SP-70 (70)

SPECIAL PUBLICATION

REPORT OF THE ARCTIC ICE OBSERVING AND FORECASTING PROGRAM—1970

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NAVAL OCEANOGRAPHIC OFFICE
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ABSTRACT

The ice program conducted by the Naval Oceanographic Office in the North American Arctic during 1970 is presented. Methods of collection and dissemination of ice data, ice forecasting, forecast verification, and ice observations by satellite are discussed. Sea ice distribution in the eastern Arctic was normal or slightly heavier than normal. Conditions for escorted and unescorted entry into five ports occurred as predicted or two to five days later than forecast. Ice conditions in the western Arctic were heavier than normal for the second consecutive year, especially along a portion of the northern Alaskan coast where the width of the shore lead did not exceed 40 miles during summer. Ice conditions, including both aerial and satellite data in the eastern and western sectors of the Arctic, are shown graphically in separate appendixes.

G. J. POTOCSKY

Applications Research Division
Ocean Science Department

FOREWORD

This report, the nineteenth of an annual series, summarizes the ice program conducted during 1970 by the Naval Oceanographic Office principally in support of Military Sealift Command resupply operations in the eastern Arctic and Commander Alaskan Sea Frontier in the western Arctic. Ice data were acquired by aerial reconnaissance, icebreakers, and from satellite photographs and were used for ice forecasting. Satellite ice information not only supplements aerial reconnaissance but provides repetitious coverage that is required to observe movement of ice edges and the opening or closing of leads. These data, together with other historical information, make possible a comprehensive accumulation of ice information which is an asset in preparation of ice forecasts and is necessary to the overall efficient planning and successful execution of arctic operations.

F. L. SLATTERY
Captain, U.S. Navy
Commander

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ILLUSTRATIONS

PART I - EASTERN ARCTIC

1. GENERAL

Resupply of the eastern Arctic during 1970 was conducted by the Military Sealift Command (MSC). MSC ships carried bulk cargoes to Goose Bay, Sondre Stromfjord, Itivdleq, Thule, and Kulusuk. These locations and other place name references in the text are presented in figure 1. For presentation purposes, the North American Arctic is divided into three major regions each of which is subdivided into ice reconnaissance areas as shown in figure 2. The eastern region was resupplied by MSC, the western region by commercial shipping, and the central region by the Canadian Department of Transport (DOT).

2. ICE FORECASTING

The U.S. Naval Oceanographic Office (NAVOCEANO) conducted a long-range ice forecasting program in support of MSC eastern Arctic operations. This program included the long-range seasonal ice outlook* and 15- and 30-day forecasts used to amend the long-range outlook. Short-range 48-hour and 5-day forecasts and ship ice routings were provided by the Naval Weather Service.

a. Long-Range Ice Outlook

The long-range ice outlook for the eastern Arctic was designed to provide an estimate of ice conditions during the resupply season for planning a generalized and tentative arctic shipping schedule. The outlook was based initially on evaluation of oceanographic and climatic factors affecting ice formation, growth, and drift. Forecasts of ice disintegration and predicted trends were then based on comparison of this evaluation with historical data.

In addition, a comprehensive aerial survey of the Labrador Sea, Davis Strait, and Baffin Bay from 17 through 21 March provided information on distribution, age, and topography of the ice. Data extracted from ESSA 9 photographs between 19 and 21 March supplemented aircraft data in the Labrador Sea and Davis Strait and provided information for the east Greenland coast. The current environment was compared to historical ice conditions to determine possible analogies. After incorporation of this information, predicted trends for the opening of the various ports were related to normal dates when ice concentrations would permit ships to safely enter these ports with and without icebreaker assistance.

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*U.S. Naval Oceanographic Office, The Eastern Arctic Ice Seasonal Outlook, 1970, H.O. SP-60(70). April 1970.

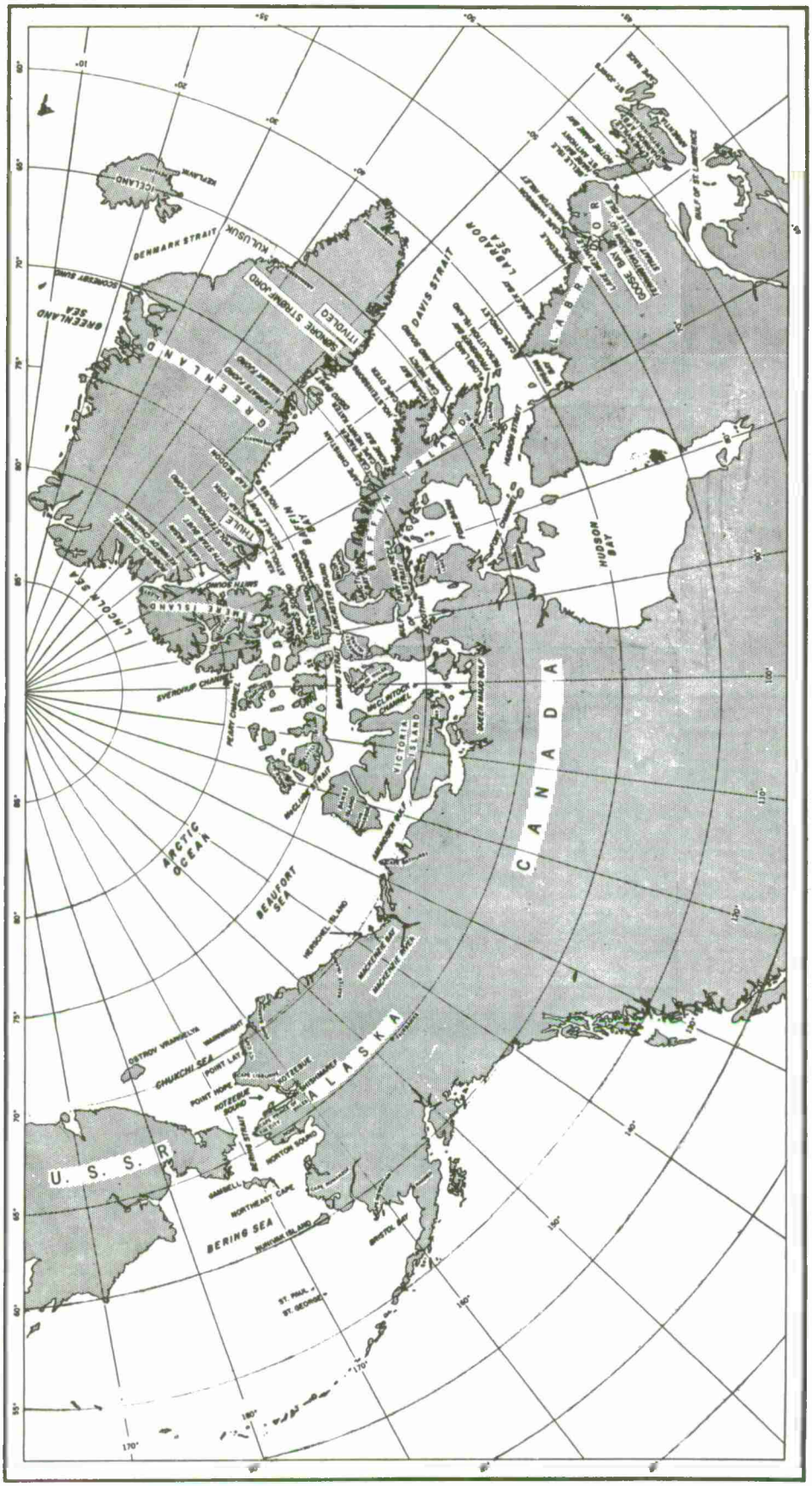


FIGURE I PLACE NAME CHART

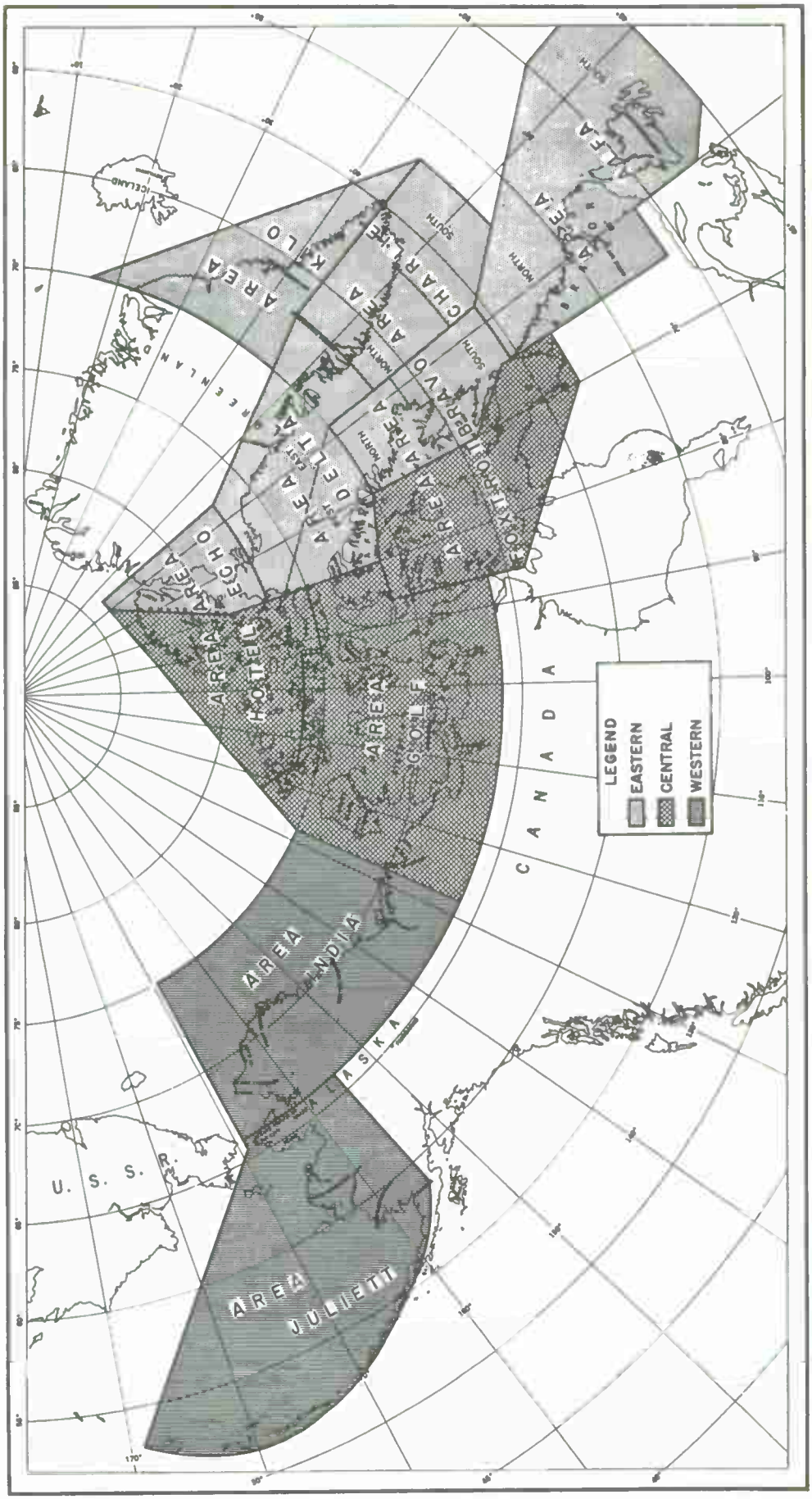


FIGURE 2 RESUPPLY AND ICE RECONNAISSANCE AREAS

b. Fifteen- and Thirty-Day Ice Forecasts

Fifteen- and 30-day forecasts were issued from NAVOCEANO via radioteletype (RATT) twice monthly between 30 May and 20 November. These forecasts were revisions of the long-range outlook and contained more detailed information on ice edge, concentration, and floe size. Forecasts were based on aerial reconnaissance, satellite data, historical ice information, and ESSA 30-day prognostic charts of the mean sea-level pressure and 700-millibar-height departure from normal. Commencing with 5 October, the 15- and 30-day forecasts were freezeup forecasts. Forecasts are summarized in table 1.

Table 1

Fifteen- and Thirty-Day Ice Forecasts
Eastern Arctic, 1970

Site-Area	Period	Number 15-Day	30-Day	Total
Goose Bay-Labrador Sea	20 May-20 June 5 Nov-20 Nov	4	3	7
Sondre Stromfjord	20 May- 5 June 5 Nov	3	1	4
Thule-Baffin Bay	20 May- 5 Aug 5 Oct-20 Nov	10	9	19
Kulusuk-Denmark Strait	20 Jun- 5 Aug	3	4	7
		20	17	37

c. Short-Range Ice Forecasts

Forty-eight-hour and 5-day forecasts were issued by the Fleet Weather Facility, Suitland, Maryland. Ice advisories and forecasts commenced when ships entered operational areas and terminated when shipping was completed or when the ice was no longer a hazard to shipping.

d. Ship Ice Routes

In order to minimize ice damage to shipping, ice routing service was provided by Fleet Weather Central, Norfolk, Virginia. Optimum track ship routes were provided from the last port of call in the Atlantic to arctic ports and return. During the periods of icebreaker escort, routes were terminated at a rendezvous point in the port approaches.

3. ICE RECONNAISSANCE

Long-range aerial ice reconnaissance of the eastern Arctic was provided by P3A aircraft stationed at Bermuda. A summary of regular flights

and hours flown over each reconnaissance area each month, including transit time, is given in table 2. Flight hours for each mission were apportioned to the various reconnaissance areas. Immediate tactical support was provided by icebreaker-based helicopters which made local ice observations.

Table 2

Ice Reconnaissance Flights, Eastern Arctic, 1970

Month	Flts.	Total Hours	ALFA	BRAVO	CHARLIE	DELTA	ECHO	KILO	Hours of Ice Obs.
March	5	32.6	12.1	2.9	4.9	12.7	0	0	18.3
May	4	33.2	6.5	6.6	4.6	6.1	1.8	0	13.2
June	11	78.8	35.6	6.1	6.6	15.1	3.3	0	27.6
July	18	121.3	22.7	7.4	3.4	53.2	0	0	43.5
Aug	4	33.5	4.3	2.1	0	4.1	0	18.1	10.9
Oct	2	14.1	3.7	1.9	0	4.3	0	0	2.9
Nov	4	25.3	4.7	2.5	2.0	7.1	0	0	7.4
Totals	48	338.8	89.6	29.5	21.5	102.6	5.1	18.1	123.8

Several other sources of ice reconnaissance over the eastern Arctic augmented the data obtained by P3A flights. These included 10 U.S. Coast Guard flights listed in table 3, in which Navy ice observers participated. Other supplementary ice reconnaissance data covered initial and terminal legs of Project BIRDS EYE missions and Danish ice reconnaissance conducted primarily along the south and east Greenland coasts including 90 flights totaling 447 hours. Some Canadian observations in Baffin Bay and Labrador Sea were also utilized.

Table 3

Participation in U.S. Coast Guard Flights, 1970

Month	Flts.	Total Hours	ALFA	BRAVO	CHARLIE	DELTA	Hours of Ice Obs.
Jan	2	12.7	6.2	3.5	3.0	0	6.8
Feb	2	10.6	10.6	0	0	0	8.4
Mar	2	11.5	11.5	0	0	0	4.9
Sep	1	5.6	0	0	0	5.6	2.8
Oct	3	21.0	0	2.7	2.0	16.3	6.8
Totals	10	61.4	28.3	6.2	5.0	21.9	29.7

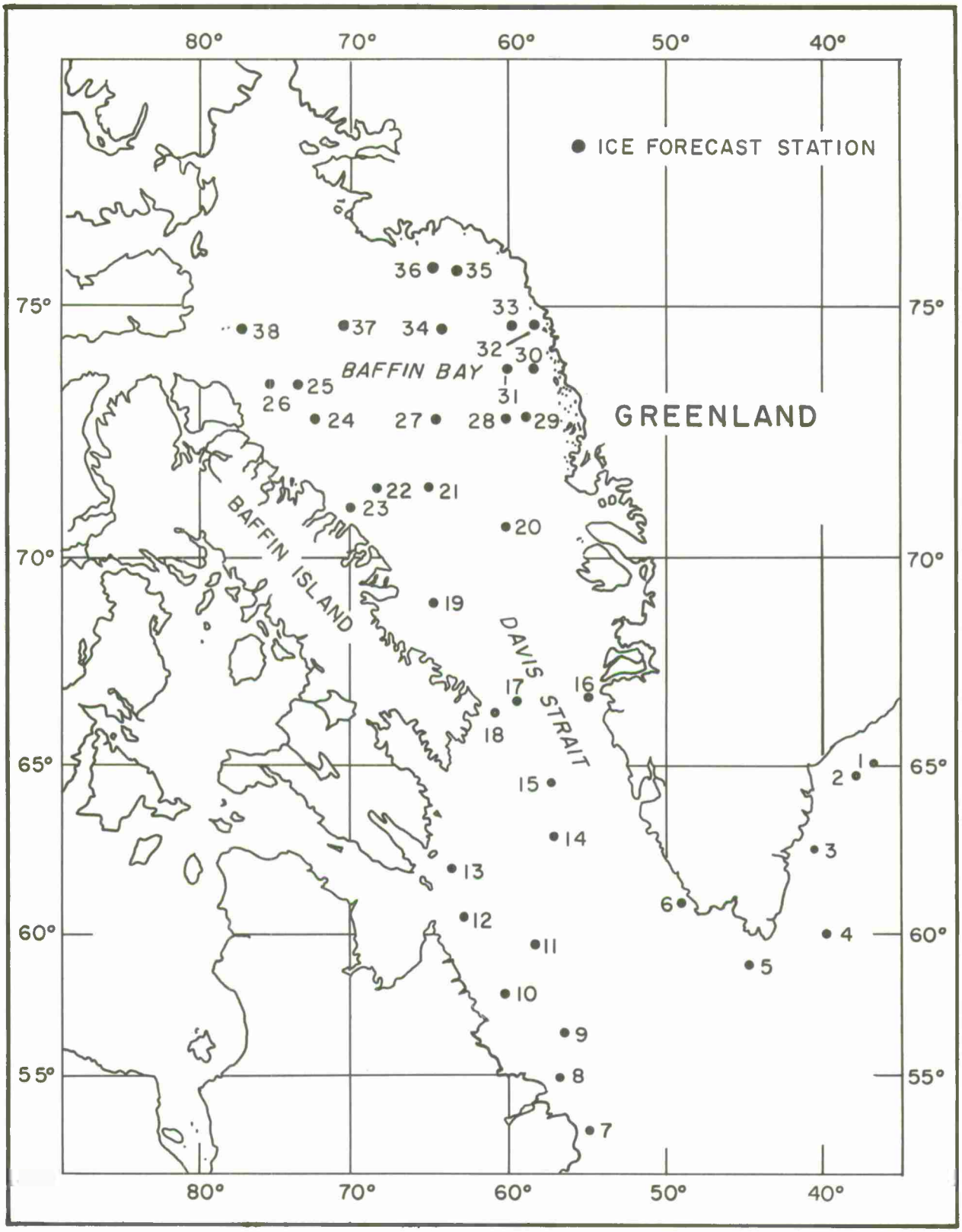


FIGURE 3 OCEANOGRAPHIC STATIONS OCCUPIED BY USCGC SOUTHWIND, OCTOBER 1970

4. SUPPORTING PROJECTS

a. Oceanography

During October, the USCGC SOUTHWIND occupied 38 oceanographic stations in Baffin Bay, Davis Strait, Labrador Sea, and along the east Greenland coast south of 65°N. The location of these stations are presented in figure 3.

b. Project BIRDS EYE

In conjunction with research and development of ice forecasting techniques for the Arctic Basin and to provide ice forecasting support, Project BIRDS EYE consisted of a series of six ice reconnaissance missions with several flights in each mission over the North American Arctic. BIRDS EYE missions totaling 51 flights for 480 hours were conducted on standard tracks primarily over the Arctic basin.

c. Barents Sea and Kara Sea Operations

During July, August, and September, 14 satellite ice messages and two 15-day ice forecasts were sent to the SOUTHWIND for use in oceanographic operations in the Barents and Kara Seas.

d. East Greenland Operations

During July and August, three 15-day ice forecasts of the pack edge and ice concentrations within the ice edge along the east Greenland coast were provided to Commander Task Group 87.1 for operations north of 70°N between the east Greenland coast and Spitsbergen.

5. OBSERVED ICE CONDITIONS

Ice conditions observed by aerial reconnaissance in the eastern North American Arctic are presented in appendix A. Ice data were obtained primarily from U.S. aerial ice reconnaissance, including BIRDS EYE flights, supplemented by U.S. Coast Guard flights and Danish reconnaissance. Ice conditions observed by satellite in the eastern North American Arctic are presented in appendix B.

Fast ice in Itivdleq and Sondre Stromfjord broke up later than normal, as forecasted by the outlook, owing to low temperatures during the preceding winter. However, the unescorted trends for Itivdleq and Sondrestrom were 2 days later than forecast. Ice concentration in the approaches to Goose Bay decreased to less than six-eighths by 11 June, 2 days later than forecasted in the outlook. Southerly drift of ice resulted in a 20- to 30-mile-wide band across the approaches to Hamilton Inlet during the first week in July. Unescorted entry to Goose Bay was therefore delayed until 6 July, four days later than predicted. Ice concentration

in the Thule approaches decreased to less than six-eighths by 15 July, resulting in normal escorted entry into Thule. Although the ice in Baffin Bay was well weakened during the remainder of July and early August, open-water conditions did not develop until 11 August owing to lack of strong winds to break up the remaining ice. Thus, the later-than-normal unescorted entry date was 9 days later than forecast in the outlook.

From mid-May to mid-June the pack ice south of 70°N through Denmark Strait to the Kulusuk approaches was near normal. By the first week in July southerly ice drift and disintegration considerably narrowed the pack southward from 70°N. Escorted entry into Kulusuk was normal, as predicted by the outlook and verified by aerial reconnaissance. Satellite data indicated that ice disintegration in the Kulusuk approaches and northward along the coast continued at a normal trend. Unescorted entry was possible by 21 August, the normal entry date as predicted by the outlook. Verification of the long-range outlook is given in table 4.

PART II - WESTERN ARCTIC

1. GENERAL

During the 1970 resupply season in the western Arctic, short-range ice forecasting support was provided by the Naval Weather Facility at Kodiak, Alaska. NAVOCEANO was responsible for providing long-range forecasts in support of military and oceanographic operations.

Table 4

Long-Range Ice Outlook Verification, 1970

Port	Normal	Predicted Trend	Observed
Escorted Entry*			
Itivdleq	17 April	Later (5 to 9 days)	26 April
Sondre Stromfjord	29 May	Later (2 to 5 days)	2 June
Goose Bay	5 June	Normal (± 4 days)	11 June
Thule	12 July	Normal (± 4 days)	15 July
Kulusuk	14 July	Normal (± 4 days)	12 July
Unescorted Entry**			
Itivdleq	1 May	Later (5 to 9 days)	12 May
Sondre Stromfjord	7 June	Normal (± 1 day)	10 June
Goose Bay	23 June	Later (5 to 9 days)	6 July
Thule	23 July	Later (5 to 9 days)	11 August
Kulusuk	18 August	Normal (± 4 days)	21 August

*Concentration in approaches 6/8 or less and fast ice, if any, in port well weakened.
** Concentration in approaches and port 1/8 or less.

2. ICE FORECASTING

Fifteen- and 30-day ice forecasts for the north Alaskan coast and the Bering and Chukchi Seas were issued to COMALSEAFRON twice monthly throughout the year. Forecasts included information on ice pack edges, concentrations, stages of development, and ice thickness for six specified points. Forty-eight 15- and 30-day forecasts were issued.

3. ICE RECONNAISSANCE

Aerial reconnaissance was conducted over areas INDIA and JULIETT by P3A aircraft stationed at Adak. Additional ice data were obtained by utilizing flights by the Arctic Research Laboratory (ARL) from Point Barrow and Project BIRDS EYE flights from Eielson AFB, Fairbanks, Alaska. A summary of P3A flights and hours flown, including ARL missions, for each month over each area and annual totals is presented in table 5. Flight hours for each mission were apportioned to reconnaissance areas INDIA and JULIETT.

4. OBSERVED ICE CONDITIONS

Ice conditions observed by aerial reconnaissance in the western North American Arctic are presented in appendix C. The data were obtained primarily by scheduled aerial reconnaissance and were supplemented by BIRDS EYE flights. Ice conditions observed by satellite in the western North American Arctic are presented in appendix D.

Table 5

Ice Reconnaissance Flights, Western Arctic, 1970

Month	No. of Flts.	Total Hours	INDIA	JULIETT	Hours of Ice Obs.
Jan	1	10.2		10.2	5.2
Feb	2	19.5	2.6	16.9	8.0
Mar	1	8.4	5.9	2.5	1.8
June	2	15.0	6.6	8.4	7.2
July	9	40.8	40.8	0	30.1
Aug	7	29.8	29.8	0	23.8
Sep	3	12.8	12.8	0	9.6
Dec	1	5.8	0	5.8	4.1
Totals	26	142.3	98.5	43.8	89.8

PART III - SATELLITE OBSERVATIONS

1. GENERAL

Ice information, including ice edges, concentrations, and large leads or water openings, was interpreted from satellite photographs between 3 March and 5 October. The data for the eastern and western Arctic and Canadian Archipelago are presented in appendixes B and D, respectively.

Ice data derived from ESSA 9 and ITOS I photographs may disagree with aerial reconnaissance data in some cases; however, discrepancies do not always indicate incorrect satellite ice information. Ice edges may be plotted incorrectly owing to navigational problems aboard the aircraft. The width of the ice pack sometimes appears less extensive in a satellite photograph than the width shown on an aerial reconnaissance chart for the same area during an equivalent time period. This specific discrepancy is due to the interpreter's inability to observe ice of less than 3 oktas concentration along an ice edge in the current series of satellite photographs. Leads and large openings observed within the pack ice are labeled "ice free to 3 oktas," unless the analyst was well assured that the area contained no ice, in which case the area was labeled "ice free." The notation "ice free to 3 oktas" generally infers that the center of the area is ice free and that concentrations of 1 to 3 oktas of ice are present along the periphery of the area.

Concentrations within the pack were interpreted by the analyst without reference to aerial reconnaissance data. Concentrations cannot be interpreted to the nearest okta with current resolution, except for fast ice; therefore, concentrations are analyzed in ranges of oktas as shown in appendixes B and D. Analysis of ice conditions covered by extensive cloud cover or under conditions of poor illumination was not possible; therefore, areas of arctic darkness or extensive cloud cover are labeled with the appropriate symbols. Ice edges can be observed occasionally through thin cloud cover; however, the concentrations are difficult to ascertain. In such cases, a cloud symbol outlines the pack ice and terminates at the ice edge.

Continuous satellite coverage of the Arctic, along with consistent interpretation of the satellite data, permits observation of significant changes. Movement of ice edges, opening and closing of flaw or shore leads, changes of concentration, and gradual expansion of large water openings, such as the North Open Water, can be observed.

2. DISSEMINATED SATELLITE DATA

From 28 May until 1 October NAVOCEANO prepared 19 charts showing ice edges, concentrations, and water openings in the eastern Arctic. These

charts were transmitted weekly by facsimile to MSC resupply ships and icebreakers. Ice charts were produced from interpreted satellite data for the eastern and western Arctic and the Canadian Archipelago. A total of 437 charts was mailed to various government agencies. Data were also extracted from these charts and transmitted via radioteletype (RATT) message to icebreakers and cognizant commands.

APPENDIX A

EASTERN ARCTIC ICE CHARTS OBSERVED BY AERIAL RECONNAISSANCE

KEY TO ICE SYMBOLS USED IN PLOTTING ICE FEATURES

TOTAL CONCENTRATION


Ice free


<1 okta* (open water)


1-<3 oktos (very open pack)


3-<6 oktas (open pack)


6-<7 oktas (close pack)


7-<8 oktas (very close pack)


8 oktas (compact pack)

CONC = Concentration
CRK = Crack
CRKS = Cracks
FRCT = Fracture
FRCTV = Very Small Fracture
FRCTS = Small Fracture
FRCTM = Medium Fracture
FRCTL = Large Fracture
LVL = Level Ice
NDTR = Not Determined
NOPG = No Openings in Ice
OPWR = Open Water
SCTD = Scattered
SD = Snow Depth
T = Ice Thickness

COVERAGE BY SIZE

$$\frac{C}{n_1 n_2 n_3}$$

C = total cancentrotion

n_1
- SS/NL = New Ice or Nilas
- PK = Pancoke <3 m
- CK = Brosh, Small Cake, Coke <20 m

n_2
- SF = Small Floe 20—100 m
- MF = Medium Flae 100—500 m

n_3
- BF = Big Floe 500—2000 m
- VF = Vost Floe 2—10 km
- GF = Giant Floe >10 km
- Fast = Fast Ice

Example: $\frac{7}{124}$ PK
- 7 = tatal concentration
- 1 = okta all pancake ice
- 2 = oktas small and medium ice flaes
- 4 = oktos big, vost, and giant ice floes

STAGE OF DEVELOPMENT

$$\frac{A}{\text{oktas predominant, oktas secondary}}$$

AGE — **AVERAGE THICKNESS**

SS = Frazil, Grease, Slush, Shuga
NL = Ice Rind, Dork Nilas, Light Nilos — — <5—10 cm
G = Gray — — — — — — 10—15 cm
GW = Gray-White — — — — — — 15—30 cm
FL = Thin First-Year — — — — — — 30—70 cm
FM = Medium First-Year — — — — — — 70—120 cm
FT = Thick First-Year — — — — — — >120 cm
SY = Second-Year
MY = Multi-Year

Exomple: $\frac{A}{5FM3G}$
- A = Stage of development
- 5FM = 5 oktos Medium First-Year
- 3G = 3 oktas Gray

*One okta equals one-eighth ice concentration

TOPOGRAPHY

- Rafted or Finger-Rafted Ice
- Hummocks
- (N) New Ridges
- (W) Weathered Ridges
- (V) Very Weothered Ridges
- (A) Aged Ridges
- (C) Consolidated Ridges

Example: $\frac{(N)\ (h)}{(n)}$

(h) height af ridges in meters
(n) tenths caverage an ice

STAGE OF MELTING

FPD = Few Puddles
MPD = Mony Puddles
FTH = Few Thaw Holes
MTH = Mony Thaw Holes
DRI = Dried Ice
ROT = Rotten Ice
FLO = Flooded Ice

UNDERCAST

Limit

THICKNESS OF ICE & SNOW

t_E = ice thickness in cm
s = snaw depth in cm

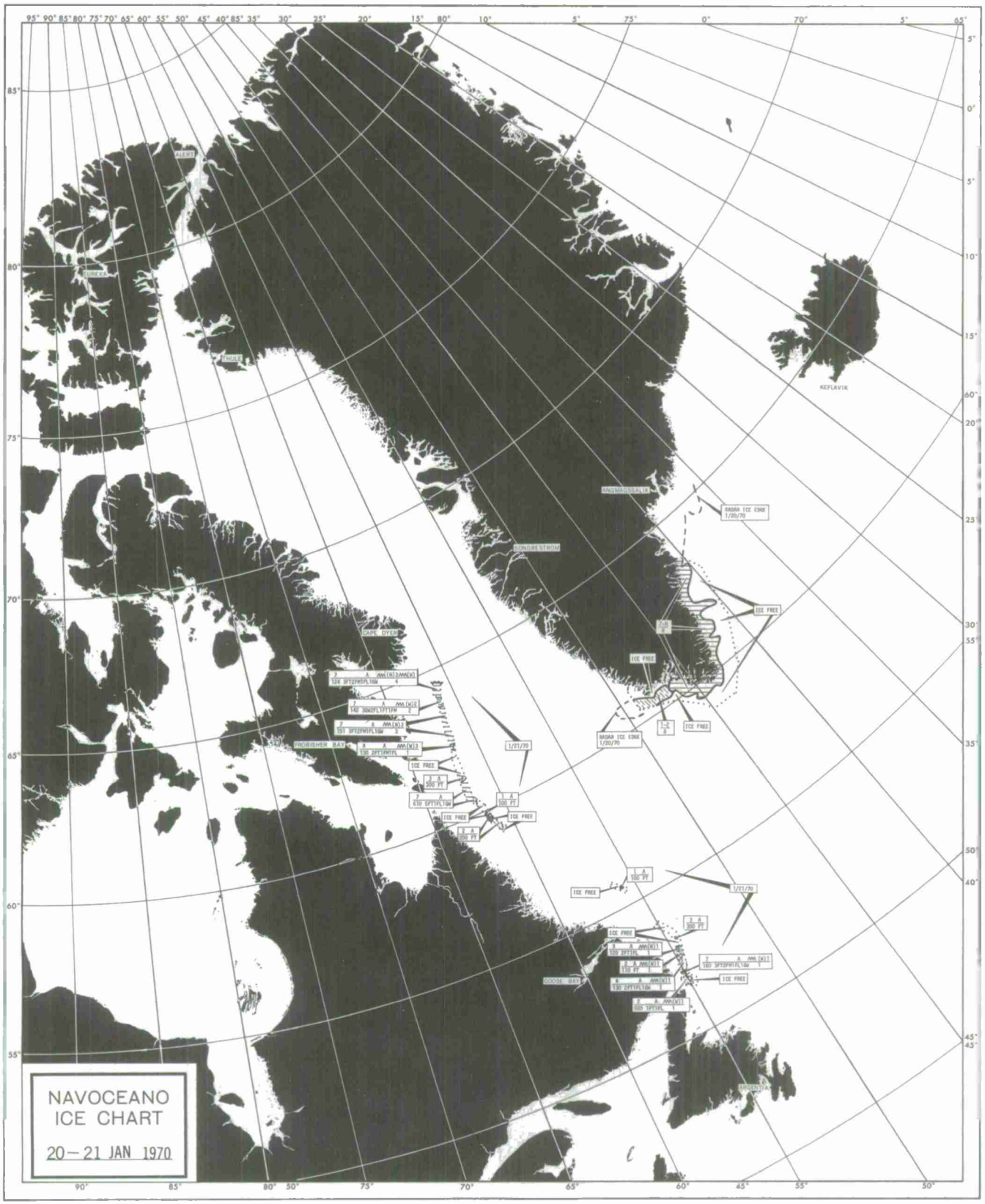
PHENOMENA

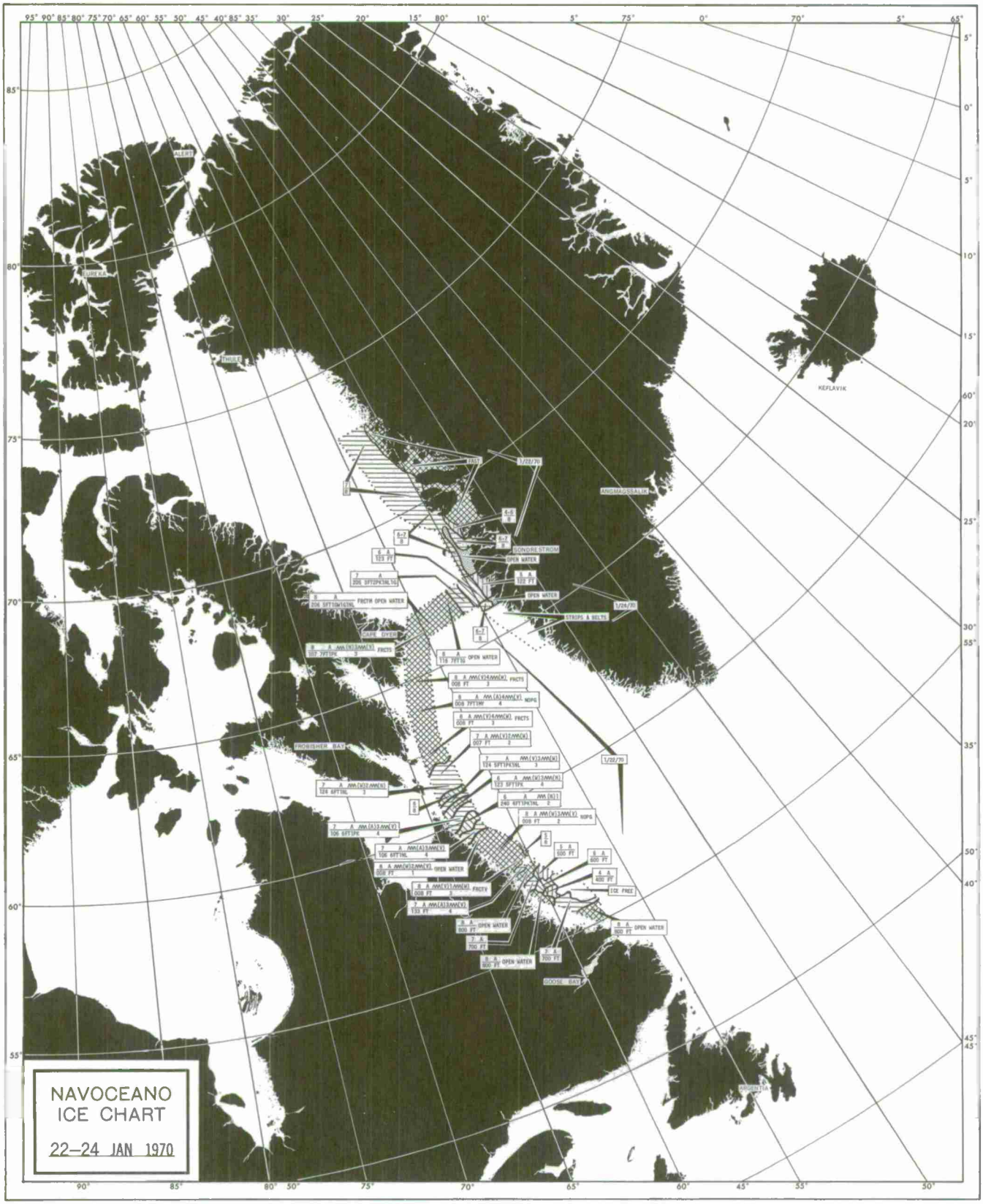
- crack
- fracture
- palynya
- lead
- (n) icebergs
- (n) bergy bits & grawlers

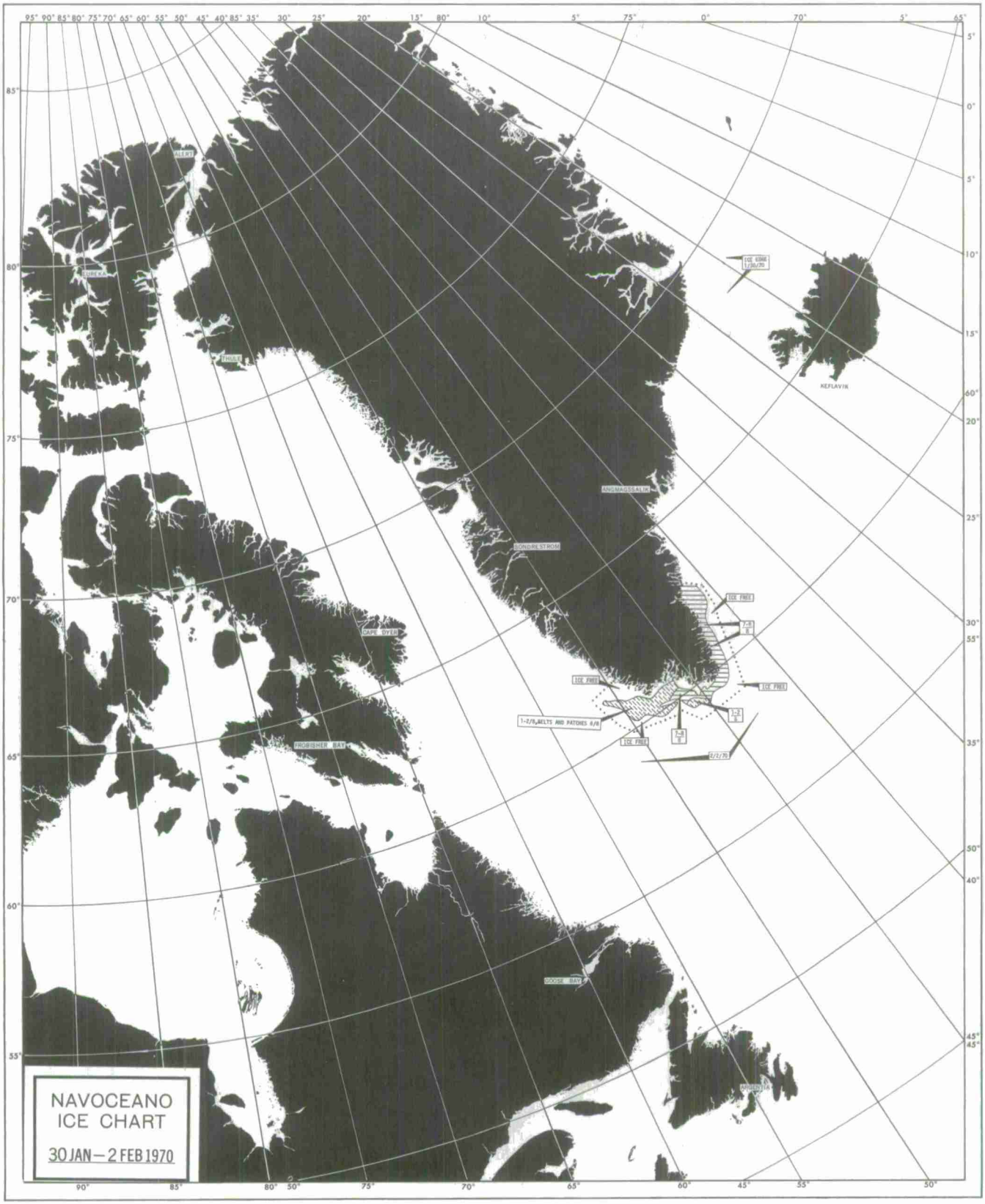
(n) = number in area

ICE EDGE

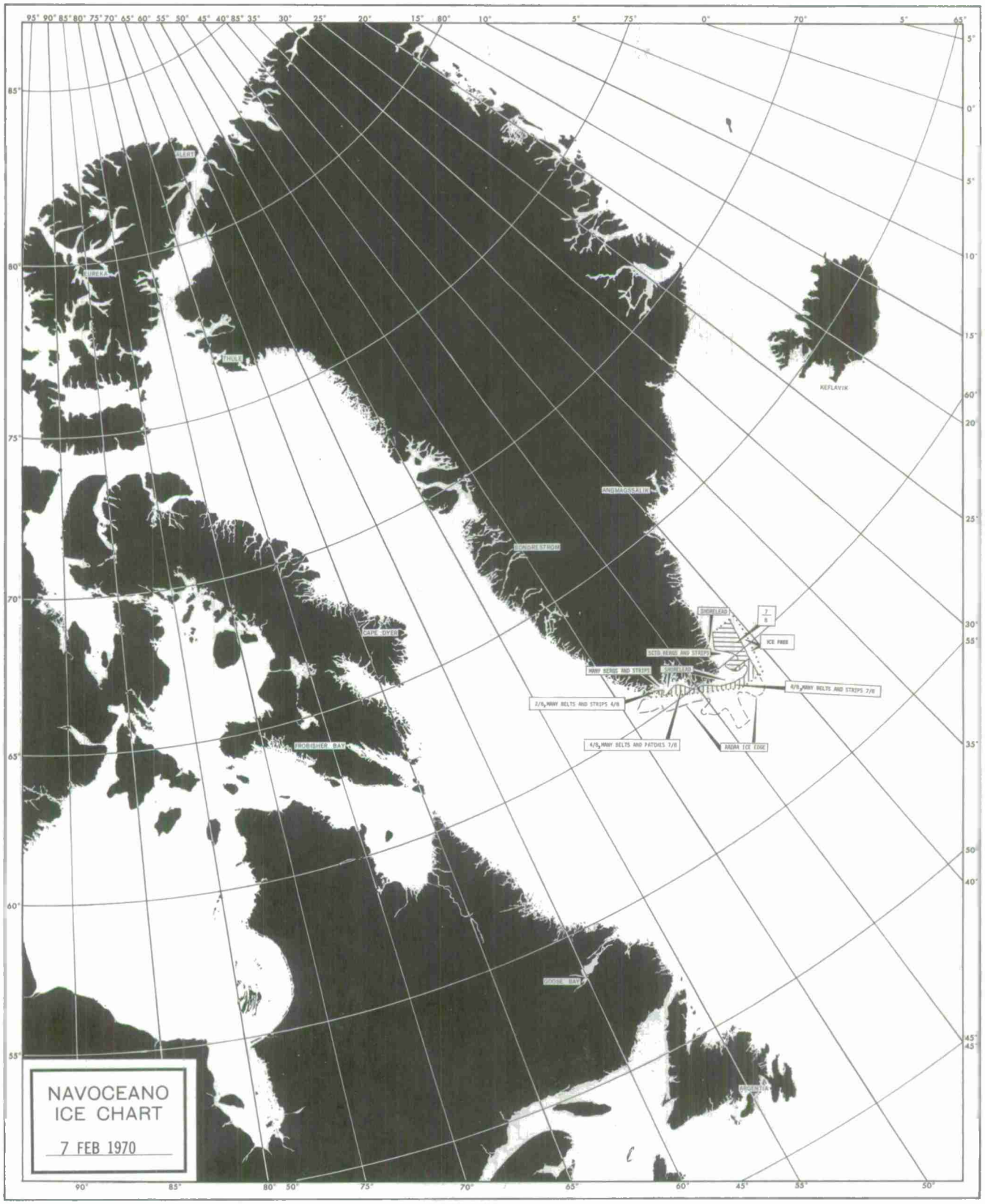
- observed
- radar
- limit of observed data
- satellite data

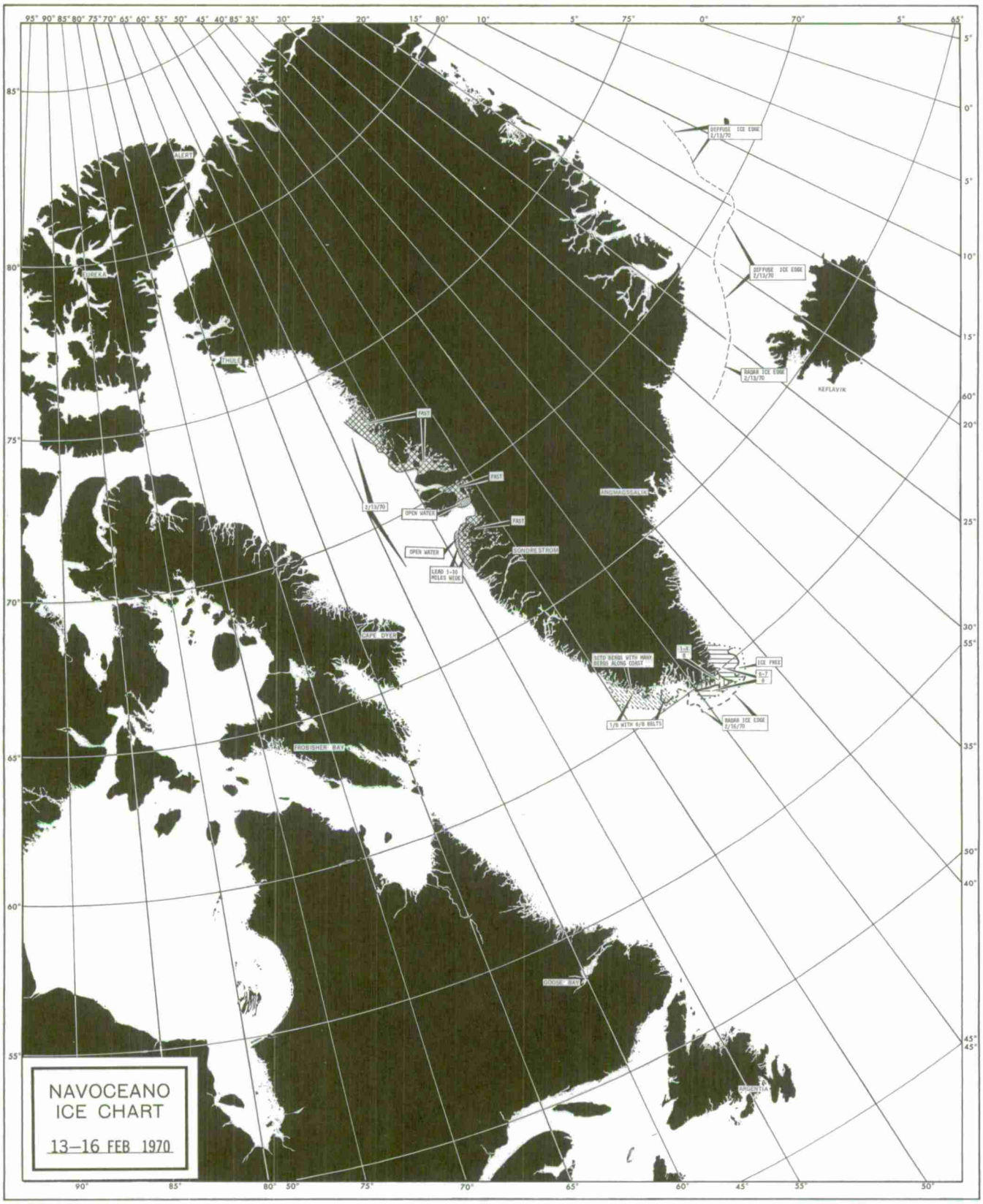

NAVOCEANO
ICE CHART
20 – 21 JAN 1970
KEFLAVIK
ANGMAGSSALIK
RADAR ICE EDGE
1/20/70
ICE FREE
1/21/70
CAPE DYER
FROBISHER BAY
RESOLUTE
ALERT
EUREKA

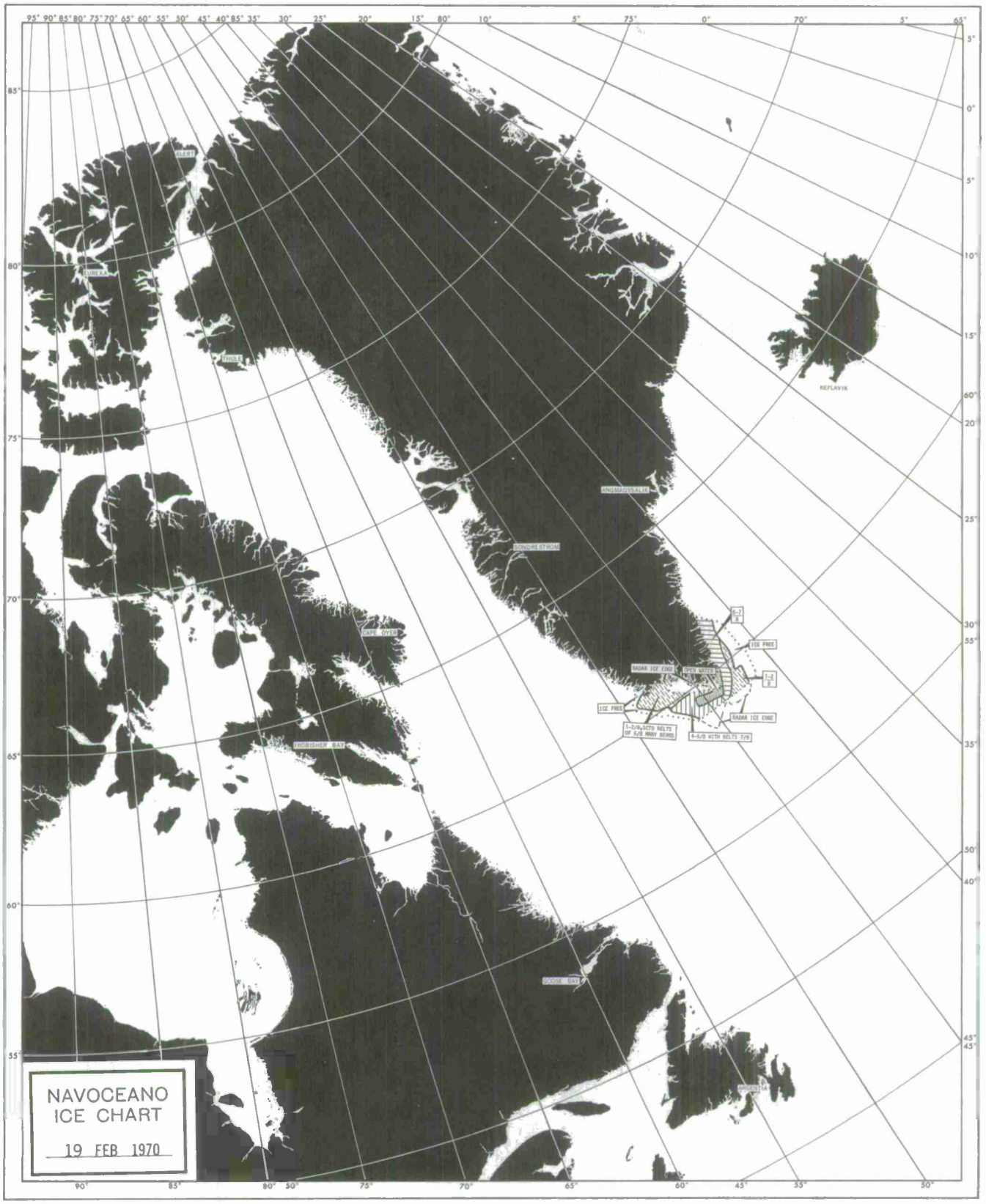

NAVOCEANO
ICE CHART
22–24 JAN 1970
ALERT
THULE
KEFLAVIK
FROBISHER BAY
GOOSE BAY
OPEN WATER
ICE FREE
STRIPS & BELTS
NDPG
FRCTS


NAVOCEANO
ICE CHART
30 JAN – 2 FEB 1970
ALERT
EUREKA
THULE
CAPE DYER
FROBISHER BAY
GOOSE BAY
KEFLAVIK
ANGMAGSSALIK
SONDRE STROM
ICE FREE
1-2/9 MELTS AND PATCHES 6/8
ICE FREE
ICE FREE
ICE FREE
7-8/8
1-2/8
7-8/8


ALERT
EUREKA
THULE
KEFLAVIK
ANGMAGSSALIK
SONDRE STROM
CAPE DYER
FROBISHER BAY
GODTHAB
SCTD BERGS AND GROWLERS
2-10 MILE WIDE SHORE LEAD
MANY BERGS
2/8,MANY BELTS AND STRIPS 4/8
2/8,MANY BERGS AND STRIPS 4/8
NAVOCEANO
ICE CHART
3 FEB 1970


NAVOCEANO
ICE CHART
7 FEB 1970
ALERT
EUREKA
THULE
KEFLAVIK
ANGMAGSSALIK
LABRADOR STREAM
CAPE DYER
PROBISHER BAY
FROBISHER BAY
SNOW LEAD
ICE FREE
ICED BERGS AND STRIPS
MANY BERGS AND STRIPS
2/8 MANY BELTS AND STRIPS 4/8
4/8 MANY BELTS AND STRIPS 7/8
4/8 MANY BELTS AND PATCHES 7/8
RADAR ICE EDGE


NAVOCEANO
ICE CHART
13–16 FEB 1970
ALERT
EUREKA
THULE
FAST
OPEN WATER
LEAD 3-10 MILES WIDE
SCORESTROM
AMMASSALIK
DIFFUSE ICE EDGE 2/13/70
RADAR ICE EDGE 2/13/70
KEFLAVIK
ICE FREE
RADAR ICE EDGE 2/16/70
CAPE DYER
FROBISHER BAY
GOOSE BAY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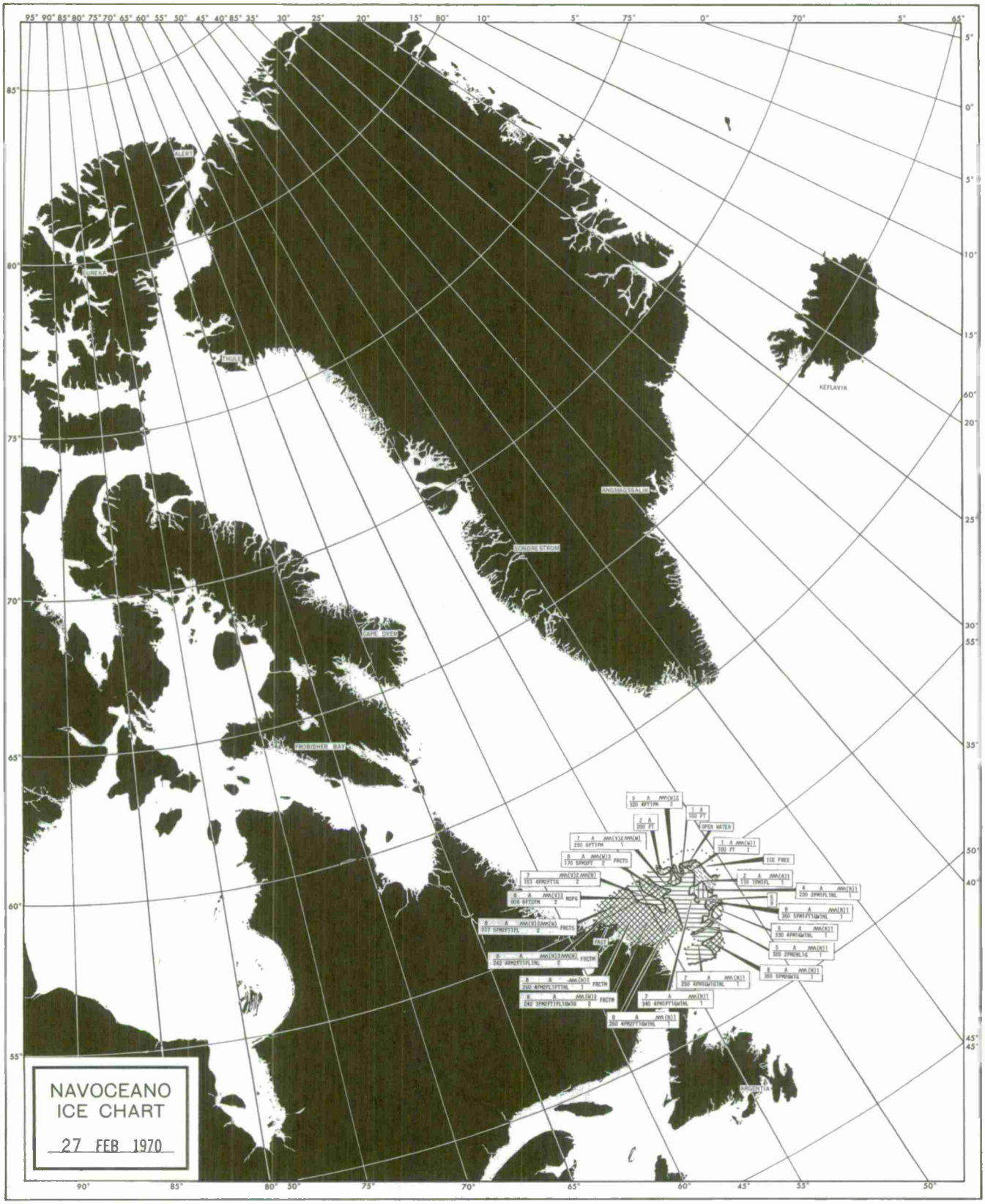
ICE CHART
19 FEB 1970
ALERT
EUREKA
THULE
KEFLAVIK
SONDRE STROM
FROBISHER BAY
GOOSE BAY
ICE FREE
RADAR ICE EDGE
OPEN WATER
1-2/8 SCTD BELTS OF 6/8 MANY BERGS
4-6/8 WITH BELTS 7/8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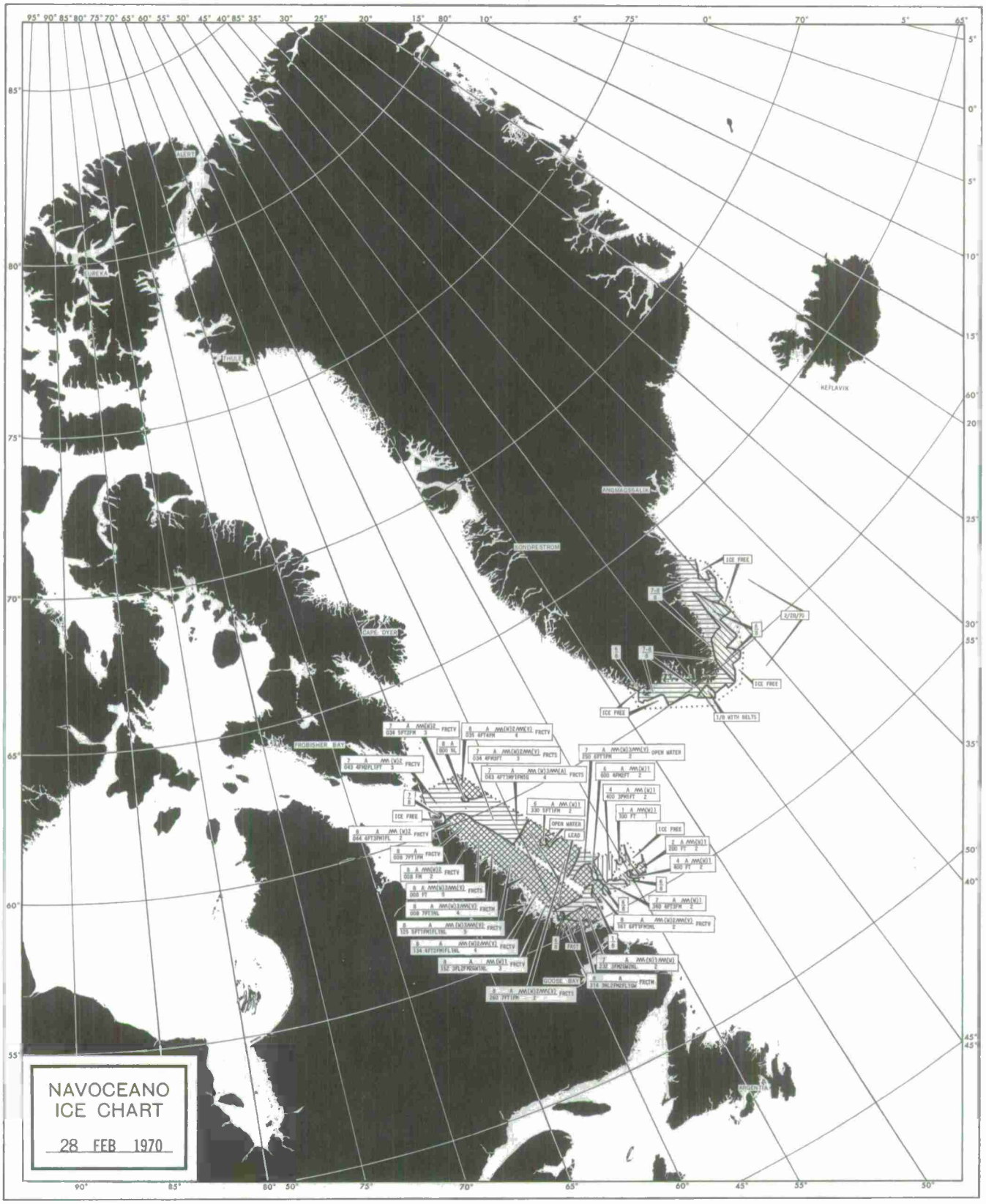
ANDMARSSALIK
SONDRE STROM
CAPE DYER
FROBISHER BAY


NAVOCEANO
ICE CHART
28 FEB 1970
ALERT
EUREKA
THULE
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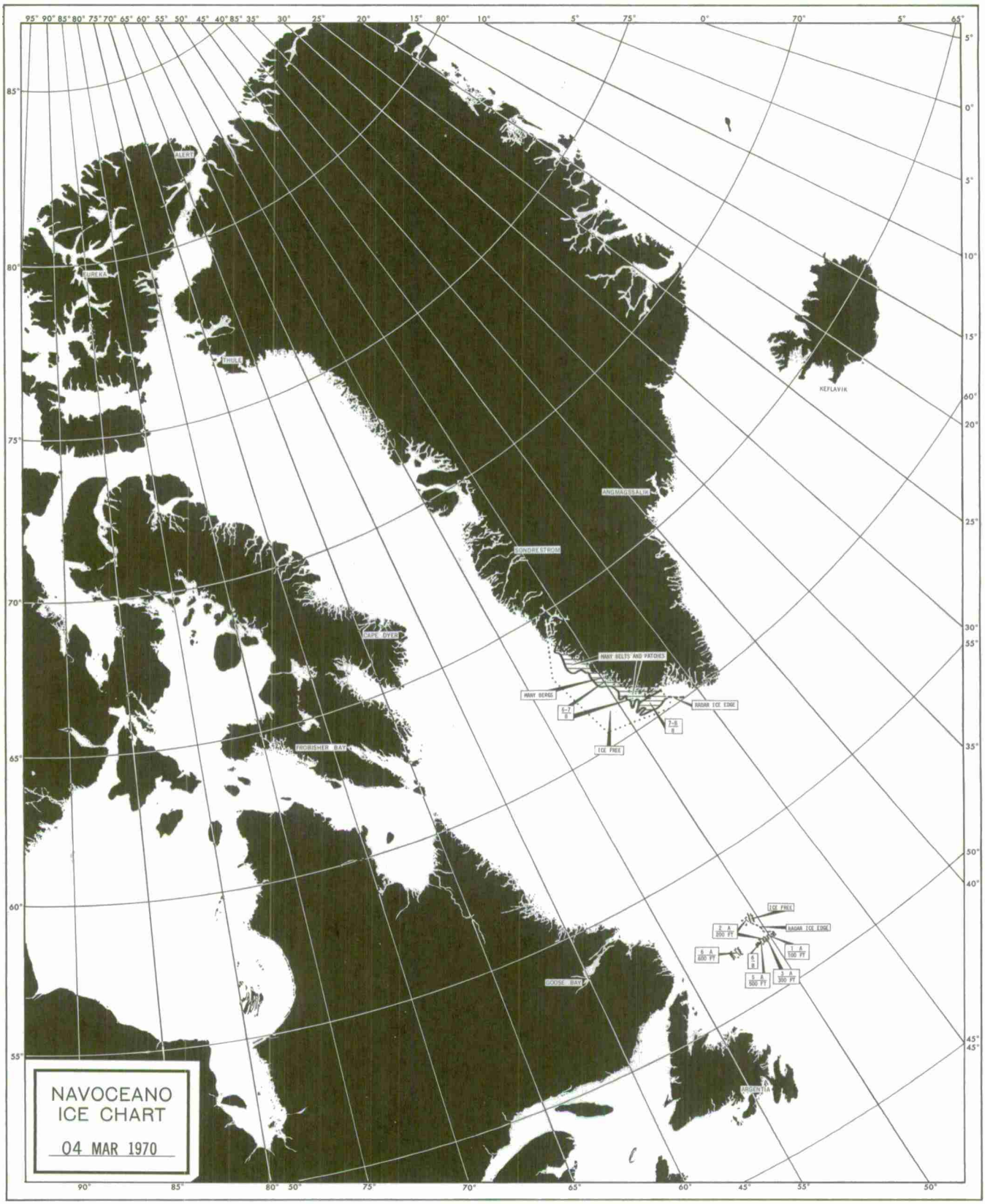
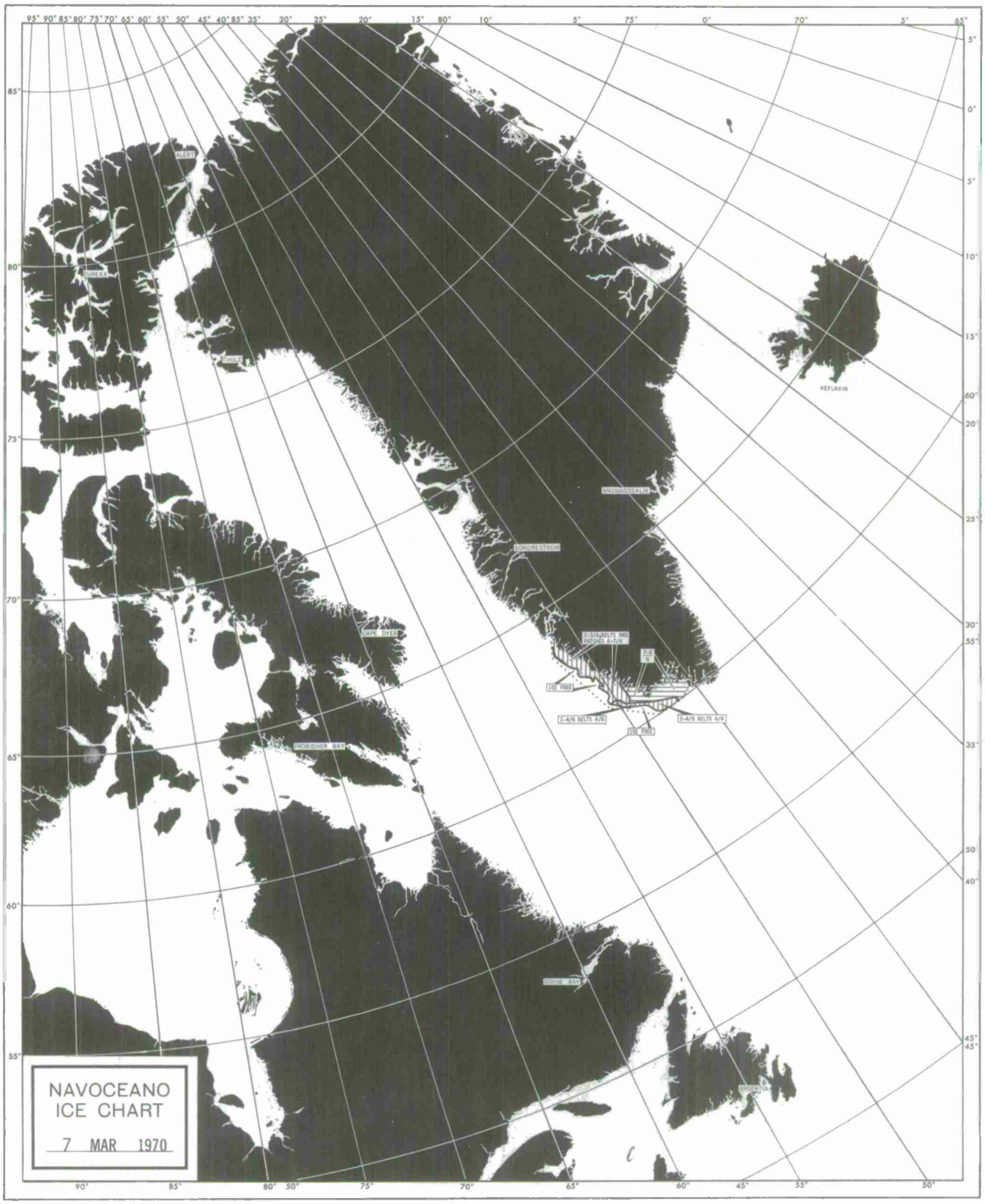
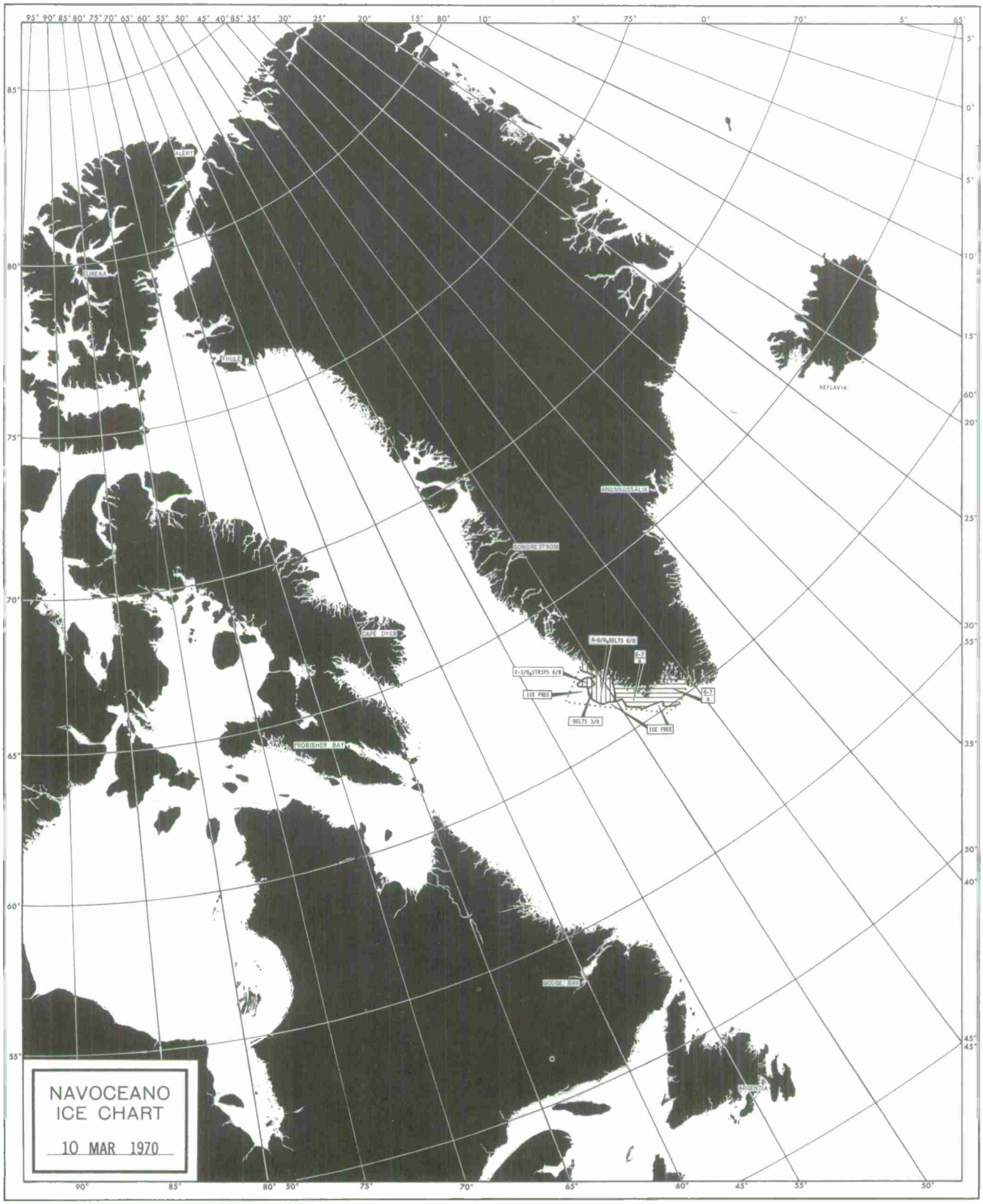
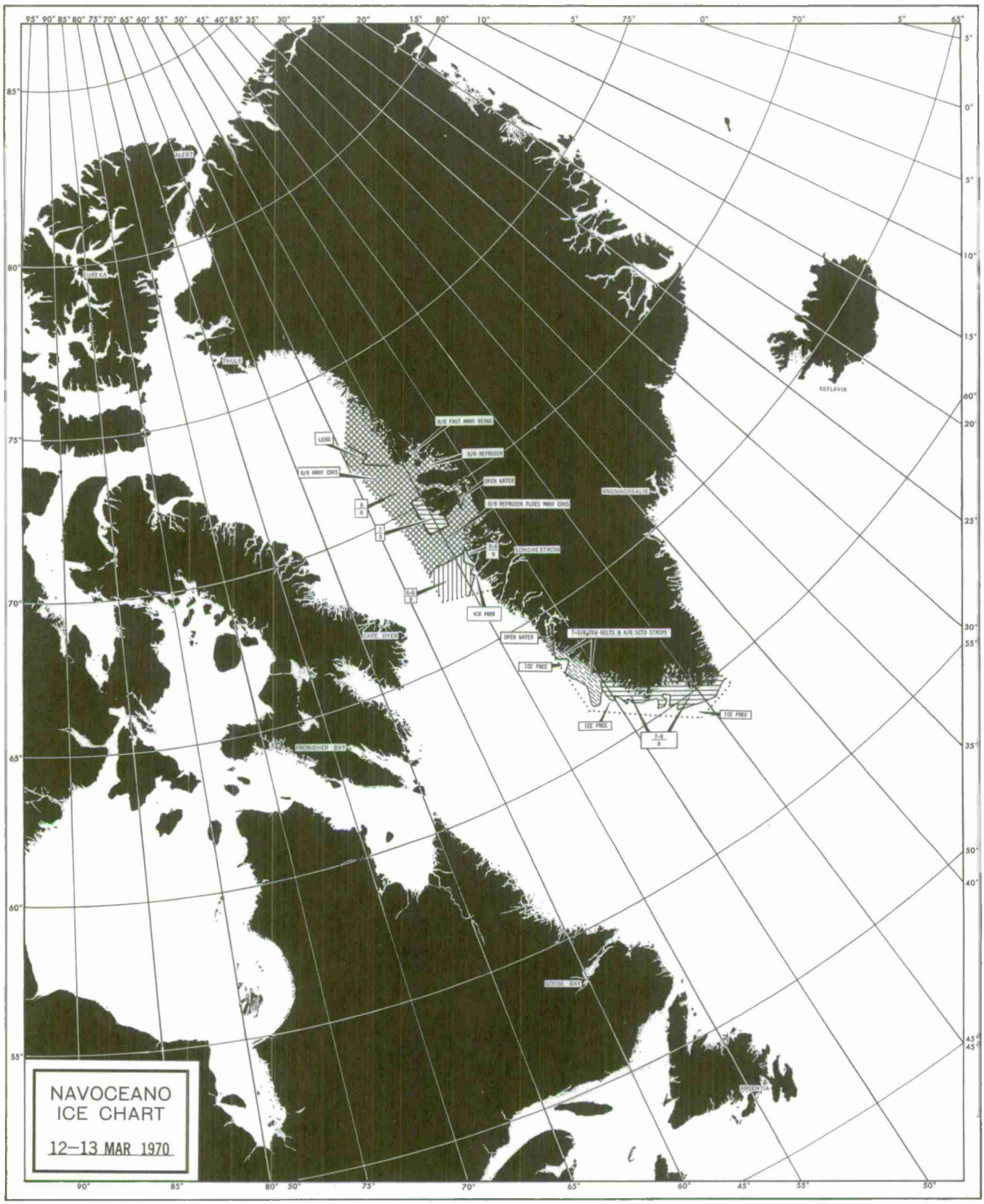
ANGMAGSSALIK
CAPE DYER
FROBISHER BAY
GOOSE BAY
ICE FREE
OPEN WATER
LEAD
1/8 WITH BELTS

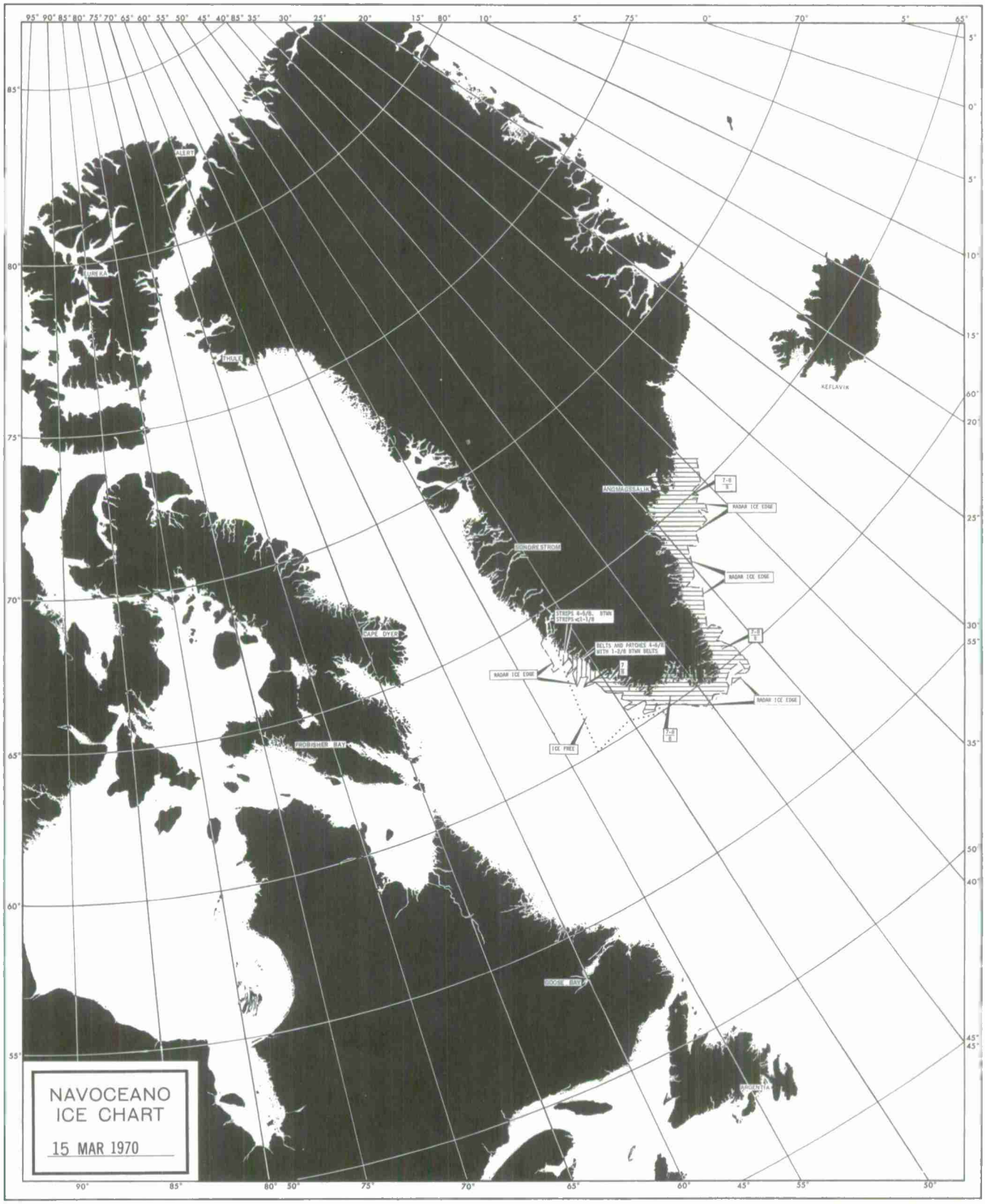

ALERT
EUREKA
THULE
KEFLAVIK
ANGMAGSSALIK
SCORESBY SUND
CAPE DYER
FROBISHER BAY
GOOSE BAY
ARGENTIA
MANY BELTS AND PATCHES
MANY BERGS
RADAR ICE EDGE
ICE FREE
NAVOCEANO
ICE CHART
04 MAR 1970

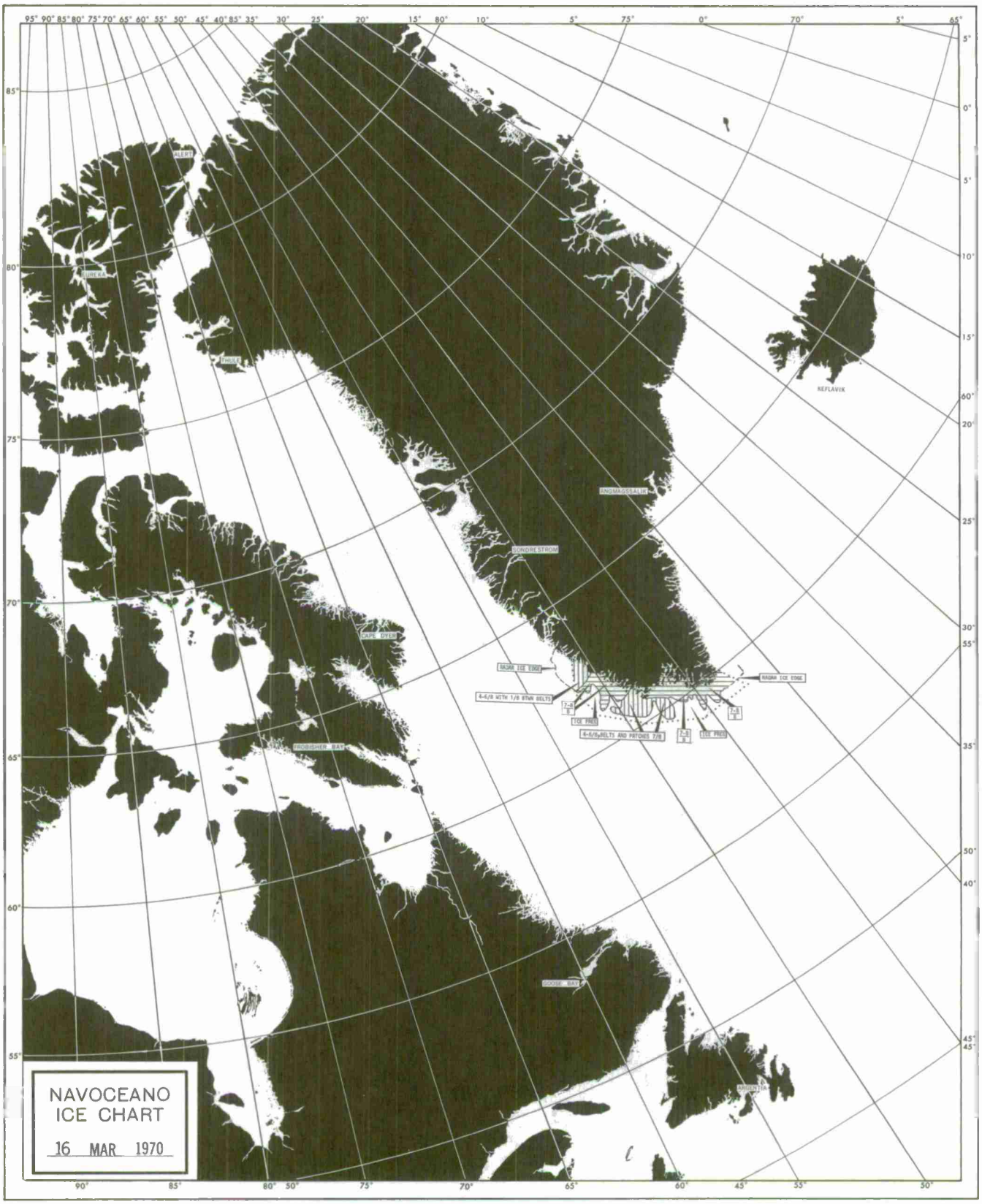

NAVOCEANO
ICE CHART
7 MAR 1970
ALERT
EUREKA
THULE
KEFLAVIK
NORDRESTROM
CAPE DYER
FROBISHER BAY
2-3/8 BELTS AND PATCHES 4-5/8
ICE FREE
2-4/8 BELTS 4/8
2-4/8 BELTS 4/8
ICE FREE

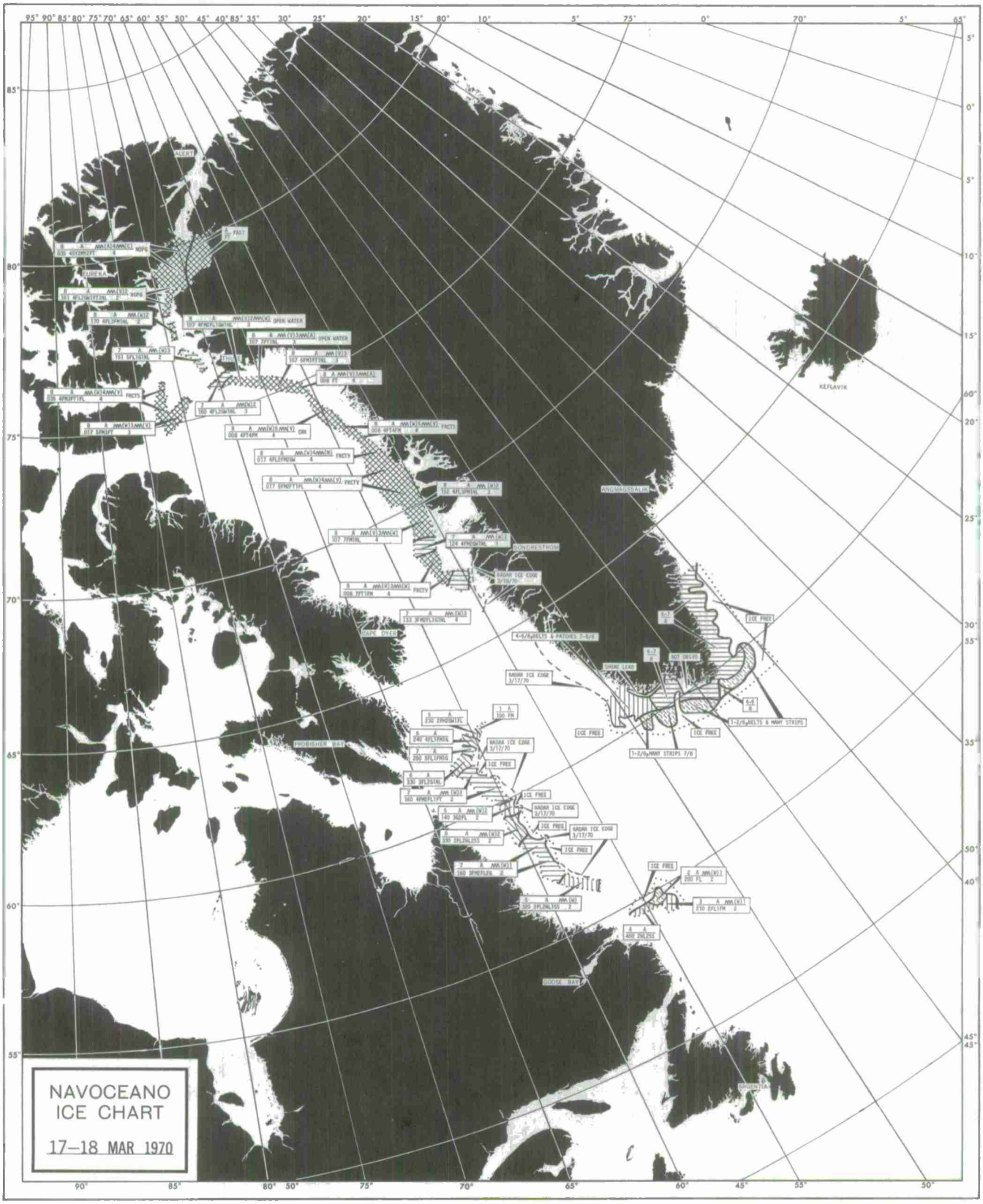

ALERT
EUREKA
THULE
KEFLAVIK
ANGMAGSSALIK
BONDE STROM
CAPE DYER
FROBISHER BAY
GOOSE BAY
ARGENTIA
E-7/8 FEW PATCHES 4-6/8
2/8 PATCHES 4/8
ICE FREE
RADAR ICE EDGE
RADAR OBSERVED FEW BELTS AND STRIPS ALONG ICE EDGE
NAVOCEANO
ICE CHART
9 MAR 1970


NAVOCEANO
ICE CHART
10 MAR 1970
ALERT
EUREKA
THULE
KEFLAVIK
ANGMAGSSALIK
DENMARK STROM
CAPE DYER
FROBISHER BAY
GODTHAB
BAGENTIA
4-6/8 BELTS 6/8
7-8/8
2-3/8 STRIPS 6/8
ICE FREE
BELTS 3/8
ICE FREE
8-7/8

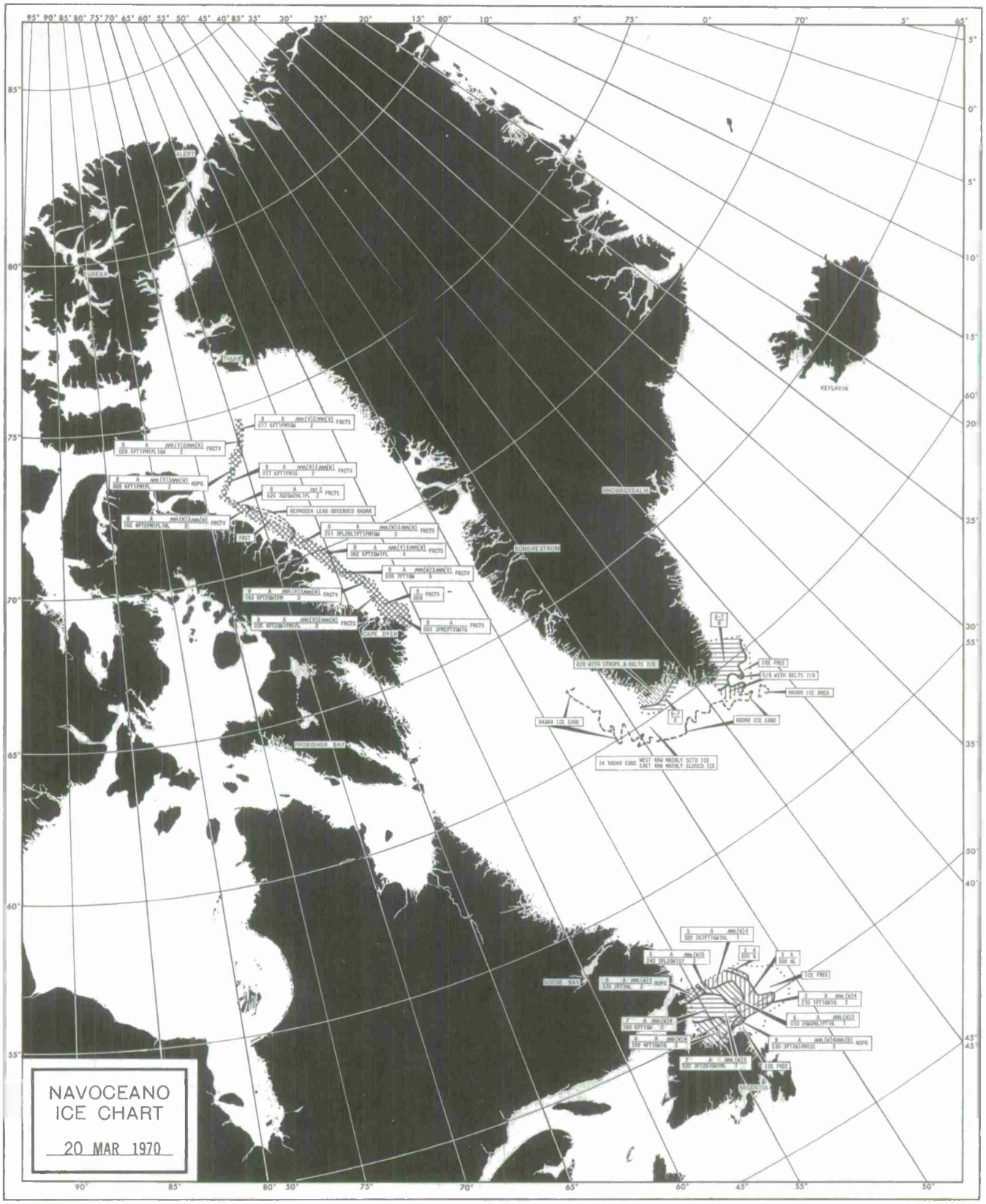

NAVOCEANO
ICE CHART
12–13 MAR 1970
ALERT
EUREKA
THULE
KEFLAVIK
6/8 FAST MANY BERGS
LEAD
6/8 REFROZEN
8/8 MANY CRKS
OPEN WATER
6/8 REFROZEN FLOES MANY CRKS
8/8
7/8
6-8/8
4-6/8
JONDRESTROM
ICE FREE
OPEN WATER
ICE FREE
1-3/8 FEW BELTS & 6/8 SCTD STRIPS
ICE FREE
ICE FREE
7-8/8
CAPE DYER
FROBISHER BAY
GOOSE BAY
GREENLAND

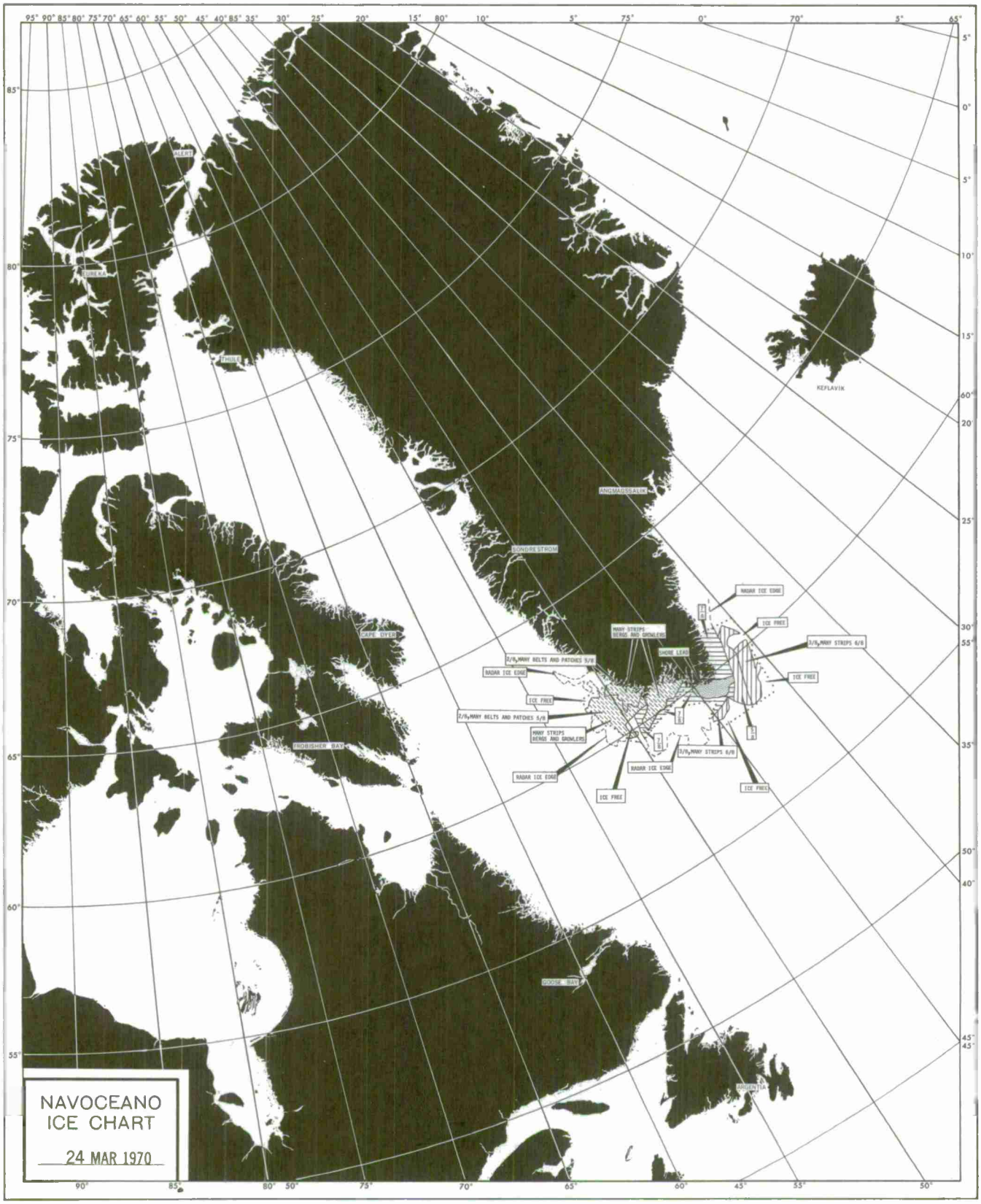

NAVOCEANO
ICE CHART
15 MAR 1970
ALERT
EUREKA
THULE
KEFLAVIK
ANGMAGSSALIK
RADAR ICE EDGE
RADAR ICE EDGE
RADAR ICE EDGE
RADAR ICE EDGE
ICE FREE
BELTS AND PATCHES 4-6/8 WITH 1-3/8 BTWN BELTS
STREPS 4-6/8, BTWN STREPS <1-1/8
CAPE DYER
PROBISHER BAY
GOOSE BAY


NAVOCEANO
ICE CHART
16 MAR 1970
ALERT
THULE
KEFLAVIK
ANGMAGSSALIK
JONDRESTROM
CAPE DYER
FROBISHER BAY
GOOSE BAY
NARSARSSUAQ
NARSARSSUAQ
NARSARSSUAQ
4-6/8 WITH 1/8 8TWN BELTS
4-6/8 BELTS AND PATCHES 7/8
7-8/8
7-8/8
7-8/8
ICE FREE
ICE FREE
ICE FREE


NAVOCEANO
ICE CHART
17–18 MAR 1970
ALERT
EUREKA
KEFLAVIK
ANGMASSALIK
BUNDRESTROM
PROBISHER BAY
GOOSE BAY
SYDNEY
FAST
OPEN WATER
RADAR ICE EDGE 3/17/70
ICE FREE
4-6/8 BELTS & PATCHES 7-8/8
1-2/8 BELTS & MANY STRIPS
1-2/8 MANY STRIPS 7/8
SMOKE LEAD

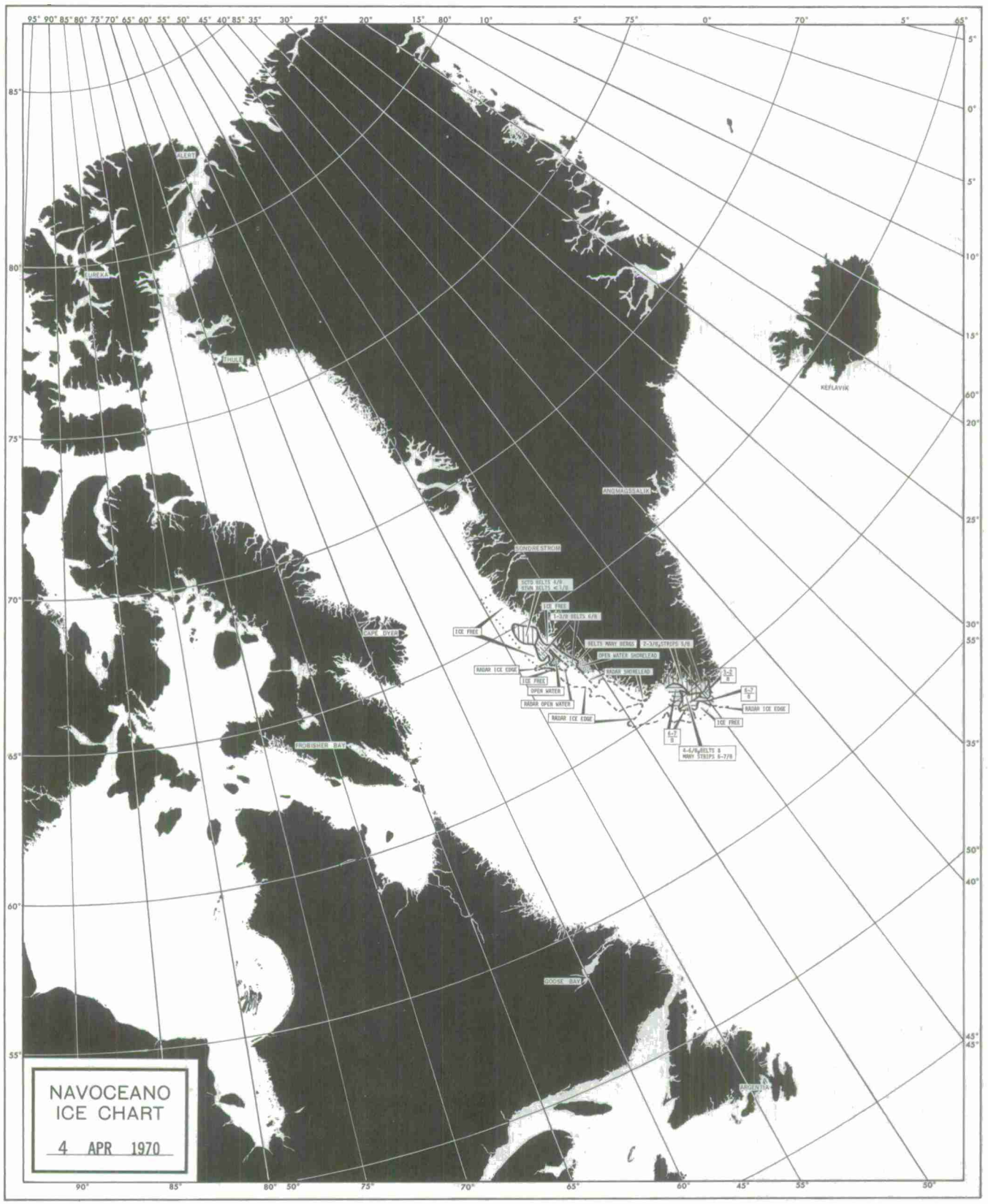

NAVOCEANO
ICE CHART
19 MAR 1970
ALERT
EUREKA
THULE
KEFLAVIK
ANGMAGSSALIK
SONDRESTROM
CAPE DYER
FROBISHER BAY
GOOSE BAY

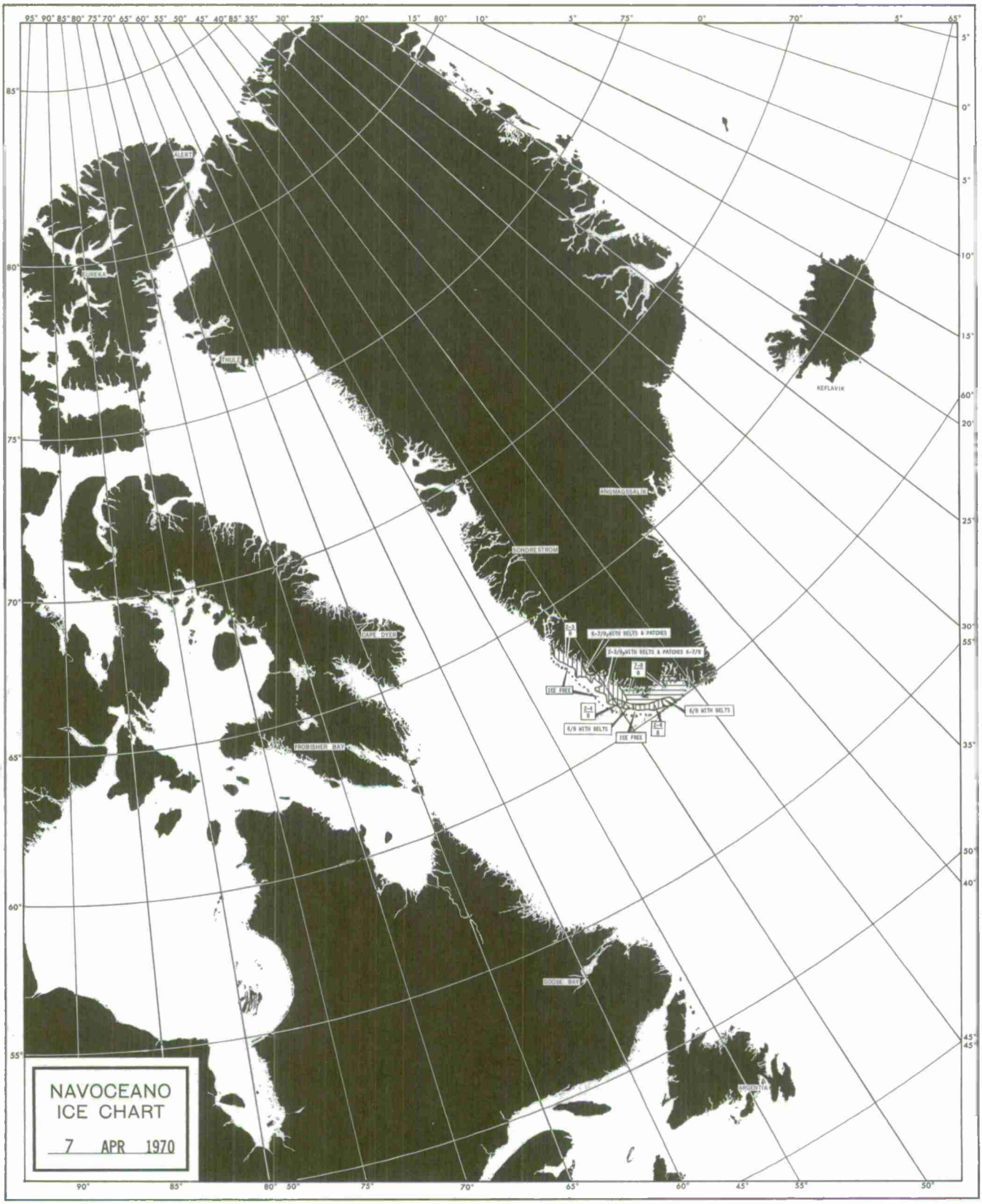

NAVOCEANO
ICE CHART
20 MAR 1970
ALERT
EUREKA
THULE
KEFLAVIK
ANDMASSA IC
JONDRESTROM
FAST
CAPE DYER
FROBISHER BAY
GOOSE BAY
2/8 WITH STRIPS 6-8TLS 7/8
ICE FREE
5/8 WITH BELTS 7/8
RADAR ICE AREA
RADAR ICE EDGE
RADAR ICE EDGE
IN RADAR EDGE
WEST 40W MAINLY SCTD ICE
EAST 40W MAINLY CLOSED ICE
ICE FREE
ICE FREE

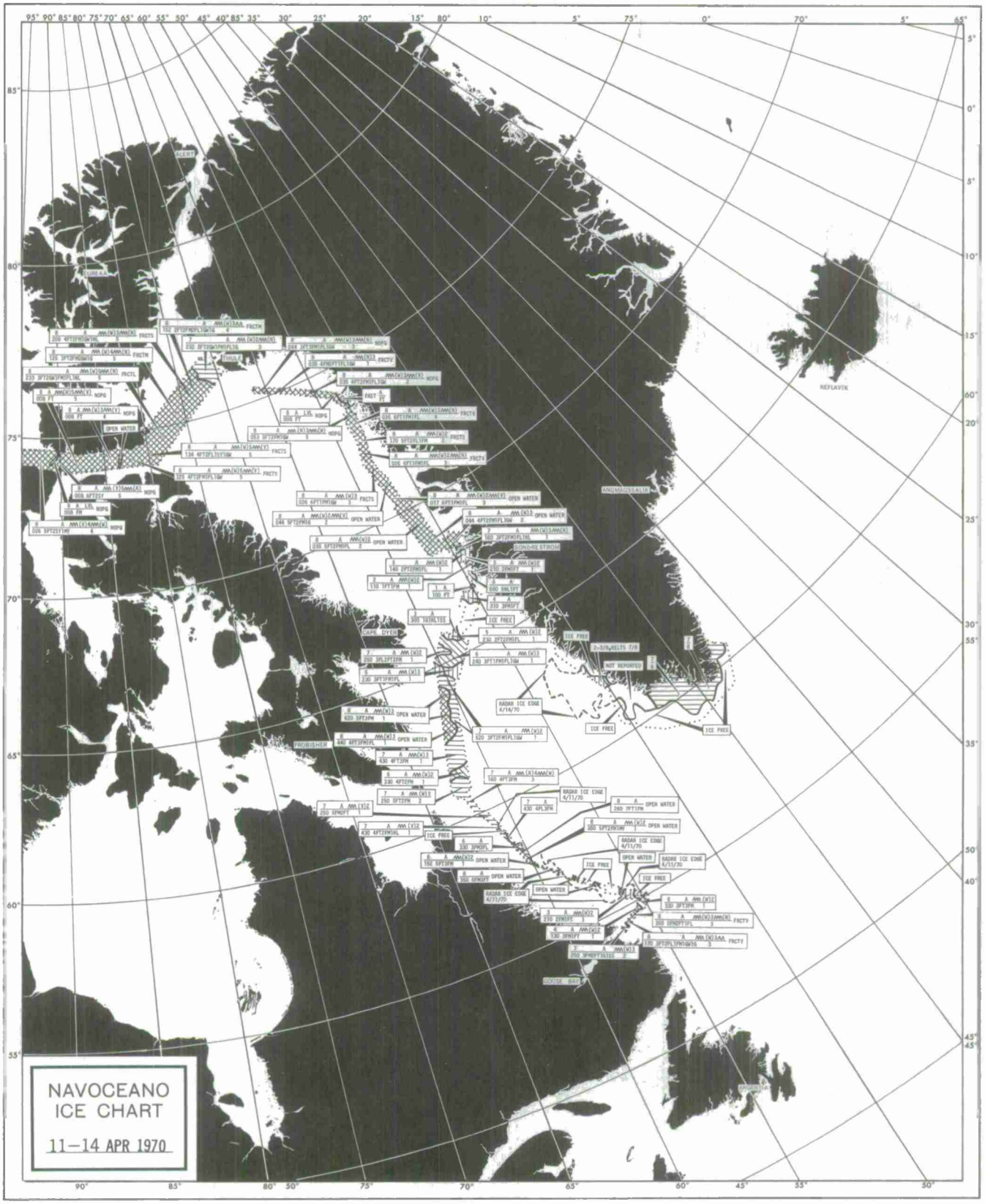

NAVOCEANO
ICE CHART
24 MAR 1970
ALERT
EUREKA
THULE
KEFLAVIK
ANGMASSALIK
BONDRESTROM
CAPE DYER
FROBISHER BAY
GOOSE BAY
RADAR ICE EDGE
ICE FREE
MANY STRIPS
BERGS AND GROWLERS
SHORE LEAD
2/8 MANY BELTS AND PATCHES 5/8
2/8 MANY STRIPS 6/8

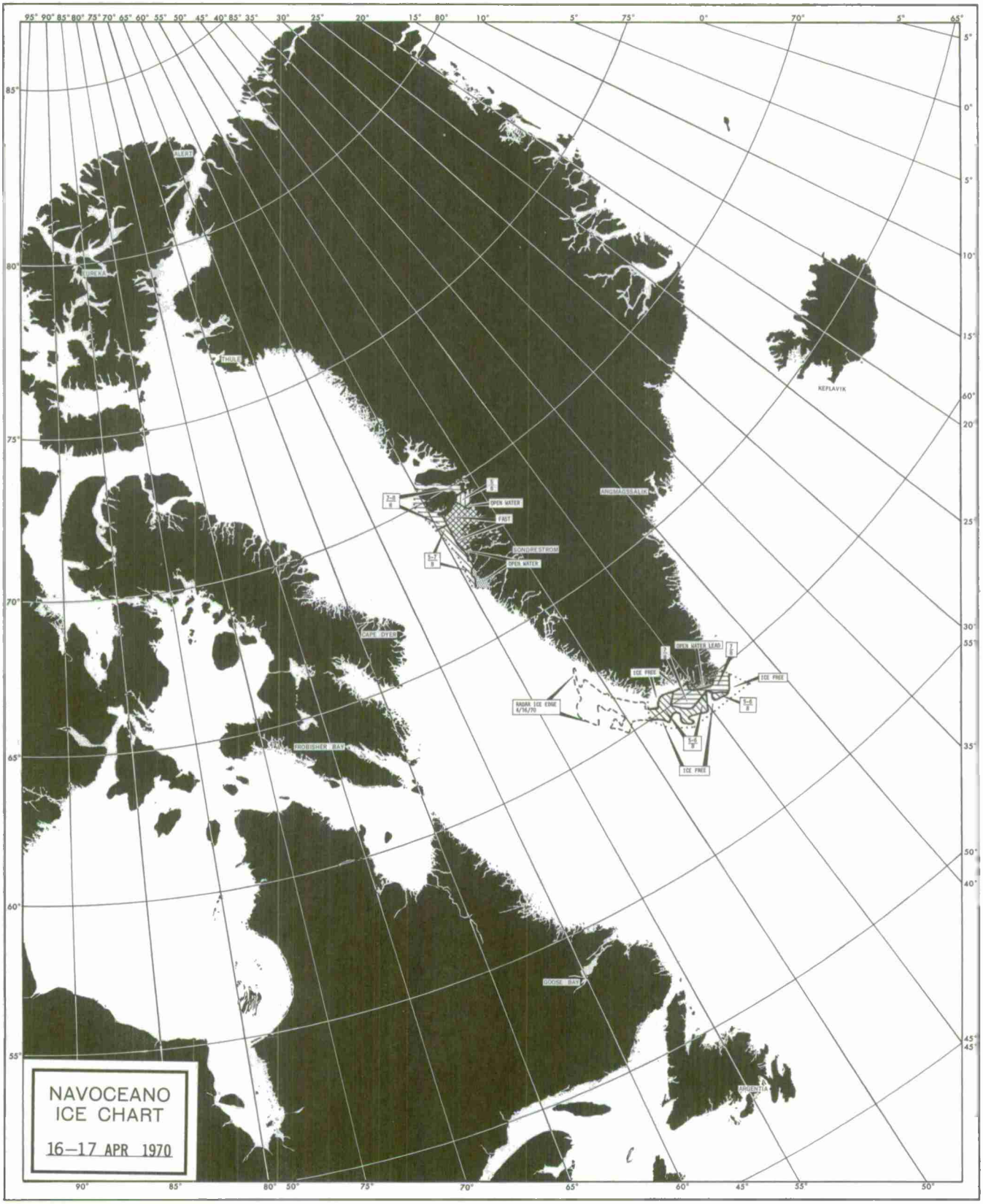

ALERT
EUREKA
THULE
KEFLAVIK
ANGMAGSSALIK
IGNOKESTROM
CAPE DYER
FROBISHER BAY
GOOSE BAY
ARGENTIA
NAVY BERG
ICE FREE
ICE FREE
ICE FREE
OPEN WATER NAVY BERGS FEW STRIPS
RADAR ICE EDGE
NAVOCEANO
ICE CHART
28 MAR 1970


ALERT
THULE
KEFLAVIK
ANGMAGSSALIK
GODTHEBSTROM
CAPE DYER
PROBISHER BAY
GOOSE BAY
ARGENTIA
7-8
8
1-3/8 WITH BELTS & PATCHES 6-8/8
RADAR ICE EDGE
ICE FREE
NAVOCEANO
ICE CHART
1 APR 1970


NAVOCEANO
ICE CHART
4 APR 1970
ALERT
THULE
CAPE DYER
FROBISHER BAY
GOOSE BAY
KEFLAVIK
ANGMAGSSALIK
SONDRESTROM
ICE FREE
RADAR ICE EDGE
OPEN WATER
RADAR OPEN WATER
RADAR SHORELEAD
OPEN WATER SHORELEAD
RADAR ICE EDGE
ICE FREE
RADAR ICE EDGE
ICE FREE


NAVOCEANO
ICE CHART
7 APR 1970
ALERT
EUREKA
THULE
KEFLAVIK
AKIMIAGDALIK
SONDRESTROM
CAPE DYER
FROBISHER BAY
GOOSE BAY
ARGENTIA
6-7/8 WITH BELTS & PATCHES
6-7/8 WITH BELTS
ICE FREE
6/8 WITH BELTS
ICE FREE
6/8 WITH BELTS


NAVOCEANO
ICE CHART
11–14 APR 1970
KEFLAVIK
ALERT
EUREKA
PROBISHER
CAPE DYER
ICE FREE
OPEN WATER
RADAR ICE EDGE 4/14/70
RADAR ICE EDGE 4/11/70
NOT REPORTED
2-3/10 BELTS 7/8

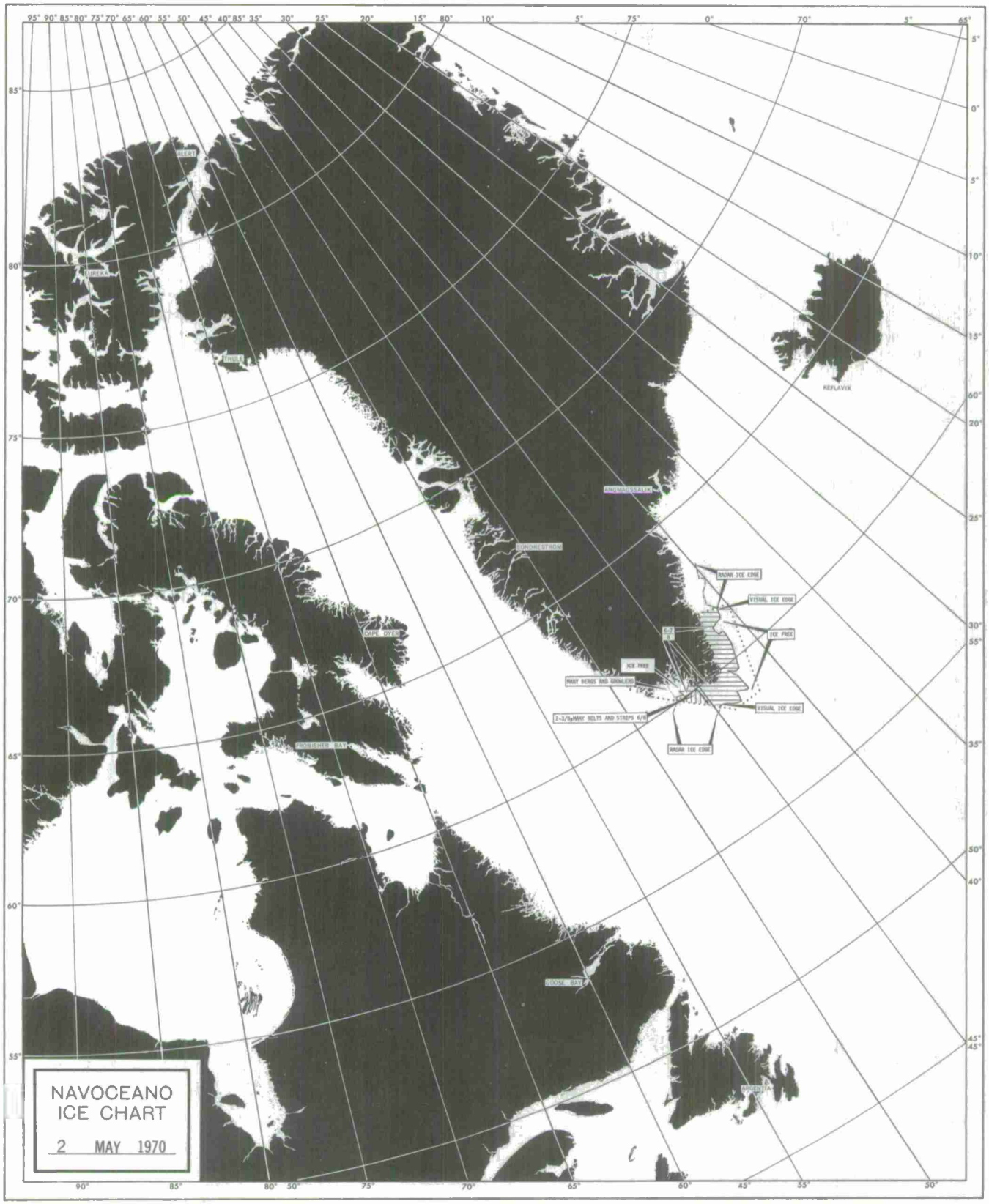

NAVOCEANO
ICE CHART
16–17 APR 1970
ALERT
EUREKA
THULE
KEFLAVIK
ANGMASSALIK
OPEN WATER
FAST
SONDRESTROM
OPEN WATER
CAPE DYER
OPEN WATER LEAD
ICE FREE
ICE FREE
RADAR ICE EDGE
4/16/70
ICE FREE
FROBISHER BAY
GOOSE BAY
ARGENTIA

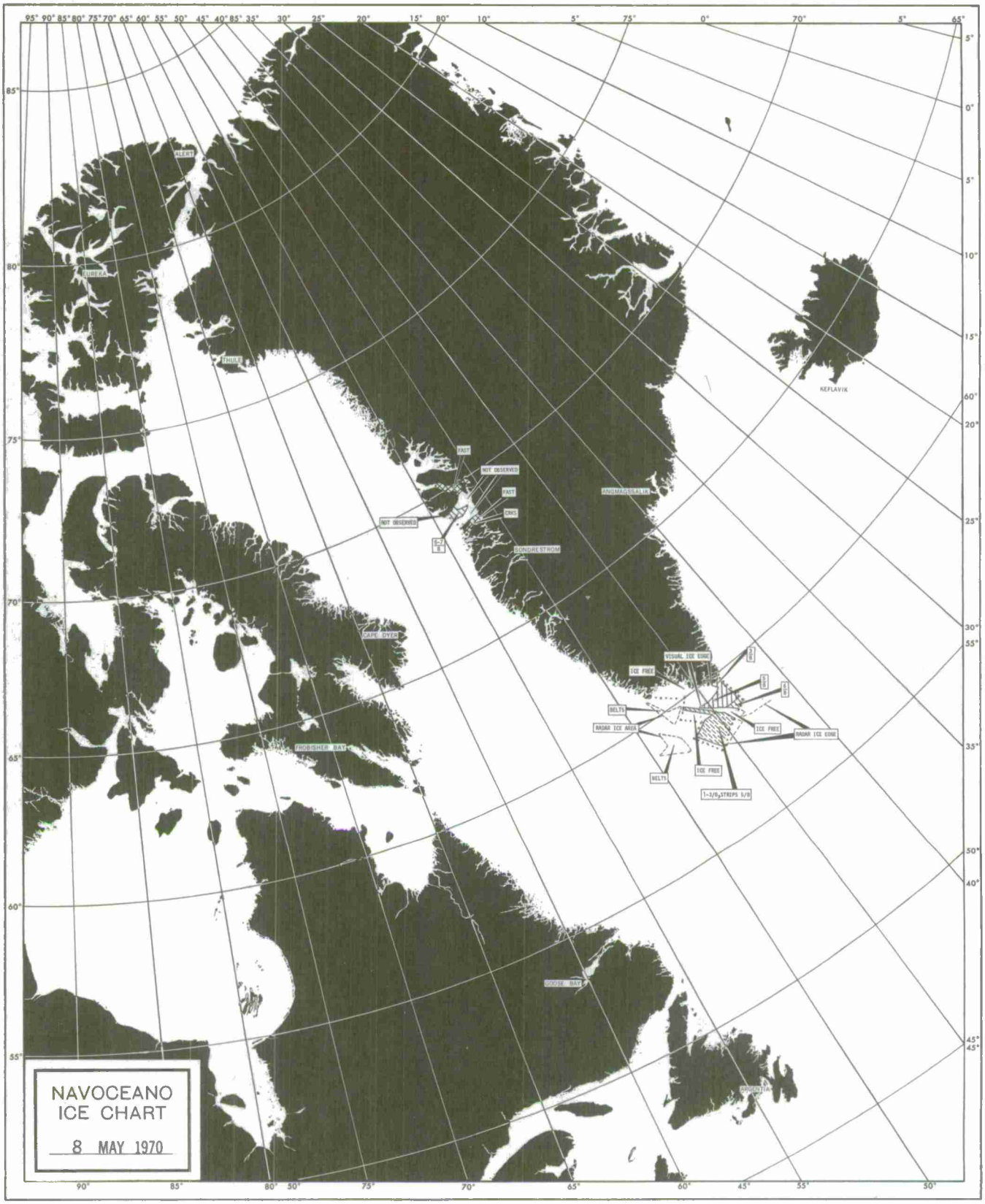

NAVOCEANO
ICE CHART
20–21 APR 1970
ALERT
EUREKA
THULE
SONDRESTROM
KEFLAVIK
ANGMAGSSALIK
SHORELAND
CAPE DYER
PROBISHER BAY
FROBISHER BAY
RADAR ICE EDGE 4/20/70
RADAR ICE EDGE 4/21/70
OPEN WATER
ICE FREE
RADAR OPEN WATER
BELTS OF ICE SHOULD BE EXPECTED NORTH EAST OF LINE

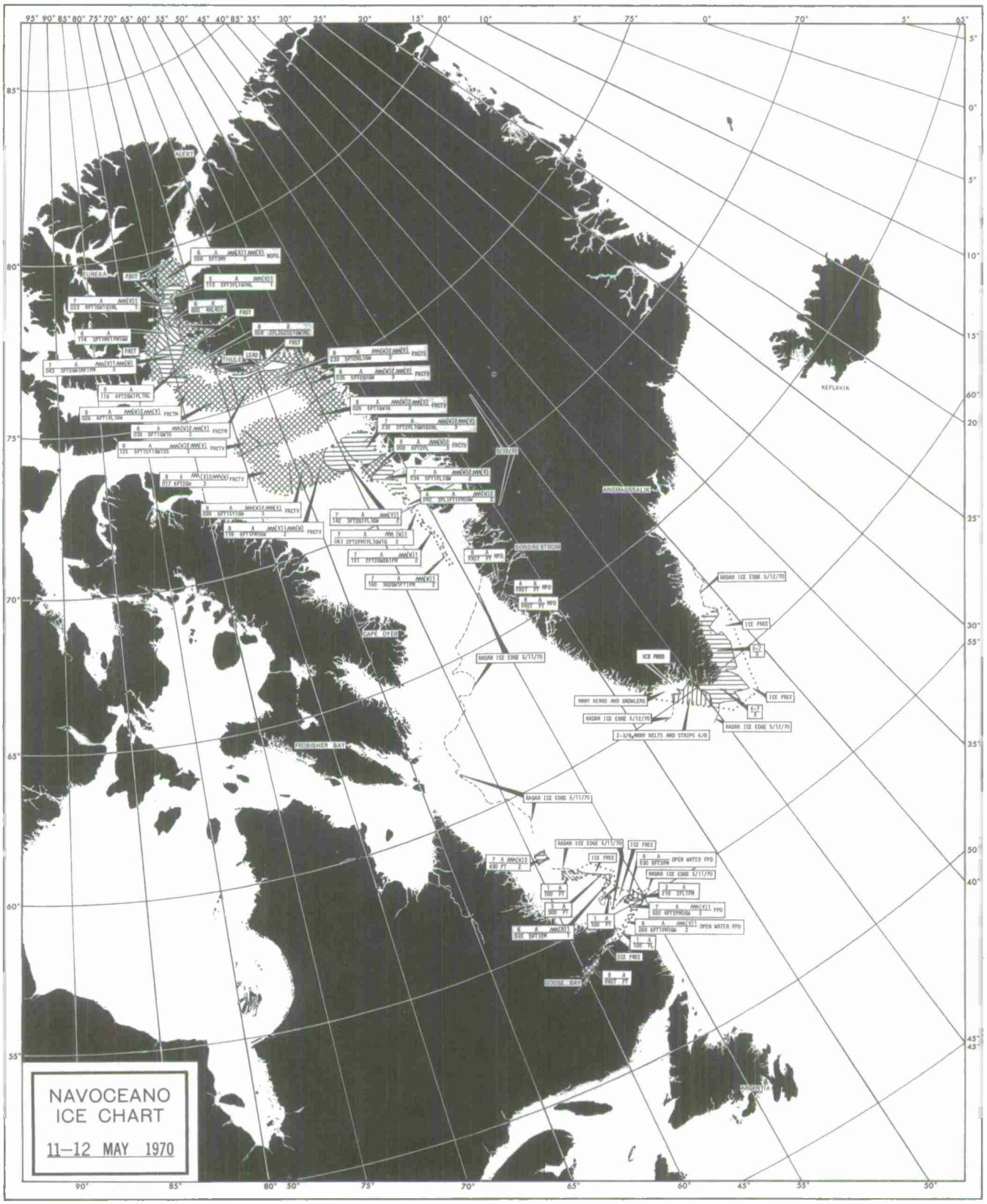

NAVOCEANO
ICE CHART
23 APR 1970
ALERT
EUREKA
THULE
KEFLAVIK
ANGMAGSSALIK
SONDRESTROM
CAPE DYER
PROBISHER BAY
GOOSE BAY
ICE FREE SHORELEAD
RADAR SHORELEAD
RADAR ICE FREE
ICE FREE
RADAR ICE EDGE
4-5/8, WAY STRIPS 6/8


NAVOCEANO
ICE CHART
28 APR 1970
ALERT
THULE
REFLAVIK
SONDRESTROM
CAPE DYER
FROBISHER BAY
GOOSE BAY
NOT OBSERVED


NAVOCEANO
ICE CHART
1 MAY 1970
ALERT
EUREKA
THULE
KEFLAVIK
ANGMAGSSALIK
BONDRE STROM
CAPE DYER
PROBISHER BAY
GOOSE BAY
ORIENTIA
VISUAL ICE EDGE
ICE FREE
<1/8 WITH FEW STRIPS
1-3/8 FEW BELTS HWY STRIPS
7-8/8
MANY BERGS AND GROWLERS
ICE FREE
RADAR ICE EDGE


NAVOCEANO
ICE CHART
2 MAY 1970
ALERT
EUREKA
THULE
KEFLAVIK
ANGMAGSSALIK
SUNDHEIMHOM
CAPE DYER
FROBISHER BAY
RADAR ICE EDGE
VISUAL ICE EDGE
ICE FREE
ICE FREE
HEAVY BERGS AND GROWLERS
2-3/8 HEAVY BELTS AND STRIPS 6/8
VISUAL ICE EDGE
RADAR ICE EDGE

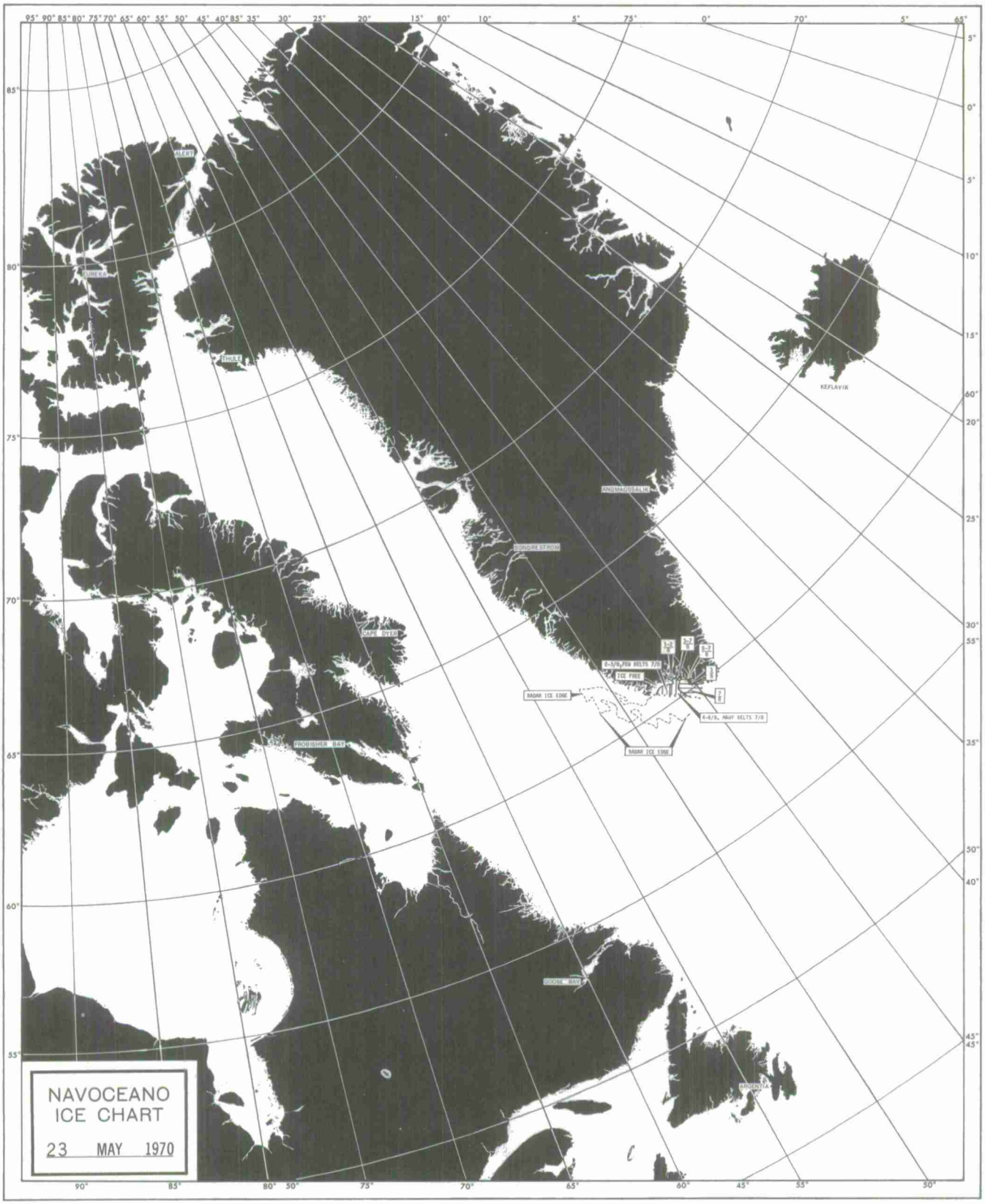

NAVOCEANO
ICE CHART
8 MAY 1970
ALERT
EUREKA
THULE
KEFLAVIK
ANGMAGSSALIK
FAST
NOT OBSERVED
FAST
CNIS
NOT OBSERVED
SONDRESTROM
CAPE DYER
FROBISHER BAY
GODTHAB
VISUAL ICE EDGE
ICE FREE
BELTS
RADAR ICE AREA
ICE FREE
RADAR ICE EDGE
BELTS
ICE FREE
1-3/8 STRIPS 5/8

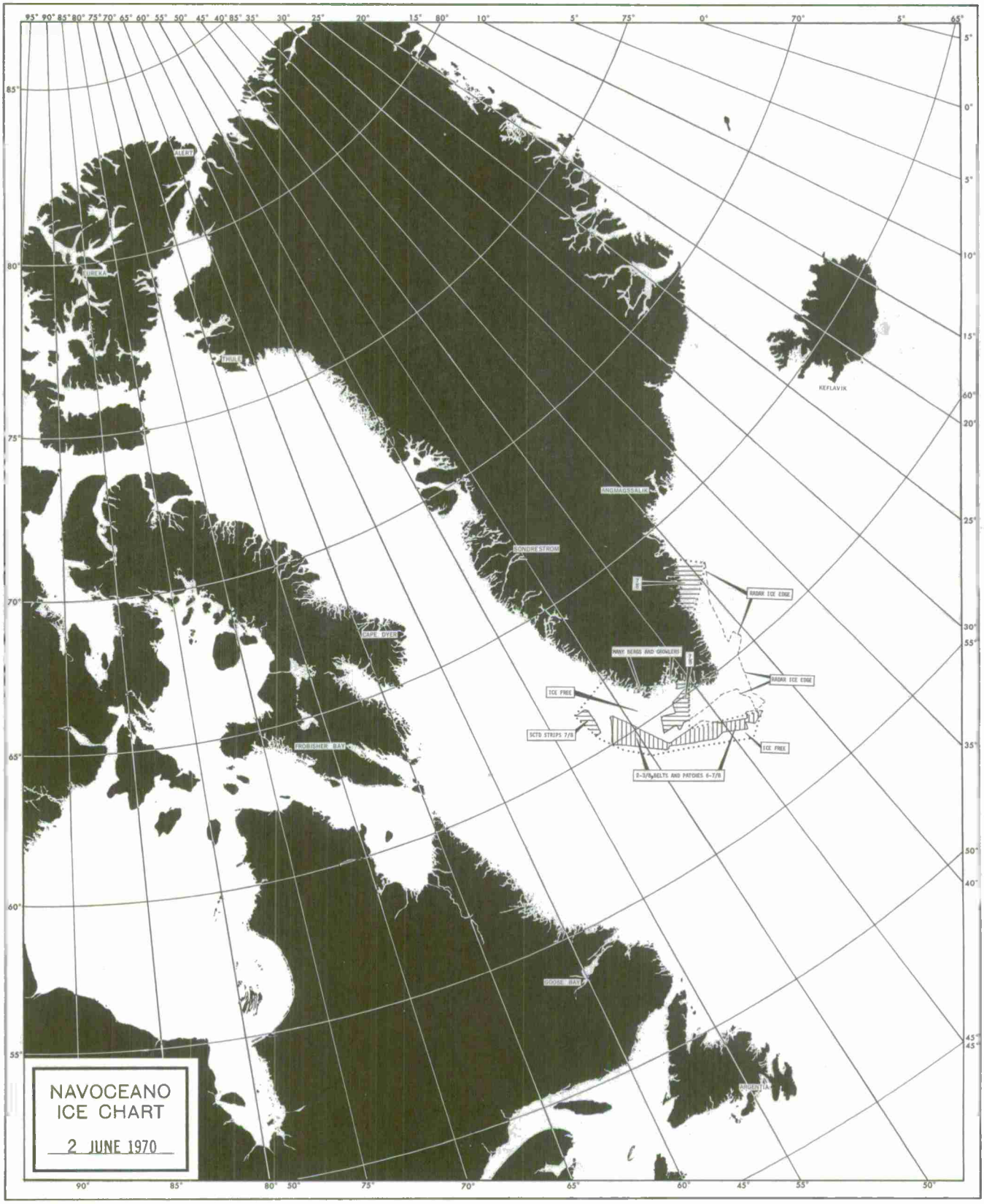

NAVOCEANO
ICE CHART
11–12 MAY 1970
KEFLAVIK
ANGMAGSSALIK
SCORESBYSTROM
CAPE DYER
FROBISHER BAY
RADAR ICE EDGE 5/12/70
RADAR ICE EDGE 5/11/70
ICE FREE
MANY BERGS AND GROWLERS
2-3/8 MANY BELTS AND STRIPS 6/8
OPEN WATER FPD
FAST
LEAD

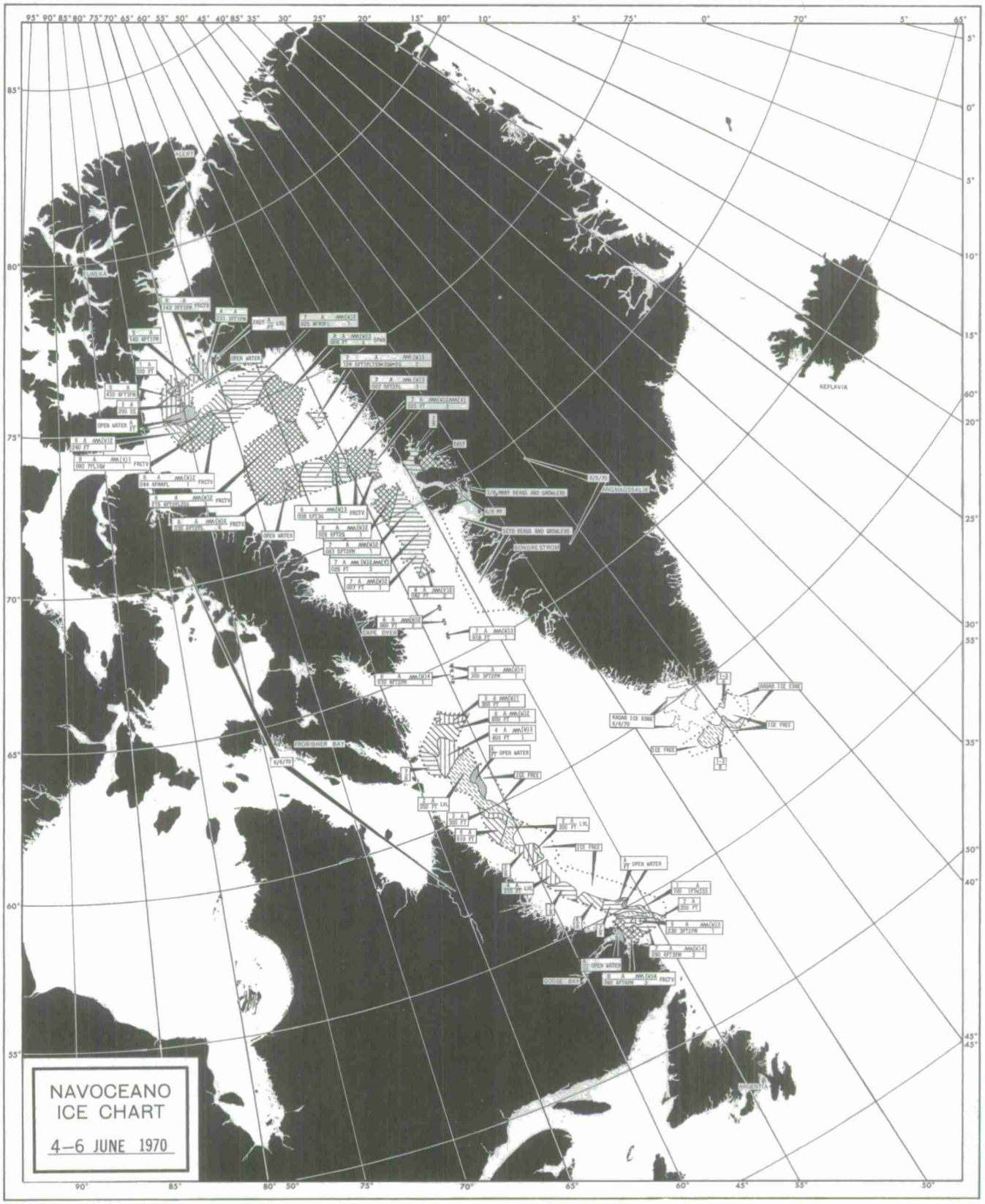

NAVOCEANO
ICE CHART
13–15 MAY 1970
ALERT
EUREKA
THULE
FAST
KEFLAVIK
ANGMASSALIK
SONDRESTROM
RADAR ICE EDGE
ICE FREE
RADAR ICE EDGE 5/13/70
CAPE DYER
OPEN WATER
MANY BERGS & GROWLERS
1-2/8 STRIPS
ICE FREE
ICE FREE
SCTD BERGS & GROWLERS
5/15/70
MANY BERGS & GROWLERS
FROBISHER BAY
ICE FREE
ICE FREE PLYA
OPEN WATER MPD
RADAR ICE EDGE 5/14/70
GOOSE BAY
ARGENTIA

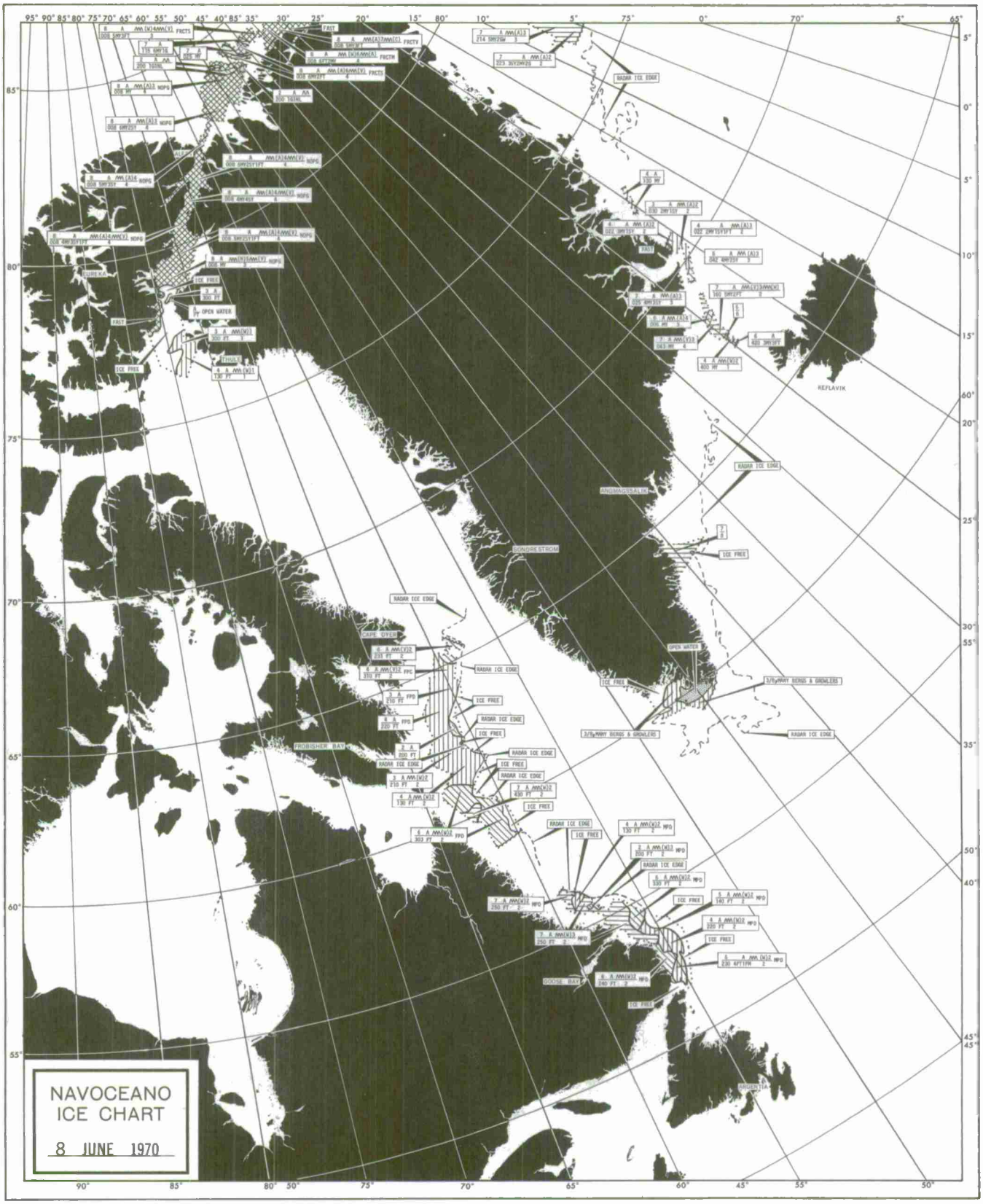

NAVOCEANO
ICE CHART
17 MAY 1970
ALERT
EUREKA
THULE
KEFLAVIK
ANGMAGSSALIK
SONDRESTROM
CAPE DYER
ICE FREE
FEW BELTS 4/8 MANY BERGS
NARSA ICE EDGE
FROBISHER BAY
HUDSON BAY
GOOSE BAY
GANDER

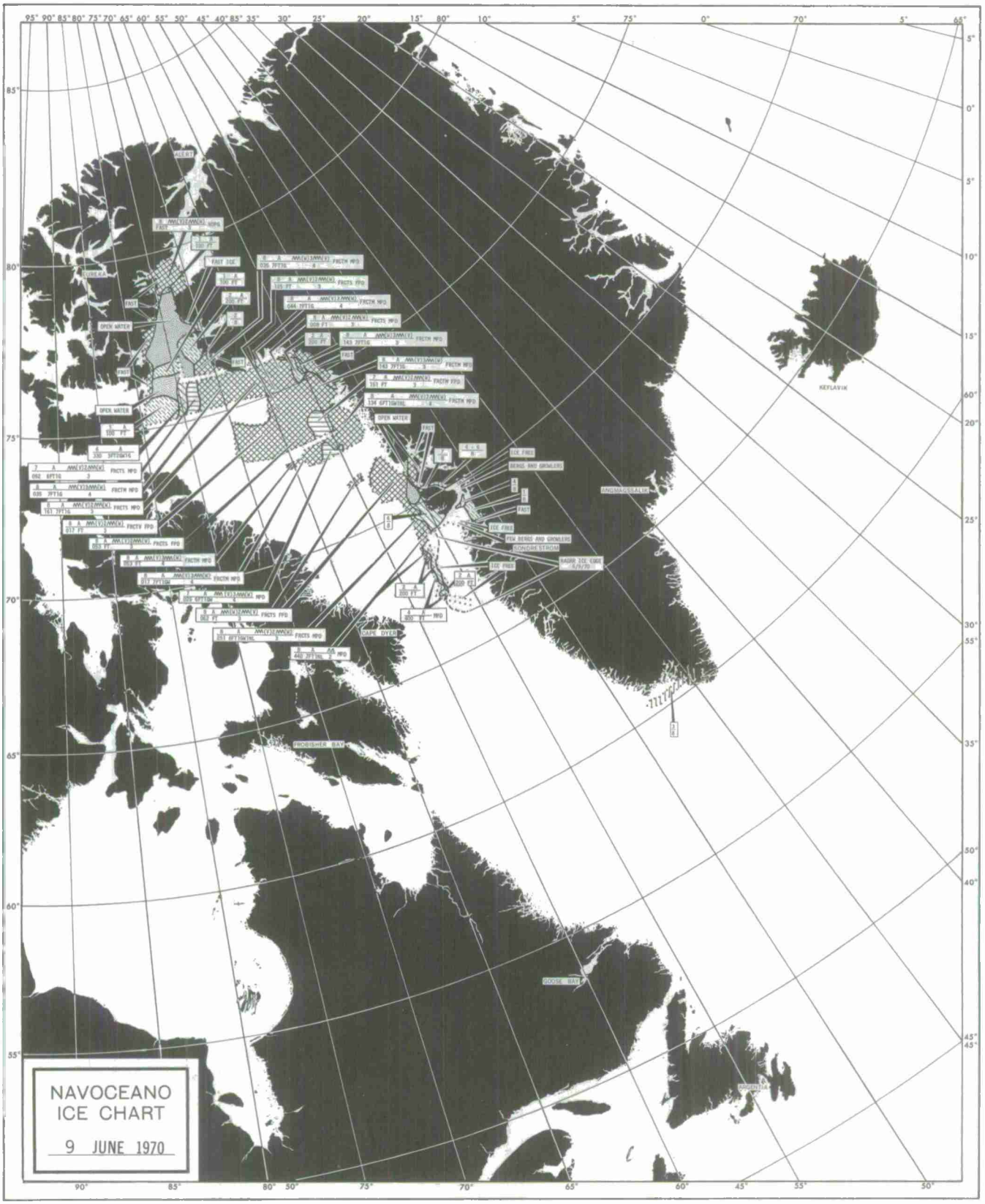

NAVOCEANO
ICE CHART
19 MAY 1970
ALERT
EUREKA
THULE
KEFLAVIK
ANGMAGSSALIK
BONDESTROM
CAPE DYER
FROBISHER BAY
GOOSE BAY
ST JOHN'S
ICE FREE
5/8 WITH BELTS 6/8
3-4/8 BELTS AND STRIPS 6/8
RADAR ICE EDGE
4-6/8 MANY BELTS 6/8

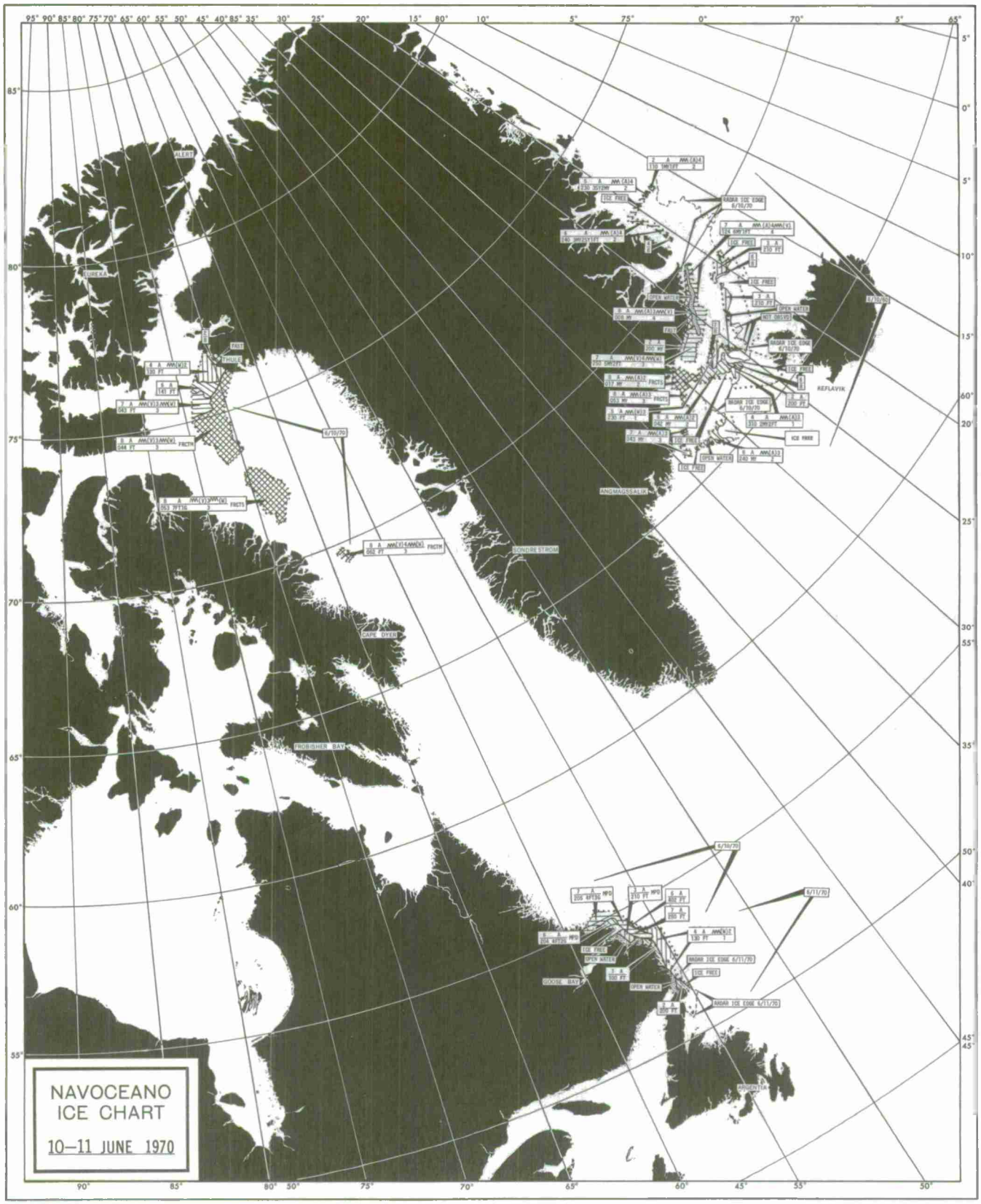

NAVOCEANO
ICE CHART
23 MAY 1970
ALERT
THULE
KEFLAVIK
ANGMAGSSALIK
SONDRESTROM
CAPE DYER
FROBISHER BAY
PRUDHOE BAY
RADAR ICE EDGE
ICE FREE
RADAR ICE EDGE
4-6/8, NAVY BELTS 7/8


ALERT
EUREKA
THULE
KEFLAVIK
ANGMASSALIK
JONDRESTROM
CAPE DYER
PROBISHER BAY
GOOSE BAY
RADAR ICE EDGE
MANY BERGS AND GROWLERS
RADAR ICE EDGE
ICE FREE
SCTD STRIPS 7/8
ICE FREE
2-3/8 BELTS AND PATCHES 6-7/8
NAVOCEANO
ICE CHART
2 JUNE 1970

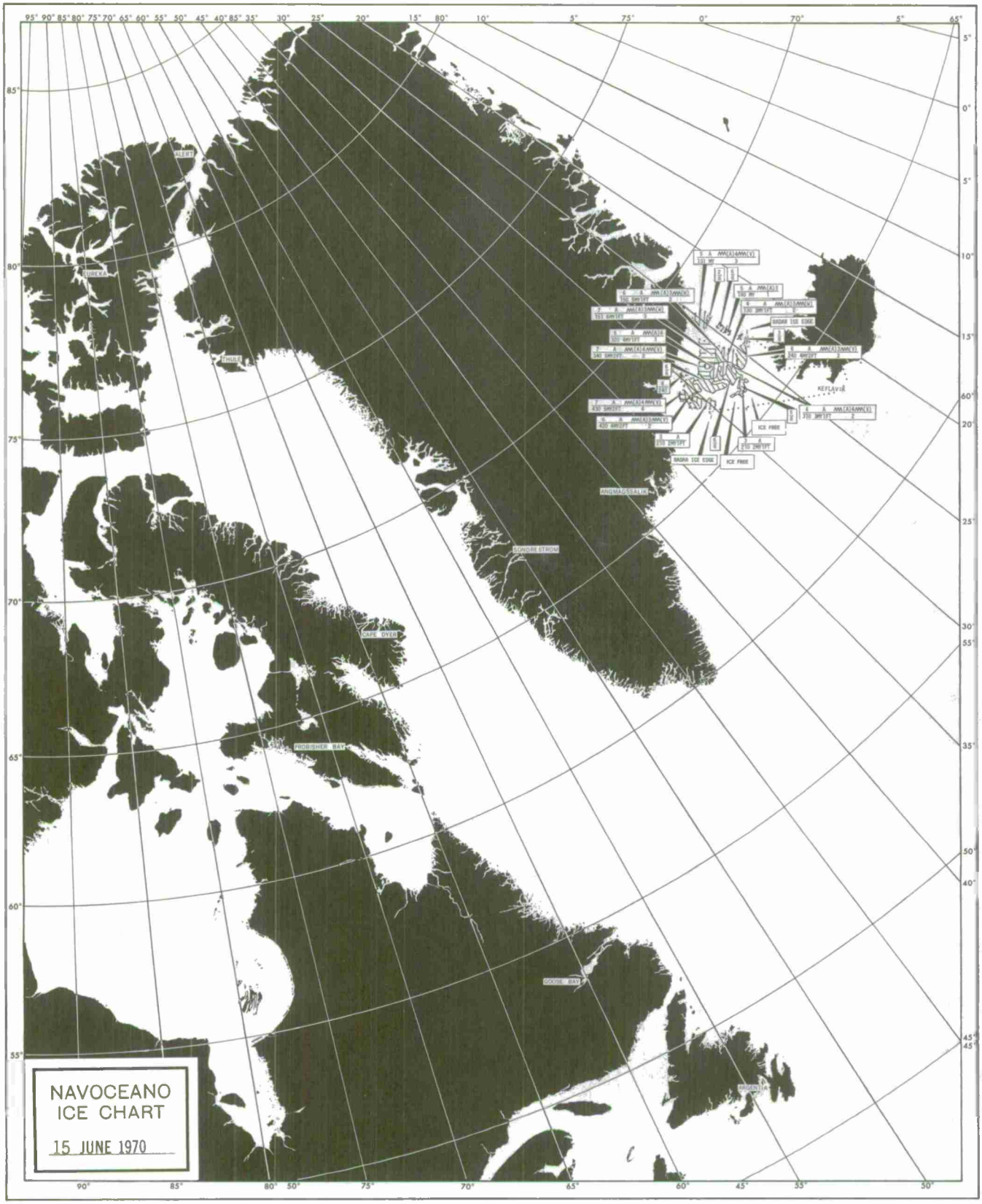

NAVOCEANO
ICE CHART
4–6 JUNE 1970
KEFLAVIK
FAST
OPEN WATER
ICE FREE
FROBISHER BAY
GOOSE BAY
SONDRESTROM
NARSARSSUAQ
RADAR ICE EDGE
ICE EDGE

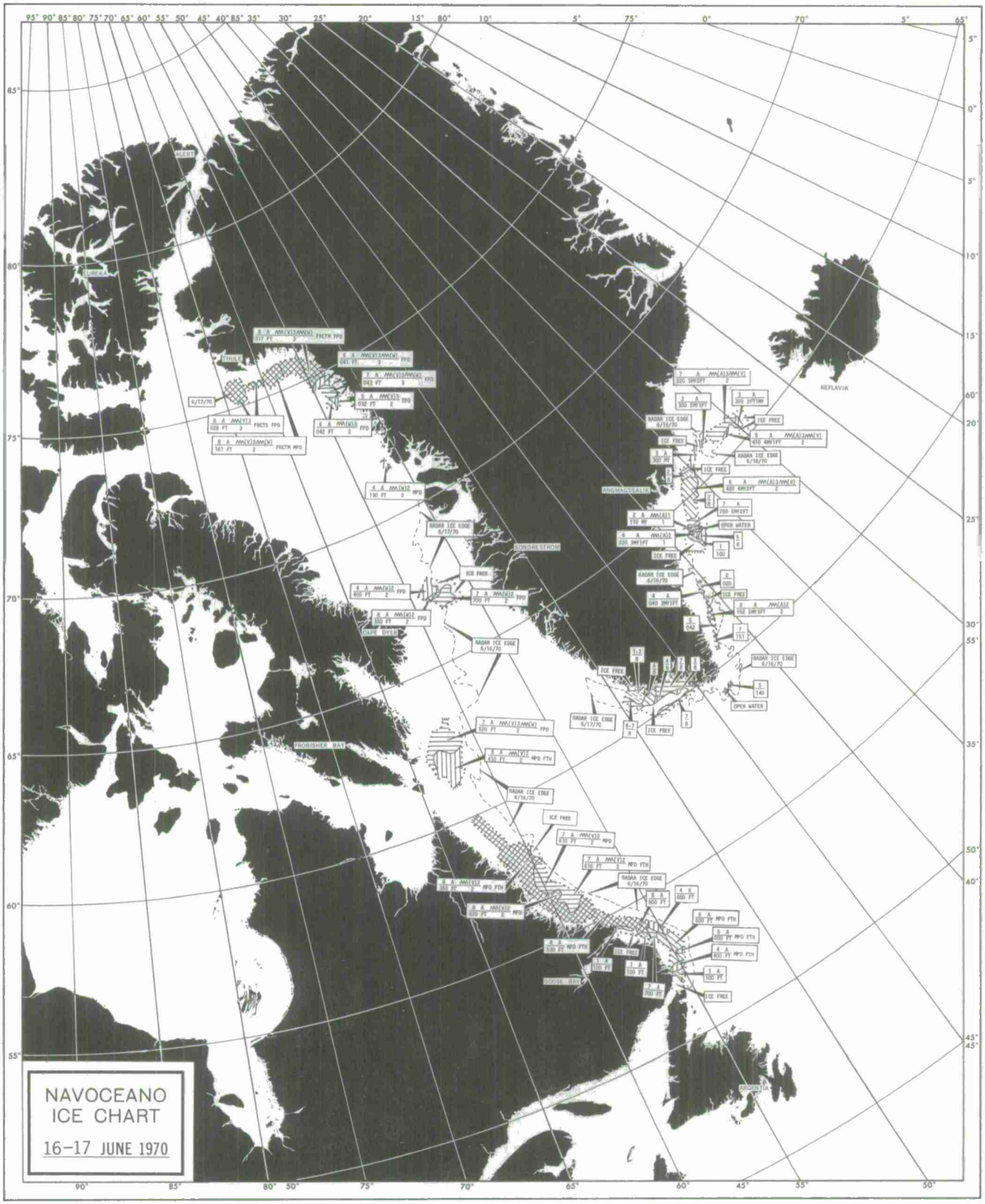

NAVOCEANO
ICE CHART
8 JUNE 1970
REYKJAVIK
ANGMAGSSALIK
SONDRESTROM
EUREKA
PROBISHER BAY
GOOSE BAY
RADAR ICE EDGE
ICE FREE
OPEN WATER
FAST

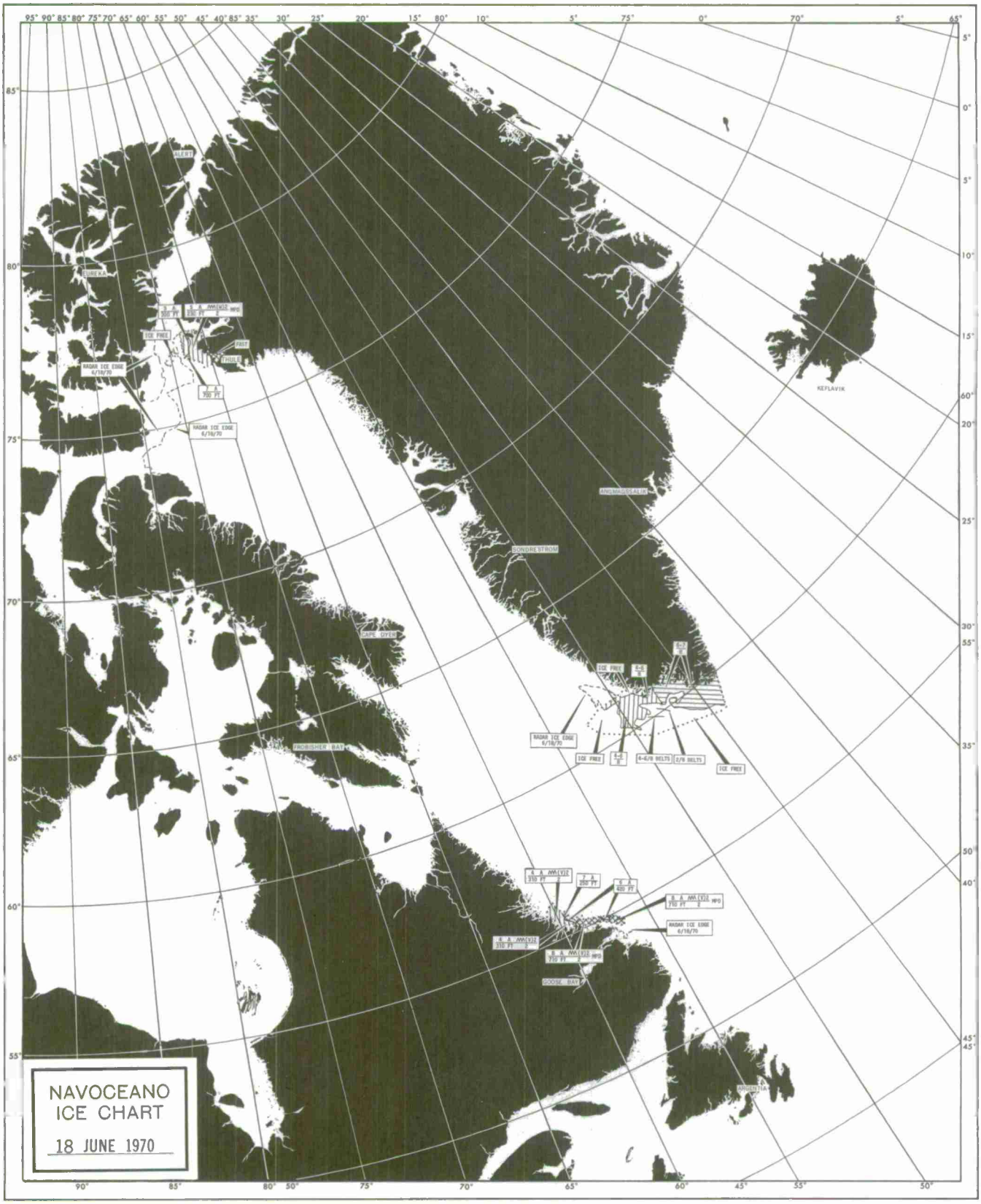

NAVOCEANO
ICE CHART
9 JUNE 1970
KEFLAVIK
FROBISHER BAY
GOOSE BAY
ANGMAGSSALIK
ALERT
EUREKA
OPEN WATER
FAST ICE
ICE FREE
BERGS AND GROWLERS
SONDRE STROM
RADIO ICE CORE
SAFE DYED

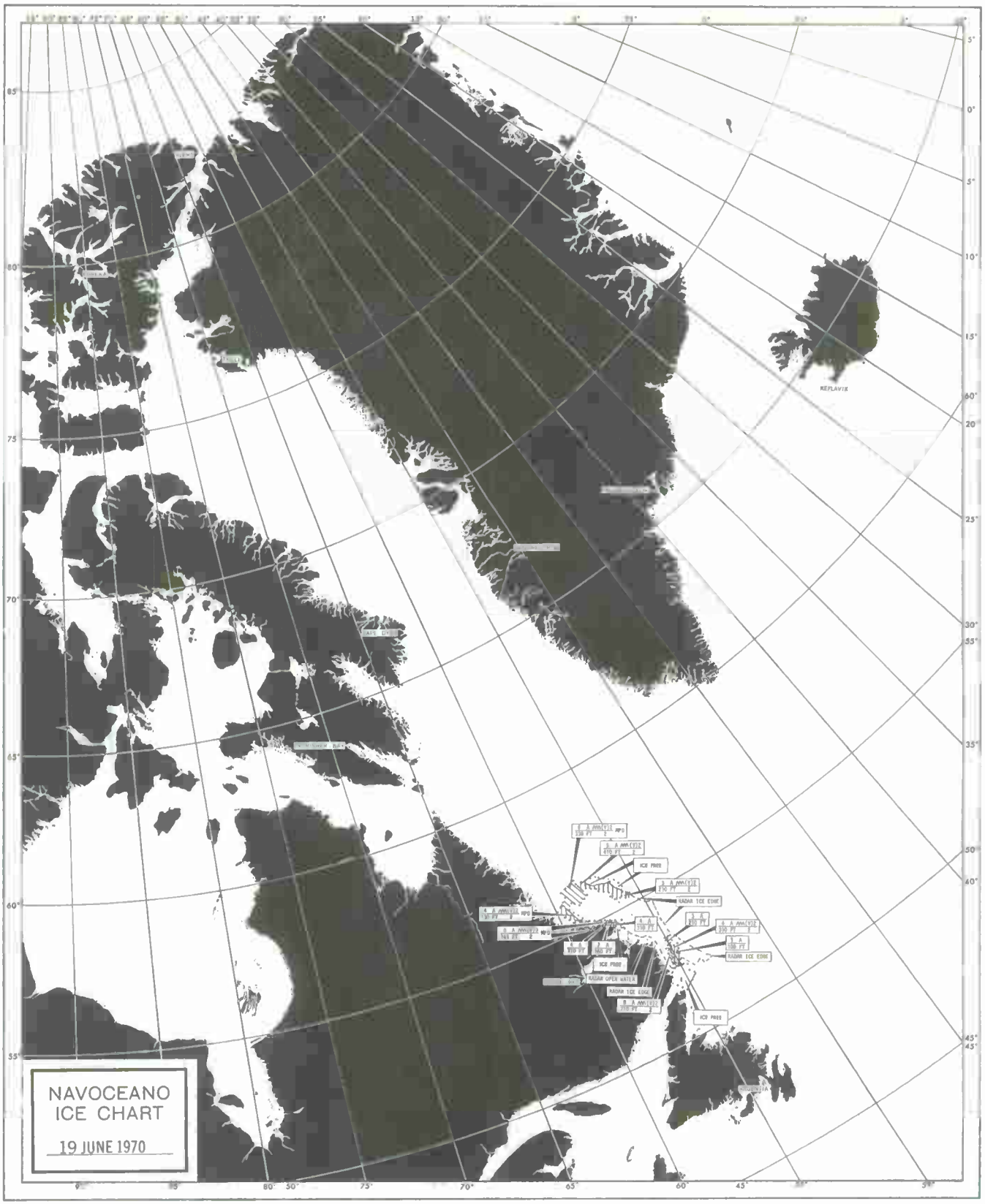

NAVOCEANO
ICE CHART
10–11 JUNE 1970
ALERT
EUREKA
THULE
FAST
6/10/70
CAPE DYER
FROBISHER BAY
SONDRE STROM
ANGMAGSSALIK
RADAR ICE EDGE 6/10/70
ICE FREE
OPEN WATER
KEFLAVIK
RADAR ICE EDGE 6/11/70
GOOSE BAY
6/11/70

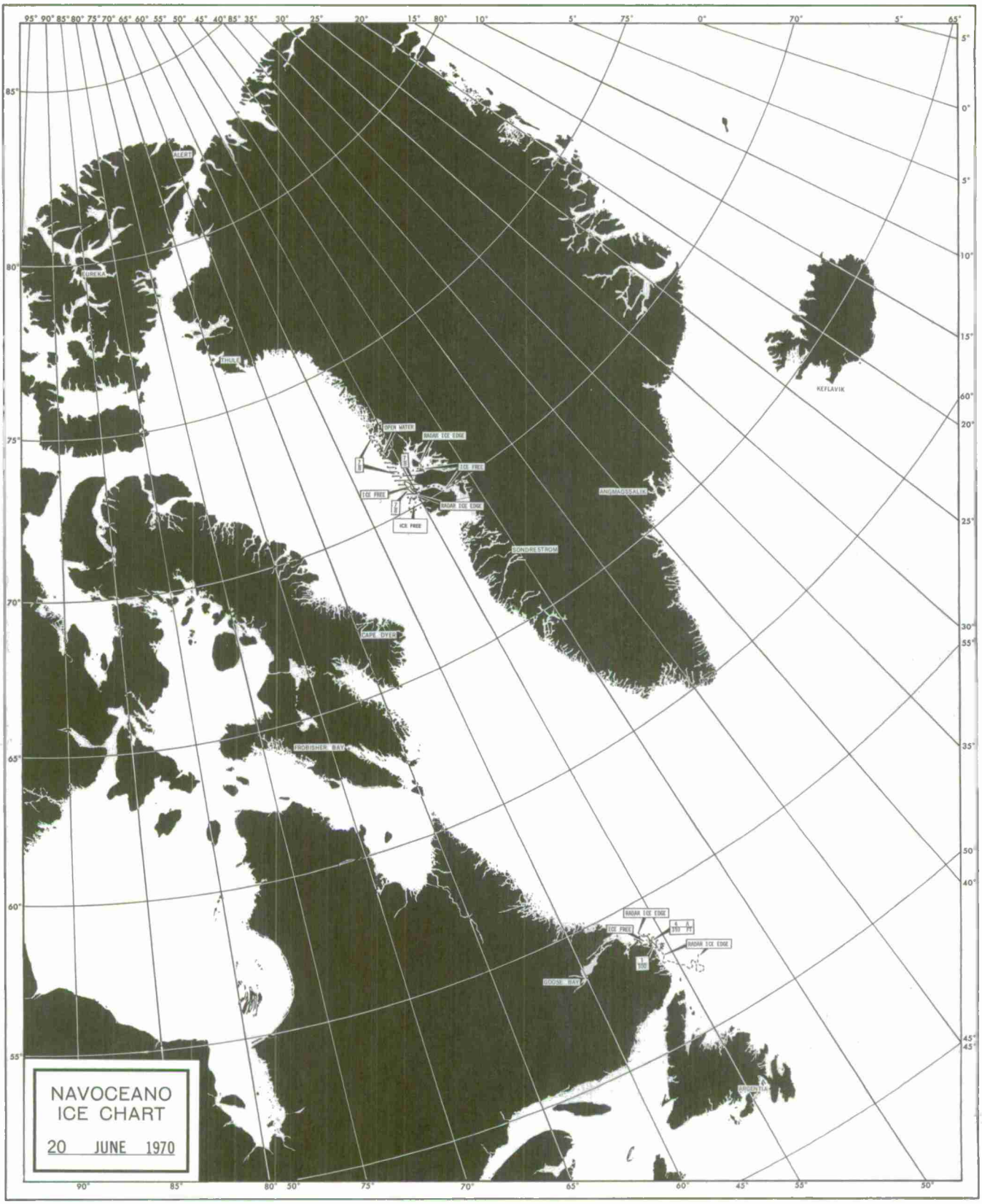

NAVOCEANO
ICE CHART
12 – 13 JUNE 1970
FAST
B/B NOPS
ALERT
THULE
OPEN WATER
RADAR ICE EDGE 6/13/70
ICE FREE
KEFLAVIK
OPEN WATER FEW FLOES MANY BERGS
MANY BERGS & GROWLERS
RONDRESTHOM
CAPE DYER
FROBISHER BAY
GOOSE BAY
6/13/70
6/12/70


NAVOCEANO
ICE CHART
15 JUNE 1970
ALERT
EUREKA
THULE
CAPE DYER
FROBISHER BAY
GOOSE BAY
KEFLAVIK
ICE FREE
NADAR ICE EDGE
ICE FREE
NADAR ICE EDGE
ANGMAGSSALIK
DANMARK STRAIT

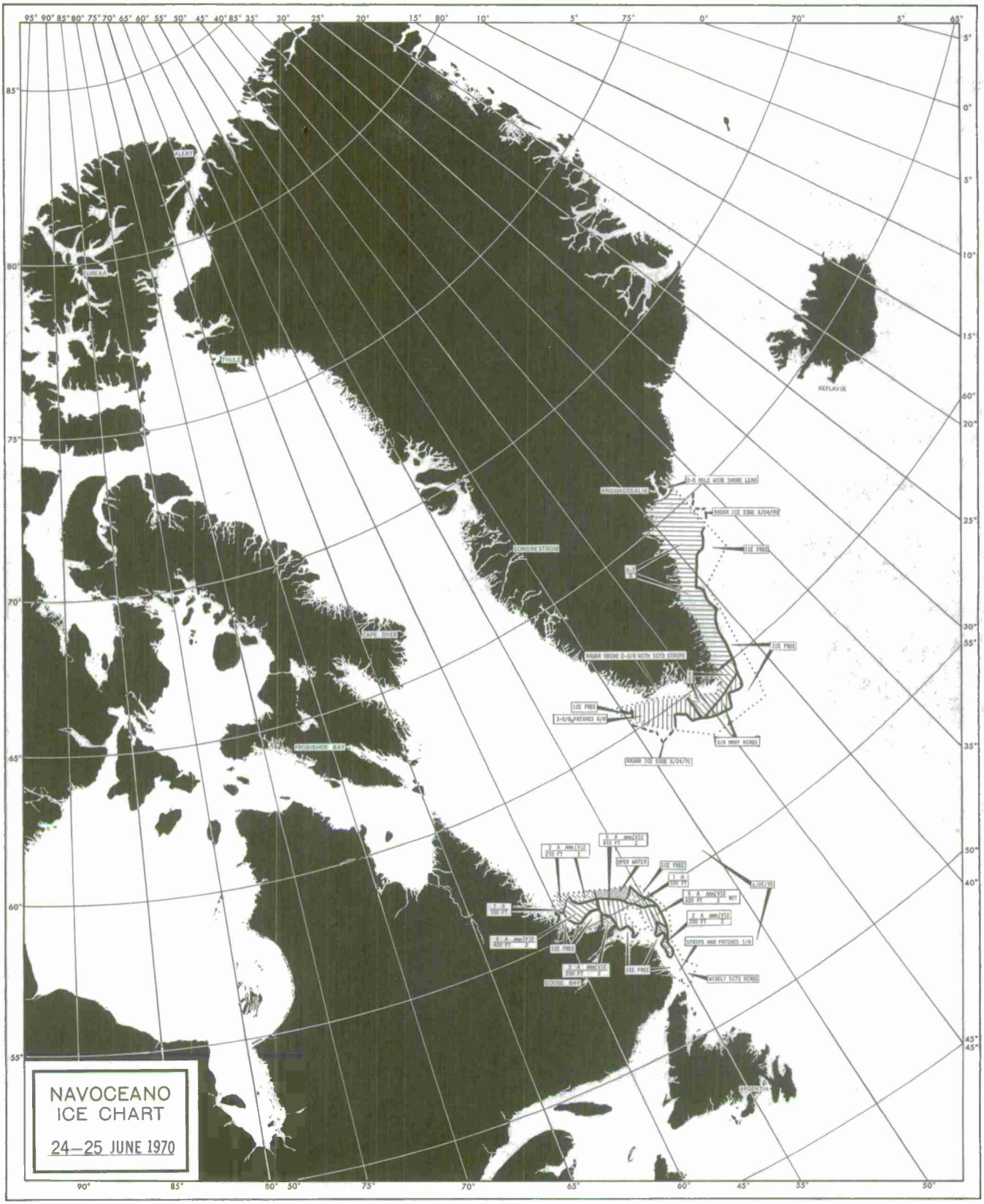

NAVOCEANO
ICE CHART
16–17 JUNE 1970
THULE
KEFLAVIK
PROBISHER BAY
RADAR ICE EDGE 6/16/70
RADAR ICE EDGE 6/17/70
ICE FREE
OPEN WATER


NAVOCEANO
ICE CHART
18 JUNE 1970
ALERT
EUREKA
ICE FREE
FAST
FLOE
RADAR ICE EDGE 6/18/70
CAPE DYER
FROBISHER BAY
SONDRESTROM
ANGMAGSSALIK
KEFLAVIK
ICE FREE
RADAR ICE EDGE 6/18/70
6-8/8 BELTS
2/8 BELTS
ICE FREE
RADAR ICE EDGE 6/18/70
GOOSE BAY
ARGENTIA

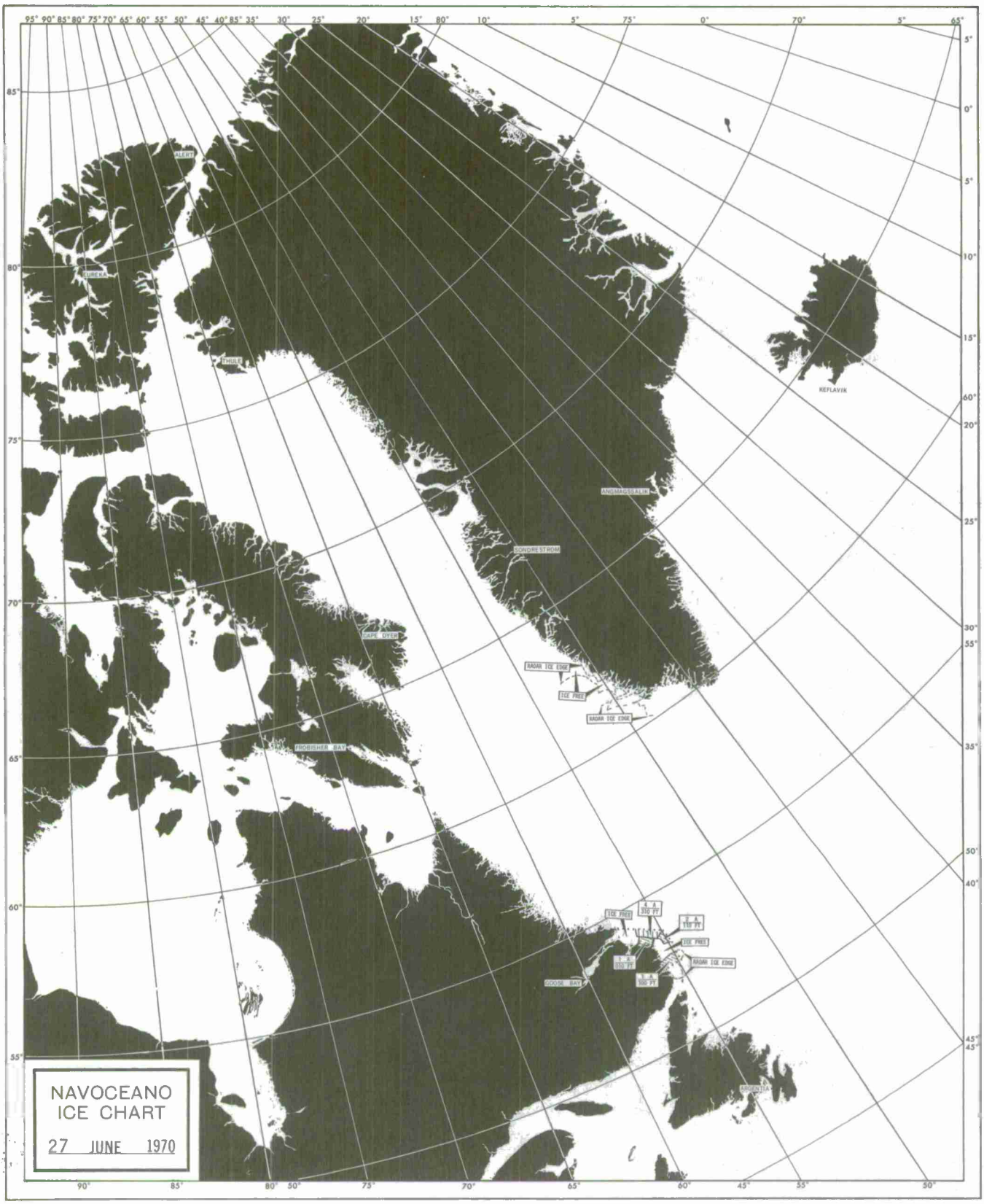

NAVOCEANO
ICE CHART
19 JUNE 1970
REYKJAVIK
ICE FREE
RADAR ICE EDGE
RADAR OPEN WATER
RADAR ICE EDGE
ICE FREE
ICE FREE

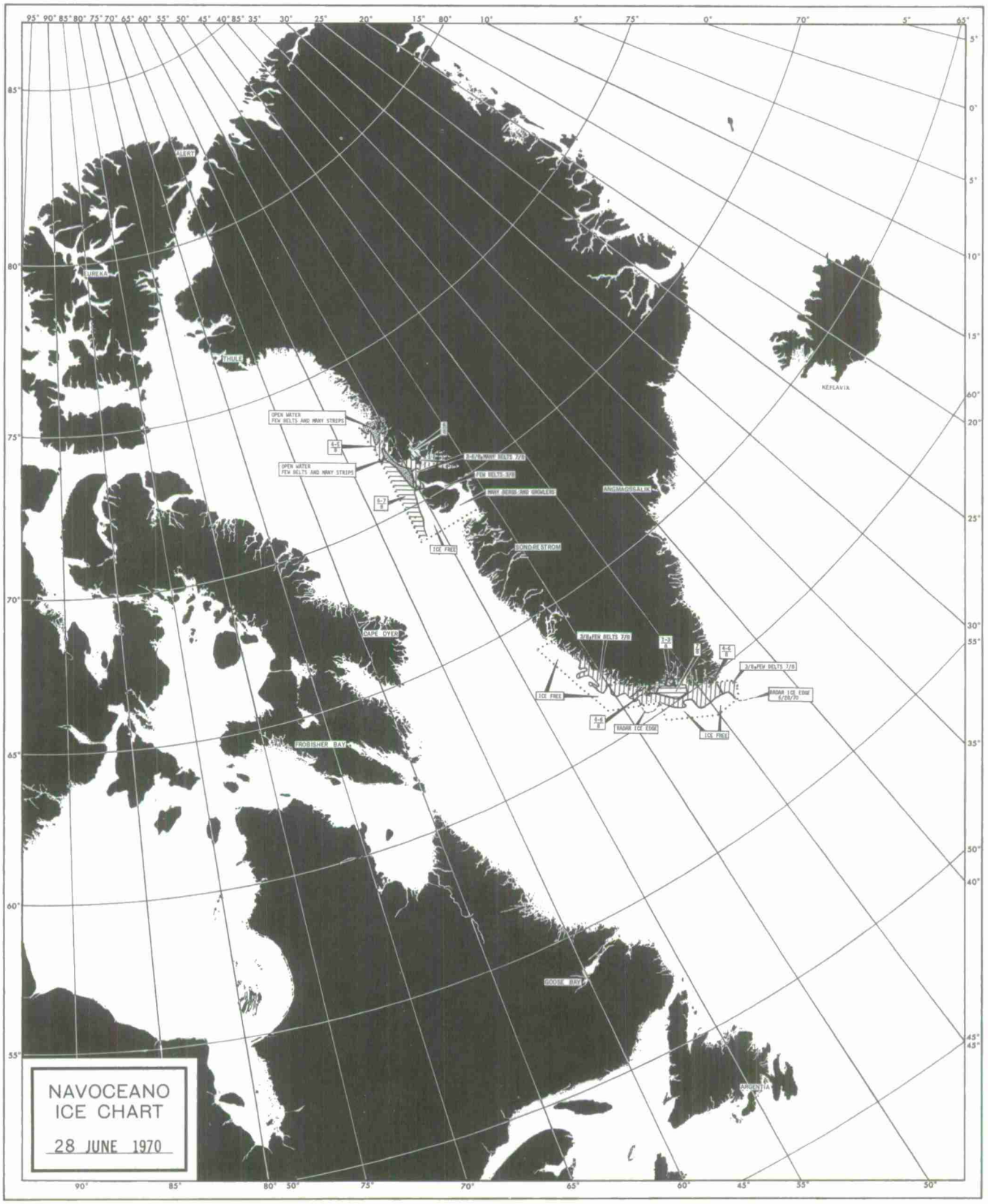

NAVOCEANO
ICE CHART
20 JUNE 1970
ALERT
EUREKA
THULE
KEFLAVIK
OPEN WATER
RADAR ICE EDGE
ICE FREE
ICE FREE
RADAR ICE EDGE
ICE FREE
ANGMAGSSALIK
SONDRESTROM
CAPE DYER
FROBISHER BAY
RADAR ICE EDGE
ICE FREE
RADAR ICE EDGE
GOOSE BAY


NAVOCEANO
ICE CHART
22–23 JUNE 1970
ALERT
EUREKA
THULE
KEFLAVIK
RADAR ICE EDGE 6/22/70
7/8 WITH 10S NF AND SF
7/8 MAINLY SF
3/8 FEW BELTS 6/8
RADAR ICE EDGE 6/20/70
MANY BERGS AND GROWLERS
ANGMAGSSALIK
SCORESBYSUND
CAPE DYER
MANY BERGS
PATCHES 7/8
RADAR ICE EDGE 6/23/70
3/8 BELTS 6/8
MANY BERGS AND GROWLERS
2-4/8 BELTS 6/8
FROBISHER BAY
ZOAR BAY


NAVOCEANO
ICE CHART
24–25 JUNE 1970
ALERT
EUREKA
THULE
KEFLAVIK
ARGENTIA
CAPE DYER
FROBISHER BAY
GODTHAB
DAVIS STRAIT
ANOMALOUS LIMIT
RADAR ICE EDGE 6/24/70
ICE FREE
RADAR OBSVD 2-3/8 WITH SCTD STRIPS
3/8 MANY BERGS
OPEN WATER
STRIPS AND PATCHES 1/8
WEEKLY SCTD BERGS


ALERT
EUREKA
THULE
KEFLAVIK
ANGMASSALIK
SONDRESTROM
CAPE DYER
FROBISHER BAY
1 A 100 FT
4 A 310 FT HPD
1 A 100 FT
ICE FREE
RADAR ICE EDGE
3 A 100 FT
4 A AMLYSE 310 FT 2 NOT
ICE FREE
1 A 100 FT
ICE FREE
4 A 310 FT
ICE FREE
4 A AMLYSE 310 FT 2 NOT
DIGHE AMLY
PATCHES & STRIPS
ARGENTIA
NAVOCEANO
ICE CHART
26 JUNE 1970

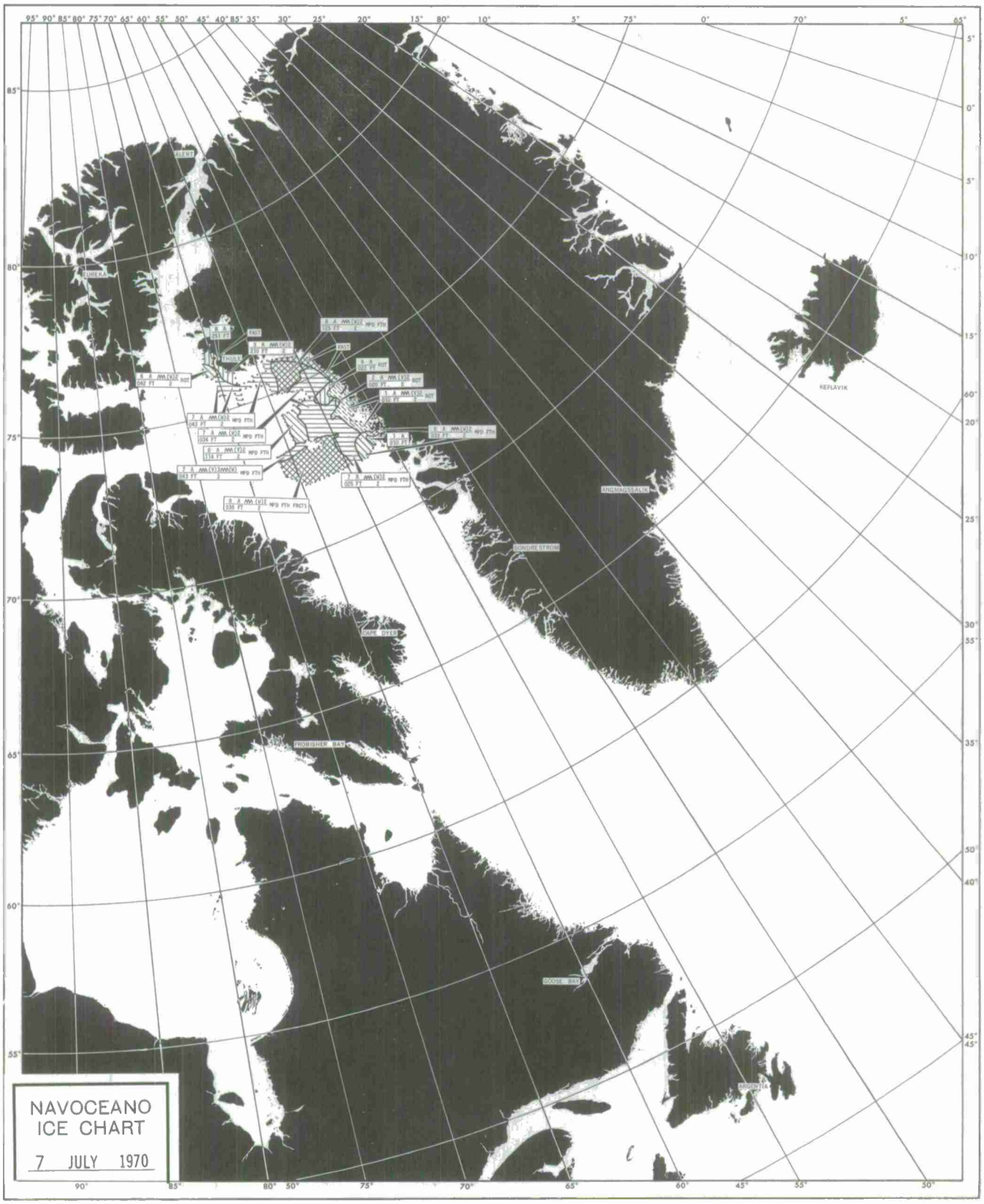

NAVOCEANO
ICE CHART
27 JUNE 1970
ALERT
EUREKA
THULE
KEFLAVIK
ANGMAGSSALIK
SONDRESTROM
CAPE DYER
RADAR ICE EDGE
ICE FREE
RADAR ICE EDGE
FROBISHER BAY
ICE FREE
ICE FREE
RADAR ICE EDGE
GOOSE BAY
GODTHAB

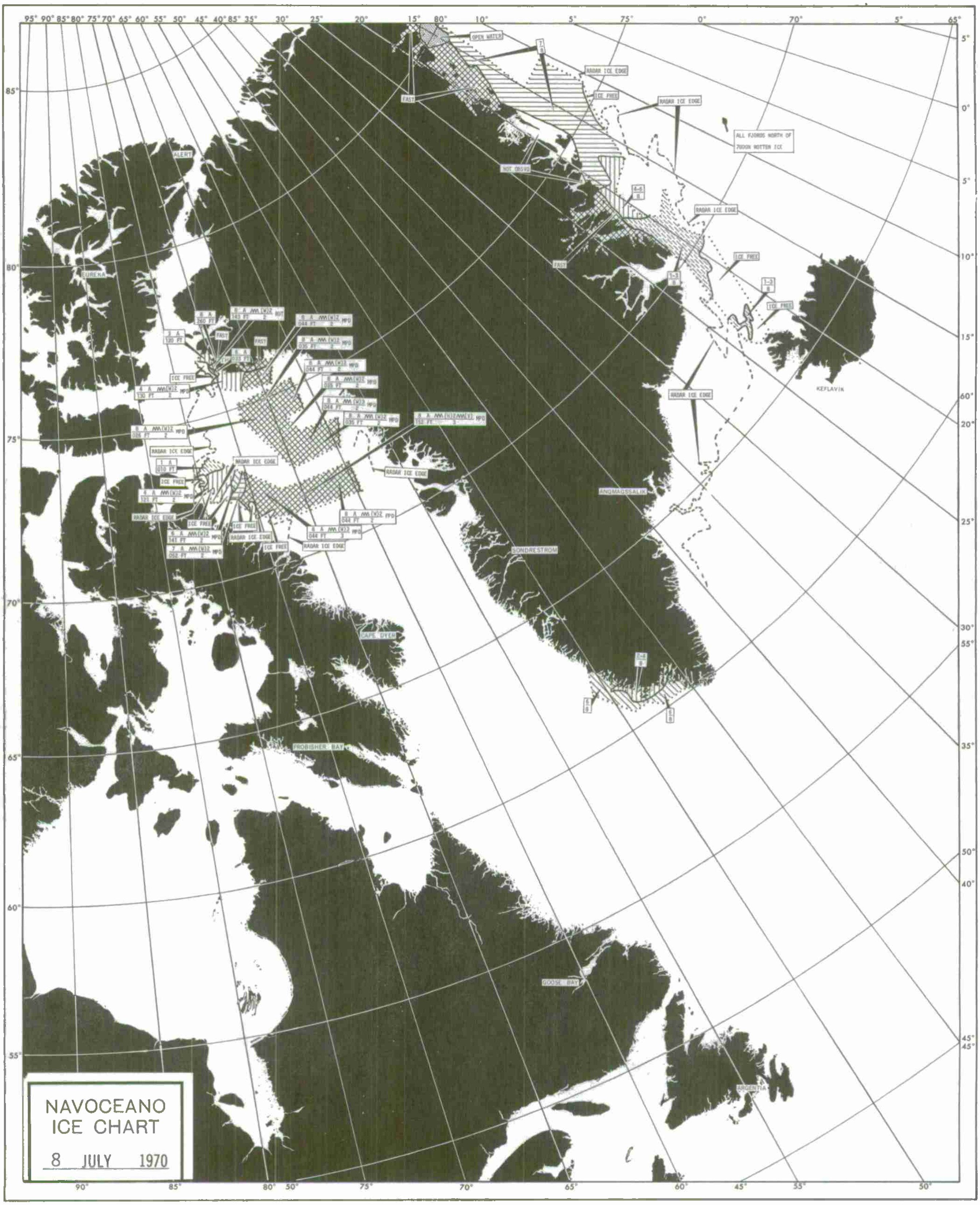

NAVOCEANO
ICE CHART
28 JUNE 1970
ALERT
EUREKA
THULE
KEFLAVIK
ANGMAGSSALIK
SONDRESTROM
DOPE OVER
FROBISHER BAY
GOOSE BAY
ARGENTIA
OPEN WATER
FEW BELTS AND MANY STRIPS
FEW BELTS 3/8
MANY BERGS AND GROWLERS
ICE FREE
3/8 FEW BELTS 7/8
RADAR ICE EDGE
6/28/70


NAVOCEANO
ICE CHART
1–2 JULY 1970
ALERT
EUREKA
KEFLAVIK
ANGMAGSSALIK
SONDRESTROM
RADAR 2/8
RADAR ICE EDGE 7/1/70
ICE FREE
FAST
OPEN WATER
CAPE DYER
FROBISHER BAY
GOOSE BAY

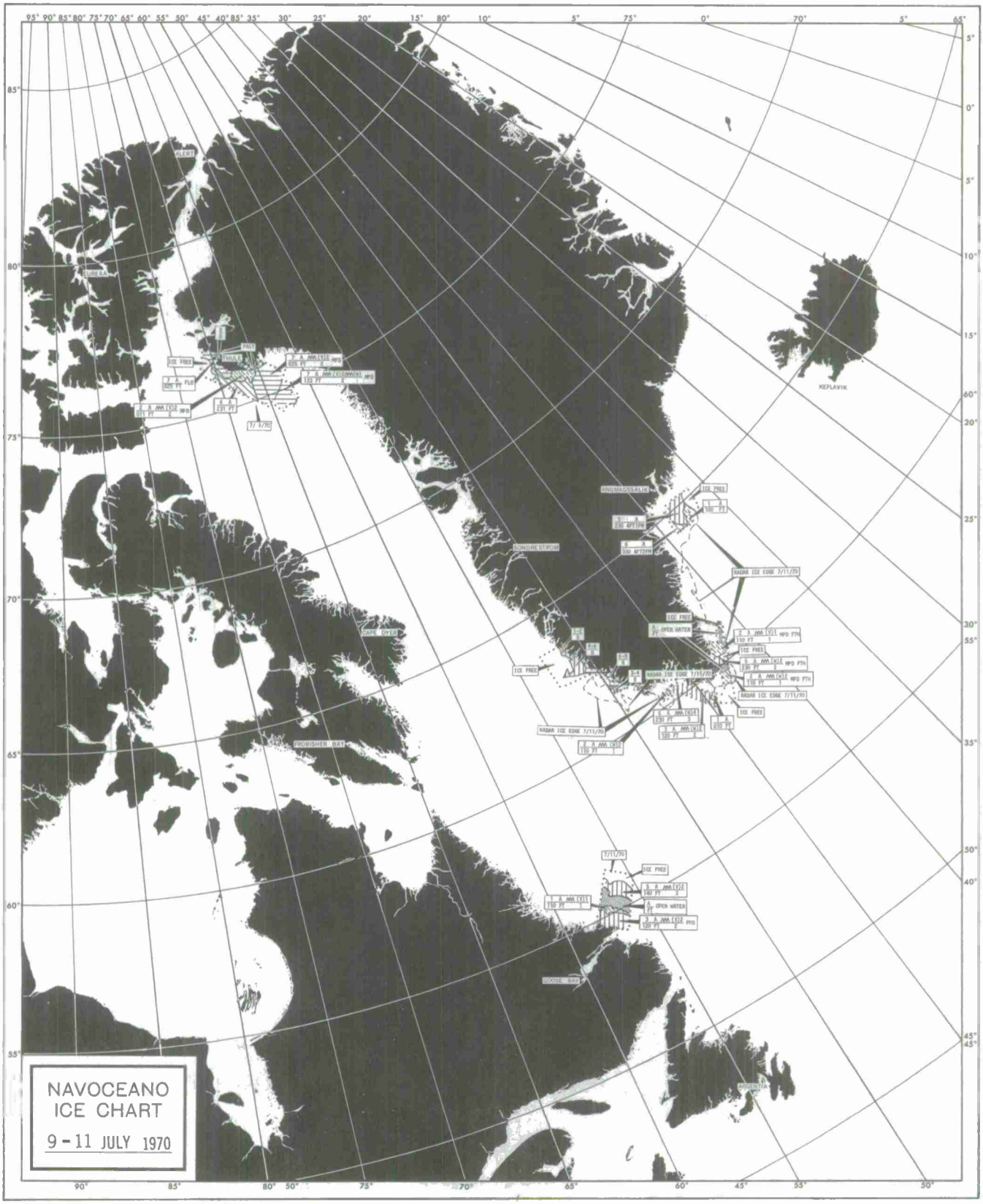

NAVOCEANO
ICE CHART
3-4 JULY 1970
KEFLAVIK
ANGMAGSSALIK
SONDRESTROM
CAPE DYER
PROVIDENCE BAY
RADAR ICE EDGE 7/4/70
RADAR ICE EDGE 7/3/70
RADAR ICE EDGE 2/4/70
ICE FREE
ICE EDGE
OPEN WATER

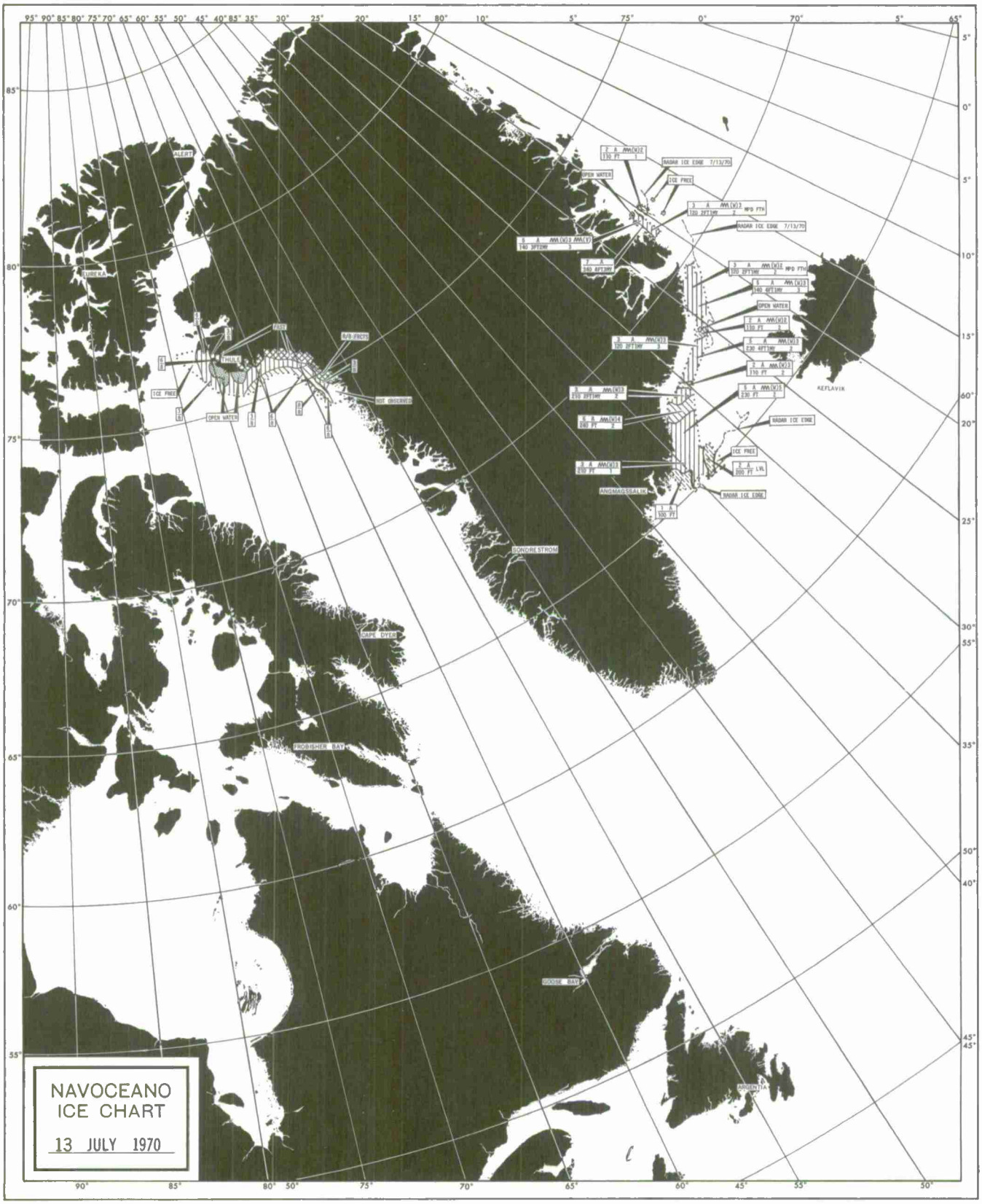

NAVOCEANO
ICE CHART
6 JULY 1970
ALERT
EUREKA
THULE
FAST
ICE FREE
OPEN WATER
RADAR ICE EDGE
KEFLAVIK
ANGMAGSSALIK
ICE FREE
RADAR ICE EDGE
BONDURE STROM
ICE FREE
RADAR ICE EDGE
CAPE DYER
FROBISHER BAY
HOUSE BAY
GODTHAB


ALERT
EUREKA
THULE
KEFLAVIK
ANGMAGSSALIK
SONDRESTROM
CAPE DYER
FROBISHER BAY
GOOSE BAY
NAVOCEANO
ICE CHART
7 JULY 1970

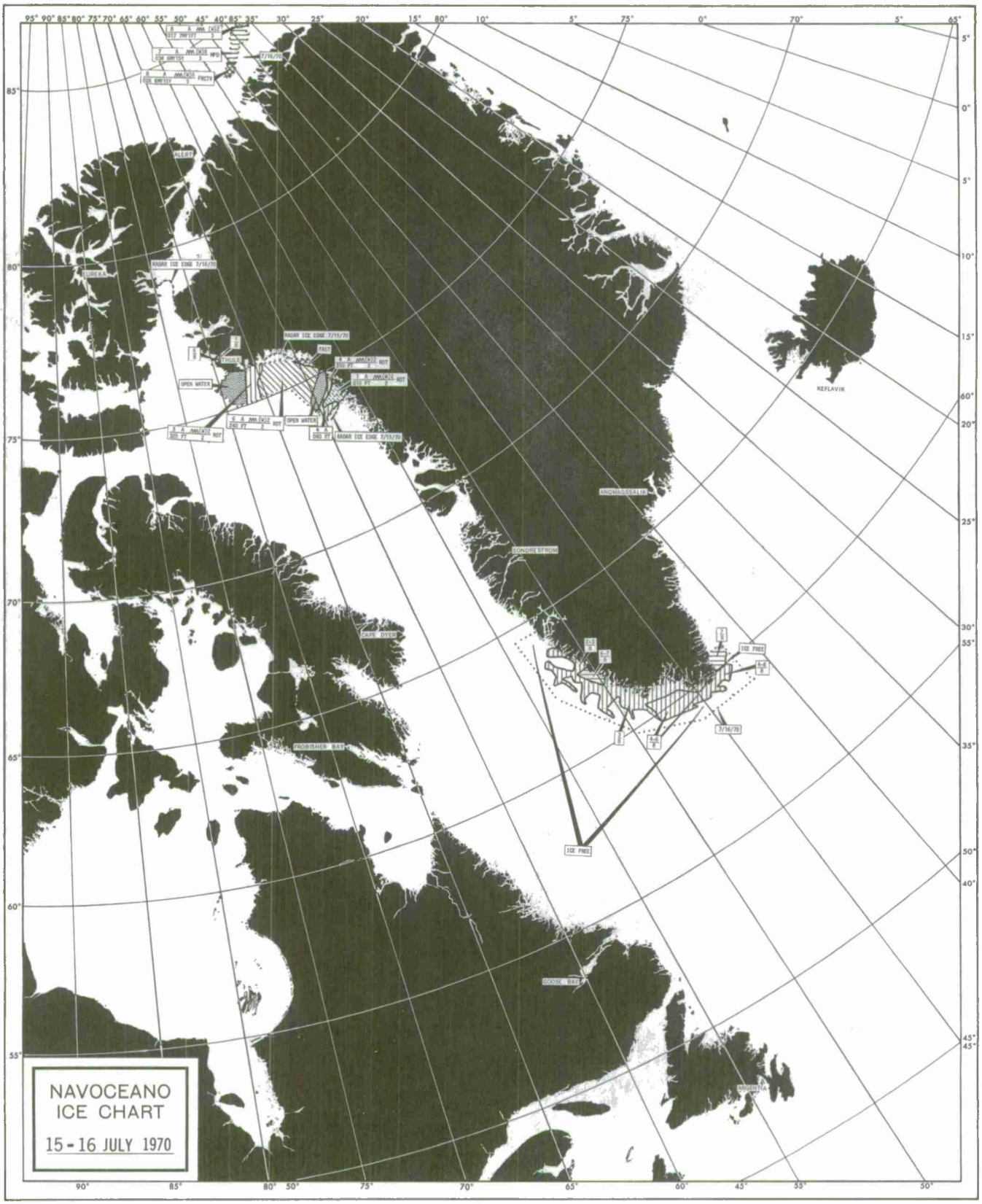


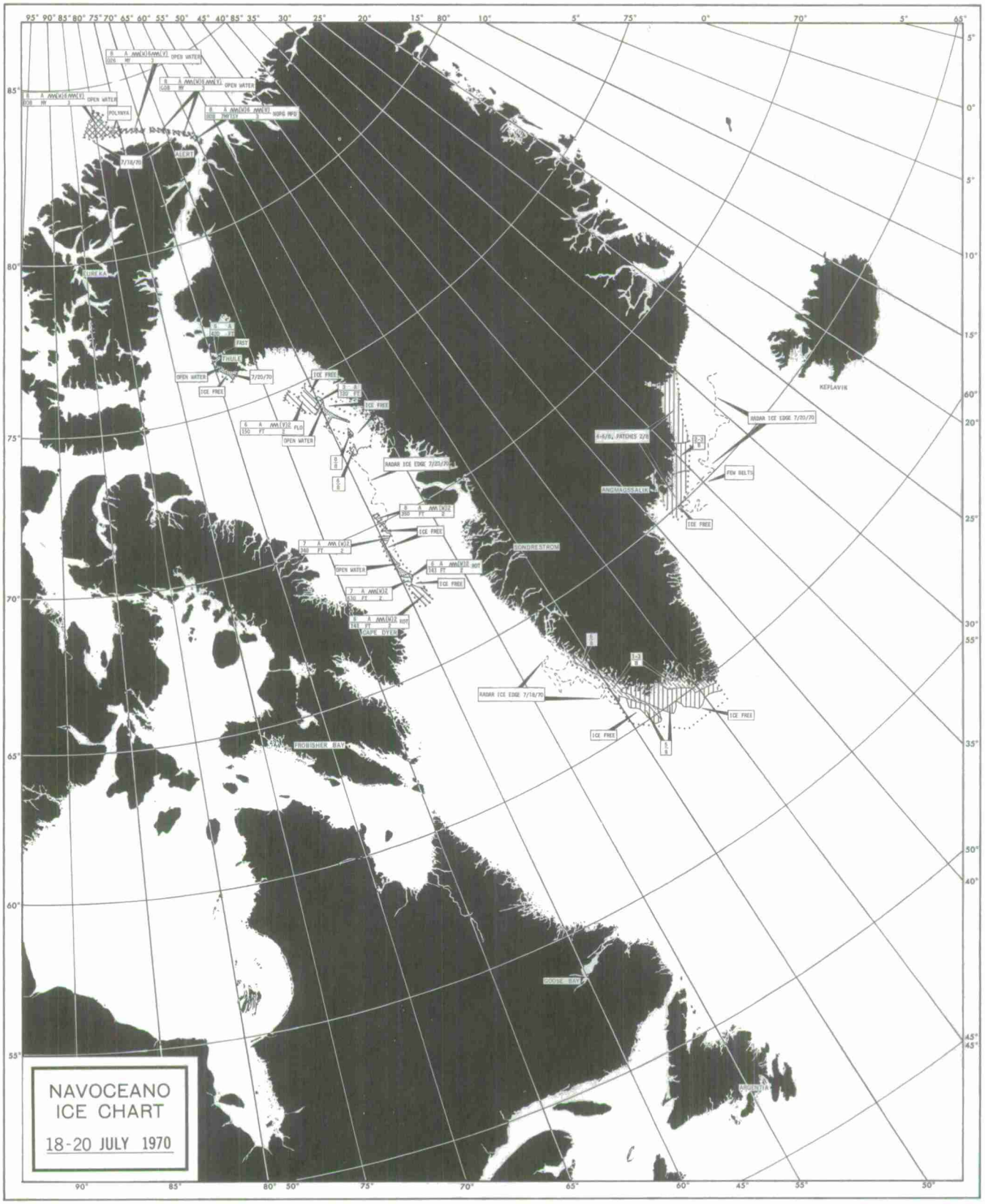
OPEN WATER
RADAR ICE EDGE
ICE FREE
FAST
HOT OBSVD
ALERT
EUREKA
KEFLAVIK
ANGMAGSSALIK
SONDRESTROM
CAPE DYER
FROBISHER BAY
GOOSE BAY
ARGENTIA
NAVOCEANO
ICE CHART
8 JULY 1970


NAVOCEANO
ICE CHART
9 - 11 JULY 1970
KEFLAVIK
THULE
ANGMASSALIK
CAPE DYER
FROBISHER BAY
GOOSE BAY
ICE FREE
RADAR ICE EDGE 7/11/70
OPEN WATER

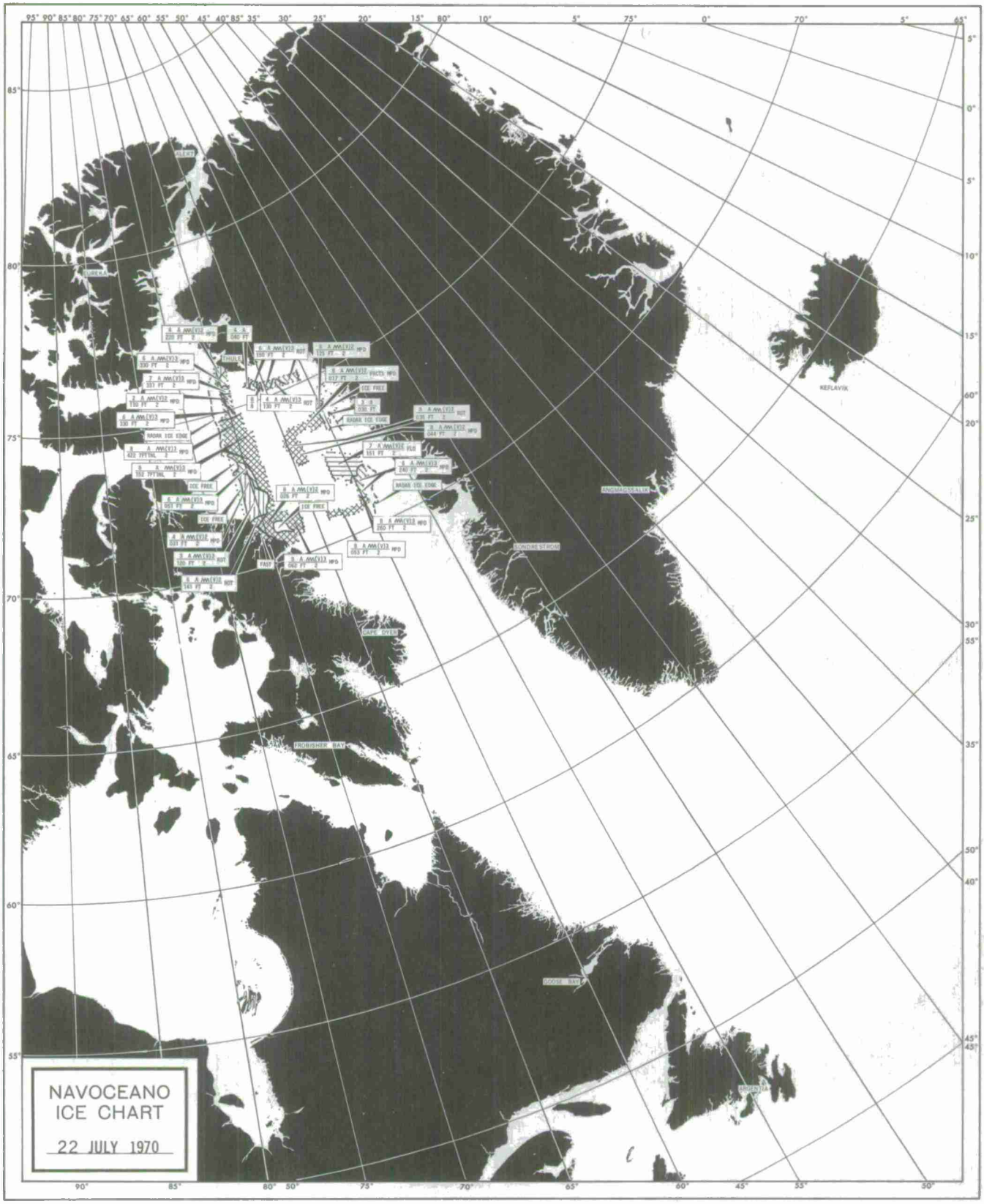

NAVOCEANO
ICE CHART
13 JULY 1970
ALERT
EUREKA
THULE
ICE FREE
OPEN WATER
NOT OBSERVED
CAPE DYER
PROBISHER BAY
GOOSE BAY
BONDESTROM
ANGMAGSSALIK
KEFLAVIK
RADAR ICE EDGE 7/13/70
OPEN WATER
ICE FREE
RADAR ICE EDGE

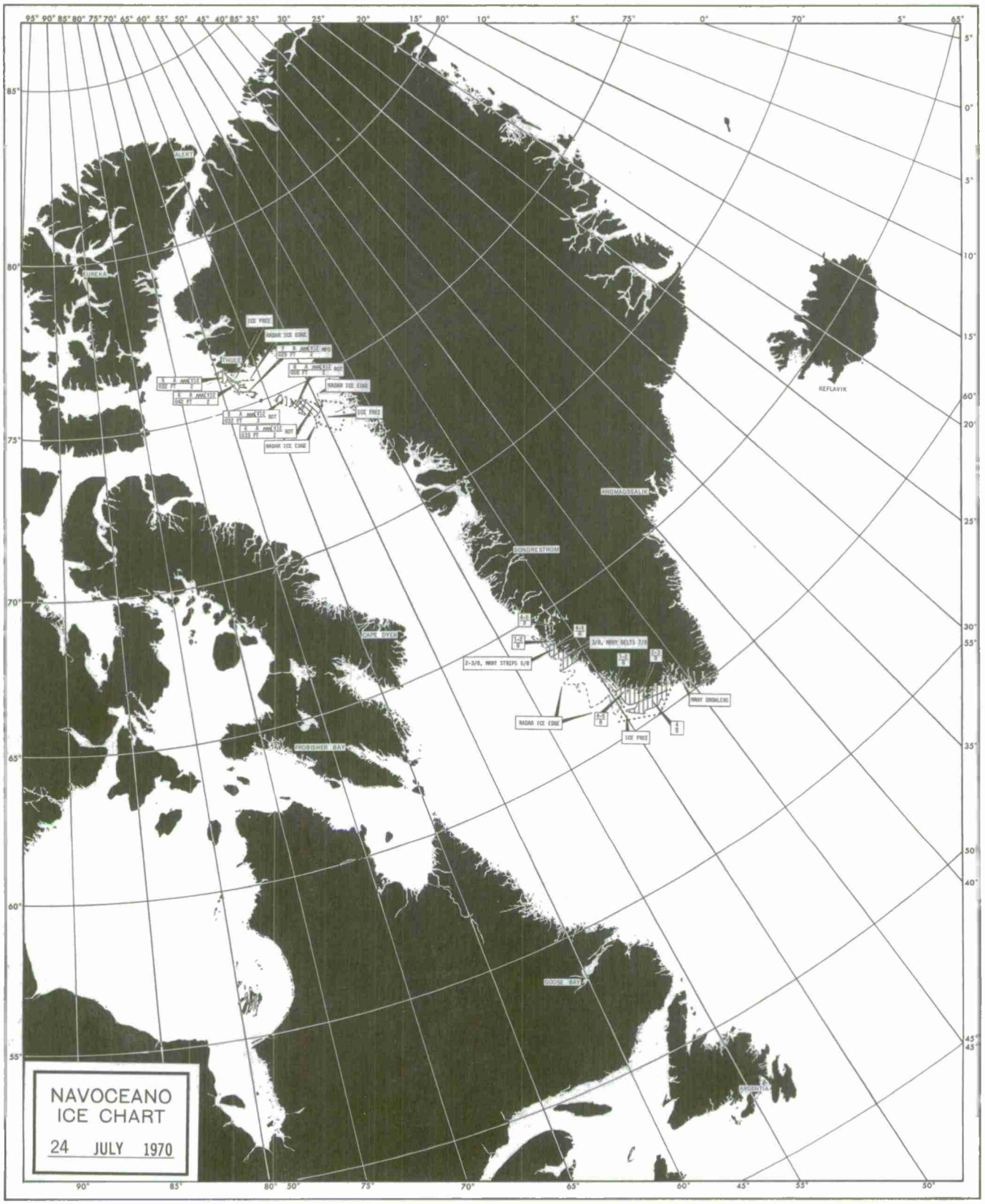

NAVOCEANO
ICE CHART
14 JULY 1970
ALERT
RADAR ICE EDGE
ICE FREE
KEFLAVIK
ANGMAGSSALIK
SCORESBY SUND
CAPE DYER
RADAR BELT
FROBISHER BAY
DAVIS STR.


NAVOCEANO
ICE CHART
15 - 16 JULY 1970
ALERT
EUREKA
RADAR ICE EDGE 7/15/70
FAST
OPEN WATER
ICE FREE
KEFLAVIK
ANGMAGSSALIK
SONDRE STROM
CAPE DYER
PROBISHER BAY
GOOSE BAY
SYDNEY
7/16/70

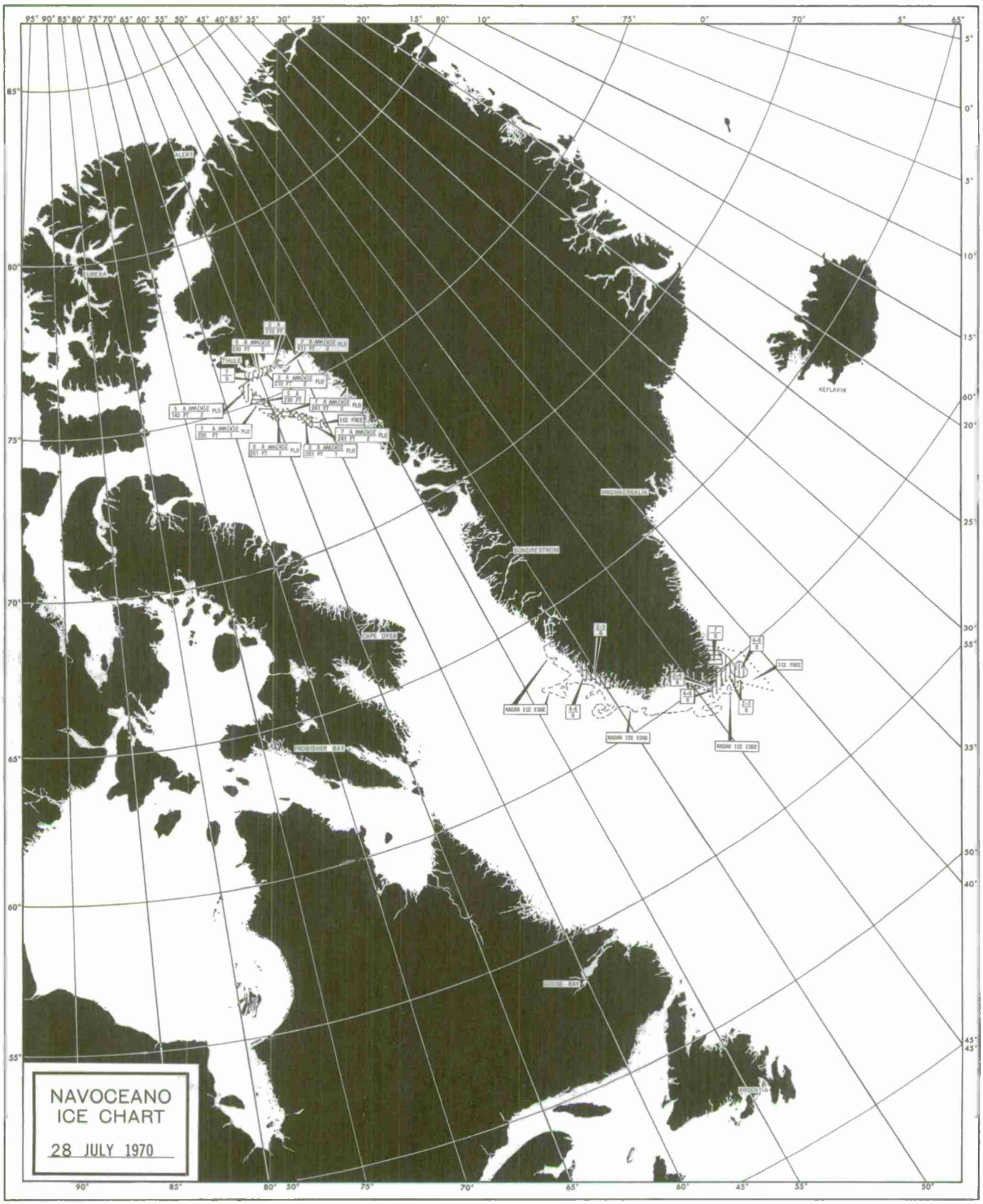

NAVOCEANO
ICE CHART
18-20 JULY 1970
ALERT
7/18/70
POLYNYA
OPEN WATER
FAST
THULE
7/20/70
ICE FREE
RADAR ICE EDGE 7/20/70
RADAR ICE EDGE 7/18/70
RADAR ICE EDGE 7/20/70
4-6/8, PATCHES 2/E
FEW BELTS
ANGMAGSSALIK
KEFLAVIK
NORDRE STROM
CAPE DYER
PROBISHER BAY
GOOSE BAY
ICE FREE

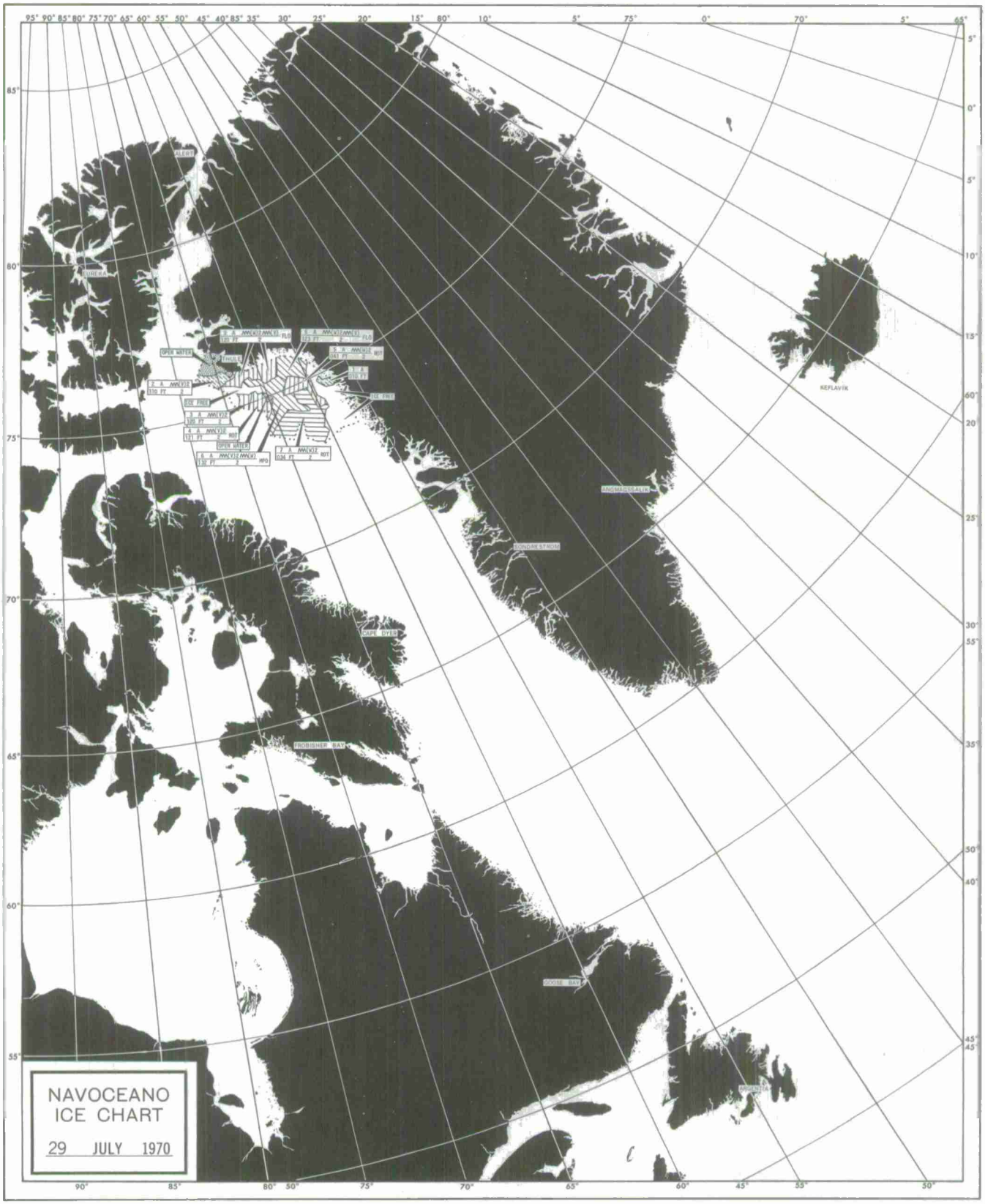

NAVOCEANO
ICE CHART
21 JULY 1970
ALERT
EUREKA
RESOLUTE
CAPE DYER
FROBISHER BAY
GODTHAB
SONDRESTROM
KEFLAVIK
ANGMAGSSALIK
ICE FREE
RADAR ICE EDGE
OPEN WATER
HPD
HPD OPEN WATER
PLO
ICE FREE
RADAR ICE EDGE
ICE FREE
7/8 BELTS 6/8 STRIPS 4/8


NAVOCEANO
ICE CHART
22 JULY 1970
KEFLAVIK
ANGMAGSSALIK
SONDRE STROM
CAPE DYER
FROBISHER BAY
GOOSE BAY
THULE


NAVOCEANO
ICE CHART
24 JULY 1970
ALERT
EUREKA
THULE
ICE FREE
RADAR ICE EDGE
REYKJAVIK
ANGMAGSSALIK
SONDRE STROM
CAPE DYER
FROBISHER BAY
GOOSE BAY
ORIENTIA
MANY BERGS
MANY GROWLERS
ICE FREE

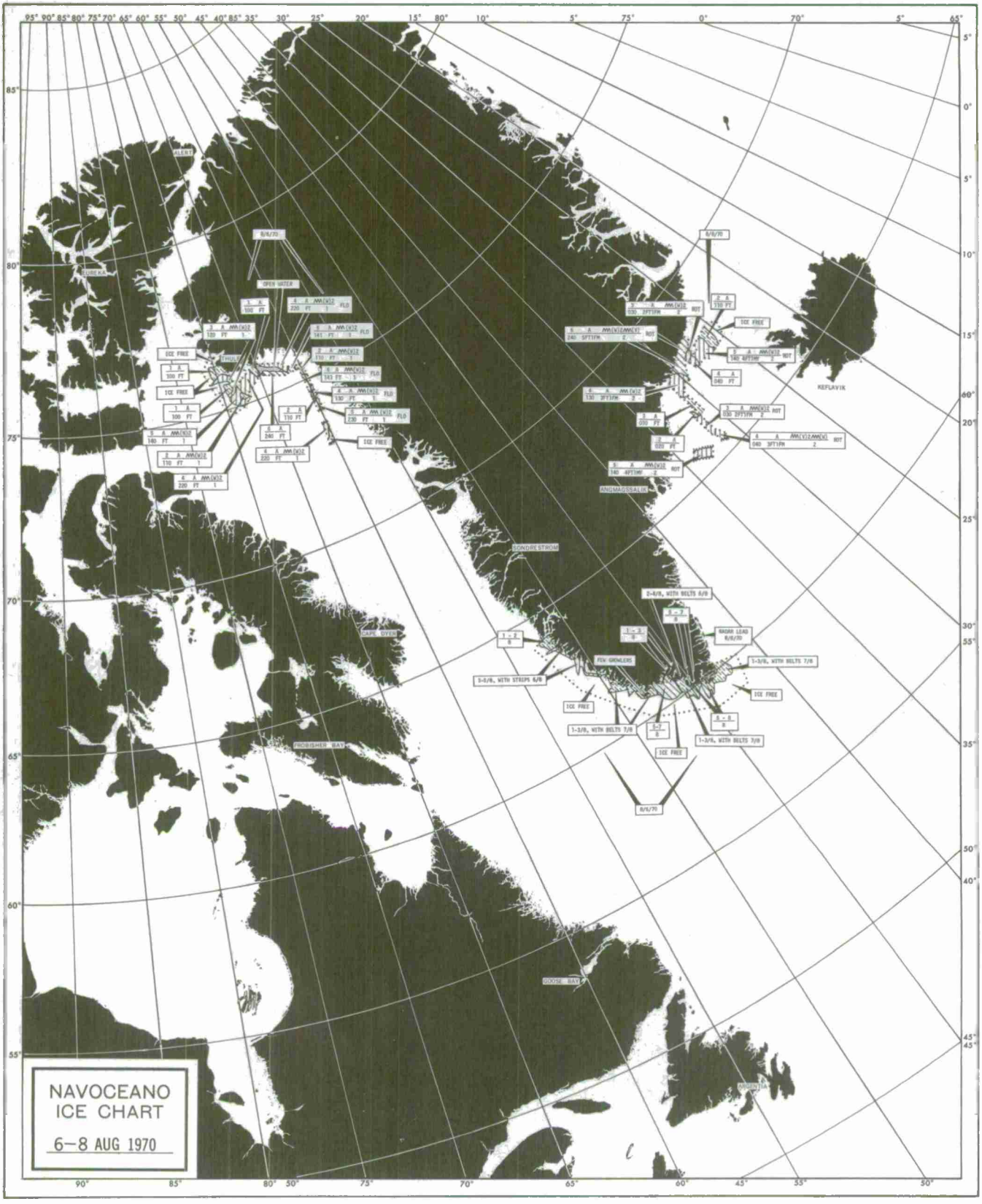

NAVOCEANO
ICE CHART
27 JULY 1970
ALERT
EUREKA
ICE FREE
THULE
RADAR ICE EDGE
RADAR ICE EDGE
ICE FREE
NOTE
CAPE DYER
PROBISHER BAY
ANGMAGSSALIK
SCORESBYSUND
KEFLAVIK
GOOSE BAY
95° 90° 85° 80° 75° 70° 65° 60° 55° 50° 45° 40° 35° 30° 25° 20° 15° 80° 10° 5° 75° 0° 70° 5° 65°
85° 80° 75° 70° 65° 60° 55° 50° 45° 40° 35° 30° 25° 20° 15° 10° 5° 0° 5° 10° 15° 60° 20° 25° 30° 55° 35° 50° 40° 45° 45°
90° 85° 80° 50° 75° 70° 65° 60° 45° 55° 50°

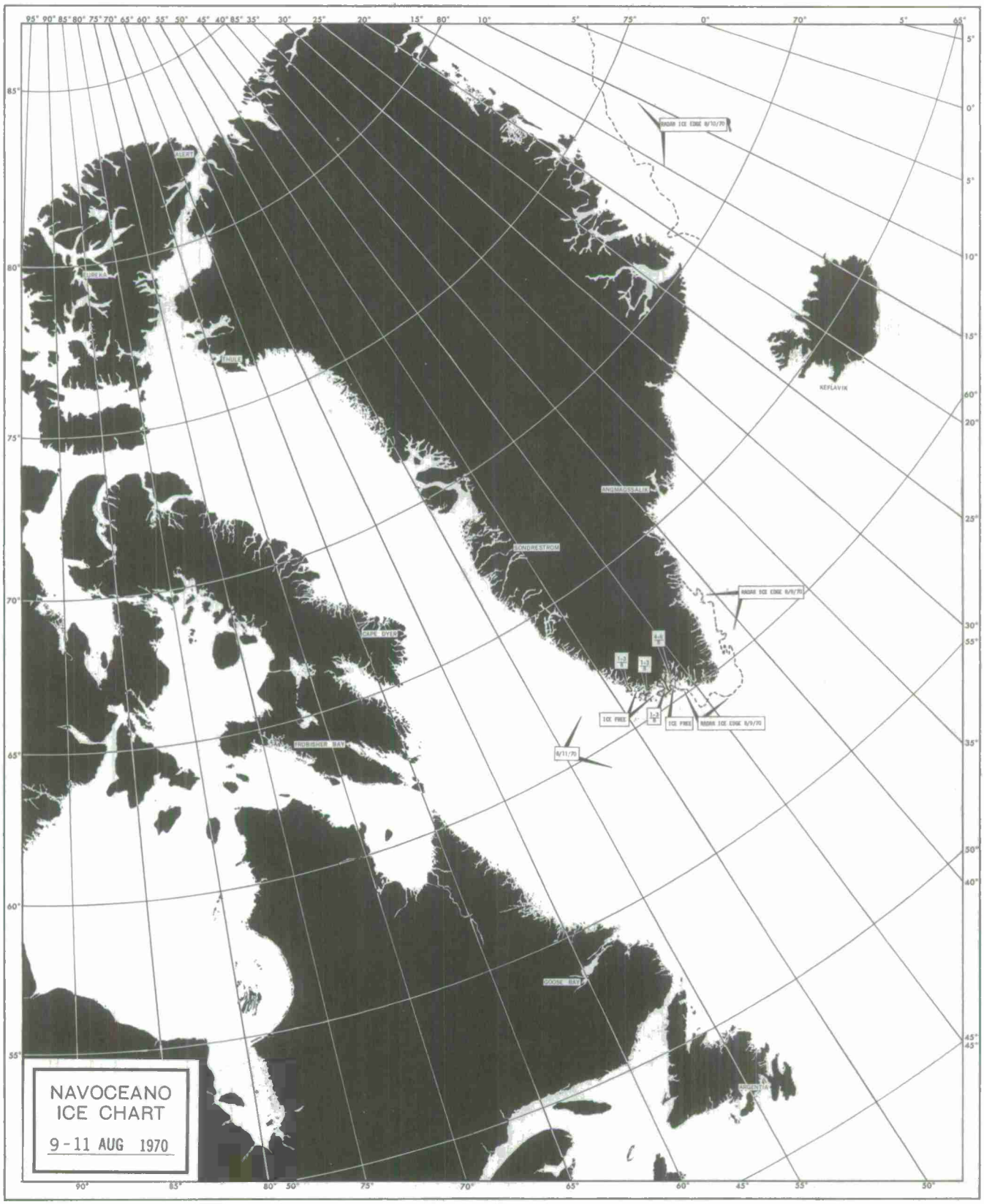

NAVOCEANO
ICE CHART
28 JULY 1970
ALERT
EUREKA
THULE
KEFLAVIK
ANGMAGSSALIK
SONDRESTROM
CAPE DYER
PROBISHER BAY
HOPEDALE
ICE FREE
RADAR ICE EDGE


NAVOCEANO
ICE CHART
29 JULY 1970
ALERT
EUREKA
THULE
OPEN WATER
ICE FREE
CAPE DYER
FROBISHER BAY
SYDNEY
KEFLAVIK
ANGMAGSSALIK
DENMARK STRAIT


NAVOCEANO
ICE CHART
30 JULY 1970
ALERT
EUREKA
REYKJAVIK
ANGMAGSSALIK
SONDRESTROM
CAPE DYER
FROBISHER BAY
GOOSE BAY
THULE
ICE FREE
ICE FREE INSHORE LEAD
SCTD MELTS 3/8
BROKEN


NAVOCEANO
ICE CHART
1-4 AUG 1970
ALERT
EUREKA
THULE
ICE FREE
KEFLAVIK
ANGMAGSSALIK
IGLOOLIK
CAPE DYER
FROBISHER BAY
GOOSE BAY
RADAR ICE EDGE 8/4/70
RADAR ICE EDGE 8/1/70
NAVY BERGS AND GROWLERS


NAVOCEANO
ICE CHART
6–8 AUG 1970
EUREKA
ALERT
RESOLUTE
CAPE DYER
FROBISHER BAY
GOOSE BAY
KEFLAVIK
ANGMAGSSALIK
SONDRE STROM
OPEN WATER
ICE FREE
FEW GROWLERS
RADAR LEAD 8/8/70
8/8/70
2-4/8, WITH BELTS 6/8
3-5/8, WITH BELTS 7/8
3-5/8, WITH STRIPS 6/8
1-3/8, WITH BELTS 7/8
1-3/8, WITH BELTS 7/8


NAVOCEANO
ICE CHART
9-11 AUG 1970
ALERT
EUREKA
THULE
KEFLAVIK
ANGMAGSSALIK
EGEDESMINDE
CAPE DYER
FROBISHER BAY
GOOSE BAY
RADAR ICE EDGE 8/10/70
RADAR ICE EDGE 8/9/70
RADAR ICE EDGE 8/9/70
ICE FREE
ICE FREE
8/11/70

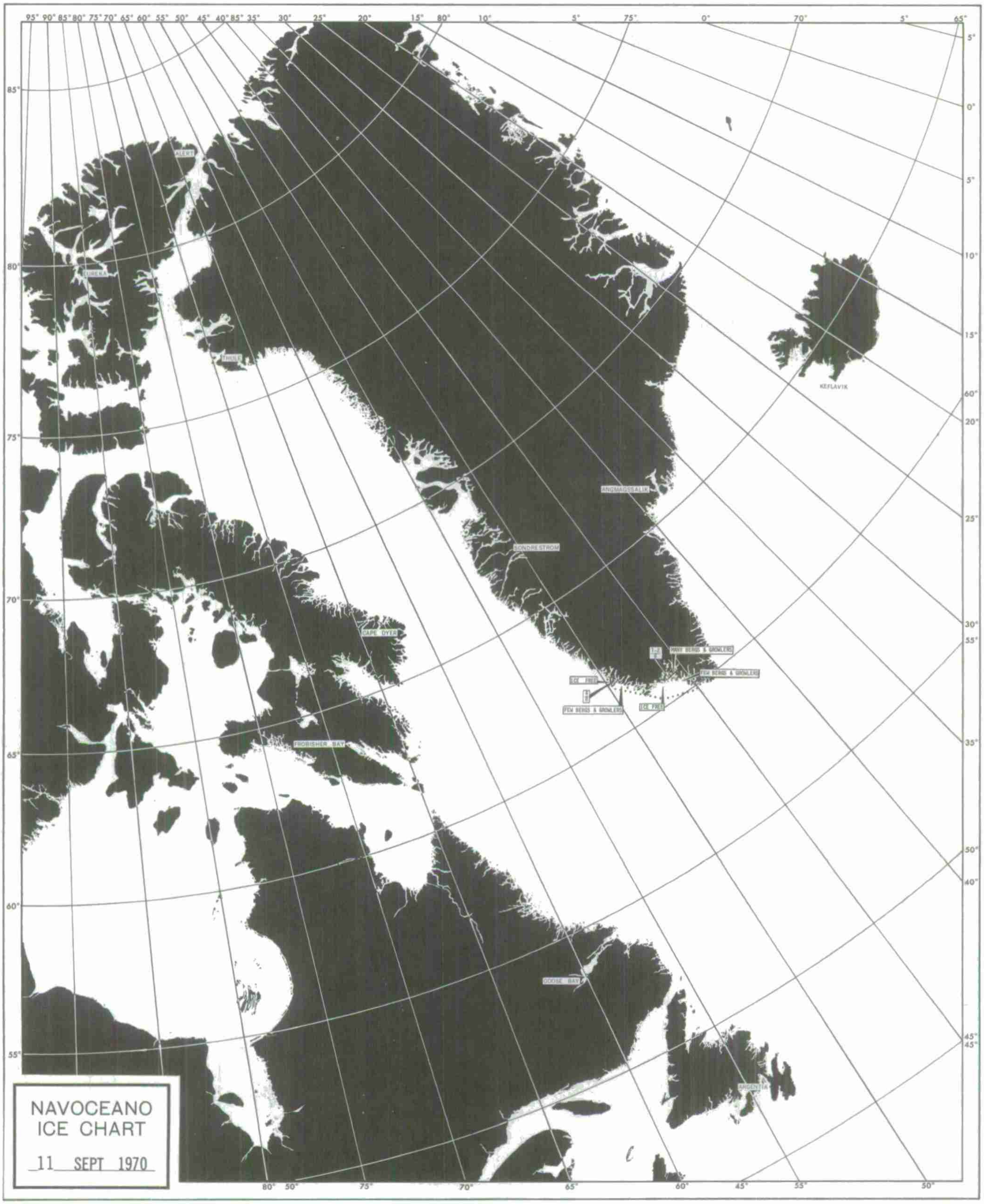

ALERT
EUREKA
THULE
KEFLAVIK
ANGMAGSSALIK
ICEBERG STRIKE
CAPE DYER
RADAR ICE EDGE
FEW STRIPS AND MANY BERGS
ICE FREE
MANY BERGS AND GROWLERS
FROBISHER BAY
GOOSE BAY
ARGENTIA
NAVOCEANO
ICE CHART
18 AUG 1970


NAVOCEANO
ICE CHART
21 AUG 1970
ALERT
EUREKA
THULE
KEFLAVIK
ANGMAGSSALIK
SONDRESTROM
CAPE DYER
FROBISHER BAY
GOOSE BAY
MANY BERGS AND GROWLERS
ICE FREE
MANY BERGS AND GROWLERS
1-2/0, MANY STRIPS 3-5/0
3/0, FEW BELTS 1-2/0
MANY BERGS AND GROWLERS

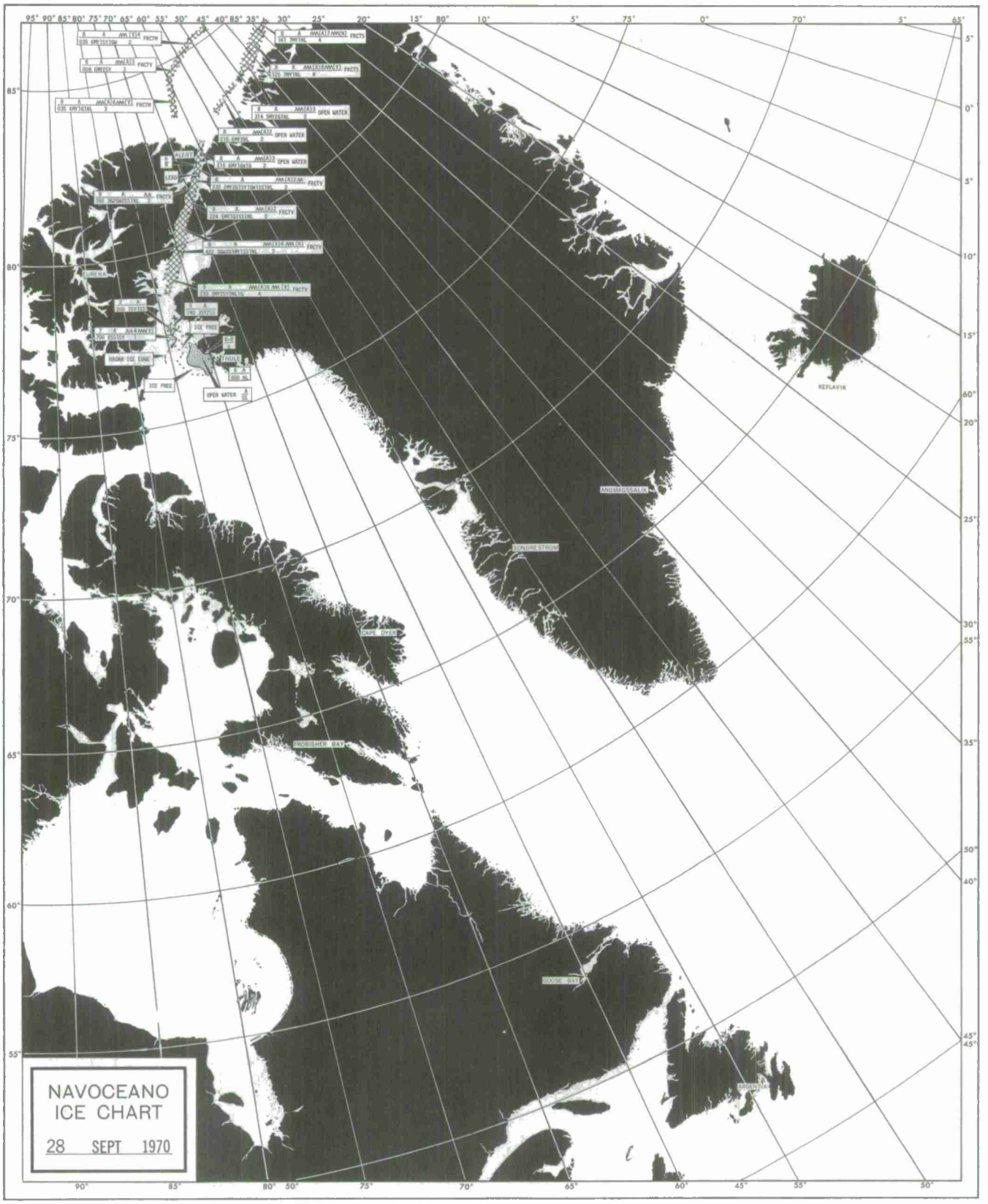

ALERT
EUREKA
THULE
KEFLAVIK
ANGMAGSSALIK
BONDRESTROM
CAPE DYER
PROBISHER BAY
GOOSE BAY
ARGENTIA
OPEN WATER
OPEN WATER, FEW STRIPS 2-3/8
ICE FREE
1-2/8, FEW STRIPS
NAVOCEANO
ICE CHART
24 AUG 1970

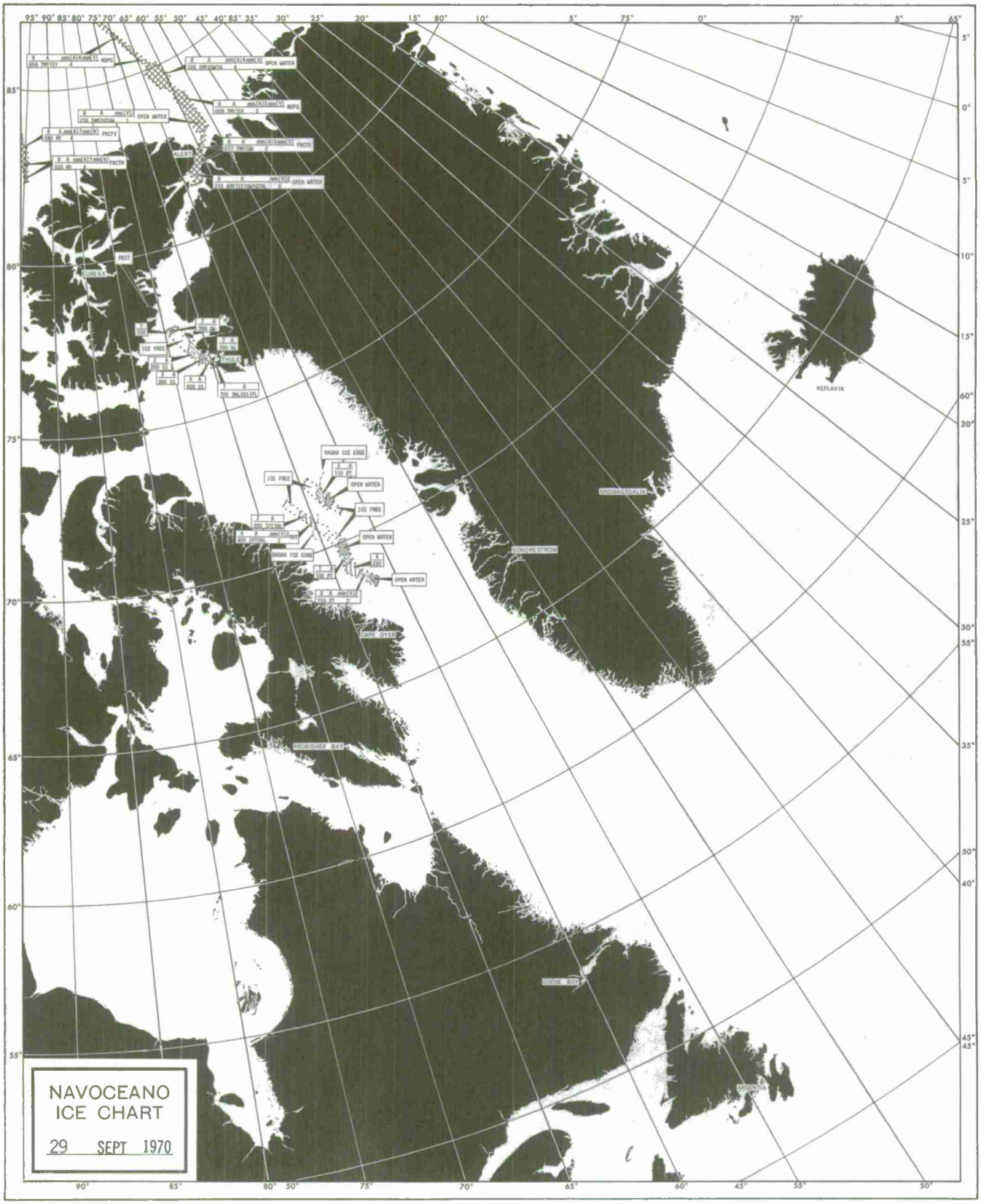

NAVOCEANO
ICE CHART
31 AUG 1970
ALERT
THULE
KEFLAVIK
ANGMAGSSALIK
SCORESBYSUND
OPEN WATER
CAPE DYER
FROBISHER BAY
ZONE XXX

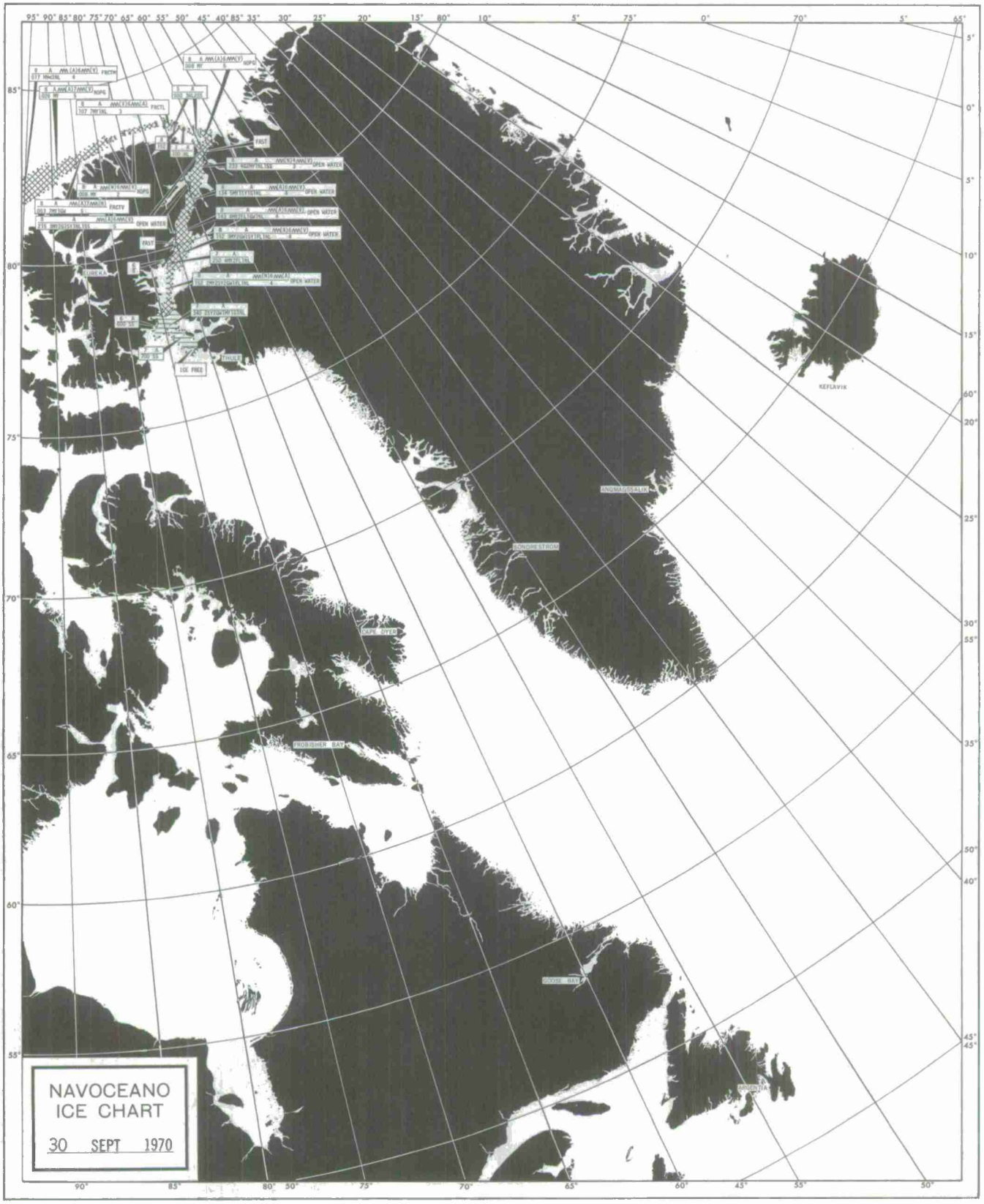

NAVOCEANO
ICE CHART
4–5 SEPT 1970
ALERT
EUREKA
THULE
ICE FREE
6–7/8, BELTS 3/8
5–8/8, BELTS 7/8
FEW BERGS
ICE FREE
MANY BERGS & GROWLERS
5–8/8, BELTS 7/8
FEW BERGS
ICE FREE
9/5/70
ANGMASSALIK
ICE FREE
RADAR ICE EDGE
9/5/70
ICE FREE
SUNDHE STROM
CAPE DYER
ICE FREE
MANY BERGS & GROWLERS
FEW BERGS & MANY GROWLERS
ICE FREE
9/4/70
PROBISHER BAY
GOOSE BAY
KEFLAVIK
ARGENTIA

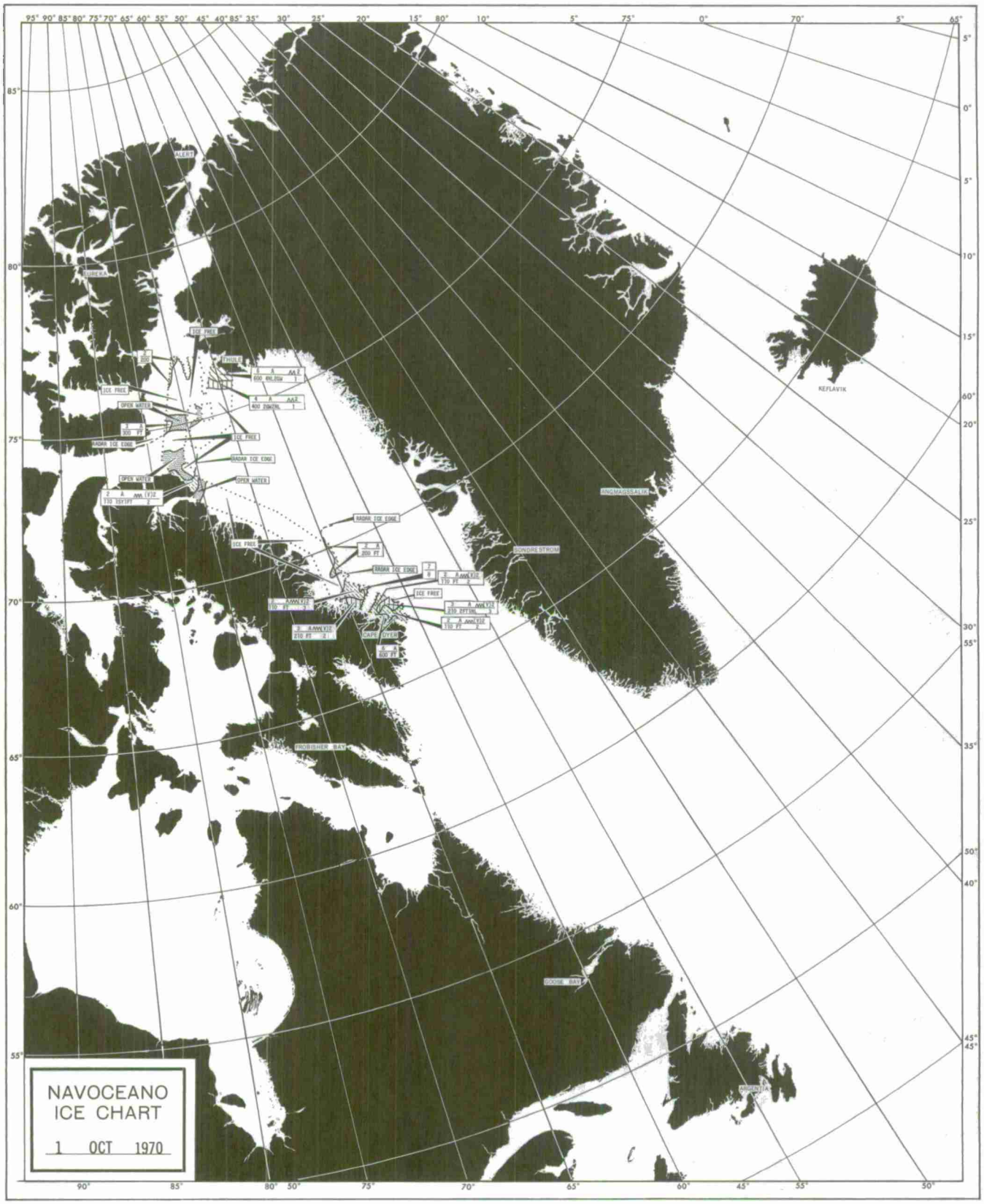

ALERT
EUREKA
THULE
KEFLAVIK
ANGMAGSSALIK
SONDRESTROM
CAPE DYER
FROBISHER BAY
GOOSE BAY
ARGENTIA
MANY BERGS & GROWLERS
FEW BERGS & GROWLERS
ICE FREE
FEW BERGS & GROWLERS
ICE FREE
NAVOCEANO
ICE CHART
11 SEPT 1970


NAVOCEANO
ICE CHART
23 SEPT 1970
ALERT
EUREKA
THULE
KEFLAVIK
ANGMAGSSALIK
SONDRE STROM
FROBISHER BAY
GOOSE BAY
ICE FREE
OPEN WATER
RADAR ICE EDGE
CAPE DYER

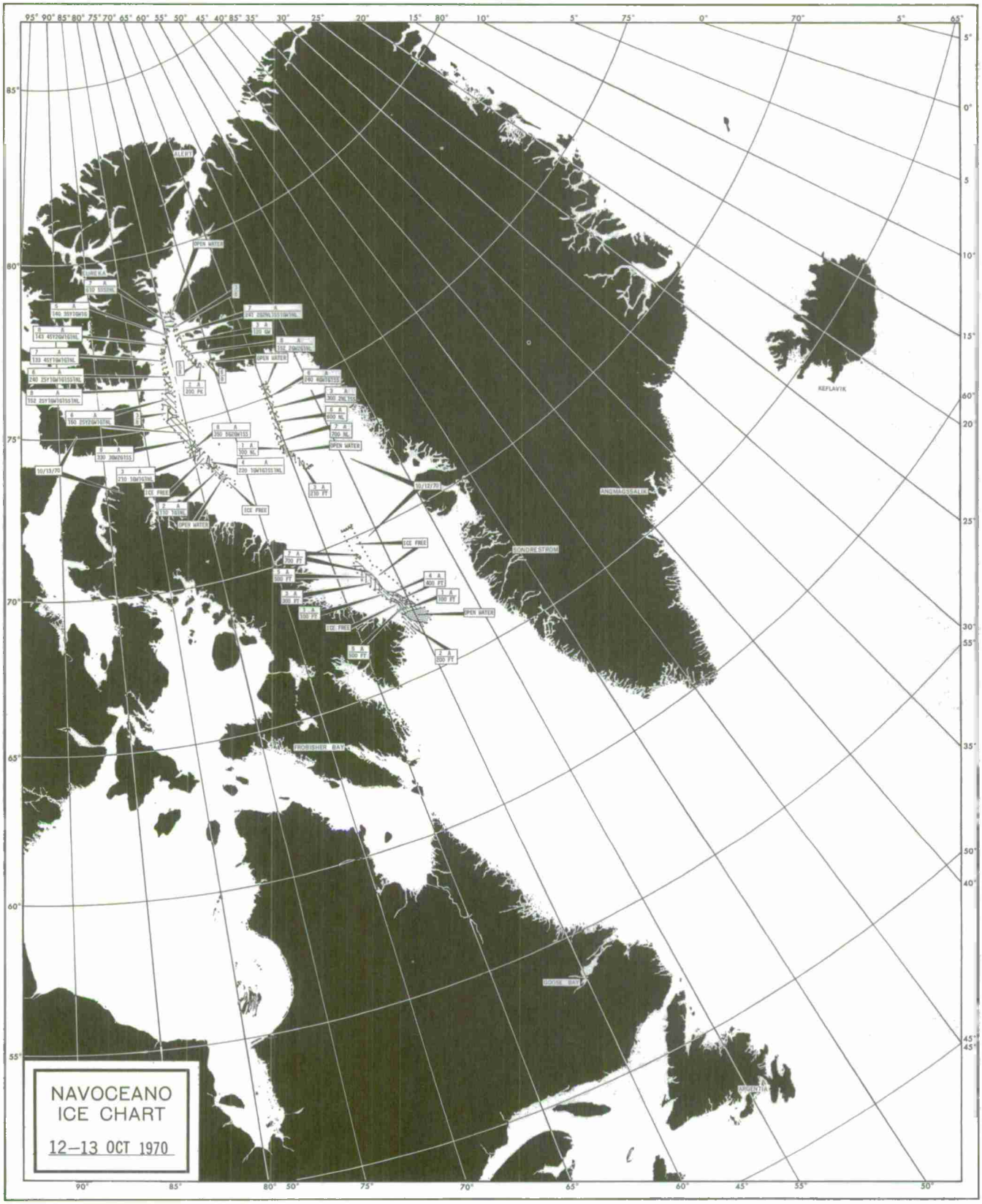

NAVOCEANO
ICE CHART
28 SEPT 1970
KEFLAVIK
AMMASSALIK
FROBISHER BAY
GOOSE BAY
ICE FREE
OPEN WATER
LEAD

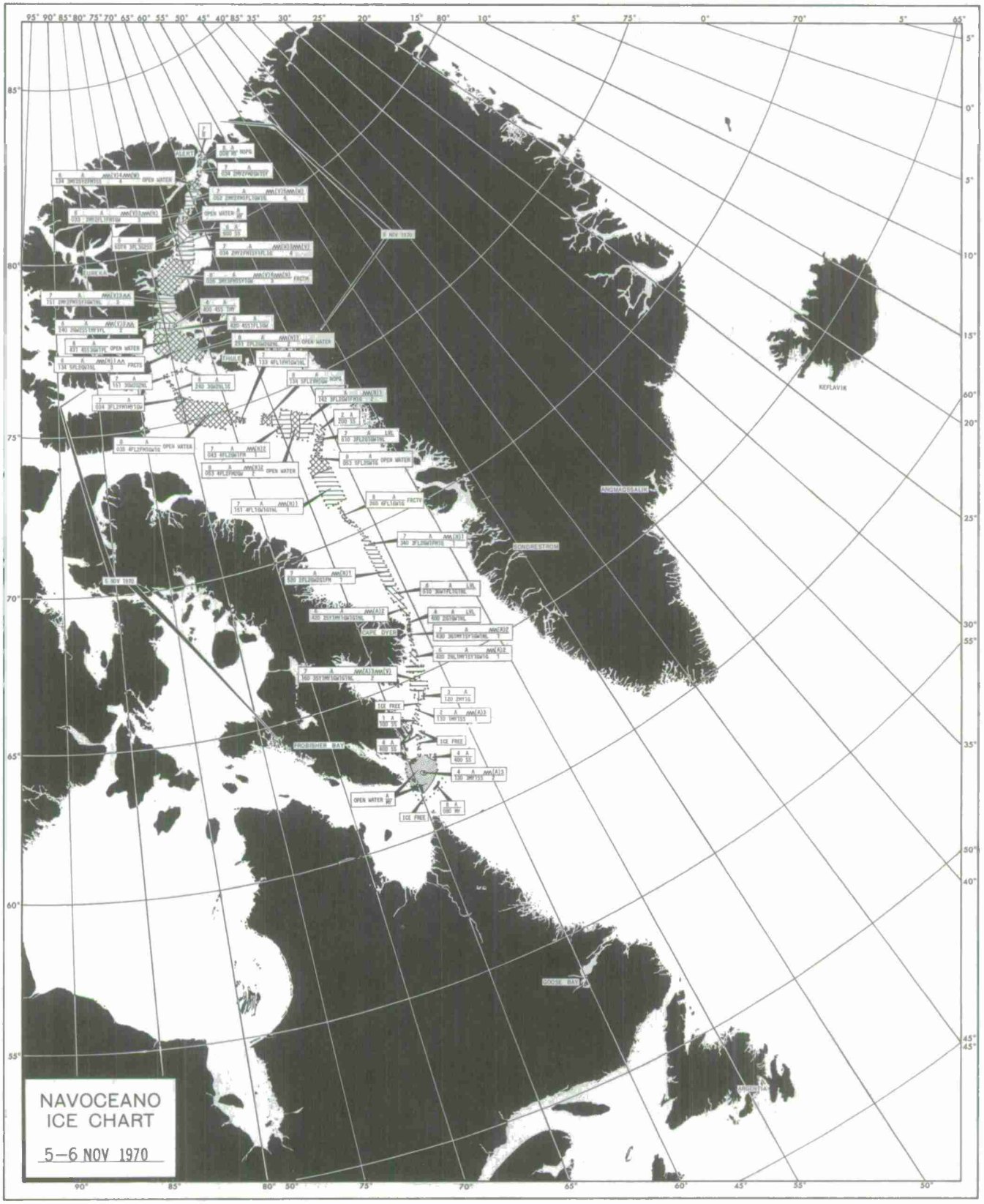

NAVOCEANO
ICE CHART
29 SEPT 1970
ALERT
EUREKA
FAST
ICE FREE
THULE
RADAR ICE EDGE
OPEN WATER
CAPE DYER
PROBISHER BAY
GOOSE BAY
KEFLAVIK
ANGMAGSSALIK
IGDLORESTROM
GODTHAB


NAVOCEANO
ICE CHART
30 SEPT 1970
KEFLAVIK
ANGMAGSSALIK
BONDHE STROM
FROBISHER BAY
OKAK BAY
ICE FREE
FAST
OPEN WATER


NAVOCEANO
ICE CHART
1 OCT 1970
ALERT
EUREKA
ICE FREE
OPEN WATER
RADAR ICE EDGE
FROBISHER BAY
KEFLAVIK
ANGMAGSSALIK
GOOSE BAY

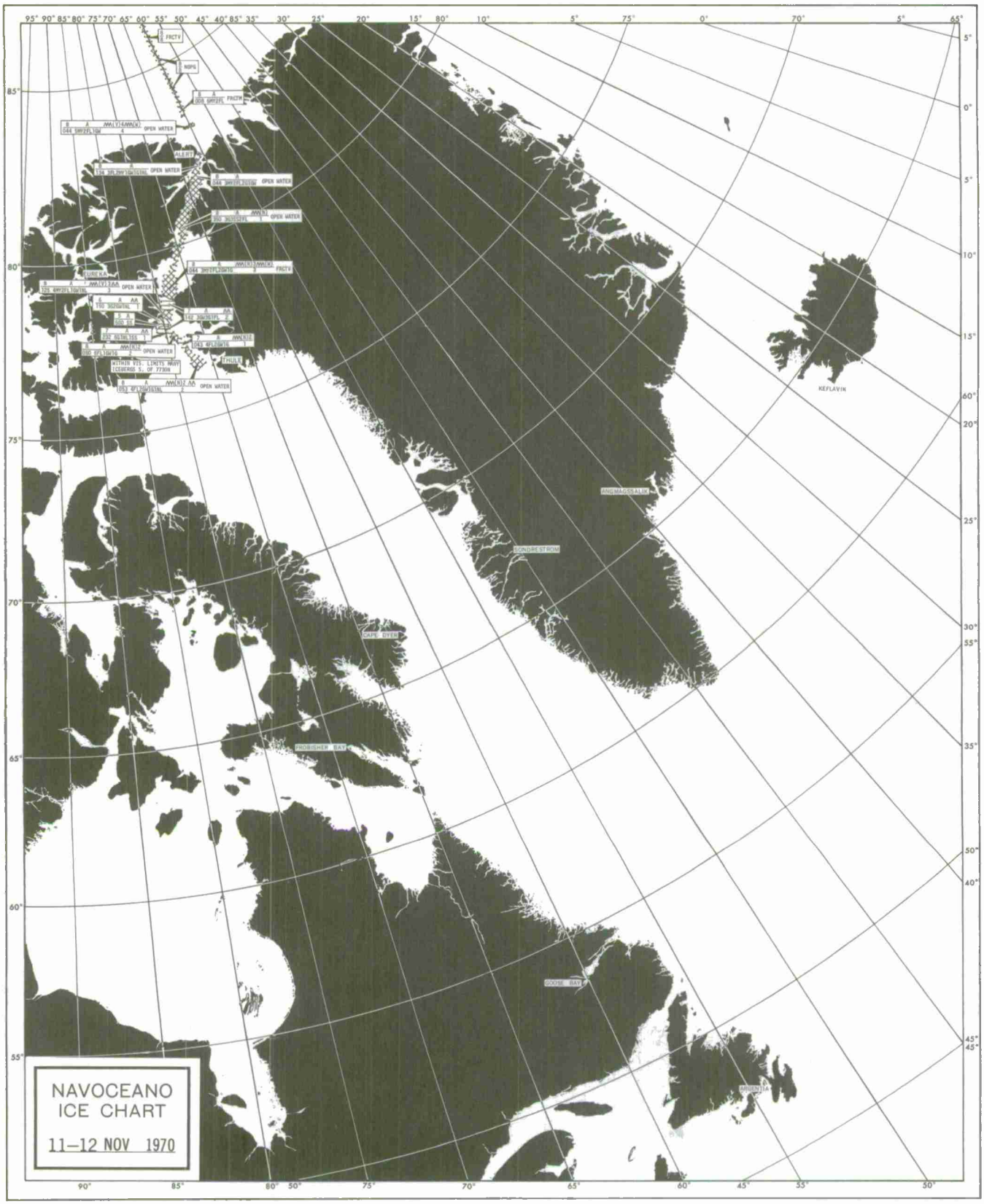

NAVOCEANO
ICE CHART
2-4 OCT 1970
ALERT
THULE
ICE FREE
ICE FREE
ICE FREE
ICE FREE
ICE FREE
RADAR ICE ENGR
KEFLAVIK
ANGMAGSSALIK
IGNORE STROM
CAPE DYER
FROBISHER BAY
GOOSE BAY
GODTHAB


NAVOCEANO
ICE CHART
12–13 OCT 1970
ALERT
OPEN WATER
ICE FREE
KEFLAVIK
ANGMAGSSALIK
IVITTUT
FROBISHER BAY
GOOSE BAY
NARSARSUAQ

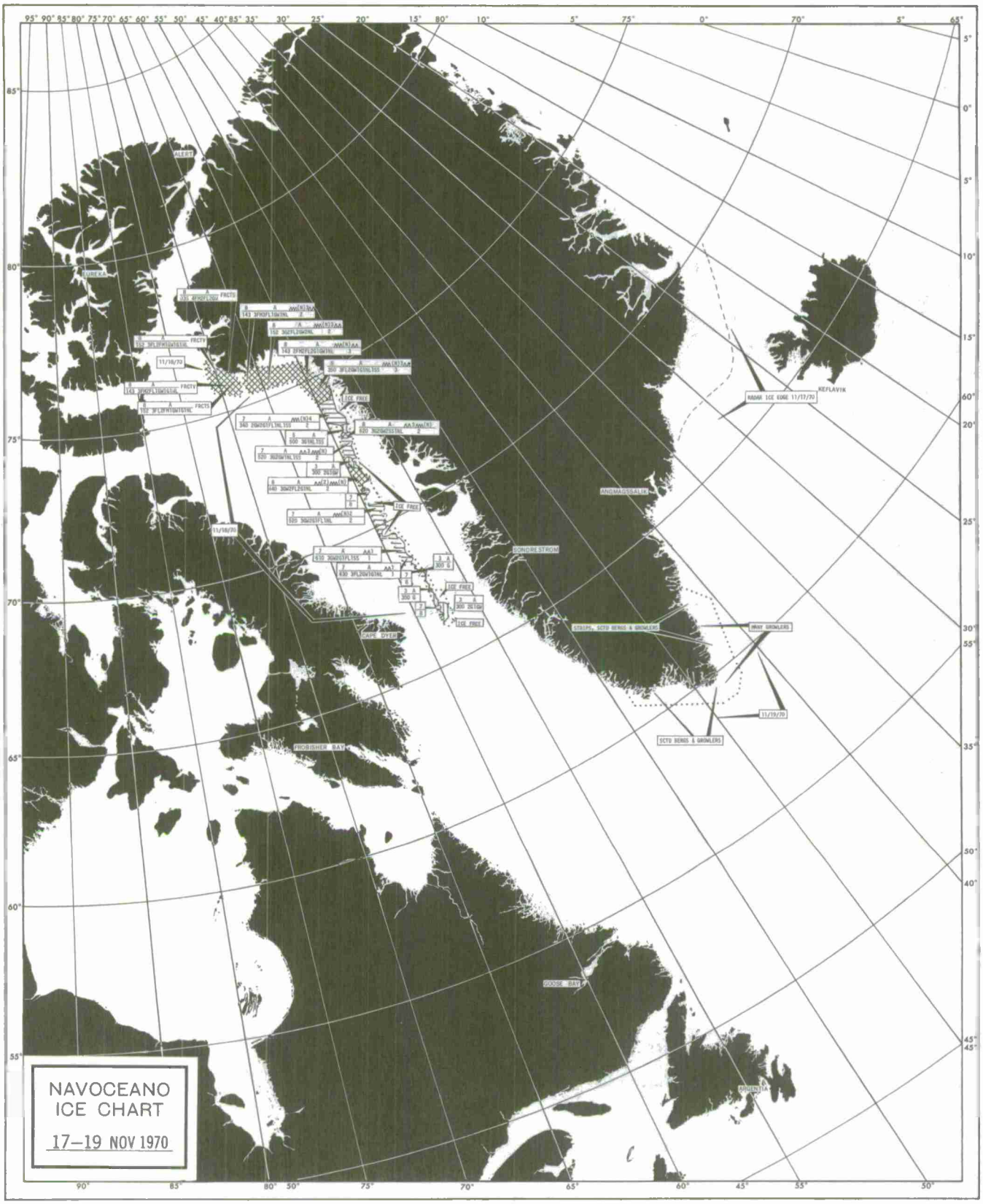

NAVOCEANO
ICE CHART
5–6 NOV 1970
ALERT
KEFLAVIK
SONDRESTROM
GODTHAB
GOOSE BAY
PROBISHER BAY
CAPE DYER
ICE FREE
OPEN WATER
6 NOV 1930

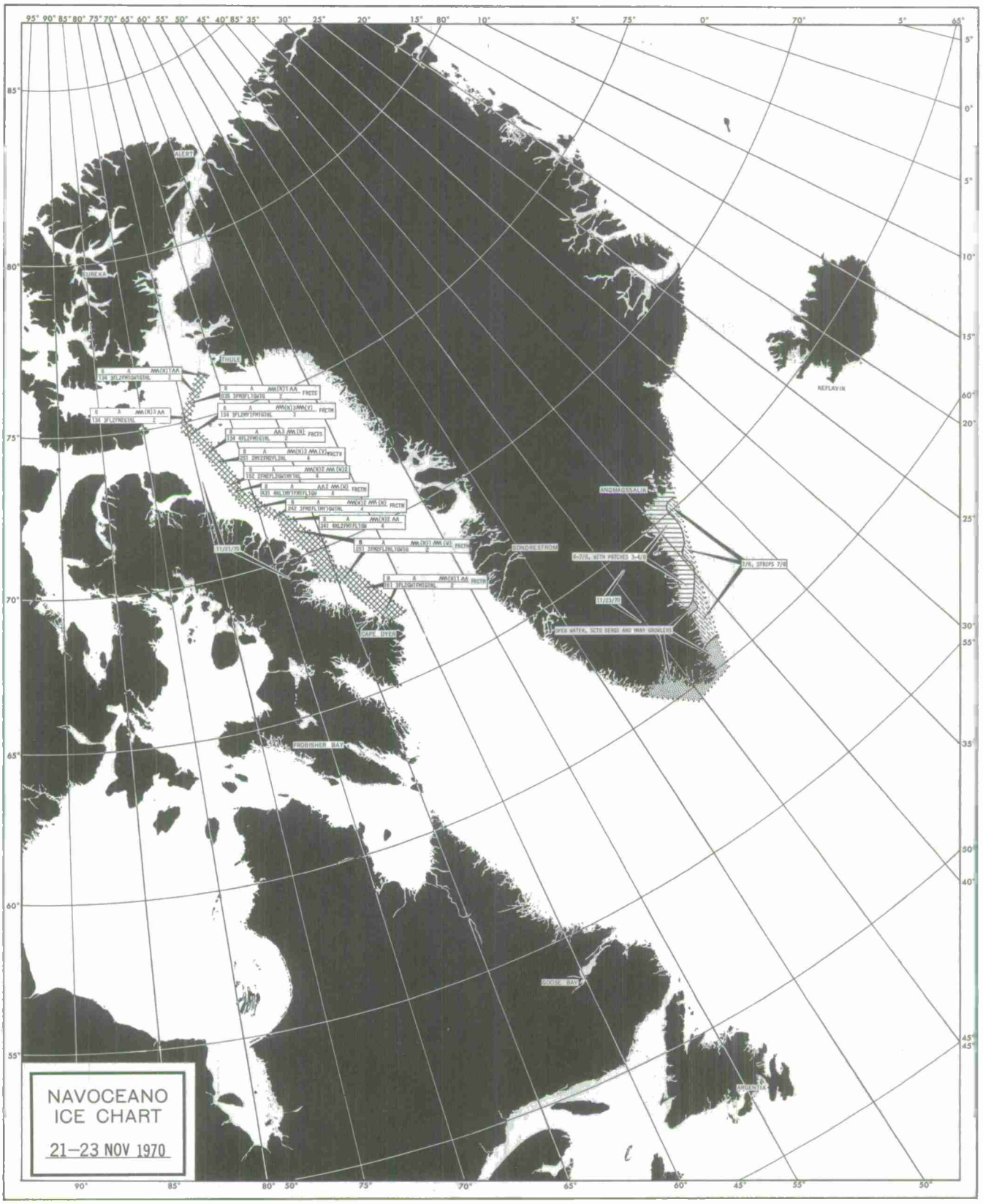

ALERT
EUREKA
THULE
KEFLAVIK
ANGMAGSSALIK
ICE FREE
SCTD BERGS & GROWLERS
BELTS 1-2/8
BELTS 1-2/8
ICE FREE
BONDRESTROM
CAPE DYER
FROBISHER BAY
GOOSE BAY
ARGENTIA
NAVOCEANO
ICE CHART
8 NOV 1970


NAVOCEANO
ICE CHART
10 NOV 1970
KEFLAVIK
ANGMAGSSALIK
SONDRE STROM
CAPE DYER
FROBISHER BAY
GOOSE BAY
THULE

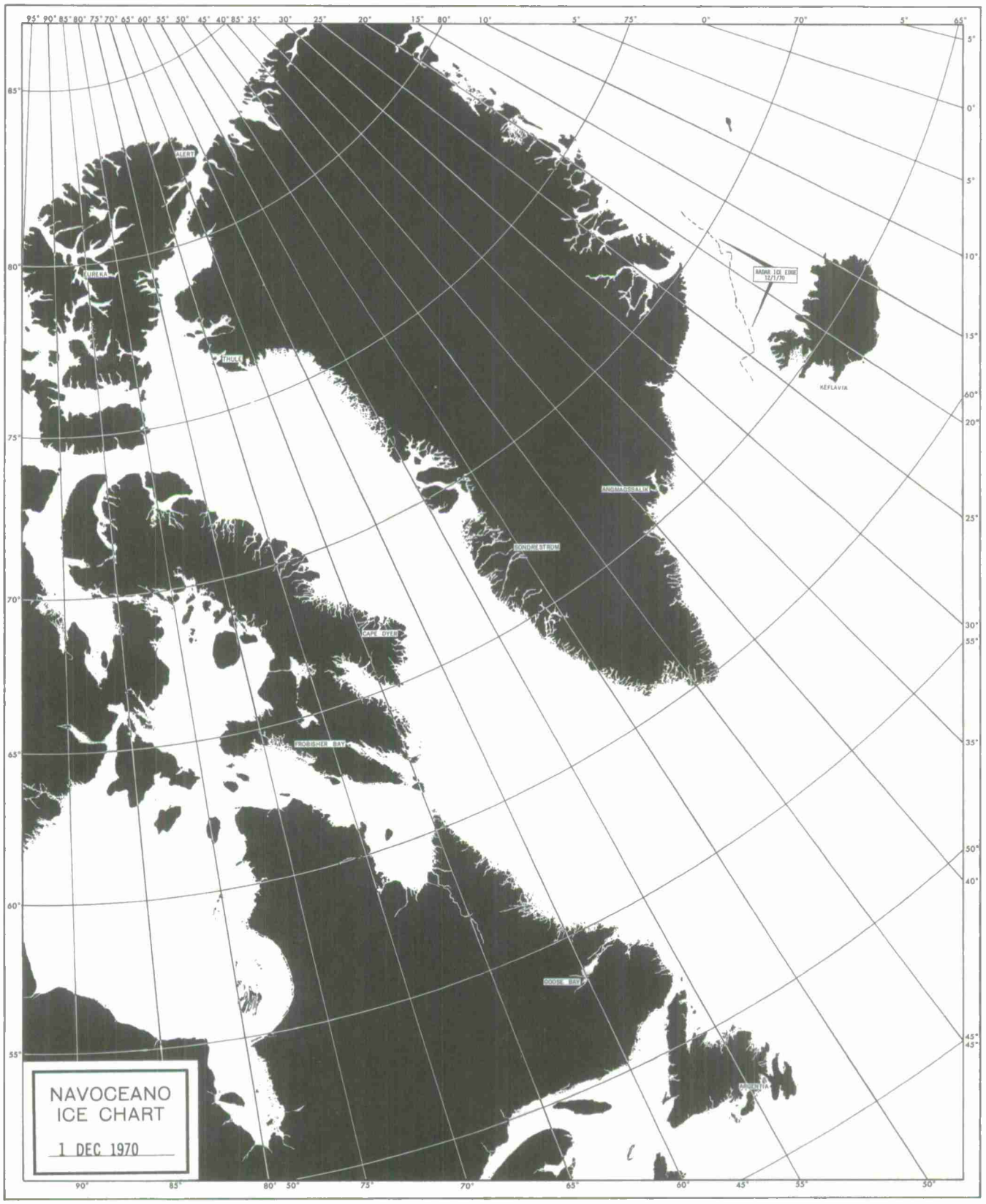

NAVOCEANO
ICE CHART
11–12 NOV 1970
KEFLAVIK
ANGMAGSALIK
JONDRESTROM
CAPE DYER
FROBISHER BAY
GOOSE BAY
THULE

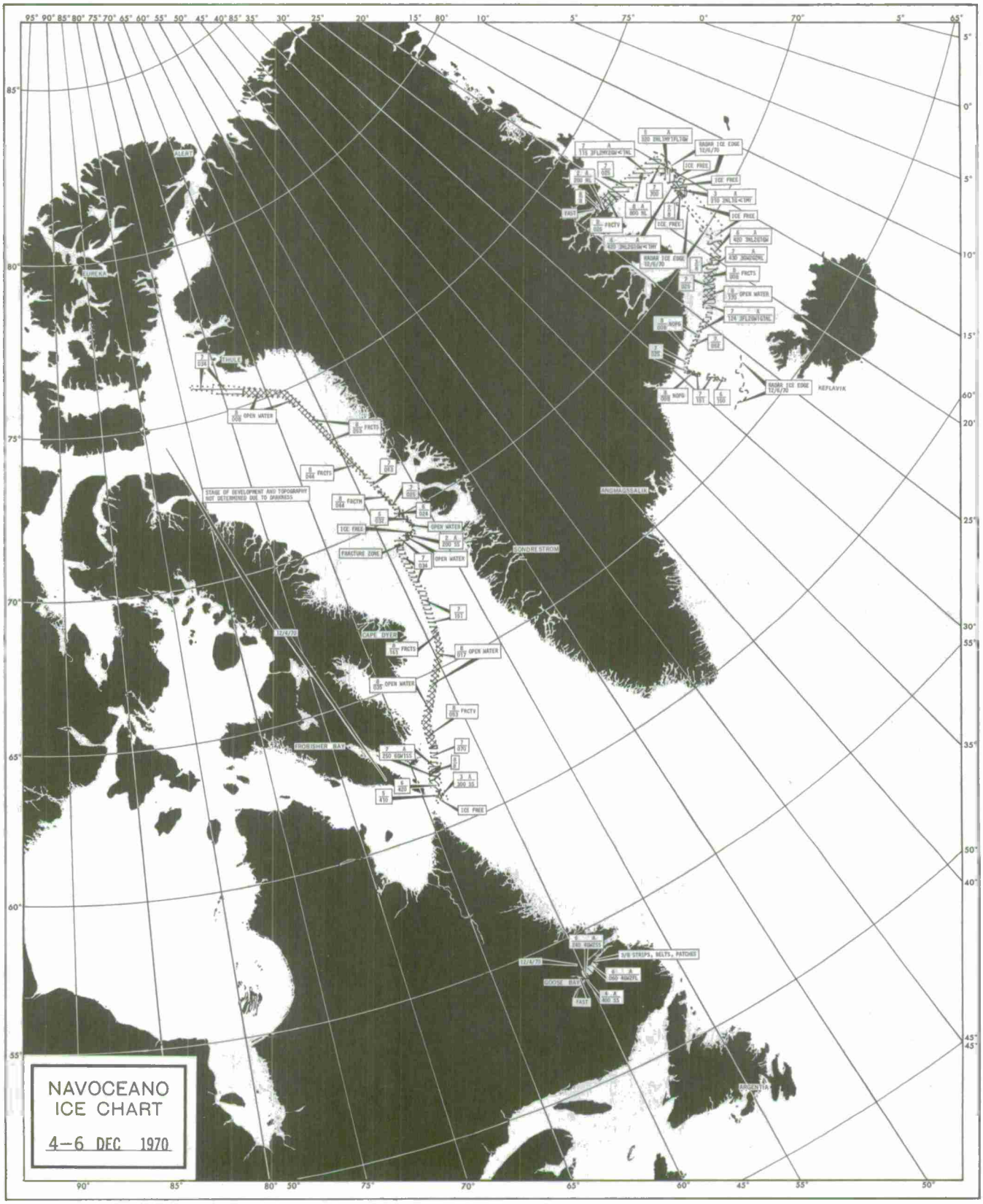

NAVOCEANO
ICE CHART
15 NOV 1970
KEFLAVIK
GOOSE BAY
PROBISHER BAY
CAPE DYER

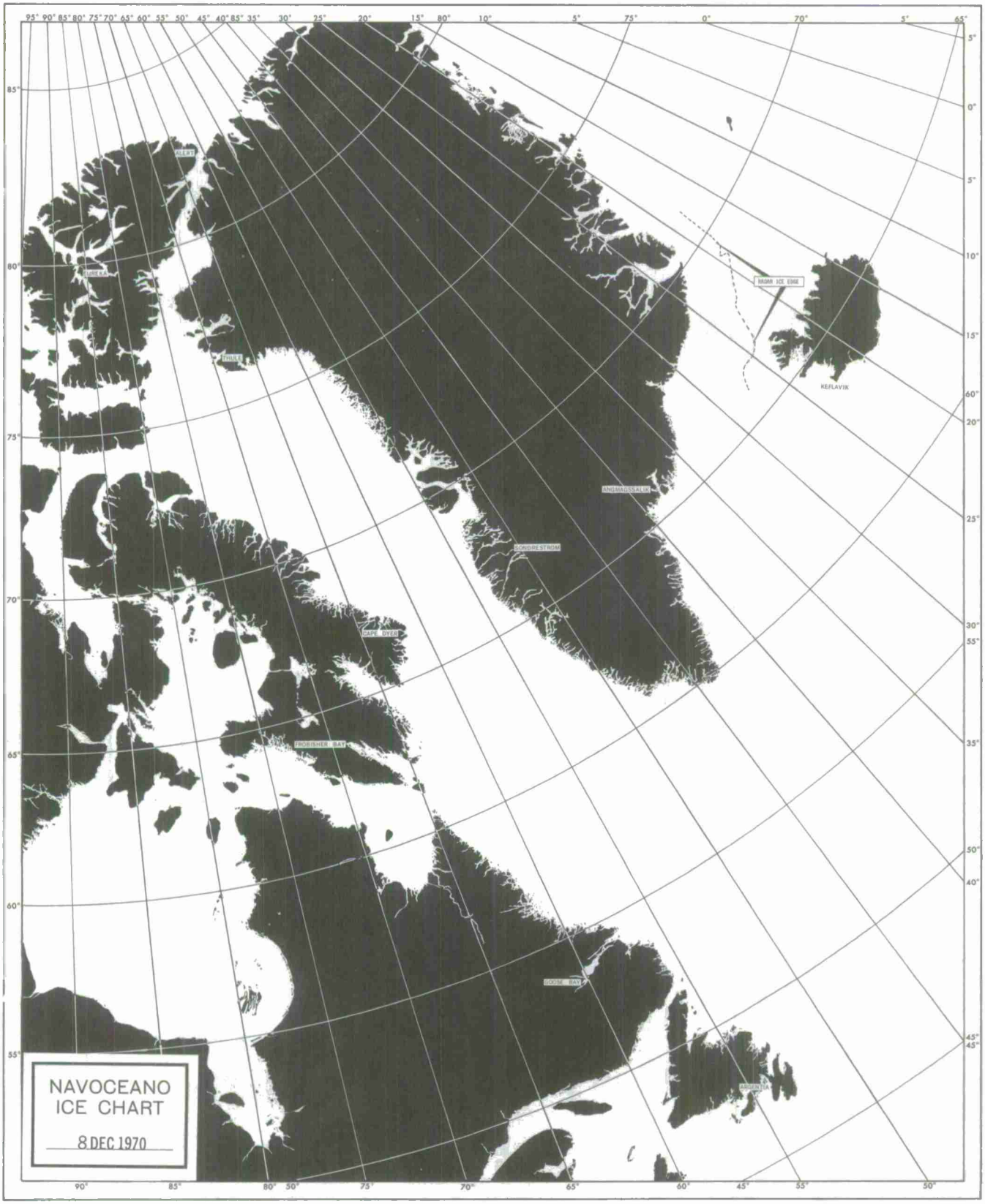

NAVOCEANO
ICE CHART
17–19 NOV 1970
ALERT
EUREKA
FROBISHER BAY
CAPE DYER
GOOSE BAY
ICE FREE
11/18/70
11/19/70
RADAR ICE EDGE 11/17/70
KEFLAVIK
ANGMAGSSALIK
JONDRELSTROM
STRIPS, SCTD BERGS & GROWLERS
HVY GROWLERS
SCTD BERGS & GROWLERS

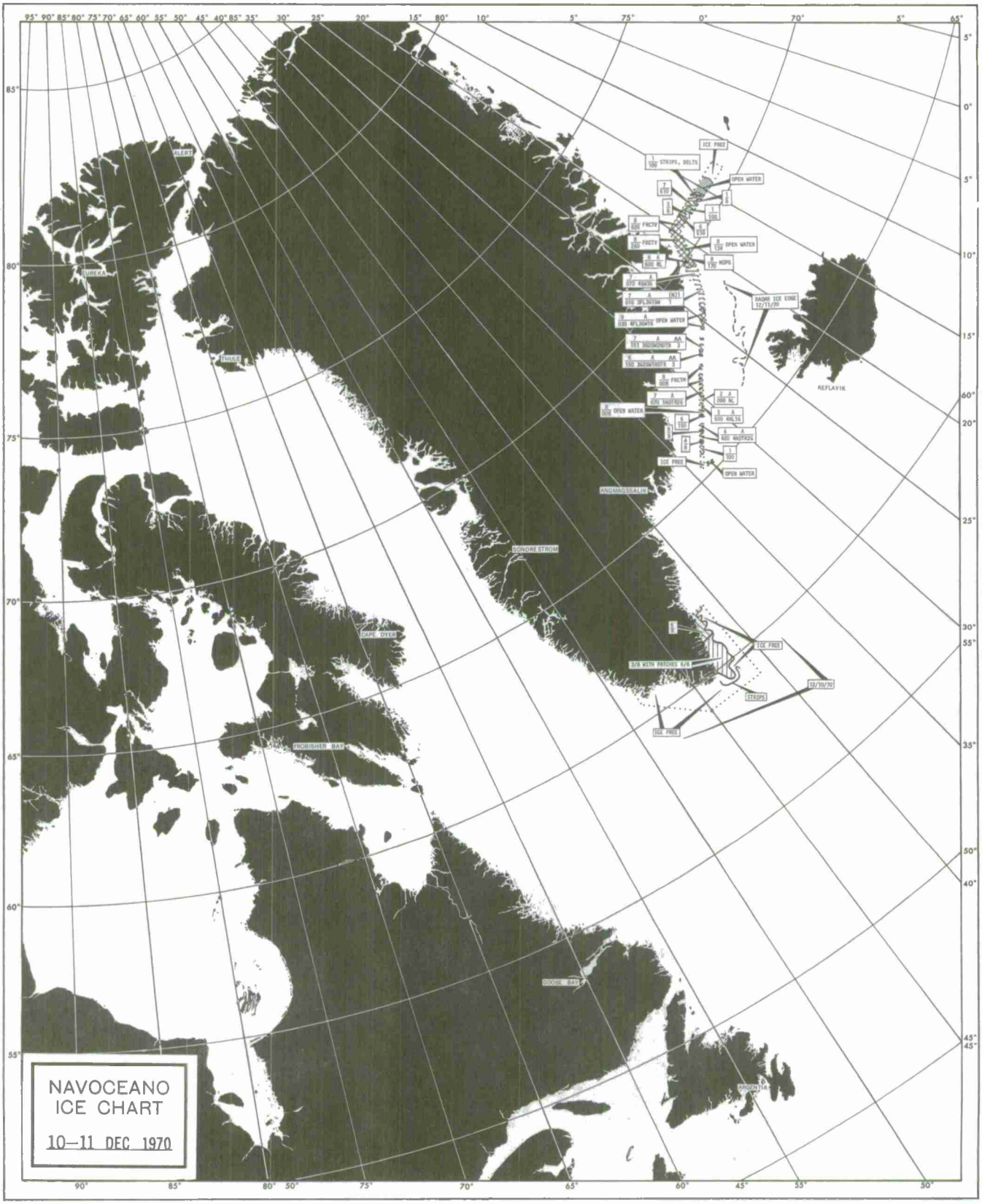

NAVOCEANO
ICE CHART
21–23 NOV 1970
ALERT
EUREKA
THULE
KEFLAVIK
ANGMAGSSALIK
SONDRE STROM
FROBISHER BAY
CAPE DYER
GOOSE BAY
ST JOHN'S
OPEN WATER, SCTD BERGS AND WAY GROWLERS
6-7/8, WITH PATCHES 3-4/8
7/8, 3FKIPS 7/8
11/27/70

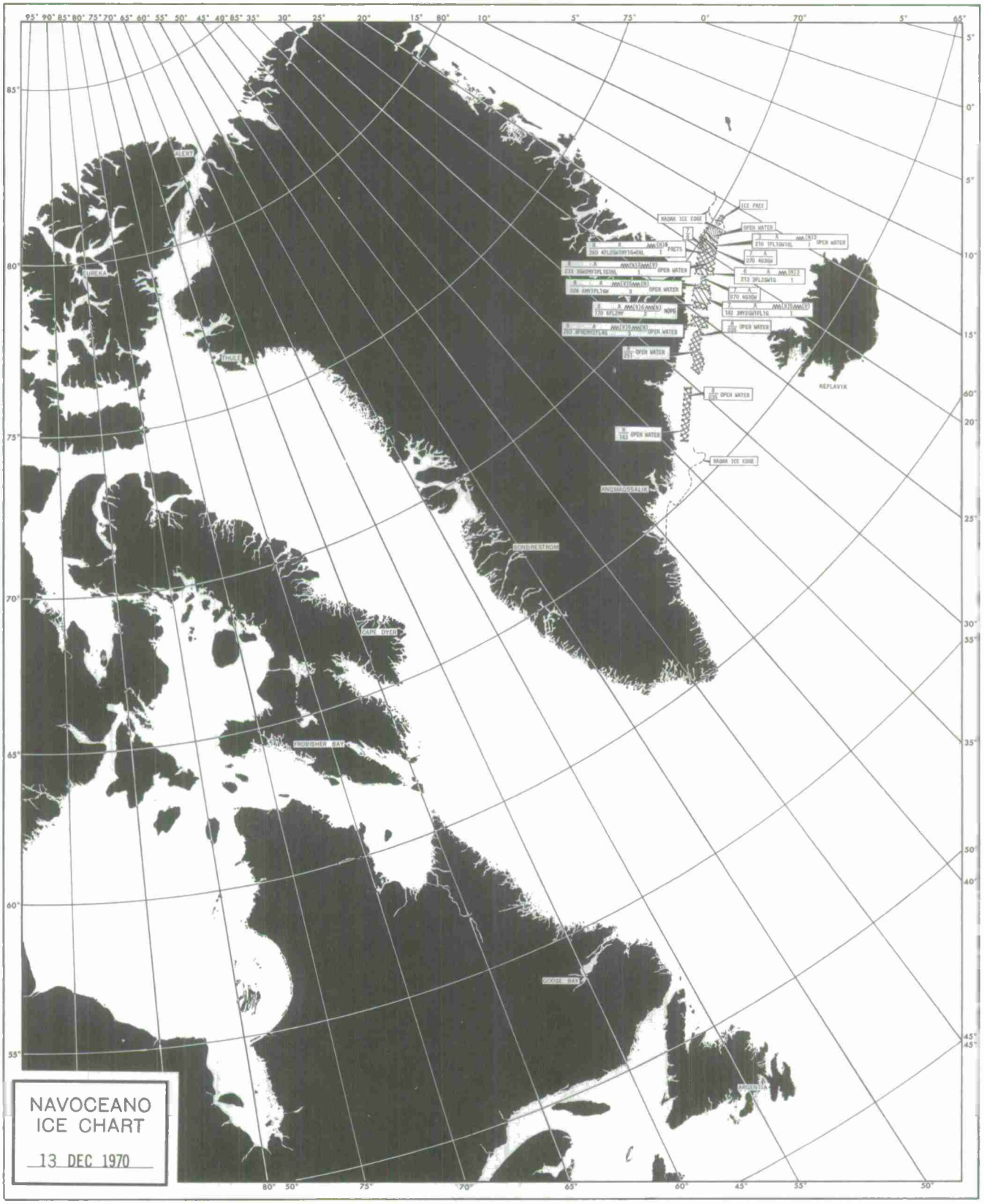

NAVOCEANO
ICE CHART
27 NOV 1970
ALERT
EUREKA
THULE
KEFLAVIK
ANGMAGSSALIK
FROBISHER BAY
CAPE DYER
GOOSE BAY
MANY BERGS AND GROWLERS
FEW BERGS AND GROWLERS
MANY BERGS AND GROWLERS
1-4/8 STRIPS O/E
3CTO BERGS AND GROWLERS
BONDESTROM
OPEN WATER


ALERT
EUREKA
THULE
KEFLAVIK
RADAR ICE EDGE 12/1/70
ANGMAGSSALIK
SCORESBYSUND
CAPE DYER
PROBISHER BAY
GOOSE BAY
NAVOCEANO
ICE CHART
1 DEC 1970


NAVOCEANO
ICE CHART
4–6 DEC 1970
ALERT
EUREKA
KEFLAVIK
ANGMAGSSALIK
SONDRESTROM
CAPE DYER
FROBISHER BAY
GOOSE BAY
ARGENTIA
STAGE OF DEVELOPMENT AND TOPOGRAPHY NOT DETERMINED DUE TO DARKNESS
FRACTURE ZONE
OPEN WATER
ICE FREE
FAST
RADAR ICE EDGE 12/6/70
12/6/70
STRIPS, BELTS, PATCHES


NAVOCEANO
ICE CHART
8 DEC 1970
ALERT
EUREKA
THULE
CAPE DYER
FROBISHER BAY
GOOSE BAY
ANGMAGSSALIK
SONDRESTROM
KEFLAVIK
ARGENTIA

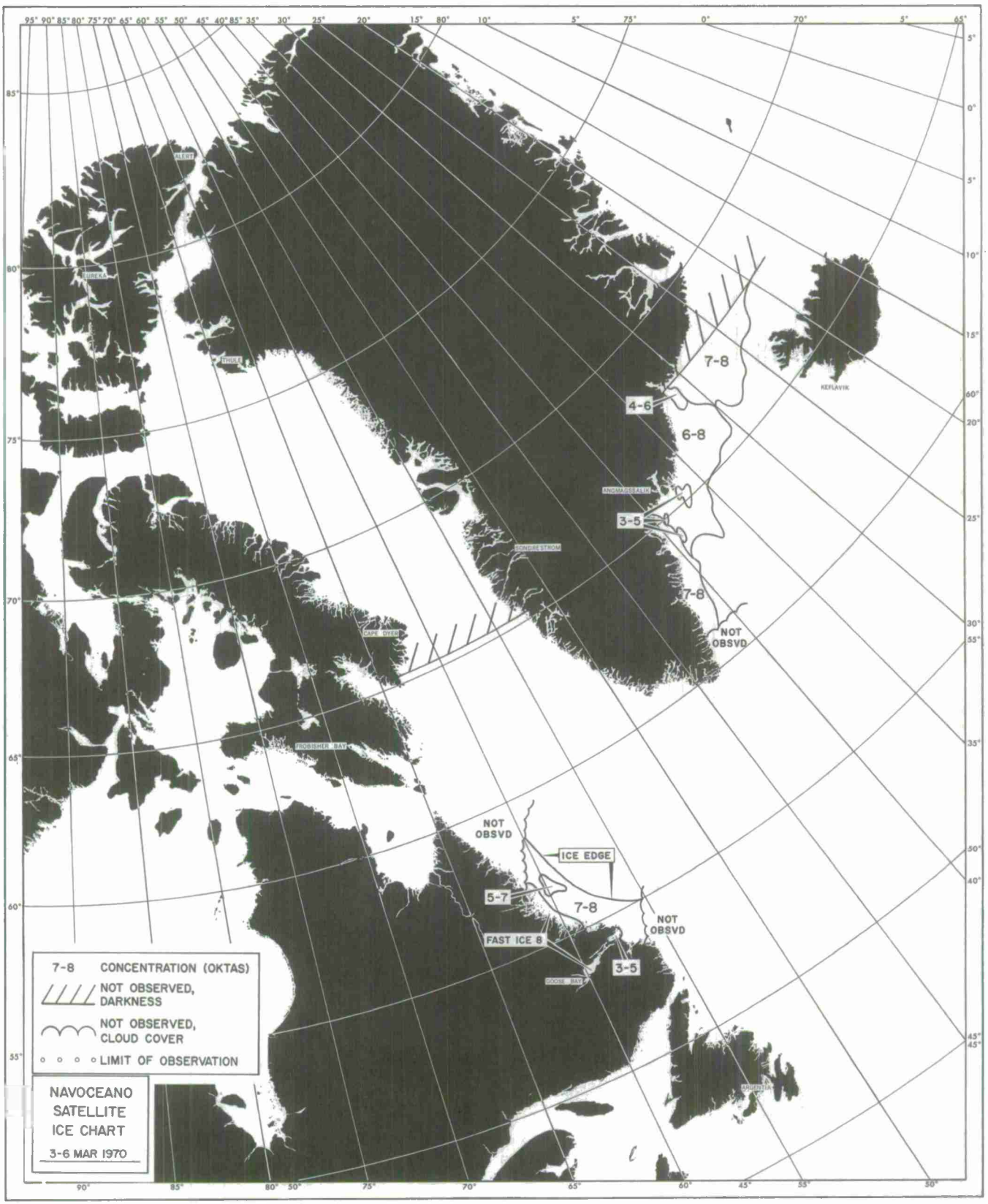

NAVOCEANO
ICE CHART
10—11 DEC 1970
ALERT
EUREKA
THULE
CAPE DYER
PROBISHER BAY
GOOSE BAY
ARGENTIA
REYKJAVIK
SONDRESTROM
ANGMAGSSALIK
ICE FREE
OPEN WATER
RADAR ICE EXAM 12/11/70
STRIPS
12/10/70
9/8 WITH PATCHES 6/8

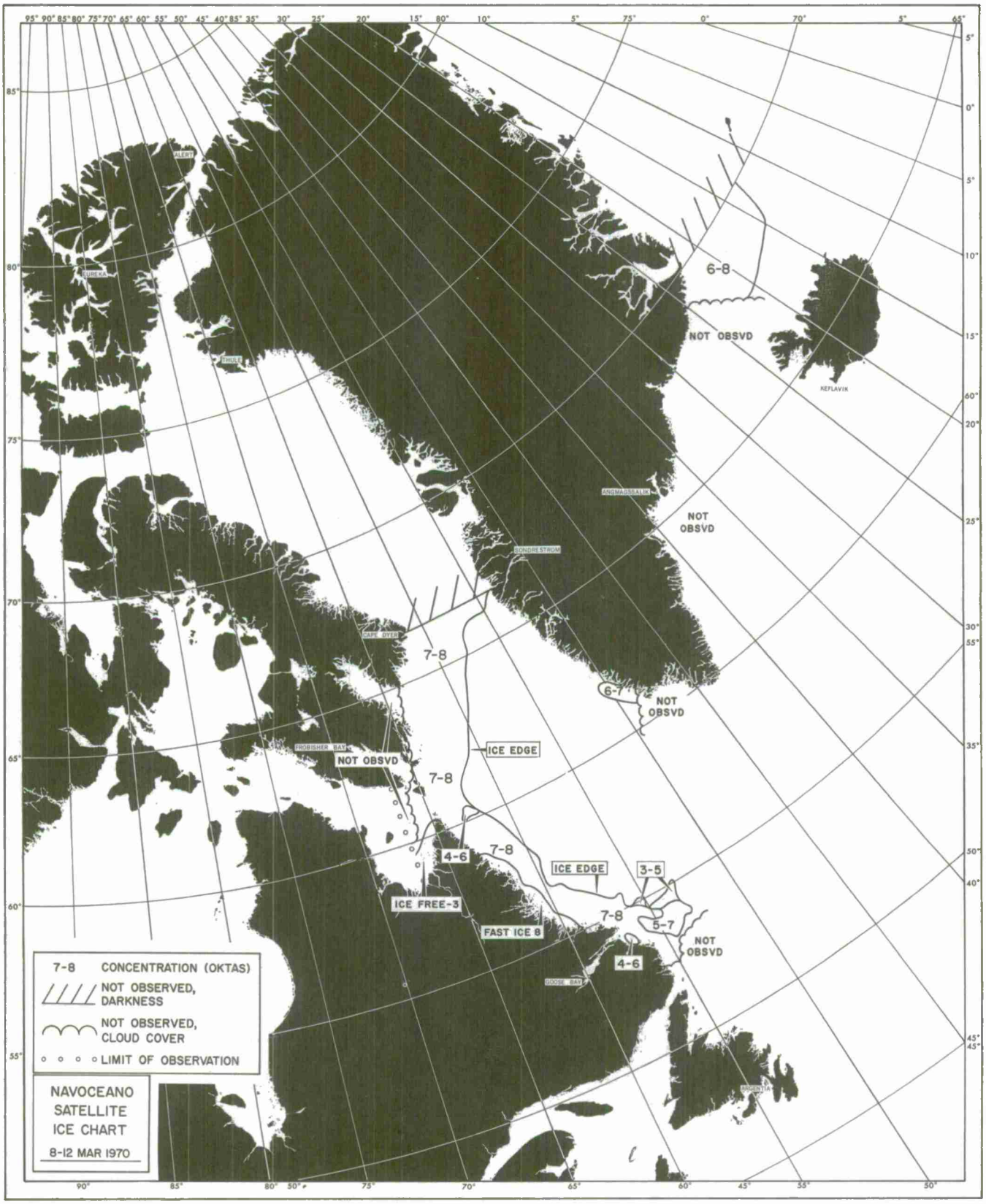

NAVOCEANO
ICE CHART
13 DEC 1970
ALERT
THULE
CAPE DYER
FROBISHER BAY
GOOSE BAY
KEFLAVIK
ICE FREE
OPEN WATER
NADM ICE EDGE

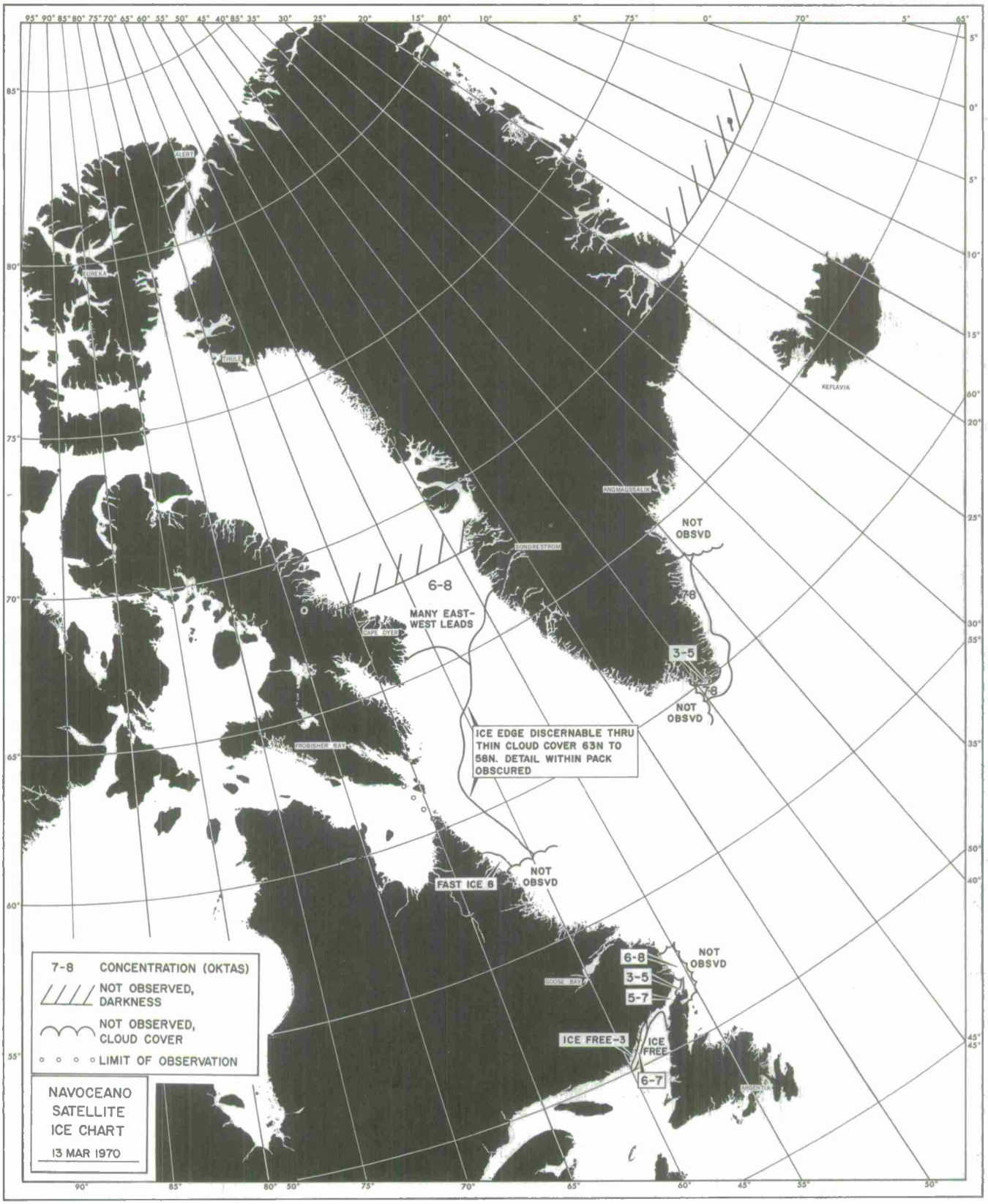

ALERT
EUREKA
THULE
KEFLAVIK
ANGMAGSSALIK
SONDRESTROM
CAPE DYER
FEW STRIPS
1-2/8 MANY STRIPS
FROBISHER BAY
COOKE BAY
ARGENTIA
NAVOCEANO
ICE CHART
30 DEC 1970

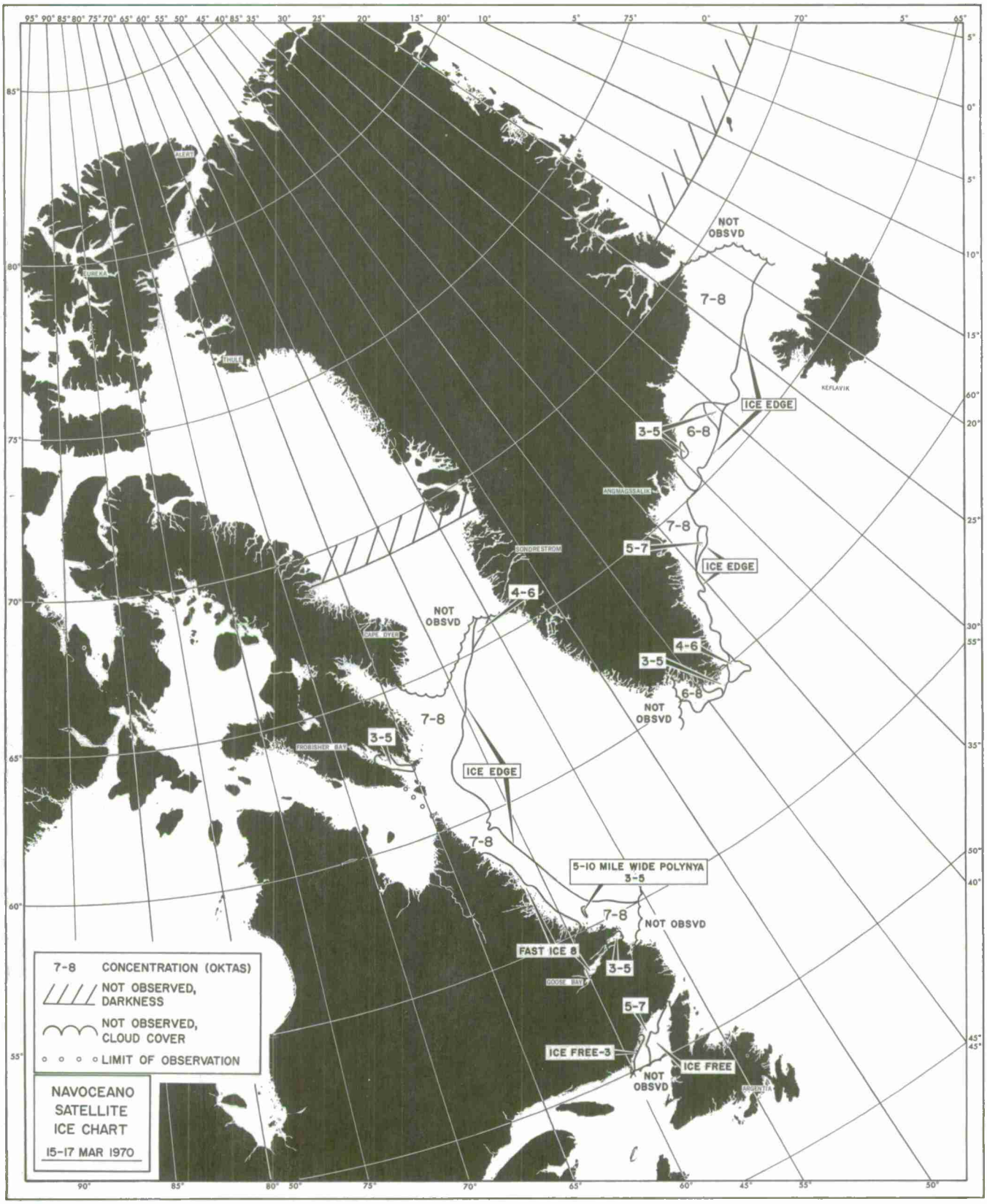
APPENDIX B

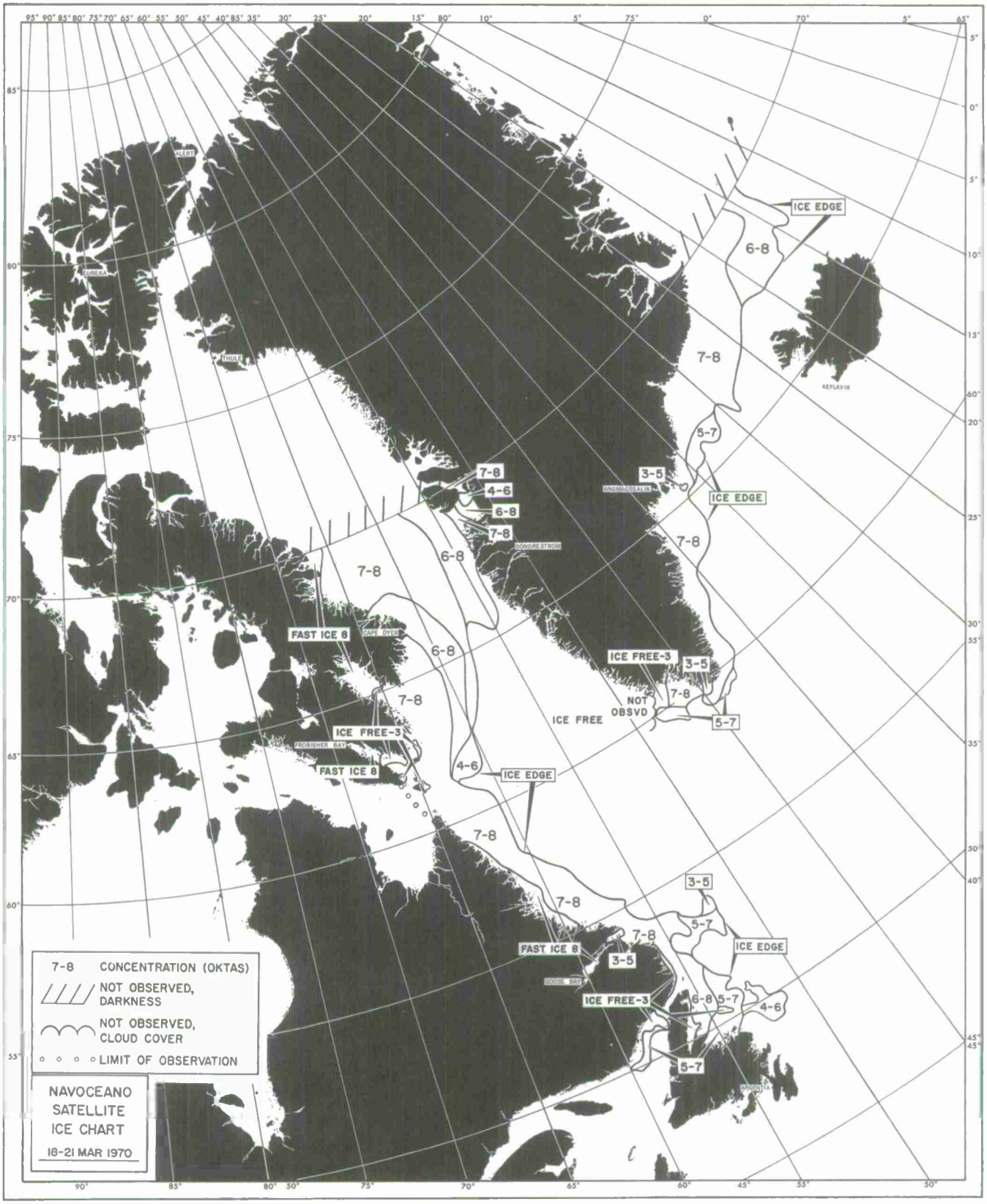
EASTERN ARCTIC ICE CHARTS OBSERVED BY SATELLITE

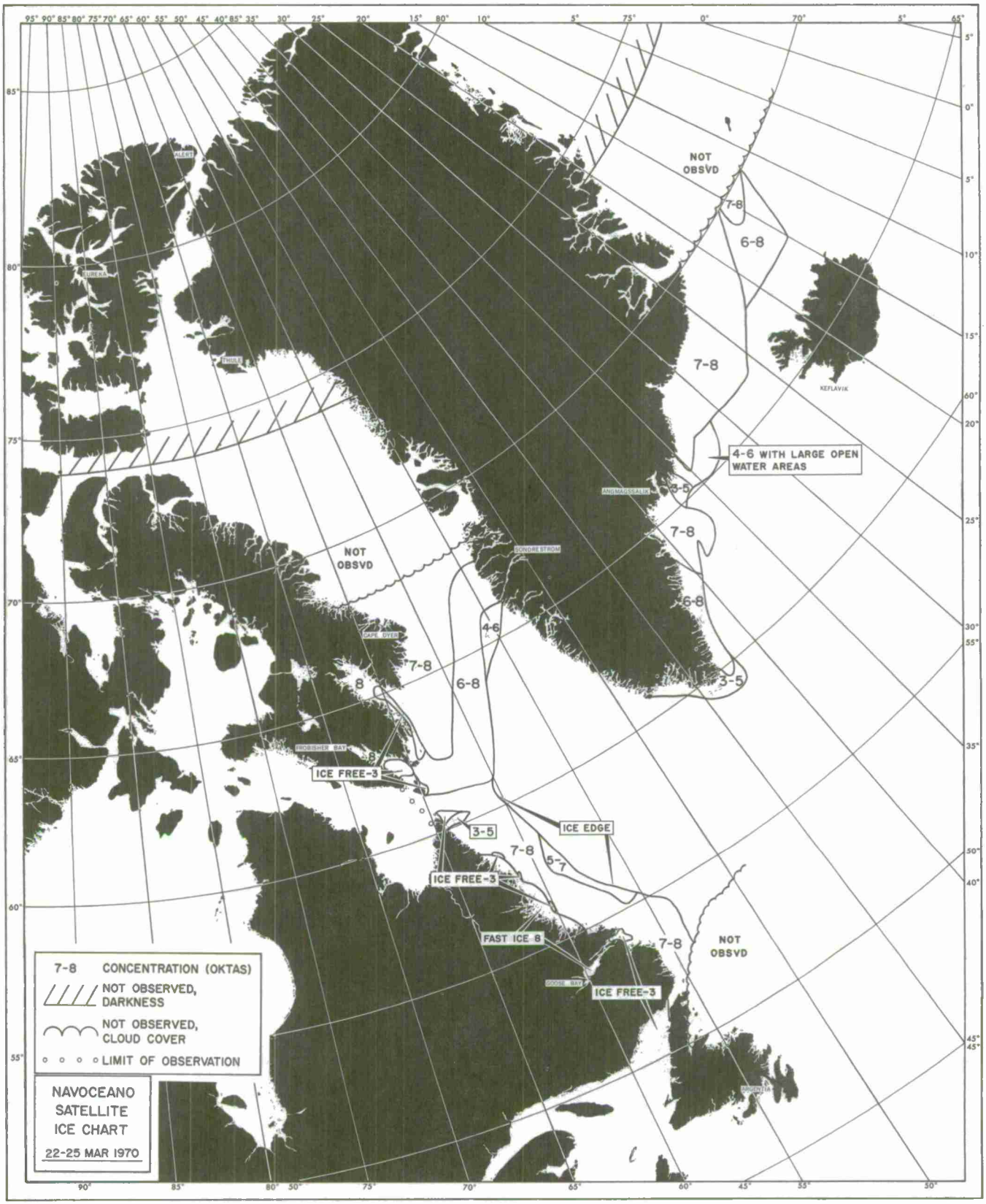

7-8
4-6
6-8
3-5
7-8
NOT OBSVD
NOT OBSVD
ICE EDGE
5-7
7-8
NOT OBSVD
FAST ICE 8
3-5
7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
3-6 MAR 1970
ALERT
EUREKA
THULE
KEFLAVIK
ANGMAGSSALIK
SONDRESTROM
CAPE DYER
FROBISHER BAY
GOOSE BAY
ARGENTIA

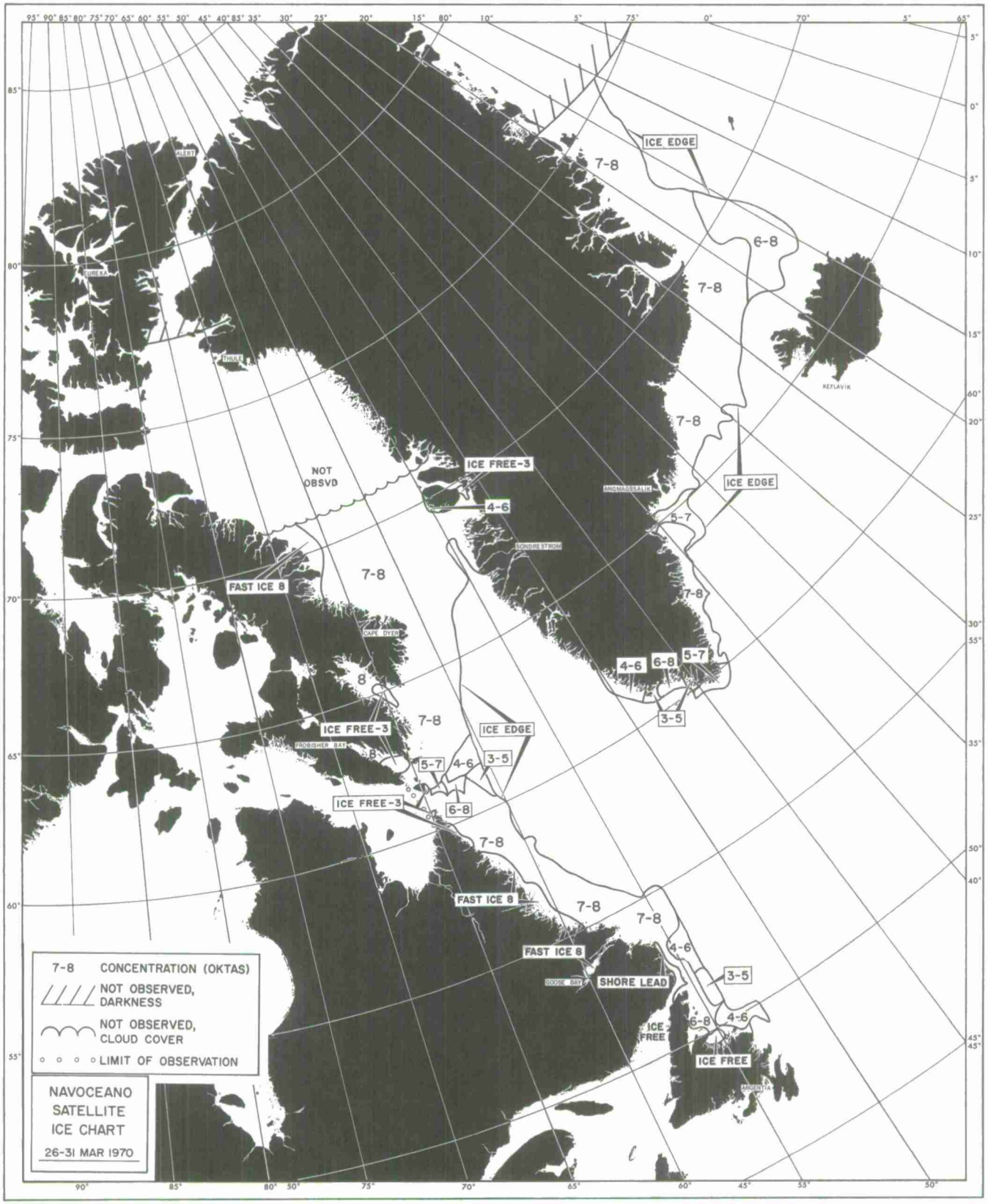

ALERT
EUREKA
THULE
KEFLAVIK
ANGMAGSSALIK
SONDRESTROM
CAPE DYER
FROBISHER BAY
GOOSE BAY
6-8
NOT OBSVD
NOT OBSVD
7-8
6-7
NOT OBSVD
NOT OBSVD
ICE EDGE
7-8
4-6
7-8
ICE EDGE
3-5
ICE FREE-3
7-8
5-7
FAST ICE 8
NOT OBSVD
4-6
7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
8-12 MAR 1970

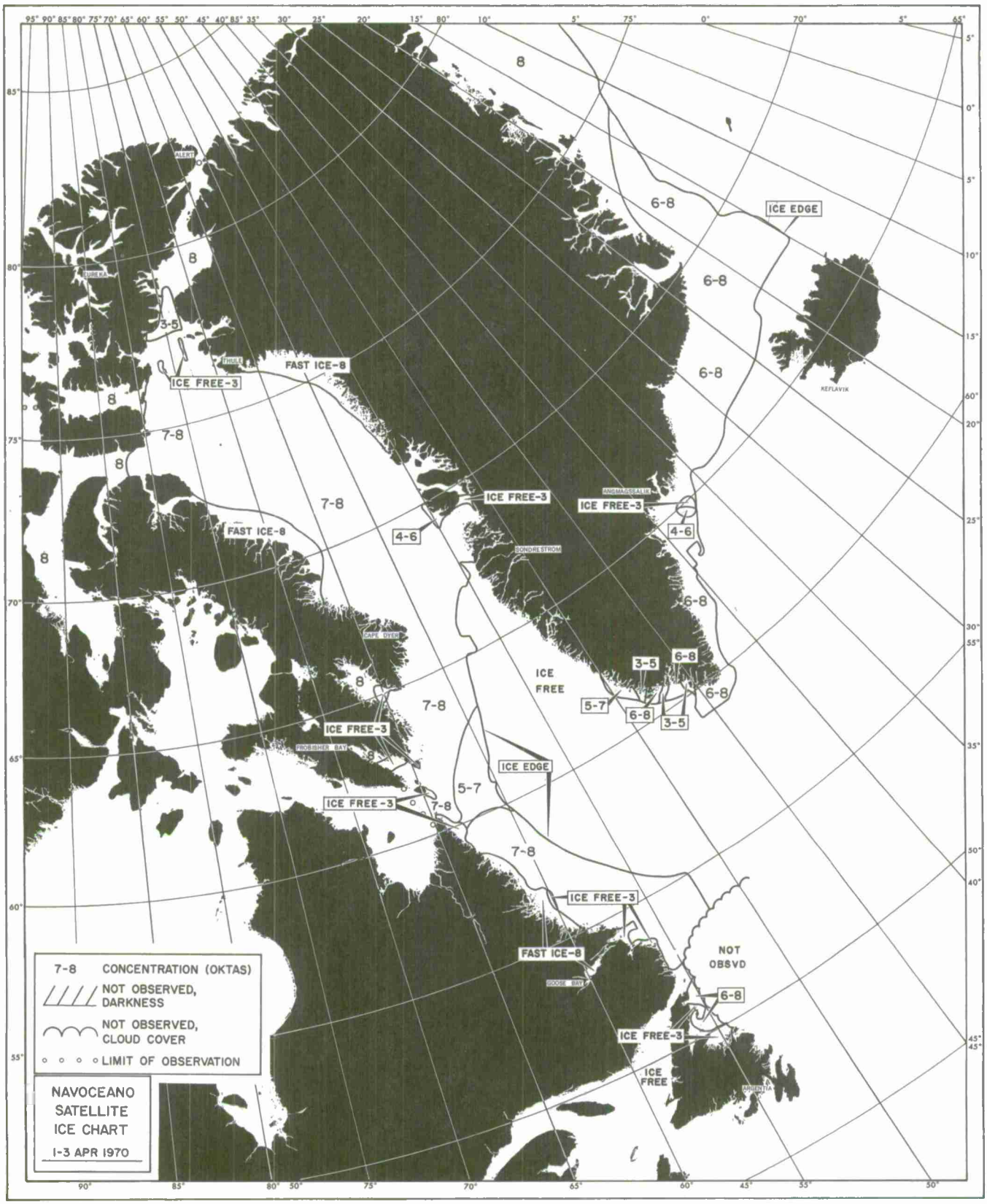

ALERT
EUREKA
THULE
KEFLAVIK
ANGMAGSSALIK
SONDRESTROM
CAPE DYER
PROBISHER BAY
NOT OBSVD
6-8
MANY EAST-WEST LEADS
3-5
7-8
NOT OBSVD
ICE EDGE DISCERNABLE THRU THIN CLOUD COVER 63N TO 58N. DETAIL WITHIN PACK OBSCURED
FAST ICE 8
NOT OBSVD
6-8
3-5
5-7
NOT OBSVD
ICE FREE-3
ICE FREE
6-7
7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
13 MAR 1970

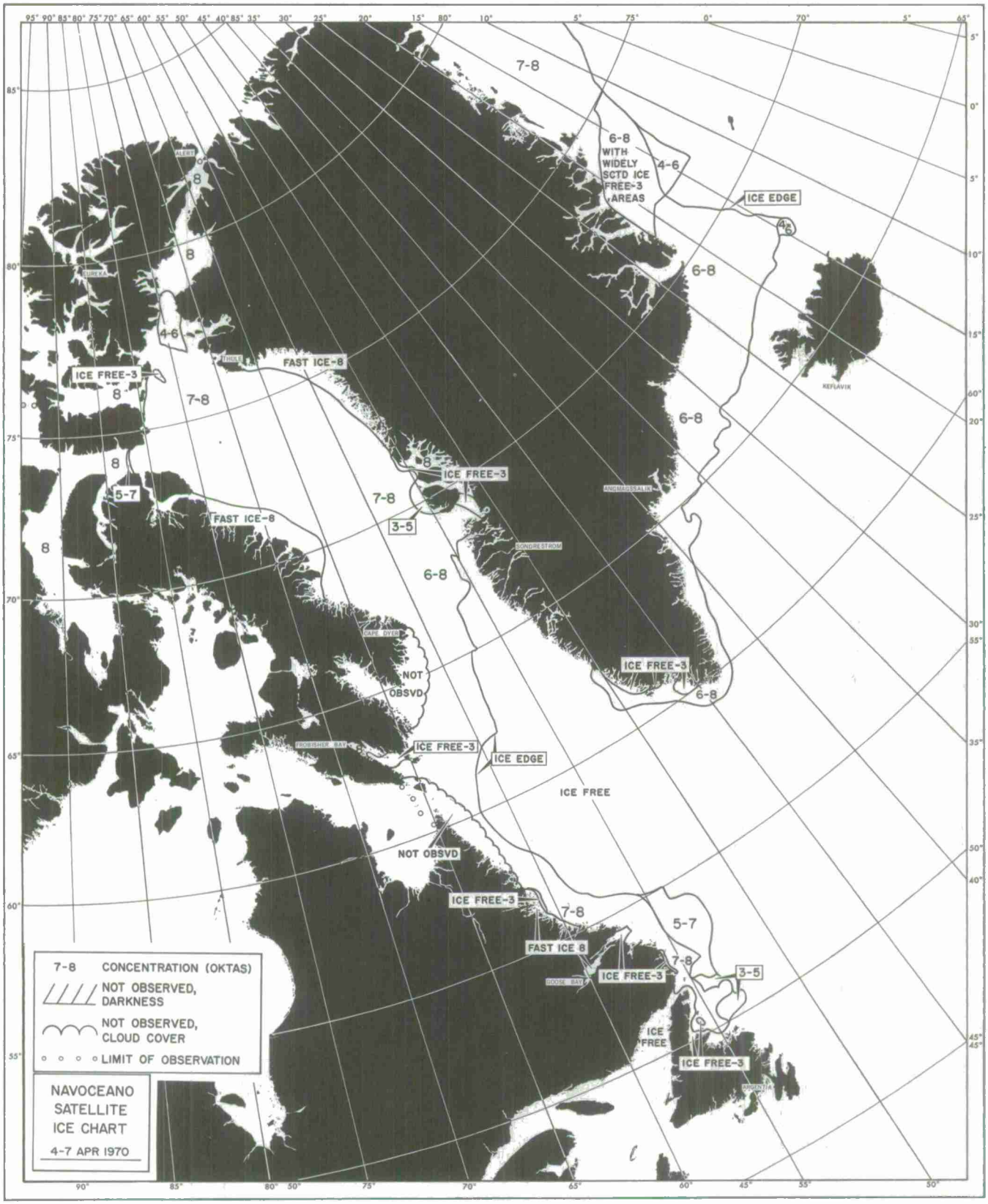

NOT OBSVD
7-8
ICE EDGE
3-5
6-8
7-8
5-7
ICE EDGE
4-6
NOT OBSVD
4-6
3-5
6-8
NOT OBSVD
7-8
3-5
ICE EDGE
7-8
5-10 MILE WIDE POLYNYA
3-5
7-8
NOT OBSVD
FAST ICE 8
3-5
5-7
ICE FREE-3
ICE FREE
NOT OBSVD
7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
15-17 MAR 1970

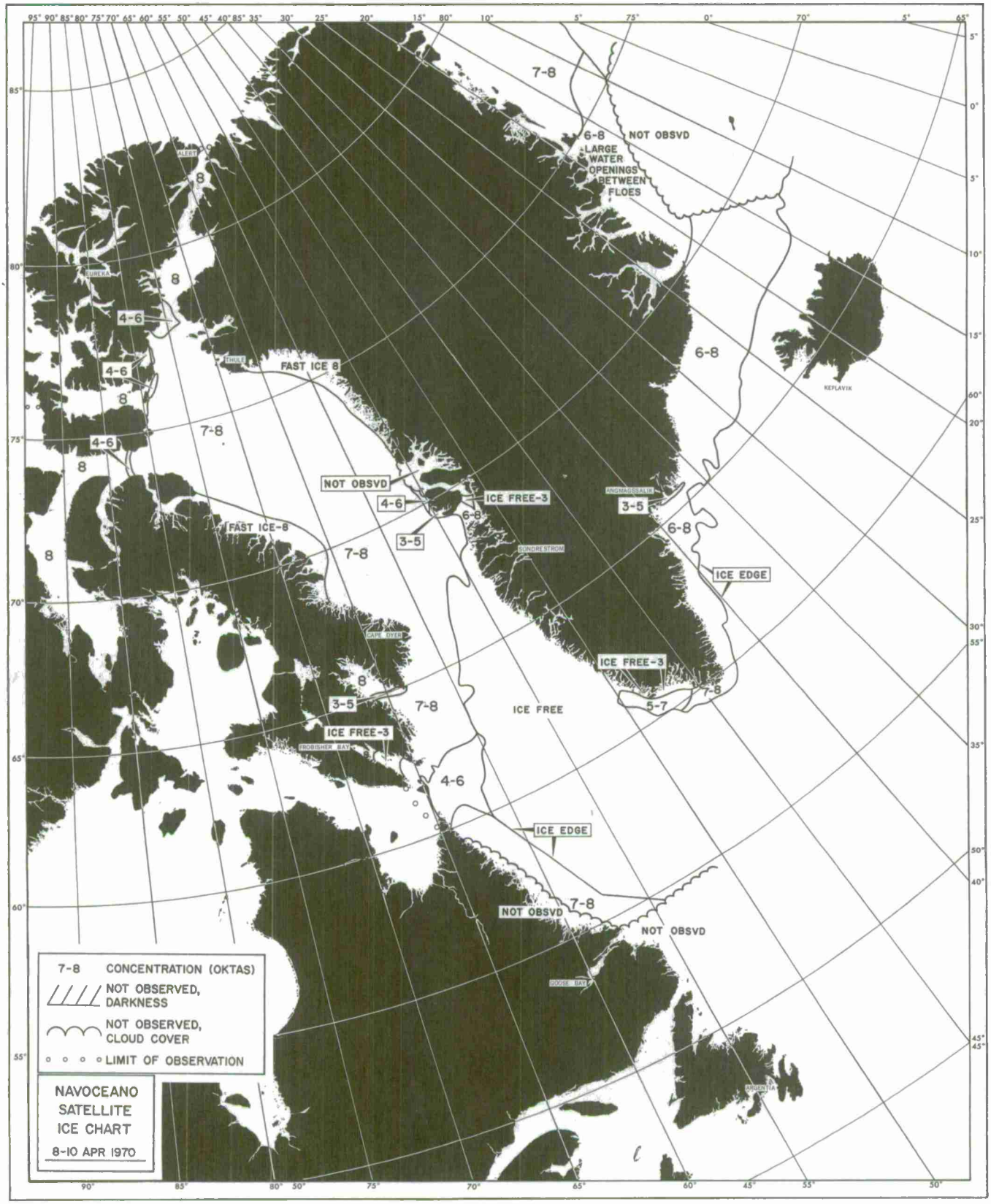

ICE EDGE
6-8
7-8
5-7
3-5
4-6
FAST ICE 8
ICE FREE-3
NOT OBSVD
ICE FREE
7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
18-21 MAR 1970

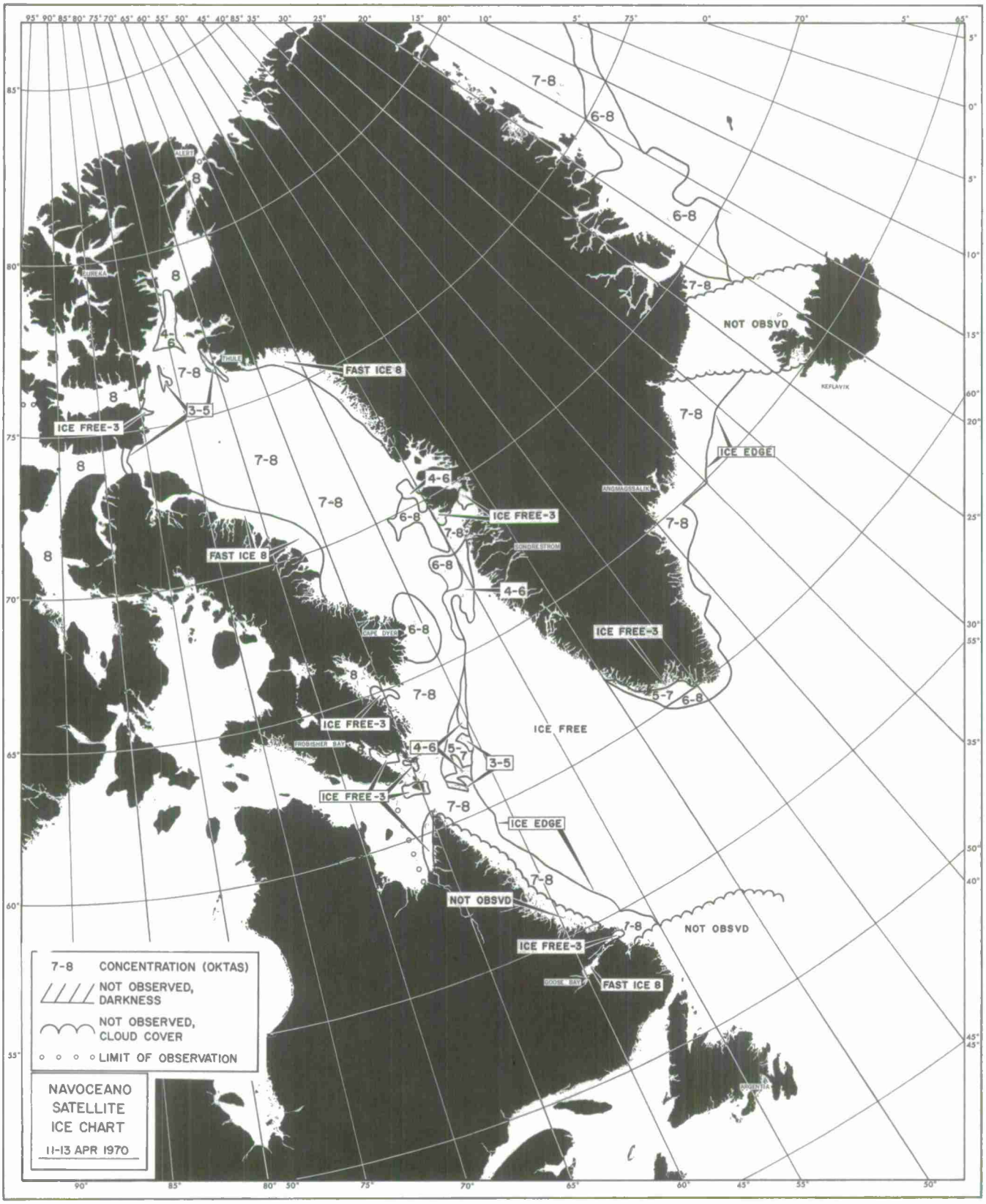

NOT OBSVD
7-8
6-8
7-8
KEFLAVIK
4-6 WITH LARGE OPEN WATER AREAS
3-5
7-8
6-8
NOT OBSVD
4-6
7-8
8
6-8
3-5
ICE FREE-3
3-5
ICE EDGE
7-8
5-7
ICE FREE-3
FAST ICE 8
7-8
NOT OBSVD
ICE FREE-3
7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
22-25 MAR 1970

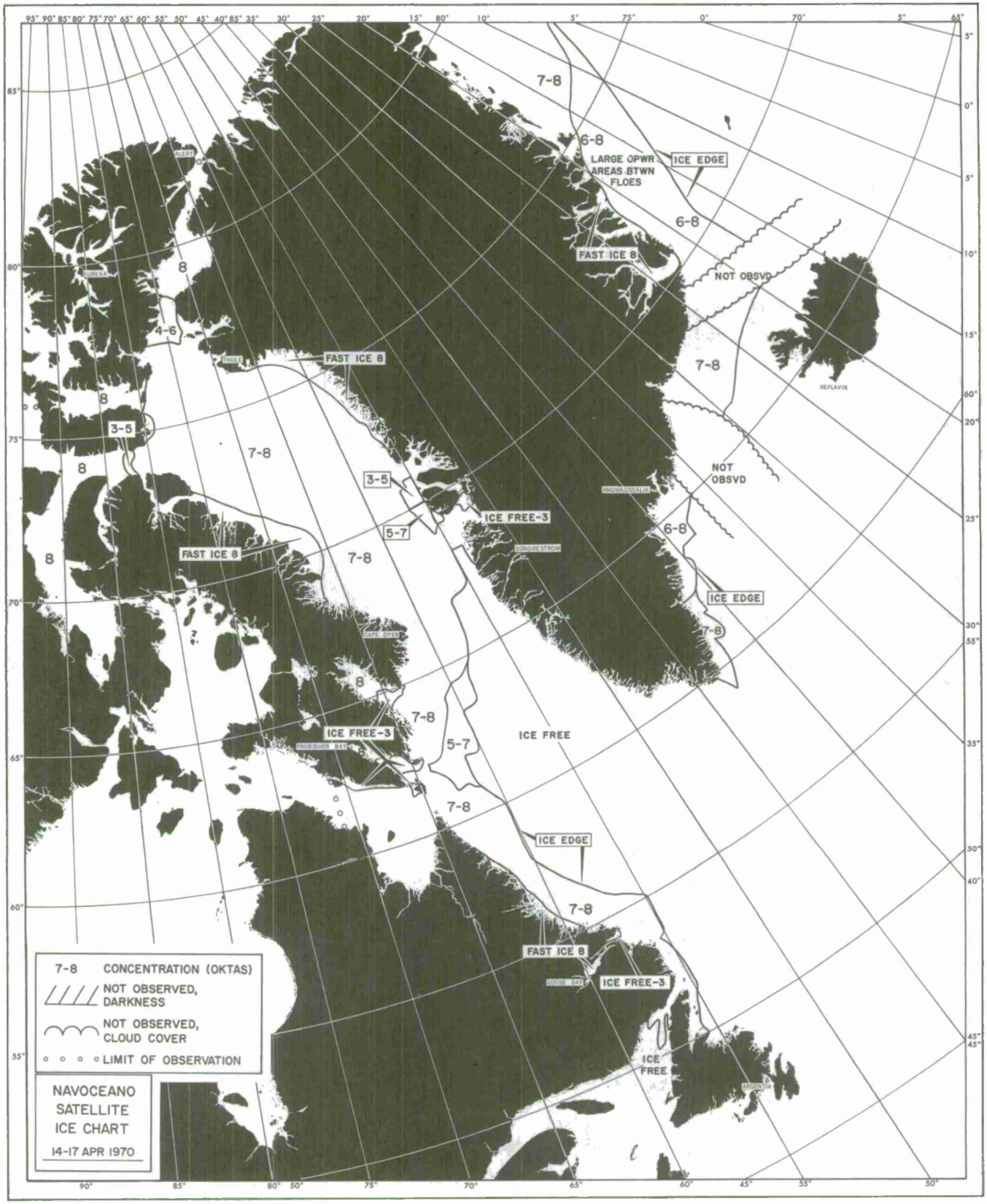

ICE EDGE
7-8
6-8
7-8
7-8
ALERT
EUREKA
THULE
KEFLAVIK
ICE FREE-3
NOT OBSVD
4-6
ANGMAGSSALIK
ICE EDGE
5-7
SONDRE STROM
7-8
FAST ICE 8
7-8
CAPE DYER
4-6
6-8
5-7
3-5
8
7-8
ICE FREE-3
ICE EDGE
PROBISHER BAY
5-7
4-6
3-5
ICE FREE-3
6-8
7-8
FAST ICE 8
7-8
7-8
4-6
FAST ICE 8
3-5
GOOSE BAY
SHORE LEAD
6-8
4-6
ICE FREE
ICE FREE
7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
26-31 MAR 1970

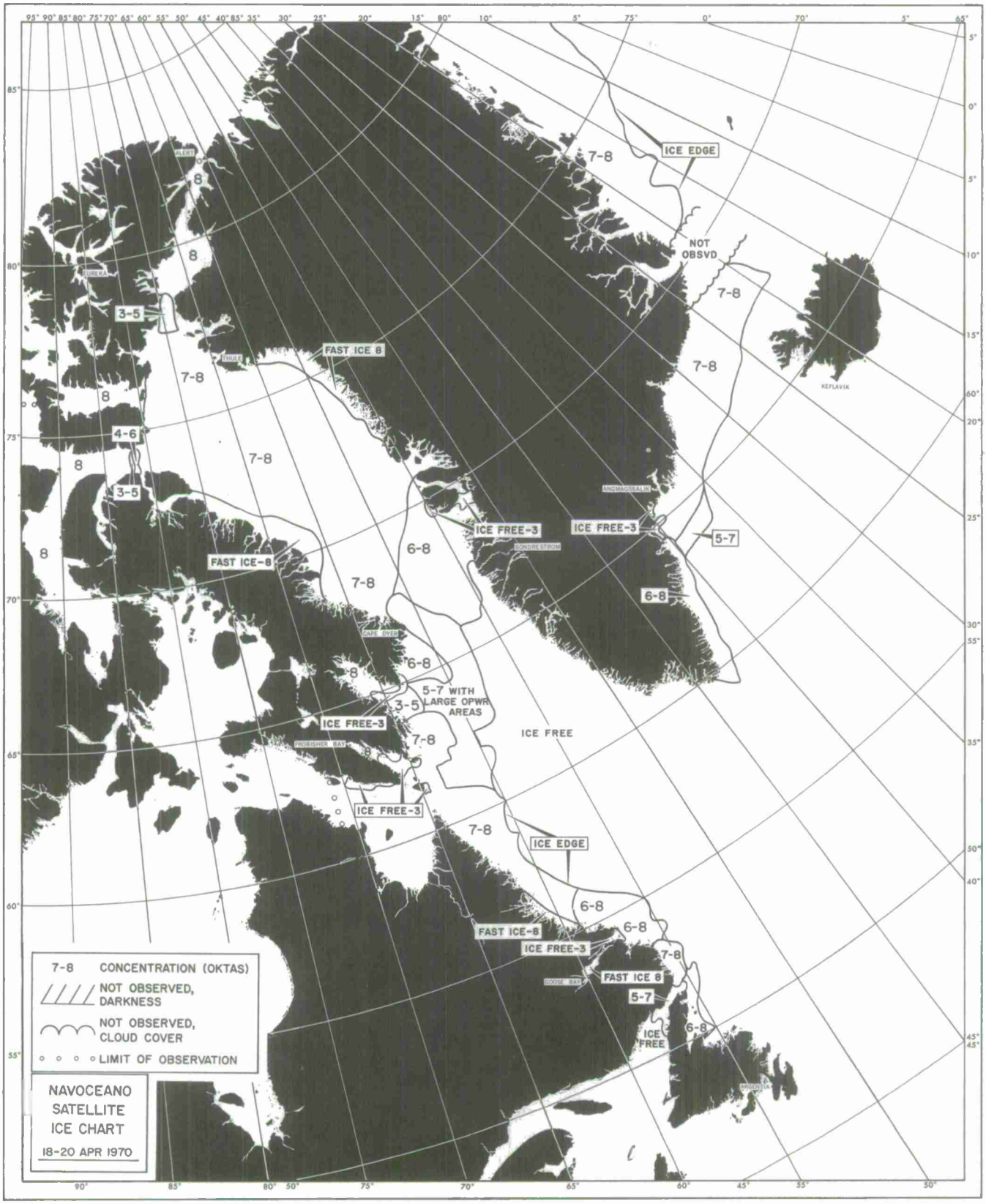

ALERT
THULE
KEFLAVIK
ANGMAGSSALIK
BONDESTROM
CAPE DYER
FROBISHER BAY
GOOSE BAY
ICE EDGE
FAST ICE-8
ICE FREE-3
ICE FREE
NOT OBSVD
7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
1-3 APR 1970

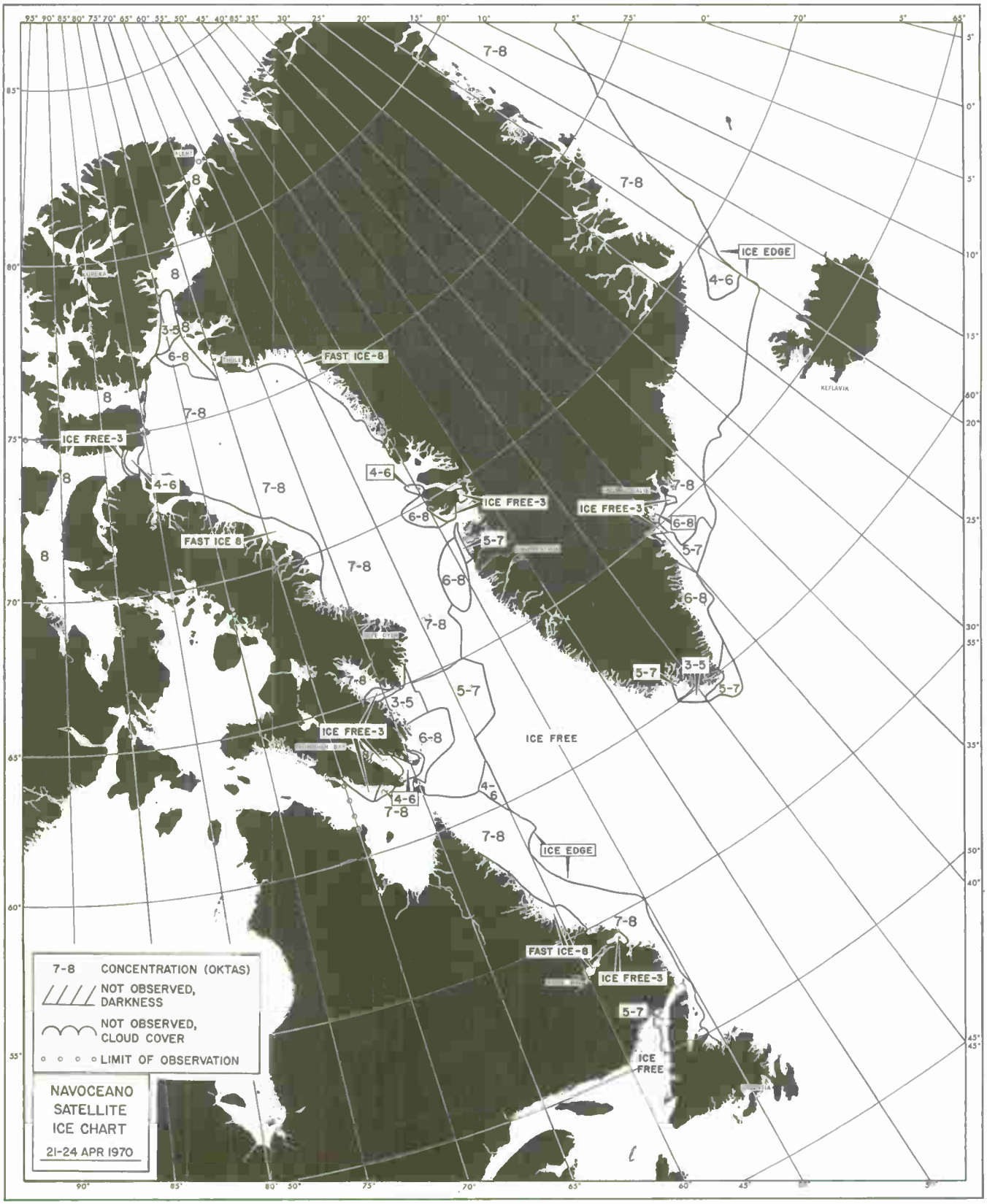

7-8
6-8
WITH
WIDELY
SCTD ICE
FREE-3
AREAS
4-6
ICE EDGE
6-8
ALERT
EUREKA
THULE
FAST ICE-8
ICE FREE-3
7-8
5-7
3-5
KEFLAVIK
ANGMAGSSALIK
JOHNSTROM
CAPE DYER
NOT
OBSVD
FROBISHER BAY
ICE FREE
FAST ICE 8
POOLE BAY
ICE
FREE
7-8 CONCENTRATION (OKTAS)
NOT OBSERVED,
DARKNESS
NOT OBSERVED,
CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO
SATELLITE
ICE CHART
4-7 APR 1970

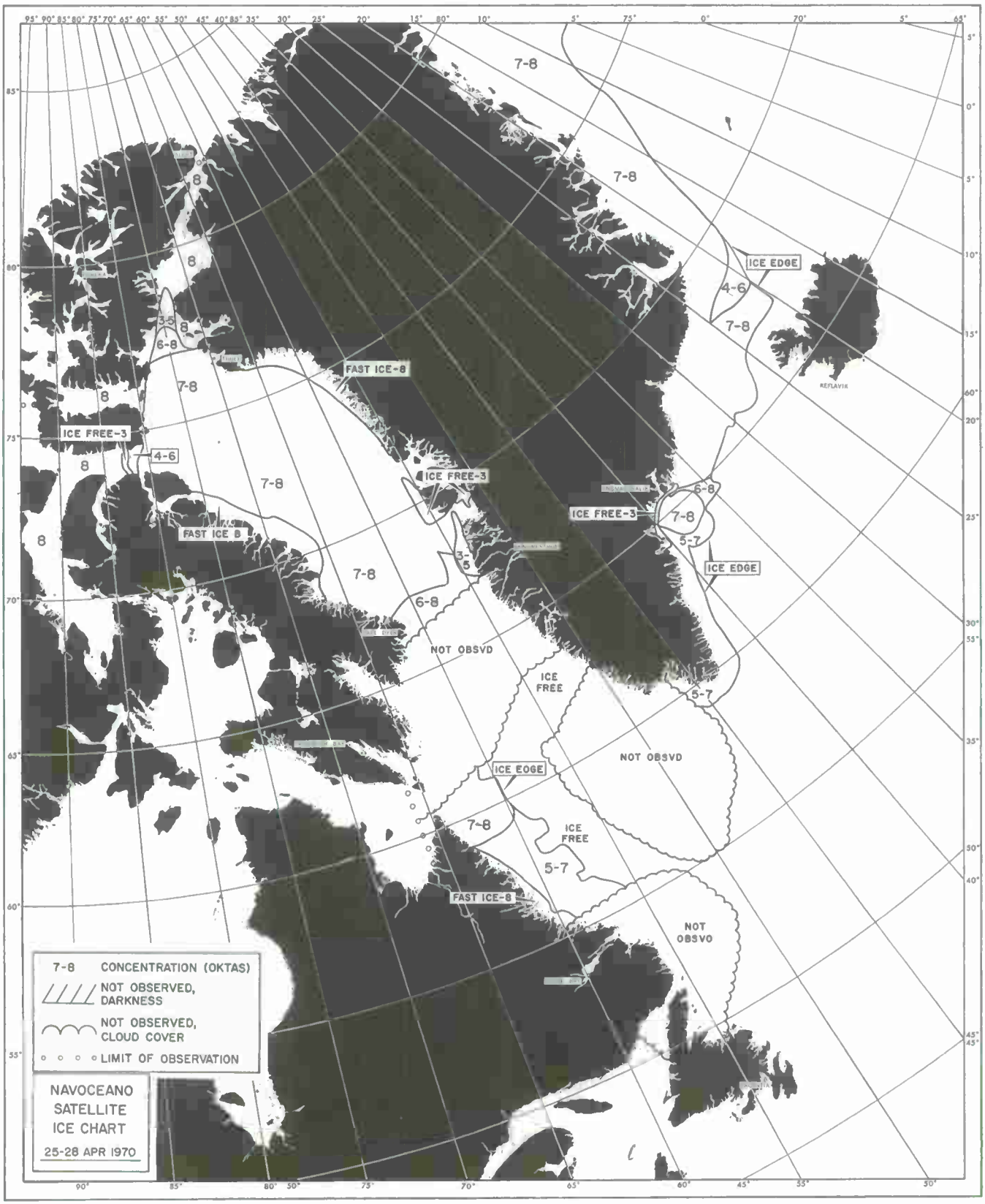

7-8
6-8
NOT OBSVD
LARGE WATER OPENINGS BETWEEN FLOES
ALERT
EUREKA
8
4-6
THULE
FAST ICE 8
7-8
NOT OBSVD
ICE FREE-3
3-5
6-8
ANGMAGSSALIK
KEFLAVIK
FAST ICE-8
SONDRESTROM
ICE EDGE
CAPE DYER
ICE FREE-3
5-7
ICE FREE
TROBISHER BAY
ICE EDGE
NOT OBSVD
NOT OBSVD
FROBISHER BAY
ARGENTIA
7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
8-10 APR 1970

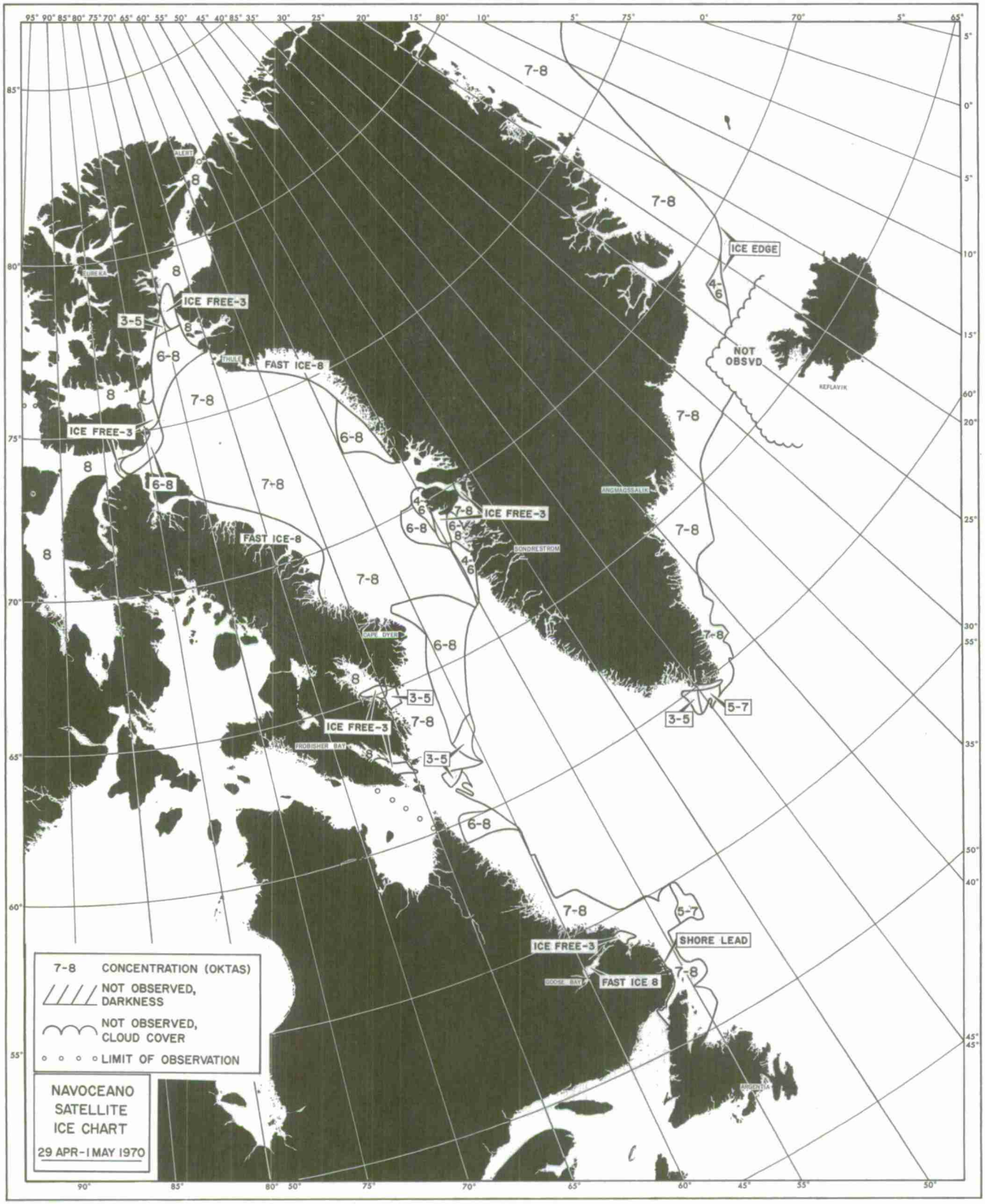

7-8
6-8
8
4-6
3-5
5-7
NOT OBSVD
FAST ICE 8
ICE FREE-3
ICE EDGE
ICE FREE
ALERT
EUREKA
THULE
KEFLAVIK
ANGMAGSSALIK
SONDRE STROM
CAPE DYER
FROBISHER BAY
GOOSE BAY
7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
11-13 APR 1970

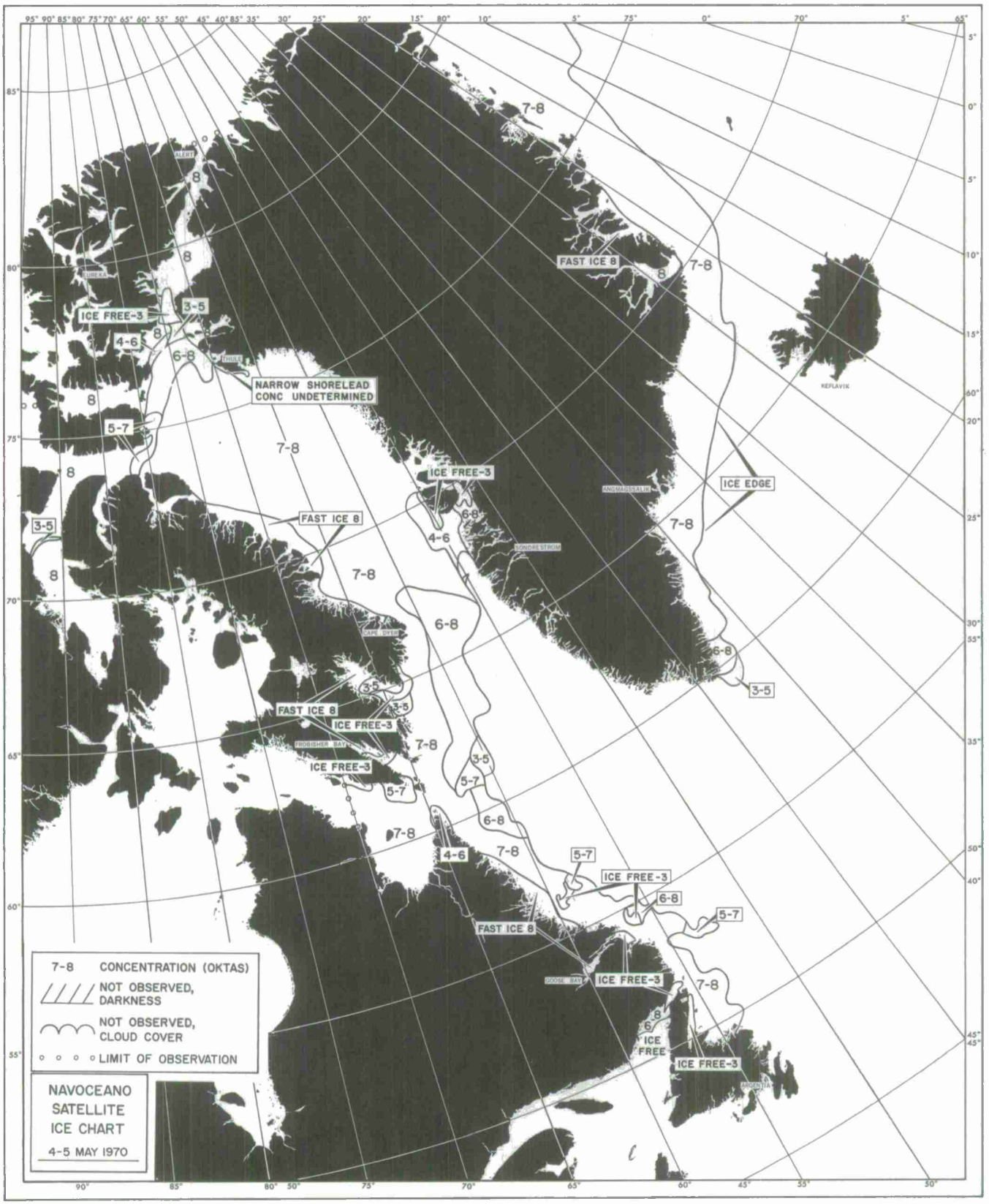

7-8
6-8
LARGE OPWR AREAS BTWN FLOES
ICE EDGE
6-8
FAST ICE 8
NOT OBSVD
7-8
KEFLAVIK
8
4-6
FAST ICE 8
THULE
8
3-5
7-8
3-5
NOT OBSVD
ANGMAGSSALIK
ICE FREE-3
5-7
6-8
8
FAST ICE 8
7-8
SONDRE STROM
ICE EDGE
CAPE DYER
7-8
8
7-8
ICE FREE-3
PROBISHER BAY
5-7
ICE FREE
7-8
ICE EDGE
7-8
FAST ICE 8
GOOSE BAY
ICE FREE-3
ICE FREE
7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
14-17 APR 1970

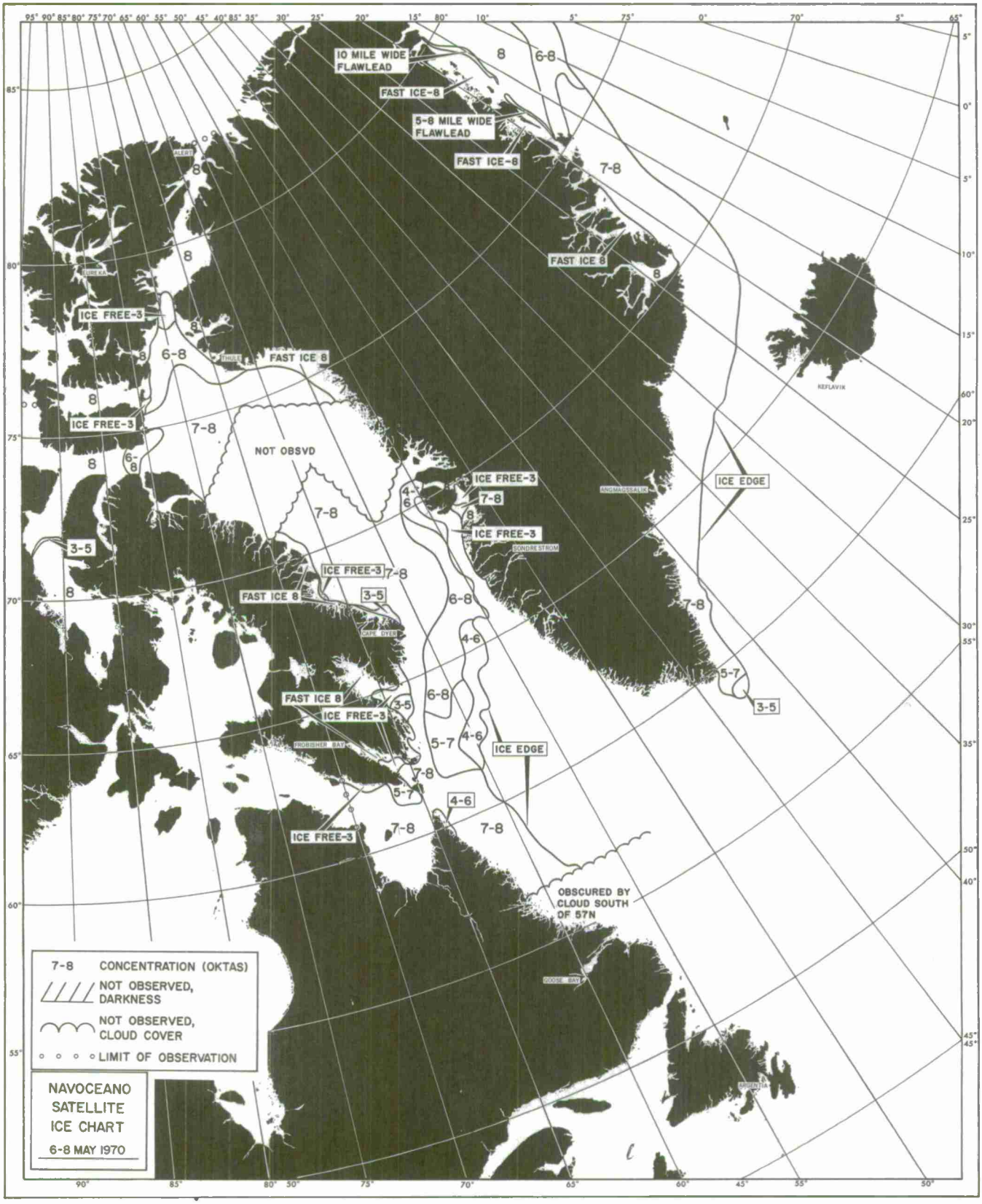

ICE EDGE
NOT OBSVD
7-8
FAST ICE 8
3-5
4-6
FAST ICE-8
ICE FREE-3
5-7
6-8
5-7 WITH LARGE OPWR AREAS
ICE FREE
FAST ICE 8
ALERT
THULE
KEFLAVIK
SONDRE STROM
CAPE DYER
FROBISHER BAY
GOOSE BAY
7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
18-20 APR 1970

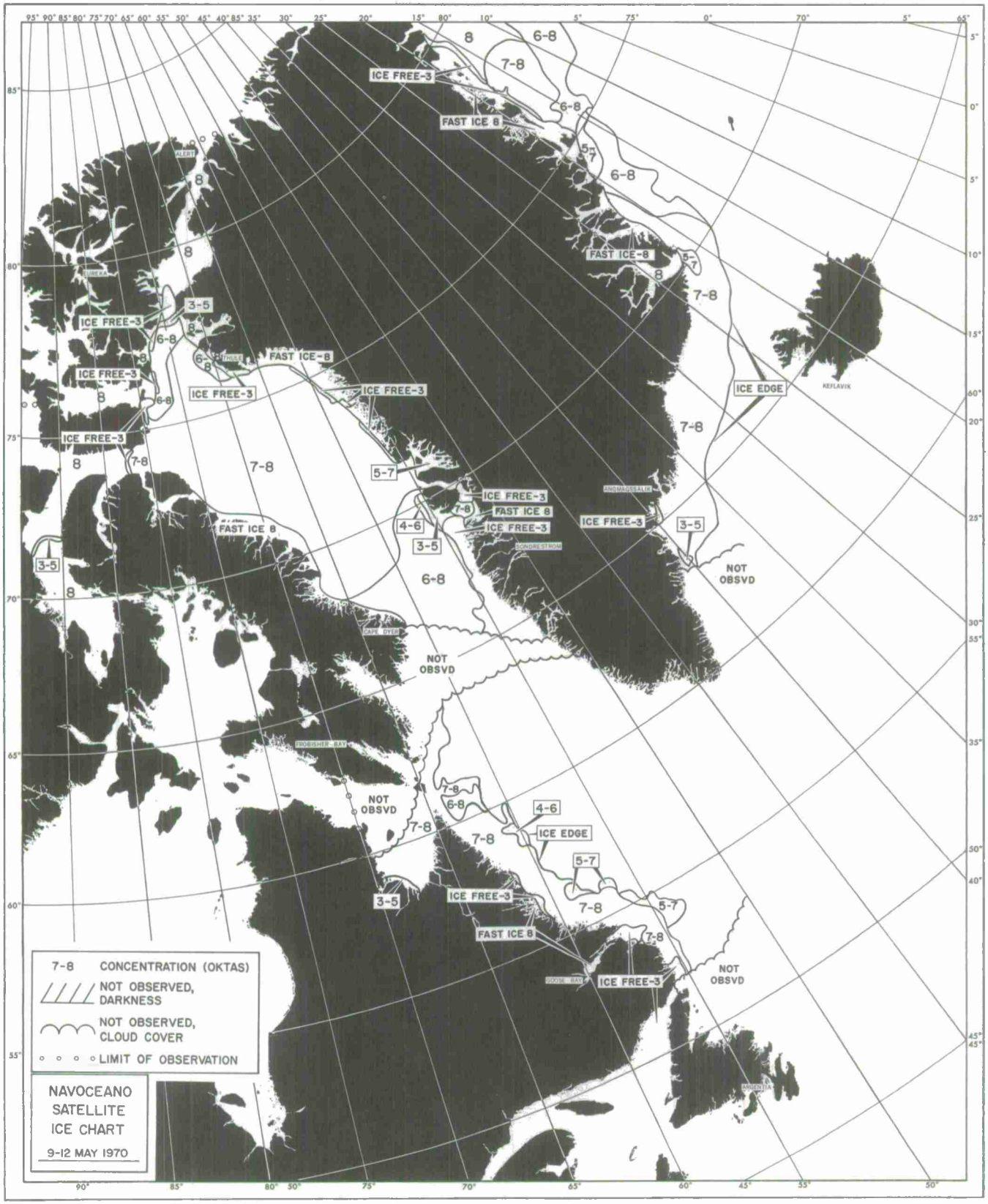

7-8
8
3-5
6-8
FAST ICE-8
ICE FREE-3
4-6
5-7
ICE EDGE
ICE FREE
KEFLAVIK
7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
21-24 APR 1970

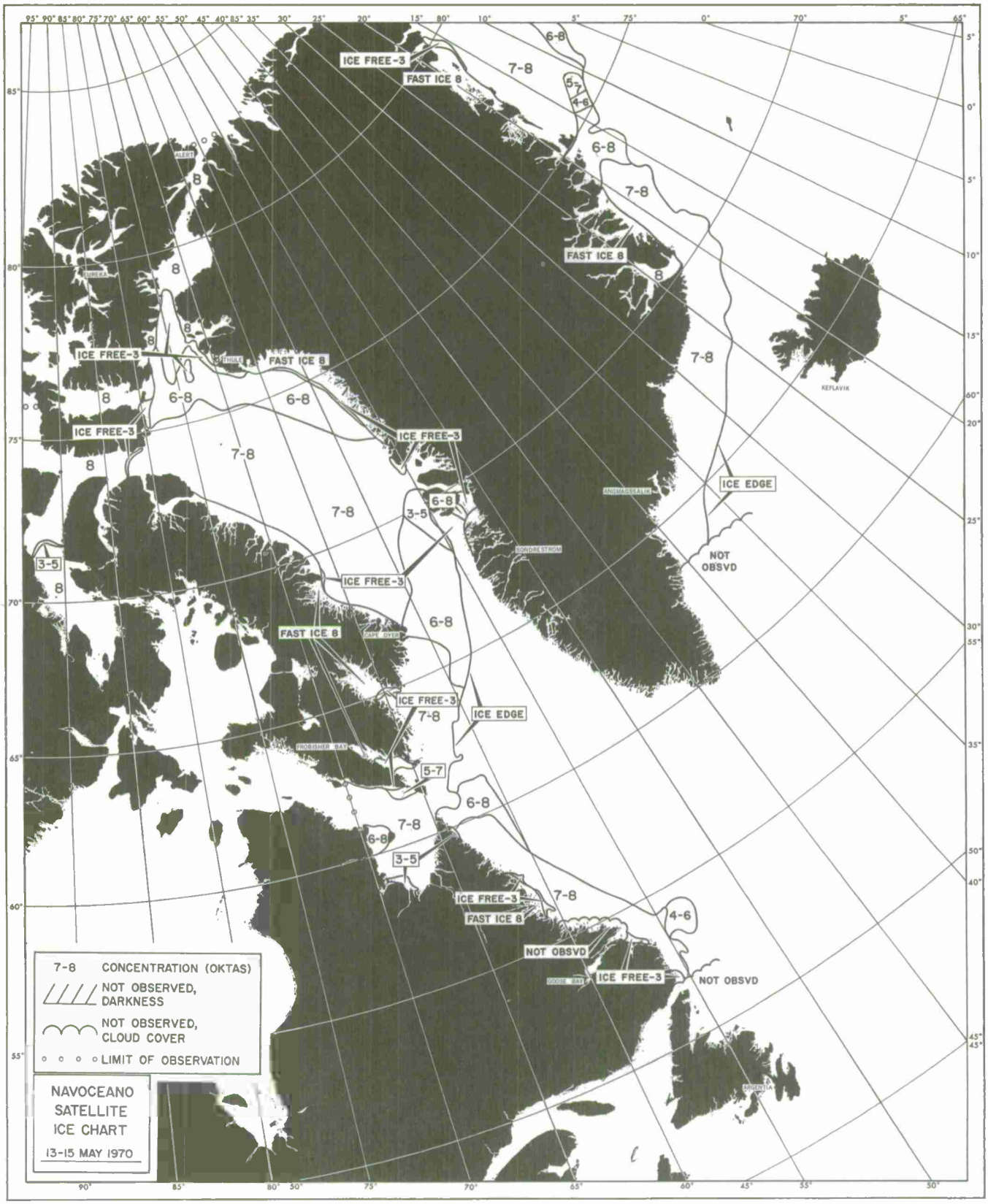

7-8
8
3-5
6-8
4-6
5-7
ICE EDGE
FAST ICE-8
ICE FREE-3
FAST ICE 8
NOT OBSVD
ICE FREE
KEFLAVIK
7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
25-28 APR 1970

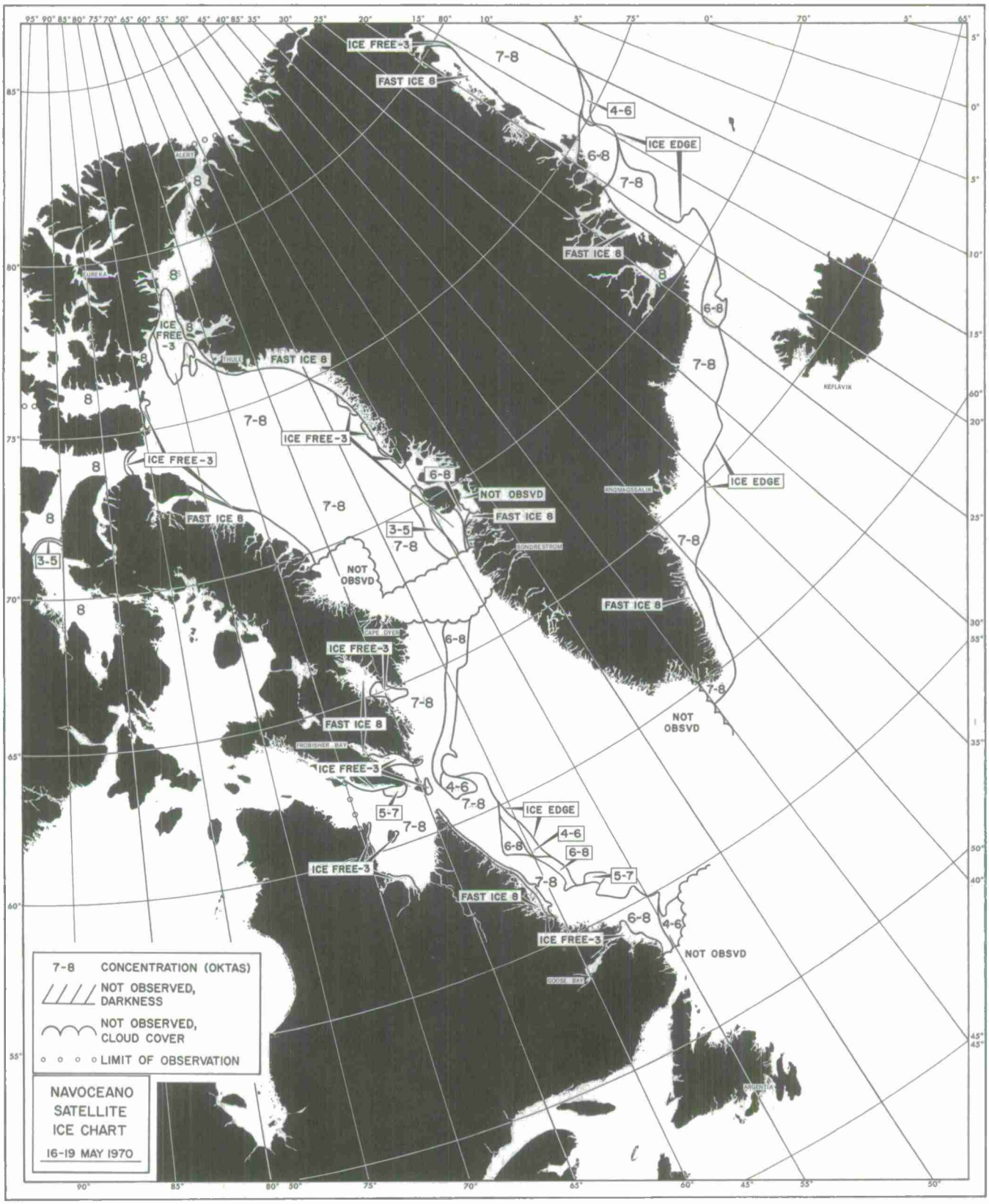

7-8
ICE EDGE
4-6
NOT OBSVD
REPLAVIK
ALERT
EUREKA
ICE FREE-3
3-5
6-8
8
FAST ICE-8
THULE
ANGMAGSALIK
BONDRESTROM
SOUTHAMPTON
CAPE DYER
PROBISHER BAY
5-7
SHORE LEAD
GOOSE BAY
FAST ICE 8
ARGENTIA
7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
29 APR-1 MAY 1970

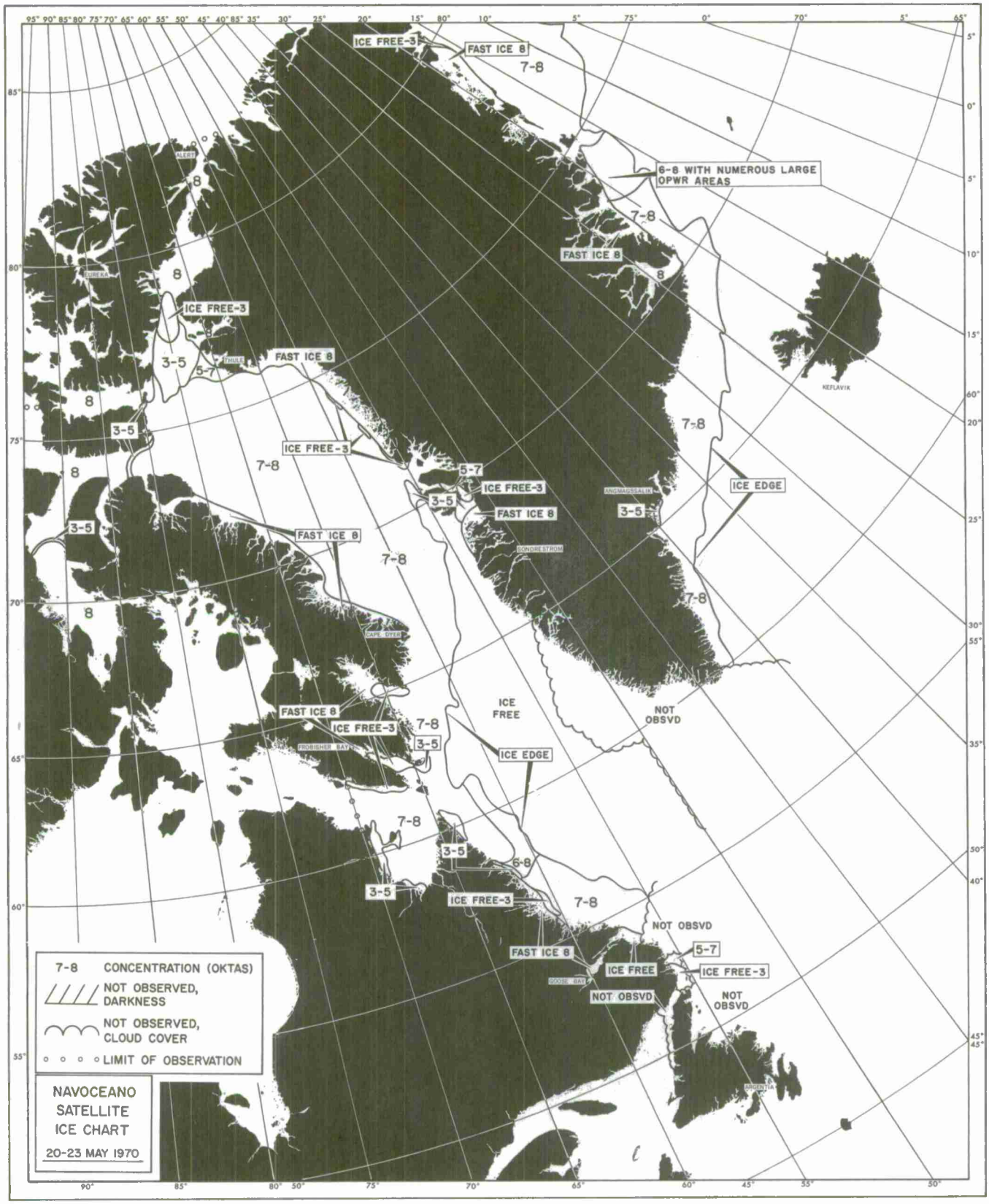

7-8
FAST ICE 8
ICE FREE-3
3-5
4-6
6-8
NARROW SHORELEAD
CONC UNDETERMINED
5-7
ICE EDGE
ALERT
EUREKA
THULE
KEFLAVIK
ANGMAGSSALIK
SONDRESTROM
CAPE DYER
FROBISHER BAY
GOOSE BAY
ICE FREE
ARGENTIA
7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
4-5 MAY 1970

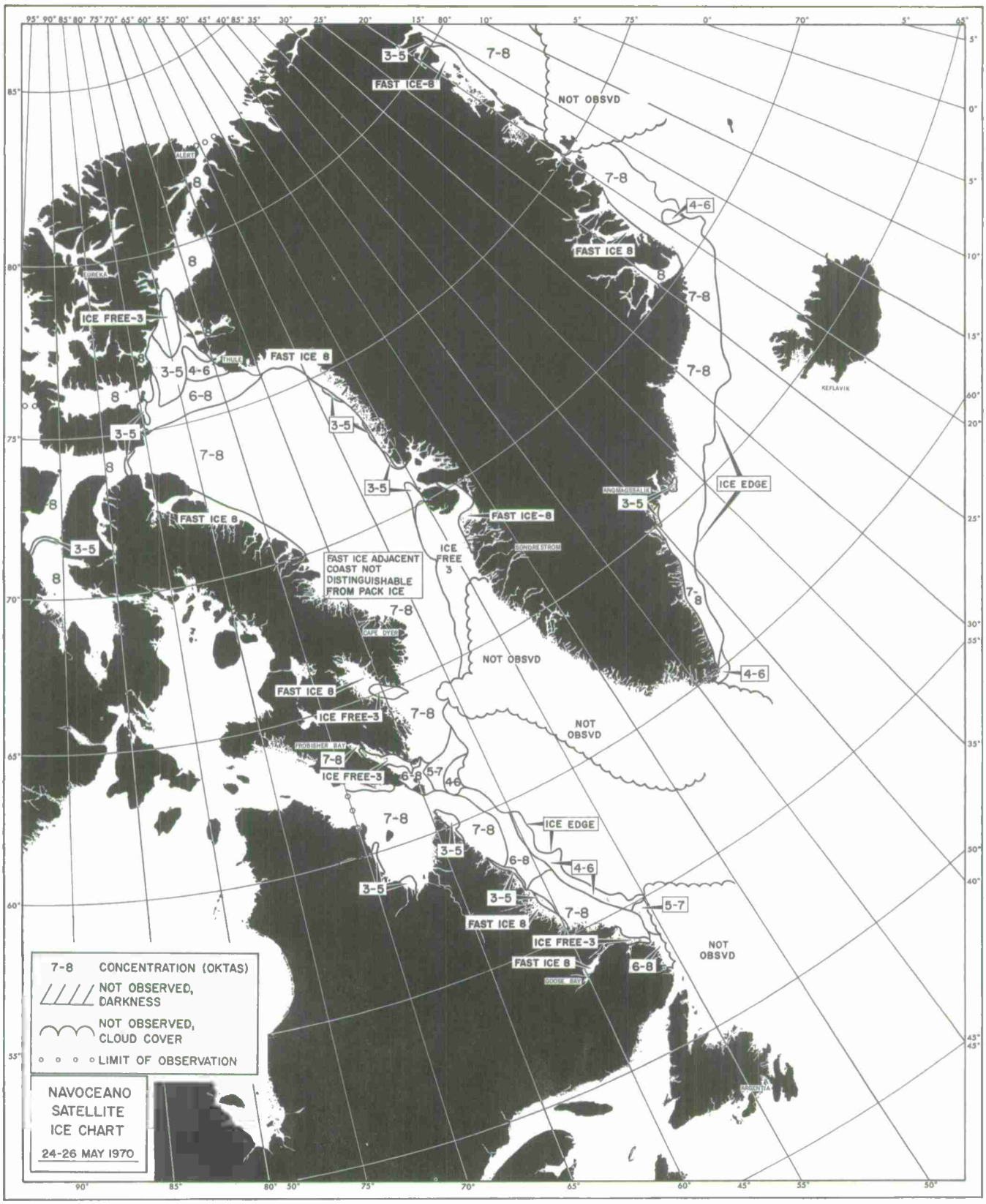

10 MILE WIDE FLAWLEAD
FAST ICE-8
5-8 MILE WIDE FLAWLEAD
FAST ICE-8
FAST ICE 8
ICE FREE-3
FAST ICE 8
ICE FREE-3
NOT OBSVD
ICE FREE-3
ICE FREE-3
ICE FREE-3
FAST ICE 8
FAST ICE 8
ICE FREE-3
ICE FREE-3
ICE EDGE
ICE EDGE
OBSCURED BY CLOUD SOUTH OF 57N
ALERT
EUREKA
THULE
KEFLAVIK
ANGMAGSSALIK
BONDE STROM
CAPE DYER
FROBISHER BAY
GOOSE BAY
7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
6-8 MAY 1970

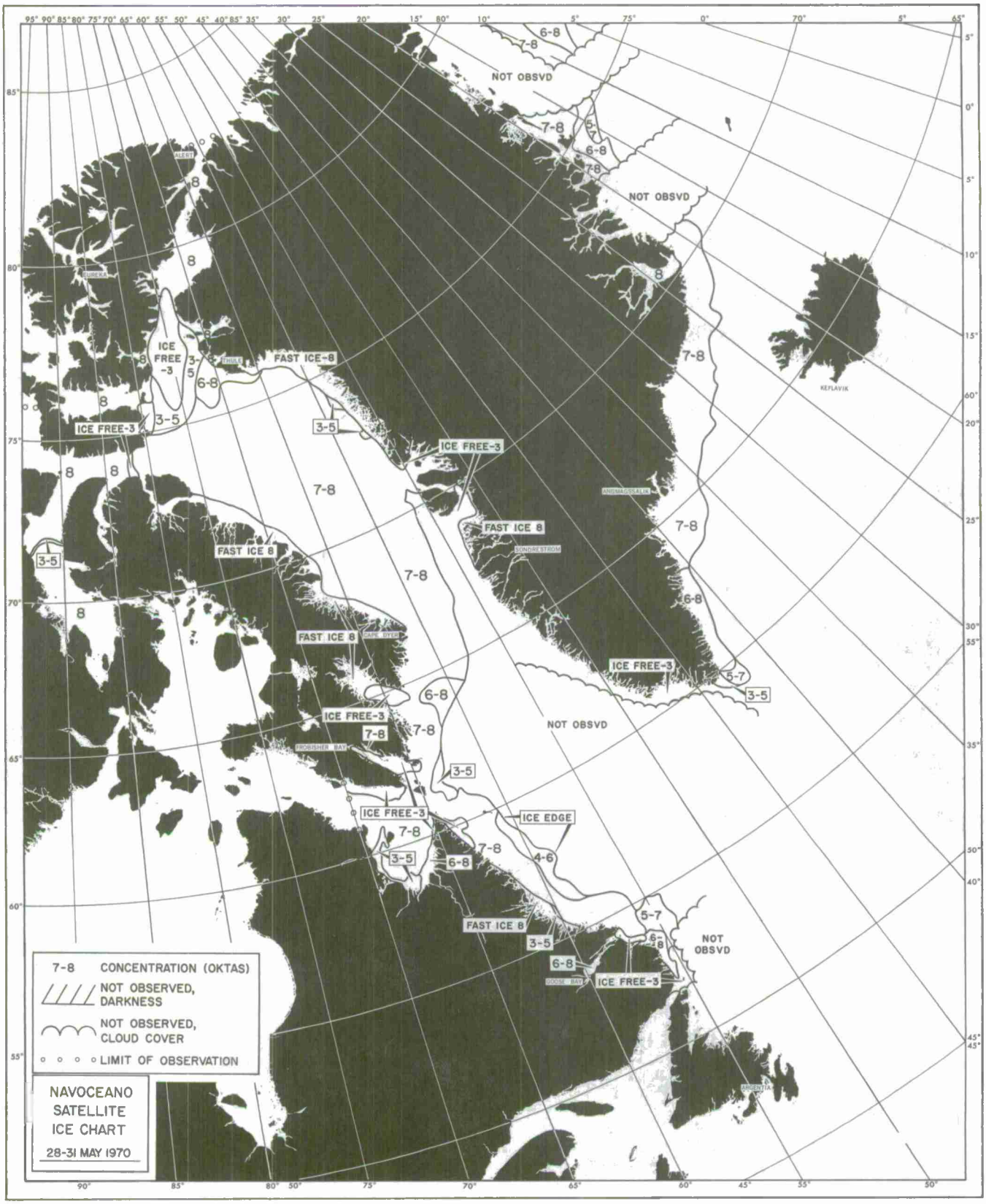

ICE FREE-3
FAST ICE 8
FAST ICE-8
ICE EDGE
NOT OBSVD
7-8
6-8
5-7
4-6
3-5
ALERT
THULE
KEFLAVIK
ANGMAGSSALIK
CAPE DYER
PROBISHER BAY
GOOSE BAY
7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
9-12 MAY 1970

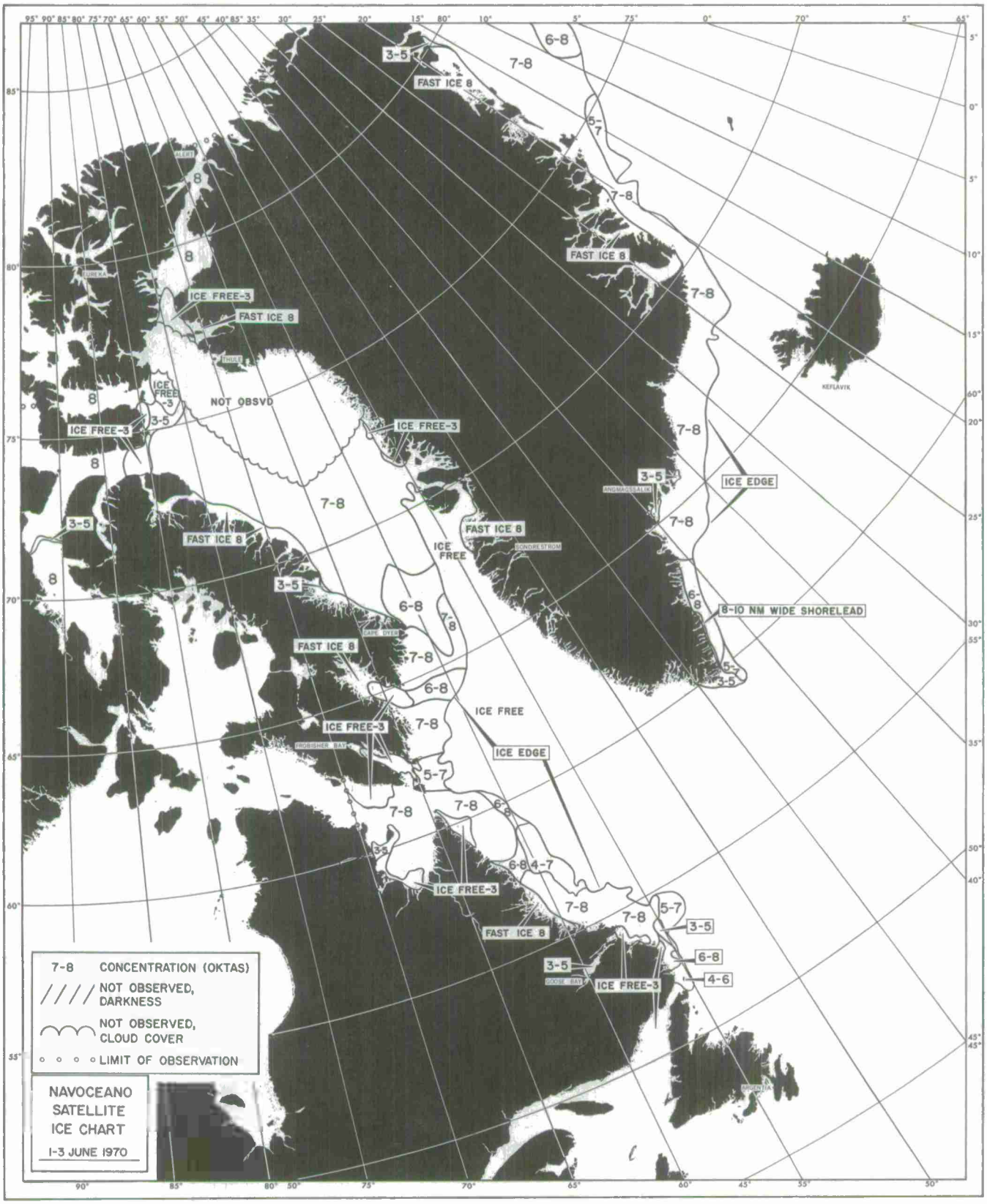

ICE FREE-3
FAST ICE 8
7-8
6-8
5-7
4-6
8
ALERT
EUREKA
THULE
3-5
ICE EDGE
NOT OBSVD
CAPE DYER
FROBISHER BAY
ANGMAGSSALIK
KEFLAVIK
7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
13-15 MAY 1970

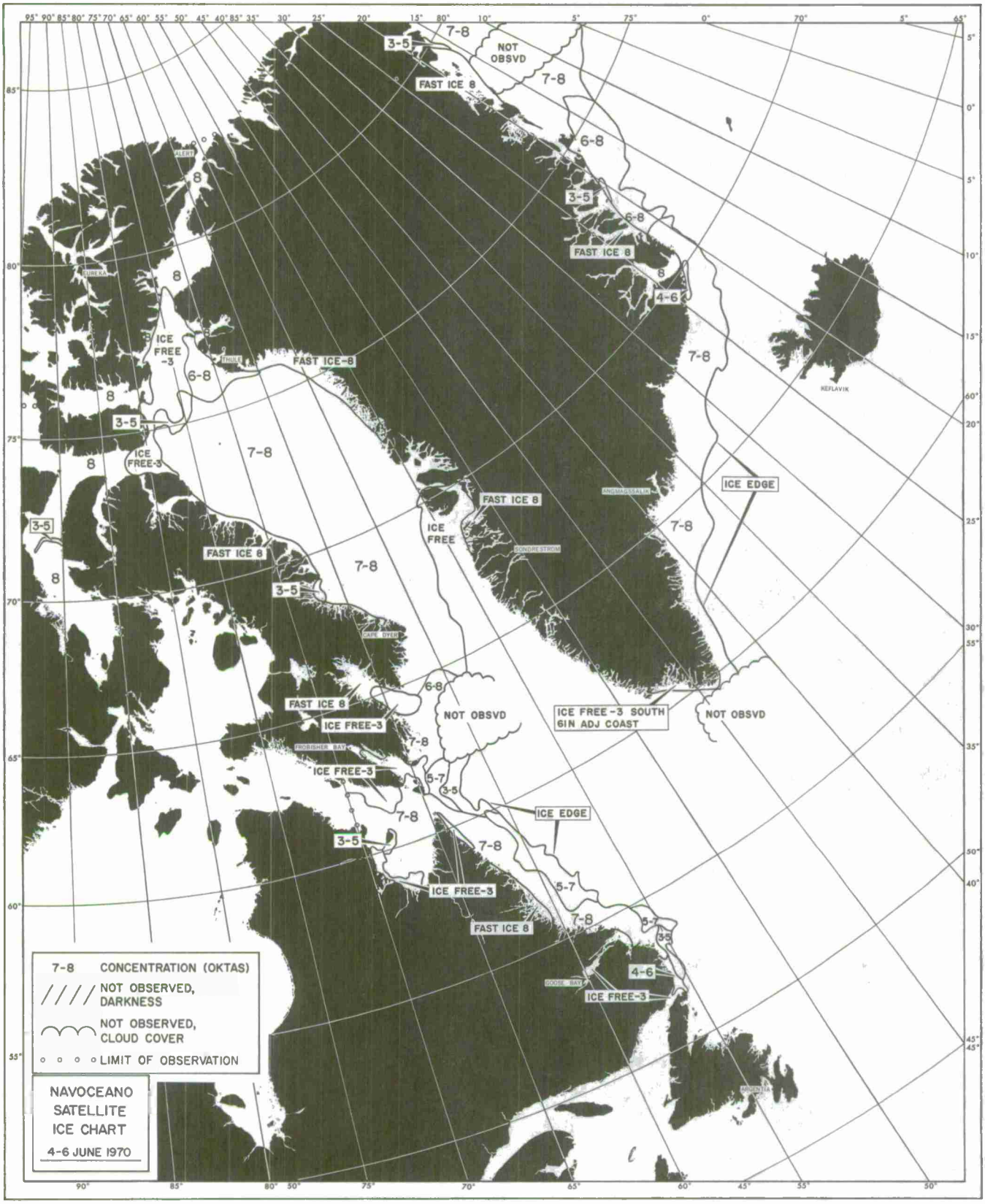

ICE FREE-3
FAST ICE 8
7-8
4-6
ICE EDGE
6-8
ALERT
EUREKA
THULE
NOT OBSVD
3-5
5-7
KEFLAVIK
ANGMAGSSALIK
SONDRESTROM
CAPE DYER
FROBISHER BAY
GOOSE BAY
GRENTIA
7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
16-19 MAY 1970

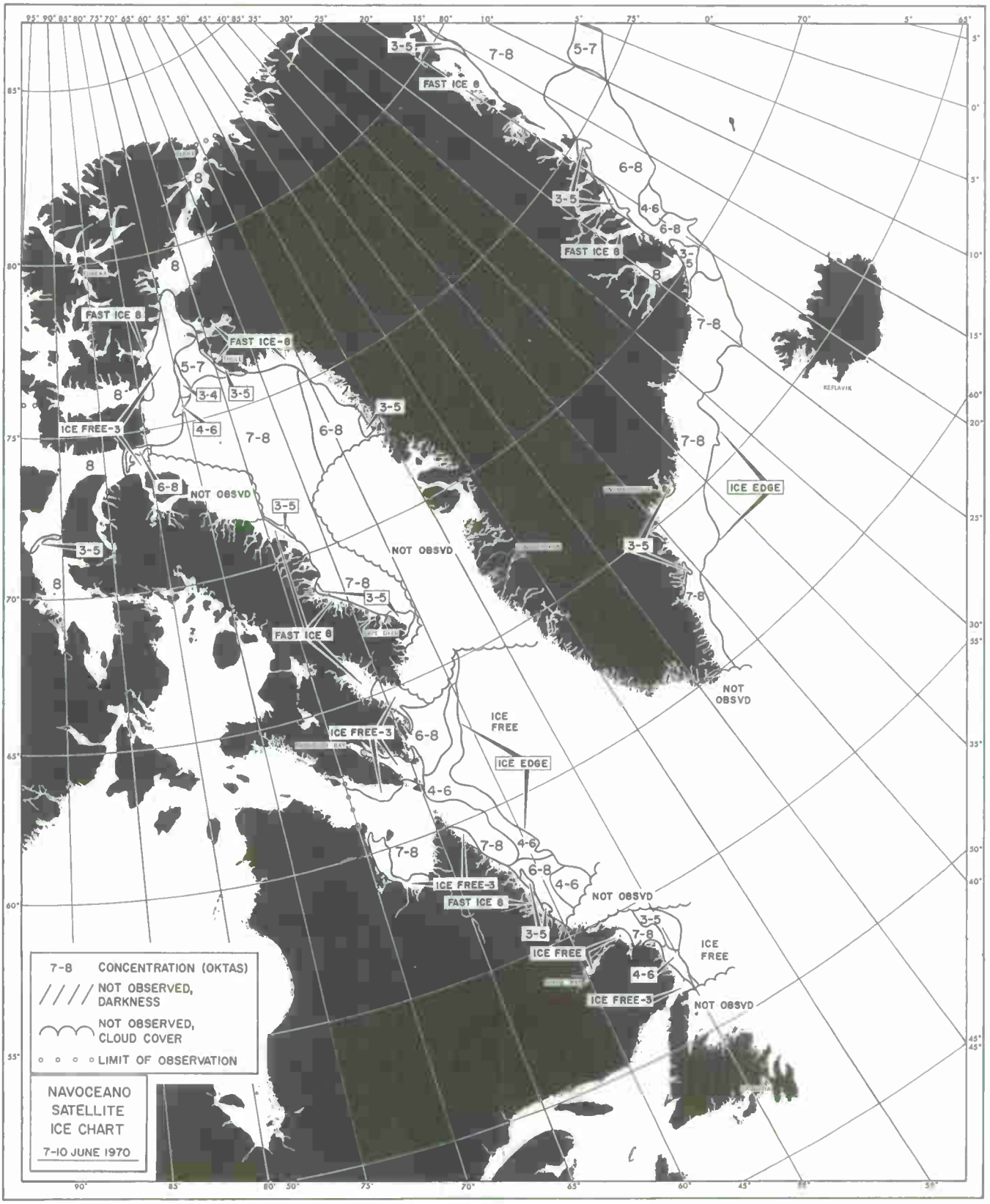

ICE FREE-3
FAST ICE 8
7-8
6-8 WITH NUMEROUS LARGE OPWR AREAS
ALERT
EUREKA
THULE
KEFLAVIK
ANGMAGSSALIK
BONDE STROM
CAPE DYER
FROBISHER BAY
POOLE BAY
ARGENTIA
3-5
5-7
ICE EDGE
ICE FREE
NOT OBSVD
NAVOCEANO SATELLITE ICE CHART
20-23 MAY 1970
7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION

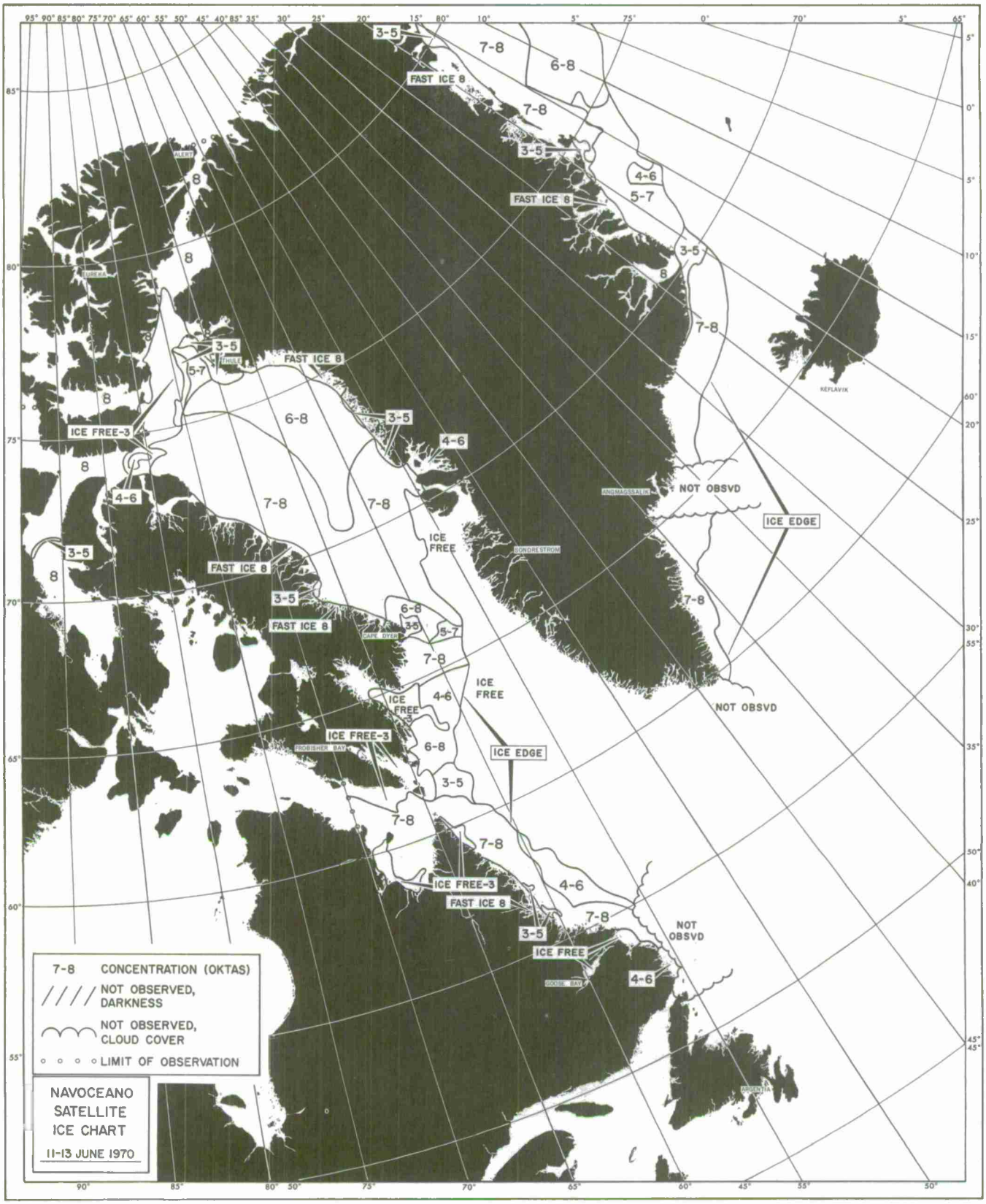

7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
24-26 MAY 1970
NOT OBSVD
FAST ICE-8
FAST ICE 8
ICE FREE-3
ICE EDGE
FAST ICE ADJACENT COAST NOT DISTINGUISHABLE FROM PACK ICE
ICE FREE 3
ALERT
EUREKA
THULE
CAPE DYER
PROBISHER BAY
BONDRETROM
ANGMAGSSALIK
KEFLAVIK
FROBISHER BAY
DOCKIE BAY
3-5
4-6
5-7
6-8
7-8
8

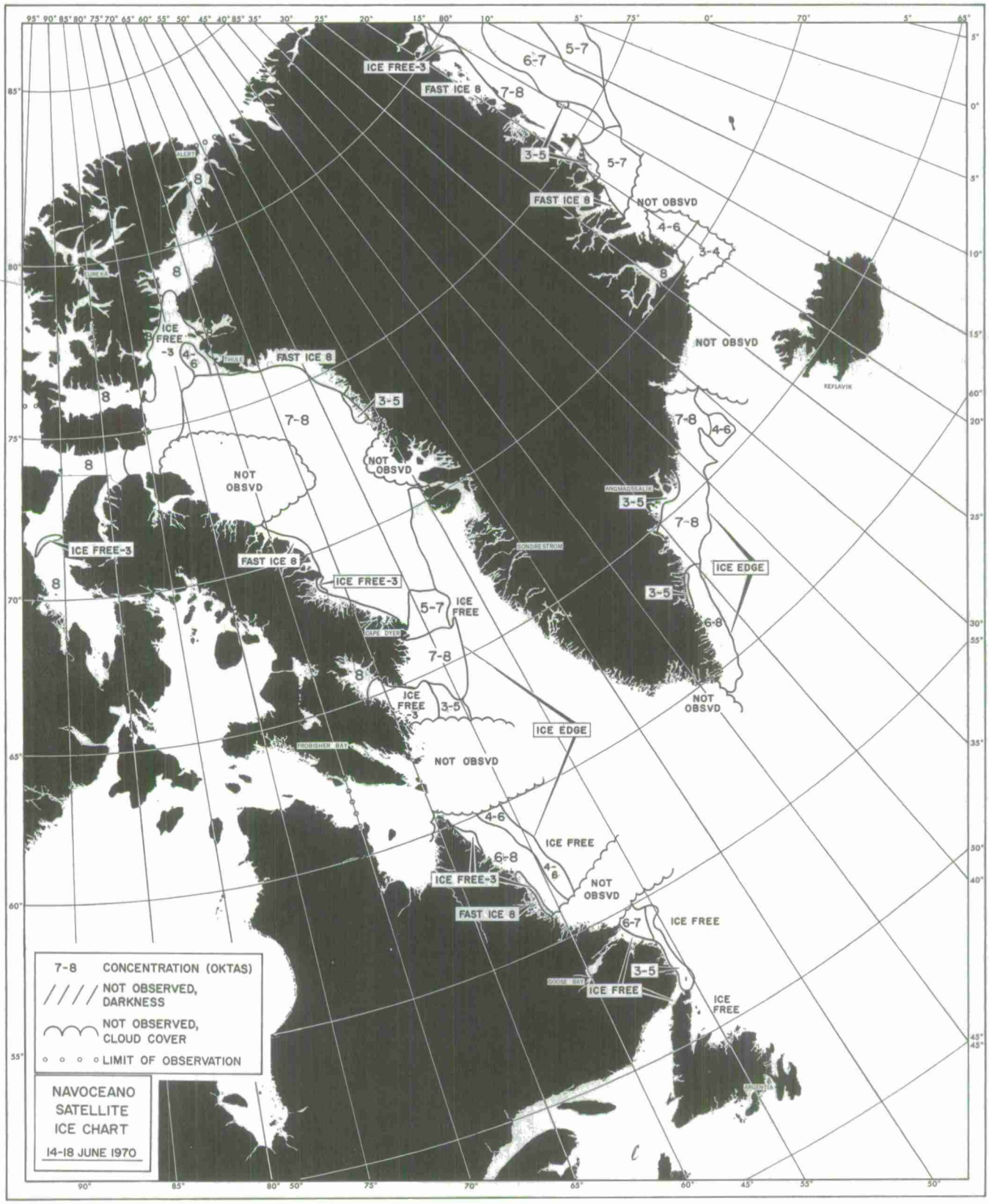

NOT OBSVD
NOT OBSVD
NOT OBSVD
NOT OBSVD
ICE FREE -3
FAST ICE-8
ICE FREE-3
FAST ICE 8
FAST ICE 8
FAST ICE 8
ICE FREE-3
ICE FREE-3
ICE FREE-3
ICE EDGE
FAST ICE 8
ICE FREE-3
7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
28-31 MAY 1970
ALERT
EUREKA
THULE
KEFLAVIK
ANGMAGSSALIK
JONSTRUP
CAPE DYER
FROBISHER BAY
ARGENTIA

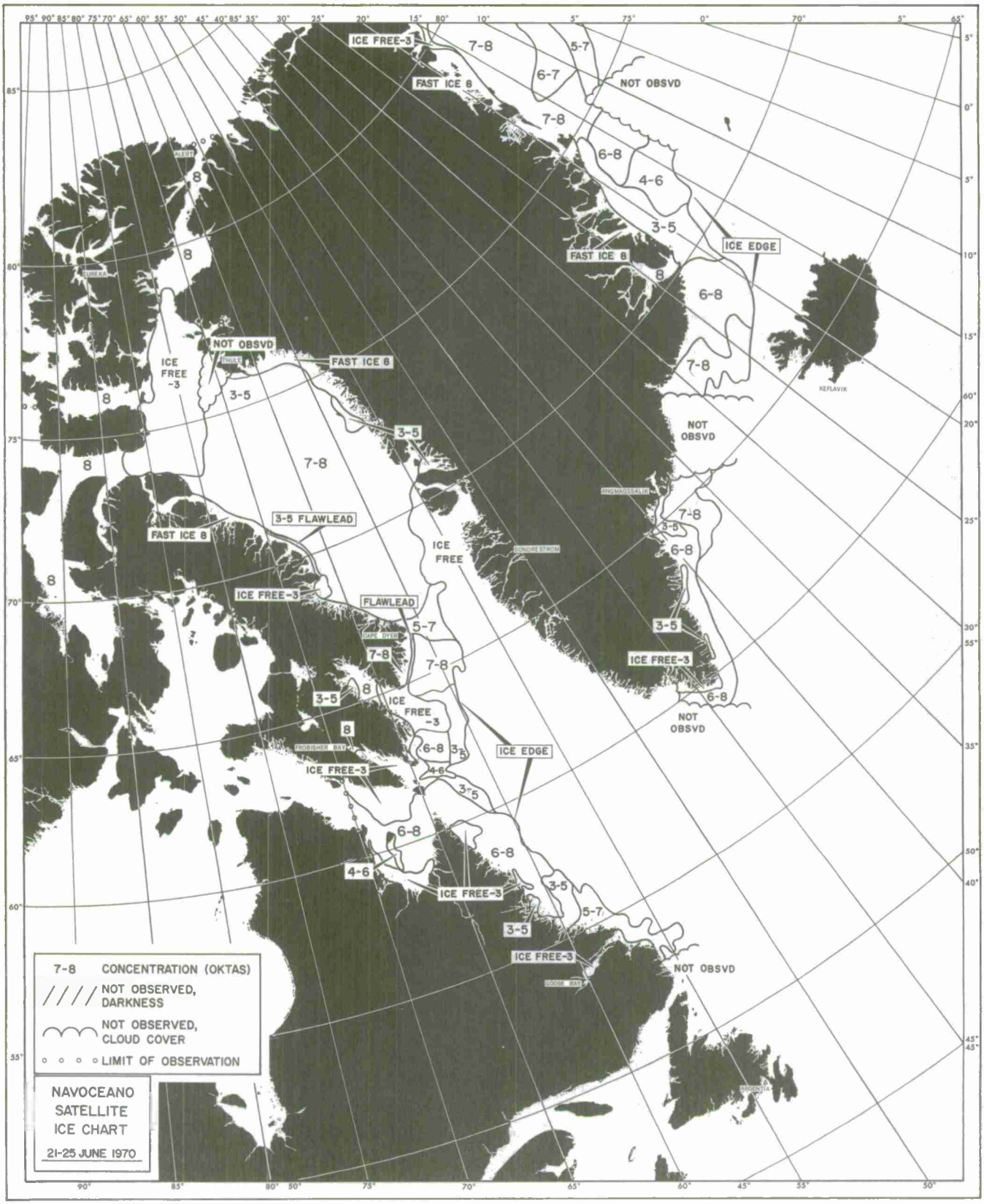

7-8 CONCENTRATION (OKTAS)
//// NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
1-3 JUNE 1970
FAST ICE 8
ICE FREE-3
ICE FREE
ICE EDGE
NOT OBSVD
8-10 NM WIDE SHORELEAD
ALERT
EUREKA
THULE
KEFLAVIK
ANDMARSSALIM
CAPE TYRE
PROBISHER BAY
BOOTIA

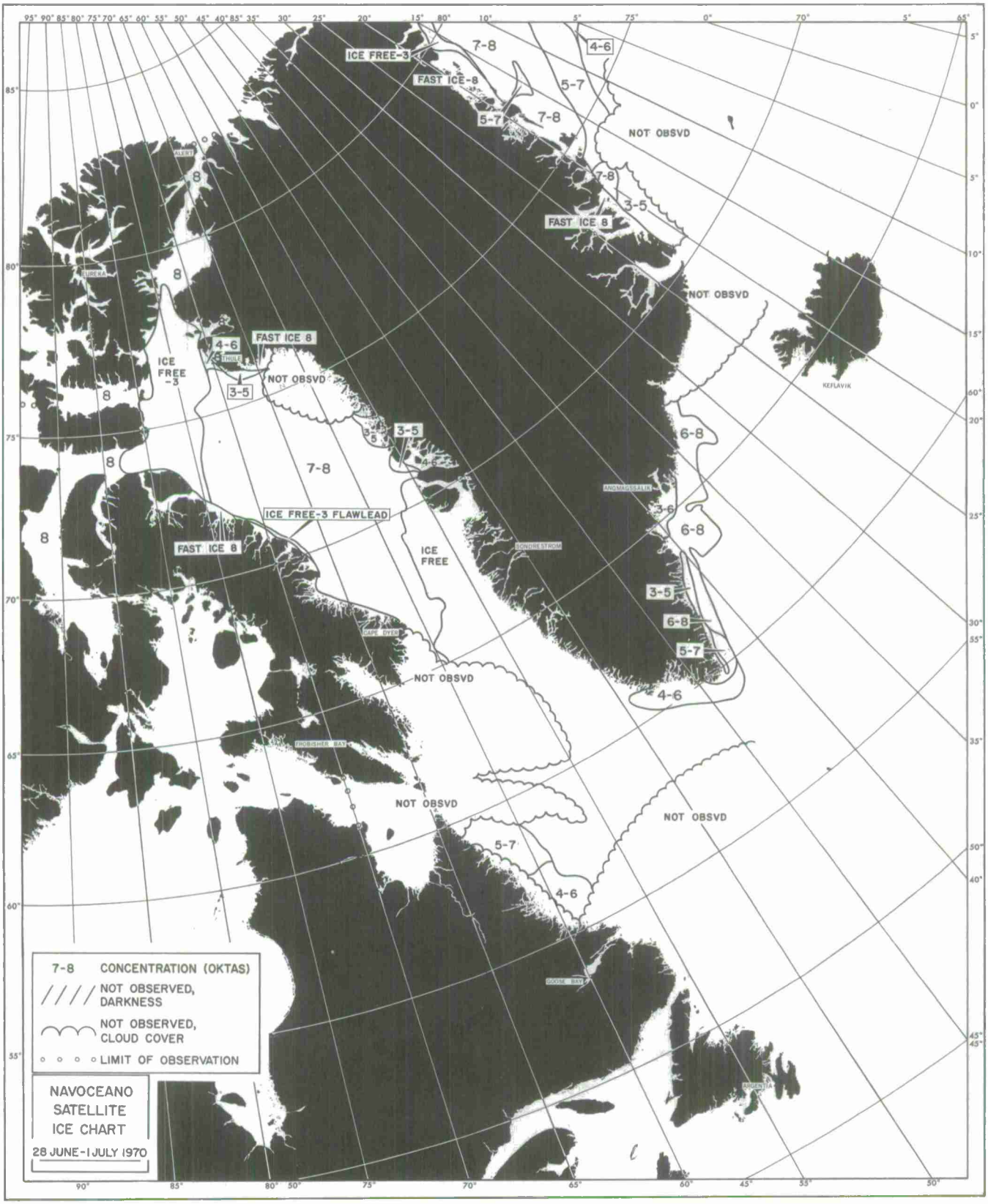

7-8 CONCENTRATION (OKTAS)
//// NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
4-6 JUNE 1970
NOT OBSVD
FAST ICE 8
ICE FREE -3
ICE EDGE
ICE FREE
ICE FREE -3 SOUTH 6IN ADJ COAST
ALERT
EUREKA
THULE
KEFLAVIK
CAPE DYER
FROBISHER BAY
GOOSE BAY
SONDRE STROM

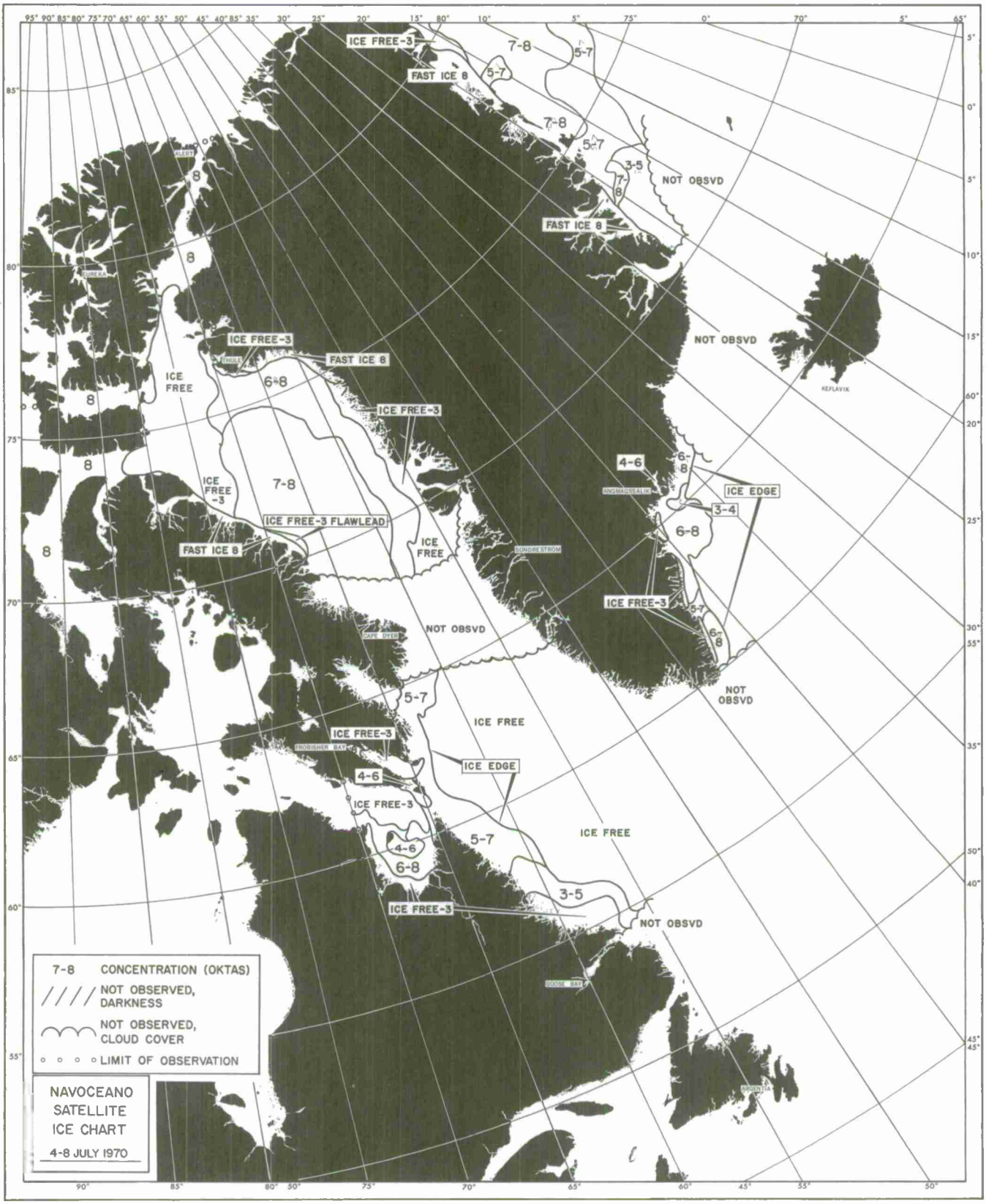

7-8 CONCENTRATION (OKTAS)
//// NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
7-10 JUNE 1970
FAST ICE 8
ICE FREE-3
ICE EDGE
NOT OBSVD
ICE FREE
KEFLAVIK

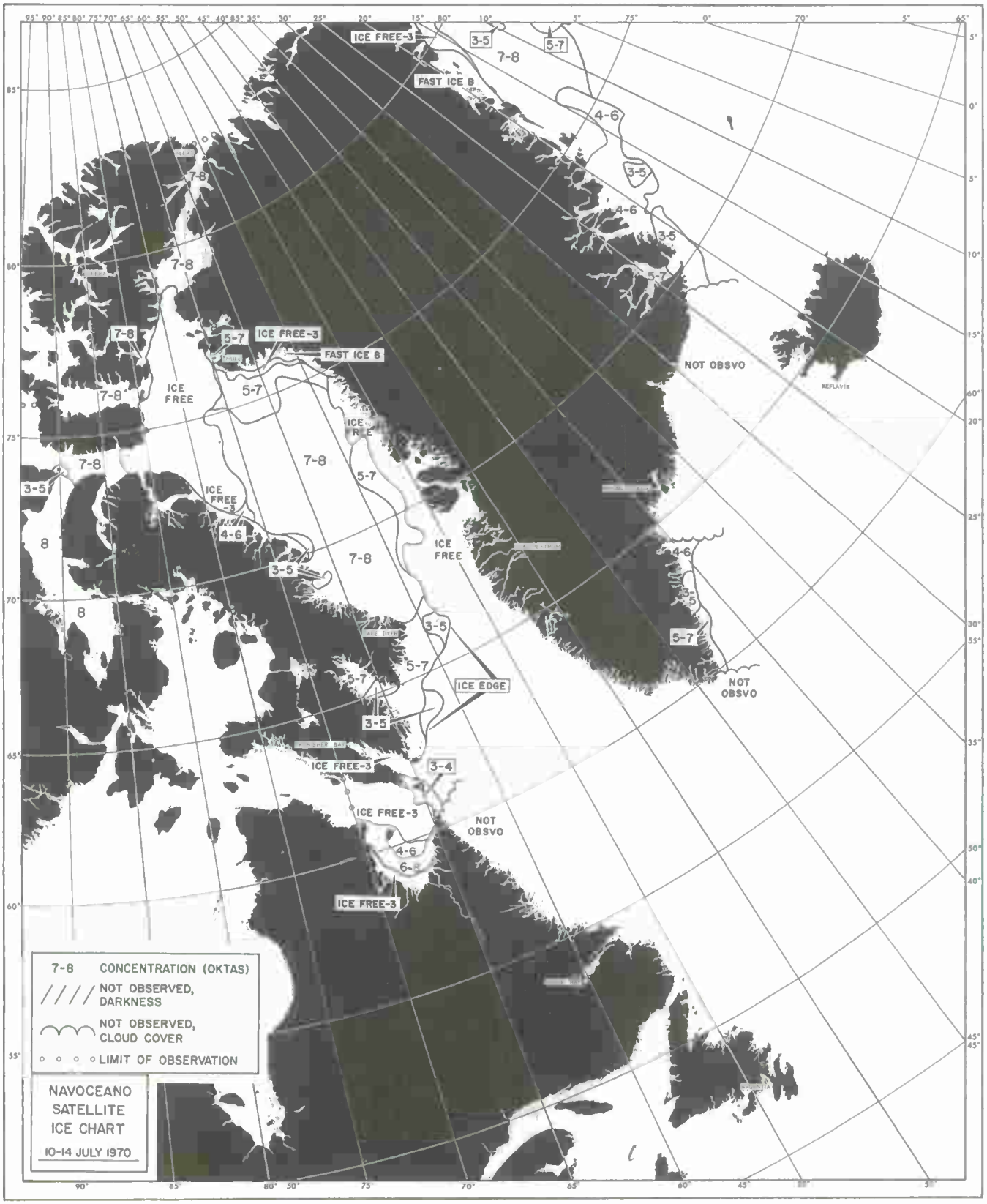

7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
11-13 JUNE 1970
FAST ICE 8
ICE FREE-3
ICE FREE
ICE EDGE
NOT OBSVD
ALERT
EUREKA
THULE
SAPE DYER
PROBISHER BAY
ANGMAGSSALIK
BONDRESTROM
KEFLAVIK
FROBISHER BAY
GODTHAB

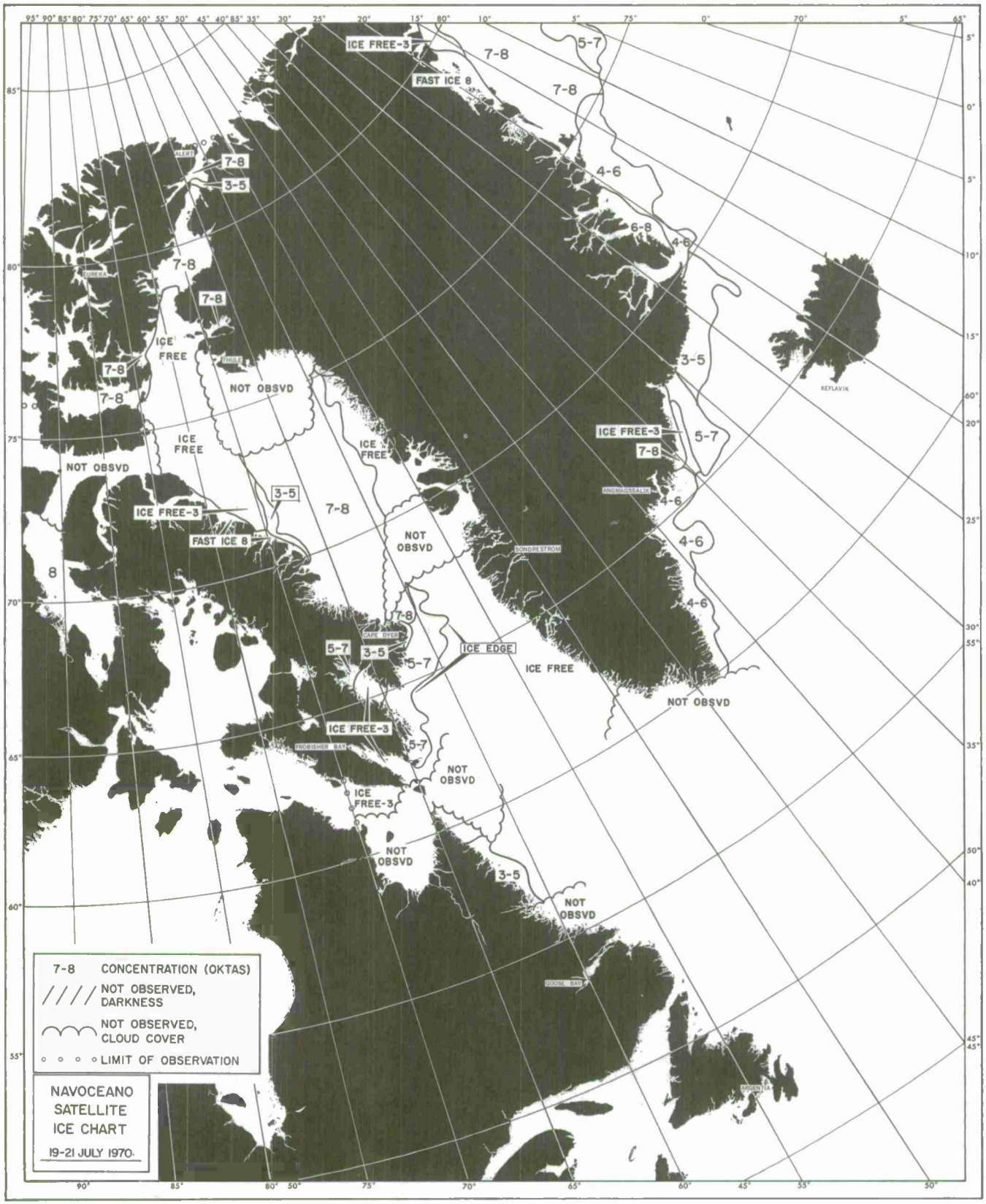

ICE FREE-3
FAST ICE 8
6-7
5-7
7-8
3-5
NOT OBSVD
4-6
3-4
ALERT
THULE
KEFLAVIK
ANGMAGSSALIK
SONDRESTROM
CAPE DYER
PROBISHER BAY
FROBISHER BAY
ICE EDGE
ICE FREE
7-CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
14-18 JUNE 1970

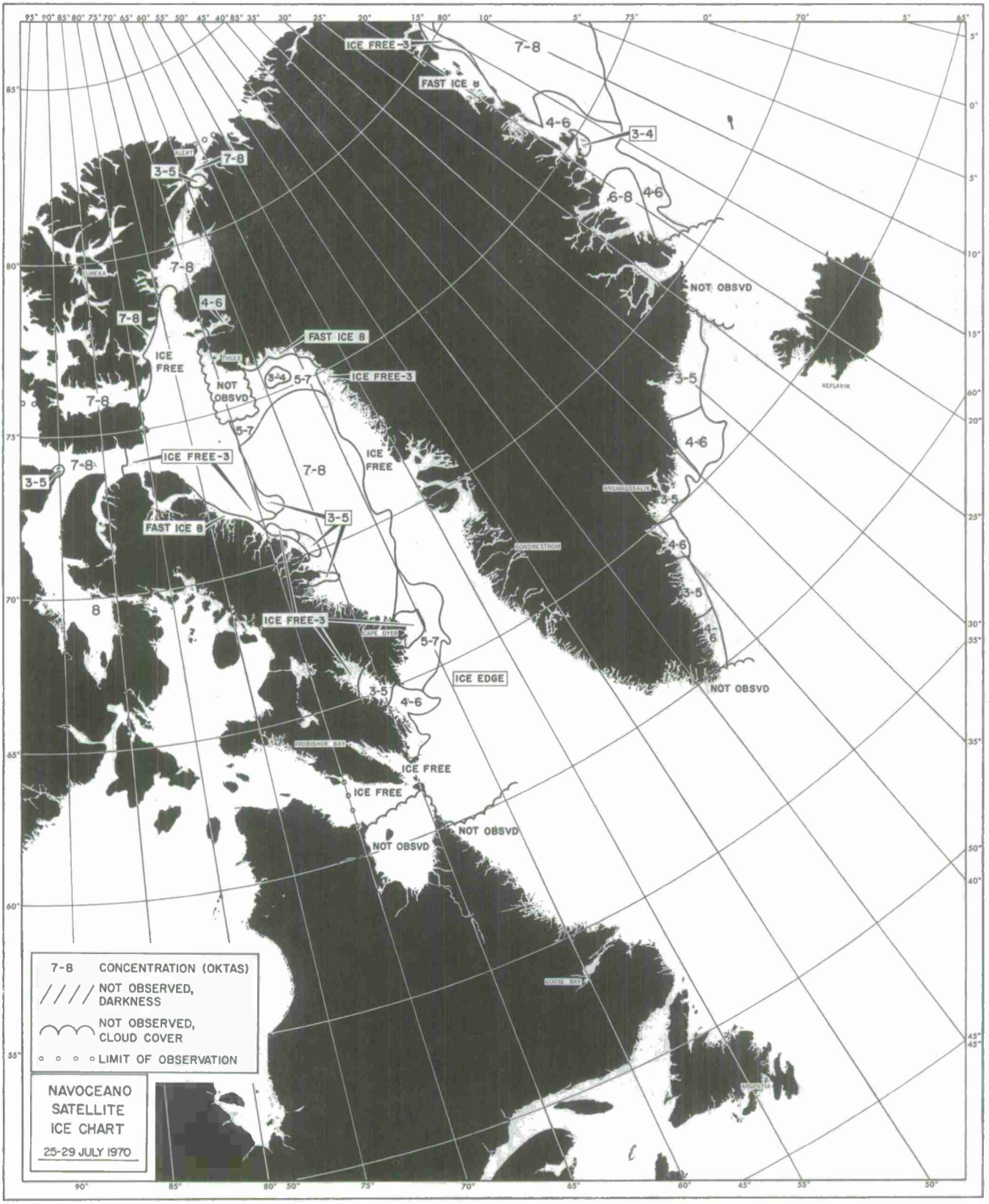

ICE FREE-3
7-8
5-7
6-7
NOT OBSVD
FAST ICE 8
7-8
6-8
4-6
3-5
ICE EDGE
FAST ICE 8
8
6-8
ALERT
8
8
THULE
NOT OBSVD
FAST ICE 8
ICE FREE -3
3-5
7-8
3-5
8
7-8
NOT OBSVD
KEFLAVIK
ANGMAGSSALIK
7-8
3-5
6-8
3-5 FLAWLEAD
FAST ICE 8
ICE FREE
SONDRE STROM
8
ICE FREE-3
FLAWLEAD
5-7
CAPE DYER
7-8
7-8
3-5
8
ICE FREE -3
6-8
NOT OBSVD
8
FROBISHER BAY
6-8
3-5
ICE EDGE
ICE FREE-3
4-6
3-5
6-8
6-8
4-6
ICE FREE-3
3-5
5-7
3-5
ICE FREE-3
NOT OBSVD
FROBISHER BAY
7-8 CONCENTRATION (OKTAS)
//// NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
21-25 JUNE 1970

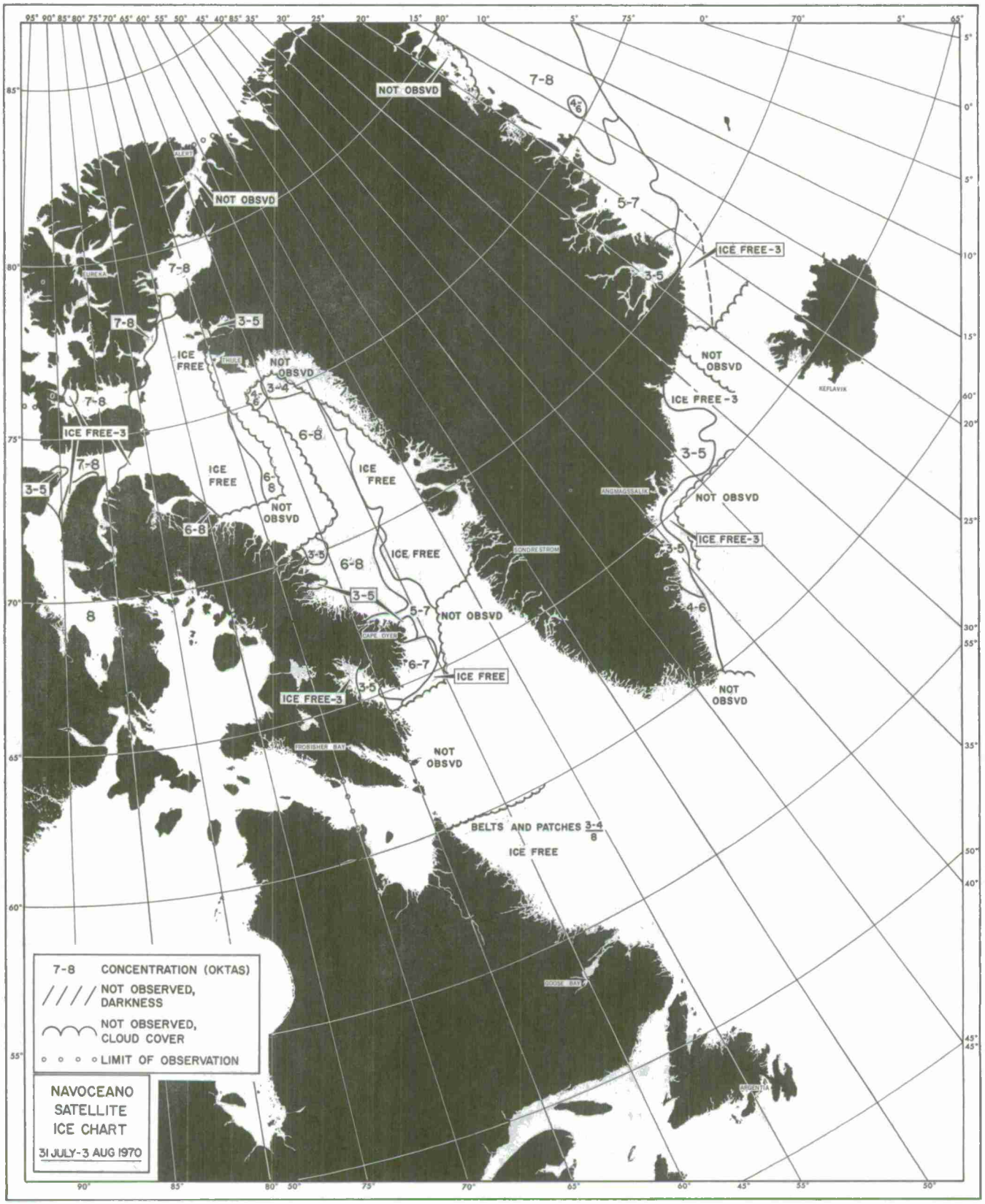

ICE FREE-3
FAST ICE-8
7-8
4-6
5-7
NOT OBSVD
FAST ICE 8
3-5
ICE FREE -3
THULE
ICE FREE-3 FLAWLEAD
ICE FREE
ANGMAGSSALIK
KEFLAVIK
SONDRE STROM
CAPE DYER
PROBISHER BAY
GOOSE BAY
6-8
7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
28 JUNE-1 JULY 1970

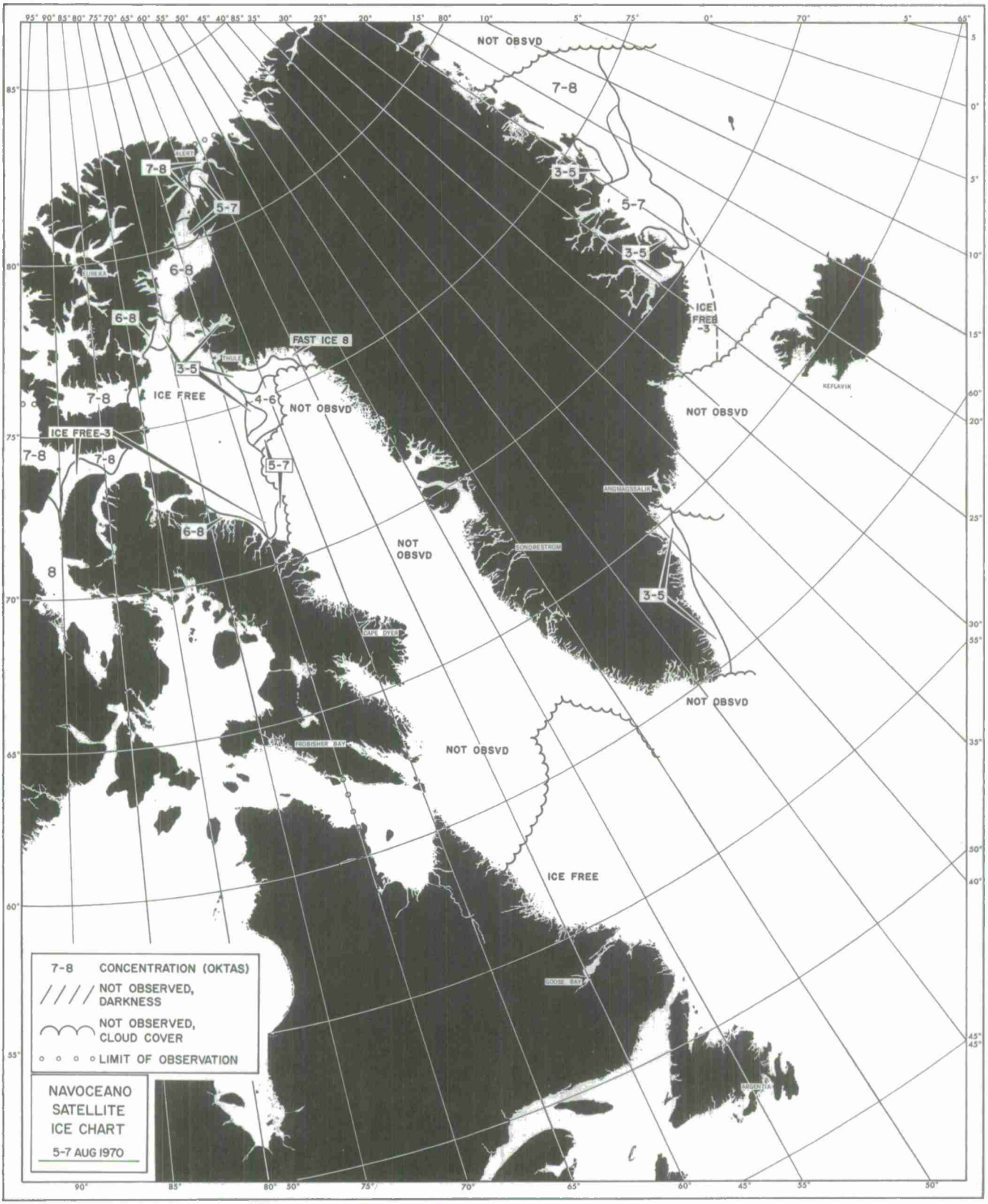

ICE FREE-3
FAST ICE 8
7-8
5-7
3-5
NOT OBSVD
6-8
4-6
3-4
ICE EDGE
ICE FREE
ICE FREE-3 FLAWLEAD
NOT OBSVD
7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
4-8 JULY 1970


ICE FREE-3
3-5
5-7
7-8
FAST ICE 8
4-6
NOT OBSVO
ICE FREE
ICE EDGE
3-4
6-8
7-8 CONCENTRATION (OKTAS)
//// NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
10-14 JULY 1970

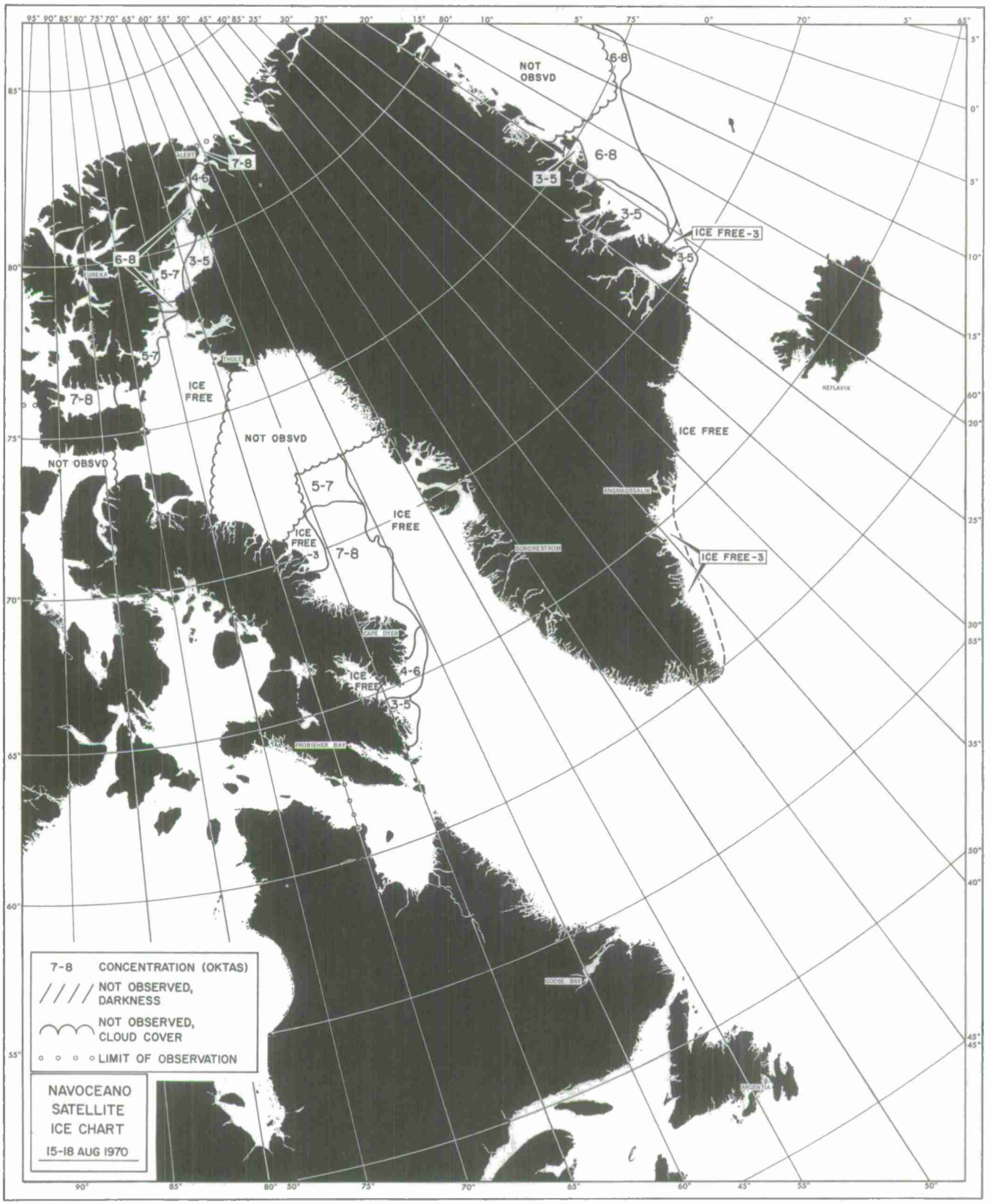

ICE FREE-3
FAST ICE 8
7-8
5-7
4-6
6-8
3-5
ALERT
EUREKA
THULE
ICE FREE
NOT OBSVD
KEFLAVIK
ANGMAGSSALIK
SONDRESTROM
CAPE DYER
ICE EDGE
PROBISHER BAY
GOOSE BAY
GODTHAB
NAVOCEANO SATELLITE ICE CHART
19-21 JULY 1970
7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION

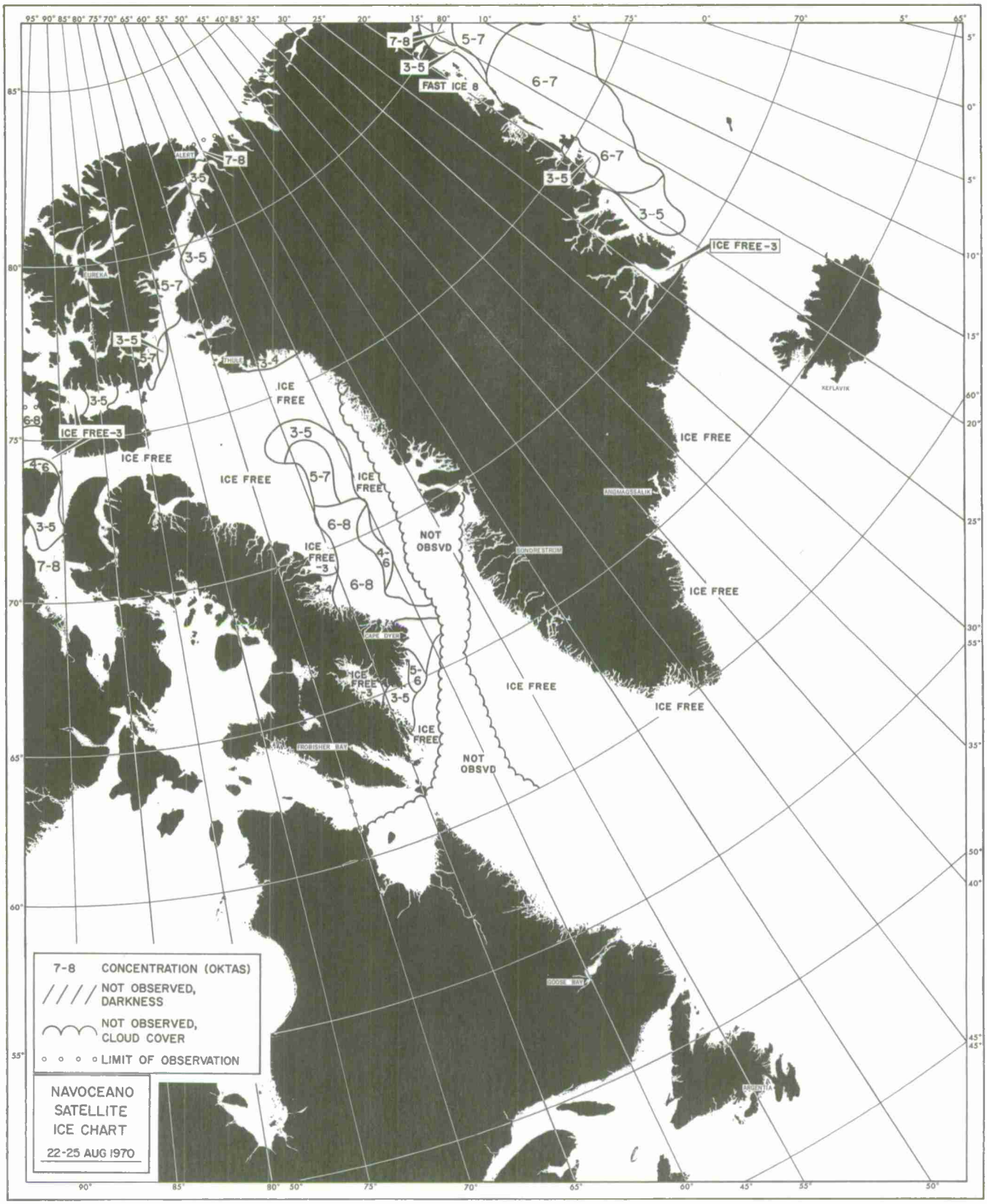

ICE FREE-3
7-8
FAST ICE 8
4-6
3-4
ALERT
3-5
7-8
6-8
4-6
EUREKA
NOT OBSVD
7-8
4-6
7-8
FAST ICE 8
ICE FREE
THULE
NOT OBSVD
3-4
5-7
ICE FREE-3
3-5
7-8
5-7
4-6
ICE FREE-3
7-8
ICE FREE
7-8
3-5
ANGMASSALIK
3-5
FAST ICE 8
3-5
CONDRESTROM
4-6
3-5
8
ICE FREE-3
CAPE DYER
5-7
4-6
ICE EDGE
NOT OBSVD
3-5
4-6
FROBISHER BAY
ICE FREE
ICE FREE
NOT OBSVD
NOT OBSVD
GOOSE BAY
7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
25-29 JULY 1970

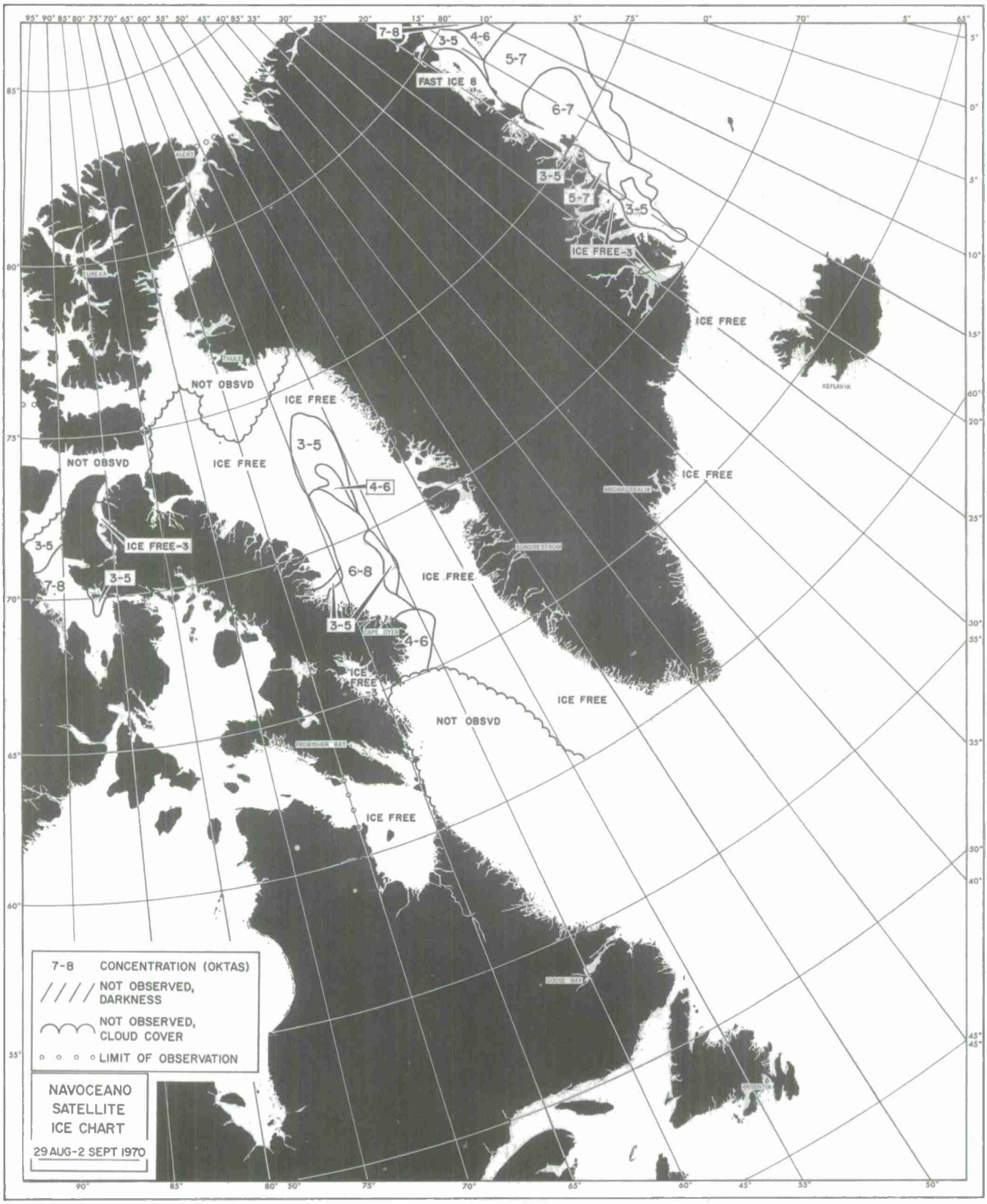

NOT OBSVD
7-8
4/6
5-7
ALERT
NOT OBSVD
ICE FREE-3
3-5
EUREKA
7-8
7-8
3-5
ICE FREE
THULE
NOT OBSVD
3-4
NOT OBSVD
ICE FREE-3
KEFLAVIK
7-8
6-8
ICE FREE-3
3-5
7-8
ICE FREE
6-8
ICE FREE
ANGMASSALIK
3-5
NOT OBSVD
6-8
NOT OBSVD
ICE FREE-3
3-5
GODTHAB
6-8
ICE FREE
3-5
3-5
5-7
NOT OBSVD
4-6
8
CAPE DYER
6-7
ICE FREE
NOT OBSVD
3-5
ICE FREE-3
FROBISHER BAY
NOT OBSVD
BELTS AND PATCHES 3-4/8
ICE FREE
7-8 CONCENTRATION (OKTAS)
//// NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
31 JULY-3 AUG 1970

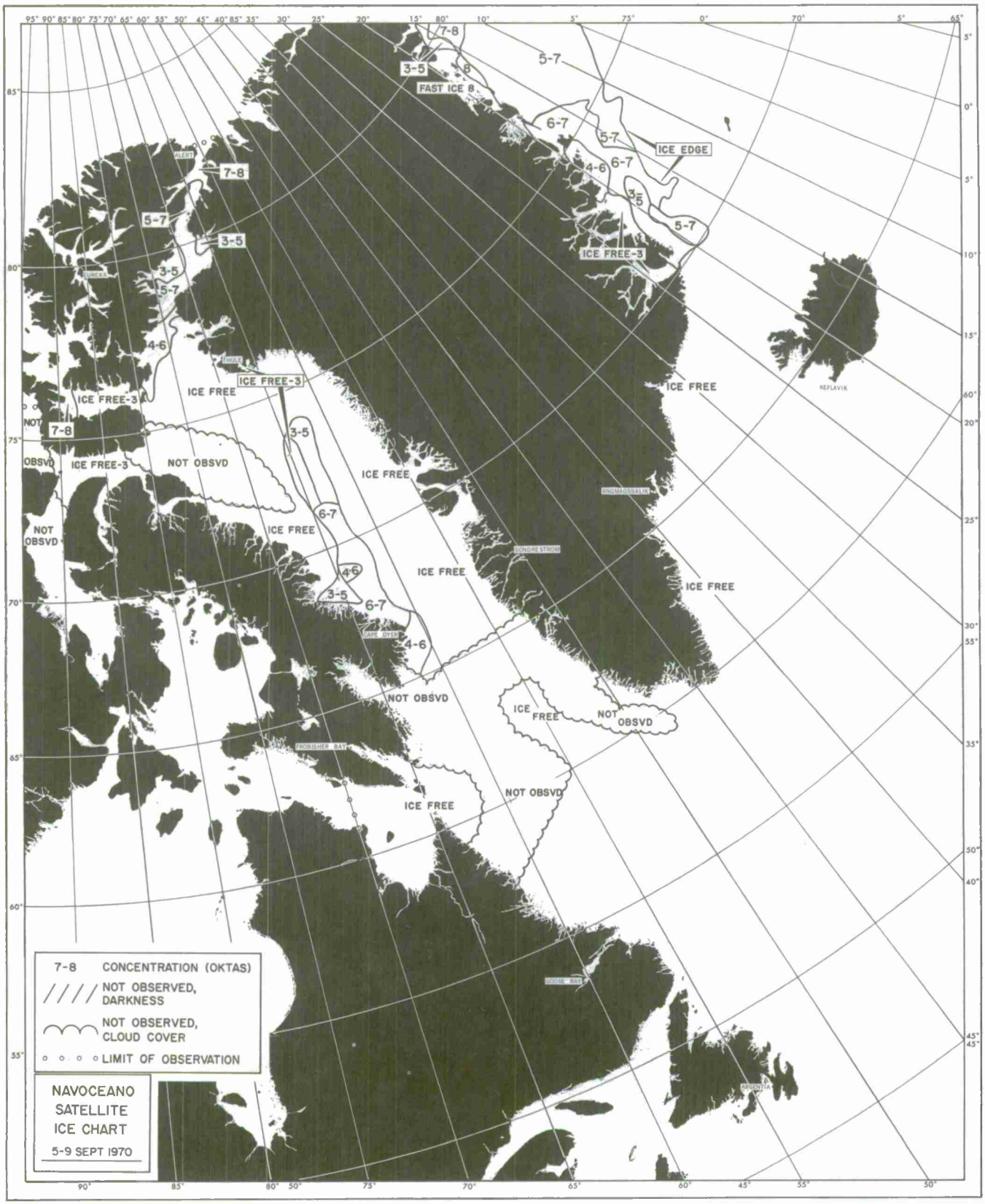

NOT OBSVD
7-8
3-5
5-7
3-5
ICE FREE -3
6-8
7-8
5-7
6-8
FAST ICE 8
3-5
7-8
ICE FREE
4-6
NOT OBSVD
NOT OBSVD
ICE FREE-3
7-8
7-8
5-7
6-8
8
NOT OBSVD
3-5
NOT OBSVD
NOT OBSVD
NOT OBSVD
ICE FREE
7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
5-7 AUG 1970

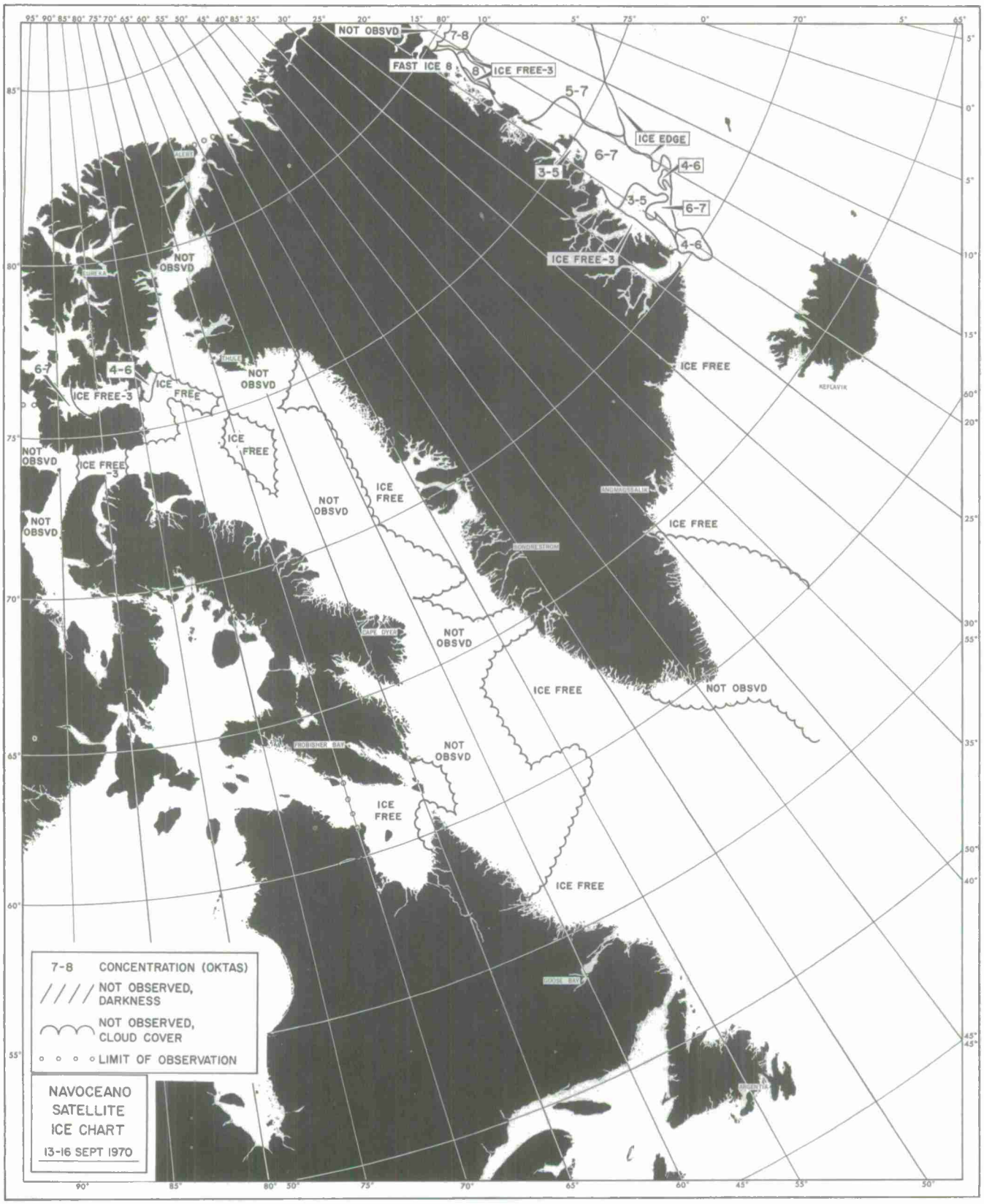

NOT OBSVD
3-5
7-8
5-7
6-8
3-5
5-7
3-5
3-5
ICE FREE-3
ALERT
NOT OBSVD
EUREKA
6-8
5-7
FAST ICE 8
THULE
3-5
NOT OBSVD
7-8
ICE FREE
4-6
5-7
7-8
ICE FREE
7-8
ICE FREE-3
3-5
NOT OBSVD
8
7-8
CAPE DYER
ICE FREE-3
ICE EDGE
4-6
FROBISHER BAY
ICE FREE
KEFLAVIK
ANGMAGSSALIK
KONDRESTROM
3-5
7-8 CONCENTRATION (OKTAS)
//// NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
9-12 AUG 1970


NOT OBSVD
6-8
7-8
4-6
3-5
ICE FREE-3
5-7
ICE FREE
NOT OBSVD
ICE FREE
ICE FREE-3
ICE FREE
4-6
3-5
7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
15-18 AUG 1970
ALERT
EUREKA
THULE
CAPE DYER
FROBISHER BAY
SONDRESTROM
KEFLAVIK
GOOSE BAY
ARGENTIA


7-8
5-7
3-5
FAST ICE 8
6-7
6-7
3-5
3-5
ICE FREE-3
ALERT
7-8
3-5
3-5
THULE
5-7
3-5
5-7
3-4
ICE FREE
3-5
6-8
ICE FREE-3
ICE FREE
4-6
ICE FREE
3-5
5-7
ICE FREE
6-8
NOT OBSVD
3-5
7-8
ICE FREE -3
4-6
3-4
6-8
CAPE DYER
ICE FREE -3
5-6
3-5
ICE FREE
FROBISHER BAY
NOT OBSVD
ICE FREE
ICE FREE
ICE FREE
ICE FREE
KEFLAVIK
ANGMAGSSALIK
SUNDRESTRUM
GOOSE BAY
ARGENTIA
7-8 CONCENTRATION (OKTAS)
//// NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
22-25 AUG 1970


7-8
3-5
4-6
5-7
FAST ICE 8
6-7
3-5
5-7
3-5
ICE FREE-3
ICE FREE
ALERT
EUREKA
THULE
NOT OBSVD
ICE FREE
3-5
4-6
NOT OBSVD
ICE FREE
ICE FREE
3-5
ICE FREE-3
7-8
3-5
6-8
3-5
CAPE DYER
4-6
ICE FREE
ICE FREE
NOT OBSVD
FROBISHER BAY
ICE FREE
KEFLAVIK
ANGMAGSSALIK
JULIANEHAAB
GODTHAB
7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
29 AUG-2 SEPT 1970


7-8
3-5
FAST ICE 8
5-7
6-7
5-7
ICE EDGE
4-6
6-7
3-5
5-7
ICE FREE-3
7-8
5-7
3-5
3-5
5-7
4-6
ICE FREE-3
ICE FREE
ICE FREE-3
ICE FREE
7-8
3-5
OBSVD
ICE FREE-3
NOT OBSVD
ICE FREE
6-7
NOT OBSVD
ICE FREE
4-6
3-5
6-7
4-6
ICE FREE
ICE FREE
NOT OBSVD
ICE FREE
NOT OBSVD
NOT OBSVD
ICE FREE
7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
5-9 SEPT 1970


NOT OBSVD
7-8
FAST ICE 8
8
ICE FREE-3
5-7
ICE EDGE
6-7
4-6
3-5
3-5
6-7
4-6
ICE FREE-3
NOT OBSVD
6-7
4-6
ICE FREE-3
ICE FREE
NOT OBSVD
ICE FREE
NOT OBSVD
ICE FREE-3
NOT OBSVD
ICE FREE
NOT OBSVD
ICE FREE
NOT OBSVD
NOT OBSVD
ICE FREE
NOT OBSVD
ICE FREE
ICE FREE
ICE FREE
ICE FREE
7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
13-16 SEPT 1970
KEFLAVIK
THULE
CAPE DYER
PROBISHER BAY
GODTHAB


7-8
8
8
5-7
NOT OBSVD
ICE FREE-3
ICE EDGE
6-8
3-5
3-5
3-5
ICE FREE-3
ALERT
RESOLUTE
NOT OBSVD
5-7
ICE FREE -3
THULE
NOT OBSVD
NOT OBSVD
ICE FREE-3
3-6
6-7
ICE FREE
ICE FREE
ICE FREE -3
ICE FREE
ANGMAGSSALIK
DENMARK STROM
NOT OBSVD
NOT OBSVD
CAPE DYER
NOT OBSVD
ICE FREE
FROBISHER BAY
KEFLAVIK
GOOSE BAY
ARGENTIA
7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
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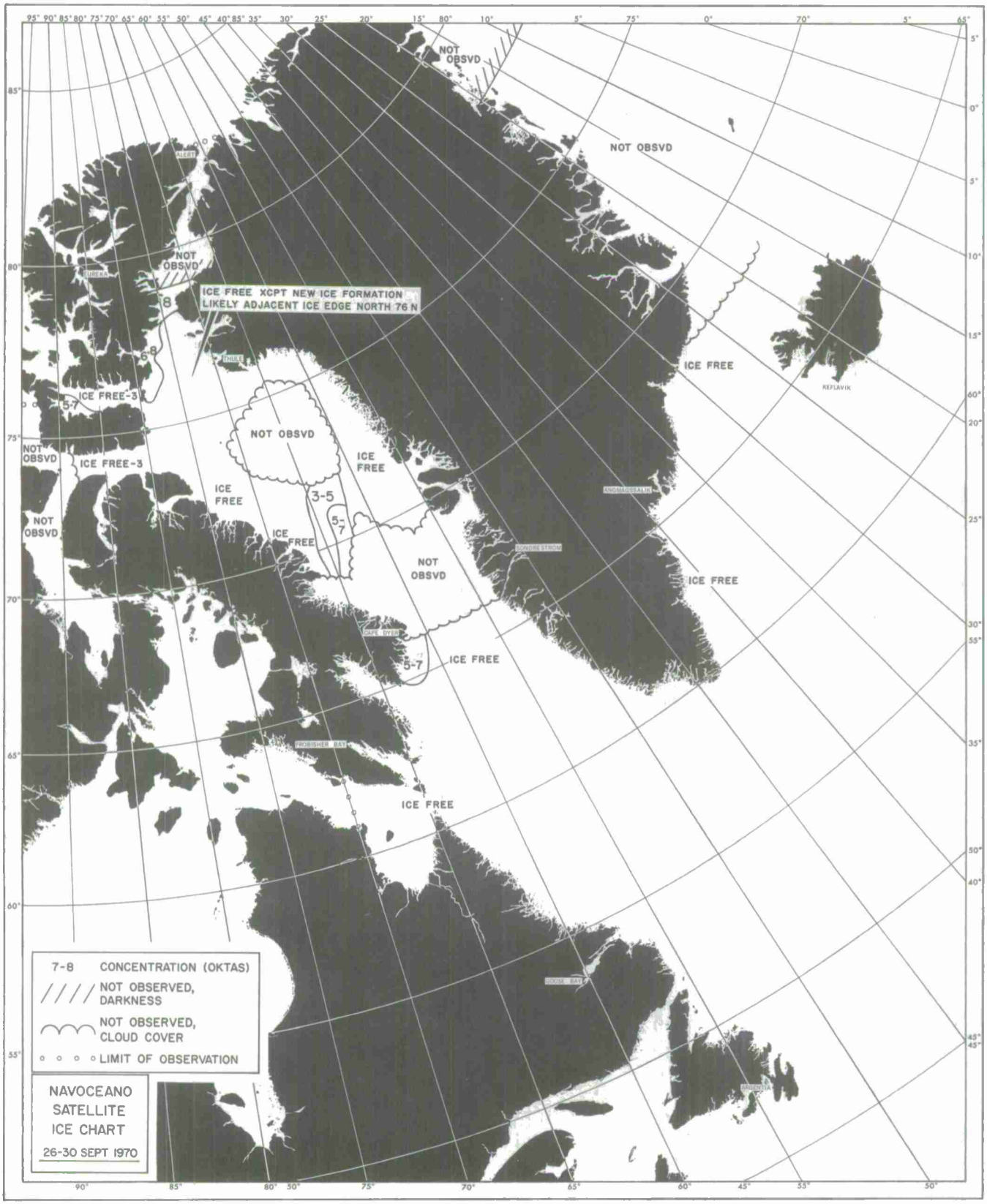
19-23 SEPT 1970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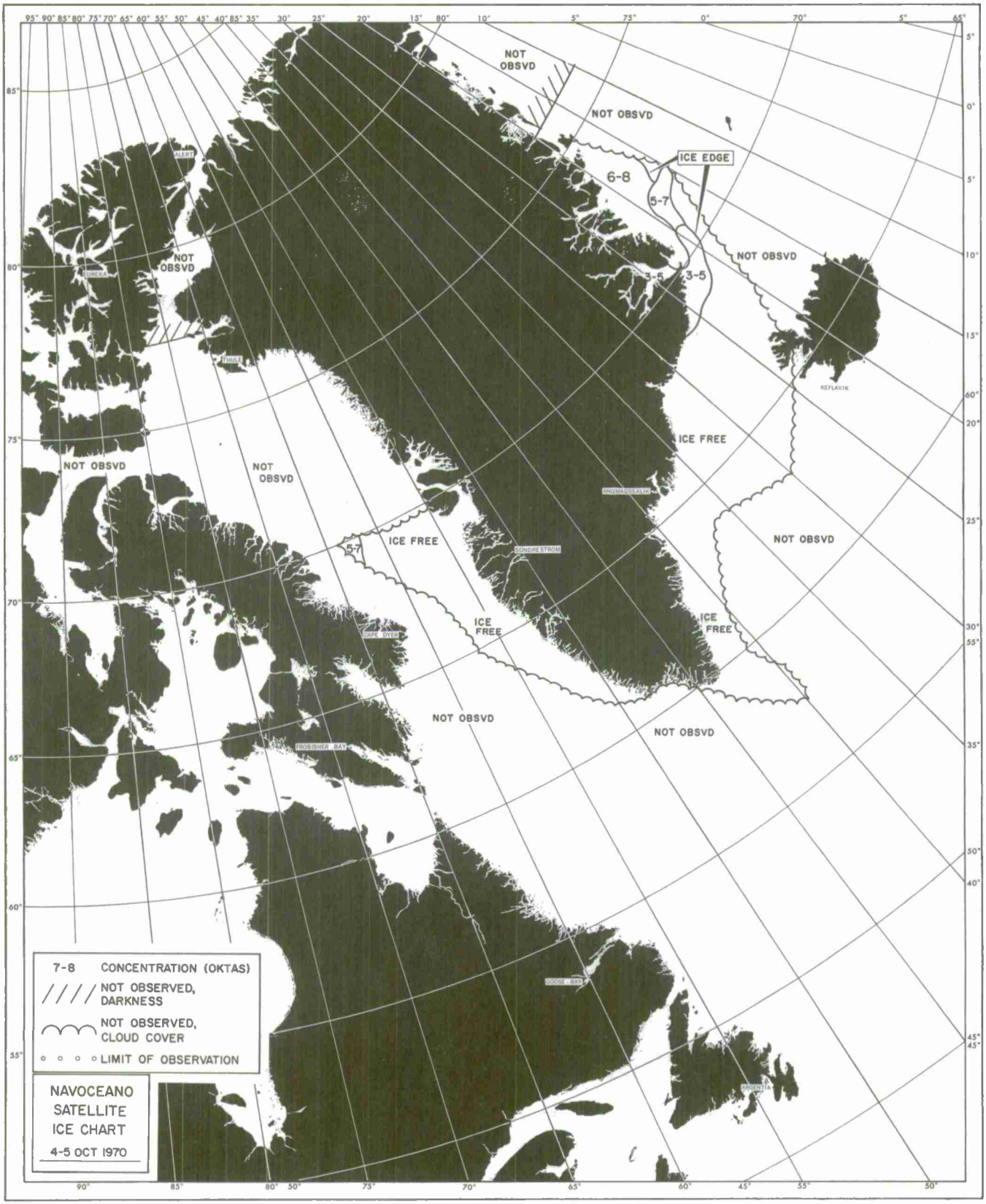
ICE FREE-3
NOT OBSVD
ICE FREE
NOT OBSVD
ICE FREE
3-5
5-7
ICE FREE
NOT OBSVD
ICE FREE
5-7
ICE FREE
ICE FREE
ICE FREE
ICE FREE
ALERT
THULE
KEFLAVIK
ANGMAGSSALIK
SONDRE STROM
CAPE DYER
FROBISHER BAY
GOOSE BAY
7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
26-30 SEPT 1970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ICE EDGE
6-8
5-7
3-5
3-5
NOT OBSVD
NOT OBSVD
NOT OBSVD
NOT OBSVD
ICE FREE
ICE FREE
5-7
ICE FREE
ICE FREE
NOT OBSVD
NOT OBSVD
NOT OBSVD
ALERT
EUREKA
THULE
SONDRESTROM
KEFLAVIK
CAPE DYER
FROBISHER BAY
GOOSE BAY
7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
4-5 OCT 1970

APPENDIX C

WESTERN ARCTIC ICE CHARTS OBSERVED BY AERIAL RECONNAISSANCE

KEY TO ICE SYMBOLS USED IN PLOTTING ICE FEATURES

TOTAL CONCENTRATION

- Ice free
- <1 okta* (open water)
- 1-<3 oktas (very open pack)
- 3-<6 oktas (open pack)
- 6-<7 oktas (close pack)
- 7-<8 oktas (very close pack)
- 8 oktas (compact pack)

CONC = Concentration
CRK = Crack
CRKS = Cracks
FRCT = Fracture
FRCTV = Very Small Fracture
FRCTS = Small Fracture
FRCTM = Medium Fracture
FRCTL = Large Fracture
LVL = Level Ice
NDTR = Not Determined
NOPG = No Openings in Ice
OPWR = Open Water
SCTD = Scattered
SD = Snow Depth
T = Ice Thickness

COVERAGE BY SIZE

$$\frac{C}{n_1 n_2 n_3}$$

C = total concentration

n_1
- SS/NL = New Ice or Nilas
- PK = Poncake <3 m
- CK = Brosh, Small Cake, Coke <20 m

n_2
- SF = Small Floe 20—100 m
- MF = Medium Floe 100—500 m

n_3
- BF = Big Floe 500—2000 m
- VF = Vast Floe 2—10 km
- GF = Giant Floe >10 km
- Fast = Fast Ice

Example:
- 7 = total concentration
- 1 = okto all pancake ice
- 2 = aktas small and medium ice floes
- 4 = aktas big, vast, and giant ice floes

$$\frac{7}{124}\ PK$$

STAGE OF DEVELOPMENT

$$\frac{A}{\text{aktas predominant, aktas secondary}}$$

AGE	AVERAGE THICKNESS
SS = Frazil, Grease, Slush, Shuga	
NL = Ice Rind, Dark Nilas, Light Nilas	<5—10 cm
G = Gray	10—15 cm
GW = Gray-White	15—30 cm
FL = Thin First-Year	30—70 cm
FM = Medium First-Year	70—120 cm
FT = Thick First-Year	>120 cm
SY = Second-Year	
MY = Multi-Year	

Example: $\frac{A}{5FM3G}$

A = Stage of development
5FM = 5 oktas Medium First-Year
3G = 3 oktas Gray

*One okta equals one-eighth ice concentration

TOPOGRAPHY

- Rafted or Finger-Rafted Ice
- Hummocks
- (N) New Ridges
- (W) Weathered Ridges
- (V) Very Weathered Ridges
- (A) Aged Ridges
- (C) Consolidated Ridges

Example: $\frac{\text{(N) (h)}}{\text{(n)}}$

(h) height of ridges in meters
(n) tenths coverage on ice

STAGE OF MELTING

FPD = Few Puddles
MPD = Many Puddles
FTH = Few Thaw Holes
MTH = Many Thaw Holes
DRI = Dried Ice
ROT = Rotten Ice
FLO = Flooded Ice

UNDERCAST

Limit

THICKNESS OF ICE & SNOW

t_E = ice thickness in cm
s = snow depth in cm

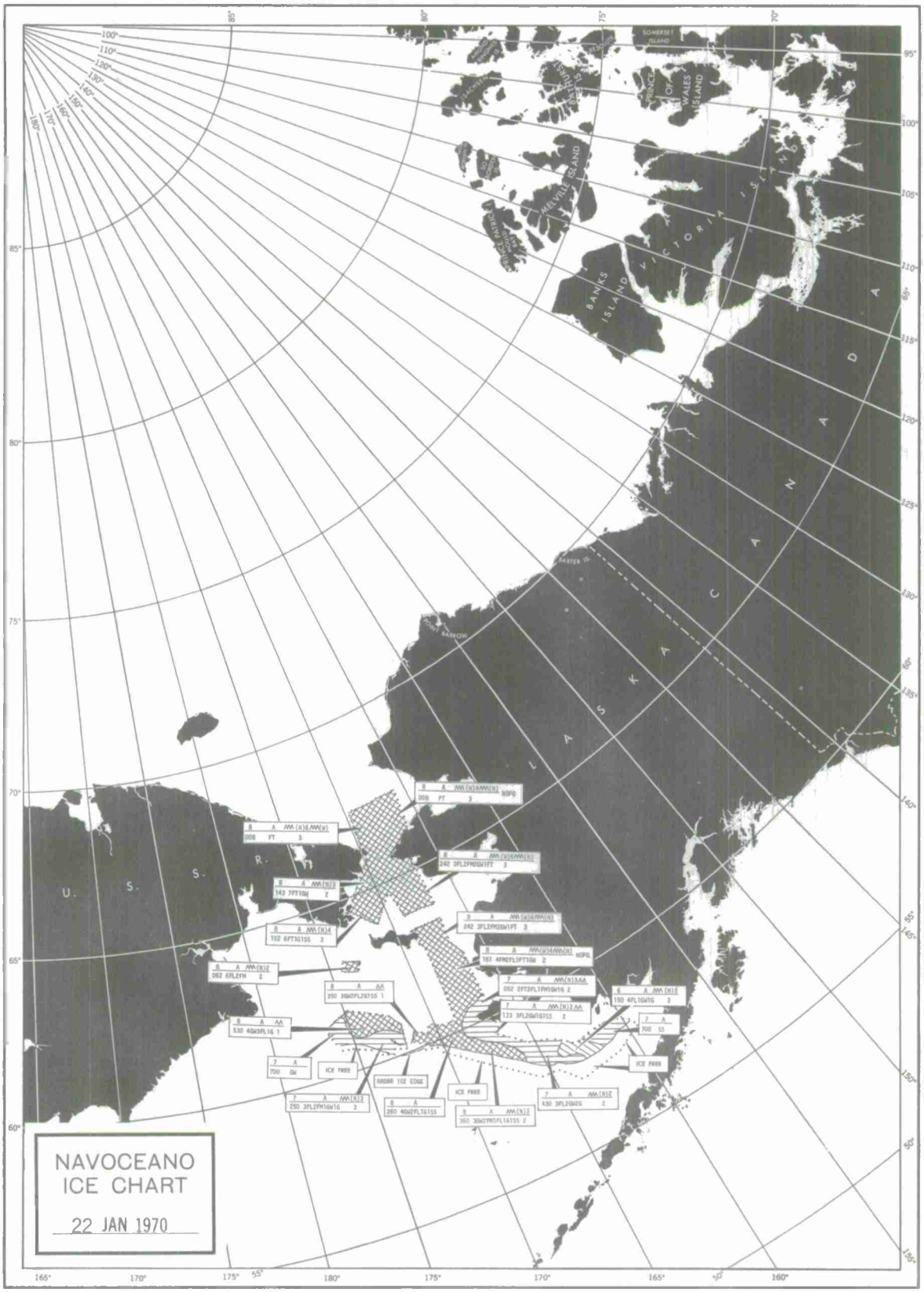
PHENOMENA

- crack
- fracture
- polynyo
- lead
- (n) icebergs
- (n) bergy bits & growlers

(n) = number in area

ICE EDGE

- observed
- radar
- limit of observed data
- satellite data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CANADA
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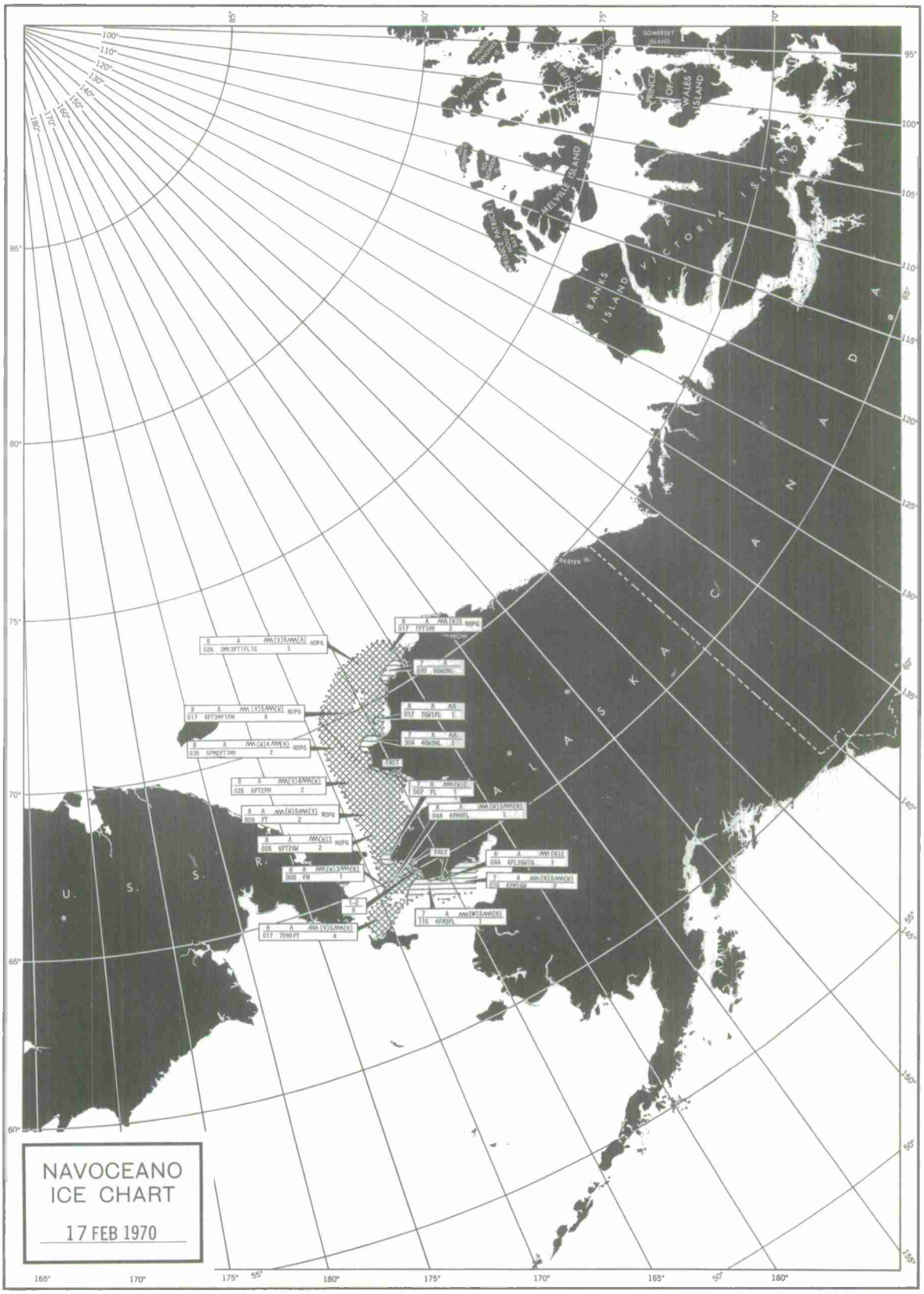
BANKS ISLAND
MELVILLE ISLAND
PRINCE OF WALES ISLAND
SOMERSET ISLAND
POINT BARROW
BAFFIN BAY
ICE FREE
RADAR ICE EDGE


NAVOCEANO
ICE CHART
12 FEB 1970
RADAR ICE EDGE
SOMERSET ISLAND
PRINCE OF WALES ISLAND
MELVILLE ISLAND
BANKS ISLAND
VICTORIA ISLAND
CANADA
ALASKA
U. S. S. R.
POINT BARROW
BARTER IS.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ICE CHART
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C A N A D A
VICTORIA ISLAND
BANKS ISLAND
MELVILLE ISLAND
PRINCE OF WALES ISLAND
SOMERSET ISLAND
PRINCE PATRICK ISLAND
AMUNDSEN GULF
BARTER IS.


NAVOCEANO
ICE CHART
13 MAR 1970
SOMERSET ISLAND
PRINCE OF WALES ISLAND
VICTORIA ISLAND
BANKS ISLAND
MELVILLE ISLAND
CANADA
ALASKA
U. S. S. R.
POINT BARROW
BARTER IS.


NAVOCEANO
ICE CHART
13–17 APR 1970
U. S. S. R.
A L A S K A
C A N A D A
HEAVY SNOW COVER
ICE SHELF REMNANTS
ICE FREE
OPEN WATER
4/17/70
4/13-14/70
PRINCE OF WALES ISLAND
BARROW


NAVOCEANO
ICE CHART
19 – 22 APR 1970
SOMERSET ISLAND
PRINCE OF WALES ISLAND
VICTORIA ISLAND
BANKS ISLAND
MELVILLE ISLAND
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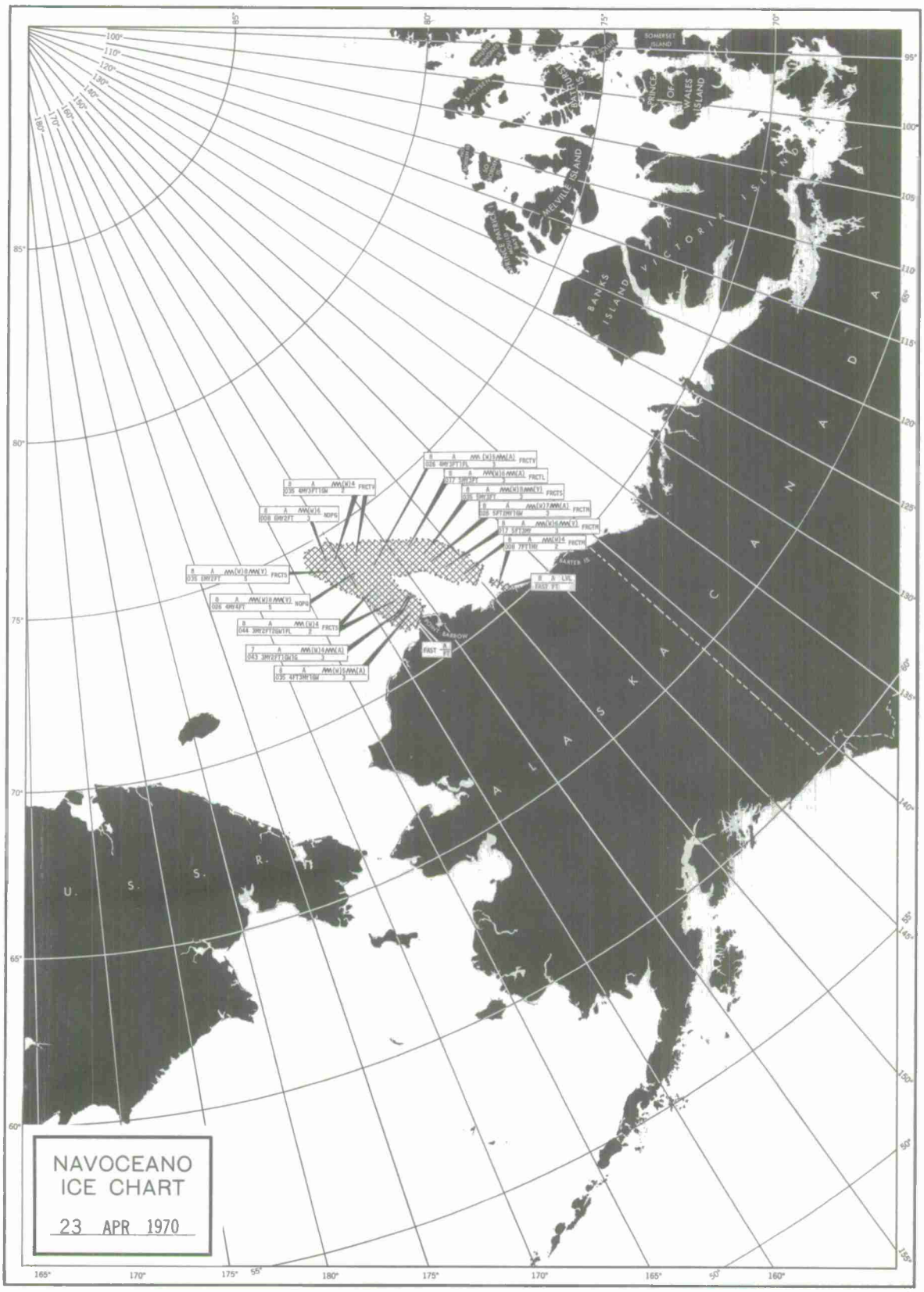
U. S. S. R.
MOSTLY MY NORTH
ICE SHELF FRAGMENTS
RADAR LEAD
4/22/70
4/19/70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PRINCE OF WALES ISLAND
SOMERSET ISLAND
POINT BARROW
FAST


NAVOCEANO
ICE CHART
23 MAY 1970
RADAR OPEN WATER
7 x 9 MILE ICE FLOE
RADAR OPEN WATER
RADAR OPEN WATER
RADAR OPEN WATER
RADAR ICE EDGE 5/23/70
RADAR ICE EDGE 5/23/70
BARROW
BARTER IS.
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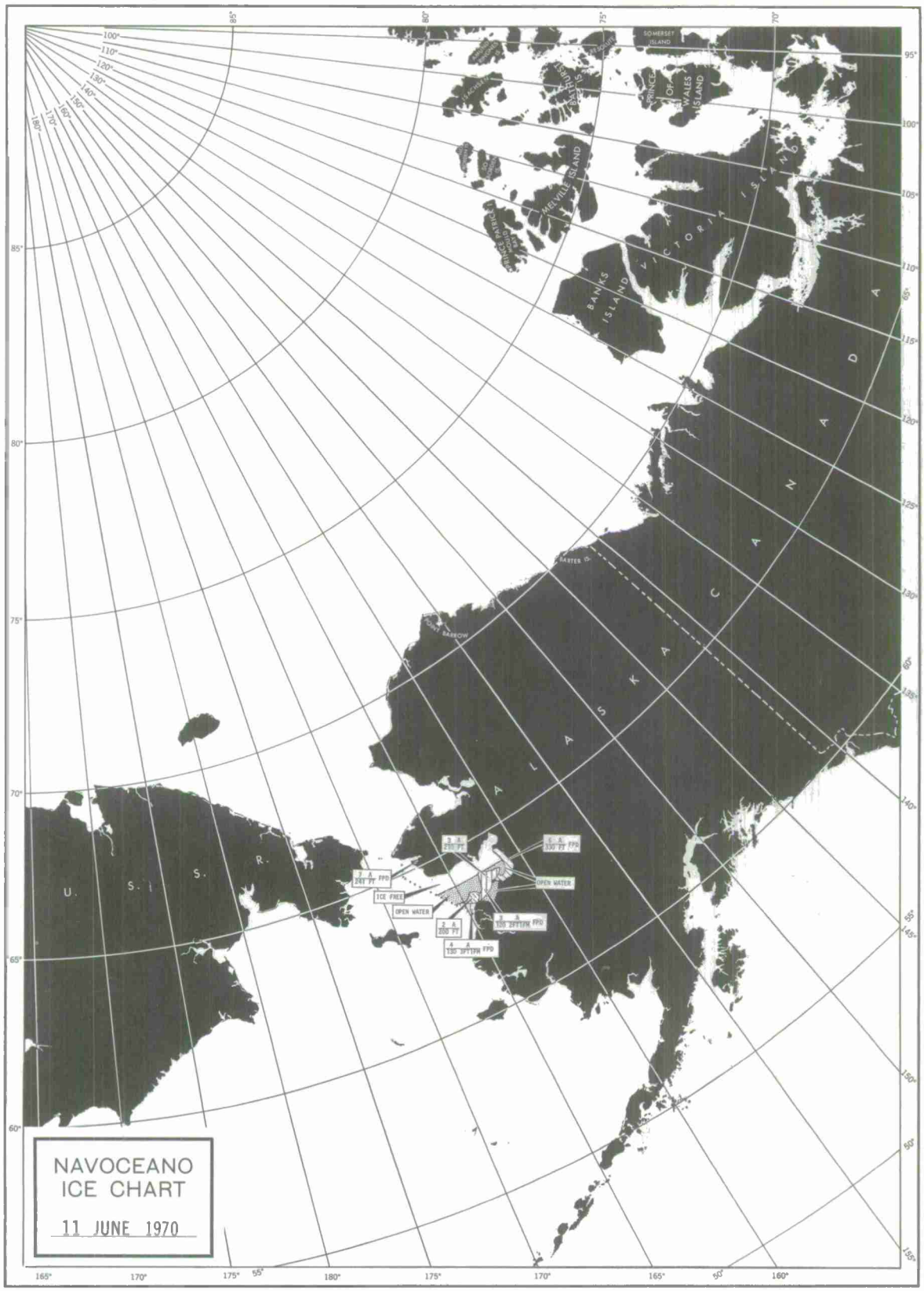
U. S. S. R.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PRINCE OF WALES ISLAND
SOMERSET ISLAND
POINT BARROW
BAXTER IS.
ICE FREE
OPEN WATER
OPEN WATER


NAVOCEANO
ICE CHART
23 JUNE 1970
SOMERSET ISLAND
PRINCE OF WALES ISLAND
MELVILLE ISLAND
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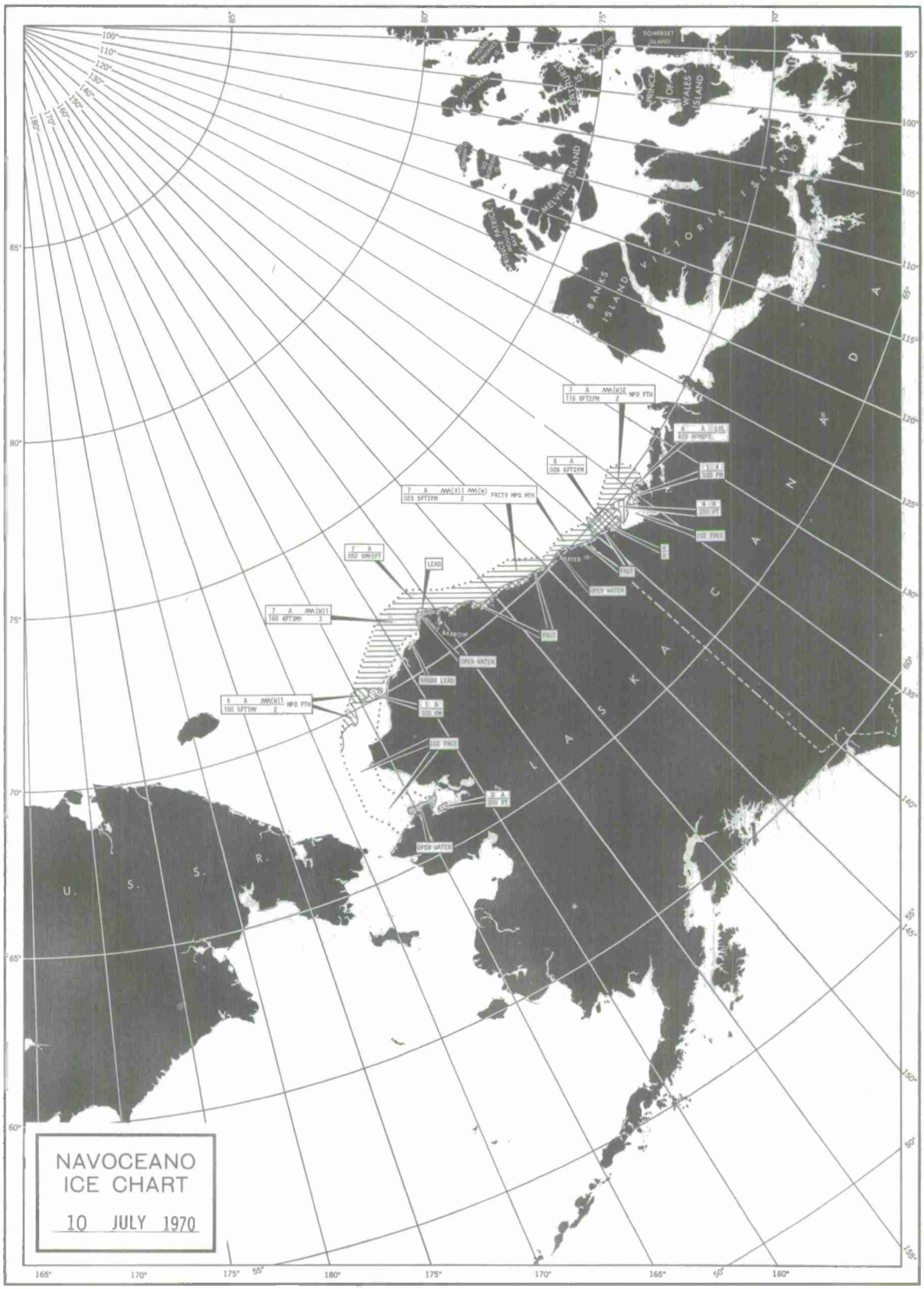
ICE FREE
RADAR ICE AREA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SOMERSET ISLAND
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ALASKA
LEAD
NARROW
OPEN WATER
RADAR LEAD
ICE FREE
FAST
SPOT WATER


NAVOCEANO
ICE CHART
11 JULY 1970
U. S. S. R.
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BANKS ISLAND
VICTORIA ISLAND
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PRINCE OF WALES ISLAND
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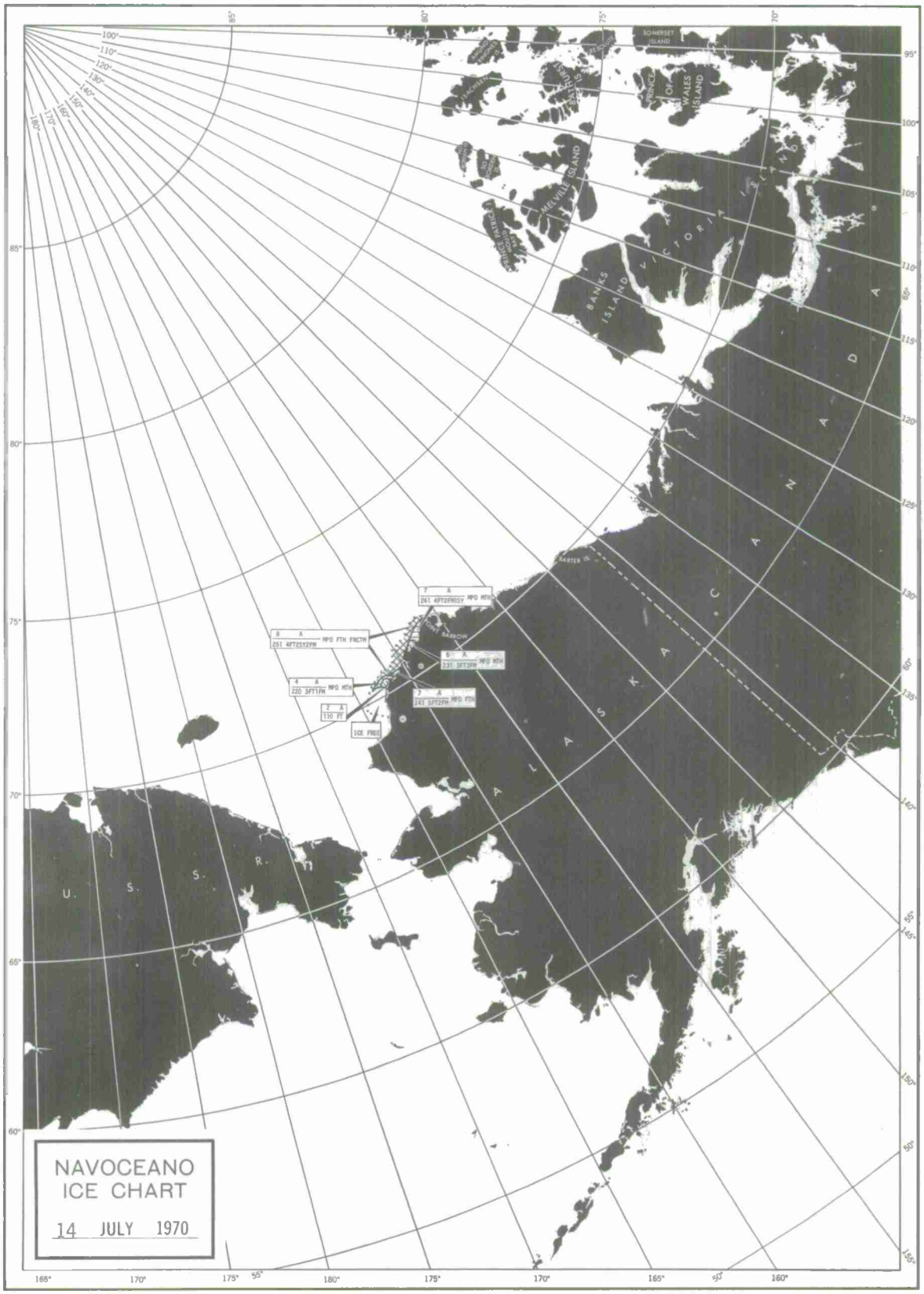
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MELVILLE ISLAND
BANKS ISLAND
VICTORIA ISLAND
CANADA
ALASKA
U. S. S. R.
BARROW
ICE FRIG


NAVOCEANO
ICE CHART
17–18 JULY 1970
U. S. S. R.
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VICTORIA ISLAND
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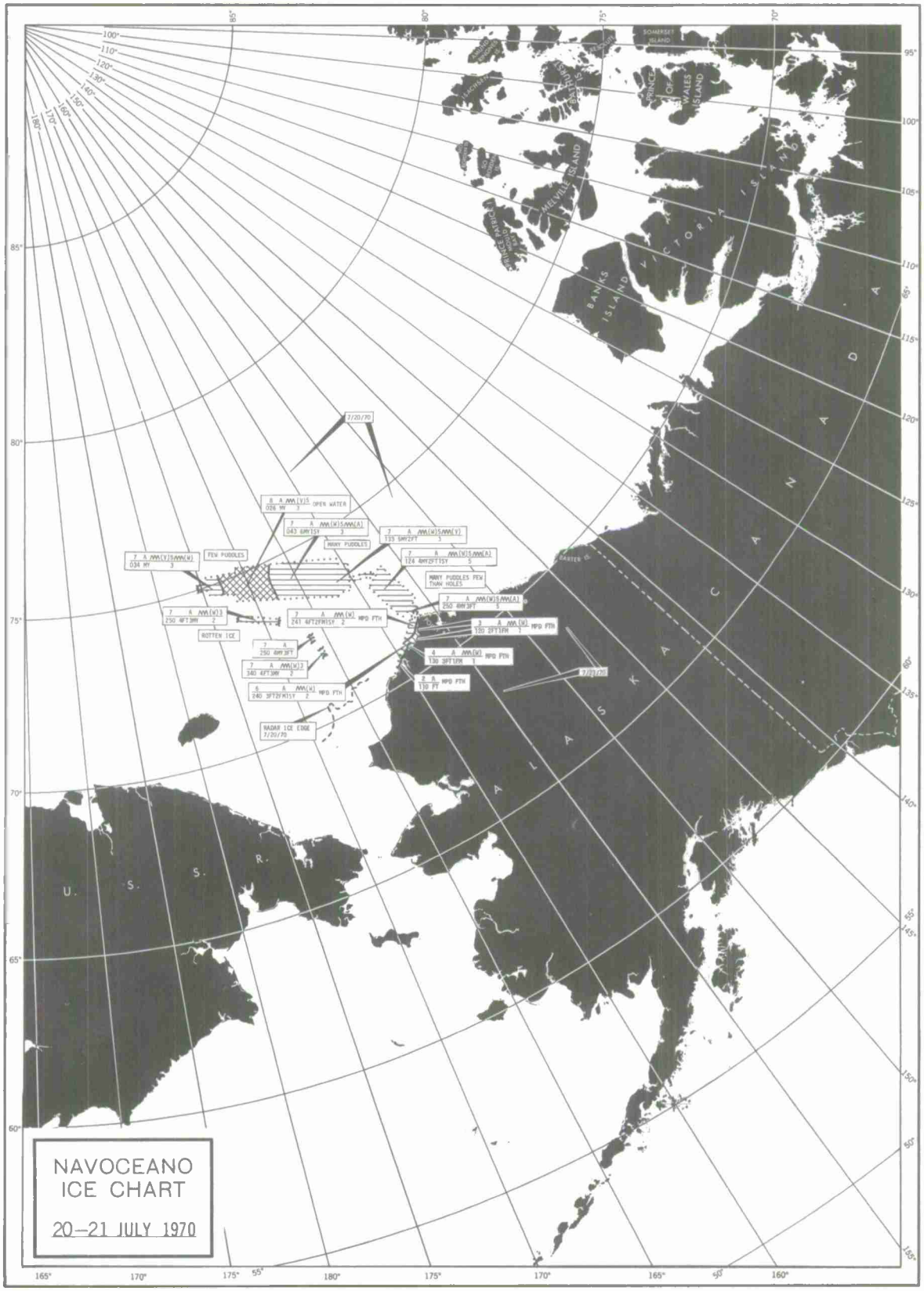
7/18/70
7/17/70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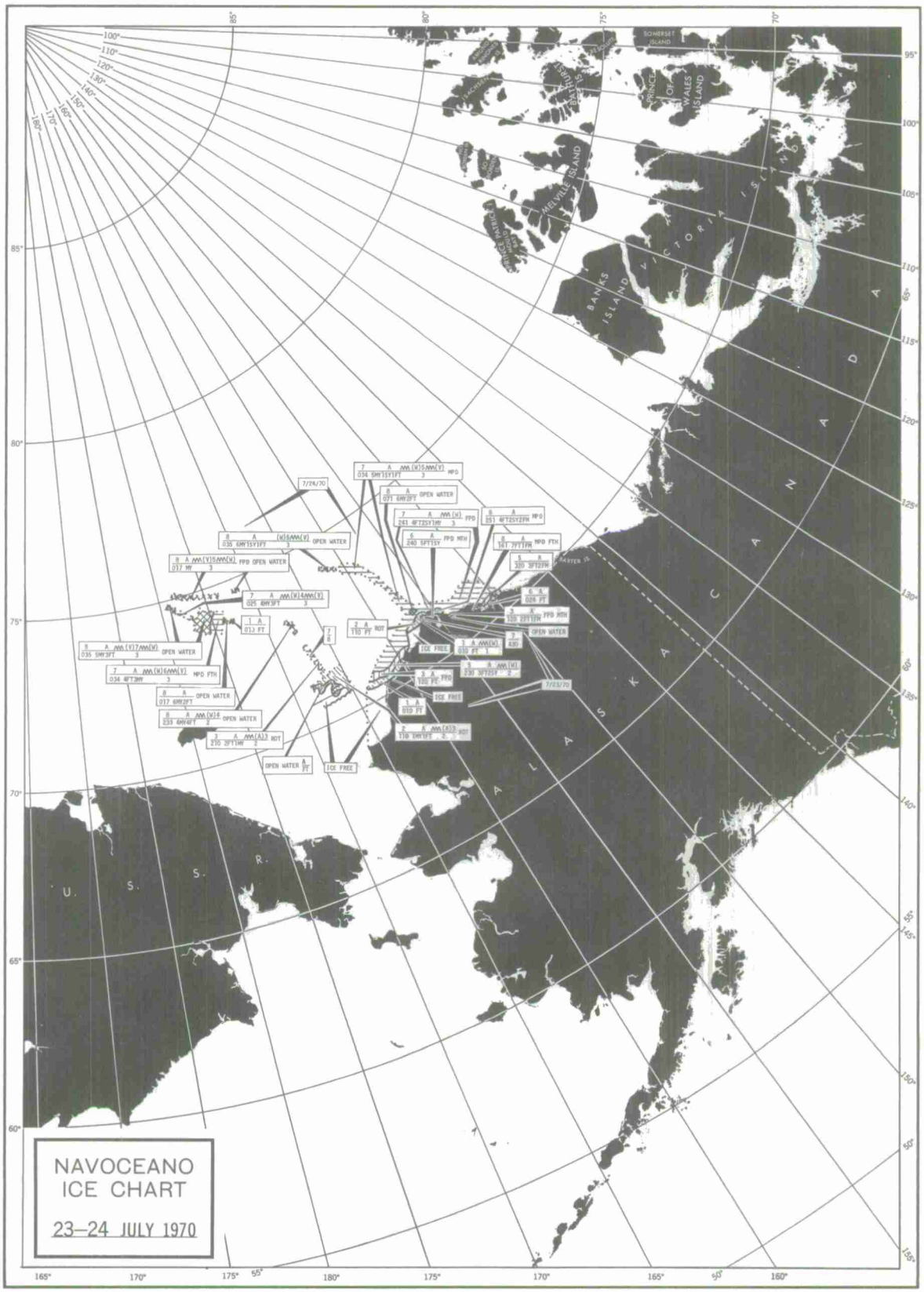
PRINCE OF WALES ISLAND
SOMERSET ISLAND
FEW PUDDLES
MANY PUDDLES
MANY PUDDLES FEW THAW HOLES
ROTTEN ICE
OPEN WATER
RADAR ICE EDGE 7/20/70
7/20/70


NAVOCEANO
ICE CHART
22 JULY 1970
U. S. S. R.
A L A S K A
C A N A D A
BANKS ISLAND
VICTORIA ISLAND
MELVILLE ISLAND
PRINCE OF WALES ISLAND
SOMERSET ISLAND
1-2/10 MELT ON MY FLOES
4/10 MELT WITH 2-3/10 MOT ON FY FLOES
OPEN WATER
RADAR ICE EDGE
RADAR ICE EDGE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BOOTHIA PENINSULA
BOOTHIA
PRINCE PATRICK ISLAND
AMUNDSEN GULF
BEAUFORT SEA
7/24/70
7/23/70
ICE FREE
OPEN WATER
MPD
FPD
MPD FTH
FPD FTH
FPD MTH
FPD OPEN WATER
NOT
100°
110°
120°
130°
140°
150°
160°
170°
180°
85°
80°
75°
70°
65°
60°
95°
100°
105°
110°
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125°
130°
135°
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155°
165°
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175°
180°
175°
170°
165°
160°


NAVOCEANO
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26 JULY 1970
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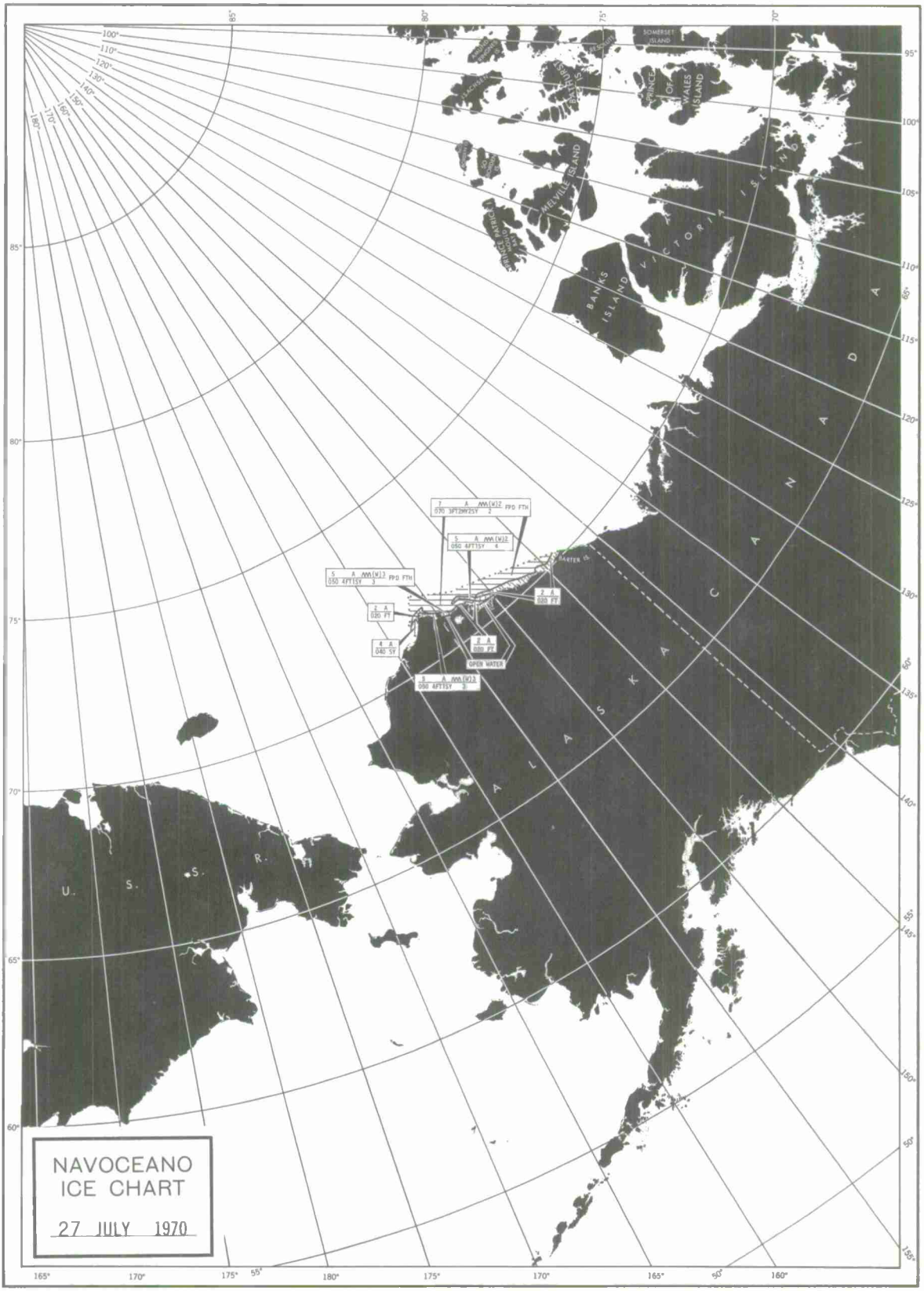
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PRINCE OF WALES ISLAND
SOMERSET ISLAND
OPEN WATER


NAVOCEANO
ICE CHART
1–5 AUG 1970
SOMERSET ISLAND
PRINCE OF WALES ISLAND
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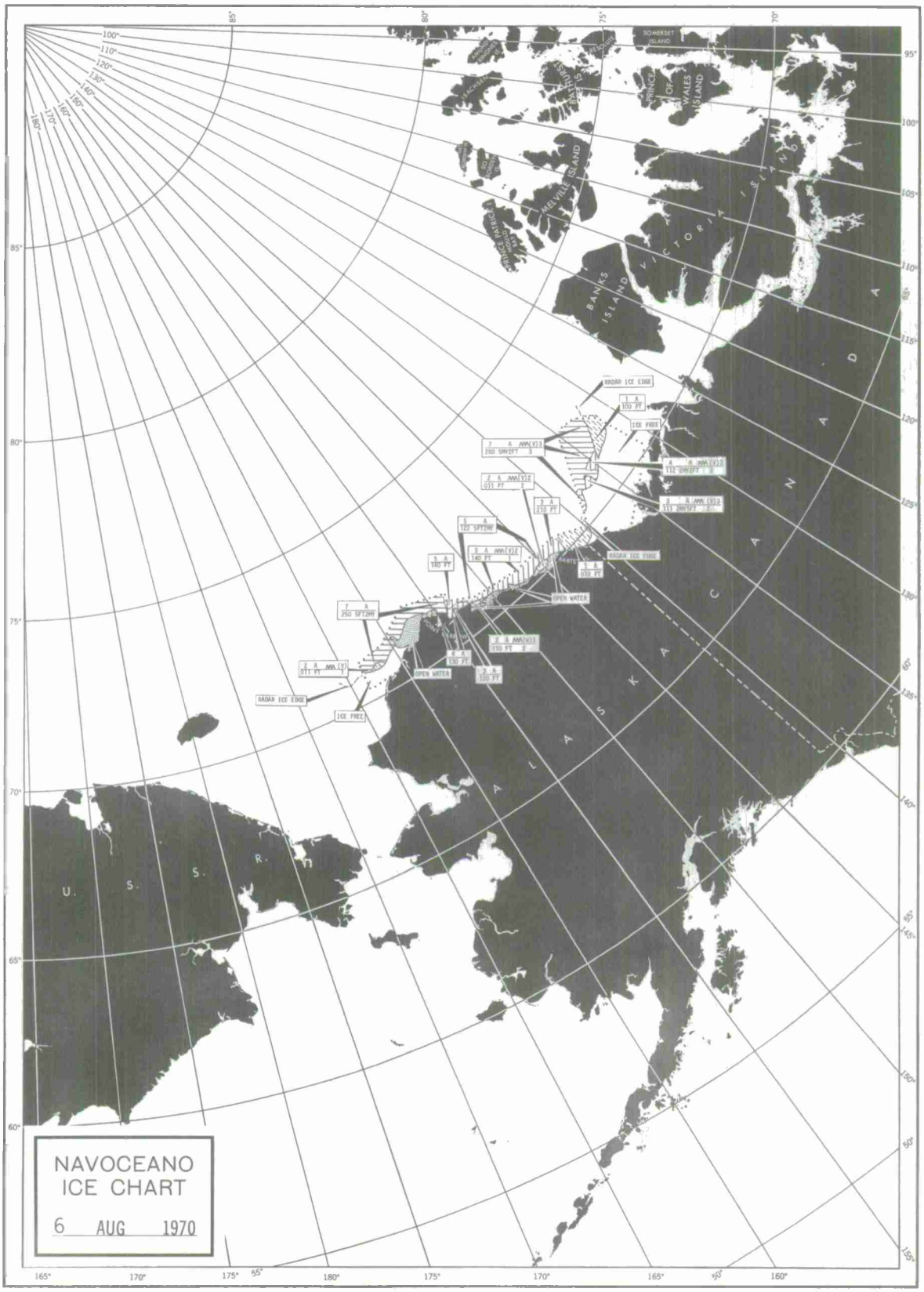
ICE FREE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MELVILLE ISLAND
PRINCE OF WALES ISLAND
SOMERSET ISLAND
RADAR ICE EDGE
ICE FREE
OPEN WATER


NAVOCEANO
ICE CHART
13 AUG 1970
U. S. S. R.
A L A S K A
C A N A D A
BANKS ISLAND
VICTORIA ISLAND
MELVILLE ISLAND
PRINCE OF WALES ISLAND
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BOOTHIA GULF
BARROW STRAIT
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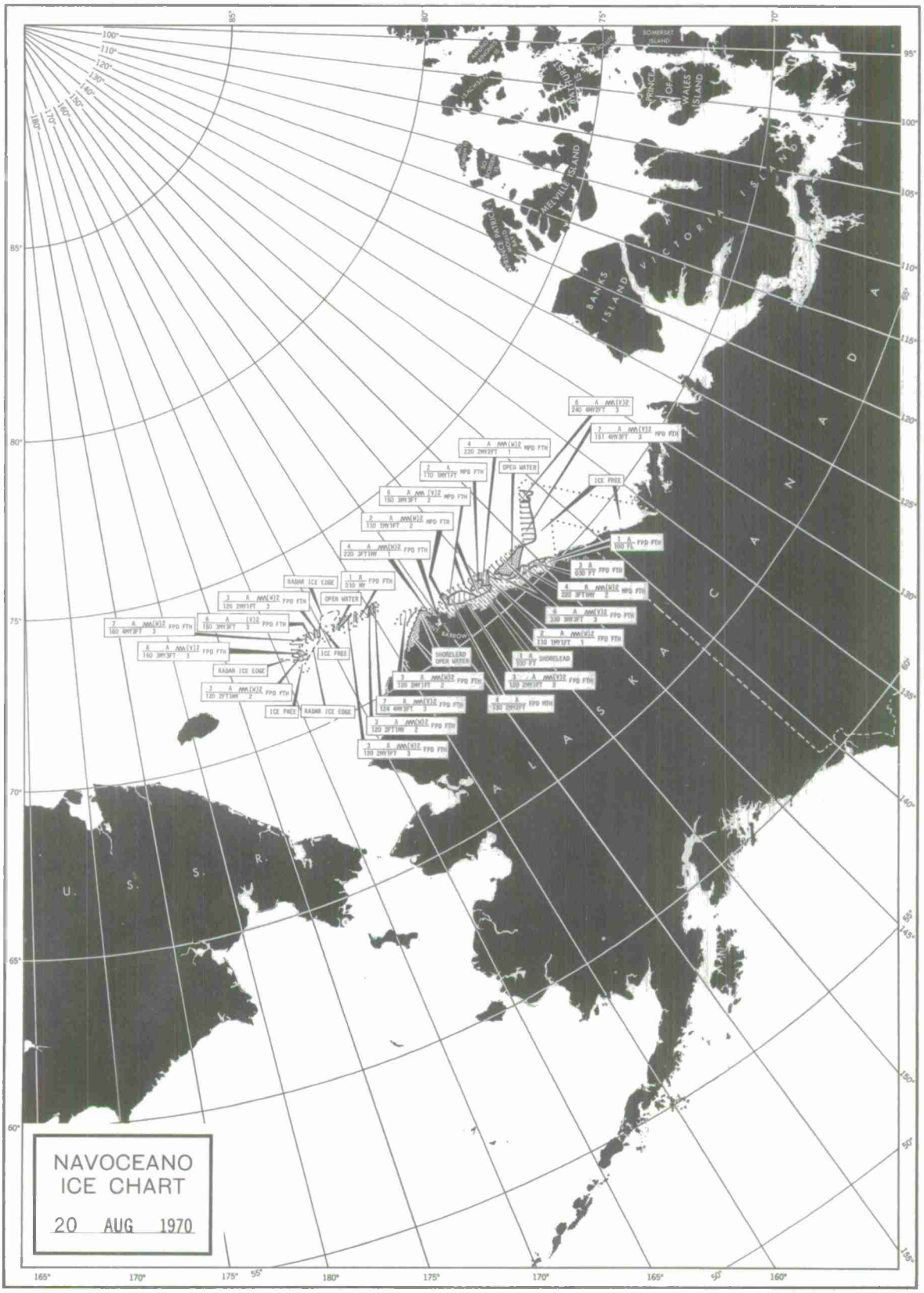
LANCASTER SOUND
BEAUFORT SEA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CANADA
ALASKA
U. S. S. R.
OPEN WATER
ICE FREE
RADAR ICE EDGE
SHORELEAD
SHORELEAD OPEN WATER
RAREFIED


NAVOCEANO
ICE CHART
22 AUG 1970
U. S. S. R.
A L A S K A
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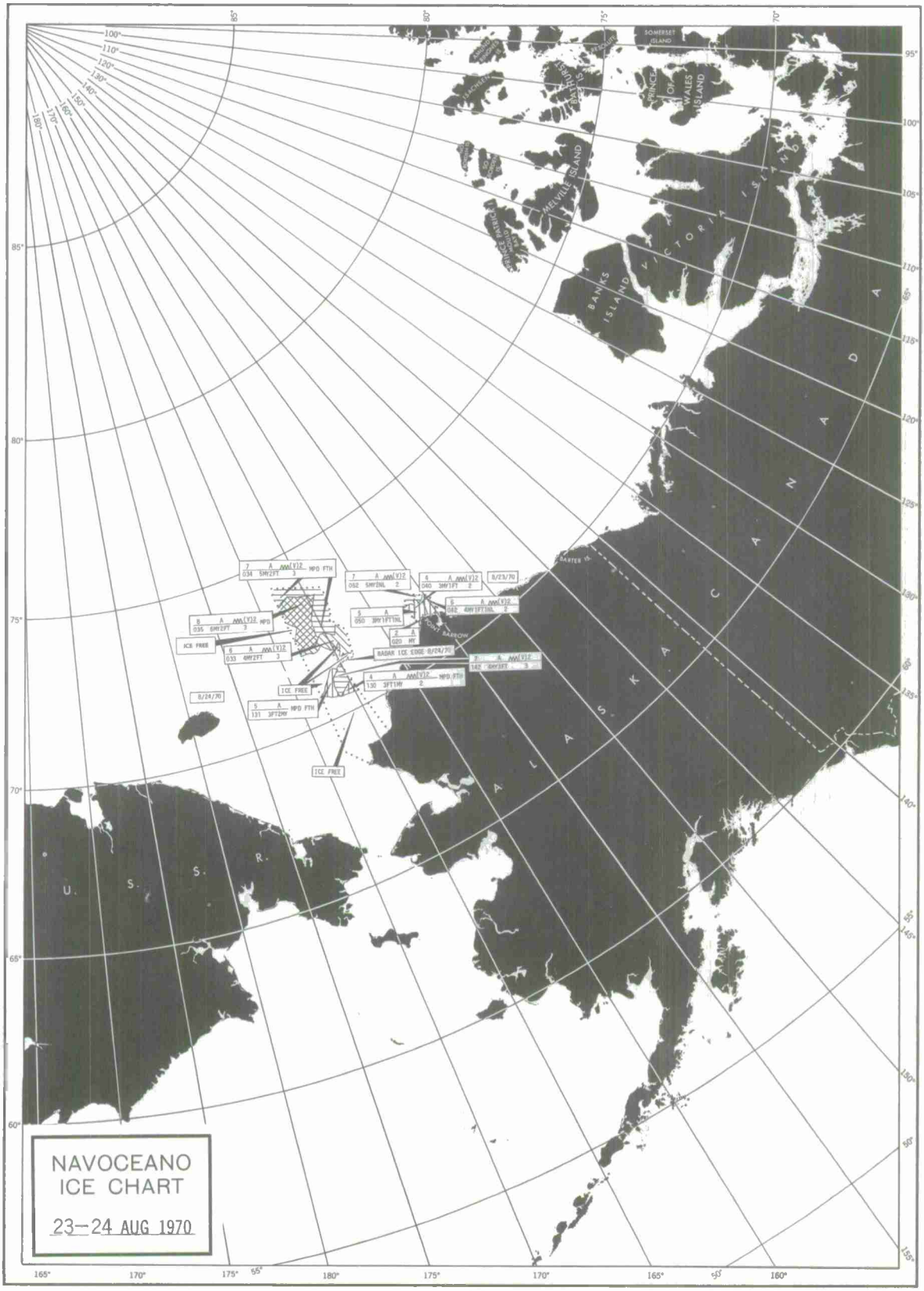
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BARTER IS
POINT BARROW
ICE FREE
RADAR ICE EDGE 8/24/70
8/24/70
8/23/70


NAVOCEANO
ICE CHART
27 AUG 1970
U. S. S. R.
A L A S K A
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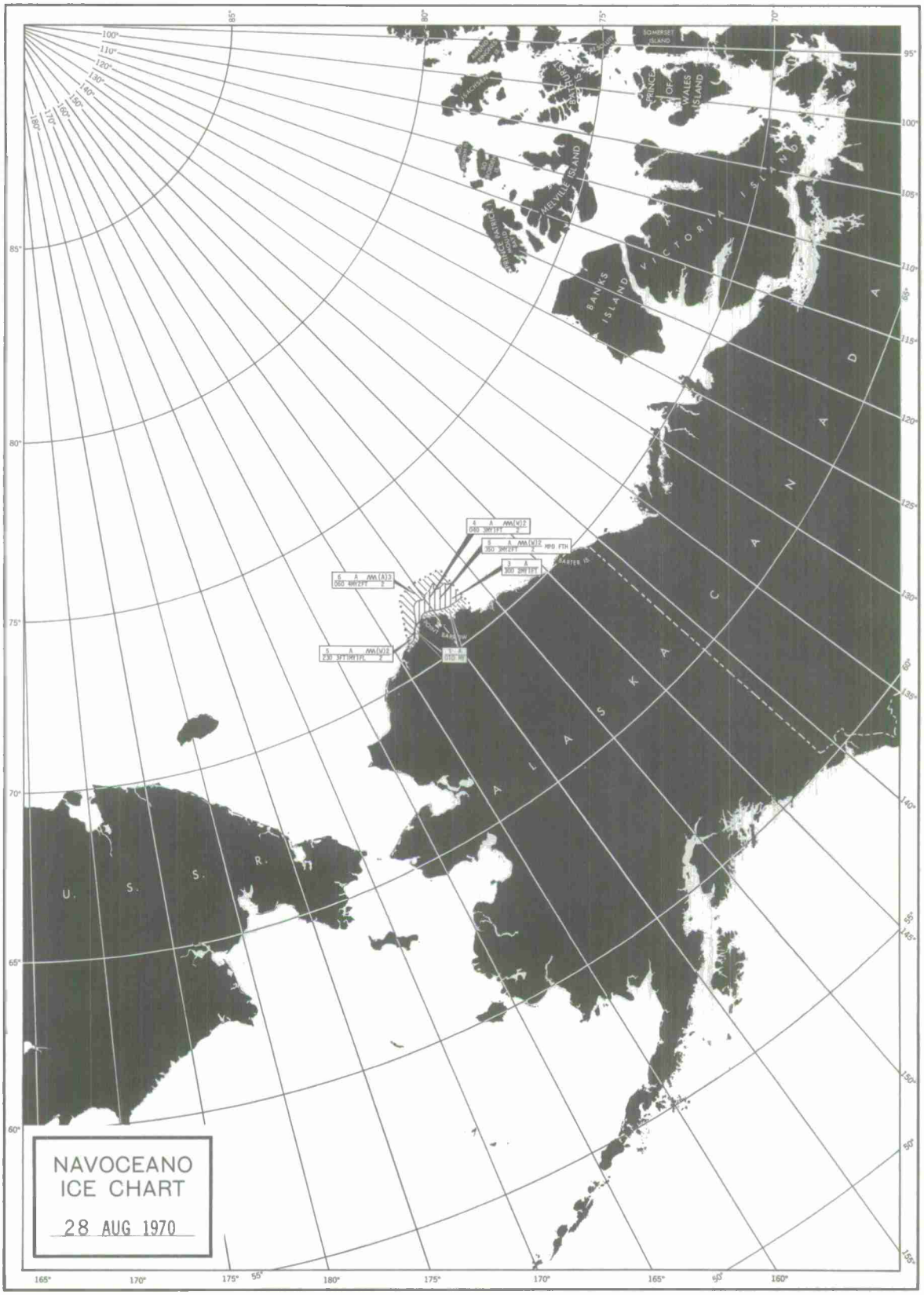
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PRINCE OF WALES ISLAND
SOMERSET ISLAND


NAVOCEANO
ICE CHART
8 SEPT 1970
RADAR ICE EDGE
RADAR BELTS & PATCHES
ICE FREE
OPEN WATER
RADAR ICE EDGE
BANKS ISLAND
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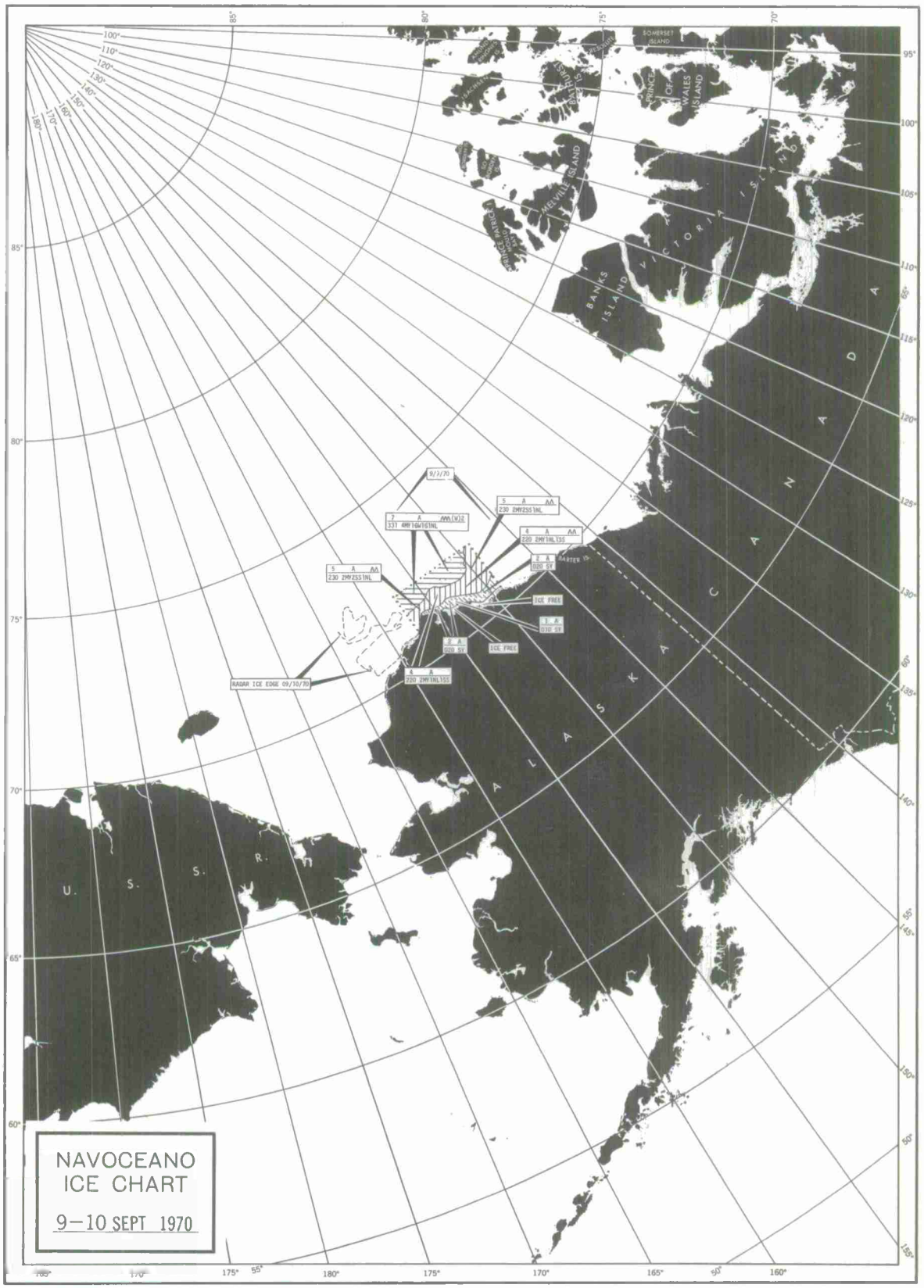
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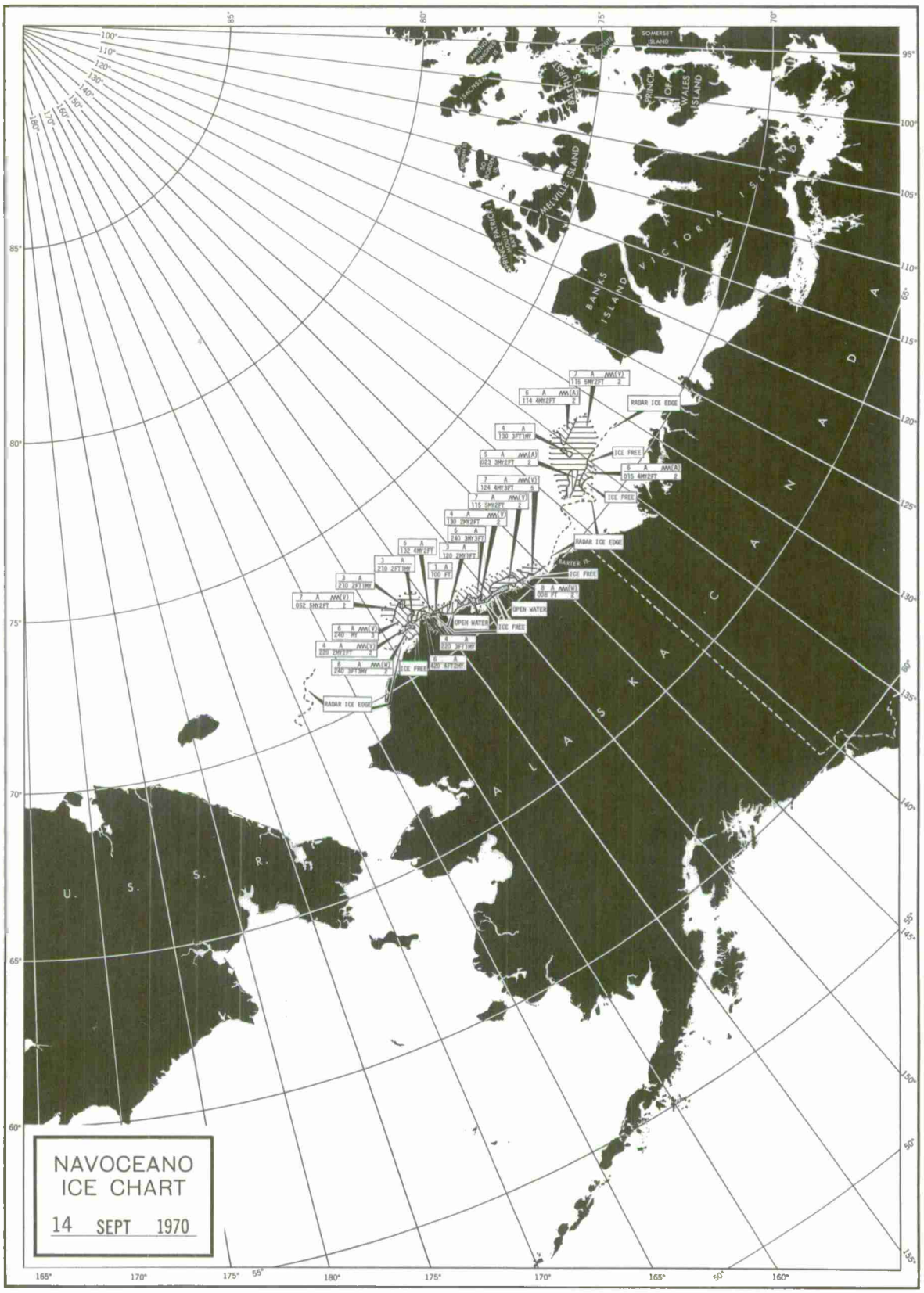
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RADAR ICE EDGE
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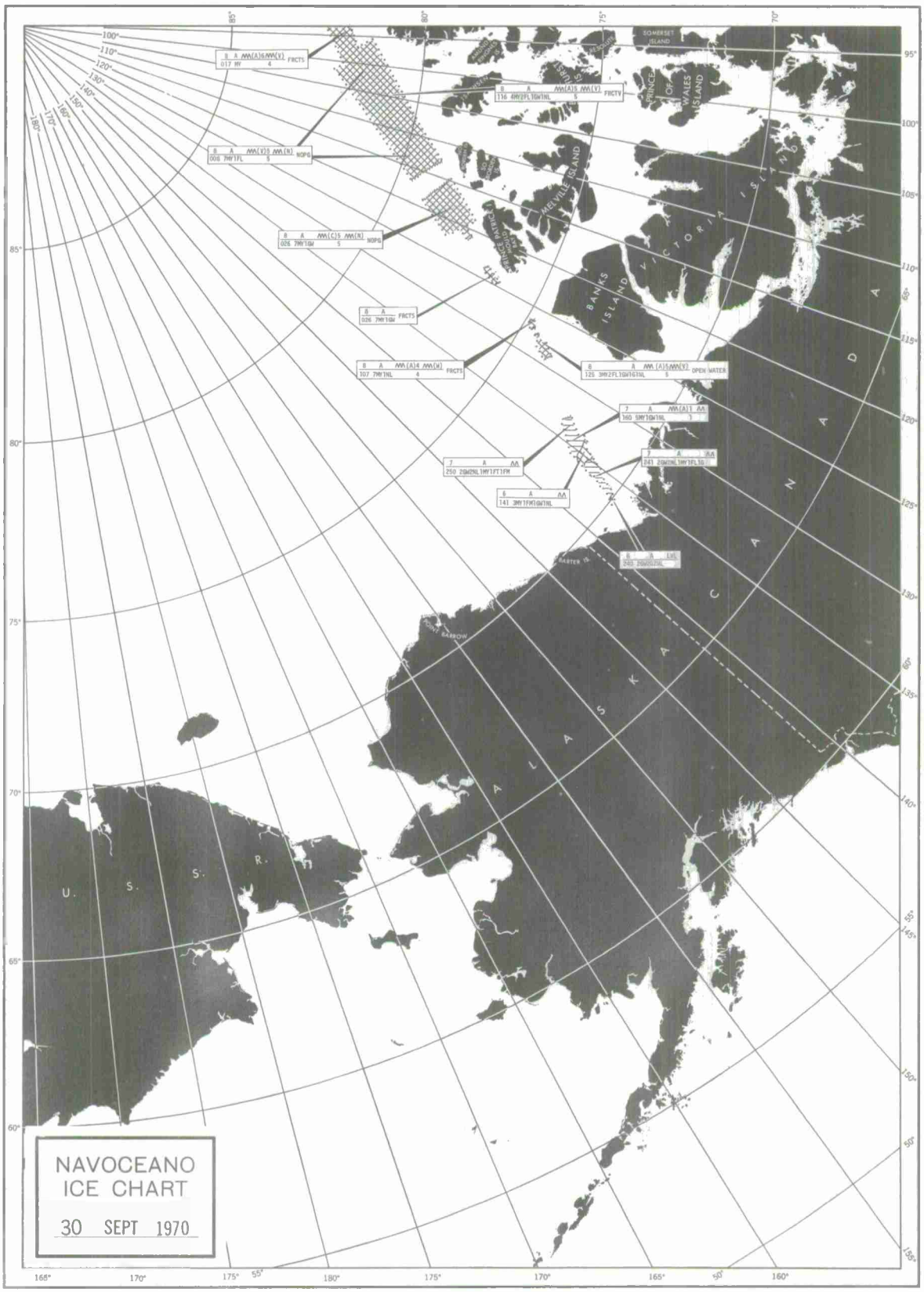
BARTER I.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CANADA
ALASKA
U. S. S. R.
POINT BARROW
BARTER I.


NAVOCEANO
ICE CHART
OCT 3 1970
U. S. S. R.
CANADA
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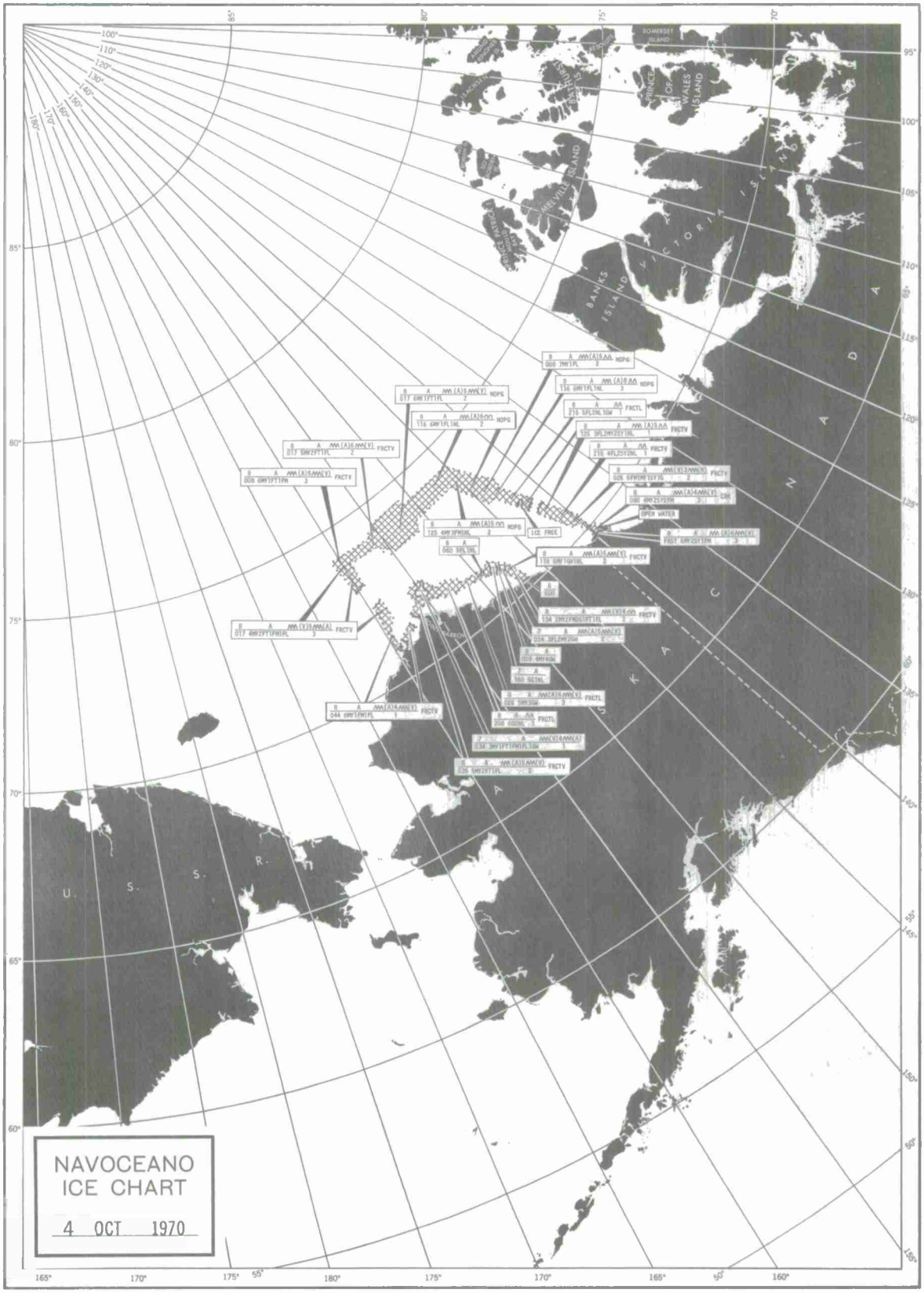
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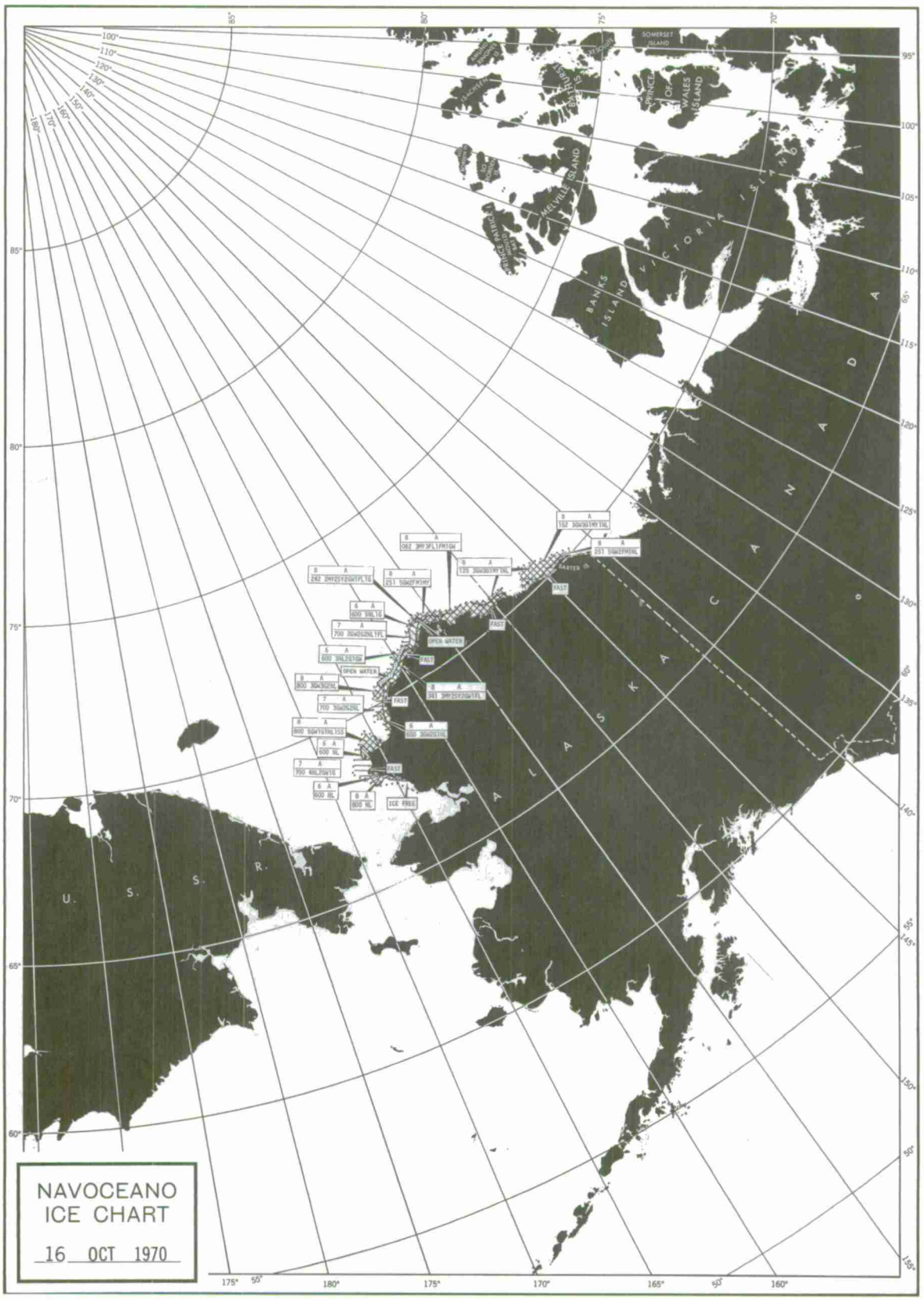
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16 OCT 1970
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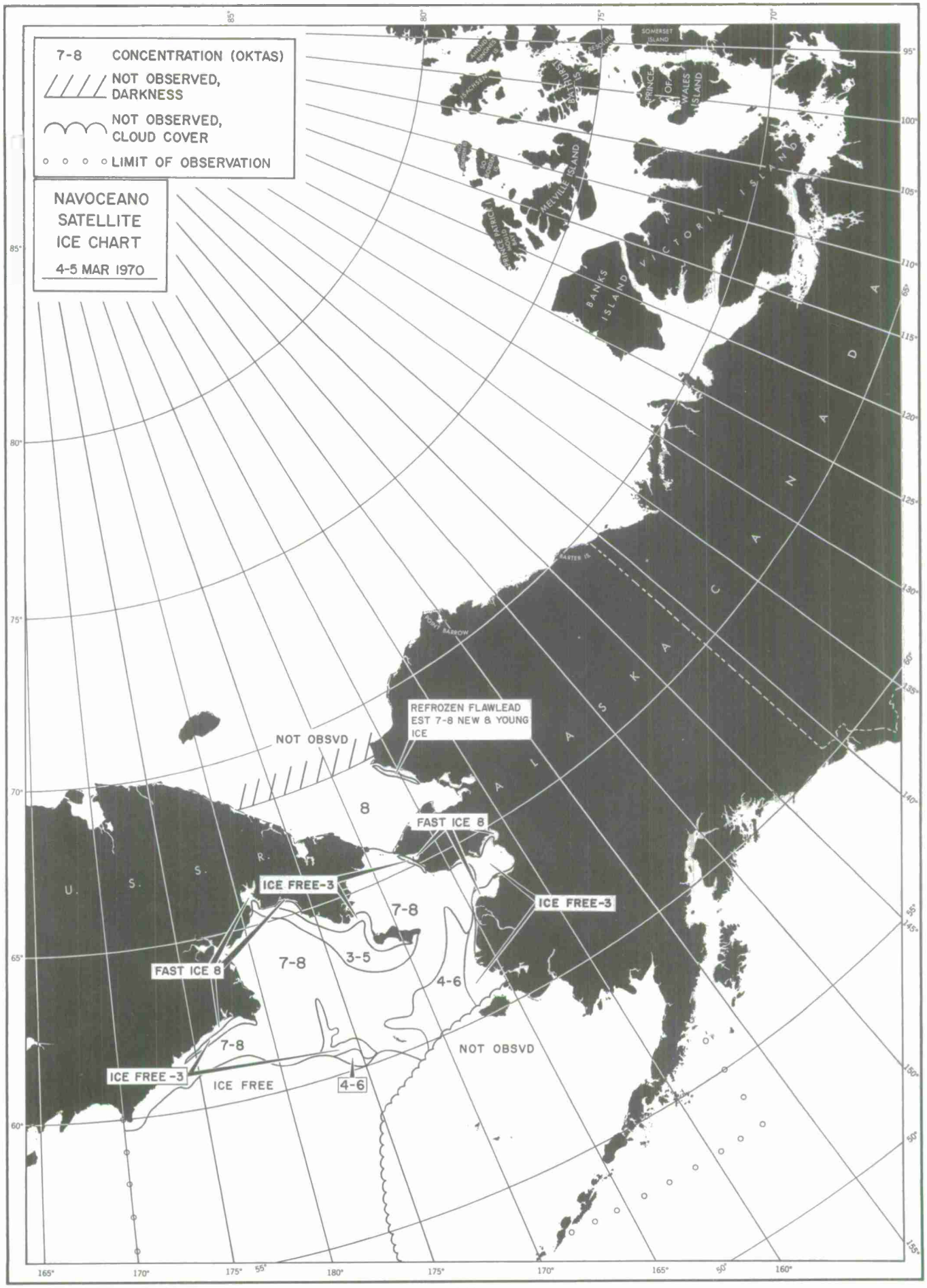
MELVILLE ISLAND
SOMERSET ISLAND
PRINCE OF WALES ISLAND
OPEN WATER
FAST
ICE FREE


NAVOCEANO
ICE CHART
11–13 NOV 1970
SOMERSET ISLAND
PRINCE OF WALES ISLAND
MELVILLE ISLAND
BANKS ISLAND
VICTORIA ISLAND
CANADA
ALASKA
U. S. S. R.
POINT BARROW
FAST ICE EDGE NOT DETERMINED
OPEN WATER
ICE FREE
11/11/70
11/12/70
11/13/70


NAVOCEANO
ICE CHART
9 DEC 1970
SOMERSET ISLAND
PRINCE OF WALES ISLAND
MELVILLE ISLAND
BANKS ISLAND
VICTORIA ISLAND
CANADA
ALASKA
U. S. S. R.
POINT BARROW
BARTER IS
FAST
FRCTZ

APPENDIX D

WESTERN ARCTIC ICE CHARTS OBSERVED BY SATELLITE


7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
4-5 MAR 1970
SOMERSET ISLAND
PRINCE OF WALES ISLAND
VICTORIA ISLAND
BANKS ISLAND
MELVILLE ISLAND
PRINCE PATRICK
CANADA
ALASKA
BARTER IS
POINT BARROW
U. S. S. R.
REFROZEN FLAWLEAD EST 7-8 NEW & YOUNG ICE
NOT OBSVD
8
FAST ICE 8
ICE FREE-3
7-8
3-5
4-6
NOT OBSVD
ICE FREE
85°
80°
75°
70°
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95°
100°
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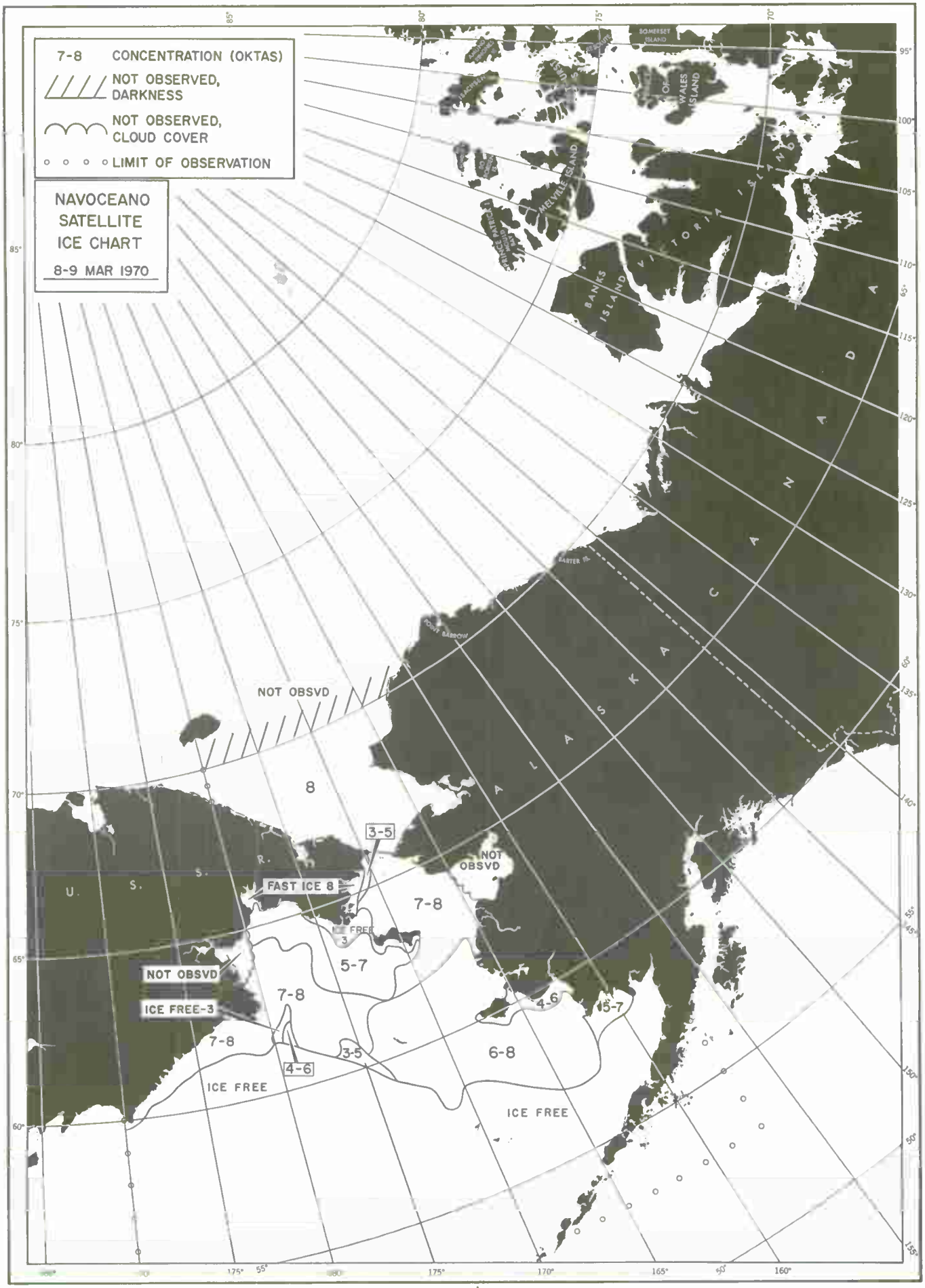
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NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
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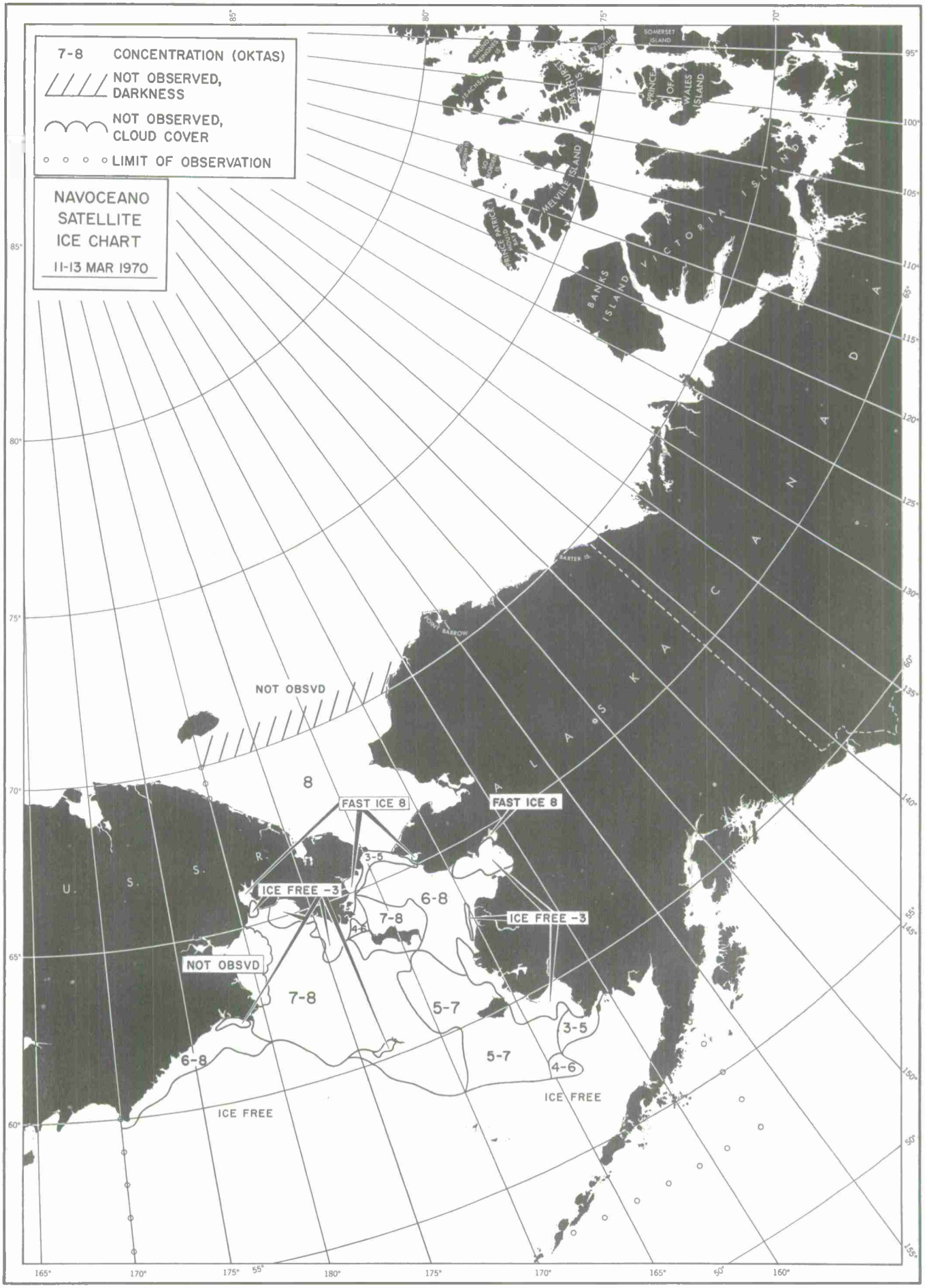
8-9 MAR 1970
NOT OBSVD
8
3-5
NOT OBSVD
FAST ICE 8
7-8
ICE FREE-3
5-7
NOT OBSVD
7-8
4-6
5-7
7-8
3-5
6-8
4-6
ICE FREE
ICE FREE
SOMERSET ISLAND
BANKS ISLAND
VICTORIA ISLAND
MELVILLE ISLAND
PRINCE PATRICK ISLAND
PRINCE OF WALES ISLAND
POINT BARROW
BARTER IS.
U. S. S. R.
CANADA
ALASKA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NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
11-13 MAR 1970
NOT OBSVD
8
FAST ICE 8
FAST ICE 8
ICE FREE -3
ICE FREE -3
NOT OBSVD
7-8
6-8
7-8
5-7
5-7
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6-8
ICE FREE
ICE FREE
U. S. S. R.
ALASKA
CANADA
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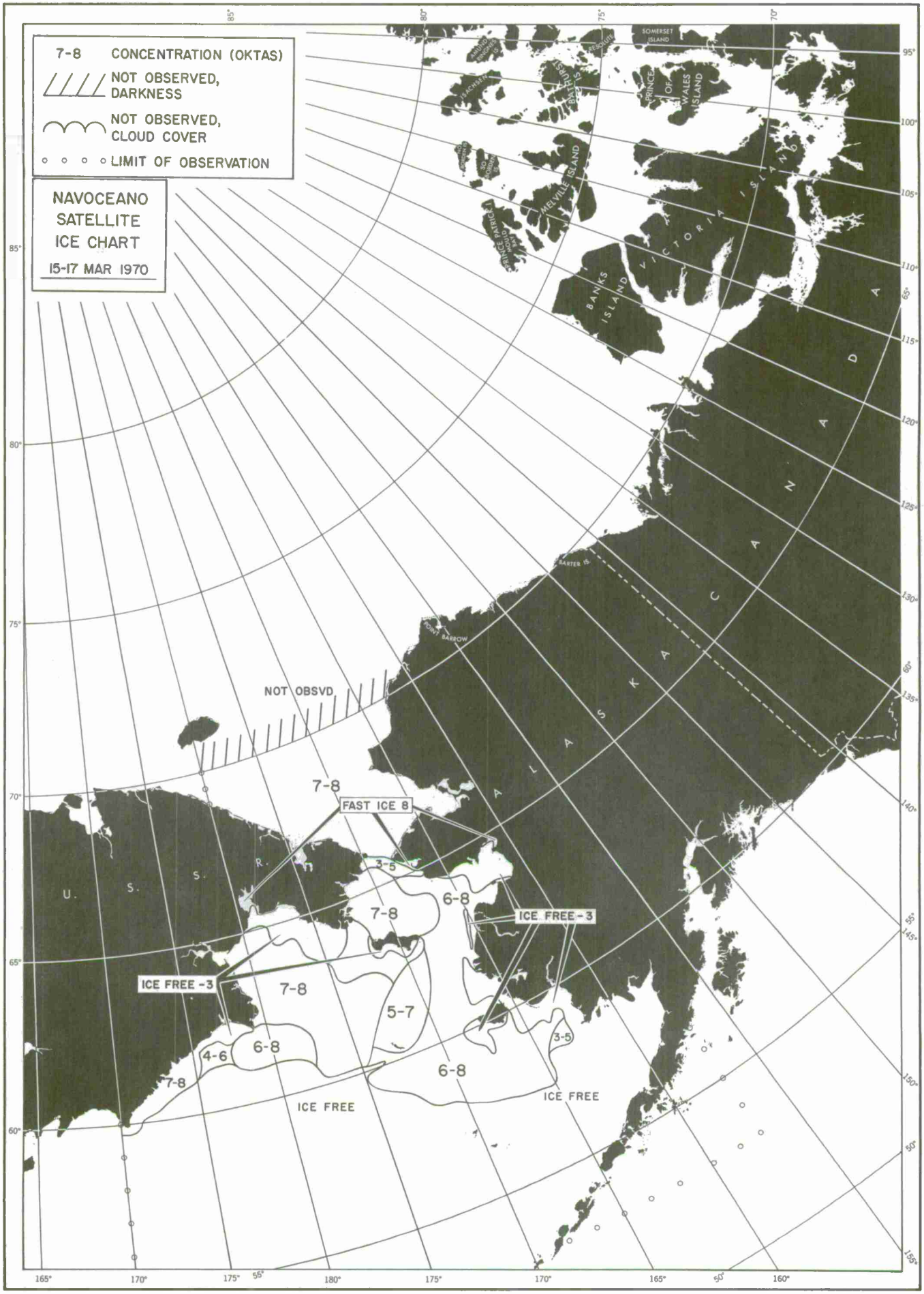
VICTORIA ISLAND
PRINCE OF WALES ISLAND
SOMERSET ISLAND
MELVILLE ISLAND
BARTER IS.
POINT BARROW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NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
15-17 MAR 1970
NOT OBSVD
7-8
FAST ICE 8
3-5
6-8
7-8
ICE FREE -3
ICE FREE -3
7-8
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4-6
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7-8
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6-8
ICE FREE
ICE FREE
U. S. S. R.
A L A S K A
C A N A D A
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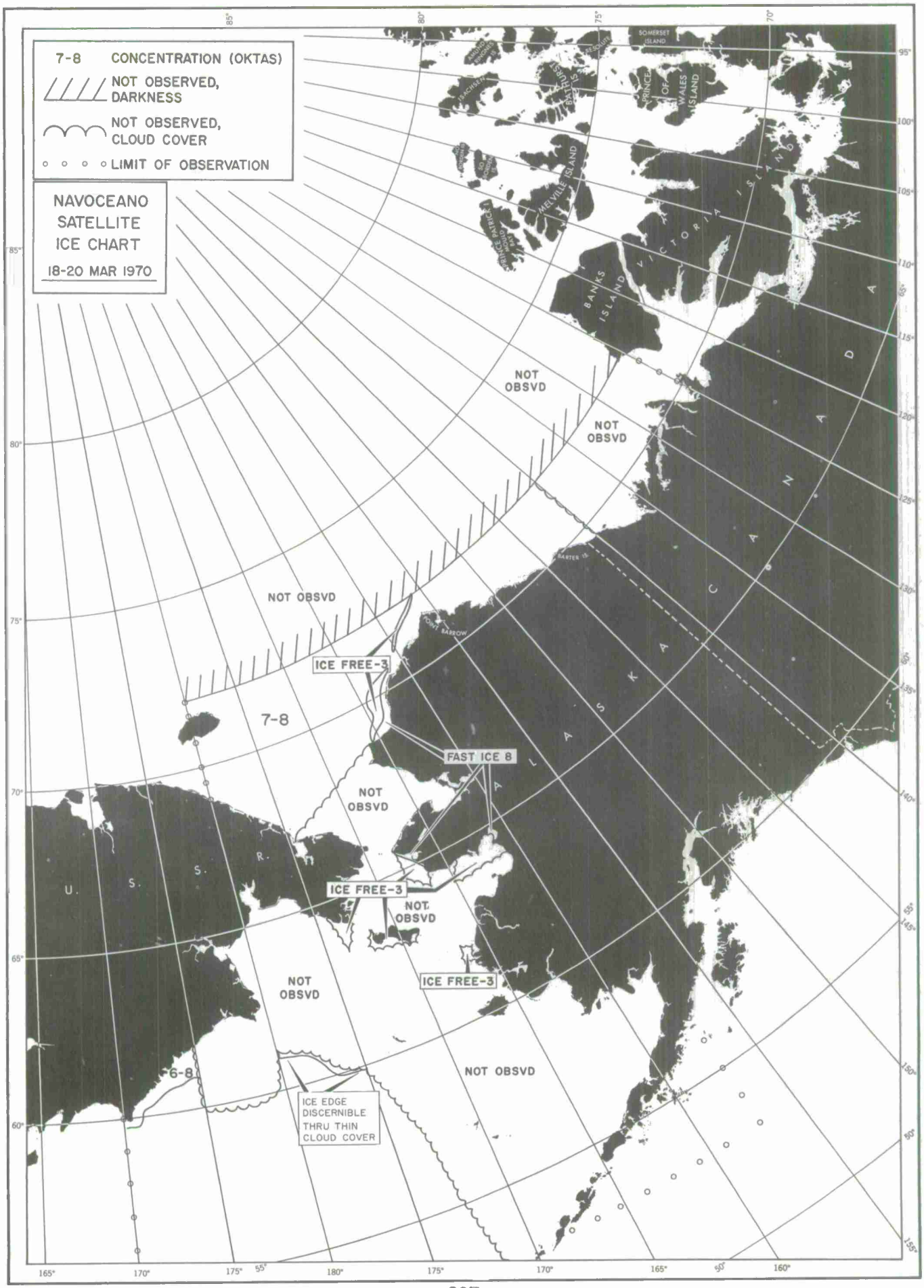
VICTORIA ISLAND
PRINCE OF WALES ISLAND
SOMERSET ISLAND
MELVILLE ISLAND
BARTER IS.
POINT BARROW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NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
18-20 MAR 1970
NOT OBSVD
NOT OBSVD
NOT OBSVD
NOT OBSVD
NOT OBSVD
NOT OBSVD
ICE FREE-3
ICE FREE-3
ICE FREE-3
FAST ICE 8
7-8
6-8
ICE EDGE DISCERNIBLE THRU THIN CLOUD COVER
BANKS ISLAND
VICTORIA ISLAND
MELVILLE ISLAND
PRINCE OF WALES ISLAND
SOMERSET ISLAND
BARTER IS
POINT BARROW
U. S. S. R.
CANADA
ALASKA


7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
23-24 MAR 1970
SOMERSET ISLAND
PRINCE OF WALES ISLAND
VICTORIA ISLAND
BANKS ISLAND
MELVILLE ISLAND
PRINCE PATRICK ISLAND
CANADA
ALASKA
BARTER IS.
POINT BARROW
U. S. S. R.
NOT OBSVD
ICE FREE -3
FAST ICE 8
7-8
3-5
4-6
6-8
5-7
ICE FREE
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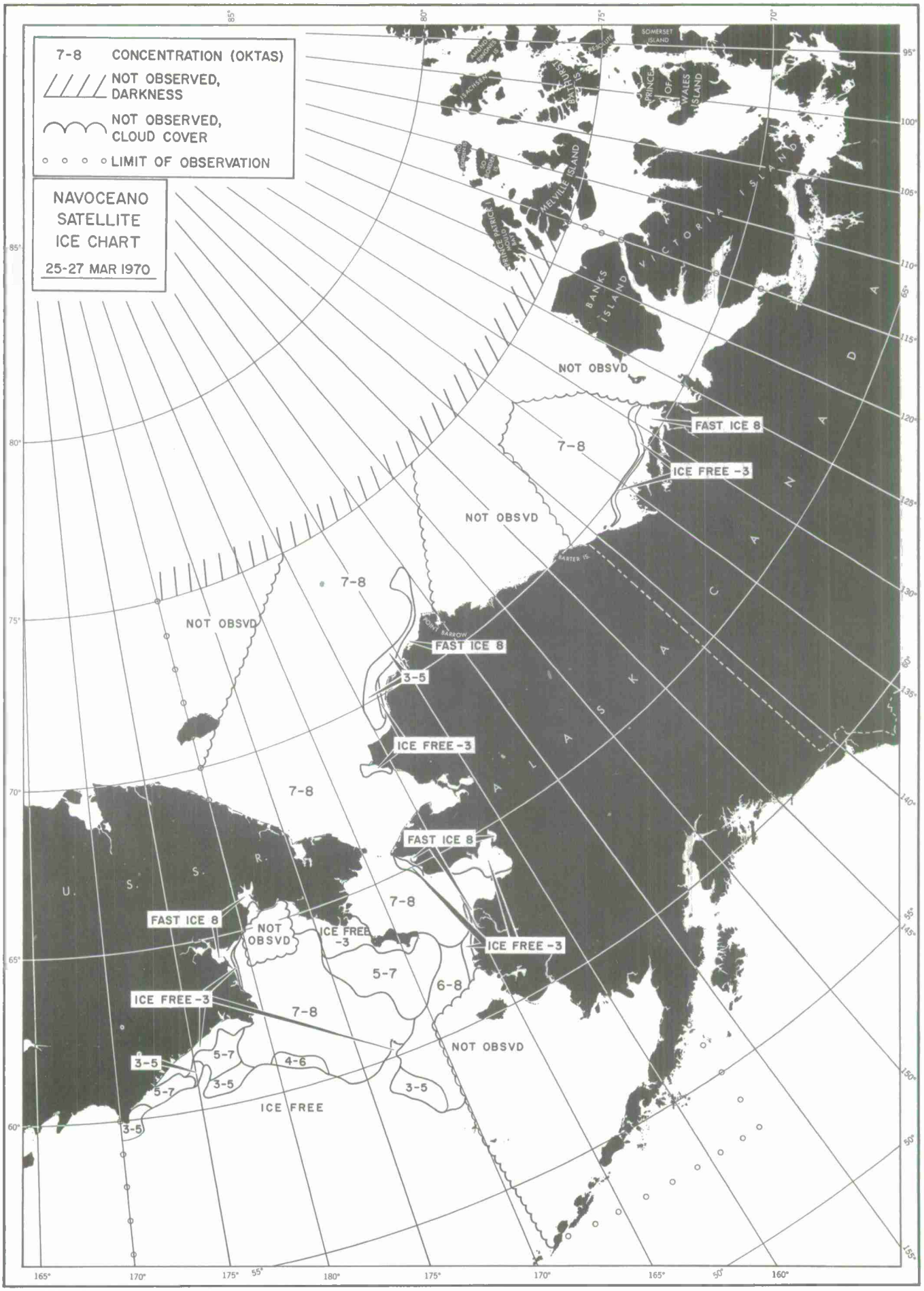
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NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
25-27 MAR 1970
SOMERSET ISLAND
PRINCE OF WALES ISLAND
MELVILLE ISLAND
BANKS ISLAND
VICTORIA ISLAND
CANADA
ALASKA
U. S. S. R.
BARTER IS.
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FAST ICE 8
ICE FREE -3
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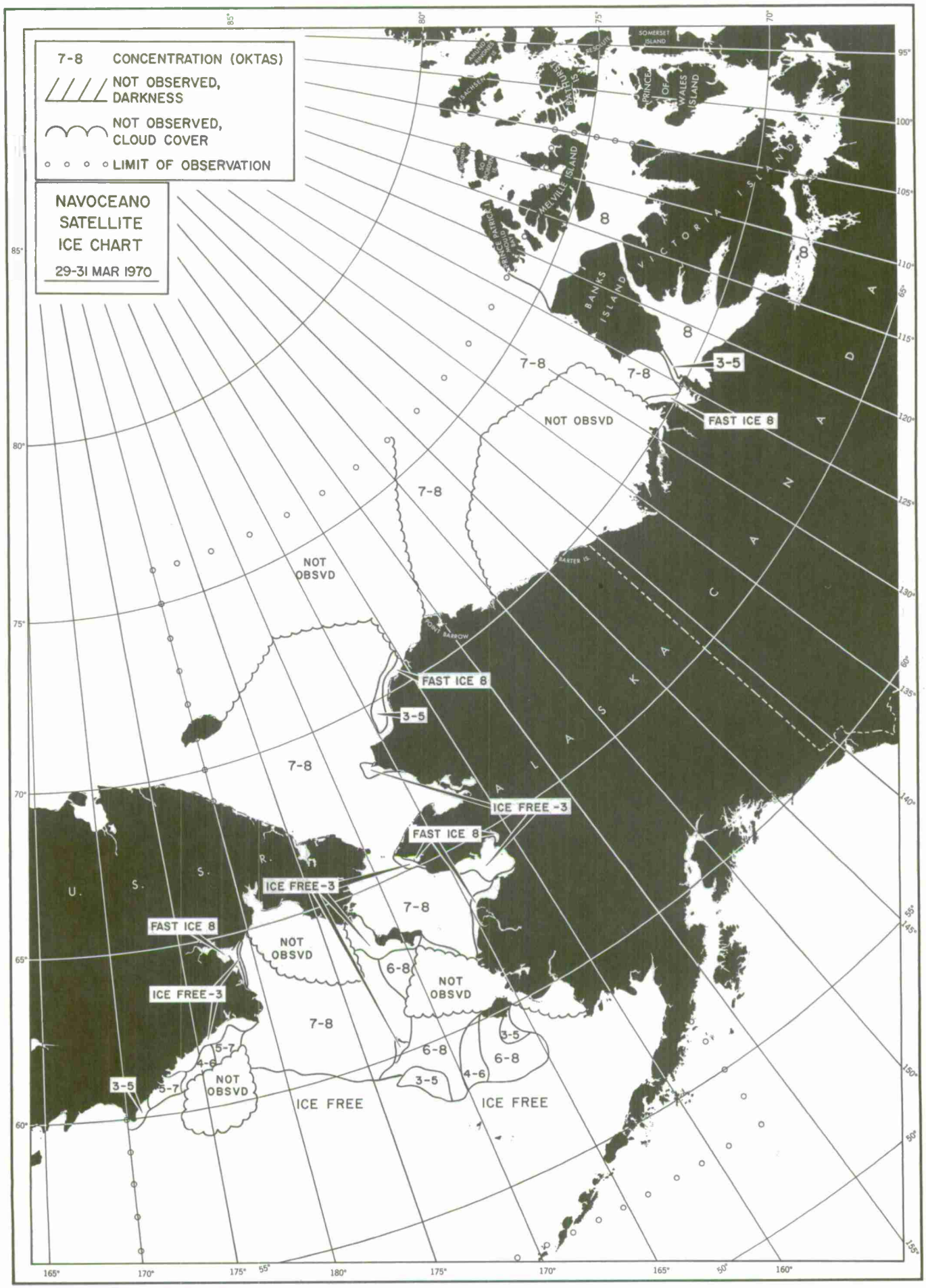
ICE FREE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NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
29-31 MAR 1970
SOMERSET ISLAND
PRINCE OF WALES ISLAND
MELVILLE ISLAND
VICTORIA ISLAND
BANKS ISLAND
CANADA
ALASKA
BARTER IS.
POINT BARROW
U. S. S. R.
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NOT OBSVD
3-5
FAST ICE 8
ICE FREE -3
6-8
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4-6
ICE FREE
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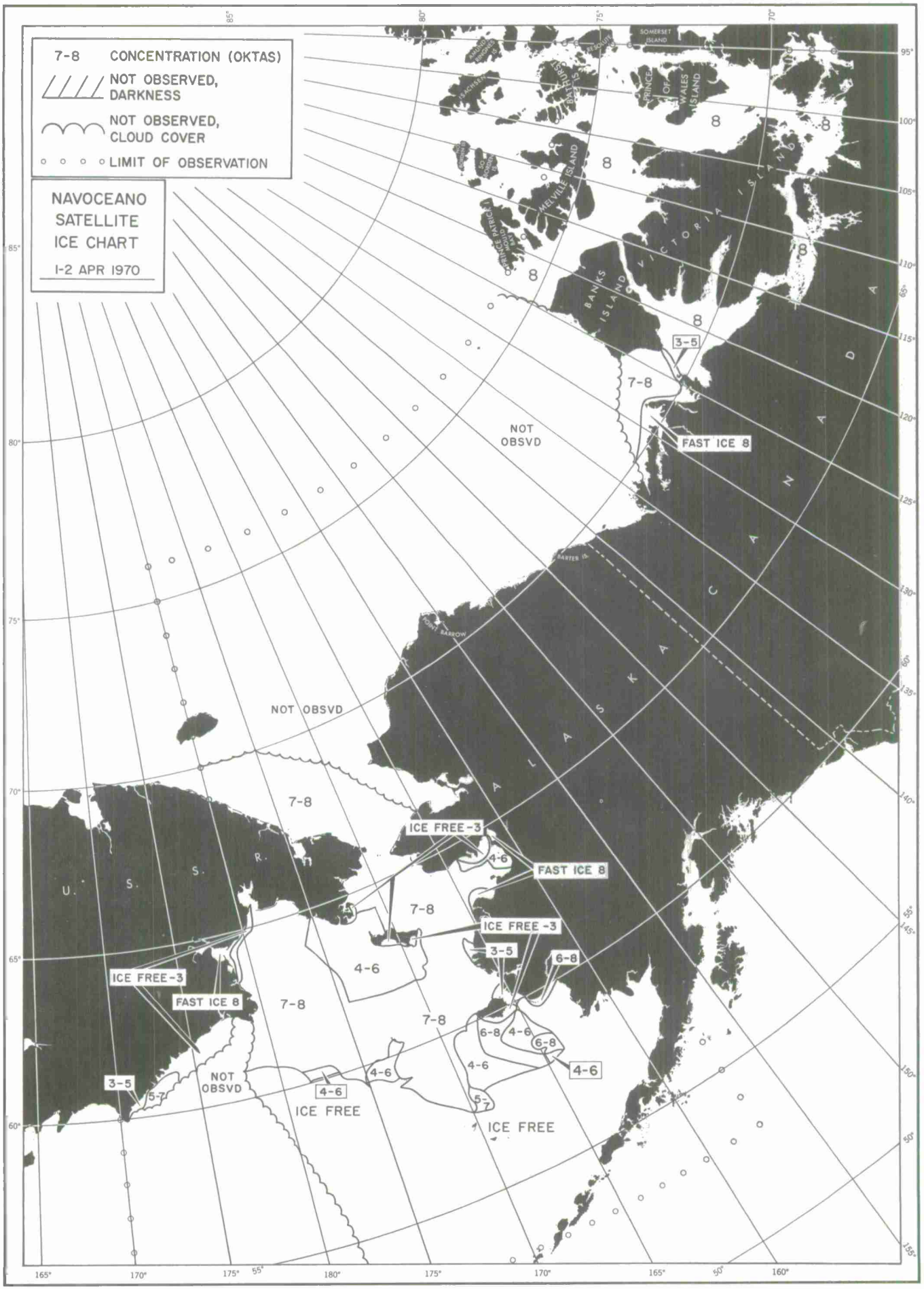
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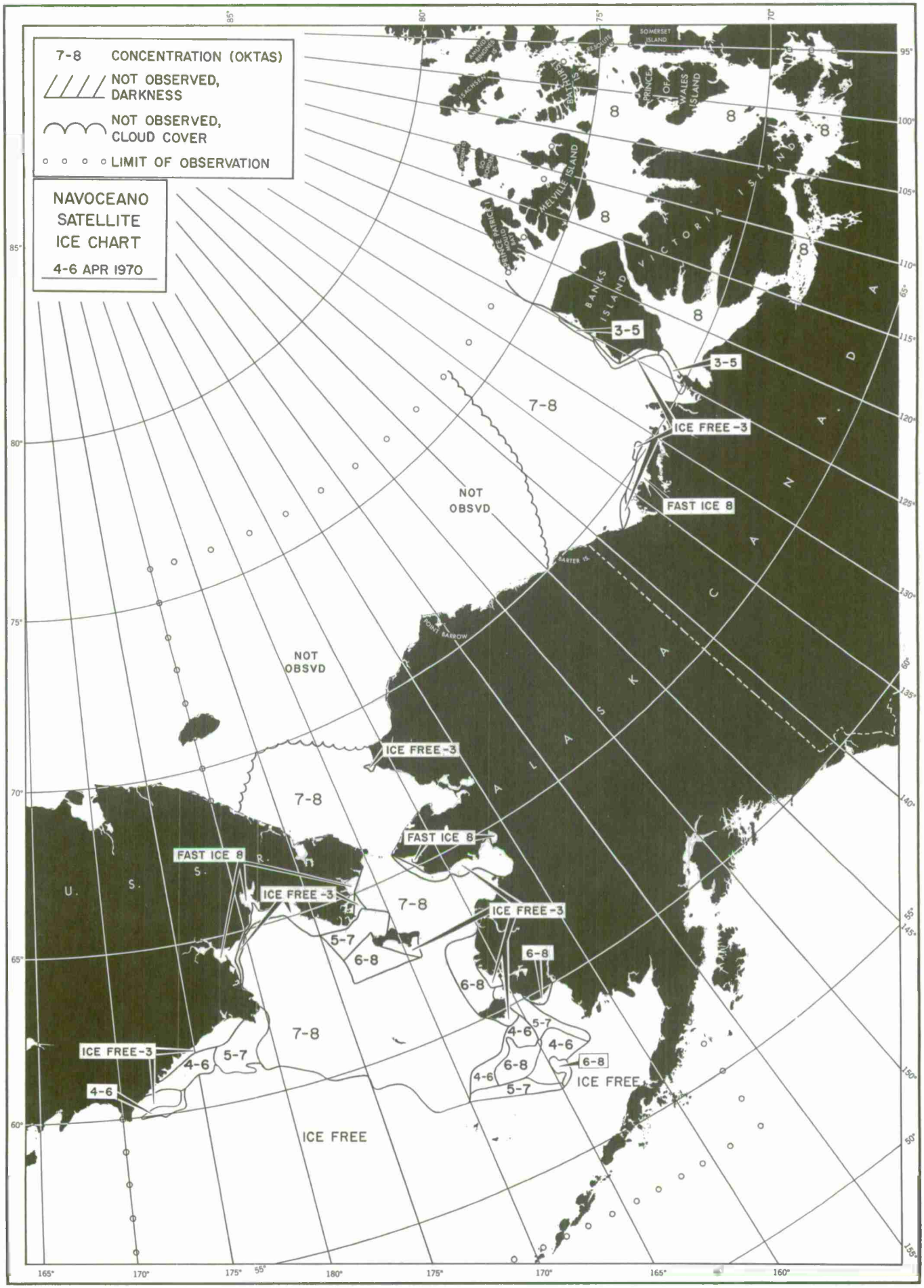
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
1-2 APR 1970
SOMERSET ISLAND
PRINCE OF WALES ISLAND
MELVILLE ISLAND
PRINCE PATRICK ISLAND
BANKS ISLAND
VICTORIA ISLAND
CANADA
ALASKA
BARTER IS.
POINT BARROW
U. S. S. R.
NOT OBSVD
FAST ICE 8
ICE FREE-3
3-5
4-6
6-8
7-8
5-7
ICE FREE
8


7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
4-6 APR 1970
SOMERSET ISLAND
PRINCE OF WALES ISLAND
VICTORIA ISLAND
MELVILLE ISLAND
BANKS ISLAND
CANADA
ALASKA
U. S. S. R.
POINT BARROW
BARTER IS.
3-5
3-5
ICE FREE -3
FAST ICE 8
NOT OBSVD
NOT OBSVD
ICE FREE -3
7-8
FAST ICE 8
FAST ICE 8
ICE FREE -3
ICE FREE -3
7-8
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6-8
7-8
ICE FREE -3
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ICE FREE
ICE FREE
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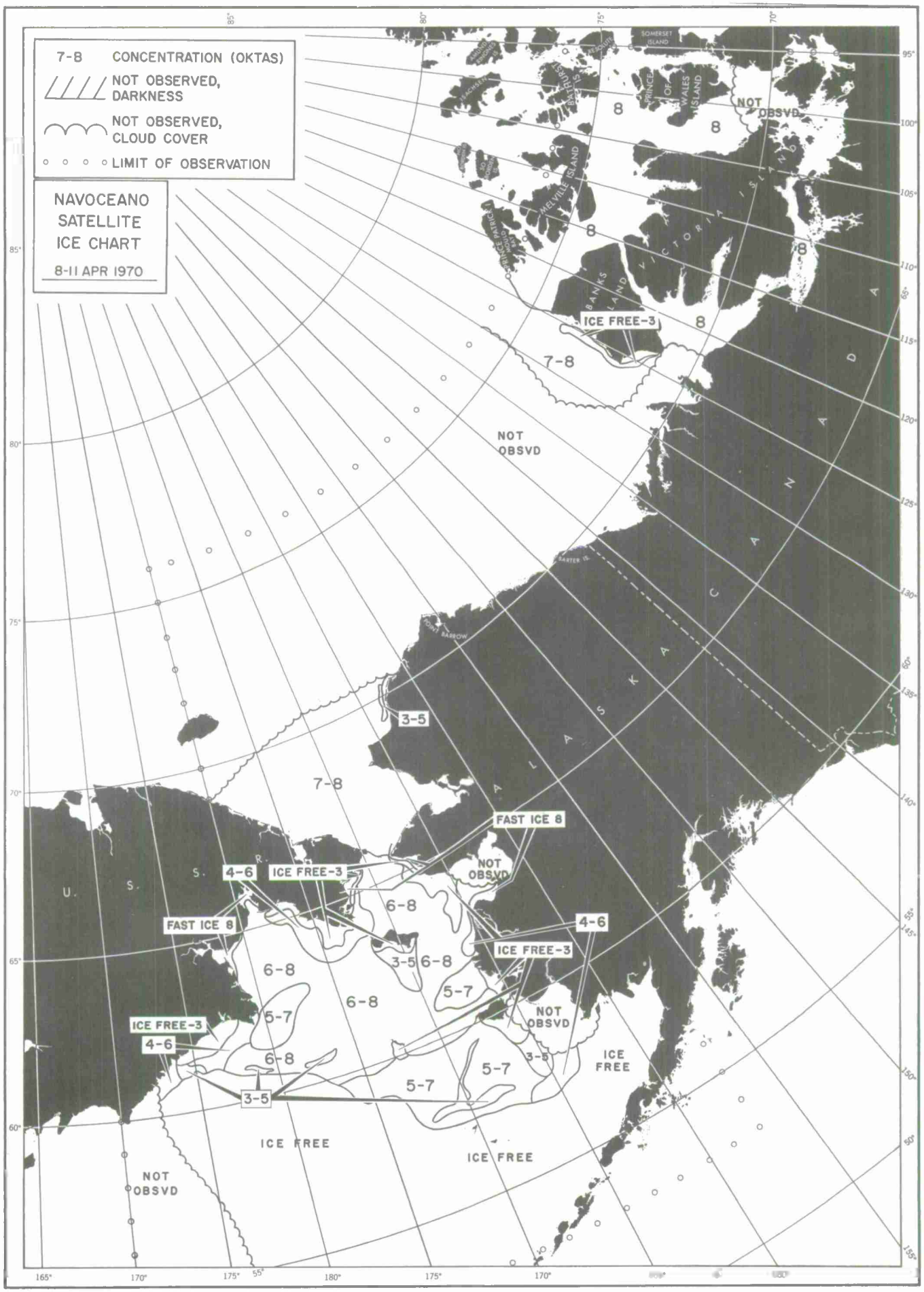
7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
8-11 APR 1970
NOT OBSVD
ICE FREE-3
7-8
NOT OBSVD
3-5
7-8
FAST ICE 8
4-6
ICE FREE-3
NOT OBSVD
FAST ICE 8
6-8
4-6
ICE FREE-3
3-5
6-8
6-8
5-7
6-8
5-7
NOT OBSVD
ICE FREE-3
4-6
6-8
5-7
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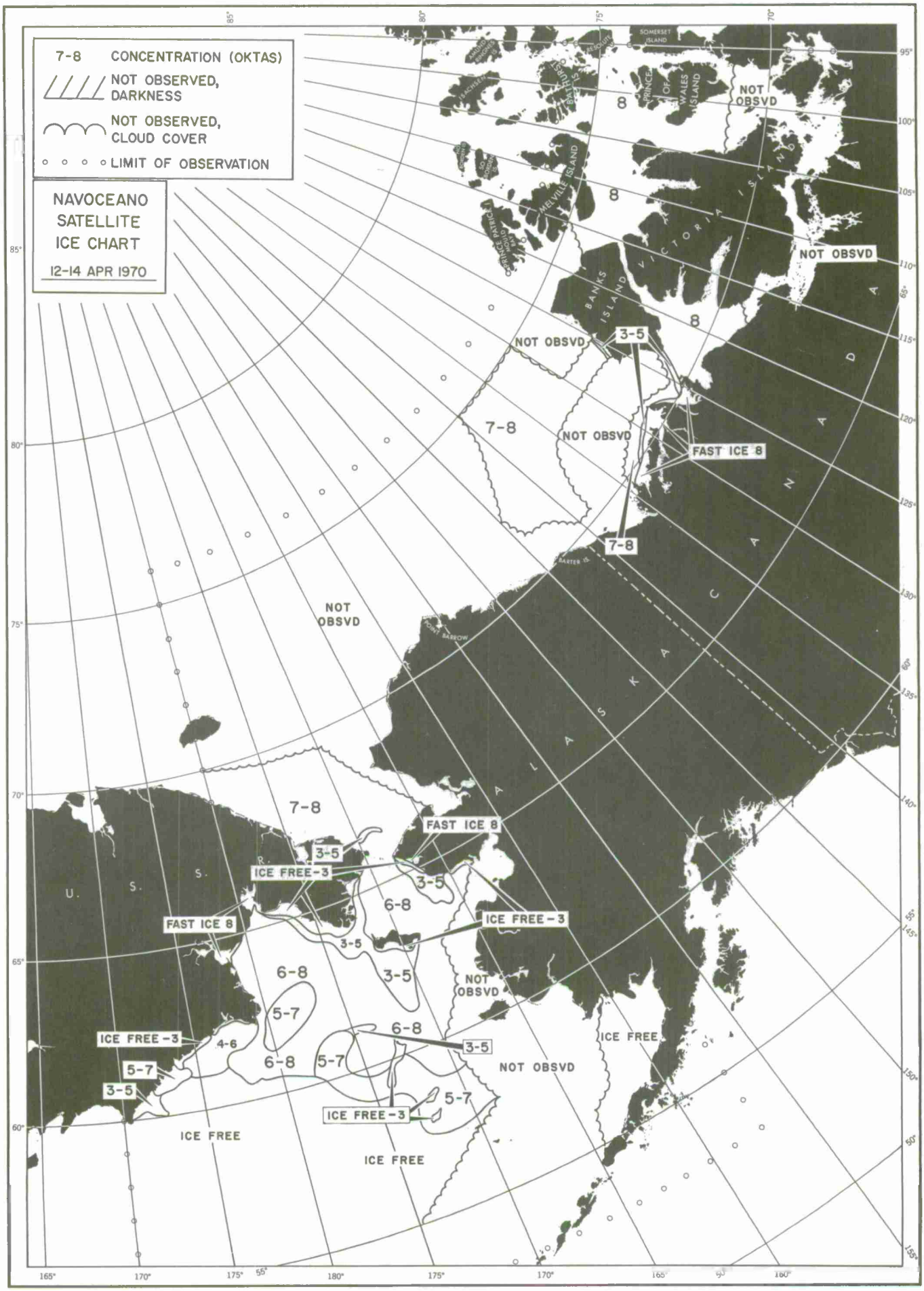
ICE FREE
3-5
5-7
ICE FREE
ICE FREE
NOT OBSVD
U. S. S. R.
A L A S K A
C A N A D A
VICTORIA ISLAND
BANKS ISLAND
MELVILLE ISLAND
PRINCE OF WALES ISLAND
SOMERSET ISLAND
PRINCE PATRICK ISLAND
BARTER IS.
POINT BARROW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NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
12-14 APR 1970
NOT OBSVD
3-5
FAST ICE 8
7-8
NOT OBSVD
NOT OBSVD
NOT OBSVD
7-8
FAST ICE 8
3-5
ICE FREE-3
3-5
6-8
FAST ICE 8
ICE FREE-3
3-5
6-8
3-5
NOT OBSVD
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NOT OBSVD
ICE FREE-3
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3-5
ICE FREE-3
ICE FREE
ICE FREE
ICE FREE
U. S. S. R.
ALASKA
CANADA
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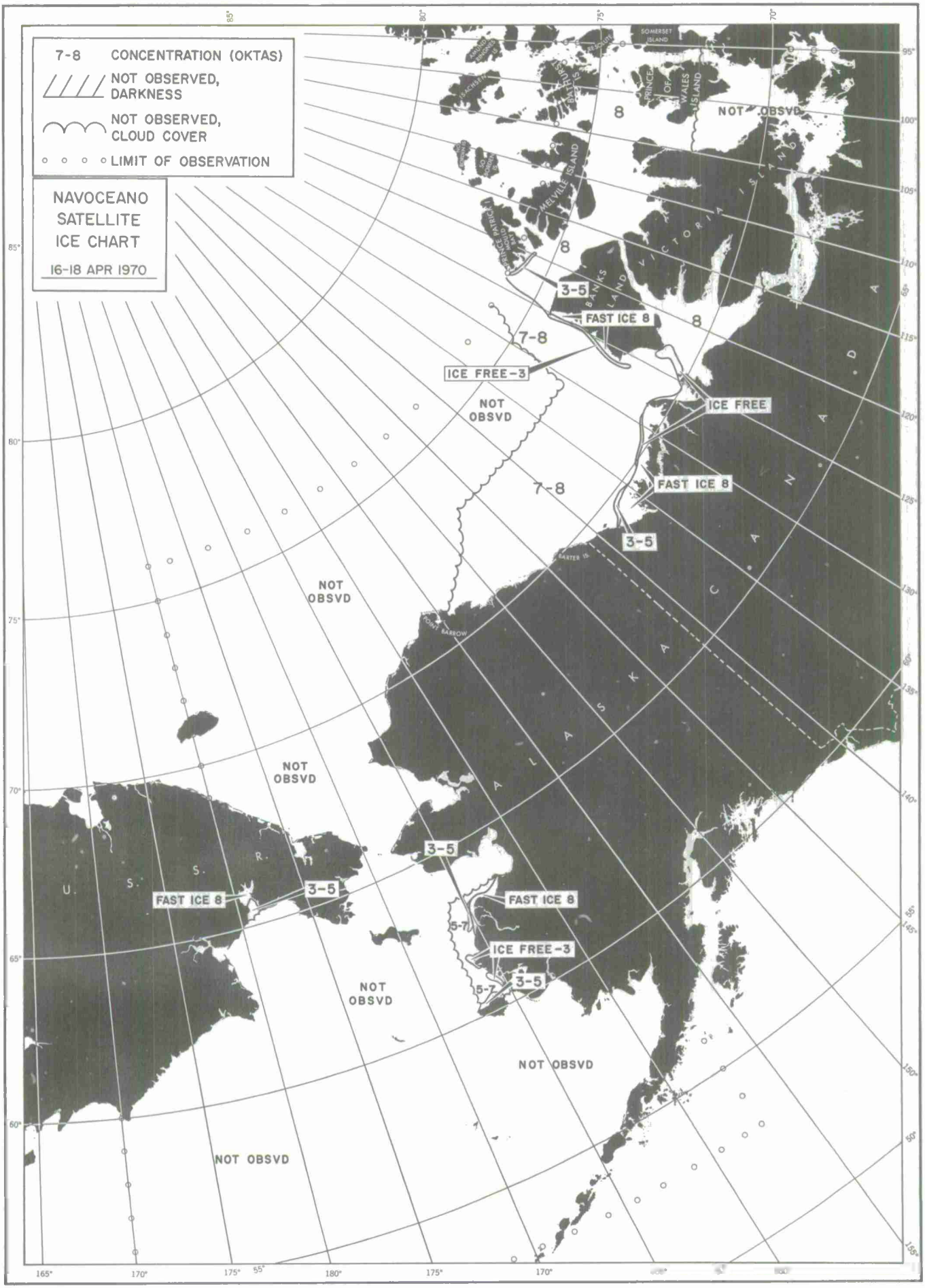
MELVILLE ISLAND
PRINCE OF WALES ISLAND
SOMERSET ISLAND
BARTER IS.
POINT BARROW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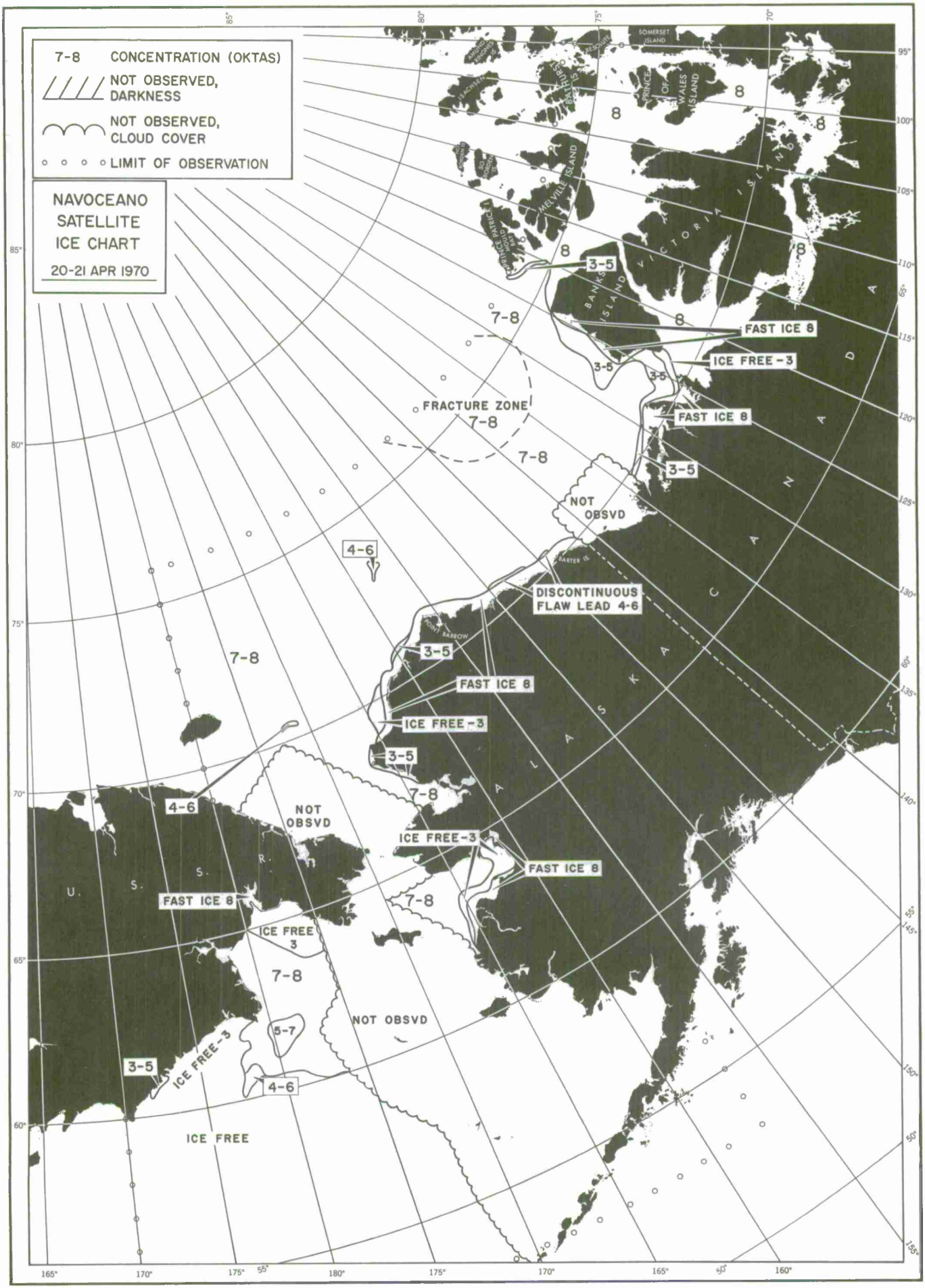
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
16-18 APR 1970
NOT OBSVD
8
3-5
FAST ICE 8
7-8
ICE FREE-3
ICE FREE
5-7
SOMERSET ISLAND
PRINCE OF WALES ISLAND
MELVILLE ISLAND
VICTORIA ISLAND
BANKS LAND
CANADA
ALASKA
U. S. S. R.
POINT BARROW
BAXTER IS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LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
20-21 APR 1970
FAST ICE 8
ICE FREE-3
FRACTURE ZONE
NOT OBSVD
DISCONTINUOUS FLAW LEAD 4-6
ICE FREE
U. S. S. R.
A L A S K A
C A N A D A
MELVILLE ISLAND
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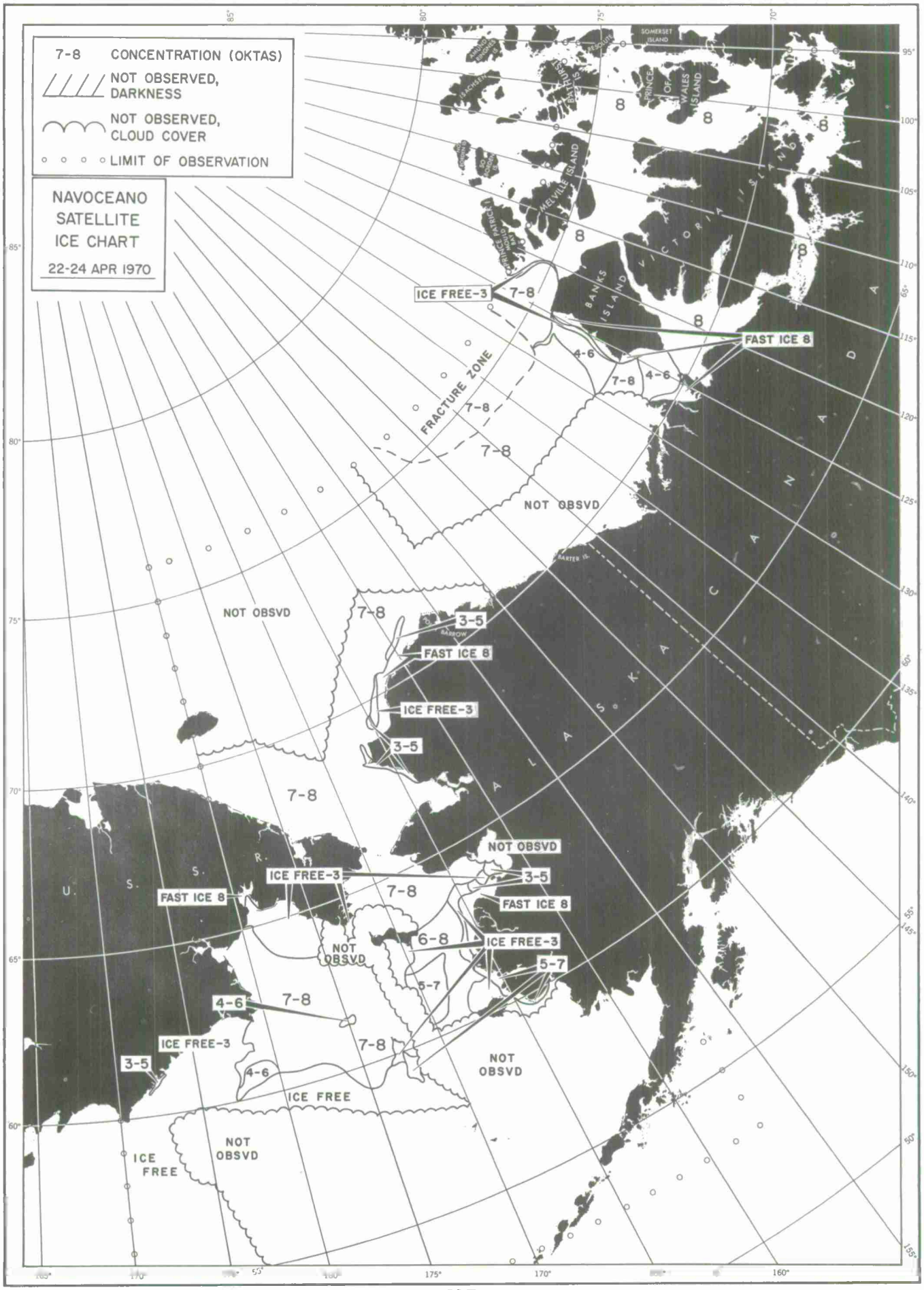
VICTORIA ISLAND
PRINCE OF WALES ISLAND
SOMERSET ISLAND
POINT BARROW
BARTER IS.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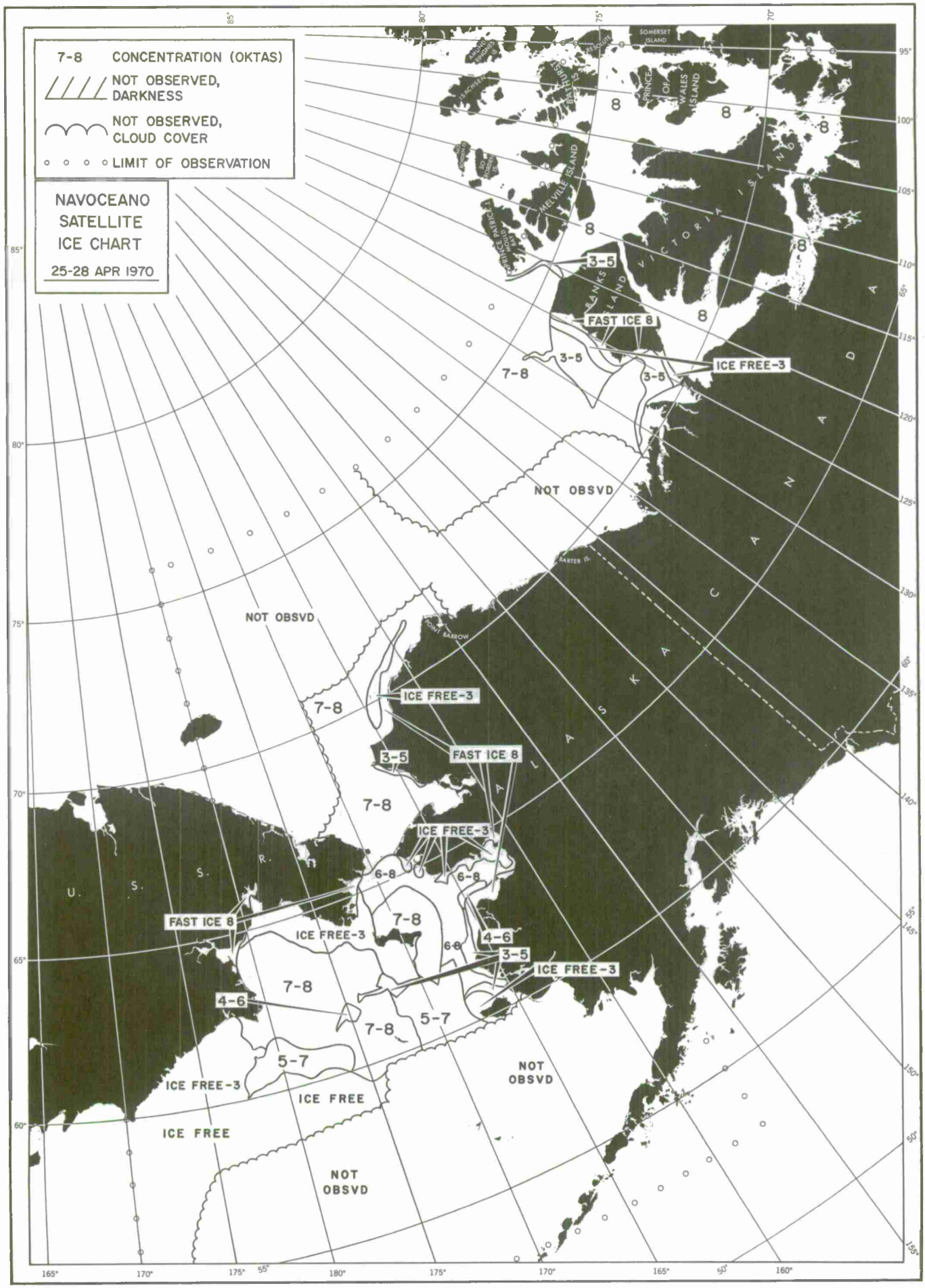
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
22-24 APR 1970
ICE FREE-3
7-8
FAST ICE 8
4-6
FRACTURE ZONE
NOT OBSVD
3-5
6-8
5-7
ICE FREE
BANKS ISLAND
VICTORIA ISLAND
PRINCE OF WALES ISLAND
SOMERSET ISLAND
MELVILLE ISLAND
BARROW
BARTER IS.
U. S. S. R.
CANADA
ALASKA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NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
25-28 APR 1970
SOMERSET ISLAND
PRINCE OF WALES ISLAND
MELVILLE ISLAND
VICTORIA ISLAND
BANKS ISLAND
CANADA
ALASKA
U. S. S. R.
POINT BARROW
BARTER IS.
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ICE FREE-3
NOT OBSVD
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ICE FREE
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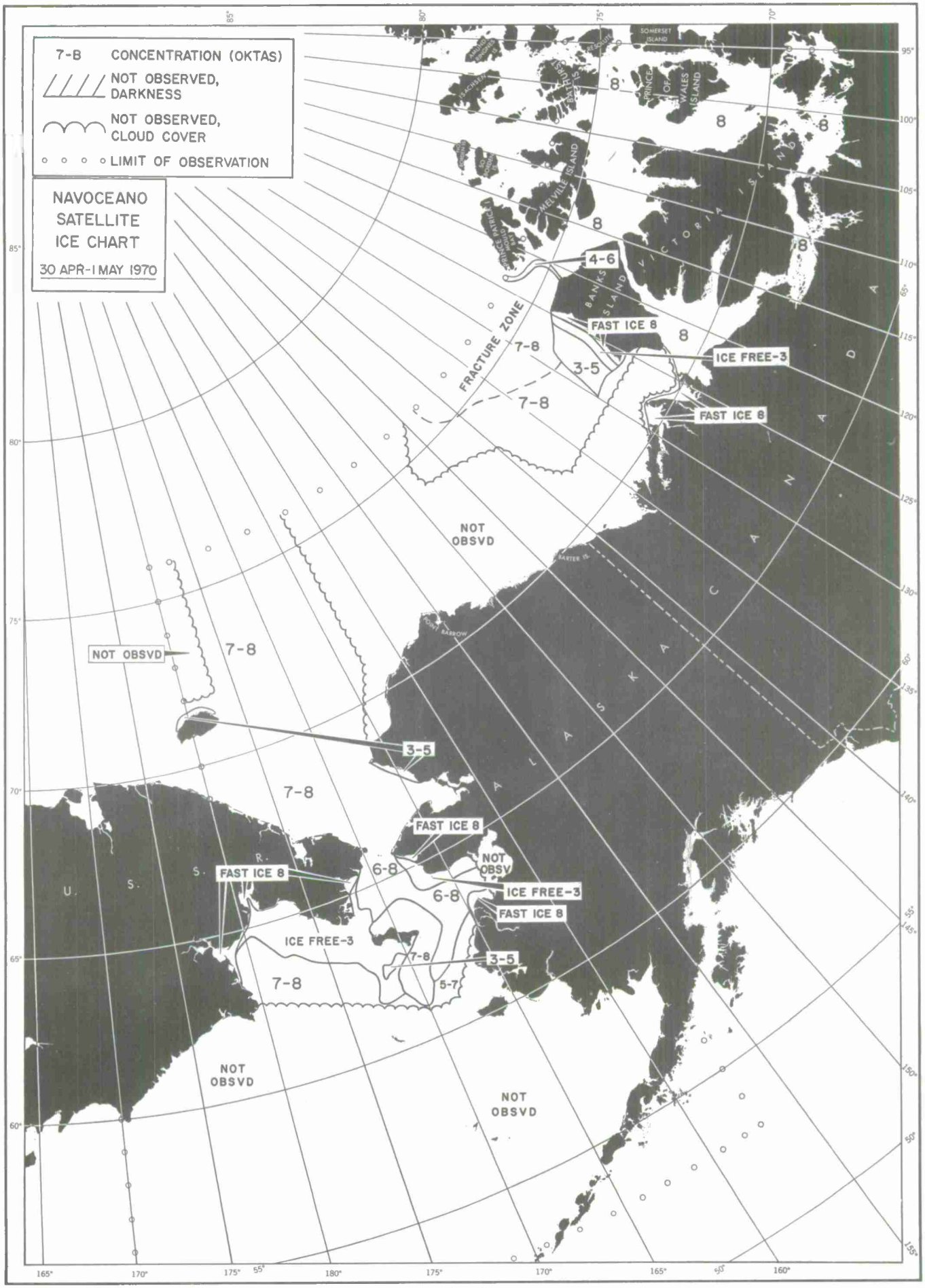
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NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
30 APR-1 MAY 1970
SOMERSET ISLAND
PRINCE OF WALES ISLAND
VICTORIA ISLAND
BANKS ISLAND
MELVILLE ISLAND
PRINCE PATRICK ISLAND
FRACTURE ZONE
4-6
FAST ICE 8
ICE FREE-3
7-8
3-5
NOT OBSVD
BARTER IS
POINT BARROW
6-8
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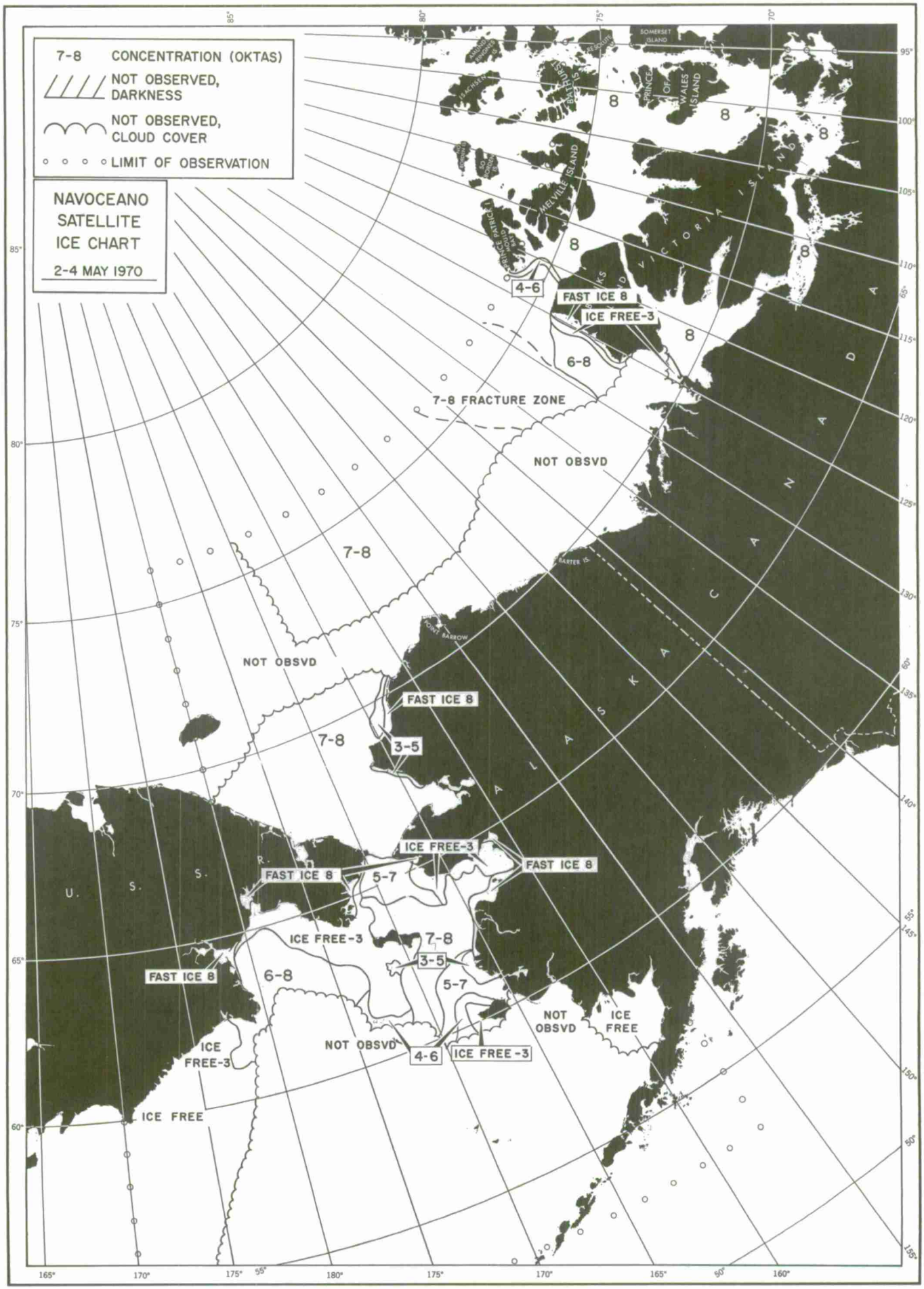
NOT OBSV
U. S. S. R.
C A N A D A
A L A S K A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NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
2-4 MAY 1970
4-6
FAST ICE 8
ICE FREE-3
6-8
7-8 FRACTURE ZONE
NOT OBSVD
7-8
NOT OBSVD
FAST ICE 8
3-5
ICE FREE-3
FAST ICE 8
FAST ICE 8
5-7
ICE FREE-3
7-8
3-5
FAST ICE 8
6-8
5-7
NOT OBSVD
ICE FREE
ICE FREE-3
NOT OBSVD
4-6
ICE FREE-3
ICE FREE
SOMERSET ISLAND
PRINCE OF WALES ISLAND
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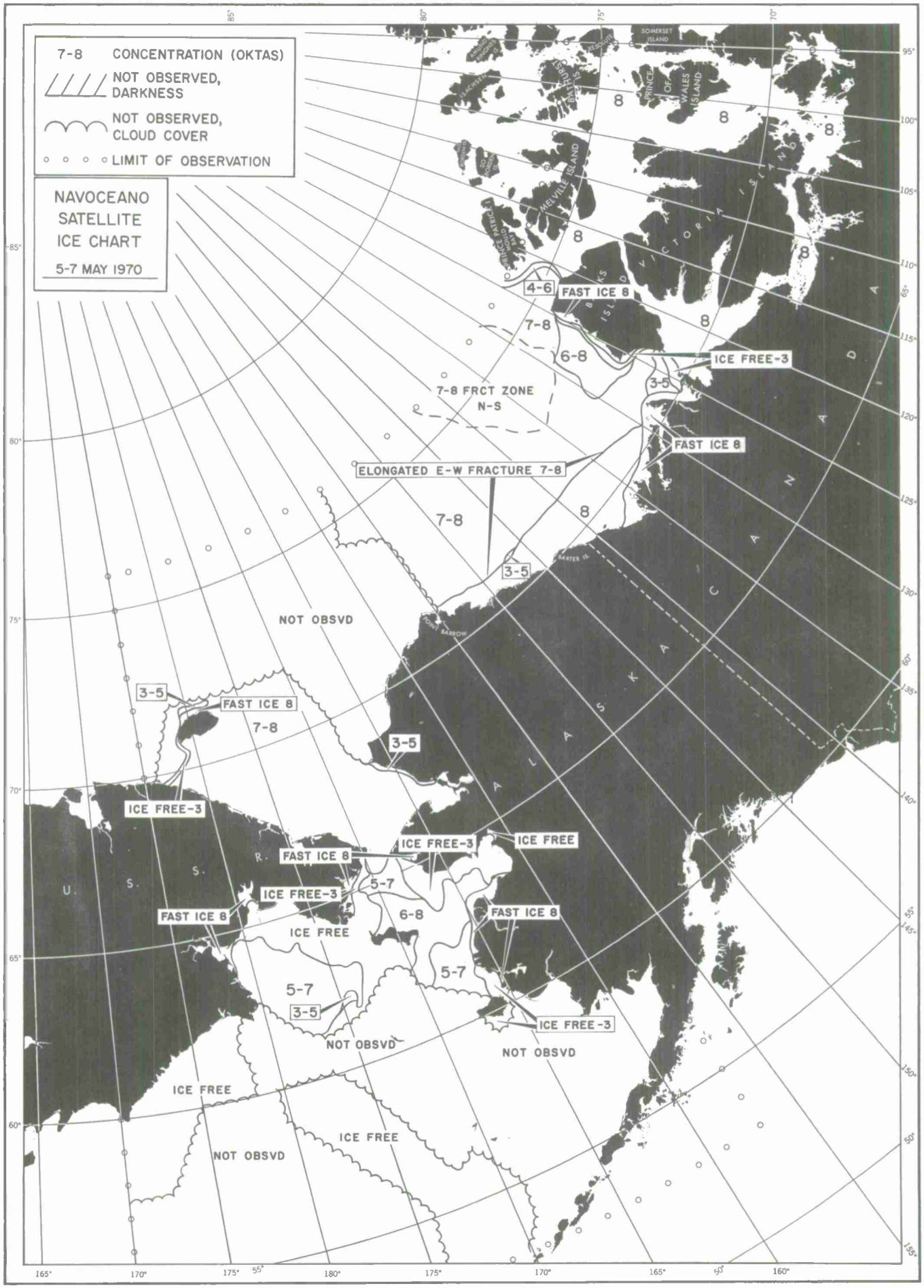
VICTORIA ISLAND
CANADA
ALASKA
U. S. S. R.
POINT BARROW
BARTER IS.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NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
5-7 MAY 1970
SOMERSET ISLAND
PRINCE OF WALES ISLAND
MELVILLE ISLAND
PRINCE PATRICK ISLAND
BANKS ISLAND
VICTORIA ISLAND
CANADA
4-6
FAST ICE 8
7-8
6-8
ICE FREE-3
3-5
7-8 FRCT ZONE N-S
FAST ICE 8
ELONGATED E-W FRACTURE 7-8
7-8
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3-5
NOT OBSVD
POINT BARROW
3-5
FAST ICE 8
7-8
3-5
ALASKA
ICE FREE-3
ICE FREE-3
ICE FREE
FAST ICE 8
U. S. S. R.
ICE FREE-3
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FAST ICE 8
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ICE FREE-3
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NOT OBSVD
ICE FREE
ICE FREE
NOT OBSVD
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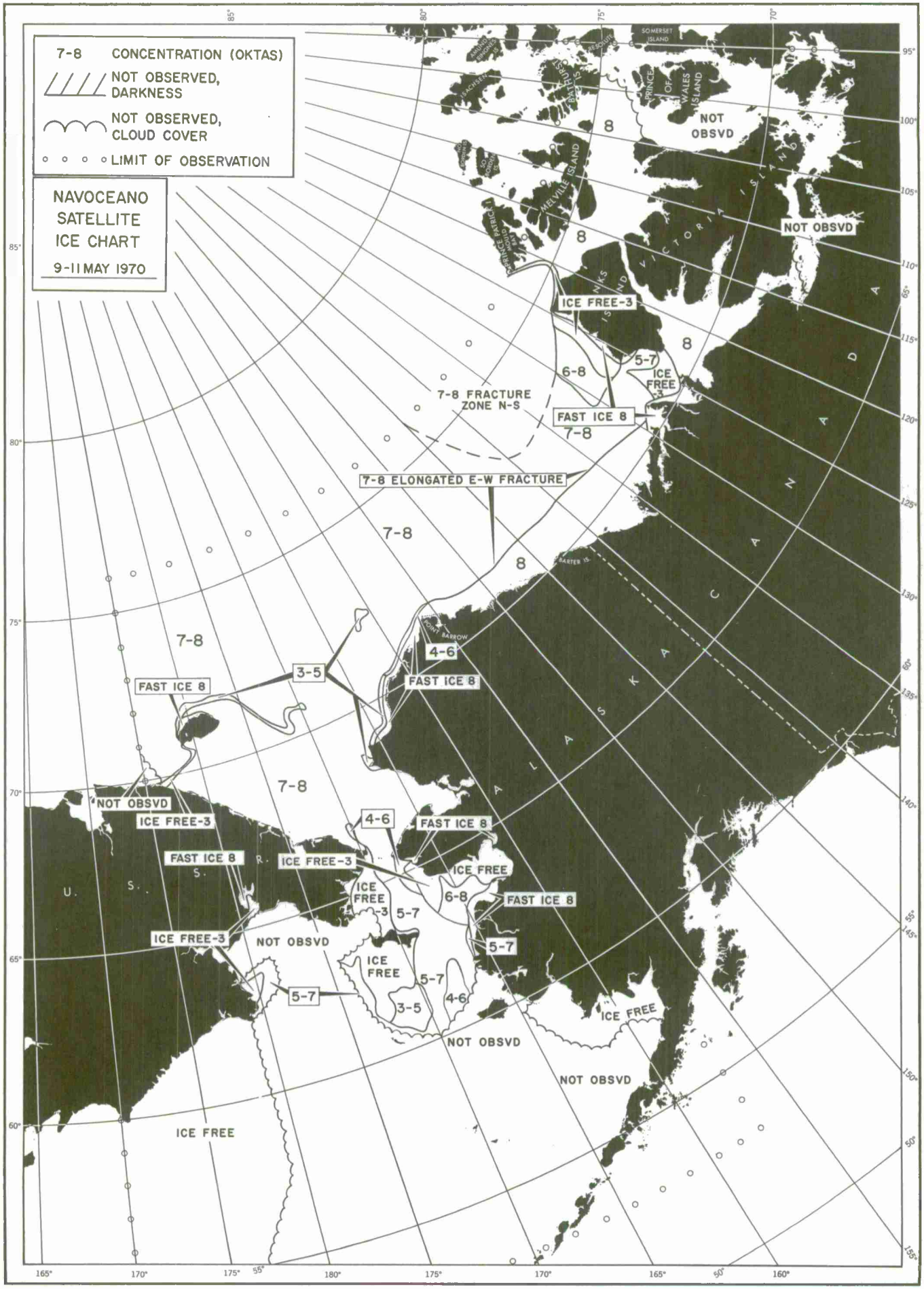
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NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
9-11 MAY 1970
NOT OBSVD
ICE FREE-3
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ICE FREE
6-8
7-8 FRACTURE ZONE N-S
FAST ICE 8
7-8
7-8 ELONGATED E-W FRACTURE
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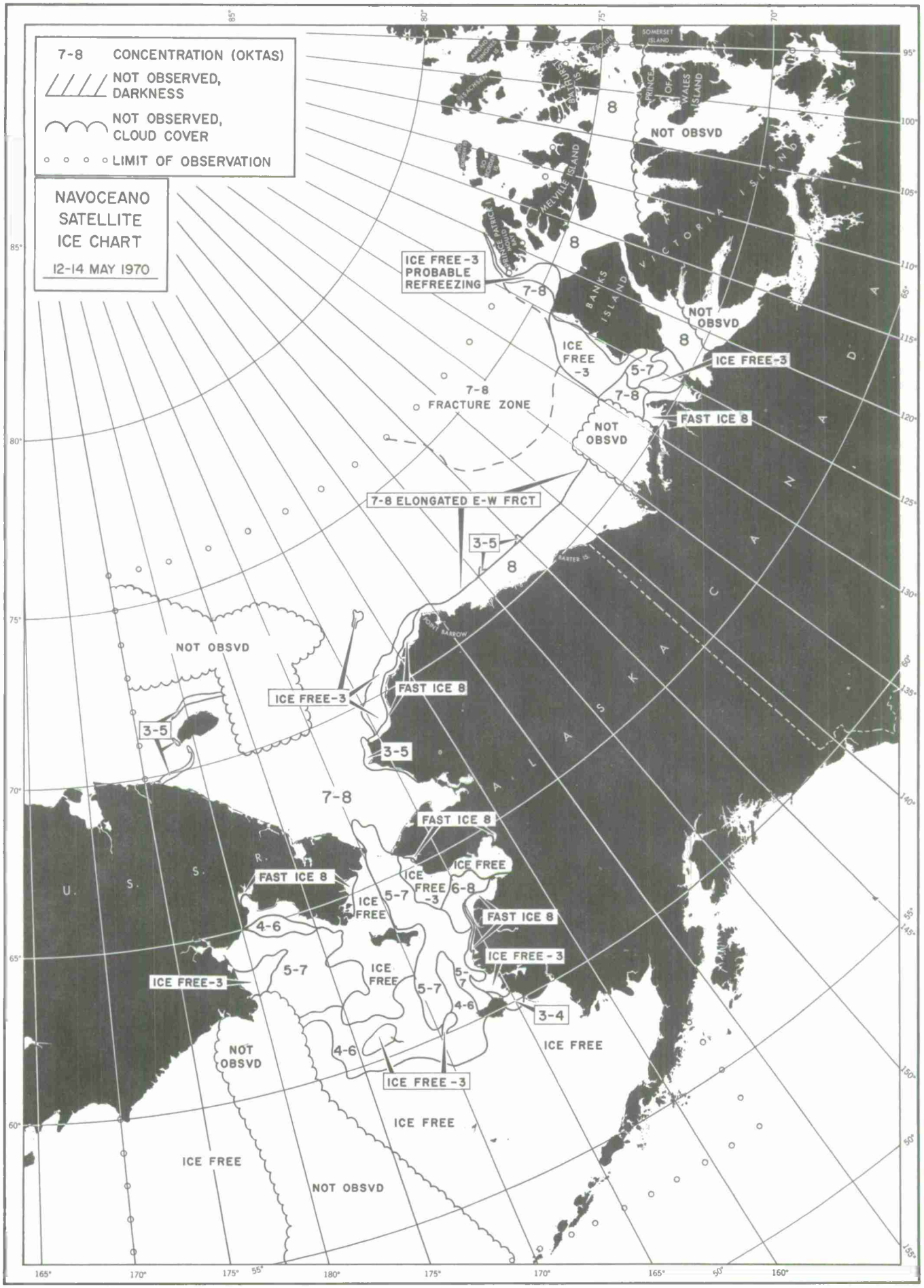
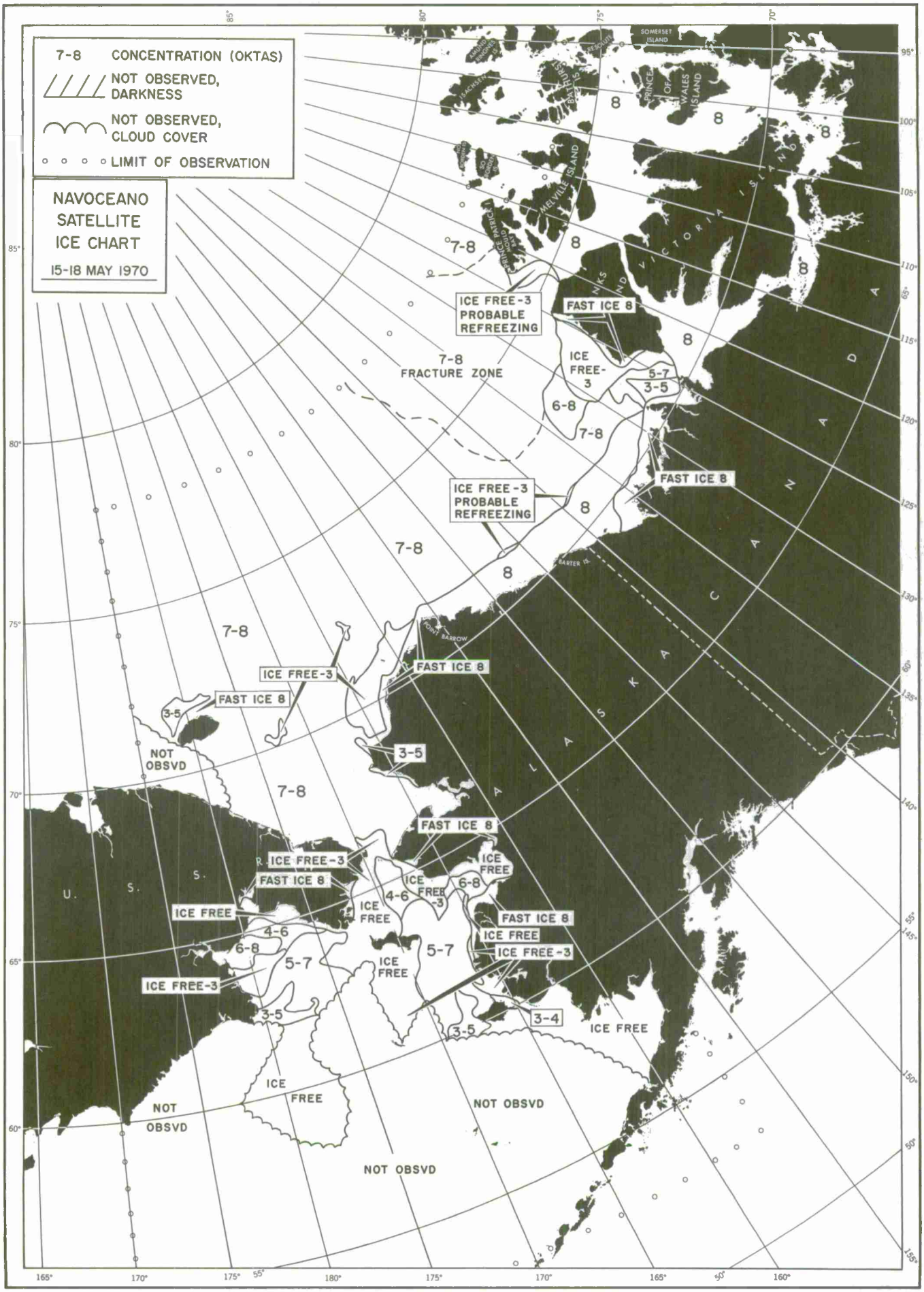
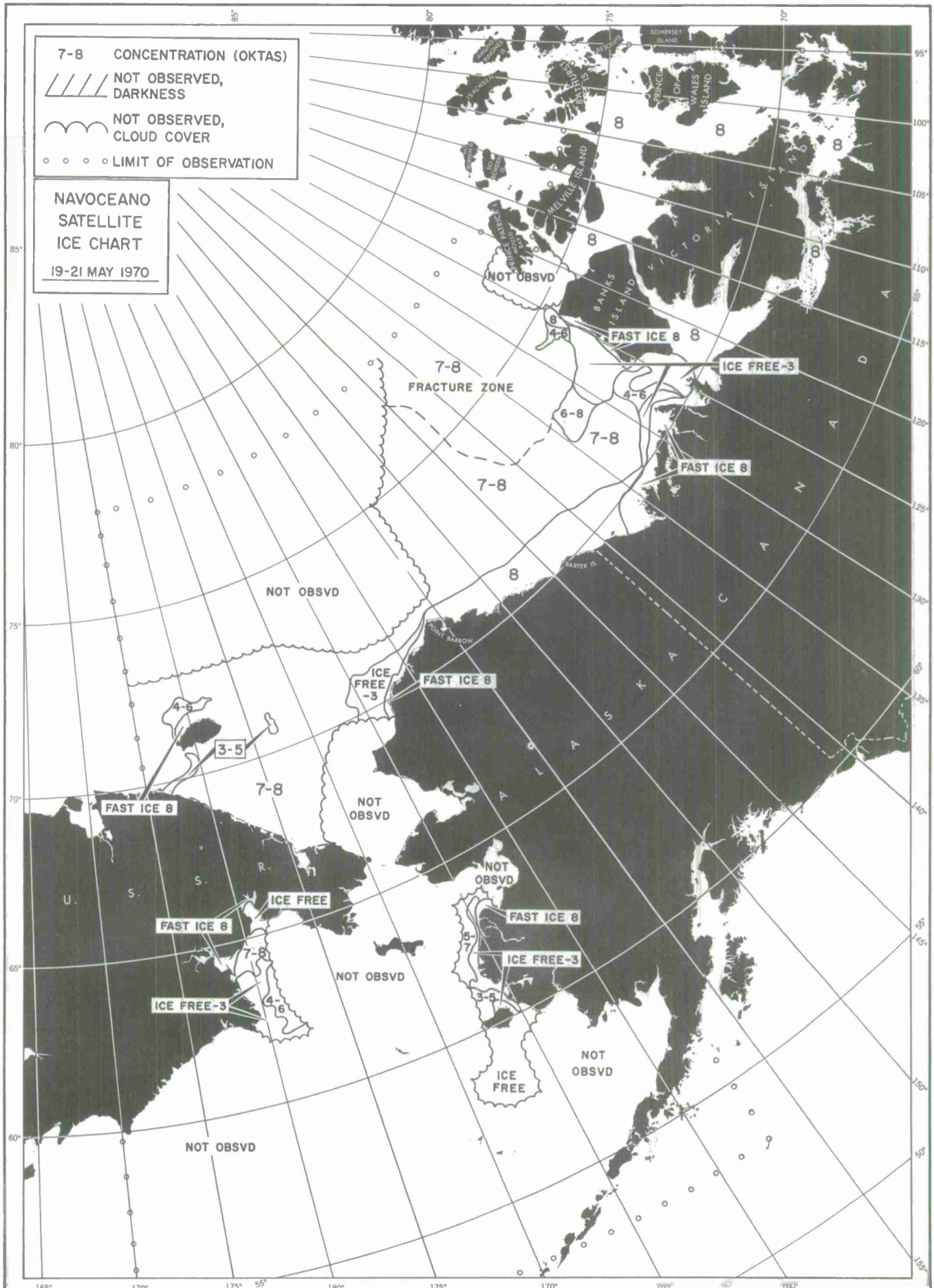
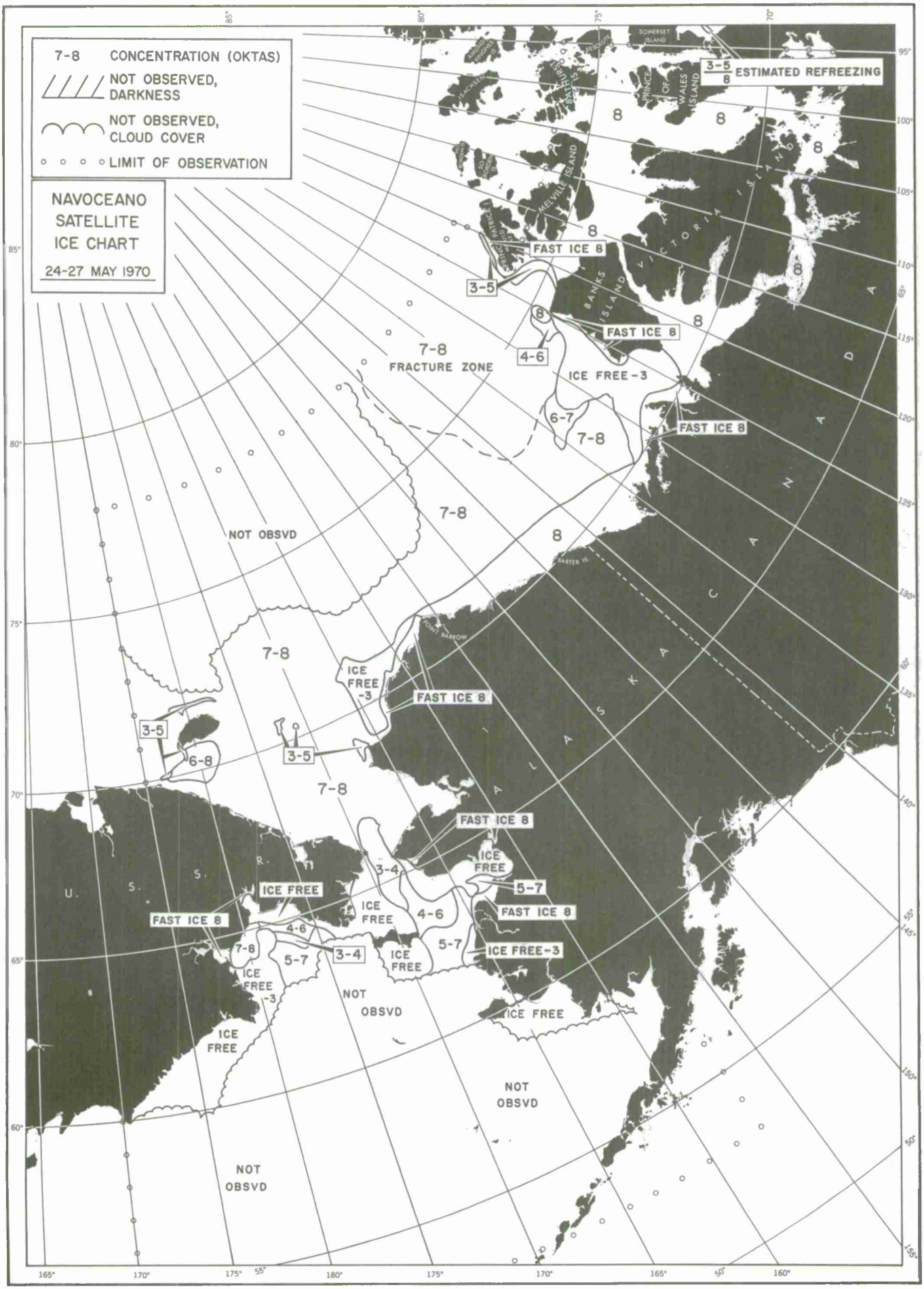
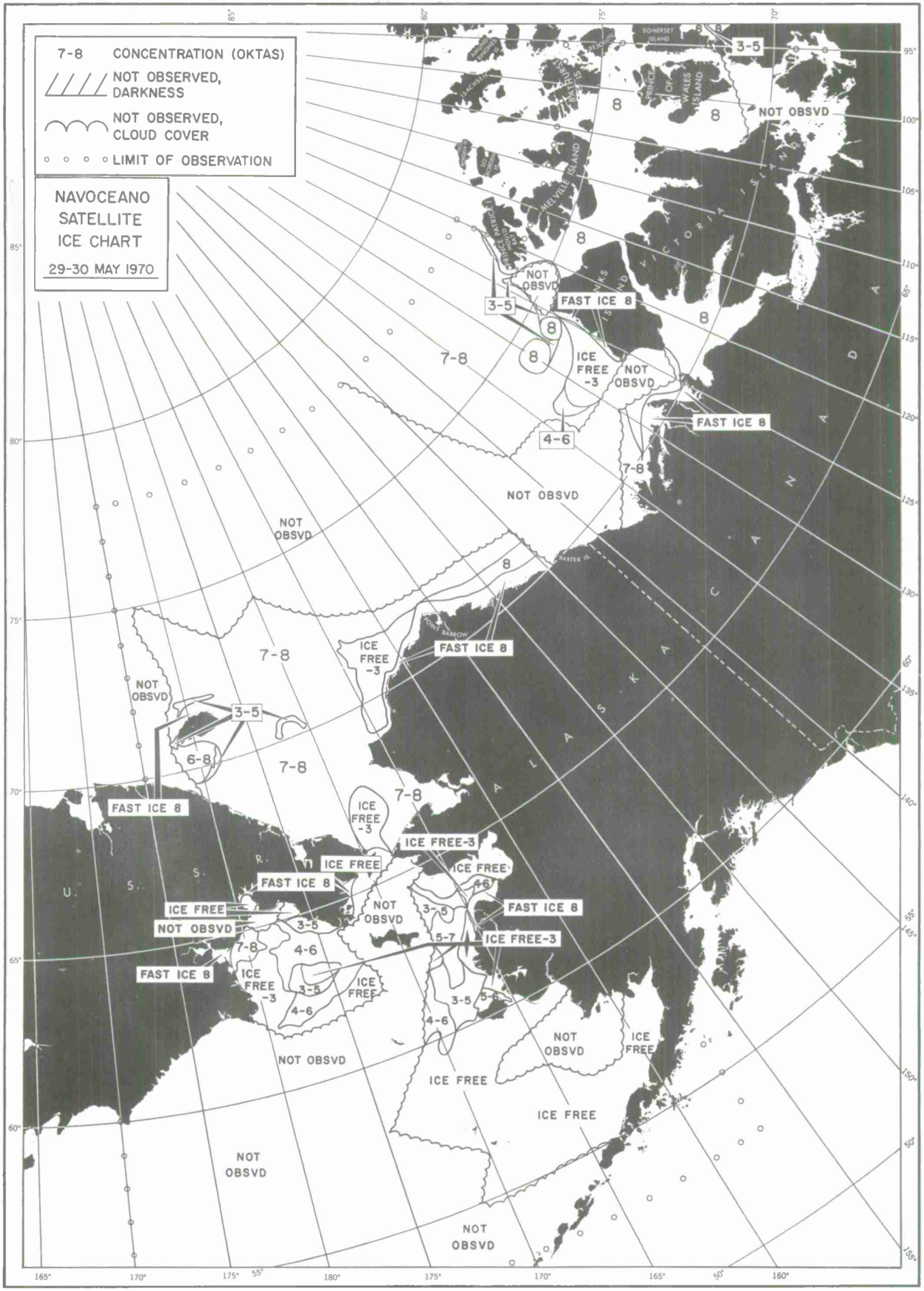
FAST ICE 8
ICE FREE
NOT OBSVD
ICE FREE
ICE FREE
NOT OBSVD
NOT OBSVD
ICE FREE
CANADA
ALASKA
U. S. S. R.
SOMERSET ISLAND
PRINCE OF WALES ISLAND
MELVILLE ISLAND
VICTORIA ISLAND
BANKS ISLAND
BARTER IS.
POINT BARROW

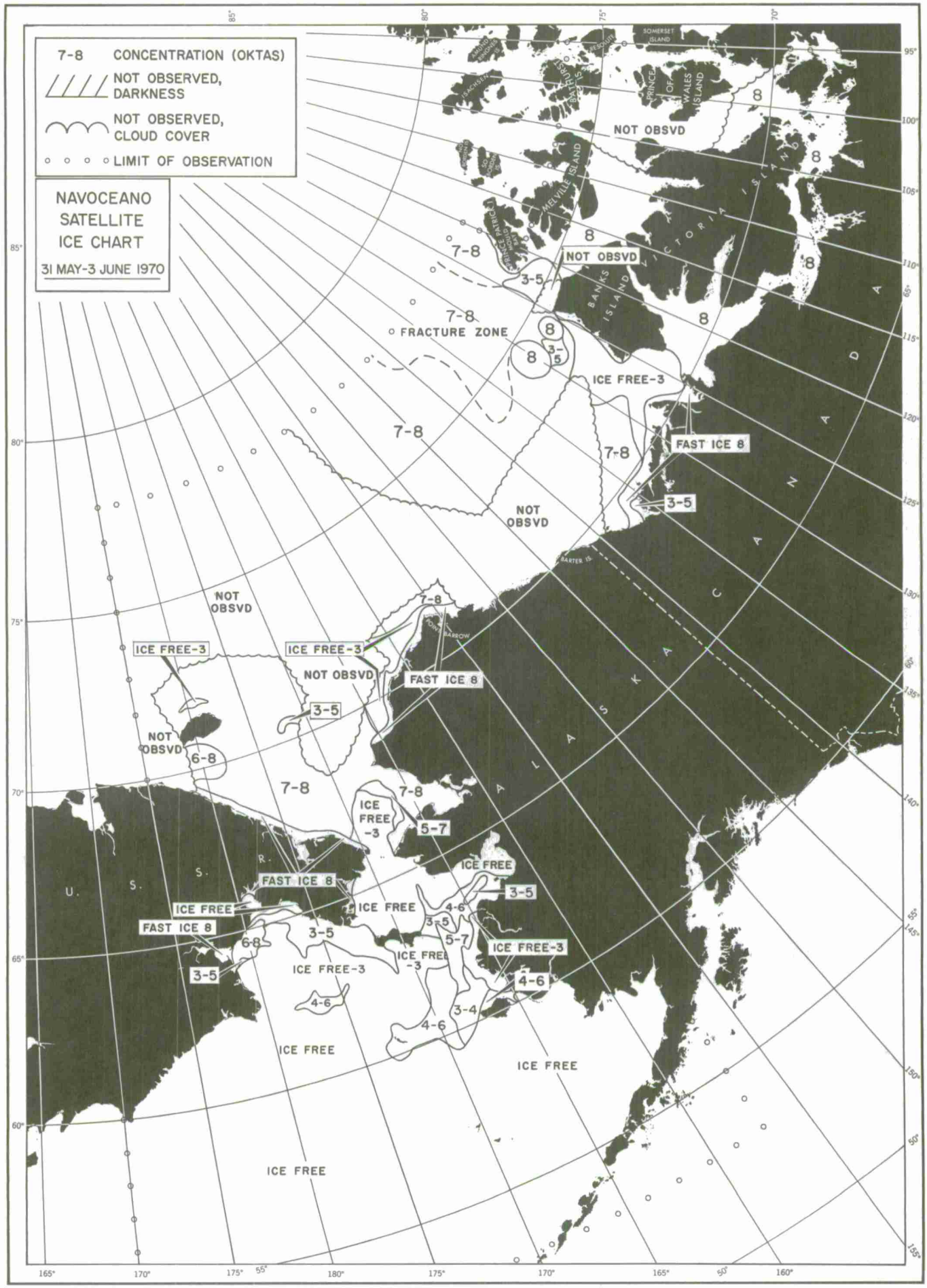

7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
12-14 MAY 1970
NOT OBSVD
ICE FREE-3 PROBABLE REFREEZING
7-8
ICE FREE -3
5-7
ICE FREE-3
7-8 FRACTURE ZONE
FAST ICE 8
7-8 ELONGATED E-W FRCT
3-5
ICE FREE-3
FAST ICE 8
3-5
7-8
FAST ICE 8
ICE FREE
FAST ICE 8
ICE FREE -3
ICE FREE
5-7
6-8
4-6
ICE FREE-3
5-7
ICE FREE
5-7
4-6
3-4
ICE FREE
NOT OBSVD
4-6
ICE FREE-3
ICE FREE
ICE FREE
NOT OBSVD
U. S. S. R.
CANADA
ALASKA
VICTORIA ISLAND
BANKS ISLAND
MELVILLE ISLAND
PRINCE PATRICK ISLAND
PRINCE OF WALES ISLAND
SOMERSET ISLAND
BARTER IS
POINT BARROW


7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
15-18 MAY 1970
SOMERSET ISLAND
PRINCE OF WALES ISLAND
MELVILLE ISLAND
VICTORIA ISLAND
CANADA
ALASKA
U. S. S. R.
BARTER IS.
POINT BARROW
7-8
8
ICE FREE-3 PROBABLE REFREEZING
FAST ICE 8
7-8 FRACTURE ZONE
ICE FREE-3
5-7
3-5
6-8
ICE FREE
4-6
3-4
NOT OBSVD


7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
19-21 MAY 1970
NOT OBSVD
FAST ICE 8
ICE FREE-3
7-8
FRACTURE ZONE
6-8
4-6
3-5
ICE FREE
BANKS ISLAND
VICTORIA ISLAND
MELVILLE ISLAND
PRINCE OF WALES ISLAND
SOMERSET ISLAND
BARTER IS.
POINT BARROW
U. S. S. R.
CANADA
ALASKA


7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
24-27 MAY 1970
3-5/8 ESTIMATED REFREEZING
FAST ICE 8
3-5
4-6
7-8
FRACTURE ZONE
ICE FREE -3
6-7
NOT OBSVD
ICE FREE
3-4
5-7
6-8
U. S. S. R.
CANADA
ALASKA
SOMERSET ISLAND
PRINCE OF WALES ISLAND
MELVILLE ISLAND
VICTORIA ISLAND
BANKS ISLAND
BARTER IS.
POINT BARROW


7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
29-30 MAY 1970
NOT OBSVD
FAST ICE 8
ICE FREE
ICE FREE -3
3-5
4-6
5-7
6-8
7-8
8
U. S. S. R.
ALASKA
CANADA
SOMERSET ISLAND
PRINCE OF WALES ISLAND
MELVILLE ISLAND
VICTORIA ISLAND
BANKS ISLAND
PRINCE PATRICK ISLAND
BARTER IS.
POINT BARROW


7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
31 MAY-3 JUNE 1970
SOMERSET ISLAND
PRINCE OF WALES ISLAND
MELVILLE ISLAND
VICTORIA ISLAND
BANKS ISLAND
PRINCE PATRICK ISLAND
NOT OBSVD
7-8
3-5
8
7-8 FRACTURE ZONE
ICE FREE-3
FAST ICE 8
NOT OBSVD
BARTER IS.
POINT BARROW
ICE FREE-3
ICE FREE-3
NOT OBSVD
FAST ICE 8
3-5
NOT OBSVD
6-8
7-8
7-8
ICE FREE -3
5-7
ICE FREE
3-5
FAST ICE 8
ICE FREE
ICE FREE
4-6
3-5
FAST ICE 8
3-5
6-8
3-5
5-7
ICE FREE -3
ICE FREE-3
3-5
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4-6
4-6
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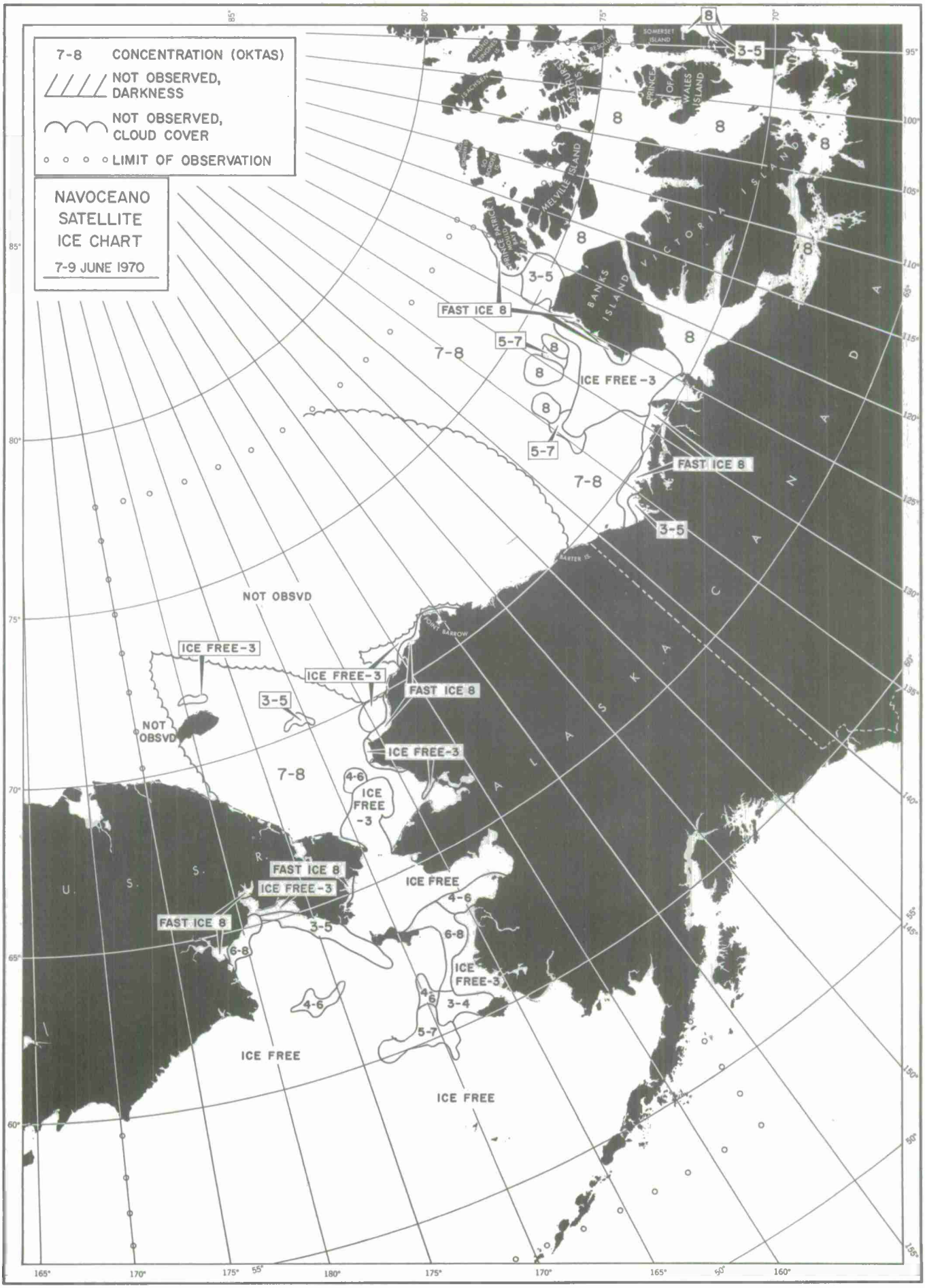
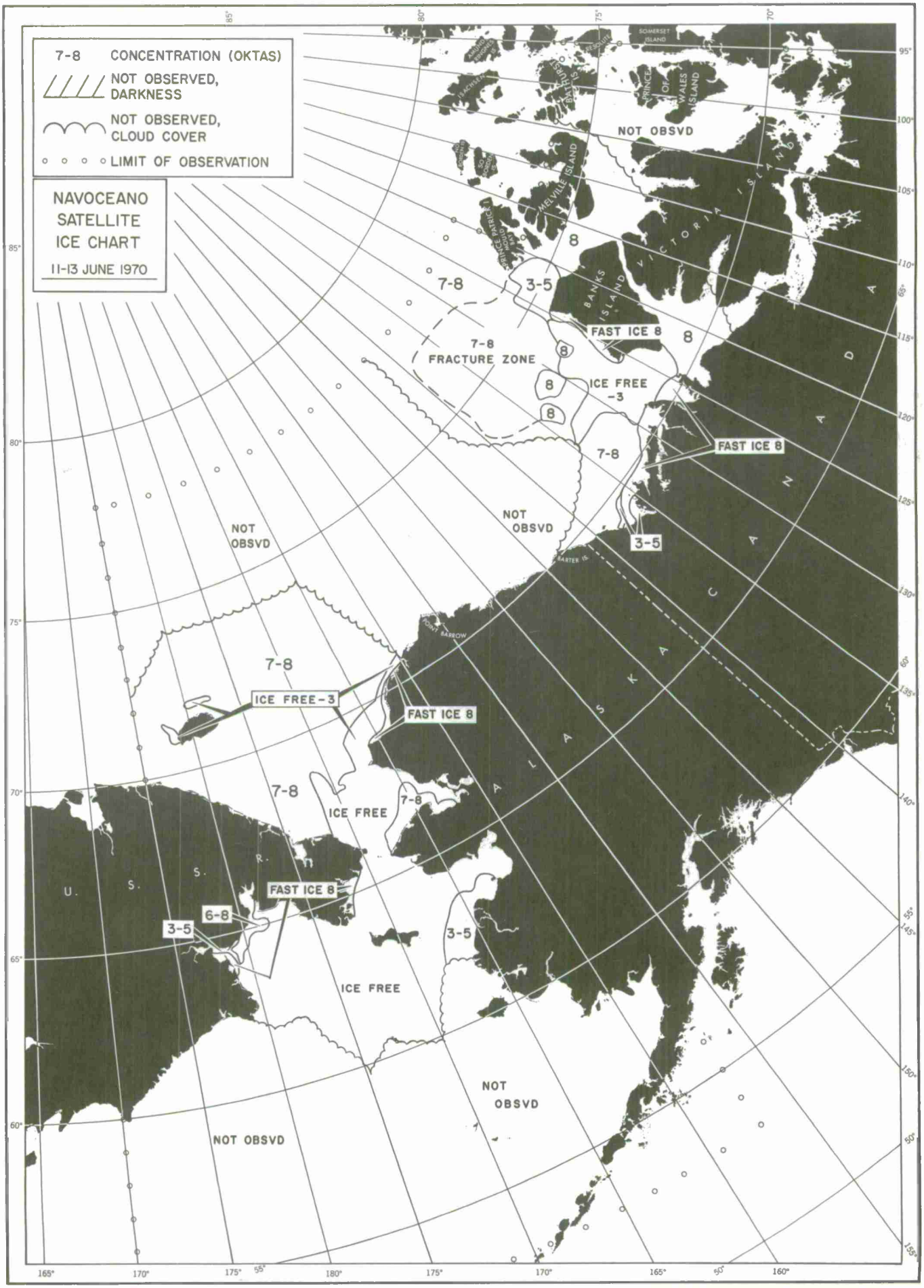
4-6
ICE FREE
ICE FREE
ICE FREE
U. S. S. R.
CANADA
ALASKA


7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
7-9 JUNE 1970
FAST ICE 8
ICE FREE-3
NOT OBSVD
ICE FREE
7-8
3-5
5-7
4-6
6-8
3-4
BANKS ISLAND
VICTORIA ISLAND
PRINCE OF WALES ISLAND
SOMERSET ISLAND
MELVILLE ISLAND
POINT BARROW
BARTER IS.
U. S. S. R.
ALASKA
CANADA


7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
11-13 JUNE 1970
NOT OBSVD
8
7-8
3-5
FAST ICE 8
7-8 FRACTURE ZONE
ICE FREE -3
7-8
FAST ICE 8
NOT OBSVD
3-5
NOT OBSVD
7-8
ICE FREE-3
FAST ICE 8
7-8
ICE FREE
7-8
FAST ICE 8
6-8
3-5
3-5
ICE FREE
NOT OBSVD
NOT OBSVD
BANKS ISLAND
VICTORIA ISLAND
MELVILLE ISLAND
PRINCE OF WALES ISLAND
SOMERSET ISLAND
BARROW
BARTER IS
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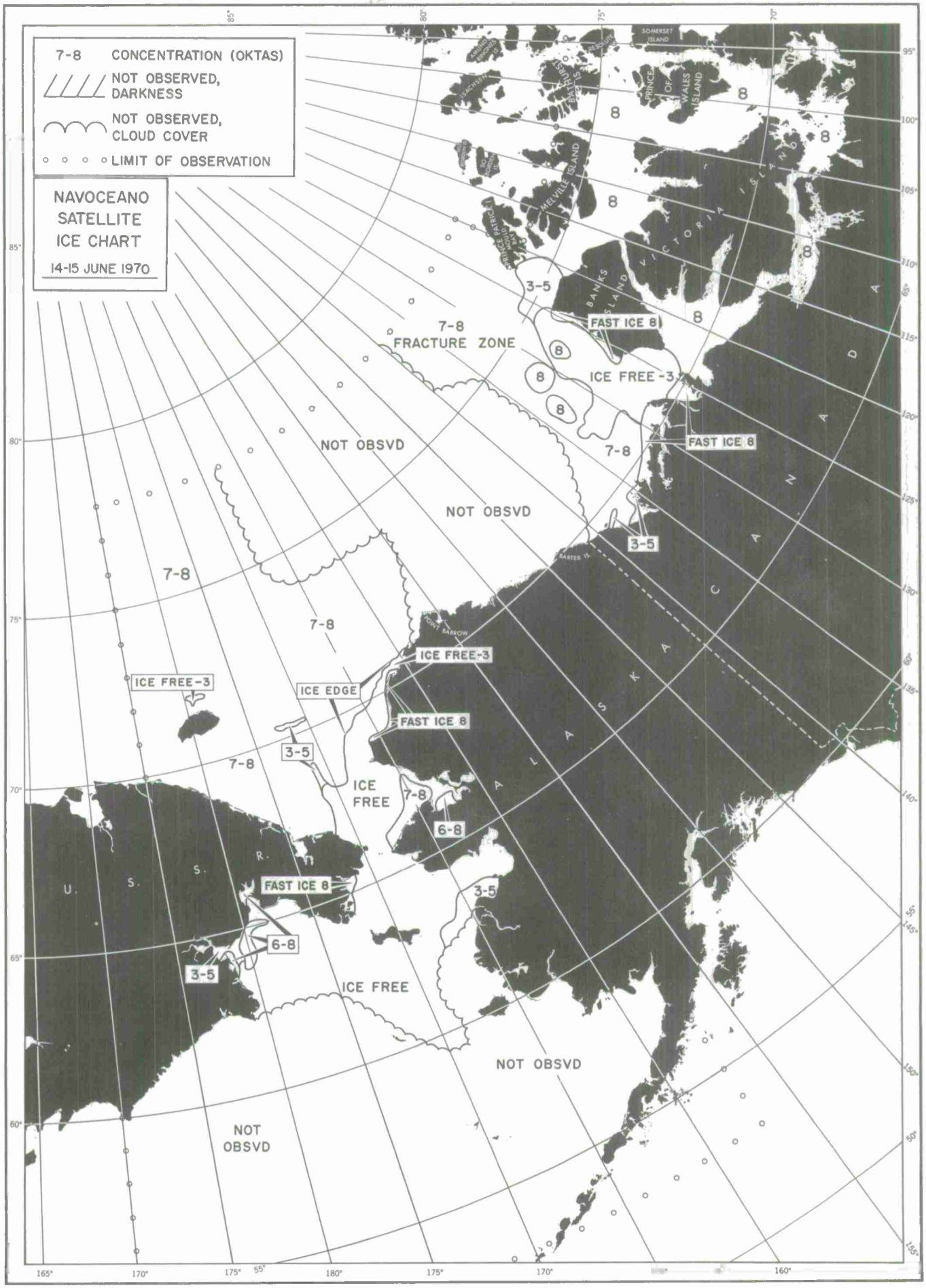
ALASKA
U. S. S. R.


7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
14-15 JUNE 1970
SOMERSET ISLAND
PRINCE OF WALES ISLAND
MELVILLE ISLAND
VICTORIA ISLAND
BANKS ISLAND
CANADA
ALASKA
U. S. S. R.
BARTER IS.
POINT BARROW
8
3-5
FAST ICE 8
7-8
FRACTURE ZONE
ICE FREE-3
NOT OBSVD
ICE EDGE
6-8
ICE FREE
85°
80°
75°
70°
95°
100°
105°
110°
115°
120°
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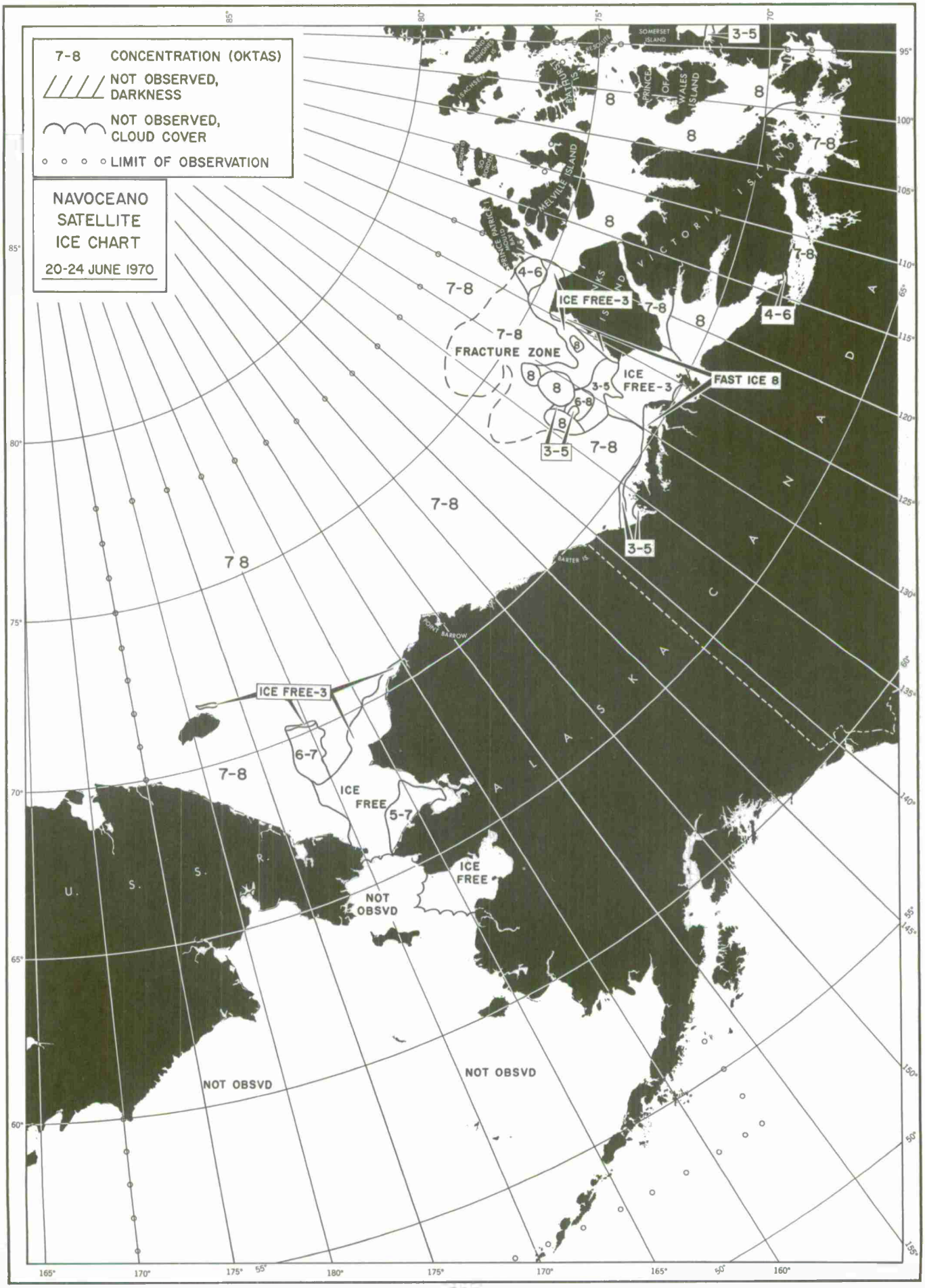
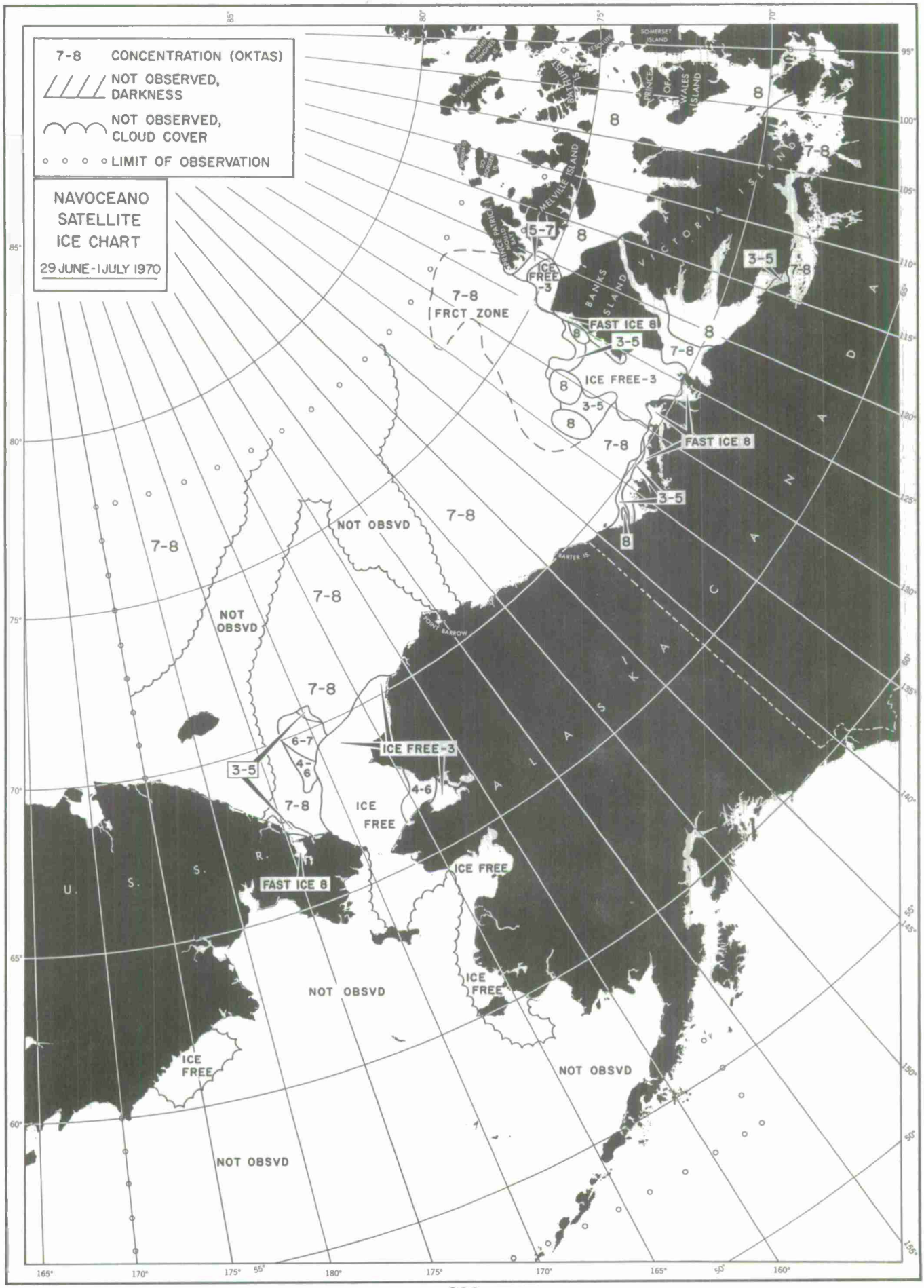
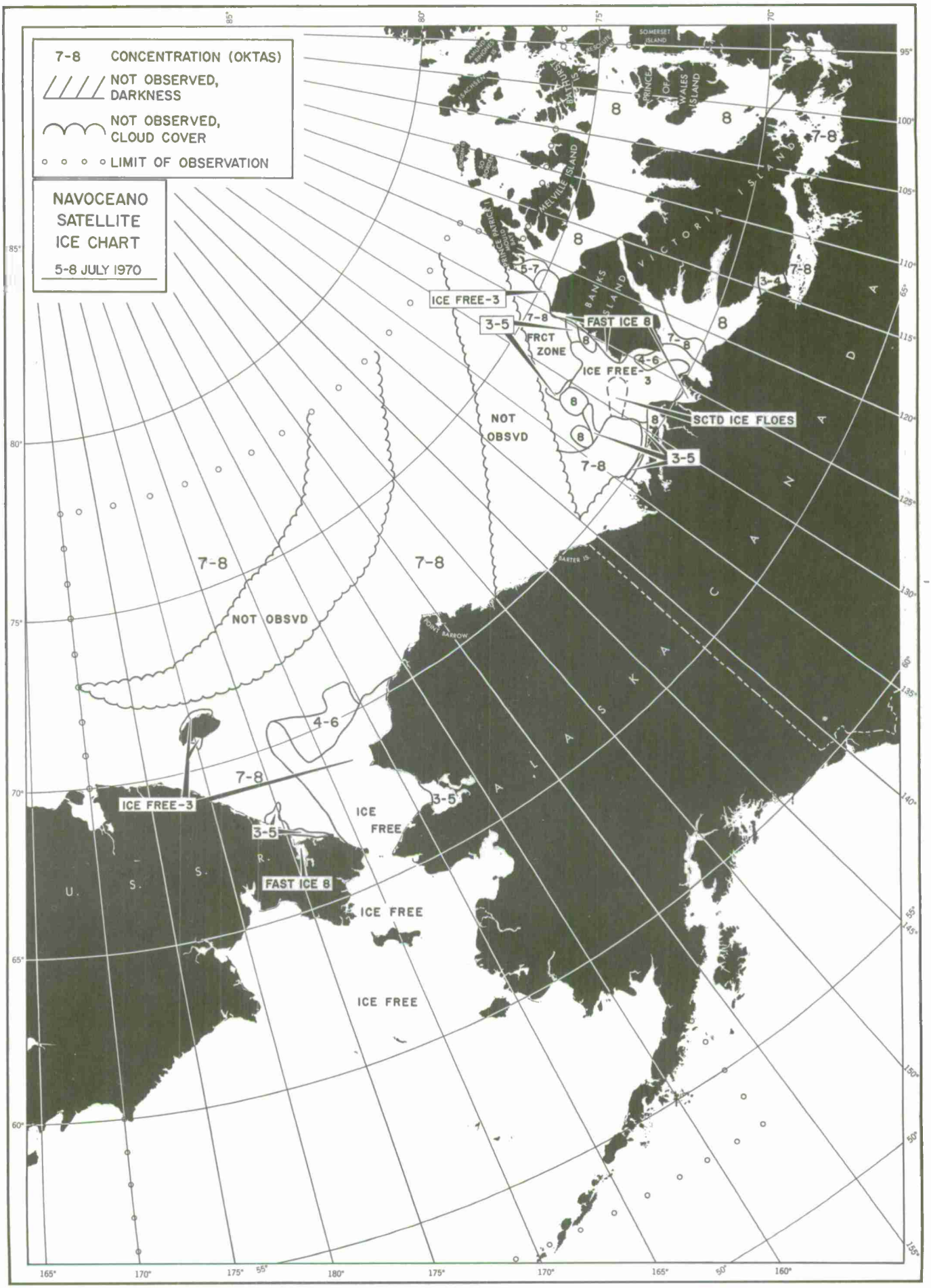

7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
20-24 JUNE 1970
SOMERSET ISLAND
3-5
PRINCE OF WALES ISLAND
VICTORIA ISLAND
MELVILLE ISLAND
PRINCE PATRICK ISLAND
BANKS ISLAND
4-6
7-8
ICE FREE-3
FRACTURE ZONE
FAST ICE 8
6-8
BARTER IS.
POINT BARROW
6-7
ICE FREE
5-7
NOT OBSVD
U. S. S. R.
CANADA
ALASKA


7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
29 JUNE-1 JULY 1970
7-8
FRCT ZONE
FAST ICE 8
3-5
ICE FREE-3
5-7
6-7
4-6
NOT OBSVD
ICE FREE
BARTER IS.
POINT BARROW
SOMERSET ISLAND
PRINCE OF WALES ISLAND
VICTORIA ISLAND
BANKS ISLAND
MELVILLE ISLAND
PRINCE PATRICK ISLAND
CANADA
ALASKA
U. S. S. R.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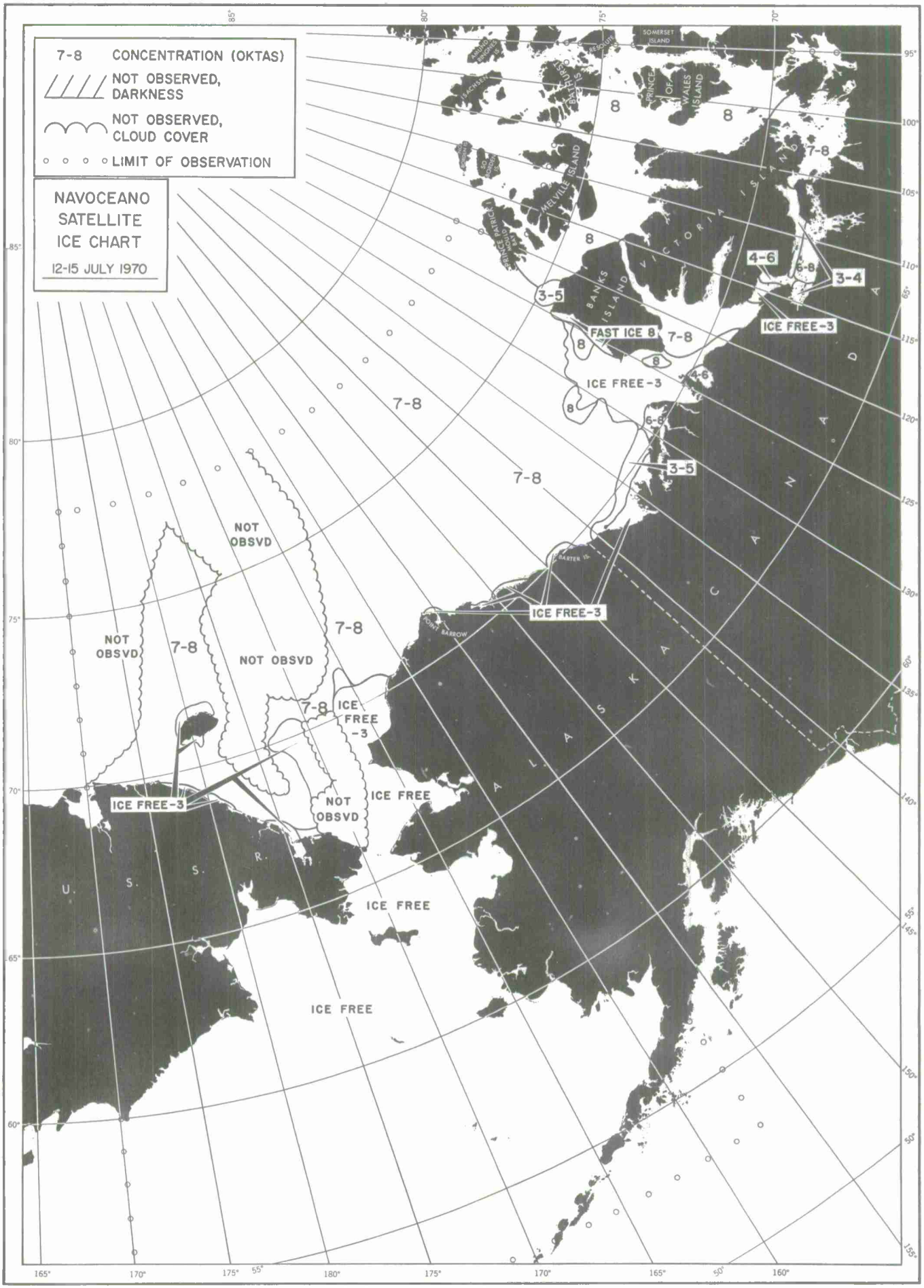
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
5-8 JULY 1970
SOMERSET ISLAND
PRINCE OF WALES ISLAND
VICTORIA ISLAND
BANKS ISLAND
MELVILLE ISLAND
PRINCE PATRICK ISLAND
ICE FREE-3
3-5
FAST ICE 8
FRCT ZONE
4-6
NOT OBSVD
SCTD ICE FLOES
7-8
BARTER IS.
POINT BARROW
ICE FREE
U. S. S. R.
CANADA
ALASKA
165° 170° 175° 180° 175° 170° 165° 160°
55° 55°


7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
12-15 JULY 1970
SOMERSET ISLAND
PRINCE OF WALES ISLAND
VICTORIA ISLAND
MELVILLE ISLAND
BANKS ISLAND
PRINCE PATRICK ISLAND
CANADA
ALASKA
U. S. S. R.
POINT BARROW
BARTER IS.
FAST ICE 8
ICE FREE-3
ICE FREE
NOT OBSVD
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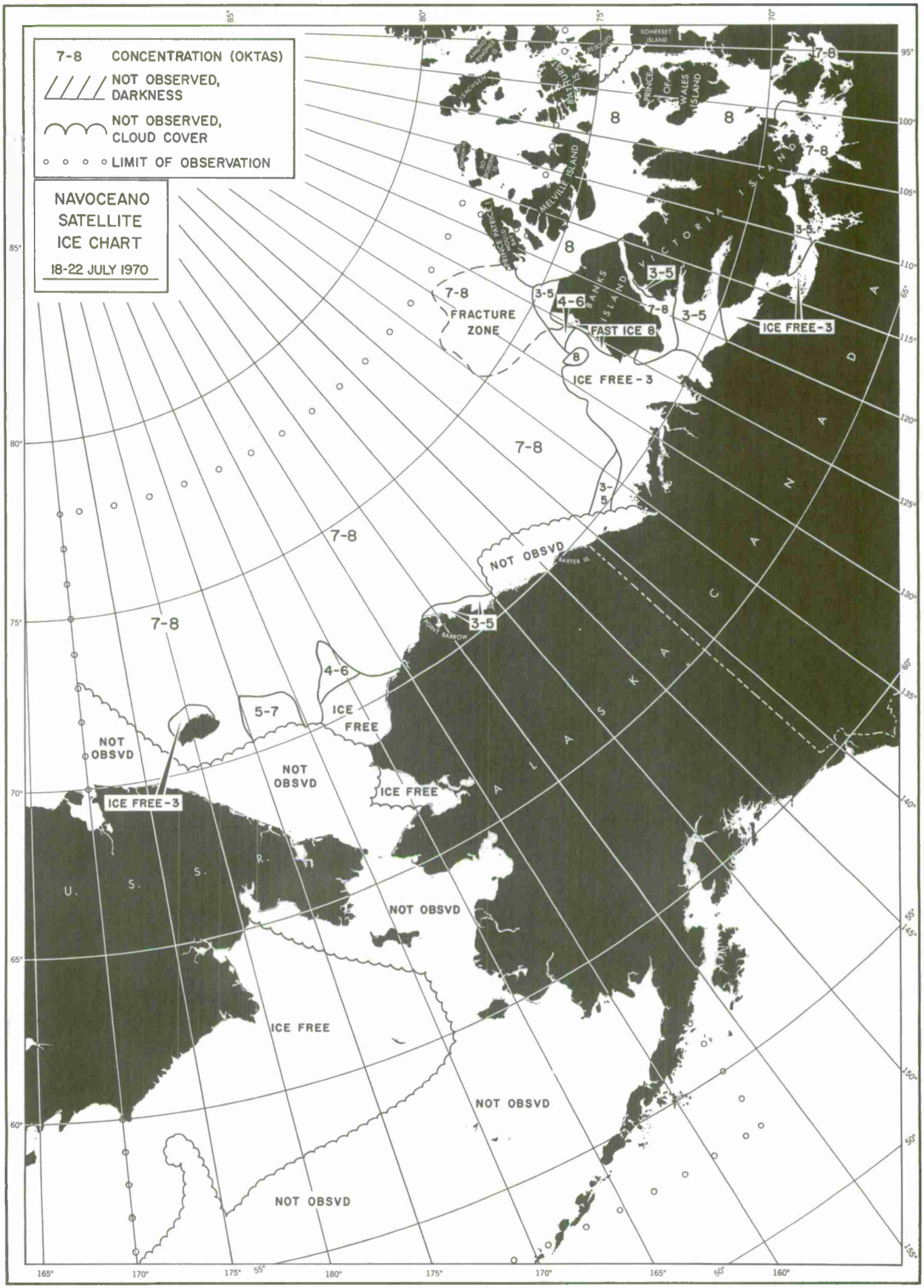
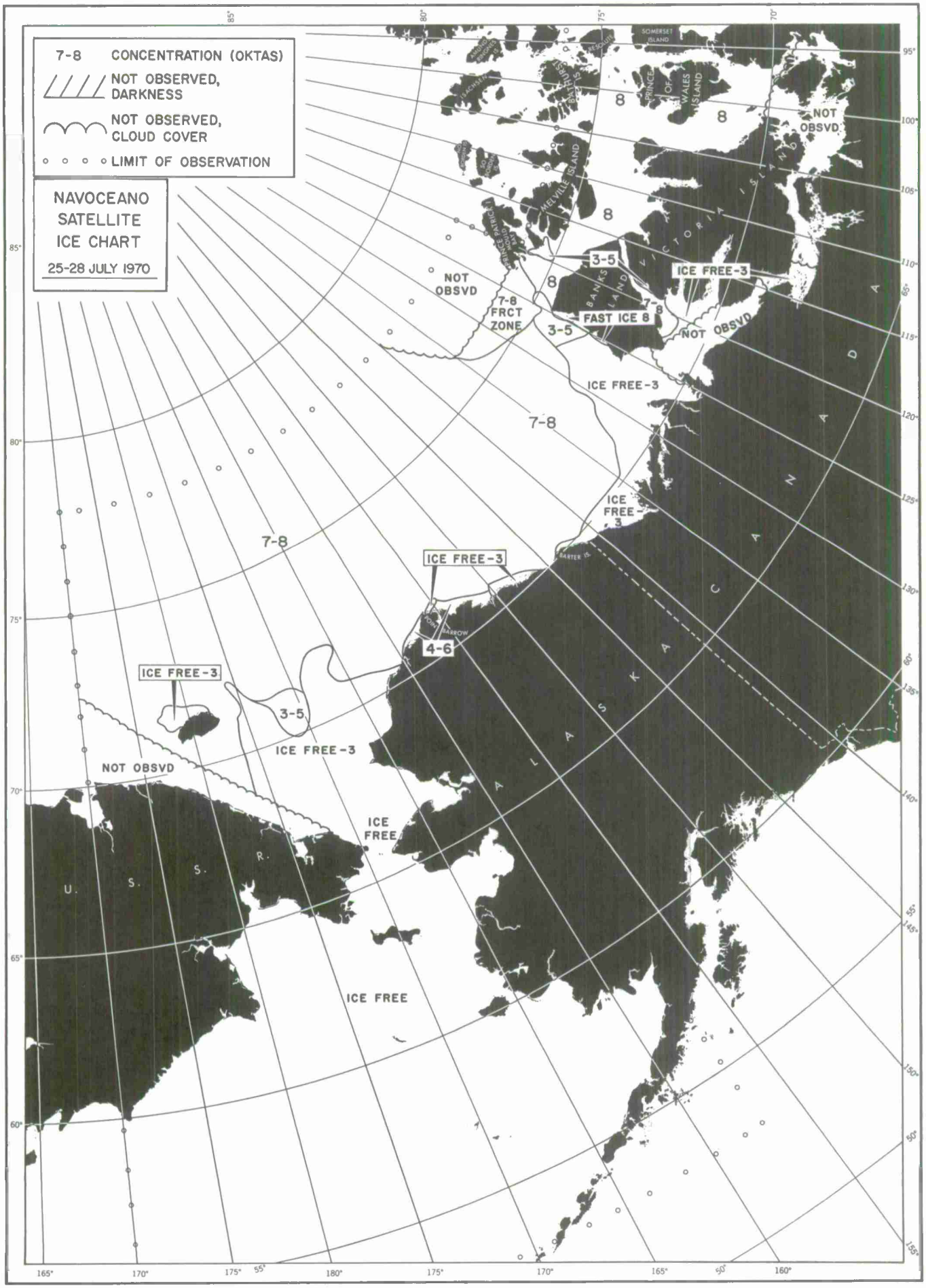
7-8
6-8
4-6
3-5
3-4


7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
18-22 JULY 1970
7-8
FRACTURE ZONE
FAST ICE 8
ICE FREE-3
3-5
4-6
5-7
ICE FREE
NOT OBSVD
SOMERSET ISLAND
PRINCE OF WALES ISLAND
MELVILLE ISLAND
VICTORIA ISLAND
BANKS ISLAND
PRINCE PATRICK ISLAND
BARTER IS.
POINT BARROW
CANADA
ALASKA
U. S. S. R.


7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
25-28 JULY 1970
NOT OBSVD
ICE FREE-3
3-5
7-8 FRCT ZONE
FAST ICE 8
7-8
4-6
ICE FREE
U. S. S. R.
CANADA
ALASKA
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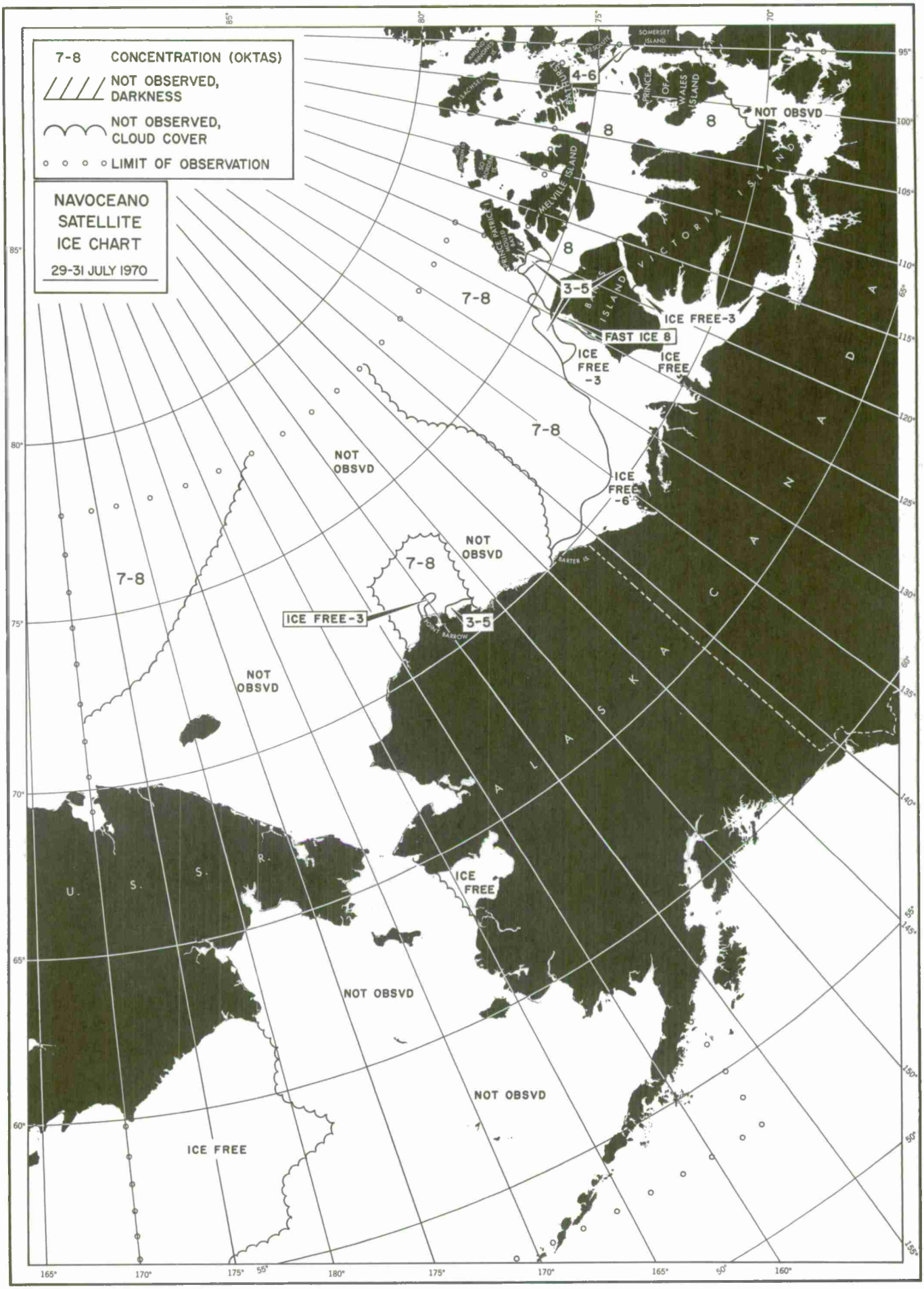
MELVILLE ISLAND
PRINCE OF WALES ISLAND
SOMERSET ISLAND
BARROW
BARTER IS.


7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
29-31 JULY 1970
SOMERSET ISLAND
PRINCE OF WALES ISLAND
NOT OBSVD
4-6
8
VICTORIA ISLAND
MELVILLE ISLAND
PRINCE PATRICK ISLAND
BANKS ISLAND
3-5
7-8
ICE FREE-3
FAST ICE 8
ICE FREE -3
ICE FREE
NOT OBSVD
ICE FREE -6
CANADA
BARTER IS.
POINT BARROW
ALASKA
U. S. S. R.
ICE FREE
NOT OBSVD
NOT OBSVD
ICE FREE
85°
80°
75°
70°
95°
100°
105°
110°
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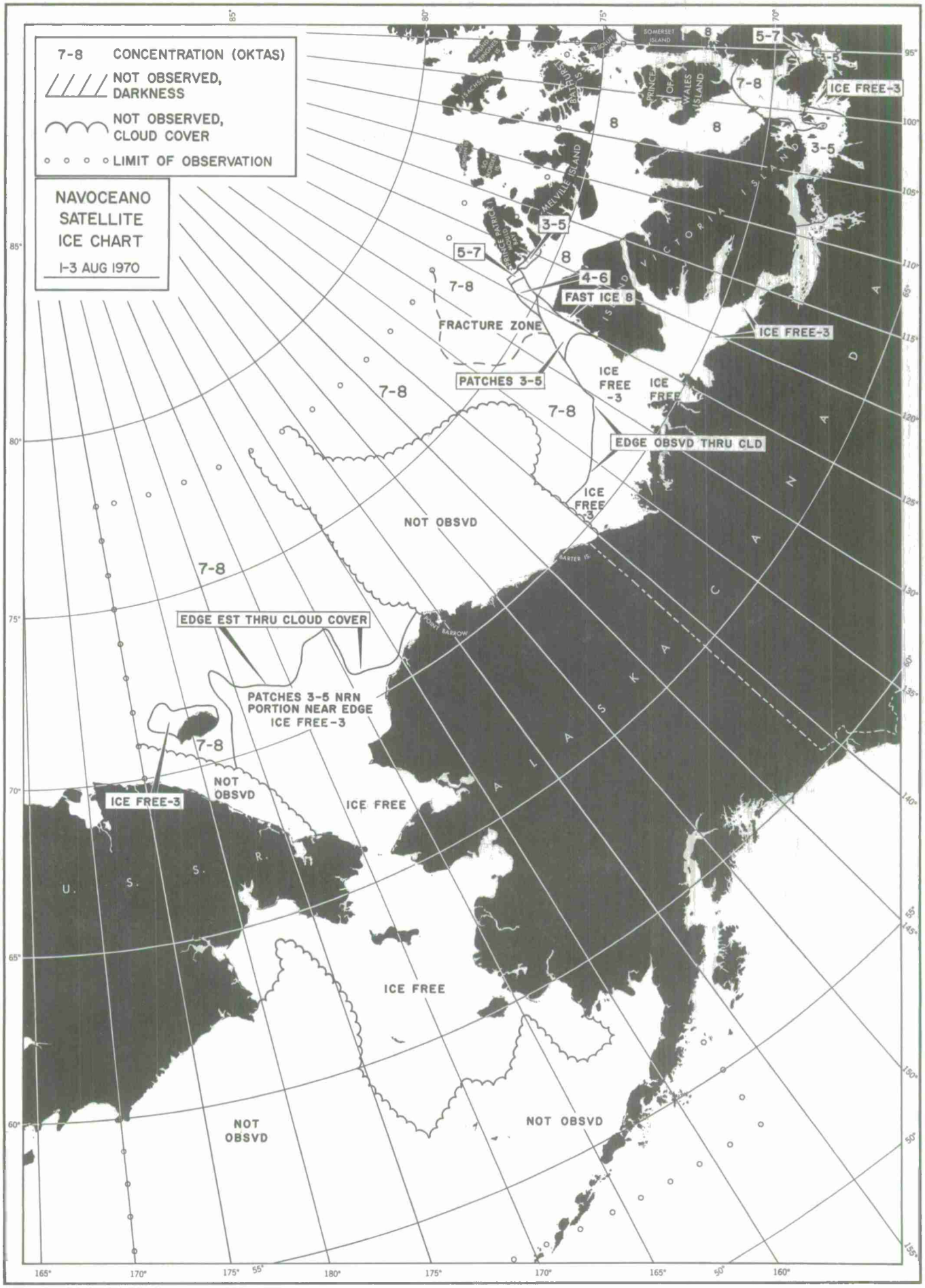
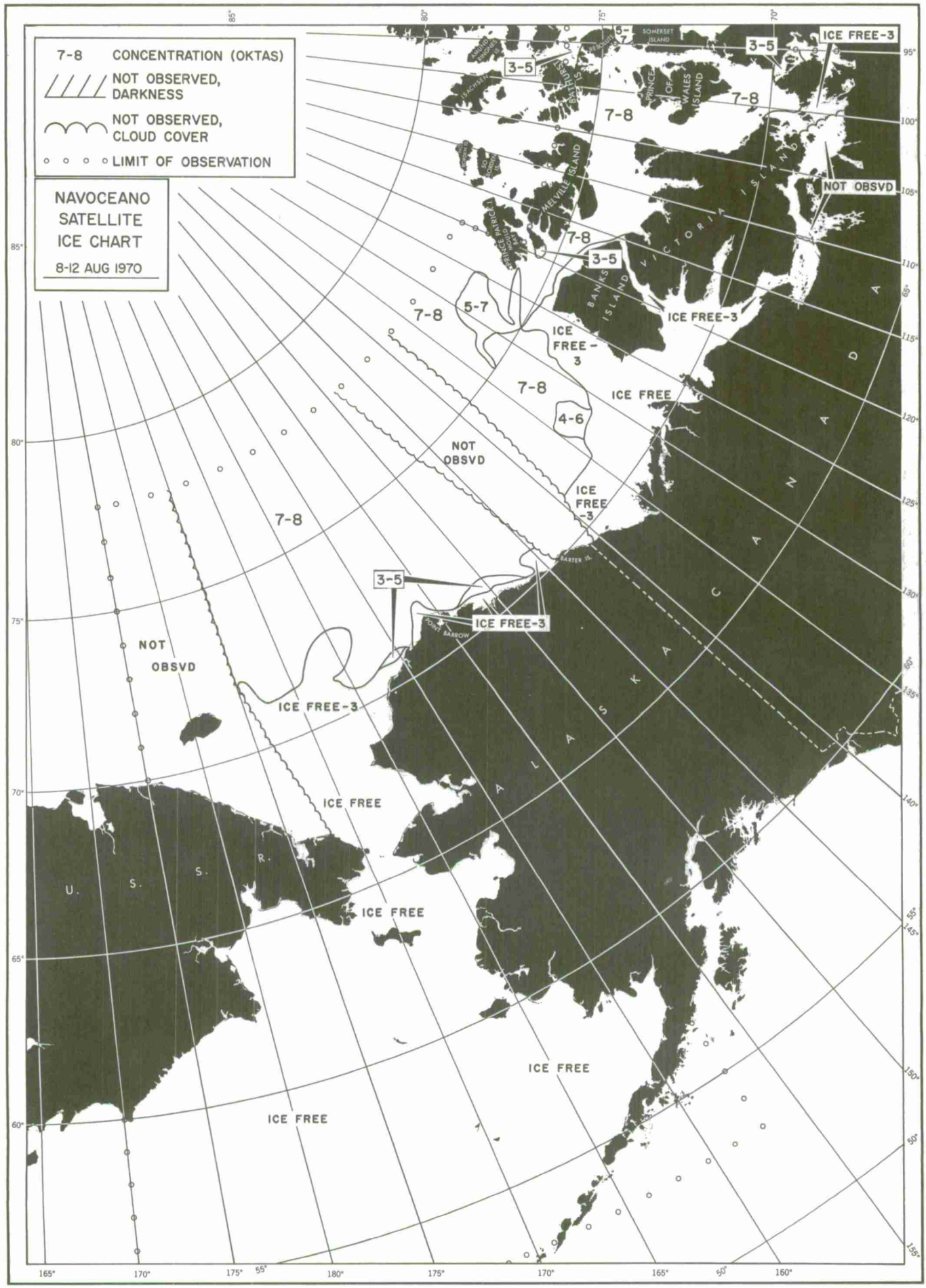

7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
1-3 AUG 1970
7-8
5-7
ICE FREE-3
8
3-5
4-6
FAST ICE 8
FRACTURE ZONE
PATCHES 3-5
ICE FREE -3
ICE FREE
EDGE OBSVD THRU CLD
NOT OBSVD
EDGE EST THRU CLOUD COVER
PATCHES 3-5 NRN PORTION NEAR EDGE ICE FREE-3
ICE FREE
U. S. S. R.
CANADA
ALASKA
SOMERSET ISLAND
PRINCE OF WALES ISLAND
MELVILLE ISLAND
PRINCE PATRICK ISLAND
VICTORIA ISLAND
BARTER IS
POINT BARROW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NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
8-12 AUG 1970
ICE FREE-3
NOT OBSVD
ICE FREE
3-5
5-7
7-8
4-6
SOMERSET ISLAND
PRINCE OF WALES ISLAND
VICTORIA ISLAND
BANKS ISLAND
MELVILLE ISLAND
PRINCE PATRICK ISLAND
BARTER IS.
POINT BARROW
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ALASKA
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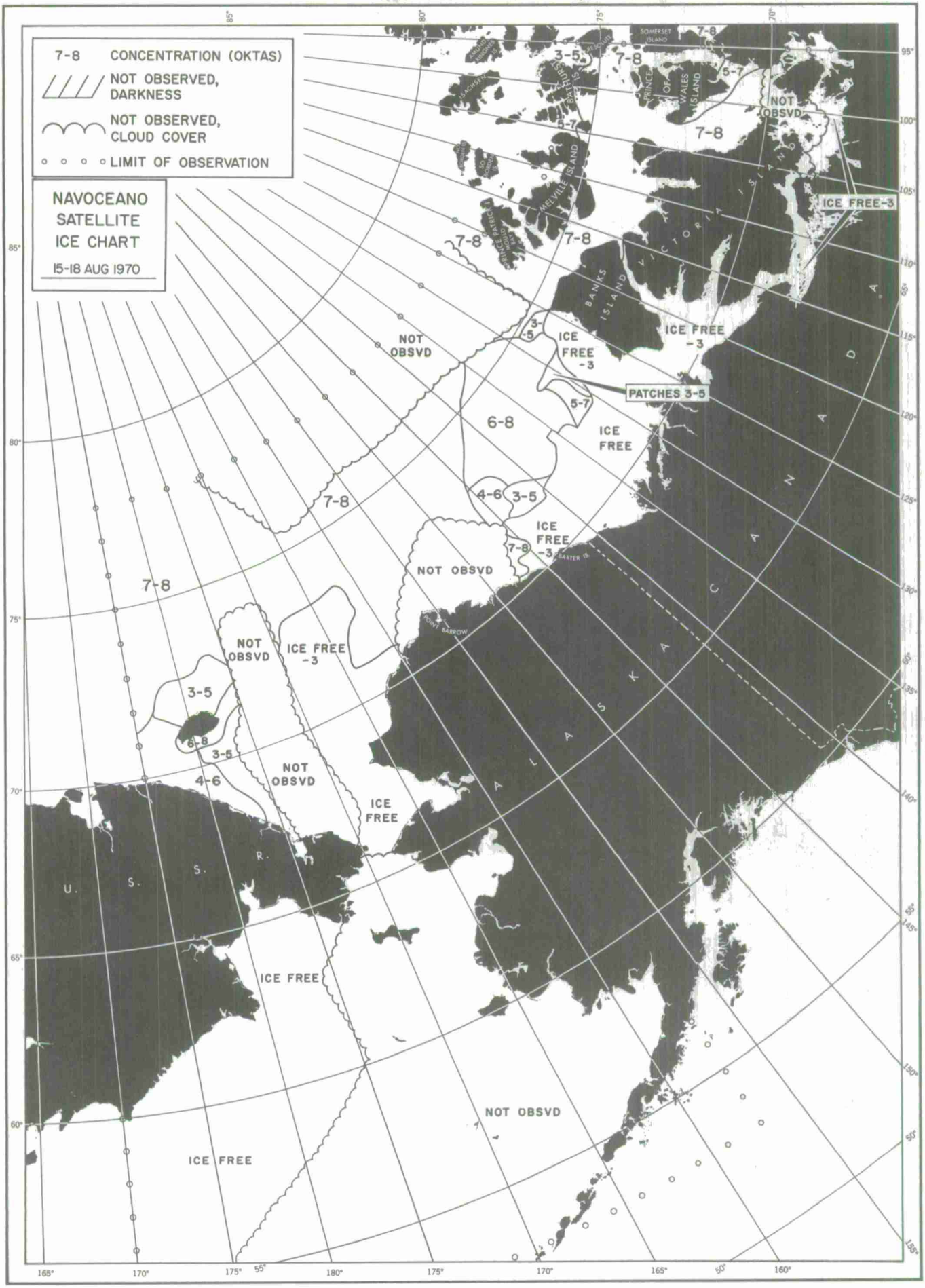
7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
15-18 AUG 1970
SOMERSET ISLAND
PRINCE OF WALES ISLAND
MELVILLE ISLAND
BANKS ISLAND
VICTORIA ISLAND
CANADA
ALASKA
U. S. S. R.
POINT BARROW
NOT OBSVD
ICE FREE -3
PATCHES 3-5
ICE FREE
7-8
6-8
5-7
4-6
3-5
85°
80°
75°
70°
65°
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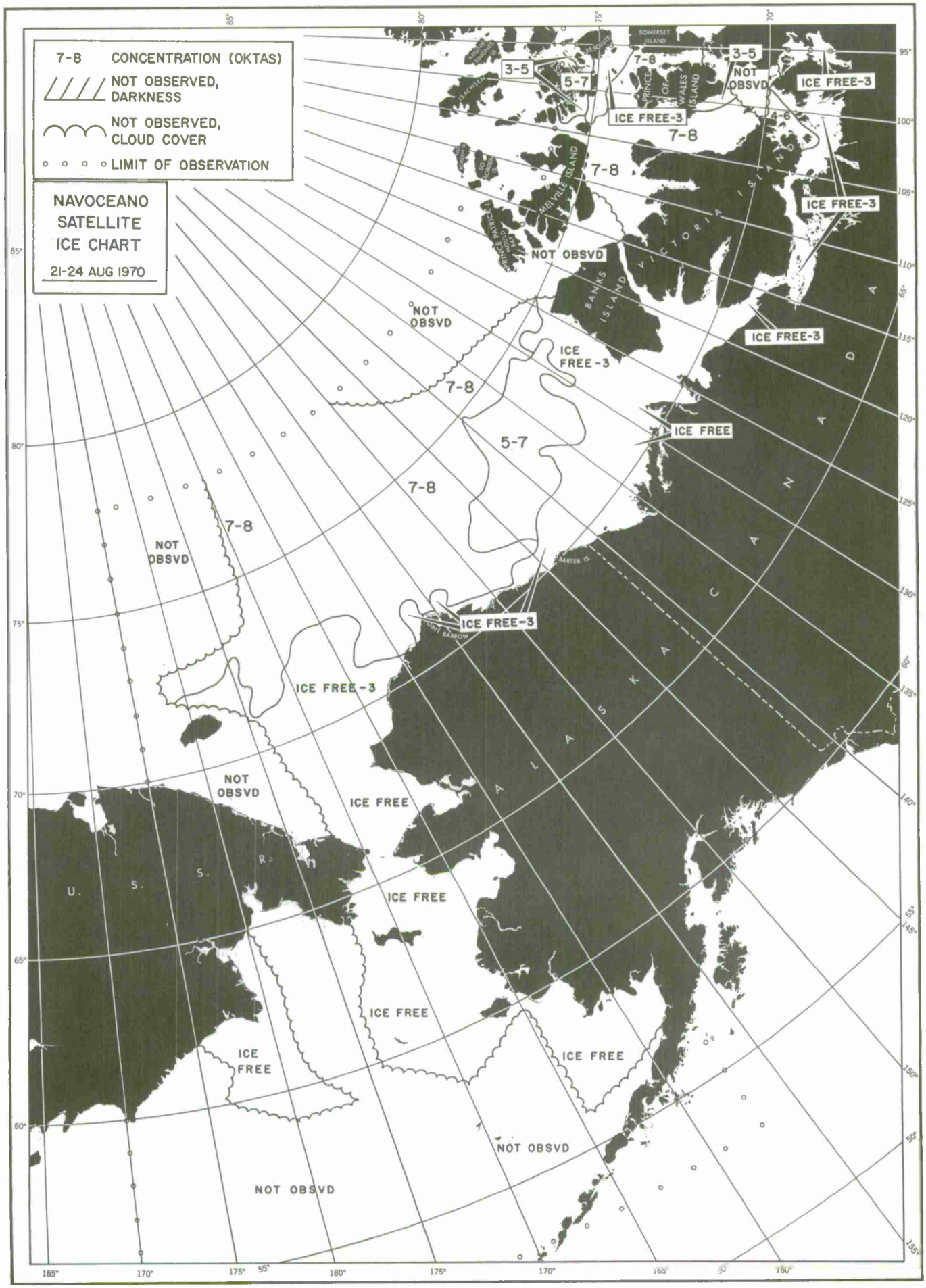
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NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
21-24 AUG 1970
3-5
5-7
7-8
NOT OBSVD
ICE FREE-3
4-6
ICE FREE
SOMERSET ISLAND
PRINCE OF WALES ISLAND
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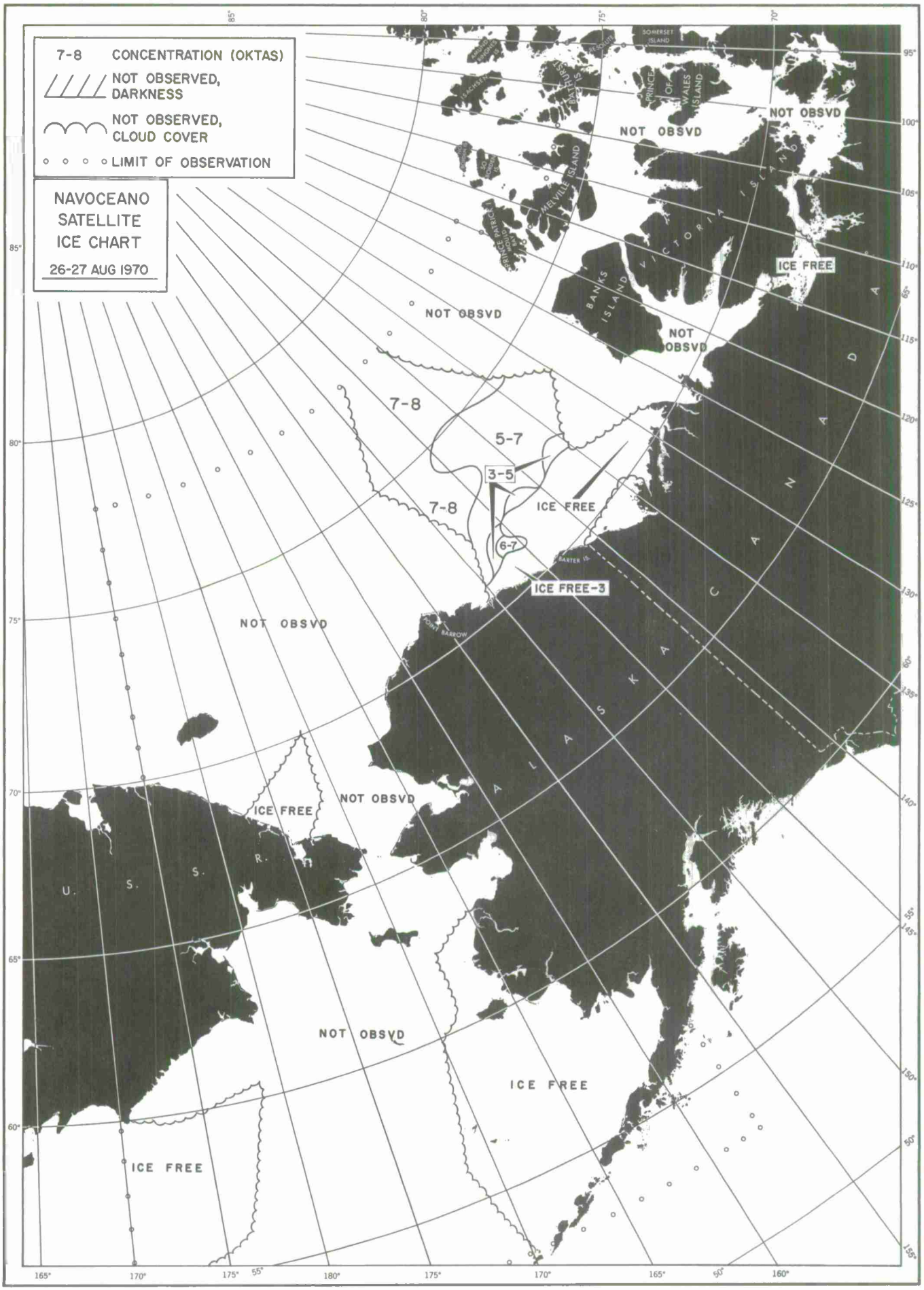
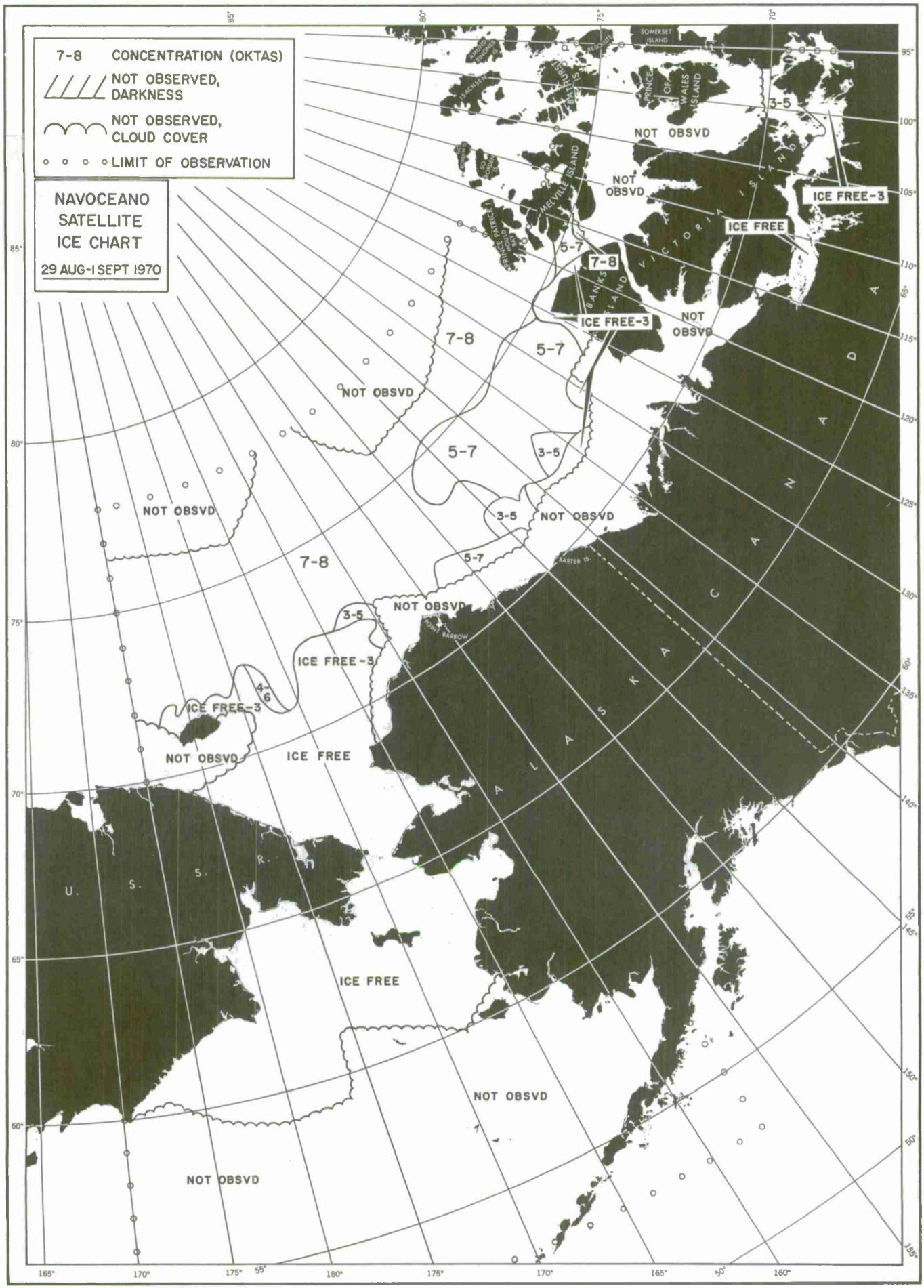
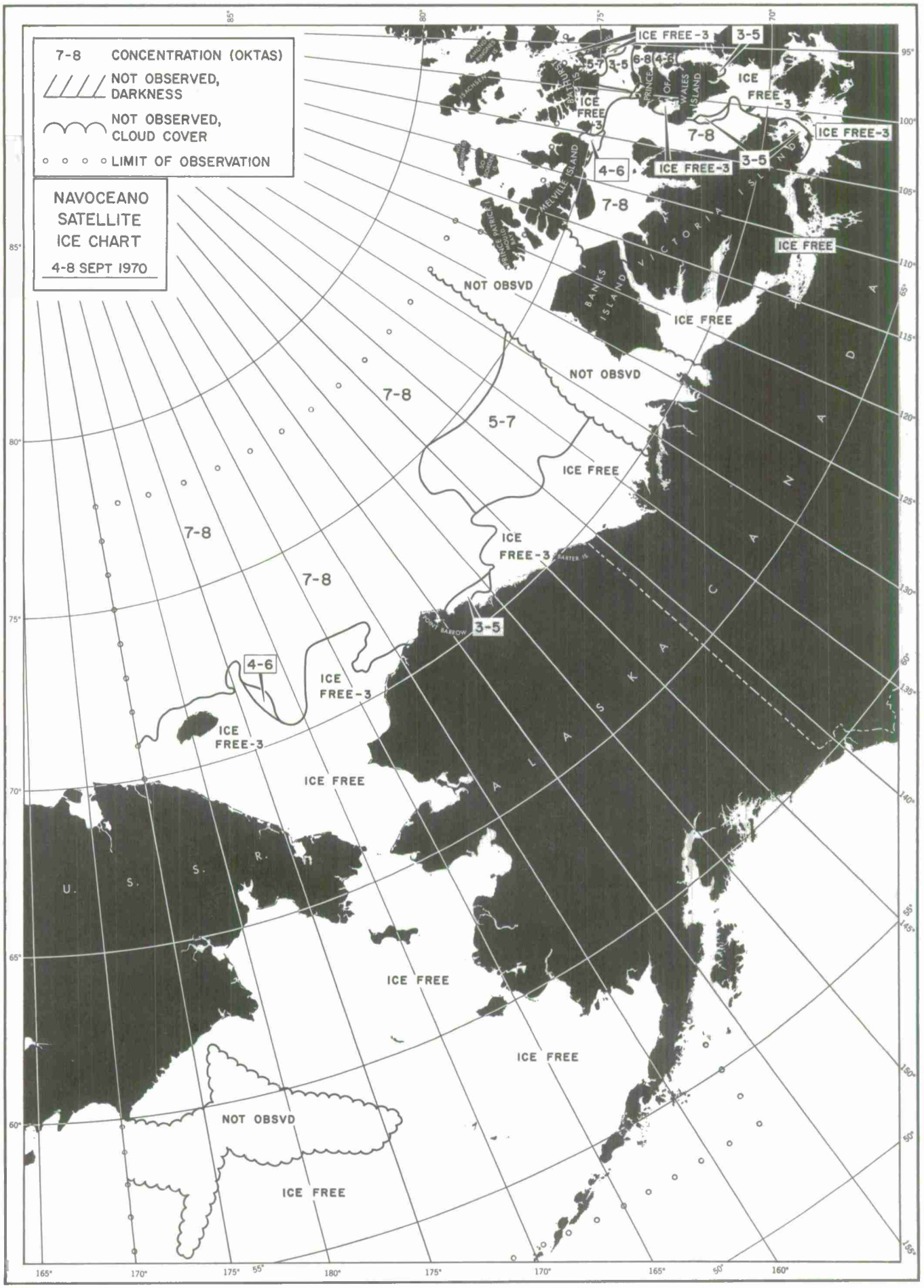
VICTORIA ISLAND
BANKS ISLAND
CANADA
ALASKA
BARTER IS.
POINT BARROW
U. S. S. R.


7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
26-27 AUG 1970
NOT OBSVD
ICE FREE
7-8
5-7
3-5
6-7
ICE FREE-3
U. S. S. R.
CANADA
ALASKA
BANKS ISLAND
VICTORIA ISLAND
MELVILLE ISLAND
PRINCE OF WALES ISLAND
SOMERSET ISLAND
BARTER IS.
POINT BARROW


7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
29 AUG-1 SEPT 1970
NOT OBSVD
ICE FREE
ICE FREE-3
7-8
5-7
3-5
4-6
SOMERSET ISLAND
PRINCE OF WALES ISLAND
MELVILLE ISLAND
VICTORIA ISLAND
BANKS ISLAND
PRINCE PATRICK ISLAND
BARTER IS.
POINT BARROW
U. S. S. R.
A L A S K A
C A N A D A


7-8 CONCENTRATION (OKTAS)
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NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
4-8 SEPT 1970
ICE FREE-3
3-5
5-7
6-8
4-6
7-8
ICE FREE
NOT OBSVD
BANKS ISLAND
VICTORIA ISLAND
MELVILLE ISLAND
PRINCE OF WALES ISLAND
PRINCE PATRICK ISLAND
SACHSEN ISLANDS
SOMERSET ISLAND
CANADA
ALASKA
U. S. S. R.
POINT BARROW
BARTER IS.
85°
80°
75°
70°
95°
100°
105°
110°
115°
120°
125°
130°
135°
140°
145°
150°
155°
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170°
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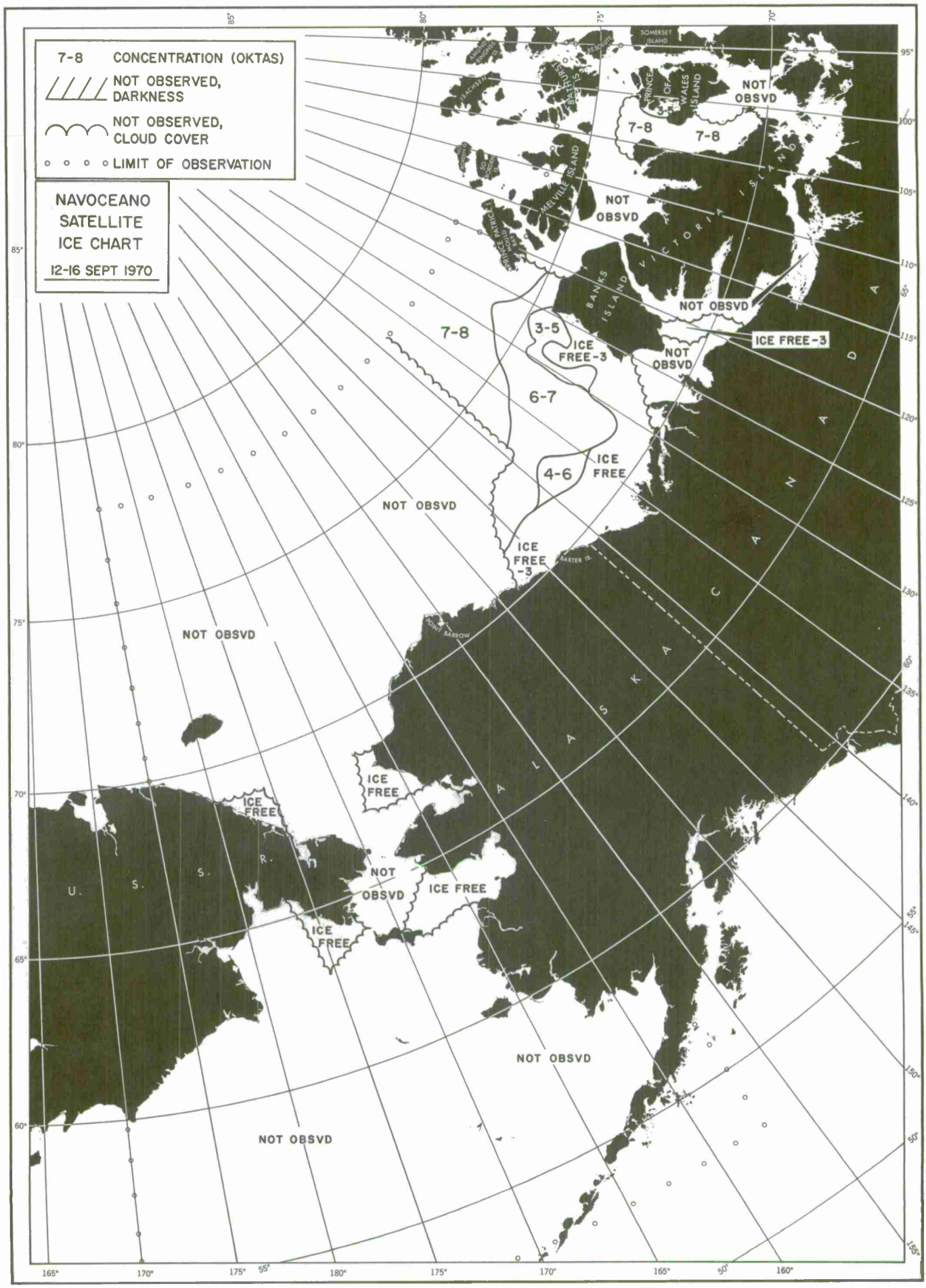
180°
55°
60°
65°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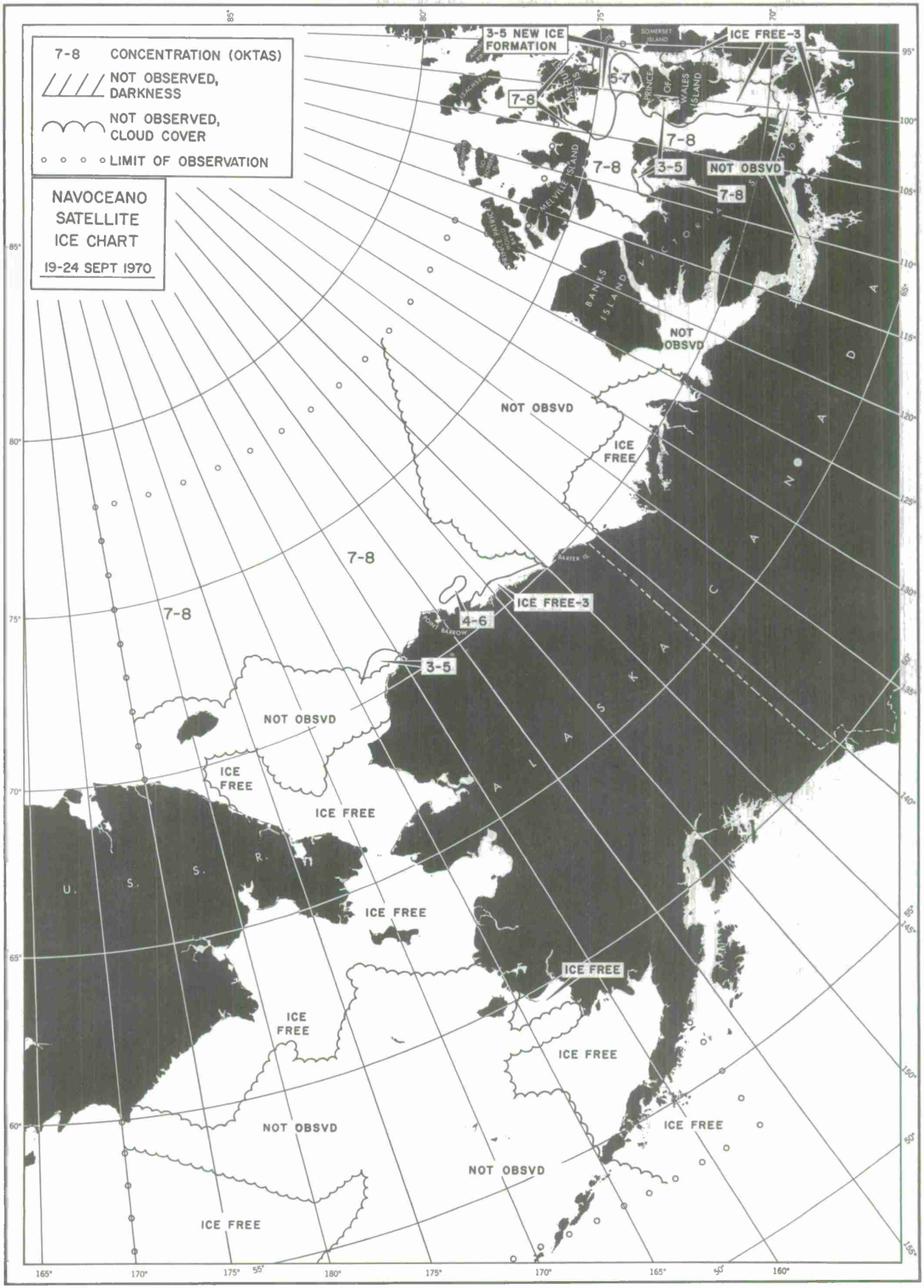
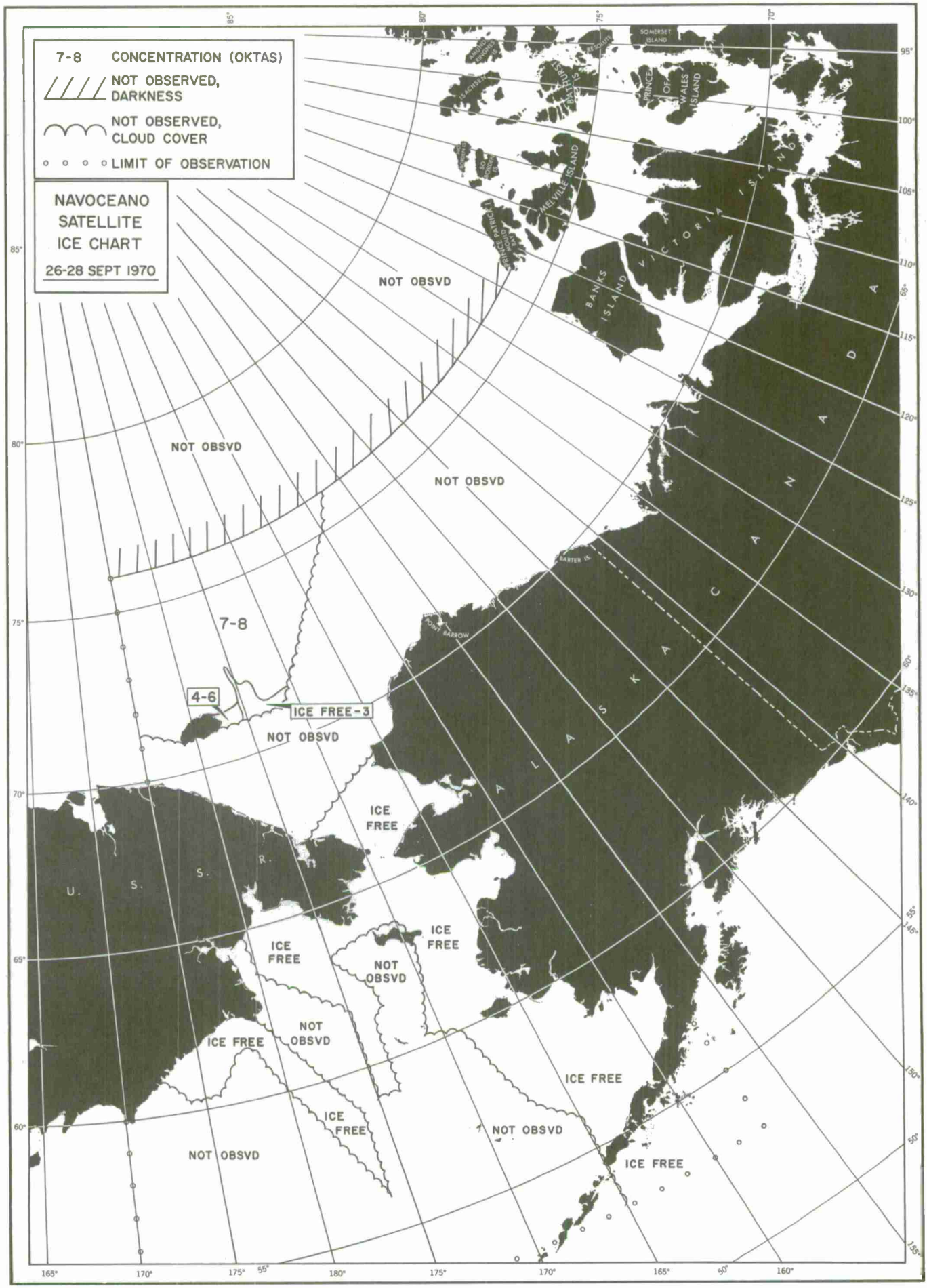
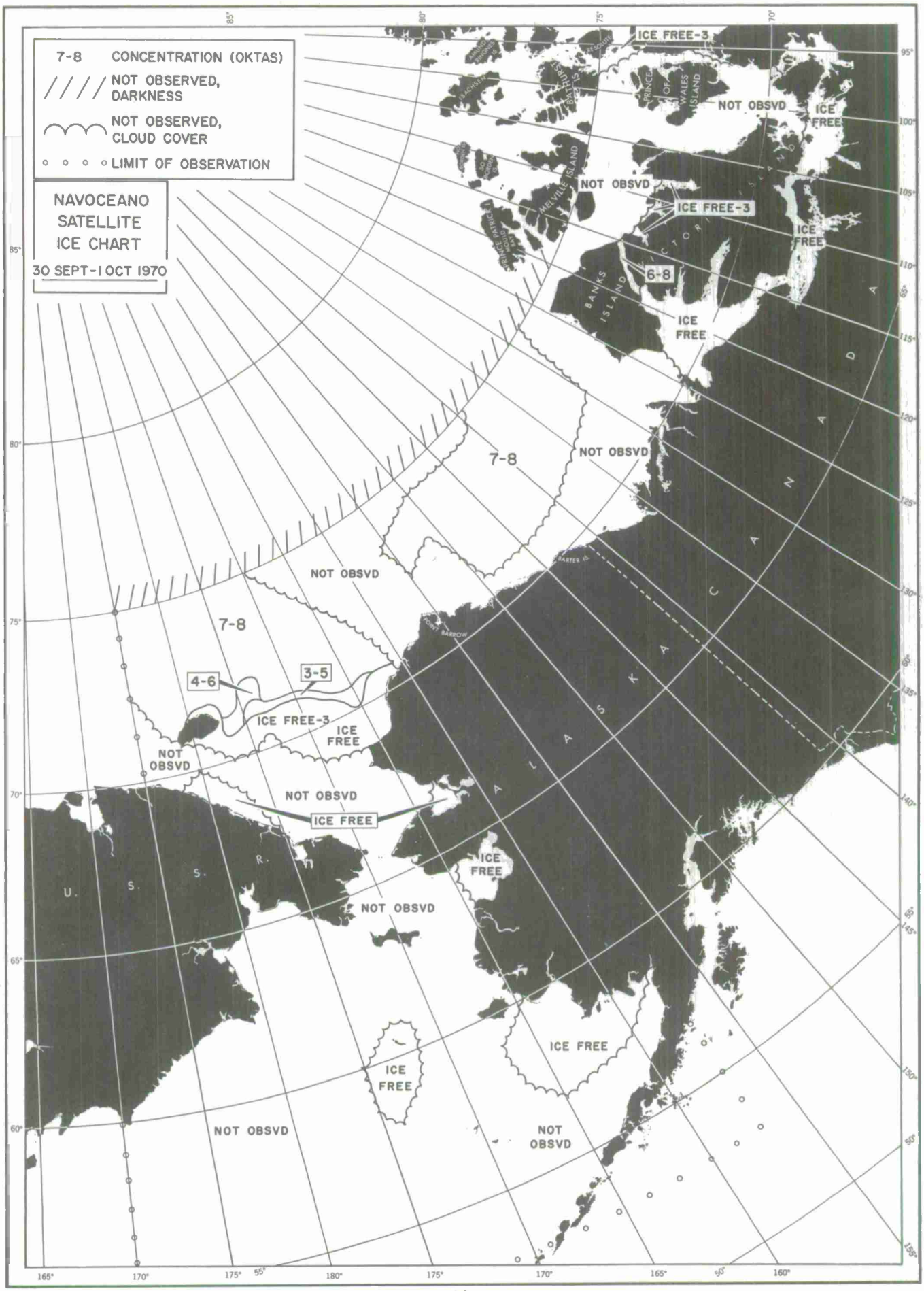
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
12-16 SEPT 1970
NOT OBSVD
7-8
3-5
ICE FREE-3
6-7
4-6
ICE FREE
U. S. S. R.
CANADA
ALASKA
SOMERSET ISLAND
PRINCE OF WALES ISLAND
MELVILLE ISLAND
VICTORIA ISLAND
BANKS ISLAND
PRINCE PATRICK
BARTER IS.
POINT BARROW


7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
19-24 SEPT 1970
3-5 NEW ICE FORMATION
ICE FREE-3
7-8
5-7
3-5
NOT OBSVD
4-6
ICE FREE
U. S. S. R.
A L A S K A
C A N A D A
BANKS ISLAND
VICTORIA ISLAND
PRINCE OF WALES ISLAND
SOMERSET ISLAND
MELVILLE ISLAND
PARRY CHANNEL
BARROW
POINT BARROW


7-8 CONCENTRATION (OKTAS)
NOT OBSERVED, DARKNESS
NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
26-28 SEPT 1970
NOT OBSVD
7-8
4-6
ICE FREE-3
ICE FREE
U. S. S. R.
BANKS ISLAND
VICTORIA ISLAND
MELVILLE ISLAND
PRINCE OF WALES ISLAND
SOMERSET ISLAND
BARTER IS.
POINT BARROW
CANADA
ALASKA


7-8 CONCENTRATION (OKTAS)
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NOT OBSERVED, CLOUD COVER
LIMIT OF OBSERVATION
NAVOCEANO SATELLITE ICE CHART
30 SEPT-1 OCT 1970
ICE FREE-3
NOT OBSVD
ICE FREE
ICE FREE-3
6-8
ICE FREE
ICE FREE
NOT OBSVD
7-8
NOT OBSVD
NOT OBSVD
4-6
3-5
ICE FREE-3
ICE FREE
NOT OBSVD
NOT OBSVD
ICE FREE
ICE FREE
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ICE FREE
ICE FREE
NOT OBSVD
NOT OBSVD
BANKS ISLAND
MELVILLE ISLAND
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Appendixes

Contains a summary of Naval Oceanographic Office and Naval Weather Service ice operations during 1970. Describes operational aspects of obtaining and disseminating ice information and the ice forecasting and observing program. Ice charts including Danish data depict observed synoptic ice conditions throughout the year. Ice conditions interpreted from satellite photographs are included separately. Locations of oceanographic stations occupied in the polar and subpolar regions are included.

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2. Ice Forecasting - Arctic
3. Oceanography - Arctic

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