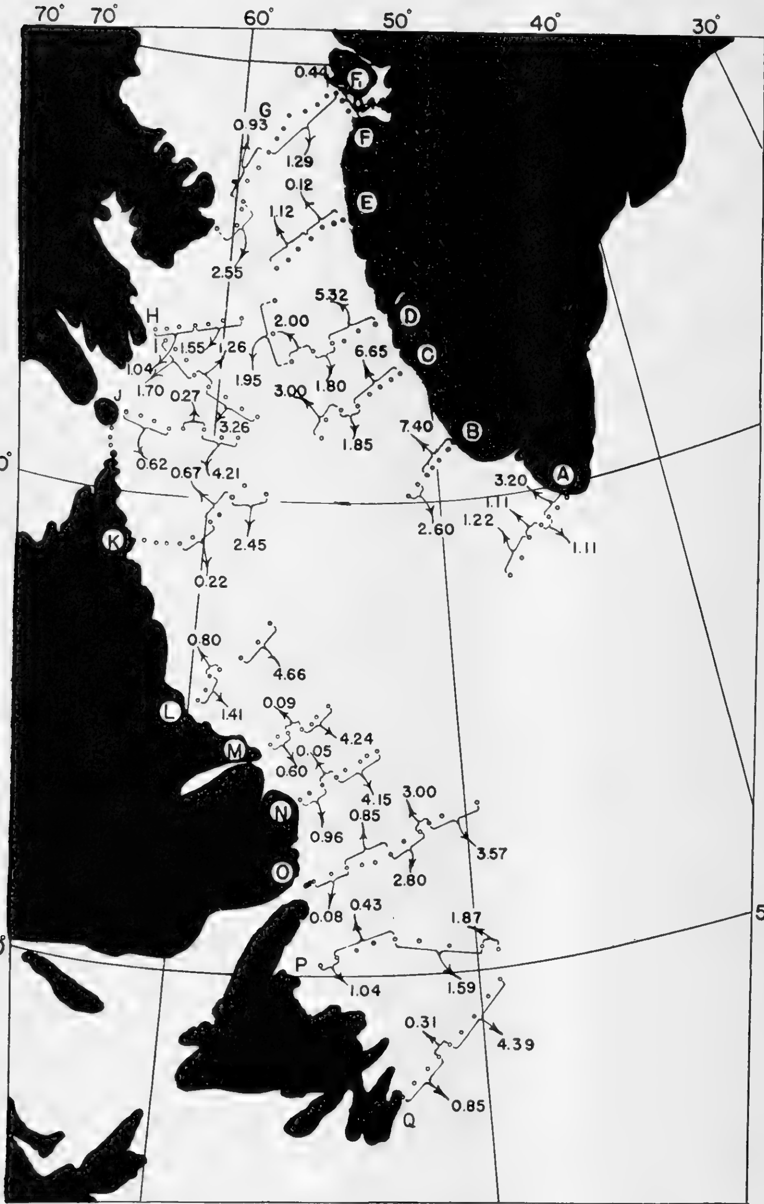

FIGURE 131.—Volume of the currents in the upper water layers (troposphere), expressed in millions of cubic meters per second, July 22–September 11, 1928.

This gives an excess of heat entering amounting to 1.7 billion kilogram calories per second. If the average temperature of the water sinking below the 1,500 meter level is assumed to be 3.2° C., the corresponding outflow of heat was about 6.1 billion kilogram calories per second on the basis of the current balance tabulated on page 173. This figure of 6.1 compared with the above excess of current-borne heat entering above 1,500 meters of 1.7 billion kilogram calories per second leaves an excess of departing current-borne heat of 4.4 billion kilogram calories per second. It seems reasonable that this represents the order of magnitude of the average summer rate of absorption of insolation for it is estimated [15] that, during the summertime, the insolation reaching the surface of the sea in this area amounts to about 20 billion kilogram calories per second of which perhaps more than 40 percent is lost, as far as the sea is concerned, through reflection. If this figure for reflection is accepted, 12 billion kilogram calories per second remain to account for radiation, evaporation, and absorption. As radiation is probably small, approximately two-thirds of the solar heat not reflected from the surface goes for evaporation and only one-third is absorbed. This proportion of absorption is probably too low because no account has been taken of land drainage, compensating sinking, and consequent transport of heat to depths below 1,500 meters.

CABBELING

The indicated sinking of approximately 1.9 million cubic meters per second volume of current below the 1,500-meter level and also, proportional quantities of heat, is substantiated by the position of the axis of saltest water along the southwest coast of Greenland for the summer of 1928. These data when plotted against depth (fig. 132) show that the Irminger-Atlantic water sank from the 200-meter level off Cape Farewell to about the 500-meter level off Godthaab. The temperature-salinity curves representative of the West Greenland Current (fig. 23, p. 48), if interpreted in terms of density, also indicate the progressive increase of density along its course. This sinking of the Irminger-Atlantic water is verified by the observations of Baggesgaard-Rasmussen and Jacobsen (1930) and those of Riis-Carstensen (Conseil Permanent International, 1929) some of the results of which are shown on figures 133 and 134, respectively. The *Dana's* observations taken June to July, 1925 when plotted on figure 133 show that the core of warmest water (Irminger-Atlantic Current) sank from a depth of about 200 meters to a depth of about

[15] According to Davis (1899, p. 18) the rate at which unobstructed insolation is received on the earth with the sun at the zenith is 75,000 thousand kilogram calories per minute per square mile or 54 billion kilogram calories per 12 hours. If the length of sunshine per day at the equator on March 20 be taken at 12 hours and the average rate of insolation during that period be taken as $\frac{2}{\pi}$ times the maximum then the daily rate would be about 34.3 billion kilogram calories per square mile. Davis (1899, p. 20) gives the daily incident radiation in latitude 60° on June 21 and September 22 as 1.09 and 0.50 times the above, respectively. A conservative estimate for July–August then is taken as 0.8, whence estimating the area in question to be 310,000 square miles the average summer rate of insolation would be $\frac{34.3\times0.8\times310{,}000}{86{,}400}$ or approximately 100 billion kilogram calories per second. According to Milhorn (1929, p. 41) about 60 percent is transmitted and of this about two-thirds is absorbed by the atmosphere so that about 20 billion kilogram calories per second reaches the ocean surface.

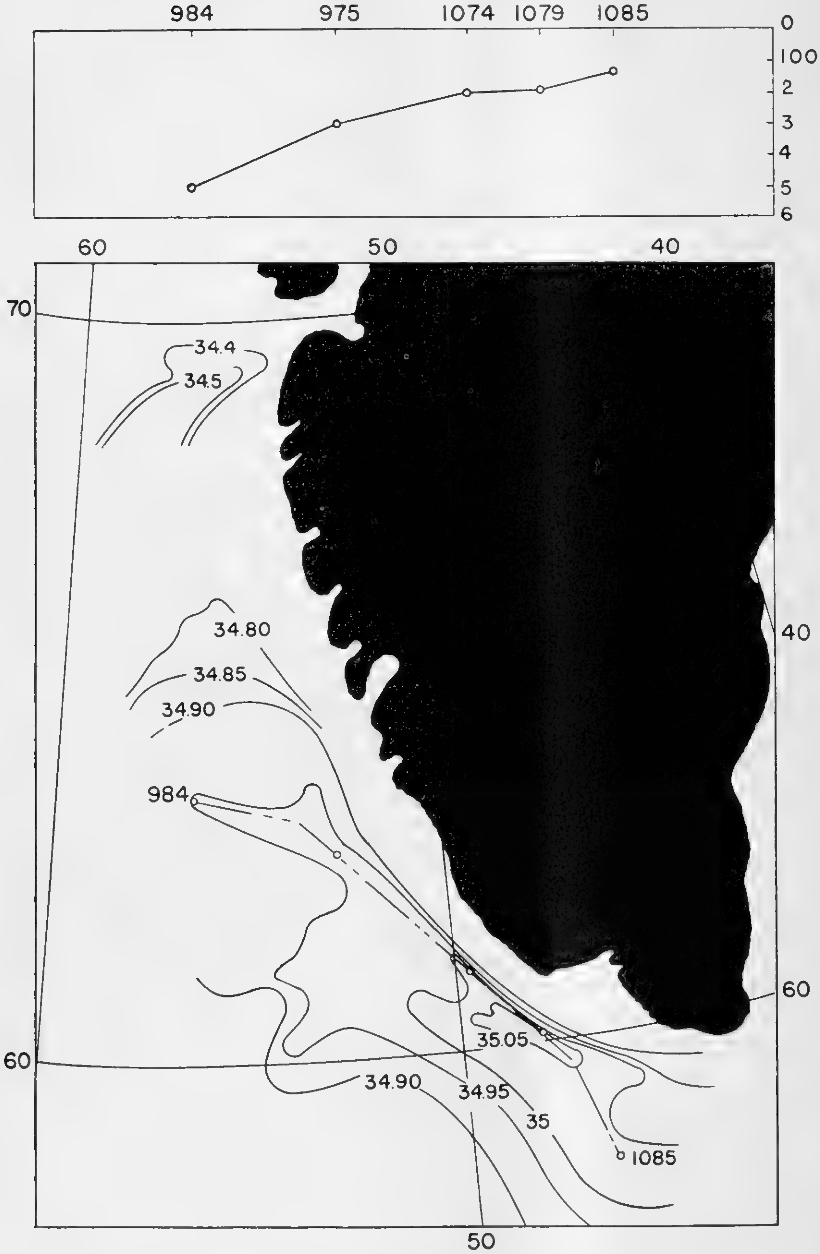

FIGURE 132.—The position of saltest water July 22–September 11, 1928.

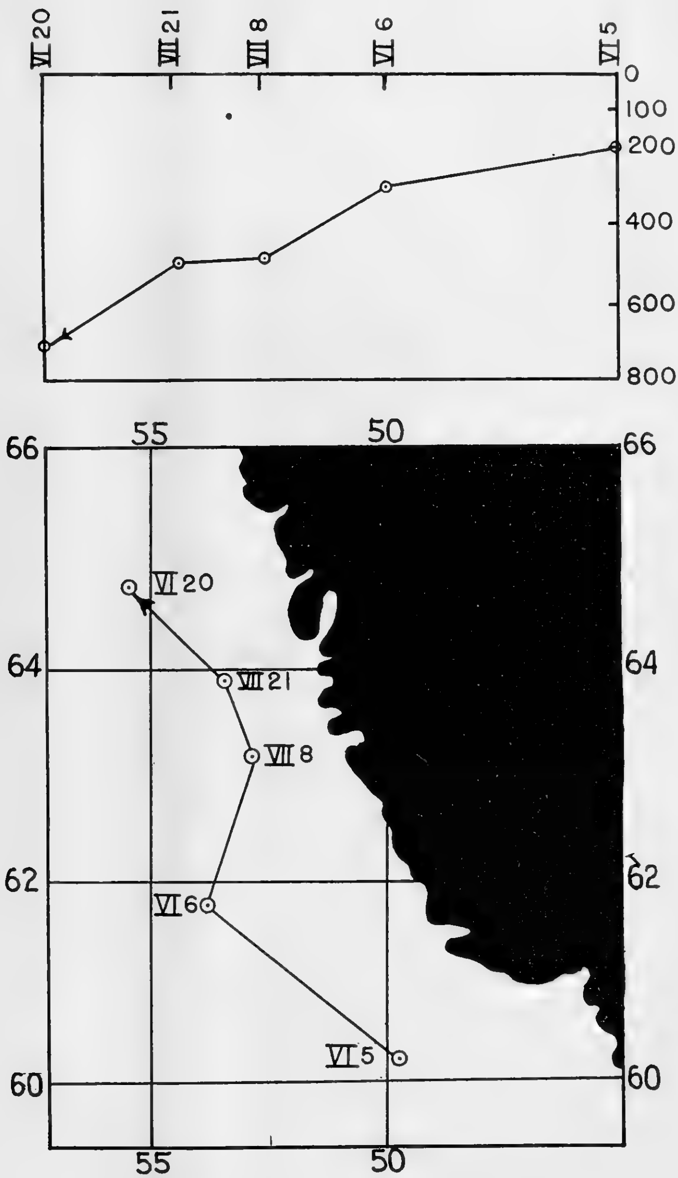

FIGURE 133.—The position of warmest water as shown by the *Dana's* observations, May 5–20, 1925.

700 meters in traversing the West Greenland sector. Also the *Godthaab's* observations in the summer of 1928 reveal that the Irminger-Atlantic water sank along its pathway north of Cape Farewell. Thus the observations of the *Dana*, *Godthaab*, and *Marion* all are in agreement in demonstrating the manner and rate of sinking of the

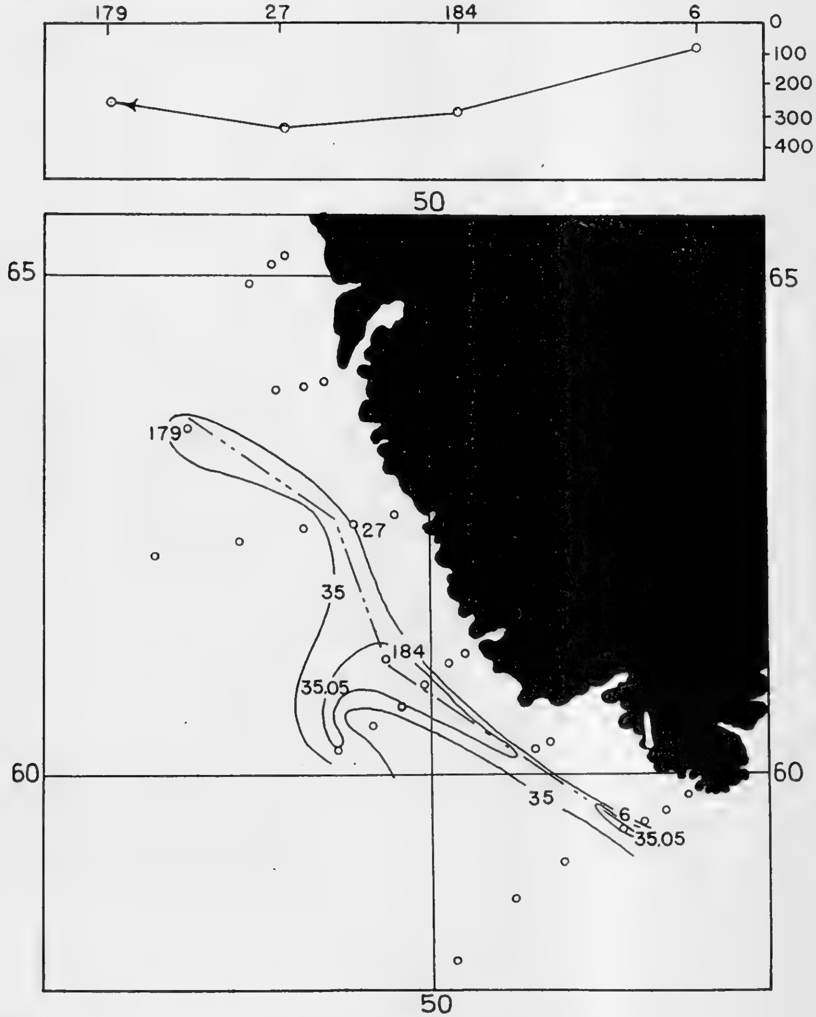

FIGURE 134.—The position of saltest water as shown by the *Godthaab's* observations, May 29–October 8, 1928.

Irminger-Atlantic water as it enters and pursues its course in the Labrador Sea. This sinking of the water as it mixes in the West Greenland Current is an illustration of what the authors consider to be cabbeling. Although this phenomenon has been indicated by the observations from several parts of the northwestern North Atlantic (pp. 44, 48, and 136) its exposition has been reserved for the

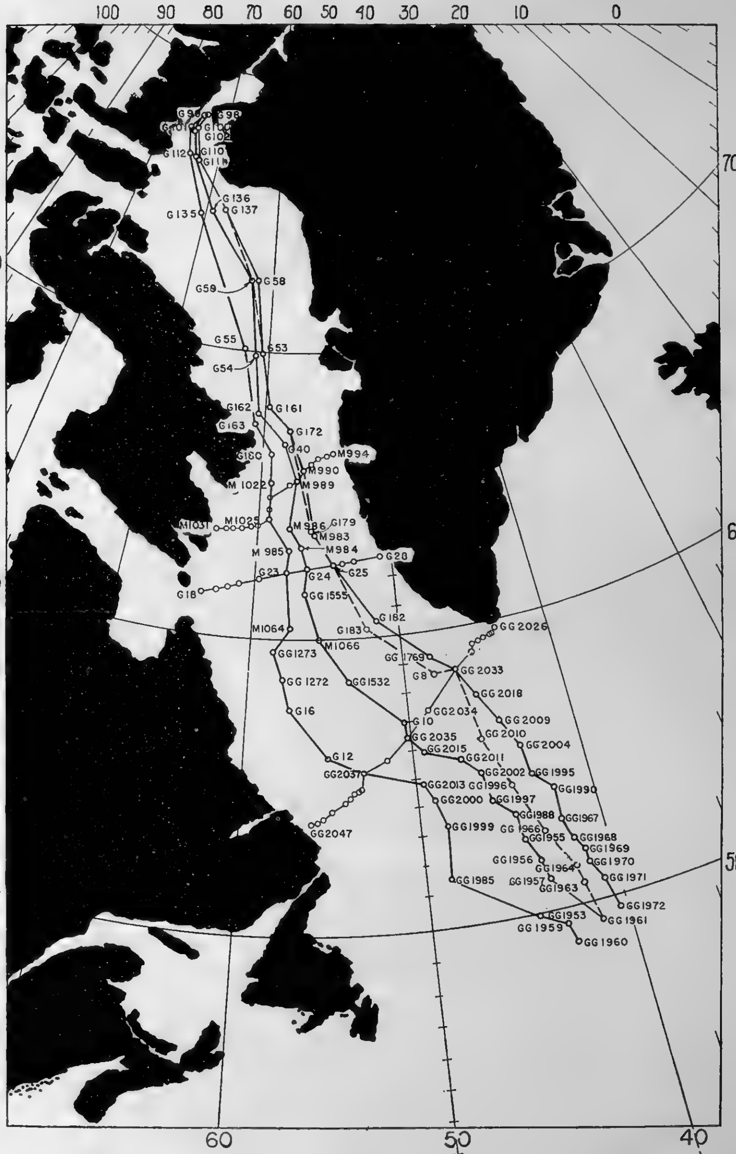

FIGURE 135.—Station map. M, *Marion;* GG, *General Greene;* and G, *Godthaab.*

West Greenland Current as it enters the Labrador Sea. The idea of cabbeling was first published by Witte (1910) and depends upon the nonlinear relation between the temperature and the density of sea water. Because of this nonlinear relation and the practically linear salinity-density relation an adiabatic mixture of two waters of equal density but of differing temperature and salinity will have a greater density than its components. It is evident that, in nature, horizontally adjacent bodies of water will have very nearly equal densities. When such adjacent waters are of differing temperature and salinity characteristics their intermixture, with its attendant increase in density, will result in a partial sinking of the mixture to an equilibrium density level from which level further sinking is possible through further mixture with adjacent water of dissimilar temperature and salinity characteristics. The fact of the presence of two water masses of dissimilar types in juxtaposition is in itself an indication of the presence of horizontal currents. The intermixture of two such water masses along their border may be aided at and near the surface by wave action but will be effected by the horizontal motion which transported the water there, not only near the surface but in deeper water as well. As a natural result, then, there will be a decided and even preponderant horizontal component to this mixed water as it sinks. Such is our conception of cabbeling as it occurs in the regions under discussion. The vertical component of motion as initiated by cabbeling is in many parts of the Labrador Sea during the colder months of the year accelerated by convectional chilling, but the latter factor is quite independent of the former.

It may be noted here that areas such as the boundaries of the Irminger-Atlantic Current and the Labrador Current have been called polar fronts by some authors. This term, borrowed from meteorology, may be considered synonomous with the mixing zones described in this paper if it is applied not only to surface phenomena but to subsurface current margins as well.

STATION DATA

In the following paragraphs the vertical distribution of the velocity of the currents, the temperature, and salinity, will be discussed with reference to two transverse and three longitudinal vertical sections, the geographical locations of which are shown on figure 135.

VELOCITY PROFILES OF THE STRATOSPHERE

A statistical investigation of the dynamic height computations for the 1935 post-season cruise of the *General Greene*, where all stations were occupied to near the bottom, indicated from a consideration of departures of differences of anomalies of dynamic heights from averages for 500-meter depth intervals, that in the Labrador Sea the 2,000 meter surface is probably close to the surface of most nearly motionless water. On the assumption that 2,000 meters represents the depth of motionless water velocity profiles for the complete sections, Resolution Island to Fiskernaessett (*Godthaab* stations 18 to 28) and South Wolf Island to Cape Farewell (*General Greene* stations 2026 to 2047) have been prepared and are shown in figures 136 and 137, respectively. Because of the small density gradients involved, because of the possibility that no absolutely motionless surface exists and because of the probably undulatory character of such a surface if it does exist, no great reliance is placed upon the absolute values of velocity thus derived. However, the indicated directions of flow are believed to be reliable and are instructive regarding the circulation of the deeper water. These two velocity profiles clearly show the cyclonic nature of the circulation in the deep water (p. 186) of the Labrador Sea and at the same time permit the southward outflow,

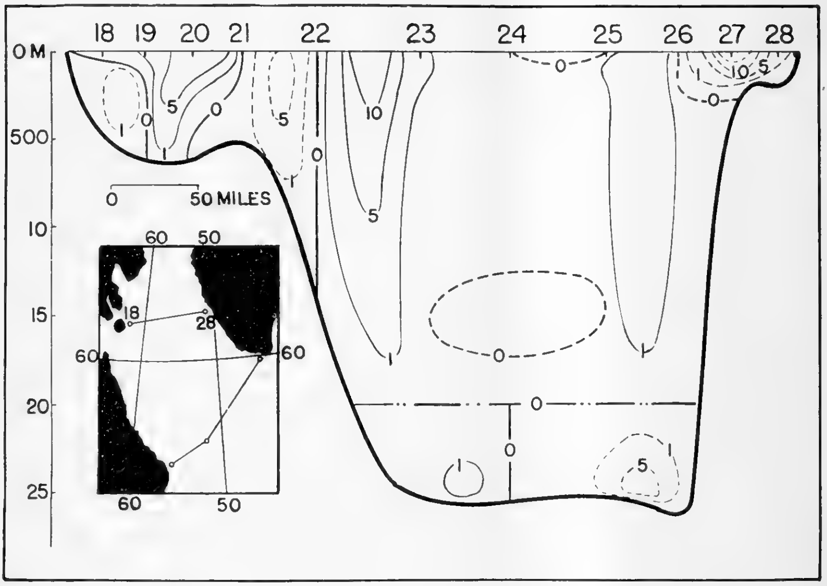

FIGURE 136.—Velocity profile Resolution Island to Fiskernaessett, June 11–16, 1928 expressed in centimeters per second (from the *Godthaab's* observations). The solid lines represent southerly current and the broken lines northerly current.

along the American side, of deep water and bottom water (p. 187) to the North Atlantic necessitated by the sinking of water from higher levels.

VERTICAL DISTRIBUTION OF TEMPERATURE AND SALINITY

Resolution Island—Fiskernaessett.—The transverse sections of temperature and salinity shown in figure 138 represent summer conditions in 1928 between Resolution Island and Fiskernaessett based on the *Godthaab* stations 18 to 28. In the upper levels the more rapid currents can be recognized, the northward-flowing West Greenland Current on the right and the southward-flowing Labrador Current on the left. The central part of the section from about 500 meters to about 2,000 meters is occupied by intermediate water (p. 184), the deeper limit of which is characterized by a temperature of about 3° C. and a salinity of about 34.90‰. This intermediate water is considered to lie below the surface water and offshore of the more rapid

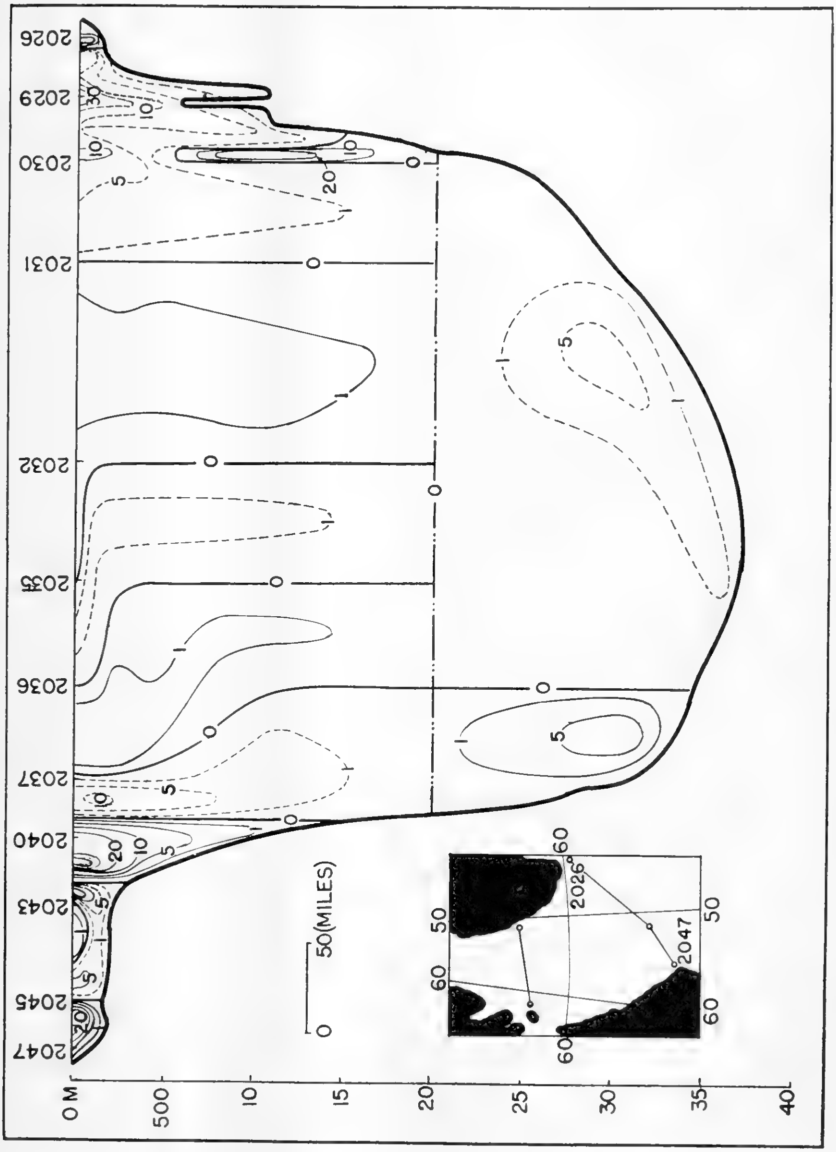

FIGURE 137.—Velocity profile South Wolf Island to Cape Farewell, August 19–23, 1935, expressed in centimeters per second. The solid lines represent southerly current, the broken lines northerly current.

currents. The intermediate water is in slow cyclonic circulation and its core is seen in the temperature minimum, which will be considered later, and in the salinity minimum of about 34.88‰.

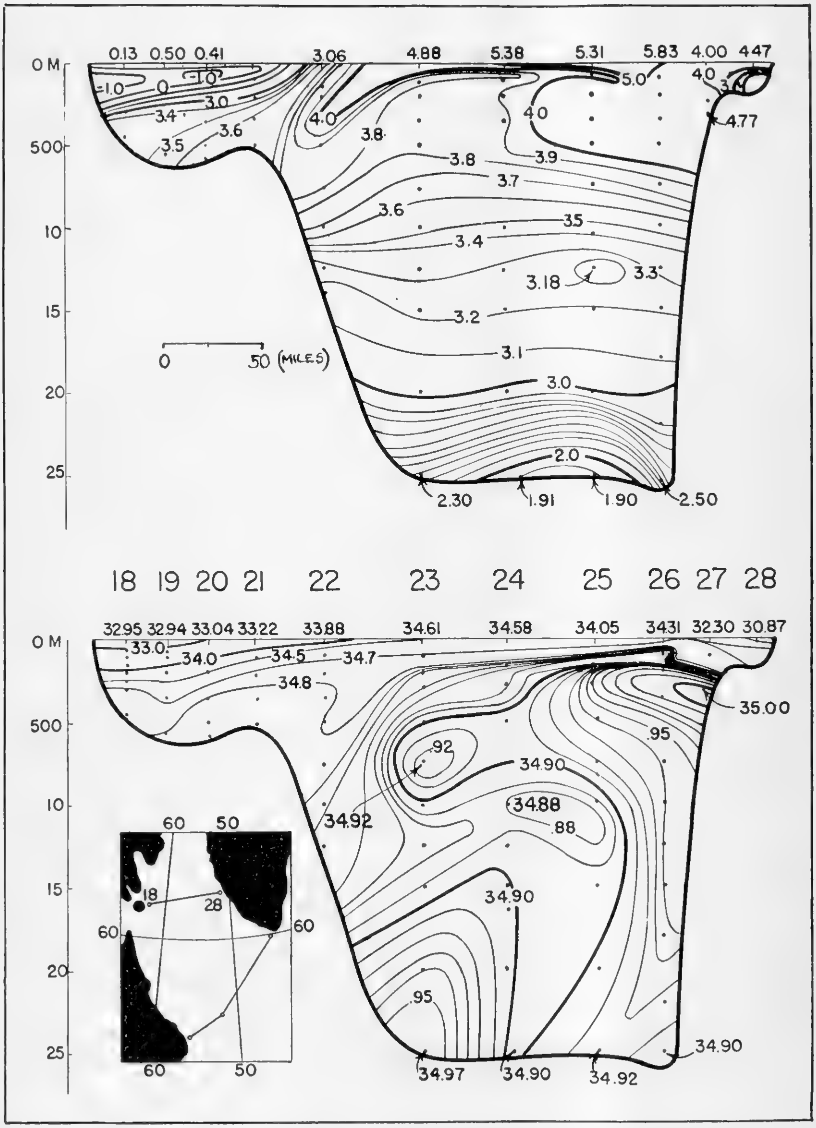

FIGURE 138.—Temperature and salinity profile Resolution Island to Fiskernaessett, June 11–16, 1928 (from the *Godthaab's* observations).

Below the intermediate water is to be seen the deep water characterized by lower temperatures than the intermediate water and by salinity maxima. Here again the circulation is cyclonic and weak. The center of the salinity maximum shown in figure 138 is located on the Labrador side. On the Greenland side at intermediate depths

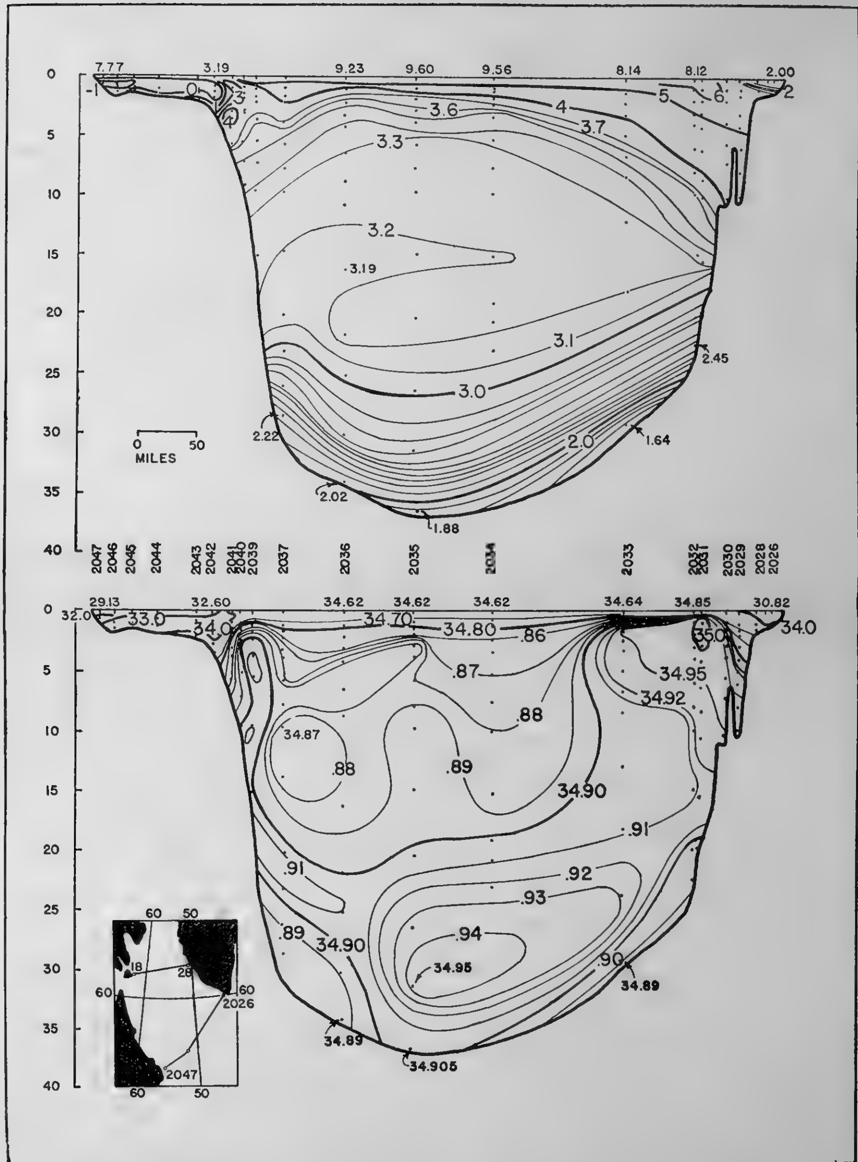

FIGURE 139.—Temperature and salinity profile, South Wolf Island to Cape Farewell, August 19–23, 1935.

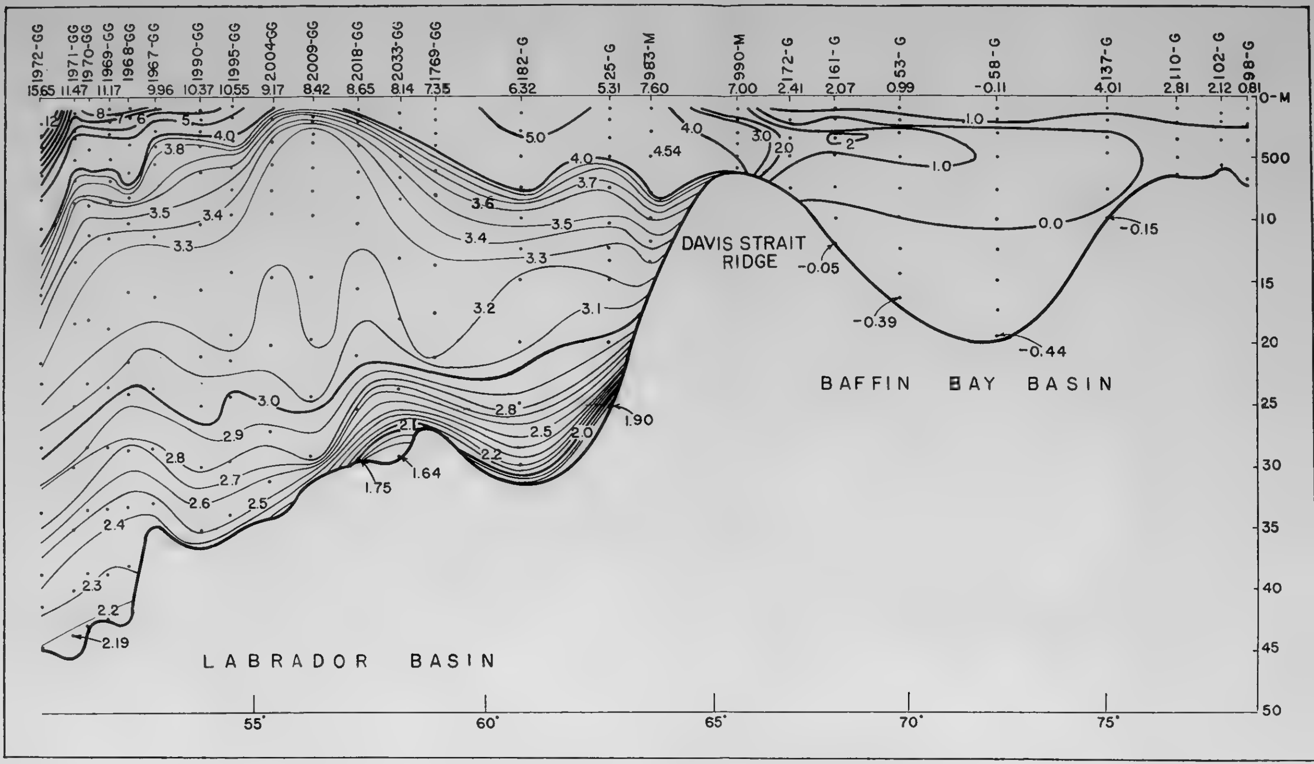

FIGURE 140.—Temperature profile, Labrador Sea to Baffin Bay (composite 1928–35).

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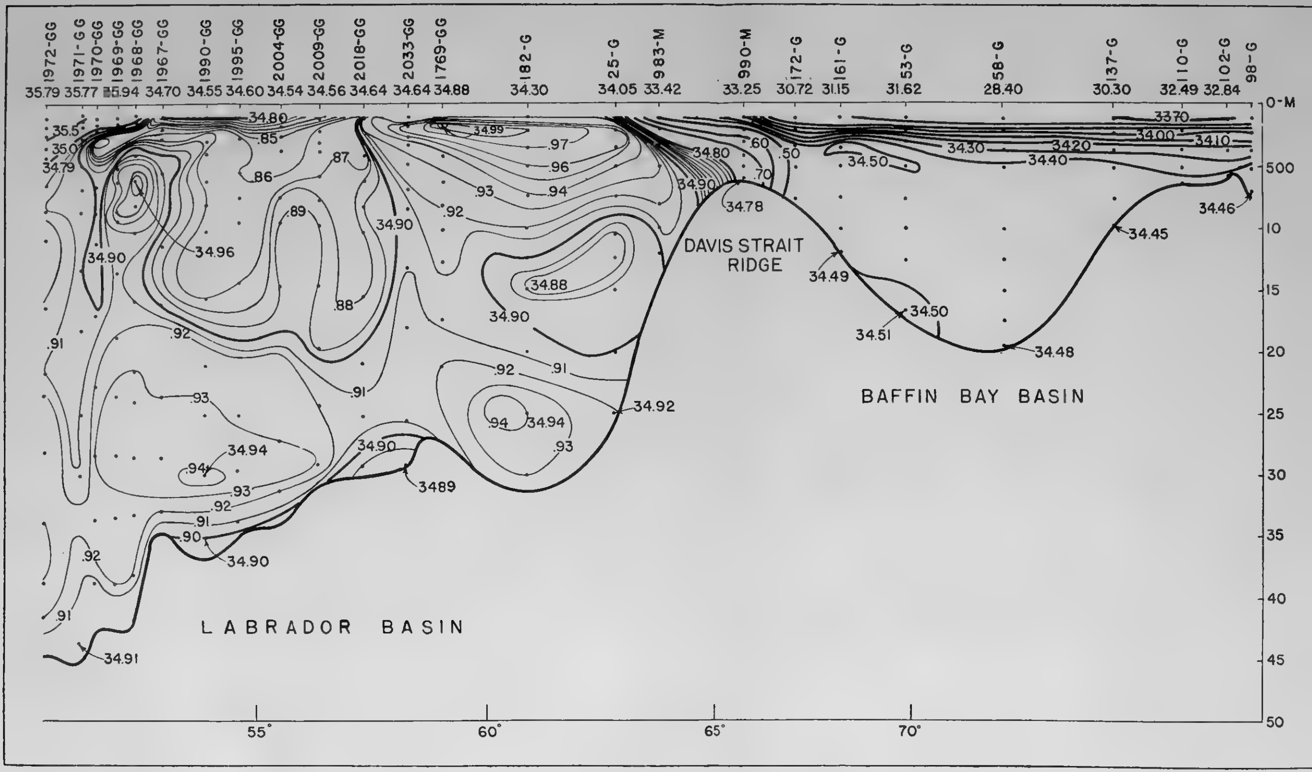

FIGURE 141.—Salinity profile, Labrador Sea to Baffin Bay (composite 1928–35).

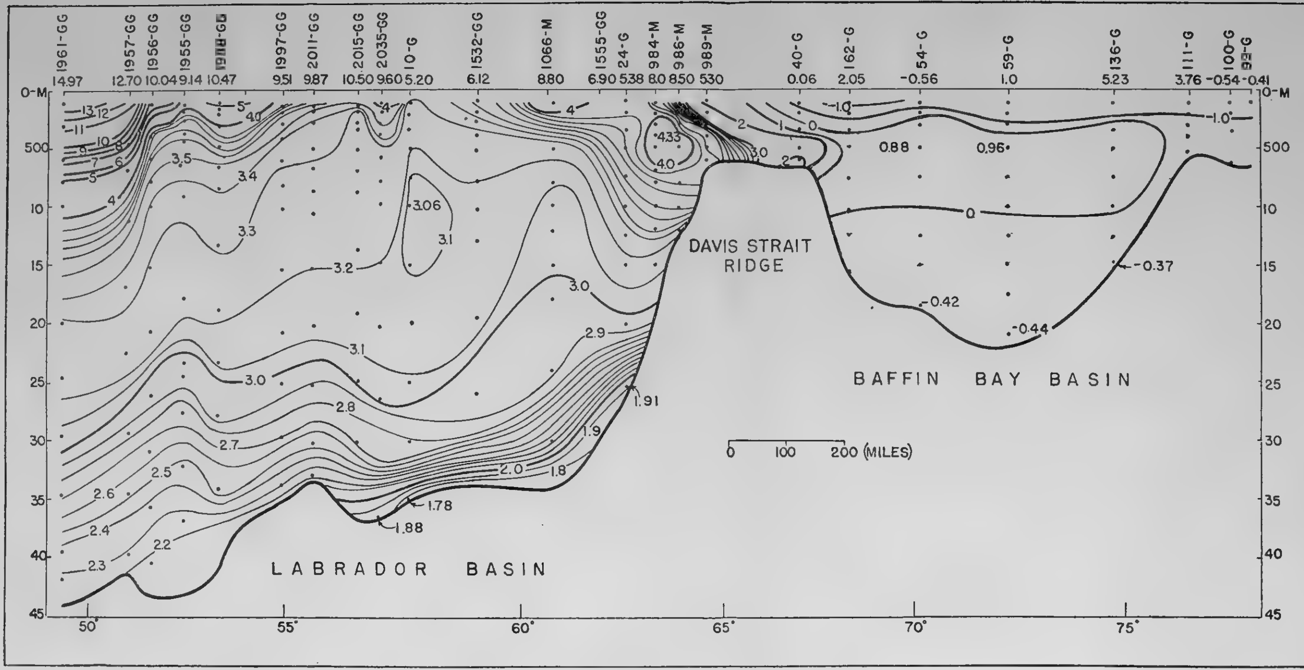

FIGURE 142.—Temperature profile, Labrador Sea to Baffin Bay (composite 1928–35).

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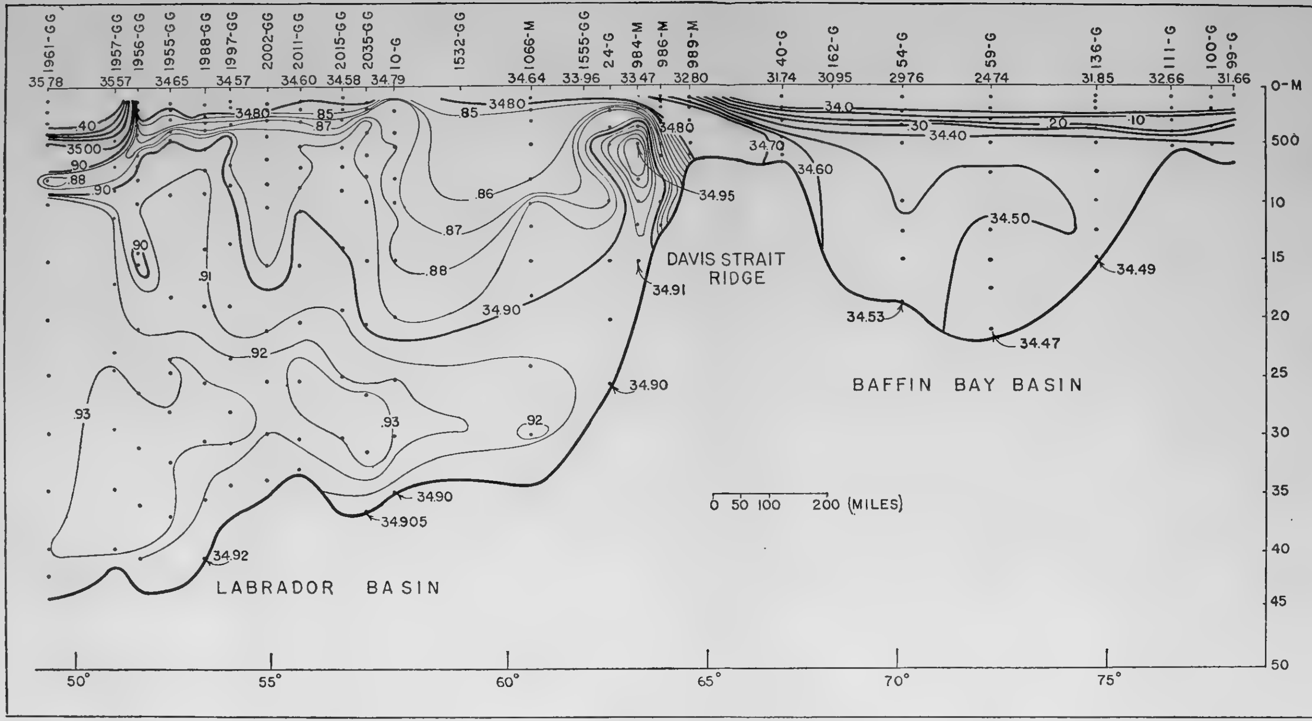

FIGURE 143.—Salinity profile, Labrador Sea to Baffin Bay (composite 1928–35).

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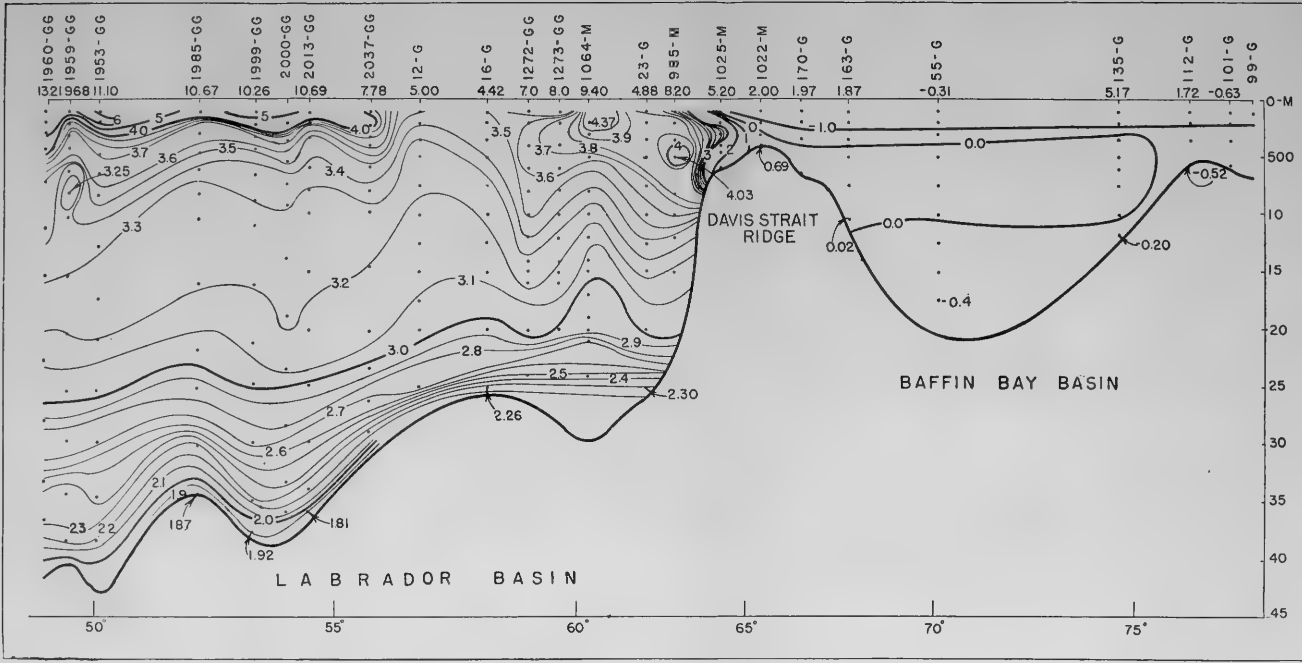

FIGURE 144.—Temperature profile, Labrador Sea to Baffin Bay (composite, 1928–35).

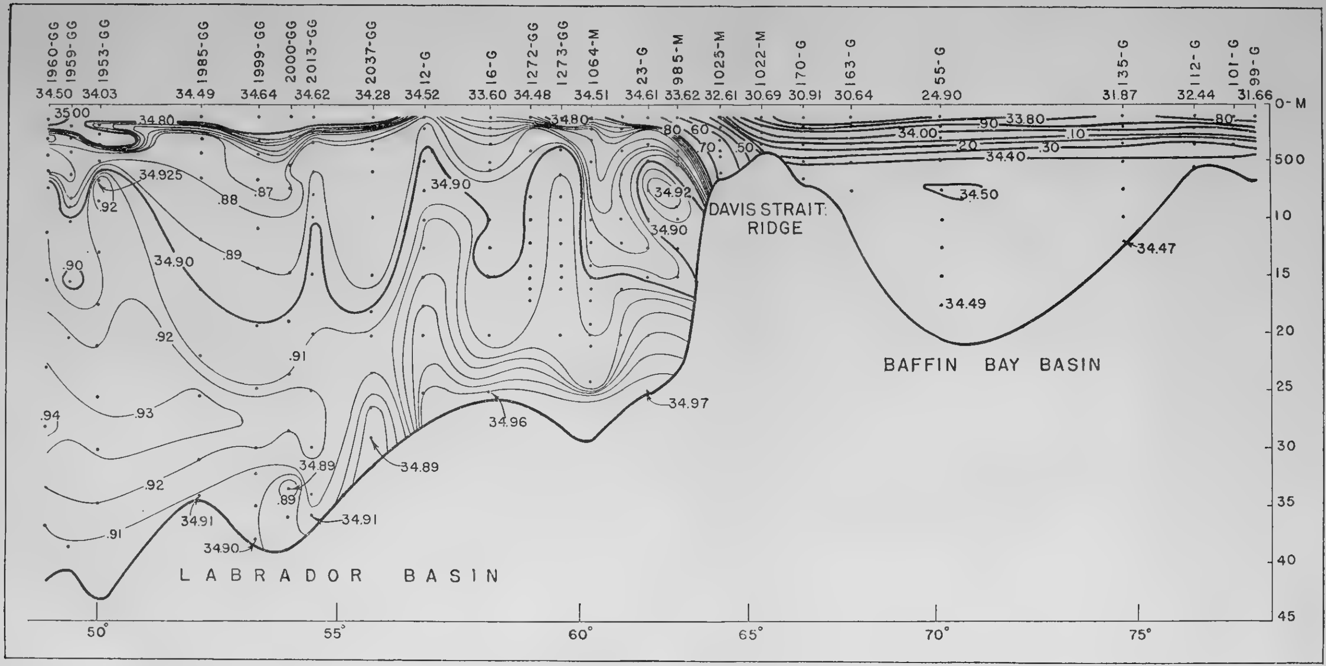

FIGURE 145.—Salinity profile, Labrador Sea to Baffin Bay (composite, 1928–35).

below the West Greenland Current is seen high salinity water which will eventually become deep water through cabbeling as it progressively sinks along its cyclonic path around the northern end of the Labrador Basin.

Below the deep water is to be seen a small amount of bottom water with temperatures of less than 2° C. This bottom water is in very slow cyclonic circulation with a general southerly direction.

South Wolf Island—Cape Farewell.—Figure 139 represents vertical sections of temperature and salinity between South Wolf Island, Labrador, and Cape Farewell, Greenland, based on the 1935 observations of the *General Greene*, stations 2026 to 2047. As in figure 138, the more rapid currents in the upper levels are recognizable at the sides of the sections. In the intermediate water the isohaline of 34.90‰ again serves to bound the lower surface at about 2,000 meters, although the temperature at this level is about 3.2 C., somewhat warmer than the lower surface of the intermediate water in the more northerly section of figure 138. The temperature minimum is again shown at about 1,500 meters. The deep-water salinity maximum is shown more clearly than in figure 138, possibly because the greater depth here permits a better development of downward decrease of salinity below the maximum and possibly because since the formation of these maxima is intermittent figure 139 may have approached more nearly a horizontal maximum than did figure 138. The bottom water, with temperatures lower than about 2° C., has lower temperatures than those of the bottom water in the more northerly section. This is probably explained by the greater depths in figure 139, the greater thickness of deep water, and the better chance of minimum temperatures surviving mixture with warmer water from higher levels.

Figures 140 to 145, inclusive, represent longitudinal vertical sections of temperature and salinity along eastern, middle, and western courses through the Labrador Sea, Davis Strait, and Baffin Bay from south of 50° N. latitude to Smith Sound. Attention is called to the fact that these are composite sections based on observations of the *Godthaab*, *Marion*, and *General Greene* made during the summer months in 1928, 1931, 1933, 1934, and 1935. The location and identity of the stations upon which these sections are based are shown in figure 135. In examining these sections, the direction of the horizontal currents should be borne in mind. In the upper levels, at least, the sections are not along the axis of the major currents and in some parts (for instance, just south of Davis Strait Ridge) are nearly at right angles to the direction of flow. Considering the non-synoptic character of the sections, they demonstrate very well the division between the intermediate water and the deep water of the Labrador Sea as did the transverse sections, figures 138 and 139. At the southern end of the midlongitudinal section (fig. 143), in a depth of about 800 meters, there is shown a salinity minimum typical of what Wüst (1935) has considered to be North Atlantic intermediate water having a major meridional component southward. An examination of the dynamic heights shows this water to be moving northward. It is the view of the authors that this is mixed water formed by cabbeling along the boundaries of the Labrador and Atlantic Currents and moving in a direction similar to that of the parent currents. This is borne out by the fact that such water has been found from the Tail of the Grand Banks to the northern limit of the Atlantic Current and its direction of motion verified by dynamic heights (page 136). Confirmation of this view is to be found in the shape of the isohalines in similar latitudes in the east and west longitudinal sections, which may be looked upon as the result of mixing but which do not indicate the intermediate water of Wüst. The difference between the intermediate water of the Labrador Sea as designated in this paper and the North Atlantic intermediate water of Wüst is threefold, embodying thickness, direction and origin.

The salinity maxima in the deep water is to be seen in all three of the longitudinal sections. Below the deep water the bottom water of minimum temperature is found. The bottom water is in slow southward motion, hugging the American side of the Labrador Basin, where bottom irregularities do not interfere, and following the deeper channels in a tortuous path at levels above which bottom formations project.

THE INTERMEDIATE WATER

It has been defined as occupying the more central parts of the Labrador Sea below the surface water and above the deep water. As might be expected, the intermediate water is a mixture, the salty component of which is the deep water from below. The fact that the salinity of the intermediate water is much lower than that of the deep water points to fresh components around the sides of the Labrador Basin and in the surface layers. The salinity gradient in the more central surface layers of the Labrador Sea is steepened during summer by the addition of fresh water from melting ice, land drainage, and precipitation. This surface water becomes relatively light as it absorbs heat from the sun and therefore mixes little with the intermediate water. But upon being cooled in winter practically all of the summertime surface water in the region of convection mixes and thereby freshens the intermediate water. A greater and more enduring supply of fresh water comes from the Labrador Current which from its northern source to the Tail of the Grand Banks cabbels along its offshore margin to form intermediate water. A secondary supply of the fresh-water component of the intermediate water arises from the East Greenland Current in the eastern arm of the Labrador Basin.

The determination of the low-salinity component of the intermediate water by means of temperature-salinity correlations is made difficult if not impossible due primarily to its wide annual temperature range. The extension of a line from the center of the group of symbols representative of the deep water (fig. 146) through the square-shaped symbol representing typical intermediate water, indicates in a general way the relationship of the questionable component with values of salinity lower than 34.88‰.

One of the remarkable characteristics of intermediate water is its thermal and haline homogeneity, the summertime temperature varying little from 3.2° C., whether it be off Cape Farewell or near the head of the Labrador Basin as marked by the 3,000-meter isobath. If a column of intermediate water be cooled to our lowest indicated bottom temperature of 1.35° C. (p. 188), greater warming of the intermediate water will be necessary there than in other convectional

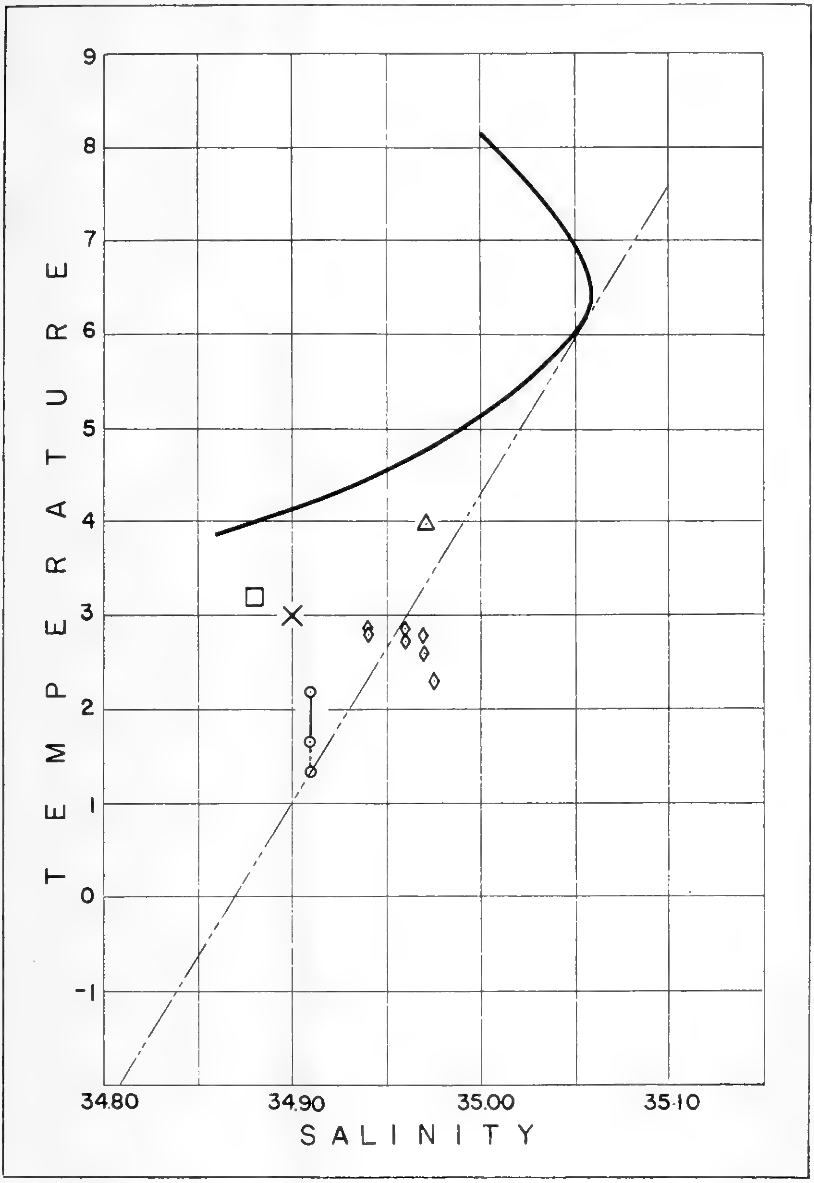

FIGURE 146.—Temperature-salinity correlations for the Labrador Sea: ⊡, intermediate water; ×, boundary between intermediate water and deep water; —, Irminger-Atlantic water off Cape Farewell in summertime; △, Irminger-Atlantic water off Cape Farewell in March; ◇, deep water.

regions of the Labrador Sea, if the nearly uniform regional temperature which it has in summer is to be attained.

As a result of vertical convection in winter, it is probable that steep density gradients are established to considerable depths between the more central regions of the Labrador Sea and the more stable waters inshore. The consequent circulation reaching a maximum at the end of winter results in a corresponding intensification of mixing between the heavy winter water and the higher-temperatured water from the margins. As mixing continues, according to our view, density gradients flatten and the intermediate water in such a self-compensating system is proportionately warmed, and temperature differences rapidly disappear as thermal homogeneity is approached. The volume of the current between *Godthaab's* stations 24 and 22 at the end of winter was computed on the assumption that station 24 (fig. 136) lay within the region of bottom-water formation, and that station 22 was on the outer margin of same. A volume of 33.5 million cubic meters per second toward the south with a mean surface velocity of 14 centimeters per second indicates that a current so hypothesized is of reasonable volume and velocity.

A temporary retardation of the frigid portion of the Labrador Current during the colder months of the year when Baffin Bay becomes ice filled may also be a factor involved in regulating the thermal state of the intermediate water of the Labrador Sea.

The intermediate water is also apparently warmed on its under side near the 2,000-meter level where in several of the sections this evidence is disclosed by slight temperature maxima (fig. 139). The component of this mixture probably arises in the Irminger-Atlantic water which on sinking spreads out in these depths more than in others as the perennial deep water acts as a virtual bottom.

An area of temperature-minimum is found in practically all of the vertical sections of the intermediate water centered at an average depth of 1,375 meters. The 3.17° C. isotherm (fig. 147) and its corresponding 34.88‰ isohaline, embrace what has been heretofore designated as typifying intermediate water. Particular importance is attached to the temperature minimum in the intermediate water, it being considered reminiscent of winter chilling, this core being farthest removed from the warmed sides and the underside remains the coldest. The minimum temperatures when plotted in horizontal projection coincide with the shaded area shown on figure 149 and extend eastward past Cape Farewell (if the *Meteor's* observations are utilized) between the Atlantic and Irminger Currents. It is interesting to note that in the longitude of Cape Farewell where a temperature minimum of the intermediate water was observed in March (see *Meteor's* station 121) it had entirely disappeared by August of the same year. (See *General Greene's* stations 2019–2009–2003–1996.)

THE DEEP WATER

That Irminger-Atlantic water as it flows cyclonically around the Labrador Basin progressively sinks, has been demonstrated by figures 132, 133, and 134. After cabbeling to depths greater than 2,000 meters, depending upon the depth of the basin, this water approaches the region of heavier bottom water over which it apparently spreads and into which it slowly mixes. This is the usual summertime distribu-

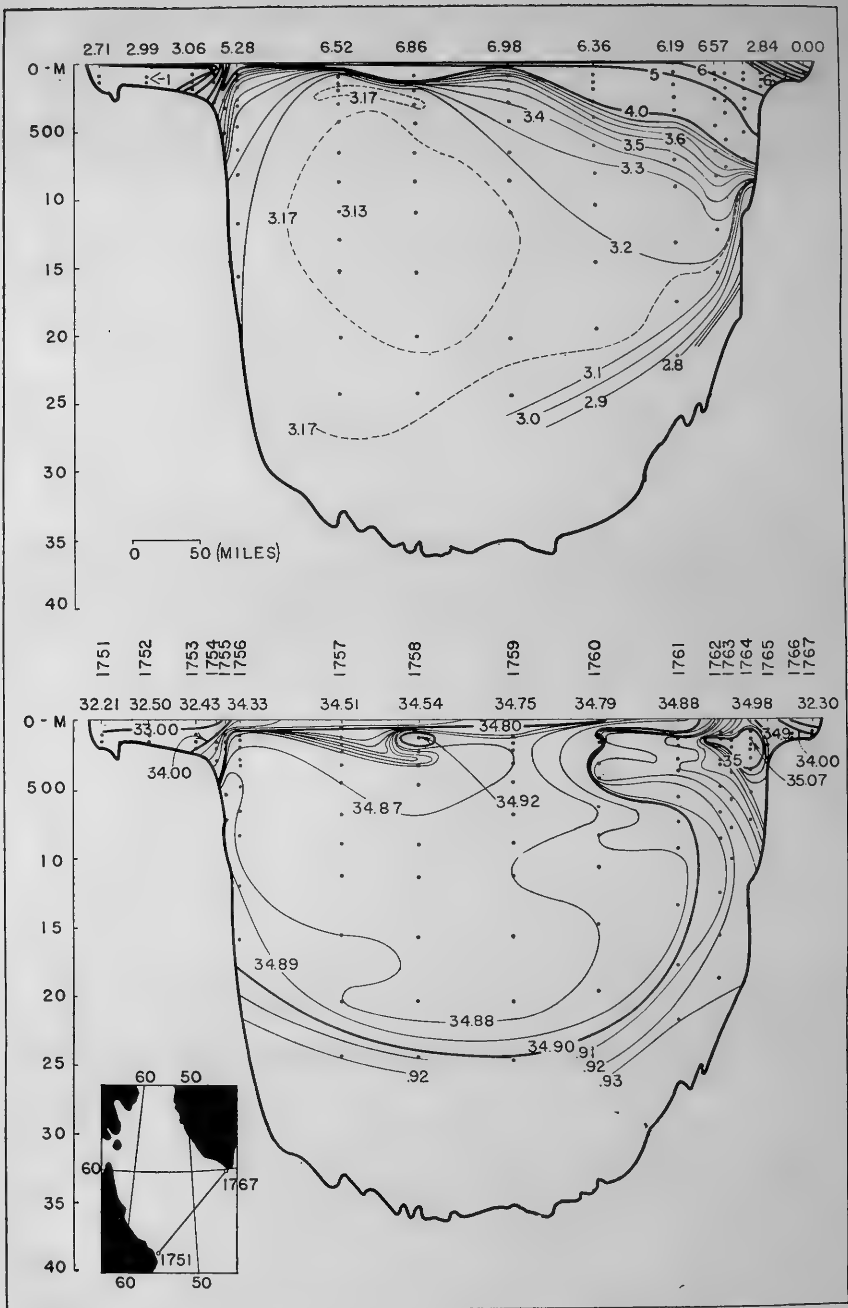

Figure 147.—Temperature and salinity profile, South Wolf Island to Cape Farewell, July 10–13, 1934.

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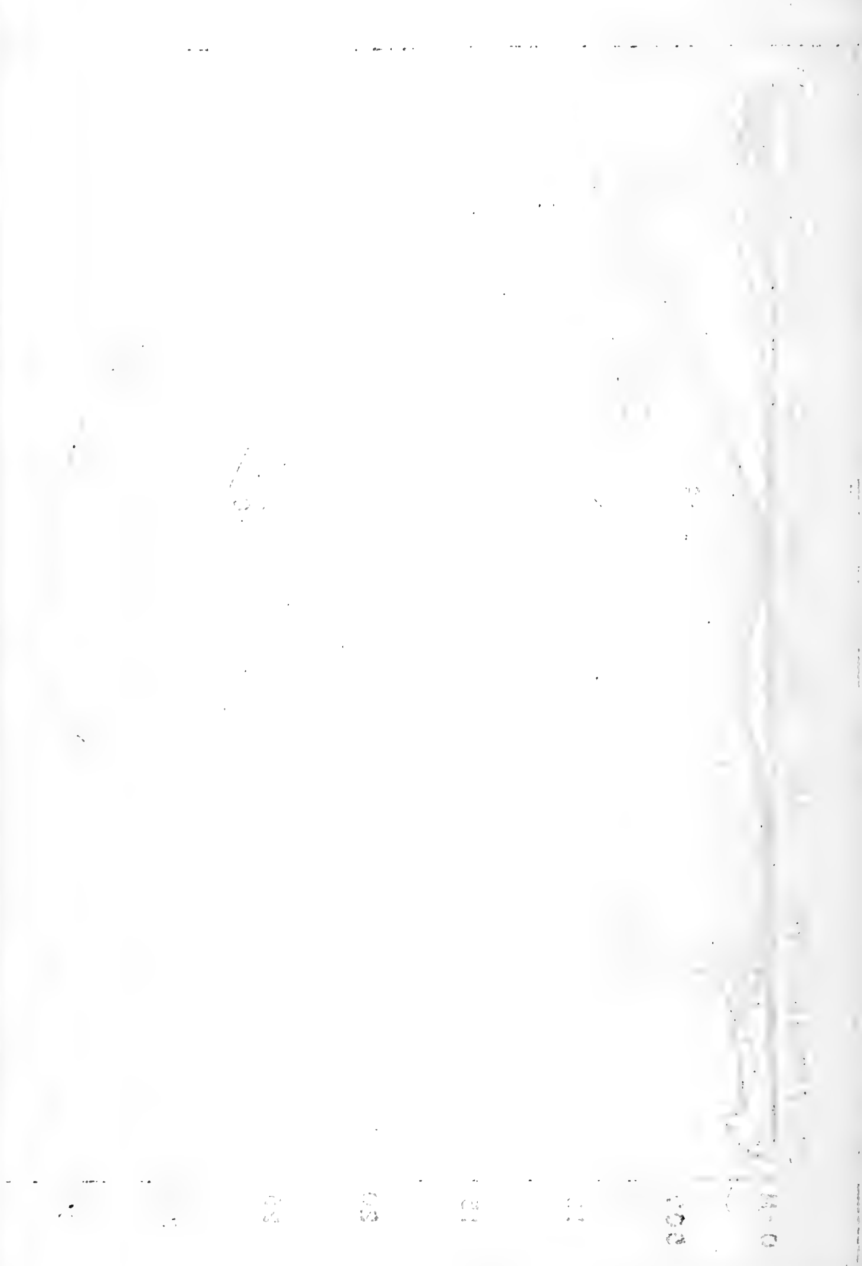

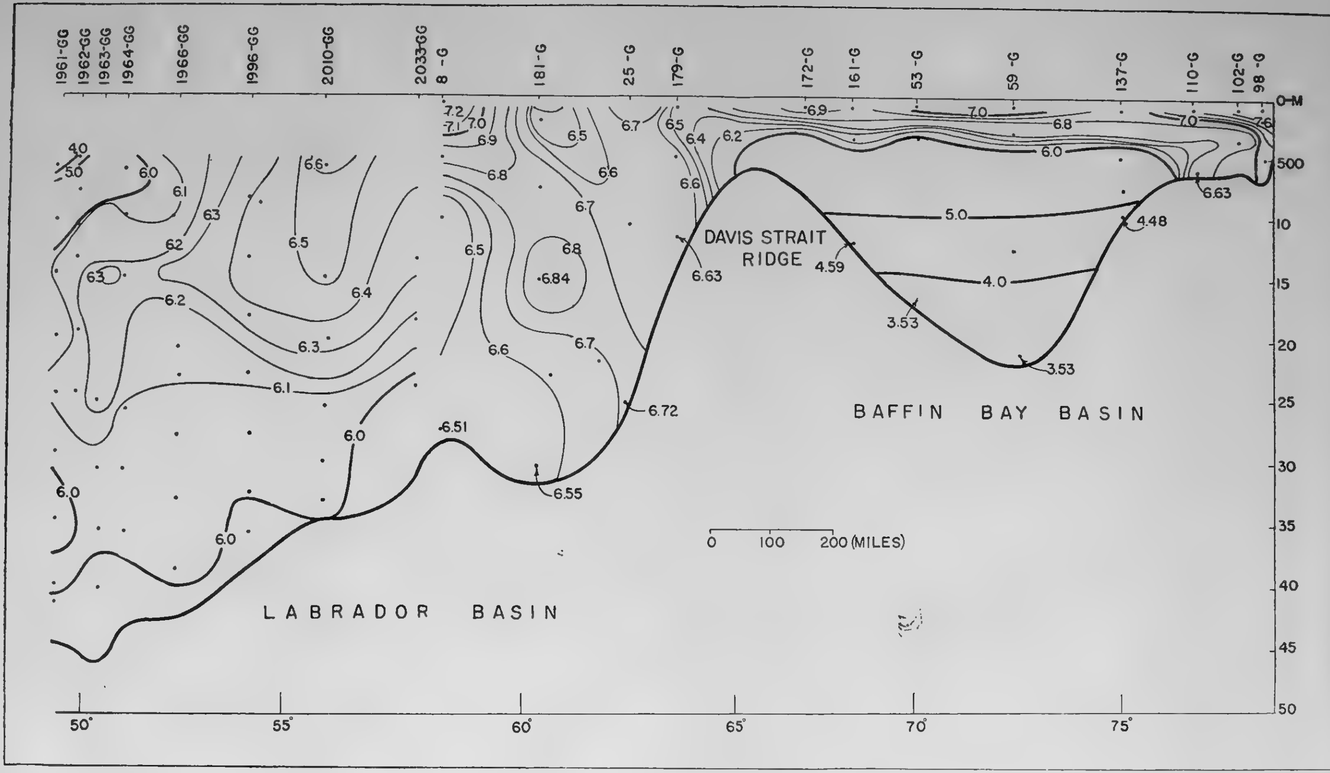

FIGURE 148.—Oxygen profile, Labrador Sea to Baffin Bay (composite, 1928–35).

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tion of salinity which gives the water below 2,000 meters and above the bottom water its character. This particular water is best typified by salinity maxima, the presence of which has already been pointed out on several of the vertical sections of the Labrador Sea. The temperature-salinity correlation in the heart of such masses is represented by the diamond-shaped symbols plotted on figure 146, page 185. Their position with respect to the broken line on the figure supports our previous statement, namely, that this which is called deep water [16] is a mixture of bottom water and Irminger-Atlantic water.

The saltiest of the deep water, which typifies it, is formed during the colder months of the year when cabbeling is assisted directly by convectional cooling. Outside of the region of convectional sinking to bottom, the deep water is found adjacently above the bottom water throughout the year. Within the area of bottom-water formation in winter the deep water becomes mixed with the intermediate water and surface water from above. Following a resumption of positive stability of the water column, the deep water re-forms in position similar to that which prevailed prior to convection.

THE BOTTOM WATER

As shown by the temperature sections (figs. 140–145) it is not possible that the bottom water of the Labrador Sea is supplied across Davis Strait Ridge in summer. Examination of the transverse sections, figures 138 and 139, also show that in summer the cold parts of the West Greenland and Labrador Currents are separated from the bottom water by intervening water of higher temperature. The low temperature of the bottom water, therefore, is either a result of wintertime conditions or is a relic of conditions which no longer exist. That the latter is not true is demonstrated by figure 148, a vertical longitudinal section showing the oxygen distribution from south of 50° N. latitude to Smith Sound. This section is a composite based upon observations made on the *Godthaab* in 1928 and on the *General Greene* in 1935. The location and identity of the stations upon which it is based are shown on figure 135 where the course of the section is indicated by the broken line. It will be noted that the *Godthaab's* oxygen values (that is, those for stations north of the break in the profile lines) are consistently higher than those of the *General Greene* by about 0.4 cubic centimeter per liter. It is evident from the concentration of dissolved oxygen that the Labrador Basin is an area of active mixing and that there is no water in it but what has been at the surface comparatively recently. It is logical, therefore, that if the activity of the water were different in different years even the deeper observations might give different results in different years.

The relative values, however, are instructive and if the oxygen profile is superimposed on the temperature and salinity profiles it is found that the *General Greene's* oxygen values of greater than 6.2 and the *Godthaab's* oxygen values of greater than 6.7 cubic centimeters per liter embrace what has been designated as the intermediate water of the Labrador Sea. The shape of the 6.0 line in the southern part of the section and the lines in the region

[16] Our deep water, which eventually drains out of the Labrador Basin into the North Atlantic, embraces what Wüst (1935) has designated as North Atlantic deep water.

northward of Cape Farewell up to Davis Strait indicate that the bottom water of the Labrador Sea is formed in the latter area and moves southward. The low oxygen values in the upper layers at the southern end of the section correspond to the northern border of the Atlantic Current. The rapid downward decrease of oxygen in Baffin Bay arises from the pocketing of water there by 600 to 700 meter thresholds.

As has been demonstrated by consideration of the distribution of oxygen the cold bottom water of the Labrador Sea is the result of wintertime chilling which affects the bottom water through vertical convection. The salinity of the water in the region where vertical convection may take place, however, is lower than that of the bottom water actually observed in the summertime. The bottom water must therefore be a mixture with saltier water, which water is typified by the Irminger-Atlantic Current. In figure 146, page 185, the temperature-salinity relation of the Irminger-Atlantic water, based on summertime observations off Cape Farewell, has been drawn as a solid line. The upper part of this line grades away from the core into insolated surface water and the lower part grades off into the colder water below the axis of the Irminger Current. The apex has been taken as most characteristic of Irminger-Atlantic water. If this is one of the components of the bottom water, the other component will lie along a line through the characteristics of the bottom water and Irminger-Atlantic water. Such a line has been drawn on figure 146, page 185. In selecting the characteristic point for the bottom water the lowest bottom temperature indicated by our observation (1.57° C. at *General Greene* station 2033) has been selected as having been least modified since formation, and the potential temperature has been used in order to translate the mixture into terms of shallow water phenomena. The other component then must lie along the broken line in the salinities lower than 34.91‰.

If vertical convection, arising from winter chilling, accounts for one of the components of the bottom water, it must take place offshore from the more rapidly moving Labrador and West Greenland Currents. Also, the density gradient prior to the beginning of winter must not be so great as to require water temperatures lower than about −1.8° C. to establish vertical convection. If complete horizontal stagnation is assumed, the maximum temperature at which vertical convection to bottom can occur may be found from the average salinity of the water column and the density of the bottom water observed in summer. Such computations of the maximum temperature to which the water must be cooled in order to establish vertical convection from the surface down to successively deeper levels have been made for a number of stations. The maximum temperature values have been plotted for the *Godthaab's* section from Resolution Island to Fiskernaessett and are shown in figure 149. As has been mentioned above, the upper limit of salinity of the bottom-water component produced through vertical convection is 34.91‰. The broken line shown in figure 149 connects points, the average salinity of the column of the water above which is 34.91‰. A similar line is shown for 34.81‰ average salinity of the superposed column of water, since 34.81‰ is the approximate salinity corresponding to the minimum practically attainable temperature of the bottom-water component shown on figure 146. Thus from figure 146 it will be seen that if there is no horizontal motion, vertical convection to bottom may be established at stations 22, 23, 24, 25, and 26 when the water columns have been cooled by winter chilling to temperatures of 2.65°, 1.35°, 1.75°, 1.60°, and 2.80° C., respectively. However, the rapid horizontal circulation in the upper levels at stations 22 and 26 eliminate the possibility of vertical convection there, and, of the remaining three stations, 25 is close enough to the West Greenland Current to make it uncertain whether or not deep vertical convection is possible. Attention is called to the fact

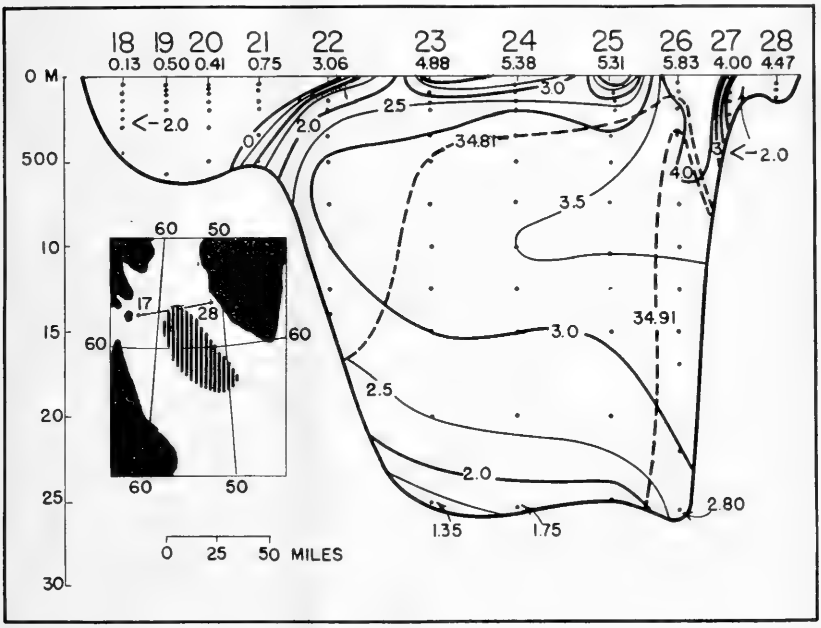

FIGURE 149.—Maximum temperature to establish vertical convection, surface to bottom, Resolution Island to Fiskernaesett. (From the *Godthaab's* observations taken June 11–16, 1928.) Inset shows area in which bottom water is formed in the wintertime according to the authors' views.

that the average salinity of the water columns at stations 23, 24, and 25 lie between 34.81 and 34.91‰, the range within which the bottom-water component must fall. This indicates that a small central part of this section lies in the area where the bottom water of the Labrador Sea is formed. That this section passes close to the northern boundary of the area of bottom-water formation is evident when one remembers the horizontal components of the westward branching of the West Greenland Current south of Davis Strait. From similar computations of the average salinity and maximum temperature for vertical convection to bottom in the region of Davis Strait Ridge two conclusions were reached—(*a*) that even if there were no horizontal currents vertical convection to bottom could be produced only at temperatures very close to the freezing point and (*b*) that even if vertical convection were established the average salinity of the water is so low as to require an impossibly low temperature to become a bottom-water constituent as defined by figure 146. In figure 150 is shown the temperature and salinity distribution at Davis Strait leading to these conclusions. A longi-

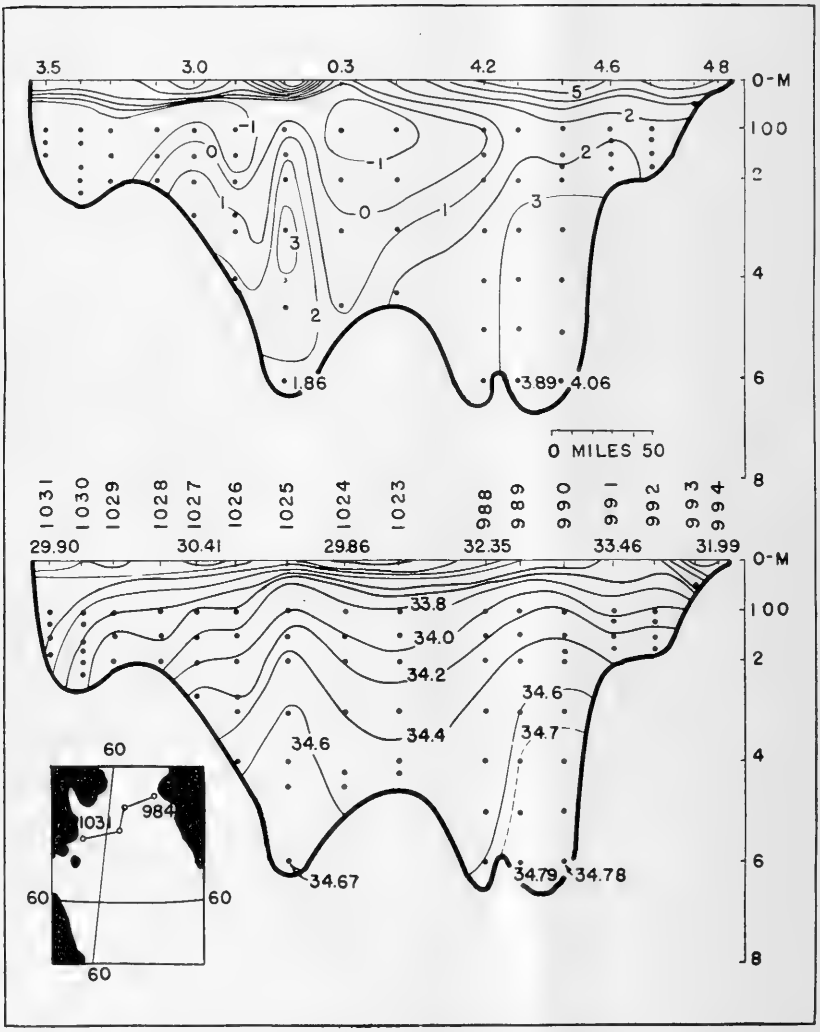

FIGURE 150.—Temperature and salinity profile across Davis Strait just south of Davis Strait Ridge August 4–18, 1928.

tudinal section, on which have been plotted maximum temperatures for vertical convection of the superposed water column, is shown in figure 151. Here again the average salinity lines of 34.81 and 34.91‰ have been drawn. All of the section from *Marion* station 984 just south of Davis Strait Ridge to *General Greene* station 1936 in the Atlantic Current border falls within the salinity limits of

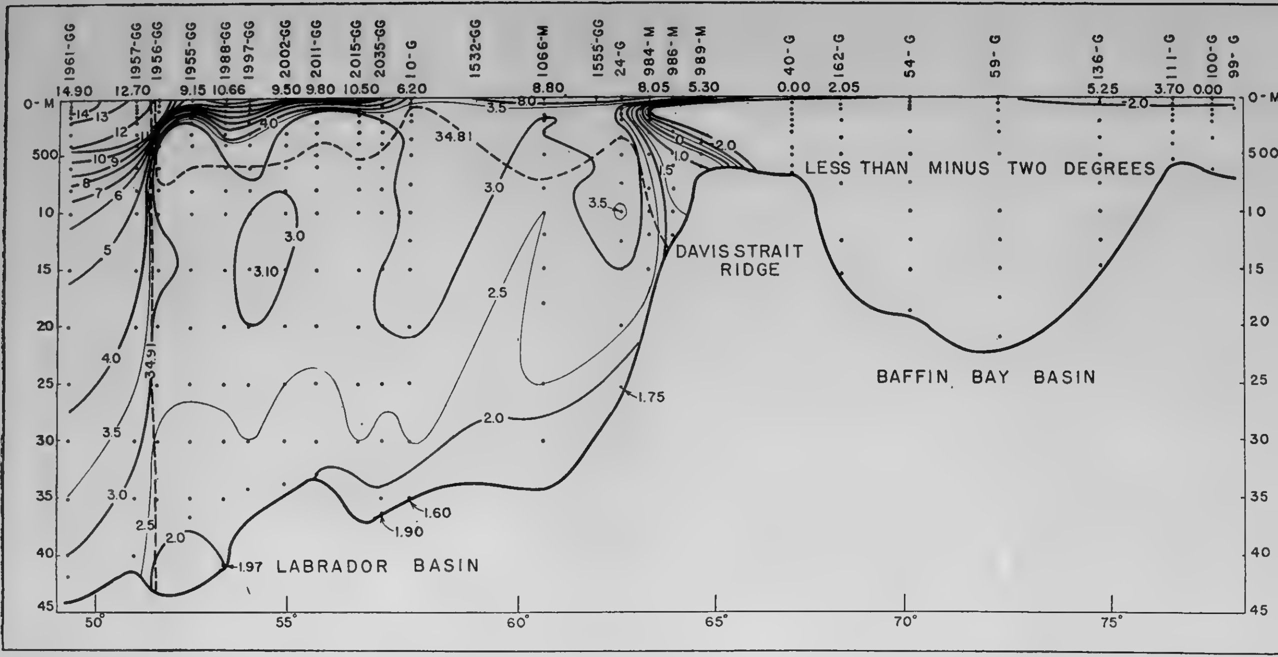

FIGURE 151.—Maximum temperature to establish convection, surface to bottom, Labrador Sea to Baffin Bay (from the observations made by the United States Coast Guard and the *Godthaab*, 1928–3

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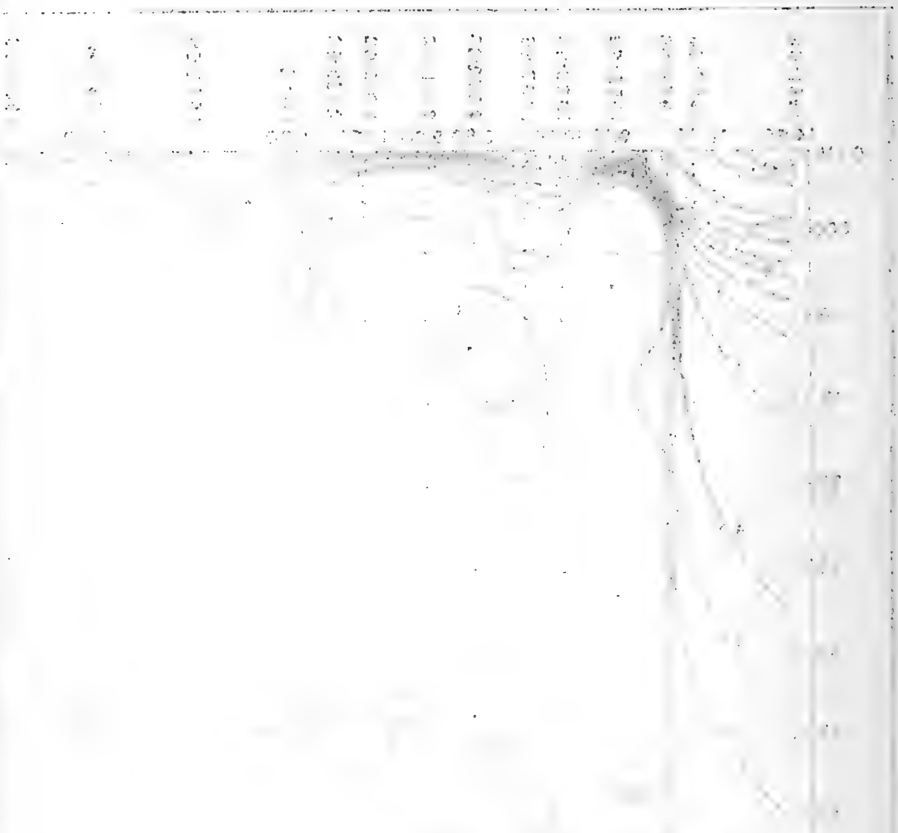

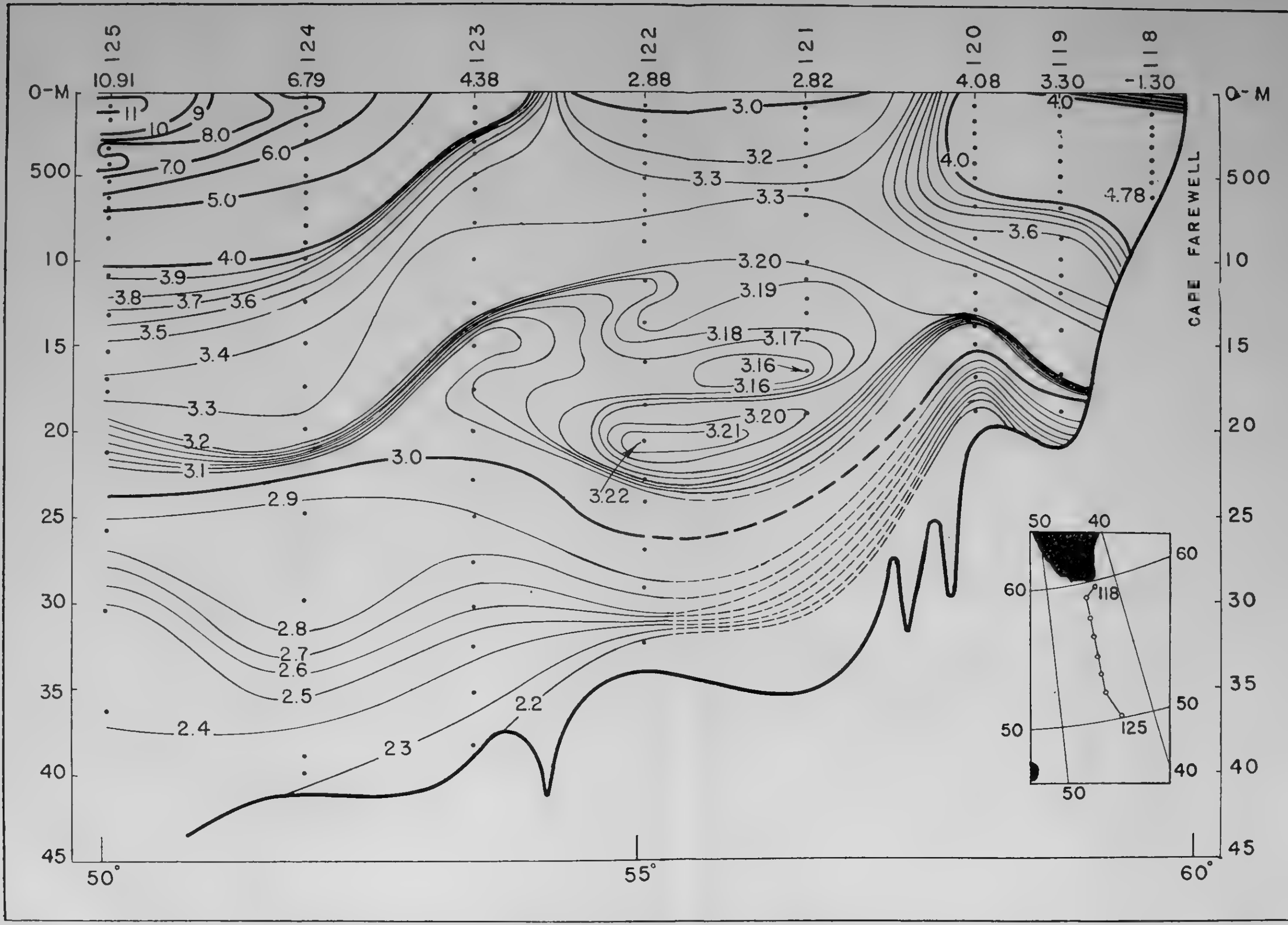

Figure 152.—Temperature profile south of Cape Farewell March 7–11, 1935 (from the *Meteor's* observations, stations 118–125).

the bottom-water constituent. As has been mentioned, the northern limit of the area in which vertical convection to bottom probably occurs is only slightly north of *Godthaab* station 24 and is probably closer to it than to *Marion* station 984 (fig. 135). A southern limit at about 55° N. latitude might be postulated from a consideration of the horizontal motion of the Atlantic Current border. However, because of the tempering effect of the more southerly latitude on the severity of the winter, the southern limit of the area of vertical convection to bottom lies more to the north and is estimated to be between *General Greene* station 2035 and *Godthaab* station 10 (fig. 135). Such limits would seem to be borne out by a consideration of the midlongitudinal salinity section (fig. 143) and the longitudinal oxygen section (fig. 148). The area in question is shown shaded on the small inset on figure 149. This shaded area is considered by the authors to represent the region in which the bottom water of the Labrador Sea is most probably formed in the wintertime. It is an area whose size will vary from winter to winter and in some years will certainly be smaller and in other years may possibly be somewhat larger than the area shown on figure 149.

An increase in the density through an increase in salinity resulting from ice formation is a factor which assists wintertime convectional sinking as has been pointed out by Helland-Hansen and Nansen (1909) and Mosby (1934). The areas of ice formation in the northwestern North Atlantic, however, are largely non-coincident with the area in which we have assumed the bottom water of the Labrador Sea to originate, and therefore this phenomenon of salt concentration is considered inconsequential there.

Adjacent to our area of bottom-water production, particularly to the north and east, are areas in which vertical convection probably penetrates to considerable depths. Figure 152 shows the temperature distribution found by the *Meteor* in March 1935 along a section extending southward from Cape Farewell, the data for which were kindly supplied by the director of the Institut für Meereskunde an der Universtät von Berlin. An inspection of the section indicates that stations 121 and 122 are in the comparatively quiet water north of the Atlantic Current and south of the Irminger Current past Cape Farewell. These stations then should be expected to be most favorable for the establishment of vertical convection in the wintertime. Furthermore, as the date of the observations was probably only slightly past the coldest part of the winter, one might expect to find evidence of vertical convection at stations 121 and 122 if it occurs in this region. Such evidence seems to be present, for at station 121 between about 725 meters and about 1,650 meters and at station 122 between about 1,100 meters and about 1,850 meters, the temperatures actually observed were slightly lower than the maximum temperature necessary to produce vertical convection to those depths on the assumption of no horizontal motion and on the basis of average observed salinities and densities. The observed densities at stations 121 and 122 showed a very weak stability, the change in σ_t from surface to 2,000 meters being but 0.03 and 0.04, respectively. A slight apparent instability was found at about 1,500 meters at station 121. These densities combined with the foregoing indicate that vertical convection extended to depths of about 2,000 meters shortly prior to the *Meteor's* observations.

The only other record of an observed temperature which was lower than the maximum temperature to initiate vertical convection to its respective depth in accordance with our assumptions, occurred at *Godthaab's* station 10 at 1,000 meters on May 3, 1928. The survival of this temperature value about 2½ months subsequent to the coldest part of winter indicates that the water in this region is subjected to greater cooling and then less warming than is the water in the vicinity of *Meteor's* stations 122 and 121.

SUMMARY

The warm, salty west Greenland water progressively sinks as it proceeds northward and westward and bends southward, spreading as it goes to furnish the intermediate water of the Labrador Sea between about 500 and 2,000 meters.

The most nearly motionless water, except perhaps that immediately adjacent to the bottom, occurs at about the 2,000-meter level below which lies the deep water and the bottom water.

The deep water, according to the foregoing view, is formed during the colder part of the year largely by mixing of bottom water with water from the West Greenland Current which has sunk to deep levels as it travels northward along the Greenland coast and westward near the head of the Labrador Basin. The major flow of the deep water is southward along the American side where, off southern Labrador, there is probably some movement toward deeper levels along the bottom, the water flowing down the slope at levels of about 3,000 to 3,500 meters. This deep water is probably absorbed into the more central, North American Basin, and thus it compensates for the loss of water at higher levels to the northwestern North Atlantic from the northern branch of the Atlantic Current.

The bottom water, in our opinion, is formed by wintertime chilling of the surface, intermediate, and deep waters in the northern part of the Labrador Basin in the area off-shore from the rapid currents and roughly bounded on the south by a line from mid-Labrador to Cape Farewell. (See inset fig. 149.) It seems likely in this area the severe winter chilling produces vertical convection to bottom and results, with some mixture of Irminger-Atlantic water, in the coldest bottom water found in the deepest part of the basin and which in summertime is isolated from the cold surface currents by warmer water. The vertical convection which takes place in winter probably sets up steep horizontal density gradients to considerable depths, with a correspondingly increased cyclonic system of circulation. With the termination of vertical convection and its resulting heat losses the energizing force for maintaining this vigorous circulation is removed and the summertime equilibrium conditions are quickly restored as the marginal water of equal salinity and higher temperature is mixed in to destroy the temporary density gradients and raise the temperature of the intermediate water to the remarkably uniform value of about 3.2° C.

If our hypothesis be correct, because of the intermittent nature of the formation of the coldest bottom water and the higher salinity deep water there are horizontal variations in these waters representing the annual cycles of their production. As the rates of southward progress of these waters are most probably different, it is not to be expected that an exhaustive survey made in any one year will show a correspondence, in a horizontal projection, between the locations of successive temperature minima in the deepest bottom water and the location of successive salinity maxima in the deep water. Furthermore, the gradual mixing with surrounding water masses tends to erase the identity of these maxima and minima as they proceed further from their sources.

The arm of the Labrador Basin between southeast Greenland and Reykjanes Ridge is a possible source of formation of saltier deep water such as is formed in the colder parts of the year in the northwest arm of the Labrador Sea, that is, that portion southward of Davis Strait Ridge. The saltier deep water, if any, so formed in this northeastern arm of the Labrador Basin, is contributed, at least in part, directly to the southern part of the Labrador Basin. Some of the deep water so formed at this source may occasionally round the southern end of Greenland and enter into the deep-water circulation of the central part of the Labrador Sea somewhat northward of Cape Farewell. A part of the bottom water, some of which is possibly formed in the wintertime in the northeast arm of the Labrador Basin according to our idea, probably escapes into the Atlantic Basin eastward of longitude 38° W. through possible deep channels which may cross the southwestern end of Reykjanes Ridge. A minor part of the bottom water of the northeastern arm of the Labrador Basin may possibly enter the central part of the basin around the southern end of Greenland.

The salinity maxima representing annual cycles of production of deep water from the northeastern source are apparently, because of the location of their sources nearer to unmodified Irminger Current water, usually higher in salinity than the maxima of the deep water produced in the northwestern arm of the Labrador Basin.

An assumption of no horizontal motion, which was made when considering the area of wintertime vertical convection to bottom is of course inaccurate and justifiable only because of the complete absence of midwinter observations from the area in question. The reality of such horizontal components is undoubted and, in fact, required for the reestablishment of summertime equilibrium. Their effect is to retard vertical convection and to restrict the area in which it is produced. It is emphasized that their equalizing effect is dependent upon the removal of their driving source with the cessation of vertical convection, that driving source being the abstraction of heat.

In conclusion the authors wish to call attention to the hypothetical nature of many other parts of this chapter. Some of the main features, however, such as the formation of bottom water during wintertime in the Labrador Sea and its eventual run-off into the deeper Newfoundland Basin, are certainly indicated by the observational data already collected. Final confirmation awaits future surveys when subsurface observations must be made during the coldest time of winter in the Labrador Sea.

BIBLIOGRAPHY

Baggesgaard-Rasmussen and Jacobsen, J. P.:

1930. Contribution to the Hydrography of the Waters around Greenland in the year 1925. Meddelelser fra Kommissionen for Haverundersoglser. Serie Hydrografi. Band II. No. 10. Copenhagen.

Bartlett, R. A.:

1935. Sea-water Temperatures of the Exploring Schooner *Morrissey*, 1934. Pilot Chart of the North Atlantic Ocean. April. U. S. Hydrographic Office. Washington.

1936. Id. February.

Beaugé, L.:

1928. Rapport de Mission sur le Banc de Terre-Neuve. Campagne 1927. Revue des Travaux de l'Office Peches Maritimes. Tome I, Fasc II, III, IV. Paris.

1929. Rapport de Mission au Groenland et a Terre-Neuve. Campagne 1929. Id. Tome II, Fasc I and II. Paris.

1930. La Peche a Terre-Neuve en 1929. Id. Tome III, Fasc I. Paris.

1931. Rapport de Mission a Terre-Neuve et au Groenland. Campagne 1930. Id. Tome IV, Fasc I. Paris.

1932. Rapport de Mission au Groenland. Campagne 1931. Id. Tome V, Fasc I. Paris.

1933. La Campagne de 1932 a Terre-Neuve et au Groenland. Id. Tome VI, Fasc I. Paris.

Bessels, E.:

1876. Scientific Results of the U. S. Arctic Expedition Steamer *Polaris*, C. F. Hall, Commanding. Vol. I. Physical Observations.

Bjerkan, Paul:

1919. Results of the Hydrographical Observations made by Dr. Johan Hjort in the Canadian Atlantic Waters during the year 1915. Canadian Fisheries Expedition, 1914–15. Ottawa.

Böhnecke, G.:

1931. Beitrag zur Ozeanographie des Oberflächen Wassers in der Dänemark-Strasse und Irminger See. Teil I. (zugleigh Bericht über die Fahrt des *Meteor*, im Sommer 1930). Annalen d'Hydrographie und Maritime Meterologie. Heft LIX, pp. 318–325. Berlin.

1935. Bericht über die Ozeanographischen Arbeiten während der Fischereischutz-Fahrt des Vermessungsschiffes *Meteor* in Februar-März, 1935. (Mimeograph paper dated April 8, 1935). Berlin.

Böhnecke, G., Hentschel E., and Wattenberg, H.:

1930. Über die Hydrographischen, Chemischen und Biologischen Verhältnisse an der Meeroberfläche zwischen Island und Grönland. (Ergebnisse einer Fahrt mit dem Vermessungsschiff *Meteor* in August 1929). Annalen d'Hydrographie und Maritime Meterologie. Heft VII, pp. 233–250. Berlin.

Carpenter, C.:

1875. Report on the Physical Investigations carried out by the H. M. S. *Valorous* during her return Voyage from Disko Island in August 1875. Proceedings Royal Society. Vol. 25, pp. 230–237. London.

Conseil Permanent International pour l'Exploration de la Mer:

1925. Bulletin Hydrographique pour l'Année 1924, pp. 52–54. Copenhagen.

1929. Id. 1928, pp. 87–95 and pp. 108–111.

1933. Id. 1932, pp. 58–59 and pp. 70–71.

Davis, William Morris:

1899. Elementary Meteorology. Boston.

Dawson, W. Bell:
1906. The Currents on the Southeastern Coasts of Newfoundland. Department of Marine and Fisheries of Canada. Ottawa.
1927. The Currents in Belle Isle Strait. Id.

Defant, A.:
1931. Bericht über die Ozeanographischen Untersuchungen des Vermessungsschiffes *Meteor* in der Dänemarkstrasse und der Irminger See. (Zweiter Bericht). Den Sitzungsberichten der Preussischen Akademie der Wissenschaften. Physics-Mathematics Klasse. XIX. Berlin.
1933. Die Ozeanographischen Arbeiten des Vermessungsschiffes *Meteor*, in der Dänemarkstrasse und in der Irminger See, in Februar-März, 1933. Forschungen und Forschütte. Annalen d'Hydrographie und Maritime Meteorologie. Heft IX. Berlin.

Ekman, V. Walfrid:
1928. A Survey of Some Theoretical Investigations on Ocean Currents. Journal du Conseil. Vol. III, No. 3. Copenhagen.
1929. Über die Strommenge der Konvektionsströme in Meere. Lund und Leipzig.

Hachey, H. B.:
1934. Movements Resulting from Mixing of Stratified Waters. Journal of the Biological Board of Canada. Vol. 1, No. 2. Toronto.

Hamberg, A.:
1884. Hydrographic Observations of the Nordenskiöld Expedition to Greenland, 1883. Proceedings Royal Society. London.

Helland-Hansen, Björn:
1930. Report of the Scientific Results of the *Michael Sars* North Atlantic Deep-Sea Expedition, 1910. Vol. I. Physical Oceanography and Meteorology. Bergen.
1934. The Sognefjord Section. Observations in the Northernmost Part of the North Sea and the Southern Part of the Norwegian Sea. James Johnstone Memorial Volume, pp. 257–274. Liverpool.

Helland-Hansen, Björn and Nansen, Fridtjof:
1909. The Norwegian Sea. Its Physical Oceanography based upon the Norwegian Researches, 1900–1904. Kristiania.

Hesselberg, H., and Sverdrup, H. U.:
1914. Beitrag zur Berechnung der Druck- und Wasserverteilung im Meere. Bergens Museum Aarbok, 1914–1915. Nr. 14. Bergen.

Huntsman, A. G.:
1924. Oceanography. (From the Handbook of the British Association for the Advancement of Science). University of Toronto Press. Toronto.

International Ice Observation and Ice Patrol Service in the North Atlantic Ocean, 1913–35, U. S. Treasury Department. Coast Guard Bulletins 1–25. Washington.

Iselin, C. O'D.:
1930. A Report on the Coastal Waters of Labrador, based on Explorations of the *Chance* during the Summer of 1926. Proceedings of the American Academy of Arts and Sciences. Vol. 66, No. I. Washington.
1936. A Study of the Circulation of the Western North Atlantic. Papers in physical oceanography and meteorology. Vol. IV, No. 4. Cambridge.

Jacobsen, J. P.:
1929. Contribution to the Hydrography of the North Atlantic. The Danish *Dana* Expedition, 1920–22, in the North Atlantic and Gulf of Panama. Oceanographical reports edited by the *Dana* Committee, Nr. 3. Copenhagen.

Jacobsen, J. P., and Jensen, Auge J. C.:
1926. Examination of Hydrographical Measurements from the Research Vessels *Explorer* and *Dana* during the summer of 1924. Rapports et Procès-Verbaux des Réunions. Conseil Permanent International pour l'Exploration de la Mer. Vol. XXXIX. Copenhagen.

Jakhelln, A.:
1936. The Water Transport of Gradient Currents. Geofysiske Publikasjoner. Vol. XI, No. 11. Oslo.

Knudsen, M.:
1898. Hydrography Danish *Ingolf* Expedition. Vol. I, No. 2. Copenhagen.
1923. Doctor Thorild Wulff's Hydrographical Investigations in the Waters West of Greenland. Report worked out by Martin Knudsen in August 1918. Den II Thule Ekspedition til Grönland's Nordkyst, 1918–19. Nr. 3. Meddelelser om Grönland. Vol. LXIV, pp. 91–100. Copenhagen.

LeDanois, E.:
1924. Étude Hydrologique de l'Atlantic-Nord. Annales de l'Institut Oceanographique—Nouvelle Serie, Vol. 1, No. 1. Paris.

Martens, E.:
1929. Hydrographical Investigations during *Michael Sars* Expedition, 1924. Rapports et Procès-Verbaux des Réunions. Conseil Permanent International pour l'Exploration de la Mer. Vol. LVI, pp. 11–29. Copenhagen.

Matthews, D. J.:
1914. Report on the work carried out by the S. S. *Scotia*, 1913. Ice Observation, Meteorology, and Oceanography in the North Atlantic Ocean. Darling and Son. London.
1928. Oceanographic Observations Between Greenland and North America. Nature. Vol. 122, No. 3071. London.

Mecking, Ludwig:
1906. Die Eisdrift aus dem Bereich der Baffin Bai beherscht von Strom und Wetter. Veröffentlichungen d'Institut für Meereskunde. Heft 7. Berlin.

Milhorn, Willis Isbister:
1929. Meteorology. New York.

Mosby, Häkon:
1934. The Waters of the Atlantic Antarctic Ocean. Scientific results of the Norwegian Antarctic Expeditions 1927–1928: instituted and financed by Consul Lars Christiansen. No. 11. Det Norske Videnskaps-Akademi i Oslo. Oslo.

Mosby, Olav:
1931. Oceanography. International Ice Observation and Ice Patrol Service in the North Atlantic Ocean. Season of 1931. U. S. Coast Guard Bulletin No. 21. Washington.

Moss, E. L.:
1878. Observations on Arctic Sea-Water and Ice. Proceedings of the Royal Society. Vol. 27, pp. 545–548. London.

Nansen, Fridtjof:
1912. Das Bodenwasser und die Abkühlung des Meers. International Revue der Gesamte Hydrobiologie und Hydrographie. Vol. V. Leipzig.

Nielsen, J. N.:
1925. Golfströmen. Geografisk Tidskrift. Bd. 28. Copenhagen.
1928. The Waters Around Greenland. Greenland. The Discovery of Greenland, Exploration, and Nature of the Country. Vol. I, pp. 184–228. Humphrey Milford. London.

Newfoundland Fishery Research Laboratory:
1931. Annual Report. Vol I, No. 4. Ottawa.
1932. Id. Vol. II, No. 1.
1933. Id. Vol. II, No. 2.
1934. Id. Vol. II, No. 5.

Oxner, Mieczyalaw and Martin Knudsen:
1920. Manual pratique de l'analyse de l'eau de mer. I. Chloruration pour la methode de Knudsen. Bulletin Commission International Exploration Sci. Mer Med., No. 3. April.

Petermann:
1867. Das Nördlichste Land der Erde. Petermann's Mitteilungen.

Publikationer fra Det Danske Meteorologiske Institut:
1926. Isforholdne i de Artiske Have; samt Havets Overflade Temperatur i det Nord Atlanterhav og Davis-Strade. (The State of the Ice in the Arctic Seas and the Surface Temperature of the Sea in the North Atlantic Ocean and Davis Strait.) Danish Meteorological Institute. Copenhagen.

Ricketts, Noble G., and Trask, Parker D.:
1932. The bathymetry and Sediments of Davis Strait. The *Marion* Expedition to Davis Strait and Baffin Bay under the direction of the U. S. Coast Guard, 1928. U. S. Treasury Department, Coast Guard Bulletin 19, Part 1. Scientific Results. Washington.

Riis-Carstensen, Eigil:
1931. The *Godthaab* Expedition, 1928. Report on the Expedition. Meddelelser om Grönland. Bd. 78, Nr. 1. Copenhagen.
1936. The *Godthaab* Expedition, 1928. The Hydrographic Work and Material. Meddelelser om Grönland. Bd. 78, Nr. 3. Copenhagen.

Sandstrom, W. J.:
1919. The Hydrodynamics of Canadian Atlantic Waters. Canadian Fisheries Expedition, 1914–15. Ottawa.

Schott, .G:
1897. Die Gewässer der Bank von Newfundland und ihrer Weitern Umgebung. Petermann's Geographische Mitteilungen. Vol. 43. Gotha.

Schulz, B.:
1934. Die Fahrt des Vermessungsschiffe *Meteor* nach dem ostlandischen Gewässern in Sommer 1933. Annalen der Hydrographie und Maritime Meteorologie. Heft I. Berlin.

Smith, Edward H.:
1922. Report of Physical Observations. International Ice Observation and Ice Patrol Service in the North Atlantic Ocean. Season of 1921. United States Coast Guard Bulletin No. 9, pp. 48–60. Washington.
1923. Oceanographer's Reports. Season of 1922. Id. Bulletin No. 10. Washington.
1924. Oceanographer's Reports. Oceanographic Cruise, October 21–26, 1923. Id. Bulletin No. 11. Washington.
1924a. Oceanographer's Reports. Season of 1924. Id. Bulletin No. 12. Washington.
1926. A Practical Method for Determining Ocean Currents. U. S. Coast Guard Bulletin No. 14. Washington.
1931. Arctic Ice; with Especial Reference to its Distribution to the North Atlantic Ocean. The *Marion* Expedition to Davis Strait and Baffin Bay under the direction of the U. S. Coast Guard, 1928. U. S. Treasury Department, Coast Guard Bulletin No. 19, Part 3. Scientific Results. Washington.

Soule, Floyd M.:
1933. Note on the Practical Correction of Deep-Sea Reversing Thermometers and the Determination of the Depth of Reversal from Protected and Unprotected Thermometers. Hydrog. Rev., Vol. X, No. 1. Monaco.
1935. Oceanography. International Ice Observation and Ice Patrol Service in the North Atlantic Ocean. Season of 1934. U. S. Coast Guard Bulletin No. 24. Washington.
1936. Oceanography. Id. Season of 1935. U. S. Coast Guard Bulletin No. 25. Washington.

Stocks, Theodor und Wüst, Georg:
1935. Morphologie des Atlantischen Ozeans. Erste Lieferung. Die Tiefenverhältnisse des Offen Atlantischen Ozeans. Begleitworte zur Übersichtskarte 1:20 mill. Wissenschaftliche Ergebnisse der Deutschen Atlantischen Expedition auf dem Forschungs- und Vermessungsschiffe *Meteor* 1925–1927. Band III, Erste Teil. Berlin.

Sverdrup, H. U.:
1933. Vereinfachtes Verfahren zur Berechnung der Druck- und Wasserverteilung im Meere. Publikasjoner fra Chr. Michelsens Institutt. No. 26. Oslo.

Thorade, H.:
1933. Methode zur Studium der Meeres-Strommengen. Handbuch der Biologischen Arbeits-Methoden. Abt. II, Teil 3, Heft 3.

Wandel, C. F.:
1891. Om de Hydrografiske Forhold i Davis-Straedet. Meddelelser om Grönland. Vol. 7. Copenhagen.

Wenner, Frank; Smith, Edward H., and Soule, Floyd M.:
1930. Apparatus for the Determination Aboard Ship of the Salinity of Sea-Water by the Electrical Conductivity Method. Bureau of Standards Journal Research. Vol. 5, pp. 711–732. September. Washington.

Werenskiold, W.:
1935. Coastal Currents. Geofysiske Publikasjoner Vol. X, No. 13. Utgivtt av det Norske Videnskaps-Akademi i Oslo. Oslo.

Wilson, A. M. and Thompson, Harold:
1933. Notes on the Physical Conditions in 1932. Reports of the Newfoundland Fishery Research Commission. Vol. 2, No. 1. Plymouth.

Witte, Emil:
1910. Aspiration infolge der Mischung von Wasser. Geographischer Anzeiger. Oktober.

Wüst, Georg:
1935. Schichtung und Zirkulation des Atlantischen Ozeans. (Zweite lieferung). Die Stratosphäre. Wissenschaftliche Ergebnisse der Deutschen Atlantischen Expedition auf dem Forschungs- und Vermessungsschiffe *Meteor*, 1925–1927. Band VI. Erste Teil. Berlin.

STATION MAPS AND STATION TABLE DATA

Stations 936 to 1127 were taken July 19 to September 11, 1928, from the United States Coast Guard cutter *Marion*. Stations 1220 to 1341 were taken July 4 to August 8, 1931, from the United States Coast Guard cutter *General Greene*. Stations 1487 to 1598 were taken June 26 to July 24, 1933, by the United States Coast Guard cutter *General Greene*.

Parentheses have been used to designate where the value of either the temperature or the salinity has been interpolated from the station curve of that variable.

In 1933 when pressure thermometers were employed both the observed and scaled values of temperature and salinity have been printed.

The depths except at the shallowest stations refer to soundings obtained by means of the fathometer.

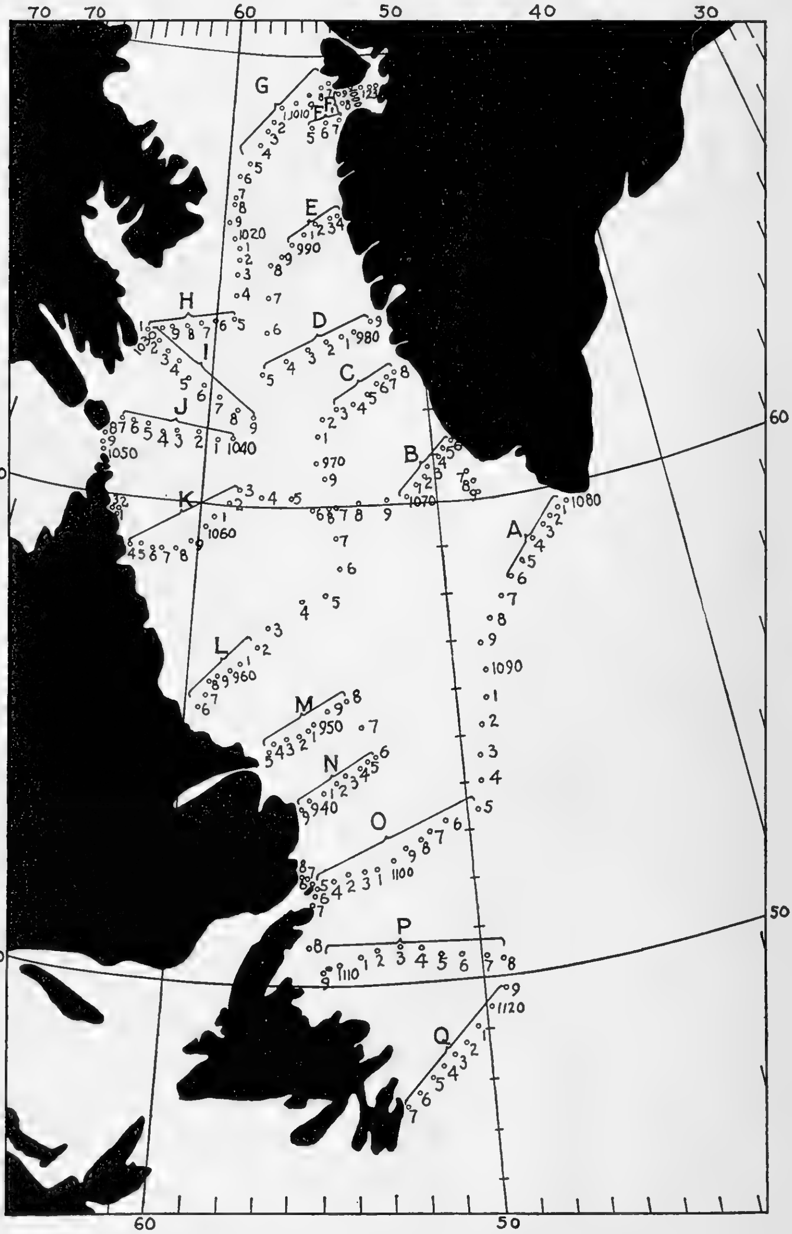

FIGURE 153.—Station map, July 19–September 11, 1928

FIGURE 154.—Station map, July 9–August 8, 1931

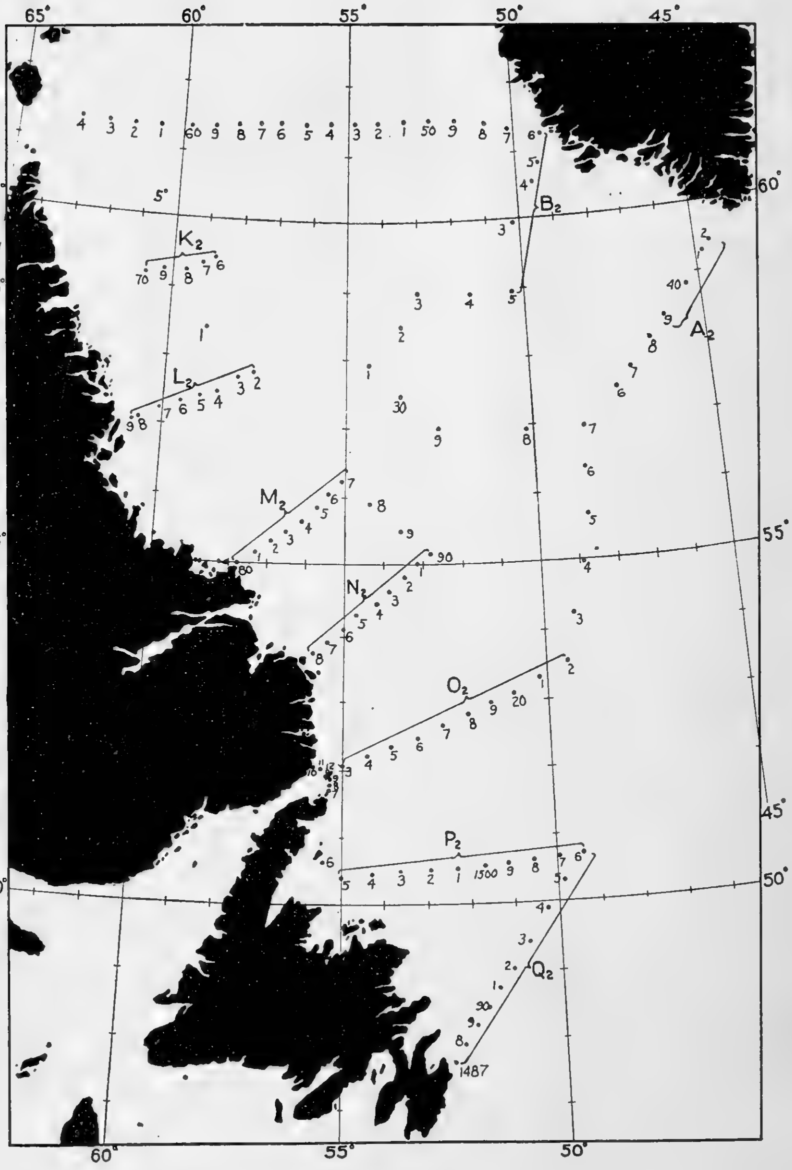

FIGURE 155.—Station map, June 16–July 24, 1933

Station 936; July 19; depth, 112 meters; lat. 52°02′ N., long. 55°16′ W.

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	7.90	29.77	23.67
25 meters	.68	32.40	26.01
50 meters	−1.35	32.84	26.43
75 meters	−1.56	32.99	26.55
100 meters	−1.67	33.00	26.57

Station 937; July 19; depth 145 meters; lat. 52°06′ N., long. 55°26′ W.

0 meter	7.30	29.97	23.30
20 meters	3.37	30.62	23.71
50 meters	−1.25	32.88	26.46
80 meters	−1.46	33.01	26.57
100 meters	−1.57	33.09	26.64
110 meters	−1.57	33.12	26.66
140 meters	−1.67	33.17	26.71

Station 938; July 19; depth 110 meters; lat. 52°10′ N., long. 55°33′ W.

0 meter	7.70	30.02	23.27
20 meters	3.68	31.23	24.16
50 meters	−1.06	32.83	26.42
75 meters	−1.56	32.93	26.51
100 meters	−1.57	33.02	26.58

Station 939; July 22; depth 82 meters; lat. 53°33′ N., long. 55°40′ W.; dynamic height 1,454.887 meters:

0 meter	6.90	29.75	23.25
15 meters	5.48	30.19	23.78
35 meters	4.37	31.63	25.09
55 meters	−.55	32.67	26.26
75 meters	−.86	32.72	26.32

Station 940; July 22; depth 275 meters; lat. 53°45′ N., long. 55°16′ W.; dynamic height, 1,454.836 meters

0 meter	5.50	32.16	25.39
25 meters	3.17	32.38	25.80
50 meters	−1.34	32.40	26.08
75 meters	−1.34	(32.61)	26.25
100 meters	−1.45	32.80	26.40
150 meters	−1.06	33.53	26.99
200 meters	.14	34.00	27.31
250 meters	.73	34.14	27.40

Station 941; July 22; depth 165 meters; lat. 53°56′ N., long. 54°52′ W.; dynamic height 1,454.787 meters

0 meter	5.20	32.21	25.47
25 meters	4.79	32.27	25.57
50 meters	−1.33	33.03	26.58
100 meters	−1.24	33.46	26.93
150 meters	−.24	33.82	27.18

Station 942; July 23; depth 175 meters; lat. 54°07′ [illegible]., long. 54°28′ W.; dynamic height, 1,454.779 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	5.00	32.28	25.55
20 meters	4.60	32.33	25.62
45 meters	−.62	32.97	26.51
85 meters	−1.33	33.37	26.87
125 meters	−.93	33.65	27.08
150 meters	−.34	(33.79)	27.20
165 meters	−.24	33.92	27.26

Station 943; July 23; depth 210 meters; lat. 54°17 N., long. 54°03′ W.; dynamic height, 1,454.753 meters

0 meter	4.90	32.40	25.65
25 meters	2.49	32.71	26.12
50 meters	−1.02	33.28	26.78
100 meters	−1.03	33.59	27.03
150 meters	−.44	33.76	27.14
190 meters	.36	34.02	27.31

Station 944; July 23; depth 235 meters; lat. 54°26′ N., long. 53°38′ W.; dynamic height, 1,454.734 meters

0 meter	7.00	32.64	25.59
15 meters	5.20	32.74	25.88
30 meters	4.59	32.97	26.13
80 meters	1.17	33.87	27.14
130 meters	1.17	34.11	27.34
180 meters	2.16	34.46	27.55
190 meters	2.36	(34.47)	27.55
230 meters	3.05	34.58	27.57

Station 945; July 23; depth 415 meters; lat. 54°33′ N., long. 53°22′ W.; dynamic height, 1,454.664 meters

0 meter	7.00	33.18	26.01
25 meters	3.79	33.71	26.80
50 meters	2.39	34.10	27.24
100 meters	2.78	34.51	27.53
200 meters	3.47	34.72	27.64
230 meters	3.47	(34.76)	27.66
300 meters	3.46	34.78	27.68
400 meters	3.46	34.79	27.69

Station 946; July 23; depth 868 meters; lat. 54°40′ N., long. 53°00′ W.; dynamic height 1,454.648 meters

0 meter	7.10	33.58	26.31
20 meters	4.90	33.91	26.85
50 meters	1.88	34.32	27.46
100 meters	3.39	34.60	27.55
150 meters	3.39	34.71	27.63
200 meters	3.48	34.73	27.65
300 meters	3.48	34.79	27.69
400 meters	3.47	(34.82)	27.71
500 meters	3.57	34.81	27.70
800 meters	3.67	34.85	27.72

Station 947; July 23; depth 2,535 meters; lat. 55°20′ N., long. 53°30′ W.; dynamic height 1,454.561 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	9.50	34.03	26.29
20 meters	6.88	34.48	27.05
50 meters	4.37	34.71	27.53
100 meters	3.86	34.87	27.71
150 meters	3.56	34.87	27.74
200 meters	3.35	34.87	27.76
300 meters	3.25	34.86	27.77
500 meters	3.15	34.86	27.78
800 meters	3.05	34.86	27.79
1,000 meters	3.14	34.87	27.79
1,200 meters	3.04	34.87	27.80
1,400 meters	2.93	34.88	27.82
1,800 meters	2.93	34.90	27.83

Station 948; July 24; depth 2,997 meters; lat. 55°51′ N., long. 54°00′ W.; dynamic height 1,454.591 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	8.70	34.37	26.70
20 meters	8.00	34.38	26.81
50 meters	4.57	34.68	27.49
100 meters	4.06	(34.83)	27.66
150 meters	3.56	34.86	27.73
200 meters	3.45	34.86	27.75
300 meters	3.35	34.87	27.76
500 meters	3.24	34.86	27.77
800 meters	3.03	34.86	27.79
1,000 meters	3.13	34.87	27.79
1,200 meters	3.13	34.88	27.80

Station 949; July 24; depth 2,745 meters; lat. 55°40′ N., long 54°42′ W.; dynamic height 1,454.582 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	9.00	34.33	26.62
20 meters	7.39	34.39	26.91
50 meters	4.27	34.88	27.68
100 meters	3.76	34.87	27.72
150 meters	3.55	34.86	27.74
200 meters	3.45	34.86	27.75
300 meters	3.54	34.87	27.76
500 meters	3.53	34.88	27.76
800 meters	3.23	34.88	27.79
1,000 meters	3,12	34.88	27.79

Station 950; July 24; depth, 2,013 meters; lat. 55°22′ N., long. 55°13′ W.; dynamic height, 1,454.663 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	8.20	33.96	26.44
20 meters	7.18	34.05	26.66
50 meters	4.36	34.28	27.20
100 meters	3.35	34.41	27.40
150 meters	3.36	(34.56)	27.52
200 meters	3.36	(34.69)	27.62
300 meters	3.35	(34.79)	27.70
500 meters	3.44	(34.86)	27.74
800 meters	3.43	(34.89)	27.77
1,000 meters	3.43	(34.89)	27.78
1,200 meters	3.32	34.90	27.79

Station 951; July 24; depth, 271 meters; lat. 55°16′ N., long. 55°21′ W.; dynamic height, 1,454.743 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	5.50	32.50	25.66
20 meters	−.84	33.04	26.58
60 meters	−1.05	33.43	26.90
110 meters	−.54	33.73	27.12
160 meters	−.04	33.90	27.20
210 meters	1.14	34.21	27.43
260 meters	(3.50)	34.63	27.56

Station 952; July 24; depth, 265 meters; lat. 55°07′ N., long. 55°42′ W.; dynamic height, 1,454.778 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	5.60	32.30	25.49
20 meters	1.37	32.71	26.20
60 meters	−1.15	33.27	26.78
110 meters	−1.05	33.53	26.98
160 meters	−.44	33.74	27.13
210 meters	.16	34.00	27.31
260 meters	1.96	34.32	27.46

Station 953; July 25; depth, 353 meters; lat. 55°02′ N., long. 56°07′ W.; dynamic height, 1,454.776 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	6.00	32.43	25.54
20 meters	3.58	32.83	26.12
50 meters	−1.25	33.18	26.71
100 meters	−1.04	33.46	26.94
150 meters	−.24	33.69	27.08
200 meters	.56	34.02	27.30
250 meters	1.67	34.33	27.48
260 meters	1.87	(34.36)	27.49
300 meters	2.37	34.52	27.58
350 meters	2.77	34.63	27.63

Station 954; July 25; depth, 159 meters; lat. 54°56′ N., long. 56°34′ W.; dynamic height, 1,454.821 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	5.70	32.38	25.54
25 meters	3.38	32.60	25.96
50 meters	−.84	32.92	26.48
70 meters	−.43	(33.08)	26.59
100 meters	−.03	33.27	26.73
150 meters	1.17	33.56	26.90

Station 955; July 25; depth, 80 meters; lat. 54°45′ N., long. 56°52′ W.; dynamic height, 1,454.844 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	6.00	32.22	25.38
20 meters	.46	32.23	25.87
50 meters	−.75	32.71	26.31
70 meters	−1.05	32.77	26.36

Station 956; July 25; depth, 50 meters; lat. 55°40′ N., long. 59°34′ W.; dynamic height, 1,454.966 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	5.10	31.86	25.20
10 meters	4.79	31.92	25.29
20 meters	2.68	31.90	25.46
30 meters	1.87	31.96	25.57
40 meters	1.87	32.11	25.69

Station 957; July 26; depth, 600 meters; lat. 55°56′ N., long. 59°14′ W.; dynamic height, 1,454.888 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	5.20	32.61	25.78
20 meters	3.19	32.80	26.14
40 meters	2.78	(32.92)	26.27
50 meters	(1.30)	32.93	26.38
100 meters	.56	33.04	26.52
150 meters	.96	33.18	26.61
200 meters	.65	33.35	26.76
300 meters	.96	34.04	27.29
400 meters	2.26	(34.50)	27.57
450 meters	2.76	34.63	27.63
600 meters	2.96	34.71	27.68

Station 958; July 26; depth, 425 meters; lat. 56°13′ N., long. 59°09′ W.; dynamic height, 1,454.864 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	4.80	32.57	25.79
20 meters	2.47	32.66	26.08
50 meters	–.86	33.15	26.67
100 meters	–1.15	33.27	26.78
150 meters	–1.05	33.37	26.86
180 meters	–1.15	(33.45)	26.93
200 meters	–1.25	33.50	26.97
300 meters	–.85	33.81	27.20
400 meters	(–.20)	34.03	27.35

Station 959; July 26; depth, 195 meters; lat. 56°20′ N., long. 58°49′ W.; dynamic height, 1,454.781 meters

0 meter	5.10	33.03	26.12
10 meters	5.00	33.05	26.15
25 meters	3.07	33.10	26.38
50 meters	.76	33.21	26.64
80 meters	–.94	33.46	26.91
130 meters	.36	33.83	27.15
180 meters	.56	34.02	27.30

Station 960; July 26; depth, 238 meters; lat. 56°27′ N., long. 58°24′ W.; dynamic height, 1,454.783 meters

0 meter	6.00	33.10	26.07
15 meters	5.49	33.15	26.17
30 meters	3.58	33.24	26.45
60 meters	2.37	33.42	26.70
100 meters	.76	33.60	26.96
150 meters	.76	34.00	27.27
180 meters	.95	(34.06)	27.29
225 meters	1.35	34.08	27.30

Station 961; July 26; depth, 1,759 meters; lat. 56°34′ N., long. 58°03′ W.; dynamic height, 1,454.612 meters

0 meter	7.20	34.15	26.74
20 meters	6.79	34.36	26.97
50 meters	3.95	34.42	27.35
100 meters	3.65	34.58	27.50
150 meters	3.64	34.80	27.68
200 meters	3.64	34.85	27.72
225 meters	3.64	(34.85)	27.72
300 meters	3.64	34.85	27.72
500 meters	3.63	34.85	27.72
800 meters	3.53	34.86	27.74
1,000 meters	3.43	34.86	27.75
1,200 meters	3.23	34.86	27.77

Station 962; July 26; depth, 2,233 meters; lat. 56°57′ N., long. 57°28′ W.; dynamic height, 1,454.618 meters

0 meter	9.60	34.09	26.33
20 meters	8.88	34.64	26.87
50 meters	4.24	34.76	27.59
100 meters	3.93	34.84	27.68
150 meters	3.93	34.84	27.68
200 meters	3.73	34.85	27.71
300 meters	3.52	34.85	27.73
500 meters	3.41	34.85	27.74
800 meters	3.41	34.88	27.77
1,000 meters	3.21	34.87	27.79
1,200 meters	3.11	34.87	27.79

Station 963; July 27; depth, 1,550 meters; lat. 57°22′ N., long. 57°02′ W.; dynamic height, 1,454.602 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	10.10	34.11	26.26
20 meters	8.78	34.48	26.77
50 meters	4.63	34.58	27.40
100 meters	4.22	34.76	27.59
150 meters	3.72	34.80	27.68
200 meters	3.51	34.83	27.71
300 meters	3.31	34.85	27.75
500 meters	3.10	34.85	27.77
800 meters	3.10	34.85	27.77
1,000 meters	3.00	34.86	27.79
1,200 meters	2.90	34.87	27.81

Station 964; July 27; depth, 3,276 meters; lat. 57°56′ N., long. 55°40′ W.; dynamic height, 1,454.635 meters

0 meter	10.00	34.51	26.59
20 meters	8.47	34.72	27.00
50 meters	5.55	34.80	27.47
100 meters	4.54	34.86	27.62
150 meters	4.33	34.86	27.65
200 meters	4.33	34.86	27.65
300 meters	4.13	34.86	27.67
500 meters	3.62	34.86	27.73
800 meters	3.62	34.86	27.73
1,000 meters	3.11	34.87	27.79
1,200 meters	3.01	34.87	27.80

Station 965; July 27; depth, 3,386 meters; lat. 58°04′ N., long. 54°39′ W.; dynamic height, 1,454.603 meters

0 meter	9.70	34.45	26.61
20 meters	7.98	34.55	26.94
50 meters	6.06	34.72	27.34
100 meters	4.23	34.80	27.62
150 meters	3.93	34.82	27.66
200 meters	3.53	34.83	27.71
300 meters	3.32	34.83	27.73
500 meters	3.12	34.84	27.76
800 meters	3.01	34.84	27.77
1,000 meters	3.01	34.87	27.79
1,200 meters	2.91	34.88	27.81
1,600 meters	2.91	34.89	27.82
2,200 meters	2.81	34.90	27.83

Station 966; July 27; depth, 3,459 meters; lat. 58°38′ N., long. 54°06′ W.; dynamic height, 1,454.631 meters

0 meter	9.30	34.89	27.00
50 meters	7.68	34.62	27.04
100 meters	5.35	34.77	27.47
150 meters	4.34	34.85	27.64
200 meters	4.14	34.85	27.67
300 meters	3.73	34.86	27.72
500 meters	3.63	34.86	27.73
800 meters	3.32	34.87	27.77
1,000 meters	3.22	34.88	27.79
1,200 meters	2.92	34.88	27.81
1,500 meters	2.92	34.89	27.82

Station 967; July 28; depth, 3,386 meters; lat. 59°18′ N., long. 54°20′ W.; dynamic height, 1,454.602 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	9.30	34.50	26.69
20 meters	8.38	34.58	26.91
50 meters	5.96	34.72	27.36
100 meters	4.34	34.85	27.64
150 meters	4.14	34.86	27.68
200 meters	4.03	34.87	27.70
300 meters	3.83	34.87	27.71
500 meters	3.32	34.87	27.77
800 meters	3.32	34.87	27.77
900 meters	3.12	34.87	27.79
1,000 meters	3.12	34.89	27.80
1,200 meters	3.02	34.89	27.81
1,500 meters	3.02	34.89	27.81

Station 968; July 29; depth, 3,340 meters; lat. 58°58′ N., long. 54°30′ W.; dynamic height, 1,454.576 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	9.90	34.80	26.83
20 meters	9.19	34.84	26.98
50 meters	5.77	34.84	27.47
100 meters	4.54	34.86	27.63
150 meters	4.34	34.87	27.66
200 meters	4.13	34.88	27.69
300 meters	3.73	34.88	27.73
500 meters	3.53	34.89	27.77
800 meters	3.12	34.90	27.82
1,000 meters	3.12	34.90	27.82
1,200 meters	2.92	34.90	27.83
1,500 meters	2.92	34.90	27.83

Station 969; July 29; depth, 3,065 meters; lat. 60°37′ N., long. 54°44′ W.; dynamic height, 1,454.660 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	9.80	34.40	26.55
20 meters	9.40	34.41	26.62
50 meters	4.86	34.55	27.35
100 meters	4.54	34.70	27.50
150 meters	4.54	34.80	27.58
200 meters	4.54	34.87	27.64
300 meters	4.13	34.87	27.69
500 meters	3.93	34.88	27.72
800 meters	3.63	34.88	27.74
1,000 meters	3.32	34.88	27.77
1,200 meters	3.12	34.90	27.81
1,500 meters	3.02	34.90	27.82

Station 970; July 29; depth, 2,983 meters; lat. 60°57′ N., long. 55°02′ W.; dynamic height, 1,454.648 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	9.40	34.46	26.66
20 meters	7.98	34.42	26.88
50 meters	5.96	34.65	27.30
100 meters	5.35	34.82	27.51
150 meters	4.94	34.88	27.60
200 meters	4.74	34.93	27.68
300 meters	4.53	34.94	27.70
500 meters	3.93	34.90	27.73
800 meters	3.52	34.89	27.76
1,000 meters	3.32	34.89	27.78
1,200 meters	3.22	34.89	27.79
1,500 meters	3.02	34.89	27.81
1,800 meters	3.02	34.90	27.82

Station 971; July 29; depth, 2,745 meters; lat. 61°31′ N., long. 55°02′ W.; dynamic height, 1,454.630 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	9.80	34.37	26.51
20 meters	8.78	34.35	26.66
50 meters	4.13	34.55	27.43
100 meters	4.03	34.80	27.63
150 meters	4.13	34.88	27.69
200 meters	4.33	34.91	27.70
300 meters	4.13	34.92	27.72
500 meters	3.93	34.90	27.73
800 meters	3.52	34.89	27.76
1,000 meters	3.32	34.89	27.78
1,200 meters	3.12	34.89	27.80
1,500 meters	3.02	34.89	27.81

Station 972; July 30; depth, 2,882 meters; lat. 61°55′ N., long. 54°40′ W.; dynamic height 1,454.650 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	9.50	34.35	26.55
20 meters	8.59	34.37	26.71
50 meters	5.05	34.57	27.35
100 meters	4.84	34.82	27.57
150 meters	4.74	34.88	27.63
200 meters	4.63	34.91	27.66
300 meters	4.33	34.92	27.70
500 meters	3.93	34.90	27.73
800 meters	3.73	34.89	27.74
1,000 meters	3.62	34.89	27.77
1,200 meters	3.42	34.89	27.80
1,500 meters	2.92	34.89	27.82

Station 973; July 30; depth, 2,791 meters; lat. 62°08′ N., long. 54°07′ W.; dynamic height, 1,454.642 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	9.60	34.46	26.62
20 meters	8.59	34.44	26.77
50 meters	6.36	34.72	27.30
100 meters	4.74	34.82	27.58
150 meters	4.33	34.83	27.63
200 meters	4.33	34.88	27.67
300 meters	4.13	34.89	27.70
400 meters	3.93	34.90	27.73
800 meters	3.52	34.89	27.77
1,000 meters	3.52	34.89	27.77
1,200 meters	3.12	34.88	27.80
1,500 meters	3.02	34.88	27.81

Station 974; July 30; depth, 2,755 meters; lat. 62°12′ N., long. 53°22′ W.; dynamic height, 1,454.664 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	8.50	33.65	26.16
20 meters	7.57	34.24	26.76
50 meters	4.95	34.69	27.45
100 meters	4.64	34.81	27.57
150 meters	4.74	34.87	27.62
200 meters	4.74	34.89	27.64
300 meters	4.53	34.93	27.69
500 meters	4.53	34.92	27.69
800 meters	3.73	34.89	27.75
1,000 meters	3.42	34.87	27.76
1,200 meters	3.32	34.87	27.78
1,500 meters	3.12	34.88	27.80

Station 975; July 30; depth, 2,745 meters; lat. 62°24′ N., long. 52°47′ W.; dynamic height, 1,454.675 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	7.30	33.49	26.21
20 meters	5.67	33.96	26.79
50 meters	4.35	34.47	27.33
100 meters	5.36	34.82	27.51
150 meters	5.15	34.88	27.58
200 meters	5.15	34.93	27.62
300 meters	5.05	34.95	27.65
500 meters	4.54	34.93	27.69
800 meters	3.73	34.92	27.76
1,000 meters	3.42	34.90	27.78
1,200 meters	3.32	34.89	27.79
1,500 meters	3.12	34.89	27.80

Station 976; July 30; depth, 2,150 meters; lat. 62°37′ N., long. 52°12′ W.; dynamic height, 1,454.804 meters

0 meter	5.70	33.04	26.06
20 meters	2.76	33.04	26.37
50 meters	2.16	33.30	26.62
100 meters	2.96	34.20	27.27
150 meters	4.37	34.59	27.44
200 meters	4.89	24.72	27.49
300 meters	4.99	34.83	25.57
500 meters	4.88	34.91	27.64
800 meters	4.37	34.93	27.71
1,000 meters	3.97	34.91	27.74
1,200 meters	3.77	34.90	27.75
1,500 meters	3.26	34.89	27.79

Station 977; July 31; depth, 329 meters; lat. 62°45′ N., long. 51°46′ W.; dynamic height, 1,454.869 meters

0 meter	5.80	32.42	25.56
15 meters	4.79	32.47	25.71
30 meters	3.79	32.88	26.15
60 meters	2.38	33.46	26.73
100 meters	3.18	33.85	26.97
150 meters	2.78	34.11	27.22
200 meters	3.38	34.34	27.34
230 meters	3.18	34.45	27.45
300 meters	4.38	34.67	27.50

Station 978; July 31; depth, 275 meters; lat. 62°54′ N., long. 51°20′ W.; dynamic height, 1,454.926 meters

0 meter	7.70	32.08	25.04
15 meters	3.97	32.15	25.54
30 meters	2.96	32.25	25.71
50 meters	1.76	32.43	25.95
80 meters	1.55	33.02	26.43
100 meters	1.65	33.30	26.65
130 meters	2.55	33.76	26.95
180 meters	3.55	34.29	27.28
230 meters	3.35	34.45	27.44

Station 979; Aug. 1; depth, 111 meters; lat. 64°01′ N., long. 52°25′ W.; dynamic height, 1,454.949 meters

0 meter	7.30	30.75	24.07
15 meters	4.78	32.07	25.39
30 meters	4.07	32.83	26.08
60 meters	3.45	33.08	26.34
100 meters	1.74	33.25	26.60

Station 980; Aug. 2; depth, 819 meters; lat. 63°50′ N., long. 53°15′ W.; dynamic height, 1,454.797 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	7.00	32.47	25.45
20 meters	3.56	33.04	26.29
50 meters	2.35	33.65	26.88
100 meters	2.64	34.15	27.26
200 meters	3.54	34.64	27.56
300 meters	4.54	34.79	27.58
500 meters	4.94	34.90	27.62
750 meters	4.54	34.92	27.68

Station 981; Aug. 2; depth, 1,336 meters; lat. 63°41′ N., long. 53°53′ W.; dynamic height, 1,454.700 meters

0 meter	7.50	33.68	26.33
20 meters	7.00	33.73	26.45
50 meters	6.38	34.43	27.07
100 meters	4.84	34.61	27.40
150 meters	4.13	34.70	27.55
200 meters	4.13	34.76	27.60
300 meters	4.33	34.88	27.67
500 meters	4.33	34.94	27.72
750 meters	4.13	34.94	27.74
800 meters	4.03	34.94	27.75
1,000 meters	3.63	34.91	27.77
1,200 meters	3.33	34.88	27.78

Station 982; Aug. 2; depth, 1,335 meters; lat. 63°34′ N., long. 54°36′ W.; dynamic height, 1,454.705 meters

0 meter	7.70	33.41	26.09
20 meters	4.65	33.42	26.48
50 meters	4.43	33.98	26.95
100 meters	4.53	34.54	27.38
150 meters	4.54	34.70	27.50
200 meters	4.43	34.77	27.57
300 meters	4.33	34.86	27.66
500 meters	4.03	34.90	27.72
800 meters	3.73	34.91	27.76
1,000 meters	3.23	34.88	27.78

Station 983; Aug. 2; depth, 1,446 meters; lat. 63°25 N., long. 55°28′ W.; dynamic height, 1,454.754 meters

0 meter	7.60	33.42	26.11
20 meters	6.39	33.44	26.30
50 meters	5.67	33.88	26.73
100 meters	4.76	34.43	27.27
150 meters	4.14	34.63	27.49
200 meters	4.14	34.71	27.55
300 meters	4.44	34.83	27.62
500 meters	4.54	34.93	27.69
800 meters	4.03	34.92	27.73
1,000 meters	3.73	34.91	27.76
1,200 meters	3.43	34.90	27.78

Station 984; Aug. 3; depth, 2,253 meters; lat. 63°10′ N., long. 56°32′ W.; dynamic height, 1,454.669 meters

0 meter	8.00	33.47	26.09
20 meters	6.26	33.50	26.36
50 meters	3.84	34.16	27.15
100 meters	3.73	34.65	27.54
150 meters	3.73	34.75	27.62
200 meters	3.93	34.82	27.66
300 meters	4.33	34.90	27.69
500 meters	4.33	34.95	27.73
800 meters	3.73	34.94	27.77
1,000 meters	3.63	34.92	27.78
1,200 meters	3.42	34.91	27.79
1,500 meters	3.12	34.91	27.82

Station 985; Aug. 3; depth, 2,187 meters; lat. 62°56′ N., long. 57°34′ W.; dynamic height, 1,454.688 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	8.20	33.62	26.18
20 meters	7.79	33.63	26.24
50 meters	3.43	34.21	27.23
100 meters	3.33	34.59	27.54
150 meters	3.53	34.71	27.62
200 meters	3.73	34.75	27.63
300 meters	3.93	34.82	27.66
500 meters	4.03	34.89	27.71
800 meters	3.83	34.92	27.76
1,000 meters	3.62	34.91	27.77
1,200 meters	3.32	34.90	27.79
1,500 meters	3.12	34.89	27.80

Station 986; Aug. 3; depth, 1,280 meters; lat. 63°48′ N., long. 57°30′ W.; dynamic height, 1,454.747 meters

0 meter	8.50	33.53	26.07
20 meters	5.98	33.54	26.42
50 meters	1.13	33.79	27.08
100 meters	3.03	34.18	27.33
150 meters	1.73	34.47	27.45
200 meters	3.43	34.58	27.53
300 meters	3.73	34.69.	27.59
500 meters	4.13	34.83	27.65
600 meters	4.03	34.85	27.68
800 meters	3.82	34.90	27.74
1,000 meters	3.62	34.90	27.76
1,200 meters	3.22	34.88	27.78

Station 987; Aug. 4; depth, 641 meters; lat. 64°34′ N., long 57°30′ W.; dynamic height, 1,454.770 meters

0 meter	8.50	33.68	26.18
20 meters	8.30	33.76	26.27
50 meters	6.78	33.91	26.61
100 meters	4.74	34.08	27.00
150 meters	3.13	34.21	27.27
200 meters	2.52	34.35	27.43
300 meters	3.12	34.62	27.59
400 meters	3.32	34.75	27.67
500 meters	3.12	34.81	27.74
600 meters	3.12	34.81	27.74

Station 988; Aug. 4; depth, 659 meters; lat. 65°17′ N., long. 57°27′ W.; dynamic height, 1,454.754 meters

0 meter	4.20	32.35	25.67
20 meters	5.20	33.28	26.31
50 meters	1.36	33.68	26.98
100 meters	−.25	34.00	27.33
150 meters	.05	34.16	27.44
200 meters	1.05	34.33	27.53
300 meters	2.16	34.53	27.60
400 meters	2.46	34.59	27.62
500 meters	2.46	34.59	27.62
600 meters	2.46	34.60	27.63

Station 989; Aug. 4; depth 650 meters; lat. 65°27′ N., long. 56°55′ W.; dynamic height, 1,454.741 meters

0 meter	5.30	32.80	25.92
20 meters	5.20	33.36	26.38
50 meters	2.09	33.94	27.14
100 meters	1.48	34.21	27.41
150 meters	1.89	34.35	27.49
200 meters	2.49	34.49	27.54
300 meters	3.29	34.65	27.60
400 meters	3.79	34.76	27.63
500 meters	3.79	34.76	27.63
600 meters	3.89	34.79	27.64

Station 990; Aug. 4; depth 630 meters; lat. 65°43′ N., long. 56°22′ W.; dynamic height, 1,454.746 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	7.00	33.25	26.06
20 meters	6.38	33.63	26.45
50 meters	3.57	33.95	27.01
100 meters	1.46	34.23	27.42
150 meters	1.56	34.37	27.52
175 meters	2.46	34.48	27.54
200 meters	2.76	34.52	27.55
300 meters	3.56	34.68	27.59
400 meters	3.96	34.76	27.61
500 meters	3.96	34.76	27.61
600 meters	4.06	34.78	27.62

Station 991; Aug. 4; depth, 206 meters; lat. 65°59′ N., long. 55°40′ W.; dynamic height, 1,454.765 meters

0 meter	4.80	33.46	26.50
15 meters	4.49	33.42	26.50
30 meters	2.98	33.45	26.68
60 meters	1.97	33.67	26.93
100 meters	1.77	33.95	27.17
120 meters	1.97	34.08	27.26
150 meters	2.57	34.27	27.36
175 meters	2.87	34.37	27.42

Station 992; Aug. 5; depth, 200 meters; lat. 66°13′30″ N., long. 55°05′ W.; dynamic height, 1,454.750 meters

0 meter	5.10	33.59	26.57
15 meters	5.10	33.62	26.59
30 meters	4.18	33.73	26.78
50 meters	(3.32)	33.90	26.99
60 meters	2.56	33.92	27.08
100 meters	1.86	34.09	27.27
120 meters	1.96	34.18	27.34
150 meters	1.76	34.23	27.40
175 meters	1.76	34.28	27.44

Station 993; Aug. 5; depth, 55 meters; lat. 66°20′ N. long. 54°15′ W.; dynamic height, 1,454.810 meters

0 meter	5.70	31.46	24.71
10 meters	5.70	31.52	24.86
20 meters	5.39	32.53	25.69
30 meters	3.98	33.05	26.27
40 meters	3.17	33.28	26.52
50 meters	2.87	33.38	26.63

Station 994; Aug. 5; depth, 20 meters; lat. 66°22′ N., long. 53°50′ W.; dynamic height, 1,454.803 meters

0 meter	4.80	31.99	25.34
5 meters	4.70	32.07	25.41
10 meters	4.40	32.35	25.66
15 meters	4.30	32.40	25.71
20 meters	4.19	32.41	25.73

Station 995; Aug. 7; depth, 461 meters; lat. 68°19′ N., long. 55°14′ W.; dynamic height, 1,454.685 meters

0 meter	4.90	33.22	26.30
20 meters	4.79	33.27	26.35
50 meters	−.25	33.55	26.97
100 meters	−.25	34.01	27.34
150 meters	.66	34.22	27.46
200 meters	1.37	34.33	27.50
300 meters	2.07	34.42	27.52
400 meters	2.57	34.47	27.52
430 meters	2.67	34.48	27.52
450 meters	2.67	(34.48)	27.52

Station 996; Aug. 7; depth, 500 meters; lat. 68°25′ N., long. 54°23′ W.; dynamic height, 1,454.728 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	5.10	33.14	26.22
15 meters	5.20	33.18	26.24
30 meters	4.89	33.30	26.37
40 meters	2.76	33.30	26.58
60 meters	−.24	33.61	27.01
100 meters	.95	33.92	27.20
150 meters	.95	34.10	27.35
200 meters	.95	34.20	27.43
300 meters	1.56	34.28	27.44
450 meters	1.66	(34.29)	27.45
475 meters	1.86	34.32	27.45

Station 997; Aug. 7; depth, 316 meters; lat. 68°30′ N., long. 53°30′ W.; dynamic height, 1,454.781 meters

0 meter	4.60	32.72	25.93
15 meters	4.80	33.19	26.29
30 meters	4.19	33.28	26.41
60 meters	3.18	33.47	26.67
100 meters	2.28	33.68	26.91
150 meters	1.77	33.90	27.13
200 meters	1.47	34.08	27.29
300 meters	1.57	34.18	27.36

Station 998; Aug. 7; depth, 799 meters; lat. 68°55′ N., long. 53°25′ W.; dynamic height, 1,454.756 meters

0 meter	7.40	32.76	25.62
20 meters	3.97	33.08	26.29
50 meters	1.35	33.32	26.69
100 meters	.64	33.66	27.01
200 meters	.74	34.08	27.34
240 meters	1.45	34.22	27.40
300 meters	1.15	34.24	27.44
400 meters	1.55	34.32	27.47
600 meters	1.85	34.35	27.48
750 meters	1.95	34.36	27.48

Station 999; Aug. 7; depth, 250 meters; lat. 69°09′ N., long. 53°32′ W.; dynamic height, 1,454.781 meters

0 meter	8.20	32.70	25.46
15 meters	3.97	33.00	26.23
30 meters	3.46	33.25	26.45
60 meters	1.32	33.55	26.88
100 meters	.92	33.88	27.17
150 meters	.72	34.06	27.32
180 meters	(.70)	34.08	27.34
240 meters	.92	34.14	27.38

Station 1000; Aug. 8; depth, 557 meters; lat. 69°12′ N., long. 52°49′ W.

0 meter	7.30	31.53	24.67
20 meters	3.96	33.13	26.32
30 meters	2.15	33.42	26.72
50 meters	.34	33.71	27.06
100 meters	−.07	33.89	27.23
150 meters	.13	34.01	27.32
200 meters	1.14	34.15	27.37
240 meters	.94	34.17	27.41
300 meters	1.44	34.23	27.42
400 meters	1.74	34.29	27.45
450 meters	1.84	34.30	27.45
525 meters	1.94	34.33	27.47

Station 1001; Aug. 8; depth, 492 meters; lat. 69°12′ N., long. 52°13′ W.

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	9.60	32.45	25.05
20 meters	3.54	33.22	26.43
50 meters	.11	33.61	27.00
100 meters	−.09	33.85	27.20
150 meters	.11	34.00	27.31
200 meters	.71	34.13	27.38
300 meters	1.52	34.26	27.44
400 meters	1.82	34.31	27.46
450 meters	1.92	34.33	27.48

Station 1002; Aug. 8; depth, 410 meters; lat. 69°11′ N., long. 51°42′ W.

0 meter	9.60	32.45	25.05
15 meters	5.77	33.41	26.35
50 meters	−.07	33.83	27.18
100 meters	.42	34.02	27.31
150 meters	1.32	34.14	27.35
200 meters	1.72	34.20	27.38
250 meters	1.62	34.22	27.40
300 meters	1.42	34.23	27.41
350 meters	1.62	34.26	27.42
400 meters	1.72	34.28	27.43

Station 1003; Aug. 8; depth, 250 meters; lat. 69°12′ N., long. 51°10′ W.

0 meter	1.00	32.29	25.89
15 meters	−.22	32.52	26.14
30 meters	−.02	32.94	26.47
60 meters	1.19	33.44	26.81
90 meters	2.19	33.71	26.95
140 meters	2.19	33.93	27.11
190 meters	2.08	34.04	27.21
240 meters	.79	34.15	27.40
250 meters	.79	34.15	27.40

Station 1004; Aug. 11; depth, 131 meters; lat. 70°14′ N., long. 52°42′ W.

0 meter	3.60	31.03	24.60
15 meters	1.98	32.20	25.75
30 meters	1.08	32.79	26.28
50 meters	.57	33.16	26.61
75 meters	.37	33.43	26.84
100 meters	.17	33.66	27.04
125 meters	.17	33.83	27.17

Station 1005; Aug. 11; depth, 500 meters; lat. 70°12′ N., long. 52°51′ W.

0 meter	3.20	31.08	24.67
20 meters	3.10	31.49	25.00
50 meters	2.18	32.50	25.98
100 meters	.67	33.61	26.97
150 meters	−.04	33.83	27.18
200 meters	−.04	33.97	27.29
300 meters	.47	34.13	27.40
400 meters	.67	34.21	27.46
475 meters	.77	34.22	27.46

Station 1006; Aug. 11; depth, 150 meters.; lat. 70°09′ N., long. 52°55′ W.

0 meter	3.80	32.35	25.72
15 meters	3.30	32.68	26.03
30 meters	1.39	33.20	26.59
50 meters	.98	33.55	26.91
75 meters	.17	33.69	27.06
100 meters	.07	33.77	27.13
125 meters	−.03	33.83	27.18
150 meters	−.03	(33.87)	27.21

Station 1007; Aug. 13; depth, 60 meters; lat. 69°20′ N., long. 54°08′ W.; dynamic height, 1,454.737 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	5.30	33.22	26.25
10 meters	5.40	33.36	26.36
25 meters	4.79	33.41	26.46
40 meters	3.98	33.50	26.62
50 meters	2.97	33.61	26.79
55 meters	1.86	33.66	26.93
60 meters	1.66	(33.73)	27.00

Station 1008; Aug. 13; depth, 127 meters; lat. 69°12′ N., long. 54°46′ W.; dynamic height, 1,454.720 meters

0 meter	5.50	33.38	26.35
20 meters	5.70	33.45	26.38
40 meters	1.75	33.61	26.89
60 meters	–.56	33.75	27.14
80 meters	–.66	33.81	27.19
100 meters	–.26	33.90	27.25
115 meters	–.16	33.92	27.26

Station 1009; Aug. 13; depth, 187 meters; lat. 69°05′ N., long. 55°23′ W.; dynamic height, 1,454.722 meters

0 meter	5.20	33.46	26.46
20 meters	5.60	33.49	26.43
40 meters	1.54	33.58	26.88
60 meters	–.37	33.68	27.07
100 meters	–.47	33.83	27.20
115 meters	–.37	(33.85)	27.21
140 meters	–.27	33.88	27.24
170 meters	–.17	33.90	27.25
180 meters	–.07	33.91	27.25

Station 1010; Aug. 13; depth, 177 meters; lat. 68°56′ N., long. 56°10′ W.; dynamic height, 1,454.716 meters

0 meter	5.10	33.61	26,59
20 meters	5.20	33,62	26.58
40 meters	2.97	33,67	26.85
60 meters	–.47	33.74	27.12
90 meters	–.37	33.86	27.22
130 meters	–.07	33.91	27.25
170 meters	.24	33.94	27.26

Station 1011; Aug. 14; depth, 205 meters; lat. 68°49′ N., long. 57°07′ W.; dynamic height, 1,454.712 meters

0 meter	5.10	33.61	26.58
20 meters	5.00	33.62	26.61
40 meters	2.56	33.80	26.99
60 meters	1.35	33.90	27.16
90 meters	.84	34.01	27.28
125 meters	.64	34.07	27.34
150 meters	.54	34.08	27.36
170 meters	.54	(34.08)	27.36
200 meters	.54	34.09	27.36

Station 1012; Aug. 14; depth, 275 meters; lat. 68°31′ N., long. 57°28′ W.; dynamic height, 1,454.716 meters

0 meter	4.80	33.33	26.40
20 meters	5.00	33.37	26.41
40 meters	2.96	33.66	26.84
60 meters	–.06	33.81	27.17
100 meters	–.17	33.98	27.31
150 meters	.54	34.12	27.38
200 meters	1.14	34.22	27.42
250 meters	1.74	34.31	27.45

Station 1013; Aug. 14; depth, 216 meters; lat. 68°15′ N., long. 57°50′ W.; dynamic height, 1,454.708 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	3.60	33.30	26.49
20 meters	4.40	33.48	26.56
40 meters	1.36	33.71	27.00
60 meters	–.46	33.83	27.20
100 meters	–.66	34.02	27.36
150 meters	.96	34.13	27.37
200 meters	1.76	34.24	27.40

Station 1014; Aug. 14; depth, 495 meters; lat. 67°58′ N., long. 58°13′ W.; dynamic height, 1,454.747 meters

0 meter	4.30	32.40	25.72
15 meters	4.30	32.87	26.09
30 meters	4.10	33.18	26.35
50 meters	2.97	33.50	26.71
100 meters	1.07	33.91	27.19
150 meters	1.96	34.16	27.39
200 meters	1.57	34.28	27.44
300 meters	2.17	34.42	27.51
375 meters	2.37	34.47	27.53

Station 1015; Aug. 14; depth, 659 meters; lat. 67°31′ N., long. 58°48′ W.; dynamic height, 1,454.743 meters

0 meter	2.00	30.79	26.23
20 meters	.08	32.66	26.24
40 meters	–1.64	33.40	26.89
60 meters	–1.74	33.60	27.06
100 meters	–1.44	33.80	27.21
150 meters	–.73	33.99	27.34
200 meters	–.12	34.11	27.41
300 meters	.59	34.28	27.51
375 meters	.69	(34.33)	27.56
400 meters	.79	34.36	27.57
500 meters	(.00)	34.38	27.62
625 meters	(.30)	34.44	27.65

Station 1016; Aug. 15; depth, 1,270 meters; lat. 67°13′ N., long. 59°20′ W.; dynamic height, 1,454.725 meters

0 meter	1.50	30.94	24.68
20 meters	1.10	32.57	26.11
40 meters	–.81	33.31	26.80
60 meters	–1.22	33.64	27.08
100 meters	–1.21	33.86	27.25
150 meters	–.61	34.00	27.35
200 meters	.61	34.12	27.38
300 meters	.83	34.30	27.52
400 meters	.35	34.39	27.62
500 meters	.45	34.45	27.66
800 meters	.30	34.49	27.70
1,000 meters	–.10	34.49	27.72
1,200 meters	–.21	34.49	27.73

Station 1017; Aug. 15; depth, 935 meters; lat. 66°49′ N., long. 59°31′ W.; dynamic height, 1,454.788 meters

0 meter	1.50	29.50	23.52
20 meters	.29	31.60	25.29
40 meters	–.71	32.00	25.73
60 meters	–1.82	33.40	26.90
100 meters	–1.82	33.65	27.11
150 meters	–1.62	33.84	27.25
200 meters	–1.32	33.96	27.34
300 meters	–.81	34.20	27.51
500 meters	.18	34.42	27.65
700 meters	.01	(34.47)	27.70
900 meters	–.20	(34.49)	27.72

Station 1018; Aug. 15; depth, 750 meters; lat. 66°36′ N., long. 59°34′ W.; dynamic height, 1,454.839 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	−0.20	29.39	23.50
20 meters	−1.81	31.60	25.32
40 meters	−1.81	(32.67)	26.31
60 meters	−1.81	33.22	26.75
100 meters	−1.81	33.48	26.96
150 meters	−1.01	33.68	27.12
200 meters	−.40	33.86	27.25
300 meters	−.40	34.08	27.38
400 meters	.00	34.24	27.50
500 meters	.40	34.35	27.58
700 meters	.40	34.41	27.63

Station 1019; Aug. 16; depth, 530 meters; lat. 66°12′ N., long. 59°47′ W.; dynamic height, 1,454.870 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	−0.10	29.19	23.36
20 meters	−1.21	31.97	25.72
40 meters	−1.61	32.60	26.24
60 meters	−1.71	32.92	26.49
100 meters	−1.81	33.27	26.79
150 meters	−1.81	33.57	27.04
200 meters	−1.61	33.76	27.19
300 meters	−1.01	34.00	27.36
400 meters	−.50	34.16	27.47
500 meters	−.10	34.26	27.53

Station 1020; Aug. 16; depth, 570 meters; lat. 65°54′ N., long. 59°26′ W.; dynamic height, 1,454.889 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	0.20	29.36	23.41
20 meters	−1.11	31.72	25.43
40 meters	−1.51	32.70	26.32
60 meters	−1.71	33.03	26.60
100 meters	−1.81	33.33	26.84
150 meters	−1.81	33.58	27.04
200 meters	−1.61	33.76	27.19
300 meters	−.80	33.99	27.35
400 meters	−.60	34.15	27.47
425 meters	−.50	(34.20)	27.48
500 meters	−.30	34.25	27.54

Station 1021; Aug. 16; depth, 448 meters; lat. 65°37′ N., long. 59°05′ W.; dynamic height, 1,454.759 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	3.40	31.85	25.27
20 meters	3.70	32.72	26.02
40 meters	.58	33.30	26.72
60 meters	−.83	33.54	26.98
100 meters	−.93	33.77	27.17
150 meters	−.32	33.96	27.30
200 meters	−.22	34.09	27.38
250 meters	.79	34.23	27.46
300 meters	1.40	34.34	27.52
400 meters	1.70	(34.54)	27.64
425 meters	2.00	34.58	27.65

Station 1022; Aug. 16; depth, 425 meters; lat. 65°23′ N., long. 59°04′ W.; dynamic height, 1,454.845 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	2.00	30.69	24.45
20 meters	2.90	31.49	25.02
40 meters	.70	33.11	26.56
60 meters	−.93	33.44	26.90
100 meters	−1.13	33.72	27.14
150 meters	−.83	33.85	27.23
200 meters	−.52	33.95	27.30
250 meters	−.22	34.03	27.36
300 meters	.19	34.10	27.39
425 meters	.69	34.24	27.47

Station 1023; Aug. 17; depth, 450 meters; lat. 65°01′ N., long. 59°04′ W.; dynamic height, 1,454.760 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	2.70	30.99	24.68
20 meters	2.30	32.49	25.96
40 meters	−.52	33.35	26.82
60 meters	−1.23	33.57	27.02
100 meters	−1.33	33.77	27.19
150 meters	−.93	33.92	27.32
200 meters	−.21	34.09	27.40
300 meters	.98	34.26	27.47
400 meters	2.20	(34.45)	27.54
425 meters	2.60	34.53	27.57

Station 1024; Aug. 17; depth, 510 meters; lat. 64°35′ N., long. 59°03′ W.; dynamic height, 1,454.663 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	0.30	29.86	23.88
20 meters	−1.42	33.00	26.56
40 meters	−1.72	33.56	27.02
60 meters	−1.72	33.70	27.14
100 meters	−1.83	33.90	27.31
150 meters	−1.11	34.09	27.44
200 meters	−.40	34.23	27.52
300 meters	.90	34.42	27.61
425 meters	.90	(34.50)	27.68
450 meters	.90	34.53	27.70

Station 1025; Aug. 17; depth, 625 meters; lat. 64°07′ N., long. 59°06′ W.; dynamic height, 1,454.701 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	5.20	32.61	25.68
20 meters	6.12	33.43	26.32
40 meters	−.35	33.77	27.15
60 meters	−.25	33.93	27.28
100 meters	.45	34.14	27.40
150 meters	2.76	34.34	27.47
200 meters	2.86	34.49	27.51
300 meters	3.27	34.62	27.58
400 meters	2.96	34.65	27.63
450 meters	2.56	(34.66)	27.66
600 meters	1.86	34.67	27.73

Station 1026; Aug. 17; depth, 407 meters; lat. 64°01′ N., long. 60°02′ W.; dynamic height, 1,454.779 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	2.90	30.64	24.34
20 meters	1.06	32.66	26.18
40 meters	−.84	33.24	26.74
60 meters	−1.45	33.44	26.93
100 meters	−1.65	33.66	27.11
150 meters	−1.75	33.86	27.27
200 meters	−.34	34.06	27.38
270 meters	1.06	(34.20)	27.42
300 meters	1.36	34.35	27.52
400 meters	2.36	34.54	27.58

Station 1027; Aug. 17; depth, 290 meters; lat. 63°56′ N., long. 60°46′ W.; dynamic height, 1,454.826 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	3.00	30.41	24.15
20 meters	4.80	32.07	25.40
40 meters	−1.15	32.80	26.39
60 meters	−1.25	33.37	26.86
100 meters	−.24	33.63	27.03
150 meters	.88	33.87	27.17
200 meters	1.28	34.06	27.29
270 meters	1.78	34.24	27.41

Station 1028; Aug. 17; depth, 210 meters; lat. 63°52′ N., long. 61°25′ W.; dynamic height, 1,454.827 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	3.60	31.52	25.06
20 meters	3.40	31.95	25.44
40 meters	.44	33.03	26.52
60 meters	−1.46	33.25	26.76
80 meters	−1.56	33.37	26.87
100 meters	−1.56	33.45	26.93
150 meters	−.95	33.56	27.01
200 meters	.56	33.66	27.01

Station 1029; Aug. 17; depth, 210 meters; lat. 63°48′ N., long. 62°11′ W.; dynamic height, 1,454.856 meters

0 meter	2.30	30.18	24.02
20 meters	2.40	31.51	25.17
40 meters	1.68	32.70	26.17
60 meters	−.64	33.16	26.67
80 meters	−1.26	33.28	26.79
100 meters	−1.26	33.39	26.89
150 meters	−1.16	33.62	27.06
200 meters	−1.06	33.79	27.19

Station 1030; Aug. 17; depth, 250 meters; lat. 63°44′ N., long. 62°44′ W.; dynamic height, 1,454.871 meters

0 meter	3.10	31.03	24.70
20 meters	1.58	31.65	25.34
40 meters	−1.25	32.75	26.36
60 meters	−1.67	32.81	26.41
80 meters	−1.77	33.12	26.67
100 meters	−1.77	33.26	26.78
125 meters	−1.67	33.34	26.85
175 meters	−1.46	33.47	26.95
200 meters	−1.26	(33.52)	26.99
225 meters	−1.16	33.59	27.03

Station 1031; Aug. 18; depth, 200 meters; lat. 63°41′ N., long. 63°21′ W.; dynamic height, 1,454.937 meters

0 meter	3.50	29.90	23.78
20 meters	2.38	31.06	24.71
40 meters	−.74	32.36	26.04
60 meters	−1.64	32.90	26.49
100 meters	−1.85	32.96	26.54
125 meters	−1.75	32.97	26.54
150 meters	−1.44	32.98	26.55
175 meters	−1.24	32.98	26.54

Station 1032; Aug. 18; depth, 201 meters; lat. 63°29′ N., long. 62°43′ W.; dynamic height, 1,454.908 meters

0 meter	2.90	30.92	24.57
20 meters	1.28	31.02	24.76
40 meters	−1.23	32.07	25.81
60 meters	−1.64	32.79	26.40
100 meters	−1.84	33.06	26.62
125 meters	−1.74	33.18	26.71
150 meters	−1.64	33.28	26.80
175 meters	−1.54	33.37	26.87

Station 1033; Aug. 18; depth, 263 meters; lat. 63°17′ N., long. 62°05′ W.; dynamic height, 1,454.850 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	2.90	30.98	24.68
20 meters	1.79	31.58	25.27
40 meters	−1.13	32.80	26.40
60 meters	−1.63	32.95	26.53
100 meters	−1.73	33.19	26.73
150 meters	−1.53	33.47	26.96
175 meters	−1.33	(33.63)	27.07
200 meters	−1.13	33.76	27.17
250 meters	.38	34.04	27.33

Station 1034; Aug. 18; depth, 302 meters; lat. 63°05′ N., long. 61°35′ W. dynamic height, 1,454.799 meters

0 meter	3.60	31.24	24.85
20 meters	2.78	31.50	25.13
40 meters	.77	33.00	26.47
60 meters	−1.03	33.24	26.75
80 meters	−1.44	33.28	26.88
100 meters	−1.44	33.53	27.00
150 meters	−1.24	33.87	27.26
200 meters	−1.04	34.16	27.51
250 meters	−.93	(34.36)	27.65
300 meters	−.83	34.53	27.78

Station 1035; Aug. 18; depth, 650 meters; lat. 62°48′ N., long. 61°11′ W.; dynamic height, 1,454.777 meters

0 meter	5.60	32.09	25.26
20 meters	5.39	32.44	25.63
40 meters	3.78	33.15	26.36
60 meters	1.16	33.51	26.86
100 meters	.55	33.83	27.15
150 meters	.85	34.11	27.36
200 meters	1.16	34.32	27.51
300 meters	1.75	34.58	27.67
400 meters	2.16	34.69	27.73
600 meters	2.66	34.74	27.72

Station 1036; Aug. 18; depth, 1025 meters; lat. 62°32′ N., long. 60°20′ W.; dynamic height, 1,454.756 meters

0 meter	8.40	33.78	26.27
20 meters	8.10	33.74	26.29
40 meters	2.33	33.80	27.00
60 meters	1.72	33.89	27.12
100 meters	2.23	34.09	27.24
200 meters	3.23	34.59	27.55
300 meters	3.93	34.77	27.63
500 meters	4.03	34.83	27.67
700 meters	3.83	34.85	27.71
900 meters	3.73	34.86	27.72
1,000 meters	3.63	34.87	27.74

Station 1037; Aug. 18; depth, 1,500 meters; lat. 62°19 N., long. 59°30′ W.; dynamic height, 1,454.742 meters

0 meter	8.40	33.95	26.40
20 meters	8.30	33.97	26.44
50 meters	7.69	34.15	26.67
100 meters	3.74	34.44	27.39
150 meters	3.53	34.63	27.55
200 meters	3.73	34.74	27.62
300 meters	4.04	34.82	27.66
500 meters	4.04	34.85	27.68
800 meters	3.84	34.87	27.72
1,000 meters	3.63	34.87	27.74
1,200 meters	3.43	34.88	27.77
1,500 meters	3.23	34.88	27.79

Station 1038; Aug. 19; depth, 2,377 meters; lat. 62°07′ N. long. 58°41′ W.; dynamic height, 1,454.677 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	8.70	33.82	26.26
20 meters	8.70	34.18	26.54
50 meters	(4.70)	34.43	27.10
100 meters	3.72	34.65	27.56
150 meters	3.72	34.75	27.63
200 meters	3.92	34.81	27.67
300 meters	4.12	34.86	27.68
500 meters	3.92	34.87	27.72
800 meters	3.62	34.88	27.75
1,000 meters	3.42	34.89	27.78
1,200 meters	3.32	34.89	27.78

Station 1039; Aug. 19; depth, 2,377 meters; lat. 61°55′ N., long. 57°58′ W.; dynamic height, 1,454.673 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	9.30	34.41	26.64
20 meters	9.10	34.41	26.67
50 meters	6.57	34.49	27.10
100 meters	3.94	34.67	27.55
150 meters	3.52	34.75	27.65
200 meters	3.72	34.80	27.67
300 meters	3.93	34.84	27.68
500 meters	3.72	34.86	27.72
800 meters	3.52	34.87	27.75
1,000 meters	3.42	34.88	27.77
1,200 meters	3.32	34.88	27.77
1,500 meters	3.22	34.89	27.78

Station 1040; Aug. 19; depth, 2,277 meters; lat. 61°23′ N., long. 58°49′ W.; dynamic height, 1,454.657 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	9.10	34.38	26.64
20 meters	9.00	34.37	26.65
50 meters	7.07	34.41	26.96
100 meters	3.93	34.64	27.52
150 meters	3.72	34.77	27.64
200 meters	3.82	34.83	27.68
300 meters	3.93	34.88	27.71
500 meters	3.72	34.89	27.74
800 meters	3.42	34.89	27.77
1,000 meters	3.32	34.89	27.78
1,200 meters	3.22	34.89	27.79

Station 1041; Aug. 19; depth, 2,300 meters; lat. 61° 26′ N., long. 59°32′ W.; dynamic height, 1,454.688 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	9.10	34.17	26.48
20 meters	9.00	34.18	26.50
50 meters	7.28	34.35	26.89
100 meters	3.93	34.66	27.54
150 meters	3.72	34.77	27.65
200 meters	3.72	34.81	27.68
300 meters	4.04	34.87	27.69
500 meters	3.93	34.88	27.72
800 meters	3.62	34.89	27.75
1,000 meters	3.42	34.89	27.77
1,200 meters	3.32	34.88	27.78

Station 1042; Aug. 19; depth, 950 meters; lat. 61° 32′ N., long. 60°26′ W.; dynamic height, 1,454.759 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	8.10	33.75	26.30
20 meters	8.00	33.74	26.31
40 meters	7.38	33.90	26.52
60 meters	6.57	34.20	26.87
100 meters	3.33	34.44	27.28
150 meters	3.13	34.60	27.57
200 meters	3.33	34.70	27.63
300 meters	3.93	34.82	27.66
500 meters	3.93	34.85	27.69
800 meters	3.83	34.85	27.70

Station 1043; Aug. 20; depth, 574 meters; lat. 61° 30′ N., long. 61°17′ W.; dynamic height, 1,454.727 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	6.20	33.71	26.53
20 meters	5.88	33.79	26.62
40 meters	4.34	33.90	26.89
60 meters	2.33	34.03	27.18
100 meters	1.93	34.35	27.48
150 meters	3.24	34.61	27.57
200 meters	3.54	34.73	27.63
300 meters	3.74	34.79	27.66
500 meters	3.74	34.82	27.69

Station 1044; Aug. 20; depth, 600 meters; lat. 61° 31′ N., long. 62°00′ W.; dynamic height, 1,454.749 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	4.90	33.34	26.39
20 meters	4.59	33.32	26.41
40 meters	3.37	33.42	26.61
60 meters	.96	33.60	26.94
100 meters	.36	34.00	27.30
150 meters	.46	34.35	27.58
200 meters	1.77	34.53	27.63
300 meters	3.27	34.72	27.66
500 meters	3.47	34.79	27.69

Station 1045; Aug. 20; depth, 635 meters; lat. 61° 35′ N., long. 62°45′ W.; dynamic height, 1,454.735 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	7.30	33.74	26.41
20 meters	6.78	33.72	26.46
40 meters	4.07	33.79	26.83
60 meters	1.13	33.94	27.20
80 meters	.93	34.12	27.36
100 meters	1.24	34.27	27.47
150 meters	2.64	34.53	27.56
200 meters	3.04	34.64	27.61
300 meters	3.44	34.72	27.64
400 meters	3.54	34.77	27.67
500 meters	3.64	(34.80)	27.68
600 meters	3.64	34.80	27.68

Station 1046; Aug. 20; depth, 535 meters; lat. 61° 39′ N., long. 63°18′ W.; dynamic height, 1,454.744 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meters	6.20	33.69	26.51
20 meters	5.89	33.67	26.54
40 meters	4.97	33.67	26.64
60 meters	1.24	33.79	27.07
100 meters	.64	34.18	27.43
150 meters	2.35	34.49	27.56
200 meters	3.15	34.62	27.59
300 meters	3.55	34.73	27.63
350 meters	3.55	34.75	27.64
500 meters	3.65	34.81	27.69

Station 1047; Aug. 20; depth, 365 meters; lat. 61°39′ N., long. 63°58′ W.; dynamic height, 1,454.772 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	5.30	31.72	25.06
20 meters	3.38	32.75	26.07
40 meters	2.05	33.45	26.75
60 meters	.44	33.71	27.06
100 meters	−.17	34.02	27.34
150 meters	1.15	34.30	27.50
200 meters	2.65	34.52	27.55
250 meters	2.85	34.58	27.58
300 meters	3.05	34.66	27.62
350 meters	2.55	34.67	27.68

Station 1048; Aug. 21; depth, 262 meters; lat. 61°17′ N., long. 64°39′ W.

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	0.90	32.63	26.16
20 meters	.38	32.83	26.35
40 meters	.28	32.95	26.46
60 meters	.29	33.05	26.54
100 meters	.29	33.22	26.67
150 meters	.23	33.40	26.83
200 meters	.13	33.47	26.89
250 meters	.19	33.53	26.93

Station 1049; Aug. 21; depth, 360 meters; lat. 61°04′ N., long. 64°46′ W.

0 meter	1.00	32.37	25.96
20 meters	.80	32.31	25.92
40 meters	.38	32.66	26.22
60 meters	−.12	32.88	26.42
80 meters	−.43	33.04	26.56
100 meters	−.73	33.18	26.69
150 meters	−.73	33.51	26.96
200 meters	.18	33.77	27.12
250 meters	.18	33.95	27.26
300 meters	.38	34.10	27.38
325 meters	.48	34.13	27.40

Station 1050; Aug. 21; depth, 575 meters; lat. 60°53′ N., long. 64°43′ W.

0 meter	1.90	32.40	25.92
20 meters	1.79	32.39	25.92
40 meters	1.38	32.55	26.07
60 meters	.97	32.77	26.28
100 meters	.16	33.09	26.58
150 meters	−.34	33.45	26.89
200 meters	−.24	33.69	27.08
300 meters	−.24	33.97	27.30
400 meters	.36	34.05	27.34
475 meters	.36	34.06	27.35

Station 1051; Aug. 24; depth, 65 meters; lat. 59°40′ N., long. 63°52′ W.

0 meter	3.90	32.02	25.45
10 meters	3.69	32.05	25.50
20 meters	3.08	32.10	25.58
30 meters	2.47	32.17	25.69
40 meters	1.56	32.42	25.95
50 meters	−.54	32.88	26.43
60 meters	−1.84	33.36	26.87

Station 1052; Aug. 24; depth, 43 meters; lat. 59°43′ N., long. 63°38′ W.

0 meter	2.80	32.30	25.77
10 meters	2.29	32.33	25.83
20 meters	2.18	32.47	25.95
30 meters	2.08	33.00	26.38
35 meters	1.98	33.40	26.72

Station 1053; Aug. 24; depth, 152 meters; lat. 59°38′ N., long. 63°09′ W.

0 meter	3.30	32.34	25.76
20 meters	1.90	32.37	25.90
40 meters	.76	32.51	26.08
60 meters	.05	32.75	26.31
80 meters	−.55	32.87	26.43
100 meters	−.85	32.91	26.47
125 meters	−.95	32.91	26.48
150 meters	−.95	32.92	26.49

Station 1054; Aug. 25; depth, 102 meters; lat. 58°52′ N., long. 62°52′ W.; dynamic height, 1,454.882 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	3.20	32.29	25.73
10 meters	2.68	32.27	25.76
20 meters	1.86	32.35	25.88
30 meters	1.45	32.45	25.99
40 meters	.96	32.50	26.06
60 meters	.75	32.55	26.11
90 meters	.55	32.56	26.13

Station 1055; Aug. 25; depth, 195 meters; lat. 58°53′ N., long. 62°23′ W.; dynamic height, 1,454.917 meters

0 meter	7.60	31.93	24.95
20 meters	4.96	31.96	25.30
30 meters	2.45	32.05	25.60
40 meters	.72	32.14	25.79
60 meters	−.08	32.44	26.07
80 meters	−.48	32.63	26.23
90 meters	−.58	(32.71)	26.30
100 meters	−.68	32.78	26.36
125 meters	−.68	32.93	26.48
150 meters	−.68	33.08	26.60
180 meters	−.68	33.10	26.62

Station 1056; Aug. 25; depth, 149 meters; lat. 58°53′ N., long. 61°54′ W.; dynamic height, 1,454.881 meters

0 meter	5.40	31.99	25.26
20 meters	4.88	32.01	25.33
40 meters	2.34	32.38	25.87
60 meters	.34	32.64	26.20
80 meters	−.37	32.82	26.39
100 meters	−.77	33.00	26.54
125 meters	−.87	33.03	26.57

Station 1057; Aug. 25; depth, 150 meters; lat. 58°54′ N., long. 61°27′ W.; dynamic height, 1,454.889 meters

0 meter	6.00	32.09	25.28
20 meters	5.39	32.01	25.29
40 meters	2.33	32.28	25.79
60 meters	.13	32.51	26.11
80 meters	−.37	32.71	26.29
100 meters	−.57	32.88	26.44
125 meters	−.67	33.08	26.60
140 meters	−.67	33.14	26.65

Station 1058; Aug. 25; depth, 190 meters; lat. 58°55′ N., long. 60°54′ W.; dynamic height, 1,454.840 meters

0 meter	4.80	32.05	25.38
20 meters	3.47	32.19	25.63
40 meters	1.14	32.62	26.14
60 meters	.34	32.83	26.36
80 meters	.14	32.94	26.47
125 meters	.04	33.18	26.65
140 meters	.04	33.17	26.68
175 meters	.14	33.37	26.81

Station 1059; Aug. 25; depth, 475 meters; lat. 59°09′ N., long. 60°18′ W.; dynamic height, 1,454.732 meters

0 meter	3.00	32.78	26.14
20 meters	3.00	32.91	26.24
40 meters	2.49	33.11	26.44
60 meters	1.18	33.36	26.74
100 meters	(−.50)	33.83	27.20
150 meters	1.18	34.29	27.49
175 meters	1.98	(34.41)	27.52
200 meters	2.28	34.48	27.55
300 meters	2.98	34.66	27.64
450 meters	3.38	34.73	27.65

Station 1060; Aug. 25; depth, 1,650 meters; lat. 59°27′ N., long. 59°48′ W.; dynamic height, 1,454.717 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	6.30	33.93	26.69
20 meters	6.30	33.99	26.74
50 meters	6.09	34.15	26.89
100 meters	5.28	(34.39)	27.18
150 meters	4.91	34.63	27.41
200 meters	4.66	34.72	27.51
300 meters	4.36	34.78	27.58
500 meters	3.85	34.86	27.71
700 meters	3.55	34.89	27.76
1,000 meters	3.35	34.89	27.78
1,200 meters	3.25	34.89	27.79
1,300 meters	3.15	34.89	27.80

Station 1061; Aug. 25; depth, 1,350 meters; lat. 59°44′ N., long. 59°21′ W.; dynamic height, 1,454.718 meters

0 meter	9.30	34.50	26.71
20 meters	9.00	34.54	26.77
40 meters	8.38	34.56	26.89
60 meters	7.85	34.58	27.04
100 meters	6.34	34.64	27.24
150 meters	5.63	34.71	27.38
200 meters	5.13	34.77	27.49
300 meters	4.52	34.83	27.61
450 meters	4.12	34.87	27.68
500 meters	4.02	34.87	27.69
600 meters	3.82	34.89	27.73
800 meters	3.52	34.89	27.78
1,000 meters	3.32	34.89	27.78
1,200 meters	3.12	34.89	27.80

Station 1062; Aug. 26; depth, 2,150 meters; lat. 60°03′ N., long. 58°52′ W.; dynamic height, 1,454.640 meters

0 meter	8.60	34.48	26.80
20 meters	7.68	34.50	26.95
40 meters	5.57	34.58	27.29
60 meters	4.97	34.63	27.81
100 meters	4.58	34.73	27.54
150 meters	4.32	34.80	27.61
200 meters	4.12	34.85	27.67
300 meters	3.92	34.86	27.70
500 meters	3.62	34.87	27.73
800 meters	3.32	34.88	27.77
1,000 meters	3.22	34.89	27.79
1,200 meters	3.12	34.88	27.79

Station 1063; Aug. 26; depth, 2,745 meters; lat. 60°21′ N., long. 58°24′ W.; dynamic height, 1,454.683 meters

0 meter	9.00	34.50	26.74
20 meters	9.10	34.49	26.73
40 meters	7.36	35.53	27.02
60 meters	5.13	34.56	27.33
100 meters	4.62	34.64	27.45
150 meters	4.42	34.73	27.54
200 meters	4.32	34.78	27.59
300 meters	4.12	34.82	27.65
500 meters	3.86	34.86	27.70
800 meters	3.56	34.88	27.75
1,000 meters	3.36	34.89	27.78
1,200 meters	3.21	34.89	27.79
1,500 meters	3.06	34.89	27.81

Station 1064; Aug. 26; depth, 2,964 meters; lat. 60°14′ N., long. 57°20′ W.; dynamic height, 1,454.649 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	9.40	34.51	26.68
20 meters	9.20	34.47	26.70
40 meters	7.57	34.53	26.98
60 meters	5.74	34.64	27.32
100 meters	4.82	34.74	27.50
150 meters	4.52	34.81	27.59
200 meters	4.37	34.85	27.64
300 meters	3.92	34.86	27.70
500 meters	3.61	34.86	27.73
800 meters	3.41	34.87	27.75
1,000 meters	3.26	34.88	27.79
1,200 meters	3.11	34.88	27.80
1,400 meters	3.06	34.89	27.81
1,500 meters	3.01	34.90	27.82
1,700 meters	2.91	34.90	27.83
1,900 meters	2.96	34.90	27.83
2,000 meters	2.91	34.91	27.84
2,100 meters	2.70	34.91	27.85
2,400 meters	2.50	34.91	27.87

Station 1065; Aug. 26; depth, 3,248 meters; lat. 60°06′ N., long. 56°13′ W.; dynamic height, 1,454.663 meters

0 meter	9.90	34.46	26.59
20 meters	9.49	34.44	26.64
40 meters	9.38	34.53	26.70
60 meters	6.03	34.62	27.27
100 meters	5.02	34.72	27.46
150 meters	4.72	34.78	27.55
200 meters	4.52	34.84	27.62
300 meters	4.16	34.86	27.67
500 meters	3.71	34.87	27.73
800 meters	3.31	34.87	27.77
1,000 meters	3.21	34.88	27.79
1,200 meters	3.11	34.89	27.81
1,500 meters	3.06	34.89	27.81

Station 1066; Aug. 26; depth, 3,430 meters; lat. 59°57′ N., long. 55°14′ W.; dynamic height, 1,454.623 meters

0 meter	8.80	34.64	26.88
20 meters	8.90	34.58	26.82
40 meters	7.78	34.54	26.96
60 meters	5.96	34.62	27.26
100 meters	4.61	34.72	27.51
150 meters	4.21	34.81	27.62
200 meters	4.01	34.85	27.69
300 meters	3.70	34.85	27.71
500 meters	3.26	34.85	27.75
800 meters	3.11	34.86	27.78
1,000 meters	3.06	34.89	27.81
1,200 meters	3.06	34.89	27.81
1,500 meters	3.01	34.89	27.81
1,800 meters	2.96	34.90	27.82
2,400 meters	2.91	34.91	27.83
3,000 meters	2.26	34.92	27.91

Station 1067; Aug. 27; depth, 3,431 meters; lat. 60°00′ N., long. 54°15′ W.; dynamic height, 1,454.605 meters

0 meter	9.20	34.56	26.76
20 meters	9.10	34.56	26.77
40 meters	8.38	34.60	26.92
60 meters	7.04	34.78	27.26
100 meters	5.72	34.90	27.53
150 meters	4.92	34.94	27.66
200 meters	4.51	34.95	27.72
300 meters	4.11	34.92	27.73
500 meters	3.56	34.91	27.78
800 meters	3.21	34.90	27.80
1,000 meters	3.11	34.90	27.81
1,200 meters	3.11	34.91	27.82
1,500 meters	3.06	34.90	27.82

Station 1068; Aug. 27; depth, 3,200 meters; lat. 60°07′ N., long. 53°17′ W.; dynamic height, 1,454.564 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	9.30	34.62	26.79
20 meters	8.99	34.58	26.82
40 meters	7.76	34.58	27.00
60 meters	5.55	34.72	27.40
100 meters	4.62	34.86	27.62
150 meters	4.02	34.92	27.74
200 meters	3.82	34.91	27.75
300 meters	3.61	34.90	27.76
500 meters	3.31	34.90	27.79
800 meters	3.11	34.90	27.81
1,000 meters	3.06	34.90	27.82
1,200 meters	3.01	34.90	27.82
1,500 meters	2.99	34.90	27.83
1,800 meters	2.96	34.90	27.83
2,400 meters	2.91	34.90	27.84
3,000 meters	2.50	34.90	27.86

Station 1069; Aug. 27; depth, 3,248 meters; lat. 60°10′ N., long. 52°06′ W.; dynamic height, 1,454.682 meters

0 meter	8.40	34.52	26.85
20 meters	7.78	34.55	26.97
40 meters	5.95	34.68	27.32
60 meters	5.43	34.82	27.49
100 meters	4.93	34.88	27.61
150 meters	5.03	34.92	27.63
200 meters	4.92	34.94	27.65
300 meters	4.77	34.94	27.67
500 meters	4.47	34.92	27.69
800 meters	4.02	34.92	27.72
1,000 meters	3.77	34.91	27.75
1,200 meters	3.62	34.91	27.77
1,500 meters	3.32	34.90	27.79

Station 1070; Aug. 27; depth, 3,376 meters; lat. 60°13′ N., long. 51°14′ W.; dynamic height, 1,454.610 meters

0 meter	9.20	34.55	26.76
20 meters	7.66	34.53	26.97
40 meters	5.94	34.55	27.22
60 meters	5.43	34.74	27.43
100 meters	5.12	34.91	27.60
150 meters	4.86	34.96	27.67
200 meters	4.71	34.96	27.69
300 meters	4.41	34.94	27.71
500 meters	3.96	34.92	27.74
800 meters	3.51	34.92	27.79
1,000 meters	3.31	34.92	27.81
1,200 meters	3.21	34.91	27.81
1,500 meters	3.11	34.91	27.82
1,800 meters	3.01	34.91	27.83
2,400 meters	2.91	34.90	27.83
3,000 meters	2.60	34.90	27.85

Station 1071; Aug. 27; depth, 3,230 meters; lat. 60°23′ N., long. 50°48′ W.; dynamic height, 1,454.575 meters.

0 meter	9.20	34.67	26.85
20 meters	8.58	34.68	26.95
40 meters	7.36	34.73	27.17
60 meters	6.05	34.88	27.47
100 meters	5.35	34.99	27.64
150 meters	4.87	35.01	27.71
200 meters	4.53	35.00	27.75
300 meters	4.17	34.98	27.77
500 meters	3.71	34.94	27.78
800 meters	3.31	34.91	27.80
1,000 meters	3.16	34.90	27.81
1,200 meters	3.06	34.90	27.82
1,500 meters	3.01	34.90	27.83

Station 1072; Aug. 28; depth, 3,120 meters; lat. 60°34′ N., long. 50°26′ W.; dynamic height 1,454.579 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	9.20	34.61	26.81
20 meters	8.98	34.68	26.89
40 meters	8.28	34.90	27.17
60 meters	7.67	34.99	27.34
100 meters	5.71	35.04	27.63
150 meters	5.21	35.04	27.70
200 meters	4.91	35.03	27.73
300 meters	4.41	34.99	27.75
500 meters	3.61	34.94	27.78
800 meters	3.41	34.93	27.80
1,000 meters	3.21	34.91	27.81
1,200 meters	3.11	34.92	27.82
1,500 meters	3.01	34.91	27.83

Station 1073; Aug. 28; depth, 2,972 meters; lat. 60°45′ N., long. 50°10′ W.; dynamic height, 1,454.577 meters

0 meter	9.40	34.68	26.82
20 meters	9.19	34.78	26.93
40 meters	8.66	34.88	27.10
60 meters	6.74	34.89	27.38
100 meters	5.03	34.89	27.60
150 meters	4.21	34.90	27.70
200 meters	3.91	34.90	27.73
300 meters	3.61	34.91	27.77
500 meters	3.41	34.90	27.79
800 meters	3.10	34.90	27.81
1,000 meters	3.00	34.89	27.82
1,200 meters	2.95	34.89	27.82
1,500 meters	2.90	34.89	27.82

Station 1074; Aug. 28; depth, 2,818 meters; lat. 60°57′ N., long. 49°45′ W.; dynamic height, 1,454.620 meters

0 meter	8.70	34.68	26.94
20 meters	8.70	34.70	26.95
40 meters	8.59	34.73	26.99
60 meters	8.08	34.78	27.11
100 meters	6.15	34.91	27.48
150 meters	5.29	34.98	27.64
200 meters	4.93	35.01	27.71
300 meters	4.53	34.99	27.74
500 meters	3.91	34.94	27.76
800 meters	3.51	34.92	27.79
1,000 meters	3.31	34.91	27.80
1,200 meters	3.18	34.90	27.81
1,500 meters	3.11	34.90	27.81

Station 1075; Aug. 28; depth, 316 meters; lat. 61°11′ N., long. 49°30′ W.; dynamic height, 1,454.840 meters

0 meter	4.60	31.73	25.13
20 meters	4.40	32.30	25.62
40 meters	2.76	32.97	26.31
60 meters	3.40	33.59	26.74
100 meters	4.50	34.35	27.24
150 meters	5.30	34.55	27.30
200 meters	5.45	34.64	27.36
275 meters	5.50	34.69	27.39
300 meters	5.50	(34.69)	27.39

Station 1076; Aug. 28; depth, 120 meters; lat. 61°15′ long. 49°08′ W.; dynamic height, 1,454.925 meters

0 meter	6.30	30.44	24.07
20 meters	5.37	31.01	24.47
40 meters	3.15	31.63	25.19
60 meters	2.45	32.33	25.81
80 meters	2.35	32.84	26.24
100 meters	2.30	33.14	26.47

Station 1077; Sept. 1; depth, 165 meters; lat. 60°39′ N., long. 48°39′ W.

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	4.10	31.47	24.98
20 meters	3.49	32.51	25.88
40 meters	3.29	33.28	26.51
60 meters	3.28	33.62	26.78
80 meters	3.38	33.72	26.85
100 meters	3.38	33.82	26.93
125 meters	3.90	34.02	27.04
150 meters	4.20	34.06	27.04

Station 1078; Sept. 1; depth, 249 meters; lat. 60°24′ N., long. 48°23′ W.

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	4.10	33.25	26.41
20 meters	3.50	33.45	26.62
40 meters	3.60	33.88	26.96
60 meters	4.70	34.23	27.12
80 meters	5.00	34.45	27.26
100 meters	5.20	34.50	27.28
150 meters	5.40	34.59	27.32
225 meters	5.50	34.64	27.35

Station 1079; Sept. 2; depth, 2,972 meters; lat. 60°08′ N., long. 48°04′ W.

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	8.90	34.94	27.10
20 meters	8.60	34.97	27.18
40 meters	8.19	35.00	27.27
60 meters	7.78	35.02	27.34
100 meters	6.26	35.06	27.51
150 meters	6.05	35.09	27.63
200 meters	5.74	35.10	27.68
225 meters	5.63	(35.10)	27.69
300 meters	5.22	35.06	27.71
500 meters	4.12	34.93	27.73
800 meters	3.71	34.91	27.76
1,000 meters	3.51	34.91	27.78
1,200 meters	3.41	34.92	27.80
1,500 meters	3.31	34.93	27.81

Station 1080; Sept. 2; depth, 175 meters; lat. 59°40′ N., long. 44°20′ W.; dynamic height, 1,454.707 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	4.60	33.28	26.38
20 meters	4.30	33.61	26.67
40 meters	4.35	34.03	27.00
60 meters	4.70	34.22	27.12
80 meters	5.00	34.42	27.24
100 meters	5.10	34.52	27.31
125 meters	5.15	34.70	27.43
150 meters	5.20	34.73	27.46

Station 1081; Sept. 2; depth, 462 meters; lat. 59°32′ N., long. 44°50′ W.; dynamic height, 1,454.671 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	7.10	34.77	27.25
20 meters	7.20	34.79	27.25
40 meters	7.20	34.81	27.26
60 meters	6.93	34.83	27.31
100 meters	6.18	34.84	27.42
150 meters	5.37	34.83	27.51
200 meters	5.17	34.82	27.53
300 meters	5.17	34.86	27.56
425 meters	5.17	34.93	27.62

Station 1082; Sept. 2; depth, 2,150 meters; lat. 59°22′ N., long. 45°13′ W.; dynamic height, 1,454.601 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	7.60	34.65	27.08
20 meters	7.20	34.81	27.26
40 meters	6.98	34.84	27.32
60 meters	6.16	34.87	27.44
100 meters	5.45	34.91	27.57
150 meters	5.05	34.93	27.63
200 meters	4.70	34.91	27.65
300 meters	4.24	34.91	27.70
425 meters	3.94	34.90	27.73
500 meters	3.63	34.89	27.75
800 meters	3.23	34.88	27.79
1,000 meters	3.13	34.89	27.80
1,200 meters	3.13	34.90	27.81
1,500 meters	3.13	34.91	27.82

Station 1083; Sept. 3; depth, 2,251 meters; lat. 59°12′ N., long. 45°37′ W.; dynamic height, 1,454.636 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	8.70	34.61	26.89
20 meters	8.80	34.67	26.91
40 meters	8.59	34.79	27.04
60 meters	8.08	34.89	27.20
100 meters	5.85	34.95	27.55
150 meters	5.23	34.96	27.63
200 meters	4.93	34.94	27.65
300 meters	4.33	34.92	27.70
500 meters	3.72	34.88	27.73
800 meters	3.31	34.88	27.77
1,000 meters	3.11	34.89	27.79
1,200 meters	3.11	34.90	27.81
1,500 meters	3.11	34.90	27.81

Station 1084; Sept. 3; depth, 2,562 meters; lat. 58°57′ N., long. 46°11′ W.; dynamic height, 1,454.615 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	8.80	34.83	27.04
20 meters	8.80	(34.83)	27.04
40 meters	8.58	34.81	27.05
60 meters	7.45	34.89	27.28
100 meters	5.53	34.94	27.58
150 meters	4.93	34.95	27.66
200 meters	4.57	34.93	27.69
300 meters	4.02	34.91	27.72
500 meters	3.51	34.89	27.76
800 meters	3.31	34.90	27.79
1,000 meters	3.11	34.90	27.81
1,200 meters	3.01	34.89	27.81
1,500 meters	3.01	34.89	27.81

Station 1085; Sept. 3; depth, 2,791 meters; lat. 58°36′ N., long. 46°44′ W.; dynamic height, 1,454.614, meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	8.70	34.75	26.98
20 meters	8.80	34.75	26.98
40 meters	8.58	34.75	27.01
60 meters	7.77	34.84	27.20
100 meters	5.64	34.99	27.61
150 meters	5.03	35.02	27.70
200 meters	4.73	34.99	27.71
300 meters	4.22	34.94	27.73
500 meters	3.71	34.89	27.74
800 meters	3.31	34.89	27.78
1,000 meters	3.11	34.89	27.80
1,200 meters	3.01	34.89	27.81
1,500 meters	3.01	34.91	27.83

79920—37——15

Station 1086; Sept. 3; depth, 3,431 meters; lat. 58°12′ N., long. 47°16′ W.; dynamic height, 1,454.582 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	8.90	34.82	27.01
20 meters	8.80	34.79	27.01
40 meters	8.39	34.78	27.06
60 meters	6.95	34.83	27.31
100 meters	5.13	34.94	27.63
150 meters	4.72	35.01	27.73
200 meters	4.52	35.02	27.77
300 meters	4.27	35.01	27.78
500 meters	3.61	34.93	27.79
800 meters	3.26	34.90	27.80
1,000 meters	3.11	34.89	27.80
1,200 meters	3.11	34.89	27.80
1,500 meters	3.11	34.90	27.81
2,000 meters	3.01	34.91	27.83

Station 1087; Sept. 3; depth, 3,493 meters; lat. 57°50′ N., long. 47°48′ W.; dynamic height, 1,454.584 meters

0 meter	9.50	34.73	26.84
20 meters	9.10	34.71	26.89
40 meters	8.99	34.75	26.94
60 meters	6.03	34.81	27.41
100 meters	4.92	34.91	27.63
150 meters	4.41	34.95	27.72
200 meters	4.21	34.94	27.73
300 meters	3.81	34.93	27.76
500 meters	3.40	34.91	27.79
800 meters	3.10	34.88	27.80
1,000 meters	3.10	34.89	27.80
1,200 meters	3.10	34.89	27.81
1,500 meters	3.00	34.90	27.82

Station 1088; Sept. 4; depth, 3,566 meters; lat. 57°27′ N., long. 48°23′ W.; dynamic height, 1,454.572 meters

0 meter	9.40	34.75	26.87
20 meters	9.10	34.73	26.91
40 meters	8.28	34.75	27.05
60 meters	5.32	34.83	27.51
100 meters	4.11	34.91	27.72
150 meters	4.01	34.93	27.75
200 meters	3.71	34.92	27.77
300 meters	3.50	34.90	27.77
500 meters	3.30	34.89	27.78
800 meters	3.10	34.88	27.80
1,000 meters	3.05	34.88	27.80
1,200 meters	3.00	34.89	27.81
1,500 meters	3.00	34.90	27.82

Station 1089; Sept. 4; depth, 3,721 meters; lat. 56°55′ N., long. 48°54′ W.; dynamic height, 1,454.606 meters

0 meter	9.70	34.64	26.73
20 meters	9.60	34.63	26.74
40 meters	9.29	34.64	26.80
60 meters	7.56	34.82	27.21
100 meters	4.31	34.90	27.68
150 meters	3.75	34.86	27.72
200 meters	3.50	34.84	27.73
300 meters	3.30	34.83	27.74
500 meters	3.10	34.83	27.76
800 meters	3.05	34.86	27.79
1,000 meters	3.00	34.88	27.81
1,200 meters	2.95	(34.88)	27.81
1,500 meters	2.90	34.88	27.81
2,000 meters	2.80	34.90	27.84
2,400 meters	2.70	34.91	27.85
3,000 meters	2.14	34.92	27.91

Station 1090; Sept. 4; depth, 3,840 meters; lat. 56°22′ N., long. 48°48′ W.; dynamic height, 1,454.565 meters.

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	9.90	34.63	26.70
20 meters	9.90	34.63	26.70
40 meters	8.98	34.68	26.88
60 meters	5.12	34.80	27.52
100 meters	3.91	34.87	27.71
150 meters	3.60	34.89	27.76
200 meters	3.35	34.88	27.77
300 meters	3.20	34.88	27.79
500 meters	3.04	34.88	27.80
800 meters	2.99	34.88	27.81
1,000 meters	2.99	34.88	27.81
1,200 meters	2.99	34.88	27.81
1,500 meters	2.89	34.88	27.82
2,000 meters	2.79	34.90	27.84

Station 1091; Sept. 4; depth, 3,800 meters; lat. 55°47′ N., long. 48°53′ W.; dynamic height, 1,454.586 meters.

0 meter	10.60	34.66	26.59
20 meters	10.40	34.66	26.63
40 meters	10.20	34.68	26.68
60 meters	5.42	34.76	27.45
100 meters	3.89	34.85	27.69
150 meters	3.63	34.89	27.75
200 meters	3.48	34.89	27.76
300 meters	3.28	34.88	27.77
500 meters	3.18	34.88	27.79
800 meters	3.08	34.87	27.80
1,000 meters	3.03	34.88	27.81
1,200 meters	3.03	34.89	27.81
1,500 meters	3.03	34.88	27.81
2,000 meters	2.98	34.89	27.82
2,050 meters	2.98	34.90	27.82
2,550 meters	2.88	34.91	27.83
3,100 meters	2.78	34.92	27.86

Station 1092; Sept. 5; depth, 3,800 meters; lat. 55°13′ N., long. 49°06′ W.; dynamic height, 1,454.599 meters.

0 meter	10.20	34.47	26.54
20 meters	10.10	34.47	26.56
40 meters	9.78	34.50	26.64
60 meters	5.12	34.68	27.42
100 meters	3.80	34.83	27.69
150 meters	3.69	34.87	27.73
200 meters	3.49	34.88	27.75
300 meters	3.29	34.87	27.76
500 meters	3.19	34.88	27.79
800 meters	3.09	34.88	27.80
1,000 meters	2.99	34.89	27.81
1,200 meters	2.99	34.89	27.81
1,500 meters	3.09	34.89	27.82

Station 1093; Sept. 5; depth, 3,724 meters; lat. 54°37′ N., long. 49°16′ W.; dynamic height, 1,454.595 meters.

0 meter	10.30	34.55	26.57
20 meters	10.20	34.58	26.60
40 meters	9.68	34.66	26.69
60 meters	7.55	34.72	27.14
100 meters	4.14	34.80	27.63
150 meters	3.49	34.83	27.72
200 meters	3.39	34.85	27.75
300 meters	3.29	34.87	27.77
500 meters	3.13	34.88	27.79
800 meters	2.98	34.88	27.81
1,000 meters	3.08	34.87	27.80
1,200 meters	2.98	34.88	27.81
1,500 meters	2.88	34.89	27.82
1,900 meters	2.88	34.89	27.82
2,400 meters	2.83	34.90	27.83
3,000 meters	2.68	34.91	27.85

Station 1094; Sept. 5; depth, 3,340 meters; lat. 54°00′ N., long. 49°26′ W.; dynamic height, 1,454.627 meters.

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	10.40	34.38	26.43
20 meters	10.10	34.39	26.49
40 meters	9.77	34.47	26.62
60 meters	5.93	34.72	27.35
100 meters	4.91	34.81	27.55
150 meters	4.00	34.84	27.67
200 meters	3.69	34.86	27.72
300 meters	3.49	34.87	27.76
500 meters	3.49	34.87	27.76
800 meters	3.29	34.87	27.78
1,000 meters	3.19	34.88	27.79
1,200 meters	3.09	34.88	27.80
1,500 meters	2.99	34.89	27.82

Station 1095; Sept. 5; depth, 3,639 meters; lat. 53°27′ N., long. 49°38′ W.; dynamic height, 1,454.626 meters.

0 meter	11.20	34.44	26.32
20 meters	11.00	34.47	26.38
40 meters	9.65	34.65	26.53
60 meters	5.82	34.78	27.41
100 meters	4.92	34.83	27.57
150 meters	4.20	34.85	27.66
200 meters	4.00	34.86	27.69
300 meters	3.69	34.88	27.75
500 meters	3.28	34.88	27.77
800 meters	3.17	34.88	27.79
1,000 meters	3.07	34.88	27.80
1,200 meters	3.07	34.89	27.80
1,500 meters	3.02	34.89	27.81
2,000 meters	2.97	34.90	27.82

Station 1096; Sept. 6; depth, 3,474 meters; lat. 53°15′ N., long. 50°46′ W.; dynamic height, 1,454.643 meters

0 meter	10.20	34.29	26.38
20 meters	9.79	34.30	26.46
40 meters	6.12	34.35	27.04
60 meters	4.51	34.56	27.40
100 meters	3.81	34.75	27.62
150 meters	3.70	34.84	27.70
200 meters	3.60	34.85	27.72
300 meters	3.60	34.87	27.75
500 meters	3.50	34.87	27.76
800 meters	3.30	34.87	27.78
1,000 meters	3.24	34.87	27.78
1,200 meters	3.19	34.87	27.79
1,500 meters	3.09	34.88	27.80
2,000 meters	2.89	34.89	27.83

Station 1097; Sept. 6; depth, 2,115 meters; lat. 53°07′ N., long. 51°14′ W.; dynamic height, 1,454.657 meters

0 meter	10.40	34.18	26.26
20 meters	10.30	34.20	26.29
40 meters	6.73	34.25	26.88
60 meters	5.10	34.51	27.29
100 meters	3.89	34.74	27.60
150 meters	3.68	34.81	27.68
200 meters	3.68	34.82	27.69
300 meters	3.68	34.85	27.71
500 meters	3.68	34.86	27.72
800 meters	3.48	34.87	27.75
1,000 meters	3.18	34.87	27.78
1,200 meters	3.08	34.87	27.79
1,500 meters	2.88	34.88	27.81
2,000 meters	2.88	34.89	27.82

Station 1098; Sept. 6; depth, 855 meters; lat. 52°55′ N., long. 51°36′ W.; dynamic height, 1,454.648 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	7.00	33.70	26.42
20 meters	7.20	33.82	26.48
40 meters	7.00	33.97	26.64
60 meters	4.15	34.05	27.03
80 meters	3.17	34.46	27.46
100 meters	3.12	34.59	27.56
150 meters	3.52	34.74	27.65
200 meters	3.67	34.81	27.68
300 meters	3.72	34.85	27.71
400 meters	3.62	34.86	27.73
600 meters	3.52	34.87	27.75
800 meters	3.42	84.88	27.77

Station 1099; Sept. 6; depth, 300 meters; lat. 52°43′ N., long. 52°04′ W.; dynamic height, 1,454.685 meters

0 meter	6.80	33.13	26.00
20 meters	6.19	33.28	26.19
40 meters	−.19	33.52	26.94
60 meters	−.39	33.66	27.06
100 meters	1.02	34.04	27.29
150 meters	2.12	34.38	27.48
200 meters	2.72	34.58	27.59
225 meters	2.93	34.67	27.60
275 meters	3.13	34.67	27.62
300 meters	3.13	(34.69)	27.65

Station 1100; Sept. 7; depth, 243 meters; lat. 52°30′ N., long. 52°32′ W.; dynamic height, 1,454.679 meters

0 meter	7.80	33.11	25.84
20 meters	7.58	33.09	25.86
40 meters	3.64	33.76	26.85
60 meters	−.07	33.80	27.16
100 meters	.93	34.11	27.35
150 meters	1.83	34.44	27.55
200 meters	2.63	34.61	27.63
225 meters	(2.85)	34.70	27.68

Station 1101; Sept. 7; depth, 250 meters; lat. 52°20′ N., long. 53°04′ W.; dynamic height, 1,454.714 meters

0 meter	8.20	32.76	25.51
20 meters	7.98	32.85	25.61
40 meters	.82	33.22	26.64
60 meters	−.69	33.56	26.99
100 meters	−.19	33.90	27.25
150 meters	1.12	34.24	27.44
200 meters	2.42	34.44	27.52
225 meters	2.62	34.50	27.53

Station 1102; Sept. 7; depth, 260 meters; lat. 52°12′ N., long. 54°07′ W.; dynamic height, 1,454.771 meters

0 meter	9.90	32.77	25.25
20 meters	9.28	32.80	25.37
40 meters	7.15	33.00	25.84
60 meters	5.54	33.30	26.29
100 meters	3.10	33.62	26.79
150 meters	.89	33.91	27.20
200 meters	−.91	34.22	27.53
225 meters	−1.11	(34.31)	27.62
240 meters	−1.21	34.39	27.69

Station 1103; Sept. 7; depth, 380 meters; lat. 52°15′ N., long. 53°30′ W.; dynamic height, 1,454.759 meters

Depth	Temperature (°C.)	Salinity (‰)	σt
0 meter	9.70	32.77	25.28
20 meters	7.14	32.78	25.66
40 meters	3.92	32.87	26.12
60 meters	.90	33.09	26.53
100 meters	−.21	33.49	26.91
150 meters	−.31	33.85	27.21
200 meters	−.02	34.15	27.43
240 meters	.59	34.37	27.55
250 meters	.79	34.43	27.57
300 meters	2.30	34.64	27.67
350 meters	3.00	34.80	27.74

Station 1104; Sept. 8; depth, 152 meters; lat. 52°05′ N., long. 54°38′ W.; dynamic height, 1,454.718 meters

Depth	Temperature (°C.)	Salinity (‰)	σt
0 meter	6.80	32.42	25.43
20 meters	4.96	32.76	25.92
40 meters	−.09	33.00	26.51
60 meters	−.89	33.30	26.79
80 meters	−.79	33.45	26.90
100 meters	−.59	33.52	27.00
120 meters	−.39	33.75	27.13
130 meters	.01	(33.85)	27.20
140 meters	−.09	33.93	27.27
150 meters	−.08	(34.00)	27.32

Station 1105: Sept. 8; depth, 145 meters; lat. 51°57′ N., long. 55°08′ W.; dynamic height, 1,454.824 meters

Depth	Temperature (°C.)	Salinity (‰)	σt
0 meter	6.40	31.40	24.66
20 meters	5.47	32.00	25.25
40 meters	3.62	32.45	25.81
60 meters	.61	32.68	26.21
80 meters	−.28	32.83	26.39
100 meters	−.59	32.86	26.42
120 meters	−.69	32.90	26.46
130 meters	−.69	32.94	26.49

Station 1106; Sept. 8; depth, 139 meters; lat. 51°46′ N., long. 55°13′ W.; dynamic height, 1,454.816 meters

Depth	Temperature (°C.)	Salinity (‰)	σt
0 meter	7.00	31.30	24.52
20 meters	6.35	31.62	24.84
40 meters	3.12	32.40	25.81
60 meters	−.29	32.61	26.21
80 meters	−.69	32.73	26.32
100 meters	−.89	32.81	26.39
125 meters	−.89	32.88	26.45
130 meters	−.89	(32.89)	26.46

Station 1107; Sept. 8; depth, 130 meters; lat. 51°38′ N., long. 55°16′ W.; dynamic height, 1,454.928 meters

Depth	Temperature (°C.)	Salinity (‰)	σt
0 meter	10.00	31.16	23.88
20 meters	9.58	31.20	24.06
40 meters	8.16	31.41	24.43
60 meters	6.74	31.62	24.79
80 meters	4.91	32.03	25.34
100 meters	3.60	32.49	25.84
125 meters	1.58	32.65	26.13

Station 1108; Sept. 8; depth, 175 meters; lat. 50°47′ N., long. 55°23′ W.

Depth	Temperature (°C.)	Salinity (‰)	σt
0 meter	9.80	31.28	24.10
20 meters	8.97	31.57	24.44
40 meters	6.35	32.48	25.53
60 meters	2.70	32.96	26.30
80 meters	−.31	33.17	26.66
100 meters	−1.31	33.30	26.80
125 meters	−1.21	33.44	26.91
160 meters	.09	33.55	26.93

Station 1109; Sept. 8; depth, 272 meters; lat. 50°17′ N., long, 54°58′ W.; dynamic height, 1,454.795 meters

Depth	Temperature (°C.)	Salinity (‰)	σt
0 meter	8.90	31.75	24.61
20 meters	7.97	31.87	24.86
40 meters	1.50	32.80	26.26
60 meters	−.70	33.01	26.55
80 meters	−1.21	33.09	26.63
100 meters	−1.51	33.17	26.71
150 meters	−1.30	33.33	26.83
160 meters	−1.20	(33.45)	26.93
200 meters	.70	33.57	26.94
250 meters	.30	(33.68)	27.04
260 meters	.20	33.79	27.13

Station 1110; Sept. 8; depth, 272 meters; lat. 50°25′ N., long. 54°22′ W.; dynamic height, 1,454.719 meters

Depth	Temperature (°C.)	Salinity (‰)	σt
0 meter	9.30	32.03	24.76
20 meters	8.68	32.07	24.89
40 meters	1.90	33.05	26.44
60 meters	−.20	33.26	26.73
80 meters	−.81	33.42	26.88
100 meters	−.92	33.57	27.00
150 meters	−.21	33.88	27.24
200 meters	.59	34.09	27.36
250 meters	1.39	34.31	27.48

Station 1111; Sept. 9; depth, 283 meters; lat. 50°35′ N., long. 53°46′ W.; dynamic height, 1,454.731 meters

Depth	Temperature (°C.)	Salinity (‰)	σt
0 meter	9.00	31.07	24.05
20 meters	8.18	31.91	24.83
40 meters	−.11	33.03	26.54
60 meters	−1.12	33.24	26.75
100 meters	−1.42	33.45	26.93
150 meters	−.82	33.75	27.18
200 meters	.28	34.04	27.33
250 meters	1.40	34.30	27.47

Station 1112; Sept. 9; depth, 423 meters; lat. 50°45′ N., long. 53°13′ W.; dynamic height, 1,454.730 meters

Depth	Temperature (°C.)	Salinity (‰)	σt
0 meter	9.10	32.36	25.05
20 meters	8.18	32.44	25.25
40 meters	−.12	32.95	26.48
60 meters	−1.21	33.18	26.70
100 meters	−1.21	33.43	26.90
150 meters	−.71	33.73	27.13
200 meters	.79	34.00	27.27
250 meters	1.70	34.22	27.40
300 meters	1.80	34.37	27.49
375 meters	2.10	34.45	27.54

Station 1113; Sept. 9; depth, 270 meters; lat. 50°49′ N., long. 52°32′ W.; dynamic height, 1,454.751 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	9.90	32.24	24.83
20 meters	9.38	32.30	24.96
40 meters	6.65	32.68	25.65
60 meters	2.90	33.26	26.52
80 meters	−.32	33.39	26.83
100 meters	−1.12	33.48	26.94
150 meters	−.92	33.75	27.15
200 meters	.18	33.99	27.30
250 meters	1.32	34.20	27.41

Station 1114; Sept. 9; depth, 230 meters; lat. 50°45′ N., long. 51°49′ W.; dynamic height, 1,454.721 meters

0 meter	10.00	32.18	24.77
20 meters	9.68	32.29	24.90
40 meters	2.91	33.00	26.32
60 meters	−.52	33.26	26.74
100 meters	−.72	33.55	26.98
150 meters	−.82	33.87	27.25
200 meters	−.22	34.16	27.45
215 meters	−.02	34.20	27.47

Station 1115; Sept. 9; depth, 275 meters; lat. 50°34′ N., long. 51°11′ W.; dynamic height, 1,454.628 meters

0 meter	9.80	32.90	25.37
20 meters	8.48	33.09	25.72
40 meters	2.70	33.68	26.87
60 meters	1.49	33.89	27.13
100 meters	1.09	34.16	27.38
150 meters	1.09	34.45	27.62
200 meters	1.09	34.58	27.72
250 meters	1.29	34.68	27.78

Station 1116; Sept. 9; depth, 810 meters; lat. 50°33′ N., long. 50°32′ W.; dynamic height, 1,454.603 meters

0 meter	8.80	33.65	26.11
20 meters	8.40	33.77	26.27
40 meters	6.05	34.29	27.08
60 meters	4.23	34.62	27.47
100 meters	3.60	34.82	27.70
150 meters	3.50	34.85	27.73
200 meters	3.45	34.86	27.75
250 meters	3.40	(34.86)	27.75
300 meters	3.40	34.86	27.76
500 meters	3.30	34.87	27.77
800 meters	3.20	34.87	27.78

Station 1117; Sept. 9; depth, 1,284 meters; lat. 50°28′ N., long. 49°54′ W.; dynamic height, 1,454.617 meters

0 meter	9.00	33.71	26.13
20 meters	8.79	33.75	26.19
40 meters	6.35	34.36	27.01
60 meters	4.43	34.72	27.53
100 meters	3.50	34.82	27.71
150 meters	3.45	34.84	27.73
200 meters	3.40	34.84	27.73
300 meters	3.35	34.85	27.75
500 meters	3.30	34.86	27.76
800 meters	3.30	34.87	27.77
1,000 meters	3.20	34.88	27.79
1,200 meters	3.10	34.88	27.80

Station 1118; Sept. 10; depth, 2,900 meters; lat. 50°24′ N., long. 49°16′ W.; dynamic height, 1,454.617 meters.

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	10.20	34.16	26.29
20 meters	9.79	34.21	26.38
40 meters	8.48	34.31	26.68
60 meters	5.12	34.53	27.31
100 meters	4.00	34.81	27.65
150 meters	3.59	34.86	27.73
200 meters	3.39	34.86	27.75
300 meters	3.28	34.86	27.76
400 meters	3.23	34.86	27.76
500 meters	3.18	34.87	27.78
800 meters	3.08	34.87	27.80
1,000 meters	3.08	34.88	27.80
1,200 meters	3.08	34.88	27.80
1,500 meters	3.08	34.88	27.80

Station 1119; Sept. 10; depth, 1,500 meters; lat. 49°45′ N., long. 49°19′ W.; dynamic height, 1,454.623 meters

0 meter	10.20	34.08	26.22
20 meters	9.79	34.26	26.44
40 meters	8.88	34.44	26.72
60 meters	6.12	34.59	27.23
100 meters	4.50	34.82	27.60
200 meters	3.89	34.86	27.70
300 meters	3.58	34.86	27.73
400 meters	3.28	34.87	27.77
500 meters	3.18	34.88	27.79
800 meters	3.08	34.87	27.80
1,000 meters	3.08	34.88	27.80
1,200 meters	3.08	34.88	27.80

Station 1120; Sept. 10; depth, 560 meters; lat. 49°25′ N., long. 49°47′ W.; dynamic height, 1,454.641 meters

0 meter	10.20	33.95	26.11
20 meters	9.68	33.96	26.21
40 meters	8.17	34.10	26.56
60 meters	5.72	34.65	27.33
100 meters	4.61	34.83	27.60
150 meters	4.20	34.84	27.65
200 meters	3.90	34.85	27.69
260 meters	(3.74)	(34.85)	27.71
300 meters	3.59	34.86	27.73
500 meters	3.28	34.86	27.76

Station 1121; Sept. 10; depth, 274 meters; lat. 49°06′ N., long. 50°14′ W.; dynamic height, 1,454.774 meters

0 meter	8.80	32.67	25.36
20 meters	8.38	32.72	25.45
40 meters	.58	33.13	26.59
60 meters	−1.62	33.36	26.87
80 meters	−1.52	33.48	26.95
100 meters	−1.22	33.59	27.04
150 meters	−.12	33.80	27.16
200 meters	1.40	34.00	27.23
250 meters	2.40	(34.10)	27.24
260 meters	2.80	34.19	27.28

Station 1122; Sept. 10; depth, 210 meters; lat. 48°51′ N., long. 50°36′ W.; dynamic height, 1,454.814 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	11.00	32.97	25.18
20 meters	10.39	32.99	25.33
40 meters	−.83	33.02	26.56
60 meters	−1.13	33.14	26.67
80 meters	−1.63	33.22	26.75
100 meters	−1.73	33.29	26.81
150 meters	−1.73	33.44	26.94
160 meters	−1.73	(33.46)	26.95
200 meters	−1.53	33.55	27.02

Station 1123; Sept. 11; depth, 168 meters; lat. 48°37′ N., long. 51°00′ W.; dynamic height, 1,454.852 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	11.20	31.70	24.19
20 meters	10.58	31.77	24.35
40 meters	1.08	32.92	26.44
60 meters	−1.13	33.17	26.69
80 meters	−1.53	33.20	26.73
100 meters	−1.63	33.29	26.81
125 meters	−1.43	33.31	26.82
140 meters	−1.43	(33.35)	26.85
160 meters	−1.33	33.37	26.87

Station 1124; Sept. 11; depth, 155 meters; lat. 48°22′ N., long. 51°21′ W.; dynamic height, 1,454.848 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	12.00	31.78	24.11
20 meters	11.58	31.83	24.25
40 meters	.36	32.93	26.44
60 meters	−1.14	33.24	26.76
80 meters	−1.54	33.30	26.81
100 meters	−1.64	33.34	26.85
125 meters	−1.64	33.38	26.88
140 meters	−1.54	33.41	26.91

Station 1125; Sept. 11; depth, 170 meters; lat. 48°07′ N., long. 51°44′ W.; dynamic height, 1,454.851 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	12.10	31.66	23.99
20 meters	11.59	31.72	24.13
40 meters	2.88	32.94	26.28
60 meters	−.34	33.05	26.58
80 meters	−1.34	33.25	26.77
100 meters	−1.64	33.31	26.83
125 meters	−1.74	33.33	26.85
140 meters	−1.74	(33.35)	26.85
150 meters	−1.64	33.35	26.86

Station 1126; Sept. 11; depth, 180 meters; lat. 47°52′ N., long. 52°06′ W.; dynamic height, 1,454.899 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	11.60	31.33	23.90
20 meters	10.90	31.38	23.99
40 meters	3.50	32.20	25.63
60 meters	.46	32.81	26.33
80 meters	−.54	33.00	26.53
100 meters	−.94	33.10	26.63
130 meters	−1.14	33.15	26.68
140 meters	−1.34	(33.15)	26.68
170 meters	−1.34	33.17	26.70

Station 1127; Sept. 11; depth, 142 meters; lat. 47°36′ N., long. 52°30′ W.; dynamic height, 1,454.900 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	12.40	31.36	23.79
20 meters	12.10	31.38	23.84
40 meters	3.50	32.43	25.81
60 meters	.96	32.80	26.30
80 meters	.96	33.01	26.47
100 meters	.96	33.07	26.52
130 meters	1.06	33.13	26.56

GENERAL GREENE, 1931

Station 1220; July 4; depth, 168 meters; lat. 47°40′ N., long. 52°32′ W.; dynamic height, 1,454.817 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	10.60	32.04	24.56
25 meters	3.22	32.23	25.68
50 meters	.45	32.69	26.24
75 meters	−1.30	32.91	26.47
100 meters	−1.22	32.98	26.54
150 meters	−.75	33.17	26.68

Station 1221; July 4; depth, 185 meters; lat. 47°56′ N., long. 52°13′ W.; dynamic height, 1,454.801 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	9.90	31.83	24.51
25 meters	2.23	32.45	25.93
50 meters	−.68	32.93	26.485
75 meters	−1.14	32.94	26.51
100 meters	−1.20	32.98	26.54
150 meters	−1.02	33.26	26.77

Station 1222; July 4; depth 192 meters; lat. 48°15′ N., long. 51°54′ W.; dynamic height, 1,454.789 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	8.29	32.20	25.06
25 meters	5.37	32.54	25.71
50 meters	−1.07	32.94	26.505
75 meters	−1.49	33.04	26.595
100 meters	−1.43	33.12	26.66
150 meters	−.99	33.36	26.85

Station 1223; July 5; depth, 170 meters; lat. 48°29′ N., long. 51°39′ W.; dynamic height 1,454.795 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	8.30	32.20	25.06
25 meters	5.12	32.55	25.74
50 meters	−.22	32.99	26.51
75 meters	−1.10	33.03	26.58
100 meters	−1.02	33.07	26.61
150 meters	−.96	33.23	26.74

Station 1224; July 5; depth, 247 meters; lat. 48°44′ N., long. 51°21′ W.; dynamic height 1,454.782 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	7.10	32.07	25.12
25 meters	.51	32.50	26.085
50 meters	−1.02	32.88	26.46
75 meters	−1.33	32.89	26.47
100 meters	−1.41	33.03	26.59
150 meters	−1.36	33.26	26.78
200 meters	−1.07		

Station 1225; July 5; depth, 321 meters; lat. 49°00′ N., long. 51°05′ W.; dynamic height 1,454.760 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	6.90	32.02	25.11
25 meters	4.96	32.17	25.465
50 meters	−1.29	32.86	26.45
75 meters	−1.65	33.20	26.73
100 meters	−1.31	33.22	26.74
150 meters	−.07	33.37	26.82
200 meters	.92	34.11	27.355

Station 1226; July 5; depth, 320 meters; lat. 49°24′ N,, long. 50°45′ W.; dynamic height 1,454.676 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	6.90	32.73	25.665
25 meters	6.18	32.93	25.91
50 meters	−.41	33.27	26.75
75 meters	(4.47)	33.58	26.99
100 meters	.04	33.61	27.005
150 meters	.79	34.19	27.435
200 meters	1.83	34.37	27.505
300 meters	2.78	34.82	27.77

Station 1227; July 5; depth, 497 meters; lat. 49°38′ N., long. 50°25′ W.; dynamic height, 1,454.628 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	5.32	32.82	25.93
25 meters	3.06	32.91	26.235
50 meters	−.39	33.83	27.195
75 meters	.79	34.04	27.305
100 meters	1.67	34.13	27.32
150 meters	2.51	34.39	27.46
200 meters	2.80	34.58	27.60
300 meters	3.20	34.86	27.77
400 meters	2.88	34.89	27.82

Station 1228; July 5; depth, 997 meters; lat. 49°58′ N., long. 50°00′ W.; dynamic height 1,454.600 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	5.02	32.80	25.95
25 meters	2.72	33.36	26.63
50 meters	.68	34.05	27.32
100 meters	1.87	34.45	27.565
150 meters	2.67	34.56	27.58
200 meters	3.11	34.72	27.67
300 meters	3.41	(34.90)	27.78
400 meters	(3.38)	34.90	27.79
600 meters	3.36	34.91	27.80
700 meters	3.36	34.91	27.80
800 meters	3.32	34.91	27.80
900 meters	3.32	34.91	27.80

Station 1229; July 6; depth, 1,792 meters; lat. 50°42′ N., long. 49°21′ W.; dynamic height, 1,454.562 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	7.10	33.61	26.33
25 meters	4.81	34.18	27.07
50 meters	3.16	34.47	27.47
100 meters	3.23	34.79	27.71
200 meters	3.41	34.90	27.78
300 meters	3.41	34.91	27.79
400 meters	3.39	34.91	27.79
600 meters	3.35	34.91	27.80
800 meters	3.34	(34.91)	27.80
1,000 meters	3.32	34.91	27.80
1,200 meters	3.32	34.91	27.80
1,400 meters		34.91	
1,500 meters		34.91	
1,600 meters		34.91	

Station 1230; July 6; depth, 1,189 meters; lat. 50°40′ N., long. 50°00′ W.; dynamic height, 1,454.569 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	7.00	33.26	26.07
25 meters	3.41	33.79	26.90
50 meters	3.25	34.58	27.54
100 meters	3.38	34.88	27.77
150 meters	3.37	34.90	27.78
200 meters	3.41	34.90	27.78
300 meters	3.50	34.90	27.78
400 meters	3.44	34.90	27.78
500 meters	3.43	34.90	27.78
600 meters	3.38	34.90	27.78
700 meters	3.39	34.90	27.78
800 meters	3.39	34.90	27.78
900 meters	3.40	34.90	27.78

Station 1231; July 6; depth, 951 meters; lat. 50°41′ N., long. 50°23′ W.; dynamic height, 1,454.595 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	6.42	33.02	25.95
25 meters	4.99	33.63	26.61
50 meters	3.01	34.58	27.57
100 meters	3.39	34.80	27.70
150 meters	3.42	34.81	27.71
200 meters	3.42	34.82	27.725
300 meters	3.47	34.86	27.745
400 meters	3.45	34.87	27.755
500 meters	3.44	34.90	27.78
600 meters	3.43	(34.90)	27.78
700 meters	3.42	34.91	27.79
800 meters	3.42	(34.91)	27.79
900 meters	3.40	34.91	27.79

Station 1232; July 6; depth, 268 meters; lat. 50°37′ N., long. 51°12′ W.; dynamic height, 1,454.727 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	6.30	32.72	25.735
25 meters	4.01	32.72	25.995
50 meters	−.88	33.05	26.58
75 meters	−.79	33.36	26.84
100 meters	−.79	33.56	27.00
150 meters	1.43	34.18	27.38
200 meters	2.03	34.36	27.48

Station 1233; July 7; depth, 210 meters; lat. 50°35′ N., long. 51°49′ W.; dynamic height, 1,454.753 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	7.00	32.49	25.47
25 meters	5.33	32.72	25.85
50 meters	1.15	32.94	26.40
75 meters	−.75	33.17	26.68
100 meters	−.71	33.33	26.81
150 meters	.95	33.92	27.19
200 meters	1.85	34.35	27.49

Station 1234; July 7; depth, 227 meters; lat. 50°32′ N. long. 52°30′ W.; dynamic height, 1,454.765 meters

0 meter	6.70	32.48	25.49
25 meters	6.40	32.62	25.64
50 meters	1.96	32.94	26.345
75 meters	.88	33.62	27.05
100 meters	.91	33.68	27.10
150 meters	.65	34.30	27.60
200 meters	1.73	---------	---------

Station 1235; July 7; depth, 432 meters; lat. 50°31′ N., long. 53°08′ W.; dynamic height, 1,454.692 meters

0 meter	6.80	32.72	25.67
25 meters	4.61	32.88	26.055
50 meters	−.86	33.45	26.915
75 meters	−1.28	33.66	27.095
100 meters	−.90	33.91	27.28
200 meters	1.79	34.50	27.61
300 meters	2.78	34.62	27.62

Station 1236; July 7; depth, 355 meters; lat. 50°28′ N., long. 53°38′ W.; dynamic height, 1,454.684 meters

0 meter	6.90	32.30	25.33
25 meters	3.30	32.70	26.045
50 meters	−.78	33.35	26.83
75 meters	−1.37	33.63	27.075
100 meters	−1.17	33.63	27.15
150 meters	−.34	34.19	27.49
250 meters	1.53	34.52	27.64

Station 1237; July 7; depth, 245 meters; lat. 50°26′ N., long. 54°13′ W.; dynamic height, 1,454.708 meters

0 meter	6.90	32.06	25.14
25 meters	1.78	32.58	26.07
50 meters	−1.15	33.23	26.745
75 meters	−1.31	33.56	27.02
100 meters	−1.25	33.70	27.125
150 meters	−1.11	34.10	27.45
200 meters	.74	34.28	27.51

Station 1238; July 7; depth, 299 meters; lat. 50°24′ N., long. 54°56′ W.; dynamic height, 1,454.751 meters

0 meter	6.01	31.95	25.17
25 meters	2.36	32.39	25.875
50 meters	−1.13	33.20	26.72
75 meters	−1.46	33.39	26.885
100 meters	−1.47	33.48	26.96
150 meters	−1.11	33.79	27.19
200 meters	−.65	33.93	27.285

Station 1239; July 7; depth, 165 meters; lat. 50°44′ N., long. 55°16′ W.; dynamic height, 1,454.774 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	5.55	31.59	24.93
25 meters	1.72	32.35	25.89
50 meters	−1.18	32.87	26.45
75 meters	−1.67	33.19	26.725
100 meters	−1.67	33.38	26.88
150 meters	−1.33	33.61	27.06

Station 1240; July 7; depth, 66 meters; lat. 51°40′ N., long. 55°22′30′ W.; dynamic height, 1,454.772 meters

0 meter	7.09	31.73	24.86
10 meters	6.45	31.71	24.92
25 meters	2.34	32.19	25.72
35 meters	.46	32.75	26.335
50 meters	−1.09	33.17	26.69

Station 1241; July 8; deptL, 81 meters; lat. 51°46′ N., long. 55°25′ W.; dynamic heights, 971.006 meters, 1,454.754 meters

0 meter	3.90	31.20	24.81
10 meters	2.81	32.35	25.81
25 meters	−.31	32.75	26.32
50 meters	−.95	33.08	26.615
65 meters	−1.34	(33.09)	26.635

Station 1242; July 8; depth, 71 meters; lat. 51°50′ N., long. 55°25′ W.; dynamic height, 1,454.760 meters

0 meter	3.00	31.58	25.18
10 meters	1.40	32.15	25.75
25 meters	−1.16	33.03	26.58
35 meters	−1.21	33.07	26.61
50 meters	−1.30	33.09	26.63

Station 1243; July 8; depth, 101 meters; lat. 52°00′ N., long. 55°24′ W.; dynamic height, 1,454.760 meters

0 meter	4.60	31.27	24.79
10 meters	1.32	32.29	25.87
25 meters	−.87	32.87	26.44
35 meters	−1.45	33.09	26.635
50 meters	−1.57	33.28	26.795

Station 1244; July 8; depth, 170 meters; lat. 52°05′ N., long. 55°29′ W.; dynamic height, 1,454.780 meters

0 meter	5.45	(31.54)	(24.905)
25 meters	2.17	32.54	26.015
50 meters	−1.29	32.99	26.55
75 meters	−1.51	33.16	26.695
100 meters	−1.57	33.17	26.705
125 meters	−1.53	33.25	26.77
150 meters	−1.44	33.26	26.775

Station 1245; July 8; depth, 101 meters; lat. 52°10′ N., long. 55°33′ W.; dynamic height, 1,454.854 meters

0 meter	4.50	29.94	23.74
10 meters	4.88	29.94	23.70
25 meters	2.45	30.97	24.74
35 meters	.82	31.88	25.575
50 meters	.16	32.37	26.00
75 meters	−.68	32.79	26.37

Station 1246; July 10; depth 61 meters; lat. 53°33′ N., long. 55°40′ W.; dynamic height, 1,454.687 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	5.60	30.01	23.68
10 meters	3.69	32.00	25.46
25 meters	.04	32.14	25.82
50 meters	−1.41	32.92	26.50

Station 1247; July 10; depth, 280 meters; lat. 53°41′ N., long. 55°14′ W.; dynamic height, 1,454.671 meters

0 meter	4.35	31.76	25.20
25 meters	2.79	32.19	25.685
50 meters	−.86	33.10	26.625
75 meters	−1.22	33.56	27.02
125 meters	−.97	33.89	27.27
200 meters	.18	34.29	27.55
250 meters	1.05	(34.37)	27.56

Station 1248; July 10; depth, 163 meters; lat. 53°54′ N., long. 54°47′ W.; dynamic height, 1,454.648 meters

0 meter	5.00	32.07	25.38
25 meters	1.54	32.59	26.095
50 meters	−1.32	33.47	26.945
75 meters	−1.35	33.56	27.02
100 meters	−1.18	33.70	27.125
125 meters	−.76	33.80	27.19
150 meters	.36	34.27	27.52

Station 1249; July 10; depth, 176 meters; lat. 54°06′ N., long. 54°23′ W.; dynamic height, 1,454.643 meters

0 meter	4.40	32.07	25.44
25 meters	−.11	32.74	26.31
50 meters	−1.36	33.42	26.905
75 meters	−1.34	33.48	26.955
100 meters	−1.08	33.72	27.14
125 meters	−.73	33.90	27.26
150 meters	.82	34.43	27.62

Station 1250; July 10; depth, 207 meters; lat. 54°19′ N., long. 53°57′ W.; dynamic height, 1,454.716 meters

0 meter	3.71	32.30	25.69
25 meters	.97	32.60	26.14
50 meters	−1.36	32.87	26.455
75 meters	−1.29	33.34	26.84
100 meters	−1.25	33.65	27.09
125 meters	−.88	33.79	27.185
150 meters	−.51	33.87	27.23

Station 1251; July 11; depth, 284 meters; lat. 54°33′ N., long. 53°31′ W.; dynamic heights, 97.374 meters, 970.929 meters, 1,454.673 meters.

0 meter	3.05	32.26	25.72
25 meters	.10	33.05	26.545
50 meters	−1.19	33.27	26.78
75 meters	−.72	33.69	27.10
100 meters	−.24	34.00	27.33
150 meters	.51	34.21	27.465
200 meters	1.36	34.47	27.62

Station 1252; July 11; depth, 631 meters; lat. 54°44′ N., long. 53°10′ W.; dynamic height, 1,454.618 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	3.50	33.79	26.89
25 meters	4.02	(33.95)	26.96
50 meters	.44	34.08	27.36
100 meters	2.02	34.48	27.575
200 meters	3.32	34.67	27.61
300 meters	3.60	34.74	27.635
400 meters	3.63	34.83	27.705
500 meters	3.65	34.87	27.735

Station 1253; July 11; depth, 2,231 meters; lat. 54°58′ N., long. 52°48′ W.; dynamic height, 1,454.573 meters

0 meter	6.30	34.33	27.01
25 meters	5.39	34.32	27.115
50 meters	3.61	34.66	27.57
100 meters	3.50	34.77	27.67
200 meters	3.55	(34.86)	27.735
300 meters	3.59	34.86	27.735
400 meters	3.57	34.87	27.745
600 meters	3.43	34.87	27.755
800 meters	(3.34)	34.88	27.775
1,000 meters	3.26	34.88	27.78
1,200 meters	3.21	34.88	27.785
1,400 meters	3.21	34.88	27.785
1,500 meters	(3.13)	(34.89)	(27.80)
1,800 meters	3.06	34.89	27.81

Station 1254; July 11; depth, 2,680 meters; lat. 55°24′ N., long. 53°38′ W.

0 meter	7.20		
25 meters	4.61		
50 meters	3.90		
100 meters	3.47		
200 meters	3.57		
400 meters	3.57		
600 meters	3.53		
800 meters	3.39		
1,000 meters	3.32		
1,200 meters	3.26		
1,400 meters	3.20		
1,600 meters	3.12		
2,000 meters	2.96		

Station 1255; July 11-12; depth, 2,980 meters lat. 55°52′ N., long. 54°26′ W.

0 meter	7.15		
25 meters	5.96		
50 meters	4.14		
100 meters	3.56		
200 meters	3.54		
400 meters	3.58		
600 meters	3.54		
800 meters	3.46		
1,000 meters	3.42		
1,200 meters	3.31		
1,400 meters	3.24		
1,500 meters	3.21		
1,600 meters	3.18		
2,000 meters	3.10		

Station 1256; July 12; depth, 2,652 meters; lat. 56°16′ N., long. 55°17′ W.; dynamic height, 1,454.587 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	8.10	34.02	26.52
25 meters	6.36	34.51	27.14
50 meters	3.59	34.72	27.62
100 meters	3.62	34.77	27.65
200 meters	3.67	34.87	27.735
400 meters	3.67	34.88	27.74
600 meters	3.57	34.89	27.76
800 meters	3.33	34.89	27.78
1,000 meters	3.28	34.89	27.79
1,200 meters	3.19	34.89	27.80
1,400 meters	3.18	34.89	27.80
1,500 meters	(3.18)	(34.89)	(27.80)
1,600 meters	3.18	34.89	27.80
2,000 meters	3.08	34.89	27.81

Station 1257; July 12; depth, 2,362 meters; lat. 55°55′ N., long. 55°51′ W.; dynamic height, 1,454.585 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	7.70	34.36	26.84
25 meters	5.49	34.48	27.23
50 meters	3.57	34.70	27.61
100 meters	3.54	34.79	27.69
200 meters	3.59	34.86	27.73
400 meters	3.56	34.87	27.74
600 meters	3.55	34.88	27.76
800 meters	3.38	34.88	27.77
1,000 meters	3.29	34.89	27.79
1,200 meters	3.30	34.89	27.795
1,400 meters	3.15	34.89	27.80
1,500 meters	(3.15)	(34.89)	(27.80)
1,600 meters	3.15	34.89	27.80
2,000 meters	2.84	34.89	27.825

Station 1258; July 12; depth, 2,150 meters; lat. 55°44′ N., long. 56°10′ W.; dynamic height, 1,454.603 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	7.70	34.48	26.94
25 meters	4.60	34.51	27.35
50 meters	4.42	34.54	27.39
100 meters	3.42	34.66	27.59
200 meters	3.59	34.83	27.71
400 meters	3.62	34.87	27.74
600 meters	3.62	34.88	27.75
800 meters	3.45	34.88	27.76
1,000 meters	3.38	34.89	27.78
1,200 meters	3.23	34.89	27.79
1,400 meters	3.18	34.89	27.80
1,500 meters	(3.18)	(34.89)	(27.80)
1,600 meters	3.18	34.89	27.80
1,800 meters	----------	34.89	----------

Station 1259; July 12; depth, 800 meters; lat. 55 °34 N., long. 56°31′ W.; dynamic height, 1,454.706 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	4.60	32.79	25.99
25 meters	−.20	33.32	26.78
50 meters	.73	33.85	27.15
100 meters	1.57	34.37	27.525
150 meters	2.11	34.49	27.575
200 meters	2.73	34.56	27.575
300 meters	3.48	34.77	27.67
400 meters	3.55	34.79	27.68
500 meters	3.68	34.84	27.71
600 meters	3.65	34.87	27.735
700 meters	3.60	34.88	27.75

Station 1260; July 12; depth, 137 meters; lat. 55°25′ N., long. 56°50′ W.; dynamic height, 1,454.767 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	4.90	32.01	25.34
10 meters	4.75	32.07	25.405
25 meters	1.68	32.51	26.025
50 meters	−1.17	32.79	26.39
75 meters	−1.22	33.05	26.60
100 meters	−.76	33.58	27.02

Station 1261; July 13; depth, 190 meters; lat. 55°18′ N., long. 57°05′ W.; dynamic height, 1,454.812 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	4.10	31.83	25.28
25 meters	.87	32.52	26.08
50 meters	.47	32.69	26.24
75 meters	−1.27	32.79	26.39
100 meters	−1.30	33.08	26.62
150 meters	−.88	33.37	26.85

Station 1262; July 13; depth, 259 meters; lat. 55°11′ N., long. 57°19′ W.; dynamic height, 1,454.839 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	4.30	31.92	25.33
25 meters	1.03	32.33	25.92
50 meters	−.82	32.57	26.20
75 meters	−1.31	32.77	26.38
100 meters	−1.27	32.92	26.495
150 meters	−.88	33.15	26.67
200 meters	−.66	33.36	26.835

Station 1263; July 13; depth 267 meters; lat. 55°05′ N., long. 57°34′ W.; dynamic height, 1,454.851 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	4.30	31.66	25.12
25 meters	.52	32.34	25.96
50 meters	−1.39	32.55	26.20
75 meters	−1.37	32.61	26.25
100 meters	−1.15	32.95	26.515
150 meters	−1.05	33.11	26.64
200 meters	−.87	33.21	26.72

Station 1264; July 15; depth 110 meters; lat. 57°07′ N., long. 60°39′ W.; dynamic height, 1,454.778 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	4.10	31.75	25.22
10 meters	2.01	31.81	25.44
25 meters	−.49	32.25	25.93
50 meters	−1.08	32.28	25.975
75 meters	−1.19	32.44	26.105

Station 1265; July 15; lat. 57°12′ N., long. 60°18′ W.; dynamic height, 1,454.765 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	4.00	31.98	25.41
25 meters	1.72	32.53	26.035
50 meters	−.25	32.62	26.22
100 meters	−1.16	32.89	26.47
150 meters	−1.01	33.67	27.10

Station 1266; July 15; depth 130 meters; lat. 57°17′ N., long. 59°47′ W.; dynamic height, 1,454.750 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	3.80	31.96	25.42
25 meters	.07	32.63	26.215
50 meters	−.63	32.77	26.355
75 meters	−.93	32.98	26.53
100 meters	−1.01	33.02	26.57

Station 1267; July 15; depth, 188 meters; lat. 57°21′ N., long. 59°20′ W.; dynamic height, 1,454.723 meters

0 meter	3.70	31.88	25.36
25 meters	1.32	32.89	26.35
50 meters	−.54	33.20	26.70
75 meters	−.52	33.21	26.705
100 meters	−.05	33.48	26.905
150 meters	1.35	34.23	27.43

Station 1268; July 15; depth, 914 meters; lat. 57°25′ N., long. 58°57′ W.; dynamic height, 1,454.617 meters

0 meter	3.90	32.94	26.18
25 meters	2.57	34.05	27.18
50 meters	2.58	34.35	27.41
100 meters	2.79	34.55	27.565
150 meters	3.19	(34.67)	(27.62)
200 meters	3.58	34.79	27.68
300 meters	3.84	34.89	27.73
400 meters	3.74	34.88	27.73
500 meters	3.82	34.90	27.74
600 meters	3.72	34.91	27.76
700 meters	3.71	34.92	27.77
800 meters	3.71	34.92	27.77

Station 1269; July 16; depth 1,920 meters; lat. 57°29′ N., long. 58°32′ W.; dynamic height, 1,454.609 meters

0 meter	6.30	33.92	26.67
25 meters	5.40	34.15	26.975
50 meters	3.92	34.52	27.43
100 meters	3.41	34.78	27.68
200 meters	3.62	34.84	27.71
400 meters	3.76	34.89	27.74
600 meters	3.68	34.90	27.75
800 meters	3.61	34.90	27.76
1,000 meters	3.46	34.90	27.78
1,200 meters	3.34	34.90	27.79
1,400 meters	3.29	34.92	27.81
1,500 meters	(3.24)	(34.92)	(27.81)
1,600 meters	3.19	34.92	27.82

Station 1270; July 16; depth, 2,560 meters; lat. 57°35′ N., long. 57°58′ W., dynamic height, 1,454.608 meters

0 meter	6.50	34.32	26.98
25 meters	5.36	34.44	27.21
50 meters	3.99	34.54	27.44
100 meters	3.53	34.72	27.625
200 meters	3.45	34.87	27.75
400 meters	3.58	34.89	27.76
600 meters	3.60	34.90	27.765
800 meters	3.47	34.90	27.775
1,000 meters	3.39	34.90	27.78
1,200 meters	3.26	34.91	27.805
1,400 meters	3.19	34.91	27.81
1,500 meters	(3.17)	(34.91)	(27.81)
1,600 meters	3.15	34.91	27.815

Station 1271; July 16; depth, 3,610 meters; lat. 57°41′ N., long. 57°23′ W.; dynamic height, 1,454.565 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	6.90	34.45	27.03
25 meters	6.33	34.52	27.15
50 meters	3.52	34.73	27.63
100 meters	3.42	34.81	27.71
200 meters	3.59	34.90	27.76
400 meters	3.63	34.90	27.76
600 meters	3.59	34.90	27.765
800 meters	3.49	34.90	27.775
1,000 meters	3.47	34.90	27.78
1,200 meters	3.30	34.92	27.81
1,400 meters	3.22	34.92	27.82
1,500 meters	(3.22)	(34.92)	(27.82)
1,600 meters	3.22	34.92	27.82
2,000 meters	2.97	34.92	27.84

Station 1272; July 16; depth, 2,634 meters; lat. 58°34′ N., long. 57°52′ W.; dynamic height, 1,454.589 meters

0 meter	7.00	34.48	27.01
25 meters	5.80	34.48	27.19
50 meters	3.48	34.62	27.55
100 meters	3.42	34.82	27.715
200 meters	3.60	34.88	27.75
400 meters	3.66	34.89	27.75
600 meters	3.62	34.90	27.76
800 meters	3.52	34.90	27.77
1,000 meters	3.51	34.90	27.77
1,200 meters	(3.40)	(34.90)	(27.78)
1,400 meters	3.28	34.90	27.795
1,500 meters	(3.25)	(34.90)	(27.80)
1,600 meters	3.21	34.90	27.80
2,000 meters	3.06	34.90	27.82

Station 1273; July 17; depth, 2,630 meters; lat. 59°26′ N., long. 58°28′ W.; dynamic height, 1,454.580 meters

0 meter	8.00	34.37	26.805
25 meters	5.51	34.37	27.14
50 meters	3.52	34.67	27.585
100 meters	3.44	34.76	27.665
200 meters	3.72	34.82	27.685
400 meters	3.71	(34.91)	27.76
600 meters	3.65	34.91	27.765
800 meters	3.49	34.91	27.78
1,000 meters	3.40	34.91	27.79
1,200 meters	3.22	(34.91)	27.81
1,400 meters	3.20	(34.91)	27.81
1,500 meters	(3.19)	(34.91)	(27.81)
1,600 meters	3.19	34.91	27.81
2,000 meters	2.97	34.91	27.83

Station 1274; July 17; depth, 2,240 meters; lat. 59°20′ N., long. 59°10′ W.; dynamic height, 1,454.604 meters

0 meter	8.27	34.48	26.85
25 meters	5.42	34.48	27.23
50 meters	4.13	34.55	27.43
100 meters	3.59	34.68	27.59
200 meters	3.70	34.80	27.67
400 meters	3.70	34.88	27.74
600 meters	3.65	34.91	27.77
800 meters	3.58	34.91	27.77
1,000 meters	3.50	34.90	27.77
1,200 meters	3.27	34.91	27.805
1,400 meters	3.17	34.90	27.805
1,500 meters	(3.13)	(34.91)	(27.81)
1,600 meters	3.10	34.91	27.81
2,000 meters	2.83	---------	---------

Station 1275; July 17; depth, 1,400 meters; lat. 59°16′ N., long. 59°51′ W.; dynamic height, 1,454.646 meters.

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	6.70	34.24	26.89
25 meters	4.64	34.26	27.15
50 meters	3.93	34.40	27.34
100 meters	3.58	34.57	27.505
200 meters	3.89	34.76	27.63
400 meters	3.94	34.89	27.72
600 meters	3.81	34.90	27.75
800 meters	3.69	34.91	27.765
1,000 meters	3.67	(34.91)	27.765
1,200 meters	3.52	(34.90)	27.77

Station 1276; July 17; depth, 257 meters; lat. 59°12′ N., long. 60°27′ W.; dynamic height, 1,454.728 meters

0 meter	3.30	33.05	26.32
25 meters	−.37	33.07	26.58
50 meters	.23	33.37	26.805
75 meters	.03	33.66	27.05
100 meters	.47	33.79	27.12
150 meters	1.44	34.03	27.315
200 meters	2.18	34.33	27.45

Station 1277; July 18; depth, 201 meters; lat. 59°13′ N., long. 60°58′ W.; dynamic height, 1,454.880 meters

0 meter	3.10	31.55	25.15
25 meters	−.22	31.88	25.575
50 meters	−.79	32.22	25.915
75 meters	−1.05	32.74	26.345
100 meters	−.62	32.76	26.345
150 meters	−.32	33.47	26.88

Station 1278; July 18; depth, 173 meters; lat. 59°13′ N., long. 61°30′ W.; dynamic height, 1,454.896 meters

0 meter	3.80	31.26	24.86
25 meters	−.32	31.77	25.495
50 meters	−.58	32.22	25.91
75 meters	−.57	32.64	26.25
100 meters	−.61	32.79	26.37
150 meters	−.47	33.20	26.695

Station 1279; July 18; depth, 144 meters; lat. 59°13′ N., long. 62°00′ W.; dynamic height, 1,454.878 meters

0 meter	4.15	31.73	25.195
25 meters	.33	32.00	25.70
50 meters	−.70	32.55	26.18
75 meters	−.90	32.72	26.325
100 meters	−1.06	32.85	26.435
125 meters	−.75	32.99	26.535

Station 1280; July 18; depth, 123 meters; lat. 59°14′ N., long. 62°29′ W.; dynamic height, 1,454.872 meters

0 meter	4.23	31.93	25.35
10 meters	3.20	31.90	25.42
25 meters	.29	32.12	25.795
50 meters	−1.44	32.62	26.25
75 meters	−1.45	32.72	26.34

Station 1281; July 18; depth, 137 meters; lat. 59°12′ N., long. 62°53′ W.; dynamic height, 1,454.896 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	5.20	31.64	25.01
25 meters	.90	31.87	25.565
50 meters	−.31	32.22	25.90
75 meters	−1.08	32.51	26.16
100 meters	−1.13	32.75	26.355

Station 1282; July 23; depth, 154 meters; lat. 59°54′ N., long. 63°11′ W.; dynamic height, 1,454.890 meters

0 meter	3.50	31.74	25.265
25 meters	.78	31.99	25.67
50 meters	−.48	32.23	25.91
75 meters	−.71	32.62	26.235
100 meters	−.82	32.64	26.26
125 meters	−.70	32.68	26.285

Station 1283; July 23; depth 139 meters; lat 59°55′ N., long. 63°28′ W.; dynamic height, 1,454.892 meters

0 meter	2.30	31.74	25.325
25 meters	1.03	31.82	25.515
50 meters	−.49	32.35	26.01
75 meters	−.75	32.61	26.23
100 meters	−.82	32.71	26.315
125 meters	−.70	32.72	26.315

Station 1284; July 23; depth, 113 meters, lat. 60°07′ N., long. 63°48′ W. dynamic height, 1,454.899 meters

0 meter	1.50	31.94	25.58
25 meters	.78	31.86	25.56
50 meters	−.09	32.32	25.97
75 meters	−.14	32.40	26.04
100 meters	−.20	32.46	26.09

Station 1285; July 24; depth, 274 meters; lat. 60°46′ N., long. 64°52′ W.; dynamic height, 1, 454.925 meters

0 meter	1.95	31.22	24.98
25 meters	.94	31.81	25.51
50 meters	−.03	32.10	25.795
75 meters	−.67	32.66	26.27
125 meters	−.71	33.36	26.84
175 meters	−.28	33.58	26.995
250 meters	−.93	34.02	27.28

Station 1286; July 24; depth, 485 meters; lat. 60°58′ N., long. 64°46′ W.; dynamic height, 1,454.879 meters

0 meter	0.80	32.49	26.06
25 meters	.43	32.63	26.195
50 meters	.06	32.74	26.30
100 meters	−.20	33.32	26.785
200 meters	.38	33.78	27.115
300 meters	1.31	33.98	27.22
400 meters	1.52	34.15	27.35

Station 1287; July 24; depth, 320 meters; lat. 61°08′ N., long. 64°45′ W.; dynamic height, 1,454.901 meters

0 meter	1.50	32.49	26.02
25 meters	1.51	32.67	26.16
50 meters	.13	32.73	26.29
100 meters	−.40	33.07	26.585
150 meters	−.85	33.41	26.88
200 meters	.49	34.02	27.31

Station 1288; July 24; depth, 402 meters; lat. 61°00′ N., long. 64°04′ W.; dynamic height, 1,454.805 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	2.00	31.77	25.41
25 meters	.76	32.83	26.34
50 meters	.32	33.07	26.55
100 meters	−.16	33.34	26.80
150 meters	.36	33.81	27.14
200 meters	1.92	34.26	27.41
300 meters	2.06	34.32	27.45

Station 1289; July 24; depth, 503 meters; lat. 60°57′ N., long. 63°23′ W.; dynamic height, 1,454.861 meters

0 meter	1.90	31.20	24.97
25 meters	.03	32.44	26.06
50 meters	−.23	32.77	26.34
100 meters	−.13	32.95	26.48
200 meters	−.52	33.78	27.16
300 meters	3.12	34.55	27.53
400 meters	----------	34.76	----------

Station 1290; July 25; depth, 595 meters; lat. 60°55′ N., long. 62°42′ W.; dynamic height, 1,454.809 meters

0 meter	1.10	31.66	25.38
25 meters	.44	32.49	26.075
50 meters	.32	32.90	26.42
100 meters	.50	33.44	26.845
200 meters	1.79	34.21	27.30
300 meters	3.39	34.63	27.57
500 meters	3.82	(34.78)	(27.64)

Station 1291; July 25; depth, 604 meters; lat. 60° 50′ N., long. 62°04′ W.; dynamic height, 1,454.705 meters

0 meter	1.45	33.41	26.76
25 meters	1.10	33.46	26.83
50 meters	.26	33.71	27.07
100 meters	.55	34.00	27.285
200 meters	2.41	34.37	27.46
300 meters	3.49	34.66	27.58
500 meters	3.91	34.79	27.64

Station 1292; July 25; depth, 572 meters; lat. 60°51′ N., long. 61°25′ W.; dynamic height, 1,454.662 meters

0 meter	4.31	33.48	26.57
25 meters	3.83	33.87	26.92
50 meters	3.45	33.87	26.955
100 meters	1.44	34.02	27.235
200 meters	3.37	34.74	27.66
300 meters	3.74	34.86	27.72
500 meters	3.82	(34.88)	(27.725)

Station 1293; July 25; depth, 1,509 meters; lat. 60°56′ N., long. 60°43′ W.

0 meter	6.80	----------	----------
25 meters	3.91	----------	----------
50 meters	1.96	----------	----------
100 meters	2.05	----------	----------
200 meters	3.91	----------	----------
400 meters	3.97	----------	----------
500 meters	3.99	----------	----------
600 meters	3.93	----------	----------
800 meters	3.80	----------	----------
1,000 meters	3.71	----------	----------
1,200 meters	3.62	----------	----------
1,400 meters	3.43	----------	----------

Station 1294; July 25; depth, 2,103 meters; lat. 61°02′ N., long. 59°46′ W.; dynamic height, 1,454.606 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	7.40	33.98	26.57
25 meters	7.27	34.29	26.85
50 meters	3.54	34.58	27.515
100 meters	3.12	34.66	27.62
200 meters	3.85	34.89	27.73
400 meters	3.83	34.91	27.745
600 meters	3.83	34.93	27.765
800 meters	3.84	34.93	27.765
1,000 meters	3.66	34.92	27.775
1,200 meters	3.48	34.92	27.79
1,400 meters	3.33	34.91	27.80
1,500 meters	(3.31)	(34.91)	(27.80)
1,600 meters	3.30	34.91	27.80

Station 1295; July 26; depth, 2,405 meters; lat. 61°08′ N., long. 58°51′ W.; dynamic height, 1,454.572 meters

0 meter	8.85	34.43	26.72
25 meters	6.24	34.57	27.20
50 meters	3.73	34.70	27.59
100 meters	3.51	34.83	27.71
200 meters	3.79	34.90	27.75
400 meters	3.83	34.92	27.76
600 meters	3.82	34.92	27.76
800 meters	3.59	34.93	27.79
1,000 meters	3.53	34.93	27.79
1,200 meters	3.31	34.92	27.81
1,400 meters	3.23	34.91	27.81
1,500 meters	(3.23)	(34.91)	(27.81)
1,600 meters	3.23	34.91	27.81

Station 1296; July 26; depth, 2,580 meters; lat. 61°13′ N., long. 58°03′ W.; dynamic height, 1,454.615 meters

0 meter	8.30	34.15	26.58
25 meters	4.71	34.48	27.32
50 meters	4.13	34.73	27.57
100 meters	4.36	34.79	27.595
200 meters	4.46	34.97	27.73
400 meters	4.31	34.96	27.74
600 meters	4.11	(34.94)	27.74
800 meters	3.96	34.92	27.745
1,000 meters	3.71	34.91	27.76
1,200 meters	3.41	34.91	27.79
1,400 meters	3.28	34.91	27.80
1,500 meters	(3.25)	(34.91)	(27.80)
1,600 meters	3.21	34.91	27.81
2,000 meters	2.84	34.90	27.835

Station 1297; July 26; depth, 2,700 meters; lat. 61°11′ N., long. 57°11′ W.; dynamic height, 1,454.583 meters

0 meter	8.99	34.26	26.56
25 meters	6.10	34.33	27.04
50 meters	3.30	34.59	27.55
100 meters	3.53	34.78	27.67
200 meters	3.82	34.88	27.725
400 meters	3.78	34.91	27.755
600 meters	3.77	34.94	27.78
800 meters	3.72	34.93	27.78
1,000 meters	3.63	34.94	27.795
1,200 meters	3.40	34.92	27.80
1,400 meters	3.26	34.92	27.815
1,500 meters	(3.24)	(34.93)	(27.825)
1,600 meters	3.21	34.94	27.835
2,000 meters	2.98	34.92	27.84

Station 1298; July 26; depth, 2,790 meters; lat. 61°05′ N., long. 56°03′ W.; dynamic height, 1,454.650 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	7.20	34.22	26.80
25 meters	3.40	34.36	27.36
50 meters	3.78	34.62	27.52
100 meters	4.02	34.75	27.60
200 meters	4.23	34.90	27.70
400 meters	4.53	34.94	27.705
600 meters	4.31	34.94	27.72
800 meters	4.24	34.94	27.73
1,000 meters	4.05	34.93	27.74
1,200 meters	3.69	34.91	27.765
1,400 meters	3.42	34.91	27.79
1,500 meters	(3.34)	(34.91)	(27.80)
1,600 meters	3.26	34.90	27.80
2,000 meters	3.13	34.90	27.81

Station 1299; July 27; depth, 2,800 meters; lat. 60°56′ N., long. 54°57′ W.; dynamic height, 1,454.610 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	8.21	34.29	26.71
25 meters	5.26	34.43	27.215
50 meters	4.35	34.64	27.48
100 meters	3.14	34.68	27.63
200 meters	3.86	34.88	27.72
400 meters	4.05	34.94	27.75
600 meters	4.07	34.94	27.75
800 meters	3.78	34.92	27.76
1,000 meters	3.61	34.90	27.76
1,200 meters	3.39	34.90	27.785
1,400 meters	3.29	34.90	27.79
1,500 meters	(3.25)	(34.90)	(27.80)
1,600 meters	3.22	34.91	27.81
2,000 meters	----------	34.91	----------

Station 1300; July 27; depth, 2,950 meters; lat. 60°46′ N., long. 53°46′ W.; dynamic height, 1,454.599 meters.

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	8.00	34.51	26.91
25 meters	6.48	34.49	27.11
50 meters	5.33	34.71	27.42
100 meters	3.61	34.72	27.62
200 meters	4.25	34.92	27.71
400 meters	4.04	34.94	27.75
600 meters	3.93	34.95	27.77
800 meters	3.74	34.93	27.775
1,000 meters	3.51	34.92	27.79
1,200 meters	3.30	34.90	27.79
1,400 meters	3.28	34.92	27.81
1,500 meters	(3.23)	(34.91)	(27.81)
1,600 meters	3.18	34.90	27.81
2,000 meters	----------	34.91	----------

Station 1301; July 27; depth, 3,018 meters; lat. 60°40′ N., long. 52°40′ W., dynamic height, 1,454.639 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	6.95	34.27	26.88
25 meters	5.93	34.52	27.20
50 meters	4.82	34.61	27.40
100 meters	4.94	34.76	27.505
200 meters	4.66	34.95	27.695
400 meters	4.34	34.97	27.74
600 meters	(4.18)	34.96	27.75
800 meters	4.02	34.94	27.75
1,000 meters	3.72	34.91	27.76
1,200 meters	3.59	34.89	27.76
1,400 meters	3.32	34.90	27.79
1,500 meters	(3.25)	(34.90)	(27.80)
1,600 meters	3.19	34.91	27.81
2,000 meters	3.16	34.91	27.815

Station 1302; July 28; depth, 3,109 meters; lat. 60°40′ N., long. 51°47′ W., dynamic height, 1,454.596 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	6.79	34.44	27.03
25 meters	4.70	34.60	27.41
50 meters	3.87	34.80	27.655
100 meters	3.98	34.84	27.68
200 meters	4.19	34.96	27.75
400 meters	4.14	34.95	27.75
600 meters	4.04	34.94	27.75
800 meters	3.79	34.91	27.75
1,000 meters	3.60	34.89	27.755
1,200 meters	3.48	(34.90)	27.775
1,400 meters	3.29	34.88	27.78
1,500 meters	(3.26)	(34.89)	(27.79)
1,600 meters	3.23	34.90	27.80
2,000 meters	3.21	----------	----------

Station 1303; July 28; depth, 3,000 meters; lat. 60°41′ N., long. 50°56′ W.; dynamic height, 1,454.639 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	3.72	32.94	26.19
25 meters	4.35	34.49	27.36
50 meters	4.96	34.73	27.48
100 meters	5.53	34.98	27.61
200 meters	5.06	35.00	27.69
400 meters	4.58	34.96	27.71
600 meters	4.41	34.96	27.73
800 meters	4.19	34.95	27.745
1,000 meters	3.89	34.94	27.77
1,200 meters	3.56	34.92	27.785
1,400 meters	3.33	34.91	27.80
1,500 mters	(3.29)	(34.91)	(27.80)
1,600 meters	3.25	34.90	27.80
2,000 meters	3.06	34.90	27.82

Station 1304; July 28; depth, 2,900 meters; lat. 60°44′ N., long. 50°15′ W.; dynamic height, 1,454.629 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	7.80	34.67	27.06
25 meters	7.08	34.60	27.11
50 meters	5.50	34.71	27.40
100 meters	5.23	35.00	27.665
200 meters	(5.02)	(34.98)	(27.675)
400 meters	(4.70)	34.95	27.69
600 meters	(4.21)	34.92	27.715
800 meters	3.69	34.91	27.765
1,000 meters	3.55	34.91	27.78
1,200 meters	3.41	34.91	27.79
1,400 meters	3.28	34.89	27.79
1,500 meters	(3.22)	(34.91)	(27.81)
1,600 meters	3.17	34.92	27.82
2,000 meters	2.92	34.90	27.83

Station 1305; July 28; depth, 2,697 meters; lat. 60°51′ N., long. 49°42′ W.; dynamic height, 1,454.622 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	7.10	34.61	27.11
25 meters	6.43	34.61	27.205
50 meters	6.30	34.66	27.26
100 meters	5.52	34.80	27.47
200 meters	4.66	34.99	27.725
400 meters	4.33	34.96	27.74
600 meters	4.30	34.96	27.74
800 meters	3.94	34.94	27.76
1,000 meters	3.71	34.93	27.78
1,200 meters	3.45	34.93	27.805
1,400 meters	3.29	34.91	27.81
1,500 meters	(3.26)	(34.91)	(27.81)
1,600 meters	3.23	34.92	27.815
2,000 meters	3.00	34.90	27.82

Station 1306; July 28; depth, 503 meters; lat. 60°58′ N., long. 49°29′ W.; dynamic height, 1,454.706 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	2.50	31.80	25.40
25 meters	.76	33.58	26.94
50 meters	1.90	33.93	27.14
100 meters	3.24	34.30	27.33
300 meters	4.96	34.93	27.64
500 meters	5.03	34.97	27.665

Station 1307; July 28; depth, 136 meters; lat. 61°06′ N., long. 49°09′ W.; dynamic height, 1,454.808 meters

0 meter	3.30	31.67	25.22
25 meters	.28	32.38	26.00
50 meters	−.27	32.74	26.315
75 meters	.65	33.41	26.81
100 meters	.77	33.61	26.965

Station 1308; July 31; depth, 132 meters; lat. 60°35′ N., long. 48°47′ W.; dynamic height, 1,454.729 meters

0 meter	1.60	31.47	25.19
25 meters	.29	32.39	26.01
50 meters	.60	33.27	26.70
100 meters	4.32	34.26	27.50

Station 1309; July 31; depth, 613 meters; lat. 60°20′ N., long. 48°46′ W.; dynamic height, 1,454.656 meters

0 meter	4.49	34.16	27.09
25 meters	3.62	34.14	27.16
50 meters	3.80	34.34	27.31
100 meters	5.03	34.72	27.465
300 meters	4.85	34.93	27.655
500 meters	5.03	35.02	27.705

Station 1310; July 31; depth, 2,798 meters; lat. 59°58′ N., long. 48°52′ W.; dynamic height, 1,454.626 meters

0 meter	7.30	34.78	27.22
25 meters	7.05	34.77	27.245
50 meters	7.45	34.87	27.265
100 meters	6.73	34.96	27.44
200 meters	5.11	35.05	27.72
400 meters	4.51	34.98	27.73
600 meters	4.50	34.98	27.73
800 meters	3.91	34.95	27.77
1,000 meters	3.61	34.93	27.79
1,200 meters	3.41	34.92	27.80
1,400 meters	3.28	34.89	27.80
1,500 meters	----------	----------	(27.80)

Station 1311; Aug. 1; depth, 200 meters; lat. 59°37′ N., long. 44°16′ W.; dynamic height, 1,454.698 meters

0 meter	0.75	31.59	25.34
25 meters	.21	32.38	26.005
50 meters	1.02	33.45	26.82
75 meters	1.31	33.80	27.075
100 meters	2.14	34.17	27.32
200 meters	3.79	34.80	27.665

Station 1312; Aug. 1; depth, 1,737 meters; lat. 59°28′ N., long. 44°46′ W.; dynamic height, 1,454.614 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	6.90	34.84	27.31
25 meters	6.91	34.81	27.295
50 meters	6.86	34.81	27.305
100 meters	6.82	34.88	27.365
200 meters	5.67	34.94	27.565
400 meters	5.51	35.07	27.69
600 meters	5.26	35.03	27.69
800 meters	4.54	35.05	27.79
1,000 meters	3.80	34.96	27.79
1,200 meters	----------	34.97	----------

Station 1313; Aug. 2; depth, 2,150 meters; lat. 59°18′ N., long. 45°37′ W.; dynamic height, 1,454.600 meters

0 meter	7.60	34.93	27.29
25 meters	7.69	34.93	27.28
50 meters	7.71	34.90	27.25
100 meters	7.60	34.95	27.31
200 meters	5.41	35.05	27.685
400 meters	4.72	35.03	27.75
600 meters	(4.60)	35.05	27.78
800 meters	4.02	34.99	27.79
1,000 meters	3.91	34.97	27.79
1,200 meters	3.58	34.95	27.81

Station 1314; Aug. 2; depth, 2,423 meters; lat. 59°08′ N., long. 46°04′ W.; dynamic height, 1,454.578 meters

0 meter	7.29	34.78	27.22
25 meters	7.19	34.73	27.19
50 meters	7.18	34.75	27.21
100 meters	5.11	34.91	27.61
200 meters	4.61	35.02	27.755
400 meters	4.18	34.97	27.76
600 meters	3.86	34.97	37.795
800 meters	3.60	34.94	27.795
1,000 meters	3.47	34.93	27.80
1,200 meters	3.30	34.91	27.80
1,400 meters	3.28	34.90	27.80
1,500 meters	(3.25)	(34.90)	(27.80)
1,600 meters	3.22	34.90	27.80
2,000 meters	2.88	34.93	27.85

Station 1315; Aug. 2; depth, 2,652 meters; lat. 58°48′ N., long. 46°40′ W.; dynamic height, 1,454.557 meters

0 meter	7.50	34.75	27.16
25 meters	7.16	34.76	27.22
50 meters	7.17	34.76	27.22
100 meters	4.31	34.93	27.71
200 meters	4.20	34.98	27.77
400 meters	4.08	34.97	27.77
600 meters	3.67	34.95	27.80
800 meters	3.57	34.94	27.80
1,000 meters	3.35	34.92	27.805
1,200 meters	3.22	34.91	27.81
1,400 meters	3.14	34.90	27.81
1,500 meters	(3.13)	(34.91)	(27.81)
1,600 meters	3.11	34.91	27.82
2,000 meters	2.74	34.93	27.82

Station 1316; Aug. 2; depth 3,201 meters; lat. 58°22′ N., long. 47°08′ W.; dynamic height, 1,454.566 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	7.45	34.63	27.08
25 meters	6.62	34.68	27.23
50 meters	6.06	34.71	27.33
100 meters	4.14	34.88	27.69
200 meters	3.92	34.95	27.77
400 meters	3.94	34.96	27.78
600 meters	3.72	34.93	27.78
800 meters	3.60	34.92	27.78
1,000 meters	3.37	34.92	27.80
1,200 meters	3.32	34.92	27.81
1,400 meters	3.21	34.91	27.81
1,500 meters	(3.20)	(34.91)	(27.81)
1,600 meters	3.20	34.91	27.81
2,000 meters	2.92	34.91	27.825

Station 1317; Aug. 2; depth 3,484 meters; lat. 57°53′ N., long. 47°52′ W.; dynamic height, 1,454.573 meters

0 meter	7.15	34.64	27.13
25 meters	6.76	34.69	27.22
50 meters	5.71	34.74	27.40
100 meters	3.95	34.88	27.71
200 meters	3.88	34.94	27.77
400 meters	3.89	34.96	27.78
600 meters	3.68	34.93	27.78
800 meters	3.51	34.91	27.78
1,000 meters	3.36	34.90	27.79
1,200 meters	3.31	34.90	27.79
1,400 meters	3.22	34.89	27.79
1,500 meters	(3.21)	(34.90)	(27.80)
1,600 meters	3.20	34.90	27.80
2,000 meters	3.09	34.89	27.81

Station 1318; Aug. 3; lat. 58°24′ N., long. 49°00′ W.; dynamic height, 1,454.570 meters.

0 meter	7.19	(34.64)	27.12
25 meters	6.97	34.66	27.17
50 meters	5.79	34.69	27.35
100 meters	3.90	34.86	27.70
200 meters	3.86	34.93	27.765
400 meters	3.74	34.94	27.78
600 meters	3.59	34.92	27.78
800 meters	3.42	34.91	27.79
1,000 meters	3.31	34.90	27.79
1,200 meters	3.25	34.90	27.79
1,400 meters	3.21	34.90	27.805
1,500 meters	(3.20)	(34.90)	(27.805)
1,600 meters	3.20	34.90	27.805
2,000 meters	3.11	34.90	27.81

Station 1319; Aug. 3; depth, 3,383 meters; lat. 58°55′ N., long. 50°01′ W.; dynamic height, 1,454.587 meters

0 meter	7.60	34.65	27.07
25 meters	6.66	34.66	27.215
50 meters	5.35	34.70	27.41
100 meters	4.34	34.92	27.70
200 meters	4.03	34.94	27.75
400 meters	3.91	34.93	27.76
600 meters	3.70	34.93	27.78
800 meters	3.51	34.91	27.78
1,000 meters	3.49	34.91	27.78
1,200 meters	3.40	34.89	27.78
1,400 meters	3.37	34.89	27.78
1,500 meters	(3.32)	(34.90)	(27.79)
1,600 meters	3.27	34.90	27.80
2,000 meters	3.17	34.90	27.81

Station 1320; Aug. 3; depth, 3,428 meters; lat. 59°00′ N., long. 51°40′ W.; dynamic height 1,454 565 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	7.70	34.67	27.07
25 meters	6.99	34.65	27.16
50 meters	3.83	34.70	27.58
100 meters	3.96	27.89	27.72
200 meters	3.94	34.92	27.745
400 meters	3.77	34.93	27.77
600 meters	3.59	34.91	27.775
800 meters	3.42	34.90	27.78
1,000 meters	3.36	34.90	27.79
1,200 meters	3.29	34.90	27.80
1,400 meters	3.23	34.90	27.805
1,500 meters	(3.23)	(34.90)	(27.805)
1,600 meters	3.23	34.90	27.805
2,000 meters	3.14	34.90	27.81

Station 1321; Aug. 4; depth, 3,338 meters; lat. 59°00′ N., long. 53°00′ W.; dynamic height, 1,454.558 meters

0 meter	7.80	34.67	27.06
25 meters	7.37	34.67	27.12
50 meters	4.94	34.81	27.545
100 meters	3.79	34.88	27.73
200 meters	3.68	34.89	27.75
400 meters	3.71	34.93	27.78
600 meters	3.62	34.92	27.78
800 meters	3.37	34.92	27.80
1,000 meters	3.31	34.91	27.80
1,200 meters	3.28	34.91	27.80
1,400 meters	3.24	34.90	27.80
1,500 meters	(3.23)	(34.90)	(27.80)
1,600 meters	3.22	34.90	27.80
2,000 meters	3.12	34.92	27.825

Station 1322; Aug. 4; depth, 3,566 meters; lat. 58°30′ N., long. 53°44′ W.; dynamic height, 1,454.553 meters

0 meter	7.90	34.63	27.01
25 meters	7.48	34.63	27.075
50 meters	4.56	34.75	27.54
100 meters	3.72	34.88	27.735
200 meters	3.69	34.91	27.765
400 meters	3.58	34.91	27.775
600 meters	3.43	34.91	27.79
800 meters	3.33	34.89	27.795
1,000 meters	3.30	34.89	27.795
1,200 meters	3.24	34.89	27.80
1,400 meters	3.21	34.90	27.805
1,500 meters	(3.20)	(34.90)	(27.805)
1,600 meters	3.20	34.91	(27.805)
2,000 meters	3.13	34.91	27.82

Station 1323; Aug. 4; depth, 3,700 meters; lat. 58°00′ N., long. 54°30′ W., dynamic height, 1,454.628 meters

0 meter	7.94	34.66	27.03
25 meters	5.72	34.78	27.43
50 meters	3.99	34.86	27.69
100 meters	4.09	34.87	27.69
200 meters	4.15	34.88	27.69
400 meters	4.30	34.90	27.69
600 meters	3.81	34.88	27.725
800 meters	3.76	34.88	27.735
1,000 meters	3.65	34.88	27.745
1,200 meters	3.51	34.88	27.755
1,400 meters	3.32	34.88	27.775
1,500 meters	(3.28)	(34.88)	(27.78)
1,600 meters	3.25	34.88	27.78
2,000 meters	3.18	34.88	27.79

Station 1324; Aug. 4; depth, 3,800 meters; lat. 57°30′ N., long. 53°31′ W.; dynamic height, 1,454.564 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	7.97	34.57	26.96
25 meters	6.76	34.59	27.15
50 meters	4.69	34.72	27.65
100 meters	3.67	34.82	27.695
200 meters	3.86	34.92	27.755
400 meters	3.77	34.92	27.765
600 meters	3.56	34.91	27.775
800 meters	3.33	34.88	27.775
1,000 meters	3.30	34.89	27.78
1,200 meters	3.24	34.88	27.78
1,400 meters	3.21	34.88	27.79
1,500 meters	(3.20)	(34.88)	(27.79)
1,600 meters	3.19	34.88	27.79
2,000 meters	3.14	34.89	27.80

Station 1325; Aug. 5; depth, 3,502 meters; lat. 56°58′ N., long. 52°29′ W.; dynamic height, 1,454.564 meters

0 meter	8.12	34.58	26.94
25 meters	7.75	34.59	27.00
50 meters	6.23	34.70	27.30
100 meters	3.58	34.85	27.725
200 meters	3.31	34.87	27.775
400 meters	3.29	34.88	27.78
600 meters	3.27	34.88	27.78
800 meters	3.24	34.88	27.78
1,000 meters	3.24	34.90	27.80
1,200 meters	3.19	34.90	27.805
1,400 meters	3.15	34.90	27.81
1,500 meters	(3.14)	(34.90)	(27.81)
1,600 meters	3.13	34.90	27.81
2,000 meters	3.05	34.90	27.82

Station 1326; Aug. 5; depth, 3,612 meters; lat. 56°58′ N., long. 50°32′ W.; dynamic height, 1,454.577 meters

0 meter	7.65	34.61	27.035
25 meters	7.35	34.62	27.085
50 meters	5.54	34.77	27.445
100 meters	4.01	34.86	27.69
200 meters	3.81	34.93	27.77
400 meters	3.70	34.92	27.77
600 meters	3.55	34.91	27.78
800 meters	3.52	34.91	27.78
1,000 meters	3.49	34.92	27.79
1,200 meters	3.48	34.92	27.79
1,400 meters	3.36	34.91	27.80
1,500 meters	(3.32)	(34.91)	(27.80)
1,600 meters	3.29	34.91	27.805
2,000 meters	3.22	34.91	27.81

Station 1327; Aug. 5; depth, 3,630 meters; lat. 56°58′ N., long. 48°40′ W.; dynamic height, 1,454.555 meters

0 meter	7.80	34.52	26.94
25 meters	7.58	34.53	26.985
50 meters	4.97	34.81	27.54
100 meters	3.86	34.87	27.715
200 meters	3.61	34.91	27.77
400 meters	3.51	34.91	27.78
600 meters	3.51	34.91	27.78
800 meters	3.35	34.92	27.805
1,000 meters	3.36	34.92	27.805
1,200 meters	3.33	34.92	27.81
1,500 meters	3.29	34.92	27.81
2,000 meters	3.20	34.91	27.81
2,500 meters	3.11	34.93	27.84
3,000 meters	2.81	34.96	27.89

Station 1328; Aug. 6; depth, 3,820 meters; lat. 56°26′ N., long. 48°56′ W.; dynamic height, 1,454.551 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	7.30	34.58	27.06
25 meters	7.57	34.56	27.01
50 meters	4.64	34.82	27.585
100 meters	3.47	34.88	27.76
200 meters	3.41	34.89	27.76
400 meters	3.38	34.90	27.79
600 meters	(3.35)	34.90	27.79
800 meters	3.33	34.90	27.79
1,000 meters	3.31	34.90	27.79
1,200 meters	3.25	34.90	27.80
1,400 meters	3.20	34.92	27.82
1,500 meters	(3.19)	(34.92)	(27.82)
1,600 meters	3.18	34.92	27.825
2,000 meters	3.13	34.92	27.82

Station 1329; Aug. 6; depth, 3,530 meters; lat. 55°40′ N., long., 49°11′ W.; dynamic height, 1,454.571 meters

0 meter	8.30	34.54	26.88
25 meters	8.03	34.52	26.91
50 meters	5.48	34.69	27.39
100 meters	3.40	34.83	27.725
200 meters	3.36	34.87	27.765
400 meters	3.35	34.88	27.77
600 meters	3.33	34.88	27.77
800 meters	3.31	34.89	27.785
1,000 meters	3.19	34.89	27.795
1,200 meters	3.20	34.89	27.795
1,400 meters	3.19	34.90	27.80
1,500 meters	(3.14)	(34.90)	(27.80)
1,600 meters	3.10	34.89	27.80

Station 1330; Aug. 7; depth, 3,450 meters; lat. 54°52′ N., long. 49°25′ W.; dynamic height, 1,454.569 meters

0 meter	8.20	34.47	26.86
25 meters	8.07	34.46	26.87
50 meters	5.44	34.63	27.345
100 meters	3.70	34.81	27.68
200 meters	3.61	34.91	27.77
400 meters	3.49	34.91	27.78
600 meters	3.40	34.90	27.785
800 meters	3.38	34.91	27.79
1,000 meters	3.28	34.90	27.795
1,200 meters	3.26	34.90	27.795
1,400 meters	3.21	34.91	27.81
1,500 meters	(3.18)	(34.90)	(27.81)
1,600 meters	3.16	34.90	27.81
2,000 meters	3.10	34.91	27.82

Station 1331; Aug. 7; depth, 3,270 meters; lat. 54°05′ N., long., 49°41′ W.; dynamic height, 1,454.585 meters

0 meter	9.55	34.41	26.60
25 meters	8.99	34.40	26.68
50 meters	5.58	34.58	27.29
100 meters	3.47	34.78	27.68
200 meters	3.46	34.88	27.76
400 meters	3.46	34.89	27.77
600 meters	3.34	34.90	27.79
800 meters	3.28	34.90	27.795
1,000 meters	3.28	34.90	27.795
1,200 meters	3.26	34.90	27.795
1,400 meters	(3.25)	34.88	27.795
1,500 meters	(3.24)	(34.89)	(27.795)
1,600 meters	3.23	34.89	27.795

79920—37——16

Station 1332; Aug. 7; depth, 3,590 meters; lat. 53°32′ N., long. 49°36′ W.; dynamic height, 1,454.691 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	11.25	34.63	26.46
25 meters	10.32	34.63	26.625
50 meters	9.48	34.67	26.79
100 meters	5.04	34.68	27.43
200 meters	3.98	34.78	27.63
400 meters	3.65	34.87	27.735
600 meters	3.56	34.88	27.75
800 meters	3.56	34.88	27.75
1,000 meters	3.51	34.88	27.755
1,200 meters	3.45	34.88	27.76
1,400 meters	3.26	34.87	27.77
1,500 meters	(3.26)	(34.88)	(27.78)
1,600 meters	3.25	34.88	27.78
2,000 meters	3.14	34.89	27.80

Station 1333; Aug. 7; depth, 3,440 meters; lat. 53°19′ N., long. 50°30′ W.; dynamic height, 1,454.574 meters

0 meter	8.70	34.41	26.73
25 meters	7.77	34.42	26.88
50 meters	5.22	34.61	27.36
100 meters	3.56	34.81	27.695
200 meters	3.43	34.87	27.755
400 meters	3.41	34.88	27.77
600 meters	3.37	34.90	27.79
800 meters	3.33	34.91	27.80
1,000 meters	3.28	34.91	27.80
1,200 meters	3.16	34.91	27.815
1,400 meters	3.14	34.91	27.815
1,500 meters	(3.12)	(34.91)	(27.815)
1,600 meters	3.11	34.91	27.82

Station 1334; Aug. 7-8; depth, 2,900 meters; lat. 53°11′ N., long, 51°01′ W.; dynamic height, 1,454.563 meters

0 meter	8.00	34.42	26.85
25 meters	6.52	34.48	27.09
50 meters	4.32	34.48	27.36
100 meters	3.58	34.83	27.71
200 meters	3.53	34.88	27.75
400 meters	3.52	34.92	27.79
600 meters	3.51	34.92	27.79
800 meters	3.50	34.92	27.79
1,000 meters	3.34	34.91	27.80
1,200 meters	3.32	34.91	27.80
1,400 meters	3.30	34.94	27.83
1,500 meters	(3.20)	(34.95)	(27.84)
1,600 meters	3.10	34.96	27.86

Station 1335; Aug. 8; depth, 1,006 meters; lat. 53°00′ N., long. 51°40′ W.; dynamic height, 1,454.603 meters

0 meter	6.18	33.34	26.24
25 meters	5.34	34.15	26.98
50 meters	3.58	(34.53)	27.48
100 meters	3.37	34.70	27.625
200 meters	3.63	34.86	27.73
400 meters	3.63	34.87	27.735
600 meters	3.63	34.90	27.76
800 meters	3.52	34.88	27.76

Station 1336; Aug. 8; depth, 273 meters; lat. 52°53′ N., long. 52°05′ W.; dynamic height, 1,454.654 meters

Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	5.35	32.53	25.70
10 meters	5.13	32.73	25.88
25 meters	1.50	33.63	26.93
50 meters	.99	33.89	27.19
100 meters	1.12	34.23	27.44
150 meters	2.13	(34.46)	(27.55)
250 meters	2.71	34.63	27.63

Station 1337; Aug. 8; depth, 216 meters; lat. 52°45′ N., long. 52°38′ W.

0 meter	5.50		
25 meters	−.71	33.28	26.775
50 meters	−.94	33.41	26.89
100 meters	−.28	33.72	27.105
125 meters	.30		
175 meters	1.67		

Station 1338; Aug. 8; depth, 317 meters; lat. 52°32′ N., long. 53°17′ W.; dynamic height, 1,454.714 meters

0 meter	5.19	32.61	25.78
25 meters	.86	32.84	26.34
50 meters	−.73	33.31	26.80
100 meters	−.39	33.61	27.025
200 meters	1.56	34.33	27.495

Station 1339; Aug. 8; depth, 194 meters; lat. 52°23′ N., long. 53°56′ W.; dynamic height, 1,454.710 meters

0 meter	6.51	32.34	25.42
25 meters	−.25	32.96	26.49
50 meters	−1.01	33.28	26.78
100 meters	.07	33.68	27.06
150 meters	.67	34.10	27.36

Station 1340; Aug. 8; depth, 232 meters; lat. 52°14′ N., long. 54°23′ W.; dynamic height, 1,454.740 meters

0 meter	6.50	32.40	25.46
25 meters	3.29	32.58	25.95
50 meters	−.88	33.20	26.71
100 meters	−.09	33.62	27.02
200 meters	.56	34.07	27.345

Station 1341; Aug. 8; depth, 209 meters; lat. 52°06′ N., long. 54°50′ W.; dynamic height, 1,454.768 meters

0 meter	6.20	32.10	25.26
25 meters	4.27	32.49	25.785
50 meters	−1.10	33.06	26.60
75 meters	−1.15	33.28	26.785
100 meters	−1.20	33.38	26.87
150 meters	−0.84	33.60	27.035

GENERAL GREENE, 1933

Observed values			Scaled values			
Depth	Temperature (°C.)	Salinity (‰)	Depth	Temperature (°C.)	Salinity (‰)	σ_t
Station 1487; June 26; lat. 47°40′ N., long. 52°33′ W.; depth, 165 meters; dynamic height, 1,454.693 meters						
0 meter	8.64	31.53	0 meter	8.64	31.53	24.48
26 meters	−.61	32.26	25 meters	−.60	32.26	25.94
52 meters	−1.12	32.55	50 meters	−1.05	32.52	26.17
78 meters	−1.36	32.74	75 meters	−1.35	32.72	26.34
104 meters	−1.58	32.85	100 meters	−1.55	32.84	26.44
157 meters	−1.31	33.12	150 meters	−1.40	33.08	26.63
Station 1488; June 26; lat. 47°58′ N., long. 52°16′ W.; depth, 190 meters; dynamic height, 1,454.677 meters						
0 meter	8.08	31.06	0 meter	8.08	31.06	24.19
24 meters	−.93	32.49	25 meters	−.98	32.50	26.15
48 meters	−.85	32.82	50 meters	−.85	32.83	26.41
72 meters	−1.61	32.86	75 meters	−1.65	32.86	26.46
96 meters	−1.65	32.94	100 meters	−1.65	32.96	26.54
143 meters	−1.42	33.12	150 meters	−1.40	33.14	26.68
Station 1489; June 27; lat. 48°14′ N., long. 51°58′ W.; depth, 170 meters; dynamic height, 1,454.674 meters						
0 meter	7.65	31.48	0 meter	7.65	31.48	24.58
26 meters	.59	32.40	25 meters	.60	32.39	26.00
52 meters	−.95	32.73	50 meters	−.90	32.71	26.32
79 meters	−1.47	32.86	75 meters	−1.45	32.85	26.44
104 meters	−1.49	32.98	100 meters	−1.50	32.96	26.54
157 meters	−.72	33.32	150 meters	−.85	33.28	26.77
Station 1490; June 27; lat. 48°30′ N., long. 51°41′ W.; depth, 192 meters; dynamic height, 1,454.646 meters						
0 meter	6.47	31.58	0 meter	6.47	31.58	24.82
28 meters	.81	32.51	25 meters	.85	32.45	26.04
55 meters	1.20	32.96	50 meters	1.20	32.92	26.38
83 meters	−1.17	32.98	75 meters	−.80	32.97	26.52
109 meters	−1.35	33.27	100 meters	−1.35	33.16	26.70
165 meters	−.46	33.75	150 meters	−.70	33.67	27.09
			(200) meters	−.20	33.87	27.23
Station 1491; June 27; lat. 48°47′ N., long. 51°24′ W.; depth, 210 meters; dynamic height, 1,454.636 meters						
0 meter	5.49	31.86	0 meter	5.49	31.86	25.16
26 meters	−.58	32.84	25 meters	−.55	32.74	26.33
52 meters	−.65	32.86	50 meters	−.65	32.86	26.33
78 meters	−1.14	33.00	75 meters	−1.05	32.99	26.55
104 meters	−1.32	33.12	100 meters	−1.35	33.09	26.64
155 meters	−.74	33.63	150 meters	−.90	33.56	27.01
207 meters	1.48	34.34	200 meters	1.10	34.28	27.48
Station 1492; June 27; lat. 49°03′ N., long. 51°08′ W.; depth, 302 meters; dynamic height, 1,454.609 meters						
0 meter	6.14	32.05	0 meter	6.14	32.05	25.23
23 meters	1.47	32.80	25 meters	1.45	32.81	26.29
45 meters	−.13	32.89	50 meters	−.45	32.93	26.48
68 meters	−1.42	33.11	75 meters	−1.40	33.19	26.72
91 meters	−.76	33.38	100 meters	−.65	33.47	26.93
136 meters	.01	33.79	150 meters	.30	33.97	27.28
181 meters	.97	34.16	200 meters	1.25	34.27	27.47
272 meters	2.47	34.60	(300) meters	2.25	34.69	27.72

Observed values			Scaled values			
Depth	Temperature (°C.)	Salinity (‰)	Depth	Temperature (°C.)	Salinity (‰)	σ_t
Station 1493; June 27; lat. 49°27′ N., long. 50°42′ W.; depth, 326 meters; dynamic height, 1,454.562 meters						
0 meter	4.07	32.73	0 meter	4.07	32.73	26.00
22 meters	1.58	33.06	25 meters	1.50	33.06	26.47
44 meters	.56	33.08	50 meters	.00	33.09	26.58
66 meters	−1.07	33.36	75 meters	−.80	33.53	26.97
88 meters	−.26	33.70	100 meters	.15	33.84	27.18
133 meters	1.07	34.16	150 meters	1.60	34.30	27.46
177 meters	2.24	34.50	200 meters	2.50	34.58	27.61
265 meters	2.87	34.69	(300) meters	2.95	34.72	27.69
Station 1494; June 27; lat. 49°52′ N., long. 50°16′ W.; depth, 302 meters; dynamic height, 1,454.523 meters						
0 meter	4.33	33.08	0 meter	4.33	33.03	26.20
25 meters	7.60	33.48	25 meters	7.60	33.53	26.20
50 meters	4.35	33.87	50 meters	4.35	33.87	26.87
75 meters	1.00	34.17	75 meters	1.00	34.17	27.40
99 meters	1.94	34.38	100 meters	1.95	34.38	27.50
149 meters	2.46	34.53	150 meters	2.45	34.54	27.58
199 meters	2.94	34.72	200 meters	2.95	34.72	27.69
298 meters	3.17	34.84	300 meters	3.15	34.84	27.76
Station 1495; June 27–28; lat. 50°17′ N., long. 49°50′ W.; depth, 960 meters; dynamic height, 1,454.408 meters						
0 meter	5.31	33.69	0 meter	5.31	33.69	26.62
24 meters	3.20	34.64	25 meters	3.20	33.64	27.60
47 meters	2.93	34.70	50 meters	2.95	34.71	27.68
71 meters	3.09	34.77	75 meters	3.10	34.78	27.72
95 meters	3.18	34.84	100 meters	3.20	34.84	27.76
142 meters	3.28	34.87	150 meters	3.30	34.87	27.78
197 meters	3.26	34.89	200 meters	3.25	34.89	27.79
296 meters	3.28	35.00	300 meters	3.25	35.00	27.88
394 meters	3.27	35.00	400 meters	3.25	35.00	27.88
591 meters	3.22	34.99	600 meters	3.25	35.00	27.88
788 meters	3.23	35.02	800 meters	3.25	35.02	27.90
Station 1496; June 28; lat. 50°40′ N., long. 49°24′ W.; depth, 1,326 meters; dynamic height, 1,454.380 meters						
0 meter	5.67	34.32	0 meter	5.67	34.32	27.08
24 meters	4.69	34.39	25 meters	4.70	34.40	27.25
47 meters	3.39	34.77	50 meters	3.35	34.78	27.69
71 meters	3.28	34.83	75 meters	3.30	34.84	27.75
94 meters	3.24	34.89	100 meters	3.25	34.89	27.79
143 meters	3.24	34.90	150 meters	3.25	34.91	27.81
190 meters	3.25	34.95	200 meters	3.25	34.95	27.84
244 meters	3.25	34.96	300 meters	3.20	34.99	27.88
330 meters	3.19	35.00	400 meters	3.20	34.99	27.88
505 meters	3.22	34.98	600 meters	3.25	35.01	27.89
688 meters	3.23	35.06	800 meters	3.25	35.08	27.94
877 meters	3.23	35.09	(1,000) meters	3.25	35.09	27.95
Station 1497; June 28; lat. 50°39′ N., long. 49°57′ W.; depth, 1,207 meters; dynamic height, 1,454.454 meters						
0 meter	6.25	33.90	0 meter	6.25	33.90	26.71
20 meters	5.36	34.04	25 meters	4.60	34.11	27.04
40 meters	3.03	34.65	50 meters	2.95	34.74	27.70
59 meters	2.96	34.78	75 meters	3.00	34.80	27.75
80 meters	3.04	34.80	100 meters	3.15	34.84	27.76
119 meters	3.20	34.87	150 meters	3.25	34.88	27.78
159 meters	3,26	34.89	200 meters	3,25	34.96	27.85
170 meters	3.25	34.95	300 meters	3.25	34.96	27.85
232 meters	3.27	34.96	400 meters	3.25	34.96	27.85
366 meters	3.26	34.96	600 meters	3.25	34.98	27.86
513 meters	3.26	35.00	(800) meters	3.25	34.97	27.86
670 meters	3.23	34.97	(1,000) meters	3.25	34.98	27.86

Observed values			Scaled values			
Depth	Temperature (°C.)	Salinity (‰)	Depth	Temperature (°C.)	Salinity (‰)	σ_t
Station 1498; June 28; lat. 50°37′ N., long. 50°32′ W.; depth, 923 meters; dynamic height, 1,454.367 meters						
0 meter	3. 92	33. 61	0 meter	3. 92	33. 61	26. 72
28 meters	4. 58	34. 81	25 meters	4. 55	34. 63	27. 45
56 meters	3. 82	34. 91	50 meters	4. 05	34. 90	27. 72
84 meters	3. 48	34. 94	75 meters	3. 60	34. 93	27. 79
113 meters	3. 29	34. 98	100 meters	3. 35	34. 96	27. 84
169 meters	3. 30	34. 97	150 meters	3. 25	34. 97	27. 86
179 meters	3. 27	34. 98	200 meters	3. 30	35. 00	27. 88
274 meters	3. 33	35. 03	300 meters	3. 30	35. 03	27. 90
373 meters	3. 33	35. 04	400 meters	3. 35	35. 04	27. 90
582 meters	3. 33	35. 10	600 meters	3. 35	35. 10	27. 95
808 meters	3. 28	35. 11	800 meters	3. 30	35. 11	27. 97
Station 1499; June 28; lat. 50°35′ N., long. 51°09′ W.; depth, 256 meters; dynamic height, 1,454.481 meters						
0 meter	3. 95	32. 94	0 meter	3. 95	32. 94	26. 17
32 meters	. 71	33. 28	25 meters	. 65	33. 17	26. 62
62 meters	—. 14	33. 81	50 meters	—. 10	33. 61	27. 01
83 meters	. 07	33. 91	75 meters	—. 05	33. 87	27. 22
126 meters	. 50	34. 24	100 meters	. 25	34. 05	27. 35
189 meters	1. 99	34. 54	150 meters	1. 15	34. 37	27. 55
251 meters	2. 61	34. 82	200 meters	2. 05	34. 59	27. 66
Station 1500; June 29; lat. 50°33′ N., long. 51°44′ W.; depth, 238 meters; dynamic height, 1,454.489 meters						
0 meter	4. 43	32. 82	0 meter	4. 43	32. 82	26. 03
26 meters	1. 11	33. 15	25 meters	1. 20	33. 14	26. 57
51 meters	—. 45	33. 52	50 meters	—. 40	33. 48	26. 92
77 meters	—. 60	33. 80	75 meters	—. 60	33. 80	27. 18
102 meters	. 23	33. 97	100 meters	. 15	33. 95	27. 27
153 meters	1. 11	34. 34	150 meters	1. 10	34. 31	27. 51
204 meters	2. 17	34. 68	200 meters	2. 10	34. 65	27. 70
Station 1501; June 29; lat. 50°31′ N., long. 52°20′ W.; depth, 214 meters; dynamic height, 1,454.497 meters						
0 meter	4. 44	32. 62	0 meter	4. 44	32. 62	25. 87
25 meters	1. 28	33. 04	25 meters	1. 30	33. 04	26. 48
50 meters	—. 14	33. 25	50 meters	—. 15	33. 25	26. 72
75 meters	—. 97	33. 67	75 meters	—. 95	33. 67	27. 10
100 meters	—. 41	33. 96	100 meters	—. 40	33. 96	27. 31
151 meters	1. 26	34. 33	150 meters	1. 25	34. 32	27. 51
201 meters	2. 38	34. 70	200 meters	2. 30	34. 69	27. 72
Station 1502; June 29; lat. 50°30′ N.; long. 52°58′ W.; depth, 274 meters; dynamic height, 1,454.488 meters						
0 meter	4. 18	32. 75	0 meter	4. 18	32. 75	26. 00
25 meters	. 71	33. 18	25 meters	. 70	33. 18	26. 62
49 meters	—1. 10	33. 28	50 meters	—1. 10	33. 29	26. 78
74 meters	—. 65	33. 76	75 meters	—. 65	33. 76	27. 16
99 meters	—. 14	34. 04	100 meters	—. 10	34. 06	27. 37
148 meters	. 95	34. 34	150 meters	1. 00	34. 34	27. 53
198 meters	1. 75	34. 60	200 meters	1. 80	34. 60	27. 69
Station 1503; June 29; lat. 50°28′ N., long. 53°39′ W.; depth, 348 meters; dynamic height, 1,454.494 meters						
0 meter	3. 55	32. 74	0 meter	3. 55	32. 74	26. 06
25 meters	. 21	33. 08	25 meters	. 20	33. 08	26. 57
51 meters	—. 99	33. 40	50 meters	—1. 00	33. 40	26. 88
76 meters	—. 69	33. 78	75 meters	—. 70	33. 78	27. 17
102 meters	—. 21	33. 98	100 meters	—. 30	33. 97	27. 31
152 meters	. 93	34. 32	150 meters	. 90	34. 31	27. 52
203 meters	1. 84	34. 56	200 meters	1. 80	34. 55	27. 65
305 meters	2. 76	34. 86	300 meters	2. 70	34. 85	27. 81

Observed values			Scaled values			
Depth	Temperature (°C.)	Salinity (‰)	Depth	Temperature (°C.)	Salinity (‰)	σ_t
Station 1504; June 29; lat. 50°26′ N., long 54°21′ W.; depth, 274 meters; dynamic height, 1,454.530 meters						
0 meter	3.68	32.72	0 meter	3.68	32.72	26.03
26 meters	1.78	33.08	25 meters	1.80	33.07	26.46
52 meters	−1.04	33.17	50 meters	−1.00	33.16	26.68
78 meters	−1.03	33.54	75 meters	−1.10	33.51	26.97
105 meters	−0.49	33.78	100 meters	−.60	33.75	27.14
156 meters	0.41	34.21	150 meters	.30	34.16	27.43
208 meters	1.04	34.35	200 meters	.95	34.33	27.52
Station 1505; June 29; lat. 50°25′ N., long. 55°00′ W.; depth, 229 meters; dynamic height, 1,454.581 meters						
0 meter	3.36	32.30	0 meter	3.36	32.30	25.72
25 meters	.00	32.68	25 meters	.00	32.68	26.26
50 meters	−1.10	32.97	50 meters	−1.10	32.96	26.52
75 meters	−1.37	33.13	75 meters	−1.40	33.13	26.67
100 meters	−1.29	33.40	100 meters	−1.30	33.40	26.89
149 meters	−.61	33.76	150 meters	−.60	33.77	27.16
199 meters	.27	34.06	200 meters	.30	34.06	27.35
Station 1506; June 30; lat. 50°37′ N., long. 55°27′ W.; depth, 180 meters; dynamic height, 1,454.632 meters						
0 meter	2.39	31.45	0 meter	2.39	31.45	25.12
26 meters	−.79	32.55	25 meters	−.80	32.54	26.18
51 meters	−.10	32.72	50 meters	−.10	32.69	26.26
77 meters	−1.37	32.92	75 meters	−1.35	32.90	26.48
102 meters	−1.53	33.10	100 meters	−1.55	33.09	26.64
153 meters	−1.28	33.40	150 meters	−1.30	33.38	26.87
Station 1507; June 30; lat. 51°41′ N., long. 55°24′ W.; depth, 82 meters; dynamic height, 1,454.646 meters						
0 meter	0.68	30.91	0 meter	0.68	30.91	24.81
22 meters	−.12	31.26	25 meters	−.20	31.31	25.17
45 meters	−.62	31.99	50 meters	−.70	32.05	25.78
68 meters	−.83	32.38	(75) meters	−.90	32.50	26.15
Station 1508; June 30; lat. 51°47′ N., long. 55°22′30″ W.; depth, 96 meters; dynamic height, 1,454.629 meters						
0 meter	1.93	30.71	0 meter	1.93	30.71	24.57
14 meters	.32	31.58	25 meters	−.30	31.82	25.57
40 meters	−1.02	32.21	50 meters	−1.15	32.35	26.03
68 meters	−1.23	32.58	75 meters	−1.30	32.70	26.32
Station 1509; June 30; lat. 51°52′ N., long. 55°22′ W.; depth, 86 meters; dynamic height, 1,454.621 meters						
0 meter	1.14	30.98	0 meter	1.14	30.98	24.82
26 meters	.60	31.84	25 meters	.60	31.80	25.52
53 meters	−1.08	32.56	50 meters	−.80	32.45	26.10
			(75) meters	−1.25	32.90	26.48
Station 1510; June 30; lat. 52°06′ N., long. 55°36′ W.; depth, 78 meters; dynamic height, 1,454.600 meters						
0 meter	0.53	31.35	0 meter	0.53	31.35	25.16
13 meters	−.86	32.10	25 meters	−1.25	32.40	26.08
34 meters	−1.41	32.67	50 meters	−1.45	32.85	26.44
55 meters	−1.47	32.90	(75) meters	−1.45	33.03	26.59
Station 1511; June 30; lat. 52°04′ N., long. 55°27′ W.; depth, 183 meters; dynamic height, 1,454.618 meters						
0 meter	−0.04	31.78	0 meter	−0.04	31.78	25.53
25 meters	−.21	31.84	25 meters	−.20	31.85	25.60
49 meters	−1.41	32.60	50 meters	−1.40	32.62	26.26
73 meters	−1.47	32.87	75 meters	−1.45	32.88	26.47
97 meters	−1.40	33.02	100 meters	−1.35	33.03	26.59
146 meters	−1.24	33.24	150 meters	−1.20	33.26	26.77

Observed values			Scaled values			
Depth	Temperature (°C.)	Salinity (‰)	Depth	Temperature (°C.)	Salinity (‰)	σ_t
Station 1512; June 30; lat. 52°02′ N., long. 55°18′ W.; depth, 119 meters; dynamic height, 1,454.646 meters						
0 meter	1.41	30.86	0 meter	1.41	30.86	24.72
17 meters	1.13	30.98	25 meters	.50	31.40	25.21
34 meters	−.48	31.78	50 meters	−1.15	32.32	26.03
51 meters	−1.21	32.38	(75) meters	−1.45	32.80	26.40
			(100) meters	−1.40	33.00	26.56
Station 1513; June 30; lat. 52°05′ N., long. 55°00′ W.; depth, 183 meters; dynamic height, 1,454.629 meters						
0 meter	1.19	31.05	0 meter	1.19	31.05	24.88
26 meters	.94	31.13	25 meters	.95	31.13	24.96
52 meters	−1.31	32.77	50 meters	−1.20	32.70	26.32
78 meters	−1.41	32.94	75 meters	−1.40	32.91	26.49
104 meters	−1.29	33.14	100 meters	−1.30	33.09	26.64
156 meters	−.38	33.83	150 meters	−.45	33.75	27.14
Station 1514; June 30; lat. 52°14′ N., long. 54°25′ W.; depth, 192 meters; dynamic height, 1,454.541 meters						
0 meter	2.20	32.42	0 meter	2.20	32.42	25.91
28 meters	1.80	32.48	25 meters	1.85	32.46	25.97
55 meters	−.88	33.48	50 meters	−.85	33.35	26.82
83 meters	−.47	33.61	75 meters	−.75	33.56	27.00
111 meters	−.02	33.96	100 meters	−.25	33.72	27.11
166 meters	.54	34.13	150 meters	.40	34.09	27.37
			(200) meters	.85	34.20	27.43
Station 1515; July 1; lat. 52°22′ N., long. 53°49′ W.; depth, 238 meters; dynamic height, 1,454.528 meters						
0 meter	2.16	32.50	0 meter	2.16	32.50	25.98
26 meters	1.62	32.76	25 meters	1.70	32.75	26.22
52 meters	−.74	33.22	50 meters	−.50	33.17	26.67
78 meters	−.93	33.55	75 meters	−.90	33.51	26.97
104 meters	−.55	33.80	100 meters	−.65	33.76	27.16
157 meters	.93	34.28	150 meters	.75	34.22	27.46
209 meters	1.75	34.49	(200) meters	1.65	34.46	27.59
Station 1516; July 1; lat. 52° 30′N., long. 53°12′ W.; depth, 192 meters; dynamic height, 1,454.479 meters						
0 meter	2.90	32.93	0 meter	2.90	32.93	26.27
26 meters	2.76	33.04	25 meters	2.80	33.04	26.38
52 meters	−.45	33.70	50 meters	−.45	33.65	27.06
77 meters	.09	34.04	75 meters	.10	34.03	27.33
103 meters	.66	34.26	100 meters	.60	34.23	27.46
154 meters	1.88	34.54	150 meters	1.75	34.51	27.62
			(200) meters	2.60	34.75	27.74
Station 1517; July 1; lat. 52°39′ N., long. 52°36′ W.; depth, 229 meters; dynamic height, 1,454.472 meters						
0 meter	2.73	32.80	0 meter	2.73	32.80	26.18
26 meters	.72	33.23	25 meters	.80	33.22	26.65
52 meters	−.34	33.73	50 meters	−.35	33.70	27.09
78 meters	.07	33.98	75 meters	.05	33.96	27.29
104 meters	.78	34.24	100 meters	.65	34.19	27.43
155 meters	1.79	34.60	150 meters	1.65	34.58	27.68
206 meters	2.79	34.80	200 meters	2.60	34.78	27.76
Station 1518; July 1; lat. 52°47′ N., long. 51°59′ W.; depth, 274 meters; dynamic height, 1,454.471 meters						
0 meter	2.18	33.12	0 meter	2.18	33.11	26.46
27 meters	2.18	33.11	25 meters	2.20	33.11	26.46
53 meters	−.55	33.77	50 meters	−.55	33.65	27.06
79 meters	.03	34.10	75 meters	−.05	34.06	27.37
105 meters	.85	34.32	100 meters	.70	34.29	27.51
159 meters	2.35	34.63	150 meters	2.25	34.59	27.64
211 meters	2.90	34.82	200 meters	2.80	34.79	27.75

Observed values			Scaled values			
Depth	Temperature (°C.)	Salinity (‰)	Depth	Temperature (°C.)	Salinity (‰)	σ_t
Station 1519; July 1; lat. 52°58′ N., long. 51°22′ W.; depth, 1,280 meters; dynamic height, 1,454.352 meters						
0 meter	4.47	34.43	0 meter	4.47	34.43	27.30
28 meters	4.83	34.67	25 meters	4.85	34.65	27.44
56 meters	3.74	34.92	50 meters	3.90	34.91	27.75
84 meters	3.50	34.94	75 meters	3.55	34.93	27.79
111 meters	3.41	34.98	100 meters	3.45	34.96	27.83
167 meters	3.37	34.99	150 meters	3.40	34.99	27.86
225 meters	3.37	35.08	200 meters	3.40	35.04	27.90
336 meters	3.39	35.08	300 meters	3.40	35.05	27.91
411 meters	3.35	35.04	400 meters	3.40	35.06	27.92
629 meters	3.35	35.07	600 meters	3.35	35.07	27.93
845 meters	3.34	35.08	800 meters	3.35	35.08	27.93
1,089 meters	3.31	35.11	1,000 meters	3.35	35.10	27.95
Station 1520; July 1–2; lat. 53°09′ N., long. 50°47′ W.; depth, 2,743 meters; dynamic height, 1,454.362 meters						
0 meter	6.55	34.73	0 meter	6.55	34.73	27.28
20 meters	5.73	34.70	25 meters	5.70	34.70	27.37
40 meters	5.26	34.73	50 meters	4.40	34.78	27.58
15 meters	5.75	34.71	75 meters	3.55	34.88	27.75
35 meters	5.57	34.70	100 meters	3.40	34.93	27.81
76 meters	3.51	34.89	150 meters	3.35	34.97	27.85
116 meters	3.38	34.94	200 meters	3.30	35.00	27.88
197 meters	3.33	35.00	300 meters	3.30	35.00	27.88
433 meters	3.25	35.00	400 meters	3.30	35.00	27.88
652 meters	3.26	35.08	600 meters	3.25	35.07	27.94
873 meters	----------	35.08	800 meters	3.25	35.08	27.94
1,096 meters	3.20	35.06	1,000 meters	3.20	35.07	27.95
1,662 meters	3.15	35.08	1,500 meters	3.20	35.08	27.95
2,165 meters	2.87	----------	(2,000) meters	2.95	35.08	27.97
Station 1521; July 2; lat. 53°22′ N., long. 50°08′ W.; depth, 3,246 meters; dynamic height, 1,454.325 meters						
0 meter	7.07	34.77	0 meter	7.07	34.77	27.25
26 meters	7.10	34.81	25 meters	7.10	34.81	27.28
51 meters	5.44	34.89	50 meters	5.70	34.89	27.52
77 meters	4.34	34.91	75 meters	4.35	34.91	27.70
101 meters	4.19	34.94	100 meters	4.20	34.94	27.74
153 meters	3.90	35.00	150 meters	3.95	35.00	27.81
204 meters	3.51	35.02	200 meters	3.55	35.02	27.87
305 meters	3.79	35.09	300 meters	3.75	35.09	27.90
349 meters	3.63	35.11	400 meters	3.65	35.12	27.94
526 meters	3.48	35.13	600 meters	3.40	35.13	27.97
741 meters	3.37	35.12	800 meters	3.35	35.13	27.97
928 meters	3.34	35.16	1,000 meters	3.35	35.16	28.00
1,411 meters	3.30	35.15	1,500 meters	3.30	35.15	28.00
1,833 meters	3.22	35.16	(2,000) meters	3.20	35.16	28.02
Station 1522; July 2; lat. 53°35′ N., long. 49°30′ W.; depth, 3,658? meters; dynamic height, 1,454.340 meters						
0 meter	7.25	34.91	0 meter	7.25	34.86	27.29
27 meters	7.36	34.88	25 meters	7.35	34.88	27.29
54 meters	6.12	34.90	50 meters	6.35	34.90	27.45
81 meters	5.54	34.94	75 meters	5.65	34.93	27.56
109 meters	4.96	34.95	100 meters	5.15	34.95	27.64
163 meters	4.45	34.94	150 meters	4.50	34.94	27.70
217 meters	4.13	34.99	200 meters	4.25	34.97	27.76
325 meters	3.90	35.09	300 meters	3.95	35.08	27.87
417 meters	3.50	35.08	400 meters	3.50	35.08	27.92
641 meters	3.58	35.17	600 meters	3.55	35.16	27.98
877 meters	3.49	35.17	800 meters	3.50	35.17	28.00
1,125 meters	3.37	35.16	1,000 meters	3.45	35.17	28.00
1,727 meters	3.25	35.20	1,500 meters	3.30	35.18	28.02
2,354 meters	3.06	35.22	(2,000) meters	3.20	35.21	28.06

Observed values			Scaled values			
Depth	Temperature (°C.)	Salinity (‰)	Depth	Temperature (°C.)	Salinity (‰)	σ_t
Station 1523; July 3; lat. 54°15′ N., long. 49°14′ W.; depth, 3,658 meters; dynamic height, 1,454.278 meters						
0 meter	6.80	34.85	0 meter	6.80	34.85	27.35
29 meters	6.80	34.86	25 meters	6.80	34.86	27.36
58 meters	4.77	34.96	50 meters	5.10	34.93	27.62
87 meters	4.13	35.04	75 meters	4.35	35.02	27.79
116 meters	3.74	35.05	100 meters	3.95	35.05	27.85
174 meters	3.31	35.08	150 meters	3.45	35.07	27.92
232 meters	3.30	35.09	200 meters	3.30	35.08	27.94
348 meters	3.34	35.08	300 meters	3.30	35.08	27.94
434 meters	3.38	35.15	400 meters	3.35	35.13	27.97
659 meters	3.40	35.13	600 meters	3.40	35.13	27.97
888 meters	3.30	35.16	800 meters	3.35	35.15	27.99
1,124 meters	3.26	35.16	1,000 meters	3.30	35.16	28.01
1,719 meters	3.23	35.19	1,500 meters	3.25	35.18	28.02
2,336 meters	3.05	35.18	2,000 meters	3.15	35.19	28.04
Station 1524; July 3; lat. 54°58′ N., long. 48°56′ W.; depth, 3,790 meters; dynamic height, 1,454.270 meters						
0 meter	6.85	34.91	0 meter	6.85	34.91	27.39
27 meters	6.73	34.92	25 meters	6.75	34.92	27.41
54 meters	4.92	34.97	50 meters	5.40	34.96	27.62
81 meters	4.50	34.98	75 meters	4.60	34.98	27.72
108 meters	4.19	35.01	100 meters	4.25	35.01	27.79
162 meters	3.95	35.02	150 meters	4.00	35.02	27.83
216 meters	3.74	35.07	200 meters	3.80	35.06	27.88
324 meters	3.51	35.09	300 meters	3.55	35.08	27.91
407 meters	3.45	35.15	400 meters	3.45	35.15	27.98
622 meters	3.38	35.17	600 meters	3.40	35.17	28.01
848 meters	3.27	35.18	800 meters	3.30	35.18	28.02
1,081 meters	3.24	35.18	1,000 meters	3.25	35.18	28.02
1,674 meters	3.24	35.21	1,500 meters	3.25	35.20	28.04
2,299 meters	3.15	35.20	2,000 meters	3.20	35.21	28.06
Station 1525; July 3; lat. 55°40′ N., long. 48°42′ W.; depth, 3,612 meters; dynamic height, 1,454.285 meters						
0 meter	6.30	34.80	0 meter	6.30	34.80	27.38
29 meters	6.23	34.80	25 meters	6.25	34.80	27.38
57 meters	4.40	34.91	50 meters	4.65	34.89	27.65
86 meters	3.92	34.96	75 meters	4.05	34.94	27.75
115 meters	3.74	35.08	100 meters	3.80	35.02	27.85
172 meters	3.88	35.10	150 meters	3.85	35.09	27.89
229 meters	3.66	35.11	200 meters	3.75	35.10	27.91
345 meters	3.52	35.11	300 meters	3.55	35.11	27.94
387 meters	3.43	35.12	400 meters	3.40	35.12	27.97
597 meters	3.29	35.13	600 meters	3.30	35.13	27.98
817 meters	3.23	35.14	800 meters	3.25	35.14	27.99
1,049 meters	3.22	35.15	1,000 meters	3.25	35.15	28.00
1,629 meters	3.22	35.16	1,500 meters	3.20	35.15	28.01
2,246 meters	3.13	35.14	2,000 meters	3.15	35.15	28.01
Station 1526; July 4; lat. 56°20′ N., long. 48°40′ W.; depth, 2,834 meters; dynamic height, 1,454.341 meters						
0 meter	6.27	34.82	0 meter	6.27	34.82	27.40
31 meters	6.04	34.81	25 meters	6.10	34.81	27.41
61 meters	4.10	34.90	50 meters	4.95	34.86	27.59
92 meters	3.65	34.98	75 meters	3.85	34.94	27.77
122 meters	3.52	34.99	100 meters	3.60	34.98	27.83
183 meters	3.34	35.02	150 meters	3.40	35.00	27.87
244 meters	3.45	35.05	200 meters	3.35	35.03	27.89
366 meters	3.34	35.06	300 meters	3.40	35.05	27.91
456 meters	3.32	35.08	400 meters	3.35	35.07	27.93
691 meters	3.24	35.08	600 meters	3.30	35.08	27.94
929 meters	3.25	35.09	800 meters	3.25	35.08	27.94
1,170 meters	3.22	35.10	1,000 meters	3.25	35.09	27.95
1,782 meters	3.23	35.11	1,500 meters	3.25	35.11	27.97
2,407 meters	3.16	35.12	2,000 meters	3.20	35.11	27.98

Observed values			Scaled values			
Depth	Temperature (°C.)	Salinity (‰)	Depth	Temperature (°C.)	Salinity (‰)	σ_t
Station 1527; July 4; lat. 56°56′ N., long. 48°36′ W.; depth, 3,610 meters; dynamic height, 1,454.304 meters						
0 meter	6.06	34.78	0 meter	6.06	34.78	27.39
31 meters	5.74	34.78	25 meters	5.85	34.78	27.41
62 meters	3.92	34.89	50 meters	4.45	34.85	27.64
93 meters	3.65	34.93	75 meters	3.80	34.90	27.75
124 meters	3.40	34.97	100 meters	3.55	34.93	27.79
186 meters	3.57	35.08	150 meters	3.45	35.03	27.88
248 meters	3.61	35.10	200 meters	3.60	35.09	27.92
372 meters	3.45	35.11	300 meters	3.60	35.10	27.93
458 meters	3.30	35.12	400 meters	3.40	35.11	27.96
694 meters	3.26	35.11	600 meters	3.30	35.11	27.97
933 meters	3.23	35.11	800 meters	3.25	35.11	27.97
1,178 meters	3.20	35.13	1,000 meters	3.20	35.11	27.98
1,790 meters	3.22	35.15	1,500 meters	3.20	35.14	28.00
2,412 meters	3.10	35.14	2,000 meters	3.20	35.15	28.01
Station 1528; July 4; lat. 56°57′ N., long. 50°10′ W.; depth, 3,475 meters; dynamic height, 1,454.295 meters						
0 meter	5.96	34.83	0 meter	5.96	34.83	27.44
30 meters	4.90	34.86	25 meters	5.10	34.84	27.56
59 meters	3.91	34.96	50 meters	4.20	34.95	27.75
90 meters	3.47	34.97	75 meters	3.65	34.96	27.81
120 meters	3.30	35.00	100 meters	3.40	34.98	27.85
179 meters	3.37	35.02	150 meters	3.30	35.01	27.89
239 meters	3.53	35.06	200 meters	3.45	35.04	27.89
358 meters	3.32	35.09	300 meters	3.50	35.08	27.92
450 meters	3.28	35.08	400 meters	3.30	35.09	27.95
684 meters	3.23	35.13	600 meters	3.25	35.11	27.97
923 meters	3.22	35.13	800 meters	3.20	35.13	27.99
1,168 meters	3.21	35.12	1,000 meters	3.20	35.13	27.99
1,776 meters	3.22	35.13	1,500 meters	3.20	35.13	27.99
2,319 meters	3.17	35.12	2,000 meters	3.20	35.13	27.99
Station 1529; July 5; lat. 57°00′ N., long. 52°30′ W.; depth, 3,292 meters; dynamic height, 1,454.293 meters						
0 meter	6.04	34.84	0 meter	6.04	34.84	27.44
31 meters	5.49	34.79	25 meters	5.65	34.79	27.45
60 meters	4.06	35.00	50 meters	4.40	34.92	27.70
91 meters	3.66	35.05	75 meters	3.80	35.02	27.85
122 meters	3.85	35.11	100 meters	3.65	35.06	27.89
182 meters	3.56	35.10	150 meters	3.75	35.10	27.91
243 meters	3.48	35.10	200 meters	3.55	35.10	27.93
365 meters	3.35	35.10	300 meters	3.40	35.10	27.95
389 meters	----------	35.10	400 meters	3.35	35.10	27.95
611 meters	3.25	35.13	600 meters	3.30	35.13	27.98
850 meters	3.21	35.15	800 meters	3.25	35.13	27.98
1,106 meters	3.22	35.12	1,000 meters	3.25	35.13	27.98
1,711 meters	3.22	35.13	1,500 meters	3.25	35.13	27.98
			(2,000) meters	3.20	35.13	27.99
Station 1530; July 5; lat. 57°29′ N., long. 53°28′W.; depth, 3,566 meters; dynamic height, 1,454.344 meters						
0 meter	5.66	34.81	0 meter	5.66	34.81	27.47
31 meters	5.54	34.82	25 meters	5.60	34.81	27.47
61 meters	3.82	34.93	50 meters	4.10	34.89	27.71
93 meters	3.69	34.98	75 meters	3.75	34.96	27.80
124 meters	3.53	34.98	100 meters	3.65	34.98	27.82
185 meters	3.42	35.03	150 meters	3.45	35.00	27.86
247 meters	3.39	35.03	200 meters	3.40	35.03	27.89
370 meters	3.35	35.08	300 meters	3.35	35.06	27.92
448 meters	3.31	35.06	400 meters	3.35	35.08	27.93
679 meters	3.23	35.08	600 meters	3.25	35.07	27.94
915 meters	3.23	35.08	800 meters	3.25	35.08	27.94
1,155 meters	3.22	35.07	1,000 meters	3.25	35.08	27.94
1,762 meters	3.24	35.09	1,500 meters	3.20	35.08	27.95
2,387 meters	3.07	35.10	2,000 meters	3.20	35.10	27.97

Station 1531; July 6; lat. 57°56′ N., long. 54°23′ W.; depth, 3,319 meters; dynamic height, 1,454.341 meters

Observed values			Scaled values			
Depth	Temperature (°C.)	Salinity (‰)	Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	5.90	34.83	0 meter	5.90	34.83	27.45
32 meters	5.62	34.83	25 meters	5.75	34.83	27.47
63 meters	3.66	34.91	50 meters	4.00	34.87	27.71
95 meters	3.51	34.98	75 meters	3.60	34.95	27.81
127 meters	3.52	34.98	100 meters	3.55	34.98	27.83
190 meters	3.44	35.06	150 meters	3.50	35.02	27.88
253 meters	3.42	35.07	200 meters	3.45	35.06	27.91
380 meters	3.40	35.07	300 meters	3.40	35.07	27.93
508 meters	3.27	35.06	400 meters	3.40	35.07	27.93
763 meters	3.24	35.06	600 meters	3.25	35.06	27.93
1,019 meters	3.21	35.08	800 meters	3.25	35.06	27.93
1,276 meters	3.20	35.07	1,000 meters	3.20	35.08	27.95
1,923 meters	3.25	35.08	1,500 meters	3.20	35.07	27.95
2,573 meters	2.94	35.11	2,000 meters	3.20	35.08	27.95

Station 1532; July 6; lat. 58°28′ N., long. 53°28′ W.; depth, 3,429 meters; dynamic height, 1,454.261 meters

Depth	Temperature (°C.)	Salinity (‰)	Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	6.12	34.82	0 meter	6.12	34.82	27.42
33 meters	4.67	34.96	25 meters	5.10	34.93	27.62
65 meters	3.74	34.98	50 meters	4.15	34.97	27.77
99 meters	3.52	35.06	75 meters	3.65	35.01	27.85
132 meters	3.60	35.08	100 meters	3.50	35.06	27.91
197 meters	3.47	35.14	150 meters	3.55	35.10	27.93
263 meters	3.36	35.14	200 meters	3.45	35.14	27.97
394 meters	3.29	35.13	300 meters	3.35	35.14	27.98
518 meters	3.23	35.16	400 meters	3.30	35.13	27.98
778 meters	3.20	35.14	600 meters	3.20	35.14	28.00
1,039 meters	3.18	35.14	800 meters	3.20	35.14	28.00
1,299 meters	3.20	35.13	1,000 meters	3.15	35.14	28.00
1,950 meters	3.25	35.16	1,500 meters	3.20	35.14	28.00
2,600 meters	2.93	35.16	2,000 meters	3.25	35.16	28.01

Station 1533; July 6; lat. 59°00′ N., long. 53°00′ W.; depth, 3,603 meters; dynamic height, 1,454.355 meters

Depth	Temperature (°C.)	Salinity (‰)	Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	6.83	34.61	0 meter	6.83	34.61	27.15
33 meters	3.24	34.63	25 meters	3.30	34.63	27.58
65 meters	3.52	34.84	50 meters	3.35	34.71	27.64
98 meters	3.94	35.00	75 meters	3.70	34.90	27.76
131 meters	4.11	35.05	100 meters	4.00	35.00	27.81
196 meters	4.06	35.04	150 meters	4.15	35.05	27.83
261 meters	3.95	35.08	200 meters	4.05	35.04	27.83
392 meters	3.57	35.10	300 meters	3.85	35.09	27.89
513 meters	3.45	35.08	400 meters	3.55	35.10	27.93
774 meters	3.31	35.08	600 meters	3.40	35.08	27.93
1,038 meters	3.24	35.08	800 meters	3.30	35.08	27.94
1,305 meters	3.20	35.11	1,000 meters	3.25	35.08	27.94
1,958 meters	3.27	35.12	1,500 meters	3.25	35.12	27.98
2,610 meters	2.91	35.12	2,000 meters	3.25	35.12	27.98

Station 1534; July 6–7; lat. 58°58′ N., long. 51°30′ W.; depth, 3,521 meters; dynamic height, 1,454.296 meters

Depth	Temperature (°C.)	Salinity (‰)	Depth	Temperature (°C.)	Salinity (‰)	σ_t
0 meter	6.01	34.61	0 meter	6.01	34.61	27.27
30 meters	4.41	34.64	25 meters	4.75	34.62	27.43
59 meters	3.66	34.86	50 meters	3.75	34.79	27.66
89 meters	3.85	35.00	75 meters	3.70	34.94	27.79
119 meters	4.22	35.11	100 meters	4.00	35.05	27.85
178 meters	4.08	35.14	150 meters	4.20	35.13	27.88
237 meters	3.93	35.14	200 meters	4.00	35.14	27.92
355 meters	3.70	35.15	300 meters	3.80	35.14	27.94
466 meters	3.68	35.15	400 meters	3.70	35.15	27.96
701 meters	3.34	35.14	600 meters	3.50	35.14	27.97
935 meters	3.33	35.16	800 meters	3.35	35.14	27.98
1,172 meters	3.48	35.14	1,000 meters	3.30	35.15	28.00
1,797 meters	3.25	35.15	1,500 meters	3.25	35.15	28.00
2,448 meters	3.06	35.16	2,000 meters	3.20	35.15	28.02

Observed values			Scaled values			
Depth	Temperature (°C.)	Salinity (‰)	Depth	Temperature (°C.)	Salinity (‰)	σ_t
Station 1535; July 7; lat. 58°57′ N., long. 50°16′ W.; depth, 3,429 meters; dynamic height, 1,454.265 meters						
0 meter	6.00	34.72	0 meter	6.00	34.72	27.36
27 meters	5.85	34.73	25 meters	5.85	34.73	27.37
53 meters	4.42	34.86	50 meters	4.85	34.85	27.59
79 meters	3.72	34.92	75 meters	3.75	34.91	27.76
106 meters	3.73	34.98	100 meters	3.75	34.97	27.81
158 meters	3.82	35.07	150 meters	3.80	35.06	27.88
211 meters	3.97	35.13	200 meters	3.95	35.12	27.91
317 meters	3.69	35.16	300 meters	3.70	35.16	27.97
400 meters	3.61	35.15	400 meters	3.60	35.15	27.97
608 meters	3.41	35.16	600 meters	3.45	35.16	27.99
823 meters	3.25	35.14	800 meters	3.25	35.14	27.99
1,044 meters	3.23	35.16	1,000 meters	3.25	35.15	28.00
1,619 meters	3.21	35.15	1,500 meters	3.20	35.15	28.01
2,227 meters	3.24	35.17	2,000 meters	3.20	35.17	28.03
Station 1536; July 8; lat. 57°26′ N., long. 47°40′ W.; depth, 3,200 meters; dynamic height 1,454.324 meters						
0 meter	6.24	34.96	0 meter	6.24	34.96	27.50
32 meters	5.89	35.00	25 meters	6.00	34.99	27.56
63 meters	5.06	35.08	50 meters	5.40	35.05	27.69
95 meters	4.69	35.12	75 meters	4.85	35.10	27.80
127 meters	4.52	35.12	100 meters	4.65	35.12	27.83
189 meters	4.38	35.15	150 meters	4.45	35.13	27.86
252 meters	4.37	35.16	200 meters	4.35	35.15	27.89
379 meters	3.91	35.13	300 meters	4.25	35.14	27.89
453 meters	3.77	35.16	400 meters	3.85	35.14	27.93
687 meters	3.43	35.15	600 meters	3.55	35.15	27.97
925 meters	3.31	35.11	800 meters	3.35	35.13	27.97
1,168 meters	3.26	35.10	1,000 meters	3.30	35.11	27.97
1,780 meters	3.27	35.10	1,500 meters	3.25	35.11	27.97
2,406 meters	2.80	35.13	2,000 meters	3.20	35.11	27.98
Station 1537; July 8; lat. 57°45′ N., long. 47°13′ W.; depth, 3,500 meters; dynamic height, 1,454.394 meters						
0 meter	5.94	35.00	0 meter	5.94	35.00	27.58
30 meters	5.76	35.00	25 meters	5.75	35.00	27.60
60 meters	6.14	35.09	50 meters	6.10	35.08	27.62
90 meters	5.03	35.09	75 meters	5.40	35.09	27.72
121 meters	5.02	35.12	100 meters	5.00	35.10	27.78
181 meters	4.94	35.11	150 meters	5.00	35.12	27.79
241 meters	4.87	35.10	200 meters	4.90	35.11	27.80
362 meters	4.64	35.12	300 meters	4.80	35.12	27.82
409 meters	4.47	35.10	400 meters	4.50	35.10	27.83
625 meters	3.61	35.10	600 meters	3.65	35.10	27.92
849 meters	3.37	35.08	800 meters	3.40	35.08	27.93
1,080 meters	3.22	35.08	1,000 meters	3.25	35.08	27.94
1,676 meters	3.24	35.08	1,500 meters	3.25	35.08	27.94
2,306 meters	3.01	35.10	2,000 meters	3.10	35.09	27.97
Station 1538; July 9; lat. 58°07′ N., long. 46°35′ W.; depth, 3,063 meters; dynamic height, 1,454.302 meters						
0 meter	6.07	34.91	0 meter	6.07	34.91	27.53
33 meters	5.82	34.93	25 meters	5.90	34.92	27.53
65 meters	4.55	35.00	50 meters	5.10	34.97	27.66
98 meters	4.47	35.03	75 meters	4.50	35.01	27.76
131 meters	4.24	35.08	100 meters	4.45	35.03	27.78
195 meters	3.94	35.11	150 meters	4.10	35.09	27.87
260 meters	4.04	35.14	200 meters	3.95	35.11	27.90
391 meters	3.66	35.16	300 meters	4.00	35.15	27.93
510 meters	3.51	35.13	400 meters	3.60	35.15	27.97
765 meters	3.34	35.14	600 meters	3.45	35.14	27.97
1,020 meters	3.25	35.12	800 meters	3.30	35.13	27.98
1,275 meters	3.21	35.15	1,000 meters	3.25	35.12	27.98
1,921 meters	3.13	35.12	1,500 meters	3.20	35.14	28.00
2,570 meters	2.51	35.13	2,000 meters	3.10	35.12	28.00

Observed values			Scaled values			
Depth	Temperature (°C.)	Salinity (‰)	Depth	Temperature (°C.)	Salinity (‰)	σ_t
Station 1539; July 9; lat. 58°26′ N., long. 46°05′ W.; depth 2,424 meters; dynamic height, 1,454.251 meters						
0 meter	6.36	35.00	0 meter	6.36	35.00	27.53
29 meters	5.97	35.06	25 meters	6.00	35.06	27.61
56 meters	5.58	35.05	50 meters	5.70	35.05	27.65
87 meters	4.80	35.26	75 meters	4.90	35.20	27.87
115 meters	4.88	35.24	100 meters	4.80	35.25	27.92
172 meters	4.57	35.27	150 meters	4.70	35.26	27.94
231 meters	4.46	35.27	200 meters	4.45	35.27	27.98
346 meters	4.08	35.23	300 meters	4.25	35.25	27.98
445 meters	3.95	35.19	400 meters	4.00	35.21	27.98
670 meters	3.56	35.18	600 meters	3.70	35.18	27.98
895 meters	3.31	35.15	800 meters	3.40	35.16	28.00
1,121 meters	3.26	35.17	1,000 meters	3.30	35.16	28.01
1,688 meters	3.01	35.19	1,500 meters	3.10	35.19	28.05
2,257 meters	2.31	35.20	2,000 meters	2.70	35.20	28.09
Station 1540; July 9; lat. 58°50′ N., long. 45°22′ W.; depth 2,488 meters; dynamic height, 1,454.368 meters						
0 meter	6.05	34.52	0 meter	6.05	34.52	27.19
29 meters	5.17	34.52	25 meters	5.25	34.52	27.29
55 meters	4.80	34.89	50 meters	4.80	34.80	27.56
86 meters	4.91	35.02	75 meters	4.85	34.99	27.70
113 meters	5.39	35.22	100 meters	5.20	35.16	27.80
171 meters	5.34	35.26	150 meters	5.40	35.25	27.84
229 meters	5.20	35.26	200 meters	5.30	35.26	27.87
342 meters	4.83	35.24	300 meters	5.00	35.25	27.89
450 meters	4.74	35.23	400 meters	4.75	35.24	27.91
677 meters	4.22	35.20	600 meters	4.50	35.21	27.92
905 meters	3.64	35.17	800 meters	3.85	35.18	27.96
1,134 meters	3.50	35.10	1,000 meters	3.60	35.14	27.96
1,704 meters	3.18	35.13	1,500 meters	3.30	35.12	27.98
2,274 meters	2.46	35.15	2,000 meters	2.75	35.14	28.04
Station 1541; July 9; lat. 59°17′ N., long. 44°49′ W.; depth, 1,692 meters; dynamic height, 1,454.378 meters						
0 meter	6.31	34.67	0 meter	6.31	34.67	27.28
27 meters	5.75	34.68	25 meters	5.80	34.68	27.34
54 meters	5.41	34.69	50 meters	5.40	34.69	27.40
81 meters	5.76	35.04	75 meters	5.75	34.90	27.53
108 meters	5.70	35.16	100 meters	5.70	35.13	27.71
163 meters	5.87	35.31	150 meters	5.85	35.30	27.83
217 meters	5.33	35.25	200 meters	5.55	35.26	27.83
325 meters	5.19	35.31	300 meters	5.20	35.29	27.90
429 meters	5.02	35.26	400 meters	5.05	35.27	27.90
641 meters	4.76	35.25	600 meters	4.85	35.25	27.91
855 meters	4.14	35.23	800 meters	4.30	35.24	27.96
1,070 meters	3.70	35.16	1,000 meters	3.80	35.18	27.97
1,610 meters	3.38	35.16	1,500 meters	3.40	35.16	28.00
Station 1542; July 9; lat. 59°25′ N., long. 44°35′ W.; depth, 153 meters; dynamic height, 1,454.416 meters						
0 meter	2.02	33.31	0 meter	2.02	33.31	26.64
24 meters	2.67	33.94	25 meters	2.65	33.90	27.06
48 meters	2.69	34.01	50 meters	2.70	34.01	27.14
73 meters	2.95	34.38	75 meters	2.95	34.39	27.42
97 meters	2.99	34.66	100 meters	3.00	34.68	27.65
136 meters	4.44	35.00	(150) meters	5.15	35.13	27.78
Station 1543; July 10; lat. 59°55′ N., long. 50°10′ W.; depth, 3,182 meters; dynamic height, 1,454.292 meters						
0 meter	4.50	34.04	0 meter	4.50	34.04	26.99
33 meters	4.74	34.62	25 meters	4.60	34.48	27.32
65 meters	5.07	34.94	50 meters	4.90	34.80	27.55
98 meters	5.18	35.08	75 meters	5.10	34.99	27.67
131 meters	5.02	35.24	100 meters	5.15	35.09	27.75
195 meters	5.14	35.31	150 meters	5.05	35.28	27.90
260 meters	4.69	35.25	200 meters	5.15	35.31	27.92
391 meters	4.26	35.23	300 meters	4.50	35.24	27.94
506 meters	4.21	35.24	400 meters	4.25	35.23	27.96
761 meters	3.86	35.21	600 meters	4.05	35.23	27.98
1,017 meters	3.56	35.21	800 meters	3.80	35.21	28.00
1,274 meters	3.42	35.24	1,000 meters	3.55	35.21	28.02
1,919 meters	3.02	35.19	1,500 meters	3.30	35.23	28.06
2,572 meters	2.54	35.19	2,000 meters	2.95	35.19	28.06

Observed values			Scaled values			
Depth	Temperature (°C.)	Salinity (‰)	Depth	Temperature (°C.)	Salinity (‰)	σ_t
Station 1544; July 11; lat. 60°32′ N., long. 49°34′ W.; depth, 1,811 meters; dynamic height, 1,454.450 meters						
0 meter	3.50	33.46	0 meter	3.50	33.46	26.63
29 meters	4.48	34.50	25 meters	4.40	34.30	27.21
58 meters	5.10	34.79	50 meters	5.05	34.72	27.47
87 meters	5.22	34.95	75 meters	5.20	34.89	27.58
115 meters	5.22	35.01	100 meters	5.20	34.98	27.65
173 meters	5.01	35.12	150 meters	5.10	35.07	27.74
232 meters	5.03	35.20	200 meters	5.00	35.18	27.84
347 meters	4.56	35.13	300 meters	4.80	35.16	27.85
463 meters	4.33	35.08	400 meters	4.40	35.11	27.85
693 meters	4.01	35.13	600 meters	4.15	35.11	27.88
923 meters	3.71	35.08	800 meters	3.85	35.11	27.91
1,152 meters	3.50	35.09	1,000 meters	3.60	35.08	27.91
1,724 meters	3.25	35.08	1,500 meters	3.35	35.08	27.93
Station 1545; July 11; lat. 60°50′ N., long. 49°20′ W.; depth, 91 meters; dynamic height, 1,454.560 meters						
0 meter	0.62	32.17	0 meter	0.62	32.17	25.88
26 meters	.87	33.78	25 meters	.85	33.65	26.99
52 meters	1.35	34.01	50 meters	1.30	34.00	27.24
78 meters	1.61	34.08	75 meters	1.60	34.07	27.28
Station 1546; July 13; lat. 61°15′ N., long. 49°10′ W.; depth, 174 meters; dynamic height, 1,454.726 meters						
0 meter	4.99	31.81	0 meter	4.99	31.81	25.18
26 meters	.30	32.44	25 meters	.35	32.44	26.05
51 meters	−.10	33.14	50 meters	−.10	33.11	26.60
76 meters	−.08	33.39	75 meters	−.05	33.39	26.83
102 meters	−.07	33.40	100 meters	−.05	33.40	26.84
			(150) meters	.00	33.41	26.85
Station 1547; July 14; lat. 61°20′ N., long. 50°07′ W.; depth, 177 meters; dynamic height, 1,454.720 meters						
0 meter	1.84	32.25	0 meter	1.84	32.25	25.80
25 meters	1.02	33.22	25 meters	1.00	33.22	26.64
50 meters	1.30	33.79	50 meters	1.30	33.79	27.07
75 meters	4.16	34.30	75 meters	4.15	34.30	27.23
99 meters	2.61	34.30	100 meters	2.60	34.30	27.38
149 meters	2.45	34.34	150 meters	2.45	34.34	27.42
Station 1548; July 14; lat. 61°25′ N., long. 50°53′ W.; depth, 2,560 meters; dynamic height, 1,454.550 meters						
0 meter	4.06	33.32	0 meter	4.06	33.32	26.46
31 meters	5.49	34.60	25 meters	5.40	34.25	27.05
61 meters	5.43	34.86	50 meters	5.45	34.80	27.48
92 meters	5.44	34.96	75 meters	5.45	34.91	27.57
122 meters	5.37	35.04	100 meters	5.45	34.98	27.62
184 meters	5.11	35.11	150 meters	5.25	35.09	27.74
245 meters	5.00	35.07	200 meters	5.10	35.10	27.76
367 meters	4.75	35.08	300 meters	4.95	35.07	27.76
471 meters	4.55	35.00	400 meters	4.70	35.06	27.78
707 meters	4.05	35.02	600 meters	4.30	35.01	27.78
940 meters	3.77	35.01	800 meters	3.95	35.02	47.83
1,172 meters	3.49	35.02	1,000 meters	3.70	35.01	27.85
1,766 meters	3.21	34.96	1,500 meters	3.35	34.99	27.86
2,366 meters	2.72	35.01	2,000 meters	3.05	34.98	27.88
Station 1549; July 14; lat. 61°30′ N., long. 51°47′ W.; depth, 2,835 meters; dynamic height, 1,454.510 meters						
0 meter	6.37	33.97	0 meter	6.37	33.97	26.72
33 meters	5.01	34.38	25 meters	5.20	34.30	27.12
65 meters	5.03	34.72	50 meters	4.95	34.56	27.35
98 meters	5.39	34.96	75 meters	5.15	34.81	27.53
130 meters	4.75	34.97	100 meters	5.40	34.96	27.62
195 meters	4.63	35.04	150 meters	4.70	34.99	27.72
260 meters	4.46	35.06	200 meters	4.65	35.04	27.77
390 meters	4.43	35.07	300 meters	4.45	35.07	27.82
509 meters	4.23	35.07	400 meters	4.40	35.07	27.82
764 meters	3.83	35.00	600 meters	4.10	35.05	27.84
1,020 meters	3.56	35.00	800 meters	3.80	35.02	27.85
1,277 meters	3.35	35.02	1,000 meters	3.60	35.00	27.85
1,927 meters	3.08	35.03	1,500 meters	3.25	35.03	27.90
2,580 meters	2.48	35.06	2,000 meters	3.00	35.03	27.93

Observed values			Scaled values			
Depth	Temperature (°C.)	Salinity (‰)	Depth	Temperature (°C.)	Salinity (‰)	σ_t
Station 1550; July 14; lat. 61°30′ N., long. 52°32′ W.; depth, 2,926 meters; dynamic height, 1,454.512 meters						
0 meter	5.65	33.30	0 meter	5.65	33.30	26.27
32 meters	3.66	34.06	25 meters	3.80	33.80	26.87
64 meters	3.45	34.56	50 meters	3.50	34.29	27.29
96 meters	4.96	34.95	75 meters	4.15	34.71	27.56
128 meters	4.79	35.02	100 meters	4.95	34.96	27.67
192 meters	5.10	35.05	150 meters	4.85	35.02	27.73
256 meters	4.48	35.07	200 meters	5.05	35.05	27.73
384 meters	4.27	35.07	300 meters	4.35	35.07	27.83
512 meters	4.33	35.08	400 meters	4.30	35.07	27.83
770 meters	3.92	35.08	600 meters	4.20	35.08	27.85
1,030 meters	3.60	35.04	800 meters	3.90	35.06	27.87
1,292 meters	3.37	35.03	1,000 meters	3.65	35.04	27.87
1,948 meters	3.20	35.02	1,500 meters	3.30	35.03	27.90
			(2,000) meters	3.15	35.02	27.91
Station 1551; July 14; lat. 61°30′ N., long. 53°17′ W.; depth, 2,935 meters; dynamic height, 1,454.456 meters						
0 meter	7.24	33.80	0 meter	7.24	33.80	26.46
32 meters	3.66	34.36	25 meters	3.75	34.20	27.20
64 meters	4.82	34.86	50 meters	4.60	34.60	27.42
97 meters	4.81	35.00	75 meters	4.85	34.92	27.65
129 meters	4.83	35.05	100 meters	4.80	35.00	27.72
193 meters	5.10	35.13	150 meters	4.95	35.08	27.77
257 meters	4.94	35.14	200 meters	5.10	35.13	27.78
519 meters	4.42	35.12	300 meters	4.85	35.14	27.83
781 meters	3.91	35.08	400 meters	4.70	35.13	27.83
1,043 meters	3.60	35.09	600 meters	4.30	35.11	27.86
1,306 meters	3.39	35.12	800 meters	3.90	35.08	27.88
1,964 meters	3.21	35.13	1,000 meters	3.65	35.09	27.91
			1,500 meters	3.30	35.12	27.98
			(2,000) meters	3.15	35.13	27.99
Station 1552; July 14–15; lat. 61°29′ N., long. 54°05′ W.; depth, 2,853 meters; dynamic height, 1,454.502 meters						
0 meter	6.90	33.66	0 meter	6.90	33.66	26.40
32 meters	3.48	34.31	25 meters	3.60	34.10	27.13
63 meters	4.08	34.78	50 meters	3.75	34.58	27.49
96 meters	4.62	34.96	75 meters	4.30	34.86	27.66
128 meters	4.67	35.04	100 meters	4.65	34.97	27.72
191 meters	4.57	35.08	150 meters	4.60	35.06	27.79
254 meters	4.69	35.09	200 meters	4.60	35.08	27.80
382 meters	4.46	35.10	300 meters	4.60	35.09	27.81
504 meters	4.34	35.10	400 meters	4.45	35.10	27.84
757 meters	3.86	35.06	600 meters	4.15	35.09	27.86
1,012 meters	3.51	35.01	800 meters	3.80	35.04	27.86
1,266 meters	3.36	34.97	1,000 meters	3.55	35.01	27.86
1,905 meters	3.20	35.05	1,500 meters	3.30	34.99	27.87
			(2,000) meters	3.10	35.05	27.94
Station 1553; July 15; lat. 61°28′ N., long. 54°49′ W.; depth, 2,798 meters; dynamic height, 1,454.510 meters						
0 meter	7.05	33.96	0 meter	7.05	33.96	26.61
31 meters	3.91	34.41	25 meters	4.00	34.30	27.25
61 meters	4.19	34.74	50 meters	4.00	34.61	27.50
92 meters	4.66	34.93	75 meters	4.45	34.84	27.63
123 meters	4.80	34.99	100 meters	4.70	34.95	27.69
184 meters	5.00	35.01	150 meters	4.90	35.00	27.71
245 meters	4.89	35.06	200 meters	5.00	35.03	27.72
511 meters	4.34	35.06	300 meters	4.75	35.06	27.77
768 meters	3.91	35.07	400 meters	4.60	35.06	27.79
1,025 meters	3.60	35.04	600 meters	4.20	35.06	27.83
1,282 meters	3.38	35.01	800 meters	3.90	35.07	27.88
1,929 meters	3.11	35.02	1,000 meters	3.60	35.04	27.88
			1,500 meters	3.30	35.01	27.89
			(2,000) meters	3.05	35.02	27.92

Observed values			Scaled values			
Depth	Temperature (°C.)	Salinity (‰)	Depth	Temperature (°C.)	Salinity (‰)	σ_t
Station 1554; July 15; lat. 61°27′ N., long. 55°35′ W.; depth, 2,808 meters; dynamic height, 1,454.515 meters						
0 meter	7.05	33.92	0 meter	7.05	33.92	26.58
31 meters	4.41	34.24	25 meters	4.45	34.10	27.04
61 meters	4.53	34.91	50 meters	4.50	34.82	27.61
92 meters	5.07	34.96	75 meters	4.80	34.93	27.66
123 meters	4.74	35.00	100 meters	5.05	34.97	27.67
184 meters	4.84	35.00	150 meters	4.85	35.00	27.71
245 meters	4.65	35.01	200 meters	4.80	35.00	27.72
368 meters	4.19	35.00	300 meters	4.35	35.01	27.78
438 meters	4.32	35.00	400 meters	4.25	35.00	27.78
666 meters	3.76	35.00	600 meters	3.80	35.00	27.83
901 meters	3.55	35.01	800 meters	3.60	35.01	27.86
1,142 meters	3.45	35.01	1,000 meters	3.50	35.01	27.87
1,752 meters	3.23	35.02	1,500 meters	3.35	35.01	27.88
2,392 meters	2.63	35.02	2,000 meters	3.15	35.02	27.91
Station 1555; July 15; lat. 61°26′ N., long. 56°20′ W.; depth, 2,817 meters; dynamic height, 1,454.494 meters						
0 meter	6.90	33.96	0 meter	6.90	33.96	26.63
33 meters	2.92	34.30	25 meters	3.15	34.19	27.24
65 meters	3.04	34.70	50 meters	2.95	34.51	27.52
98 meters	3.72	34.88	75 meters	3.35	34.76	27.68
131 meters	3.95	34.94	100 meters	3.75	34.88	27.73
196 meters	4.08	34.95	150 meters	4.00	34.94	27.76
261 meters	4.12	35.02	200 meters	4.05	34.95	27.76
392 meters	3.98	34.96	300 meters	4.10	35.00	27.80
516 meters	3.97	35.00	400 meters	3.95	35.00	27.81
774 meters	3.72	35.01	600 meters	3.90	35.00	27.82
1,031 meters	3.45	35.02	800 meters	3.70	35.01	27.85
1,289 meters	3.31	35.00	1,000 meters	3.50	35.02	27.88
1,935 meters	3.11	35.00	1,500 meters	3.25	35.00	27.88
2,581 meters	2.30	35.00	2,000 meters	3.10	35.00	27.90
Station 1556; July 15; lat. 61°27′ N., long. 57°05′ W.; depth, 2,835 meters; dynamic height, 1,454.518 meters						
0 meter	7.17	33.94	0 meter	7.17	33.94	26.58
32 meters	4.91	34.25	25 meters	5.40	34.14	26.97
62 meters	4.30	34.77	50 meters	4.35	34.55	27.41
94 meters	4.30	34.94	75 meters	4.30	34.88	27.68
125 meters	4.33	34.95	100 meters	4.30	34.94	27.72
188 meters	4.32	35.00	150 meters	4.30	34.97	27.75
250 meters	4.42	35.01	200 meters	4.35	35.00	27.77
376 meters	4.23	35.02	300 meters	4.40	35.02	27.78
499 meters	4.03	35.01	400 meters	4.20	35.02	27.80
752 meters	3.66	35.00	600 meters	3.90	35.01	27.83
1,005 meters	3.40	34.98	800 meters	3.60	35.00	27.85
1,261 meters	3.28	34.96	1,000 meters	3.40	34.98	27.85
1,901 meters	3.21	34.98	1,500 meters	3.25	34.96	27.85
2,548 meters	2.44	35.00	2,000 meters	3.20	34.98	27.87
Station 1557; July 15; lat. 61°25′ N., long. 57°43′ W.; depth, 2,633 meters; dynamic height, 1,454.486 meters						
0 meter	7.05	34.14	0 meter	7.05	34.14	26.75
32 meters	4.84	34.15	25 meters	5.45	34.14	26.96
63 meters	2.76	34.54	50 meters	3.10	34.33	27.36
95 meters	3.31	34.73	75 meters	2.90	34.61	27.61
127 meters	3.70	34.87	100 meters	3.40	34.76	27.68
191 meters	3.87	34.91	150 meters	3.80	34.88	27.73
254 meters	3.93	34.95	200 meters	3.90	34.91	27.75
381 meters	3.85	35.01	300 meters	3.90	34.98	27.80
503 meters	3.75	35.02	400 meters	3.85	35.01	27.83
756 meters	3.63	35.02	600 meters	3.70	35.02	27.86
1,010 meters	3.51	35.05	800 meters	3.60	35.02	27.87
1,265 meters	3.46	35.04	1,000 meters	3.50	35.05	27.90
1,901 meters	3.13	35.03	1,500 meters	3.30	35.03	27.90
2,540 meters	2.18	35.00	2,000 meters	3.10	35.02	27.92

Observed values			Scaled values			
Depth	Temperature (°C.)	Salinity (‰)	Depth	Temperature (°C.)	Salinity (‰)	σ_t
Station 1558; July 16; lat. 61°24′ N., long. 58°22′ W.; depth, 2,551 meters; dynamic height, 1,454.531 meters						
0 meter	6.20	33.87	0 meter	6.20	33.87	26.66
31 meters	.77	34.04	25 meters	1.00	34.00	27.26
61 meters	1.91	34.24	50 meters	1.55	34.18	27.36
92 meters	2.81	34.55	75 meters	2.40	34.35	27.44
122 meters	3.28	34.68	100 meters	2.95	34.59	27.58
182 meters	3.57	34.87	150 meters	3.40	34.78	27.69
243 meters	3.89	34.93	200 meters	3.65	34.89	27.75
364 meters	4.07	34.97	300 meters	4.00	34.96	27.78
474 meters	3.99	34.96	400 meters	4.05	34.97	27.78
713 meters	3.77	34.97	600 meters	3.85	34.96	27.79
953 meters	3.68	35.03	800 meters	3.70	34.99	27.83
1,192 meters	3.52	35.02	1,000 meters	3.60	35.03	27.87
1,794 meters	3.18	35.05	1,500 meters	3.35	35.04	27.90
2,399 meters	2.33	35.05	2,000 meters	3.00	35.05	27.95
Station 1559; July 16; lat. 61°23′ N., long. 59°00′ W.; depth, 2,423 meters; dynamic height, 1,454.513 meters						
0 meter	5.80	33.95	0 meter	5.80	33.95	26.77
26 meters	4.72	34.06	25 meters	4.70	34.07	27.00
51 meters	2.08	34.37	50 meters	2.05	34.34	27.46
77 meters	2.58	34.54	75 meters	2.55	34.53	27.47
101 meters	3.02	34.65	100 meters	3.00	34.64	27.62
153 meters	3.66	34.86	150 meters	3.65	34.85	27.72
205 meters	3.92	34.91	200 meters	3.90	34.91	27.75
306 meters	4.27	35.02	300 meters	4.25	35.02	27.80
397 meters	4.07	35.01	400 meters	4.05	35.01	27.81
600 meters	3.87	35.00	600 meters	3.85	35.00	27.82
806 meters	3.71	35.03	800 meters	3.70	35.03	27.86
1,014 meters	----------	35.03	1,000 meters	3.60	35.03	27.87
1,551 meters	3.25	35.02	1,500 meters	3.30	35.02	27.90
2,108 meters	2.72	----------	(2,000) meters	2.85	35.02	27.94
Station 1560; July 16; lat. 61°22′ N., long. 59°48′ W.; depth, 2,423 meters; dynamic height, 1,454.477 meters						
0 meter	5.91	33.90	0 meter	5.91	33.90	26.72
24 meters	5.21	34.10	25 meters	5.20	34.10	26.96
49 meters	3.49	34.37	50 meters	3.50	34.38	27.36
73 meters	2.57	34.46	75 meters	2.55	34.47	27.53
98 meters	2.68	34.65	100 meters	2.70	34.66	27.66
147 meters	3.54	34.89	150 meters	3.55	34.89	27.76
196 meters	3.84	34.94	200 meters	3.85	34.94	27.77
294 meters	4.02	35.00	300 meters	4.00	35.00	27.81
378 meters	3.86	35.02	400 meters	3.85	35.02	27.84
568 meters	3.68	35.02	600 meters	3.65	35.02	27.86
758 meters	3.59	35.03	800 meters	3.55	35.04	27.88
948 meters	3.49	35.05	1,000 meters	3.45	35.05	27.90
1,432 meters	3.22	35.04	1,500 meters	3.20	35.04	27.92
1,923 meters	2.68	35.04	(2,000) meters	2.55	35.04	27.98
Station 1561; July 16; lat. 61°20′ N., long. 60°41′ W.; depth, 960 meters; dynamic height, 1,454.435 meters						
0 meter	4.62	33.19	0 meter	4.62	33.19	26.31
29 meters	1.49	33.92	25 meters	1.70	33.80	27.05
58 meters	.88	34.31	50 meters	.85	34.24	27.46
88 meters	1.95	34.48	75 meters	1.60	34.42	27.56
116 meters	2.39	34.60	100 meters	2.10	34.53	27.60
174 meters	3.46	34.85	150 meters	3.05	34.77	27.72
234 meters	3.75	34.91	200 meters	3.60	34.88	27.75
349 meters	4.26	35.06	300 meters	4.10	34.99	27.79
463 meters	4.17	35.07	400 meters	4.25	35.06	27.83
694 meters	3.71	35.11	600 meters	3.80	35.10	27.91
925 meters	3.75	35.10	800 meters	3.70	35.11	27.93

Observed values			Scaled values			
Depth	Temperature (°C.)	Salinity (‰)	Depth	Temperature (°C.)	Salinity (‰)	σ_t
Station 1562; July 16; lat. 61°20′ N., long. 61°31′ W.; depth, 549 meters; dynamic height, 1,454.445 meters						
0 meter	3.90	34.04	0 meter	3.90	34.04	27.05
32 meters	2.56	34.05	25 meters	2.50	34.04	27.18
62 meters	1.97	34.19	50 meters	2.15	34.11	27.27
94 meters	2.11	34.50	75 meters	1.95	34.29	27.43
126 meters	2.71	34.67	100 meters	2.20	34.53	27.60
188 meters	3.46	34.80	150 meters	3.10	34.73	27.68
251 meters	3.67	34.90	200 meters	3.50	34.82	27.72
377 meters	3.77	34.96	300 meters	3.70	34.93	27.78
501 meters	3.81	35.02	400 meters	3.75	34.97	27.81
Station 1563; July 17; lat. 61°19′ N., long. 62°20′ W.; depth, 549 meters; dynamic height, 1,454.497 meters						
0 meter	3.03	33.20	0 meter	3.03	33.20	26.47
32 meters	2.49	33.44	25 meters	2.65	33.37	26.64
62 meters	1.76	33.84	50 meters	2.15	33.68	26.93
94 meters	.96	34.15	75 meters	1.30	33.99	27.23
125 meters	1.28	34.35	100 meters	.95	34.18	27.40
187 meters	2.28	34.59	150 meters	1.60	34.46	27.59
250 meters	3.29	34.79	200 meters	2.55	34.64	27.66
375 meters	3.57	34.93	300 meters	3.50	34.87	27.76
499 meters	3.58	34.94	400 meters	3.60	34.93	27.79
Station 1564; July 17; lat. 61°21′ N., long. 63°07′ W.; depth, 594 meters; dynamic height, 1,454.551 meters						
0 meter	1.64	32.04	0 meter	1.64	32.04	25.66
33 meters	.46	33.34	25 meters	.75	32.95	26.44
66 meters	−.47	33.46	50 meters	−.15	33.41	26.86
99 meters	−.57	33.92	75 meters	−.50	33.60	27.02
132 meters	−.33	33.97	100 meters	−.55	33.92	27.28
198 meters	1.37	34.36	150 meters	.10	34.04	27.34
264 meters	2.82	34.62	200 meters	1.45	34.37	27.53
396 meters	3.50	34.92	300 meters	3.15	34.72	27.67
527 meters	3.59	34.98	400 meters	3.50	34.92	27.80
			(600) meters	3.60	34.99	27.84
Station 1565; July 17; lat. 60°21′ N., long. 60°27′ W.; depth, 1,829 meters; dynamic height, 1,454.478 meters						
0 meter	5.30	34.09	0 meter	5.30	34.09	26.94
29 meters	4.40	34.22	25 meters	4.50	34.19	27.11
58 meters	3.37	34.43	50 meters	3.60	34.37	27.35
87 meters	3.22	34.52	75 meters	3.20	34.48	27.47
116 meters	3.63	34.88	100 meters	3.40	34.63	27.57
173 meters	4.00	34.96	150 meters	3.90	34.94	27.77
231 meters	3.97	34.97	200 meters	4.00	34.97	27.79
347 meters	3.91	34.98	300 meters	3.95	34.97	27.79
470 meters	3.76	35.04	400 meters	3.85	35.00	27.82
707 meters	3.58	35.03	600 meters	3.65	35.04	27.87
945 meters	3.52	35.05	800 meters	3.55	35.03	27.87
1,183 meters	3.44	35.06	1,000 meters	3.50	35.05	27.90
			(1,500) meters	3.40	35.06	27.92
Station 1566; July 18; lat. 59°28′ N., long. 58°40′ W.; depth, 2,560 meters; dynamic height, 1,454.456 meters						
0 meter	7.04	34.28	0 meter	7.04	34.28	26.86
30 meters	4.44	34.27	25 meters	4.60	34.27	27.17
59 meters	3.88	34.37	50 meters	4.05	34.33	27.27
90 meters	3.20	34.62	75 meters	3.40	34.48	27.45
119 meters	3.50	34.91	100 meters	3.20	34.74	27.68
178 meters	3.98	34.98	150 meters	3.80	34.96	27.80
238 meters	4.02	35.00	200 meters	4.05	35.00	27.80
357 meters	3.82	35.02	300 meters	3.95	35.01	27.82
474 meters	3.84	35.04	400 meters	3.80	35.03	27.85
715 meters	3.58	35.05	600 meters	3.70	35.05	27.88
956 meters	3.39	35.03	800 meters	3.50	35.05	27.90
1,199 meters	3.28	35.00	1,000 meters	3.35	35.04	27.90
1,803 meters	2.92	35.05	1,500 meters	3.10	35.02	27.92
2,417 meters	2.18	35.04	2,000 meters	2.80	35.05	27.96

Observed values			Scaled values			
Depth	Temperature (°C.)	Salinity (‰)	Depth	Temperature (°C.)	Salinity (‰)	σ_t
Station 1567; July 18; lat. 59°22′ N., long. 59°10′ W.; depth, 2,716 meters; dynamic height, 1,454.454 meters						
0 meter	5.20	34.01	0 meter	5.20	34.01	26.89
31 meters	3.72	34.22	25 meters	3.60	34.19	27.20
61 meters	2.87	34.32	50 meters	2.95	34.27	27.33
92 meters	3.19	34.55	75 meters	3.00	34.40	27.43
122 meters	2.98	34.72	100 meters	3.15	34.59	27.56
183 meters	3.76	35.00	150 meters	3.40	34.90	27.79
244 meters	3.94	35.00	200 meters	3.85	35.00	27.82
366 meters	3.94	35.01	300 meters	4.00	35.01	27.82
460 meters	3.83	35.05	400 meters	3.90	35.02	27.84
703 meters	3.66	35.06	600 meters	3.75	35.06	27.88
952 meters	3.50	35.05	800 meters	3.60	35.06	27.90
1,208 meters	3.37	35.06	1,000 meters	3.50	35.05	27.90
1,812 meters	2.94	35.07	1,500 meters	3.20	35.07	27.95
2,414 meters	2.08	35.08	2,000 meters	2.80	35.07	27.98
Station 1568; July 18; lat. 59°16′ N., long. 59°40′ W., depth, 1,792 meters; dynamic height, 1,454.544 meters						
0 meter	4.91	33.58	0 meter	4.91	33.58	26.58
27 meters	2.17	34.01	25 meters	2.40	33.97	27.14
52 meters	1.45	34.17	50 meters	1.45	34.04	27.26
79 meters	2.20	34.46	75 meters	2.10	34.43	27.52
105 meters	2.42	34.56	100 meters	2.40	34.55	27.60
158 meters	3.10	34.75	150 meters	3.00	34.74	27.70
210 meters	3.51	34.77	200 meters	3.45	34.80	27.70
315 meters	3.93	34.88	300 meters	3.90	34.86	27.71
414 meters	4.17	34.98	400 meters	4.15	34.97	27.77
619 meters	3.83	34.97	600 meters	3.85	34.97	27.80
826 meters	3.72	34.99	800 meters	3.75	34.99	27.82
1,034 meters	3.57	35.05	1,000 meters	3.60	35.04	27.88
1,556 meters	3.38	35.04	1,500 meters	3.40	35.04	27.90
Station 1569; July 18; lat. 59°14′ N., long. 60°14′ W.; depth, 686 meters; dynamic height, 1,454.638 meters						
0 meter	0.76	31.26	0 meter	0.76	31.26	25.07
28 meters	0.81	33.01	25 meters	.80	32.70	26.23
55 meters	−.42	33.68	50 meters	−.40	33.55	26.98
83 meters	−.05	33.90	75 meters	−.25	33.85	27.21
111 meters	.35	34.14	100 meters	.15	34.05	27.35
167 meters	1.36	34.27	150 meters	1.00	34.24	27.45
222 meters	2.86	34.72	200 meters	2.25	34.57	27.63
291 meters	3.66	34.84	300 meters	3.70	34.85	27.72
389 meters	3.96	34.96	400 meters	3.95	34.96	27.78
582 meters	3.94	34.97	(600) meters	3.95	34.97	27.79
Station 1570; July 18; lat. 59°11′ N., long. 60°46′ W.; depth, 198 meters; dynamic height, 1,454.786 meters						
0 meter	−0.46	30.93	0 meter	−0.46	30.93	24.87
10 meters	−1.16	31.76	25 meters	−1.50	32.20	25.92
35 meters	−1.53	32.49	50 meters	−1.50	32.75	26.37
60 meters	−1.48	32.93	75 meters	−1.05	33.08	26.62
85 meters	−.95	33.18	100 meters	−.90	33.21	26.73
135 meters	−.87	33.26	150 meters	−.80	33.30	26.78
185 meters	−.72	33.43	(200) meters	−.70	33.48	26.93
Station 1571; July 19; lat. 58°26′ N., long. 58°55′ W.; depth, 1,865 meters; dynamic height, 1,454.491 meters						
0 meter	7.02	34.33	0 meter	7.02	34.33	26.91
29 meters	4.67	34.50	25 meters	4.95	34.48	27.29
57 meters	3.87	34.52	50 meters	4.00	34.52	27.43
86 meters	3.57	34.50	75 meters	3.65	34.50	27.44
115 meters	3.33	34.57	100 meters	3.45	34.53	27.48
172 meters	3.15	34.70	150 meters	3.20	34.65	27.61
229 meters	3.24	34.78	200 meters	3.20	34.74	27.68
344 meters	3.38	34.94	300 meters	3.35	34.88	27.77
464 meters	3.59	34.99	400 meters	3.50	34.98	27.84
699 meters	3.52	35.02	600 meters	3.60	35.01	27.86
935 meters	3.40	35.02	800 meters	3.50	35.02	27.88
1,171 meters	3.30	35.00	1,000 meters	3.35	35.02	27.89
1,764 meters	2.94	35.02	1,500 meters	3.10	35.02	27.92

Observed values			Scaled values			
Depth	Temperature (°C.)	Salinity (‰)	Depth	Temperature (°C.)	Salinity (‰)	σ_t
Station 1572; July 19–20; lat. 57°47′ N., long 57°35′ W.; depth, 2,562 meters; dynamic height, 1,454.469 meters						
0 meter	7.90	34.38	0 meter	7.90	34.38	26.82
31 meters	5.87	34.44	25 meters	6.80	34.42	27.01
61 meters	3.21	34.63	50 meters	3.45	34.52	27.48
92 meters	3.43	34.73	75 meters	3.25	34.68	27.62
123 meters	3.73	34.90	100 meters	3.50	34.77	27.68
185 meters	3.86	34.96	150 meters	3.80	34.93	27.77
246 meters	3.87	35.01	200 meters	3.85	34.97	27.80
369 meters	3.70	35.04	300 meters	3.80	35.03	27.85
486 meters	3.60	35.03	400 meters	3.65	35.04	27.87
732 meters	3.48	35.02	600 meters	3.55	35.02	27.87
981 meters	3.38	35.01	800 meters	3.45	35.02	27.88
1,233 meters	3.27	35.02	1,000 meters	3.40	35.01	27.88
1,876 meters	3.09	35.00	1,500 meters	3.20	35.01	27.90
2,535 meters	1.99	34.97	2,000 meters	3.00	34.99	27.90
Station 1573; July 20; lat. 57°41′ N., long. 58°00′ W.; depth, 2,240 meters; dynamic height, 1,454.476 meters						
0 meter	7.85	34.50	0 meter	7.85	34.50	26.92
28 meters	5.54	34.52	25 meters	5.80	34.52	27.22
54 meters	3.61	34.54	50 meters	3.85	34.54	27.45
82 meters	3.21	34.75	75 meters	3.25	34.65	27.60
108 meters	3.27	34.78	100 meters	3.25	34.77	27.70
163 meters	3.40	34.84	150 meters	3.40	34.82	27.73
217 meters	3.61	34.95	200 meters	3.60	34.94	27.80
325 meters	3.67	34.96	300 meters	3.70	34.96	27.81
398 meters	3.61	34.96	400 meters	3.65	34.96	27.81
601 meters	3.54	34.96	600 meters	3.55	34.96	27.82
810 meters	3.48	35.00	800 meters	3.45	35.00	27.86
1,021 meters	3.39	35.04	1,000 meters	3.40	35.04	27.90
1,548 meters	3.14	35.04	1,500 meters	3.20	35.04	27.92
2,087 meters	2.58	35.07	2,000 meters	2.70	35.07	27.99
Station 1574; July 20; lat. 57°32′ N., long. 58°33′ W.; depth, 2,057 meters; dynamic height, 1,454.454 meters						
0 meter	5.74	33.88	0 meter	5.74	33.88	26.72
24 meters	5.60	34.48	25 meters	5.60	34.48	27.21
48 meters	3.95	34.55	50 meters	3.95	34.55	27.45
72 meters	3.55	34.63	75 meters	3.50	34.64	27.57
96 meters	3.32	34.78	100 meters	3.30	34.79	27.71
145 meters	3.43	34.86	150 meters	3.45	34.87	27.76
193 meters	3.66	34.93	200 meters	3.60	34.94	27.80
289 meters	3.74	34.96	300 meters	3.75	34.97	27.81
347 meters	3.70	35.02	400 meters	3.65	35.02	27.86
524 meters	3.58	35.03	600 meters	3.55	35.02	27.87
704 meters	3.53	35.01	800 meters	3.50	35.03	27.88
889 meters	3.46	35.05	1,000 meters	3.40	35.05	27.91
1,361 meters	3.22	35.04	1,500 meters	3.15	35.04	27.92
1,852 meters	2.69	35.05	(2,000) meters	2.35	35.05	28.00
Station 1575; July 20; lat. 57°24′ N., long. 59°00′ W.; depth, 1,143 meters; dynamic height, 1,454.506 meters						
0 meter	3.06	33.43	0 meter	3.06	33.43	26.65
27 meters	.99	33.74	25 meters	1.15	33.69	27.00
52 meters	.46	33.97	50 meters	.45	33.95	27.25
79 meters	1.76	34.32	75 meters	1.65	34.25	27.42
105 meters	1.96	34.42	100 meters	1.90	34.39	27.51
158 meters	3.04	34.75	150 meters	2.95	34.72	27.69
211 meters	3.52	34.83	200 meters	3.45	34.82	27.72
316 meters	3.76	34.84	300 meters	3.75	34.86	27.72
379 meters	3.86	35.07	400 meters	3.85	35.02	27.84
577 meters	3.89	35.02	600 meters	3.90	35.02	27.84
781 meters	3.86	35.06	800 meters	3.85	35.06	27.87
992 meters	3.69	35.07	1,000 meters	3.70	35.07	27.90

Observed values			Scaled values			
Depth	Temperature (°C.)	Salinity (‰)	Depth	Temperature (°C.)	Salinity (‰)	σ_t
Station 1576; July 20; lat. 57°19′ N., long. 59°33′ W.; depth, 200 meters; dynamic height, 1,454.597 meters						
0 meter	1.57	32.00	0 meter	1.57	32.00	25.62
14 meters	-.68	32.75	25 meters	-.90	33.00	26.56
38 meters	-.97	33.38	50 meters	-.85	33.54	26.98
61 meters	-.68	33.64	75 meters	-.55	33.74	27.13
85 meters	-.50	33.81	100 meters	-.25	33.90	27.25
132 meters	1.12	34.20	150 meters	1.15	34.25	27.45
180 meters	1.02	34.30	(200)meters	1.00	34.32	27.52
Station 1577; July 20; lat. 57°13′ N., long. 60°05′ W.; depth, 137 meters; dynamic height, 1,454.615 meters						
0 meter	1.92	31.59	0 meter	1.92	31.59	25.27
26 meters	.64	33.09	25 meters	.65	33.00	26.48
52 meters	.55	33.51	50 meters	.55	33.48	26.87
77 meters	.22	33.73	75 meters	.30	33.70	27.06
103 meters	-.44	33.81	100 meters	-.25	33.80	27.17
Station 1578; July 20; lat. 57°03′ N., long. 60°35′ W.; depth, 238 meters; dynamic height, 1,454.671 meters						
0 meter	1.76	30.71	0 meter	1.76	30.71	24.58
24 meters	-.93	32.74	25 meters	-.95	32.75	26.36
49 meters	-1.42	33.03	50 meters	-1.40	33.04	26.60
73 meters	-1.14	33.18	75 meters	-1.15	33.18	26.71
97 meters	-1.27	33.25	100 meters	-1.30	33.25	26.76
146 meters	-.96	33.58	150 meters	-.90	33.60	27.04
194 meters	-.46	33.82	200 meters	-.40	33.83	27.20
Station 1579; July 20; lat. 57°01′ N., long. 60°46′ W.; depth, 151 meters; dynamic height, 1,454.715 meters						
0 meter	-0.60	29.17	0 meter	-0.60	29.17	23.46
26 meters	.25	32.33	25 meters	.25	31.90	25.62
52 meters	-1.44	33.02	50-meters	-1.45	33.01	26.57
77 meters	-1.34	33.19	75 meters	-1.35	33.18	26.71
103 meters	-1.26	33.26	100 meters	-1.25	33.25	26.76
			(150) meters	-1.10	33.33	26.82
Station 1580; July 21; lat. 55°00′ N., long. 57°47′ W.; depth, 110 meters; dynamic height, 1,454.772 meters						
0 meter	7.53	28.89	0 meter	7.53	28.89	22.57
26 meters	-0.75	32.11	25 meters	-.75	31.70	25.50
52 meters	-1.45	32.58	50 meters	-1.40	32.55	26.20
77 meters	-1.39	32.66	75 meters	-1.40	32.65	26.28
103 meters	-1.28	32.76	100 meters	-1.30	32.74	26.35
Station 1581; July 21; lat. 55°09′ N., long. 57°20′ W.; depth, 238 meters; dynamic height, 1,454.717 meters						
0 meter	4.73	30.94	0 meter	4.73	30.94	24.52
30 meters	-.80	32.65	25 meters	-.20	32.40	26.04
61 meters	-1.22	32.84	50 meters	-1.20	32.79	26.40
90 meters	-1.00	33.00	75 meters	-1.15	32.91	26.48
150 meters	-1.01	33.40	100 meters	-1.00	33.05	26.60
212 meters	-.34	33.78	150 meters	-1.00	33.40	26.88
			200 meters	-.50	33.71	27.11
Station 1582; July 22; lat. 55°19′ N., long 56°55′ W.; depth, 176 meters; dynamic height, 1,454.700 meters						
0 meter	4.23	31.84	0 meter	4.23	31.84	25.28
25 meters	-1.10	32.66	25 meters	-1.10	32.66	26.28
50 meters	-1.21	32.85	50 meters	-1.21	32.85	26.44
75 meters	-1.27	33.05	75 meters	-1.27	33.05	26.60
100 meters	-1.17	33.12	100 meters	-1.17	33.12	26.66
150 meters	-1.05	33.29	150 meters	-1.05	33.29	26.78

Observed values			Scaled values			
Depth	Temperature (°C.)	Salinity (‰)	Depth	Temperature (°C.)	Salinity (‰)	σ_t
Station 1583; July 22; lat. 55°28′ N., long. 56°33′ W.; depth, 1,353 to 1,463 meters; dynamic height 1,454.516 meters						
0 meter	5.30	33.86	0 meter	5.30	33.86	26.76
31 meters	3.08	34.14	25 meters	3.60	34.09	27.12
61 meters	1.44	34.21	50 meters	1.65	34.18	27.36
92 meters	2.12	34.44	75 meters	1.60	34.30	27.46
122 meters	2.73	34.58	100 meters	2.30	34.48	27.55
183 meters	3.44	34.79	150 meters	3.15	34.69	27.64
244 meters	3.64	34.88	200 meters	3.55	34.82	27.71
334 meters	3.76	35.00	300 meters	3.70	34.97	27.82
445 meters	3.80	35.01	400 meters	3.80	35.01	27.84
667 meters	3.85	35.02	600 meters	3.85	35.02	27.84
878 meters	3.83	35.03	800 meters	3.85	35.03	27.84
1,107 meters	3.55	35.05	1,000 meters	3.70	35.04	27.87
Station 1584; July 22; lat. 55°38′ N., long. 56°08′ W.; depth, 2,241 meters; dynamic height, 1,454.462 meters						
0 meter	7.70	34.34	0 meter	7.70	34.34	26.82
27 meters	4.20	34.42	25 meters	4.50	34.40	27.28
53 meters	3.23	34.62	50 meters	3.30	34.57	27.54
80 meters	3.28	34.76	75 meters	3.20	34.74	27.68
106 meters	3.43	34.82	100 meters	3.40	34.80	27.71
160 meters	3.80	34.96	150 meters	3.80	34.93	27.77
213 meters	3.73	34.97	200 meters	3.75	34.97	27.81
319 meters	3.64	34.97	300 meters	3.70	34.97	27.82
423 meters	3.58	35.01	400 meters	3.60	35.00	27.85
634 meters	3.51	35.03	600 meters	3.55	35.03	27.87
845 meters	3.48	35.04	800 meters	3.50	35.03	27.88
1,056 meters	3.43	35.01	1,000 meters	3.45	35.02	27.88
1,585 meters	3.24	35.02	1,500 meters	3.30	35.02	27.90
2,112 meters	2.65	35.03	2,000 meters	2.80	35.03	27.94
Station 1585; July 22; lat. 55°50′ N., long. 55°47′ W.; depth, 2,607 meters; dynamic height, 1,454.422 meters						
0 meter	8.10	34.45	0 meter	8.10	34.45	26.85
30 meters	5.42	34.62	25 meters	5.75	34.60	27.29
60 meters	3.48	34.82	50 meters	3.80	34.76	27.64
90 meters	3.68	34.88	75 meters	3.50	34.85	27.74
120 meters	3.78	34.96	100 meters	3.75	34.92	27.77
180 meters	3.76	34.98	150 meters	3.80	34.97	27.81
240 meters	3.65	34.99	200 meters	3.75	34.99	27.82
360 meters	3.49	34.99	300 meters	3.55	34.99	27.84
486 meters	3.45	35.03	400 meters	3.50	35.00	27.86
730 meters	3.38	35.02	600 meters	3.40	35.03	27.89
973 meters	3.23	35.04	800 meters	3.35	35.02	27.89
1,218 meters	3.22	35.05	1,000 meters	3.25	35.04	27.91
1,827 meters	3.13	35.06	1,500 meters	3.20	35.06	27.94
			2,000 meters	3.10	35.06	27.95
Station 1586; July 22; lat. 56°03′ N., long. 55°28′ W.; depth, 2,770 meters; dynamic height, 1,454.447 meters						
0 meter	8.44	34.53	0 meter	8.44	34.53	26.85
32 meters	6.37	34.58	25 meters	7.40	34.56	27.04
63 meters	3.72	34.78	50 meters	4.60	34.69	27.49
95 meters	3.63	34.82	75 meters	3.65	34.79	27.67
127 meters	3.50	34.90	100 meters	3.60	34.83	27.71
191 meters	3.67	34.96	150 meters	3.55	34.93	27.79
254 meters	3.61	34.97	200 meters	3.65	34.96	27.81
381 meters	3.53	35.01	300 meters	3.60	34.98	27.83
511 meters	3.39	35.03	400 meters	3.50	35.02	27.88
767 meters	3.31	35.02	600 meters	3.40	35.03	27.89
1,023 meters	3.24	35.02	800 meters	3.30	35.02	27.90
1,280 meters	3.20	35.03	1,000 meters	3.30	35.02	27.90
1,919 meters	3.13	35.01	1,500 meters	3.20	35.03	27.90
2,560 meters	2.44	35.02	2,000 meters	3.10	35.01	27.91

Observed values			Scaled values			
Depth	Temperature (°C.)	Salinity (‰)	Depth	Temperature (°C.)	Salinity (‰)	σ_t
Station 1587; July 22; lat. 56°16′ N., long. 55°10′ W.; depth, 3,072 meters; dynamic height, 1,454.429 meters						
0 meter	8.14	34.54	0 meter	8.14	34.54	26.91
33 meters	4.10	34.78	25 meters	4.90	34.75	27.51
64 meters	3.63	34.81	50 meters	3.75	34.79	27.66
97 meters	3.76	34.88	75 meters	3.65	34.83	27.70
130 meters	3.79	34.93	100 meters	3.75	34.88	27.73
194 meters	3.63	34.98	150 meters	3.75	34.95	27.79
258 meters	3.57	35.01	200 meters	3.60	34.98	27.83
388 meters	3.45	35.04	300 meters	3.55	35.02	27.87
510 meters	3.40	35.02	400 meters	3.45	35.04	27.89
767 meters	3.27	35.02	600 meters	3.35	35.02	27.89
1,023 meters	3.29	34.99	800 meters	3.25	35.01	27.89
1,279 meters	3.20	34.98	1,000 meters	3.30	35.01	27.89
1,921 meters	3.16	35.00	1,500 meters	3.20	35.00	27.89
2,560 meters	2.56	35.02	2,000 meters	3.15	35.00	27.89
Station 1588; July 23; lat. 55°53′ N., long. 54°21′ W.; depth, 2,761 meters; dynamic height, 1,454.469 meters						
0 meter	8.17	34.53	0 meter	8.17	34.53	26.90
33 meters	6.00	34.79	25 meters	6.85	34.72	27.24
65 meters	3.75	34.80	50 meters	4.30	34.80	27.62
97 meters	3.64	34.92	75 meters	3.75	34.85	27.71
130 meters	3.63	34.93	100 meters	3.65	34.92	27.78
195 meters	3.39	34.96	150 meters	3.55	34.94	27.80
259 meters	3.41	34.96	200 meters	3.40	34.95	27.83
390 meters	3.35	34.95	300 meters	3.40	34.95	27.83
512 meters	3.35	34.96	400 meters	3.35	34.95	27.83
768 meters	3.25	34.96	600 meters	3.30	34.96	27.85
1,024 meters	3.20	34.96	800 meters	3.25	34.96	27.85
1,280 meters	3.19	34.97	1,000 meters	3.20	34.96	27.86
1,923 meters	3.20	35.00	1,500 meters	3.20	34.98	27.87
2,565 meters	2.75	35.01	2,000 meters	3.20	35.00	27.89
Station 1589; July 23; lat. 55°30′ N., long. 53°36′ W.; depth 3,017 meters; dynamic height, 1,454.466 meters						
0 meter	8.38	34.60	0 meter	8.38	34.60	26.92
30 meters	5.27	34.73	25 meters	5.90	34.71	27.36
59 meters	3.63	34.81	50 meters	3.65	34.79	27.67
90 meters	3.63	34.88	75 meters	3.60	34.85	27.73
120 meters	3.77	34.92	100 meters	3.70	34.89	27.75
179 meters	3.67	34.93	150 meters	3.70	34.93	27.78
239 meters	3.61	34.98	200 meters	3.65	34.95	27.80
359 meters	3.43	34.99	300 meters	3.55	34.99	27.84
487 meters	3.37	34.98	400 meters	3.40	34.98	27.85
734 meters	3.33	34.97	600 meters	3.35	34.98	27.85
983 meters	3.23	34.96	800 meters	3.30	34.97	27.86
1,236 meters	3.20	34.97	1,000 meters	3.25	34.97	27.86
1,866 meters	3.24	35.00	1,500 meters	3.20	34.99	27.88
2,503 meters	2.70	34.99	2,000 meters	3.20	35.00	27.89
Station 1590; July 23; lat. 55°09′ N., long. 52°50′ W.; depth, 2,917 meters; dynamic height, 1,454.479 meters						
0 meter	8.65	34.32	0 meter	8.65	34.32	26.66
31 meters	5.41	34.71	25 meters	6.20	34.65	27.27
62 meters	3.61	34.78	50 meters	3.80	34.76	27.64
93 meters	3.54	34.79	75 meters	3.60	34.78	27.67
125 meters	3.68	34.90	100 meters	3.55	34.81	27.70
187 meters	3.59	34.96	150 meters	3.65	34.94	27.79
249 meters	3.53	34.97	200 meters	3.60	34.96	27.82
374 meters	3.45	34.96	300 meters	3.50	34.97	28.84
497 meters	3.36	34.95	400 meters	3.40	34.96	27.84
749 meters	3.33	35.01	600 meters	3.35	34.96	27.84
1,000 meters	3.34	34.99	800 meters	3.35	34.99	27.86
1,255 meters	3.25	35.00	1,000 meters	3.34	34.99	27.86
1,893 meters	3.18	34.97	1,500 meters	3.20	34.98	27.87
2,540 meters	2.65	34.96	2,000 meters	3.15	34.97	27.87

Observed values			Scaled values			
Depth	Temperature (°C.)	Salinity (‰)	Depth	Temperature (°C.)	Salinity (‰)	σ_t
Station 1591; July 23; lat. 55°00′ N., long. 53°10′ W.; depth, 2,195 meters; dynamic height, 1,454.509 meters						
0 meter	8.40	34.45	0 meter	8.40	34.45	26.80
25 meters	5.76	34.60	25 meters	5.75	34.60	27.29
49 meters	4.03	34.71	50 meters	4.05	34.71	27.57
74 meters	3.63	34.78	75 meters	3.65	34.78	27.66
99 meters	3.59	34.81	100 meters	3.60	34.81	27.70
148 meters	3.62	34.82	150 meters	3.65	34.82	27.70
197 meters	3.59	34.88	200 meters	3.60	34.88	27.75
296 meters	3.51	34.89	300 meters	3.50	34.89	27.77
397 meters	3.46	34.95	400 meters	3.45	34.95	27.82
593 meters	3.37	34.95	600 meters	3.40	34.95	27.83
789 meters	3.27	34.96	800 meters	3.25	34.95	27.84
983 meters	3.27	34.94	1,000 meters	3.25	34.95	27.84
1,476 meters	3.21	34.94	1,500 meters	3.20	34.94	27.84
1,968 meters	3.07	34.97	(2,000) meters	3.05	34.97	27.88
Station 1,592; July 23; lat. 54°50′ N., long. 53°30′ W.; depth, 686 meters; dynamic height, 1,454.658 meters						
0 meter	5.06	32.15	0 meter	5.06	32.15	25.43
25 meters	2.16	33.59	25 meters	2.15	33.59	26.86
49 meters	2.94	34.32	50 meters	2.95	34.32	27.37
74 meters	2.61	34.45	75 meters	2.60	34.45	27.50
99 meters	2.79	34.60	100 meters	2.80	34.60	27.60
148 meters	3.44	34.70	150 meters	3.45	34.70	27.62
198 meters	3.74	34.78	200 meters	3.75	34.78	27.65
299 meters	3.82	34.85	300 meters	3.85	34.85	27.70
395 meters	3.83	34.86	400 meters	3.85	34.86	27.71
581 meters	3.73	34.88	(600) meters	3.75	34.88	27.73
Station 1593; July 24; lat. 54°40′ N., long. 53°52′ W.; depth, 252 meters; dynamic height, 1,454.727 meters						
0 meter	6.22	32.15	0 meter	6.22	32.15	25.30
28 meters	−0.94	33.11	25 meters	−0.90	33.10	26.63
55 meters	−1.03	33.31	50 meters	−1.05	33.28	26.78
83 meters	−.90	33.44	75 meters	−.95	33.40	26.88
110 meters	−.73	33.52	100 meters	−.80	33.48	26.93
165 meters	.08	34.00	150 meters	−.25	33.80	27.17
222 meters	2.10	34.41	200 meters	1.15	34.29	27.48
Station 1594; July 24; lat. 54°30′ N., long. 54°13′ W.; depth, 229 meters; dynamic height, 1,454.708 meters						
0 meter	6.50	31.85	0 meter	6.50	31.85	25.03
27 meters	−.03	33.12	25 meters	.35	32.95	26.46
52 meters	−.72	33.51	50 meters	−.75	33.47	26.93
79 meters	−.61	33.70	75 meters	−.65	33.68	27.09
104 meters	−.35	33.81	100 meters	−.45	33.78	27.16
157 meters	.53	34.12	150 meters	.40	34.05	27.34
209 meters	1.75	34.42	200 meters	1.60	34.39	27.53
Station 1595; July 24; lat. 54°19′ N., long. 54°33′ W.; depth, 192 meters; dynamic height, 1,454.713 meters						
0 meter	6.50	32.12	0 meter	6.50	32.12	25.24
28 meters	−.69	33.05	25 meters	−.60	32.90	26.45
56 meters	−.96	33.33	50 meters	−.95	33.29	26.78
84 meters	−.89	33.56	75 meters	−.95	33.48	26.94
111 meters	−.42	33.78	100 meters	−.75	33.68	27.09
167 meters	1.06	34.22	150 meters	.65	34.10	27.36

Observed values			Scaled values			
Depth	Temperature (°C.)	Salinity (‰)	Depth	Temperature (°C.)	Salinity (‰)	σ_t
Station 1596; July 24; lat. 54°06′ N., long. 55°01′ W.; depth, 174 meters; dynamic height, 1,454.711 meters						
0 meter	6.48	31.88	0 meter	6.48	31.88	25.06
27 meters	.09	32.98	25 meters	.25	32.90	26.42
52 meters	−.78	33.32	50 meters	−.75	33.28	26.77
79 meters	−.72	33.55	75 meters	−.75	33.51	26.96
104 meters	−.29	33.78	100 meters	−.45	33.73	27.12
157 meters	1.26	34.26	150 meters	1.10	34.21	27.43
Station 1597; July 24; lat. 53°53′ N., long. 55°26′ W.; depth, 167 meters; dynamic height, 1,454.741 meters						
0 meter	6.00	31.56	0 meter	6.00	31.56	24.86
25 meters	−.83	32.88	25 meters	−.83	32.88	26.45
51 meters	−.96	33.10	50 meters	−.95	33.09	26.62
76 meters	−1.06	33.32	75 meters	−1.05	33.29	26.78
101 meters	−.83	33.56	100 meters	−.85	33.54	26.98
152 meters	−.24	33.78	150 meters	−.25	33.77	27.15
Station 1598; July 24; lat. 53°43′ N., long. 55°45′ W.; depth, 144 meters; dynamic height, 1,454.772 meters						
0 meter	6.75	31.10	0 meter	6.75	31.10	24.41
31 meters	−.82	32.69	25 meters	.20	32.30	25.94
60 meters	−.93	33.16	50 meters	−.90	33.06	26.60
91 meters	−1.04	33.33	75 meters	−1.00	33.24	26.75
120 meters	−1.00	33.41	100 meters	−1.05	33.35	26.84
			(150) meters	−.60	33.48	26.92

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