

EASTERN—WESTERN  
ARCTIC SEA ICE ANALYSIS

1988

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JAN 16 1991  
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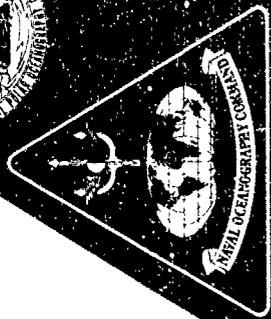
PREPARED BY  
NAVAL POLAR OCEANOGRAPHY CENTER  
SUITLAND, MD

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AD-A231 333

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## FOREWORD

The U.S. Navy has a long and eventful history of polar exploration from Robert E. Peary in the Arctic to Richard E. Byrd in the Antarctic. In recent years the strategic importance and expanded research pursuits in these areas have resulted in greater national and international requirements for environmental information. Since 1976, the National Oceanic and Atmospheric Administration (NOAA) and the Navy have worked together at the Joint Ice Center (JIC) in Suitland, Maryland. By combining the Navy's experience in observing and recording sea ice data, and NOAA's expertise in satellite data collection and interpretation, the JIC has been able to keep pace with that demand in both polar regions.

This publication is the 15th edition of the Arctic sea ice atlases prepared by the JIC. The atlas contains weekly charts depicting Northern Hemisphere and Great Lakes ice conditions and extent. The significant use of high resolution satellite imagery, combined with valuable ice reconnaissance data from various sources, has greatly improved the accuracy of these analyses.

The purpose of this atlas is to provide the user with reliable weekly hemispheric ice analyses. Both Navy and NOAA personnel with considerable experience in sea ice analysis prepare the analyses. The following procedures have been developed to ensure the quality of the final products:

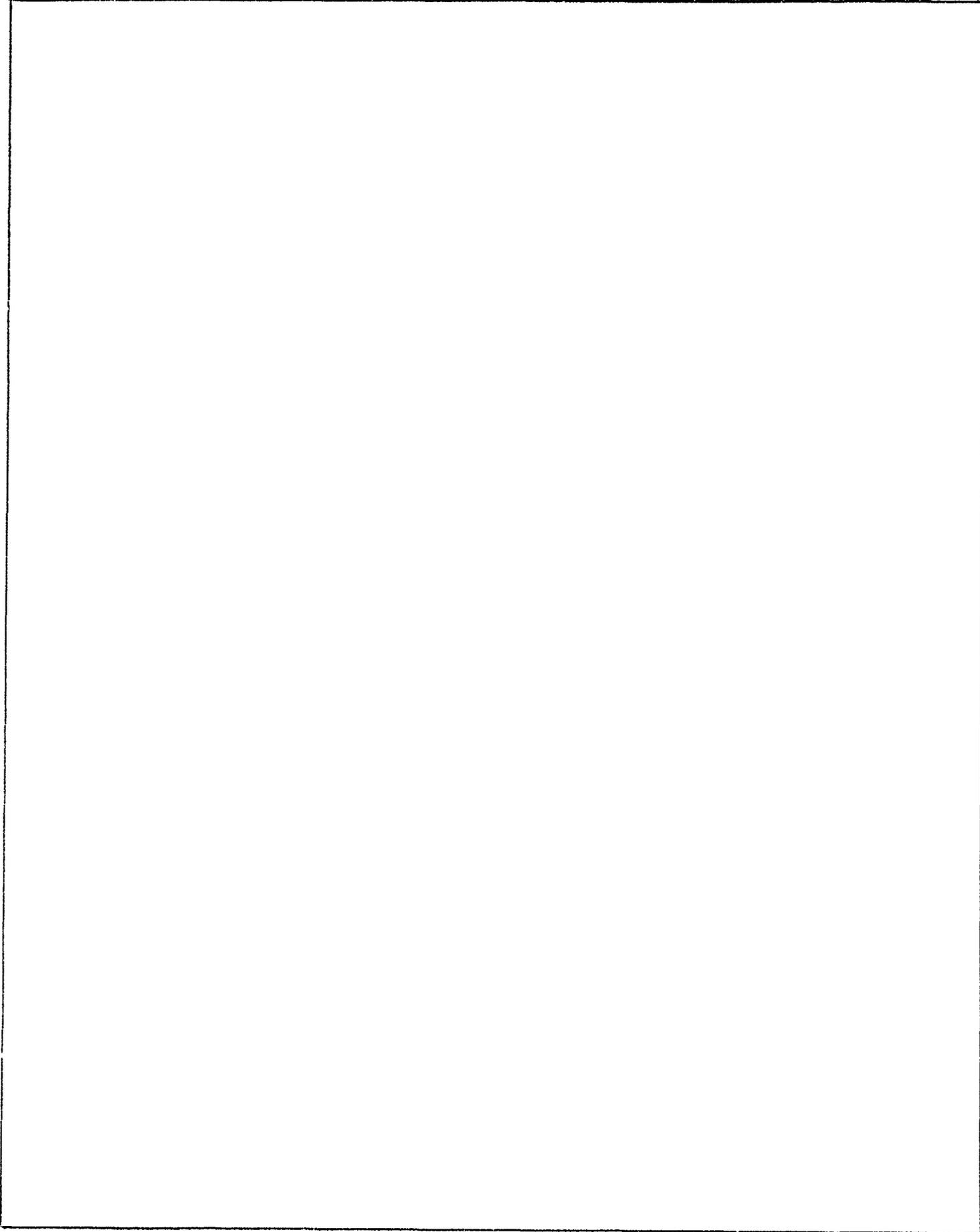
- a. Conventional shore station, ship and aerial ice reconnaissance observations are plotted and evaluated.
- b. Satellite data from different sensors is compared and analyzed for ice information content. Table I, located on the inside back cover, summarizes satellite data availability for 1988.
- c. A final product results from a. and b. However, where insufficient data is available, an estimated boundary will be depicted. Meteorological data and computer generated ice drift vectors are utilized to determine the estimated ice edge position.

Navy/NOAA Joint Ice Center  
Naval Polar Oceanography Center  
4301 Suitland Road  
Washington, DC 20395-5180

## REPORT DOCUMENTATION PAGE

1a REPORT SECURITY CLASSIFICATION <b>UNCLASSIFIED</b>		1b RESTRICTIVE MARKINGS	
2a SECURITY CLASSIFICATION AUTHORITY		3 DISTRIBUTION/AVAILABILITY OF REPORT Public Release/Distribution Unlimited	
2b DECLASSIFICATION/DOWNGRADING SCHEDULE			
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12 PERSONAL AUTHOR(S)			
13a TYPE OF REPORT Final	13b TIME COVERED FROM _____ TO _____	14 DATE OF REPORT (Year, Month, Day) 1988	15 PAGE COUNT
16 SUPPLEMENTARY NOTATION			
17 COSATI CODES			18 SUBJECT TERMS (Continue on reverse if necessary and identify by block number) Sea ice, polar ice fields, satellite imagery, concentration stage of development, fast ice, concentration of thickness, theoretical thickness, Arctic
FIELD	GROUP	SUB-GROUP	
19 ABSTRACT (Continue on reverse if necessary and identify by block number) These are approximately 7-day analyses of sea ice prepared by the Naval Polar Oceanography Center, Suitland, MD. Included are ice concentrations, and thickness of ice thickness (age) and age determination.			
20. DISTRIBUTION/AVAILABILITY OF ABSTRACT <input type="checkbox"/> UNCLASSIFIED/UNLIMITED <input checked="" type="checkbox"/> SAME AS RPT <input type="checkbox"/> DTIC USERS		21 ABSTRACT SECURITY CLASSIFICATION Unclassified	
22a NAME OF RESPONSIBLE INDIVIDUAL Brian L. Wallace		22b TELEPHONE (Include Area Code) (704) 252-7865	22c OFFICE SYMBOL

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# INSTRUCTIONS FOR PREPARATION OF REPORT DOCUMENTATION PAGE

## GENERAL INFORMATION

The accuracy and completeness of all information provided in the DD Form 1473, especially classification and distribution limitation markings, are the responsibility of the authoring or monitoring DoD activity.

Because the data input on this form will be what others will retrieve from DTIC's bibliographic data base or may determine how the document can be accessed by future users, care should be taken to have the form completed by knowledgeable personnel. For better communication and to facilitate more complete and accurate input from the originators of the form to those processing the data, space has been provided in Block 22 for the name, telephone number, and office symbol of the DoD person responsible for the input cited on the form.

All information on the DD Form 1473 should be typed.

Only information appearing on or in the report, or applying specifically to the report in hand, should be reported. If there is any doubt, the block should be left blank.

Some of the information on the forms (e.g., title, abstract) will be machine indexed. The terminology used should describe the content of the report or identify it as precisely as possible for future identification and retrieval.

**NOTE:** Unclassified abstracts and titles describing classified documents may appear separately from the documents in an unclassified context, e.g., in DTIC announcement bulletins and bibliographies. This must be considered in the preparation and marking of unclassified abstracts and titles.

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## SPECIFIC BLOCKS

**Block 1a** Report Security Classification: Designate the highest security classification of the report. (See DoD 5220.1-R, Chapters I, IV, VII, XI, Appendix A.)

**Block 1b** Restricted Marking: Enter the restricted marking or warning notice of the report (e.g., CNWDI, RD, NATO).

**Block 2a** Security Classification Authority: Enter the commonly used markings in accordance with DoD 5200.1-R, Chapter IV, Section 4, paragraph 4-400 and 4-402. Indicate classification authority.

**Block 2b** Declassification / Downgrading Schedule: Indicate specific date or event for declassification or the notation, "Originating Agency Determination Required" or "OADR." Also insert (when applicable) downgrade to \_\_\_\_\_ on \_\_\_\_\_ (e.g., Downgrade to Confidential on 6 July 1983). (See also DoD 5220.22-M, Industrial Security Manual for Safeguarding Classified Information, Appendix II.)

**NOTE:** Entry must be made in Blocks 2a and 2b except when the original report is unclassified and has never been upgraded.

**Block 3** Distribution/Availability Statement of Report: Insert the statement as it appears on the report. If a limited distribution statement is used, the reason must be one of those given by DoD Directive 5200.20, Distribution Statements on Technical Documents, as supplemented by the 18 OCT 1983 SECDEF Memo, "Control of Unclassified Technology with Military Application." The Distribution Statement should provide for the broadest distribution possible within limits of security and controlling office limitations.

**Block 4.** Performing Organization Report Number(s): Enter the unique alphanumeric report number(s) assigned by the organization originating or generating the report from its research and whose name appears in Block 6. These numbers should be in accordance with ANSI STD 239 23-74, "American National Standard Technical Report Number." If the Performing Organization is also the Monitoring Agency, enter the report number in Block 4.

**Block 5** Monitoring Organization Report Number(s): Enter the unique alphanumeric report number(s) assigned by the Monitoring Agency. This should be a number assigned by a DoD or other government agency and should be in accordance with ANSI STD 239 23-74. If the Monitoring Agency is the same as the Performing Organization, enter the report number in Block 4 and leave Block 5 blank.

**Block 6a** Name of Performing Organization: For in-house reports, enter the name of the performing activity. For reports prepared under contract or grant, enter the contractor or the grantee who generated the report and identify the appropriate corporate division, school, laboratory, etc., of the author.

**Block 6b** Office Symbol: Enter the office symbol of the Performing Organization.

**Block 6c** Address: Enter the address of the Performing Organization. List city, state, and ZIP code.

**Block 7a** Name of Monitoring Organization: This is the agency responsible for administering or monitoring a project, contract, or grant. If the monitor is also the Performing Organization, leave Block 7a blank. In the case of joint sponsorship, the Monitoring Organization is determined by advance agreement. It can be either an office, a group, or a committee representing more than one activity, service, or agency.

**Block 7b** Address: Enter the address of the Monitoring Organization. Include city, state, and ZIP code.

**Block 8a** Name of Funding/Sponsoring Organization: Enter the full official name of the organization under whose immediate funding the document was generated, whether the work was done in-house or by contract. If the Monitoring Organization is the same as the Funding Organization, leave 8a blank.

**Block 8b** Office Symbol: Enter the office symbol of the Funding/Sponsoring Organization.

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**Block 9.** Procurement Instrument Identification Number: For a contractor grantee report, enter the complete contract or grant number(s) under which the work was accomplished. Leave this block blank for in-house reports.

**Block 10.** Source of Funding (Program Element, Project, Task Area, and Work Unit Number(s)): These four data elements relate to the DoD budget structure and provide program and/or administrative identification of the source of support for the work being carried on. Enter the program element, project, task area, work unit accession number, or their equivalents which identify the principal source of funding for the work required. These codes may be obtained from the applicable DoD forms such as the DD Form 1498 (Research and Technology Work Unit Summary) or from the fund citation of the funding instrument. If this information is not available to the authoring activity, these blocks should be filled in by the responsible DoD Official designated in Block 22. If the report is funded from multiple sources, identify only the Program Element and the Project, Task Area, and Work Unit Numbers of the principal contributor

**Block 11.** Title: Enter the title in Block 11 in initial capital letters exactly as it appears on the report. Titles on all classified reports, whether classified or unclassified, must be immediately followed by the security classification of the title enclosed in parentheses. A report with a classified title should be provided with an unclassified version if it is possible to do so without changing the meaning or obscuring the contents of the report. Use specific, meaningful words that describe the content of the report so that when the title is machine-indexed, the words will contribute useful retrieval terms.

If the report is in a foreign language and the title is given in both English and a foreign language, list the foreign language title first, followed by the English title enclosed in parentheses. If part of the text is in English, list the English title first followed by the foreign language title enclosed in parentheses. If the title is given in more than one foreign language, use a title that reflects the language of the text. If both the text and titles are in a foreign language, the title should be translated, if possible, unless the title is also the name of a foreign periodical. Transliterations of often used foreign alphabets (see Appendix A of MIL-STD-847B) are available from DTIC in document AD-A080 800.

**Block 12.** Personal Author(s): Give the complete name(s) of the author(s) in this order: last name, first name, and middle name. In addition, list the affiliation of the authors if it differs from that of the performing organization

List all authors. If the document is a compilation of papers, it may be more useful to list the authors with the titles of their papers as a contents note in the abstract in Block 19. If appropriate, the names of editors and compilers may be entered in this block

**Block 13a.** Type of Report: Indicate whether the report is summary, final, annual, progress, interim, etc.

**Block 13b.** Time Covered: Enter the inclusive dates (year, month, day) of the period covered, such as the life of a contract in a final contractor report.

**Block 14** Date of Report: Enter the year, month, and day, or the year and the month the report was issued as shown on the cover

**Block 15.** Page Count: Enter the total number of pages in the report that contain information, including cover, preface, table of contents, distribution lists, partial pages, etc. A chart in the body of the report is counted even if it is unnumbered

**Block 16.** Supplementary Notation: Enter useful information about the report in hand, such as: "Prepared in cooperation with...", "Translation at (or by)...," "Symposium...", "If there are report numbers for the report which are not noted elsewhere on the form (such as: internal series numbers or participating organization report numbers) enter in this block.

**Block 17.** COSATI Codes: This block provides the subject coverage of the report for announcement and distribution purposes. The categories are to be taken from the "COSATI Subject Category List" (DoD Modified), Oct 65, AD-624 000. A copy is available on request to any organization generating reports for DoD. At least one entry is required as follows:

**Field** - to indicate subject coverage of report.

**Group** - to indicate greater subject specificity of information in the report.

**Sub-Group** - if specificity greater than that shown by Group is required, use further designation as the numbers after the period (.) in the Group breakdown. Use only the designation provided by AD-624 000.

**Example:** The subject "Solid Rocket Motors" is Field 21, Group 08, Subgroup 2 (page 32, AD-624 000).

**Block 18.** Subject Terms: These may be descriptors, keywords, posting terms, identifiers, open-ended terms, subject headings, acronyms, code words, or any words or phrases that identify the principal subjects covered in the report, and that conform to standard terminology and are exact enough to be used as subject index entries. Certain acronyms or "buzz words" may be used if they are recognized by specialists in the field and have a potential for becoming accepted terms. "Laser" and "Reverse Osmosis" were once such terms.

If possible, this set of terms should be selected so that the terms individually and as a group will remain UNCLASSIFIED without losing meaning. However, priority must be given to specifying proper subject terms rather than making the set of terms appear "UNCLASSIFIED." Each term on classified reports must be immediately followed by its security classification, enclosed in parentheses

For reference on standard terminology the "DTIC Retrieval and Indexing Terminology" DRIT-1979, AD-A068 500, and the DoD "Thesaurus of Engineering and Scientific Terms (TEST) 1968, AD-672 000, may be useful

**Block 19.** Abstract: The abstract should be a pithy, brief (preferably not to exceed 300 words), factual summary of the most significant information contained in the report. However, since the abstract may be machine-searched, all specific and meaningful words and phrases which express the subject content of the report should be included, even if the word limit is exceeded

If possible, the abstract of a classified report should be unclassified and consist of publicly releasable information (Unlimited), but in no instance should the report content description be sacrificed for the security classification

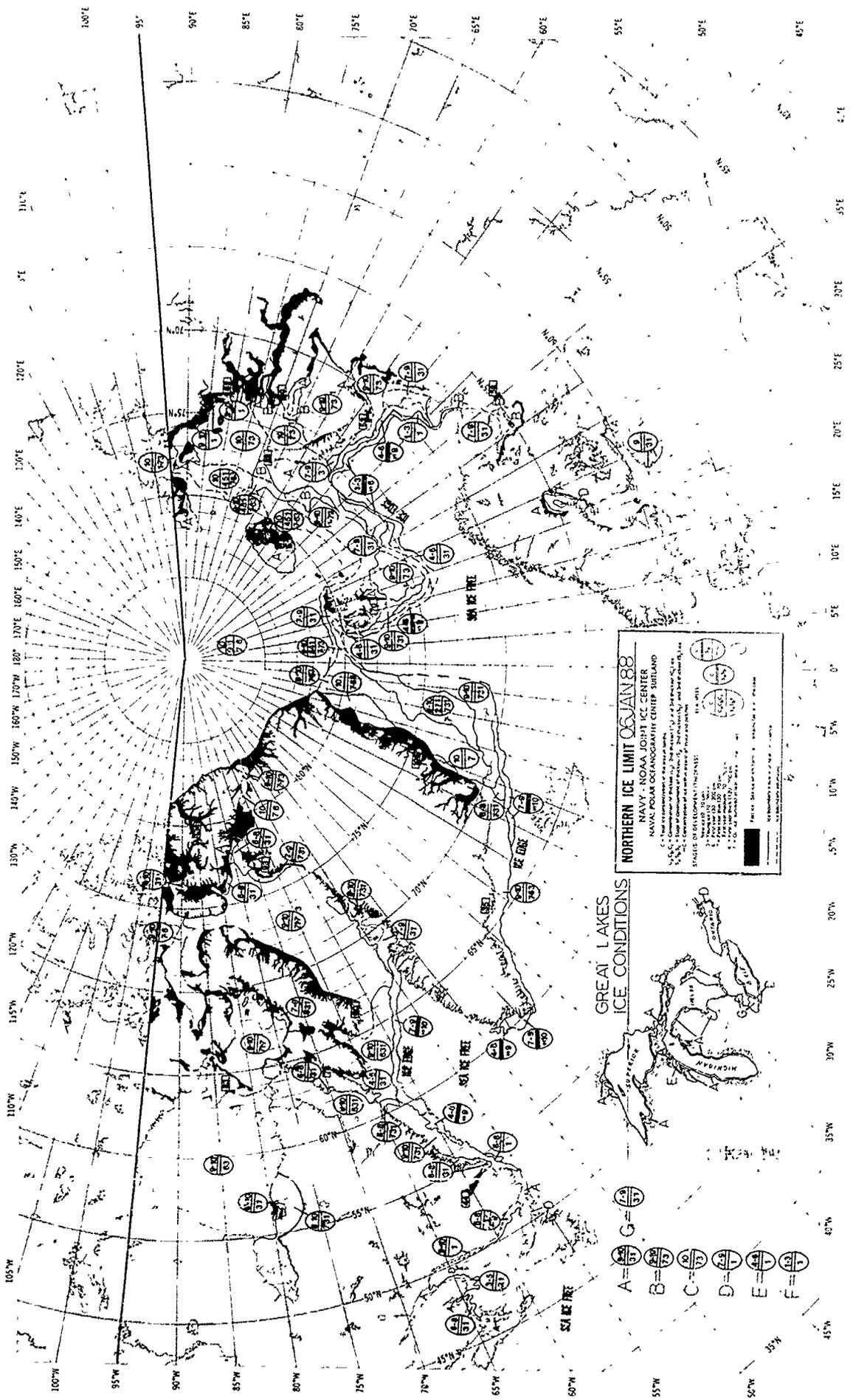
**NOTE:** An unclassified abstract describing a classified document may appear separately from the document in an unclassified context e.g., in DTIC announcement or bibliographic products. This must be considered in the preparation and marking of unclassified abstracts.

For further information on preparing abstracts, employing scientific symbols, verbalizing, etc., see paragraphs 2 1(n) and 2.3(b) in MIL-STD-847B

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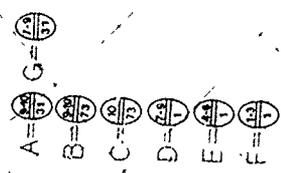
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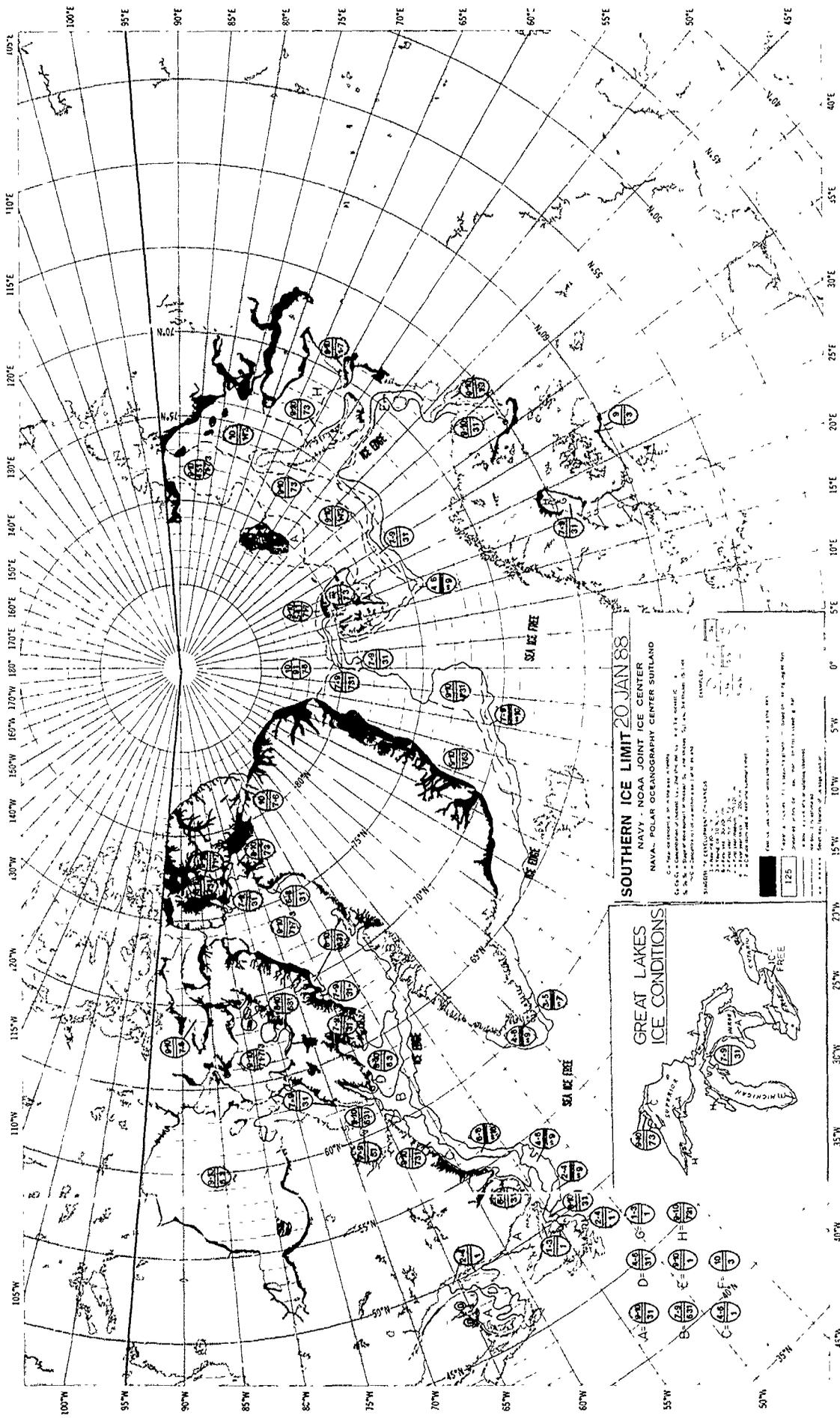
**NORTHERN ICE LIMIT 05 JAN 88**  
 NAVY - NORTH ICE CENTER  
 NAVAL POLAR OCEANOGRAPHIC CENTER - BURLINGAME, CA  
 C - Year of observation in the Great Lakes  
 N - U.S. Coast Guard or other source  
 S - U.S. Coast Guard or other source  
 T - U.S. Coast Guard or other source  
 U - U.S. Coast Guard or other source  
 V - U.S. Coast Guard or other source  
 W - U.S. Coast Guard or other source  
 X - U.S. Coast Guard or other source  
 Y - U.S. Coast Guard or other source  
 Z - U.S. Coast Guard or other source  
 0 - U.S. Coast Guard or other source  
 1 - U.S. Coast Guard or other source  
 2 - U.S. Coast Guard or other source  
 3 - U.S. Coast Guard or other source  
 4 - U.S. Coast Guard or other source  
 5 - U.S. Coast Guard or other source  
 6 - U.S. Coast Guard or other source  
 7 - U.S. Coast Guard or other source  
 8 - U.S. Coast Guard or other source  
 9 - U.S. Coast Guard or other source  
 10 - U.S. Coast Guard or other source

**GREAT LAKES  
 ICE CONDITIONS**



- A =
- B =
- C =
- D =
- E =
- F =





**SOUTHERN ICE LIMIT 20 JAN 88**

NAVA - NOAA JOINT ICE CENTER  
 NAVY - POLAR OCEANOGRAPHY CENTER SUITLAND

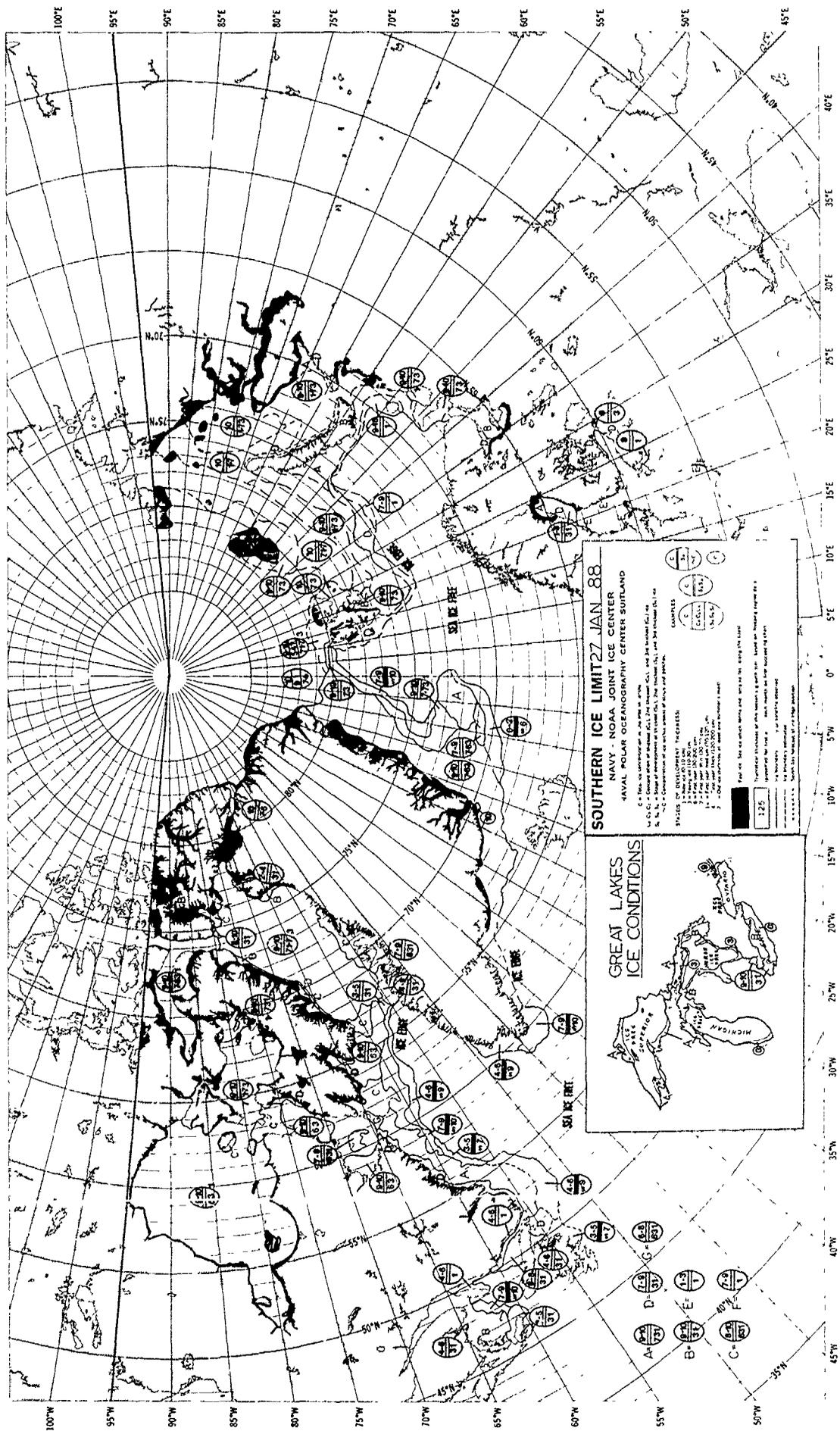
1. This chart is based on the latest available information from the following sources:  
 a. U.S. Navy - Polar Oceanography Center Suitland  
 b. U.S. Navy - Naval Oceanographic Office  
 c. U.S. Navy - Naval Hydrographic Office  
 d. U.S. Navy - Naval Facilities Engineering Command  
 e. U.S. Navy - Naval Air Station  
 f. U.S. Navy - Naval Air Station  
 g. U.S. Navy - Naval Air Station  
 h. U.S. Navy - Naval Air Station  
 i. U.S. Navy - Naval Air Station  
 j. U.S. Navy - Naval Air Station  
 k. U.S. Navy - Naval Air Station  
 l. U.S. Navy - Naval Air Station  
 m. U.S. Navy - Naval Air Station  
 n. U.S. Navy - Naval Air Station  
 o. U.S. Navy - Naval Air Station  
 p. U.S. Navy - Naval Air Station  
 q. U.S. Navy - Naval Air Station  
 r. U.S. Navy - Naval Air Station  
 s. U.S. Navy - Naval Air Station  
 t. U.S. Navy - Naval Air Station  
 u. U.S. Navy - Naval Air Station  
 v. U.S. Navy - Naval Air Station  
 w. U.S. Navy - Naval Air Station  
 x. U.S. Navy - Naval Air Station  
 y. U.S. Navy - Naval Air Station  
 z. U.S. Navy - Naval Air Station

**GREAT LAKES ICE CONDITIONS**

Legend for Great Lakes Ice Conditions:

- A =  $\frac{A}{1}$
- B =  $\frac{B}{2}$
- C =  $\frac{C}{3}$
- D =  $\frac{D}{4}$
- E =  $\frac{E}{5}$
- F =  $\frac{F}{6}$
- G =  $\frac{G}{7}$
- H =  $\frac{H}{8}$

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



**SOUTHERN ICE LIMIT 27 JAN 88**

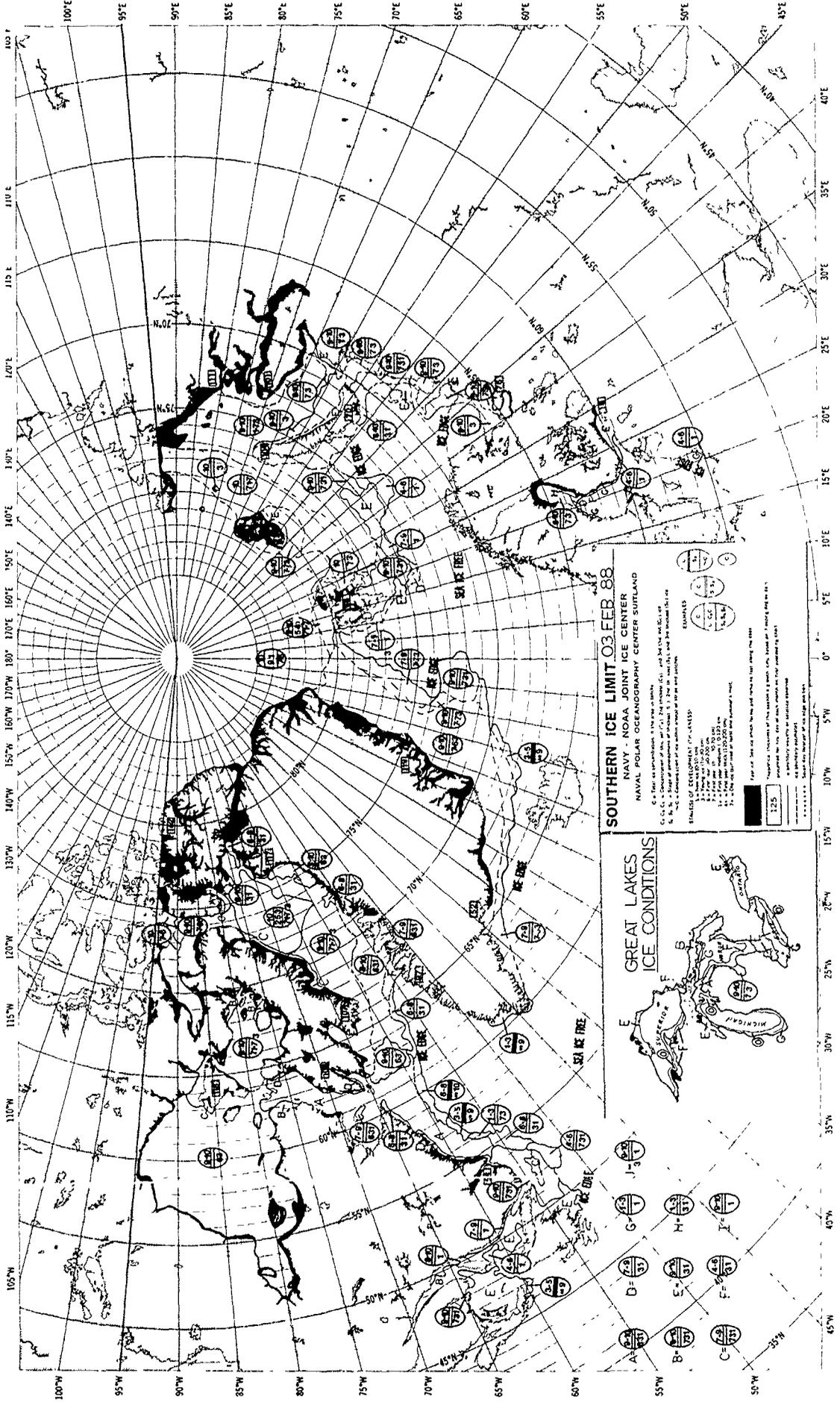
NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND

1. Data collected from 0100 to 0100 UTC  
 2. Data collected from 0100 to 0100 UTC  
 3. Data collected from 0100 to 0100 UTC  
 4. Data collected from 0100 to 0100 UTC  
 5. Data collected from 0100 to 0100 UTC  
 6. Data collected from 0100 to 0100 UTC  
 7. Data collected from 0100 to 0100 UTC  
 8. Data collected from 0100 to 0100 UTC  
 9. Data collected from 0100 to 0100 UTC  
 10. Data collected from 0100 to 0100 UTC

**GREAT LAKES ICE CONDITIONS**



Symbol	Meaning
(A) (1/2) (1/2)	Ice 1/2
(B) (1/2) (1/2)	Ice 2/2
(C) (1/2) (1/2)	Ice 3/2
(D) (1/2) (1/2)	Ice 4/2
(E) (1/2) (1/2)	Ice 5/2
(F) (1/2) (1/2)	Ice 6/2
(G) (1/2) (1/2)	Ice 7/2
(H) (1/2) (1/2)	Ice 8/2
(I) (1/2) (1/2)	Ice 9/2
(J) (1/2) (1/2)	Ice 10/2
(K) (1/2) (1/2)	Ice 11/2
(L) (1/2) (1/2)	Ice 12/2
(M) (1/2) (1/2)	Ice 13/2
(N) (1/2) (1/2)	Ice 14/2
(O) (1/2) (1/2)	Ice 15/2
(P) (1/2) (1/2)	Ice 16/2
(Q) (1/2) (1/2)	Ice 17/2
(R) (1/2) (1/2)	Ice 18/2
(S) (1/2) (1/2)	Ice 19/2
(T) (1/2) (1/2)	Ice 20/2
(U) (1/2) (1/2)	Ice 21/2
(V) (1/2) (1/2)	Ice 22/2
(W) (1/2) (1/2)	Ice 23/2
(X) (1/2) (1/2)	Ice 24/2
(Y) (1/2) (1/2)	Ice 25/2
(Z) (1/2) (1/2)	Ice 26/2
(AA) (1/2) (1/2)	Ice 27/2
(AB) (1/2) (1/2)	Ice 28/2
(AC) (1/2) (1/2)	Ice 29/2
(AD) (1/2) (1/2)	Ice 30/2
(AE) (1/2) (1/2)	Ice 31/2
(AF) (1/2) (1/2)	Ice 32/2
(AG) (1/2) (1/2)	Ice 33/2
(AH) (1/2) (1/2)	Ice 34/2
(AI) (1/2) (1/2)	Ice 35/2
(AJ) (1/2) (1/2)	Ice 36/2
(AK) (1/2) (1/2)	Ice 37/2
(AL) (1/2) (1/2)	Ice 38/2
(AM) (1/2) (1/2)	Ice 39/2
(AN) (1/2) (1/2)	Ice 40/2
(AO) (1/2) (1/2)	Ice 41/2
(AP) (1/2) (1/2)	Ice 42/2
(AQ) (1/2) (1/2)	Ice 43/2
(AR) (1/2) (1/2)	Ice 44/2
(AS) (1/2) (1/2)	Ice 45/2
(AT) (1/2) (1/2)	Ice 46/2
(AU) (1/2) (1/2)	Ice 47/2
(AV) (1/2) (1/2)	Ice 48/2
(AW) (1/2) (1/2)	Ice 49/2
(AX) (1/2) (1/2)	Ice 50/2
(AY) (1/2) (1/2)	Ice 51/2
(AZ) (1/2) (1/2)	Ice 52/2
(BA) (1/2) (1/2)	Ice 53/2
(BB) (1/2) (1/2)	Ice 54/2
(BC) (1/2) (1/2)	Ice 55/2
(BD) (1/2) (1/2)	Ice 56/2
(BE) (1/2) (1/2)	Ice 57/2
(BF) (1/2) (1/2)	Ice 58/2
(BG) (1/2) (1/2)	Ice 59/2
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(CP) (1/2) (1/2)	Ice 94/2
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(CT) (1/2) (1/2)	Ice 98/2
(CU) (1/2) (1/2)	Ice 99/2
(CV) (1/2) (1/2)	Ice 100/2



**SOUTHERN ICE LIMIT 03 FEB 88**

NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCCUPANCY CENTER SUTLAND

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- 99. 1/2 inch scale map.
- 100. 1/2 inch scale map.

EXAMPLES



SCALE OF DEVELOPMENT 1:100,000

1:100,000

1:100,000

1:100,000

**GREAT LAKES  
 ICE CONDITIONS**



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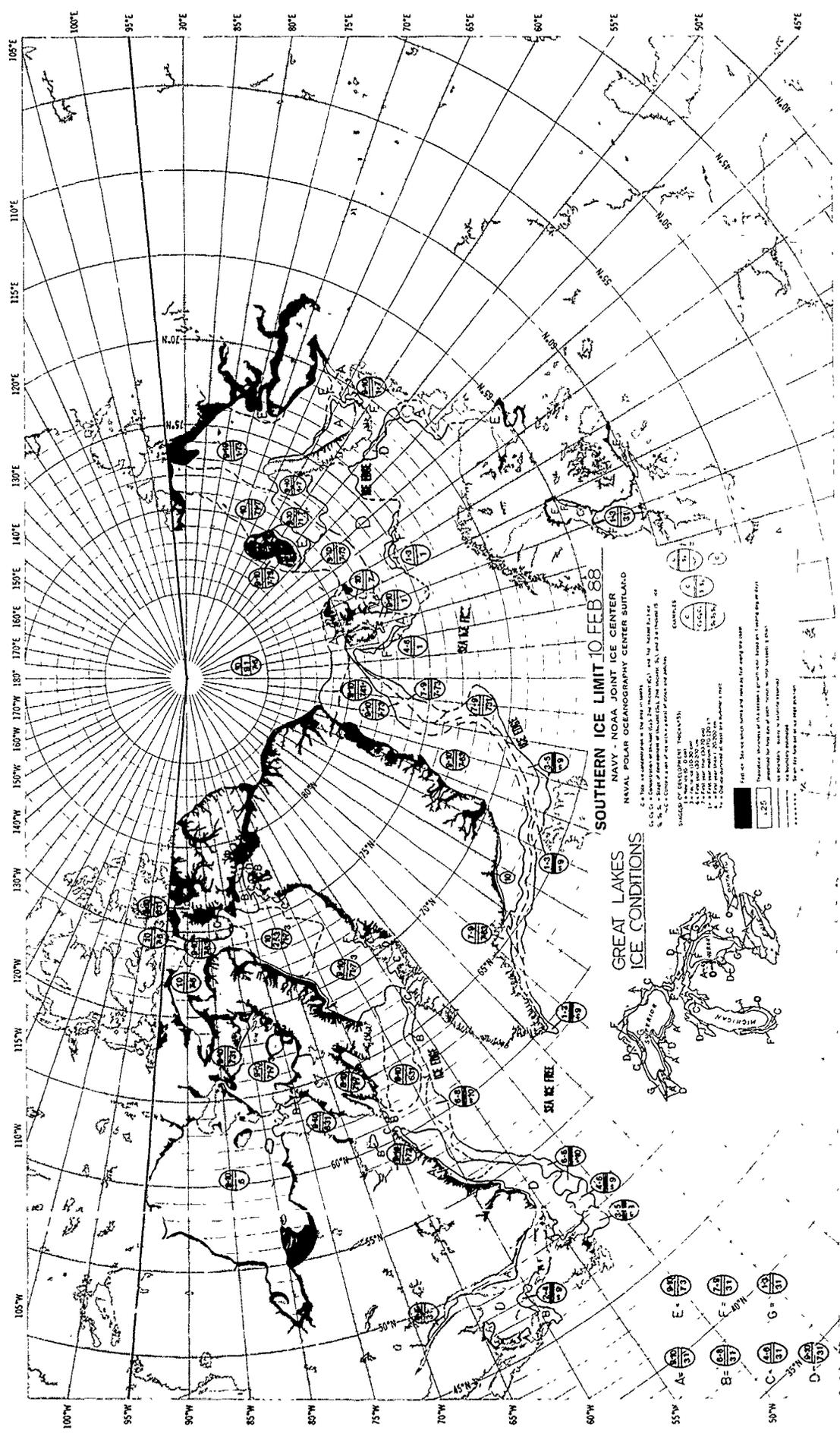
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AX

AY

AZ



**SOUTHERN ICE LIMIT 10 FEB 88**  
 NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUTLAD

**GREAT LAKES ICE CONDITIONS**

1. This chart shows the southern limit of ice in the Arctic region for the month of February 1988. The ice limit is based on the latest available data from the Navy and NOAA Joint Ice Center. The ice limit is shown as a thick black line. The area to the north of the ice limit is shaded. The area to the south of the ice limit is unshaded.

2. The ice limit is based on the latest available data from the Navy and NOAA Joint Ice Center. The ice limit is shown as a thick black line. The area to the north of the ice limit is shaded. The area to the south of the ice limit is unshaded.

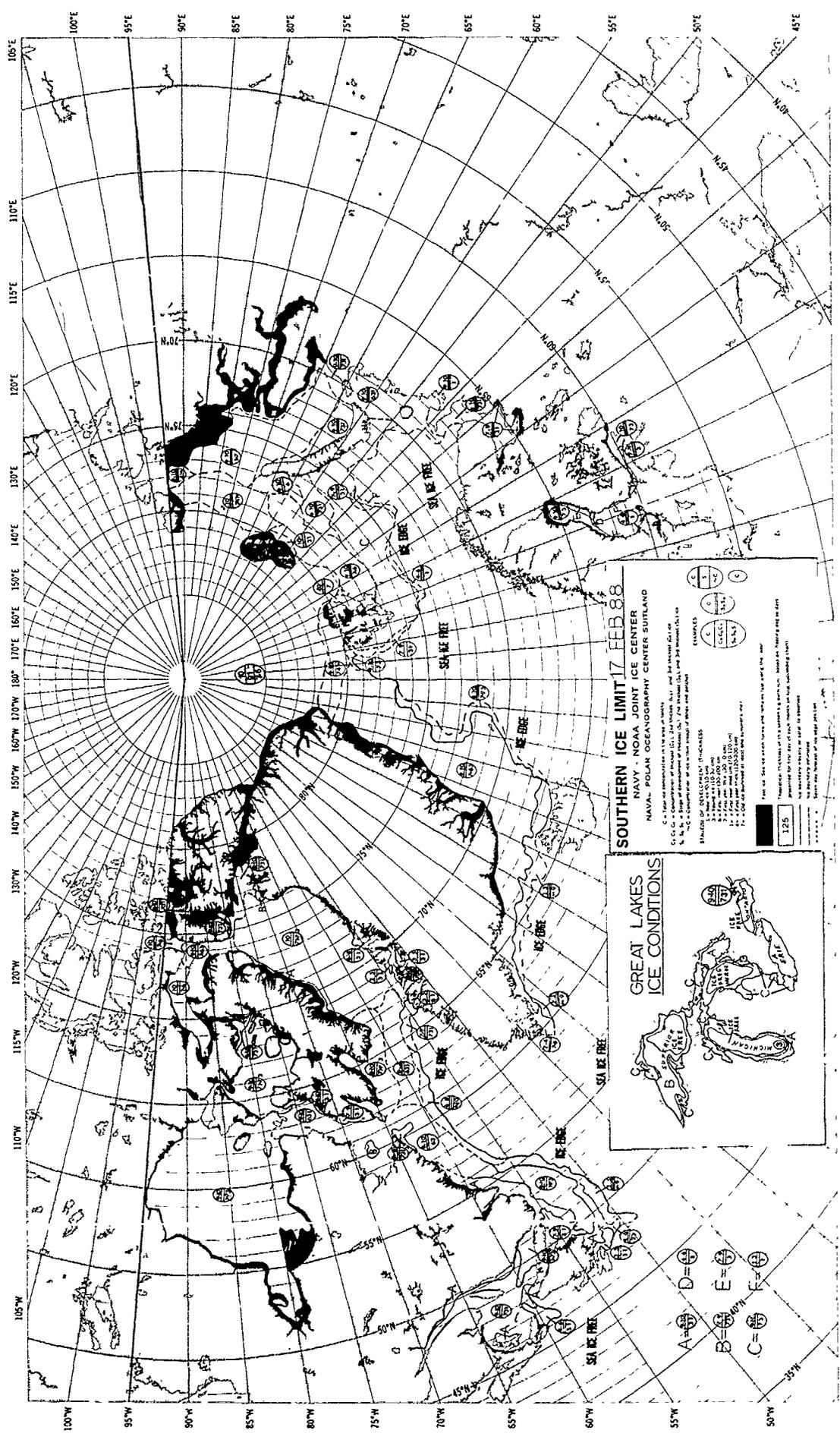
3. The ice limit is based on the latest available data from the Navy and NOAA Joint Ice Center. The ice limit is shown as a thick black line. The area to the north of the ice limit is shaded. The area to the south of the ice limit is unshaded.

4. The ice limit is based on the latest available data from the Navy and NOAA Joint Ice Center. The ice limit is shown as a thick black line. The area to the north of the ice limit is shaded. The area to the south of the ice limit is unshaded.

5. The ice limit is based on the latest available data from the Navy and NOAA Joint Ice Center. The ice limit is shown as a thick black line. The area to the north of the ice limit is shaded. The area to the south of the ice limit is unshaded.



- SYMBOLS:**
- 1. Ice thickness in feet
  - 2. Ice strength in pounds per square foot
  - 3. Ice temperature in degrees Fahrenheit
  - 4. Ice age in years
  - 5. Ice type
- LETTERS:**
- A - Ice thickness 1-2 feet
  - B - Ice thickness 3-4 feet
  - C - Ice thickness 5-6 feet
  - D - Ice thickness 7-8 feet
  - E - Ice thickness 9-10 feet
  - G - Ice thickness 11-12 feet



**SOUTHERN ICE LIMIT 17 FEB 88**

NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND

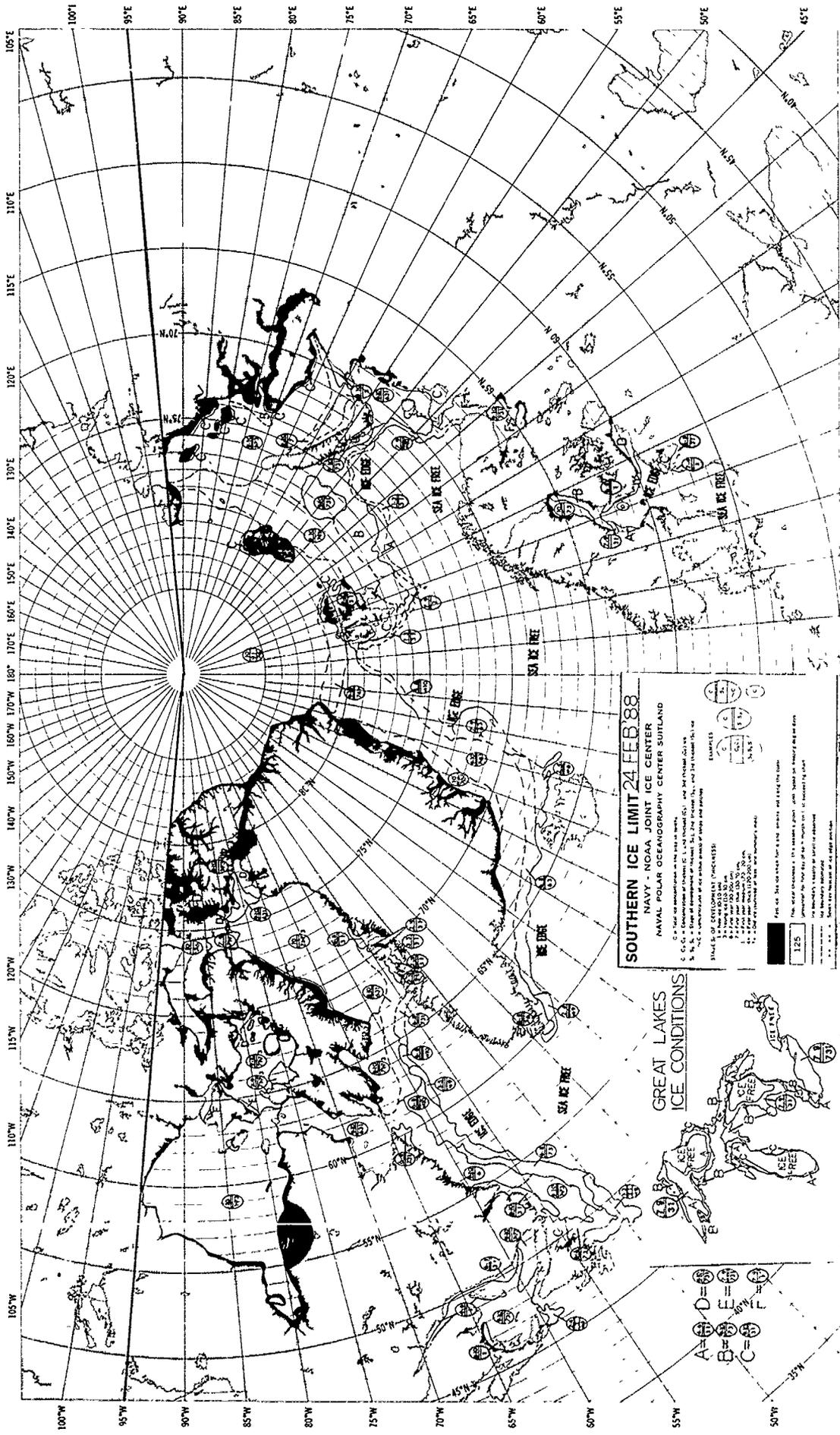
1. Ice type abbreviations in the map are: A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, AA, AB, AC, AD, AE, AF, AG, AH, AI, AJ, AK, AL, AM, AN, AO, AP, AQ, AR, AS, AT, AU, AV, AW, AX, AY, AZ, BA, BB, BC, BD, BE, BF, BG, BH, BI, BJ, BK, BL, BM, BN, BO, BP, BQ, BR, BS, BT, BU, BV, BW, BX, BY, BZ, CA, CB, CC, CD, CE, CF, CG, CH, CI, CJ, CK, CL, CM, CN, CO, CP, CQ, CR, CS, CT, CU, CV, CW, CX, CY, CZ, DA, DB, DC, DD, DE, DF, DG, DH, DI, DJ, DK, DL, DM, DN, DO, DP, DQ, DR, DS, DT, DU, DV, DW, DX, DY, DZ, EA, EB, EC, ED, EE, EF, EG, EH, EI, EJ, EK, EL, EM, EN, EO, EP, EQ, ER, ES, ET, EU, EV, EW, EX, EY, EZ, FA, FB, FC, FD, FE, FF, FG, FH, FI, FJ, FK, FL, FM, FN, FO, FP, FQ, FR, FS, FT, FU, FV, FW, FX, FY, FZ, GA, GB, GC, GD, GE, GF, GG, GH, GI, GJ, GK, GL, GM, GN, GO, GP, GQ, GR, GS, GT, GU, GV, GW, GX, GY, GZ, HA, HB, HC, HD, HE, HF, HG, HH, HI, HJ, HK, HL, HM, HN, HO, HP, HQ, HR, HS, HT, HU, HV, HW, HX, HY, HZ, IA, IB, IC, ID, IE, IF, IG, IH, II, IJ, IK, IL, IM, IN, IO, IP, IQ, IR, IS, IT, IU, IV, IW, IX, IY, IZ, JA, JB, JC, JD, JE, JF, JG, JH, JI, JJ, JK, JL, JM, JN, JO, JP, JQ, JR, JS, JT, JU, JV, JW, JX, JY, JZ, KA, KB, KC, KD, KE, KF, KG, KH, KI, KJ, KK, KL, KM, KN, KO, KP, KQ, KR, KS, KT, KU, KV, KW, KX, KY, KZ, LA, LB, LC, LD, LE, LF, LG, LH, LI, LJ, LK, LL, LM, LN, LO, LP, LQ, LR, LS, LT, LU, LV, LW, LX, LY, LZ, MA, MB, MC, MD, ME, MF, MG, MH, MI, MJ, MK, ML, MM, MN, MO, MP, MQ, MR, MS, MT, MU, MV, MW, MX, MY, MZ, NA, NB, NC, ND, NE, NF, NG, NH, NI, NJ, NK, NL, NM, NN, NO, NP, NQ, NR, NS, NT, NU, NV, NW, NX, NY, NZ, OA, OB, OC, OD, OE, OF, OG, OH, OI, OJ, OK, OL, OM, ON, OO, OP, OQ, OR, OS, OT, OU, OV, OW, OX, OY, OZ, PA, PB, PC, PD, PE, PF, PG, PH, PI, PJ, PK, PL, PM, PN, PO, PP, PQ, PR, PS, PT, PU, PV, PW, PX, PY, PZ, QA, QB, QC, QD, QE, QF, QG, QH, QI, QJ, QK, QL, QM, QN, QO, QP, QQ, QR, QS, QT, QU, QV, QW, QX, QY, QZ, RA, RB, RC, RD, RE, RF, RG, RH, RI, RJ, RK, RL, RM, RN, RO, RP, RQ, RR, RS, RT, RU, RV, RW, RX, RY, RZ, SA, SB, SC, SD, SE, SF, SG, SH, SI, SJ, SK, SL, SM, SN, SO, SP, SQ, SR, SS, ST, SU, SV, SW, SX, SY, SZ, TA, TB, TC, TD, TE, TF, TG, TH, TI, TJ, TK, TL, TM, TN, TO, TP, TQ, TR, TS, TT, TU, TV, TW, TX, TY, TZ, UA, UB, UC, UD, UE, UF, UG, UH, UI, UJ, UK, UL, UM, UN, UO, UP, UQ, UR, US, UT, UY, UZ, VA, VB, VC, VD, VE, VF, VG, VH, VI, VJ, VK, VL, VM, VN, VO, VP, VQ, VR, VS, VT, VU, VV, VW, VX, VY, VZ, WA, WB, WC, WD, WE, WF, WG, WH, WI, WJ, WK, WL, WM, WN, WO, WP, WQ, WR, WS, WT, WU, WV, WW, WX, WY, WZ, XA, XB, XC, XD, XE, XF, XG, XH, XI, XJ, XK, XL, XM, XN, XO, XP, XQ, XR, XS, XT, XU, XV, XW, XX, XY, XZ, YA, YB, YC, YD, YE, YF, YG, YH, YI, YJ, YK, YL, YM, YN, YO, YP, YQ, YR, YS, YT, YU, YV, YW, YX, YY, YZ, ZA, ZB, ZC, ZD, ZE, ZF, ZG, ZH, ZI, ZJ, ZK, ZL, ZM, ZN, ZO, ZP, ZQ, ZR, ZS, ZT, ZU, ZV, ZW, ZX, ZY, ZZ.

**GREAT LAKES ICE CONDITIONS**



- A =
- B =
- C =
- D =
- E =
- F =

1. Ice type abbreviations in the map are: A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, AA, AB, AC, AD, AE, AF, AG, AH, AI, AJ, AK, AL, AM, AN, AO, AP, AQ, AR, AS, AT, AU, AV, AW, AX, AY, AZ, BA, BB, BC, BD, BE, BF, BG, BH, BI, BJ, BK, BL, BM, BN, BO, BP, BQ, BR, BS, BT, BU, BV, BW, BX, BY, BZ, CA, CB, CC, CD, CE, CF, CG, CH, CI, CJ, CK, CL, CM, CN, CO, CP, CQ, CR, CS, CT, CU, CV, CW, CX, CY, CZ, DA, DB, DC, DD, DE, DF, DG, DH, DI, DJ, DK, DL, DM, DN, DO, DP, DQ, DR, DS, DT, DU, DV, DW, DX, DY, DZ, EA, EB, EC, ED, EE, EF, EG, EH, EI, EJ, EK, EL, EM, EN, EO, EP, EQ, ER, ES, ET, EU, EV, EW, EX, EY, EZ, FA, FB, FC, FD, FE, FF, FG, FH, FI, FJ, FK, FL, FM, FN, FO, FP, FQ, FR, FS, FT, FU, FV, FW, FX, FY, FZ, GA, GB, GC, GD, GE, GF, GG, GH, GI, GJ, GK, GL, GM, GN, GO, GP, GQ, GR, GS, GT, GU, GV, GW, GX, GY, GZ, HA, HB, HC, HD, HE, HF, HG, HH, HI, HJ, HK, HL, HM, HN, HO, HP, HQ, HR, HS, HT, HU, HV, HW, HX, HY, HZ, IA, IB, IC, ID, IE, IF, IG, IH, II, IJ, IK, IL, IM, IN, IO, IP, IQ, IR, IS, IT, IU, IV, IW, IX, IY, IZ, JA, JB, JC, JD, JE, JF, JG, JH, JI, JJ, JK, JL, JM, JN, JO, JP, JQ, JR, JS, JT, JU, JV, JW, JX, JY, JZ, KA, KB, KC, KD, KE, KF, KG, KH, KI, KJ, KK, KL, KM, KN, KO, KP, KQ, KR, KS, KT, KU, KV, KW, KX, KY, KZ, LA, LB, LC, LD, LE, LF, LG, LH, LI, LJ, LK, LL, LM, LN, LO, LP, LQ, LR, LS, LT, LU, LV, LW, LX, LY, LZ, MA, MB, MC, MD, ME, MF, MG, MH, MI, MJ, MK, ML, MM, MN, MO, MP, MQ, MR, MS, MT, MU, MV, MW, MX, MY, MZ, NA, NB, NC, ND, NE, NF, NG, NH, NI, NJ, NK, NL, NM, NN, NO, NP, NQ, NR, NS, NT, NU, NV, NW, NX, NY, NZ, OA, OB, OC, OD, OE, OF, OG, OH, OI, OJ, OK, OL, OM, ON, OO, OP, OQ, OR, OS, OT, OU, OV, OW, OX, OY, OZ, PA, PB, PC, PD, PE, PF, PG, PH, PI, PJ, PK, PL, PM, PN, PO, PP, PQ, PR, PS, PT, PU, PV, PW, PX, PY, PZ, QA, QB, QC, QD, QE, QF, QG, QH, QI, QJ, QK, QL, QM, QN, QO, QP, QQ, QR, QS, QT, QU, QV, QW, QX, QY, QZ, RA, RB, RC, RD, RE, RF, RG, RH, RI, RJ, RK, RL, RM, RN, RO, RP, RQ, RR, RS, RT, RU, RV, RW, RX, RY, RZ, SA, SB, SC, SD, SE, SF, SG, SH, SI, SJ, SK, SL, SM, SN, SO, SP, SQ, SR, SS, ST, SU, SV, SW, SX, SY, SZ, TA, TB, TC, TD, TE, TF, TG, TH, TI, TJ, TK, TL, TM, TN, TO, TP, TQ, TR, TS, TT, TU, TV, TW, TX, TY, TZ, UA, UB, UC, UD, UE, UF, UG, UH, UI, UJ, UK, UL, UM, UN, UO, UP, UQ, UR, US, UT, UY, UZ, VA, VB, VC, VD, VE, VF, VG, VH, VI, VJ, VK, VL, VM, VN, VO, VP, VQ, VR, VS, VT, VU, VV, VW, VX, VY, VZ, WA, WB, WC, WD, WE, WF, WG, WH, WI, WJ, WK, WL, WM, WN, WO, WP, WQ, WR, WS, WT, WU, WV, WW, WX, WY, WZ, XA, XB, XC, XD, XE, XF, XG, XH, XI, XJ, XK, XL, XM, XN, XO, XP, XQ, XR, XS, XT, XU, XV, XW, XX, XY, XZ, YA, YB, YC, YD, YE, YF, YG, YH, YI, YJ, YK, YL, YM, YN, YO, YP, YQ, YR, YS, YT, YU, YV, YW, YX, YY, YZ, ZA, ZB, ZC, ZD, ZE, ZF, ZG, ZH, ZI, ZJ, ZK, ZL, ZM, ZN, ZO, ZP, ZQ, ZR, ZS, ZT, ZU, ZV, ZW, ZX, ZY, ZZ.



**SOUTHERN ICE LIMIT 24 FEB 88**  
 NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUTLAND

C = Total ice concentration on this date  
 C, G, G, = Extent of ice (Percent C, L, and Percent G) and Ice Thickness (m)  
 S, H, G, = State of ice (Percent S, H, and Percent G), Ice Thickness (m), and Ice Pressure (m)

EXAMPLES

(C)	(G)	(G)

SCALE OF SYMBOLS - PROFILES

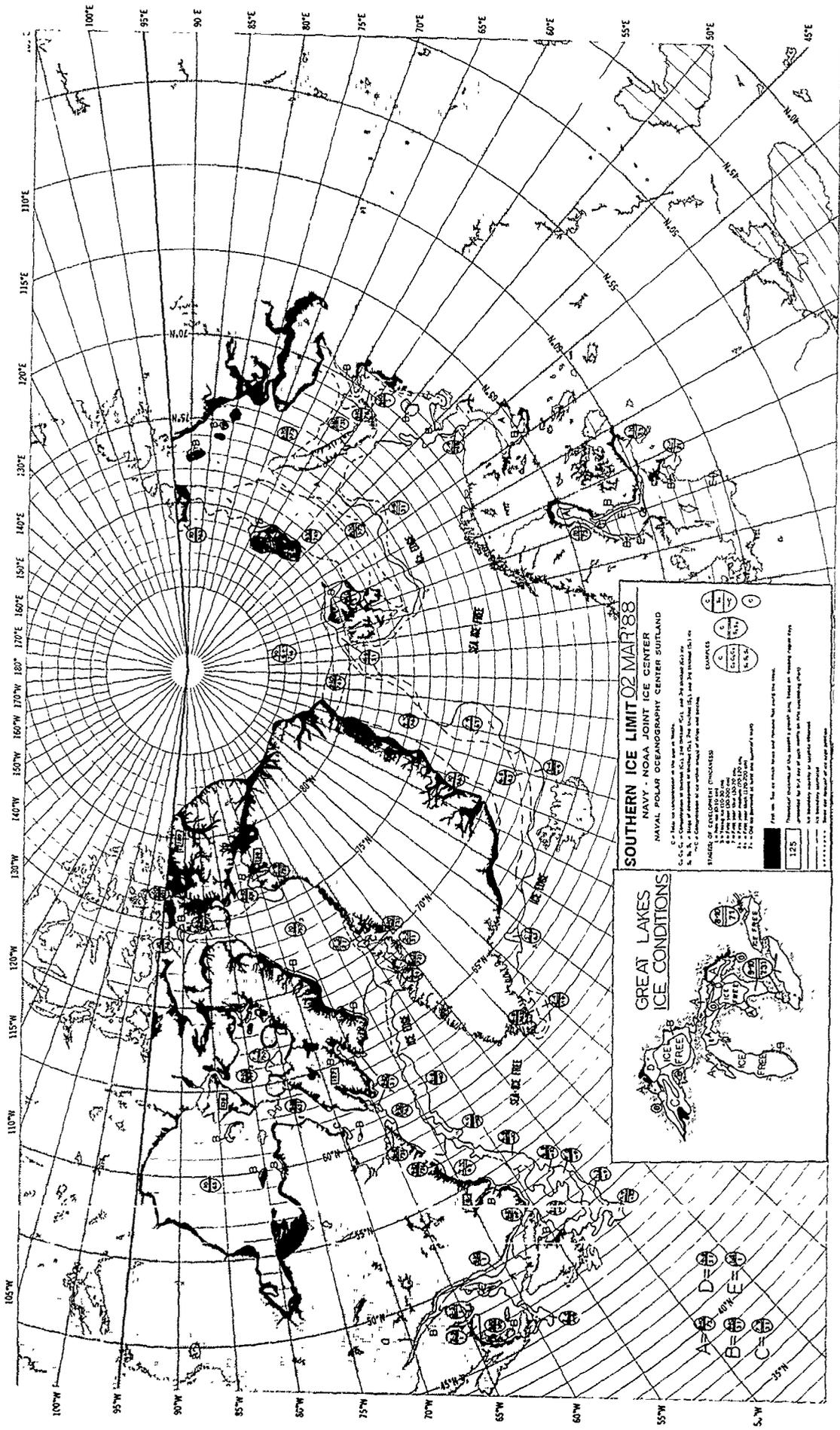
1	Ice 100% (100%)
2	Ice 75% (75%)
3	Ice 50% (50%)
4	Ice 25% (25%)
5	Ice 10% (10%)
6	Ice 5% (5%)
7	Ice 2% (2%)
8	Ice 1% (1%)
9	Ice 0% (0%)

1:250,000  
 1" = 100 Miles  
 1" = 160,934 Meters

For use: This chart shows the ice limits and ice thickness data for the Arctic Ocean. The symbols are plotted on a grid of latitude and longitude. The symbols are plotted on a grid of latitude and longitude. The symbols are plotted on a grid of latitude and longitude.

**GREAT LAKES ICE CONDITIONS**

A	D	(C)	(G)	(G)
B	E	(C)	(G)	(G)
C	F	(C)	(G)	(G)



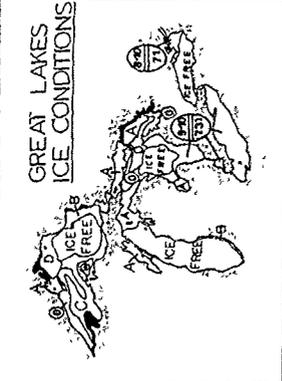
**SOUTHERN ICE LIMIT 02 MAR 88**  
 NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SOUTLAND

① Data on ice concentration at the point in brackets.  
 ② Data on ice concentration at the point in brackets.  
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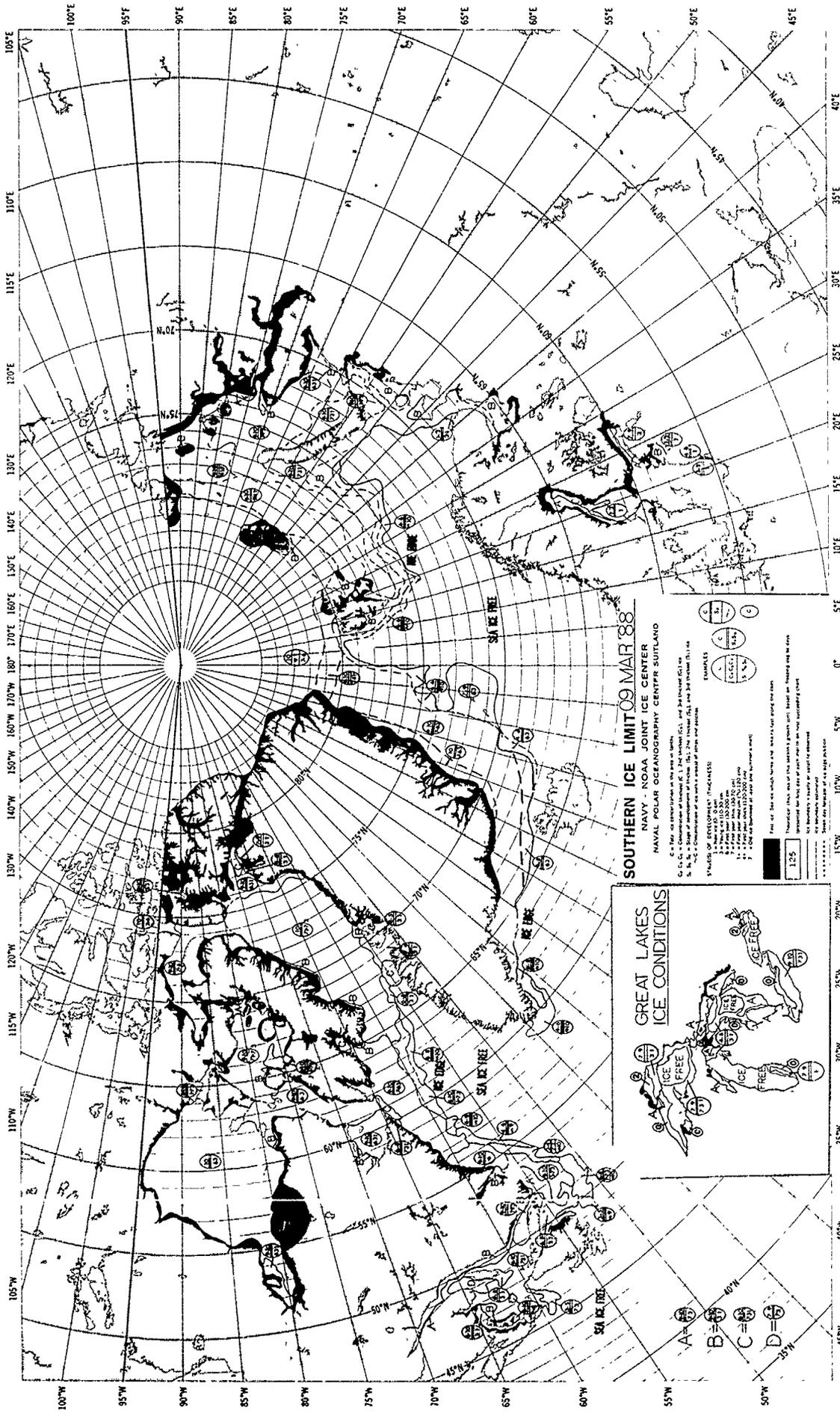
**STATUS OF DEVELOPMENT (CIRCLES)**

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**SOUTHERN ICE LIMIT 09 MAR 88**

NAVAL POLAR OCEANOGRAPHY CENTER SUTTLAND

C = Sea ice extent on the day of limit  
 S, N, E, W = Direction of ice extent (S, N, E, W)  
 S, N, E, W = Direction of ice extent (S, N, E, W) (Inner, Outer, Sea, and Ice)

VALUES OF EXTENT (THICKNESS)  
 1 = 1000 ft (305 m)  
 2 = 2000 ft (610 m)  
 3 = 3000 ft (915 m)  
 4 = 4000 ft (1220 m)  
 5 = 5000 ft (1525 m)  
 6 = 6000 ft (1830 m)  
 7 = 7000 ft (2135 m)  
 8 = 8000 ft (2440 m)  
 9 = 9000 ft (2745 m)  
 10 = 10000 ft (3050 m)

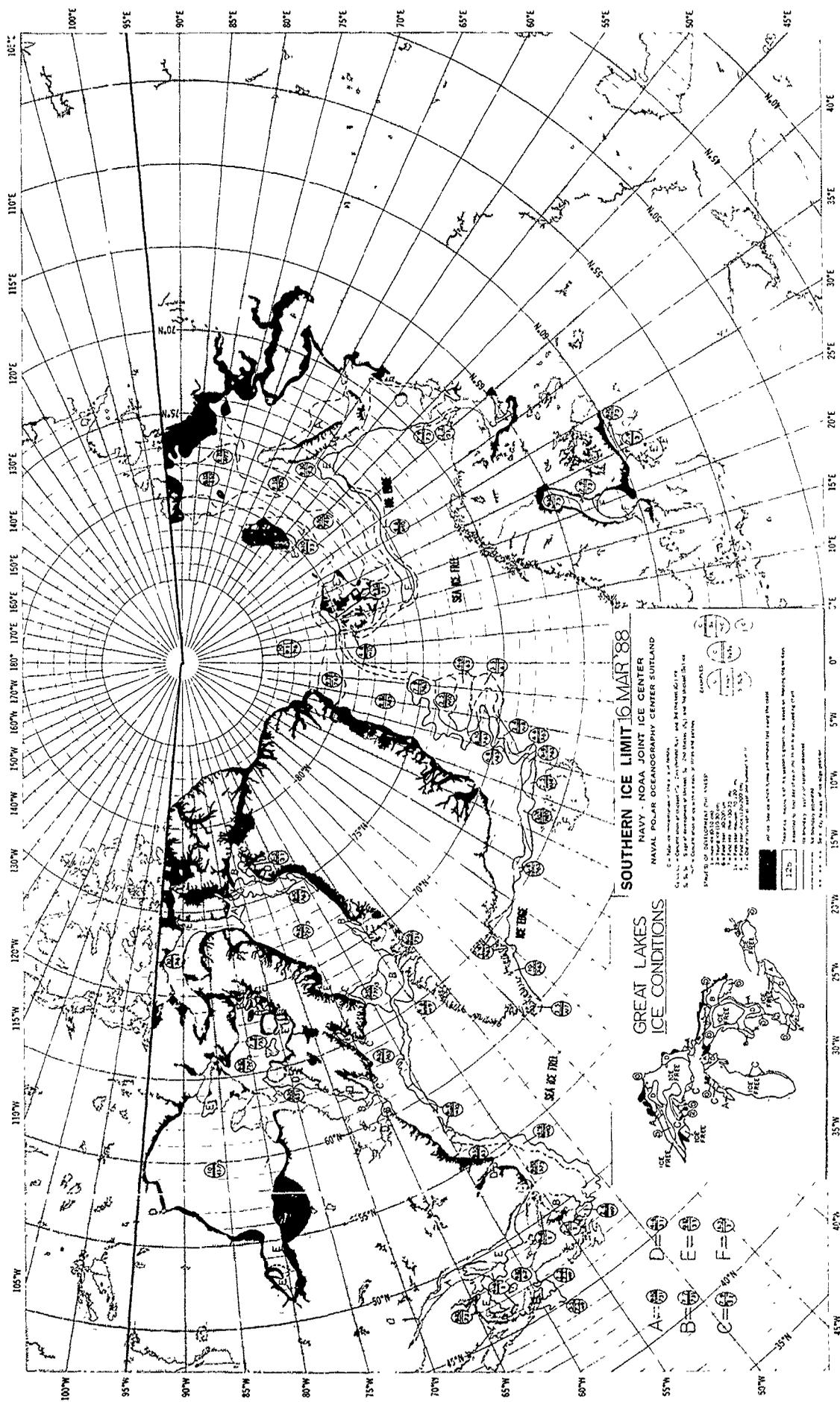
EXAMPLES  
 (S) (N) (E) (W)  
 (S) (N) (E) (W)  
 (S) (N) (E) (W)  
 (S) (N) (E) (W)

125  
 125  
 125  
 125

**GREAT LAKES ICE CONDITIONS**



- A = (S)
- B = (S)
- C = (S)
- D = (S)



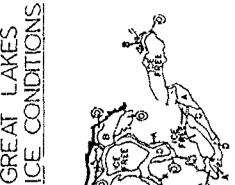
**SOUTHERN ICE LIMIT 16 MAR '88**

NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER EUTLAND

E = Ice-free temperature > 3.0°C (32°F)  
 C = Ice-free temperature > 2.0°C (32°F) and the last day  
 S = Ice-free temperature > 1.0°C (32°F) and the last day  
 N = Ice-free temperature > 0.0°C (32°F) and the last day

SEASIDE  
 1. 100% SEA ICE FREE  
 2. 75% SEA ICE FREE  
 3. 50% SEA ICE FREE  
 4. 25% SEA ICE FREE  
 5. 10% SEA ICE FREE  
 6. 5% SEA ICE FREE  
 7. 2% SEA ICE FREE  
 8. 1% SEA ICE FREE  
 9. 0% SEA ICE FREE

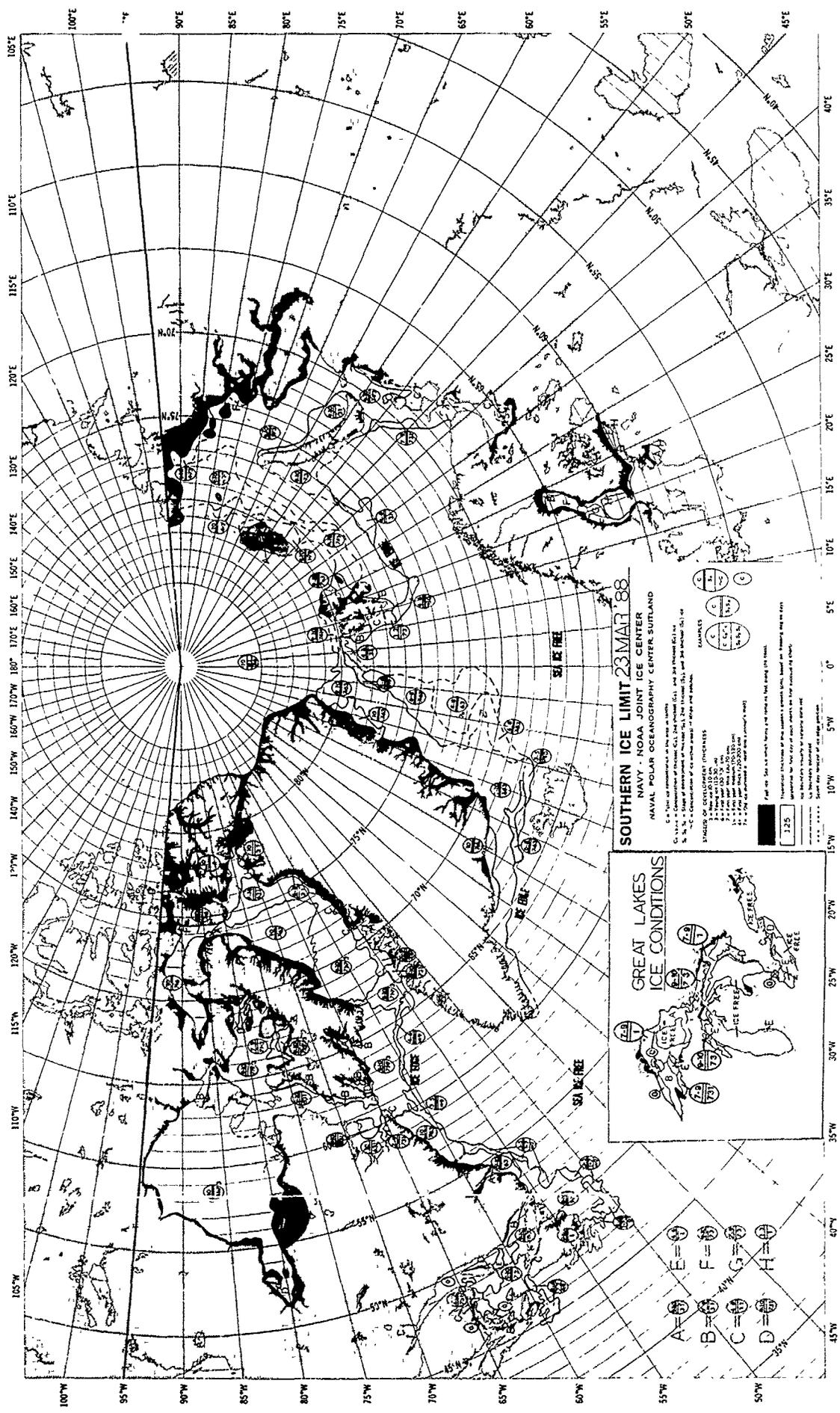
**GREAT LAKES  
 ICE CONDITIONS**



- A = (Symbol)
- B = (Symbol)
- C = (Symbol)
- D = (Symbol)
- E = (Symbol)
- F = (Symbol)

100% SEA ICE FREE  
 75% SEA ICE FREE  
 50% SEA ICE FREE  
 25% SEA ICE FREE  
 10% SEA ICE FREE  
 5% SEA ICE FREE  
 2% SEA ICE FREE  
 1% SEA ICE FREE  
 0% SEA ICE FREE

100% SEA ICE FREE  
 75% SEA ICE FREE  
 50% SEA ICE FREE  
 25% SEA ICE FREE  
 10% SEA ICE FREE  
 5% SEA ICE FREE  
 2% SEA ICE FREE  
 1% SEA ICE FREE  
 0% SEA ICE FREE



**SOUTHERN ICE LIMIT 23 MAR 88**

NAVAL POLAR OCEANOGRAPHY CENTER SUTLAND

0 = 100% ice concentration  
 1 = 75% ice concentration  
 2 = 50% ice concentration  
 3 = 25% ice concentration  
 4 = 10% ice concentration  
 5 = 5% ice concentration  
 6 = 2% ice concentration  
 7 = 1% ice concentration  
 8 = 0% ice concentration (SEA ICE FREE)

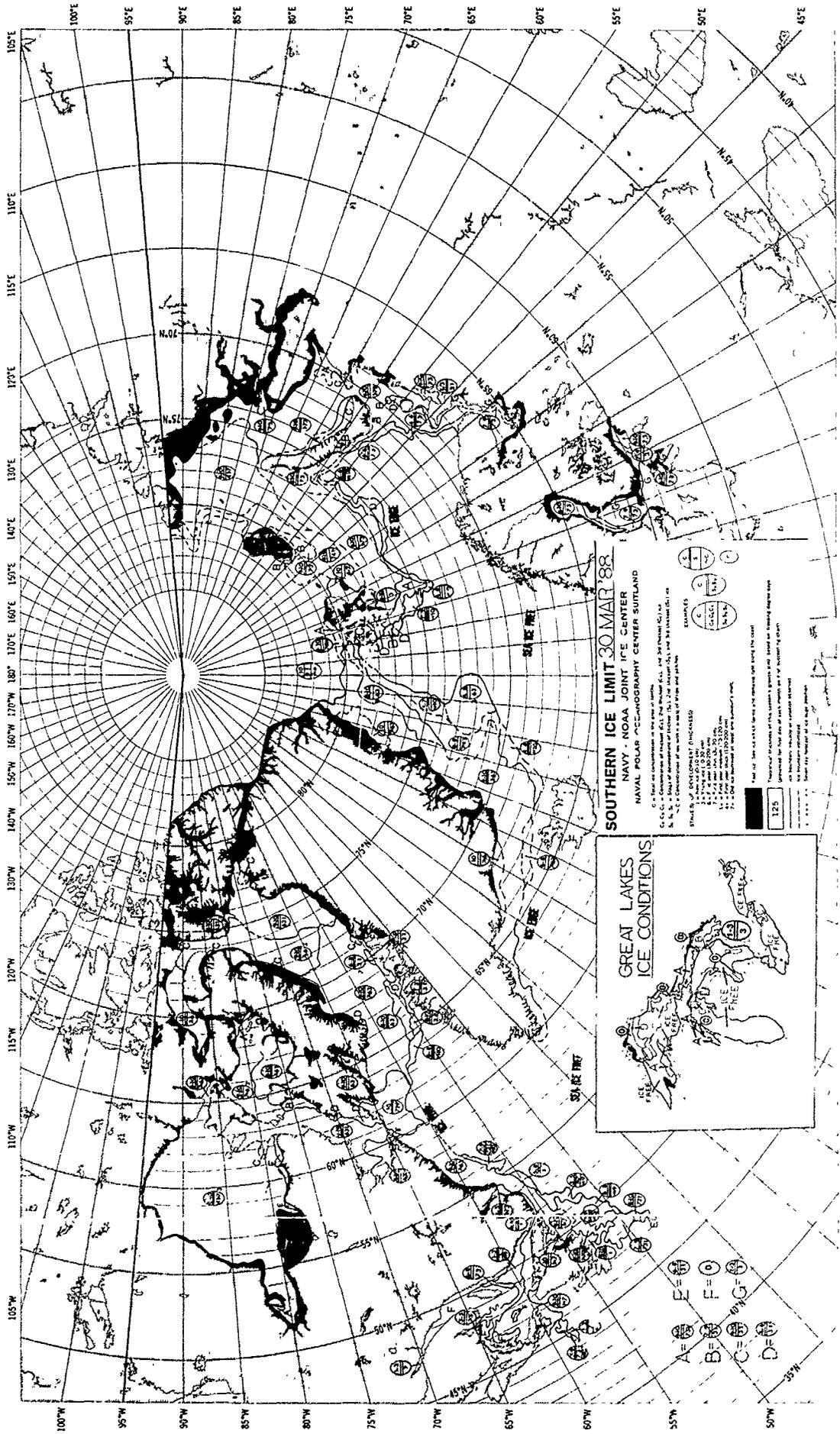
12.5 = 12.5 meters  
 25 = 25 meters  
 50 = 50 meters  
 100 = 100 meters  
 150 = 150 meters  
 200 = 200 meters  
 250 = 250 meters  
 300 = 300 meters  
 350 = 350 meters  
 400 = 400 meters  
 450 = 450 meters  
 500 = 500 meters  
 550 = 550 meters  
 600 = 600 meters  
 650 = 650 meters  
 700 = 700 meters  
 750 = 750 meters  
 800 = 800 meters  
 850 = 850 meters  
 900 = 900 meters  
 950 = 950 meters  
 1000 = 1000 meters

12.5 = 12.5 meters  
 25 = 25 meters  
 50 = 50 meters  
 100 = 100 meters  
 150 = 150 meters  
 200 = 200 meters  
 250 = 250 meters  
 300 = 300 meters  
 350 = 350 meters  
 400 = 400 meters  
 450 = 450 meters  
 500 = 500 meters  
 550 = 550 meters  
 600 = 600 meters  
 650 = 650 meters  
 700 = 700 meters  
 750 = 750 meters  
 800 = 800 meters  
 850 = 850 meters  
 900 = 900 meters  
 950 = 950 meters  
 1000 = 1000 meters

**GREAT LAKES ICE CONDITIONS**



- A = (Symbol)
- B = (Symbol)
- C = (Symbol)
- D = (Symbol)
- E = (Symbol)
- F = (Symbol)
- G = (Symbol)
- H = (Symbol)



**SOUTHERN ICE LIMIT 30 MAR 88**

NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND

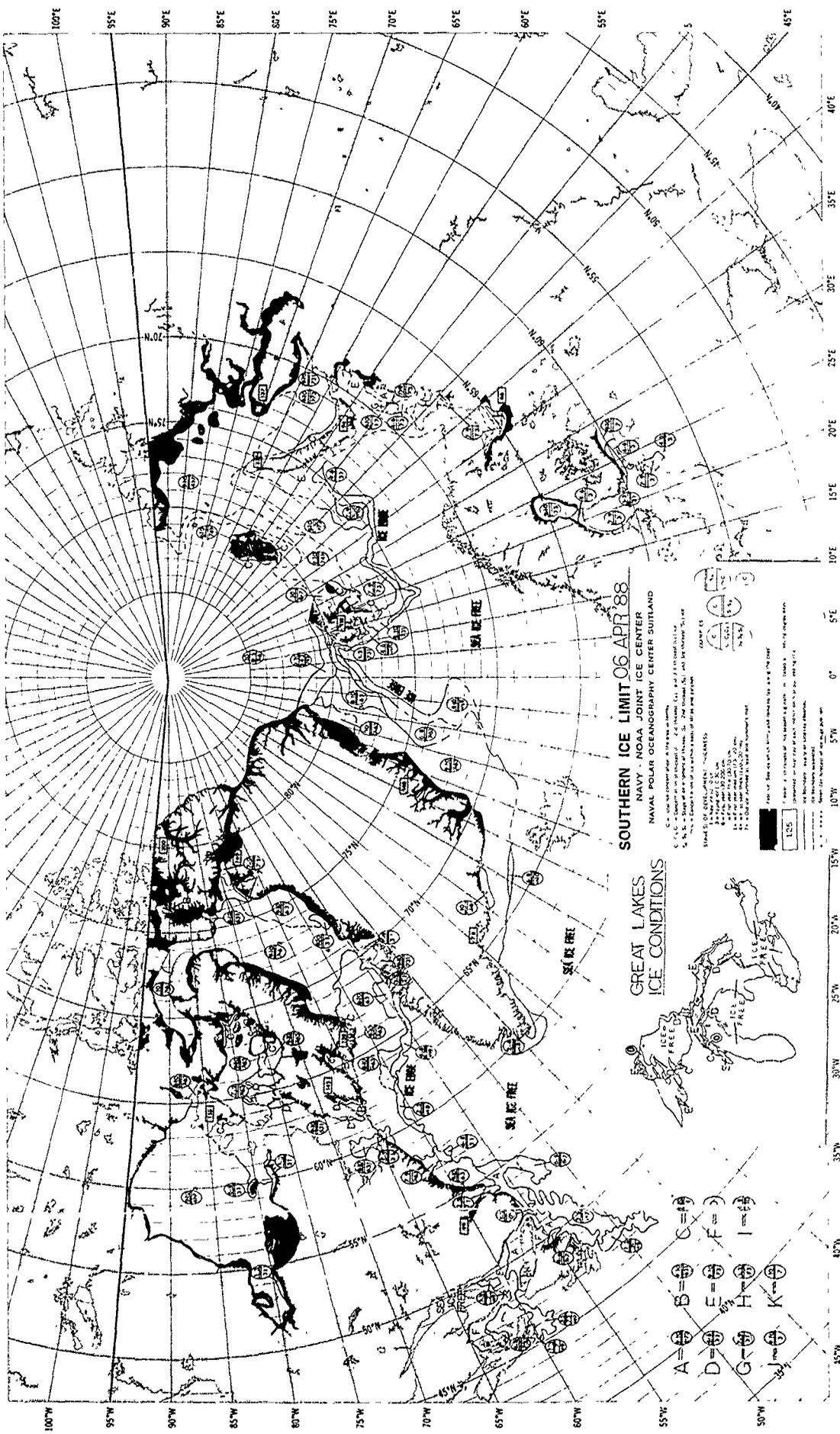
1. Date of observation in the top of symbol.  
 2. Direction of movement of ice in the bottom (N, S, E, W, NE, SE, SW, NW) and the amount (in 10's of degrees) in the middle of symbol (0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100).

EXAMPLES:  
 (1) 10 MAR 88 (N) 10 (N) 10 (N)  
 (2) 11 MAR 88 (S) 10 (S) 10 (S)  
 (3) 12 MAR 88 (E) 10 (E) 10 (E)  
 (4) 13 MAR 88 (W) 10 (W) 10 (W)  
 (5) 14 MAR 88 (NE) 10 (NE) 10 (NE)  
 (6) 15 MAR 88 (SE) 10 (SE) 10 (SE)  
 (7) 16 MAR 88 (SW) 10 (SW) 10 (SW)  
 (8) 17 MAR 88 (NW) 10 (NW) 10 (NW)



- A = (10) (N) 10 (N)
- B = (11) (S) 10 (S)
- C = (12) (E) 10 (E)
- D = (13) (W) 10 (W)
- E = (14) (NE) 10 (NE)
- F = (15) (SE) 10 (SE)
- G = (16) (SW) 10 (SW)
- H = (17) (NW) 10 (NW)

1. Date of observation in the top of symbol.  
 2. Direction of movement of ice in the bottom (N, S, E, W, NE, SE, SW, NW) and the amount (in 10's of degrees) in the middle of symbol (0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100).

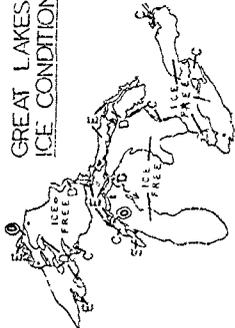


**SOUTHERN ICE LIMIT 06 APR 88**  
 NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND

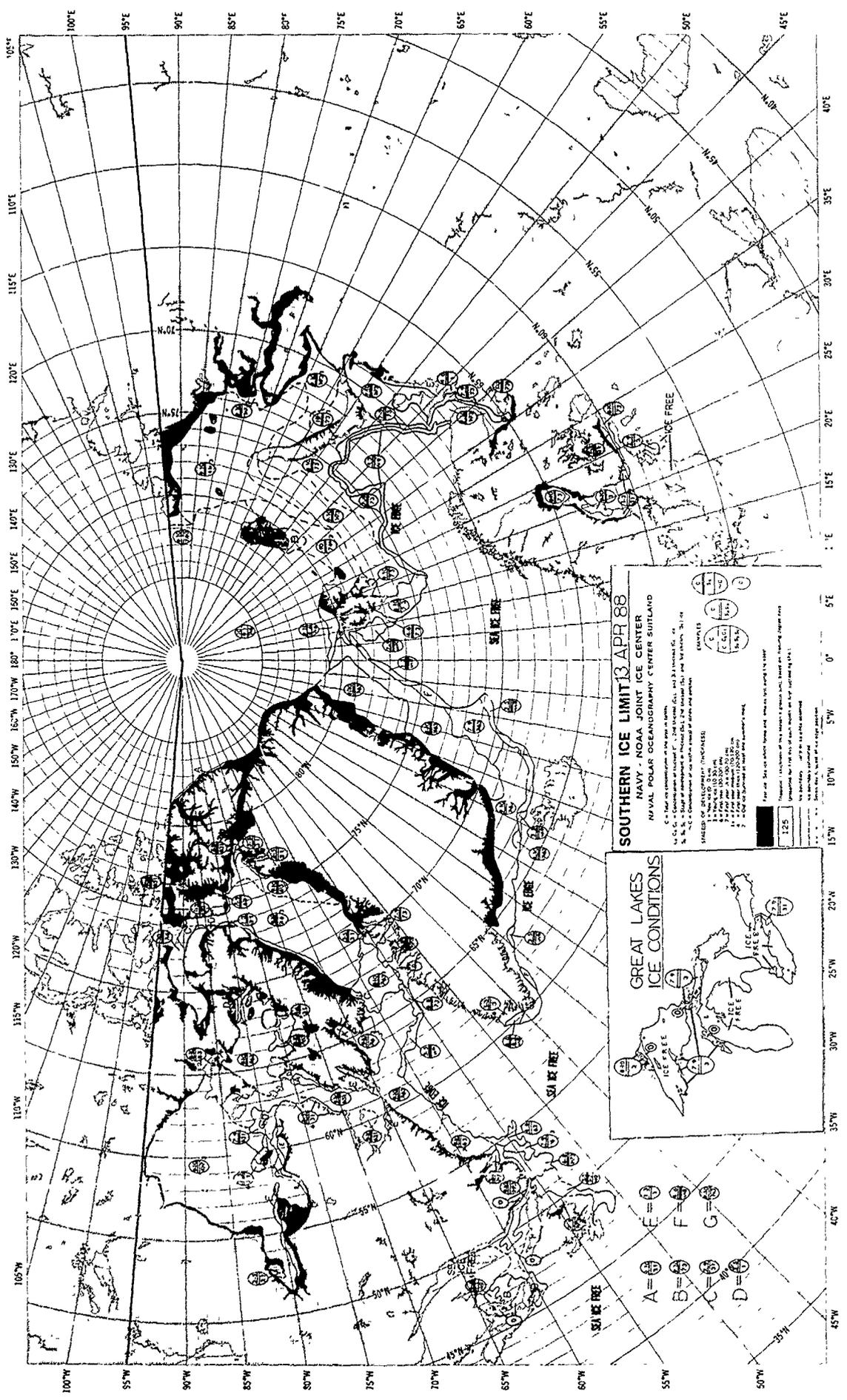
C, D, E = Ice concentration in percent (0-100). C = 0-25%, D = 26-50%, E = 51-75%.  
 F, G, H, I = Degree of ice strength (0-100). F = 1st, G = 2nd, H = 3rd, I = 4th.  
 J, K = Degree of ice thickness (0-100). J = 1st, K = 2nd.  
 The "SEA ICE FREE" label indicates that no ice was reported in that area.

**GREAT LAKES  
 ICE CONDITIONS**

- A = (Symbol: circle with A)
- B = (Symbol: circle with B)
- C = (Symbol: circle with C)
- D = (Symbol: circle with D)
- E = (Symbol: circle with E)
- F = (Symbol: circle with F)
- G = (Symbol: circle with G)
- H = (Symbol: circle with H)
- I = (Symbol: circle with I)
- J = (Symbol: circle with J)
- K = (Symbol: circle with K)



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



### SOUTHERN ICE LIMIT 13 APR 88

NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND

C = Total ice concentration in the area of datum.  
 S, N, E, W = Direction of maximum ice thickness. (S, N, E, W = 0° = Direction of maximum ice thickness. (S, N, E, W = 0° = Direction of maximum ice thickness.)

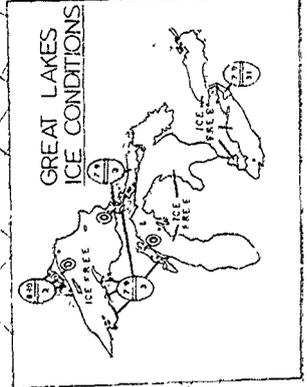
**SIZES OF OBSERVATIONS (THICKNESS)**

- 1 - Thick (10-20 cm)
- 2 - Medium (5-10 cm)
- 3 - Thin (2-5 cm)
- 4 - Very thin (1-2 cm)
- 5 - Ice-free (0 cm)
- 6 - Ice-free (0 cm)
- 7 - Ice-free (0 cm)

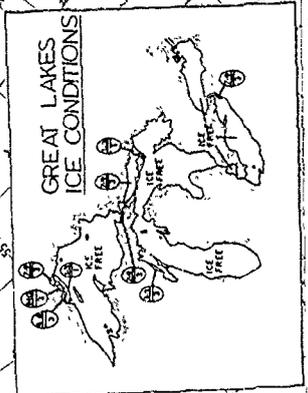
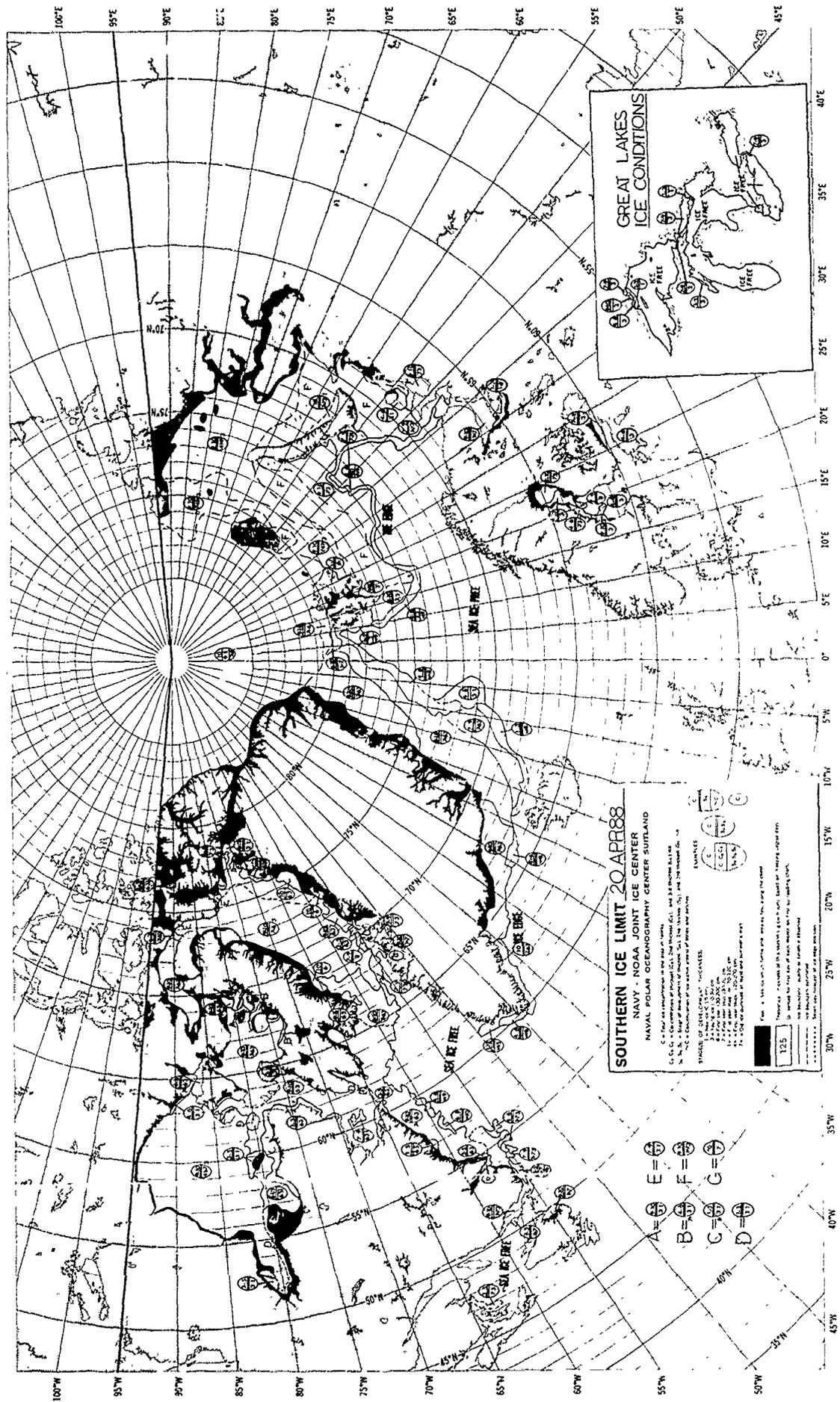
**EXAMPLES**

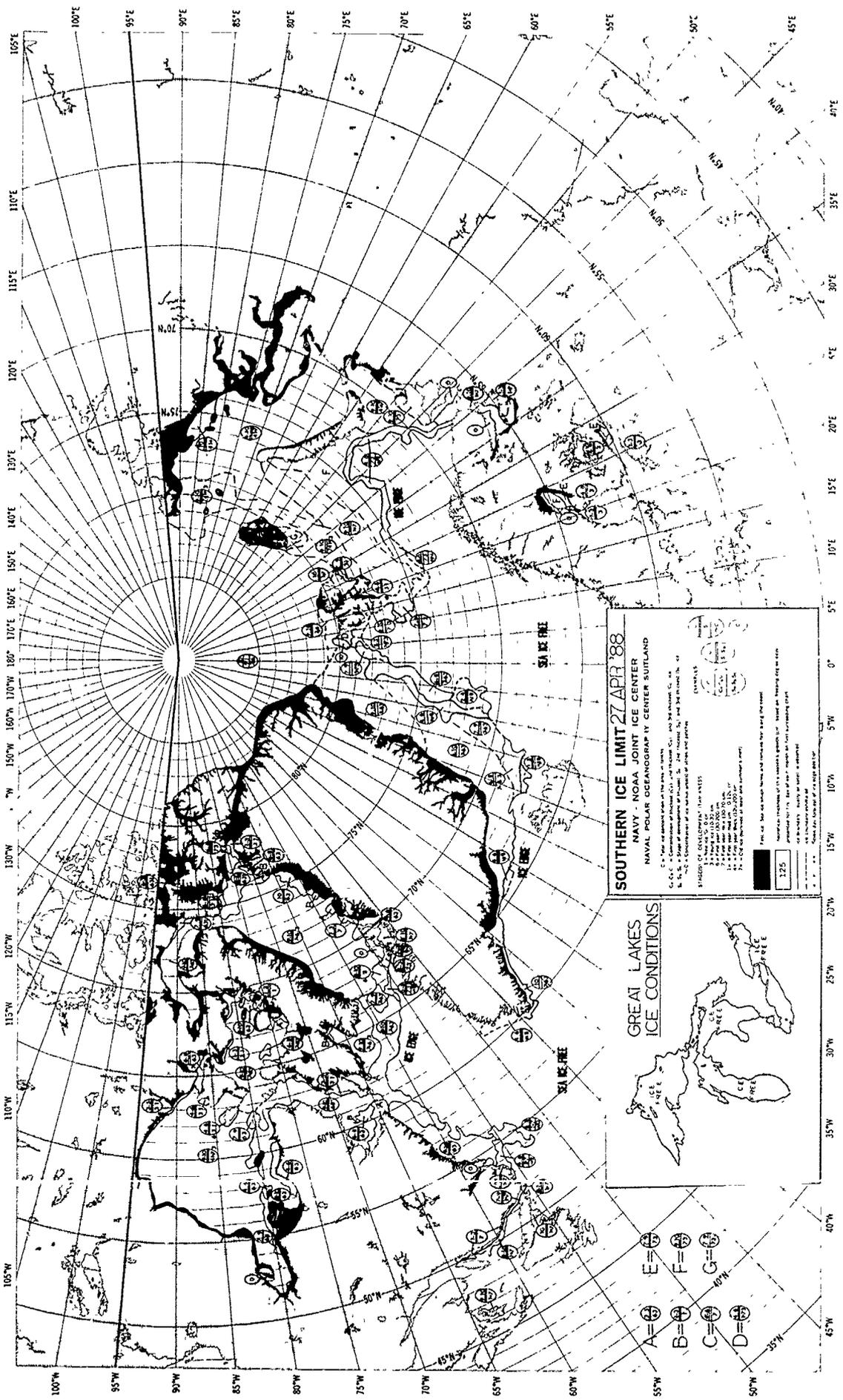
(A)	(B)	(C)	(D)	(E)	(F)	(G)
(A)	(B)	(C)	(D)	(E)	(F)	(G)

For all Sea Ice data, the area shown is for 13 APR 88.  
 (Thickens) - thickness of the ice in centimeters. Based on floating ice area.  
 (Ice-free) - thickness of the ice in centimeters. Based on floating ice area.  
 (Ice-free) - thickness of the ice in centimeters. Based on floating ice area.  
 (Ice-free) - thickness of the ice in centimeters. Based on floating ice area.



- A = (A)    E = (E)  
 B = (B)    F = (F)  
 C = (C)    G = (G)  
 D = (D)





**SOUTHERN ICE LIMIT 27 APR 88**

NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUTLAND  
 1. Year and station number of the data on which  
 2. Date of observation  
 3. Name of the vessel  
 4. Name of the commanding officer  
 5. Name of the observer  
 6. Name of the recorder  
 7. Name of the recorder's assistant  
 8. Name of the recorder's assistant's assistant



**Legend:**

- A =
- B =
- C =
- D =
- E =
- F =
- G =

**Scale:** 1:50,000

**Projection:** Polar Stereographic

**Reference:** 1983 Edition

**Scale of Denominator:** 1:50,000

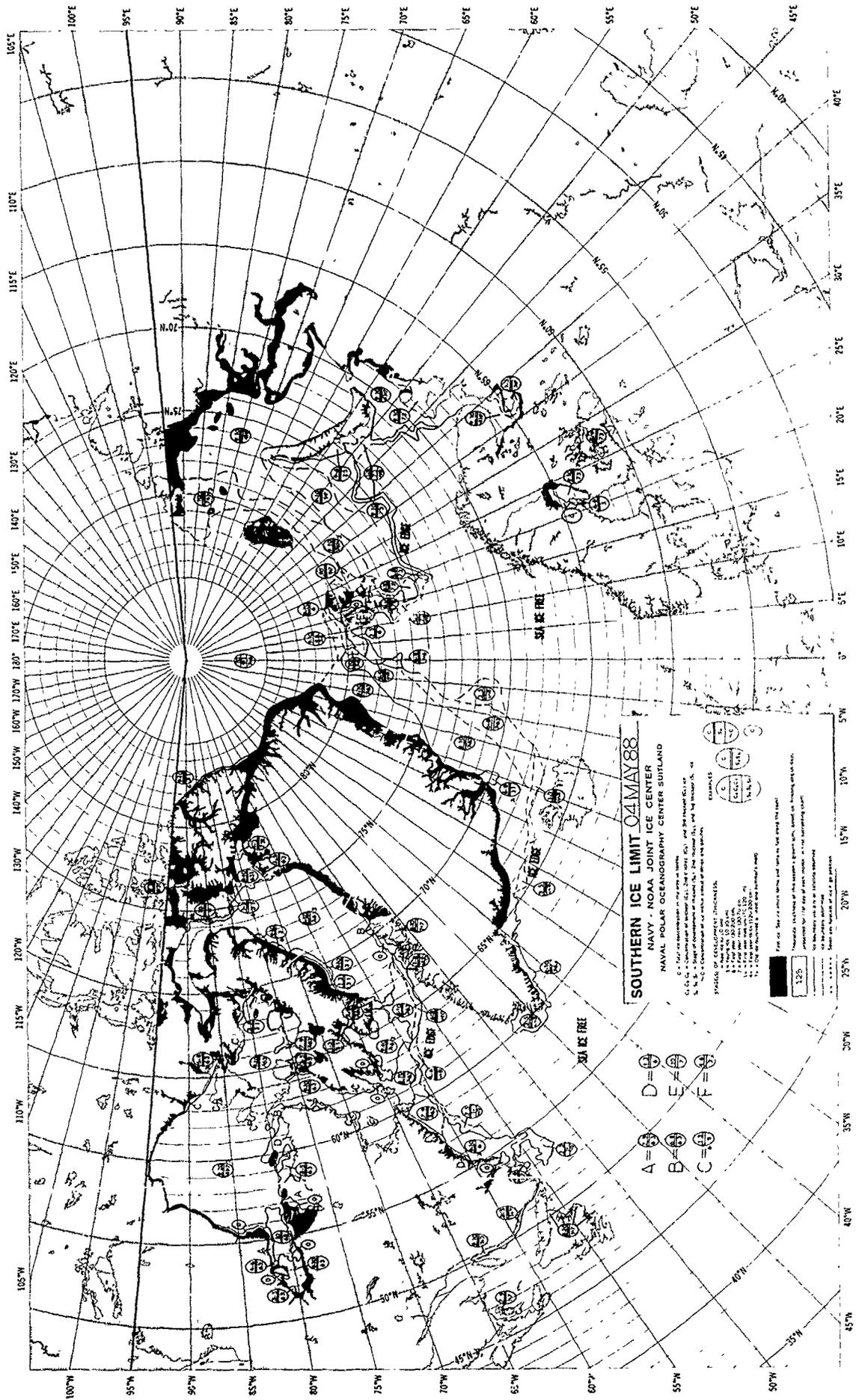
**Scale of Numerator:** 1:50,000

**Scale of Denominator:** 1:50,000

**Scale of Numerator:** 1:50,000

**Scale of Denominator:** 1:50,000

**Scale of Numerator:** 1:50,000



**SOUTHERN ICE LIMIT 04 MAY 88**  
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND

A = 100% ice concentration in the area shown  
 B = 75% ice concentration in the area shown  
 C = 50% ice concentration in the area shown  
 D = 25% ice concentration in the area shown  
 E = 10% ice concentration in the area shown  
 F = 5% ice concentration in the area shown  
 G = 0% ice concentration in the area shown

1. 100% ice concentration in the area shown  
 2. 75% ice concentration in the area shown  
 3. 50% ice concentration in the area shown  
 4. 25% ice concentration in the area shown  
 5. 10% ice concentration in the area shown  
 6. 5% ice concentration in the area shown  
 7. 0% ice concentration in the area shown

1. 100% ice concentration in the area shown  
 2. 75% ice concentration in the area shown  
 3. 50% ice concentration in the area shown  
 4. 25% ice concentration in the area shown  
 5. 10% ice concentration in the area shown  
 6. 5% ice concentration in the area shown  
 7. 0% ice concentration in the area shown

1. 100% ice concentration in the area shown  
 2. 75% ice concentration in the area shown  
 3. 50% ice concentration in the area shown  
 4. 25% ice concentration in the area shown  
 5. 10% ice concentration in the area shown  
 6. 5% ice concentration in the area shown  
 7. 0% ice concentration in the area shown

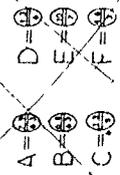
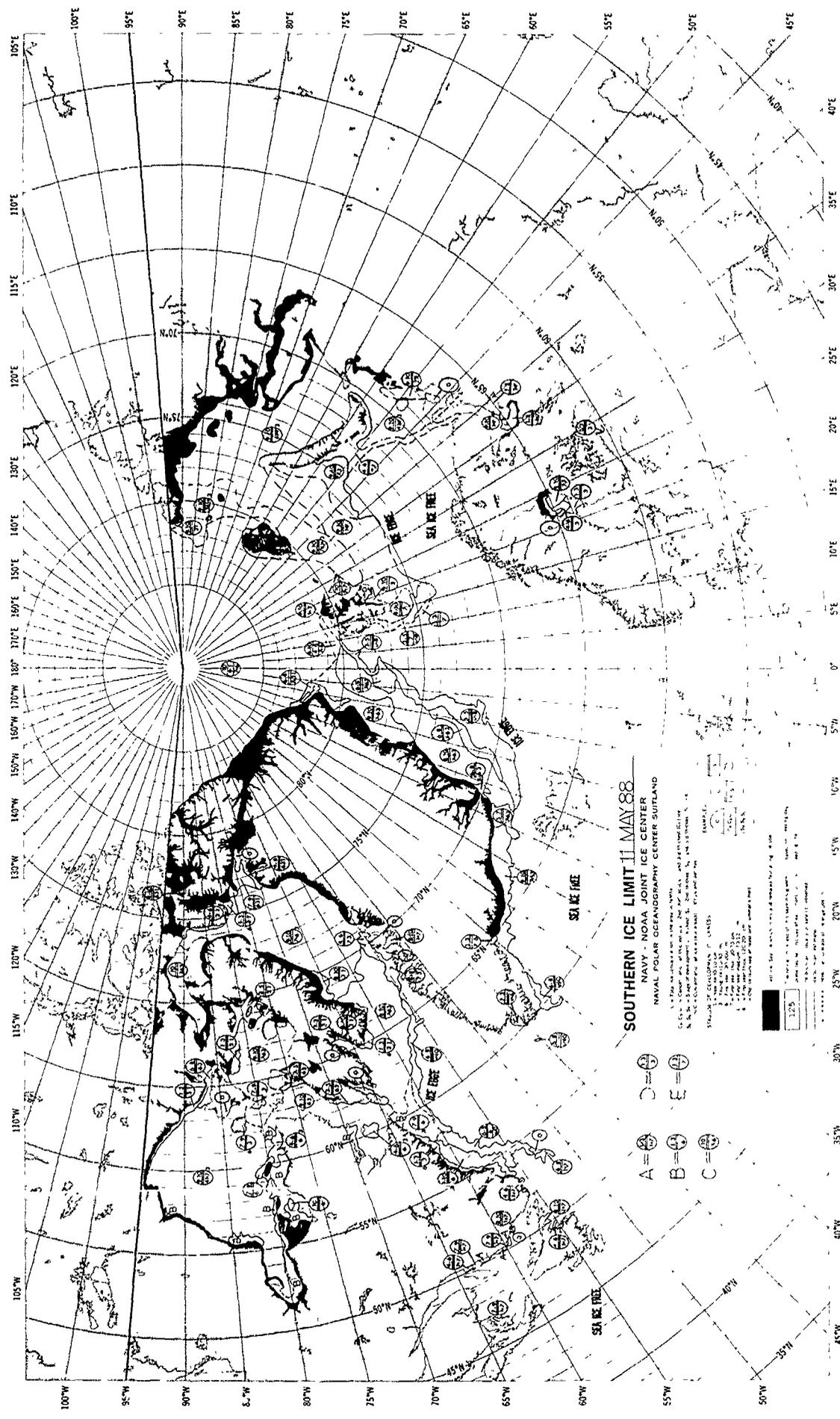


TABLE 1. Ice Thicknesses (in meters) and Percentages of Ice Thicknesses

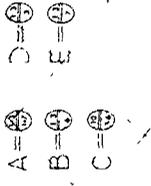
Ice Thickness (m)	Percentage of Ice Thicknesses
1.0	100%
1.5	100%
2.0	100%
2.5	100%
3.0	100%
3.5	100%
4.0	100%
4.5	100%
5.0	100%
5.5	100%
6.0	100%
6.5	100%
7.0	100%
7.5	100%
8.0	100%
8.5	100%
9.0	100%
9.5	100%
10.0	100%
10.5	100%
11.0	100%
11.5	100%
12.0	100%
12.5	100%
13.0	100%
13.5	100%
14.0	100%
14.5	100%
15.0	100%
15.5	100%
16.0	100%
16.5	100%
17.0	100%
17.5	100%
18.0	100%
18.5	100%
19.0	100%
19.5	100%
20.0	100%
20.5	100%
21.0	100%
21.5	100%
22.0	100%
22.5	100%
23.0	100%
23.5	100%
24.0	100%
24.5	100%
25.0	100%
25.5	100%
26.0	100%
26.5	100%
27.0	100%
27.5	100%
28.0	100%
28.5	100%
29.0	100%
29.5	100%
30.0	100%
30.5	100%
31.0	100%
31.5	100%
32.0	100%
32.5	100%
33.0	100%
33.5	100%
34.0	100%
34.5	100%
35.0	100%



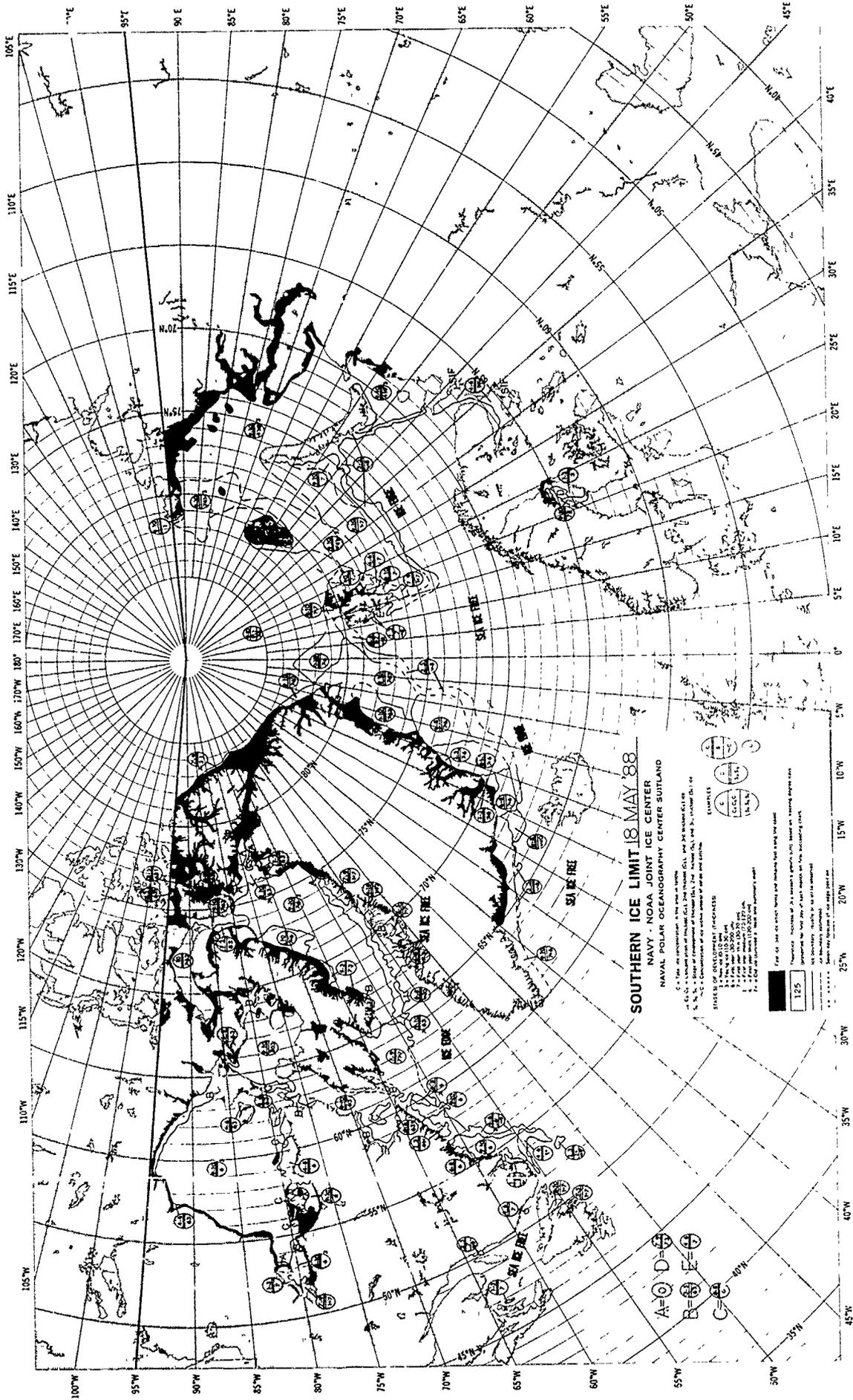
**SOUTHERN ICE LIMIT 11 MAY 88**

NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND

- 1. This map is intended for use as a general guide.
- 2. Data is derived from the following sources:
- 3. Data is based on observations from the U.S. Coast Guard Cutter Healy (WMEC-903) and the U.S. Coast Guard Cutter Spencer (WMEC-904) during the period 11 May 1988.
- 4. Data is based on observations from the U.S. Coast Guard Cutter Spencer (WMEC-904) during the period 11 May 1988.
- 5. Data is based on observations from the U.S. Coast Guard Cutter Spencer (WMEC-904) during the period 11 May 1988.



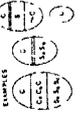
OFFICE OF NAVAL OPERATIONS, SUITLAND, ALASKA  
 11 MAY 1988  
 1:10,000  
 1:10,000



**SOUTHERN ICE LIMIT 18 MAY '88**

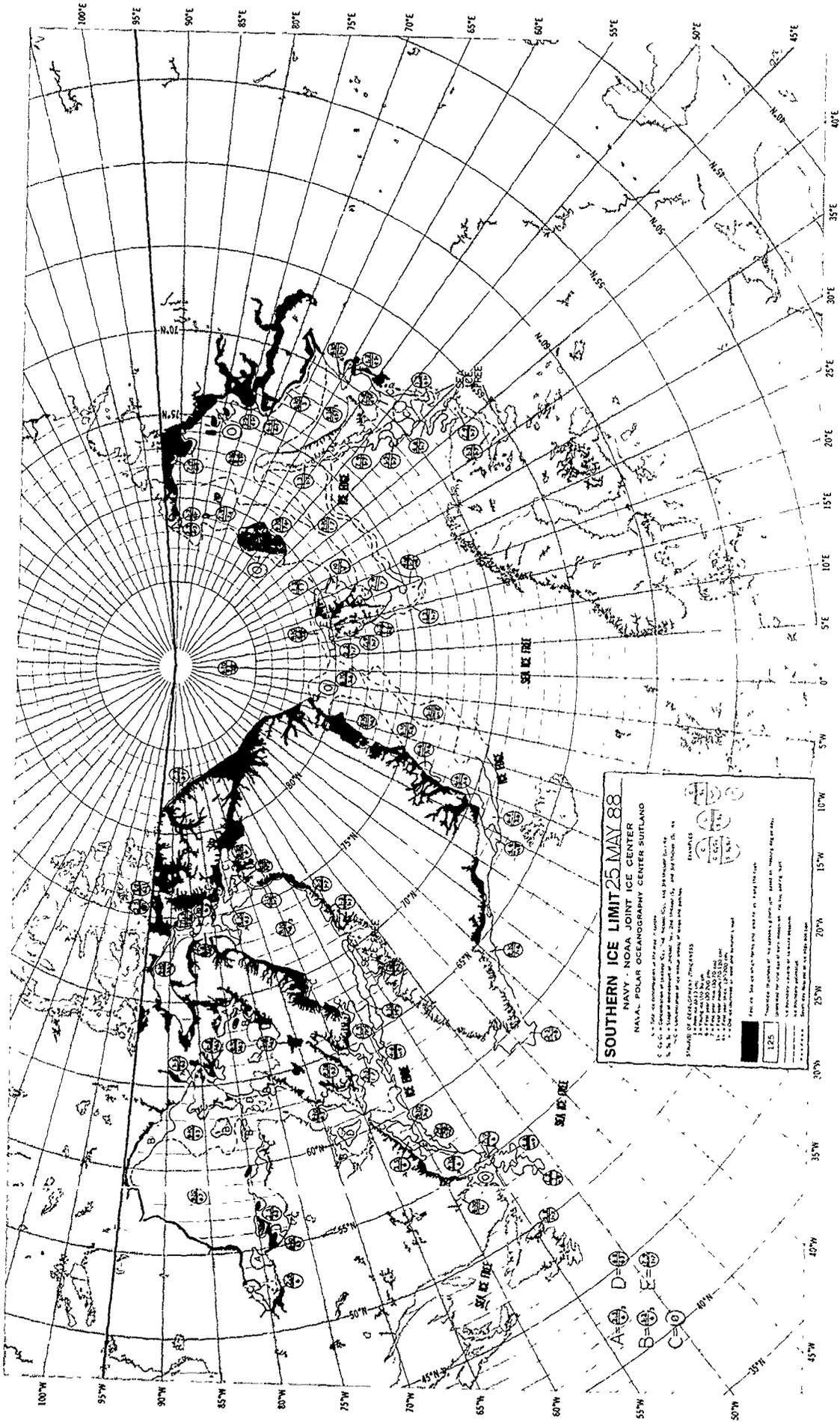
NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND

C - Ice limit of ice chart (see page 18 of this chart)  
 A, B, C - Ice limit of ice chart (see page 18 of this chart)  
 S, N, W - Range of concentration of ice (see page 18 of this chart)  
 S, N, W - Range of concentration of ice (see page 18 of this chart)



STATES OF ANTARCTICA (PROGRESS)  
 1. The Antarctic continent  
 2. The Antarctic Peninsula  
 3. The Antarctic Peninsula  
 4. The Antarctic Peninsula  
 5. The Antarctic Peninsula

This chart is for use in conjunction with the chart of the same area.  
 Numbers in circles are 1000 foot depth contours, based on sounding depth data.  
 Contours are shown at 1000 foot intervals, except where indicated otherwise.  
 Ice limits are shown as solid lines.  
 Ice concentration ranges are shown as dashed lines.  
 Ice limits and concentration ranges are shown as dashed lines.  
 Ice limits and concentration ranges are shown as dashed lines.



**SOUTHERN ICE LIMIT 25 MAY 88**  
 NAVY - NOAA JOINT ICE CENTER  
 NAVY - POLAR OCEANOGRAPHY CENTER SUITLAND

A - 100% ice concentration  
 B - 75% ice concentration  
 C - 50% ice concentration  
 D - 25% ice concentration  
 E - 10% ice concentration  
 F - 5% ice concentration  
 G - 0% ice concentration (open water)

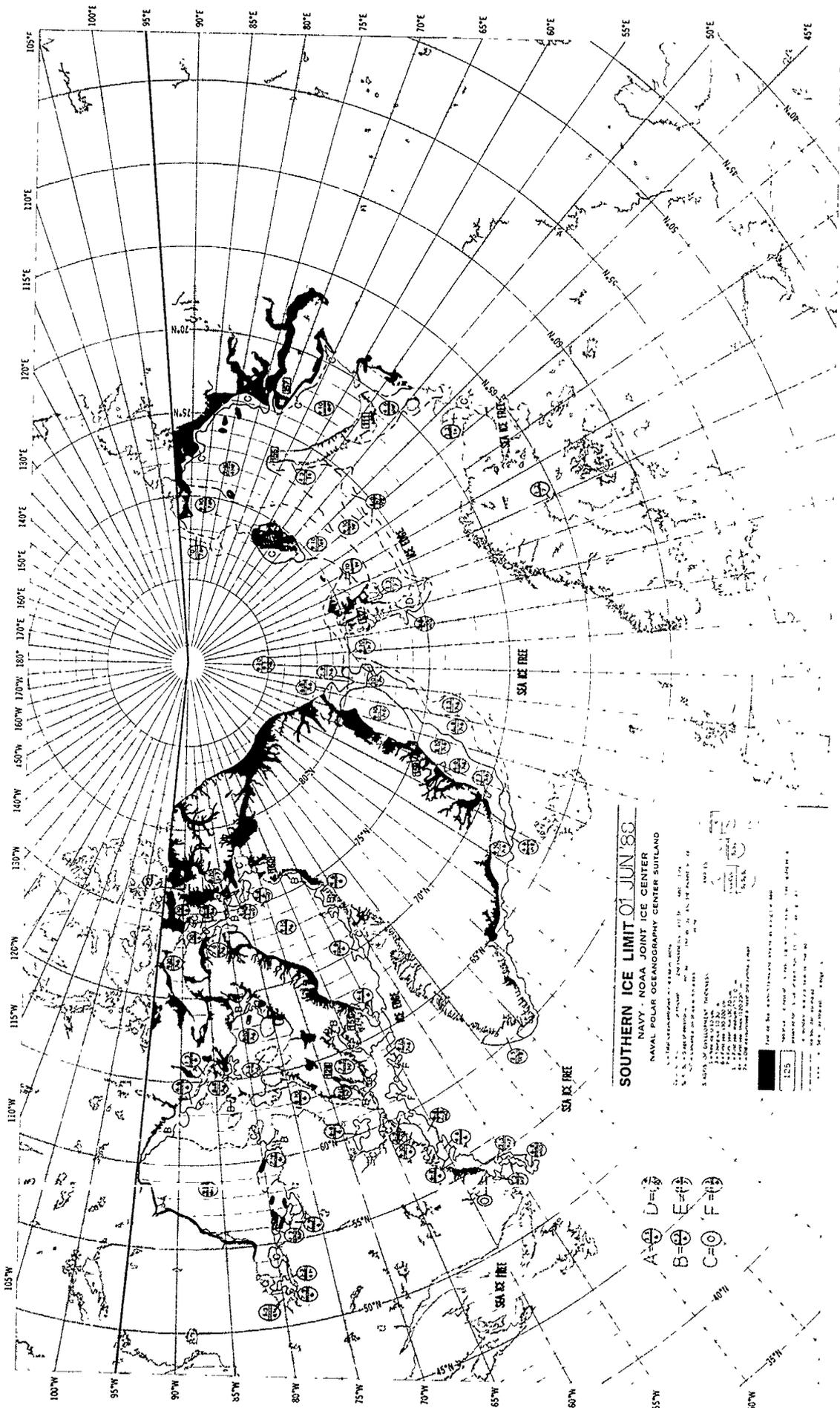
STANDARD OF OBSERVATION FREQUENCIES

1. 100% ice concentration  
 2. 75% ice concentration  
 3. 50% ice concentration  
 4. 25% ice concentration  
 5. 10% ice concentration  
 6. 5% ice concentration  
 7. 0% ice concentration (open water)

125

For use only for the purpose of the map. Do not use for other purposes.  
 This map is based on the data of the Southern Ocean Ice Limit as of May 25, 1988.  
 The map is based on the data of the Southern Ocean Ice Limit as of May 25, 1988.  
 The map is based on the data of the Southern Ocean Ice Limit as of May 25, 1988.  
 The map is based on the data of the Southern Ocean Ice Limit as of May 25, 1988.

A = 100%  
 B = 75%  
 C = 50%  
 D = 25%  
 E = 10%  
 F = 5%  
 G = 0%



**SOUTHERN ICE LIMIT OF JUN 188**

NAVY - NOAA JOINT ICE CENTER

NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND

1:500,000 (1:1,000,000)

NAVY - NOAA JOINT ICE CENTER

NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND

1:500,000 (1:1,000,000)

NAVY - NOAA JOINT ICE CENTER

NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND

1:500,000 (1:1,000,000)

- A = ⊕
- B = ⊕
- C = ⊙
- D = ⊕
- E = ⊕
- F = ⊕

1:500,000 (1:1,000,000)

NAVY - NOAA JOINT ICE CENTER

NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND

1:500,000 (1:1,000,000)

NAVY - NOAA JOINT ICE CENTER

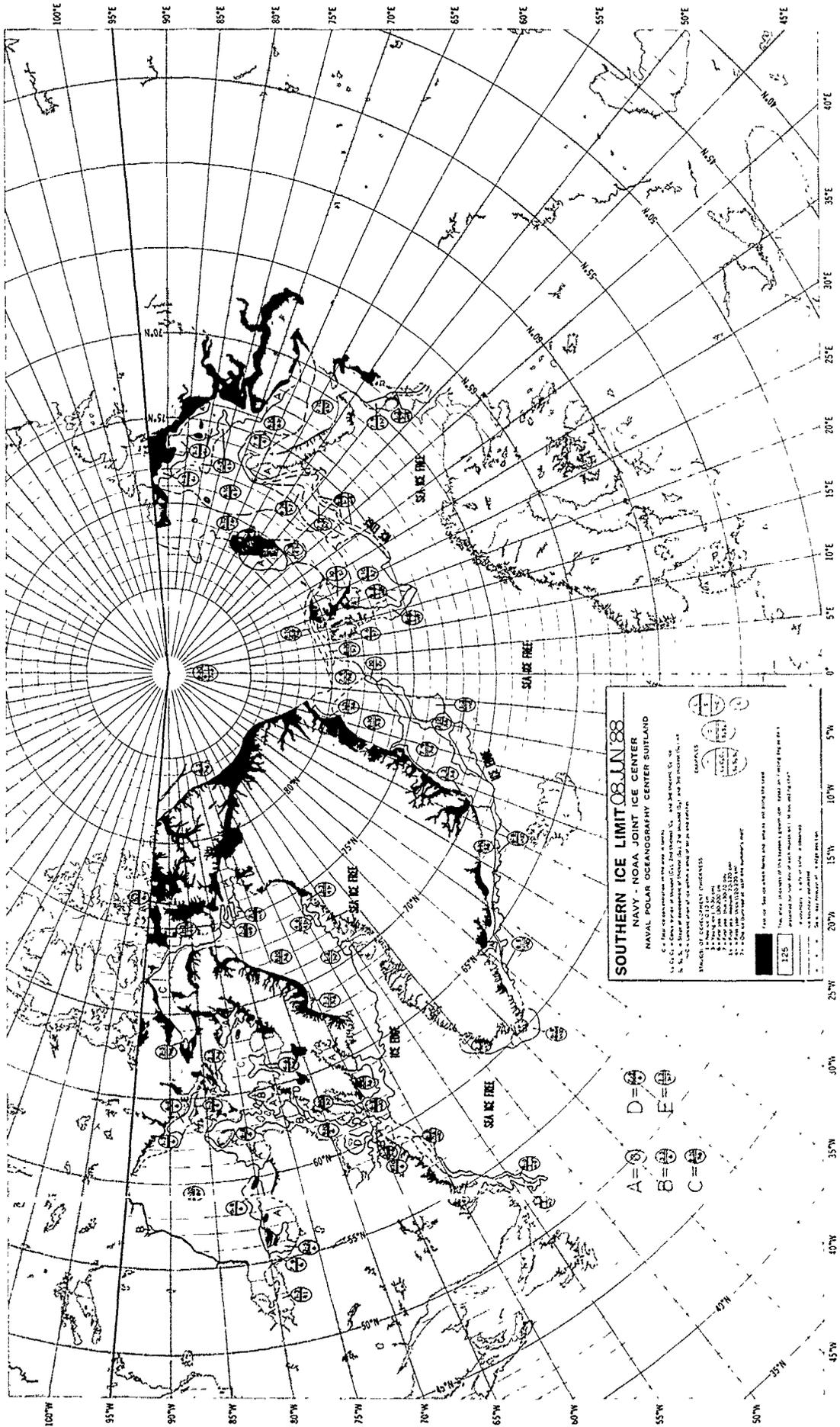
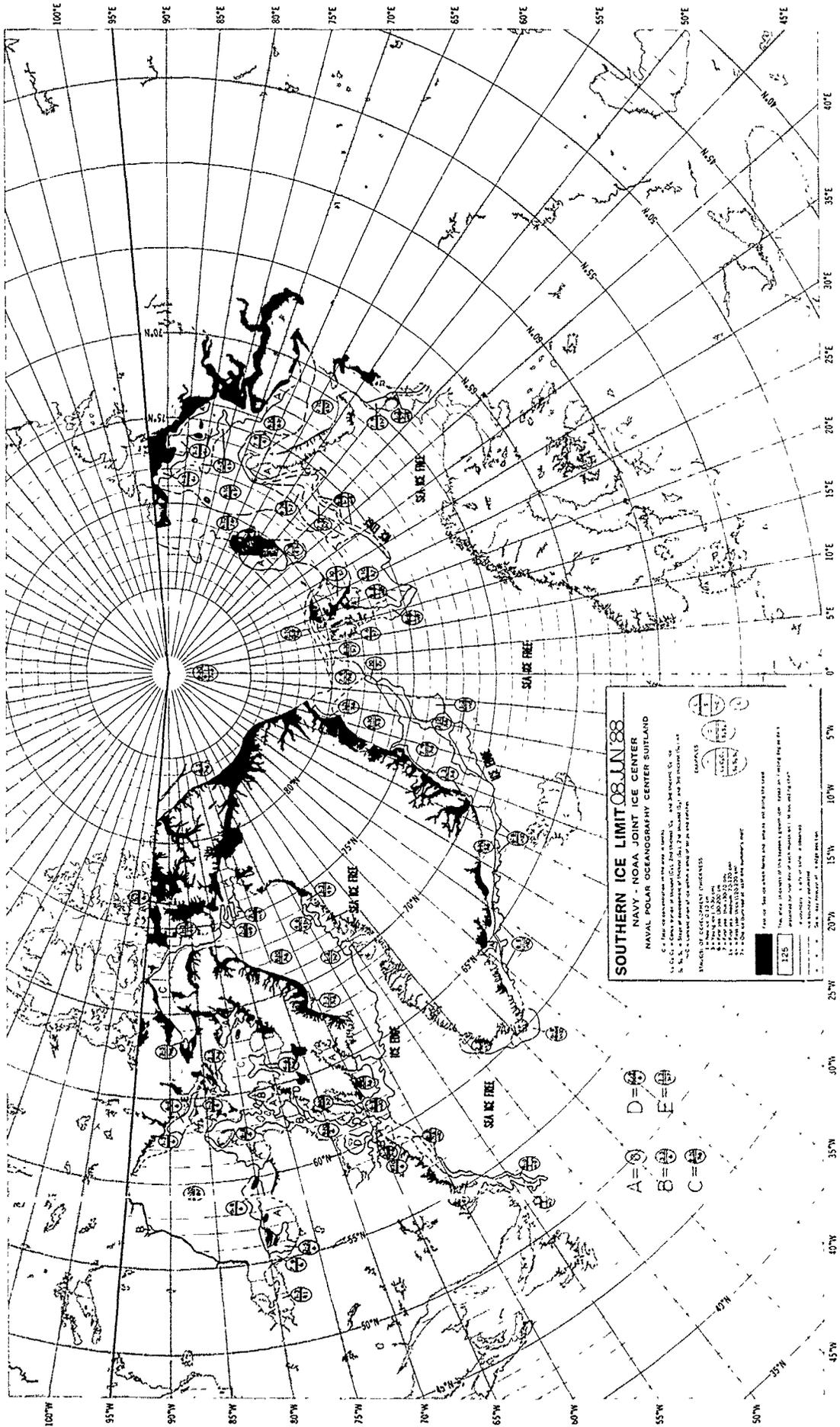
NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND

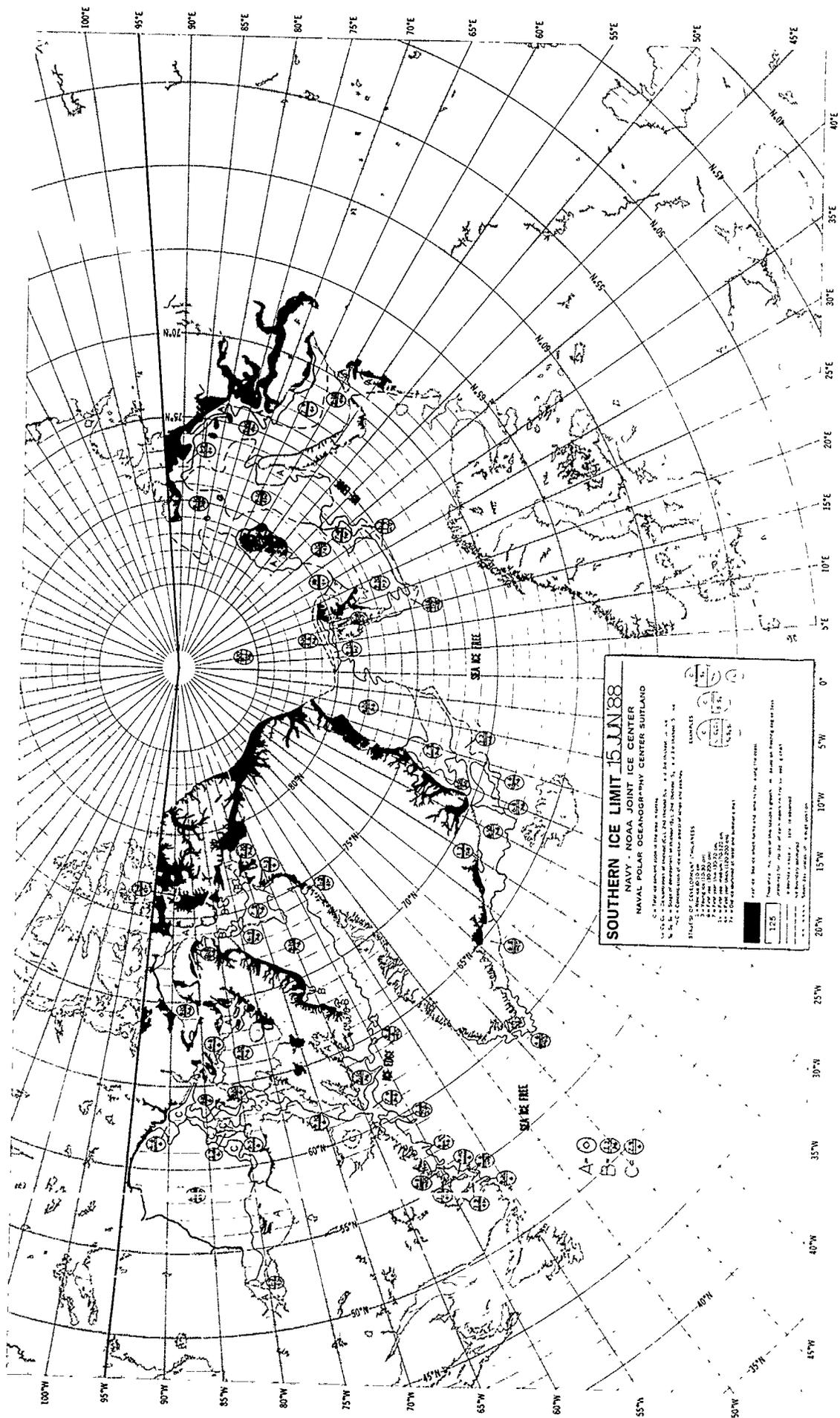
1:500,000 (1:1,000,000)

NAVY - NOAA JOINT ICE CENTER

NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND

1:500,000 (1:1,000,000)





**SOUTHERN ICE LIMIT 15 JUN 88**  
NAVAL POLAR OCEANOGRAPHY CENTER SUTLAND  
NAVY - NOAA JOINT ICE CENTER

1. Ice Limit: The ice limit is defined as the outermost edge of the ice field. It is shown as a thick black line on this chart. The ice limit is shown as a thick black line on this chart. The ice limit is shown as a thick black line on this chart.

2. Ice Observations: Ice observations are shown as circular symbols. The symbols are defined as follows:

Symbol	Description
(A)	Ice observed by the ship
(B)	Ice observed by aircraft
(C)	Ice observed by satellite

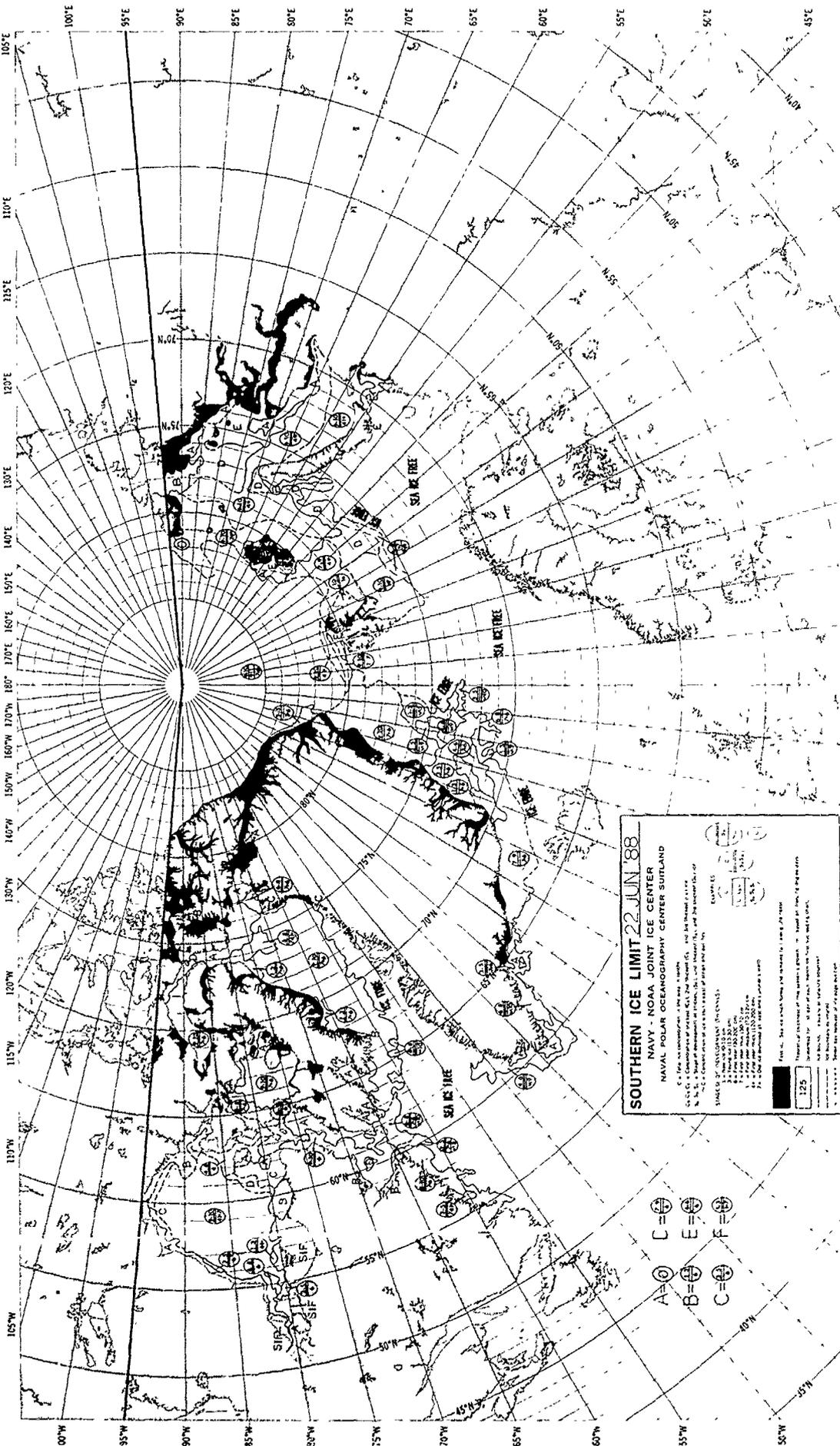
3. Sea Ice Free: Areas where no ice was observed are labeled "SEA ICE FREE".

4. Data Source: This chart is based on data from the following sources:

- U.S. Navy - Operation Iceberg (1988)
- U.S. Navy - Operation High Jump (1988)
- U.S. Navy - Operation Iceberg (1988)
- U.S. Navy - Operation High Jump (1988)

5. Chart Information:

- Scale: 1:100,000
- Projection: Lambert Conformal Conic Projection
- Reference Datum: WGS 84
- Chart Number: 1000
- Issue Date: 1988

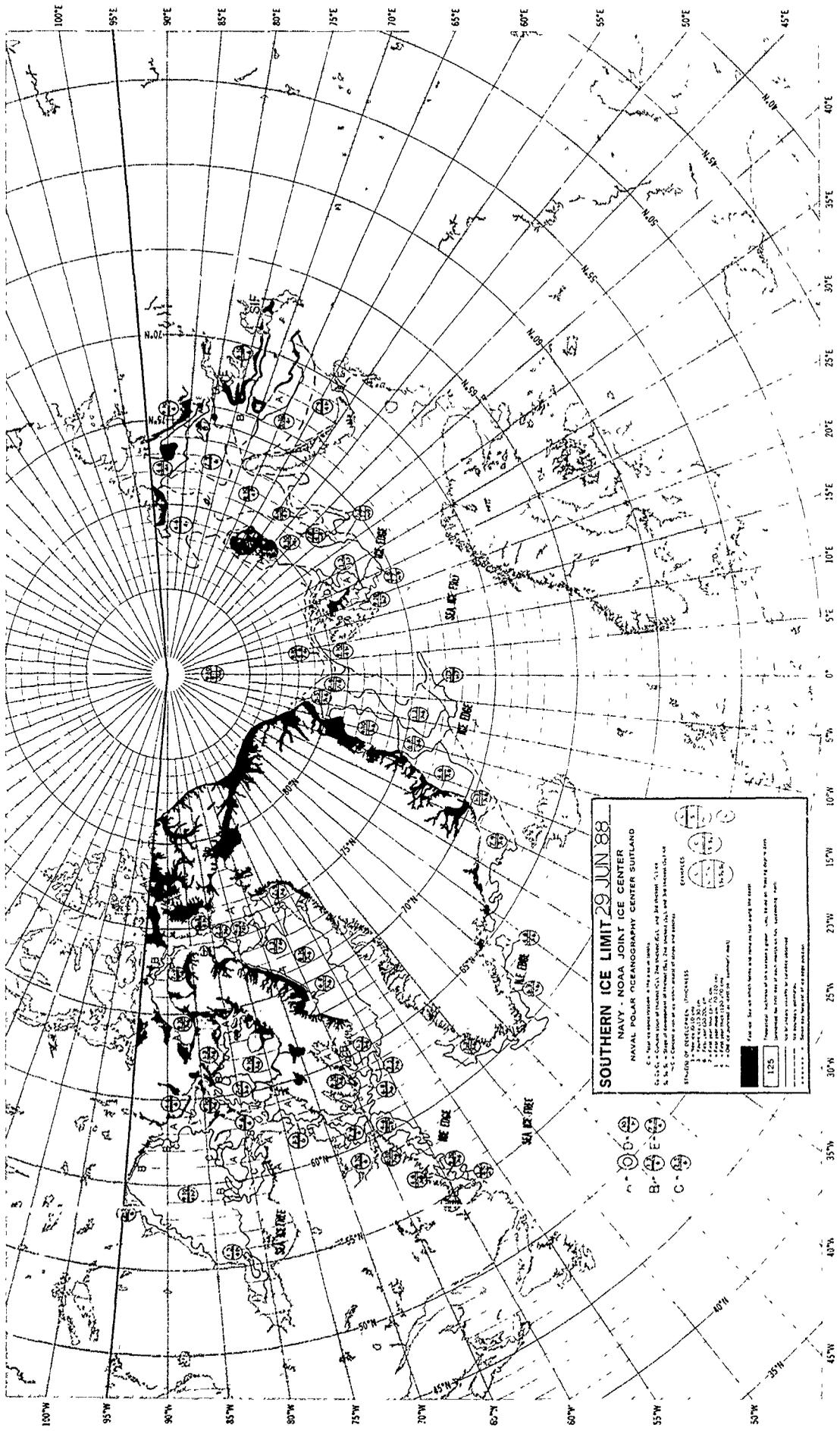


**SOUTHERN ICE LIMIT 22 JUN '88**  
 NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUTLAND

1. Contours are drawn at 100, 200, 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1300, 1400, 1500, 1600, 1700, 1800, 1900, 2000, 2100, 2200, 2300, 2400, 2500, 2600, 2700, 2800, 2900, 3000, 3100, 3200, 3300, 3400, 3500, 3600, 3700, 3800, 3900, 4000, 4100, 4200, 4300, 4400, 4500, 4600, 4700, 4800, 4900, 5000, 5100, 5200, 5300, 5400, 5500, 5600, 5700, 5800, 5900, 6000, 6100, 6200, 6300, 6400, 6500, 6600, 6700, 6800, 6900, 7000, 7100, 7200, 7300, 7400, 7500, 7600, 7700, 7800, 7900, 8000, 8100, 8200, 8300, 8400, 8500, 8600, 8700, 8800, 8900, 9000, 9100, 9200, 9300, 9400, 9500, 9600, 9700, 9800, 9900, 10000, 10100, 10200, 10300, 10400, 10500, 10600, 10700, 10800, 10900, 11000, 11100, 11200, 11300, 11400, 11500, 11600, 11700, 11800, 11900, 12000, 12100, 12200, 12300, 12400, 12500, 12600, 12700, 12800, 12900, 13000, 13100, 13200, 13300, 13400, 13500, 13600, 13700, 13800, 13900, 14000, 14100, 14200, 14300, 14400, 14500, 14600, 14700, 14800, 14900, 15000, 15100, 15200, 15300, 15400, 15500, 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72800, 72900, 73000, 73100, 73200, 73300, 73400, 73500, 73600, 73700, 73800, 73900, 74000, 74100, 74200, 74300, 74400, 74500, 74600, 74700, 74800, 74900, 75000, 75100, 75200, 75300, 75400, 75500, 75600, 75700, 75800, 75900, 76000, 76100, 76200, 76300, 76400, 76500, 76600, 76700, 76800, 76900, 77000, 77100, 77200, 77300, 77400, 77500, 77600, 77700, 77800, 77900, 78000, 78100, 78200, 78300, 78400, 78500, 78600, 78700, 78800, 78900, 79000, 79100, 79200, 79300, 79400, 79500, 79600, 79700, 79800, 79900, 80000, 80100, 80200, 80300, 80400, 80500, 80600, 80700, 80800, 80900, 81000, 81100, 81200, 81300, 81400, 81500, 81600, 81700, 81800, 81900, 82000, 82100, 82200, 82300, 82400, 82500, 82600, 82700, 82800, 82900, 83000, 83100, 83200, 83300, 83400, 83500, 83600, 83700, 83800, 83900, 84000, 84100, 84200, 84300, 84400, 84500, 84600, 84700, 84800, 84900, 85000, 85100, 85200, 85300, 85400, 85500, 85600, 85700, 85800, 85900, 86000, 86100, 86200, 86300, 86400, 86500, 86600, 86700, 86800, 86900, 87000, 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- A=①
- B=②
- C=③
- E=④
- F=⑤

Scale: 1:100,000,000  
 Date: 22 JUN 1988  
 Time: 1200Z  
 Location: 105°W 45°S



**SOUTHERN ICE LIMIT 29 JUN 88**

NAVAL POLAR OCEANOGRAPHY CENTER SUIITLAND  
 NAVY - NOAA JOINT ICE CENTER

**SYMBOLS OF INTEREST:**

- 1 - 100% Ice
- 2 - 75% Ice
- 3 - 50% Ice
- 4 - 25% Ice
- 5 - Open Water

**EXAMPLES:**

- A - 100% Ice, 100m thickness
- B - 100% Ice, 100m thickness, 100m depth
- C - 100% Ice, 100m thickness, 100m depth, 100m salinity
- D - 100% Ice, 100m thickness, 100m depth, 100m salinity, 100m ice age
- E - 100% Ice, 100m thickness, 100m depth, 100m salinity, 100m ice age, 100m ice type
- F - 100% Ice, 100m thickness, 100m depth, 100m salinity, 100m ice age, 100m ice type, 100m ice color

**Notes:**

- 1. Data is derived from satellite imagery.
- 2. Data is derived from ship reports.
- 3. Data is derived from ice charts.
- 4. Data is derived from ice logs.
- 5. Data is derived from ice reconnaissance.

A

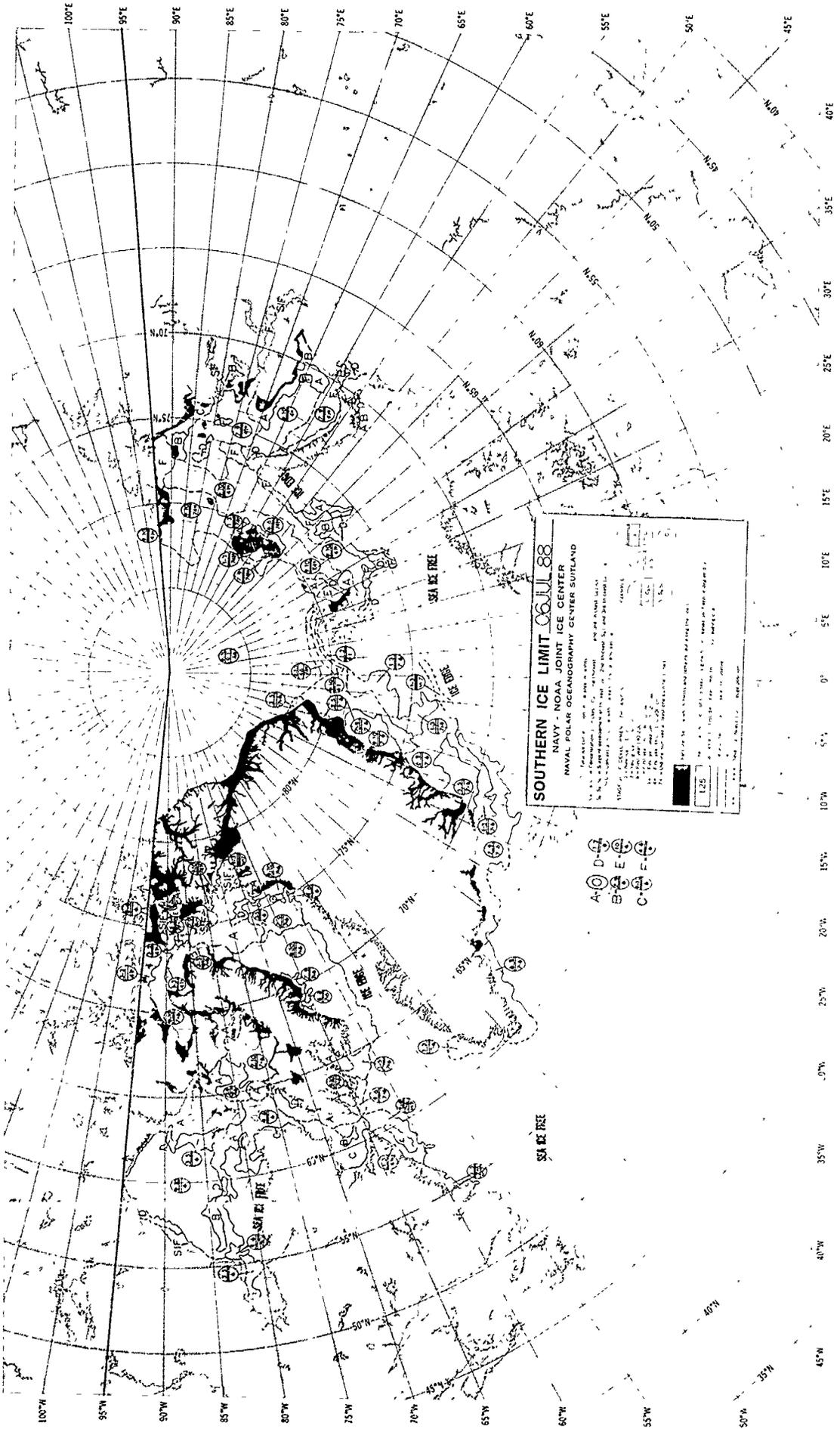
B

C

D

E

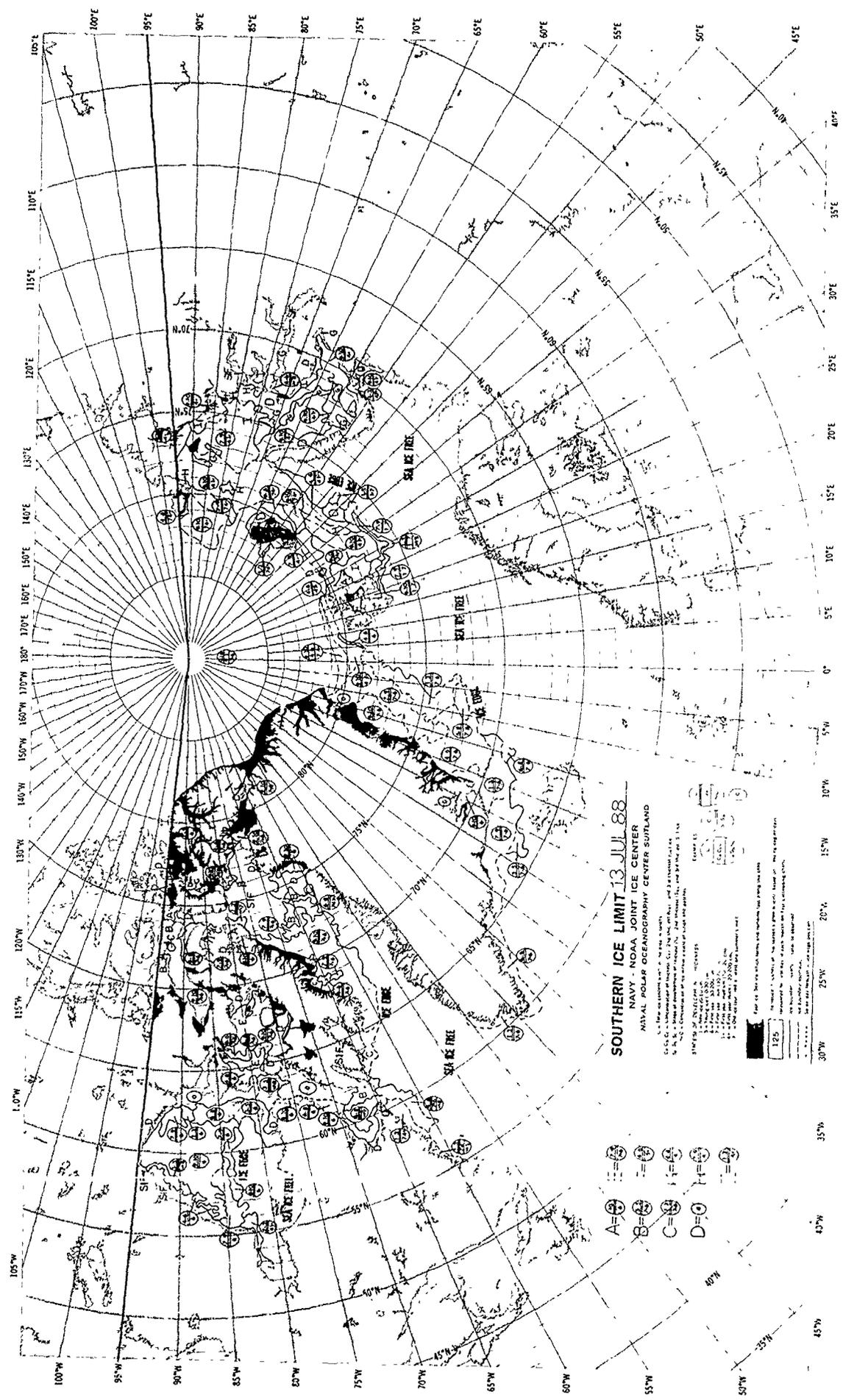
F



**SOUTHERN ICE LIMIT 06 JUL 88**  
NAVY - NOAA JOINT ICE CENTER  
NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND

SYMBOL	MEANING
(A) (C)	ICE DENSITY (kg/m <sup>3</sup> )
(B) (D)	ICE THICKNESS (m)
(E) (F)	ICE TYPE
(G) (H)	ICE DIRECTION (true)
(I) (J)	ICE SPEED (knots)
(K) (L)	ICE CRACK WIDTH (m)
(M) (N)	ICE CRACK DIRECTION (true)
(O) (P)	ICE CRACK SPEED (knots)
(Q) (R)	ICE CRACK LENGTH (m)
(S) (T)	ICE CRACK WIDTH (m)
(U) (V)	ICE CRACK DIRECTION (true)
(W) (X)	ICE CRACK SPEED (knots)
(Y) (Z)	ICE CRACK LENGTH (m)

- A (C)
- B (D)
- C (E)
- D (F)



**SOUTHERN ICE LIMIT 13 JUL 88**

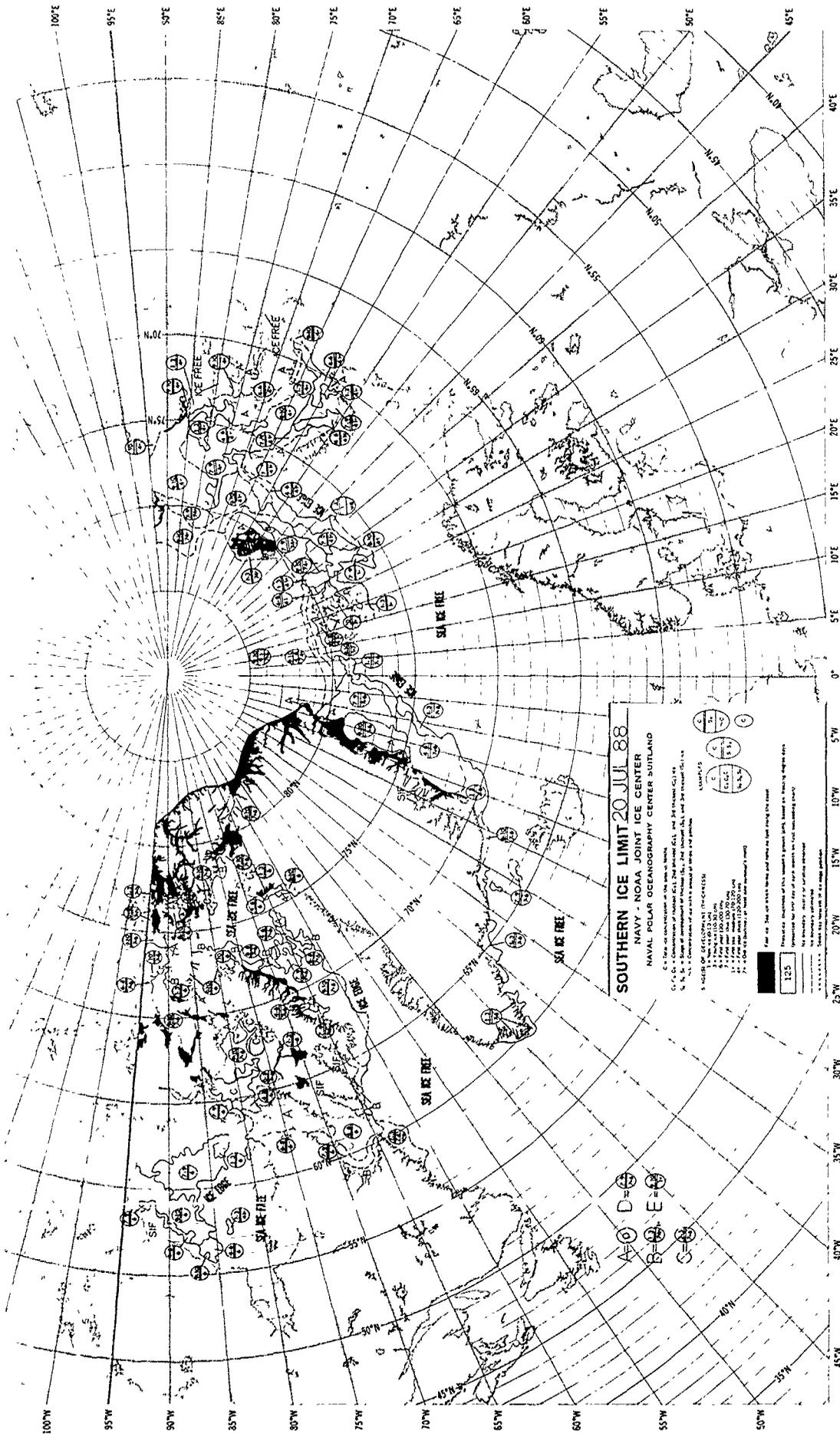
NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUTLAND

1. This chart shows the ice limit as of 13 JUL 88.  
 2. The ice limit is defined as the outer edge of the ice pack.  
 3. The ice limit is shown as a solid line with a 1/2 inch width.  
 4. The ice limit is shown as a dashed line with a 1/2 inch width.  
 5. The ice limit is shown as a dotted line with a 1/2 inch width.  
 6. The ice limit is shown as a dash-dot line with a 1/2 inch width.  
 7. The ice limit is shown as a long-dash line with a 1/2 inch width.  
 8. The ice limit is shown as a short-dash line with a 1/2 inch width.  
 9. The ice limit is shown as a solid line with a 1/2 inch width.  
 10. The ice limit is shown as a dashed line with a 1/2 inch width.

11. The ice limit is shown as a solid line with a 1/2 inch width.  
 12. The ice limit is shown as a dashed line with a 1/2 inch width.  
 13. The ice limit is shown as a dotted line with a 1/2 inch width.  
 14. The ice limit is shown as a dash-dot line with a 1/2 inch width.  
 15. The ice limit is shown as a long-dash line with a 1/2 inch width.  
 16. The ice limit is shown as a short-dash line with a 1/2 inch width.

- A = (circle with cross)
- B = (circle with dot)
- C = (circle with horizontal lines)
- D = (circle with vertical lines)
- E = (circle with diagonal lines)

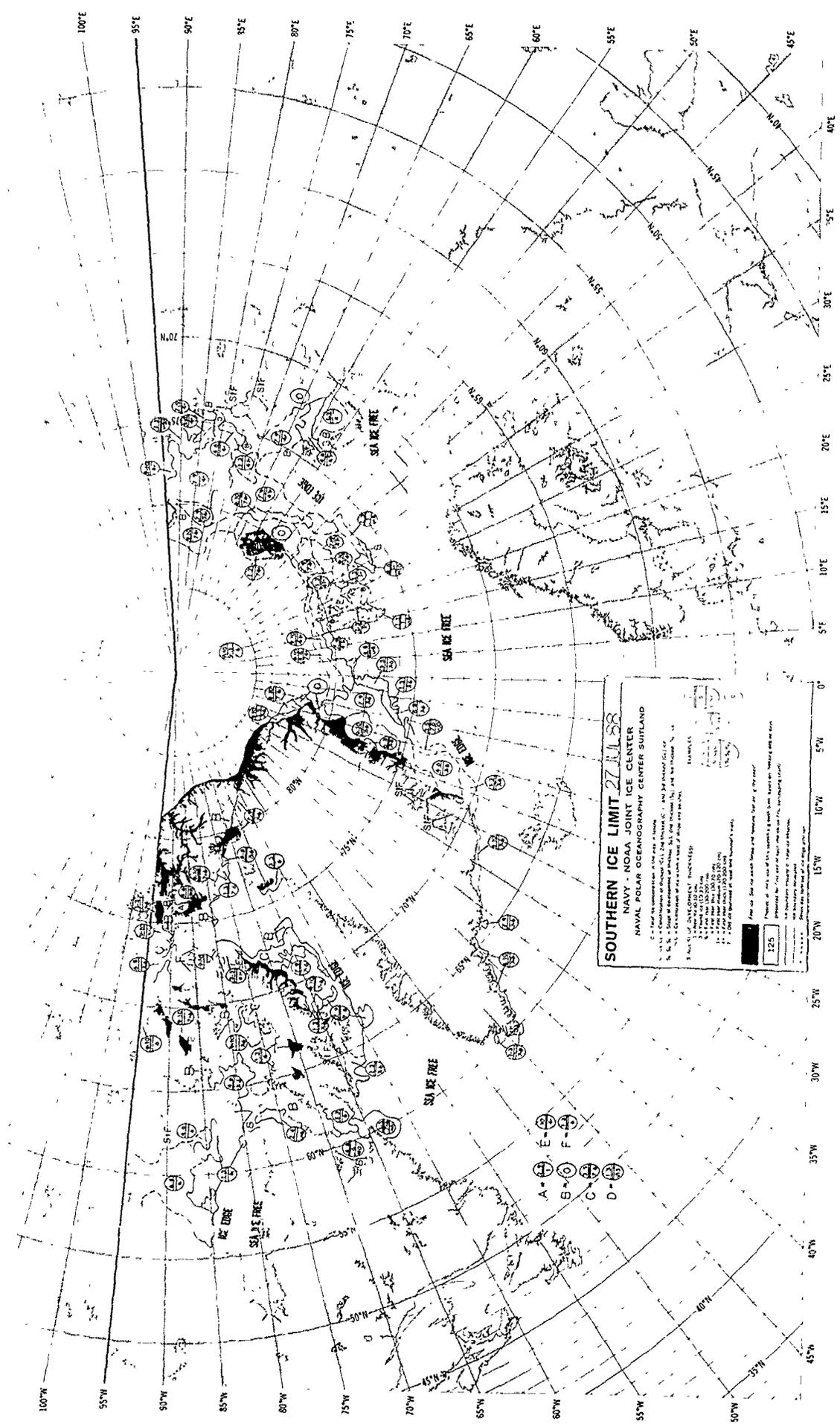
17. The ice limit is shown as a solid line with a 1/2 inch width.  
 18. The ice limit is shown as a dashed line with a 1/2 inch width.  
 19. The ice limit is shown as a dotted line with a 1/2 inch width.  
 20. The ice limit is shown as a dash-dot line with a 1/2 inch width.  
 21. The ice limit is shown as a long-dash line with a 1/2 inch width.  
 22. The ice limit is shown as a short-dash line with a 1/2 inch width.



**SOUTHERN ICE LIMIT 20 JUL 88**  
 NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUTCLIFF

1 - Area of observation  
 2 - Area of observation  
 3 - Area of observation  
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 94 - Area of observation  
 95 - Area of observation  
 96 - Area of observation  
 97 - Area of observation  
 98 - Area of observation  
 99 - Area of observation  
 100 - Area of observation

A = 0  
 B = 1  
 C = 2  
 D = 3  
 E = 4



**SOUTHERN ICE LIMIT 27 JUL 88**  
 NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND

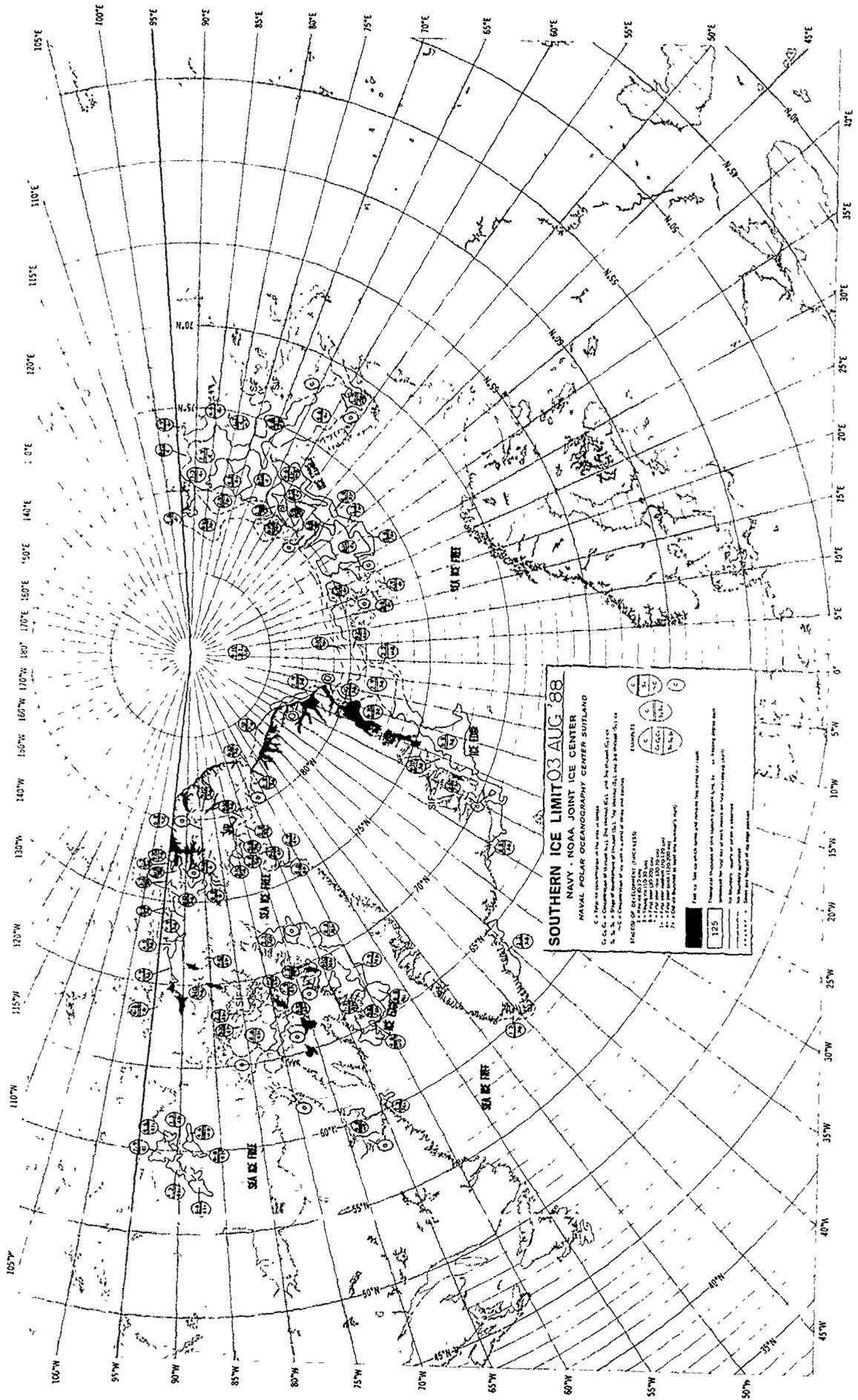
1. This chart is a composite of charts 1:250,000, 1:500,000, and 1:1,000,000 scale.  
 2. This chart is a composite of charts 1:250,000, 1:500,000, and 1:1,000,000 scale.  
 3. This chart is a composite of charts 1:250,000, 1:500,000, and 1:1,000,000 scale.  
 4. This chart is a composite of charts 1:250,000, 1:500,000, and 1:1,000,000 scale.  
 5. This chart is a composite of charts 1:250,000, 1:500,000, and 1:1,000,000 scale.  
 6. This chart is a composite of charts 1:250,000, 1:500,000, and 1:1,000,000 scale.  
 7. This chart is a composite of charts 1:250,000, 1:500,000, and 1:1,000,000 scale.  
 8. This chart is a composite of charts 1:250,000, 1:500,000, and 1:1,000,000 scale.  
 9. This chart is a composite of charts 1:250,000, 1:500,000, and 1:1,000,000 scale.  
 10. This chart is a composite of charts 1:250,000, 1:500,000, and 1:1,000,000 scale.

**SYMBOLS**

A - SEA ICE FREE  
 B - SEA ICE FREE  
 C - SEA ICE FREE  
 D - SEA ICE FREE  
 E - SEA ICE FREE  
 F - SEA ICE FREE

1:250,000

Scale: 1:250,000



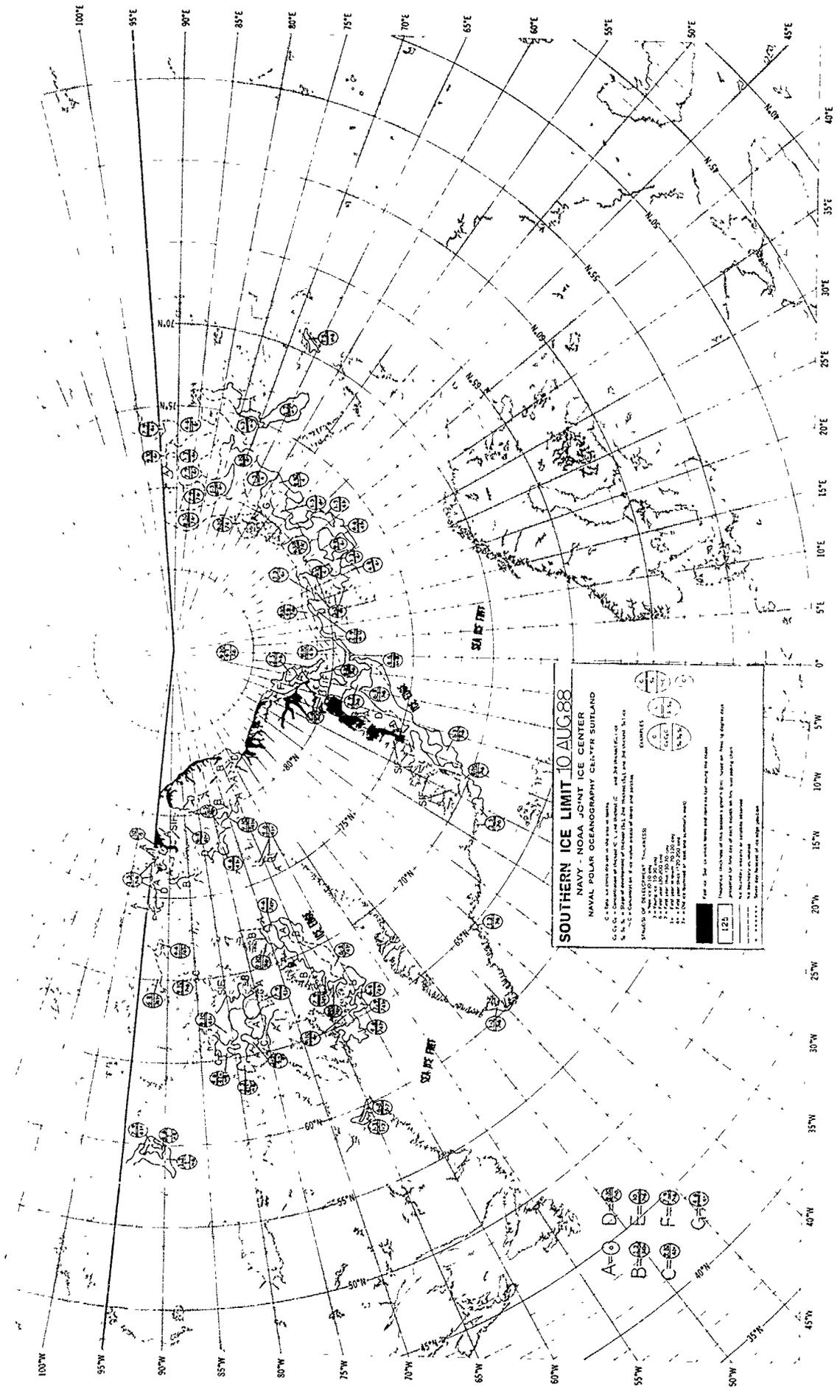
**SOUTHERN ICE LIMIT 03 AUG 88**  
 NAVAL POLAR OCEANOGRAPHY CENTER SUIIAND  
 NAVY - NOAA JOINT ICE CENTER

C = 1 Mile ice concentration in the area of interest  
 C.C. = Concentration of thickness (C, the thickness C.T., and the thickness C.T. at the same location) (C.C.C. = Concentration of thickness at same location)  
 S = 1 Mile ice concentration in the area of interest  
 S.C. = Concentration of thickness (S, the thickness S.T., and the thickness S.T. at the same location) (S.C.S. = Concentration of thickness at same location)

**EXAMPLES**

	1 mile ice concentration in the area of interest
	1 mile ice concentration in the area of interest, C.C. = Concentration of thickness
	1 mile ice concentration in the area of interest, S.C. = Concentration of thickness
	1 mile ice concentration in the area of interest, C.C. = Concentration of thickness, S.C. = Concentration of thickness

**125**  
 125 = 125 miles ice concentration in the area of interest



**SOUTHERN ICE LIMIT 10 AUG 88**  
 NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SOUTHLAND

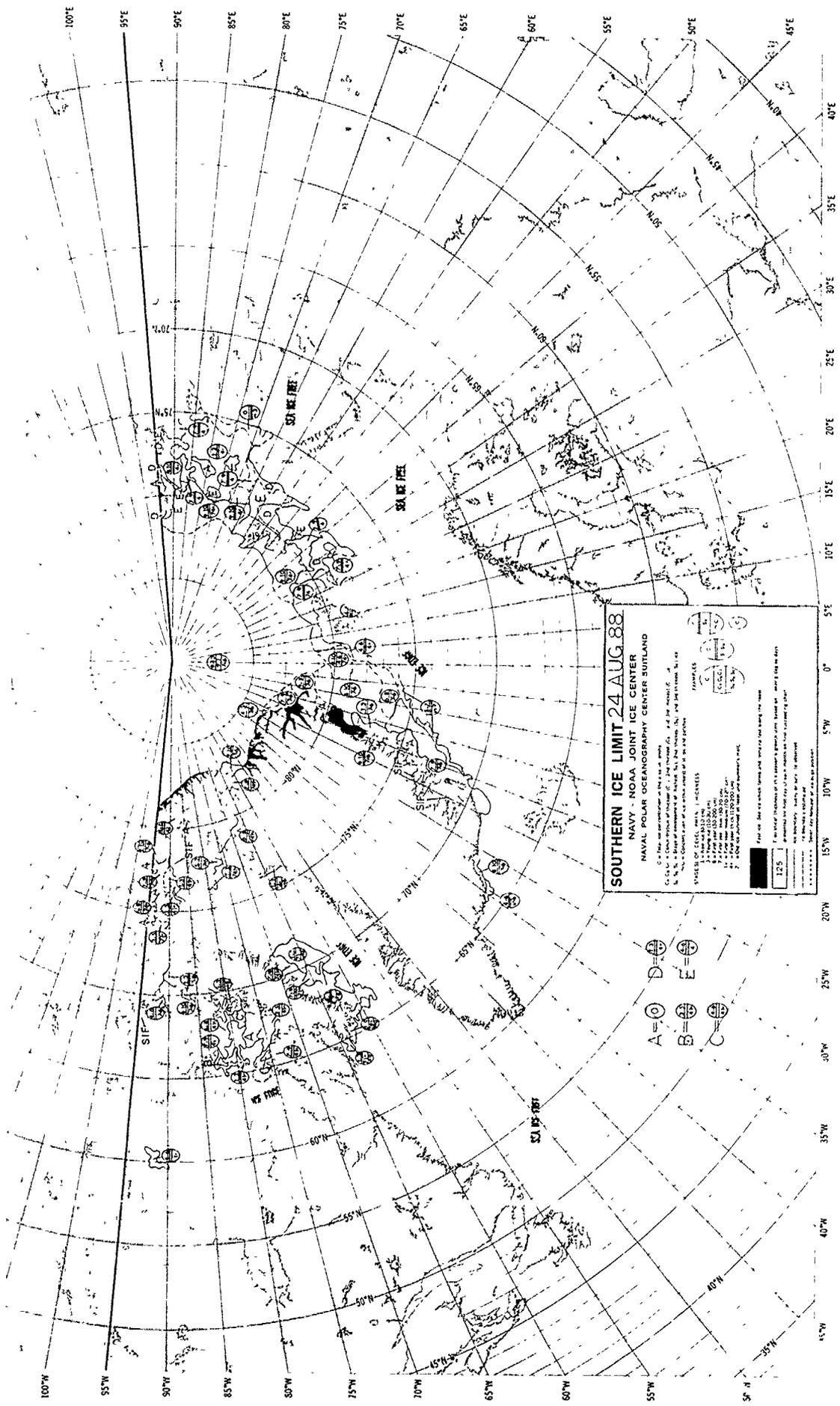
C = Mean ice concentration in the area shown.  
 S.C. = Sea ice concentration in the area shown.  
 S.C. = Sea ice concentration in the area shown.  
 S.C. = Sea ice concentration in the area shown.

**SYMBOLS OF INTEREST**

1. Iceberg  
 2. Iceberg  
 3. Iceberg  
 4. Iceberg  
 5. Iceberg  
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 99. Iceberg  
 100. Iceberg

- A = 0
- B = 1
- C = 2
- D = 3
- E = 4
- F = 5
- G = 6





**SOUTHERN ICE LIMIT 24 AUG 88**  
 NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND

1. This chart is a representation of the ice limit for the month of August, 1988, based on the data received from the Navy and NOAA. It is not a forecast of the ice limit for the month of August, 1988, but a representation of the ice limit for the month of August, 1988, based on the data received from the Navy and NOAA.

2. The ice limit is shown as a dashed line with various symbols (circles, squares, triangles) indicating data points. The symbols are defined in the legend below.

3. The ice limit is shown as a dashed line with various symbols (circles, squares, triangles) indicating data points. The symbols are defined in the legend below.

4. The ice limit is shown as a dashed line with various symbols (circles, squares, triangles) indicating data points. The symbols are defined in the legend below.

5. The ice limit is shown as a dashed line with various symbols (circles, squares, triangles) indicating data points. The symbols are defined in the legend below.

6. The ice limit is shown as a dashed line with various symbols (circles, squares, triangles) indicating data points. The symbols are defined in the legend below.

7. The ice limit is shown as a dashed line with various symbols (circles, squares, triangles) indicating data points. The symbols are defined in the legend below.

8. The ice limit is shown as a dashed line with various symbols (circles, squares, triangles) indicating data points. The symbols are defined in the legend below.

9. The ice limit is shown as a dashed line with various symbols (circles, squares, triangles) indicating data points. The symbols are defined in the legend below.

10. The ice limit is shown as a dashed line with various symbols (circles, squares, triangles) indicating data points. The symbols are defined in the legend below.

11. The ice limit is shown as a dashed line with various symbols (circles, squares, triangles) indicating data points. The symbols are defined in the legend below.

12. The ice limit is shown as a dashed line with various symbols (circles, squares, triangles) indicating data points. The symbols are defined in the legend below.

13. The ice limit is shown as a dashed line with various symbols (circles, squares, triangles) indicating data points. The symbols are defined in the legend below.

14. The ice limit is shown as a dashed line with various symbols (circles, squares, triangles) indicating data points. The symbols are defined in the legend below.

15. The ice limit is shown as a dashed line with various symbols (circles, squares, triangles) indicating data points. The symbols are defined in the legend below.

16. The ice limit is shown as a dashed line with various symbols (circles, squares, triangles) indicating data points. The symbols are defined in the legend below.

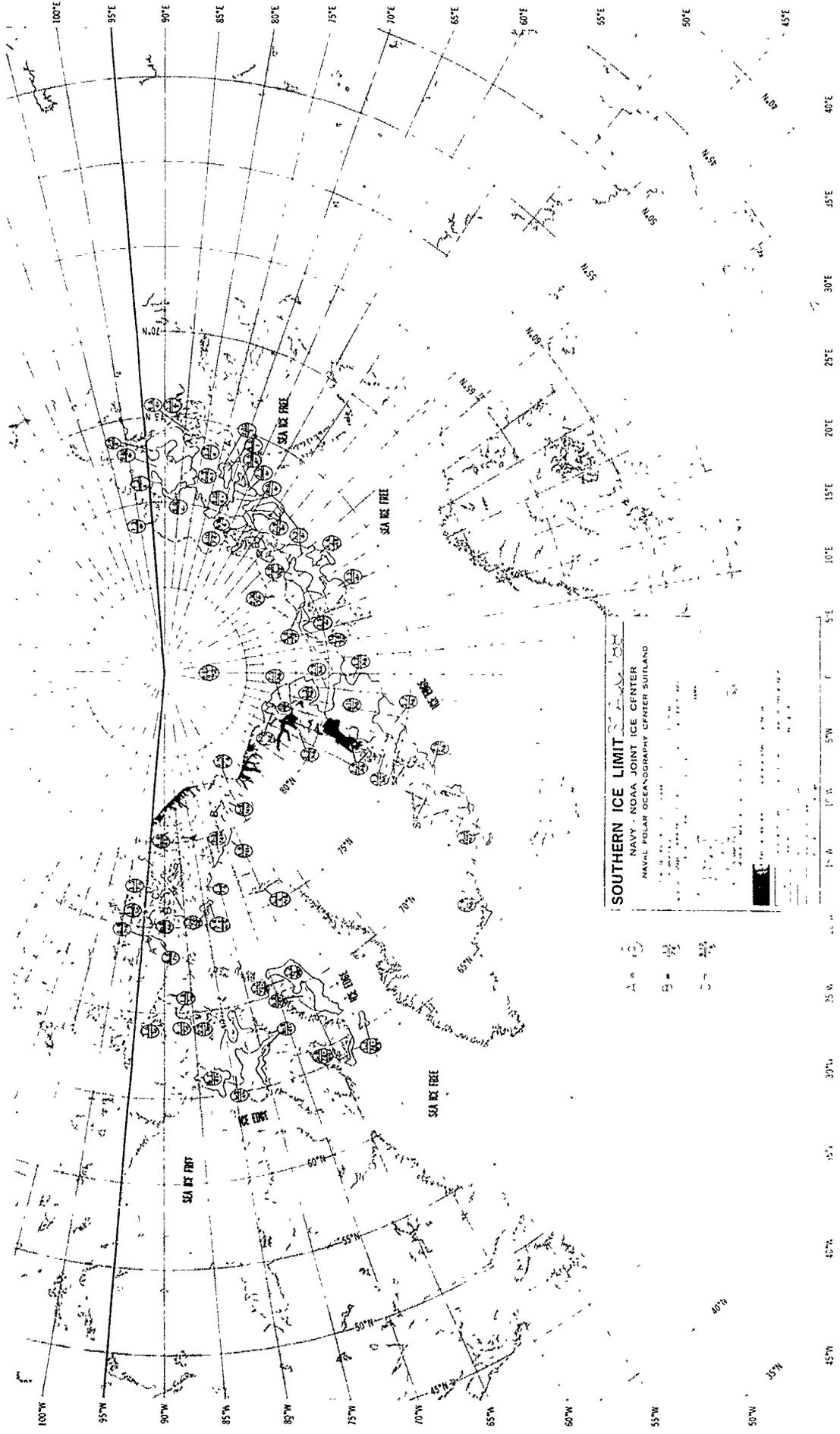
17. The ice limit is shown as a dashed line with various symbols (circles, squares, triangles) indicating data points. The symbols are defined in the legend below.

18. The ice limit is shown as a dashed line with various symbols (circles, squares, triangles) indicating data points. The symbols are defined in the legend below.

19. The ice limit is shown as a dashed line with various symbols (circles, squares, triangles) indicating data points. The symbols are defined in the legend below.

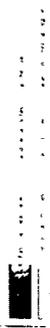
20. The ice limit is shown as a dashed line with various symbols (circles, squares, triangles) indicating data points. The symbols are defined in the legend below.

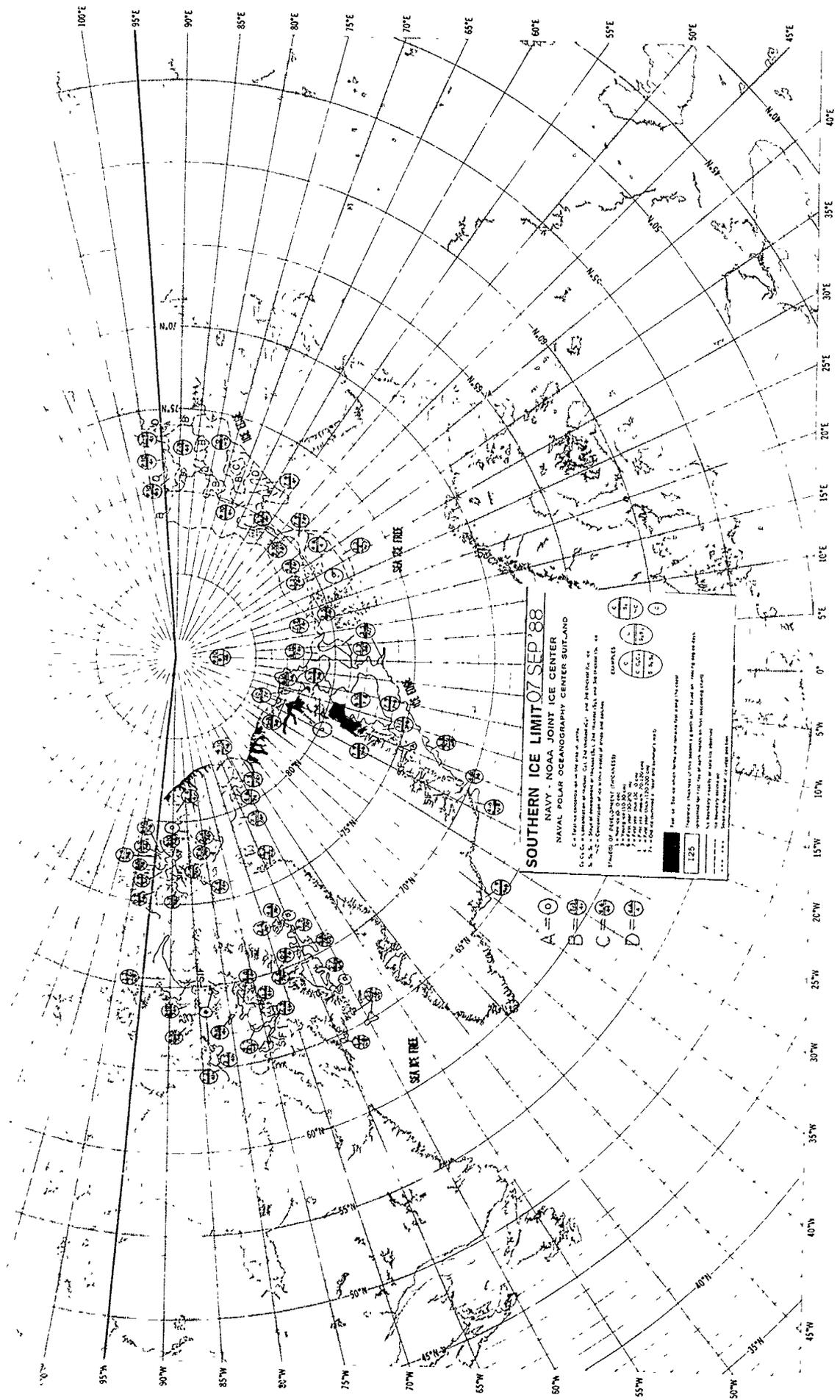
- Legend:
- A = (circle with dot)
  - B = (circle with cross)
  - C = (circle with horizontal lines)
  - D = (circle with vertical lines)
  - E = (circle with diagonal lines)
  - F = (circle with diagonal lines)
  - G = (circle with diagonal lines)
  - H = (circle with diagonal lines)
  - I = (circle with diagonal lines)
  - J = (circle with diagonal lines)
  - K = (circle with diagonal lines)
  - L = (circle with diagonal lines)
  - M = (circle with diagonal lines)
  - N = (circle with diagonal lines)
  - O = (circle with diagonal lines)
  - P = (circle with diagonal lines)
  - Q = (circle with diagonal lines)
  - R = (circle with diagonal lines)
  - S = (circle with diagonal lines)
  - T = (circle with diagonal lines)
  - U = (circle with diagonal lines)
  - V = (circle with diagonal lines)
  - W = (circle with diagonal lines)
  - X = (circle with diagonal lines)
  - Y = (circle with diagonal lines)
  - Z = (circle with diagonal lines)



**SOUTHERN ICE LIMIT**  
 NAVY - NOAA JOINT ICE CENTER  
 NAVIL POLAR OCEANOGRAPHY CENTER SUITLAND

- A = (Symbol: Circle with cross)
- B = (Symbol: Circle with dot)
- C = (Symbol: Circle with horizontal lines)





**SOUTHERN ICE LIMIT 07 SEP 88**  
 NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND

C - Data collected on the ship at sea  
 C.C.C. - Data collected on the ship at sea  
 S.S.S. - Data collected on the ship at sea  
 S.S.S. - Data collected on the ship at sea

**SYMBOLS OF OBSERVATION (FROM NALES)**

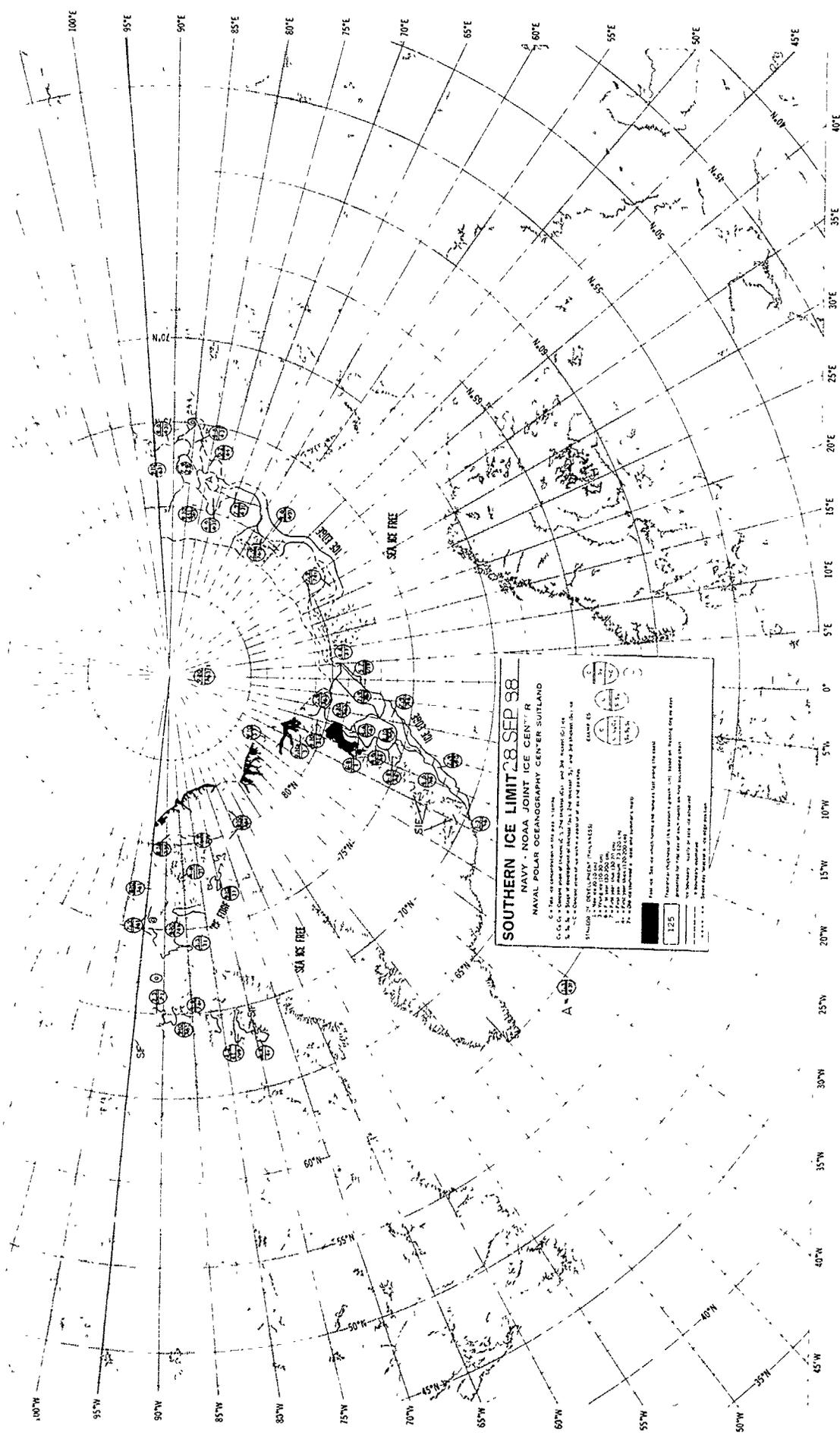
1. 1-1000 m depth  
 2. 1000-2000 m depth  
 3. 2000-3000 m depth  
 4. 3000-4000 m depth  
 5. 4000-5000 m depth  
 6. 5000-6000 m depth  
 7. 6000-7000 m depth  
 8. 7000-8000 m depth  
 9. 8000-9000 m depth  
 10. 9000-10000 m depth

For use: This chart should be used for general reference only.  
 Information furnished on this chart is based on the best available information at the time of publication.  
 The Department of Defense and the Department of State are not responsible for errors or omissions.  
 The Department of Defense and the Department of State are not responsible for errors or omissions.

- A = ○
- B = ⊗
- C = ⊕
- D = ⊙



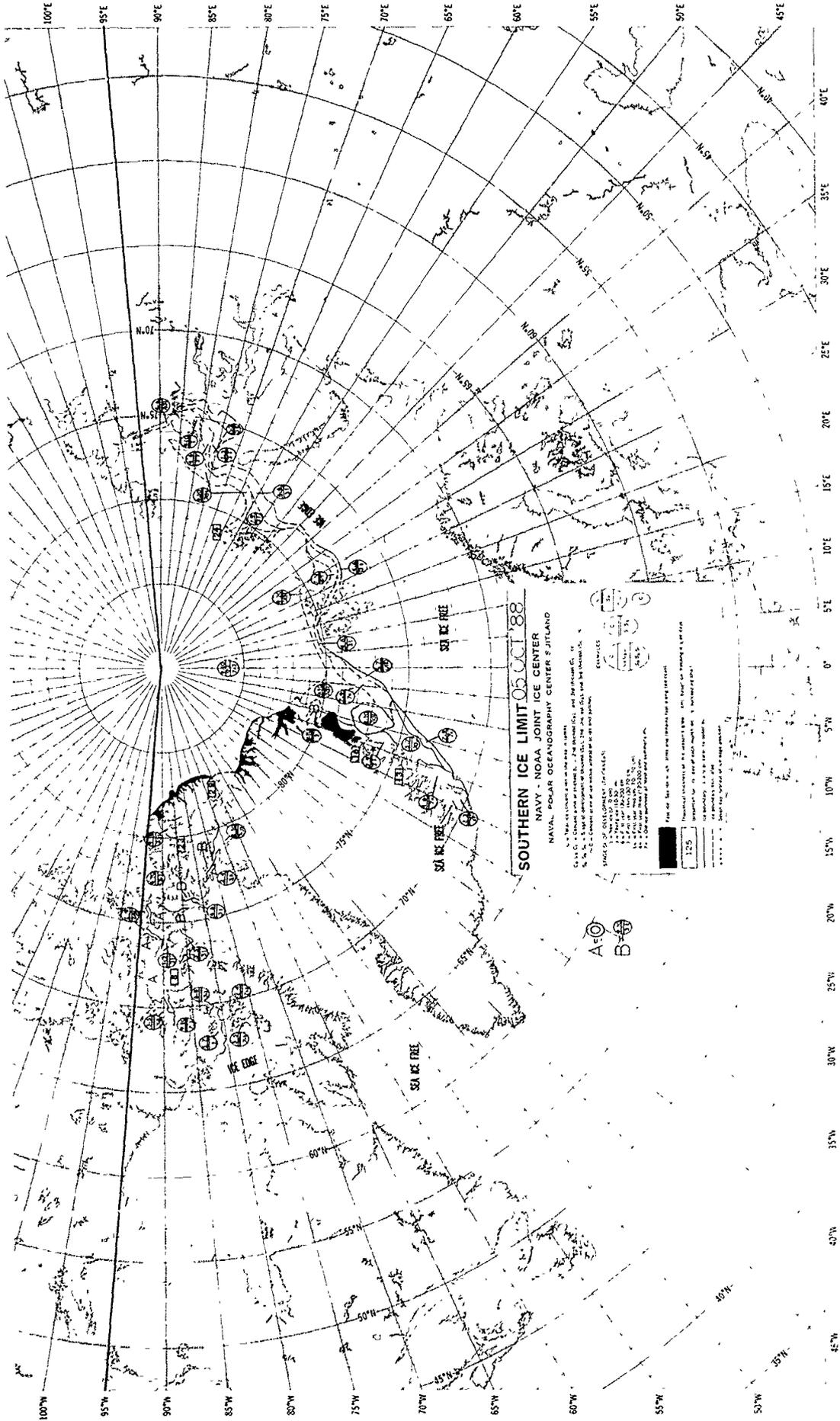




**SOUTHERN ICE LIMIT 28 SEP 88**  
 NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SOUTLAND

1. Date of observation or date of report  
 2. Name of vessel  
 3. Name of commanding officer  
 4. Name of observer  
 5. Name of observer's position  
 6. Name of observer's rank  
 7. Name of observer's service number or other identifier  
 8. Name of observer's organization  
 9. Name of observer's home address  
 10. Name of observer's telephone number  
 11. Name of observer's fax number  
 12. Name of observer's e-mail address  
 13. Name of observer's internet address  
 14. Name of observer's pager number  
 15. Name of observer's cell phone number  
 16. Name of observer's mobile phone number  
 17. Name of observer's satellite phone number  
 18. Name of observer's other phone number  
 19. Name of observer's other contact information  
 20. Name of observer's other contact information

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**SOUTHERN ICE LIMIT 03 OCT 88**

NAVY - NOAA JOINT ICE CENTER  
NAVAL POLAR OCEANOGRAPHY CENTER SUTLAND

1. This chart is intended for use as a guide only. It is not intended for navigation.  
2. The ice limit is based on satellite data and is subject to change.  
3. The ice limit is based on satellite data and is subject to change.  
4. The ice limit is based on satellite data and is subject to change.

**SOURCE OF OBSERVATIONS (SYMBOLS)**

- 1. 1979-80
- 2. 1980-81
- 3. 1981-82
- 4. 1982-83
- 5. 1983-84
- 6. 1984-85
- 7. 1985-86
- 8. 1986-87
- 9. 1987-88

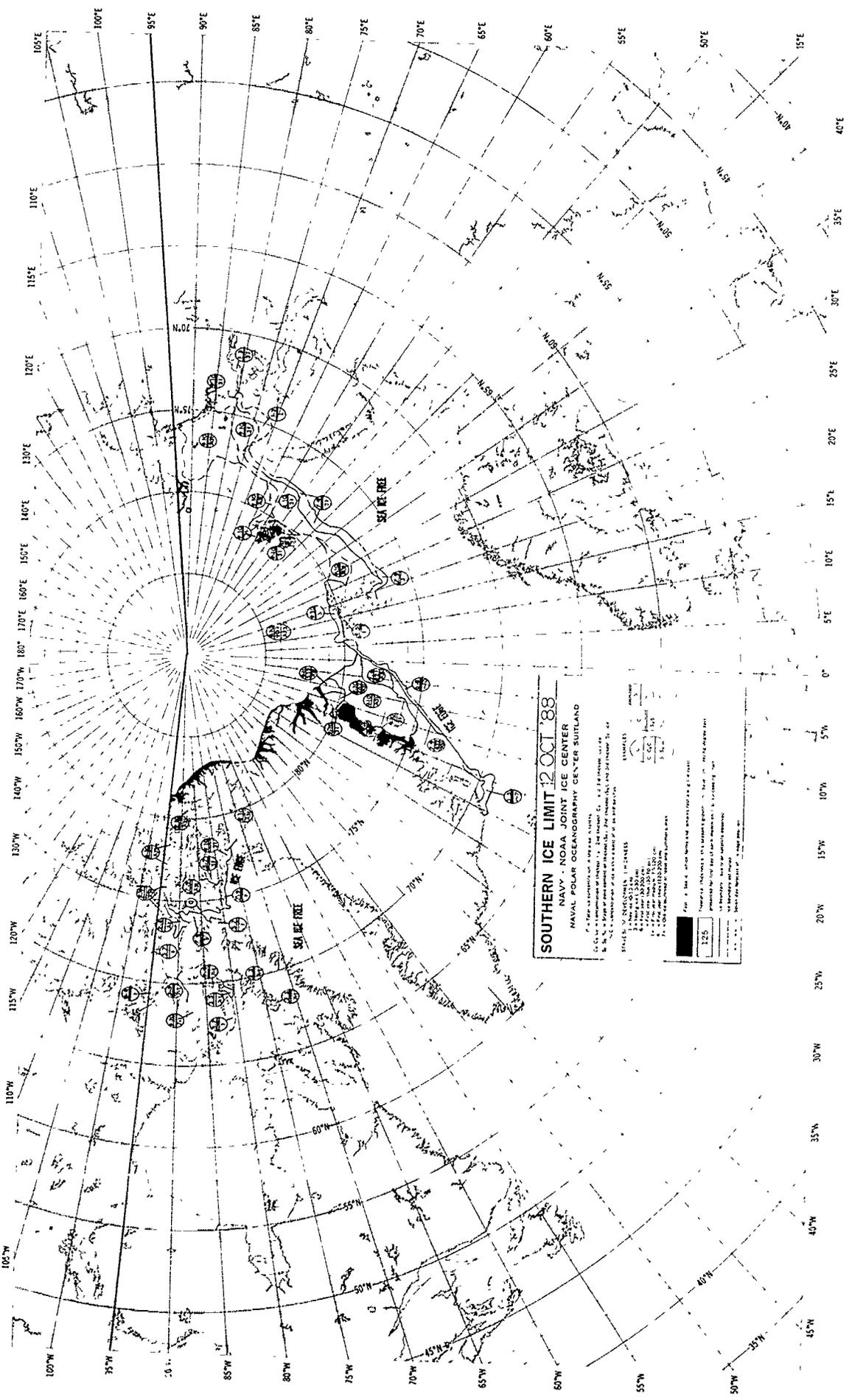
**SYMBOLS**

- 1. Ice Limit
- 2. Ice Limit
- 3. Ice Limit
- 4. Ice Limit
- 5. Ice Limit
- 6. Ice Limit
- 7. Ice Limit
- 8. Ice Limit
- 9. Ice Limit

**NOTES**

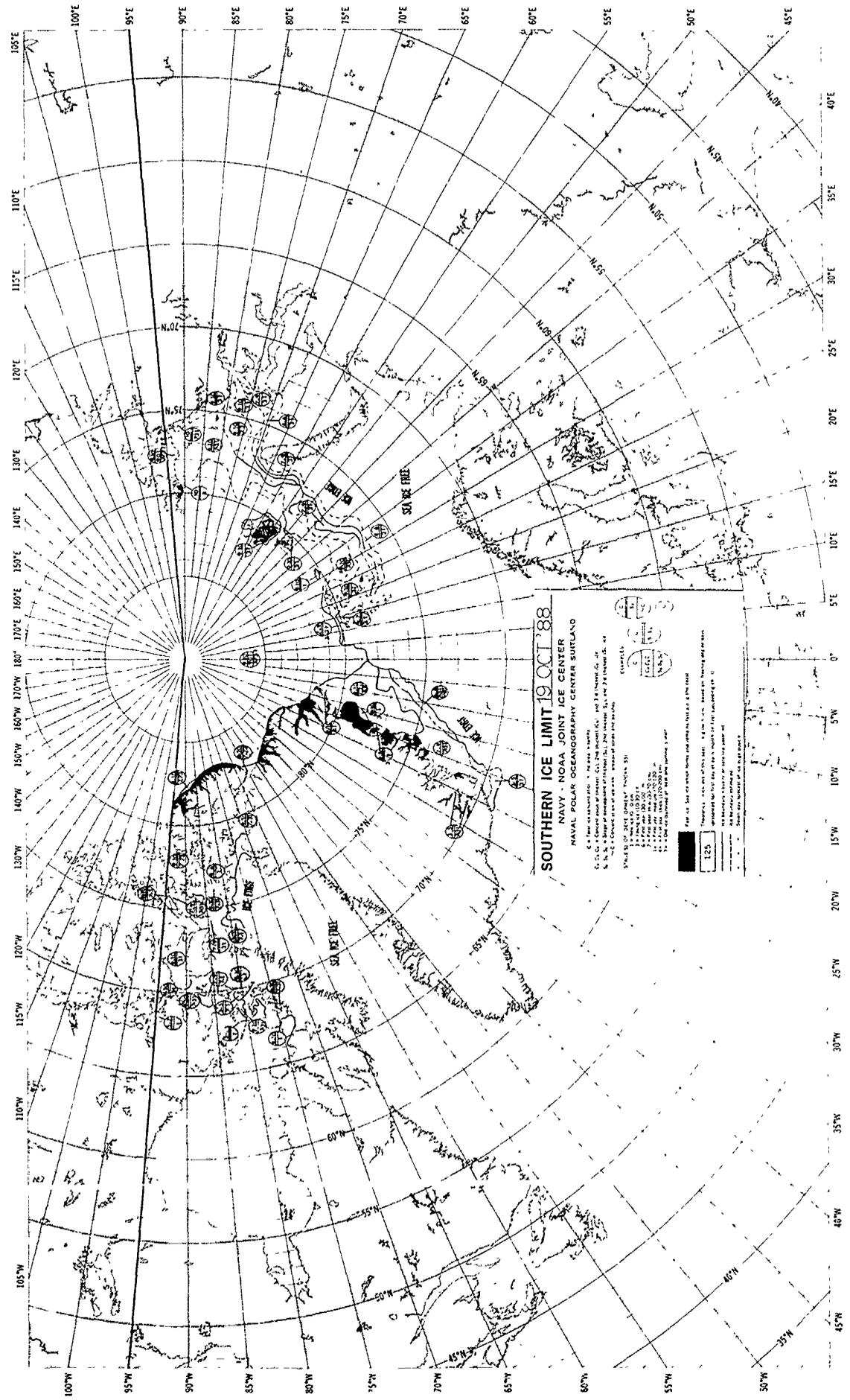
- 1. The ice limit is based on satellite data and is subject to change.
- 2. The ice limit is based on satellite data and is subject to change.
- 3. The ice limit is based on satellite data and is subject to change.

A-0  
B-0



**SOUTHERN ICE LIMIT 12 OCT '88**  
 NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND

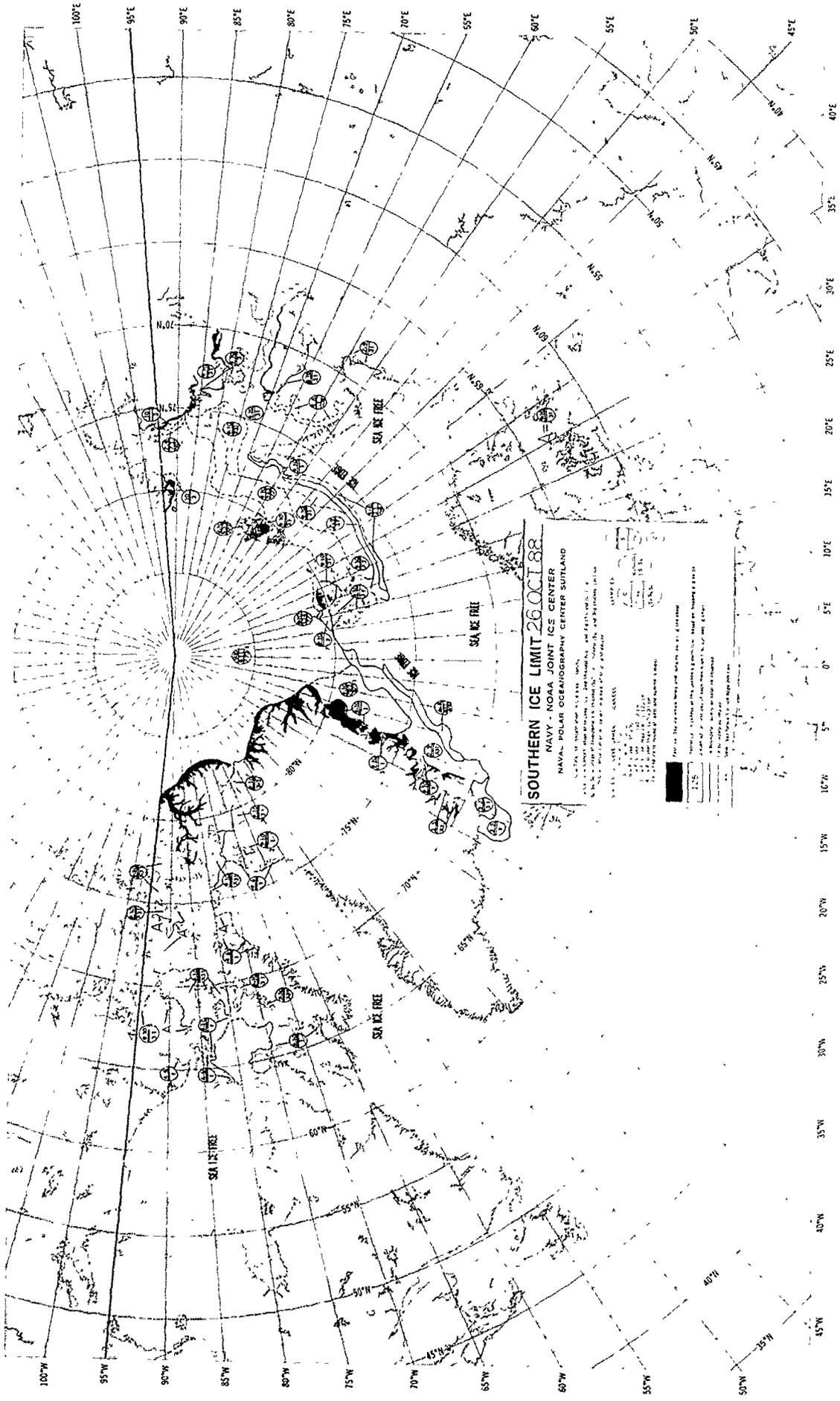
1. This map is based on the following information:  
 a. U.S. Navy and NOAA satellite data for the period 100°W to 150°W and 15°S to 85°S.  
 b. U.S. Navy and NOAA satellite data for the period 100°W to 150°W and 15°S to 85°S.  
 c. U.S. Navy and NOAA satellite data for the period 100°W to 150°W and 15°S to 85°S.  
 d. U.S. Navy and NOAA satellite data for the period 100°W to 150°W and 15°S to 85°S.  
 e. U.S. Navy and NOAA satellite data for the period 100°W to 150°W and 15°S to 85°S.  
 f. U.S. Navy and NOAA satellite data for the period 100°W to 150°W and 15°S to 85°S.  
 g. U.S. Navy and NOAA satellite data for the period 100°W to 150°W and 15°S to 85°S.  
 h. U.S. Navy and NOAA satellite data for the period 100°W to 150°W and 15°S to 85°S.  
 i. U.S. Navy and NOAA satellite data for the period 100°W to 150°W and 15°S to 85°S.  
 j. U.S. Navy and NOAA satellite data for the period 100°W to 150°W and 15°S to 85°S.  
 k. U.S. Navy and NOAA satellite data for the period 100°W to 150°W and 15°S to 85°S.  
 l. U.S. Navy and NOAA satellite data for the period 100°W to 150°W and 15°S to 85°S.  
 m. U.S. Navy and NOAA satellite data for the period 100°W to 150°W and 15°S to 85°S.  
 n. U.S. Navy and NOAA satellite data for the period 100°W to 150°W and 15°S to 85°S.  
 o. U.S. Navy and NOAA satellite data for the period 100°W to 150°W and 15°S to 85°S.  
 p. U.S. Navy and NOAA satellite data for the period 100°W to 150°W and 15°S to 85°S.  
 q. U.S. Navy and NOAA satellite data for the period 100°W to 150°W and 15°S to 85°S.  
 r. U.S. Navy and NOAA satellite data for the period 100°W to 150°W and 15°S to 85°S.  
 s. U.S. Navy and NOAA satellite data for the period 100°W to 150°W and 15°S to 85°S.  
 t. U.S. Navy and NOAA satellite data for the period 100°W to 150°W and 15°S to 85°S.  
 u. U.S. Navy and NOAA satellite data for the period 100°W to 150°W and 15°S to 85°S.  
 v. U.S. Navy and NOAA satellite data for the period 100°W to 150°W and 15°S to 85°S.  
 w. U.S. Navy and NOAA satellite data for the period 100°W to 150°W and 15°S to 85°S.  
 x. U.S. Navy and NOAA satellite data for the period 100°W to 150°W and 15°S to 85°S.  
 y. U.S. Navy and NOAA satellite data for the period 100°W to 150°W and 15°S to 85°S.  
 z. U.S. Navy and NOAA satellite data for the period 100°W to 150°W and 15°S to 85°S.



**SOUTHERN ICE LIMIT 19 OCT 58**

NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND

- 1. Ice of 1/4 inch or more thickness.
- 2. Ice of 1/2 inch or more thickness.
- 3. Ice of 3/4 inch or more thickness.
- 4. Ice of 1 inch or more thickness.
- 5. Ice of 1 1/2 inches or more thickness.
- 6. Ice of 2 inches or more thickness.
- 7. Ice of 3 inches or more thickness.
- 8. Ice of 4 inches or more thickness.
- 9. Ice of 5 inches or more thickness.
- 10. Ice of 6 inches or more thickness.
- 11. Ice of 7 inches or more thickness.
- 12. Ice of 8 inches or more thickness.
- 13. Ice of 9 inches or more thickness.
- 14. Ice of 10 inches or more thickness.
- 15. Ice of 11 inches or more thickness.
- 16. Ice of 12 inches or more thickness.
- 17. Ice of 13 inches or more thickness.
- 18. Ice of 14 inches or more thickness.
- 19. Ice of 15 inches or more thickness.
- 20. Ice of 16 inches or more thickness.
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- 96. Ice of 92 inches or more thickness.
- 97. Ice of 93 inches or more thickness.
- 98. Ice of 94 inches or more thickness.
- 99. Ice of 95 inches or more thickness.
- 100. Ice of 96 inches or more thickness.
- 101. Ice of 97 inches or more thickness.
- 102. Ice of 98 inches or more thickness.
- 103. Ice of 99 inches or more thickness.
- 104. Ice of 100 inches or more thickness.

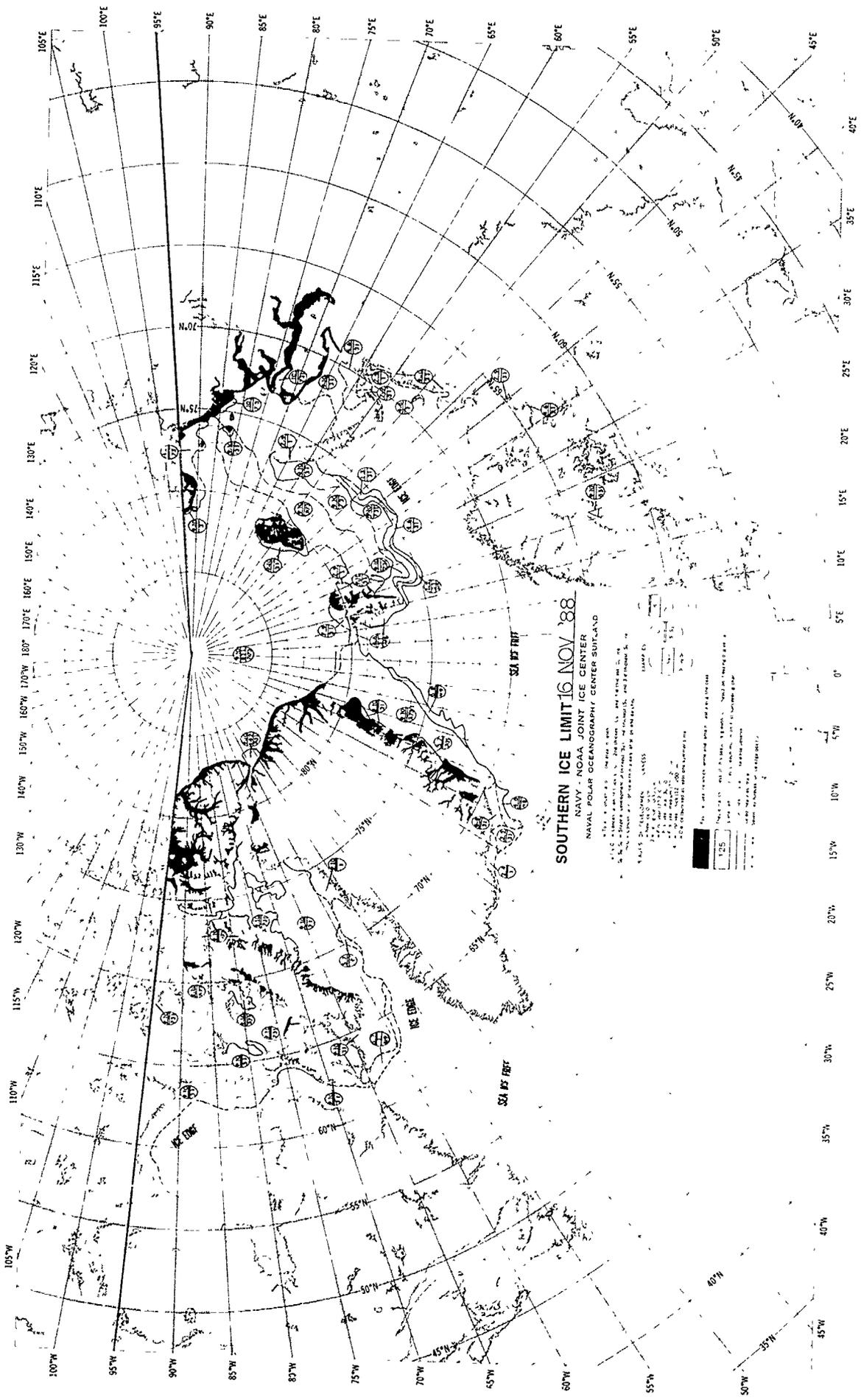


**SOUTHERN ICE LIMIT 26 OCT 1988**  
 NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUTLAND

1. Iceberg  
 2. Iceberg (observed)  
 3. Iceberg (reported)  
 4. Iceberg (estimated)  
 5. Iceberg (unobserved)  
 6. Iceberg (unreported)  
 7. Iceberg (unestimated)  
 8. Iceberg (unobserved, unreported)  
 9. Iceberg (unobserved, unreported, unestimated)  
 10. Iceberg (unobserved, unreported, unestimated, unobserved)  
 11. Iceberg (unobserved, unreported, unestimated, unobserved, unreported)  
 12. Iceberg (unobserved, unreported, unestimated, unobserved, unreported, unestimated)  
 13. Iceberg (unobserved, unreported, unestimated, unobserved, unreported, unestimated, unobserved)  
 14. Iceberg (unobserved, unreported, unestimated, unobserved, unreported, unestimated, unobserved, unreported)  
 15. Iceberg (unobserved, unreported, unestimated, unobserved, unreported, unestimated, unobserved, unreported, unestimated)  
 16. Iceberg (unobserved, unreported, unestimated, unobserved, unreported, unestimated, unobserved, unreported, unestimated, unobserved)  
 17. Iceberg (unobserved, unreported, unestimated, unobserved, unreported, unestimated, unobserved, unreported, unestimated, unobserved, unreported)  
 18. Iceberg (unobserved, unreported, unestimated, unobserved, unreported, unestimated, unobserved, unreported, unestimated, unobserved, unreported, unestimated)  
 19. Iceberg (unobserved, unreported, unestimated, unobserved, unreported, unestimated, unobserved, unreported, unestimated, unobserved, unreported, unestimated, unobserved)  
 20. Iceberg (unobserved, unreported, unestimated, unobserved, unreported, unestimated, unobserved, unreported, unestimated, unobserved, unreported, unestimated, unobserved, unreported)







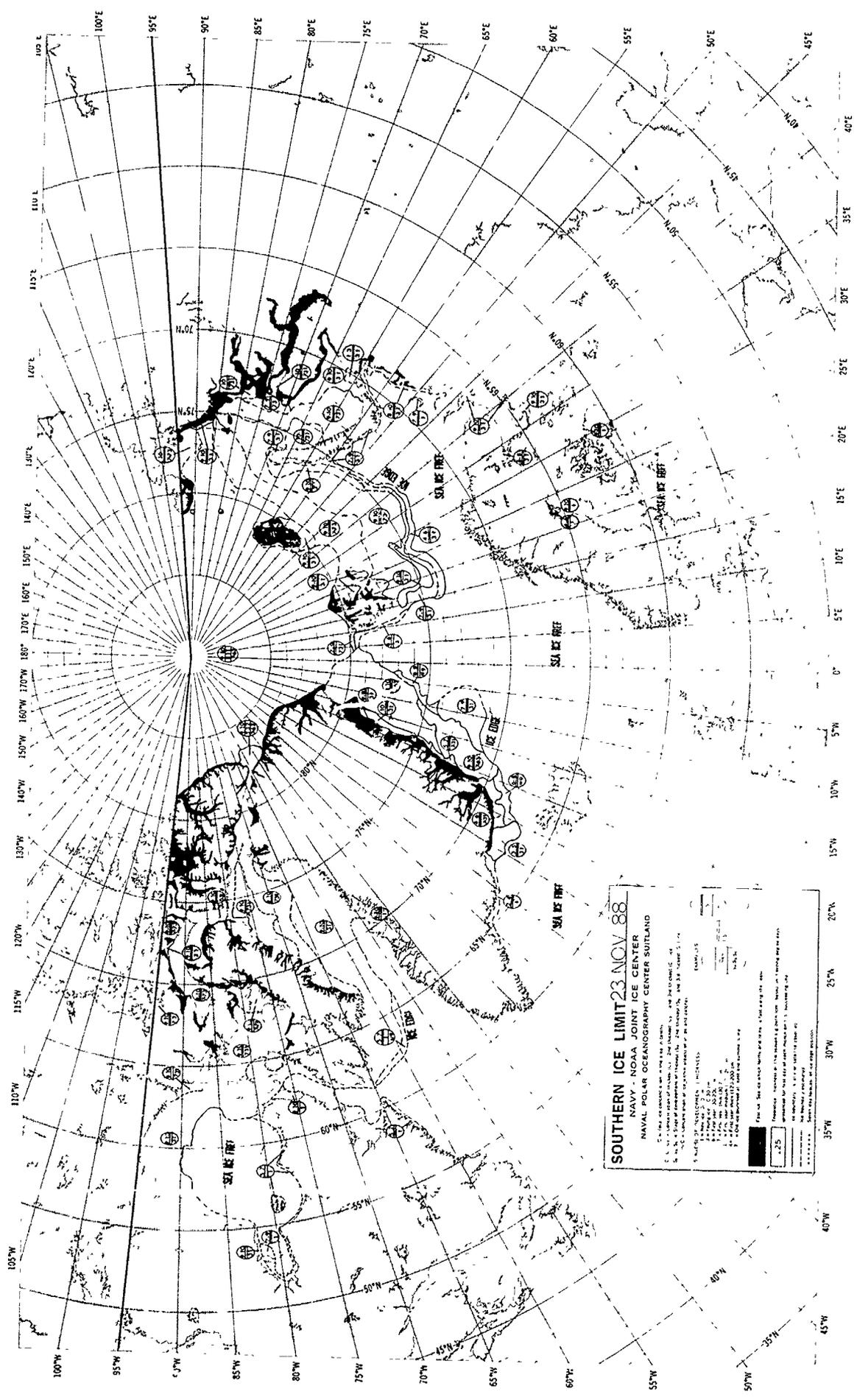
**SOUTHERN ICE LIMIT 16 NOV '88**

NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND

THIS IS A SUMMARY OF THE SOUTHERN ICE LIMIT DATA FOR THE DATE SHOWN. THE DATA IS BASED ON THE REPORTS OF THE ICEBERG WATERSHED SURVEILLANCE SYSTEM (IWSS) AND THE ICEBERG WATERSHED SURVEILLANCE SYSTEM (IWSS) DATA CENTER. THE DATA IS BASED ON THE REPORTS OF THE ICEBERG WATERSHED SURVEILLANCE SYSTEM (IWSS) AND THE ICEBERG WATERSHED SURVEILLANCE SYSTEM (IWSS) DATA CENTER.

ICEBERG WATERSHED SURVEILLANCE SYSTEM (IWSS) DATA CENTER  
 1000 WASHINGTON AVENUE  
 SUITLAND, ALASKA 99661  
 (907) 485-2000  
 FAX (907) 485-2001  
 WWW.IWSS.NA.NAVY.MIL

THIS IS A SUMMARY OF THE SOUTHERN ICE LIMIT DATA FOR THE DATE SHOWN. THE DATA IS BASED ON THE REPORTS OF THE ICEBERG WATERSHED SURVEILLANCE SYSTEM (IWSS) AND THE ICEBERG WATERSHED SURVEILLANCE SYSTEM (IWSS) DATA CENTER. THE DATA IS BASED ON THE REPORTS OF THE ICEBERG WATERSHED SURVEILLANCE SYSTEM (IWSS) AND THE ICEBERG WATERSHED SURVEILLANCE SYSTEM (IWSS) DATA CENTER.



**SOUTHERN ICE LIMIT 23 NOV 88**  
 NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND

1. This chart displays the ice limit data for the period 23 NOV 88. The data is derived from the following sources:  
 a. U.S. Navy - Naval Polar Oceanography Center Suitland  
 b. U.S. Navy - Naval Oceanographic Office  
 c. U.S. Navy - Naval Hydrographic Office  
 d. U.S. Navy - Naval Air Station  
 e. U.S. Navy - Naval Facilities Engineering Command  
 f. U.S. Navy - Naval Facilities Engineering Command  
 g. U.S. Navy - Naval Facilities Engineering Command

2. The chart displays the ice limit data for the period 23 NOV 88. The data is derived from the following sources:  
 a. U.S. Navy - Naval Polar Oceanography Center Suitland  
 b. U.S. Navy - Naval Oceanographic Office  
 c. U.S. Navy - Naval Hydrographic Office  
 d. U.S. Navy - Naval Air Station  
 e. U.S. Navy - Naval Facilities Engineering Command  
 f. U.S. Navy - Naval Facilities Engineering Command  
 g. U.S. Navy - Naval Facilities Engineering Command

3. The chart displays the ice limit data for the period 23 NOV 88. The data is derived from the following sources:  
 a. U.S. Navy - Naval Polar Oceanography Center Suitland  
 b. U.S. Navy - Naval Oceanographic Office  
 c. U.S. Navy - Naval Hydrographic Office  
 d. U.S. Navy - Naval Air Station  
 e. U.S. Navy - Naval Facilities Engineering Command  
 f. U.S. Navy - Naval Facilities Engineering Command  
 g. U.S. Navy - Naval Facilities Engineering Command

4. The chart displays the ice limit data for the period 23 NOV 88. The data is derived from the following sources:  
 a. U.S. Navy - Naval Polar Oceanography Center Suitland  
 b. U.S. Navy - Naval Oceanographic Office  
 c. U.S. Navy - Naval Hydrographic Office  
 d. U.S. Navy - Naval Air Station  
 e. U.S. Navy - Naval Facilities Engineering Command  
 f. U.S. Navy - Naval Facilities Engineering Command  
 g. U.S. Navy - Naval Facilities Engineering Command





**SOUTHERN ICE LIMIT 27 DEC 68**  
 NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND

1. This map shows the ice limit for the month of December 1968. The ice limit is defined as the outermost edge of the ice cover. The ice limit is shown as a solid line. The ice limit is shown as a dashed line when the ice cover is broken up into small pieces. The ice limit is shown as a dotted line when the ice cover is broken up into small pieces and the ice is thin. The ice limit is shown as a dash-dot line when the ice cover is broken up into small pieces and the ice is thin and the ice is thin.

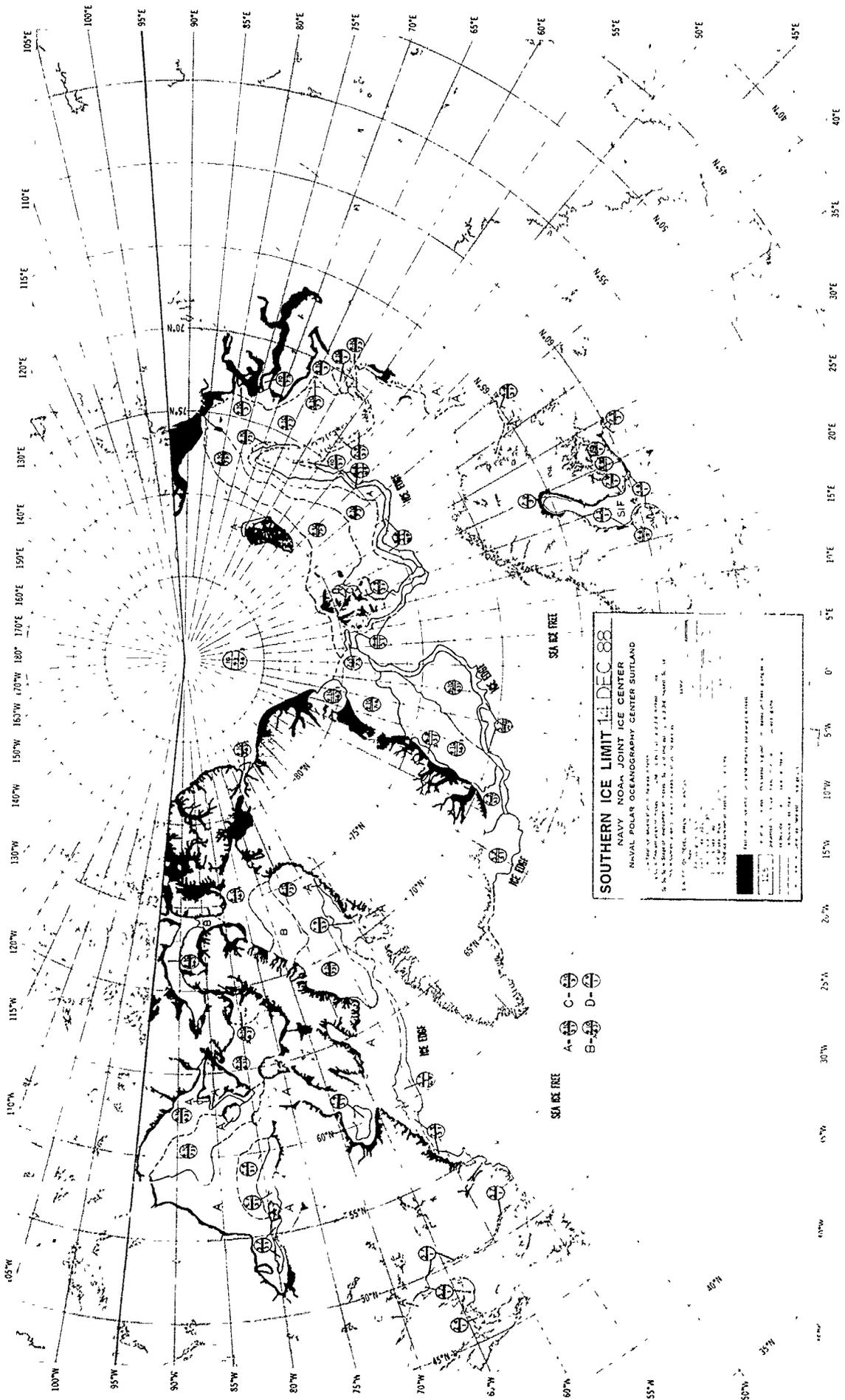
2. The ice limit is shown as a solid line when the ice cover is continuous. The ice limit is shown as a dashed line when the ice cover is broken up into small pieces. The ice limit is shown as a dotted line when the ice cover is broken up into small pieces and the ice is thin. The ice limit is shown as a dash-dot line when the ice cover is broken up into small pieces and the ice is thin and the ice is thin.

3. The ice limit is shown as a solid line when the ice cover is continuous. The ice limit is shown as a dashed line when the ice cover is broken up into small pieces. The ice limit is shown as a dotted line when the ice cover is broken up into small pieces and the ice is thin. The ice limit is shown as a dash-dot line when the ice cover is broken up into small pieces and the ice is thin and the ice is thin.

4. The ice limit is shown as a solid line when the ice cover is continuous. The ice limit is shown as a dashed line when the ice cover is broken up into small pieces. The ice limit is shown as a dotted line when the ice cover is broken up into small pieces and the ice is thin. The ice limit is shown as a dash-dot line when the ice cover is broken up into small pieces and the ice is thin and the ice is thin.

5. The ice limit is shown as a solid line when the ice cover is continuous. The ice limit is shown as a dashed line when the ice cover is broken up into small pieces. The ice limit is shown as a dotted line when the ice cover is broken up into small pieces and the ice is thin. The ice limit is shown as a dash-dot line when the ice cover is broken up into small pieces and the ice is thin and the ice is thin.

A ⊕  
 B ⊕

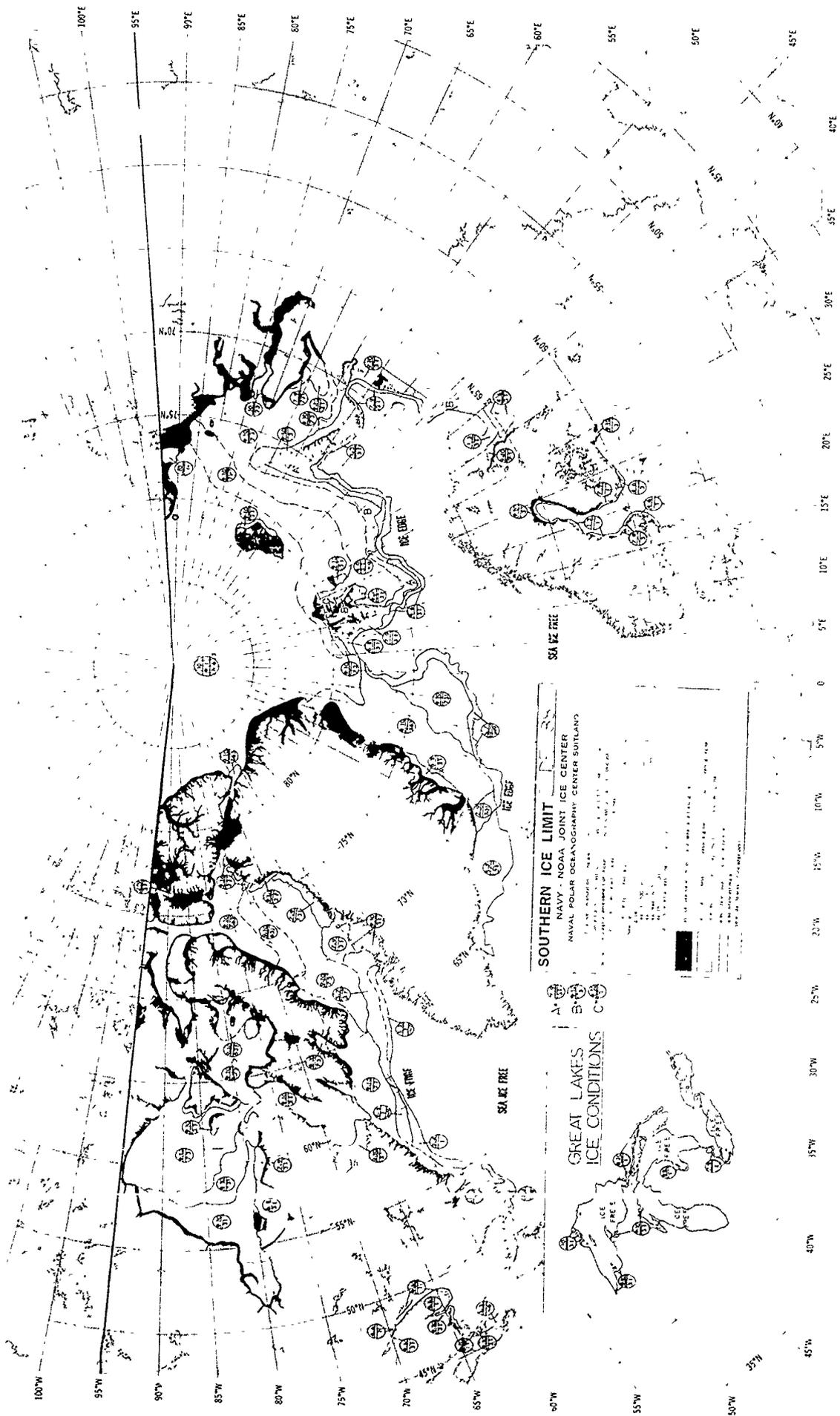


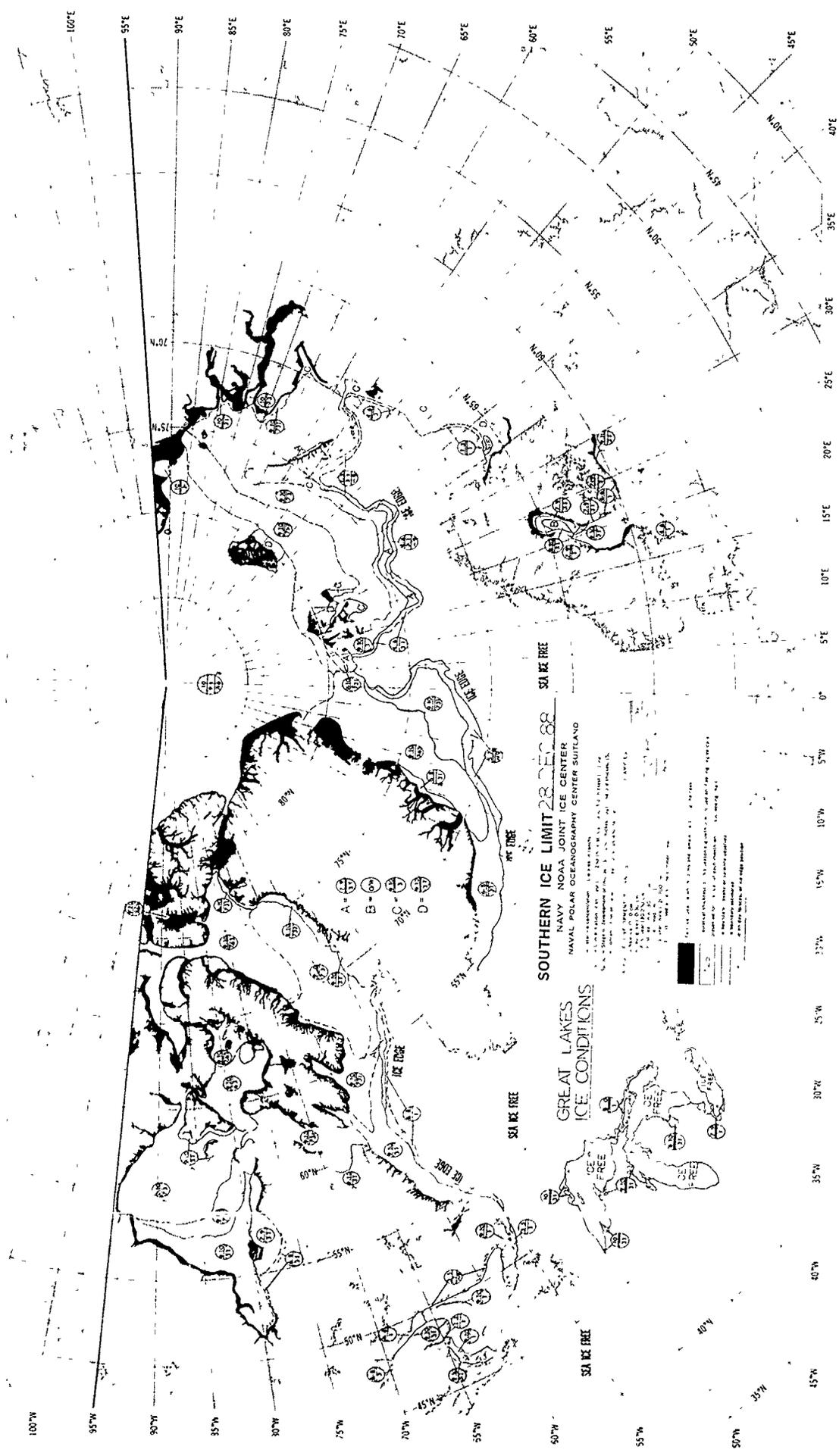
**SOUTHERN ICE LIMIT 14 DEC 88**  
 NAVY NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUTLAND

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 (301) 714-3404  
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 (301) 714-3409  
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 (301) 714-3416  
 (301) 714-3417  
 (301) 714-3418  
 (301) 714-3419  
 (301) 714-3420

SEA ICE FREE  
 A ⊕ ⊕ C ⊕ ⊕  
 B ⊕ ⊕ D ⊕ ⊕





**SOUTHERN ICE LIMIT 28 DEC 88**  
 NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND

**GREAT LAKES  
 ICE CONDITIONS**

1. THE INFORMATION IS FOR INFORMATIONAL PURPOSES ONLY AND IS NOT TO BE USED FOR OPERATIONAL PURPOSES.  
 2. THE INFORMATION IS FOR INFORMATIONAL PURPOSES ONLY AND IS NOT TO BE USED FOR OPERATIONAL PURPOSES.  
 3. THE INFORMATION IS FOR INFORMATIONAL PURPOSES ONLY AND IS NOT TO BE USED FOR OPERATIONAL PURPOSES.  
 4. THE INFORMATION IS FOR INFORMATIONAL PURPOSES ONLY AND IS NOT TO BE USED FOR OPERATIONAL PURPOSES.  
 5. THE INFORMATION IS FOR INFORMATIONAL PURPOSES ONLY AND IS NOT TO BE USED FOR OPERATIONAL PURPOSES.  
 6. THE INFORMATION IS FOR INFORMATIONAL PURPOSES ONLY AND IS NOT TO BE USED FOR OPERATIONAL PURPOSES.  
 7. THE INFORMATION IS FOR INFORMATIONAL PURPOSES ONLY AND IS NOT TO BE USED FOR OPERATIONAL PURPOSES.  
 8. THE INFORMATION IS FOR INFORMATIONAL PURPOSES ONLY AND IS NOT TO BE USED FOR OPERATIONAL PURPOSES.  
 9. THE INFORMATION IS FOR INFORMATIONAL PURPOSES ONLY AND IS NOT TO BE USED FOR OPERATIONAL PURPOSES.  
 10. THE INFORMATION IS FOR INFORMATIONAL PURPOSES ONLY AND IS NOT TO BE USED FOR OPERATIONAL PURPOSES.

M.001

M.55

M.06

M.55

M.08

M.52

M.07

M.55

M.09

M.55

M.05

M.05

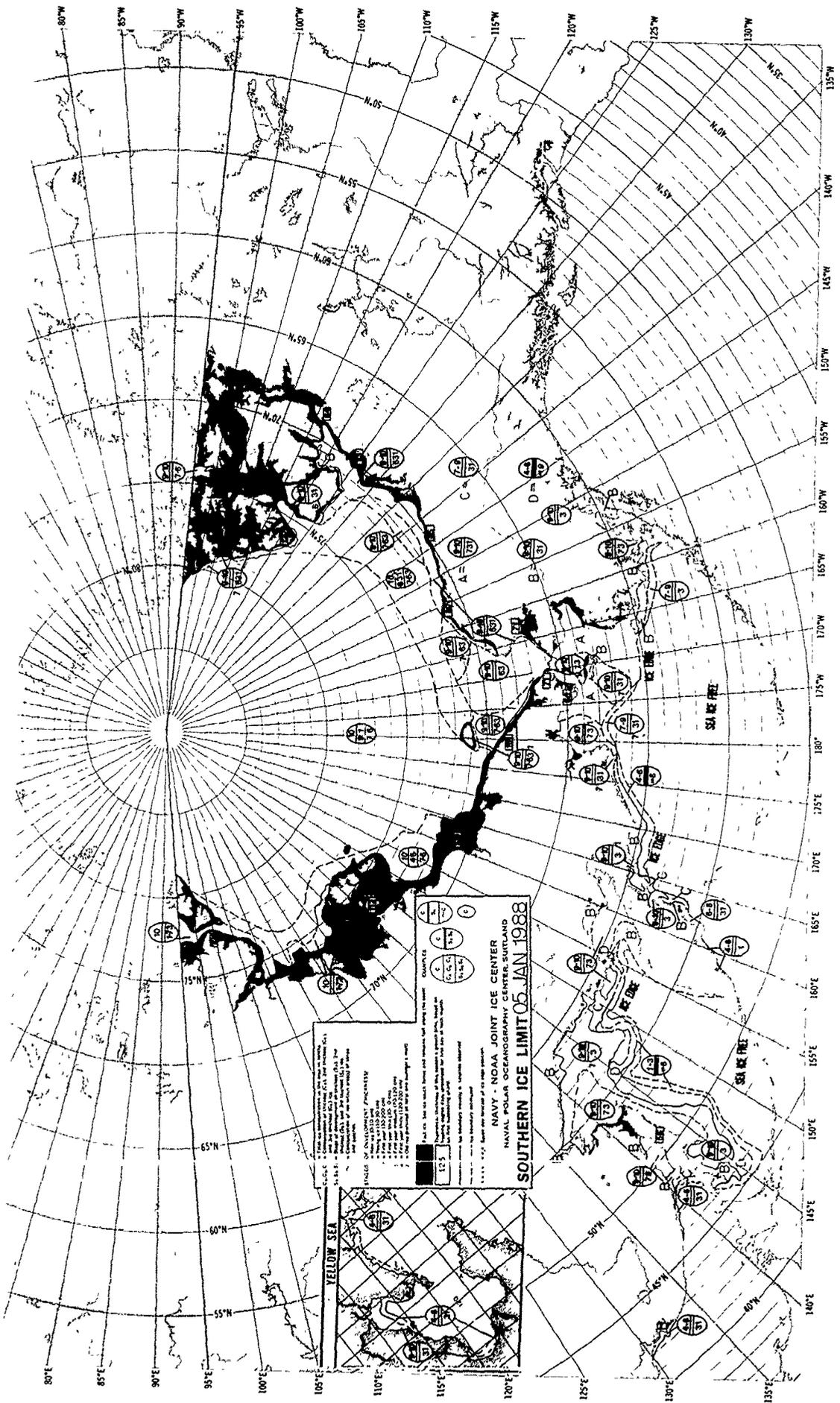
M.55

M.05

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M.05

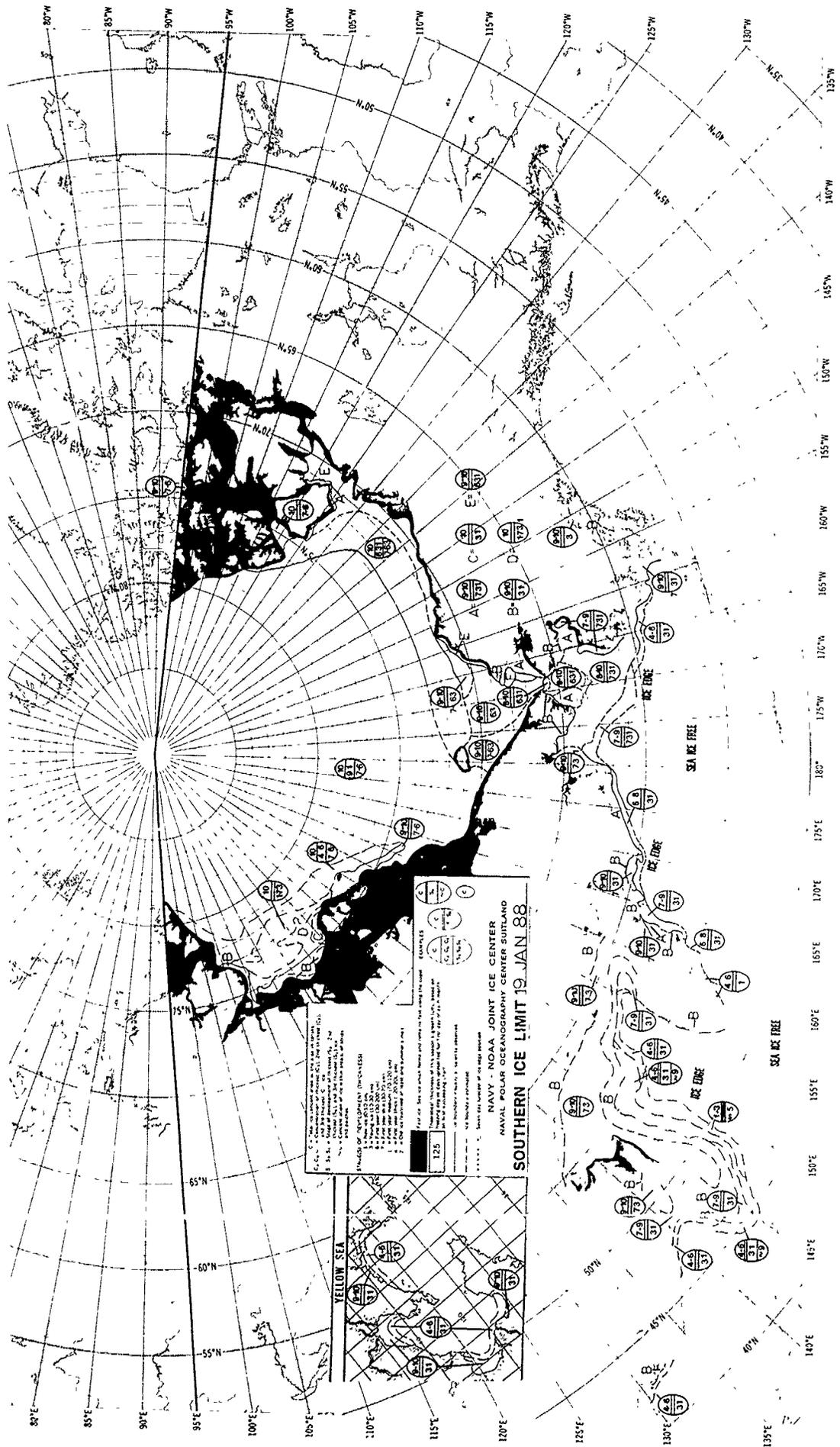


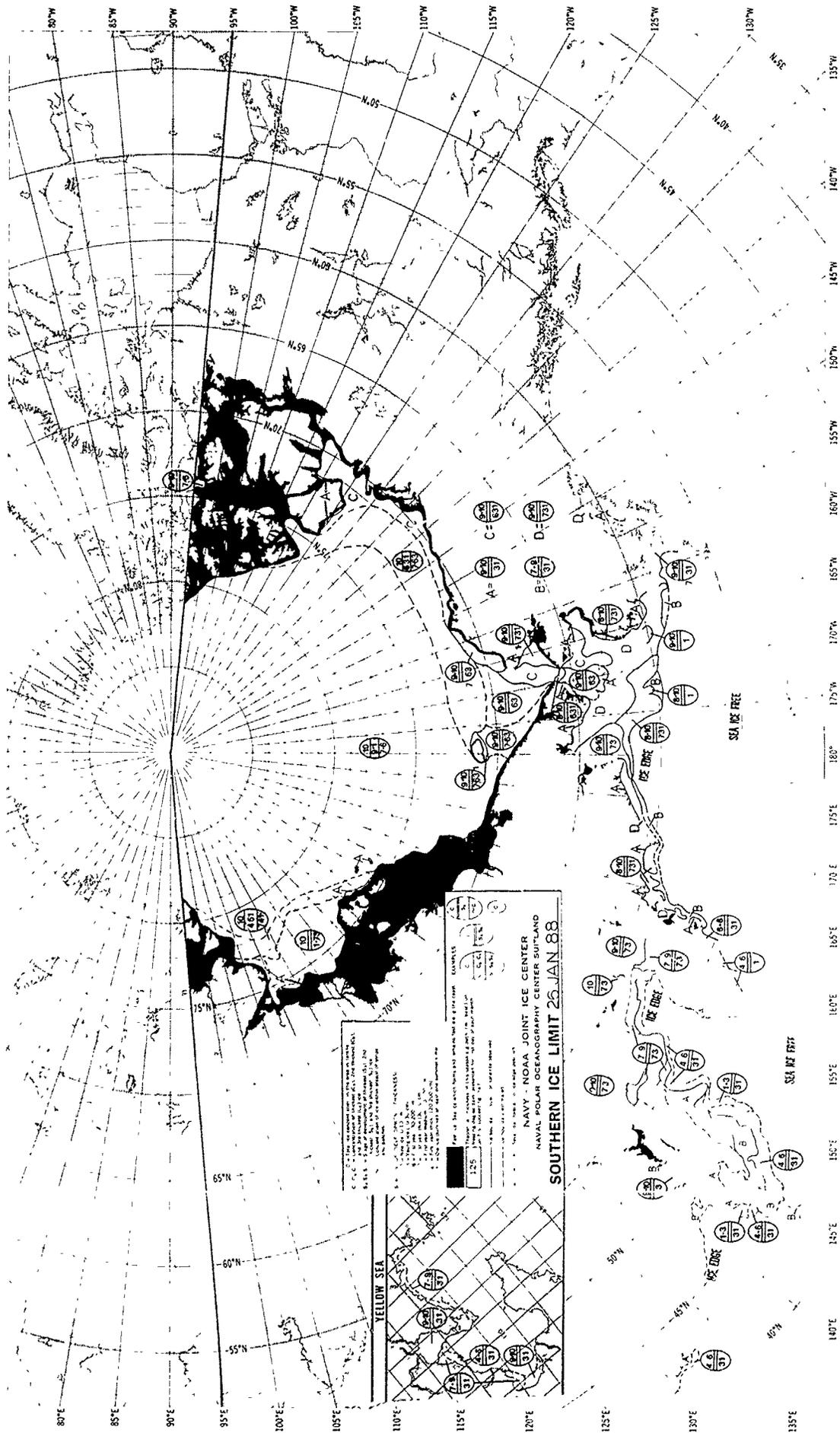
NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUTLAND  
**SOUTHERN ICE LIMIT 05 JAN 1988**

1. This map shows the ice limit for the month of January 1988. The ice limit is defined as the outer edge of the ice pack. The ice limit is shown as a solid line. The ice limit is shown as a solid line. The ice limit is shown as a solid line.

2. The ice limit is shown as a solid line. The ice limit is shown as a solid line. The ice limit is shown as a solid line.

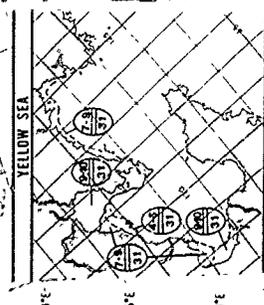


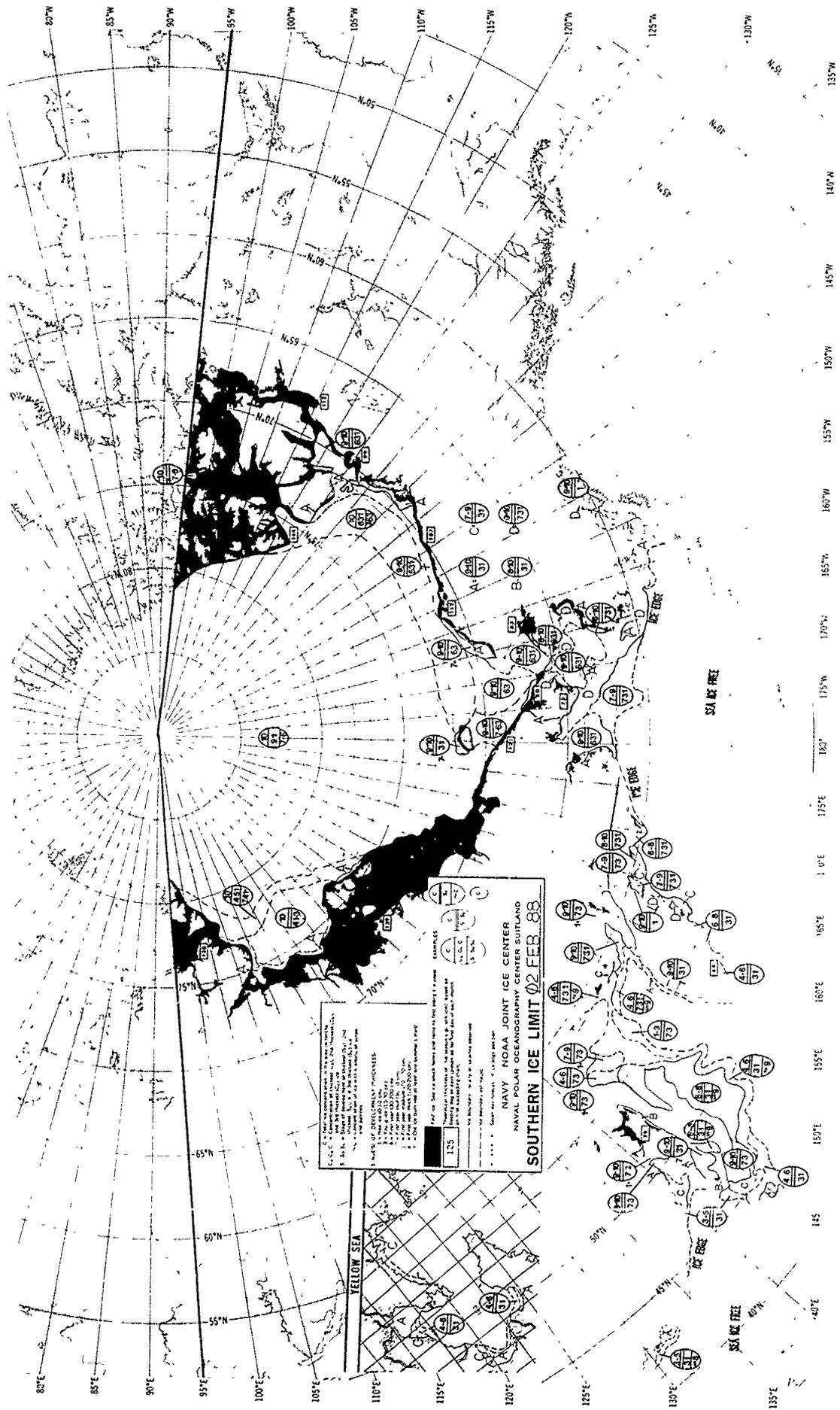




NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUPPLAND  
**SOUTHERN ICE LIMIT 26 JAN 88**

**EXAMPLES**  
 A=10, B=11, C=12, D=13  
 E=14, F=15, G=16, H=17  
 I=18, J=19, K=20, L=21  
 M=22, N=23, O=24, P=25  
 Q=26, R=27, S=28, T=29  
 U=30, V=31, W=32, X=33  
 Y=34, Z=35, AA=36, AB=37  
 AC=38, AD=39, AE=40, AF=41  
 AG=42, AH=43, AI=44, AJ=45  
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 AS=54, AT=55, AU=56, AV=57  
 AW=58, AX=59, AY=60, AZ=61  
 BA=62, BB=63, BC=64, BD=65  
 BE=66, BF=67, BG=68, BH=69  
 BI=70, BJ=71, BK=72, BL=73  
 BM=74, BN=75, BO=76, BP=77  
 BQ=78, BR=79, BS=80, BT=81  
 BU=82, BV=83, BW=84, BX=85  
 BY=86, BZ=87, CA=88, CB=89  
 CC=90, CD=91, CE=92, CF=93  
 CG=94, CH=95, CI=96, CJ=97  
 CK=98, CL=99, CM=100, CN=101  
 CO=102, CP=103, CQ=104, CR=105  
 CS=106, CT=107, CU=108, CV=109  
 CW=110, CX=111, CY=112, CZ=113  
 DA=114, DB=115, DC=116, DD=117  
 DE=118, DF=119, DG=120, DH=121  
 DI=122, DJ=123, DK=124, DL=125  
 DM=126, DN=127, DO=128, DP=129  
 DQ=130, DR=131, DS=132, DT=133  
 DU=134, DV=135, DW=136, DX=137  
 DY=138, DZ=139, EA=140, EB=141  
 EC=142, ED=143, EE=144, EF=145  
 EG=146, EH=147, EI=148, EJ=149  
 EK=150, EL=151, EM=152, EN=153  
 EO=154, EP=155, EQ=156, ER=157  
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 FE=170, FF=171, FG=172, FH=173  
 FI=174, FJ=175, FK=176, FL=177  
 FM=178, FN=179, FO=180, FP=181  
 FQ=182, FR=183, FS=184, FT=185  
 FU=186, FV=187, FW=188, FX=189  
 FY=190, FZ=191, GA=192, GB=193  
 GC=194, GD=195, GE=196, GF=197  
 GG=198, GH=199, GI=200, GJ=201  
 GK=202, GL=203, GM=204, GN=205  
 GO=206, GP=207, GQ=208, GR=209  
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 GW=214, GX=215, GY=216, GZ=217  
 HA=218, HB=219, HC=220, HD=221  
 HE=222, HF=223, HG=224, HH=225  
 HI=226, HJ=227, HK=228, HL=229  
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 HU=238, HV=239, HW=240, HX=241  
 HY=242, HZ=243, IA=244, IB=245  
 IC=246, ID=247, IE=248, IF=249  
 IG=250, IH=251, II=252, IJ=253  
 IK=254, IL=255, IM=256, IN=257  
 IO=258, IP=259, IQ=260, IR=261  
 IS=262, IT=263, IU=264, IV=265  
 IW=266, IX=267, IY=268, IZ=269  
 JA=270, JB=271, JC=272, JD=273  
 JE=274, JF=275, JG=276, JH=277  
 JI=278, JJ=279, JK=280, JL=281  
 JM=282, JN=283, JO=284, JP=285  
 JQ=286, JR=287, JS=288, JT=289  
 JU=290, JV=291, JW=292, JX=293  
 JY=294, JZ=295, KA=296, KB=297  
 KC=298, KD=299, KE=300, KF=301  
 KG=302, KH=303, KI=304, KJ=305  
 KK=306, KL=307, KM=308, KN=309  
 KO=310, KP=311, KQ=312, KR=313  
 KS=314, KT=315, KU=316, KV=317  
 KW=318, KX=319, KY=320, KZ=321  
 LA=322, LB=323, LC=324, LD=325  
 LE=326, LF=327, LG=328, LH=329  
 LI=330, LJ=331, LK=332, LL=333  
 LM=334, LN=335, LO=336, LP=337  
 LQ=338, LR=339, LS=340, LT=341  
 LU=342, LV=343, LW=344, LX=345  
 LY=346, LZ=347, MA=348, MB=349  
 MC=350, MD=351, ME=352, MF=353  
 MG=354, MH=355, MI=356, MJ=357  
 MK=358, ML=359, MM=360, MN=361  
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 MS=366, MT=367, MU=368, MV=369  
 MW=370, MX=371, MY=372, MZ=373  
 NA=374, NB=375, NC=376, ND=377  
 NE=378, NF=379, NG=380, NH=381  
 NI=382, NJ=383, NK=384, NL=385  
 NO=386, NP=387, NQ=388, NR=389  
 NS=390, NT=391, NU=392, NV=393  
 NW=394, NX=395, NY=396, NZ=397  
 OA=398, OB=399, OC=400, OD=401  
 OE=402, OF=403, OG=404, OH=405  
 OI=406, OJ=407, OK=408, OL=409  
 OM=410, ON=411, OO=412, OP=413  
 OQ=414, OR=415, OS=416, OT=417  
 OU=418, OV=419, OW=420, OX=421  
 OY=422, OZ=423, PA=424, PB=425  
 PC=426, PD=427, PE=428, PF=429  
 PG=430, PH=431, PI=432, PJ=433  
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 PW=446, PX=447, PY=448, PZ=449  
 QA=450, QB=451, QC=452, QD=453  
 QE=454, QF=455, QG=456, QH=457  
 QI=458, QJ=459, QK=460, QL=461  
 QM=462, QN=463, QO=464, QP=465  
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 QU=470, QV=471, QW=472, QX=473  
 QY=474, QZ=475, RA=476, RB=477  
 RC=478, RD=479, RE=480, RF=481  
 RG=482, RH=483, RI=484, RJ=485  
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 SA=502, SB=503, SC=504, SD=505  
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 SI=510, SJ=511, SK=512, SL=513  
 SM=514, SN=515, SO=516, SP=517  
 SQ=518, SR=519, SS=520, ST=521  
 SU=522, SV=523, SW=524, SX=525  
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 TK=538, TL=539, TM=540, TN=541  
 TO=542, TP=543, TQ=544, TR=545  
 TS=546, TT=547, TU=548, TV=549  
 TW=550, TX=551, TY=552, TZ=553  
 UA=554, UB=555, UC=556, UD=557  
 UE=558, UF=559, UG=560, UH=561  
 UI=562, UJ=563, UK=564, UL=565  
 UM=566, UN=567, UO=568, UP=569  
 UQ=570, UR=571, US=572, UT=573  
 UY=574, UZ=575, VA=576, VB=577  
 VC=578, VD=579, VE=580, VF=581  
 VG=582, VH=583, VI=584, VJ=585  
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 WE=606, WF=607, WG=608, WH=609  
 WI=610, WJ=611, WK=612, WL=613  
 WM=614, WN=615, WO=616, WP=617  
 WQ=618, WR=619, WS=620, WT=621  
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 XC=626, XD=627, XE=628, XF=629  
 XG=630, XH=631, XI=632, XJ=633  
 XK=634, XL=635, XM=636, XN=637  
 XO=638, XP=639, XQ=640, XR=641  
 XS=642, XT=643, XU=644, XV=645  
 XW=646, XX=647, XY=648, XZ=649  
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 ZD=678, ZE=679, ZF=680, ZG=681  
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 ZP=690, ZQ=691, ZR=692, ZS=693  
 ZT=694, ZU=695, ZV=696, ZW=697  
 ZX=698, ZY=699, ZZ=700





1. Data from the Antarctic Peninsula and the Antarctic Peninsula region are plotted on this map. Data from the Antarctic Peninsula and the Antarctic Peninsula region are plotted on this map. Data from the Antarctic Peninsula and the Antarctic Peninsula region are plotted on this map.

**SOUTHERN ICE LIMIT 02 FEB 88**  
 NAVY, NOAA, JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUDBURY

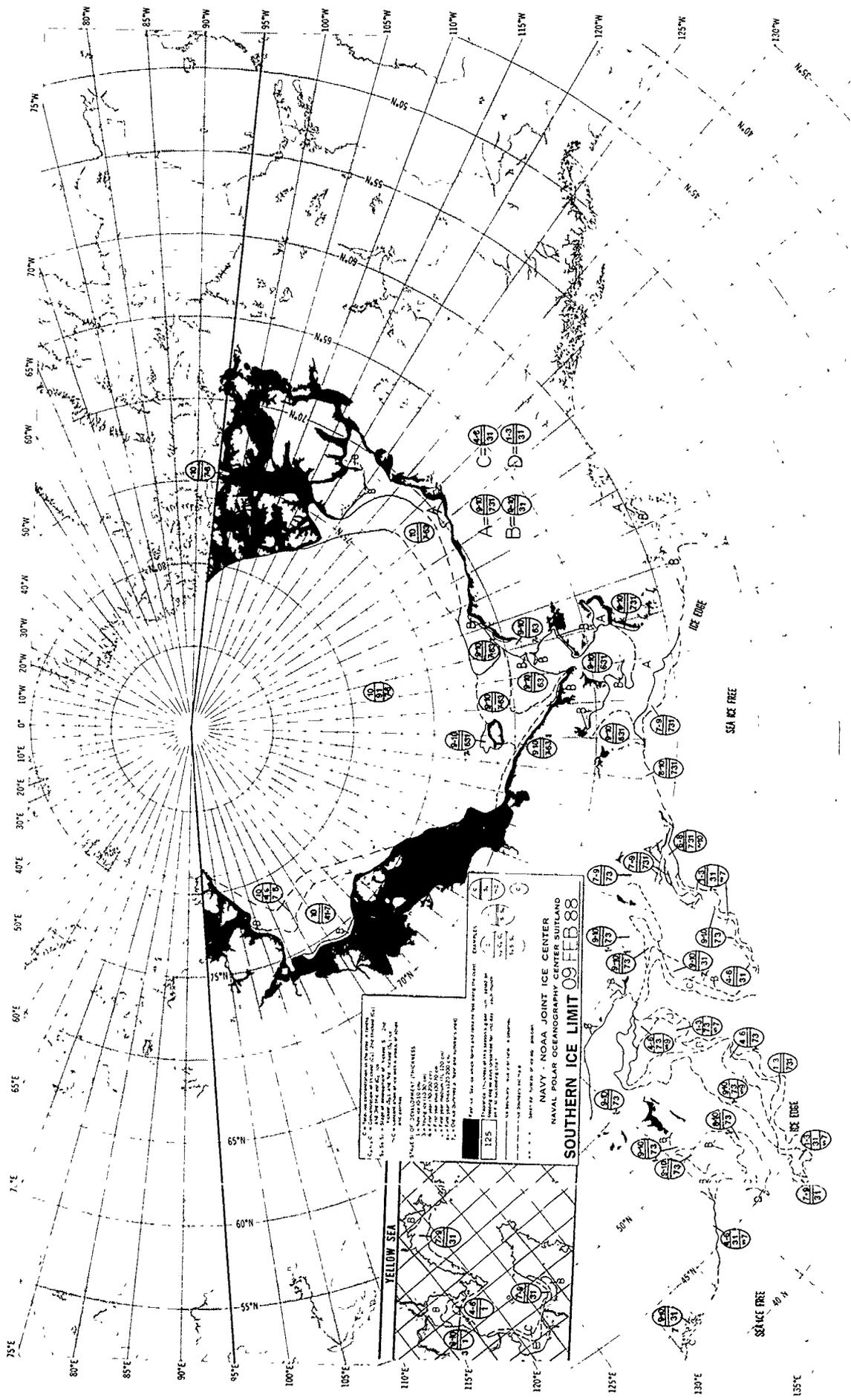
1. Data from the Antarctic Peninsula and the Antarctic Peninsula region are plotted on this map. Data from the Antarctic Peninsula and the Antarctic Peninsula region are plotted on this map. Data from the Antarctic Peninsula and the Antarctic Peninsula region are plotted on this map.

2. Data from the Antarctic Peninsula and the Antarctic Peninsula region are plotted on this map. Data from the Antarctic Peninsula and the Antarctic Peninsula region are plotted on this map. Data from the Antarctic Peninsula and the Antarctic Peninsula region are plotted on this map.

3. Data from the Antarctic Peninsula and the Antarctic Peninsula region are plotted on this map. Data from the Antarctic Peninsula and the Antarctic Peninsula region are plotted on this map. Data from the Antarctic Peninsula and the Antarctic Peninsula region are plotted on this map.

4. Data from the Antarctic Peninsula and the Antarctic Peninsula region are plotted on this map. Data from the Antarctic Peninsula and the Antarctic Peninsula region are plotted on this map. Data from the Antarctic Peninsula and the Antarctic Peninsula region are plotted on this map.

5. Data from the Antarctic Peninsula and the Antarctic Peninsula region are plotted on this map. Data from the Antarctic Peninsula and the Antarctic Peninsula region are plotted on this map. Data from the Antarctic Peninsula and the Antarctic Peninsula region are plotted on this map.



**NAVY - NOAA JOINT ICE CENTER**  
**NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND**  
**SOUTHERN ICE LIMIT 09 FEB 88**

1:25

2:100

3:150

4:200

5:250

6:300

7:350

8:400

9:450

10:500

11:550

12:600

13:650

14:700

15:750

16:800

17:850

18:900

19:950

20:1000

21:1050

22:1100

23:1150

24:1200

25:1250

26:1300

27:1350

28:1400

29:1450

30:1500

31:1550

32:1600

33:1650

34:1700

35:1750

36:1800

37:1850

38:1900

39:1950

40:2000

41:2050

42:2100

43:2150

44:2200

45:2250

46:2300

47:2350

48:2400

49:2450

50:2500

51:2550

52:2600

53:2650

54:2700

55:2750

56:2800

57:2850

58:2900

59:2950

60:3000

61:3050

62:3100

63:3150

64:3200

65:3250

66:3300

67:3350

68:3400

69:3450

70:3500

71:3550

72:3600

73:3650

74:3700

75:3750

76:3800

77:3850

78:3900

79:3950

80:4000

81:4050

82:4100

83:4150

84:4200

85:4250

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88:4400

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169:8450

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171:8550

172:8600

173:8650

174:8700

175:8750

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177:8850

178:8900

179:8950

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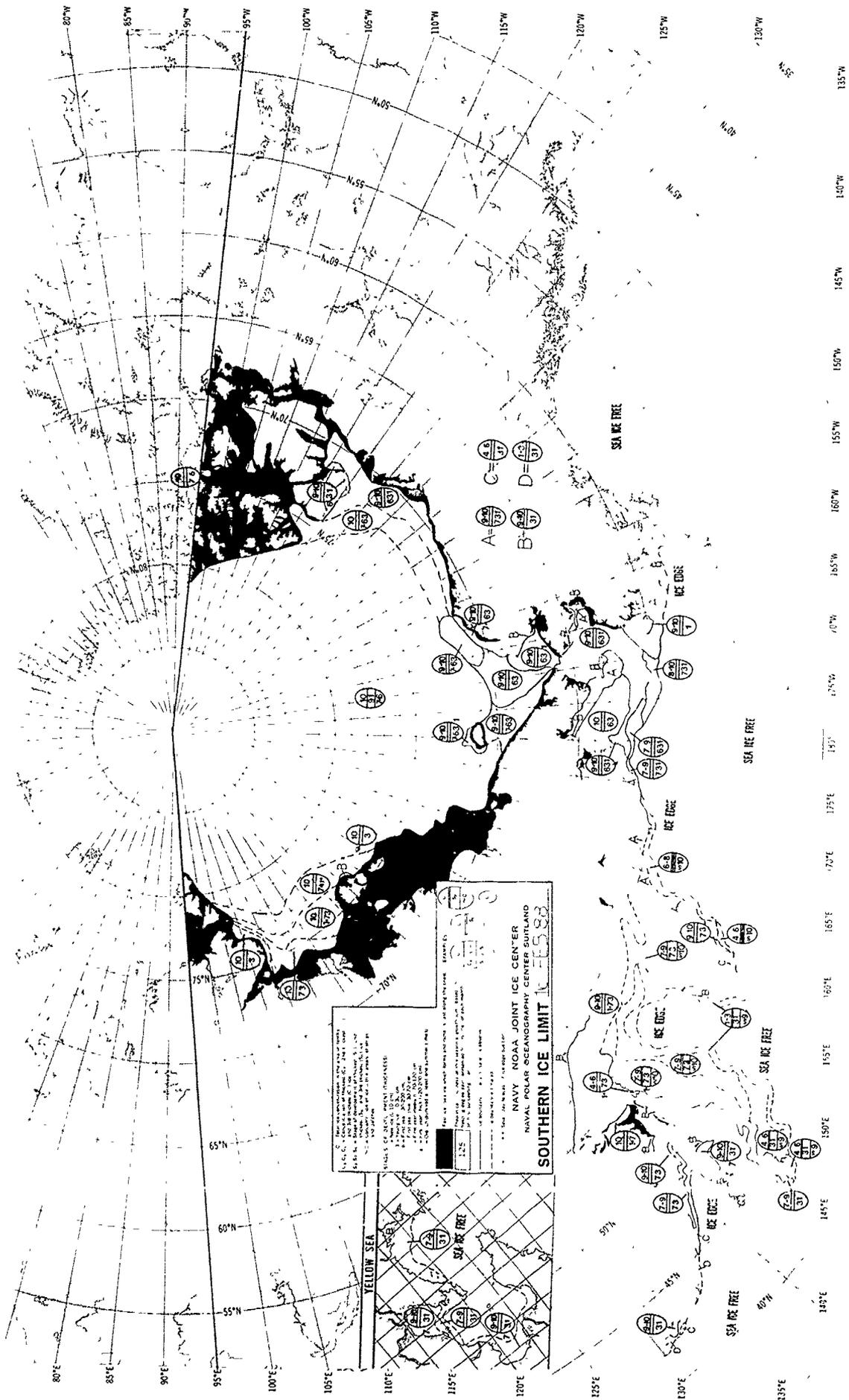
196:9800

197:9850

198:9900

199:9950

200:10000



**SOUTHERN ICE LIMIT**  
 NAVY, NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND  
 FEB 83

**LEGEND**

1. SEA ICE THICKNESS (METERS)

2. SEA ICE TYPE

3. SEA ICE DIRECTION

4. SEA ICE DENSITY

5. SEA ICE TEMPERATURE

6. SEA ICE SALINITY

7. SEA ICE AGE

8. SEA ICE CONCENTRATION

9. SEA ICE CONTAMINATION

10. SEA ICE OBSCURATION

11. SEA ICE SOURCE

12. SEA ICE DESTINATION

13. SEA ICE CHARACTERISTICS

14. SEA ICE OBSERVATIONS

15. SEA ICE DATA POINTS

16. SEA ICE DATA POINTS (EXAMPLES)

17. SEA ICE DATA POINTS (EXAMPLES)

18. SEA ICE DATA POINTS (EXAMPLES)

19. SEA ICE DATA POINTS (EXAMPLES)

20. SEA ICE DATA POINTS (EXAMPLES)

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57. SEA ICE DATA POINTS (EXAMPLES)

58. SEA ICE DATA POINTS (EXAMPLES)

59. SEA ICE DATA POINTS (EXAMPLES)

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62. SEA ICE DATA POINTS (EXAMPLES)

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64. SEA ICE DATA POINTS (EXAMPLES)

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75. SEA ICE DATA POINTS (EXAMPLES)

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82. SEA ICE DATA POINTS (EXAMPLES)

83. SEA ICE DATA POINTS (EXAMPLES)

84. SEA ICE DATA POINTS (EXAMPLES)

85. SEA ICE DATA POINTS (EXAMPLES)

86. SEA ICE DATA POINTS (EXAMPLES)

87. SEA ICE DATA POINTS (EXAMPLES)

88. SEA ICE DATA POINTS (EXAMPLES)

89. SEA ICE DATA POINTS (EXAMPLES)

90. SEA ICE DATA POINTS (EXAMPLES)

91. SEA ICE DATA POINTS (EXAMPLES)

92. SEA ICE DATA POINTS (EXAMPLES)

93. SEA ICE DATA POINTS (EXAMPLES)

94. SEA ICE DATA POINTS (EXAMPLES)

95. SEA ICE DATA POINTS (EXAMPLES)

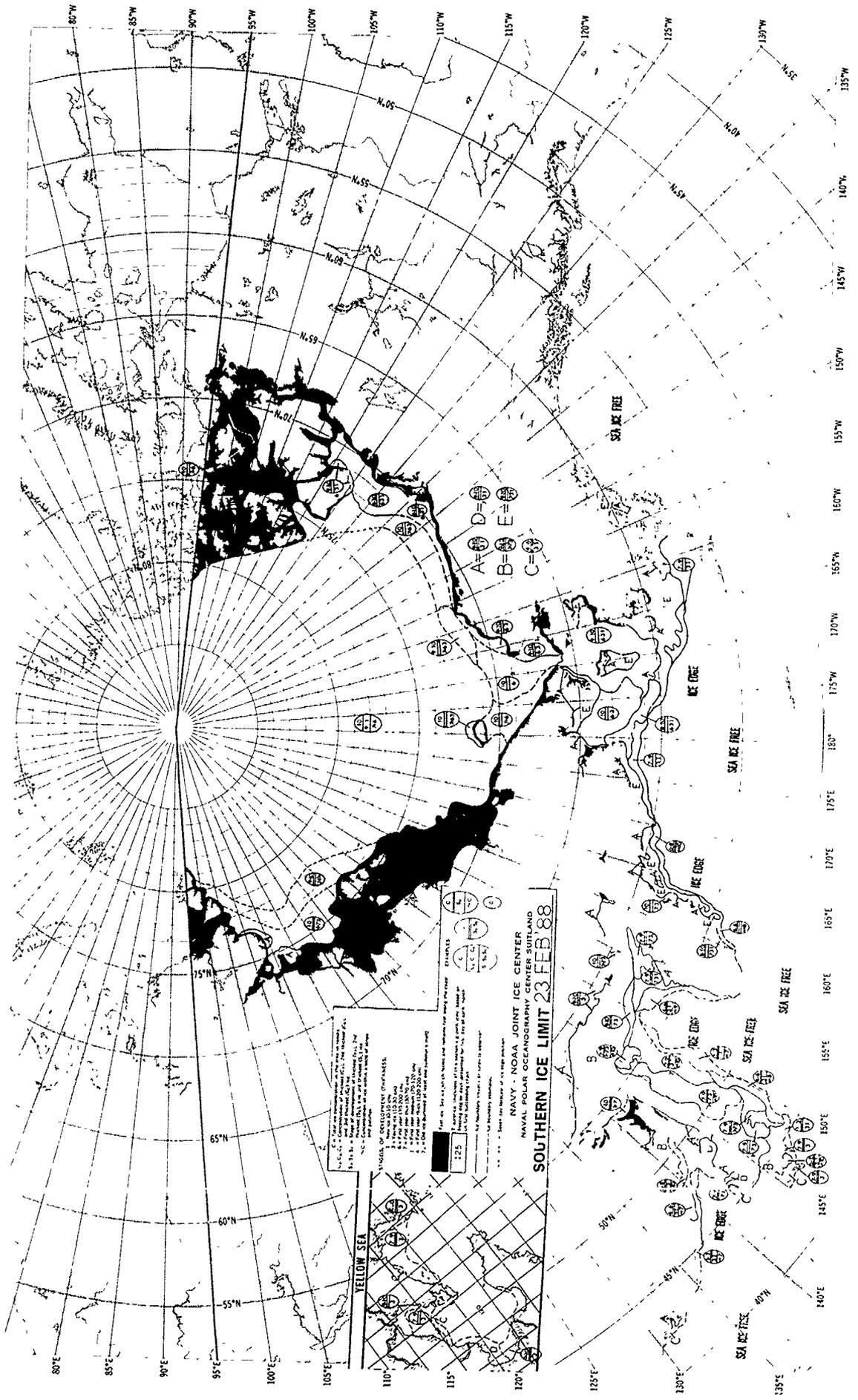
96. SEA ICE DATA POINTS (EXAMPLES)

97. SEA ICE DATA POINTS (EXAMPLES)

98. SEA ICE DATA POINTS (EXAMPLES)

99. SEA ICE DATA POINTS (EXAMPLES)

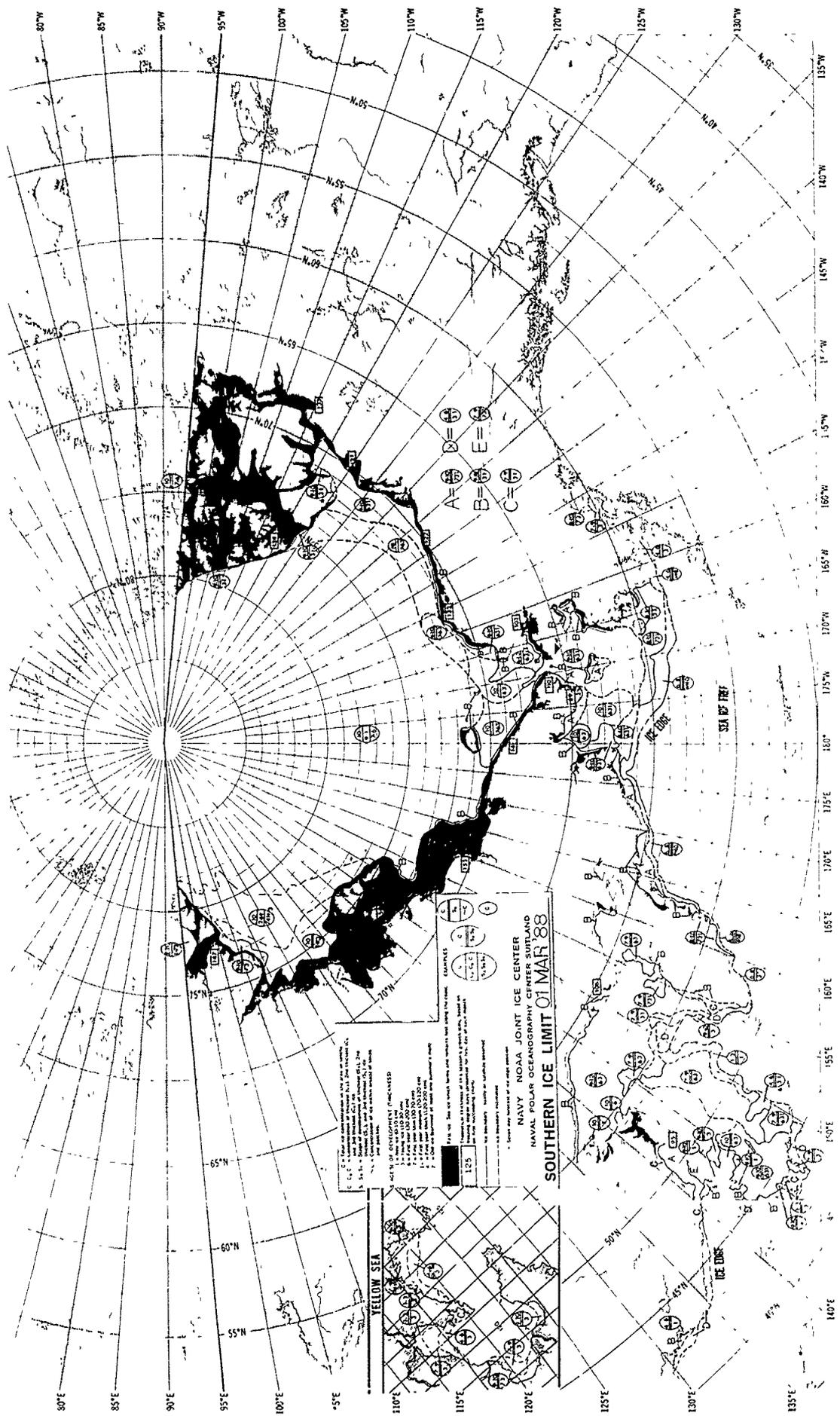
100. SEA ICE DATA POINTS (EXAMPLES)



1. 1:50,000 scale chart of the area, showing the ice limit for the date of the observation.  
 2. 1:50,000 scale chart of the area, showing the ice limit for the date of the observation.  
 3. 1:50,000 scale chart of the area, showing the ice limit for the date of the observation.  
 4. 1:50,000 scale chart of the area, showing the ice limit for the date of the observation.  
 5. 1:50,000 scale chart of the area, showing the ice limit for the date of the observation.  
 6. 1:50,000 scale chart of the area, showing the ice limit for the date of the observation.  
 7. 1:50,000 scale chart of the area, showing the ice limit for the date of the observation.  
 8. 1:50,000 scale chart of the area, showing the ice limit for the date of the observation.  
 9. 1:50,000 scale chart of the area, showing the ice limit for the date of the observation.  
 10. 1:50,000 scale chart of the area, showing the ice limit for the date of the observation.

NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER  
 SOUTHERN ICE LIMIT 23 FEB 88

STAGES OF DEVELOPMENT CAPABILITIES:  
 1. 1:50,000 scale chart of the area, showing the ice limit for the date of the observation.  
 2. 1:50,000 scale chart of the area, showing the ice limit for the date of the observation.  
 3. 1:50,000 scale chart of the area, showing the ice limit for the date of the observation.  
 4. 1:50,000 scale chart of the area, showing the ice limit for the date of the observation.  
 5. 1:50,000 scale chart of the area, showing the ice limit for the date of the observation.  
 6. 1:50,000 scale chart of the area, showing the ice limit for the date of the observation.  
 7. 1:50,000 scale chart of the area, showing the ice limit for the date of the observation.  
 8. 1:50,000 scale chart of the area, showing the ice limit for the date of the observation.  
 9. 1:50,000 scale chart of the area, showing the ice limit for the date of the observation.  
 10. 1:50,000 scale chart of the area, showing the ice limit for the date of the observation.



A = (Symbol)  
 B = (Symbol)  
 C = (Symbol)  
 D = (Symbol)  
 E = (Symbol)

**SOUTHERN ICE LIMIT OF MAR 88**

NAVY NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUTLAND

**EXAMPLES**

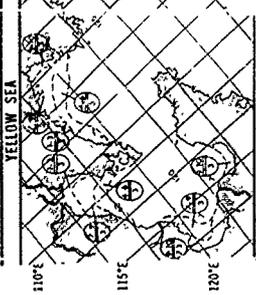
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 (Symbol) 3. 1000  
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 (Symbol) 5. 1000

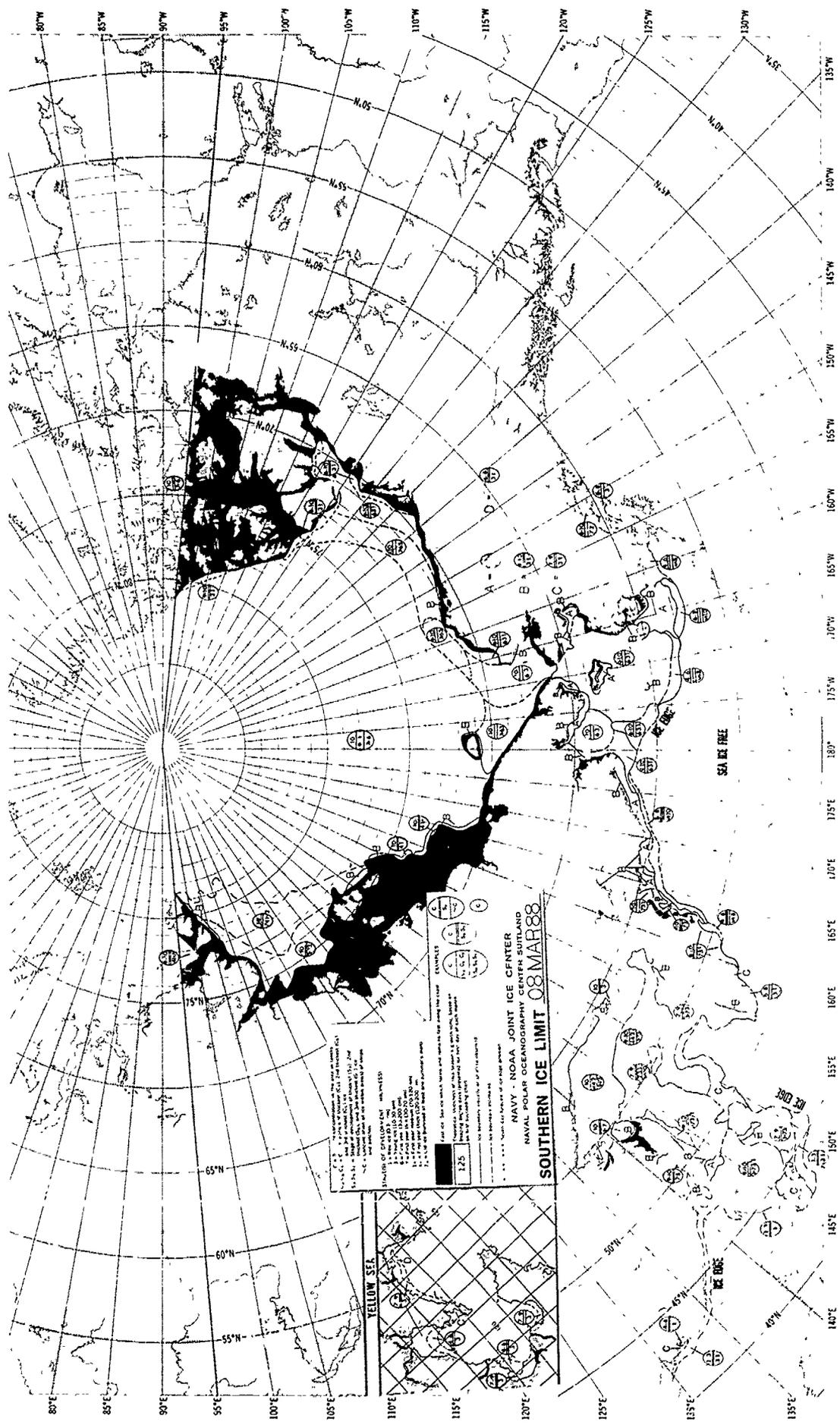
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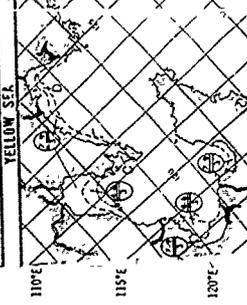
- SOURCES OF DATA**
1. U.S. NAVY POLAR OCEANOGRAPHY CENTER SUTLAND
  2. U.S. NAVY POLAR OCEANOGRAPHY CENTER SUTLAND
  3. U.S. NAVY POLAR OCEANOGRAPHY CENTER SUTLAND
  4. U.S. NAVY POLAR OCEANOGRAPHY CENTER SUTLAND
  5. U.S. NAVY POLAR OCEANOGRAPHY CENTER SUTLAND

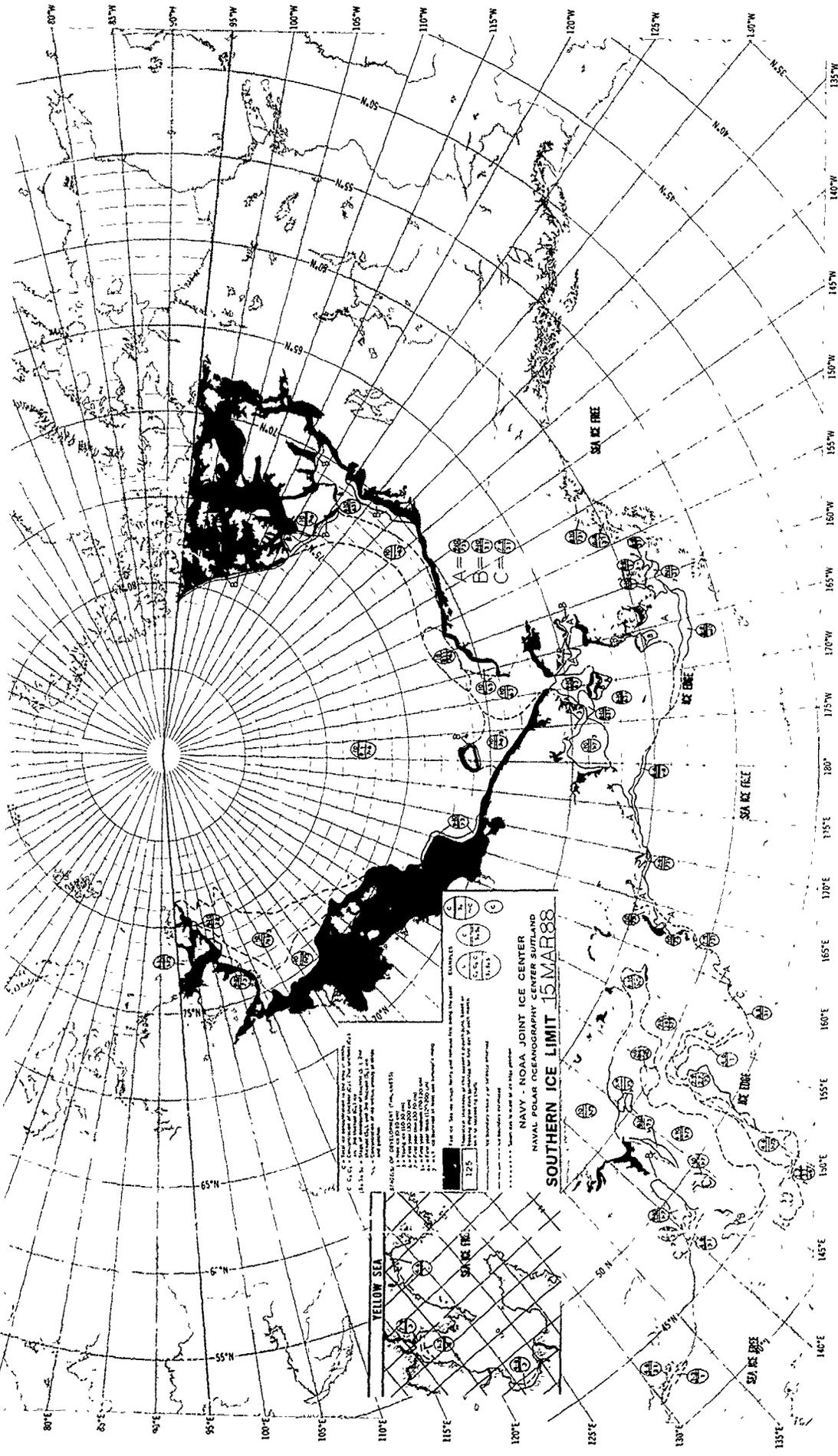




NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND  
**SOUTHERN ICE LIMIT 08 MAR 88**

1. This chart is based on the latest available information from the following sources:  
 a. U.S. Navy Hydrographic Office charts and publications.  
 b. U.S. Navy Oceanographic Office charts and publications.  
 c. U.S. Navy Antarctic Research Program charts and publications.  
 d. U.S. Navy Antarctic Research Program data.  
 e. U.S. Navy Antarctic Research Program data.  
 f. U.S. Navy Antarctic Research Program data.  
 g. U.S. Navy Antarctic Research Program data.  
 h. U.S. Navy Antarctic Research Program data.  
 i. U.S. Navy Antarctic Research Program data.  
 j. U.S. Navy Antarctic Research Program data.  
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 l. U.S. Navy Antarctic Research Program data.  
 m. U.S. Navy Antarctic Research Program data.  
 n. U.S. Navy Antarctic Research Program data.  
 o. U.S. Navy Antarctic Research Program data.  
 p. U.S. Navy Antarctic Research Program data.  
 q. U.S. Navy Antarctic Research Program data.  
 r. U.S. Navy Antarctic Research Program data.  
 s. U.S. Navy Antarctic Research Program data.  
 t. U.S. Navy Antarctic Research Program data.  
 u. U.S. Navy Antarctic Research Program data.  
 v. U.S. Navy Antarctic Research Program data.  
 w. U.S. Navy Antarctic Research Program data.  
 x. U.S. Navy Antarctic Research Program data.  
 y. U.S. Navy Antarctic Research Program data.  
 z. U.S. Navy Antarctic Research Program data.

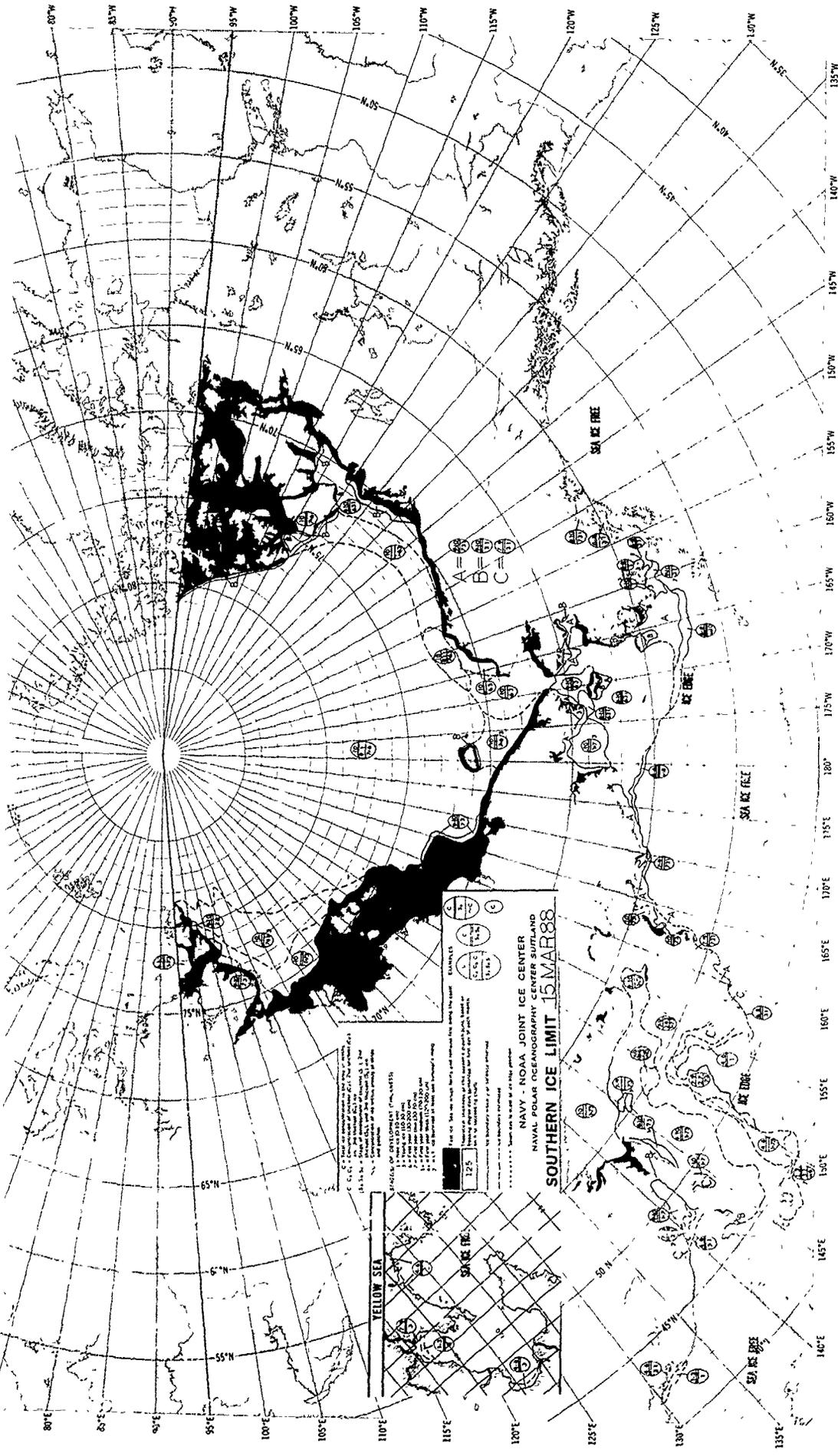
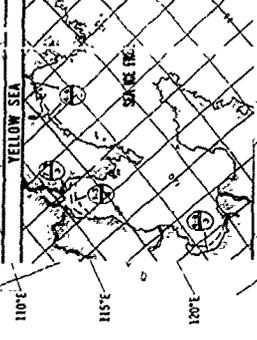


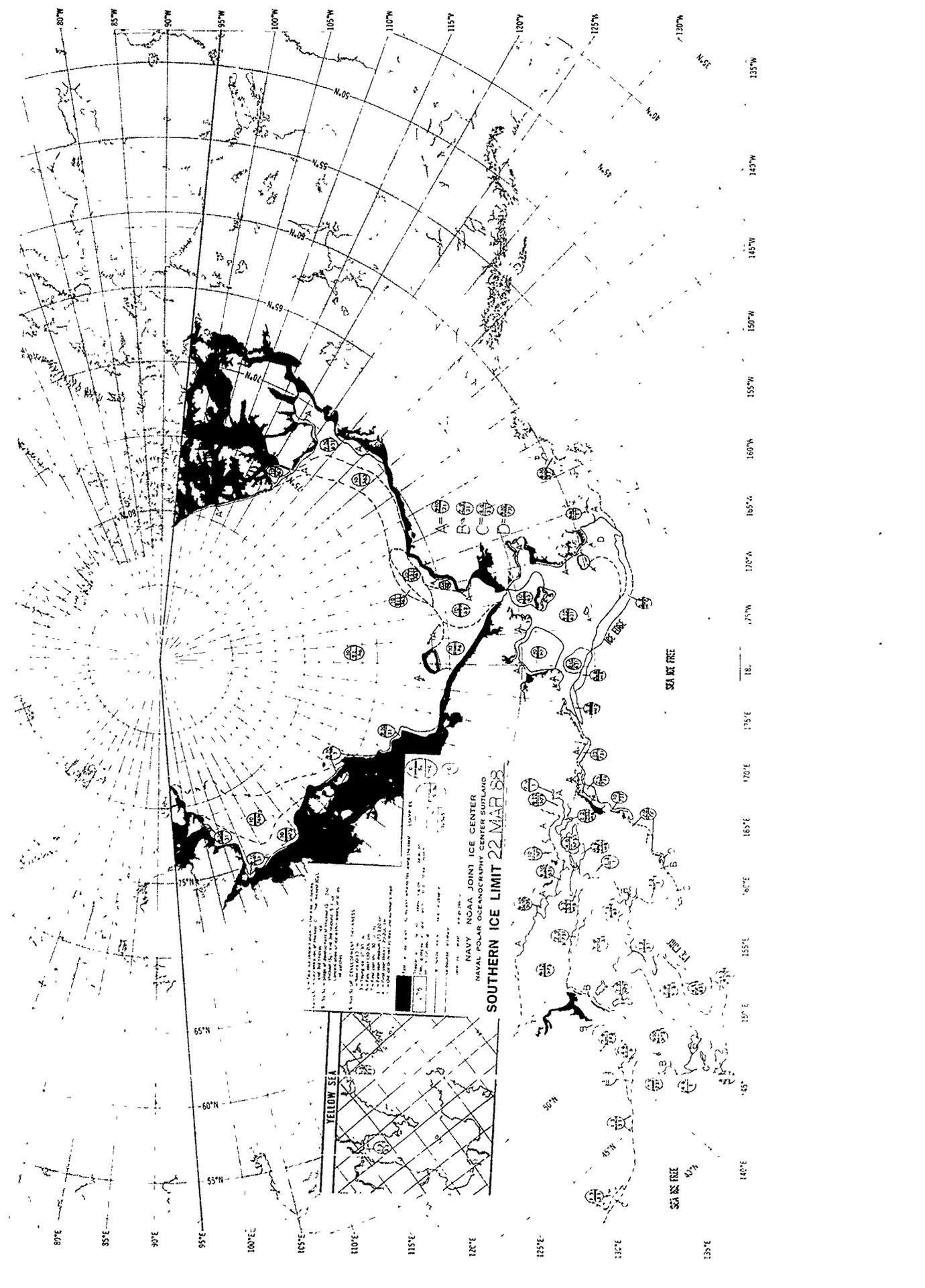


NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND  
**SOUTHERN ICE LIMIT 15 MAR 88**

1. 1000 FT (300 M)  
 2. 2000 FT (600 M)  
 3. 3000 FT (900 M)  
 4. 4000 FT (1200 M)  
 5. 5000 FT (1500 M)  
 6. 6000 FT (1800 M)  
 7. 7000 FT (2100 M)  
 8. 8000 FT (2400 M)  
 9. 9000 FT (2700 M)  
 10. 10000 FT (3000 M)

SYMBOLS  
 A = 1000 FT (300 M)  
 B = 2000 FT (600 M)  
 C = 3000 FT (900 M)





**SOUTHERN ICE LIMIT 22 MAR 68**

NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUTTLAND

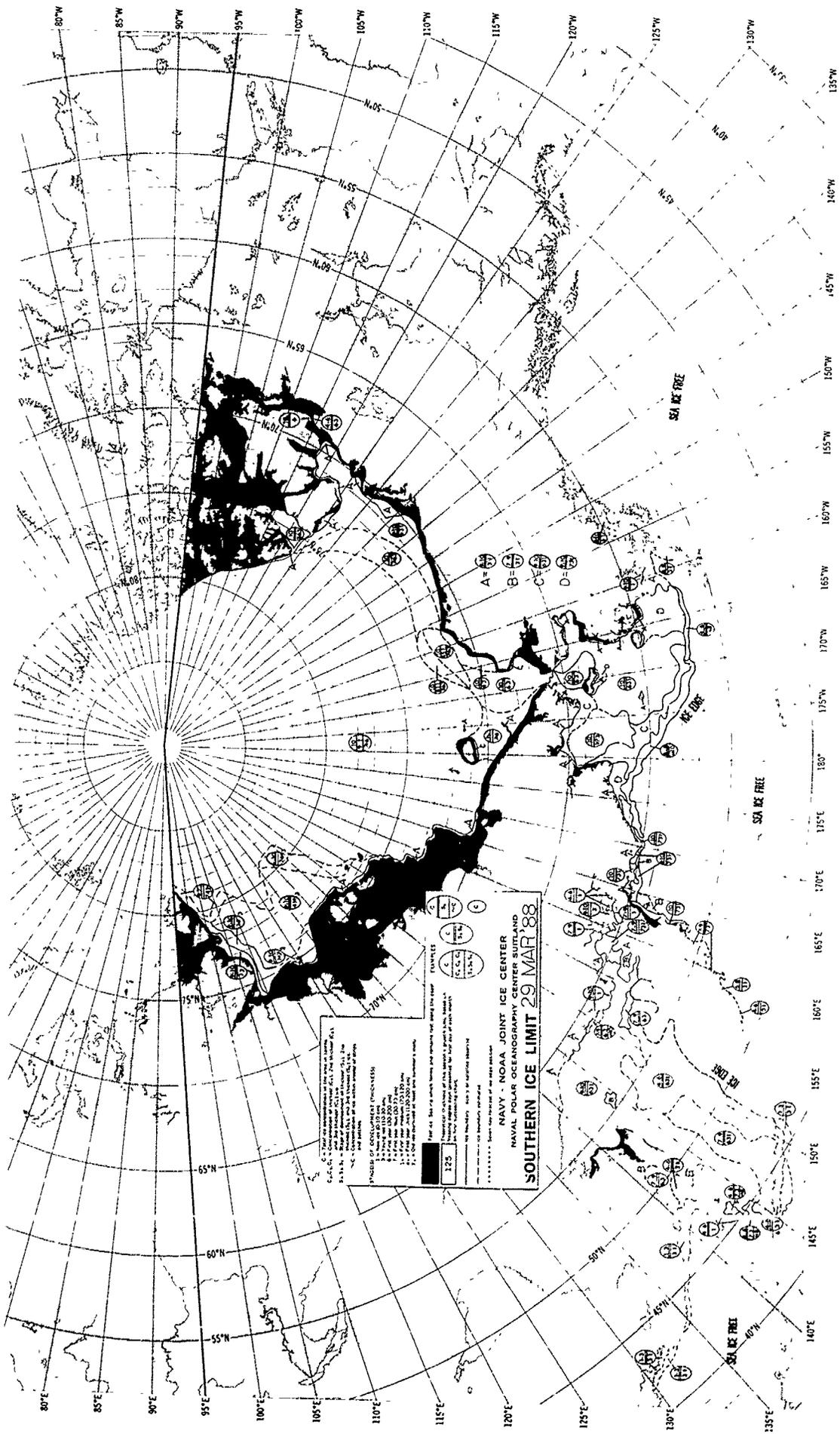
1. This map shows the southern limit of ice observed on 22 March 1968. The limit is shown as a solid line. The area to the north of the limit is shaded. The area to the south of the limit is unshaded. The limit is based on observations from the ship USCGC Healy (WMEC-90) and other sources. The limit is shown in the area of the Svalbard archipelago. The limit is shown in the area of the Svalbard archipelago. The limit is shown in the area of the Svalbard archipelago.



80°E 75°E 70°E 65°E 60°E 55°E 50°E 45°E 40°E 35°E 30°E 25°E 20°E 15°E 10°E 5°E 0°E 5°W 10°W 15°W 20°W 25°W 30°W 35°W 40°W 45°W 50°W 55°W 60°W 65°W 70°W 75°W 80°W 85°W 90°W 95°W 100°W 105°W 110°W 115°W 120°W 125°W 130°W 135°W 140°W 145°W 150°W 155°W 160°W 165°W 170°W 175°W 180°W

SEA ICE FREE

SEA ICE FREE

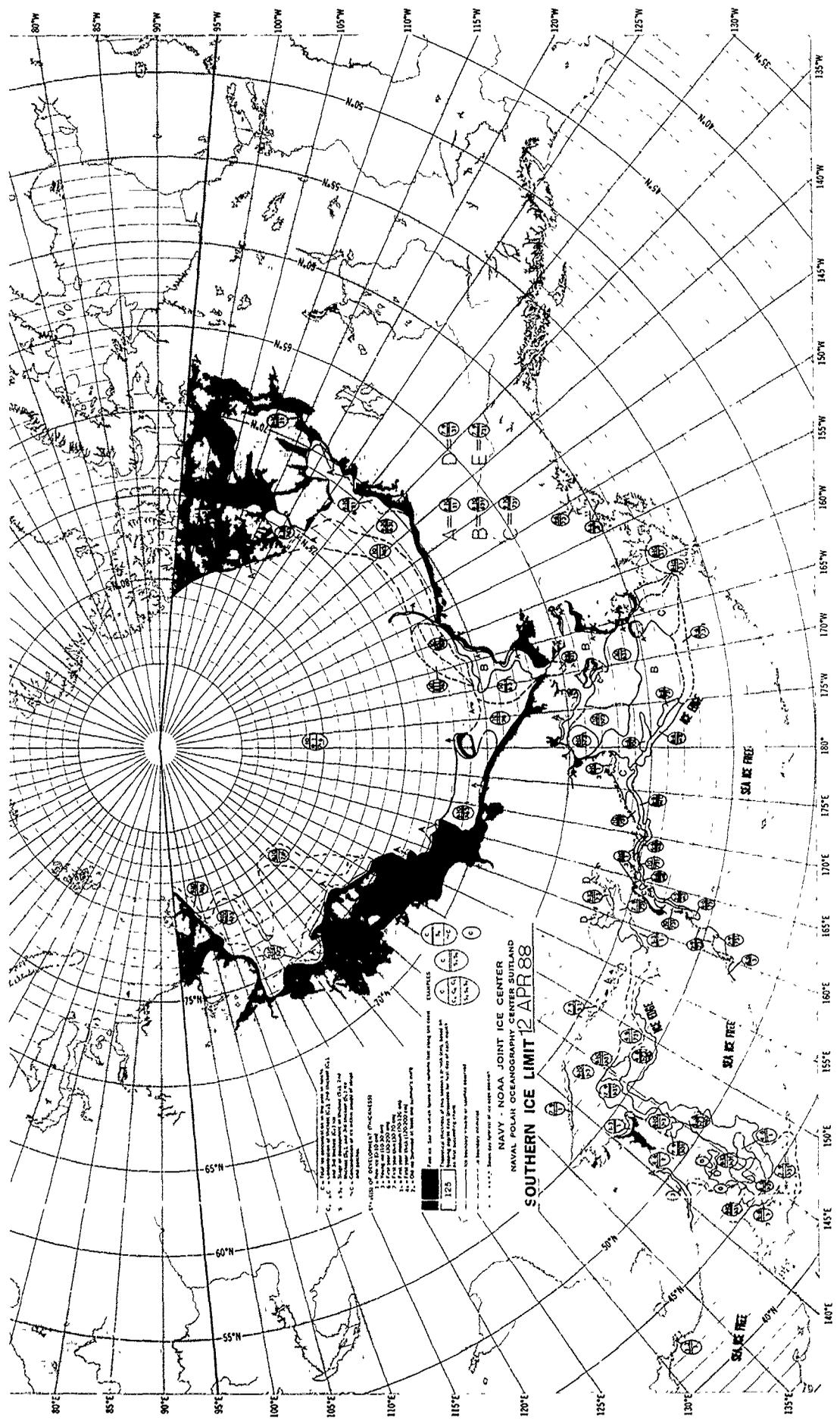


NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND  
**SOUTHERN ICE LIMIT 29 MAR 88**

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

1. 1:50,000 Scale  
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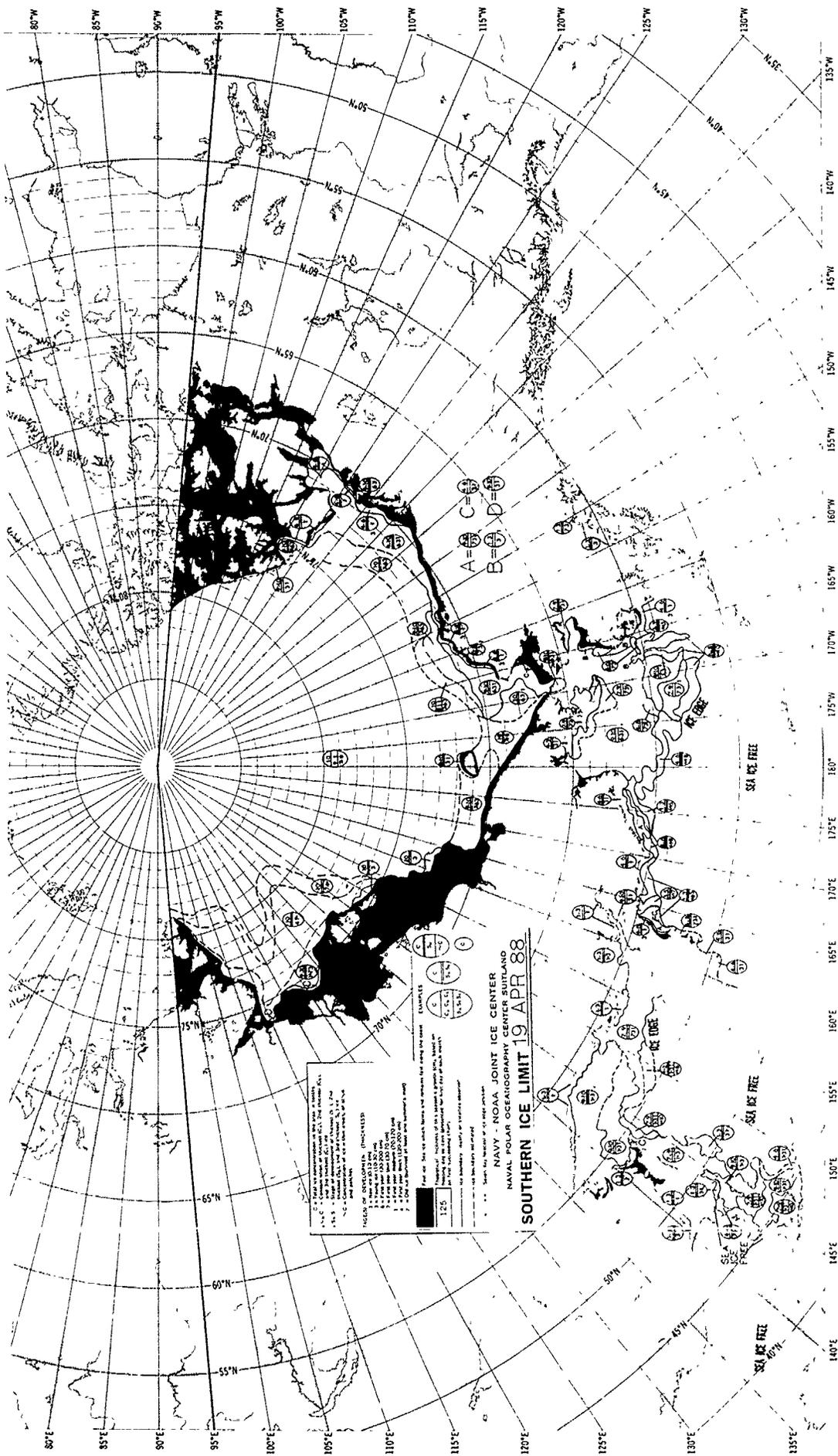


NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SOUTLAND  
**SOUTHERN ICE LIMIT 12 APR 88**

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- EXAMPLES**
- (A) 1000 ft. ice thickness
  - (B) 2000 ft. ice thickness
  - (C) 3000 ft. ice thickness
  - (D) 4000 ft. ice thickness
  - (E) 5000 ft. ice thickness
  - (F) 6000 ft. ice thickness
  - (G) 7000 ft. ice thickness
  - (H) 8000 ft. ice thickness
  - (I) 9000 ft. ice thickness
  - (J) 10000 ft. ice thickness
  - (K) 11000 ft. ice thickness
  - (L) 12000 ft. ice thickness
  - (M) 13000 ft. ice thickness
  - (N) 14000 ft. ice thickness
  - (O) 15000 ft. ice thickness
  - (P) 16000 ft. ice thickness
  - (Q) 17000 ft. ice thickness
  - (R) 18000 ft. ice thickness
  - (S) 19000 ft. ice thickness
  - (T) 20000 ft. ice thickness

1. 1000 ft. ice thickness  
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 5. 5000 ft. ice thickness  
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 19. 19000 ft. ice thickness  
 20. 20000 ft. ice thickness



1. 100% ice  
 2. 75% ice  
 3. 50% ice  
 4. 25% ice  
 5. 10% ice  
 6. 5% ice  
 7. 2% ice  
 8. 1% ice  
 9. 0% ice  
 10. Sea Ice Free

NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHIC CENTER SUIBARD  
**SOUTHERN ICE LIMIT 19 APR 88**

A = (100%)  
 B = (75%)  
 C = (50%)  
 D = (25%)

SEA ICE FREE

SEA ICE FREE

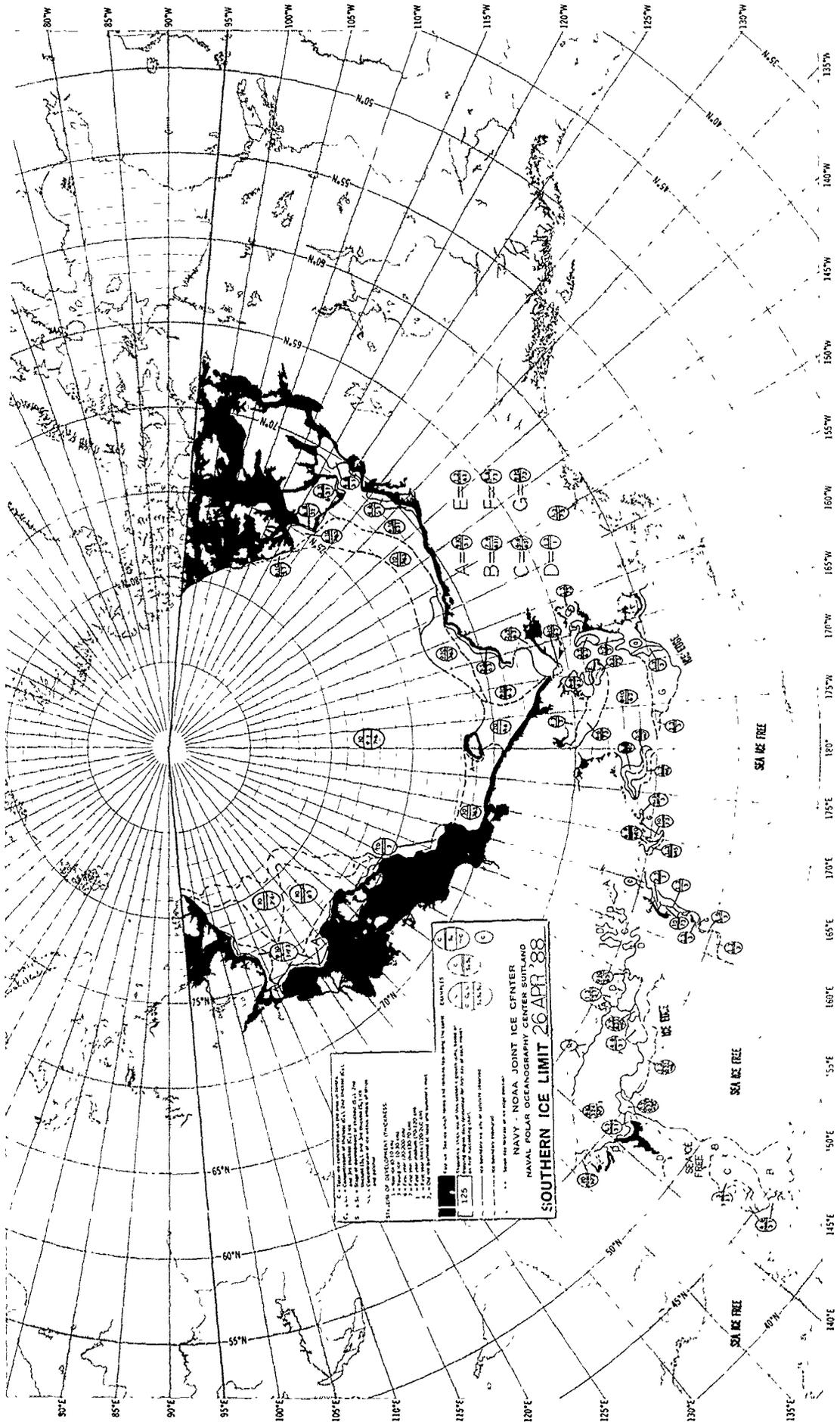
SEA ICE FREE

ICE TUBE

ICE TUBE

ICE TUBE

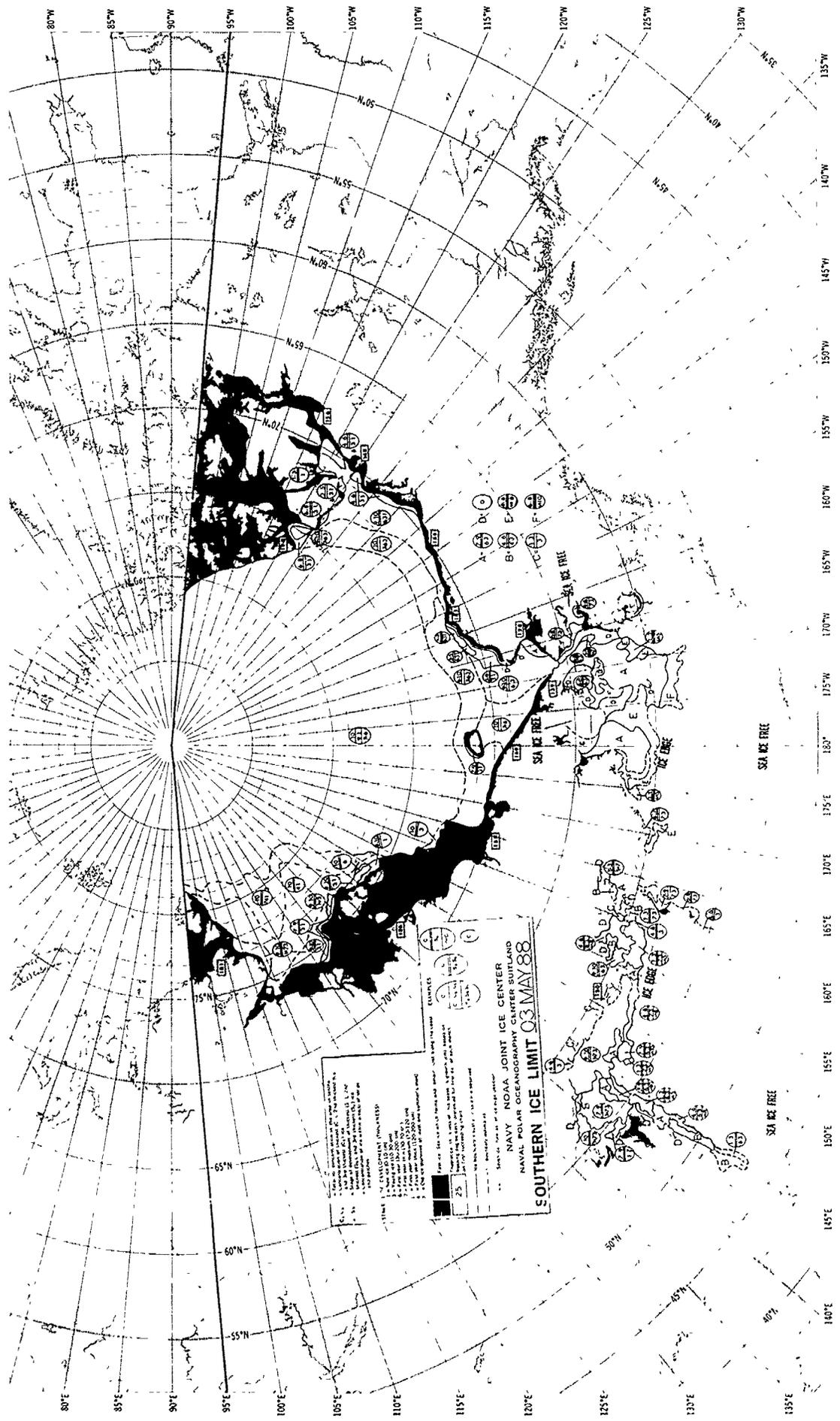
140°E 145°E 150°E 155°E 160°E 165°E 170°E 175°E 180° 175°W 170°W 165°W 160°W 155°W 150°W 145°W 140°W  
 80°N 75°N 70°N 65°N 60°N 55°N 50°N

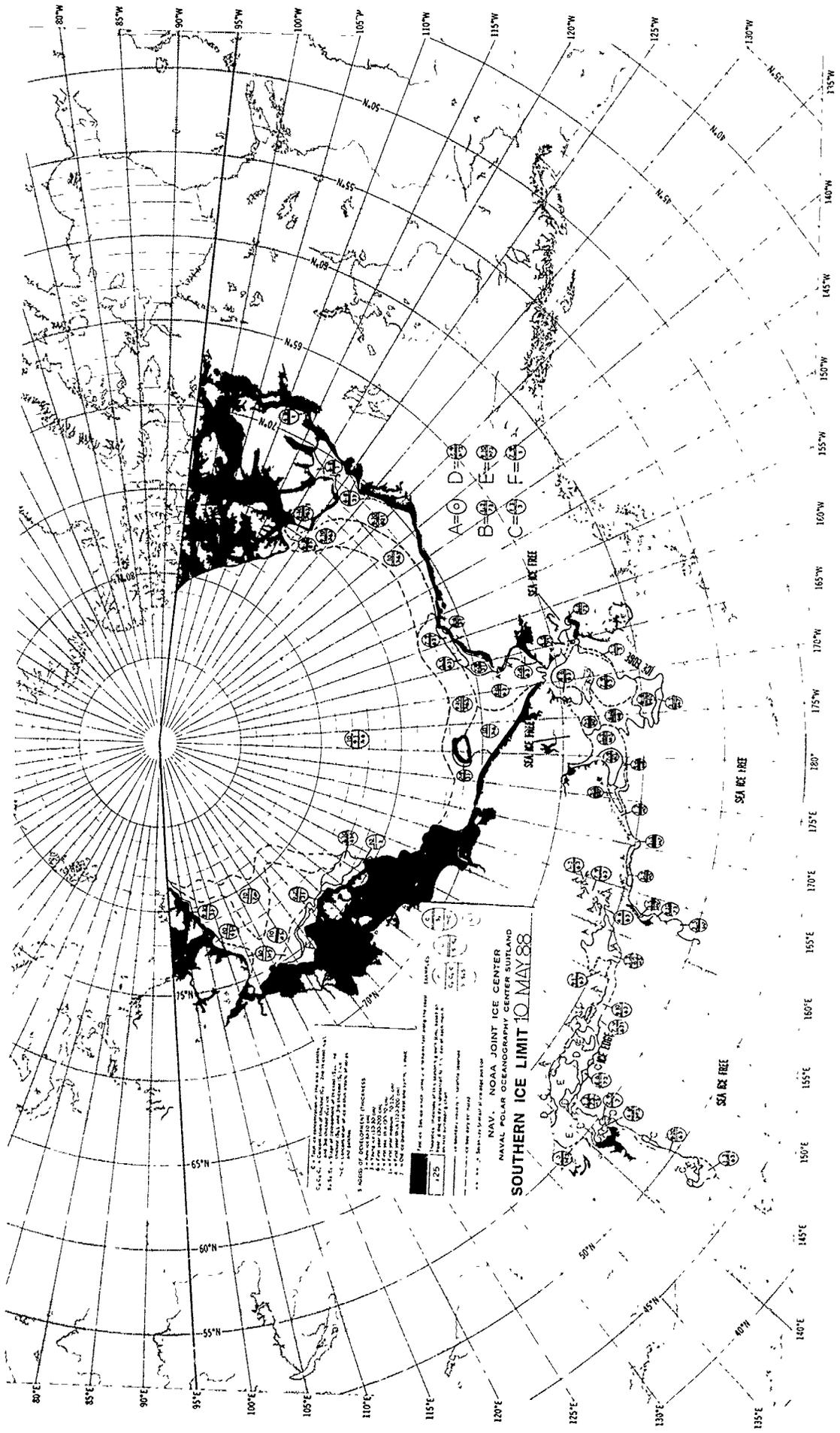


1. 1/4" = 100 Miles  
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NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUITSLANG  
**SOUTHERN ICE LIMIT 26 APR '88**



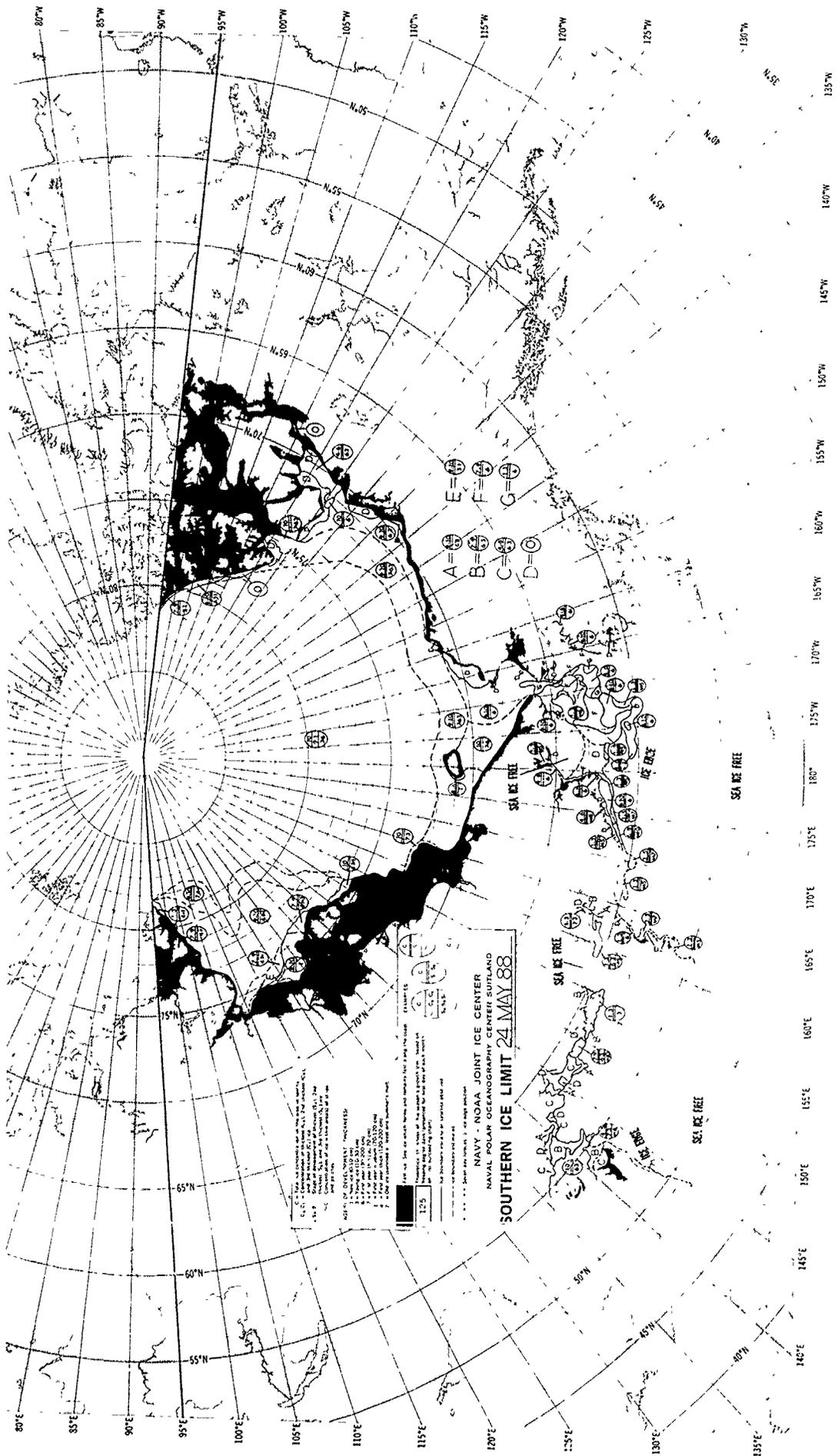




NAVY - NAVY JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND  
 SOUTHERN ICE LIMIT 10 MAY 88

1. This chart is based on the latest available information and is subject to change without notice. It is not to be used for navigation. 2. The depth contours are based on the latest available information and are subject to change without notice. 3. The ice limits are based on the latest available information and are subject to change without notice. 4. The chart is based on the latest available information and is subject to change without notice. 5. The chart is based on the latest available information and is subject to change without notice. 6. The chart is based on the latest available information and is subject to change without notice. 7. The chart is based on the latest available information and is subject to change without notice. 8. The chart is based on the latest available information and is subject to change without notice. 9. The chart is based on the latest available information and is subject to change without notice. 10. The chart is based on the latest available information and is subject to change without notice.





NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUTCLAND  
**SOUTHERN ICE LIMIT 24 MAY 88**

1. This map shows the ice extent and sea ice limit for the period 24 May 1988. The ice extent is shown by the dark shaded area. The sea ice limit is shown by the dashed line. The map is based on data from the Navy and NOAA ice charts and satellite data.

2. The map is a polar projection map of the Arctic region. The latitude and longitude coordinates are shown on the map. The map is based on data from the Navy and NOAA ice charts and satellite data.

3. The map is based on data from the Navy and NOAA ice charts and satellite data. The map is based on data from the Navy and NOAA ice charts and satellite data.

4. The map is based on data from the Navy and NOAA ice charts and satellite data. The map is based on data from the Navy and NOAA ice charts and satellite data.

5. The map is based on data from the Navy and NOAA ice charts and satellite data. The map is based on data from the Navy and NOAA ice charts and satellite data.

EXAMPLES

A = (Symbol)

B = (Symbol)

C = (Symbol)

D = (Symbol)

E = (Symbol)

F = (Symbol)

G = (Symbol)

1. This map shows the ice extent and sea ice limit for the period 24 May 1988. The ice extent is shown by the dark shaded area. The sea ice limit is shown by the dashed line. The map is based on data from the Navy and NOAA ice charts and satellite data.

2. The map is a polar projection map of the Arctic region. The latitude and longitude coordinates are shown on the map. The map is based on data from the Navy and NOAA ice charts and satellite data.

3. The map is based on data from the Navy and NOAA ice charts and satellite data. The map is based on data from the Navy and NOAA ice charts and satellite data.

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7. The map is based on data from the Navy and NOAA ice charts and satellite data. The map is based on data from the Navy and NOAA ice charts and satellite data.

8. The map is based on data from the Navy and NOAA ice charts and satellite data. The map is based on data from the Navy and NOAA ice charts and satellite data.

9. The map is based on data from the Navy and NOAA ice charts and satellite data. The map is based on data from the Navy and NOAA ice charts and satellite data.

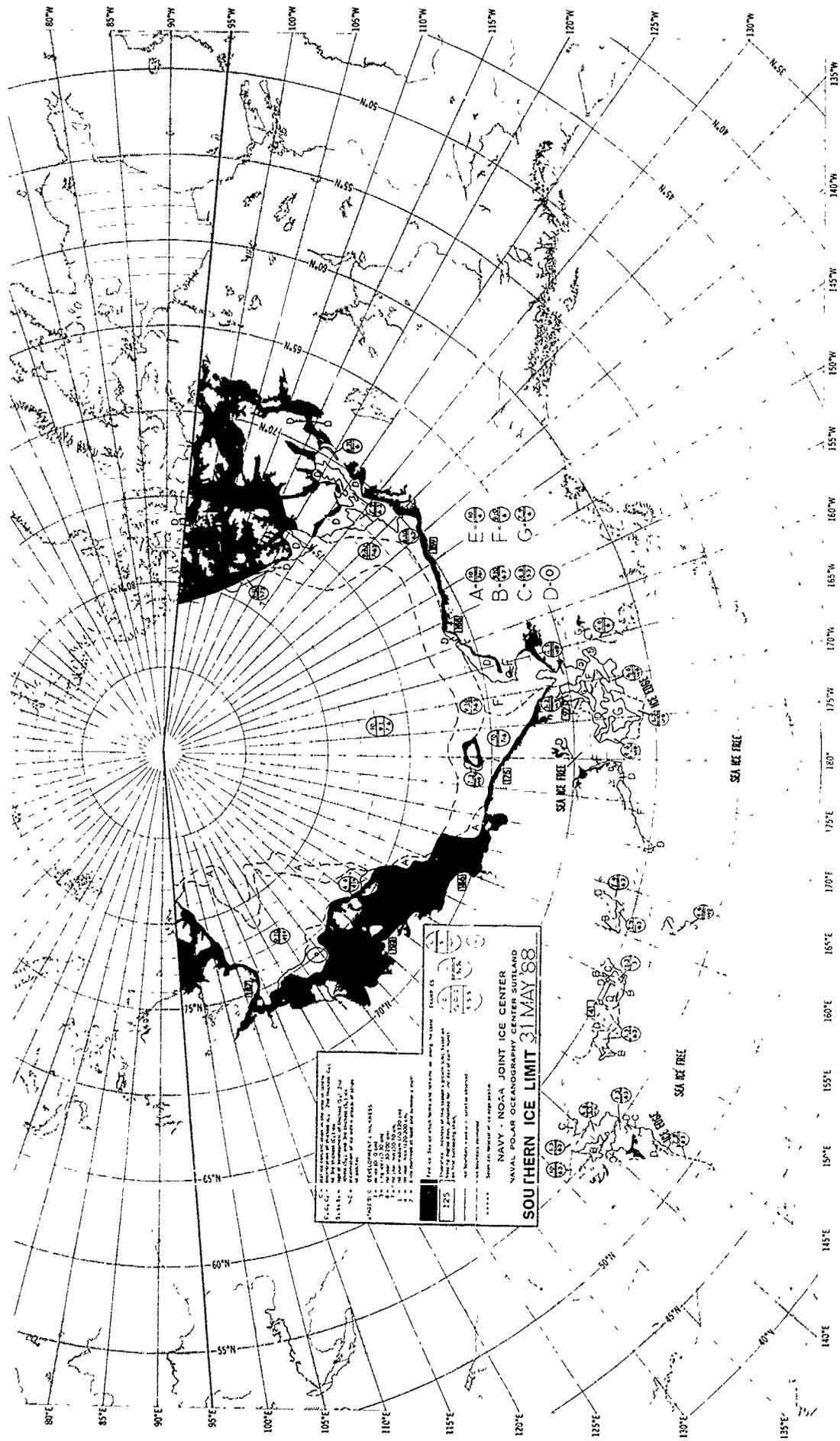
10. The map is based on data from the Navy and NOAA ice charts and satellite data. The map is based on data from the Navy and NOAA ice charts and satellite data.

11. The map is based on data from the Navy and NOAA ice charts and satellite data. The map is based on data from the Navy and NOAA ice charts and satellite data.

12. The map is based on data from the Navy and NOAA ice charts and satellite data. The map is based on data from the Navy and NOAA ice charts and satellite data.

13. The map is based on data from the Navy and NOAA ice charts and satellite data. The map is based on data from the Navy and NOAA ice charts and satellite data.

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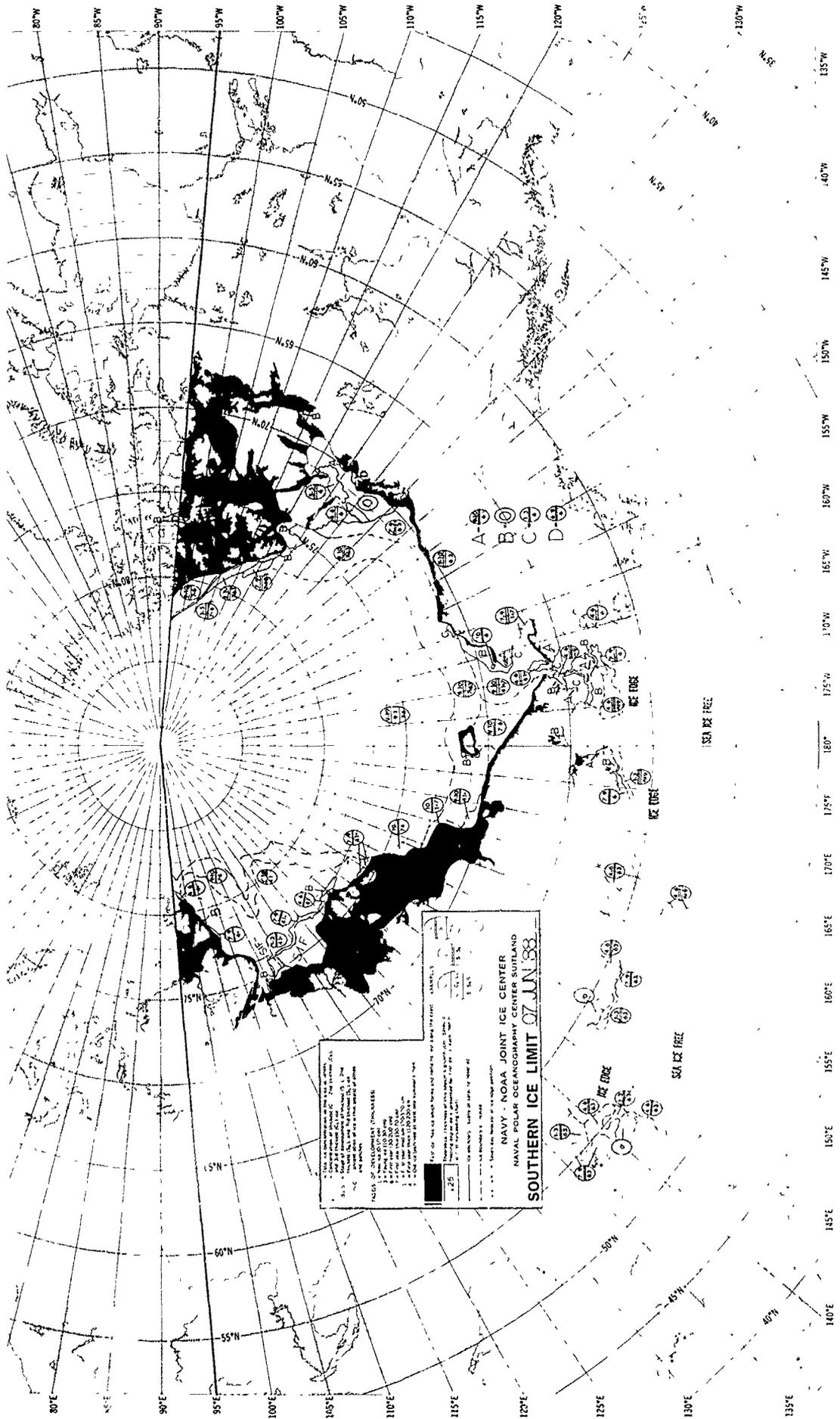


For the most accurate information on shipping conditions, consult the latest edition of the Admiralty Sailing Directions, Volume 4, Arctic Seas, Part 1, 2, and 3, and the latest edition of the Admiralty Sailing Directions, Volume 4, Arctic Seas, Part 4, and the latest edition of the Admiralty Sailing Directions, Volume 4, Arctic Seas, Part 5.

**SOUTHERN ICE LIMIT 31 MAY 88**  
 NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUTCLIFF  
 1:500,000

**ICE CLASSIFICATION**  
 1 Thin Ice  
 2 Medium Ice  
 3 Thick Ice

**ICE CHARACTERISTICS**  
 A Ice Age  
 B Ice Type  
 C Ice Thickness  
 D Ice Concentration



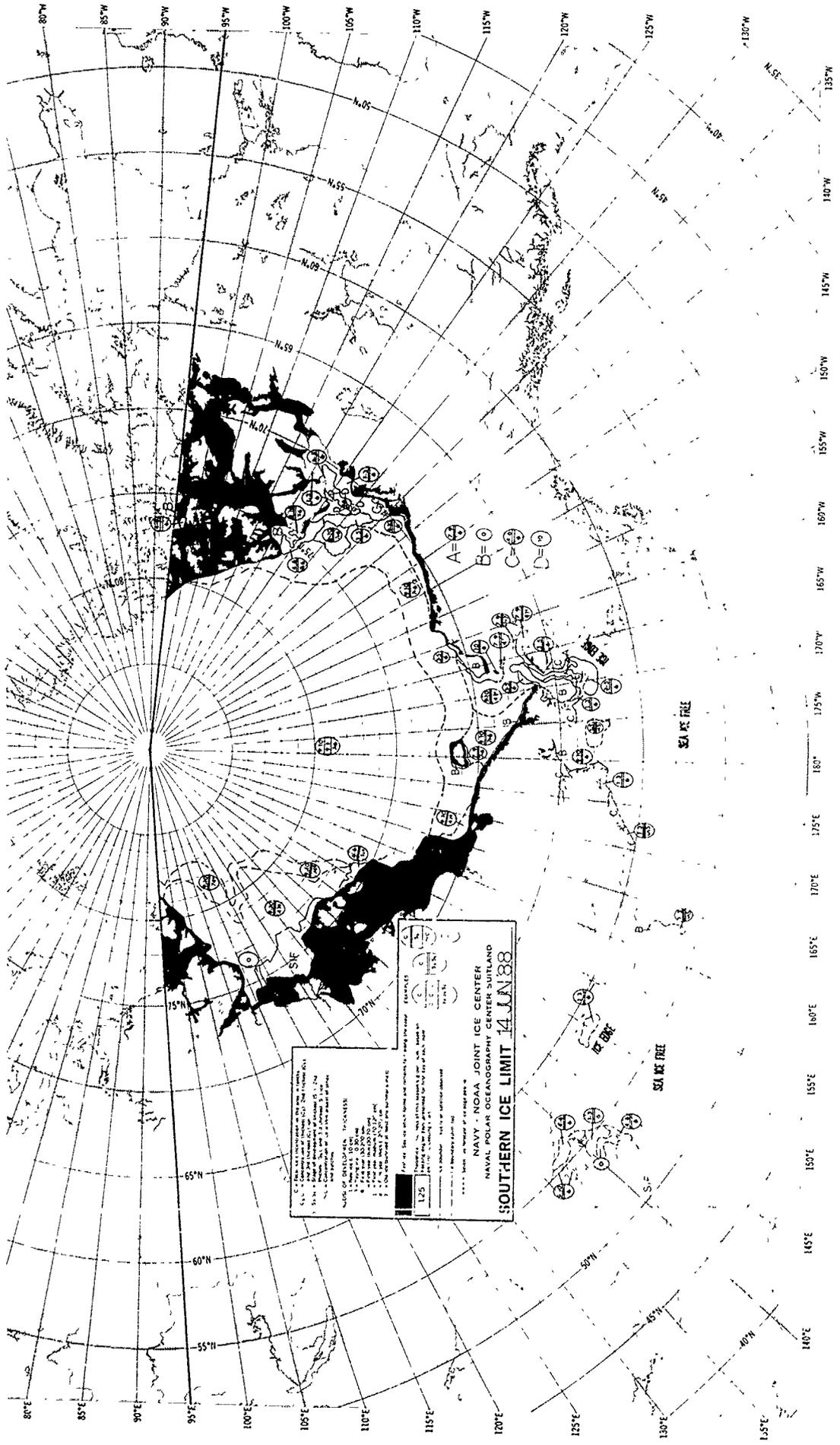
1. This is a contour map of the ice extent and ice type in the Southern Ocean south of 30°S, as of 07 JUN 58. The ice extent is shown by a solid line, and the ice type is shown by a dashed line. The ice concentration is shown by a dotted line. The ice extent and ice type are shown in the legend. The ice concentration is shown in the legend.

**NAVY - NOAA JOINT ICE CENTER**  
**NAVAL POLAR OCEANOGRAPHY CENTER SUTLAND**  
**SOUTHERN ICE LIMIT 07 JUN 58**

2. This is a contour map of the ice extent and ice type in the Southern Ocean south of 30°S, as of 07 JUN 58. The ice extent is shown by a solid line, and the ice type is shown by a dashed line. The ice concentration is shown by a dotted line. The ice extent and ice type are shown in the legend. The ice concentration is shown in the legend.

3. This is a contour map of the ice extent and ice type in the Southern Ocean south of 30°S, as of 07 JUN 58. The ice extent is shown by a solid line, and the ice type is shown by a dashed line. The ice concentration is shown by a dotted line. The ice extent and ice type are shown in the legend. The ice concentration is shown in the legend.

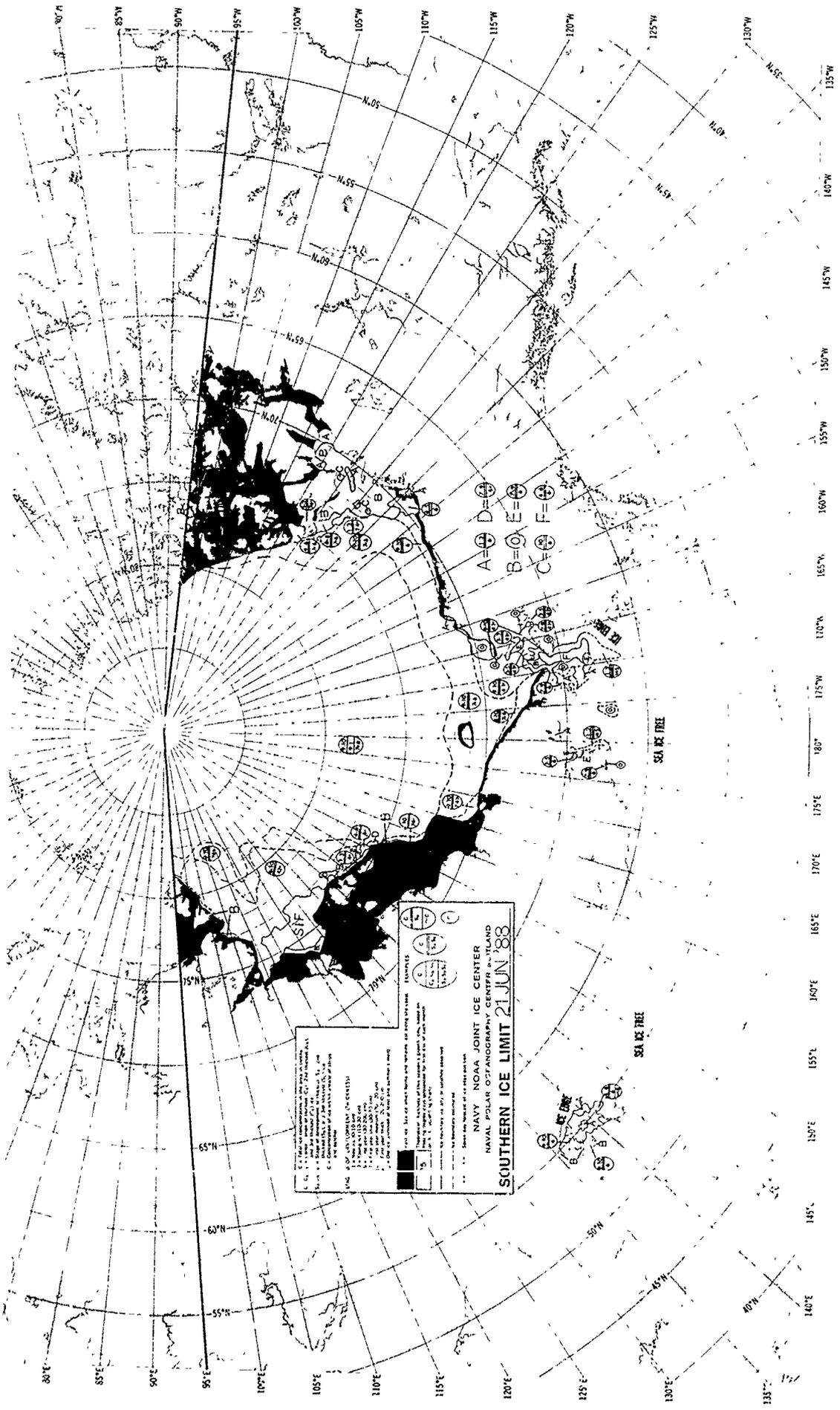
4. This is a contour map of the ice extent and ice type in the Southern Ocean south of 30°S, as of 07 JUN 58. The ice extent is shown by a solid line, and the ice type is shown by a dashed line. The ice concentration is shown by a dotted line. The ice extent and ice type are shown in the legend. The ice concentration is shown in the legend.



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NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND  
**SOUTHERN ICE LIMIT 14 JUN 88**

150°E 140°E 130°E 120°E 110°E 100°E 90°E 80°E 70°E 60°E 50°E  
 150°W 140°W 130°W 120°W 110°W 100°W 90°W 80°W 70°W 60°W 50°W



1. 1:50,000 scale map of Antarctica, 1988, published by the U.S. Navy Hydrographic Office, Washington, D.C. (1:50,000 scale).  
 2. 1:50,000 scale map of Antarctica, 1988, published by the U.S. Navy Hydrographic Office, Washington, D.C. (1:50,000 scale).  
 3. 1:50,000 scale map of Antarctica, 1988, published by the U.S. Navy Hydrographic Office, Washington, D.C. (1:50,000 scale).  
 4. 1:50,000 scale map of Antarctica, 1988, published by the U.S. Navy Hydrographic Office, Washington, D.C. (1:50,000 scale).  
 5. 1:50,000 scale map of Antarctica, 1988, published by the U.S. Navy Hydrographic Office, Washington, D.C. (1:50,000 scale).  
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 9. 1:50,000 scale map of Antarctica, 1988, published by the U.S. Navy Hydrographic Office, Washington, D.C. (1:50,000 scale).  
 10. 1:50,000 scale map of Antarctica, 1988, published by the U.S. Navy Hydrographic Office, Washington, D.C. (1:50,000 scale).

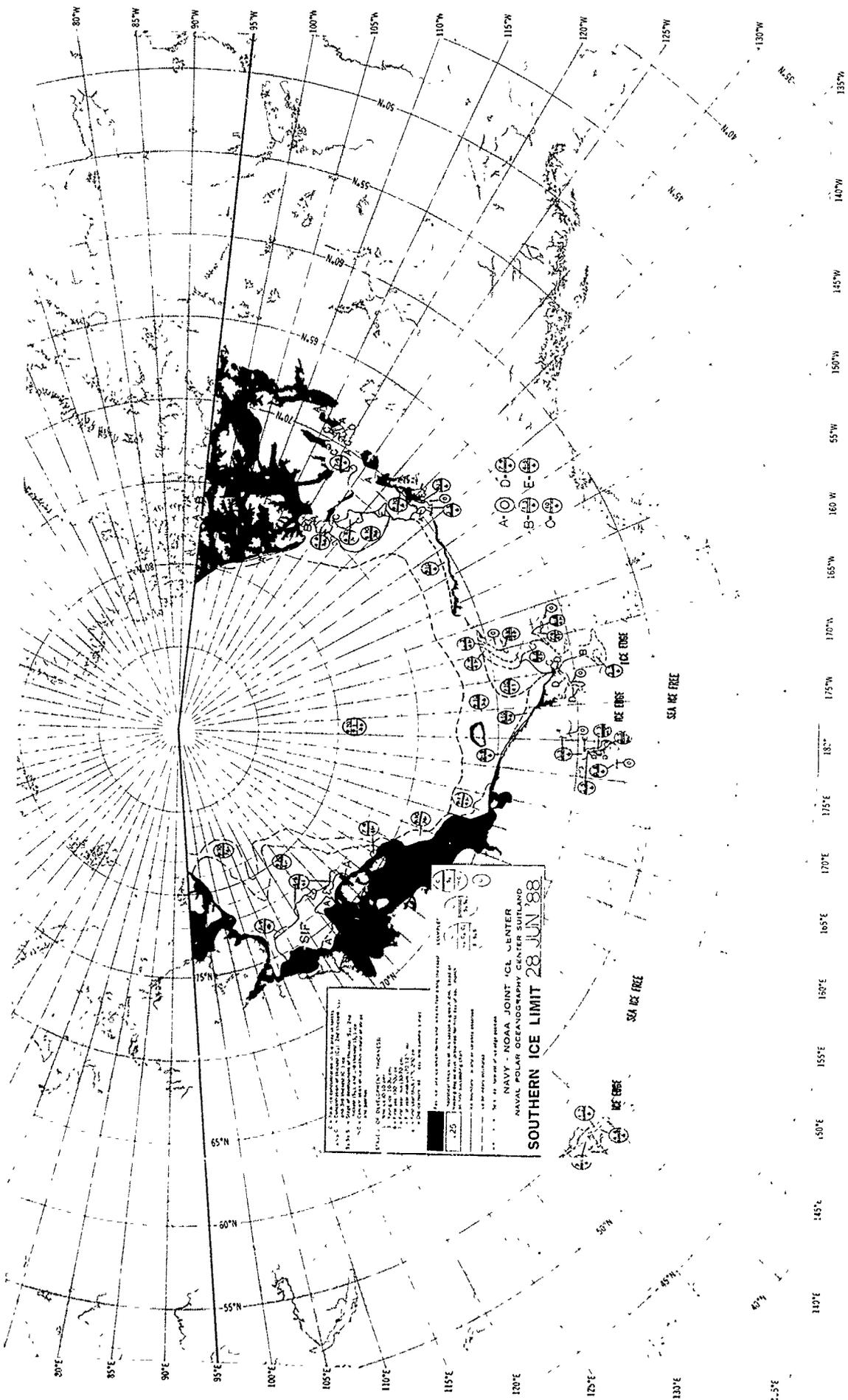
**NAVY NOAA JOINT ICE CENTER**  
**NAVAL POLAR OCEANOGRAPHY CENTER**  
**SOUTHERN ICE LIMIT 21 JUN 88**

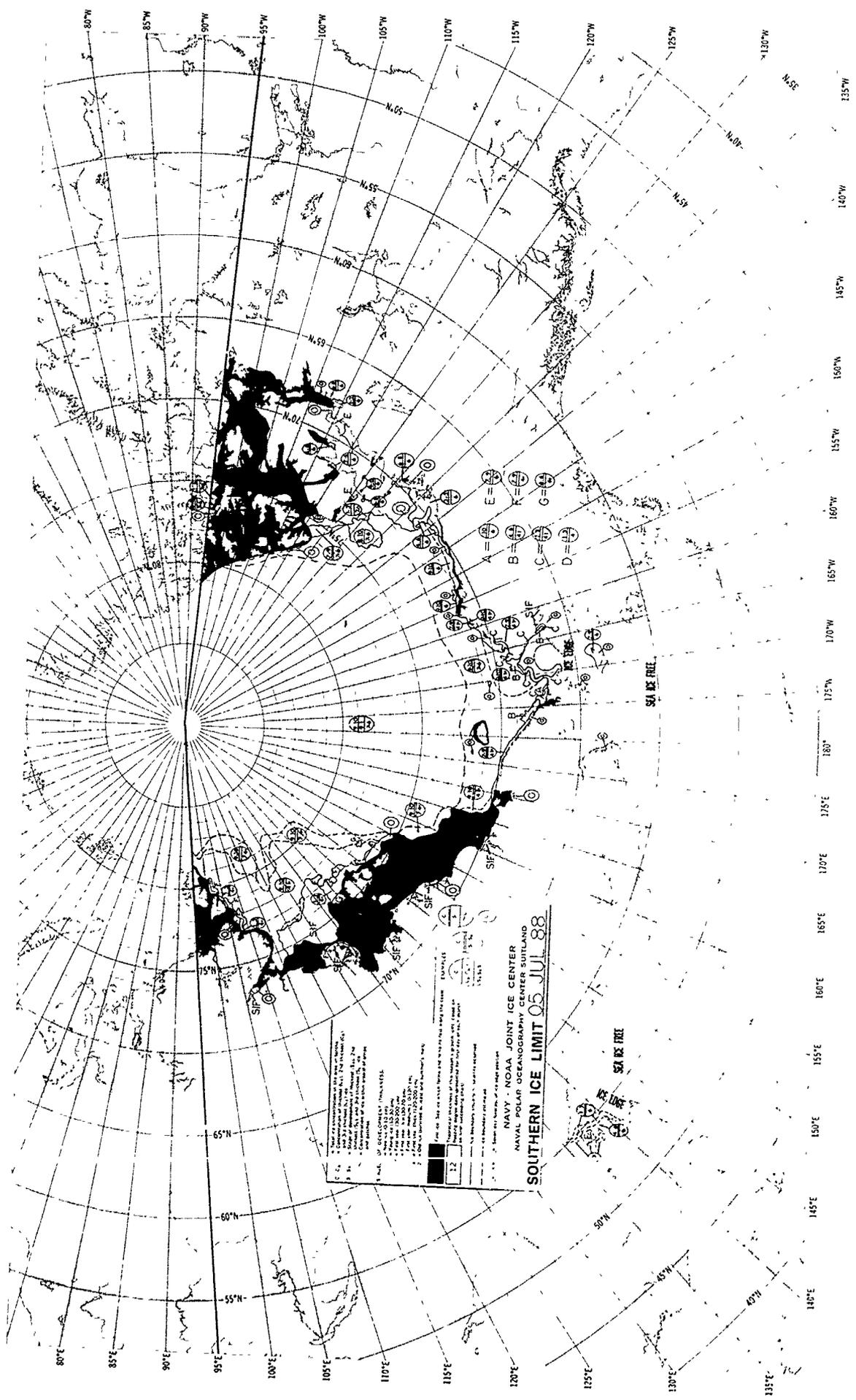
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SEA ICE FREE

SEA ICE FREE

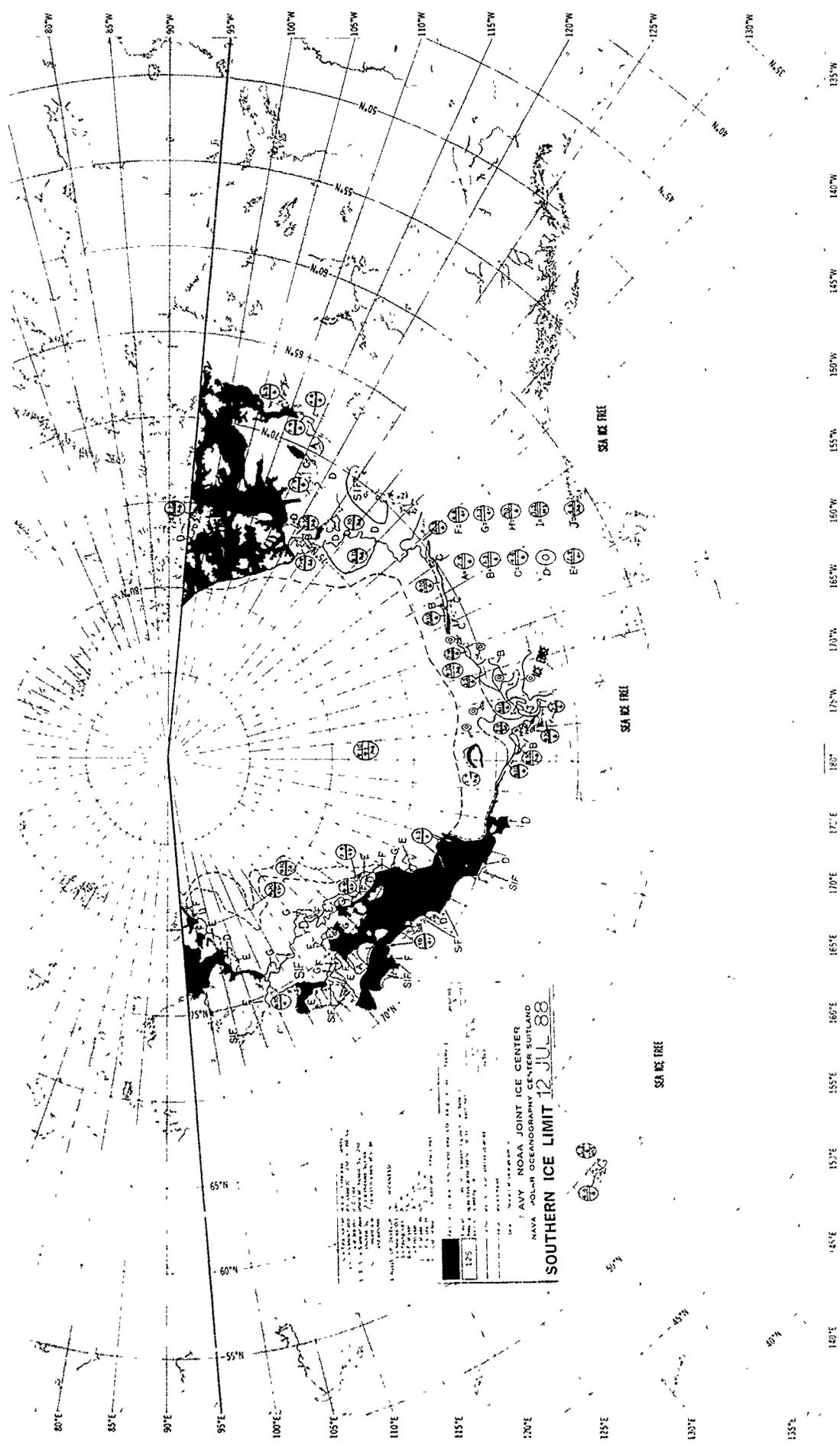
ICE FREE





From the Sea Ice Thickness and Extent Data (SIT) File  
 Produced by the Naval Polar Oceanography Center SUII/LAND  
 SOUTHERN ICE LIMIT 05 JUL 88

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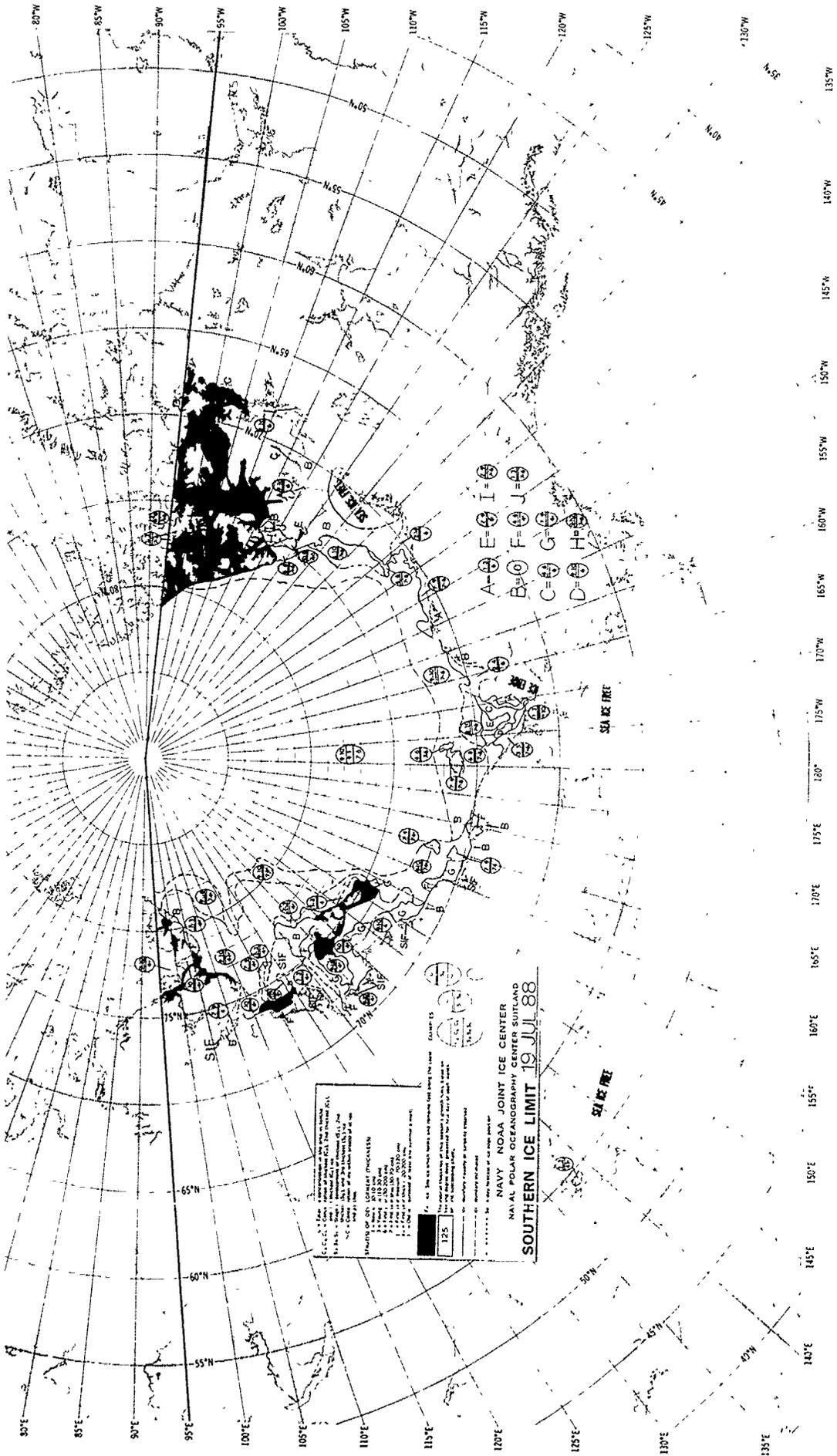
NAVY, NOAA, JOINT ICE CENTER  
NAVY, POLAR GEOGRAPHY CENTER, SUITLAND  
**SOUTHERN ICE LIMIT 12 JUL 88**

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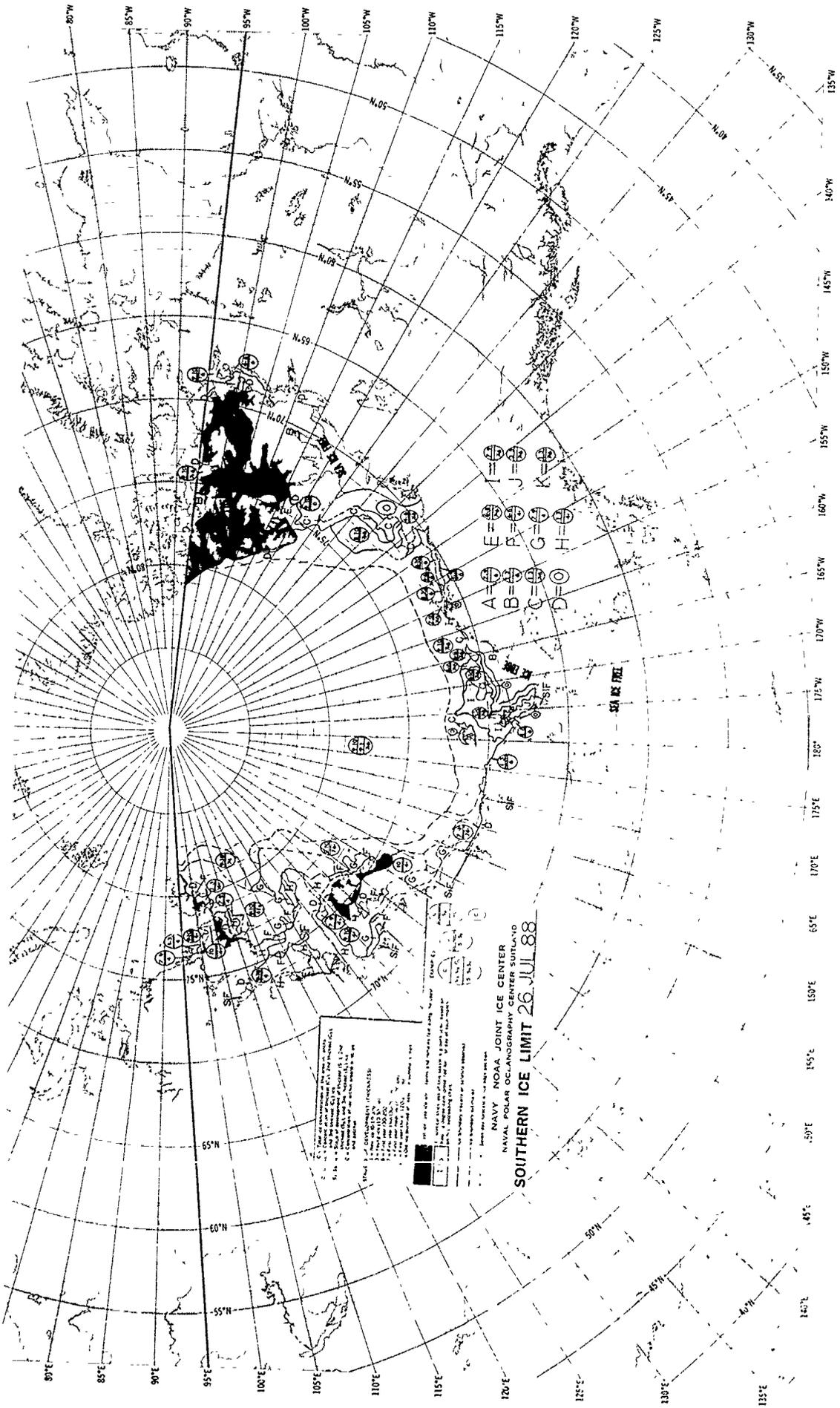
155°E 150°E 145°E 140°E 135°E 130°E 125°E 120°E 115°E 110°E 105°E 100°E 95°E 90°E 85°E 80°E



1. Ice type as determined by the observer or by satellite data. The observer's name is indicated by the letter in the center of the symbol. The number in the center of the symbol indicates the ice concentration in percent. The number in the outer ring of the symbol indicates the ice thickness in feet. The number in the inner ring of the symbol indicates the ice age in years. The number in the center of the symbol indicates the ice type as determined by the observer or by satellite data. The number in the center of the symbol indicates the ice concentration in percent. The number in the outer ring of the symbol indicates the ice thickness in feet. The number in the inner ring of the symbol indicates the ice age in years.

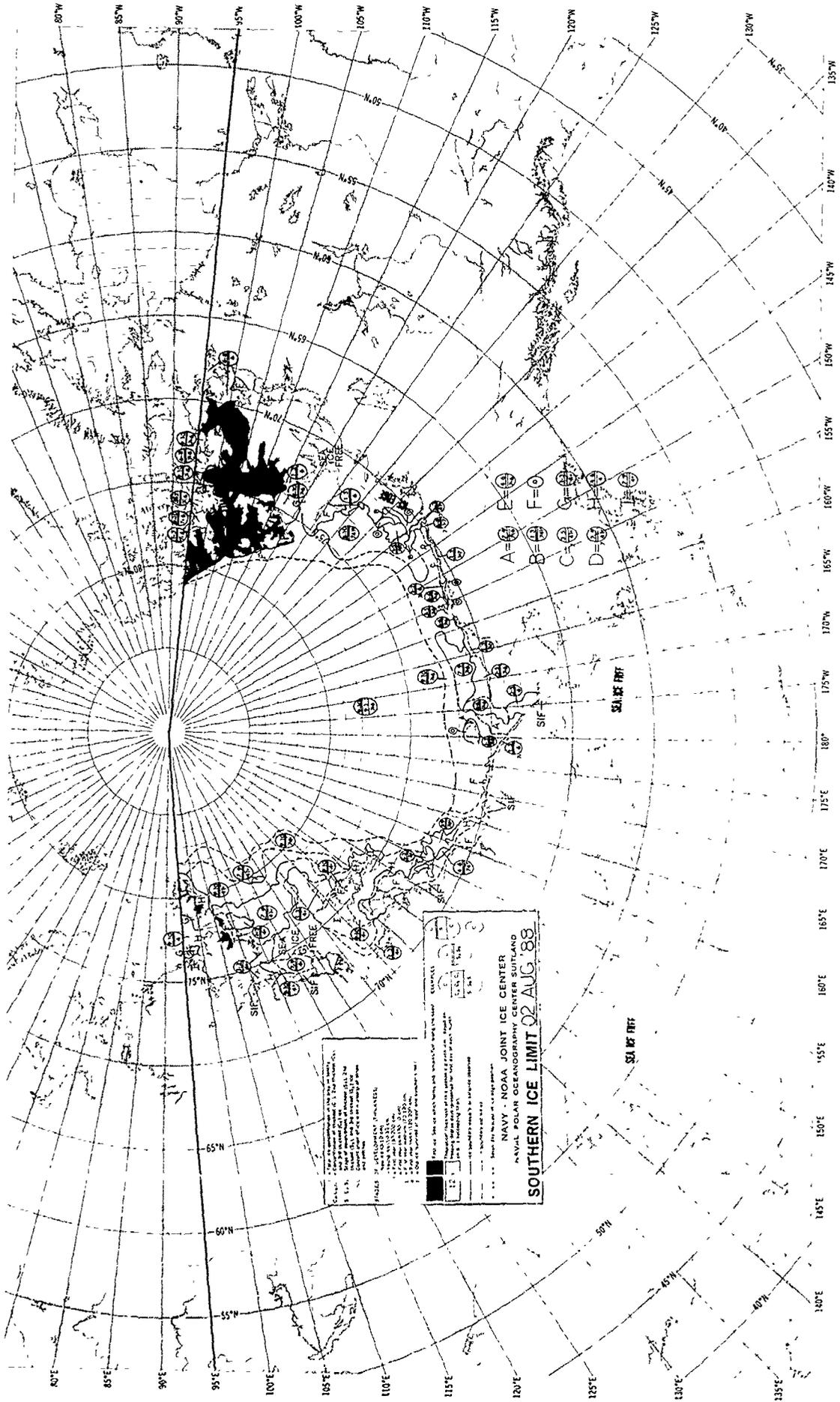
NAVY NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND  
 SOUTHERN ICE LIMIT 19 JUL 88

A = E = I =   
 B = F = J =   
 C = G =   
 D = H =



1. Symbols for ice types are defined in the legend.  
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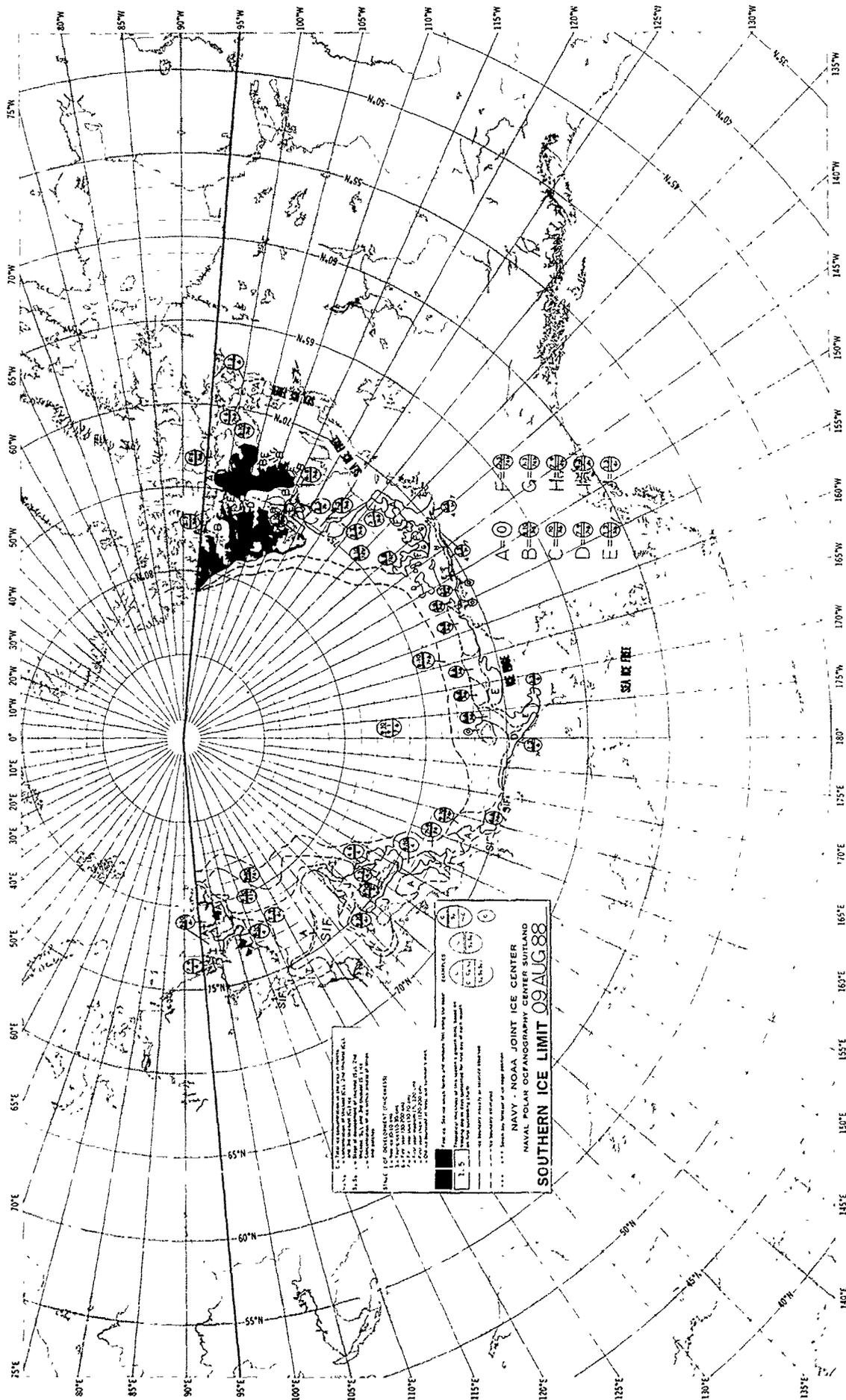
NAVY NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND  
 SOUTHERN ICE LIMIT 26 JUL 88



1. Data from the Navy's Antarctic Oceanographic Survey (AOS) and the Navy's Antarctic Oceanographic Survey (AOS) are used to determine the ice limit. The AOS data is used to determine the ice limit in the Southern Ocean. The AOS data is used to determine the ice limit in the Southern Ocean.

**NAVY - NOAA JOINT ICE CENTER**  
**NAVIL POLAR OCEANOGRAPHY CENTER SUTLAND**  
**SOUTHERN ICE LIMIT 02 AUG 88**

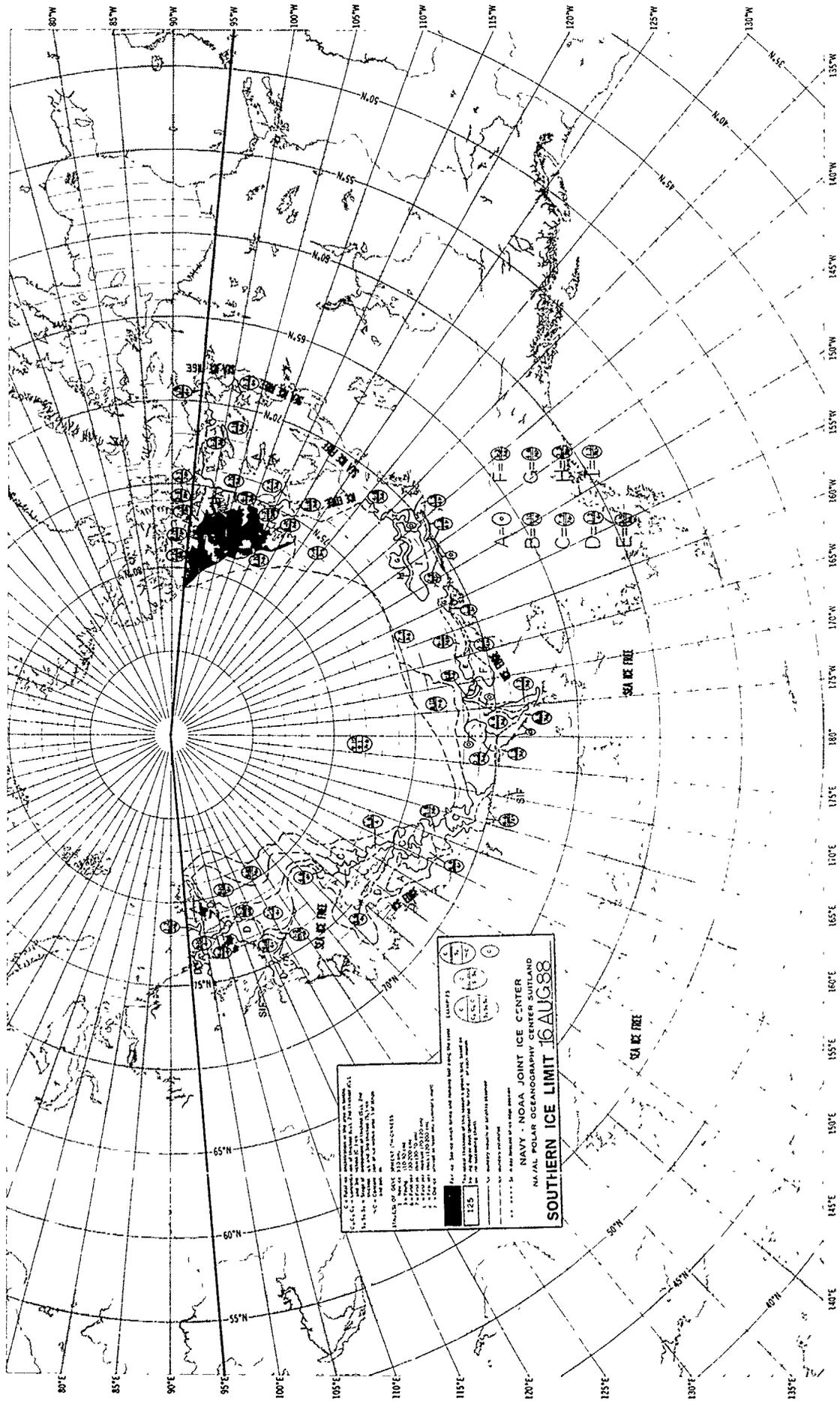
A = E =   
 B = F =   
 C = G =   
 D = H = I =



1. Symbols for ice thickness are shown in the legend.  
 2. Symbols for ice type are shown in the legend.  
 3. Symbols for ice concentration are shown in the legend.  
 4. Symbols for ice motion are shown in the legend.  
 5. Symbols for ice age are shown in the legend.  
 6. Symbols for ice color are shown in the legend.  
 7. Symbols for ice texture are shown in the legend.  
 8. Symbols for ice surface are shown in the legend.  
 9. Symbols for ice bottom are shown in the legend.  
 10. Symbols for ice topography are shown in the legend.

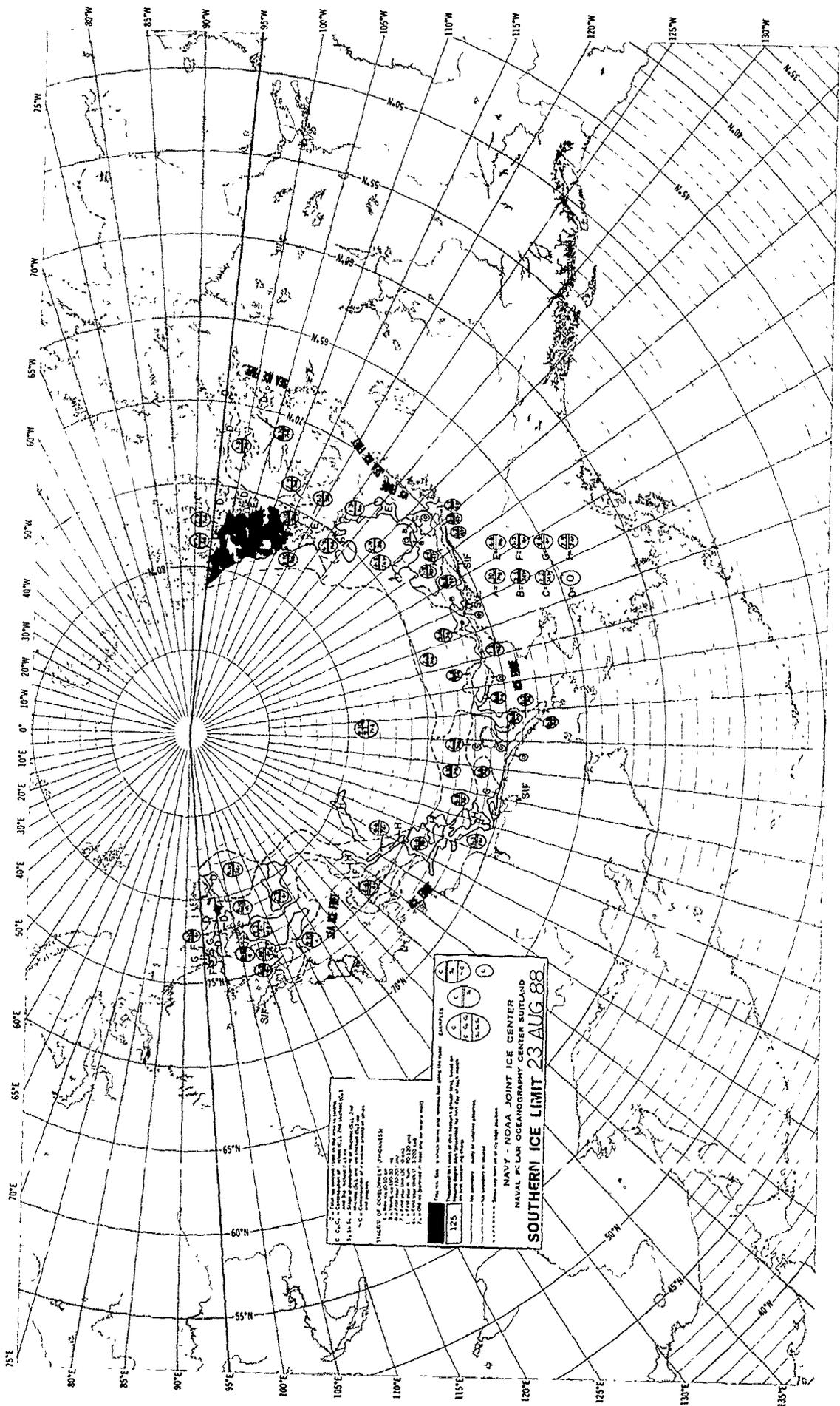
NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND  
**SOUTHERN ICE LIMIT 09 AUG 88**

A = 0  
 B = 1  
 C = 2  
 D = 3  
 E = 4  
 F = 5



U.S. POLAR PROGRAM  
 NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUTLAND  
**SOUTHERN ICE LIMIT 16 AUG 68**

1. 0-100% ice  
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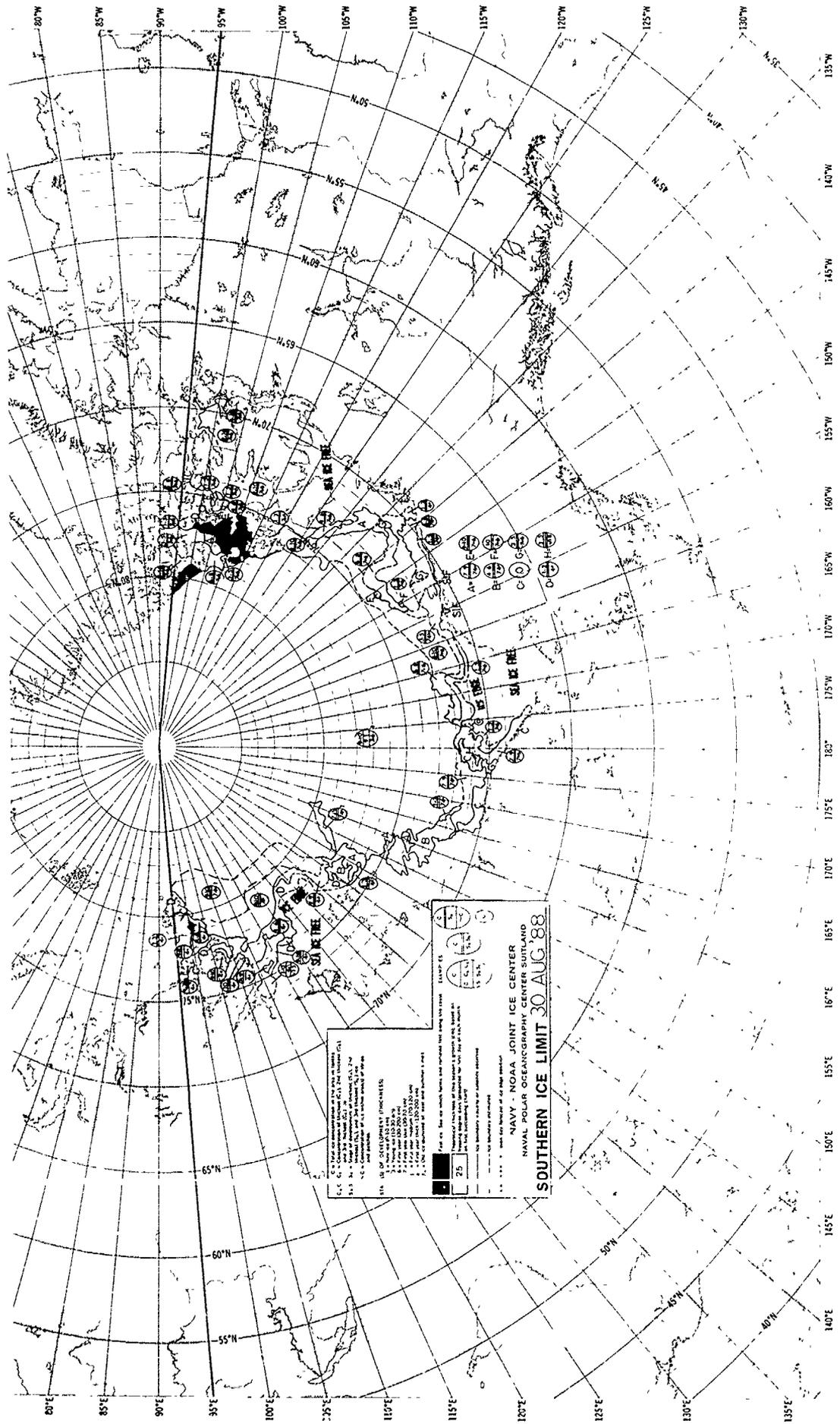


1. 0-100% of the area covered by ice is shown. The area covered by ice is shown in black. The area covered by open water is shown in white. The area covered by ice is shown in black. The area covered by open water is shown in white. The area covered by ice is shown in black. The area covered by open water is shown in white.

**VALUES OF INTERESTING SPICES:**  
 1. 0-100% of the area covered by ice is shown. The area covered by open water is shown in white. The area covered by ice is shown in black. The area covered by open water is shown in white. The area covered by ice is shown in black. The area covered by open water is shown in white.

**VALUES OF INTERESTING SPICES:**  
 1. 0-100% of the area covered by ice is shown. The area covered by open water is shown in white. The area covered by ice is shown in black. The area covered by open water is shown in white. The area covered by ice is shown in black. The area covered by open water is shown in white.

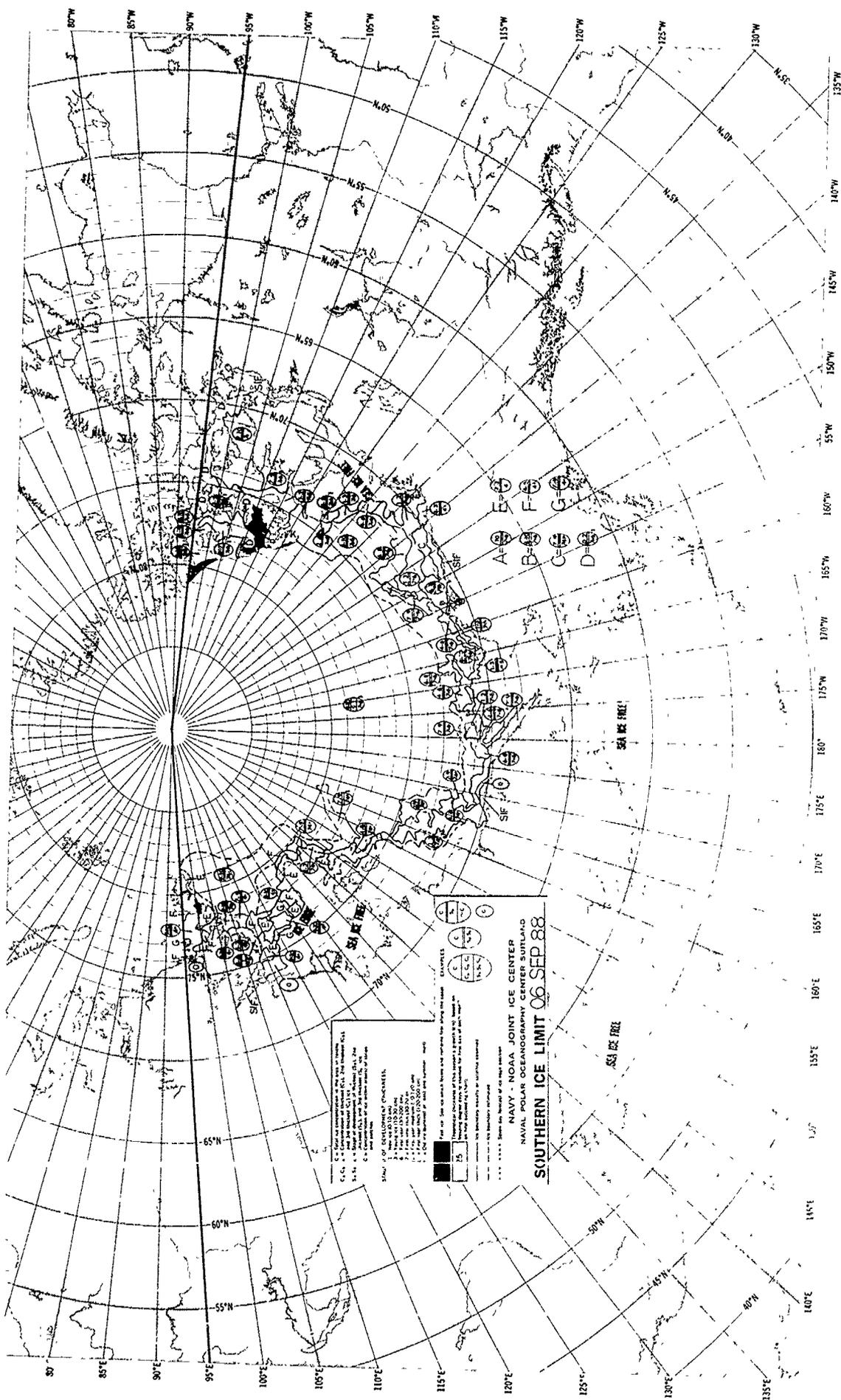
NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND  
**SOUTHERN ICE LIMIT 23 AUG 88**



1. 0-9: Ice concentration (0-100%) as reported by the observer.  
2. 10-19: Ice concentration (0-100%) as reported by the observer, corrected for wind drift.  
3. 20-29: Ice concentration (0-100%) as reported by the observer, corrected for wind drift and ice motion.  
4. 30-39: Ice concentration (0-100%) as reported by the observer, corrected for wind drift and ice motion, and adjusted for ice motion.  
5. 40-49: Ice concentration (0-100%) as reported by the observer, corrected for wind drift and ice motion, and adjusted for ice motion, and adjusted for ice motion.  
6. 50-59: Ice concentration (0-100%) as reported by the observer, corrected for wind drift and ice motion, and adjusted for ice motion, and adjusted for ice motion.  
7. 60-69: Ice concentration (0-100%) as reported by the observer, corrected for wind drift and ice motion, and adjusted for ice motion, and adjusted for ice motion.  
8. 70-79: Ice concentration (0-100%) as reported by the observer, corrected for wind drift and ice motion, and adjusted for ice motion, and adjusted for ice motion.  
9. 80-89: Ice concentration (0-100%) as reported by the observer, corrected for wind drift and ice motion, and adjusted for ice motion, and adjusted for ice motion.  
10. 90-99: Ice concentration (0-100%) as reported by the observer, corrected for wind drift and ice motion, and adjusted for ice motion, and adjusted for ice motion.

1. 1: Ice motion direction in degrees true.  
2. 2: Ice motion speed in knots.  
3. 3: Ice motion speed in miles per hour.  
4. 4: Ice motion speed in kilometers per hour.  
5. 5: Ice motion speed in meters per second.  
6. 6: Ice motion speed in feet per second.  
7. 7: Ice motion speed in miles per minute.  
8. 8: Ice motion speed in kilometers per minute.  
9. 9: Ice motion speed in meters per minute.  
10. 10: Ice motion speed in feet per minute.

NAVY - NOAA JOINT ICE CENTER  
NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND  
SOUTHERN ICE LIMIT 30 AUG 88



**SYMBOLS FOR DEVELOPMENTAL FEATURES:**

- - Circle with letter A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, AA, AB, AC, AD, AE, AF, AG, AH, AI, AJ, AK, AL, AM, AN, AO, AP, AQ, AR, AS, AT, AU, AV, AW, AX, AY, AZ, BA, BB, BC, BD, BE, BF, BG, BH, BI, BJ, BK, BL, BM, BN, BO, BP, BQ, BR, BS, BT, BU, BV, BW, BX, BY, BZ, CA, CB, CC, CD, CE, CF, CG, CH, CI, CJ, CK, CL, CM, CN, CO, CP, CQ, CR, CS, CT, CU, CV, CW, CX, CY, CZ, DA, DB, DC, DD, DE, DF, DG, DH, DI, DJ, DK, DL, DM, DN, DO, DP, DQ, DR, DS, DT, DU, DV, DW, DX, DY, DZ, EA, EB, EC, ED, EE, EF, EG, EH, EI, EJ, EK, EL, EM, EN, EO, EP, EQ, ER, ES, ET, EU, EV, EW, EX, EY, EZ, FA, FB, FC, FD, FE, FF, FG, FH, FI, FJ, FK, FL, FM, FN, FO, FP, FQ, FR, FS, FT, FU, FV, FW, FX, FY, FZ, GA, GB, GC, GD, GE, GF, GG, GH, GI, GJ, GK, GL, GM, GN, GO, GP, GQ, GR, GS, GT, GU, GV, GW, GX, GY, GZ, HA, HB, HC, HD, HE, HF, HG, HH, HI, HJ, HK, HL, HM, HN, HO, HP, HQ, HR, HS, HT, HU, HV, HW, HX, HY, HZ, IA, IB, IC, ID, IE, IF, IG, IH, II, IJ, IK, IL, IM, IN, IO, IP, IQ, IR, IS, IT, IU, IV, IW, IX, IY, IZ, JA, JB, JC, JD, JE, JF, JG, JH, JI, JJ, JK, JL, JM, JN, JO, JP, JQ, JR, JS, JT, JU, JV, JW, JX, JY, JZ, KA, KB, KC, KD, KE, KF, KG, KH, KI, KJ, KK, KL, KM, KN, KO, KP, KQ, KR, KS, KT, KU, KV, KW, KX, KY, KZ, LA, LB, LC, LD, LE, LF, LG, LH, LI, LJ, LK, LL, LM, LN, LO, LP, LQ, LR, LS, LT, LU, LV, LW, LX, LY, LZ, MA, MB, MC, MD, ME, MF, MG, MH, MI, MJ, MK, ML, MM, MN, MO, MP, MQ, MR, MS, MT, MU, MV, MW, MX, MY, MZ, NA, NB, NC, ND, NE, NF, NG, NH, NI, NJ, NK, NL, NM, NN, NO, NP, NQ, NR, NS, NT, NU, NV, NW, NX, NY, NZ, OA, OB, OC, OD, OE, OF, OG, OH, OI, OJ, OK, OL, OM, ON, OO, OP, OQ, OR, OS, OT, OU, OV, OW, OX, OY, OZ, PA, PB, PC, PD, PE, PF, PG, PH, PI, PJ, PK, PL, PM, PN, PO, PP, PQ, PR, PS, PT, PU, PV, PW, PX, PY, PZ, QA, QB, QC, QD, QE, QF, QG, QH, QI, QJ, QK, QL, QM, QN, QO, QP, QQ, QR, QS, QT, QU, QV, QW, QX, QY, QZ, RA, RB, RC, RD, RE, RF, RG, RH, RI, RJ, RK, RL, RM, RN, RO, RP, RQ, RR, RS, RT, RU, RV, RW, RX, RY, RZ, SA, SB, SC, SD, SE, SF, SG, SH, SI, SJ, SK, SL, SM, SN, SO, SP, SQ, SR, SS, ST, SU, SV, SW, SX, SY, SZ, TA, TB, TC, TD, TE, TF, TG, TH, TI, TJ, TK, TL, TM, TN, TO, TP, TQ, TR, TS, TT, TU, TV, TW, TX, TY, TZ, UA, UB, UC, UD, UE, UF, UG, UH, UI, UJ, UK, UL, UM, UN, UO, UP, UQ, UR, US, UT, UY, UZ, VA, VB, VC, VD, VE, VF, VG, VH, VI, VJ, VK, VL, VM, VN, VO, VP, VQ, VR, VS, VT, VU, VV, VW, VX, VY, VZ, WA, WB, WC, WD, WE, WF, WG, WH, WI, WJ, WK, WL, WM, WN, WO, WP, WQ, WR, WS, WT, WU, WV, WW, WX, WY, WZ, XA, XB, XC, XD, XE, XF, XG, XH, XI, XJ, XK, XL, XM, XN, XO, XP, XQ, XR, XS, XT, XU, XV, XW, XX, XY, XZ, YA, YB, YC, YD, YE, YF, YG, YH, YI, YJ, YK, YL, YM, YN, YO, YP, YQ, YR, YS, YT, YU, YV, YW, YX, YY, YZ, ZA, ZB, ZC, ZD, ZE, ZF, ZG, ZH, ZI, ZJ, ZK, ZL, ZM, ZN, ZO, ZP, ZQ, ZR, ZS, ZT, ZU, ZV, ZW, ZX, ZY, ZZ.

**CHANGES**

1. Add ice limit for 06 SEP 88.

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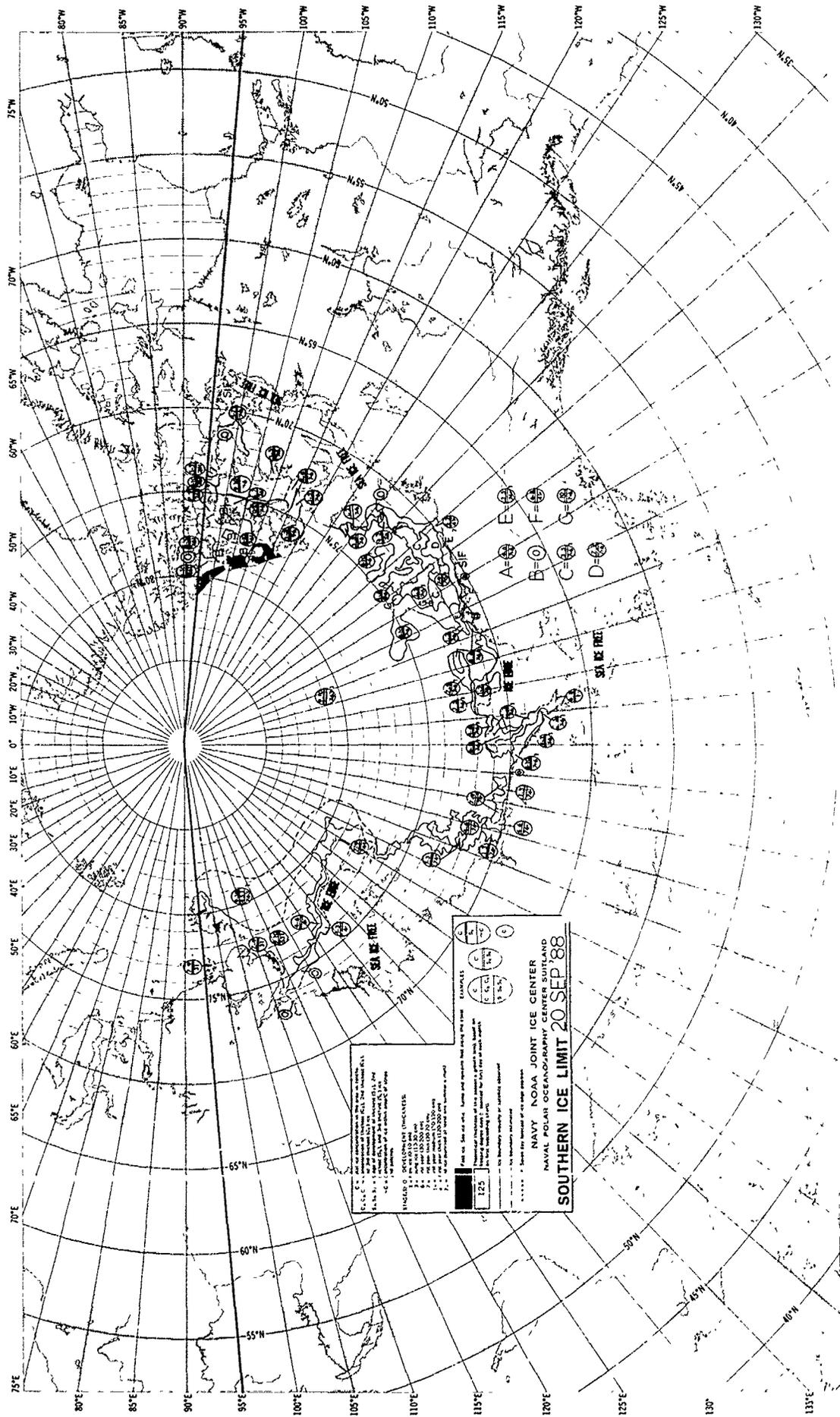
98. Add ice limit for 06 SEP 88.

99. Add ice limit for 06 SEP 88.

100. Add ice limit for 06 SEP 88.

**NAVY - NOAA JOINT ICE CENTER**  
**NAVAL POLAR OCEANOGRAPHY CENTER SURLAND**  
**SOUTHERN ICE LIMIT 06 SEP 88**

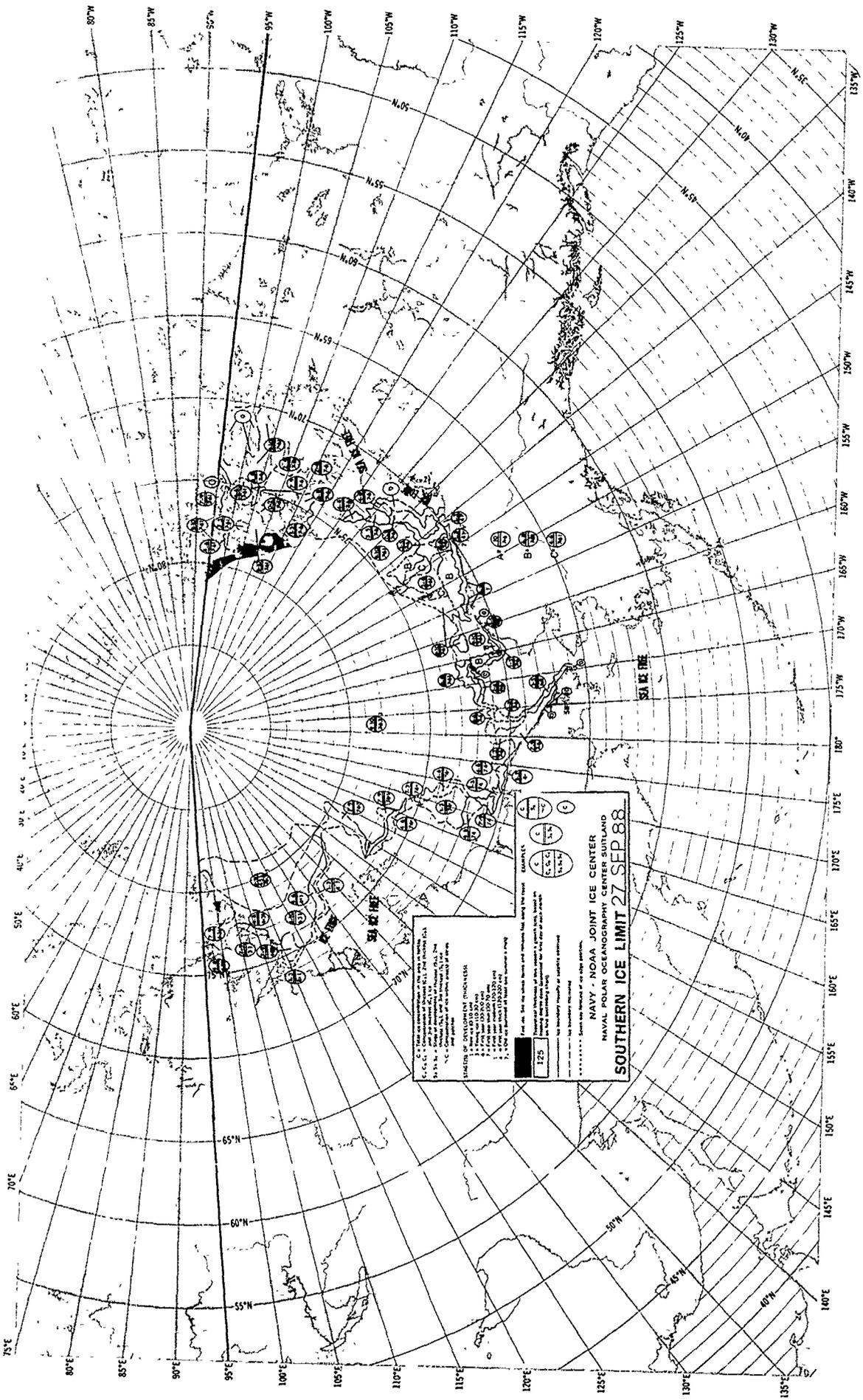




A - Ice observed in the area of the...  
 B - Ice observed in the area of the...  
 C - Ice observed in the area of the...  
 D - Ice observed in the area of the...  
 E - Ice observed in the area of the...  
 F - Ice observed in the area of the...

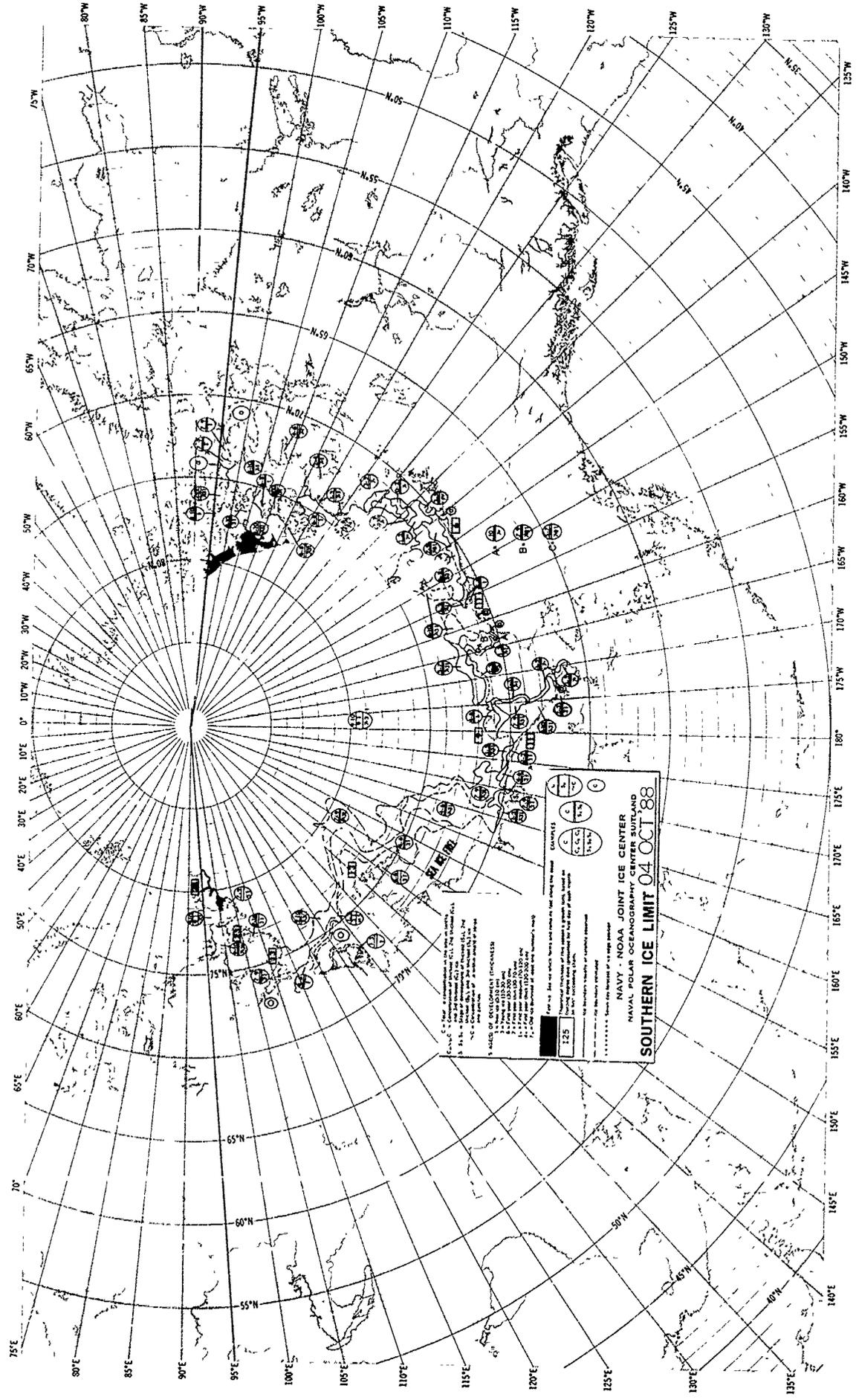
**EXAMPLES**  
 A = 100%  
 B = 100%  
 C = 100%  
 D = 100%  
 E = 100%  
 F = 100%

NAVY-NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND  
**SOUTHERN ICE LIMIT 20 SEP 88**



NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUTLAND  
**SOUTHERN ICE LIMIT 27 SEP 88**


DASHED LINE: Ice edge (thin line) and ice limit (thick line).  
 125: Ice thickness in meters.  
 A, B, C: Ice concentration in percent.  
 100%: Solid ice.  
 10-15%: Broken ice.  
 15-30%: Broken ice.  
 30-50%: Broken ice.  
 50-70%: Broken ice.  
 70-80%: Broken ice.  
 80-90%: Broken ice.  
 90-100%: Solid ice.  
 100%: Solid ice.  
 100%: Solid ice.



C-10 Polar coordinates on the map are in the Greenwich Meridian. The map is based on the International Geodetic Reference System (IGRS) 1975 datum. The map is based on the International Geodetic Reference System (IGRS) 1975 datum. The map is based on the International Geodetic Reference System (IGRS) 1975 datum.

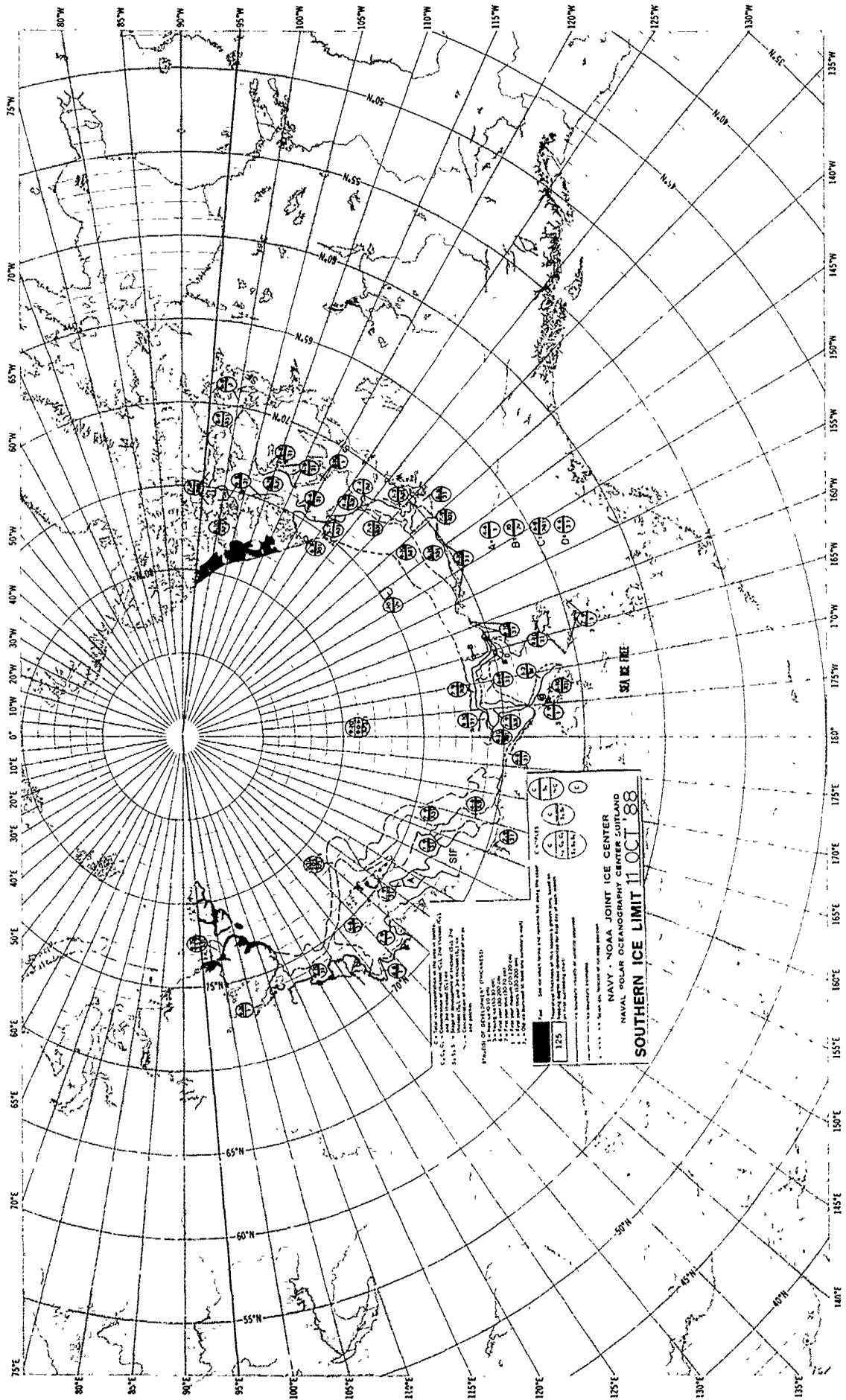
**AREAS OF DEVELOPMENT (CHECKLIST)**

- 1. Areas of development are shown by a thick black line.
- 2. Areas of development are shown by a thick black line.
- 3. Areas of development are shown by a thick black line.
- 4. Areas of development are shown by a thick black line.
- 5. Areas of development are shown by a thick black line.
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- 9. Areas of development are shown by a thick black line.

**LEGEND**

125 **SOUTHERN ICE LIMIT 04 OCT 88**

NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND



1. Area covered by this report is the Arctic Ocean, including the coastlines of Alaska, Canada, Greenland, and Iceland. The area shown includes the Bering Sea, Chukchi Sea, Laptev Sea, East Siberian Sea, Kara Sea, and the central Arctic Ocean.

2. This report is based on the data received from the U.S. Navy and U.S. Coast Guard during the period 11 October 1988.

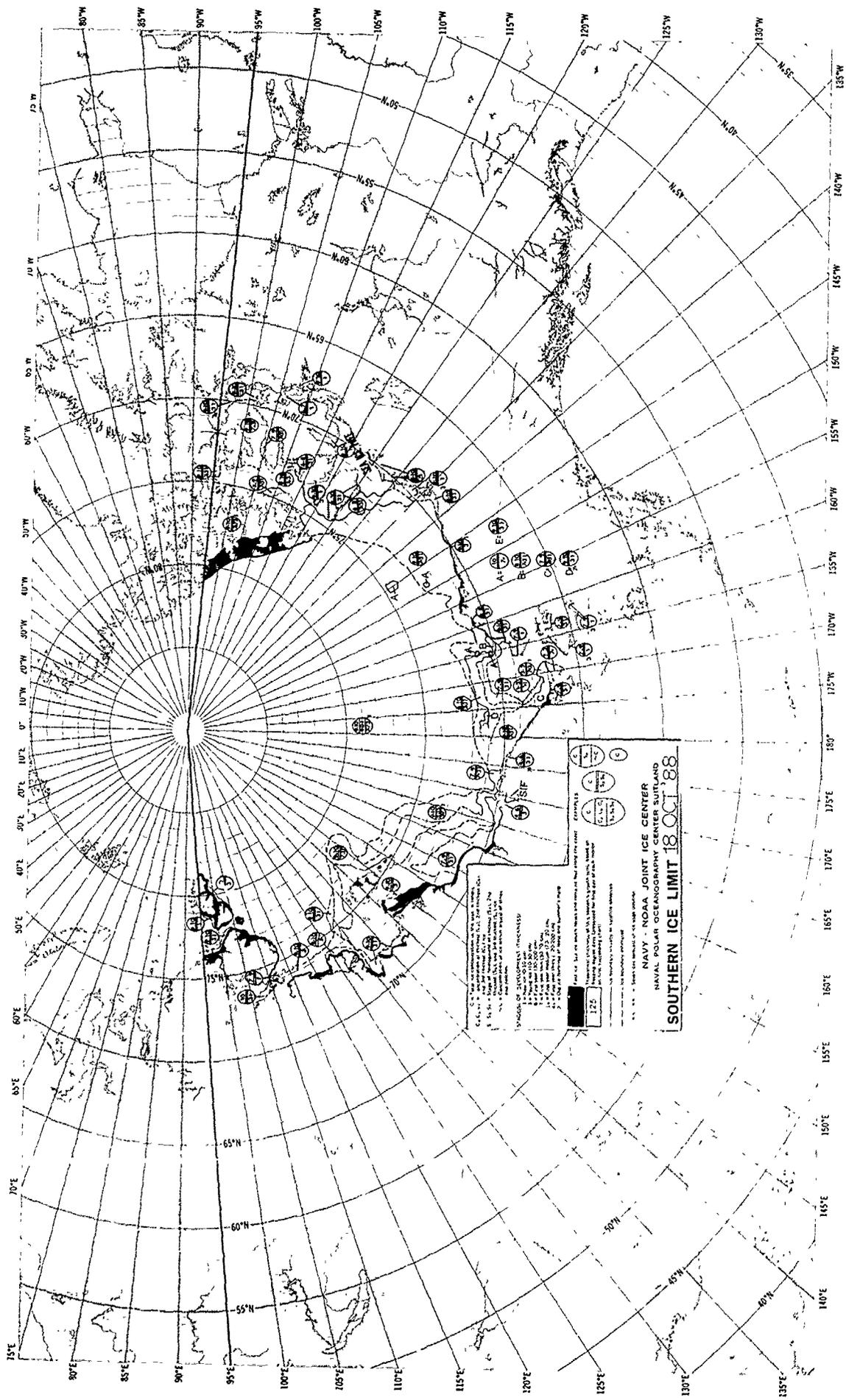
3. The symbols shown on this map are defined in the legend below.

**SIGHTING OF DEVELOPMENTAL ICELANDERS:**

- 1. 1255
- 2. 1256
- 3. 1257
- 4. 1258
- 5. 1259
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- 528. 1782
- 529. 1783
- 530. 1784
- 531. 1785
- 532. 1786
- 533. 1787
- 534. 1788
- 535. 1789
- 536. 1790
- 537. 1791
- 538. 1792
- 539. 1793
- 540. 1794
- 541. 1795
- 542. 1796
- 543. 1797
- 544. 1798
- 545. 1799
- 546. 1800

NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND  
**SOUTHERN ICE LIMIT 11 OCT '88**

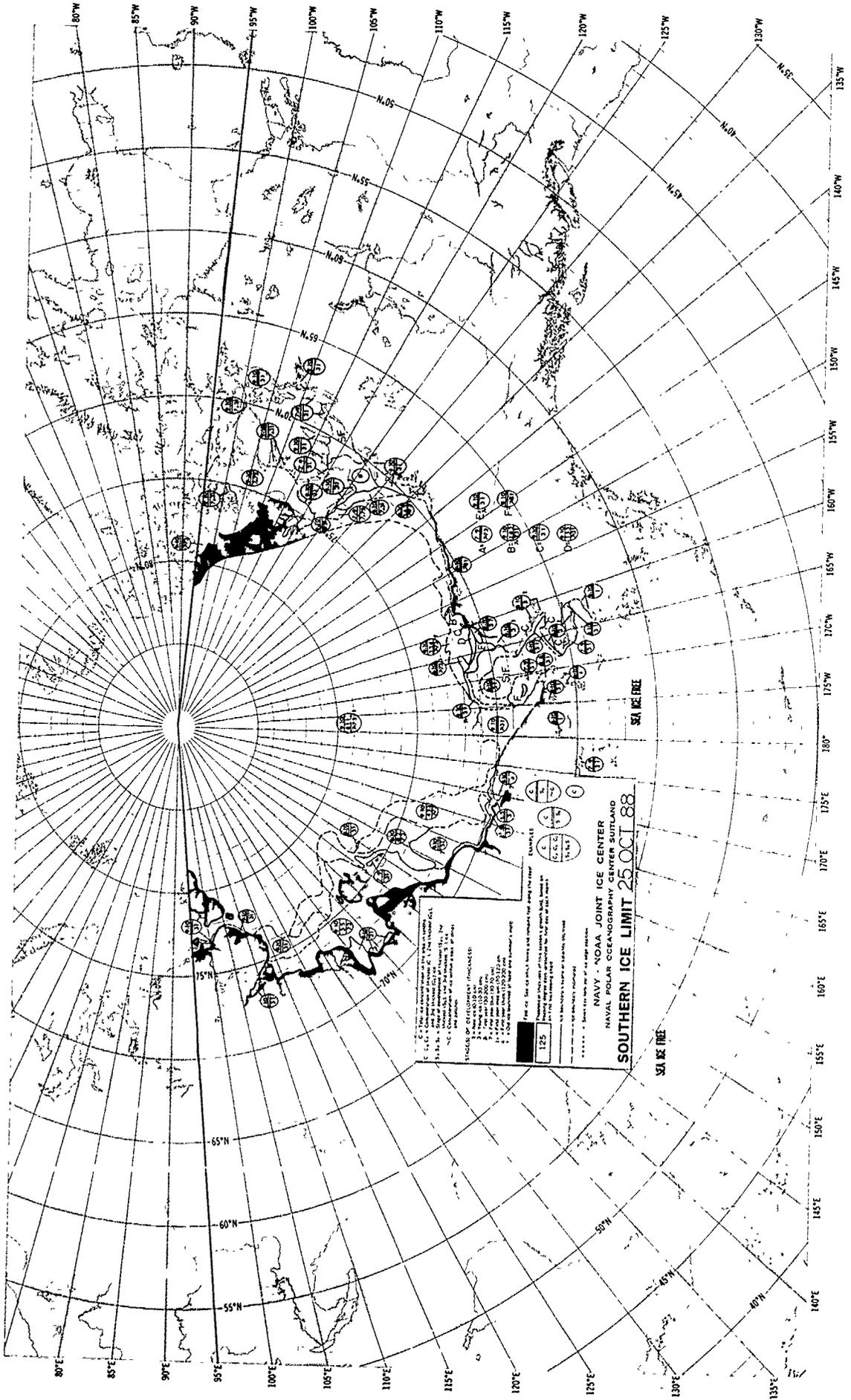
SHEET NO. 1225



NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUTLAND  
**SOUTHERN ICE LIMIT 18 OCT '88**

122  
 1. 1000-1500 METERS  
 2. 1500-2000 METERS  
 3. 2000-2500 METERS  
 4. 2500-3000 METERS  
 5. 3000-3500 METERS  
 6. 3500-4000 METERS  
 7. 4000-4500 METERS  
 8. 4500-5000 METERS  
 9. 5000-5500 METERS  
 10. 5500-6000 METERS  
 11. 6000-6500 METERS  
 12. 6500-7000 METERS  
 13. 7000-7500 METERS  
 14. 7500-8000 METERS  
 15. 8000-8500 METERS  
 16. 8500-9000 METERS  
 17. 9000-9500 METERS  
 18. 9500-10000 METERS  
 19. 10000 METERS AND DEEPER

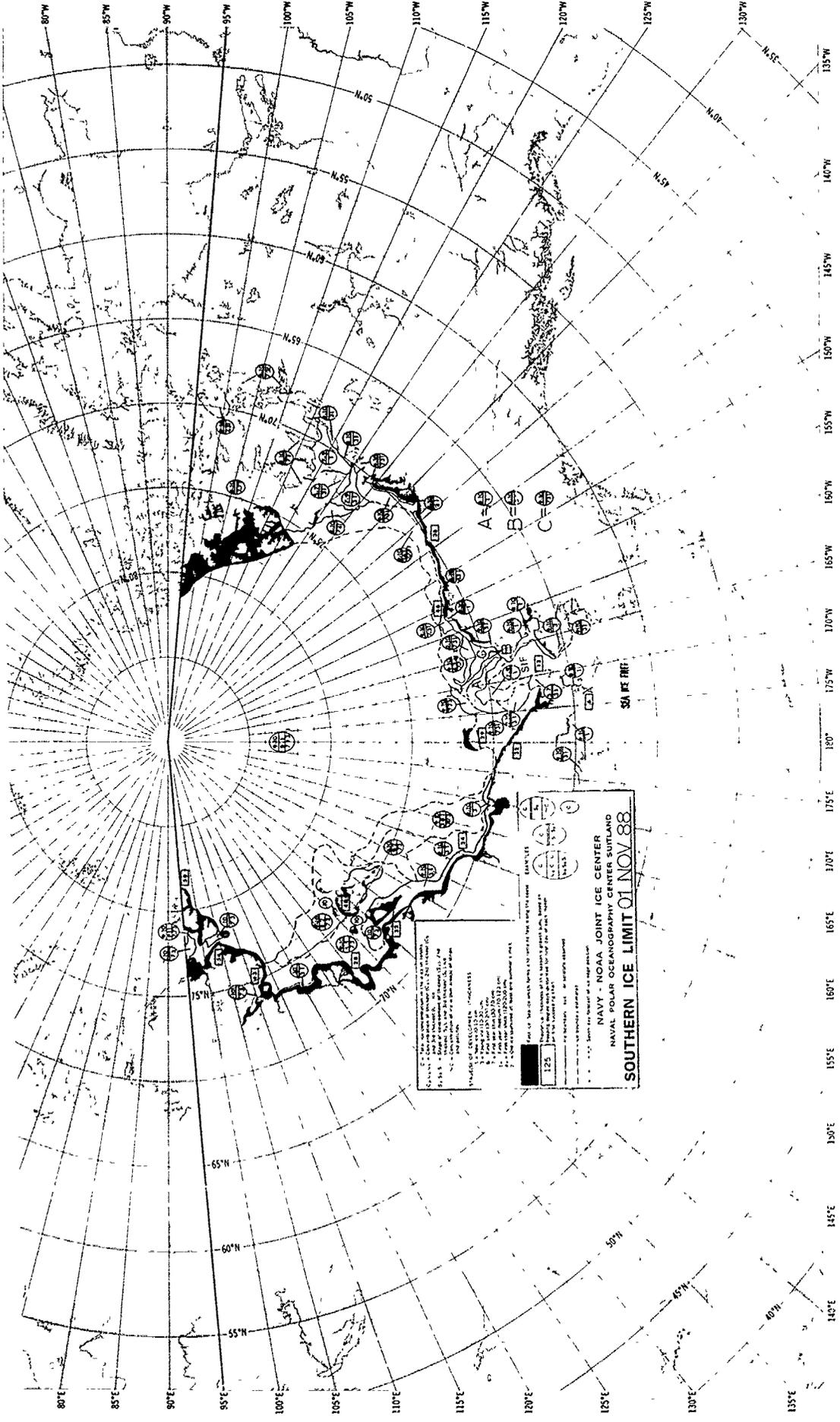
SYMBOLS OF INTEREST: PREVIOUS EDITIONS  
 A. 1000-1500 METERS  
 B. 1500-2000 METERS  
 C. 2000-2500 METERS  
 D. 2500-3000 METERS  
 E. 3000-3500 METERS  
 F. 3500-4000 METERS  
 G. 4000-4500 METERS  
 H. 4500-5000 METERS  
 I. 5000-5500 METERS  
 J. 5500-6000 METERS  
 K. 6000-6500 METERS  
 L. 6500-7000 METERS  
 M. 7000-7500 METERS  
 N. 7500-8000 METERS  
 O. 8000-8500 METERS  
 P. 8500-9000 METERS  
 Q. 9000-9500 METERS  
 R. 9500-10000 METERS  
 S. 10000 METERS AND DEEPER



1. Data from the U.S.S.R. is shown and reported using the 1976 datum.  
 2. Data from the U.S.S.R. is shown and reported using the 1976 datum.  
 3. Data from the U.S.S.R. is shown and reported using the 1976 datum.  
 4. Data from the U.S.S.R. is shown and reported using the 1976 datum.  
 5. Data from the U.S.S.R. is shown and reported using the 1976 datum.  
 6. Data from the U.S.S.R. is shown and reported using the 1976 datum.  
 7. Data from the U.S.S.R. is shown and reported using the 1976 datum.  
 8. Data from the U.S.S.R. is shown and reported using the 1976 datum.  
 9. Data from the U.S.S.R. is shown and reported using the 1976 datum.  
 10. Data from the U.S.S.R. is shown and reported using the 1976 datum.

**NAVY - NOAA JOINT ICE CENTER**  
**NAVAL POLAR GEOGRAPHY CENTER SURLAND**  
**SOUTHERN ICE LIMIT 25 OCT 88**

SEA ICE FREE



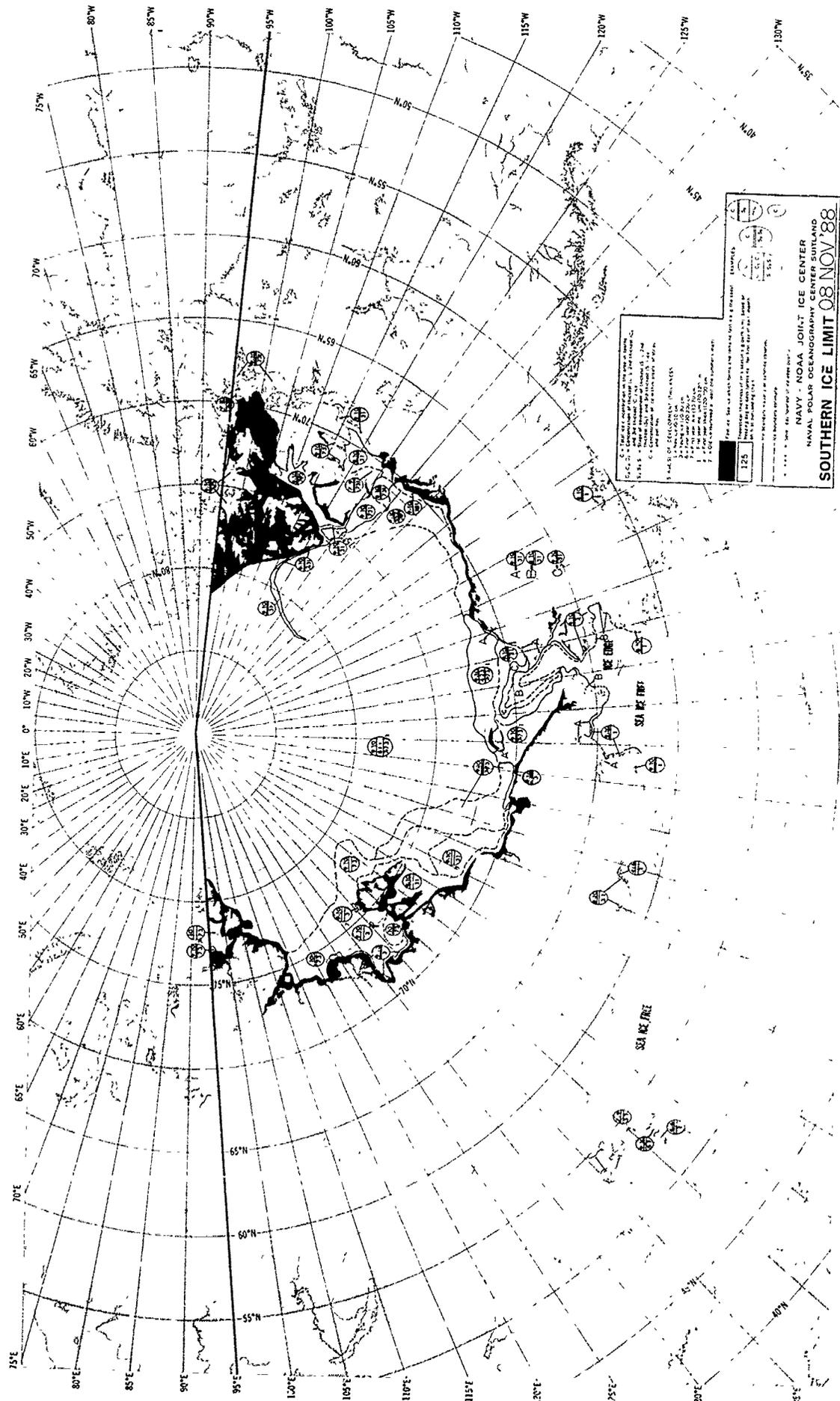
This map shows the results of the 1988 expedition to the Arctic region led by the U.S. Navy's Joint Ice Center (JIC) and the Naval Polar Oceanography Center (NPOC) in Suitsland. The data was collected during the period from October 15 to November 15, 1988. The map shows the southern limit of the ice cover, based on observations from the expedition. The ice limit is shown as a thick black line. The map also shows the location of the JIC and NPOC in Suitsland. The map is a polar projection map with latitude and longitude markings. The title of the map is "SOUTHERN ICE LIMIT 01 NOV 88". The map is a joint effort of the U.S. Navy and the National Oceanic and Atmospheric Administration (NOAA).

**SOUTHERN ICE LIMIT 01 NOV 88**  
 NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND

**LEGEND**  
 1. Ice Limit (Thick Black Line)  
 2. Ice Edge (Thin Black Line)  
 3. Ice Free (White Area)  
 4. Ice Type (Shaded Areas)  
 5. Ice Thickness (Hatched Areas)  
 6. Ice Concentration (Dotted Areas)  
 7. Ice Floes (Small Circles)  
 8. Icebergs (Large Squares)

1. Ice Limit (Thick Black Line)  
 2. Ice Edge (Thin Black Line)  
 3. Ice Free (White Area)  
 4. Ice Type (Shaded Areas)  
 5. Ice Thickness (Hatched Areas)  
 6. Ice Concentration (Dotted Areas)  
 7. Ice Floes (Small Circles)  
 8. Icebergs (Large Squares)

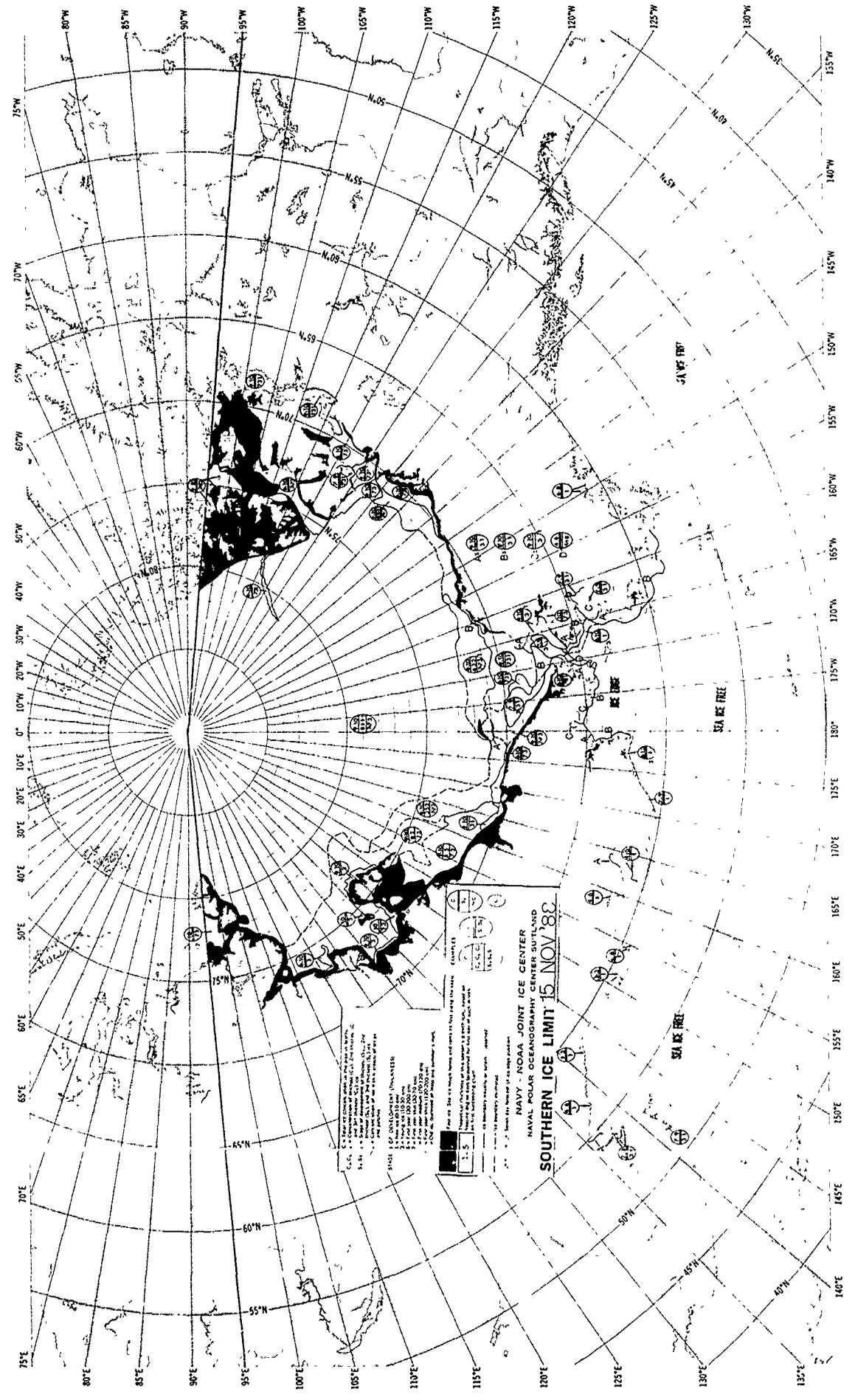
SEA BE FRI

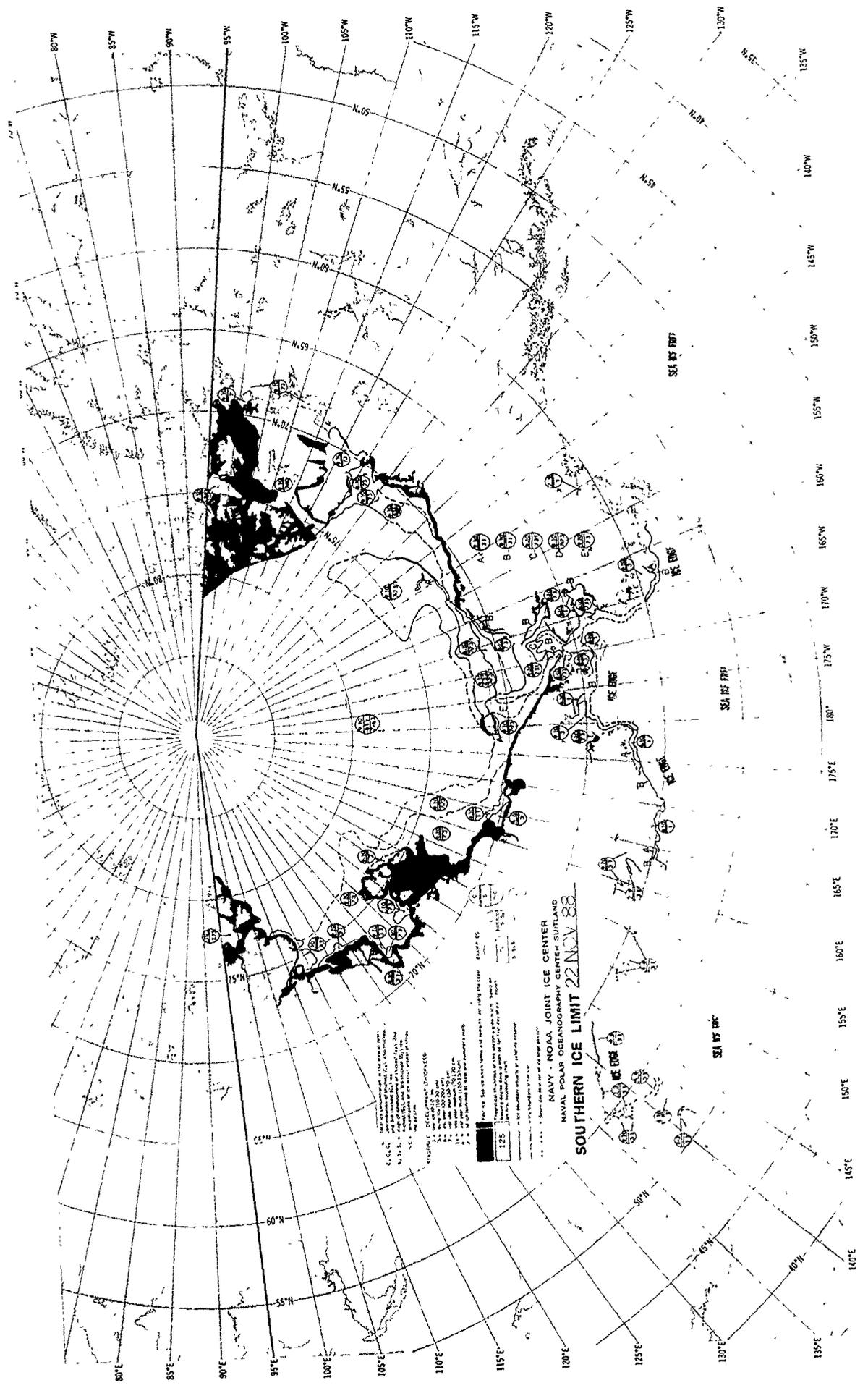


1. The information on this chart is derived from the following sources:  
 a. U.S. Navy Hydrographic Office charts  
 b. U.S. Navy Oceanographic Office charts  
 c. U.S. Navy Oceanographic Office observations  
 d. U.S. Navy Oceanographic Office reports  
 e. U.S. Navy Oceanographic Office publications  
 f. U.S. Navy Oceanographic Office data

125  
 SOUTHERN ICE LIMIT 08 NOV 88  
 NAVY - NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER BUILDING  
 1315 N. PINE STREET  
 WASHINGTON, D.C. 20340-5000  
 (301) 741-2000  
 FAX (301) 741-2001  
 WWW.NPOC.NAVY.MIL

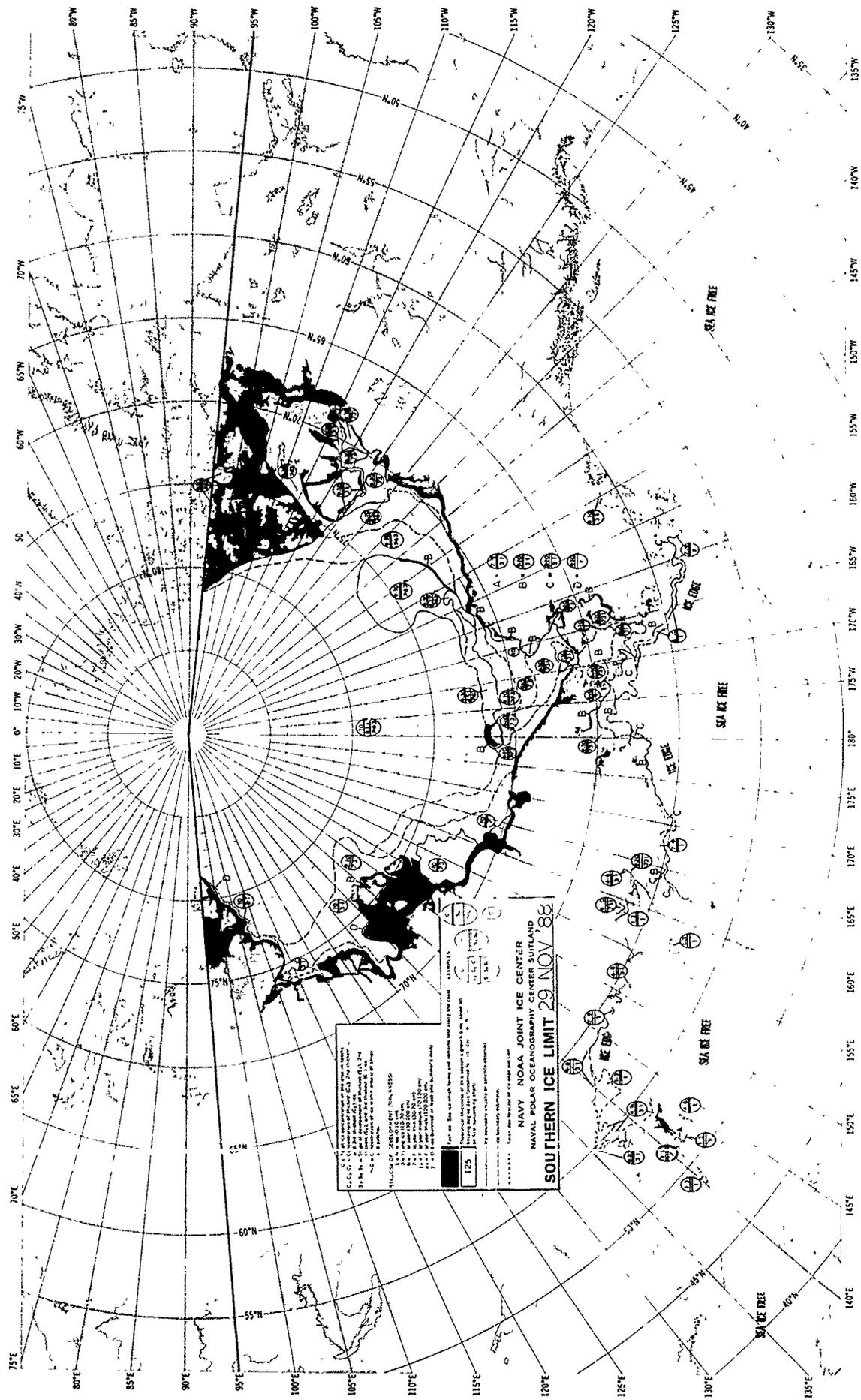
1:25,000 Scale. This map is a reproduction of the original map published by the Naval Hydrographic Office, Washington, D.C., in 1983. It is based on the original map and is not a new edition. The original map is available for purchase from the Naval Hydrographic Office, Washington, D.C., and is also available for purchase from the National Oceanic and Atmospheric Administration, Silver Spring, Maryland. The original map is available for purchase from the Naval Hydrographic Office, Washington, D.C., and is also available for purchase from the National Oceanic and Atmospheric Administration, Silver Spring, Maryland.





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 NAVAL POLAR OCEANOGRAPHY CENTER SUTCLIFF  
**SOUTHERN ICE LIMIT 22 NOV 88**

1. This chart is based on the latest available information and is subject to change without notice.  
 2. The chart is not to be used for navigation without the aid of a compass.  
 3. The chart is not to be used for navigation without the aid of a compass.  
 4. The chart is not to be used for navigation without the aid of a compass.  
 5. The chart is not to be used for navigation without the aid of a compass.  
 6. The chart is not to be used for navigation without the aid of a compass.  
 7. The chart is not to be used for navigation without the aid of a compass.  
 8. The chart is not to be used for navigation without the aid of a compass.  
 9. The chart is not to be used for navigation without the aid of a compass.  
 10. The chart is not to be used for navigation without the aid of a compass.



NAVY, NOAA, JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND  
**SOUTHERN ICE LIMIT 29 NOV 88**

1:25  
 1:50  
 1:100  
 1:200  
 1:500  
 1:1000  
 1:2000  
 1:5000  
 1:10000  
 1:20000  
 1:50000  
 1:100000  
 1:200000  
 1:500000  
 1:1000000

Symbol: Ice Limit  
 Symbol: Ice Edge  
 Symbol: Ice Margin  
 Symbol: Ice Shelf  
 Symbol: Ice Sheet  
 Symbol: Ice Flow Line  
 Symbol: Ice Accumulation Area  
 Symbol: Ice Discharge Area  
 Symbol: Ice Storage Area  
 Symbol: Ice Accumulation Rate  
 Symbol: Ice Discharge Rate  
 Symbol: Ice Storage Rate

Symbol: Ice Limit  
 Symbol: Ice Edge  
 Symbol: Ice Margin  
 Symbol: Ice Shelf  
 Symbol: Ice Sheet  
 Symbol: Ice Flow Line  
 Symbol: Ice Accumulation Area  
 Symbol: Ice Discharge Area  
 Symbol: Ice Storage Area  
 Symbol: Ice Accumulation Rate  
 Symbol: Ice Discharge Rate  
 Symbol: Ice Storage Rate

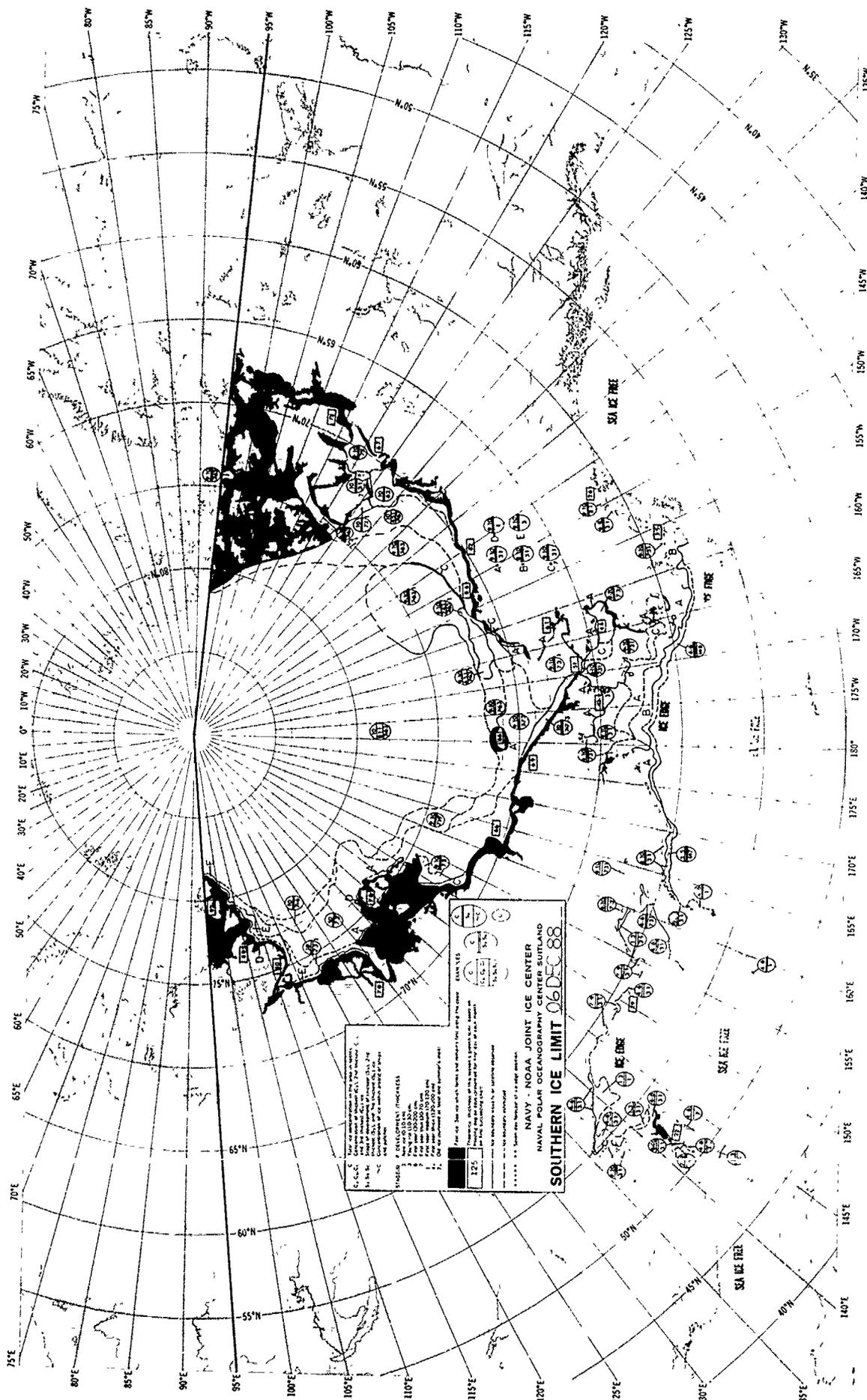
Symbol: Ice Limit  
 Symbol: Ice Edge  
 Symbol: Ice Margin  
 Symbol: Ice Shelf  
 Symbol: Ice Sheet  
 Symbol: Ice Flow Line  
 Symbol: Ice Accumulation Area  
 Symbol: Ice Discharge Area  
 Symbol: Ice Storage Area  
 Symbol: Ice Accumulation Rate  
 Symbol: Ice Discharge Rate  
 Symbol: Ice Storage Rate

Symbol: Ice Limit  
 Symbol: Ice Edge  
 Symbol: Ice Margin  
 Symbol: Ice Shelf  
 Symbol: Ice Sheet  
 Symbol: Ice Flow Line  
 Symbol: Ice Accumulation Area  
 Symbol: Ice Discharge Area  
 Symbol: Ice Storage Area  
 Symbol: Ice Accumulation Rate  
 Symbol: Ice Discharge Rate  
 Symbol: Ice Storage Rate

Symbol: Ice Limit  
 Symbol: Ice Edge  
 Symbol: Ice Margin  
 Symbol: Ice Shelf  
 Symbol: Ice Sheet  
 Symbol: Ice Flow Line  
 Symbol: Ice Accumulation Area  
 Symbol: Ice Discharge Area  
 Symbol: Ice Storage Area  
 Symbol: Ice Accumulation Rate  
 Symbol: Ice Discharge Rate  
 Symbol: Ice Storage Rate

Symbol: Ice Limit  
 Symbol: Ice Edge  
 Symbol: Ice Margin  
 Symbol: Ice Shelf  
 Symbol: Ice Sheet  
 Symbol: Ice Flow Line  
 Symbol: Ice Accumulation Area  
 Symbol: Ice Discharge Area  
 Symbol: Ice Storage Area  
 Symbol: Ice Accumulation Rate  
 Symbol: Ice Discharge Rate  
 Symbol: Ice Storage Rate

Symbol: Ice Limit  
 Symbol: Ice Edge  
 Symbol: Ice Margin  
 Symbol: Ice Shelf  
 Symbol: Ice Sheet  
 Symbol: Ice Flow Line  
 Symbol: Ice Accumulation Area  
 Symbol: Ice Discharge Area  
 Symbol: Ice Storage Area  
 Symbol: Ice Accumulation Rate  
 Symbol: Ice Discharge Rate  
 Symbol: Ice Storage Rate



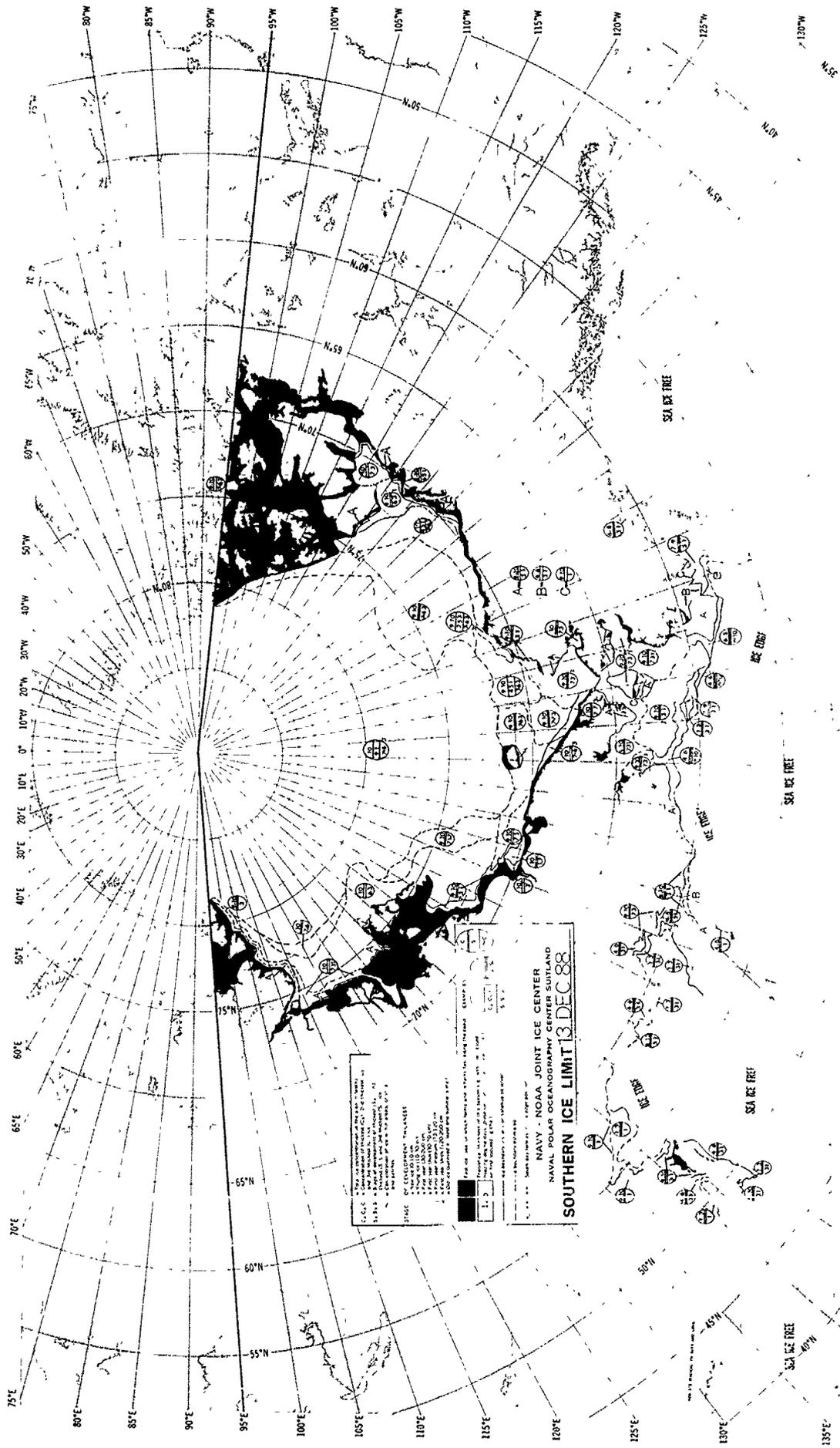
NAVY, NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND  
**SOUTHERN ICE LIMIT 06 DEC 88**

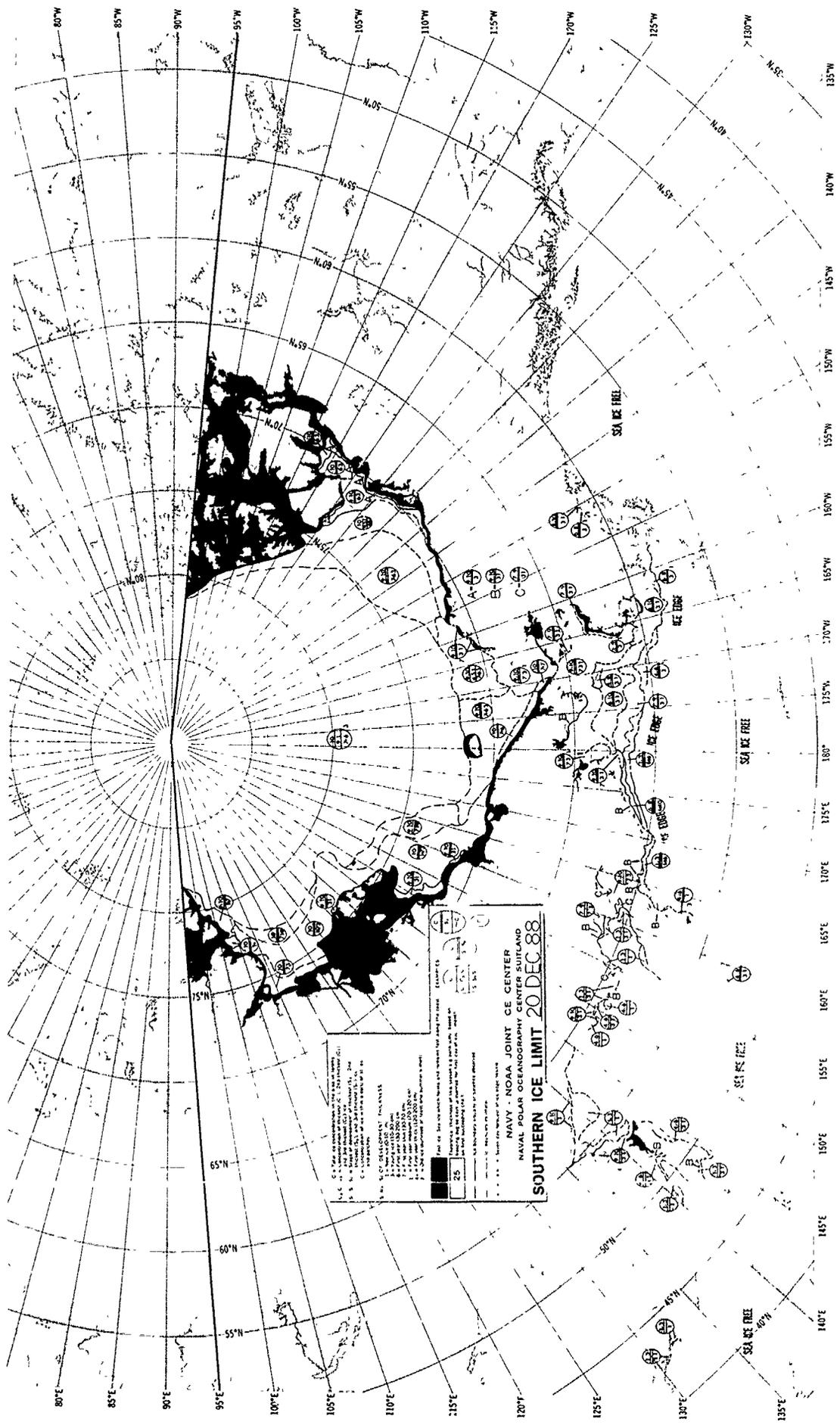
**LEGEND**  
 1. Ice edge (solid line)  
 2. Sea ice free (dashed line)  
 3. Ice edge (dotted line)  
 4. Sea ice free (dash-dot line)  
 5. Ice edge (long-dash line)  
 6. Sea ice free (short-dash line)

**SYMBOLS**  
 1. Ice edge (circle with cross)  
 2. Sea ice free (circle with dot)  
 3. Ice edge (circle with horizontal lines)  
 4. Sea ice free (circle with vertical lines)  
 5. Ice edge (circle with diagonal lines)  
 6. Sea ice free (circle with diagonal lines)

**SCALE**  
 1:100,000  
 1:50,000  
 1:25,000  
 1:12,500  
 1:6,250

NAVY, NOAA JOINT ICE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND  
 06 DEC 88





NAVY - NOAA JOINT CE CENTER  
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND  
**SOUTHERN ICE LIMIT 20 DEC 88**

1. This map shows the southern ice limit as of 20 December 1988. It is based on data from the USCGC Healy (WMEC-903) and the USCGC Spencer (WMEC-904) during their operations in the region. The ice limit is defined as the outermost edge of the ice pack.

2. The map is a polar projection centered on the South Pole. The latitude lines are shown as concentric circles, and the longitude lines are shown as radial lines. The map covers the area from 60°N to 80°N latitude and 135°E to 155°E longitude.

3. The ice limit is shown as a solid black line. The area to the north of this line is ice-free. The area to the south of this line is covered by ice. The ice is shown in various shades of gray, representing different ice types and thicknesses.

4. The map includes several data points, represented by circular symbols with letters (A, B, C) and numbers. These points are scattered across the map, primarily in the region between 65°N and 75°N latitude and 140°E and 150°E longitude.

5. The map also includes labels for 'SEA ICE FREE' and 'ICE FREE' in several locations. These labels indicate areas where the ice limit was not reached or where the ice was broken up.

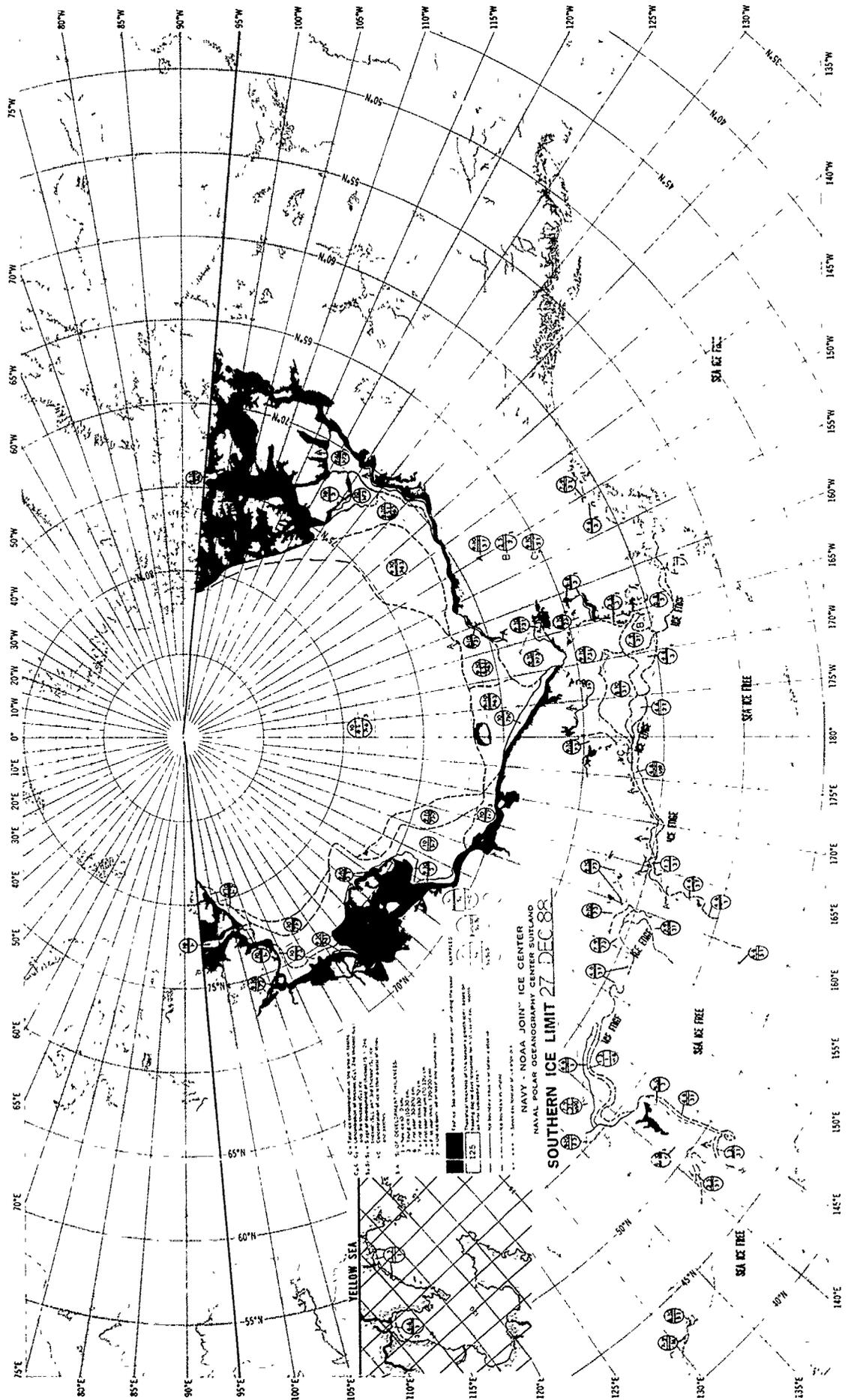
1. This map is a reproduction of the original map. It is not a final proof. It is subject to change without notice.

2. The map is a reproduction of the original map. It is not a final proof. It is subject to change without notice.

3. The map is a reproduction of the original map. It is not a final proof. It is subject to change without notice.

4. The map is a reproduction of the original map. It is not a final proof. It is subject to change without notice.

5. The map is a reproduction of the original map. It is not a final proof. It is subject to change without notice.



**TABLE 1. SATELLITE DATA UTILIZED DURING 1988 (ARCTIC)**

Time period		Satellite Remote Sensing				
From	To	Sensor Platform	Sensor Type	Spectral Region	Resolution	Coverage
1-88	3-88	NOAA-9	AVHRR			
			HRPT/LAC			
			VIS	0.58-0.68 um	1 km	Regional
			NIR	0.73-1.10 um		
			IR	10.5-11.3 um		
			GAC			
			VIS	0.58-0.68 um	4 km	Global
			IR	10.3-11.3 um		
1-88	12-88	NOAA-10	AVHRR			
			HRPT/LAC			
			VIS	0.58-0.68 um	1 km	Regional
			NIR	0.725-1.10 um		
			IR	10.5-11.5 um		
			GAC			
			VIS	0.58-0.68 um	4 km	Global
			IR	10.5-11.5 um		
9-88	12-88	NOAA-11	AVHRR			
			HRPT/LAC			
			VIS	0.58-0.68 um	1 km	Regional
			NIR	0.725-1.10 um		
			IR	10.5-11.5 um		
			GAC			
			VIS	0.58-0.68 um	4 km	Regional
			IR	10.5-11.5 um		
11-87	12-88	DMSP-F(8)	VIS	0.4-1.1 um	3.7 km	Global
			IR	10.2-12.8 um	4.4 km	
5-88	12-88	DMSP-F(9)	VIS	0.4-1.1 um	3.7 km	Global
			IR	10.2-12.8 um	4.4 km	
1-87	12-88	GEOSAT	Radar Altimeter	N/A	7 km	Regional

**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
- SMMR - Scanning Multifrequency Microwave Radiometer
- VIS - Visible
- um - Micrometer