

UNCLASSIFIED

**ANTARCTIC ICE CHARTS  
1983—1984**

**AD-A159 907**

**PREPARED BY  
NAVAL POLAR OCEANOGRAPHY CENTER,  
SUITLAND, MD**

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# C ICE CHARTS

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## FOREWORD

The U.S. Navy has a long and colorful history of polar exploration and currently is an active participant in the growing national activity in the Arctic and Antarctic. The strategic importance and increased demand for the natural resources of these areas have resulted in a greater requirement for environmental information. In 1976, the National Oceanic and Atmospheric Administration, (NOAA) joined the Navy in forming a Joint Ice Center (JIC) to combine efforts and resources in sea ice analysis and forecasting.

Through 1972, reliable sea ice information in the polar regions was based on a relatively few shore station and ship reports augmented by limited aerial reconnaissance data. These data were further restricted mainly to the relatively small areas observed primarily during the ship operating seasons. The advent of high resolution satellite imagery combined with the ground truth of conventional observations has in recent years enabled a description of the polar ice fields on a semi-synoptic scale in both polar regions.

This publication is the sixth in a continuing bi-yearly series of Antarctic sea ice atlases prepared in the Joint Ice Center at the Naval Polar Oceanography Center, Suitland. The atlas contains weekly charts depicting Southern Hemisphere ice conditions and extents. The information presented was prepared under operational time constraints principally from satellite imagery supplemented by conventional observations. Table 1, located on the inside back cover, summarizes satellite data availability for 1983 and 1984.

The purpose of this atlas is to provide operators and researchers with reliable weekly hemispheric ice analyses. Satellite data limitations and other difficulties involved in manually synthesizing various forms of ice data have evolved the following analysis procedures:

- a. Conventional shore station, ship and aerial ice reconnaissance observations are plotted on base charts and evaluated for timeliness.
- b. Satellite data is analyzed for ice information content, with the most recent and highest resolution considered first. Synthesis of conventional with satellite data yields the final analysis.
- c. Where sufficient data is not available to define the sea ice limit, an estimated ice boundary is depicted. After one week of no data availability the ice edge position is based on analyzed theoretical ice drift data and other diagnostic aids. During subsequent weeks of no data availability the ice edges approach seasonal mean positions.

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)  These are approximately 7-days analysis of sea ice prepared by the Naval Polar Oceanography Center, Suitland, MD. Included are ice concentration and ice thickness (age).		

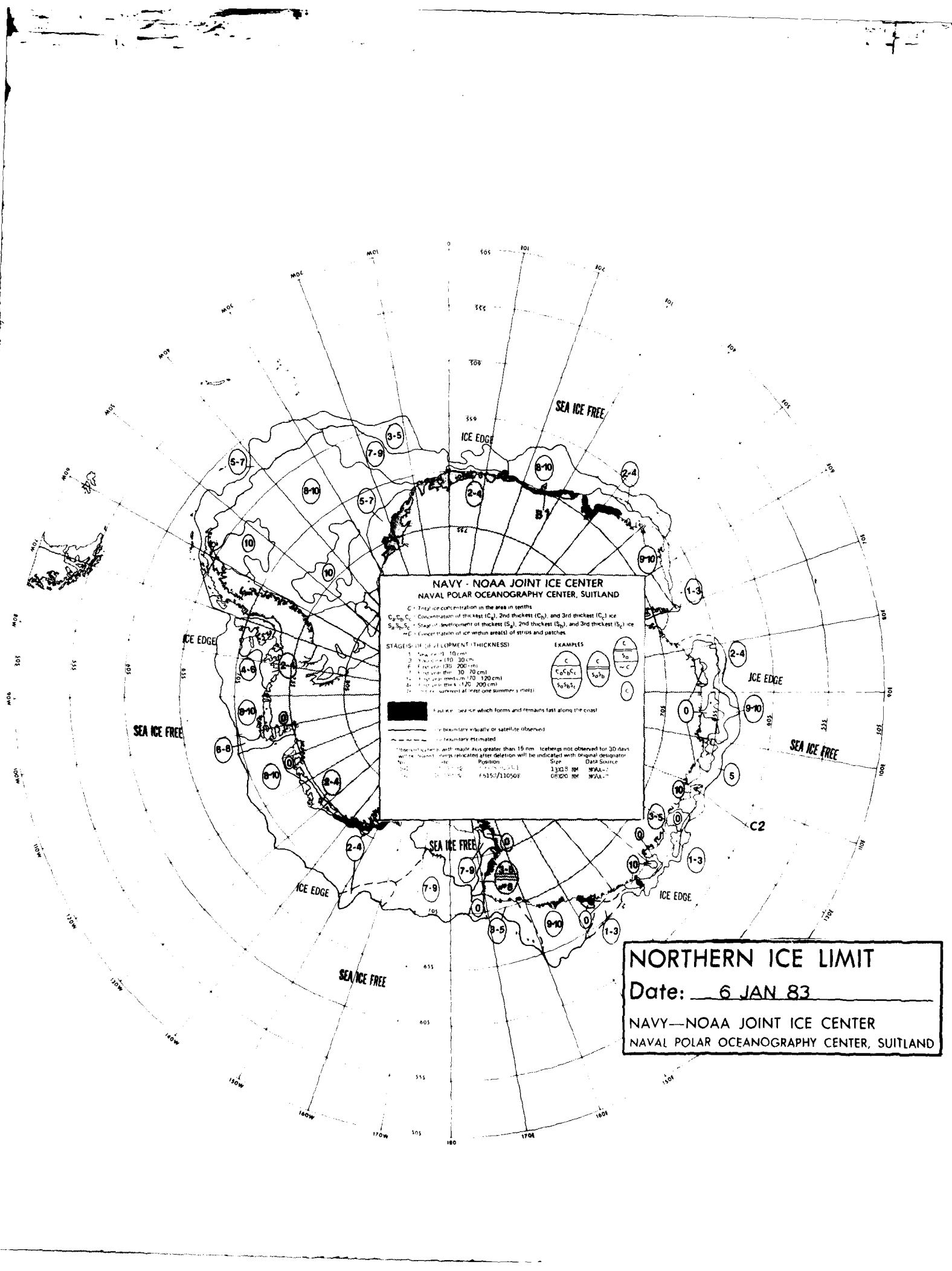
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**NAVY - NOAA JOINT ICE CENTER**  
**NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND**

C = Total ice concentration in the area in percents  
 C<sub>1</sub>, C<sub>2</sub>, C<sub>3</sub> = Concentration of the 1st (C<sub>1</sub>), 2nd thickest (C<sub>2</sub>), and 3rd thickest (C<sub>3</sub>) ice  
 S<sub>1</sub>, S<sub>2</sub>, S<sub>3</sub> = Stage or development of thickest (S<sub>1</sub>), 2nd thickest (S<sub>2</sub>), and 3rd thickest (S<sub>3</sub>) ice  
 m = (Lower portion of ice within areas) of straits and patches

**STAGES OF DEVELOPMENT (THICKNESS)**

1. Ice edge (10 cm)
2. Ice edge (10-30 cm)
3. Ice edge (30-200 cm)
4. Ice edge (20-70 cm)
5. Ice edge (medium 70-120 cm)
6. Ice edge (thick 120-200 cm)
7. Ice edge (submerged at least one summer's melt)

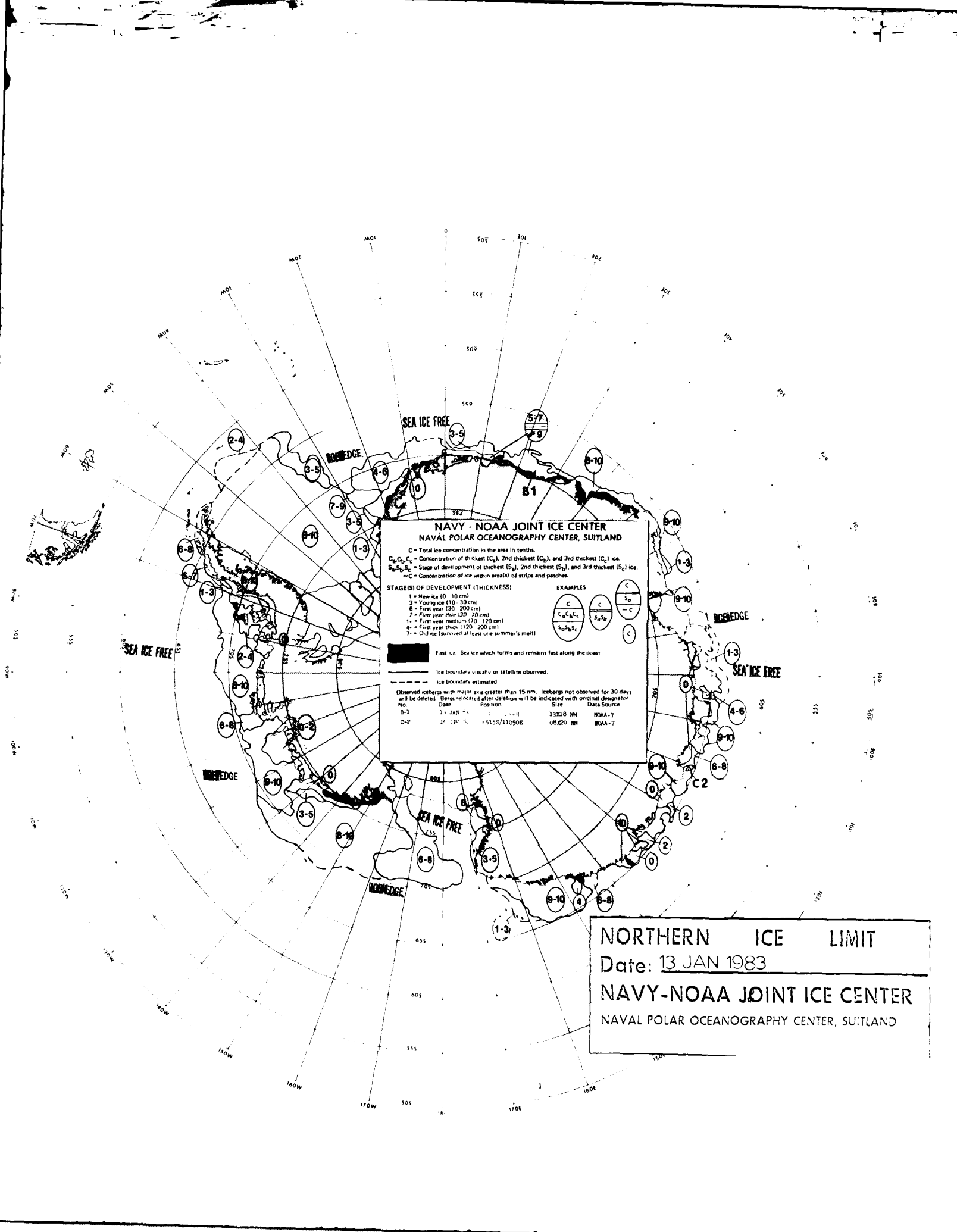
**EXAMPLES**

$\frac{C}{C_1 C_2 C_3}$	$\frac{C}{S_1 S_2 S_3}$	$\frac{C}{m}$
$\frac{C}{C_1 C_2 C_3}$	$\frac{C}{S_1 S_2 S_3}$	$\frac{C}{m}$

Fast ice - sea ice which forms and remains fast along the coast  
 Ice boundary visually or satellite observed  
 Ice boundary estimated  
 (Intersecting lines with major axis greater than 15 mm - Icebergs not observed for 30 days with the buoyant marks indicated after deletion will be indicated with original designator)

Date: 13 JAN 83  
 Position: 130°S 81°W  
 Date Source: 130°S 81°W  
 Data Source: 130°S 81°W

**NORTHERN ICE LIMIT**  
 Date: 6 JAN 83  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



**NAVY - NOAA JOINT ICE CENTER**  
**NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND**

C = Total ice concentration in the area in tenths.  
 $C_1, C_2, C_3$  = Concentration of thickest ( $C_1$ ), 2nd thickest ( $C_2$ ), and 3rd thickest ( $C_3$ ) ice.  
 $S_1, S_2, S_3$  = Stage of development of thickest ( $S_1$ ), 2nd thickest ( $S_2$ ), and 3rd thickest ( $S_3$ ) ice.  
 -C = Concentration of ice within area(s) of strips and patches.

**STAGES OF DEVELOPMENT (THICKNESS)**

- 1 = New ice (0 - 10 cm)
- 2 = Young ice (10 - 30 cm)
- 3 = First year (30 - 200 cm)
- 4 = First year thin (30 - 70 cm)
- 5 = First year medium (70 - 120 cm)
- 6 = First year thick (120 - 200 cm)
- 7 = Old ice (survived at least one summer's melt)

**EXAMPLES**

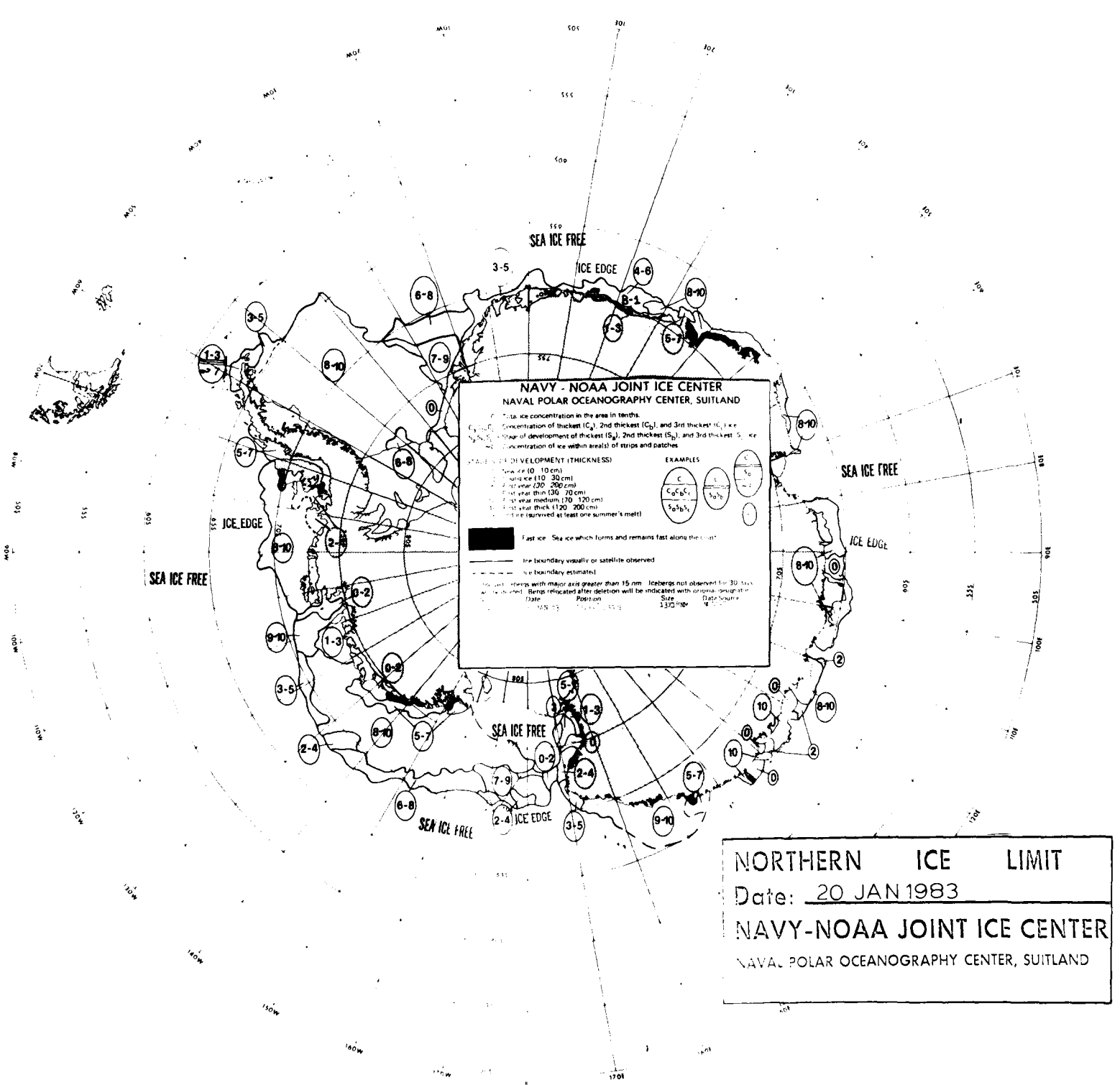
$\frac{C}{S_1 S_2 S_3}$	$\frac{C}{S_1 S_2}$	$\frac{C}{S_1}$	$\frac{C}{-C}$
$\frac{C}{S_1 S_2 S_3}$	$\frac{C}{S_1 S_2}$	$\frac{C}{S_1}$	$\frac{C}{-C}$

Fast ice - Sea ice which forms and remains fast along the coast.  
 — Ice boundary visually or satellite observed.  
 - - - Ice boundary estimated.

Observed icebergs with major axis greater than 15 nm. Icebergs not observed for 30 days will be deleted. Beras indicated after deletion will be indicated with original designator.

No.	Date	Position	Size	Data Source
B-1	13 JAN 83	155°E 75°N	13X15 NM	NOAA-7
D-2	13 JAN 83	151°55' 71°05'00"E	08X20 NM	NOAA-7

**NORTHERN ICE LIMIT**  
 Date: 13 JAN 1983  
**NAVY-NOAA JOINT ICE CENTER**  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



**NAVY - NOAA JOINT ICE CENTER**  
**NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND**

C<sub>1</sub> Ice concentration in the area in tenths  
 C<sub>2</sub> Concentration of thickest (C<sub>1</sub>), 2nd thickest (C<sub>2</sub>), and 3rd thickest (C<sub>3</sub>) ice  
 S<sub>1</sub> Stage of development of thickest (S<sub>1</sub>), 2nd thickest (S<sub>2</sub>), and 3rd thickest (S<sub>3</sub>) ice  
 A<sub>1</sub> Concentration of ice within areas (A<sub>1</sub>, A<sub>2</sub>, A<sub>3</sub>) of strips and patches

**STAGE OF DEVELOPMENT (THICKNESS)**

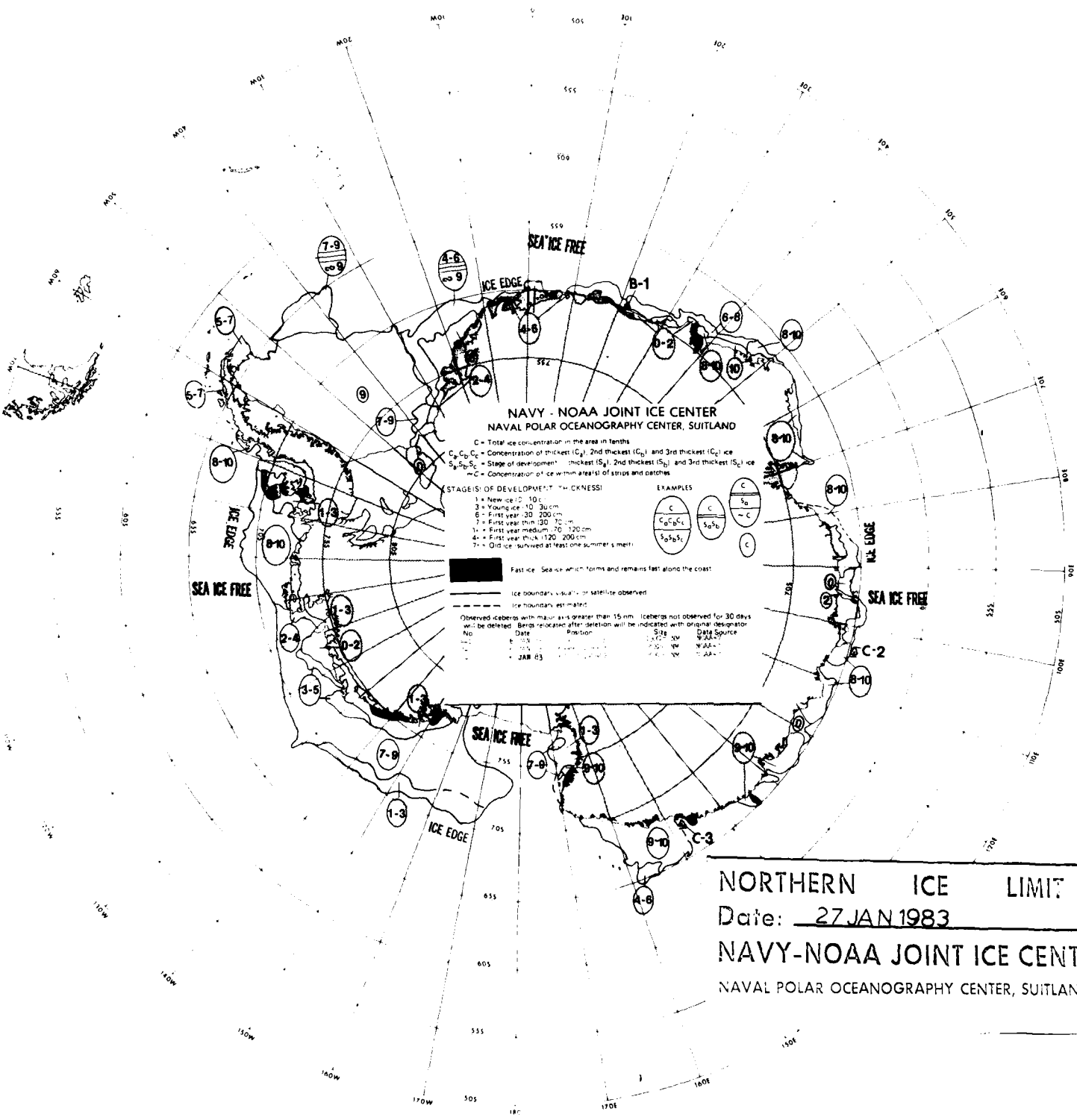
- Stage 1 (0 - 10 cm)
- Stage 2 (10 - 30 cm)
- Stage 3 (30 - 70 cm)
- Stage 4 (70 - 120 cm)
- Stage 5 (120 - 200 cm)
- Stage 6 (200 cm or more)
- Stage 7 (ice survived at least one summer's melt)

**EXAMPLES**

C<sub>1</sub> C<sub>2</sub> C<sub>3</sub> S<sub>1</sub> S<sub>2</sub> S<sub>3</sub> A<sub>1</sub> A<sub>2</sub> A<sub>3</sub>

■ Fast ice: Sea ice which forms and remains fast along the coast  
 — Ice boundary visually or satellite observed  
 - - - Ice boundary estimated  
 ○ Icebergs with major axis greater than 15 nm. Icebergs not observed for 30 days are indicated. Bergs relocated after deletion will be indicated with original designation.  
 Date: 20 JAN 83 Position: 137° 10'W 64° 10'N

**NORTHERN ICE LIMIT**  
 Date: 20 JAN 1983  
**NAVY-NOAA JOINT ICE CENTER**  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



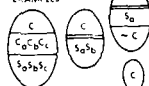
**NAVY - NOAA JOINT ICE CENTER**  
**NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND**

C = Total ice concentration in the area in tenths  
 C<sub>1</sub> C<sub>2</sub> C<sub>3</sub> = Concentration of thickest (C<sub>1</sub>), 2nd thickest (C<sub>2</sub>) and 3rd thickest (C<sub>3</sub>) ice  
 S<sub>1</sub> S<sub>2</sub> S<sub>3</sub> = Stage of development - thickest (S<sub>1</sub>), 2nd thickest (S<sub>2</sub>) and 3rd thickest (S<sub>3</sub>) ice  
 T = Concentration of ice within area(s) of strips and patches

**STAGES OF DEVELOPMENT - THICKNESS:**

- 1 = New ice (0-10 cm)
- 2 = Young ice (10-30 cm)
- 3 = First year thin (30-200 cm)
- 4 = First year medium (20-200 cm)
- 5 = First year thick (120-200 cm)
- 6 = Old ice (survived at least one summer's melt)

**EXAMPLES**



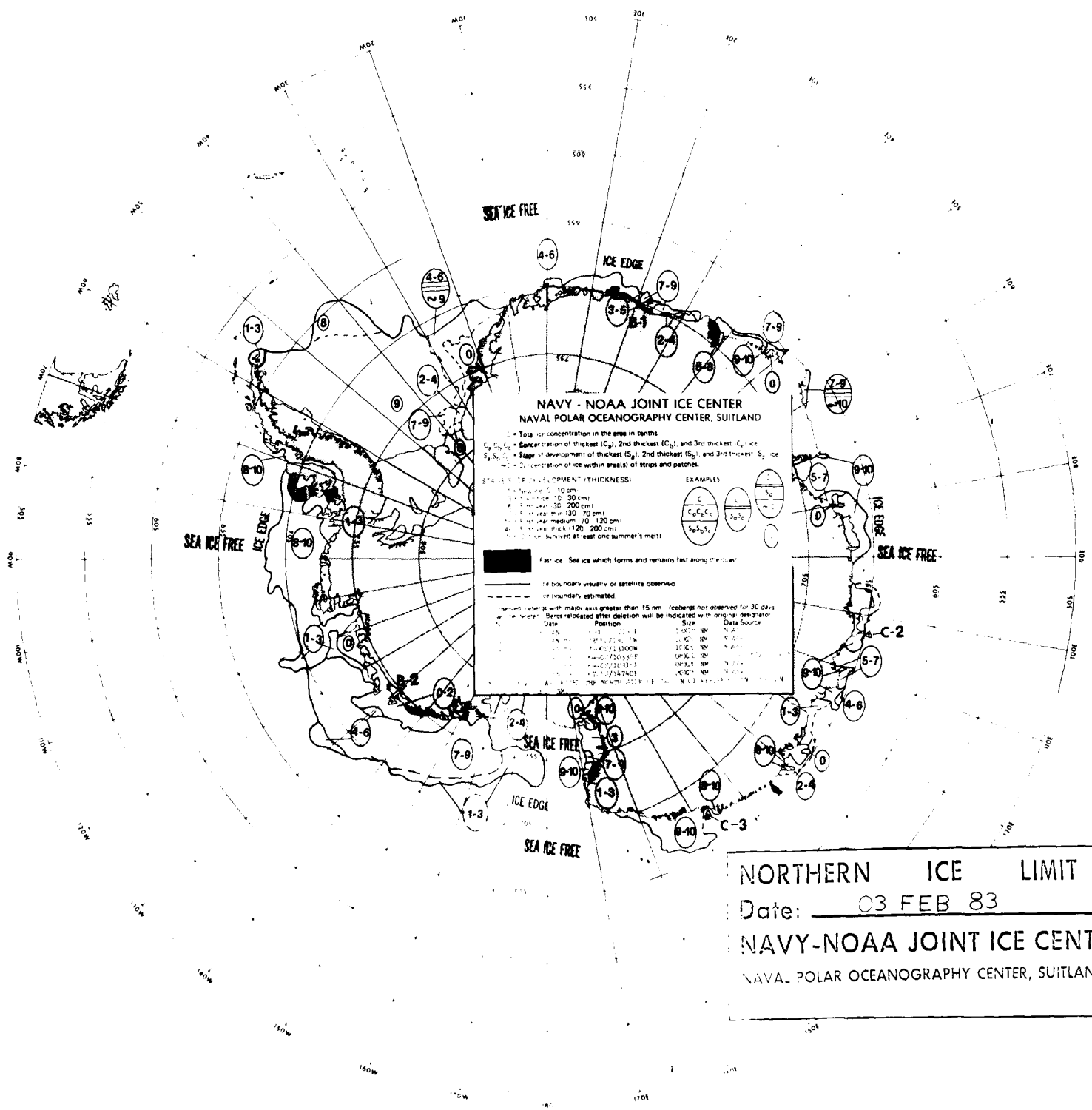
Fast ice - Sea ice which forms and remains fast along the coast

Ice boundary visible on satellite observed  
 Ice boundary estimated

Observed icebergs with major axis greater than 15 nm. Icebergs not observed for 30 days will be deleted. Bergs relocated after deletion will be indicated with original designator

No.	Date	Position	Size	Data Source
1	1-83	75°N 150°W	100 x 50	WAA-1
2	1-83	75°N 150°W	100 x 50	WAA-1
3	JAN 83	75°N 150°W	100 x 50	WAA-1

**NORTHERN ICE LIMIT**  
 Date: 27 JAN 1983  
**NAVY-NOAA JOINT ICE CENTER**  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



**NAVY - NOAA JOINT ICE CENTER**  
**NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND**

C = Total ice concentration in the area in tenths  
 C<sub>1</sub>, C<sub>2</sub>, C<sub>3</sub> = Concentration of thickest (C<sub>1</sub>), 2nd thickest (C<sub>2</sub>), and 3rd thickest (C<sub>3</sub>) ice  
 S<sub>1</sub>, S<sub>2</sub>, S<sub>3</sub> = Stage of development of thickest (S<sub>1</sub>), 2nd thickest (S<sub>2</sub>), and 3rd thickest (S<sub>3</sub>) ice  
 A, B, C = Concentration of ice within areas of strips and patches

**STAGE OF DEVELOPMENT (THICKNESS)**

1 = New ice < 10 cm  
 2 = Thin ice 10 - 30 cm  
 3 = Medium ice 30 - 200 cm  
 4 = Thick ice 200 - 70 cm  
 5 = Very thick ice 170 - 200 cm  
 6 = Icebergs (thickness > 120, 200 cm)  
 7 = Icebergs (thickness > 120, 200 cm)

**EXAMPLES**

$\frac{C}{C_1 C_2 C_3}$	$\frac{C}{S_1 S_2 S_3}$	$\frac{C}{A B C}$
$\frac{5}{30 20 10}$	$\frac{5}{1 2 3}$	$\frac{5}{1 2 3}$

■ Fast ice - Sea ice which forms and remains fast along the coast  
 --- Ice boundary visually or satellite observed  
 - - - - - Ice boundary estimated  
 - - - - - Icebergs with major axis greater than 15 nm (icebergs not observed for 30 days will be deleted)  
 \* Berms relocated after deletion will be indicated with original designator

Date	Position	Size	Data Source
15 FEB 83	72°N 150°W	1000	NOAA
16 FEB 83	71°N 150°W	1000	NOAA
17 FEB 83	70°N 150°W	1000	NOAA
18 FEB 83	69°N 150°W	1000	NOAA
19 FEB 83	68°N 150°W	1000	NOAA
20 FEB 83	67°N 150°W	1000	NOAA
21 FEB 83	66°N 150°W	1000	NOAA
22 FEB 83	65°N 150°W	1000	NOAA
23 FEB 83	64°N 150°W	1000	NOAA
24 FEB 83	63°N 150°W	1000	NOAA
25 FEB 83	62°N 150°W	1000	NOAA
26 FEB 83	61°N 150°W	1000	NOAA
27 FEB 83	60°N 150°W	1000	NOAA
28 FEB 83	59°N 150°W	1000	NOAA
29 FEB 83	58°N 150°W	1000	NOAA
30 FEB 83	57°N 150°W	1000	NOAA
01 MAR 83	56°N 150°W	1000	NOAA
02 MAR 83	55°N 150°W	1000	NOAA
03 MAR 83	54°N 150°W	1000	NOAA
04 MAR 83	53°N 150°W	1000	NOAA
05 MAR 83	52°N 150°W	1000	NOAA
06 MAR 83	51°N 150°W	1000	NOAA
07 MAR 83	50°N 150°W	1000	NOAA
08 MAR 83	49°N 150°W	1000	NOAA
09 MAR 83	48°N 150°W	1000	NOAA
10 MAR 83	47°N 150°W	1000	NOAA
11 MAR 83	46°N 150°W	1000	NOAA
12 MAR 83	45°N 150°W	1000	NOAA
13 MAR 83	44°N 150°W	1000	NOAA
14 MAR 83	43°N 150°W	1000	NOAA
15 MAR 83	42°N 150°W	1000	NOAA
16 MAR 83	41°N 150°W	1000	NOAA
17 MAR 83	40°N 150°W	1000	NOAA
18 MAR 83	39°N 150°W	1000	NOAA
19 MAR 83	38°N 150°W	1000	NOAA
20 MAR 83	37°N 150°W	1000	NOAA
21 MAR 83	36°N 150°W	1000	NOAA
22 MAR 83	35°N 150°W	1000	NOAA
23 MAR 83	34°N 150°W	1000	NOAA
24 MAR 83	33°N 150°W	1000	NOAA
25 MAR 83	32°N 150°W	1000	NOAA
26 MAR 83	31°N 150°W	1000	NOAA
27 MAR 83	30°N 150°W	1000	NOAA
28 MAR 83	29°N 150°W	1000	NOAA
29 MAR 83	28°N 150°W	1000	NOAA
30 MAR 83	27°N 150°W	1000	NOAA
31 MAR 83	26°N 150°W	1000	NOAA
01 APR 83	25°N 150°W	1000	NOAA
02 APR 83	24°N 150°W	1000	NOAA
03 APR 83	23°N 150°W	1000	NOAA
04 APR 83	22°N 150°W	1000	NOAA
05 APR 83	21°N 150°W	1000	NOAA
06 APR 83	20°N 150°W	1000	NOAA
07 APR 83	19°N 150°W	1000	NOAA
08 APR 83	18°N 150°W	1000	NOAA
09 APR 83	17°N 150°W	1000	NOAA
10 APR 83	16°N 150°W	1000	NOAA
11 APR 83	15°N 150°W	1000	NOAA
12 APR 83	14°N 150°W	1000	NOAA
13 APR 83	13°N 150°W	1000	NOAA
14 APR 83	12°N 150°W	1000	NOAA
15 APR 83	11°N 150°W	1000	NOAA
16 APR 83	10°N 150°W	1000	NOAA
17 APR 83	9°N 150°W	1000	NOAA
18 APR 83	8°N 150°W	1000	NOAA
19 APR 83	7°N 150°W	1000	NOAA
20 APR 83	6°N 150°W	1000	NOAA
21 APR 83	5°N 150°W	1000	NOAA
22 APR 83	4°N 150°W	1000	NOAA
23 APR 83	3°N 150°W	1000	NOAA
24 APR 83	2°N 150°W	1000	NOAA
25 APR 83	1°N 150°W	1000	NOAA
26 APR 83	0°N 150°W	1000	NOAA
27 APR 83	0°N 150°W	1000	NOAA
28 APR 83	0°N 150°W	1000	NOAA
29 APR 83	0°N 150°W	1000	NOAA
30 APR 83	0°N 150°W	1000	NOAA
01 MAY 83	0°N 150°W	1000	NOAA

**NORTHERN ICE LIMIT**  
 Date: 03 FEB 83  
**NAVY-NOAA JOINT ICE CENTER**  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



SEA ICE FREE

SEA ICE FREE

SEA ICE FREE

SEA ICE FREE

NAVY - NOAA JOINT ICE CENTER  
NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND

Ice concentration in the area in tenths  
Ice thickness (T<sub>1</sub>) 2nd thickness (T<sub>2</sub>) and 3rd thickness (T<sub>3</sub>)  
Ice composition of thickness (S<sub>1</sub>) 2nd thickness (S<sub>2</sub>) and 3rd thickness (S<sub>3</sub>)  
Ice composition within areas of strips and patches

ICE THICKNESS EXAMPLES  
1-30 cm  
2-200 cm  
3-30 cm  
4-120 cm  
5-200 cm  
6-120 cm  
7-200 cm  
8-120 cm  
9-200 cm  
10-120 cm

ICE TYPE  
1-Sea ice which forms and remains fast with the land

2-Sea ice which forms and remains fast with the land  
3-Sea ice which forms and remains fast with the land

4-Sea ice which forms and remains fast with the land  
5-Sea ice which forms and remains fast with the land

6-Sea ice which forms and remains fast with the land  
7-Sea ice which forms and remains fast with the land

8-Sea ice which forms and remains fast with the land  
9-Sea ice which forms and remains fast with the land

10-Sea ice which forms and remains fast with the land

NORTHERN ICE LIMIT  
Date: FEB 83  
NAVY-NOAA JOINT ICE CENTER  
NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND

SEA ICE FREE

SEA ICE FREE

SEA ICE FREE

**NAVY - NOAA JOINT ICE CENTER**  
**NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND**

C = Total ice concentration in the area in tenths  
 C<sub>1</sub>, C<sub>2</sub>, C<sub>3</sub> = Concentration of 1st thickest (C<sub>1</sub>), 2nd thickest (C<sub>2</sub>) and 3rd thickest (C<sub>3</sub>) ice  
 S<sub>1</sub>, S<sub>2</sub>, S<sub>3</sub> = Stage of new layers of thickest (S<sub>1</sub>), 2nd thickest (S<sub>2</sub>) and 3rd thickest (S<sub>3</sub>) ice  
 -C = Concentration of ice within areas of strips and patches

STAGE SIZE DESIGNATION THICKNESS:

1 = New ice	2 = Thin ice	3 = Medium ice	4 = Thick ice
5 = Very thick ice	6 = First year	7 = Second year	8 = Third year
9 = Fourth year	10 = Fifth year	11 = Sixth year	12 = Seventh year
13 = Eighth year	14 = Ninth year	15 = Tenth year	16 = Eleventh year
17 = Twelfth year	18 = Thirteenth year	19 = Fourteenth year	20 = Fifteenth year
21 = Sixteenth year	22 = Seventeenth year	23 = Eighteenth year	24 = Nineteenth year
25 = Twentieth year	26 = Twenty-first year	27 = Twenty-second year	28 = Twenty-third year
29 = Twenty-fourth year	30 = Twenty-fifth year	31 = Twenty-sixth year	32 = Twenty-seventh year
33 = Twenty-eighth year	34 = Twenty-ninth year	35 = Thirtieth year	36 = Thirty-first year
37 = Thirty-second year	38 = Thirty-third year	39 = Thirty-fourth year	40 = Thirty-fifth year
41 = Thirty-sixth year	42 = Thirty-seventh year	43 = Thirty-eighth year	44 = Thirty-ninth year
45 = Fortieth year	46 = Forty-first year	47 = Forty-second year	48 = Forty-third year
49 = Forty-fourth year	50 = Forty-fifth year	51 = Forty-sixth year	52 = Forty-seventh year
53 = Forty-eighth year	54 = Forty-ninth year	55 = Fiftieth year	56 = Fifty-first year
57 = Fifty-second year	58 = Fifty-third year	59 = Fifty-fourth year	60 = Fifty-fifth year
61 = Fifty-sixth year	62 = Fifty-seventh year	63 = Fifty-eighth year	64 = Fifty-ninth year
65 = Sixtieth year	66 = Sixty-first year	67 = Sixty-second year	68 = Sixty-third year
69 = Sixty-fourth year	70 = Sixty-fifth year	71 = Sixty-sixth year	72 = Sixty-seventh year
73 = Sixty-eighth year	74 = Sixty-ninth year	75 = Seventieth year	76 = Seventy-first year
77 = Seventy-second year	78 = Seventy-third year	79 = Seventy-fourth year	80 = Seventy-fifth year
81 = Seventy-sixth year	82 = Seventy-seventh year	83 = Seventy-eighth year	84 = Seventy-ninth year
85 = Eightieth year	86 = Eighty-first year	87 = Eighty-second year	88 = Eighty-third year
89 = Eighty-fourth year	90 = Eighty-fifth year	91 = Eighty-sixth year	92 = Eighty-seventh year
93 = Eighty-eighth year	94 = Eighty-ninth year	95 = Ninetieth year	96 = One hundred year

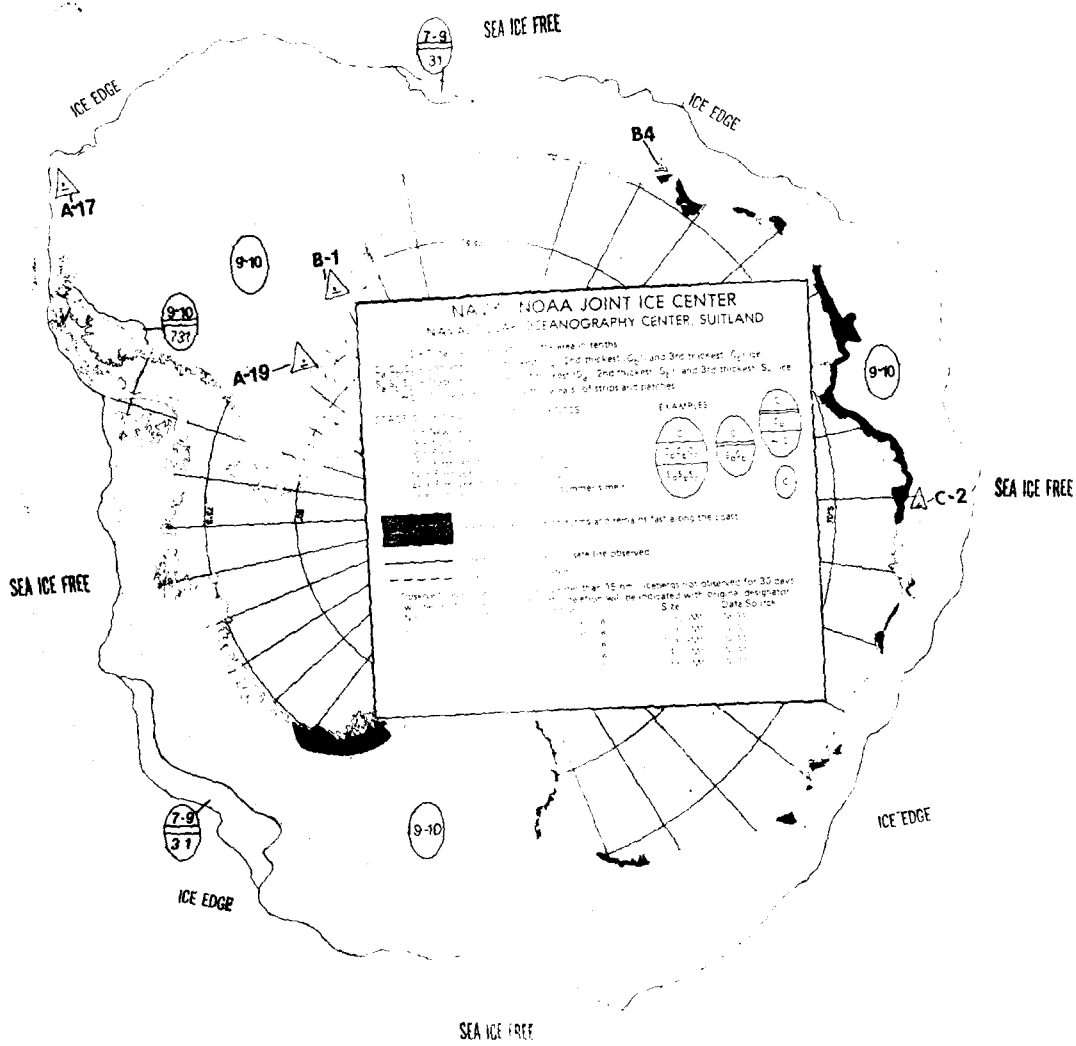
EXAMPLES

$\frac{C}{C_1 C_2 C_3}$	$\frac{C}{S_1 S_2 S_3}$	$\frac{C}{S_1 S_2 S_3}$	$\frac{C}{C_1 C_2 C_3}$
$\frac{C}{C_1 C_2 C_3}$	$\frac{C}{S_1 S_2 S_3}$	$\frac{C}{S_1 S_2 S_3}$	$\frac{C}{C_1 C_2 C_3}$
$\frac{C}{C_1 C_2 C_3}$	$\frac{C}{S_1 S_2 S_3}$	$\frac{C}{S_1 S_2 S_3}$	$\frac{C}{C_1 C_2 C_3}$

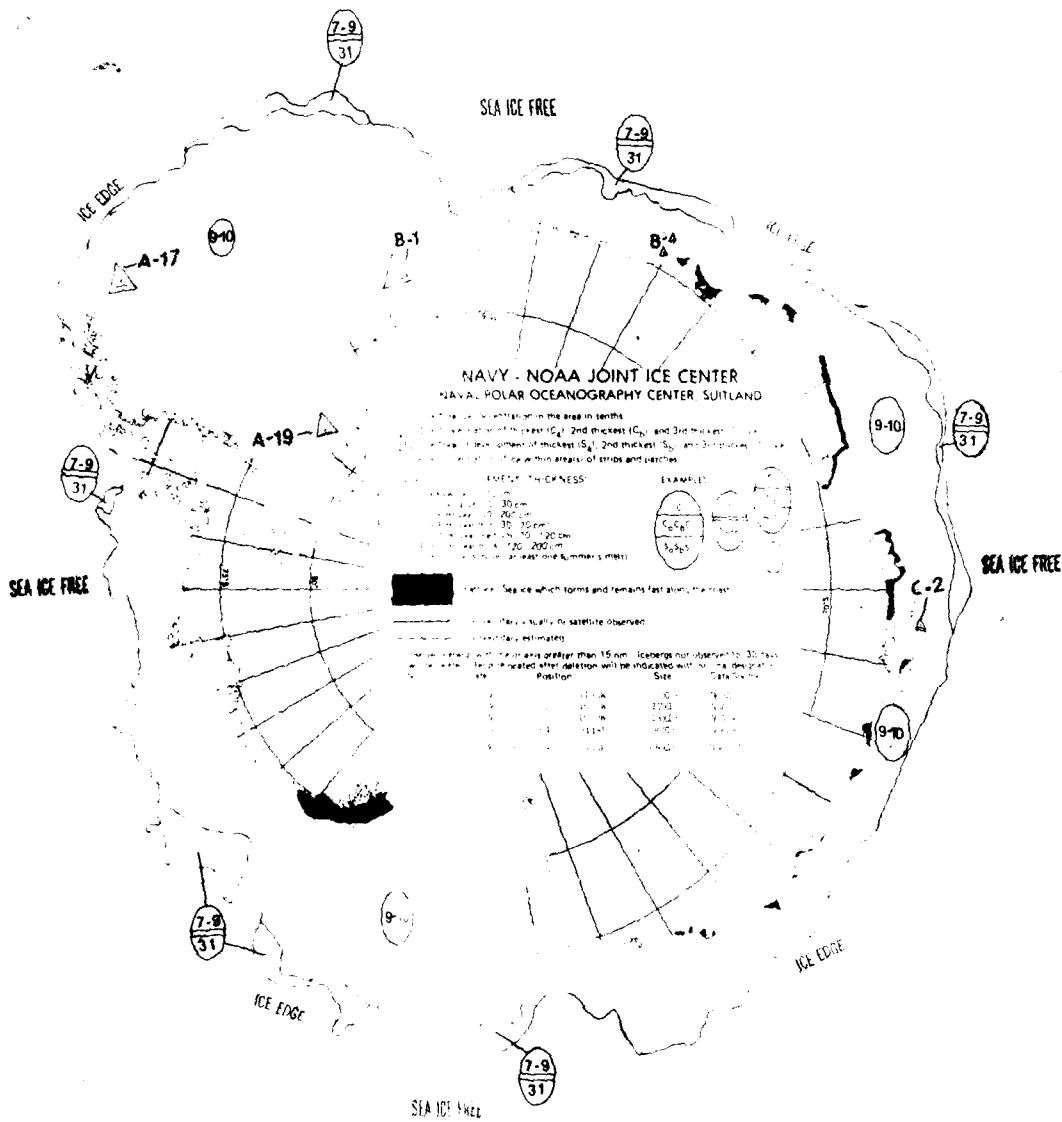
1. Thick ice which forms and remains fast along the coast  
 2. Ice which is a minimum satellite observed  
 3. Ice which is estimated  
 4. Ice which is greater than 15 nm. Icebergs not observed for 30 days will be deleted. If they are later observed after deletion will be indicated with original designator.

No.	Date	Position	Size	Data Source
1	1/15/83	75°N 150°W	1000	NOAA
2	1/15/83	75°N 150°W	1000	NOAA
3	1/15/83	75°N 150°W	1000	NOAA
4	1/15/83	75°N 150°W	1000	NOAA
5	1/15/83	75°N 150°W	1000	NOAA
6	1/15/83	75°N 150°W	1000	NOAA
7	1/15/83	75°N 150°W	1000	NOAA
8	1/15/83	75°N 150°W	1000	NOAA
9	1/15/83	75°N 150°W	1000	NOAA
10	1/15/83	75°N 150°W	1000	NOAA
11	1/15/83	75°N 150°W	1000	NOAA
12	1/15/83	75°N 150°W	1000	NOAA
13	1/15/83	75°N 150°W	1000	NOAA
14	1/15/83	75°N 150°W	1000	NOAA
15	1/15/83	75°N 150°W	1000	NOAA
16	1/15/83	75°N 150°W	1000	NOAA
17	1/15/83	75°N 150°W	1000	NOAA
18	1/15/83	75°N 150°W	1000	NOAA
19	1/15/83	75°N 150°W	1000	NOAA
20	1/15/83	75°N 150°W	1000	NOAA
21	1/15/83	75°N 150°W	1000	NOAA
22	1/15/83	75°N 150°W	1000	NOAA
23	1/15/83	75°N 150°W	1000	NOAA
24	1/15/83	75°N 150°W	1000	NOAA
25	1/15/83	75°N 150°W	1000	NOAA
26	1/15/83	75°N 150°W	1000	NOAA
27	1/15/83	75°N 150°W	1000	NOAA
28	1/15/83	75°N 150°W	1000	NOAA
29	1/15/83	75°N 150°W	1000	NOAA
30	1/15/83	75°N 150°W	1000	NOAA
31	1/15/83	75°N 150°W	1000	NOAA
32	1/15/83	75°N 150°W	1000	NOAA
33	1/15/83	75°N 150°W	1000	NOAA
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53	1/15/83	75°N 150°W	1000	NOAA
54	1/15/83	75°N 150°W	1000	NOAA
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56	1/15/83	75°N 150°W	1000	NOAA
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59	1/15/83	75°N 150°W	1000	NOAA
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61	1/15/83	75°N 150°W	1000	NOAA
62	1/15/83	75°N 150°W	1000	NOAA
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64	1/15/83	75°N 150°W	1000	NOAA
65	1/15/83	75°N 150°W	1000	NOAA
66	1/15/83	75°N 150°W	1000	NOAA
67	1/15/83	75°N 150°W	1000	NOAA
68	1/15/83	75°N 150°W	1000	NOAA
69	1/15/83	75°N 150°W	1000	NOAA
70	1/15/83	75°N 150°W	1000	NOAA
71	1/15/83	75°N 150°W	1000	NOAA
72	1/15/83	75°N 150°W	1000	NOAA
73	1/15/83	75°N 150°W	1000	NOAA
74	1/15/83	75°N 150°W	1000	NOAA
75	1/15/83	75°N 150°W	1000	NOAA
76	1/15/83	75°N 150°W	1000	NOAA
77	1/15/83	75°N 150°W	1000	NOAA
78	1/15/83	75°N 150°W	1000	NOAA
79	1/15/83	75°N 150°W	1000	NOAA
80	1/15/83	75°N 150°W	1000	NOAA
81	1/15/83	75°N 150°W	1000	NOAA
82	1/15/83	75°N 150°W	1000	NOAA
83	1/15/83	75°N 150°W	1000	NOAA
84	1/15/83	75°N 150°W	1000	NOAA
85	1/15/83	75°N 150°W	1000	NOAA
86	1/15/83	75°N 150°W	1000	NOAA
87	1/15/83	75°N 150°W	1000	NOAA
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89	1/15/83	75°N 150°W	1000	NOAA
90	1/15/83	75°N 150°W	1000	NOAA
91	1/15/83	75°N 150°W	1000	NOAA
92	1/15/83	75°N 150°W	1000	NOAA
93	1/15/83	75°N 150°W	1000	NOAA
94	1/15/83	75°N 150°W	1000	NOAA
95	1/15/83	75°N 150°W	1000	NOAA
96	1/15/83	75°N 150°W	1000	NOAA
97	1/15/83	75°N 150°W	1000	NOAA
98	1/15/83	75°N 150°W	1000	NOAA
99	1/15/83	75°N 150°W	1000	NOAA
100	1/15/83	75°N 150°W	1000	NOAA

**NORTHERN ICE LIMIT**  
 Date: 24 FEB 83  
**NAVY-NOAA JOINT ICE CENTER**  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND

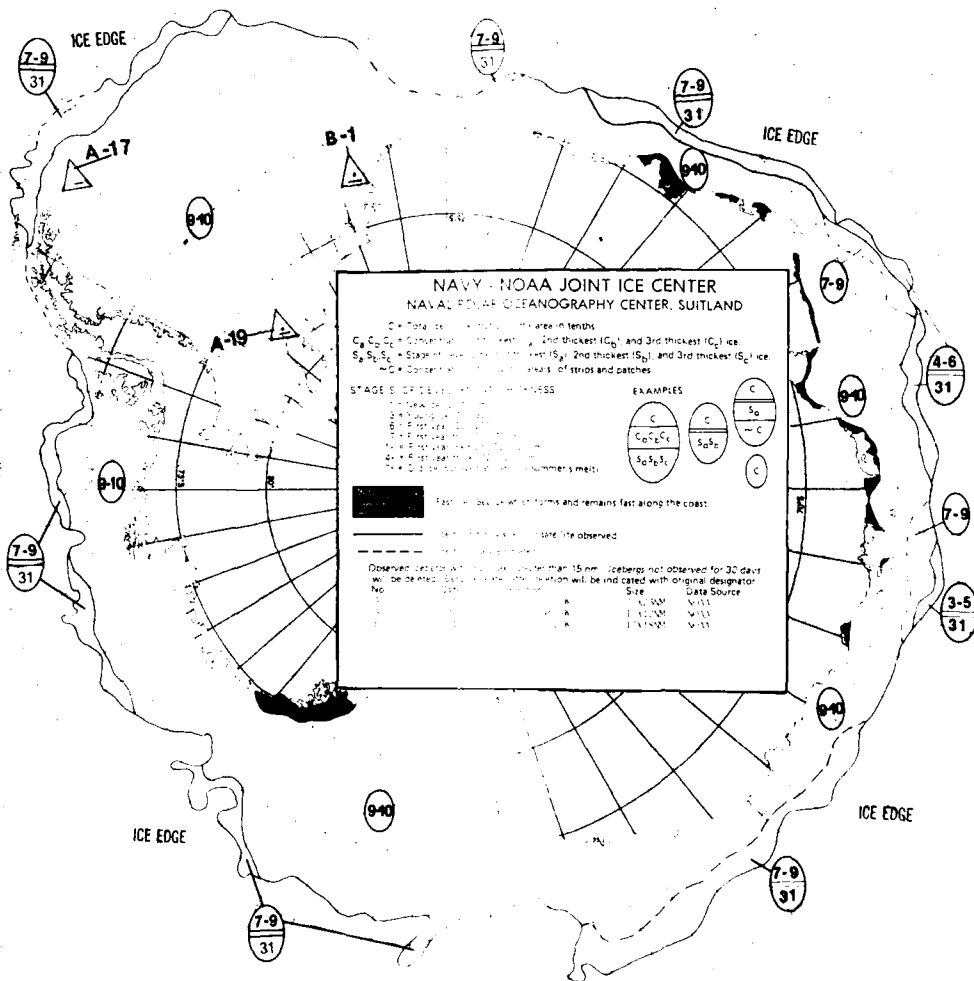


**NORTHERN ICE LIMIT**  
 Date: 02 JUN 81  
 NAVY-NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND

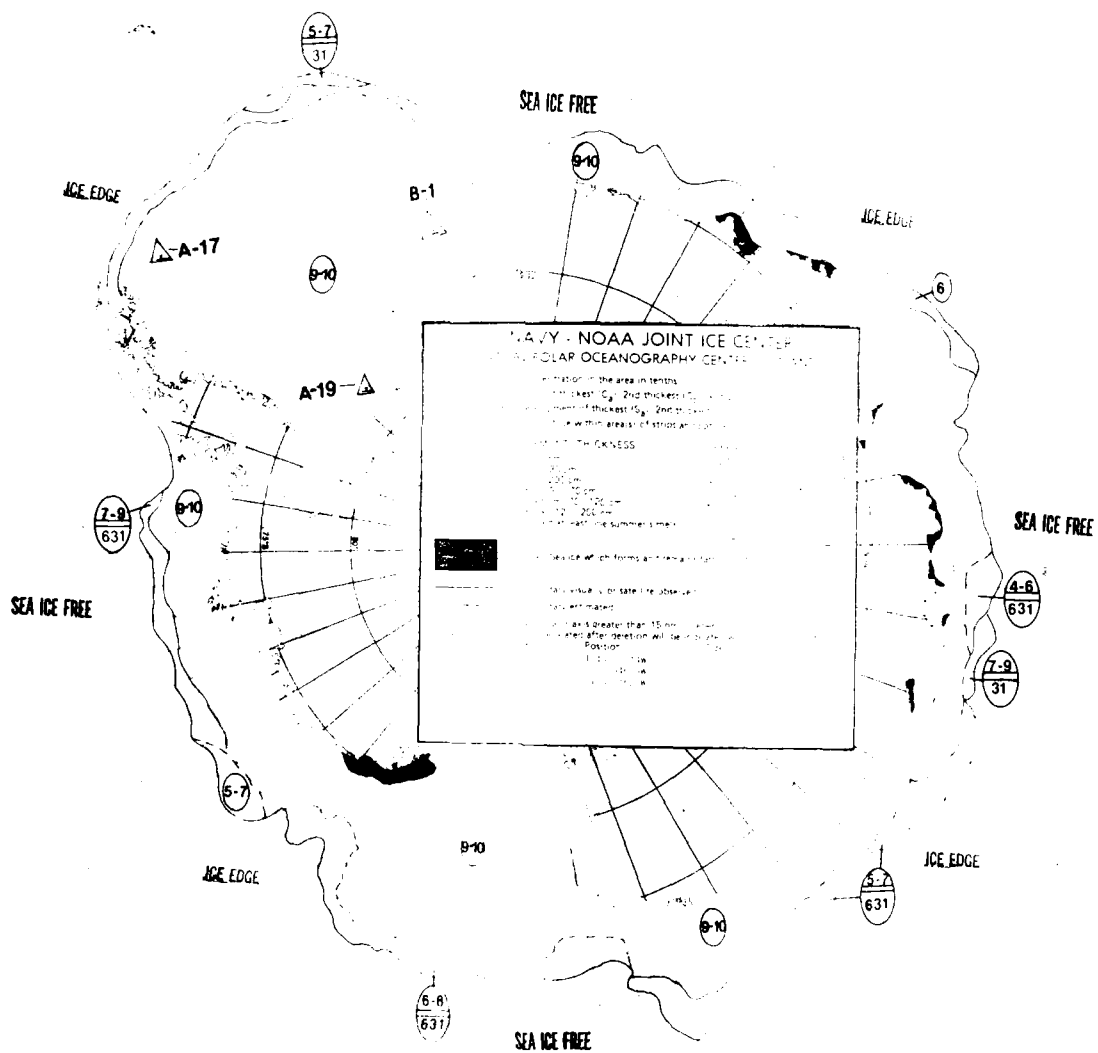


**NORTHERN ICE LIMIT**  
 Date: 26 MAY 83  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND

SEA ICE FREE

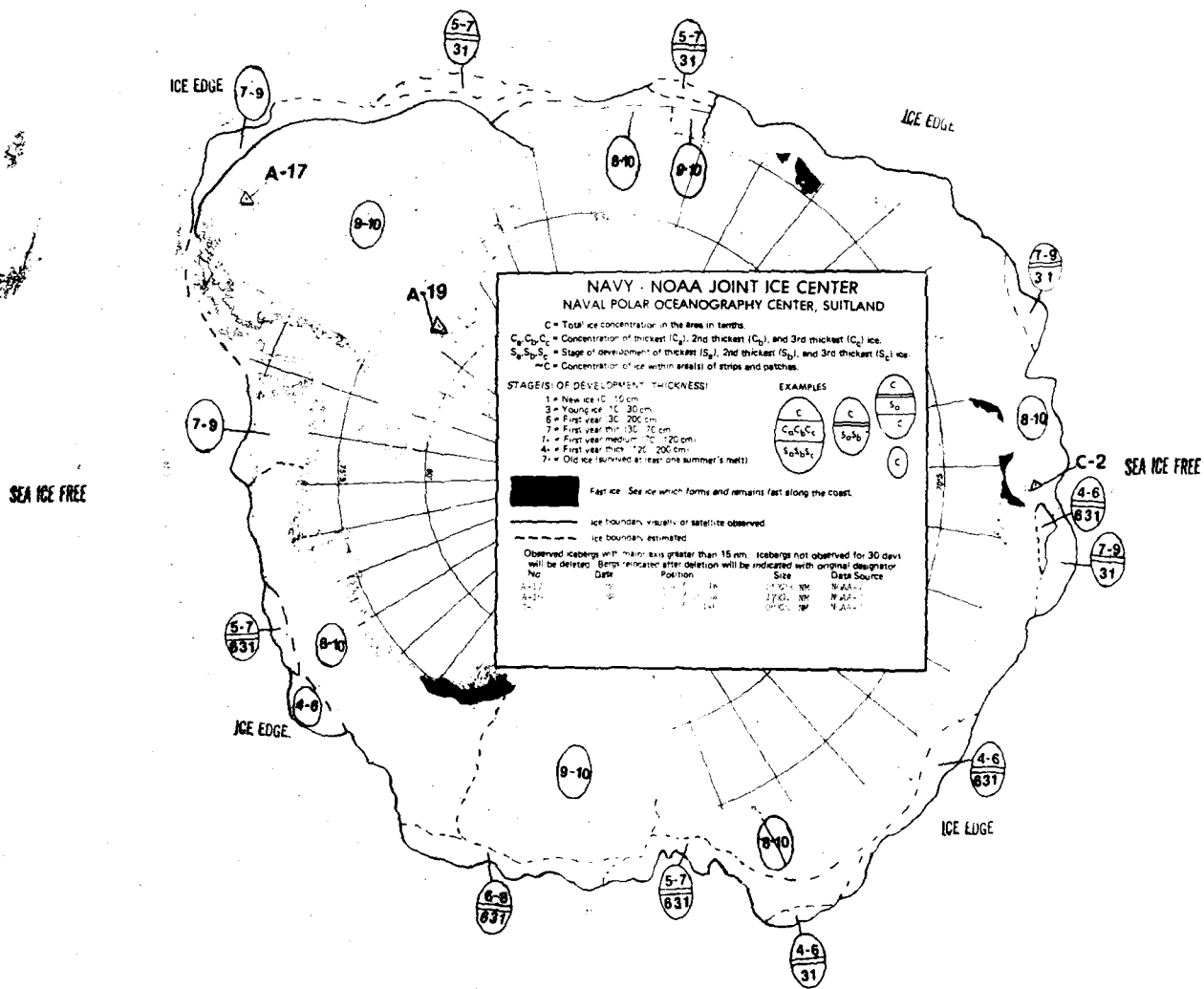


**NORTHERN ICE LIMIT**  
**Date: 19 MAY 83**  
 NAVY-NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



**NORTHERN ICE LIMIT**  
 Date: 12 MAY 1983  
 NAVY--NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND

SEA ICE FREE



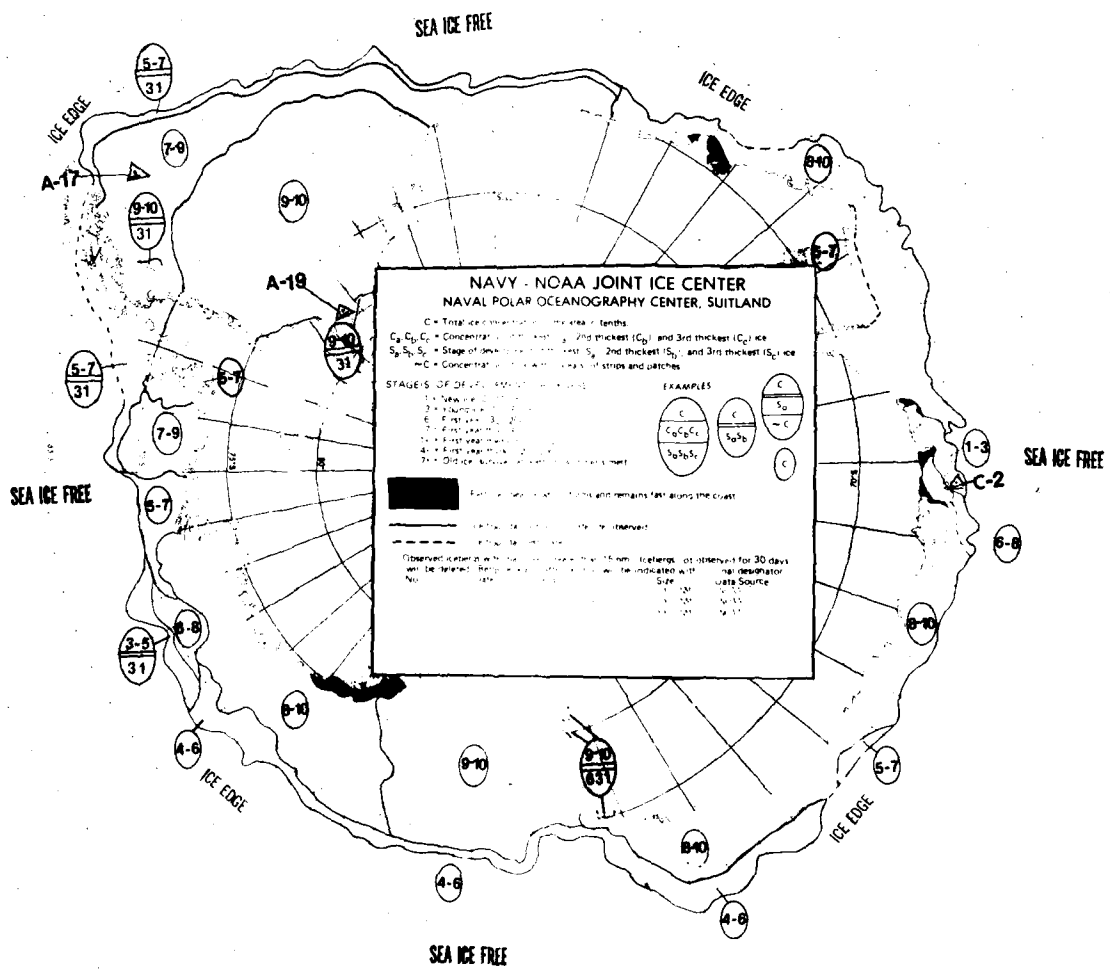
SEA ICE FREE

**NORTHERN ICE LIMIT**

Date: 05 MAY 58

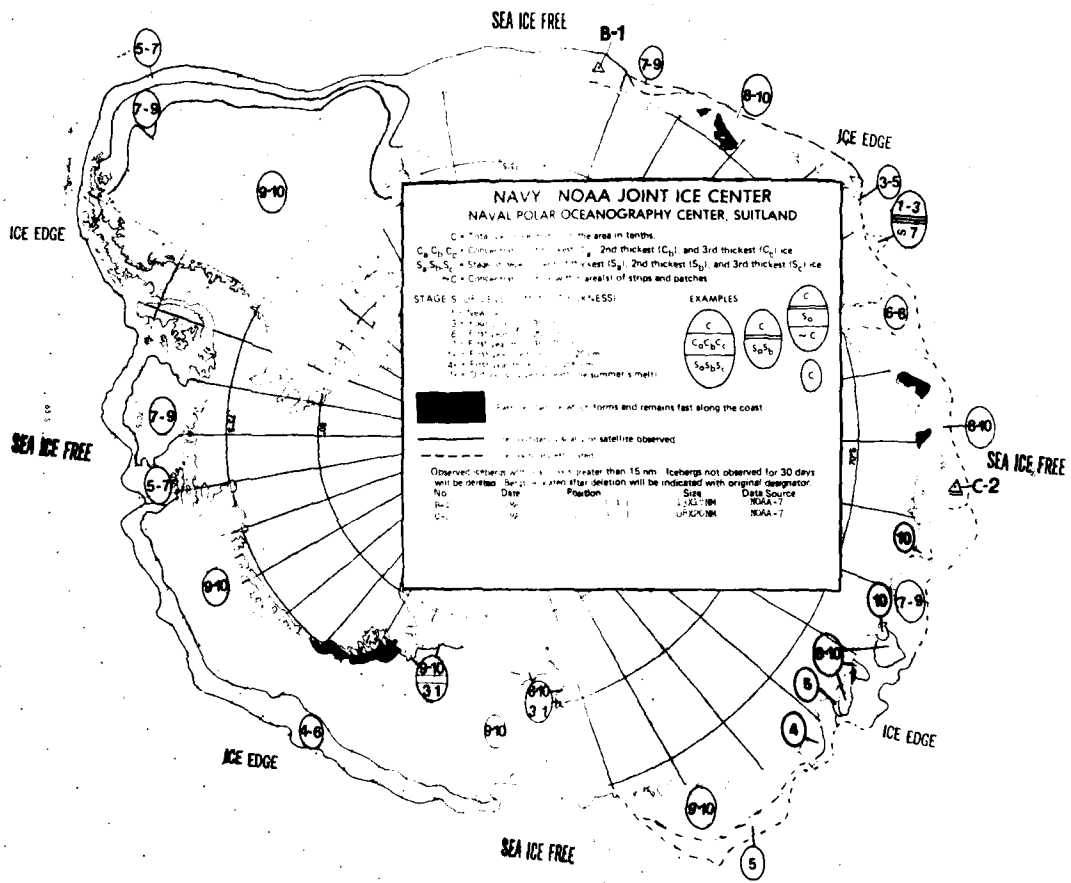
NAVY-NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND





**NORTHERN ICE LIMIT**  
**Date: 21 APR 83**  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



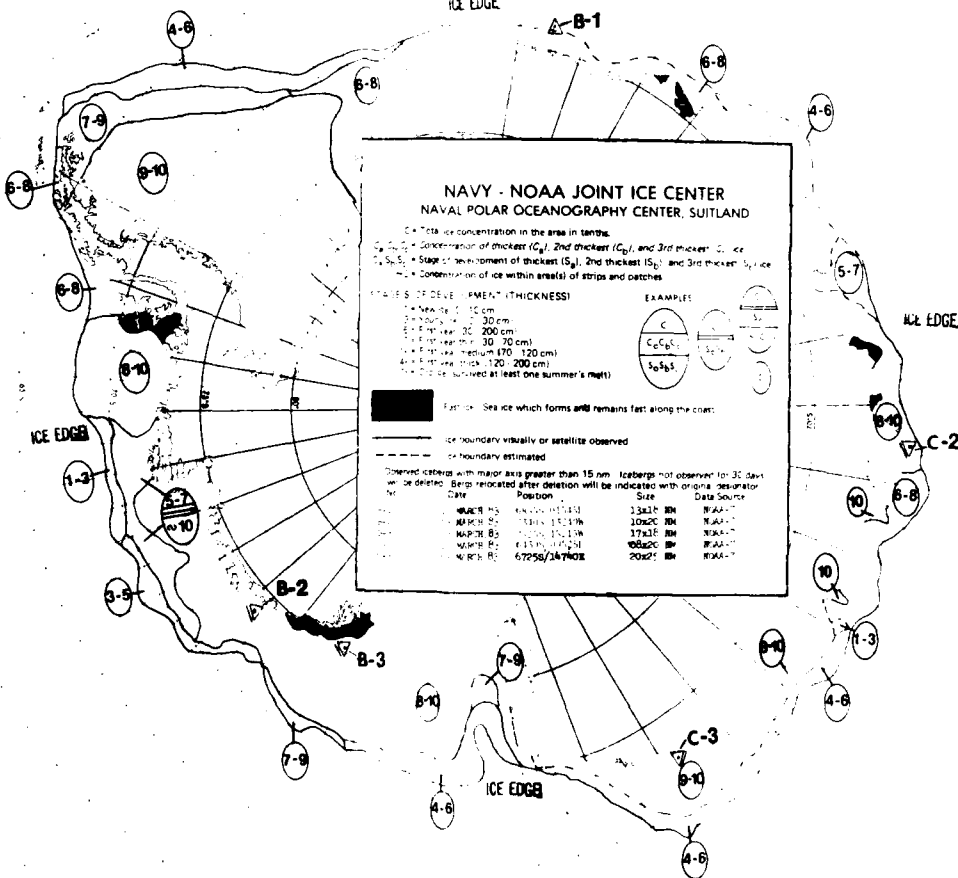


**NORTHERN ICE LIMIT**  
**Date: 07 APR 83**  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND

SEA ICE FREE

ICE EDGE

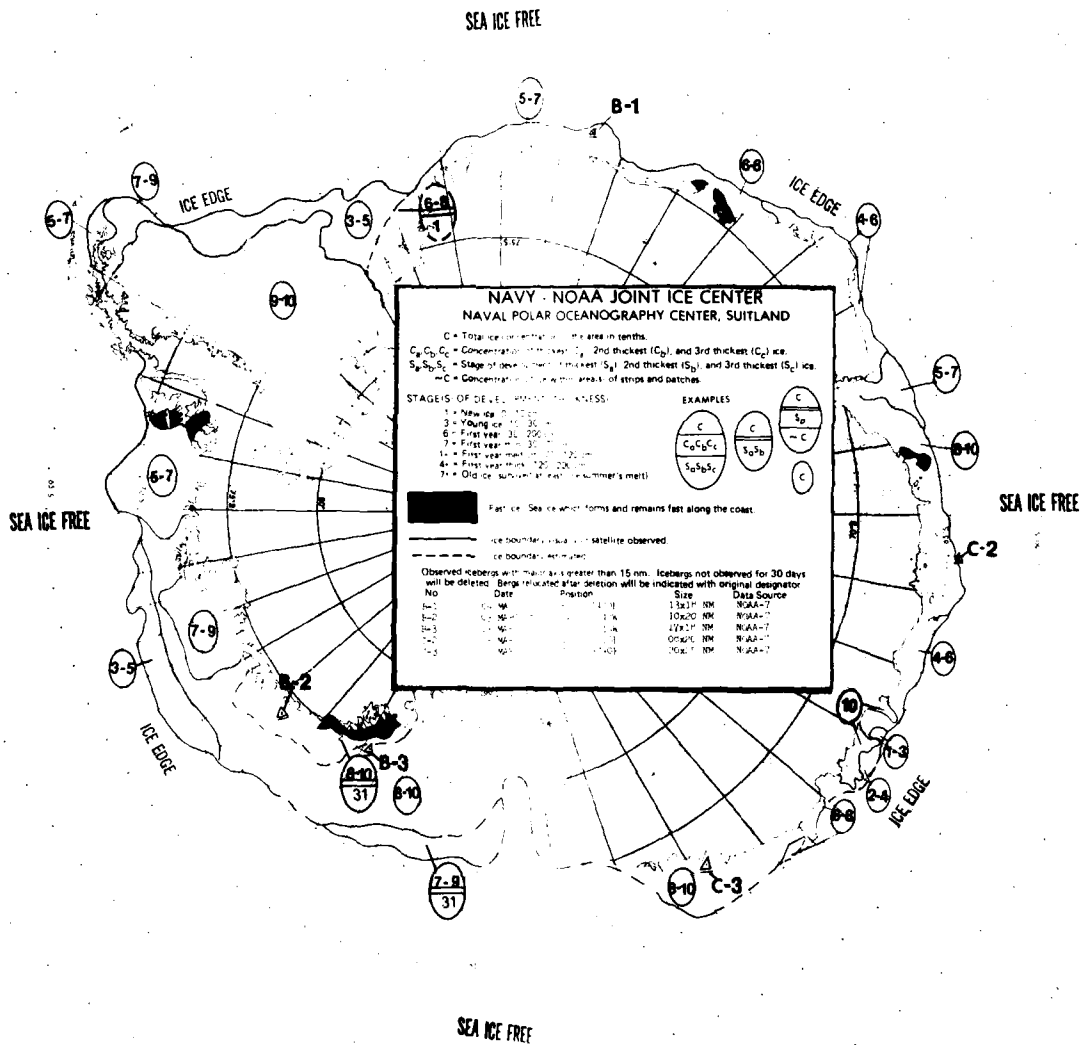
SEA ICE FREE



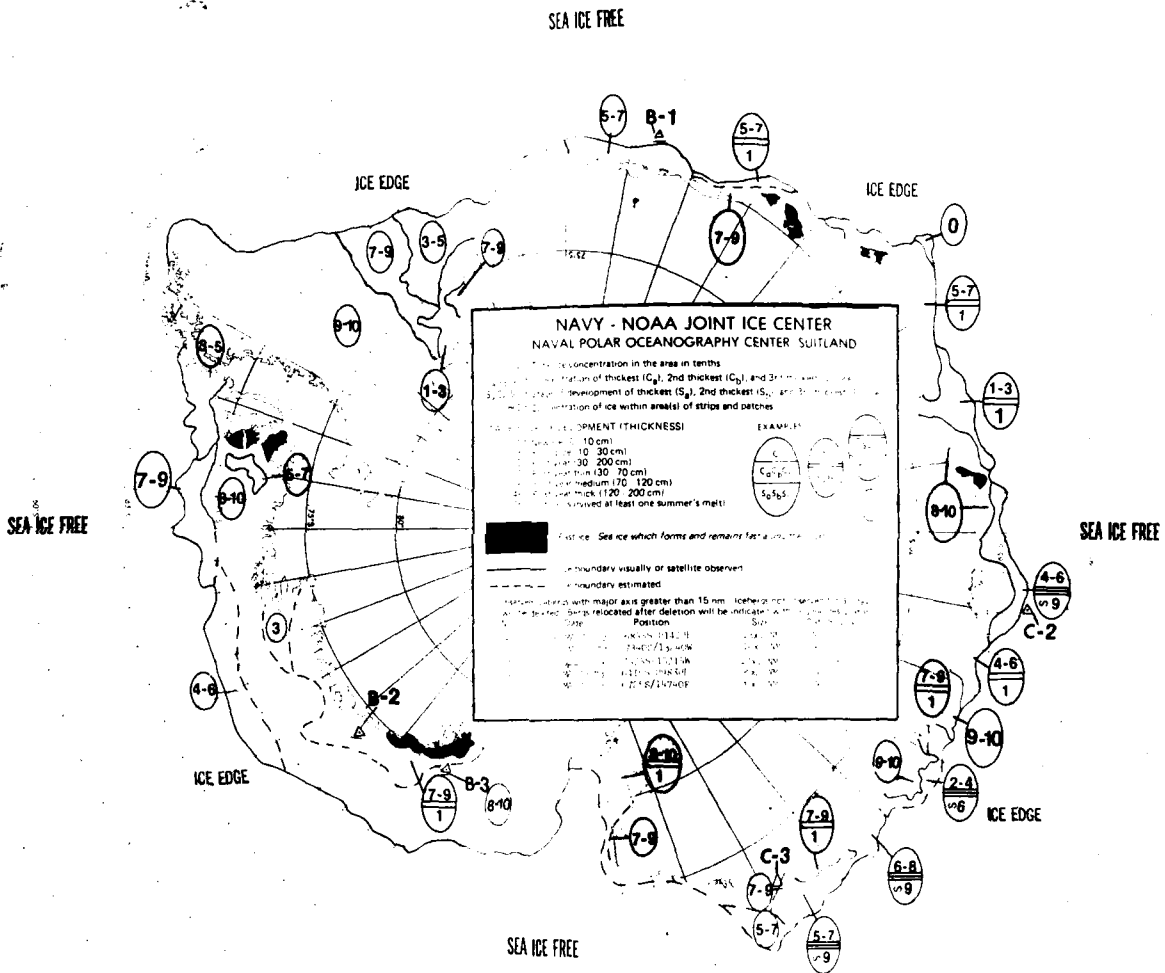
SEA ICE FREE

SEA ICE FREE

**NORTHERN ICE LIMIT**  
**Date: 31 MAR 83**  
**NAVY—NOAA JOINT ICE CENTER**  
**NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND**

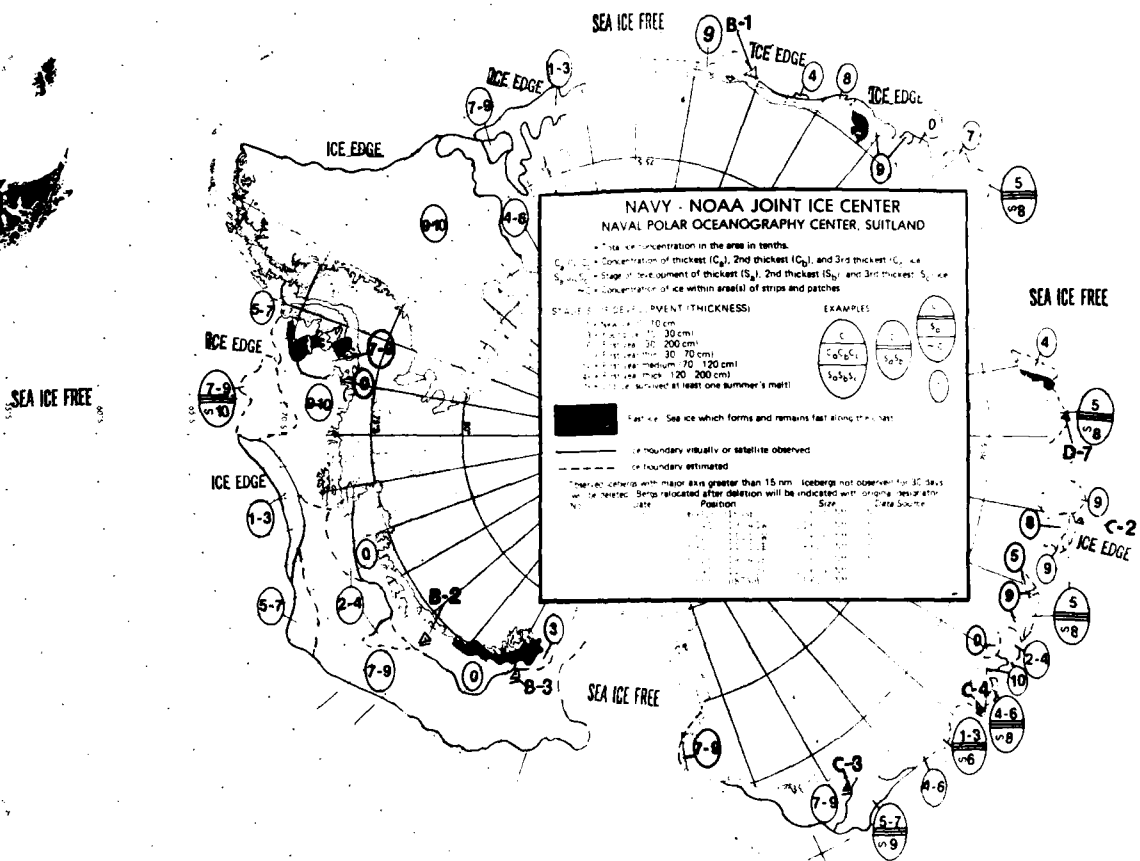


**NORTHERN ICE LIMIT**  
**Date: 24 MAR 83**  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND

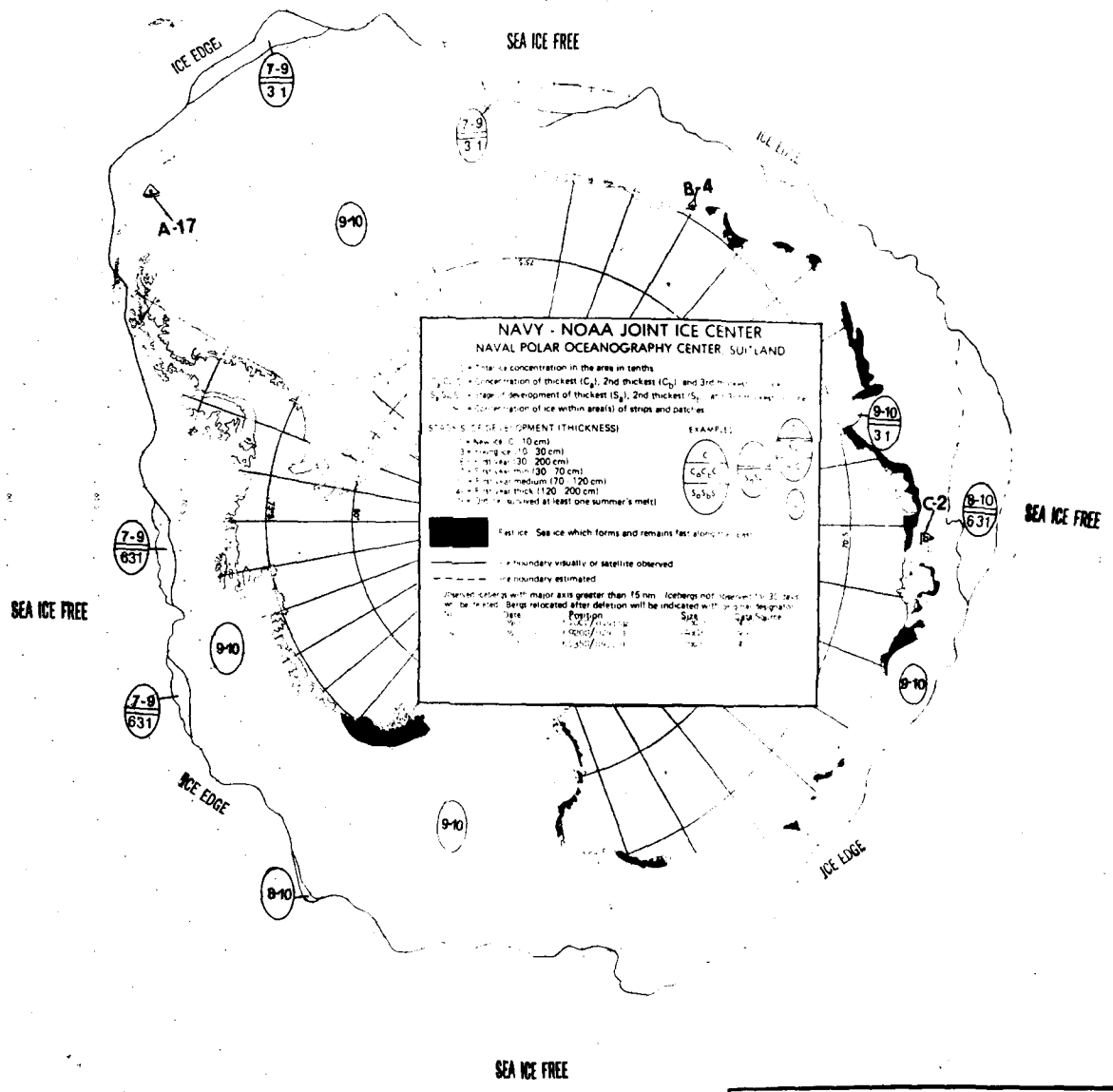


**NORTHERN ICE LIMIT**  
 Date: 17 MAR 83  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND

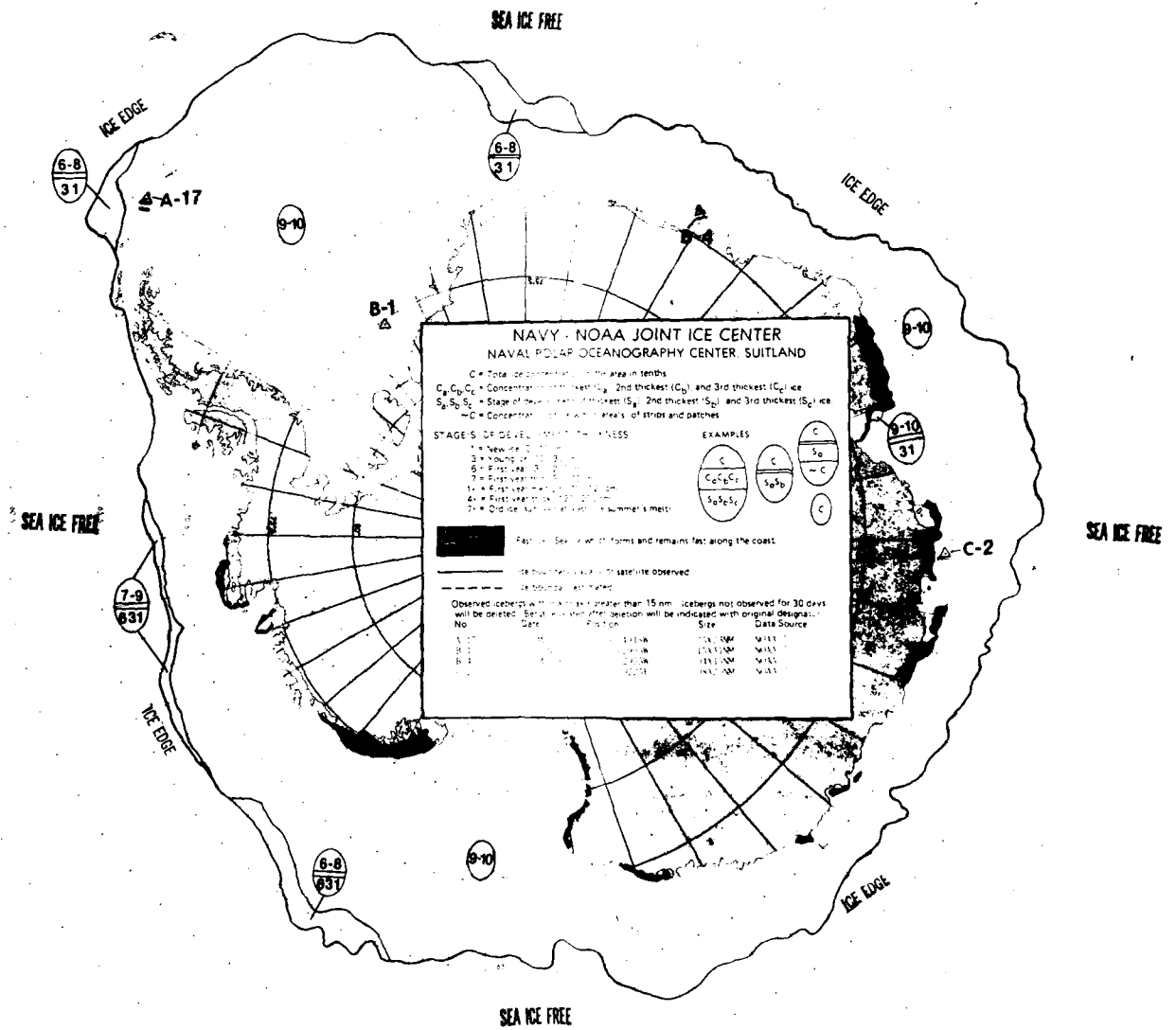




**NORTHERN ICE LIMIT**  
 Date: 03 MARCH 1983  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND

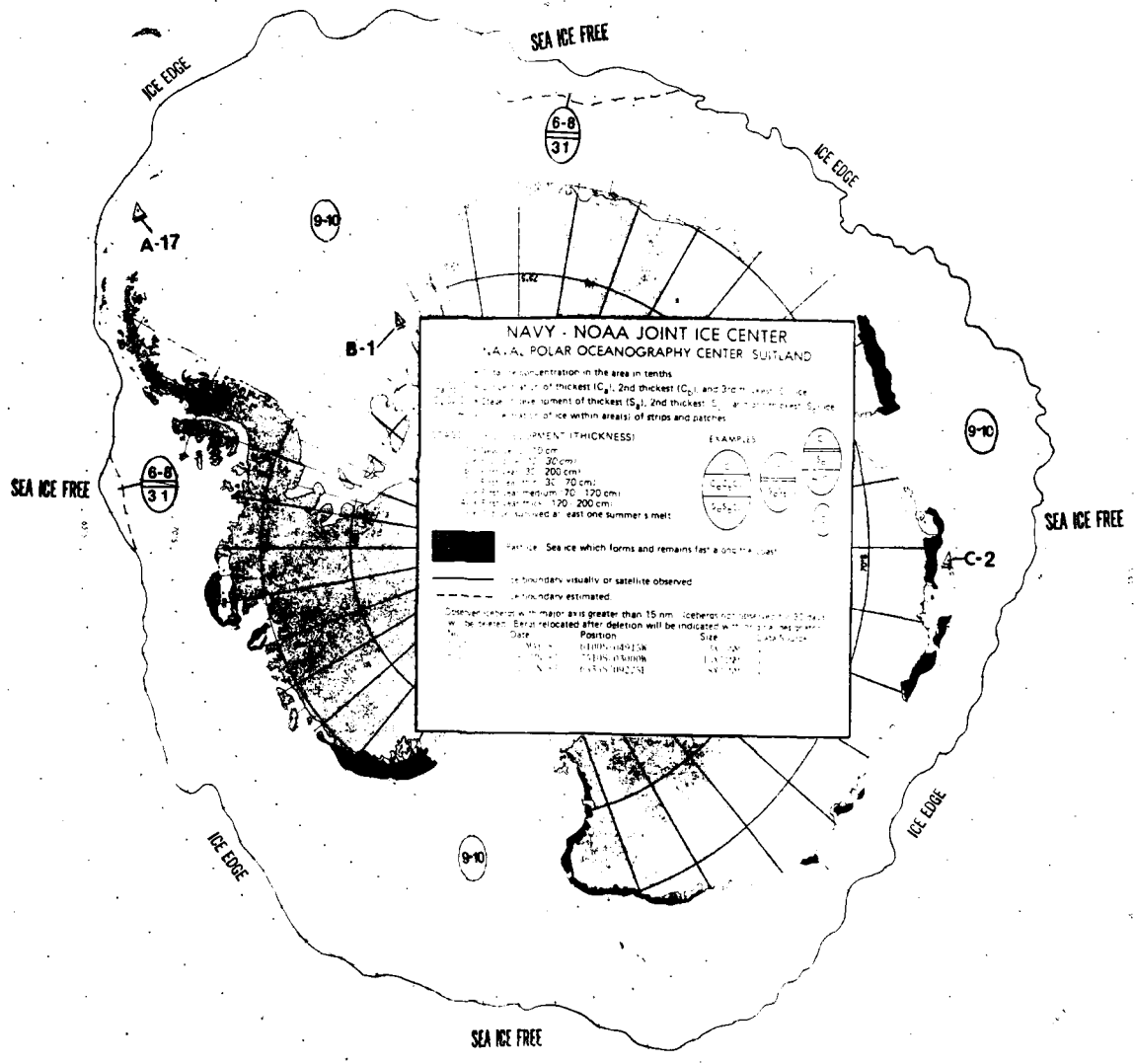


**NORTHERN ICE LIMIT**  
**Date: 09 JUNE 83**  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND

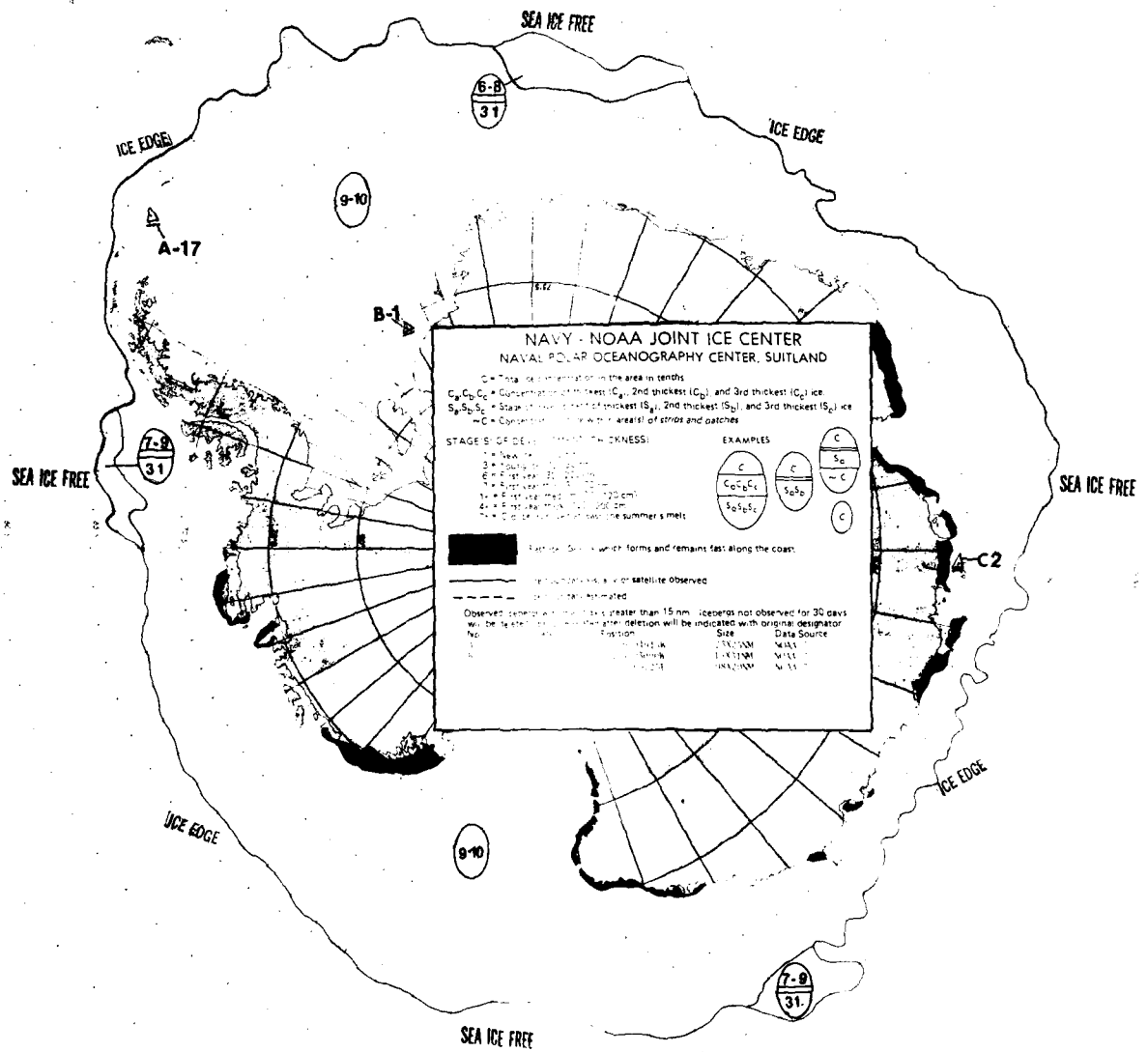


**NORTHERN ICE LIMIT**  
**Date: 16 JUN 83**

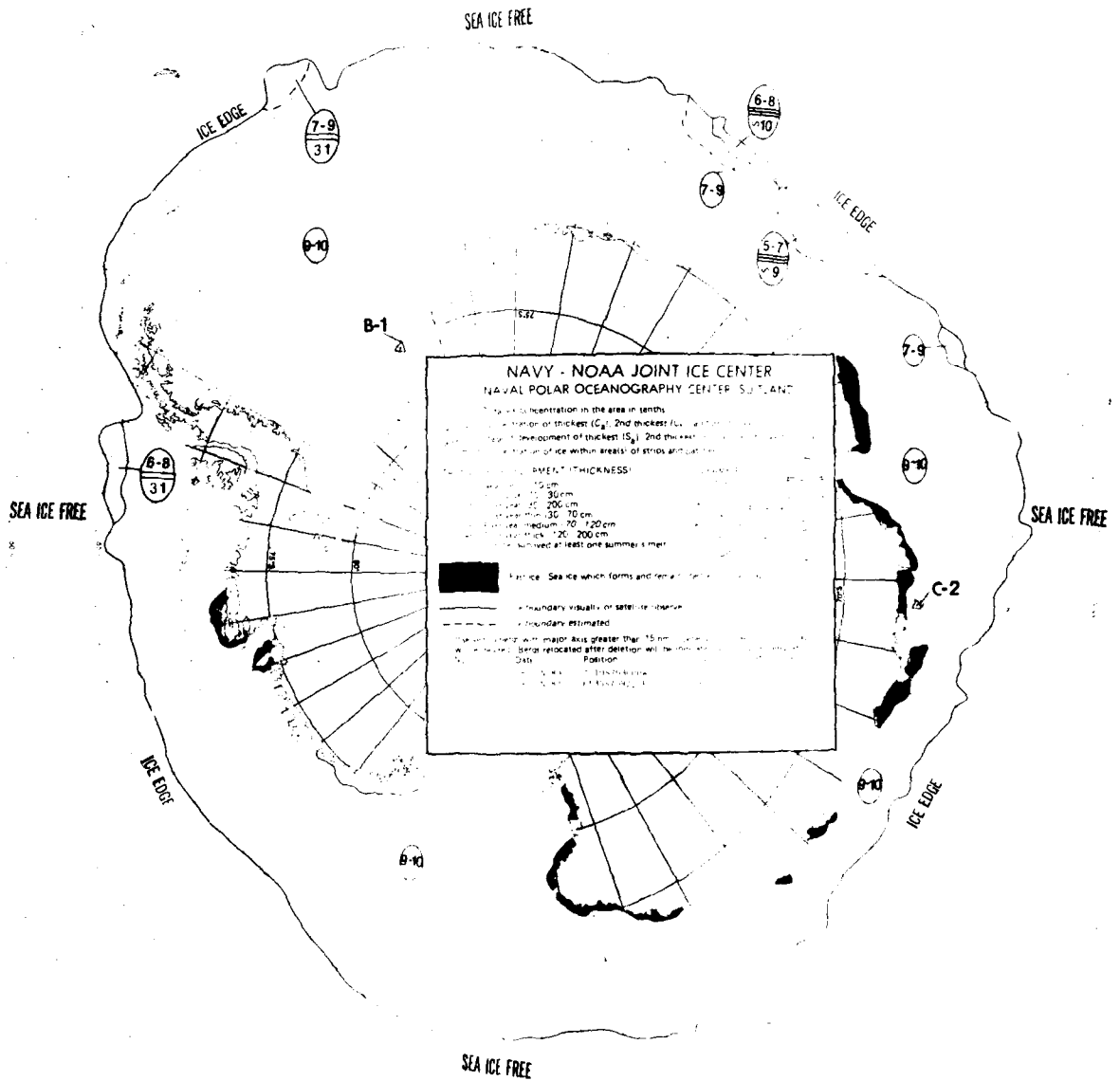
NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



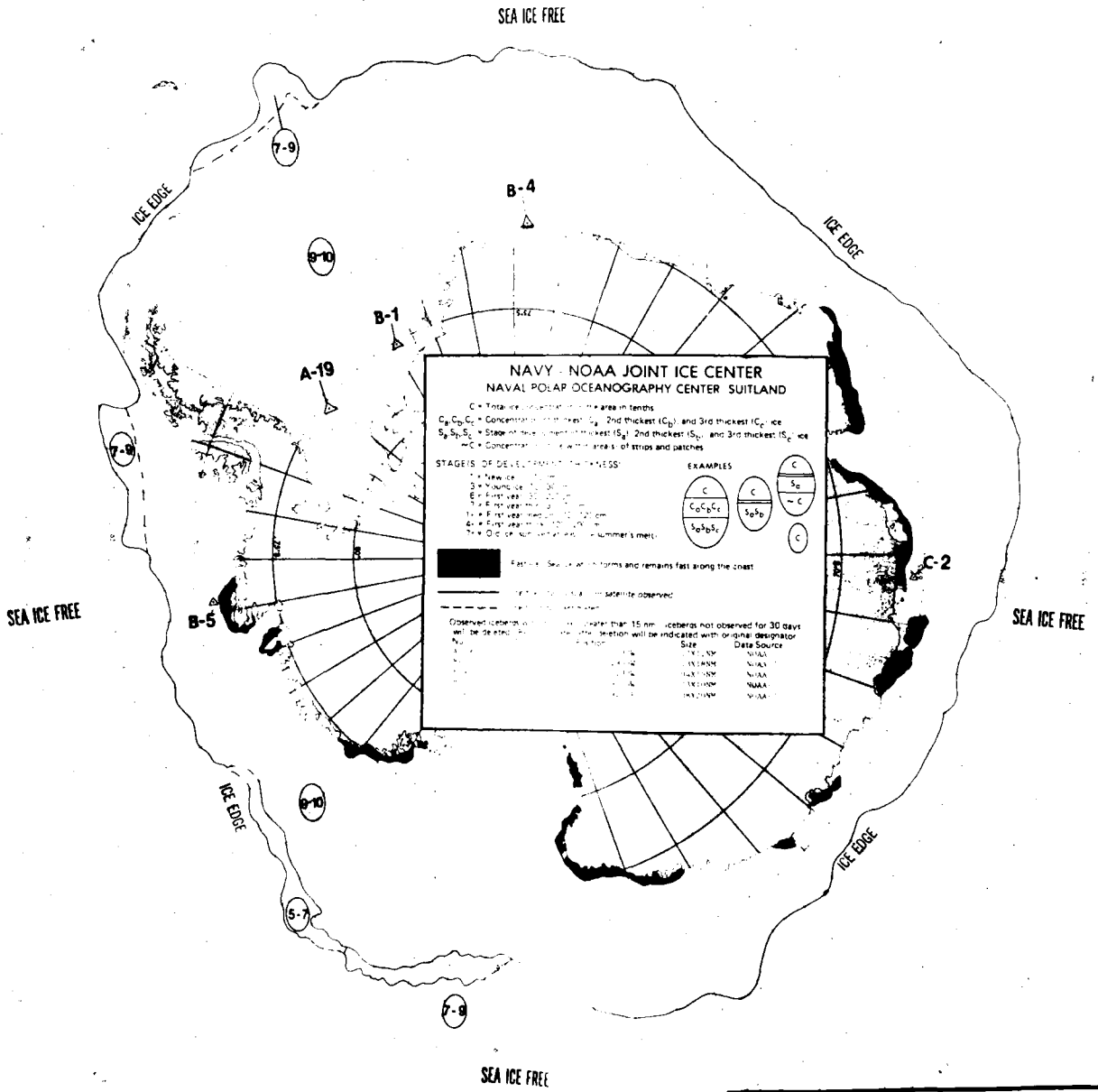
**NORTHERN ICE LIMIT**  
**Date: 23 JUN 83**  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



**NORTHERN ICE LIMIT**  
**Date: 30 JUNE 83**  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND

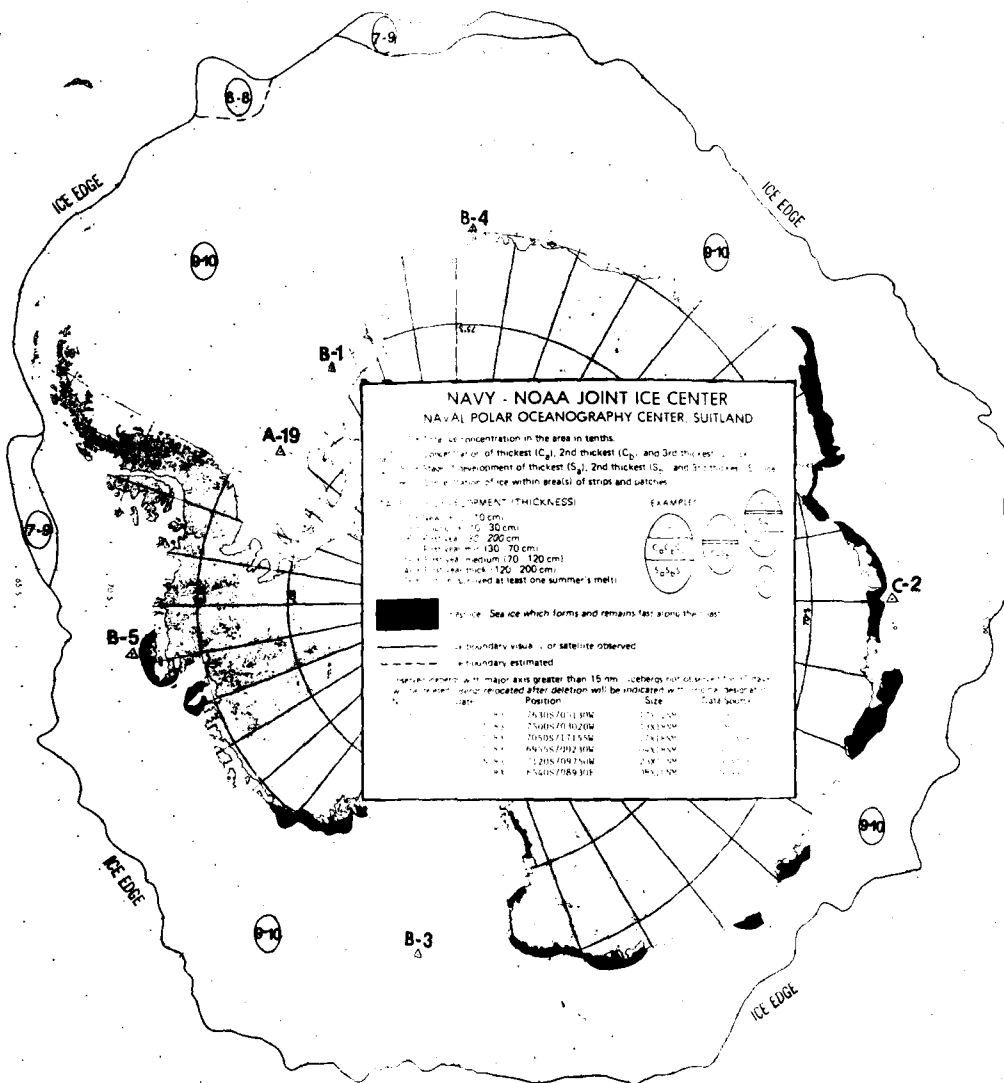


**NORTHERN ICE LIMIT**  
 Date: 07 JUL 83  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



**NORTHERN ICE LIMIT**  
**Date: 14 JUL 83**  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND

SEA ICE FREE



**NAVY - NOAA JOINT ICE CENTER**  
**NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND**

Ice concentration in the area in tenths.  
 Concentration of thickest (C<sub>1</sub>), 2nd thickest (C<sub>2</sub>), and 3rd thickest (C<sub>3</sub>).  
 Stage of development of thickest (S<sub>1</sub>), 2nd thickest (S<sub>2</sub>), and 3rd thickest (S<sub>3</sub>).  
 Concentration of ice within areas of stros and patches.

**ICE THICKNESS EQUIPMENT THICKNESS**

EXAMPLES:

100%	10 cm
100%	30 cm
100%	200 cm
100%	130-170 cm
100%	medium (70-120 cm)
100%	120-200 cm

Ice which has survived at least one summer's melt.

Sea ice which forms and remains fast along the coast.

Boundary visible or satellite observed.  
 Boundary estimated.

Icebergs with major axis greater than 15 nm. Icebergs not observed but their  
 probable location after deletion will be indicated with a dashed line.

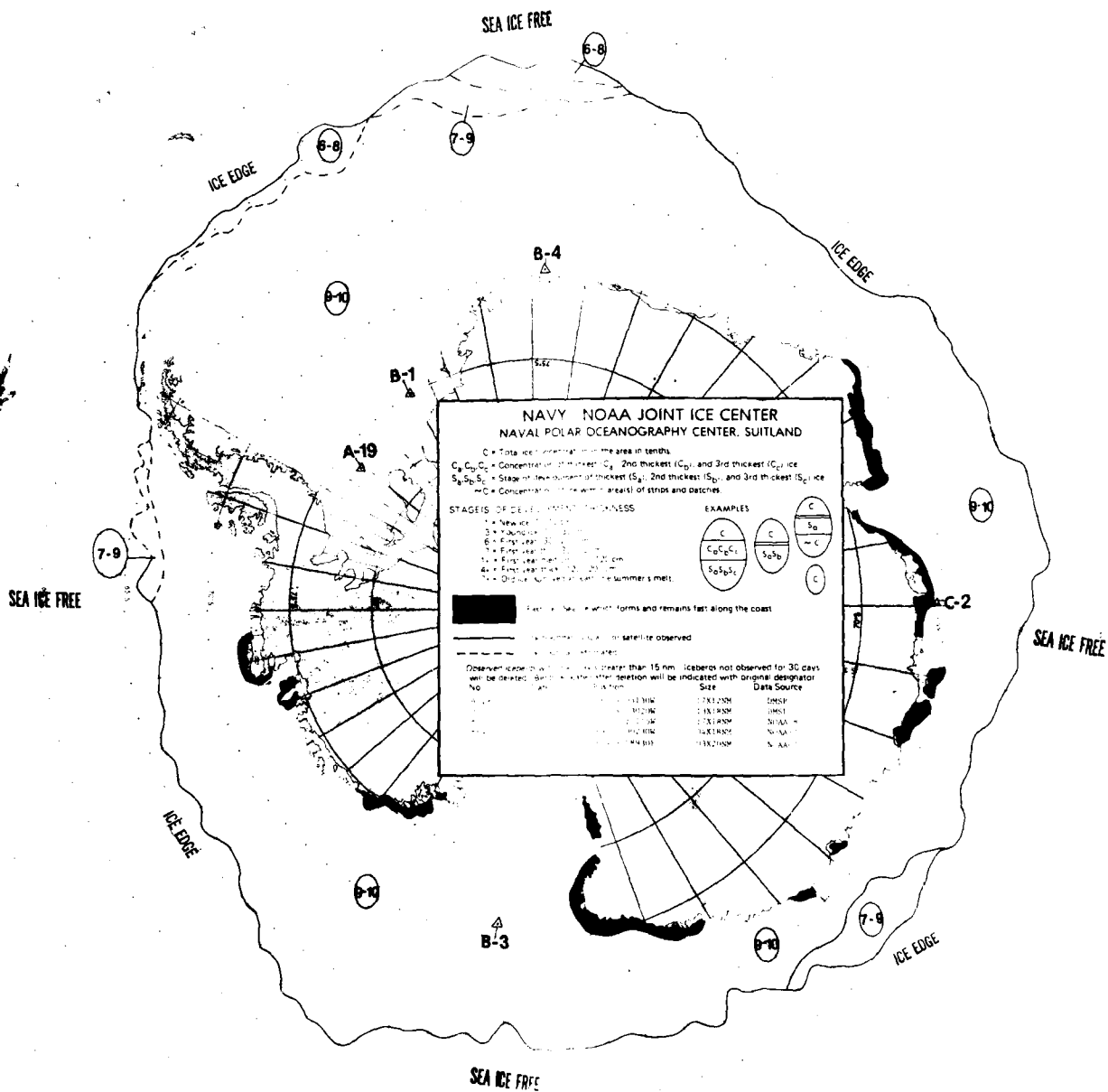
Position	Size	Date Sighted
74°05'N 111°30'W	175 x 200	11/23/82
74°05'N 111°20'W	175 x 200	11/23/82
70°55'N 171°55'W	140 x 170	11/23/82
69°55'N 172°30'W	140 x 170	11/23/82
71°05'N 170°30'W	200 x 300	11/23/82
71°05'N 170°30'W	180 x 300	11/23/82

SEA ICE FREE

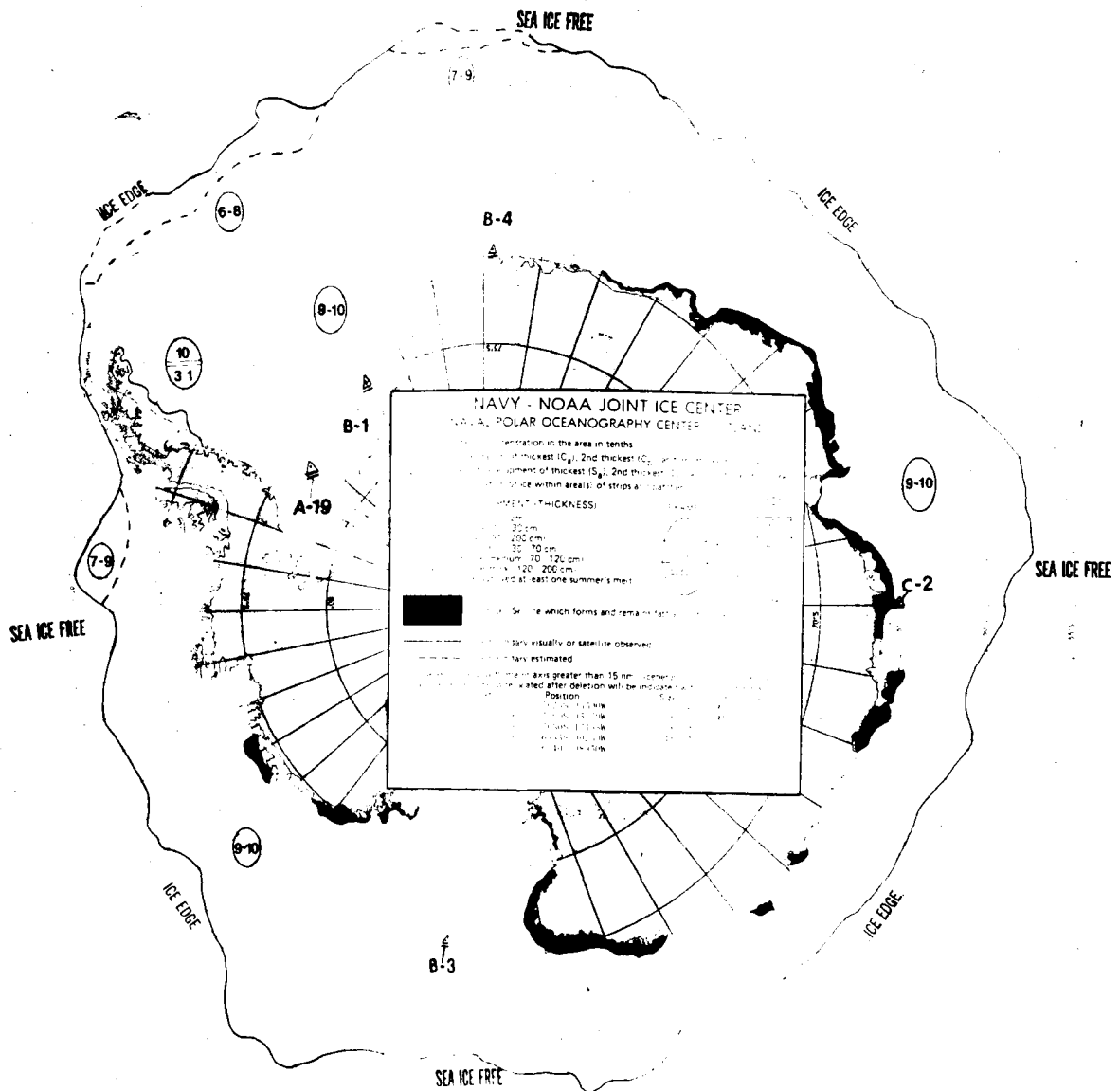
SEA ICE FREE

SEA ICE FREE

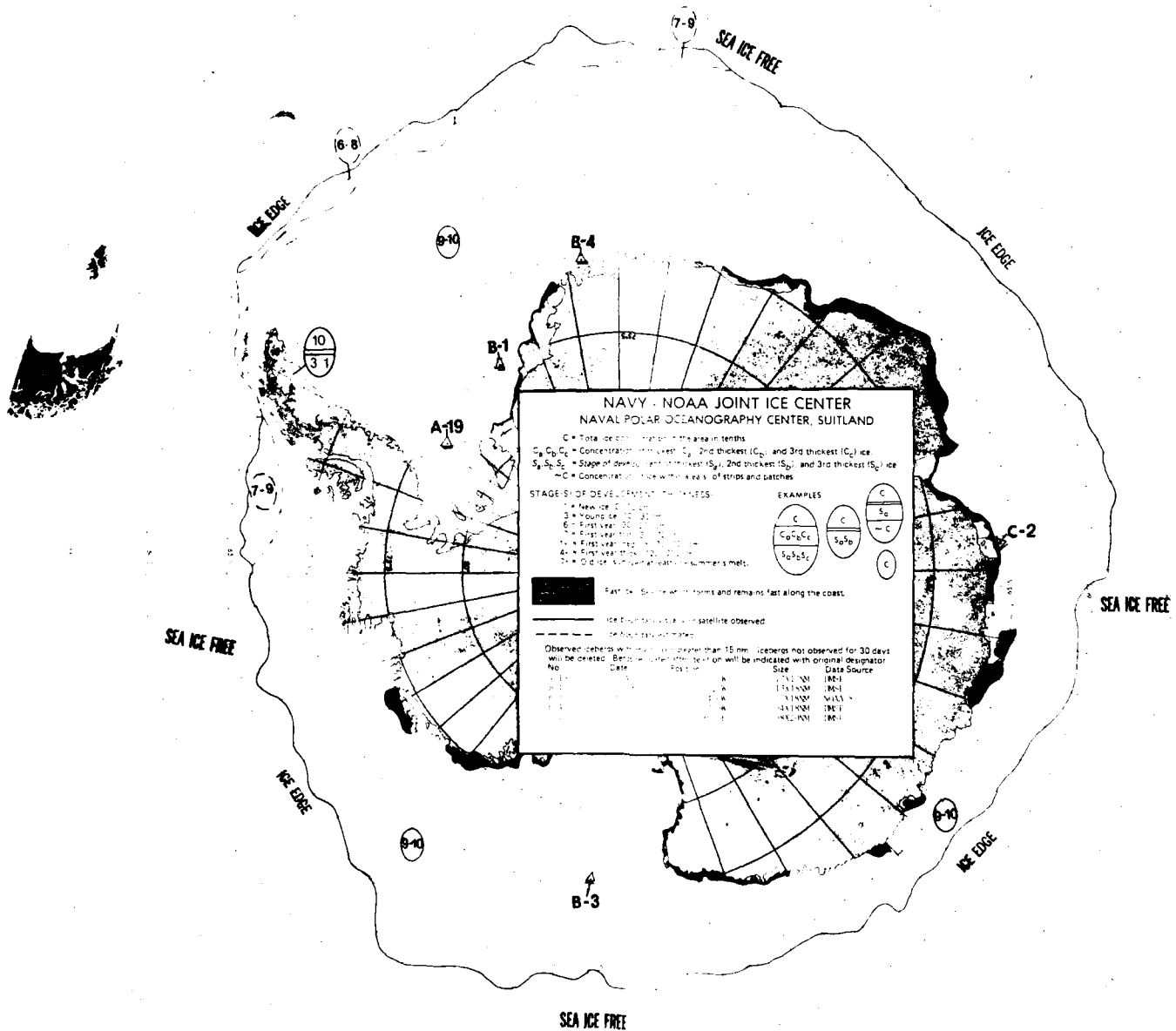
**NORTHERN ICE LIMIT**  
 Date: 21 JUL 83  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



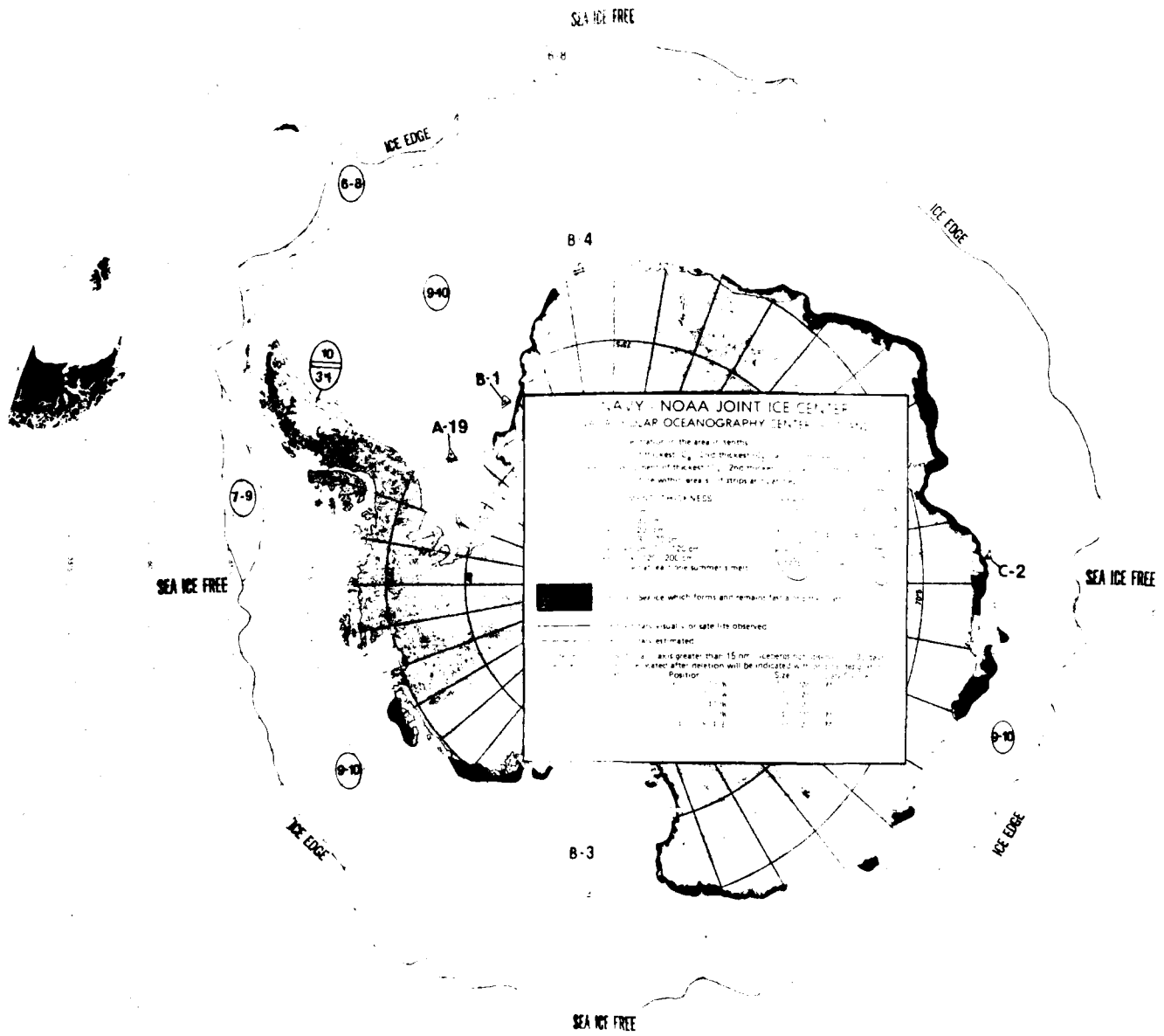
**NORTHERN ICE LIMIT**  
 Date: 28JUL 83  
 NAVY-NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



**NORTHERN ICE LIMIT**  
 Date: 04 AUG 83  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



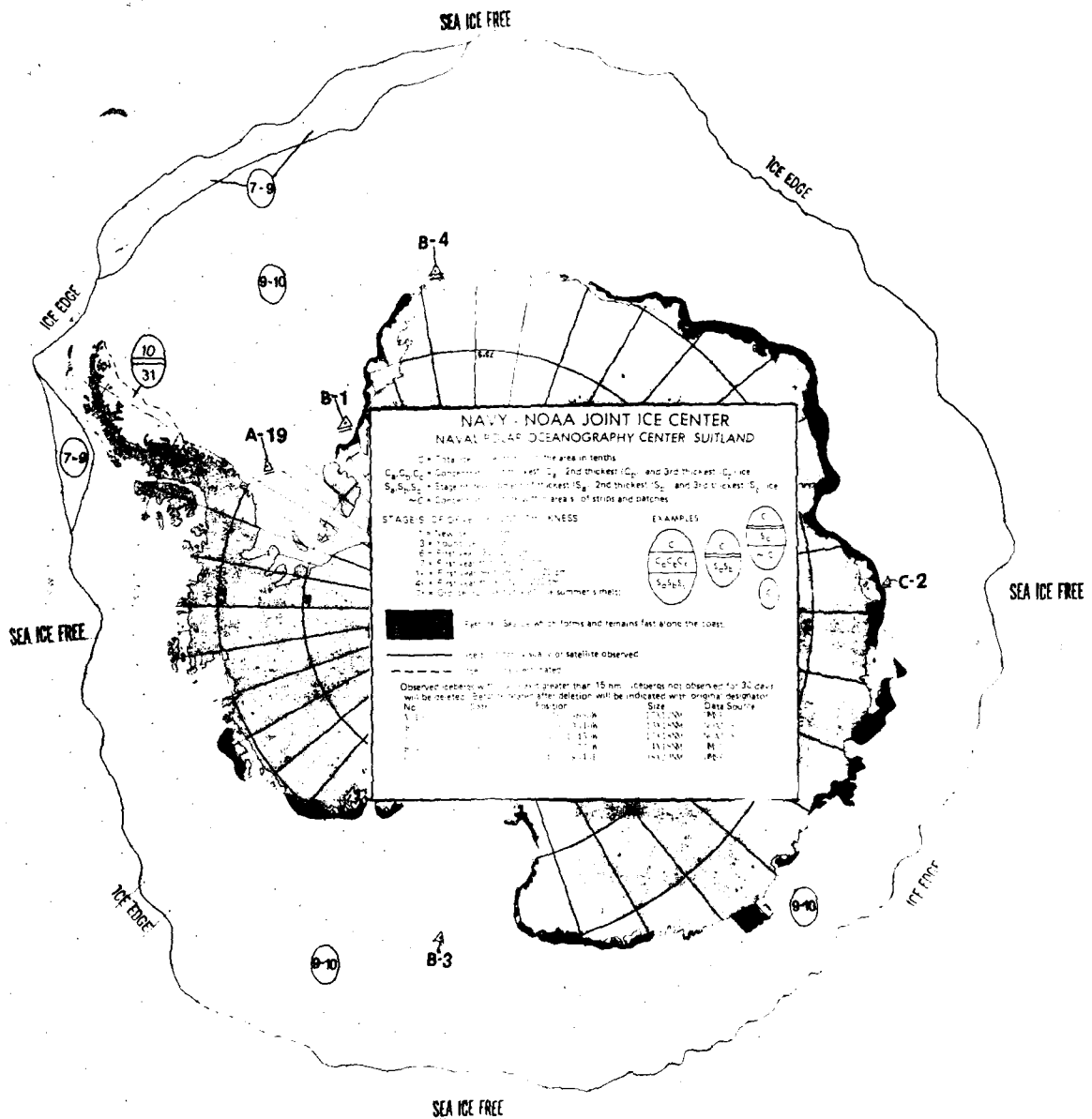
**NORTHERN ICE LIMIT**  
**Date: 11 AUG 83**  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



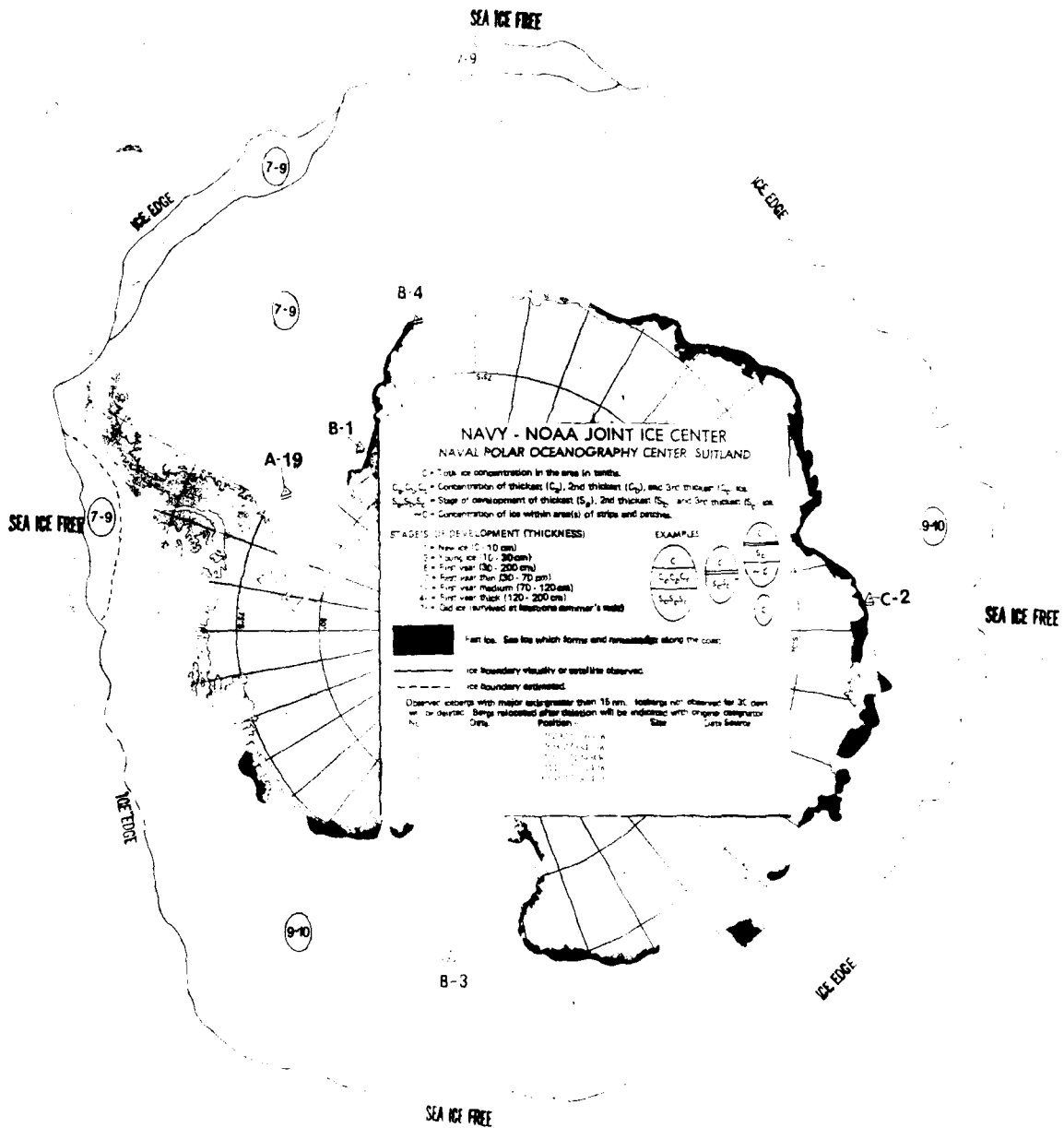
## NORTHERN ICE LIMIT

Date: 18 AUG 83

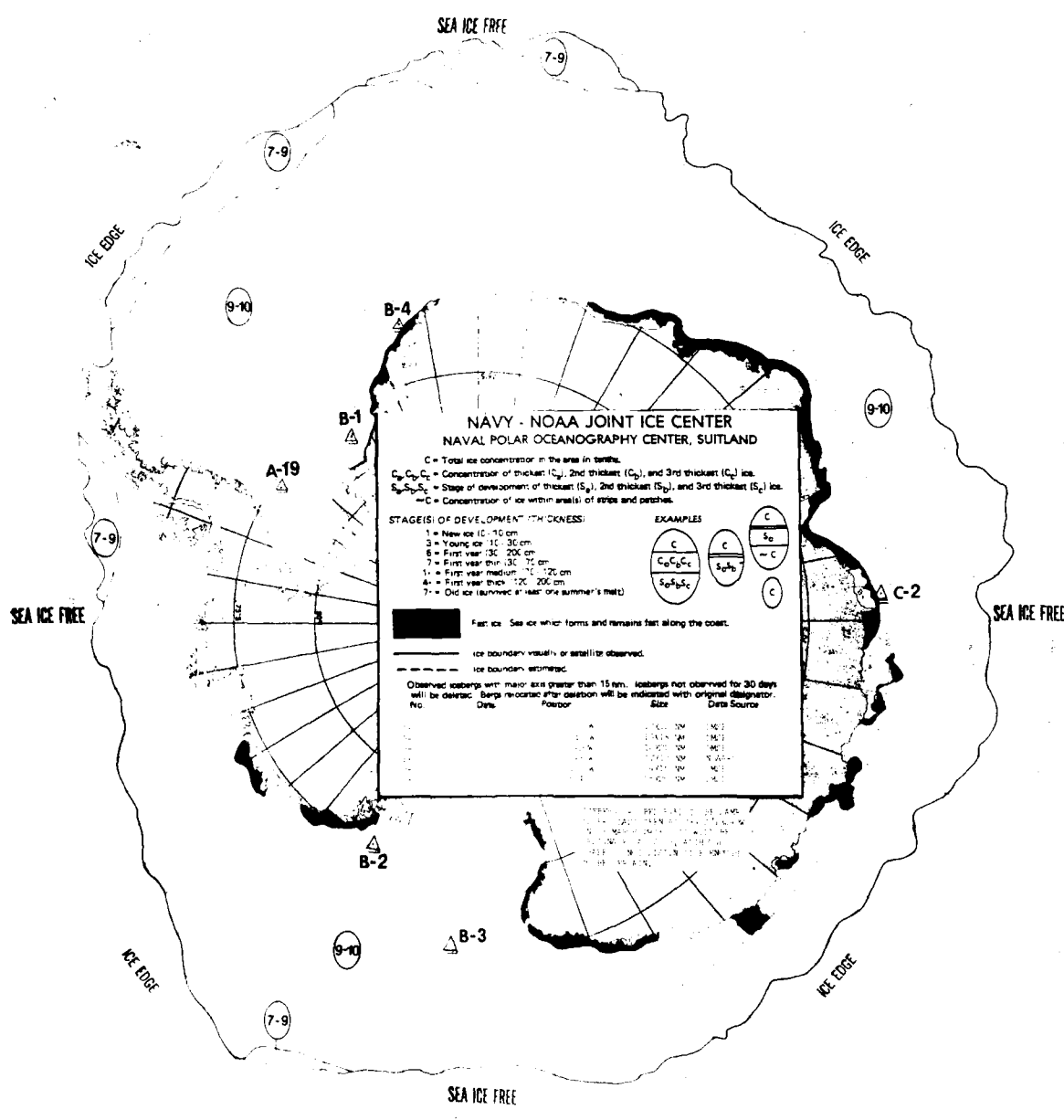
NAVY--NOAA JOINT ICE CENTER  
NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



**NORTHERN ICE LIMIT**  
 Date: 10 AUG 83  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



**NORTHERN ICE LIMIT**  
 Date: 01 SEP 83  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



**NORTHERN ICE LIMIT**  
**Date: 08 SEPT 83**  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUI TLAND

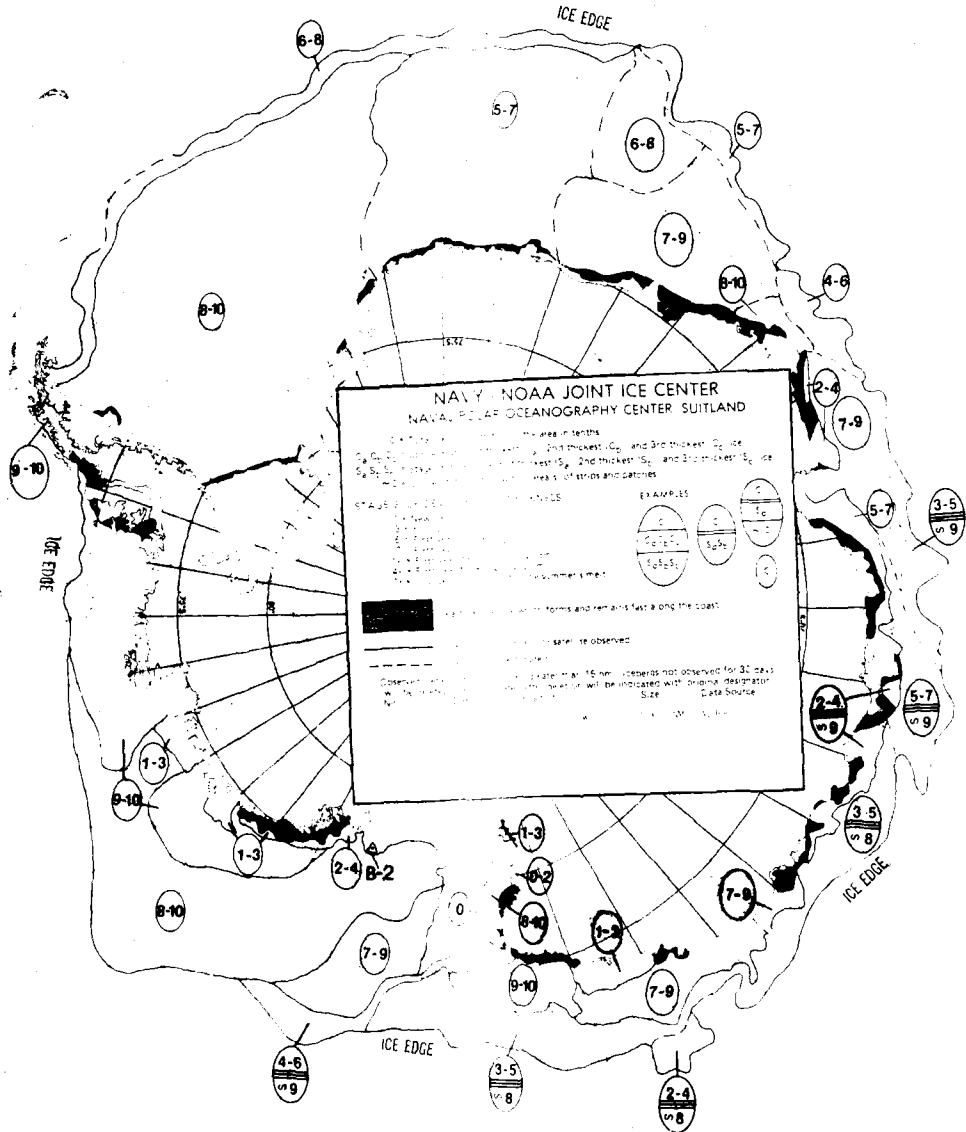
SEA ICE FREE

ICE EDGE

SEA ICE FREE

SEA ICE FREE

SEA ICE FREE



**NAVY-NOAA JOINT ICE CENTER**  
**NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND**

1. Ice thickness in tenths  
 2. Ice type  
 3. Ice strength  
 4. Ice color  
 5. Ice texture  
 6. Ice surface  
 7. Ice bottom  
 8. Ice lead  
 9. Ice drift  
 10. Ice age

EXAMPLES

1-3	4-6	7-9	8-10
1-3	4-6	7-9	8-10
1-3	4-6	7-9	8-10
1-3	4-6	7-9	8-10

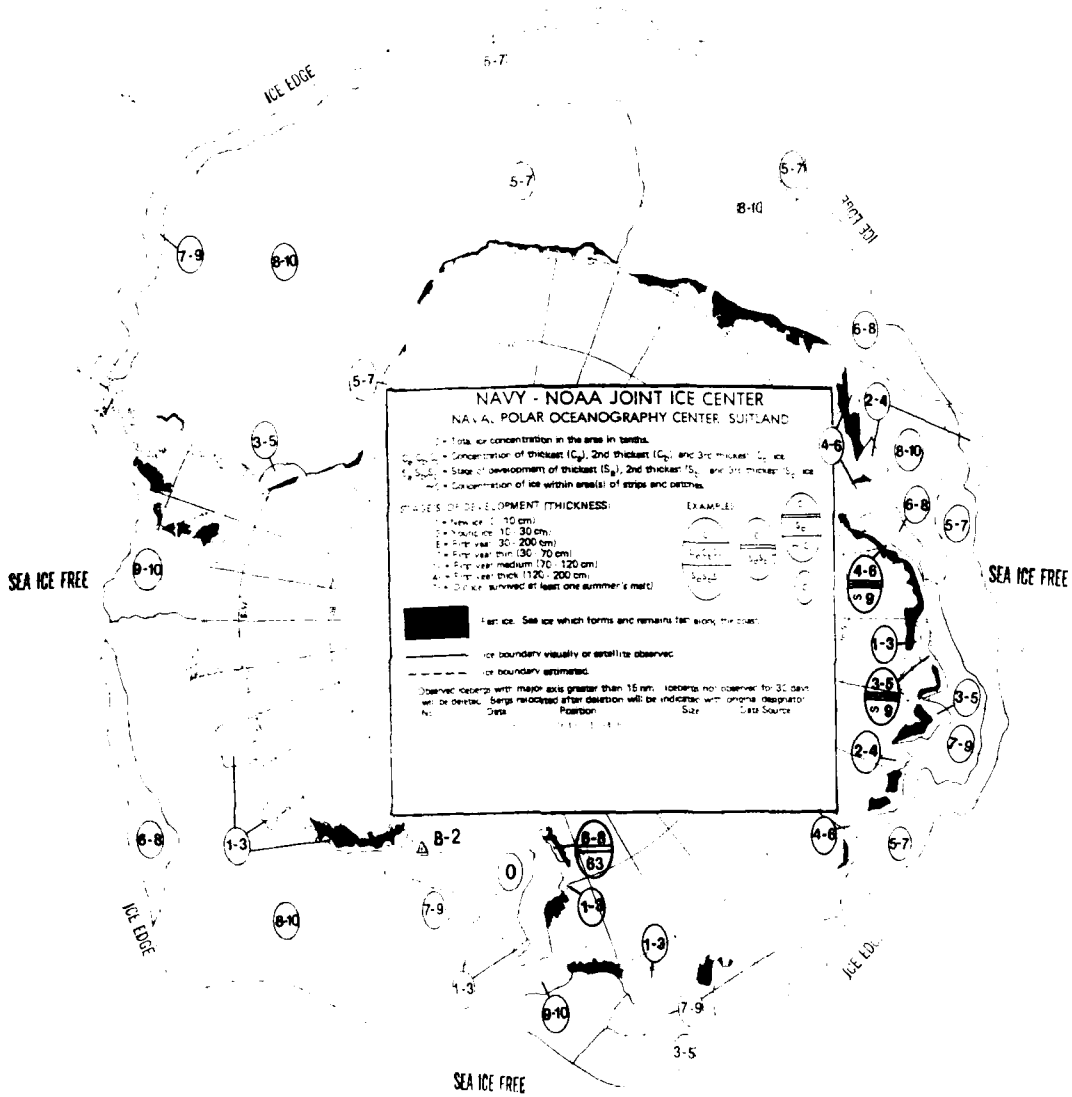
1. Ice thickness in tenths  
 2. Ice type  
 3. Ice strength  
 4. Ice color  
 5. Ice texture  
 6. Ice surface  
 7. Ice bottom  
 8. Ice lead  
 9. Ice drift  
 10. Ice age

EXAMPLES

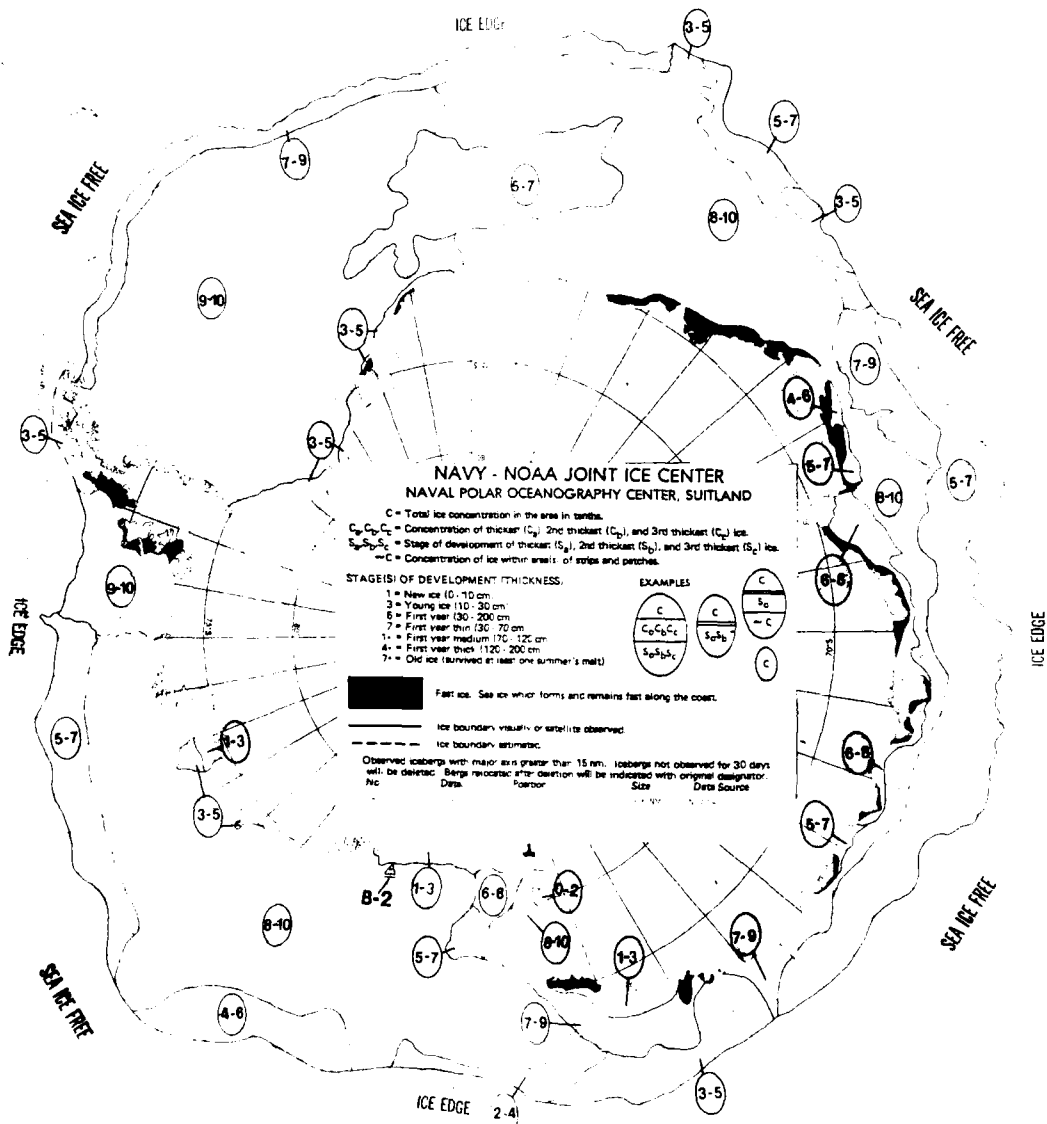
1-3	4-6	7-9	8-10
1-3	4-6	7-9	8-10
1-3	4-6	7-9	8-10
1-3	4-6	7-9	8-10

**NORTHERN ICE LIMIT**  
 Date: \_\_\_\_\_  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND

SEA ICE FREE

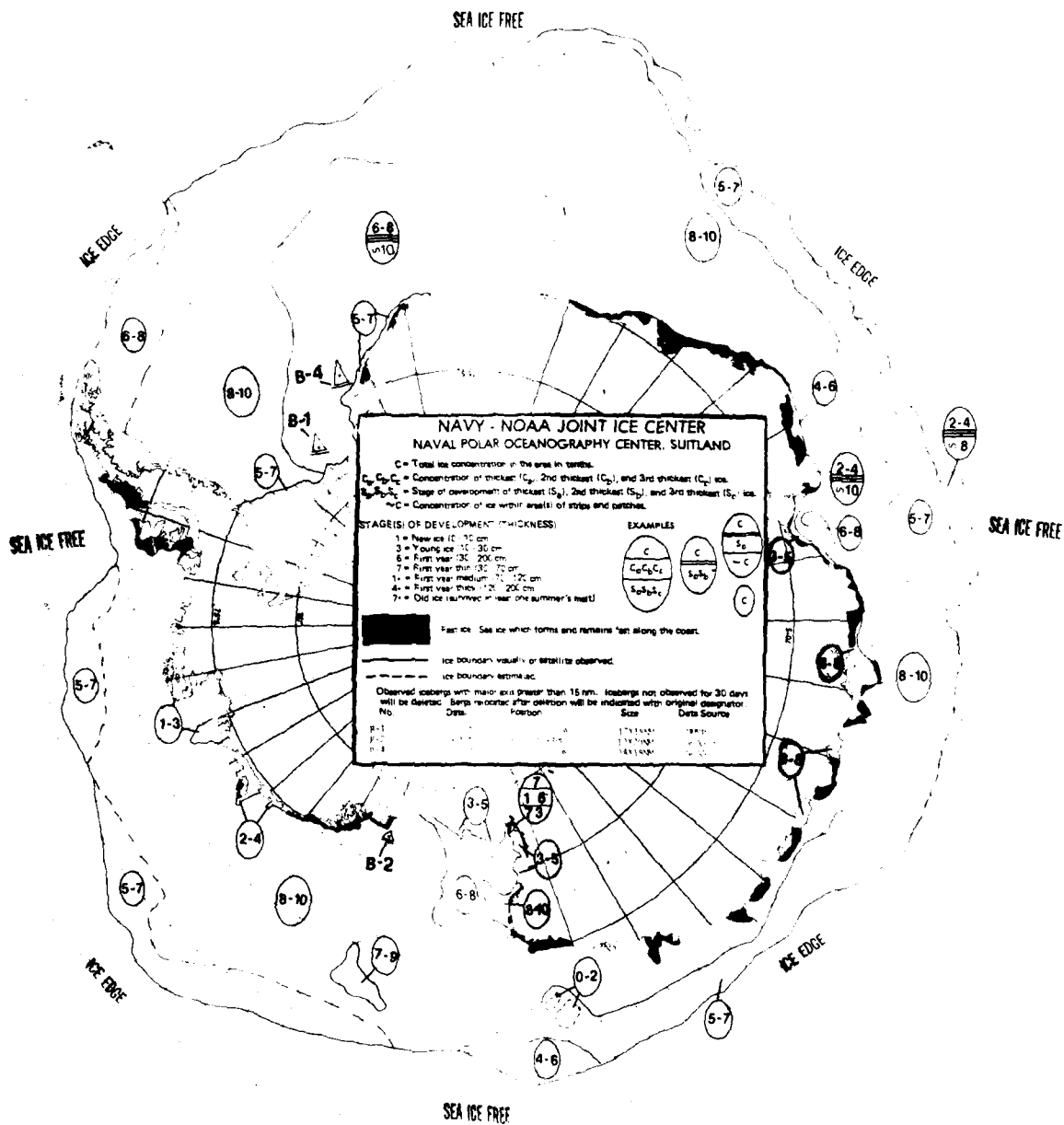


**NORTHERN ICE LIMIT**  
 Date: 15 DEC 83  
 NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND

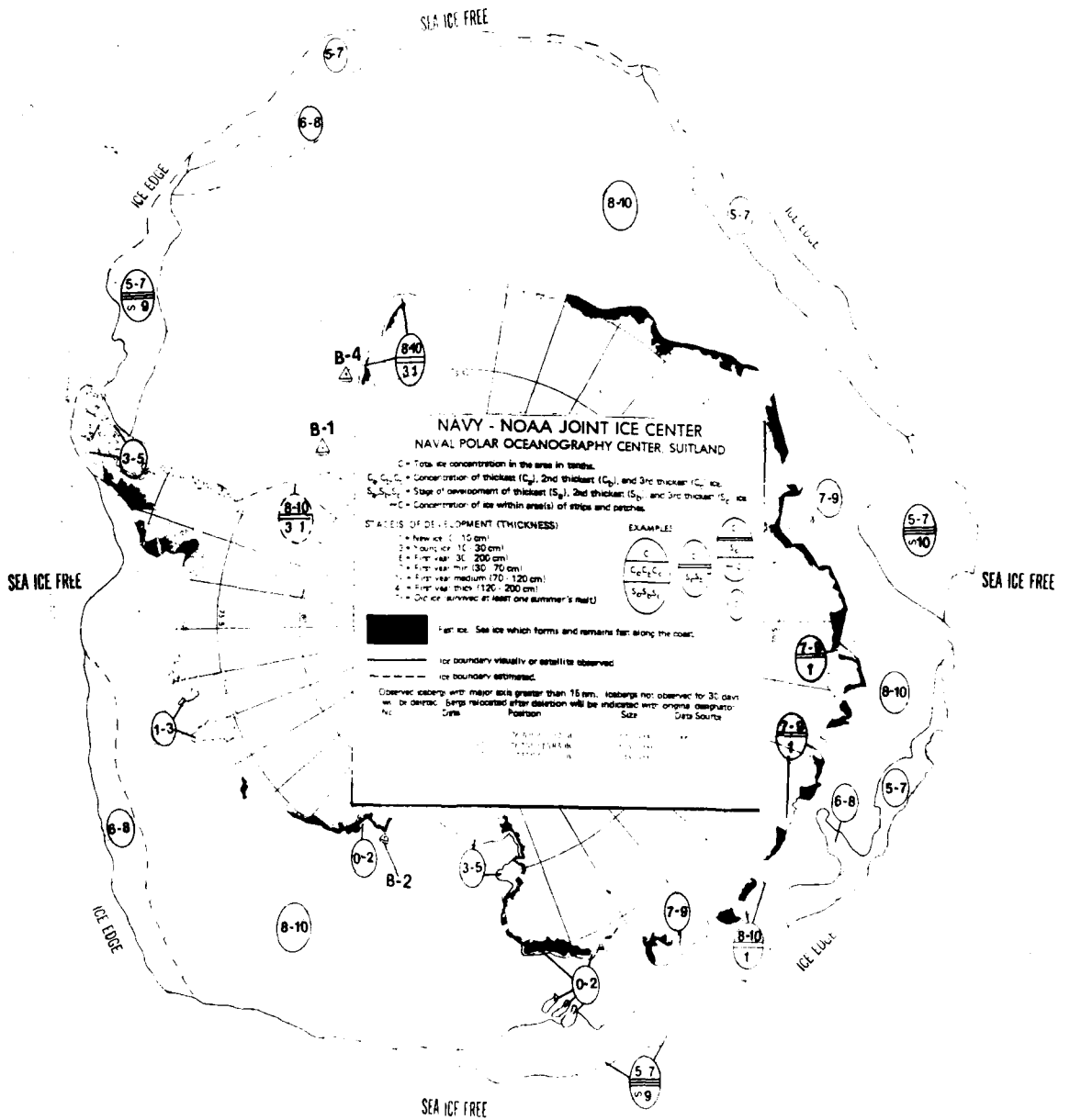


**NORTHERN ICE LIMIT**  
**Date: 01DEC83**  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND

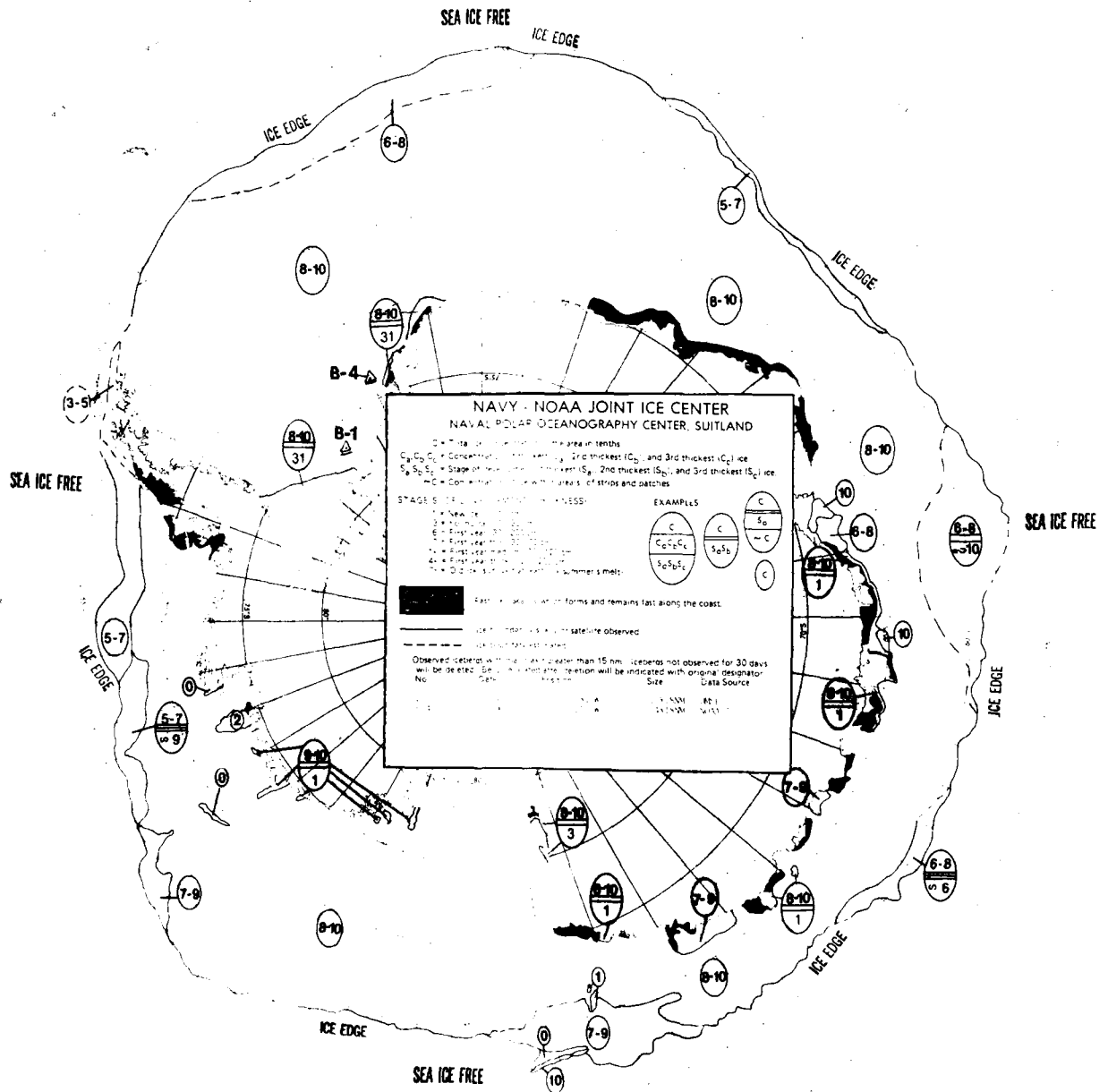




**NORTHERN ICE LIMIT**  
 Date: 17 NOV 83  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



**NORTHERN ICE LIMIT**  
**Date: 10NOV 83**  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



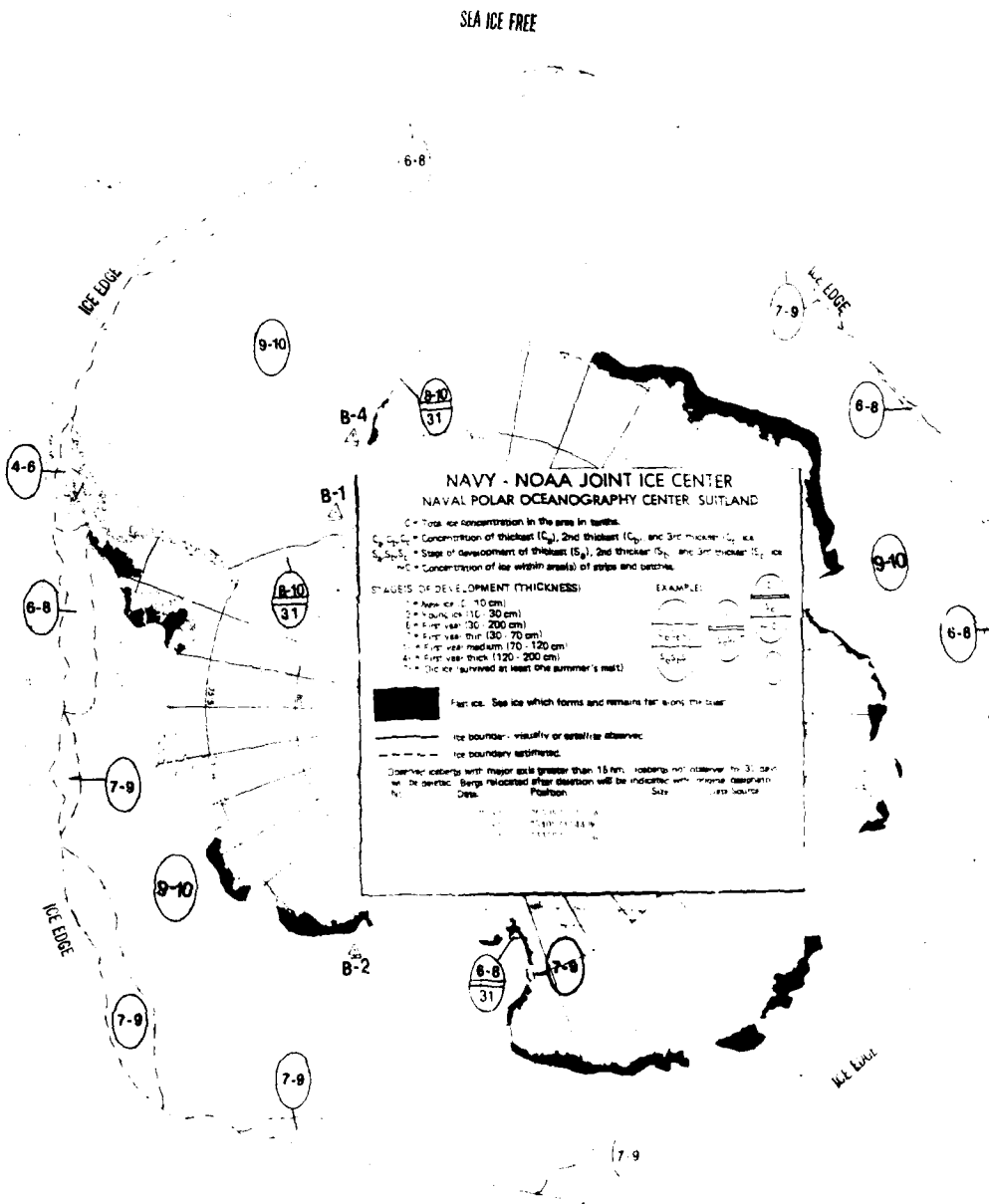
**NORTHERN ICE LIMIT**  
**Date:** 03 NOV 83  
**NAVY—NOAA JOINT ICE CENTER**  
**NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND**

SEA ICE FREE

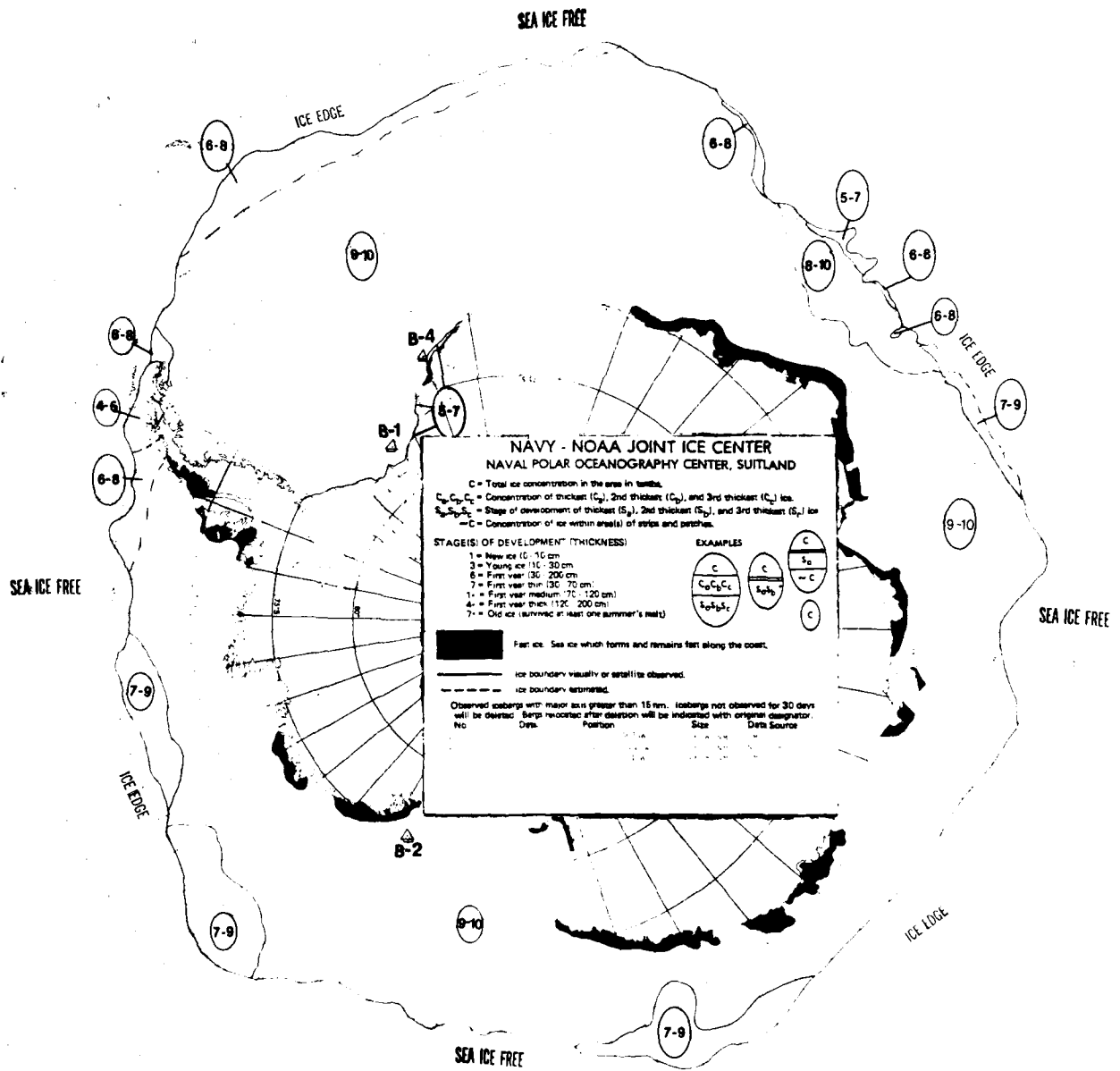
SEA ICE FREE

SEA ICE FREE

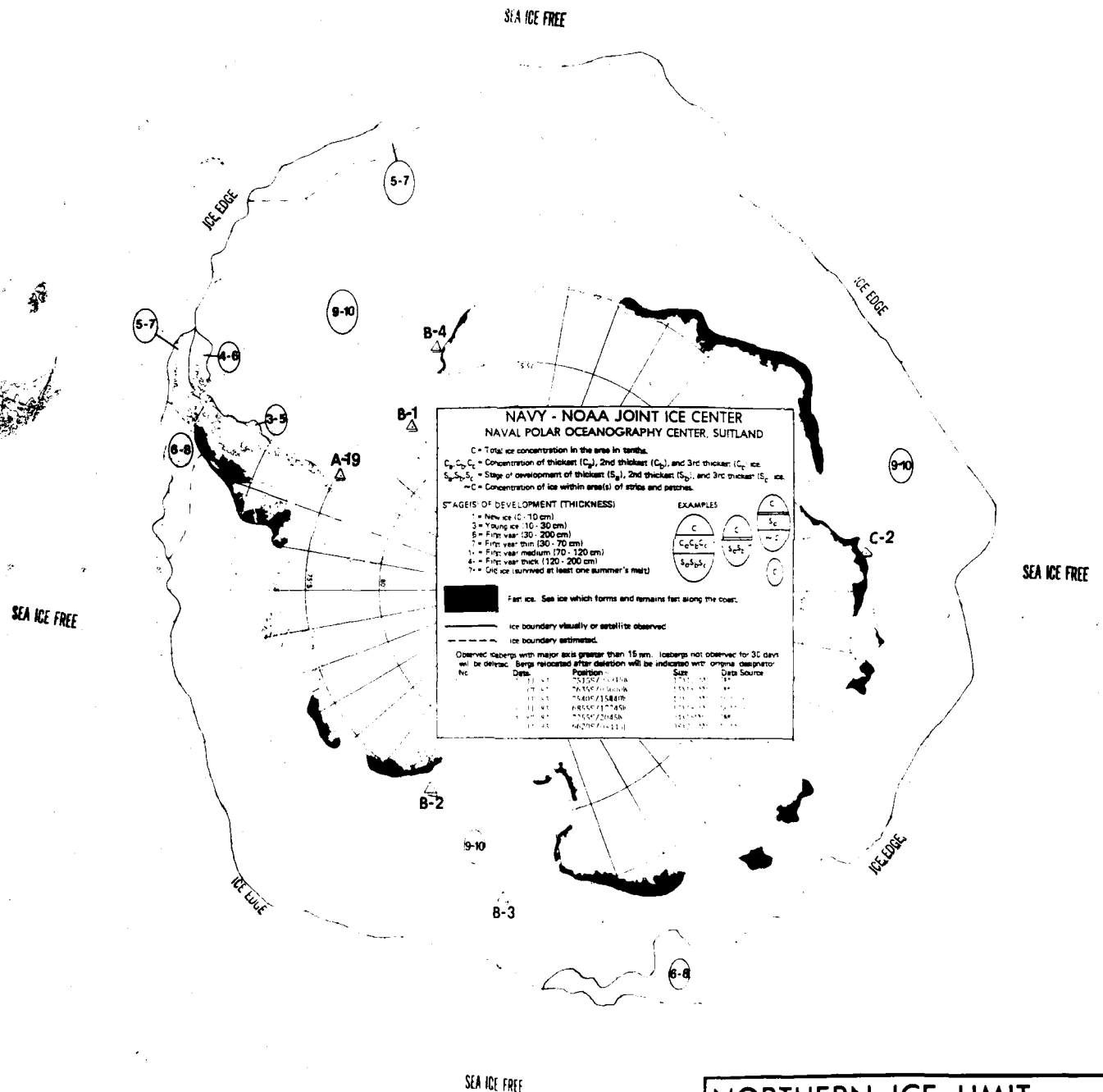
SEA ICE FREE



**NORTHERN ICE LIMIT**  
 Date:            198    
 NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUTLAND



**NORTHERN ICE LIMIT**  
 Date: 20 OCT 63  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



**NAVY - NOAA JOINT ICE CENTER**  
**NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND**

C = Total ice concentration in the area in tenths.  
 $C_1, C_2, C_3$  = Concentration of thickest ( $C_1$ ), 2nd thickest ( $C_2$ ), and 3rd thickest ( $C_3$ ) ice.  
 $S_1, S_2, S_3$  = Stage of development of thickest ( $S_1$ ), 2nd thickest ( $S_2$ ), and 3rd thickest ( $S_3$ ) ice.  
 -C = Concentration of ice within area(s) of stripes and patches.

**STAGES OF DEVELOPMENT (THICKNESS)**

- 1 = New ice (0 - 10 cm)
- 2 = Young ice (10 - 30 cm)
- 3 = First year (30 - 200 cm)
- 4 = First year thin (30 - 70 cm)
- 5 = First year medium (70 - 120 cm)
- 6 = First year thick (120 - 200 cm)
- 7 = Old ice (survived at least one summer's melt)

**EXAMPLES**

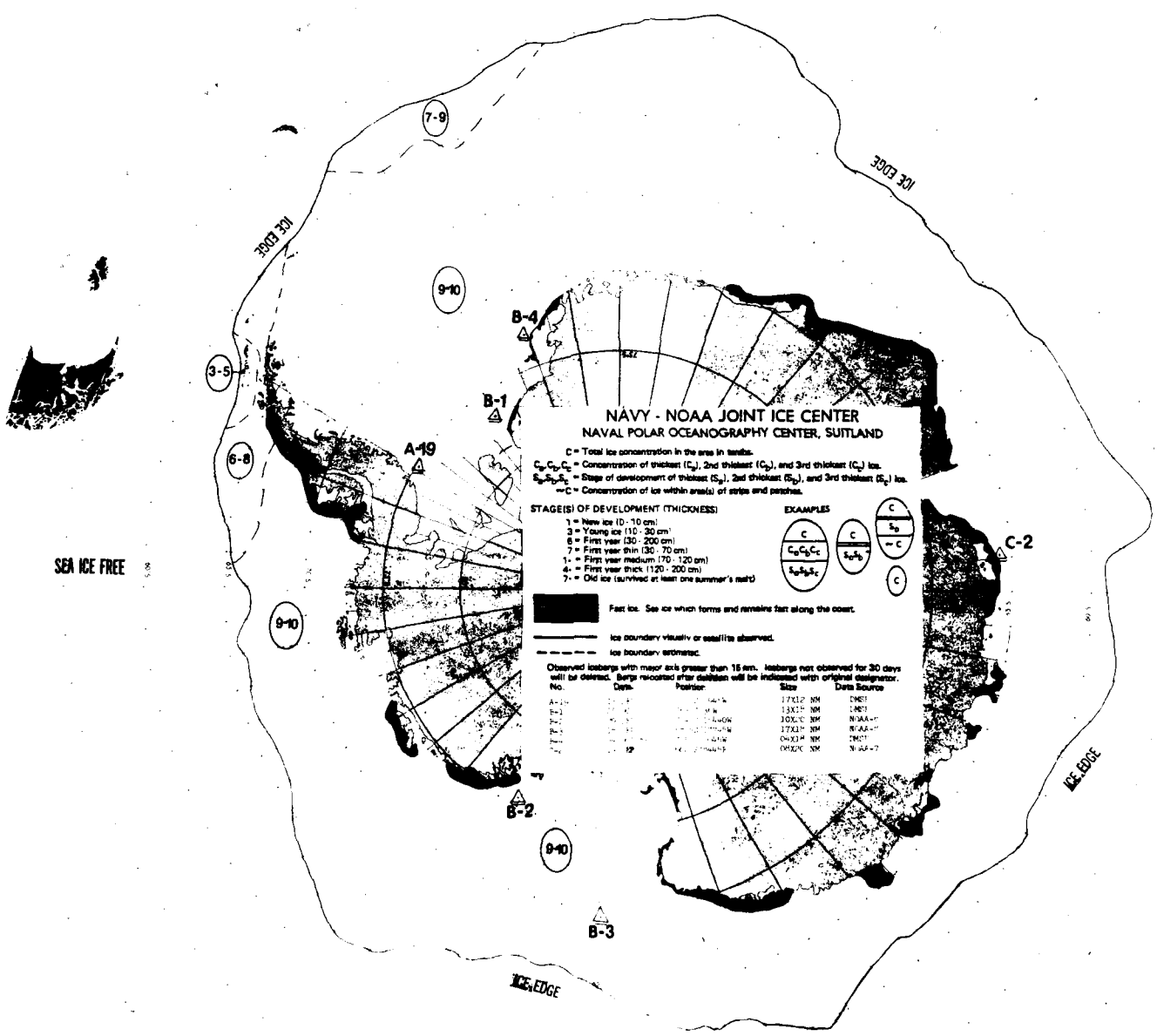
Fast ice: Sea ice which forms and remains fast along the coast.  
 ——— ice boundary visually or satellite observed  
 - - - - - ice boundary estimated.

Observed icebergs with major axis greater than 15 km. Icebergs not observed for 30 days will be deleted. Bergs relocated after deletion will be indicated with original designator.

No.	Date	Position	Size	Data Source
11	11	75°50'N/158°15'W	1200 x 1200	NS
12	11	76°55'N/158°00'W	1200 x 1200	NS
13	11	76°00'N/158°00'W	1200 x 1200	NS
14	11	76°55'N/157°45'W	1200 x 1200	NS
15	11	75°50'N/158°00'W	1200 x 1200	NS
16	11	76°20'N/158°11'W	1200 x 1200	NS

**NORTHERN ICE LIMIT**  
 Date: 13 OCT 83  
 NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND

SEA ICE FREE



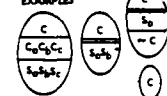
**NAVY - NOAA JOINT ICE CENTER  
NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND**

C = Total ice concentration in the area in tenths.  
 $C_1, C_2, C_3$  = Concentration of thickest ( $C_1$ ), 2nd thickest ( $C_2$ ), and 3rd thickest ( $C_3$ ) ice.  
 $S_1, S_2, S_3$  = Stage of development of thickest ( $S_1$ ), 2nd thickest ( $S_2$ ), and 3rd thickest ( $S_3$ ) ice.  
 -C = Concentration of ice within areas of strips and patches.

**STAGE(S) OF DEVELOPMENT (THICKNESS)**

- 1 = New ice (10 - 10 cm)
- 3 = Young ice (10 - 30 cm)
- 6 = First year (30 - 200 cm)
- 7 = First year thin (30 - 70 cm)
- 1 = First year medium (70 - 120 cm)
- 4 = First year thick (120 - 200 cm)
- 7 = Old ice (survived at least one summer's melt)

**EXAMPLES**



**Fast ice.** Sea ice which forms and remains fast along the coast.

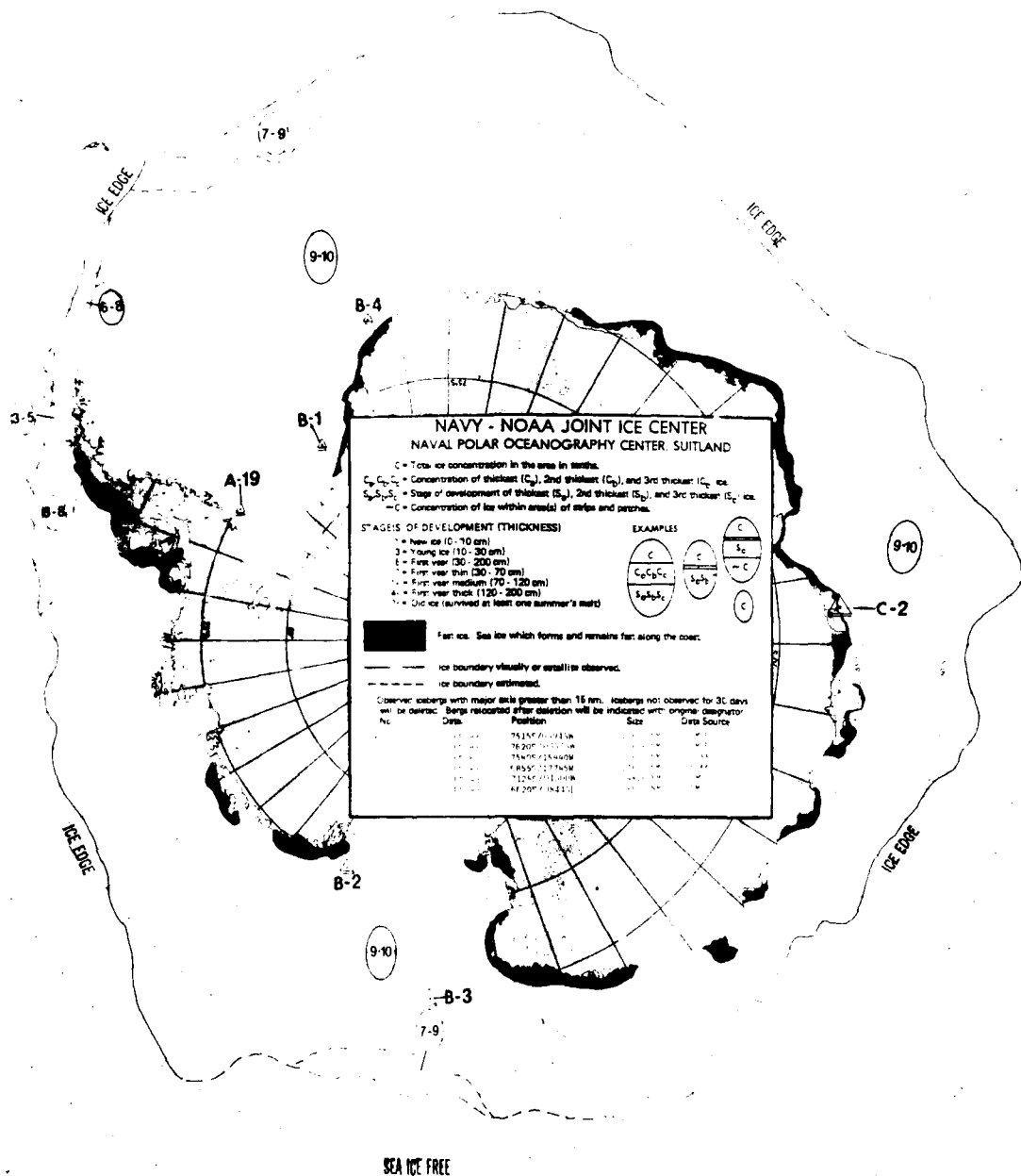
— ice boundary visually or satellite observed.  
 - - - - - ice boundary estimated.

Observed icebergs with major axis greater than 15 m. Icebergs not observed for 30 days will be deleted. Berge recorded after deletion will be indicated with original designator.

No.	Date	Position	Size	Data Source
1	10/1	66°N 150°W	17X12 NM	IMET
2	10/1	66°N 150°W	13X12 NM	IMET
3	10/1	66°N 150°W	10X10 NM	N-SEA-1
4	10/1	66°N 150°W	17X12 NM	N-SEA-1
5	10/1	66°N 150°W	10X10 NM	IMET
6	10/1	66°N 150°W	10X10 NM	N-SEA-1

**NORTHERN ICE LIMIT**  
**Date:** 06 OCT 83  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND

SEA ICE FREE



**NAVY - NOAA JOINT ICE CENTER**  
**NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND**

C = Total ice concentration in the area in tenths.  
 C<sub>1</sub>C<sub>2</sub>C<sub>3</sub> = Concentration of thickest (C<sub>1</sub>), 2nd thickest (C<sub>2</sub>), and 3rd thickest (C<sub>3</sub>) ice.  
 S<sub>1</sub>S<sub>2</sub>S<sub>3</sub> = Stage of development of thickest (S<sub>1</sub>), 2nd thickest (S<sub>2</sub>), and 3rd thickest (S<sub>3</sub>) ice.  
 -C = Concentration of ice within areas of edges and patches.

**STAGES OF DEVELOPMENT (THICKNESS)**

- 1 = New ice (10 cm)
- 2 = Young ice (10 - 30 cm)
- 3 = First year (30 - 200 cm)
- 4 = First year thin (30 - 70 cm)
- 5 = First year medium (70 - 120 cm)
- 6 = First year thick (120 - 200 cm)
- 7 = Old ice (survived at least one summer's melt)

**EXAMPLES**

$\frac{C}{C_1 C_2 C_3}$      $\frac{C}{S_1 S_2 S_3}$      $\frac{C}{S_1 C_2 C_3}$      $\frac{C}{S_1 S_2 C_3}$      $\frac{C}{S_1 C_2 S_3}$      $\frac{C}{S_1 S_2 S_3}$

Far ice. Sea ice which forms and remains far along the coast.  
 - - - - - ice boundary visually or satellite observed.  
 . . . . . ice boundary estimated.

Observed icebergs with major axis greater than 15 km. Icebergs not observed for 30 days will be detrac. Bergs rescored after deletion will be indicated with original operator.

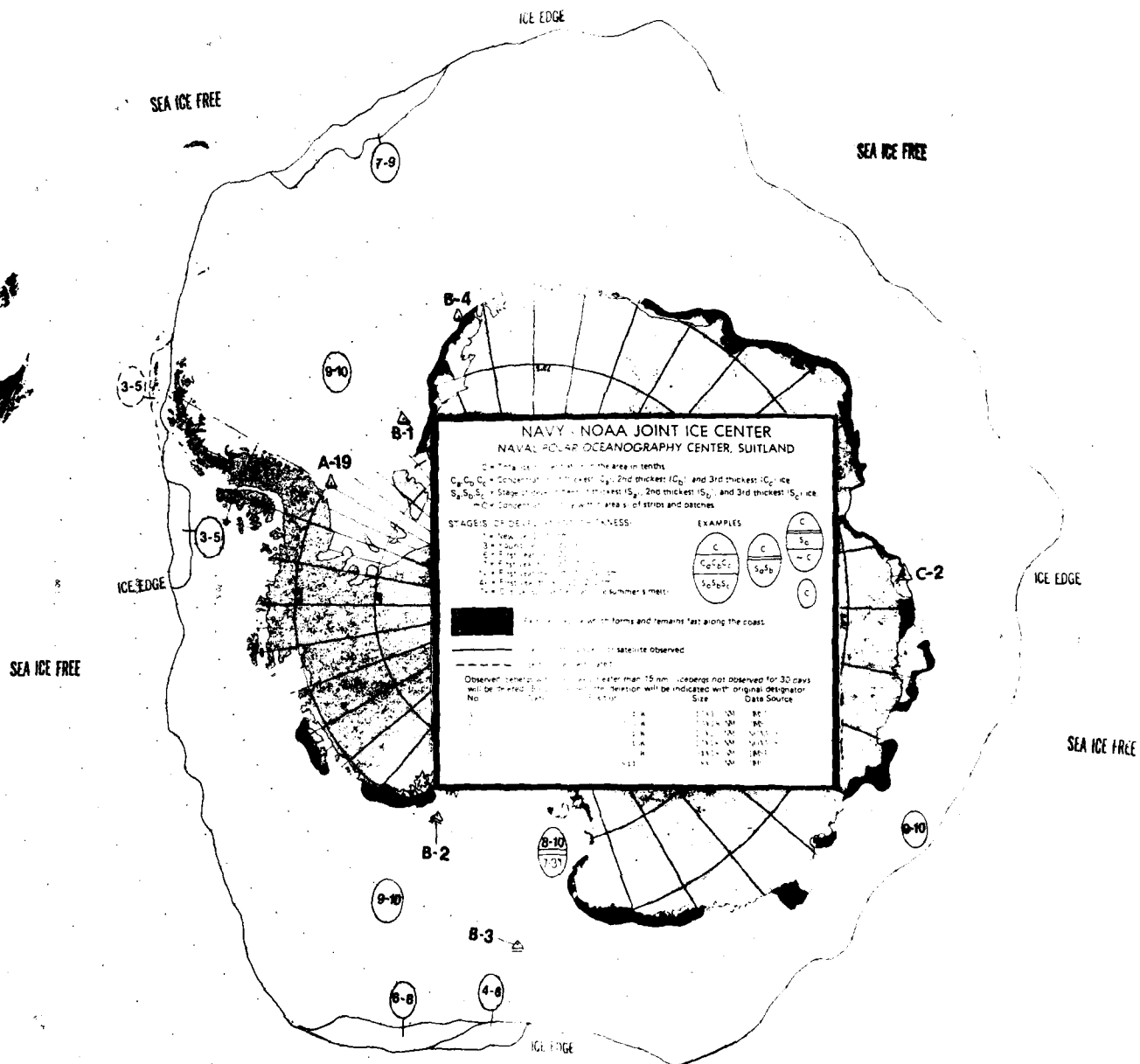
Ac	Date	Position	Size	Data Source
11	11	75 55N 121 50W	11	11
11	11	76 20N 121 10W	11	11
11	11	75 40N 124 00W	11	11
11	11	78 55N 121 70W	11	11
11	11	71 50N 121 00W	11	11
11	11	81 20N 114 10E	11	11

SEA ICE FREE

SEA ICE FREE

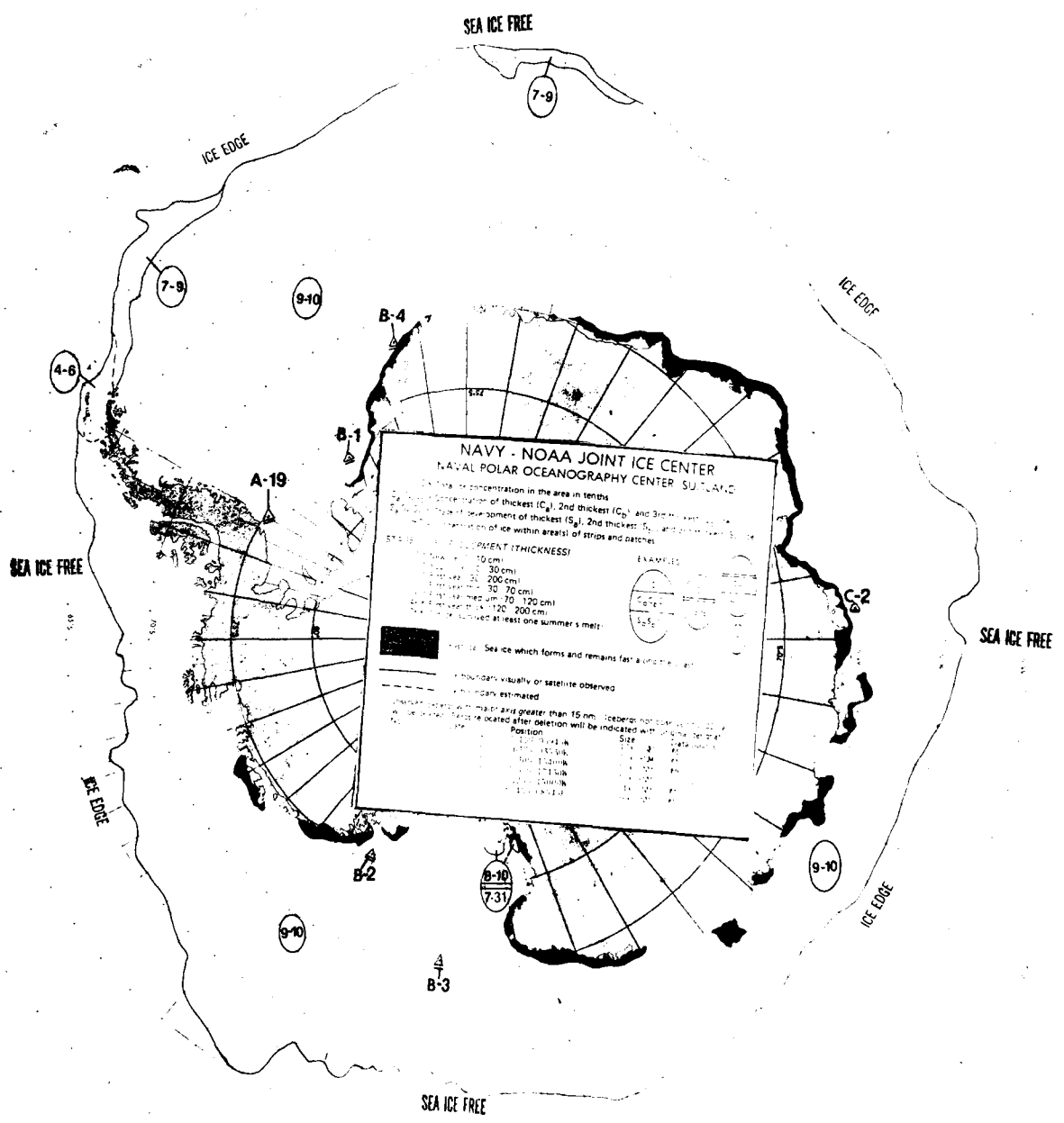
SEA ICE FREE

**NORTHERN ICE LIMIT**  
 Date: 29SEP83  
 NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



**NORTHERN ICE LIMIT**  
 Date: 22 SEP 83  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND

7



**NAVY - NOAA JOINT ICE CENTER**  
**NAVAL POLAR OCEANOGRAPHY CENTER, SVALBARD**

Ice concentration in the area in tenths  
 1st thickest (C<sub>1</sub>), 2nd thickest (C<sub>2</sub>) and 3rd thickest (C<sub>3</sub>)  
 1st thickest (S<sub>1</sub>), 2nd thickest (S<sub>2</sub>) and 3rd thickest (S<sub>3</sub>)  
 1st thickest (A<sub>1</sub>), 2nd thickest (A<sub>2</sub>) and 3rd thickest (A<sub>3</sub>)

**STRIPS (THICKNESS)**  
 1st thickest (C<sub>1</sub>)  
 2nd thickest (C<sub>2</sub>)  
 3rd thickest (C<sub>3</sub>)  
 1st thickest (S<sub>1</sub>)  
 2nd thickest (S<sub>2</sub>)  
 3rd thickest (S<sub>3</sub>)  
 1st thickest (A<sub>1</sub>)  
 2nd thickest (A<sub>2</sub>)  
 3rd thickest (A<sub>3</sub>)

**EXAMPLES**

1st thickest (C<sub>1</sub>)  
 2nd thickest (C<sub>2</sub>)  
 3rd thickest (C<sub>3</sub>)  
 1st thickest (S<sub>1</sub>)  
 2nd thickest (S<sub>2</sub>)  
 3rd thickest (S<sub>3</sub>)  
 1st thickest (A<sub>1</sub>)  
 2nd thickest (A<sub>2</sub>)  
 3rd thickest (A<sub>3</sub>)

Icebergs with major axis greater than 15 nm. Icebergs not shown  
 Icebergs shown after deletion will be indicated with a 'D' after the number

Position	Size
10° 15' N 15° 15' W	100 x 200 m
10° 30' N 15° 30' W	100 x 200 m
10° 45' N 15° 45' W	100 x 200 m
10° 15' N 15° 15' W	100 x 200 m
10° 30' N 15° 30' W	100 x 200 m
10° 45' N 15° 45' W	100 x 200 m

**NORTHERN ICE LIMIT**  
**Date: 15 SEP 83**  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SVALBARD

SEA ICE FREE

ICE EDGE

5-7

0-2

4-6

7-9

8-10

0

ICE EDGE

1-3

3-5

7-9

8-10

8-10

SEA ICE FREE

SEA ICE FREE

ICE EDGE

0-2

1-3

0-2

0

ICE FREE

3-5

8-10

9-10

8-2

6-8

0

8-8

7-9

ICE EDGE

ICE EDGE

7-9

8-10

8-10

1-3

3-5

8

SEA ICE FREE

**NAVY - NOAA JOINT ICE CENTER**  
**NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND**

C = Total ice concentration in the area in tenths.  
 C<sub>1</sub>, C<sub>2</sub>, C<sub>3</sub> = Concentration of thickest (C<sub>1</sub>), 2nd thickest (C<sub>2</sub>), and 3rd thickest (C<sub>3</sub>) ice.  
 S<sub>1</sub>, S<sub>2</sub>, S<sub>3</sub> = Stage of development of thickest (S<sub>1</sub>), 2nd thickest (S<sub>2</sub>), and 3rd thickest (S<sub>3</sub>) ice.  
 -C = Concentration of ice within area(s) of strip and circles.

**STAGES OF DEVELOPMENT (THICKNESS)**

- 1 = New ice (0 - 10 cm)
- 2 = Young ice (10 - 30 cm)
- 3 = 4-yr ice (30 - 200 cm)
- 4 = 5-yr ice (30 - 200 cm)
- 5 = 6-yr ice (30 - 200 cm)
- 6 = 7-yr ice (30 - 200 cm)
- 7 = 8-yr ice (30 - 200 cm)
- 8 = 9-yr ice (30 - 200 cm)
- 9 = 10-yr ice (30 - 200 cm)
- 10 = 11-yr ice (30 - 200 cm)
- 11 = 12-yr ice (30 - 200 cm)
- 12 = 13-yr ice (30 - 200 cm)
- 13 = 14-yr ice (30 - 200 cm)
- 14 = 15-yr ice (30 - 200 cm)
- 15 = 16-yr ice (30 - 200 cm)
- 16 = 17-yr ice (30 - 200 cm)
- 17 = 18-yr ice (30 - 200 cm)
- 18 = 19-yr ice (30 - 200 cm)
- 19 = 20-yr ice (30 - 200 cm)
- 20 = 21-yr ice (30 - 200 cm)
- 21 = 22-yr ice (30 - 200 cm)
- 22 = 23-yr ice (30 - 200 cm)
- 23 = 24-yr ice (30 - 200 cm)
- 24 = 25-yr ice (30 - 200 cm)
- 25 = 26-yr ice (30 - 200 cm)
- 26 = 27-yr ice (30 - 200 cm)
- 27 = 28-yr ice (30 - 200 cm)
- 28 = 29-yr ice (30 - 200 cm)
- 29 = 30-yr ice (30 - 200 cm)
- 30 = 31-yr ice (30 - 200 cm)
- 31 = 32-yr ice (30 - 200 cm)
- 32 = 33-yr ice (30 - 200 cm)
- 33 = 34-yr ice (30 - 200 cm)
- 34 = 35-yr ice (30 - 200 cm)
- 35 = 36-yr ice (30 - 200 cm)
- 36 = 37-yr ice (30 - 200 cm)
- 37 = 38-yr ice (30 - 200 cm)
- 38 = 39-yr ice (30 - 200 cm)
- 39 = 40-yr ice (30 - 200 cm)
- 40 = 41-yr ice (30 - 200 cm)
- 41 = 42-yr ice (30 - 200 cm)
- 42 = 43-yr ice (30 - 200 cm)
- 43 = 44-yr ice (30 - 200 cm)
- 44 = 45-yr ice (30 - 200 cm)
- 45 = 46-yr ice (30 - 200 cm)
- 46 = 47-yr ice (30 - 200 cm)
- 47 = 48-yr ice (30 - 200 cm)
- 48 = 49-yr ice (30 - 200 cm)
- 49 = 50-yr ice (30 - 200 cm)

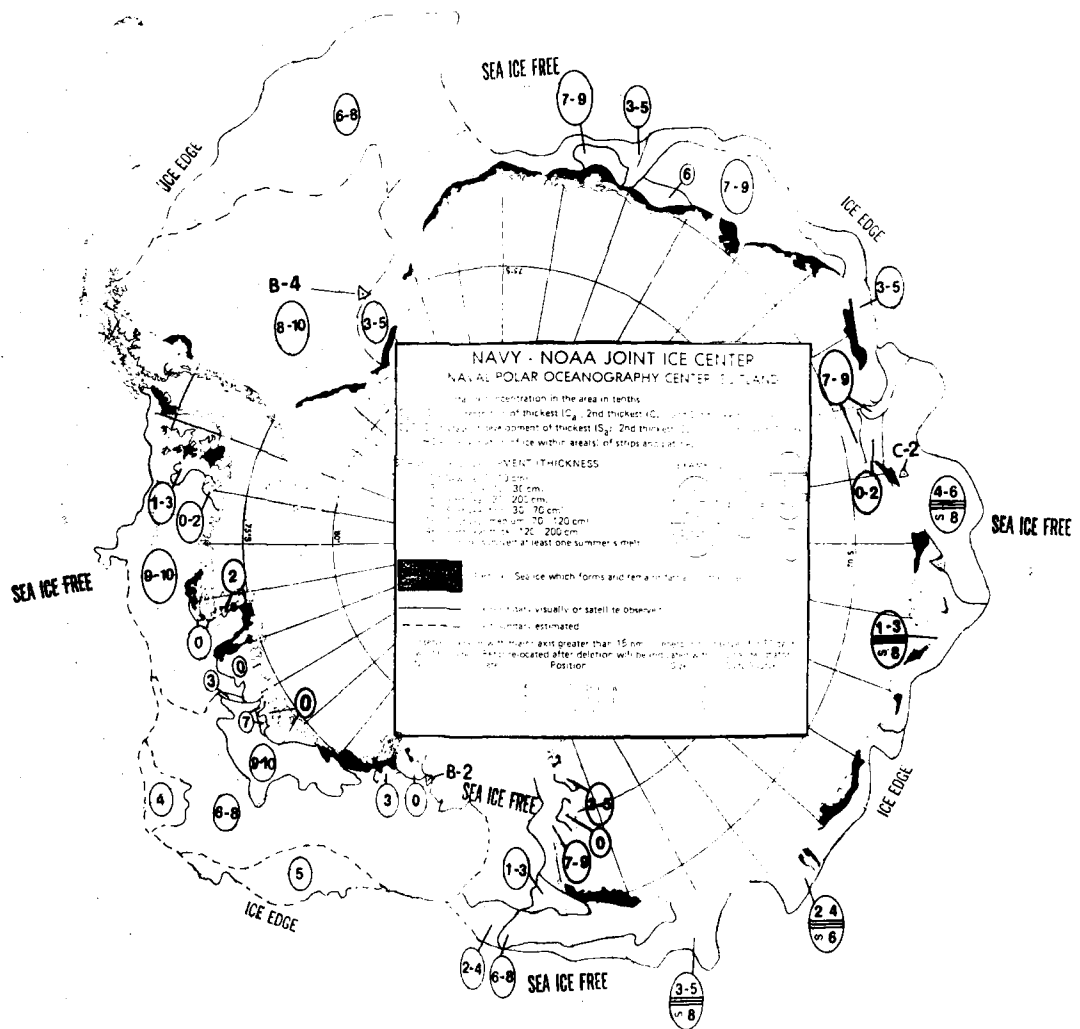
**EXAMPLES:**

$\frac{C}{S_1 S_2 S_3}$	$\frac{C}{S_1 S_2}$	$\frac{C}{S_1 S_3}$	$\frac{C}{S_2 S_3}$	$\frac{C}{S_1}$	$\frac{C}{S_2}$	$\frac{C}{S_3}$
$\frac{C}{S_1 S_2 S_3}$	$\frac{C}{S_1 S_2}$	$\frac{C}{S_1 S_3}$	$\frac{C}{S_2 S_3}$	$\frac{C}{S_1}$	$\frac{C}{S_2}$	$\frac{C}{S_3}$

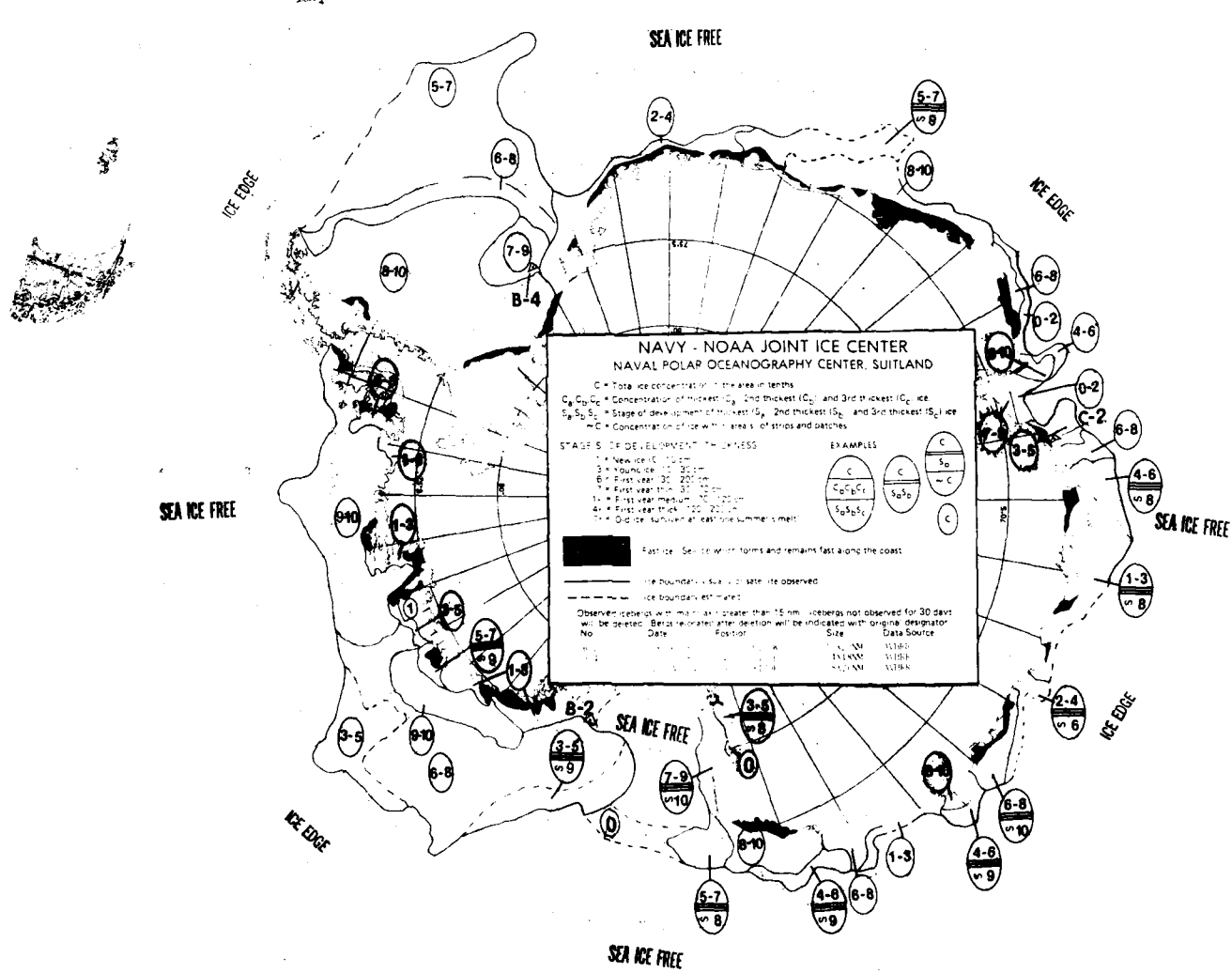
█ Fair ice. See ice which forms and remains fast along the coast.  
 --- Ice boundary visually or satellite observed.  
 - - - - - Ice boundary estimated.  
 Observed icebergs with major axis greater than 15 m. Icebergs not observed to 30 days will be deleted. Bergs relocated after deletion will be indicated with original designator.  
 N: Date Position Size Date Source

**NORTHERN ICE LIMIT**  
 Date: 22DEC83  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND





**NORTHERN ICE LIMIT**  
 Date: 05 JAN 84  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



**NAVY - NOAA JOINT ICE CENTER**  
**NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND**

C = Total ice concentration in the area in tenths  
 C<sub>1</sub>C<sub>2</sub>C<sub>3</sub> = Concentration of thickest (C<sub>1</sub>), 2nd thickest (C<sub>2</sub>) and 3rd thickest (C<sub>3</sub>) ice  
 S<sub>1</sub>S<sub>2</sub>S<sub>3</sub> = Stage of development of thickest (S<sub>1</sub>), 2nd thickest (S<sub>2</sub>) and 3rd thickest (S<sub>3</sub>) ice  
 -C = Concentration of ice within areas of strips and patches

**STAGE S OF DEVELOPMENT THICKNESS**

- 1 = New ice (< 10 cm)
- 2 = Young ice (> 10 - 30 cm)
- 3 = First year (> 30 - 200 cm)
- 4 = First year medium (> 200 - 300 cm)
- 5 = First year thick (> 300 - 2000 cm)
- 6 = Old ice (> 2000 cm)
- 7 = Old ice (> 2000 cm) after summer melt

**EXAMPLES**

C	C	C
C <sub>1</sub> C <sub>2</sub> C <sub>3</sub>	S <sub>1</sub> S <sub>2</sub>	-C
S <sub>1</sub> S <sub>2</sub> S <sub>3</sub>	C	C

Fast ice - Sea ice which forms and remains fast along the coast  
 Ice boundaries - Sea ice (if site) observed  
 Ice boundaries estimated  
 Observers (letters) with number in circle greater than 15 nm - observers not observed for 30 days will be deleted. Beris re-observed after deletion will be indicated with original designator.

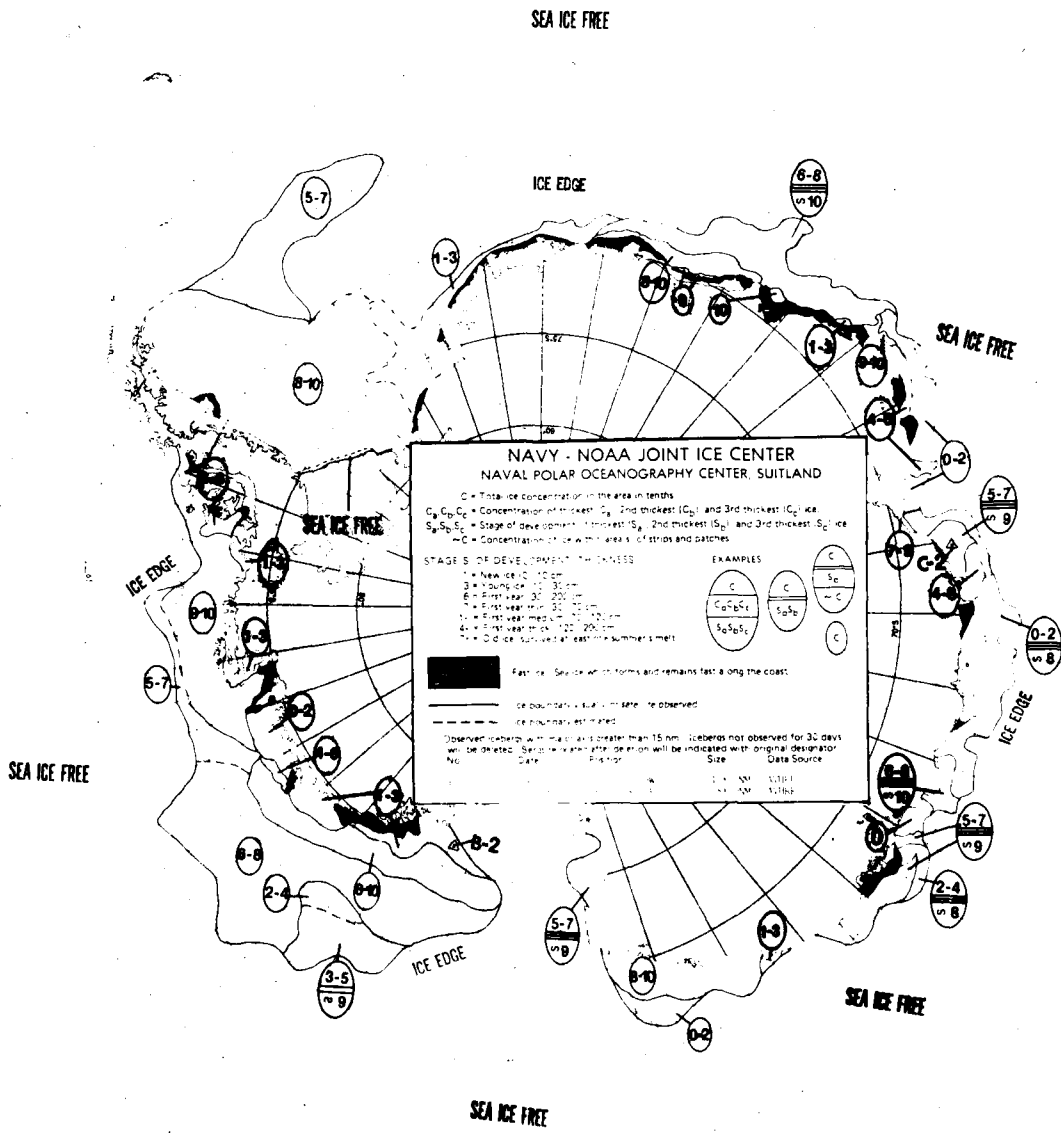
No.	Date	Position	Size	Data Source
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			100 NM	N1180
			100 NM	N1180

**NORTHERN ICE LIMIT**  
**Date: 12 JAN 84**

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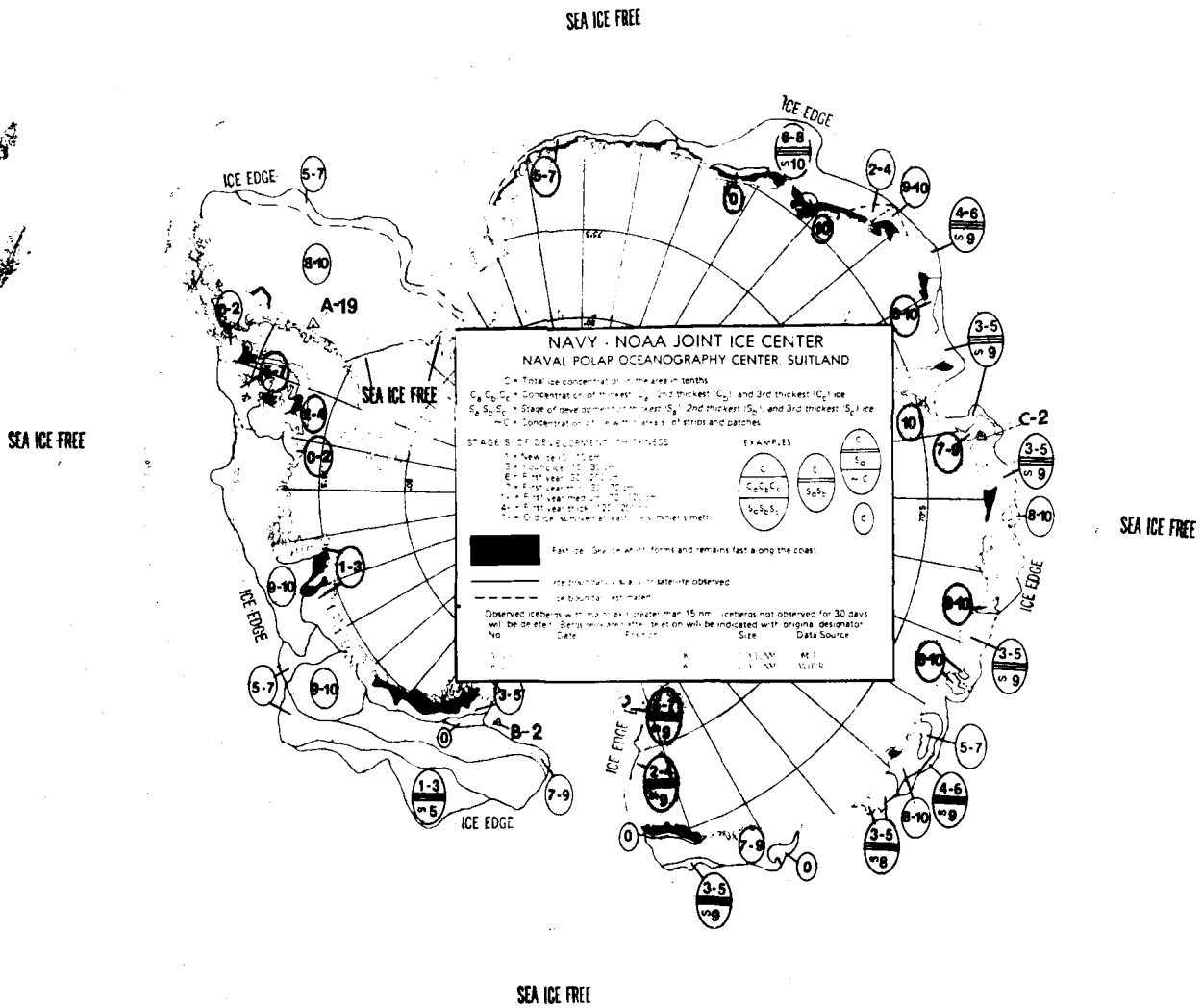
NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLA





**NORTHERN ICE LIMIT**  
**Date: 26 JAN 84**  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND

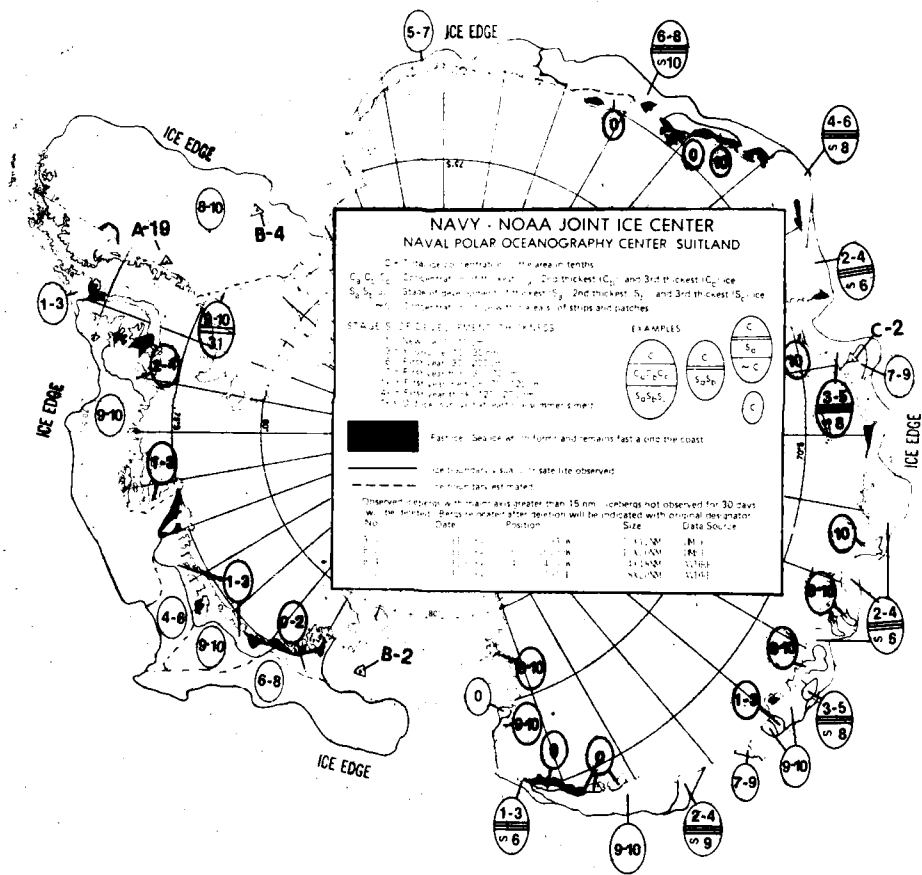




**NORTHERN ICE LIMIT**  
**Date: 09 FEB 84**  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



SEA ICE FREE



SEA ICE FREE

SEA ICE FREE

SEA ICE FREE

**NORTHERN ICE LIMIT**  
**Date:** 23 FEB 84  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



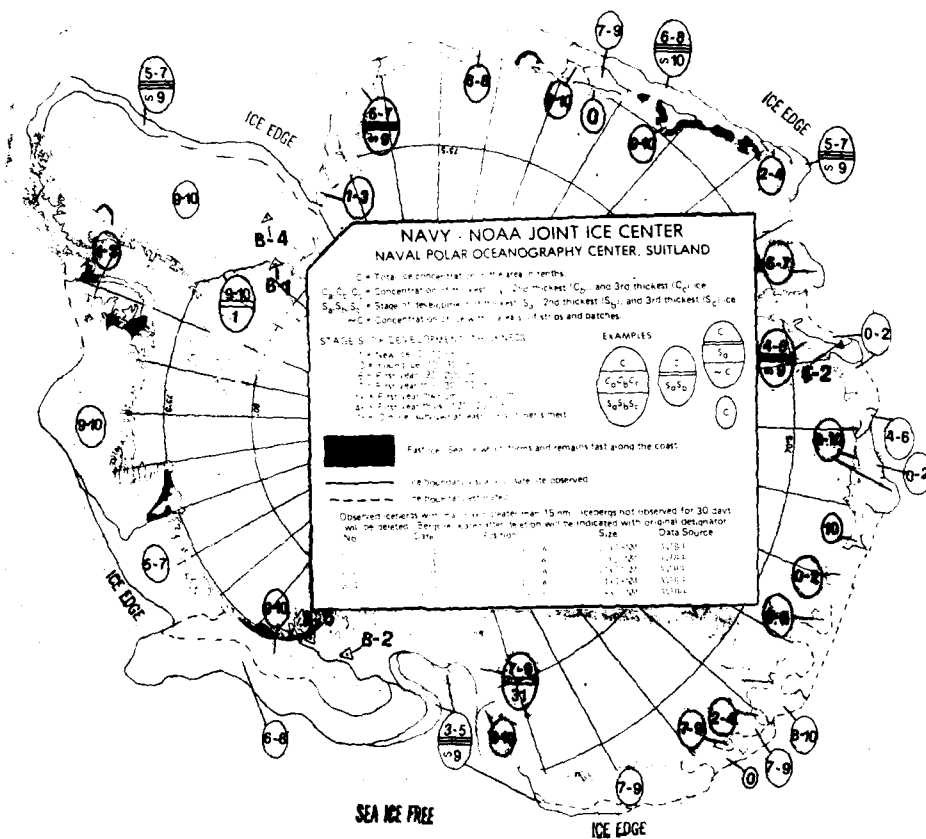
SEA ICE FREE

SEA ICE FREE

SEA ICE FREE

SEA ICE FREE

ICE EDGE



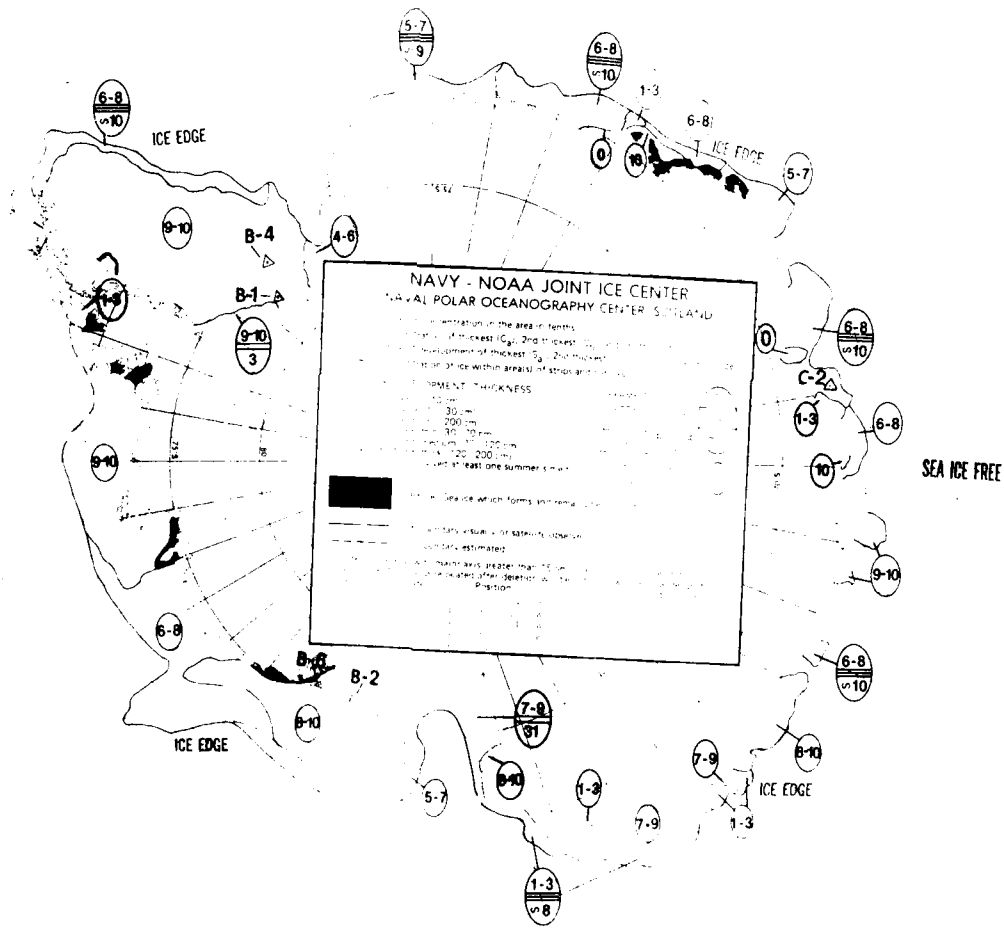
**NORTHERN ICE LIMIT**  
 Date: 08 MAR 84  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND

SEA ICE FREE

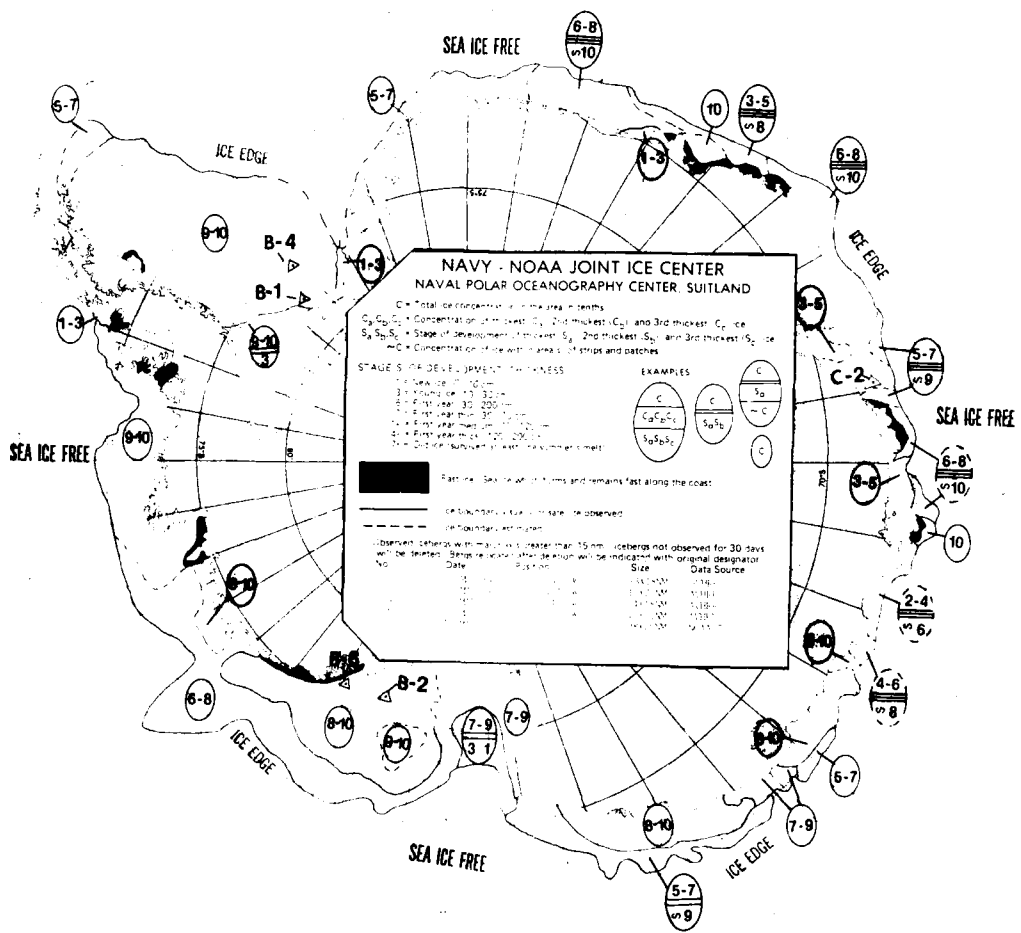
SEA ICE FREE

SEA ICE FREE

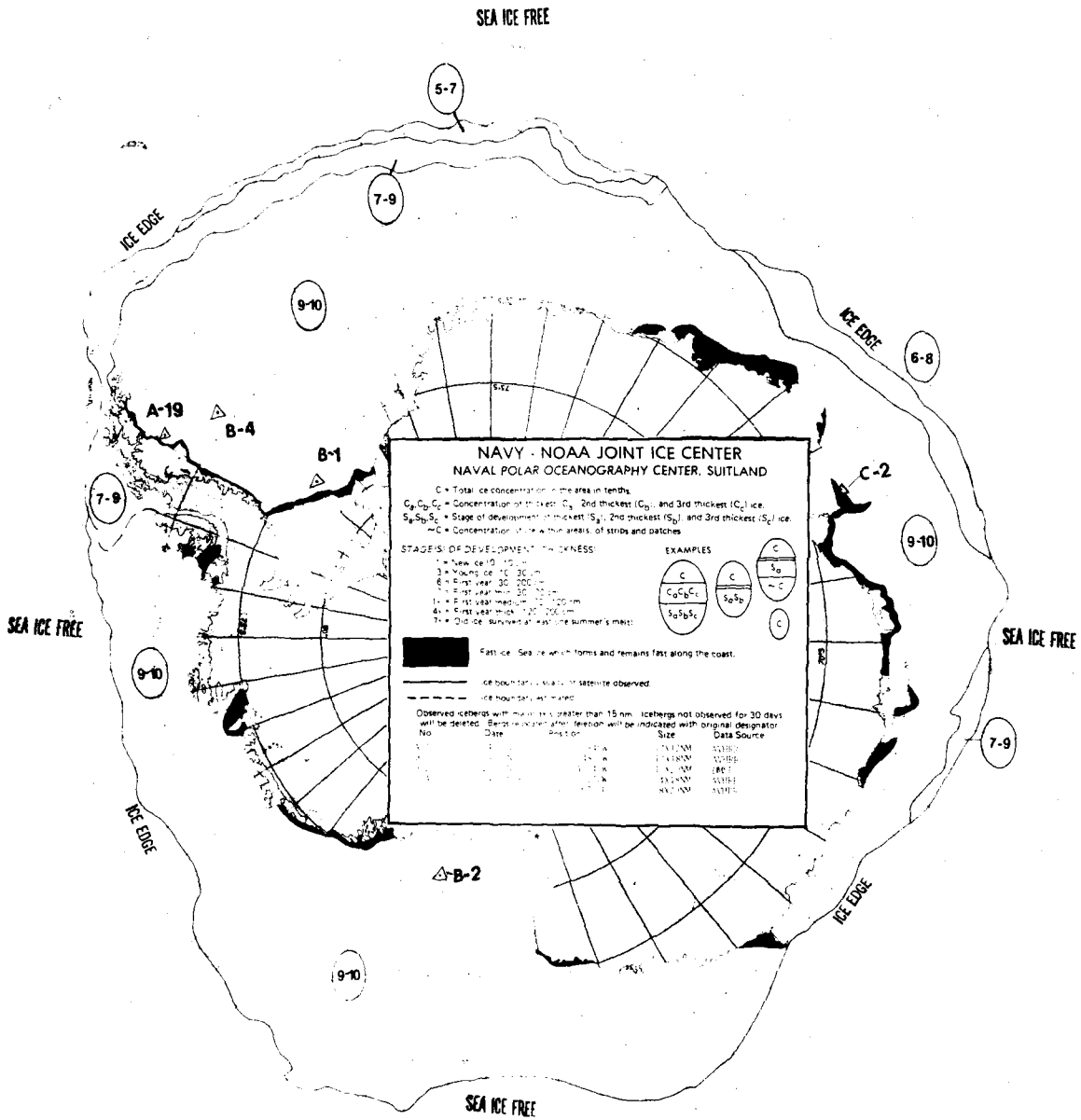
SEA ICE FREE



**NORTHERN ICE LIMIT**  
 Date: 15 MAR 84  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND

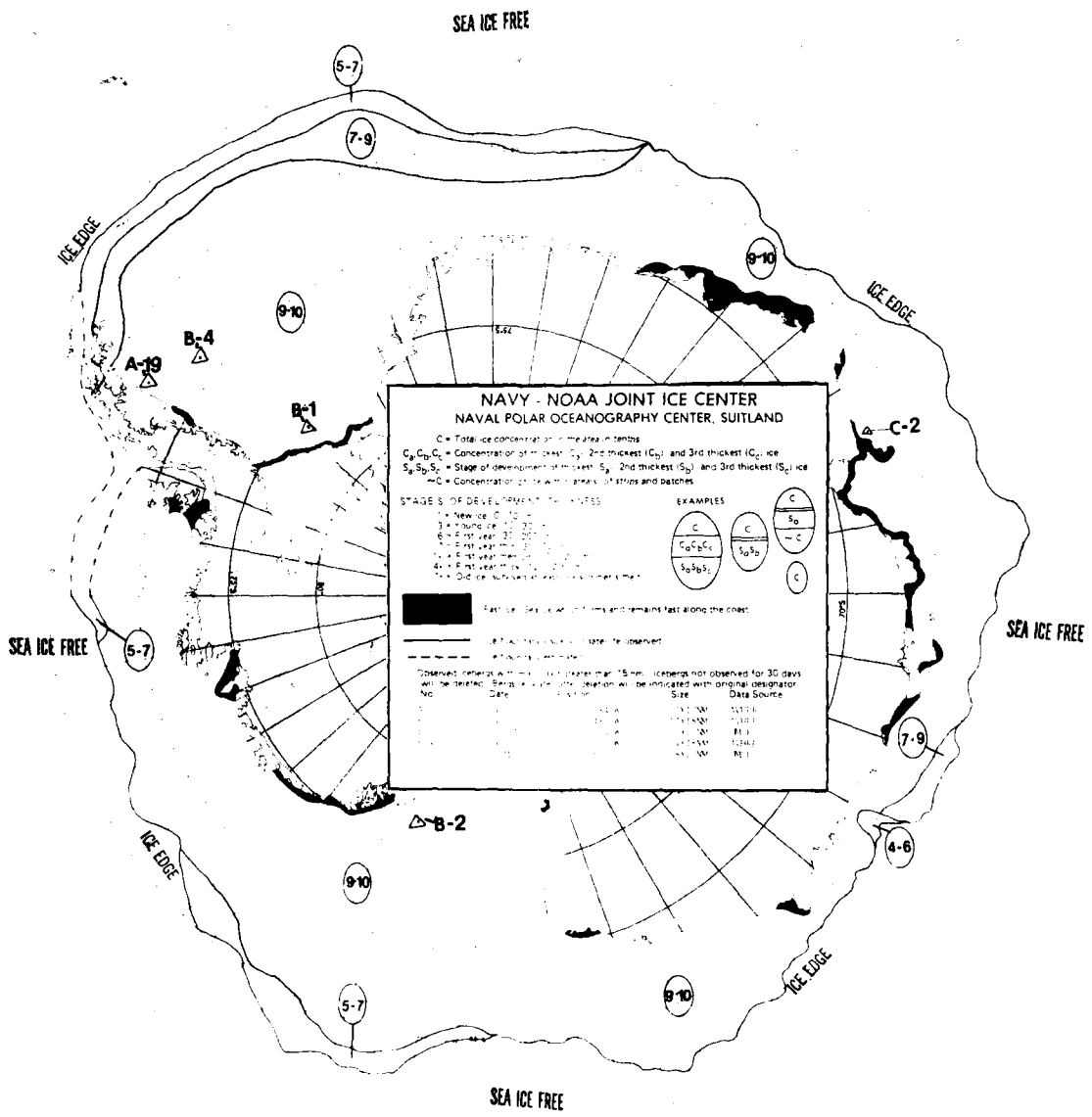


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**Date:** 22 MAR 84  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND

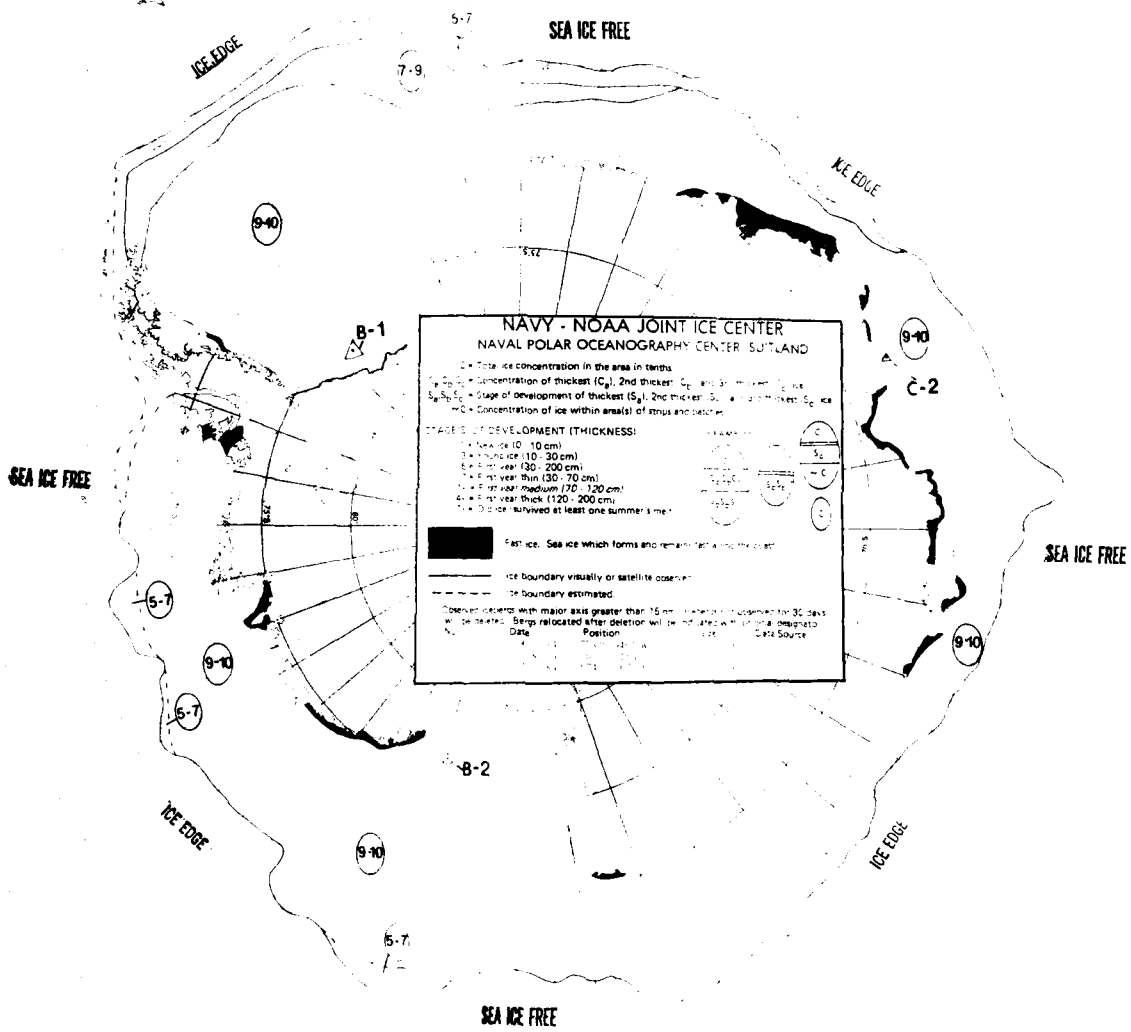


**NORTHERN ICE LIMIT**  
 Date: 28 JUNE 84  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND

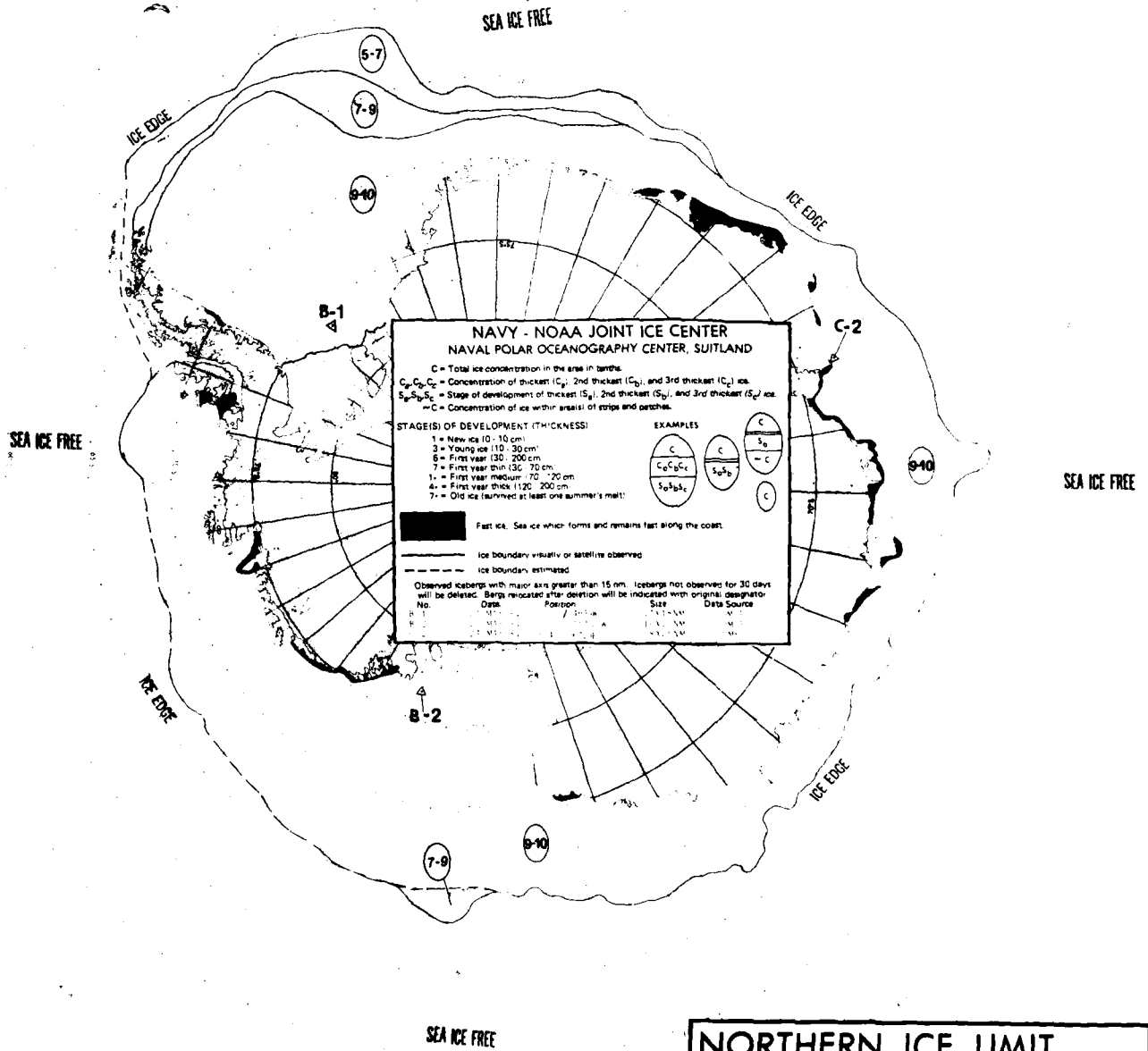




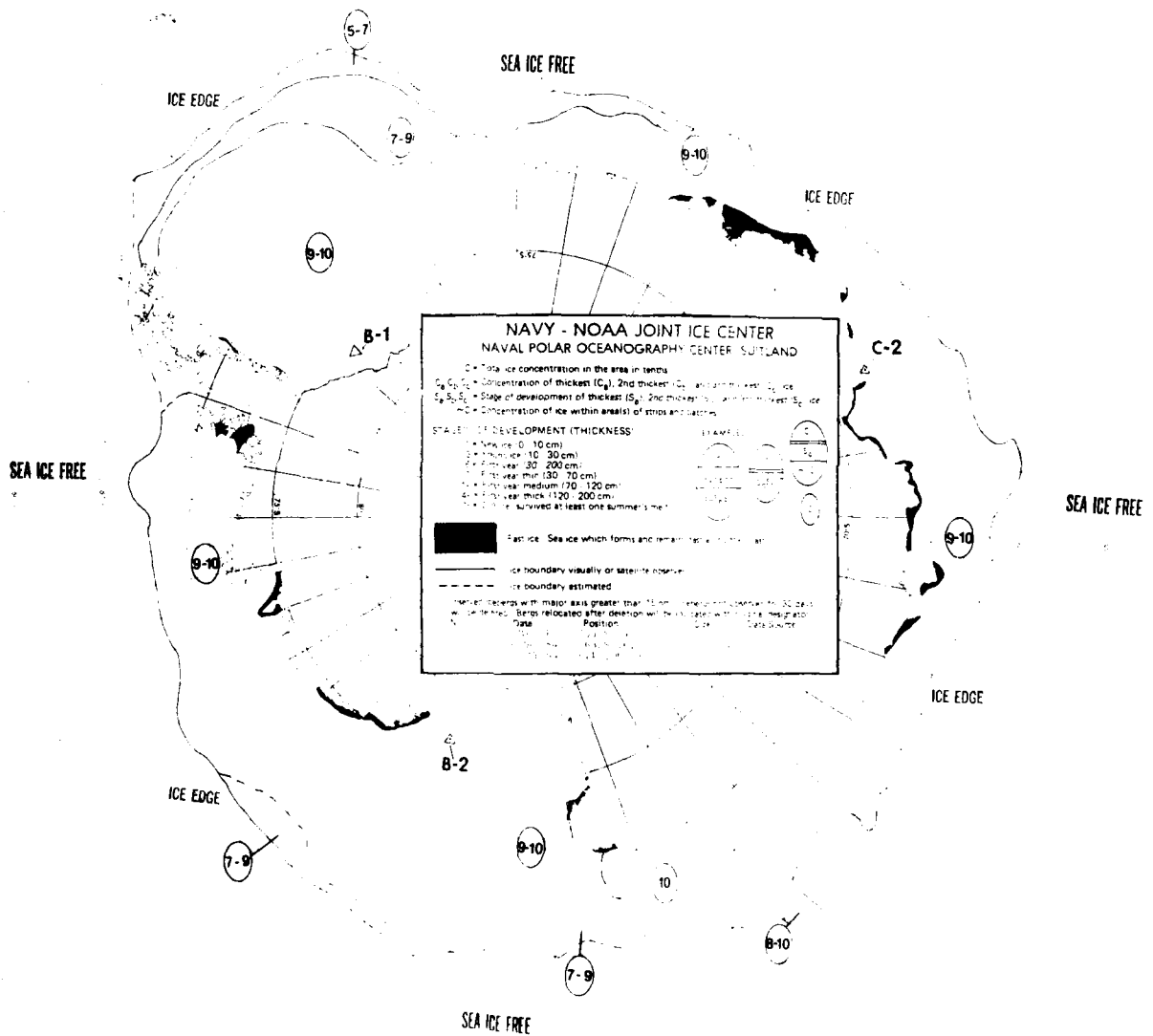
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**Date:** 14 JUNE 84  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



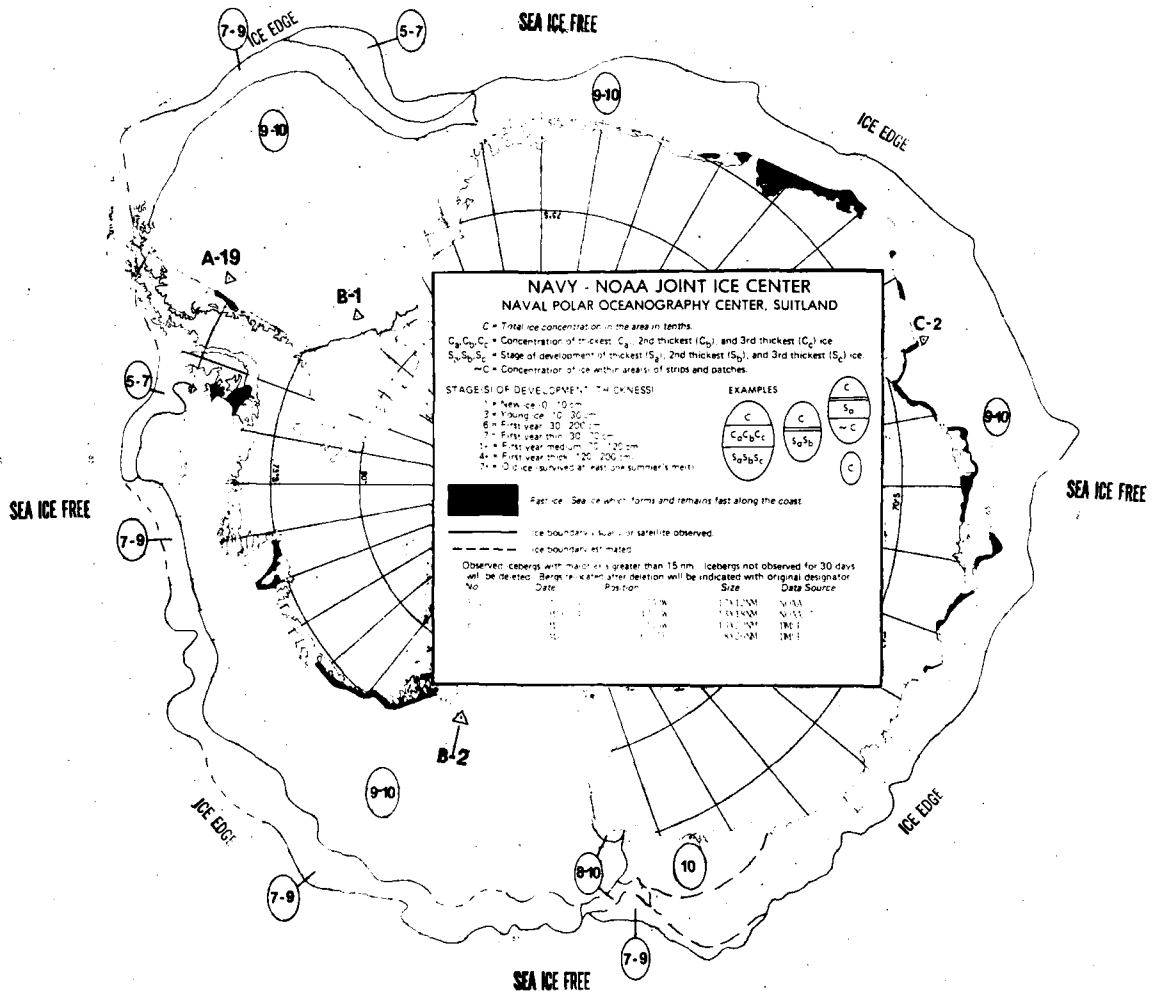
**NORTHERN ICE LIMIT**  
**Date:** 07 JUN 84  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



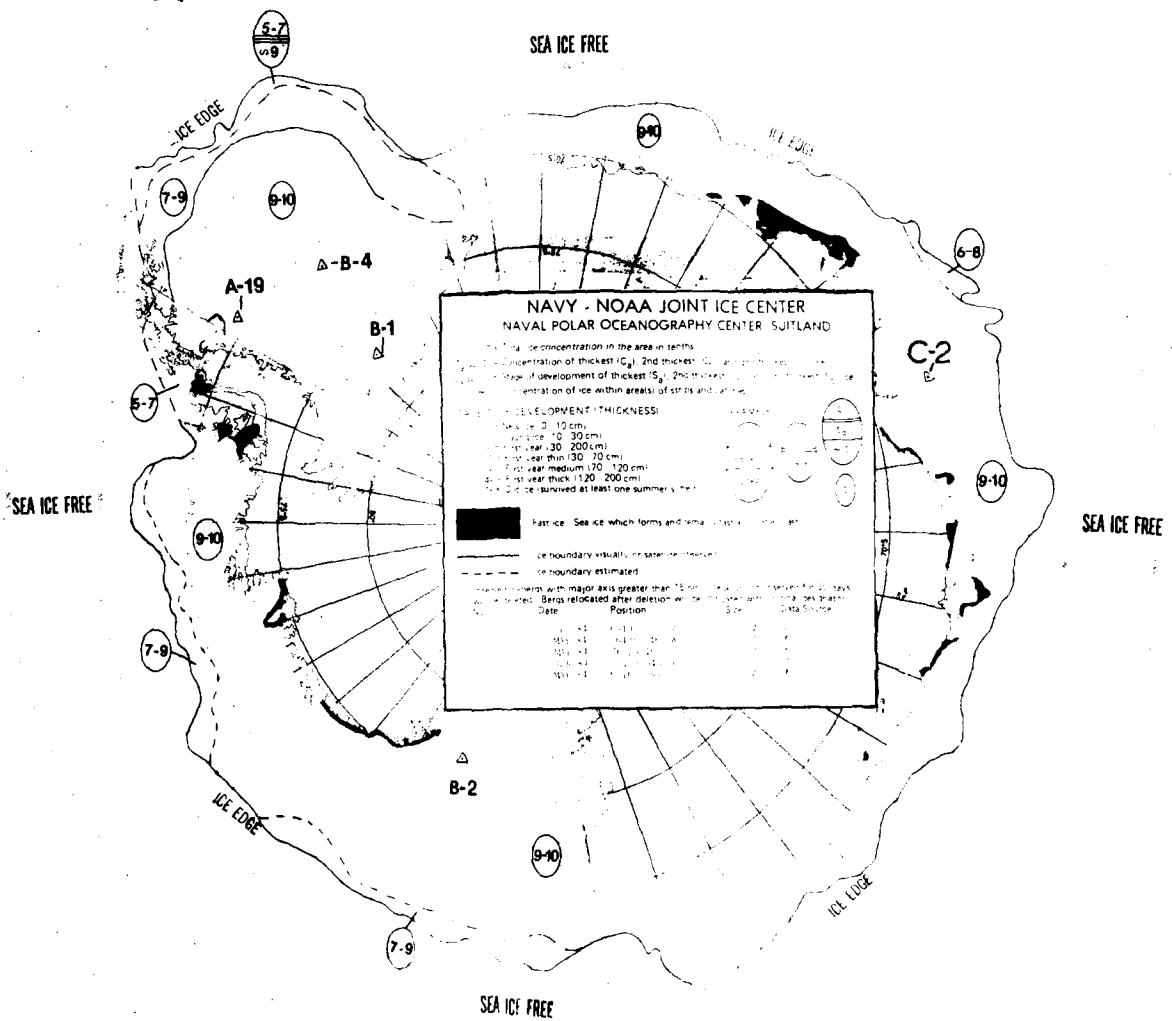
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**Date: 31 MAY 84**  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



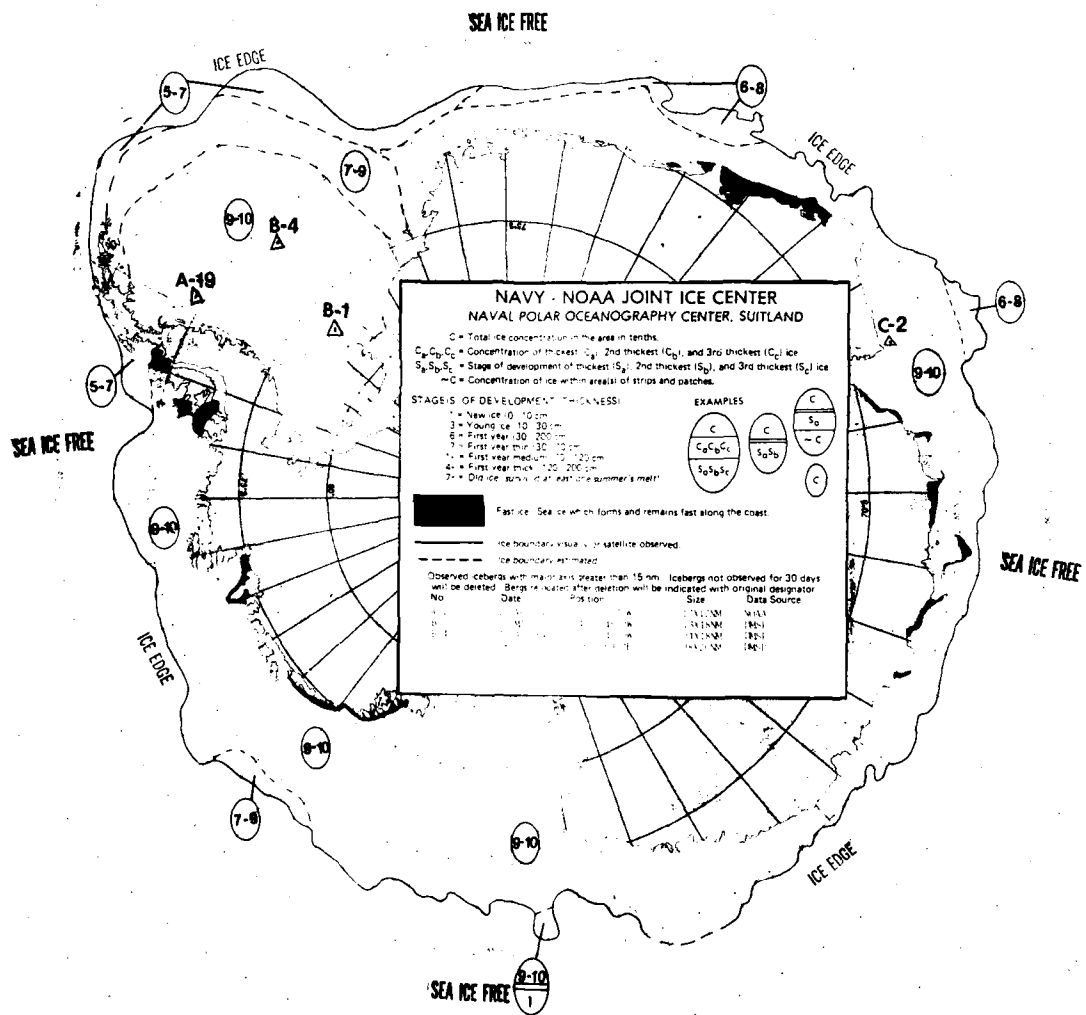
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 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



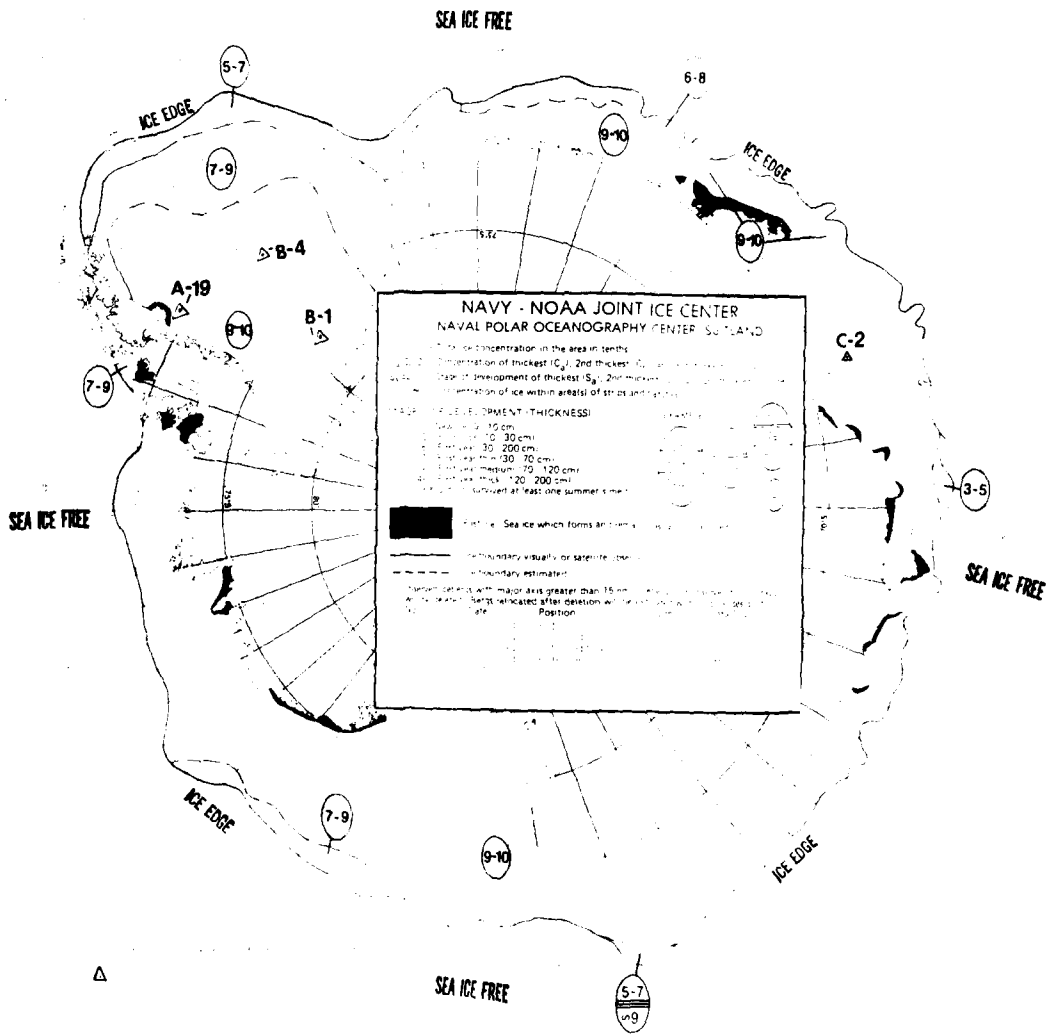
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**Date:** 17 MAY 84  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



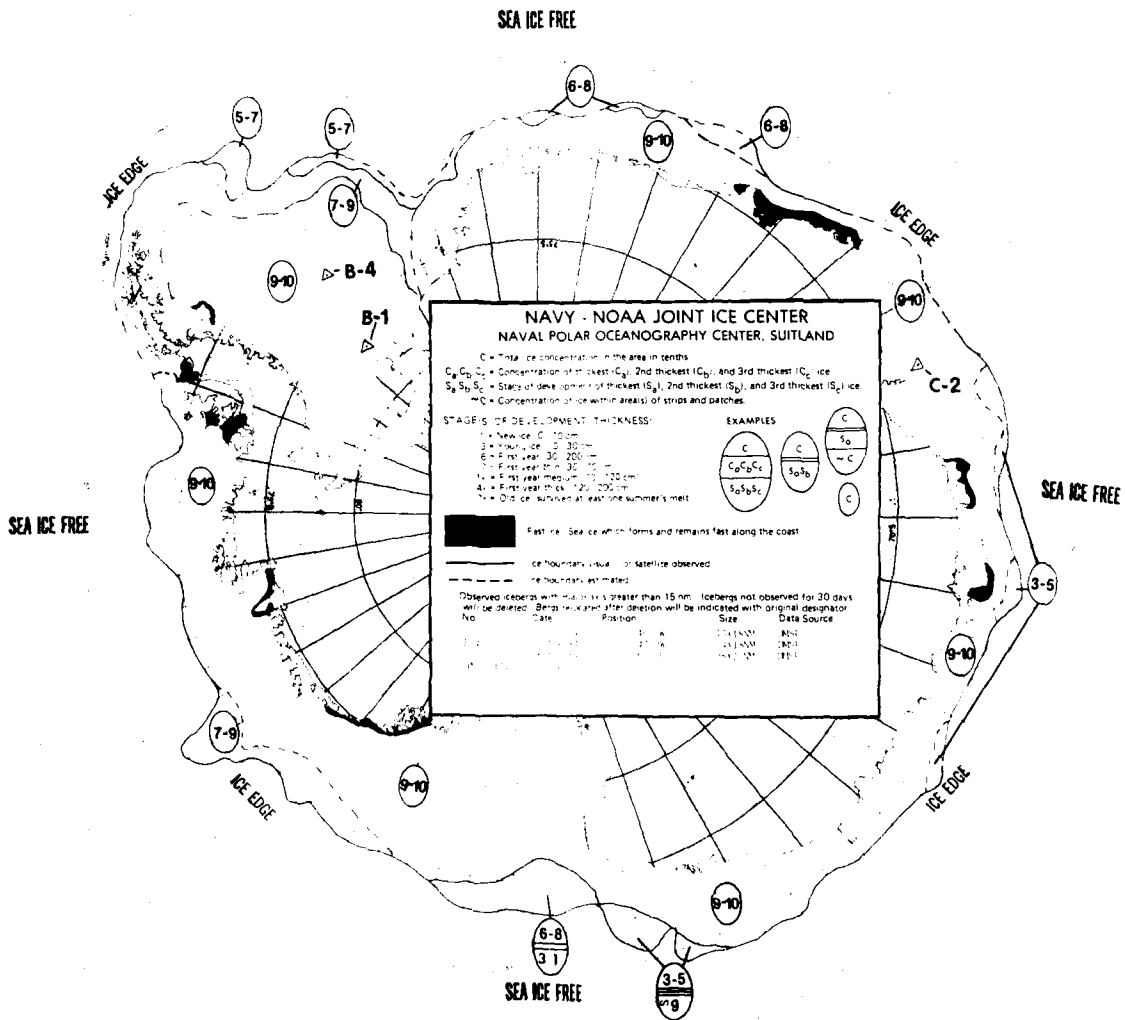
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**Date: 10 MAY 84**  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



**NORTHERN ICE LIMIT**  
**Date:** 03 MAY 84  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



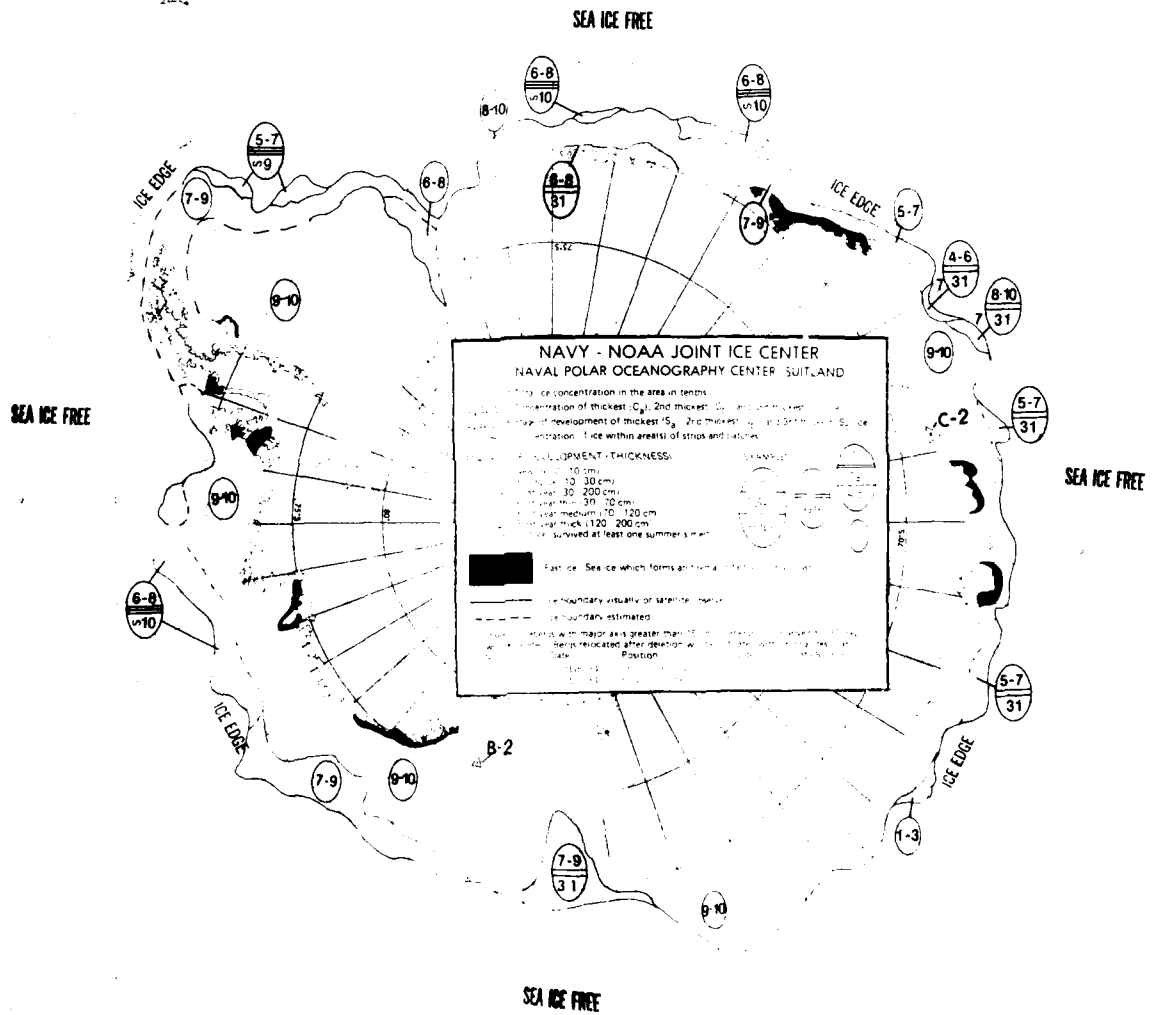
**NORTHERN ICE LIMIT**  
 Date: 25 APR 84  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SVALBARD



**NORTHERN ICE LIMIT**  
**Date: 19 APR 84**

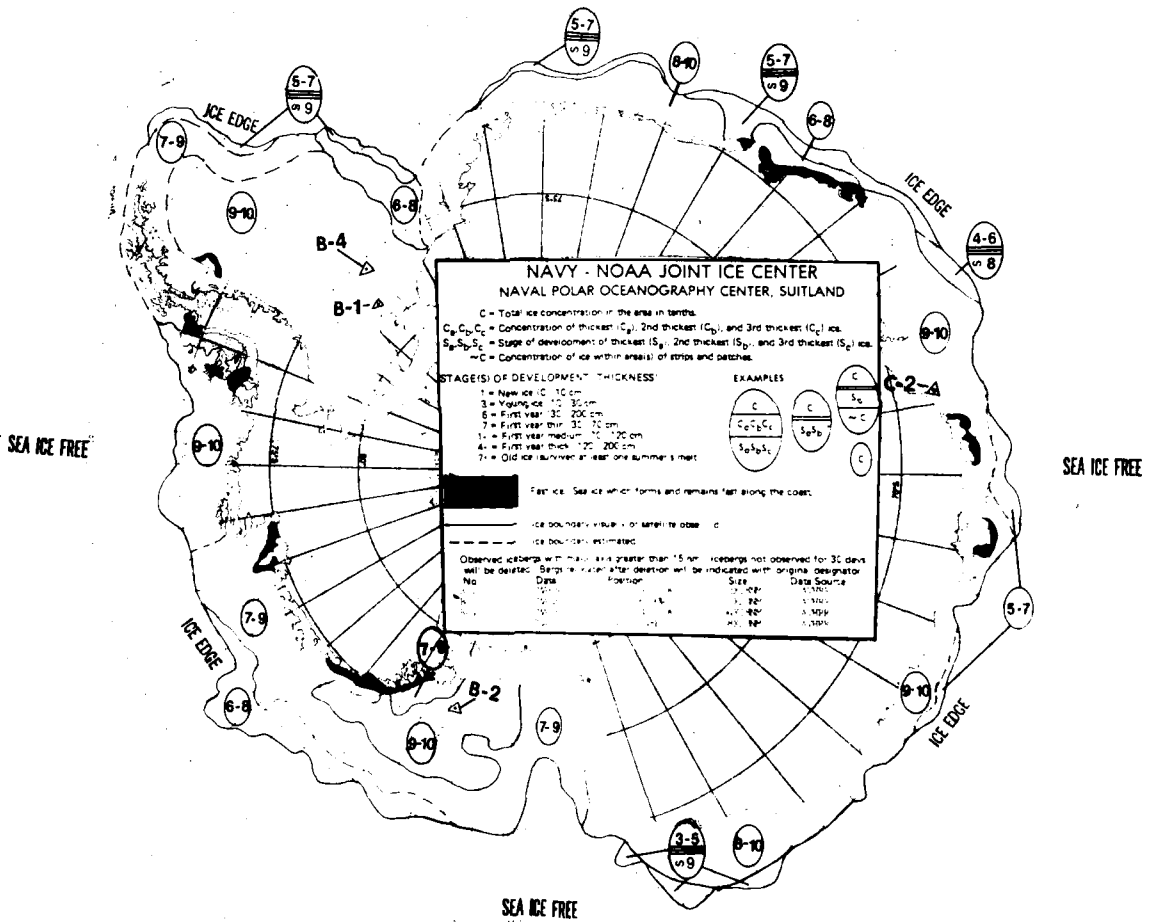
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NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



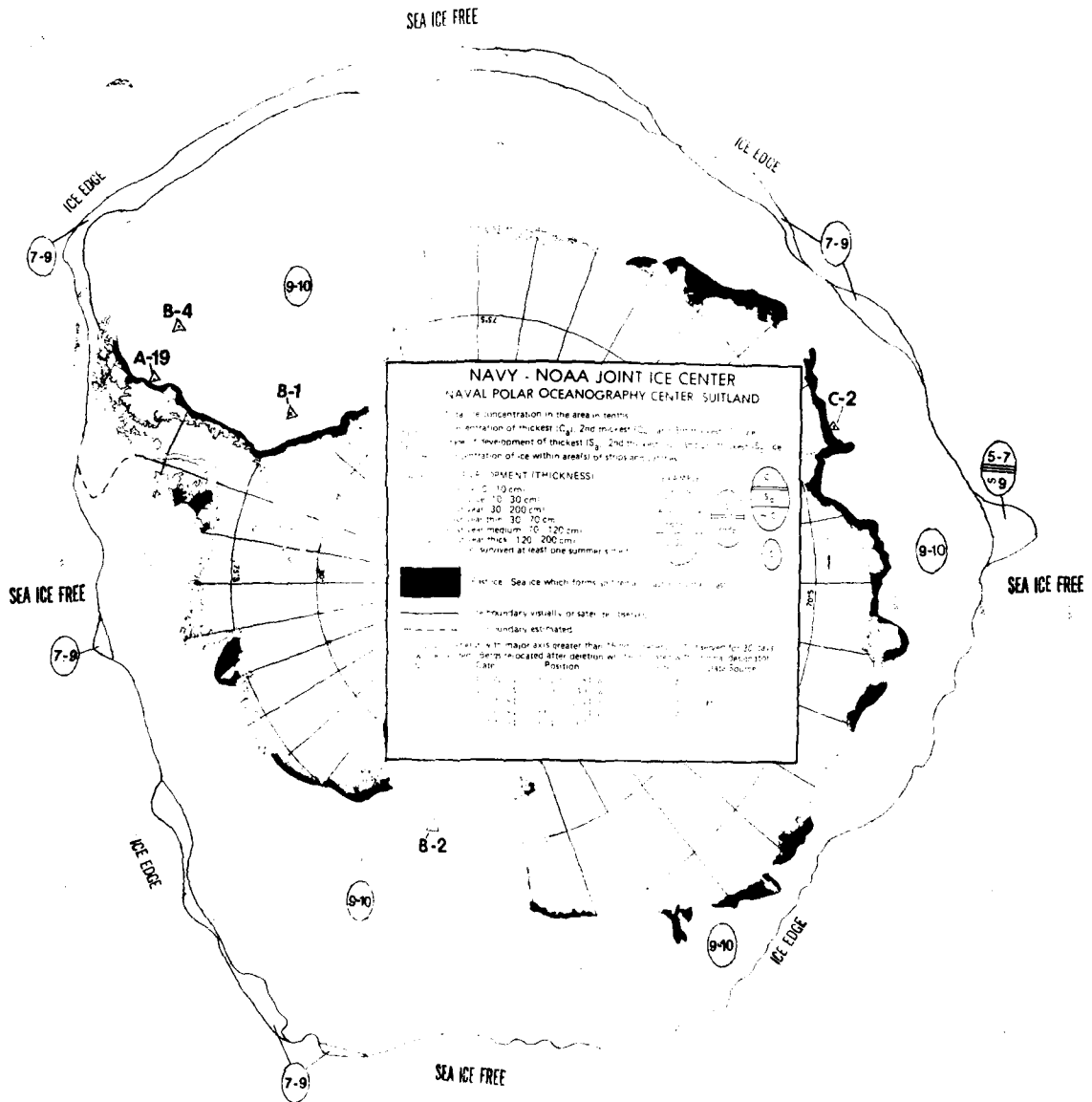
**NORTHERN ICE LIMIT**  
**Date: 12 APR 84**  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND

SEA ICE FREE



**NORTHERN ICE LIMIT**  
**Date:** 05 APR 84  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND





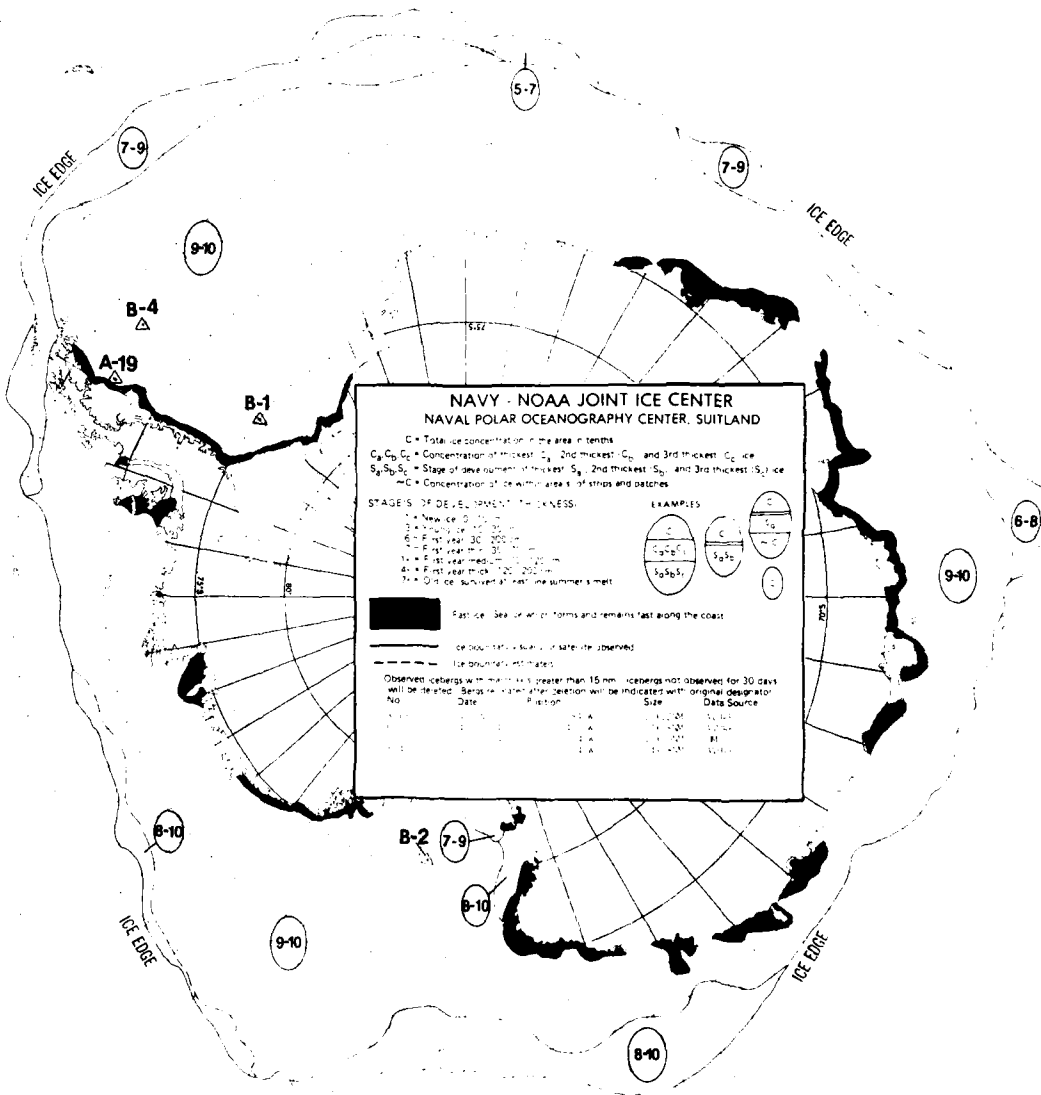
**NORTHERN ICE LIMIT**  
 Date: 05 JUL 84  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND

SEA ICE FREE

SEA ICE FREE

SEA ICE FREE

SEA ICE FREE



**NAVY - NOAA JOINT ICE CENTER**  
**NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND**

C = Total ice concentration in the area in tenths  
 C<sub>1</sub>, C<sub>2</sub>, C<sub>3</sub> = Concentration of thickest, 2nd thickest, and 3rd thickest ice  
 S<sub>1</sub>, S<sub>2</sub>, S<sub>3</sub> = Stage of development of thickest, 2nd thickest, and 3rd thickest ice  
 C = Concentration of ice within areas of strips and patches

**STAGES OF DEVELOPMENT OF THICKNESS:**

- 1 = New ice 0-10 cm
- 2 = First year ice 10-20 cm
- 3 = First year ice 20-30 cm
- 4 = First year ice 30-40 cm
- 5 = First year ice 40-50 cm
- 6 = First year ice 50-60 cm
- 7 = First year ice 60-70 cm
- 8 = First year ice 70-80 cm
- 9 = First year ice 80-90 cm
- 10 = Old ice survived past the summer's melt

**EXAMPLES:**

Fast ice: Sea ice which forms and remains fast along the coast

Ice observed at site (or satellite observed)

Ice observed at site

Observed icebergs with thickness greater than 15 m; icebergs not observed for 30 days will be deleted. Bergs in later section will be indicated with original designator.

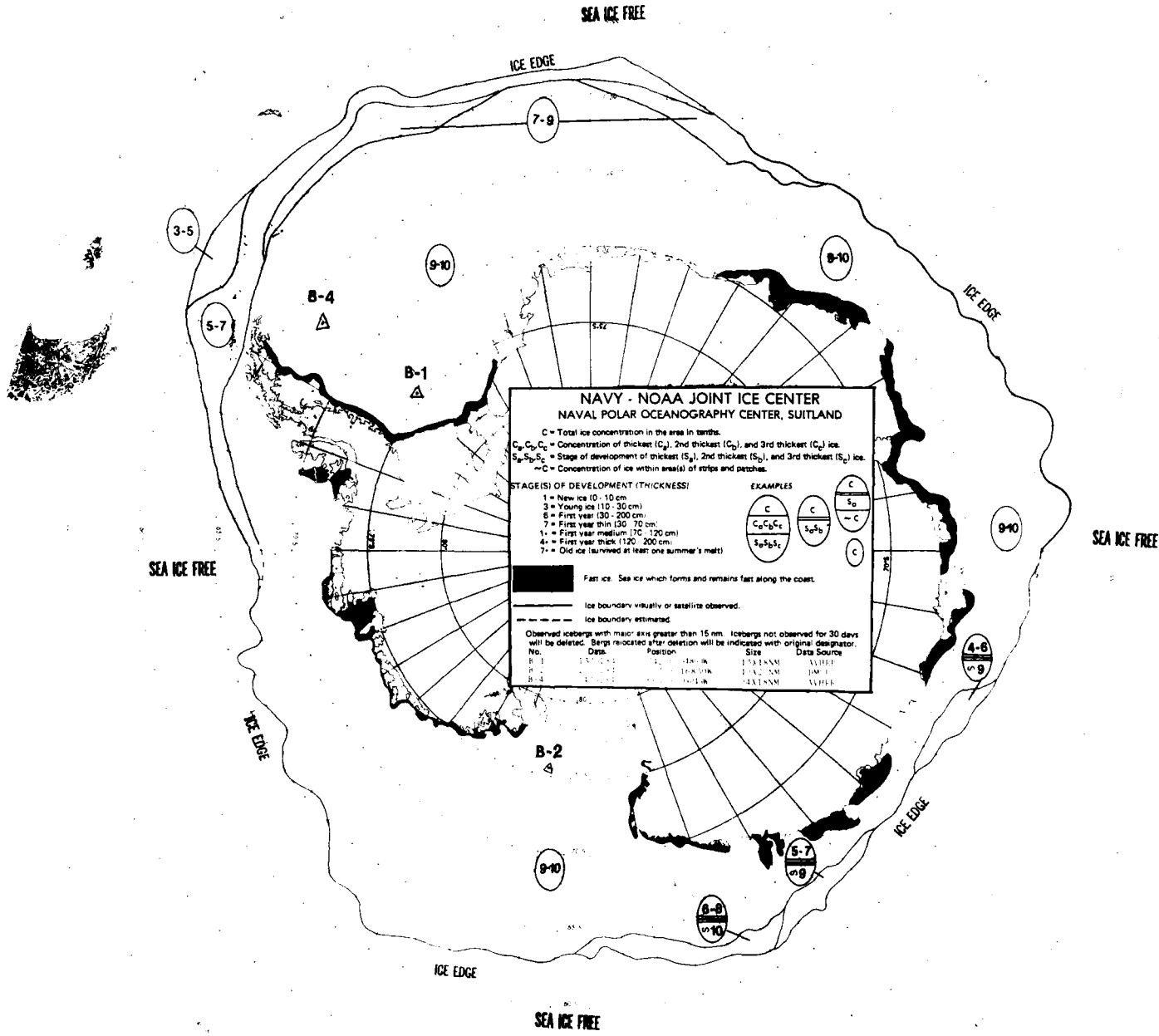
No.	Date	Position	Size	Data Source
1	11 JUL 84	71° 12' N	150 m	BS
2	11 JUL 84	71° 12' N	150 m	BS
3	11 JUL 84	71° 12' N	150 m	BS
4	11 JUL 84	71° 12' N	150 m	BS

**NORTHERN ICE LIMIT**

Date: 12 JUL 84

NAVY—NOAA JOINT ICE CENTER  
NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND





**NAVY - NOAA JOINT ICE CENTER**  
**NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND**

C = Total ice concentration in the area in tenths.  
 $C_1, C_2, C_3$  = Concentration of thickest ( $C_1$ ), 2nd thickest ( $C_2$ ), and 3rd thickest ( $C_3$ ) ice.  
 $S_1, S_2, S_3$  = Stage of development of thickest ( $S_1$ ), 2nd thickest ( $S_2$ ), and 3rd thickest ( $S_3$ ) ice.  
 -C = Concentration of ice within area(s) of strips and patches.

**STAGE(S) OF DEVELOPMENT (THICKNESS)**

- 1 = New ice (0 - 10 cm)
- 3 = Young ice (10 - 30 cm)
- B = First year (30 - 200 cm)
- 7 = First year thin (30 - 70 cm)
- 1 = First year medium (70 - 120 cm)
- 4 = First year thick (120 - 200 cm)
- 7 = Old ice (survived at least one summer's melt)

**EXAMPLES**

$\frac{C}{C_1 C_2 C_3}$      $\frac{C}{S_1 S_2 S_3}$      $\frac{C}{S_1}$   
 $\frac{C}{S_1 S_2}$      $\frac{C}{S_2}$      $\frac{C}{S_3}$

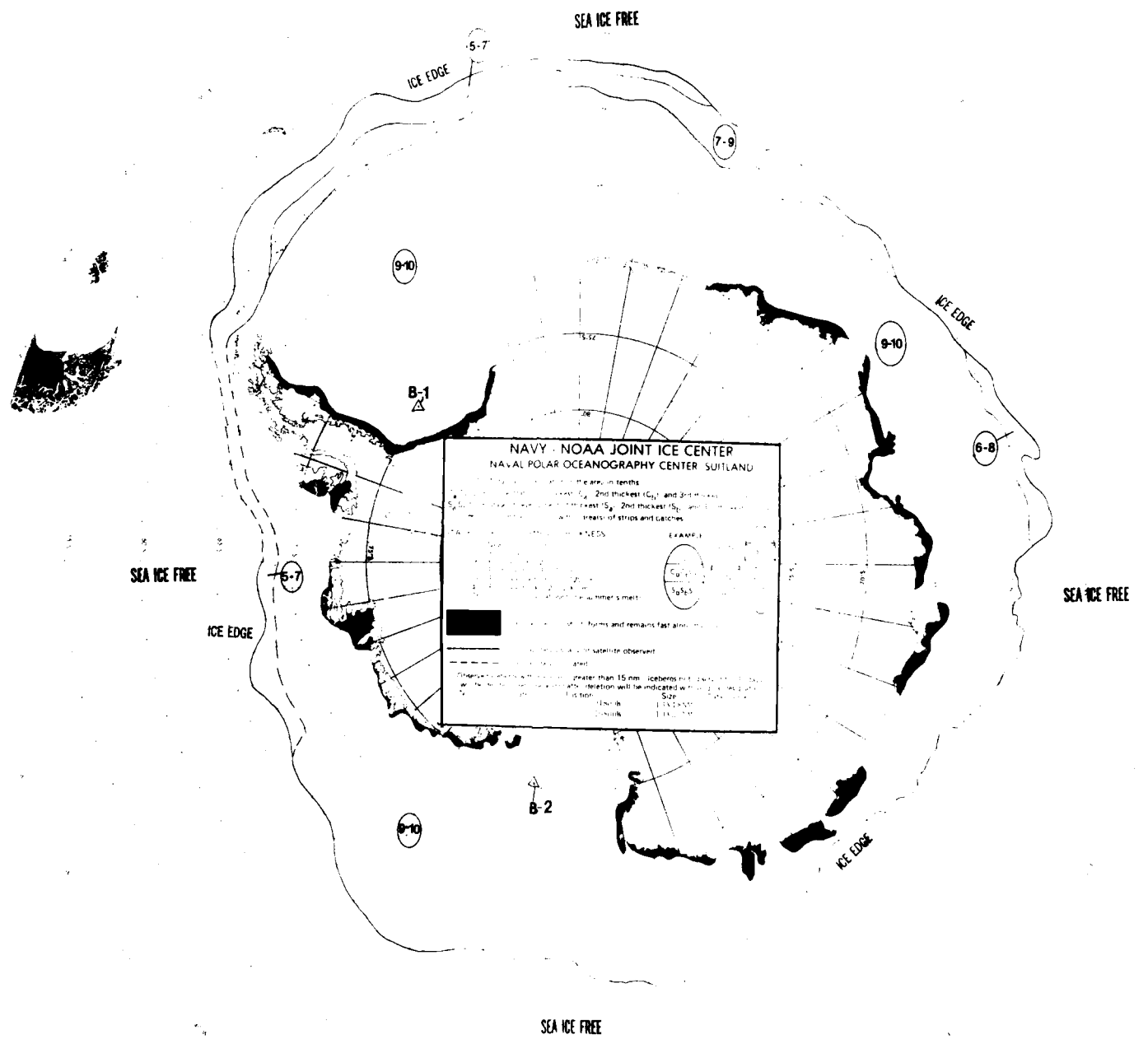
**Legend:**

- Fat ice: Sea ice which forms and remains fast along the coast.
- Ice boundary visually or satellite observed.
- Ice boundary estimated.

Observed icebergs with major axis greater than 15 nm. Icebergs not observed for 30 days will be deleted. Bergs relocated after deletion will be indicated with original designator.

No.	Date	Position	Size	Data Source
B-1	15 JUL 84	65° 10' S, 150° 00' W	170 x 100 NM	AVHRR
B-2	15 JUL 84	65° 00' S, 150° 00' W	170 x 100 NM	AVHRR
B-4	15 JUL 84	65° 10' S, 150° 00' W	170 x 100 NM	AVHRR

**NORTHERN ICE LIMIT**  
**Date:** 26 JULY 1984  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



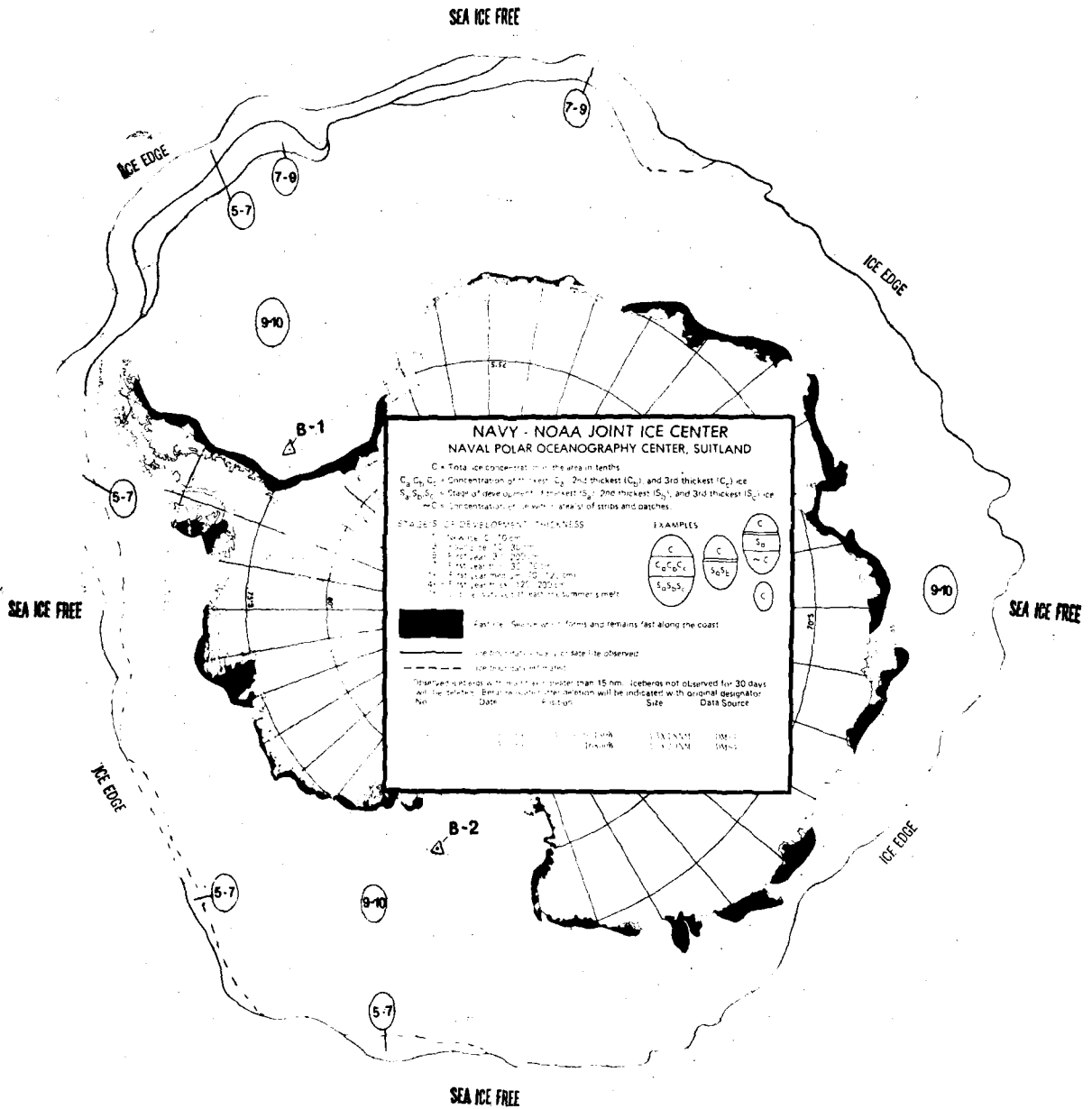
**NAVY - NOAA JOINT ICE CENTER**  
**NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND**

This map shows the area in terms of ice thickness contours (1st, 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, 9th, 10th, 11th, 12th, 13th, 14th, 15th, 16th, 17th, 18th, 19th, 20th, 21st, 22nd, 23rd, 24th, 25th, 26th, 27th, 28th, 29th, 30th, 31st, 32nd, 33rd, 34th, 35th, 36th, 37th, 38th, 39th, 40th, 41st, 42nd, 43rd, 44th, 45th, 46th, 47th, 48th, 49th, 50th, 51st, 52nd, 53rd, 54th, 55th, 56th, 57th, 58th, 59th, 60th, 61st, 62nd, 63rd, 64th, 65th, 66th, 67th, 68th, 69th, 70th, 71st, 72nd, 73rd, 74th, 75th, 76th, 77th, 78th, 79th, 80th, 81st, 82nd, 83rd, 84th, 85th, 86th, 87th, 88th, 89th, 90th, 91st, 92nd, 93rd, 94th, 95th, 96th, 97th, 98th, 99th, 100th).

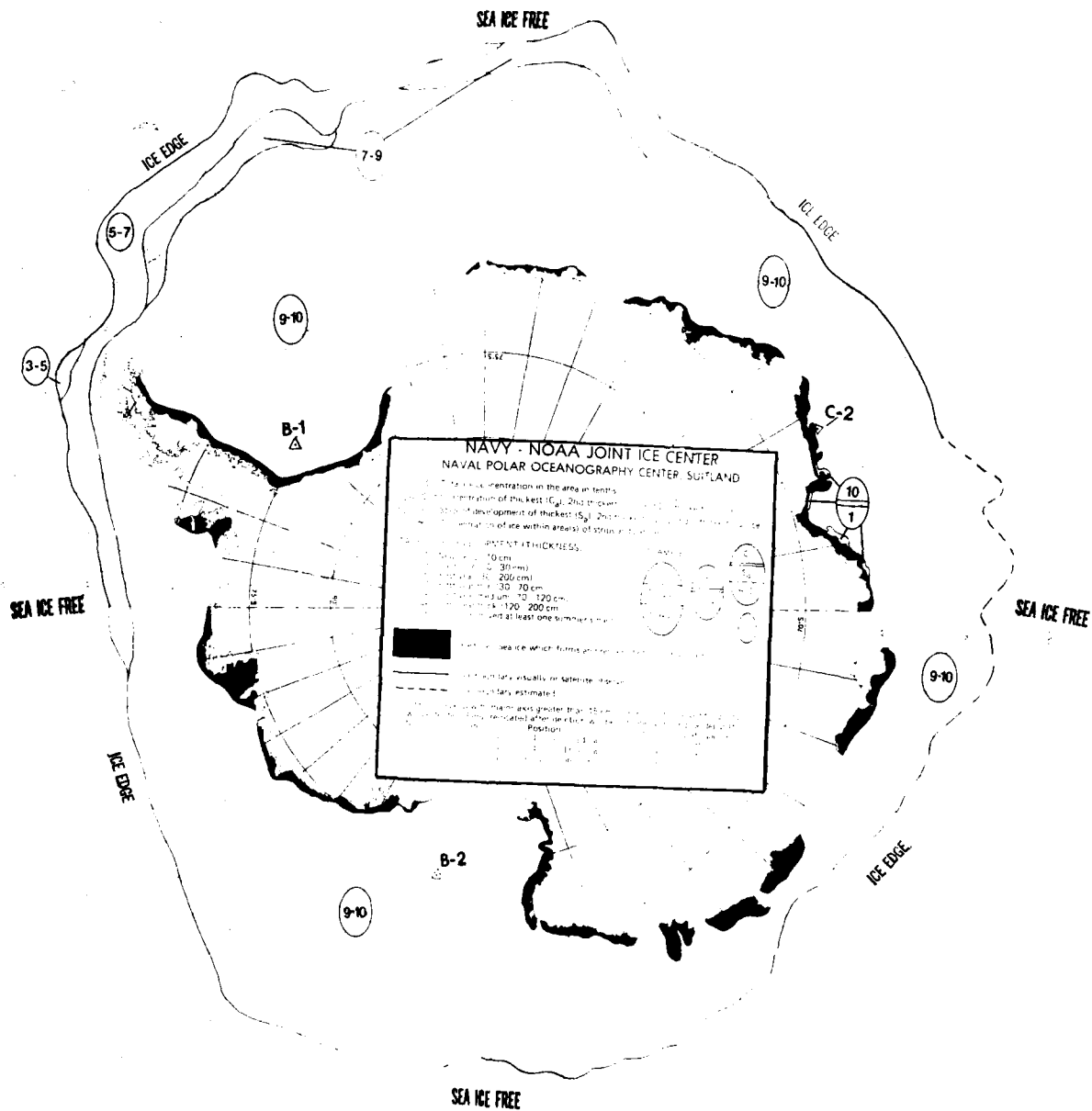
**LEGEND**

- Solid line: 1st thickest (C<sub>1</sub>)
- Dashed line: 2nd thickest (C<sub>2</sub>)
- Dotted line: 3rd thickest (C<sub>3</sub>)
- Long dashed line: 4th thickest (C<sub>4</sub>)
- Short dashed line: 5th thickest (C<sub>5</sub>)
- Thin solid line: 6th thickest (C<sub>6</sub>)
- Thin dashed line: 7th thickest (C<sub>7</sub>)
- Thin dotted line: 8th thickest (C<sub>8</sub>)
- Thin long dashed line: 9th thickest (C<sub>9</sub>)
- Thin short dashed line: 10th thickest (C<sub>10</sub>)
- Thin thin solid line: 11th thickest (C<sub>11</sub>)
- Thin thin dashed line: 12th thickest (C<sub>12</sub>)
- Thin thin dotted line: 13th thickest (C<sub>13</sub>)
- Thin thin long dashed line: 14th thickest (C<sub>14</sub>)
- Thin thin short dashed line: 15th thickest (C<sub>15</sub>)
- Thin thin thin solid line: 16th thickest (C<sub>16</sub>)
- Thin thin thin dashed line: 17th thickest (C<sub>17</sub>)
- Thin thin thin dotted line: 18th thickest (C<sub>18</sub>)
- Thin thin thin long dashed line: 19th thickest (C<sub>19</sub>)
- Thin thin thin short dashed line: 20th thickest (C<sub>20</sub>)
- Thin thin thin thin solid line: 21st thickest (C<sub>21</sub>)
- Thin thin thin thin dashed line: 22nd thickest (C<sub>22</sub>)
- Thin thin thin thin dotted line: 23rd thickest (C<sub>23</sub>)
- Thin thin thin thin long dashed line: 24th thickest (C<sub>24</sub>)
- Thin thin thin thin short dashed line: 25th thickest (C<sub>25</sub>)
- Thin thin thin thin thin solid line: 26th thickest (C<sub>26</sub>)
- Thin thin thin thin thin dashed line: 27th thickest (C<sub>27</sub>)
- Thin thin thin thin thin dotted line: 28th thickest (C<sub>28</sub>)
- Thin thin thin thin thin long dashed line: 29th thickest (C<sub>29</sub>)
- Thin thin thin thin thin short dashed line: 30th thickest (C<sub>30</sub>)
- Thin thin thin thin thin thin solid line: 31st thickest (C<sub>31</sub>)
- Thin thin thin thin thin thin dashed line: 32nd thickest (C<sub>32</sub>)
- Thin thin thin thin thin thin dotted line: 33rd thickest (C<sub>33</sub>)
- Thin thin thin thin thin thin long dashed line: 34th thickest (C<sub>34</sub>)
- Thin thin thin thin thin thin short dashed line: 35th thickest (C<sub>35</sub>)
- Thin thin thin thin thin thin thin solid line: 36th thickest (C<sub>36</sub>)
- Thin thin thin thin thin thin thin dashed line: 37th thickest (C<sub>37</sub>)
- Thin thin thin thin thin thin thin dotted line: 38th thickest (C<sub>38</sub>)
- Thin thin thin thin thin thin thin long dashed line: 39th thickest (C<sub>39</sub>)
- Thin thin thin thin thin thin thin short dashed line: 40th thickest (C<sub>40</sub>)
- Thin thin thin thin thin thin thin thin solid line: 41st thickest (C<sub>41</sub>)
- Thin thin thin thin thin thin thin thin dashed line: 42nd thickest (C<sub>42</sub>)
- Thin thin thin thin thin thin thin thin dotted line: 43rd thickest (C<sub>43</sub>)
- Thin thin thin thin thin thin thin thin long dashed line: 44th thickest (C<sub>44</sub>)
- Thin thin thin thin thin thin thin thin short dashed line: 45th thickest (C<sub>45</sub>)
- Thin thin thin thin thin thin thin thin thin solid line: 46th thickest (C<sub>46</sub>)
- Thin thin thin thin thin thin thin thin thin dashed line: 47th thickest (C<sub>47</sub>)
- Thin thin thin thin thin thin thin thin thin dotted line: 48th thickest (C<sub>48</sub>)
- Thin thin thin thin thin thin thin thin thin long dashed line: 49th thickest (C<sub>49</sub>)
- Thin thin thin thin thin thin thin thin thin short dashed line: 50th thickest (C<sub>50</sub>)
- Thin thin thin thin thin thin thin thin thin thin solid line: 51st thickest (C<sub>51</sub>)
- Thin thin thin thin thin thin thin thin thin thin dashed line: 52nd thickest (C<sub>52</sub>)
- Thin thin thin thin thin thin thin thin thin thin dotted line: 53rd thickest (C<sub>53</sub>)
- Thin thin thin thin thin thin thin thin thin thin long dashed line: 54th thickest (C<sub>54</sub>)
- Thin thin thin thin thin thin thin thin thin thin short dashed line: 55th thickest (C<sub>55</sub>)
- Thin thin thin thin thin thin thin thin thin thin thin solid line: 56th thickest (C<sub>56</sub>)
- Thin thin thin thin thin thin thin thin thin thin thin dashed line: 57th thickest (C<sub>57</sub>)
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- Thin thin thin thin thin thin thin thin thin thin thin long dashed line: 59th thickest (C<sub>59</sub>)
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- Thin thin thin thin thin thin thin thin thin thin thin thin solid line: 61st thickest (C<sub>61</sub>)
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- Thin thin thin thin thin thin thin thin thin thin thin thin long dashed line: 64th thickest (C<sub>64</sub>)
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- Thin thin thin thin thin thin thin thin thin thin thin thin thin short dashed line: 70th thickest (C<sub>70</sub>)
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- Thin thin thin thin thin thin thin thin thin thin thin thin thin thin dashed line: 72nd thickest (C<sub>72</sub>)
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- Thin thin thin thin thin thin thin thin thin thin thin thin thin thin short dashed line: 75th thickest (C<sub>75</sub>)
- Thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin solid line: 76th thickest (C<sub>76</sub>)
- Thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin dashed line: 77th thickest (C<sub>77</sub>)
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- Thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin short dashed line: 80th thickest (C<sub>80</sub>)
- Thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin solid line: 81st thickest (C<sub>81</sub>)
- Thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin dashed line: 82nd thickest (C<sub>82</sub>)
- Thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin dotted line: 83rd thickest (C<sub>83</sub>)
- Thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin long dashed line: 84th thickest (C<sub>84</sub>)
- Thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin short dashed line: 85th thickest (C<sub>85</sub>)
- Thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin solid line: 86th thickest (C<sub>86</sub>)
- Thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin dashed line: 87th thickest (C<sub>87</sub>)
- Thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin dotted line: 88th thickest (C<sub>88</sub>)
- Thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin long dashed line: 89th thickest (C<sub>89</sub>)
- Thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin short dashed line: 90th thickest (C<sub>90</sub>)
- Thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin solid line: 91st thickest (C<sub>91</sub>)
- Thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin dashed line: 92nd thickest (C<sub>92</sub>)
- Thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin dotted line: 93rd thickest (C<sub>93</sub>)
- Thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin long dashed line: 94th thickest (C<sub>94</sub>)
- Thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin short dashed line: 95th thickest (C<sub>95</sub>)
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- Thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin dashed line: 97th thickest (C<sub>97</sub>)
- Thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin dotted line: 98th thickest (C<sub>98</sub>)
- Thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin long dashed line: 99th thickest (C<sub>99</sub>)
- Thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin thin short dashed line: 100th thickest (C<sub>100</sub>)

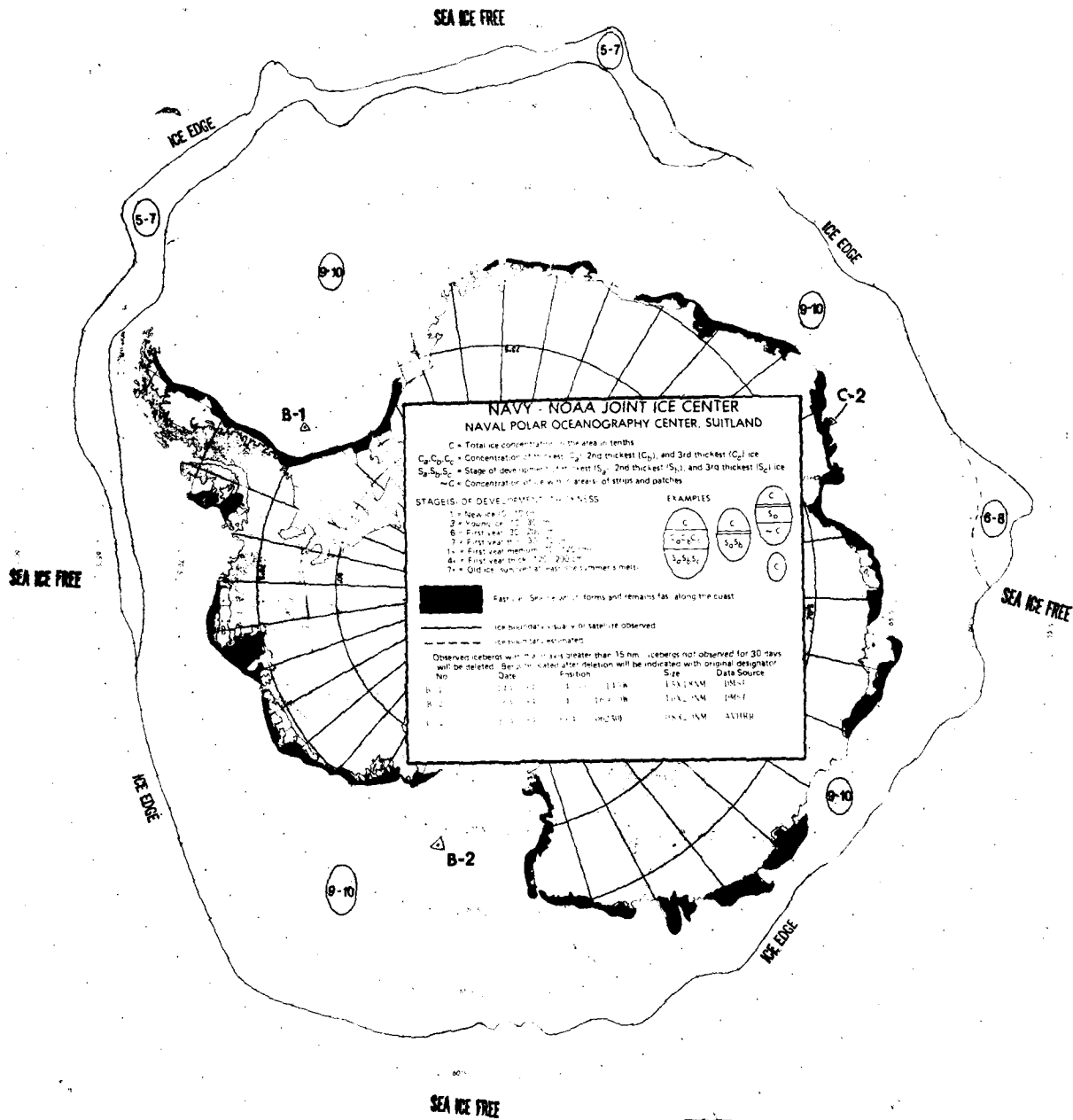
**NORTHERN ICE LIMIT**  
 Date: 0240384  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



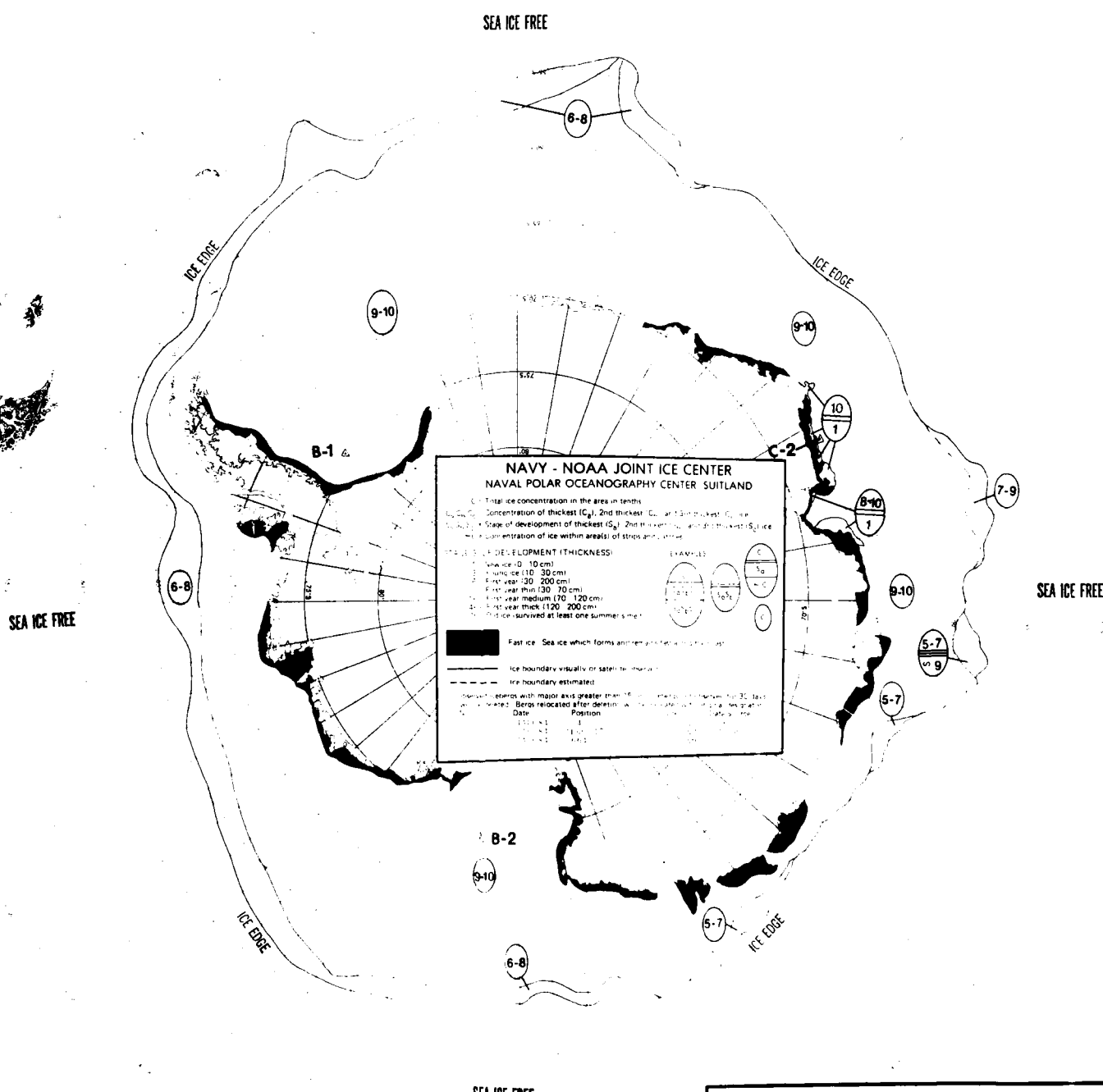
**NORTHERN ICE LIMIT**  
 Date: 09 AUG 84  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



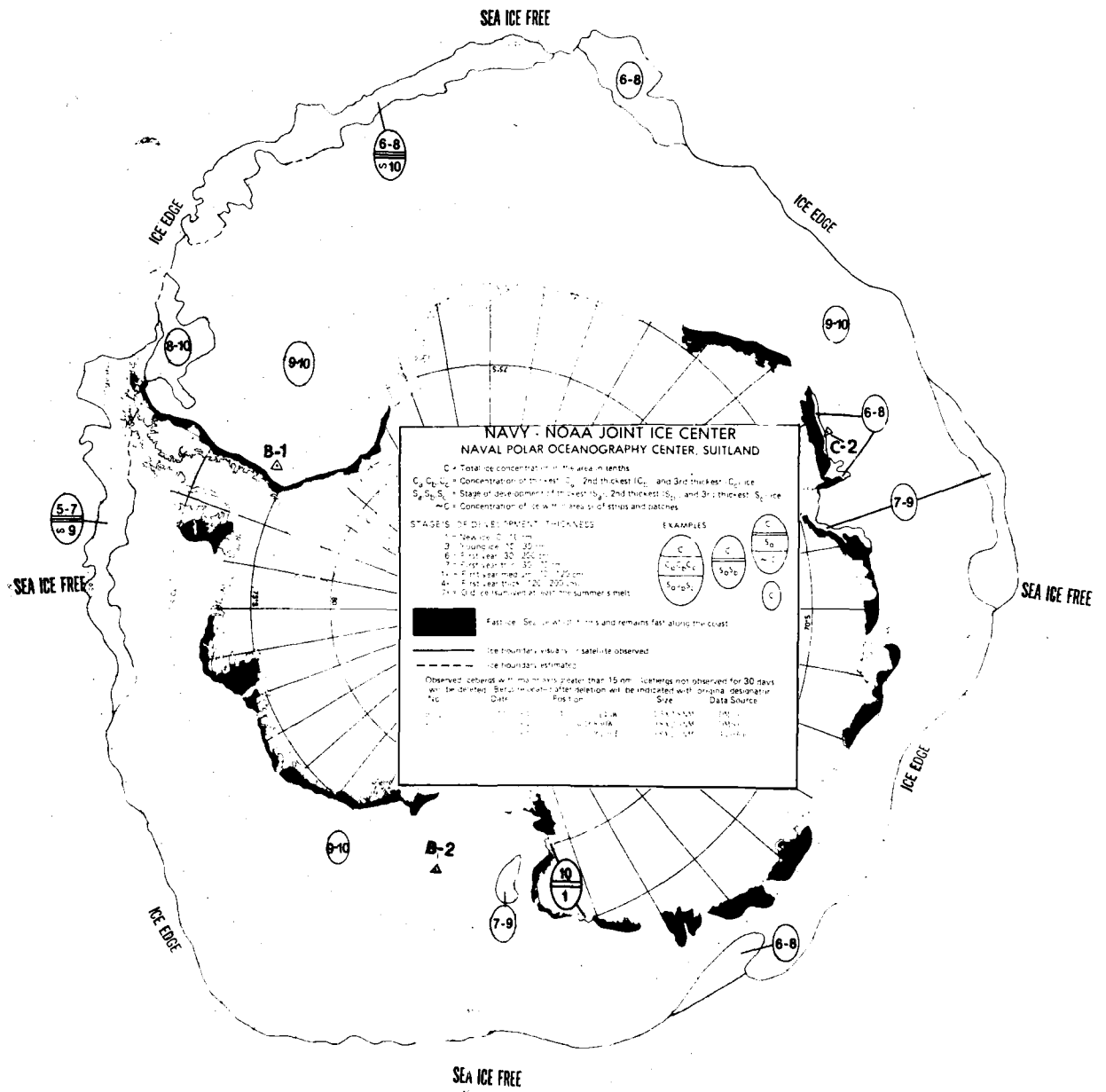
**NORTHERN ICE LIMIT**  
**Date: 16 AUG 84**  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



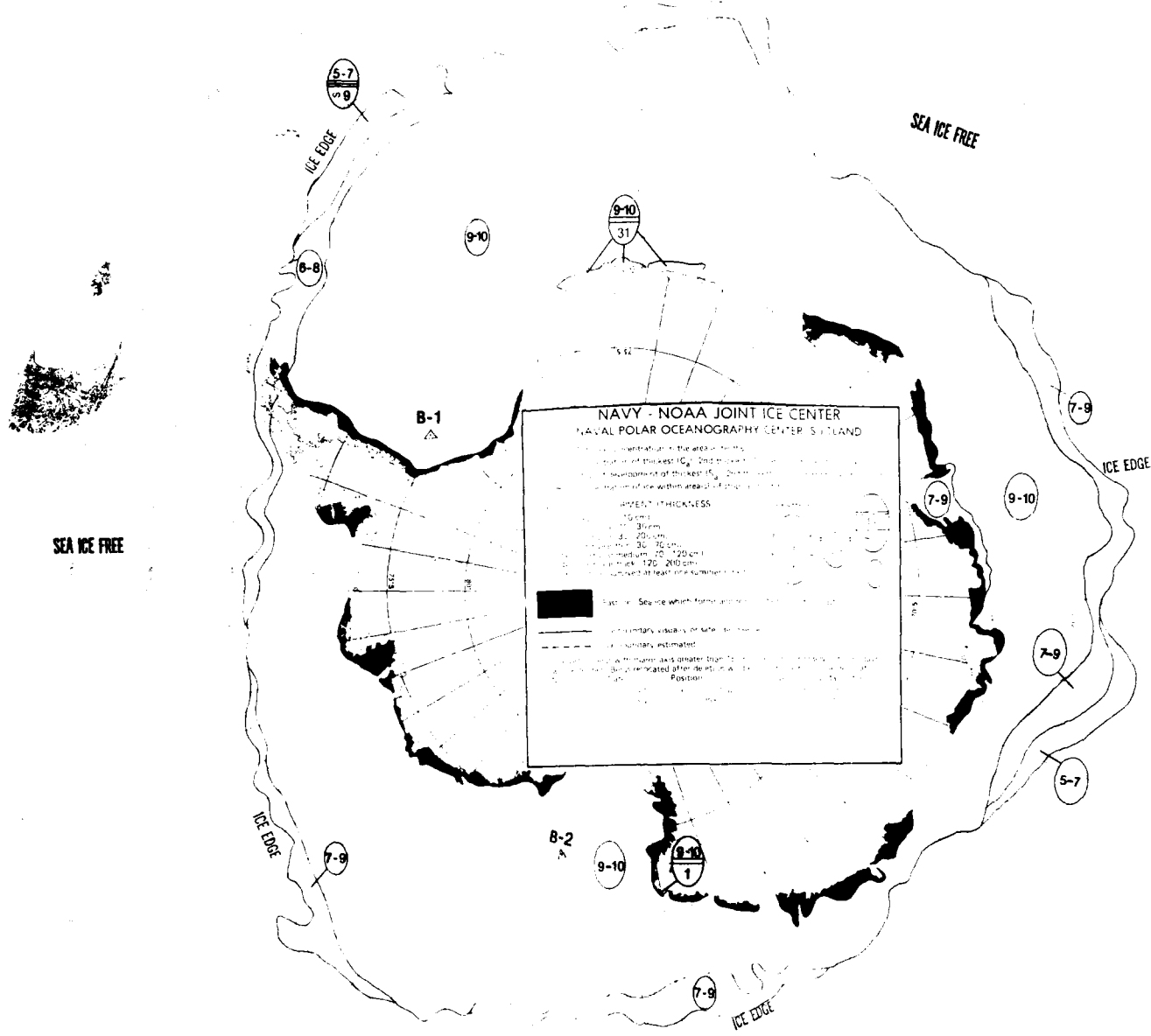
**NORTHERN ICE LIMIT**  
 Date: 23 AUG 84  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



**NORTHERN ICE LIMIT**  
 Date: 30 AUG 1984  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



**NORTHERN ICE LIMIT**  
**Date: 06 SEPT 84**  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



**NAVY - NOAA JOINT ICE CENTER**  
**NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND**

Ice concentration in the area is in the form of thickets (C<sub>1</sub>) and thinets (C<sub>2</sub>). The number of thickets (C<sub>1</sub>) and thinets (C<sub>2</sub>) is the number of ice within a grid of 100 km x 100 km.

**ICE THICKNESS**

100m  
 200m  
 300m  
 400m  
 500m  
 600m  
 700m  
 800m  
 900m  
 1000m  
 1200-2000m

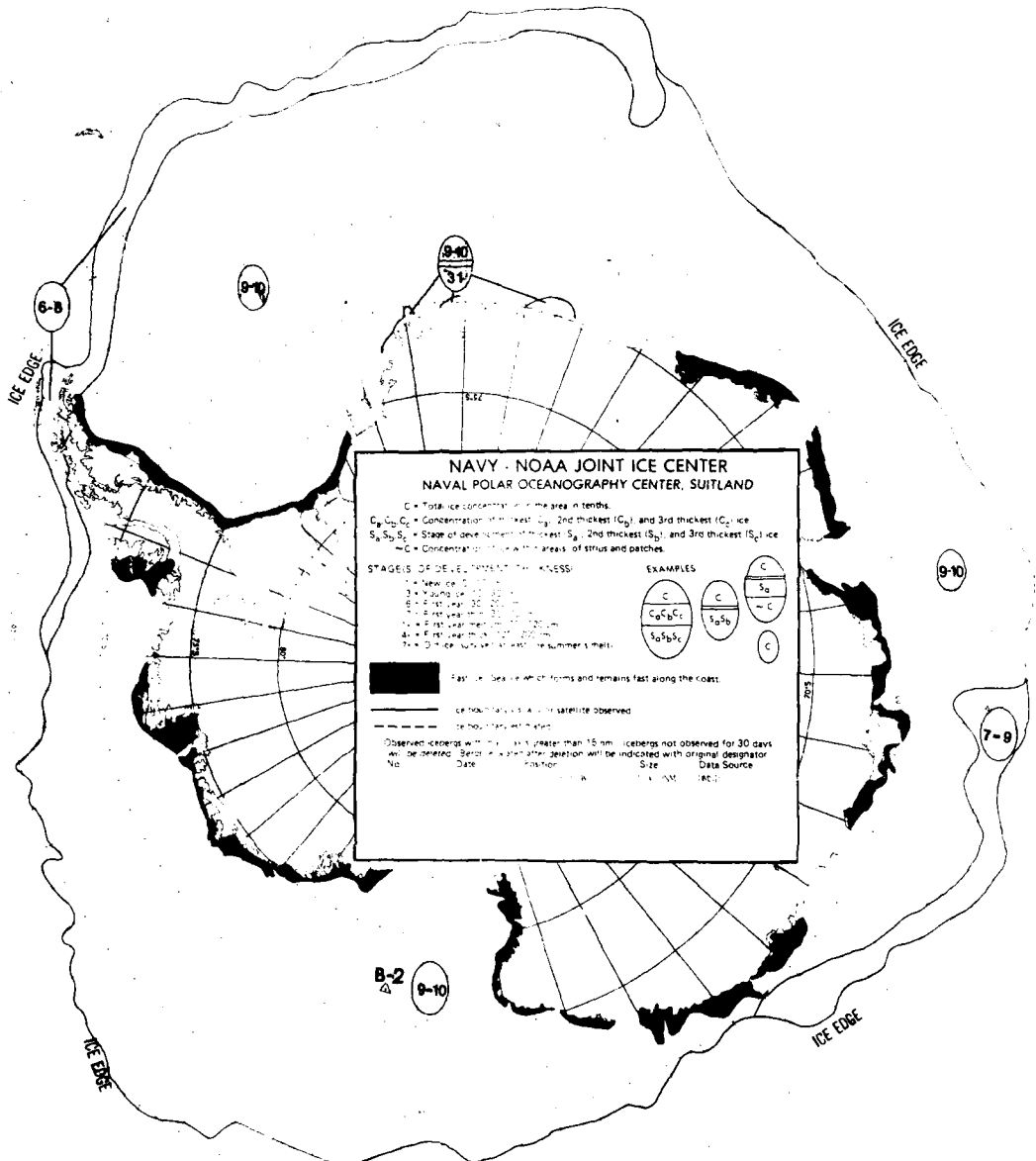
Fast ice: Sea ice which forms adjacent to the coast.

--- Primary ice edge on the ice chart  
 --- Secondary ice edge  
 --- Ice edge estimated  
 --- Ice edge with thickness greater than 1000m  
 --- Ice edge with thickness greater than 1000m and ice concentration greater than 10%

Position

**NORTHERN ICE LIMIT**  
 Date: 13 SEP 84  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND

SEA ICE FREE



**NAVY - NOAA JOINT ICE CENTER**  
**NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND**

C = Total ice concentration in the area in tenths.  
 C<sub>1</sub>C<sub>2</sub>C<sub>3</sub> = Concentration of thickest (C<sub>1</sub>), 2nd thickest (C<sub>2</sub>), and 3rd thickest (C<sub>3</sub>) ice.  
 S<sub>1</sub>S<sub>2</sub>S<sub>3</sub> = Stage of development of thickest (S<sub>1</sub>), 2nd thickest (S<sub>2</sub>), and 3rd thickest (S<sub>3</sub>) ice.  
 -C = Concentration of ice in areas of strus and patches.

**STAGES OF DEVELOPMENT OF ICE:**

1. New ice (1st year)
2. Young ice (1st year)
3. 1st year ice (1st year)
4. 2nd year ice (1st year)
5. 3rd year ice (1st year)
6. 4th year ice (1st year)
7. 5th year ice (1st year)
8. 6th year ice (1st year)
9. 7th year ice (1st year)
10. 8th year ice (1st year)
11. 9th year ice (1st year)
12. 10th year ice (1st year)
13. 11th year ice (1st year)
14. 12th year ice (1st year)
15. 13th year ice (1st year)
16. 14th year ice (1st year)
17. 15th year ice (1st year)
18. 16th year ice (1st year)
19. 17th year ice (1st year)
20. 18th year ice (1st year)
21. 19th year ice (1st year)
22. 20th year ice (1st year)
23. 21st year ice (1st year)
24. 22nd year ice (1st year)
25. 23rd year ice (1st year)
26. 24th year ice (1st year)
27. 25th year ice (1st year)
28. 26th year ice (1st year)
29. 27th year ice (1st year)
30. 28th year ice (1st year)
31. 29th year ice (1st year)
32. 30th year ice (1st year)
33. 31st year ice (1st year)
34. 32nd year ice (1st year)
35. 33rd year ice (1st year)
36. 34th year ice (1st year)
37. 35th year ice (1st year)
38. 36th year ice (1st year)
39. 37th year ice (1st year)
40. 38th year ice (1st year)
41. 39th year ice (1st year)
42. 40th year ice (1st year)
43. 41st year ice (1st year)
44. 42nd year ice (1st year)
45. 43rd year ice (1st year)
46. 44th year ice (1st year)
47. 45th year ice (1st year)
48. 46th year ice (1st year)
49. 47th year ice (1st year)
50. 48th year ice (1st year)
51. 49th year ice (1st year)
52. 50th year ice (1st year)
53. 51st year ice (1st year)
54. 52nd year ice (1st year)
55. 53rd year ice (1st year)
56. 54th year ice (1st year)
57. 55th year ice (1st year)
58. 56th year ice (1st year)
59. 57th year ice (1st year)
60. 58th year ice (1st year)
61. 59th year ice (1st year)
62. 60th year ice (1st year)
63. 61st year ice (1st year)
64. 62nd year ice (1st year)
65. 63rd year ice (1st year)
66. 64th year ice (1st year)
67. 65th year ice (1st year)
68. 66th year ice (1st year)
69. 67th year ice (1st year)
70. 68th year ice (1st year)
71. 69th year ice (1st year)
72. 70th year ice (1st year)
73. 71st year ice (1st year)
74. 72nd year ice (1st year)
75. 73rd year ice (1st year)
76. 74th year ice (1st year)
77. 75th year ice (1st year)
78. 76th year ice (1st year)
79. 77th year ice (1st year)
80. 78th year ice (1st year)
81. 79th year ice (1st year)
82. 80th year ice (1st year)
83. 81st year ice (1st year)
84. 82nd year ice (1st year)
85. 83rd year ice (1st year)
86. 84th year ice (1st year)
87. 85th year ice (1st year)
88. 86th year ice (1st year)
89. 87th year ice (1st year)
90. 88th year ice (1st year)
91. 89th year ice (1st year)
92. 90th year ice (1st year)
93. 91st year ice (1st year)
94. 92nd year ice (1st year)
95. 93rd year ice (1st year)
96. 94th year ice (1st year)
97. 95th year ice (1st year)
98. 96th year ice (1st year)
99. 97th year ice (1st year)
100. 98th year ice (1st year)
101. 99th year ice (1st year)
102. 100th year ice (1st year)

**EXAMPLES:**

C	C	C
C <sub>1</sub> C <sub>2</sub> C <sub>3</sub>	S <sub>1</sub> S <sub>2</sub> S <sub>3</sub>	-C
S <sub>1</sub> S <sub>2</sub> S <sub>3</sub>	C	C

Fast ice: ice which forms and remains fast along the coast.

Ice thickness: as observed by satellite.

Observed icebergs with size greater than 15 nm. Icebergs not observed for 30 days will be denoted. Berge which after jettison will be indicated with original designator.

No. Date Position Size Data Source

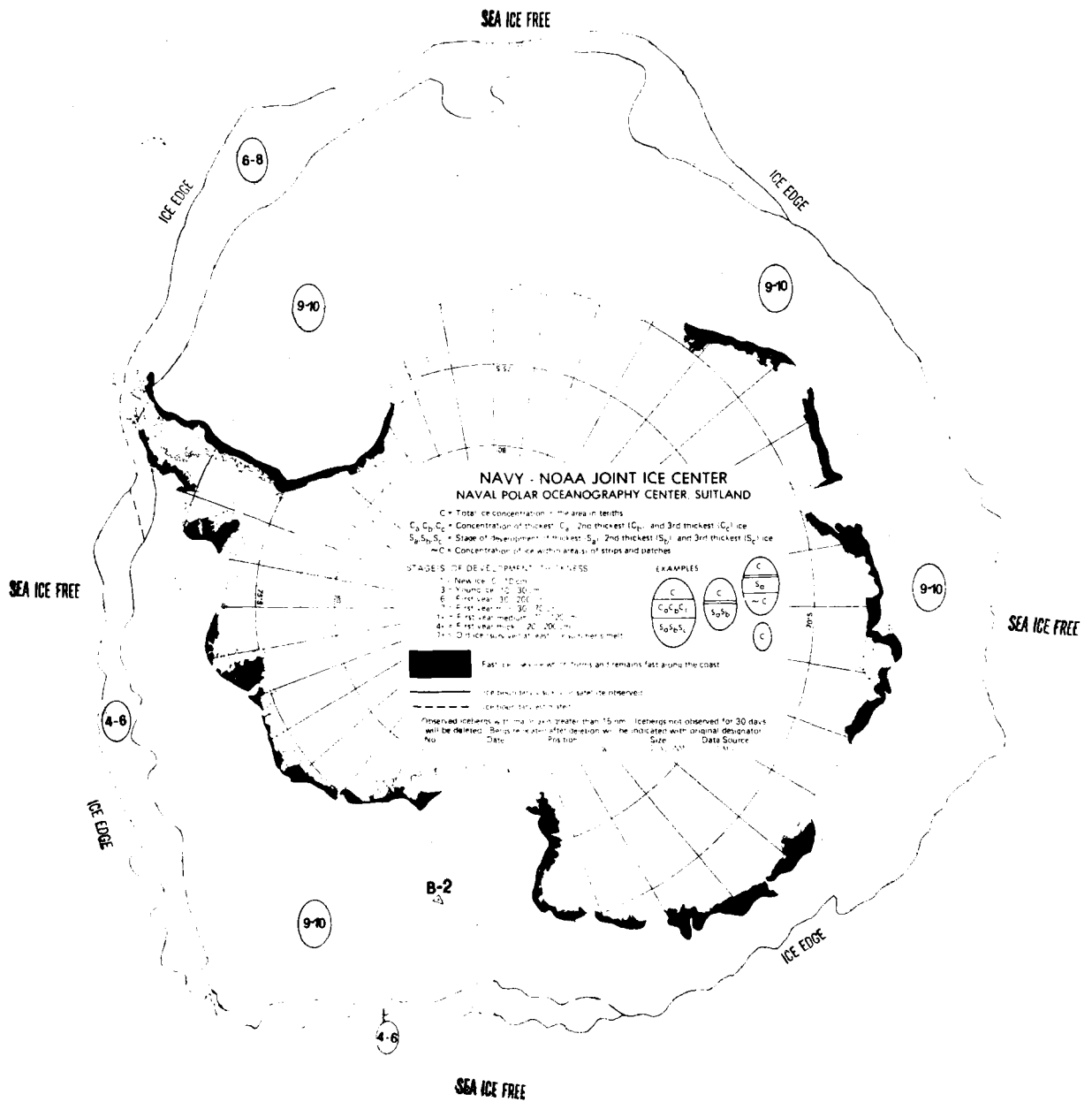
SEA ICE FREE

SEA-ICE FREE

SEA ICE FREE

**NORTHERN ICE LIMIT**  
 Date: 20 SEP84  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND





**NORTHERN ICE LIMIT**  
**Date: 04 OCT 84**  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND

AD-A159 907

ANTARCTIC ICE CHARTS 1983--1984(U) NAVAL POLAR  
OCEANOGRAPHY CENTER WASHINGTON DC SEP 85

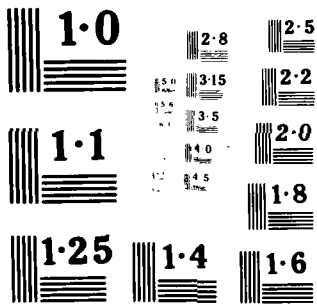
2/2

UNCLASSIFIED

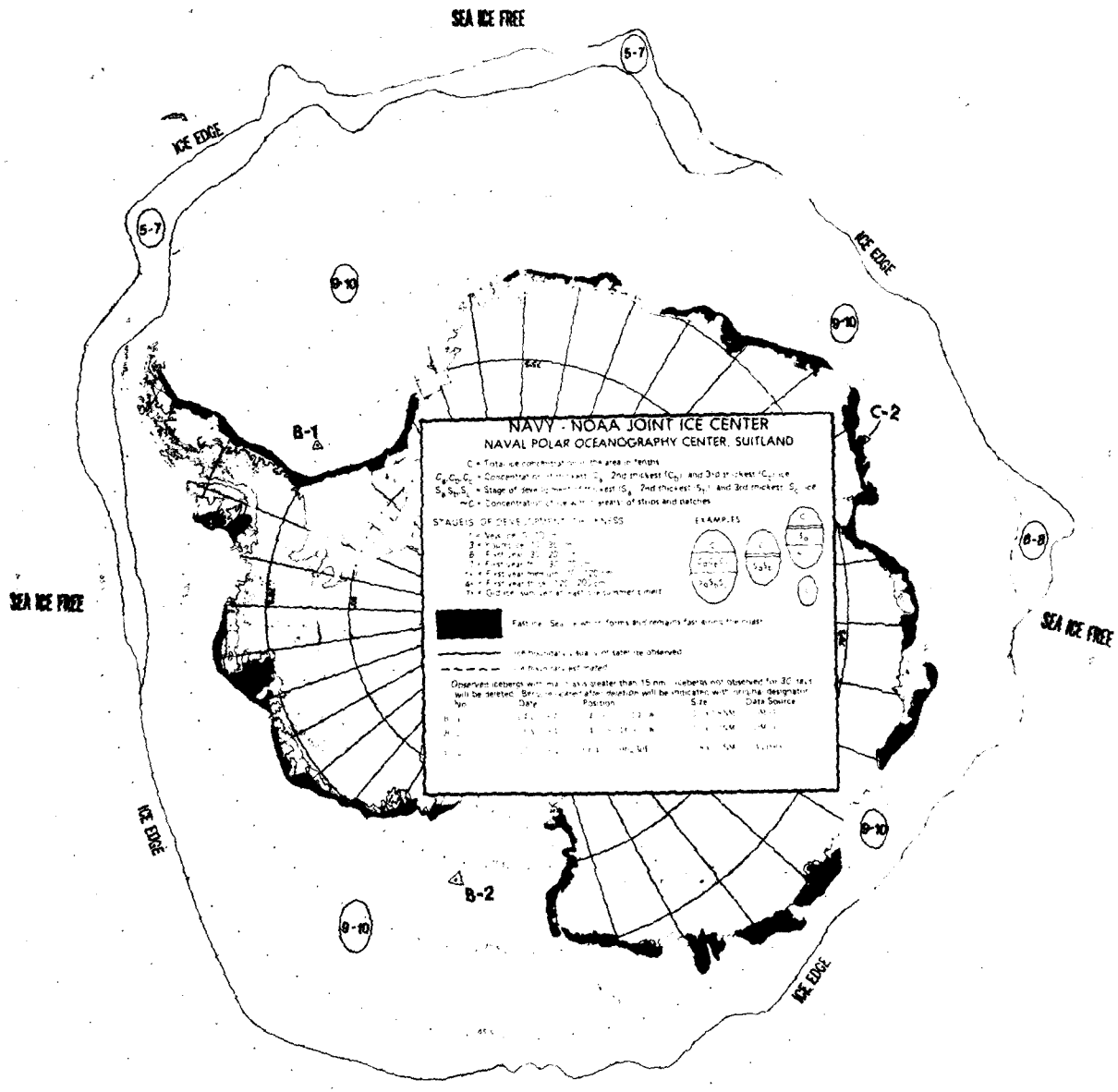
F/G 8/12

NL

END
DATE
FORMED
12-85
DTIC







SEA ICE FREE

ICE EDGE

B-7

B-7

B-10

B-10

**NAVY - NOAA JOINT ICE CENTER**  
**NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND**

C - Total ice concentration of the area in tenths  
 C<sub>1</sub>, C<sub>2</sub>, C<sub>3</sub> - Concentration in tenths of 1st, 2nd and 3rd thickest ice  
 S<sub>1</sub>, S<sub>2</sub>, S<sub>3</sub> - Stage of development of 1st, 2nd and 3rd thickest ice  
 P - Concentration of ice in percent of spots and patches

**STAGES OF DEVELOPMENT OF ICE**

- 1 - Very thin ice (10-15 cm)
- 2 - Thin ice (15-20 cm)
- 3 - First year ice (20-30 cm)
- 4 - First year ice (30-40 cm)
- 5 - First year ice (40-50 cm)
- 6 - First year ice (50-60 cm)
- 7 - Old ice (more than 60 cm)

**EXAMPLES**



— Fatigue Sea ice when forms and remains fast along the coast  
 - - - - - Ice thickness data not satellite observed  
 - - - - - Ice thickness estimated

Observed icebergs with max. axis greater than 15 nm. Icebergs not observed for 30 days will be deleted. Symbols used after deletion will be circled with the designator: No. Date Position Size Data Source

No.	Date	Position	Size	Data Source
1	11/11/83	67°N 15°W	1000m	AS
2	11/11/83	67°N 15°W	1000m	AS
3	11/11/83	67°N 15°W	1000m	AS

SEA ICE FREE

SEA ICE FREE

ICE EDGE

ICE EDGE

SEA ICE FREE

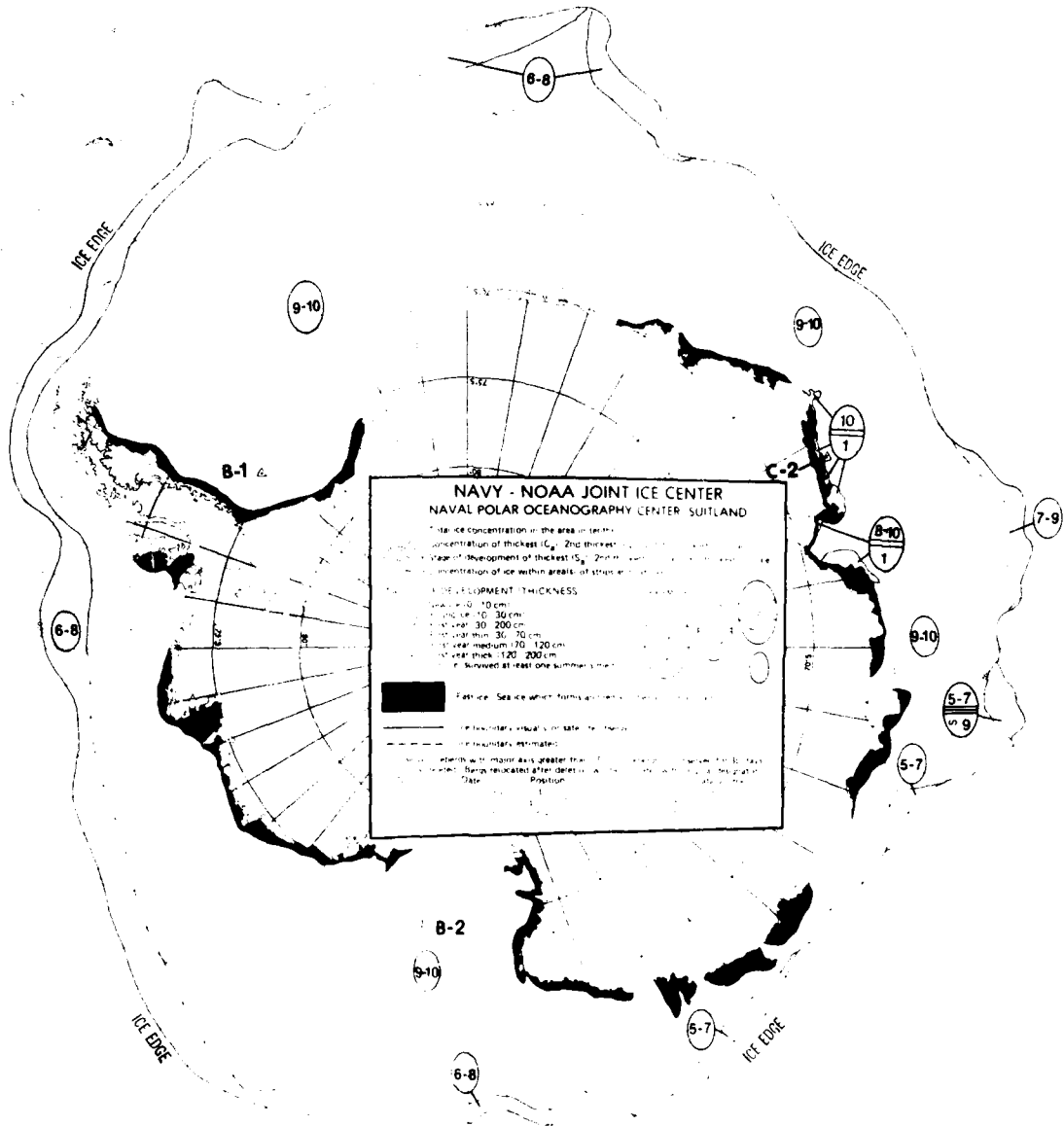
**NORTHERN ICE LIMIT**  
**Date: 23 AUG 84**  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND

SEA ICE FREE

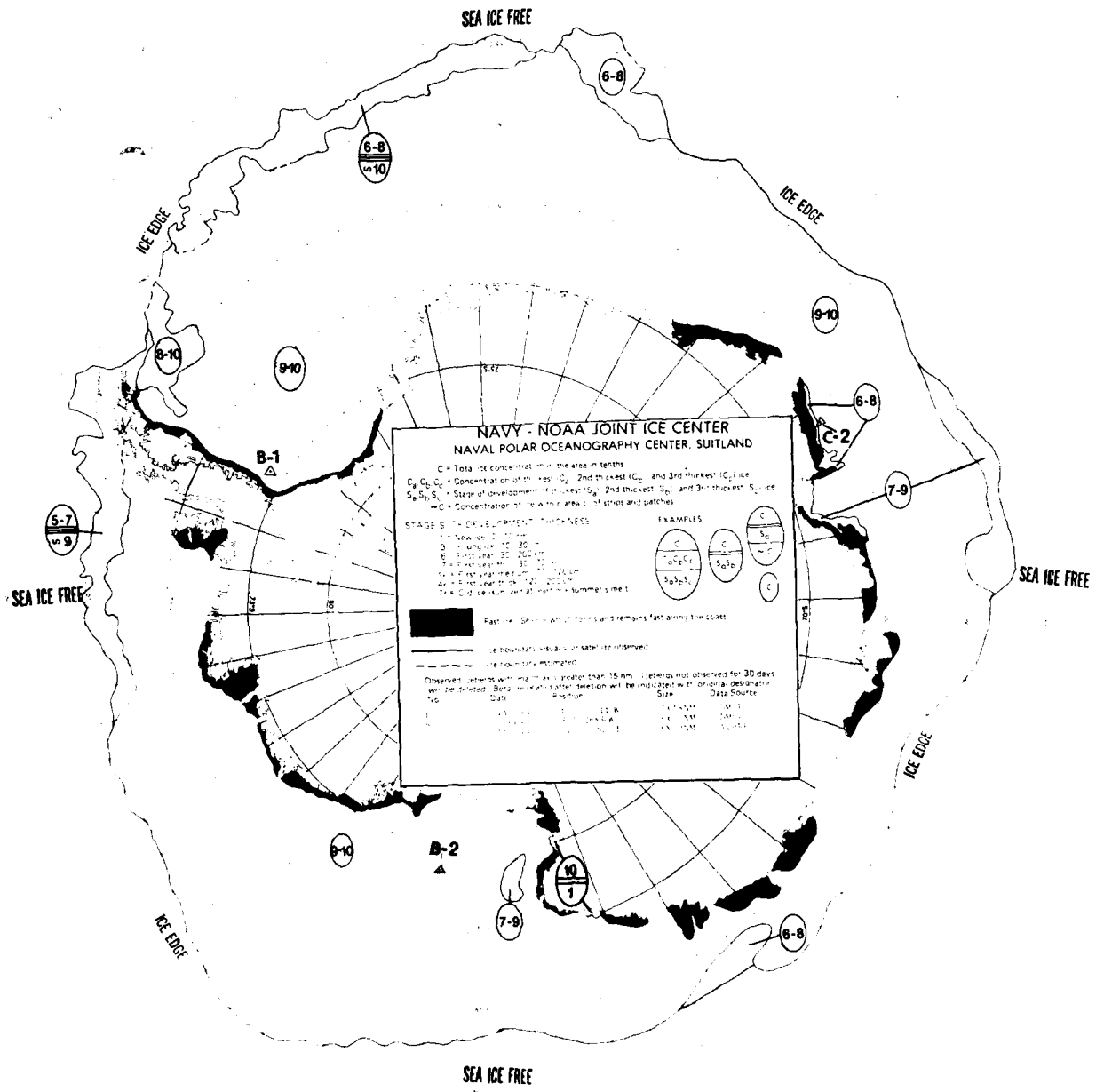
SEA ICE FREE

SEA ICE FREE

SEA ICE FREE

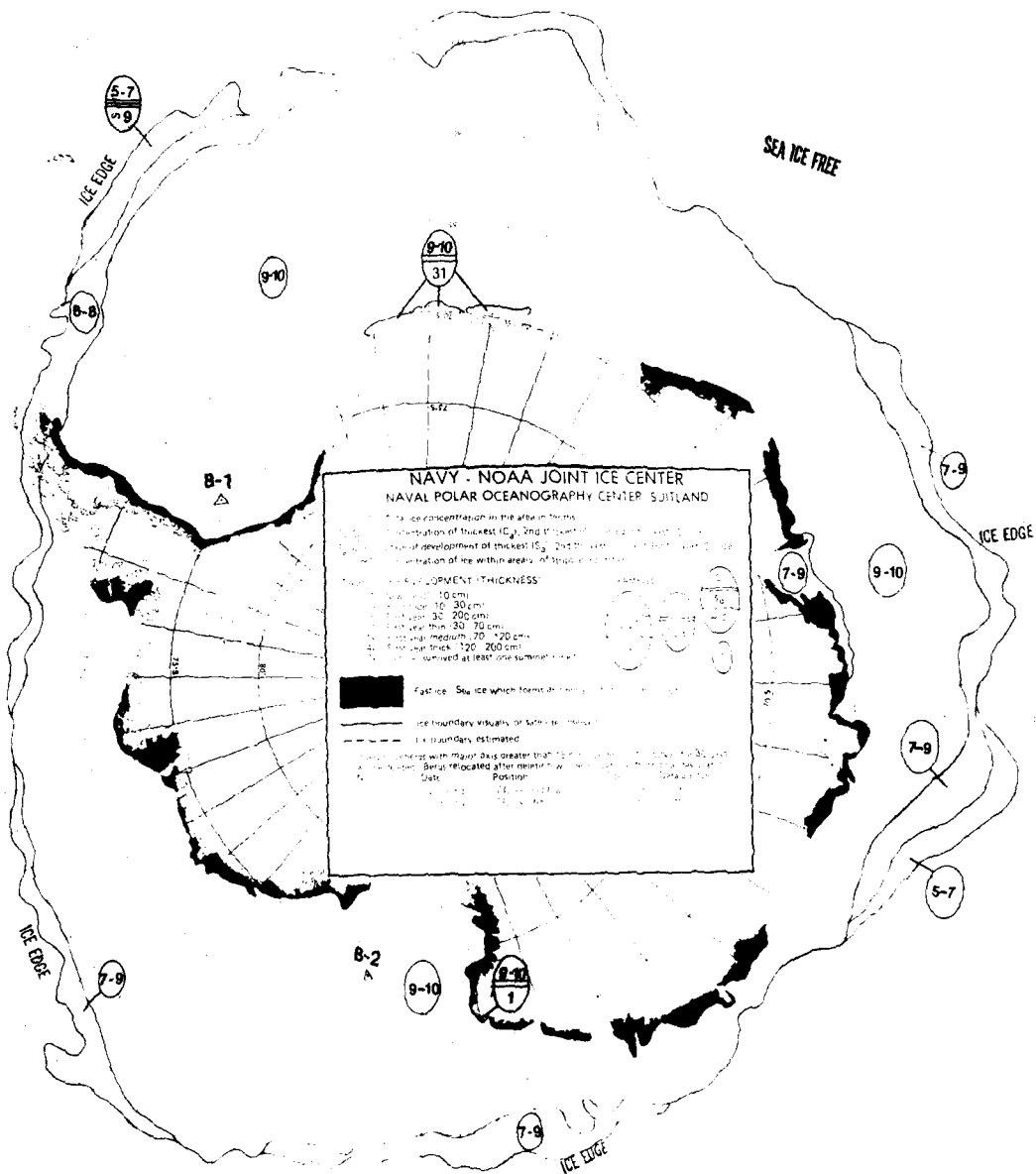


**NORTHERN ICE LIMIT**  
 Date: \_\_\_\_\_  
 NAVY--NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



**NORTHERN ICE LIMIT**  
**Date: 06 SEPT 84**  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND

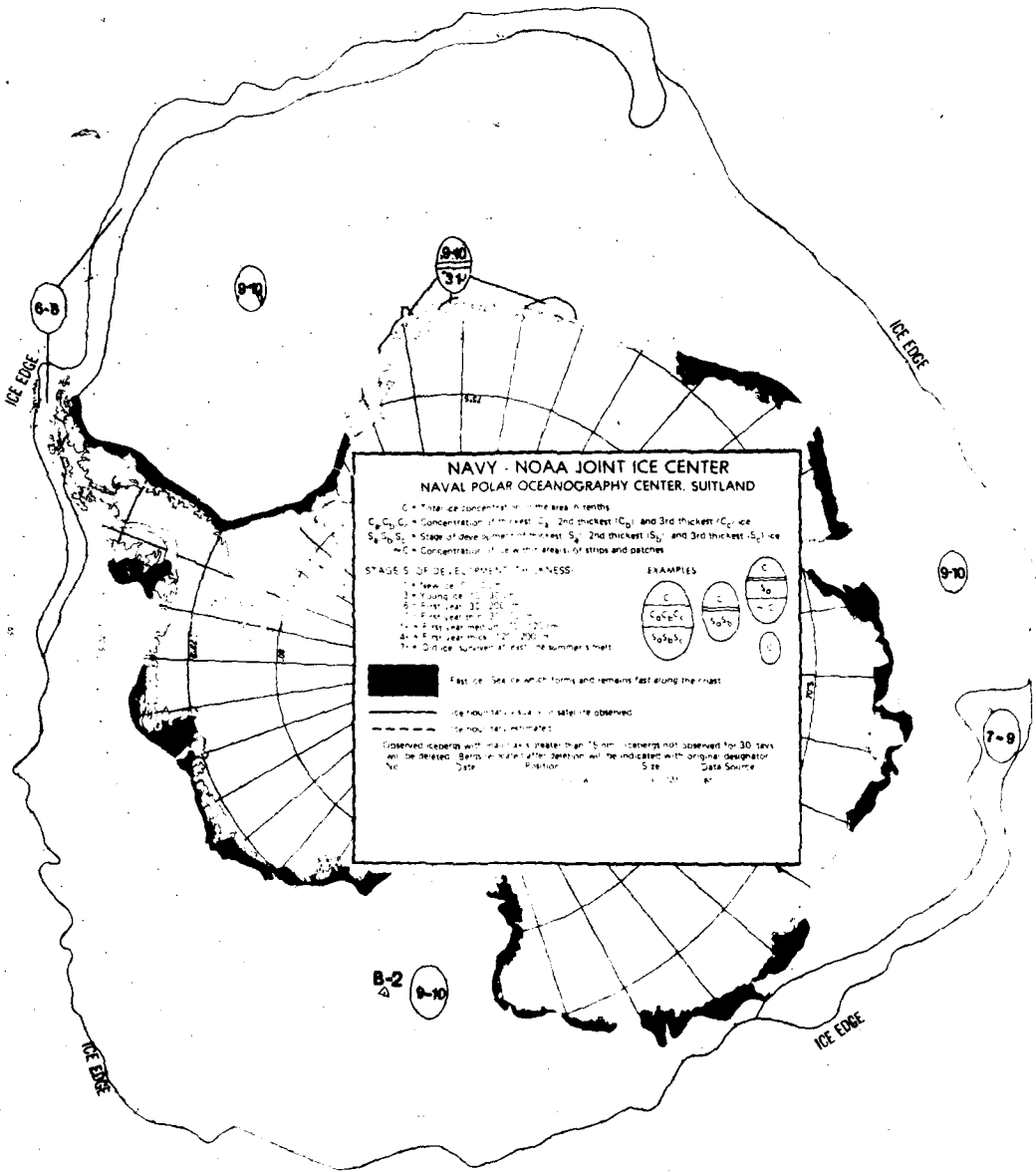
SEA ICE FREE



SEA ICE FREE

**NORTHERN ICE LIMIT**  
 Date: 13 SEP 84  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND

SEA ICE FREE



SEA ICE FREE

SEA-ICE FREE

SEA ICE FREE

**NAVY - NOAA JOINT ICE CENTER**  
**NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND**

C = Total ice concentration in tenths  
 C<sub>1</sub>, C<sub>2</sub>, C<sub>3</sub> = Concentration of 1st, 2nd, and 3rd thickest ice  
 S<sub>1</sub>, S<sub>2</sub>, S<sub>3</sub> = Stage of development of 1st, 2nd, and 3rd thickest ice  
 W = Concentration of ice within area of strips and patches

STAGE S OF DEVELOPMENT THICKNESS

EXAMPLES

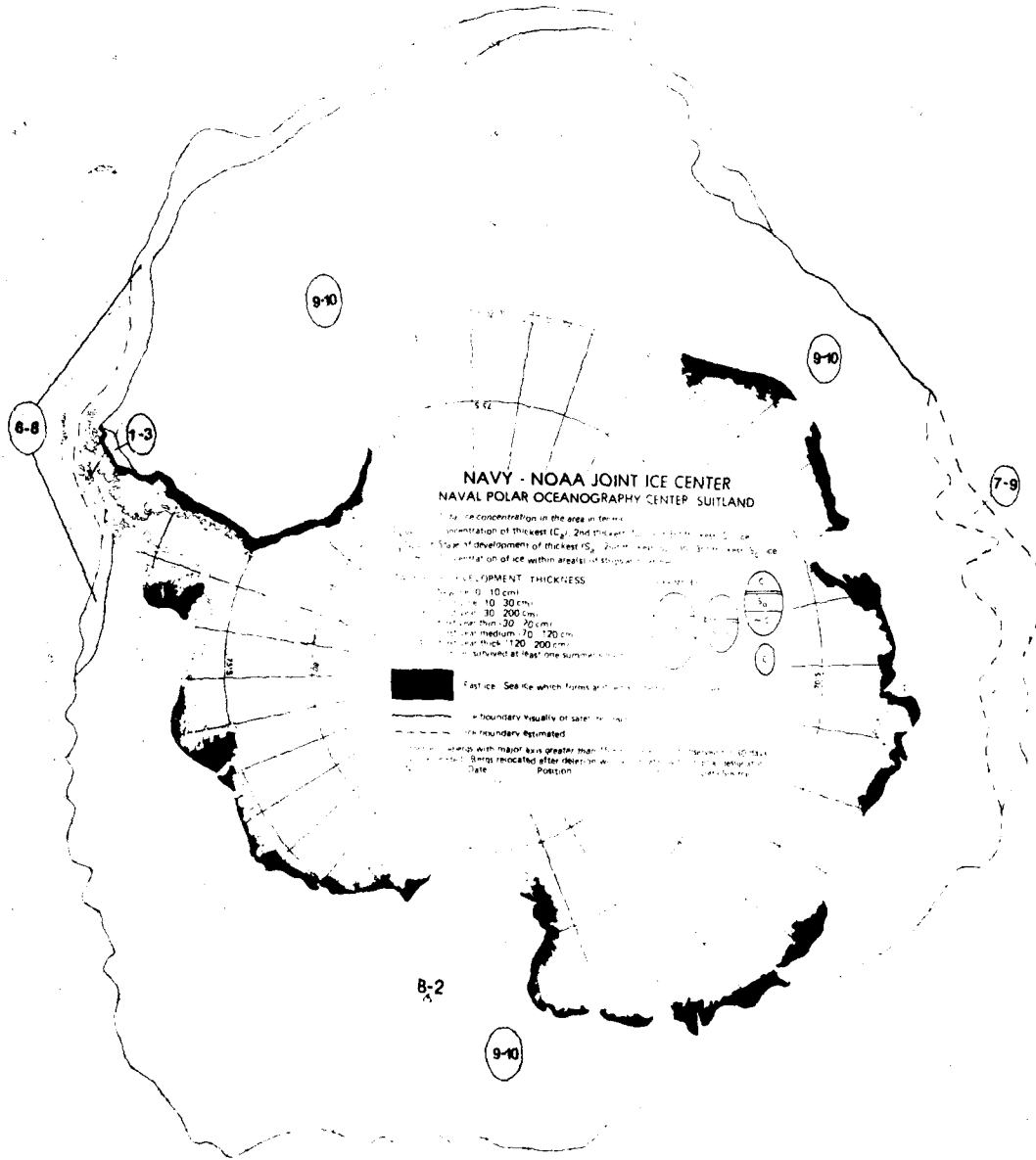
1. New ice	0
2. Young ice	1
3. First year ice	2
4. Second year ice	3
5. Third year ice	4
6. Fourth year ice	5
7. Old ice	6
8. Icebergs	7
9. Icebergs	8
10. Icebergs	9
11. Icebergs	10

Fast ice: Sea ice which forms and remains fast along the coast

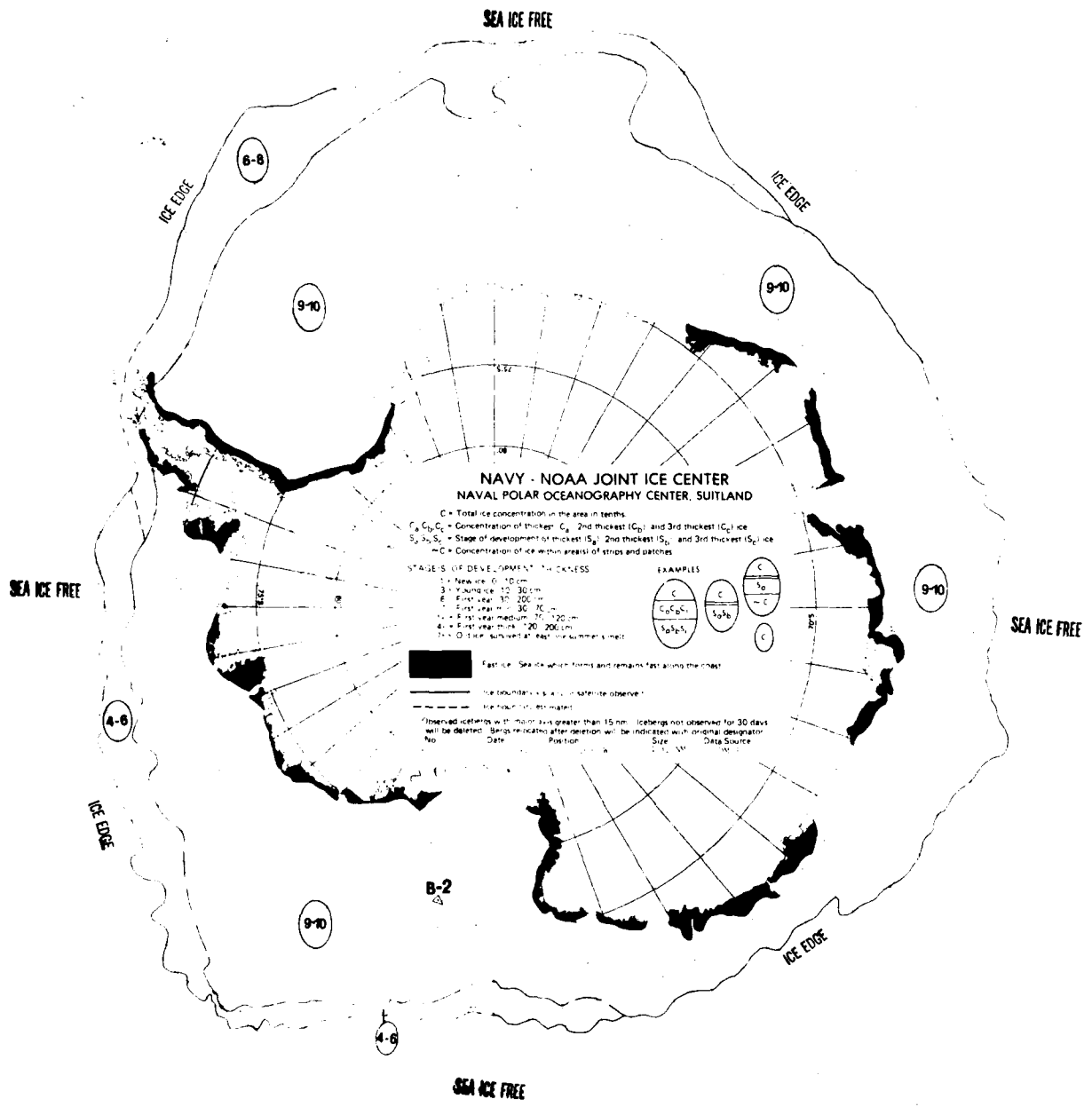
--- Ice boundary as last satellite observed  
 - - - - - Ice boundary estimated

Observed icebergs with maximums greater than 15 nm<sup>2</sup> icebergs not observed for 30 days will be deleted. Bergs in water after deletion will be indicated with original designator No. Date Position Size Data Source

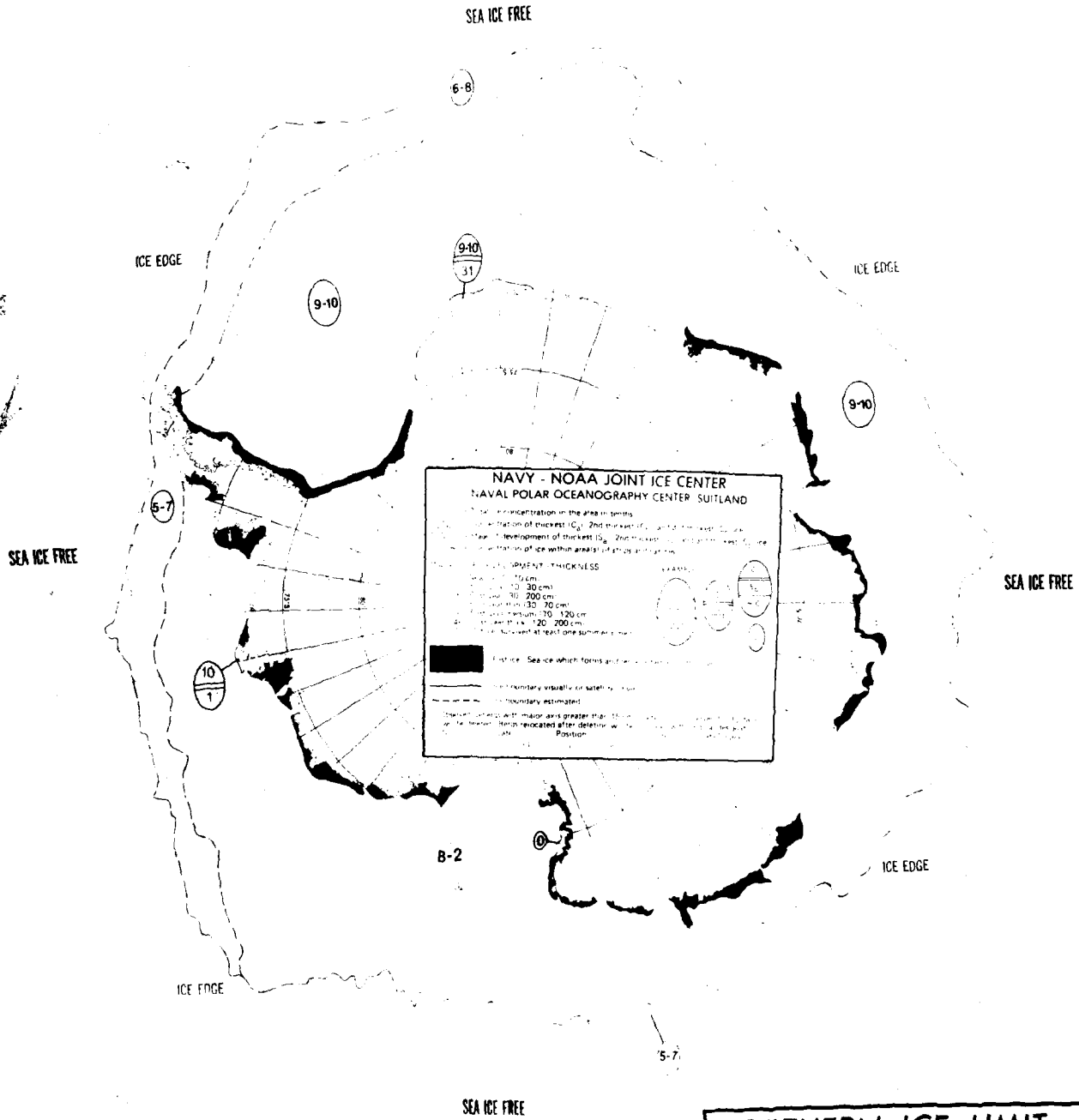
**NORTHERN ICE LIMIT**  
 Date: 20 SEP84  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



**NORTHERN ICE LIMIT**  
**Date: 27 SEP 84**  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



**NORTHERN ICE LIMIT**  
**Date: 04 OCT 84**  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



**NORTHERN ICE LIMIT**  
 Date: 11 OCT 84  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND

SEA ICE FREE

SEA ICE FREE

SEA ICE FREE

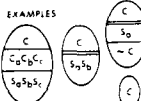
SEA ICE FREE

### NAVY - NOAA JOINT ICE CENTER NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND

C = Total ice concentration in the area in tenths  
 C<sub>1</sub>, C<sub>2</sub>, C<sub>3</sub> = Concentration of thickest (C<sub>1</sub>), 2nd thickest (C<sub>2</sub>), and 3rd thickest (C<sub>3</sub>) ice  
 S<sub>1</sub>, S<sub>2</sub>, S<sub>3</sub> = Stage of development of thickest (S<sub>1</sub>), 2nd thickest (S<sub>2</sub>), and 3rd thickest (S<sub>3</sub>) ice  
 -C = Concentration of ice within areas of strips and patches

STAGES OF DEVELOPMENT - THICKNESS:

- 1 = New ice (0 - 10 cm)
- 2 = Young ice (10 - 30 cm)
- 3 = First year (30 - 200 cm)
- 4 = First year thin (20 - 100 cm)
- 5 = First year medium (10 - 200 cm)
- 6 = First year thick (20 - 200 cm)
- 7 = Old ice survived at least one summer melt



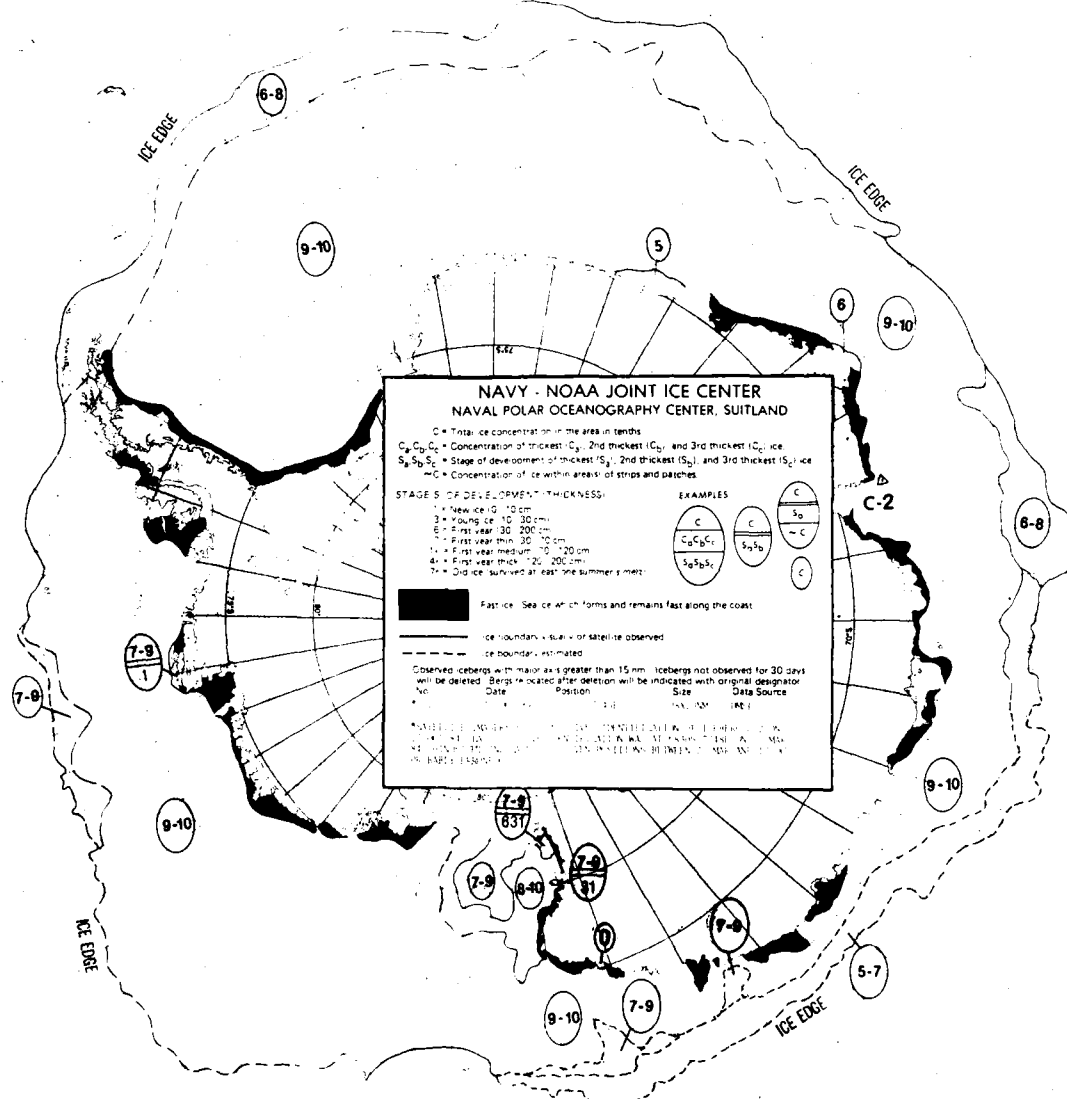
Fast ice - Sea ice which forms and remains fast along the coast

ice boundary: solid or satellite observed  
 ice boundary: estimated

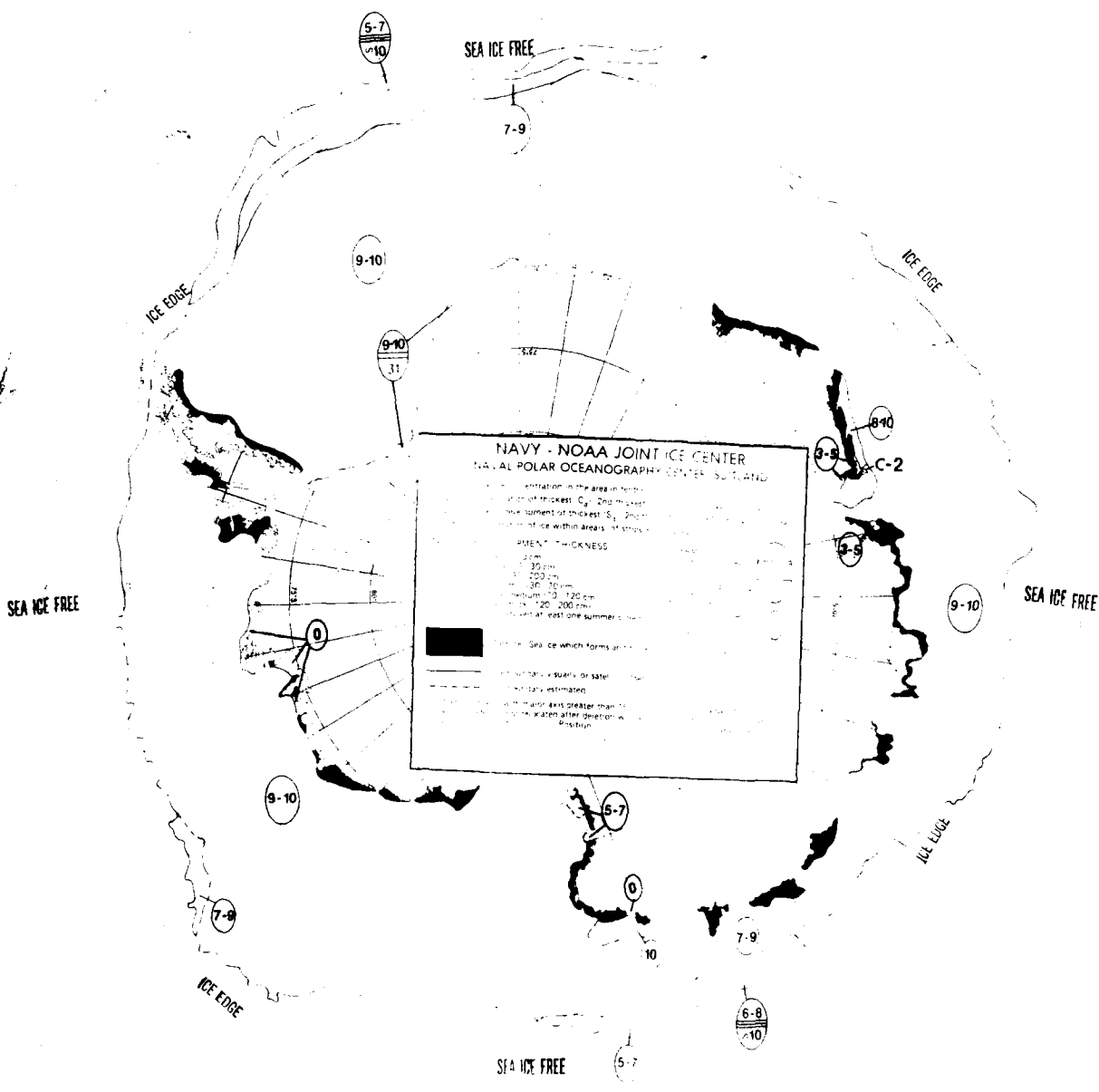
Observed icebergs with major axis greater than 15 nm. Icebergs not observed for 30 days will be deleted. Berge located after deletion will be indicated with original designator.

No.	Date	Position	Size	Data Source
1	18 OCT 84	75°N 150°W	100 x 100	MSU

\*SATELLITE AND SURVEY DATA FROM THE NAVY POLAR OCEANOGRAPHY CENTER, SUITLAND, ALASKA AND THE NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND, ALASKA. DATA FROM THE NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND, ALASKA. DATA FROM THE NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND, ALASKA.



**NORTHERN ICE LIMIT**  
**Date: 18 OCT 84**  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



**NORTHERN ICE LIMIT**  
 Date: 25 OCT 84  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND

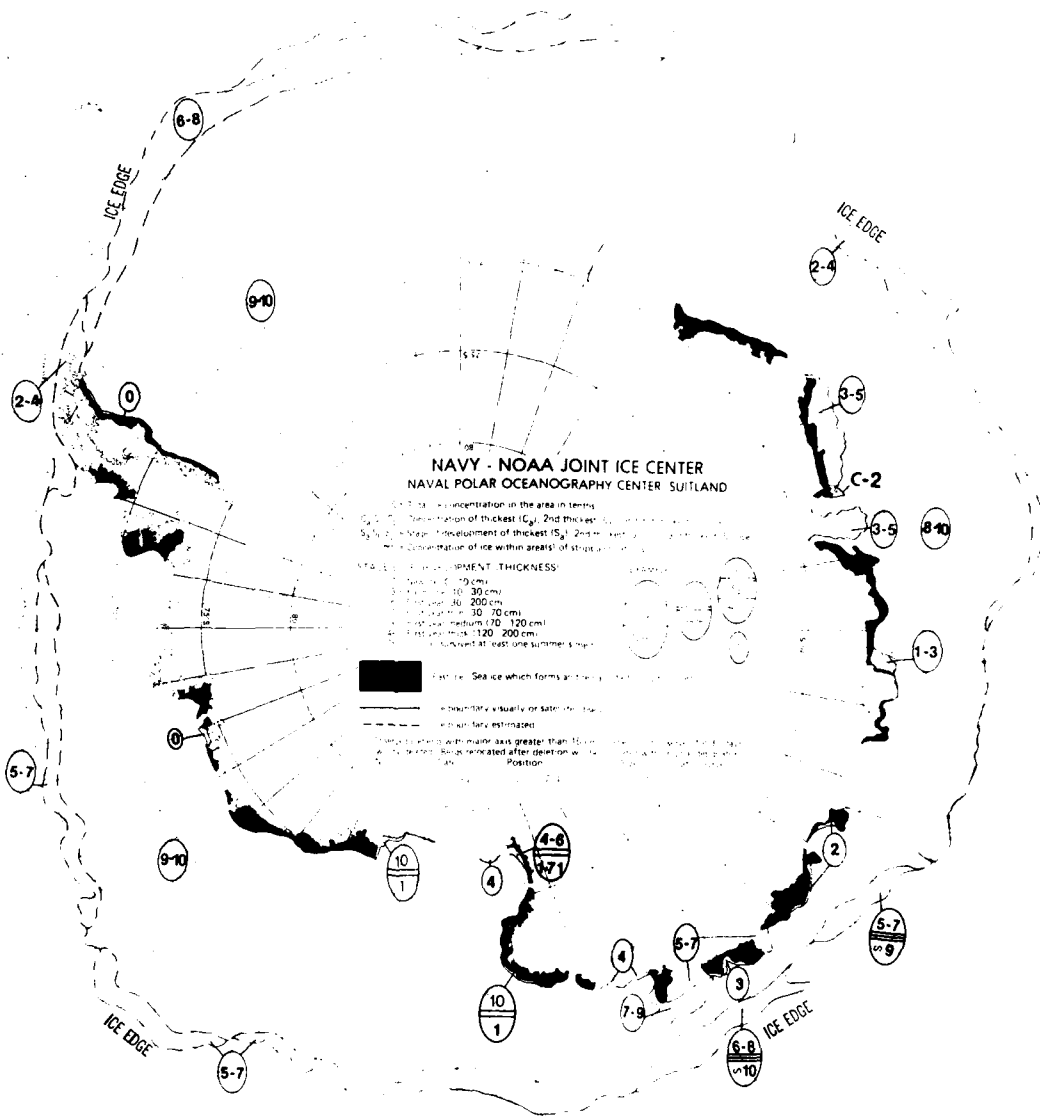


SEA ICE FREE

SEA ICE FREE

SEA ICE FREE

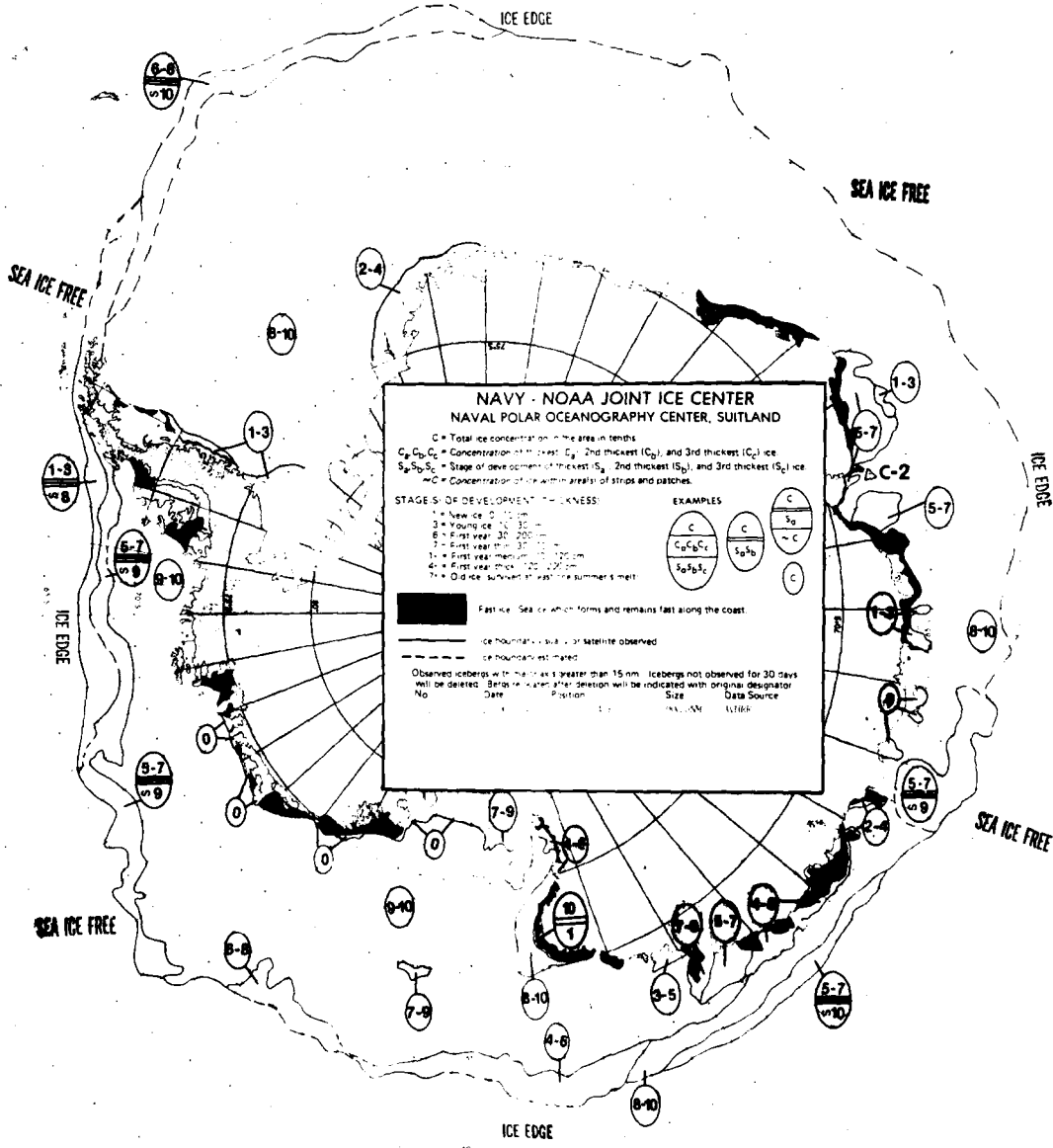
SEA ICE FREE



**NORTHERN ICE LIMIT**

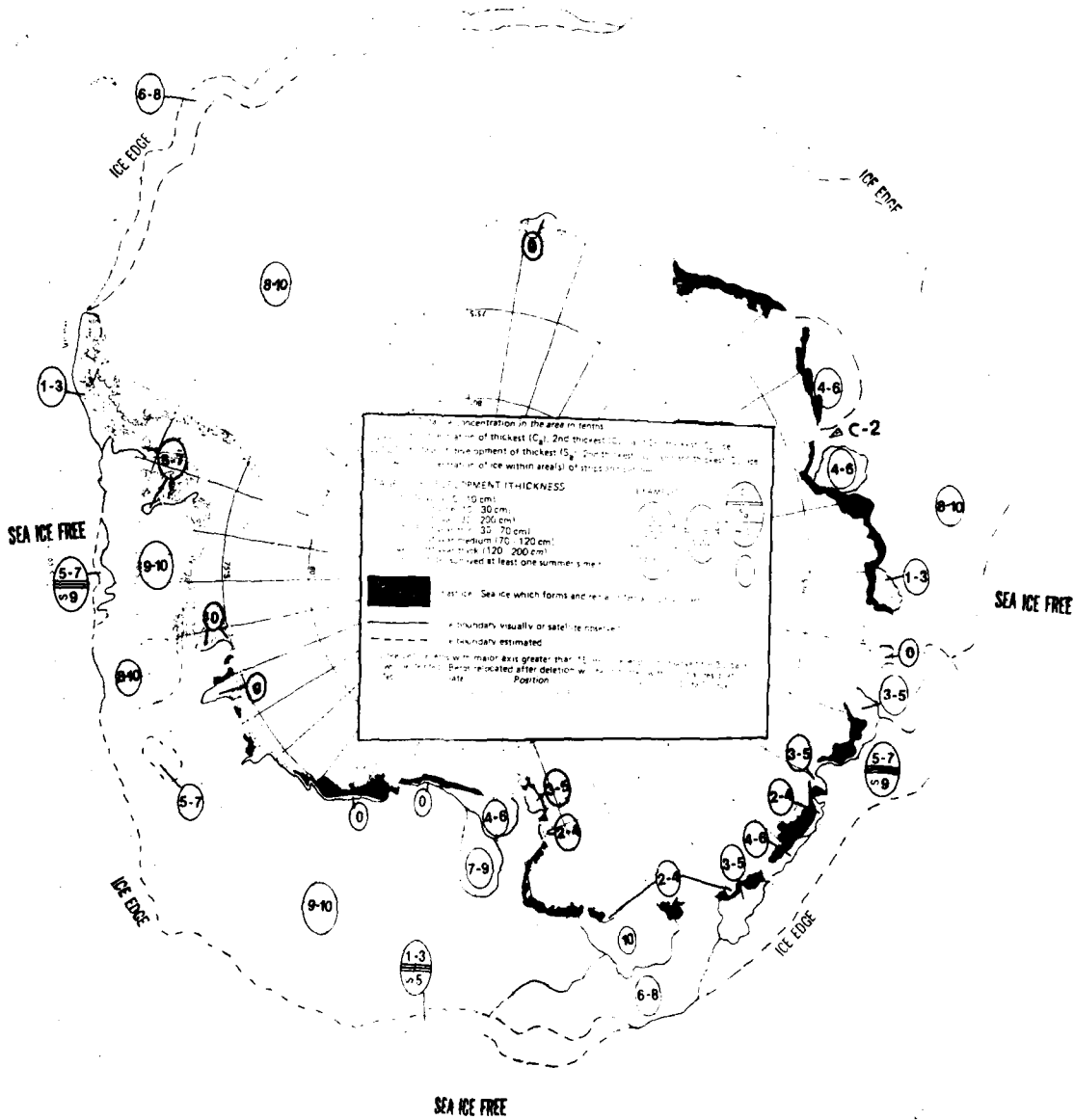
Date: 08 NOV 84

NAVY—NOAA JOINT ICE CENTER  
NAVAL POLAR OCEANOGRAPHY CENTER, SVALBARD

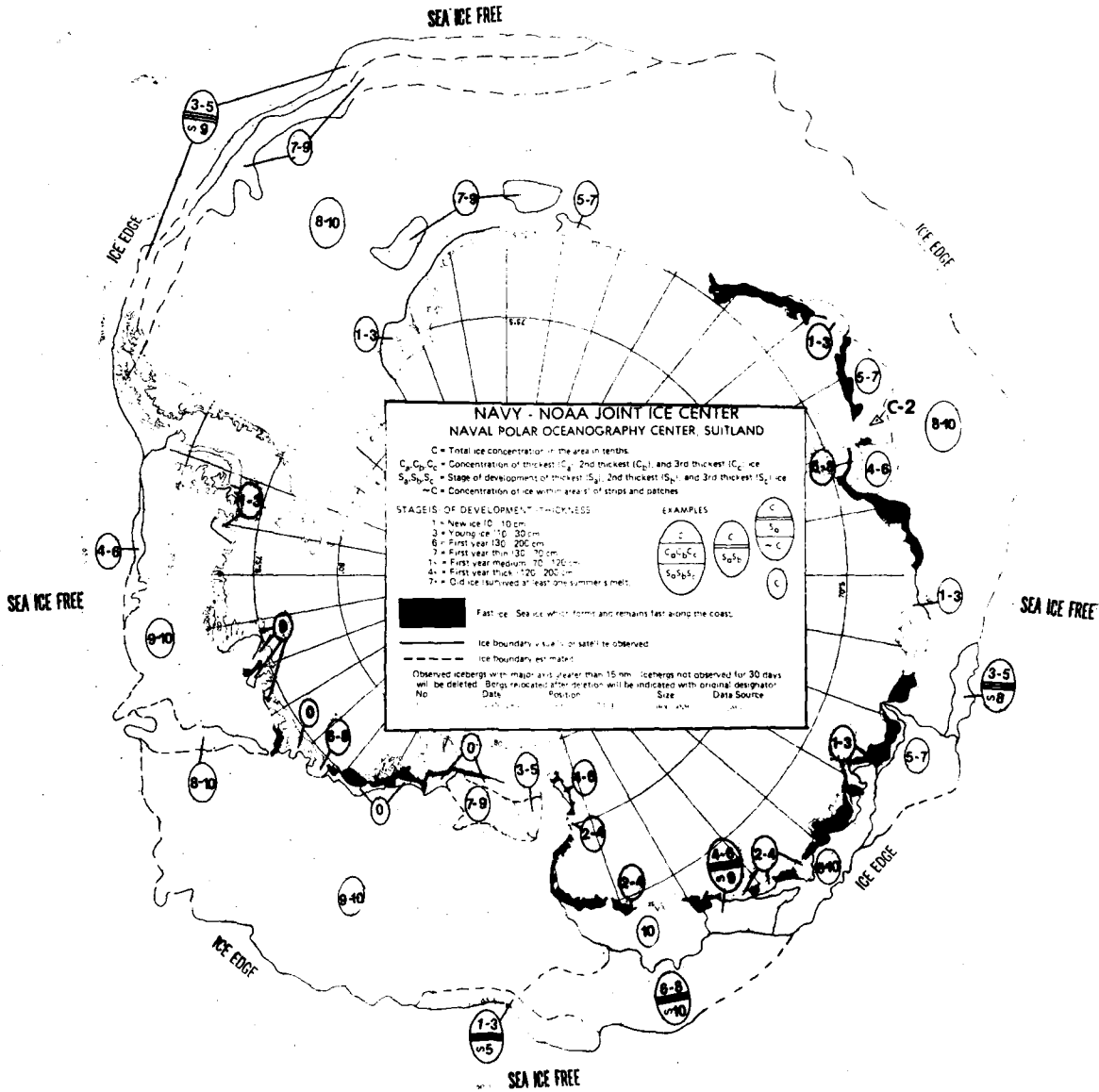


**NORTHERN ICE LIMIT**  
**Date: 15 NOV 84**  
**NAVY—NOAA JOINT ICE CENTER**  
**NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND**

SEA ICE FREE



**NORTHERN ICE LIMIT**  
**Date: 22 NOV 84**  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



**NORTHERN ICE LIMIT**  
**Date: 29 NOV 84**

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NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND

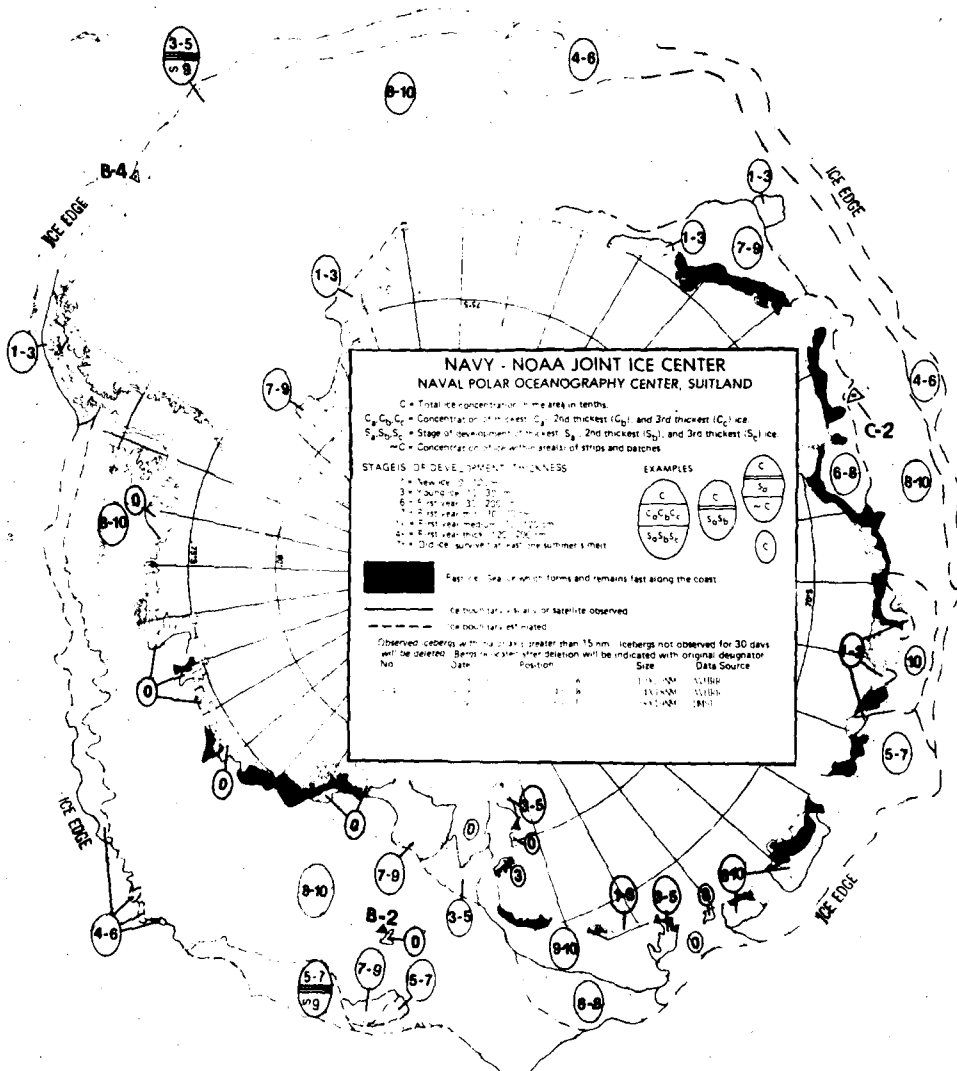


SEA ICE FREE

SEA ICE FREE

SEA ICE FREE

SEA ICE FREE



**NAVY - NOAA JOINT ICE CENTER**  
**NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND**

C = Total ice concentration in the area in tenths  
 C<sub>1</sub>, C<sub>2</sub>, C<sub>3</sub> = Concentration of 1st, 2nd, and 3rd thickest (C<sub>1</sub>) and 3rd thickest (C<sub>3</sub>) ice  
 S<sub>1</sub>, S<sub>2</sub>, S<sub>3</sub> = Stage of development of 1st, 2nd, and 3rd thickest (S<sub>1</sub>) and 3rd thickest (S<sub>3</sub>) ice  
 -C = Concentration of ice within strips and patches

**STAGES OF DEVELOPMENT THICKNESS**

- 1 = New ice 0 - 10 cm
- 2 = Young ice 10 - 30 cm
- 3 = First year ice 30 - 200 cm
- 4 = Second year ice 200 - 1000 cm
- 5 = First year ice 1000 - 2000 cm
- 6 = Second year ice 2000 - 3000 cm
- 7 = Third year ice 3000 - 4000 cm
- 8 = Old ice 4000 - 5000 cm
- 9 = Old ice 5000 - 6000 cm
- 10 = Old ice 6000 - 7000 cm

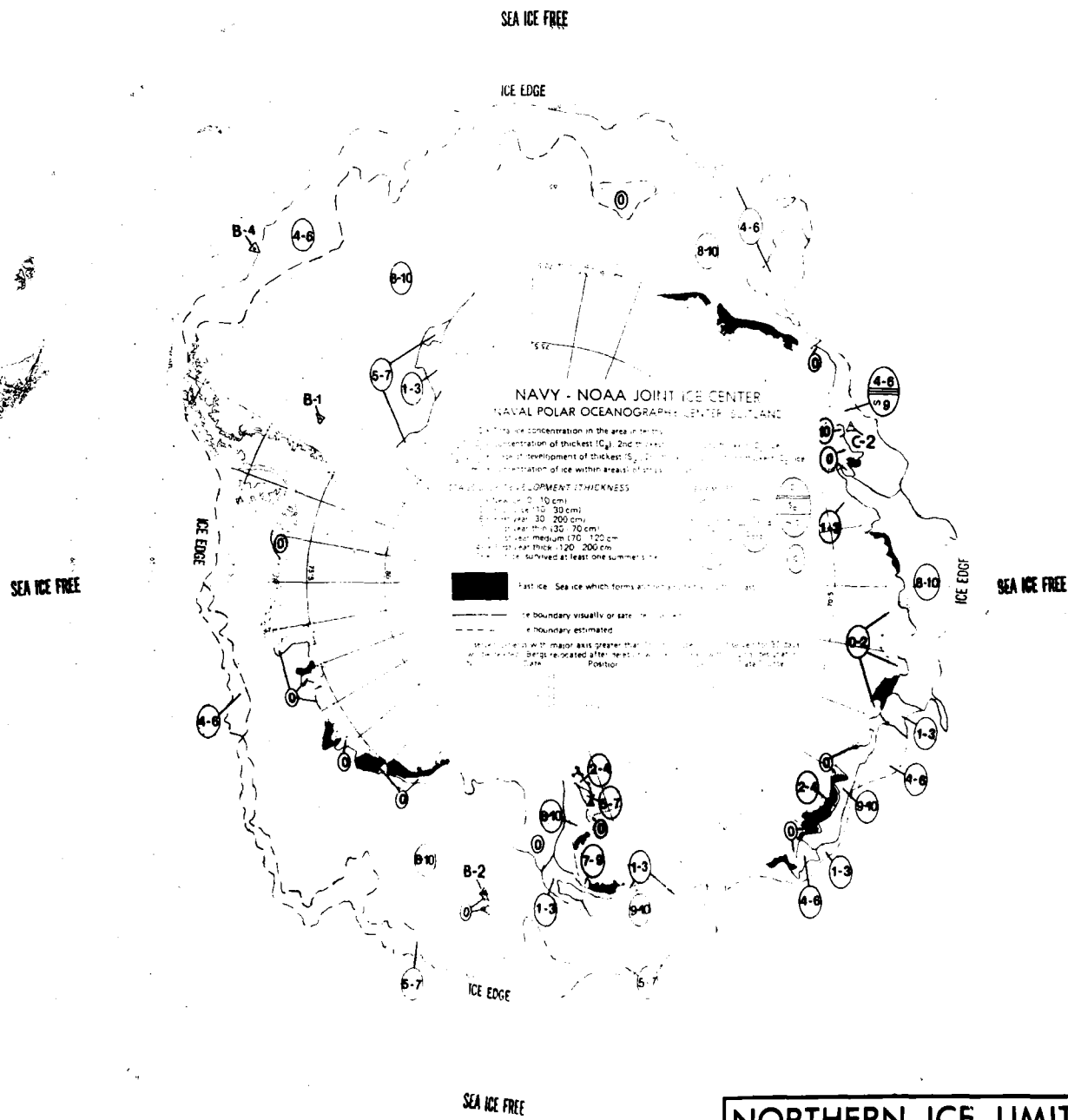
**EXAMPLES**

$\frac{C}{S_1}$	$\frac{C}{S_2}$	$\frac{C}{S_3}$
$\frac{C_1 C_2 C_3}{S_1 S_2 S_3}$	$\frac{C}{S_1 S_2}$	$\frac{C}{S_1 S_3}$
$\frac{C}{S_1 S_2 S_3}$	$\frac{C}{S_1 S_2}$	$\frac{C}{S_1 S_3}$

Fast ice: Sea ice which forms and remains fast along the coast  
 Ice thickness: actual or satellite observed  
 Ice boundary: estimated  
 Observed icebergs with height less than 15 m. Icebergs not observed for 30 days will be deleted. Berms and other features will be indicated with original designator.

No.	Date	Position	Size	Data Source
1	12/13/84	71°N 150°W	1000	11150
2	12/13/84	71°N 150°W	1000	11150
3	12/13/84	71°N 150°W	1000	11150

**NORTHERN ICE LIMIT**  
 Date: 13 DEC 84  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



**NORTHERN ICE LIMIT**  
**Date:** 20 DEC 84  
 NAVY—NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND



TABLE I SATELLITE DATA UTILIZED DURING 1983 AND 1984

Time Period		Satellite Remote Sensing			Resolution	Coverage
From	To	Sensor Platform	Sensor Type	Spectral Region		
1-83 6-84	3-83 12-84	NOAA-6	AVHRR HRPT/LAC	0.58-0.68 um 0.73-1.10 um 10.5-11.5 um	1 km	Regional
			VIS NIR IR			
			GAC VIS IR	0.58-0.68 um 10.5-11.5 um	4 km	Global
1-83	12-84	NOAA-7	AVHRR HRPT/LAC	0.58-0.68 um 0.73-1.10 um 10.5-11.3 um	1 km	Regional
			VIS NIR IR			
			GAC VIS IR	0.58-0.68 um 10.3-11.3 um	4 km	Global
3-83	6-84	NOAA-8	AVHRR HRPT/LAC	0.58-0.68 um 0.725-1.10 um 10.5-11.5 um	1 km	Regional
			VIS NIR IR			
			GAC VIS IR	0.58-0.68 um 10.5-11.5 um	4 km	Global
1-83	12-84	NIMBUS-7	SMR	0.81 cm 1.66 cm	50 km	Global
1-83	2-83	DMSP-F(3)	VIS IR	0.4-1.1 um 8.0-13.0 um	3.7 km 4.4 km	Global
1-83	12-84	DMSP-F(6)	VIS IR	0.4-1.1 um 10.2-12.8 um	3.7 km 4.4 km	Global
11-83	12-84	DMSP-F(7)	VIS IR	0.4-1.1 um 10.2-12.8 um	3.7 km 4.4 km	Global

Abbreviations and Acronyms

AVHRR - Advanced Very High Resolution Radiometer  
 cm - Centimeter  
 GAC - Global Area Coverage  
 HRPT - High Resolution Picture Transmission  
 IR - Infrared  
 km - Kilometer  
 LAC - Local Area Coverage  
 NIR - Near Infrared  
 SMR - Scanning Multifrequency Microwave Radiometer  
 VIS - Visible  
 um - Micrometer

END

DATE

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12-85

DTIC