

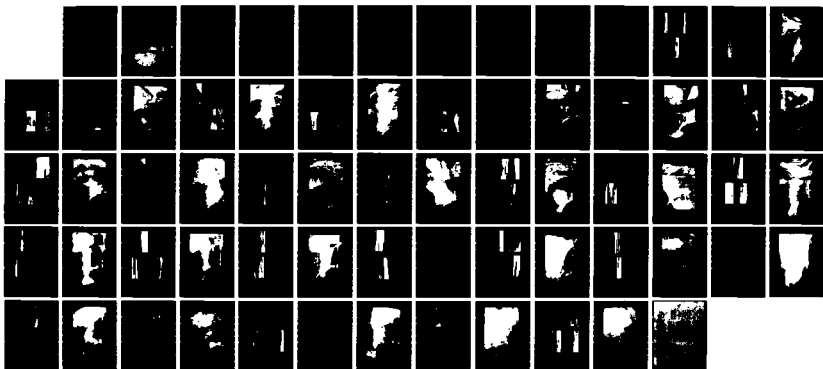
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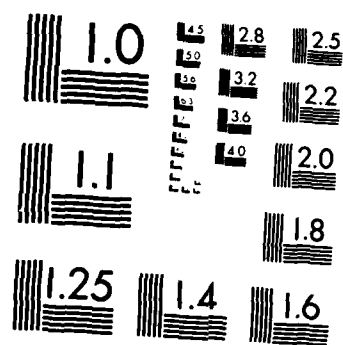
REPORTS OF THE US - USSR WEDDELL POLYNVA EXPEDITION
OCTOBER-NOVEMBER 1981. (U) COLD REGIONS RESEARCH AND
ENGINEERING LAB HANOVER NH S F ACKLEY ET AL. JAN 83
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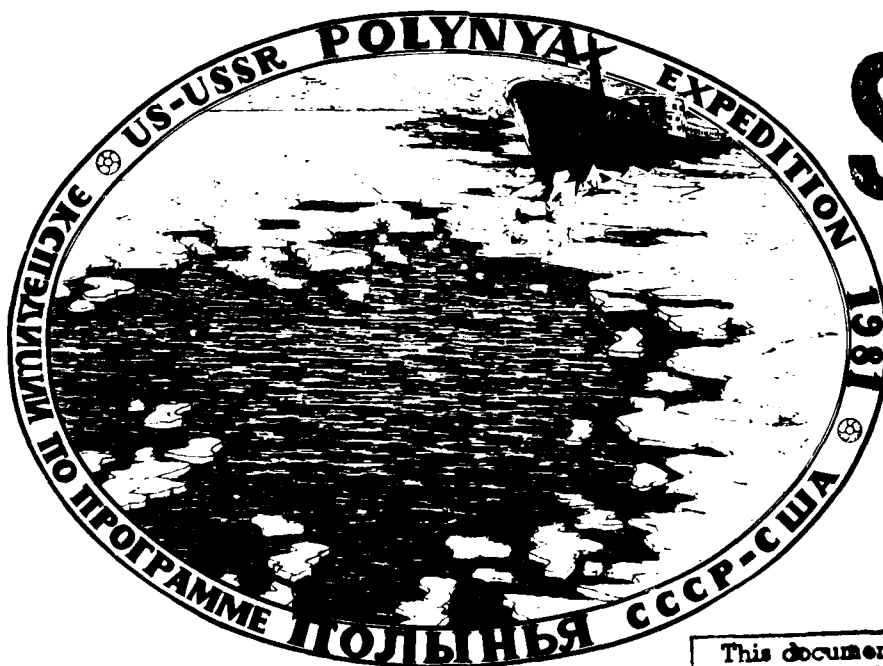
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NATIONAL BUREAU OF STANDARDS-1963-A

Reports of the

**U.S. ~ U.S.S.R.
WEDDELL POLYNIA
EXPEDITION**

October - November
1981

Volume 5
Sea Ice Observations



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U.S. Army Cold Regions Research and Engineering Laboratory

1983

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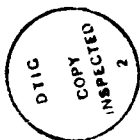
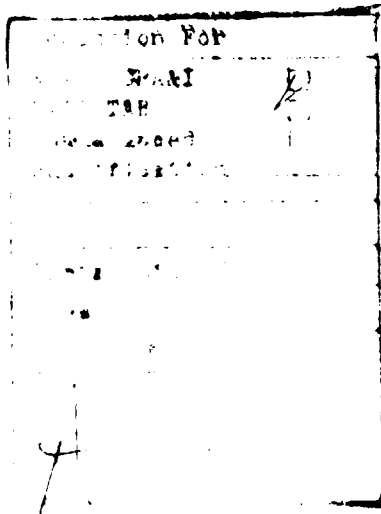
SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER Special Report 83-2	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) REPORTS OF THE U.S.-U.S.S.R. WEDDELL POLYNIA EXPEDITION, OCTOBER-NOVEMBER 1981 Volume 5, Sea Ice Observations		5. TYPE OF REPORT & PERIOD COVERED
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Stephen F. Ackley and Sandra J. Smith		8. CONTRACT OR GRANT NUMBER(s) NSF #DPP-8006 922
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army Cold Regions Research and Engineering Laboratory Hanover, NH 03755		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS National Science Foundation Washington, D.C.		12. REPORT DATE January 1983
		13. NUMBER OF PAGES 68
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Antarctica Cold regions Ice Ice reporting Sea ice		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Sea ice conditions recorded during the Weddell Polynya Expedition (Oct-Nov 1981) are presented in several formats. These include an ice conditions map prepared by the ship's meteorological crew, a narrative ice log supplemented by photographs taken by one of the authors, and daily satellite photographs. These are presented in a format compiling each day's conditions on one or two pages. These observations are being correlated with other satellite-based estimates of ice conditions, and with other oceanographic and meteorological measurements made during the expedition.		

PREFACE

This report was prepared by Stephen F. Ackley, Chief, Snow and Ice Branch, Research Division, U.S. Army Cold Regions Research and Engineering Laboratory, and Sandra J. Smith, Mathematics Technician, SIB. The study was funded under National Science Foundation Agreement DPP-8006922, "Air-Sea Interaction and Sea Ice Studies of the Joint Weddell Polynya Expedition."

The authors thank the scientific and meteorological complements of NES Mikhail Somov for the observations pertinent to and preparation of the ice conditions map. Ivan Chuguy headed this effort and his cooperation is gratefully acknowledged. They also thank Diane Clarke of the Snow and Ice Branch for editing the narrative and clarifying ambiguities in the text by drawing on her own observations during the cruise.



WEDDELL POLYNIA EXPEDITION: SEA ICE OBSERVATIONS

Stephen F. Ackley and Sandra J. Smith

INTRODUCTION

This report contains data sets that describe the ice conditions encountered by the vessel Mikhail Somov during the Weddell Polynya Expedition. The expedition was a multidisciplinary effort consisting of physical oceanography, biological oceanography, chemical oceanography, sea ice studies, atmospheric boundary layer studies, and upper air observations during late winter and spring in the eastern part of the Weddell Sea (near 60°S latitude, 0° longitude) in areas covered by pack ice. Figure 1 shows the cruise track and study area in relation to Antarctica. A summary of the scientific activities is given in Gordon and Sarukhanyan (1982). Narrative cruise reports describing each scientific component in more detail may be found in the U.S. Expedition Report - WEPOLLEX (Gordon 1982).

The ice conditions encountered are depicted in four ways. There were two sets of independent vessel-based observations: 1) An ice observation map was constructed by the Soviet scientific party based on visual observations of ice conditions at about 3-hour intervals (Fig. 2). 2) Visual observations were made and photographs taken at about the same intervals by a member of the American scientific party (see Appendix). Two other representations of the ice conditions were obtained by satellite imagery. One, transmitted by satellite directly to the vessel, consisted of visual band facsimile photographs (Appendix) from Soviet meteorological satellites (Meteor Series). The other was composed of weekly maps of ice conditions constructed by the Navy-NOAA Joint Ice Center in Suitland, Maryland. These maps were based primarily on microwave satellite images from the NIMBUS-7 Scanning Multifrequency Microwave Radiometer (SMMR) (Fig. 3).

The primary purpose of this report is to present these data sets in one accessible location. Some comparisons are made among the data sets. A more detailed discussion of the differences will be the subject of future reports.

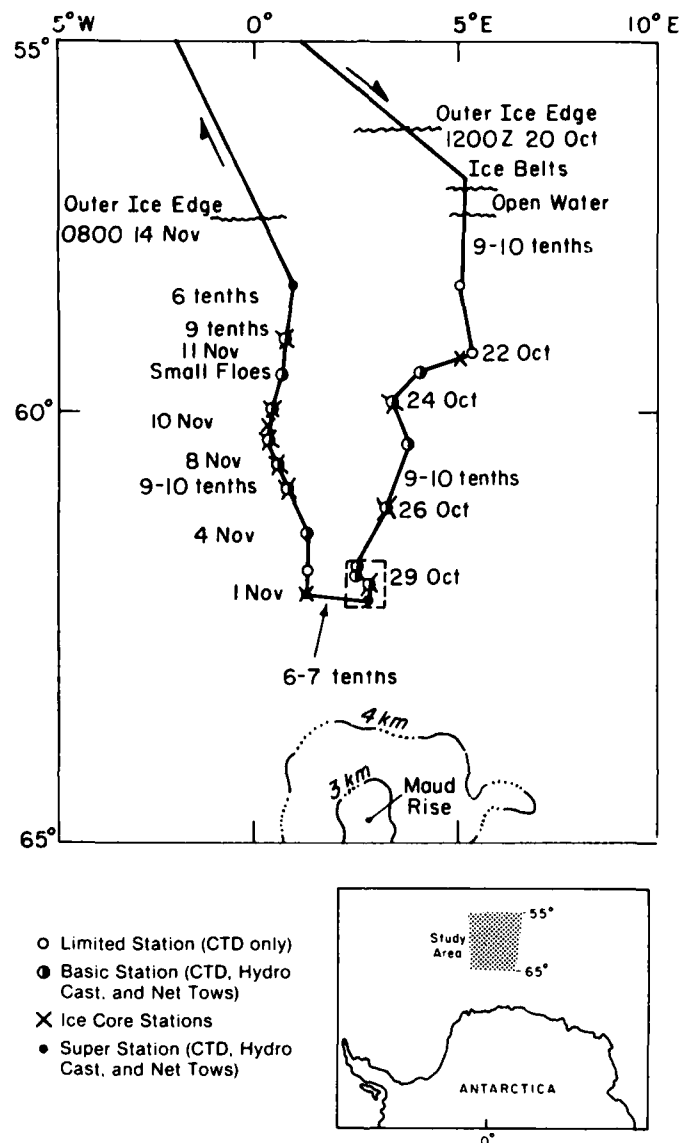


Figure 1. Cruise track of the NES Mikhail Somov, 20 Oct - 14 Nov 1981.

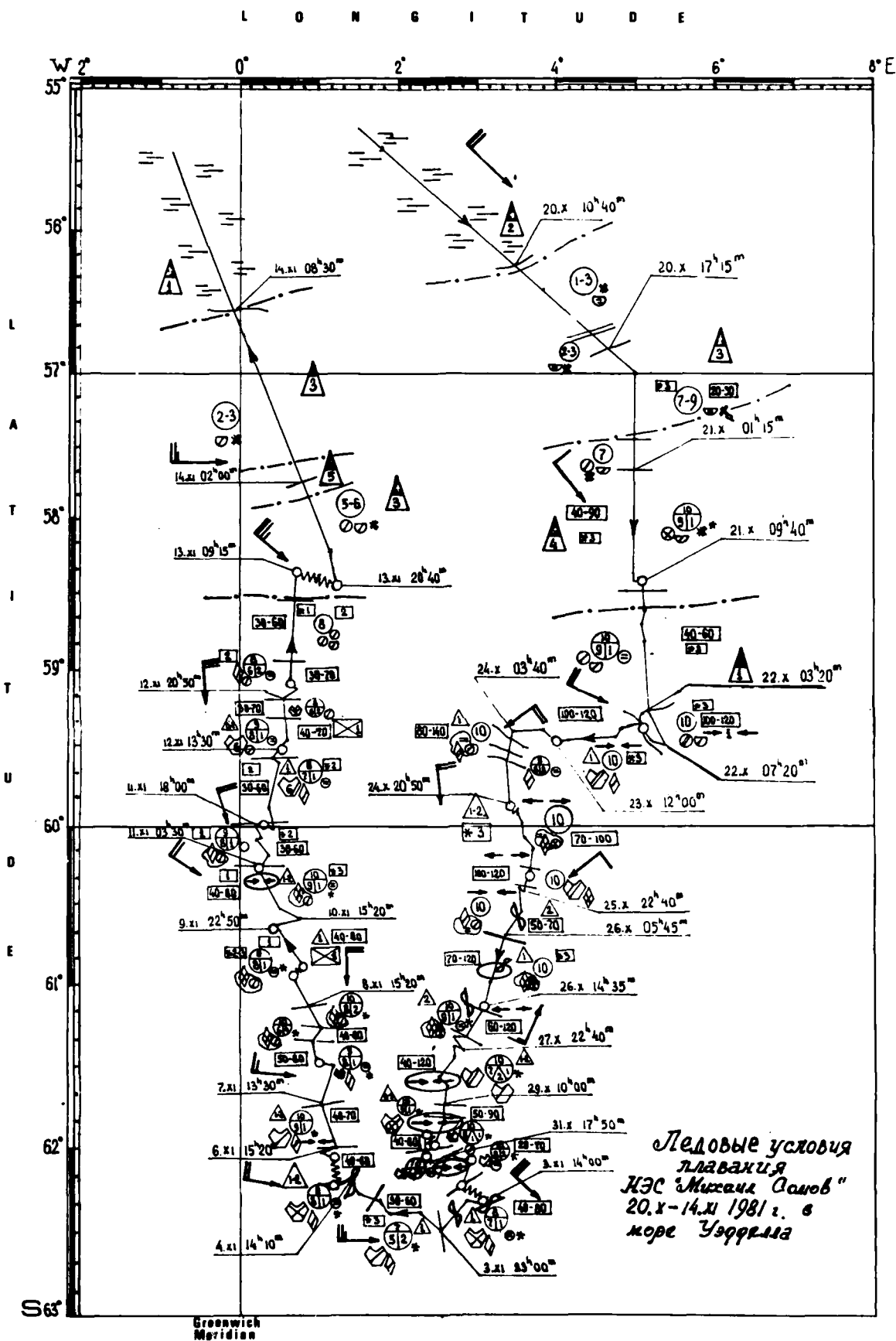


Figure 2. Ice conditions during the voyage of the NES Mikhail Somov, 20 Oct - 14 Nov 1981 (20.x-14.xl 1981) in the Weddell Sea. (Prepared by Soviet party aboard ship.)

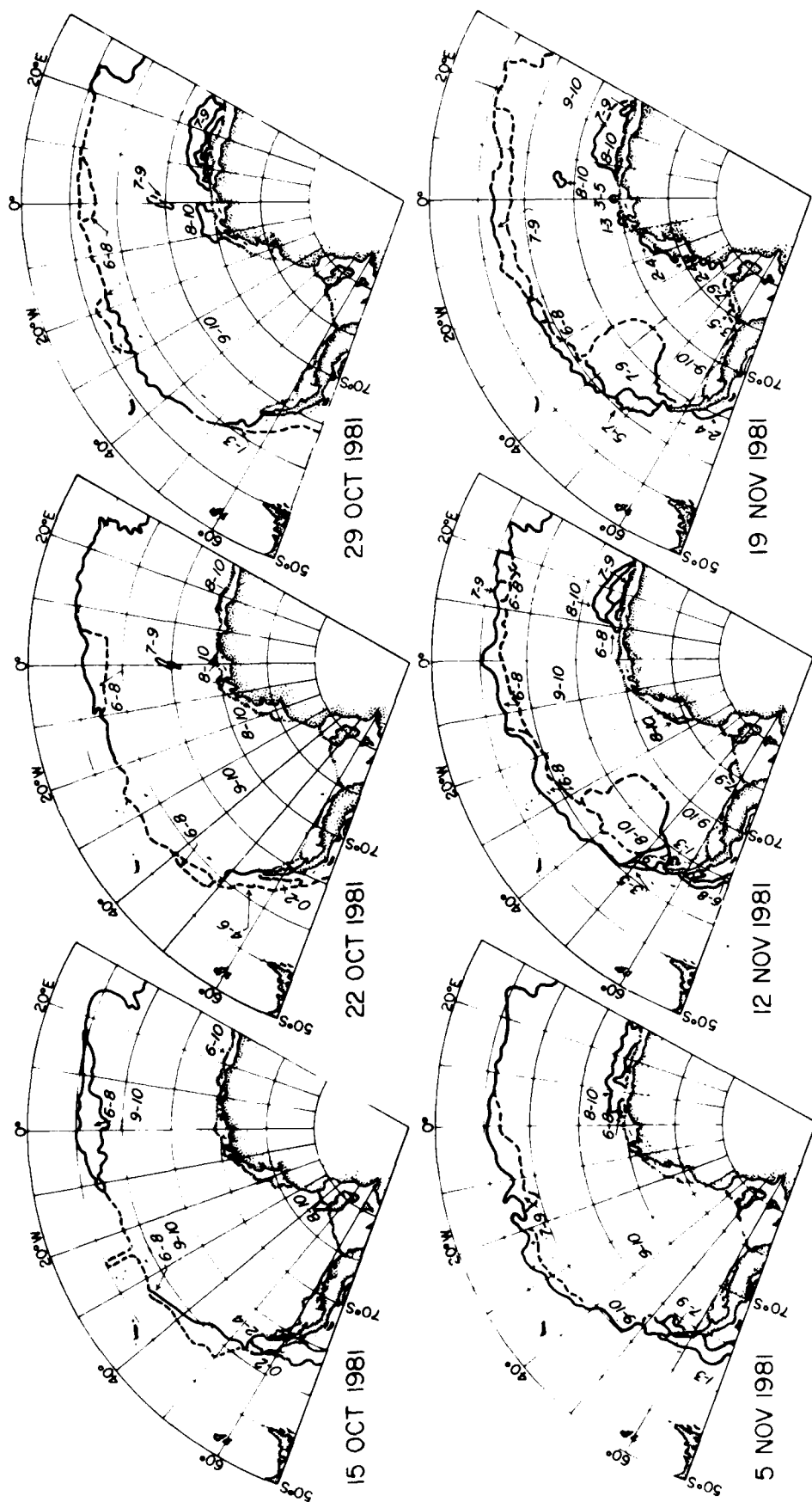


Figure 3. Sea ice extent and concentration during October and November 1981, taken from the Navy-NOAA Joint Ice Center maps.

ICE CONDITION DATA SETS

The ice map prepared by the Soviet party is shown in Figure 2. The ship's track is represented by the solid arrow-line.

The daily ice observation sheets in the Appendix are divided into the date plus five columns. The second and third (Hour and Symbols) columns refer to information taken directly off the ice map. The Description of Symbols (column 4) is a direct interpretation of the grouping of Russian symbols, each depicting a specific ice condition at that time and point along the ship's track. The symbols were interpreted by using a Russian-to-English dictionary and the Soviet Monograph "Sea Ice Nomenclature: Conventional Terms Used on Ice Maps" (1974). The final two columns (5 and 6) are visual observations of the ice conditions as described by S.F. Ackley in his ice observation log recorded aboard ship at the specific time and date in column 1. Photographs taken at ship level at the time indicated on the ice observation sheets are also shown.

For any given day some discrepancies can be seen between the ice map description (derived from the symbols) and the ice log narrative for corresponding times. These discrepancies are explained by the "averaging" technique apparently used by the ship's party in representing the ice conditions. The symbols on the map represent the overall ice conditions during some spatial (a few kilometers) or temporal (hours) period. The ice log narrative, on the other hand, describes the conditions alongside the ship at the time of the observation ($\pm$ minutes) and within the visual range of the observer (less than about 1 km). If both techniques were used correctly, then the ice map representation should be the "sum" of the ice log observations for any given day. A number of factors will, however, introduce error into such a comparative procedure, including the frequency of the ice log observations, observer bias (both in detailing ice characteristics and in regional averaging), ship speed, and weather conditions (visibility). In most cases, there is reasonable agreement between the map and the ice log narrative; where there is not, one or more of the factors described above are responsible.

Figure 3 shows the weekly ice maps for the Weddell Sea sector prepared by the Navy-NOAA Joint Ice Center (after Gordon, in press). The major feature shown on these maps is the relatively high ice concentration (9-10 tenths) in the interior regions of the pack ice. On 22 and 29 October 1981

an area of reduced concentration (7-9 tenths) appears in the region of 65°S, 0° longitude. This feature at the time of observation was thought to be "polynya-like." However, as shown on the later maps (5 and 12 November) the ice concentration subsequently increased. This feature was also detected on the Soviet meteorological satellite images (Appendix), thus verifying the microwave interpretation of the lesser concentration.

The meteorological satellite photo for each day (with grid overlay indicating geographical coordinates) is shown on the page adjacent to the same day's ground-level ice observation sheets in the Appendix. If the ice cover is not obscured by clouds, these photos can give a regional-level view of ice conditions. For reference the ship's position on the indicated day is shown by a dot on the satellite photo.

LITERATURE CITED

- Gordon, A.L. (Ed.) (1982) U.S. expedition report - WEPOLLEX 1981. Lamont-Doherty Geological Observatory Miscellaneous Paper.
- Gordon, A.L. and E.I. Sarukhanyan (1982) American and Soviet expedition into the Southern Ocean sea ice in October and November 1981. EOS, vol. 63, no. 1, p. 2.
- Gordon, A.L. (in press) The US-USSR Weddell Polynya Expedition. Antarctic Journal of the United States.
- Nomenklatura morskikh l'dov. Uslovnnye obozhnacheniiia d'lia ledovykh kart (Sea ice nomenclature. Conventional terms used on ice maps.) (1974) Leningrad, Gidrometeoizdat (CRREL Bibliography 30-737).

APPENDIX: ICE MAP INTERPRETATION AND DAILY ICE OBSERVATION LOG

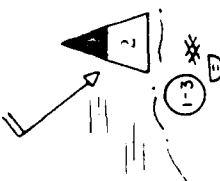
APPENDIX A

REMARKS: F.M. ICE OBSERVATION LOG

HOUR

DESCRIPTION OF SYMBOLS

Wind direction NW. Wind speed 10 m/s.
Berry water (concentration 2 on scale of 0-9).
Ice edge region.
1-3 tenths concentration brash ice and ice
cakes (2-20 m diameter and 15-30 cm thickness).



DATE

at

1715



Small lead.

2-3 tenths concentration composed of ice cakes
(2-20 m diameter; 15-30 cm thickness) and brash
ice (<2 m diameter).

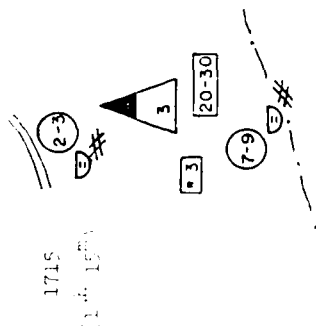
Iceberg concentration 3 on scale of 0-9.

Still in ice edge region.

Snow encrusted ice (concentration of 3 on scale
of 0-3).

7-9 tenths concentration composed of ice cakes
(2-20 m diameter; 15-30 cm thickness) and brash
ice <2 m diameter).

Average ice thickness 20-30 cm.



1115 First small chunks of ice appear.

1139 Small bits and pancakes (concentration less than 1
tenth).

1143 Plume of pancakes and small broken floes.

1156 Open water, between ice edge plumes.

1200 Low concentration (1 tenth).

1213 Change from brash plume to small broken floes

(1-2 tenths concentration).

1304 Open water entering thickly concentrated plume of

small floes and brash.

1345 Small bands between lots of open water. Some older
ice with ridges, floe size approximately 5 m.

1521 Band and plumes; floe size 3-5 m across. Low period
swell.

1645 Plume of concentrated small floes, small bits of
old ice. Now covered ice. Floes 4-5 m across.

1717 Extensive band of small floes. More complete ice
cover 4-6 tenths.



1756 7-9 tenths ice concentration. Band of first year
floes 8-10 m diameter with brash/frazil between
floes.

1809 10 tenths ice concentration. Small floes and brash.

1815 9 tenths ice concentration. Continued cover of small
floes, first year ice.

REMARKS FROM ICE OBSERVATION LOG

Lesser concentration (5-6 tenths). Frazil between floes.

9-10 tenths ice concentration with new ice.

9-10 tenths ice concentration, small floes. Continuous swell.

9-10 tenths ice concentration. New ice between floes. Floe size increasing with several >10 m. Open water. Ice band appearing.

Belts of small to medium floes alternating with bands of open water. Swell continues.

Open water, entering band, some rafted and ridged ice. Floe sizes 8-10 m.

Open water alternating with concentrated bands (3-6 tenths ice concentration).

HOUR

1851

1935

2115

2121

2126

2131

2240

2304

DESCRIPTION OF SYMBOLS

SYMBOLS

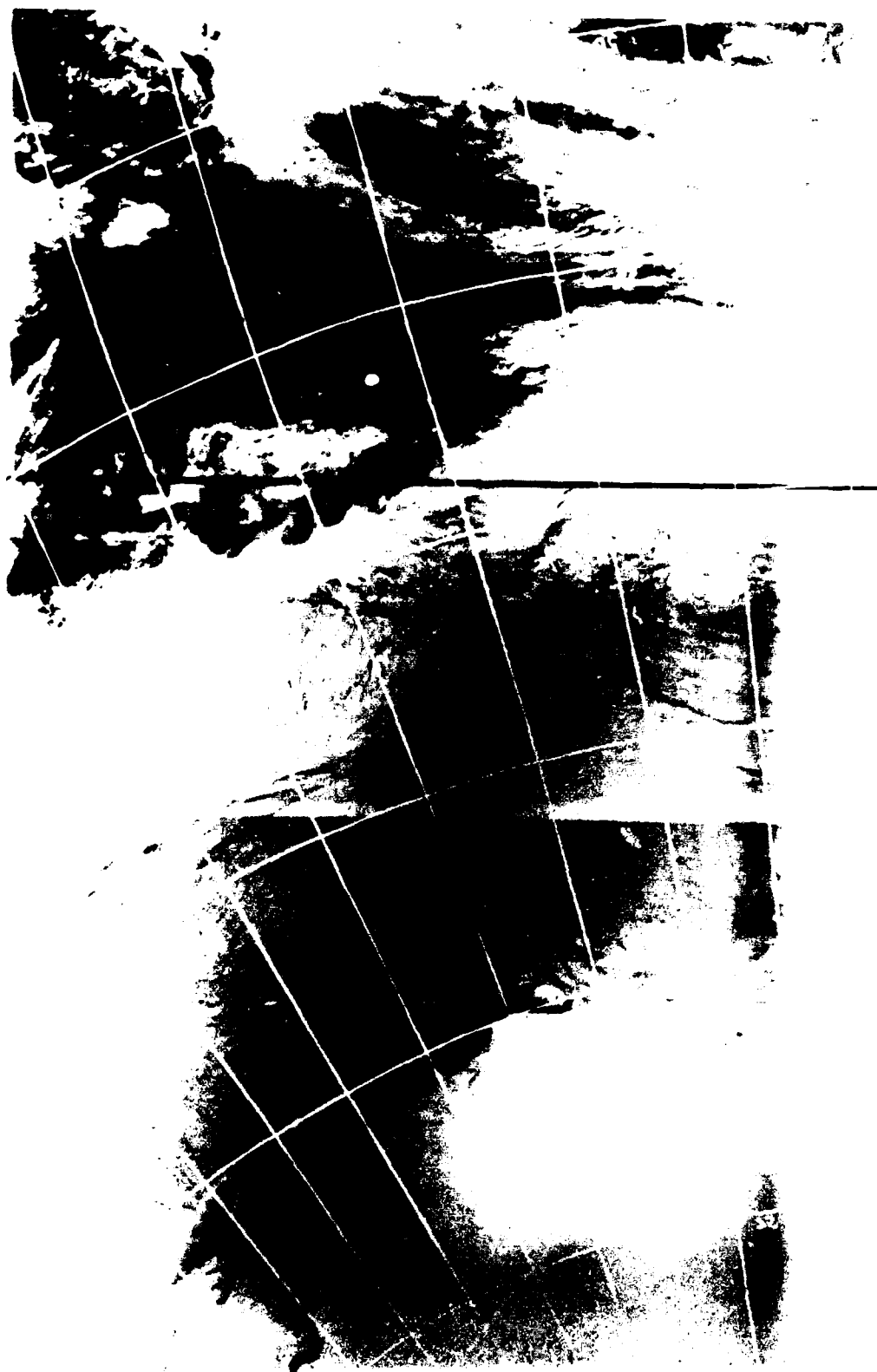
HOUR

DATE

20 Oct 51

(20.X)





-35° -30° -25° -20° -15° -10° -5° 0° 5° 10° 15°

20.10.81 12⁰⁰ GMT

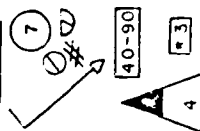
DATE

21 Oct 61

TIME

21.00

SYMBOLS



0115

(01st 10th)

Wind NW, 5 m/s.

7 tenths concentration of small floes (20-100 m diameter; 30-70 cm thickness), and ice cakes (2-20 m diameter; 30-70 cm thickness) and brash ice.

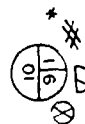
Average ice thickness 40-90 cm.

Icebergs (concentration of 4 on scale of 0-9).

Snow encrusted ice (concentration of 3 on scale of 0-3).



0940

(09th 40th)

10 tenths concentration composed of 9 tenths small ice floes (20-100 m diameter; 70-120 cm thickness) and ice cakes (2-20 m diameter; 30-70 cm thickness) and 1 tenth brash ice (<2 m diameter) and light Nilas (5-10 cm thickness).



HOUR

0012

0100

0200

0300

0500

0600

0620

0720

0730

0803

0845

1234

1307

1643

PEAKS FROM ICE OBSERVATION 1961

10 tenths floes and new ice.
10 tenths floes and new ice.
10 tenths floes; icebergs.
8 tenths first year floes; 2 tenths new ice.
Continued 10 tenths first year ice with 10-15% new ice. 8-10 diameter floes, swell continues to propagate with estimated 3 mile amplitude.

Continued 10 tenths first year ice with 10% new ice. All new ice looks like swell generated by oscillatory motion as pieces "jigsaw". Floe diameter maximum 8-10 m with some smaller pieces.

10 tenths concentration, first year floes "15 m diameter. Platons. Substantial porosity in ice. Approximately 10% new ice between older floes. Thickness approximately .5-1 m, color in center of blocks.

10 tenths concentration, approximately 10% new ice (swell formed). Between 5-10 m diameter floes, swell continues.

10 tenths concentration, slightly less new ice in the cracks formed by swell propagation. Floes 4-10 m diameter.

Ice conditions 10 tenths concentration, small floes (2-10 m) separated by approximately 10% new ice. Swell continues.

Ice conditions 10 tenths concentration, small floes 8-10 m diameter, approximately 10% new ice.

10 tenths concentration small of 2-10 m diameter. Very few plates, approximately 10% new ice between floes. Swell continues to propagate 3 mile.

SECRET FROM THE OFFICE OF THE SECRETARY OF DEFENSE

thicker floes, greater diameter. Well amplitude diminished to approximately 1 m. Floe diameter increasing to about 2 to 2.25 m. New ice down to under 10'.

ice concentration 10 tenths, 90-95% first year floes with new ice, 20-25 m diameter, swell visible still apparent.

ice concentration 10 tenths. 20-25" first year
floes 25 m or larger with new ice.

Concentration 10 tenths. Well, broken floes of 10 diameter, fairly flat first year. Less new ice.

25 m diameter floes recently broken by swell action. Evidently older floes. Snow drifting into small ridges, dunes, and mounds. Floes still broken recently but evidence for small ridges rather than new ice between the floes, diameter remains at 20-25 m.

Floes continue to increase at 30 m. diameter or greater. Colder looking with packed snow surfaces.

Area of some convergence with young low ridging observed. 7-6 flocs per chip length the lower axis is usually normal so floc sizes that are clearly in evidence.

DESCRIPTION OF SYMBOLS

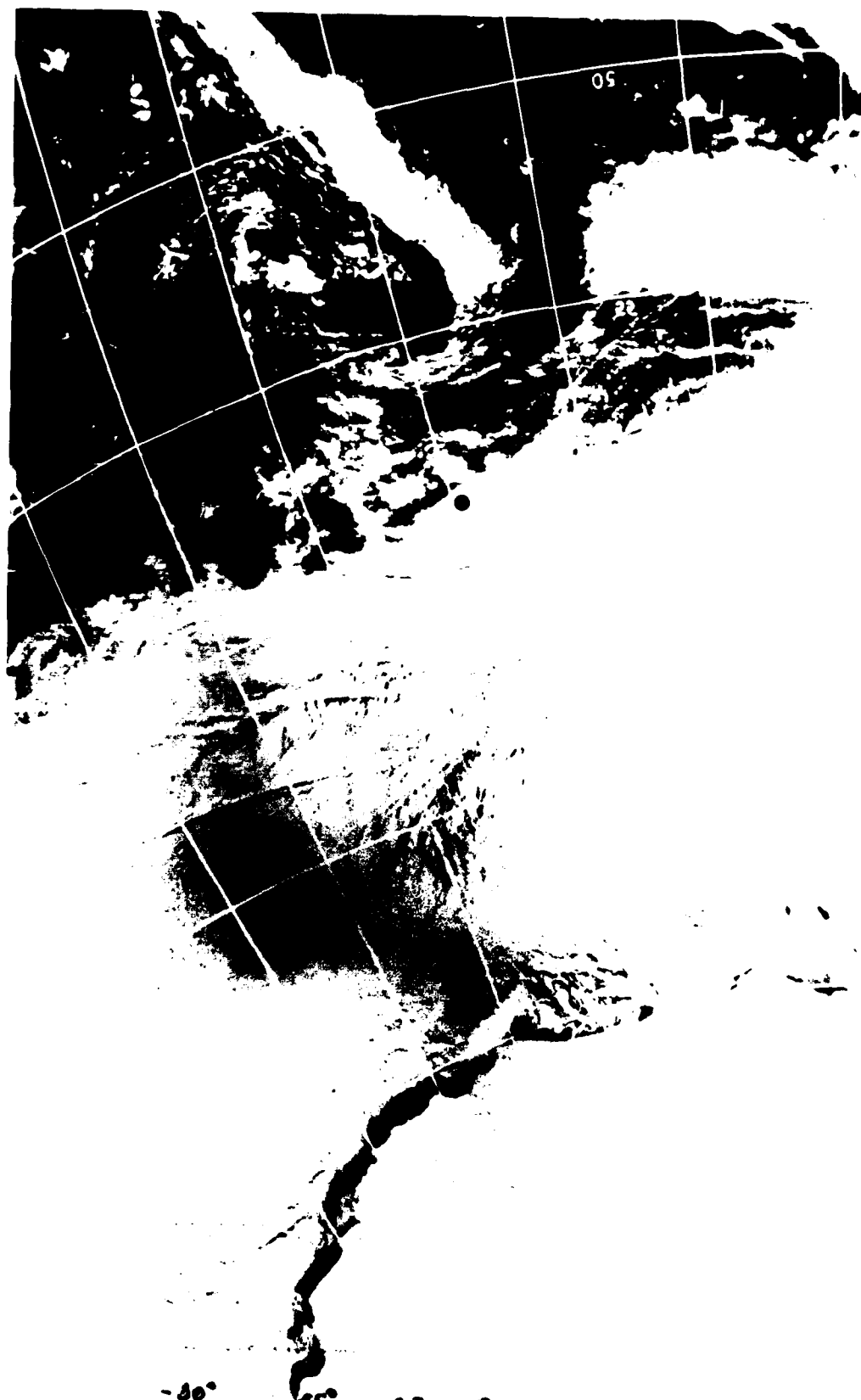
SYMBOLS

HOURLY

ETC

21 Oct 81

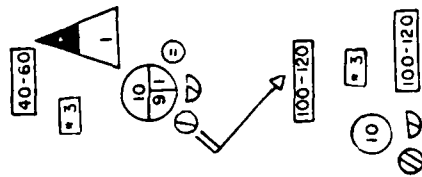
IX. TC



-30° -25° -20° -15° -10° -5° 0° 5° 10° 15°
21.10.81 12 GMT

DATE 22 Oct 81
(22.x)

SYMBOLS



0320
(03^h 20^m)

0720
(07^h 20^m)

DESCRIPTION OF SYMBOLS

Average ice thickness 40-60 cm.
Snow encrusted ice, concentration 3 (on scale of 0-3).
Iceberg concentration 1 (0-9 scale).
10 tenths concentration, composed of 9/10 small floes (20-100 m diameter, 30-70 cm thickness), and ice cakes (2-20 m diameter, 30-70 cm thickness); and 1/10 small floes (20-100 m diameter, 15-30 cm thickness).
Wind speed 10 m/sec, NW direction.
Average ice thickness 100-120 cm

Snow encrusted ice concentration 3 (0-3 scale).
10 tenths concentration consisting of small floes (20-100 m diameter, 120 cm thickness) and ice cakes (2-20 m diameter, 30-70 cm thickness).
Average ice thickness 100-120 cm.
Floes and ice cakes compacting; converging.



HOUR

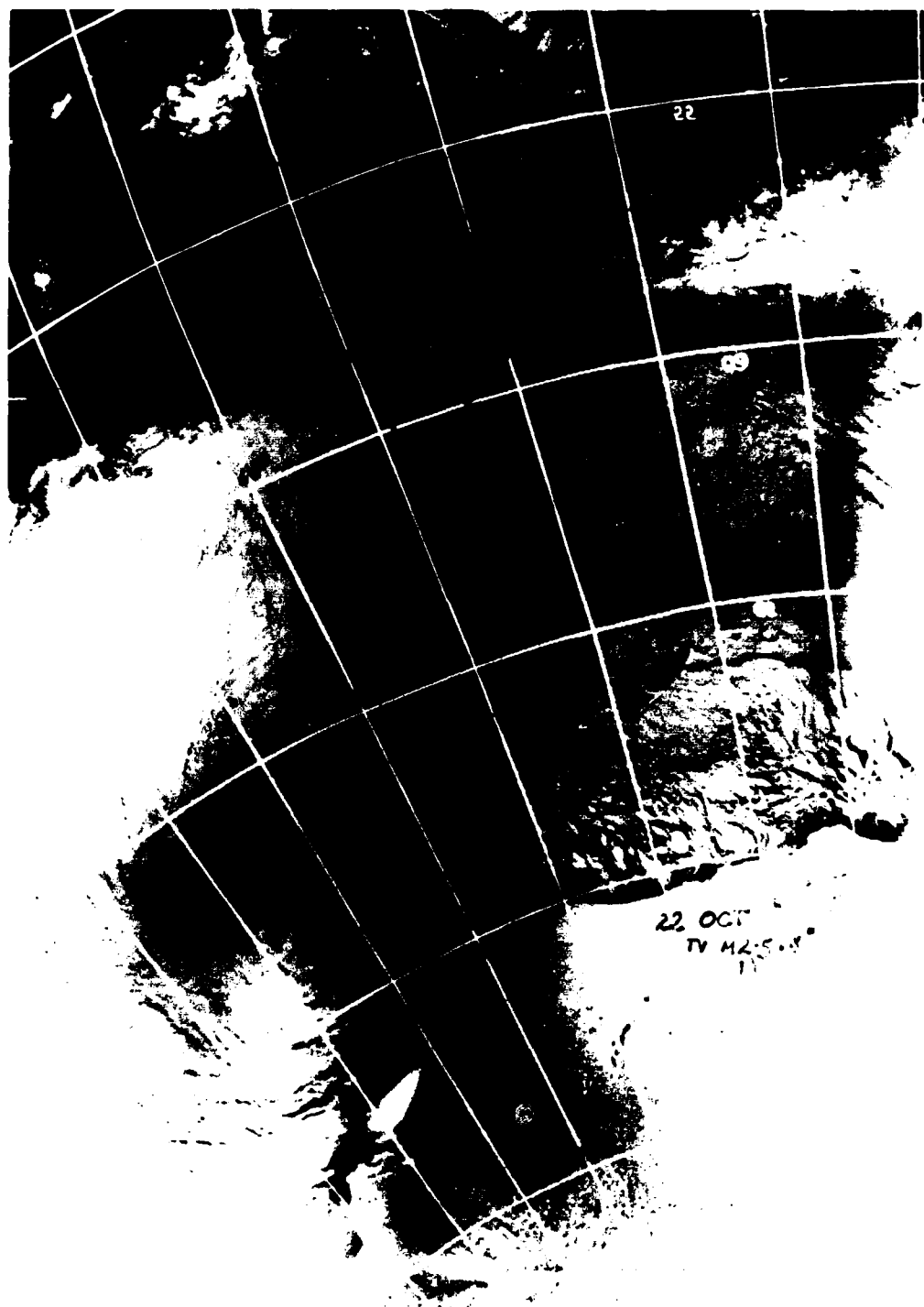
0000 10 tenths concentration, floes thicker and larger.
0200 Thicker floes > 1 m, > 40 m diameter.
0306 Large ice chunks.



REMARKS FROM ICE OBSERVATION LOG

0526 Evidence for convergence. Small ridges between floes.
0553 Heading North, under close conditions.
0720 Snow cover deeper, older floes.

0810 Iceberg.
1010 Ice conditions compact, older floes, 40-50 m diameter converging. Ice station, cores 1 and 2.
1827 Small floes, some flooding from swell action, leads.
1901 8-9 tenths concentration.
2104 Small floes with leads, 8-9 tenths concentration.
2230 Lots of slush patches.
2302 Old ice with ridges 10 tenths concentration.
Heavily ridged old ice. 10 tenths concentration.
Close packed older ice, 10 tenths concentration.



111° 112° 113° 114° 115° 116° 117° 118° 119° 120° 121° 122° 123° 124° 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°

DATE

23 Oct 61

HOUR

SYMBOLS

DESCRIPTION OF SYMBOLS

HOUR

REMARKS FROM ICE OBSERVATION LOG

23, X



Heavy ice ridged and compact, 10 tenths concentration.
10 tenths concentration; heavily ridged rubble field.
In lead, newly forming grease ice and small pancakes.
First year floes nearly continuous along lead. More lead
and floe structure rather than floes. 9 to 9 1/2 tenths
concentration with leads. Ice drift 20 cm/sec to E.
150 m wide lead. Heavily ridged old ice on sides.
Traversing heavy ice through variable leads, 9 1/2-10 tenths
concentration.
Ice conditions variable, young first year ice alternating
with more ridged material. Some leads. Diatoms in ice
continuously.
Fairly flat first year floes, some small ridges between
swell induced cracks. Highly concentrated.
First year floes, compact conditions.

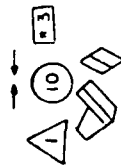
0851

0940

1042

1120

1200



Ice compacting.
Ridging 1 tenth concentration (0-5 scale).
Snow encrusted ice 3 tenths concentration
(on scale 0-3).
10 tenths concentration composed of large
floes (0.5-2 km diameter, 120 cm thickness)
and medium floes (100-500 m diameter, 30-70
cm thickness)

1600

1636

1713

1903

2034

2216

2345

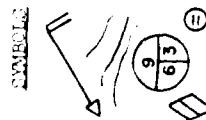
10 tenths concentration, compact conditions.
Slightly less than 10 tenths concentration, some leads,
flat first year ice; some older ridged floes interspersed.
Stopped in rough old ice.
Highly compacted; first-year floes <1 m thick.
Thick first year floes, some ridging.
Stopped in heavy first year ice with ridges, tightly
concentrated.
Compact 10 tenths conditions.





20° 10° 0° 10°
TV M2-0 23 11 11 11 37 11 37 11 37 11 37

DATE 24 Oct 81
1030 4.30



DESCRIPTION OF SYMBOLS

Wind speed 10 m/s, NE.

Some leads.
9 tenths concentration consisting of
6 tenths medium floes (100-500 m
diameter, 30-70 cm thickness) and
3 tenths small floes (20-100 m diameter,
15-30 cm thickness).

HOURLY
0000-0200
0256

REMARKS FROM ICE OBSERVATION LOG
10 tenths concentration.
Snowing.

0420-0700
0720

10 tenths concentration.
Ice looks very convergent, all old cracks closed
with large floes and leads developing. Looks more
like deep pack conditions.
Narrow lead in 10 tenths concentration. Large floe
lead structure, some ridges.
Lead-large floe structure continues. Ice looks
quite weak but compact conditions.

0907

0926

0937

1023

1116

1225

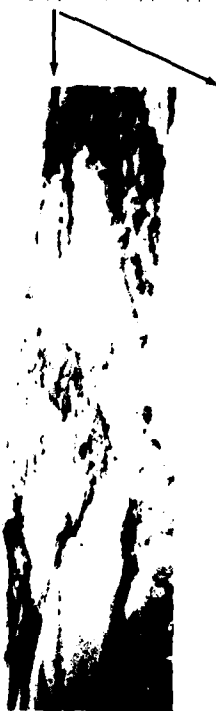
1253

1507

1622

1730

2010



REMARKS FROM ICE OBSERVATION LOG

HOUR

DESCRIPTION OF SYMBOLS

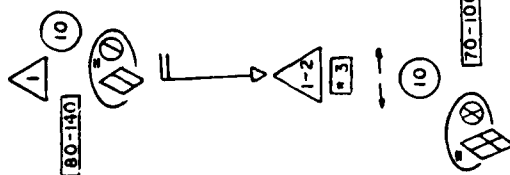
SYMBOLS

DATE

24 Oct 81
(24.x)

2050

(20^h 50^m)



Average ice thickness 80-140 cm.
Ridging concentration 1 (0-5 scale).
10 tenths concentration ice Breccia
composed of medium floes (100-500 m
diameter, 120 cm thick) and small floes
(20-100 m diameter, 30-70 cm thickness).
Wind 10 m/s, N.

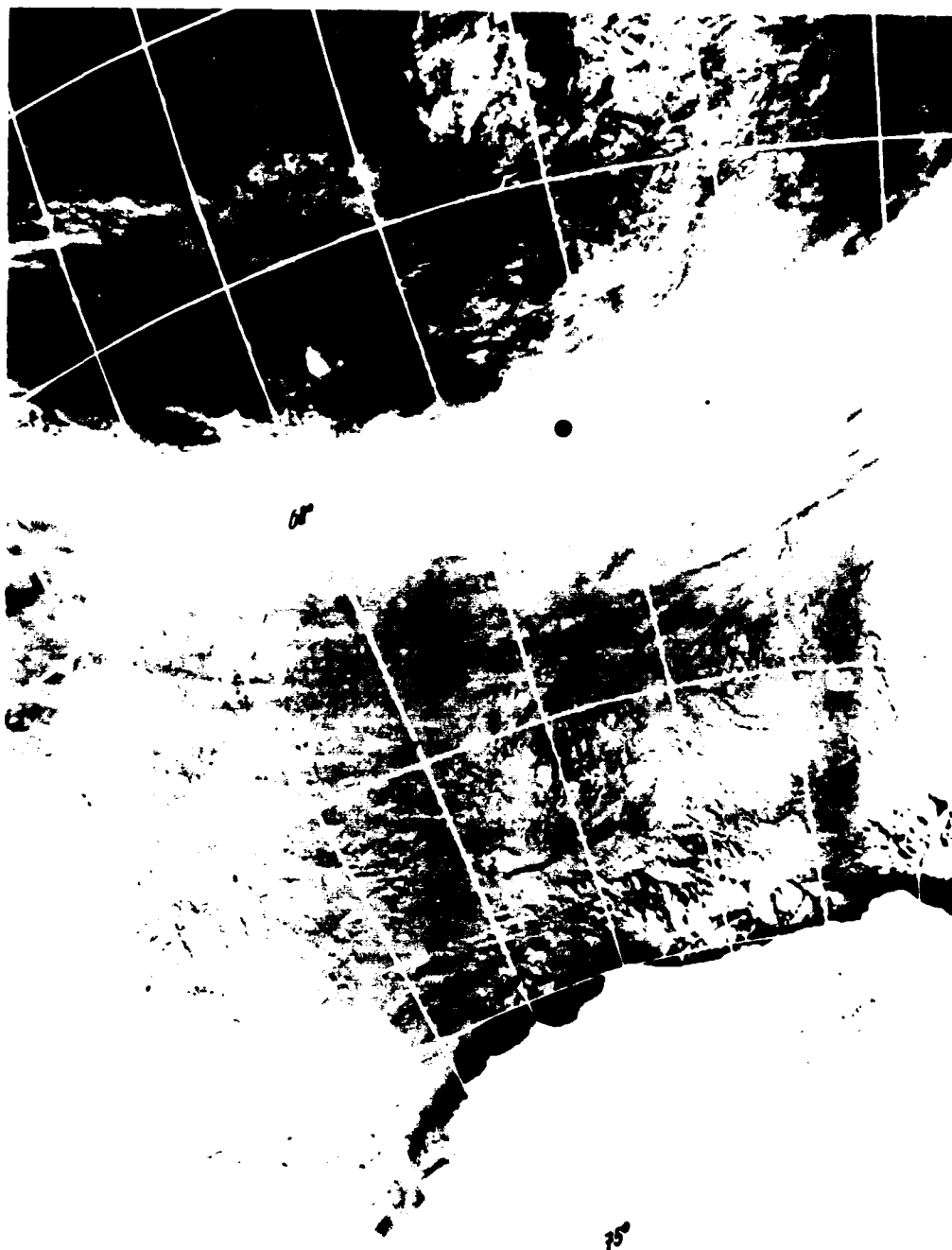
Ice Ridging, hummocks 1-2 concentration
(on 0-5 scale).

Snow encrusted concentration of 3 (0-3).

Pack ice motion diverging.

10 tenths concentration ice Breccia consist-
ing of medium floes (100-500 m diameter,
70-120 cm thick) and small floes (20-100 m
diameter, 70-120 cm thickness).

Average ice thickness 70-100 cm.



40°

30°

20°

10°

0°

10°

TV MC 5

24 10. 81

11^h35' GMT

A15

REMARKS PP 8104 - CONTINUATION

DATE

25 Oct 81

25.8

POSITION N. E. 100-120

TIME

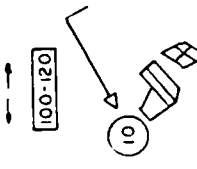
HR



Pack ice motion - diverging.
Average ice thickness 100-120 cm.

Wind NE, 5 m/s.

10 tenths concentration composed of
large floes (0.5-2 km diameter, 120 cm
thickness) and medium floes (100-500 m
diameter, 70-120 cm thickness).

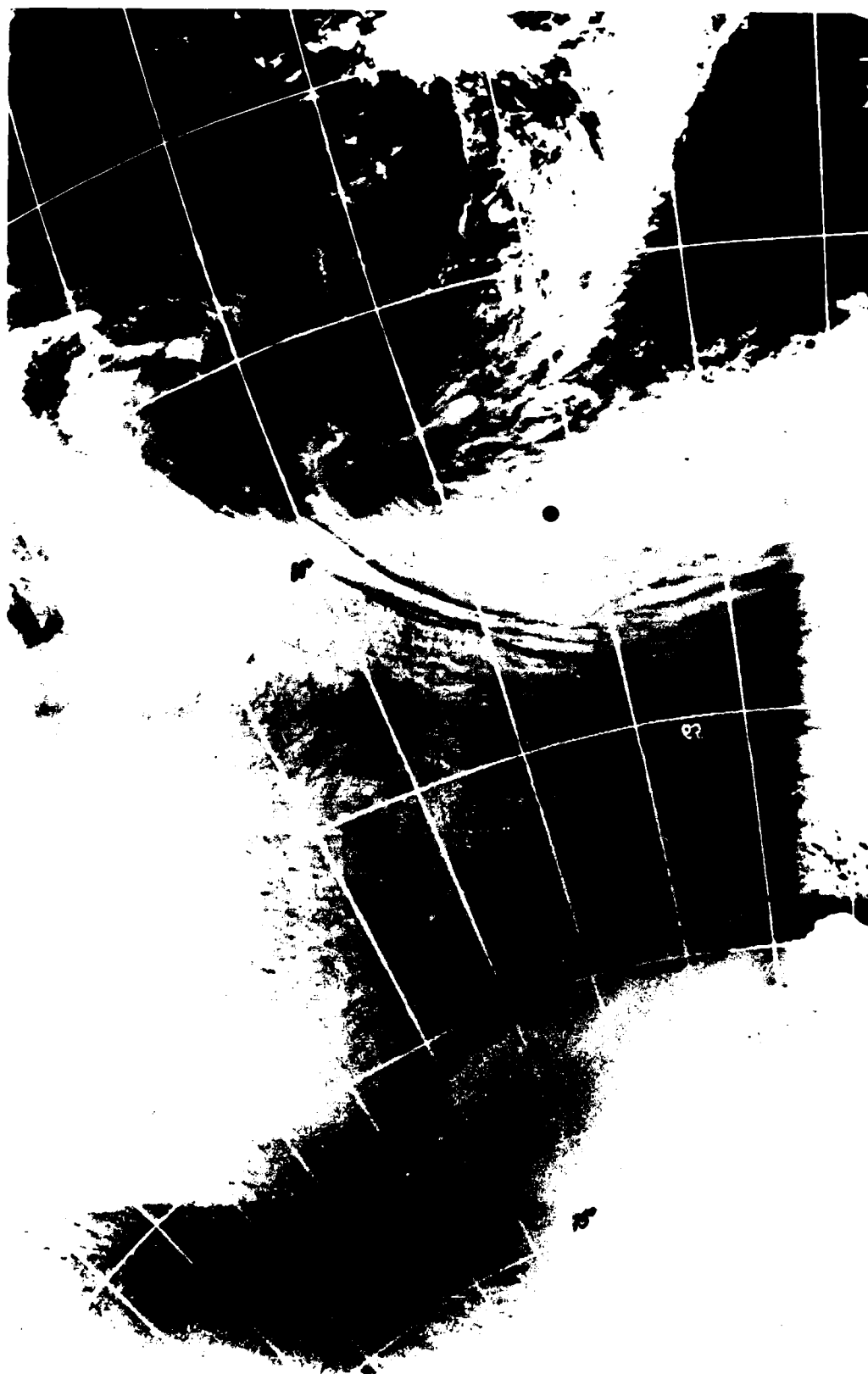


2240

100-120

0300-0600
0700
0800
0900
1127-1431
1502
1928
2133
2232

Following leads, 4-10 tenths concentration.
Following leads, occasional rubble field.
10 tenths with narrow leads 2-10 m. Relatively
thin first year floes (0.5 m). 10 tenths
with narrow leads, thin first-year floes (0.5 m).
More small ridges. Large floes with linear leads.
10 tenths with narrow leads. 11 rubble field,
lots of snow cover. Heavily ridged.
First-year floes, occasional ridges and rubble
fields.
10 tenths concentration encroaching ridged ice.
10 tenths concentration, some ridged areas.
Ice conditions 10 tenths concentration
First-year ice. Some ridges.



-40° -30° -20° -10° 0° 10°
TV M2-5 25.10.81. 11°31'50" GMT.

DATE	TIME	SYMBOLS	DESCRIPTION OF SYMBOLS	REMARKS FROM ICE OBSERVATION LOG
26 Oct 81 (26.x)	0545 (5 ^h 45 ^m)	   	Pack ice motion - converging. 10 tenths concentration. Ice Breccia consisting of medium floes (100-500 m diameter, 30-70 cm thickness) and small floes (20-100 m diameter, 30-70 cm thickness). Ridging 2 on a scale of 0-5. Very small fractures (50-200 m). Average ice thickness 50-70 cm.	0238 Some leads; 10 tenths concentration. 0400-0800 Following leads. 0900 Large lead (200 m wide). Many leads, concentration down to 9 tenths. Thin patches and leads. Ice 9-10 tenths, thin patches and leads. Traversing 9-10 tenths concentration, leads with first year floes; occasional ridge and rubble. Lead > 500 m, occasional rough spots at corners. Lead 9-10 tenths concentration. Some thin ice possibly slush from snow. Lead and large floe structure, first year floes.
	1435 (14 ^h 35 ^m)	   	Average ice thickness 70-120 cm. Ridging concentration of 1 (scale 0-5). Snow encrusted concentration 3 (scale 0-3). Fracture zone. 10 tenths concentration ice Breccia composed of medium floes (100-500 m diameter, 70-120 cm thickness) and small floes (20-100 m diameter, 70-120 thickness).	1134 } 1154 } 1407 }  1455 Ice concentration 10 tenths with leads. 1705 First year floes with occasional rubble and pressure ridge areas, 10 tenths concentration. 1715 First year floes. Ice station, cores 5 and 6. 

DATE

27 Oct 81
(27.x)

SYMBOLS

DESCRIPTION OF SYMBOLS

HOUR

REMARKS FROM ICE OBSERVATION LOG

0135
0400
0500-0700
08000900
09521022
1030

1401



1632

1648
18011904
1957

2208

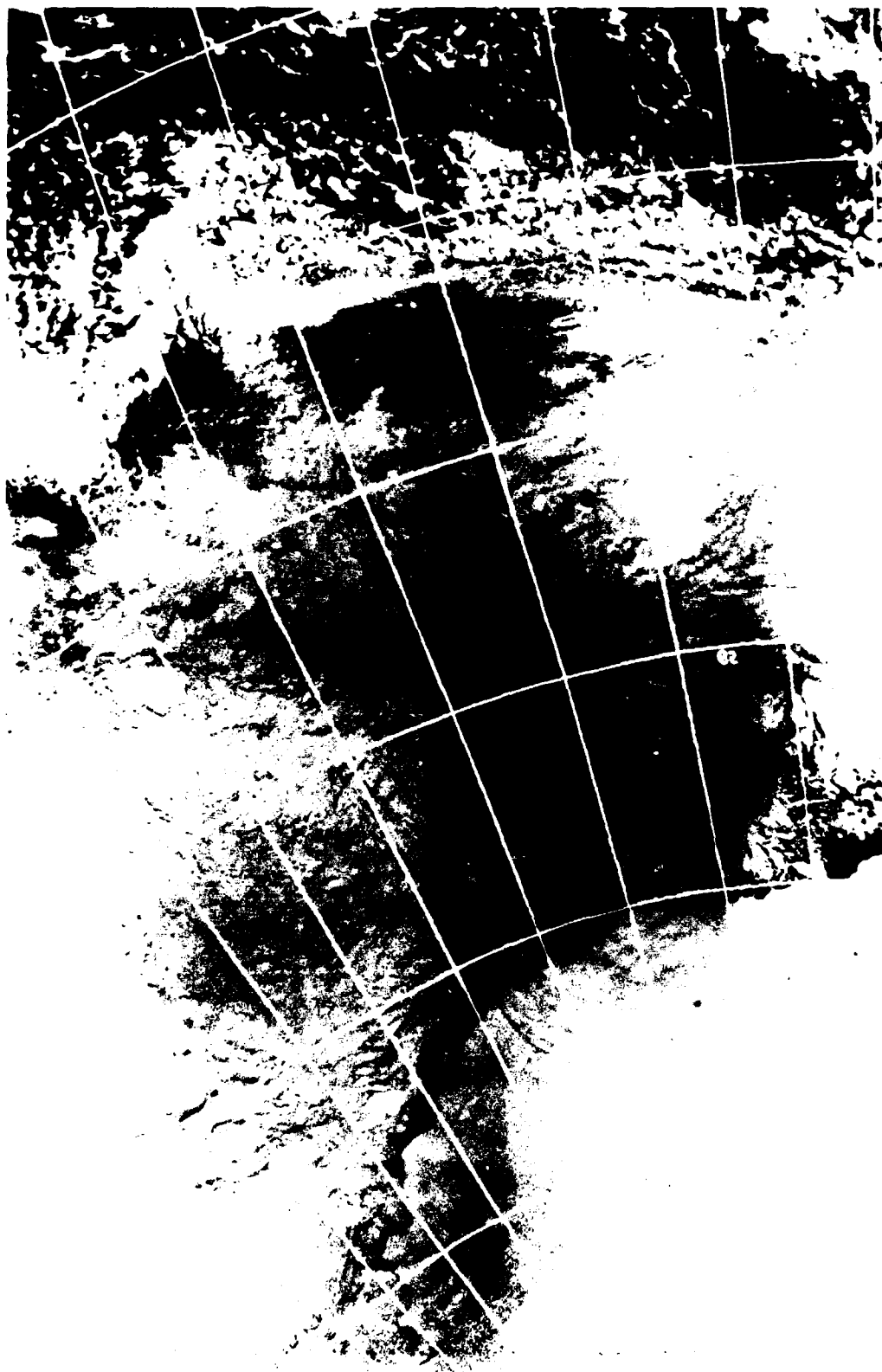
Ridging concentration 2 (scale 0-5).
Very small fractures (0-50 cm).
10 tenths concentration; 9 tenths ice
Breccia composed of medium floes (100-
500 m diameter, 70-120 cm thickness)
and small floes (20-100 m diameter,
70-120 cm thickness); and 1 tenth small
floes (20-100 m diameter, 15-30 cm
thickness) and light nilas 5-10 cm thick.
Pack ice - diverging.
Average ice thickness 60-120 cm.
Wind SE, 7 m/s.



60-120



10 tenths concentration.
10 tenths concentration.
10 tenths concentration.
9-10 tenths concentration. Leads. Some fog, arease
ice in leads.
10 tenths concentration. Some leads. Occasional
rubble field/pressure ridges.
Wide band of grey-white ice 10-15 cm thick. Some
small ridges and open water.
Wide thin ice areas appear to be locally converging.
Traversing grey-white ice in recent lead. Lots of
new ridges (blue cast) indicating recent compression
at lead edges.
Stopped in relatively thin young ice (20-30 cm). Lots
of new ridges, open water, nearly alternating com-
pressed and diverged areas. Blue ice ridges.
Broke through into lead (>100 m in some parts).
Grease ice plumes herded into "tadpole" shapes.
Wind from South.
Traversing lead; some rough spots.
Traversing 1 m thick first year floe, 10 tenths
concentration.
First year and young ice.
Traversing lead with new ice forming. First year
floes; some ridging.
First year floes with ridges.



50°

40°

30°

20°

10°

0°

10°

TV M2-5

27 10 XI

11^h 23' 30 GMT

REMARKS FROM ICE OBSERVATION LOG

In lead, open water, 10 tenths concentration.
 In lead to another lead.
 Open water, large lead, grease ice.
 Traversing floes between lead section. Ice > 1 m
 some ridges especially new at edges of refrozen
 leads.
 Ship stopped in heavy ice, compression and heavy
 ridging.
 Wide lead with thin ice (> 300 m).

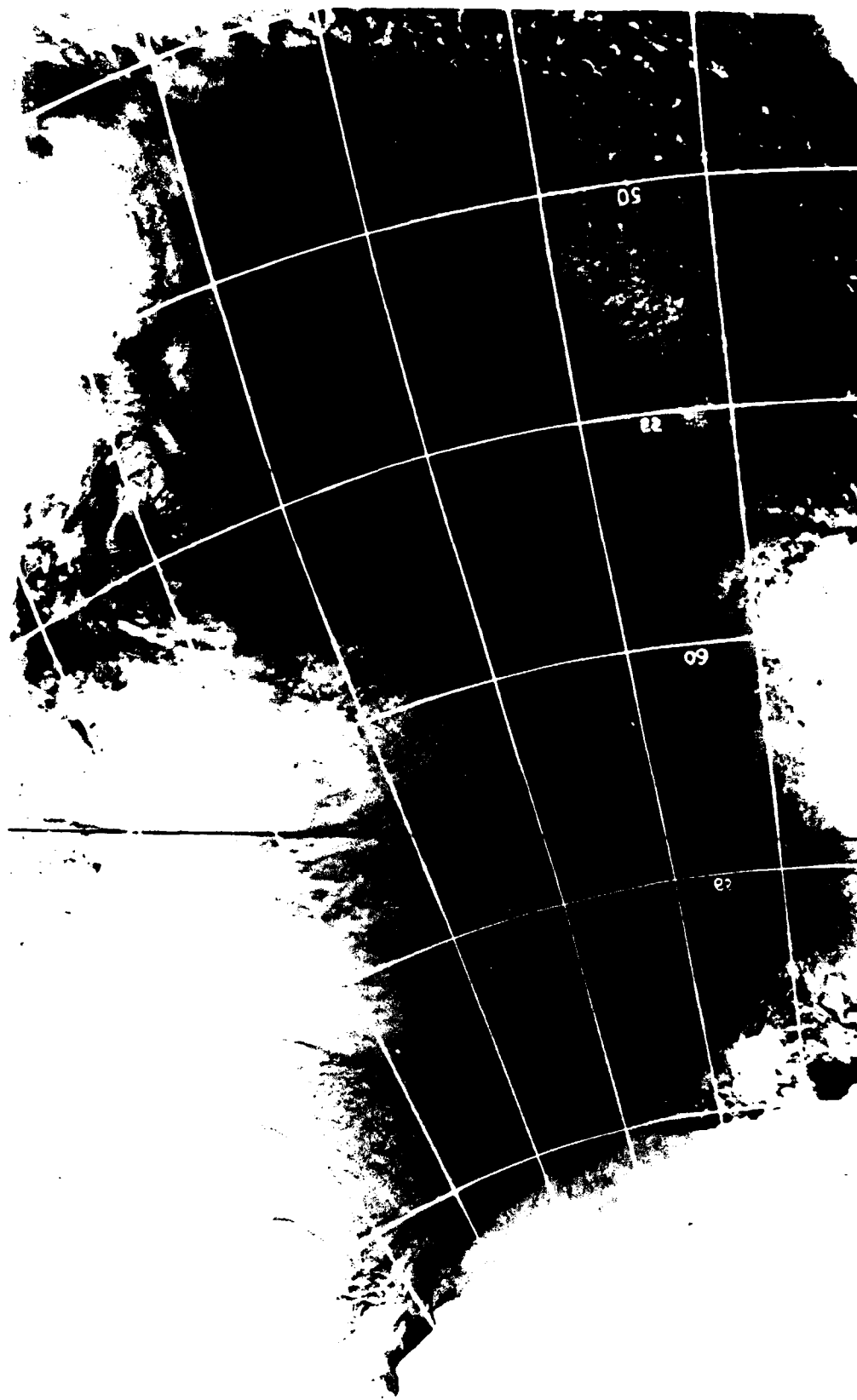
0400-0500
 0600
 { 0700
 1049 }
 1700
 0256

DESCRIPTION OF SYMBOLS

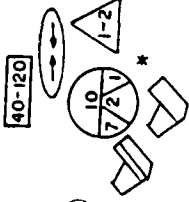
SYMBOLS

HOUR

DATE
 23 Oct 81
 (23.X)



-30° -20° -10°
TV M2-5 28 10 x1 11/21/95

DATE	TIME	SYMBOLS	DESCRIPTION OF SYMBOLS	REMARKS FROM ICE OBSERVATION LOG
29 Oct 81	1000		Average ice thickness 40-120 cm. Compression zone. Ridging 1-2 concentration (1-5 scale). 10 tenths concentration composed of 7 tenths large floes (0.5-2 km diameter, 120 cm thickness); 2 tenths large floes (0.5-2 km diameter, 30-70 cm thickness); and 1 tenth light nilas 5-10 cm thick.	Traversing some grey-white ice in leads 10 tenths concentration. Traversing narrow lead in first year ice. 10 tenths concentration. Very few narrow leads. Lower topography and less ridges than previously observed. Ice station, cores 7 and 8.
				1050 1431 1654

REMARKS FROM ICE OBSERVATION LOG

In thick ice. Narrow to no leads.
 Refrozen leads under compression. Lots of blue
 ridges. No open leads.
 In wide refrozen lead, 5-15 cm thickness, 10
 tenths concentration, no leads.

HOURLY

0800
 1521
 1800

DESCRIPTION OF SYMBOLS

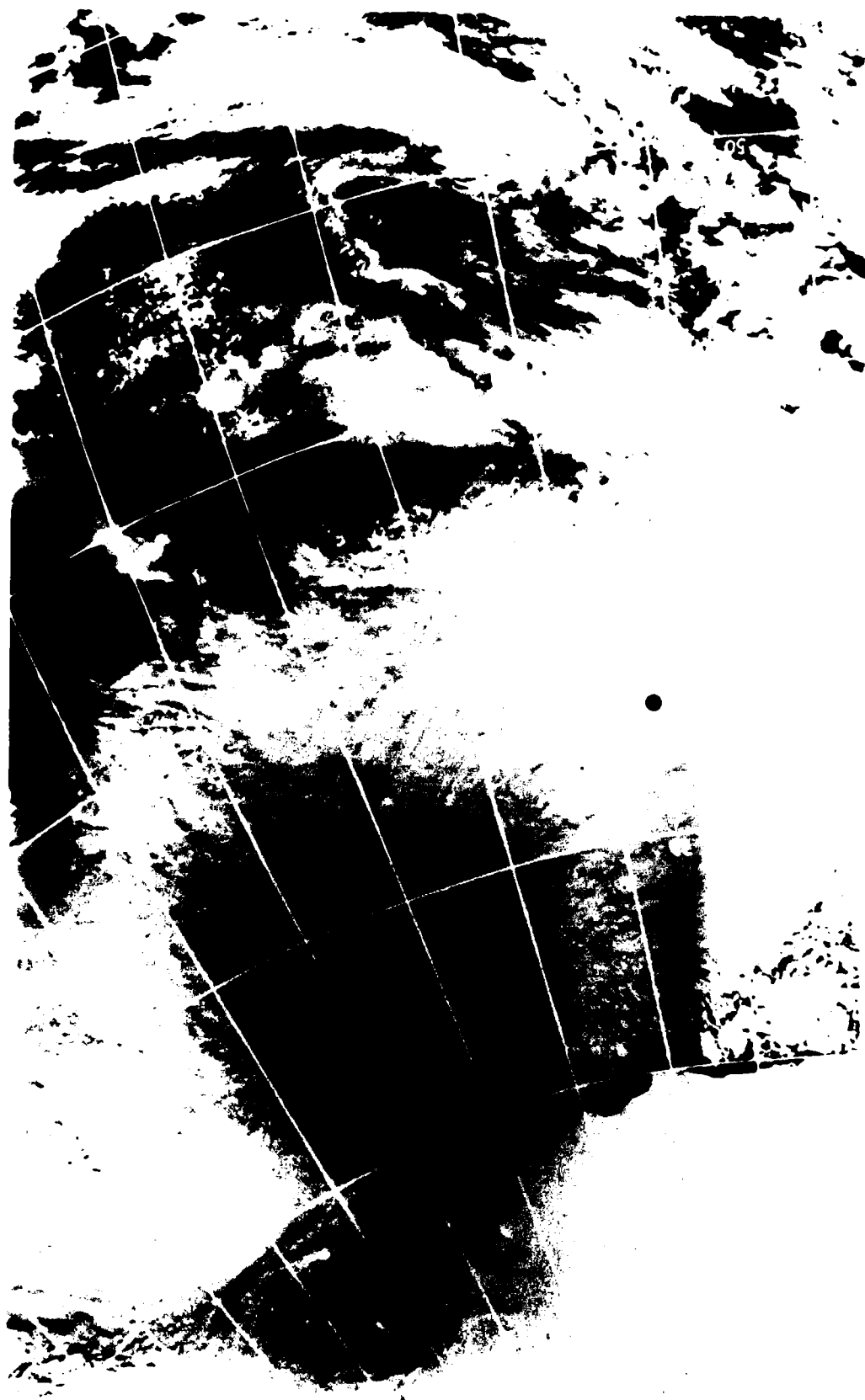
SYMBOLS

HOURLY

DATE
 30 Oct 81
 (30.x)



-40° -30° -20° -10° 0° 10°
TV M2-5 30-10.81. 11°12'50" GMT



-40° -30° -20° -10° 0° 10°
TV M2-5 31. 10. 91. 11^h 09' 00" GMT.

REMARKS: 100 m lead, concentration of lead.
 Approximately 9 tenths concentration of lead.
 Very heavy ridging between two flat areas.
 Ice station, cores 7, 17 and 18.
 Moved down a wide lead to 900 m to the ship.
 Saw none of the same (lead-ridge-lead).

H. CR

1115
 0818
 1100
 1210
 1800-1900

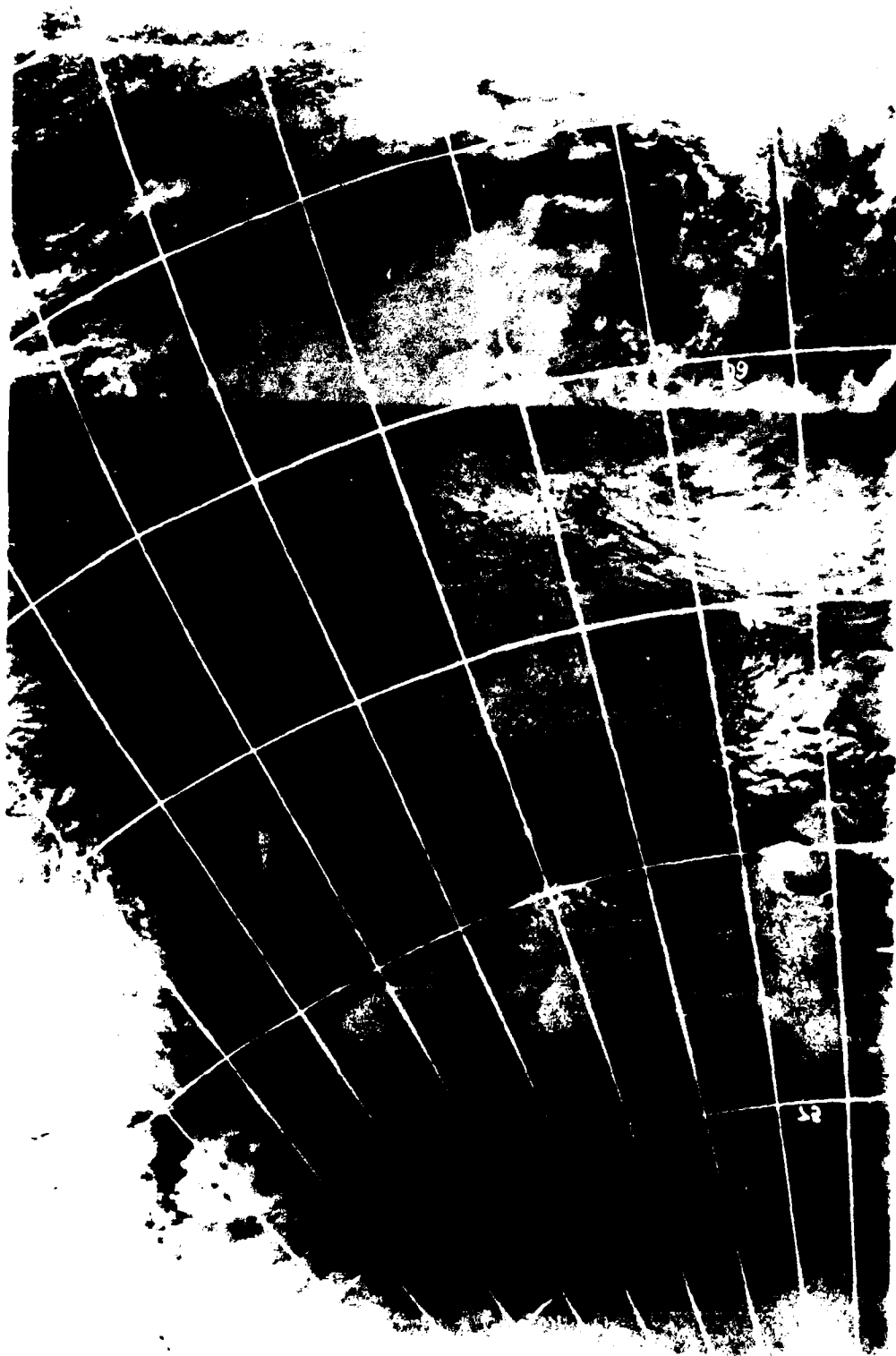
DESCRIPTION OF SYMBOLS

SYMBOLS

HOURLY

DATE

1 Nov 81
 (1.81)



-30° -20° -10° 0° 10° 20° 30°
 TV M2-5 01.11.81 09^h21'20" GMT.

DATE

2 Nov 81
13.11

TIME

SYMBOLS

DESCRIPTION OF SYMBOLS

REMARKS FROM ICE OBSERVATION LOG

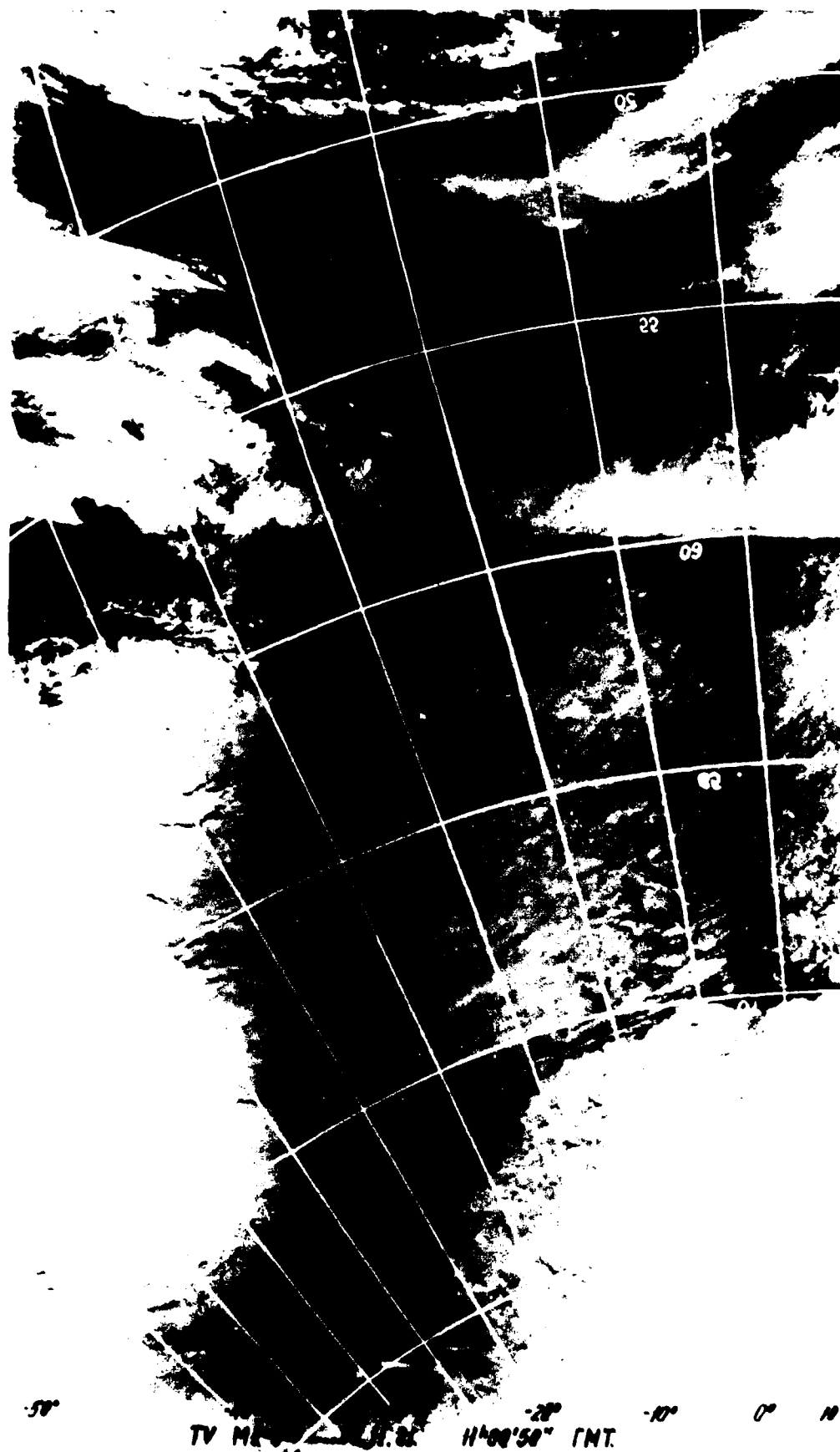
Wide lead (500 m), some new ice, some broken
20-40 m diameter floes within the lead.
Temperatures moderate (0- -2°C), wind strong,
Polynya continued to be open.

TIME

0805

1200





DATE

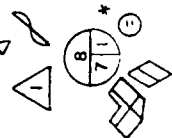
3 Nov 81

TIME

WINDSPEED

1400

1400



1400

1400



Wind NW, 15 m/s.
Very small fracture (0-50 m).
Bridging (1 on 0-5 scale).
7 tenths large floes (0.5-2 km diameter, 70-120 cm thickness) and medium floes (100-500 m diameter, 30-70 cm thickness); and 1 tenth small floes (20-100 m diameter, 15-30 cm thickness) and light nilas (5-10 cm). Very small fracture (0-5 m).
Average ice thickness 40-50 cm.

TIME

1500

1500

REMARKS FROM ICE OBSERVATION LOG

Some new ice formation on polynya.
Traversing small lead canal into warmer lead, 10 tenths concentration, large (km diameter) first year floes.



1502

1605

1722

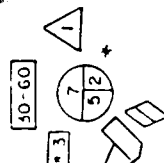
2135

2212

2300

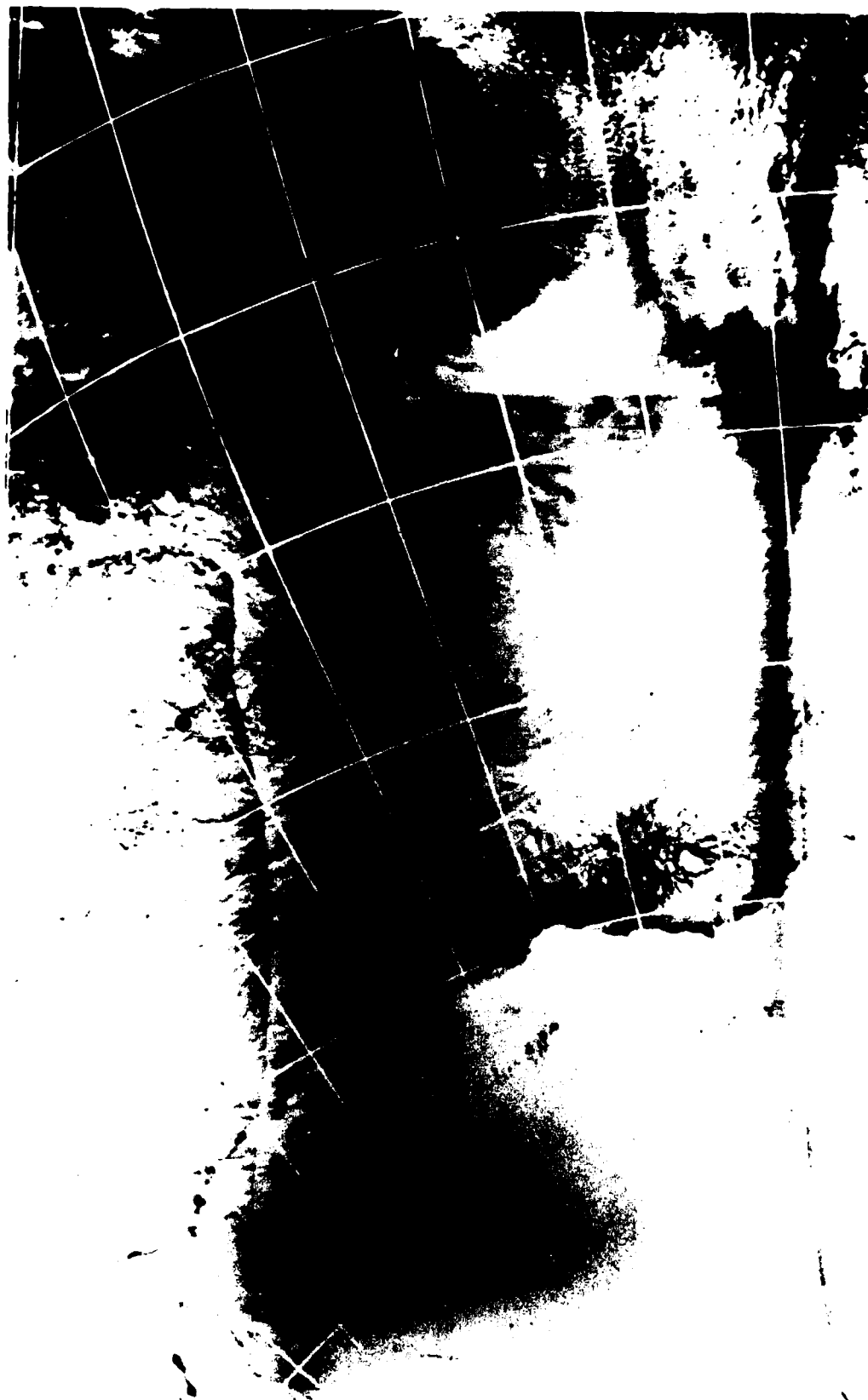
Ice conditions approximately 9 tenths concentration. Traversing relatively wide leads.
Wide leads, open water conditions, 1-2 tenths concentration.
Thinner ice of less than 2 tenths concentration. Lots of open water, low ridging.
Refreezing leads, concentration 4 to 1 tenths.
Some breaking, refreezing lead, concentration 4 to 1 tenths.
Some leads, new ice forming.

Average ice thickness 30-60 cm.
Snow encrusted ice 3 (scale 0-3).
7 tenths concentration with 5 tenths large floes (0.5-2 km diameter, 30-70 cm thickness) and medium floes (100-500 m diameter, 30-70 cm thickness) and 2 tenths light nilas (5-10 cm).
Some ridging (1 on 0-5 scale).
Wind from W, 12 m/s.



2300

2300



30°

20°

TV M2-5

10°

03. 11. 81.

0°

09°13'40"

10°

GMT.

20°

30°

1410

1410

DESCRIPTION OF SYMBOLS

REMARKS FROM ICE OBSERVATION LOG

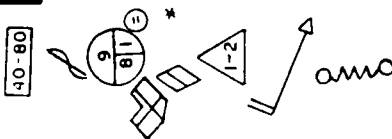
1410
1410

HOUR

0700
0800
0946
1202
1351



Average ice thickness 40-80 cm.
Very small fracture (0-50 m).
9 tenths concentration consisting of
8 tenths large floes (0.5-2 km diameter,
70-120 cm thickness), medium floes
(100-500 m diameter, 30-70 cm thickness);
and 1 tenth small floes (20-100 m diameter,
15-30 cm thickness) and light nilas (5-10
cm).
Some ridging (1-2 on 0-5 scale).
Wind NW; 10 m/s.
Ship drifting.



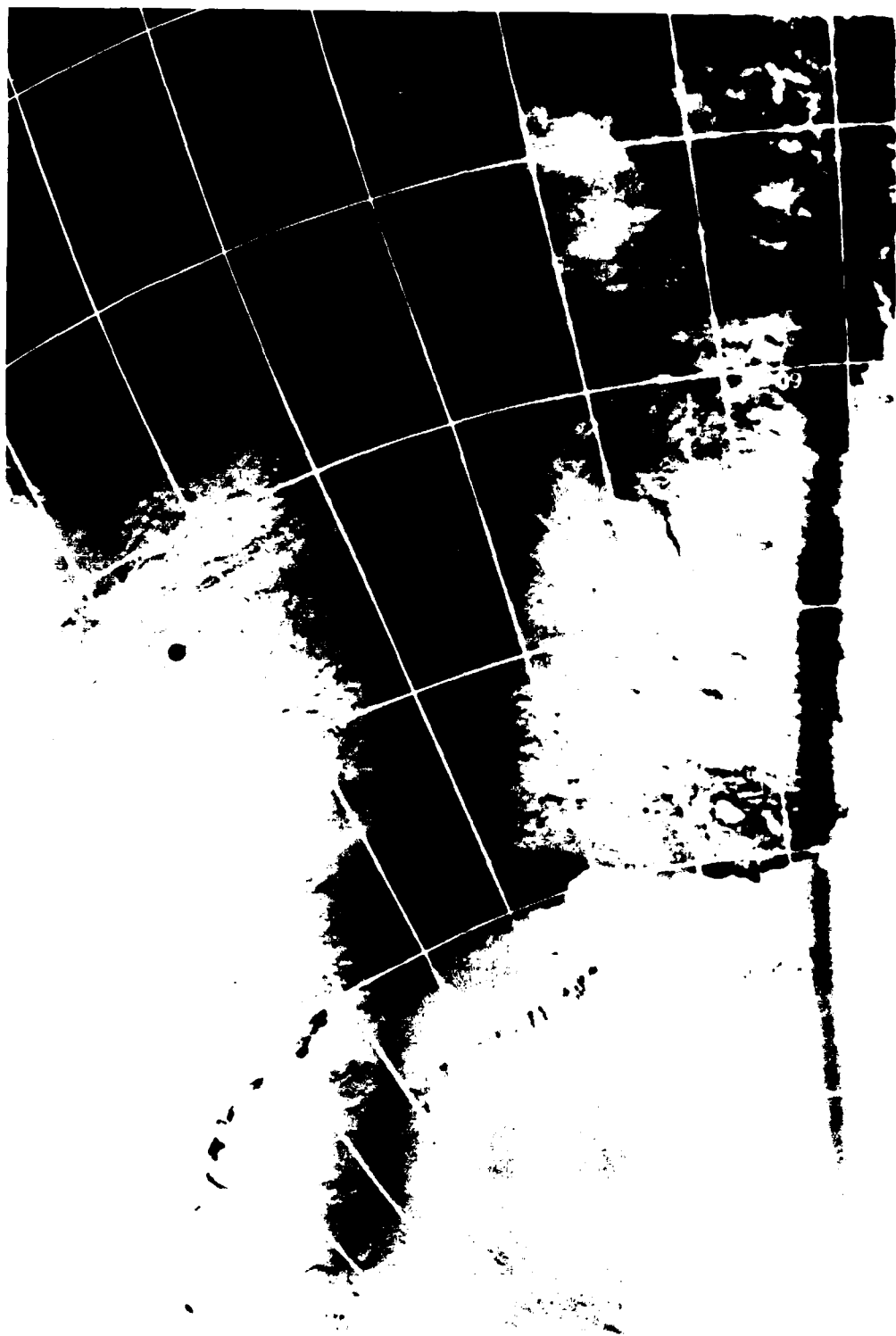
1410
1410



1556
1610
2316

In small field of thick floes (approximately 1 m).
Field of thick floes.
Ice station, cores 12, 13, 14, and 15.





-30° -20° -10° 0° 10° 20° 30°
 TV M. 11.11. 09°09'15" ГНТ.

DATE

HOUR

SYMBOLS

DESCRIPTION OF SYMBOLS

5 Nov 81
(5.x1)



1500



1500



30° 20° 10° 0° 10° 20°
TV M2-5 05.11.81 09:05:15 GMT

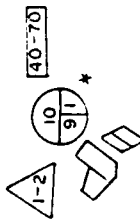
DATE
6 Nov 51
(7.11)

TIME

1520

(15° 21')

SYMBOLS



DESCRIPTION OF SYMBOLS

Average ice thickness 40-70 cm.
 within 1-2 (scale 0-5).
 10 tenths concentration consisting of 9
 tenths large floes (0.5-2 km diameter,
 30-70 cm thickness) and medium floes
 (100-500 m diameter, 30-70 cm thickness);
 and 1 tenth light nilas (5-10 cm).
 Ice converging.

TIME

1305

1500

REMARKS FROM ICE OBSERVATION LOG

Concentration 9-10 tenths, traversing leads.
 Traveling with leads, 9-10 tenths concentration.



NOTE: There was no satellite photo
available for 6 November 1981.

DATE

HOUR

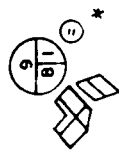
SYMBOLS

DESCRIPTION OF SYMBOLS

DATE

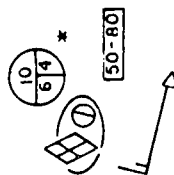
REMARKS FROM THE OBSERVATION LOG

7 Nov 81
(7. x1)



9 tenths concentration consisting of 8 tenths large floes (0.5-2 km diameter, 70-120 cm thickness), medium floes (100-500 m diameter, 30-70 cm thickness); and 1 tenth small floes (20-100 m diameter, 15-30 cm thickness) and light nilas (5-10 cm).

1330

(13^h 30^m)

10 tenths concentration consisting of 6 tenths ice Breccia made up of medium floes (100-500 m diameter, 70-120 cm thickness) and small floes (20-100 m diameter, 30-70 cm thickness); and 4 tenths light nilas (5-10 cm).

Wind from W, 7 m/s.

Average ice thickness 50-80 cm.

1303

Traversing leads, concentration 9-10 tenths.

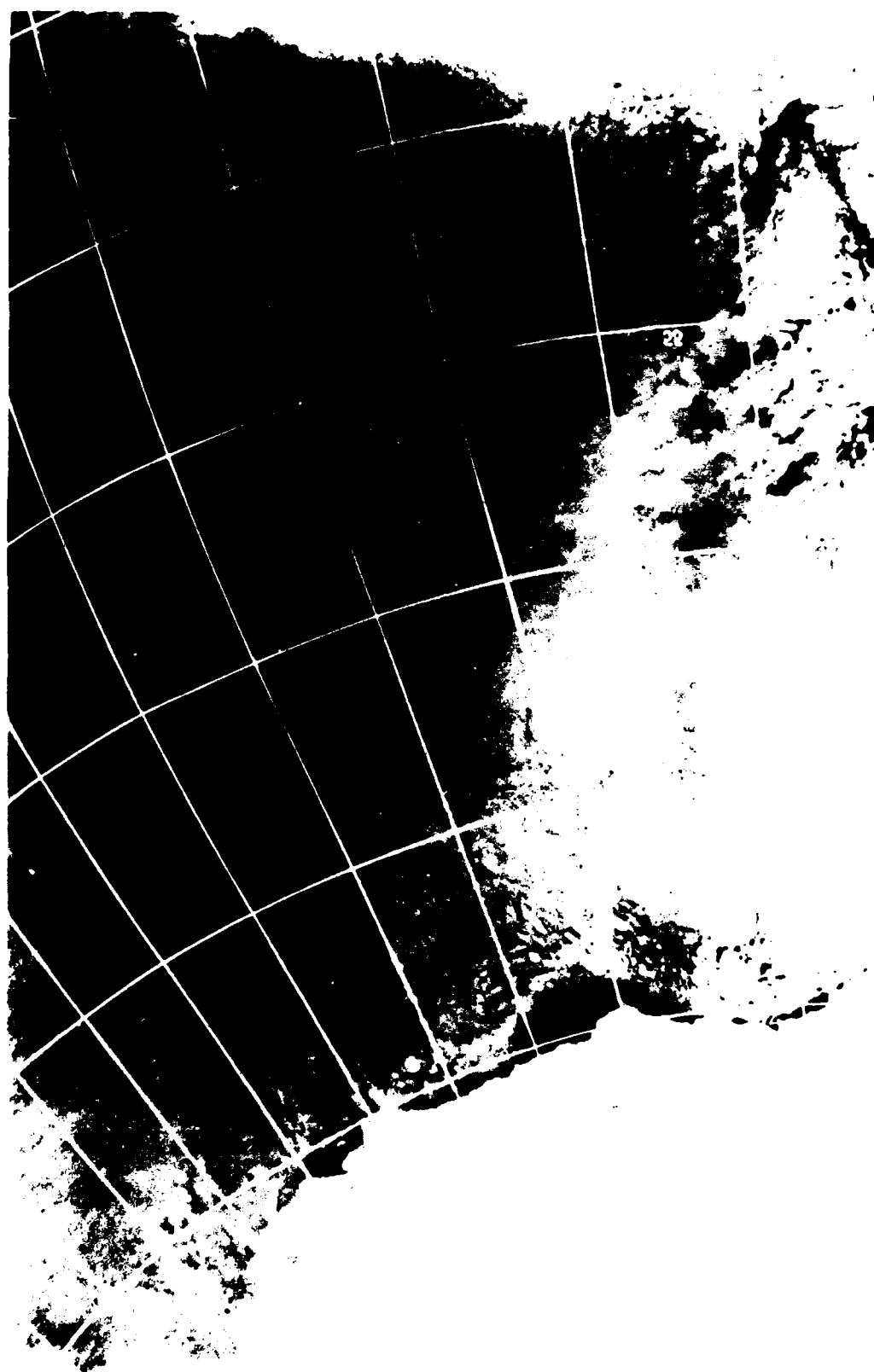


1605

Traversing leads, ice concentration 9-10 tenths.

10 tenths concentration consisting of 8 tenths ice Breccia of medium floes (100-500 m diameter, 70-120 cm thick) and small floes (20-100 m diameter, 30-70 cm thickness); and 2 tenths light nilas (5-10 cm).





20° 20° 10° 0° 10° 20° 30°
TV M2-5 07 11 81 08°58'40" GMT.

A43

Page

000001

0001

HO. N.

SYMBOLS



40-80



1800

1800

Ridging 1 (scale 0-5).

Average ice thickness 40-80 cm.

Salt flowers, concentration 1 (scale 0-3).

Wind from N, 10 m/s.

DESCRIPTION OF SYMBOLS

HO. N.

0800

1310

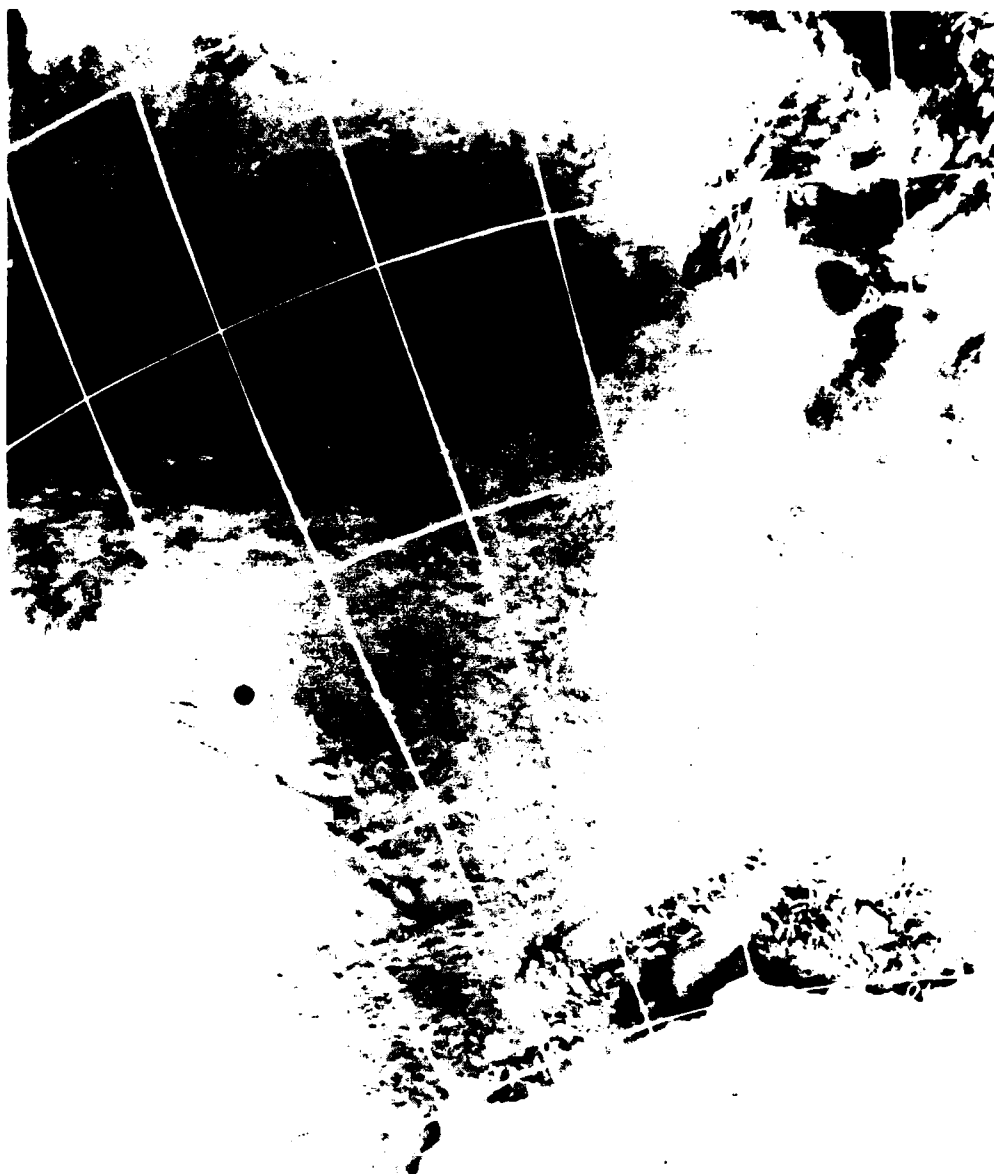
REMARKS FROM OBSERVATION LOG

Traversing leads in 7-10 tenths concentration.

Traversing leads in 4-10 tenths concentration.

1800

Ice station, open 17 and 18.



-10°

TV M2-5

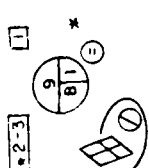
-20°
08.11.81

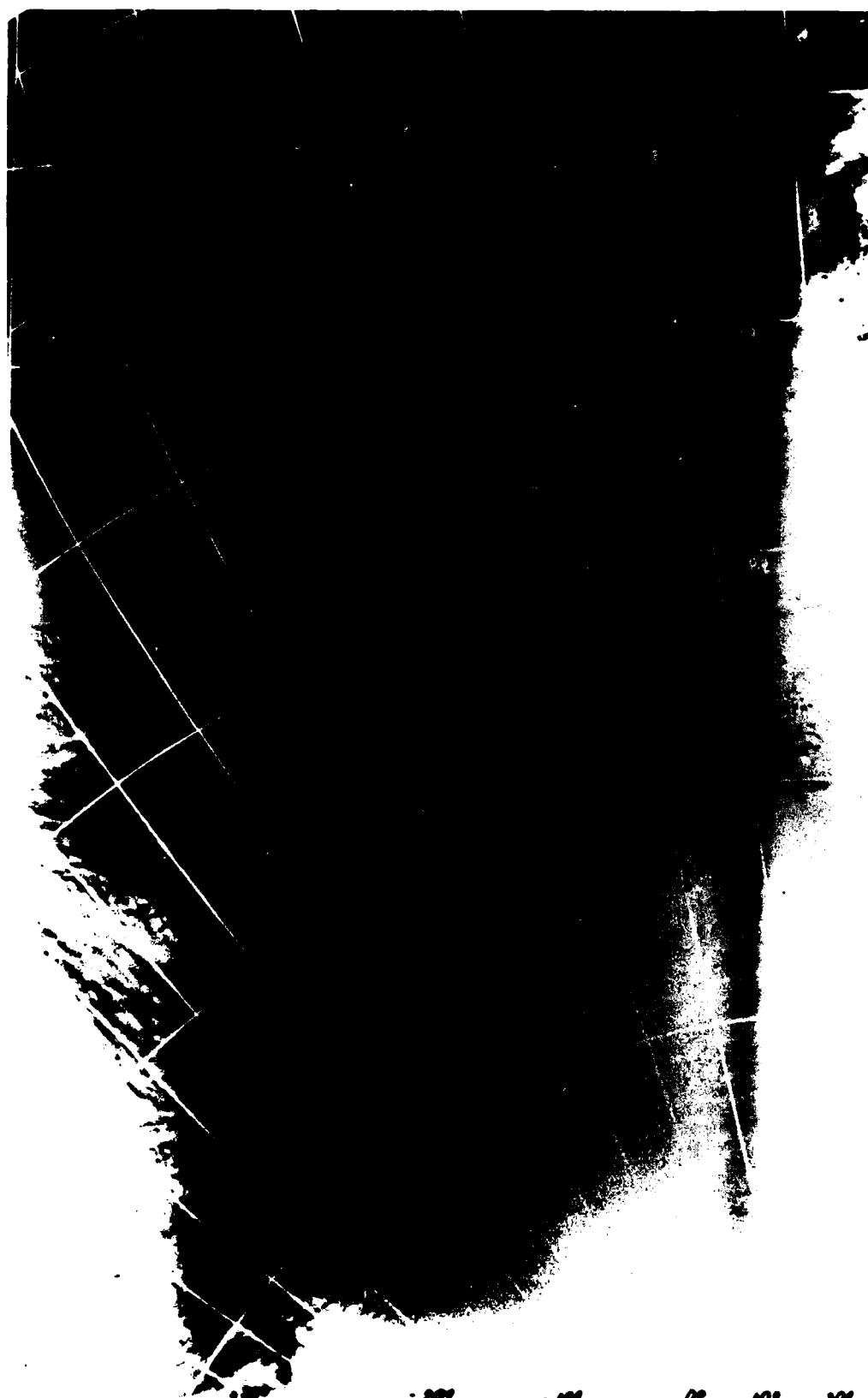
-10°
08°53'40"

0° GMT

10°

-20°

DATE	HOUR	SYMBOLS	DESCRIPTION OF SYMBOLS	HOUR	REMARKS FROM ICE OBSERVATION LOG
Nov 21 1951			Rotting ice concentration 1 (scale 0-5). Snow encrusted ice 2-3 concentration (scale 0-3). 9 tenths concentration composed of 8 tenths medium floes (100-500 m diameter, 70-120 cm thickness) and small floes (20-100 m diameter, 30-70 cm thickness); and 1 tenth small floes (20-100 m diameter, 15-30 cm thickness) and light nilas (5-10 cm).	1200 1340 1800	First year ice, some leads. Less open water, lots of refrozen leads. Traversed area of open water to thin ice to thin ice with compression. New ridges. Ice station, cores 18 and 19.



09.00 TV. M2-5 20° 00° 10° 20°
08°49'25" GMT.

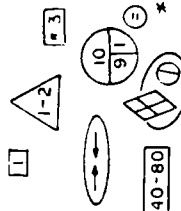
53

17 Nov 21

10. x1)

1520

15 OCT 1963



Rotting; ice 1 concentration (scale 0-5).

Riding 1-2 concentration (0-5).

Snow encrusted concentration 3 (scale 0-3).

Compression zone.

10 tenths concentration composed of 9 tenths

ice breccia made up of medium floes (100-500

70-120 cm diameter, 70-120 cm thickness) and small

floes (20-100 m diameter, 30-70 cm thickness);

and 1 tenth small floes (20-100 m diameter,

15-30 cm thickness) and light nilas (5-10 cm).

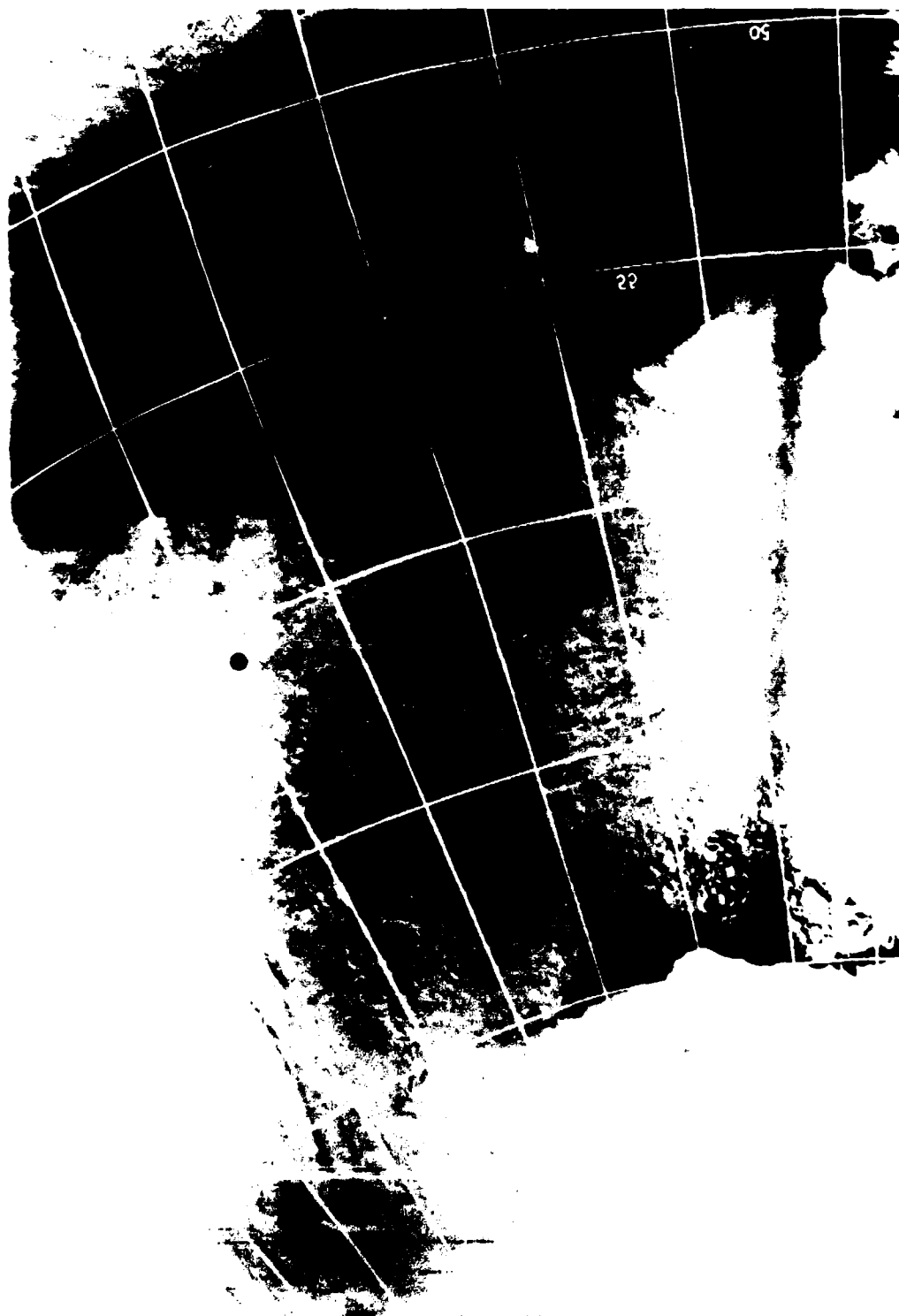
Average ice thickness 40-80 cm.

Ice station, cores 20 and 21.

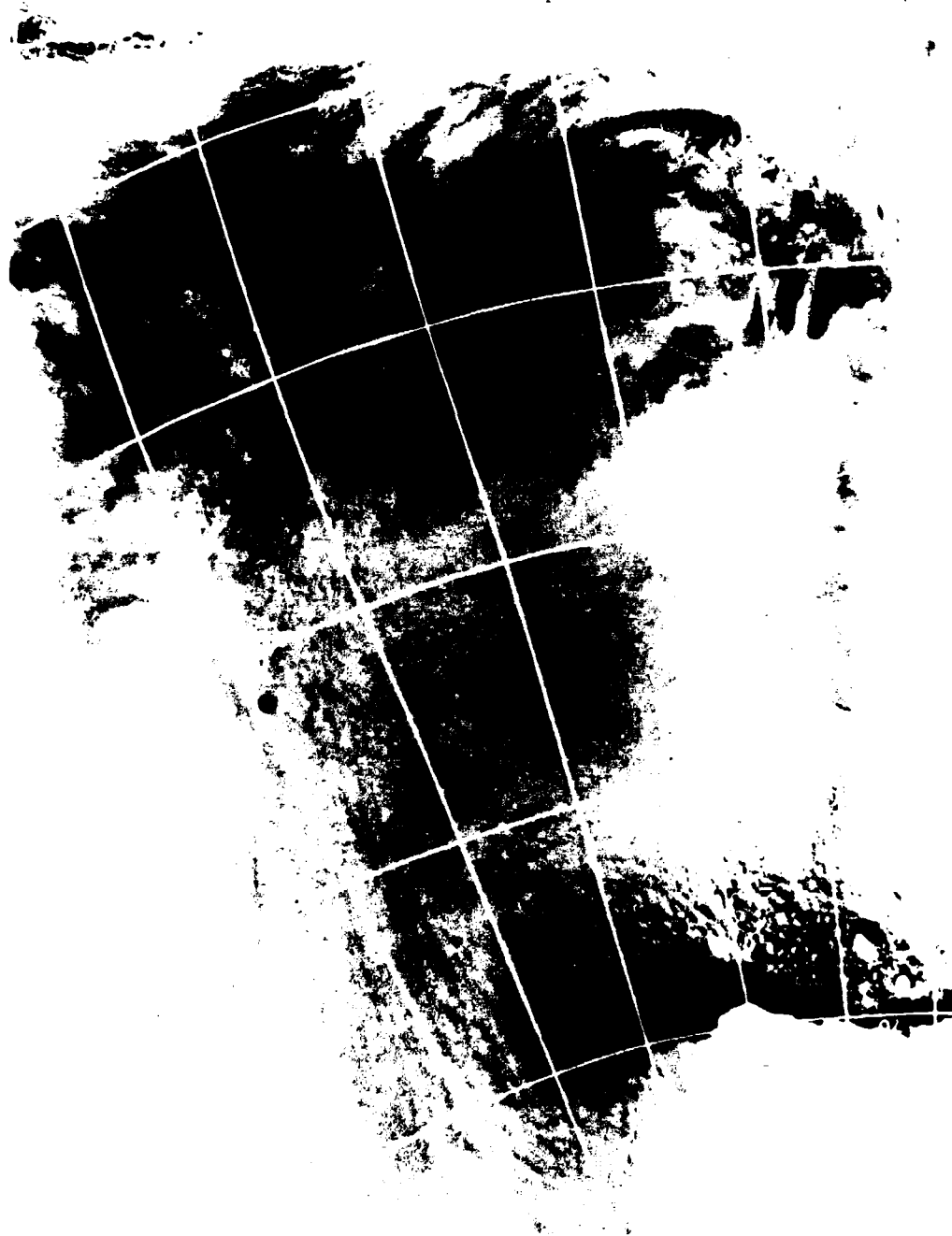
9-10 tenths concentration.

'starting' to get more large floes/open water structure of 100's of meters dimension rather than kilometers wide.

Ice station, cores 22 and 23.



-30° -20° -10° 0° 10° 20°
TV M2.5 10.11.81 01^h 46'15" GMT.



-30° -20° -10° 0° 10° 20°
TV M2-5 11.11.81. 08^h42'30" GMT.

DATE 12 Nov 81
(12.x1)

1330

13^h 30^m

DESCRIPTION OF SYMBOLS

1500

REMARKS FROM ICE OBSERVATION

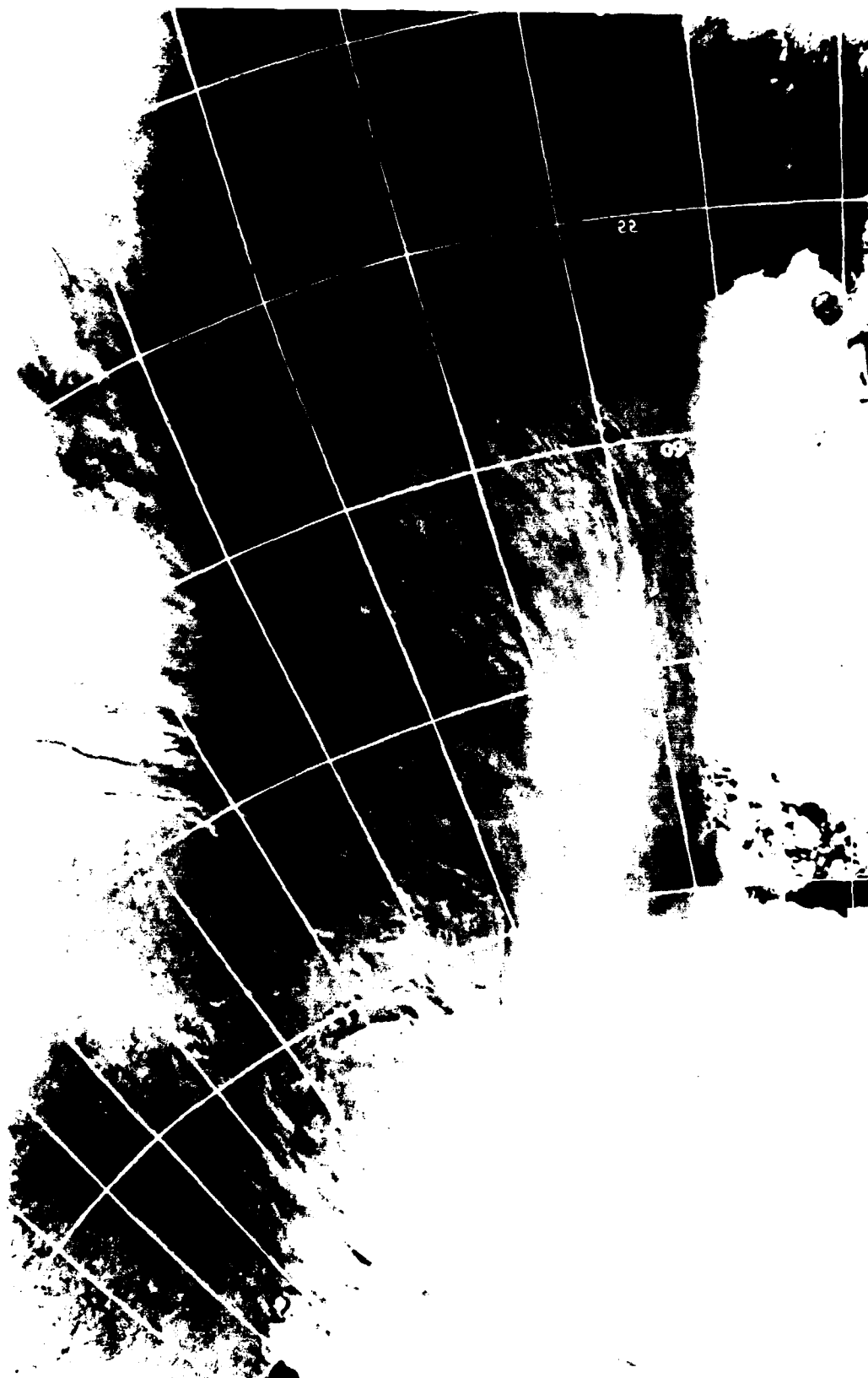
Larve floes, some open water, thin ice patches.
Ice thickness seems less, reflecting recent divergence. Various floes (100-1000 m) separated by open water, thin ice 9 tenths concentration.
Transitioning to ice edge, some swell, concentration locally about 7-8 tenths prior to entering more concentrated belt.
Core swell berminin. Traversing floes and open water/thin ice sequences.
Broken floes approximately 50-100 m diameter. Lots of thin ice 7-10 tenths concentration.
Ice floes with open water between 5-10 tenths concentration.

Average ice thickness 30-70 cm.
Ridging concentration 0-1 (scale 0-5).
9 tenths concentration composed of
8 tenths large floes and small floes
6 tenths of the 8 tenths are large
floes (0.5-2 km diameter, 30-70 cm
thickness), 2 tenths are small floes
(20-100 m diameter, 30-70 cm thickness);
and 1 tenth of total 9 tenths is small
floes (20-100 m diameter, 15-30 cm
thickness).
8 tenths concentration consisting of
6 tenths large floes (concentration 2/
0.5-2 km diameter, 30-70 cm thickness);
2 tenths small floes (20-100 m diameter,
30-70 cm thickness).
Average ice thickness 40-70 cm.
Salt flowers, concentration 1 (0-5 scale).

Small to medium floes, thin ice, low concentration.

1730

<u>DATE</u>	<u>HOURL</u>	<u>SYMBOLS</u>	<u>DESCRIPTION OF SYMBOLS</u>	<u>HOURL</u>	<u>REMARKS FROM ICE OBSERVATION LOG</u>
12 Nov 81 (12.x1)	2050 (20 ^h 50 ^m)		Rotting ice concentration 2 (scale 0-5). 8 tenths concentration consisting of 6 tenths medium floes (100-500 m diameter, 30-70 cm thickness) and small floes (20- 100 m diameter, 30-70 cm thickness); and 2 tenths small floes (20-100 m diameter, 15-30 cm thickness). Average ice thickness 30-70 cm. Wind from the N, 15 m/s.	2000	In ice edge region. Exclusively young ice of less than approximately 30 cm thickness. Riding down. Concentration 9-10 tenths.



-50° -40° -30° -20° -10° 0° 10°
TV 9 M2-5 12.11.81. 08^38'15" GMT.

11

13 Nov 51
13. x1)

H. J. R.

0200

0070

0608.

2.2.0

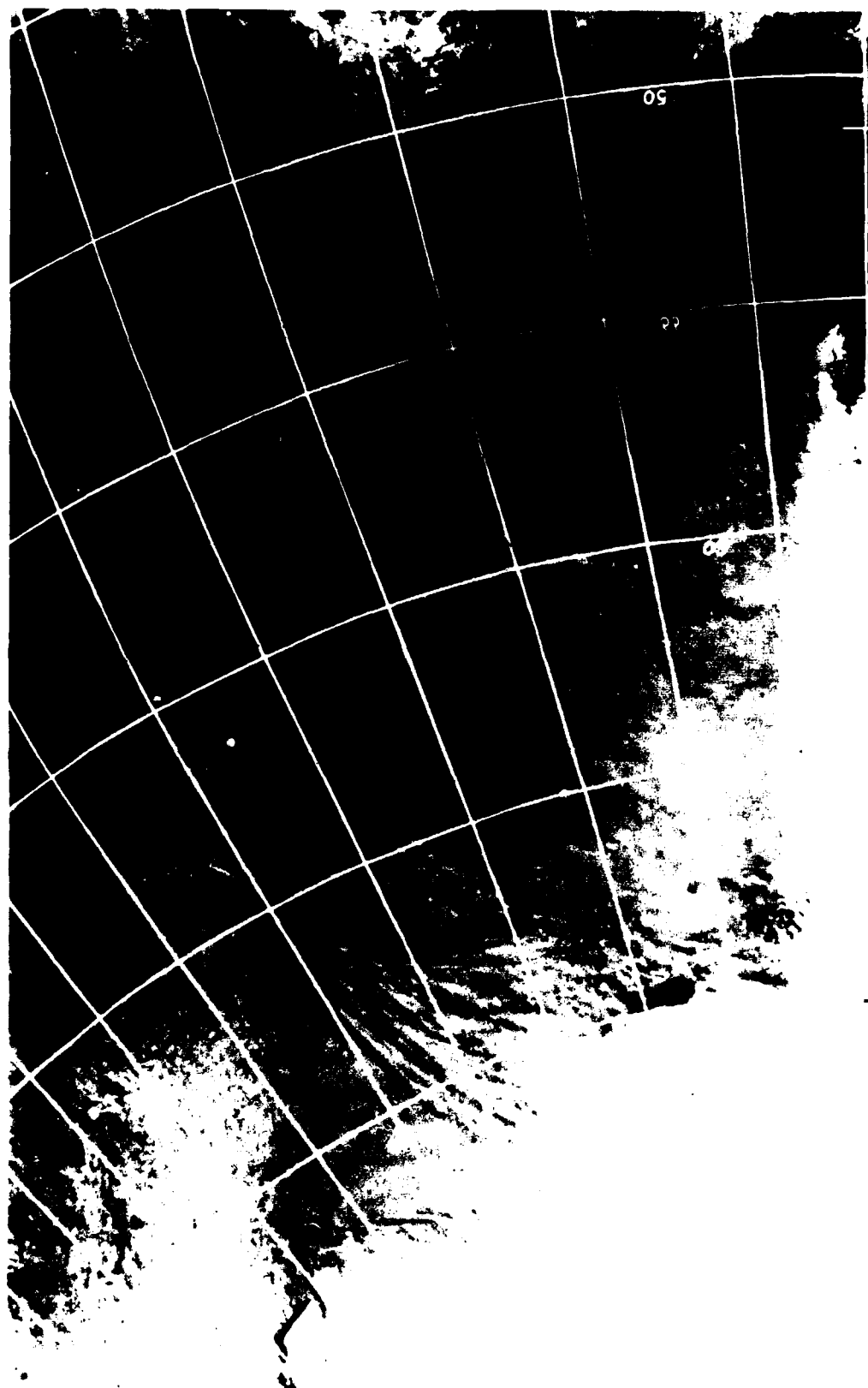
DESCRIPTION OF SYMBOLS

In ice edge region.
Rotting ice concentration 2 (0-5 scale).
Snow encrusted ice concentration 1
(scale 0-3).
8 tenths concentration small floes (20-
100 m diameter, 30-70 cm thickness) and
ice cakes (2-20 m diameter, 30-70 cm
thickness).
Average ice thickness 30-60 cm.
Wind NW, 17 m/s.
Ship drifting.

Bergy water at ice edge region, concentration 5 and 3 (scale 0-9). 5-6 tenths concentration small floes (20-100 m diameter, 30-70 cm thickness). Ice cakes (2-20 m diameter, 30-70 cm thickness), and brash ice (<2 m diameter).

Small floes alternating with open water patches.

Traveling through ice edge region, alternating patches of broken ice, open water.



30° 20° 10° 0° 10° 20°
TV M2-5 08 54'50 GMT 13. 11. 81.

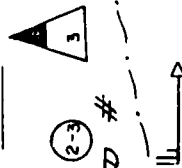
DATE

14 Nov 81
(14.11)

HOUR

0200
(02^h 00^m)

SYMBOLS



DESCRIPTION OF SYMBOLS

Ice berg concentration 3 (0-9).
2-3 tenths concentration ice cakes (2-20 m diameter, 30-70 cm thickness) and brash ice (< 2 m diameter) at ice edge region.
Wind from W, at 12 m/s.

HOUR

0200

Traveling through ice edge region, alternating patches of broken ice open water.

0400

Increasing open water.
Hands of ice at 100% concentration alternating with open water.

0430

Rands and strips, small bits in water.

0503

Small bands of ice.

0508

Plumes from belts of more concentrated ice.

0615

More widely separated belts of ice. Several small berrys.

0645

More extensive bands, highly concentrated within the band, some floes > 5 m diameter.

0700

Field of small broken floes 10 tenths concentration pancakes and concealed slush between.

Entering open water again.

0705

Iceberrys.

0715

Field of 1 m chunks of ice.

0811

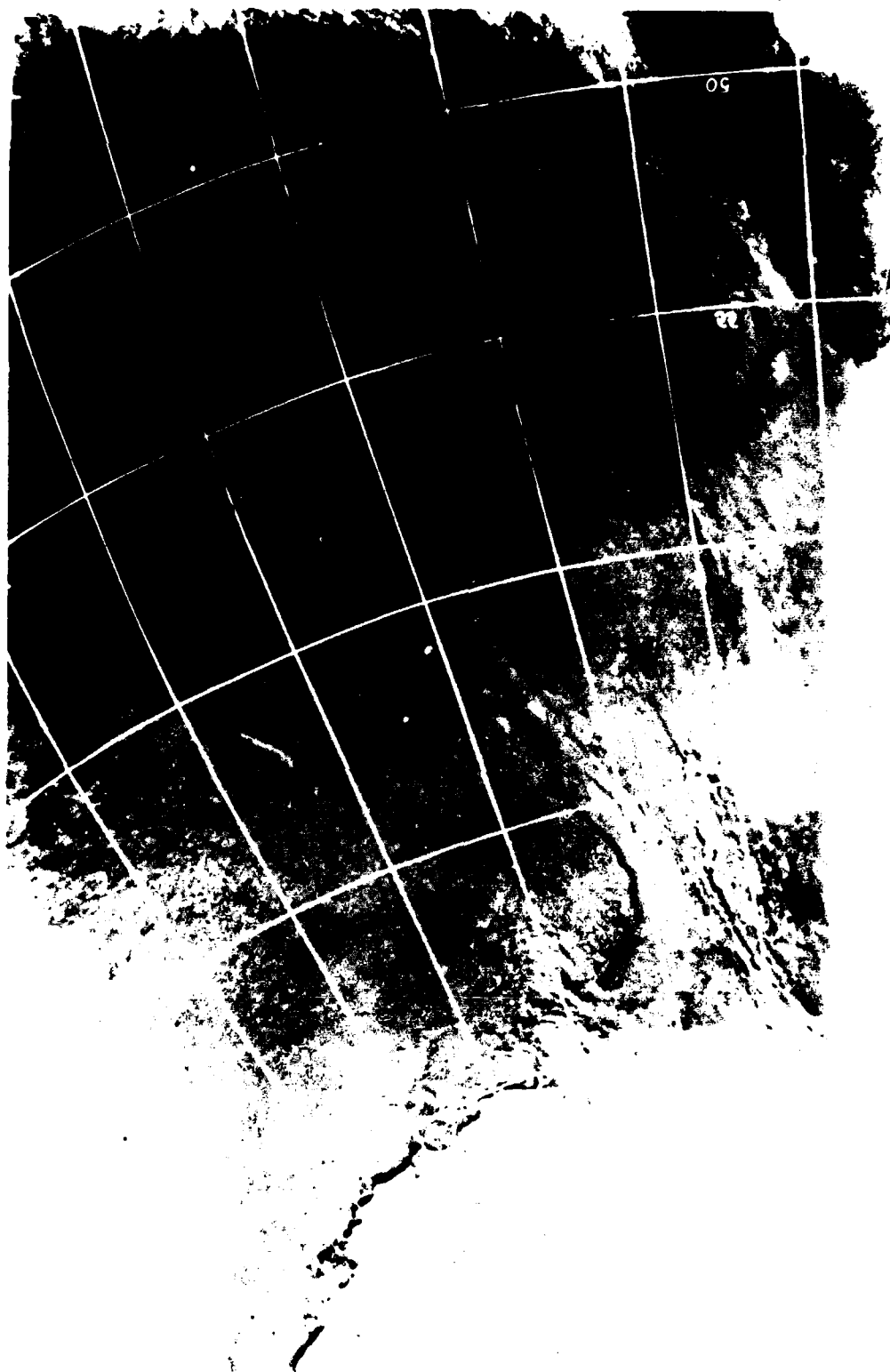
Different swell character. End of ice.

0820

Ice edge region.
Icebergs concentration 1 (0-9 scale).
Entering open water.

0830
(08^h 30^m)





-30° TV M2-5 -20° 14.11.91 -10° 08°38'45" GMT

END

FILMED

8-83

DTIC