Ice and Marine Shipping Assessment
Mary River Iron Ore Project
North Baffin Island Nunavut Final Report

1 Introduction

This report describes the ice data analysis completed by Enfotec for the marine operations component for the Mary River Iron Ore Project.

This present work considered four port options for the Mary' River Iron Ore development. The first port option is in the southern reaches of Milne Inlet accessible via northern Baffin Bay, Pond Inlet and Eclipse Sound. Other sites considered are at Nanisivik and at a site on the coast of Baffin Island more or less adjacent to the Mary River deposit. In many cases, the reference herein will be to North Baffin Sites where applicable commentary can encompass all three sites. The other port option is in Steensby Inlet accessible via Hudson Strait and the Foxe Basin. Figure 1 shows the routing options analysed for this study.

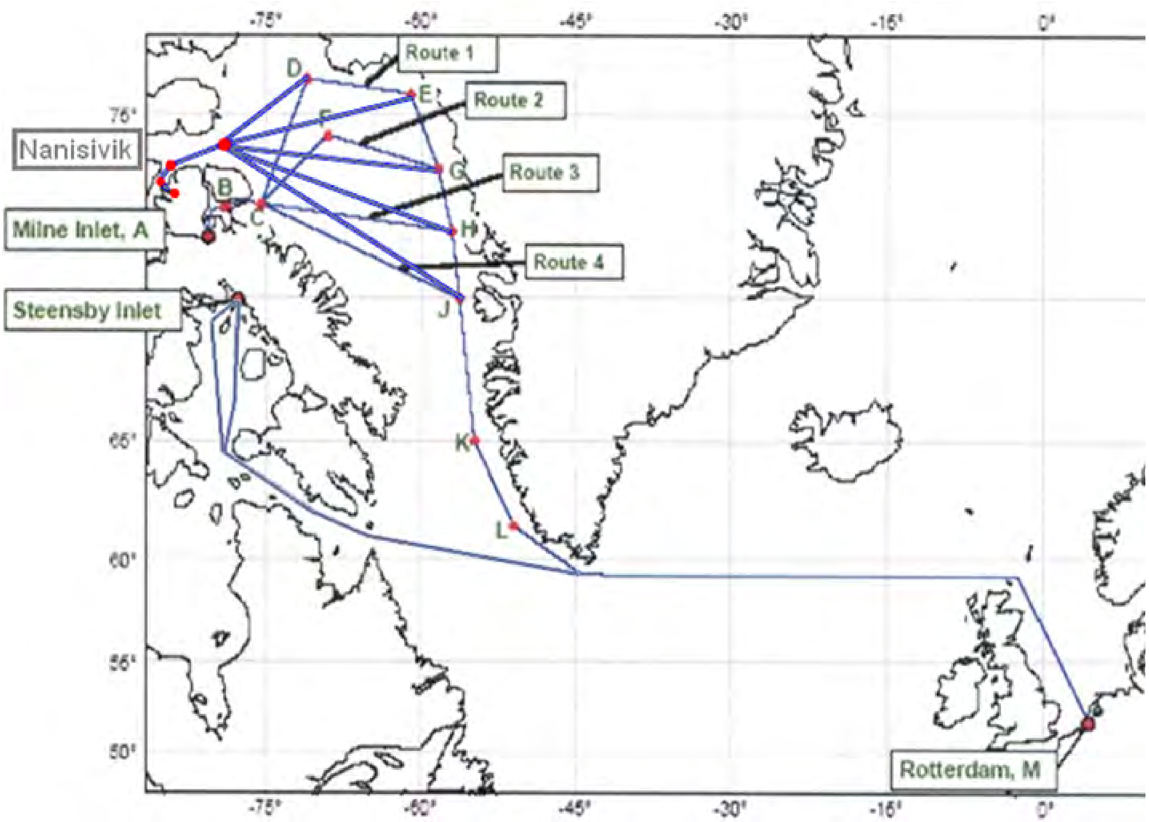

Figure 1: Routing Options to Mary's River Deposit

1.1 Objectives and Work Program

The objectives of the present work were to follow on previous work done on the Milne Inlet and Steensby site options and expanding options to assess the relative ease of navigation with additional options of Nansivik and a site on the East Coast of Baffin Island. A detailed analysis of the series of winter ice atlases of the region compiled by the Canadian Ice Service since 1990 was completed. These ice atlases are based on high resolution synthetic aperture radar (SAR) image from aircraft (1990 to 1995) and RADARSAT (from 1998 to 2010). The image data in the atlases allow for the delineation of areas of old ice concentration as well as ridged and pressured ice. In addition, shear zone locations show up well on the SAR imagery contained in the atlases. Enfotec augmented this analysis with satellite image data contained in the Company's image archive acquired from supporting shipping operations in this region since the early 1980's.

The output from this task is an image map showing the ice regime zones where ice of varying type and deformation exist along leading to the different port options. Specific features mapped were:

- Shear zones and areas of recurring ice pressure.
- Zones of old ice occurrence including range of concentrations (based on our interpretation of the images).
- First year ice thickness profile estimates within each zone with ranges.

The results of this work are provided in this report.

1.2 Results of the Image-based Review of Ice Conditions

The image-based review was completed separately for each of the Milne Inlet and Steensby routes. Each route is described separately below.

1.2.1 Access to Milne, Nanisivik and East Coast Baffin Island (collectively North Baffin Sites)

A detailed month-by-month analysis of the ice conditions leading to North Baffin sites has been done. A summary of the mid-winter ice conditions that occur along the shipping corridors to these sites is provided in Figure 2 below. The images used for Figure 2 are the RADARSAT Ice Atlas mosaic of the eastern Canadian Arctic from February 1, 1999 and February 1, 2004, produced by the Canadian Ice Service (CIS 1999) and are representative of the typical mid-winter ice conditions leading to the North Baffin Sites. A typical mid-winter ice chart is also included (Figure 3).

Seven ice regime zones of similar ice conditions have been defined by Enfotec based on the analysis of this study. These Zones are marked A to G on Figure 2.

Zone A – West Greenland Lead

Zone A marked on Figure 2 defines the ice conditions influenced by the West Greenland Current of south-eastern Baffin Bay. A relatively warm north-flowing current from the North Atlantic Ocean follows the west coast of Greenland northward to the Disko Island area of Greenland. This current maintains an open water and thin ice lead in this area of south-eastern Baffin Bay. This current reduces as it travels north gradually dispersing westward across Baffin Bay. This current causes the early clearing of ice in the spring and summer along the west coast of Greenland north of Disko Island. The currents of Baffin Bay play an important role in the distribution of ice in Baffin Bay and are shown here schematically in Figure 4.

In addition to sea ice, the West Greenland Current pattern is also responsible for distributing icebergs that calve primarily from Disko and Melville Bays of western Greenland across Baffin Bay. Figure 5 is a landmark analysis done by the US Coast Guard ice patrol in 1949. The US Coast Guard undertook an intense aerial survey of Baffin Bay in August of 1949 counting every iceberg. The concentration of icebergs coming out of the Disko Bay – Upernavik area and Melville Bay areas clearly shows the pattern of iceberg dispersal across Baffin Bay. **It should be noted that the occurrence of icebergs does not restrict shipping in a shipping channel. Icebergs form point targets that require special operating procedures to avoid but do not limit access.**

Zone B – East Baffin Bay Level First Year Ice

Area B as defined in Figure 2 occupies the eastern portion of Baffin Bay and defines an area of relatively level thick first year ice in giant floes sizes in the mid to late winter period. The relatively light and diverging ocean currents in this part of Baffin Bay produces little pressure or ridging on the ice cover over the winter period. First year ice thicknesses well in excess of 2.0 metres can be encountered in the fast ice area of Melville Bay at the extreme northern end of this regime by the end of the winter period. Throughout most of this regime ice thickness of 1.2 to 1.4 metres are more typical by the end of the winter.

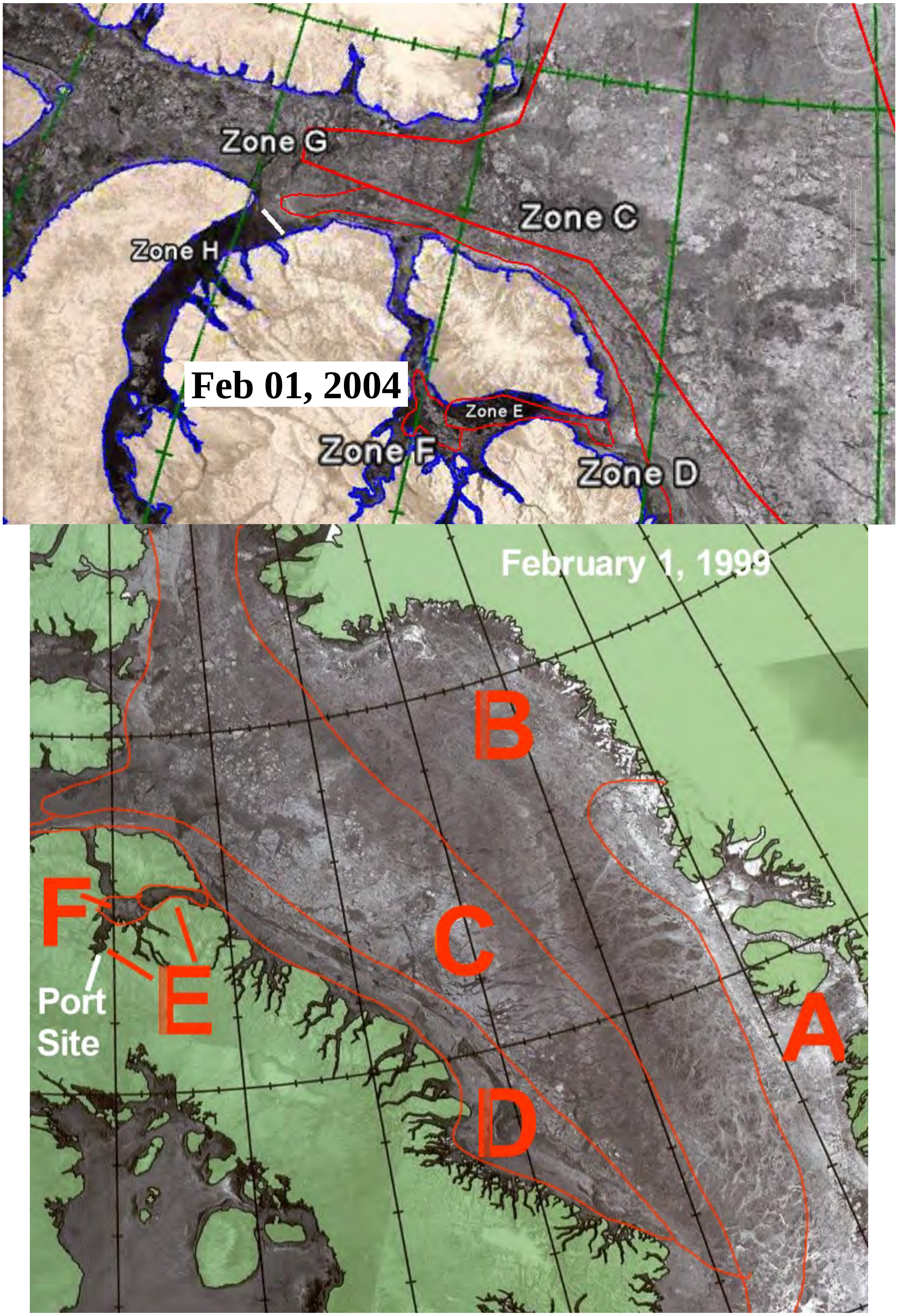

Figure 2: Ice Zones in the shipping channels leading to North Baffin Sites.

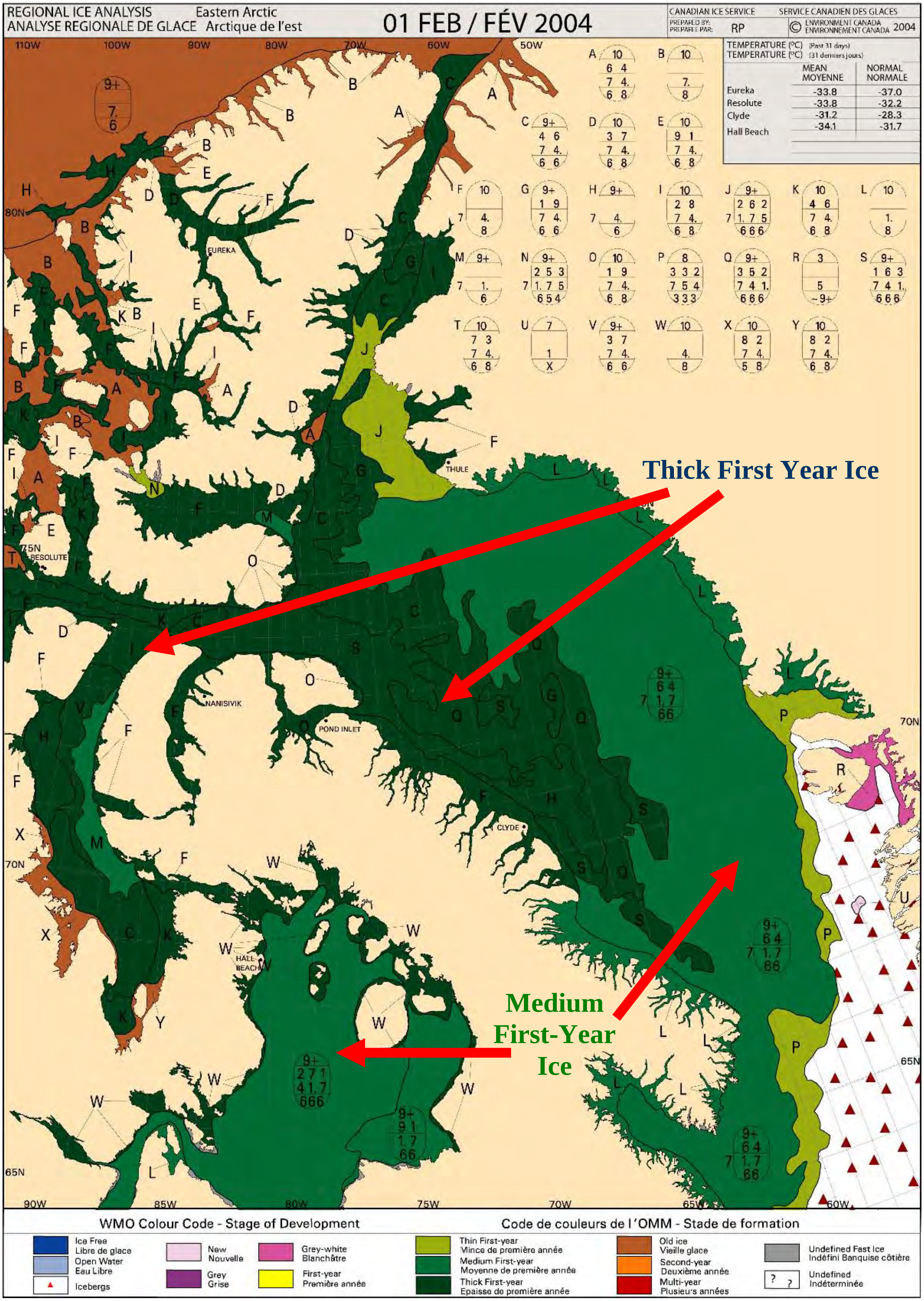

Figure 3: Typical Ice Condition during mid-winter time in North Baffin Sites. Dark Green shows the extensive area of Thick First Year Ice in access to North Baffin Sites while Mild Green shows the area of Medium First Year Ice in Steensby Inlet access.

Zone C – Central and Western Baffin Bay Deformed First Year and Old Ice Field

The most difficult ice regime for shipping in the eastern Canadian Arctic occurs in central and western Baffin Bay in the winter period, as defined by Zone C on Figure 2. Old polar ice from the Arctic Ocean drifts south through Nares Strait between Greenland and Ellesmere Island each summer. As the summer melt season wanes in late September this old ice advances into northern Baffin Bay and crossing the eastern entrance to Lancaster Sound by late October and is joined by old ice drifting eastward from the Queen Elizabeth Islands through Lancaster Sound. This southward advance continues through the central and western portions of Baffin Bay as the old ice is carried by the south-flowing Canadian Current found along the western side of Baffin Bay (see Figure 4). The southward advance of old ice reaches Cape Dyer by mid-February and the eastern entrance to Hudson Strait in Davis Strait by mid-March. It was the pressured old ice field in this zone that forced the MV Arctic to abandon early winter voyages to the Polaris and Nanisivik mines in December of 1986 and 1989 (Gorman 1987, 1990).

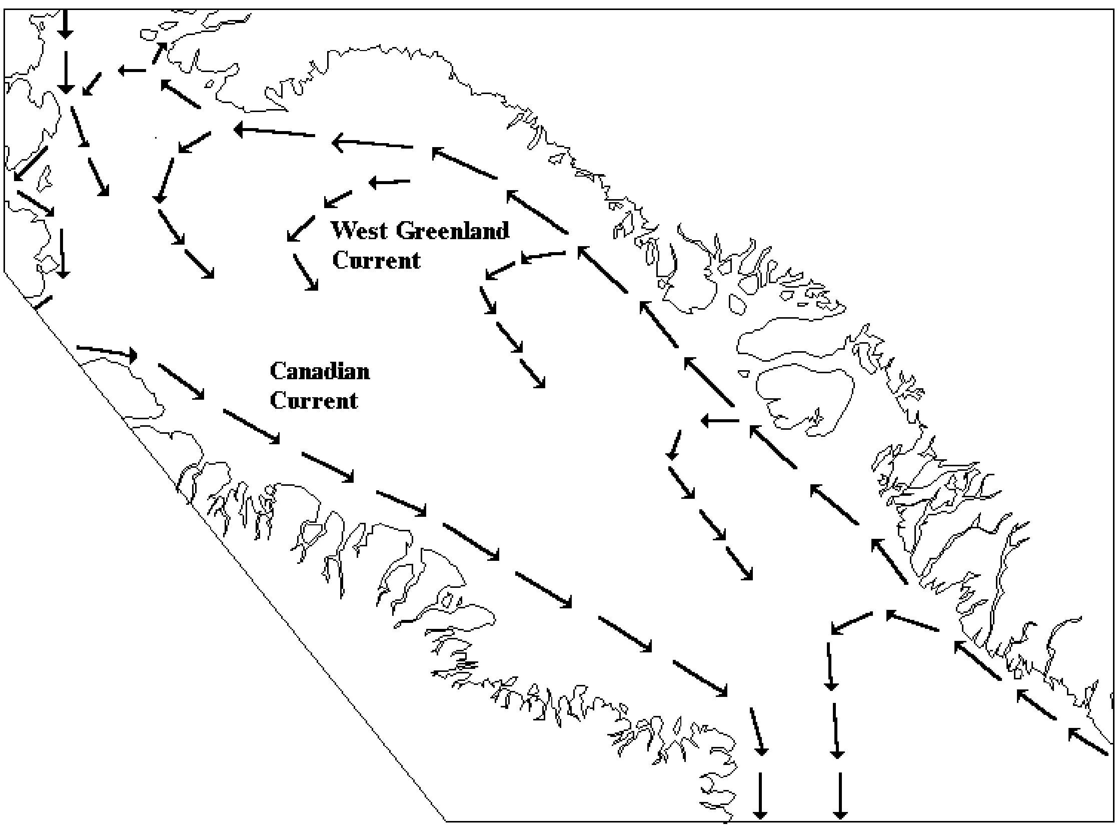

Figure 4: Currents of Baffin Bay

The old ice concentrations typically occur in the 4/10 to 7/10 range in Zone C during the winter months. This old ice field creates a zone of ice pressure and ridging in the developing first year ice field around it, as evident on the RADARSAT image of Figure 2. The reason for this are two fold. Firstly, the greater thickness of the old ice (and some of these floes exceed 5 metres in thickness as they are sourced from the area of the Arctic Ocean with the oldest and thickest multi-year ice floes) cause the floes to move at a slightly different rate in response to winds and current than do the thinner first year ice floes around them. Secondly, the track of mid-winter storms into Baffin Bay in winter tend to bring north-easterly winds that cause heavier ridging on the central and western side of Baffin Bay.

The flow of old ice through Nares Strait stops with the formation of shore-fast ice in Smith Sound at the southern exit of Nares Strait, usually by mid-February. As the remainder of the winter progresses the old ice field gradually drifts southward. However, old ice is always found in central Baffin Bay in winter and spring.

Zone D – East Baffin Shear Zone

A prominent feature of the ice regime of Baffin Bay in the winter and spring is a shear zone of ice along the east coast of Baffin Island as delineated as Zone D on Figure 2. Each fall shore fast ice forms along the coastline of Baffin Island. In the region along the north and east coast of Baffin Island as well as Bylot Island, a shear develops between the mobile ice of Lancaster Sound and Baffin Bay and the shore fast ice. Under stormy conditions, particularly when winter low pressure cells bring north-east winds into Baffin Bay, the mobile pack ice is driven against the shore fast zone and gets “sheared” by the Canadian Current as the mobile ice is carried southward. This creates a large shear ridge at the boundary of the fast ice zone that can accumulate to over 20 metres in thickness. This zone is also an area of very high ice pressure when stormy conditions exist.

Fortunately, there is a break in the shearing process at the eastern entrance to Pond Inlet as diverging currents limit the formation of a shear ridge. However, there is still an offshore pressure zone in this area.

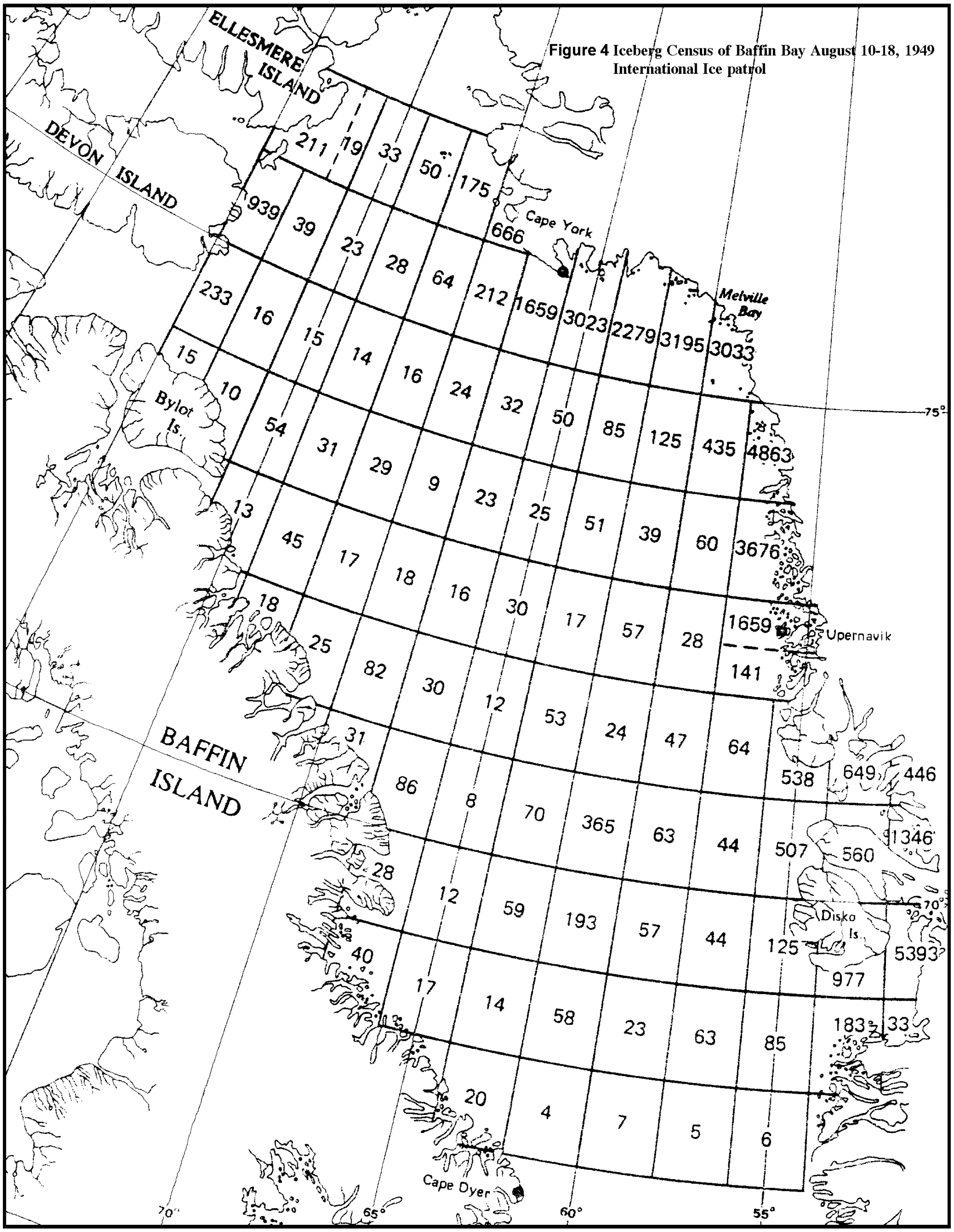

Figure 5: Iceberg Census of Baffin Bay, August 10-18, 1949. International Ice Patrol.

Zone E – Level Fast Ice of Pond and Milne Inlets

Relatively level fast ice forms each fall in the channels of Pond and Milne Inlets. This ice achieves an average thickness of 1.6 metres with extremes approaching 2.0 metres. The

Canadian Ice Service ran an ice thickness measurement station at Pond Inlet for a number of years. Data from this station provides an accurate measurement of the level ice and snow thickness for this ice regime. Data for the monthly analysis in the 1990's presented in Attachment B used the weekly data from the CIS records.

Figure 6 is the average ice thickness curve for Pond Inlet as calculated by the Canada Ice Service ice thickness data. There is a total of 125 nautical miles of shore fast ice leading to the Milne Inlet port site.

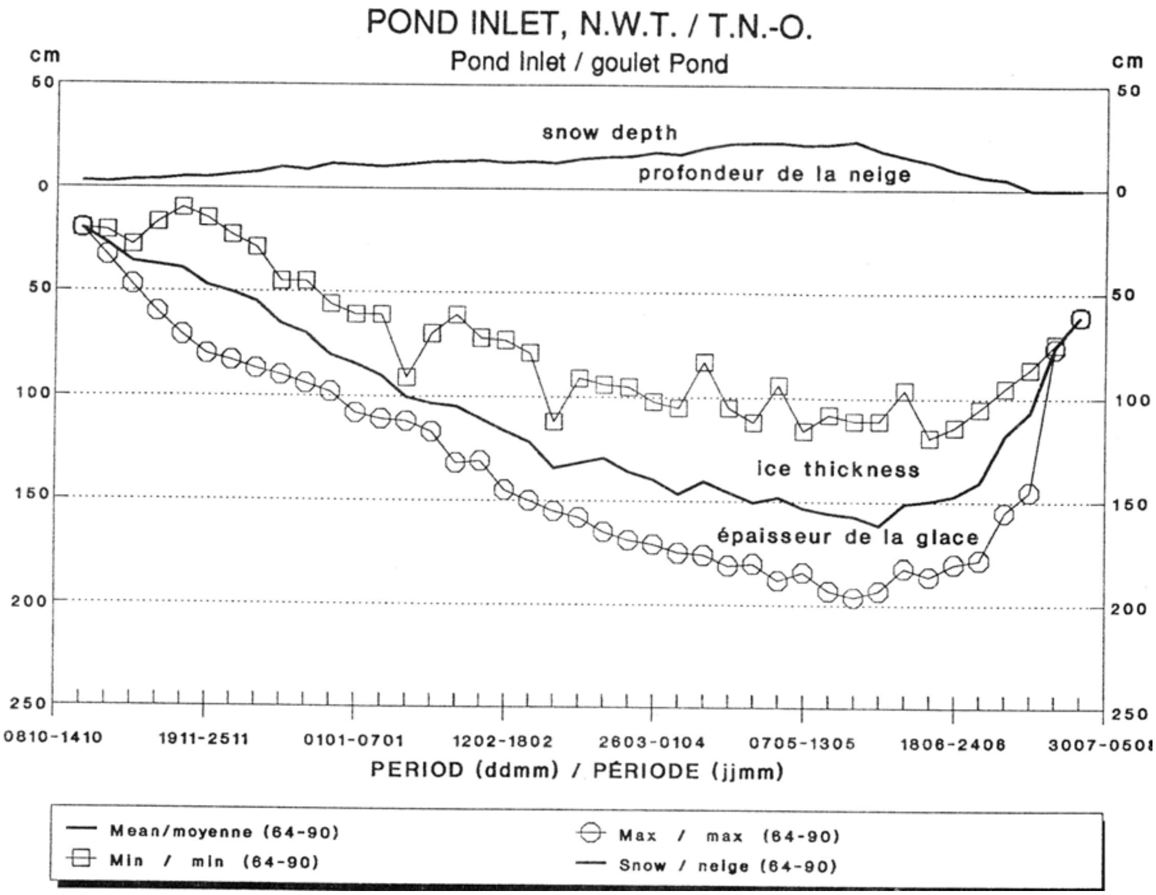

Figure 6: Ice Thickness data from Pond Inlet (IC 1992).

Zone F – Fast Ice of Eclipse Sound

The fast ice of Eclipse Sound (Zone F) takes on a different character than that found in Pond and Milne Inlets. Although the fast ice achieves a similar thickness, the fact that Eclipse Sound is exposed to Navy Board Inlet to the north means that the ice cover is susceptible to more ridging during formation due to the greater fetch in the sound. In addition, quantities of old ice frequently drift south from Lancaster Sound through Navy Board Inlet into Eclipse Sound during freeze-up often leaving 3/10 to 6/10 concentrations of old ice in the winter fast ice of the sound. The quantity of old ice each winter is highly variable from none in some years to high concentrations in others. An additional factor is the frequent transit of the fast ice in Eclipse Sound will require the selection of additional paths as the track builds up ice rubble in the winter. The choice of alternate routes could be problematic when high old ice concentrations occur in the fast ice in Eclipse Sound.

Zone G – Lancaster Sound

The conditions within Lancaster Sound will be very dynamic. In mid-winter pressure ridges will form in several locations and will be influenced by the pressure in Zone C. Although technically mobile, the ice in the region will effectively consolidate and loosen several times throughout the winter.

Zone H – Admiralty Inlet

The final 50 miles of the journey will be through Admiralty Inlet and area of relatively consistent shorefast ice the thickness of which will rarely exceed two metres. Figure 7 is the average ice thickness curve for Arctic Bay as calculated by the Canada Ice Service ice thickness data.

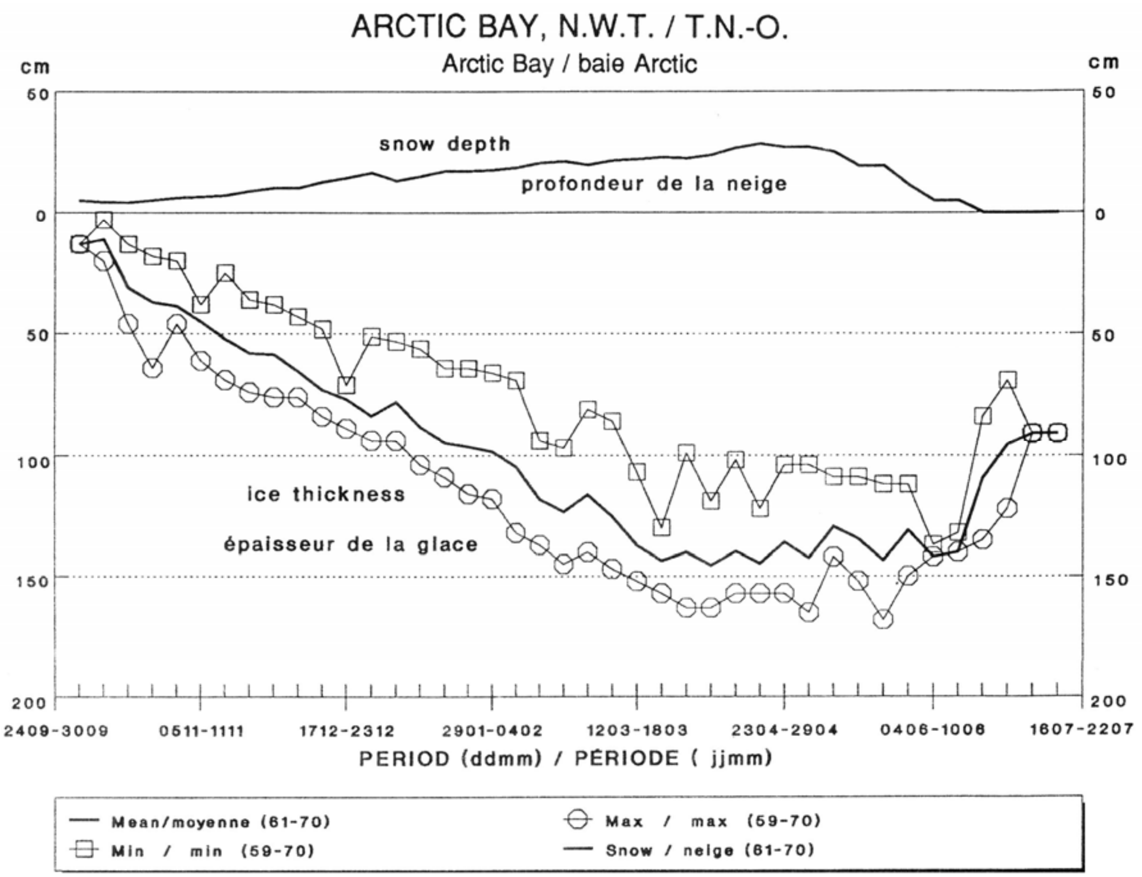

Figure 7: Ice Thickness data from Arctic Bay (IC 1992).

1.2.1.1 Ice Season along the Shipping Routes to North Baffin Sites

The first signs of the spring break-up in the region occur in April as the West Greenland Lead and North Water Polynya expand, as illustrated in Figure 8.

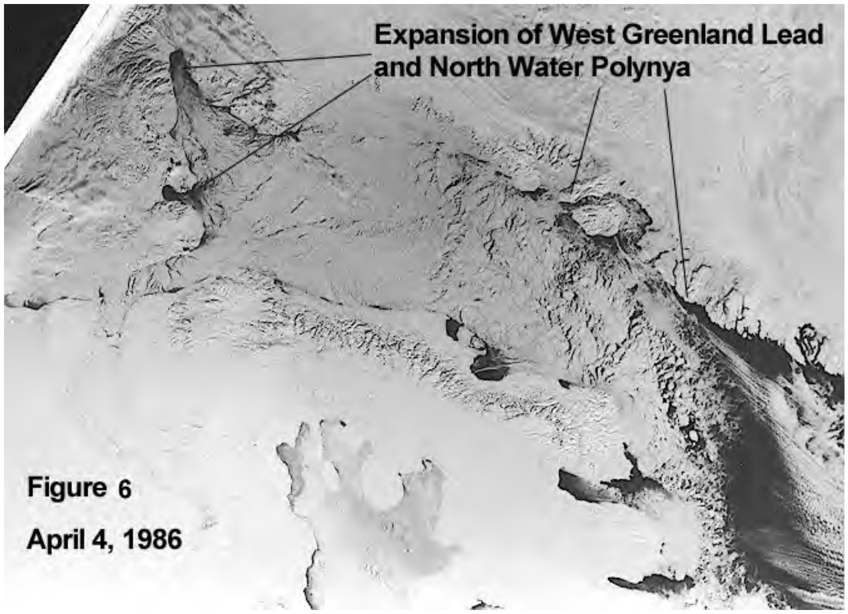

Figure 8: NOAA Satellite Image April 4, 1986

The expansion of the leads continues through May to August as the ice cover of Baffin Bay reduces, as illustrated in Figure 9.

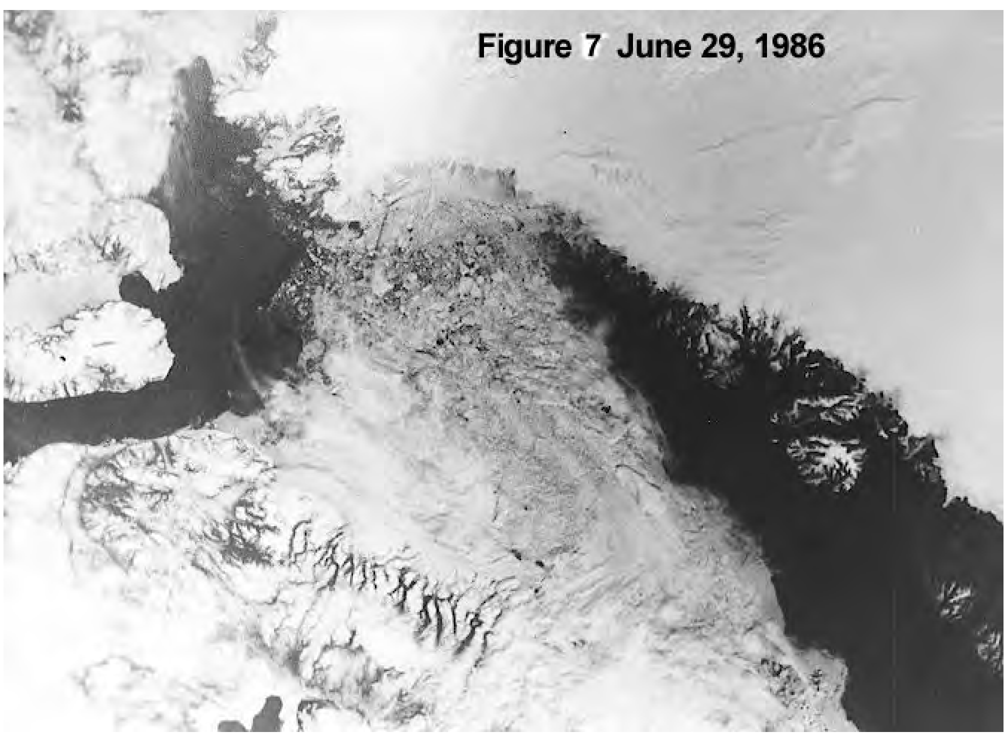

Figure 9: NOAA Satellite Image June 29, 1986

The melting of the fast ice in Milne Inlet occurs in late June with the fracture and clearing of Eclipse Sound and Pond Inlet occurring during the month of July as illustrated in Figure 10 and Figure 11. Note the clearing of Lancaster Sound is well underway, while Pond Inlet and Admiralty Inlet remain fast. Remnants of the Baffin pack remain firmly in place on the Baffin coast.

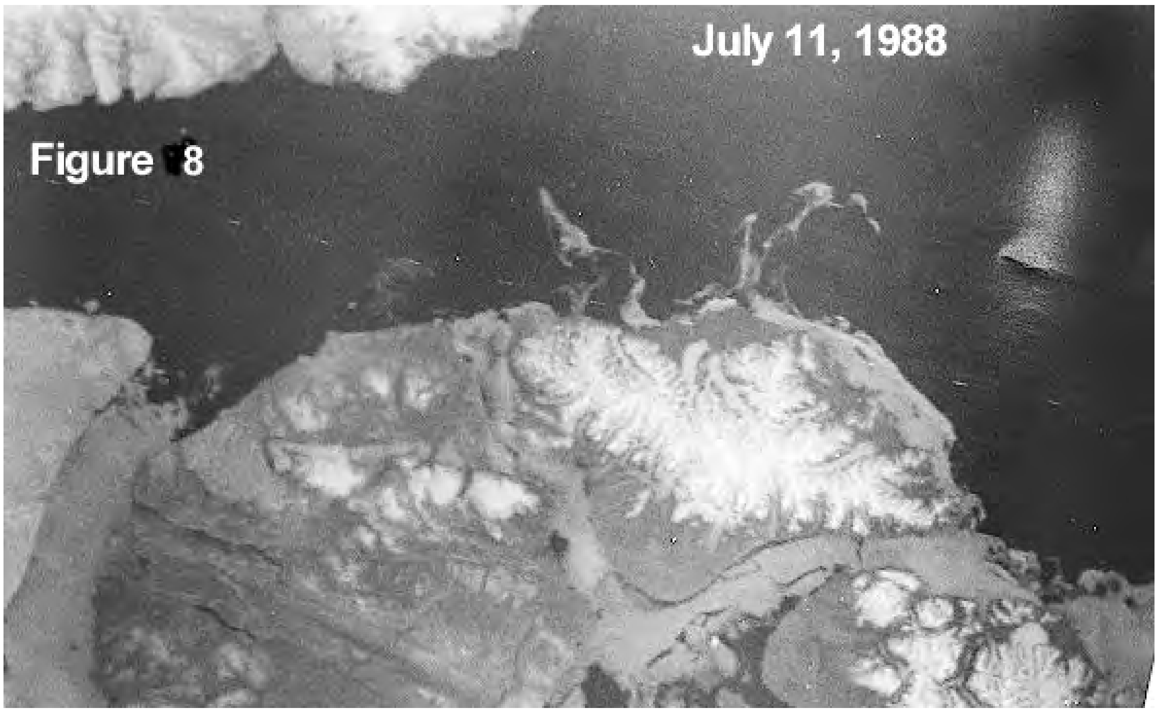

Figure 10: NOAA Satellite Image July 11, 1988

Figure 11: NOAA Satellite Image July 22, 1988. Pond Inlet clearing well, but Admiralty Inlet remains consolidated

However, a cool summer may delay the fracture of the fast ice in Eclipse Sound into mid-August as illustrated in Figure 12 below.

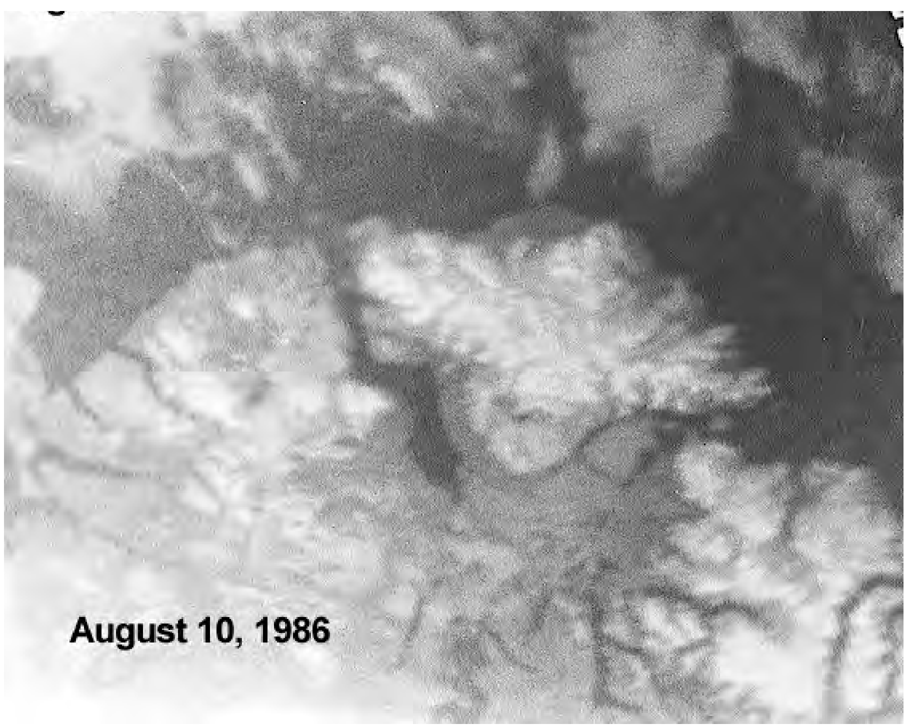

Figure 12: NOAA Satellite Image August 10, 1986

Freeze-up occurs rapidly in the access channels to Milne Inlet in early October as new/young ice spreads south-eastward from Lancaster Sound and northern Baffin Bay. Of particular note is the advance of Arctic Ocean old ice from Nares Strait into northern Baffin Bay across the entrance to Lancaster Sound affecting traffic to potential port site in Nanisivik. This old ice covers the eastern entrance to Pond Inlet by early November. The advance of freeze-up (and the old ice from Nares Strait) is illustrated in Figure 13 below.

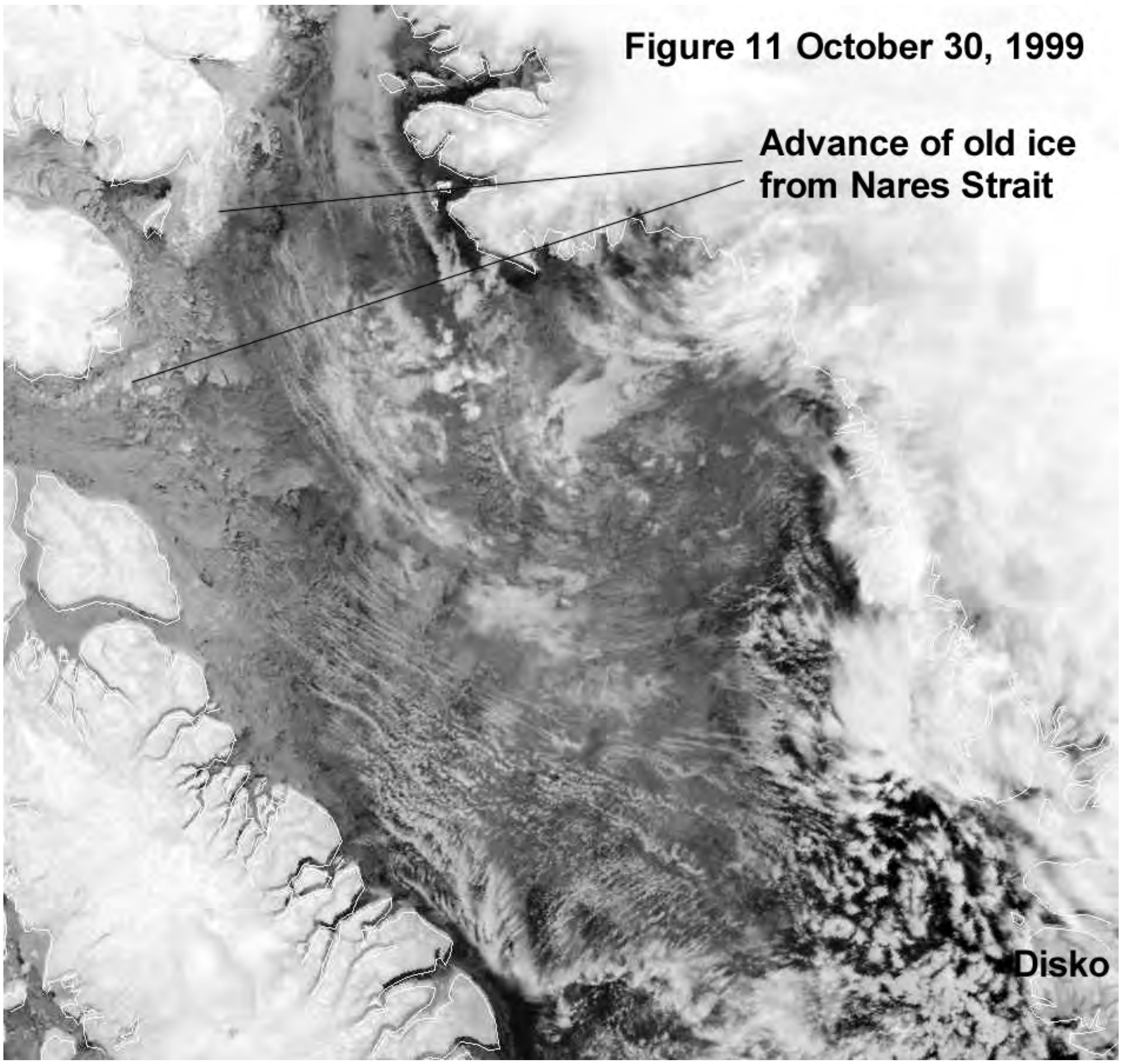

Figure 13: NOAA Satellite Image October 30, 1999

The development of the typical winter conditions for the access to Milne Inlet as shown in Figure 2 above occurs by early December. Though the conditions across Lancaster Sound appear to be looser, embedded in that ice will be old ice. Likewise pressure ridges can begin to form along the Baffin Coast at this time.

1.2.2 Steensby Inlet Access

The tabulation of monthly ice statistics for the route to Steensby Inlet used a list of waypoints following the nominal route into the Inlet as defined by Enfotec and are shown in Figure 14. This represents a new routing analysis to Steensby Inlet.

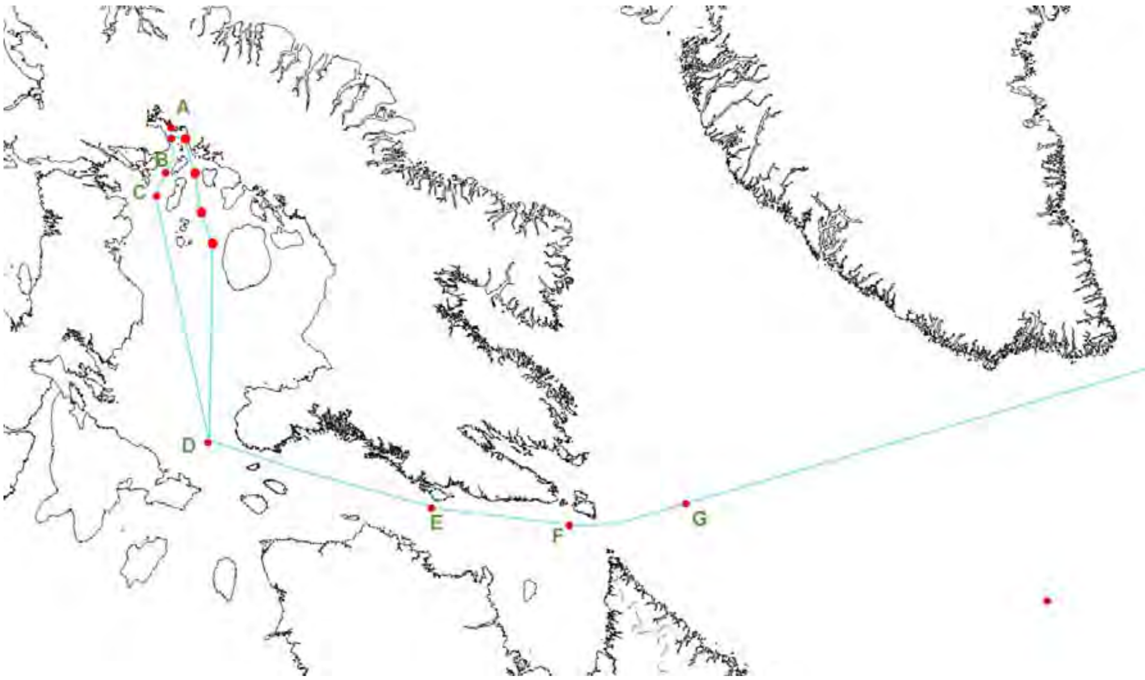

Figure 14: Route waypoints used for the Steensby Routing Analysis

The results of the detailed month-by-month analysis of the ice conditions leading to Steensby Inlet are provided in Attachment C. A summary of the mid-winter ice conditions that occur along the shipping corridors to Steensby Inlet is provided in Figure 15 below. The image used for Figure 15 is the RADARSAT Ice Atlas mosaic of the eastern Canadian Arctic from February 1, 1999, produced by the Canadian Ice Service (CIS 1999) and is representative of the typical mid-winter ice conditions leading to Steensby Inlet. A typical ice chart of the mid-winter condition of Hudson Strait is also shown in Figure 16.

Five ice regime zones of similar ice conditions have been defined by Enfotec based on the analysis of this study. These Zones are marked A to E on Figure 15.

<u>Zone A – Labrador Sea</u>

Zone A covers the eastern entrance to Hudson Strait in the Labrador Sea. The ice of this zone is a composite of the following source areas for sea ice:

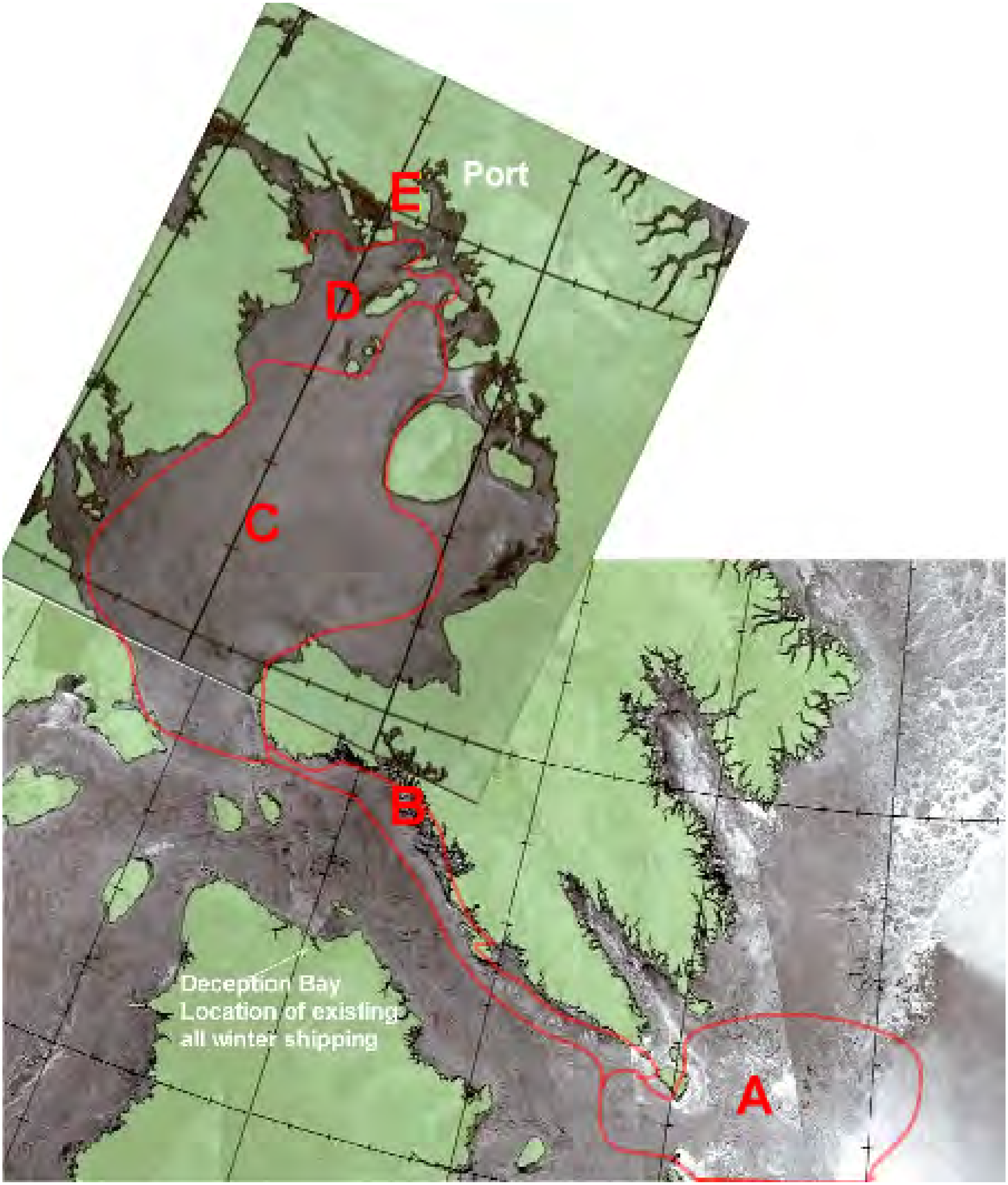

Figure 15: Ice Zones in the shipping channels leading to Steensby Inlet

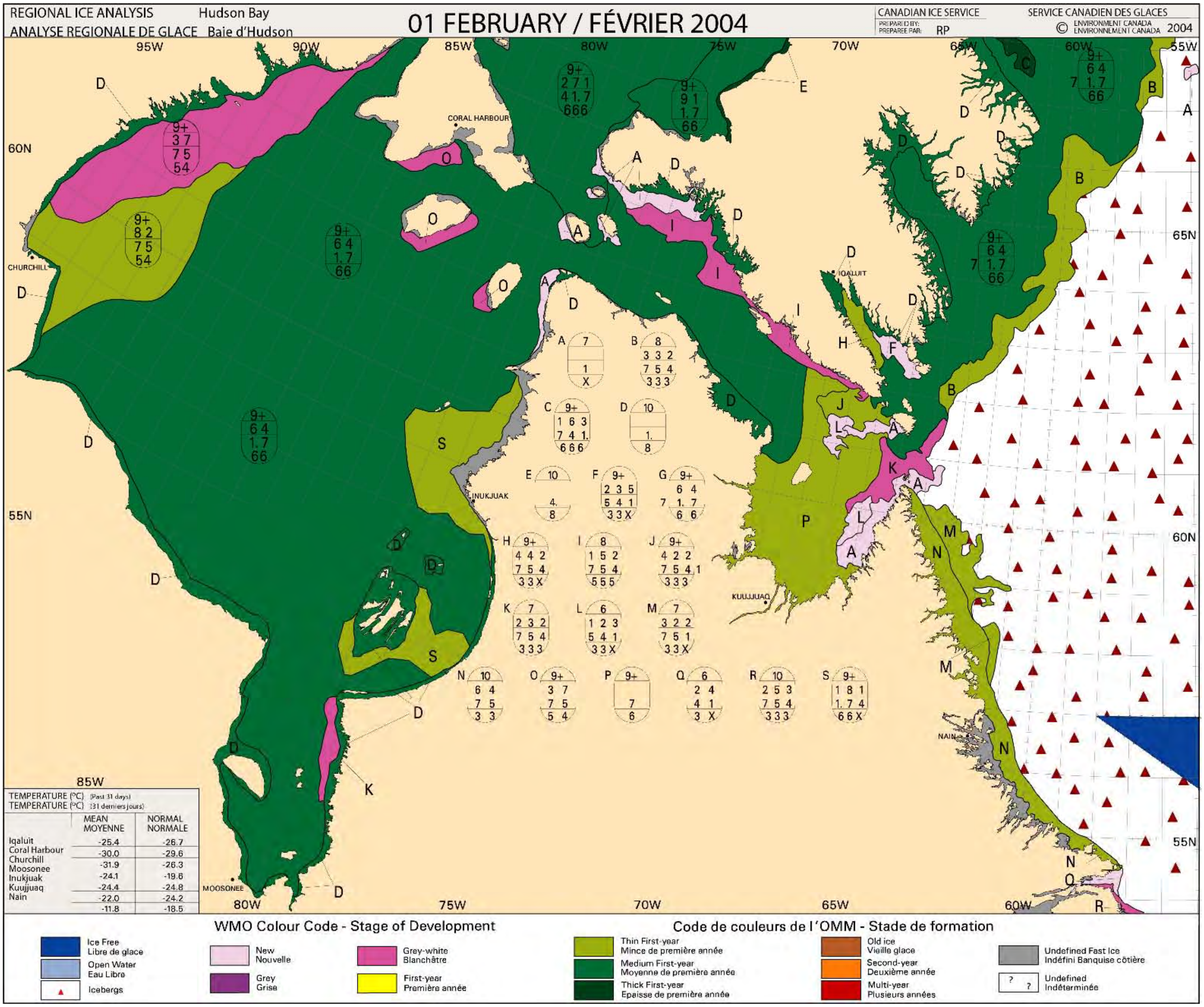

Figure 16: Typical Ice Condition during mid-winter time in Hudson Strait. Note the relative absence of Thick First Year Ice compared to Baffin Bay (Figure 3).

First year and old ice drifting south from Baffin Bay through Davis Strait. This ice tends to occur on the eastern edge of the pack ice of the zone. This is due to the fact that the ice of Baffin Bay is deflected to the east as it drifts south past Cape Dyer to enter Davis Strait. The Baffin Bay ice tends to contain the thickest first year ice floes in the zone as well as the old ice that drifts south through Baffin Bay over the winter. The old ice tends to occur along the eastern third of the zone from mid-March to early June in concentrations that rarely exceed 2/10. The reason old ice concentration in the zone is lower than that typically found in

Baffin Bay to the north is due to the fact that the old ice concentration is dispersed as it passes Cape Dyer.

Locally grown first year ice in Davis Strait as well as from Cumberland Sound and Frobisher Bay. The sea ice found in the central and western portion of Zone A is ice that formed near the coast of Baffin Island in Davis Strait. This ice tends to be thinner than the first year and old ice that enters the region from Baffin Bay.

Sea ice from Hudson Strait. The sea ice drifting eastward from Hudson Strait exits Hudson Strait into Zone A at the south side of the zone north of Cape Chidley Labrador. This ice trends to be heavily ridged by the tidal currents in Hudson Strait and of similar thickness to the ice from Baffin Bay.

The eastward limit of the ice edge in the Labrador Sea can be highly variable, depending on the severity of winter temperatures as well as prevailing winds at any given time. Westerly winds and colder than average temperatures can push the eastern ice edge east of 57W and strong easterly winds can press the ice edge westward as close as Resolution Island. Moderate ice pressure can be experienced in the Zone during easterly wind conditions when the pack ice is compressed westward. The analysis of ice conditions for this study has noticed a tendency for more extensive ice in Zone A in the early 1990's compared to recent years this century.

It should be noted that ships will occasionally encounter pressured ice in the area of Resolution Island that may result in delays in transit times. However, with the vessels envisioned, these delays will be relatively short and likely coincide with with easterly winds and larger tides.

Zone B – South Baffin Lead

The prevailing north-westerly winds over the region results in the creation of numerous leads along south-facing coastlines in Hudson Strait and at the northern reaches of the Foxe Basin. The most prominent of these leads is the lead found along the south coast of Baffin Island, defined as Zone B on Figure 15. Figure 17 is a satellite image showing the typical extent of the lead along the south coast of Baffin Island.

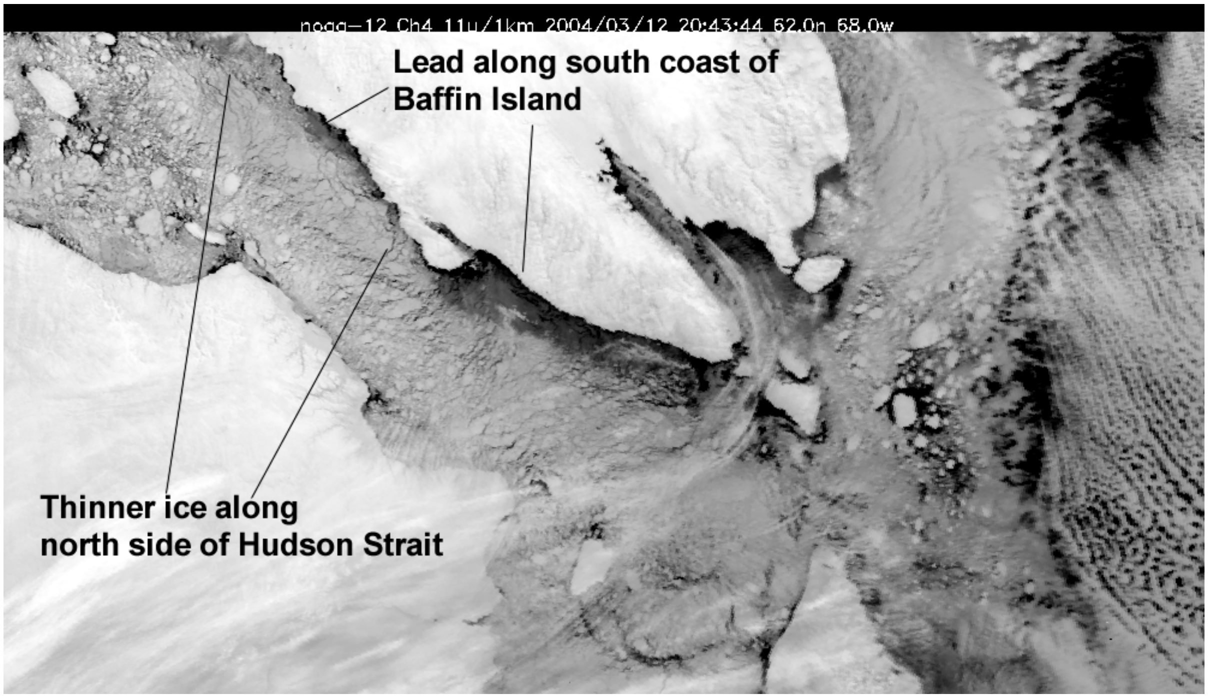

Figure 17: Satellite image from March 12, 2004, showing the lead found along the south coast of Baffin Island.

The lead is most prominent between Resolution Island and Big Island becoming narrower west of Big Island. The lead is present most of the winter and early spring closing only occasionally under southerly wind conditions for brief periods. The general north-west to south-east forcing of the ice that creates the lead also creates a zone a thinner first year ice in the area. Although termed a “lead” the cold temperatures in the region in mid-winter results in the “open water” areas always containing a thin new or young ice layer.

Another feature of Zone A is the presence of icebergs in the area west to Big Island. The ocean current pattern in Hudson Strait is such that icebergs drifting south through Davis Strait are carried westward along the south coast of Baffin Island before being carried south then eastward once again. Figure 18 illustrates the current pattern in Hudson Bay. The diverging currents away for the Baffin Island coast west to Big Island is also a factor in helping to maintain the large lead that is present in this area in the winter.

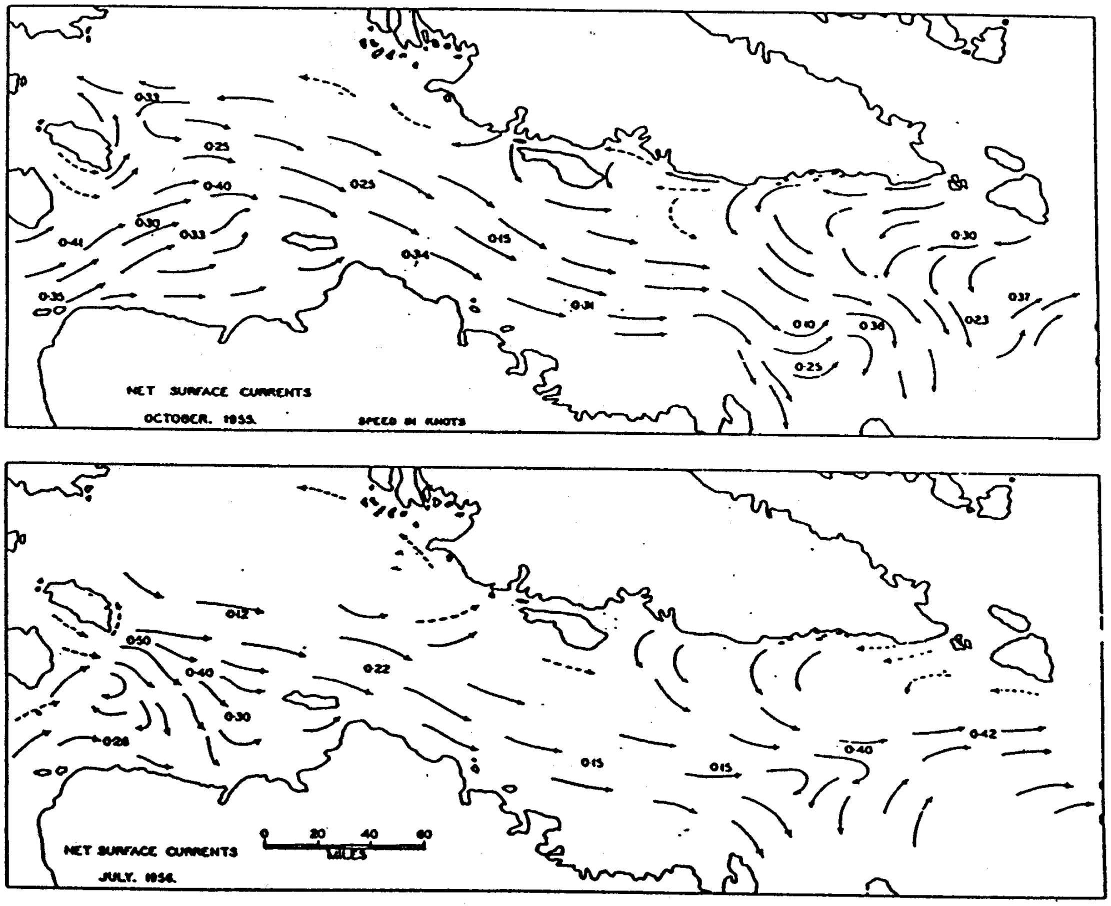

Figure 18: Ocean current patterns in Hudson Strait (Campbell 1958)

<u>Zone C – Foxe Basin Pack Ice</u>

Zone C defines the southern and central regions of the Foxe Basin. This area contains 9+/10 first year pack ice throughout the winter. Radar imagery of this pack ice taken in the mid winter indicates that ridging is common in this zone, likely caused by the pulsing of the Atlantic tide into the basin in winter. This ridging is evident by the mottled appearance of the pack ice in this zone in Figure 15. In addition, the persistent north-westerly winds in mid winter compress the pack ice southward toward Hudson Strait.

Zone C is the region where ice pressure will be most likely encountered on a regular basis for winter ship transits to Steensby Inlet. The causes of ice pressure in the pack ice are twofold. The most common cause is the daily ebb and flow of the tide in Foxe Basin that will give episodic pressure events as the tide waxes and wanes during the day. Tidal-induced ice pressure is commonly experienced now by the MV Arctic while crossing Hudson Strait during winter transits to the Port of Deception Bay. It is likely that these pressure events will also be experienced in the Foxe Basin but to a somewhat lesser extent as the tidal current is likely lower in this area. It is unlikely that the ore carriers will experience the ice pressure events in the transit of Hudson Strait (in Zone B) as they will be staying on the north side of the strait where the ice is thinner and pressure is less of an issue. The second source of ice pressure for Zone C will be wind-induced. Since the Foxe Basin is a relatively enclosed basin, it is highly susceptible to wind-induced ice pressure, regardless of the direction the wind blows from. The wind blows almost continuously in this region in winter making ice pressure a common event.

It should be noted on the issue of ridging that this may not, in fact, pose a serious impediment to the ore carriers. The experience of the MV Arctic in transiting the heavily ridged ice of Hudson Strait is that the ice is so rubbled by winds and tides that the vessel actually moves through the ice easily when the pressure is not on the ice field.

Small amounts of old ice in concentrations of 1/10 to 2/10 occasionally occur in the pack ice of Zone C, usually along the western edge of Foxe Basin. There are two source areas for this old ice. One source of old ice occurs in summers when cooler than normal temperatures prevail over the region such that not all the first year ice in Hudson Strait melts. This will occasionally leave a small amount of second year ice in the Foxe Basin that slowly drifts south in the fall and early winter to exit through Hudson Strait. This is a relatively rare occurrence, usually about once every six to ten years and becoming somewhat less frequent recently. The second source of old ice is the drift of small amounts of old ice spilling through Fury and Hecla Strait at the north-west entrance to the Foxe Basin from Committee Bay at the south end of the Gulf of Boothia. This was once a fairly common source of old ice for the Foxe Basin but there has been a reduction in the concentration of old ice in the source area of Committee Bay such that this has not been recorded to have occurred in the past 10 years.

Zone D – Northern Foxe Basin

Like the south coast of Baffin Island, the northern Foxe Basin develops thin first year ice and open water leads throughout the winter as the prevailing north-westerly winds push the Foxe Basin pack ice south away from the Baffin Island Coast. Figure 19 is a satellite image from February 28, 2003 showing the thinner ice leads across the northern section of the Foxe Basin.

Zone E – Steensby Inlet

The waterways in the access to the proposed port site in Steensby Inlet develop shore fast ice each winter along both of the routes. The southern anchor of the shore fast ice reaches Koch Island. The boundary between the shore fast ice and the mobile pack ice of the northern Foxe Basin represents a diverging ice edge over the winter with the result that an open water lead is usually always present off the fast ice edge. The additional benefit of this diverging condition is that no shear ridge occurs along the fast ice edge in winter. There is an average of 35 nautical miles of shore fast ice leading to the Steensby Port site.

There are only recent measurements of the shorefast ice in the Steensby area. Those measurements taken in 2008 support the notion that maximum thicknesses will reach about 2 metres. Although some areas were measured in excess of that, the vast majority of readings were closer to the 2 metre mark. Figure 20 shows the site locations and its ice thickness measurements (in metre) for Steensby Inlet; the measurements were taken place in May and June 2008.

The other closest ice thickness measurement station in the region at Hall Beach to the southwest of Steensby Inlet has recorded average ice thicknesses at the end of the winter's growth of 192 cm with extremes of over 250 cm (Figure 21). These thickness average 5% to 10% more than those recorded at Pond Inlet. The shore fast ice appears very level with few ridges or leads and no possibility that old ice can become entrained in the ice over as is the case in Eclipse Sound.

It should be noted that the MV Arctic presently trades all winter to the port of Deception Bay on the north coast of Quebec. The ice conditions the MV Arctic traverses to the port of Deception Bay are similar to those that are to be transited to reach Steensby Inlet. The vessel is able to contend with the shorefast ice with varying degrees of difficulty however the main impediment is always in the pressure ridges or shear zone. Vessels trading to Steensby will not have to contend with that type of condition.

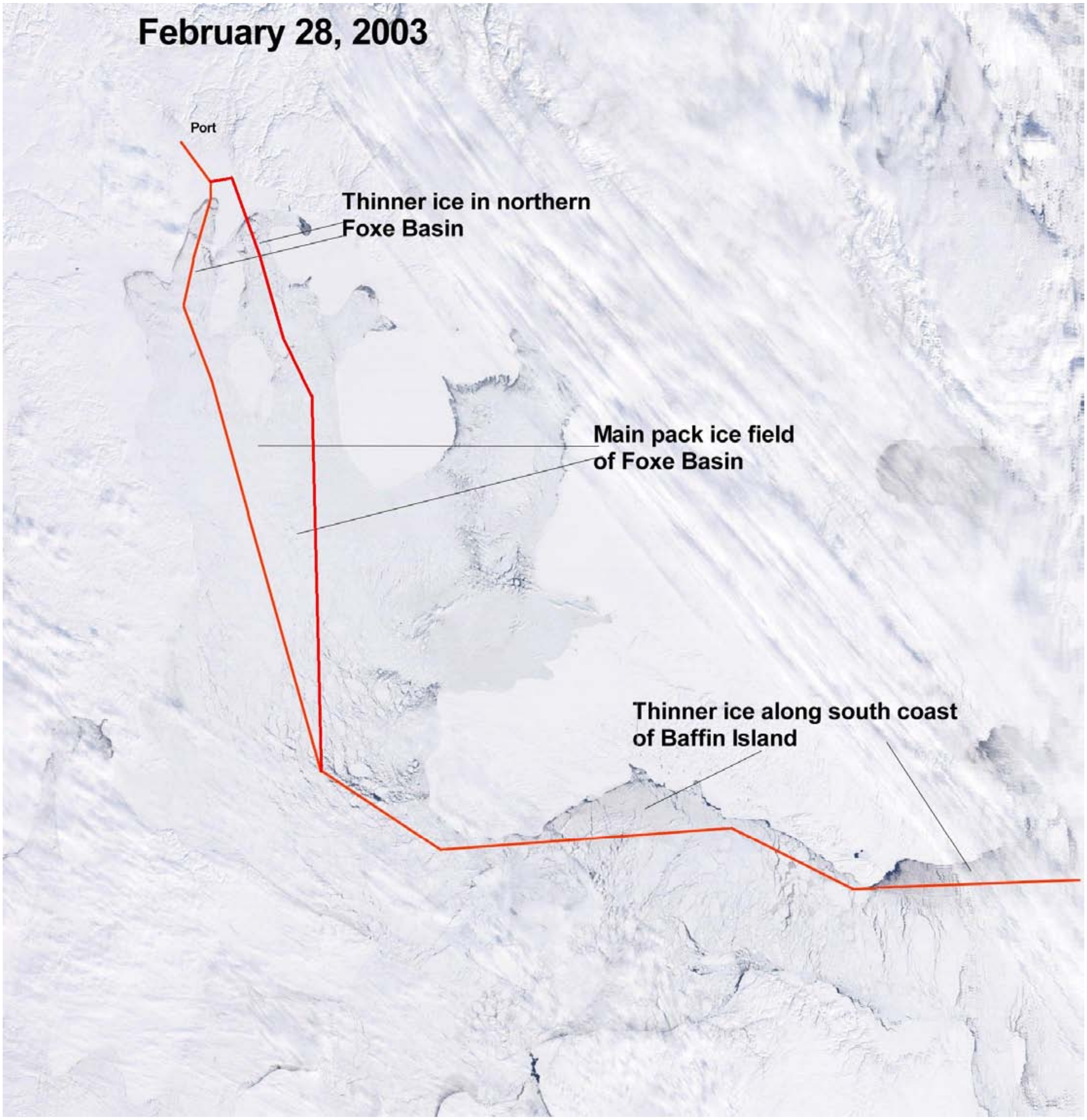

Figure 19: Satellite image of the ice features of the Foxe Basin in winter. The nominal shipping route to Steensby Inlet is shown in red.

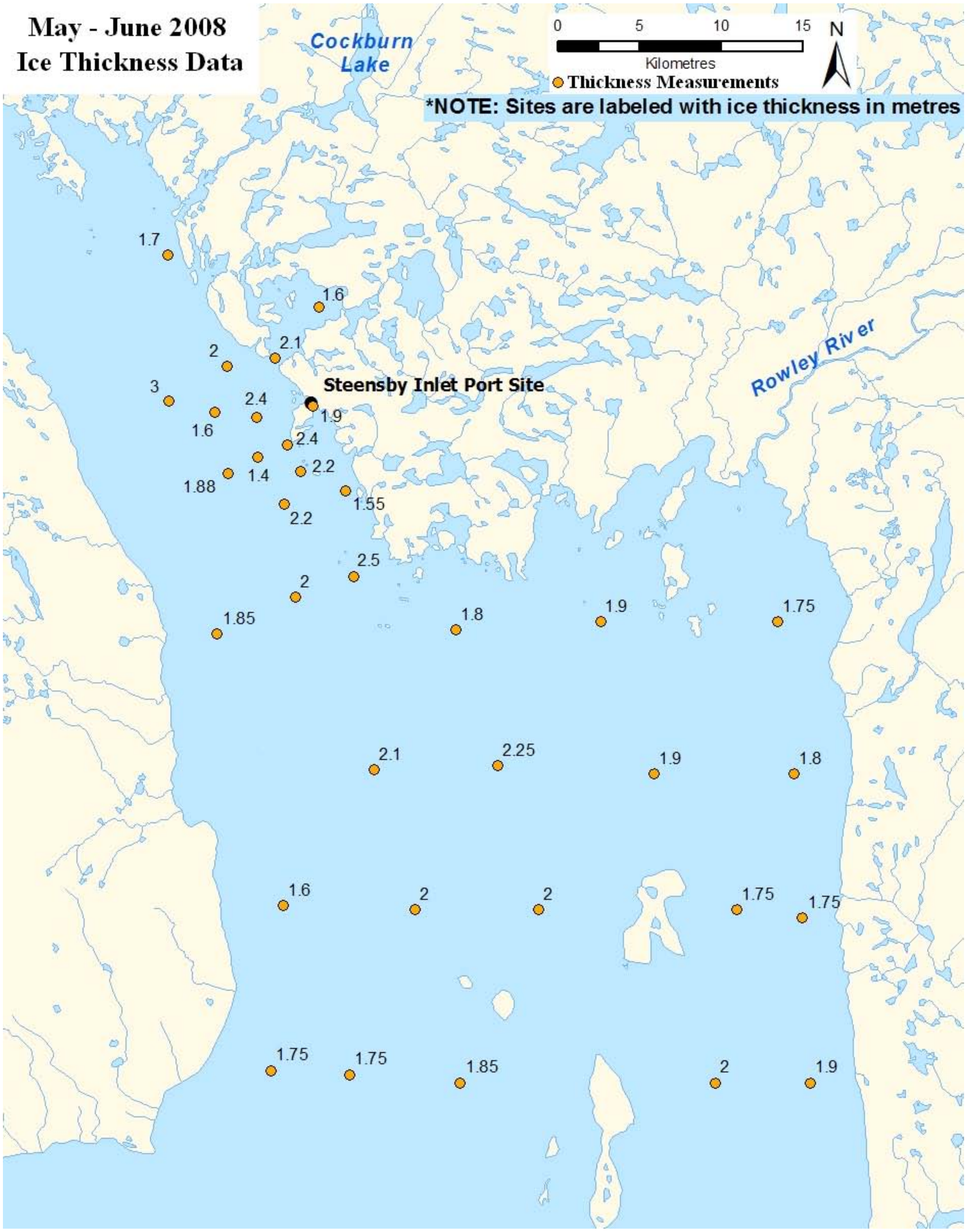

Figure 20: Ice Thickness Measurement Data of Steensby Inlet in May and June 2008.

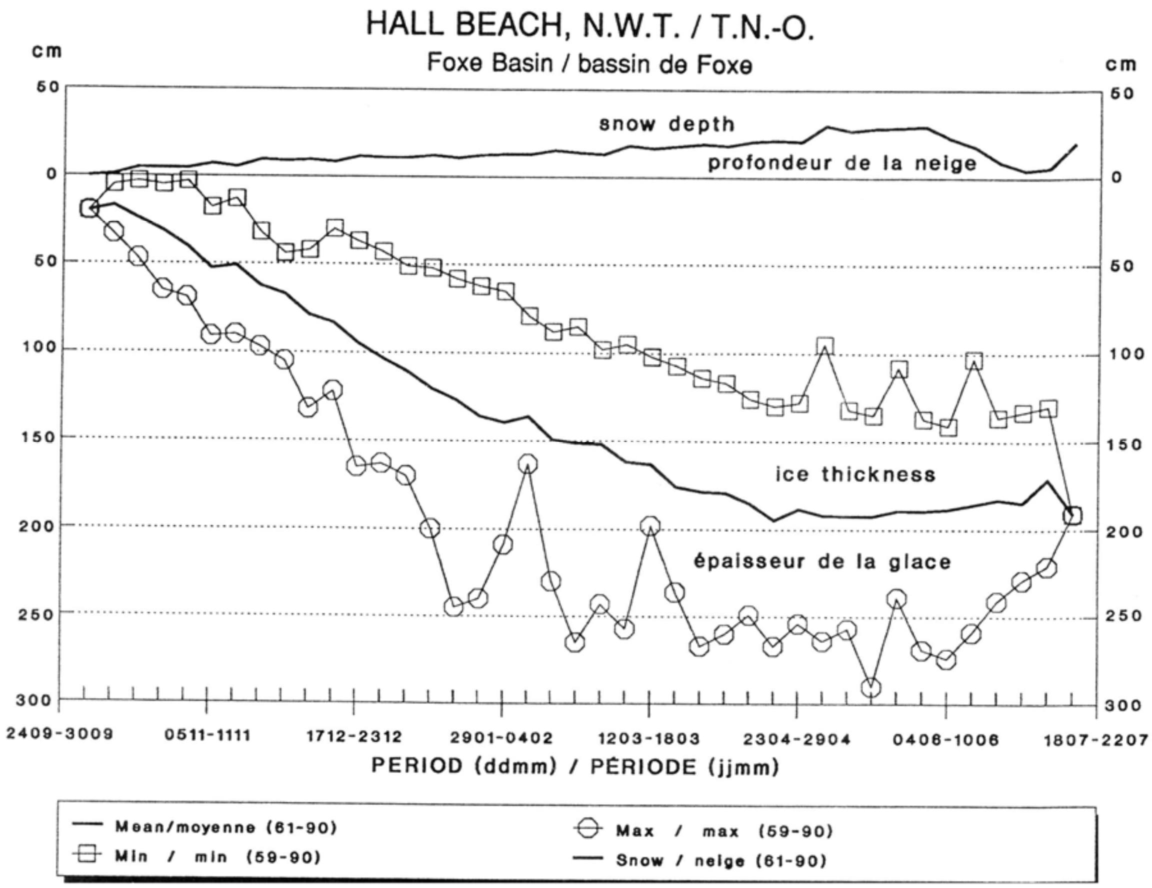

Figure 21: Ice thickness data from Hall Beach (IC 1992)

1.2.3 Ice Season in the Accesses Channels to Steensby Inlet

The first signs of the spring break-up is the widening of the leads found in northern Foxe Basin and along the south coast of Baffin Island during the month of April and May as solar radiation increases in the region. Figure 22 is a satellite image from May 2, 2003 showing the expansion of the leads in the region.

Figure 22: Satellite image of the spring expansion of leads in the access to Steensby May 2, 2003.

Ice reduction is slow and gradual during the months of June and July as Hudson Strait clears of sea ice and the ice edge in the Foxe Basin retreats northward. Figure 23 is a satellite image from July 6, 2003 showing the typical ice conditions for the Foxe Basin in the early summer.

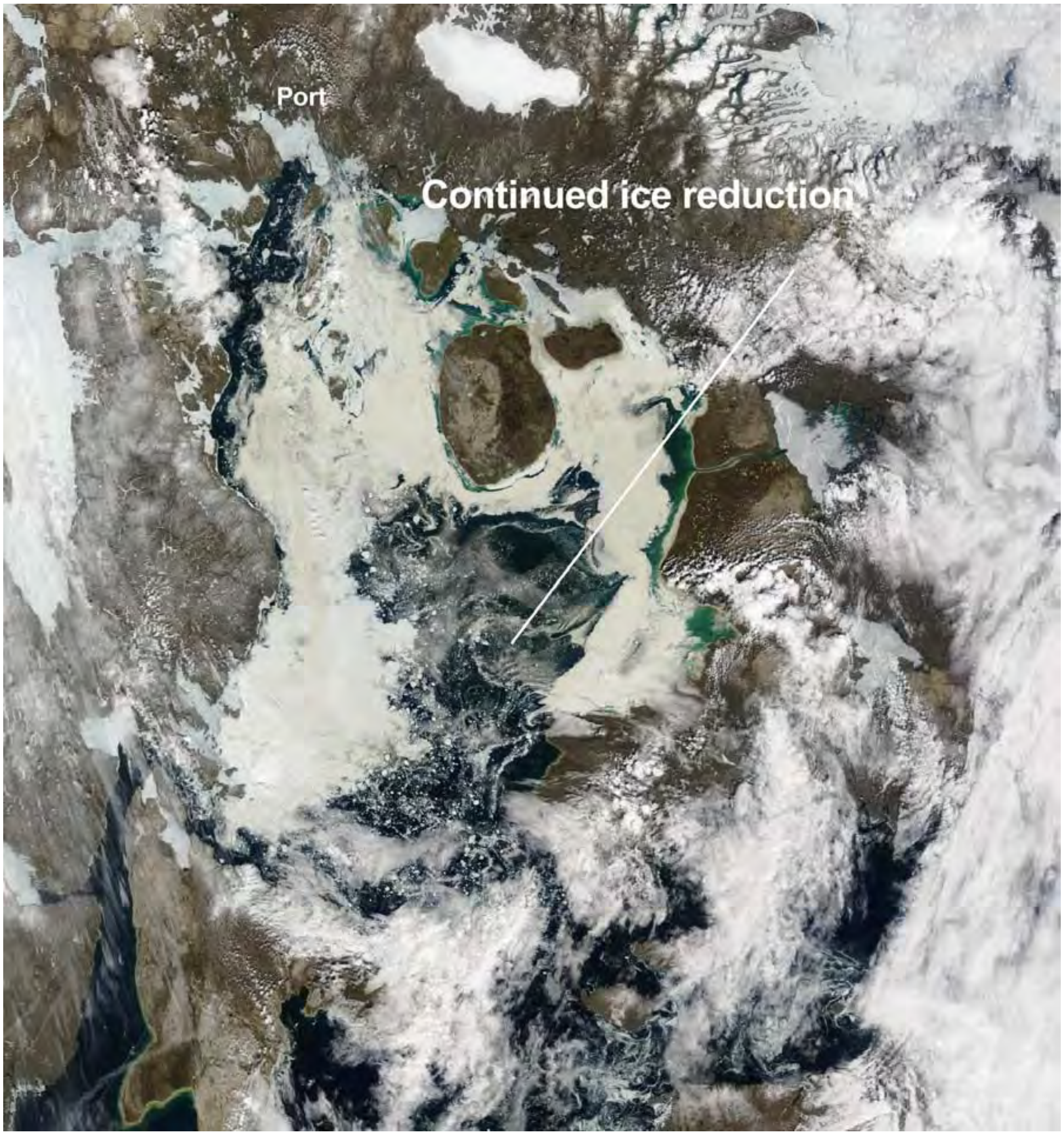

Figure 23: Satellite image showing the continued reduction in sea ice in the access to Steensby by the early summer July 6, 2003.

The fast ice of Steensby Inlet fractures during the second and third week of July. The fracture begins with the fracture of the lower portion of the fast ice in late June and this is followed by the complete fracture of the Inlet by the fourth week of July. The satellite images of Figure 24 illustrate the typical fracture sequence of the fast ice of Steensby Inlet.

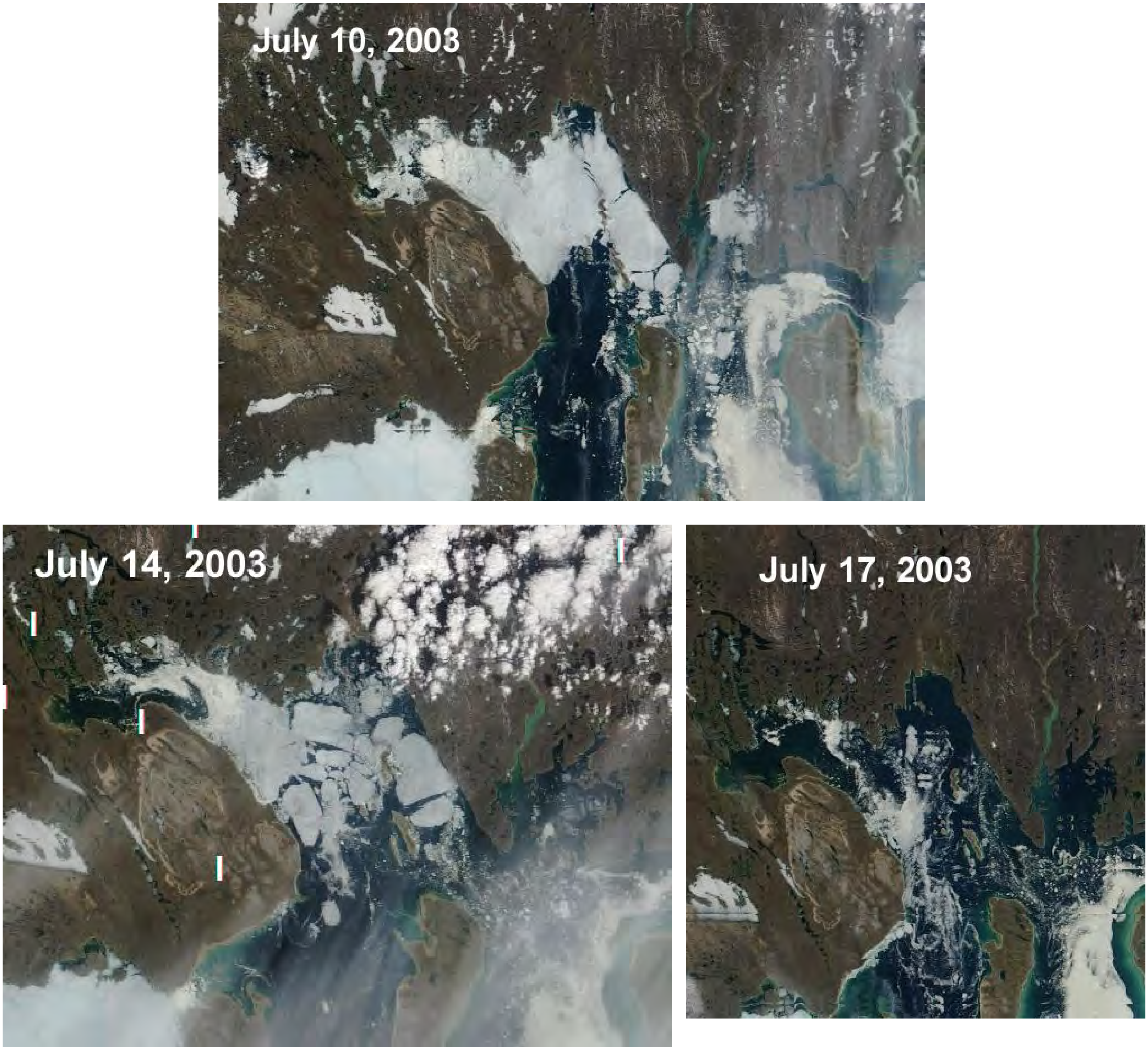

Figure 24: Typical fast ice fracture sequence for Steensby Inlet July 10 - 17, 2003

The pack ice of the Foxe Basin continues to reduce during the months of August and September as strips and patches of ice in the basin gradually melt, as illustrated in the satellite image of Figure 25 below. In rare cool summers some of this remnant pack ice will remain in the Foxe Basin to become second year ice by October 1. The concentration of this ice rarely exceeds 2/10 second year ice.

Figure 25: Satellite image of remnant decaying first year ice in the northern Foxe Basin August 9, 2006.

Sea ice can commonly occur in the access channels into the month of September before clearing, as indicated in the satellite image of Figure 26 from September 1, 2003. The incidence of first year ice surviving the summer's melt has reduced in recent years and now only occurs approximately in 10% of summers. The occurrence of remnant ice in the Foxe Basin does not preclude the use of market vessels during the late summer period for the project although some measures as using an owner familiar with navigation in sea ice and experienced Ice Navigators would provide mitigation.

Figure 26: Satellite image showing remnant first year ice persisting into September along the shipping route to Steensby Inlet September 1, 2003.

Freeze-up starts in late October with new/young ice expanding southward from northern Foxe Basin and extending eastward through Hudson Strait in December. Figure 27 is a satellite image showing the expansion of ice formation in the northern Foxe Basin while Figure 28 shows the advancement of ice through Hudson Strait in December.

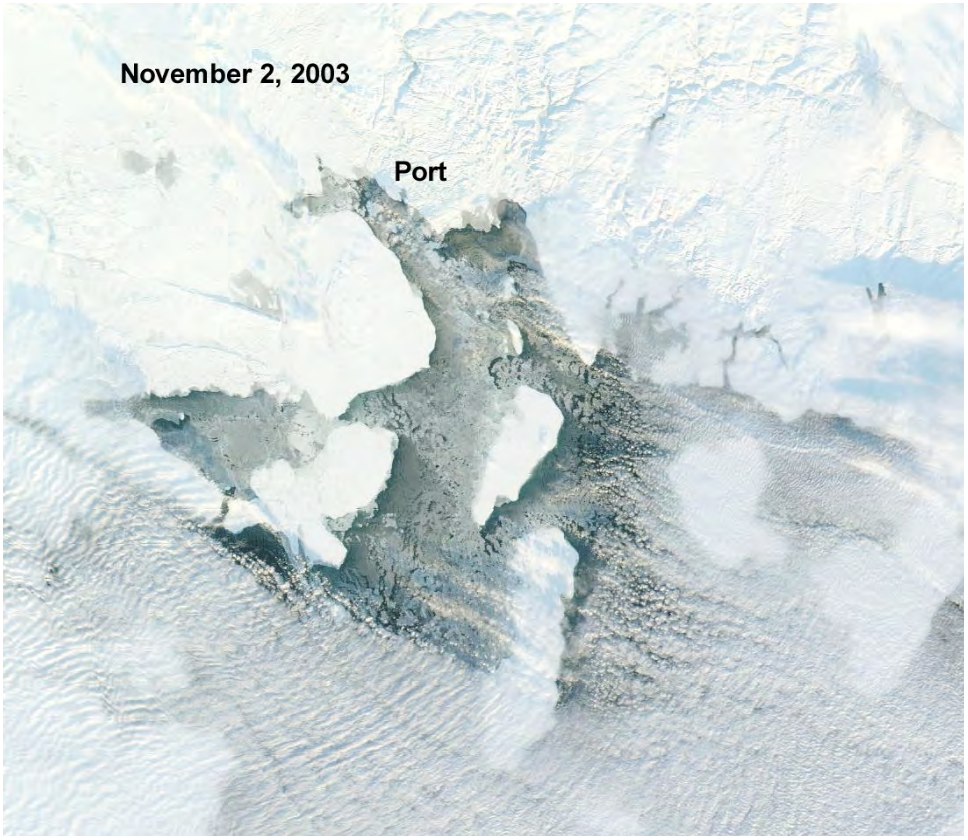

Figure 27: Satellite image showing the advancement of new/young ice in the northern Foxe basin during freeze-up November 2, 2003.

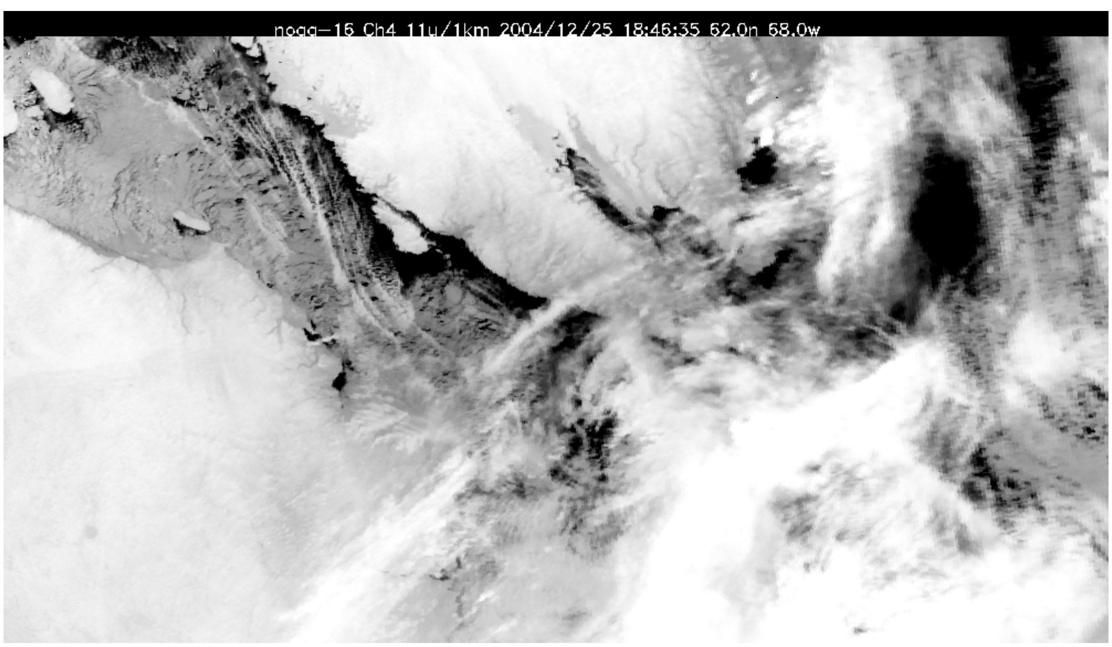

Figure 28: Satellite image showing the ice advance through Hudson Strait December 25, 2004.