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2256\*  
(1975)

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USNS ELTANIN  
SOUTHERN OCEAN  
OCEANOGRAPHIC ATLAS

CRUISES 4 - 55  
JUNE 1962 - NOVEMBER 1972



PREPARED BY:                   ARNOLD L. GORDON AND EUGENE MOLINELLI  
  
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PALISADES, NEW YORK 10964  
  
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LDGO CONTRIBUTION NUMBER 2256  
  
DATE: SEPTEMBER 1975

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OCEANOGRAPHIC ATLAS\*

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The ELTANIN physical oceanographic data, collected during a period from 1962 to 1972 (Gordon 1973) have been distributed in a series of Data Reports, Table 1. These data have been combined into a uniform format on a set of magnetic tapes, which is available for loan from Lamont (by contacting either Gordon or Molinelli) and with this publication, in atlas form. The atlas plates display the data in a variety of formats which have proven useful in data interpretation studies. Hopefully this atlas will provide the basic information needed for planning of Southern Ocean studies in both the field and laboratory.

The submarine topography (contours for 1000, 2000 and 3000 meters are shown) is modified from Heezen et al. 1972. The depths, less than 3000 meters, are patterned with dots.

In order to increase station density or length of the section the north-south sections, whose positions are shown on Plate 1, are often composed of stations obtained from a number of different ELTANIN cruises, though most stations are derived from a particular cruise. This mixture results in a mis-match of contours particularly in the surface layer, where seasonal variations are strong. Below 1000 meters, data apparently can be treated synoptically. Contours are often not extended across a discontinuity of station sequence if the mis-match of contours is extreme. A benefit of adding a non-sequence station to a section, besides increasing density of data, is that it yields some information on variability.

The atlas plates have been prepared by contouring computer selected and plotted values. The plotted values which are apparent on the plates and may be legible, provide information on the distribution of points used in contouring each plate. Contouring procedure attempted to generalize somewhat to yield smooth lines, which hopefully depicts climatic or mean conditions. The contoured plates were then reproduced by a xerox process with a reduction to the atlas page size (50% reduction in the case of the aerial views). This atlas is considered as a preliminary view of the ELTANIN working area, and as a step towards developing a comprehensive circumpolar atlas for the Southern Ocean.

The parameters used in the atlas are as follows:

Parameter	Symbol	Units
Salinity	S	parts per mille ‰
Potential Temperature	T, θ	C
Oxygen	O	milliliters per liter
Silicate	SI	micro-gram atoms per liter
Phosphate	P	micro-gram atoms per liter
Nitrate	N	micro-gram atoms per liter
Depth	D	meters on aerial views kilometers on sections

The T/θ plots have the 50% and the 100% oxygen saturation curves for salinity of 34.7‰ and 34.0‰ respectively, calculated from the equation given in the International Oceanographic Tables, Volume 2, 1973

The surface temperature and salinity plates are presented for six month intervals: January-June and July-December. The temperature values plotted on the July-December plate indicate winter period (July-September) stations and on the January-June plate indicate summer period (January-March) stations. The positions of the salinity values indicate the spring and fall station positions.

Copies of the Atlas are distributed to oceanographers who have expressed interest (by publications or other means) in the Southern Ocean. Since copies are limited, copies would have to be shared.

The Atlas project is supported by the National Science Foundation Office for the International Decade of Ocean Exploration as a component of the ISOS (International Southern Ocean Studies) program of Grant GX 41955.

\* LDGO Contribution Number 2256

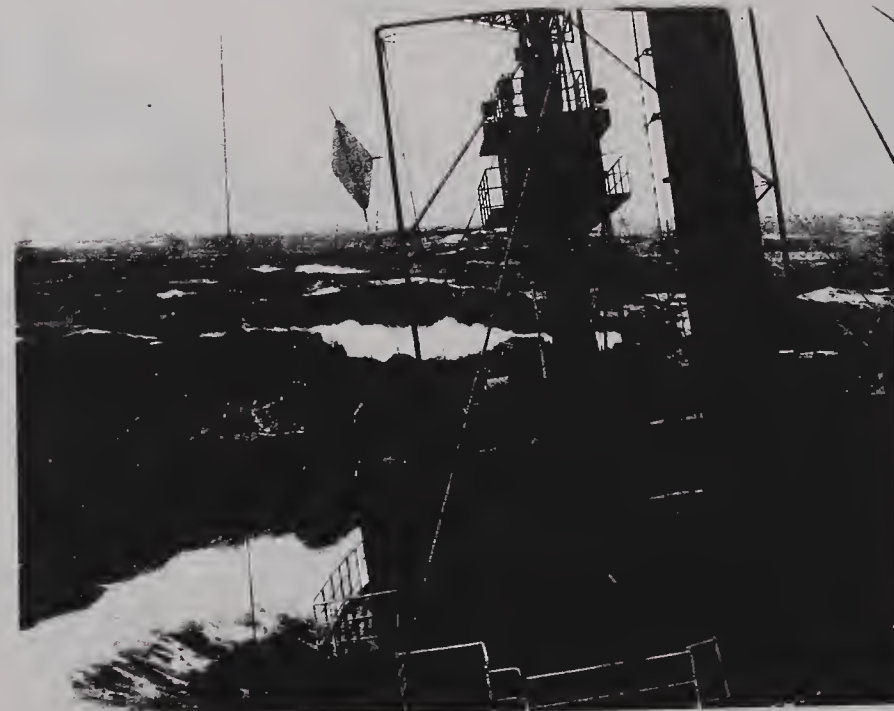
REFERENCES

- Gordon, A.L. (1973) Physical Oceanography. Antarctic Journal, 8 (3), 61-68
- Heezen, B.C., Sharp, M., and Bentley, C.R. (1972). Morphology of the Earth in the Antarctic and Subantarctic. Antarctic map folio series, no. 16, American Geographical Society.

TABLE I  
ELTANIN DATA REPORTS

CRUISE NUMBERS	SOURCE
4 - 6	FRIEDMAN-LDGO, 1964
7 - 15	JACOBS- LDGO, 1965
16 - 21	JACOBS- LDGO, 1966
22 - 27	JACOBS- LDGO, 1967
28 - 29	SIO/WHOI 1969
32 - 36	JACOBS- LDGO, 1970
37 - 39, 42-46	JACOBS- LDGO, 1972
41	SIO/ HORACE LAMB CENTRE/ JOHNS HOPKINS UNIVERSITY 1970
47 - 50, 52-55*	JACOBS- LDGO, 1974

\* THE REPORT CONTAINS A MAP OF ALL STATION POSITIONS AND A "DIRECTORY" OF ALL ELTANIN STATIONS



Station numbers for the following cruises were changed from the original numbers in order to avoid duplication with the sequential listing given to the Lamont stations. (Jacob's reports, Table I)

CRUISE	ORIGINAL	ASSIGNED
28	1-85	2001-2085
29	86-128	2086-2128
38	1-19	2201-2219
41	1-23	2301-2323
46	1-18	2401-2418
51	1-18	2451-2468

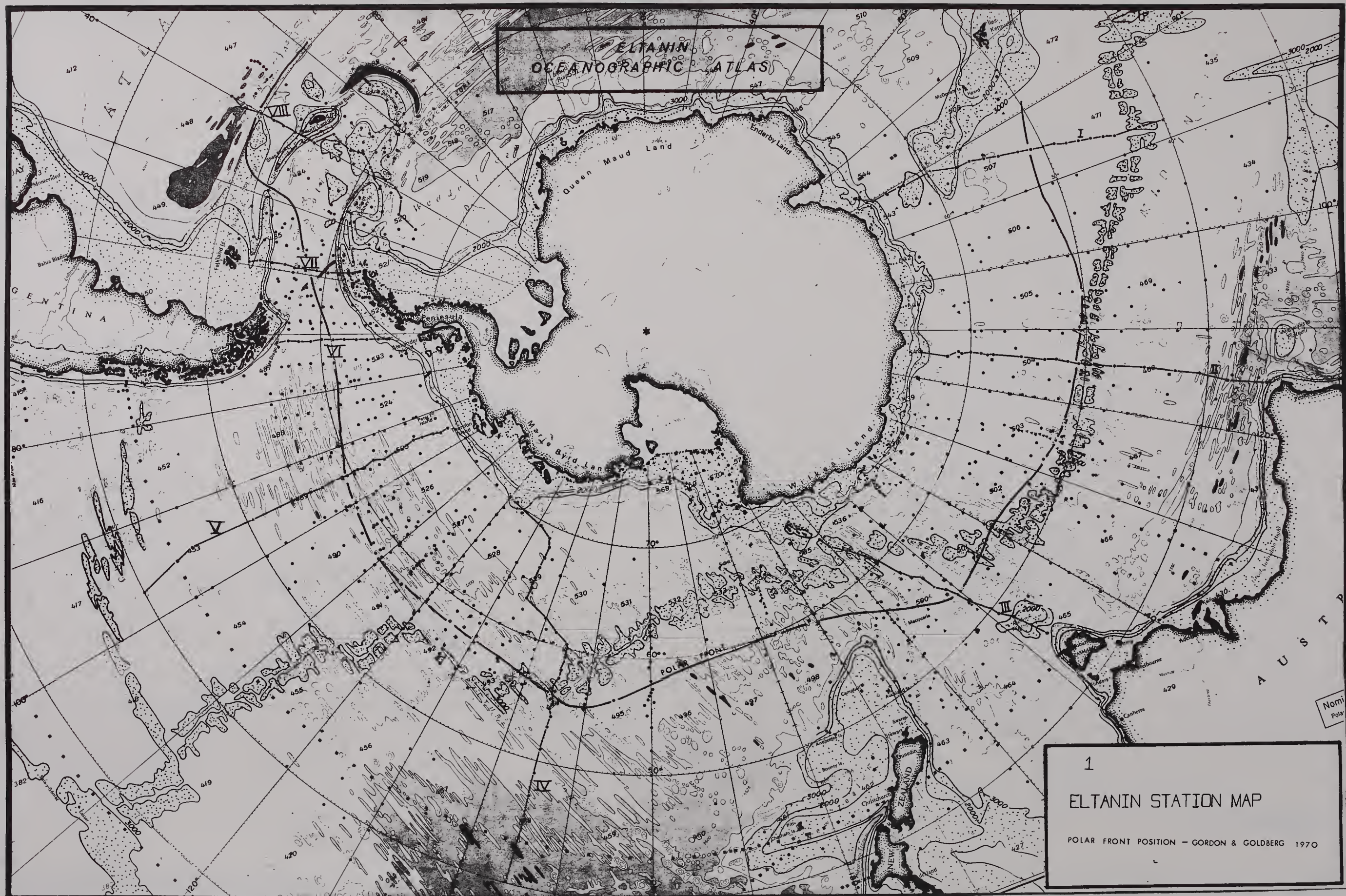
Five STD station numbers of cruise 25 were changed:

ORIGINAL STD	ASSIGNED STO
602	1602
603	1603
607	1607
608	1608
609	1609

PLATE # CONTENTS

1.....	ELTANIN Station map showing positions of vertical sections 1 to 8, (Plates 15-22) and Polar Front (Gordon and Goldberg) 1970
2a.....	July-Dec surface temperature
2b.....	July-Dec surface salinity
3a.....	Jan.-June surface temperature
3b.....	Jan.-June surface salinity
4a.....	Depth T-min.
4b.....	Temperature T-min.
4c.....	Salinity T-min.
4S.....	θ-min/S Scatter Diagram
5a.....	Depth T-max.
5b.....	Temperature T-max.
5c.....	Salinity T-max.
5S.....	θ-max/S Scatter Diagram
6a.....	Depth O <sub>2</sub> -min.
6b.....	Oxygen O <sub>2</sub> -min.
6S-1.....	θ/S on O <sub>2</sub> -min.
6S-2.....	θ/D <sub>2</sub> -min.
6S-3.....	S/O <sub>2</sub> -min.
7a.....	Depth S-max.
7b.....	Salinity S-max.
7S.....	θ/S-max.
8a.....	Bottom θ
8b.....	Bottom S
8c.....	Bottom D <sub>2</sub>
8S-1.....	Bottom θ/S Scatter Diagram
8S-2.....	Bottom θ/D <sub>2</sub> Scatter Diagram
8S-3.....	Bottom θ/S <sub>1</sub> Scatter Diagram
9a.....	Depth of 100 cl/t surface
9b.....	Temperature on the 100 cl/t surface
9c.....	Salinity on the 100 cl/t surface
10a.....	Depth of the 40 cl/t surface
10b.....	Temperature on the 40 cl/t surface
10c.....	Salinity on the 40 cl/t surface
11a.....	0/1000 Dynamic Topography
11b.....	1000/25000 Dynamic Topography
11c.....	2500/4000 Dynamic Topography
12a.....	θ/S group Scatter Diag. for stations west of 180°
12b.....	θ/D <sub>2</sub> group Scatter Diag. for stations west of 180°
12c.....	θ/S <sub>1</sub> group Scatter Diag. for stations west of 180°
13a.....	θ/S group Scatter Diag. for the Pacific Sector
13b.....	θ/O <sub>2</sub> group Scatter Diag. for the Pacific Sector
13c.....	θ/S <sub>1</sub> group Scatter Diag. for the Pacific Sector
14a.....	θ/S group Scatter Diag. for the SW Atlantic
14b.....	θ/D <sub>2</sub> group Scatter Diag. for the SW Atlantic
14c.....	θ/S <sub>1</sub> group Scatter Diag. for the SW Atlantic
15a.....	Temperature along 84°E Profile I
15b.....	Salinity along 84°E Profile I
15c.....	Oxygen along 84°E Profile I
15d.....	Silicate along 84°E Profile I
15S.....	Scatter Diag. for all stations in vicinity of 84°E
16a.....	Temperature along 115°E Profile II
16b.....	Salinity along 115°E Profile II
16c.....	Oxygen along 115°E Profile II
16S.....	θ/S Scatter Diag. for all stations in vicinity of 155°E
17a.....	Temperature along 155°E Profile III
17b.....	Salinity along 155°E Profile III
17c.....	Oxygen along 155°E Profile III
17d.....	Silicate along 155°E Profile III
17e.....	Phosphate along 115°E Profile III
17f.....	Nitrate along 115°E Profile III
17S.....	θ/s Scatter Diag. for all stations in vicinity of 155°E
18a.....	Temperature along 145°W Profile IV
18b.....	Salinity along 145°W Profile IV
18c.....	Oxygen along 145°W Profile IV
18d.....	Silicate along 145°W Profile IV
18e.....	Phosphate along 145°W Profile IV
18f.....	Nitrate along 145°W Profile IV
18S.....	θ/S Scatter Diagram for all stations in vicinity of 145°W
19a.....	Temperature along 95°W Profile V
19b.....	Salinity along 95°W Profile V
19c.....	Oxygen along 95°W Profile V
19d.....	Silicate along 95°W Profile V
19e.....	Phosphate along 95°W Profile V
19f.....	Nitrate along 95°W Profile V
19S.....	θ/S Scatter Diag. for all stations in vicinity of 95°W
20a.....	Temperature along 71°W Profile VI
20b.....	Salinity along 71°W Profile VI
20S.....	θ/S Scatter Diag. for all stations in vicinity of 71°W
21a.....	Temperature along 60°W Profile VII
21b.....	Salinity along 60°W Profile VII
21S.....	Scatter Diag. for all stations in vicinity of 60°W
22a.....	Temperature along 40°W Profile VIII
22b.....	Salinity along 40°W Profile VIII
22c.....	Oxygen along 40°W Profile VIII
22d.....	Silicate along 40°W Profile VIII
22e.....	Phosphate along 40°W Profile VIII
22f.....	Nitrate along 40°W Profile VIII
22S.....	θ/S Scatter Diag. for all stations in vicinity of 40°W
23a.....	Depth S-Minimum
23b.....	Salinity S Minimum





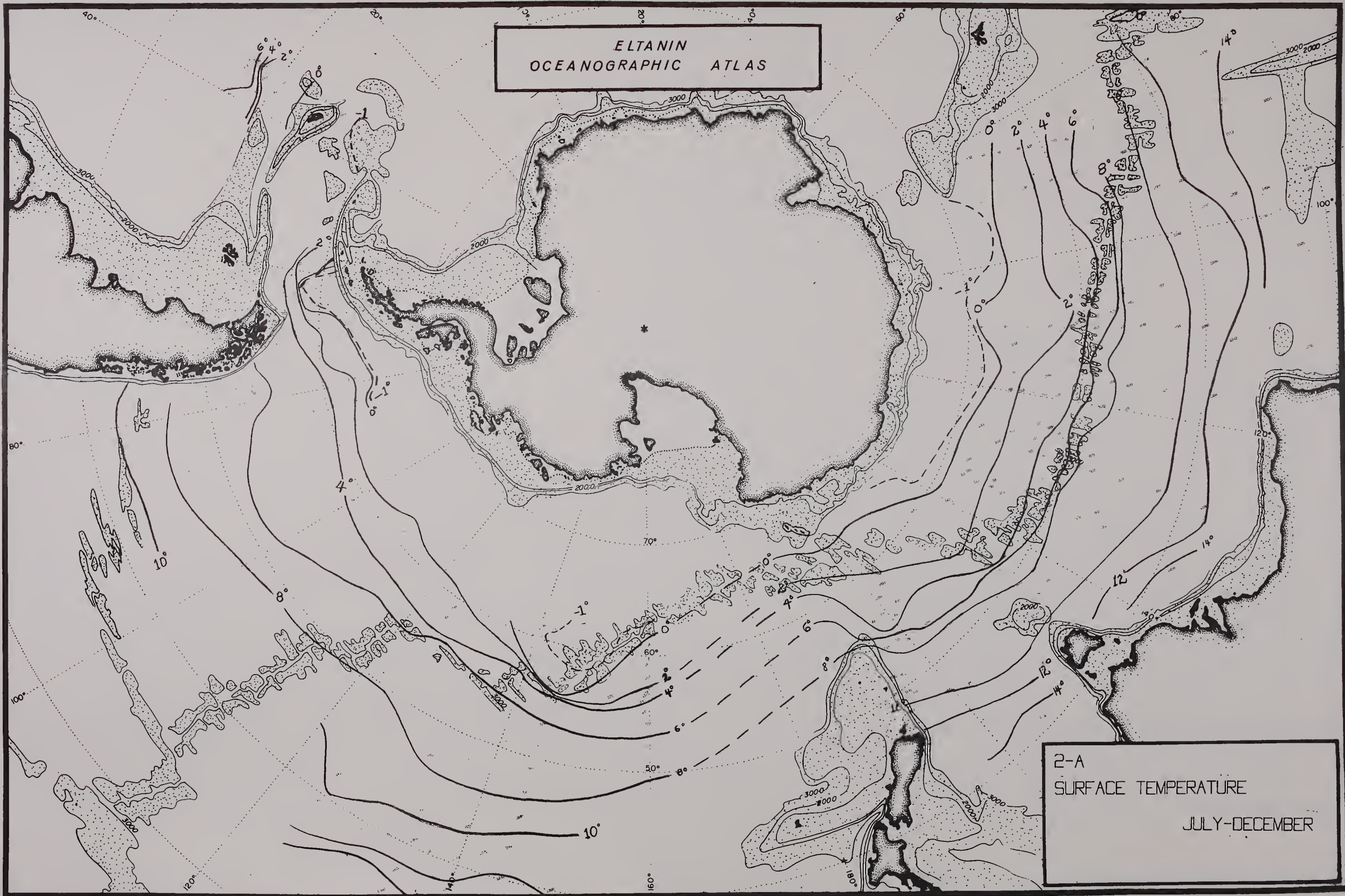
ELTANIN  
OCEANOGRAPHIC ATLAS

1  
ELTANIN STATION MAP  
POLAR FRONT POSITION - GORDON & GOLDBERG 1970

Nomi  
Pola



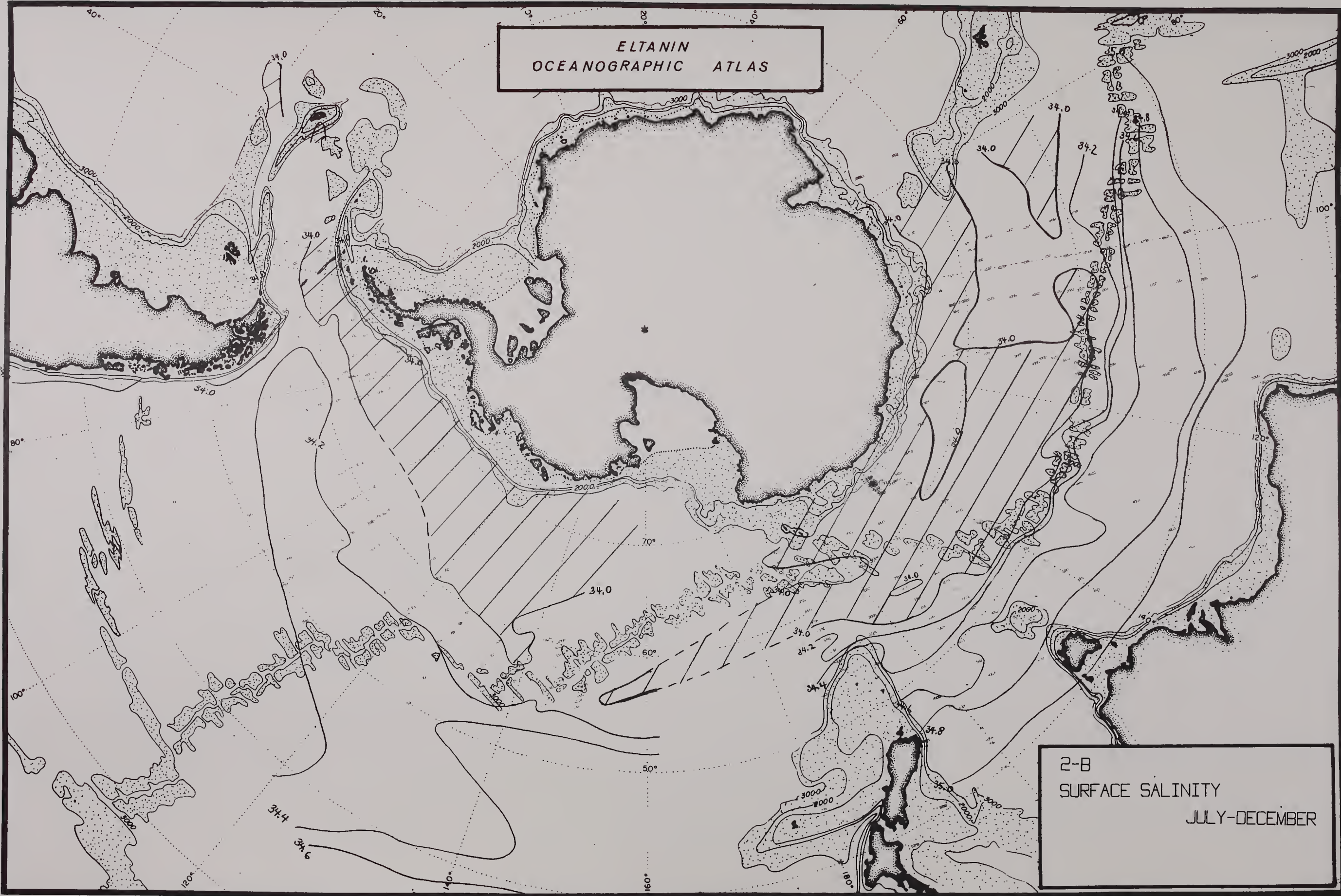
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OCEANOGRAPHIC ATLAS



2-A  
SURFACE TEMPERATURE  
JULY-DECEMBER



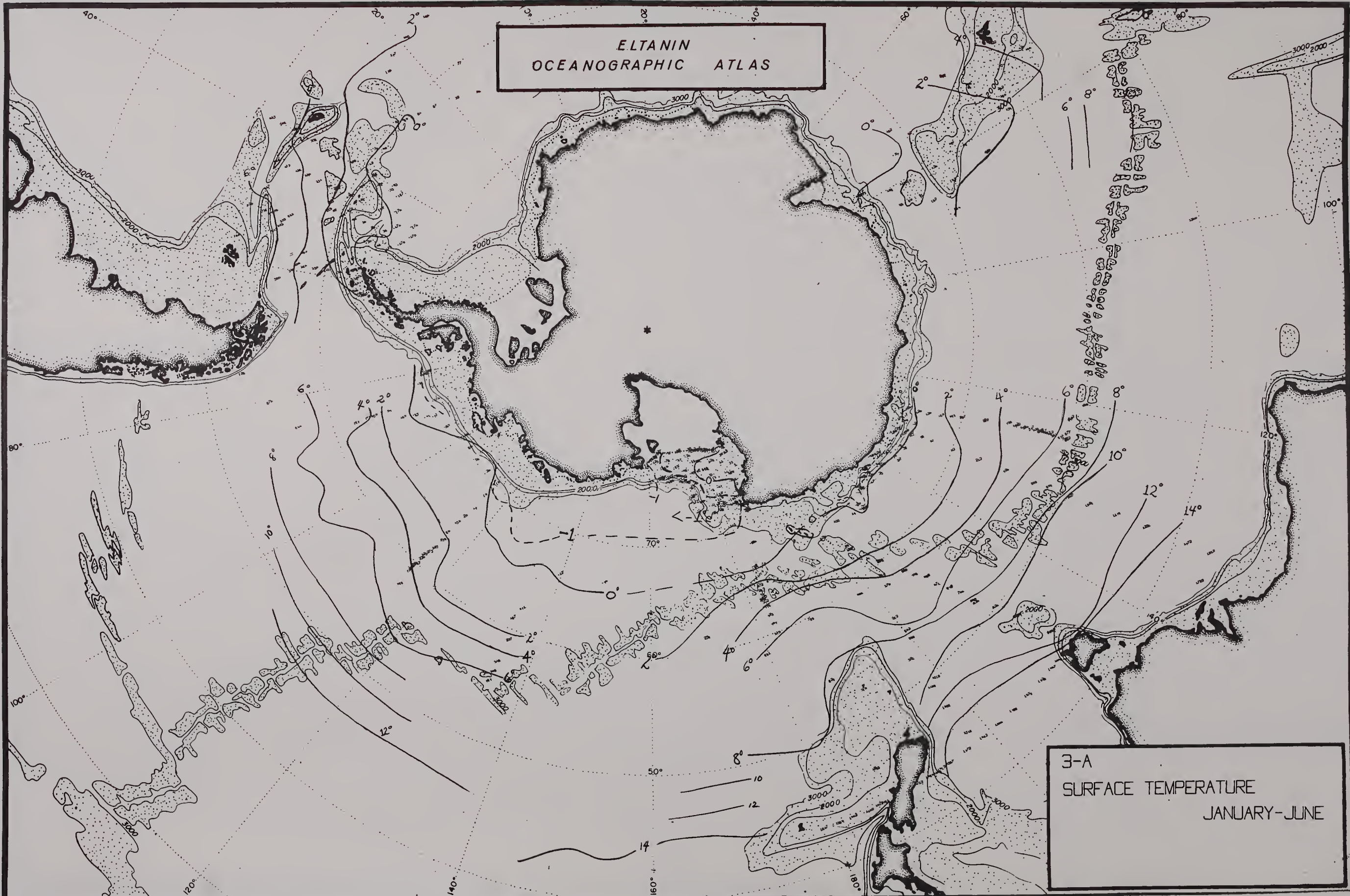
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2-B  
SURFACE SALINITY  
JULY-DECEMBER

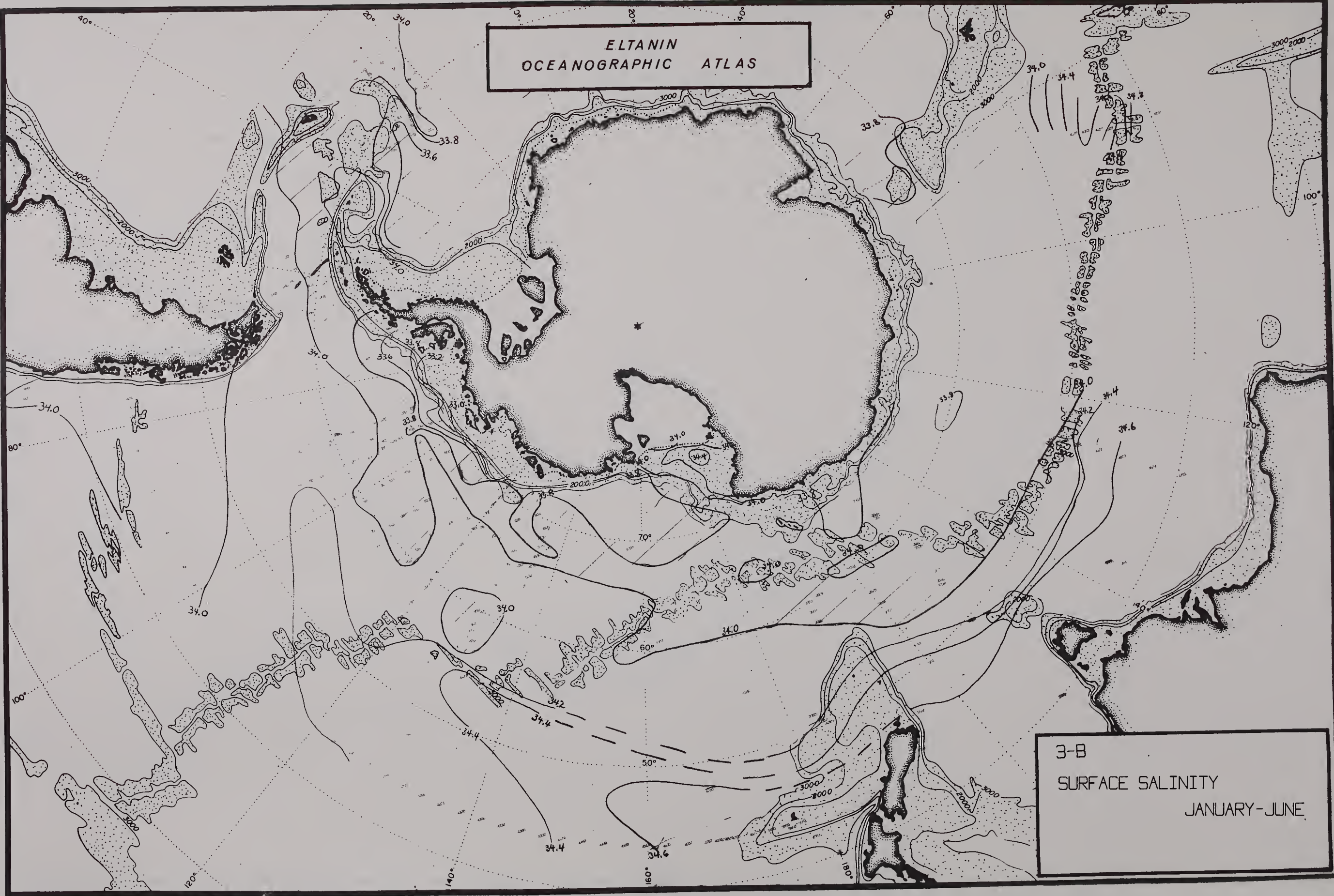


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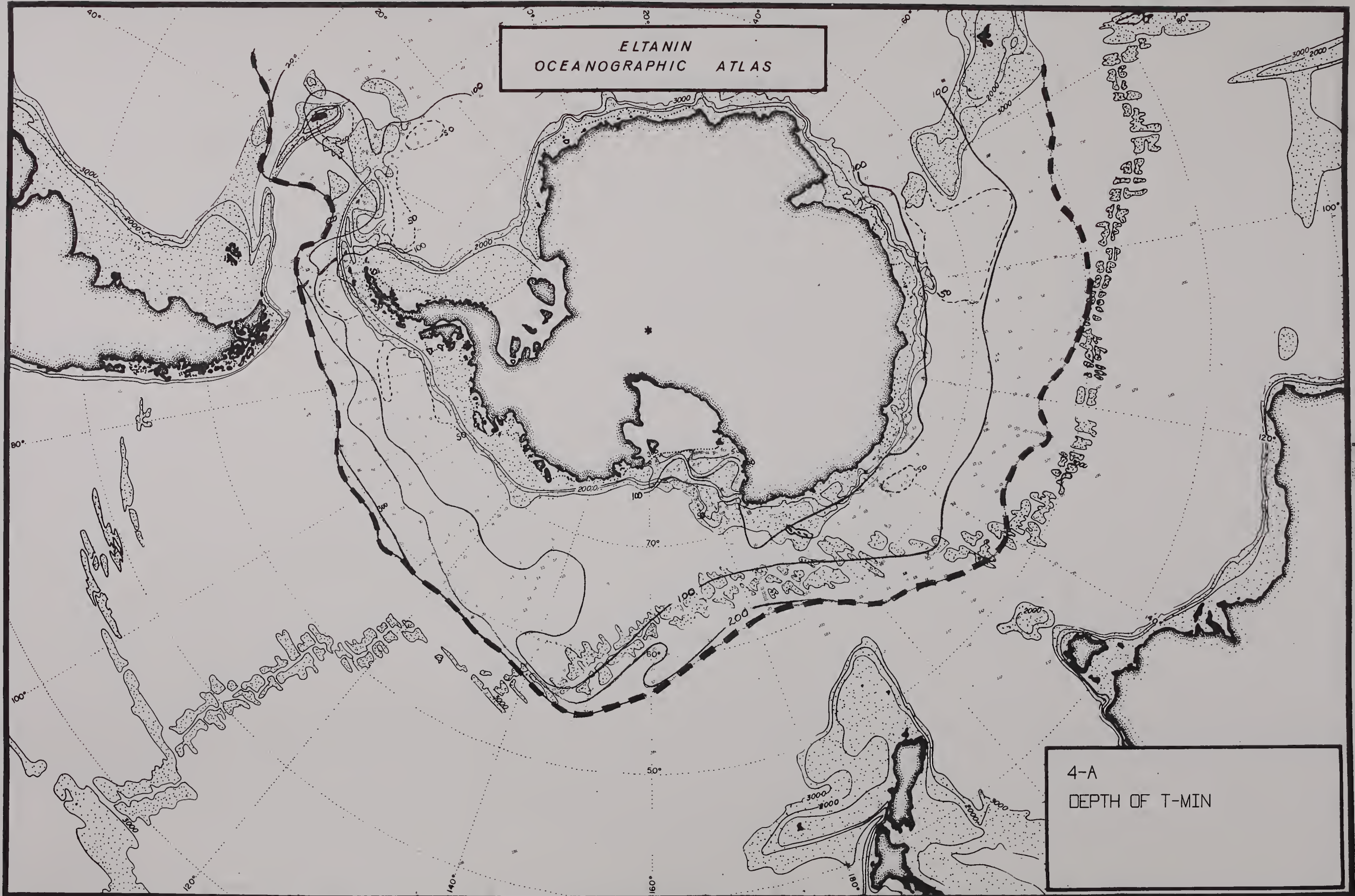
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3-B  
SURFACE SALINITY  
JANUARY-JUNE



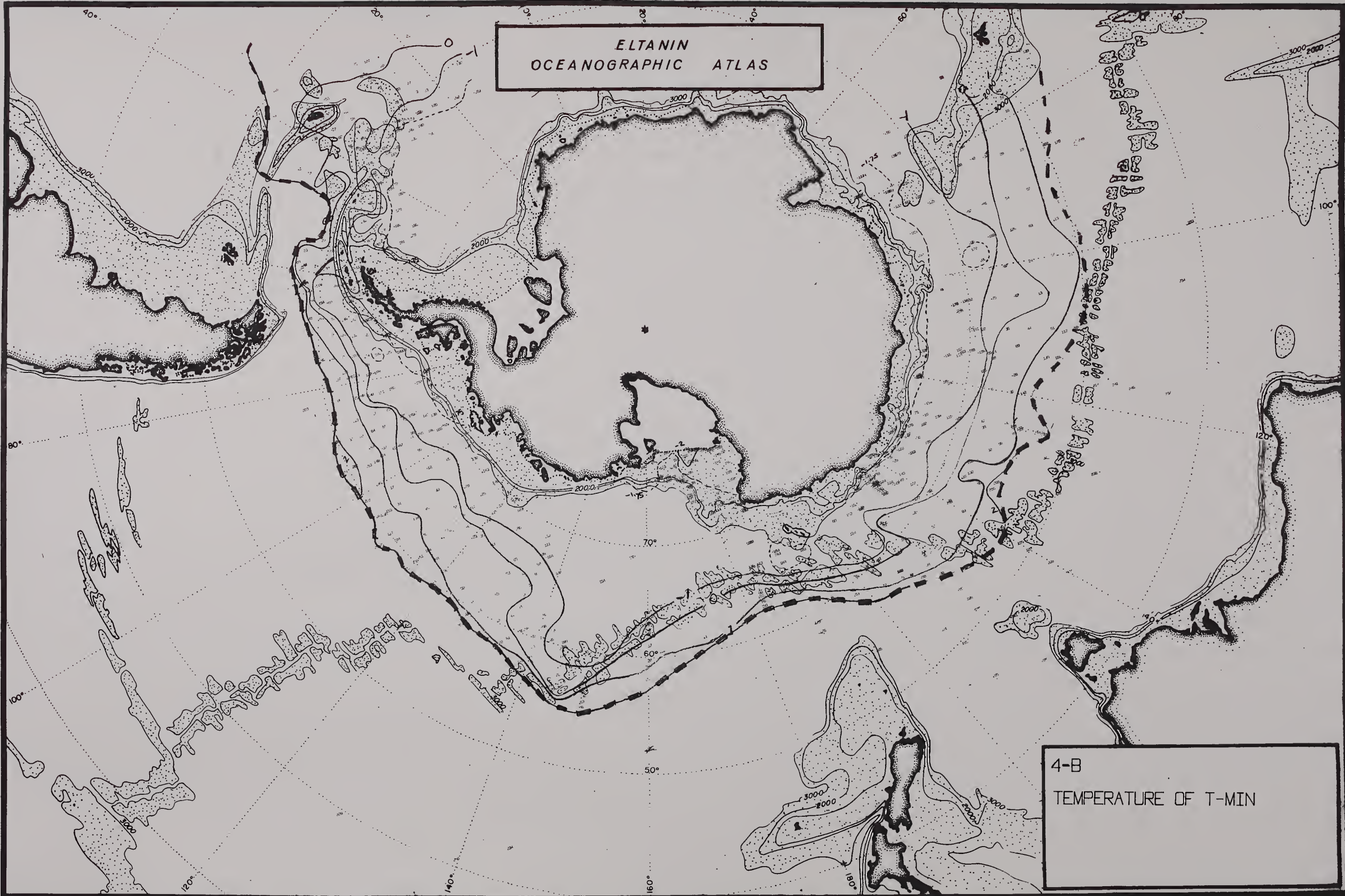
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4-A  
DEPTH OF T-MIN



ELTANIN  
OCEANOGRAPHIC ATLAS



4-B  
TEMPERATURE OF T-MIN

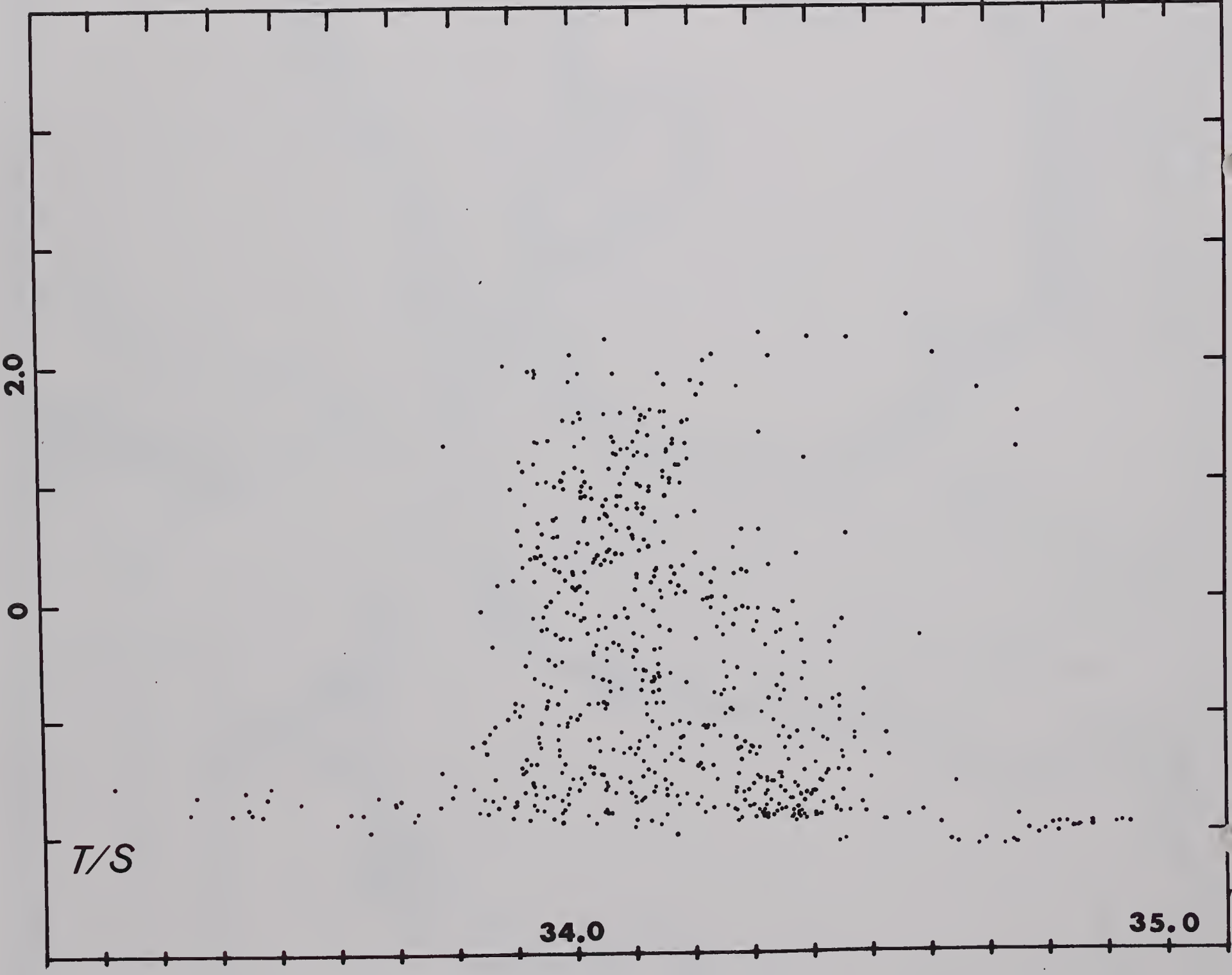


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SALINITY OF T-MIN

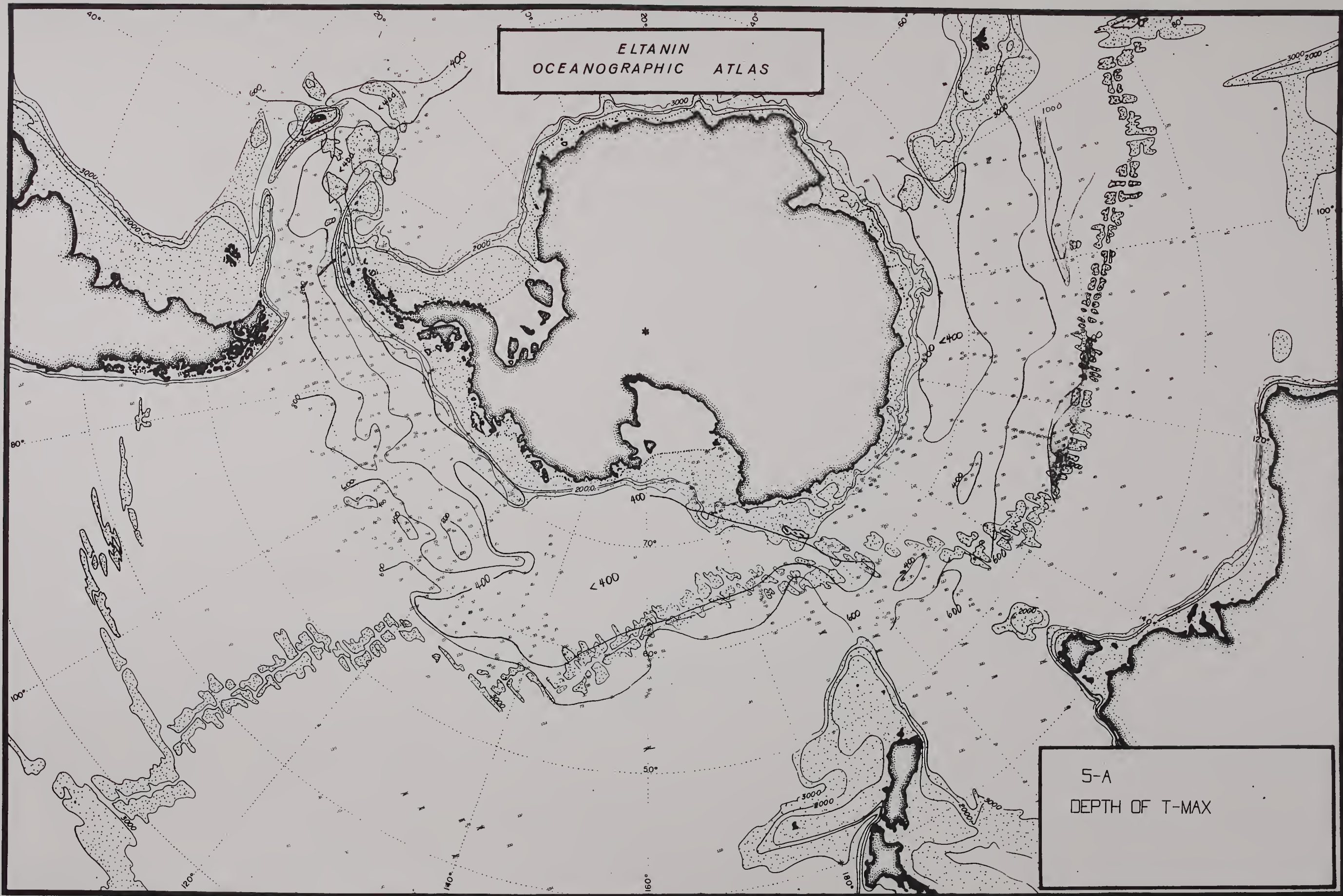




4-5



ELTANIN  
OCEANOGRAPHIC ATLAS



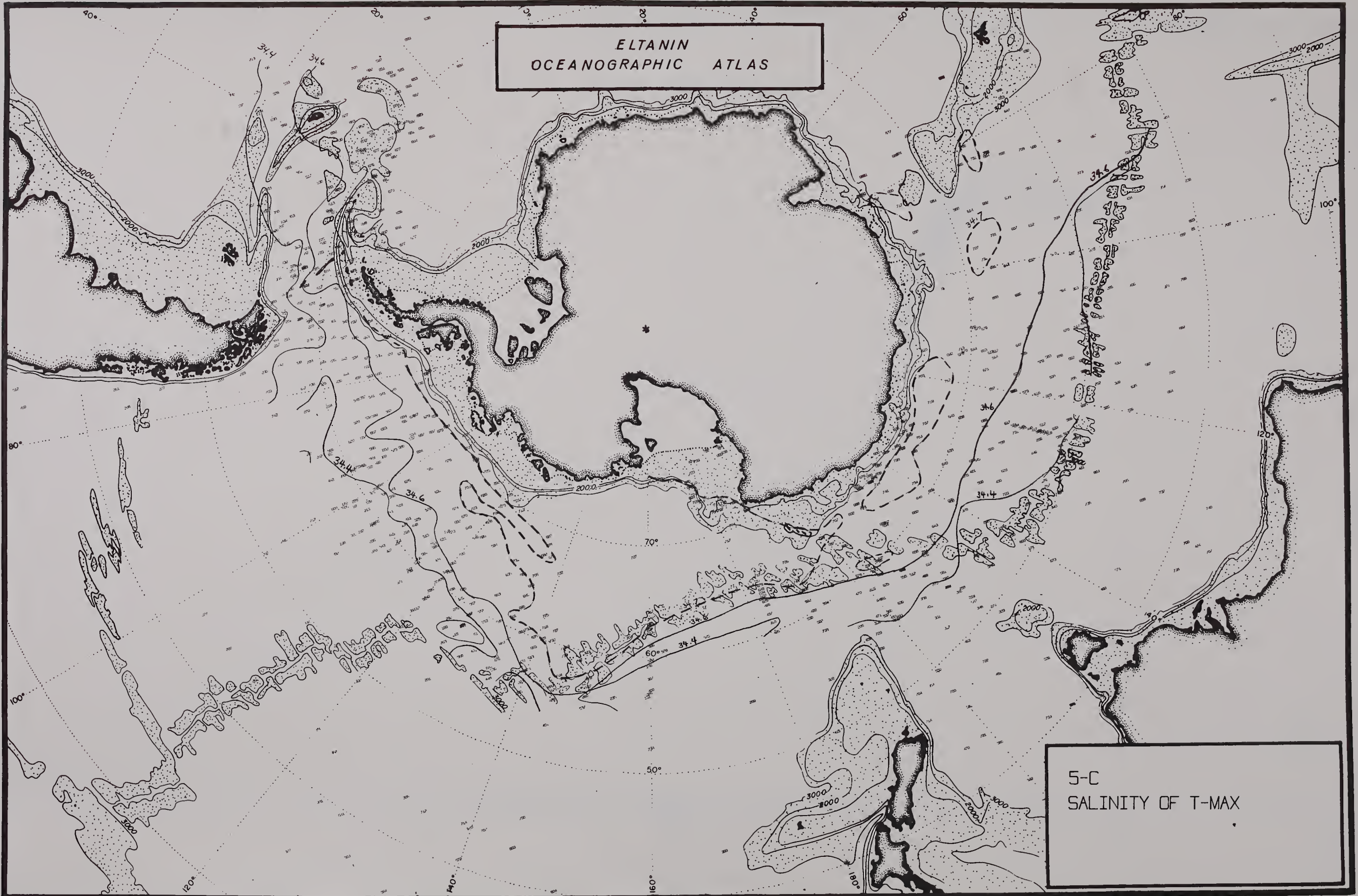
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DEPTH OF T-MAX





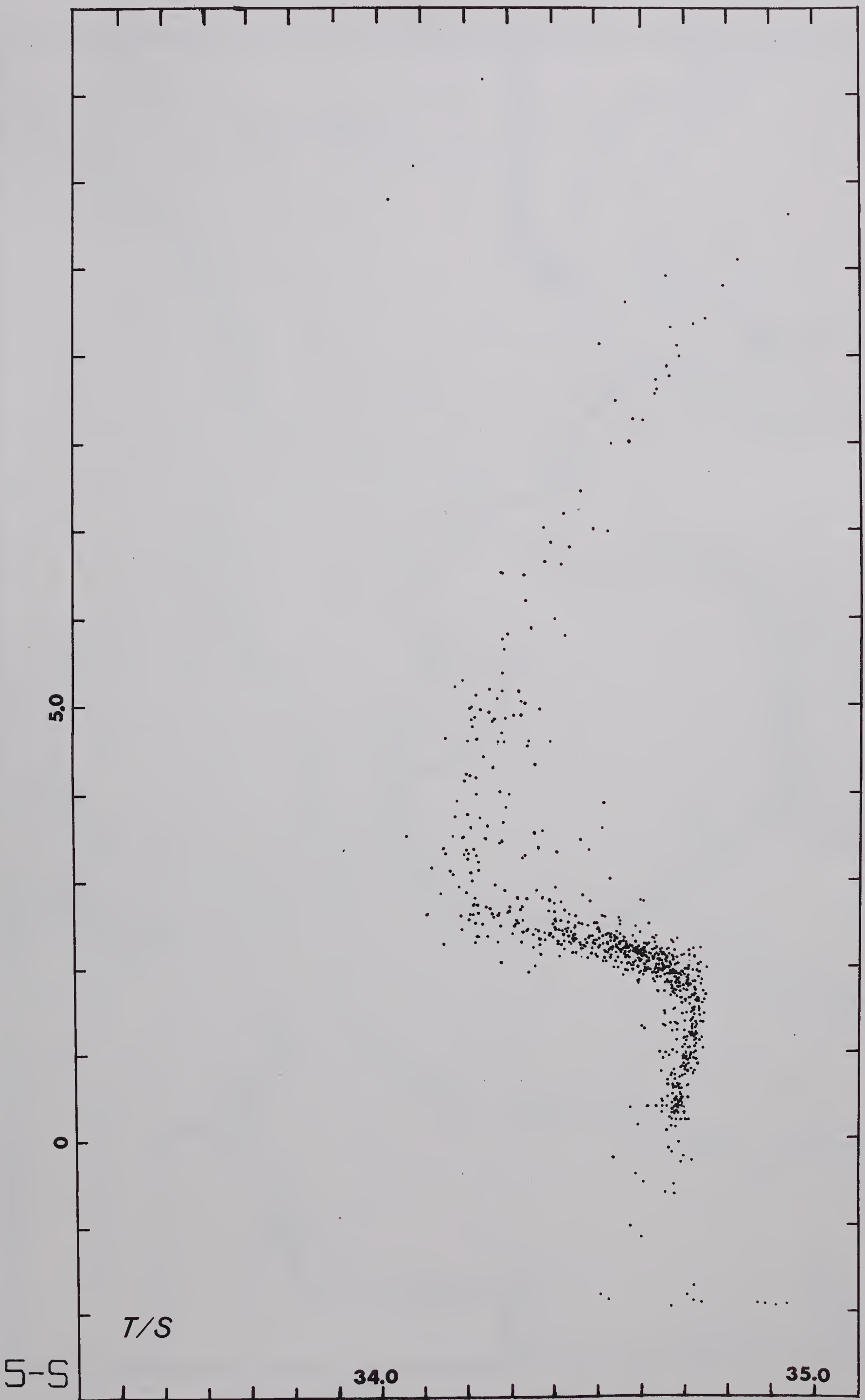


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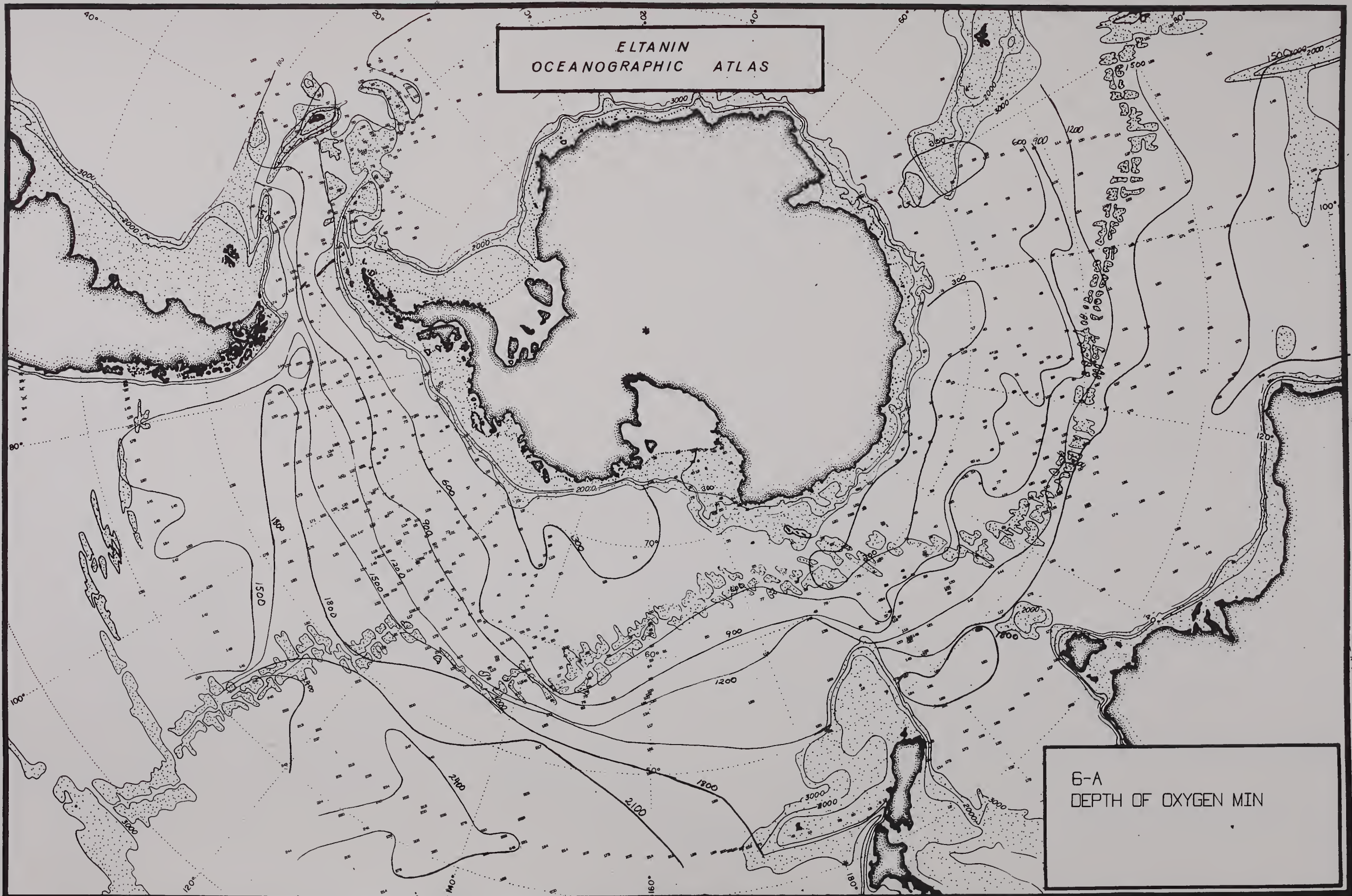
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SALINITY OF T-MAX







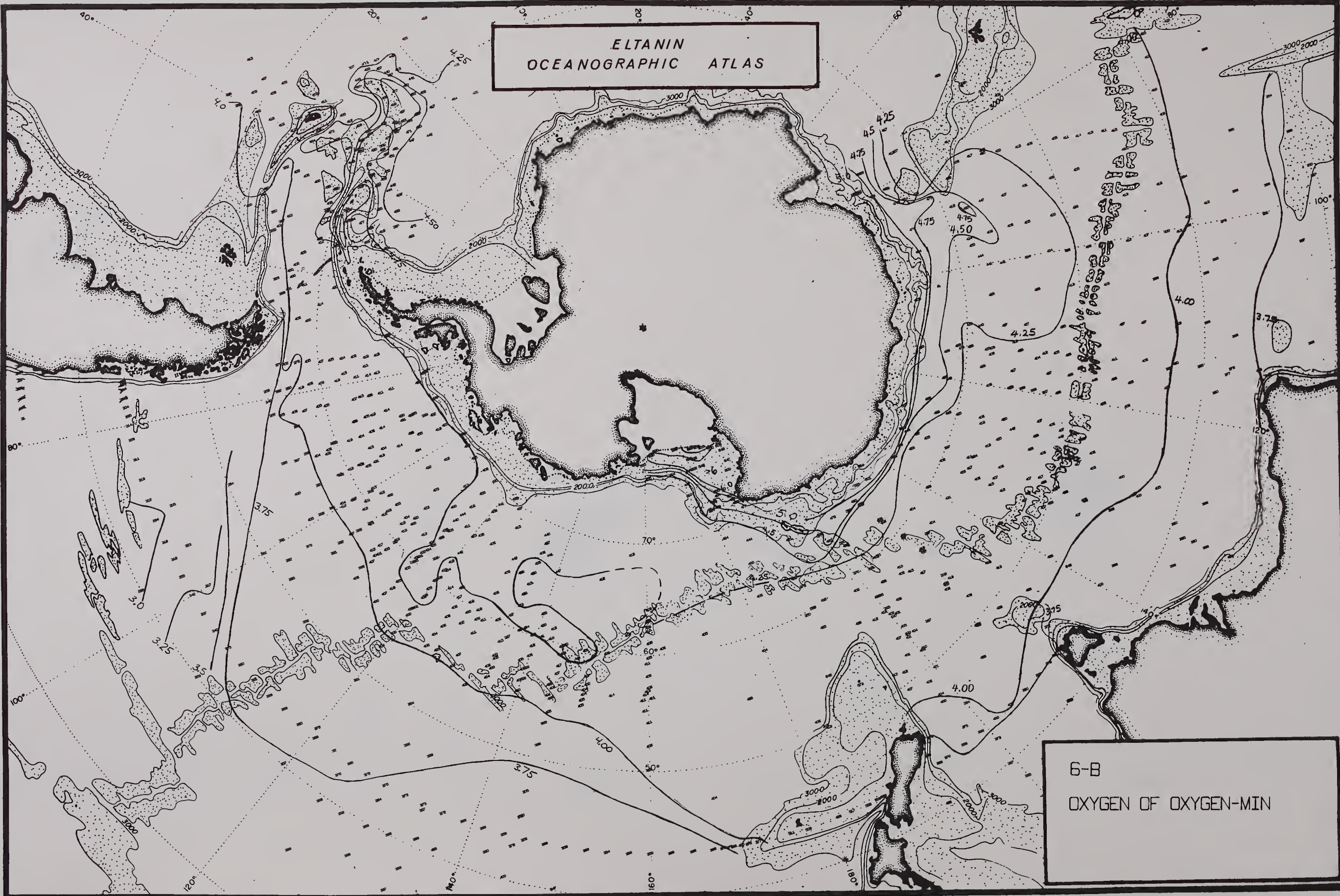
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OCEANOGRAPHIC ATLAS



6-A  
DEPTH OF OXYGEN MIN

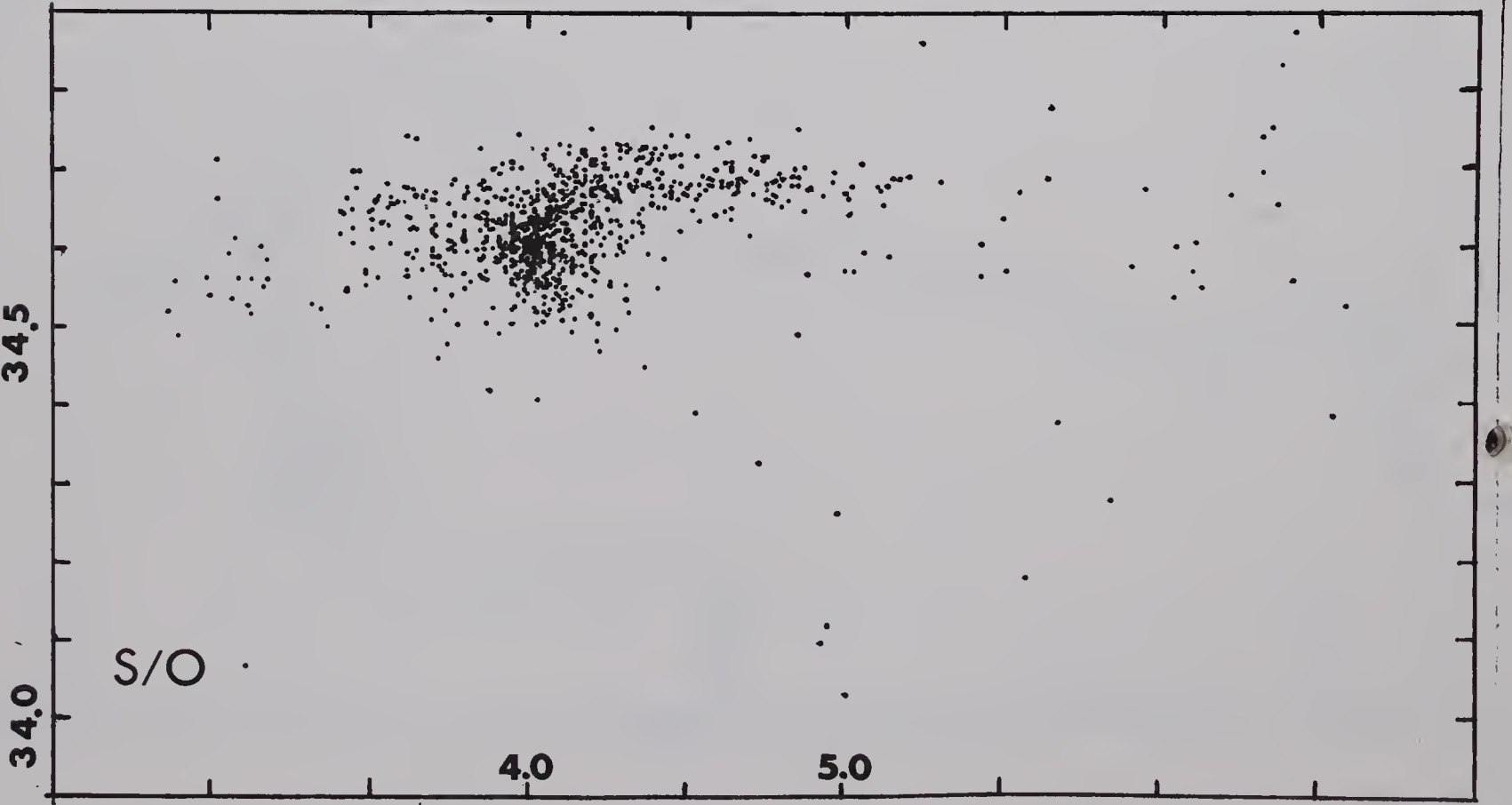
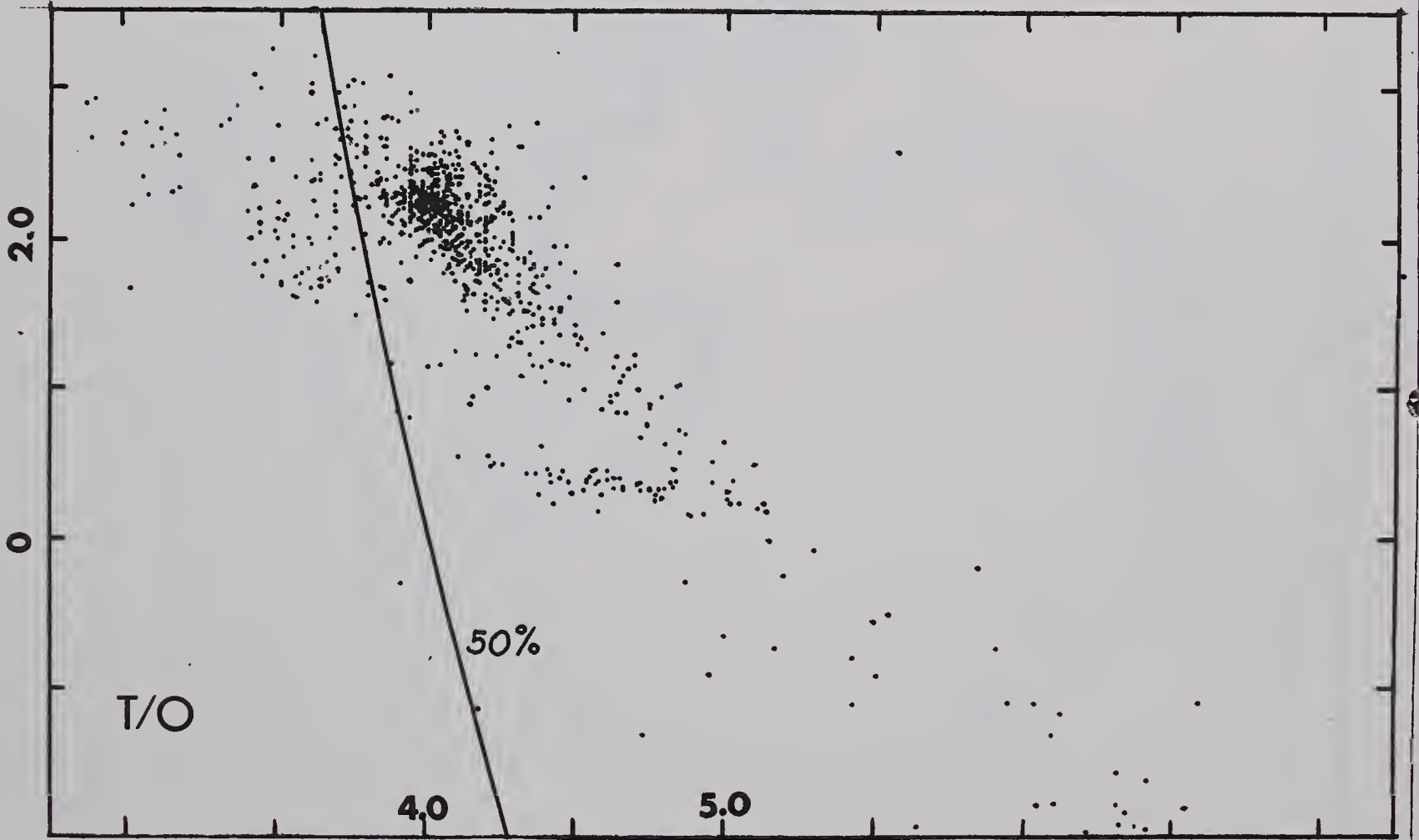
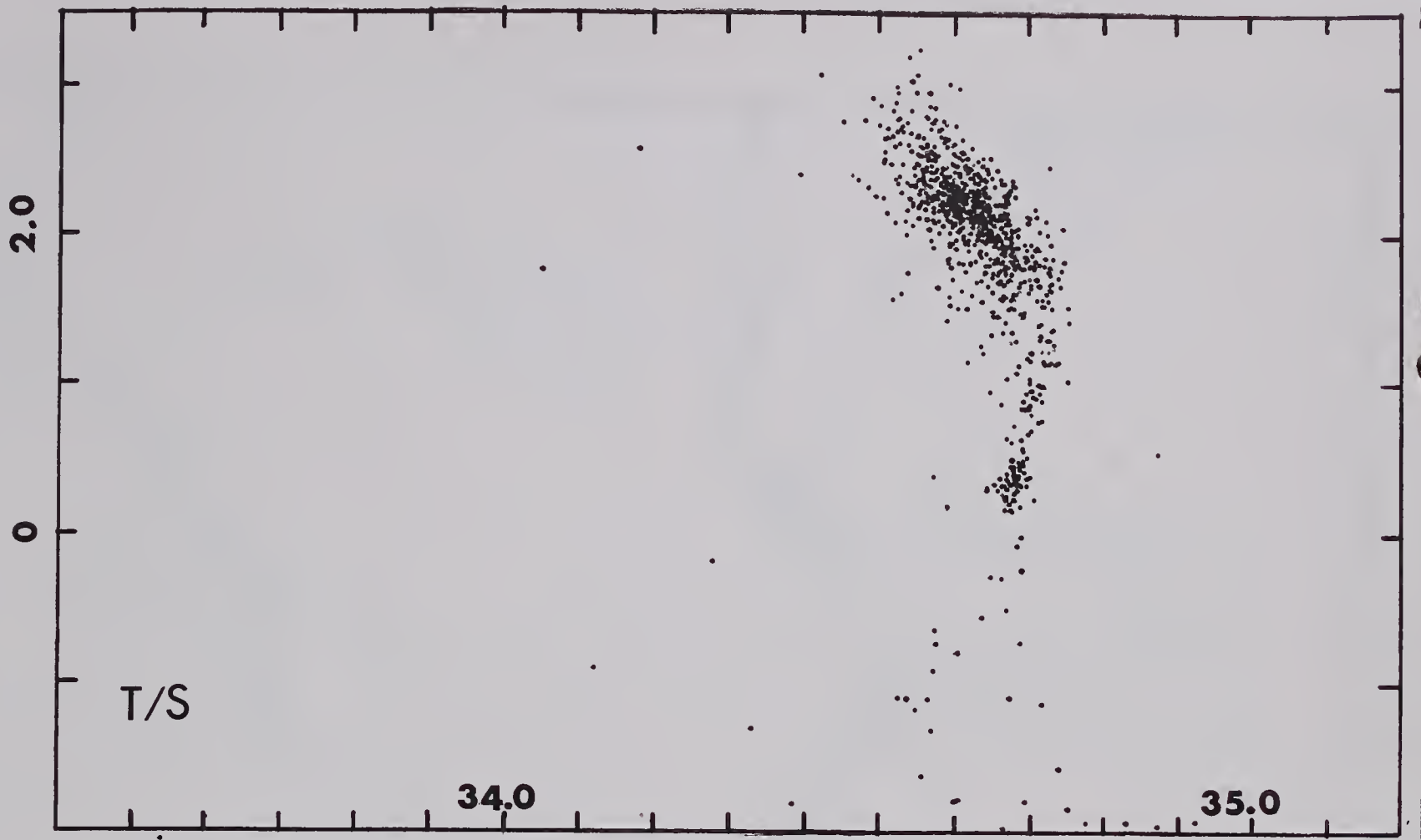


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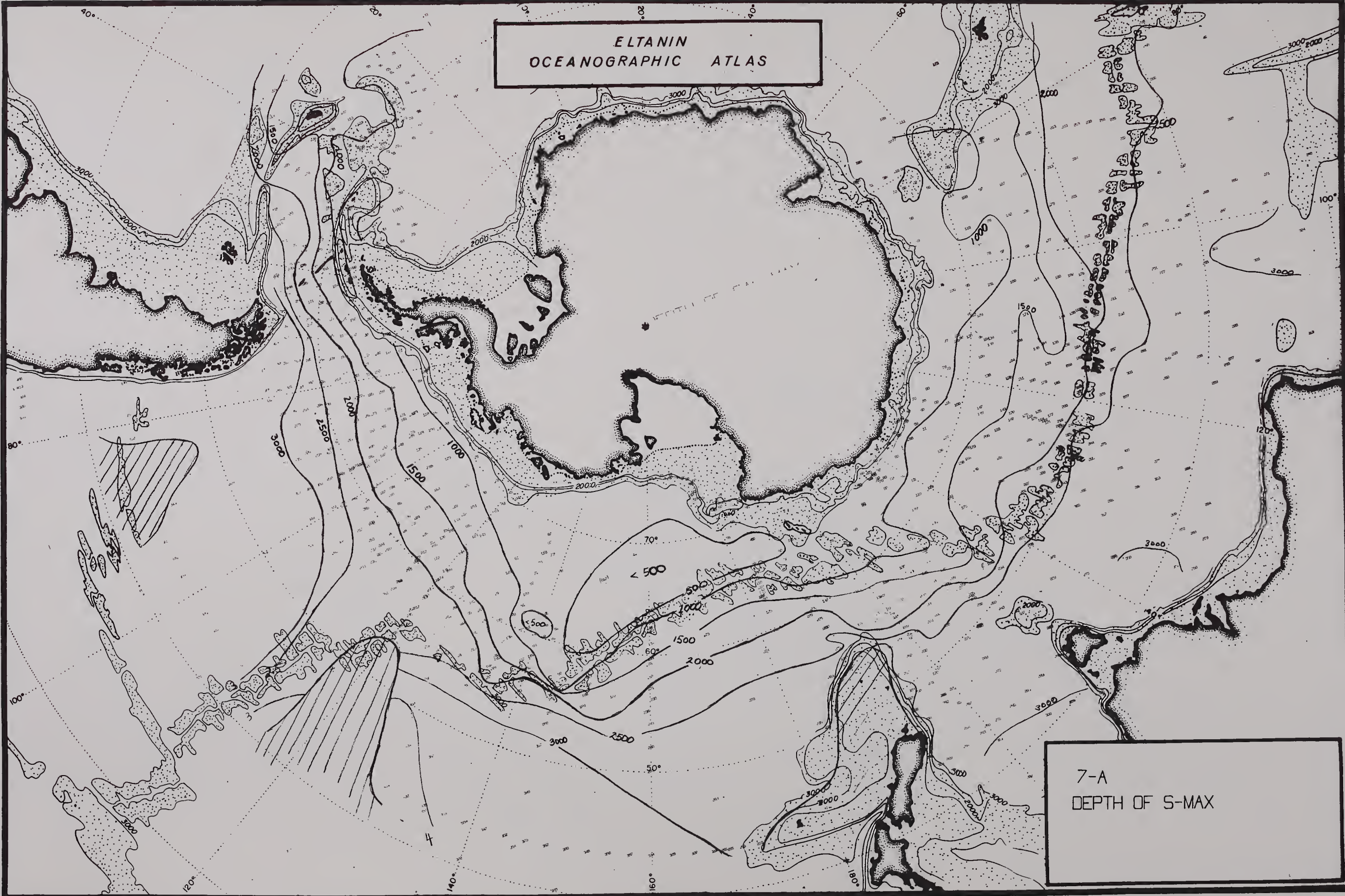
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OXYGEN OF OXYGEN-MIN







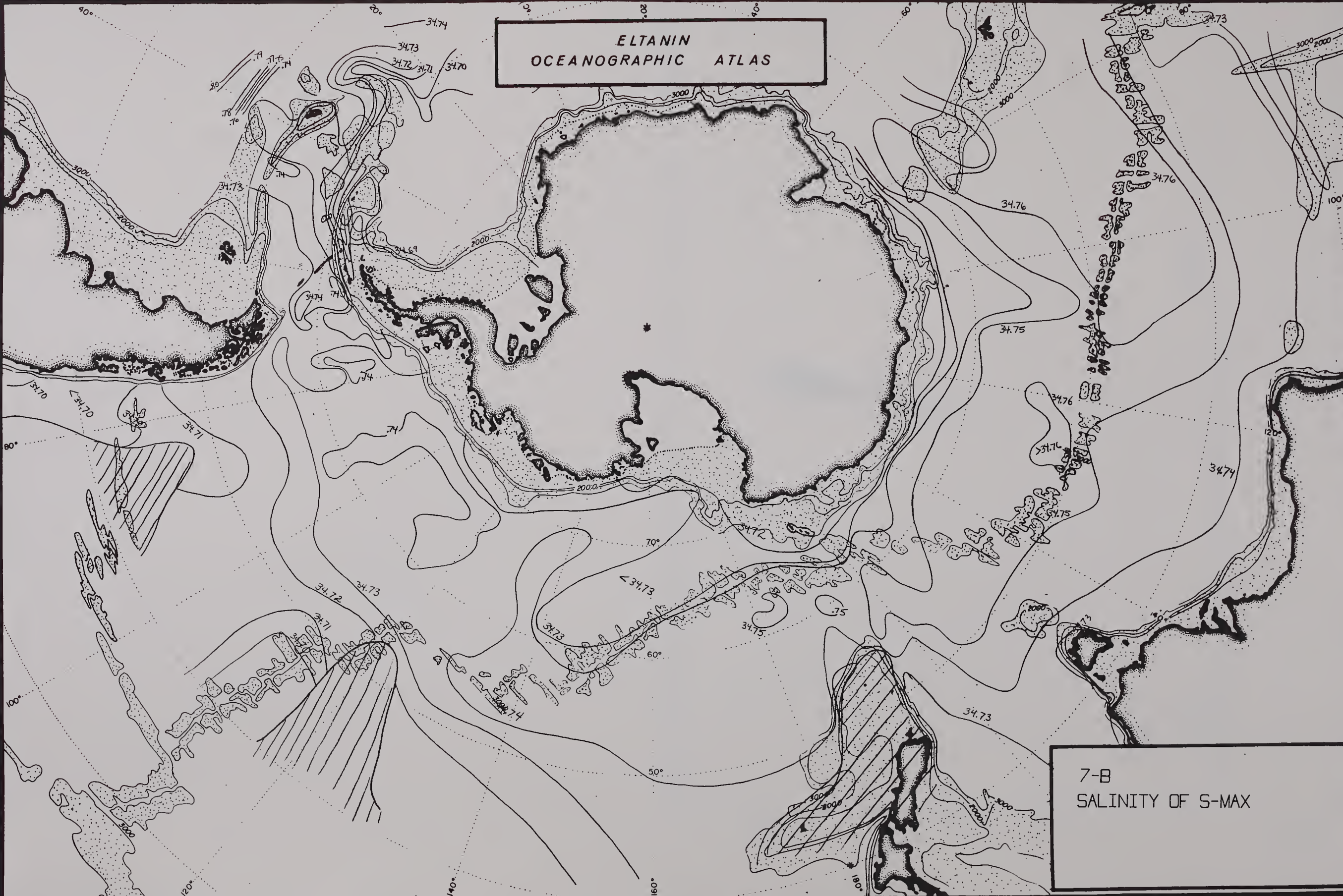
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7-A  
DEPTH OF S-MAX

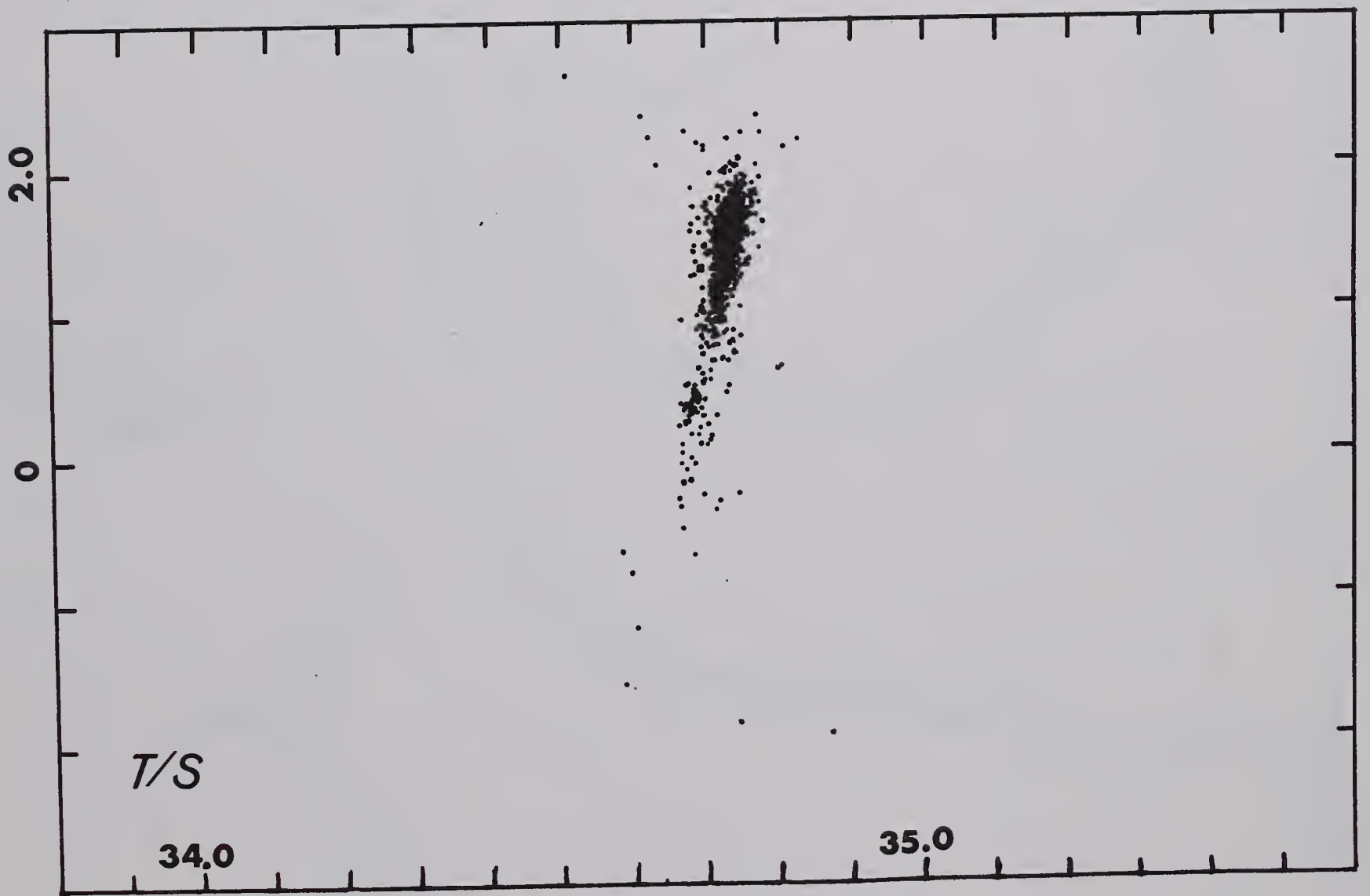


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OCEANOGRAPHIC ATLAS



7-B  
SALINITY OF S-MAX

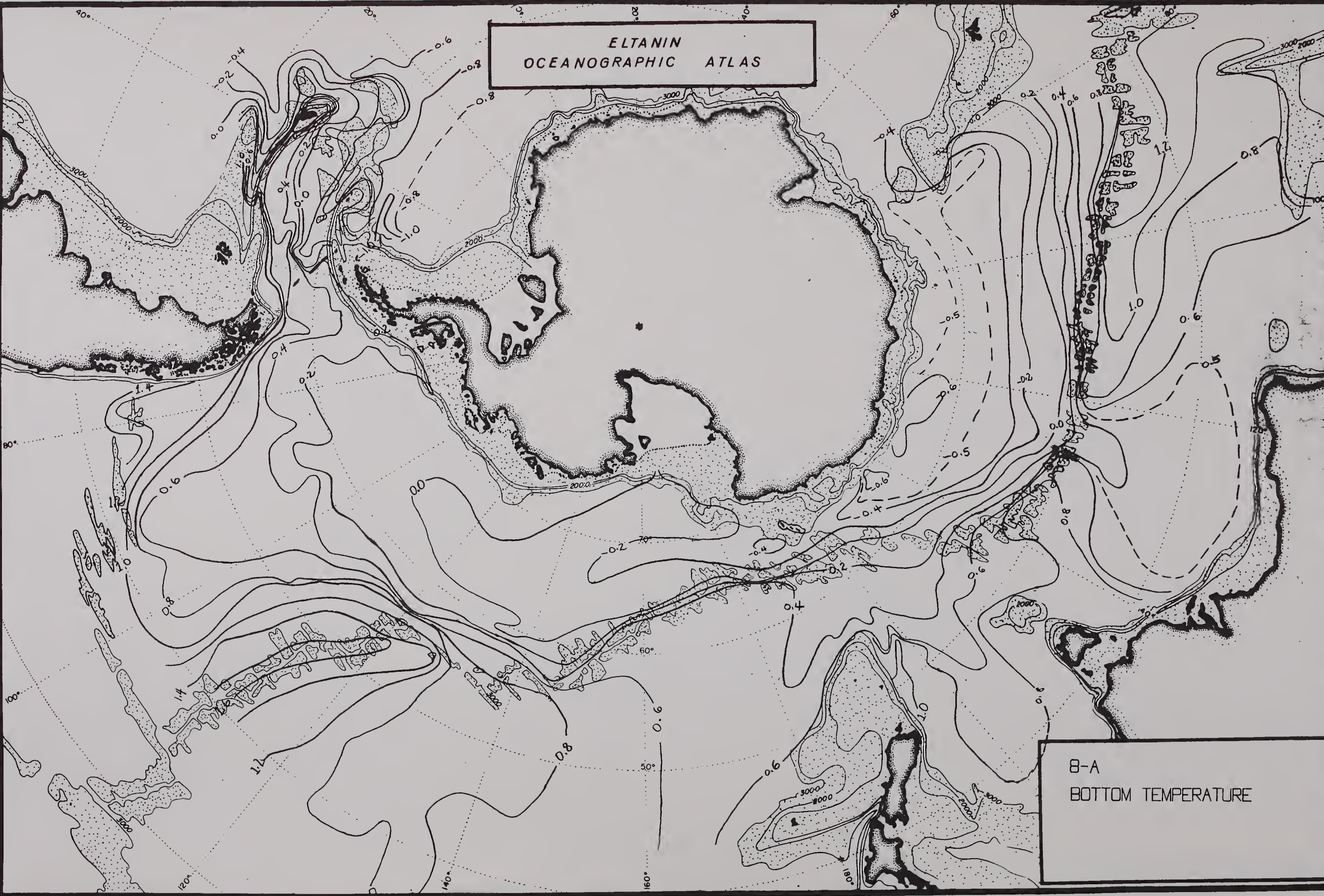




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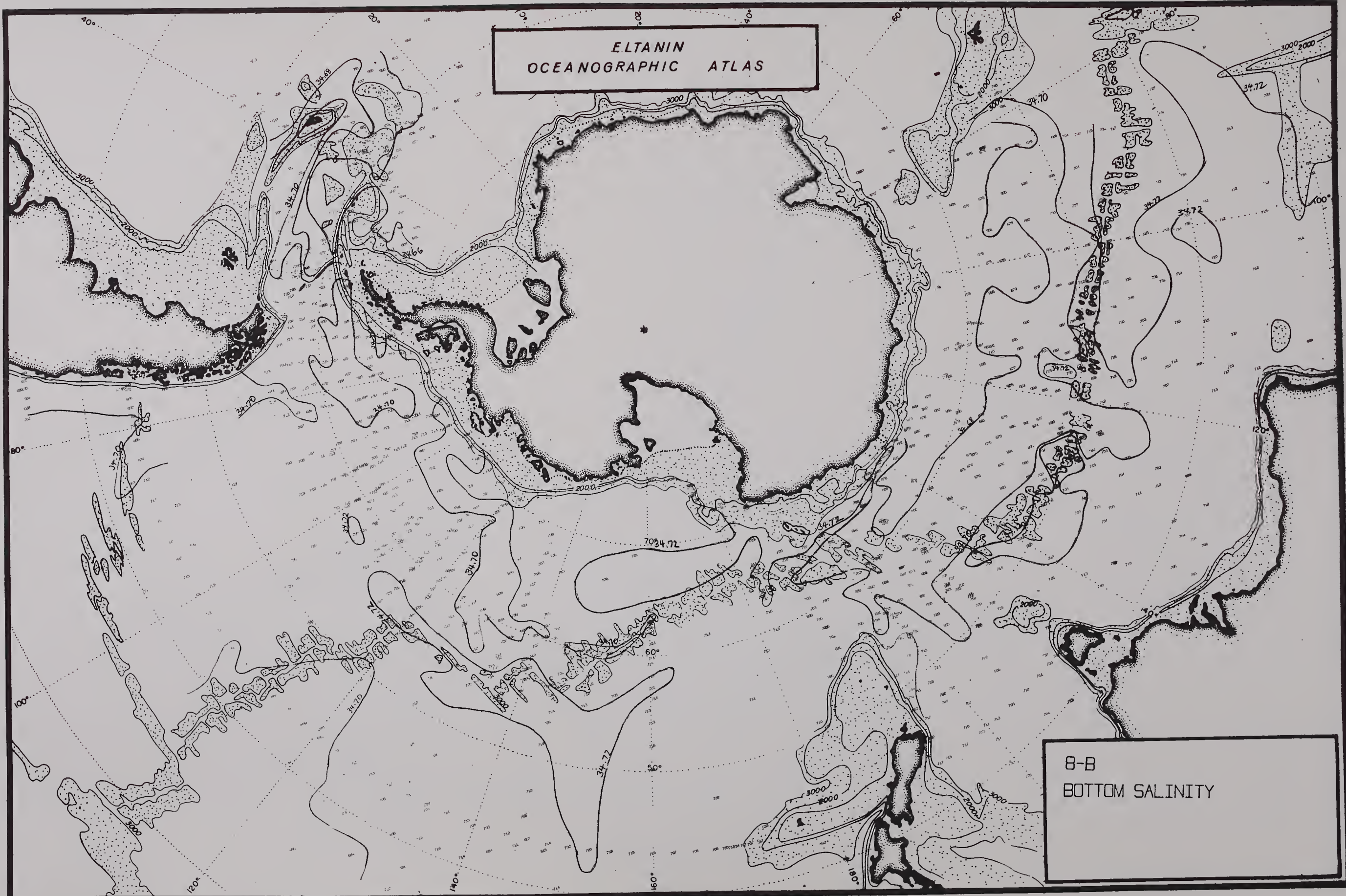
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8-A  
BOTTOM TEMPERATURE



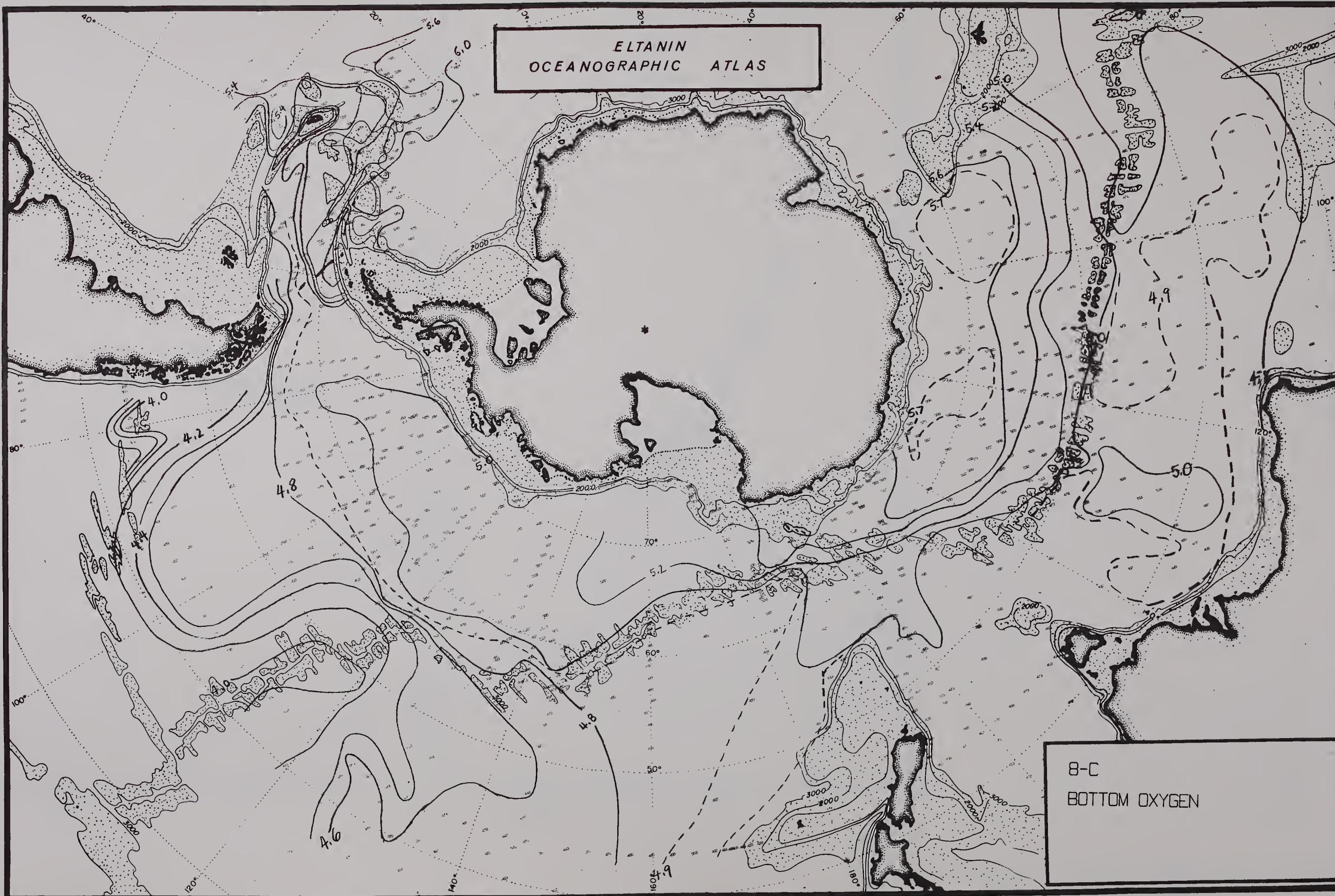
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OCEANOGRAPHIC ATLAS



8-B  
BOTTOM SALINITY

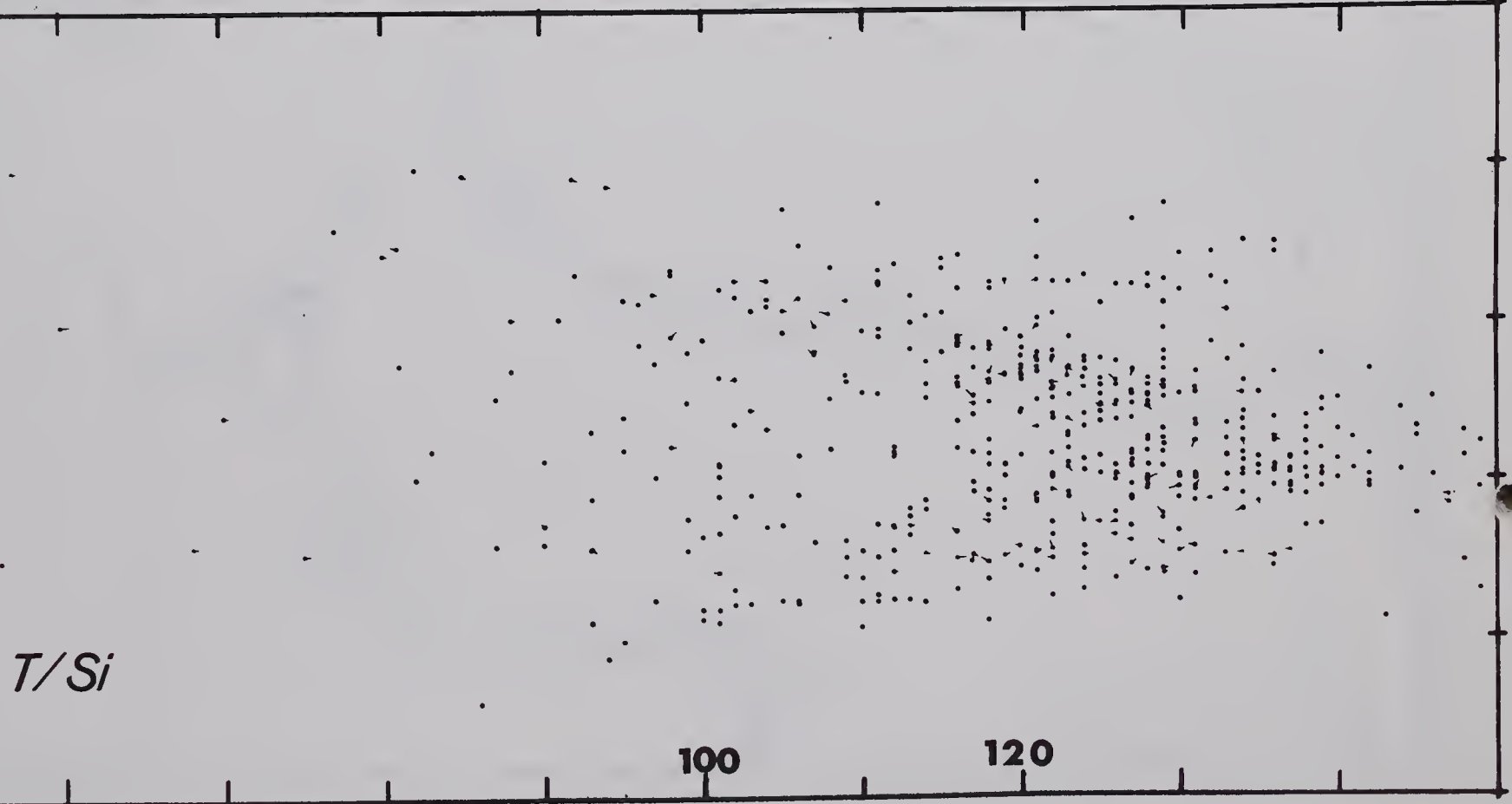
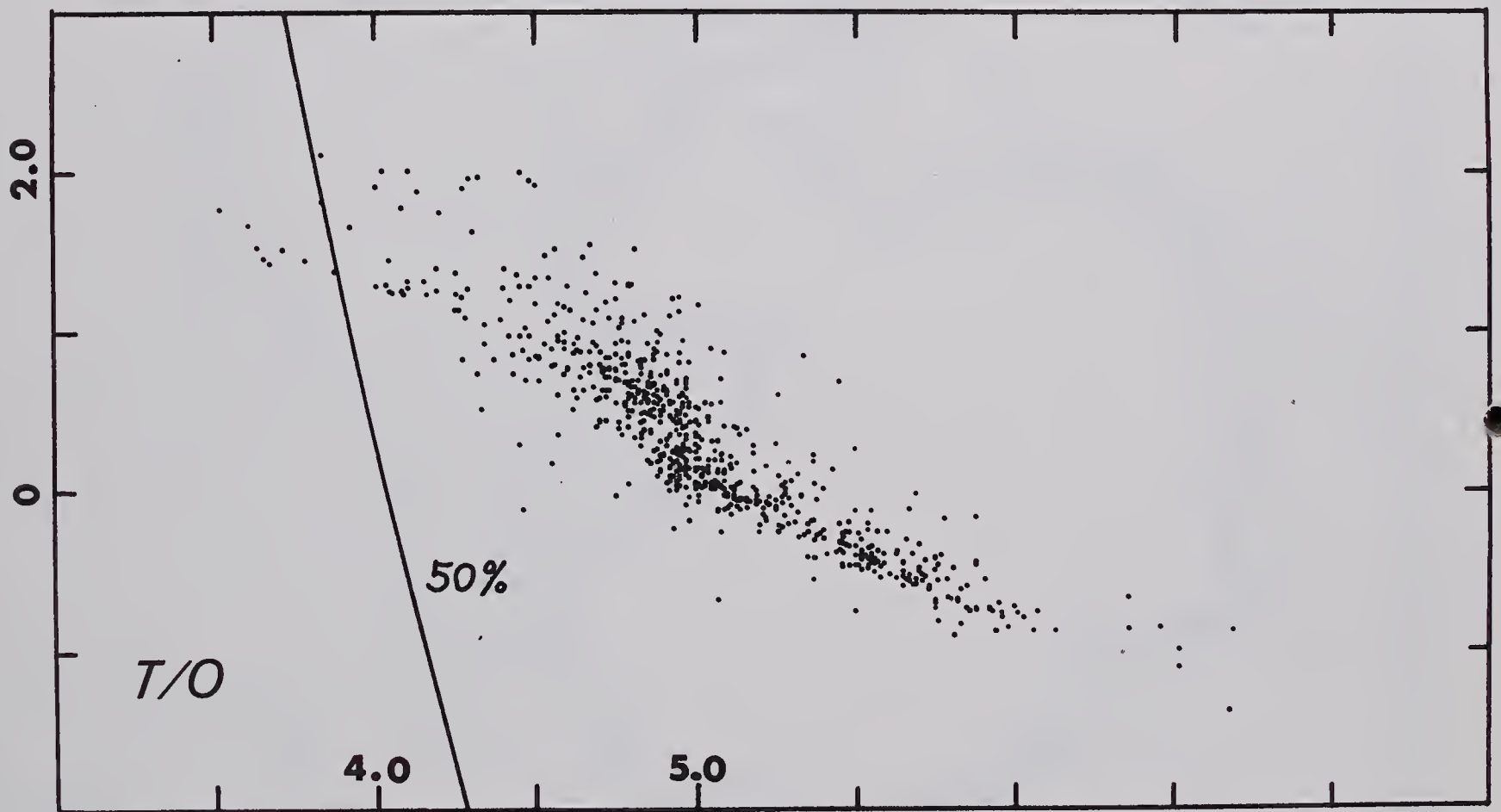
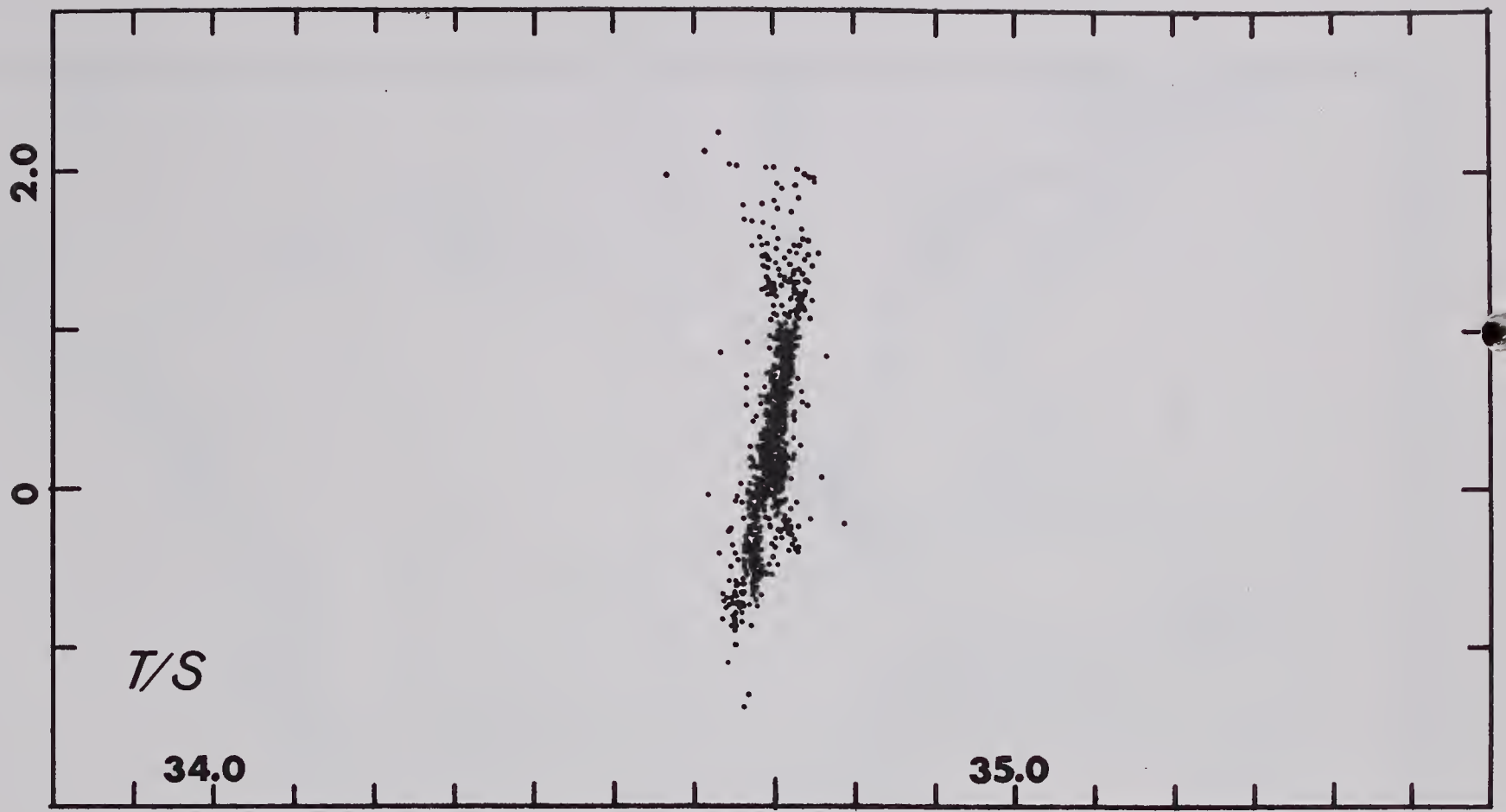


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OCEANOGRAPHIC ATLAS



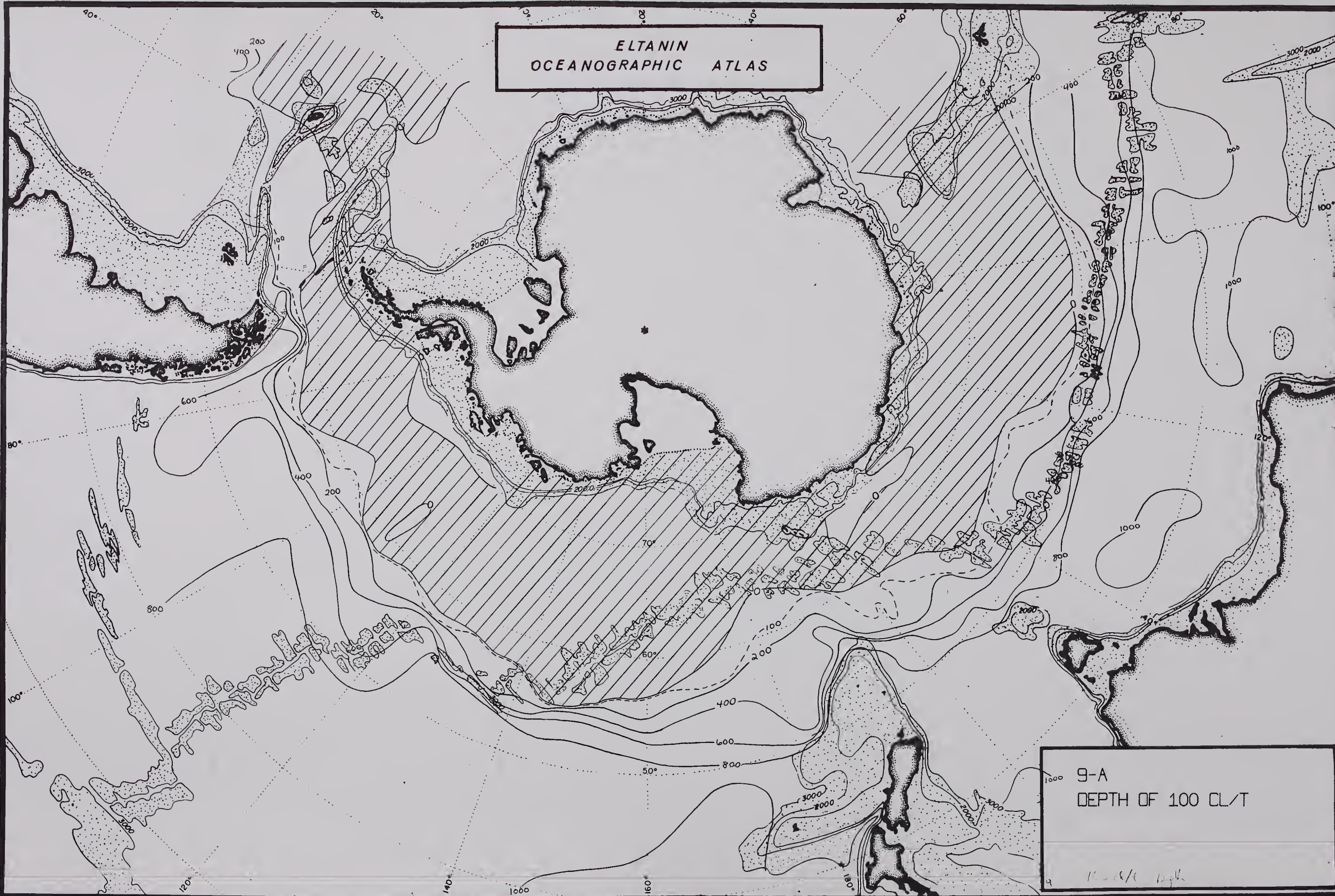
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BOTTOM OXYGEN







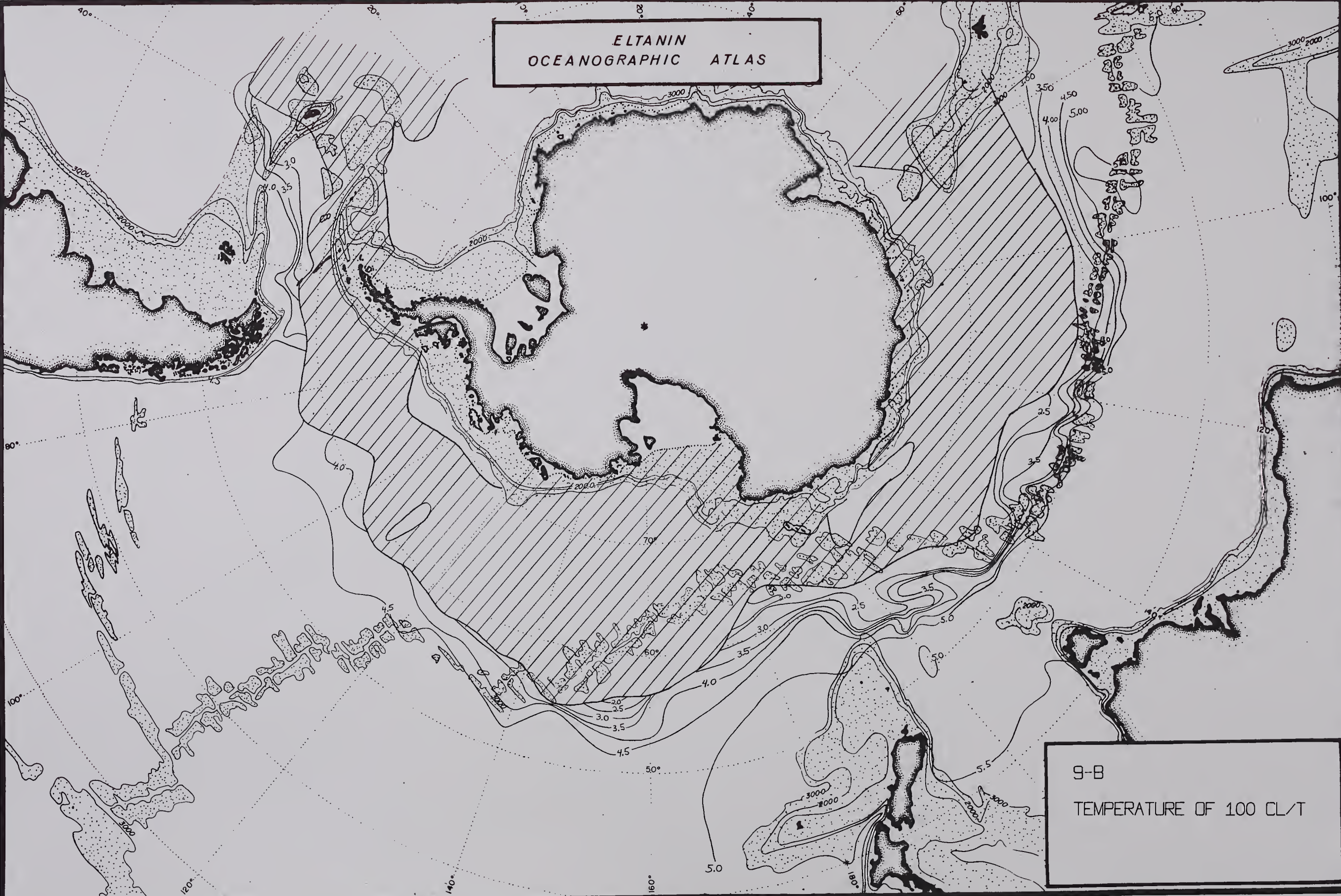
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OCEANOGRAPHIC ATLAS



9-A  
DEPTH OF 100 CL/T  
*Rock/Depth*



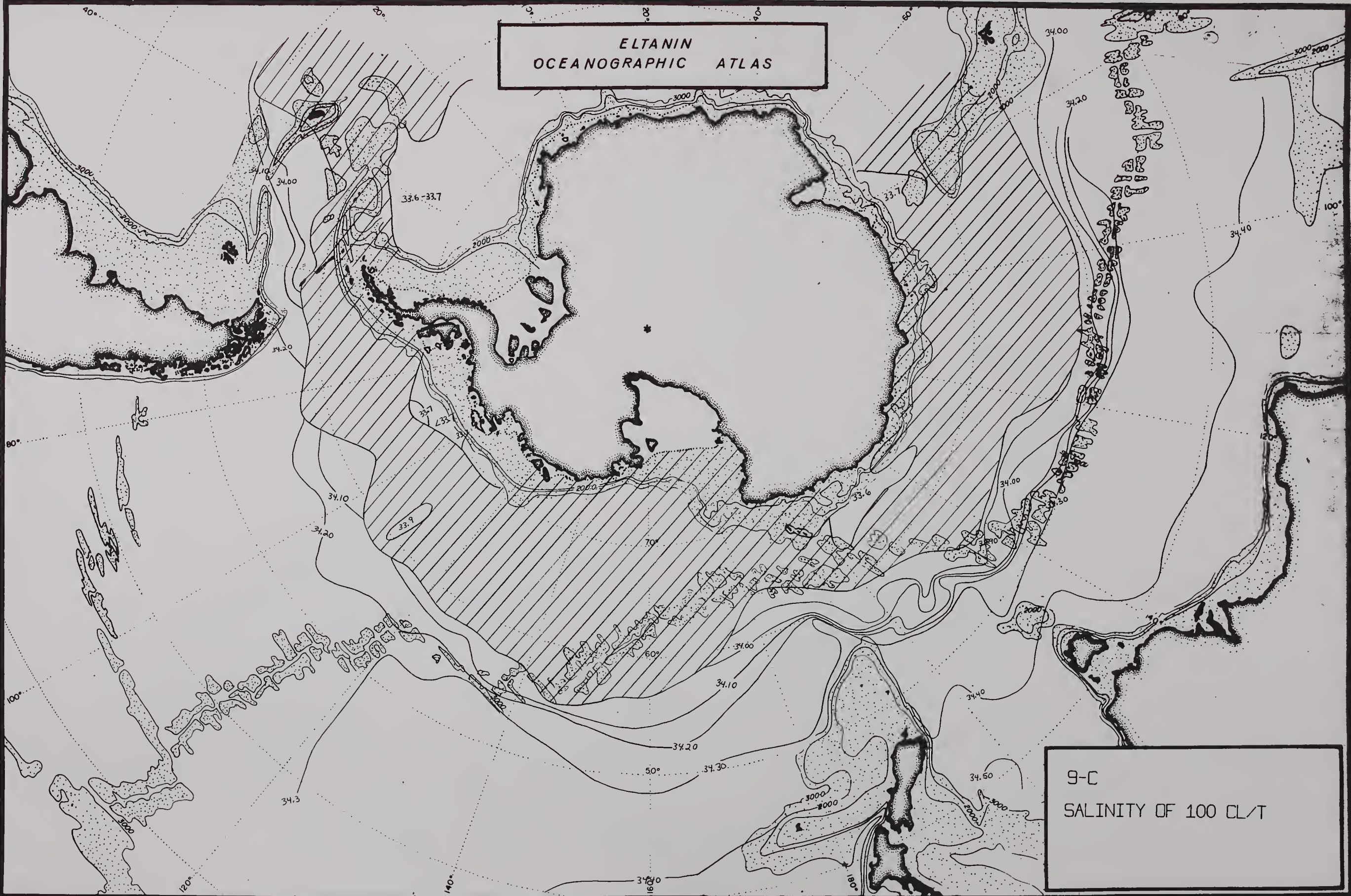
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OCEANOGRAPHIC ATLAS



9-B  
TEMPERATURE OF 100 CL/T



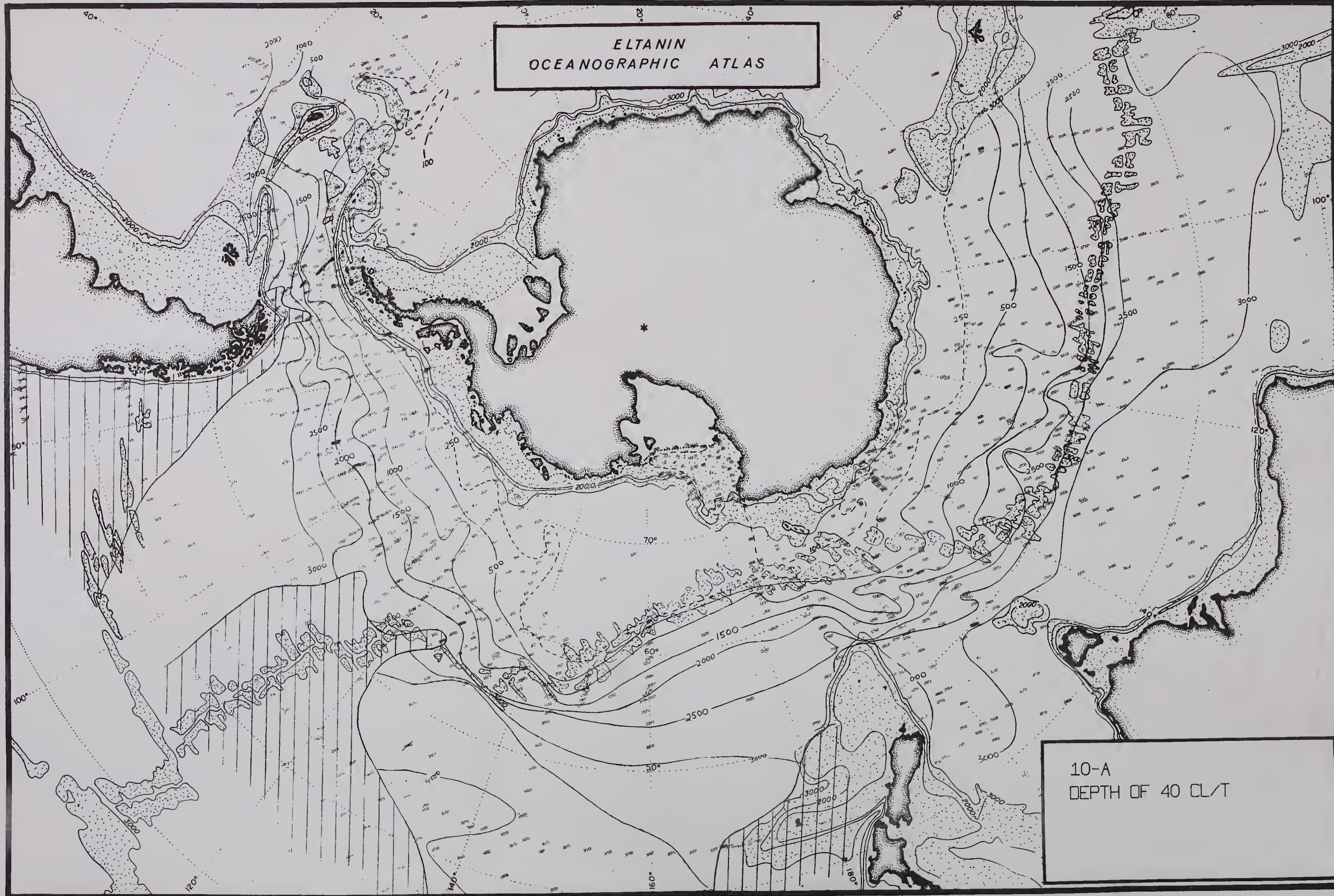
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OCEANOGRAPHIC ATLAS



9-C  
SALINITY OF 100 CL/T



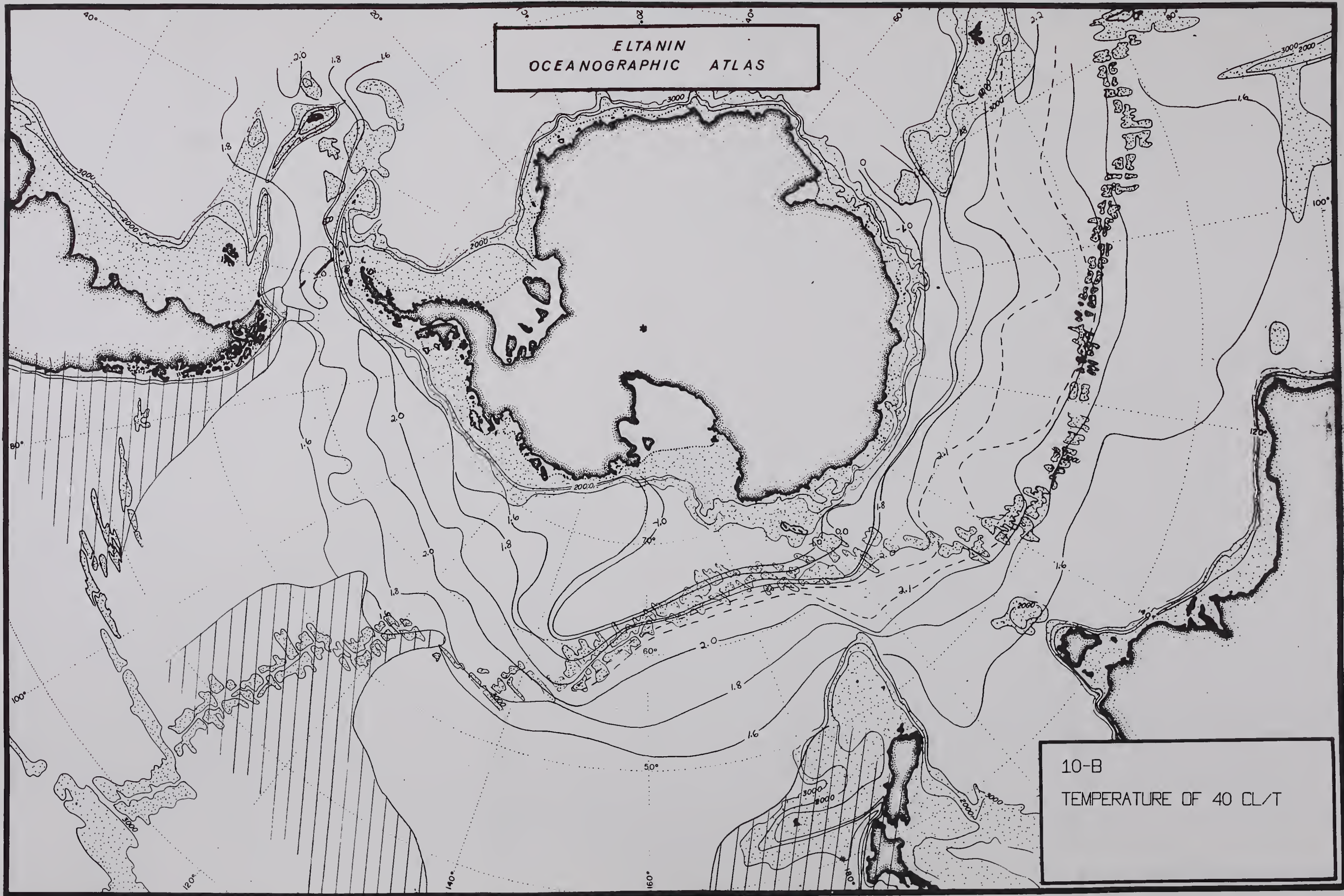
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OCEANOGRAPHIC ATLAS



10-A  
DEPTH OF 40 CL/T



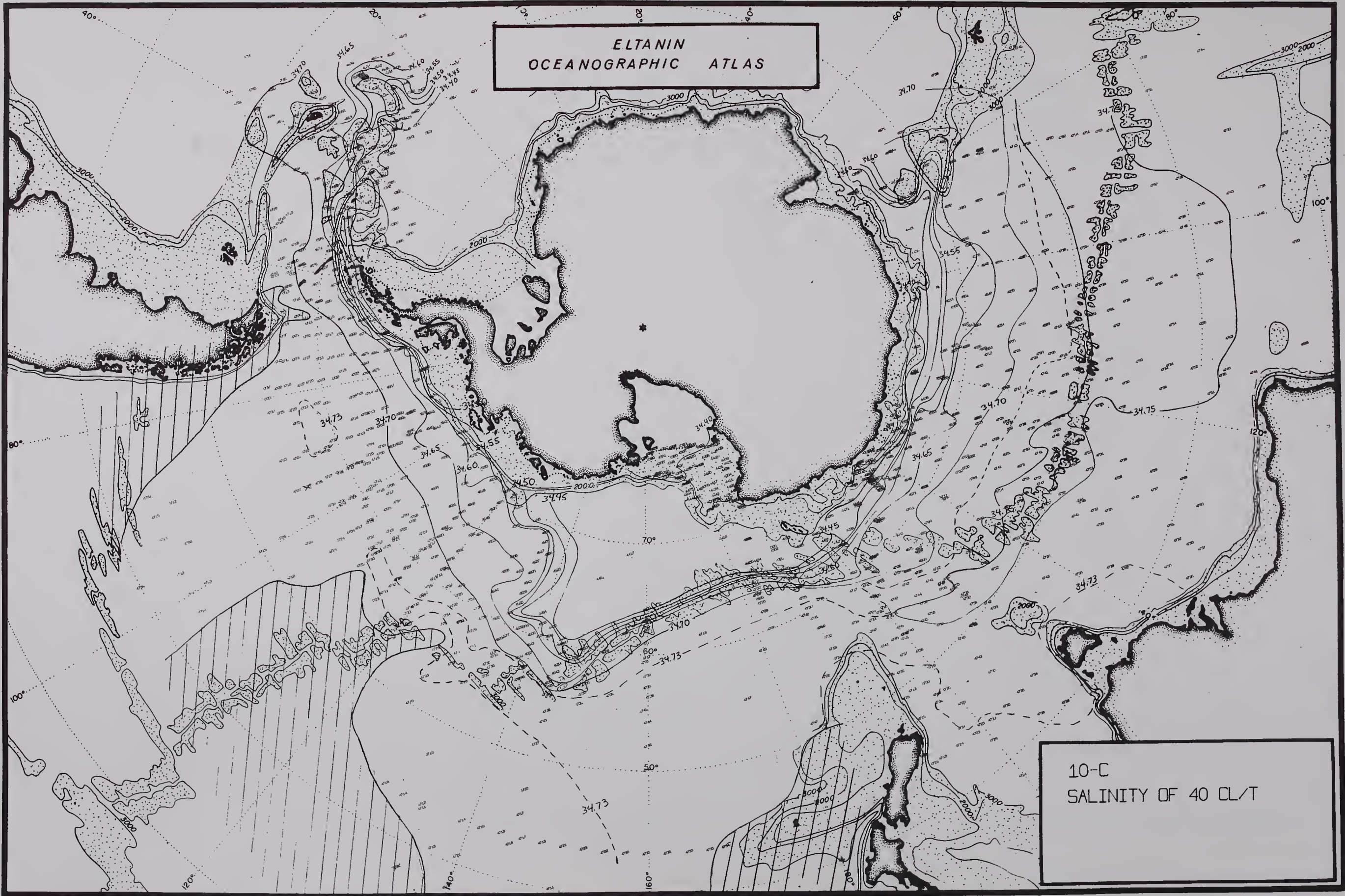
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OCEANOGRAPHIC ATLAS



10-B  
TEMPERATURE OF 40 CL/T



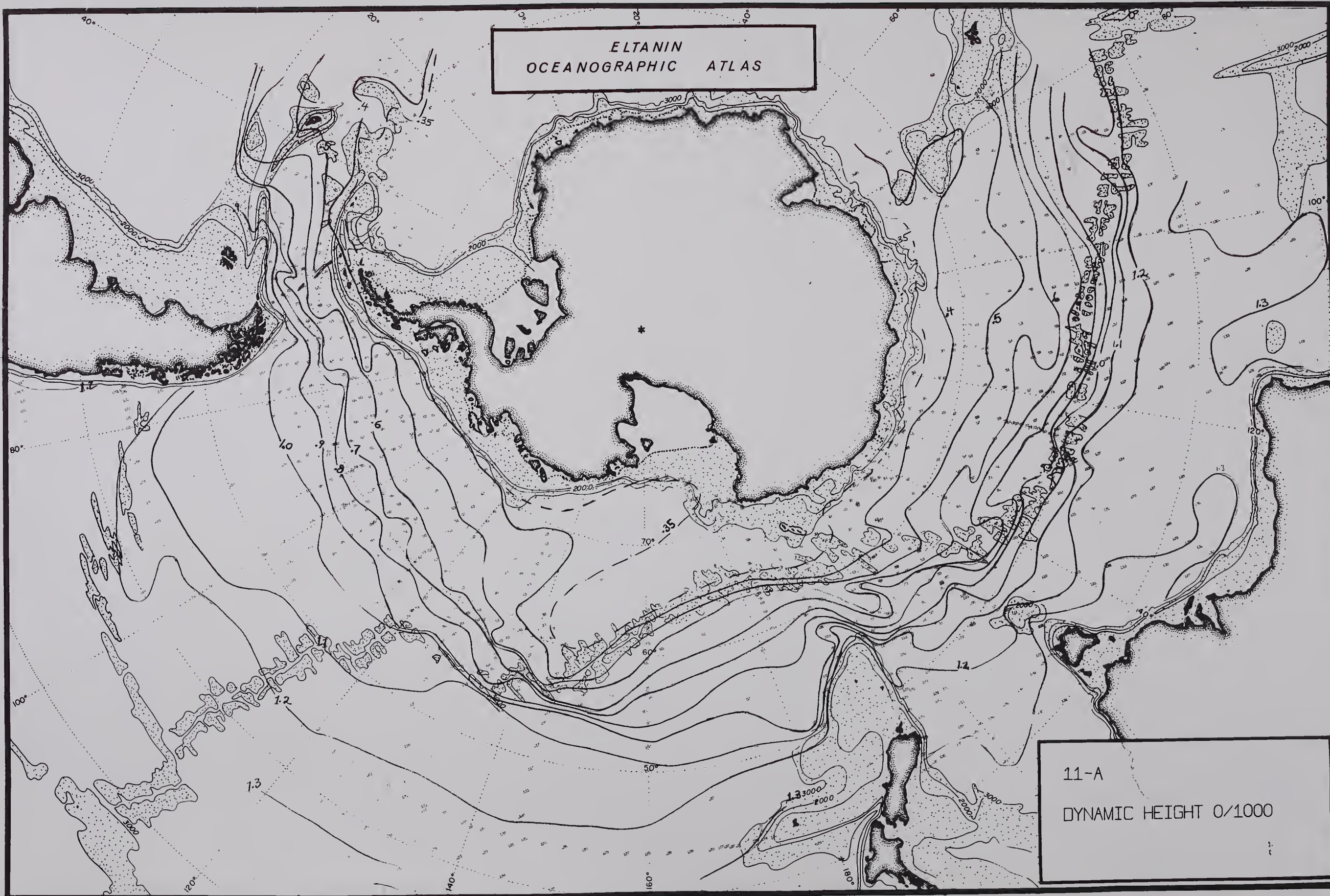
ELTANIN  
OCEANOGRAPHIC ATLAS



10-C  
SALINITY OF 40 CL/T



ELTANIN  
OCEANOGRAPHIC ATLAS



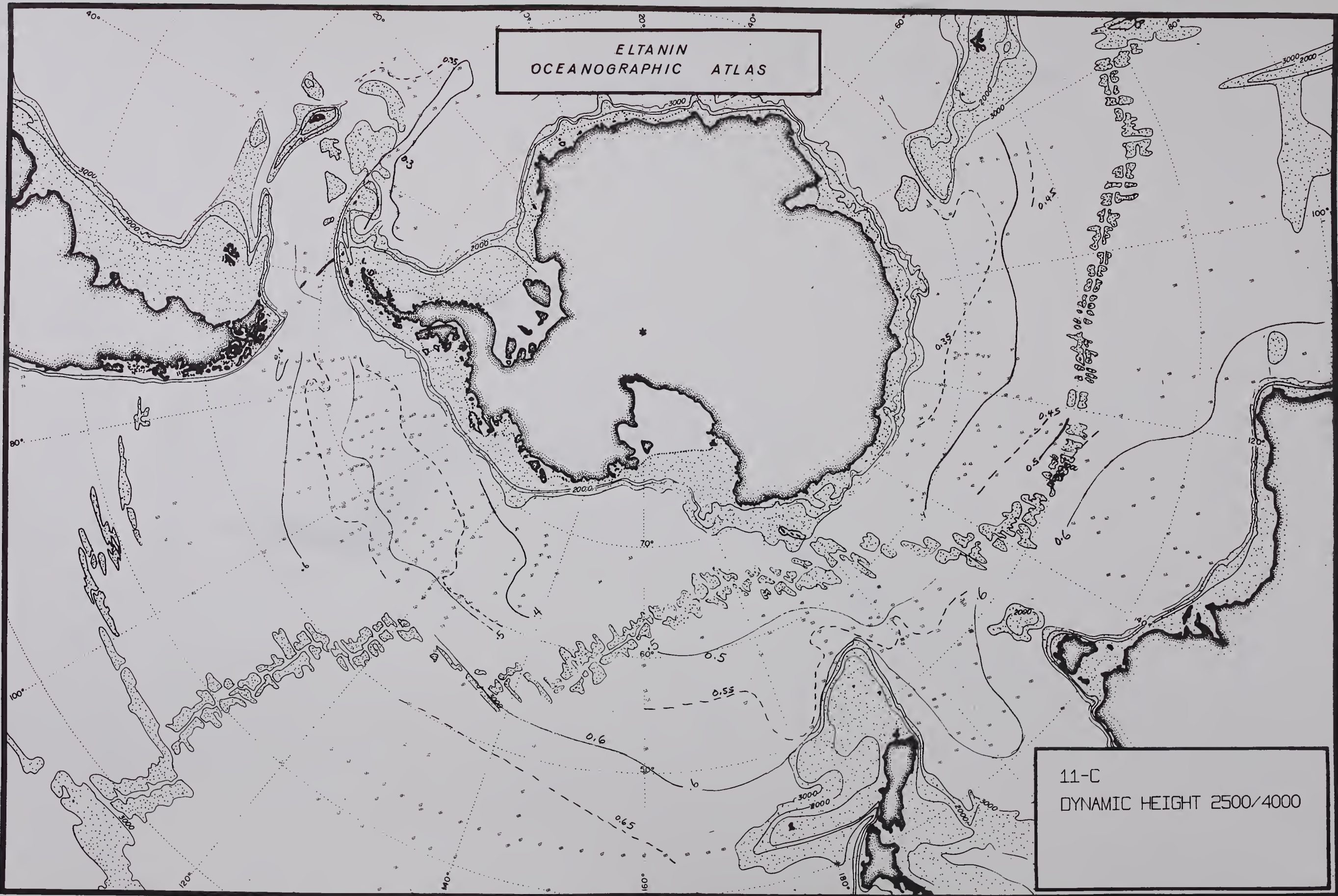
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DYNAMIC HEIGHT 0/1000





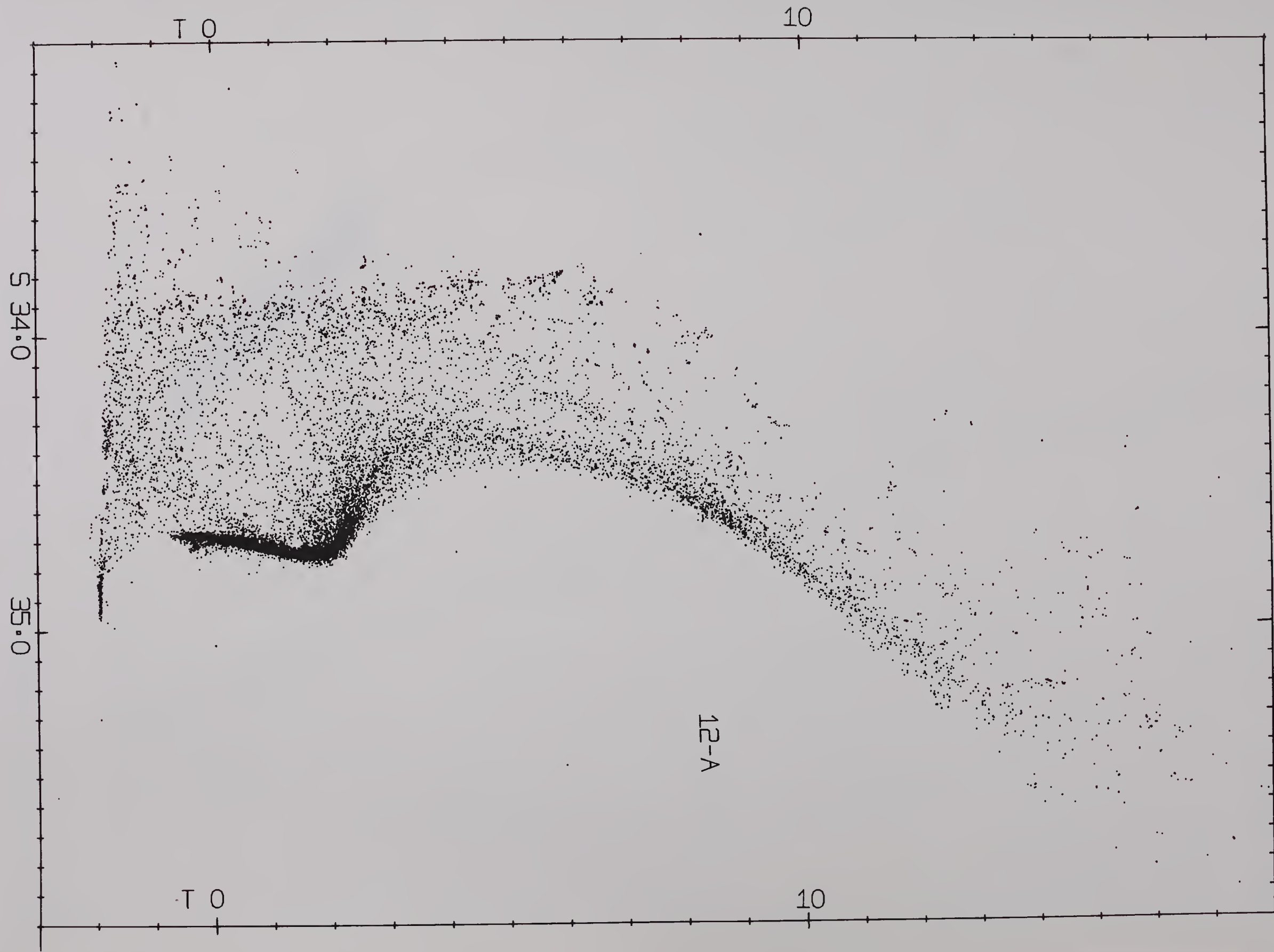


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OCEANOGRAPHIC ATLAS

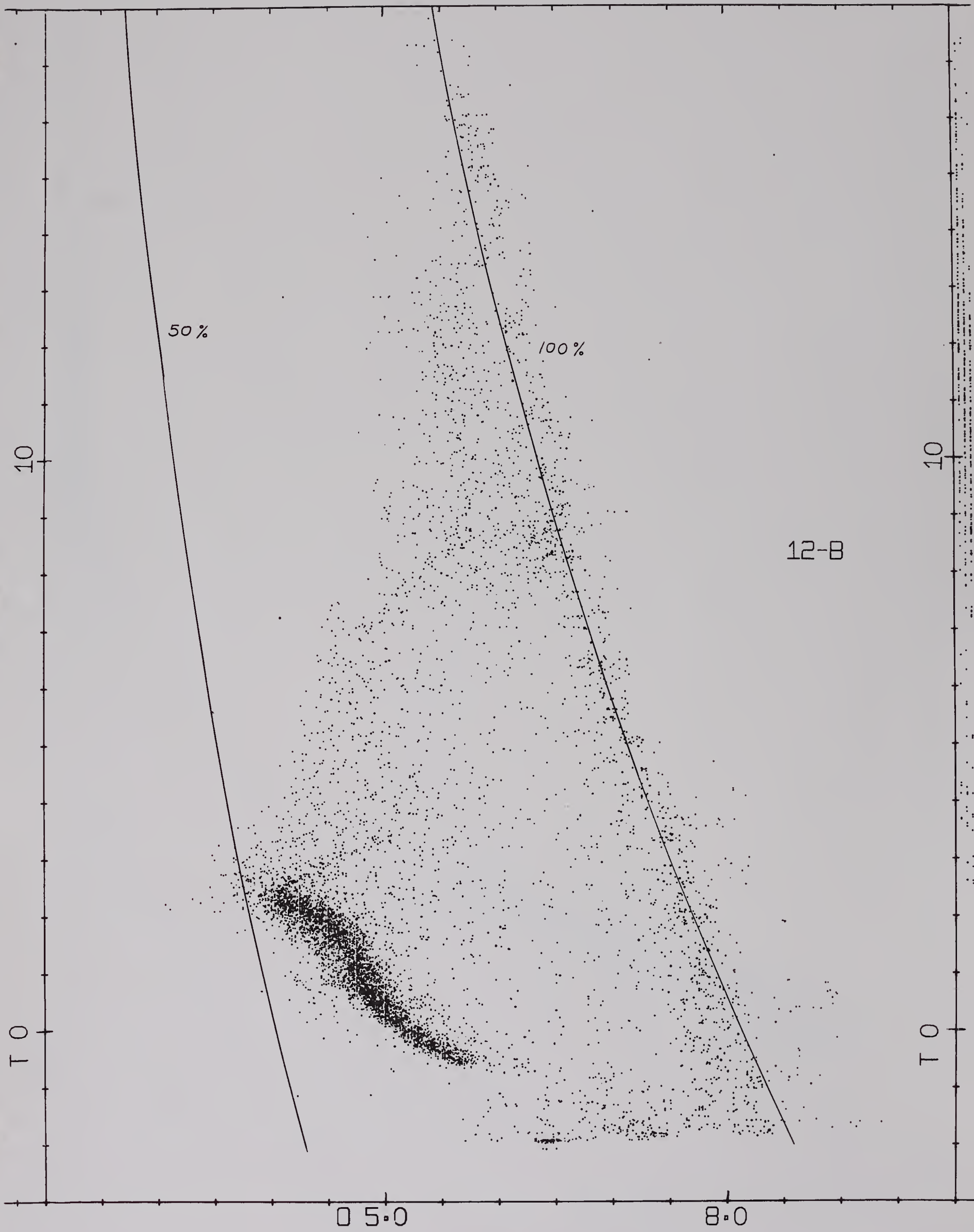


11-C  
DYNAMIC HEIGHT 2500/4000

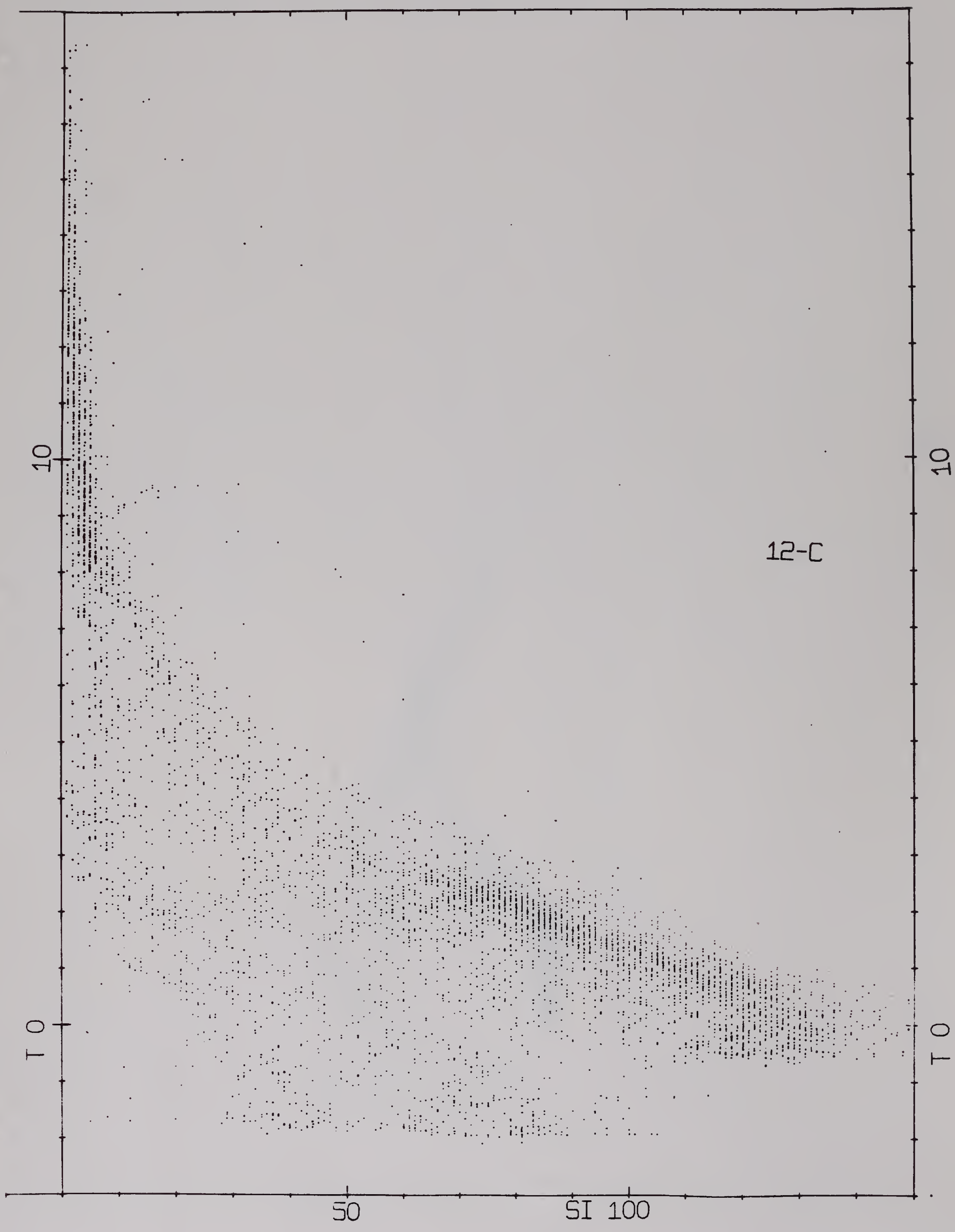






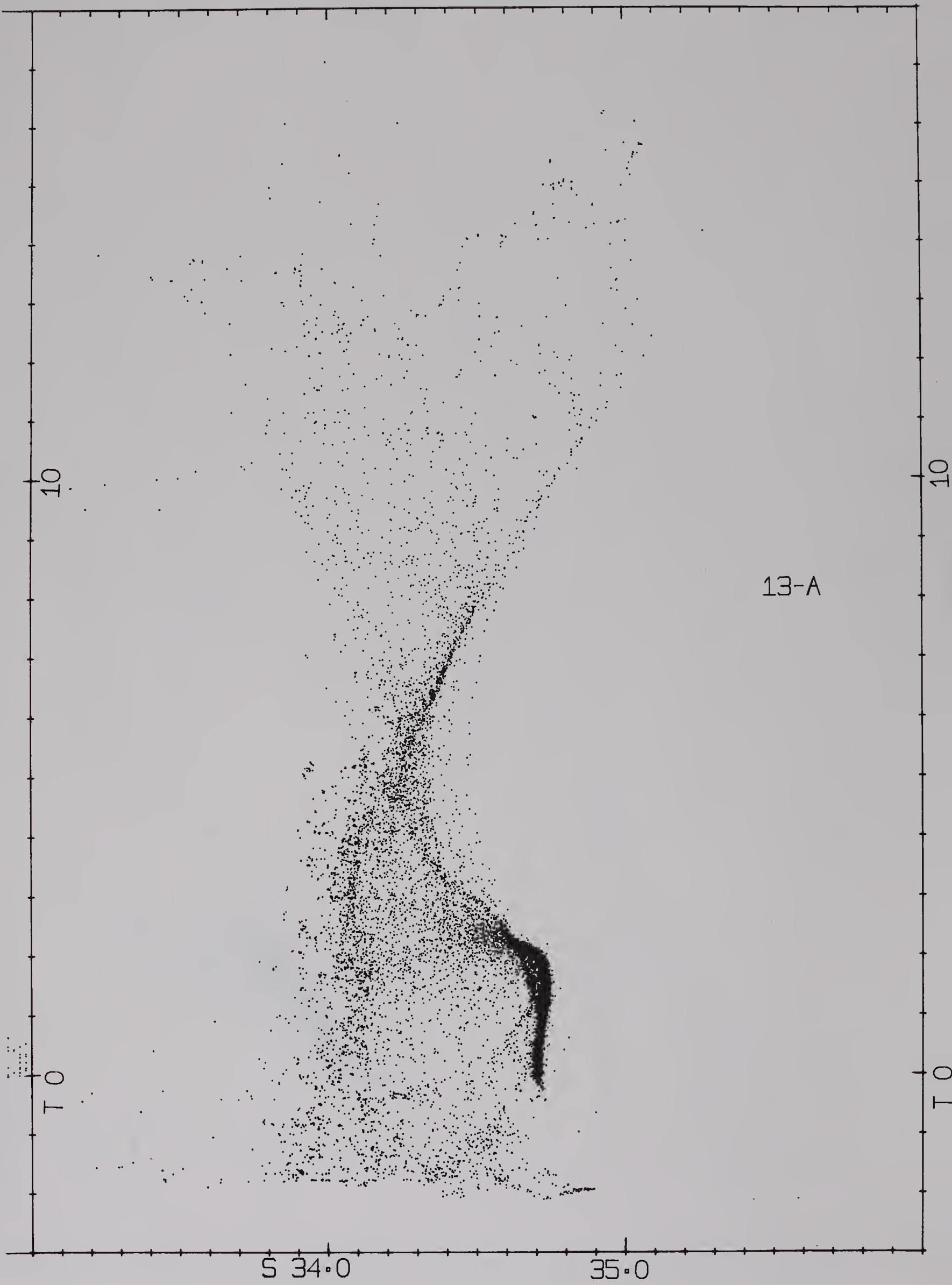




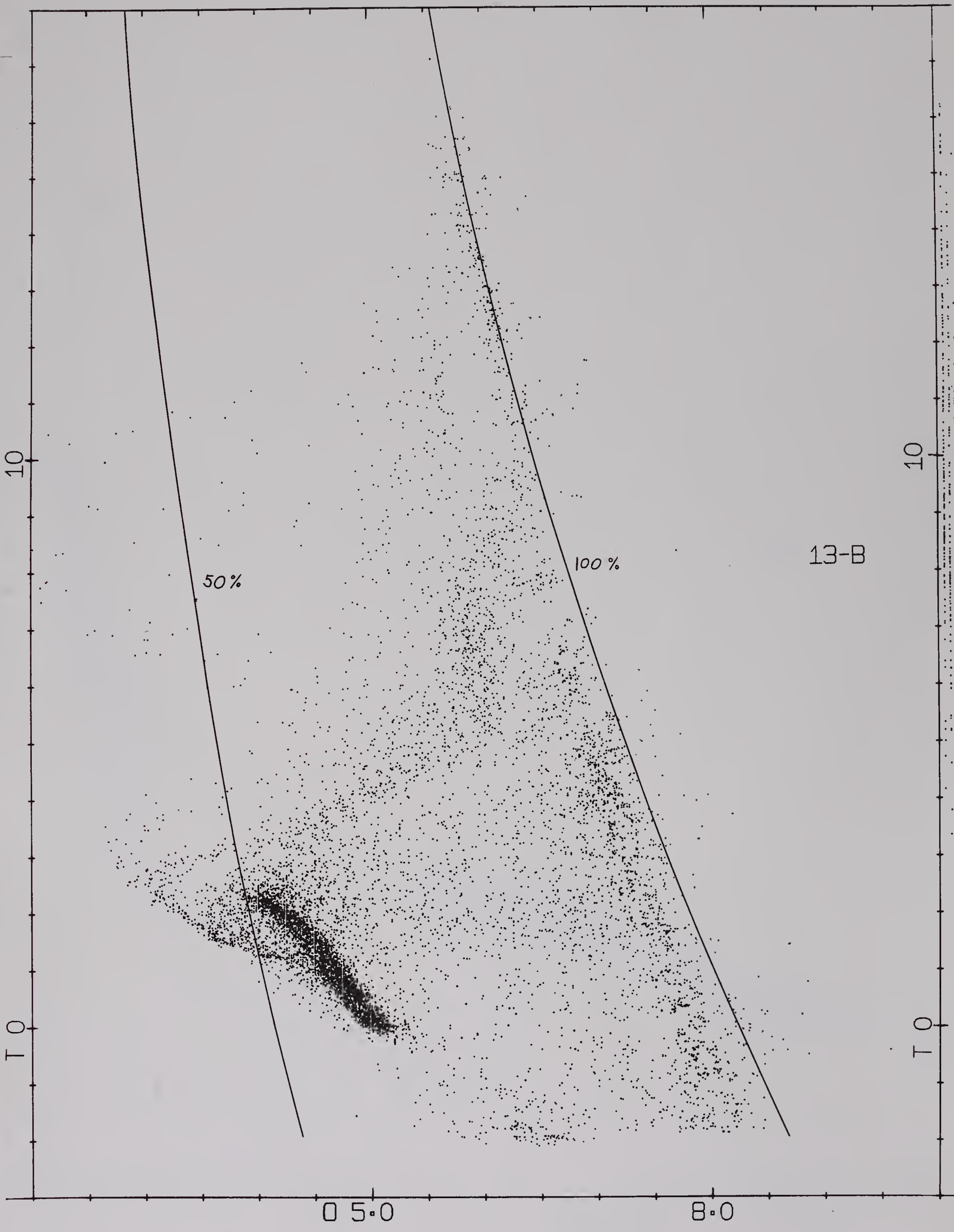




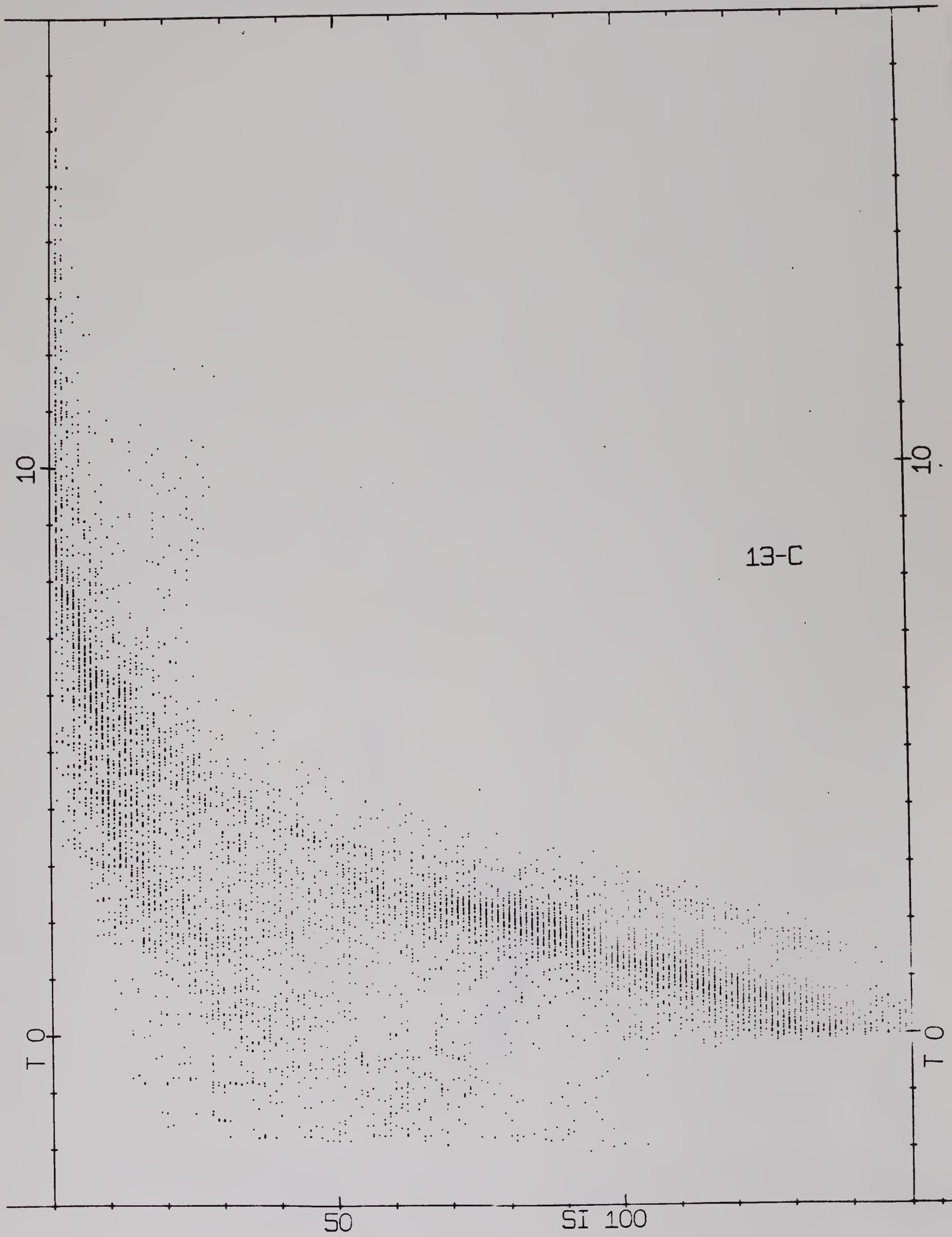
13-A







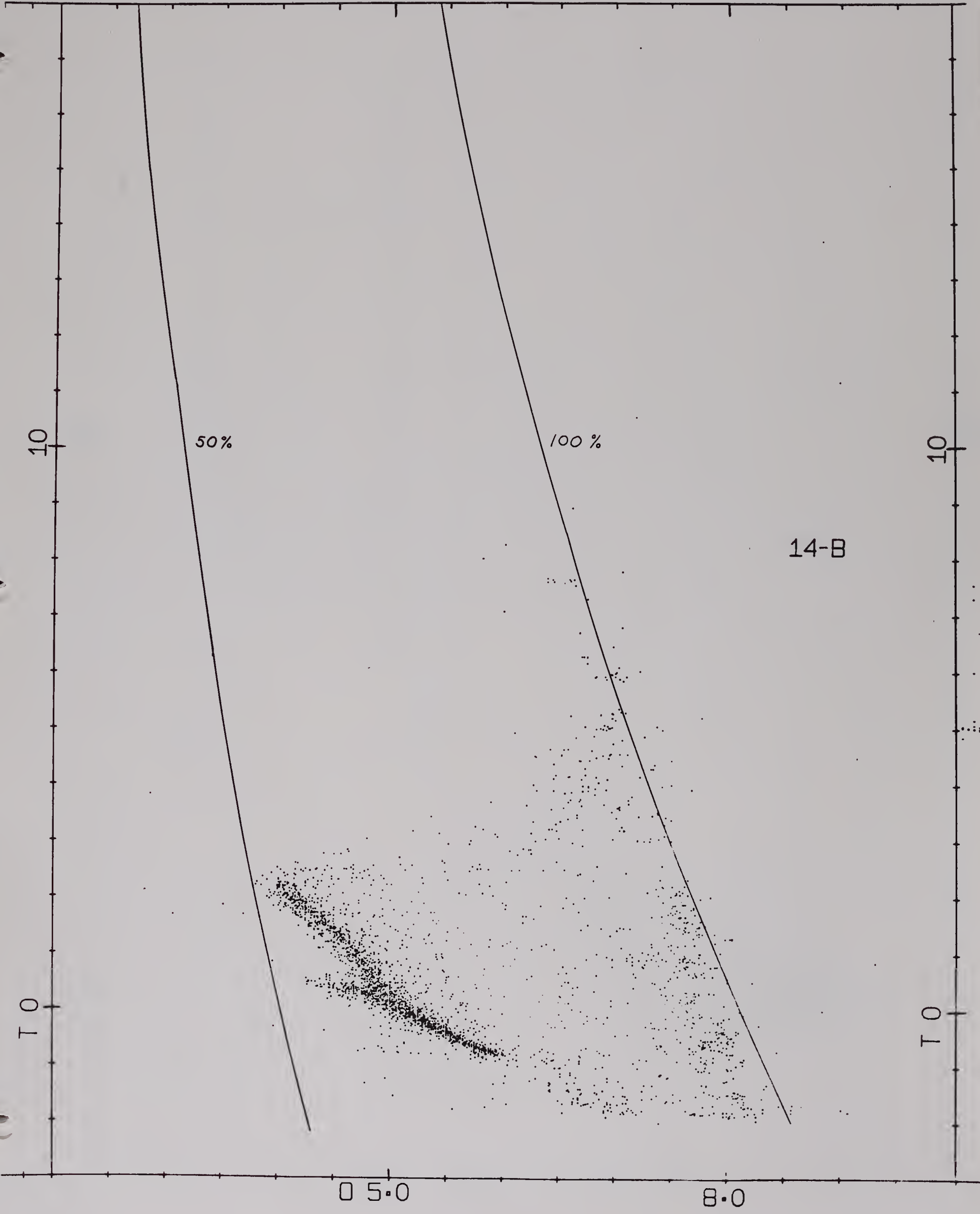




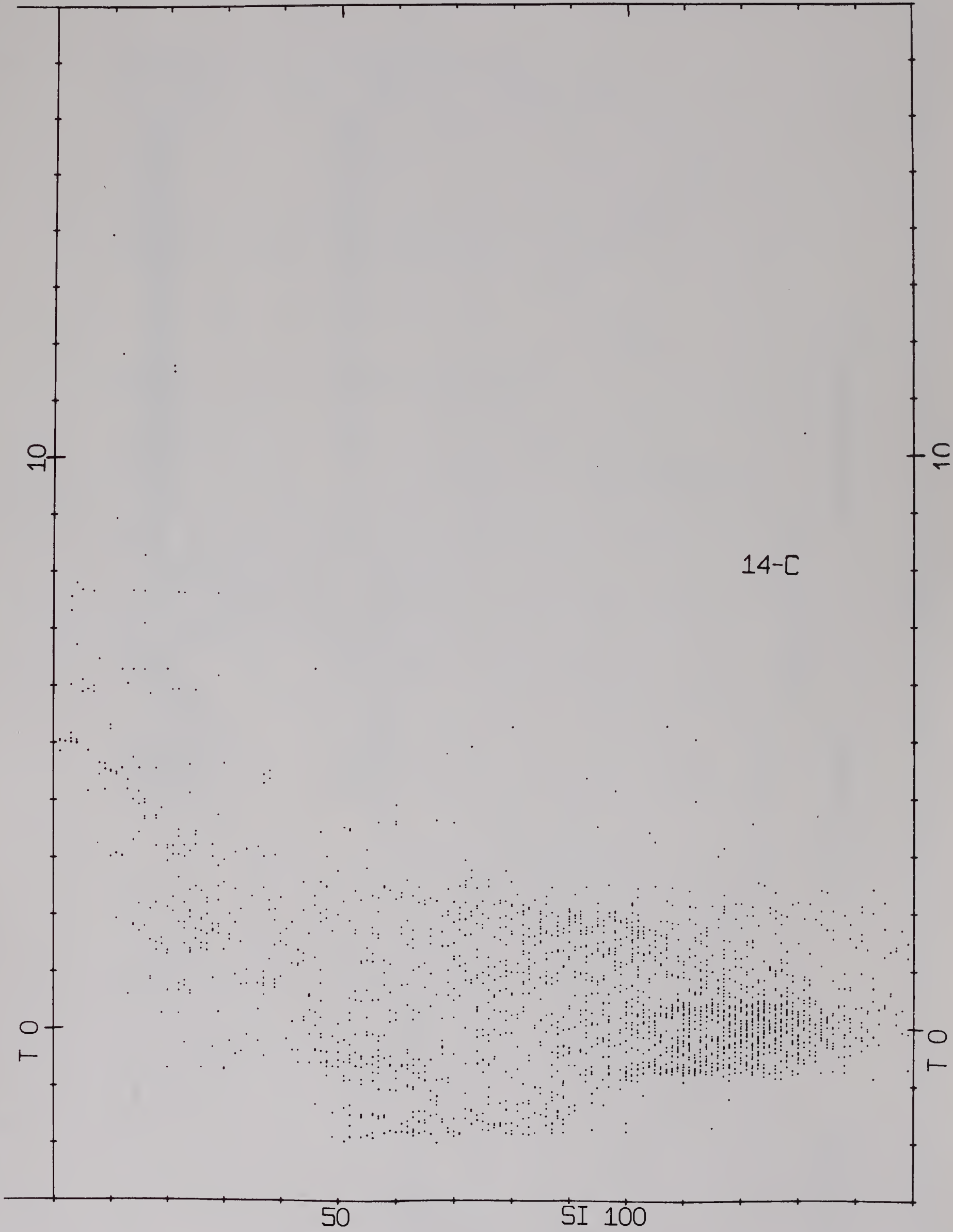


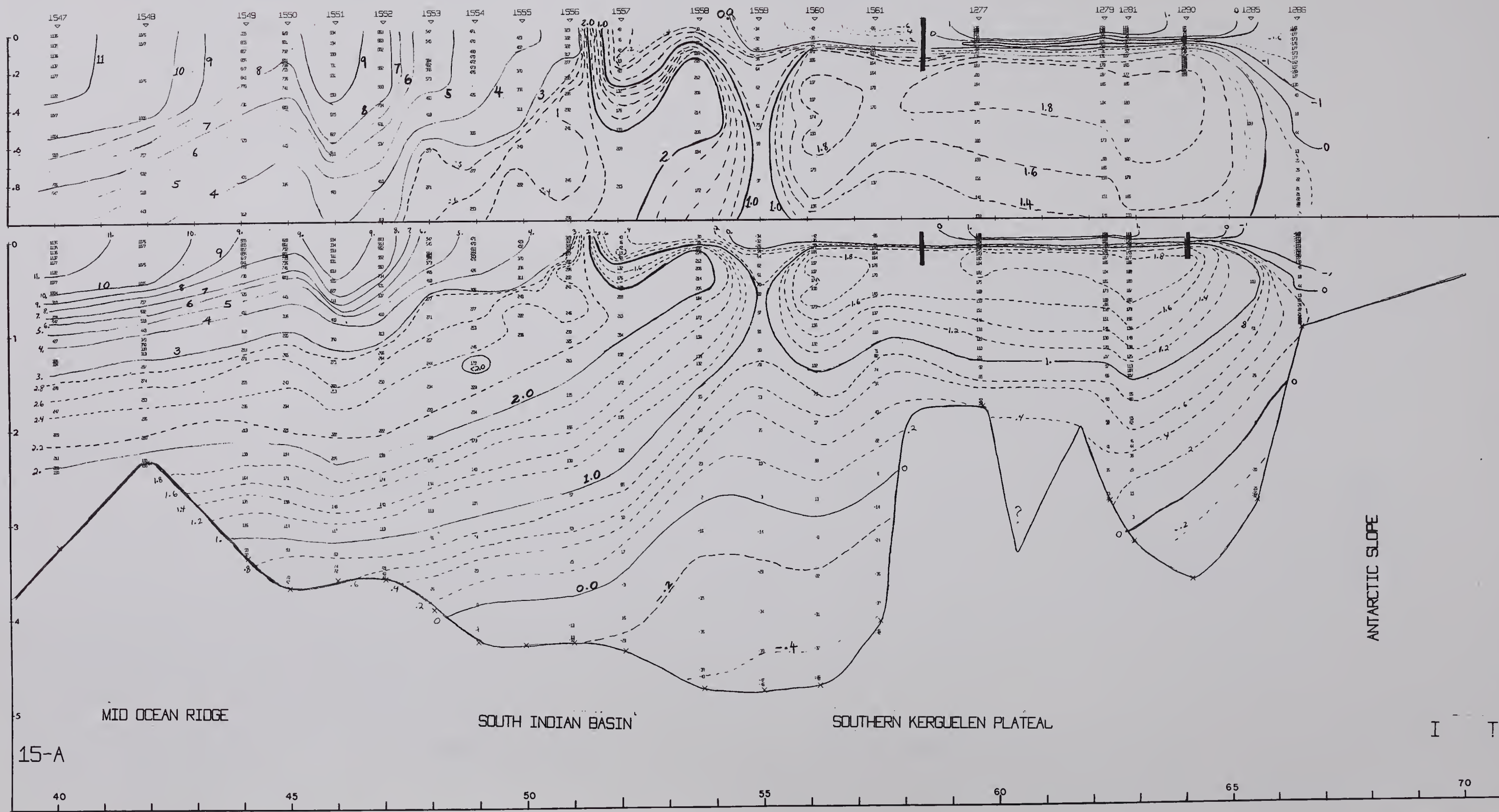












MID OCEAN RIDGE

SOUTH INDIAN BASIN

SOUTHERN KERGUELEN PLATEAU

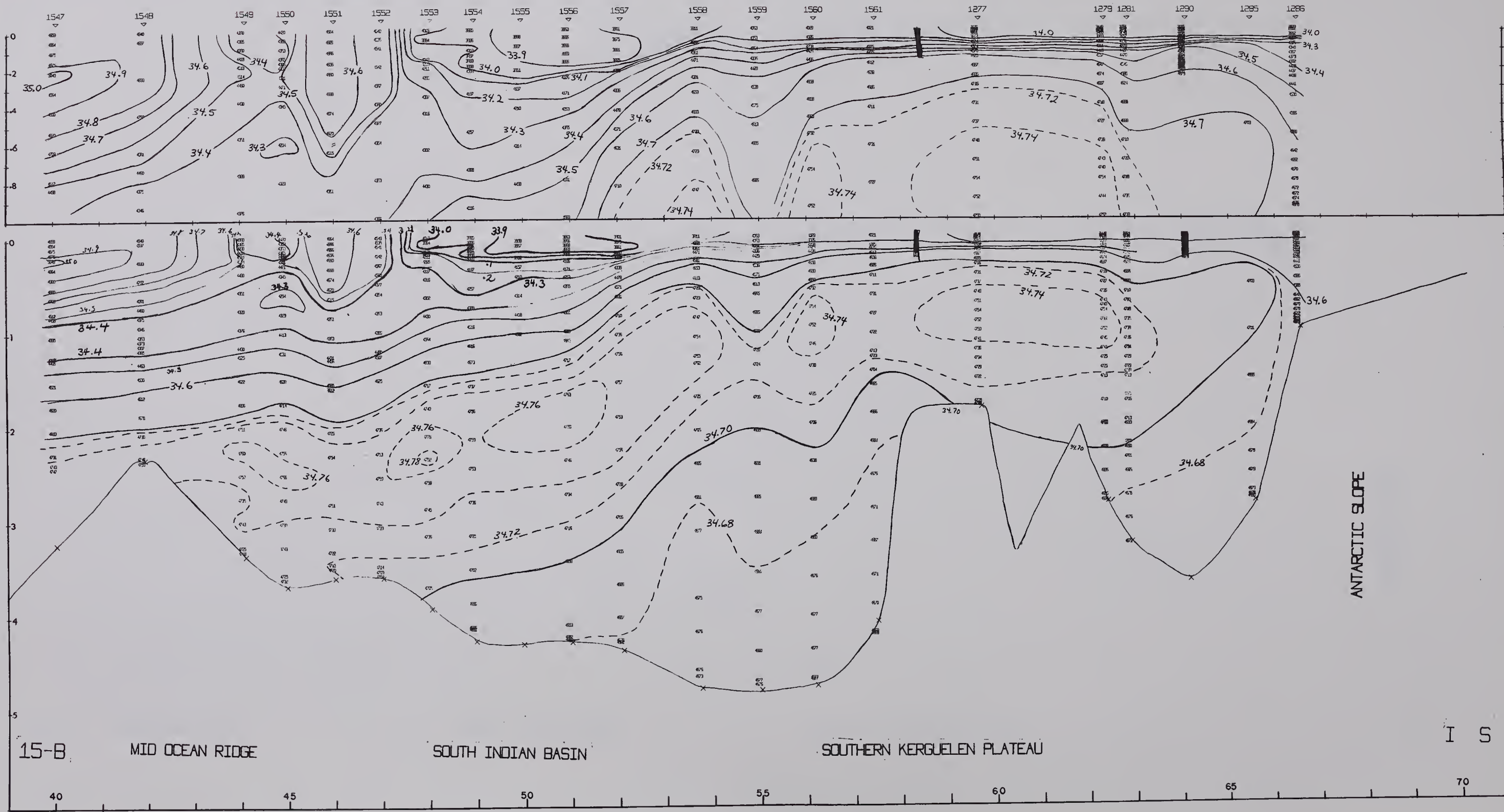
ANTARCTIC SLOPE

15-A

I T

40 45 50 55 60 65 70





15-B

MID OCEAN RIDGE

SOUTH INDIAN BASIN

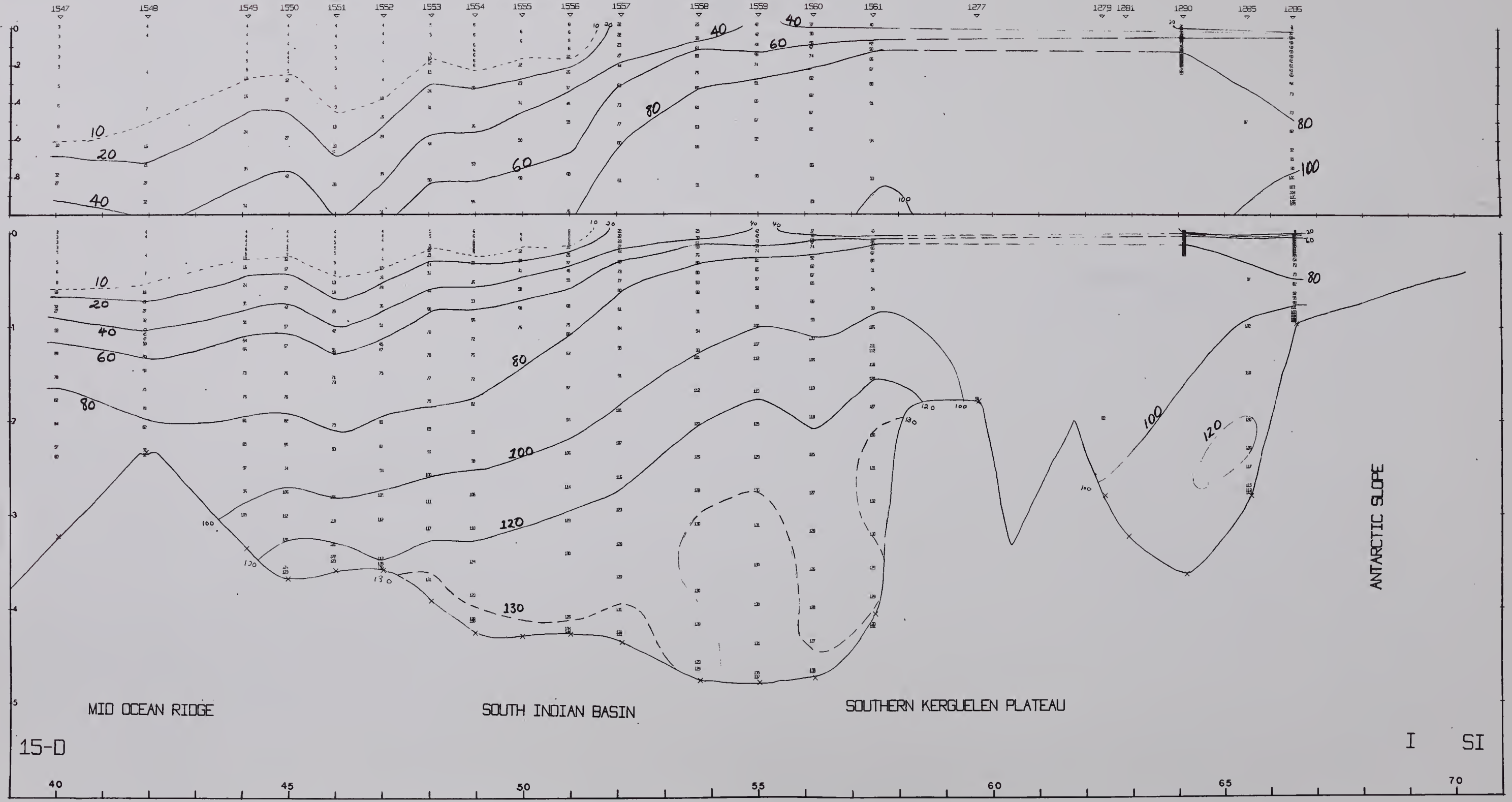
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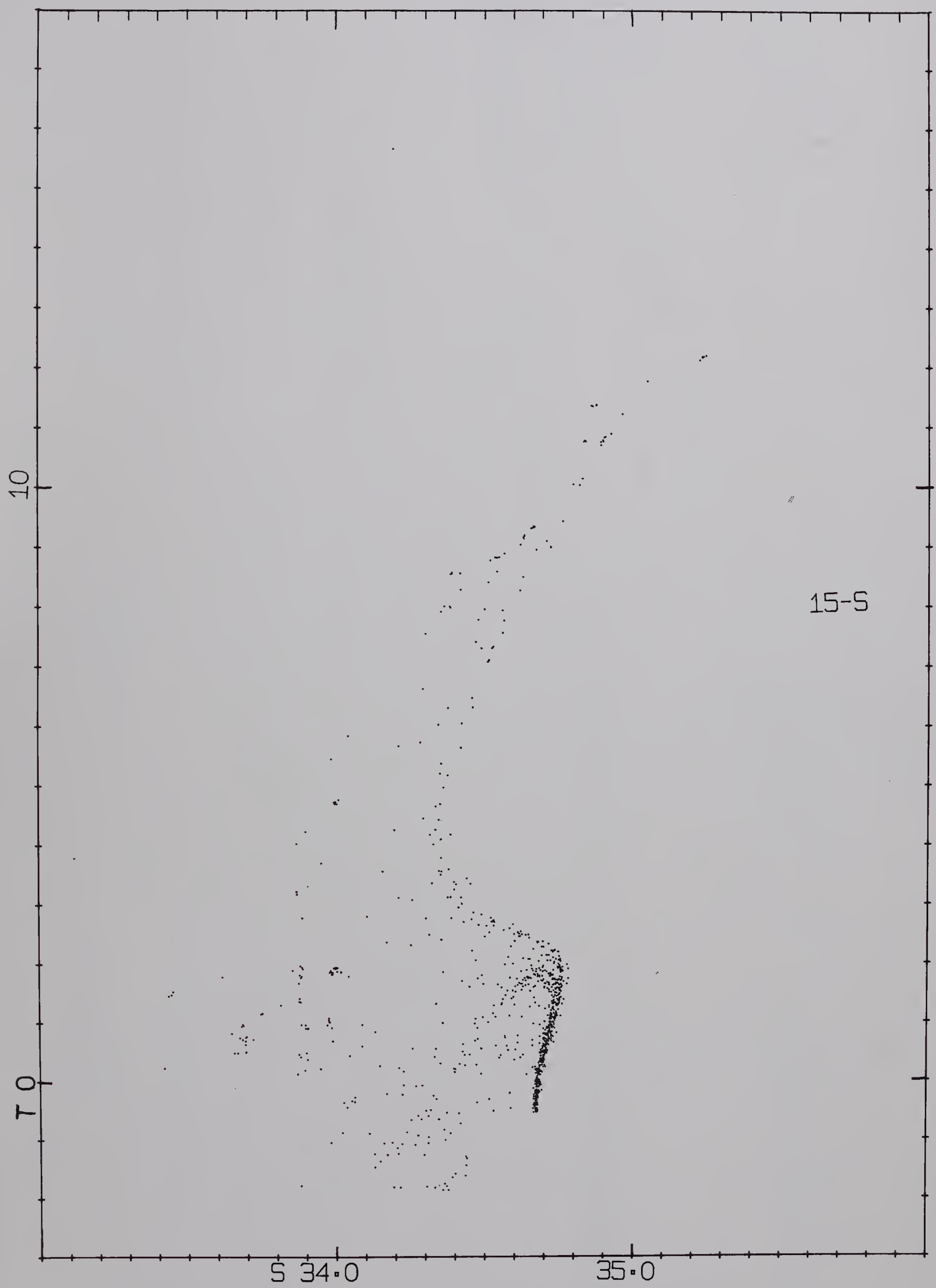
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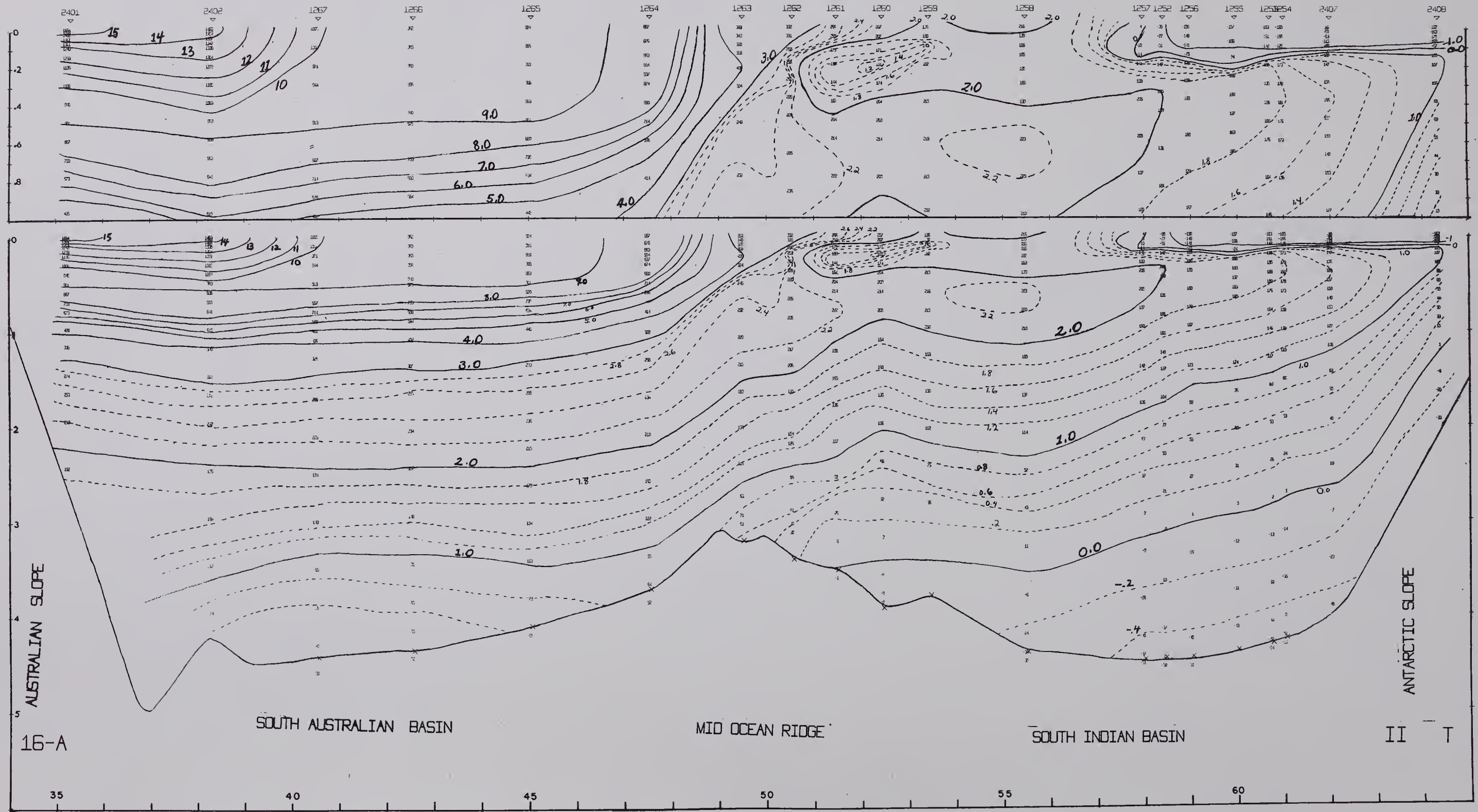


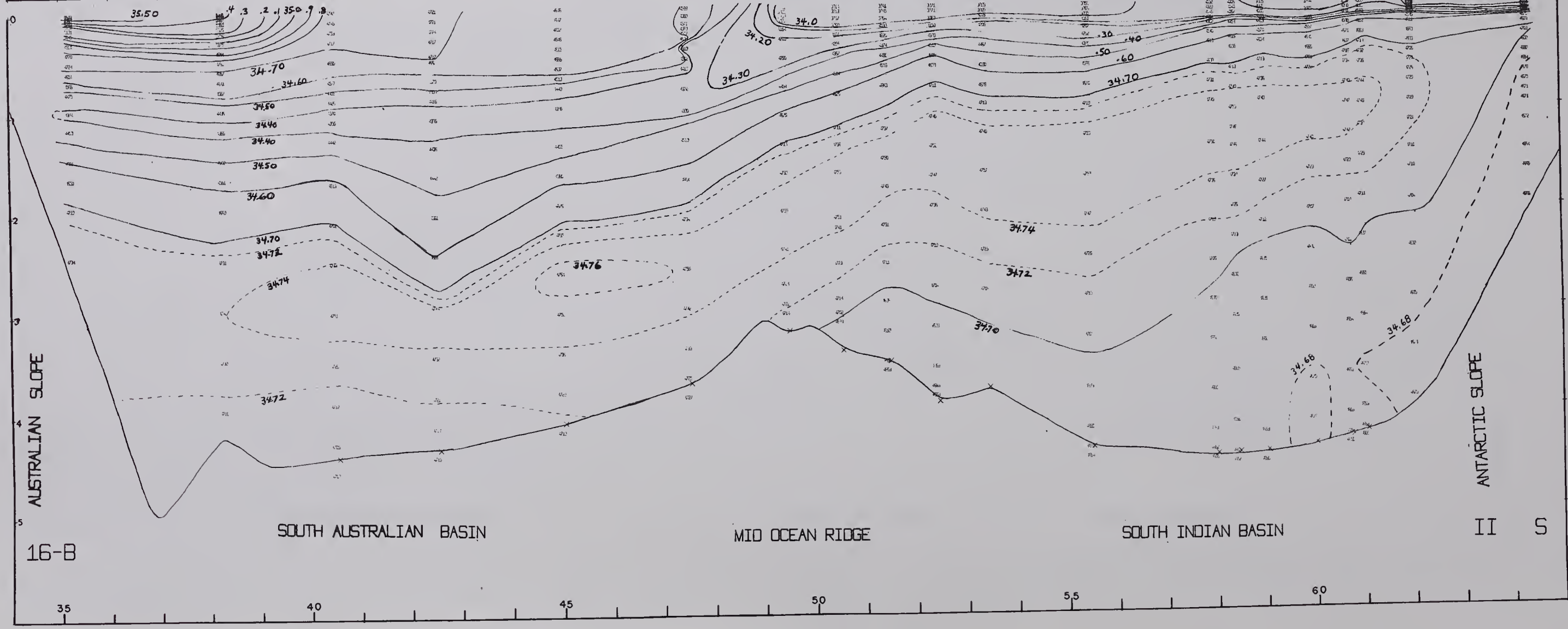
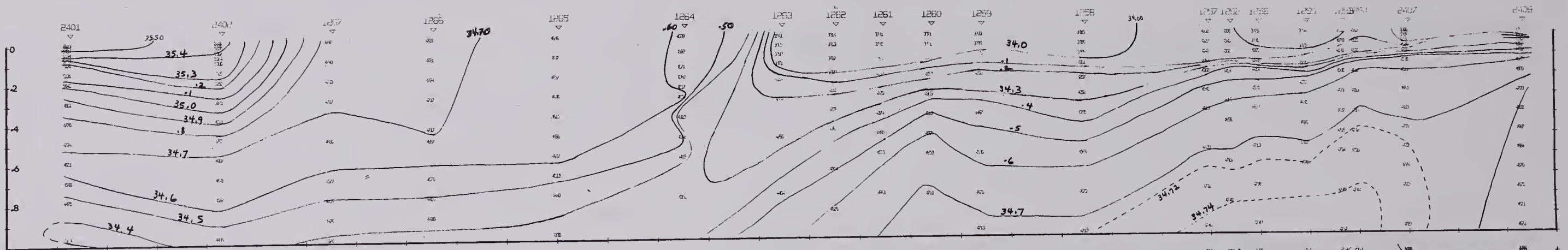








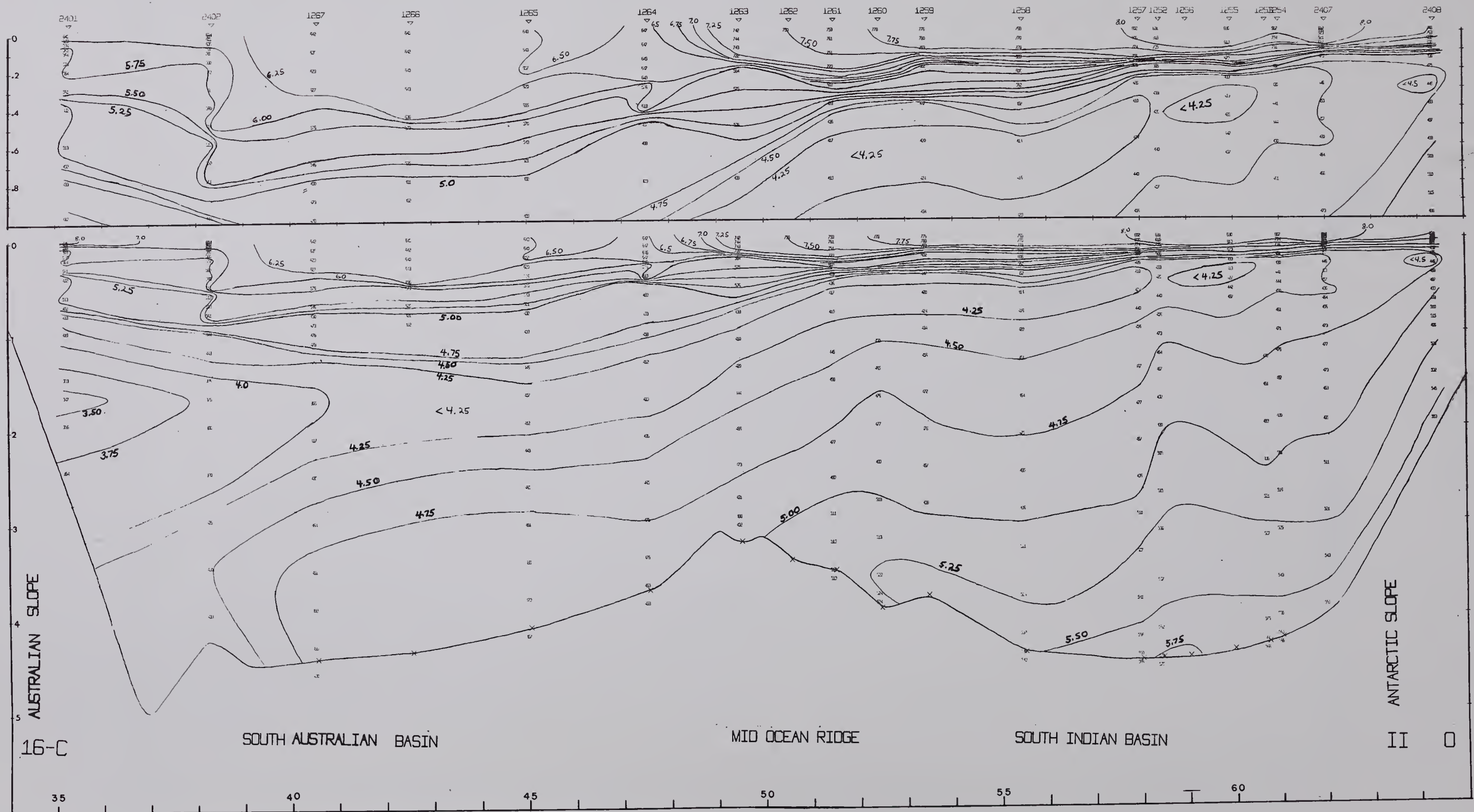


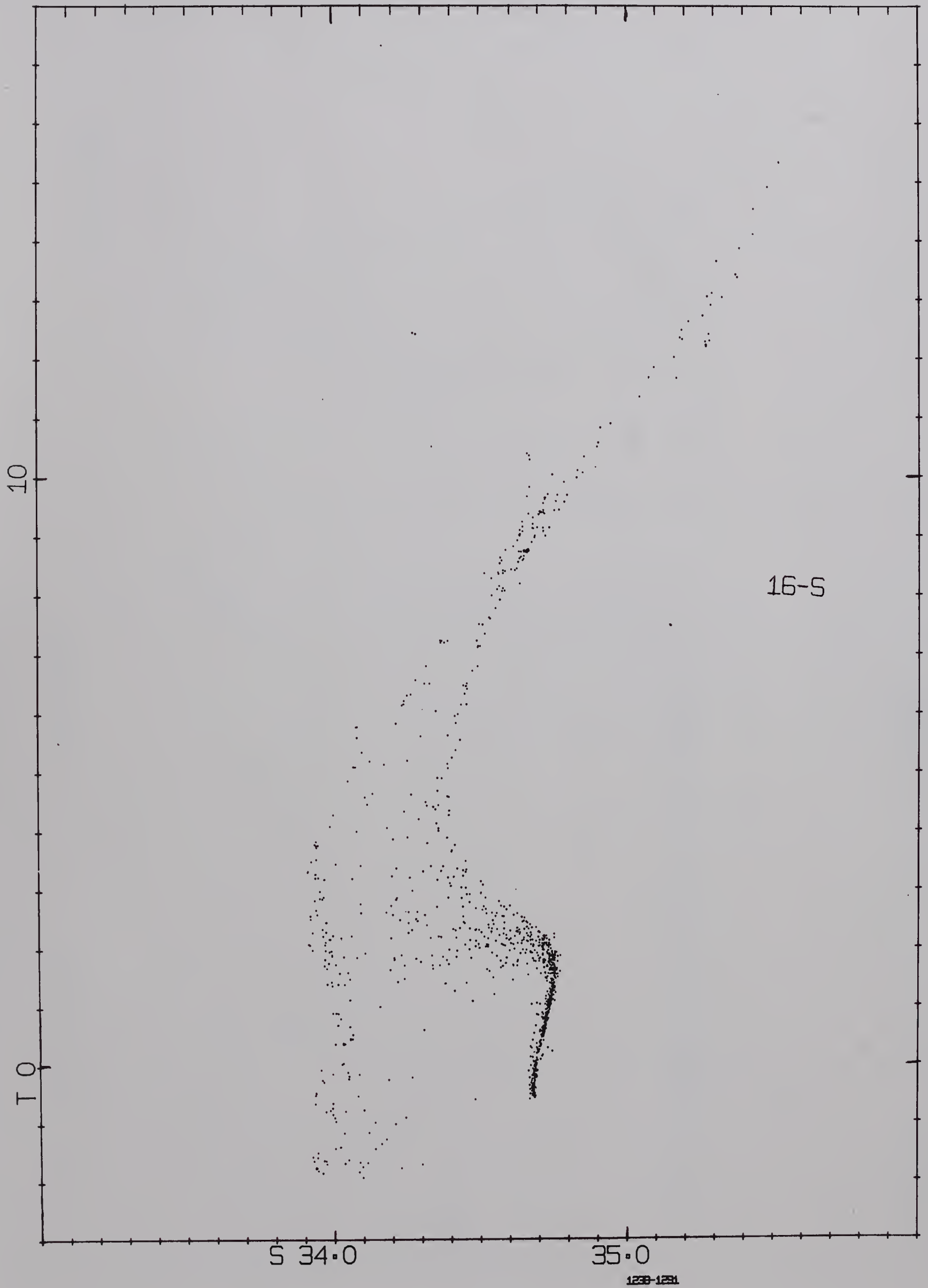


16-B

II S

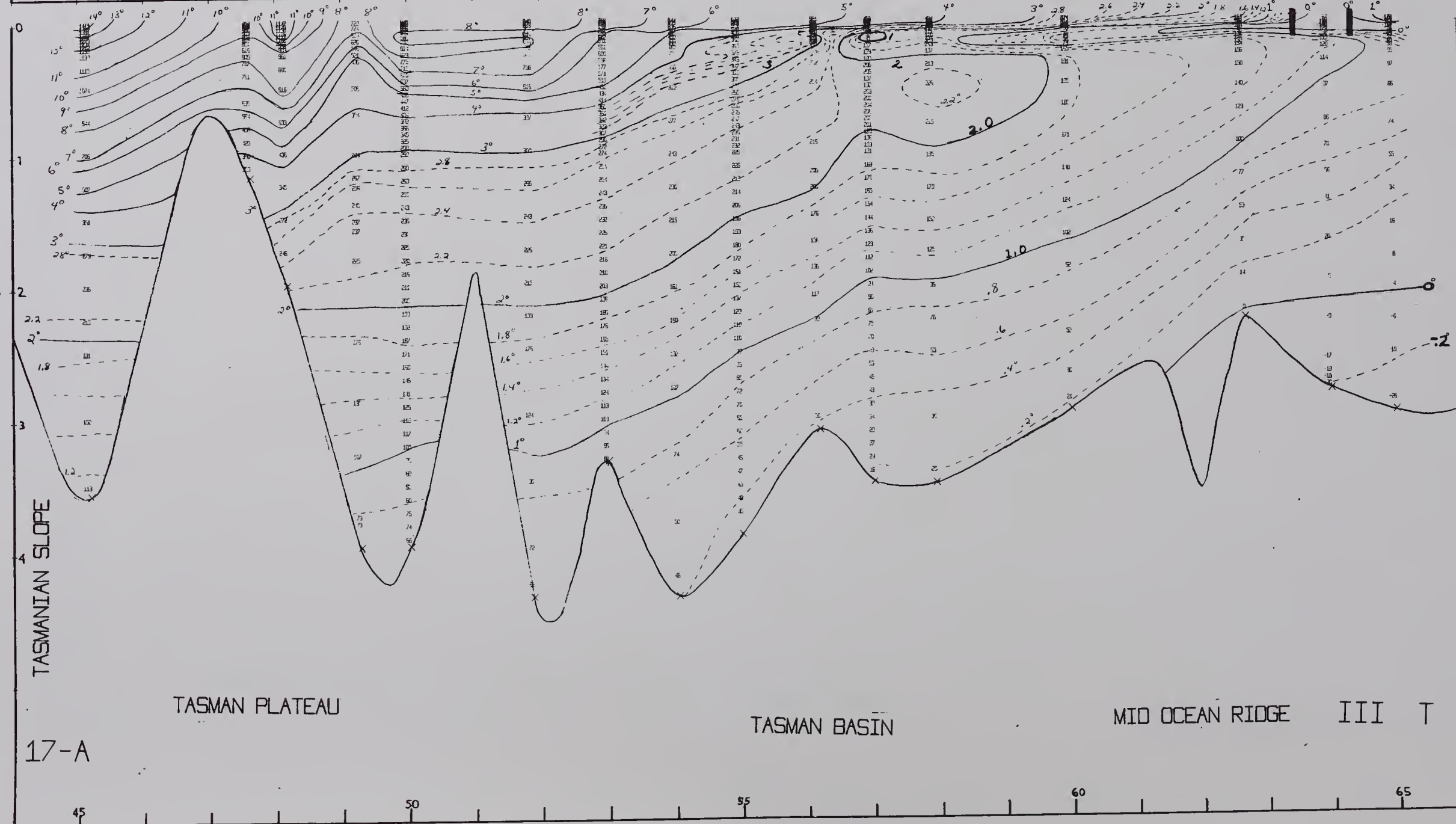
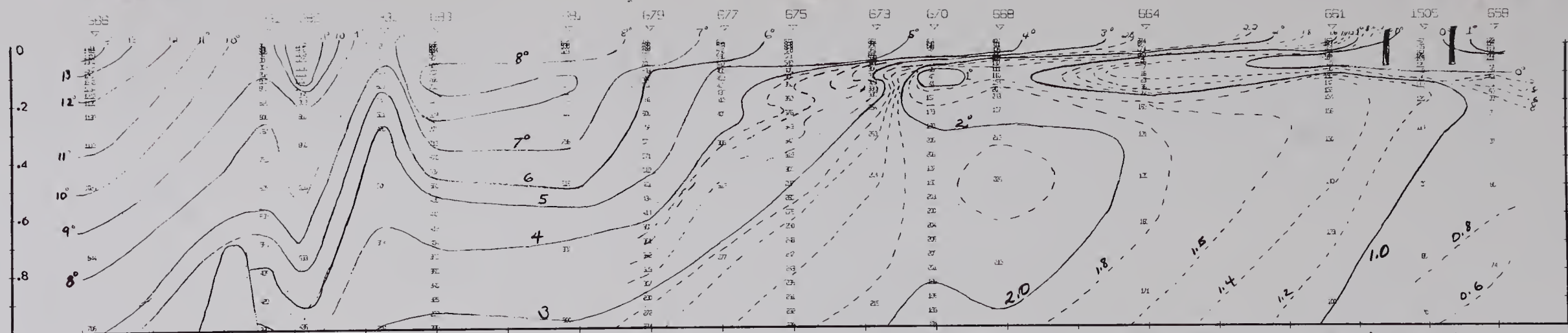


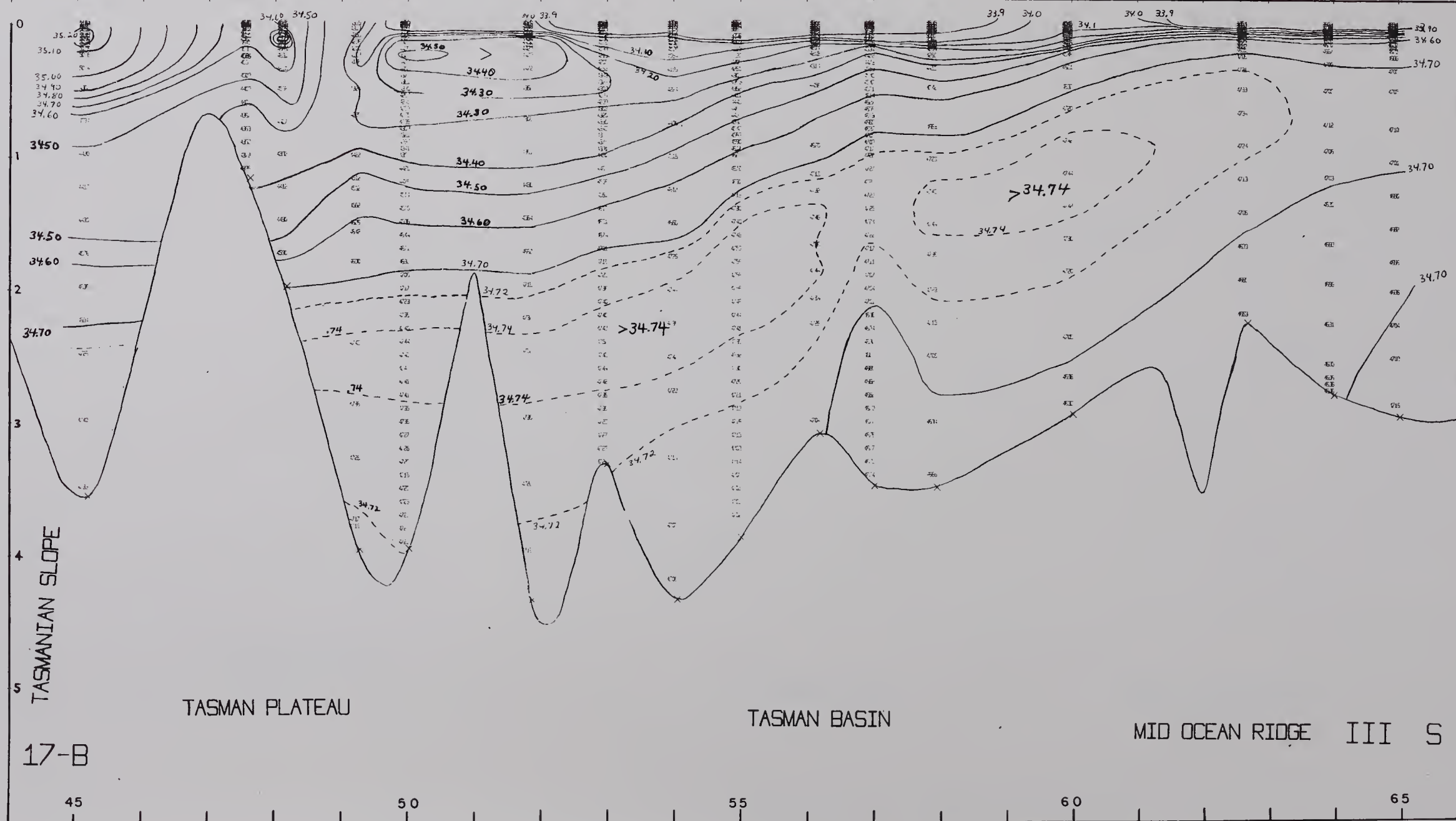
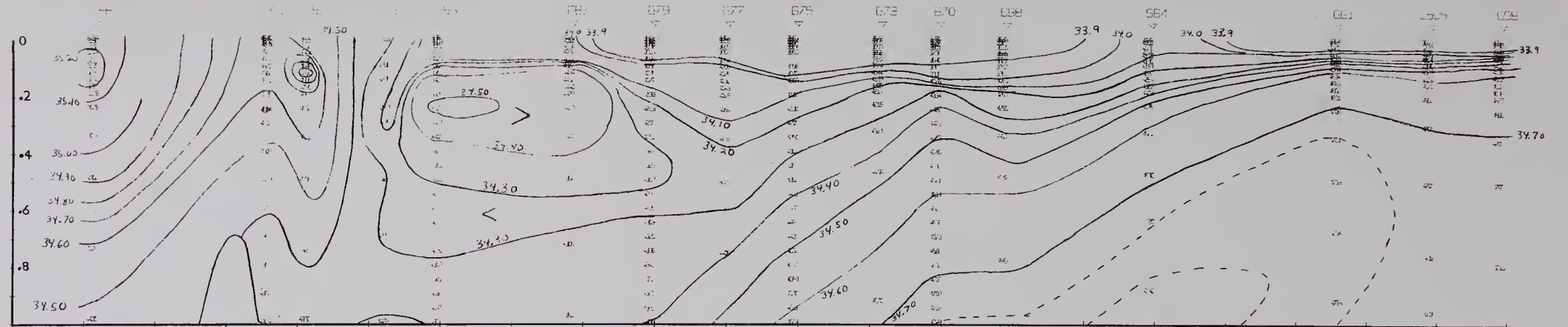




PROFILE II







17-B

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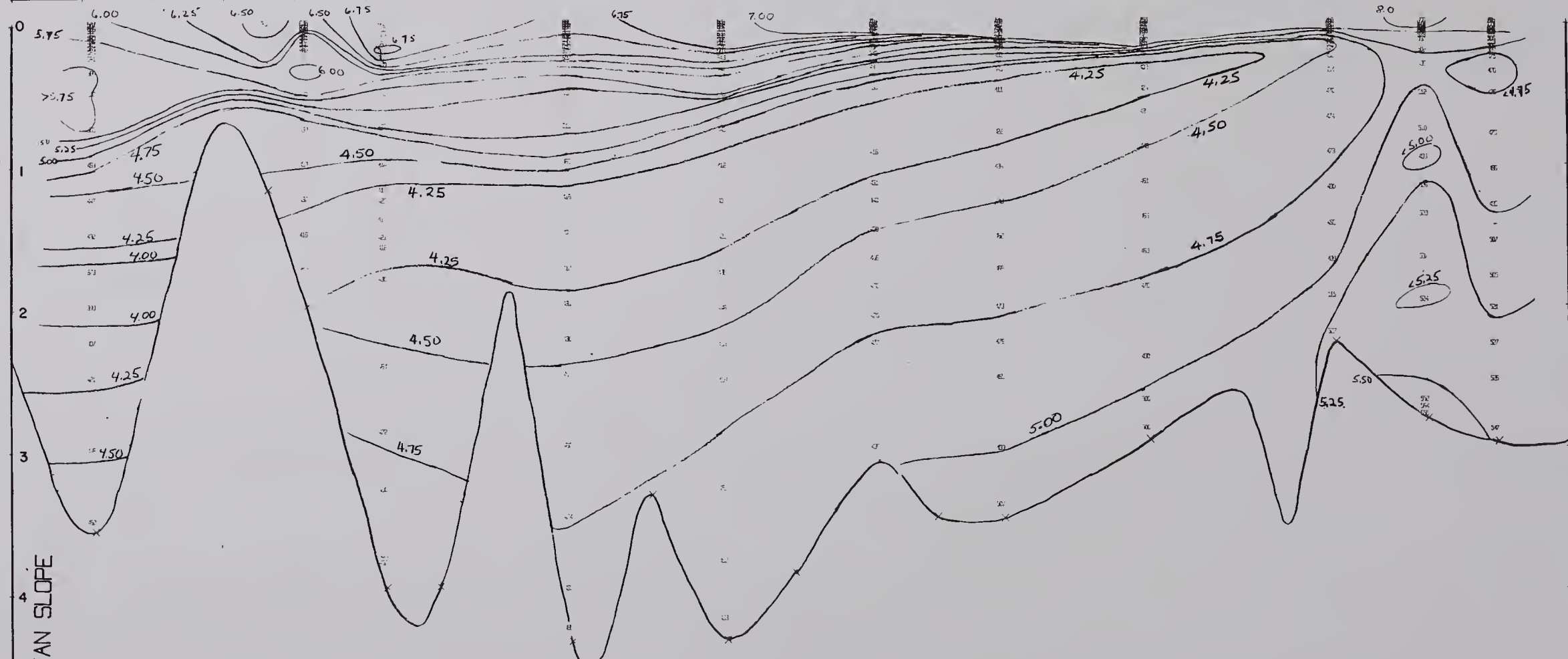
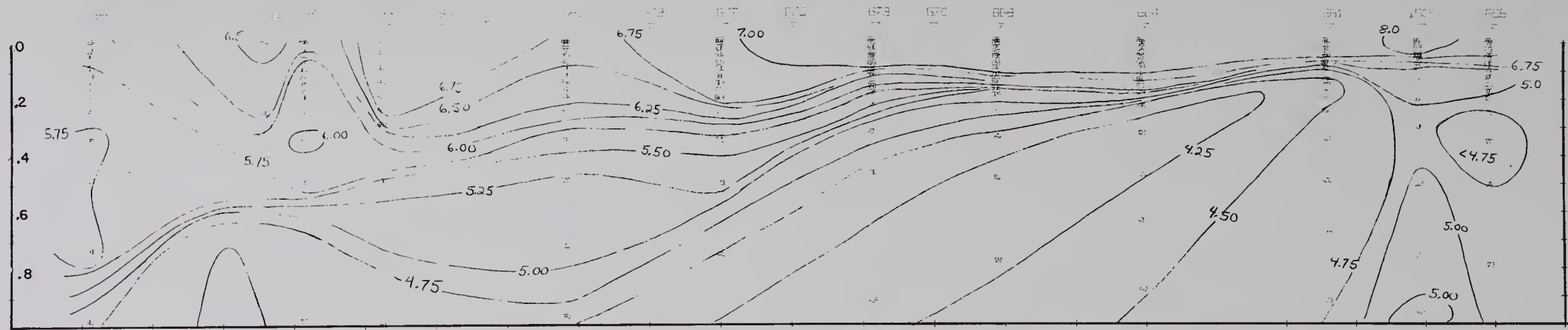
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TASMANIAN SLOPE

TASMAN PLATEAU

TASMAN BASIN

MID OCEAN RIDGE

17-C

III O

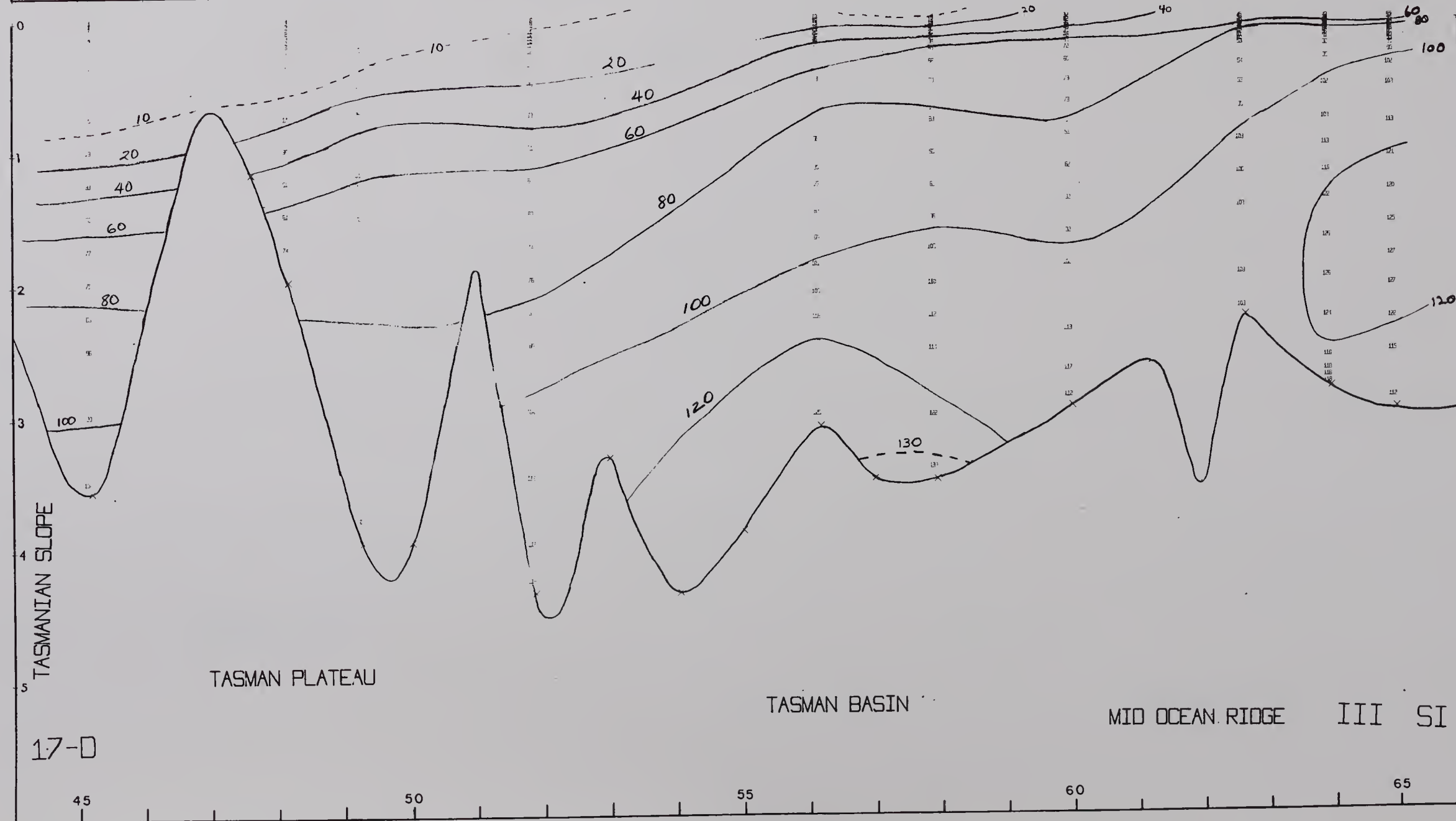
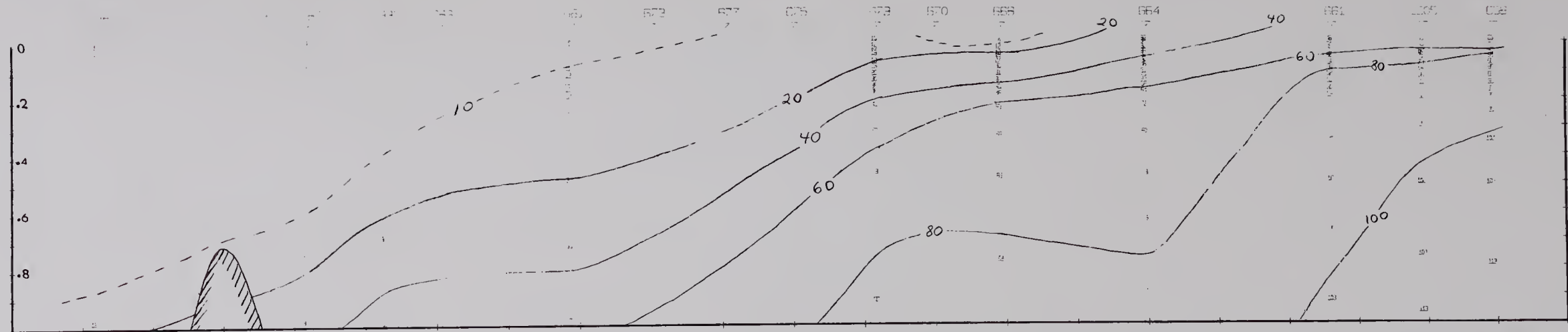
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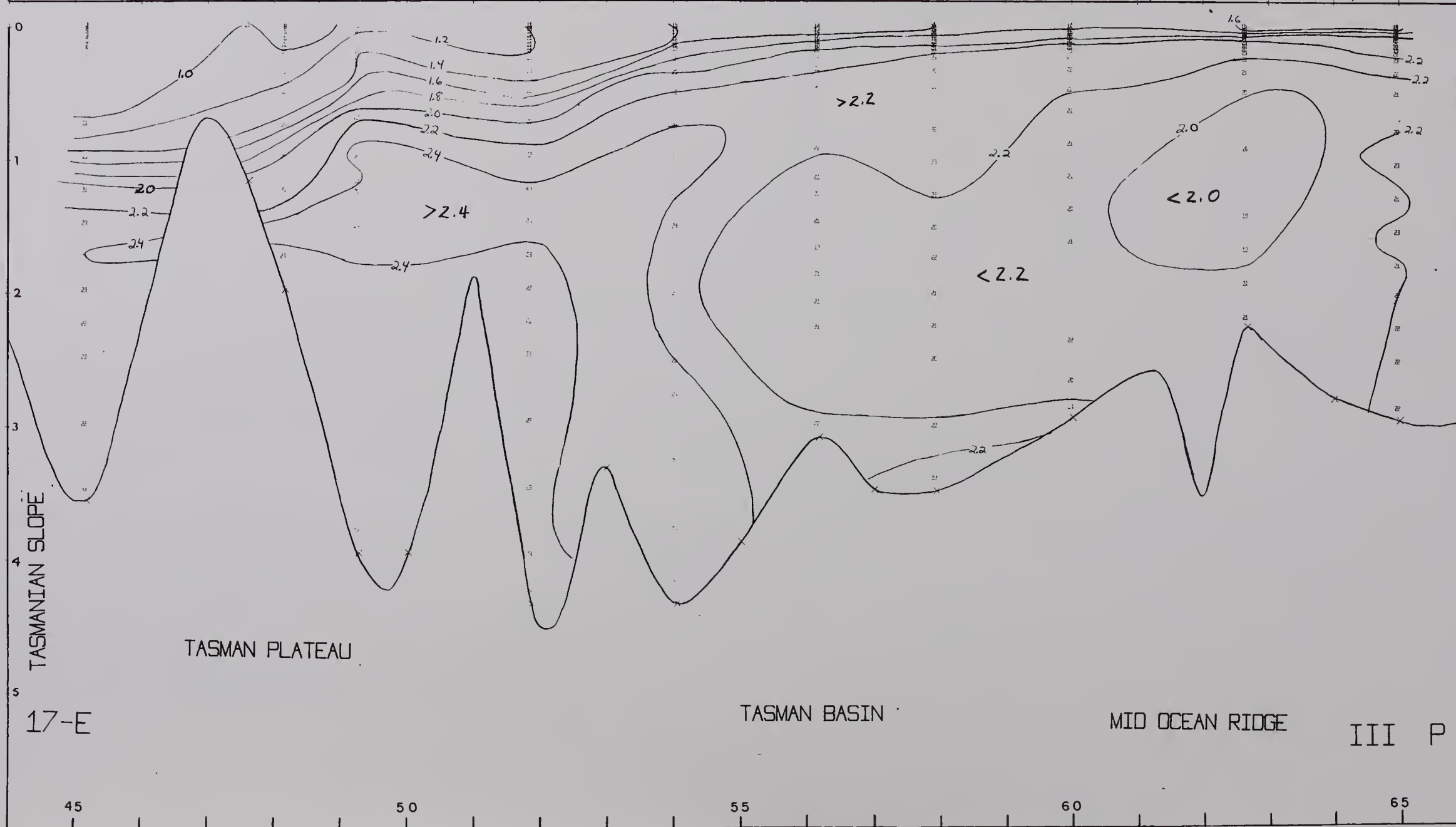
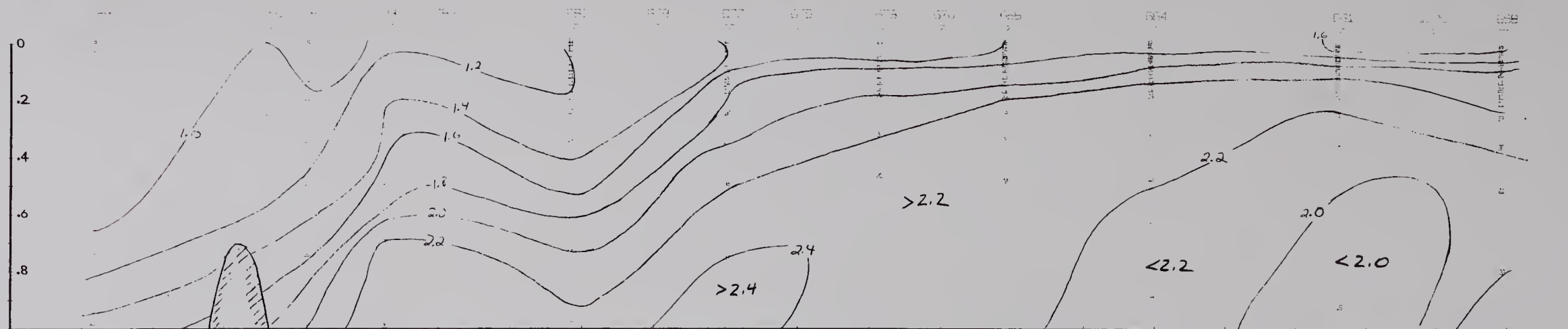
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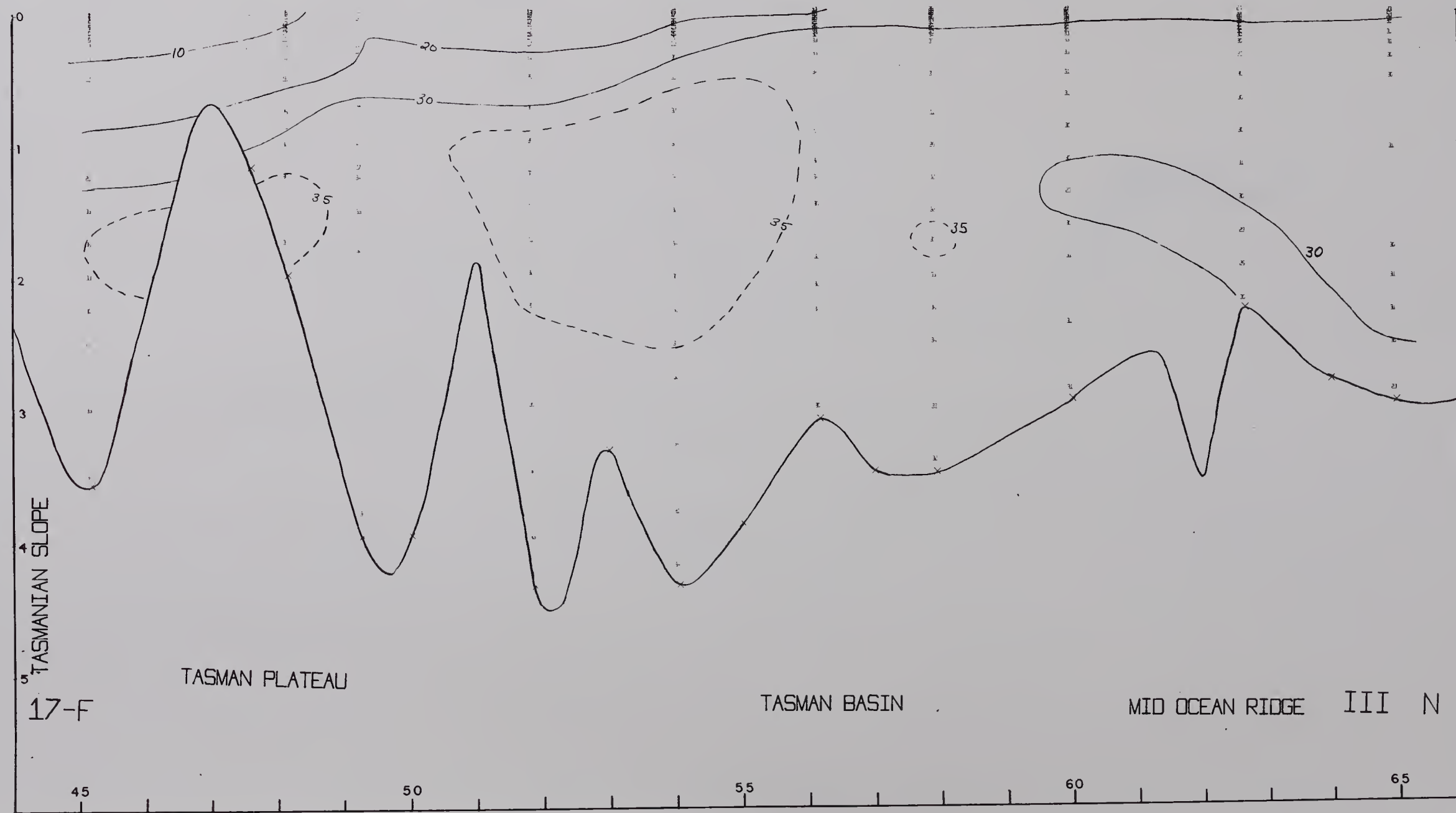
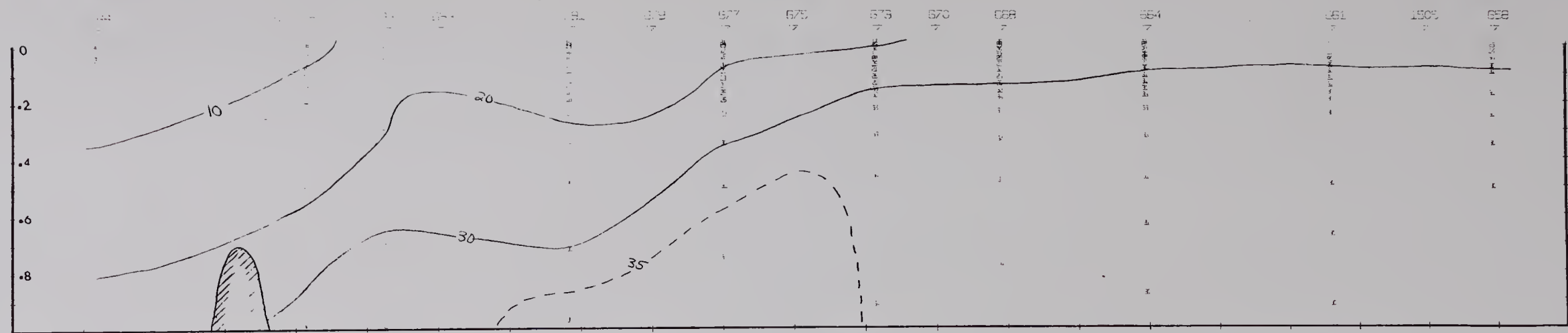
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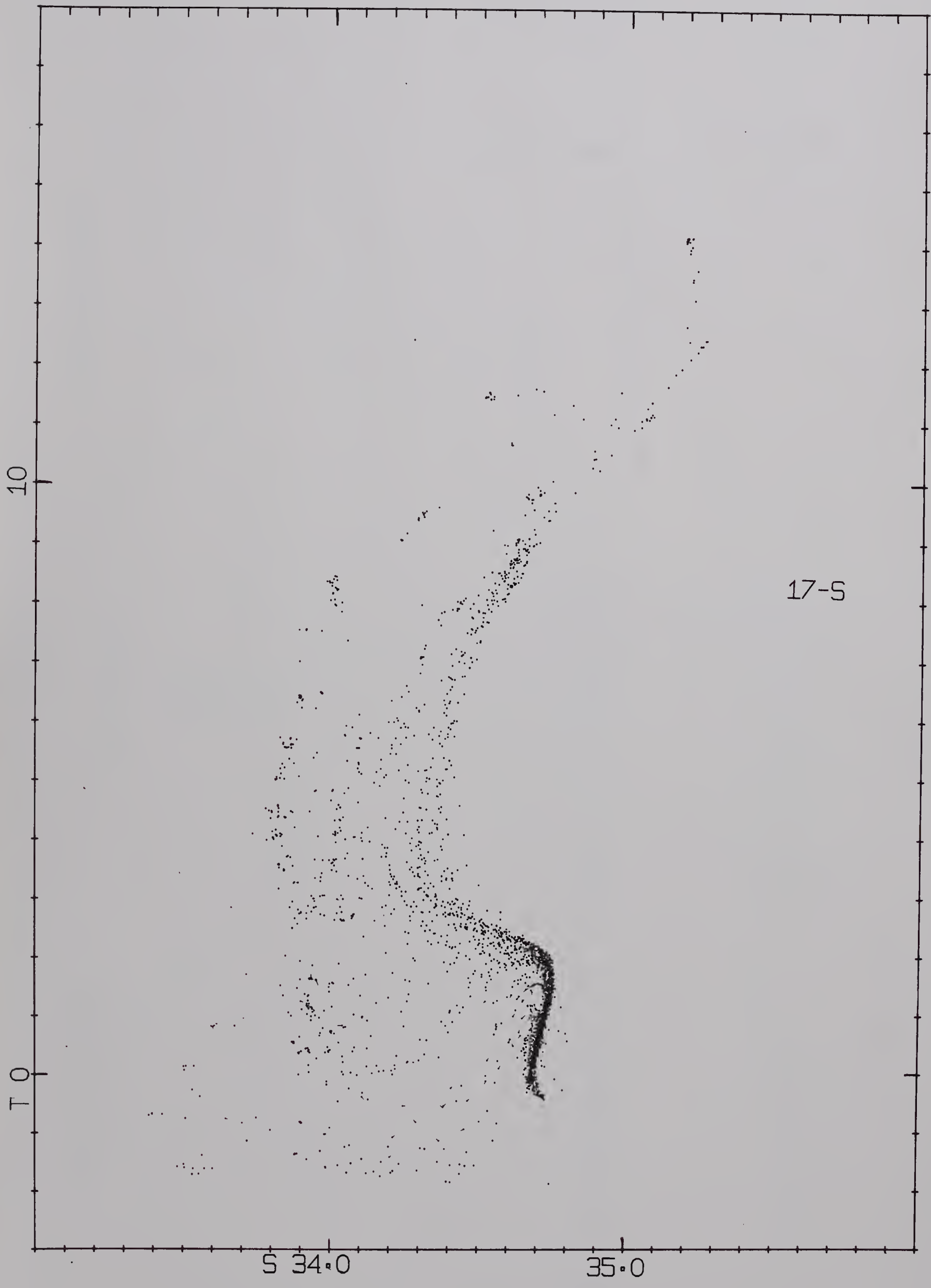
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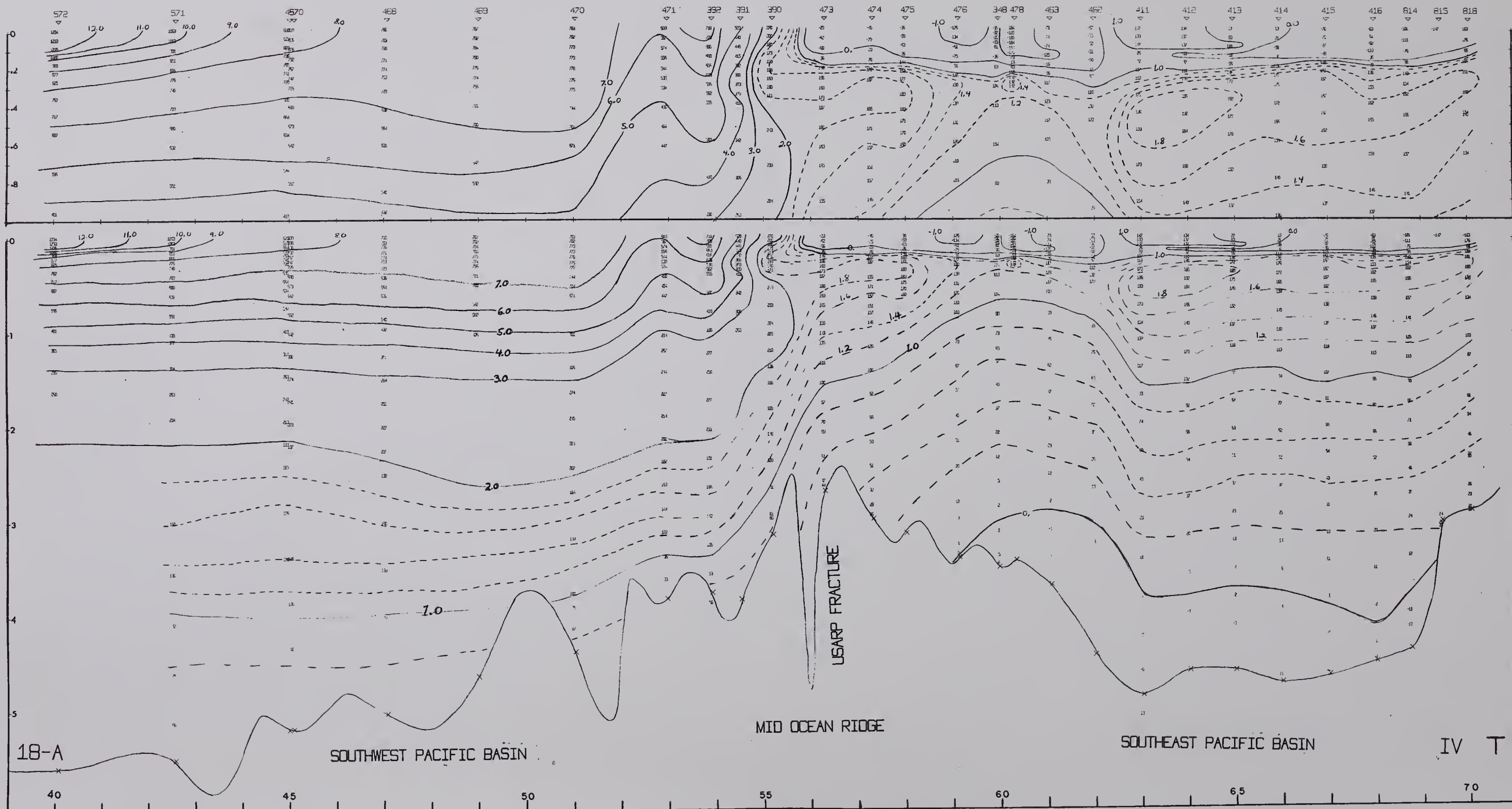






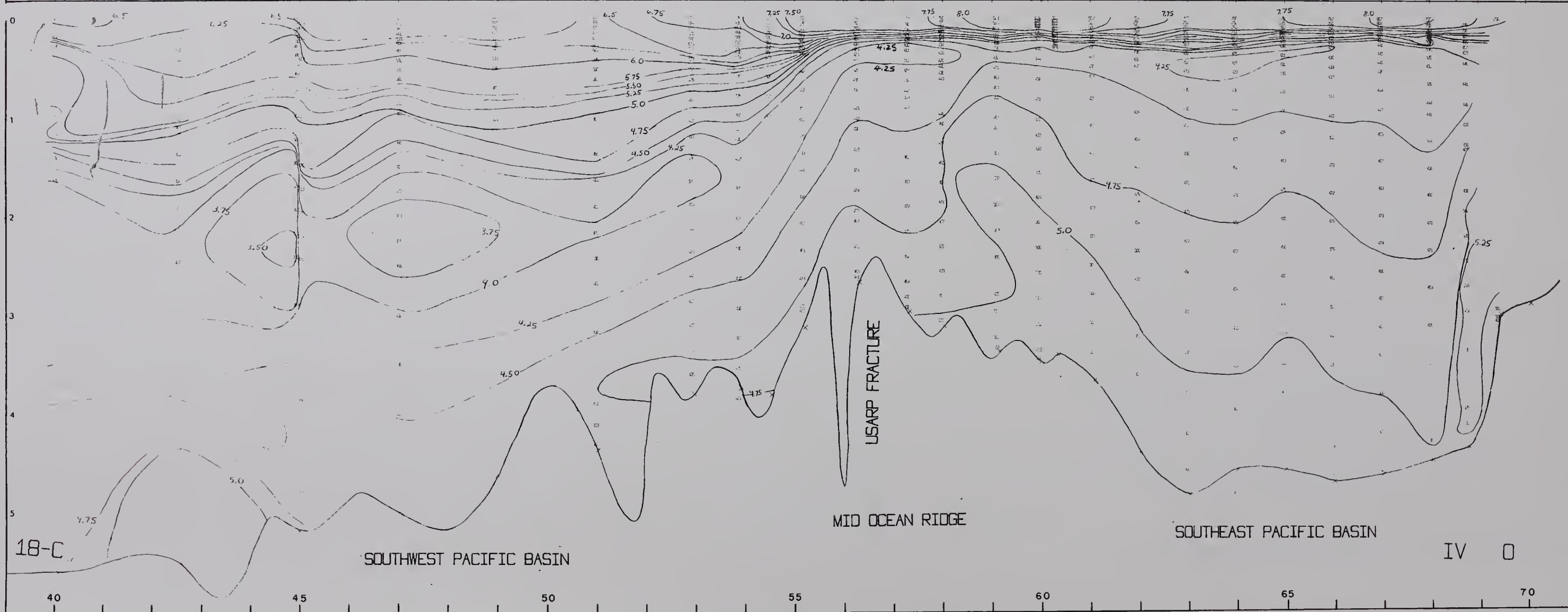
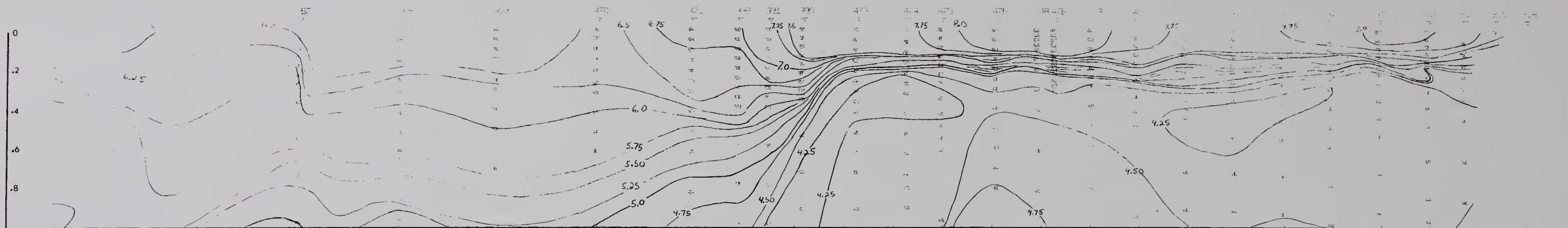












18-C

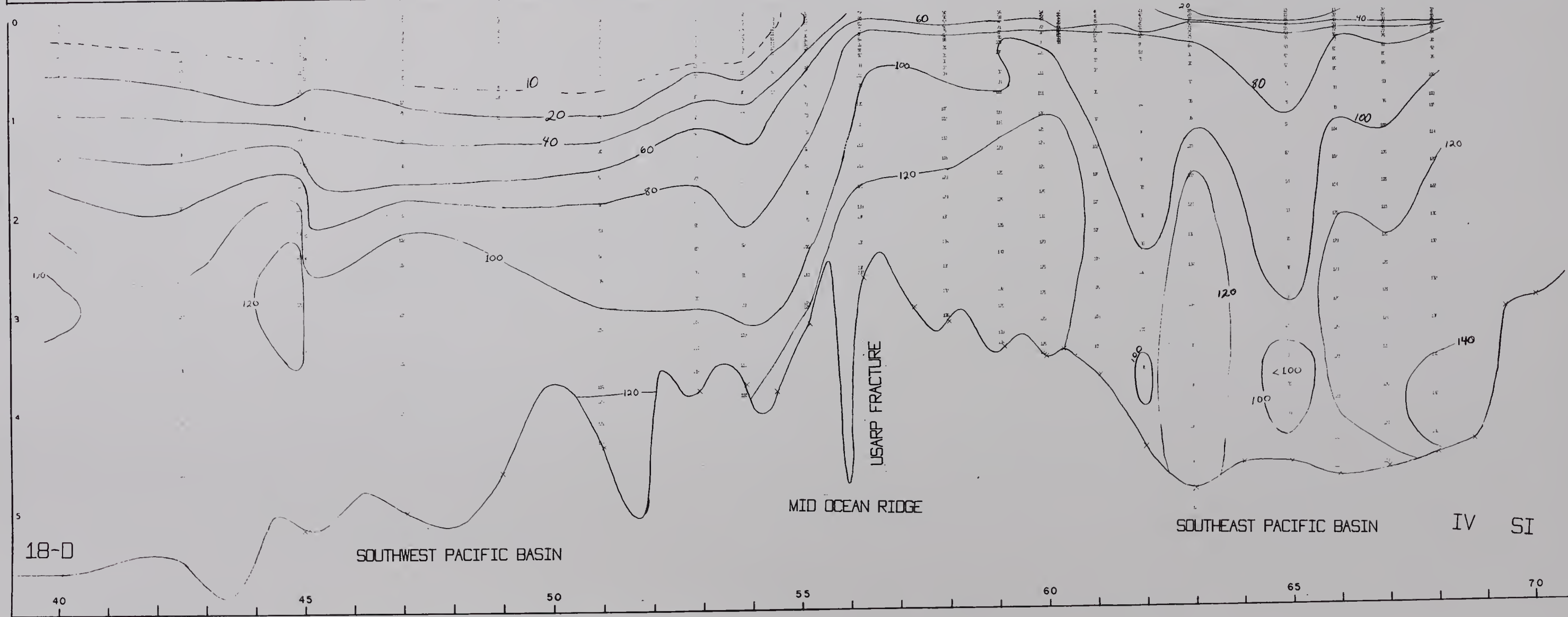
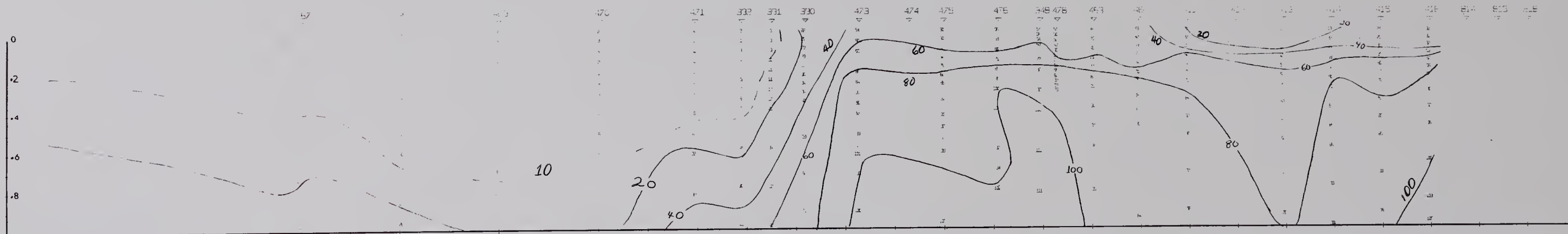
SOUTHWEST PACIFIC BASIN

MID OCEAN RIDGE

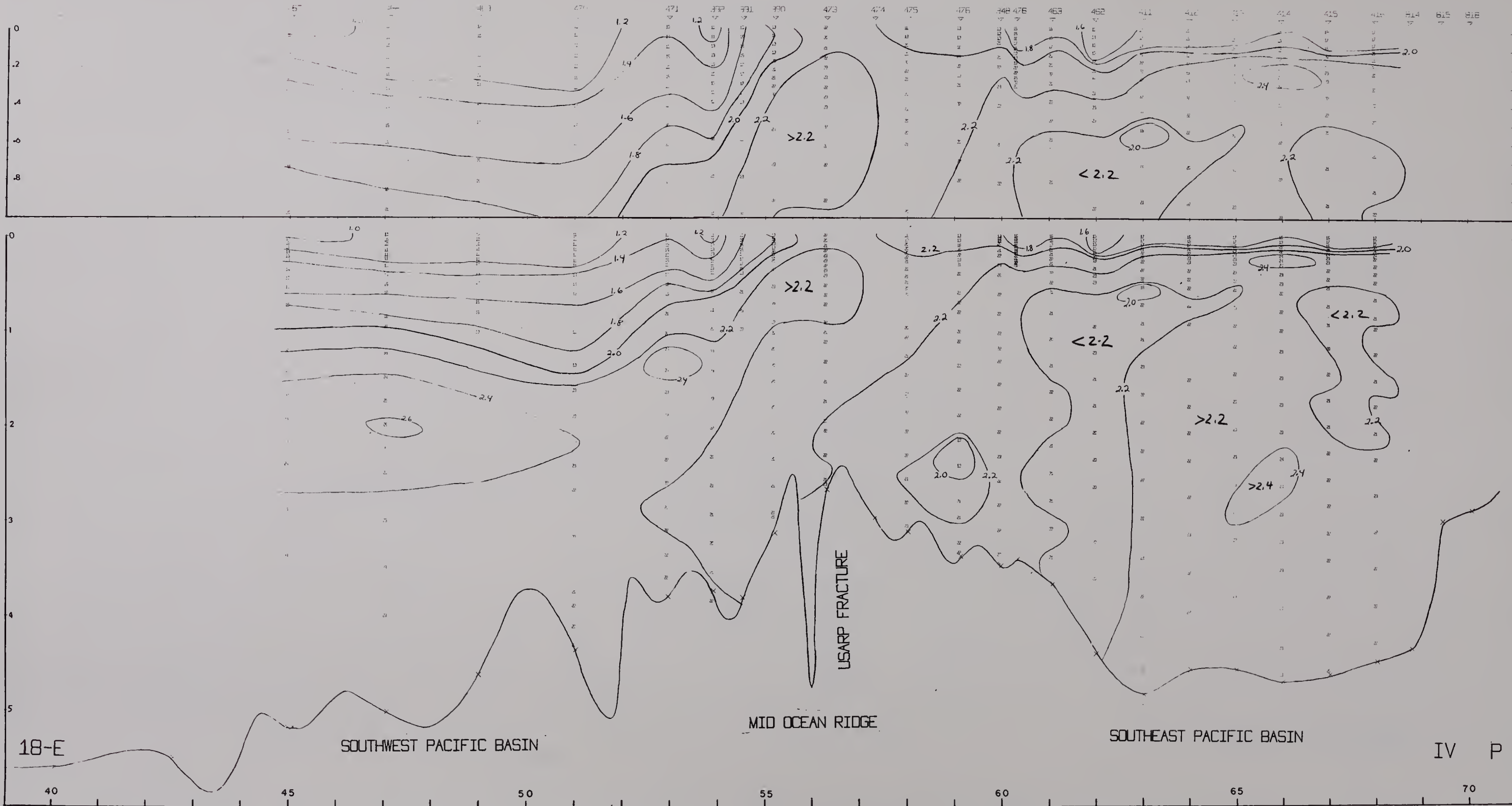
SOUTHEAST PACIFIC BASIN

IV O

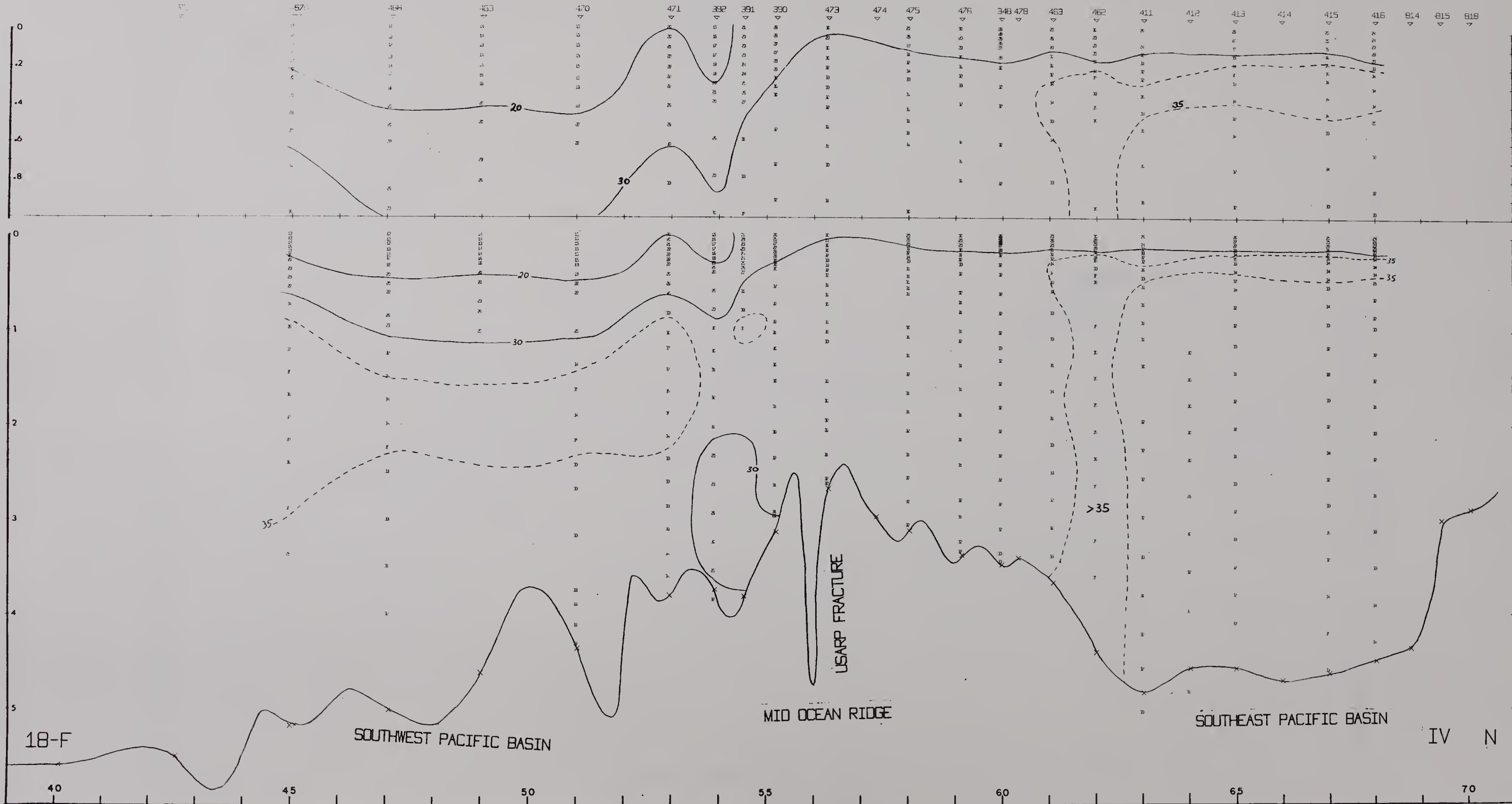


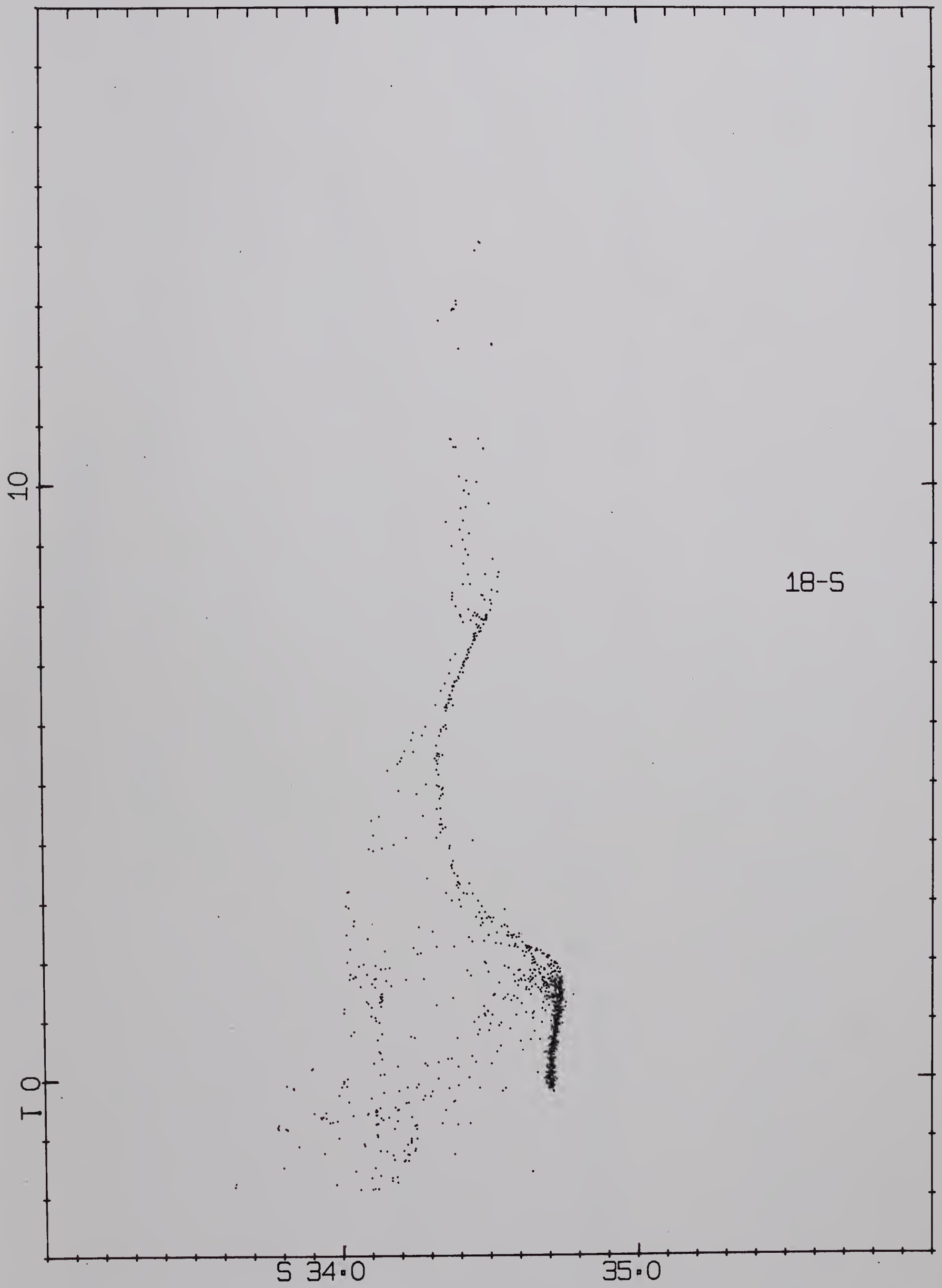


18-D

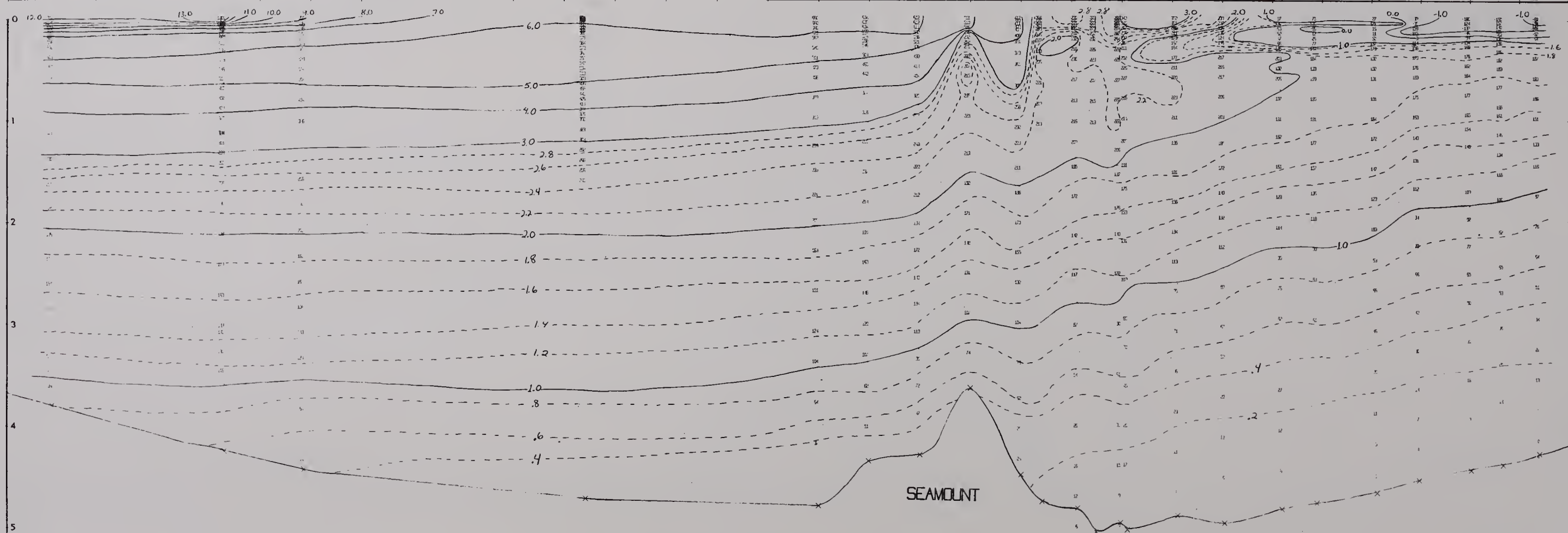
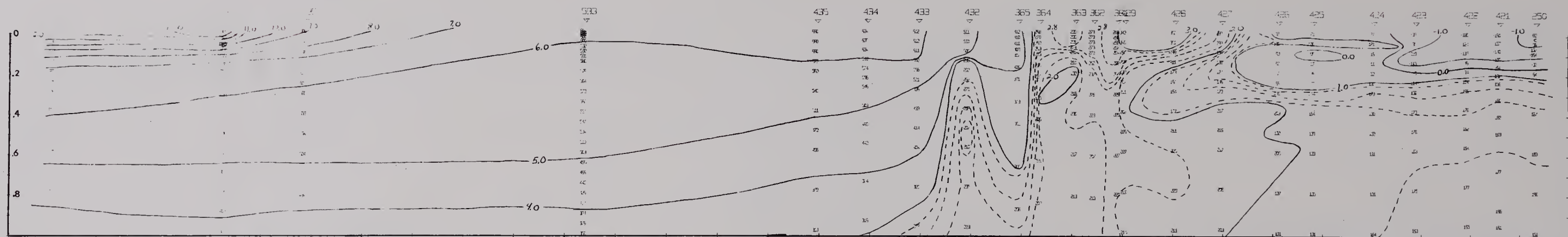












19-A

SOUTHEAST PACIFIC BASIN

V T

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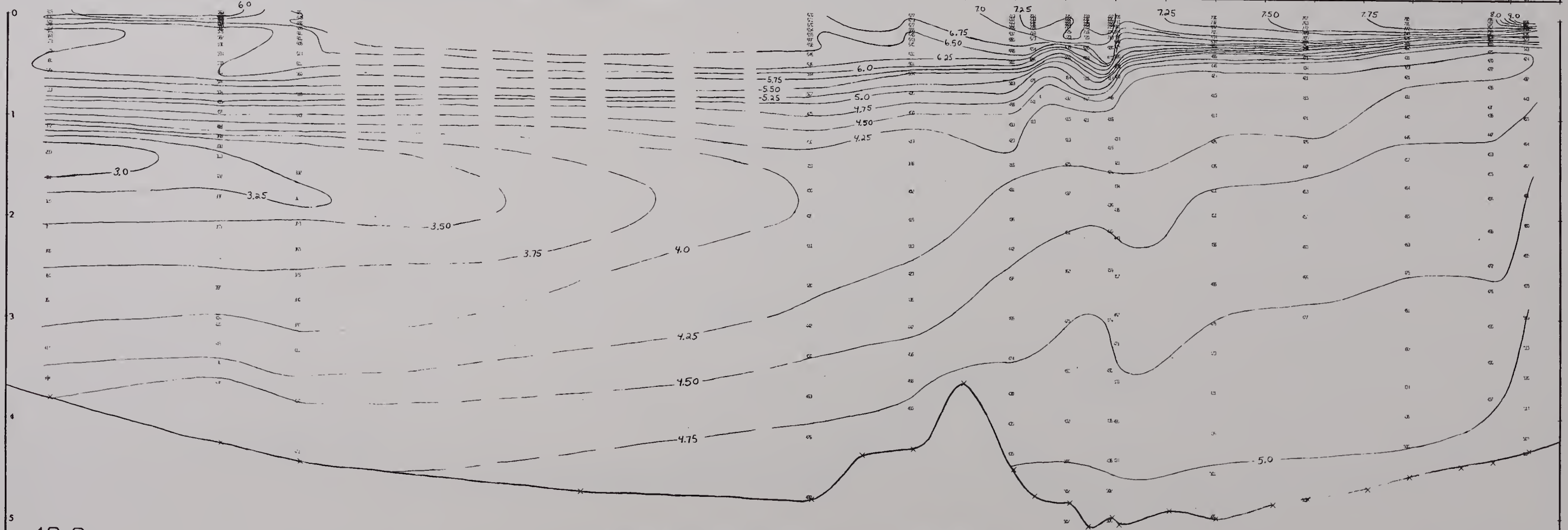
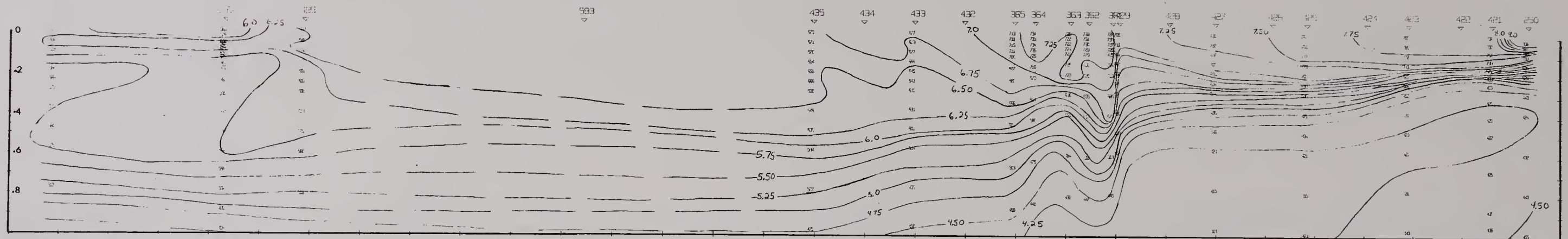
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19-C

SOUTHEAST PACIFIC BASIN

SEAMOUNT

V O

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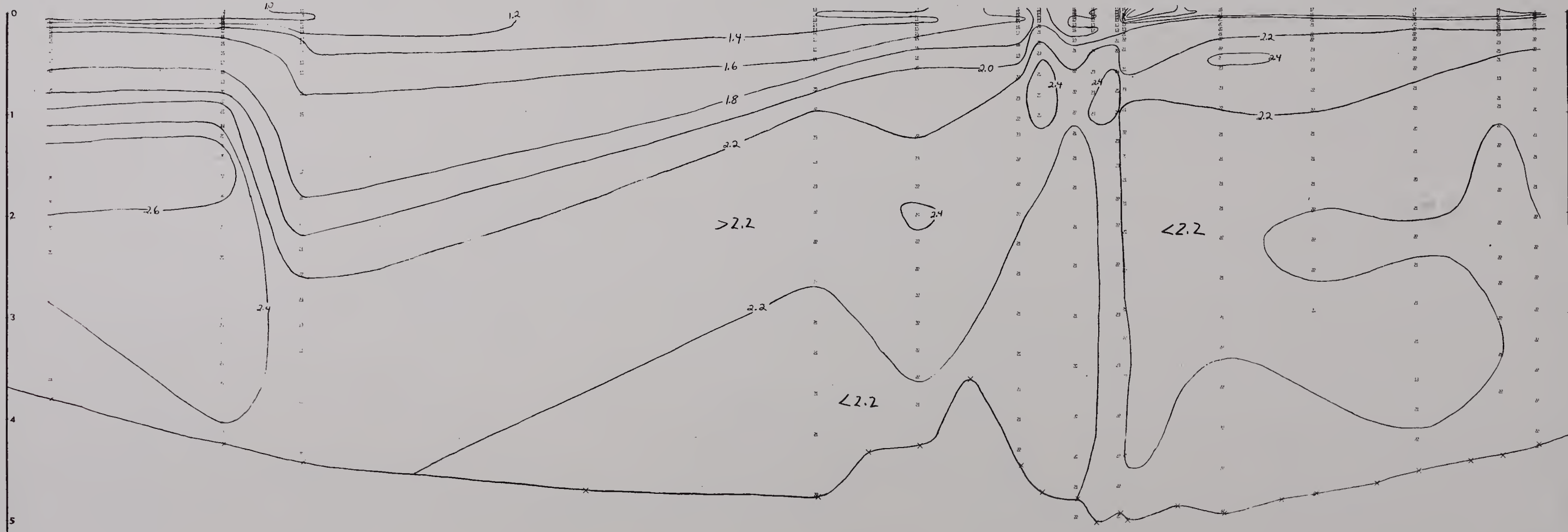
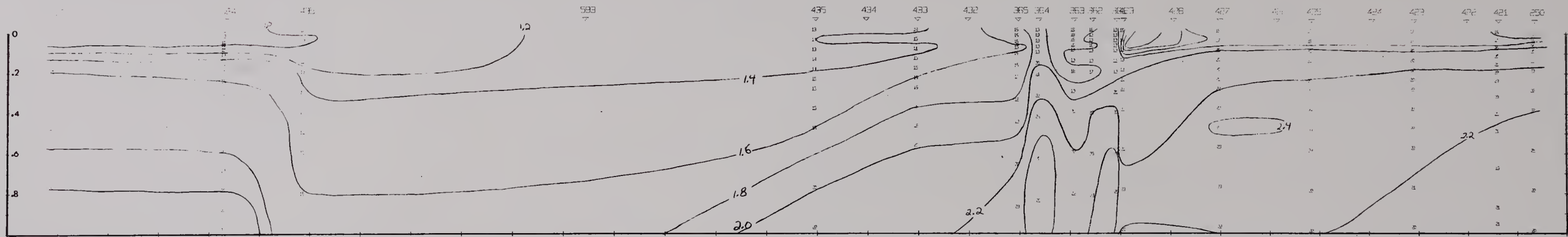
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19-E

SOUTHEAST PACIFIC BASIN

SEAMOUNT

V P

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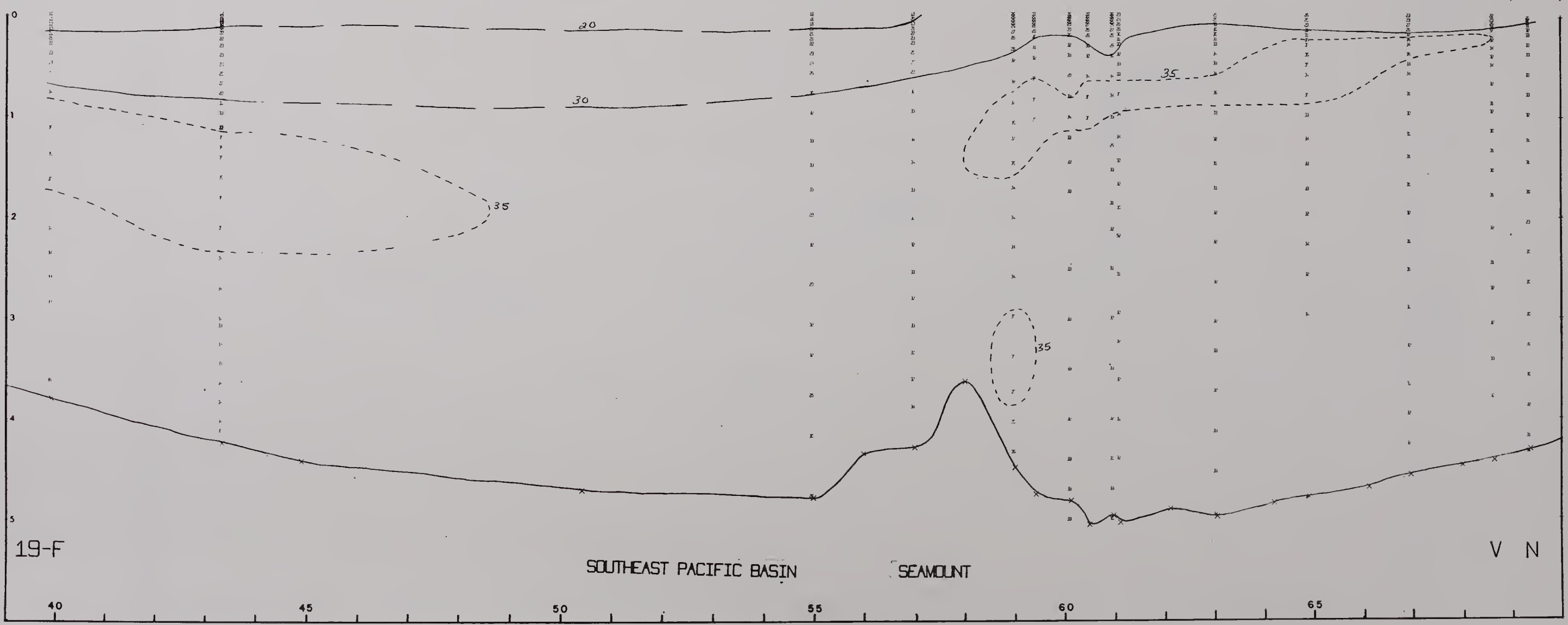
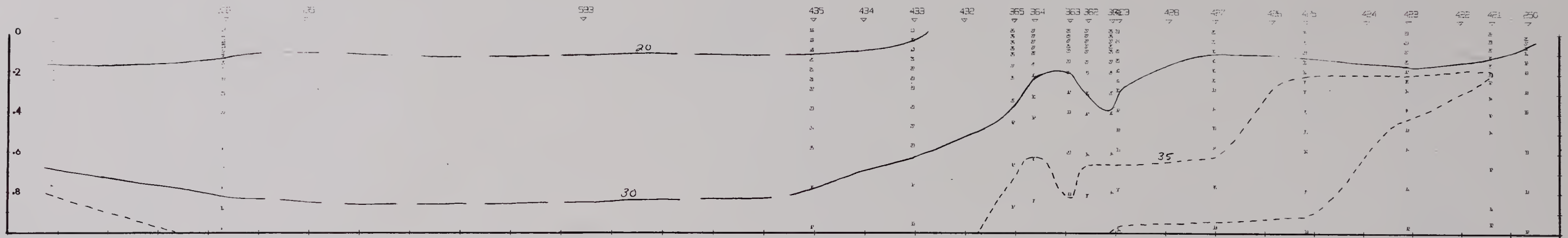
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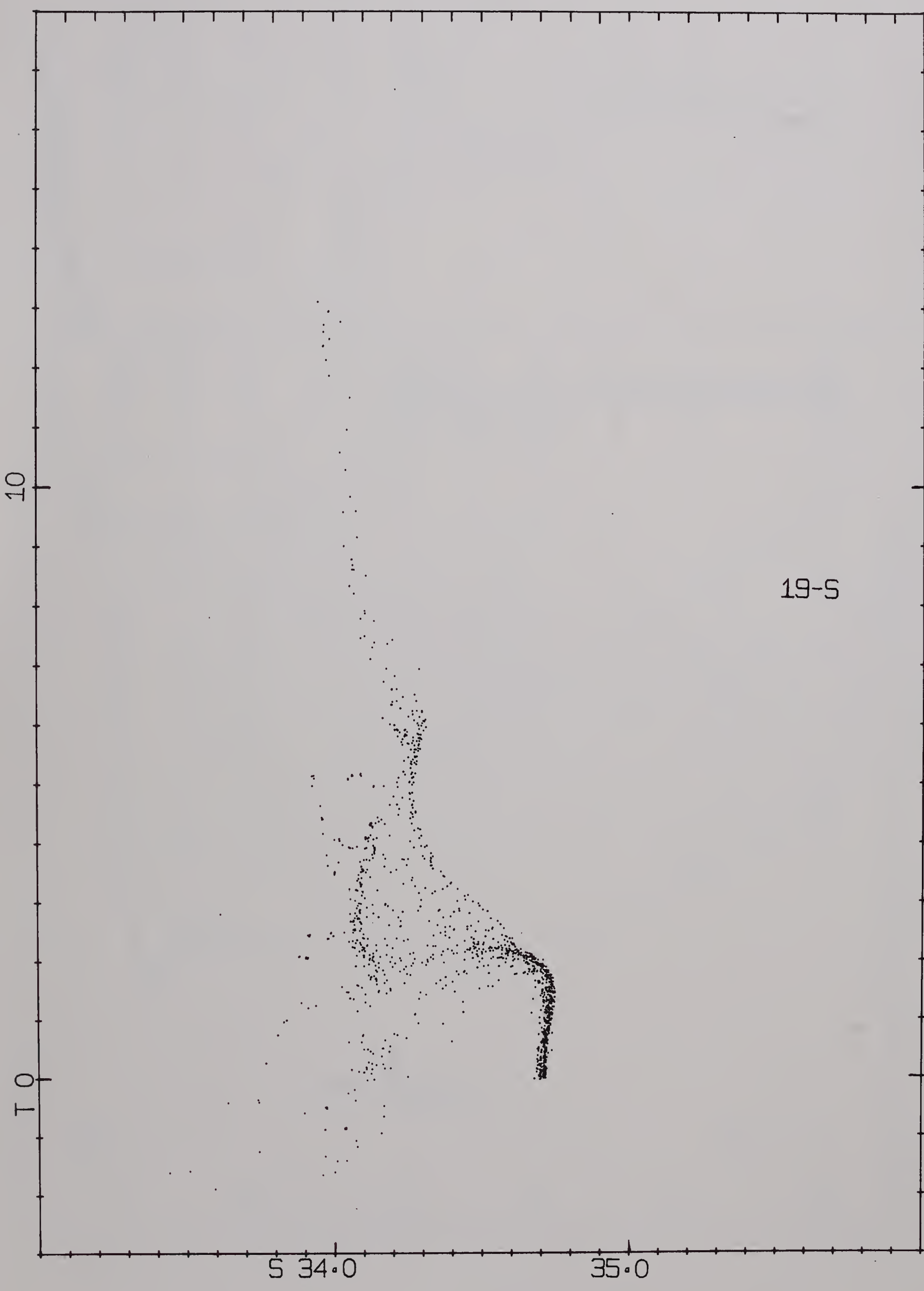
19-F

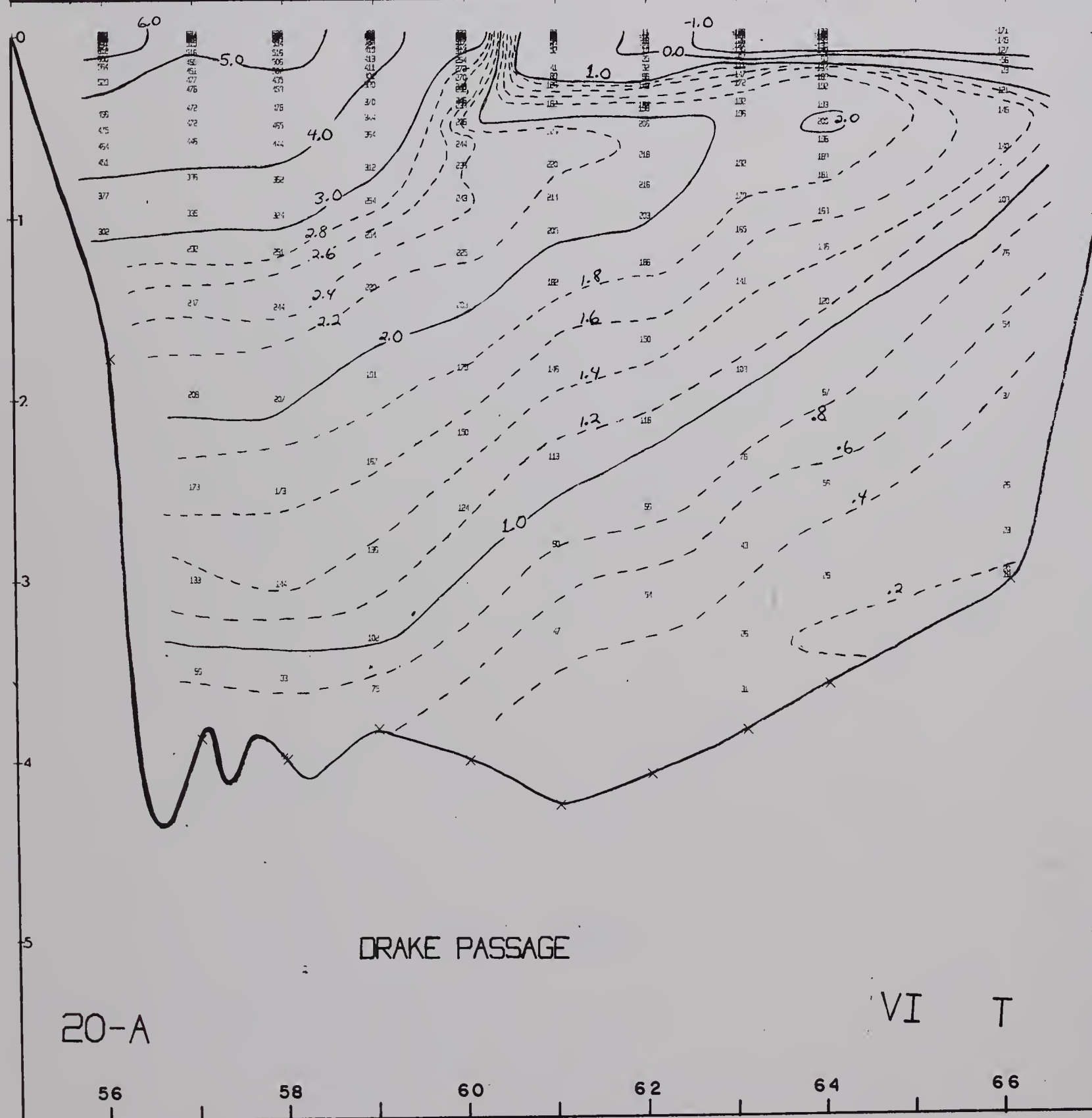
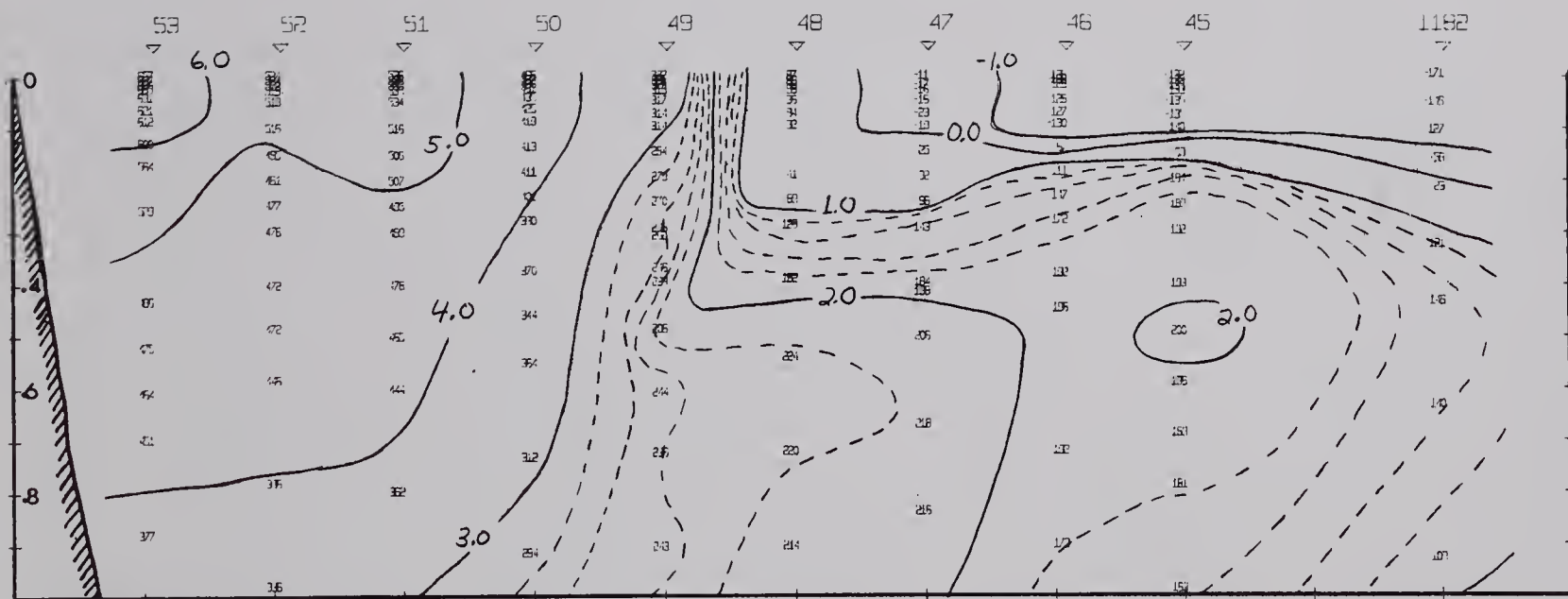
SOUTHEAST PACIFIC BASIN SEAMOUNT

V N

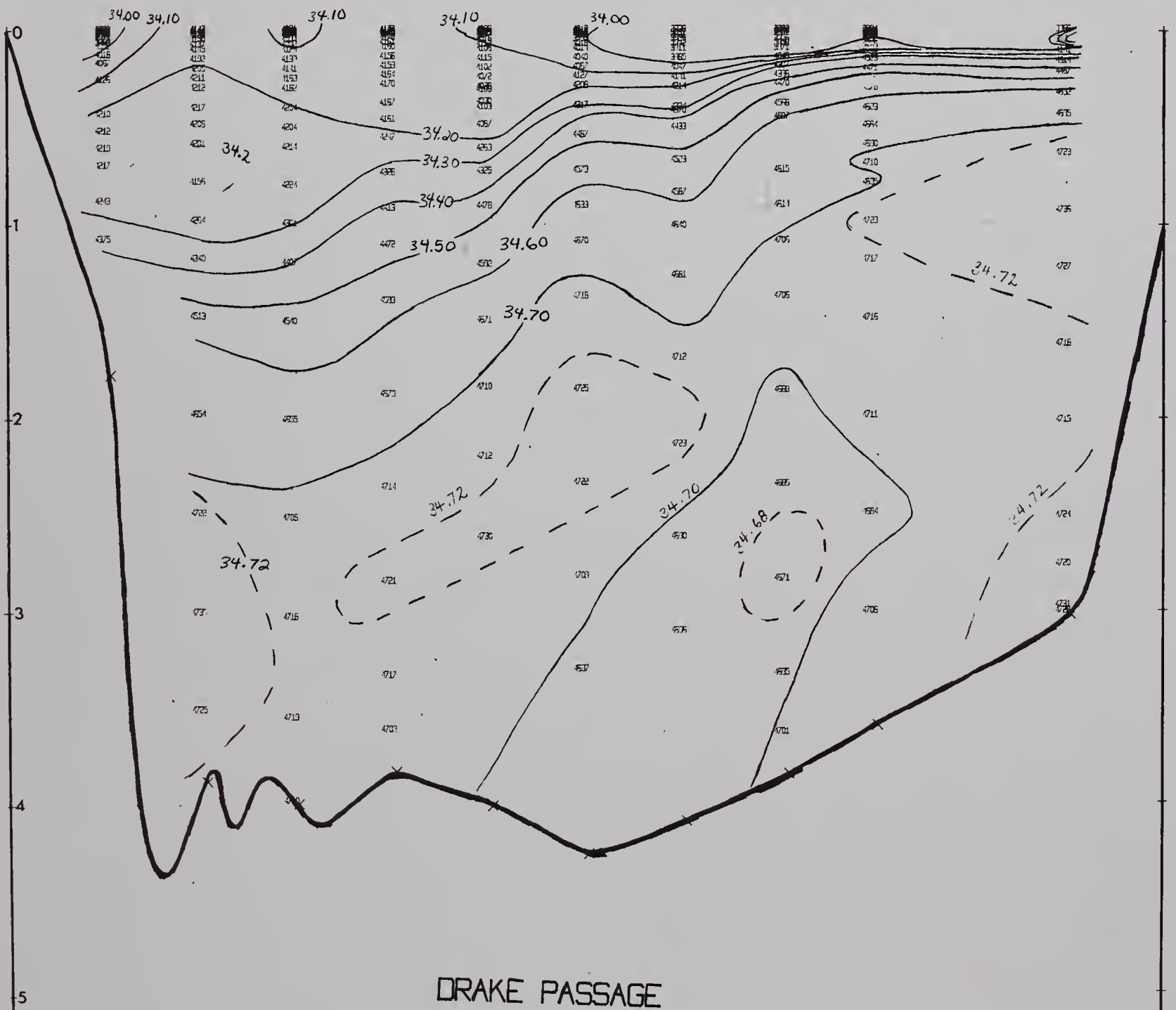
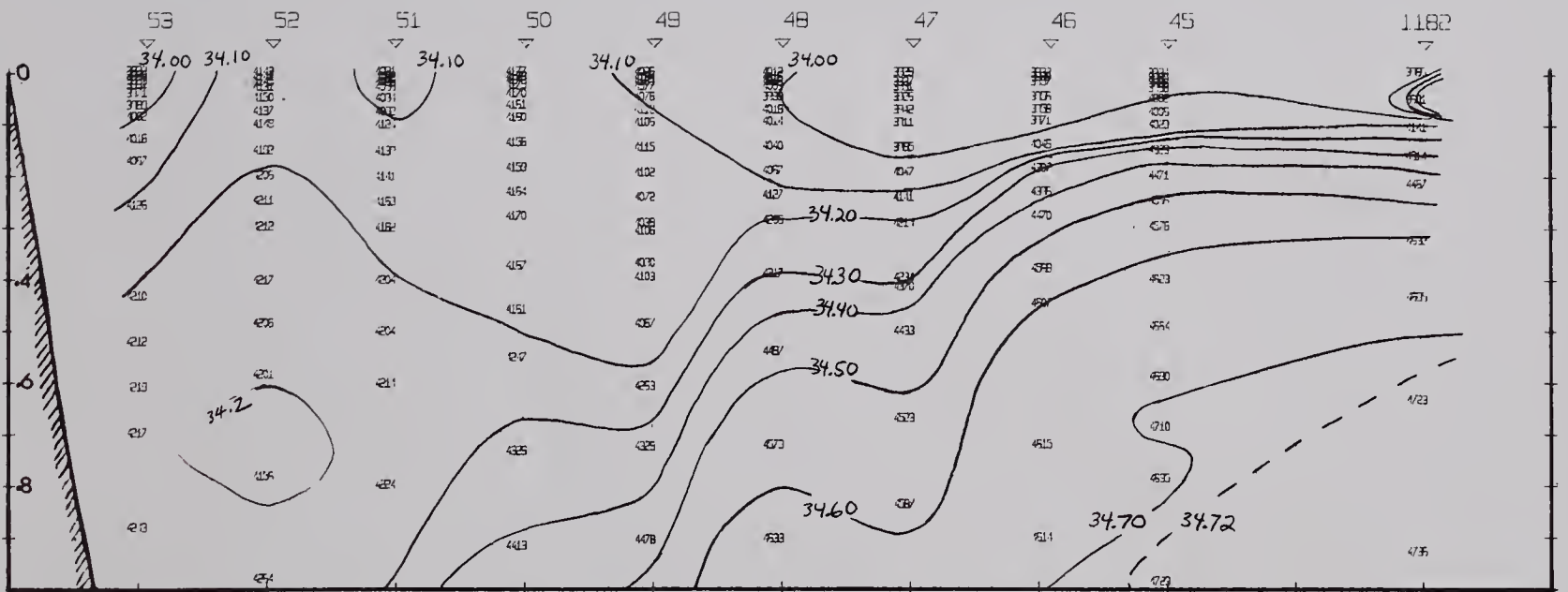
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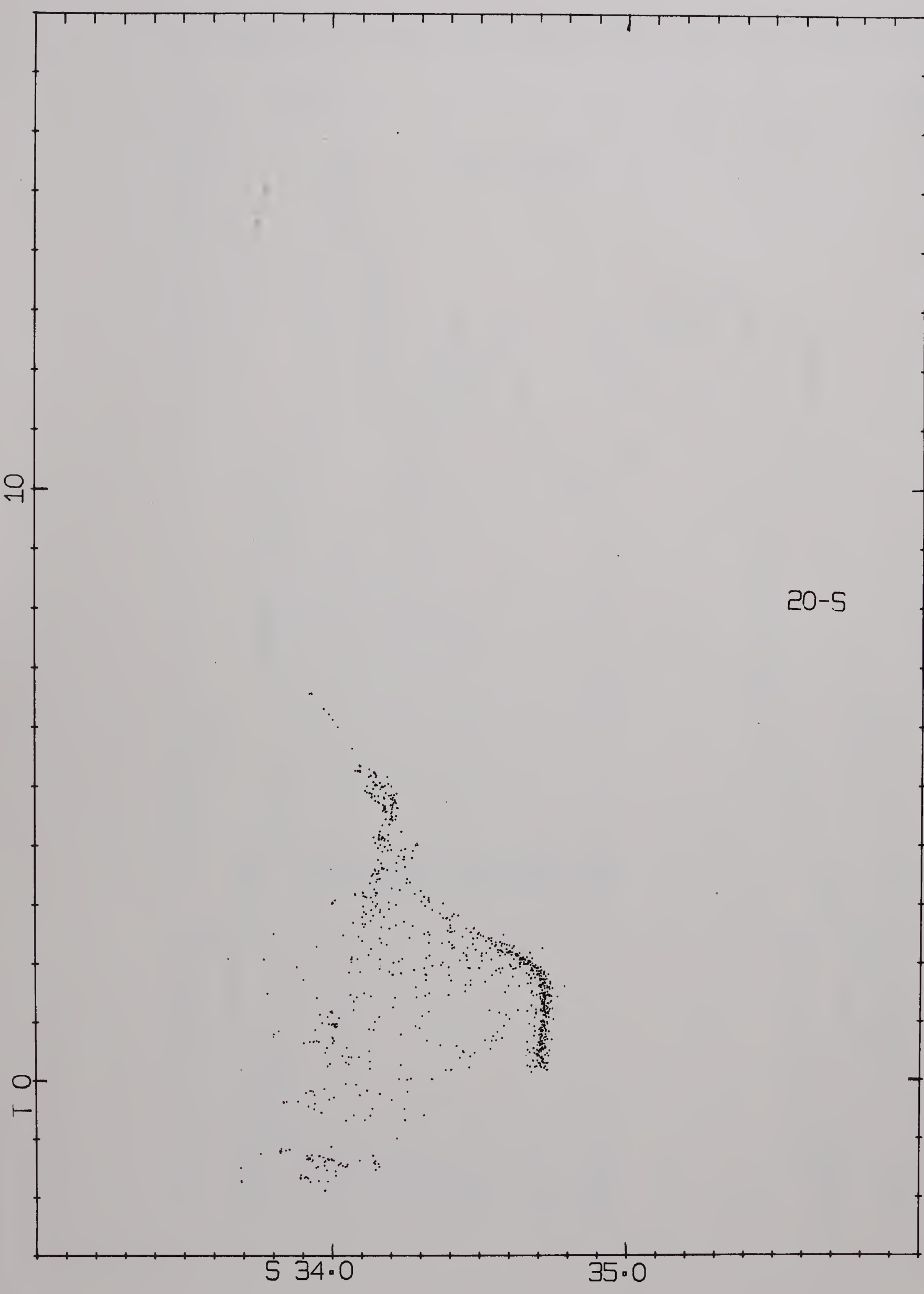




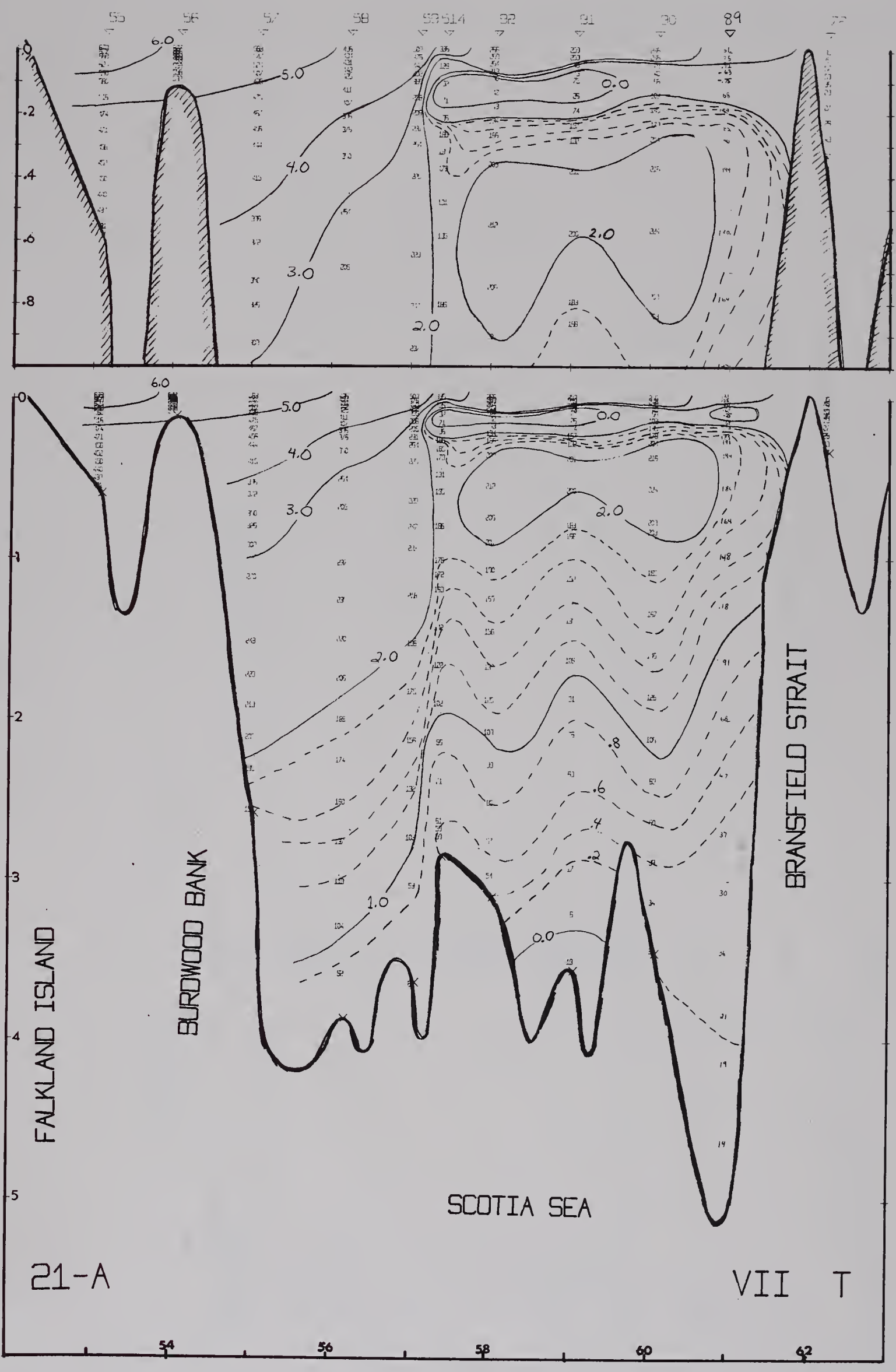


20-B

VI S

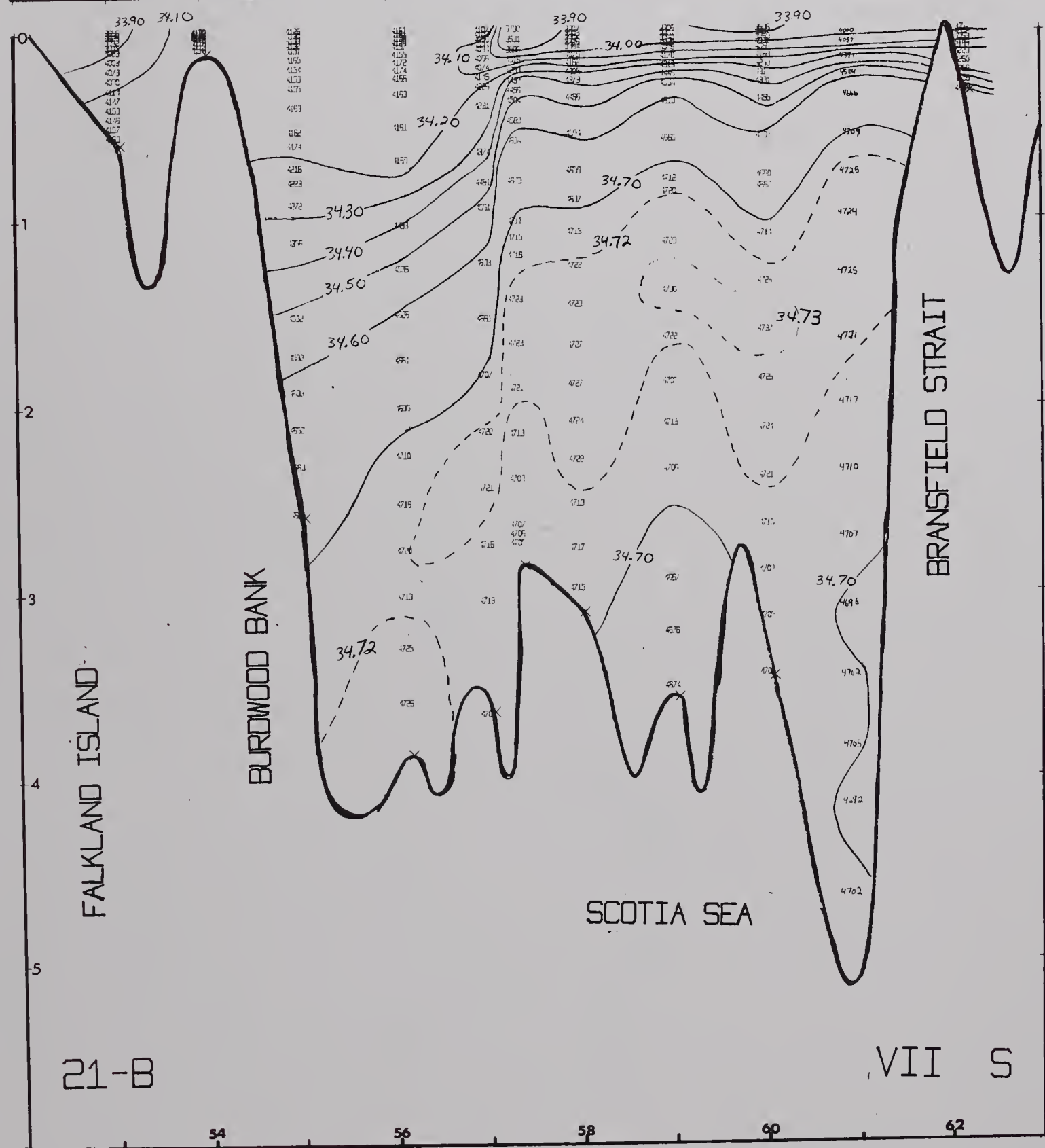
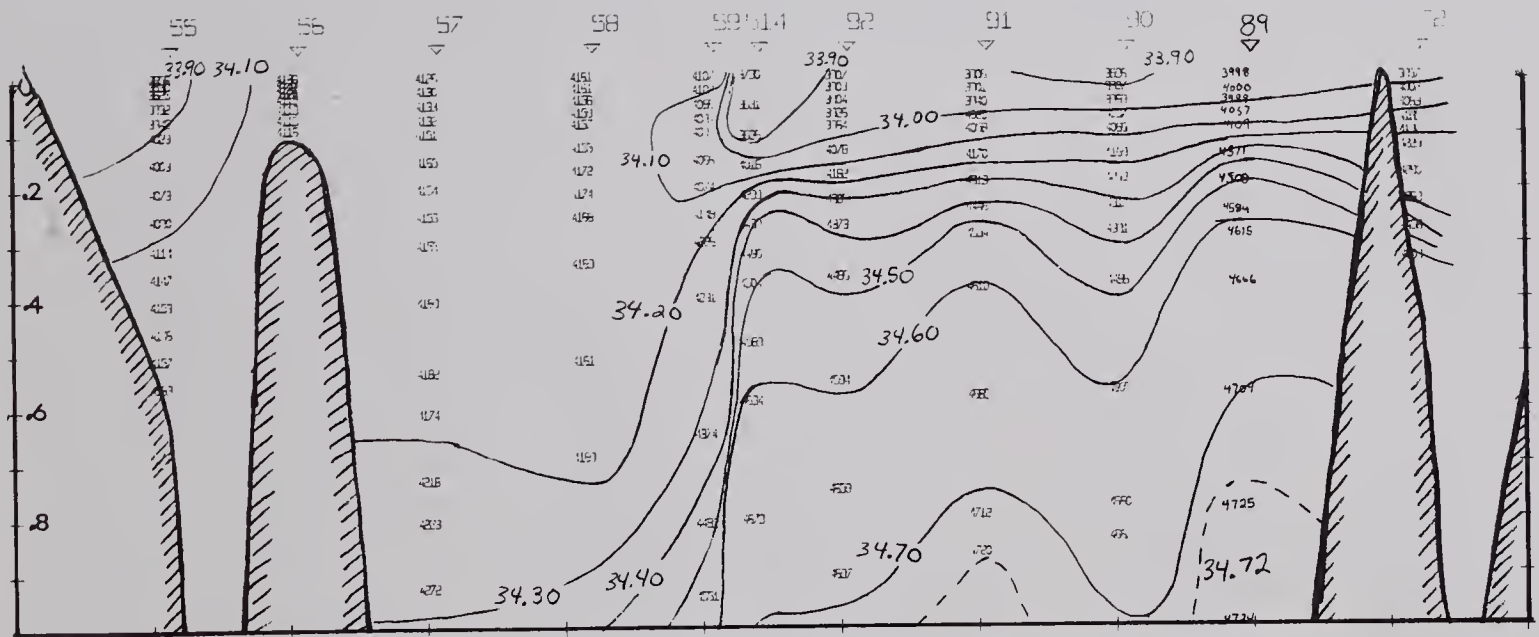






21-A

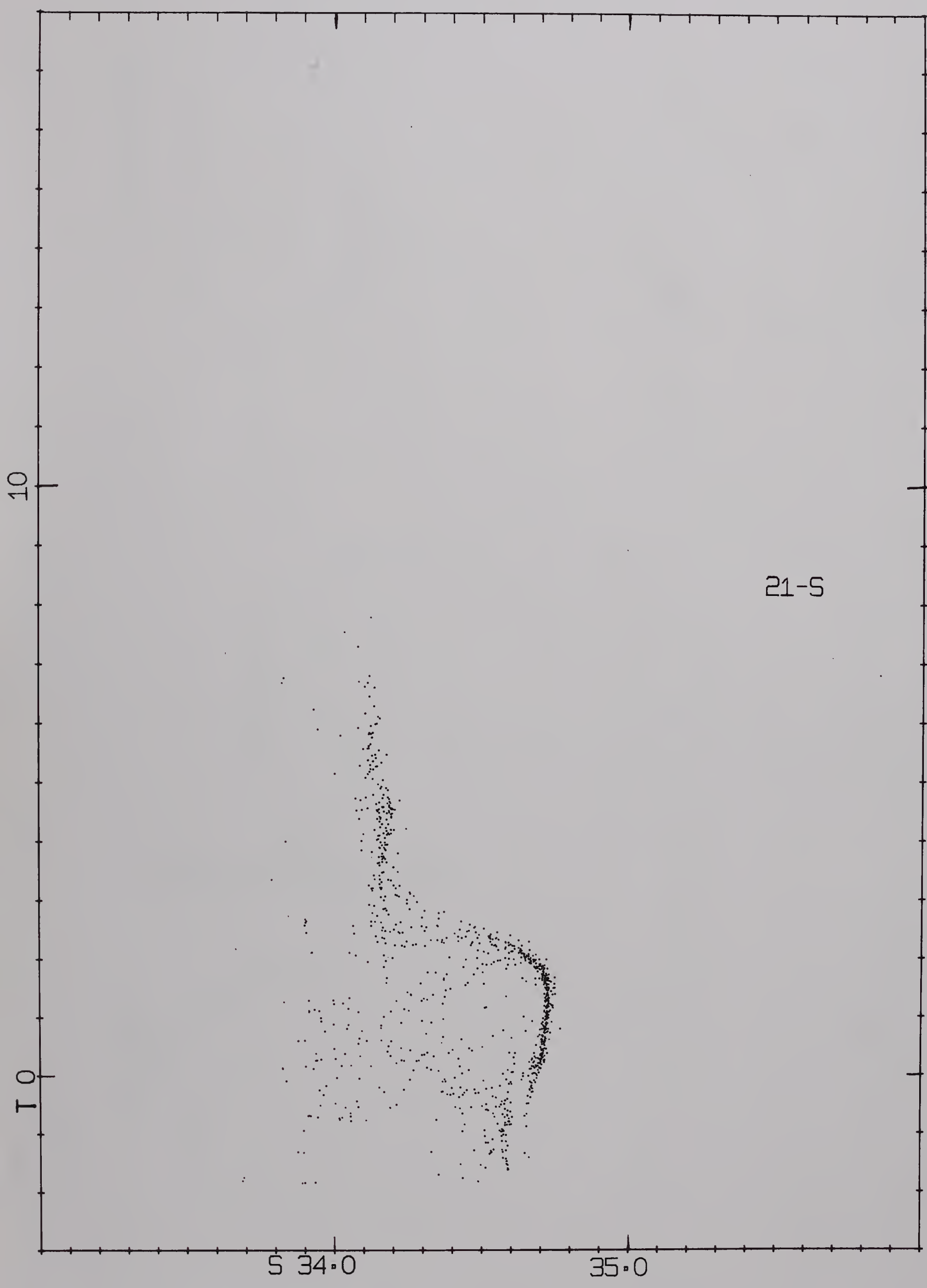
VII T

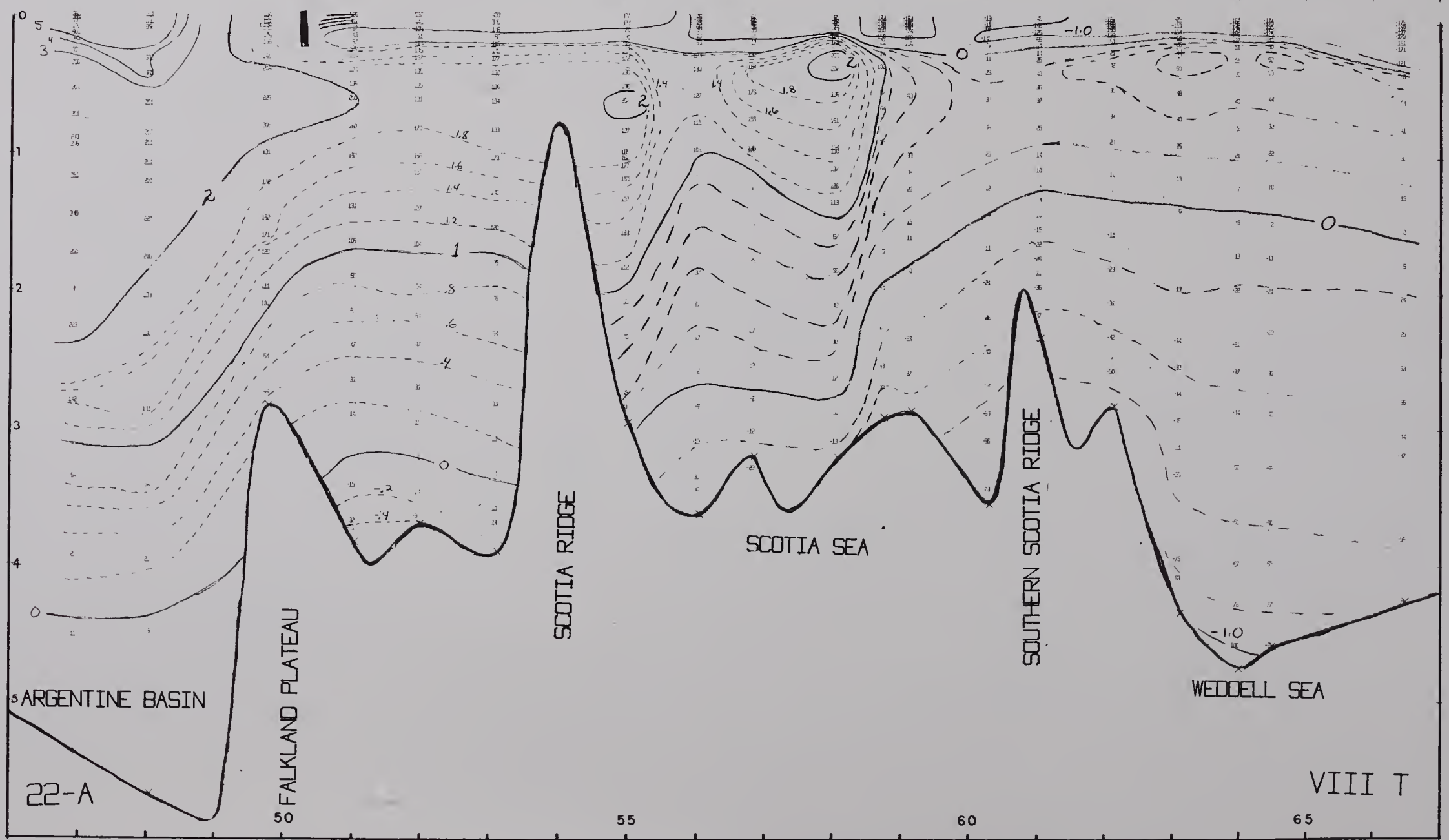
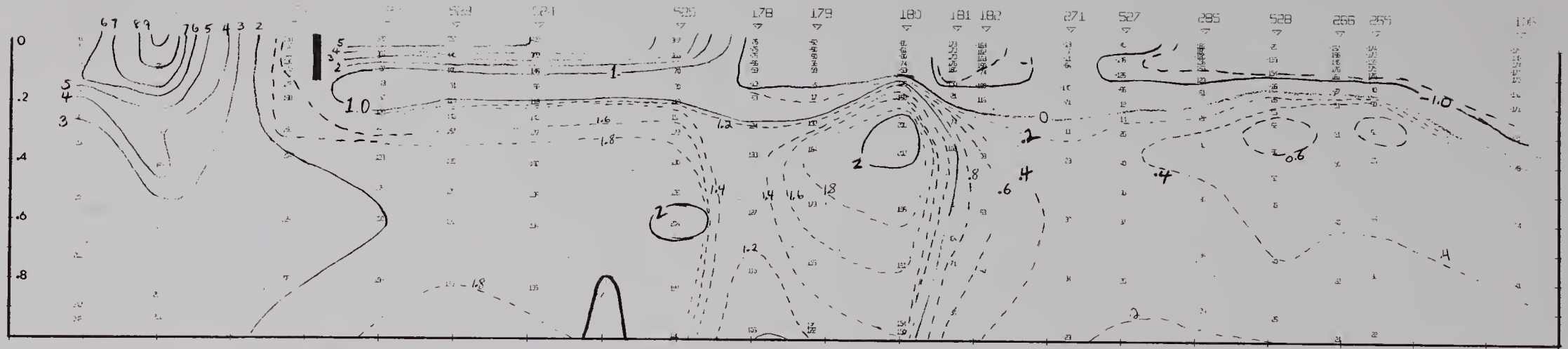


21-B

VII S



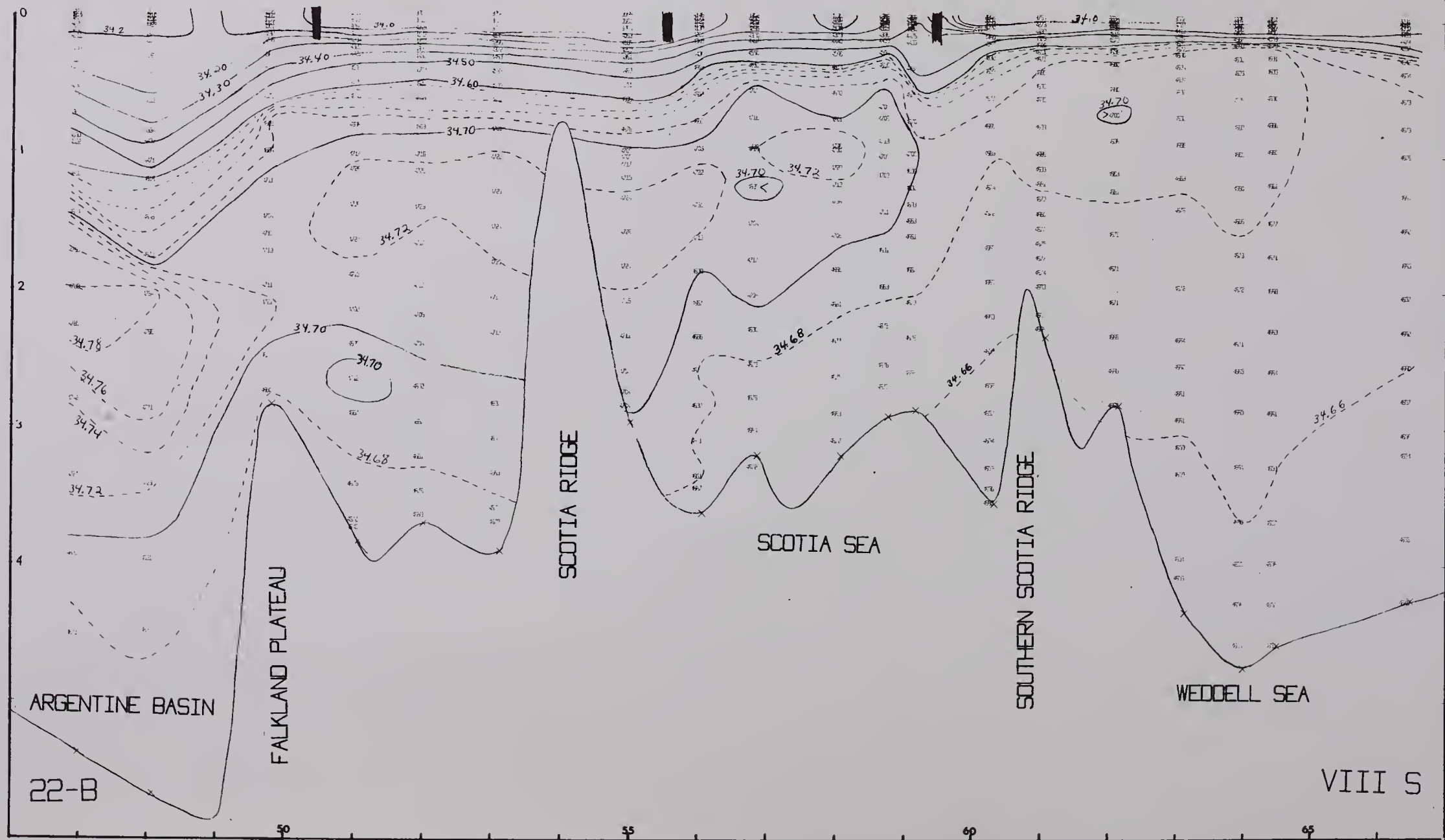
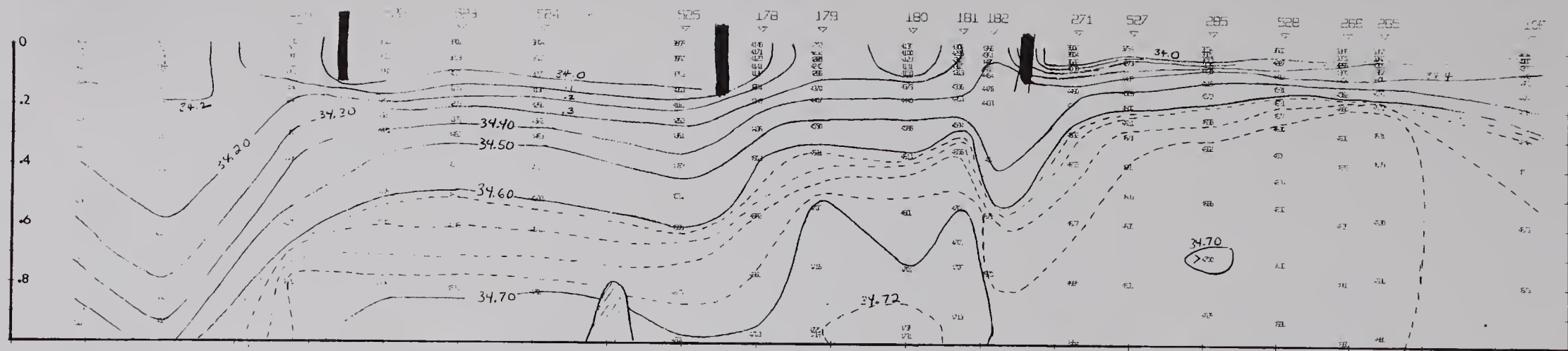


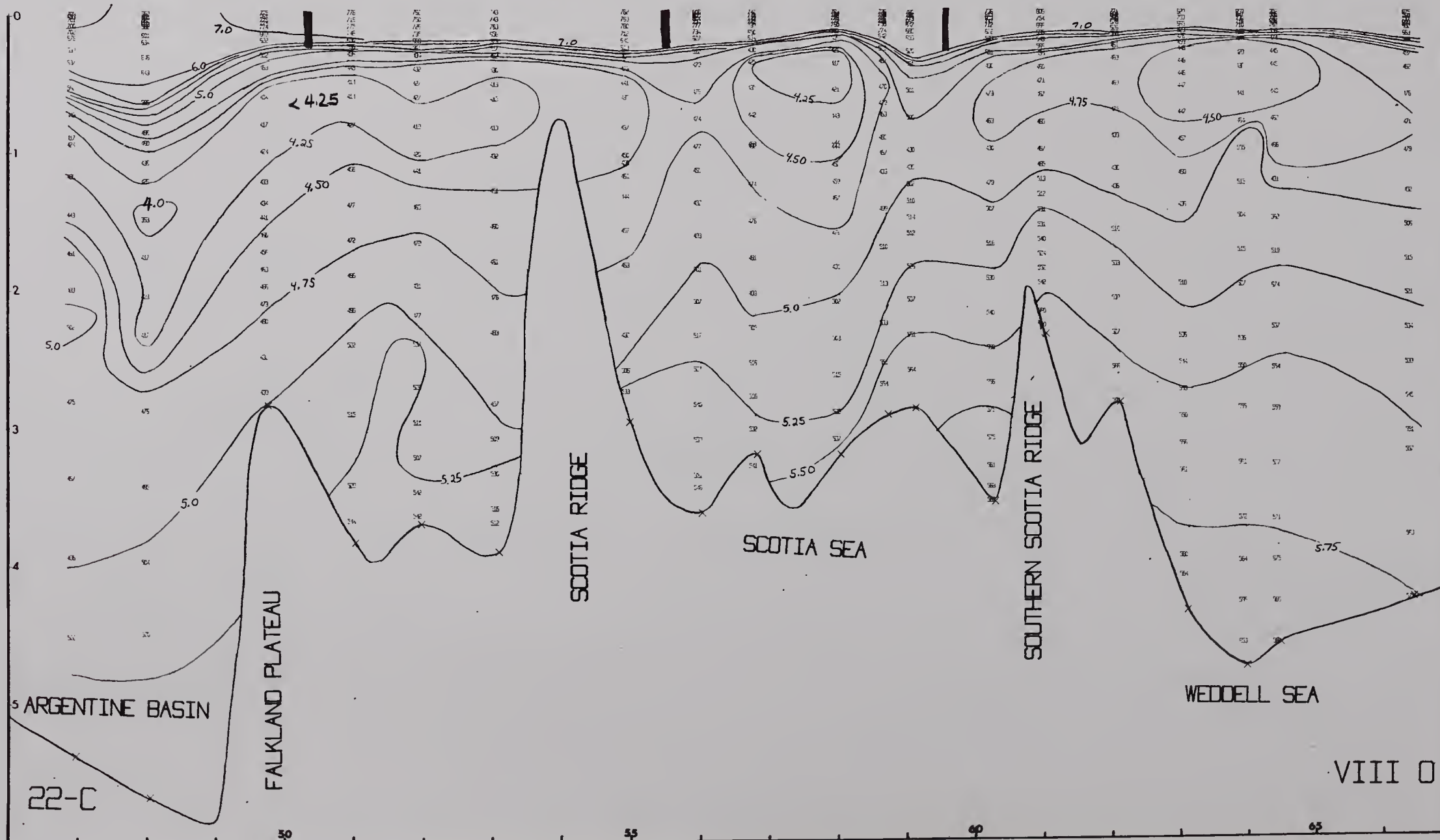
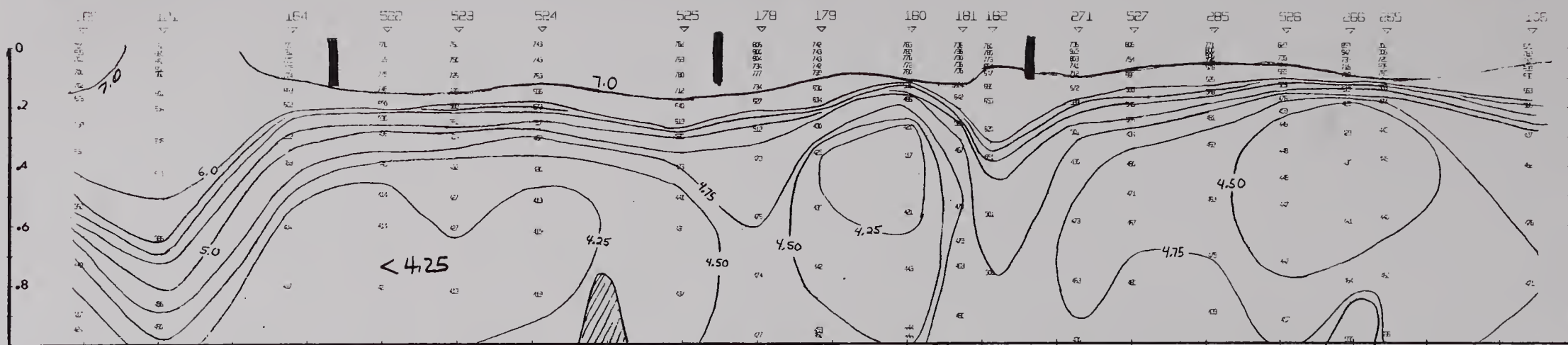


22-A

VIII T



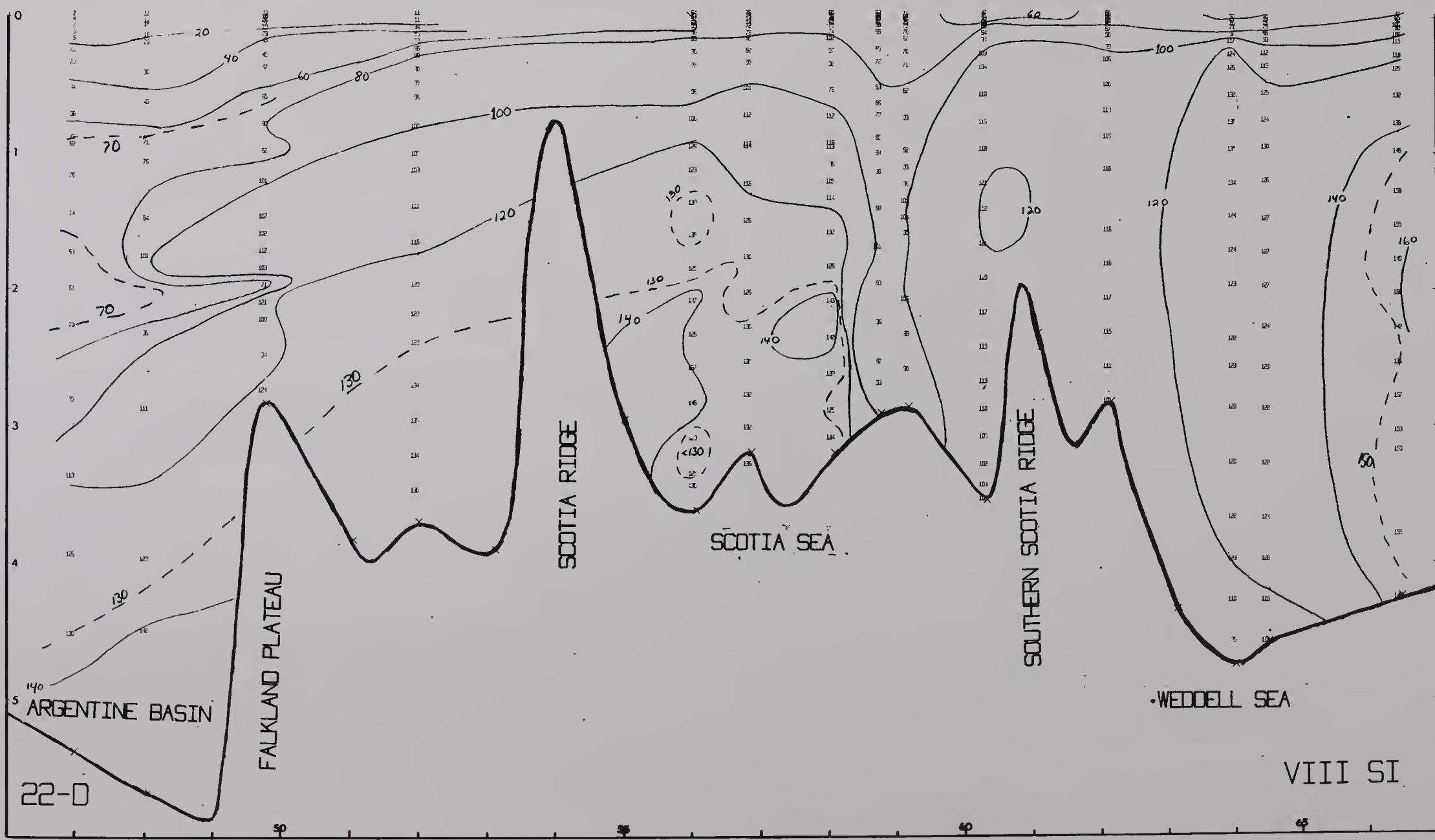
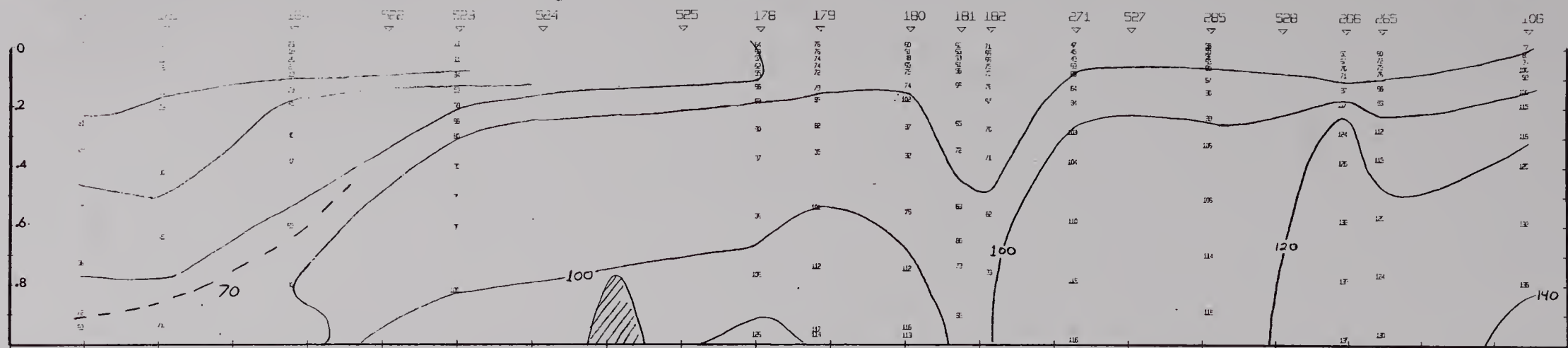




22-C

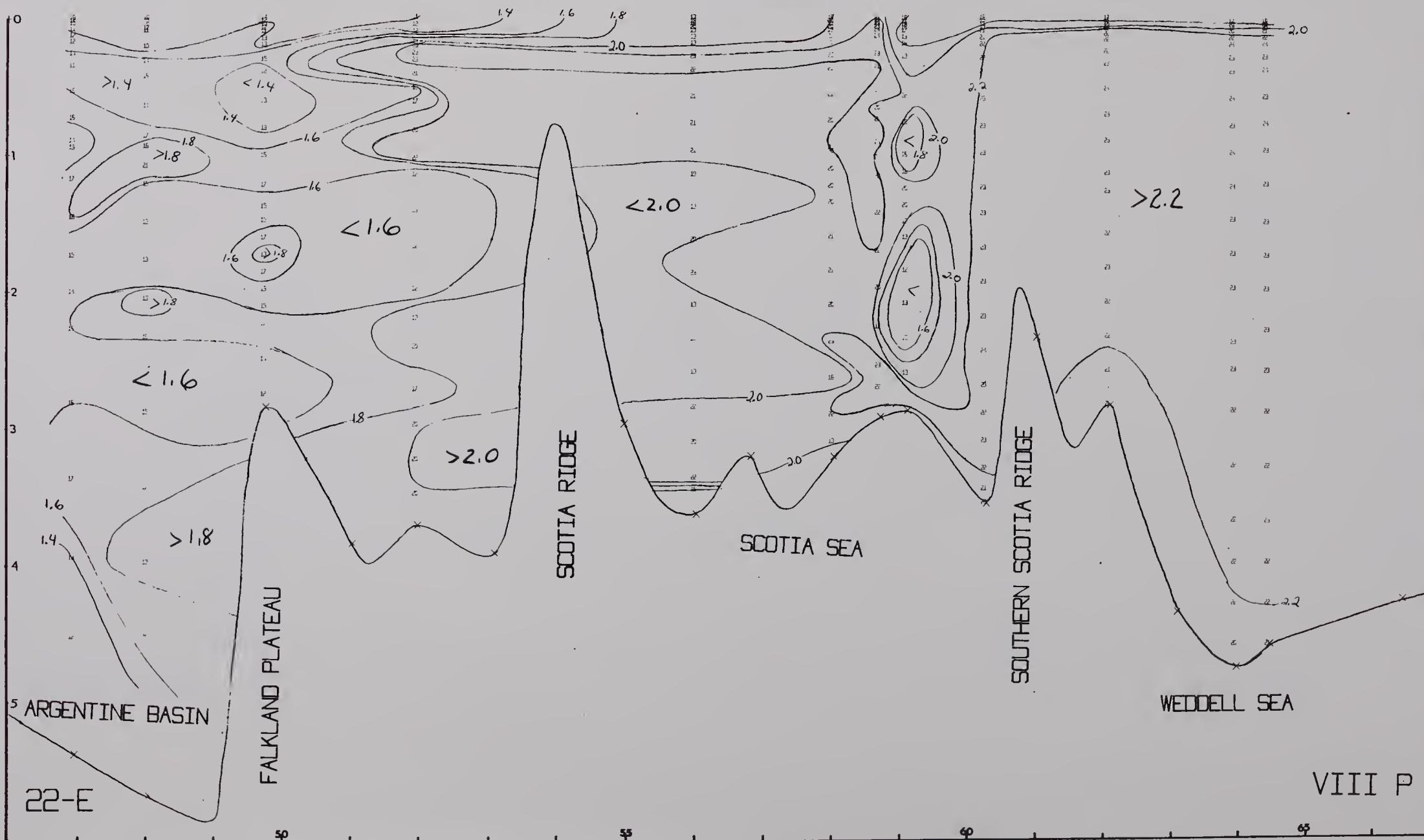
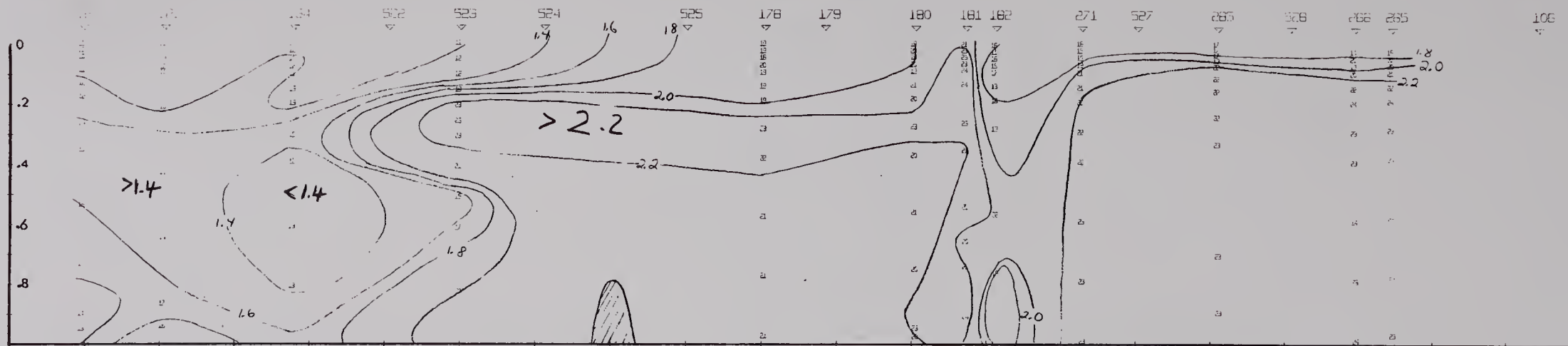
VIII O



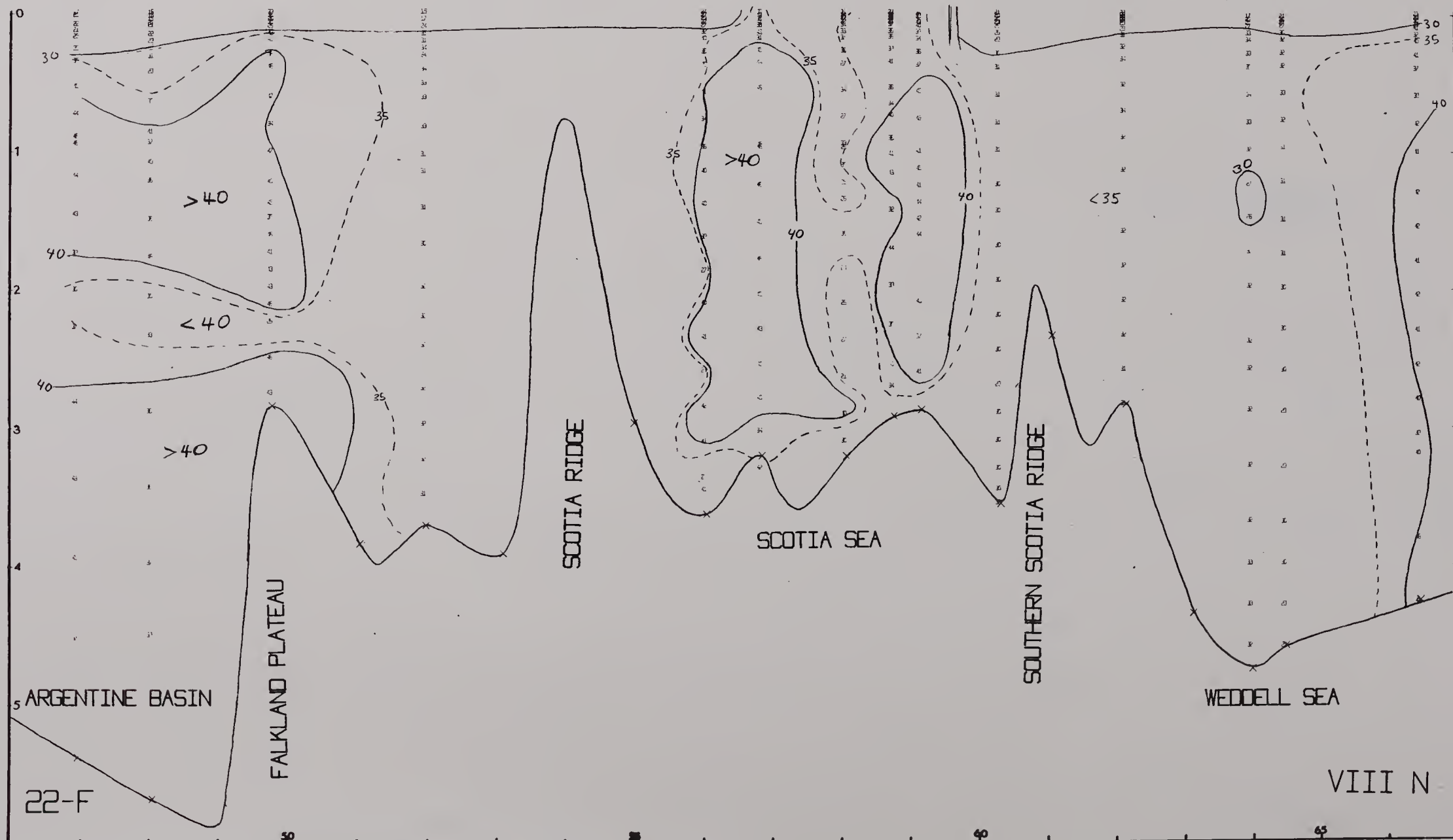
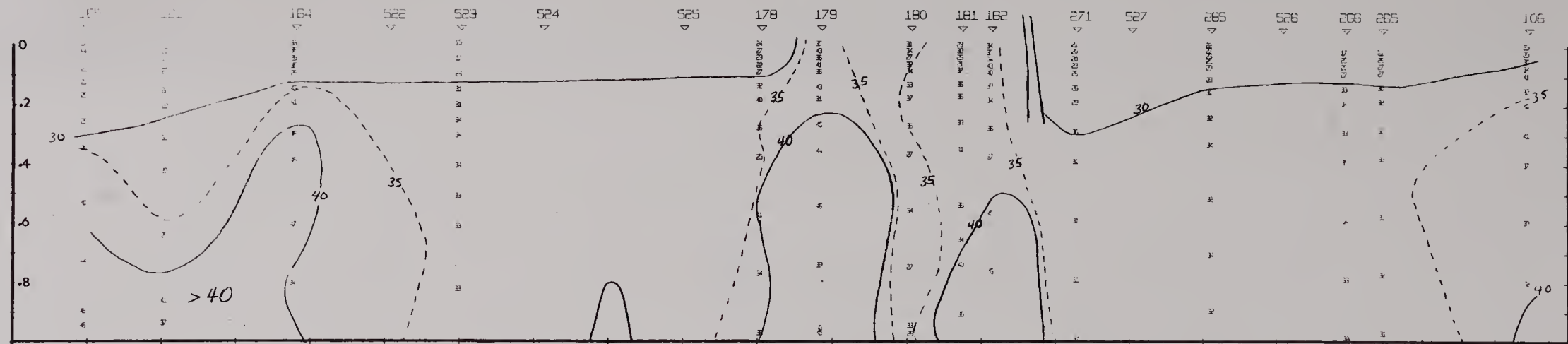


22-D

VIII SI



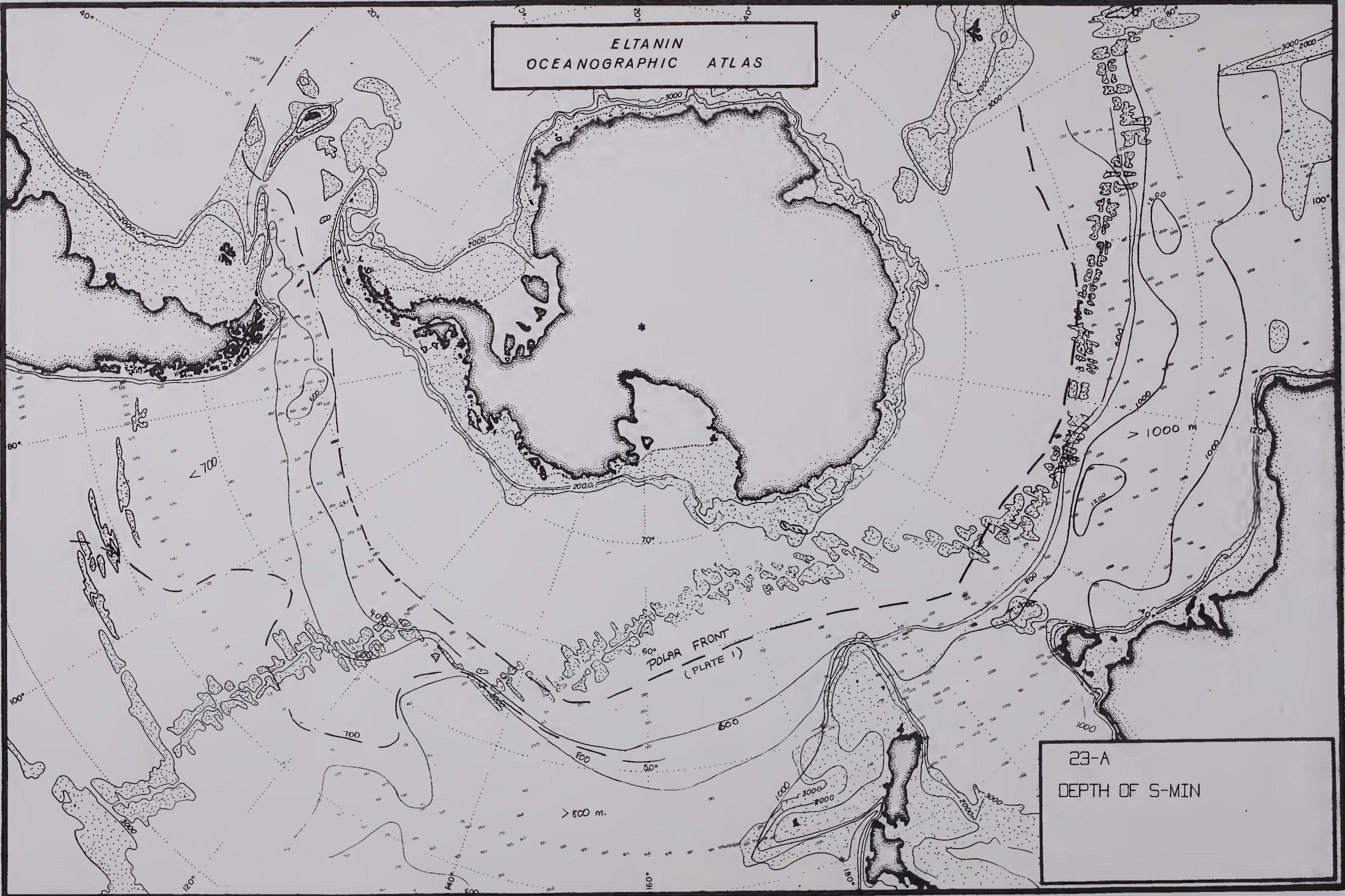








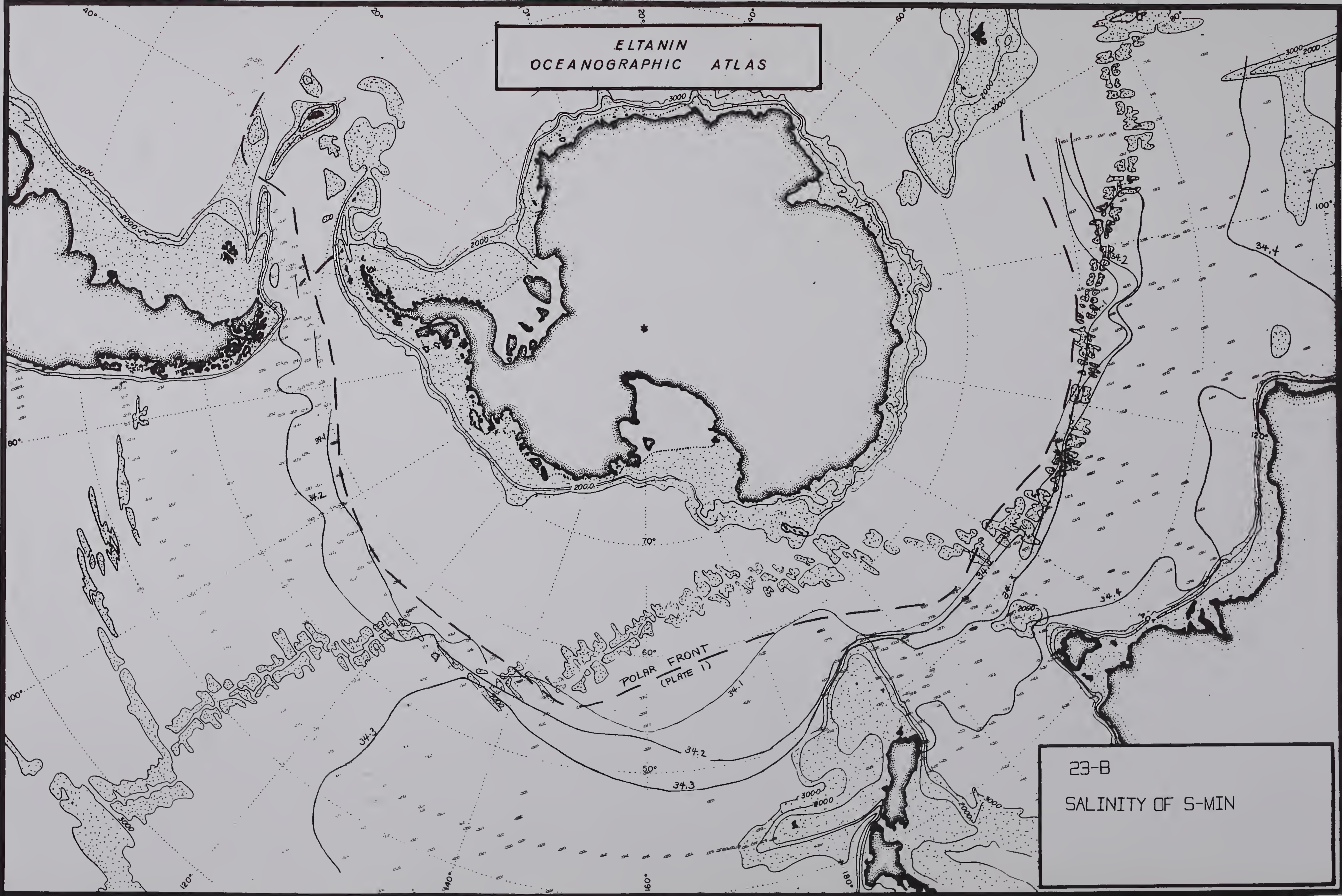
ELTANIN  
OCEANOGRAPHIC ATLAS



23-A  
DEPTH OF S-MIN



ELTANIN  
OCEANOGRAPHIC ATLAS



23-B  
SALINITY OF S-MIN



