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**Nantucket Shoals Flux Experiment
Data Report I. Hydrography**

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northeast Fisheries Center
Woods Hole, Massachusetts

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NANTUCKET SHOALS FLUX EXPERIMENT

DATA REPORT I. HYDROGRAPHY

by

W. Redwood Wright

The Nantucket Shoals Flux Experiment (1979-1980) was a multi-institutional effort to measure the flux of shelf water along the continental shelf south of Nantucket Shoals. Cooperating institutions and principal investigators were the Northeast Fisheries Center, National Marine Fisheries Service (W. Redwood Wright); Woods Hole Oceanographic Institution (Robert C. Beardsley); U.S. Geological Survey (Bradford Butman); and the University of New Hampshire (Wendell Brown).

The field work began in March 1979 and continued until April 1980. There were two principal components: (1) an array of continuously recording instruments deployed at six locations across the shelf from 44 m to 800 m depth (Figure 1), and 2) a series of cruises to measure hydrographic variables along and near the instrument line. The instrumented array included 19 current meters, most with temperature sensors, four bottom-mounted pressure and temperature sensors and one bottom tripod with current meter, camera, and nephelometer. This report presents the results of the hydrographic cruises. The data from the moored instruments are presented in Data Report II (Beardsley et al., 1983).

During the 13 months of field work, a total of 27 cruises were made (Table 1). Most involved members of the participating institutions, but several sets of data were obtained thanks to the cooperation of interested scientists at other institutions: the University of Rhode Island; Lamont-Doherty Geological Observatory; the U.S. Coast Guard; the Sea Fisheries Institute in Gdynia, Poland; the Atlantic Science Research Institute of Oceanology (ATLANTNIRO) in Kalingrad, USSR; and the University of Hamburg, Federal Republic of Germany.

Most cruises were restricted to a single section along the line of moored instruments, but on some occasions it was possible to repeat the original section or to make additional sections east or west of the line so that a total of 38 sections were made.

Hydrographic observations were made with expendable bathythermographs (XBTs), continuous measurement devices (STD, CTD) and water bottles (Nansen, Niskin) with reversing thermometers. Temperature was measured in every case, sometimes with both XBT and thermometers, salinity on 22 sections and dissolved oxygen on seven sections. All data have been submitted to NODC; original log sheets, XBT traces and CTD/STD records can be obtained from the participating institutions (those from the foreign ships are at Northeast Fisheries Center).

When water bottles were used for sampling, thermometers were corrected and oxygen samples were analyzed (by modified Winkler method) on board. Salinities were measured by conductive salinometer either on board or at the Northeast Fisheries Center in Woods Hole.

The sections were drawn at NEFC. All those along the line of current meter moorings are on the same base; individual bottom configurations were drawn for the others. They are presented here in the same order as the listing in Table 1, i.e., cruises in chronological order, variables as available in the order of temperature (XBT), temperature (reversing thermometer), temperature (STD or CTD), salinity, dissolved oxygen, sigma-t.

Note: Samples for determination of nutrients (nitrate, phosphate, silicate) were taken on ten cruises and were frozen on shipboard for subsequent analysis at the NEFC laboratory in Sandy Hook, New Jersey. No nutrient sections are presented in this report because analysis has been completed for only one cruise (WHITING 79-01). Those data are reported in Matte, Waldhauser and Draxler (1979).

Acknowledgements

Thanks are due Ronald Kirschner, Thomas Laughton, Derek Sutton and James King for preparing the original sections and to Cindy Moor and Jeff Zwinakis for drafting the final figures.

References

Beardsley, R.C., C.A. Mills, J.A. Vermersch, Jr., W.S. Brown, N. Pettigew, J. Irish, S. Ramp, R. Schlitz, and B. Butman. 1983. Nantucket Shoals Flux Experiment (NSFE 79). Part II: Moored Array Data Report. WHOI Tech. Rpt. No. 83-13.

Matte, A., R. Waldhauser, and A.F.J. Draxler. 1979. Nutrient data from the cruise of the WHITING, FRC 05-06, 29-31 May 1979. NEFC Laboratory Report No. SHL 79-39.

TABLE 1

Nantucket Shoals Flux Experiment Hydrography Sections

Date	Ship (Institution)	Cruise Number	Variables Plotted
1979			
MAR 6	OCEANUS (WHOI)	56	T ₁
17	OCEANUS	57	T ₁
20	"	"	T ₃ , S, σ_t
25-26	EASTWARD (LDGO)	SWIG I	T ₃ , S, σ_t
27-28	"	"	T ₃ , S, σ_t
28-29	"	"	T ₃ , S, σ_t
29	"	"	T ₃ , S, σ_t
29	OCEANUS	58	T ₁
APRIL 1	EASTWARD	SWIG I	T ₃ , S, σ_t
26-27	ENDEAVOR (UR)	035	T ₁
27	OCEANUS	60	T ₃ , S, σ_t
MAY 9	ENDEAVOR	036	T ₁
15	OCEANUS	63	T ₁
18	DELAWARE II (NEFC)	79-05	T ₁ , S, O ₂
25	EVERGREEN (USCG)	"	T ₁
30	WHITING (NEFC)	79-01 I	T ₁ , T ₂ , S, σ_t
31	"	" II	T ₁ , T ₂ , S, σ_t
31	"	" III	T ₁ , T ₂ , S, σ_t
JUNE 15	OCEANUS	63	T ₁
JULY 8	ALBATROSS IV (NEFC)	79-06	T ₂ , S, O ₂ , σ_t
23	ALBATROSS IV	79-07	T ₁ , T ₂ , S, σ_t
AUG 6	OCEANUS	67	T ₁ , S, σ_t
16	ALLOT (USSR)	79-03	T ₁
22	BELOGORSK (USSR)	79-01	T ₁ , T ₂ , S, σ_t
SEPT 5	ALBATROSS IV	79-09	T ₁
7	"	"	T ₁ , T ₂ , O ₂ , σ_t
20	OCEANUS	70	T ₁
OCT 18	ALBATROSS IV	79-11	T ₁ , T ₂ , S, O ₂ , σ_t
25	ANTON DOHRN (FRG)	213	T ₃ , S, σ_t
NOV 13	ANTON DOHRN	213	T ₃ , S, σ_t
14	OCEANUS	74	T ₁
DEC 19	ALBATROSS IV	79-13	T ₁ , T ₂ , S, O ₂ , σ_t
1980			
JAN 3-4	WHITEFOOT (USGS)	-	T ₁
22	WHITEFOOT (USGS)	-	T ₁
FEB 5	WHITFOOT (NEFC)	-	T ₁
MAR 7	WIECZNO (POLAND)	80-02	T ₂ , S, O ₂ , σ_t
19	ALBATROSS IV	80-02	T ₁ , T ₂ , S, O ₂ , σ_t
APRIL 16	ALBATROSS IV	80-04	T ₂ , S, σ_t

Code: T₁ = XBT, T₂ = reversing thermometers, T₃ = CTD or STD

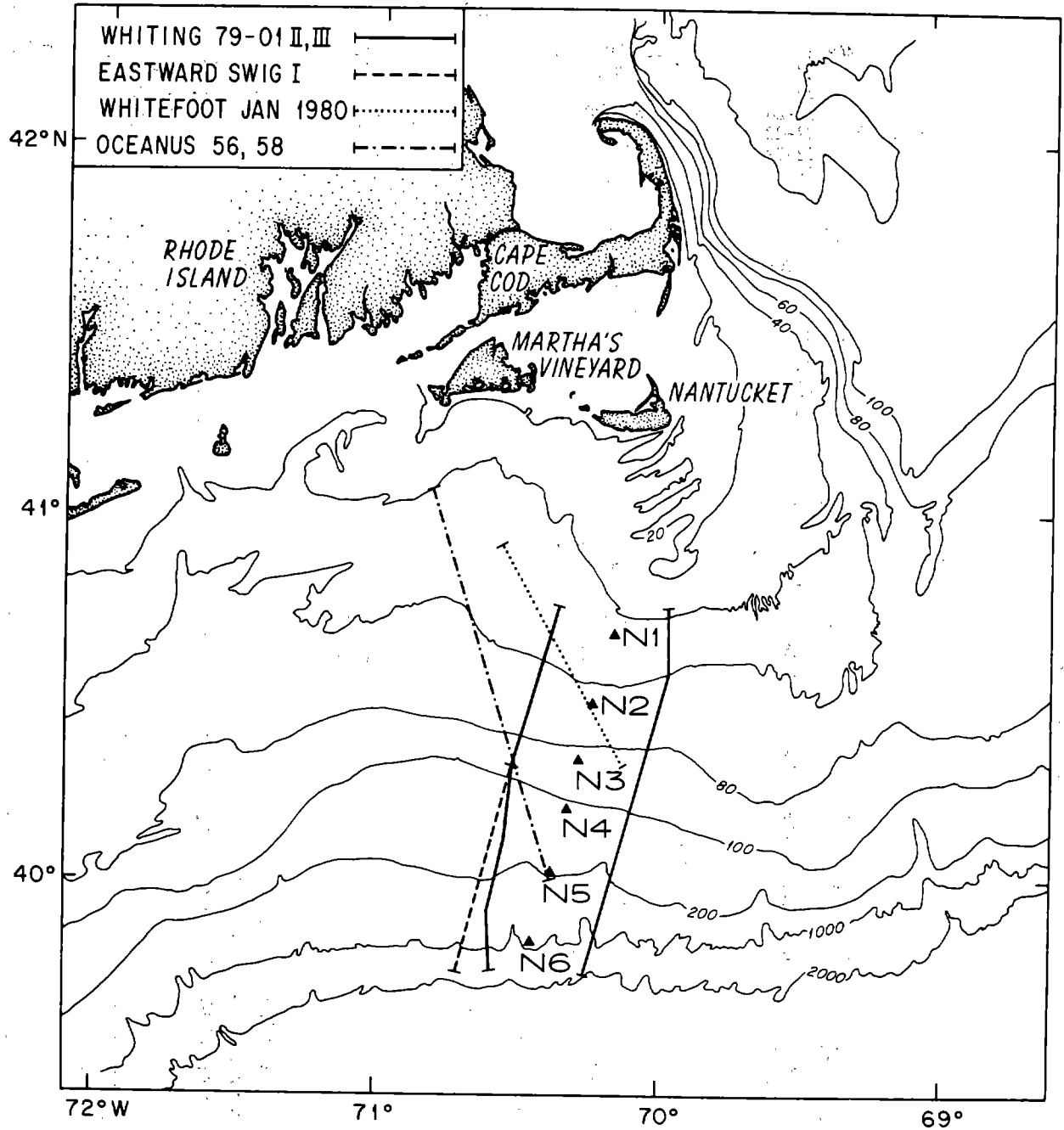
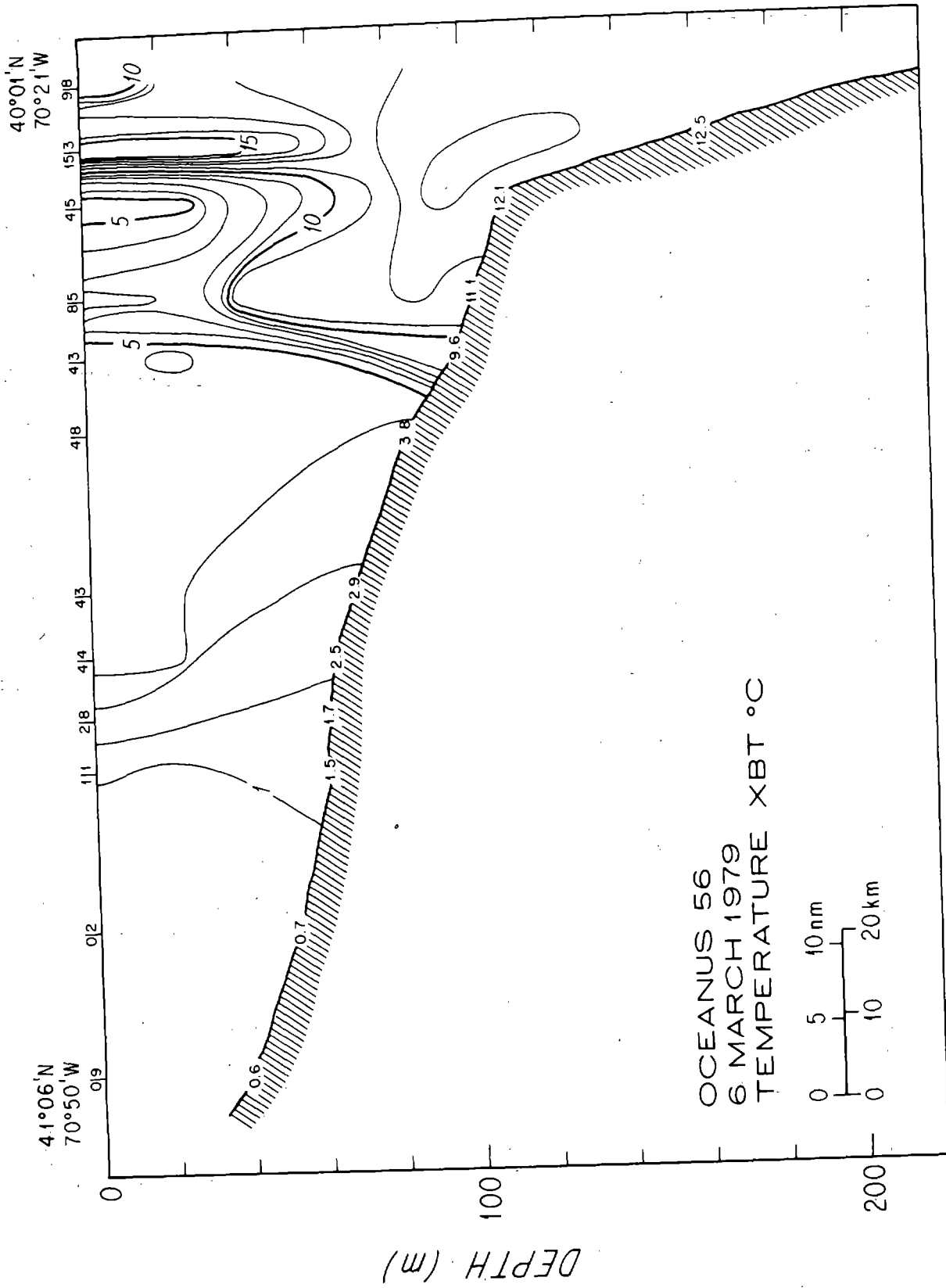
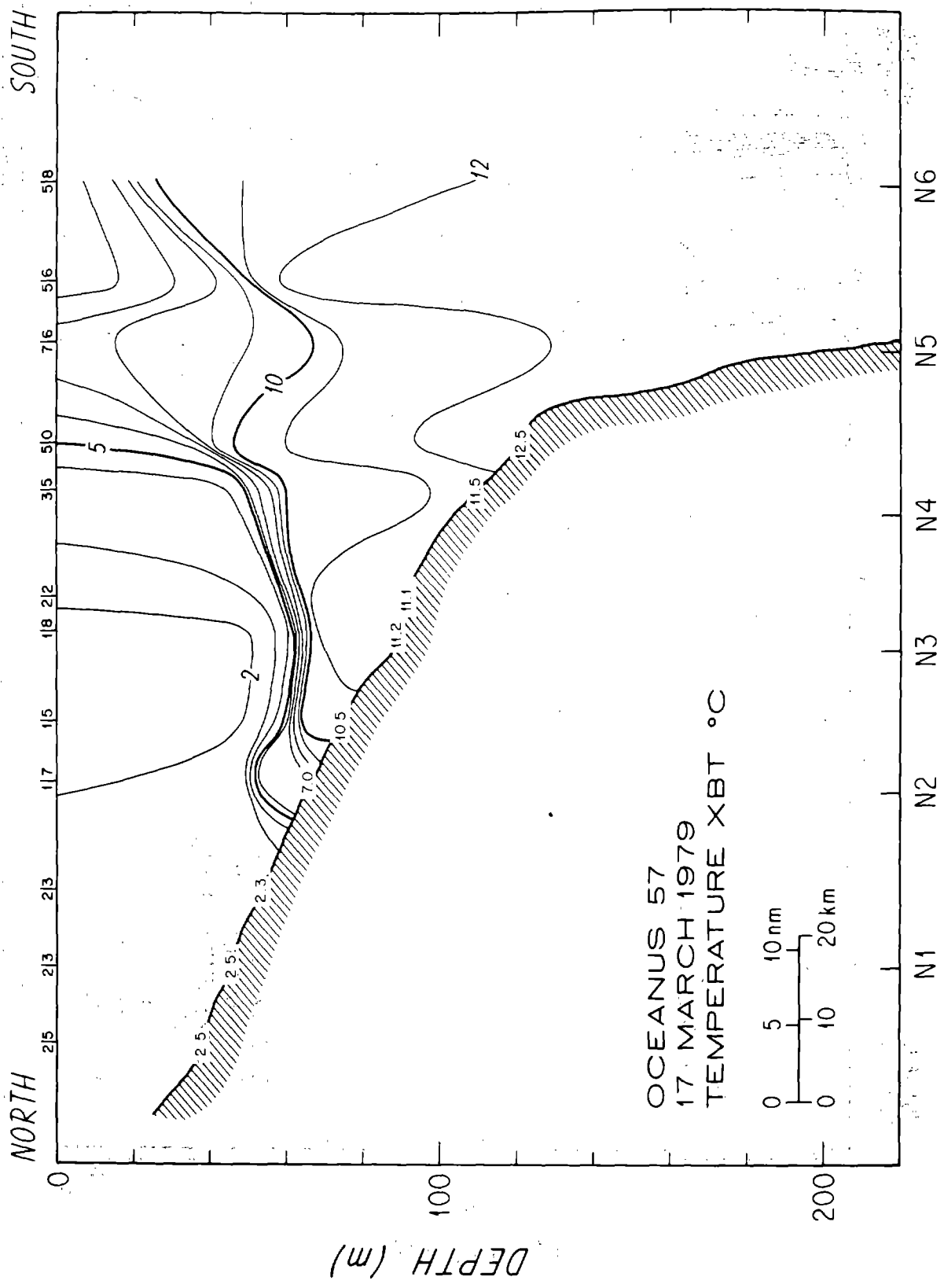
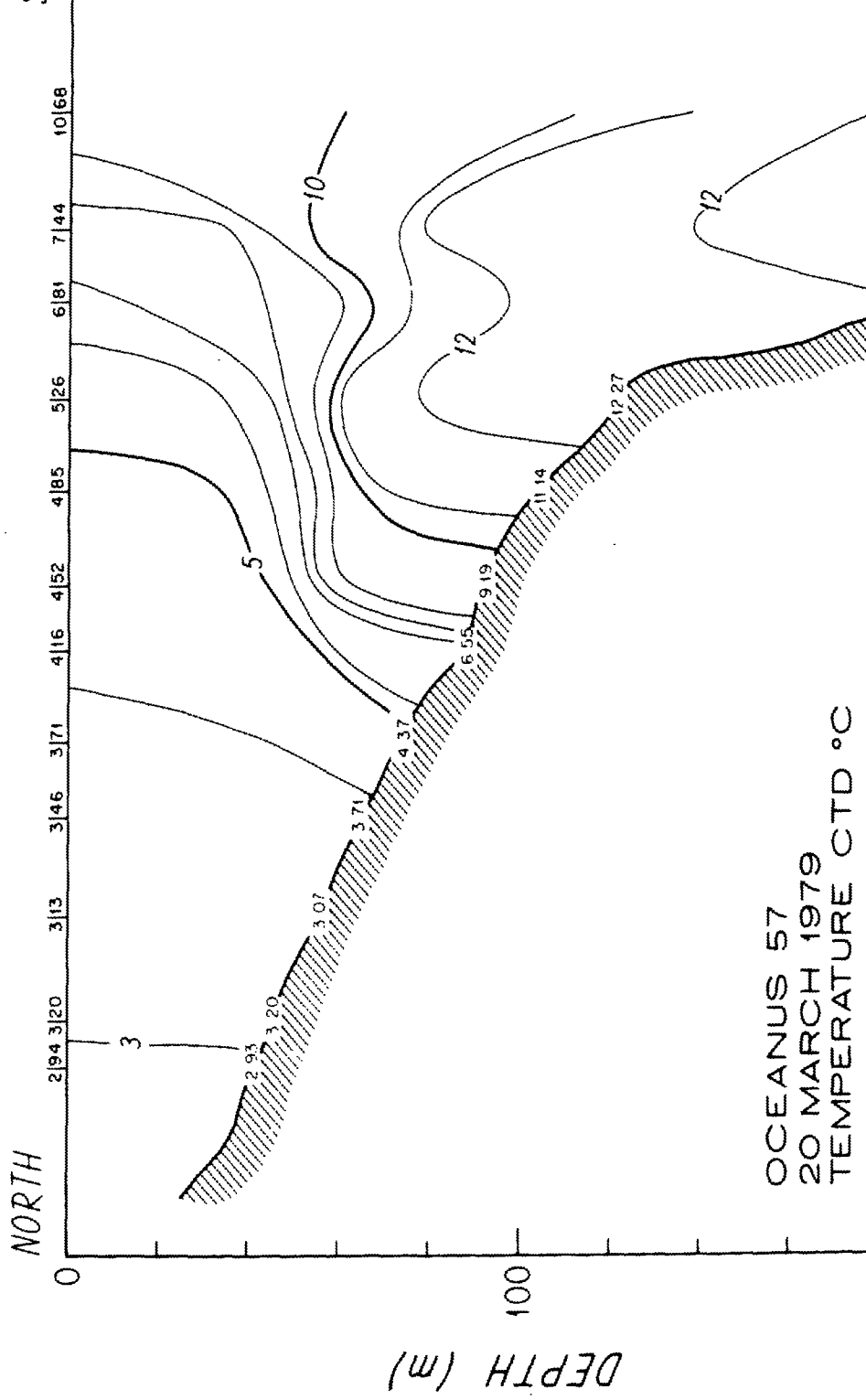


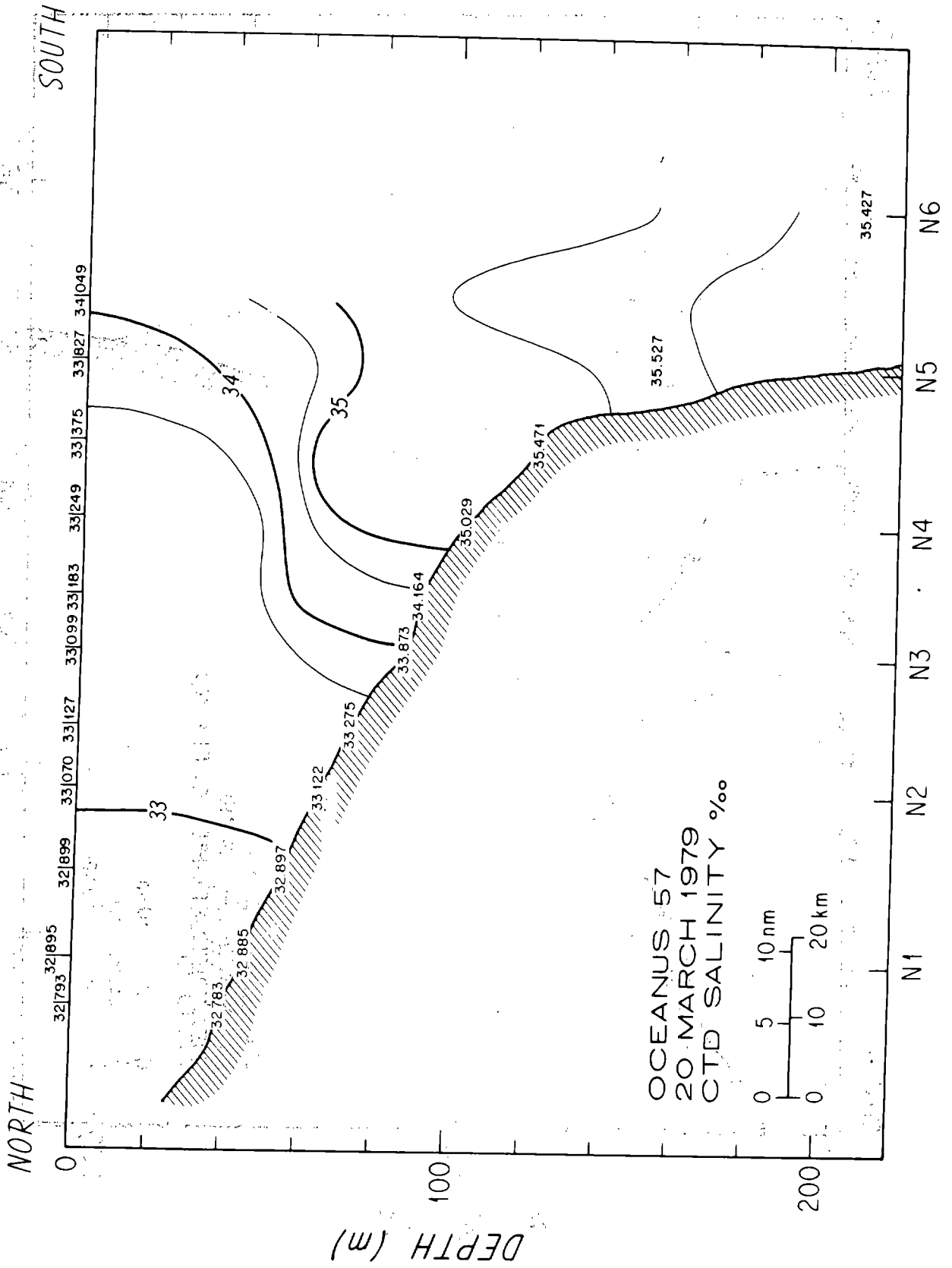
Fig. 1. Location of current meter moorings (N1-N6) during the Nantucket Shoals Flux Experiment. Hydrographic transects not along the mooring line are shown







OCEANUS 57
 20 MARCH 1979
 TEMPERATURE CTD °C

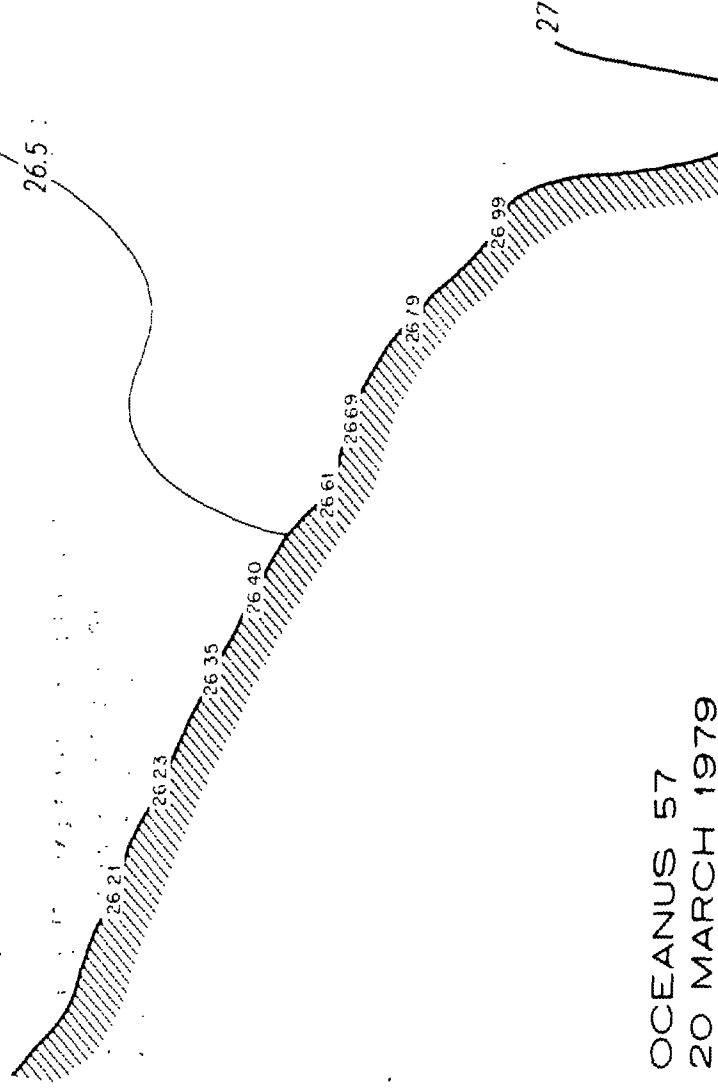


NORTH

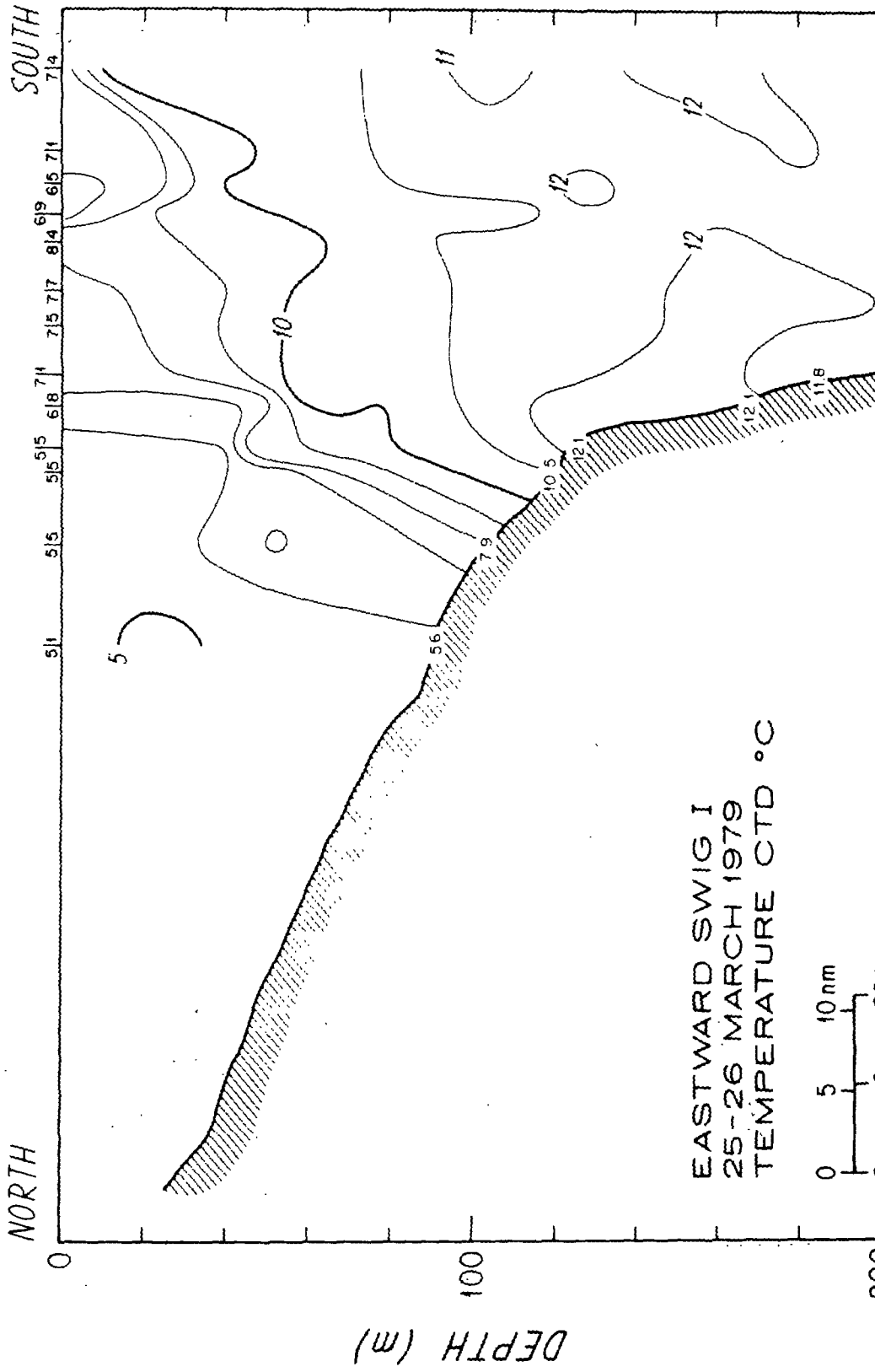
0 26|21 26|33 26|35 26|28 26|32 26|33 26|38 26|54 26|64

DEPTH (m)

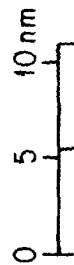
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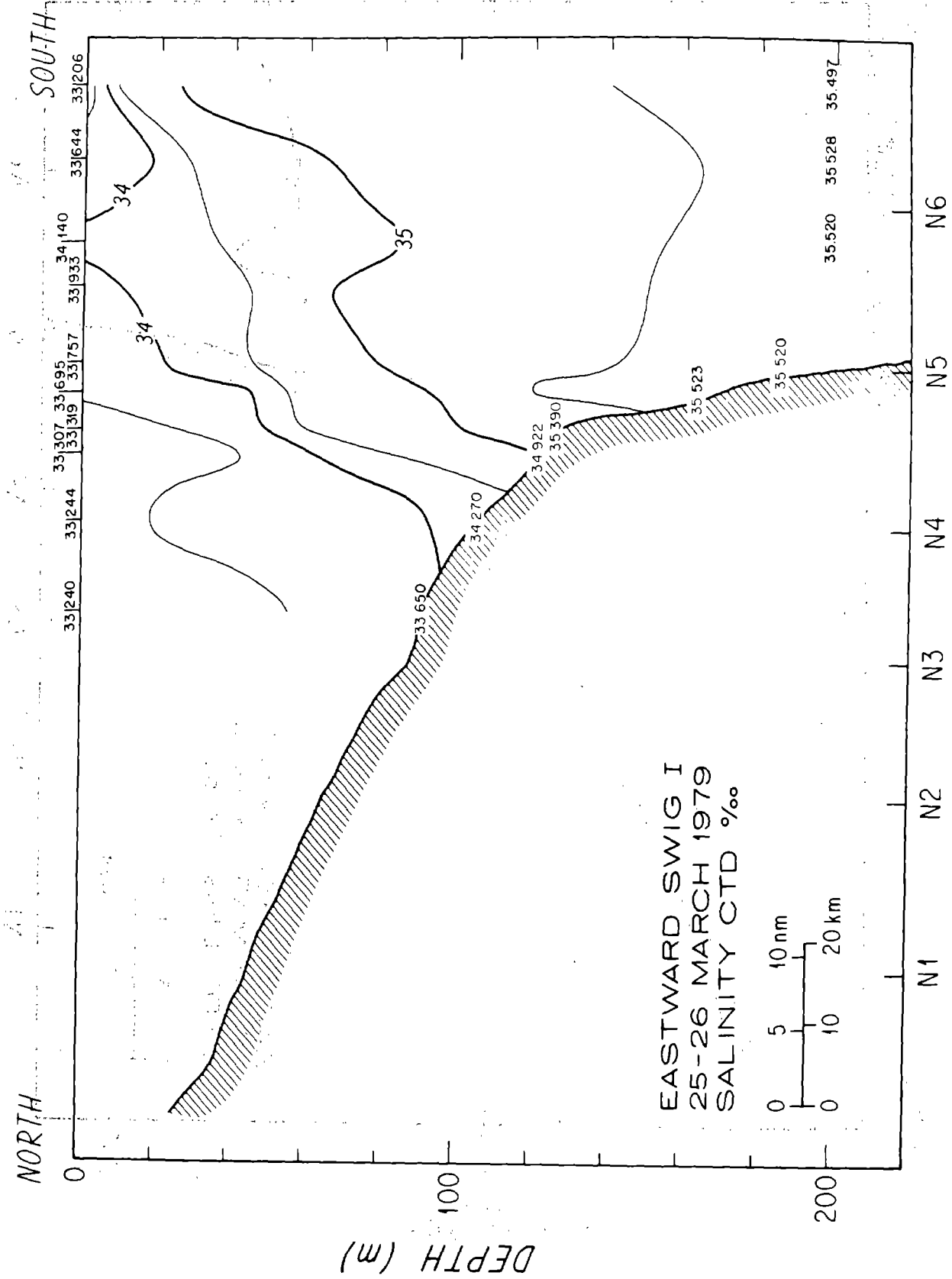


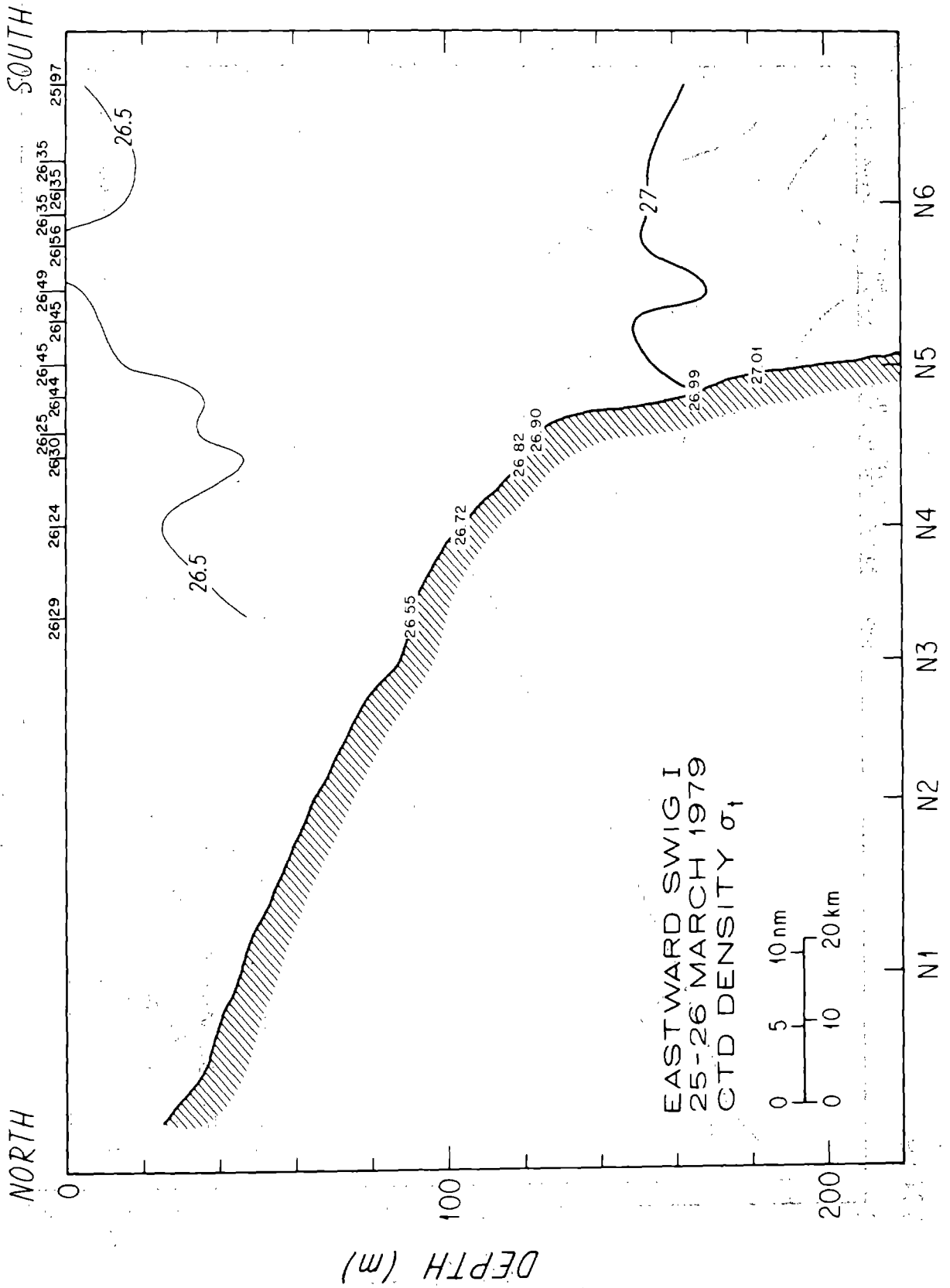
OCEANUS 57
20 MARCH 1979
C... ..

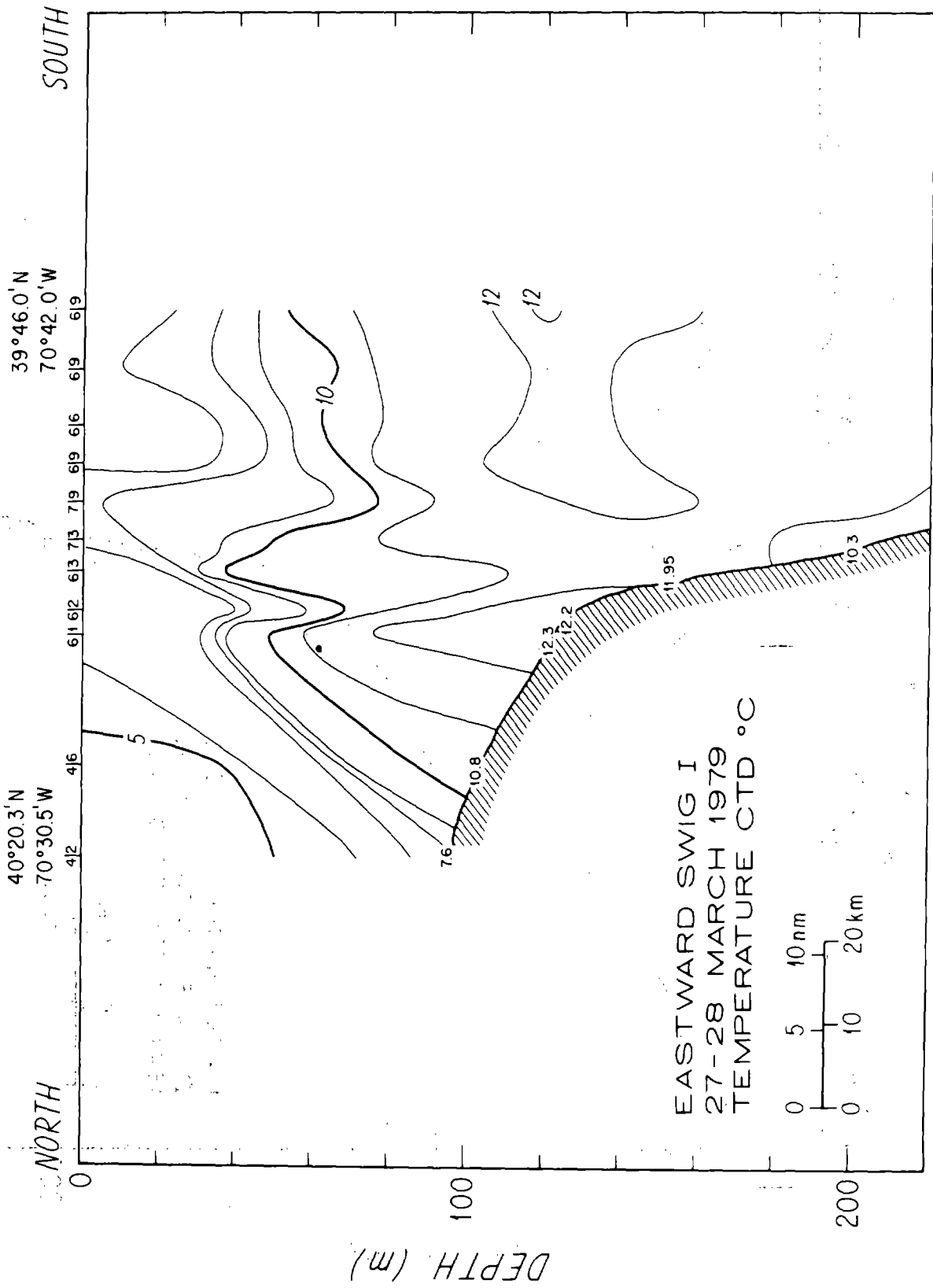


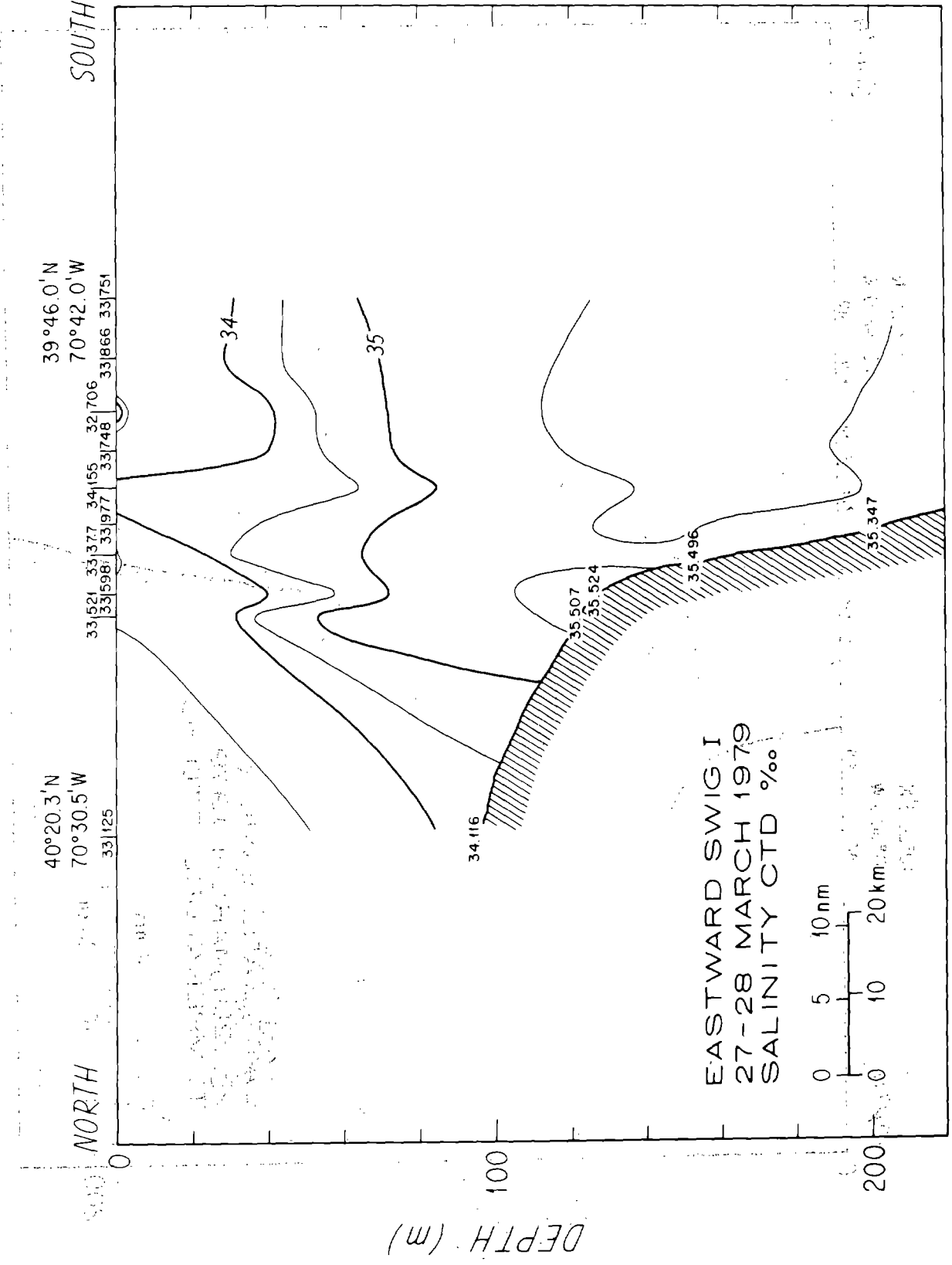
EASTWARD SWIG I
 25-26 MARCH 1979
 TEMPERATURE CTD °C

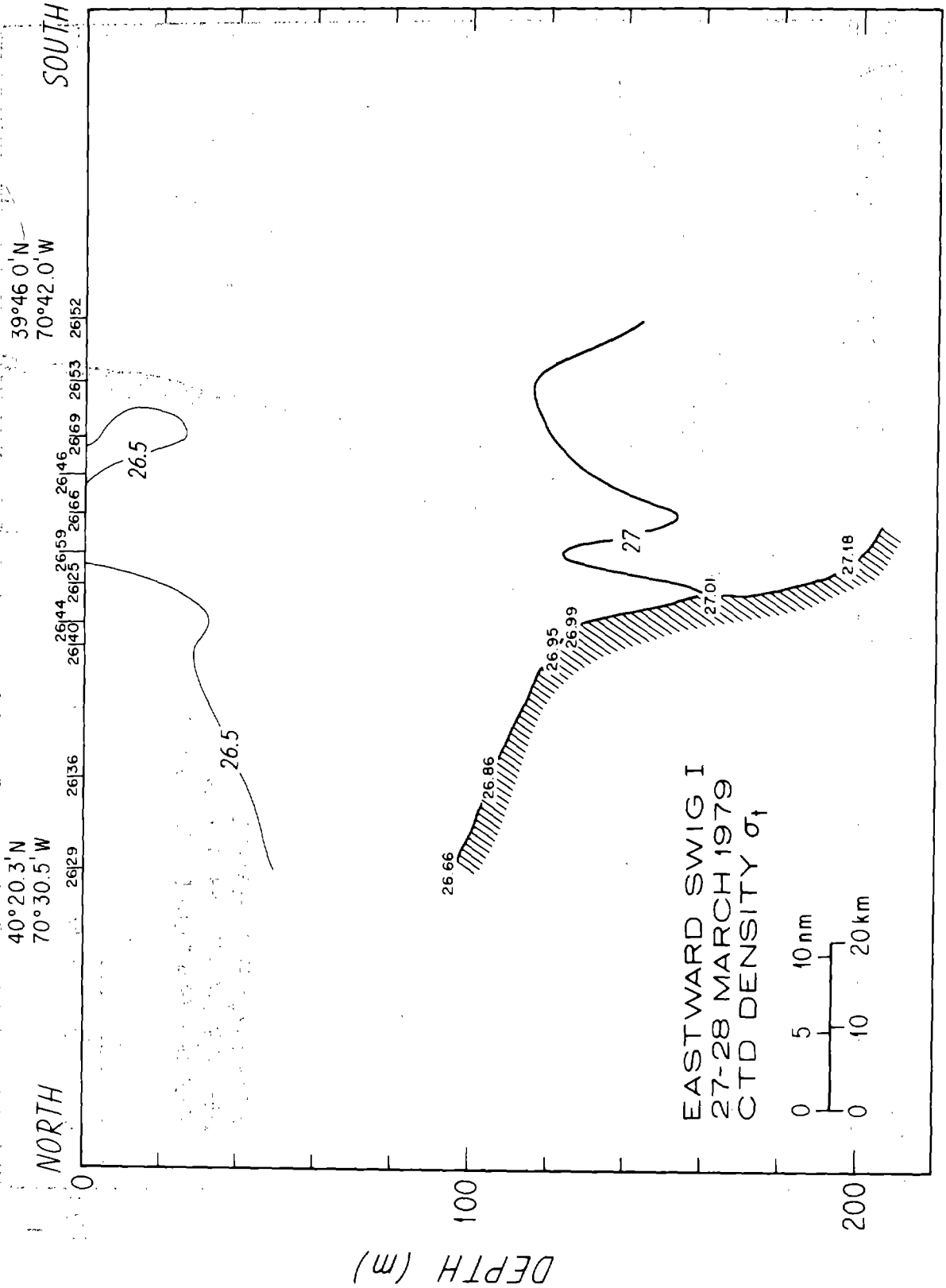


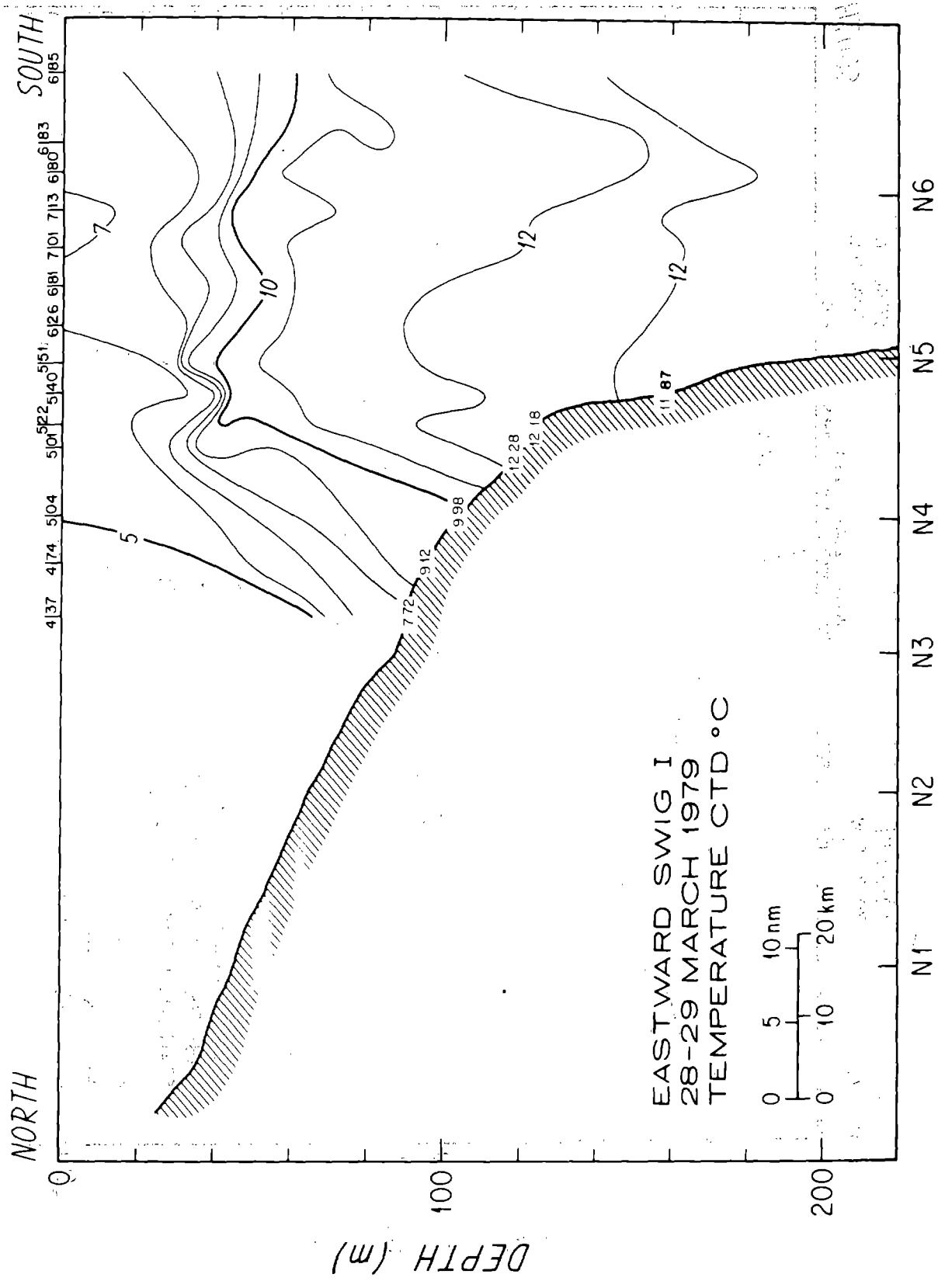












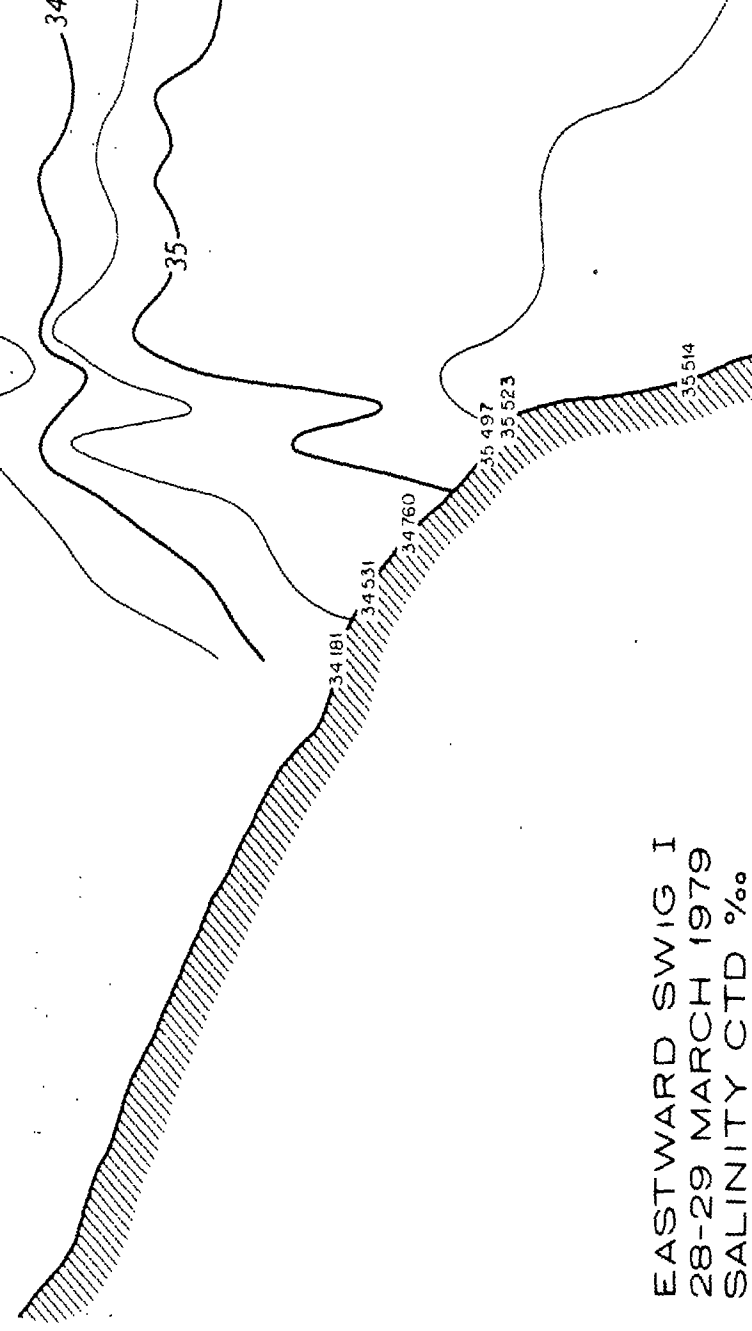
NORTH

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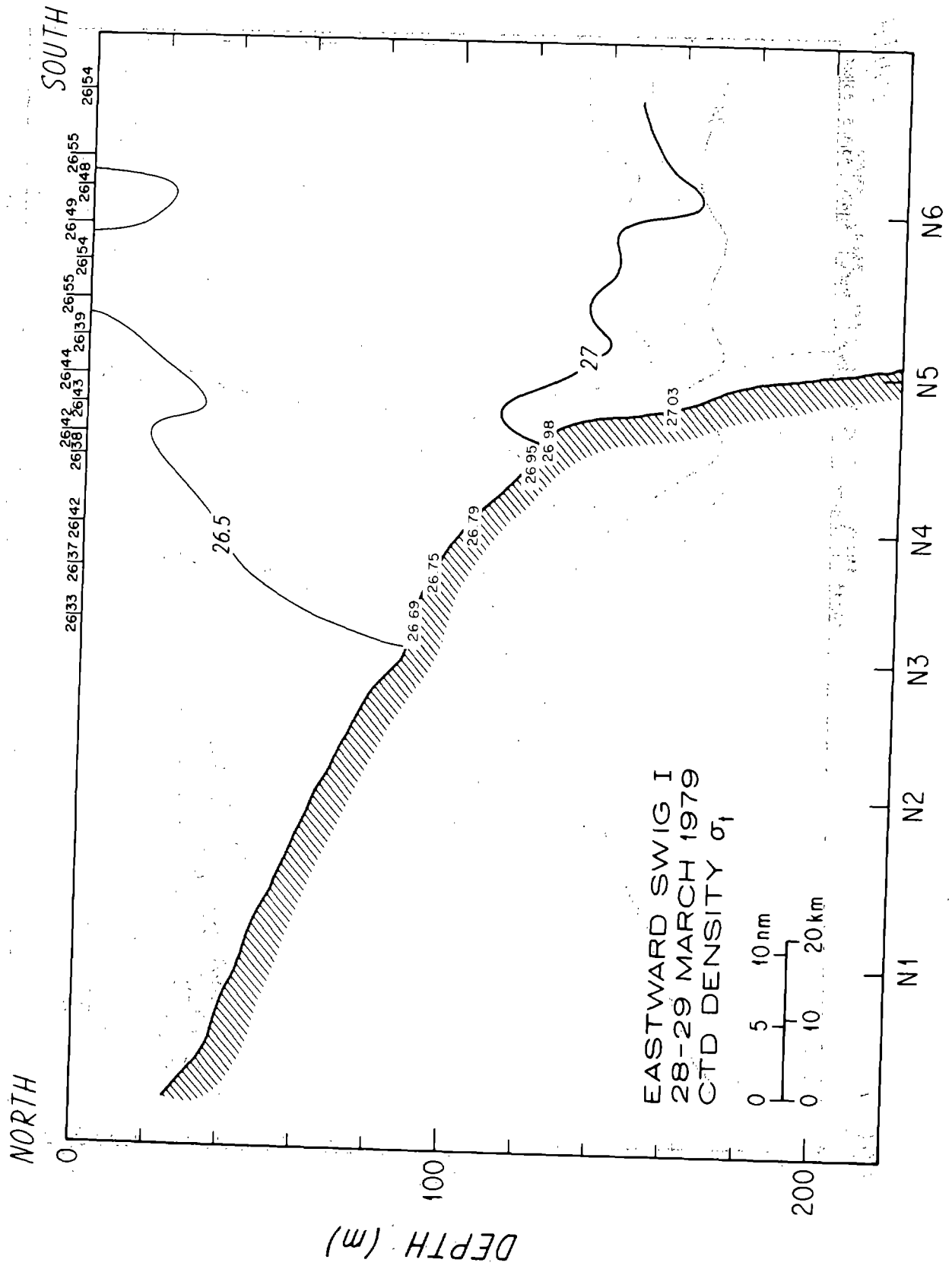
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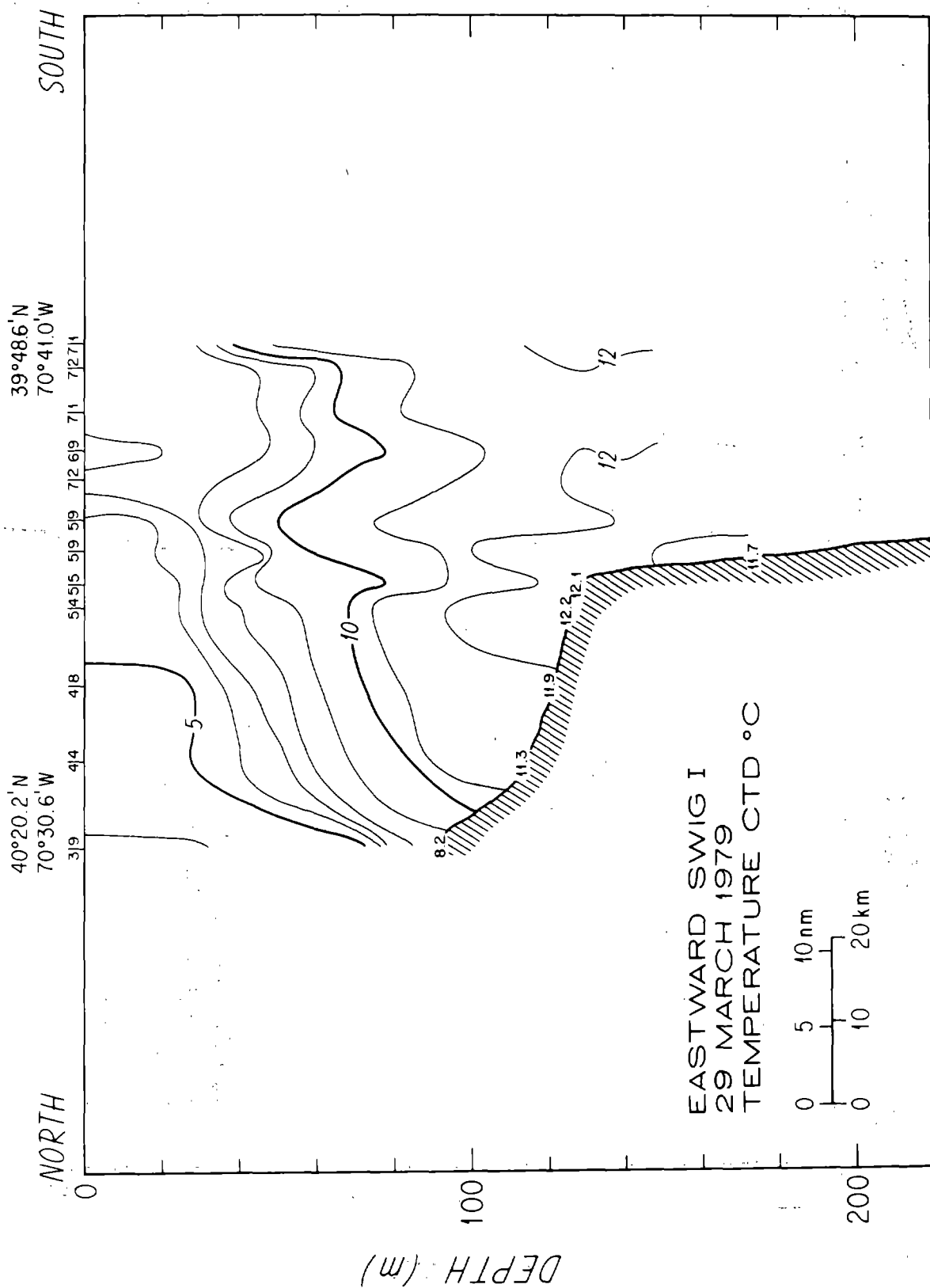
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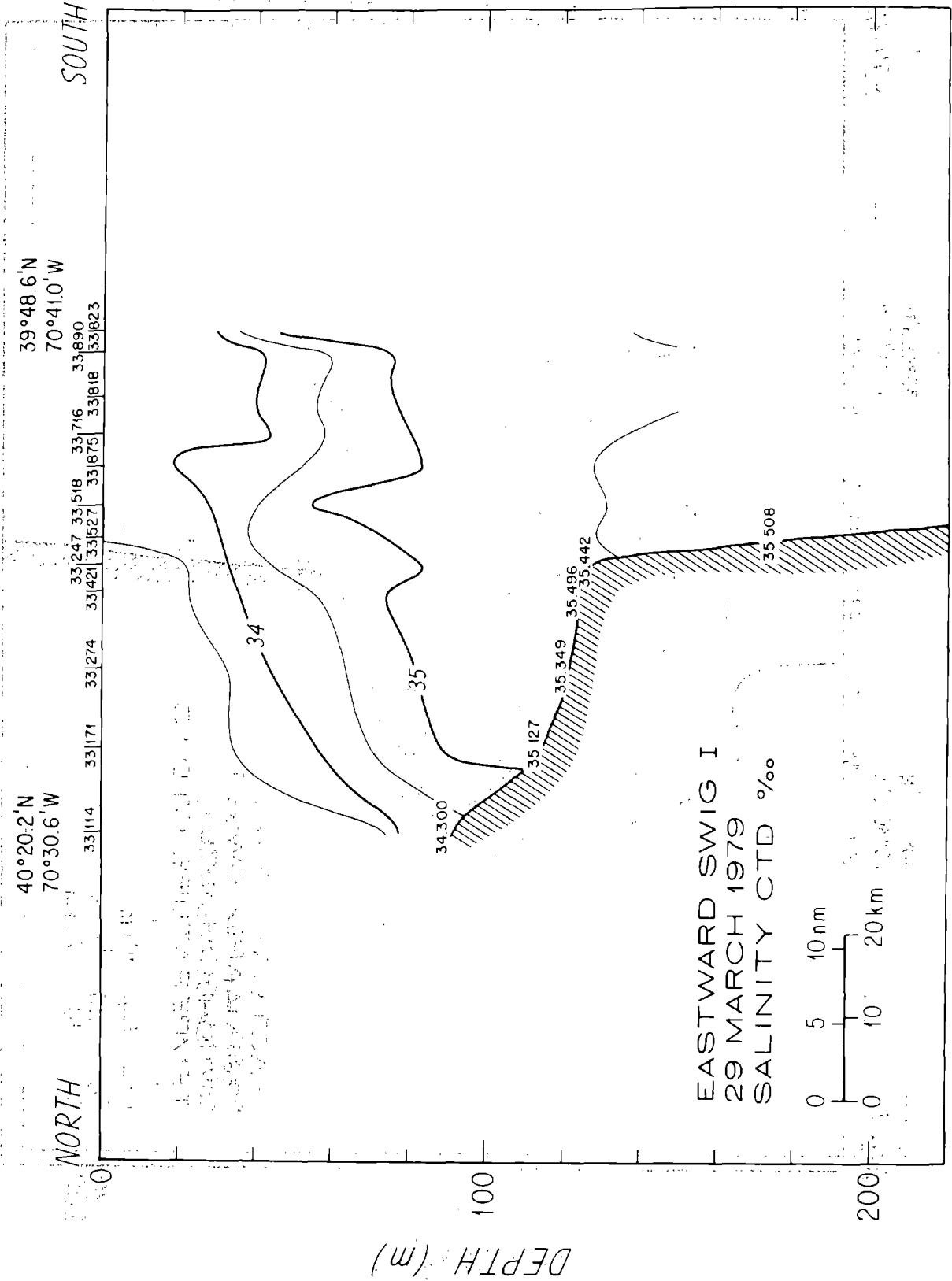
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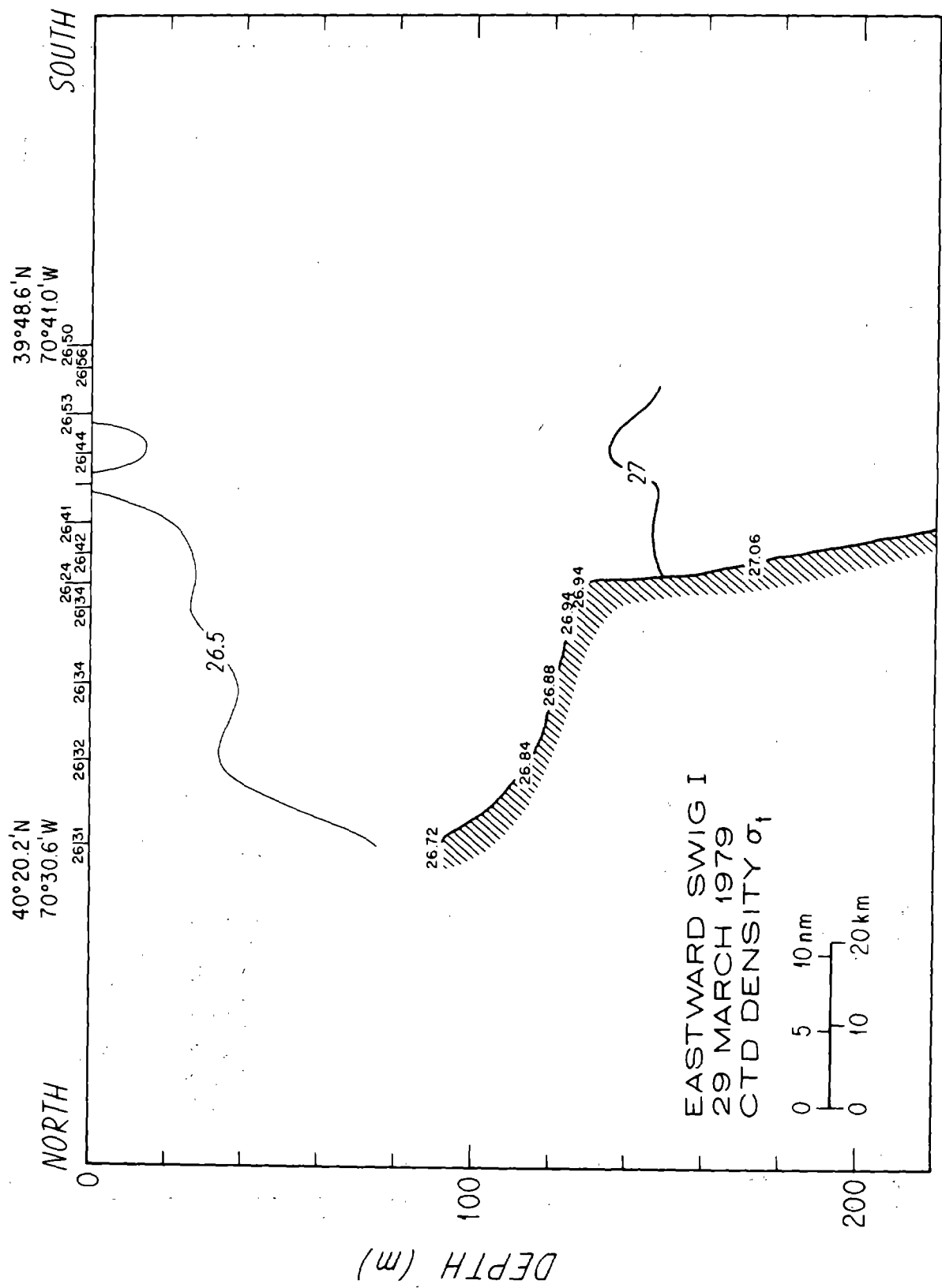


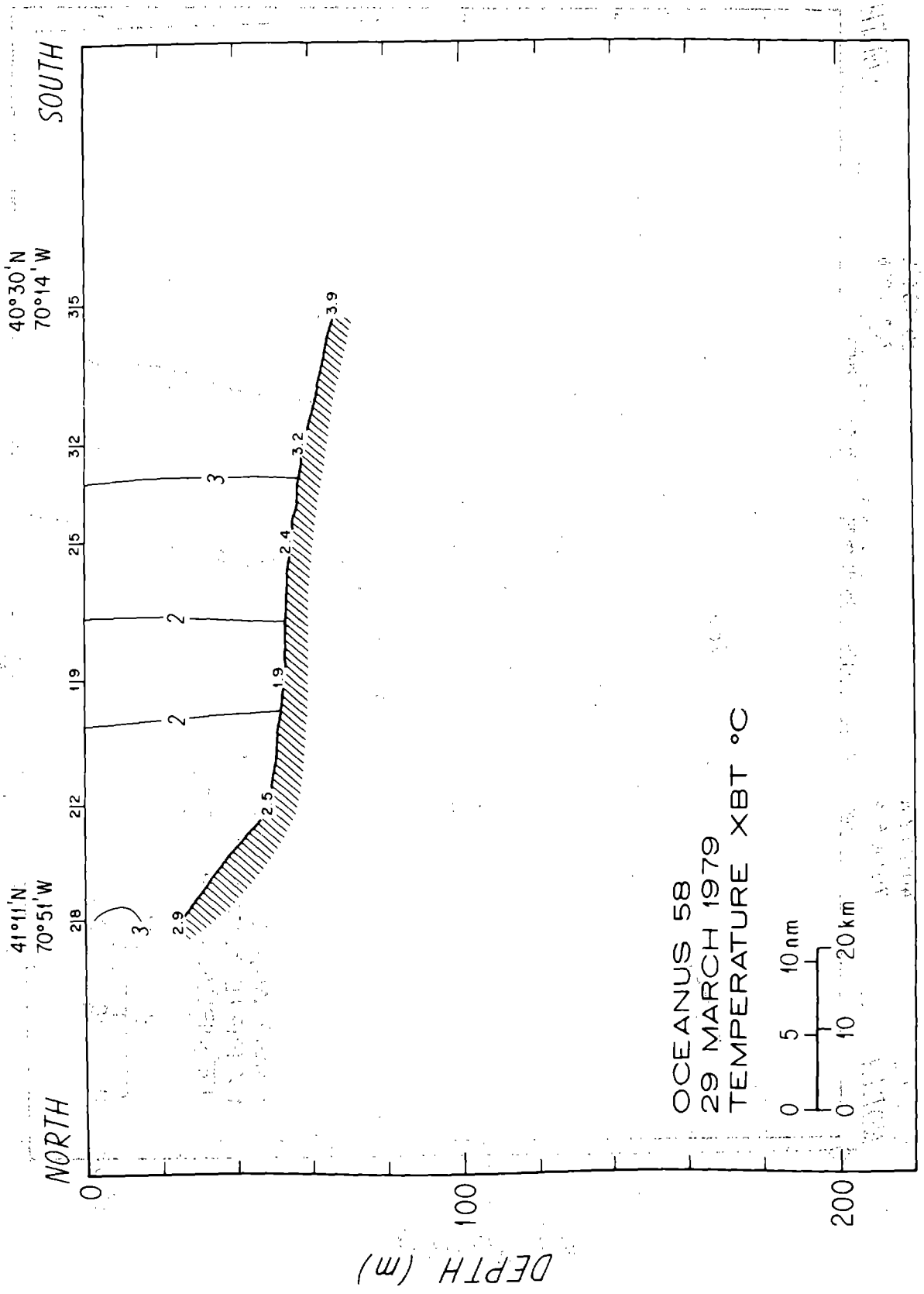
EASTWARD SWIG I
28-29 MARCH 1979
SALINITY CTD ‰











OCEANUS 58
29 MARCH 1979
TEMPERATURE XBT °C

0 5 10 nm
0 10 20 km

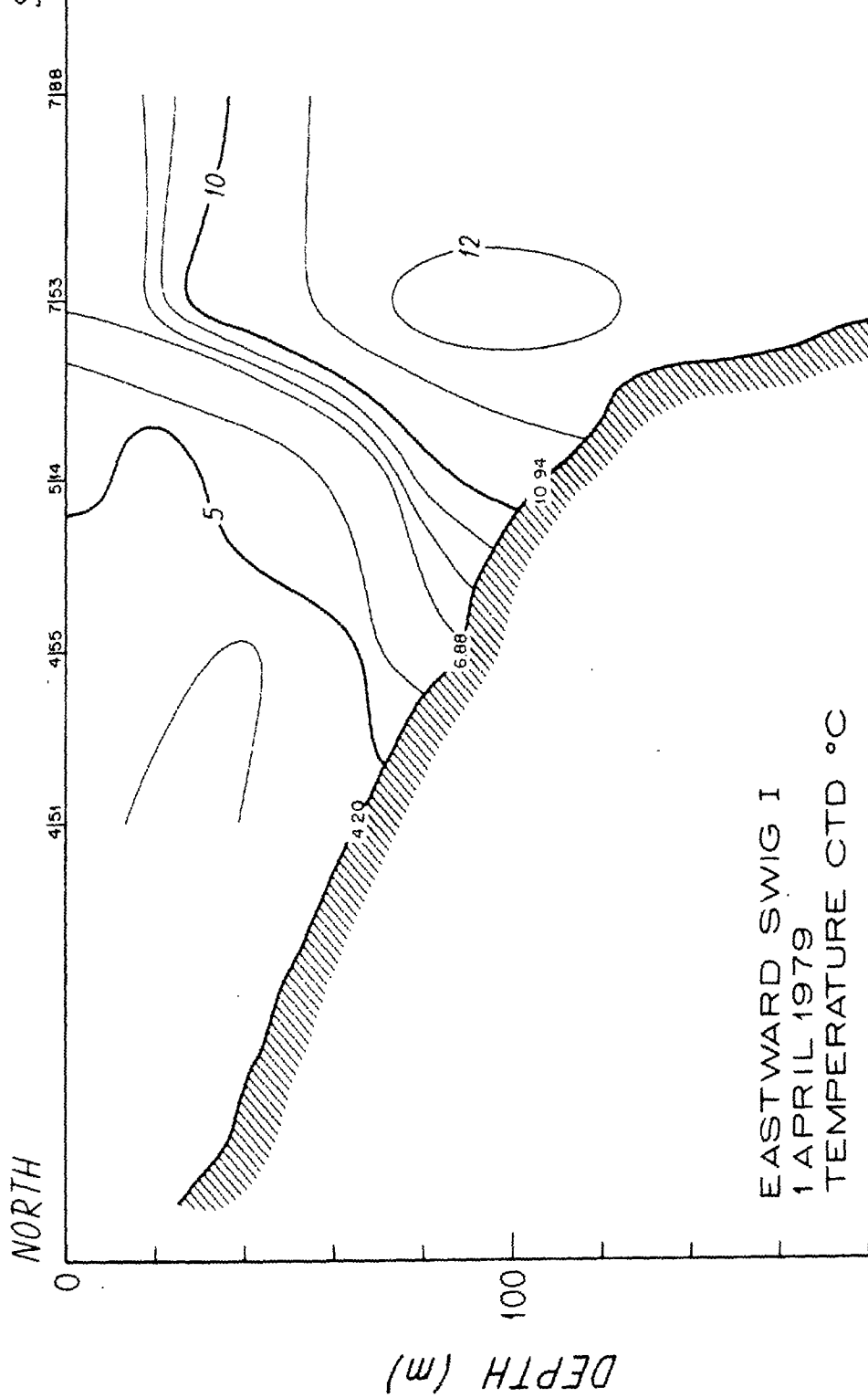
NO. 1117
DATE 3/29/79
TIME 1400

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70°51'W

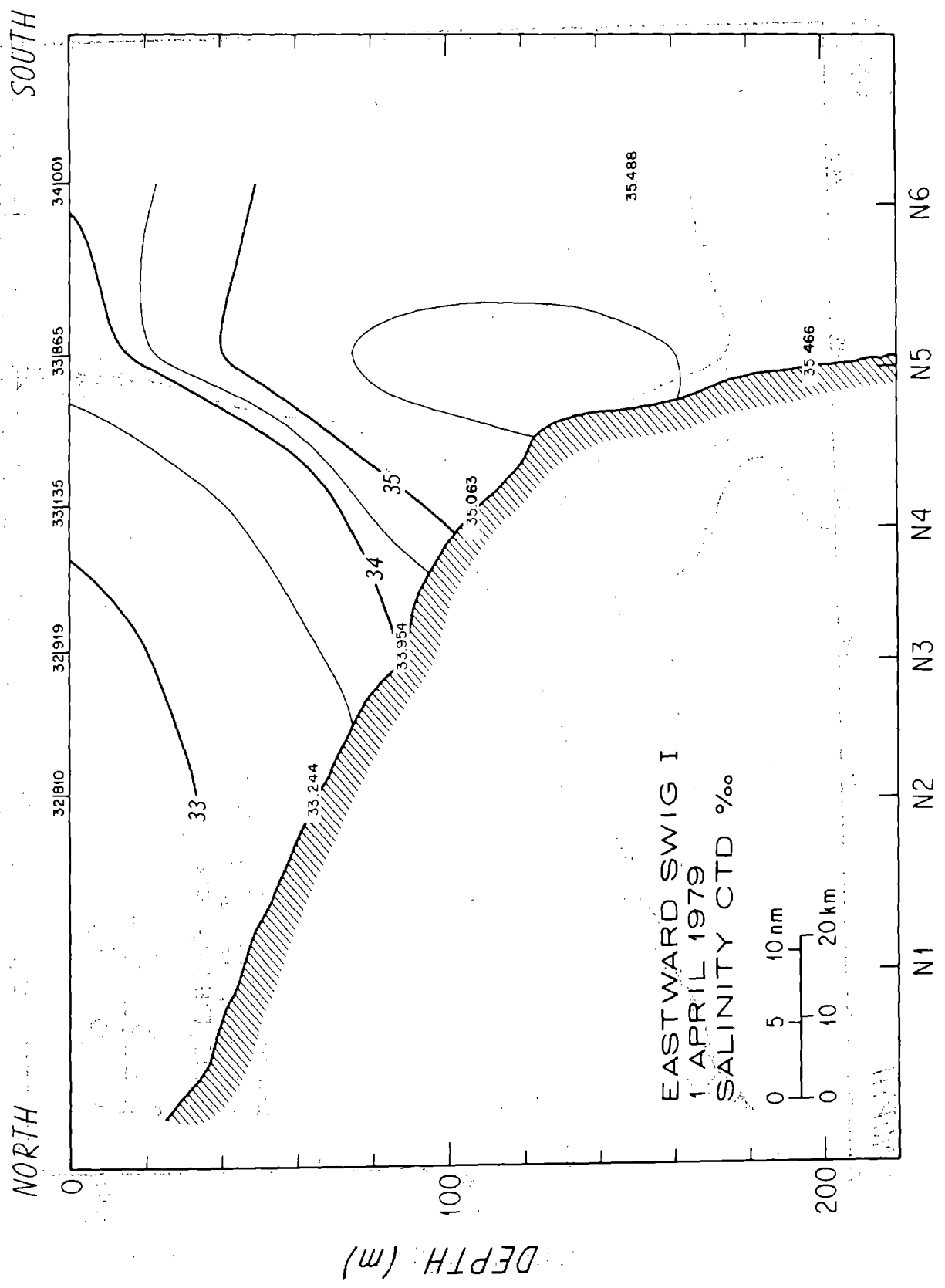
40°30'N
70°14'W

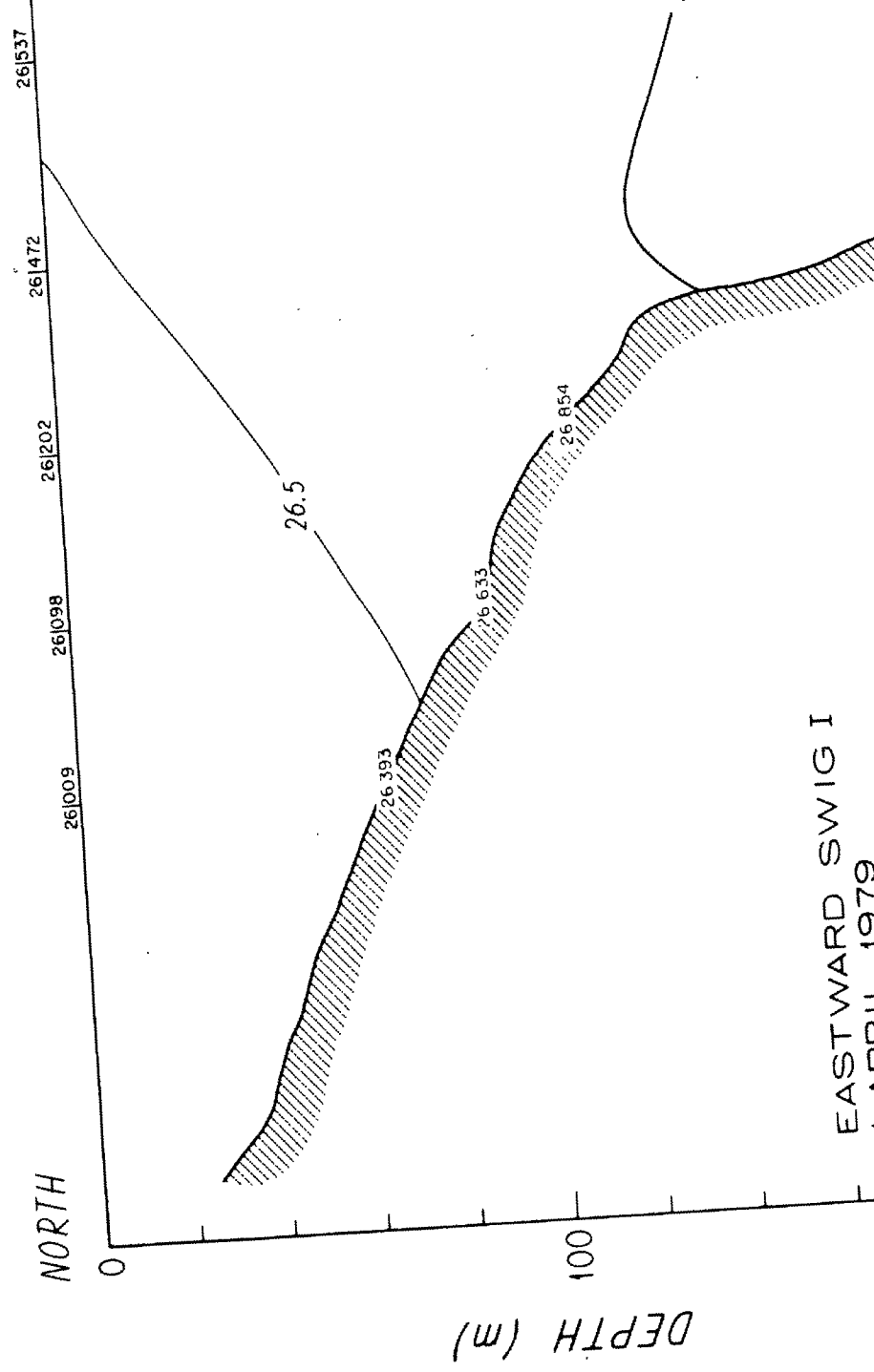
NORTH SOUTH

DEPTH (m)

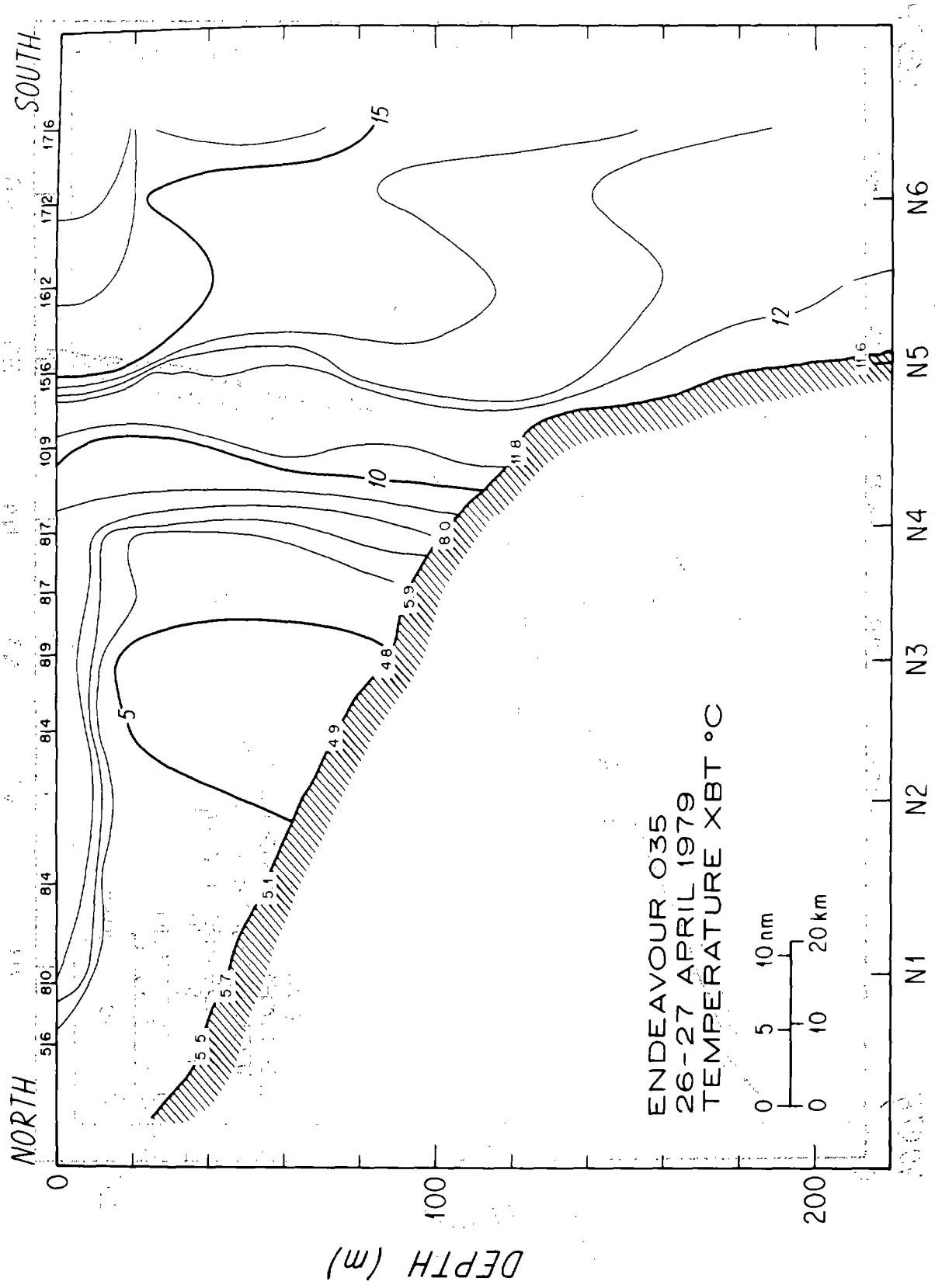


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 TEMPERATURE CTD °C

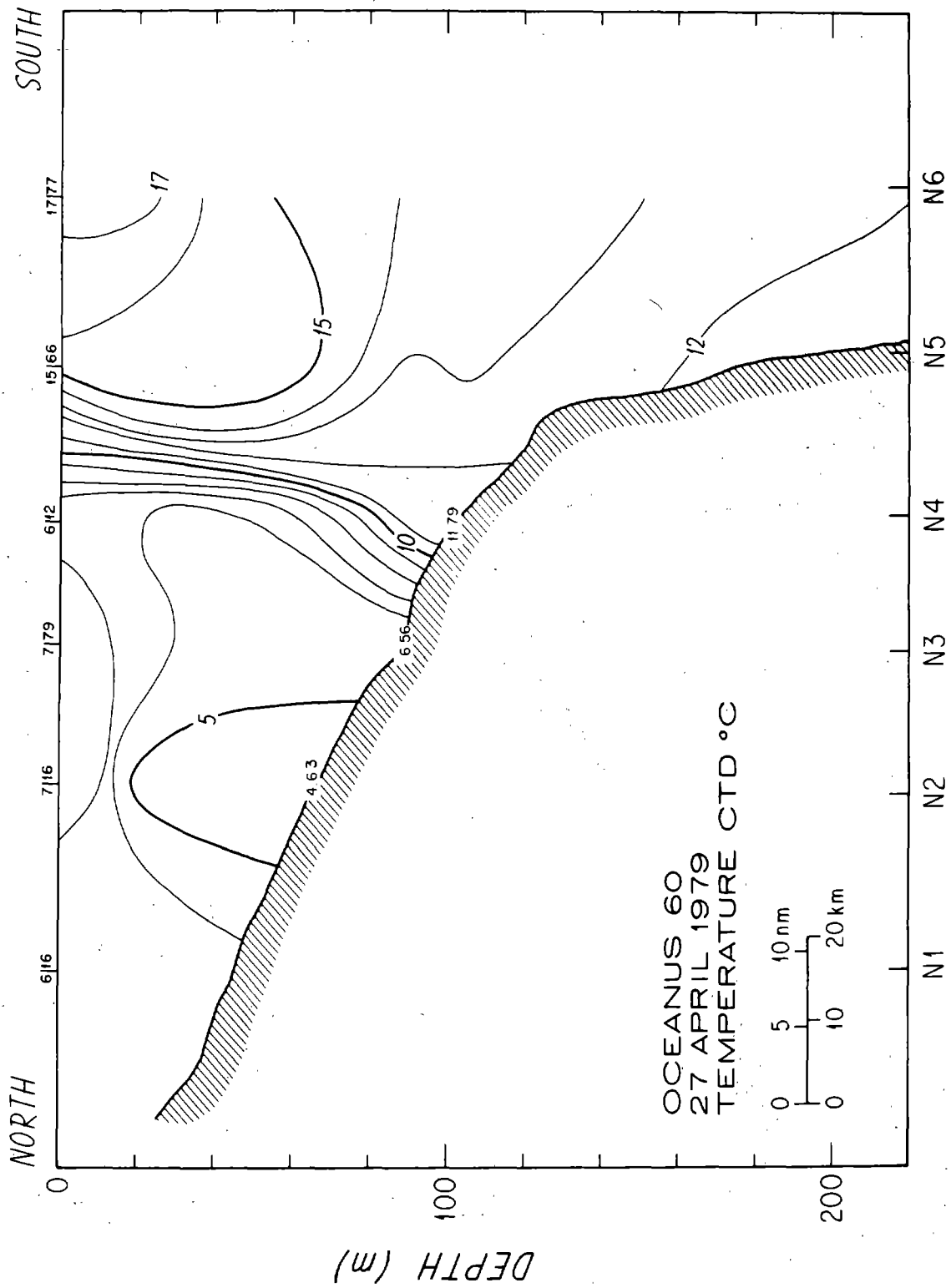


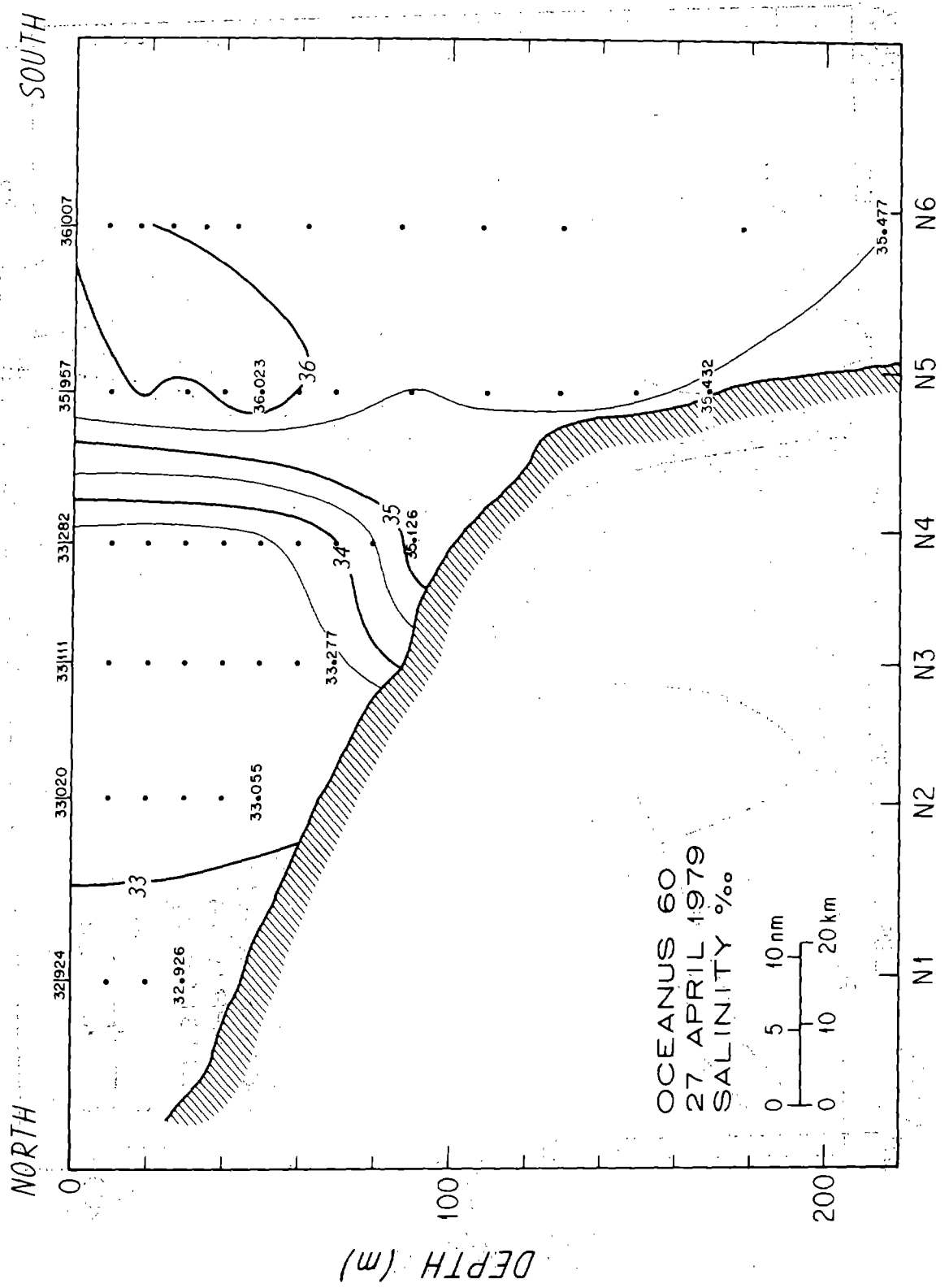


EASTWARD SWIG I
APRIL 1979



00019





NORTH

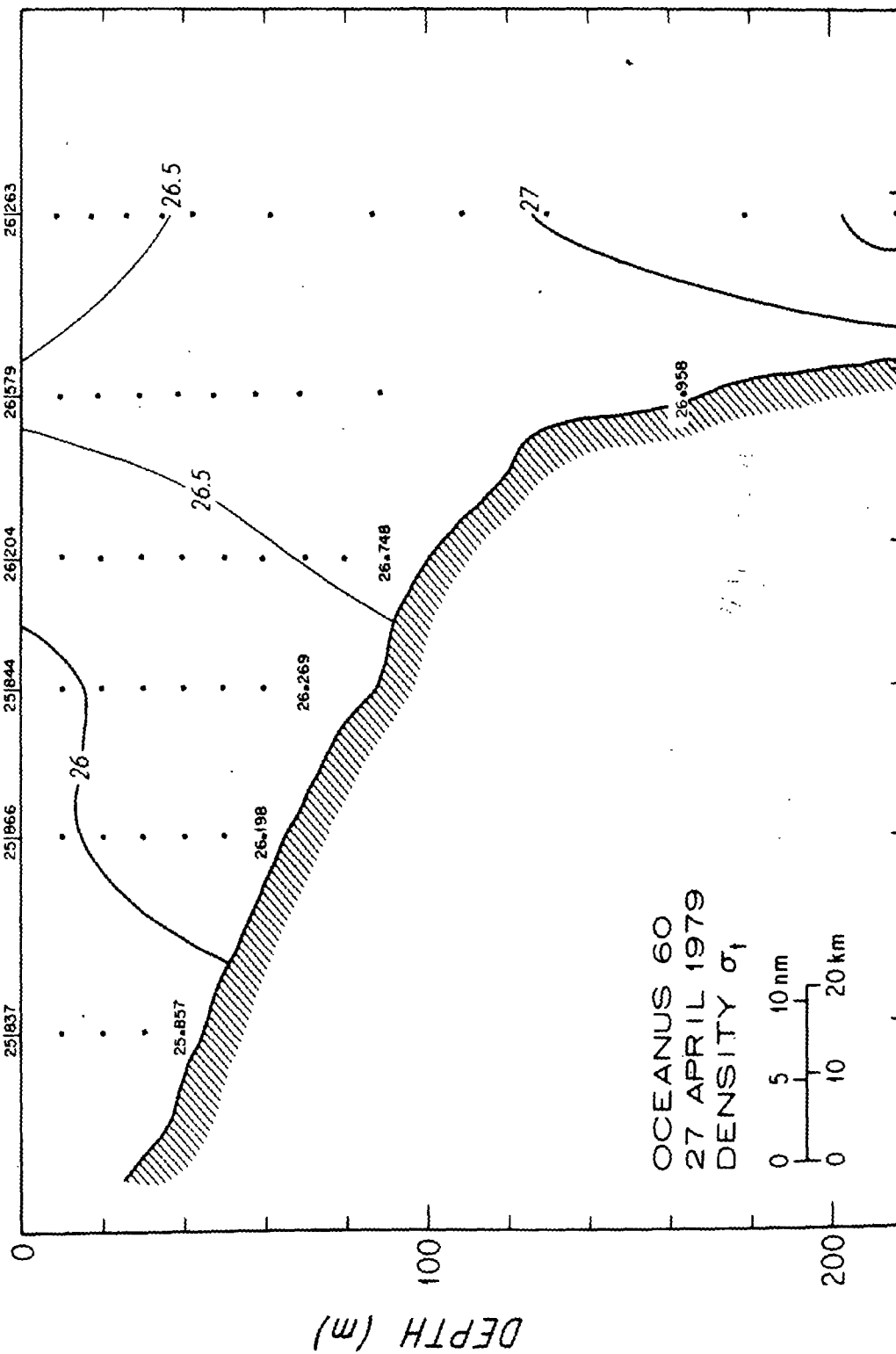
SOUTH

DEPTH (m)

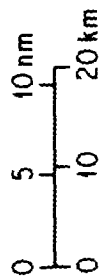
0 5 10 nm
0 10 20 km

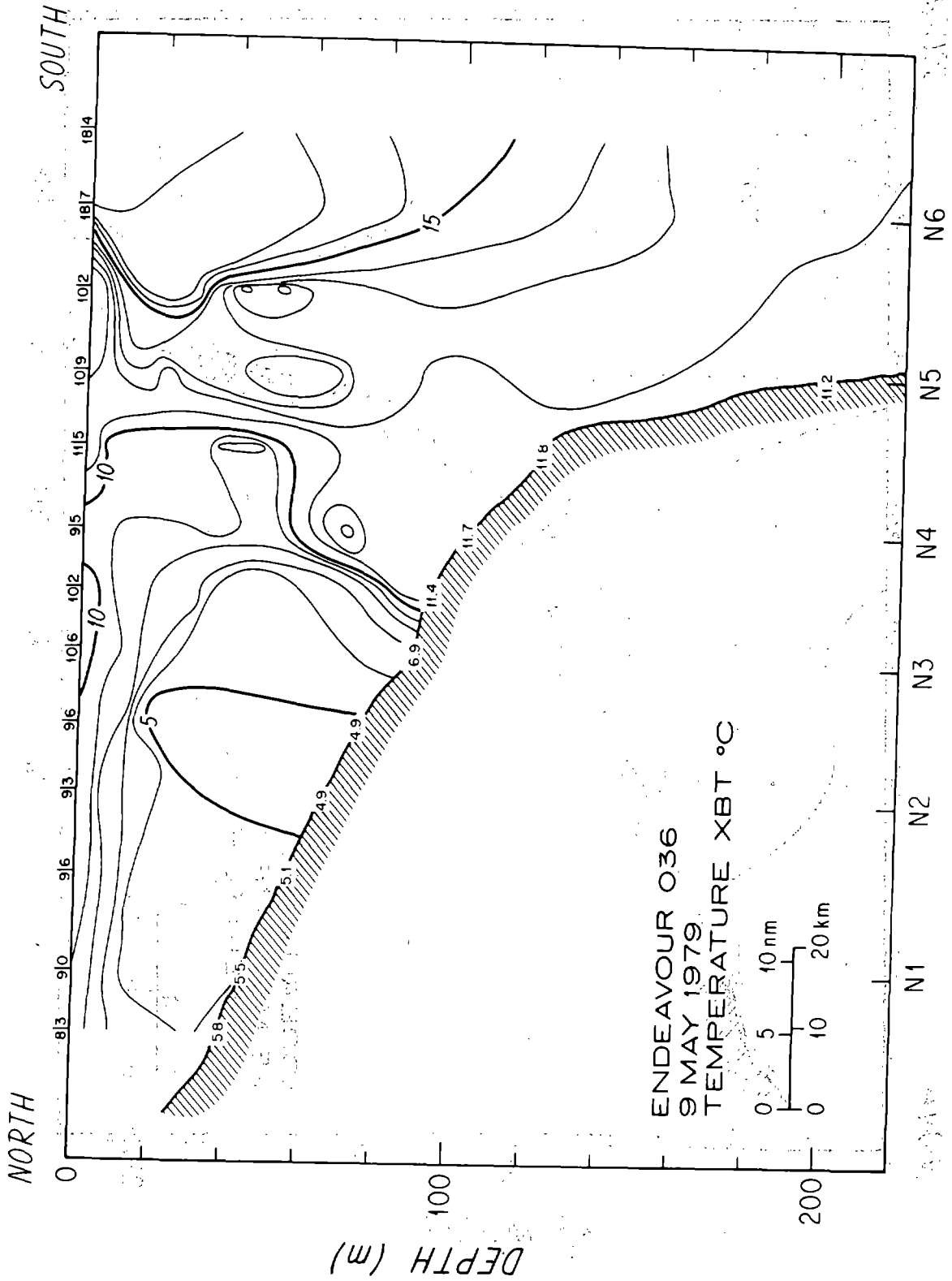
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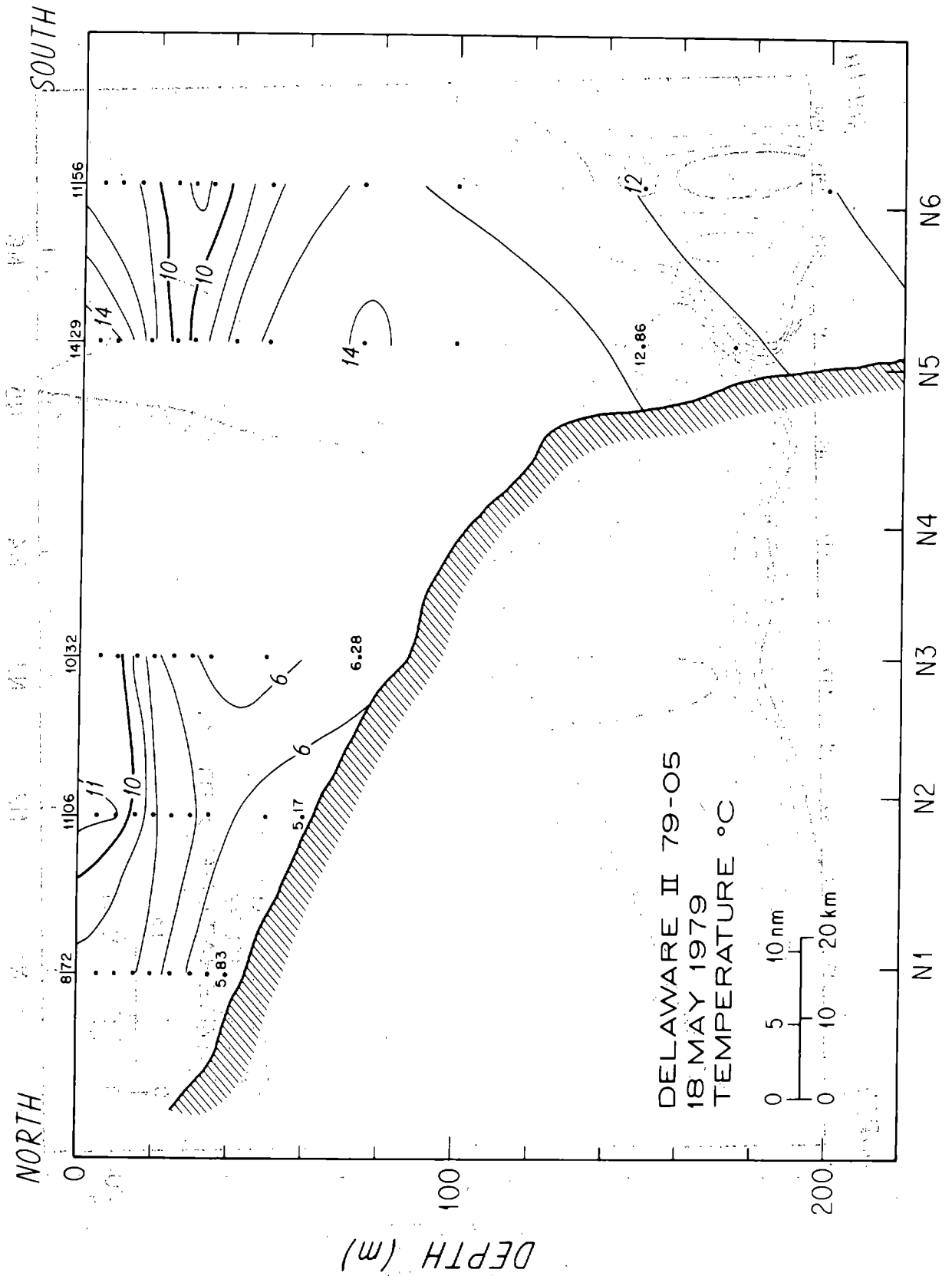
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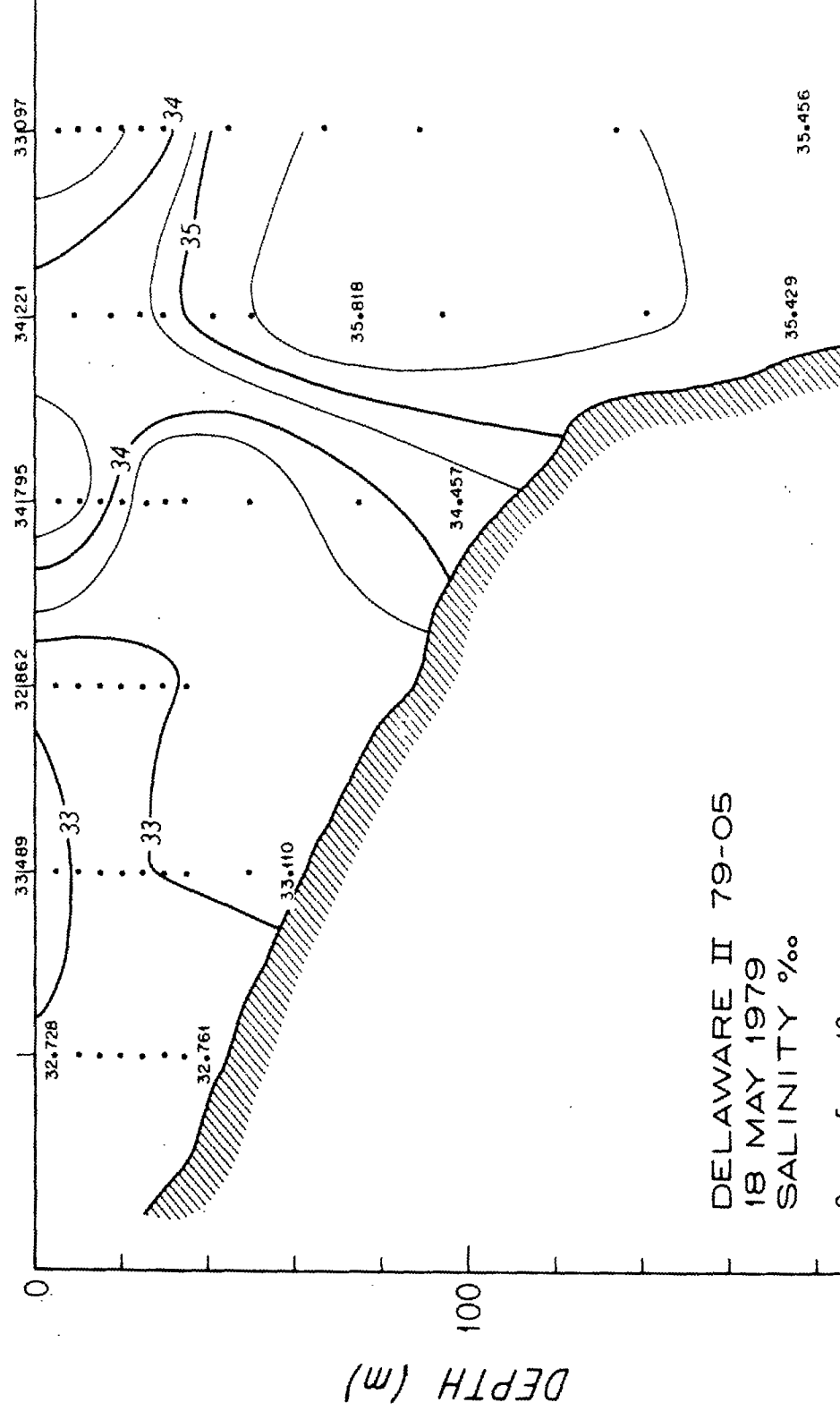
OCEANUS 60
27 APRIL 1979
DENSITY σ_t

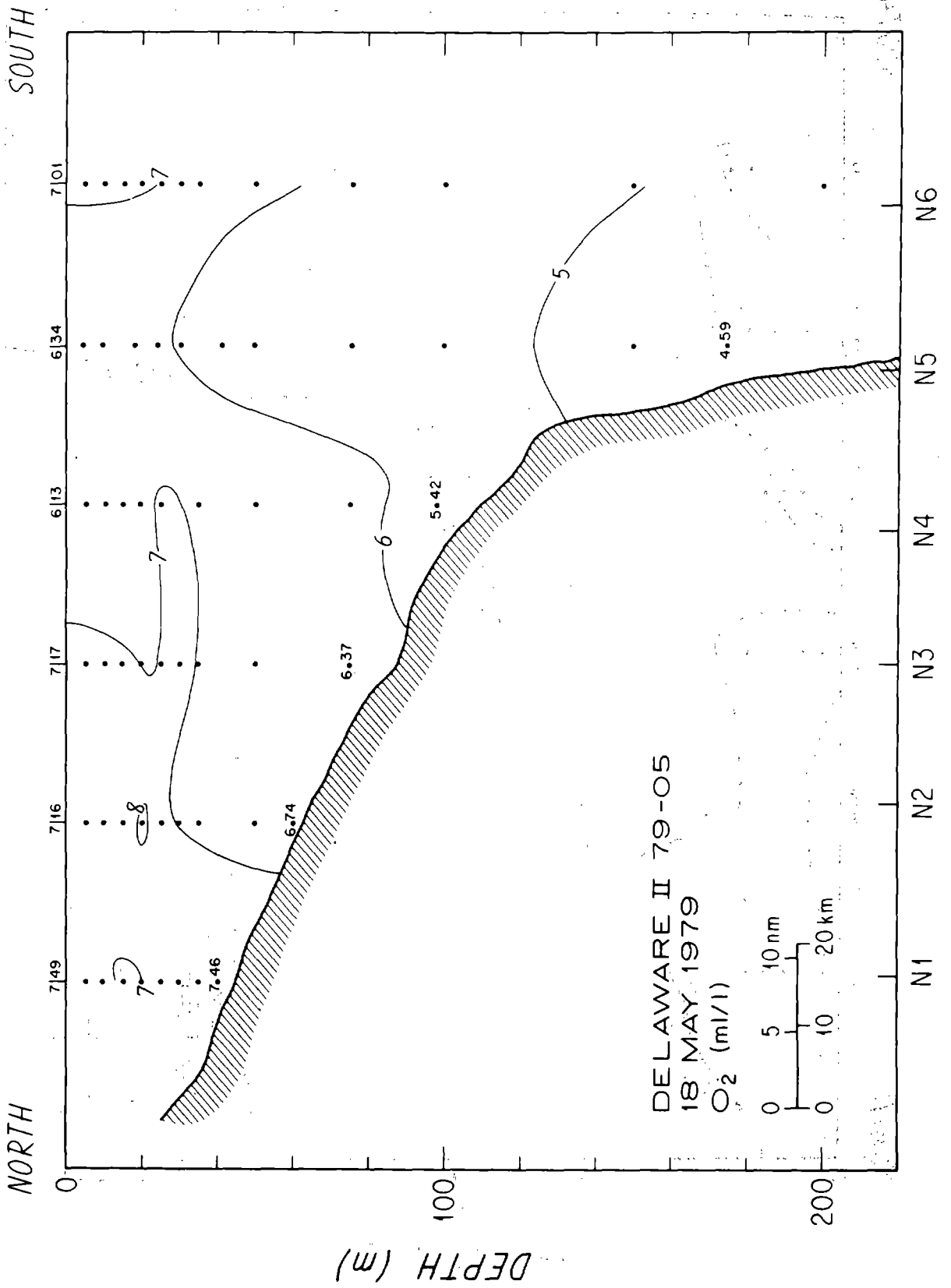


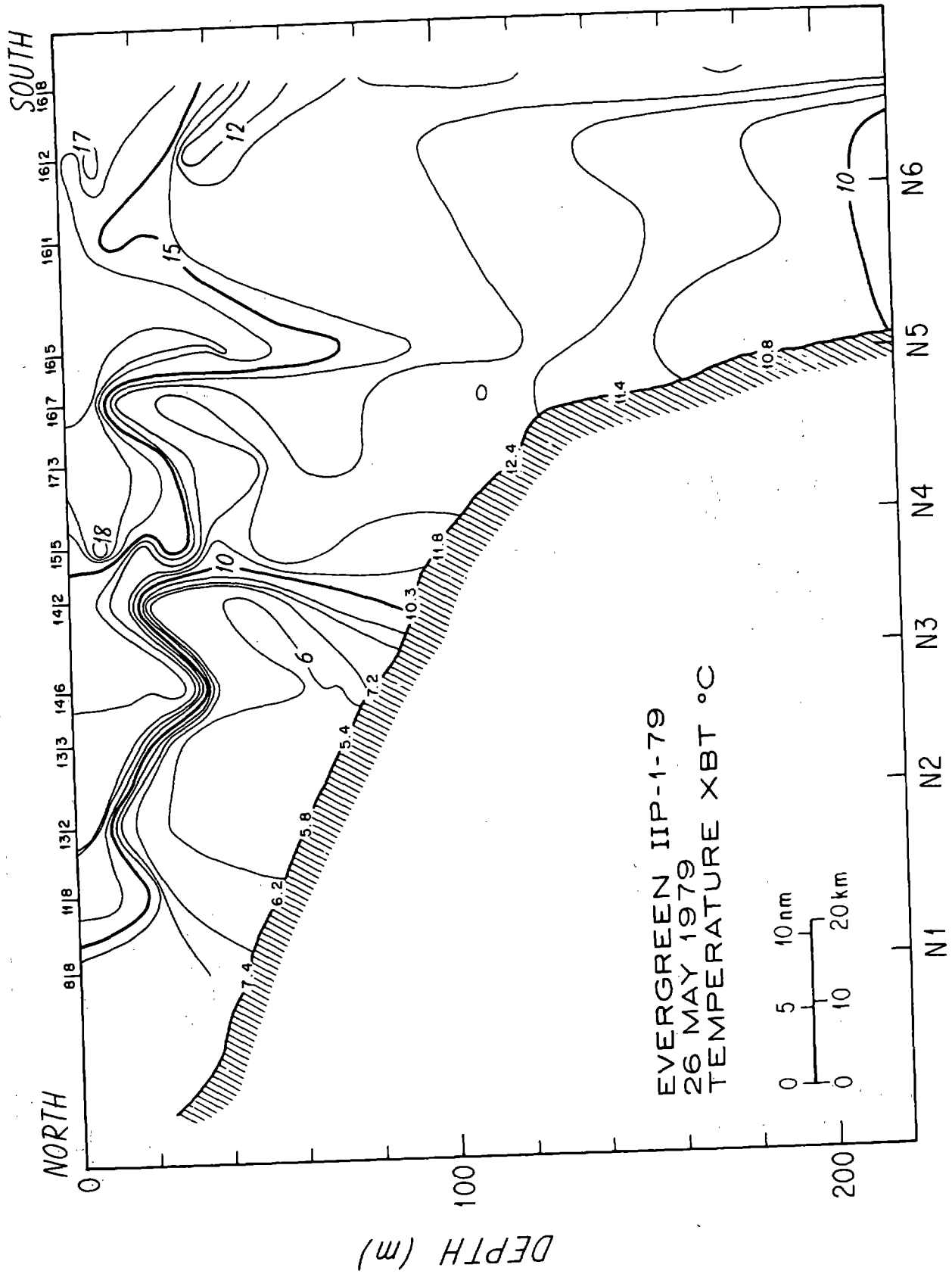


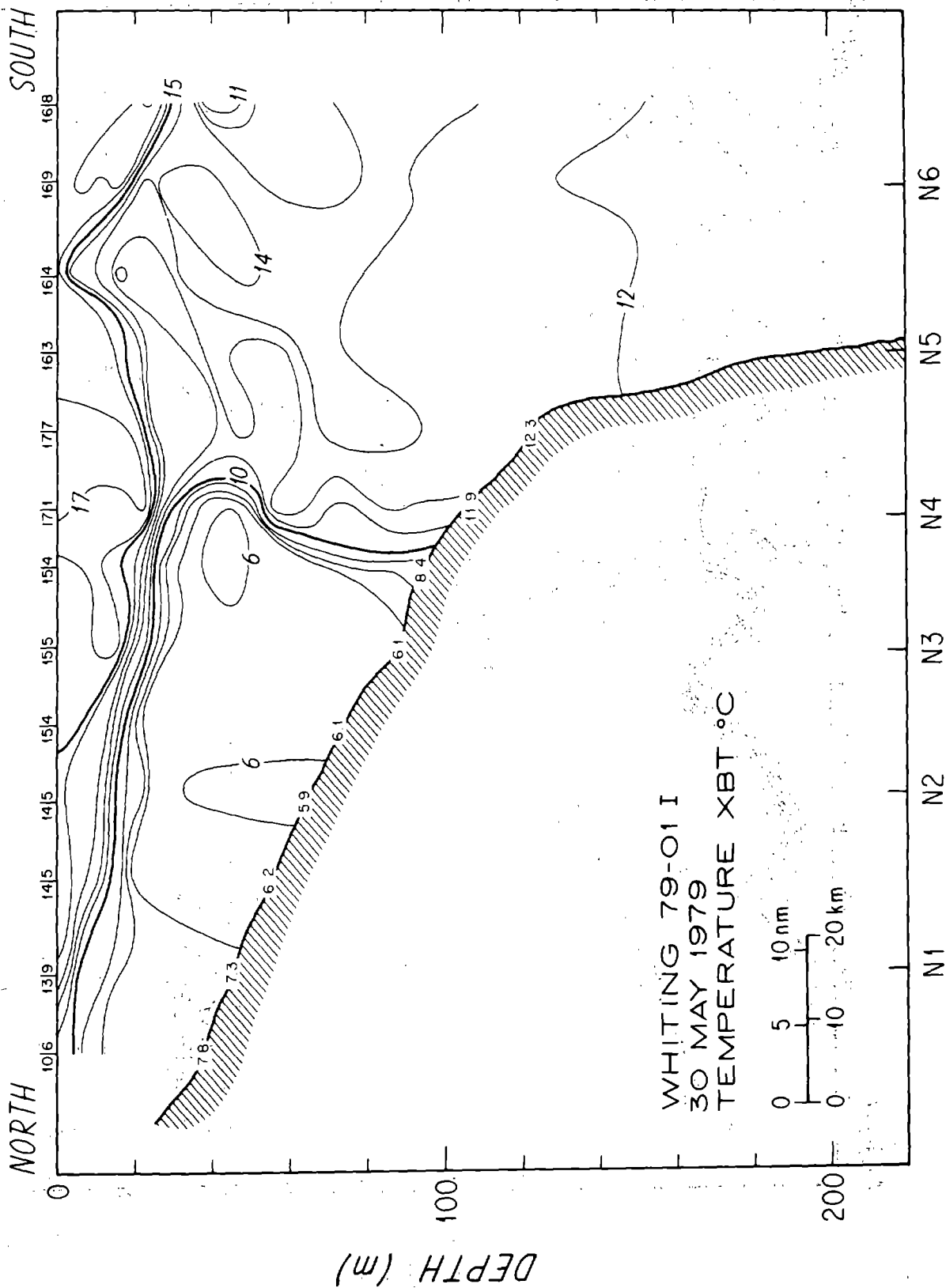


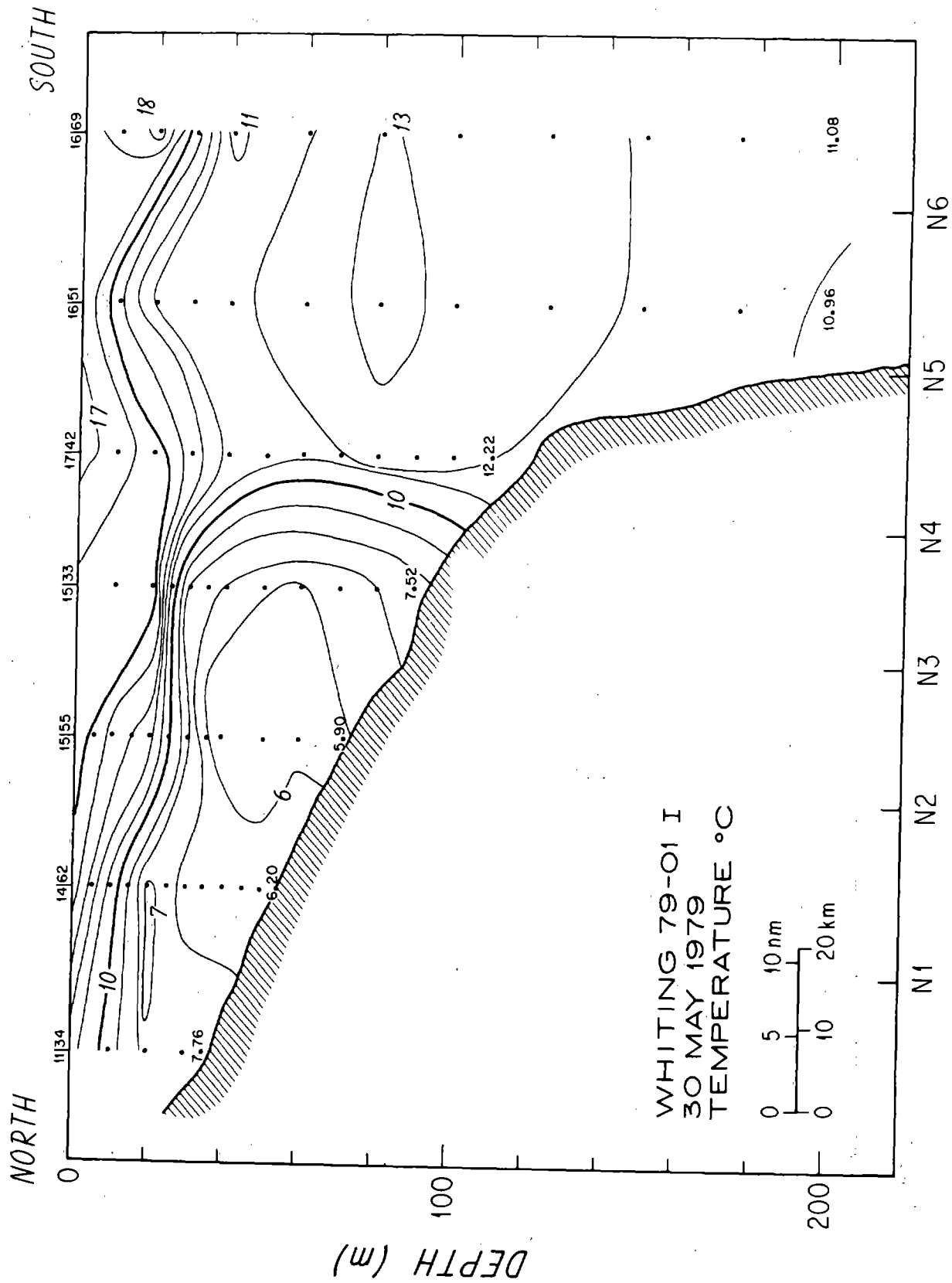
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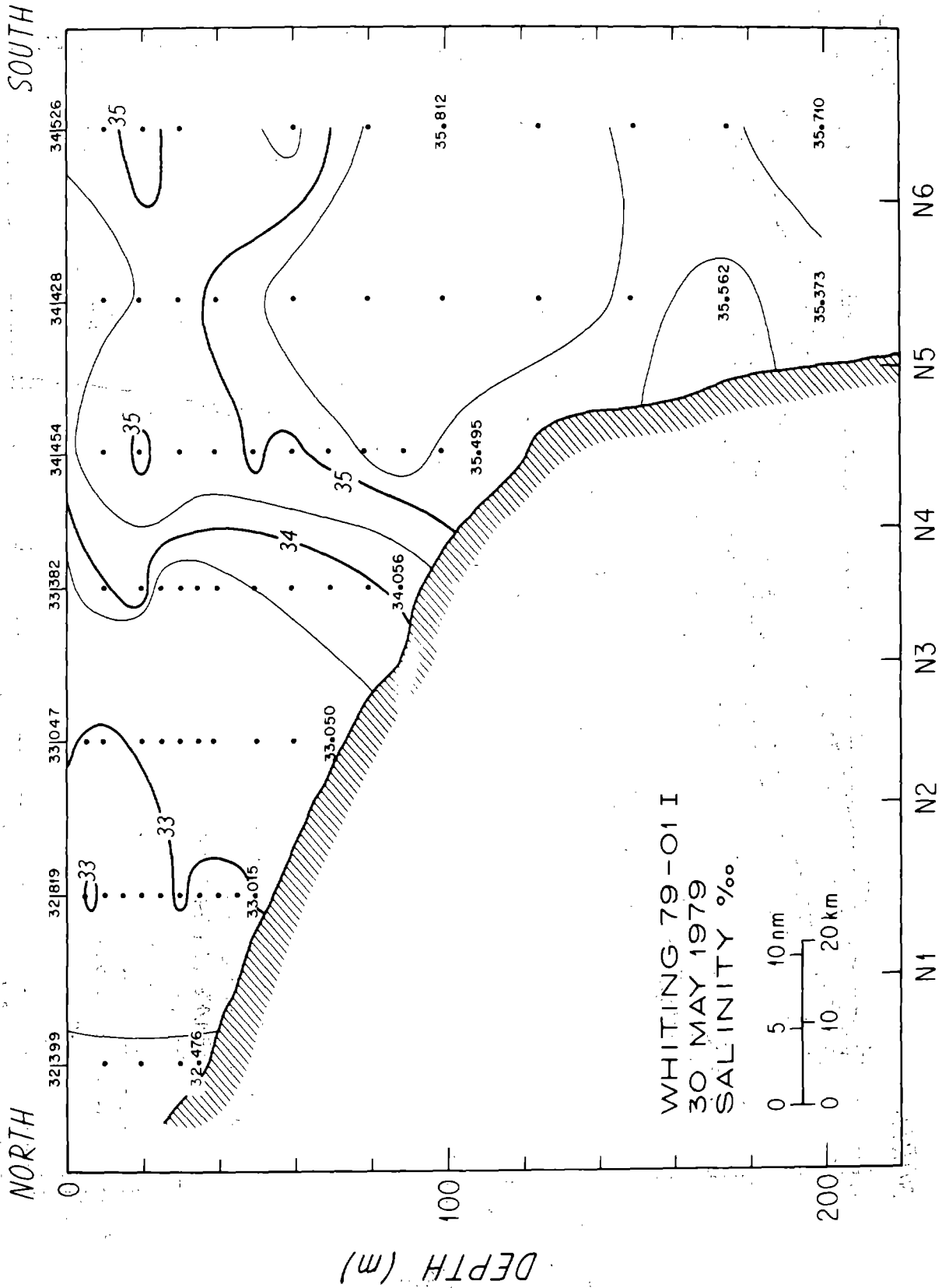


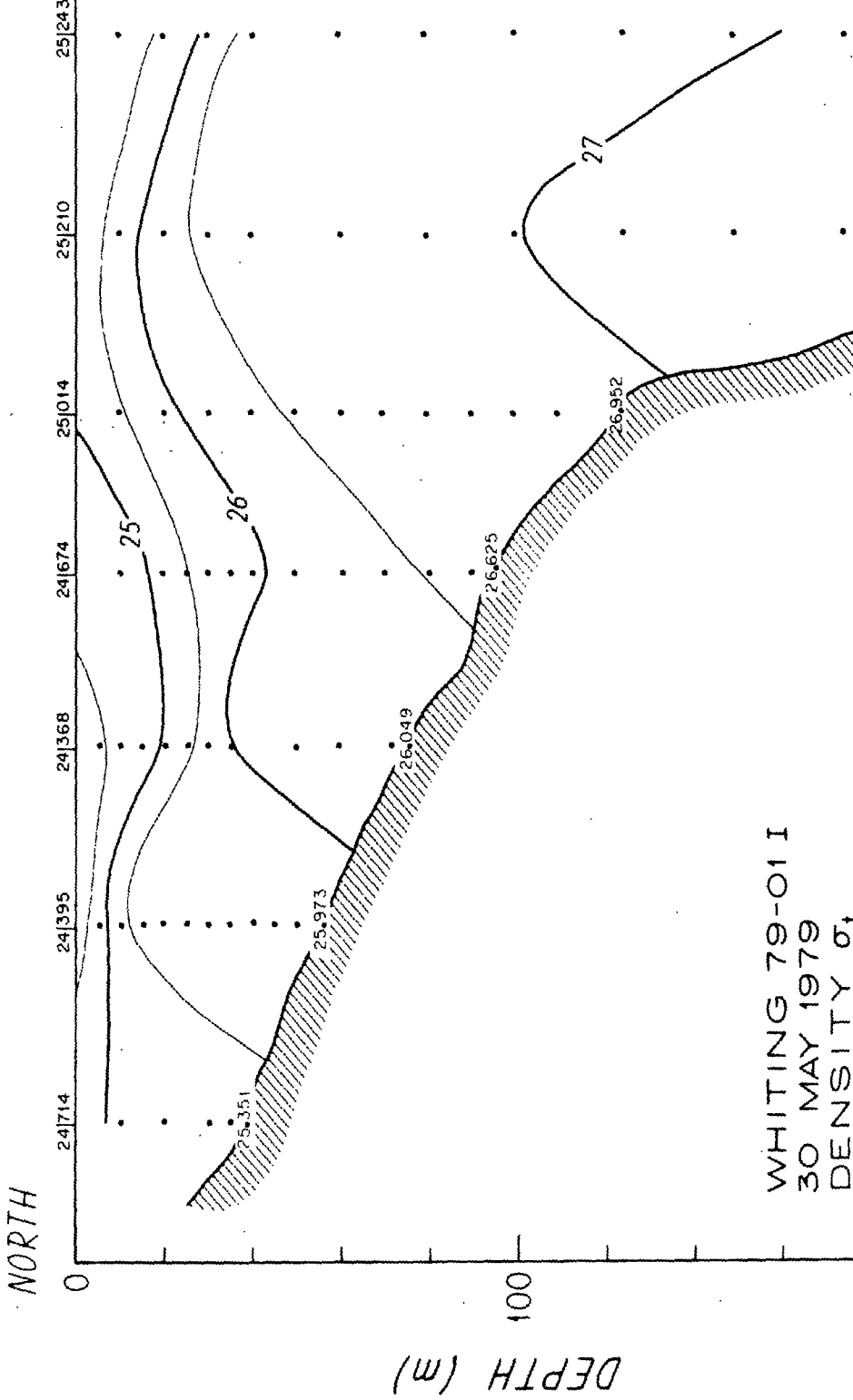




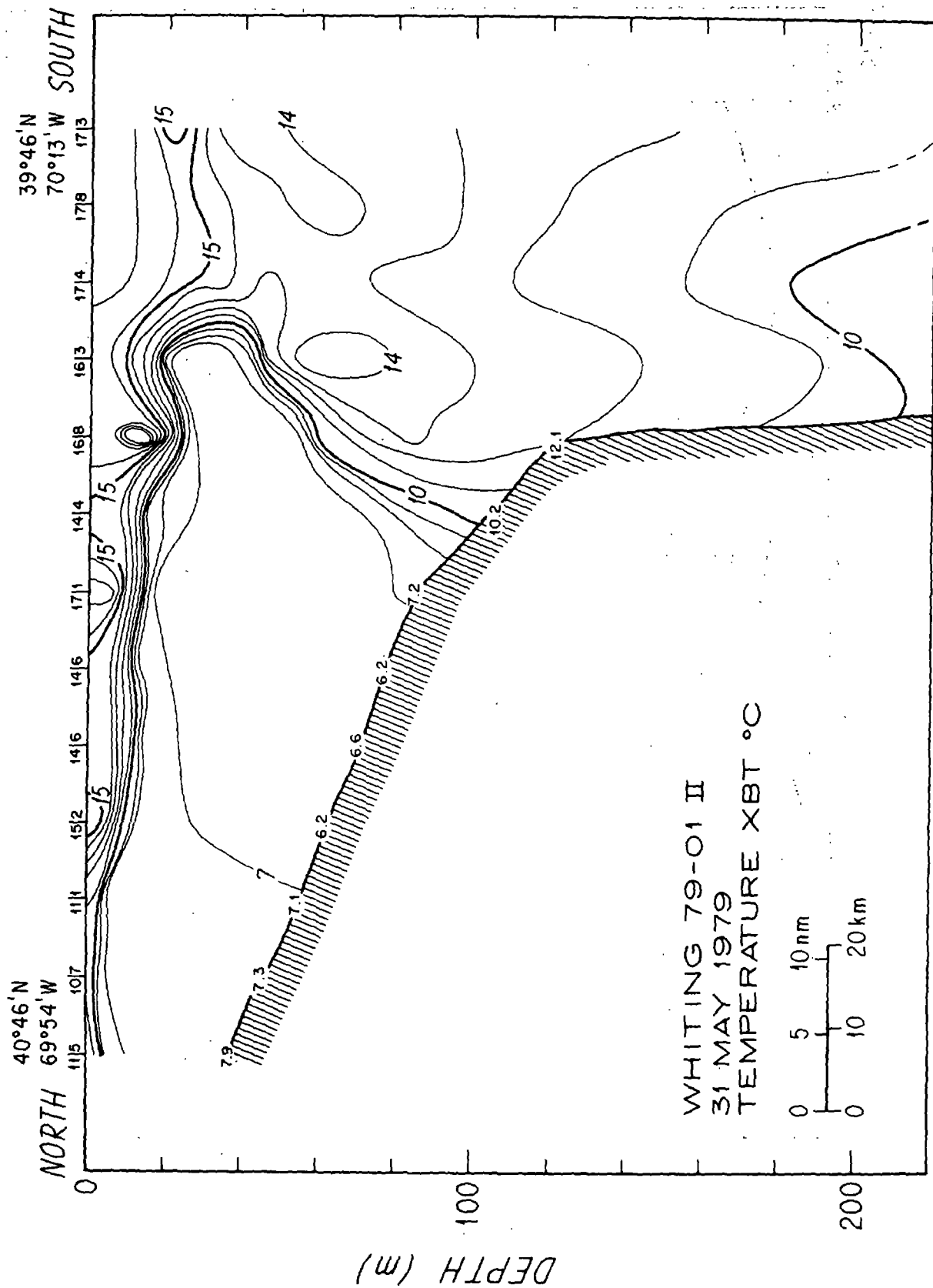


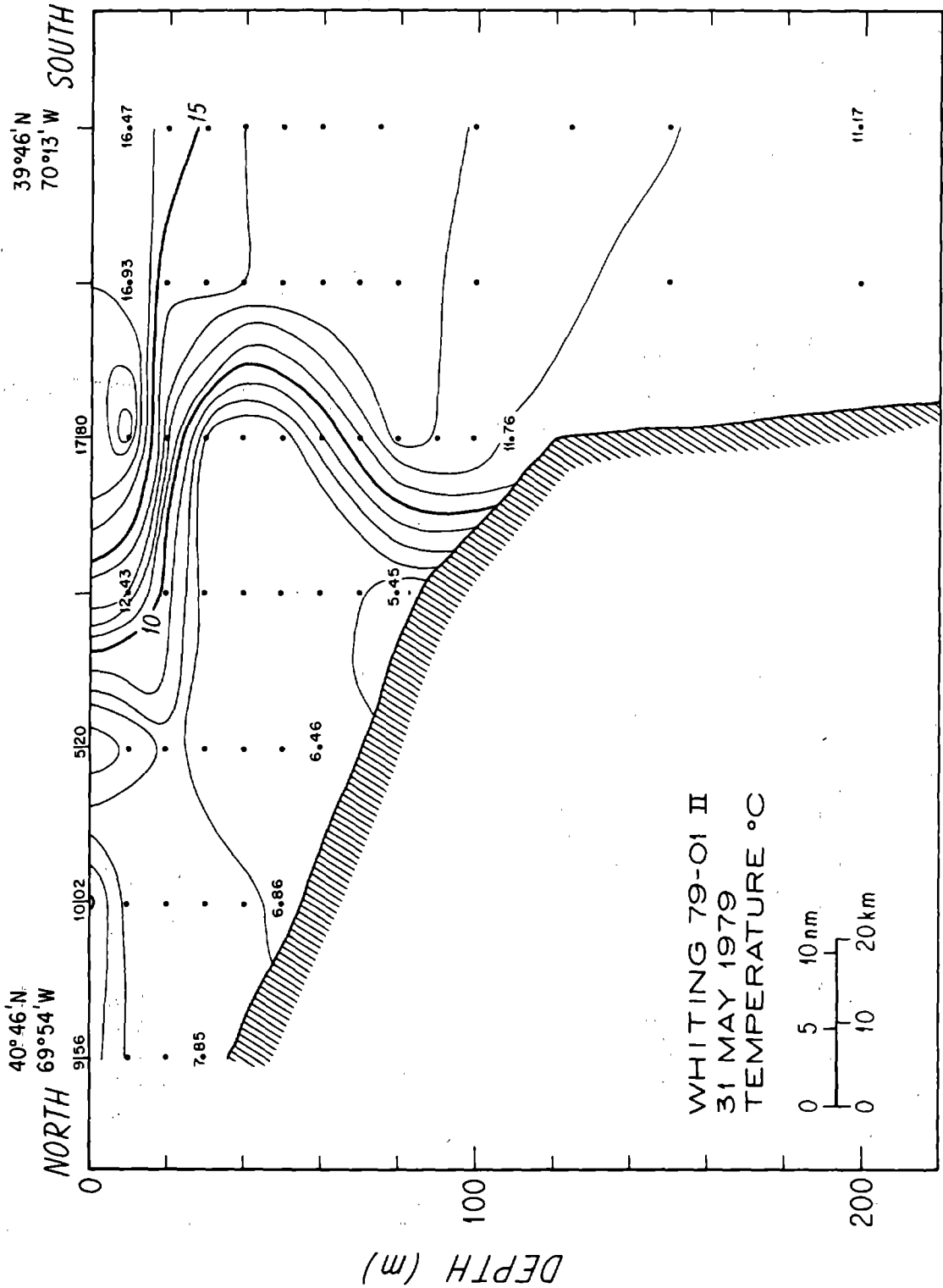


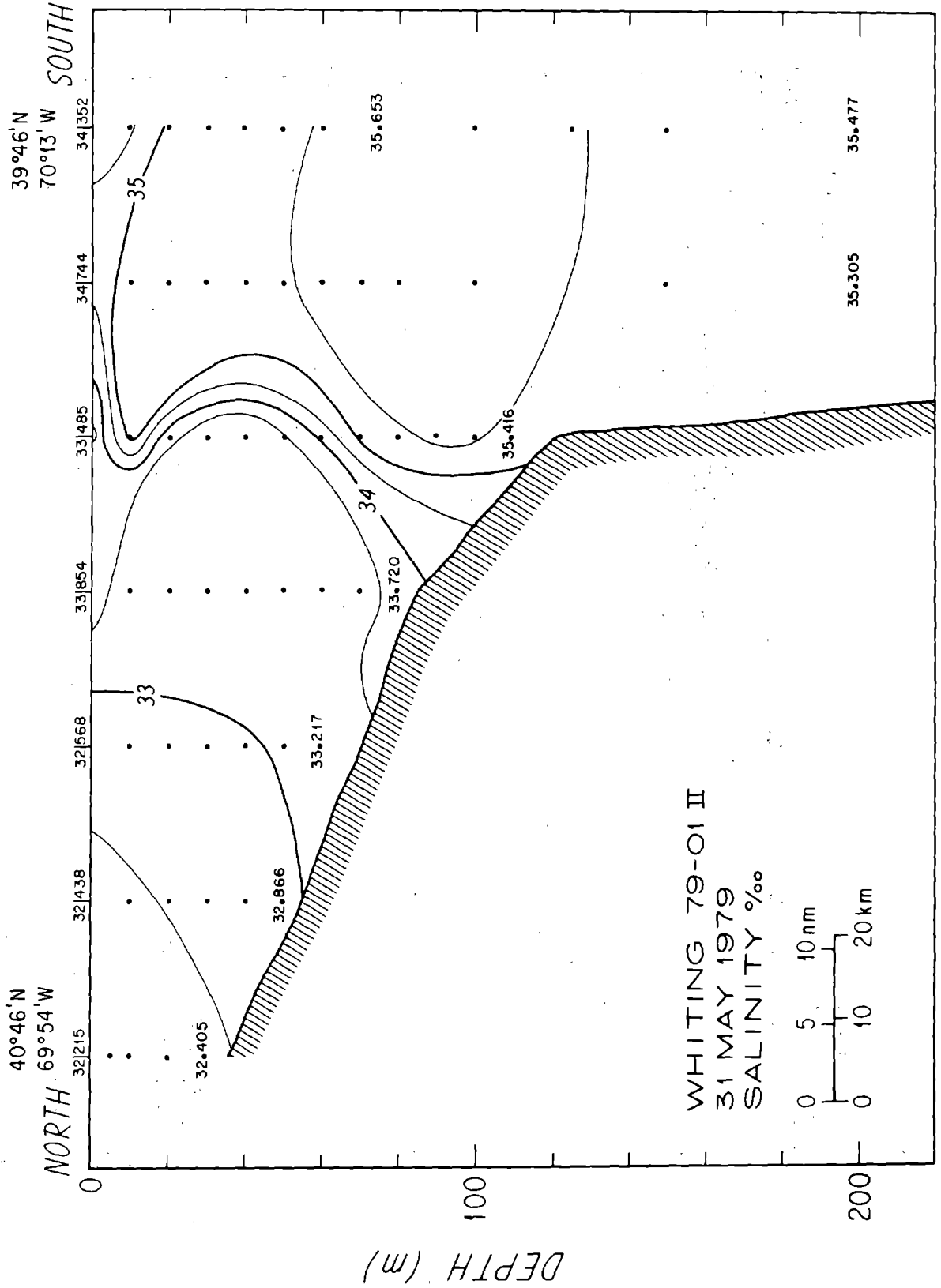


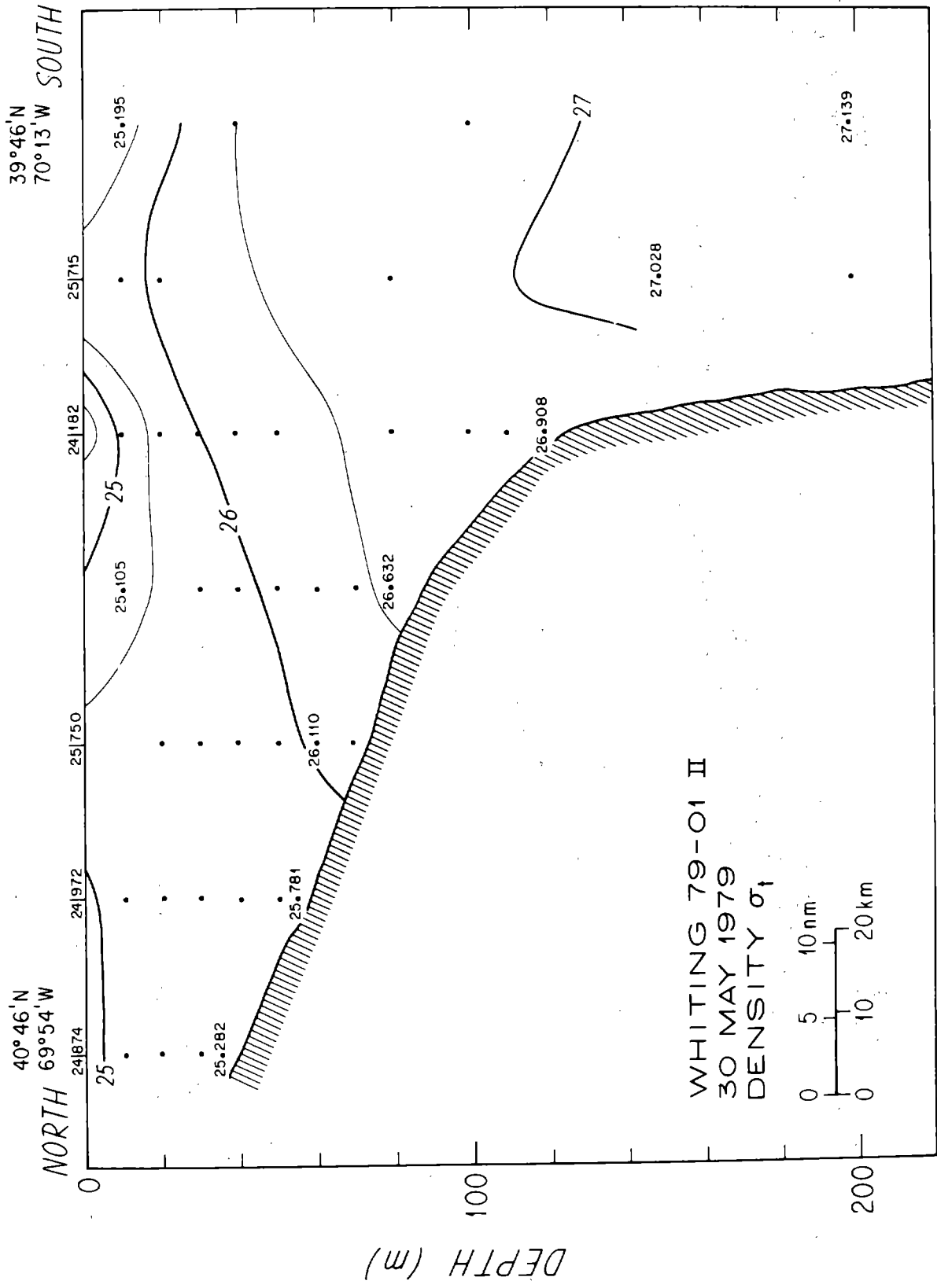


WHITING 79-01 I
 30 MAY 1979
 DENSITY σ_t

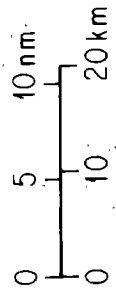


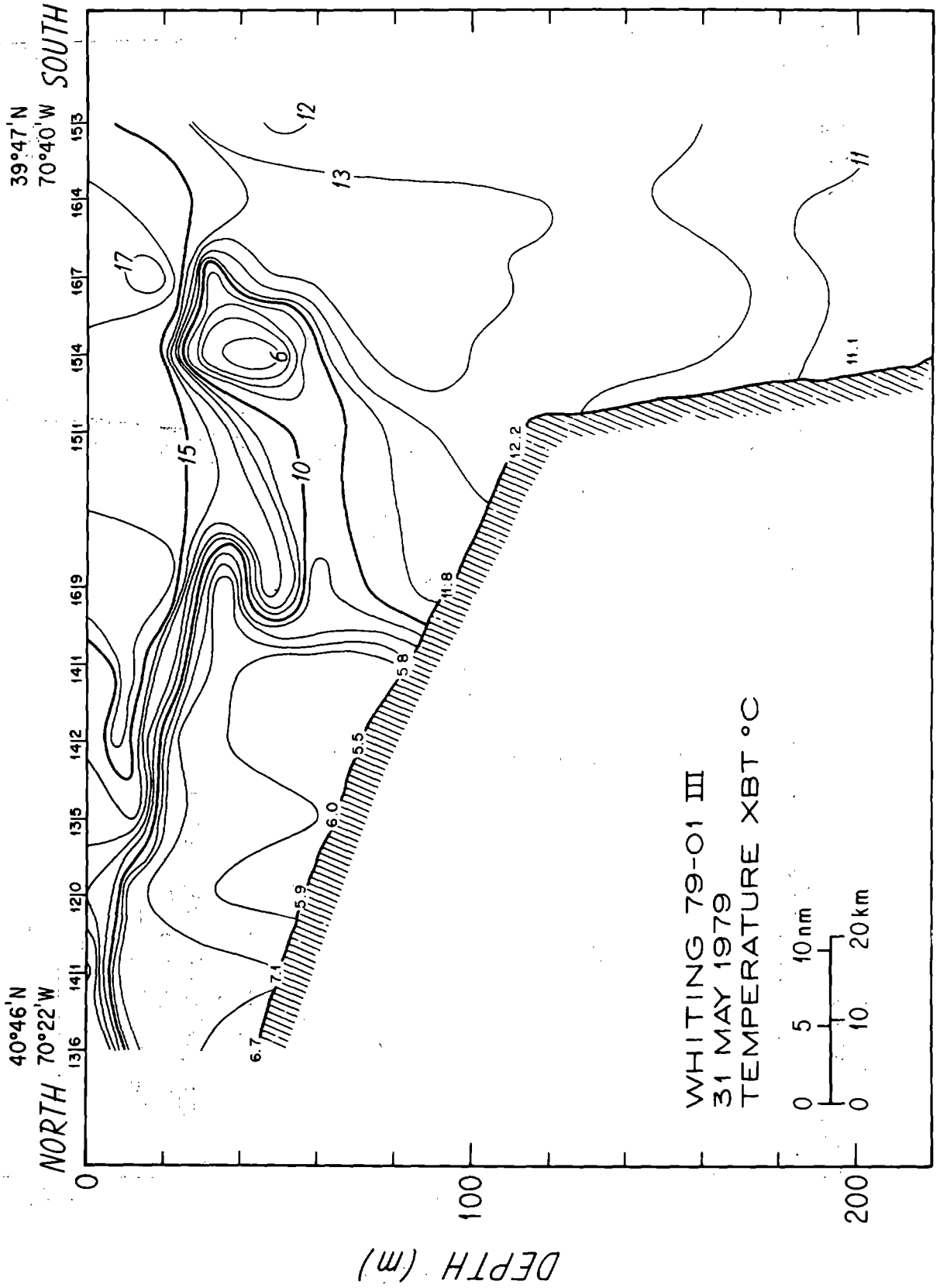


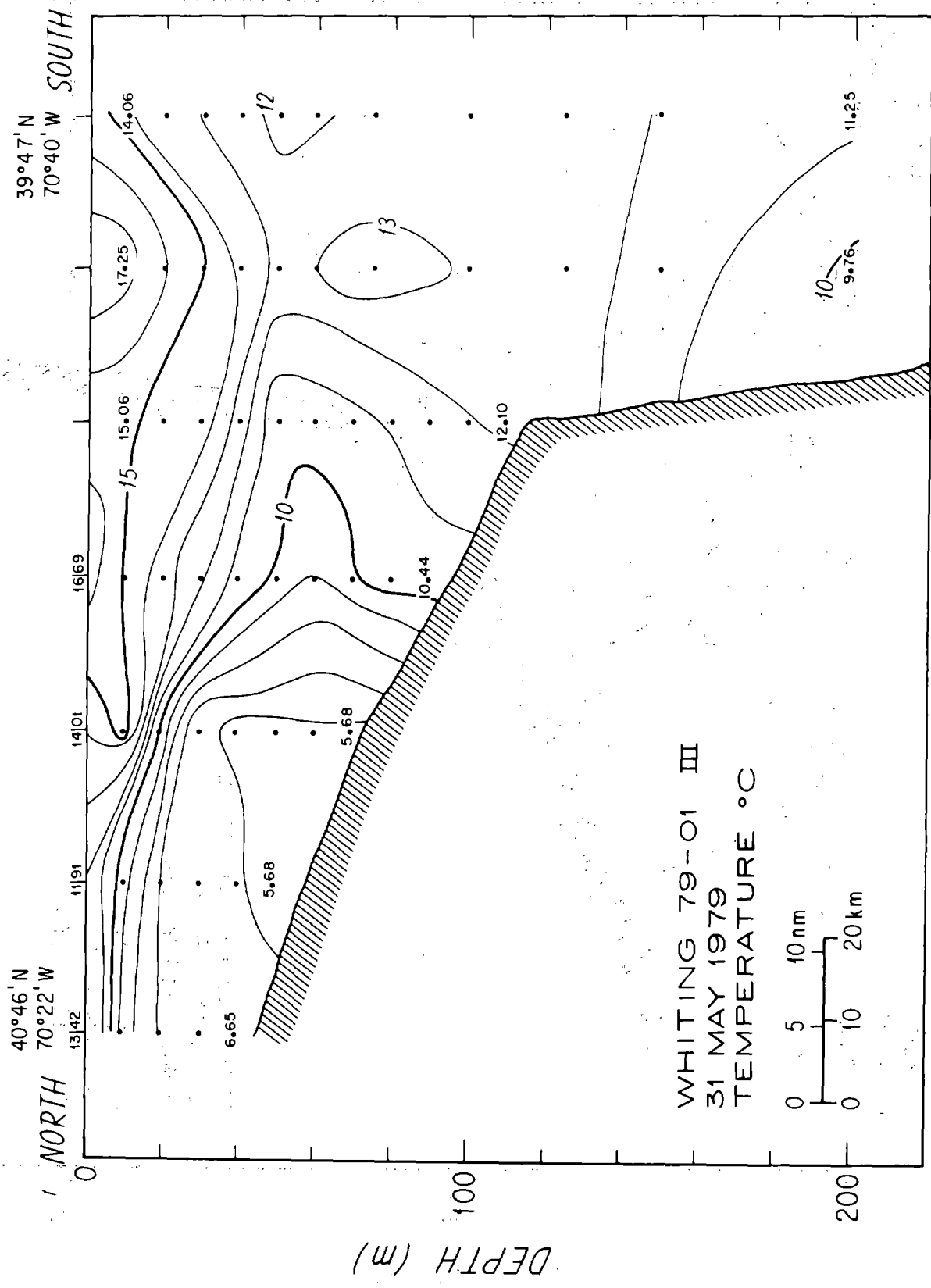


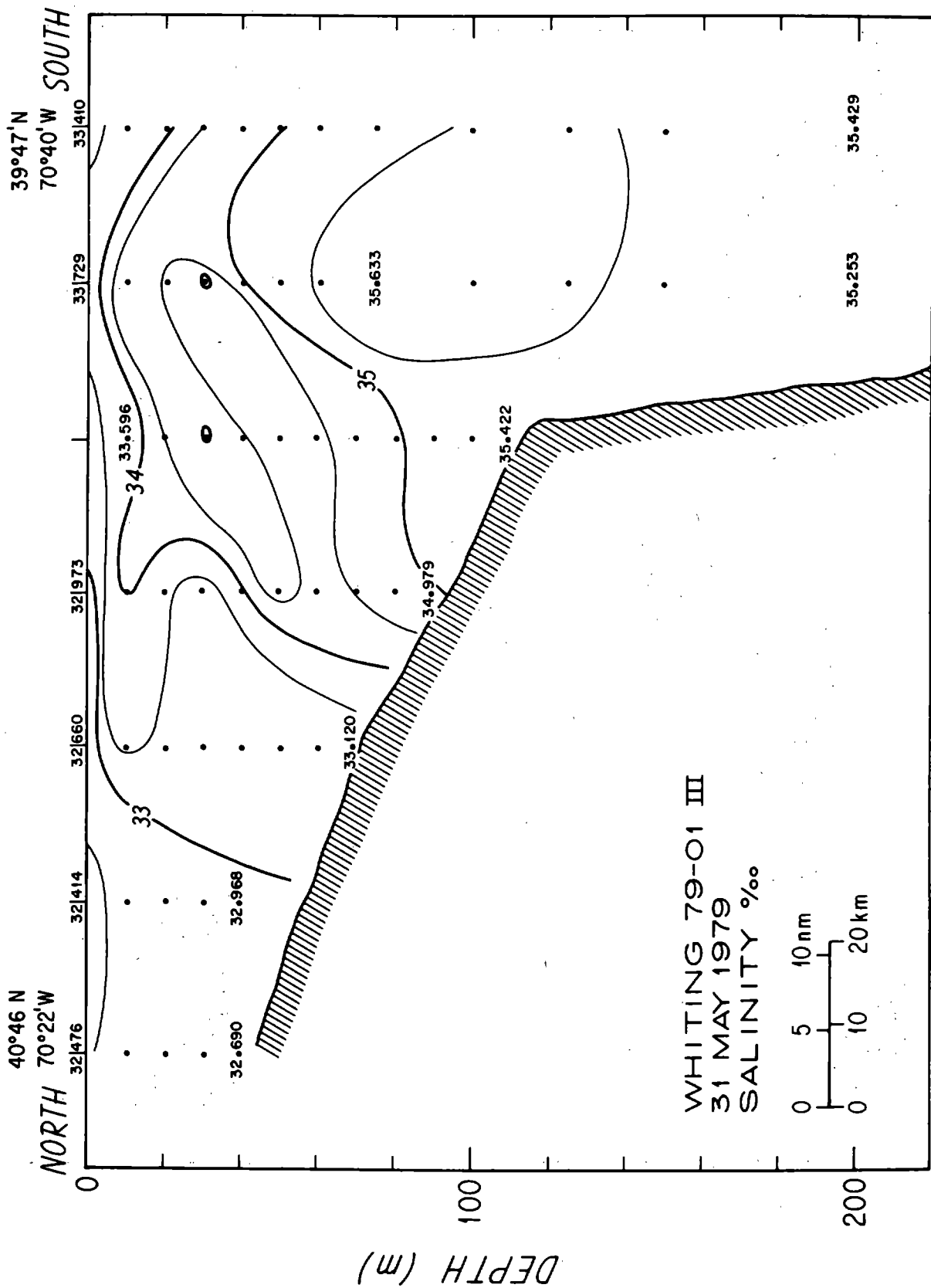


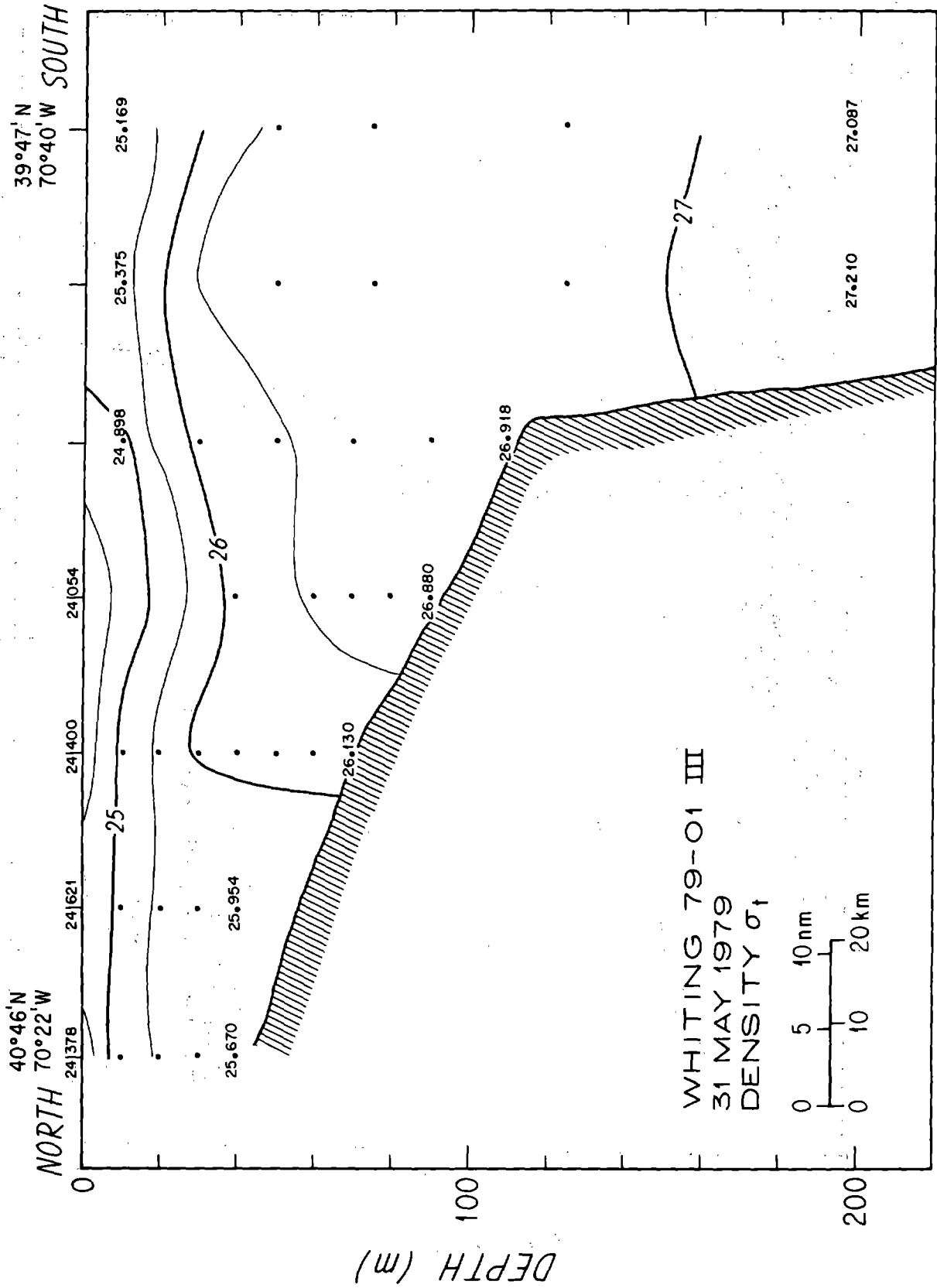
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30 MAY 1979
DENSITY σ_t

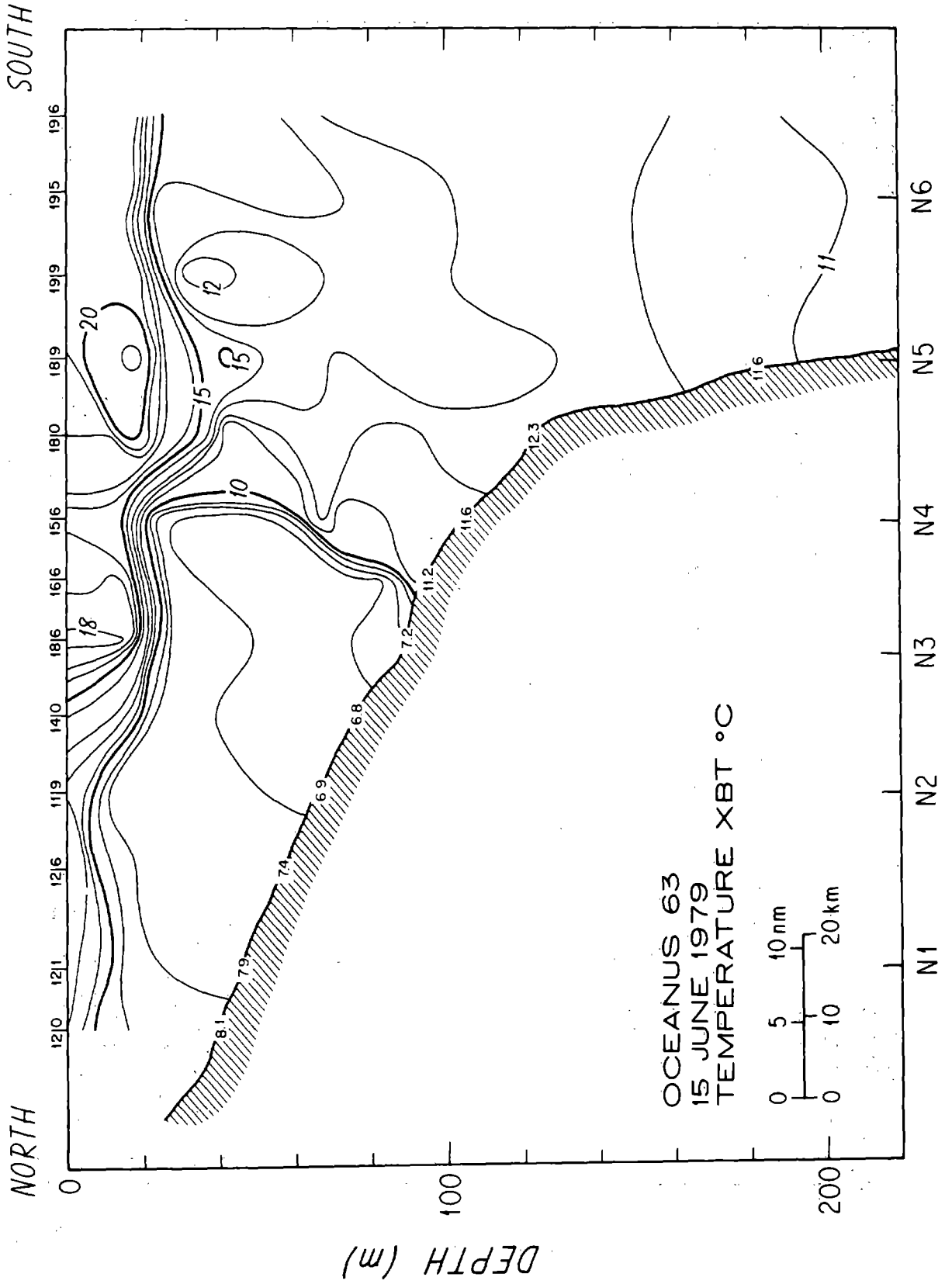


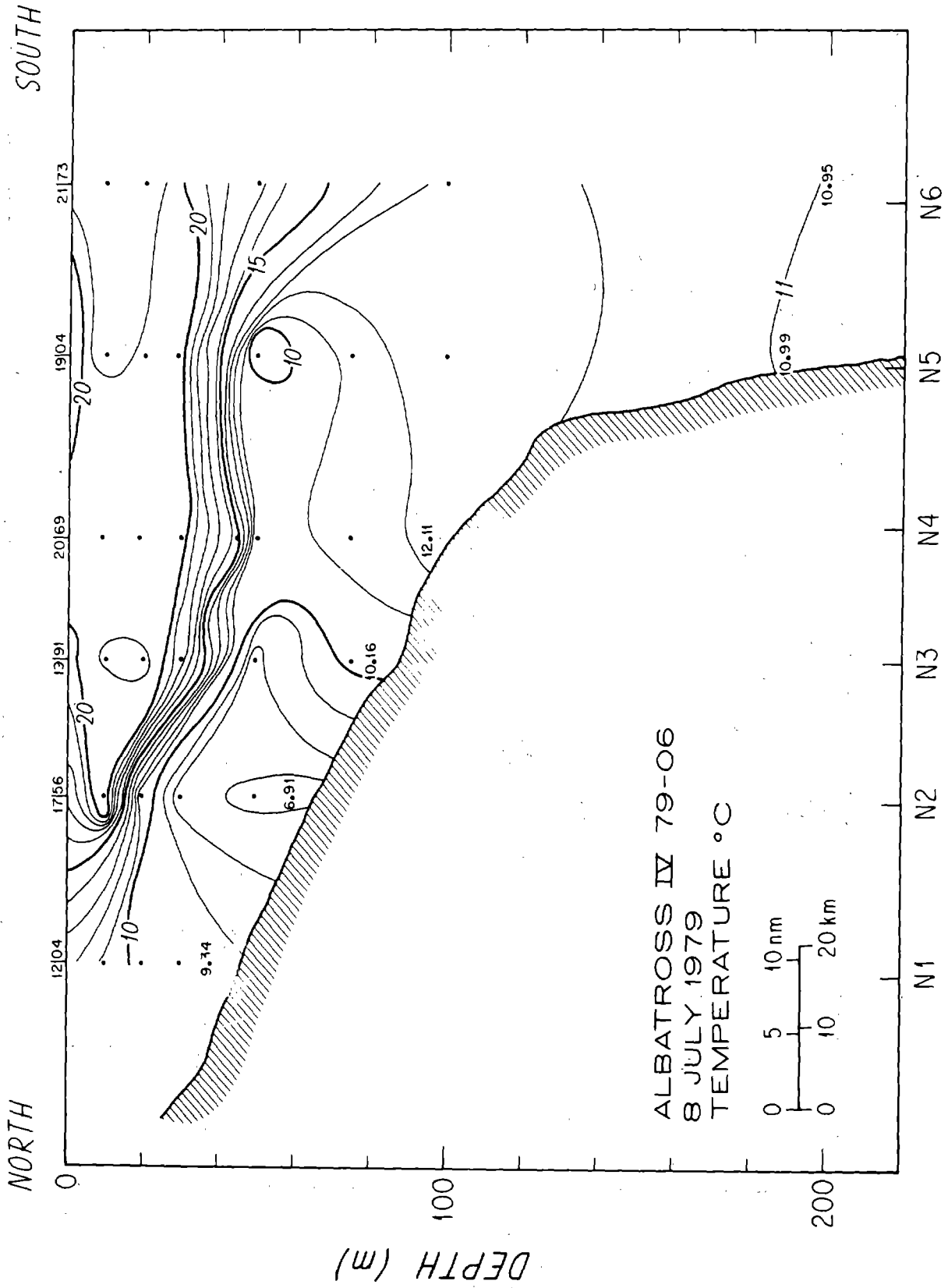


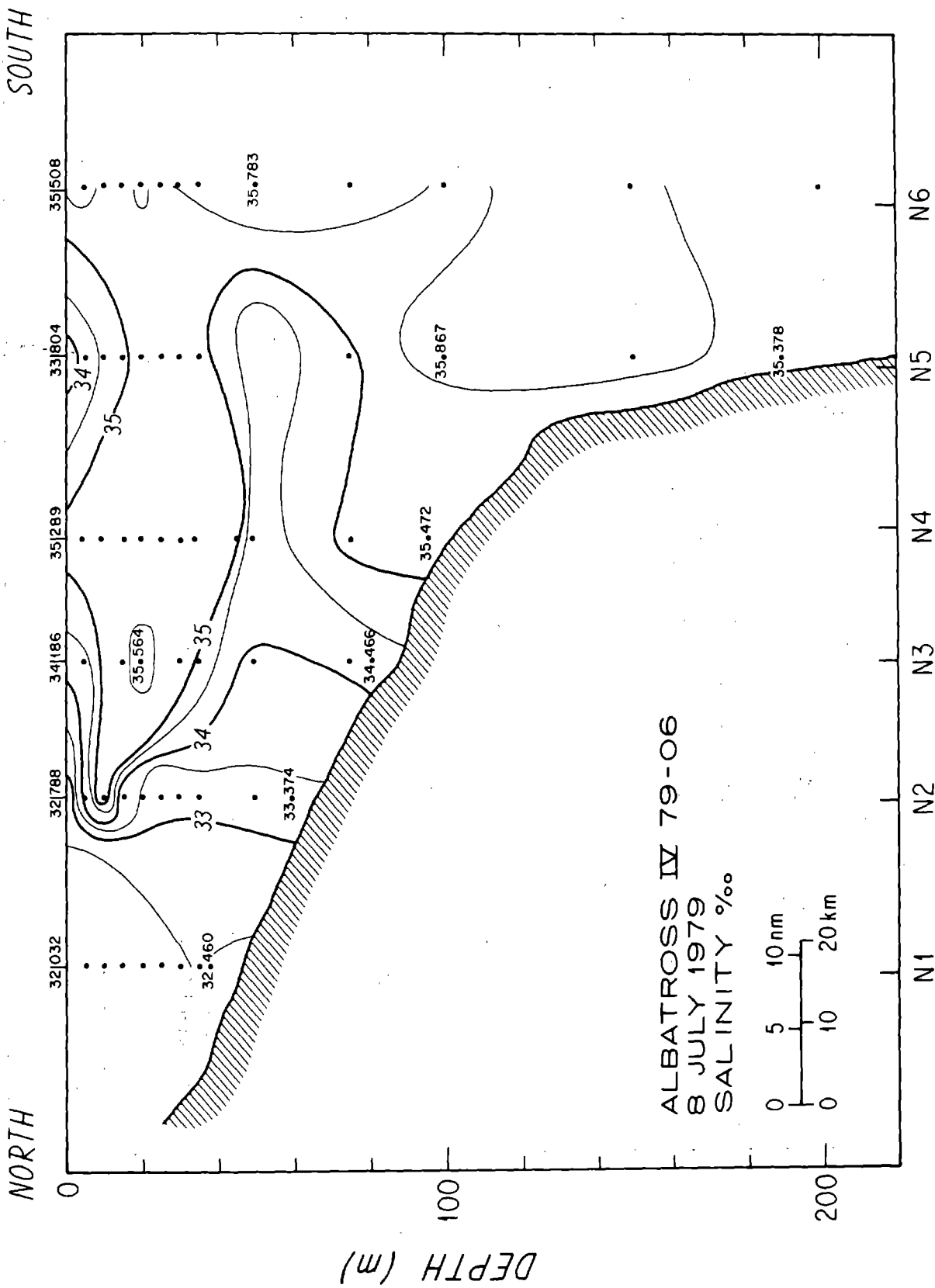


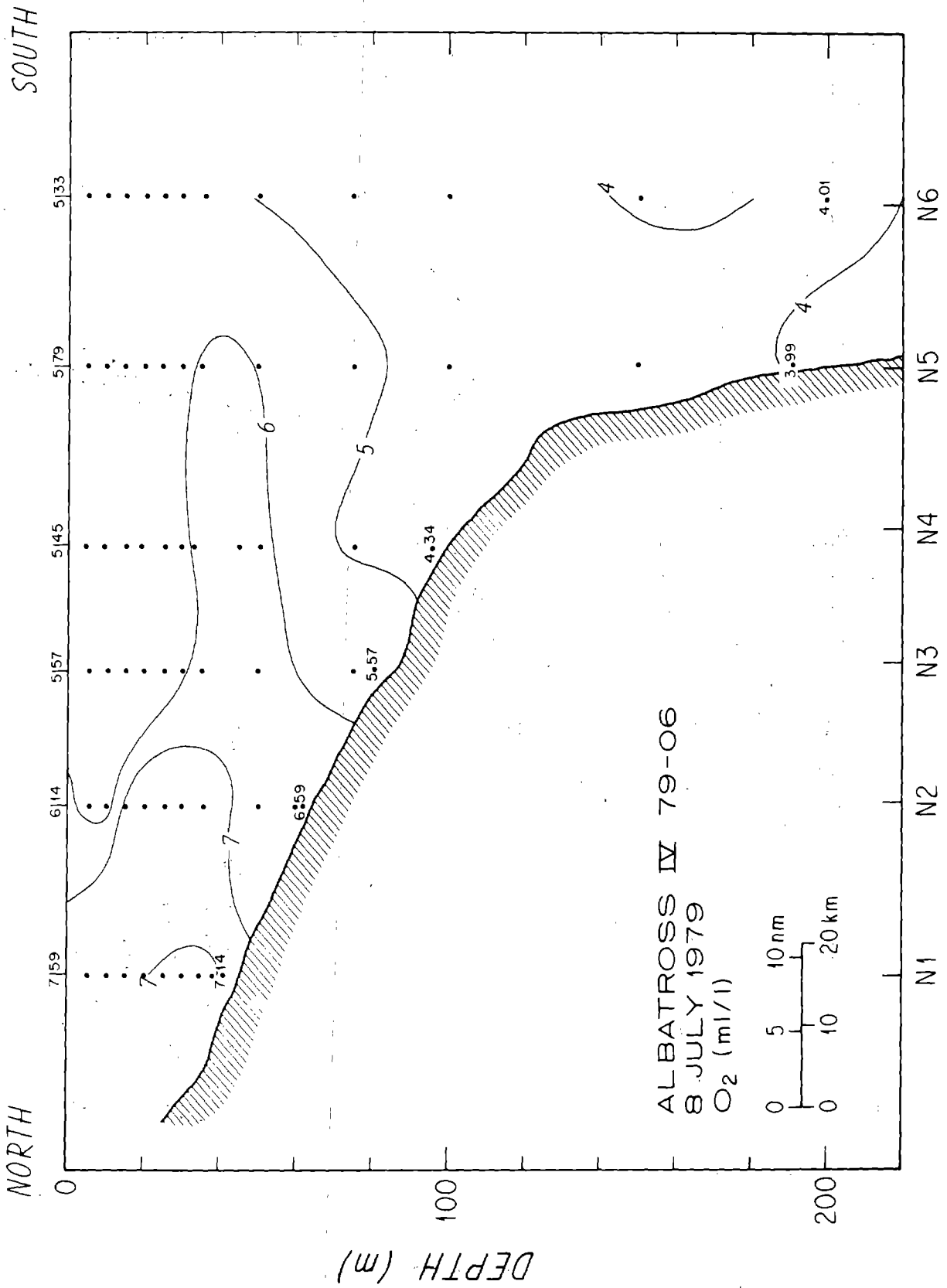


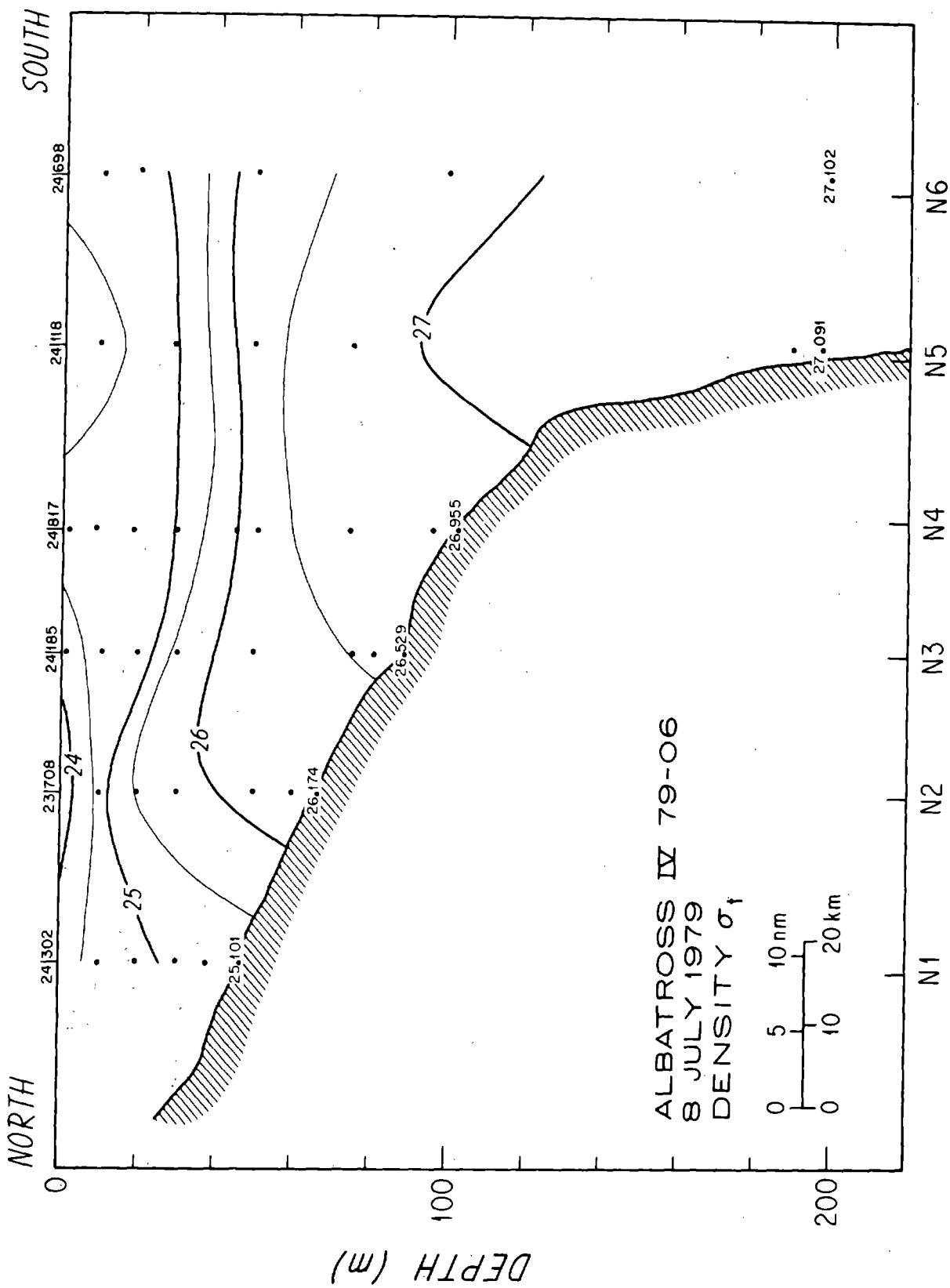


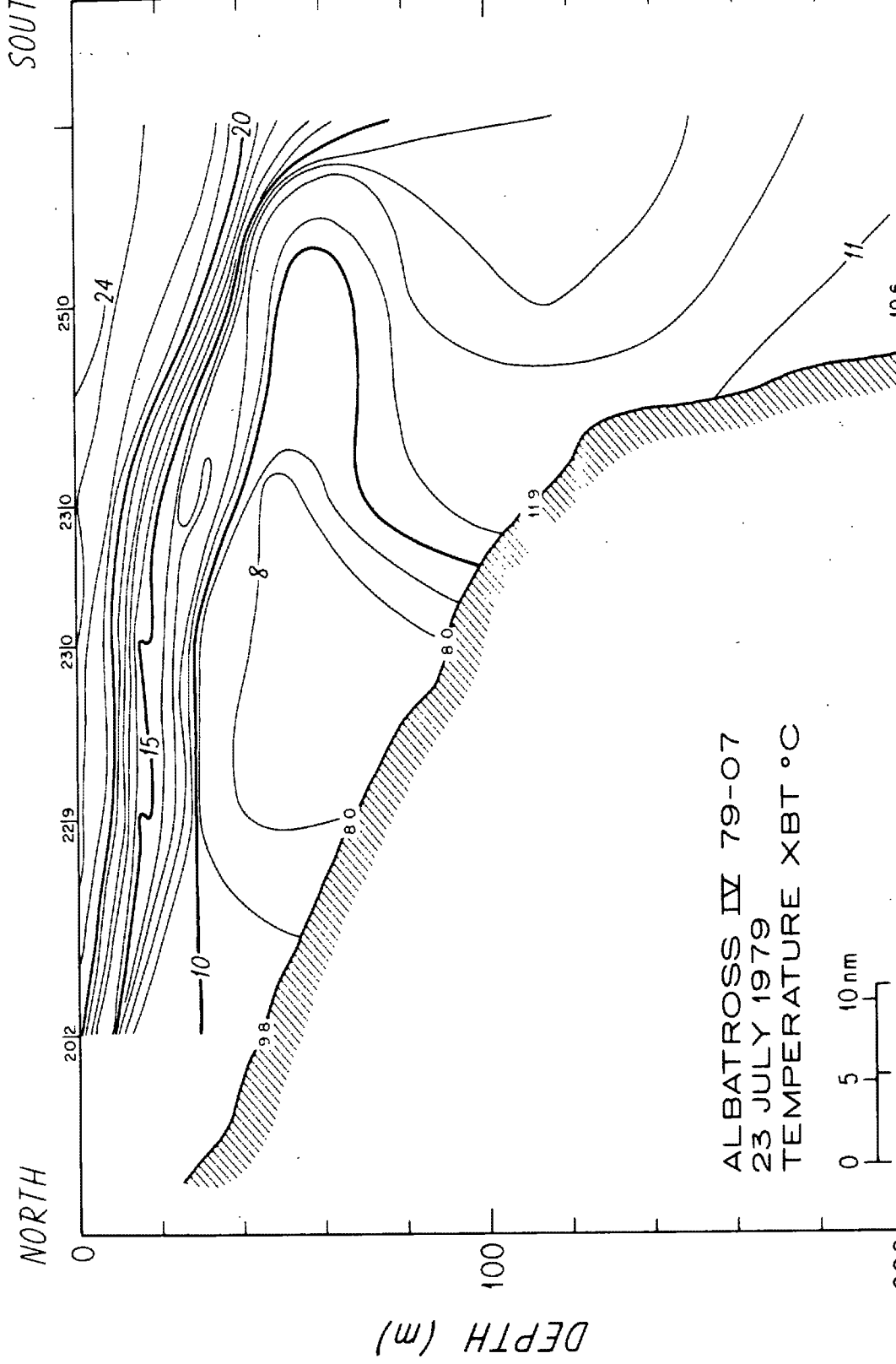




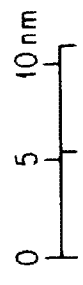


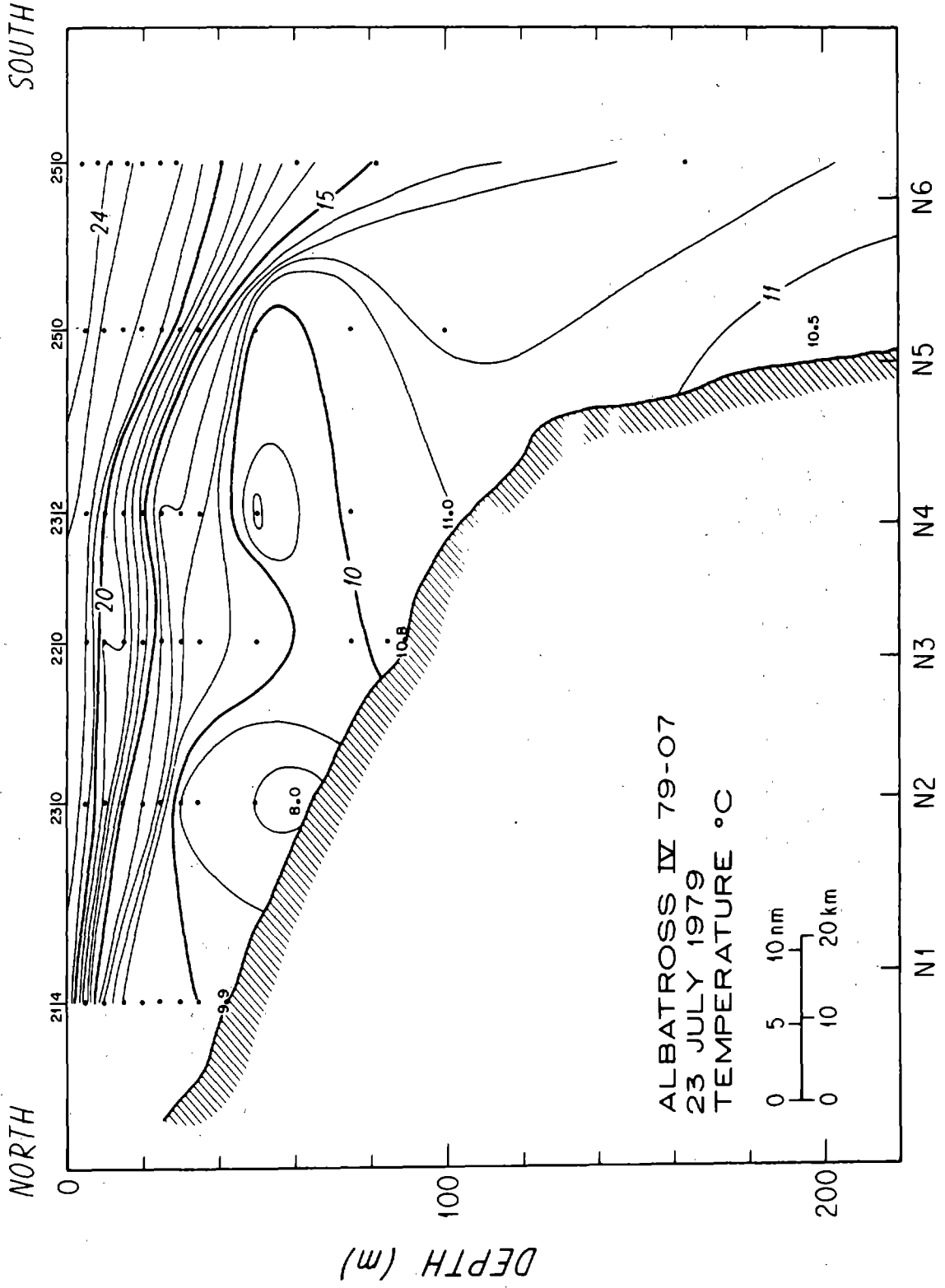


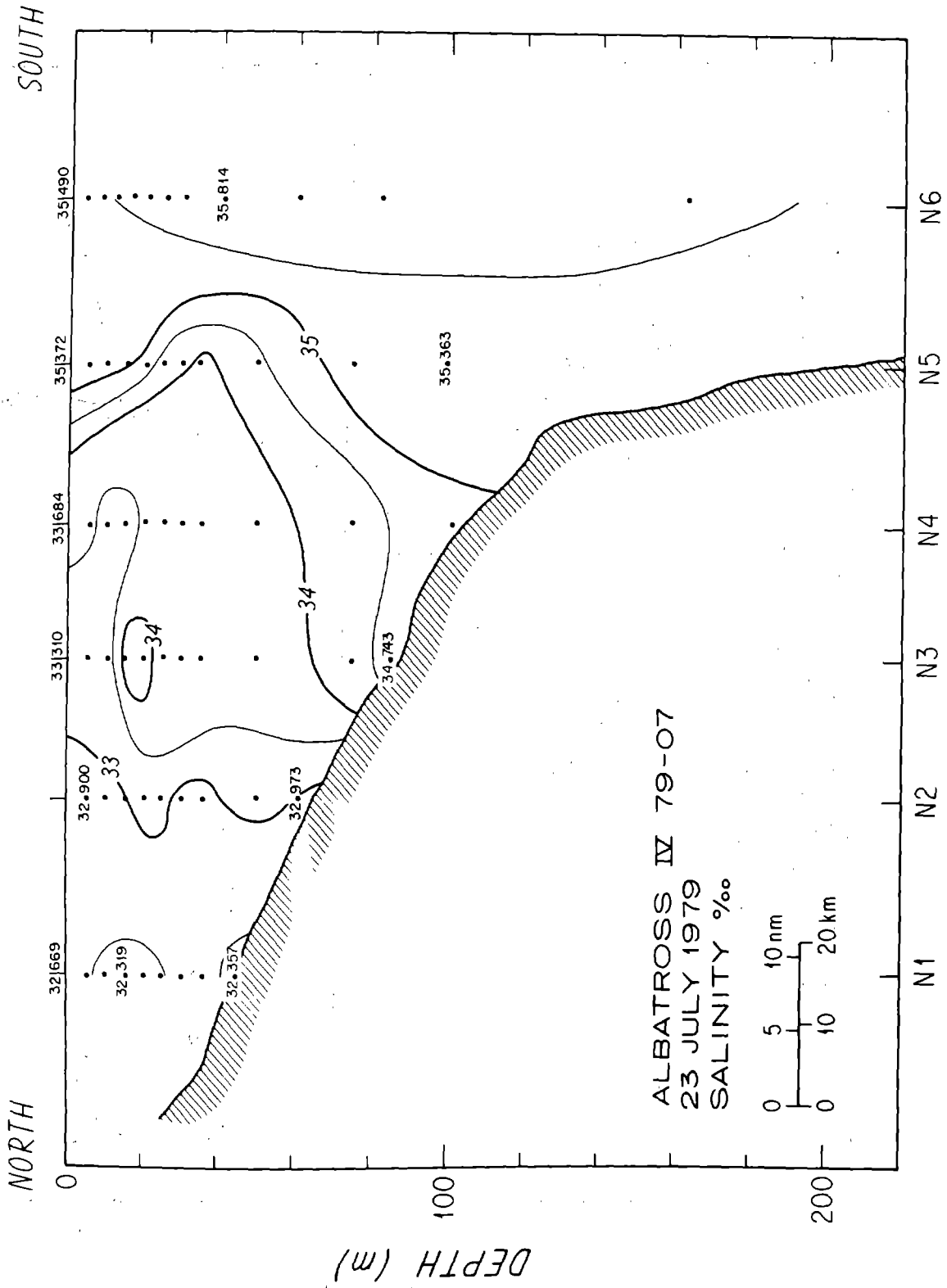


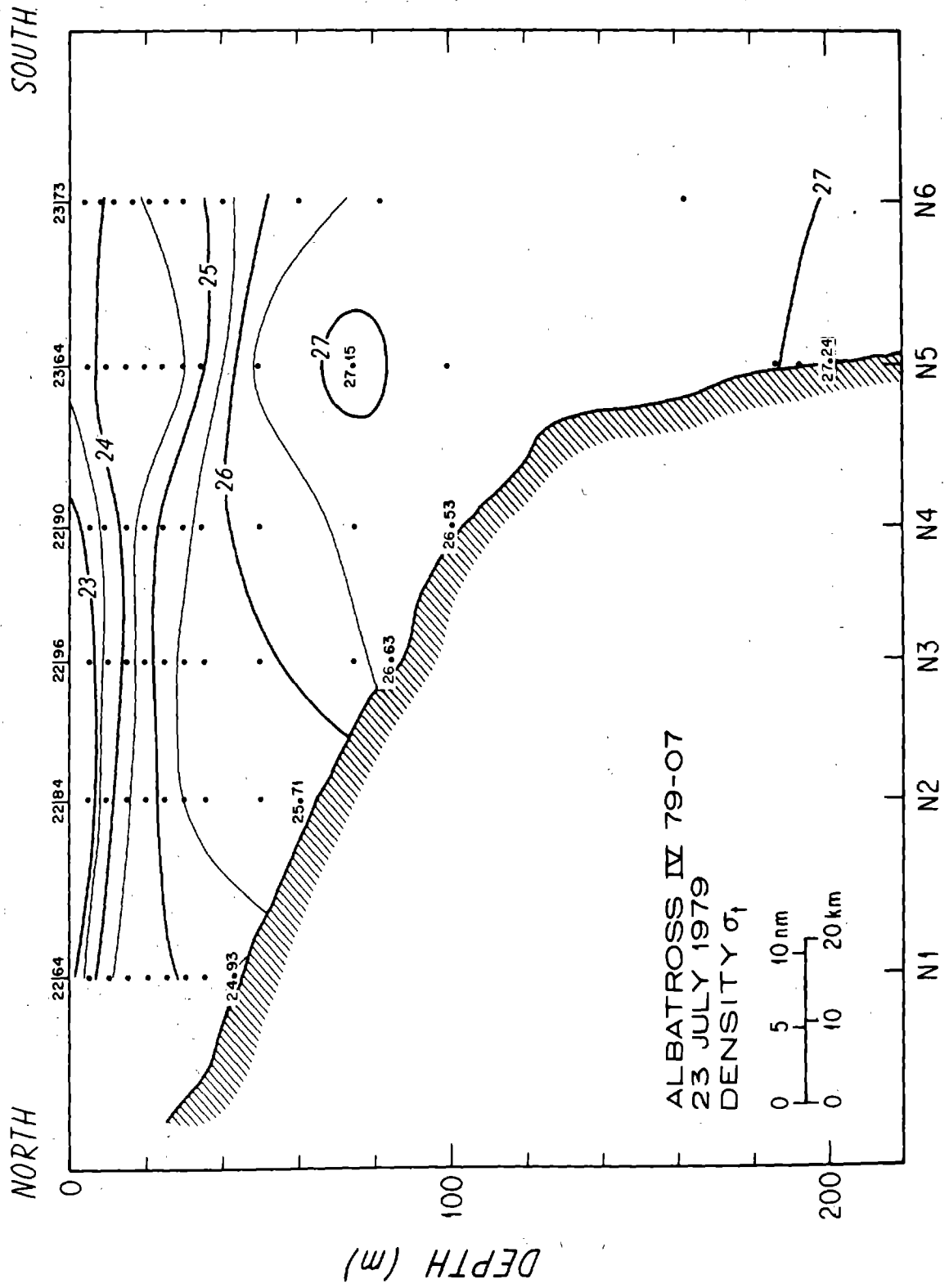


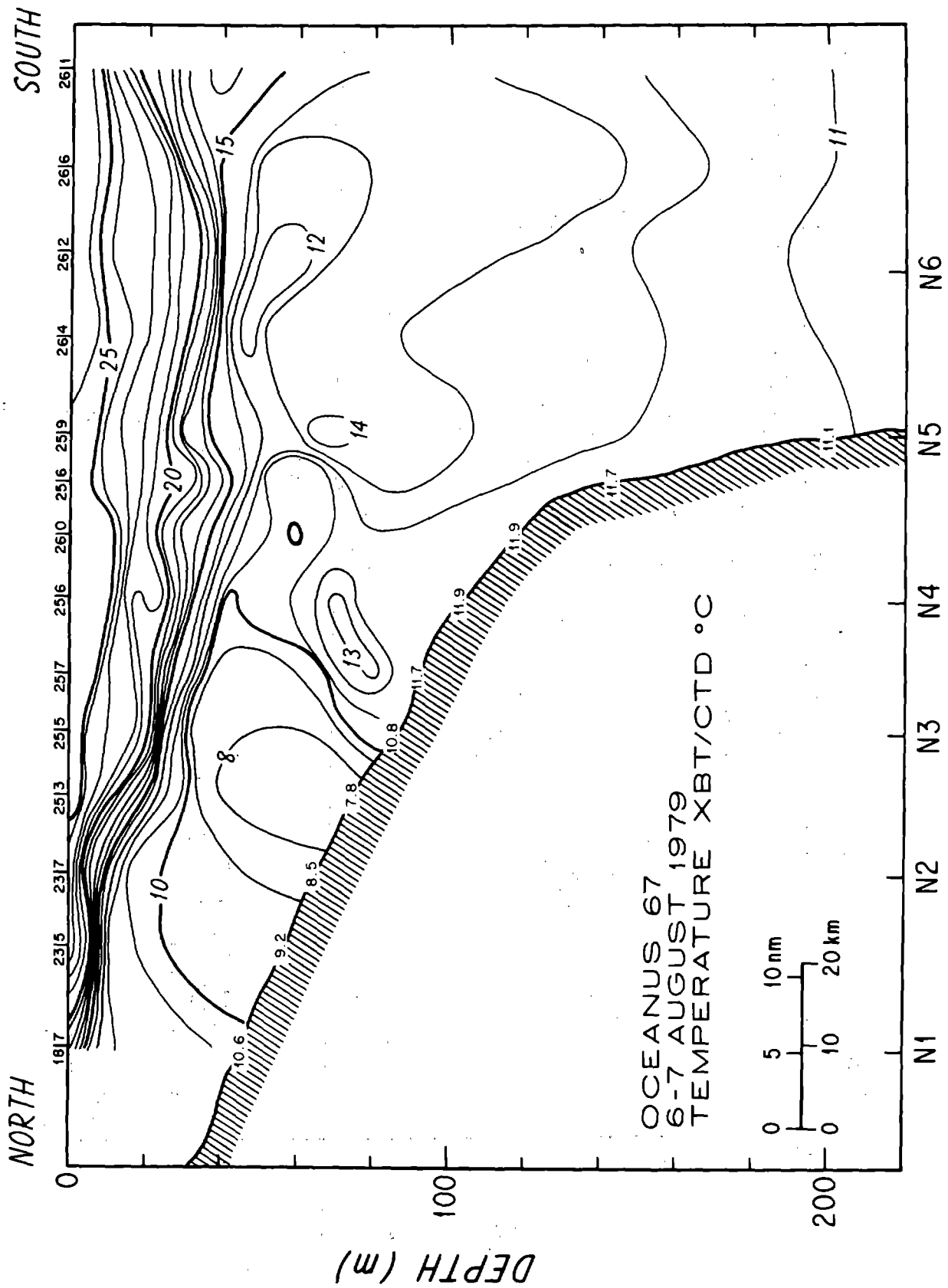
ALBATROSS IV 79-07
23 JULY 1979
TEMPERATURE XBT °C

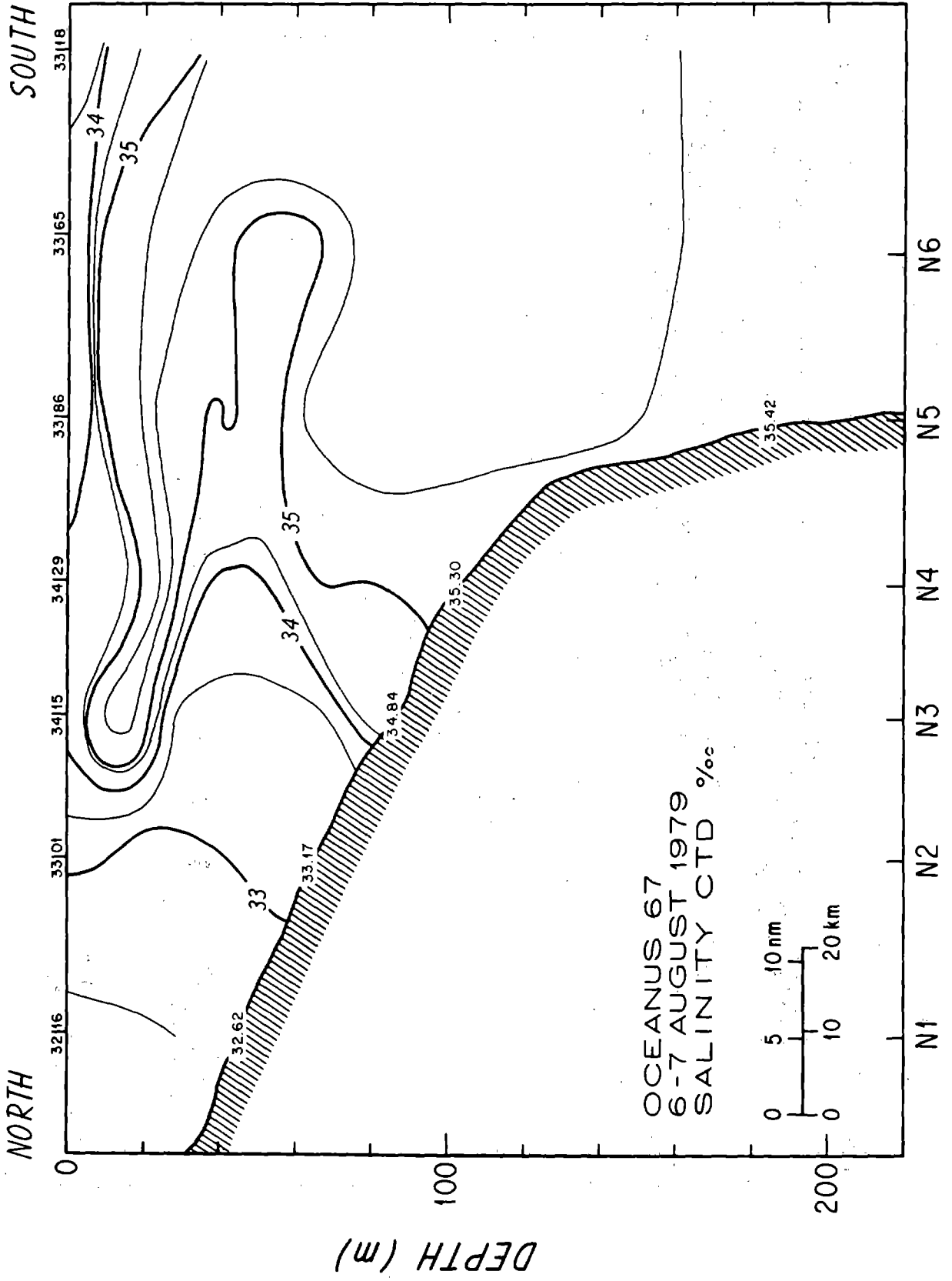


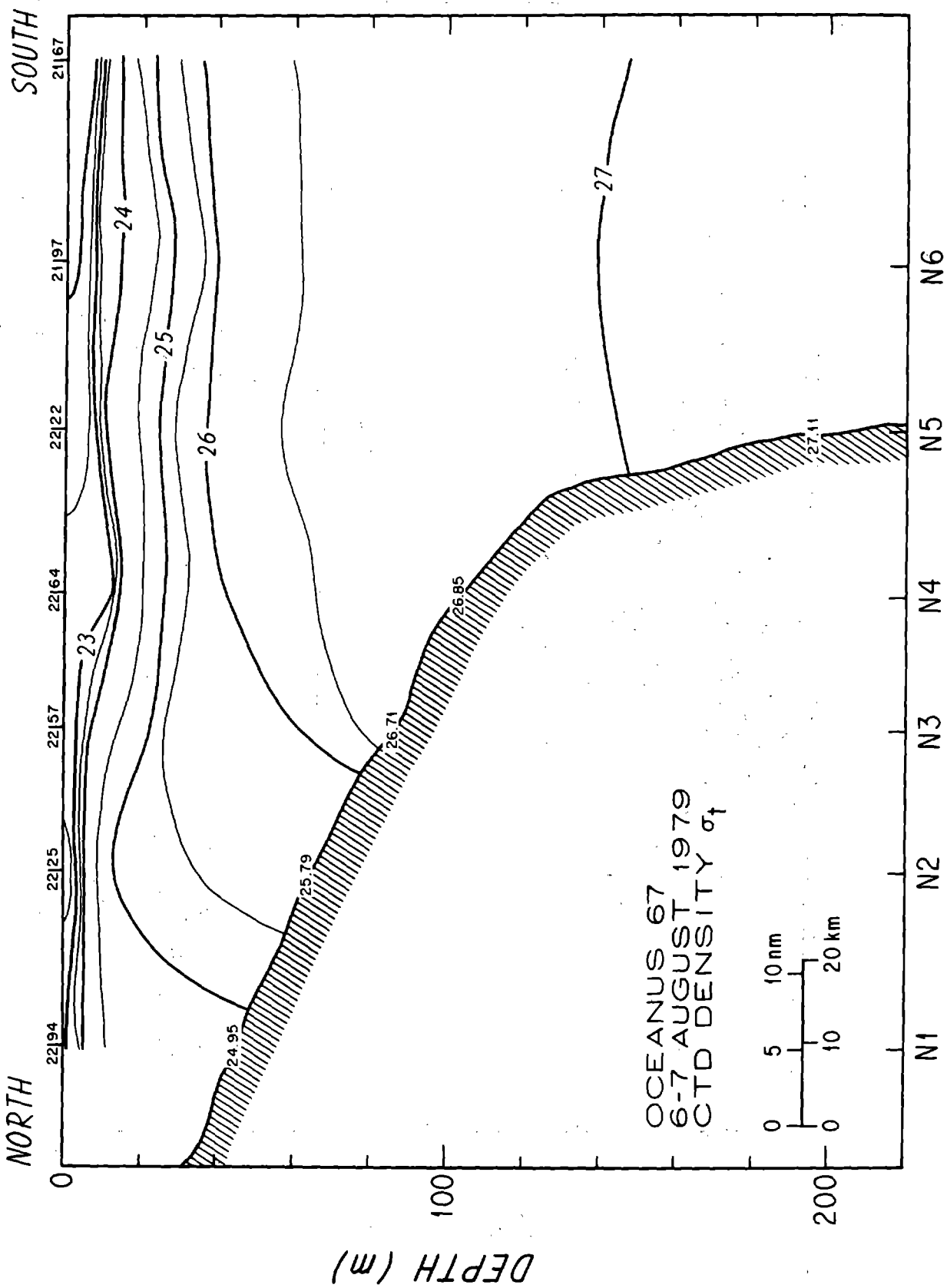






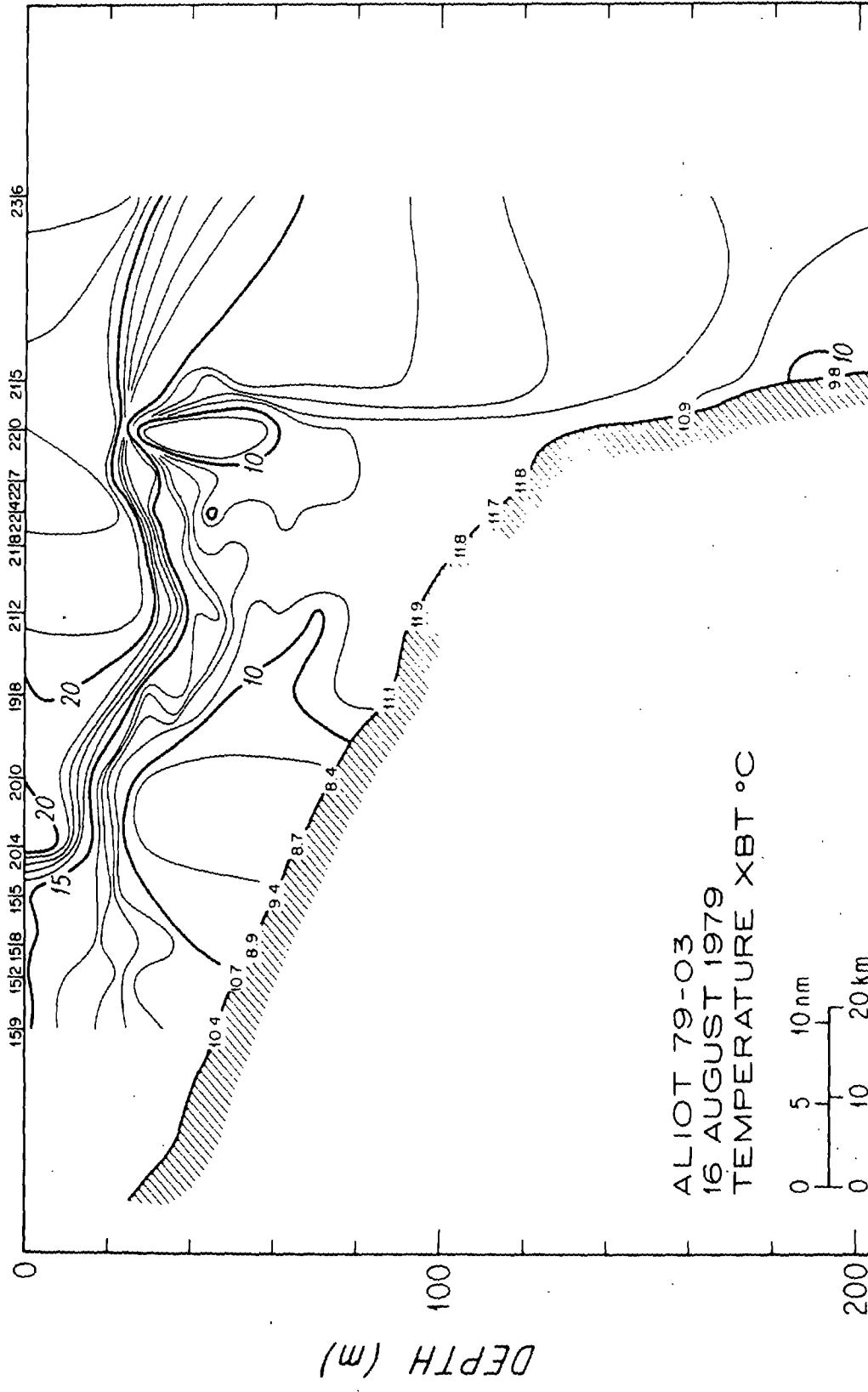




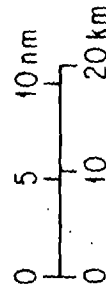


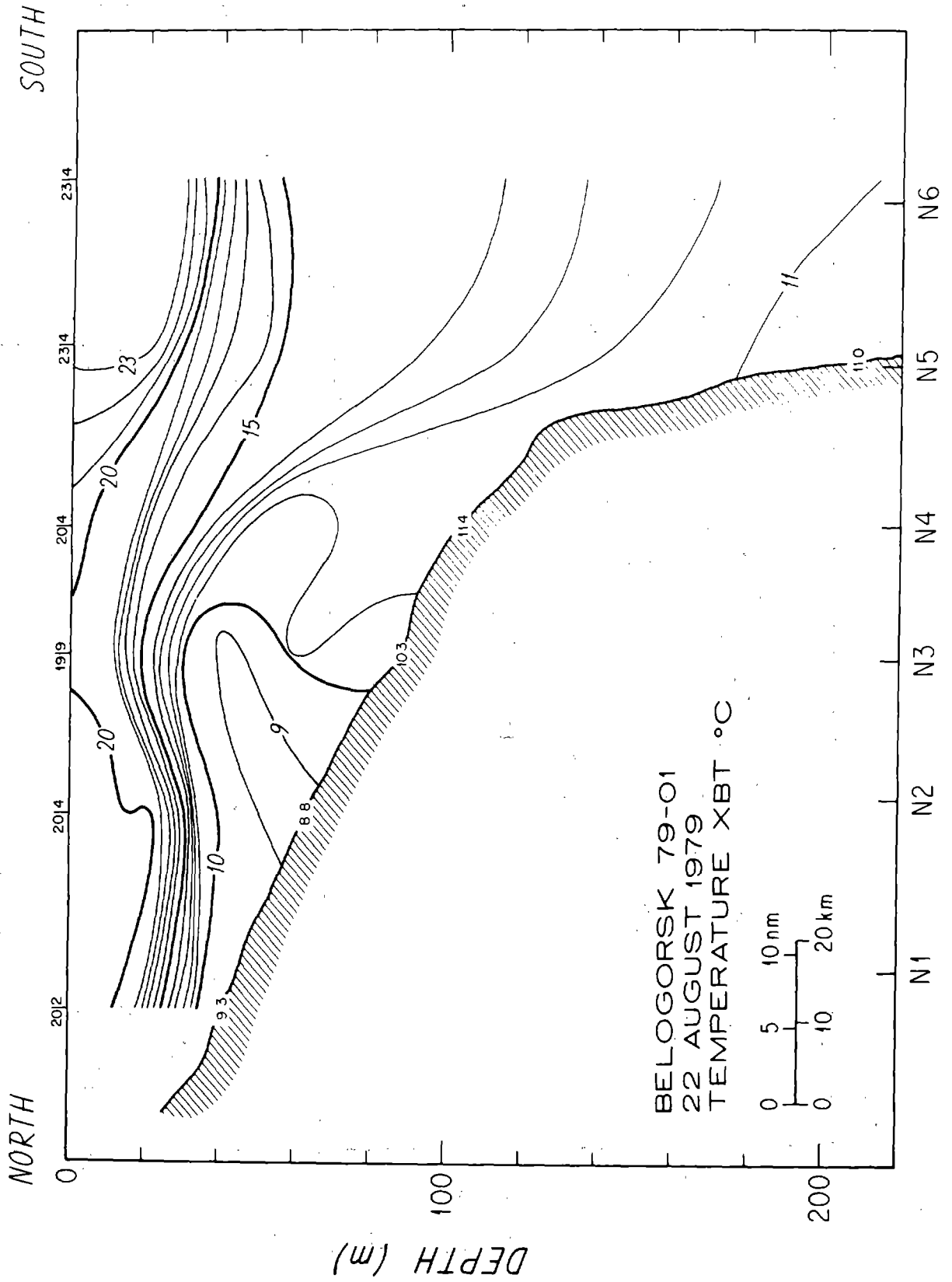
SOUTH

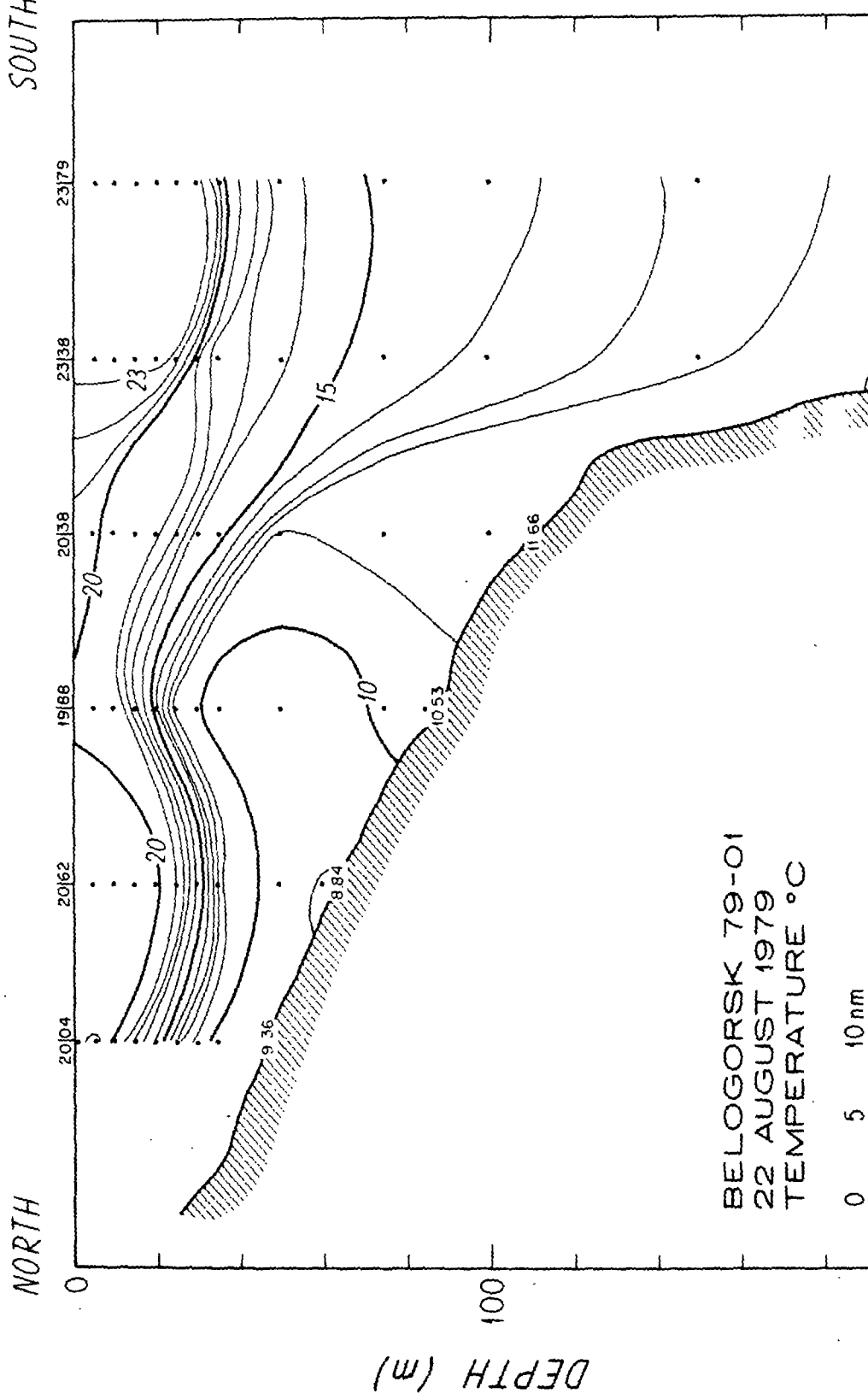
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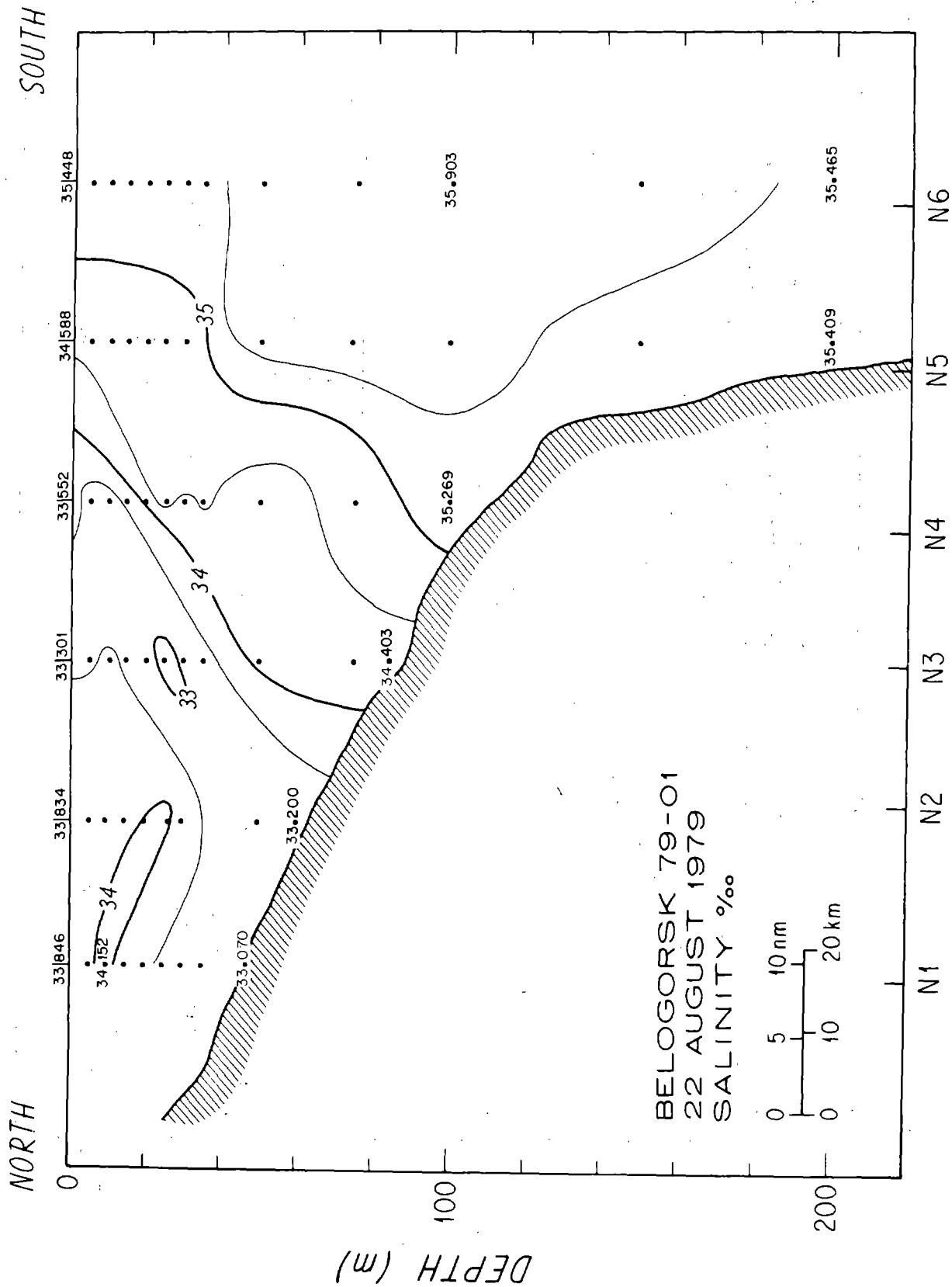


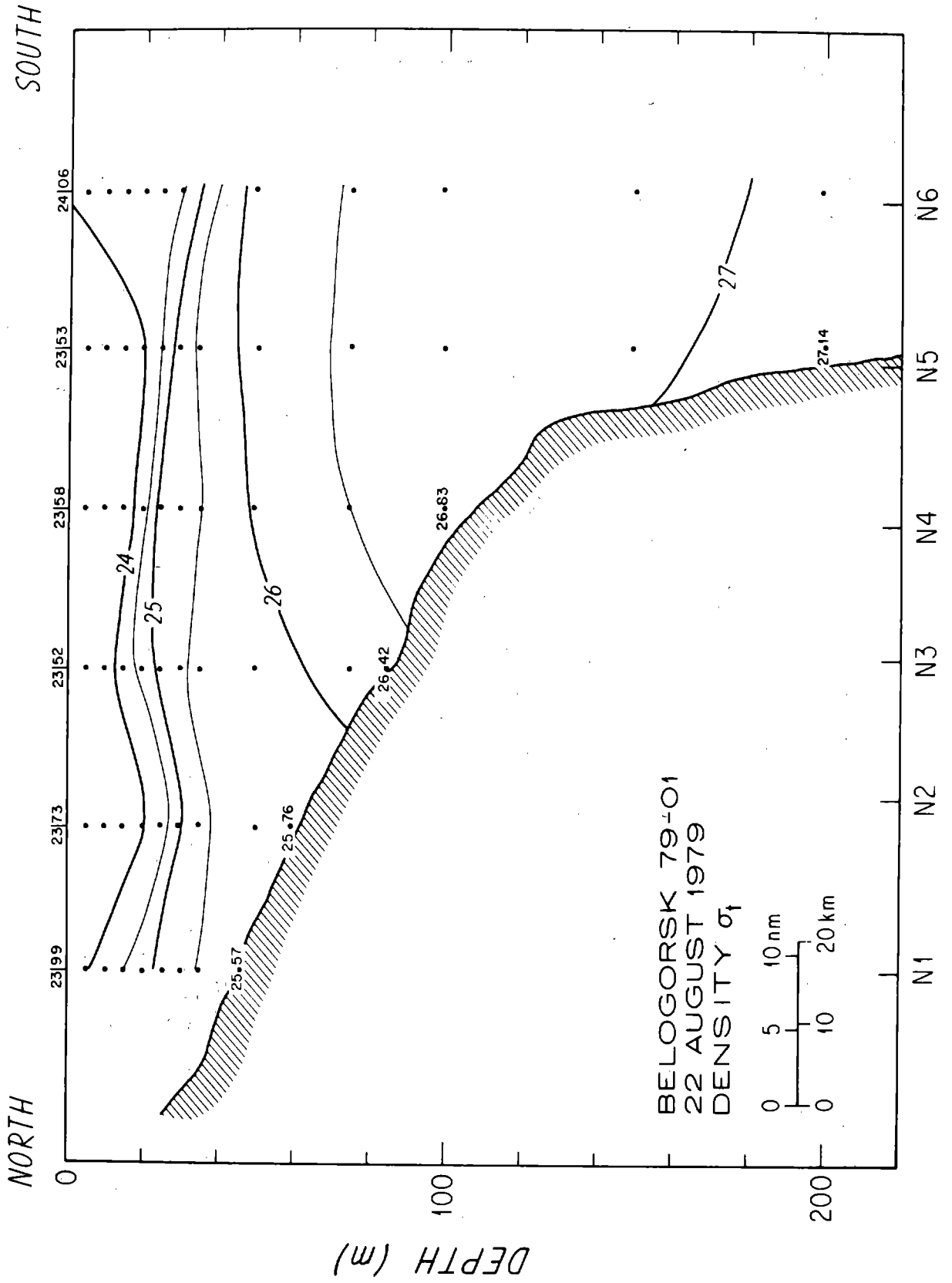
ALLOT 79-03
16 AUGUST 1979
TEMPERATURE XBT °C



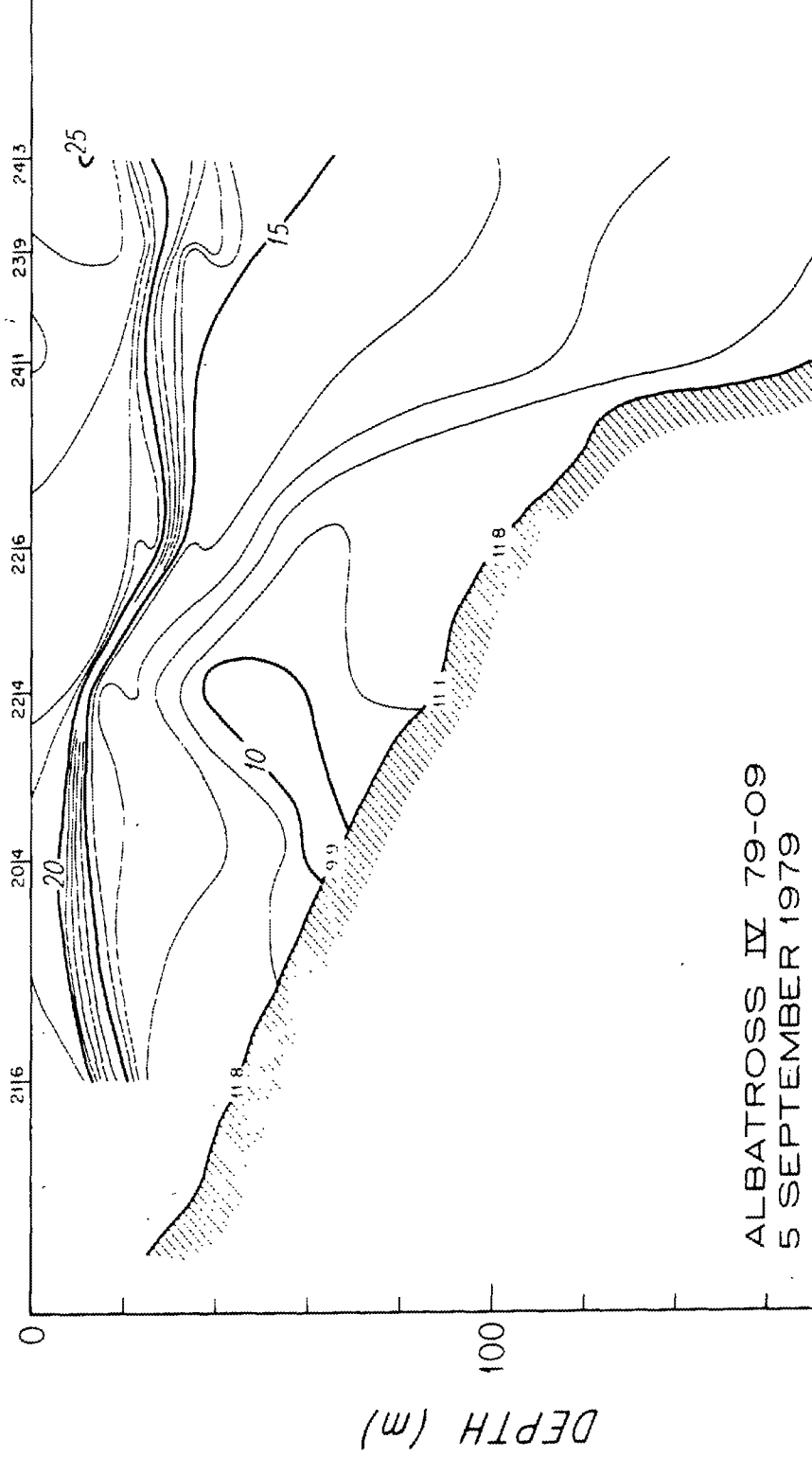




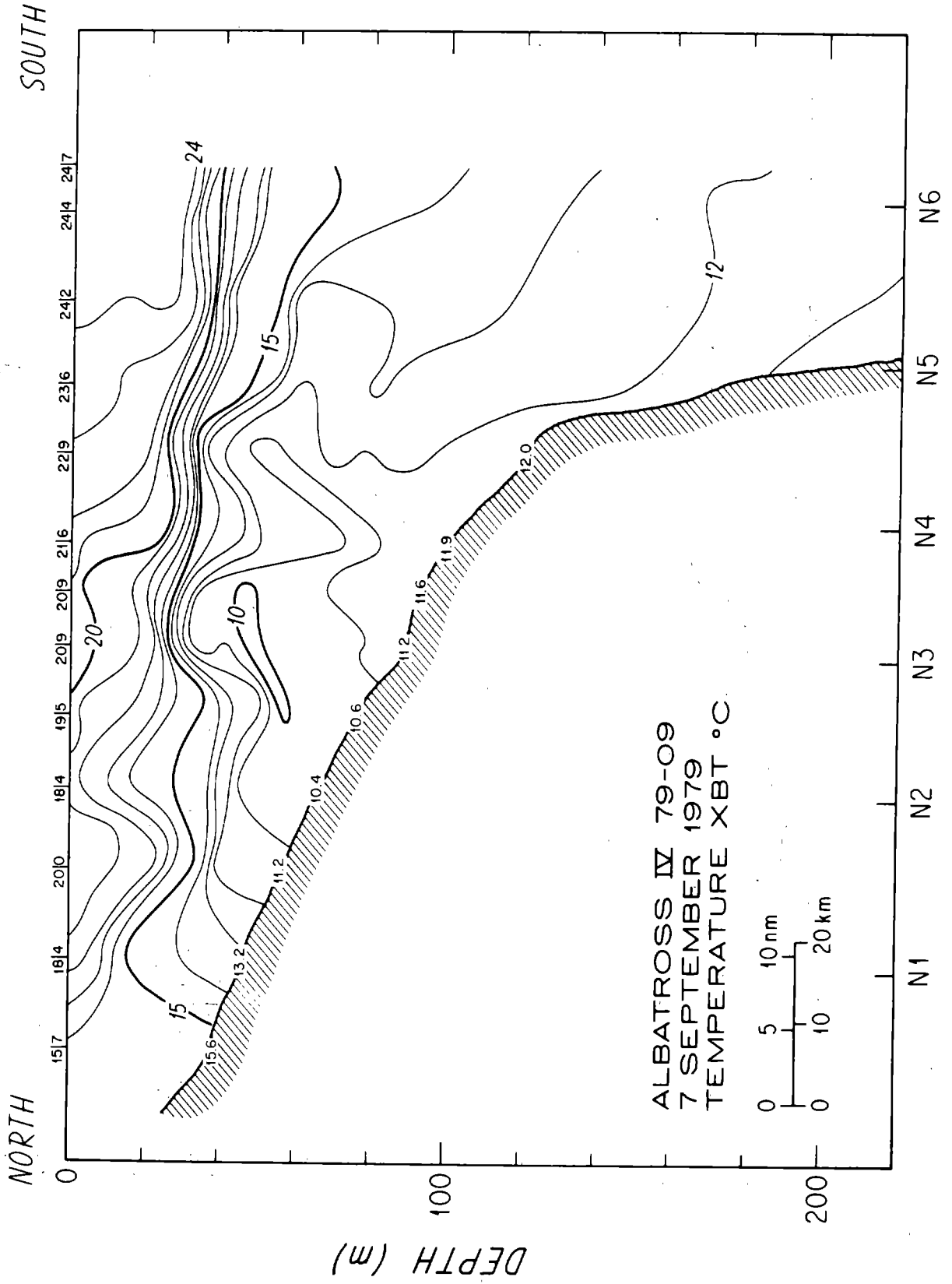


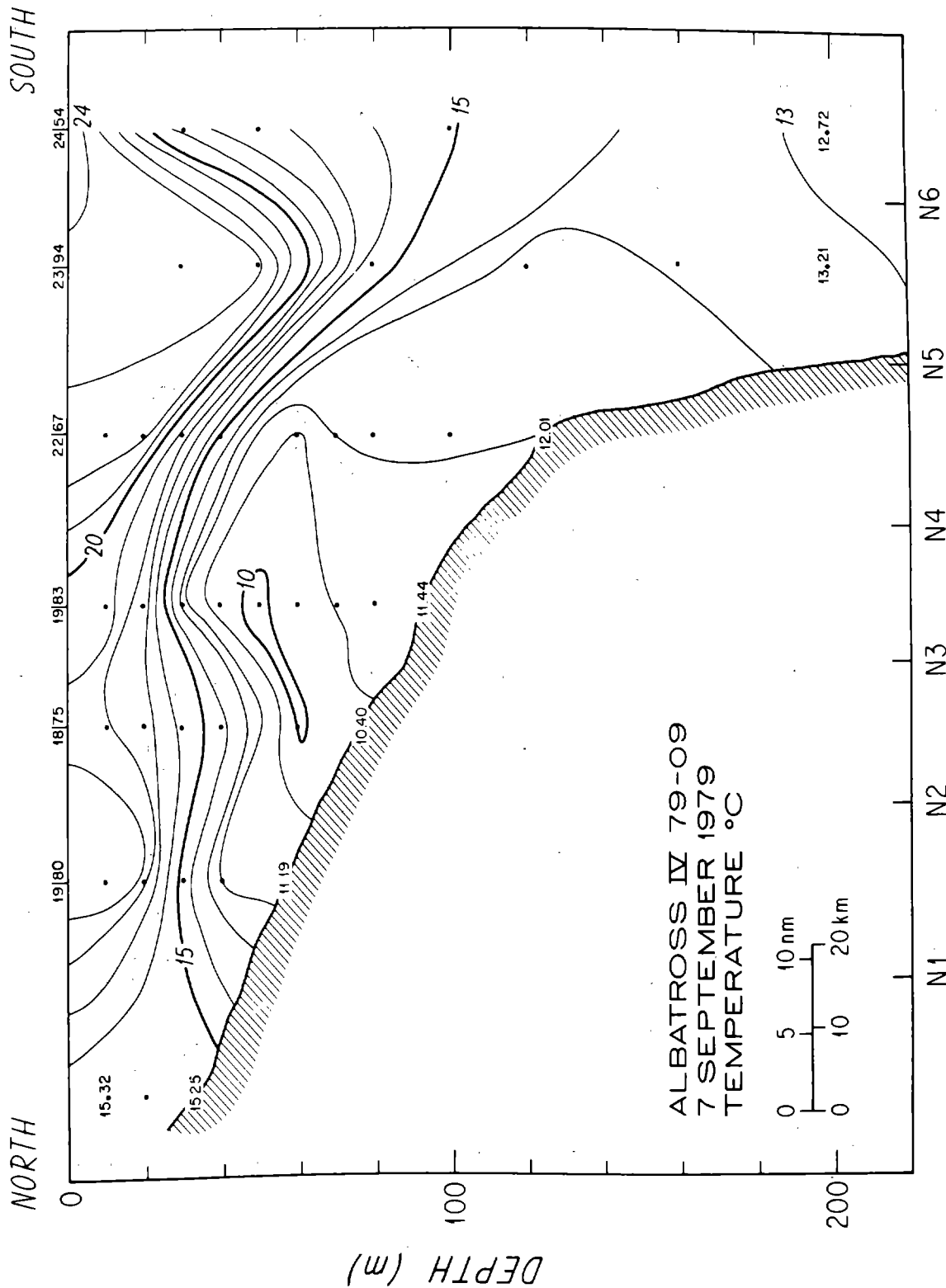


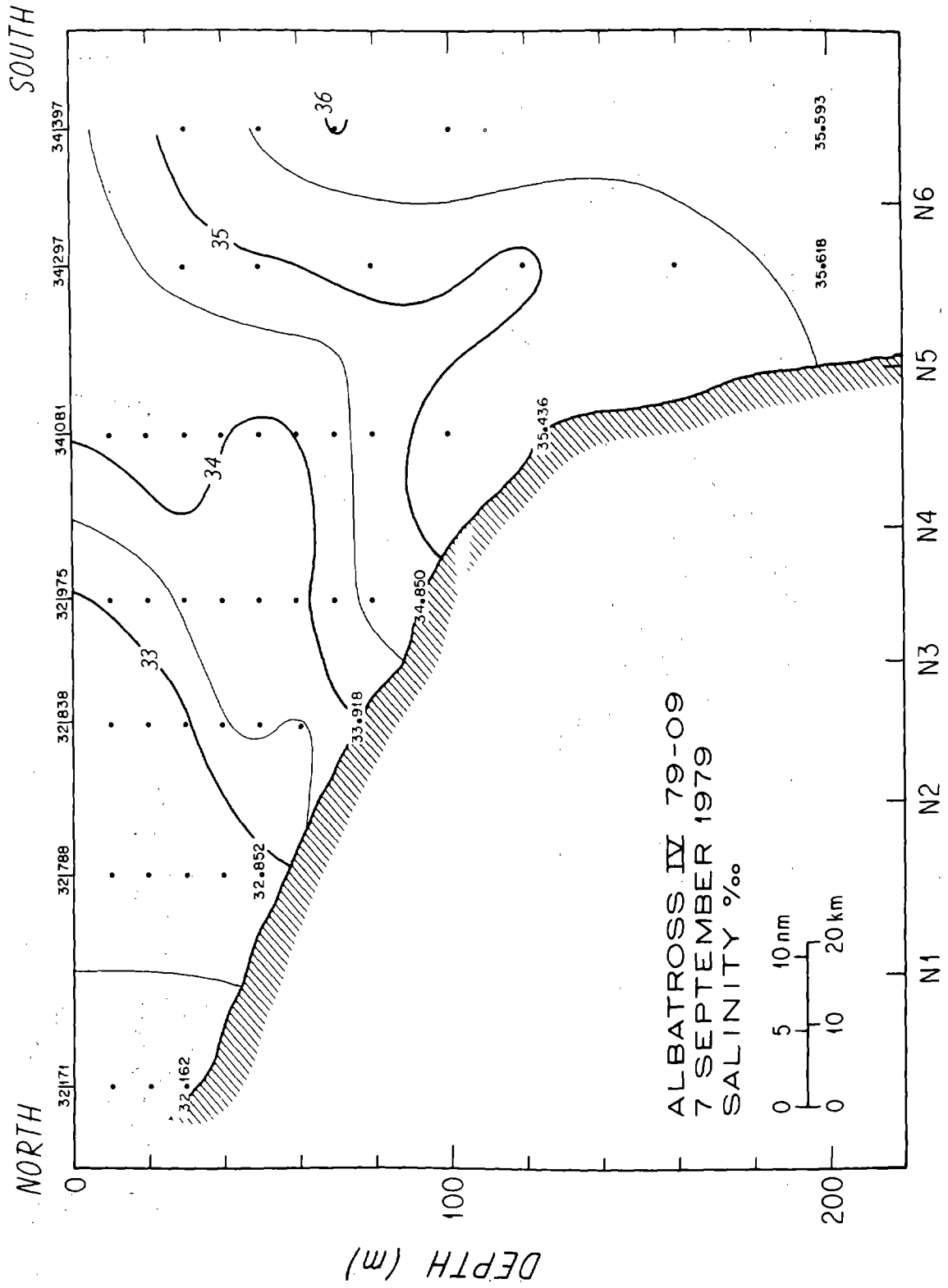
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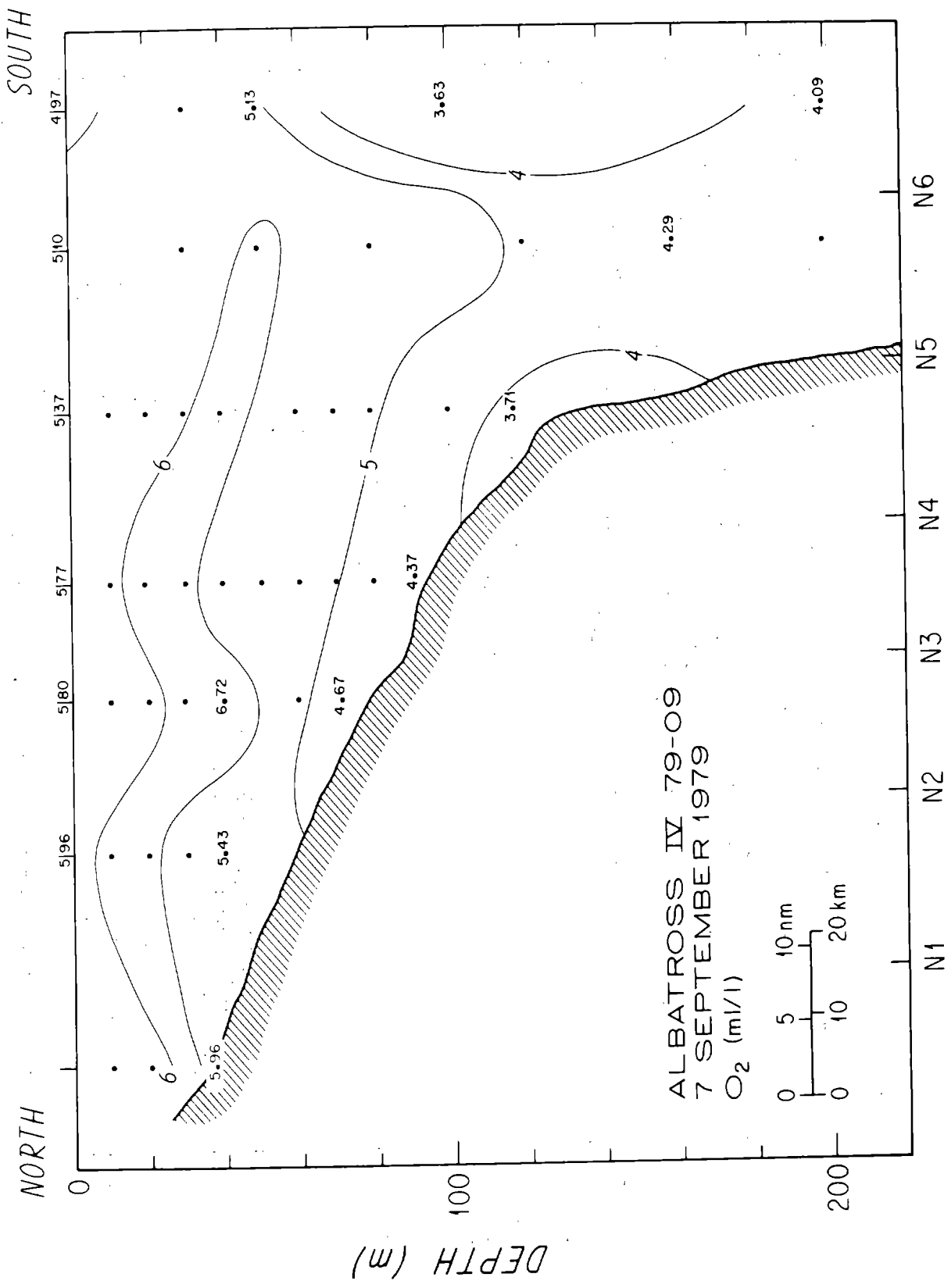


ALBATROSS IV 79-09
5 SEPTEMBER 1979





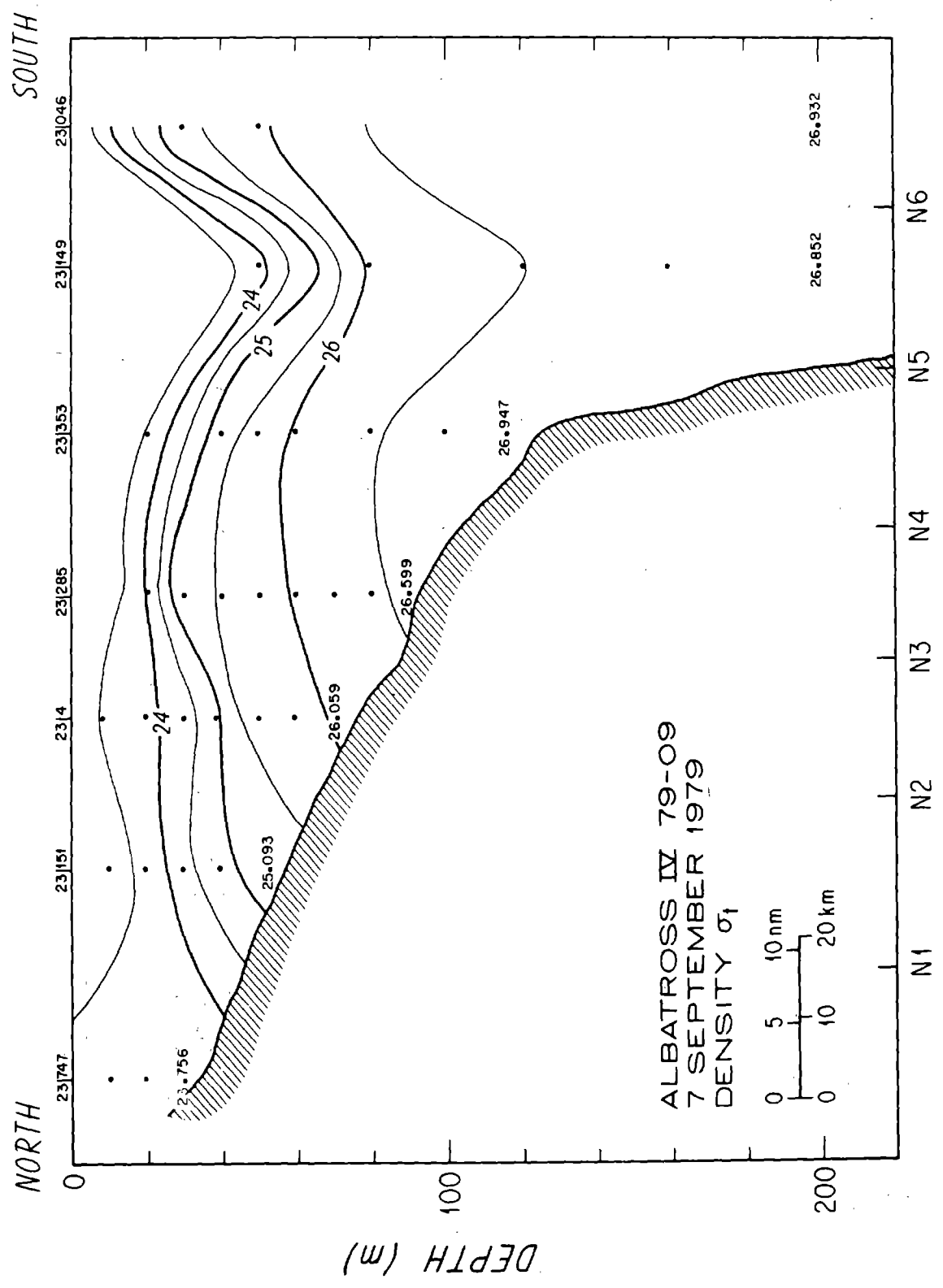


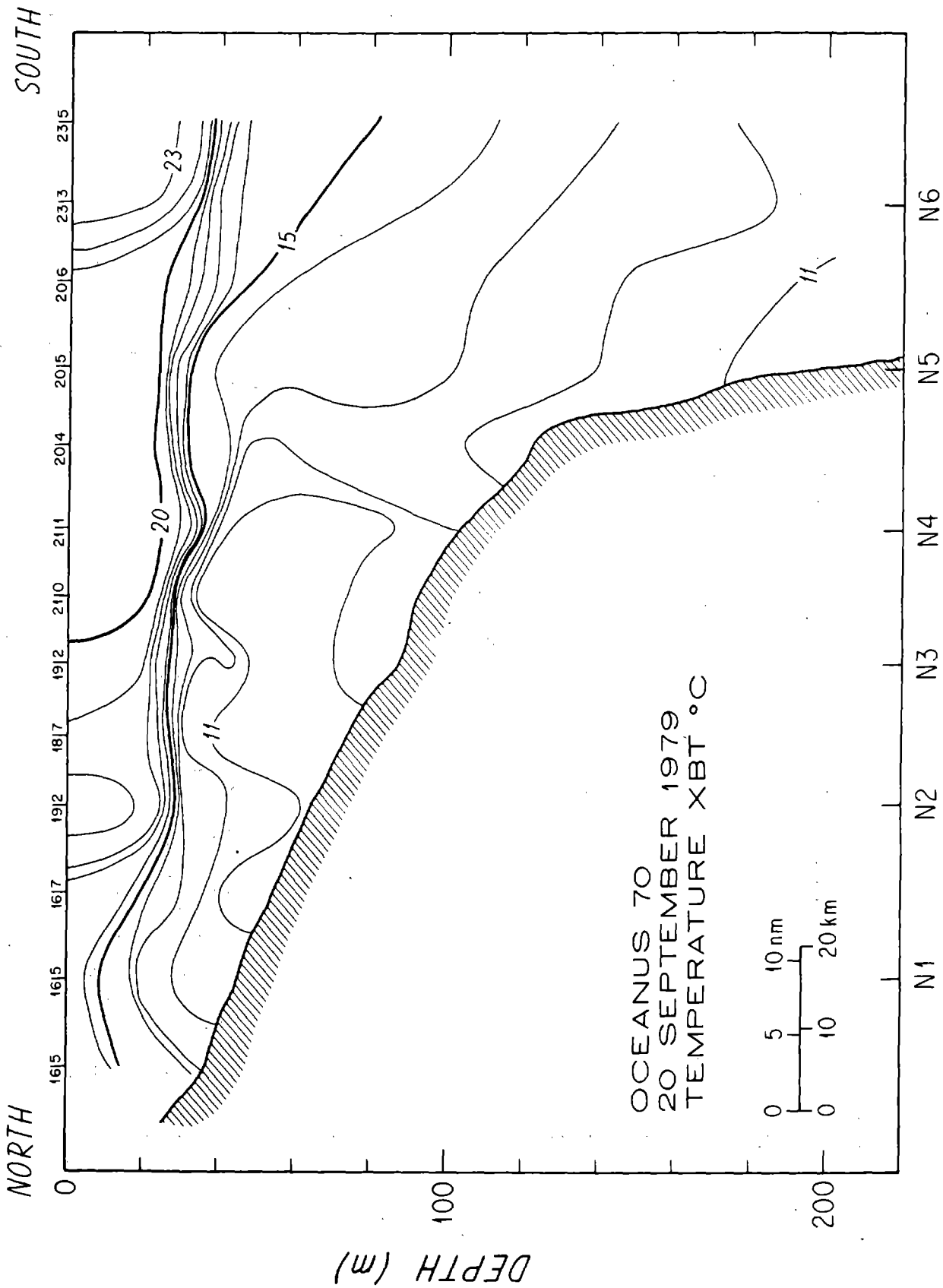


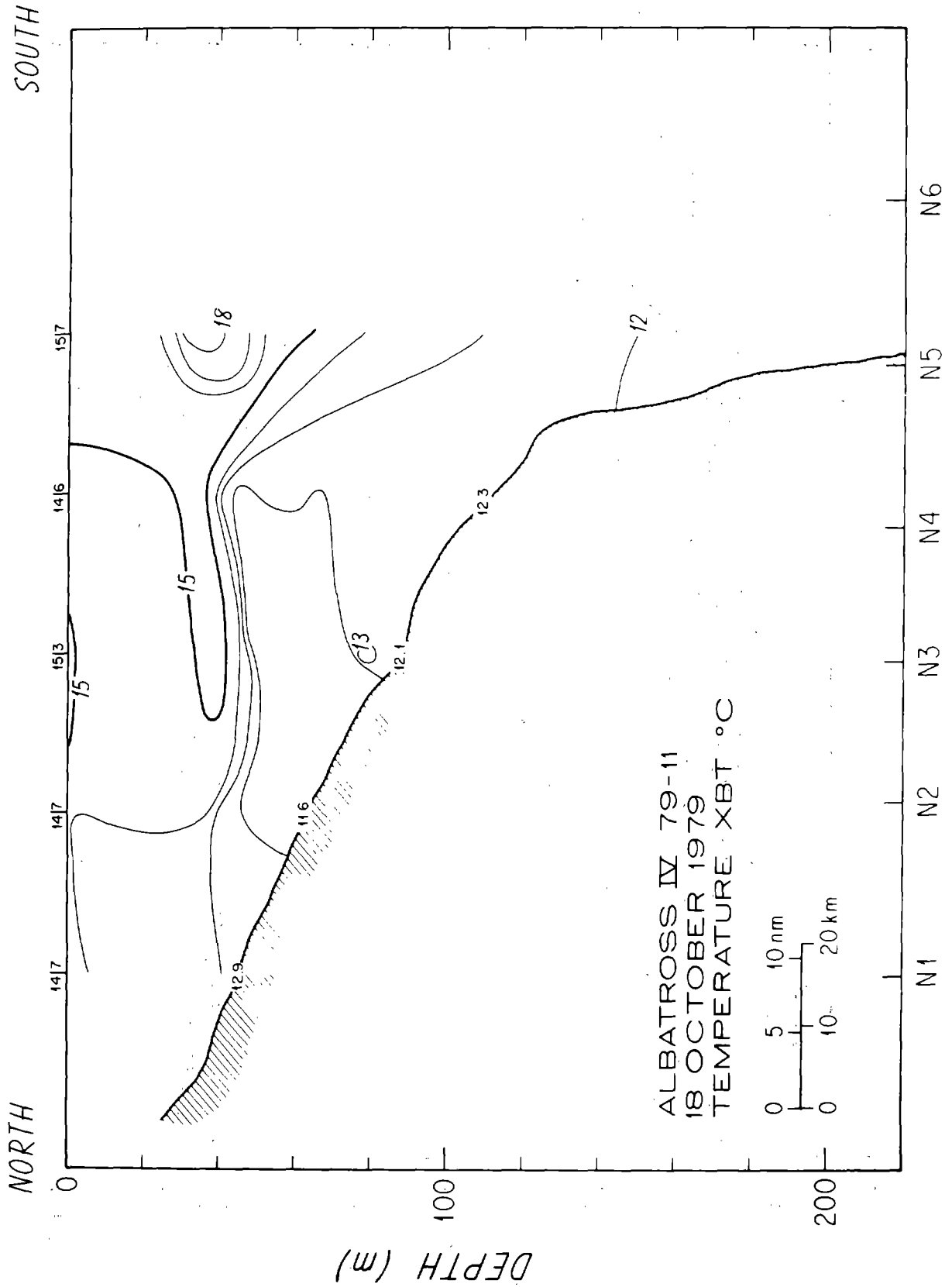
ALBATROSS IV 79-09
7 SEPTEMBER 1979
 O_2 (ml/l)

0 5 10 nm
0 10 20 km

NORTH SOUTH

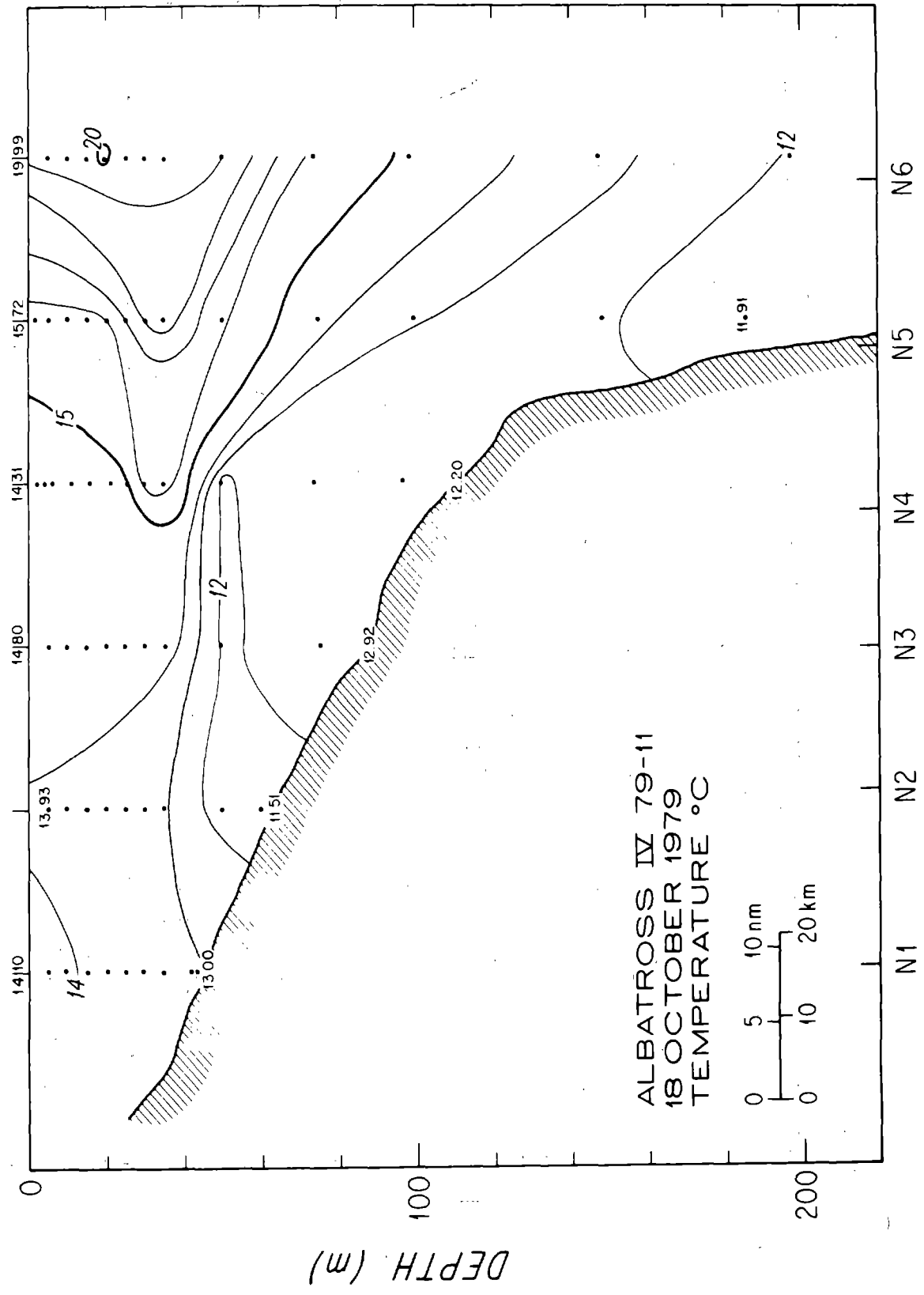


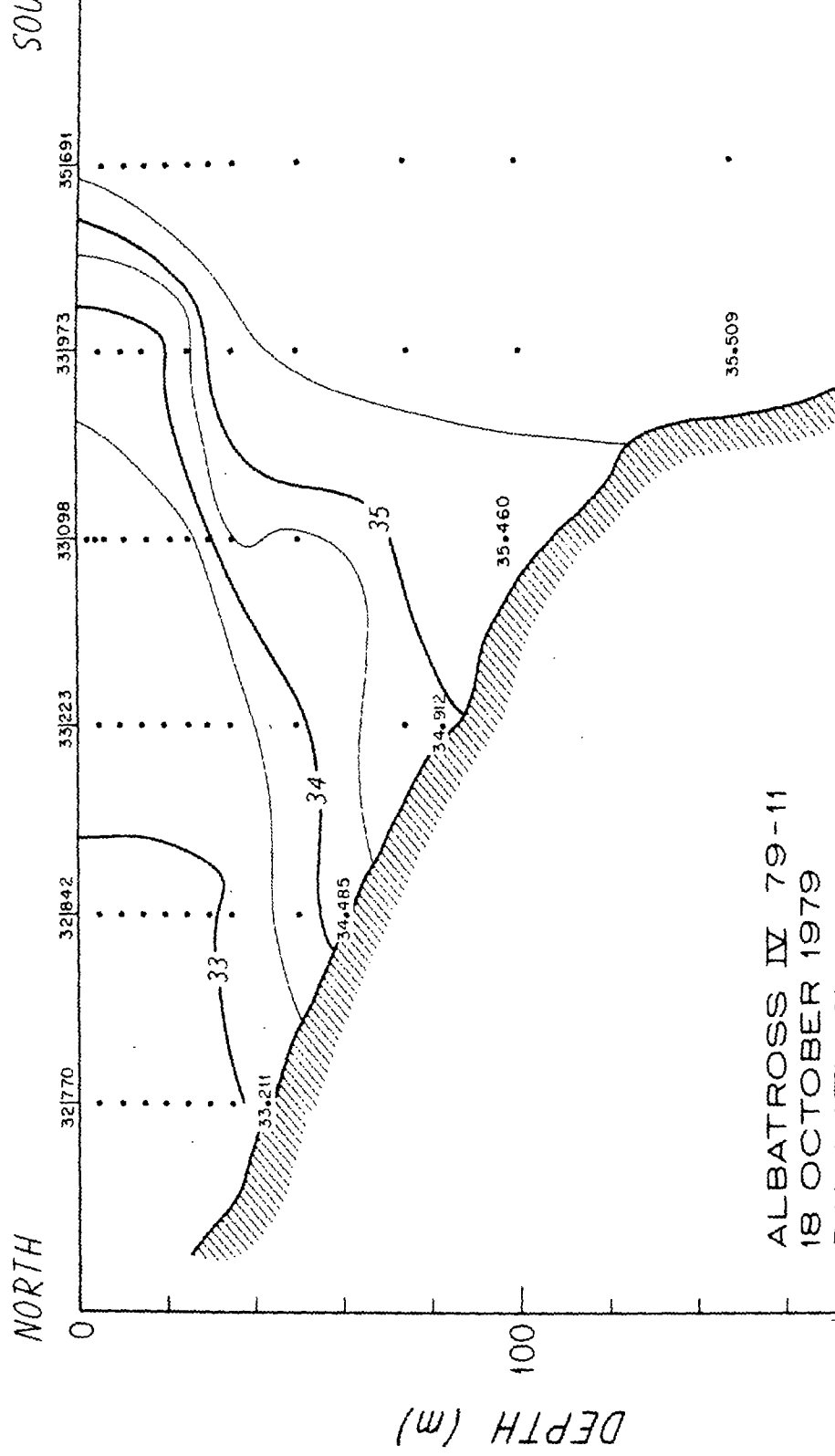




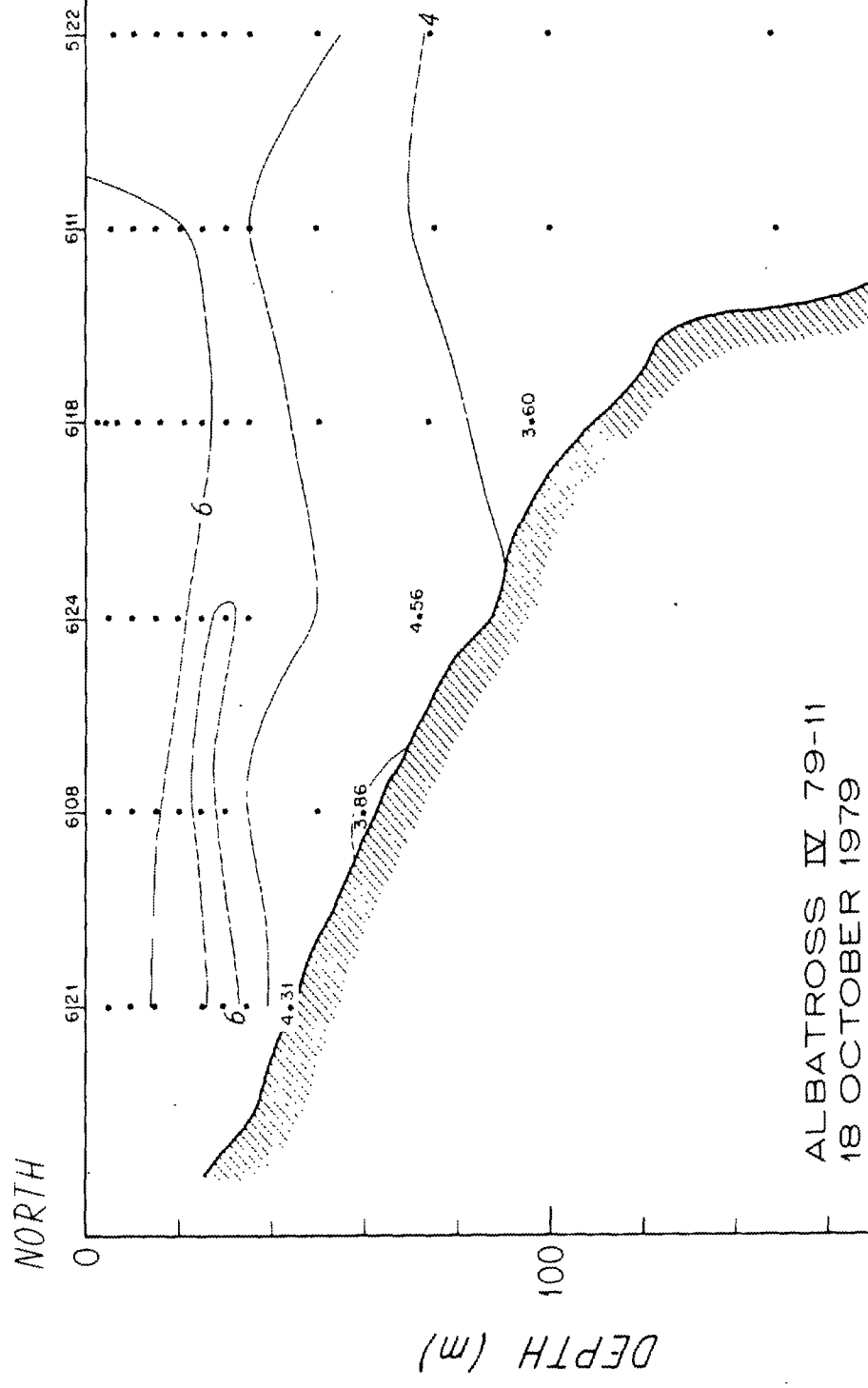
SOUTH

NORTH

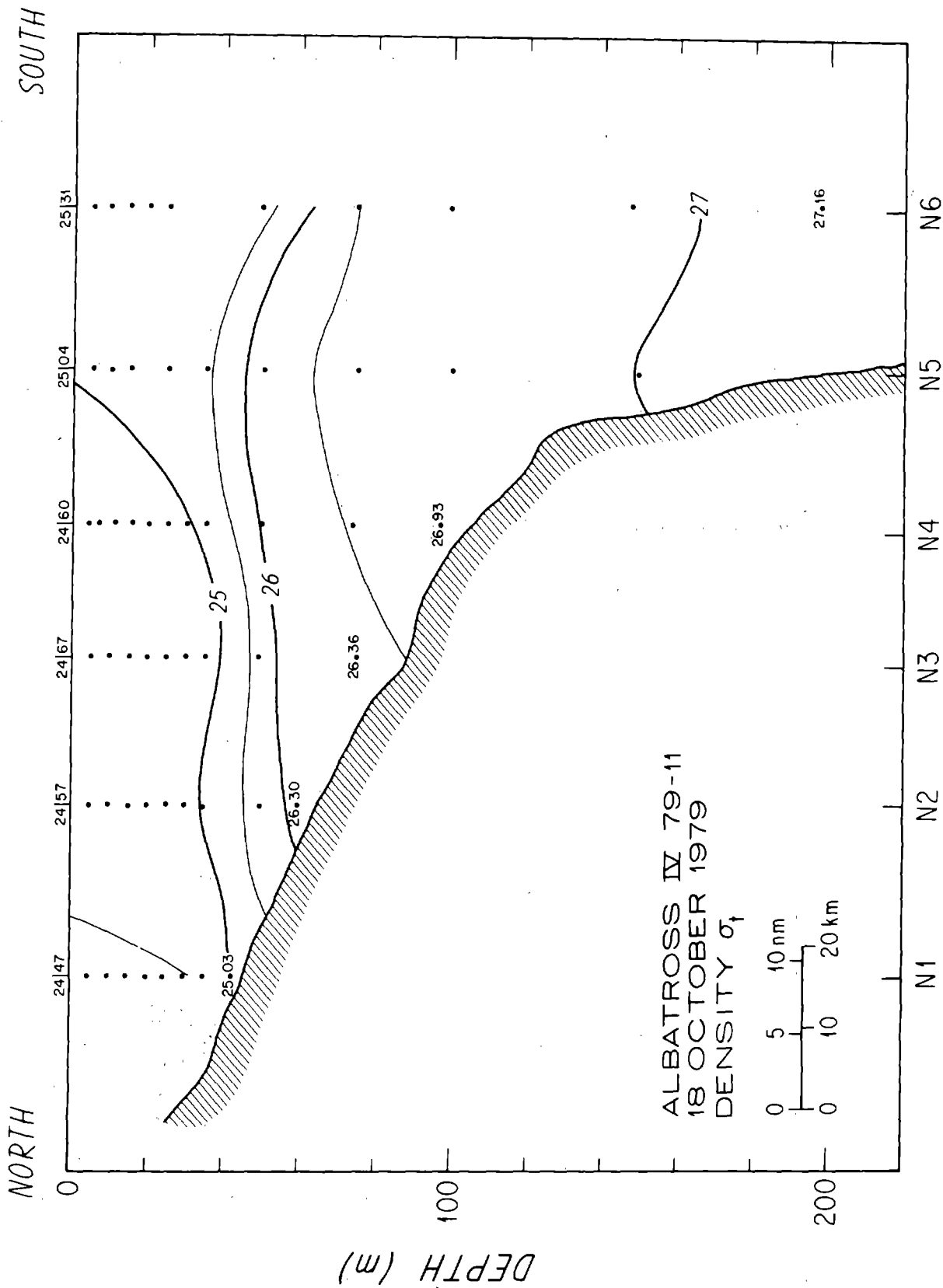


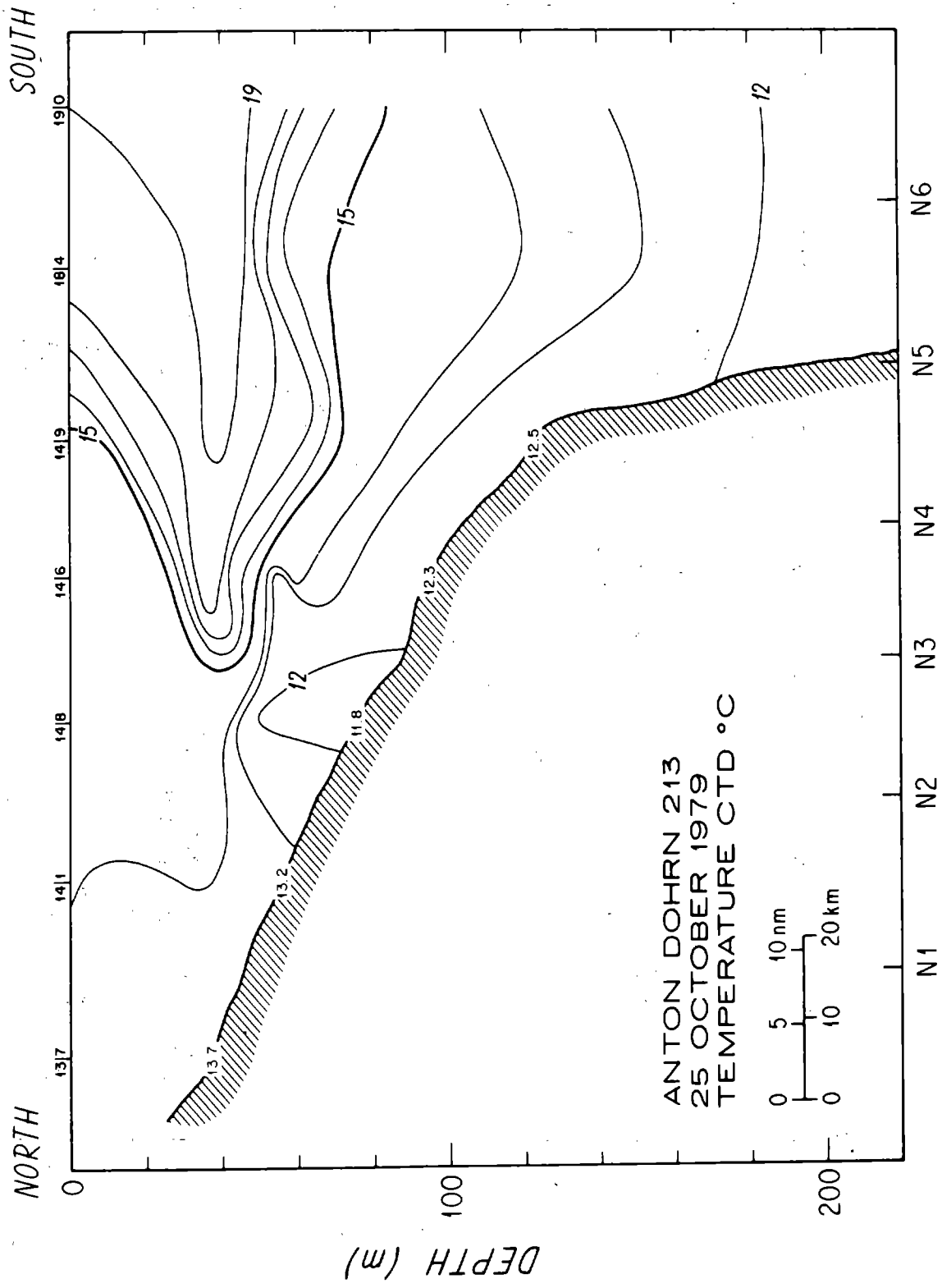


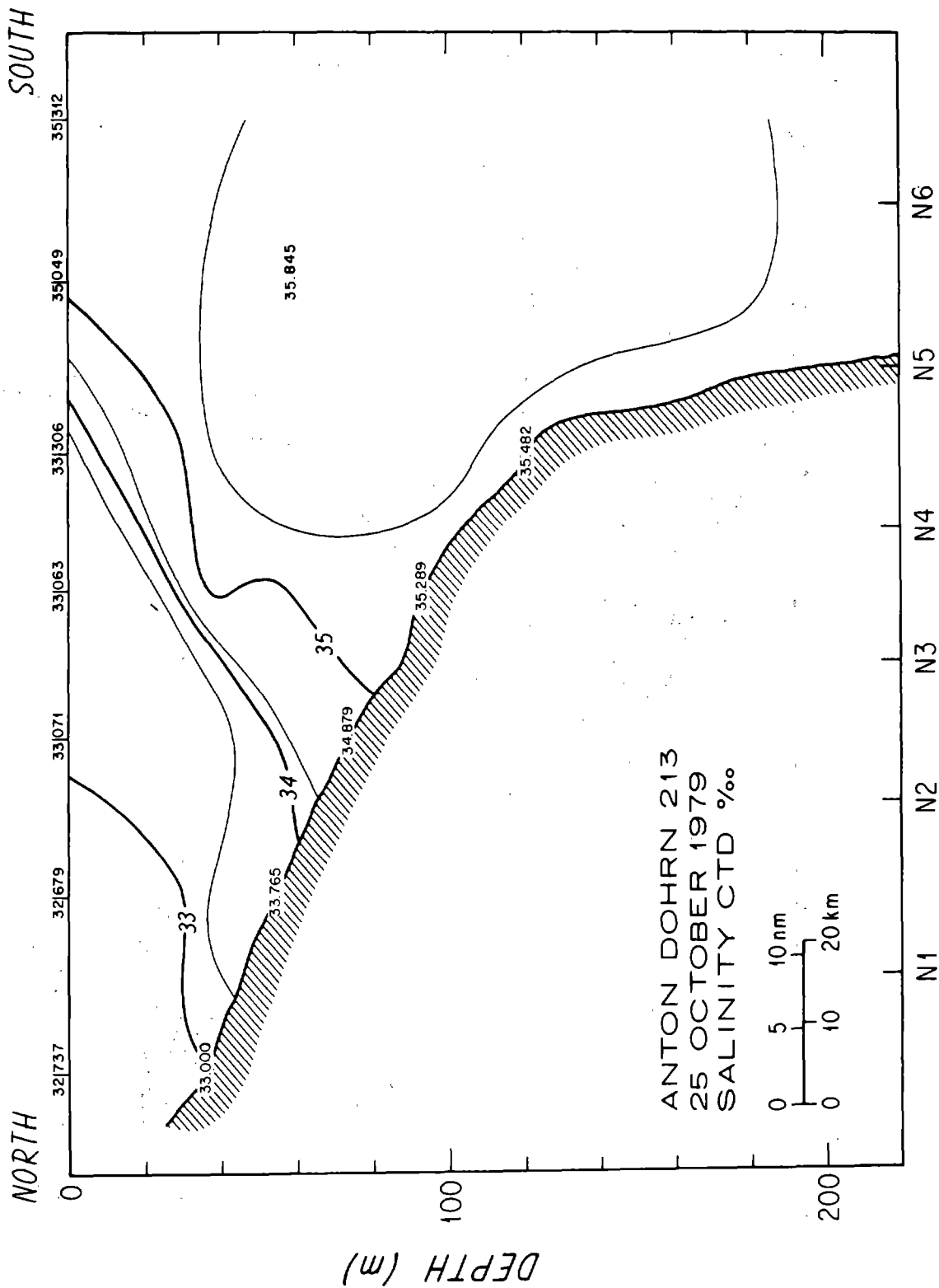
ALBATROSS IV 79-11
18 OCTOBER 1979

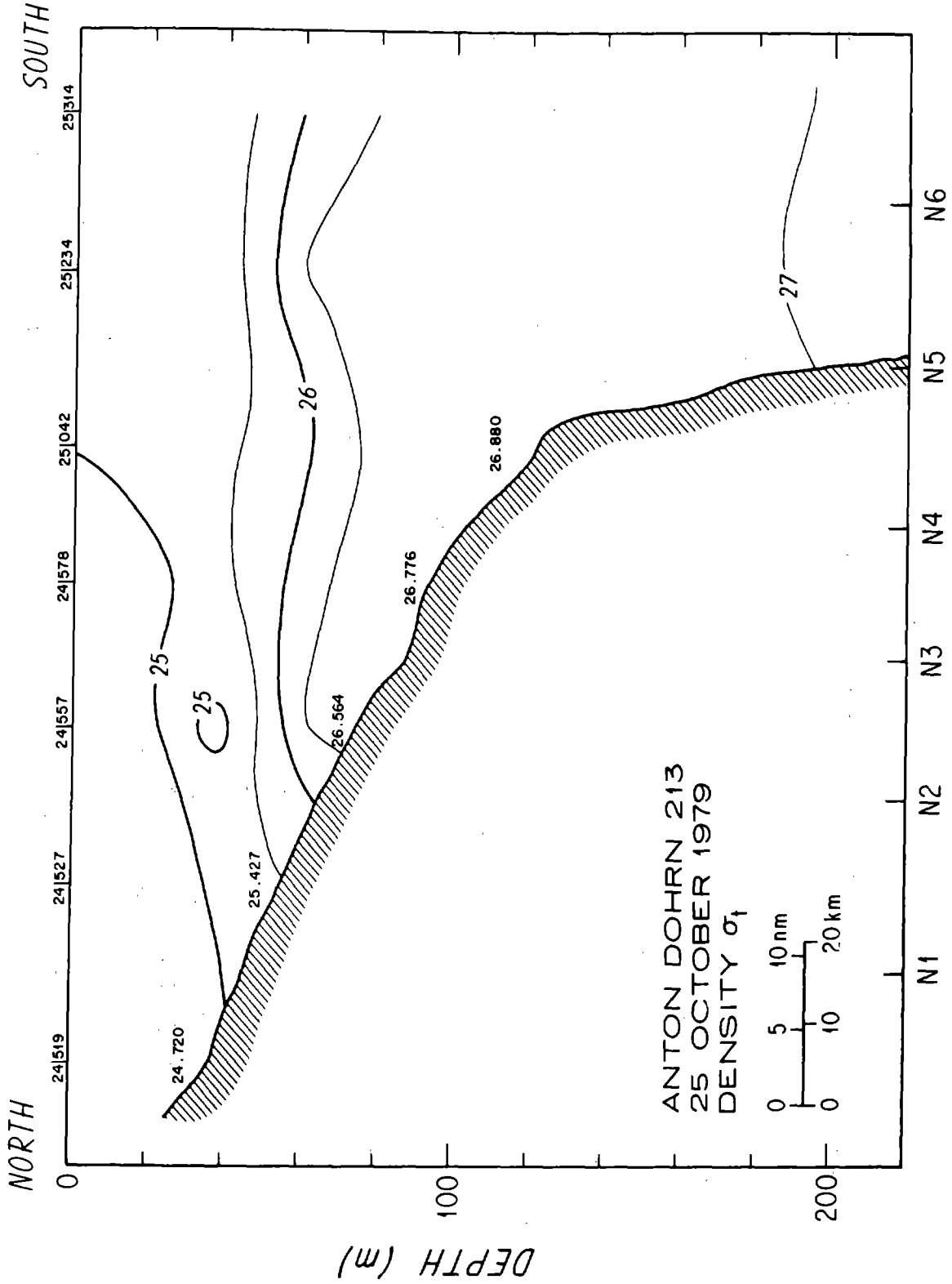


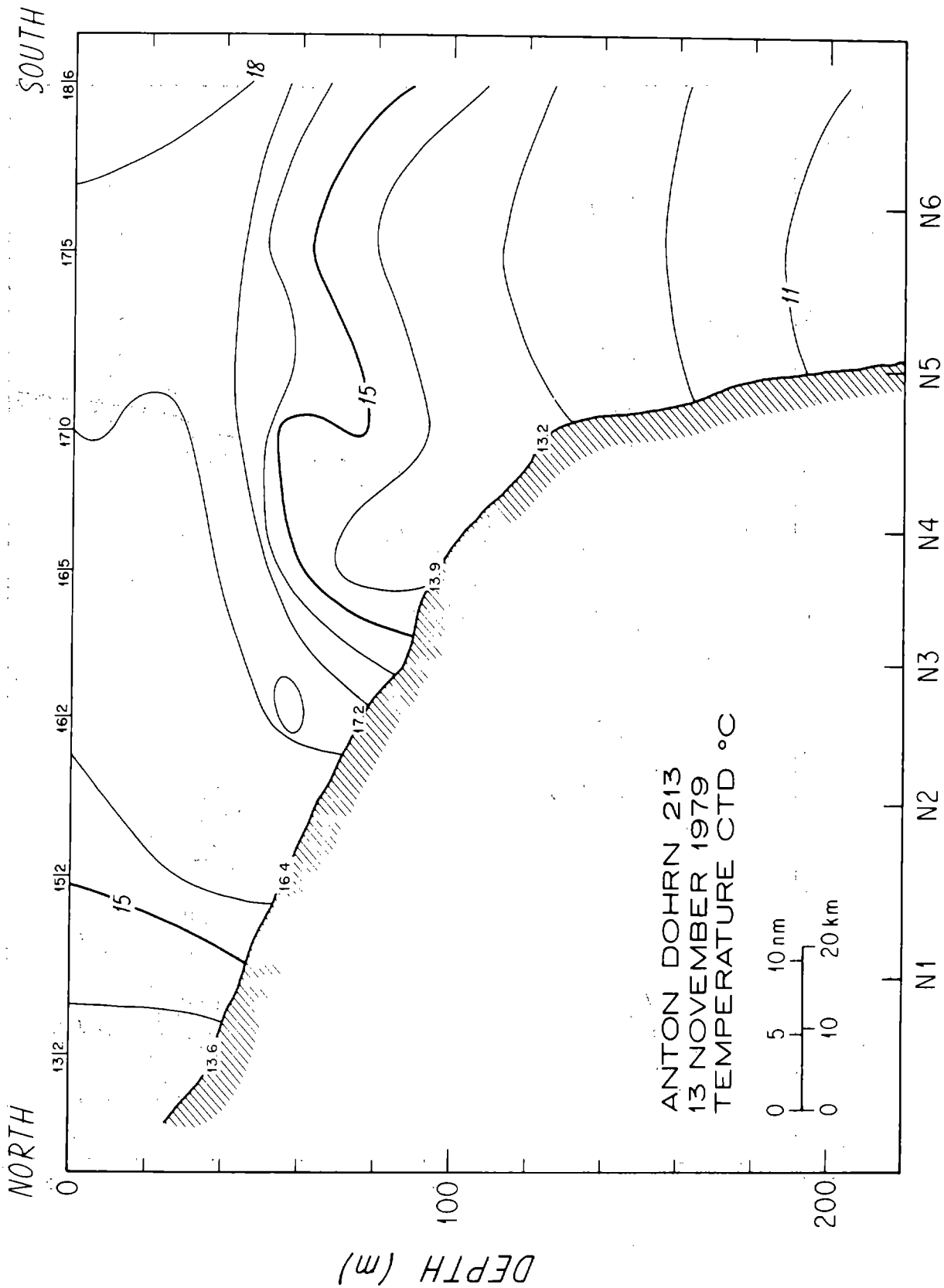
ALBATROSS IV 79-11
18 OCTOBER 1979

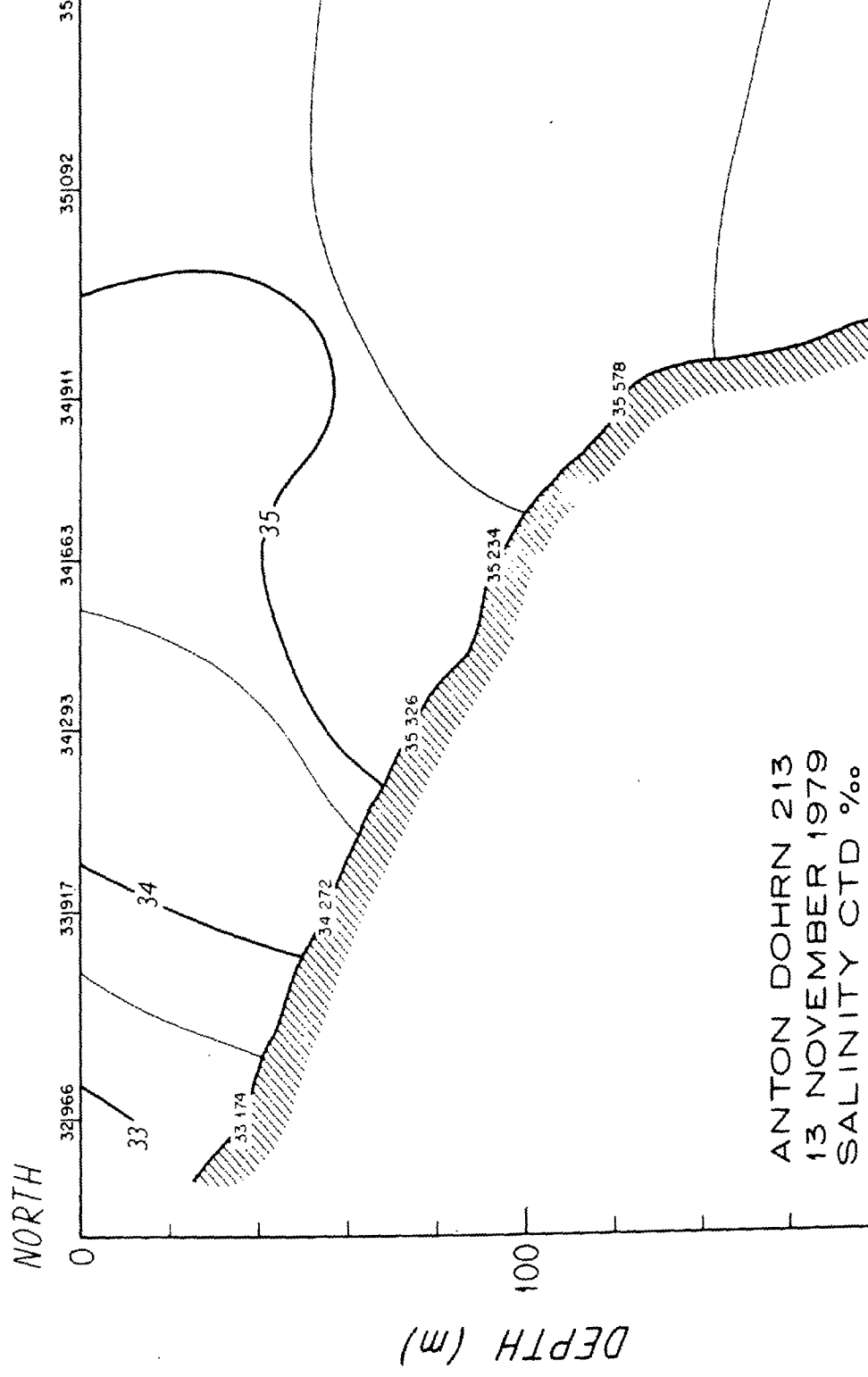




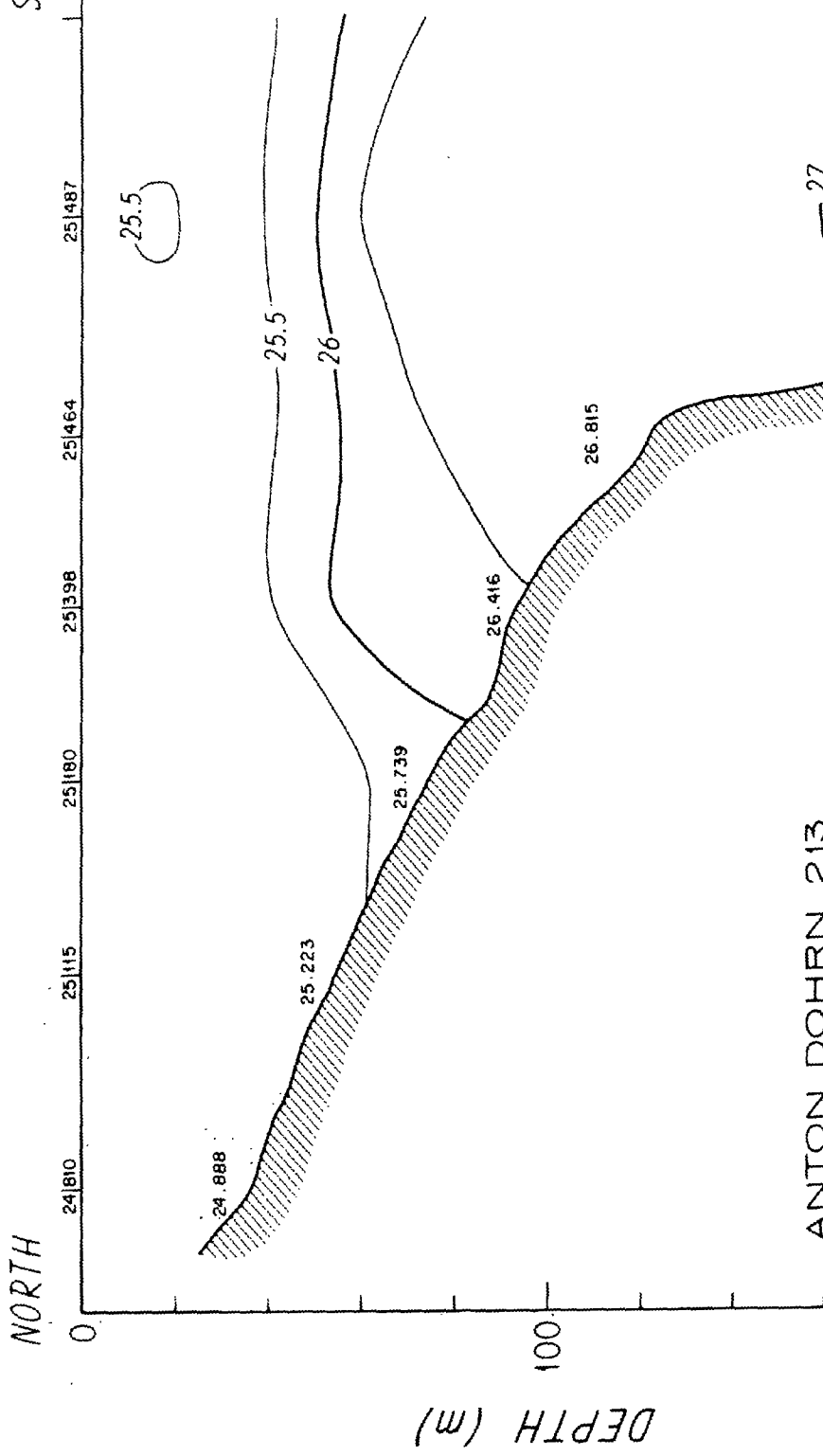






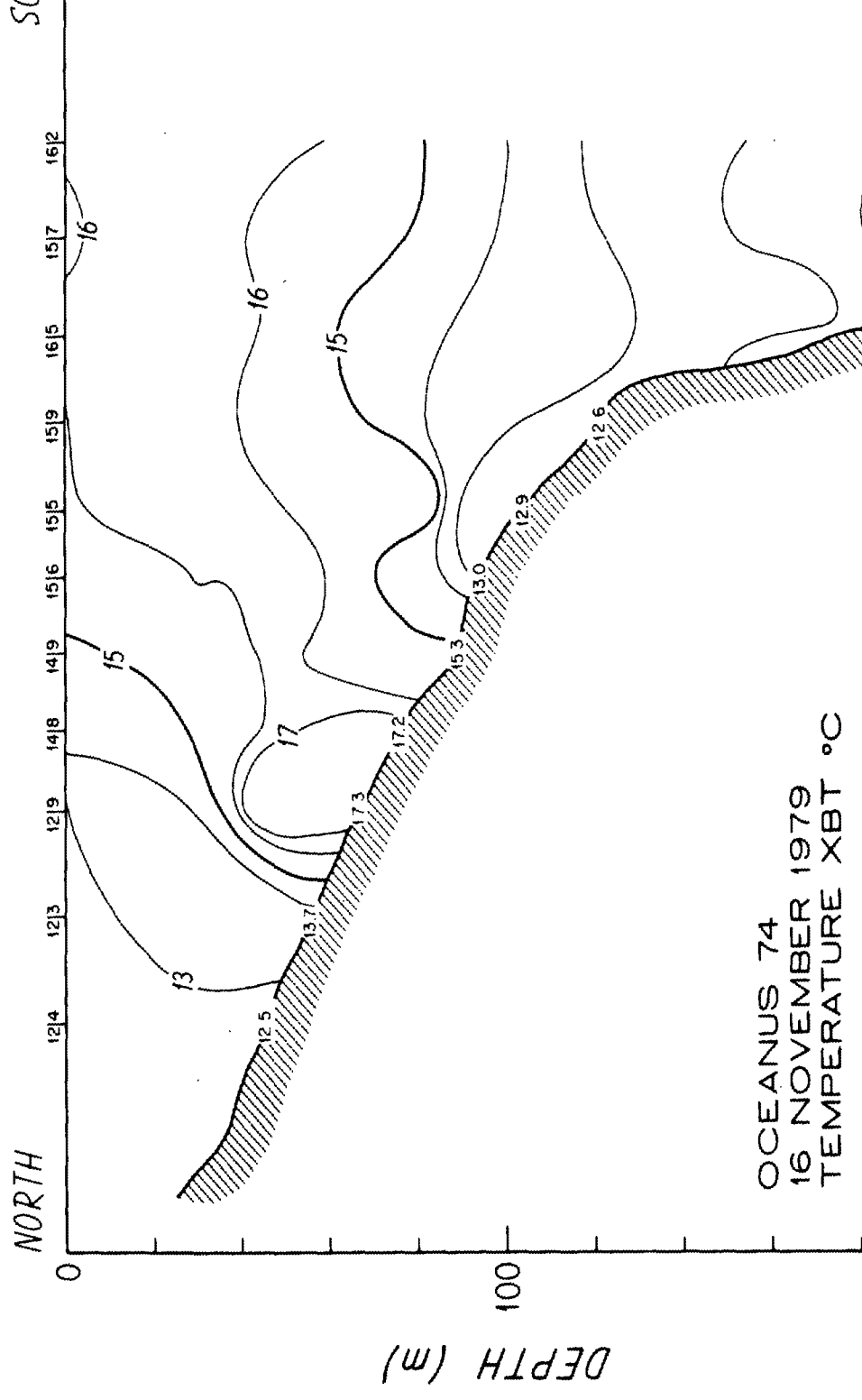


ANTON DOHRN 213
13 NOVEMBER 1979
SALINITY CTD ‰

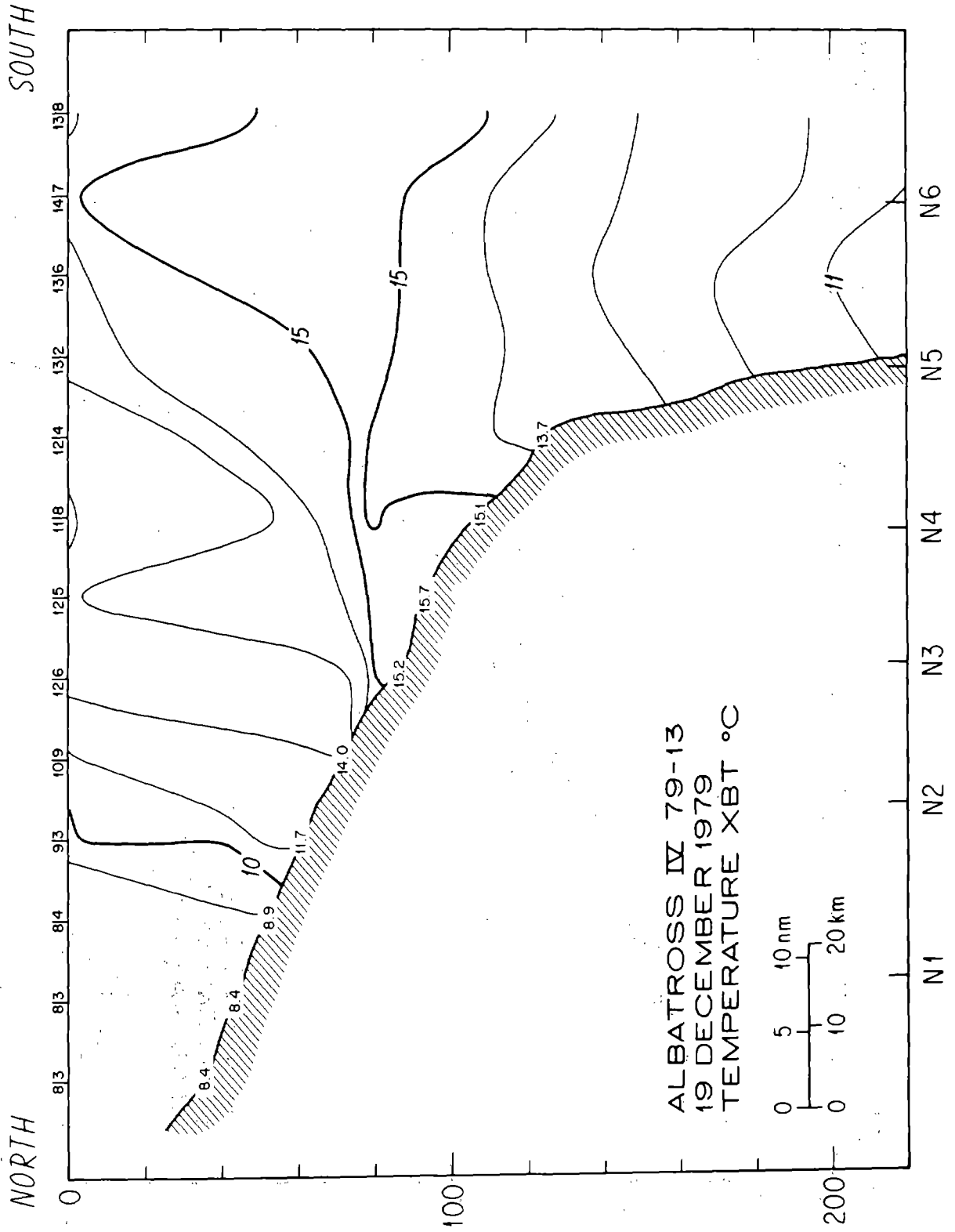


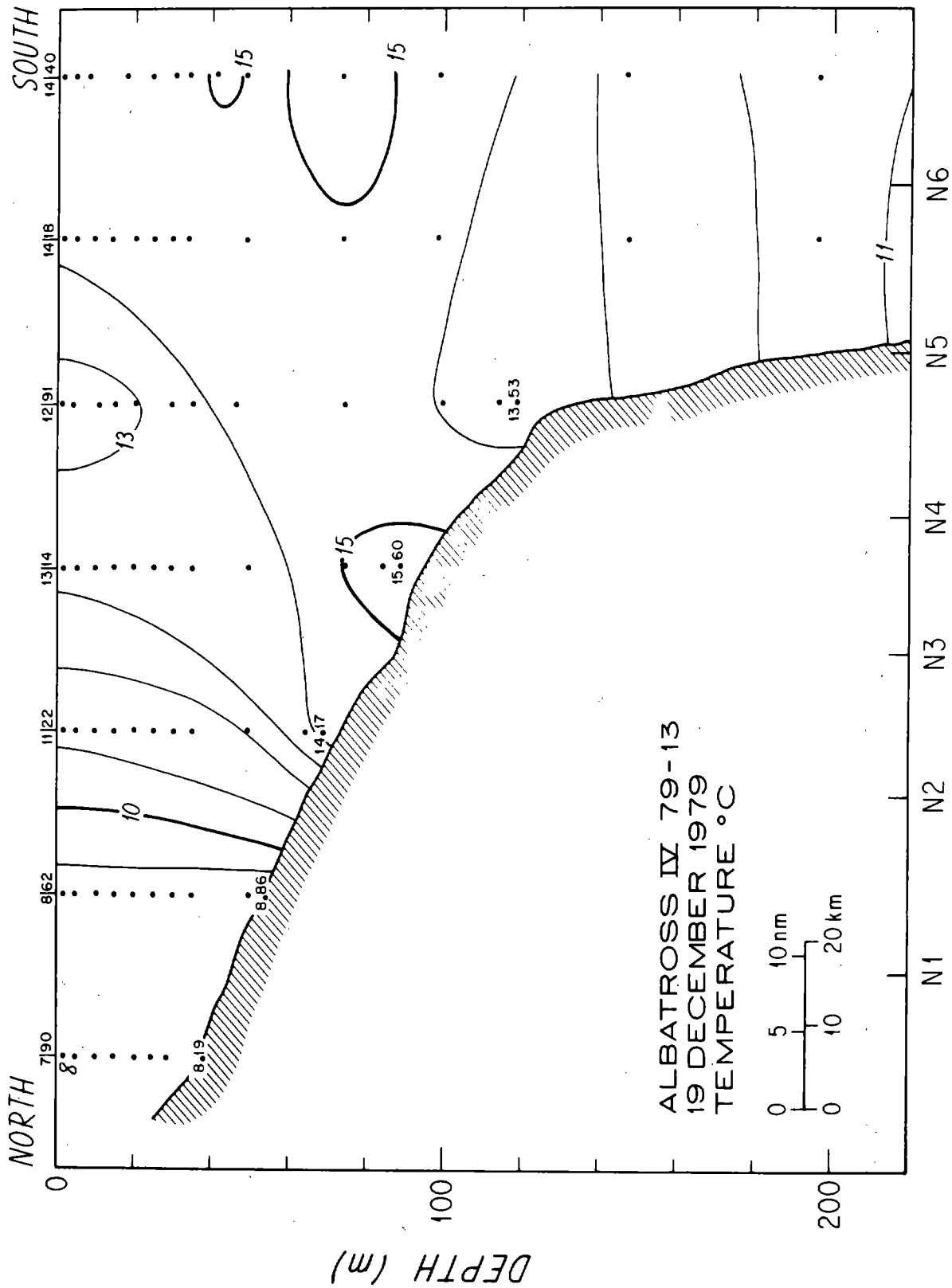
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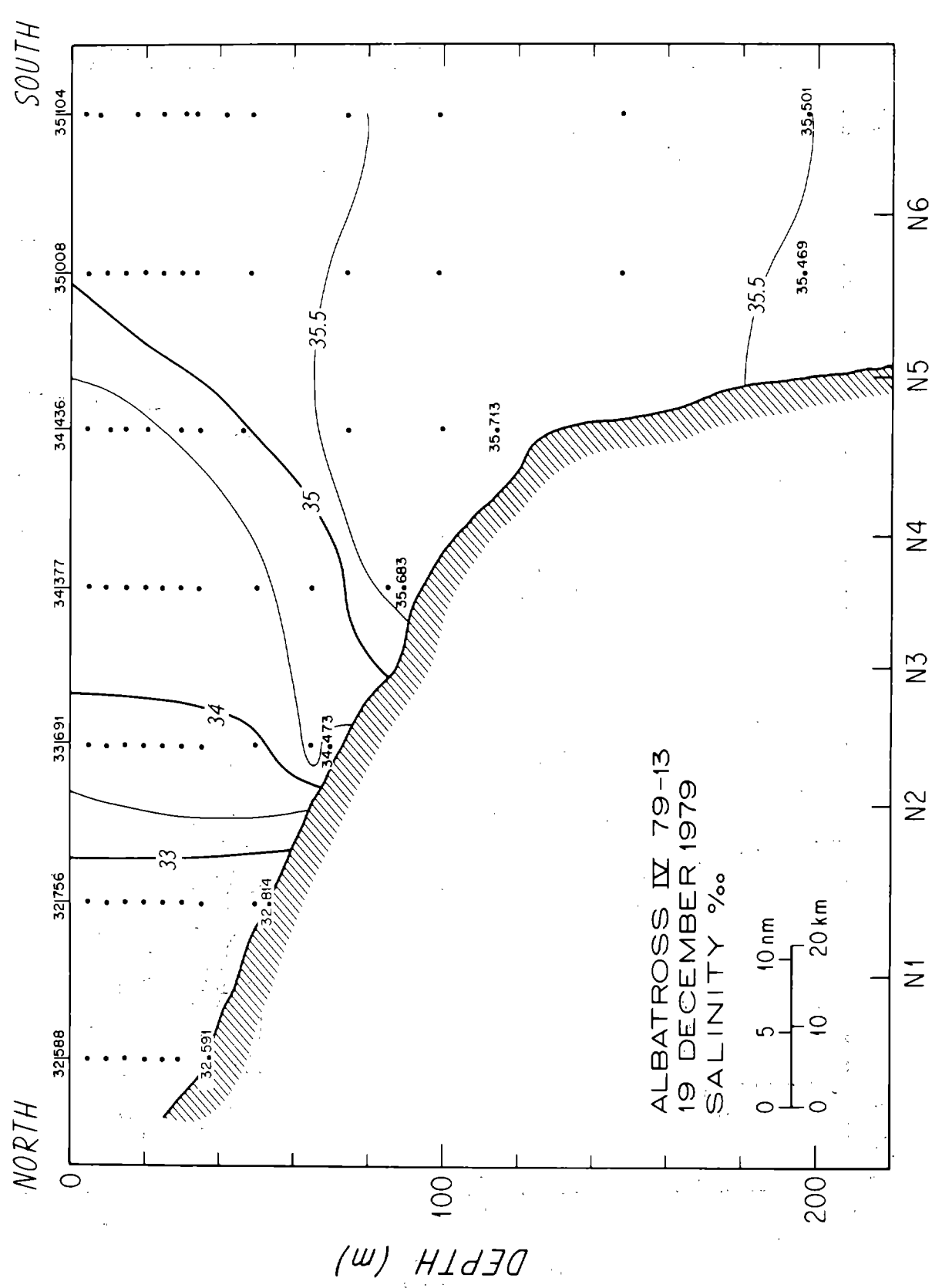
27

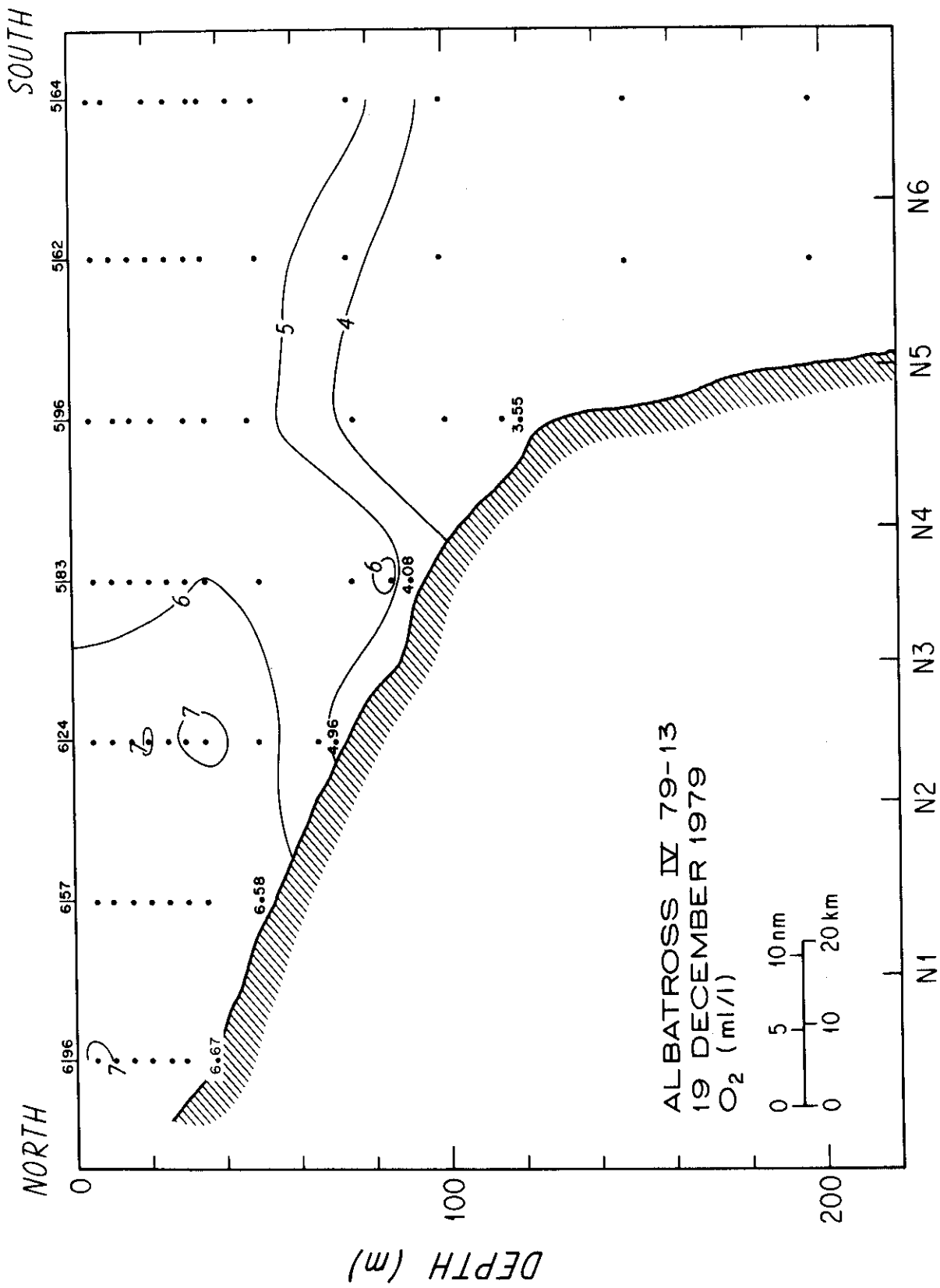


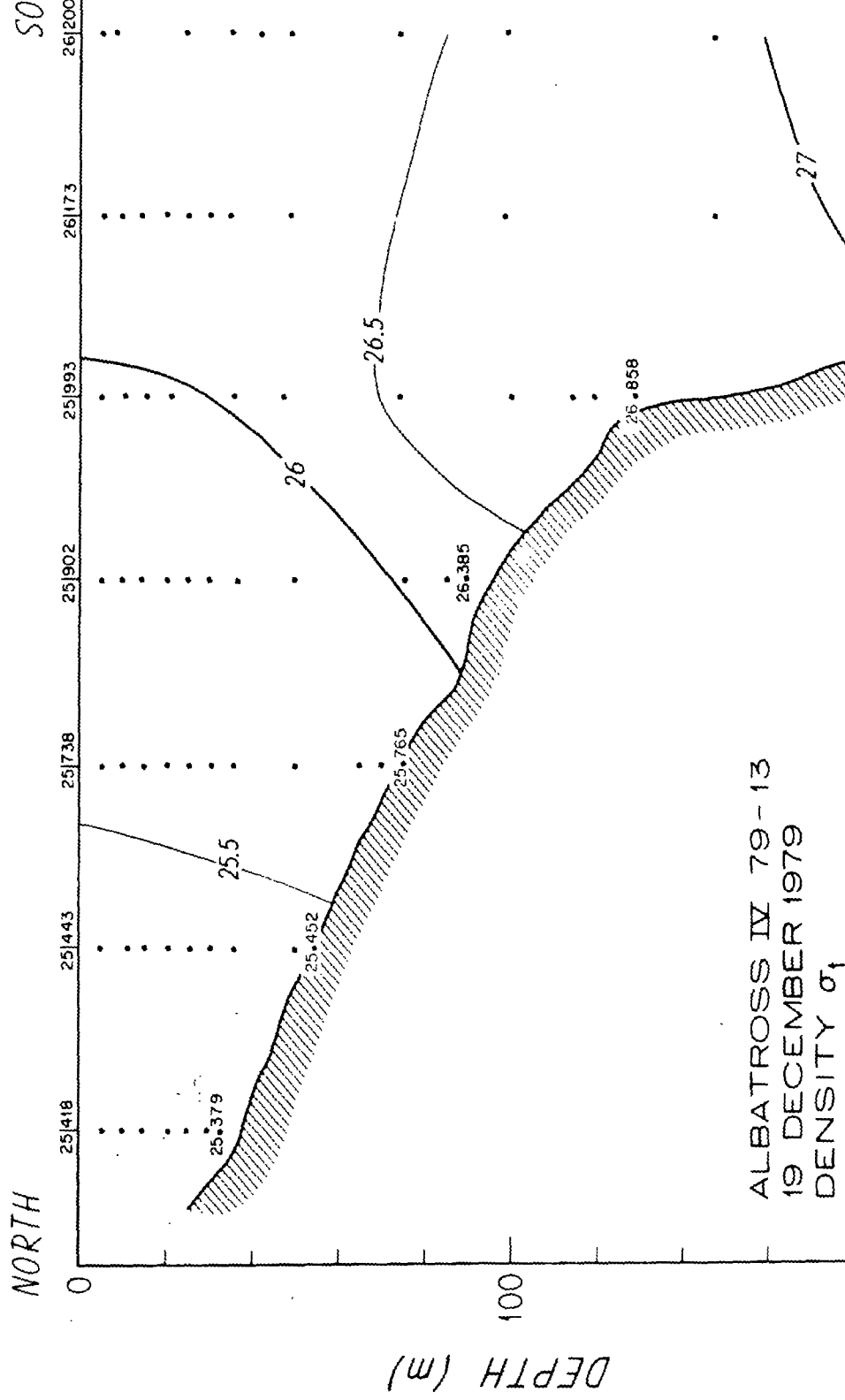
OCEANUS 74
 16 NOVEMBER 1979
 TEMPERATURE XBT °C

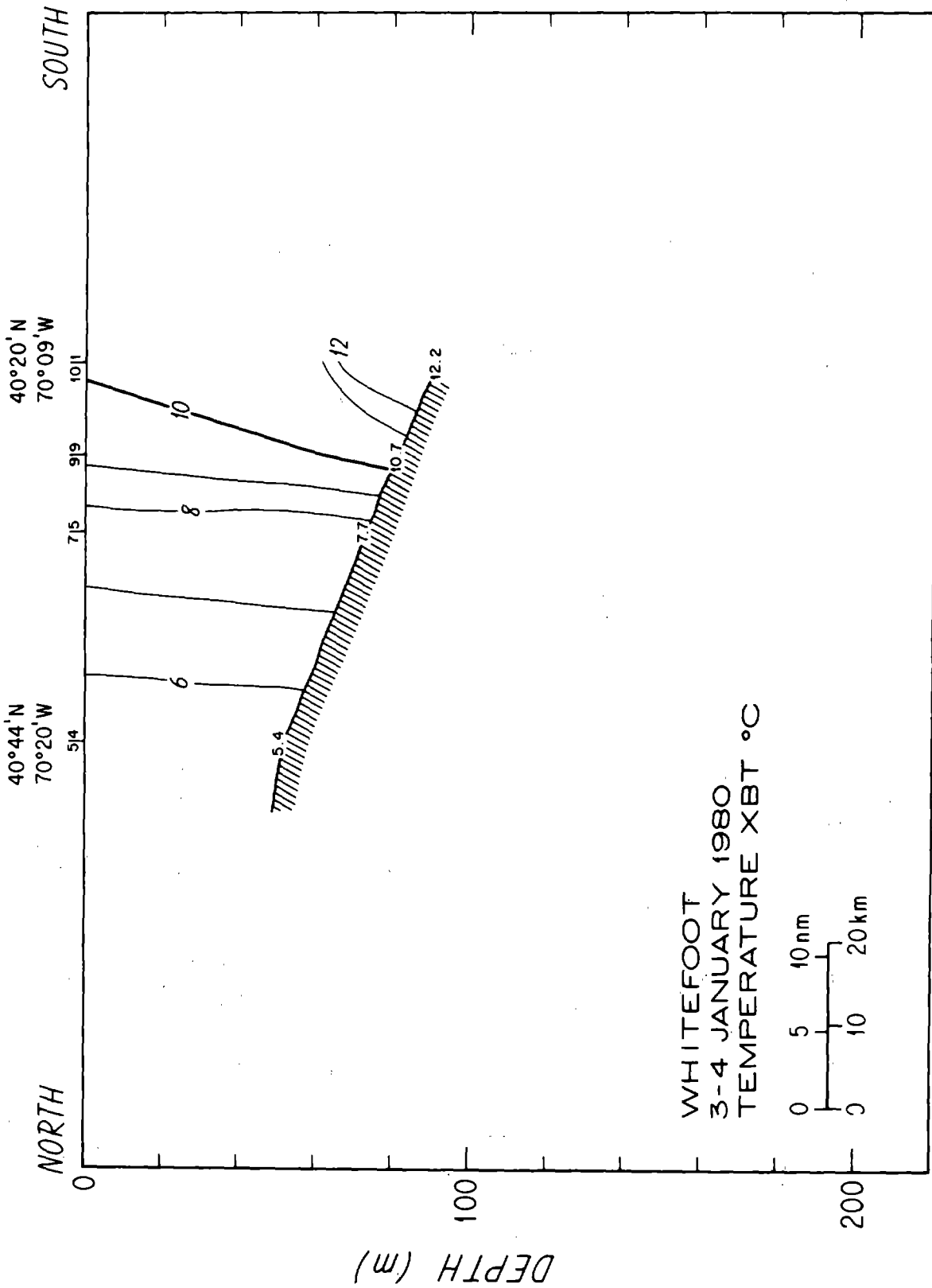


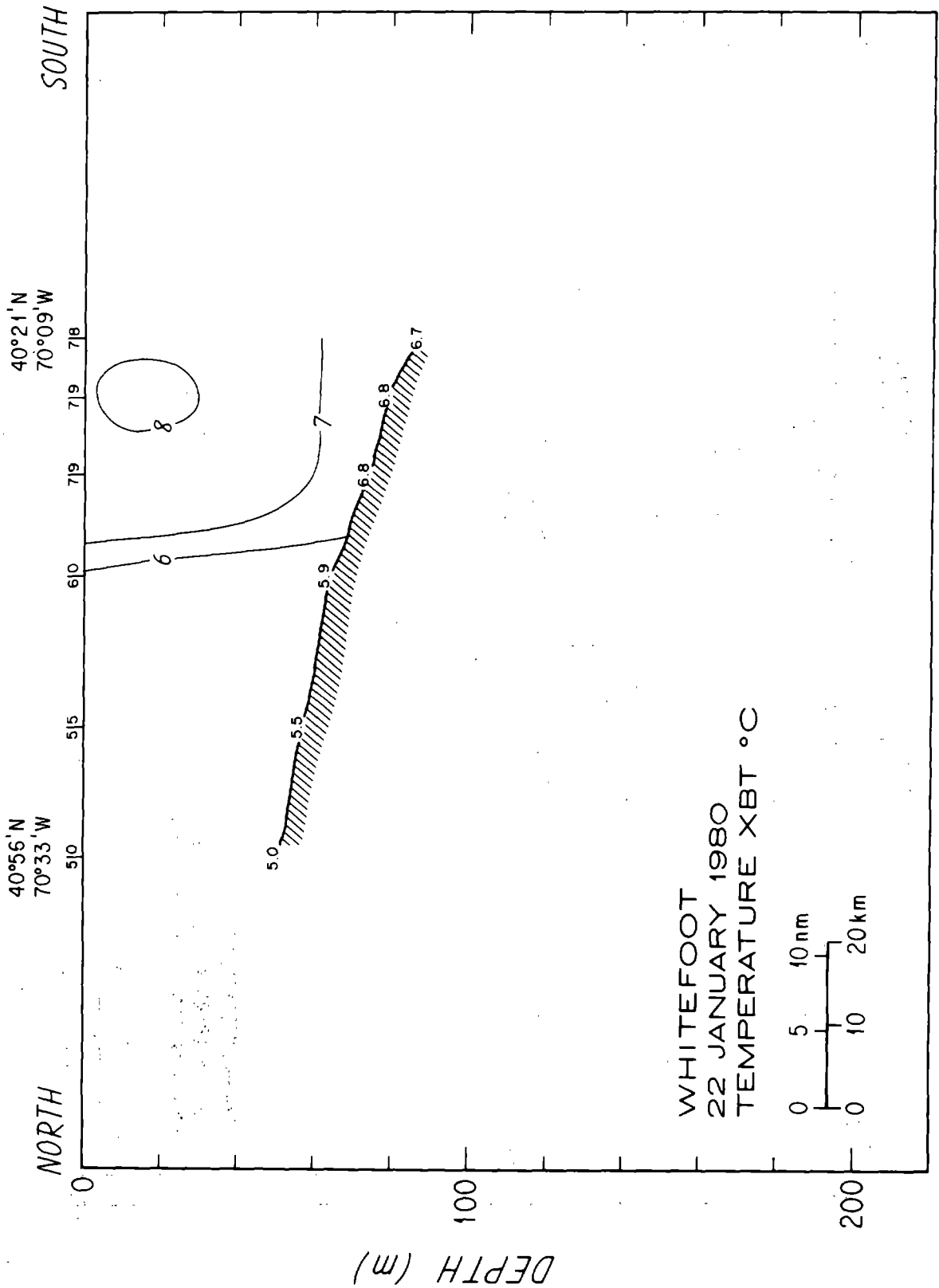


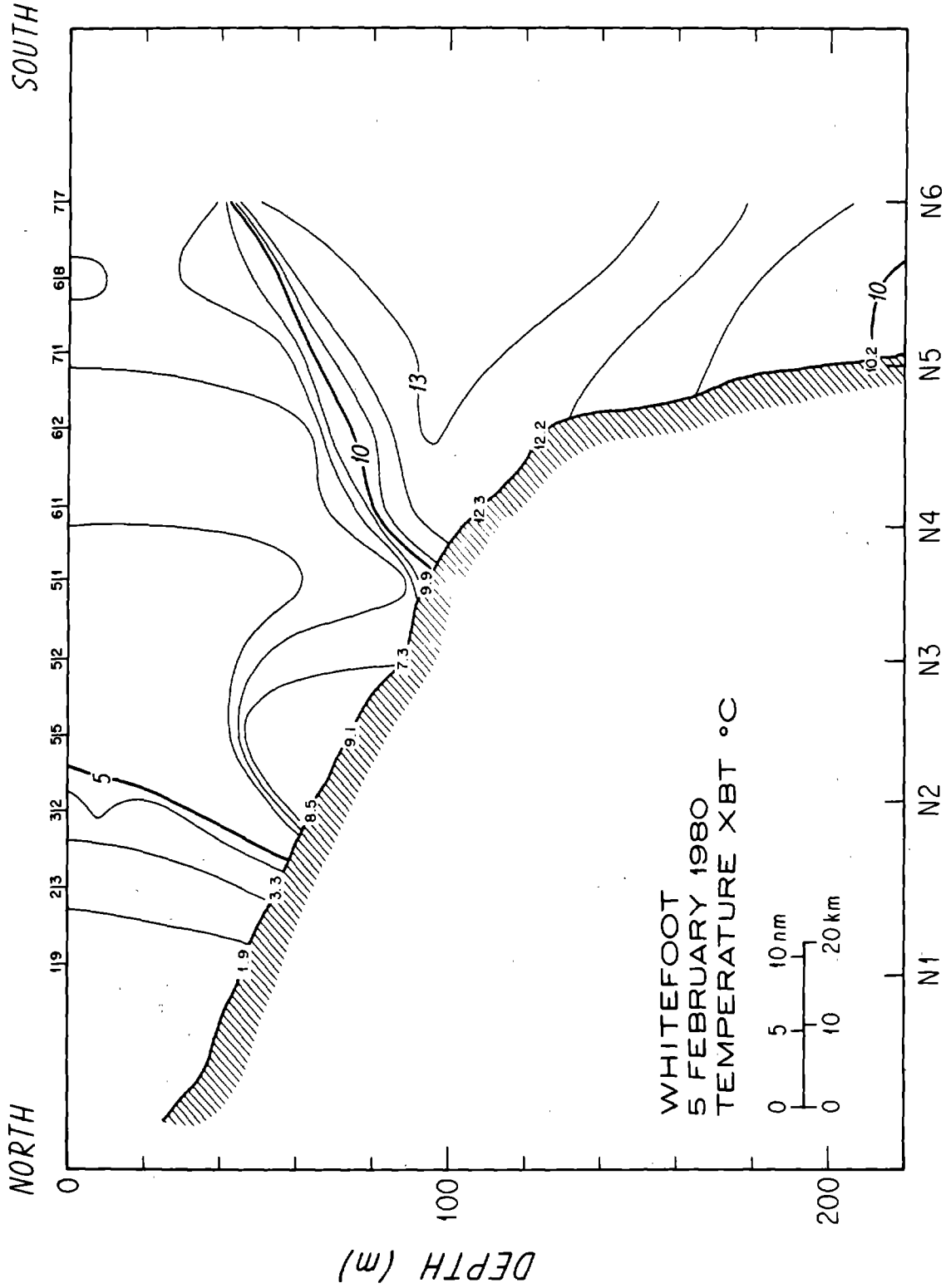


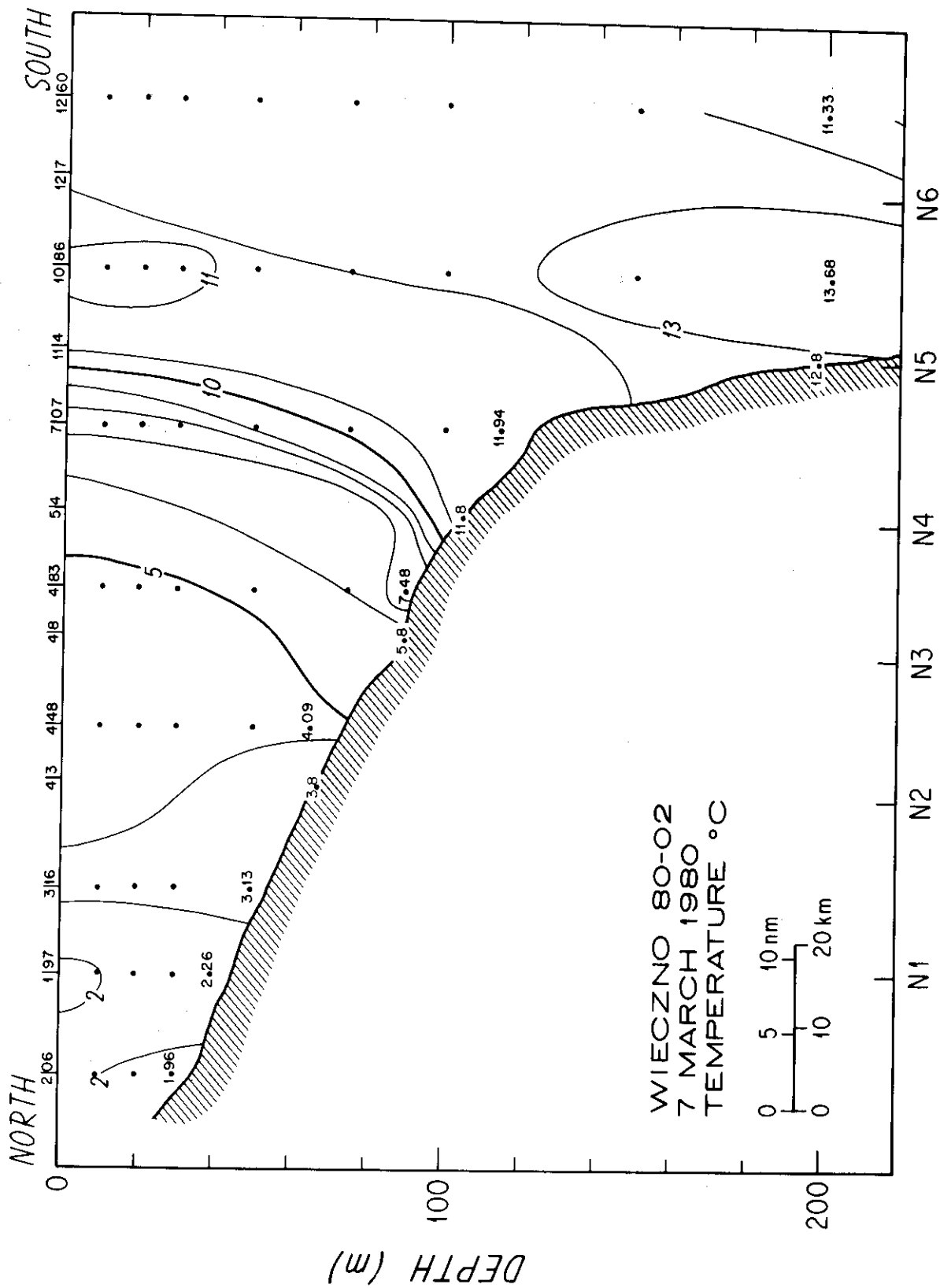


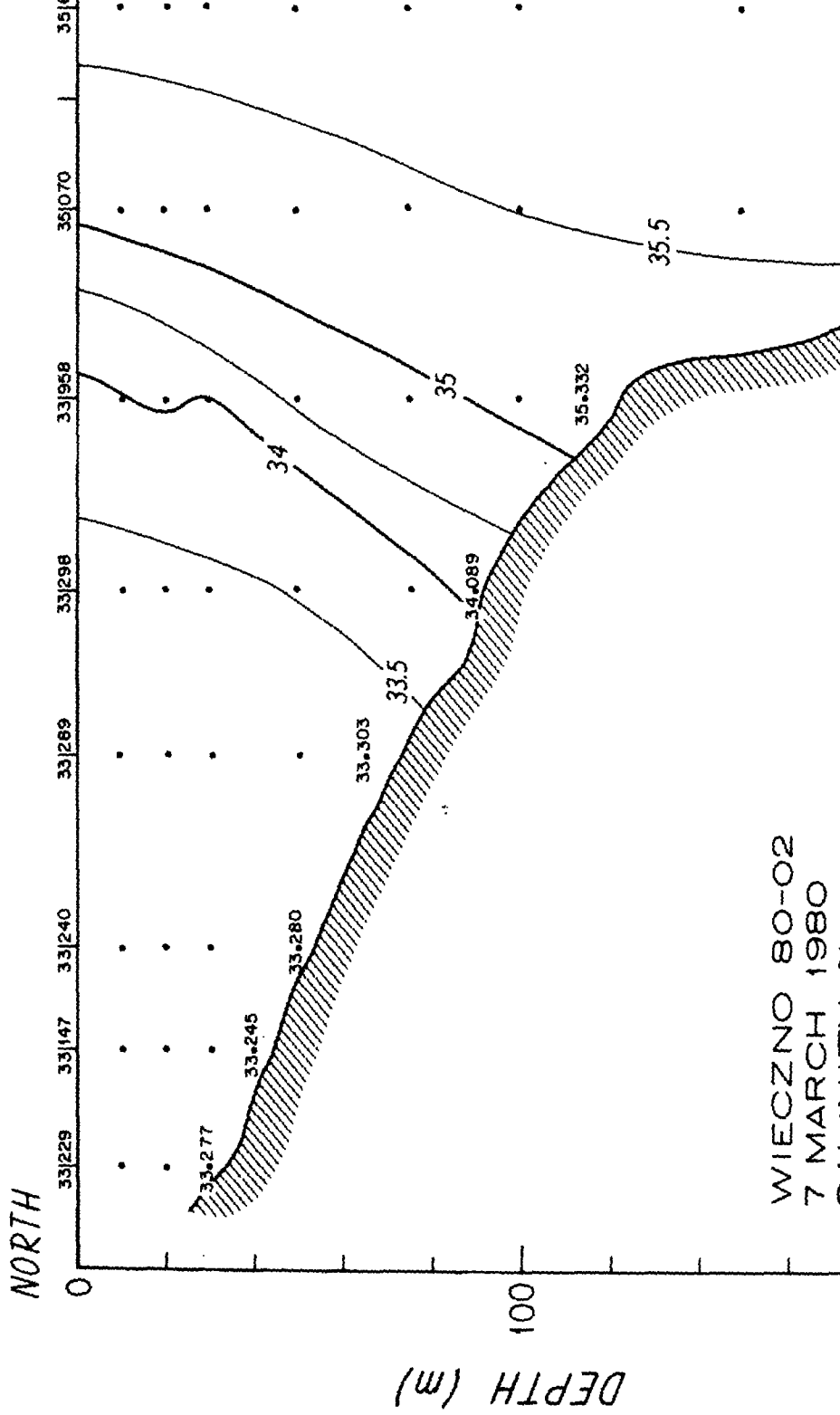












WIECZNO 80-02
7 MARCH 1980

