TECHNICAL REPORT

DISTRIBUTION OF ICE IN BAFFIN BAY AND DAVIS STRAIT

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ABSTRACT

The distribution of sea and land ice in Baffin Bay and Davis Strait is presented by operational localities. The behavior of the ice is discussed by meteorological and oceanographic parameters. The ice condition charts, presented by months, are compiled largely from data gathered by Hydrographic Office observers over a period of years. Special emphasis is placed upon those ice properties known to affect aircraft trafficability. It is concluded that in certain areas, ice topography tends to remain relatively stable, whereas in other areas the topography tends to fluctuate with passing storms.

FOREWORD

Interest in arctic problems requires shipping to enter areas where sea ice restricts certain types of surface movements. In addition, with the use of aircraft over arctic areas, there is need for information about distribution of ice in the sea, with reference to the feasibility of emergency landings on ice as well as planning and executing various operations in the areas. This report has been prepared at the request of the U.S. Air Force and depicts ice conditions, by month, for the Baffin Bay-Davis Strait area.

Since the Hydrographic Office is charged with the responsibility of developing and testing techniques for the observing and forecasting of sea ice conditions, much of the developmental work has been performed in conjunction with logistic operations. Observations of ice in the Baffin Bay-Davis Strait area during recent seasons have been reviewed critically for the preparation of this report.

The author was killed in a plane crash near Paget Point, Ellesmere Island on 16 April 1954, while participating as an ice observer aboard a U.S. Navy ice reconnaissance patrol plane.

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PREFACE

This study concerns the distribution of sea ice and ice of land origin in the Baffin Bay-Davis Strait region. Consideration is given to ice as it normally appears in these areas in terms of space and time. It should be emphasized, however, that the presentation of sea ice conditions for any given period of the year, although substantially useful as a guide, may have restricted value when applied to a specific field operation.

In order for a study of this nature to be applicable to a specific operation, a broad scale investigation of the dynamic as well as the kinematic forces involved in the processes of sea ice formation, growth, development, and distribution would be required. A well integrated approach to the problem would include the determination of the thermohaline structure of the waters (on a much larger scale than heretofore employed by this Office), and a continuous study of air temperatures, wind, and precipitation. This would establish not only the date of initial ice formation, but also its rate of growth. The second step in the field investigation of ice would include long-range aerial surveys of the ice throughout the area of distribution for visual evaluations of the many topographic features of the ice, significant ice forms, extent and concentration of the ice, the location of certain types of sea and land ice, and its designation in terms of textual and graphic presentation. This type of study of sea ice conditions would furnish reliable data. It would provide the location of sea ice suitable for forced or deliberate landing of aircraft and information consonant with the requirements of any specific operation.

The formation and growth of sea ice is a function of oceanographic and meteorological variables. These vary from year to year, so we may expect different ice years. The distribution of ice over a given water area, with respect to variance in topographical features, is also a function of the meteorological parameters. Thus, the magnitude and frequency distribution of pressure ridges, the number and quality of refrozen leads, and the presence or absence of open water areas are related and are subjected to the impact of the pressures and stresses exerted on the ice by the passage of many storms and pressure patterns of varying intensities. If the early history of development and growth of winter ice is associated with relatively long periods of calms, light winds, and few storms, the topography of the ice will feature few pressure ridges. Conversely, if the early history is associated with intense storm activity, the topography of the ice will present a wild array of pressure ridges, compressed and irregular ice, and a high degree of rafting. With respect to the latter, however, there are greater numbers of frozen leads in varying stages of growth, size, and orientation.

The presentation of normal sea ice conditions, in the Baffin Bay-Davis Strait region, is based largely upon the observations of personnel of the U. S. Navy Hydrographic Office. Over the past years, they have flown several hundred aerial ice reconnaissance surveys, either preliminary to, or in direct support of surface operations in these waters. Also used as material for this study were ship and shore observations of ice conditions taken in recent years, and some historical data contained in reports of the many exploratory voyages in these waters during this and the past century.

This information should serve as a useful guide and reference in determining feasibility of emergency landings on ice, and the planning and execution of operations in these waters, particularly when modified to reflect the deviations from normal of factors controlling the growth, distribution, and behavior of sea ice.

Minor corrections have been made in the reprint of this report, formerly identified as H.O. Misc. 15891 and printed in 1954.

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A. INTRODUCTION

A description of sea ice conditions in Baffin Bay and Davis Strait would be incomplete without a brief discussion of the general disposition of the water circulation, and some of the external forces to which they are exposed. Movement and structural peculiarities of the ice are due chiefly to the geographical position of these waters and their circulation.

The Baffin Bay-Davis Strait system of waters is complex. Currents off the southwestern coast of Greenland, characterized by relatively high salinities and temperatures, flow northward into the waters off Disko and beyond. Tributary waters from Lancaster, Jones, and Smith Sounds flow into northwestern Baffin Bay. From here the currents travel southward along the coasts of Baffin Island and Labrador bringing in polar waters. A great eddy-current system is formed in Baffin Bay. To the south, the warm north-setting, West Greenland Current is diverted by the Hellefiske Bank and the Davis Strait ridge to the west, and south toward the coast of Labrador and back into the Labrador Sea. Thus, slow warm waters set against swift cold waters markedly influencing the formation of ice in the area.

The first area of the striking effect of the influence of the warm currents is the Labrador Sea and along the shores of western Greenland as far north as the southern approaches to Melville Bugt. South of the 66th parallel, except for a few coastal indentations and fjords, the waters rarely freeze. To the north of this latitude, except for the fjords and bays, the ice arrives late, is generally weak, and is very unstable. The westward and southward deflections of the large water mass by the Hellefiske Bank not only keeps the inner waters of the Labrador Sea free of sea ice, but also causes large quantities of sea ice at the southern periphery of the Baffin Bay-Davis Strait pack to drift southwestward, thereby contributing to the great ice drift off the Labrador coast.

The second region where water circulation influences the behavior of ice is the western part of Baffin Bay and Davis Strait from the area of southern Ellesmere Island to Newfoundland. Here the cold currents exert constant pressure on the ice, setting some sections of the Baffin Bay Pack into eddy motions, and carrying large quantities of sea ice formed in Baffin Bay and Davis Strait southward into the drift stream off Labrador. Winter and polar ice discharged into Baffin Bay through the sounds enter the pack, become part of it, and are carried southward. Disturbed sections of the pack expose areas of water which rapidly refreeze, only to break again and resume the production of new winter ice. It grows and replenishes the great drift of ice to the south in this manner.

Tide affects the ice in these regions. In areas of large tide ranges, ice is piled against the shore. This is noted in the early stages of ice formation and growth. At ebb tide, slush packed against the shore is exposed to the influence of low air temperatures, thus freezing into sheets of ice. At flood tide these sheets rise, break into smaller fragments, and are driven against the shore where they are piled haphazardly. Distortions in the bottom relief, tides, and, to a lesser extent, normal dynamic currents cause local rip currents which, in some local areas of bays and fjords, either prevent the formation of ice or cause the ice to be thin and treacherous. Fast ice which forms in some of the protected coastal indentations is fractured and open cracks appear at spring tides. The effect of tides on the ice of these waters generally is confined to limited areas and will be considered in the appropriate sections of this study.

Davis Strait, the southern egress of Baffin Bay, plays a distinct role in the cyclic history of the ice generated in these waters. Pressure systems moving into and across this area often cause great havoc to the ice. Winds with accompanying sea and swell resulting from the passage of low pressure systems across the Labrador Sea pound against the southern boundaries of the pack, compact it, break up its peripheral ice, and narrow the drift belt westward. Again, strong winds from the north exert immense pressure on the pack, disrupt it, and expose large areas of open water to the renewal of ice formation. When this occurs, Davis Strait becomes a great flushing estuary through which discharges increasing masses of broken ice. This changes the area of distribution and rapidly broadens the drift pack to the south.

It was not intended that this study should consider the causes and effects of sea-ice growth and formation. To do this would deviate from the purpose and function. Occasionally in this report, reference is directed toward the effect of some of the meteorological variables on the behavior and physical characteristics of ice. This reference, then, would contribute in small measure to the promotion of a more factual appraisal of ice conditions and provide means for a more ready evaluation of these conditions in terms of emergency descent and safe landing of aircraft.

This study did not intend to consider the behavior of ice, nor to its cause and effect, within any specific area. However, in order to clarify particular aspects of local ice conditions it was desirable to do so. To have done otherwise would have involved considerations of a nature dissonant with the purpose of this study.

Ice in Baffin Bay and Davis Strait does not form uniformly. Actually, it can be considered not only a function of oceanographic and meteorological variables, but also of latitude. Sea ice begins to form first in the uppermost regions of Baffin Bay and spreads slowly southward into the waters of Davis Strait. The freezing process continues southward, but takes place first in the west and somewhat later in the east. As a result, coastal waters in the north are frozen over with a fairly thick layer of ice, while those to the south remain open and free of ice. Also, owing to the many factors that influence its formation and distribution, ice is not uniformly present even in many strictly confined regions of this area. Again, it is apparent that a balanced presentation of the distribution of ice must be made consistent with its development in space and time as well as its many facets. Therefore, for the purpose of clearer presentation, the region of Baffin Bay and Davis Strait has been divided into several coastal and open water sections with a description of the ice from the time of its initial significant appearance to the period of initial disintegration.

Glacial ice in some forms is much less dependent on the factors which control the distribution of sea ice. Because of its nearly independent nature, aspects peculiar to it are described in a separate section.

The symbols indicating ice features on the accompanying charts, are those of standard Hydrographic Office ice chart presentations. Ice terminology is that of H. O. Pub. No. 609 "A Function Glossary of Ice Terminology."

B. BAFFIN BAY

Thule and Approaches - Generally, ice first begins to form in North Star Bay in the beginning of October. In the latter part of the month, it attains a thickness of as much as 15 inches and extends as a continuous, almost flat layer, as far as Wolstenholme and Saunder Øer. To the north of Saunder Ø it joins the fast ice formed earlier along the opposite shore. As the season progresses, the ice thickens and may reach 30 inches by the end of November. In December it may attain a thickness of 40 inches, growing thereafter month by month; in April and early May, it attains a thickness of more than 70 inches.

The ice is thickest in the immediate vicinity of the shores, becoming thin in the approaches to Wolstenholme and Saunder Øer where it has a depth in the range of 4 to 5 feet. Small danger areas exist between Saunder Ø and the small islands of Kekertarssuit to the north, where the ice is often very thin and disappears with first period of warming in the Thule area.

The ice of North Star Bay is quite smooth and flat. In some winters, an upthrust of sea ice occurs in the shoal vicinity of the pier. Bergs and bergy bits are present in the bay the year around and usually are lodged in the ice. The greatest quantity of glacial ice is found in the fjord itself and may be regarded as generally unsuitable for aircraft landings.

Melting of the ice sets in during the latter part of May and puddling is general in June.

High winds may force the removal of most of the ice in North Star Bay as early as mid-June; if the winds are absent, the ice will linger in the bay as late as 10 July. The ice in the fjord north of Thule has a rough contour, contains large quantities of glacial fragments, and is usually the last to leave this coastal indentation.

Fast ice joins Saunder and Wolstenholme Øer and sometimes contains many bergys and bergy bits. However, it seldom extends more than a mile west of these islands, where the shifting Baffin Bay Pack is encountered.

Wolstenholme Ø to Kap York - Ice will begin to form along this coast by 10 October. If undisturbed, it will assume the character of fast ice, in which case it may extend seaward from 15 to 20 miles. Under these conditions the topography of this ice is relatively flat, and pressure ridges are few in number. The height of the ridges are 12 to 18 inches; however, some will exceed 2 feet. Snow cover on this ice is fairly uniform and averages 3 to 5 inches with areas of 6 to 8 inches. Thickness of the ice will vary from 2 to 3 feet in December and 3 to 4 feet by mid-February, with local areas attaining a thickness as great as 5 feet.

This area seldom retains fast ice along its coasts. Strong offshore winds tend to cause long fractures parallel to the coast a short distance from shore. When the fractures occur, a lead several hundred feet to more than a mile in width will form from the vicinity of Kap York to Conical Rock, northwestward to Wolstenholme Ø, and beyond. If the lead forms in the period of February-March, rapid refreezing of the exposed water will take place, so that within 2 weeks it will be covered with an ice layer of approximately 18 inches, increasing to more than 2½ feet in 3 weeks. On the other hand, if the situation occurs during April, refreezing of the lead will be progressively slower and probably will not exceed 12 inches. After mid-May such a lead would remain open and the breaking pack ice would alternately close and reopen it.

Parker Snow Bay is covered with flat, fast ice which is almost free of any pressure ridges and remains in the bay independent of the ice along the coast.

The inshore waters of this coastal section are infested with bergs and bergy bits. Growlers are lodged in the ice in varying numbers. The greatest numbers are in the vicinity of Conical Rock. The ice to the west generally is infested with many bergs, some of which may exceed 200 feet in height; although heights of 75 to 150 feet are most common.

Normally this fast ice breaks up in May leaving a wide shore lead. Permanent fast ice still attaches to the coast from the vicinity of Kap York to about 20 miles westward. It is irregular in its seaward projection, varying from a few hundred to more than 1,000 yards. Tidal and basin cracks cause large sections of this ice to break away until it is completely removed by the end of June or first of July.

Kap York to Tasiussaq Bugt - Fast ice first appears to the east of Kap York in the early part of October, and gradually spreads along the coast to the east and south. By the latter part of the month it reaches Nugssuaq Ø. The boundary of this fast ice may be described as an arc connecting Kap York to Bushnans Ø, Bushnans Ø to a point 5 to 10 miles southwest of Bryants Ø, extending southward to Thoms Ø, then to the western extremities of Holms and

Nugssuaq Øer. Thickness of this ice will be generally 3 feet by January and 4 to 5 feet from mid-February to mid-April. Following this period, gradual disintegration takes place and the ice will decrease in thickness to 3 to 4 feet in May, and 3 feet in June.

Although fairly level and smooth, with comparatively few pressure ridges (owing to its protected environment), the ice is heavily dotted with bergs, bergy bits, and growlers. Some of the bergs will be as high as 300 feet, although the average height is 150 to 200 feet. Greatest banks of bergs are found off Kap York, immediately east of Bushnans Ø and south of Kap Melville, the east side of Thoms Ø, and the length of the ice between Thoms and Holms Øer. Growlers are found more frequently between Holms and Nugssuaq Øer. Fewer growlers are found in the ice to the north, the majority having drifted along the coastal waters to the west of Kap York and Wolstenholme Ø.

Although there are great numbers of bergs and smaller fragments of glacial ice, great stretches of flat ice which can be used for emergency descent are present.

The fast ice begins to break and separate from the shore late in the melting season. The area between Holms and Nugssuaq Øer and north of Holms Ø to the vicinity of Red Head, is the first to clear. This will occur usually in the end of June. Cracks and puddles appear in the ice by mid-July. The ice disappears by the end of July or early August throughout this section of the coast except for Dedodes Fjord where bergs and current eddies maintain remnant floes.

The coastal waters of Melville Bugt are never free of ice; glacial ice remains following the removal of sea ice. In early August the glacier coast becomes very active, calving an abundance of glacial fragments which spread seaward as much as 30 miles. These in turn follow the normal current pattern of the Melville Bugt waters and drift toward the Crimson Cliffs and the waters to the west of Thule.

Melville Bugt - This bay is frozen over by the early part of November. During the early weeks of its formation, passing storms tend to break the ice and cause considerable rafting and ridging. Large quantities of this ice apparently drift westward. The succeeding ice which forms rapidly usually features less rafting and ridges. The ridges should be 2 to 4 feet with some exceeding 6 feet; however, they are separated by layers of flat and fairly level ice which frequently have dimensions of several thousand yards.

Calculations show that the ice in Melville Bugt generally should reach a thickness of 2 to 3 feet by mid-January and 3 to 4 feet by March. Locally, some of the ice will exceed a thickness of 5 feet. Ice continues to grow slowly through April and, at times, into the early part of the following month.

Snow cover is usually light, 4 to 8 inches with drifts of 12 to 18 inches.

The pack ice of Melville Bugt is seldom immobile. In February and March, during the periods when this area is under the prolonged influence of "flat" pressure systems, the pack is either stationary, or there is very slow, local motion. At such times, the entire ice field becomes a part of the fast ice which then appears to extend far beyond the normal limits.

Of all the ice in Baffin Bay, that portion in Melville Bugt appears to be least subject to frequent breakup in the winter months. However, fracture of the ice is a normal feature. Passing storms set the ice in motion; leads may be expected to form along the margin of the fast ice, on the lee side of bergs, and in areas where cracks resulting from thermodynamic and kinematic influences are present in the ice.

Leads which form along the fast ice of Melville Bugt will be found to the south of Thoms Ø. Their orientation parallels the fast ice and attains widths of a few hundred yards to more than 2 miles. Their entire length may exceed 10 miles. As a result of pressure from the north, shorter leads develop in the northerly sector of the bay. Lengths of ½ to 2 miles and widths of a few hundred feet to 1,000 yards are common. Their orientation is along an east-west axis. Leads that form on the lee side of bergs will be of varying lengths as a result of pressure. Their size will depend on the magnitude and duration of winds that pressed against the ice. Generally, their width corresponds to the width of the berg. Their length varies from a few hundred yards to more than a mile.

During January through March, the refreezing of exposed cracks and leads begins immediately on exposure to the air. An exposed lead may acquire a smooth layer of ice 18 inches thick within a little more than a week, depending on the winds and temperatures. After a lapse of a few more weeks, a lead of this sort may attain a cover of new ice more than 2 feet thick. The newly frozen leads in Melville Bugt may be free of snow for considerable periods, therefore their movement can be detected from the air, and their relative thickness and size can be judged. When the lead is covered with snow, the snow layer generally will be light and level.

The ice in Melville Bugt begins to break up on a greater scale in the latter part of April. The first signs of the breakup are noticed along the fast ice where the pack separates and forms the great lead known as the Northabout Route. After a relatively mild winter the ice is fragmented into blocks and floes in the region centered at 75°30'N and 67°00'W. Giant floes and fields remain in inner Melville Bugt. The ice in the area of west of Nugssuaq and Holms Øer and to the north as far as 74°20' also will begin to break into smaller floes. Northwest of Duck Øer polynyas will form. Similarly, along a line connecting these islands with Conical Rock, small irregular leads and polynyas will be present.

General fragmentation of the pack begins in the latter part of May with accelerated breakup starting in the latter part of June. Inner Melville Bugt, however, retains a number of giant floes and fields. Puddling and rotting of ice begins off Nugssuaq and Holmes Øer by the end of June and becomes general throughout the area a few weeks later. By mid-July large areas of open water are present. The Melville Bugt pack, south of 75°N is fragmented into brash, block, and small floes at this time; the pack completely dissipates by the end of the month.

Tasiussaq Bugt to Disko Bugt - Bays and fjords in this section of the Greenland coast become frozen by the end of November. The fast ice advances seaward and rapidly engulfs all of the outlying rocks and islands that dot these coastal waters. Their outer rim outlines the seaward margin of the fast ice.

Thickness of the fast ice is generally 2 to 3 feet by early January in the northern sector and by the latter part of January in the southern sector. The ice will increase to 4 feet thick and locally to 5 feet by late February and March. Generally, the ice is flat and fairly smooth. Pressure ridges are present most frequently near the margin of the ice.

Breakup by the fast ice begins as early as mid-May in Disko Bugt and Vaigat, and by mid-June in the areas to the north. Sea ice is gone completely from these waters by mid-July. Only in the northern part of the sector there appear occasional remnants of ice as a result of the wind and currents.

Climatological data indicates that snow cover varies quite extensively. In the northern sector it usually is in the range of 6 to 8 inches and increases to 12 inches in the south. Snow drifts, therefore, should be correspondingly greater in the southern sector. Their estimated range is from 12 to 15 inches in the north and 18 and 24 inches in the south.

The coastal waters abound in glacial ice; however, many of the inlets and passages are free of glacial ice. Most of these inlets contain large quantities of bergs, bergy bits, and growlers which break off the numerous glaciers located at the head of the many fjords.

The Outer Ice from Tasiussaq Bugt to Disko Bugt - The sea ice westward of the margin of the fast ice forms relatively late along this sector of the coast. It is generally the least stable of any of the regions in Baffin Bay except, perhaps, the area of the North Open Water. While the freezing process envelopes all of Baffin Bay and Davis Strait in November, the offshore waters from Disko Bugt to the vicinity of Tasuissaq Bugt remain relatively free of sea ice. It is not until December that freezing finally occurs.

As the freezing process begins and the waters acquire a thicker ice layer, there remains, at distances of 10 to 20 miles offshore, a narrow tongue of weak ice. This belt of weak ice is found the length of this coastal section and varies in width from about 5 to 10 miles in the vicinity of Tasiussaq Bugt to more than 25 miles at the approaches to Disko Bugt.

Passing storms frequently open the ice and cause its general breakup, separating it into floes of many sizes and thicknesses. Large areas of water are exposed which freeze rapidly and cover the area with layers of new ice. Onshore pressure closes the ice causing considerable rafting and ridging. Sea ice is usually in a state of great mobility and subject to sudden and unpredictable changes. Sea ice appears last and is the first to disappear from the eastern waters of Baffin Bay and Davis Strait. A broad shore lead begins to replace it in early May when it begins to encroach the coastal waters of Disko and reaches Tasiussaq Bugt by early June.

Disko Bugt to Søndre Strømfjord - Coastal indentations and fjords along this coast begin to freeze in the latter part of November and are usually frozen completely by January. Because of the tidal currents, many of the passages and some areas of the fjords are either open or are covered by a thin layer of ice. Ice forming in the fjords is usually flat and smooth. It may attain a thickness of 3 feet or more by mid-February.

Breakup of the ice in the exposed sections usually begins in May. However, in the fjords this occurs in the latter part of May and early June.

Offshore, the Davis Strait pack may extend southward along the coast from Disko Bugt to the northern approaches to Søndre Strømfjord. The ice first appears off Egedesminde in January, and extends southward to the latitude of 66° or 66°30'N by February. Pressure from the south and southeast will force the ice away from the coast and create a broad shore lead, which may extend northward to the vicinity of Egedesminde.

In the northern part of the sector, the ice is similar to that found off Disko; to the south it is composed mostly of new ice, broken into block and small floes by winds, sea, and swell. In this area a broad shore lead develops during the latter part of April. Occasional incursions of the shore lead occur under strong, persistent pressure from the northwest. This brings in ice from the fringe of the pack to the west.

Cape Chidley, Labrador to Cape Dyer, Baffin Island - East Hudson Strait and the coastal area to Cumberland Sound are influenced by strong tides where ranges may exceed 35 feet (Frobisher Bay). As a result of the tides and the strong south-setting currents, a small amount of fast ice is formed along the shores. Ridges exceeding 7 feet usually occur in the ice when developed in the close confines at the head of the great funnel-like bays. Otherwise, there is rafting because of piling by tidal action during the early stages of formation and growth of the fast ice.

Fast ice which develops in the coastal waters exposed to the sea, normally is confined to two narrow sections of this coast, the northern shores of Loks Land to the Leybourne Islands group at the approaches to Cumberland Sound, and Leopold Island to a few miles north of Exeter Bay.

There is no fast ice off Cape Chidley, the northern shores of East Hudson Strait, or the islands guarding the approaches to Lower Frobisher Bay. Tidal currents prevent the formation of fast ice off Cape Chidley. Only a narrow ice foot is found along the northern shores of east Hudson Strait. The same is true of Resolution, Edgell, and Lower Savage Islands, as well as the southern coast of Loks Land. The tidal ice foot is also a prominent feature of Lower Frobisher Bay. Fast ice is encountered only in the protected bays and sounds of this body of water. Although Upper Frobisher Bay is fairly locked in fast ice, swift tidal currents keep many of the narrow channels open through the winter; still others acquire a temporary thin layer of ice which breaks at high tides and under pressure of winds. Ice over the tidal flats is extremely rough, rafted, and ridged. Only the ice of Ward Inlet, Wayne Bay, and the center ice of the upper bay is flat. Ice begins to form in this region in the latter part of October and should cover Upper Frobisher Bay by mid-November. A thickness of 3 feet is expected by January, and 4 to 5 feet by March.

The nearshore ice normally has a heavy snow layer, 8 to 12 inches, with drifts of 2 to 3 feet; the flat ice has a more uniform and lighter cover, 6 to 8 inches, with occasional drifts of 12 to 24 inches.

The outer margin of the fast ice north of Loks Land extends approximately from Osbon Bay to almost 64°30'W, skirting a distance of 2 to 4 miles seaward of the north of Hall and Hudson Islands and Loks Land. Here it forms an embayment and turns eastward to within 4 or 5 miles of Monumental Island and curves northward to within a few miles of Cape Murchison and continues to skirt the coastal islands. The ice encloses Leybourne Islands and turns into Cumberland Sound.

To the north, the fast ice generally is confined to the protected waters. Its outer boundary extends from the northwest tip of Leopold Island to the east side Muingniak Island and encloses the bay on the northeast side of Kekertuk Island. The extent of the fast ice terminates at this point. However, it resumes its coverage in the southern entry of the passage on the west side of Angijak Island and envelopes the northern shore of this island as far as its eastern terminus. From here, it proceeds northward to Cape Walsingham, thereafter curving into Exeter Sound, almost jutting the coast to the north, and ending a few miles south of Cape Dyer. This fast ice is similar to the ice to the south. It forms in the latter part of October and very likely progresses seaward to the described margin by the end of November. Its thickness is estimated to be 3 feet by early January, increasing to 5 feet by March. However, not all of the shore waters in this region freeze over completely. Tidal currents funneling through some of the passages tend to keep the islands north of the Leybourne Islands free of ice. The ice-free areas are found in passages having a north-south orientation.

The fast ice is generally flat and is normally free of glacial fragments. A small number of bergs, and bergy bits on occasion drift into some of the bays and ground. The ice begins to break along the margin in the early part of June and the coast is clear in early July.

The snow layer on the ice in the vicinity of Loks Land, varies from 6 to 8 inches and decreases northward to 4 inches. These depths will vary considerably as a result of drifting.

The ice seaward of the fast ice margin is in motion constantly. It first appears locally in early November and moves eastward until it covers the sea to within 50 or 60 miles of the Greenland coast at the latitude of Cape Dyer. It turns southwestward toward Cape Chidley where it appears in the early weeks of December as a belt of 40 to 60 miles in width. Augmented by the ice from the waters to the north, the ice enters Baffin Bay through the sounds of the Canadian Archipelago. The drifting pack has a complex composition with ever-changing concentration and distribution.

During the winter and early spring months, the inner pack is composed largely of medium and giant floes. Its periphery frequently is broken into small floes and blocks because of the action of sea and swell and sudden changes in pressure. Floes are frequently the product of consolidation; they may contain ice of different ages and stages of growth. Waters undergoing rapid refreezing often retain large distributions of newly fragmented ice. Newly formed floes are broken and the process is renewed.

Thus, the ice is unreliable from the point of thickness, dimension, and topography. Locally formed ice is subject to frequent breakup, and the process of consolidating the ice produces ridging. Floes drifting from the north are often heavily ridged and hummocked.

During the latter part of March or April, ice drift increases. The pack broadens considerably and changes radically in distribution and concentration. In May it reopens and the contribution from Baffin Bay diminishes. Thereafter, the area of ice rapidly decreases leaving ice patches and belts by the latter part of June. The pack practically disappears by August.

Glacier ice is found in this region during the entire year. Bergs discharged from Disko Bugt drift within the boundary zone of the pack and converge on Resolution Island. Those drifting off the coast of Baffin Island are of many varities and represent products of the glaciers in Melville Bugt, the region to the north of Thule, and the coast of Ellesmere Island.

In the vicinity of Cape Dyer and southward to the latitude of Cumberland Sound, strong northerly winds produce east-west leads several miles wide and 40 miles or more long. They are usually ice free; however, when formed in March and April, they freeze over rapidly. The new ice formed in these leads attain a thickness of 15 to 20 inches within a few weeks. Storms and the south-setting currents break the new ice into small and medium floes, mixing them with the surrounding ice. Pressure from the west forces the pack seaward and exposes broad leads between the fast ice and the pack. Also, within the pack irregular north-south leads are associated with this western pressure.

The shore lead and the leads in the pack are short lived; the pack closes against the fast ice when the pressure from the west abates.

Cape Dyer to Bylot Island - The fast ice along the coast of Baffin Island resumes a few miles to the west and north of Cape Dyer, aligns the eastern coast of the island, continues northward, and completely surrounds Bylot Island. Forming first in the month of October in Eclipse Sound and Navy Board Inlet, it rapidly develops eastward and southward to the vicinity of Cape Dyer toward the end of October or early November. Its seaward advance is broad and rapid. At height of development, the ice extends 8 to 10 miles at Bylot Island, broadens to 20 to 30 miles in the region of Cape Christian and more than 30 miles in the vicinity of Home Bay.

At Padloping Island the ice undergoes very rapid growth during the first month of development, and by mid-December measures as much as 30 inches in thickness. Hereafter, growth of the ice is retarded, but continuous. In the latter part of March, this ice may exceed 80 inches in thickness. In early May the fast ice facing Cape Christian may attain a thickness of 3 to 5 feet within the first 2 miles of its eastern margin.

The surface of the fast ice along this coast of Baffin Island is rather flat. Pressure ridges are few; those formed in the ice during its initial phases of growth are not prominent. Few attain greater heights than 12 to 18 inches. However, some of the marginal ice, notably that to the north of the latitude of Home Bay, is usually very heavily ridged, especially along the edge which separates the fast ice from the pack. Here pressure ridges reach considerable dimensions, often exceeding 10 feet. They may be found in the marginal zone of the ice for distances of 2 miles.

To the north of Eclipse Sound and Pond Inlet, the area is covered with a smooth layer of ice. However, the fast ice which encloses the east and northeast coast of Bylot Island has ridges resulting from the great pressures exerted against the shores.

Lodged in the fast ice, throughout the length of Baffin and Bylot Islands, a varied collection of glacier and polar ice is found. This glacial ice is very sparse when compared to the eastern portion of Melville Bugt. However, the fast ice contains certain types of glacial ice, flat tabular bergs of relatively inconspicuious heights, extending 5 to 10 feet above the surface of the sea ice. Ice of this type rarely is observed elsewhere in these waters. Its detection from the air is difficult when the ice is covered with fresh snow. These fragments are not numerous and may be found in broken clusters of small sizes near the shore where they were grounded prior to the formation of the sea ice. When lodged in ice over deep waters, they exist singly and are larger in size, perhaps several hundred yards.

Snow is distributed uniformly throughout this region. The snow cover is estimated to be 6 to 8 inches with drifts of 12 to 18 inches.

The boundary of the fast ice begins to recede in June. In early July large sections of the ice break away becoming part of the great pack. Many sections of the coast are ice free in the latter part of the month, and in early August all of the ice disappears.

Bylot Island to Ellesmere Island - Fast ice is formed in the indentations of the southern coast of Devon Island. Currents and tidal influences cause the ice to move continuously in the north side of Lancaster Sound. This breaks the ice and forces it into Baffin Bay.

A half-mile belt of fast ice normally is found on the east coast of Devon Island, from the southern side of Philpots Island to the entrance of Lady Ann Strait where it narrows to the coast. Its surface is relatively smooth except for a marginal zone in the northeast where ridges are formed as a result of pressure from the north and northeast. The snow layer is fairly uniform and corresponds to the snow layer found on the ice to the south.

Shore waters off Devon Island begin to freeze in October. Fast ice is firmly established in November. Its rate of growth and thickness is comparable to that at Bylot Island. Breakup of the ice commences in the latter part of June and is general by July. The coast is clear at the end of July or early August.

Lady Ann Strait is free of fast ice. Locally formed ice breaks as the result of currents and pressure from Jones Sound and Baffin Bay. The floes are smaller and their concentration varies with changes in the passing meteorological pressure systems.

Fast ice occurs on the southern coast of Coburg Island, enveloping the island, and closing Glacier Strait. It continues northward along the coast of Ellesmere Island into Smith Sound. With the exception of Glacier Strait and the coastal indentations in the islands, the ice is rough and has pressure ridges. It contains large quantities of polar ice, which drift into this area through Smith Sound. The margin of the fast ice extends a few hundred yards to the east of Coburg Island, arcing toward Smith Sound at a distance of 10 to 15 miles from shore.

Sea and swell activity gradually breaks up the marginal zone of this ice and forces its boundary westward. Accelerated breakup of the ice takes place in July. The shore is free of ice by the early part of August.

The Baffin Bay Pack - The Baffin Bay Pack is east of the fast ice which extends the length of the Baffin Island coast north of Cape Dyer and Bylot and Devon Islands. It forms in the northern area during the early weeks of October, expands southward and encloses all of the waters of Baffin Bay and central and western Davis Strait in November. Its composition and structure has many local variations. The Baffin Bay Pack contains floes of different sizes, thicknesses, great pressure ridges, young ice, polar ice, and ice of land origin. The pack grows in size during winter. Storms will cause fragment shifting of the pack and the opening of great leads. New and winter ice are compressed and pressure ridges are formed. Large sections of the pack drift southward through Davis Strait, enter the Labrador Current, and the newly exposed water areas acquire new layers of ice. Therefore, because Baffin Bay and Davis Strait ice is replenished constantly through the season of growth, the pack is vast and heterogeneous.

Because of geographic dissimilarities, the pack can be separated into two sectors: the southern sector extends from Cape Dyer to the latitude of Home Bay, and the other section, to the north of this latitude. The southern sector responds more readily to changes in pressure. Strong northerly winds cause very broad east-west leads that extend nearly the width of the pack. They may form singly, or in a parallel series separated from each other by wide bands of densely concentrated floes. Winds of a westerly component produce short, narrow, and irregular leads with a general north-south orientation. Finally, the coastal blocking of Cumberland Peninsula and other controlling factors bring about the formation of polynyas and many small leads in the area northwest and east of Cape Dyer which will close upon the slightest change in the condition of the pack.

During the months of intense ice production, January through mid-April, newly opened leads readily freeze. Within a few weeks they may acquire a layer of ice 18 inches or more thick. However, renewed stresses on the ice break up the new ice into floes of different sizes which mix with the surrounding ice of the pack.

The western side of the pack ice contains floes of hummocked polar ice and floes that are extremely rough and very heavily laced with pressure ridges. Some of the ridges exceed 10 feet in height. Also found in this area are floes whose surface features resemble a consolidated mass of crushed upended blocks. On the other hand, the eastern side of the pack contains a high percentage of giant floes in which pressure ridges are widely separated; the surface of the ice between them is relatively smooth. These floes have frozen within them smaller floes of thicker ice whose ridges protrude above the surface and often escape detection owing to the snow layer that covers them.

Thickness of the ice in this sector of the pack is variable. Older ice, formed in autumn, attains a thickness of more than 30 inches by January, and may exceed 4 feet by March. Within this pack thin ice is found which formed recently in leads or polynyas.

Snow cover is irregular. Older ice may have 8 or more inches of snow, while new ice may have a few inches, or be snow free.

The northern sector of the Baffin Bay Pack is more stable than the section to the south. Large expanses of the pack remain relatively immobile for extended periods. This is particularly true of the central, eastern, and northeastern portions where large expanses grow uninterrupted. Exceptions are found in the north, in the reaches of the North Open Water, and in the west where changes in the ice occur with regularity.

From January to April, the region of the pack's greatest stability is composed principally of medium and giant floes and fields. The ice is interspersed with pressure ridges 8 to 12 feet in height. Large areas of relatively flat ice separate these ridges. Small ridges, ranging in height from 1 to 2 feet usually are present in varying concentrations within the flat ice. Relatively few bergs are found in this ice.

In January floes formed in the autumn may attain a thickness of 3 feet; it may increase to 3 to 5 feet by March and April. Snow cover generally is 6 to 8 inches with drifts of 12 to 18 inches.

To the west, the pack ice that drifts along the fast ice has greater mobility and contains ice of varied types; polar ice, ice formed in Lancaster Sound, and that which has formed or drifted into the North Open Water. Glacier ice also is found in a larger proportion. Most of the ice found along the Baffin Island ice is composed of medium and giant floes and fields. Its surface is rougher and has more pressure ridges than that to the east. East of Pond Inlet and Bylot Island, pressure ridges have been observed to exceed 15 feet in height.

The ice is comparable in thickness, to that previously described except in isolated areas that contain ice from Lancaster Sound or the North Open Water.

The ice usually is disturbed in the pack east of Cape Byam Martin and for 50 or 60 miles eastward of the Lancaster Sound egress. Here, unlike the central pack, the ice is in a state of greater mobility and changing concentration and composition. Leads appear to open readily and close before any appreciable growth of new ice takes place. Here, too, is often found ice which at one time was subjected to great pressure, producing ridges exceeding 15 feet in height, or floes that were compressed and crushed into masses of ice with rough surfaces.

The ice of the North Open Water is seldom stable in character; it never attains great thickness because of frequent breakup. Winds, light or strong, tend to clear great areas of this water and form polynyas which soon acquire a cover of frazil crystals and young ice.

The destruction of the Baffin Bay Pack occurs along its entire periphery, except for the ice which remains on the coast of Baffin Island. In June, when melting starts, the pack boundary in the area of the North Open Water contracts and moves southward. Its western boundary facing Devon and Bylot Islands recedes eastward. The Melville Bugt Pack begins to break in the region of the Middle Passage, along a line connecting Upernavik and Wolstenholme Ø. Along the coast of Greenland a broad shore lead forms, gradually moves northward into Melville Bugt joining the Northabout Route, and the great pack recedes westward. The drift of the fragmented pack gradually narrows to the south and withdraws toward Cape Dyer. By the latter part of July the pack is rotted and reduced in size. The fast ice of Baffin Island, already deteriorated, is leaving its coastal anchorage. In August the pack becomes a floating mass of rotten floes that rapidly fall apart into brash and block. By mid-September the pack disappears.

During periods of optimum ice growth, passing storms greatly increase the pressure on the Baffin Bay Pack. On such occassions large areas of the pack are forced open forming leads. Some of the leads rapidly acquire fresh layers of hard ice while others close and form pressure ridges along lines of contact. The ice of the newly frozen leads is readily recognized from its smooth surface and color. The color of the newly formed ice depends greatly on its thickness. It was observed that the thickness of dark and gray ice ranged 6 to 8 inches, of lightest gray ice 8 to 14 inches, and almost white 14 to 18 inches. In the extremely cold months of February, March, and April, ice formed during periods of relatively light winds takes on a glass-like surface. This ice may reach a thickness of 20 inches within a two-week period.

Leads of the type described above are found in the northeast and central part of the pack. They usually have a northwest-southeast orientation. They frequently are irregular in size and may vary in width from a few hundred feet to several hundred yards and attain a length of several miles. Occasionally, they appear as a great network that may extend for distances of 50 to 100 miles.

The leads that form in the western part of this section of the pack undergo rapid changes; hence, the newly formed ice usually is broken up before a lead attains appreciable size.

Under the influence of westerly winds, the northern sector of the pack will separate from the Baffin Island fast ice, and a broad lead will form from the vicinity of Home Bay to the latitude of Pond Inlet. Its width depends on the duration and magnitude of the wind force exerted against the pack. It may vary from a few miles to more than 20 miles. Its life, however, is short and the pack soon crushes against the fast ice and creates great ridges.

Leads that form in the southern sector of the Baffin Bay Pack also have a short life. The high mobility of the pack and the rapid changes which occur as a result of different pressures, open and close leads frequently.

C. GLACIER ICE

Baffin Bay and Davis Strait are the source of the majority of icebergs of the northern hemisphere. The inshore water of Melville Bugt has a massive glacier coast. Into the Melville Bugt waters great numbers of bergs drift from the south. Here, even greater numbers of bergs originate.

Icebergs are present in Baffin Bay and Davis Strait during all seasons. Their number and distribution varies with the season and the year.

There are approximately 100 active glaciers on the west coast of Greenland; 20 of these are regarded as significant producers of bergs. The bergs that are calved along the coast north of Disko Bay assume a northabout drift in the coastal waters of Baffin Bay. They enter Melville Bugt where they augment the thousands of bergs that lie in the nearshore waters.

Bergs vary in height, from rather insignificant masses 30 to 50 feet high to giants that occasionally attain heights of 400 feet. Their shapes are as varied as their sizes. Few, however, are of the tabular variety common to the Antarctic. Although approximately 7/8 of the mass of the berg is submerged, measurements indicate that anywhere from 1 to 5 times the height of the berg actually is submerged.

Winds and surface currents have little influence on the direction or speed of the drift of bergs because of the immense mass of the submerged portion. Thebberg's rate and direction of drift is a function of the magnitude of the speed and direction of the subsurface currents acting upon it.

In addition to icebergs there is an abundance of other glacier fragments (bergy bits and growlers). The number and distribution vary with the distribution of the bergs and the intensity of the calving process of the glaciers at the time of calving and at the time of mass disintegration of great numbers of the older bergs.

Some of the glaciers on the west coast of Greenland, such as Jakobshavns Isbrae, may calve the year round. Those to the north, however, are active for a relatively short period. Glaciers located north of Disko and south of Melville Bugt usually begin to calve in the latter part of July, and those in Melville Bugt in the beginning of August coincidental with the final removal of the fast ice. Glacier activity reaches its height in the few weeks following initial calving. Soon vast quantities of glacial fragments move out of the fjords and bays into coastal waters and slowly drift northward. In Melville Bugt, coastal waters fill with glacier debris as much as 30 miles to the seaward.

Toward the end of the month, the mass of floating glacial fragments, in the forms of bergs, bergy bits, and growlers will have drifted into the area of Kap York and westward along the Crimson Cliffs. The debris of the glaciers, pulverized glacier ice, and growlers are subjected to fairly rapid melting, leaving the heavier masses of ice. By mid-September, when autumn begins to take full sway, great numbers of bergs that were subjected to summer influences begin to disintegrate. Once again the coastal waters are filled with growlers which drift toward the western waters of Baffin Bay. In October, when the winter ice forms, the growlers lodge in the new ice and drift where the winds and currents direct them.

Currents often ground icebergs into shallow waters. When grounded near shore, they may serve as anchorages for the newly formed fast ice. When carried by the currents into deep waters, the bergs continue their independent course impeded slightly by the new ice. It is only when the ice becomes formidable in itself, by means of its own hardness and size, that a berg's drift may be appreciably affected; nevertheless, it is not dominated by the drifting ice. Great pressures that force a violent movement of sea ice will cause extremely hard and substantially thick ice to crumble against the windward side of bergs and will create on their lee side leads of considerable length. In the periods of intense cold, such leads (unlike the leads that result from the separation of great floes) quickly refreeze and create fairly broad lanes of smooth and flat ice.

During the period when the waters of Baffin Bay and Davis Strait are covered with ice, the greatest concentration of bergs is formed in Melville Bay and southward along Greenland coastal waters. Fewer bergs are found along Baffin Island, although here are located many of the bergs discharged from Kane Basin and the glaciers of southeast Ellesmere Island.

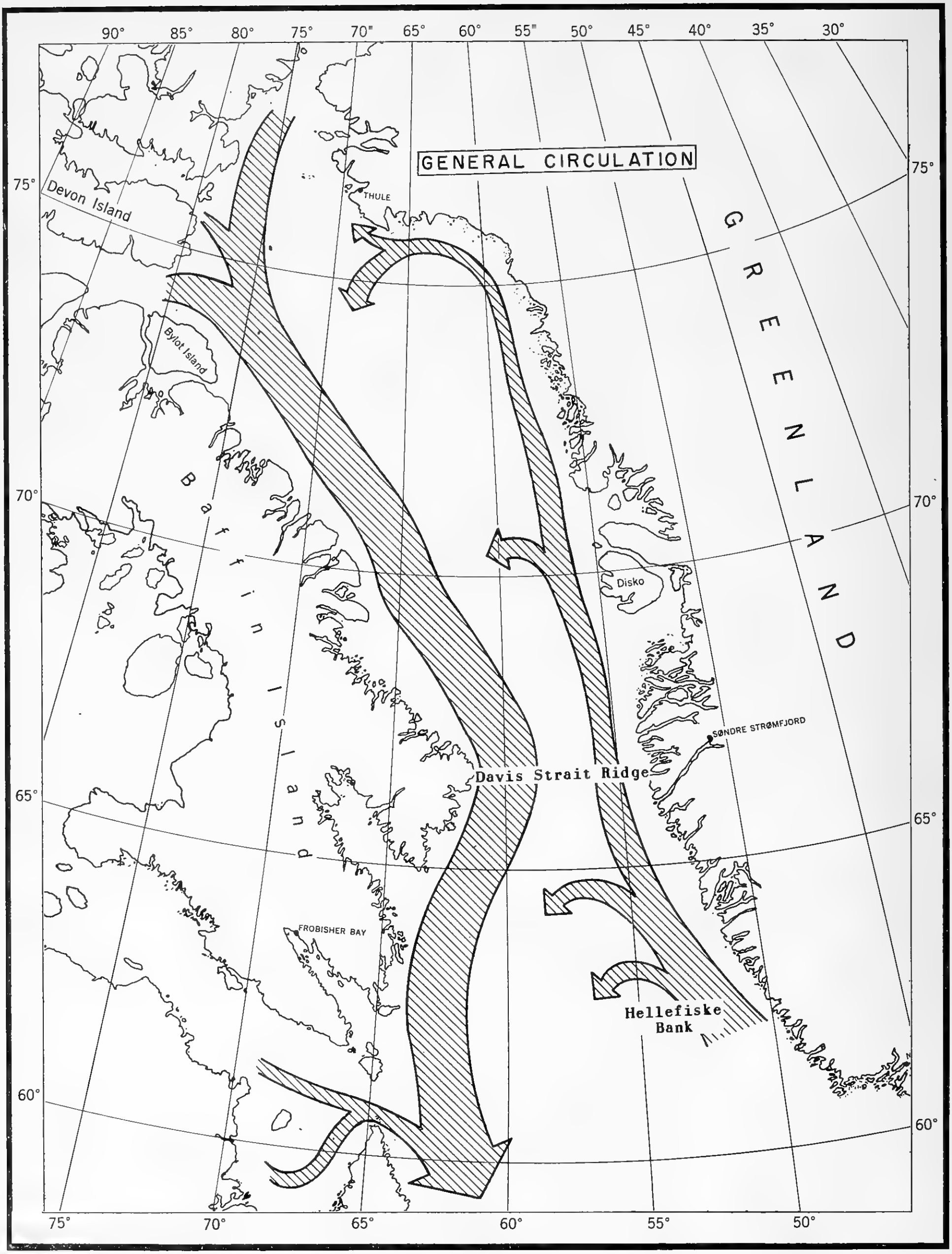
GENERAL CIRCULATION
Devon Island
Bylot Island
Baffin Island
GREENLAND
THULE
Disko
SØNDRE STRØMFJORD
Davis Strait Ridge
FROBISHER BAY
Hellefiske Bank
90°
85°
80°
75°
70°
65°
60°
55°
50°
45°
40°
35°
30°

Figure 1

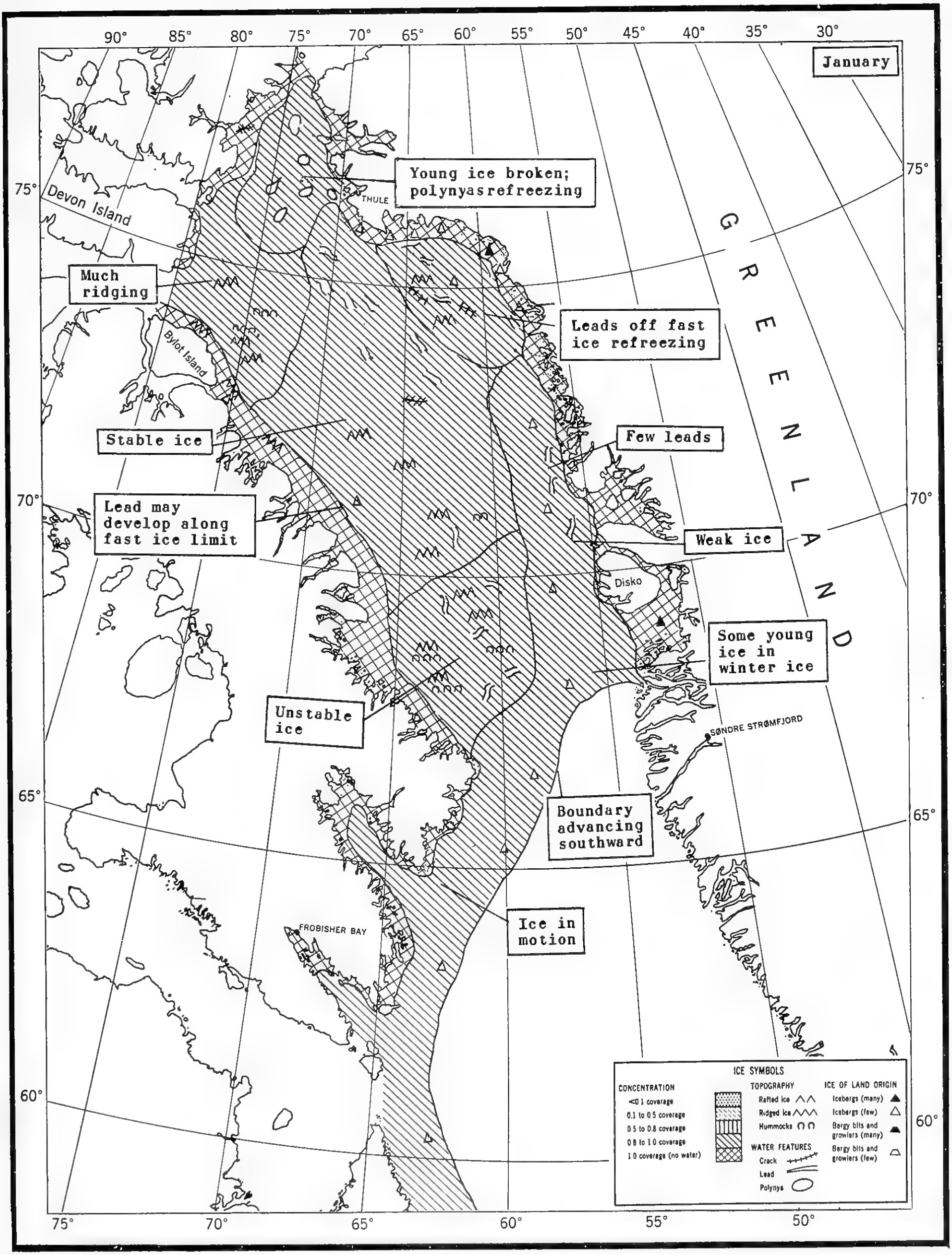
January
Young ice broken; polynyas refreezing
THULE
Devon Island
GREENLAND
Much ridging
Leads off fast ice refreezing
Bylot Island
Stable ice
Few leads
Lead may develop along fast ice limit
Weak ice
Disko
Some young ice in winter ice
Unstable ice
SØNDRE STRØMFJORD
Boundary advancing southward
Ice in motion
FROBISHER BAY
ICE SYMBOLS
CONCENTRATION
TOPOGRAPHY
ICE OF LAND ORIGIN
WATER FEATURES
Crack
Lead
Polynya
Rafted ice
Ridged ice
Hummocks
Icebergs (many)
Icebergs (few)
Bergy bits and growlers (many)
Bergy bits and growlers (few)
1.0 coverage (no water)

Figure 2

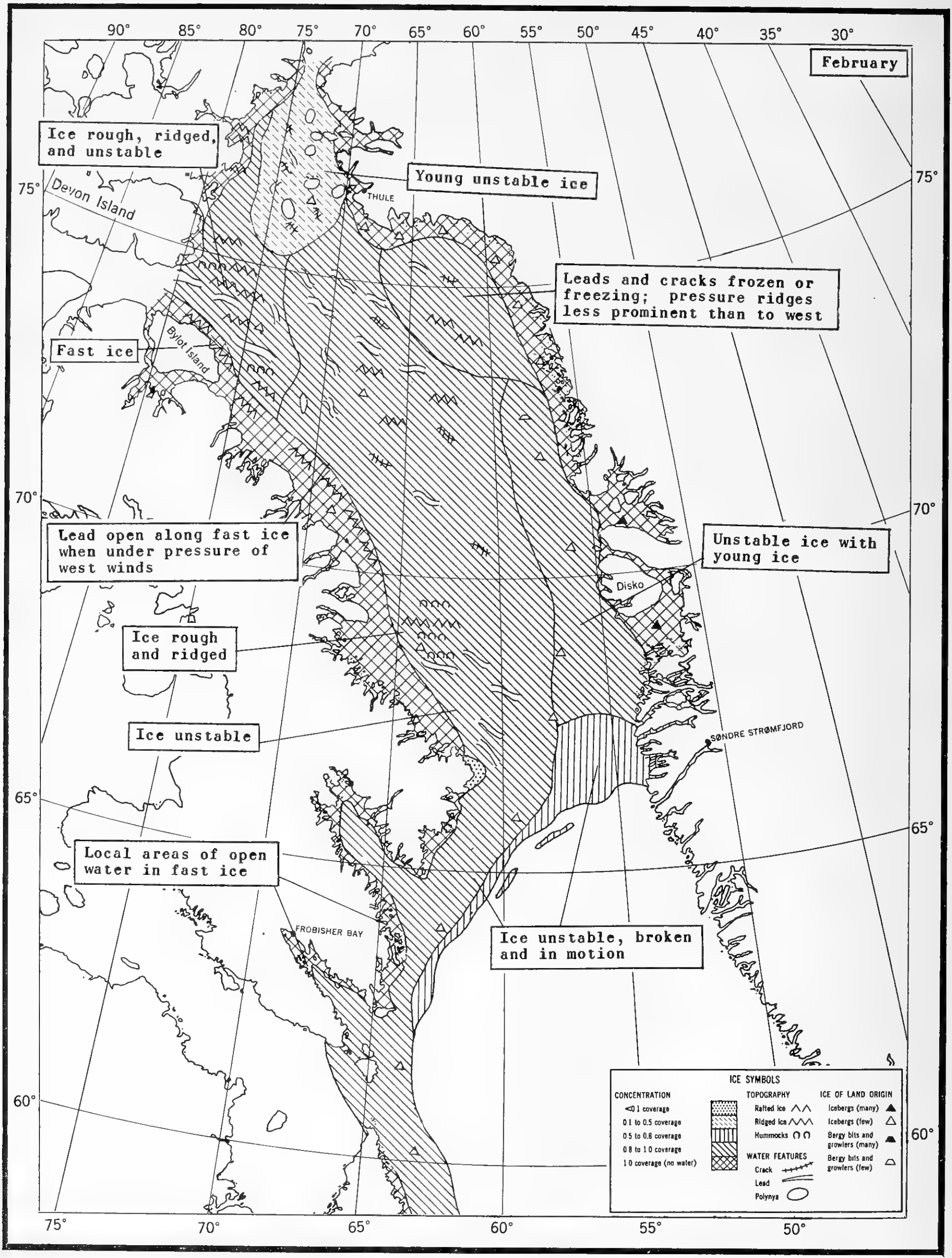
February
Ice rough, ridged, and unstable
Young unstable ice
THULE
Devon Island
Leads and cracks frozen or freezing; pressure ridges less prominent than to west
Fast ice
Bylot Island
Lead open along fast ice when under pressure of west winds
Unstable ice with young ice
Disko
Ice rough and ridged
Ice unstable
SØNDRE STRØMFJORD
Local areas of open water in fast ice
FROBISHER BAY
Ice unstable, broken and in motion
ICE SYMBOLS
CONCENTRATION
TOPOGRAPHY
ICE OF LAND ORIGIN
Rafted ice
Ridged ice
Hummocks
Icebergs (many)
Icebergs (few)
Bergy bits and growlers (many)
Bergy bits and growlers (few)
WATER FEATURES
Crack
Lead
Polynya

Figure 3

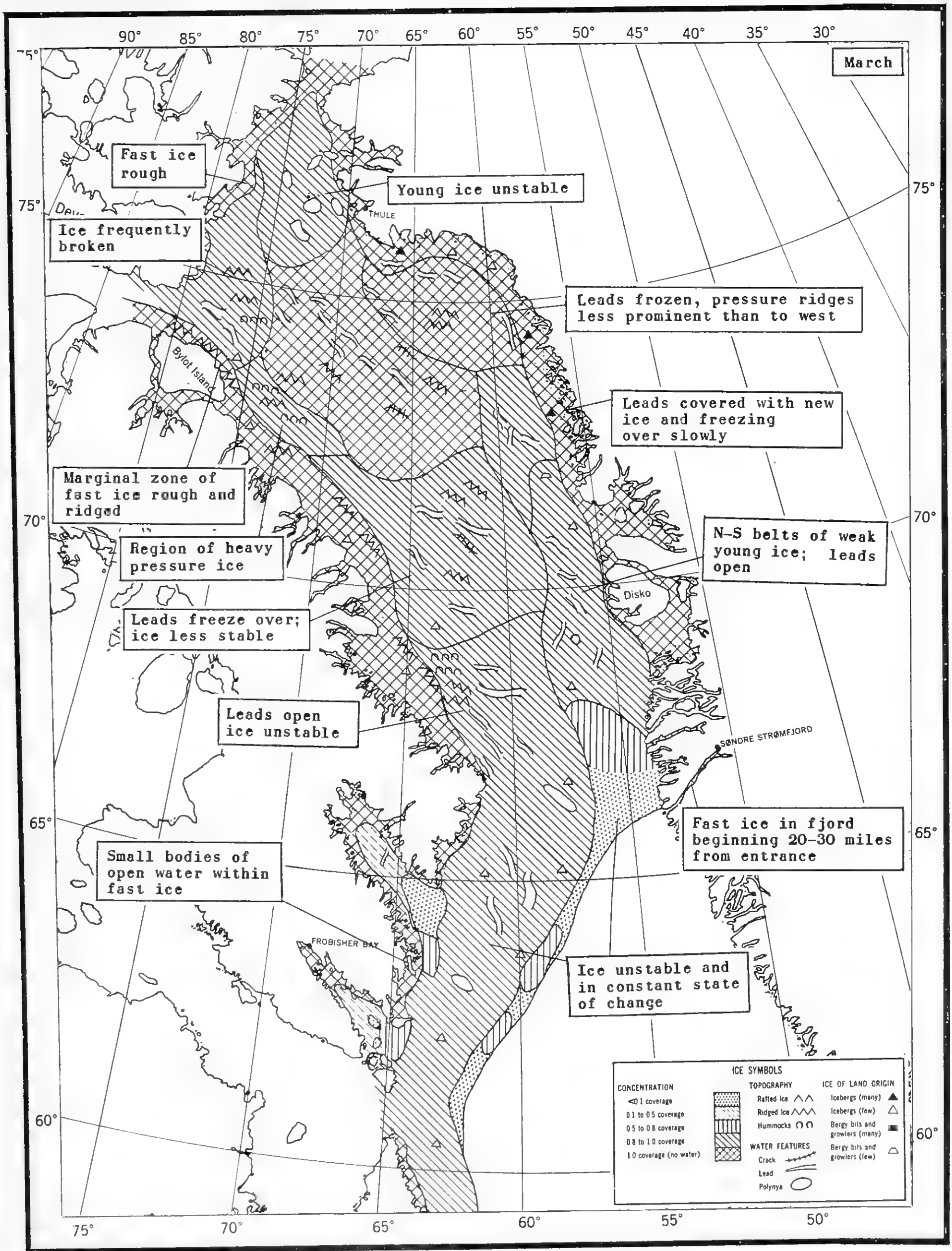
March
Fast ice rough
Young ice unstable
THULE
Ice frequently broken
Leads frozen, pressure ridges less prominent than to west
Bylot Island
Leads covered with new ice and freezing over slowly
Marginal zone of fast ice rough and ridged
Region of heavy pressure ice
N-S belts of weak young ice; leads open
Disko
Leads freeze over; ice less stable
Leads open ice unstable
SØNDRE STRØMFJORD
Fast ice in fjord beginning 20-30 miles from entrance
Small bodies of open water within fast ice
FROBISHER BAY
Ice unstable and in constant state of change
ICE SYMBOLS
CONCENTRATION
TOPOGRAPHY
Rafted ice
Ridged ice
Hummocks
WATER FEATURES
Crack
Lead
Polynya
ICE OF LAND ORIGIN
Icebergs (many)
Icebergs (few)
Bergy bits and growlers (many)
Bergy bits and growlers (few)

Figure 4

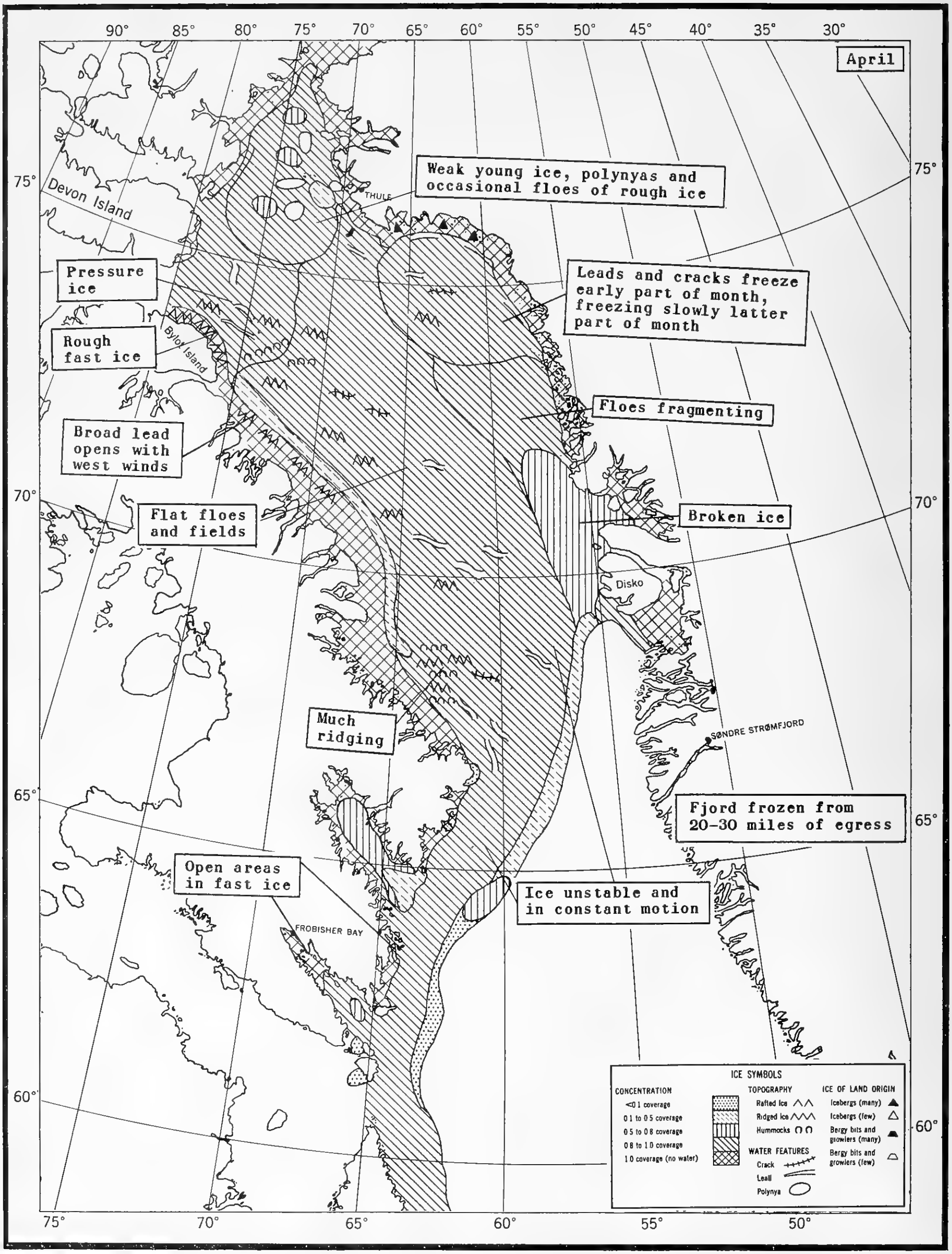
April
Weak young ice, polynyas and occasional floes of rough ice
THULE
Devon Island
Pressure ice
Leads and cracks freeze early part of month, freezing slowly latter part of month
Rough fast ice
Bylot Island
Floes fragmenting
Broad lead opens with west winds
Broken ice
Flat floes and fields
Disko
SØNDRE STRØMFJORD
Much ridging
Fjord frozen from 20-30 miles of egress
Open areas in fast ice
Ice unstable and in constant motion
FROBISHER BAY
ICE SYMBOLS
CONCENTRATION
<0.1 coverage
0.1 to 0.5 coverage
0.5 to 0.8 coverage
0.8 to 1.0 coverage
1.0 coverage (no water)
TOPOGRAPHY
Rafted ice
Ridged ice
Hummocks
WATER FEATURES
Crack
Lead
Polynya
ICE OF LAND ORIGIN
Icebergs (many)
Icebergs (few)
Bergy bits and growlers (many)
Bergy bits and growlers (few)

Figure 5

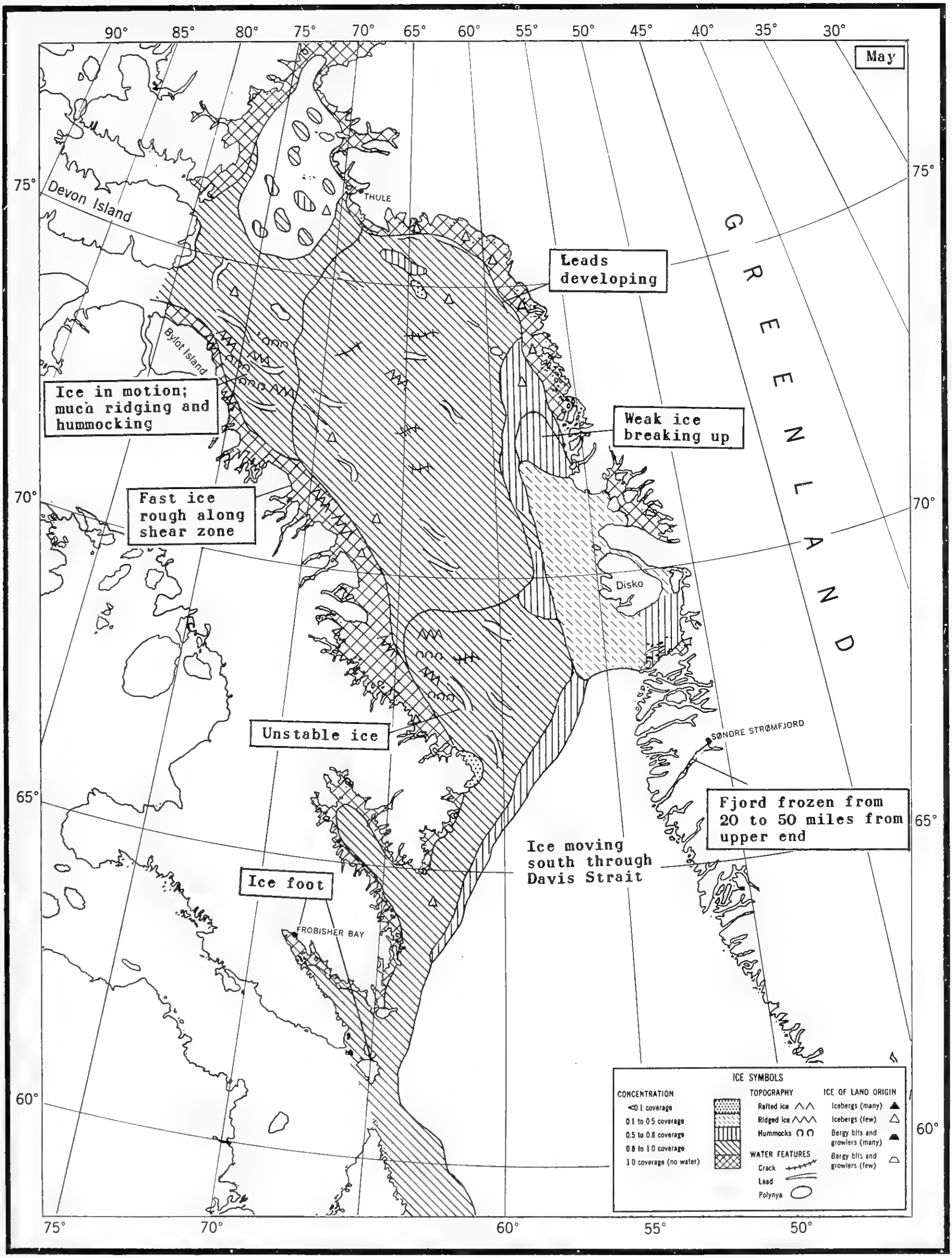
May
Devon Island
Bylot Island
THULE
GREENLAND
Disko
SØNDRE STRØMFJORD
FROBISHER BAY
Leads developing
Ice in motion; much ridging and hummocking
Weak ice breaking up
Fast ice rough along shear zone
Unstable ice
Fjord frozen from 20 to 50 miles from upper end
Ice moving south through Davis Strait
Ice foot
ICE SYMBOLS
CONCENTRATION
<0.1 coverage
0.1 to 0.5 coverage
0.5 to 0.8 coverage
0.8 to 1.0 coverage
1.0 coverage (no water)
TOPOGRAPHY
Rafted ice
Ridged ice
Hummocks
WATER FEATURES
Crack
Lead
Polynya
ICE OF LAND ORIGIN
Icebergs (many)
Icebergs (few)
Bergy bits and growlers (many)
Bergy bits and growlers (few)

Figure 6

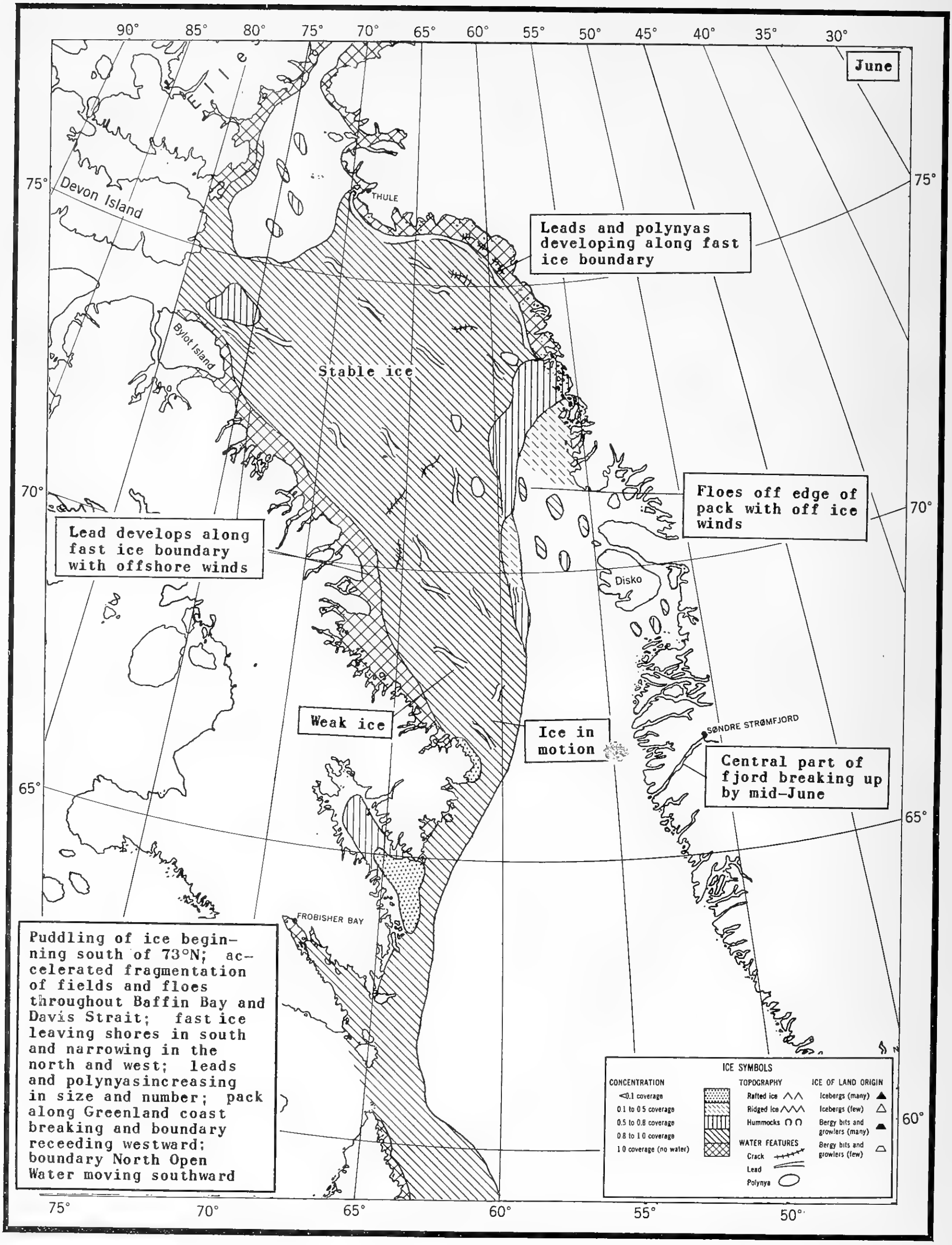
June
Devon Island
Bylot Island
THULE
Disko
SØNDRE STRØMFJORD
FROBISHER BAY
Leads and polynyas developing along fast ice boundary
Stable ice
Floes off edge of pack with off ice winds
Lead develops along fast ice boundary with offshore winds
Weak ice
Ice in motion
Central part of fjord breaking up by mid-June
Puddling of ice beginning south of 73°N; accelerated fragmentation of fields and floes throughout Baffin Bay and Davis Strait; fast ice leaving shores in south and narrowing in the north and west; leads and polynyas increasing in size and number; pack along Greenland coast breaking and boundary receeding westward; boundary North Open Water moving southward
ICE SYMBOLS
CONCENTRATION
TOPOGRAPHY
ICE OF LAND ORIGIN
Rafted ice
Ridged ice
Hummocks
Icebergs (many)
Icebergs (few)
Bergy bits and growlers (many)
Bergy bits and growlers (few)
WATER FEATURES
Crack
Lead
Polynya

Figure 7

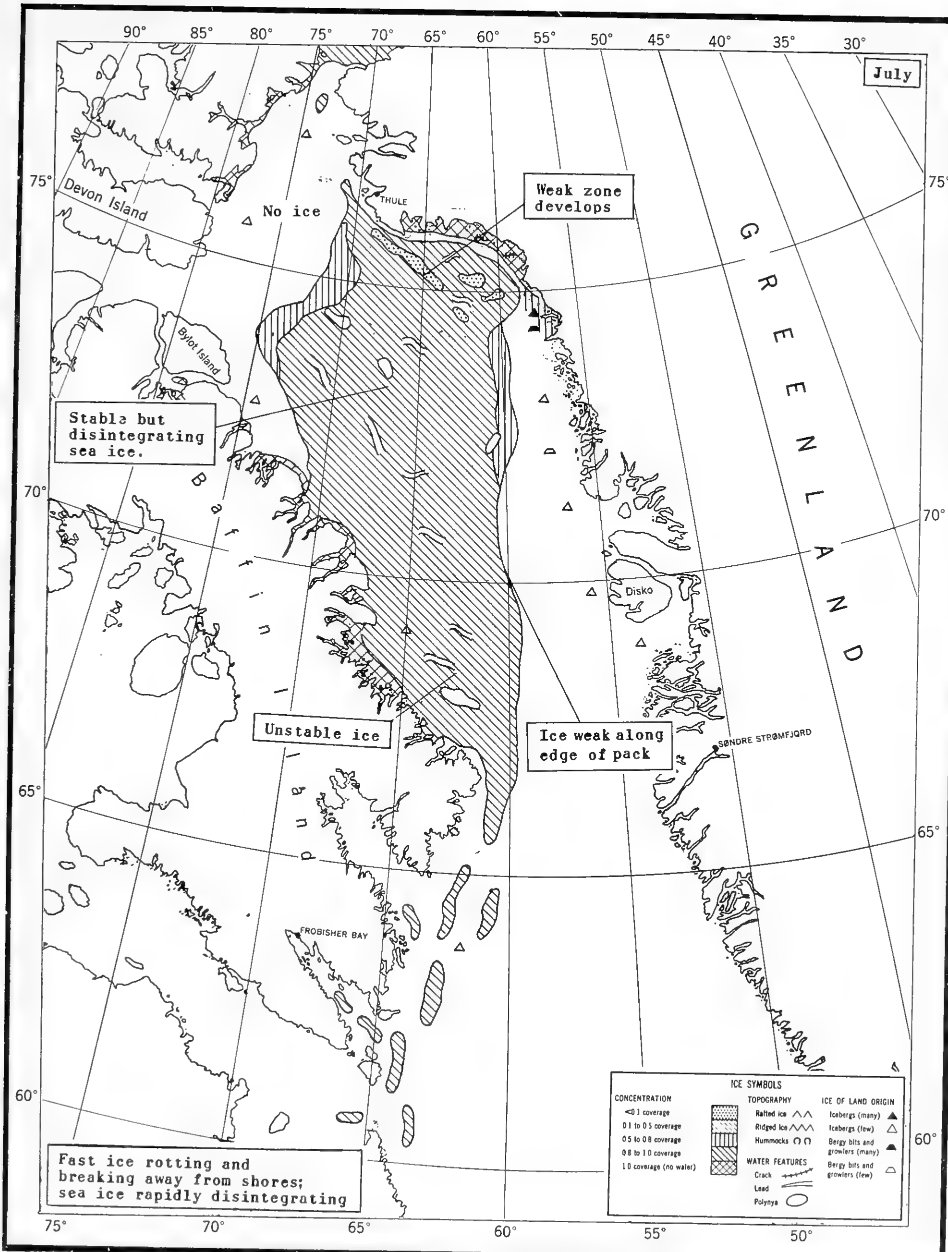
July
90°
85°
80°
75°
70°
65°
60°
55°
50°
45°
40°
35°
30°
75°
70°
65°
60°
Devon Island
Bylot Island
No ice
THULE
Weak zone develops
GREENLAND
Stabla but disintegrating sea ice.
Baffin Island
Disko
Unstable ice
Ice weak along edge of pack
SØNDRE STRØMFJORD
FROBISHER BAY
Fast ice rotting and breaking away from shores; sea ice rapidly disintegrating
ICE SYMBOLS
CONCENTRATION
<0.1 coverage
0.1 to 0.5 coverage
0.5 to 0.8 coverage
0.8 to 1.0 coverage
1.0 coverage (no water)
TOPOGRAPHY
Rafted ice
Ridged ice
Hummocks
WATER FEATURES
Crack
Lead
Polynya
ICE OF LAND ORIGIN
Icebergs (many)
Icebergs (few)
Bergy bits and growlers (many)
Bergy bits and growlers (few)
75°
70°
65°
60°
55°
50°

Figure 8

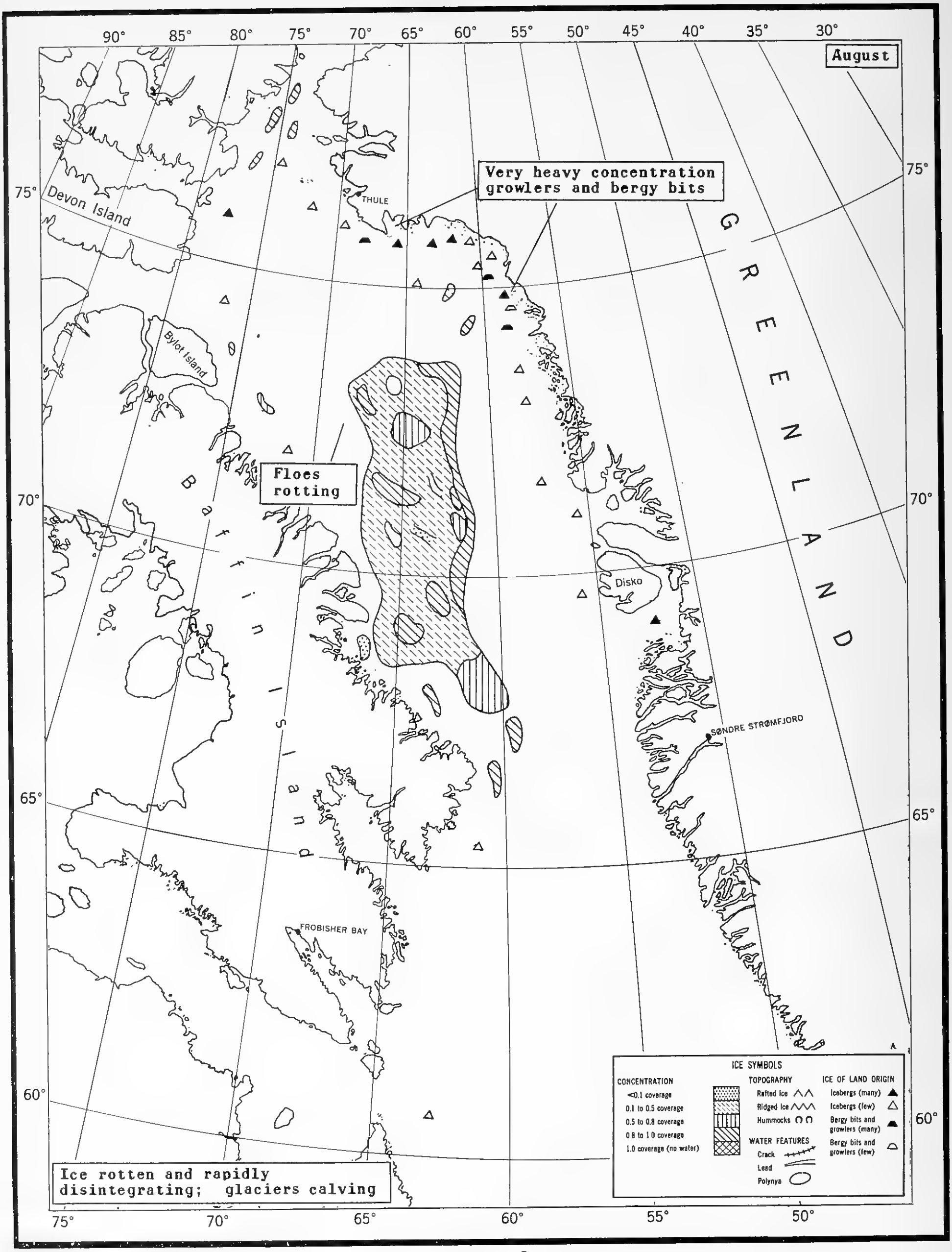
August
Very heavy concentration growlers and bergy bits
Floes rotting
Ice rotten and rapidly disintegrating; glaciers calving
Devon Island
Bylot Island
Baffin Island
GREENLAND
THULE
Disko
SØNDRE STRØMFJORD
FROBISHER BAY
ICE SYMBOLS
CONCENTRATION
<0.1 coverage
0.1 to 0.5 coverage
0.5 to 0.8 coverage
0.8 to 1.0 coverage
1.0 coverage (no water)
TOPOGRAPHY
Rafted Ice
Ridged Ice
Hummocks
WATER FEATURES
Crack
Lead
Polynya
ICE OF LAND ORIGIN
Icebergs (many)
Icebergs (few)
Bergy bits and growlers (many)
Bergy bits and growlers (few)

Figure 9

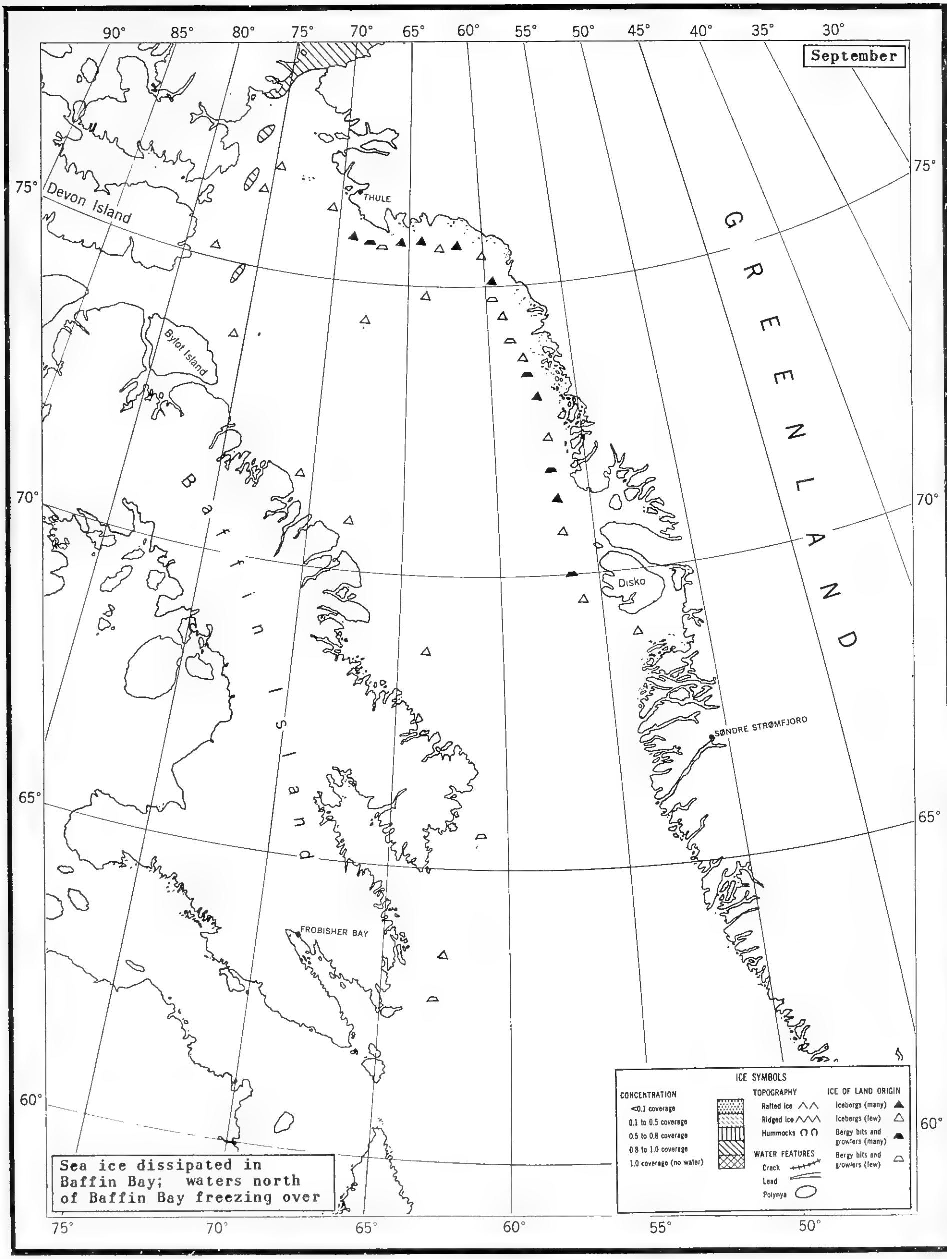
September
Devon Island
Bylot Island
Baffin Island
GREENLAND
THULE
Disko
SØNDRE STRØMFJORD
FROBISHER BAY
90° 85° 80° 75° 70° 65° 60° 55° 50° 45° 40° 35° 30°
75° 70° 65° 60°
75° 70° 65° 60° 55° 50°
ICE SYMBOLS
CONCENTRATION
<0.1 coverage
0.1 to 0.5 coverage
0.5 to 0.8 coverage
0.8 to 1.0 coverage
1.0 coverage (no water)
TOPOGRAPHY
Rafted ice
Ridged ice
Hummocks
WATER FEATURES
Crack
Lead
Polynya
ICE OF LAND ORIGIN
Icebergs (many)
Icebergs (few)
Bergy bits and growlers (many)
Bergy bits and growlers (few)
Sea ice dissipated in Baffin Bay; waters north of Baffin Bay freezing over

Figure 10

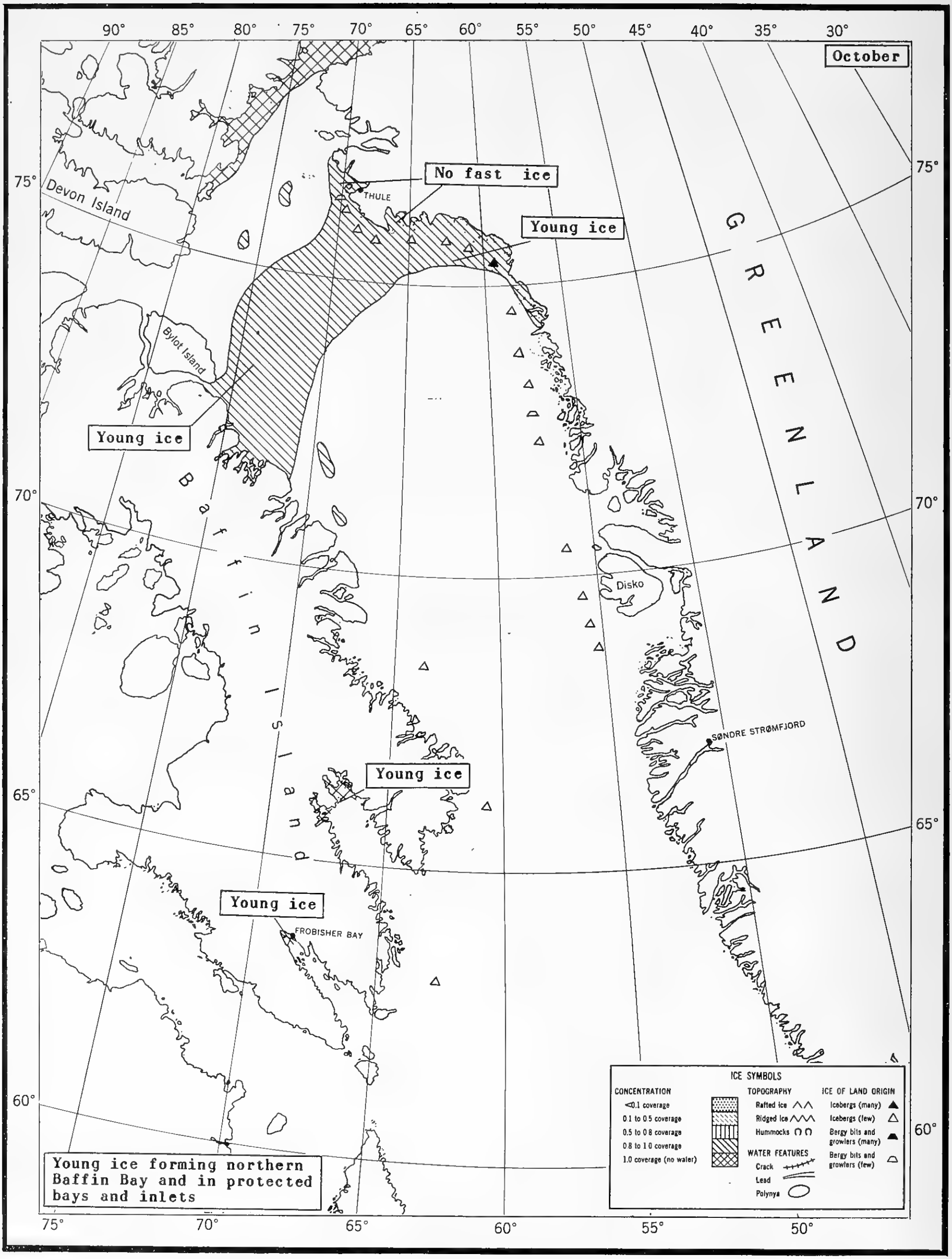
October
No fast ice
THULE
Young ice
Devon Island
GREENLAND
Bylot Island
Young ice
Baffin Island
Disko
SØNDRE STRØMFJORD
Young ice
Young ice
FROBISHER BAY
Young ice forming northern Baffin Bay and in protected bays and inlets
ICE SYMBOLS
CONCENTRATION
<0.1 coverage
0.1 to 0.5 coverage
0.5 to 0.8 coverage
0.8 to 1.0 coverage
1.0 coverage (no water)
TOPOGRAPHY
Rafted ice
Ridged ice
Hummocks
WATER FEATURES
Crack
Lead
Polynya
ICE OF LAND ORIGIN
Icebergs (many)
Icebergs (few)
Bergy bits and growlers (many)
Bergy bits and growlers (few)

Figure 11

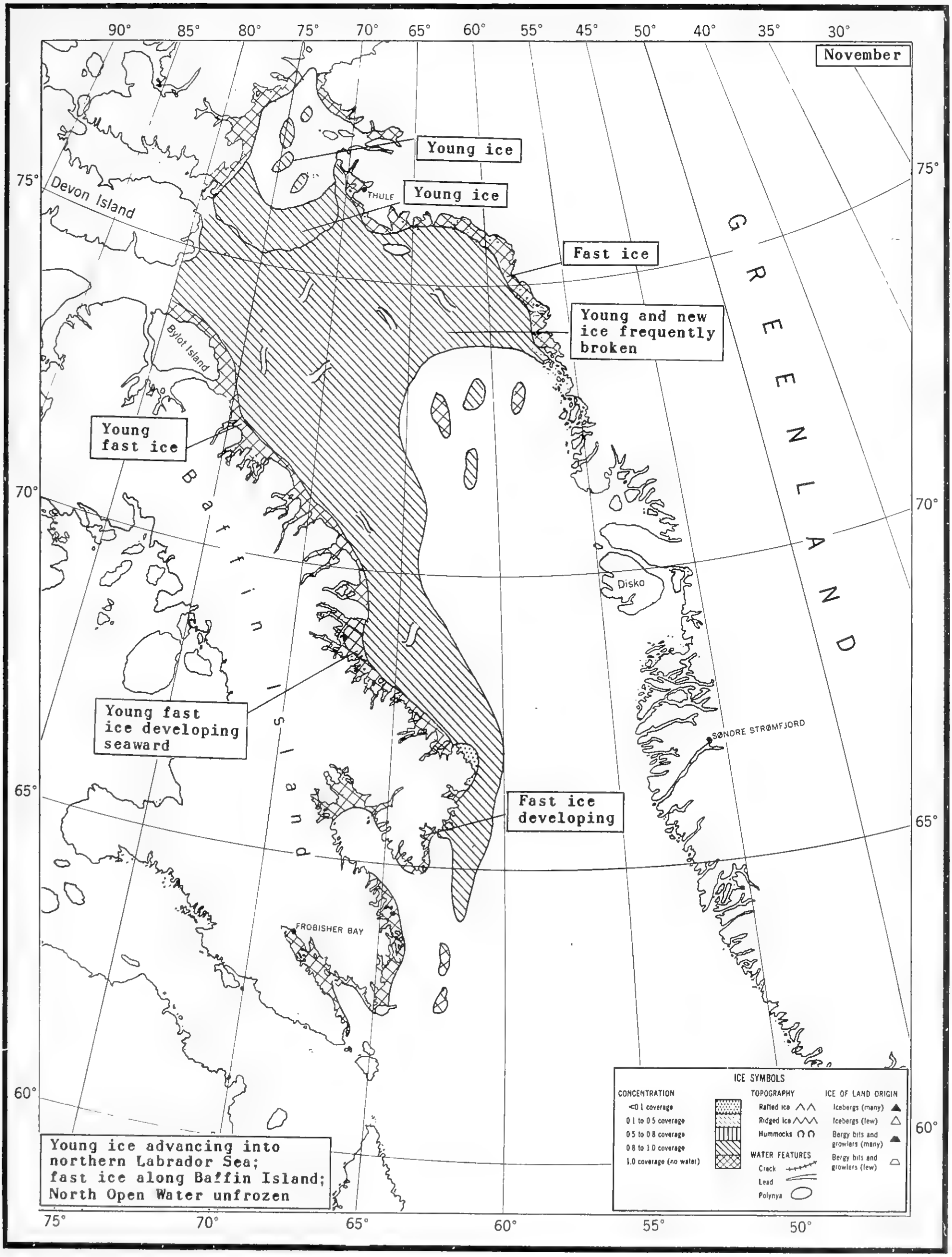
November
Young ice
Young ice
THULE
Devon Island
Fast ice
Young and new ice frequently broken
GREENLAND
Bylot Island
Young fast ice
Baffin Island
Disko
Young fast ice developing seaward
SØNDRE STRØMFJORD
Fast ice developing
FROBISHER BAY
ICE SYMBOLS
CONCENTRATION
TOPOGRAPHY
ICE OF LAND ORIGIN
Rafted ice
Ridged ice
Hummocks
Icebergs (many)
Icebergs (few)
Bergy bits and growlers (many)
Bergy bits and growlers (few)
WATER FEATURES
Crack
Lead
Polynya
Young ice advancing into northern Labrador Sea; fast ice along Baffin Island; North Open Water unfrozen

Figure 12

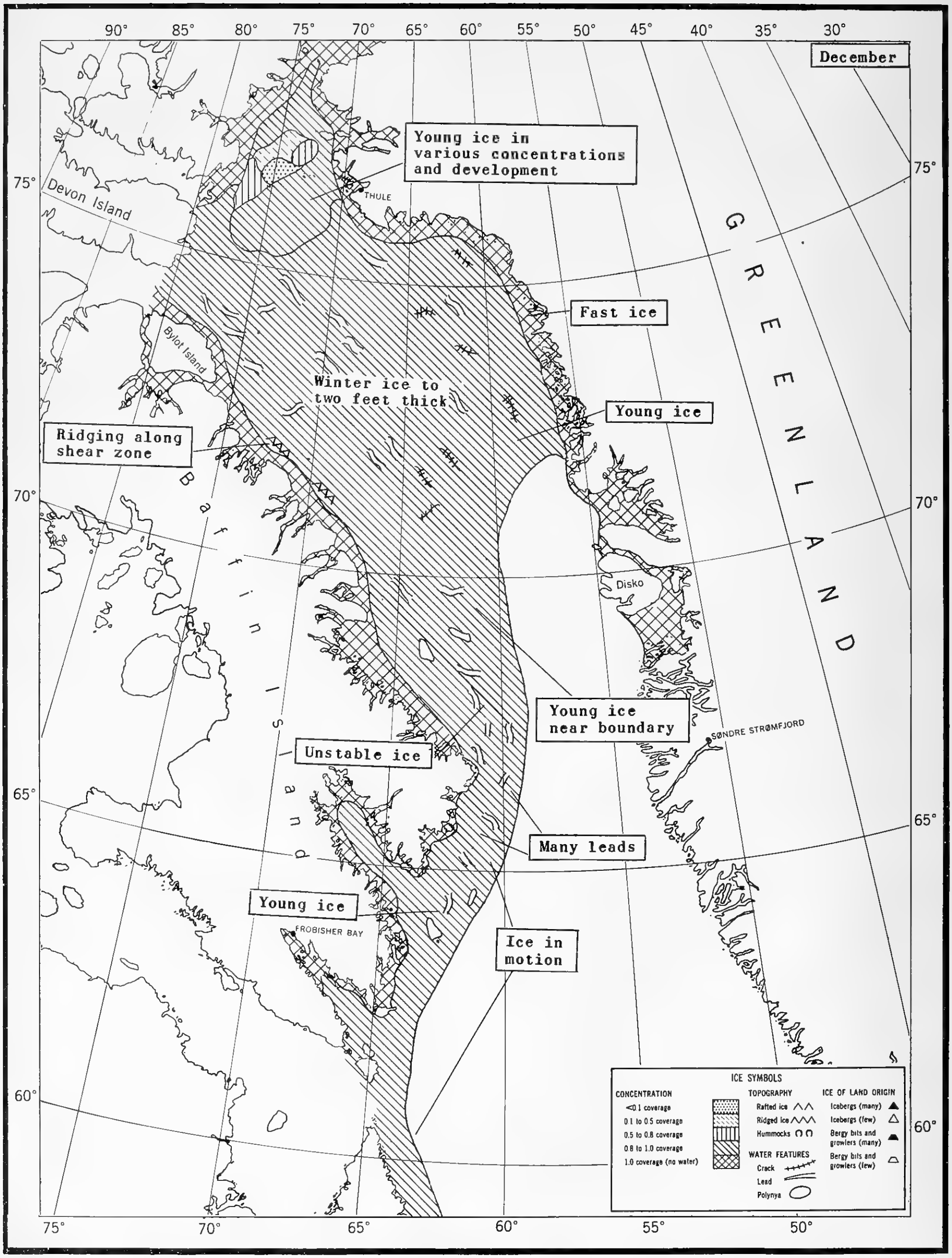
December
Young ice in various concentrations and development
THULE
Devon Island
GREENLAND
Fast ice
Bylot Island
Winter ice to two feet thick
Young ice
Ridging along shear zone
Baffin Island
Disko
Young ice near boundary
SØNDRE STRØMFJORD
Unstable ice
Many leads
Young ice
FROBISHER BAY
Ice in motion
ICE SYMBOLS
CONCENTRATION
<0.1 coverage
0.1 to 0.5 coverage
0.5 to 0.8 coverage
0.8 to 1.0 coverage
1.0 coverage (no water)
TOPOGRAPHY
Rafted ice
Ridged ice
Hummocks
WATER FEATURES
Crack
Lead
Polynya
ICE OF LAND ORIGIN
Icebergs (many)
Icebergs (few)
Bergy bits and growlers (many)
Bergy bits and growlers (few)

Figure 13

BAFFIN BAY
DAVIS STRAIT
GREENLAND
LABRADOR SEA
HUDSON STRAIT
Ellesmere Island
Baffin Island
Axel Heiberg Island
Devon Island
Lancaster Sound
Jones Sound
Kane Basin
Smith Sound
Thule
Etah
Upernavik
Disko
Godhavn
Disko Bugt
Egedesminde
Holsteinsborg
Søndre Strømfjord
Sukkertoppen
Godthaab
Frederikshaab
Ivigtut
Narsarssuak
Kap Farvel
Cumberland Peninsula
Cumberland Sound
Hall Peninsula
Frobisher Bay
Resolution Island
Cape Chidley
Ungava Bay
Prince Charles Island
Borden Peninsula
Bylot Island

Figure 14

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