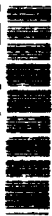


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**EASTERN--WESTERN
ARCTIC SEA ICE ANALYSIS**

1990

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

**PREPARED UNDER AUTHORITY OF
COMNAVFORPAC, NAVAL OCEANOGRAPHY COMMAND
NAVAL SPACE CENTER, MS 39529-5000**

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DISSEMINATION STATEMENT A
Approved for public release;
Distribution Unlimited



FOREWORD

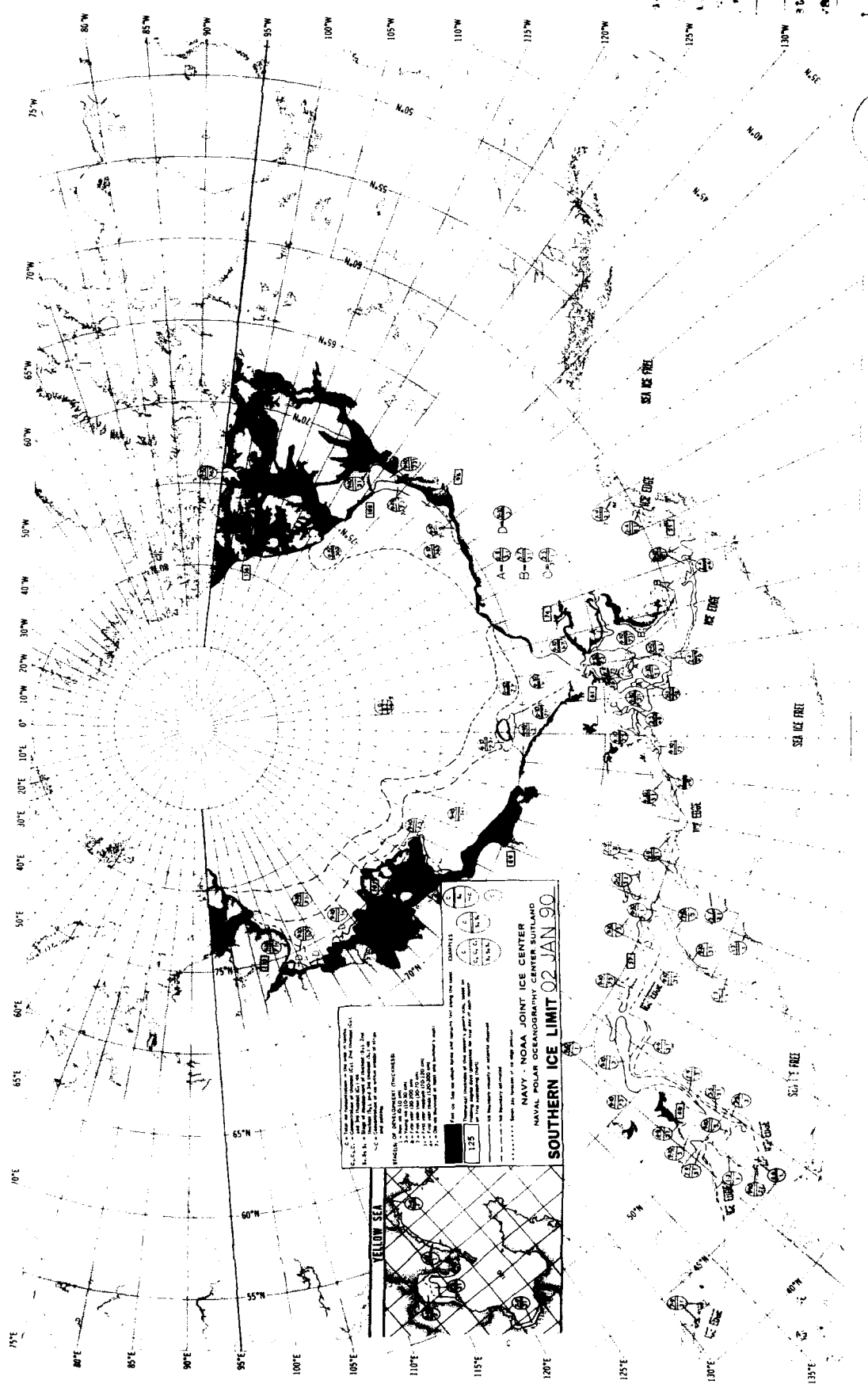
The U.S. Navy has a long and eventful history of polar exploration from Robert E. Peary in the Arctic to Richard E. Byrd in the Antarctic. In recent years the strategic importance and expanded research pursuits in these areas have resulted in greater national and international requirements for environmental 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 17th 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 1990.
- 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



SOUTHERN ICE LIMIT 02 JAN 90

NAVY - NOAA JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPHY CENTER BUILDING

SYMBOLS

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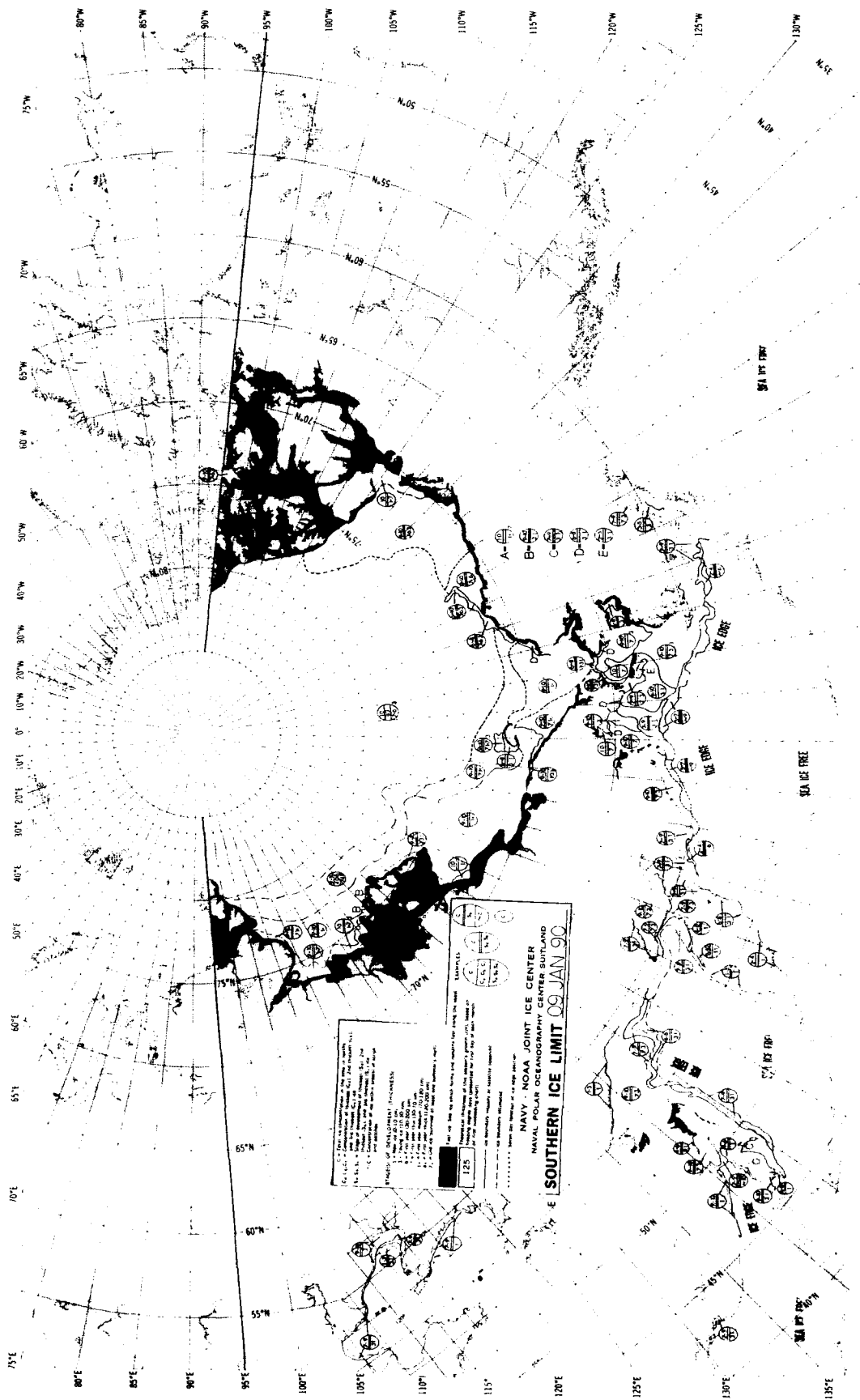
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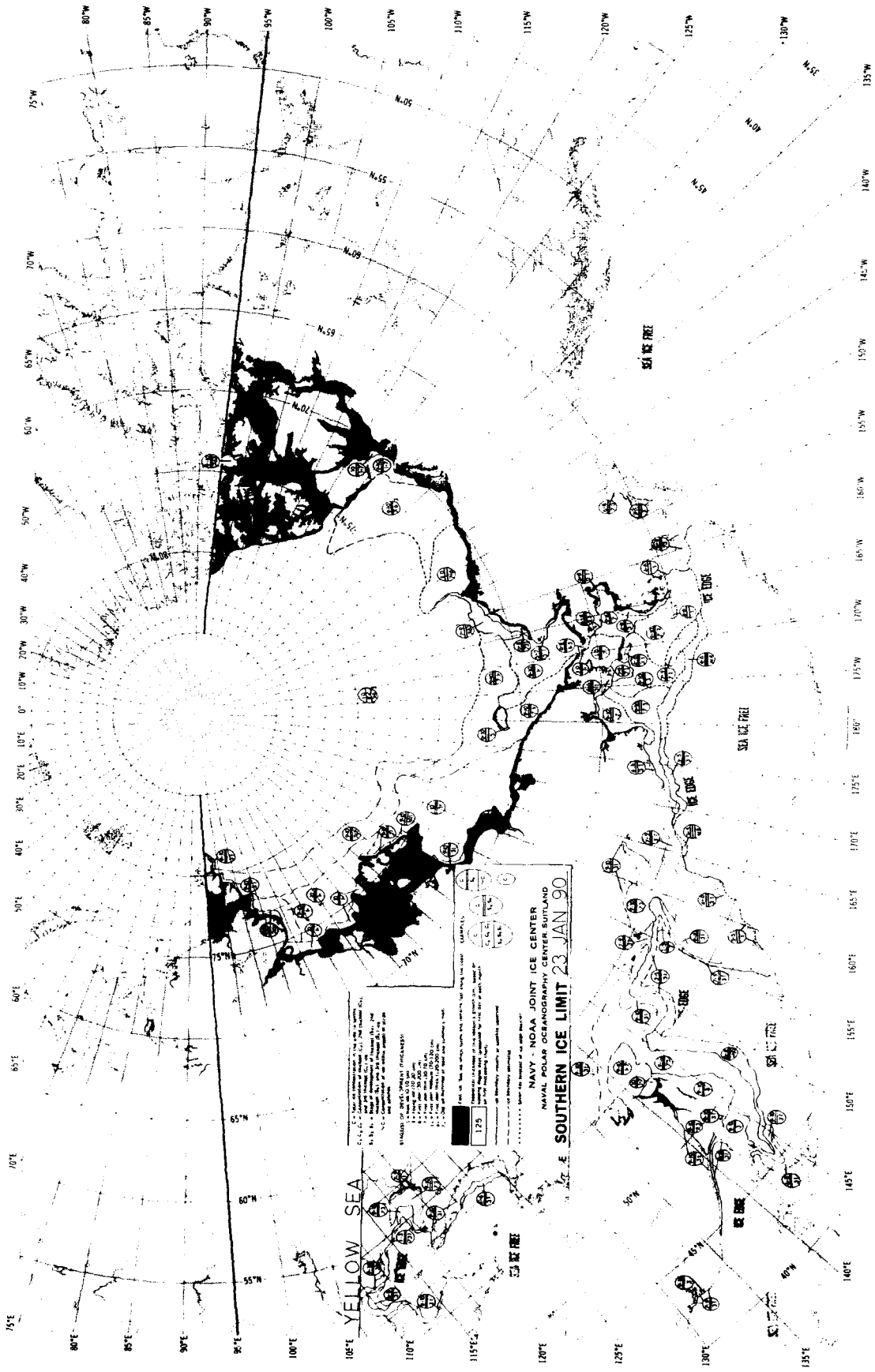
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NAVY - NOAA JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPHY CENTER SUTLAND
SOUTHERN ICE LIMIT 23 JAN 90

1. This map shows the southern ice limit for the Arctic region as of 23 January 1990. The ice limit is defined as the southernmost edge of the ice pack.

2. The ice limit is shown as a solid line. The area to the north of the ice limit is shaded.

3. The ice limit is based on data from the Navy's Polar Oceanography Center and NOAA's Joint Ice Center.

4. The ice limit is shown for the entire Arctic region.

5. The ice limit is shown for the entire Arctic region.

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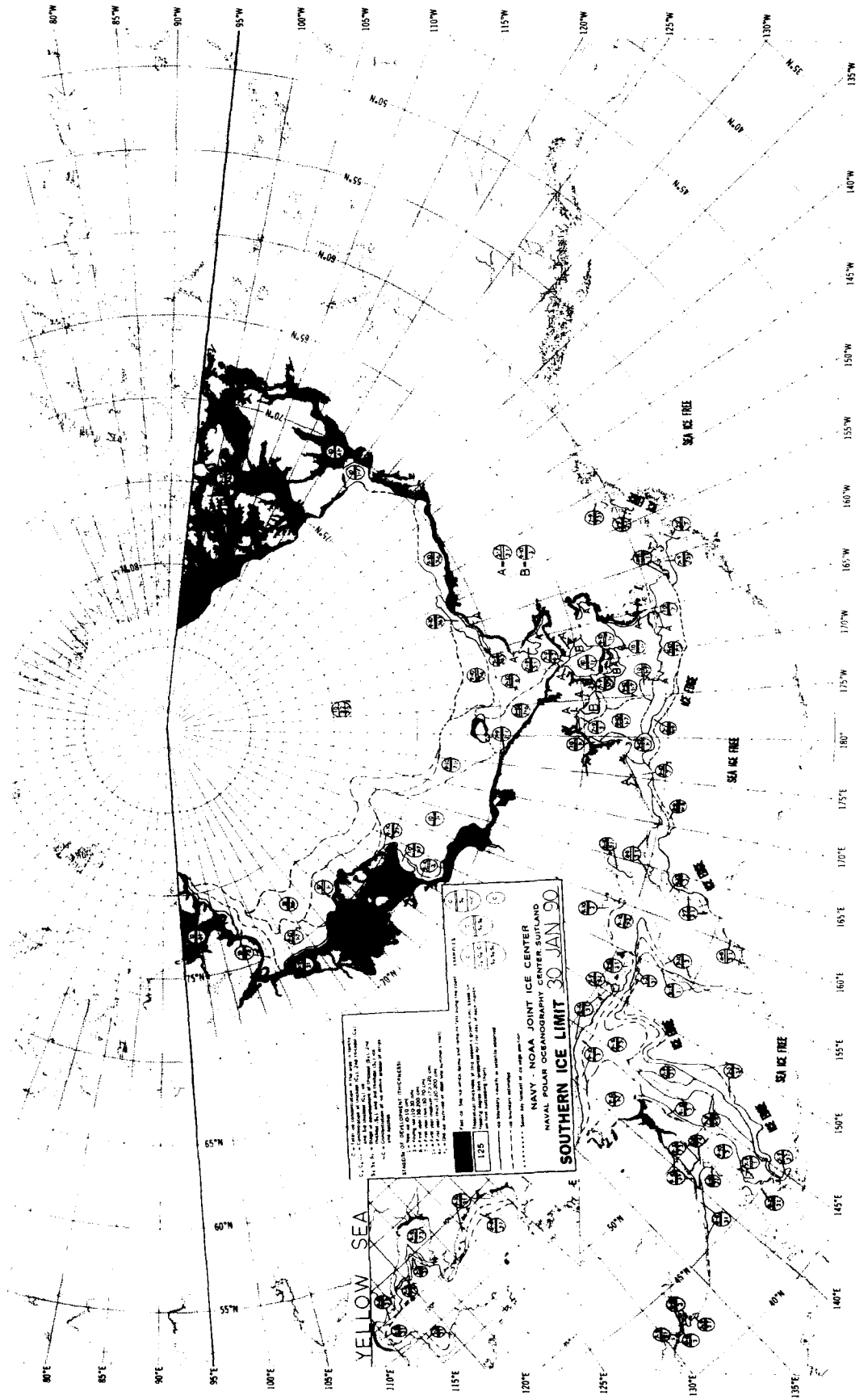
16. The ice limit is shown for the entire Arctic region.

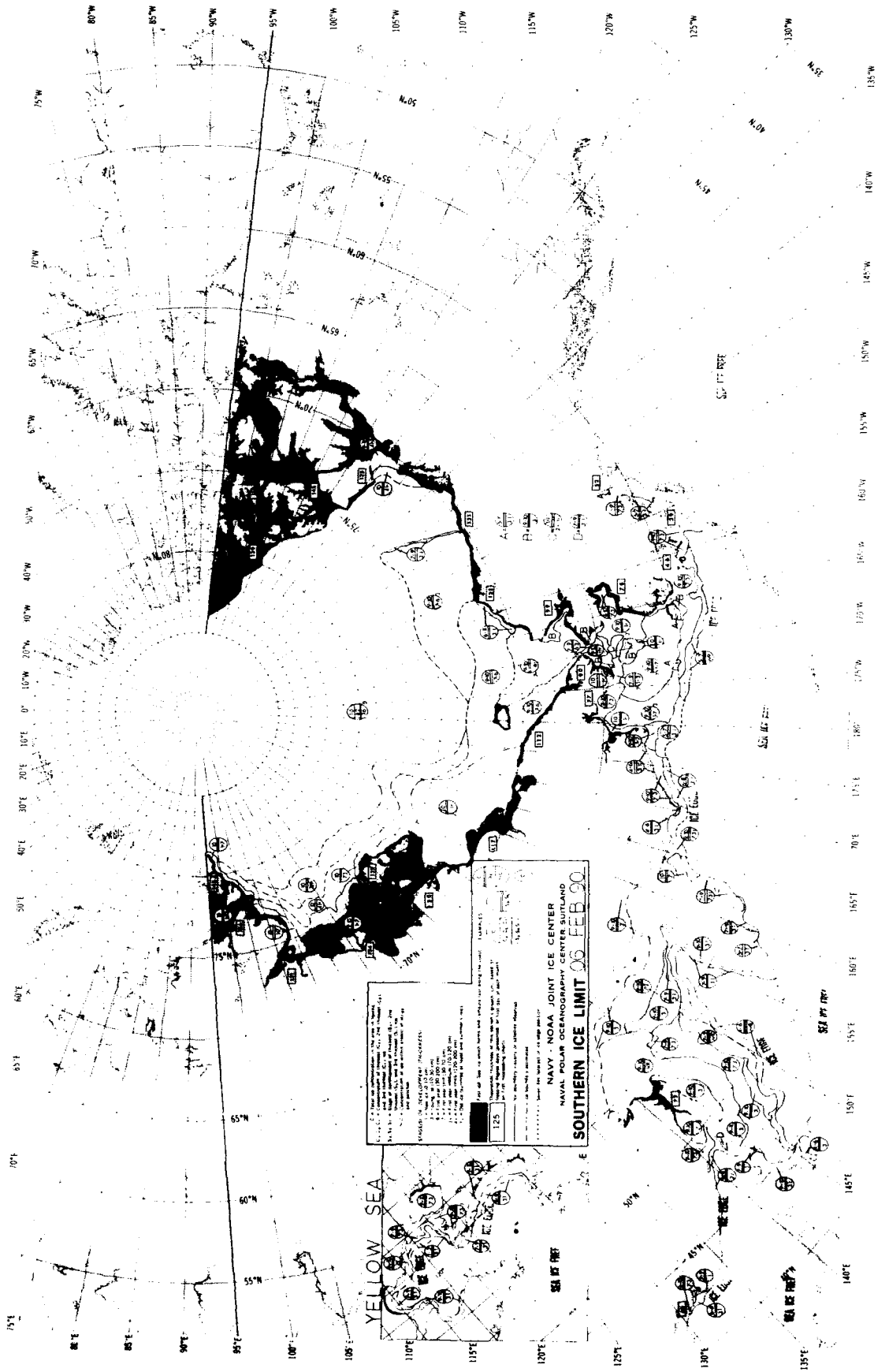
17. The ice limit is shown for the entire Arctic region.

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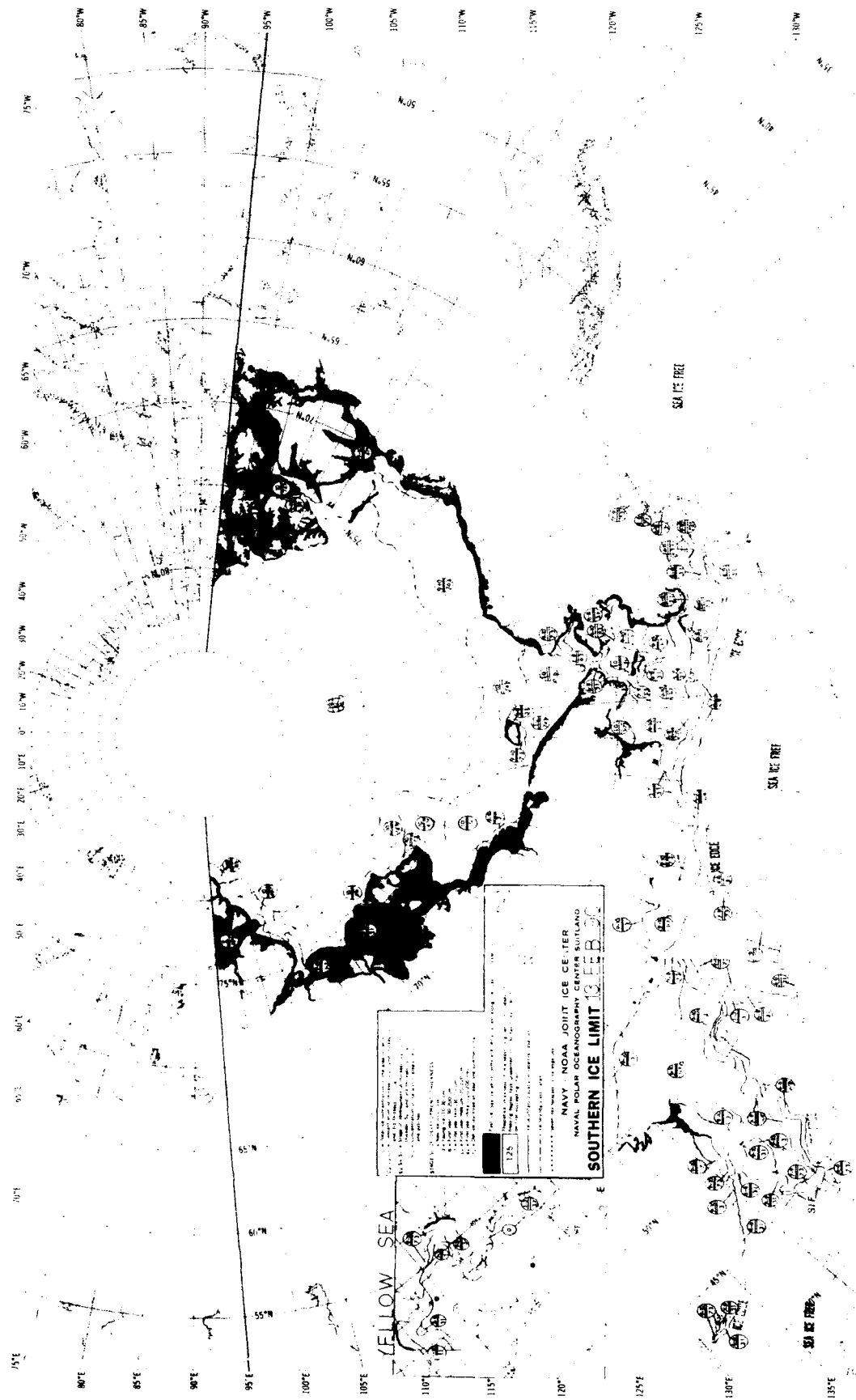
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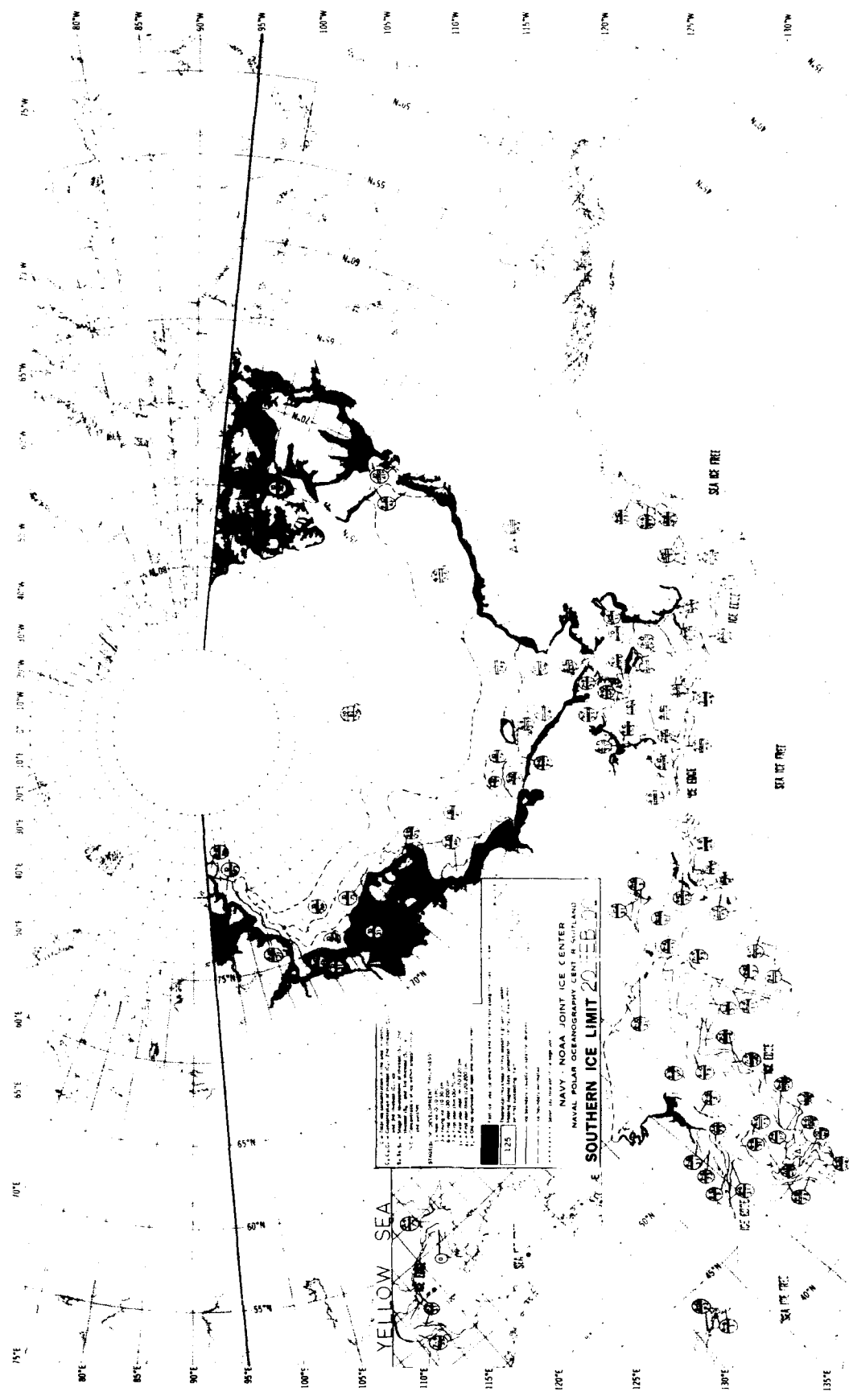
NAVY - NOAA JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPHY CENTER SUTLAND
SOUTHERN ICE LIMIT 06 FEB 90

125

NAVY - NOAA JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPHY CENTER SUTLAND
SOUTHERN ICE LIMIT 06 FEB 90

125







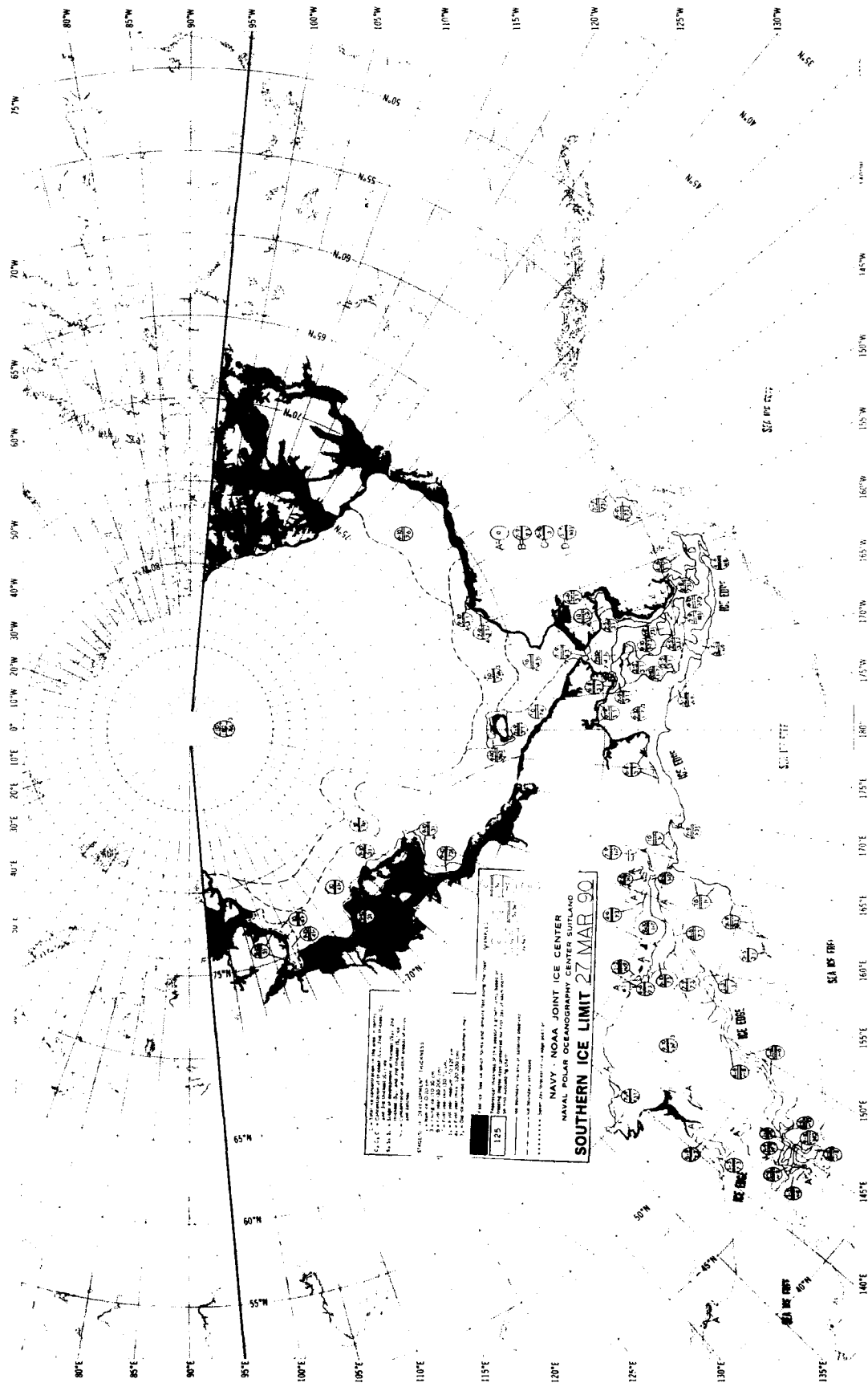






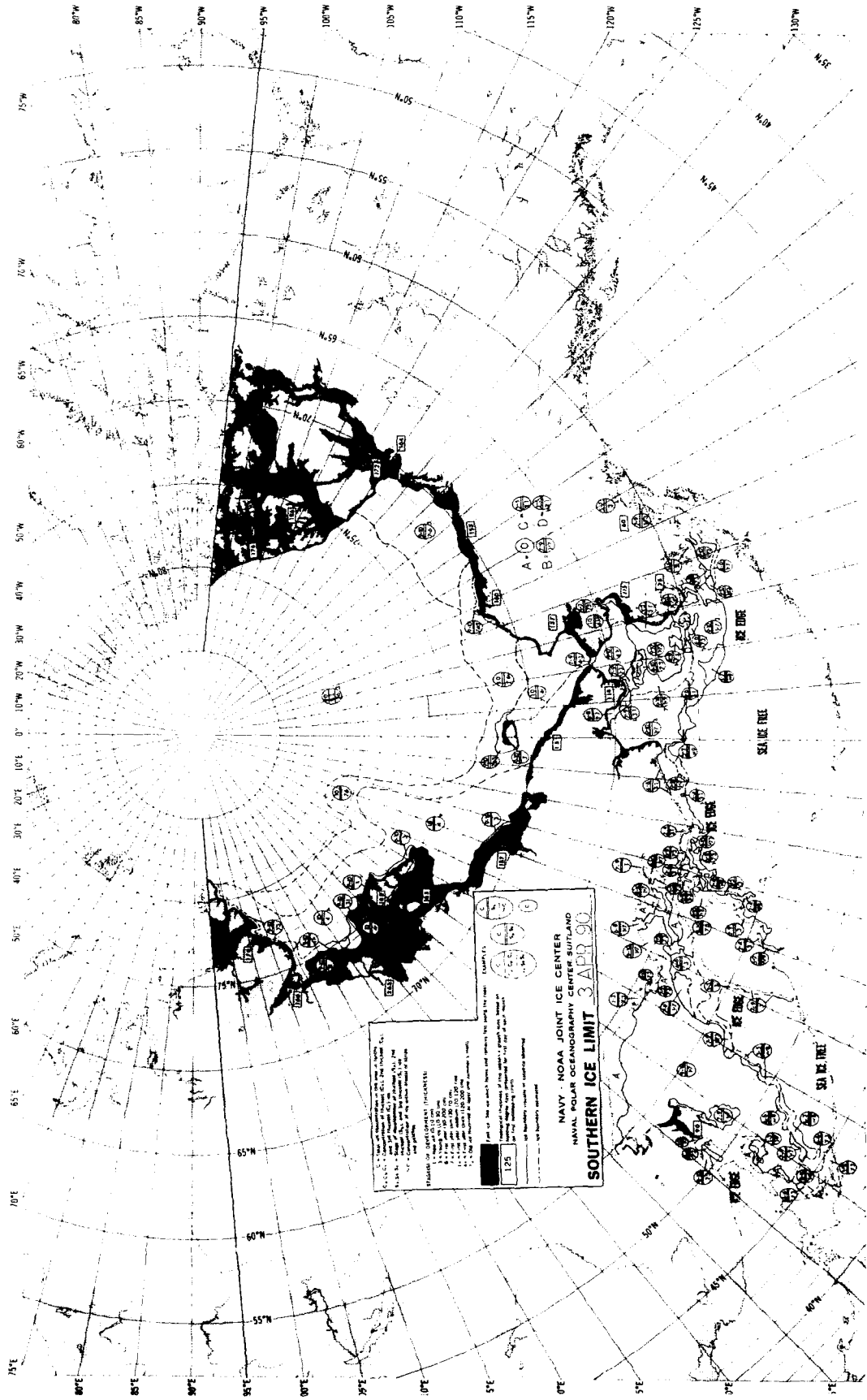
1. This chart is based on the latest available information from the following sources:
 a. The Hydrographic Survey of the United States Navy
 b. The Hydrographic Survey of the United States Coast and Geodetic Survey
 c. The Hydrographic Survey of the United States Coast and Geodetic Survey
 d. The Hydrographic Survey of the United States Coast and Geodetic Survey
 e. The Hydrographic Survey of the United States Coast and Geodetic Survey

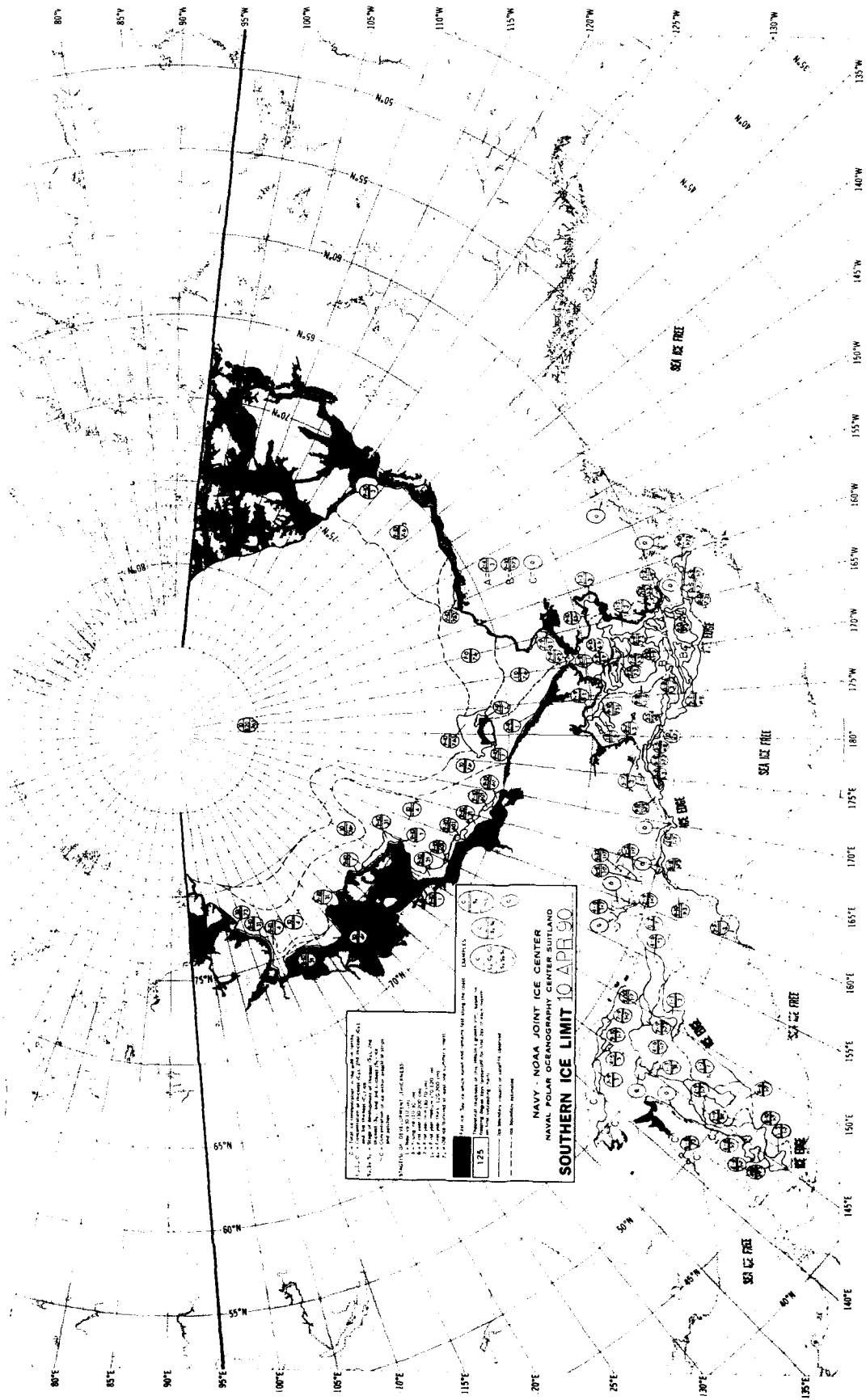
NATIONAL ICE CENTER
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 NAVAL POLAR OCEANOGRAPHY CENTER SUTLAND
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NAVY - NOAA JOINT ICE CENTER
NAVAL POLAR OCEANOGRAPHY CENTER SUTCLIFF
SOUTHERN ICE LIMIT 27 MAR 90

1:50,000 Scale
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Horizontal Datum: Antarctic Peninsula Datum
Projection: Lambert Conformal Conic
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Units: Meters
Scale: 1:50,000
Datum: Antarctic Peninsula Datum
Projection: Lambert Conformal Conic
Zone: 16S
Units: Meters
Scale: 1:50,000





NAVY, NOAA JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPHY CENTER
SOUTHERN ICE LIMIT 10 APR 90

1. This map is based on the data provided by the following sources:
 a. U.S. Navy, Naval Polar Oceanography Center, Naval Arctic Research Laboratory, and the Naval Arctic Research Center.
 b. U.S. Navy, Naval Arctic Research Laboratory, and the Naval Arctic Research Center.
 c. U.S. Navy, Naval Arctic Research Laboratory, and the Naval Arctic Research Center.
 d. U.S. Navy, Naval Arctic Research Laboratory, and the Naval Arctic Research Center.
 e. U.S. Navy, Naval Arctic Research Laboratory, and the Naval Arctic Research Center.
 f. U.S. Navy, Naval Arctic Research Laboratory, and the Naval Arctic Research Center.
 g. U.S. Navy, Naval Arctic Research Laboratory, and the Naval Arctic Research Center.
 h. U.S. Navy, Naval Arctic Research Laboratory, and the Naval Arctic Research Center.
 i. U.S. Navy, Naval Arctic Research Laboratory, and the Naval Arctic Research Center.
 j. U.S. Navy, Naval Arctic Research Laboratory, and the Naval Arctic Research Center.

2. Symbols are defined as follows:
 a. 125: Ice concentration of 125% (solid black circle)
 b. 100: Ice concentration of 100% (circle with 100 inside)
 c. 75: Ice concentration of 75% (circle with 75 inside)
 d. 50: Ice concentration of 50% (circle with 50 inside)
 e. 25: Ice concentration of 25% (circle with 25 inside)
 f. 0: No ice (circle with 0 inside)

3. The thick black line represents the 'SEA ICE FREE' limit.

4. The map is based on data from 10 April 1990.

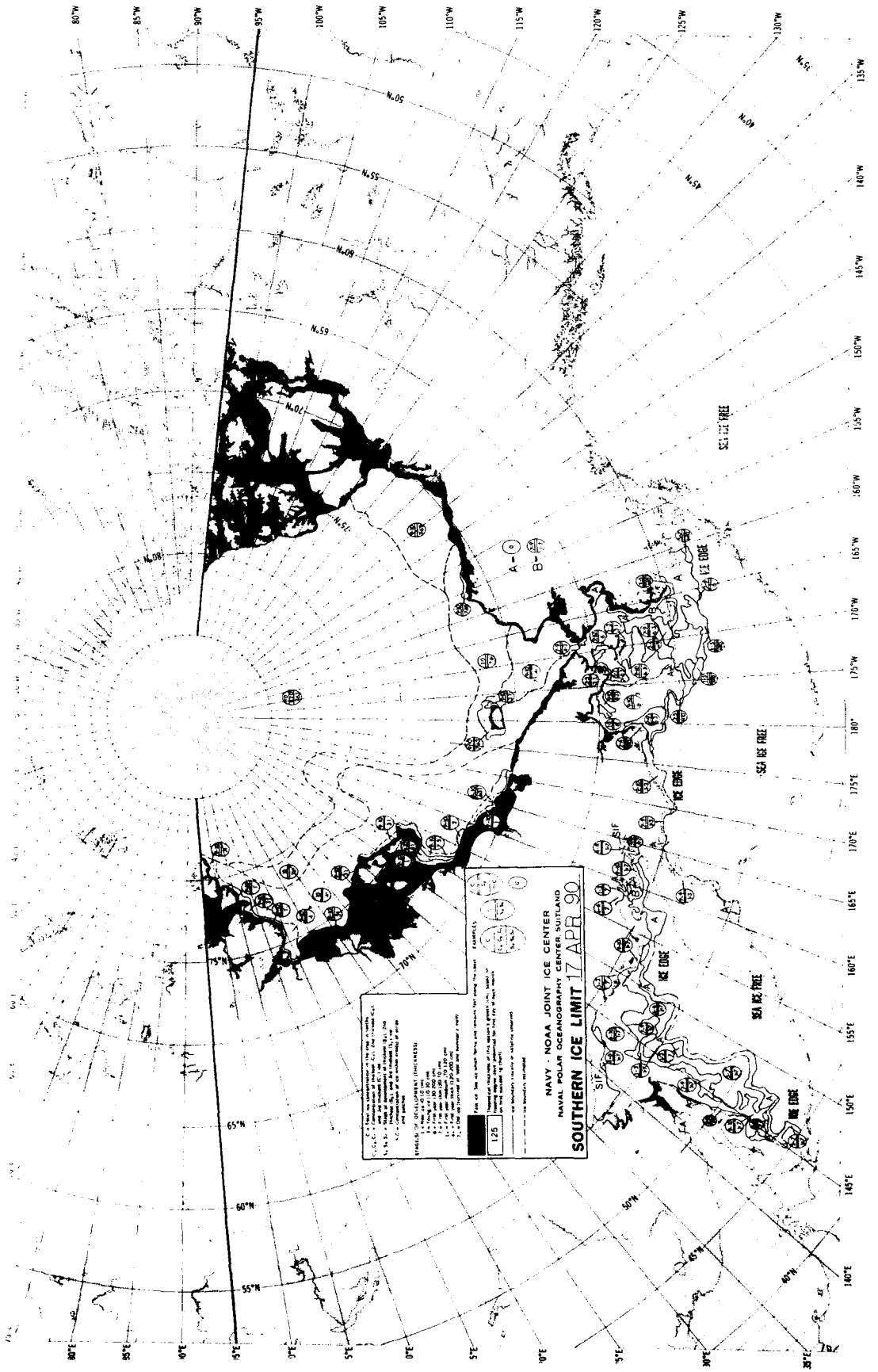
5. The map is based on data from the Naval Arctic Research Laboratory and the Naval Arctic Research Center.

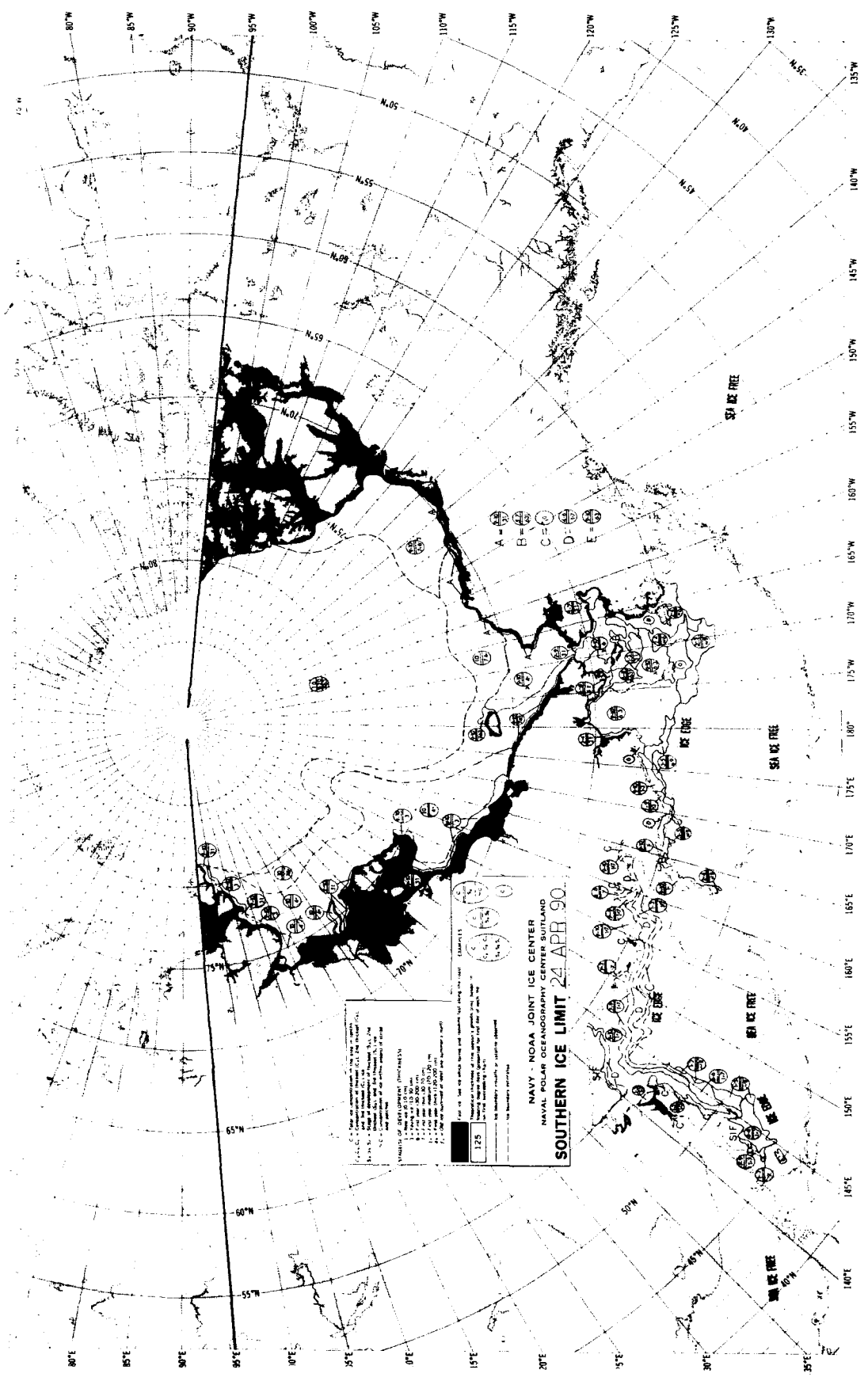
6. The map is based on data from the Naval Arctic Research Laboratory and the Naval Arctic Research Center.

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9. The map is based on data from the Naval Arctic Research Laboratory and the Naval Arctic Research Center.





NAVY - NOAA JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND
SOUTHERN ICE LIMIT 24 APR 90

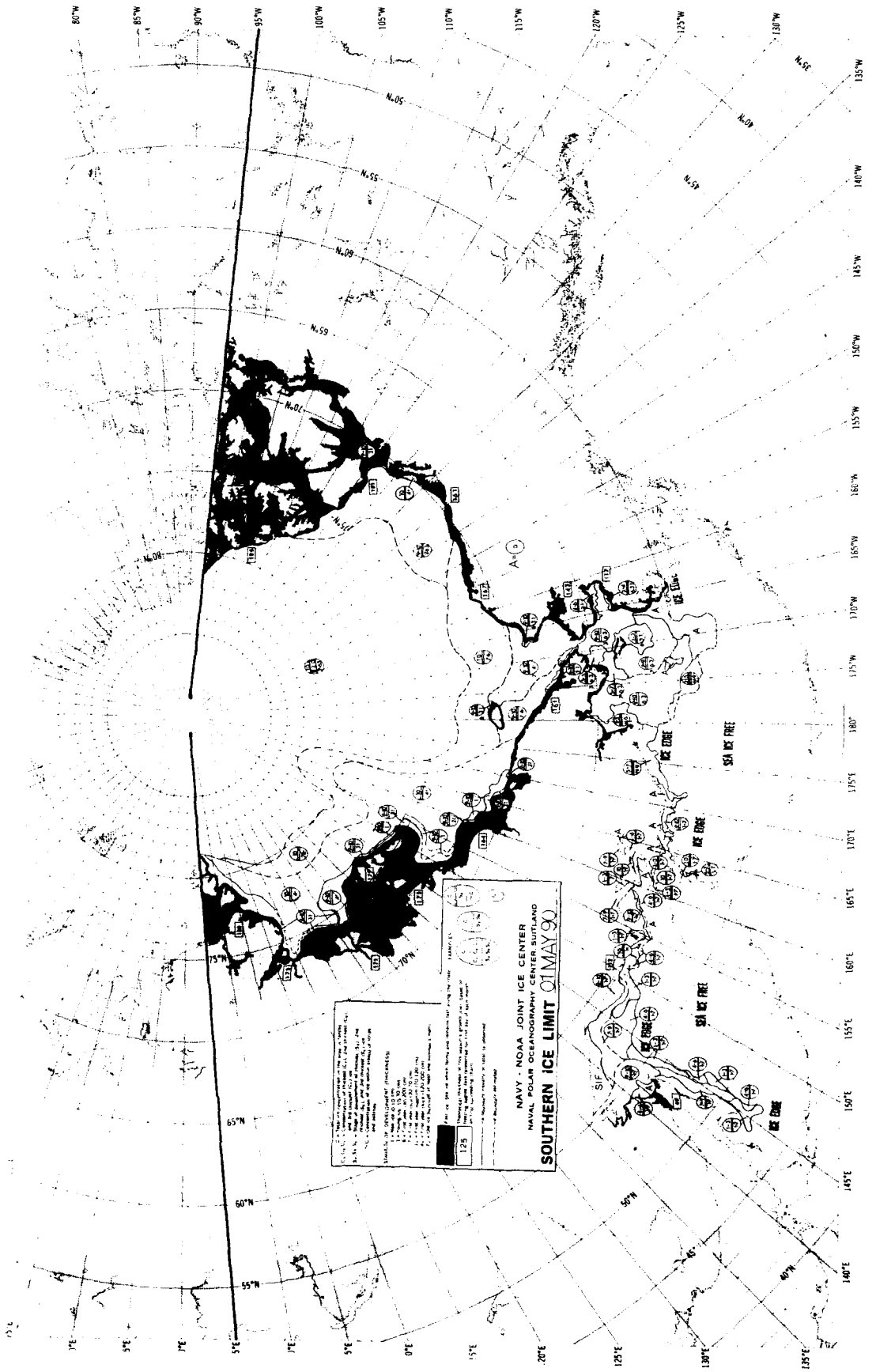
1. This map shows the ice limit for the date and location indicated. It is based on the latest available data from the Navy and NOAA. The ice limit is defined as the outer edge of the ice pack. The area inside the ice limit is shaded. The area outside the ice limit is unshaded. The ice limit is shown as a dashed line. The area inside the ice limit is shaded. The area outside the ice limit is unshaded. The ice limit is shown as a dashed line. The area inside the ice limit is shaded. The area outside the ice limit is unshaded.

2. The ice limit is shown as a dashed line. The area inside the ice limit is shaded. The area outside the ice limit is unshaded. The ice limit is shown as a dashed line. The area inside the ice limit is shaded. The area outside the ice limit is unshaded.

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1. This chart is a reproduction of the original chart published by the Navy and NOAA Joint Ice Center. It is not to be used for navigation.

2. This chart is a reproduction of the original chart published by the Navy and NOAA Joint Ice Center. It is not to be used for navigation.

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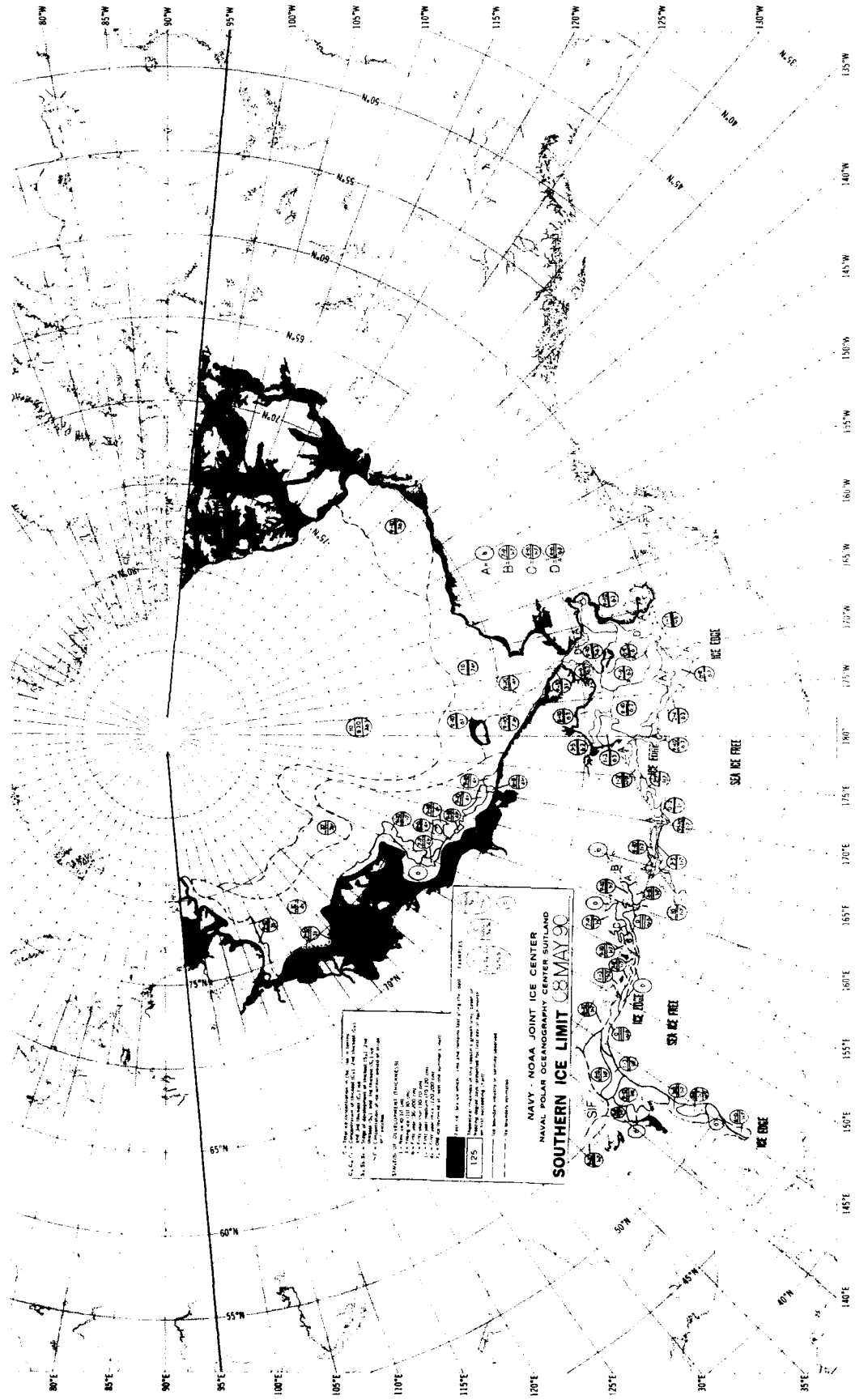
7. This chart is a reproduction of the original chart published by the Navy and NOAA Joint Ice Center. It is not to be used for navigation.

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NAVY - NOAA JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPHY CENTER
SOUTHERN ICE LIMIT OF MAY 90



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NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND
SOUTHERN ICE LIMIT 8 MAY 90

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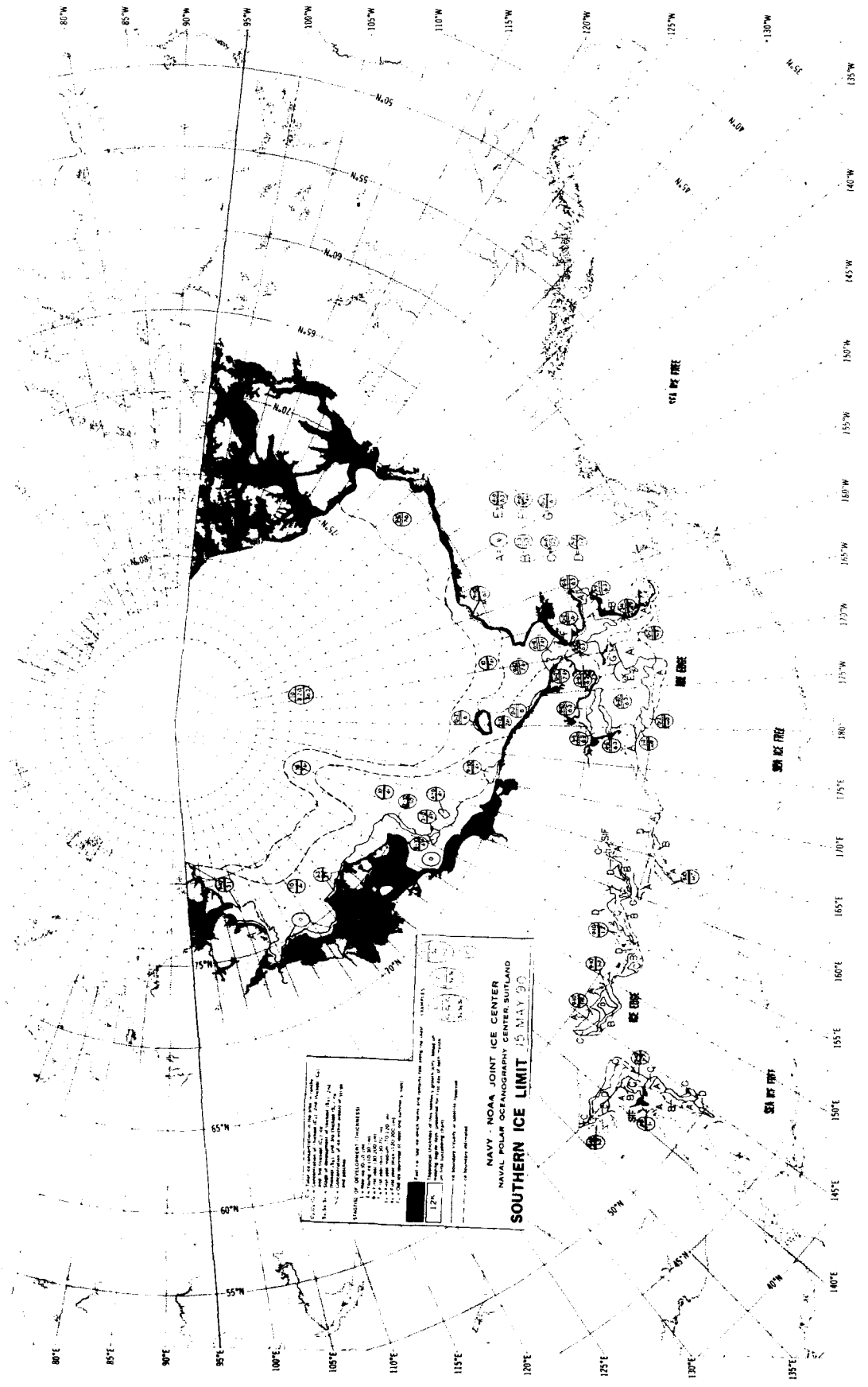
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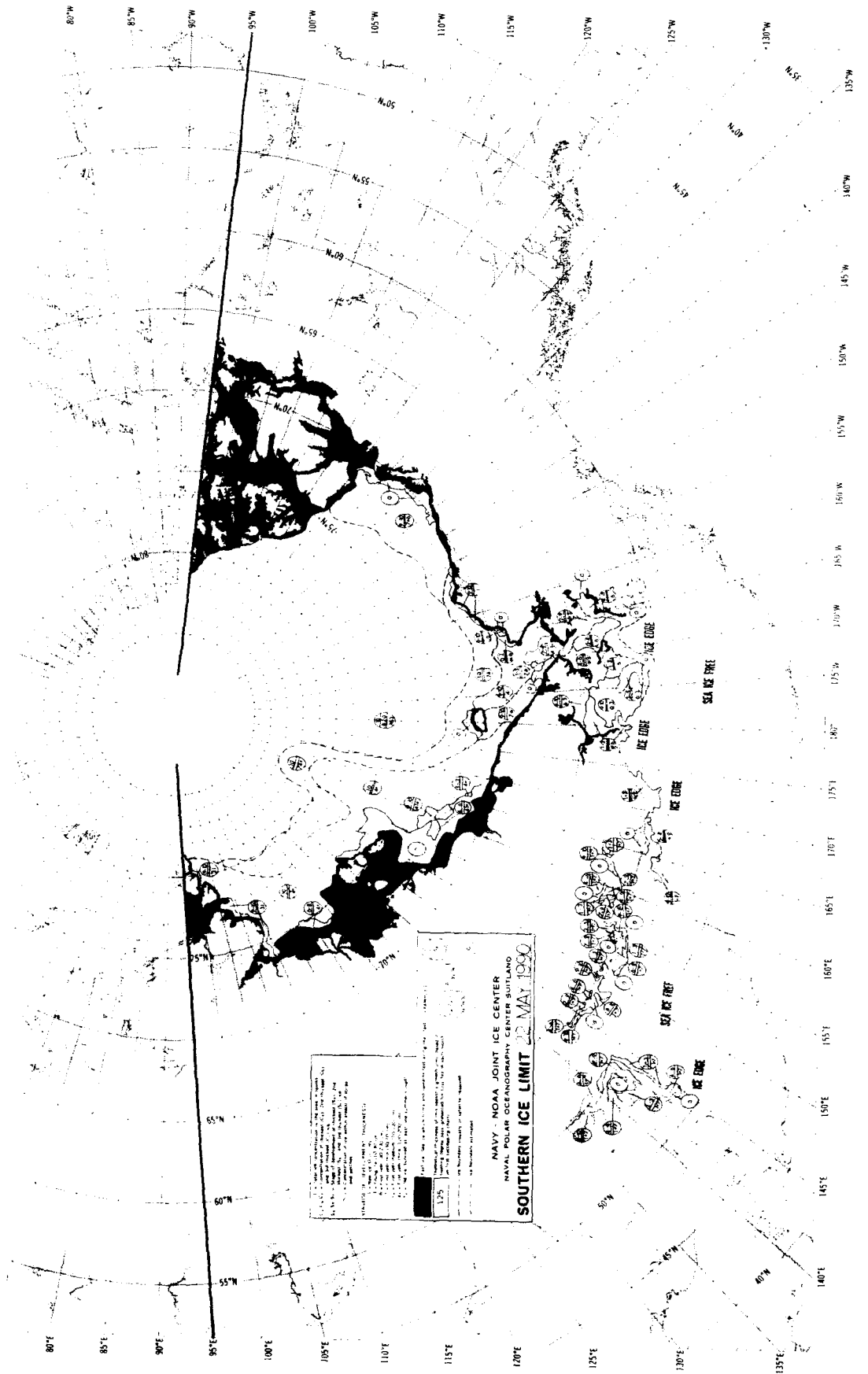
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NAVY - NOAA JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPHY CENTER SUTLAND
SOUTHERN ICE LIMIT 15 MAY 90

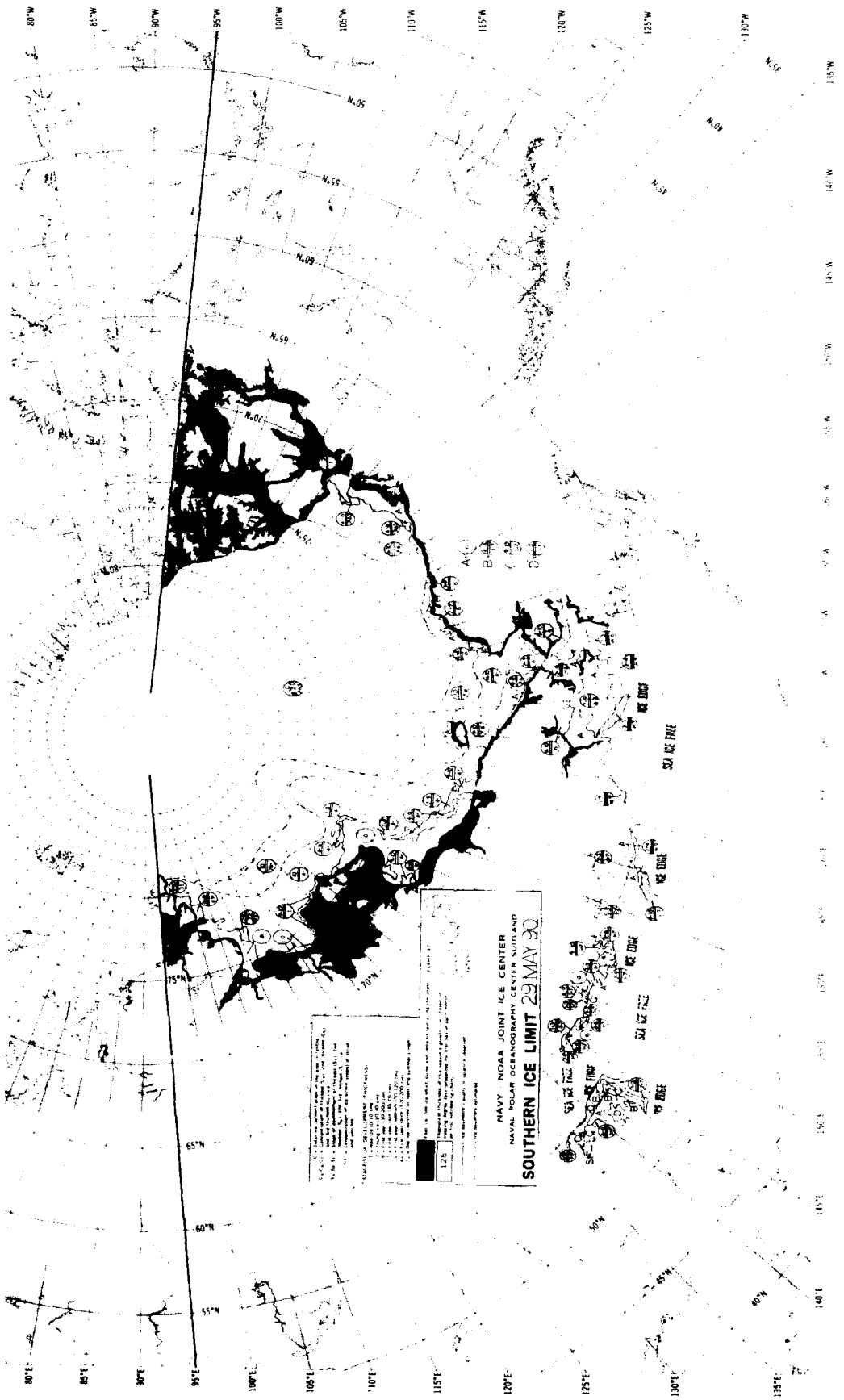
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 Chart No. 1668
 Date: 15 May 1990
 Issue: 1
 Edition: 1
 Revision: 1
 Status: Active
 Authority: NIMA
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 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND
SOUTHERN ICE LIMIT 22 MAY 1990

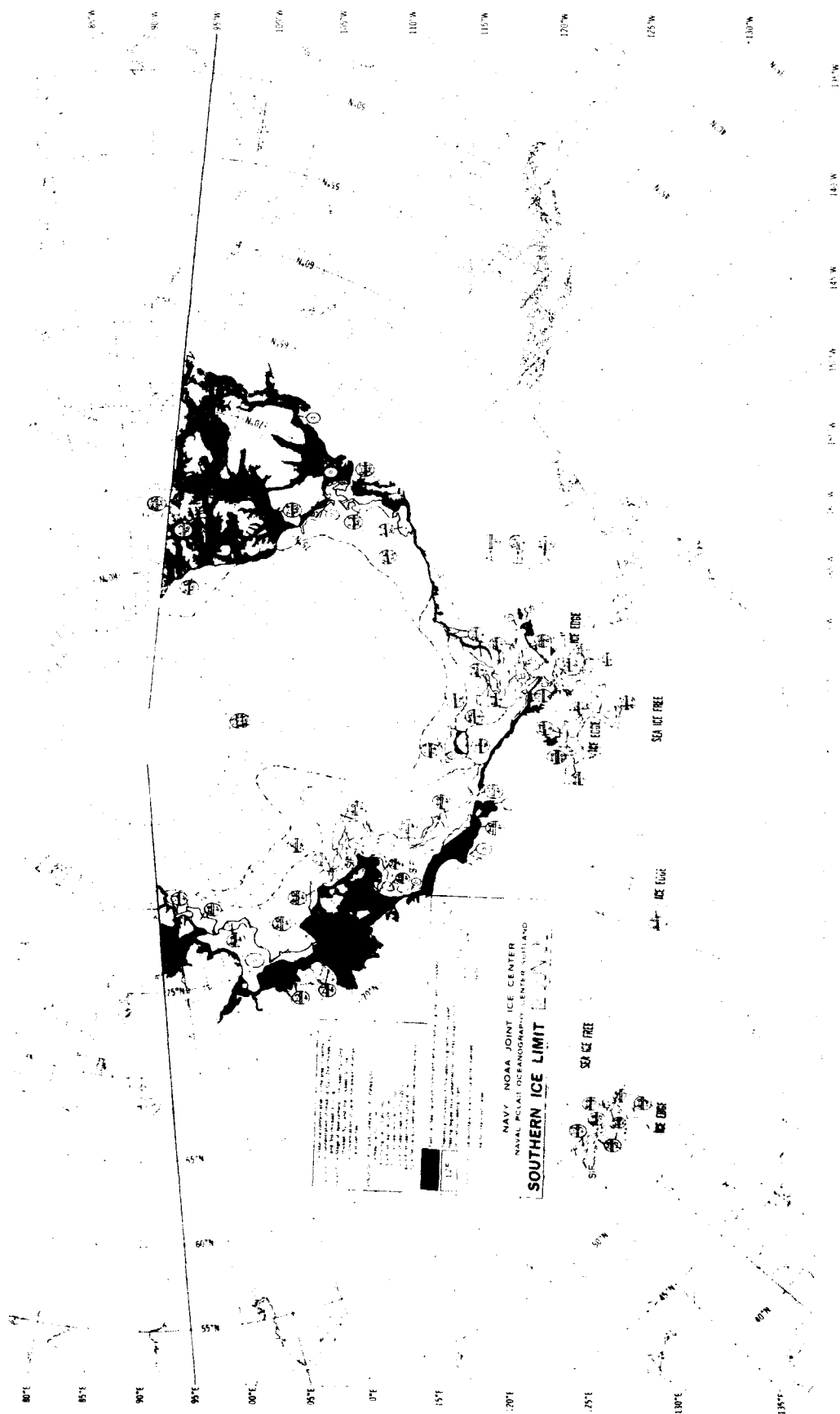
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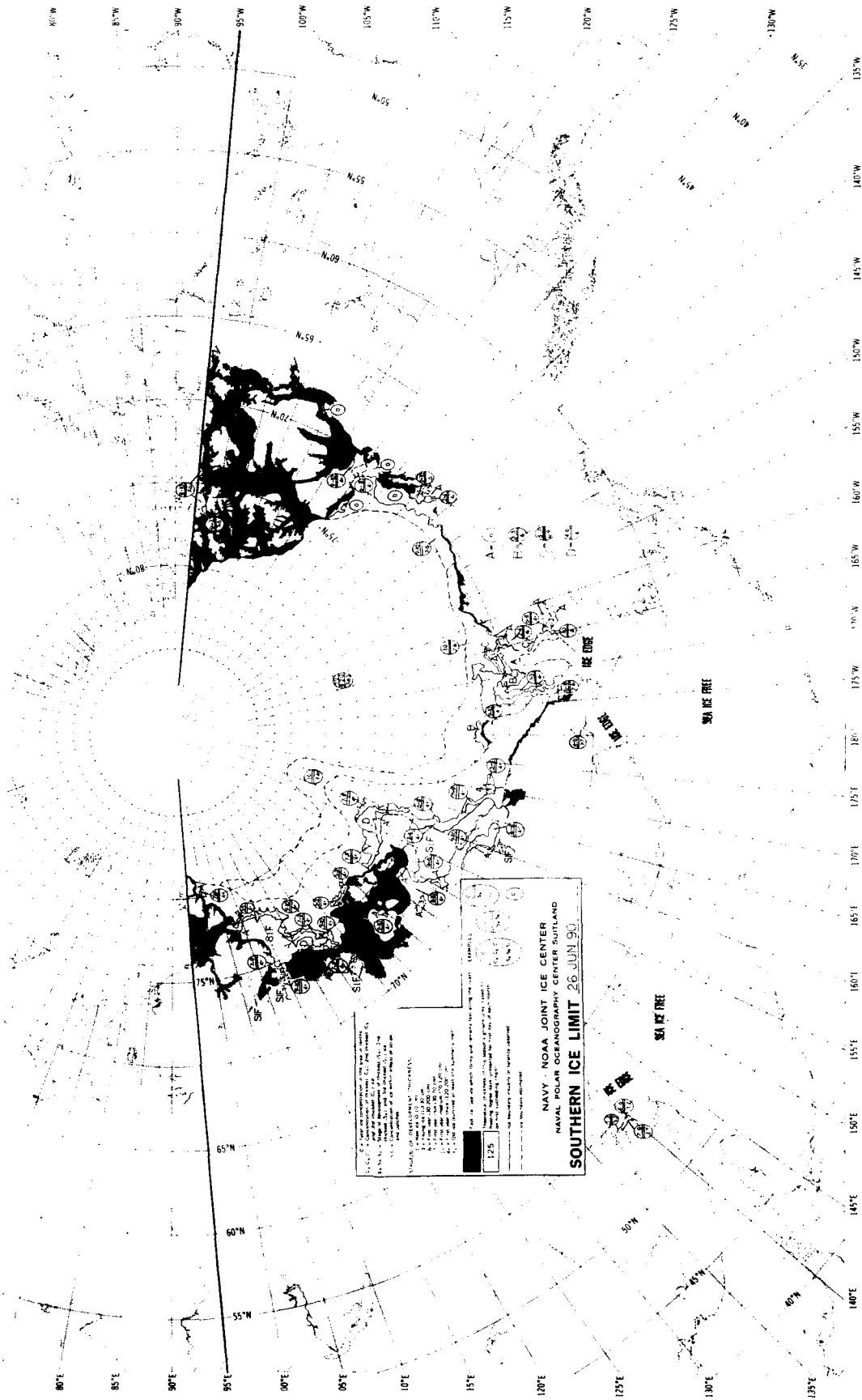
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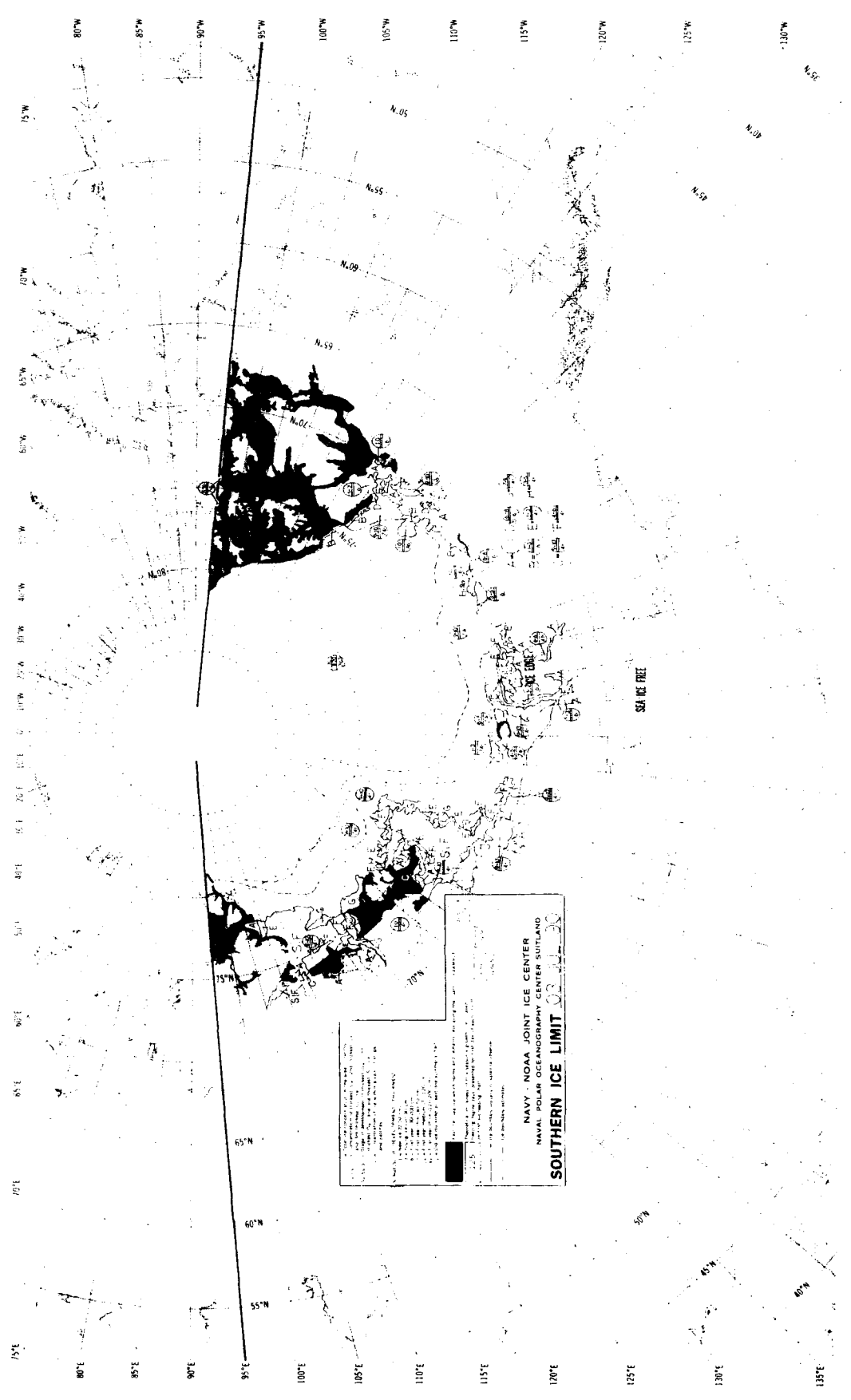
NAVY, NOAA JOINT ICE CENTER
NAVAL POLAR OPERATIONS CENTER, WASHINGTON
SOUTHERN ICE LIMIT





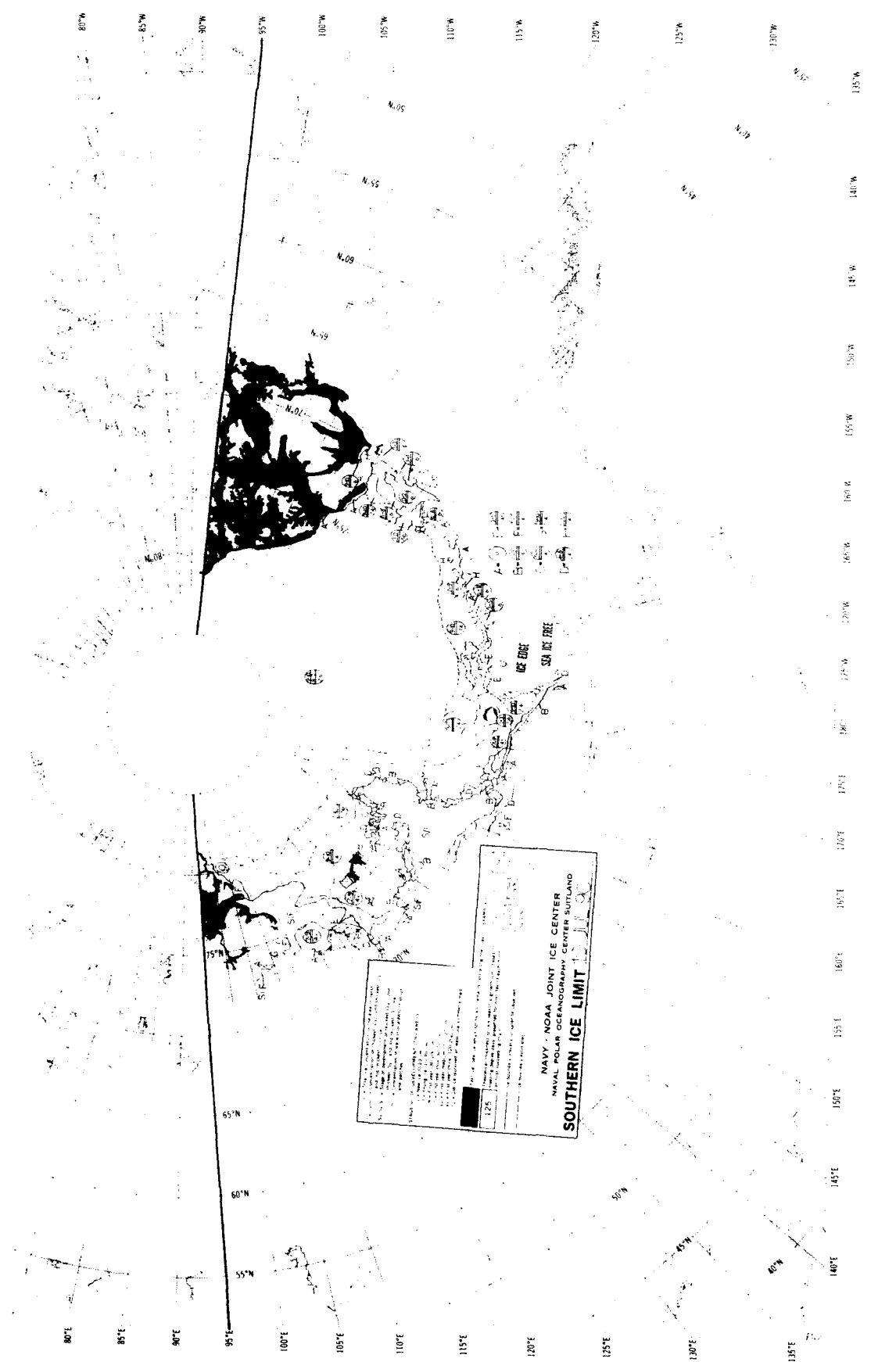
NAVY - NOAA JOINT ICE CENTER
 NAVAL POLAR GEOGRAPHY CENTER SUTCLAND
SOUTHERN ICE LIMIT 30 JUN 90

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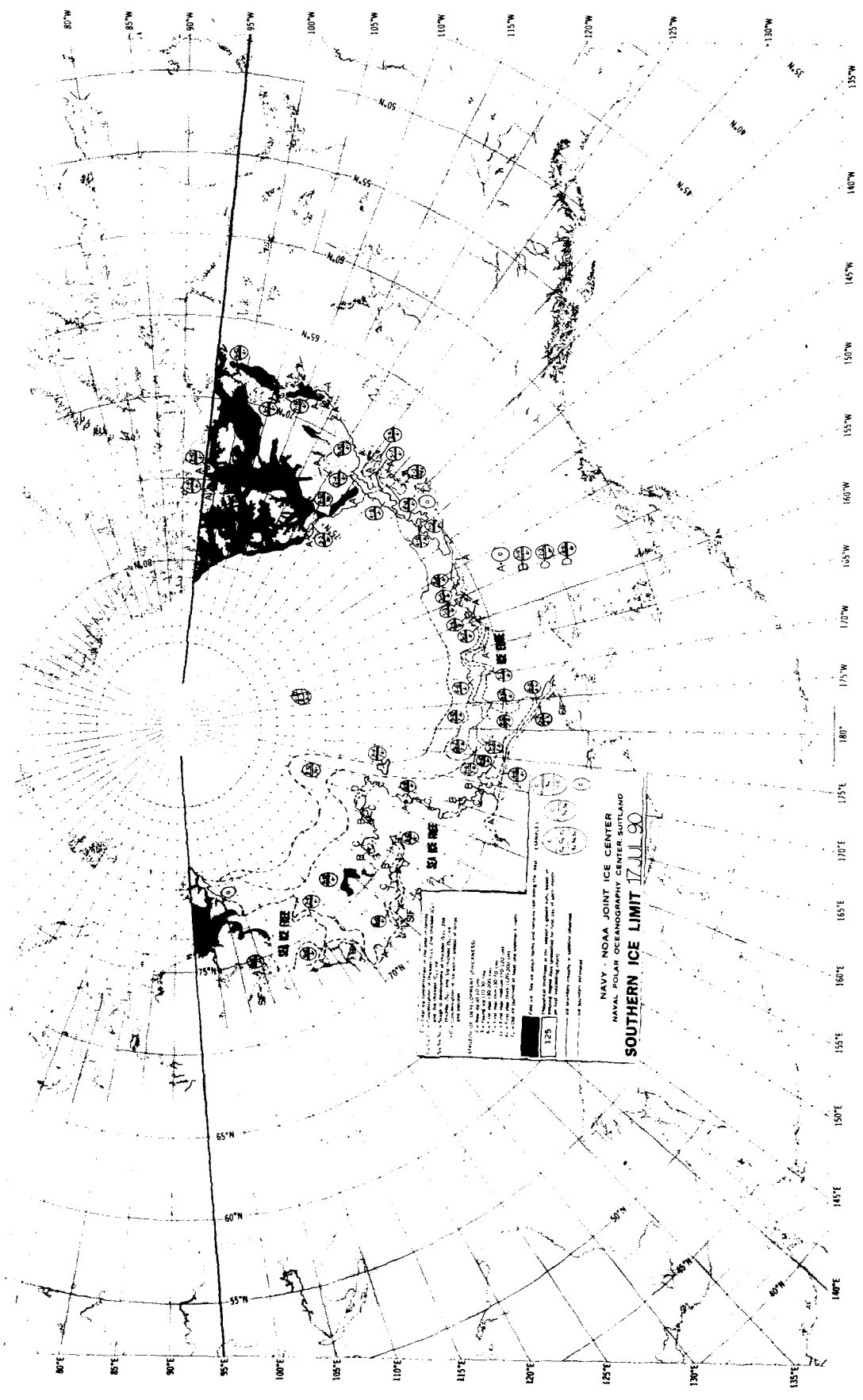


NAVY - NOAA JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPHY CENTER SUTLAND
SOUTHERN ICE LIMIT 03 01 20

This chart is a reproduction of the original chart published by the Hydrographic Office, U.S. Navy, in 1968. It is based on the original chart No. 1600, which was revised in 1968. The chart is a nautical chart of the Southern Ocean region, showing the Antarctic continent and surrounding islands. The chart features a grid of latitude and longitude lines. Latitude lines are labeled from 55°N to 65°N, and longitude lines are labeled from 150°W to 170°W. A prominent feature is the 'SEA ICE FREE' area, which is shaded in black and covers a large portion of the continent and surrounding waters. The chart includes various navigational symbols, soundings, and depth contours.



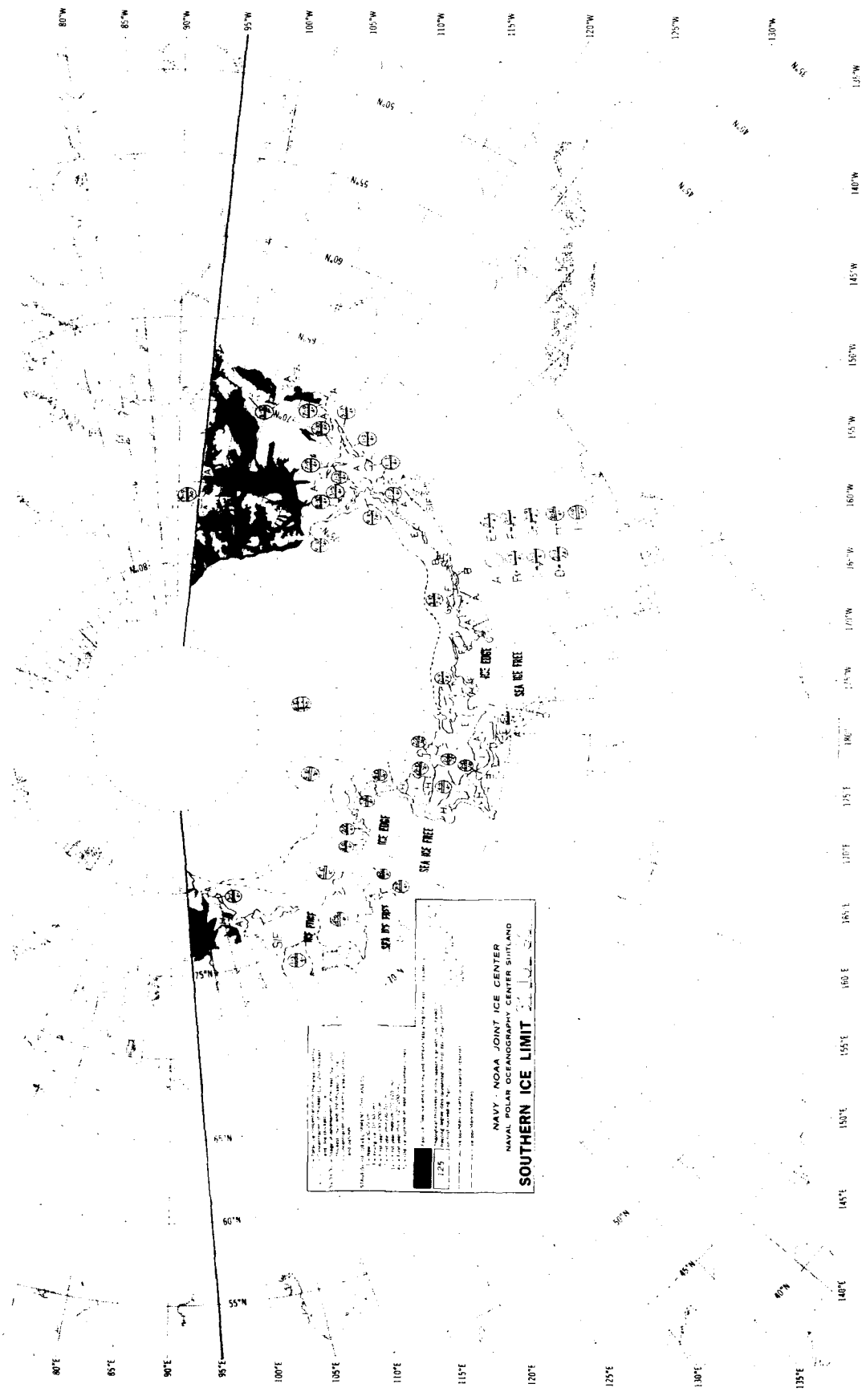
NAVY - NOAA JOINT ICE CENTER
NAVAL POLAR OCEANOGRAPHIC CENTER SUTLAND
SOUTHERN ICE LIMIT



1. Soundings in fathoms, unless otherwise indicated.
 2. Soundings in meters, unless otherwise indicated.
 3. Soundings in feet, unless otherwise indicated.
 4. Soundings in meters, unless otherwise indicated.
 5. Soundings in fathoms, unless otherwise indicated.
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 9. Soundings in fathoms, unless otherwise indicated.
 10. Soundings in meters, unless otherwise indicated.

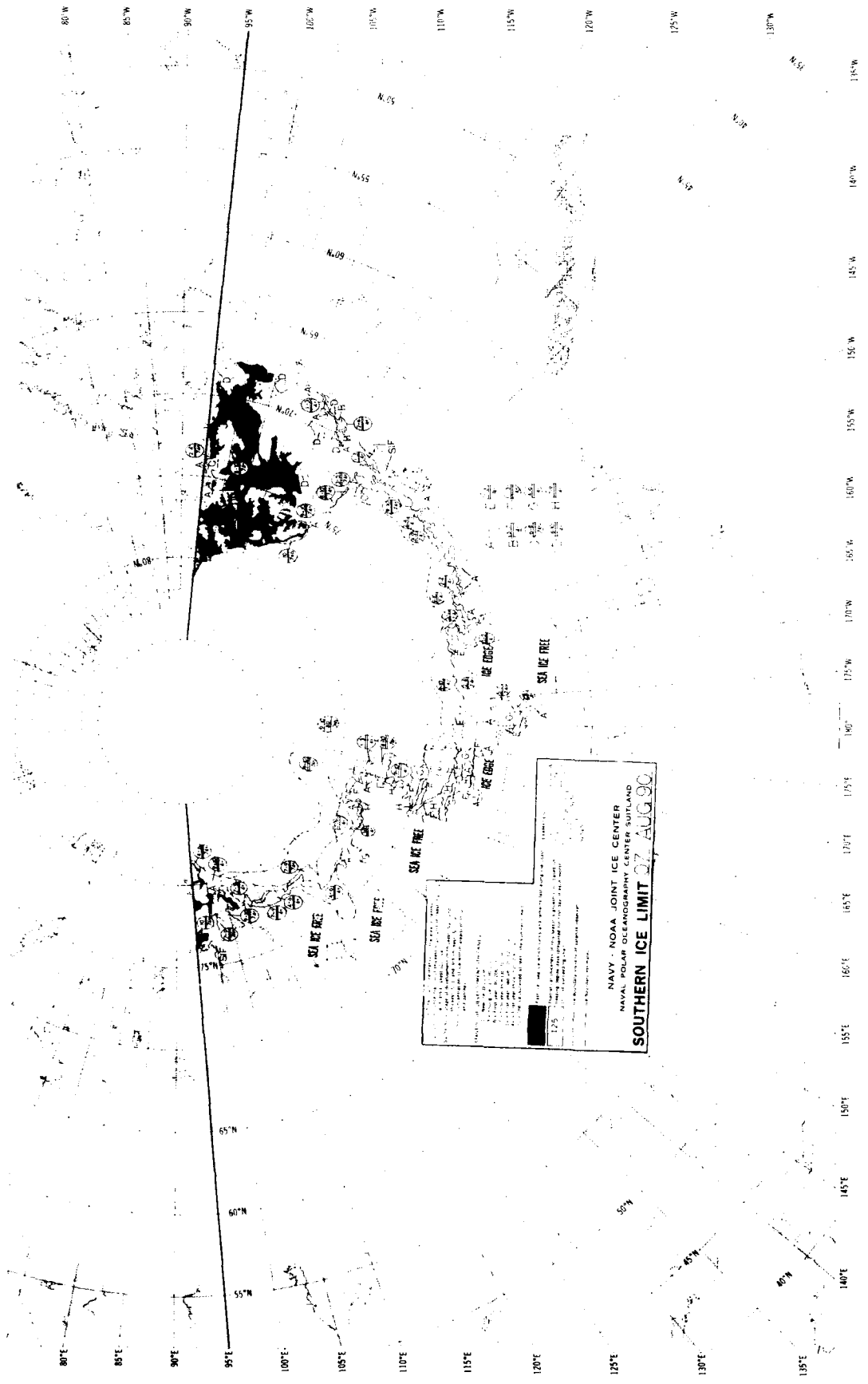
NAVY · NOAA JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPHY CENTER, SUITLAND
SOUTHERN ICE LIMIT 17 JUL 80

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 135°W
 80°N 85°N 90°N 95°N 100°N 105°N 110°N 115°N 120°N 125°N 130°N 135°N



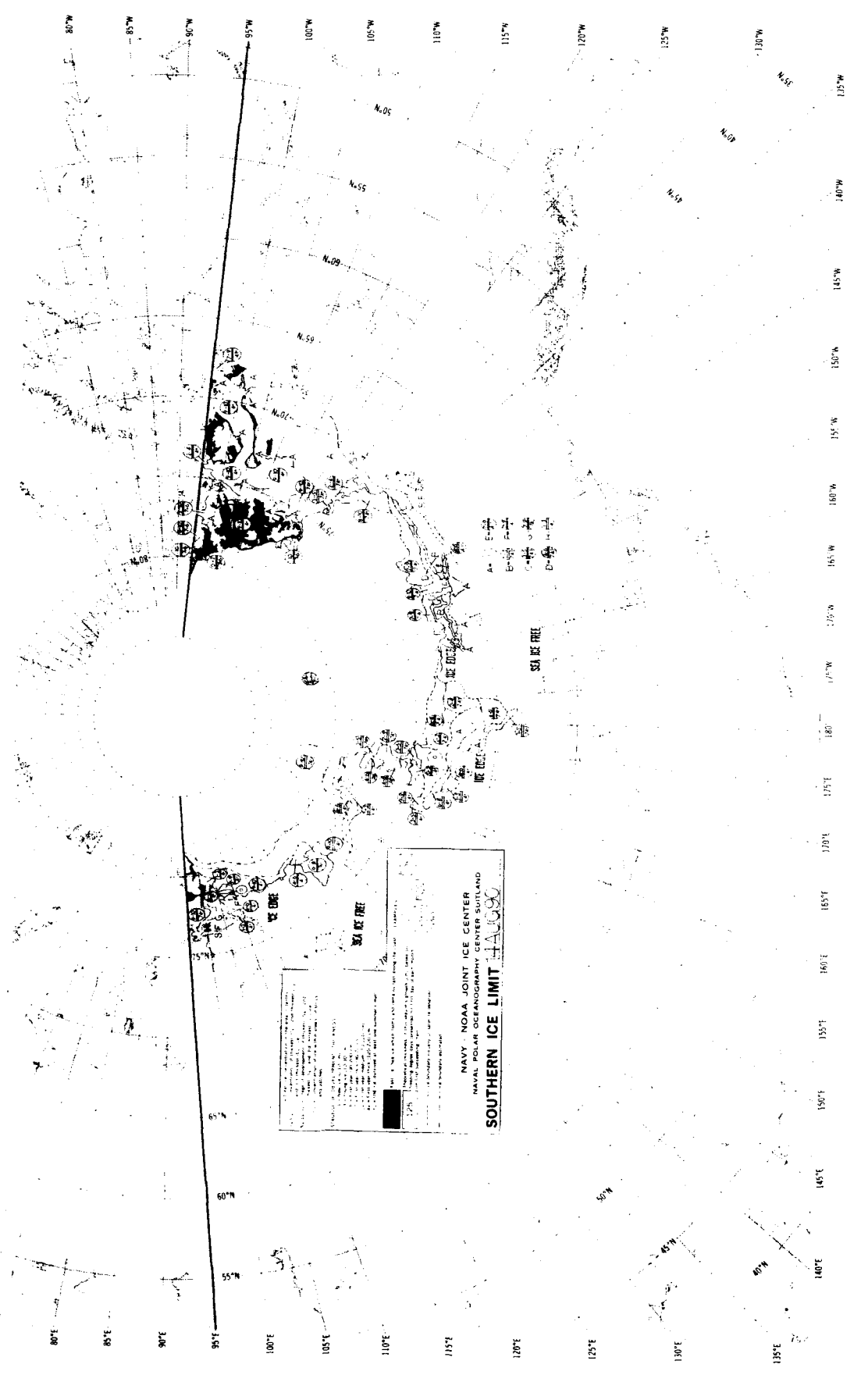
NAVY - NOAA JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND
SOUTHERN ICE LIMIT

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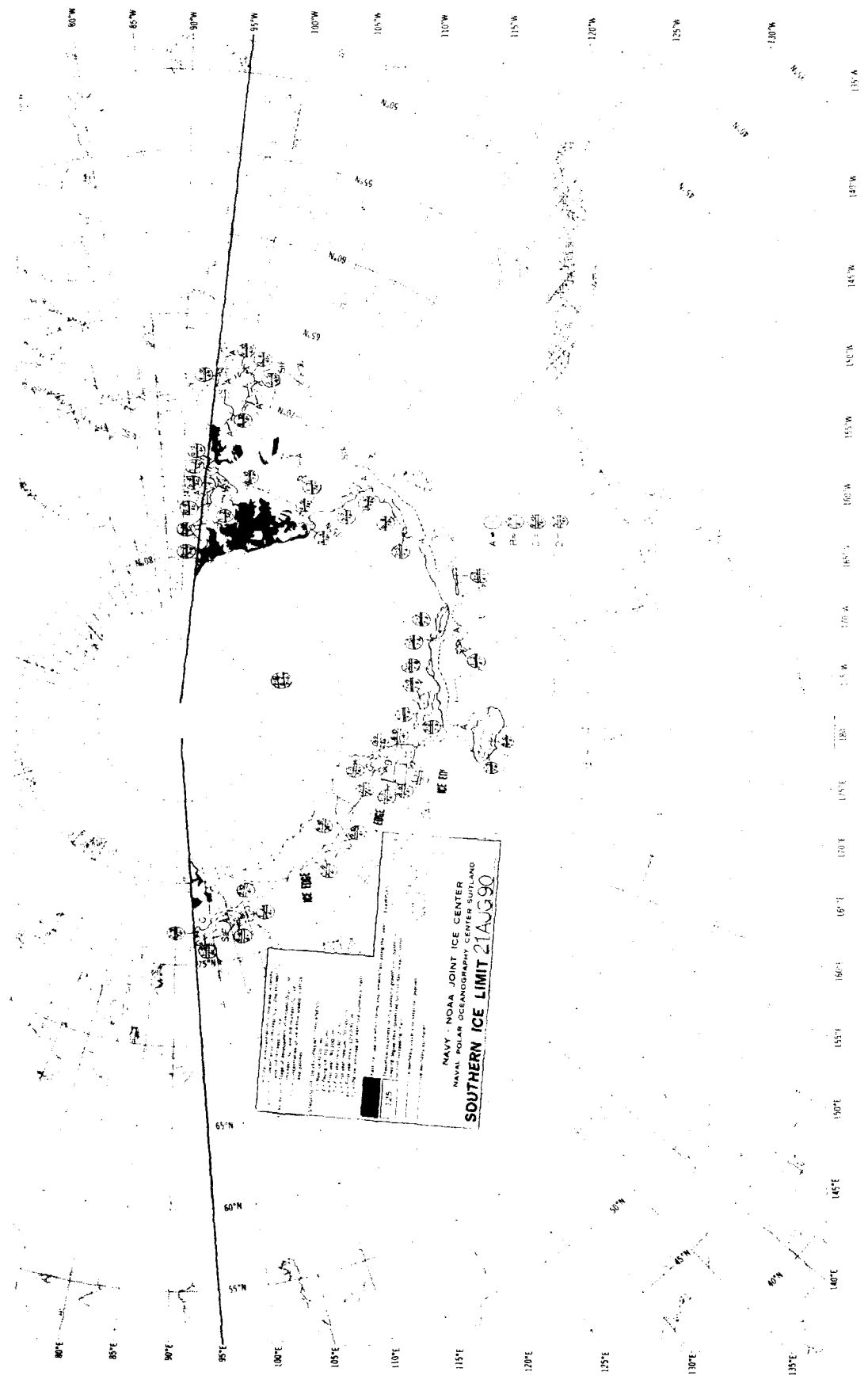
NAVY - NOAA JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPHY CENTER SUTLAND
SOUTHERN ICE LIMIT 07 AUG 90

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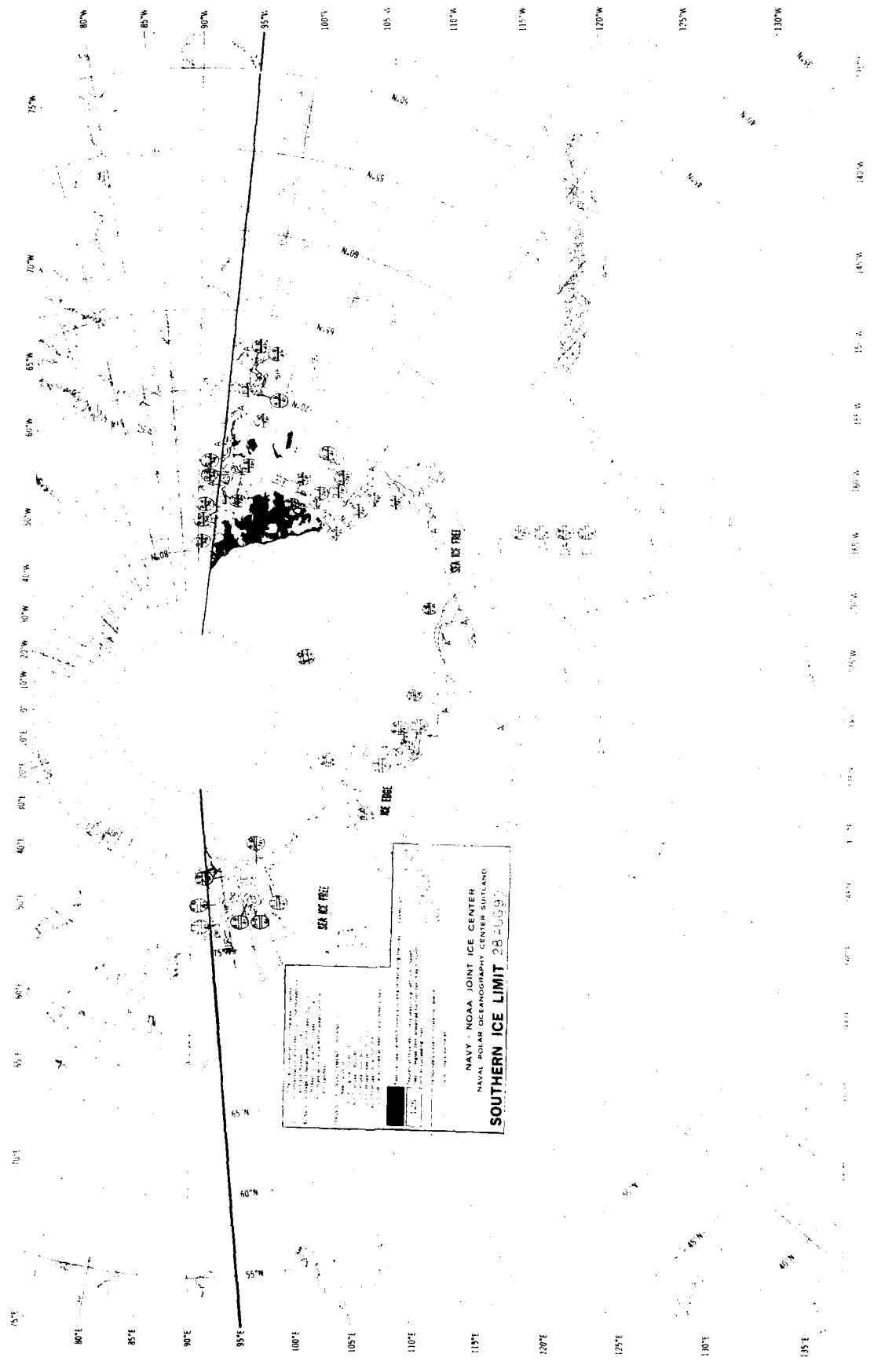
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 3. It is not to be used for any other purpose without the express permission of the Hydrographic Office.
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 10. The Hydrographic Office is not responsible for any claims or damages of any kind.

NAVY - NOAA JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPHY CENTER SUTLAND
SOUTHERN ICE LIMIT

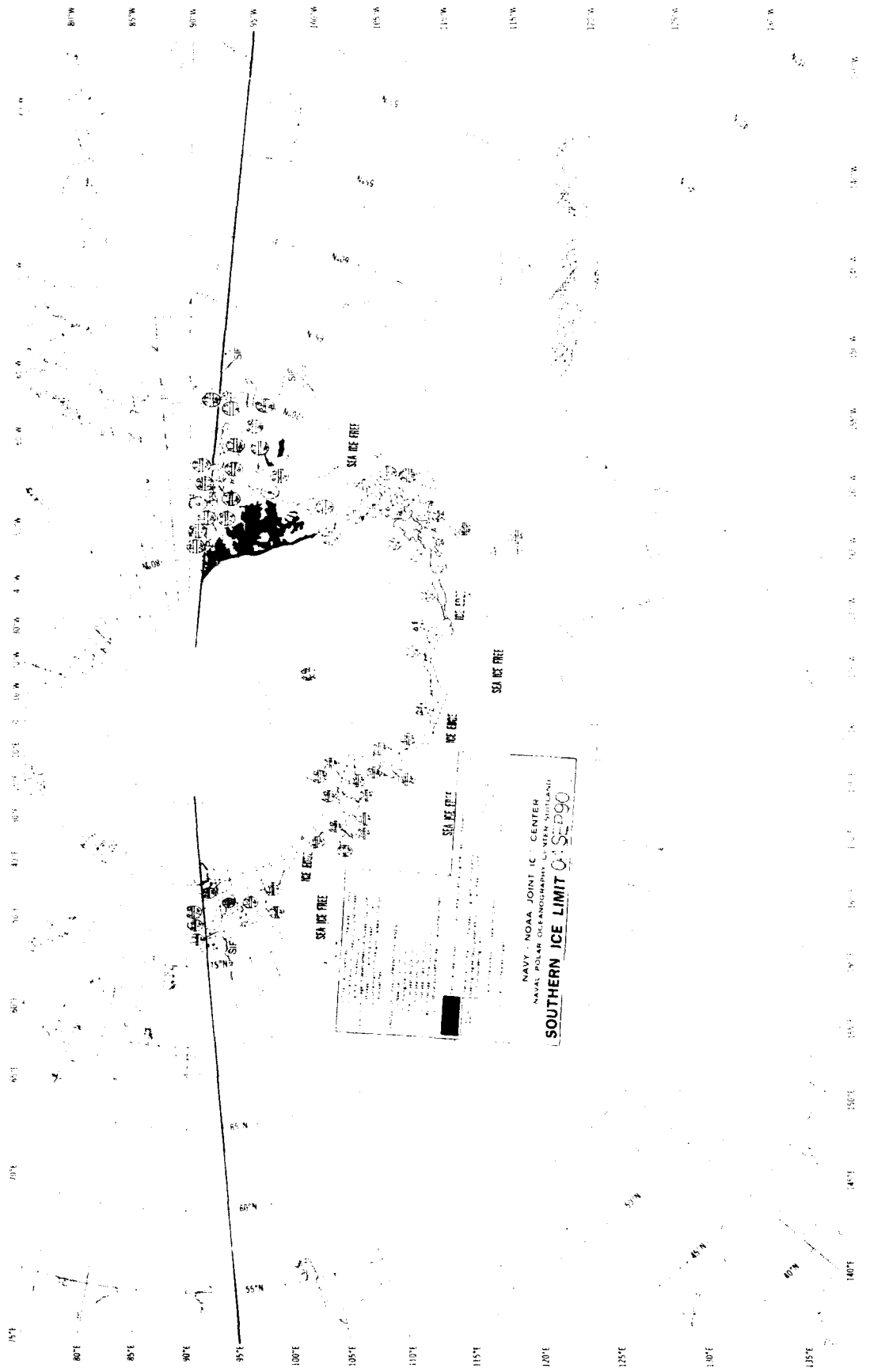


NAVY - NOAA JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPHY CENTER SUTLAND
SOUTHERN ICE LIMIT 21AUG90

This chart shows the Southern Ice Limit for 21 August 1990. The data was collected by the USCGC Healy (WMEC 913) and the USCGC Spencer (WMEC 914) during their operations in the region. The limit is shown as a dashed line, and the area to the south of this line is shaded to indicate ice. The chart also shows depth soundings, navigational aids, and other features of the region.



NAVY - NOAA JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPHY CENTER SUTCLAND
SOUTHERN ICE LIMIT 28 JUL 69



NAVY - NOAA JOINT IC CENTER
 NAVAL POLAR OCEANOGRAPHY CENTER, WASHINGTON, D.C. 20375
 SOUTHERN ICE LIMIT 05 SEP 90

SEA ICE FREE

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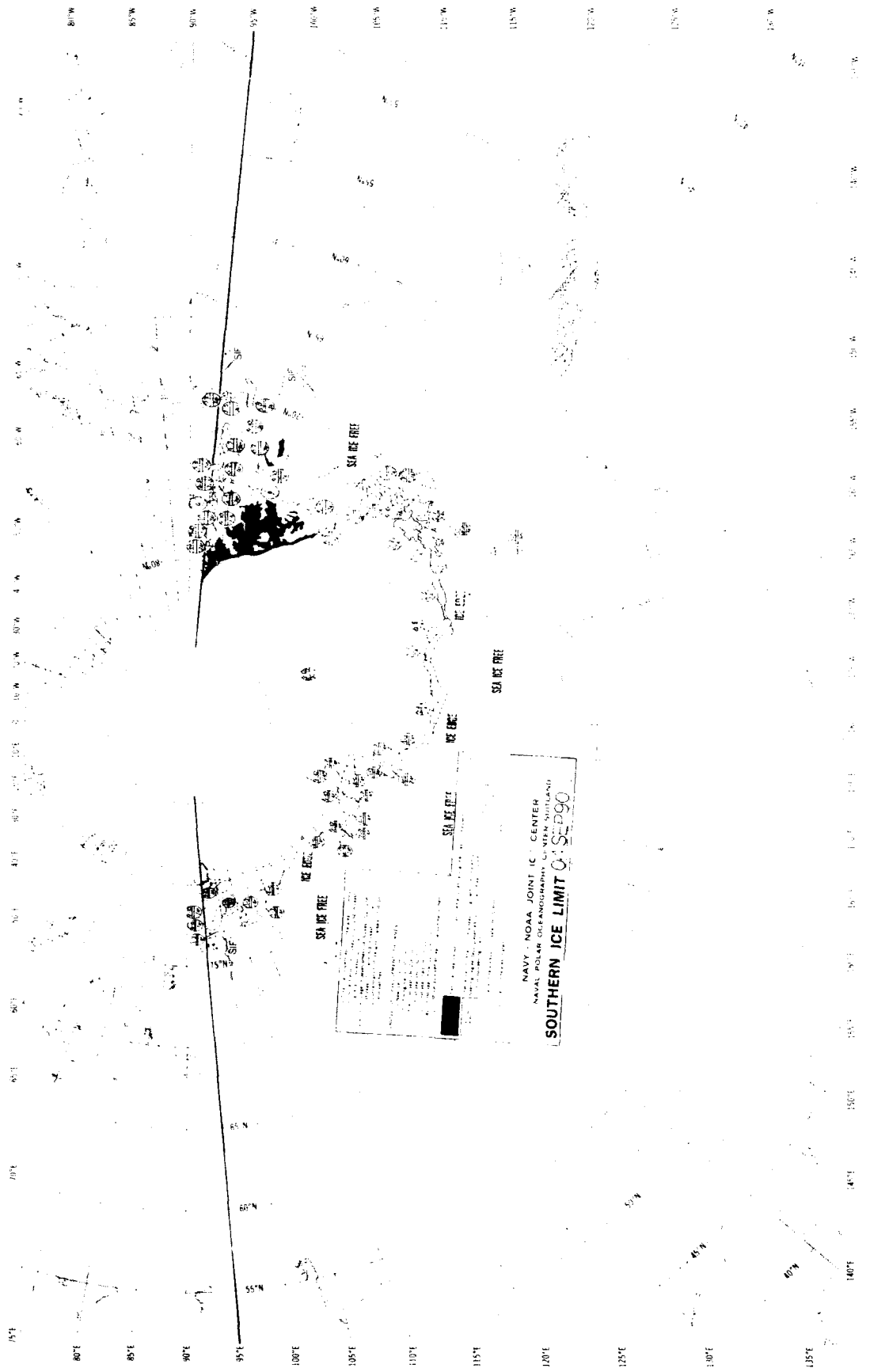
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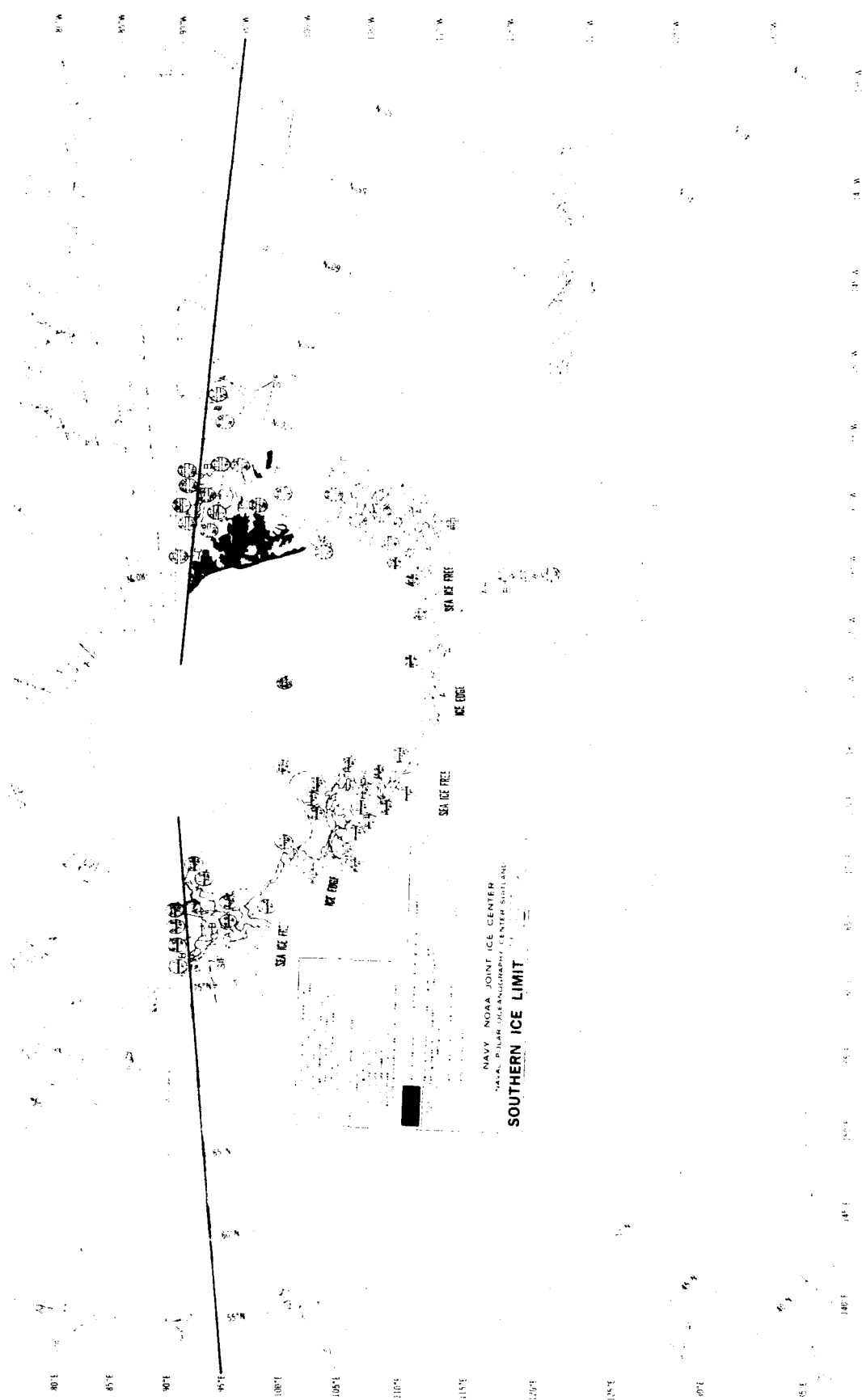
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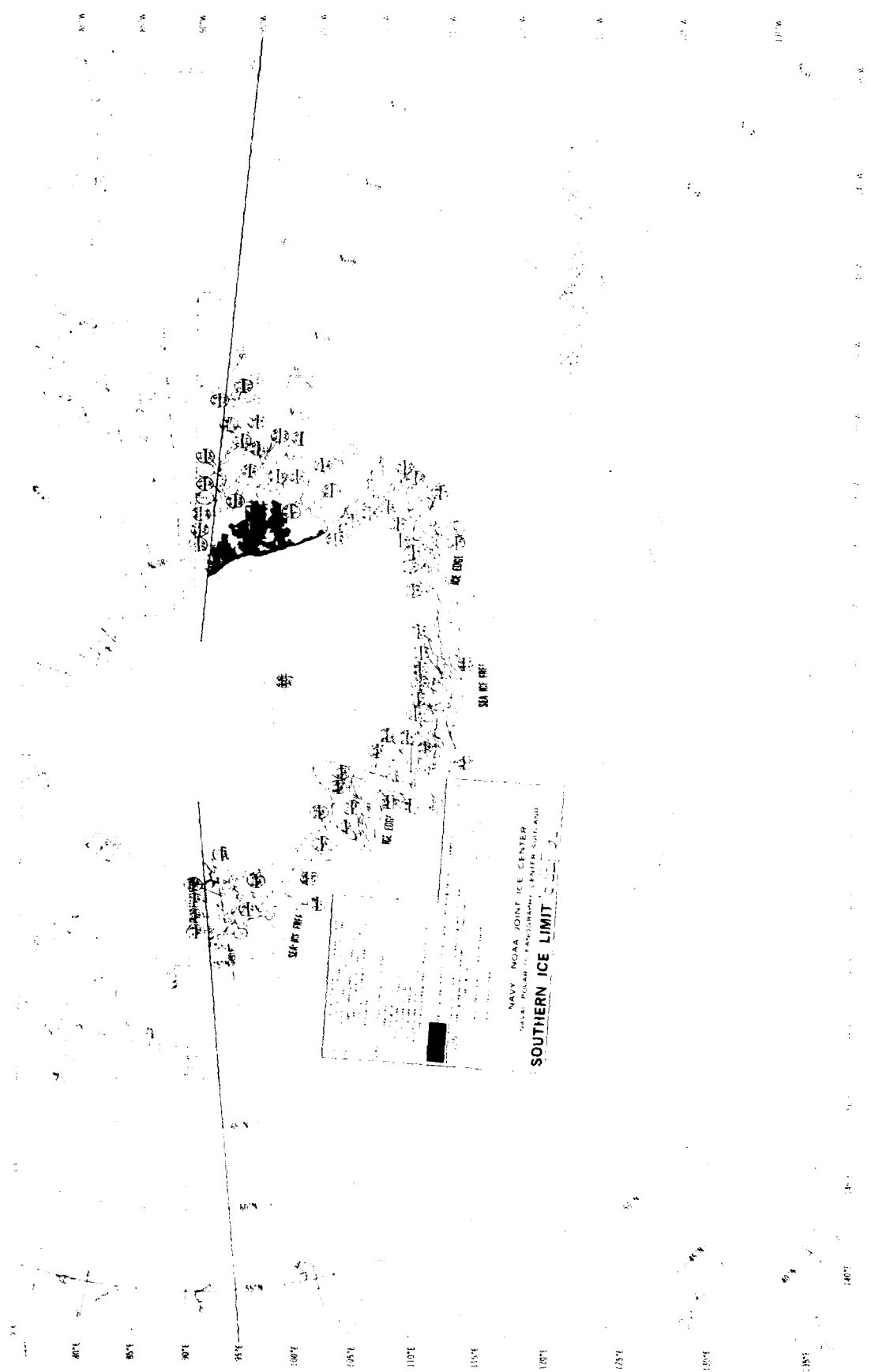
SEA ICE FREE

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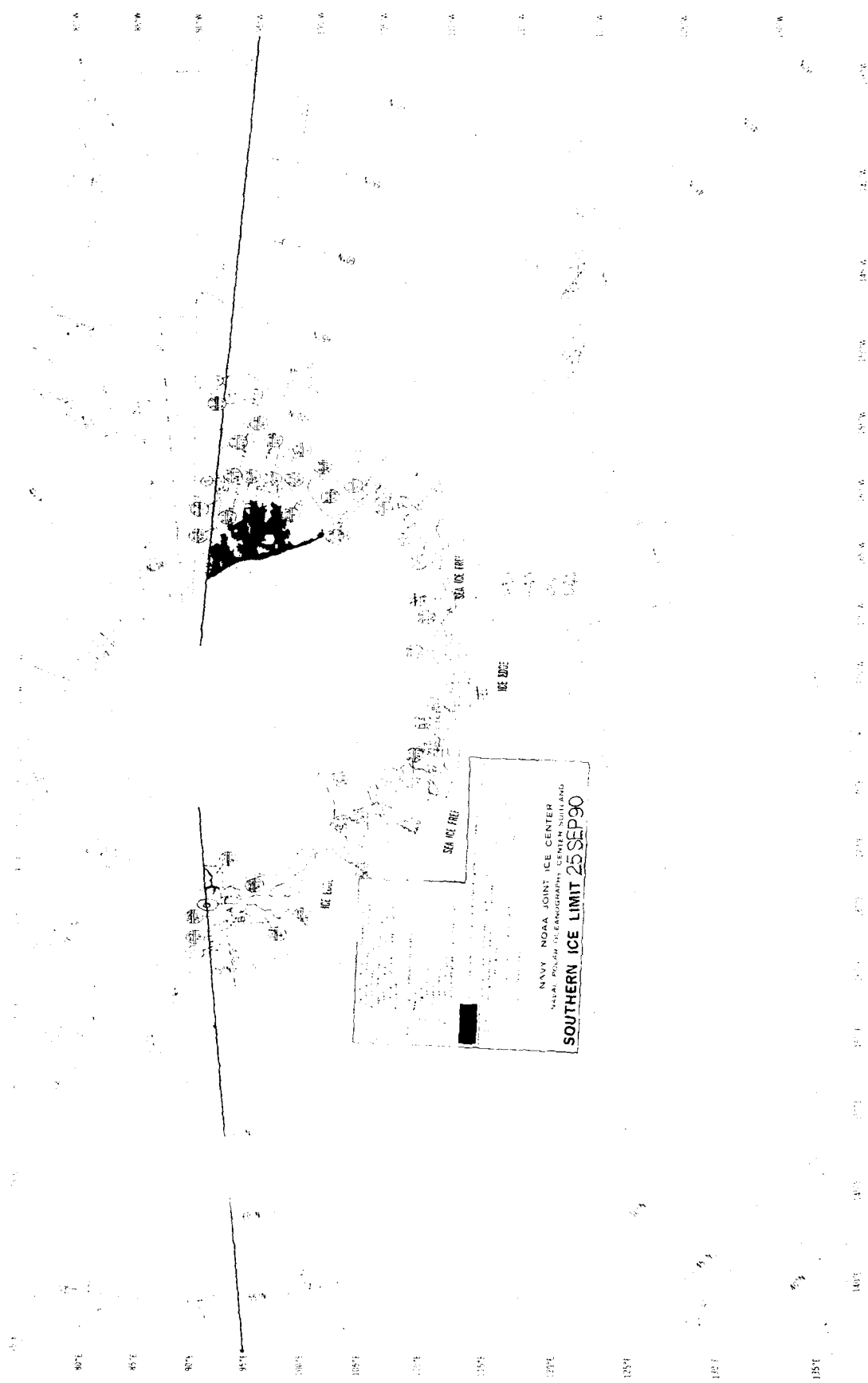




NAVY, NOAA JOINT ICE CENTER
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SOUTHERN ICE LIMIT



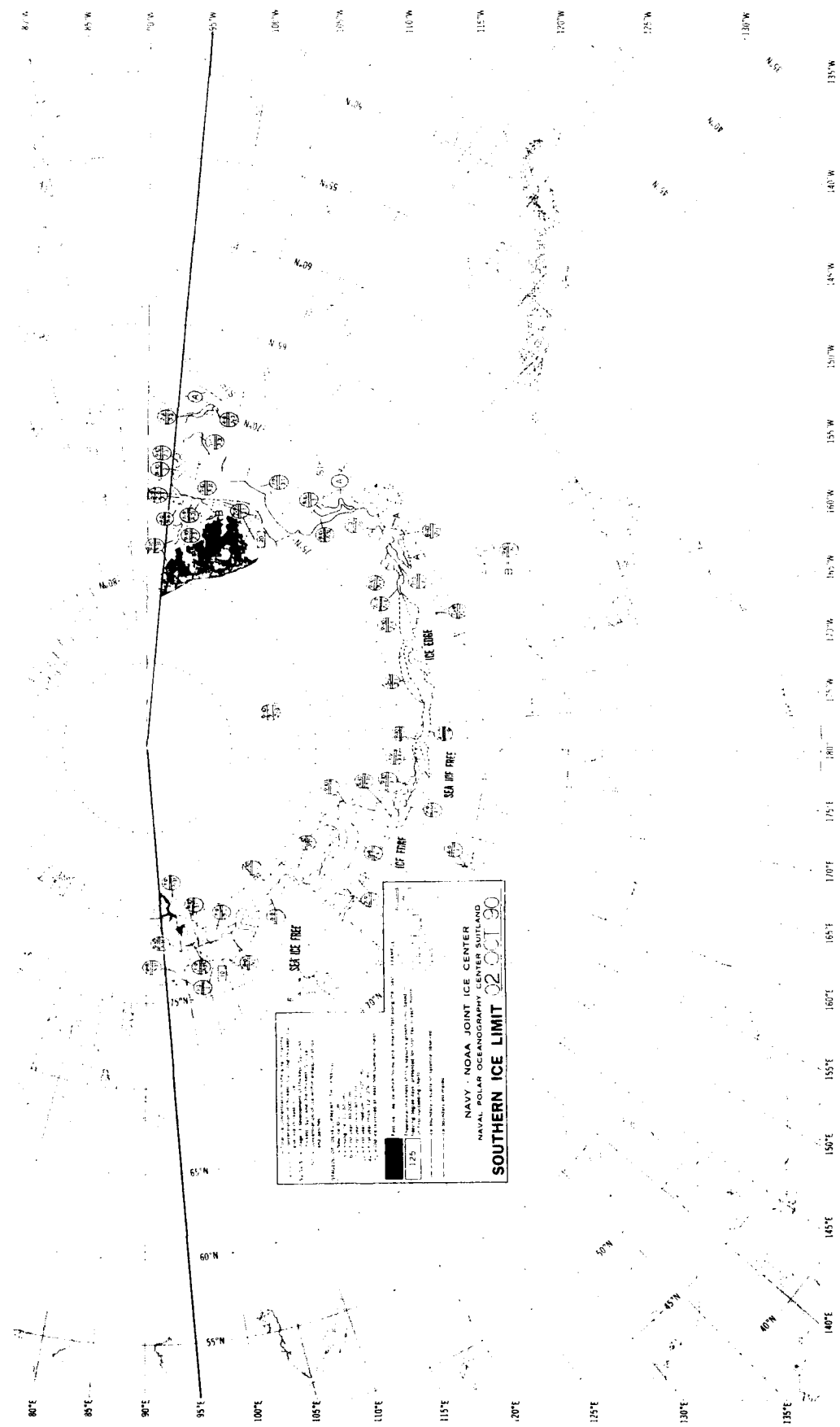
NAVY, NOAA, JOINT ICE CENTER
NAVY, POLAR PROGRAM, JOINT ICE CENTER, SUDBURY
SOUTHERN ICE LIMIT



SEA ICE FREE

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NAVY NOAA JOINT ICE CENTER
 NAVY POLAR OCEANOGRAPHY CENTER SULLAND
SOUTHERN ICE LIMIT 25 SEP 90



NAVY - NOAA JOINT ICE CENTER
NAVAL POLAR OCEANOGRAPHY CENTER SUTCLAND
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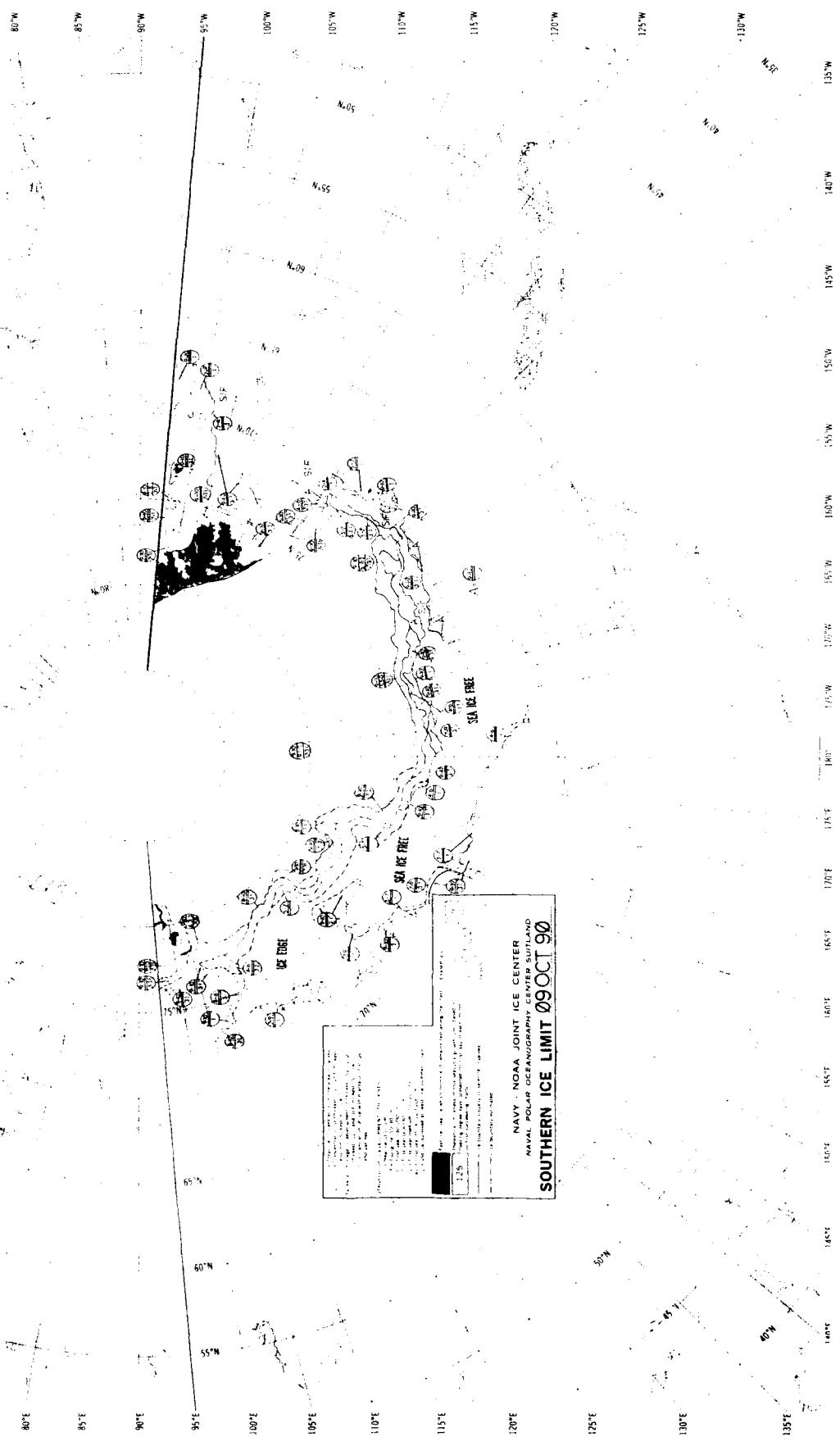
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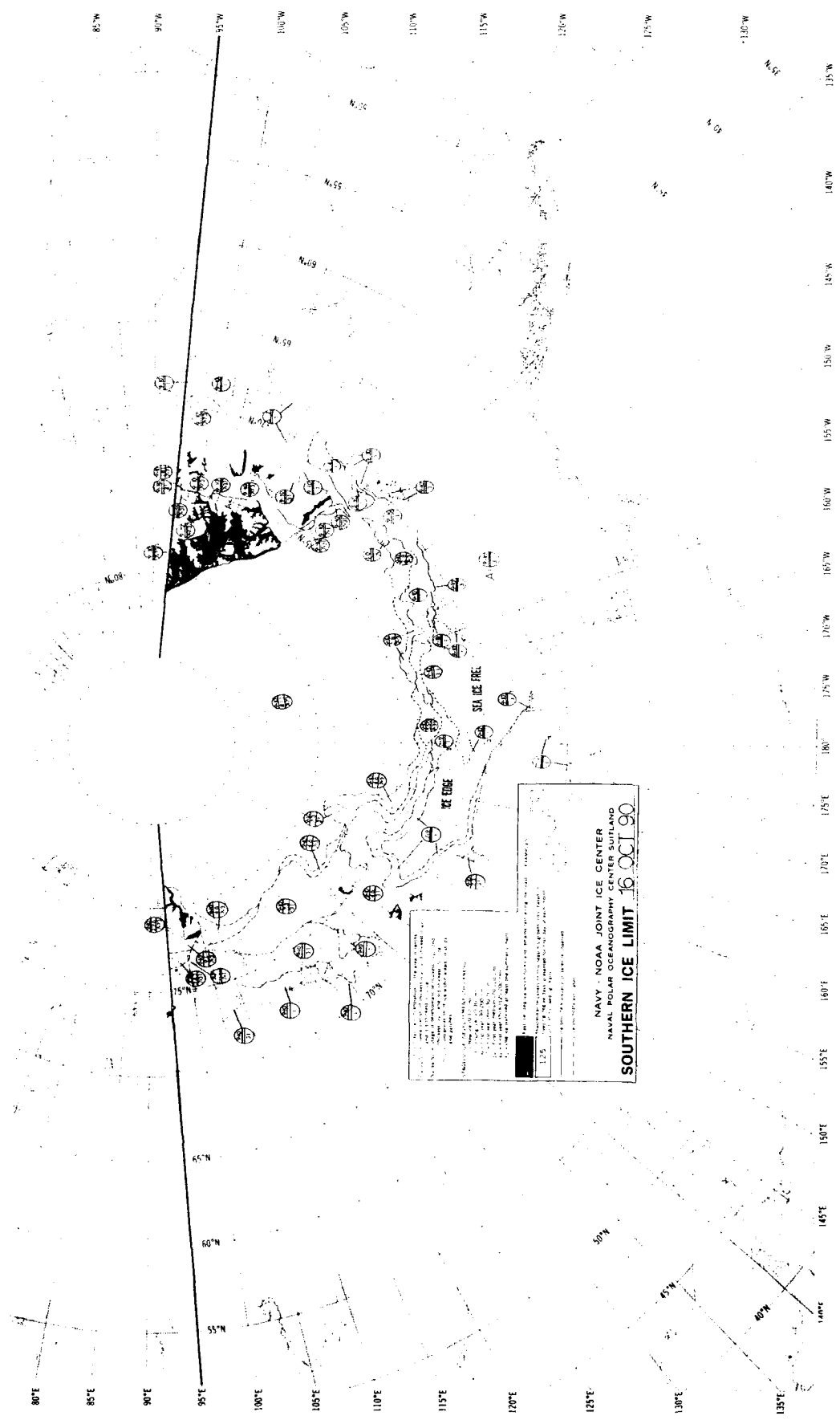
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NAVY - NOAA JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND
SOUTHERN ICE LIMIT 09 OCT 90

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 NAVY - NOAA JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND
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NAVY - NOAA JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND
SOUTHERN ICE LIMIT 16 OCT 90

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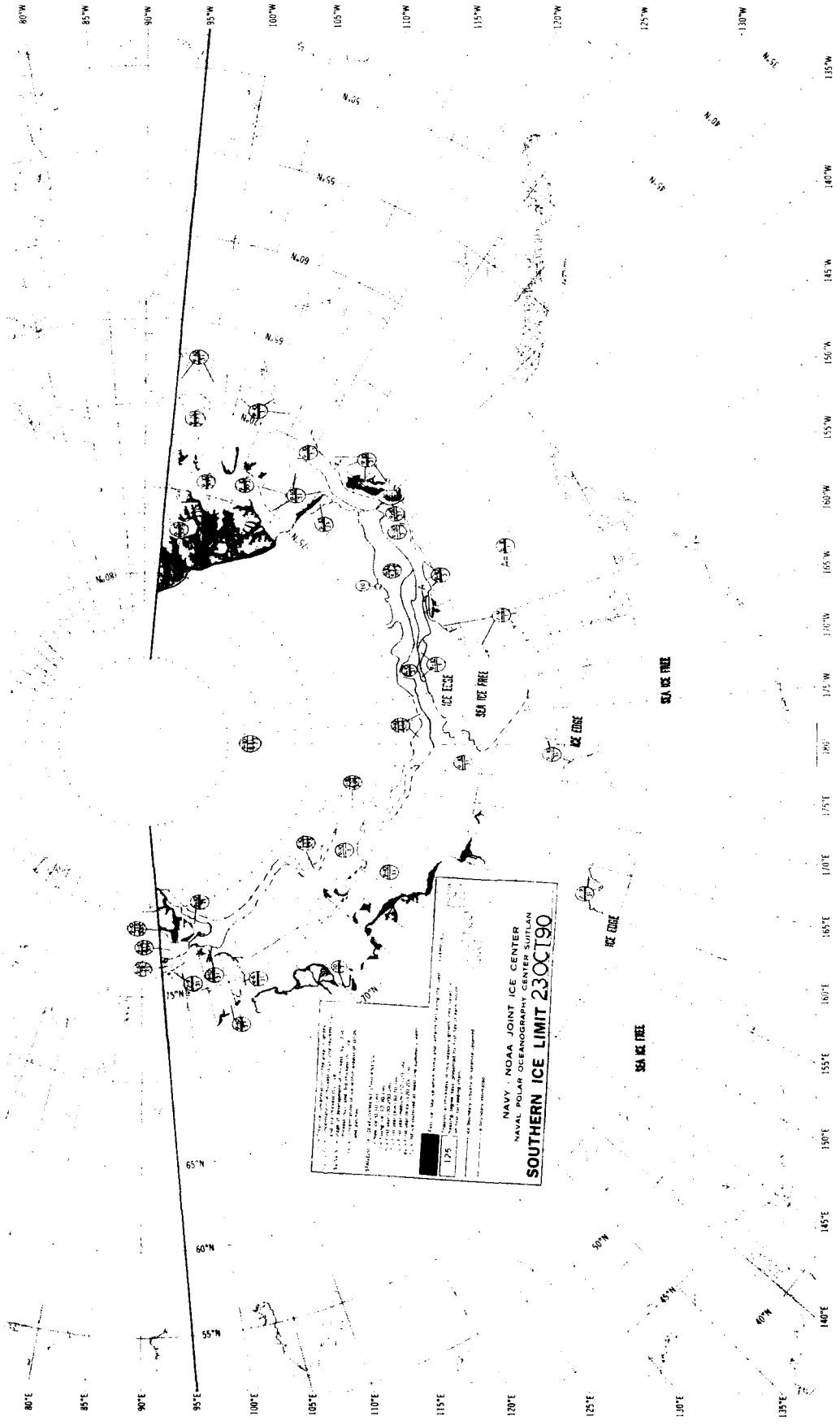
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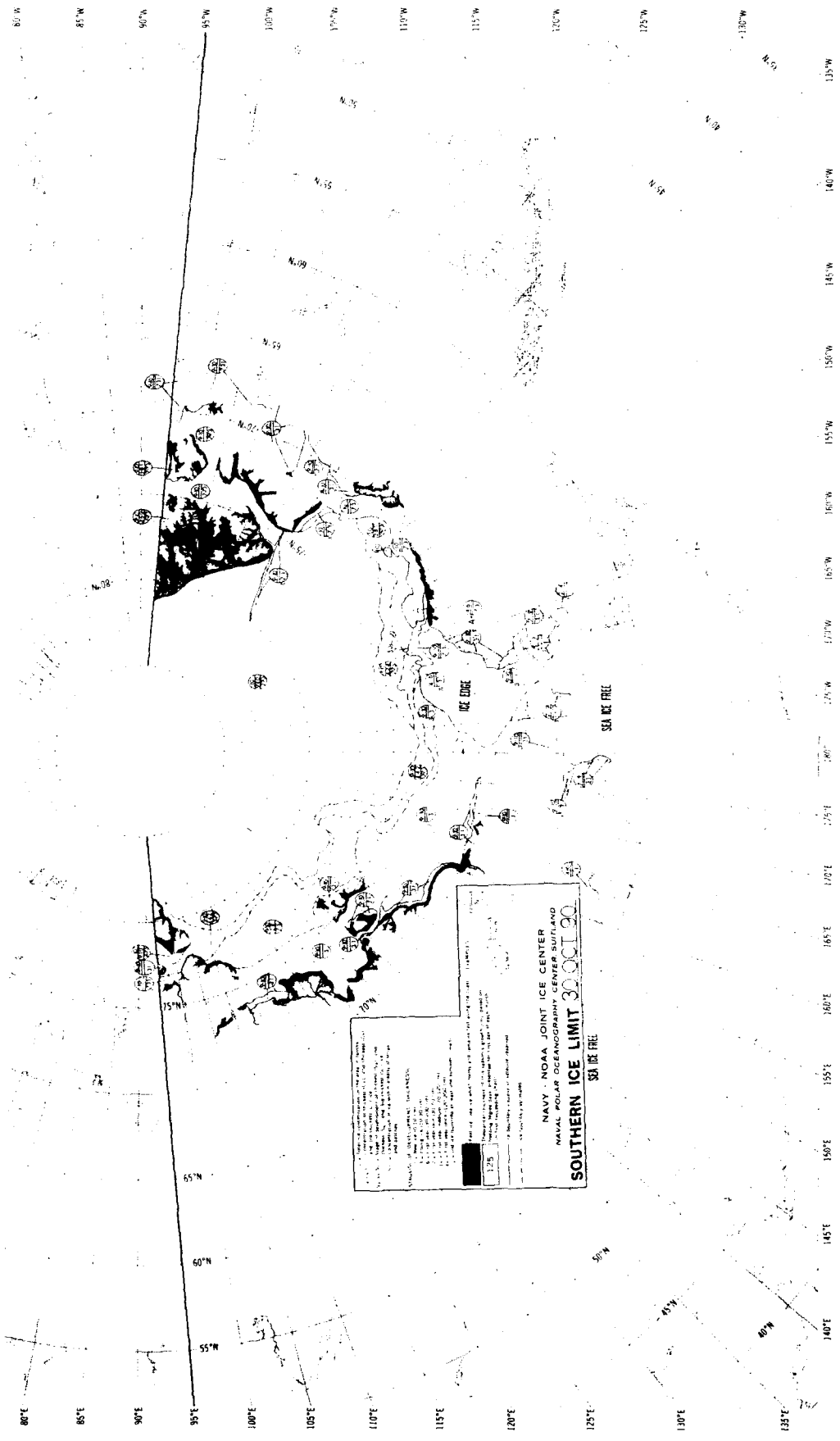
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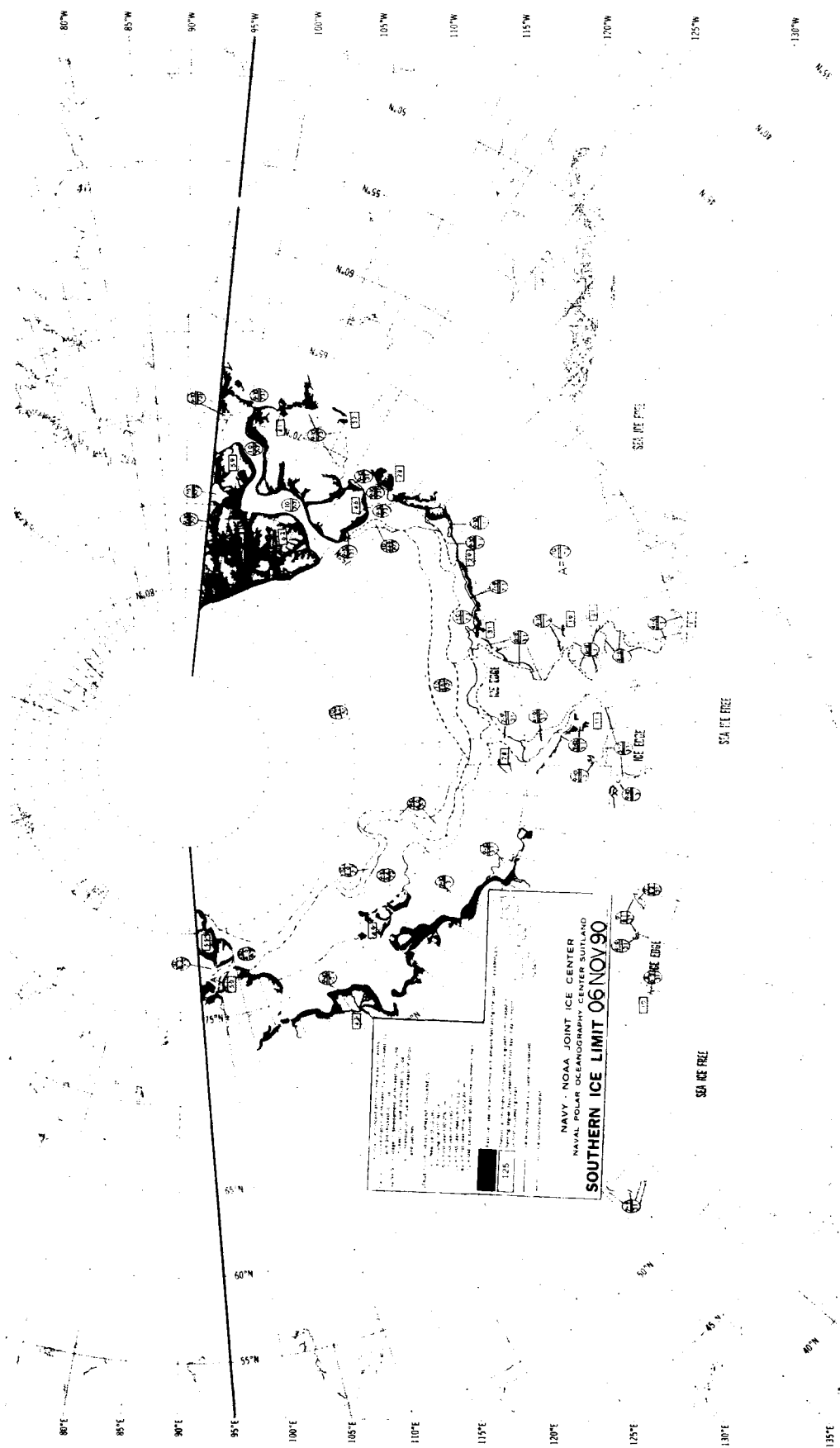
NAVY - NOAA JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAN
SOUTHERN ICE LIMIT 23 OCT 1990

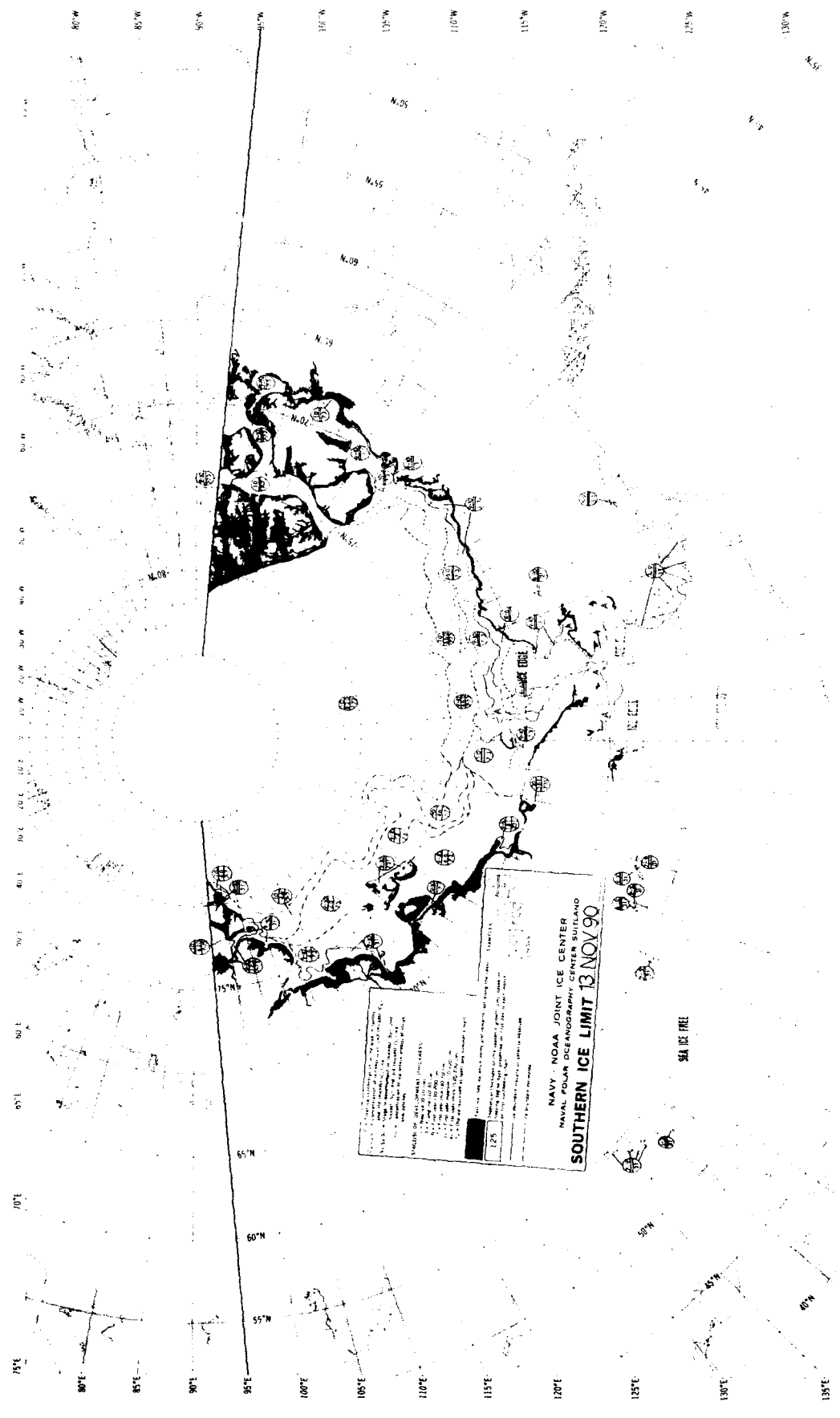
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NAVY - NOAA JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND
 SOUTHERN ICE LIMIT 3000190
 SEA ICE FREE

Scale: 1:25,000
 Vertical Datum: Mean Sea Level
 Horizontal Datum: WGS 84
 Chart No. 125
 Edition: 1980
 Date of Issue: 1980
 Date of Revision: 1980
 Date of Survey: 1980
 Date of Publication: 1980
 Date of Distribution: 1980
 Date of Revision: 1980
 Date of Survey: 1980
 Date of Publication: 1980
 Date of Distribution: 1980





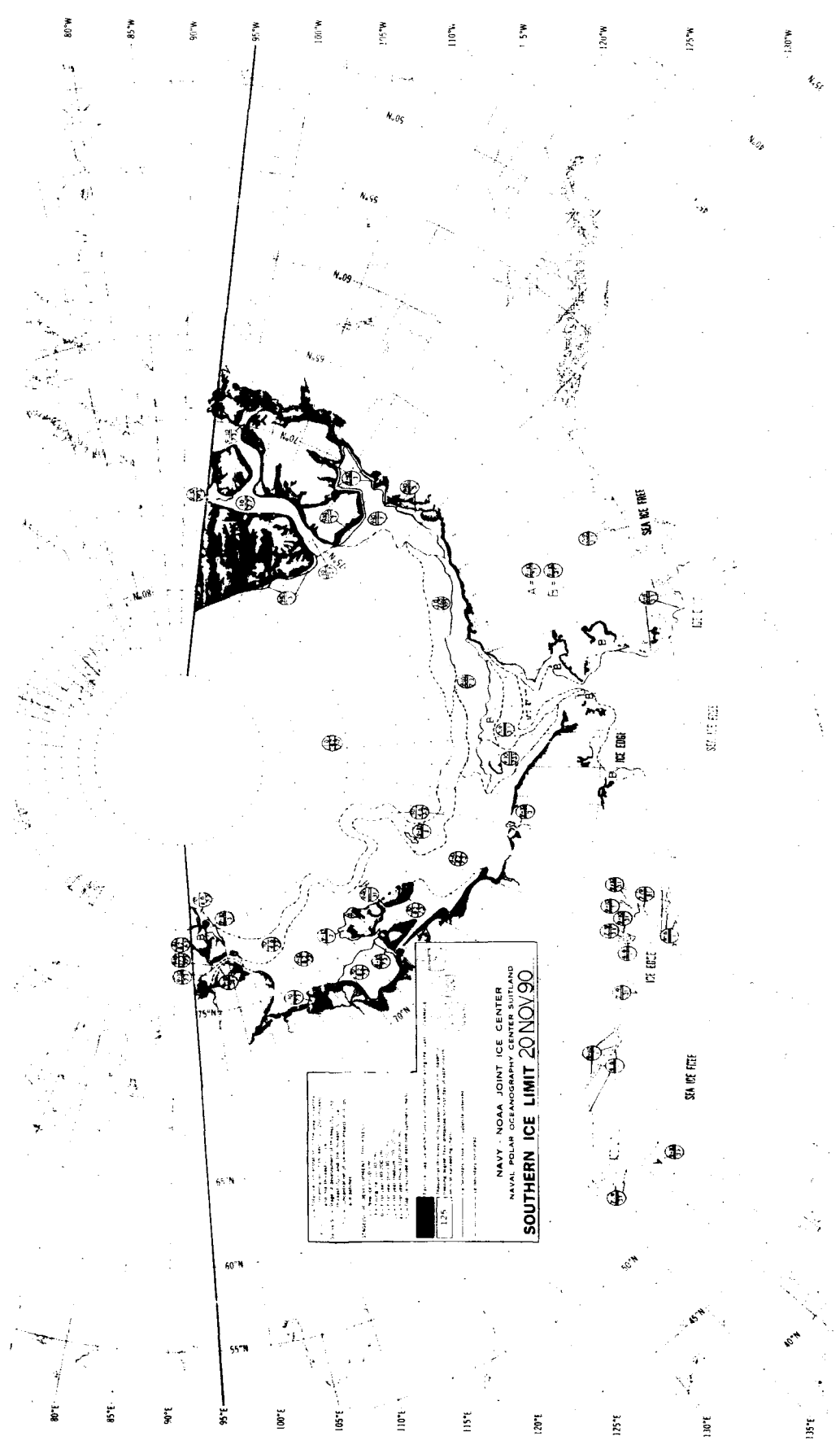
NAVY - NOAA JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND
SOUTHERN ICE LIMIT 13 NOV 90

125

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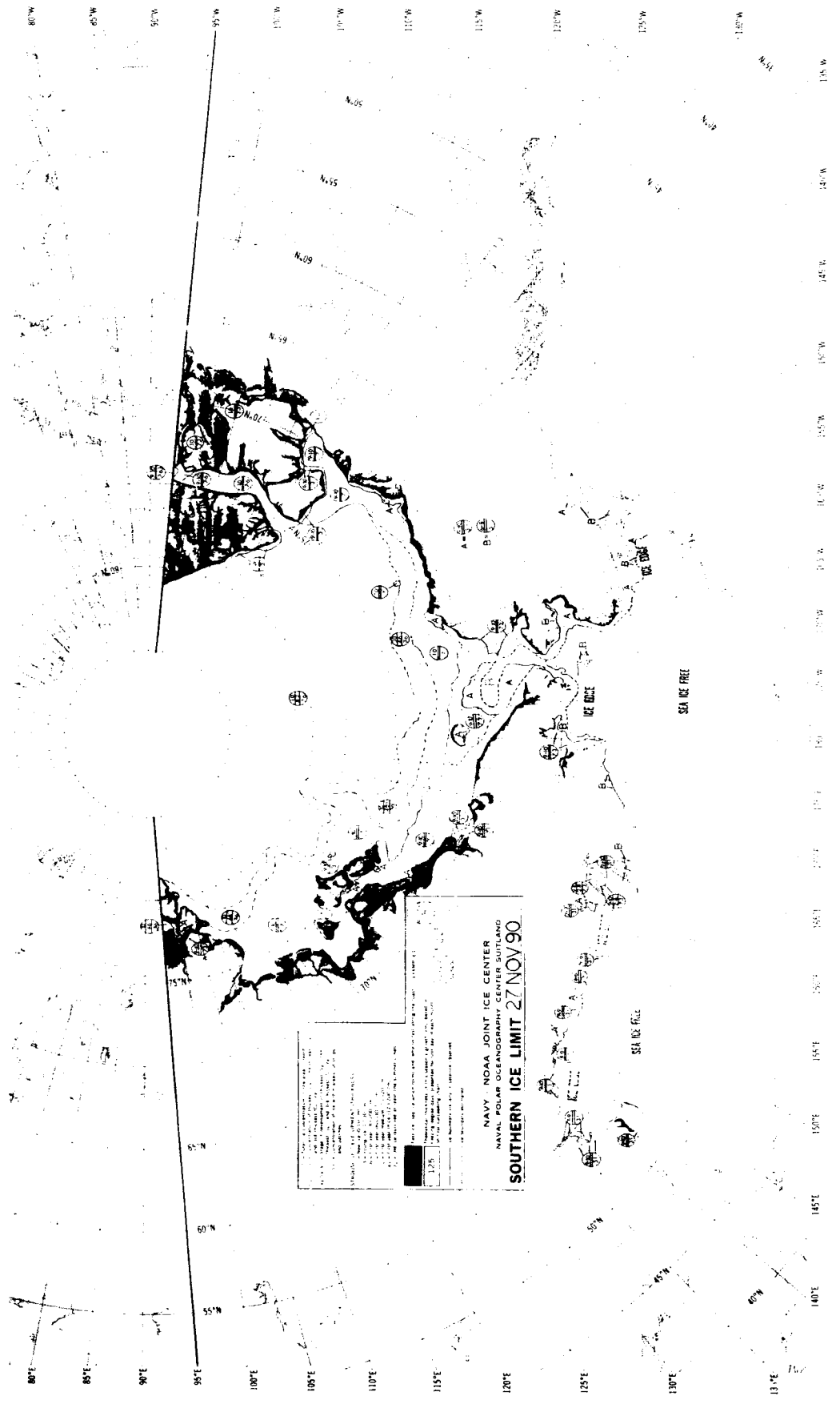
NAVY POLAR OCEANOGRAPHY CENTER SUITLAND
 13 NOV 90

SEA ICE FREE



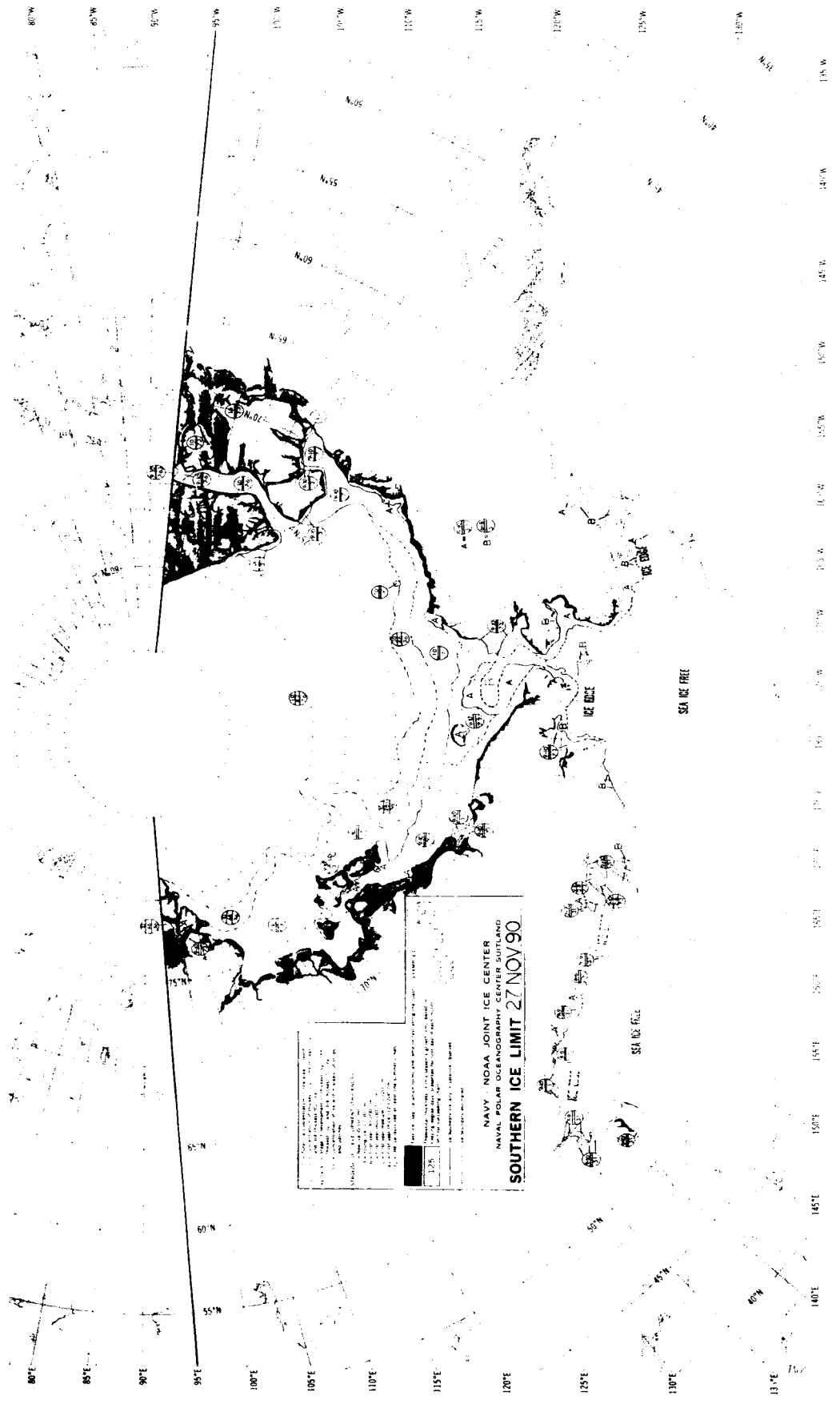
NAVY - NOAA JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPHY CENTER SUTTLAND
SOUTHERN ICE LIMIT 20 NOV 90

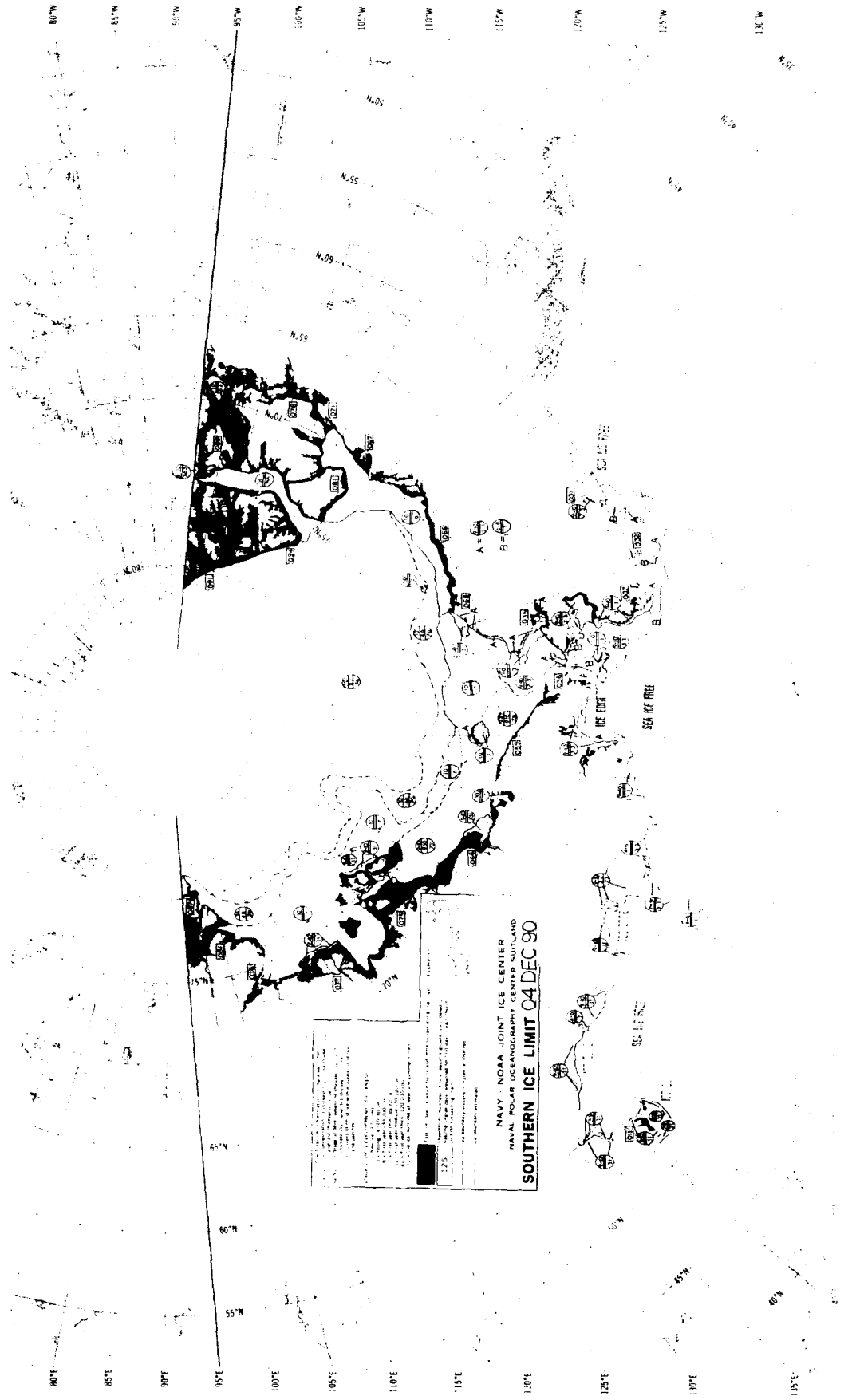
This map shows the Southern Ice Limit (SIL) for the period 20 November 1990. The SIL is defined as the southernmost limit of the ice edge, excluding icebergs and icebergs-in-formation. The map is based on satellite data from the Advanced Very High Resolution Radiometer (AVHRR) and the SeaWiFS instrument. The data was processed by the Navy - NOAA Joint Ice Center and the Naval Polar Oceanography Center Suttland. The map is a composite of several satellite passes and is intended for use in ice navigation and ice management operations.

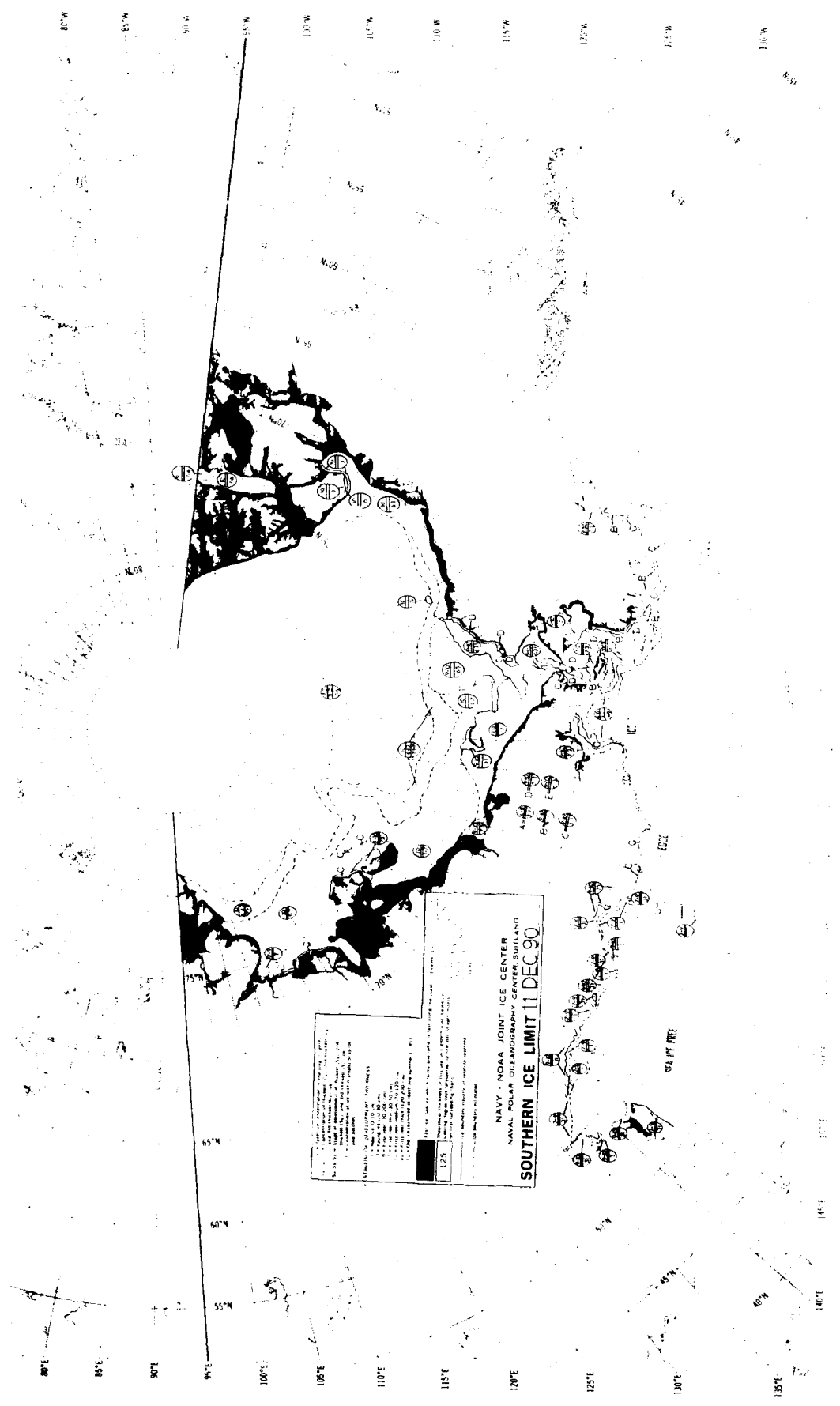


NAVY - NOAA JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPHY CENTER SUTLAND
SOUTHERN ICE LIMIT 27 NOV 90

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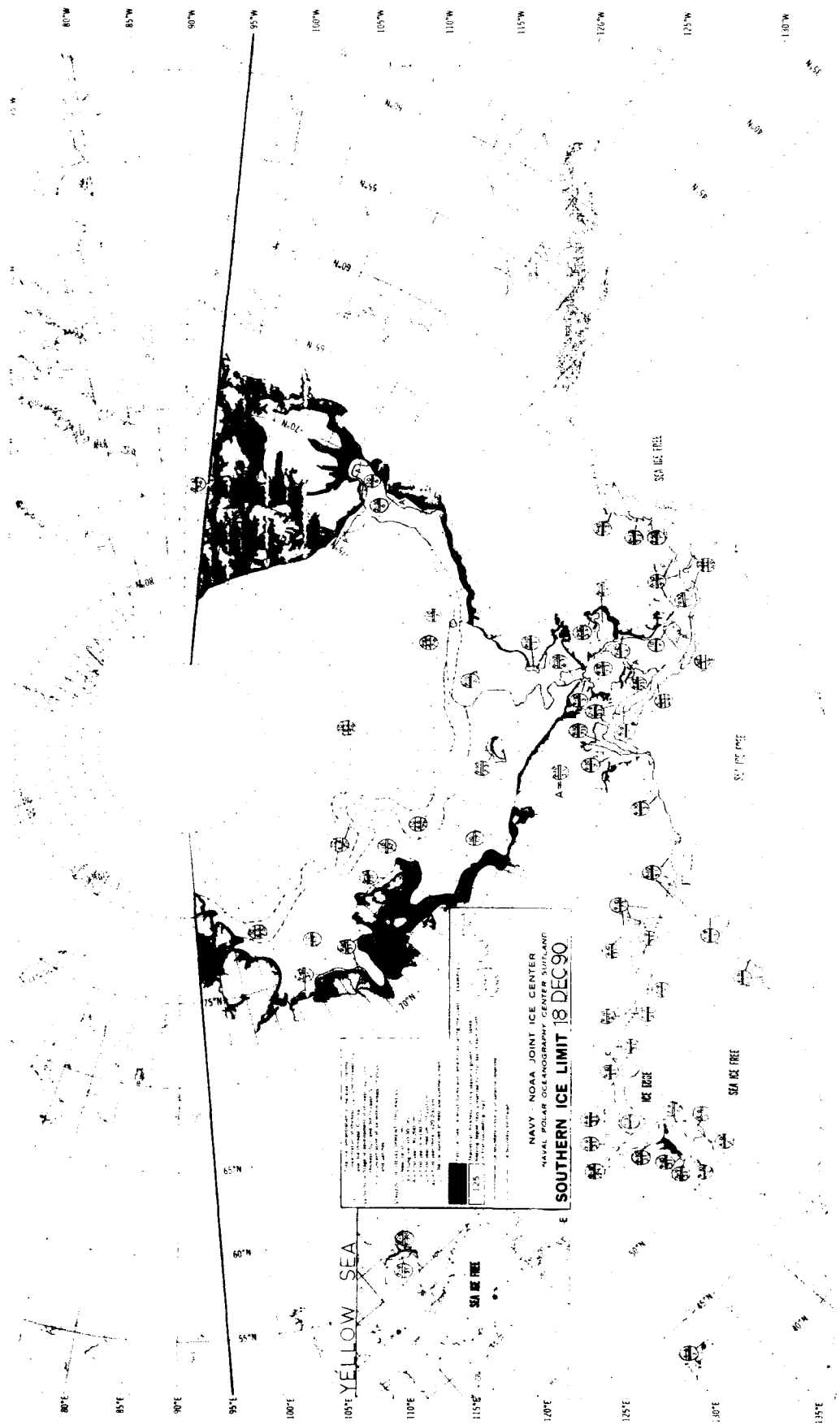


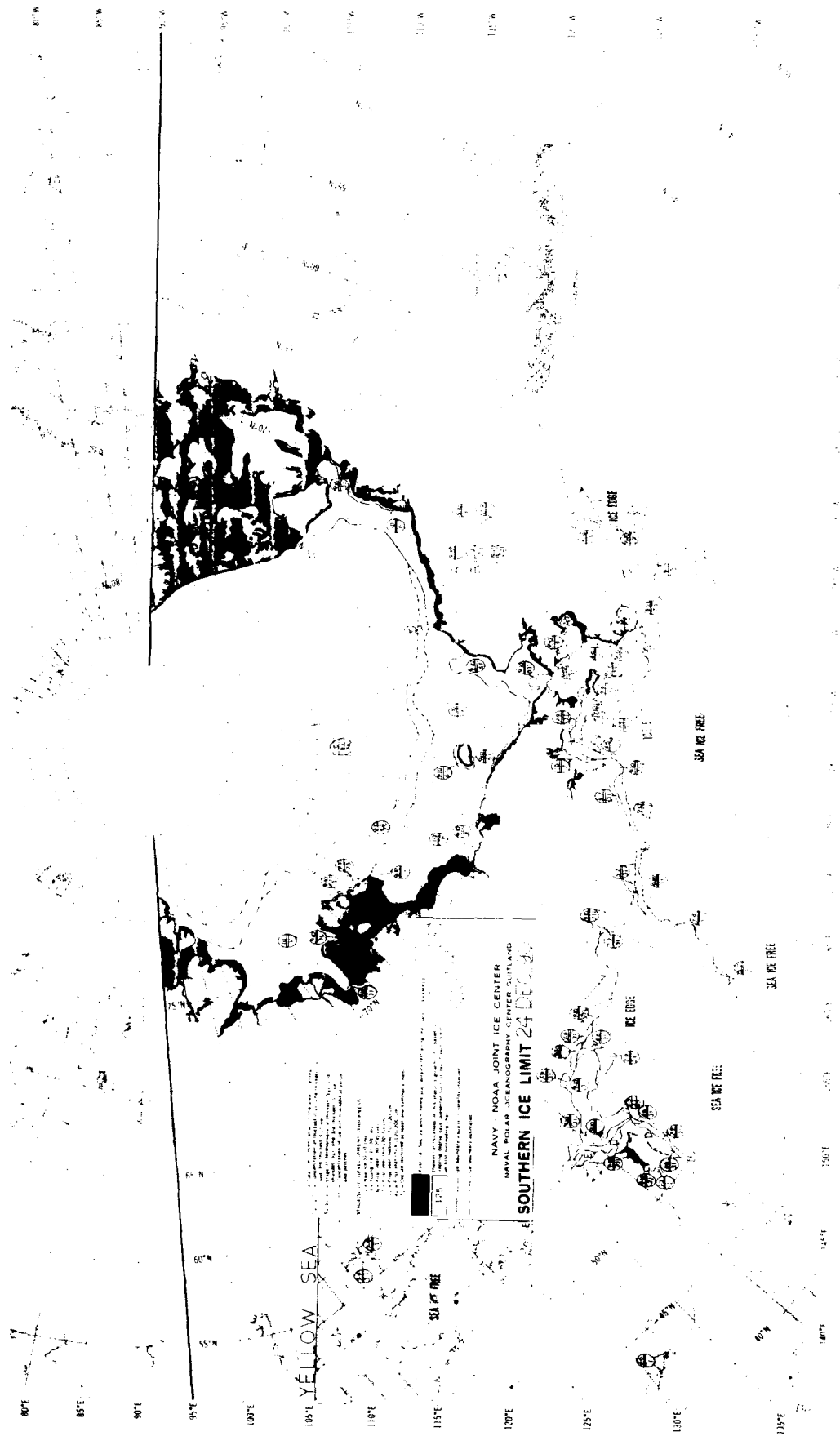
NAVY - NOAA JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPHY CENTER SUDBURY

SOUTHERN ICE LIMIT 11 DEC 90

125

NOAA: 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.



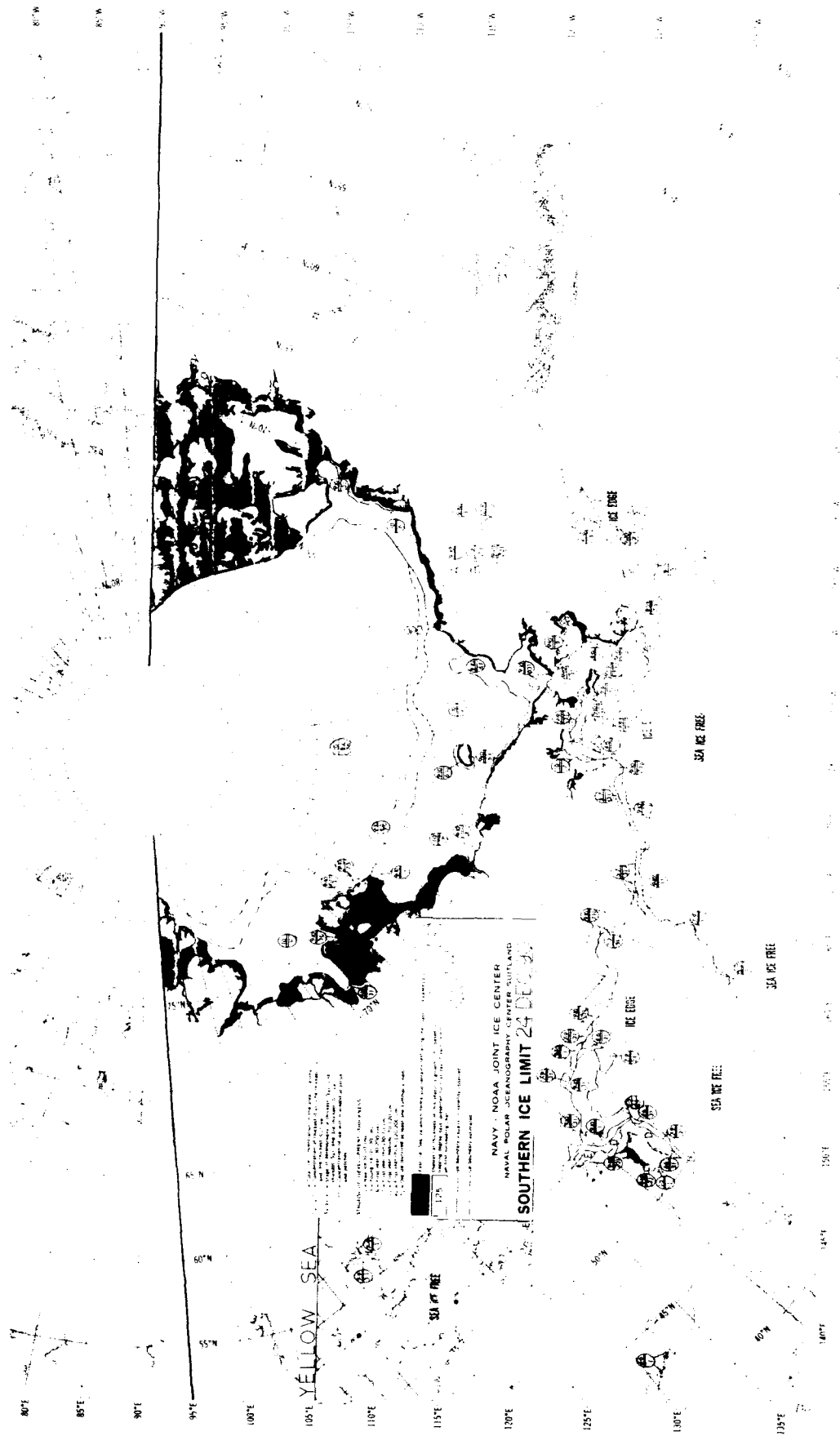


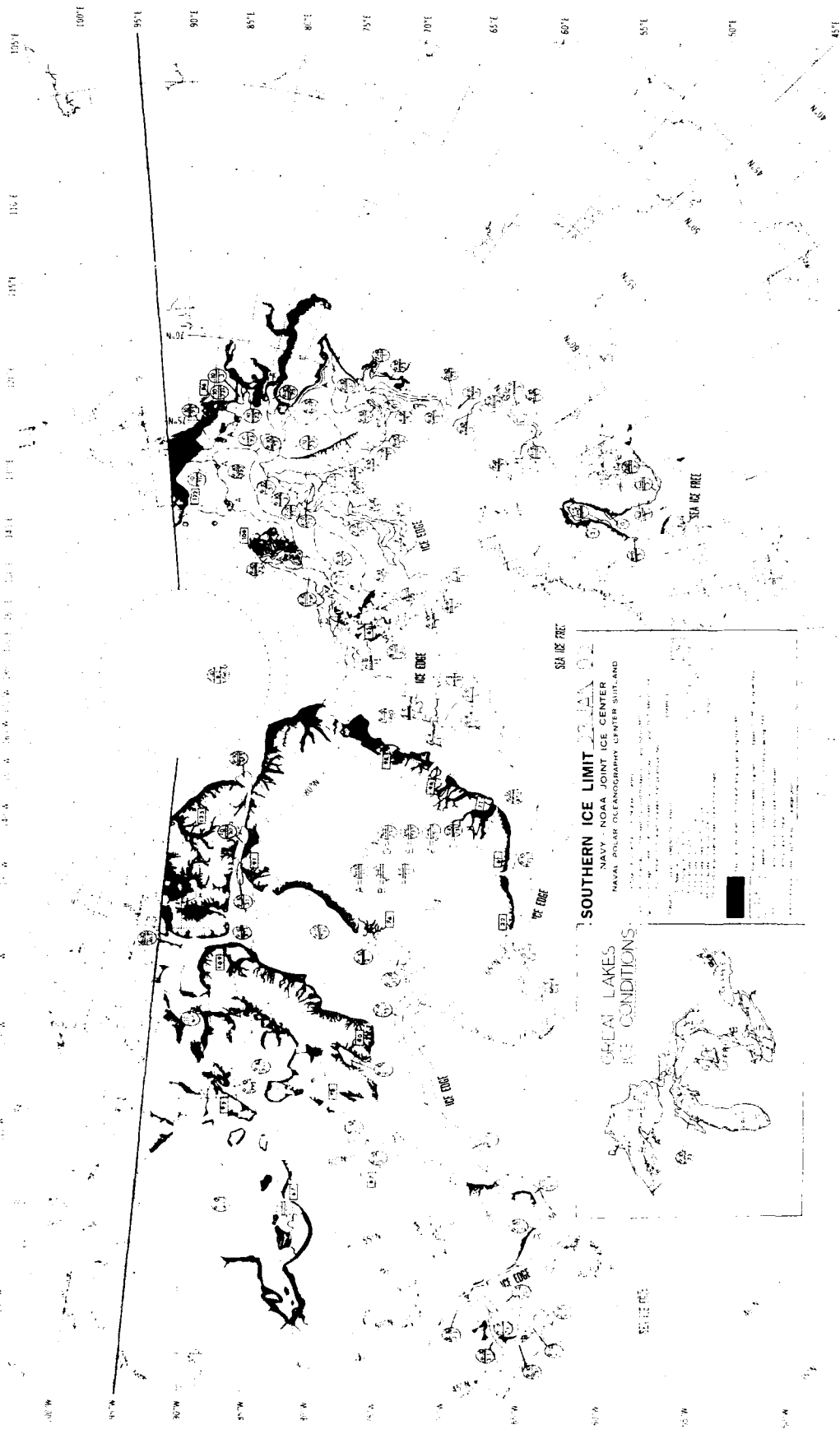
NAVY - NOAA JOINT ICE CENTER
NAVAL POLAR OCEANOGRAPHY CENTER SUTLAND

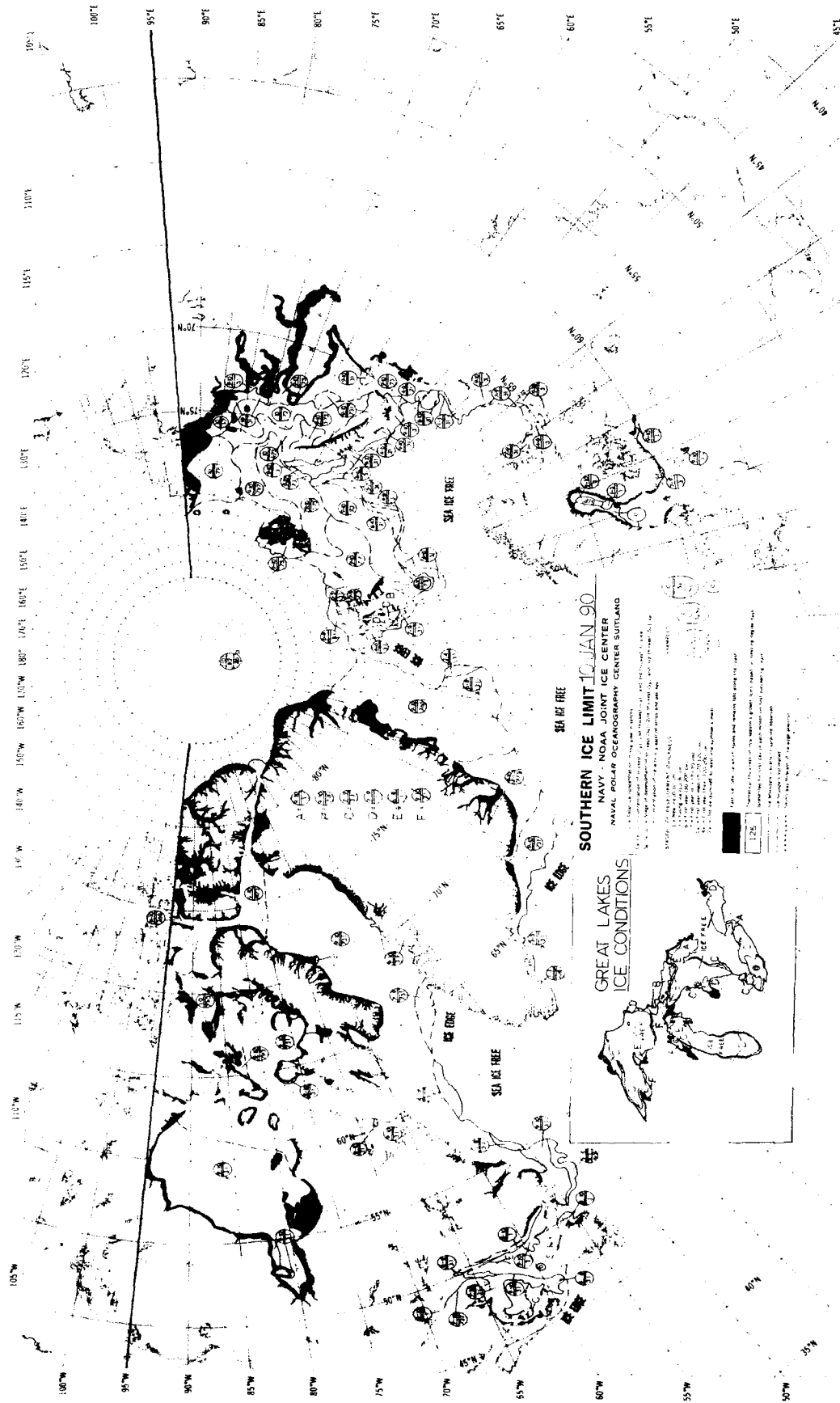
SOUTHERN ICE LIMIT 24 DEC 62

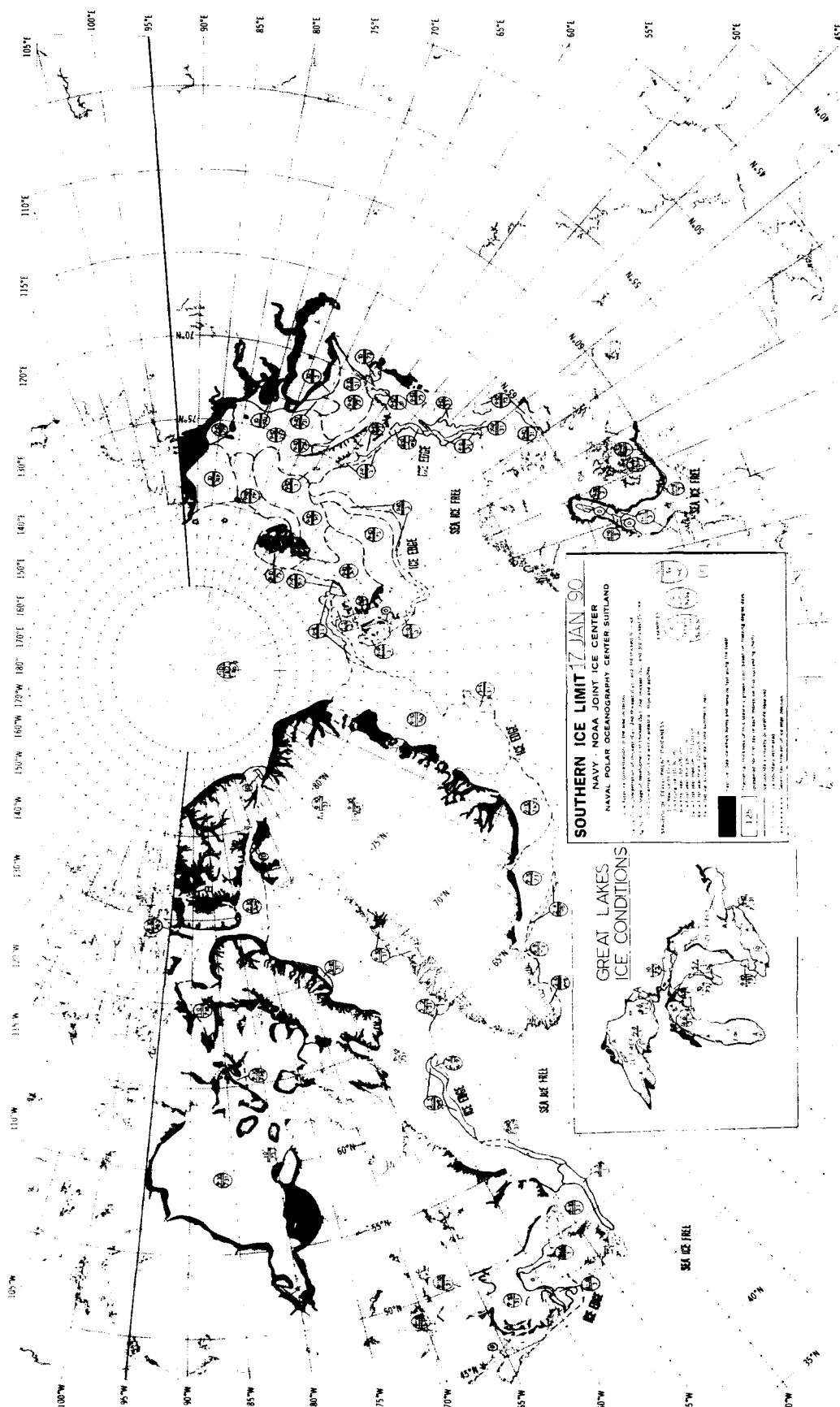
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SOUTHERN ICE LIMIT 17 JAN 90
 NAVY - NOAA JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPHY CENTER SUTHLAND

1. This is a preliminary report of the ice conditions in the Great Lakes region. It is based on the information received from the ice reporting stations and the ice reconnaissance flights. The ice conditions are subject to change and should be used as a guide only. The ice conditions are not guaranteed.

2. The ice conditions are based on the information received from the ice reporting stations and the ice reconnaissance flights. The ice conditions are subject to change and should be used as a guide only. The ice conditions are not guaranteed.

3. The ice conditions are based on the information received from the ice reporting stations and the ice reconnaissance flights. The ice conditions are subject to change and should be used as a guide only. The ice conditions are not guaranteed.

4. The ice conditions are based on the information received from the ice reporting stations and the ice reconnaissance flights. The ice conditions are subject to change and should be used as a guide only. The ice conditions are not guaranteed.

5. The ice conditions are based on the information received from the ice reporting stations and the ice reconnaissance flights. The ice conditions are subject to change and should be used as a guide only. The ice conditions are not guaranteed.

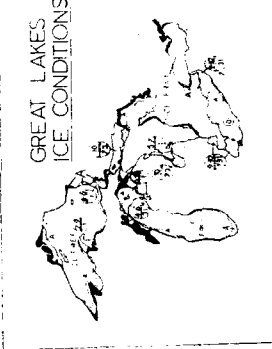
6. The ice conditions are based on the information received from the ice reporting stations and the ice reconnaissance flights. The ice conditions are subject to change and should be used as a guide only. The ice conditions are not guaranteed.

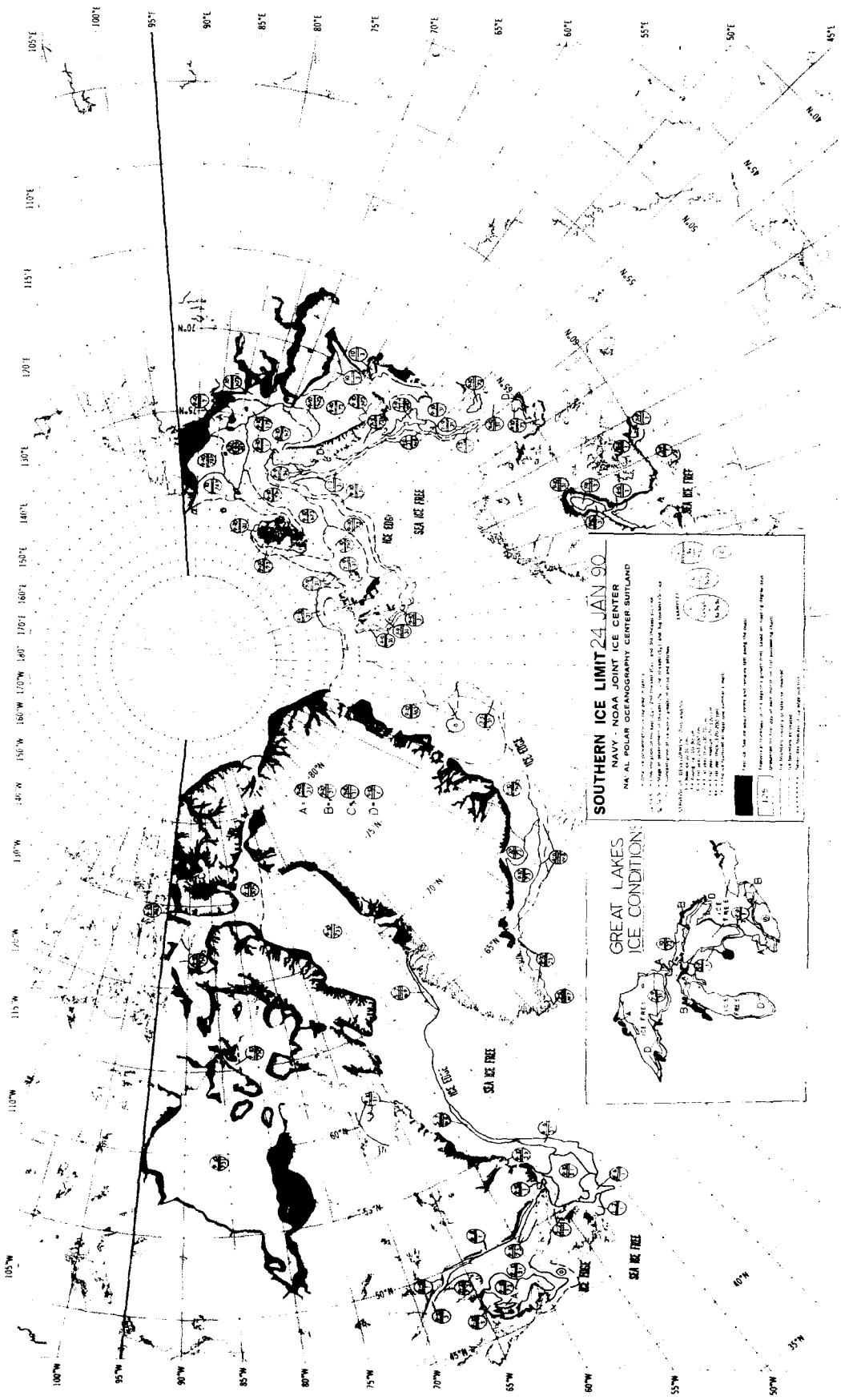
7. The ice conditions are based on the information received from the ice reporting stations and the ice reconnaissance flights. The ice conditions are subject to change and should be used as a guide only. The ice conditions are not guaranteed.

8. The ice conditions are based on the information received from the ice reporting stations and the ice reconnaissance flights. The ice conditions are subject to change and should be used as a guide only. The ice conditions are not guaranteed.

9. The ice conditions are based on the information received from the ice reporting stations and the ice reconnaissance flights. The ice conditions are subject to change and should be used as a guide only. The ice conditions are not guaranteed.

10. The ice conditions are based on the information received from the ice reporting stations and the ice reconnaissance flights. The ice conditions are subject to change and should be used as a guide only. The ice conditions are not guaranteed.





SOUTHERN ICE LIMIT 24 JAN 90

NAVY - NOAA JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPHY CENTER BUTLAND

1. THIS MAP IS A SUMMARY OF THE DATA RECEIVED FROM THE GREAT LAKES ICE SURVEILLANCE SYSTEM (GLISS) AND THE POLAR OCEANOGRAPHY CENTER BUTLAND (POC) ON 24 JANUARY 1990.

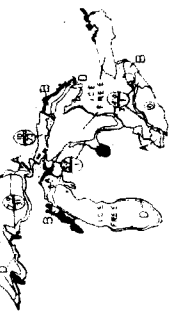
2. THE DATA WAS RECEIVED FROM THE GREAT LAKES ICE SURVEILLANCE SYSTEM (GLISS) AND THE POLAR OCEANOGRAPHY CENTER BUTLAND (POC) ON 24 JANUARY 1990.

3. THE DATA WAS RECEIVED FROM THE GREAT LAKES ICE SURVEILLANCE SYSTEM (GLISS) AND THE POLAR OCEANOGRAPHY CENTER BUTLAND (POC) ON 24 JANUARY 1990.

4. THE DATA WAS RECEIVED FROM THE GREAT LAKES ICE SURVEILLANCE SYSTEM (GLISS) AND THE POLAR OCEANOGRAPHY CENTER BUTLAND (POC) ON 24 JANUARY 1990.

5. THE DATA WAS RECEIVED FROM THE GREAT LAKES ICE SURVEILLANCE SYSTEM (GLISS) AND THE POLAR OCEANOGRAPHY CENTER BUTLAND (POC) ON 24 JANUARY 1990.

**GREAT LAKES
 ICE CONDITION:**



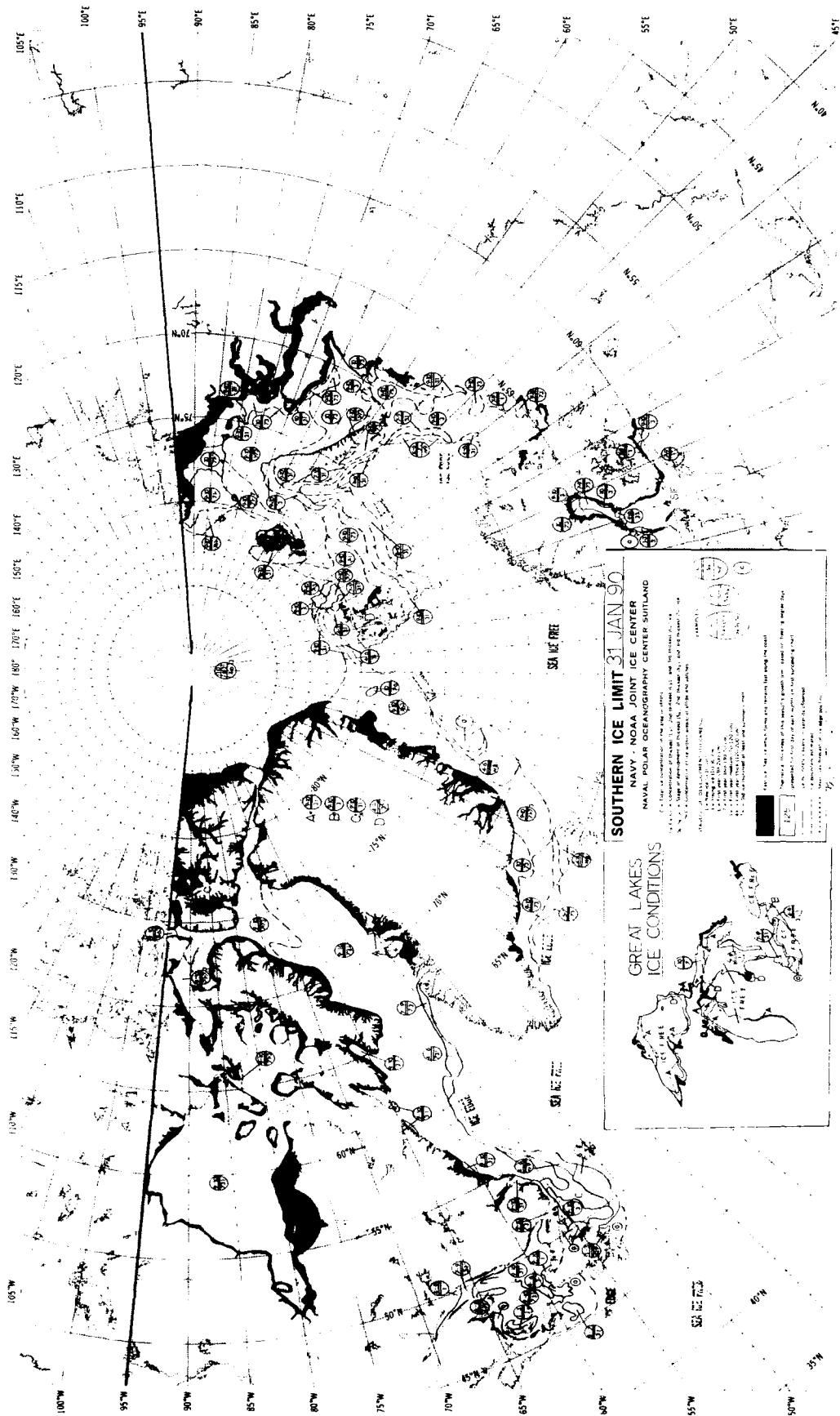
1. THIS MAP IS A SUMMARY OF THE DATA RECEIVED FROM THE GREAT LAKES ICE SURVEILLANCE SYSTEM (GLISS) AND THE POLAR OCEANOGRAPHY CENTER BUTLAND (POC) ON 24 JANUARY 1990.

2. THE DATA WAS RECEIVED FROM THE GREAT LAKES ICE SURVEILLANCE SYSTEM (GLISS) AND THE POLAR OCEANOGRAPHY CENTER BUTLAND (POC) ON 24 JANUARY 1990.

3. THE DATA WAS RECEIVED FROM THE GREAT LAKES ICE SURVEILLANCE SYSTEM (GLISS) AND THE POLAR OCEANOGRAPHY CENTER BUTLAND (POC) ON 24 JANUARY 1990.

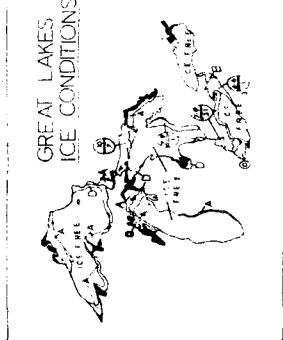
4. THE DATA WAS RECEIVED FROM THE GREAT LAKES ICE SURVEILLANCE SYSTEM (GLISS) AND THE POLAR OCEANOGRAPHY CENTER BUTLAND (POC) ON 24 JANUARY 1990.

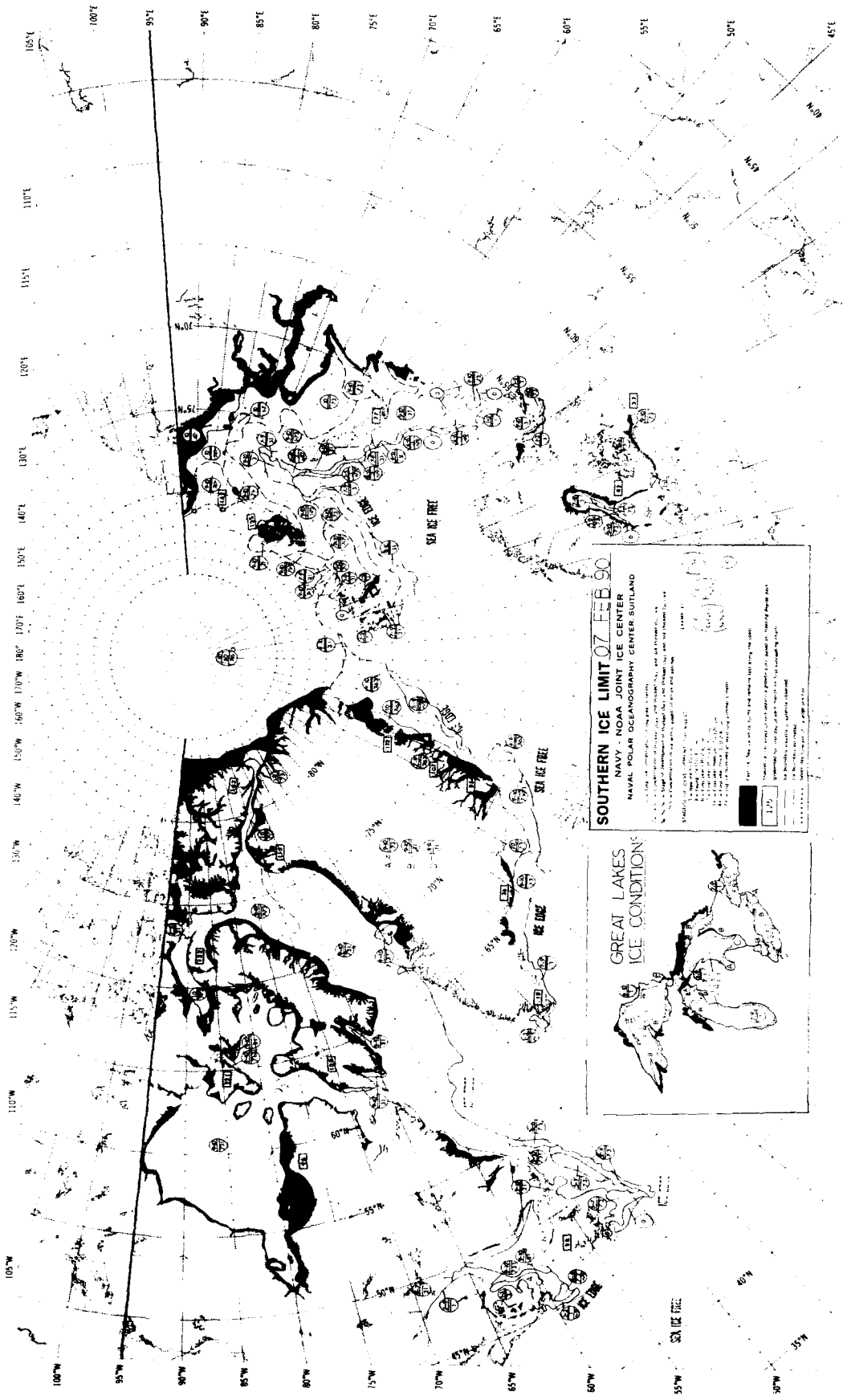
5. THE DATA WAS RECEIVED FROM THE GREAT LAKES ICE SURVEILLANCE SYSTEM (GLISS) AND THE POLAR OCEANOGRAPHY CENTER BUTLAND (POC) ON 24 JANUARY 1990.



SOUTHERN ICE LIMIT 31 JAN 90
 NAVY - NOAA JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND

1. Data is unclassified and not for release.
 2. Data is the property of the Department of Defense and is loaned to you.
 3. This is a reproduction of the original data and is not to be used for any other purpose.
 4. This data is for informational purposes only and does not constitute a forecast.
 5. This data is for informational purposes only and does not constitute a forecast.
 6. This data is for informational purposes only and does not constitute a forecast.
 7. This data is for informational purposes only and does not constitute a forecast.
 8. This data is for informational purposes only and does not constitute a forecast.
 9. This data is for informational purposes only and does not constitute a forecast.
 10. This data is for informational purposes only and does not constitute a forecast.





SOUTHERN ICE LIMIT 07 FEB 90
 NAVY, NORDA JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPHY CENTER, SUTCLAND

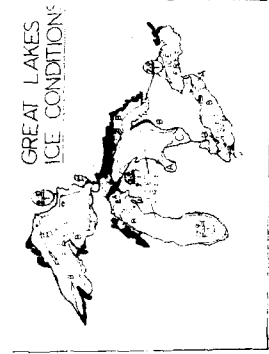
1. This chart shows the ice limit for the period 07 FEB 90. The ice limit is defined as the outer edge of the ice pack. The ice limit is shown as a solid line. The ice limit is shown as a dashed line when the ice is broken up. The ice limit is shown as a dotted line when the ice is thin. The ice limit is shown as a dash-dot line when the ice is thin and broken up.

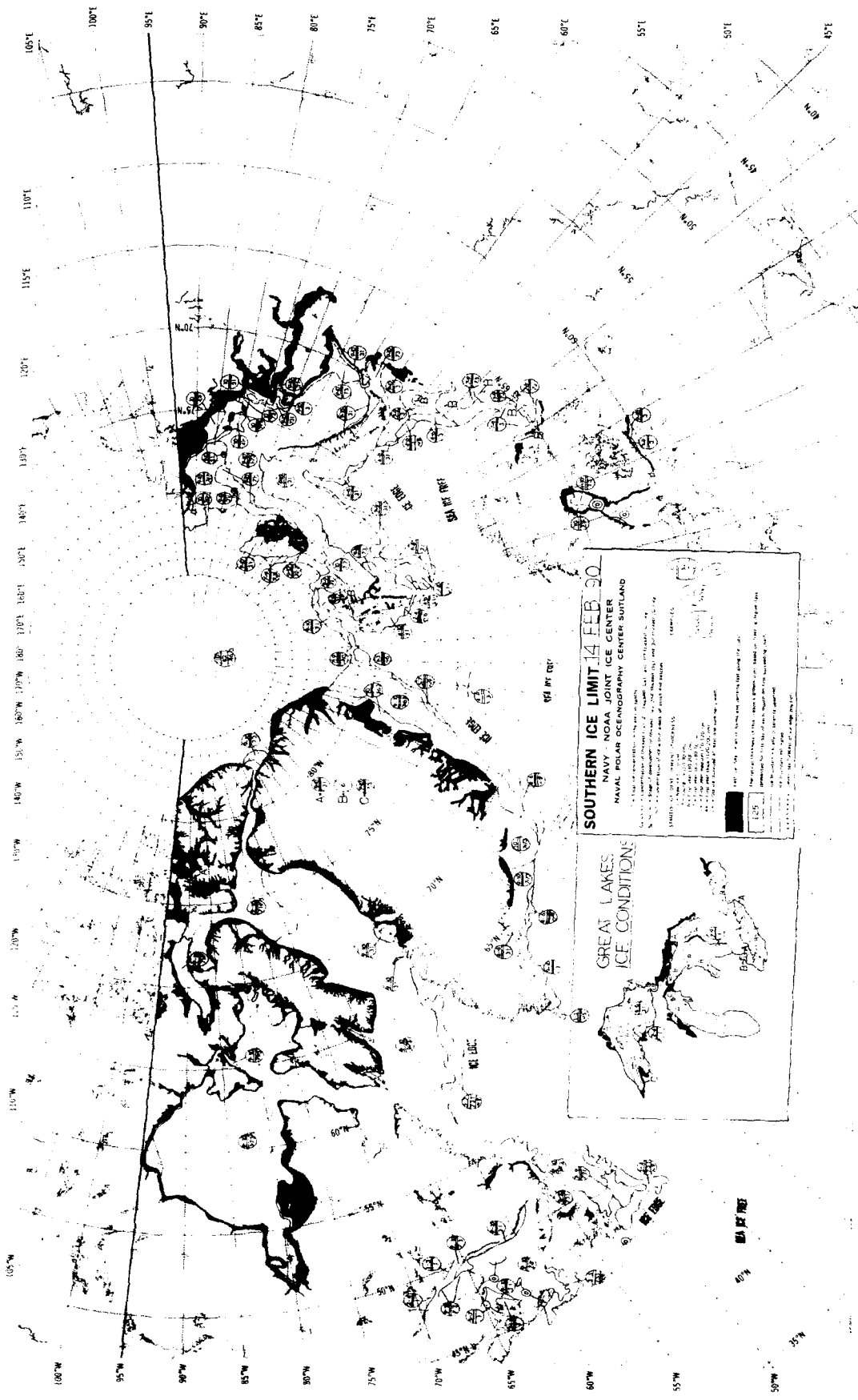
2. The ice limit is shown as a solid line when the ice is continuous. The ice limit is shown as a dashed line when the ice is broken up. The ice limit is shown as a dotted line when the ice is thin. The ice limit is shown as a dash-dot line when the ice is thin and broken up.

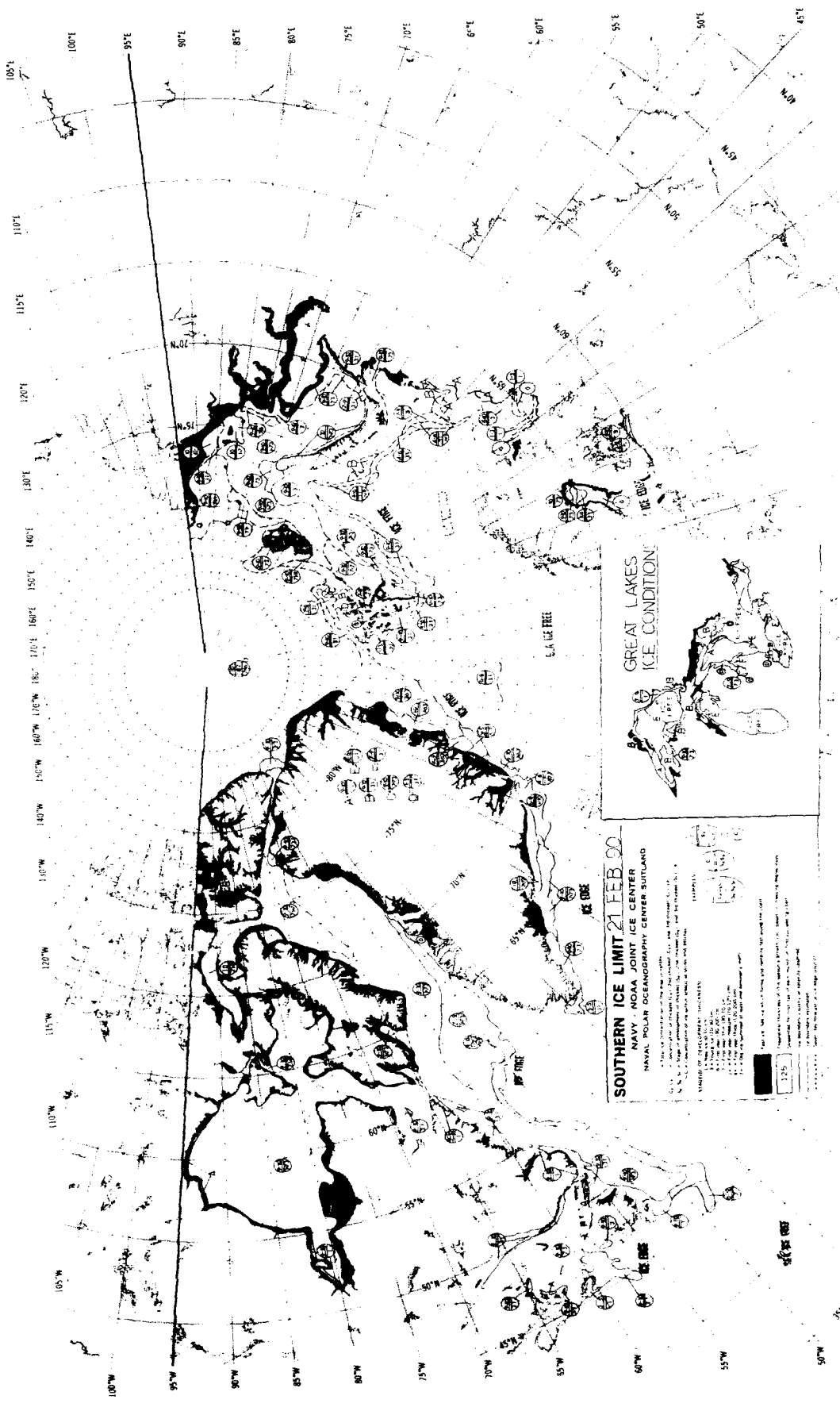
3. The ice limit is shown as a solid line when the ice is continuous. The ice limit is shown as a dashed line when the ice is broken up. The ice limit is shown as a dotted line when the ice is thin. The ice limit is shown as a dash-dot line when the ice is thin and broken up.

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

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







GREAT LAKES
ICE CONDITION

SOUTHERN ICE LIMIT 21 FEB 00

NAVY - NOAA JOINT ICE CENTER
NAVAL POLAR OCEANOGRAPHY CENTER BUTLAND

1. This map shows the location of the ice limit for the Great Lakes region on 21 February 2000. The ice limit is defined as the location of the ice edge, which is the boundary between open water and ice. The ice limit is shown as a solid line. The area to the north of the ice limit is covered by ice. The area to the south of the ice limit is open water. The ice limit is shown for the Great Lakes region, including Lake Superior, Lake Michigan, Lake Huron, Lake Erie, and Lake Ontario.

2. The ice limit is shown for the Great Lakes region, including Lake Superior, Lake Michigan, Lake Huron, Lake Erie, and Lake Ontario. The ice limit is shown as a solid line. The area to the north of the ice limit is covered by ice. The area to the south of the ice limit is open water. The ice limit is shown for the Great Lakes region, including Lake Superior, Lake Michigan, Lake Huron, Lake Erie, and Lake Ontario.

3. The ice limit is shown for the Great Lakes region, including Lake Superior, Lake Michigan, Lake Huron, Lake Erie, and Lake Ontario. The ice limit is shown as a solid line. The area to the north of the ice limit is covered by ice. The area to the south of the ice limit is open water. The ice limit is shown for the Great Lakes region, including Lake Superior, Lake Michigan, Lake Huron, Lake Erie, and Lake Ontario.

4. The ice limit is shown for the Great Lakes region, including Lake Superior, Lake Michigan, Lake Huron, Lake Erie, and Lake Ontario. The ice limit is shown as a solid line. The area to the north of the ice limit is covered by ice. The area to the south of the ice limit is open water. The ice limit is shown for the Great Lakes region, including Lake Superior, Lake Michigan, Lake Huron, Lake Erie, and Lake Ontario.

5. The ice limit is shown for the Great Lakes region, including Lake Superior, Lake Michigan, Lake Huron, Lake Erie, and Lake Ontario. The ice limit is shown as a solid line. The area to the north of the ice limit is covered by ice. The area to the south of the ice limit is open water. The ice limit is shown for the Great Lakes region, including Lake Superior, Lake Michigan, Lake Huron, Lake Erie, and Lake Ontario.

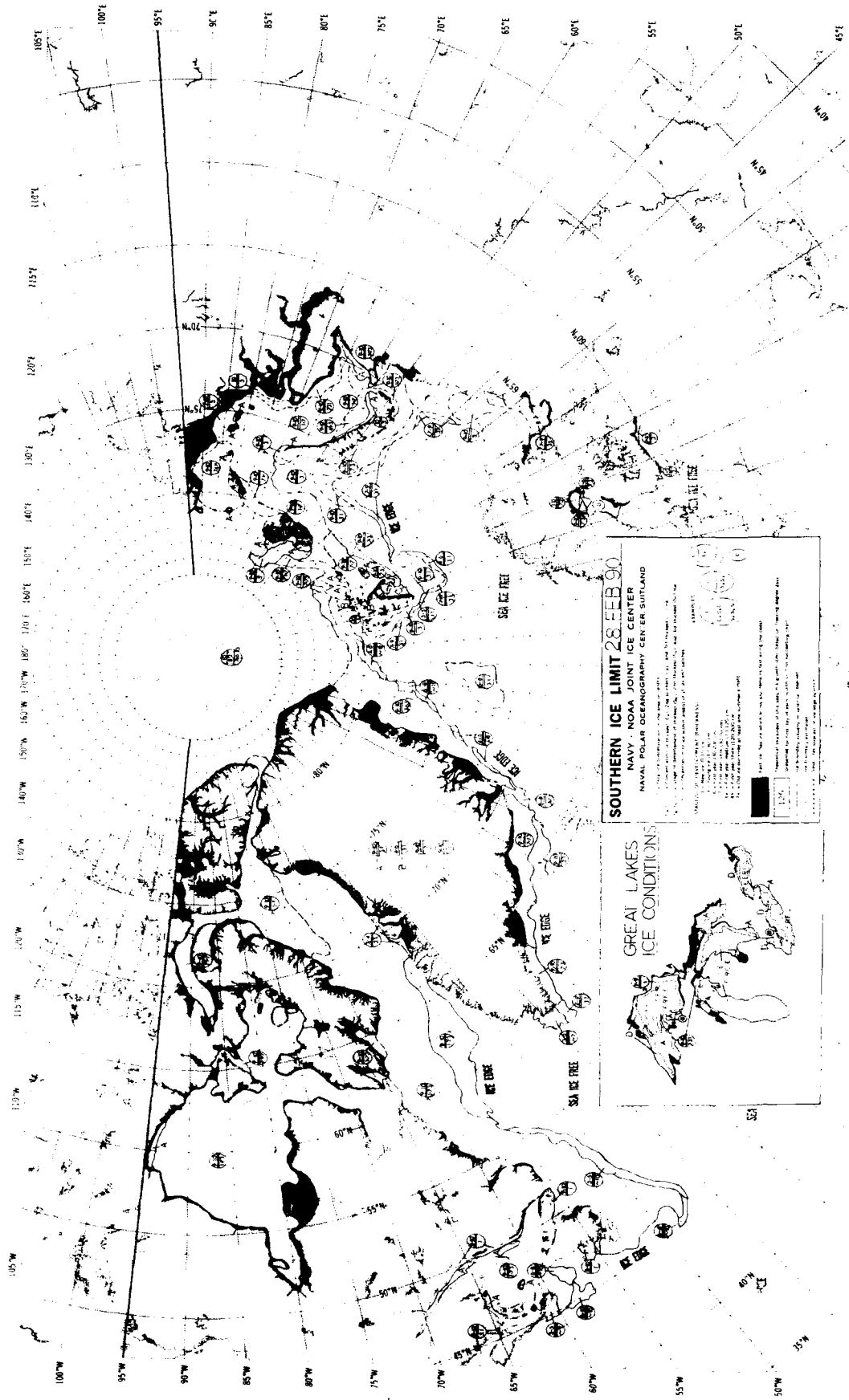
6. The ice limit is shown for the Great Lakes region, including Lake Superior, Lake Michigan, Lake Huron, Lake Erie, and Lake Ontario. The ice limit is shown as a solid line. The area to the north of the ice limit is covered by ice. The area to the south of the ice limit is open water. The ice limit is shown for the Great Lakes region, including Lake Superior, Lake Michigan, Lake Huron, Lake Erie, and Lake Ontario.

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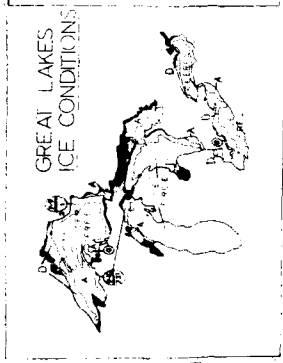
9. The ice limit is shown for the Great Lakes region, including Lake Superior, Lake Michigan, Lake Huron, Lake Erie, and Lake Ontario. The ice limit is shown as a solid line. The area to the north of the ice limit is covered by ice. The area to the south of the ice limit is open water. The ice limit is shown for the Great Lakes region, including Lake Superior, Lake Michigan, Lake Huron, Lake Erie, and Lake Ontario.

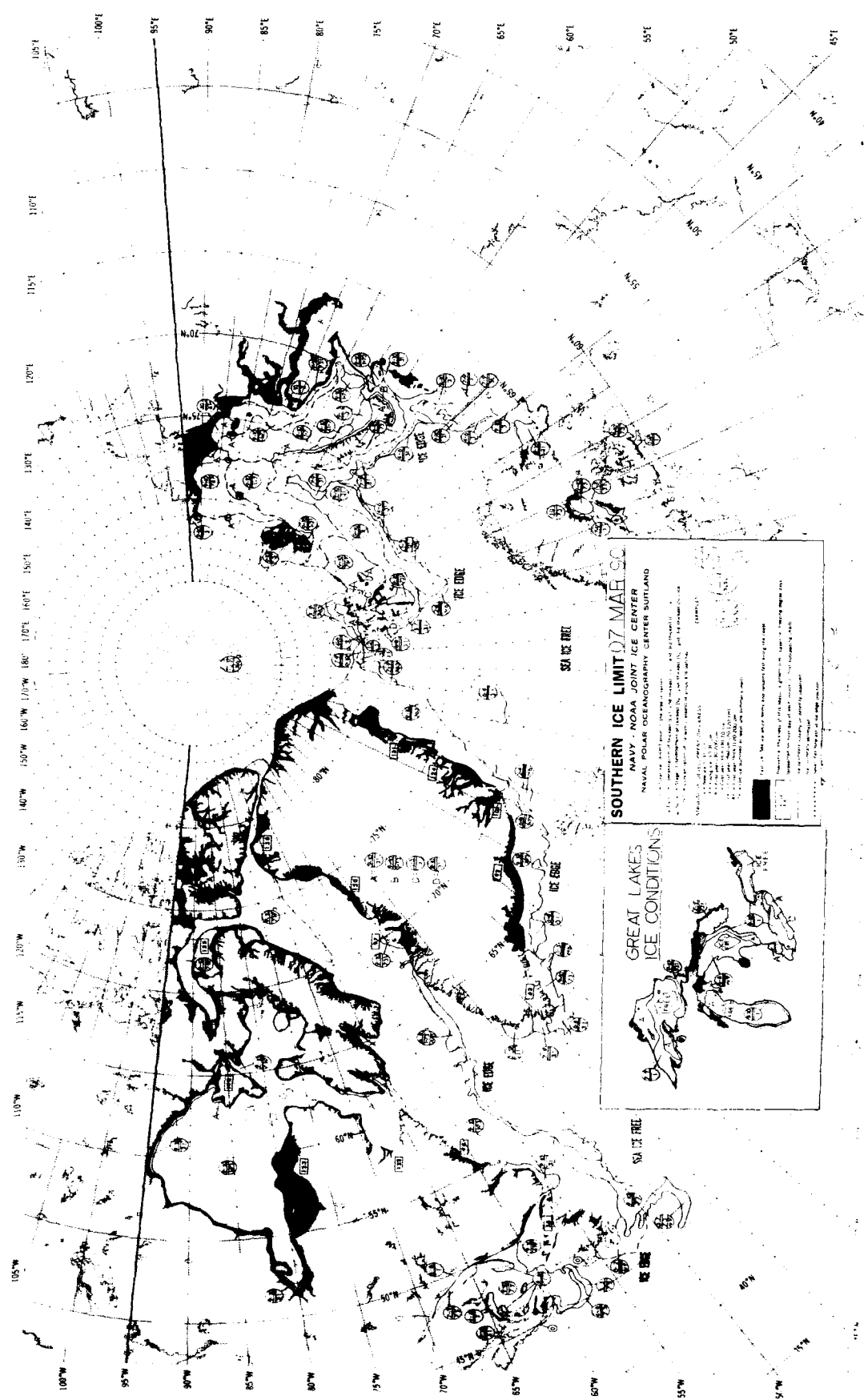
10. The ice limit is shown for the Great Lakes region, including Lake Superior, Lake Michigan, Lake Huron, Lake Erie, and Lake Ontario. The ice limit is shown as a solid line. The area to the north of the ice limit is covered by ice. The area to the south of the ice limit is open water. The ice limit is shown for the Great Lakes region, including Lake Superior, Lake Michigan, Lake Huron, Lake Erie, and Lake Ontario.



SOUTHERN ICE LIMIT 28 FEB 90
 NAVY - NOAA JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND

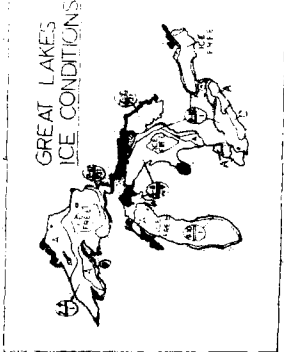
1. This chart is a composite of data from various sources and is not intended for navigation.
 2. The data is current as of the date of publication.
 3. The data is subject to change without notice.
 4. The data is provided for informational purposes only.
 5. The data is not to be used for any purpose other than that for which it was intended.
 6. The data is not to be used for any purpose other than that for which it was intended.
 7. The data is not to be used for any purpose other than that for which it was intended.
 8. The data is not to be used for any purpose other than that for which it was intended.
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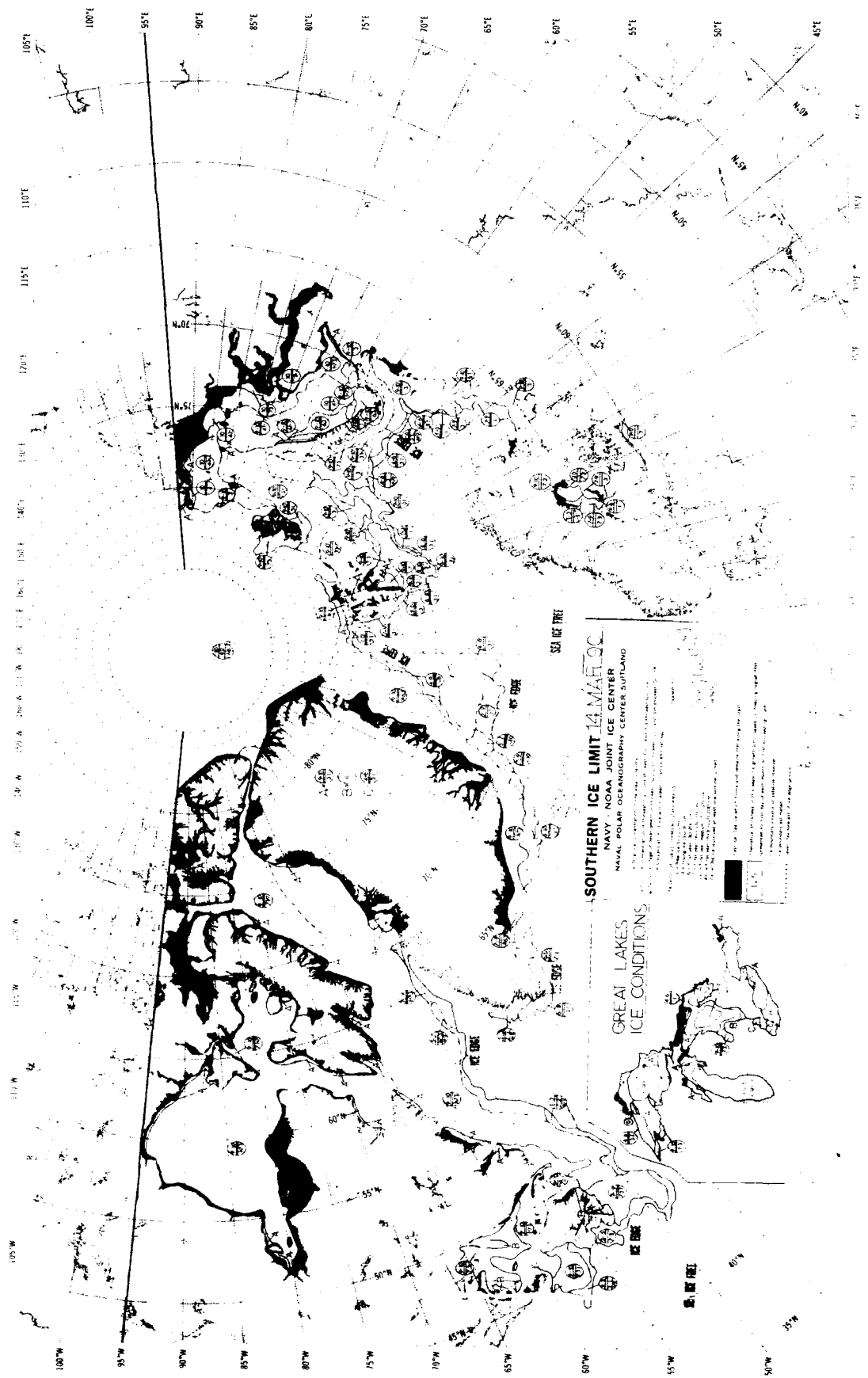


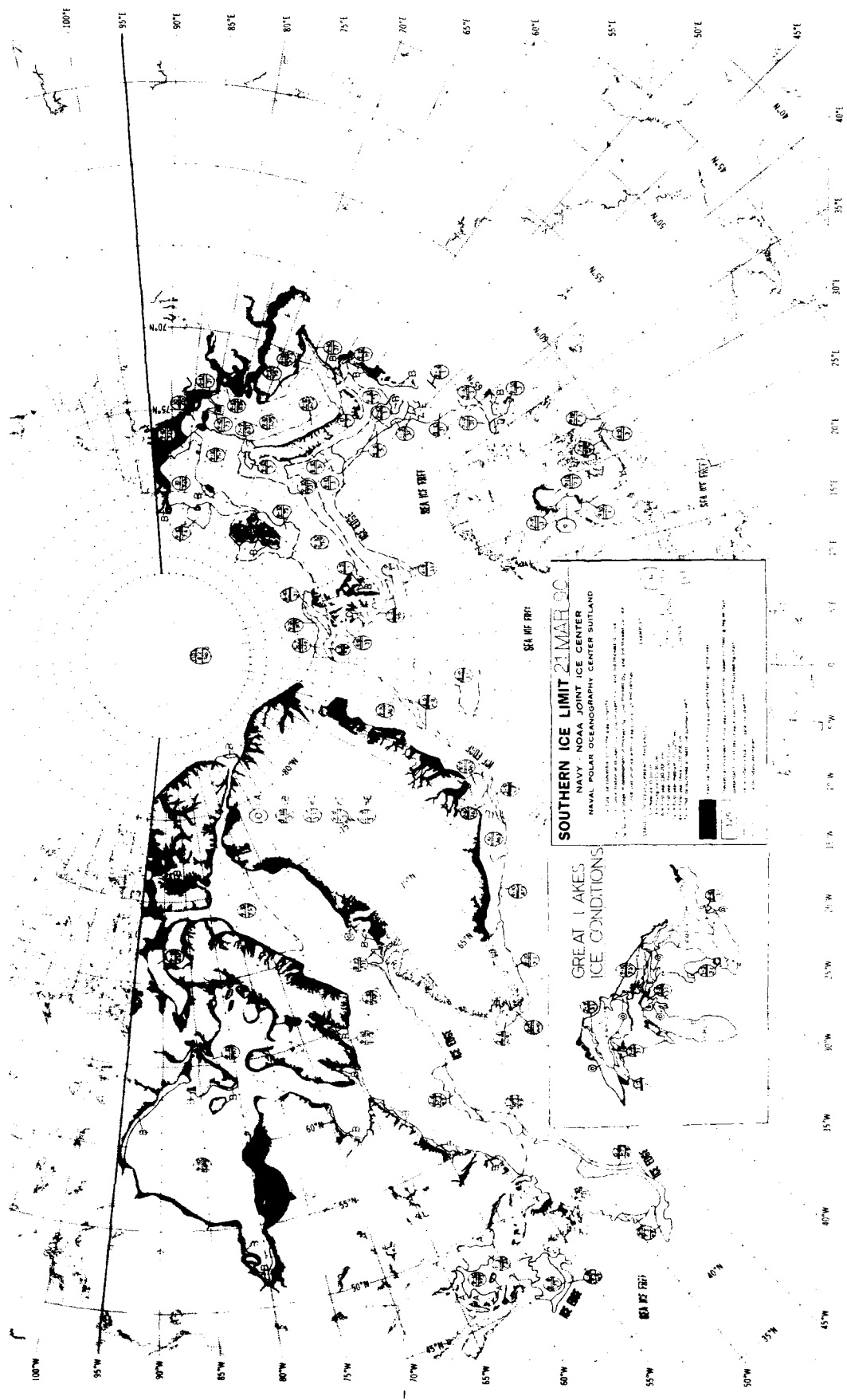


SOUTHERN ICE LIMIT 07 MAR 50
 NAVY - NOAA JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND

1. This chart shows the southern ice limit for the month of March, 1950, based on observations from the Navy's ice reconnaissance ships, the USSC-1, USSC-2, USSC-3, USSC-4, USSC-5, USSC-6, USSC-7, USSC-8, USSC-9, USSC-10, USSC-11, USSC-12, USSC-13, USSC-14, USSC-15, USSC-16, USSC-17, USSC-18, USSC-19, USSC-20, USSC-21, USSC-22, USSC-23, USSC-24, USSC-25, USSC-26, USSC-27, USSC-28, USSC-29, USSC-30, USSC-31, USSC-32, USSC-33, USSC-34, USSC-35, USSC-36, USSC-37, USSC-38, USSC-39, USSC-40, USSC-41, USSC-42, USSC-43, USSC-44, USSC-45, USSC-46, USSC-47, USSC-48, USSC-49, USSC-50, USSC-51, USSC-52, USSC-53, USSC-54, USSC-55, USSC-56, USSC-57, USSC-58, USSC-59, USSC-60, USSC-61, USSC-62, USSC-63, USSC-64, USSC-65, USSC-66, USSC-67, USSC-68, USSC-69, USSC-70, USSC-71, USSC-72, USSC-73, USSC-74, USSC-75, USSC-76, USSC-77, USSC-78, USSC-79, USSC-80, USSC-81, USSC-82, USSC-83, USSC-84, USSC-85, USSC-86, USSC-87, USSC-88, USSC-89, USSC-90, USSC-91, USSC-92, USSC-93, USSC-94, USSC-95, USSC-96, USSC-97, USSC-98, USSC-99, USSC-100.





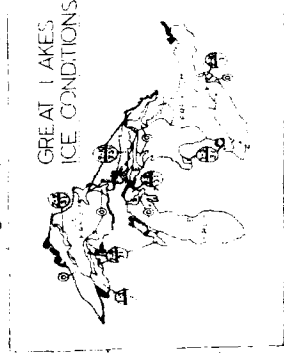


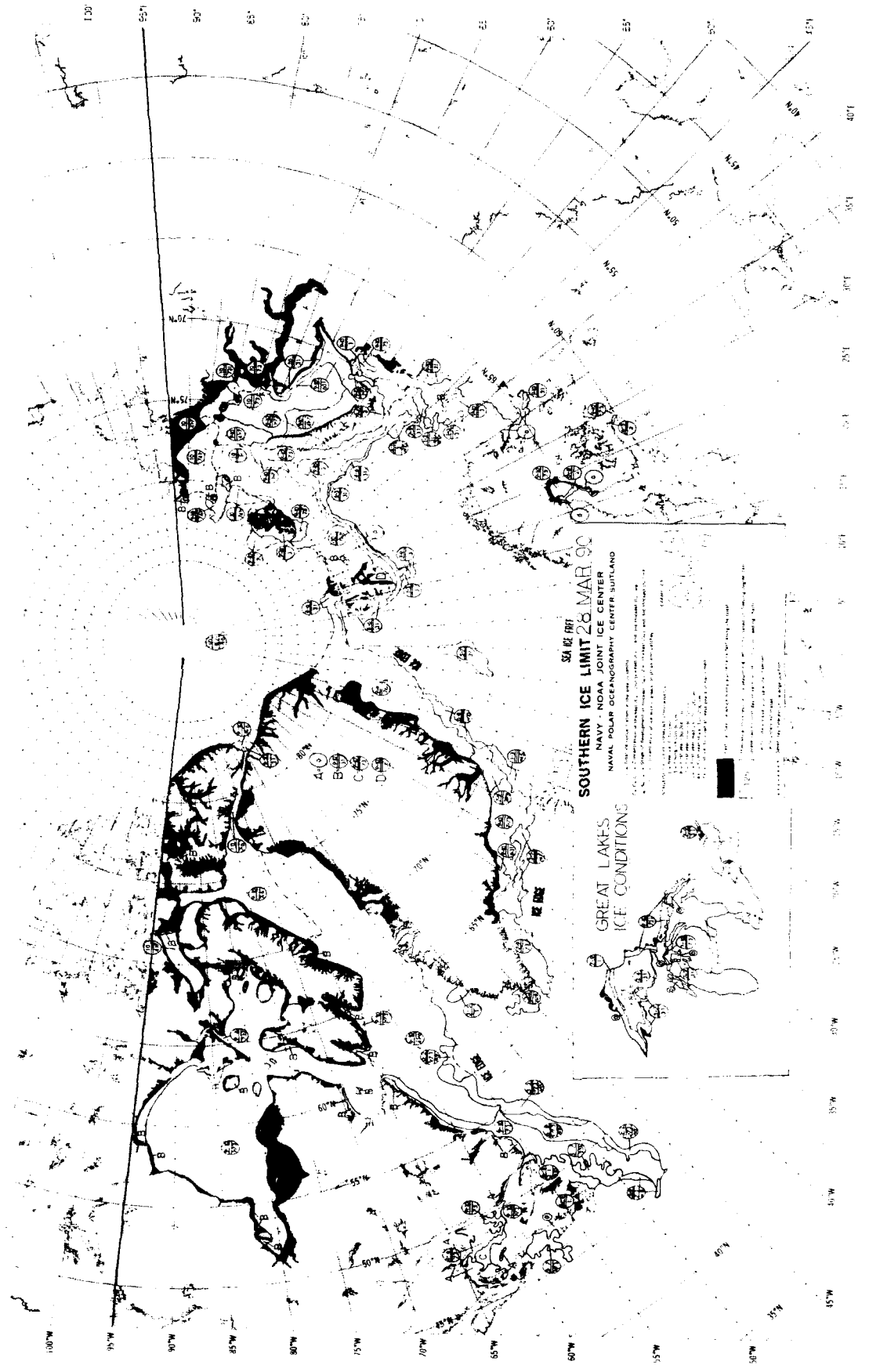
SOUTHERN ICE LIMIT 21 MAR 66
 NAVY - NOAA JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPH CENTER SUTLAND

THIS MAP SHOWS THE SOUTHERN ICE LIMIT FOR THE GREAT LAKES REGION ON 21 MARCH 1966. THE DATA WAS OBTAINED FROM THE NAVY POLAR OCEANOGRAPH CENTER SUTLAND AND THE NOAA JOINT ICE CENTER. THE MAP IS A PRODUCT OF THE JOINT ICE CENTER'S ICE ANALYSIS AND FORECASTING CENTER.

THE SOUTHERN ICE LIMIT IS DEFINED AS THE MOST SOUTHERN POSITION WHERE ICE WAS OBSERVED OR FORECAST TO OCCUR. THE DATA WAS OBTAINED FROM THE NAVY POLAR OCEANOGRAPH CENTER SUTLAND AND THE NOAA JOINT ICE CENTER. THE MAP IS A PRODUCT OF THE JOINT ICE CENTER'S ICE ANALYSIS AND FORECASTING CENTER.

THE SOUTHERN ICE LIMIT IS DEFINED AS THE MOST SOUTHERN POSITION WHERE ICE WAS OBSERVED OR FORECAST TO OCCUR. THE DATA WAS OBTAINED FROM THE NAVY POLAR OCEANOGRAPH CENTER SUTLAND AND THE NOAA JOINT ICE CENTER. THE MAP IS A PRODUCT OF THE JOINT ICE CENTER'S ICE ANALYSIS AND FORECASTING CENTER.



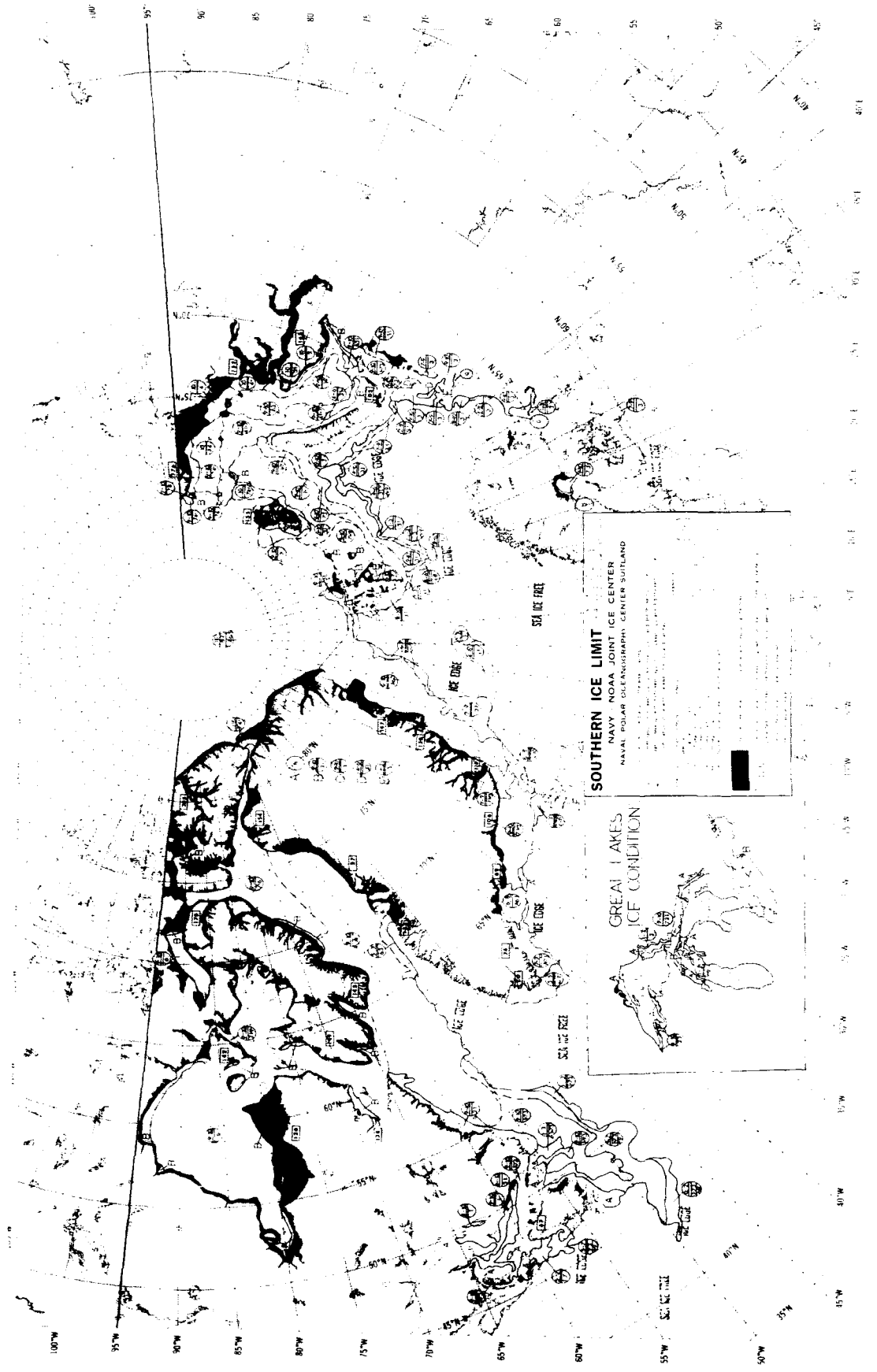


SEA ICE DATA
SOUTHERN ICE LIMIT 28 MAR 90
NAVY - NOAA JOINT ICE CENTER
NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND

**GREAT LAKES
ICE CONDITIONS**

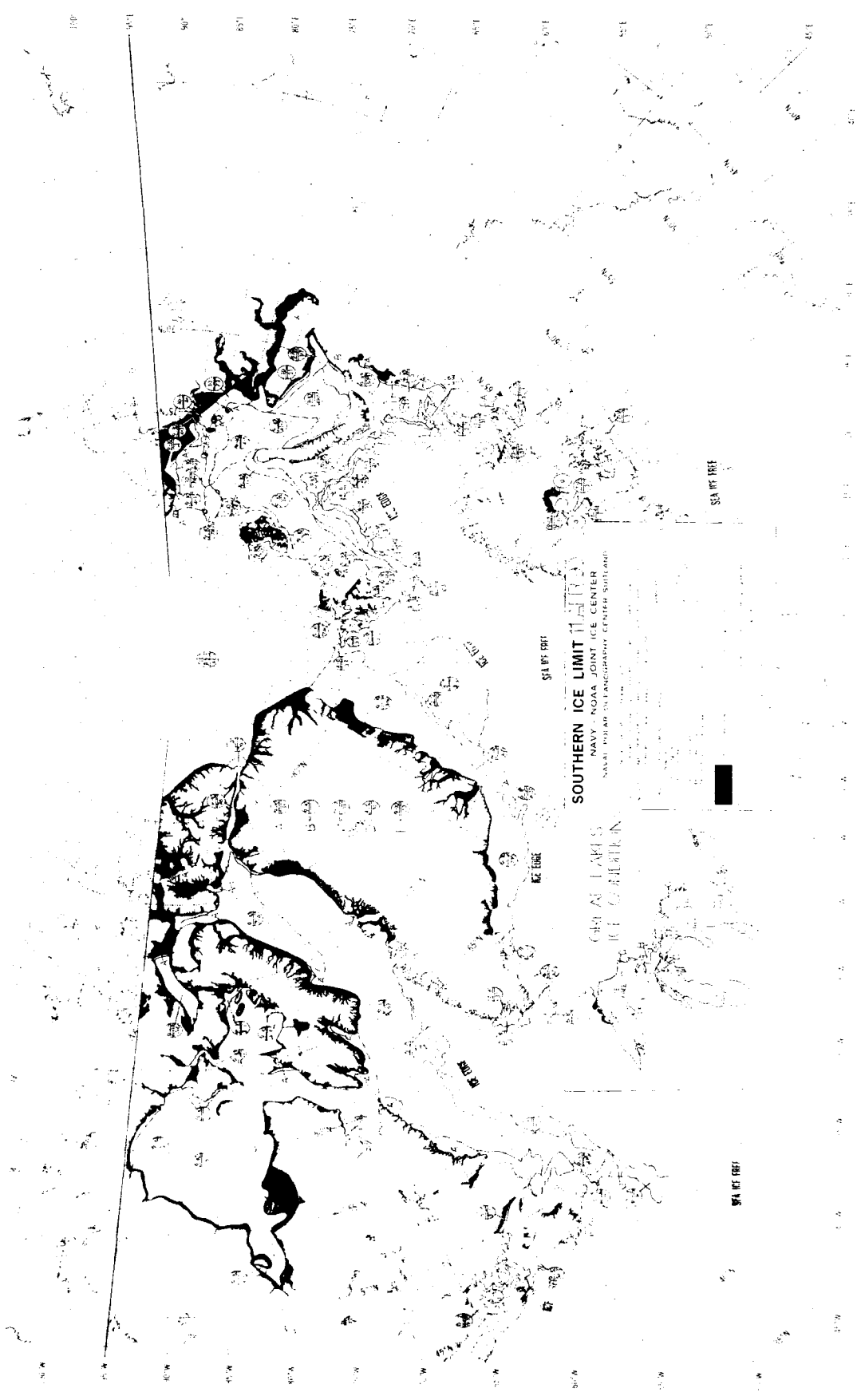
Legend
A. Icebreaker
B. Icebreaker
C. Icebreaker
D. Icebreaker
E. Icebreaker
F. Icebreaker
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V. Icebreaker
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Y. Icebreaker
Z. Icebreaker

Map Symbols
A. Icebreaker
B. Icebreaker
C. Icebreaker
D. Icebreaker
E. Icebreaker
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T. Icebreaker
U. Icebreaker
V. Icebreaker
W. Icebreaker
X. Icebreaker
Y. Icebreaker
Z. Icebreaker



SOUTHERN ICE LIMIT
 NAVY - NOAA JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPHIC CENTER SUTLAND

GREAT LAKES ICE CONDITION



SEA ICE FREE

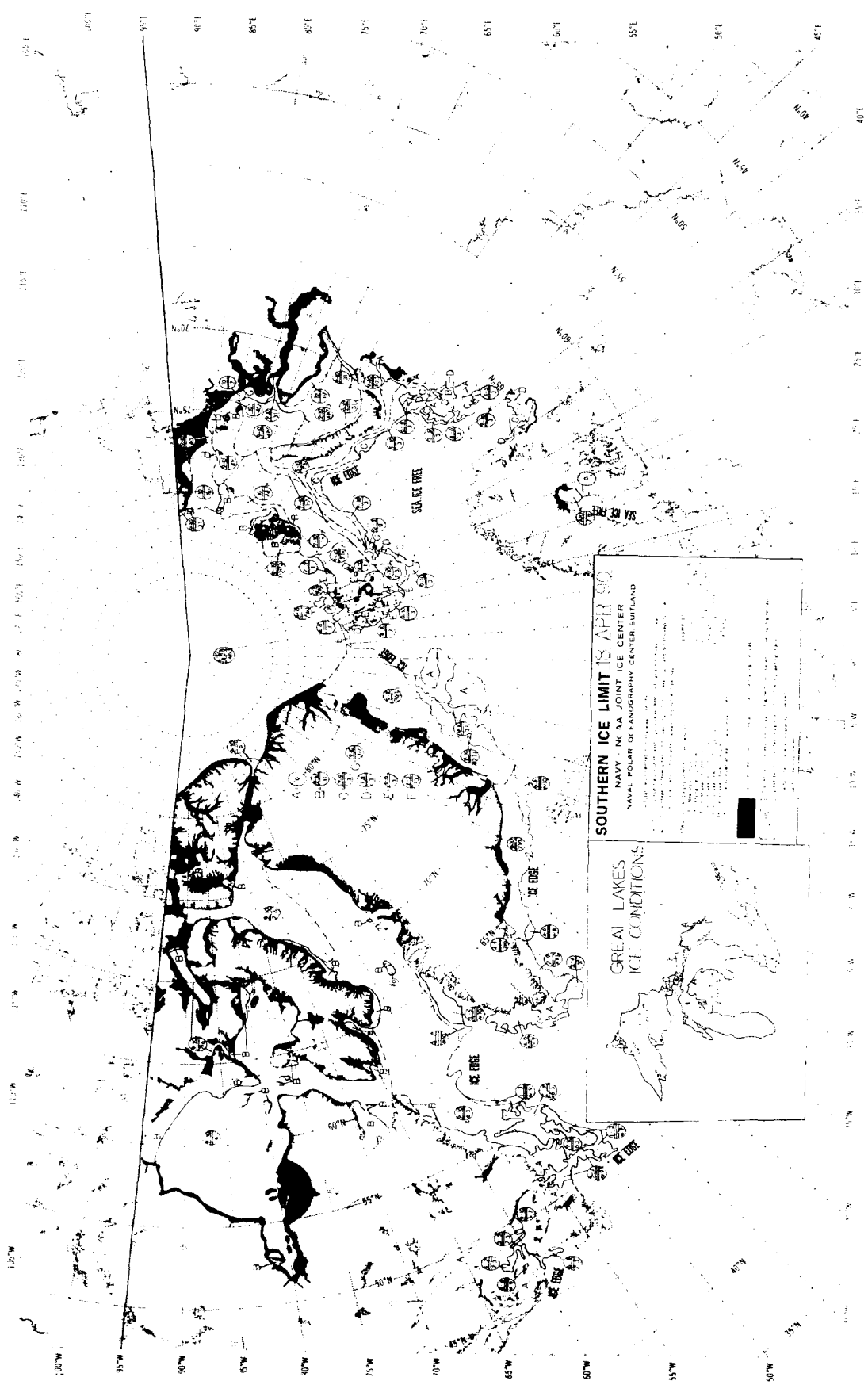
SOUTHERN ICE LIMIT
NAVY - NOAA JOINT ICE CENTER
NAVAL POLAR OPERATIONAL CENTER SUTLAND

ICE LIMIT

CHOCOLATE LIPS
ICE SHELF

SEA ICE FREE

SEA ICE FREE

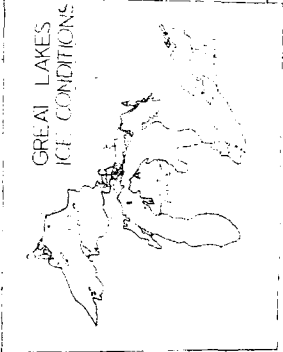


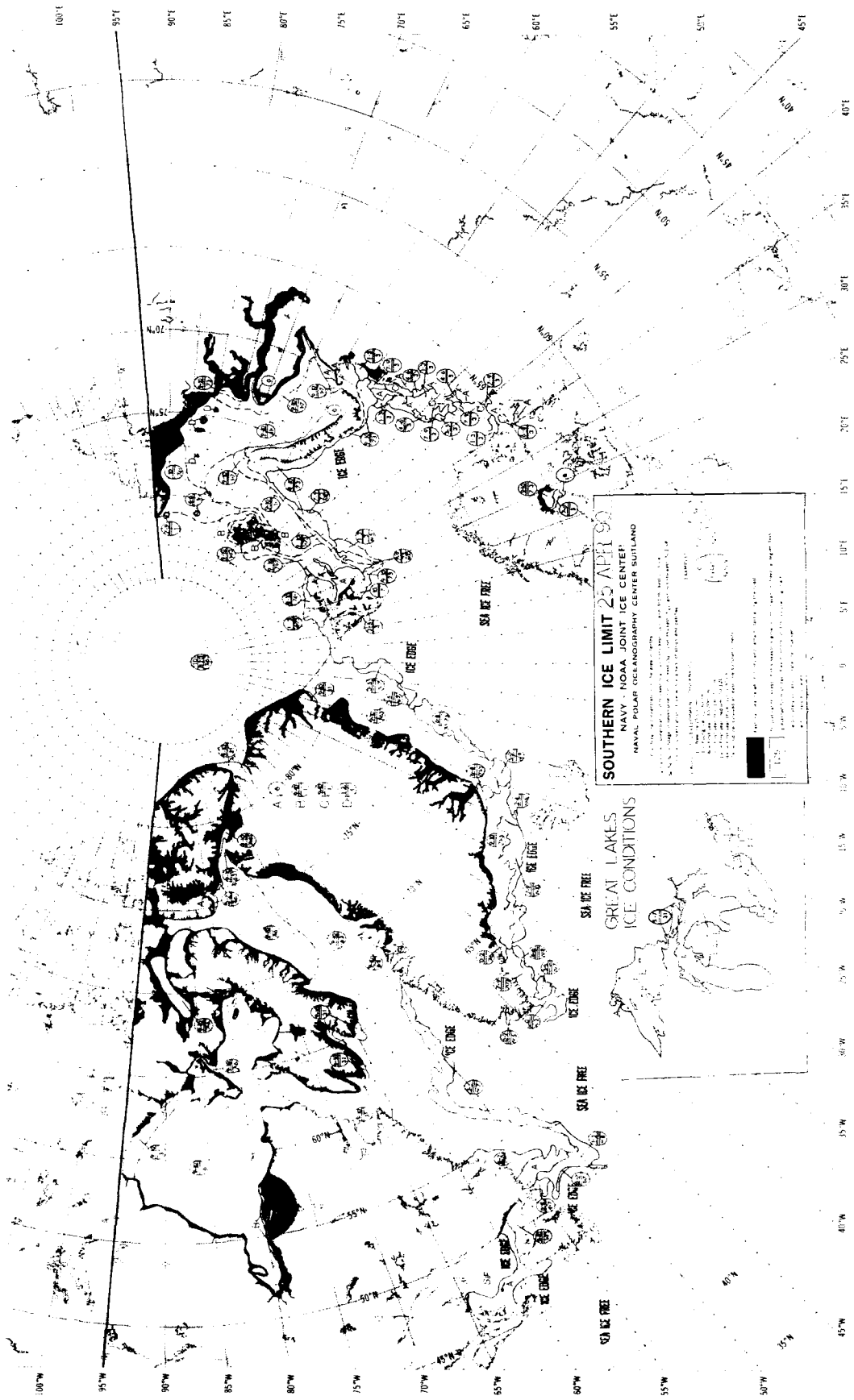
SOUTHERN ICE LIMIT 19 APR 80
 NAVY - NC AA JOINT ICE CENTER
 NAVAL POLAR OPERATIONS CENTER SUITLAND

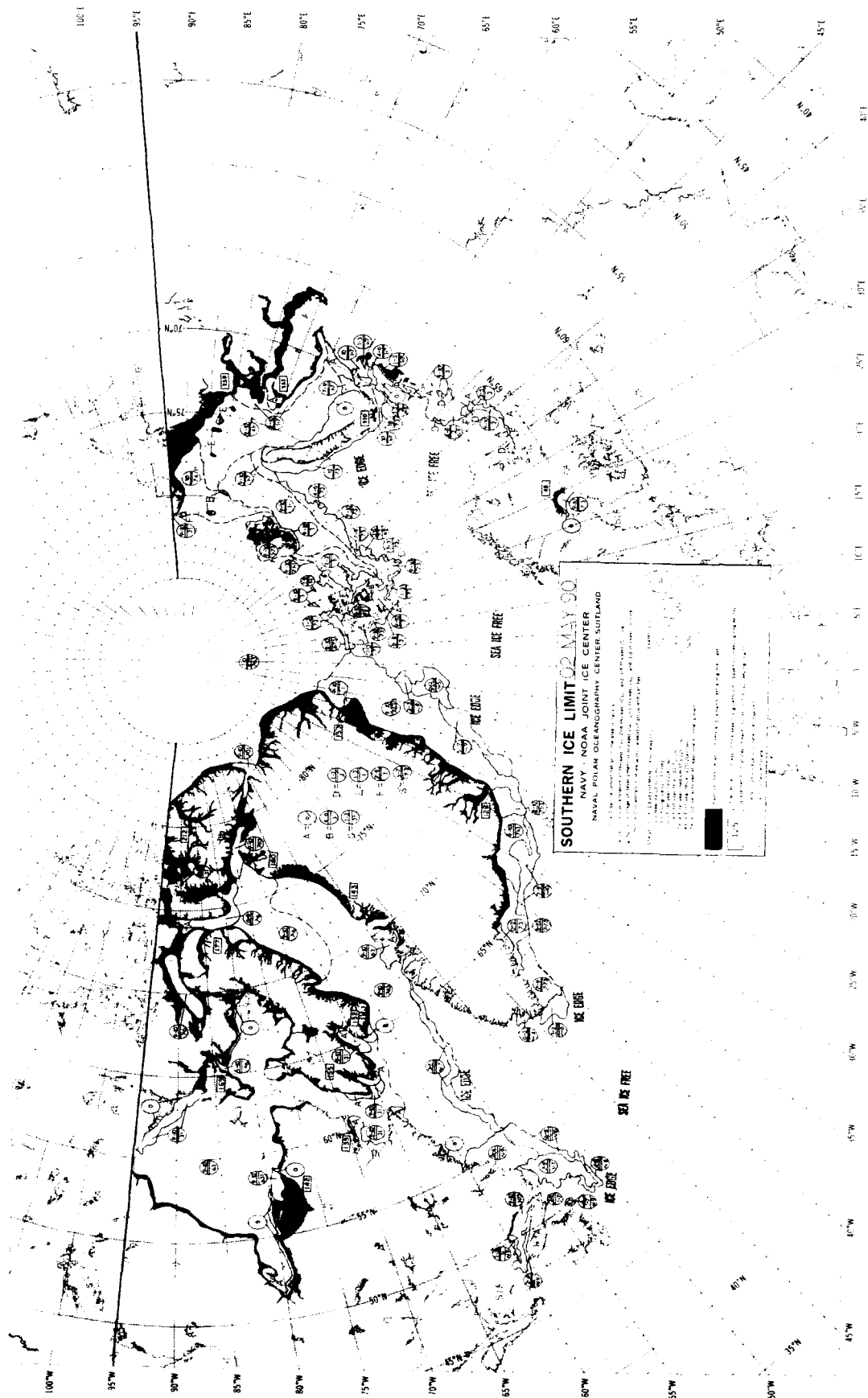
1. This map shows the southern ice limit of the Antarctic continent as of 19 April 1980. The ice limit is defined as the outermost edge of the ice shelf and ice flows. The ice limit is shown as a solid line. The area between the ice limit and the coast is shaded black. The area between the ice limit and the 100-degree meridian is shaded gray. The area between the ice limit and the 140-degree meridian is white.

2. The ice limit is shown as a solid line. The area between the ice limit and the coast is shaded black. The area between the ice limit and the 100-degree meridian is shaded gray. The area between the ice limit and the 140-degree meridian is white.

3. The ice limit is shown as a solid line. The area between the ice limit and the coast is shaded black. The area between the ice limit and the 100-degree meridian is shaded gray. The area between the ice limit and the 140-degree meridian is white.







SOUTHERN ICE LIMIT 02 MAY 90
 NAVY - NOAA JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPHY CENTER SUTCLAND

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2. This map is based on data received from the United States Navy, the United States Coast Guard, and other sources. It is not to be used for navigation.

3. This map is not to be used for navigation.

4. This map is not to be used for navigation.

5. This map is not to be used for navigation.

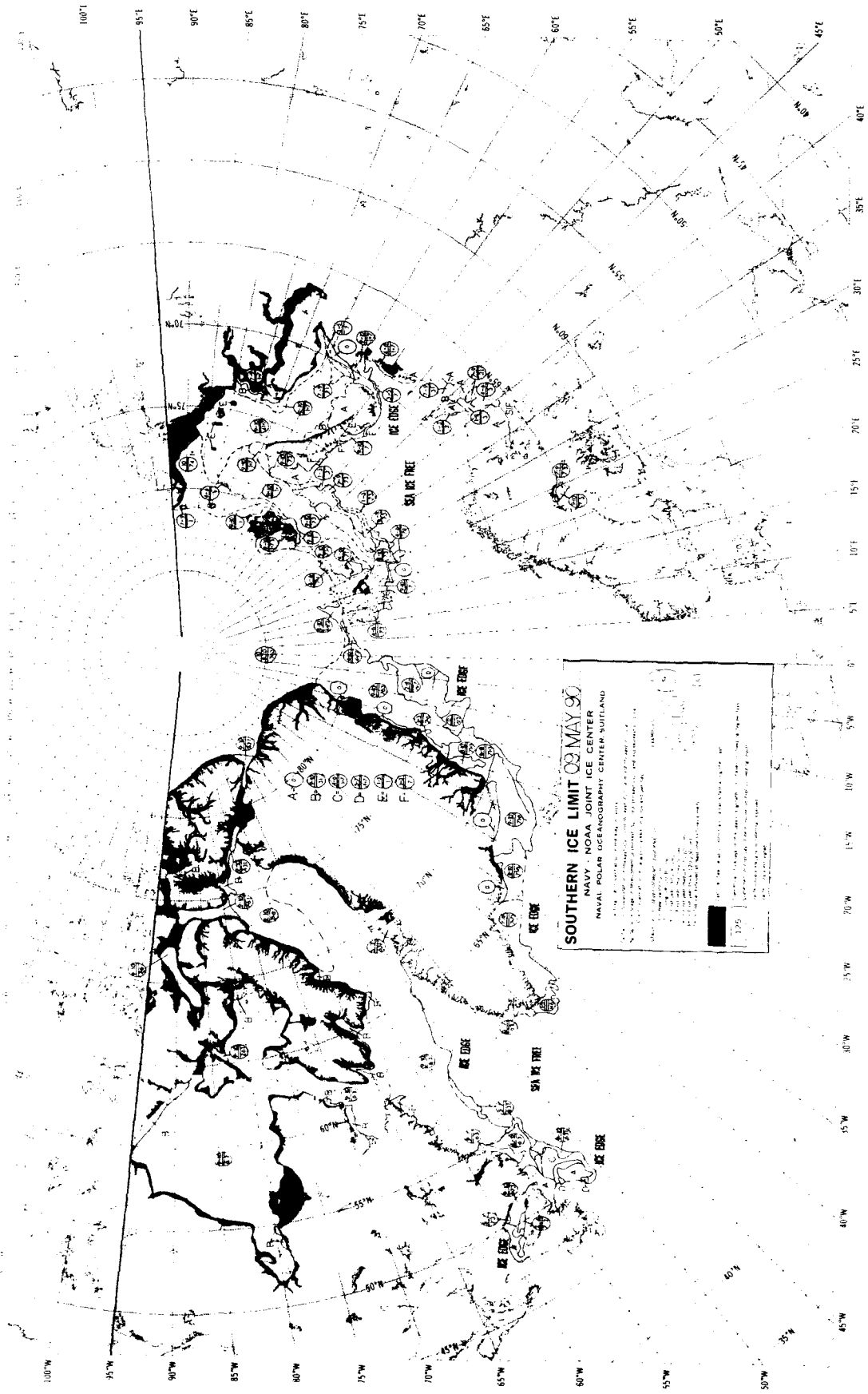
6. This map is not to be used for navigation.

7. This map is not to be used for navigation.

8. This map is not to be used for navigation.

9. This map is not to be used for navigation.

10. This map is not to be used for navigation.



SOUTHERN ICE LIMIT 03 MAY 90
 NAVY - NOAA JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPHY CENTER SUITLAND

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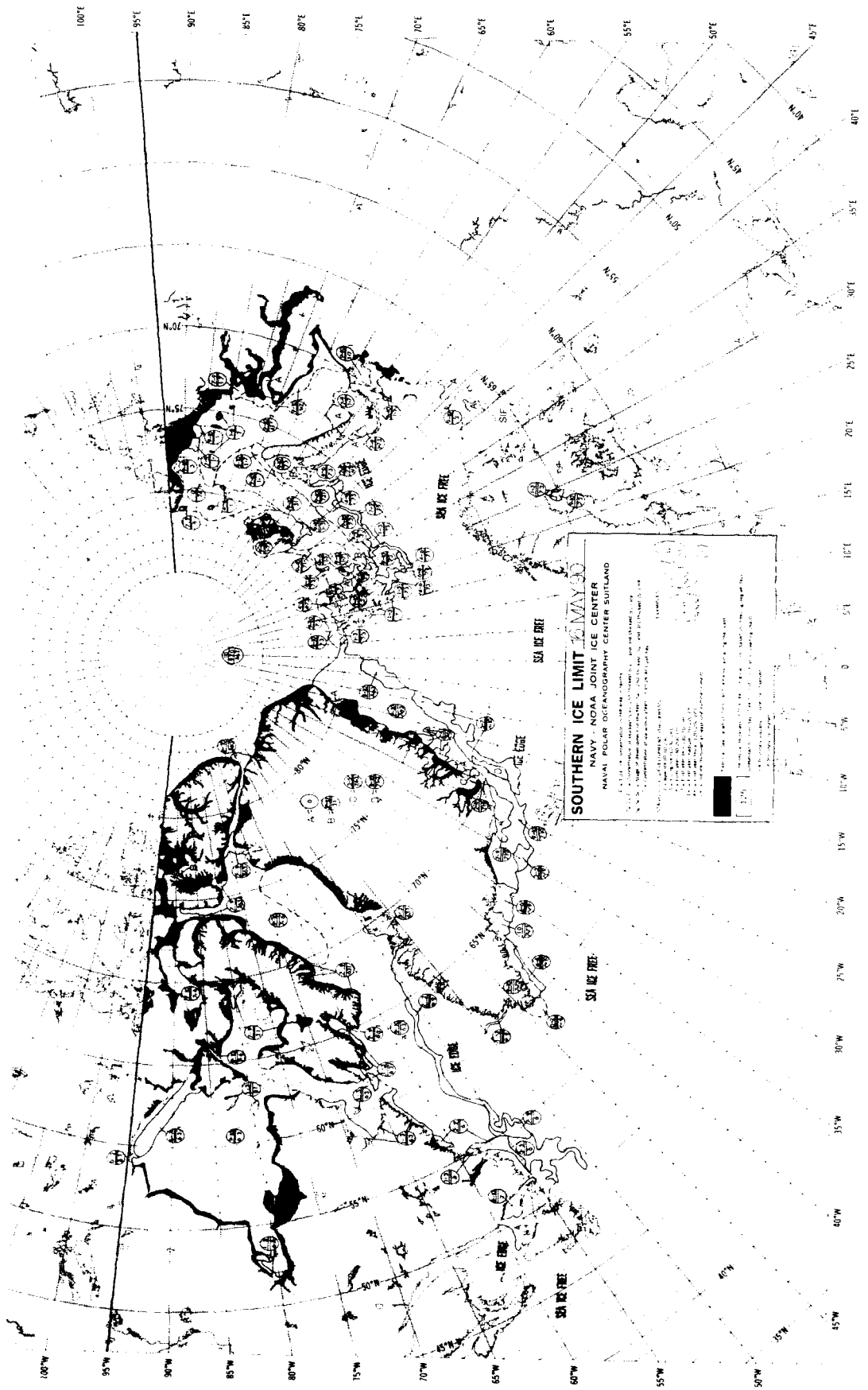
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8. THIS MAP IS A PRODUCT OF THE JOINT ICE CENTER, NAVY - NOAA. IT IS THE PROPERTY OF THE JOINT ICE CENTER AND IS LOANED TO YOU. IT IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE EXPRESS WRITTEN PERMISSION OF THE JOINT ICE CENTER.

9. THIS MAP IS A PRODUCT OF THE JOINT ICE CENTER, NAVY - NOAA. IT IS THE PROPERTY OF THE JOINT ICE CENTER AND IS LOANED TO YOU. IT IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE EXPRESS WRITTEN PERMISSION OF THE JOINT ICE CENTER.

10. THIS MAP IS A PRODUCT OF THE JOINT ICE CENTER, NAVY - NOAA. IT IS THE PROPERTY OF THE JOINT ICE CENTER AND IS LOANED TO YOU. IT IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE EXPRESS WRITTEN PERMISSION OF THE JOINT ICE CENTER.

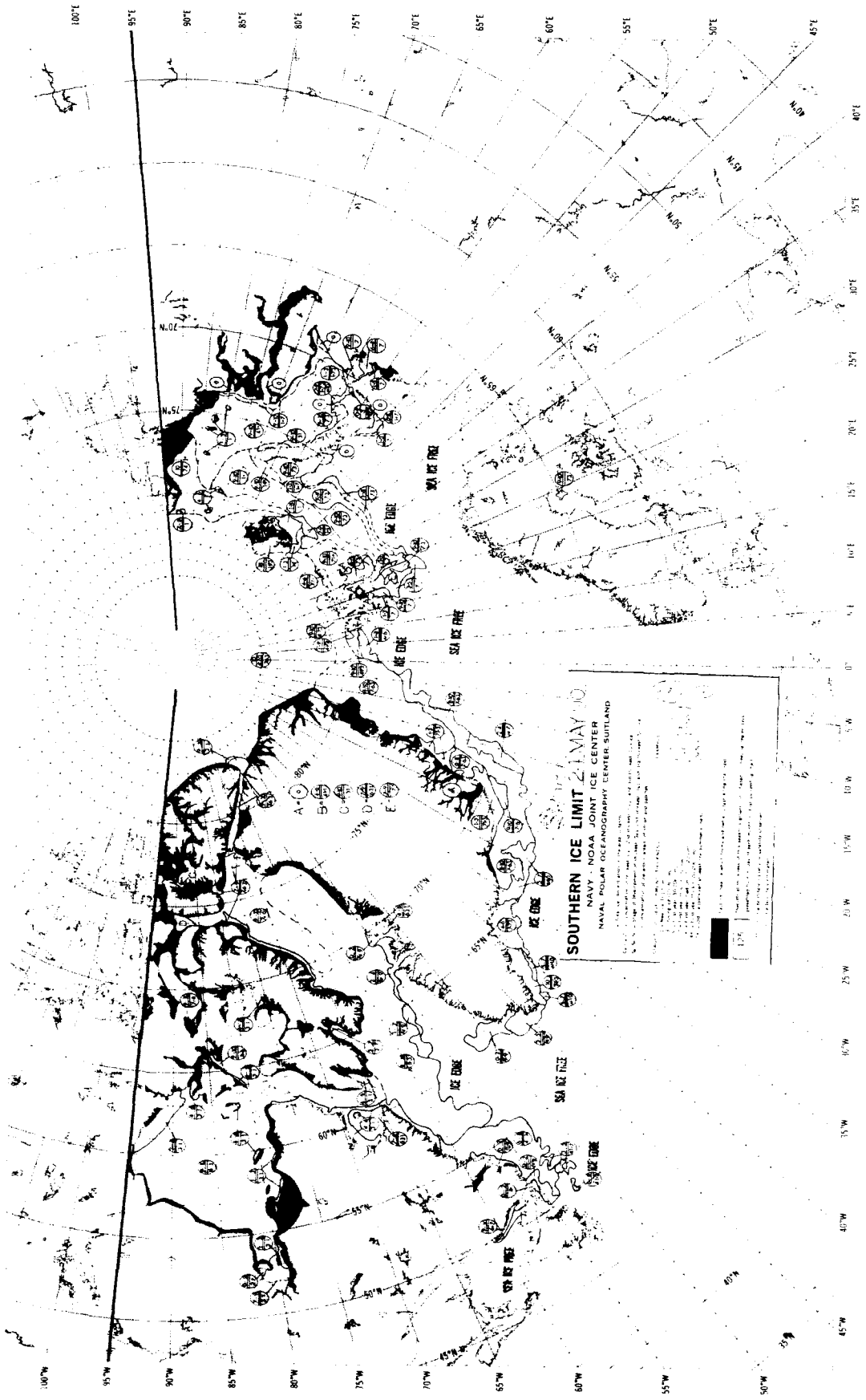
- A (Symbol)
- B (Symbol)
- C (Symbol)
- D (Symbol)
- E (Symbol)
- F (Symbol)



SOUTHERN ICE LIMIT

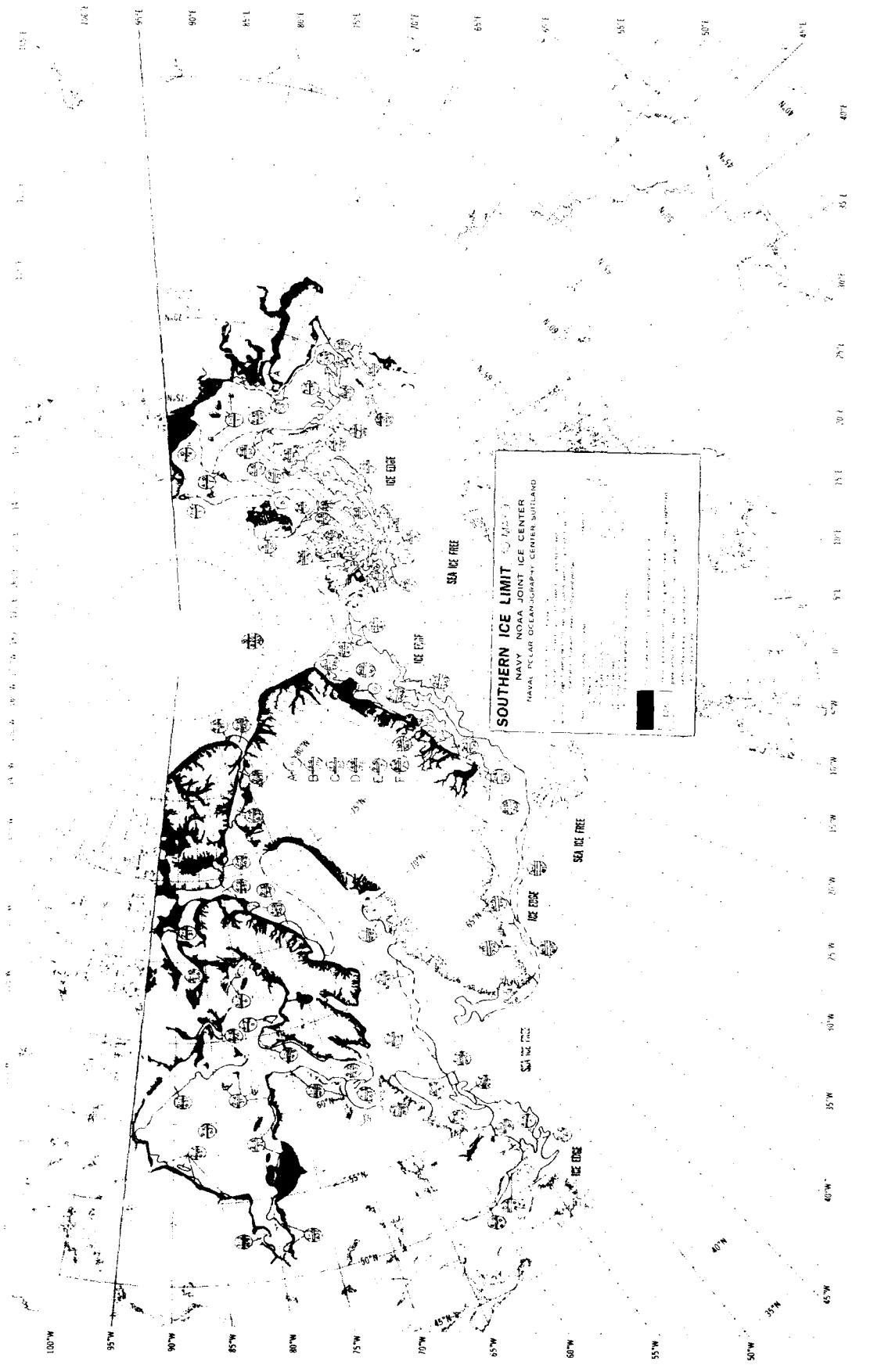
NAVY - NOAA JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPHY CENTER SUTLAND

THIS MAP IS A PRODUCT OF THE JOINT ICE CENTER, NAVY - NOAA, AND THE OCEANOGRAPHY CENTER SUTLAND, NAVY - NOAA. IT IS THE PROPERTY OF THE JOINT ICE CENTER AND IS LOANED TO YOU. IT IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE EXPRESS WRITTEN PERMISSION OF THE JOINT ICE CENTER. FOR MORE INFORMATION, CONTACT THE JOINT ICE CENTER, 1100 N. PINE STREET, WASHINGTON, D.C. 20314-5039.



SOUTHERN ICE LIMIT 21 MAY 70
NAVY - NOAA JOINT ICE CENTER
NAVAL POLAR OCEANOGRAPHY CENTER-SUTLAND

1:50,000
Scale: 1:50,000
Projection: Mercator
Datum: WGS 84
Units: Meters
Contour Interval: 100 Meters
Elevation: 1000 Meters
Depth: 1000 Meters
Ice Limit: 21 MAY 70
Ice Edge: 21 MAY 70
Sea Ice Free: 21 MAY 70



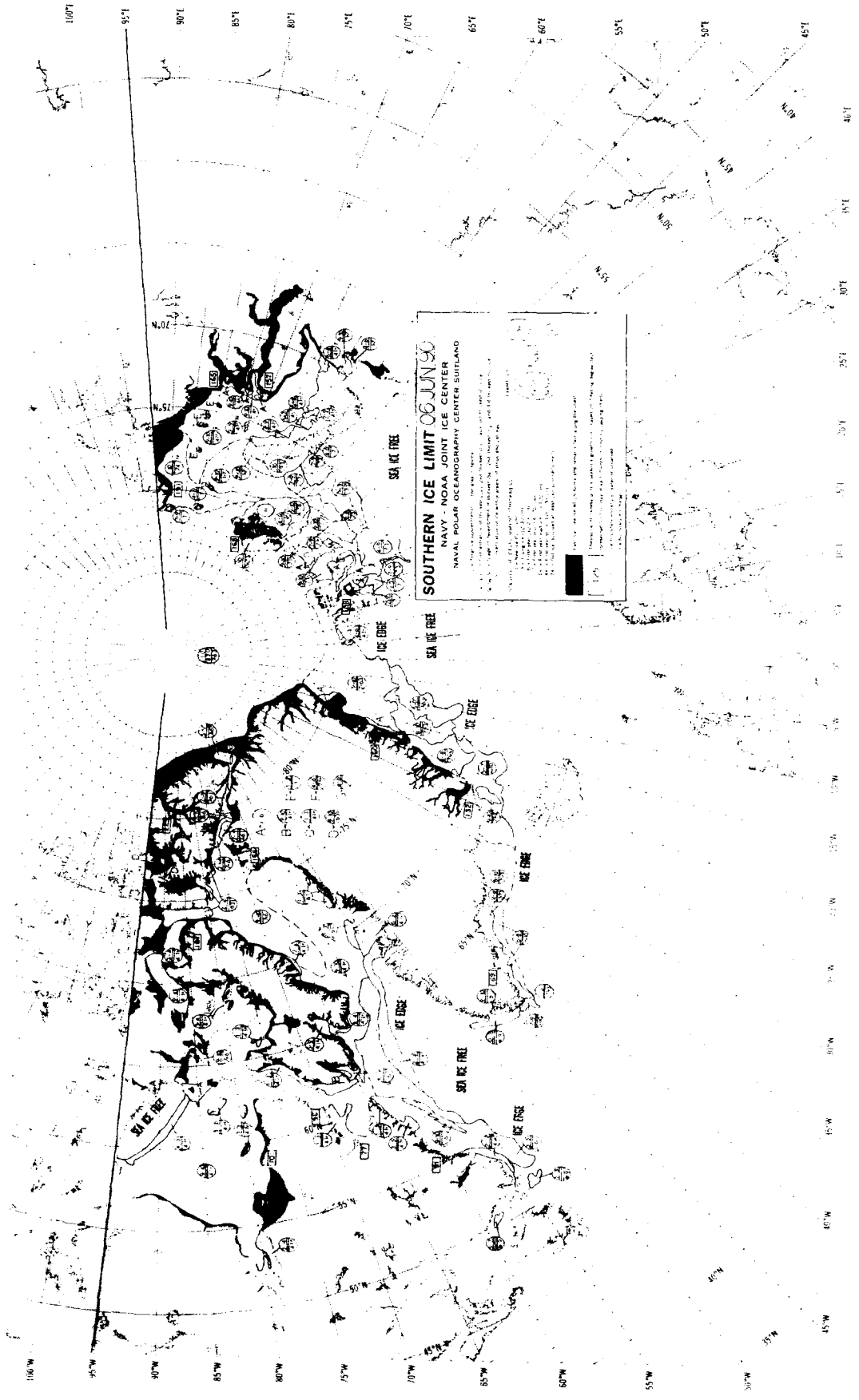
SOUTHERN ICE LIMIT (M.S.I.)
 NAVY NOAA JOINT ICE CENTER
 NAVAL RELAD OCEANOGRAPHY CENTER SULLAND

The Southern Ice Limit (SIL) is defined as the southernmost limit of the ice-free zone. It is determined by the presence of icebergs and the extent of the ice pack. The SIL is shown as a solid black line on this map.

The icebergs are marked with circled letters (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). The ice pack is shown as a stippled area. The ice-free zone is shown as a white area.

The map is based on data collected by the NOAA Joint Ice Center and the Naval Relaid Oceanography Center Sulland. The data was collected during the period of the Southern Ocean Iceberg Watch (SOIW) program.

The map is a reproduction of the original data and is not intended for navigation. It is provided for informational purposes only.



SOUTHERN ICE LIMIT 06 JUN 90
 NAVY - NOAA JOINT ICE CENTER
 NAVAL POLAR OCCANOGRAPHY CENTER SUTLAND

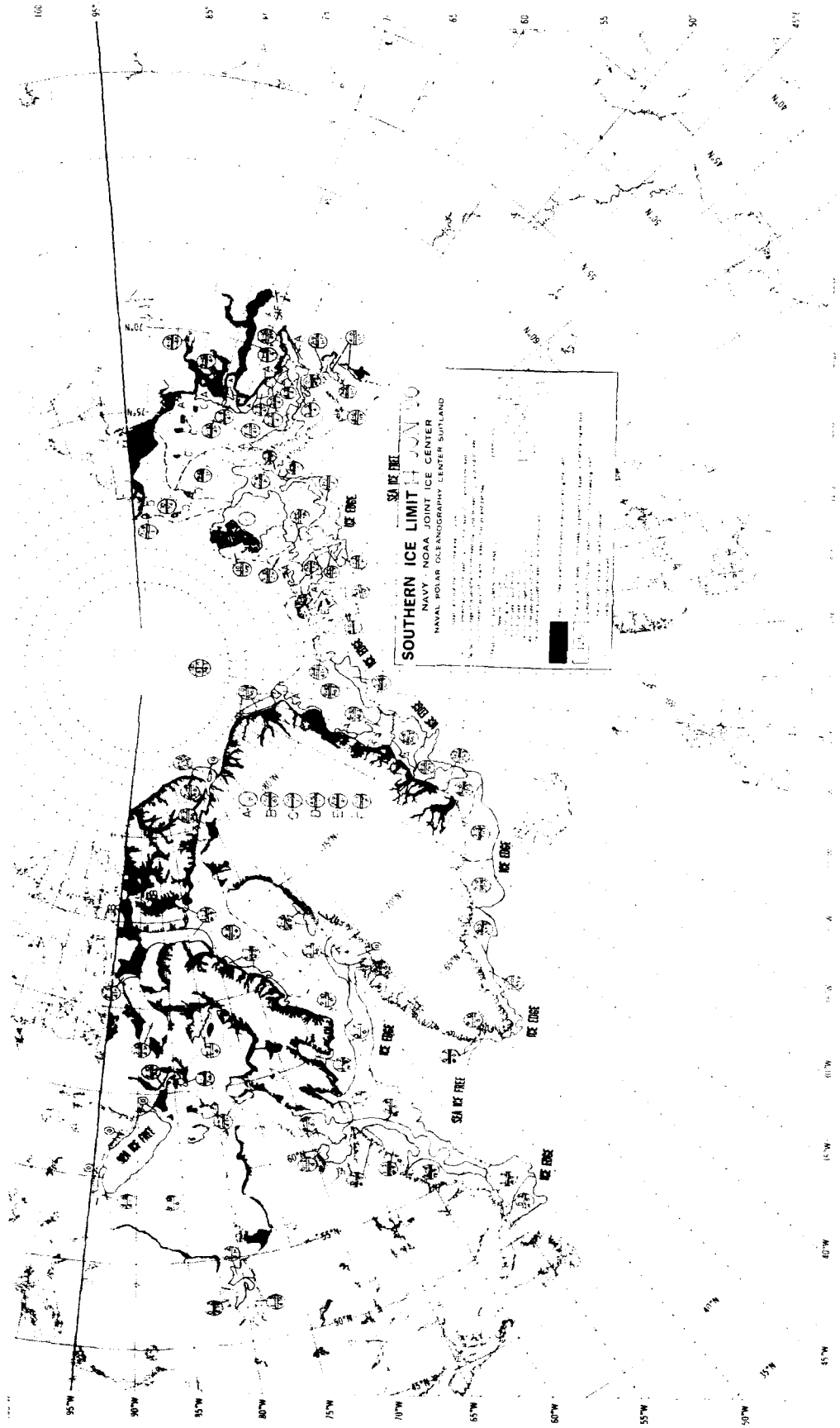
THIS MAP SHOWS THE SOUTHERN ICE LIMIT FOR THE DATE OF THE OBSERVATION. THE DATA WAS OBTAINED FROM THE NAVY - NOAA JOINT ICE CENTER. THE DATA IS BASED ON THE NAVY - NOAA JOINT ICE CENTER'S BEST AVAILABLE DATA. THE DATA IS SUBJECT TO CHANGE AS MORE DATA BECOMES AVAILABLE.

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SOUTHERN ICE LIMIT

NAVY NOAA JOINT ICE CENTER
NAVAL POLAR ORBITAL CENTER BUILDING

ICE EDGE



SOUTHERN ICE LIMIT

ICE EDGE

ICE EDGE

ICE EDGE

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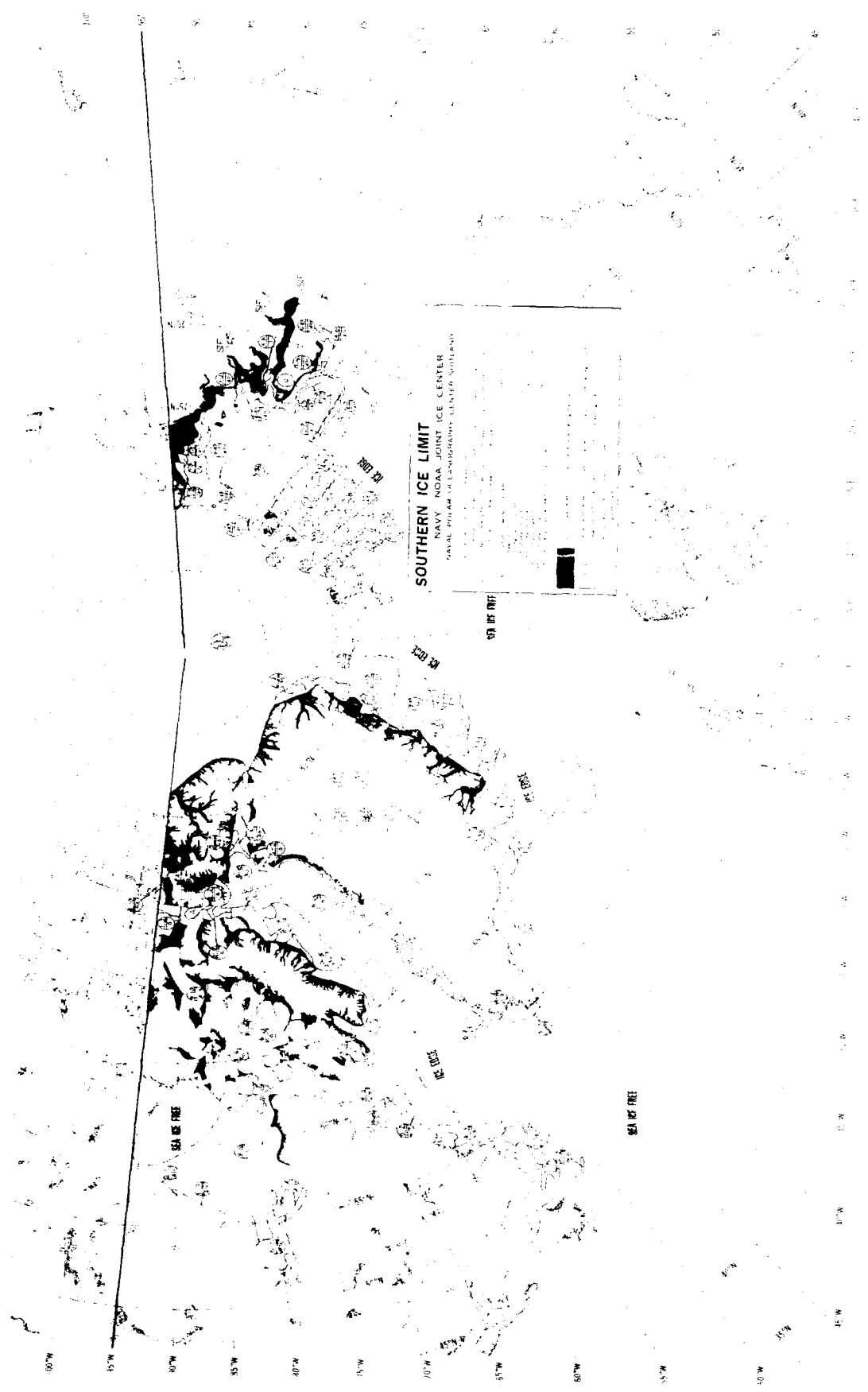
ICE EDGE

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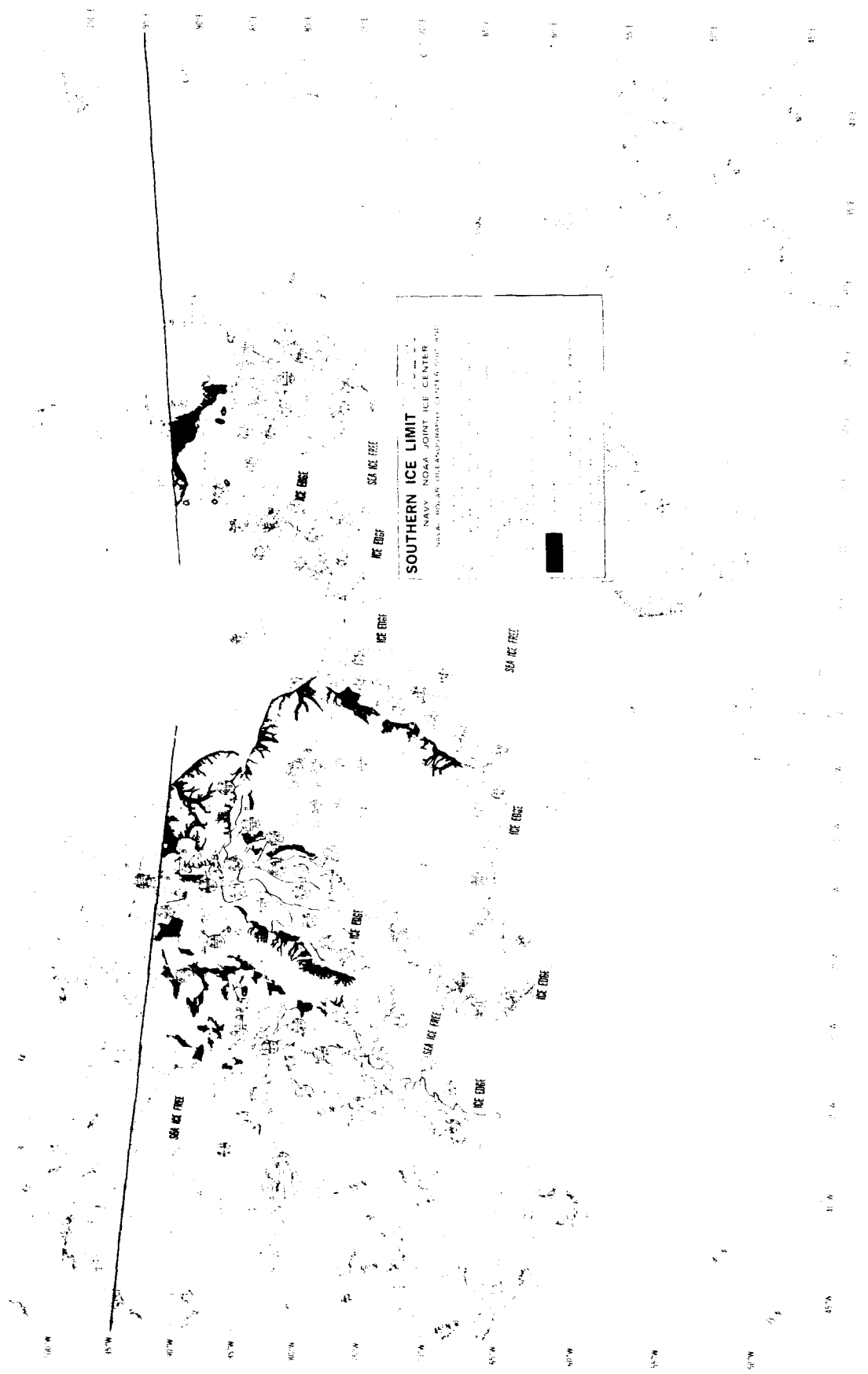
ICE EDGE

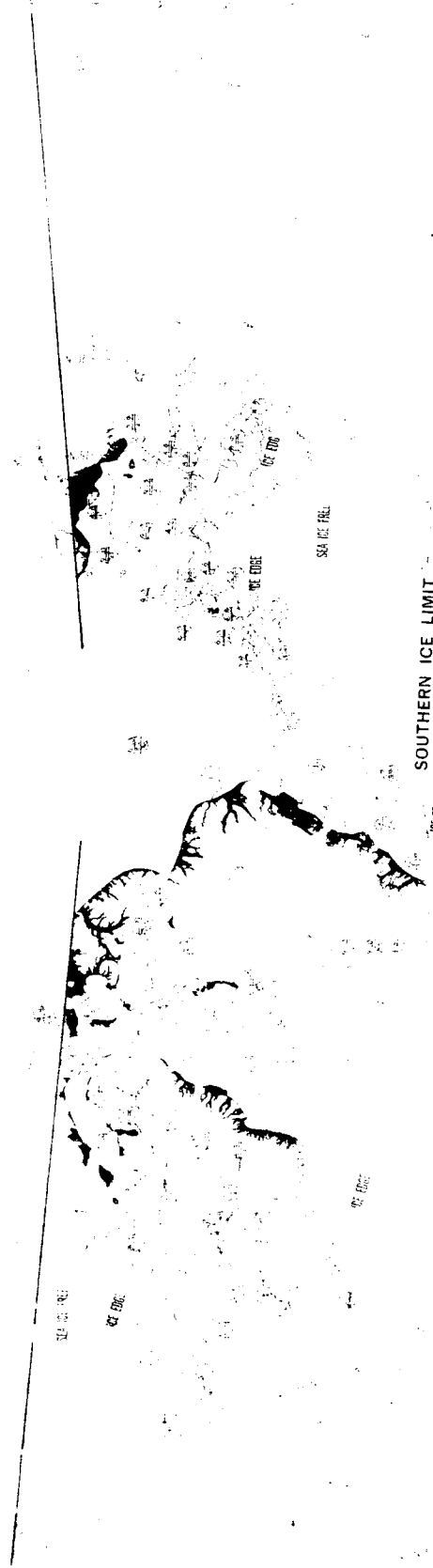


SOUTHERN ICE LIMIT
NAVY - NOAA JOINT ICE CENTER
NAVAL FLEET AIR OPERATIONS CENTER WASHINGTON



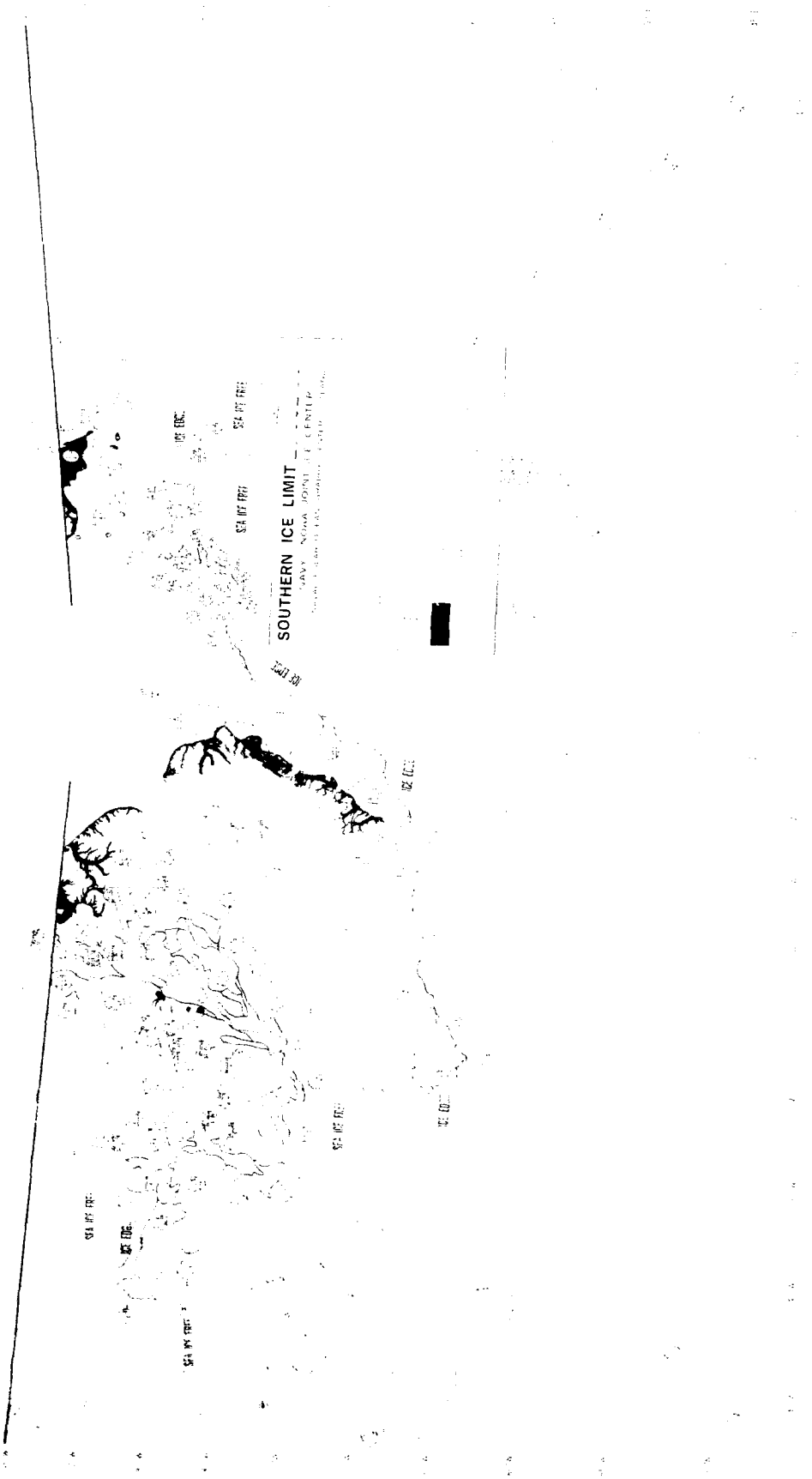






SOUTHERN ICE LIMIT
NAVY NEPAO JONSTAD CENTER
NAVY OPERATIONAL RESEARCH CENTER WASHINGTON





SOUTHERN ICE LIMIT

NAVY - NOAA JOINT CENTER
for Environmental Data Interpretation and Analysis

SEA ICE LIMIT

ICE EDGE

SEA ICE LIMIT

SEA ICE LIMIT

SEA ICE LIMIT

SEA ICE LIMIT

ICE EDGE

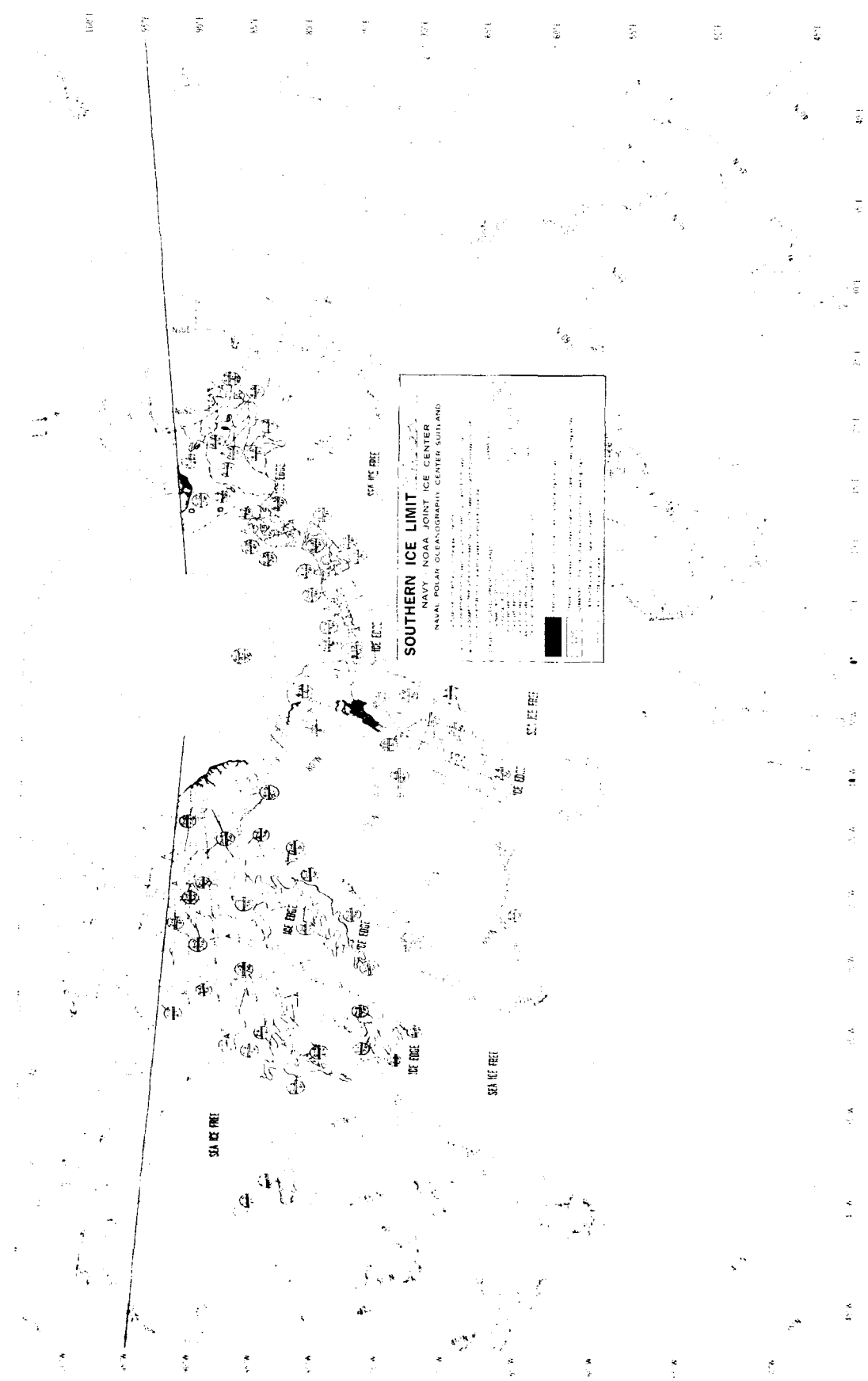
SEA ICE LIMIT

ICE EDGE





SOUTHERN ICE LIMIT
NAVY - NOAA JOINT ICE CENTER
NAVAL POLAR OPERATIONS CENTER, SPAIN



SOUTHERN ICE LIMIT
 NAVY - NOAA JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPHY CENTER SUDBURY

THIS MAP SHOWS THE SOUTHERN ICE LIMIT AS DETERMINED BY THE NAVY - NOAA JOINT ICE CENTER AND THE NAVAL POLAR OCEANOGRAPHY CENTER SUDBURY. THE LIMIT IS BASED ON DATA FROM THE NAVY - NOAA JOINT ICE CENTER AND THE NAVAL POLAR OCEANOGRAPHY CENTER SUDBURY. THE LIMIT IS BASED ON DATA FROM THE NAVY - NOAA JOINT ICE CENTER AND THE NAVAL POLAR OCEANOGRAPHY CENTER SUDBURY.

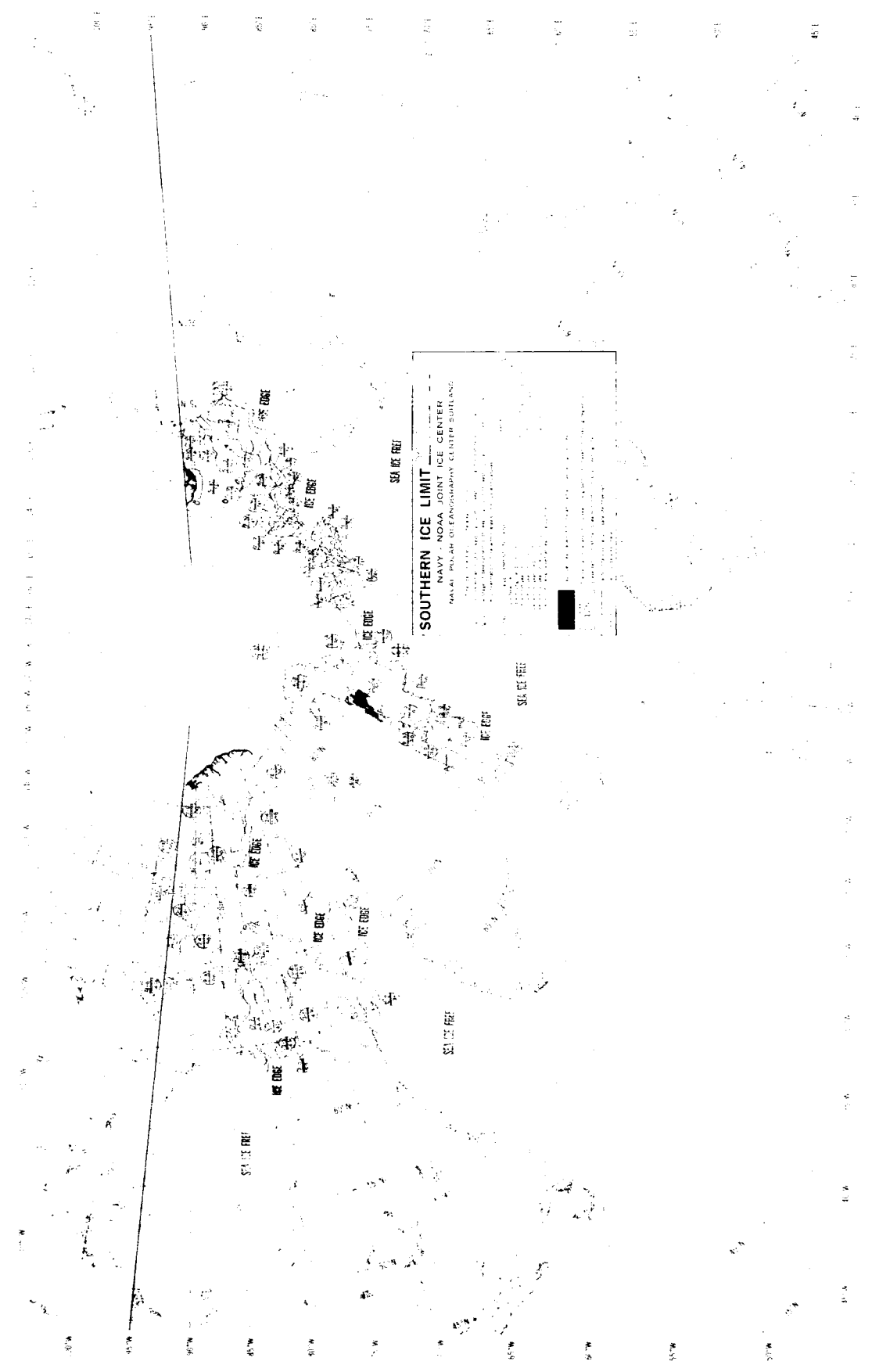
SEA ICE LIMIT

SEA ICE LIMIT

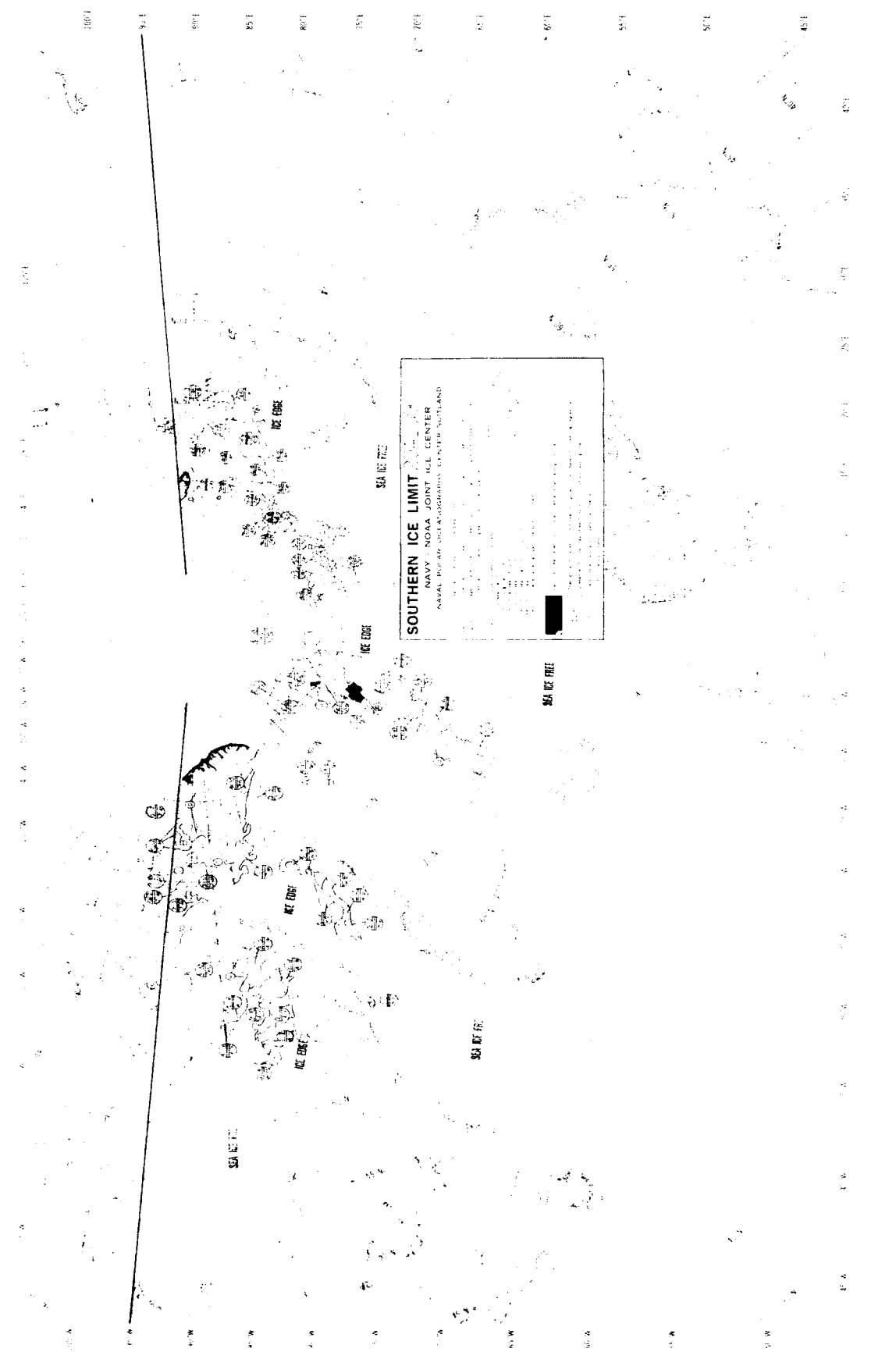
SEA ICE LIMIT

SEA ICE LIMIT

SEA ICE LIMIT



SOUTHERN ICE LIMIT
NAVY - NOAA JOINT ICE CENTER
MALDEN POLAR OCEANOGRAPHY CENTER SUELEN



SOUTHERN ICE LIMIT
NAVY - NOAA JOINT ICE CENTER
NAVAL SURF OBSERVING CENTER AUSTRALIA

1. This limit is based on the 1000 m depth contour of the sea ice. It is not necessarily the same as the 1000 m depth contour of the sea floor.

2. This limit is based on the 1000 m depth contour of the sea ice. It is not necessarily the same as the 1000 m depth contour of the sea floor.

3. This limit is based on the 1000 m depth contour of the sea ice. It is not necessarily the same as the 1000 m depth contour of the sea floor.

4. This limit is based on the 1000 m depth contour of the sea ice. It is not necessarily the same as the 1000 m depth contour of the sea floor.

5. This limit is based on the 1000 m depth contour of the sea ice. It is not necessarily the same as the 1000 m depth contour of the sea floor.

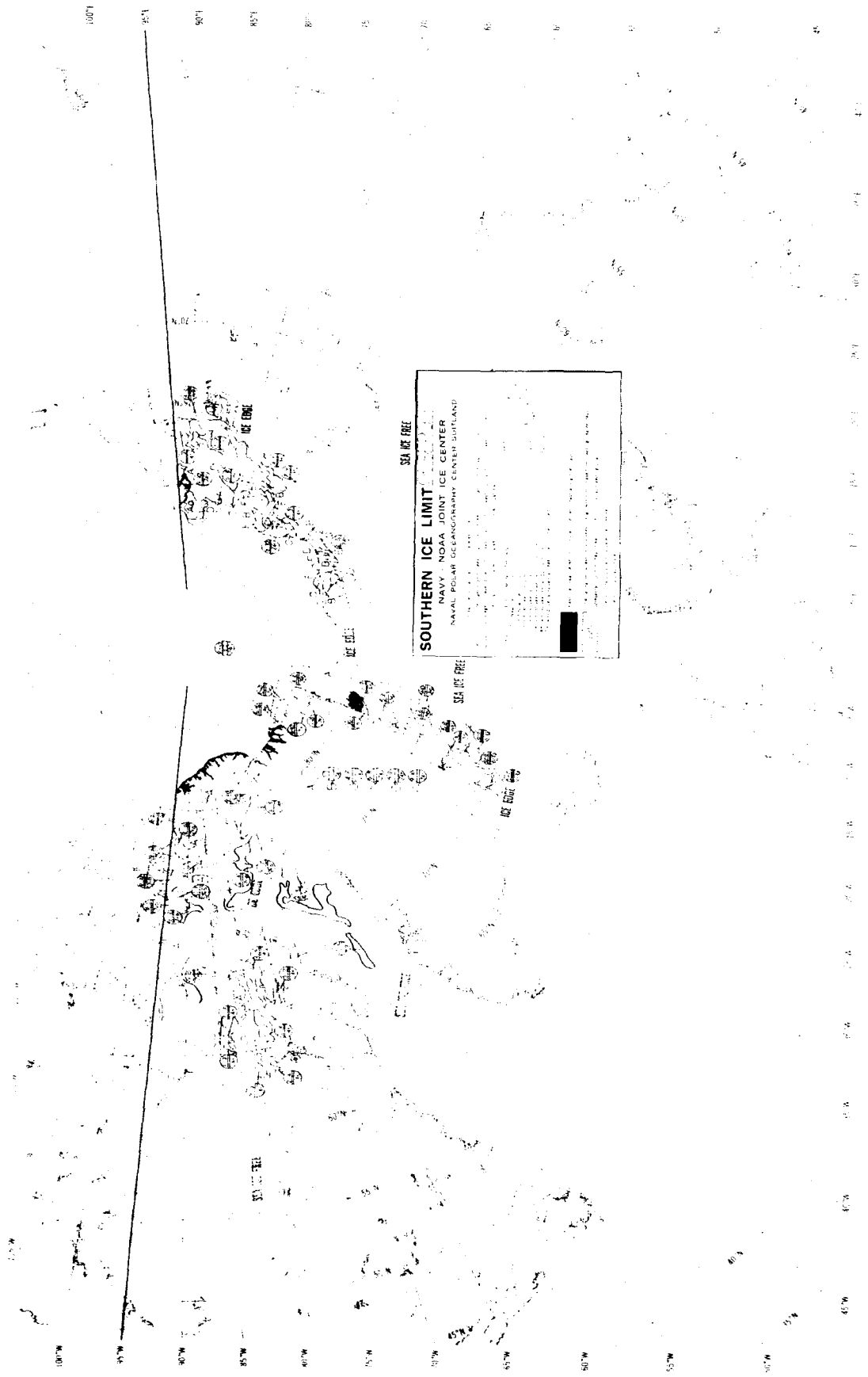
6. This limit is based on the 1000 m depth contour of the sea ice. It is not necessarily the same as the 1000 m depth contour of the sea floor.

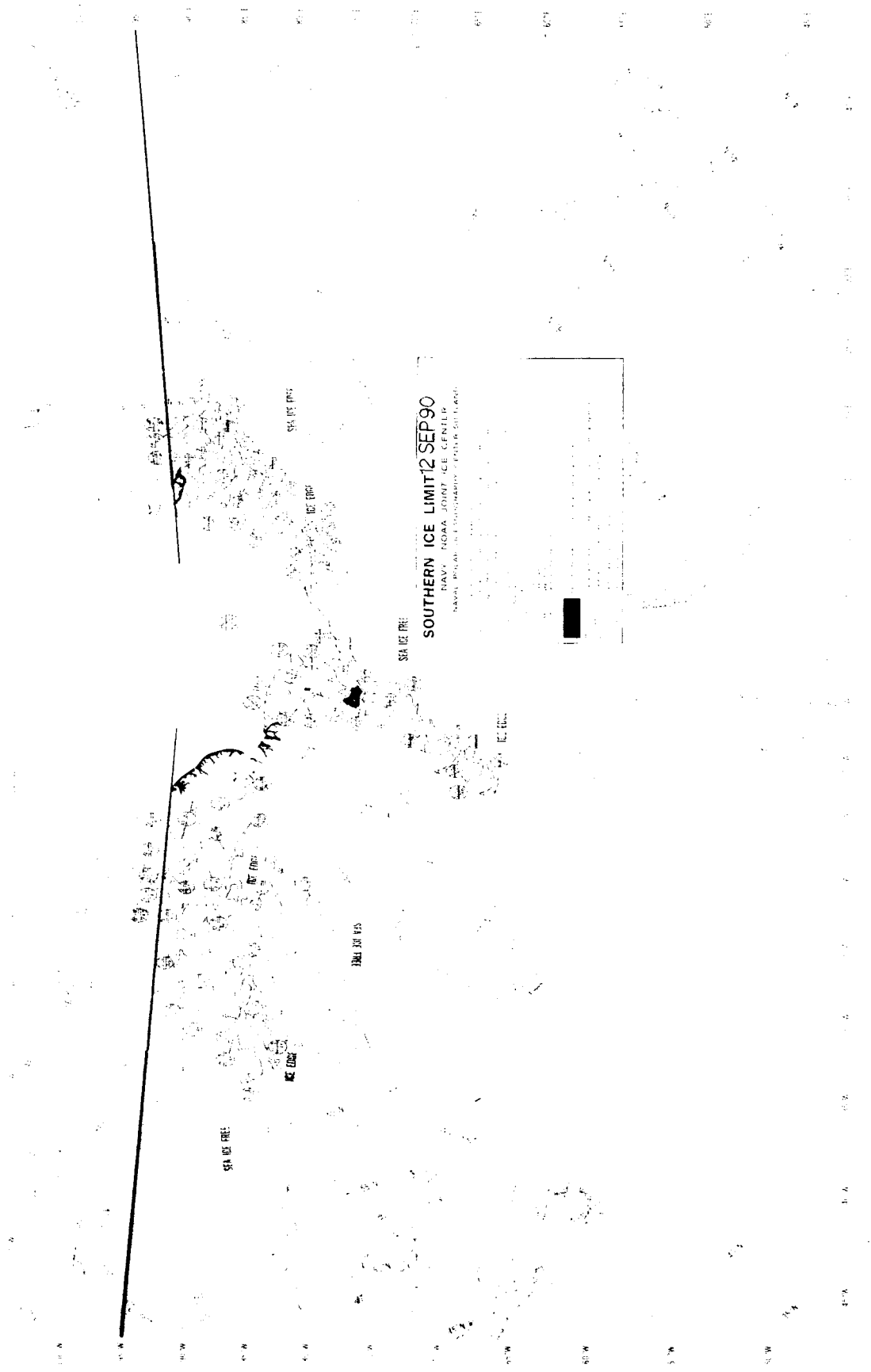
7. This limit is based on the 1000 m depth contour of the sea ice. It is not necessarily the same as the 1000 m depth contour of the sea floor.

8. This limit is based on the 1000 m depth contour of the sea ice. It is not necessarily the same as the 1000 m depth contour of the sea floor.

9. This limit is based on the 1000 m depth contour of the sea ice. It is not necessarily the same as the 1000 m depth contour of the sea floor.

10. This limit is based on the 1000 m depth contour of the sea ice. It is not necessarily the same as the 1000 m depth contour of the sea floor.

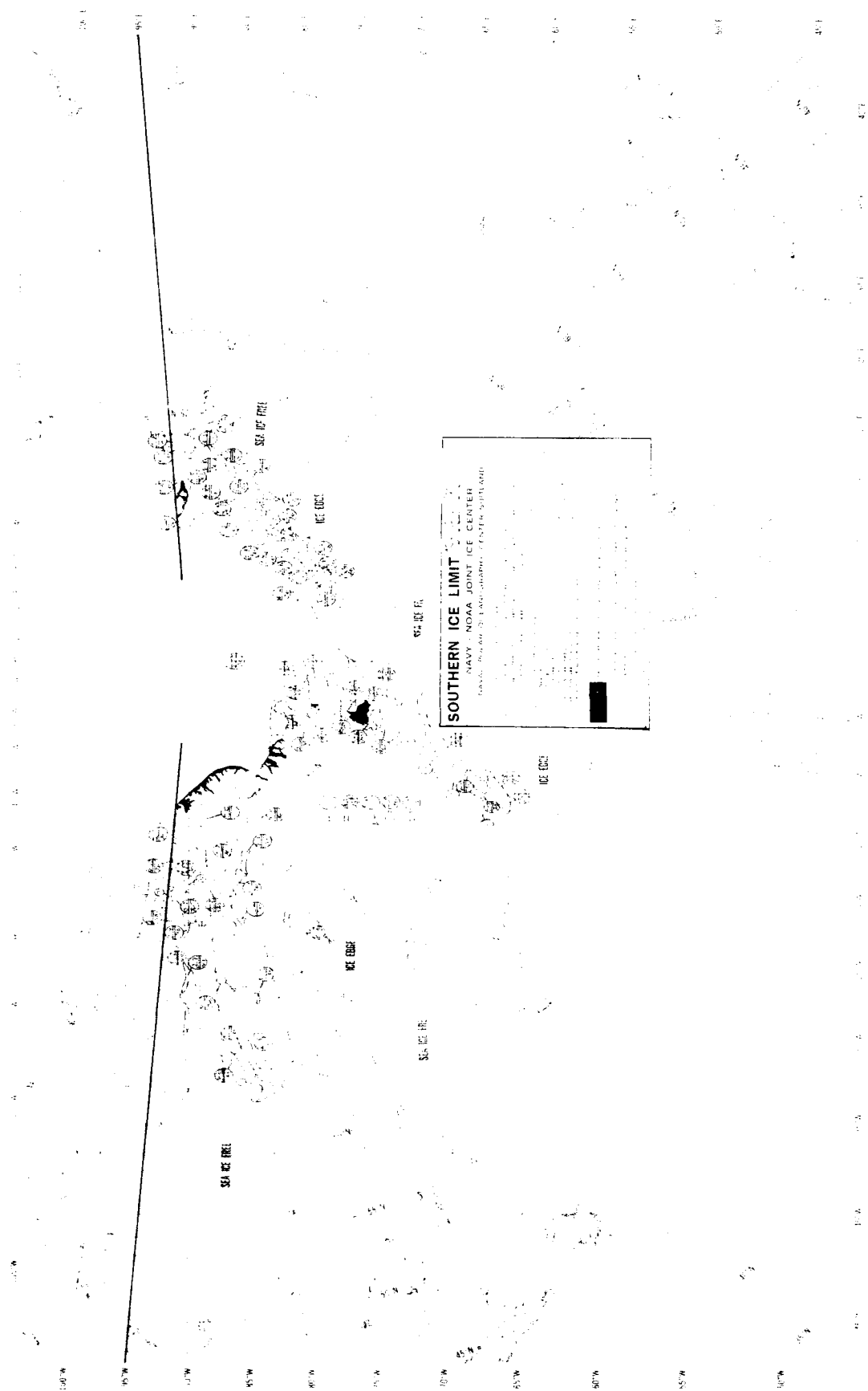




SOUTHERN ICE LIMIT 12 SEP 90

NAVY - NOAA JOINT ICE CENTER
NAVAL POSTAL CENTER, GAITHERSBURG, MARYLAND 20878



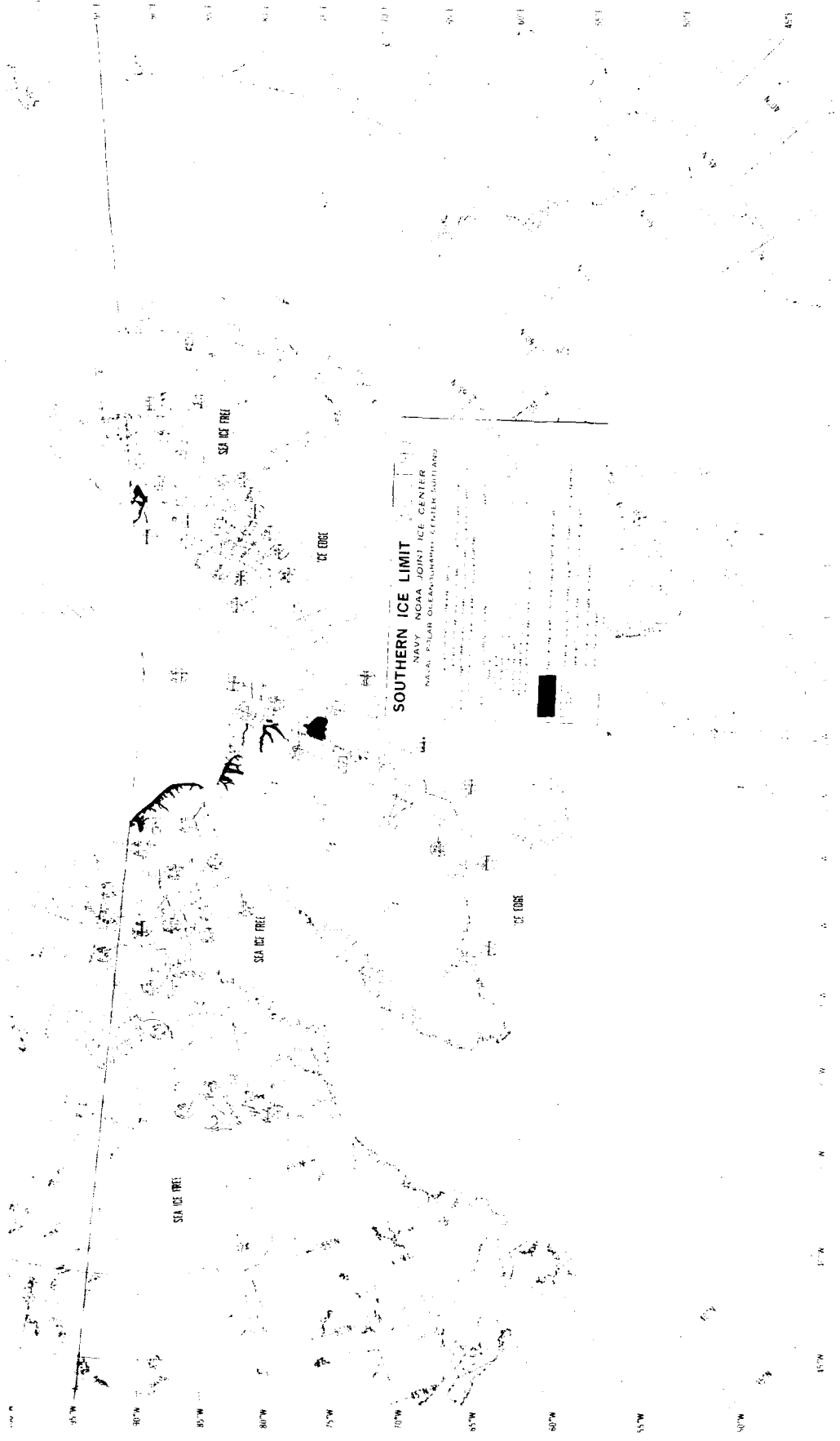


SOUTHERN ICE LIMIT
NAVY - NOAA JOINT ICE CENTER
PACIFIC OCEANOGRAPHY CENTER, SUTHERLAND

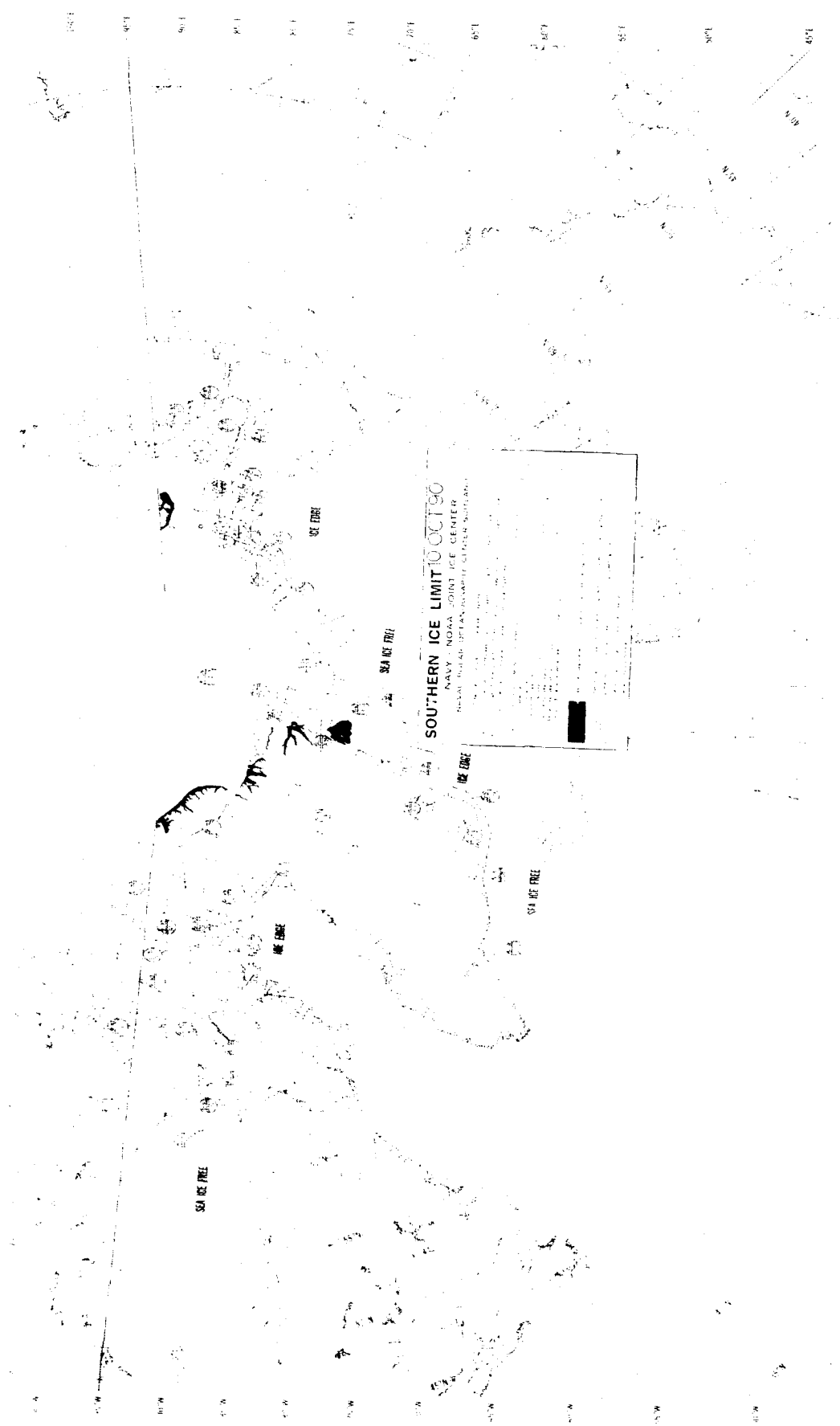


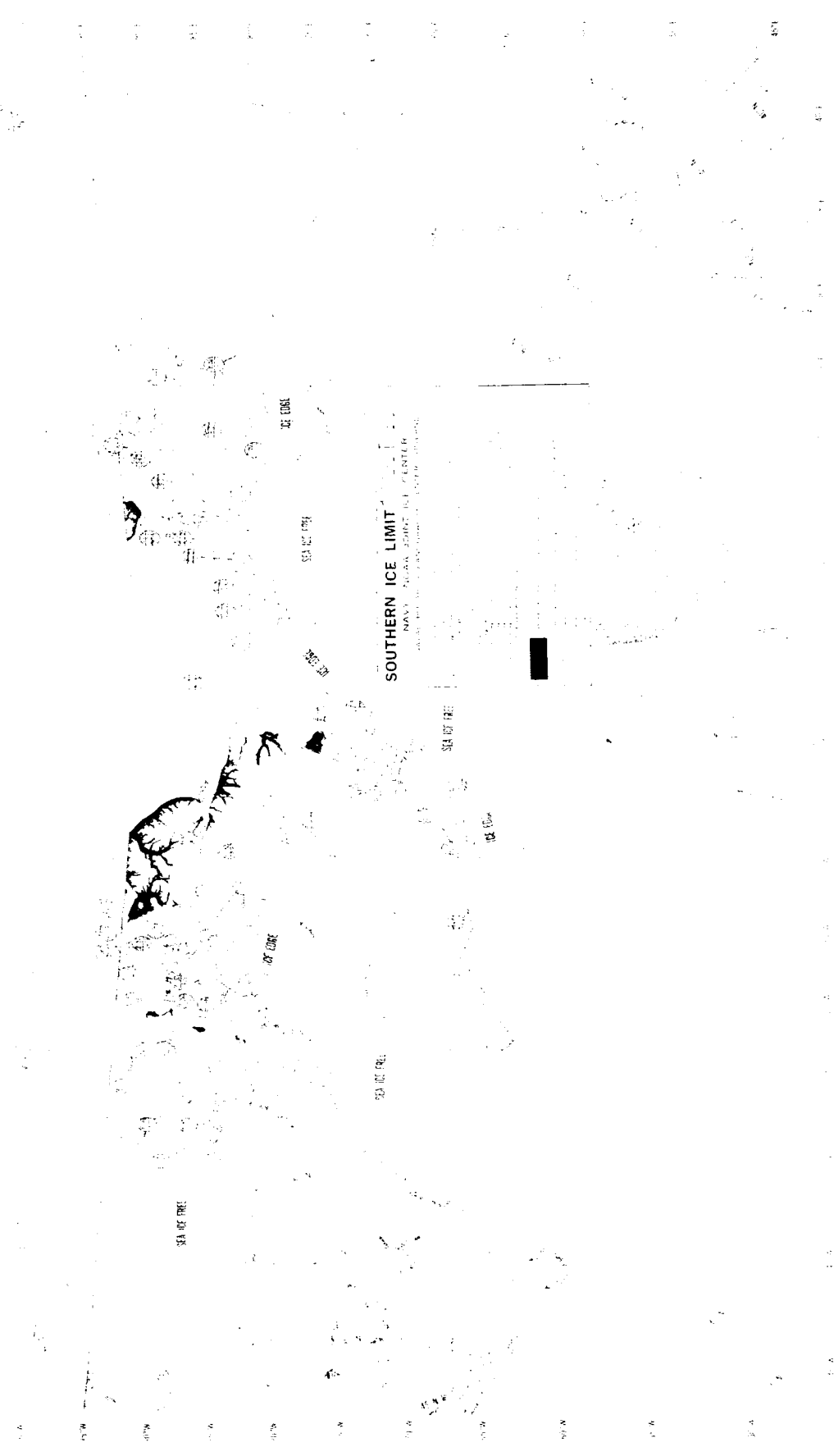
SOUTHERN ICE LIMIT





SOUTHERN ICE LIMIT
NAVY - NOAA JOINT ICE CENTER
NAVAL POLAR OCEANOGRAPHY CENTER SUDBURY





SOUTHERN ICE LIMIT

NAVY NAVAL JOINT ICE CENTER
NAVY NAVAL OPERATIONS CENTER, WASHINGTON

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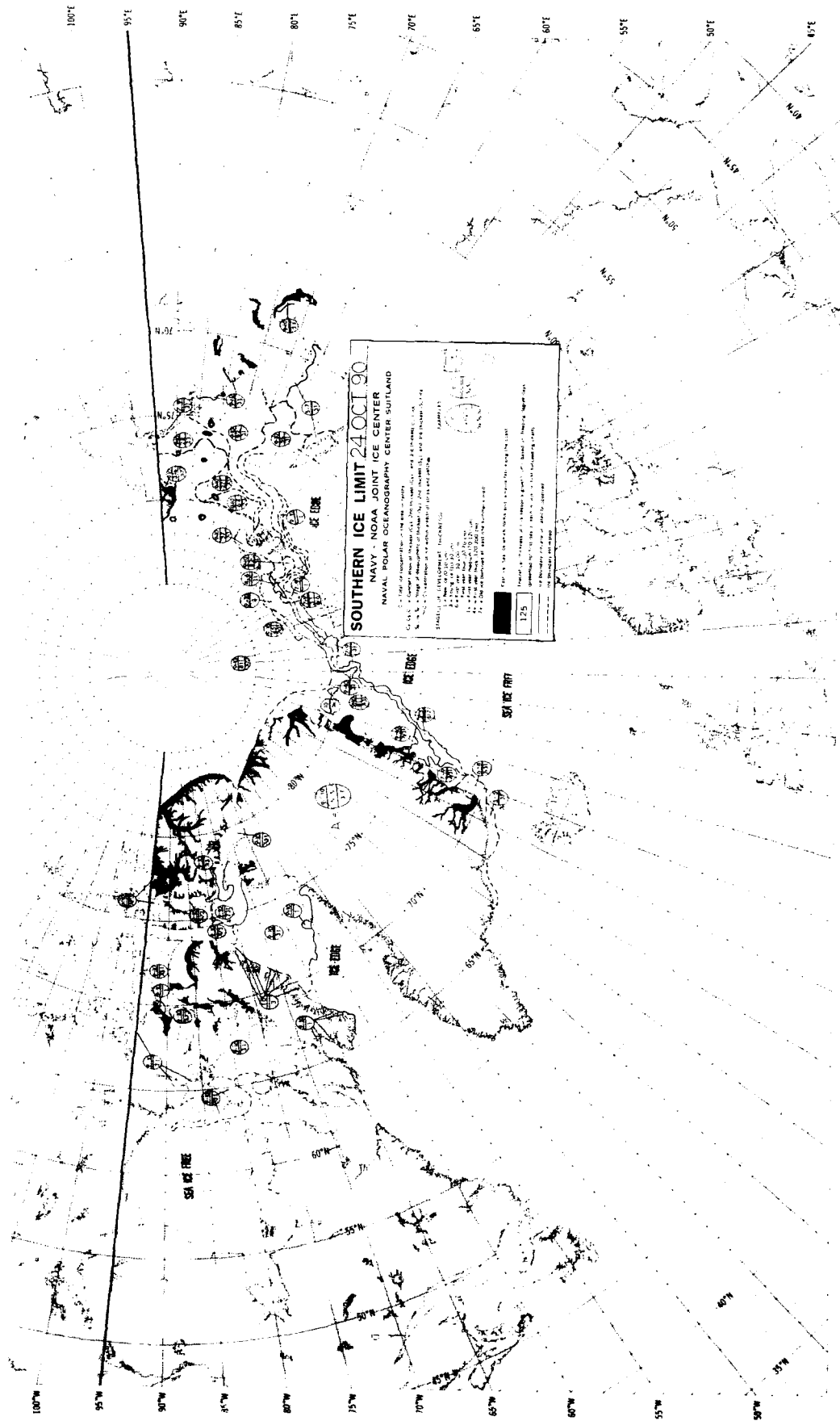
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SOUTHERN ICE LIMIT 24 OCT 90
NAVY - NOAA JOINT ICE CENTER
NAVAL POLAR OCEANOGRAPHY CENTER SUTLAND

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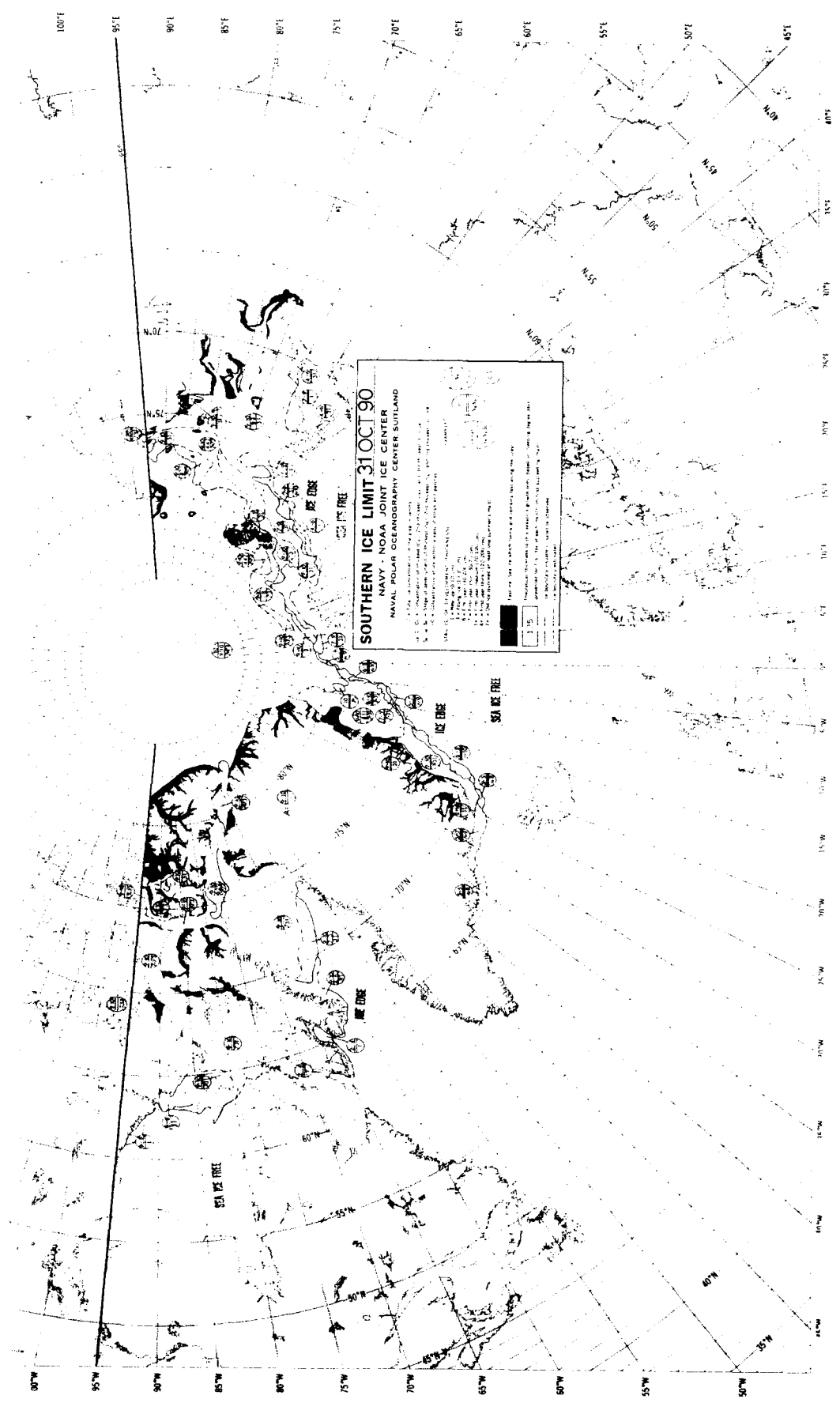
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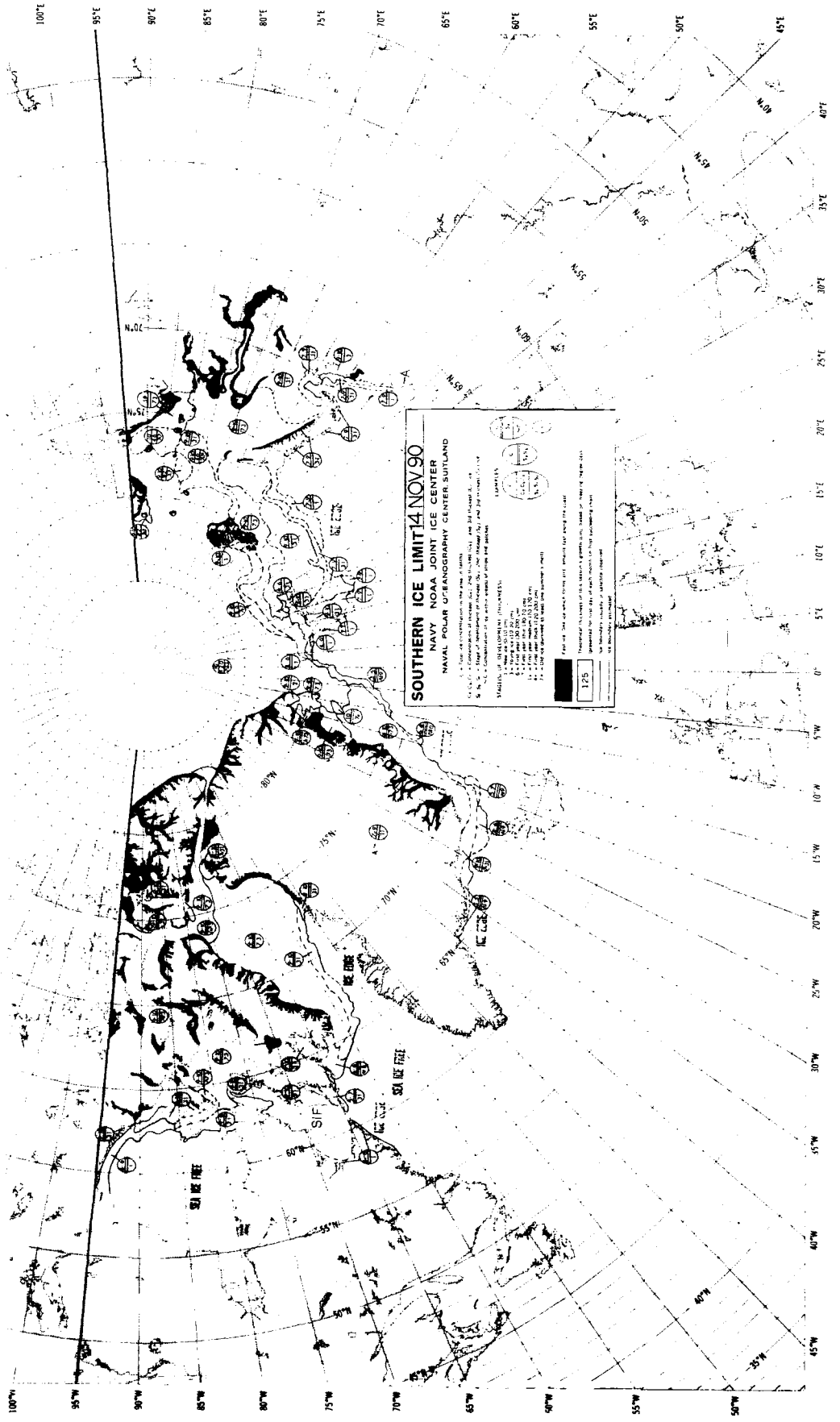
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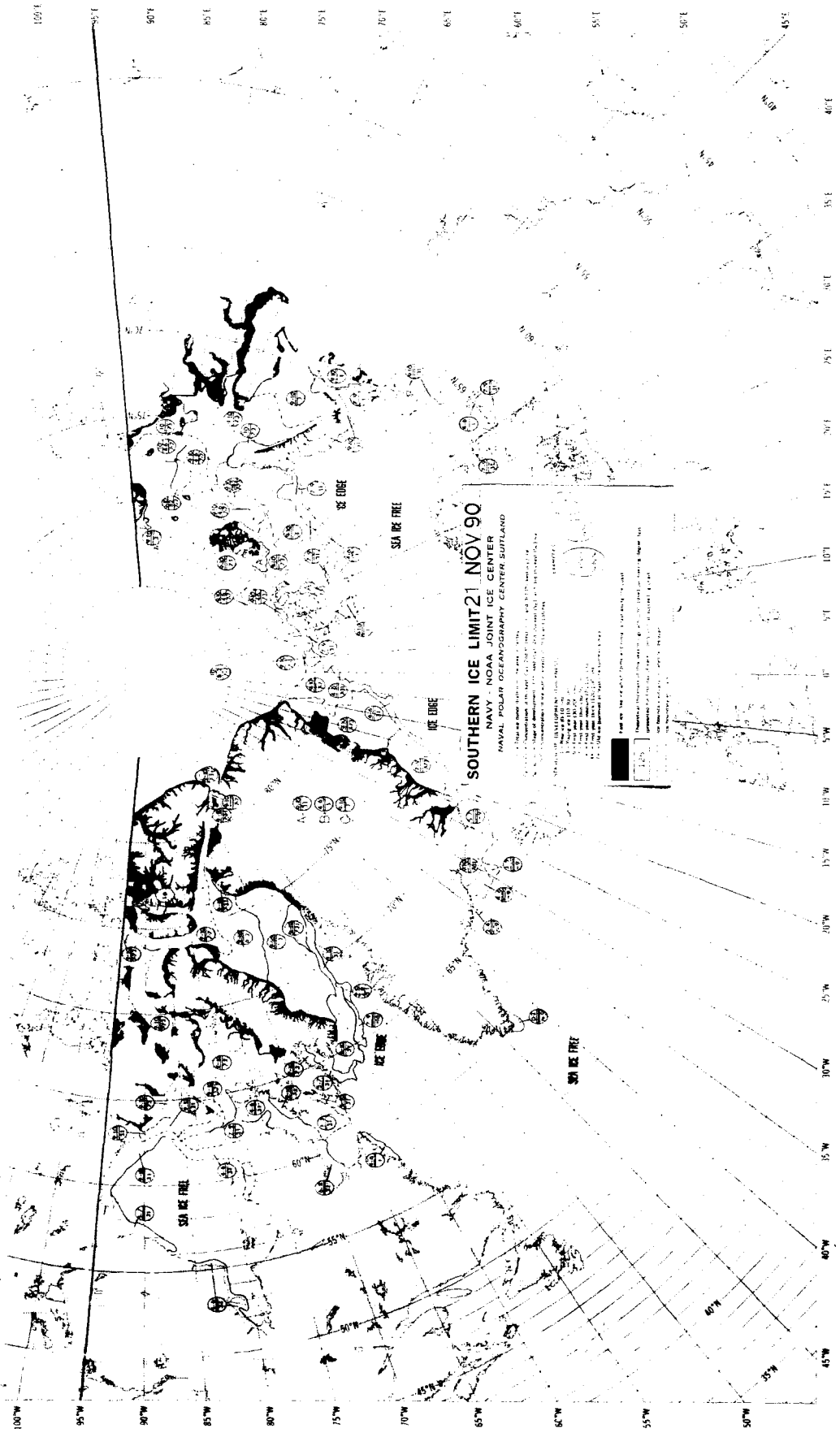


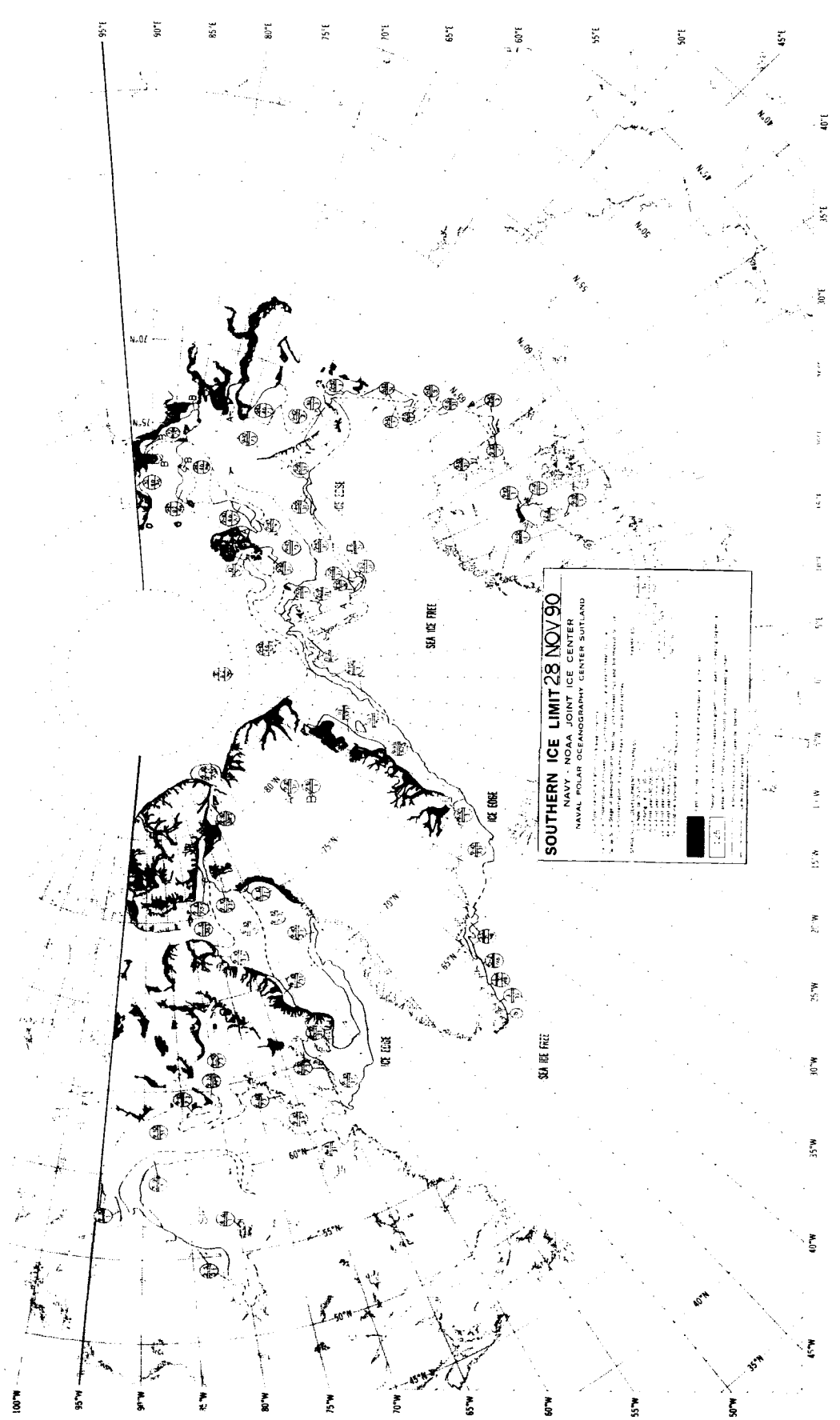
SOUTHERN ICE LIMIT 31 OCT 90
 NAVY - NOAA JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPHY CENTER SUTLAND

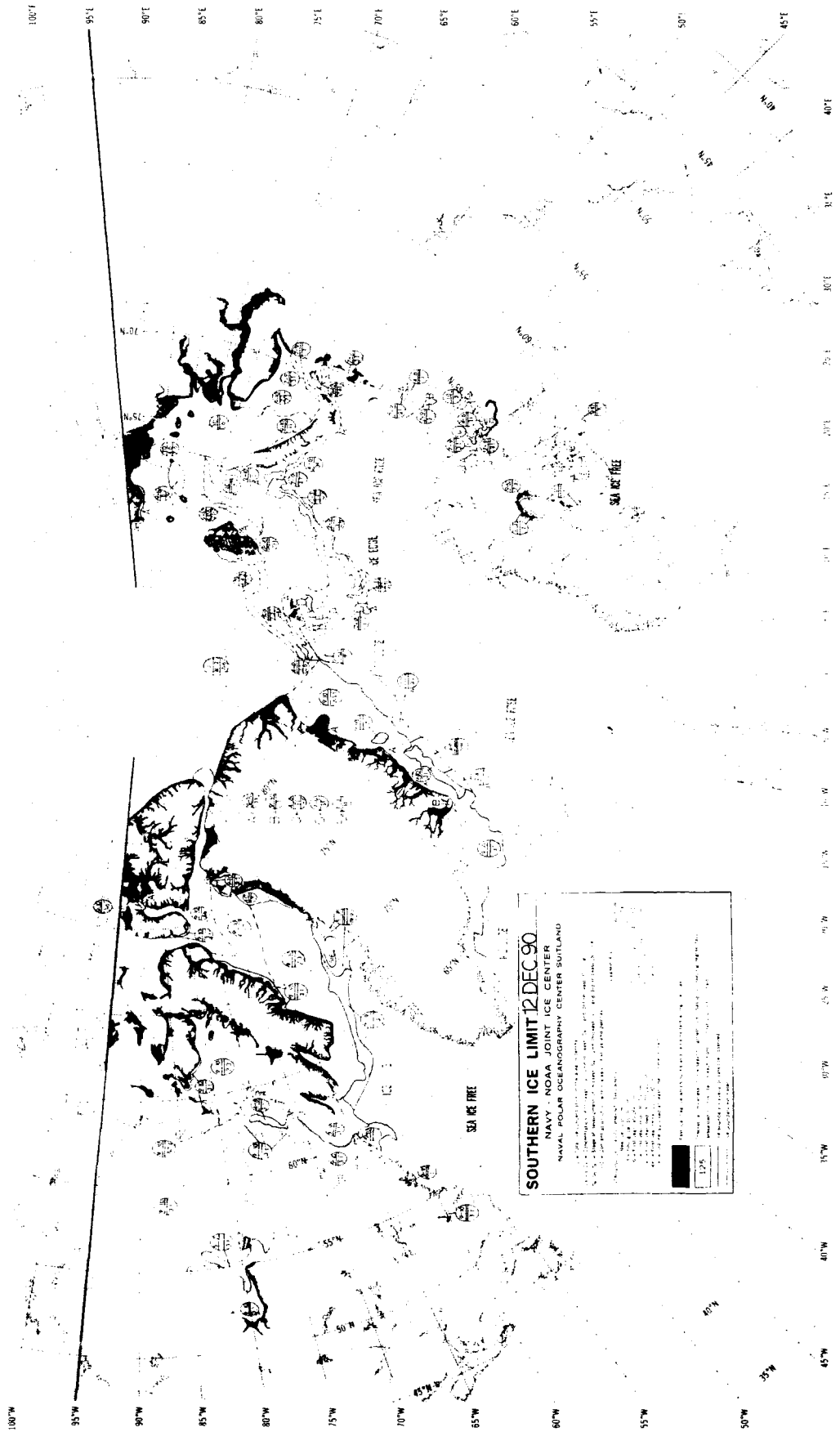
LEGEND

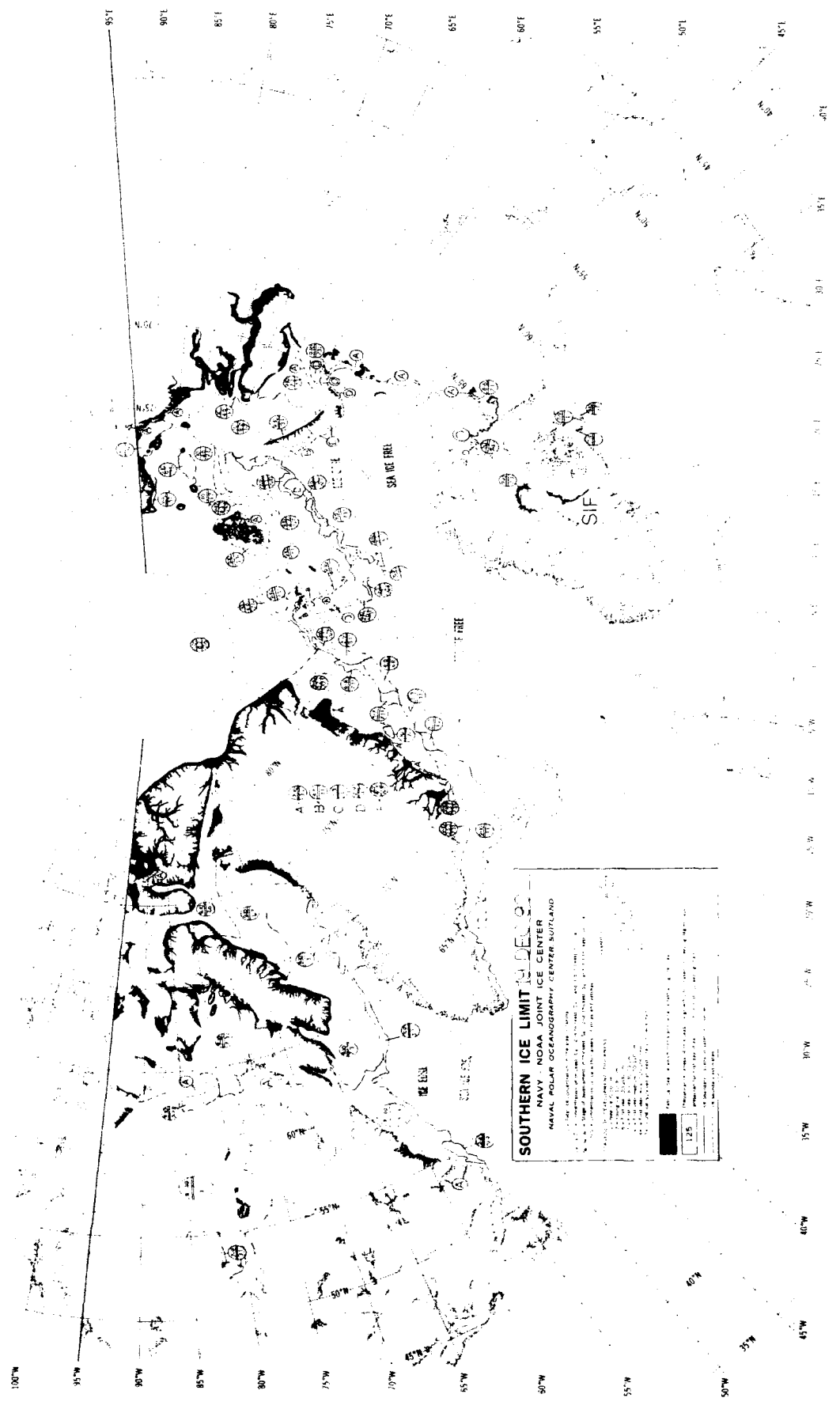
- 1. Ice Limit (Thick Black Line)
- 2. Ice Edge (Thin Black Line)
- 3. Ice Shelf (Dotted Line)
- 4. Ice Floe (Small Circle)
- 5. Ice Free (Large Circle)
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SOUTHERN ICE LIMIT
 NAVY, NOAA, JOINT ICE CENTER
 NAVAL POLAR OCEANOGRAPHY CENTER SINGAPORE

Scale: 1:250,000
 Date: 1975

Legend:

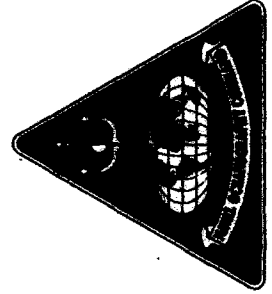
- Ice Limit
- Ice Shelf
- Ice Stream
- Ice Front
- Ice Edge
- Ice Margin
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- Ice Limit (2017)
- Ice Limit (2018)
- Ice Limit (2019)
- Ice Limit (2020)

TABLE 1. SATELLITE DATA UTILIZED DURING 1990 (ARCTIC)

Time period		Satellite Remote Sensing				
From	To	Sensor Platform	Sensor Type	Spectral Region	Resolution	Coverage
1-90	12-90	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		
1-90	12-90	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		
1-90	12-90	DMSP-F(8)	OLS			
			VIS	0.4-1.1 um	.62 km	Regional
			IR	10.2-12.8 um	.62 km	Regional
			SSM/I			
			MW	1.55 cm (19.35 GHz)	50 km	Global
				0.81 cm (37.0 GHz)	35 km	Global

Abbreviations and Acronyms

- AVHRR - Advanced Very High Resolution Radiometer
- cm - Centimeter
- GAC - Global Area Coverage
- GHz - Giga-hertz
- HRPT - High Resolution Picture Transmission
- IR - Infrared
- km - Kilometer
- LAC - Local Area Coverage
- MW - Microwave
- NIR - Near Infrared
- OLS - Operational Line Scan System
- SSM/I - Special Sensor, Microwave Imager
- um - Micrometer
- VIS - Visible



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