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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

June 1983

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Data Report I. Hydrography

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U.S. DEPARTMENT OF COMMERCE
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National Marine Fisheries Service
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Northeast Fisheries Center

Woods Hole, Massachusetts

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 (Breadsley 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_2, 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	ALIOT (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: T_1 = XBT, T_2 = reversing thermometers, T_3 = CTD or STD

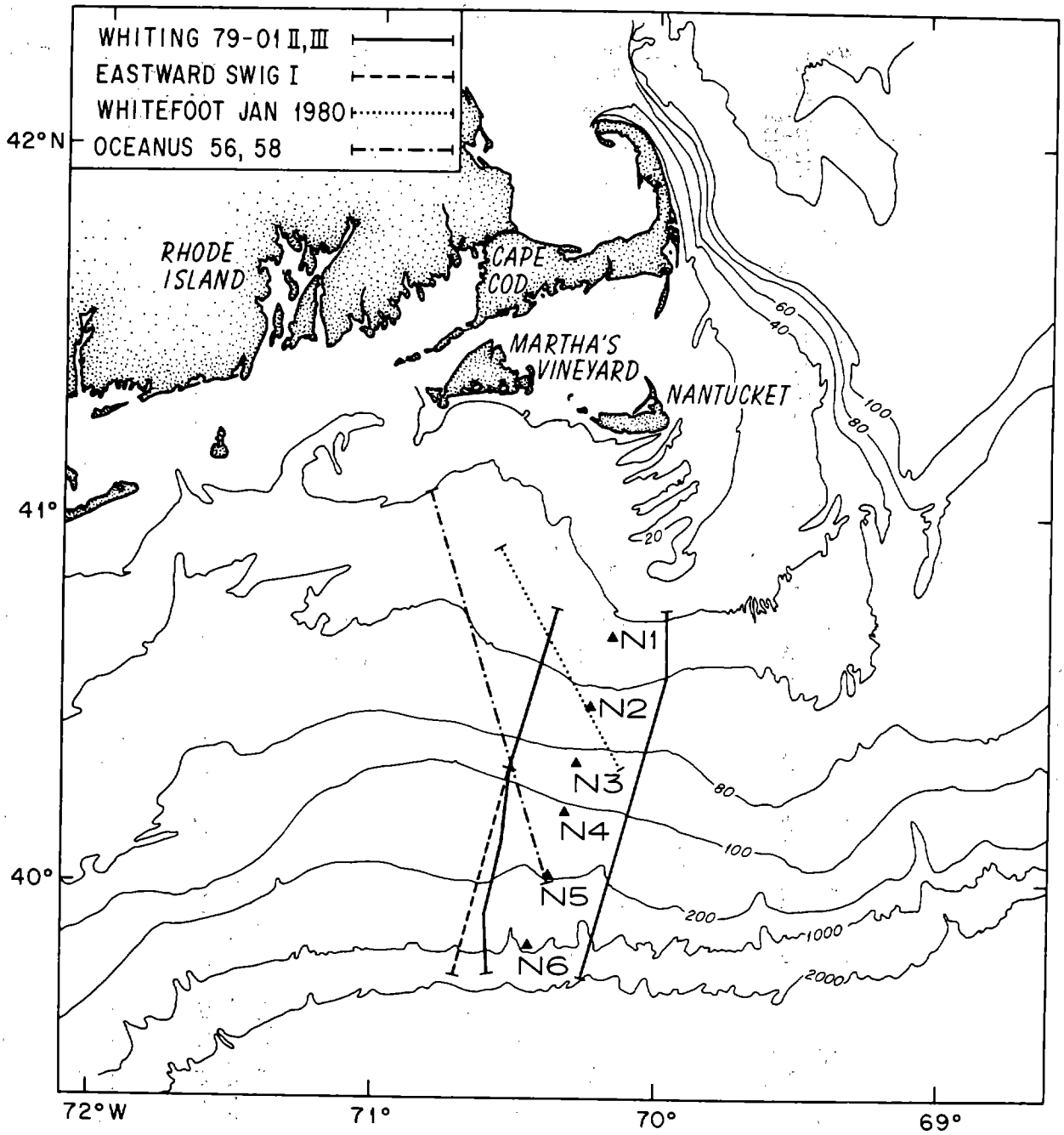
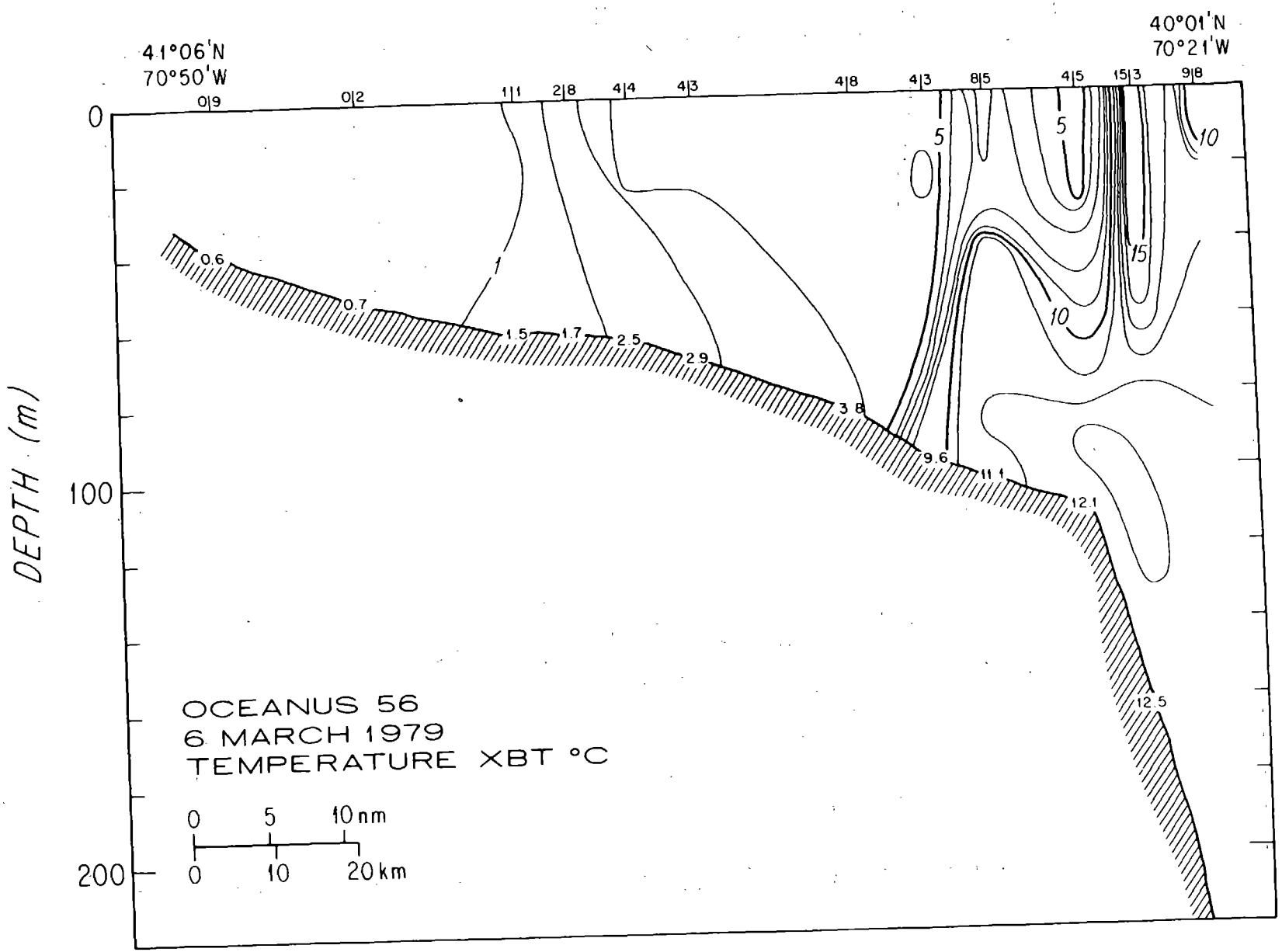
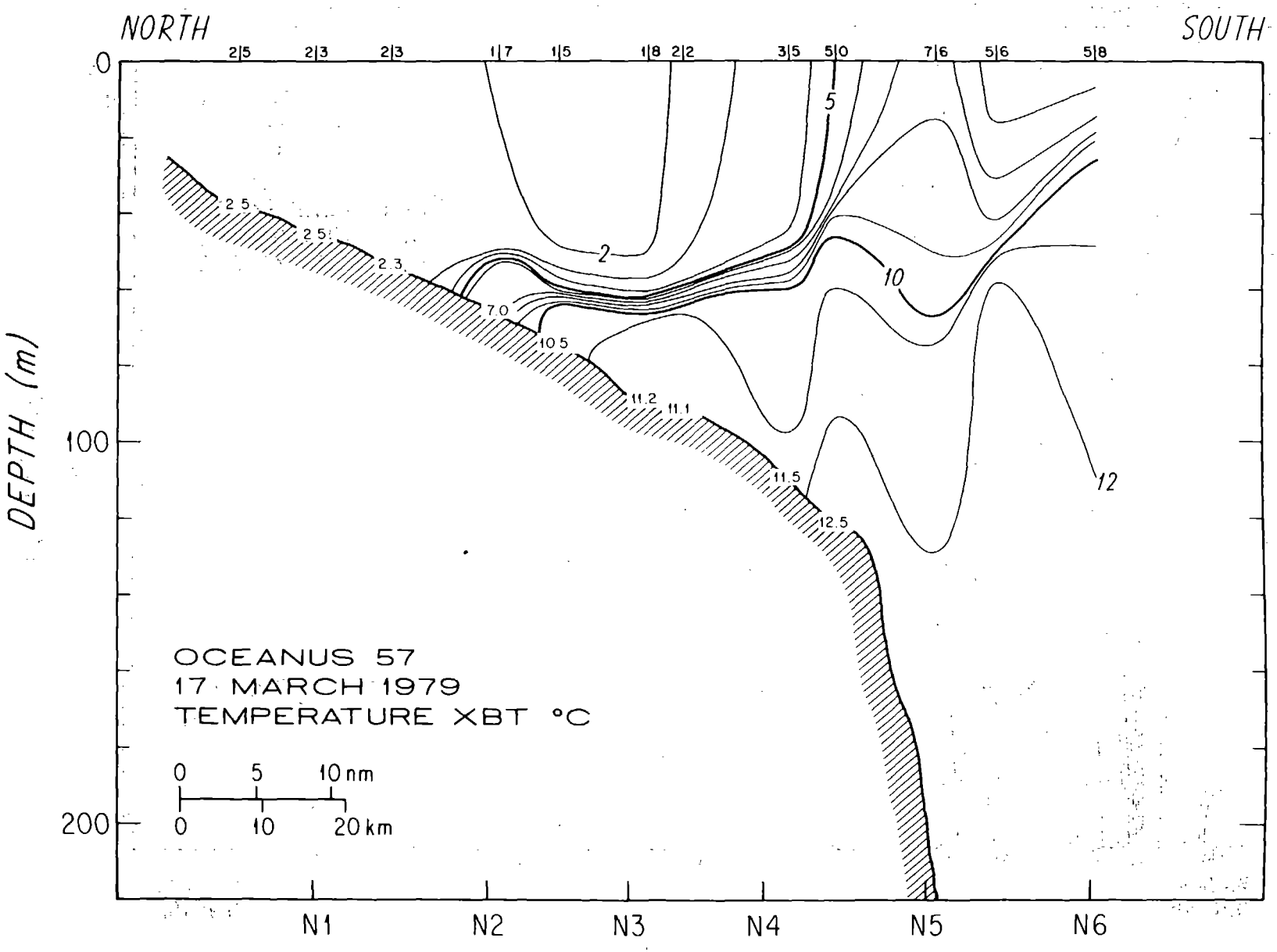
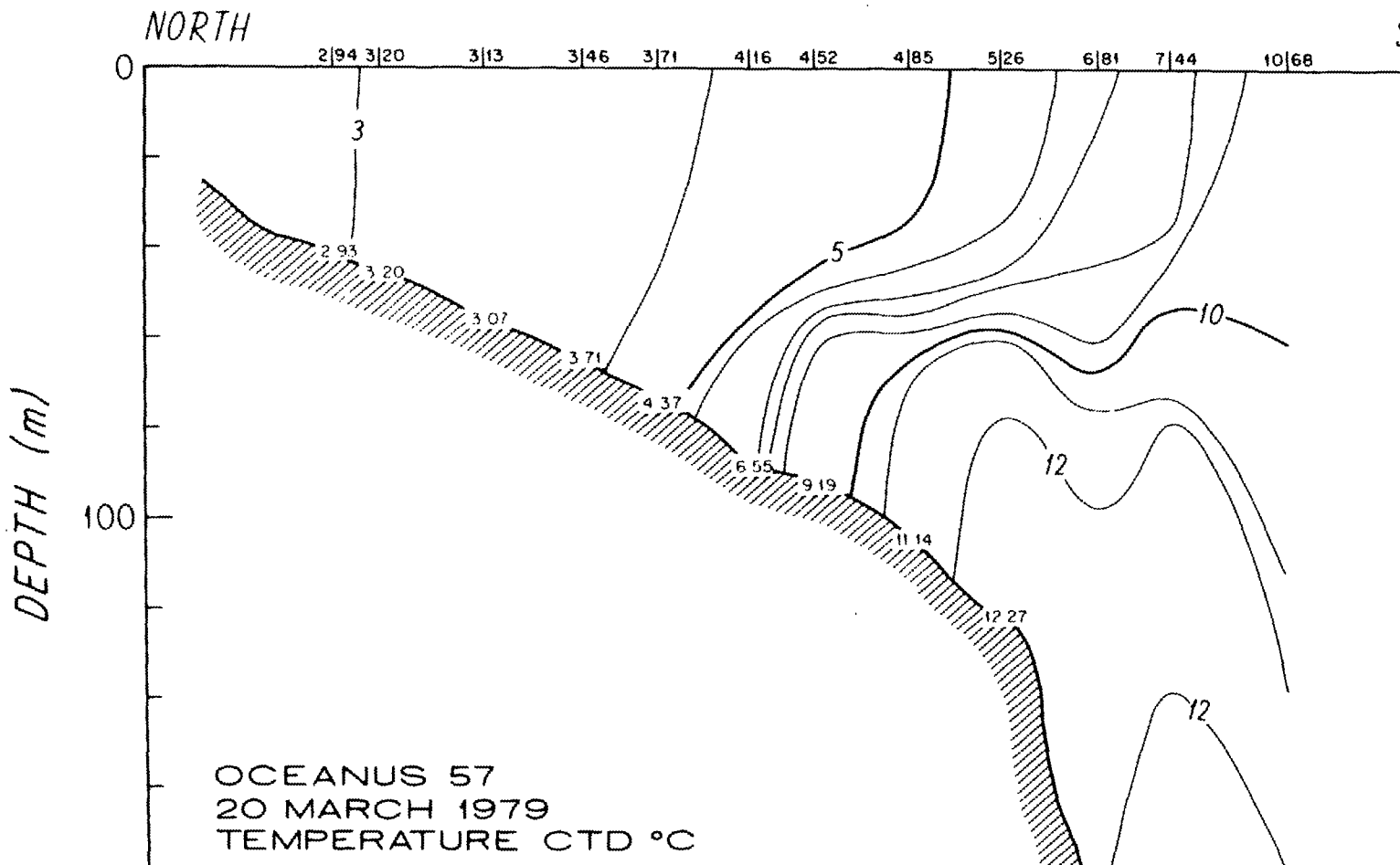
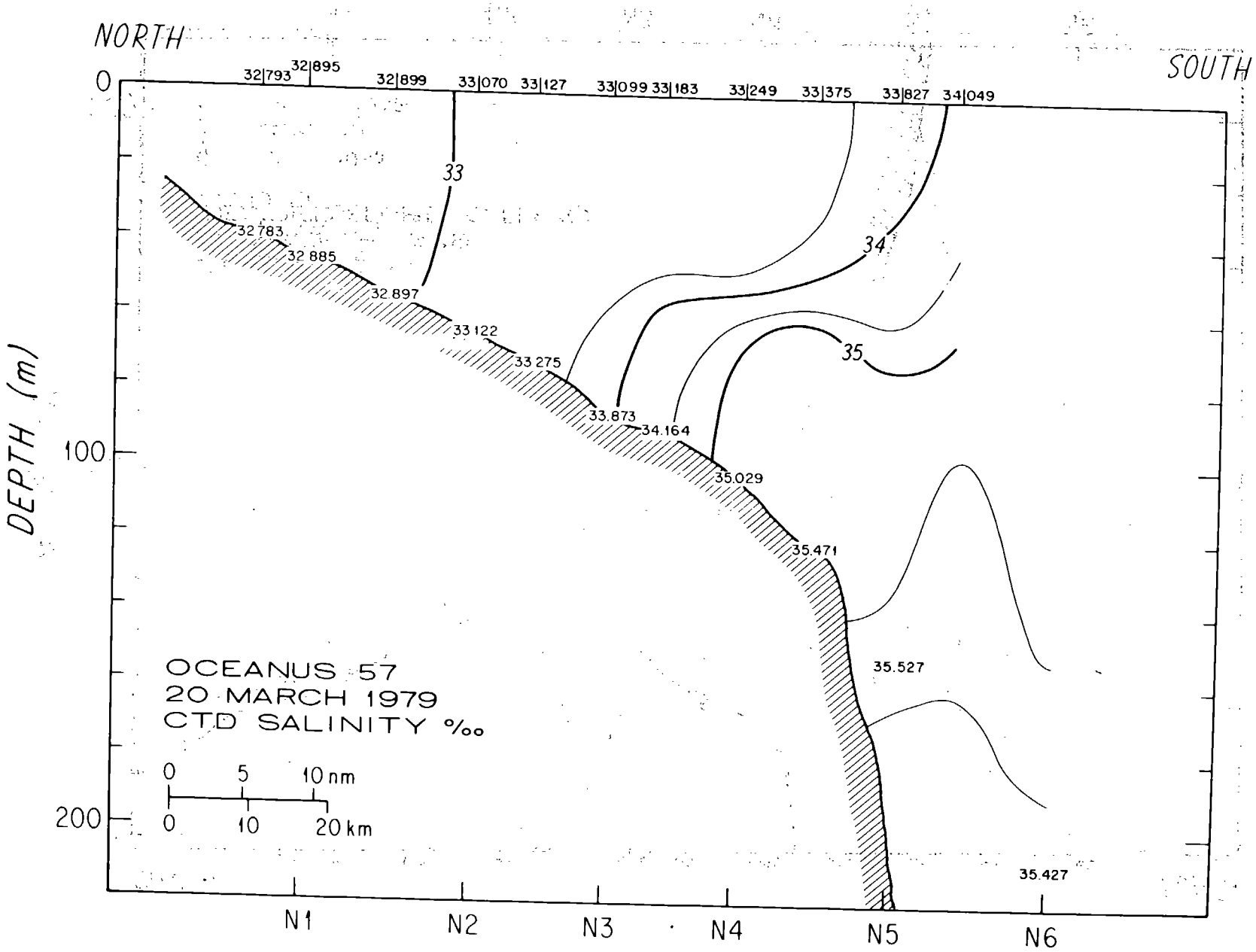


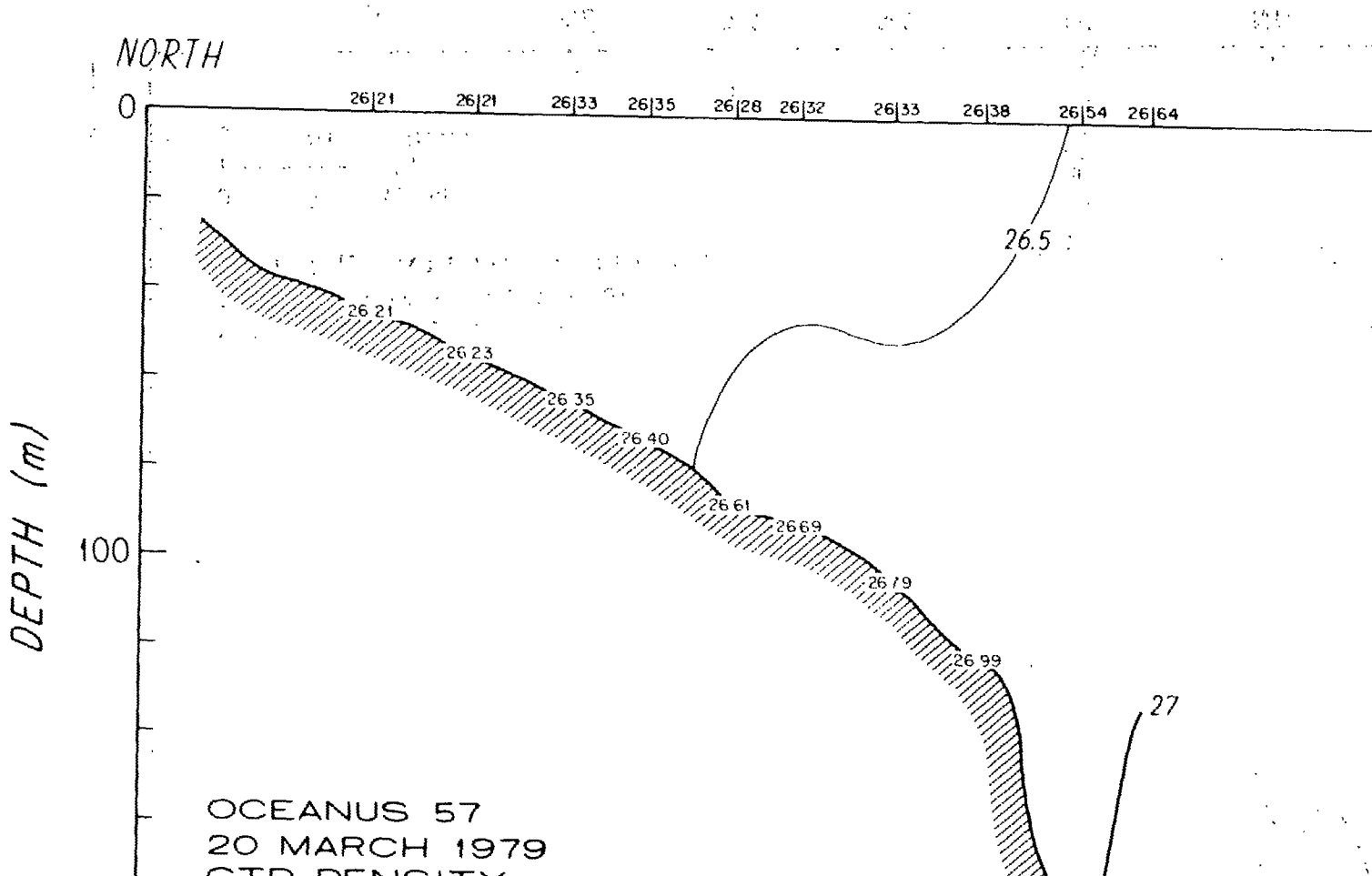
Fig. 1. Location of current meter moorings (N1–N6) during the Nantucket Shoals Flux Experiment. Hydrographic transects not along the mooring line are shown

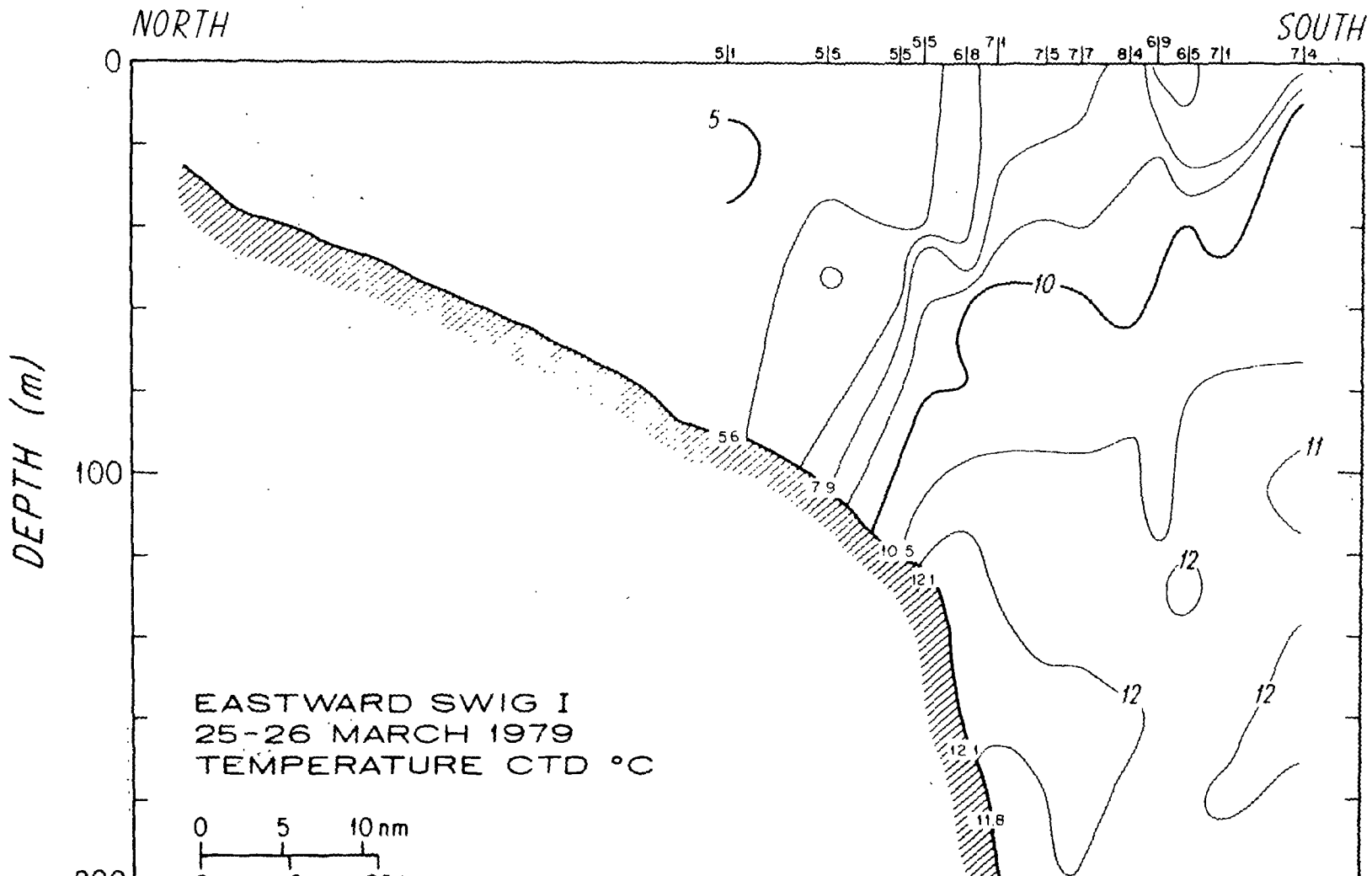

41°06'N
70°50'W
40°01'N
70°21'W
0|9
0|2
1|1
2|8
4|4
4|3
4|8
4|3
8|5
4|5
15|3
9|8
DEPTH (m)
0
100
200
0.6
0.7
1.5
1.7
2.5
2.9
3.8
9.6
11.1
12.1
12.5
1
5
5
10
10
15
OCEANUS 56
6 MARCH 1979
TEMPERATURE XBT °C
0 5 10 nm
0 10 20 km

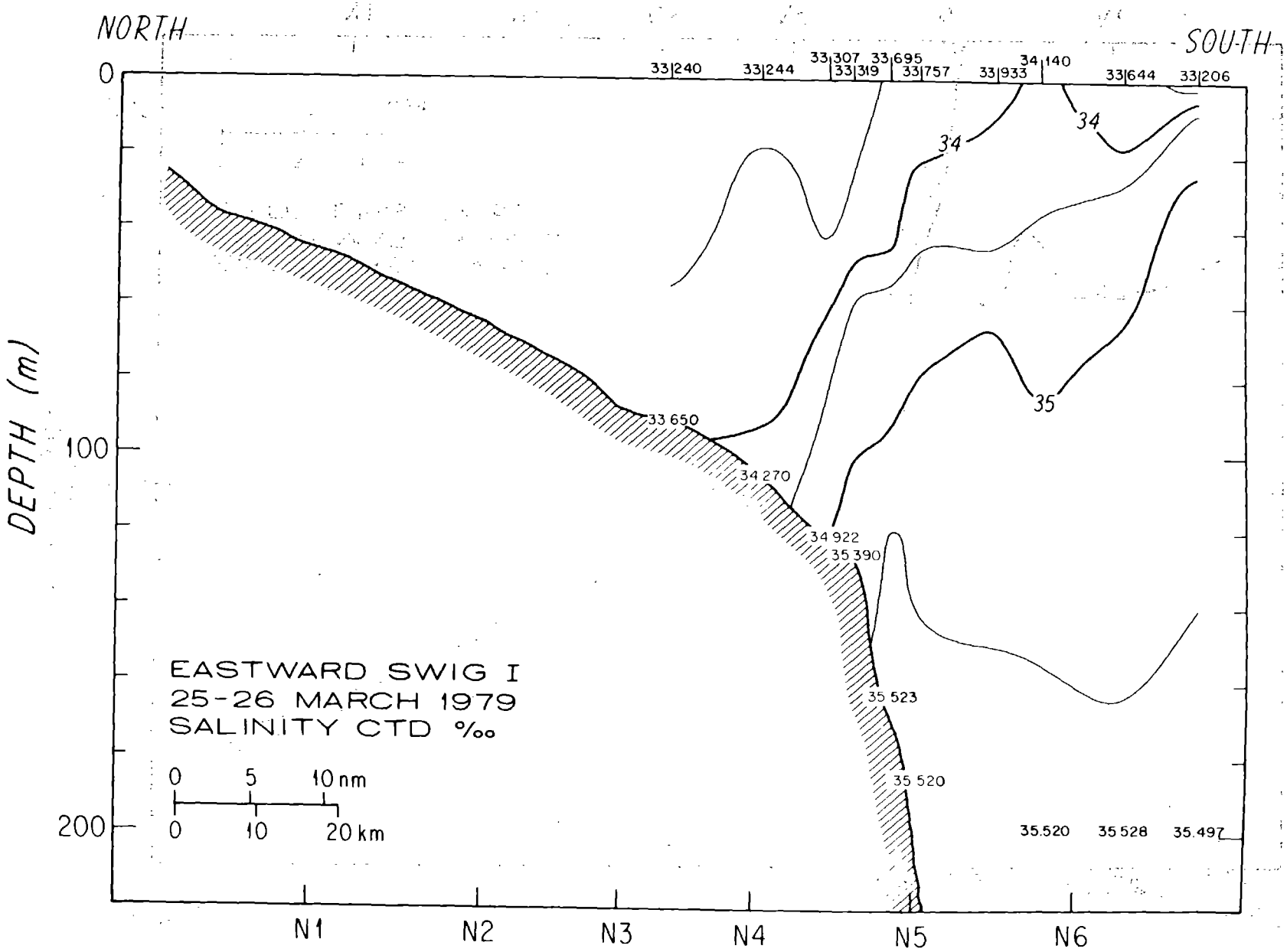

NORTH
SOUTH
2|5
2|3
2|3
1|7
1|5
1|8
2|2
3|5
5|0
7|6
5|6
5|8
0
100
200
DEPTH (m)
2.5
2.5
2.3
7.0
10.5
11.2
11.1
11.5
12.5
2
5
10
12
OCEANUS 57
17 MARCH 1979
TEMPERATURE XBT °C
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

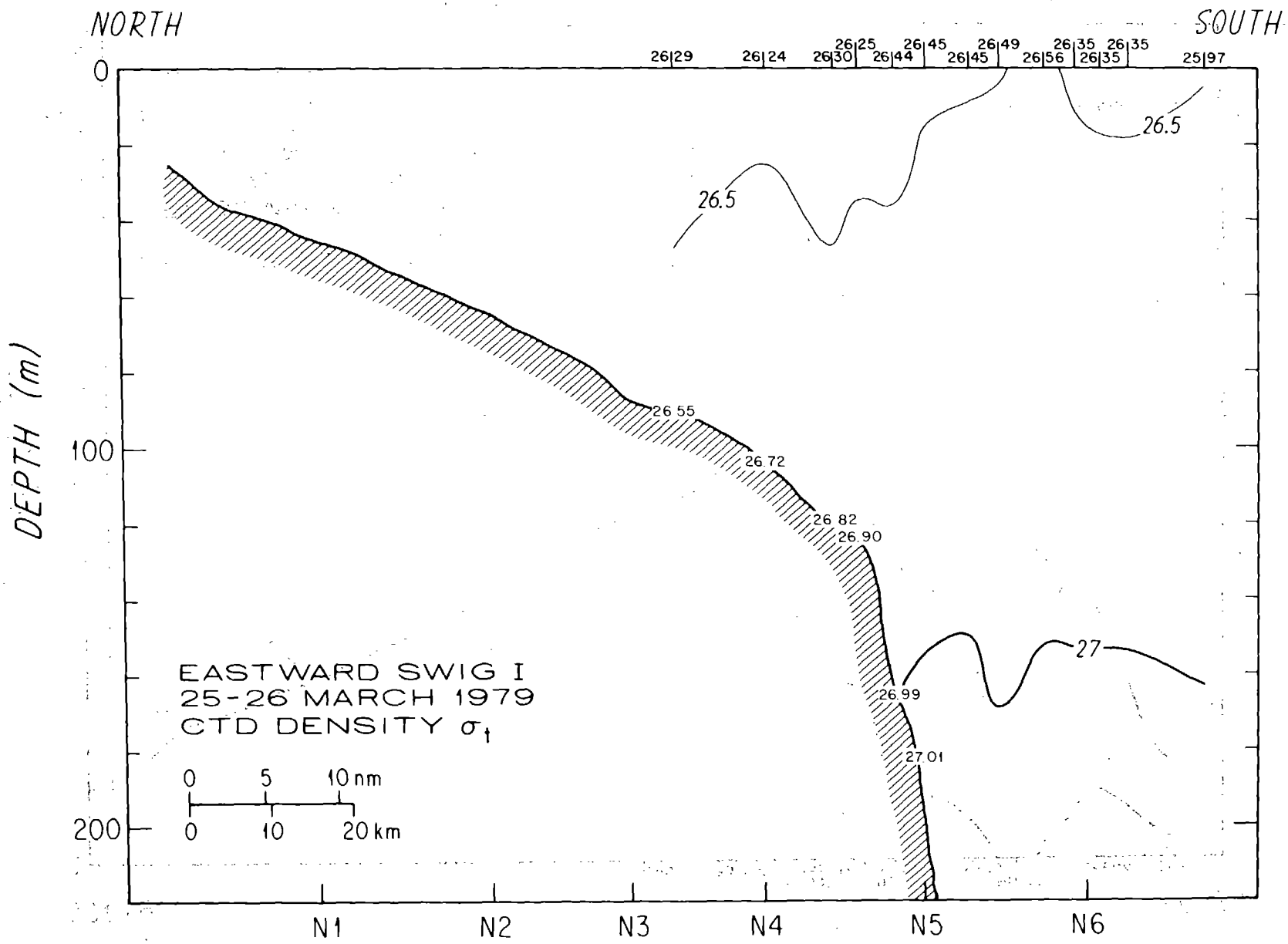

NORTH
0
100
DEPTH (m)
2|94
3|20
3|13
3|46
3|71
4|16
4|52
4|85
5|26
6|81
7|44
10|68
3
5
10
12
12
2.93
3.20
3.07
3.71
4.37
6.55
9.19
11.14
12.27
OCEANUS 57
20 MARCH 1979
TEMPERATURE CTD °C

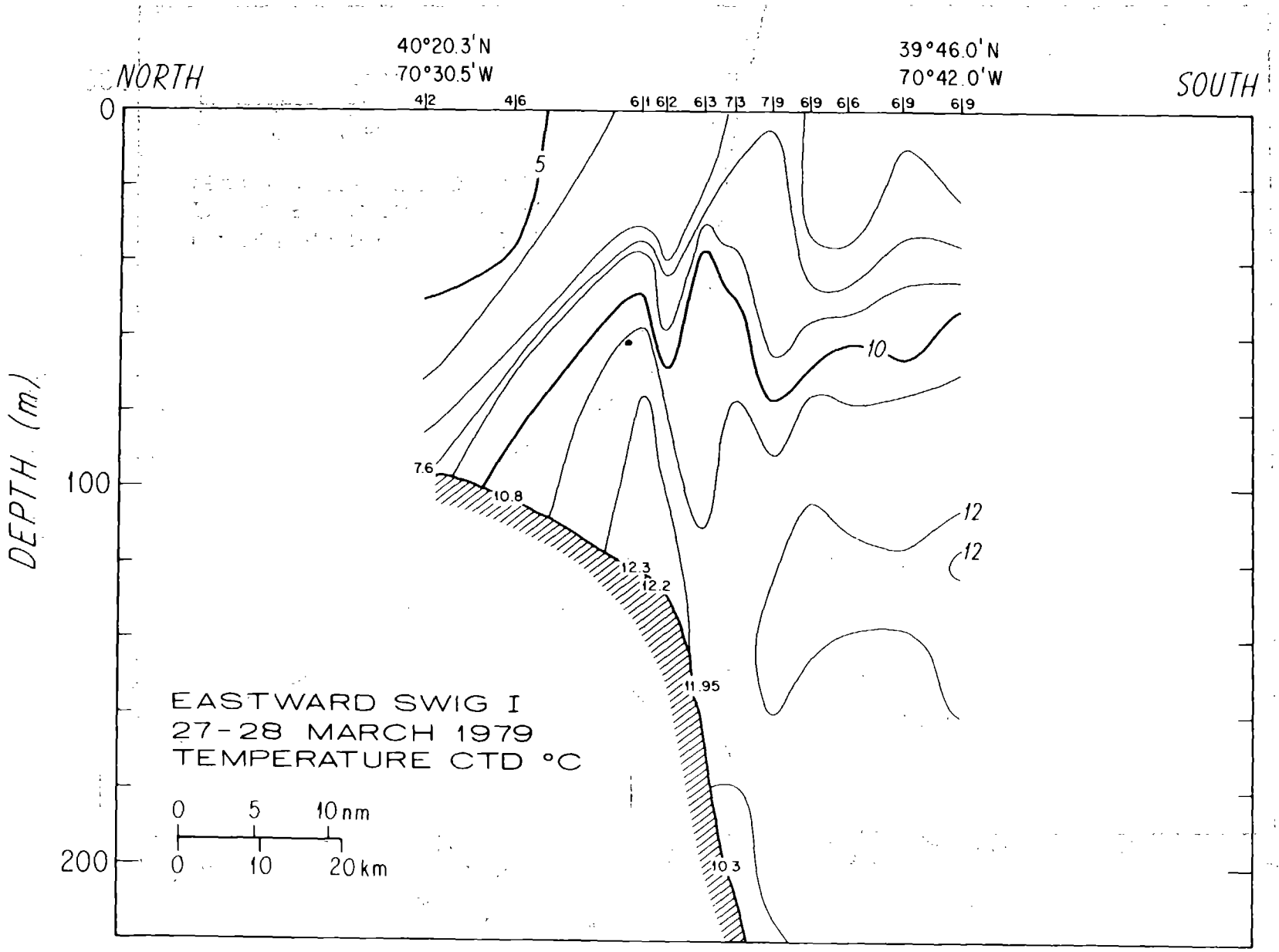

NORTH
SOUTH
DEPTH (m)
0
100
200
32|793
32|895
32|899
33|070
33|127
33|099
33|183
33|249
33|375
33|827
34|049
33
34
35
32.783
32.885
32.897
33.122
33.275
33.873
34.164
35.029
35.471
35.527
35.427
OCEANUS 57
20 MARCH 1979
CTD SALINITY ‰
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

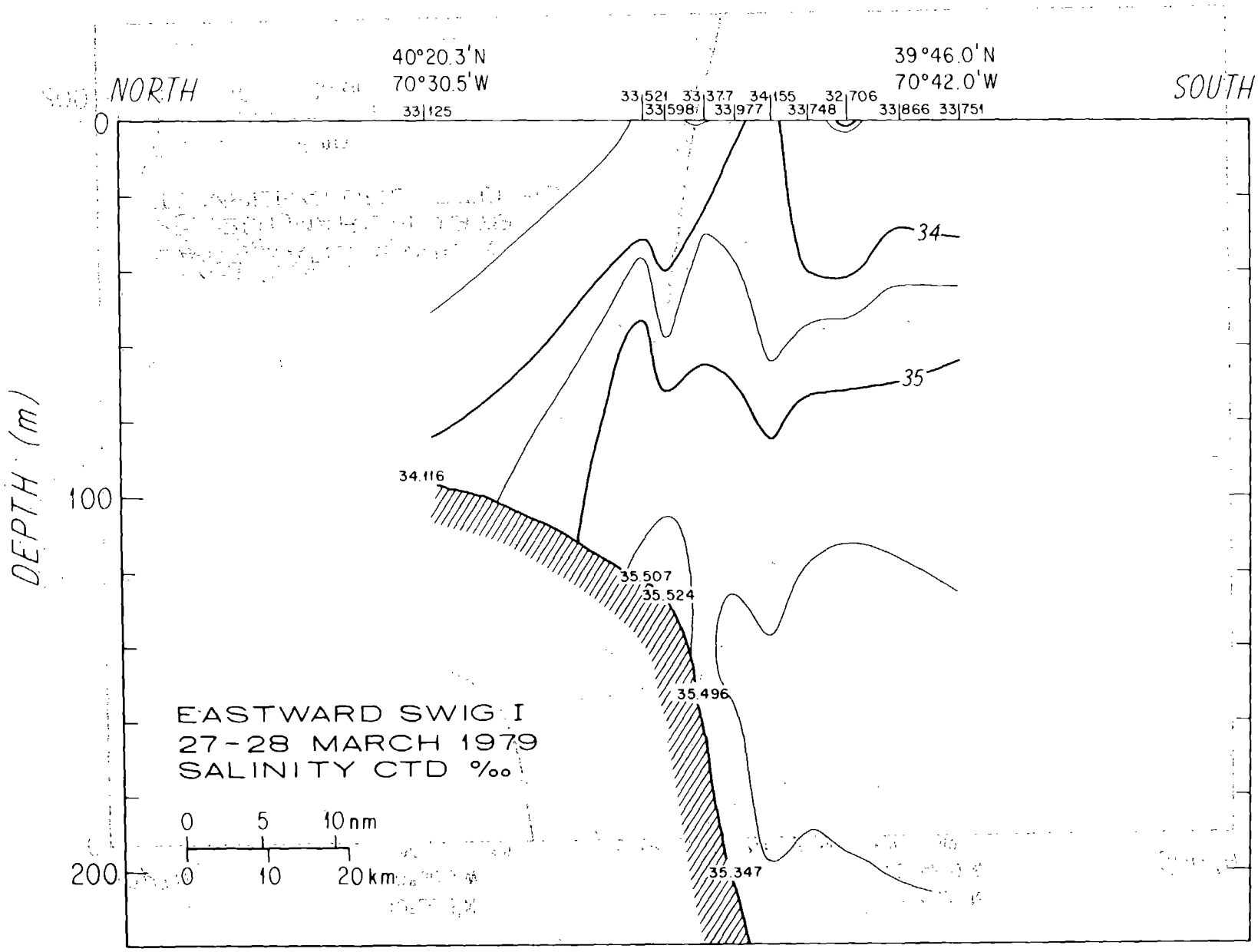

NORTH
0
100
DEPTH (m)
26|21
26|21
26|33
26|35
26|28
26|32
26|33
26|38
26|54
26|64
26.5
26.21
26.23
26.35
26.40
26.61
26.69
26.79
26.99
27
OCEANUS 57
20 MARCH 1979
CTD DENSITY

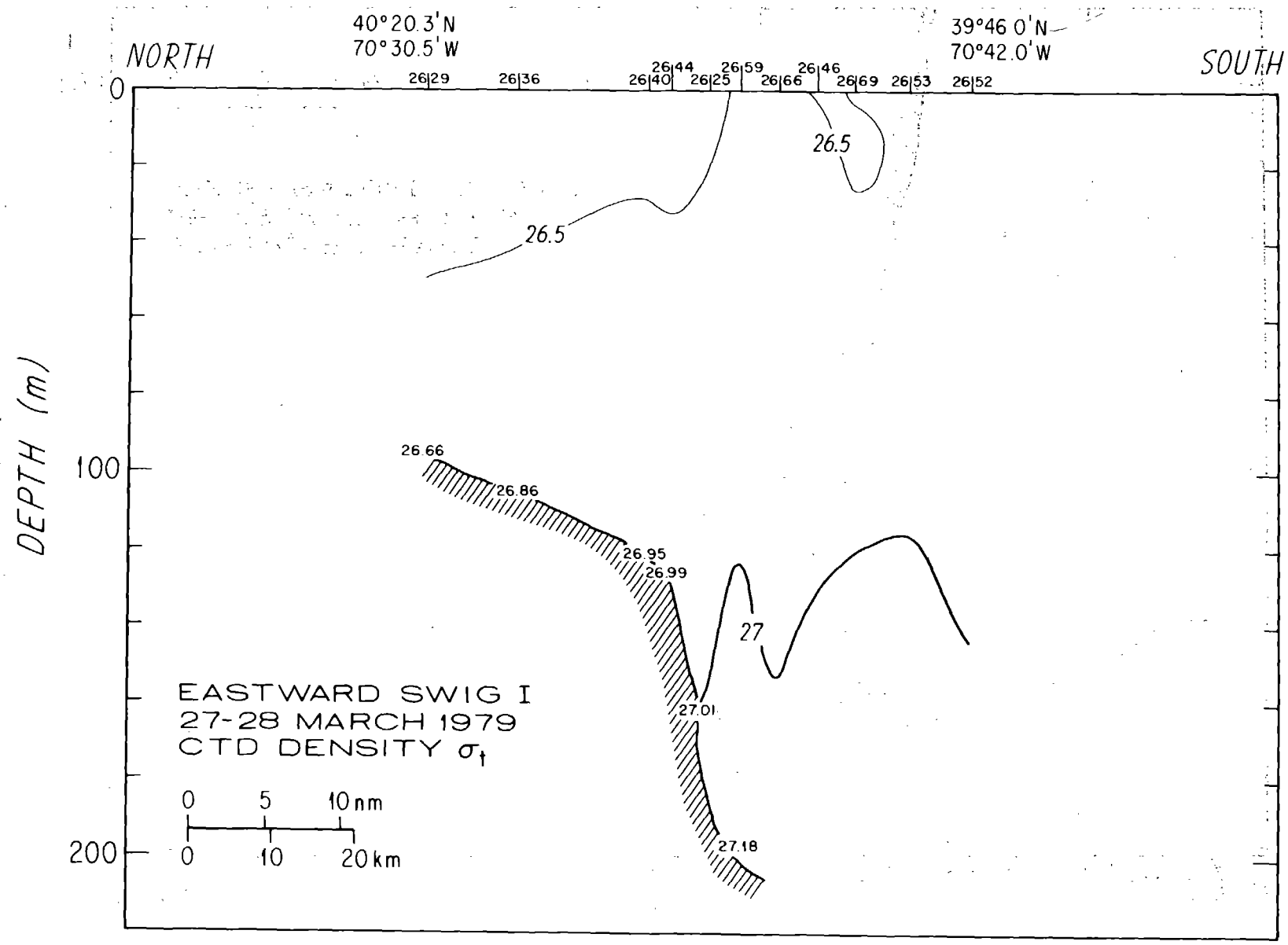

NORTH
SOUTH
DEPTH (m)
0
100
200
EASTWARD SWIG I
25-26 MARCH 1979
TEMPERATURE CTD °C
0 5 10 nm
5
10
11
12
5.1
5.5
5.5
5.5
6.8
7.1
7.5
7.7
8.4
6.9
6.5
7.1
7.4
5.6
7.9
10.5
12.1
12.1
11.8

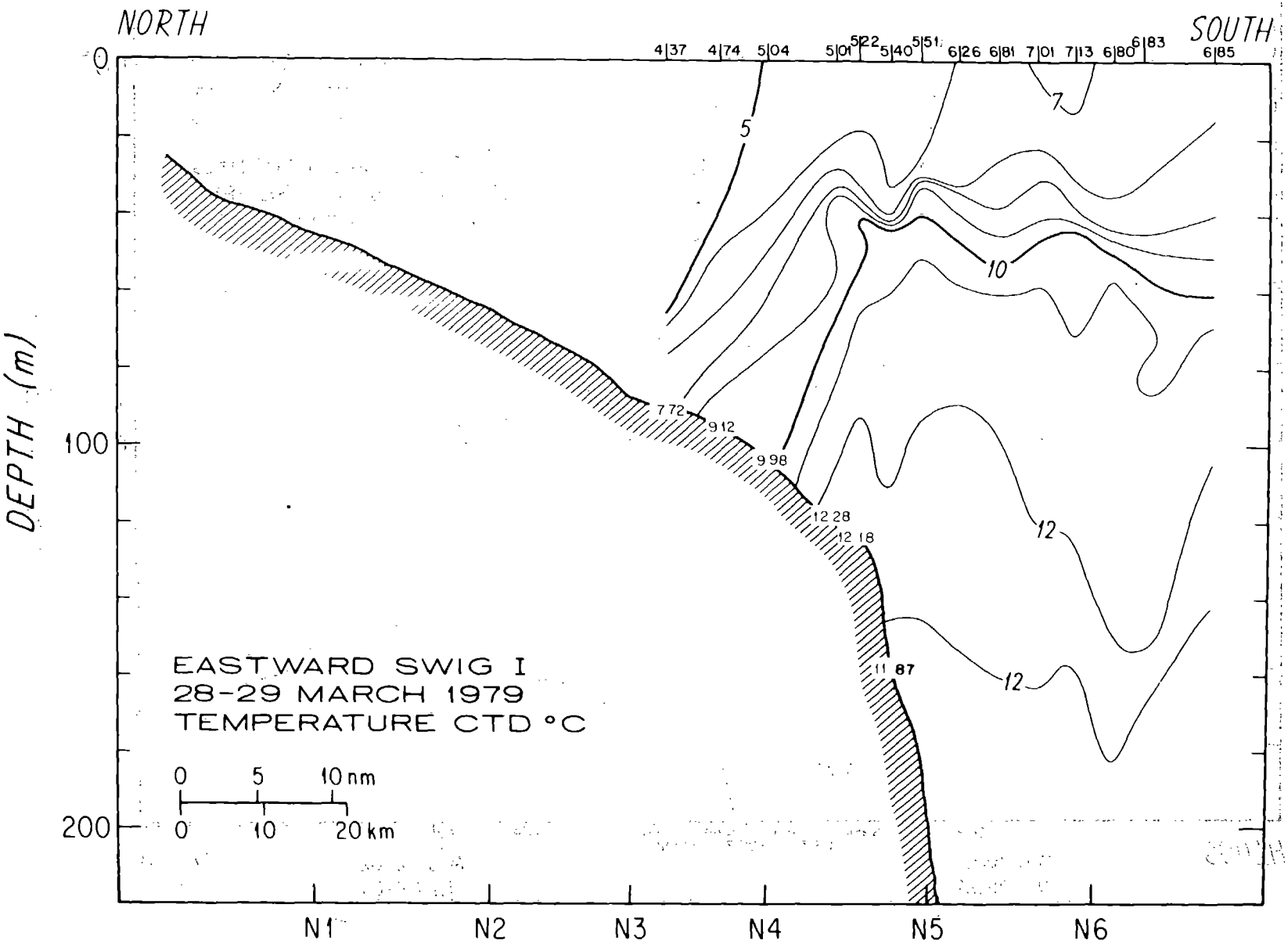

NORTH
SOUTH
DEPTH (m)
0
100
200
33|240
33|244
33|307
33|319
33|695
33|757
33|933
34|140
33|644
33|206
34
34
35
33 650
34 270
34 922
35 390
35 523
35 520
35.520
35 528
35.497
EASTWARD SWIG I
25-26 MARCH 1979
SALINITY CTD ‰
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

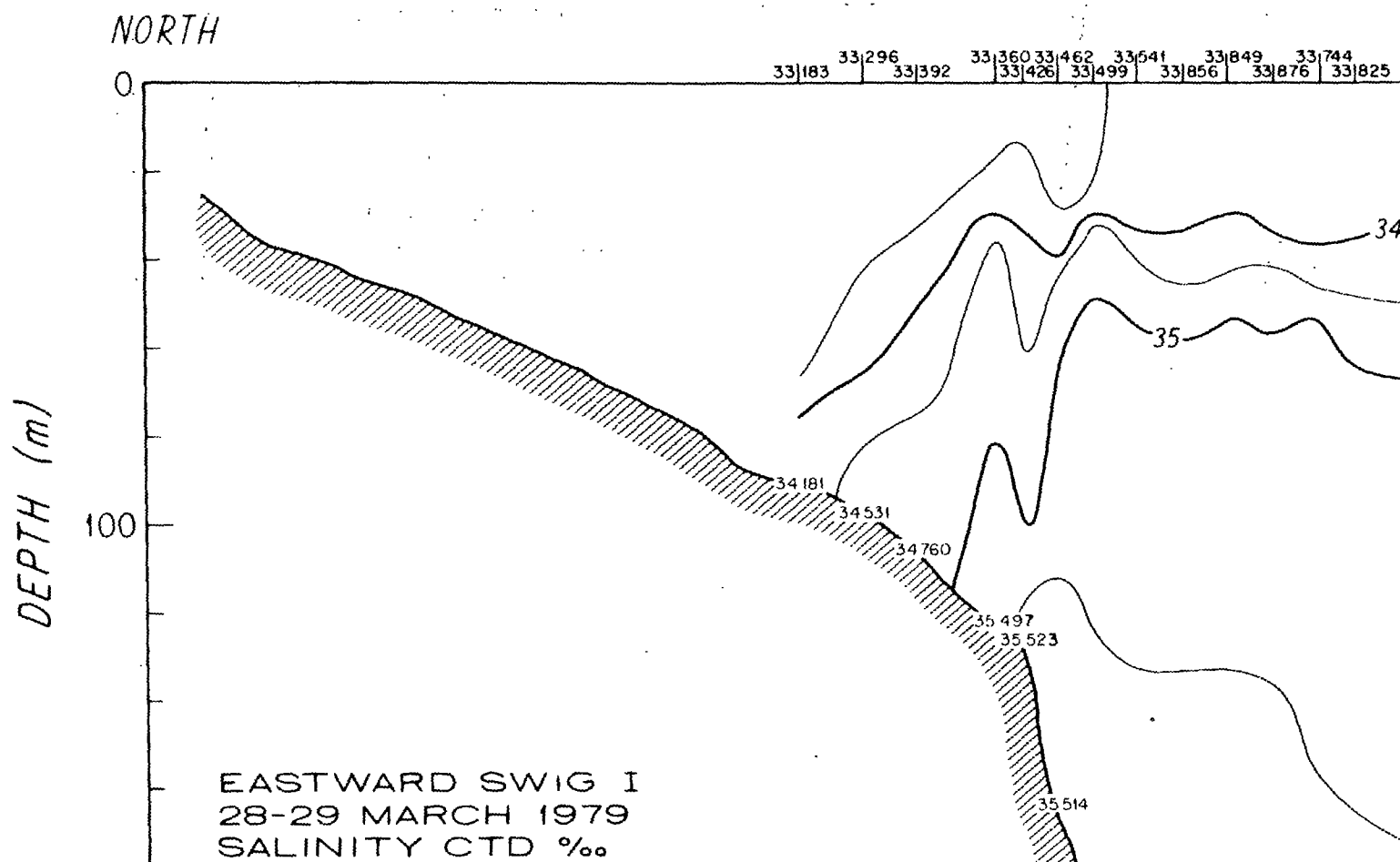

NORTH
SOUTH
DEPTH (m)
0
100
200
26|29
26|24
26|30
26|25
26|44
26|45
26|45
26|49
26|56
26|35
26|35
26|35
25|97
26.5
26.5
26.55
26.72
26.82
26.90
26.99
27.01
27
EASTWARD SWIG I
25-26 MARCH 1979
CTD DENSITY σ_t
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

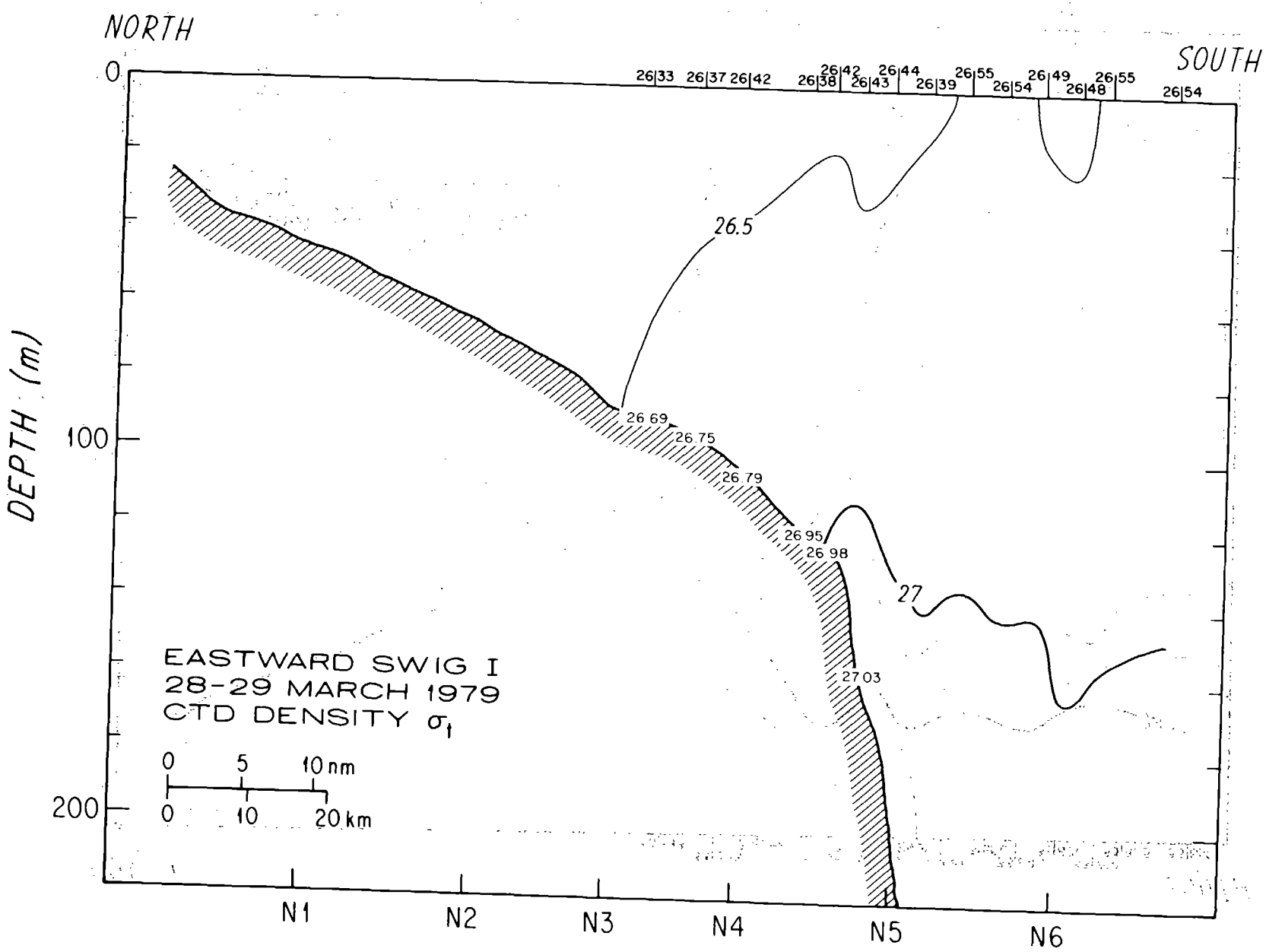

NORTH
SOUTH
40°20.3'N
70°30.5'W
39°46.0'N
70°42.0'W
4|2
4|6
6|1
6|2
6|3
7|3
7|9
6|9
6|6
6|9
6|9
DEPTH (m)
0
100
200
5
10
12
12
7.6
10.8
12.3
12.2
11.95
10.3
EASTWARD SWIG I
27-28 MARCH 1979
TEMPERATURE CTD °C
0 5 10 nm
0 10 20 km

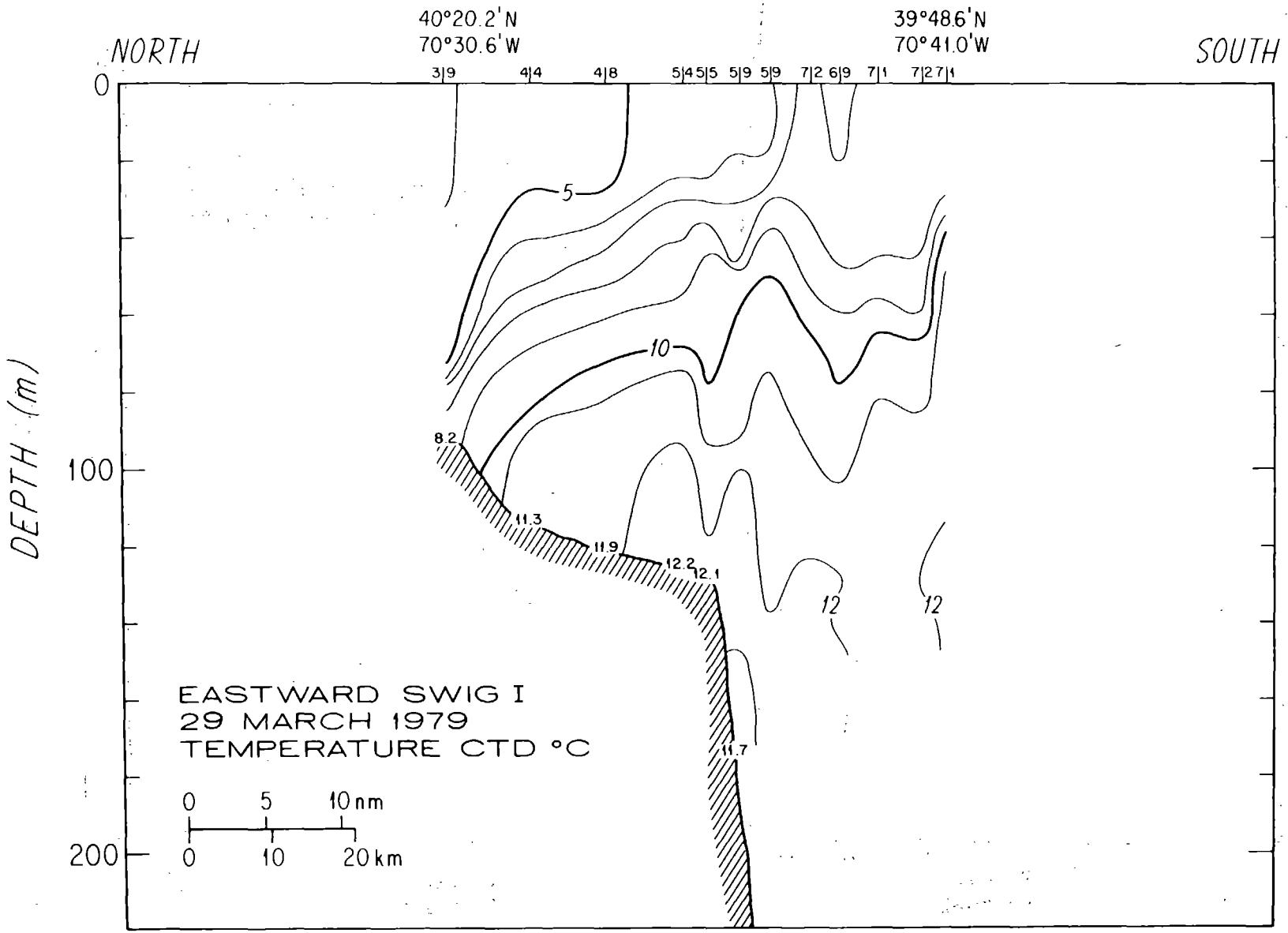

40°20.3'N
70°30.5'W
39°46.0'N
70°42.0'W
NORTH
SOUTH
33|125
33|521
33|598
33|377
33|977
34|155
33|748
32|706
33|866
33|751
34
35
34.116
35.507
35.524
35.496
35.347
DEPTH (m)
0
100
200
EASTWARD SWIG I
27-28 MARCH 1979
SALINITY CTD ‰
0 5 10 nm
0 10 20 km

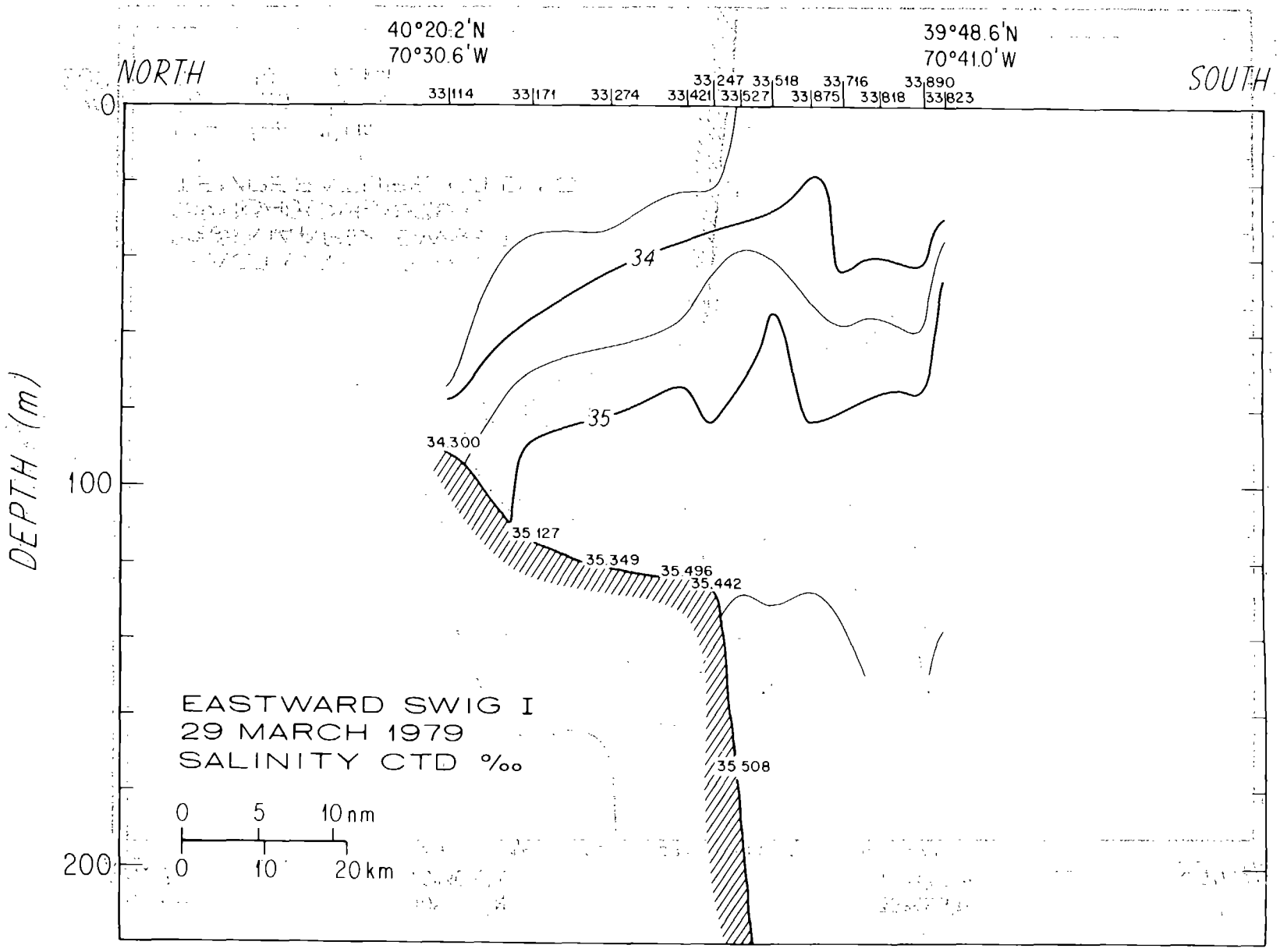

NORTH
SOUTH
40°20.3'N
70°30.5'W
39°46.0'N
70°42.0'W
26|29
26|36
26|40
26|44
26|25
26|59
26|66
26|46
26|69
26|53
26|52
26.5
26.5
26.66
26.86
26.95
26.99
27
27.01
27.18
DEPTH (m)
0
100
200
EASTWARD SWIG I
27-28 MARCH 1979
CTD DENSITY σ_t
0 5 10 nm
0 10 20 km

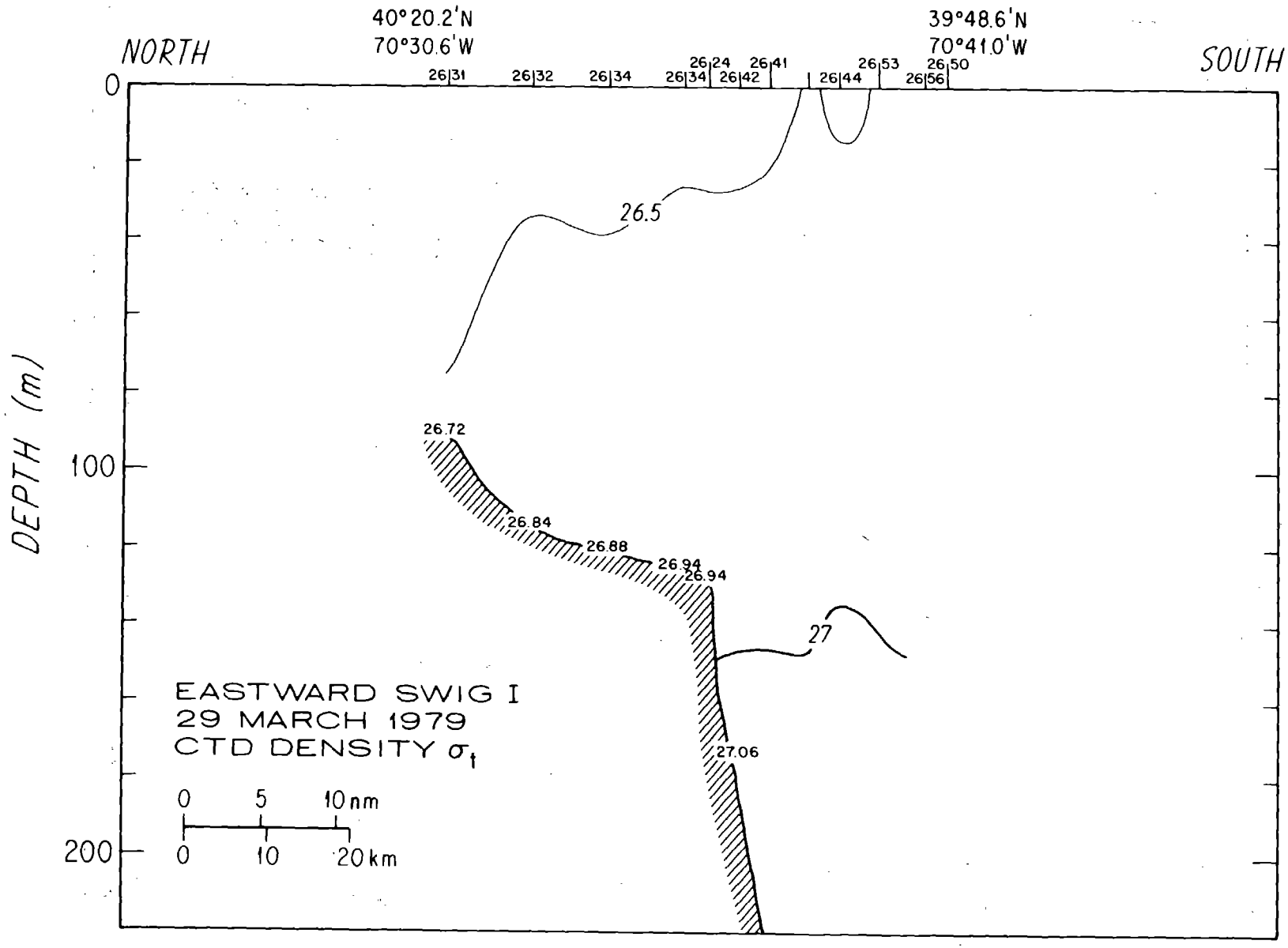

NORTH
SOUTH
4|37 4|74 5|04 5|01 5|22 5|40 5|51 6|26 6|81 7|01 7|13 6|80 6|83 6|85
DEPTH (m)
0
100
200
5
7
10
12
12
7.72
9.12
9.98
12.28
12.18
11.87
EASTWARD SWIG I
28-29 MARCH 1979
TEMPERATURE CTD °C
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

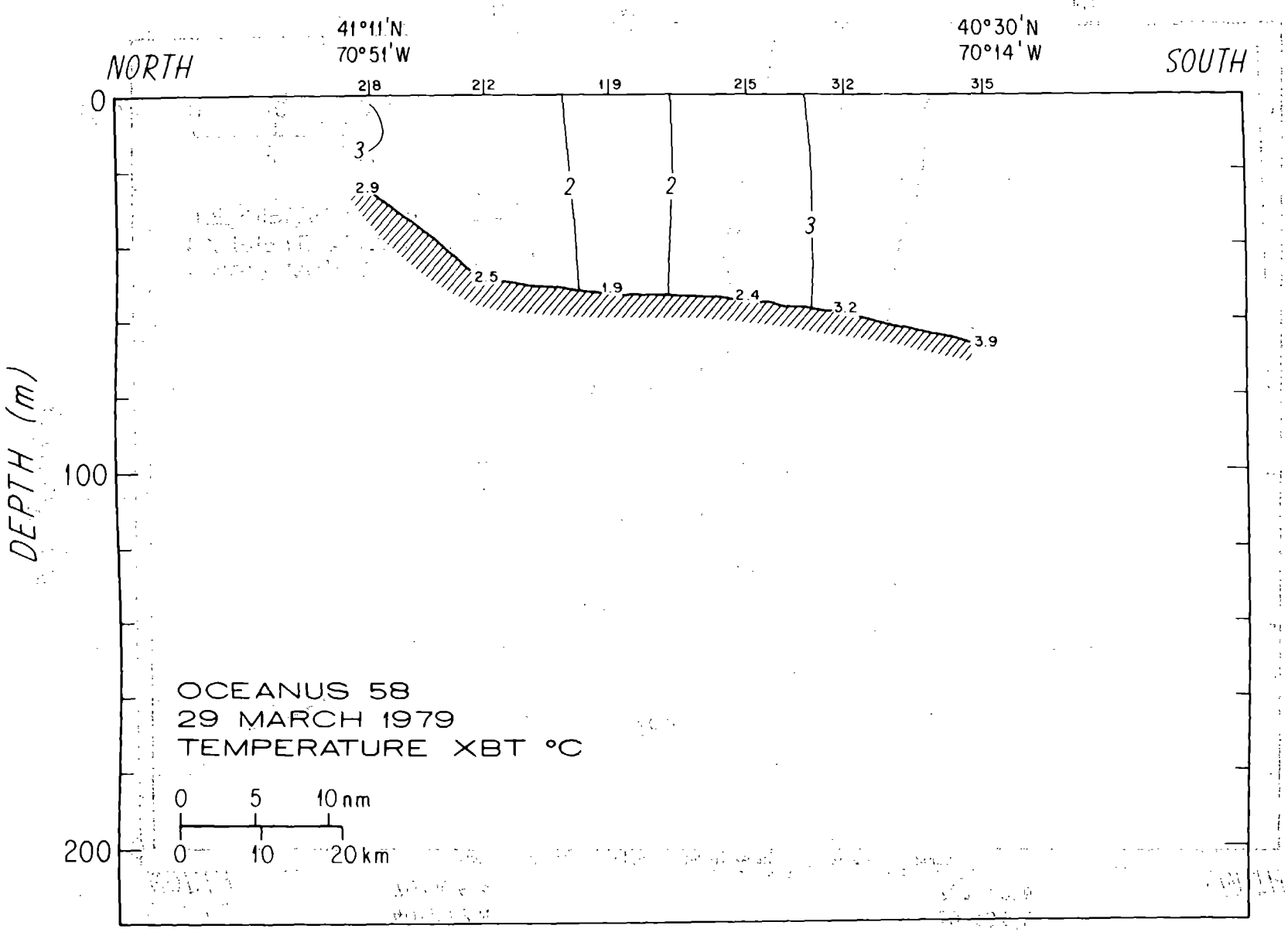

NORTH
0
100
DEPTH (m)
33|183
33|296
33|392
33|360
33|426
33|462
33|499
33|541
33|856
33|849
33|876
33|744
33|825
34
35
34.181
34.531
34.760
35.497
35.523
35.514
EASTWARD SWIG I
28-29 MARCH 1979
SALINITY CTD ‰

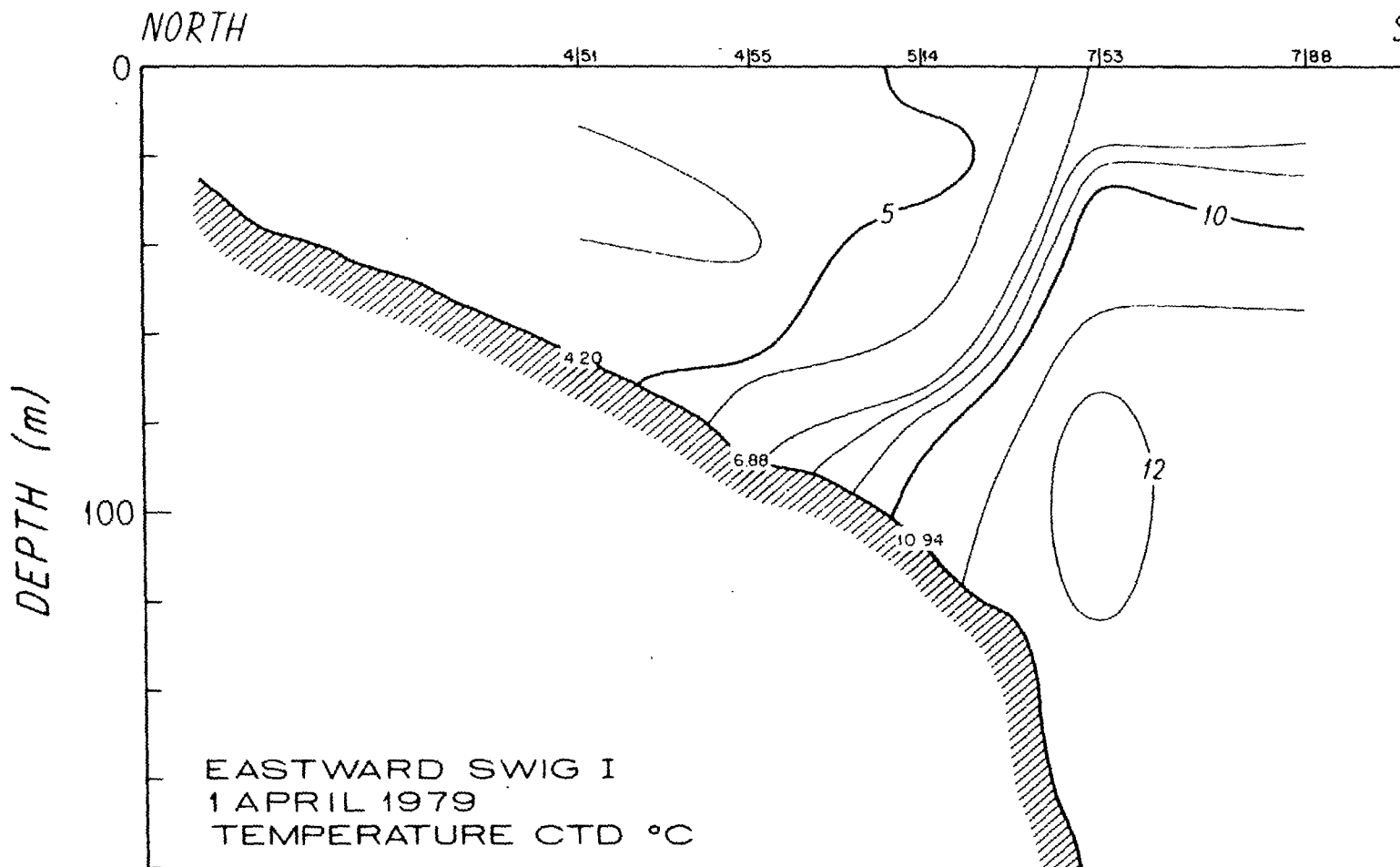

NORTH
SOUTH
DEPTH (m)
0
100
200
26|33
26|37
26|42
26|38
26|42
26|43
26|44
26|39
26|55
26|54
26|49
26|48
26|55
26|54
26.5
26 69
26.75
26.79
26 95
26 98
27
27 03
EASTWARD SWIG I
28-29 MARCH 1979
CTD DENSITY σ_t
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

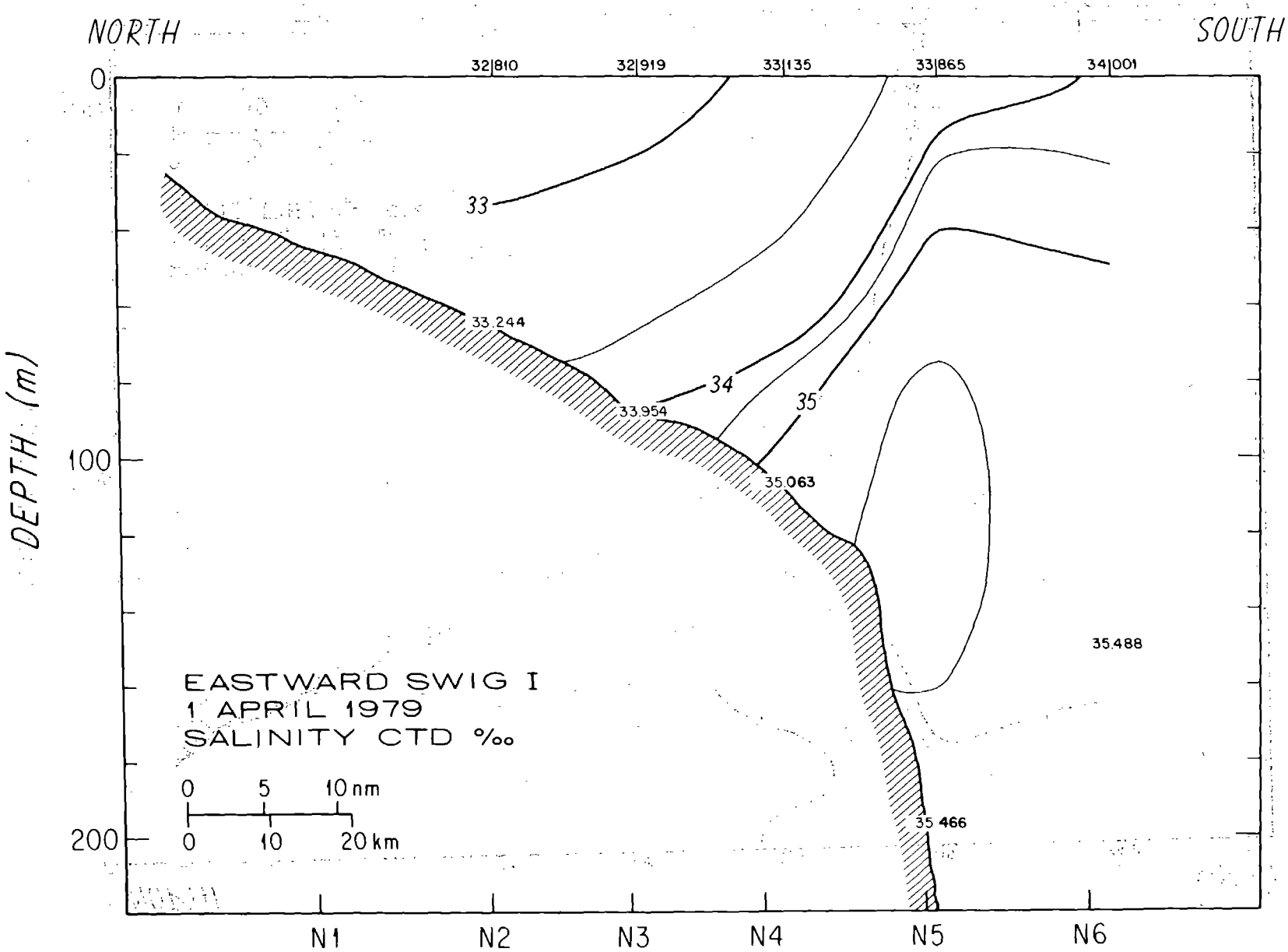

40°20.2'N
70°30.6'W
39°48.6'N
70°41.0'W
NORTH
SOUTH
3|9
4|4
4|8
5|4 5|5
5|9
5|9
7|2 6|9
7|1
7|2 7|1
0
100
200
DEPTH (m)
5
10
12
12
8.2
11.3
11.9
12.2
12.1
11.7
EASTWARD SWIG I
29 MARCH 1979
TEMPERATURE CTD °C
0 5 10 nm
0 10 20 km

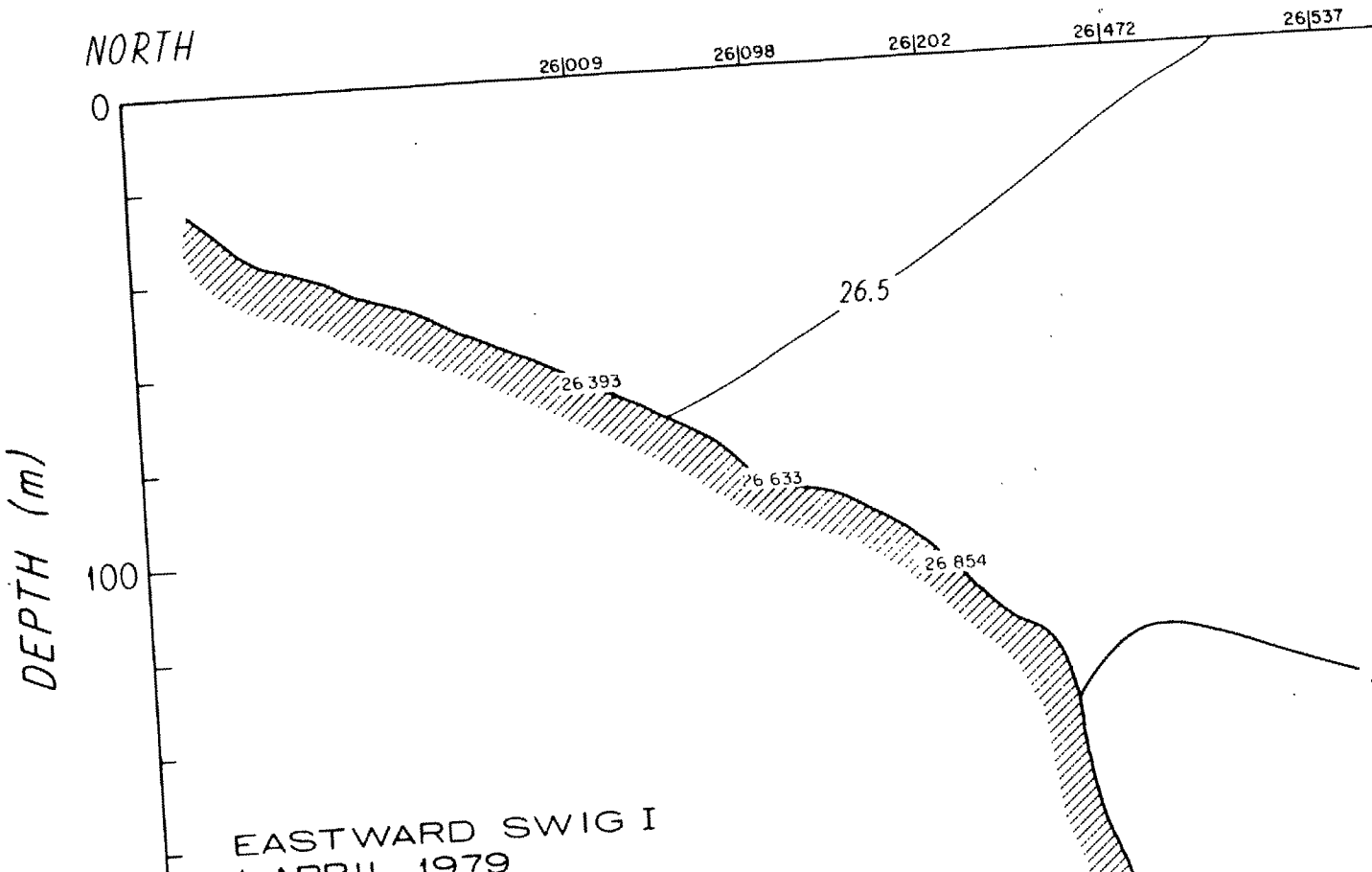

40°20.2'N
70°30.6'W
39°48.6'N
70°41.0'W
NORTH
SOUTH
33|114
33|171
33|274
33|421
33|247
33|527
33|518
33|875
33|716
33|818
33|890
33|823
34
35
34.300
35.127
35.349
35.496
35.442
35.508
DEPTH (m)
0
100
200
EASTWARD SWIG I
29 MARCH 1979
SALINITY CTD ‰
0 5 10 nm
0 10 20 km

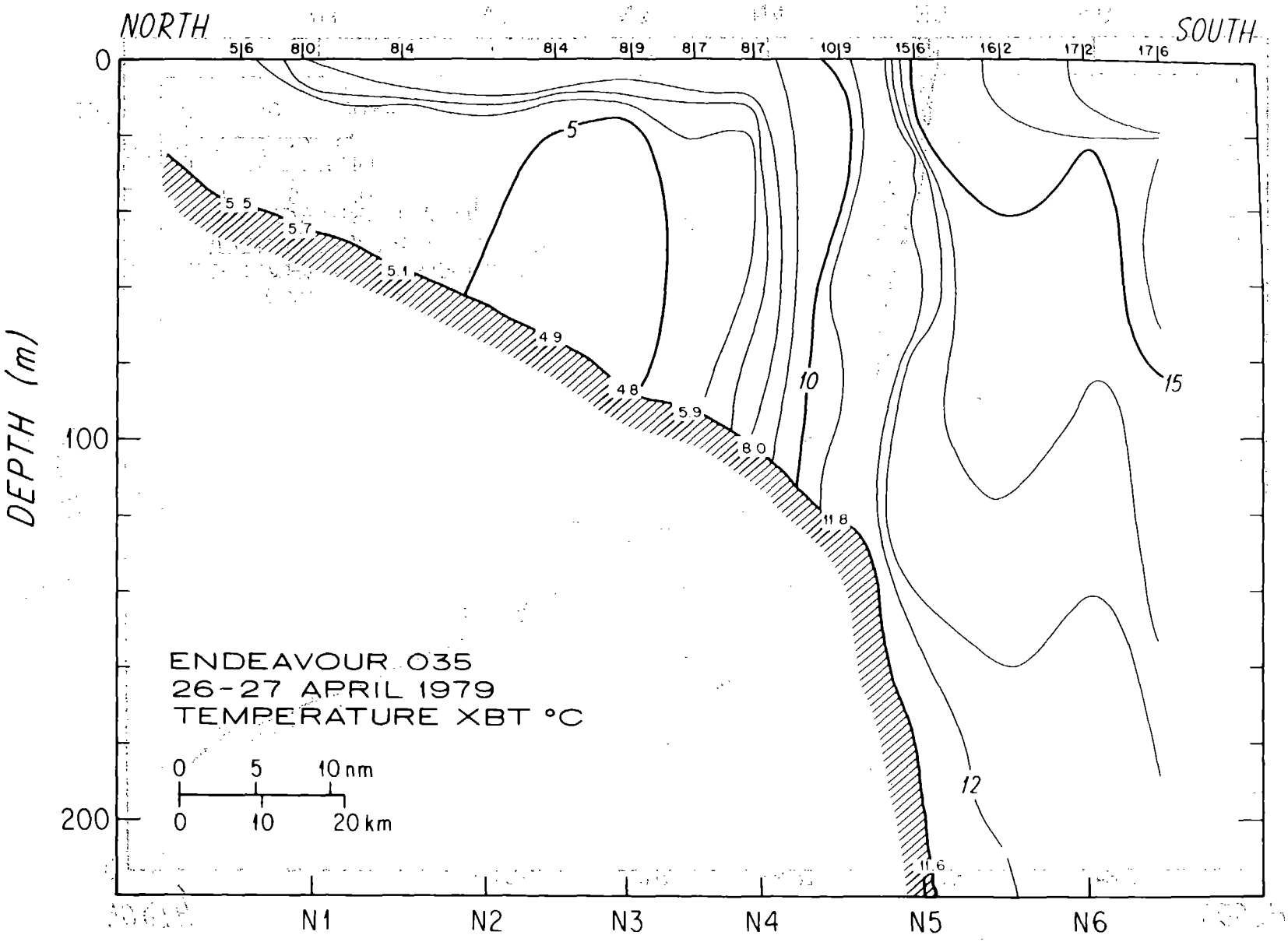

40°20.2'N
70°30.6'W
39°48.6'N
70°41.0'W
NORTH
SOUTH
26|31
26|32
26|34
26|34
26|24
26|42
26|41
26|44
26|53
26|56
26|50
26.5
26.72
26.84
26.88
26.94
26.94
27
27.06
DEPTH (m)
0
100
200
EASTWARD SWIG I
29 MARCH 1979
CTD DENSITY σ_t
0 5 10 nm
0 10 20 km

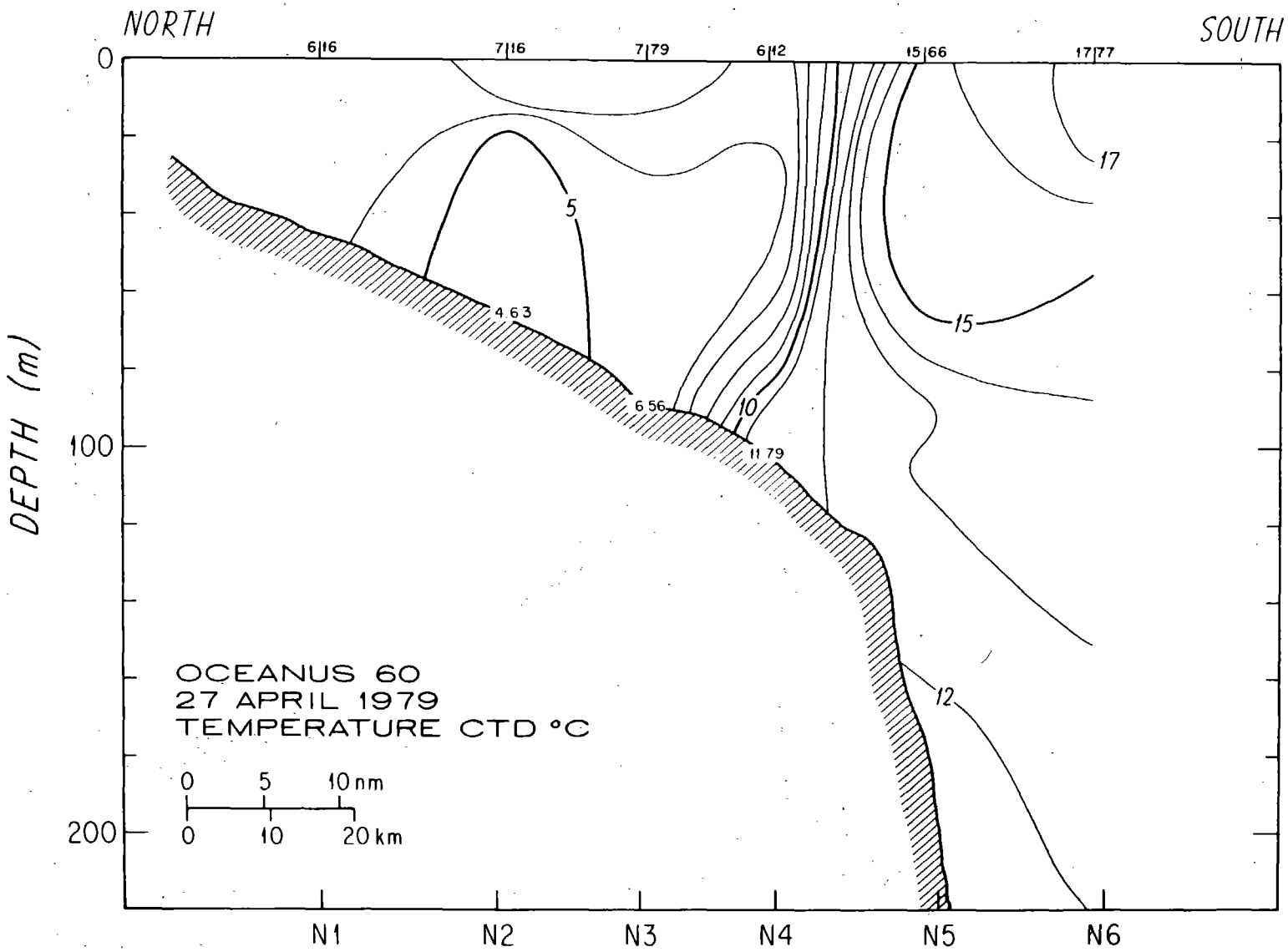

41°11'N
70°51'W
40°30'N
70°14'W
NORTH
SOUTH
2|8
2|2
1|9
2|5
3|2
3|5
3
2
2
3
2.9
2.5
1.9
2.4
3.2
3.9
DEPTH (m)
0
100
200
OCEANUS 58
29 MARCH 1979
TEMPERATURE XBT °C
0 5 10 nm
0 10 20 km

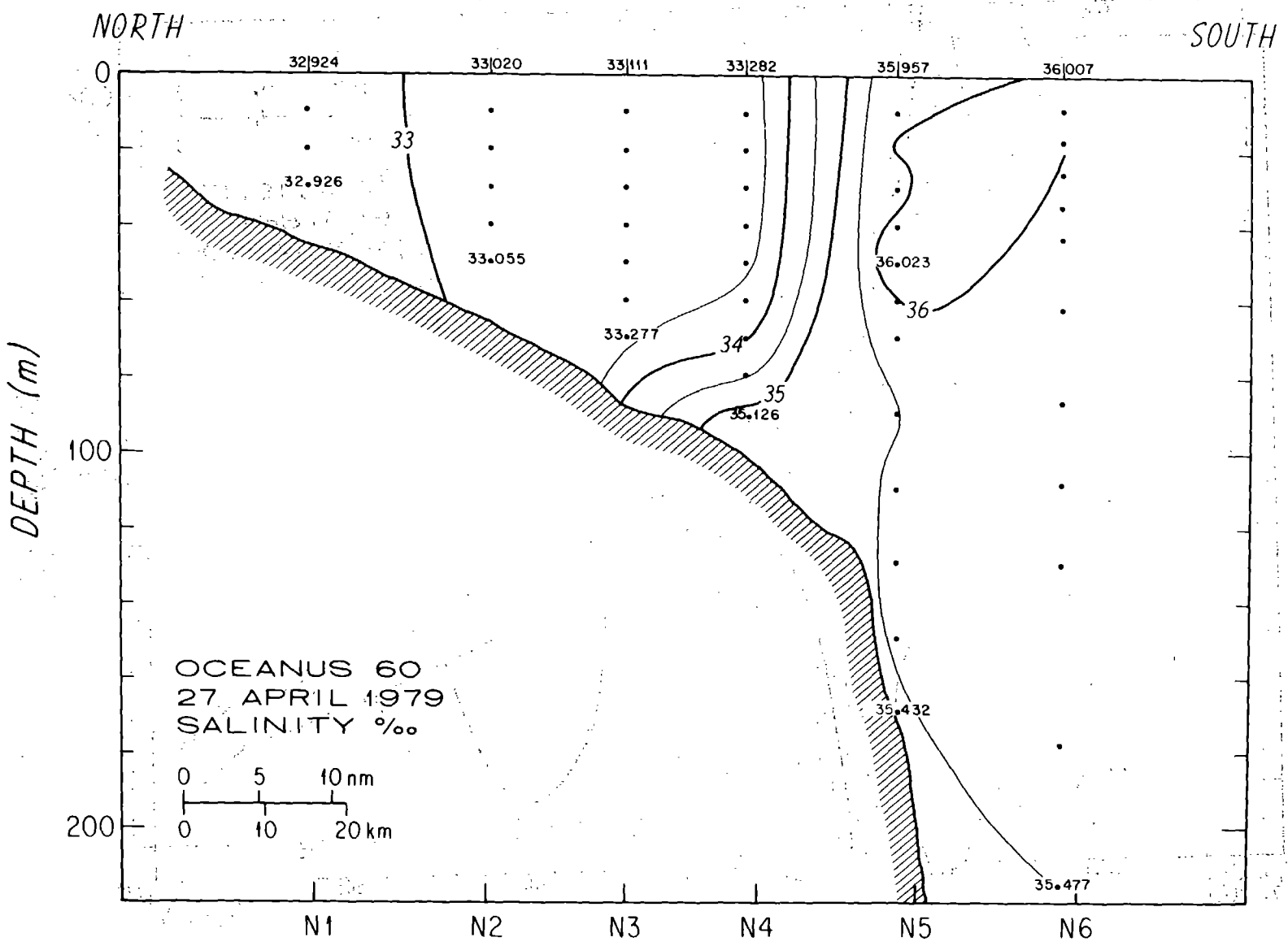

NORTH
0
100
DEPTH (m)
4|51
4|55
5|14
7|53
7|88
5
10
12
4.20
6.88
10.94
EASTWARD SWIG I
1 APRIL 1979
TEMPERATURE CTD °C

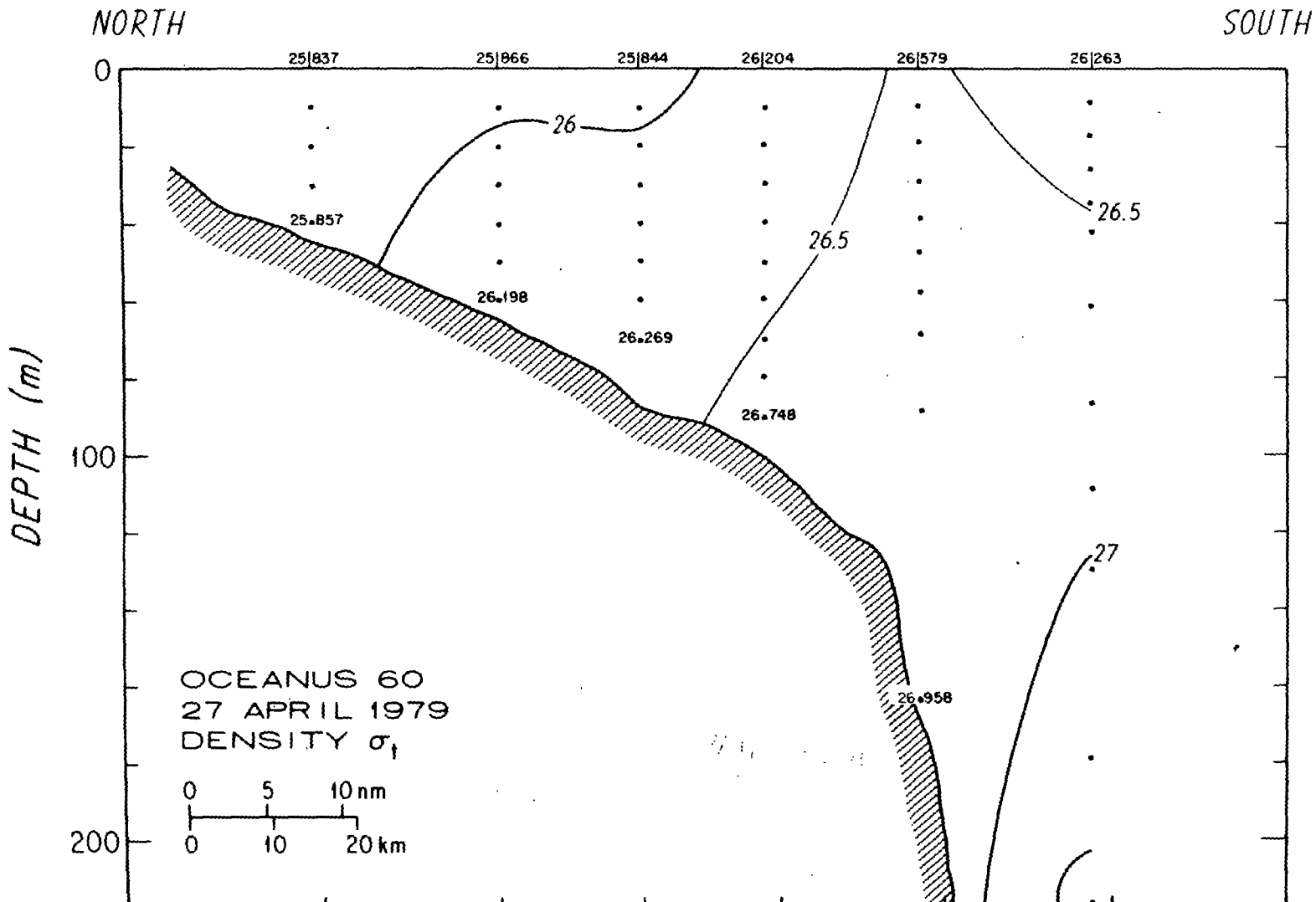

NORTH
SOUTH
DEPTH (m)
0
100
200
32|810
32|919
33|135
33|865
34|001
33
34
35
33.244
33.954
35.063
35.488
35.466
EASTWARD SWIG I
1 APRIL 1979
SALINITY CTD ‰
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

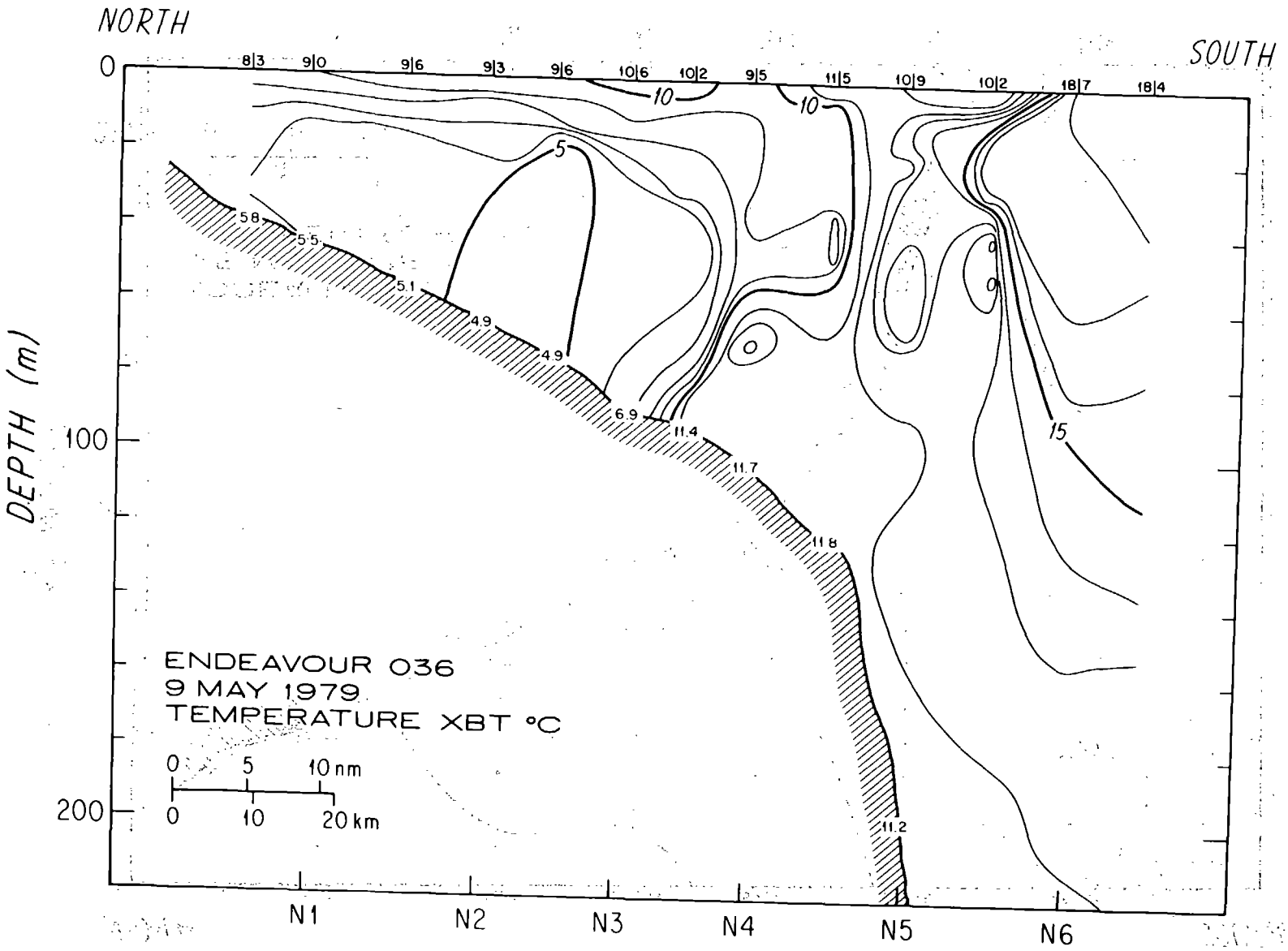

NORTH
26|009
26|098
26|202
26|472
26|537
0
100
DEPTH (m)
26.5
26.393
26.633
26.854
EASTWARD SWIG I
APRIL 1979

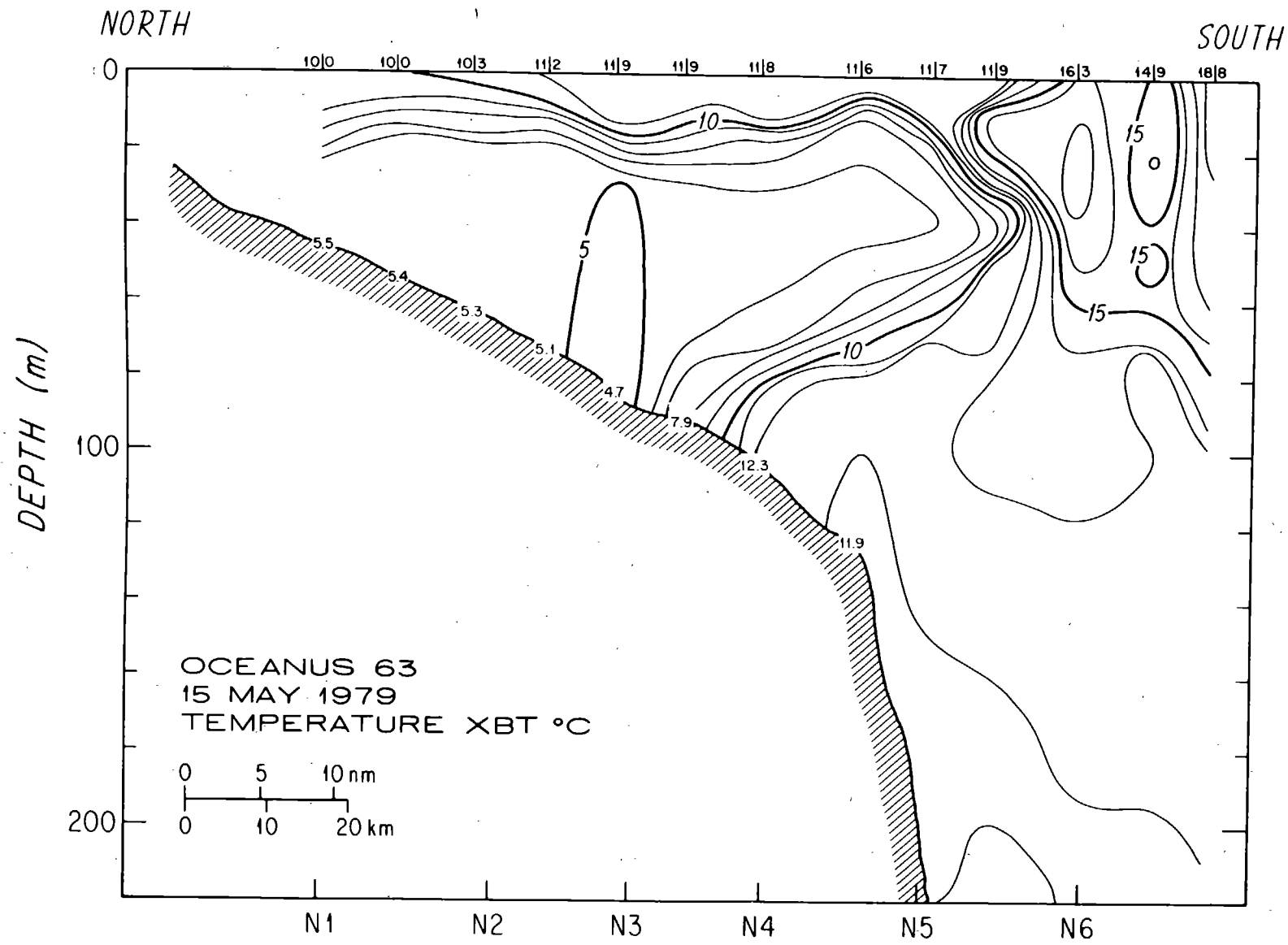

NORTH
SOUTH
DEPTH (m)
0
100
200
5.6
8.0
8.4
8.4
8.9
8.7
8.7
10.9
15.6
16.2
17.2
17.6
5
10
15
12
5.5
5.7
5.1
4.9
4.8
5.9
8.0
11.8
11.6
ENDEAVOUR 035
26-27 APRIL 1979
TEMPERATURE XBT °C
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

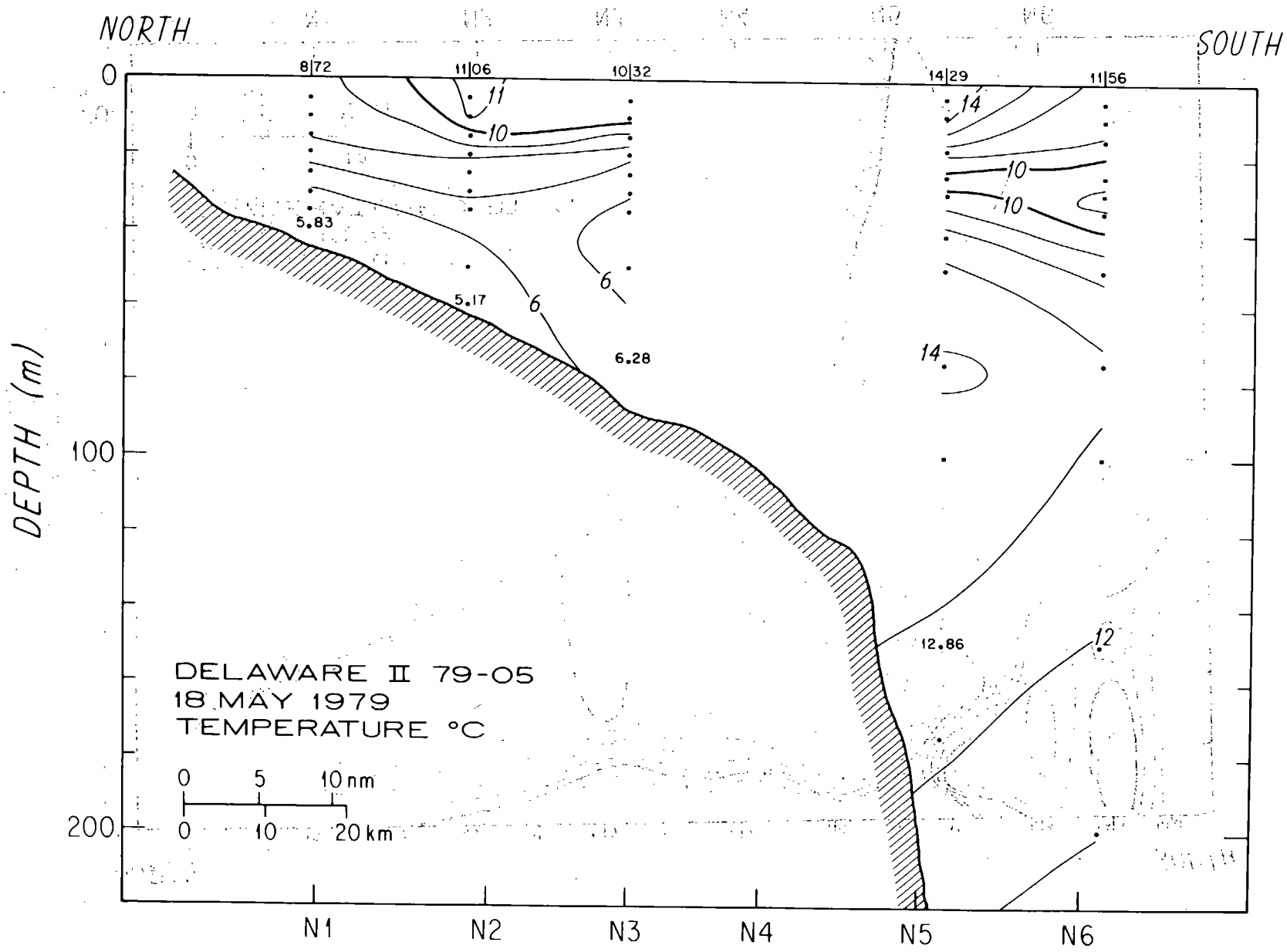

NORTH
SOUTH
DEPTH (m)
0
100
200
6|16
7|16
7|79
6|12
15|66
17|77
5
4.63
6.56
10
11.79
15
17
12
OCEANUS 60
27 APRIL 1979
TEMPERATURE CTD °C
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

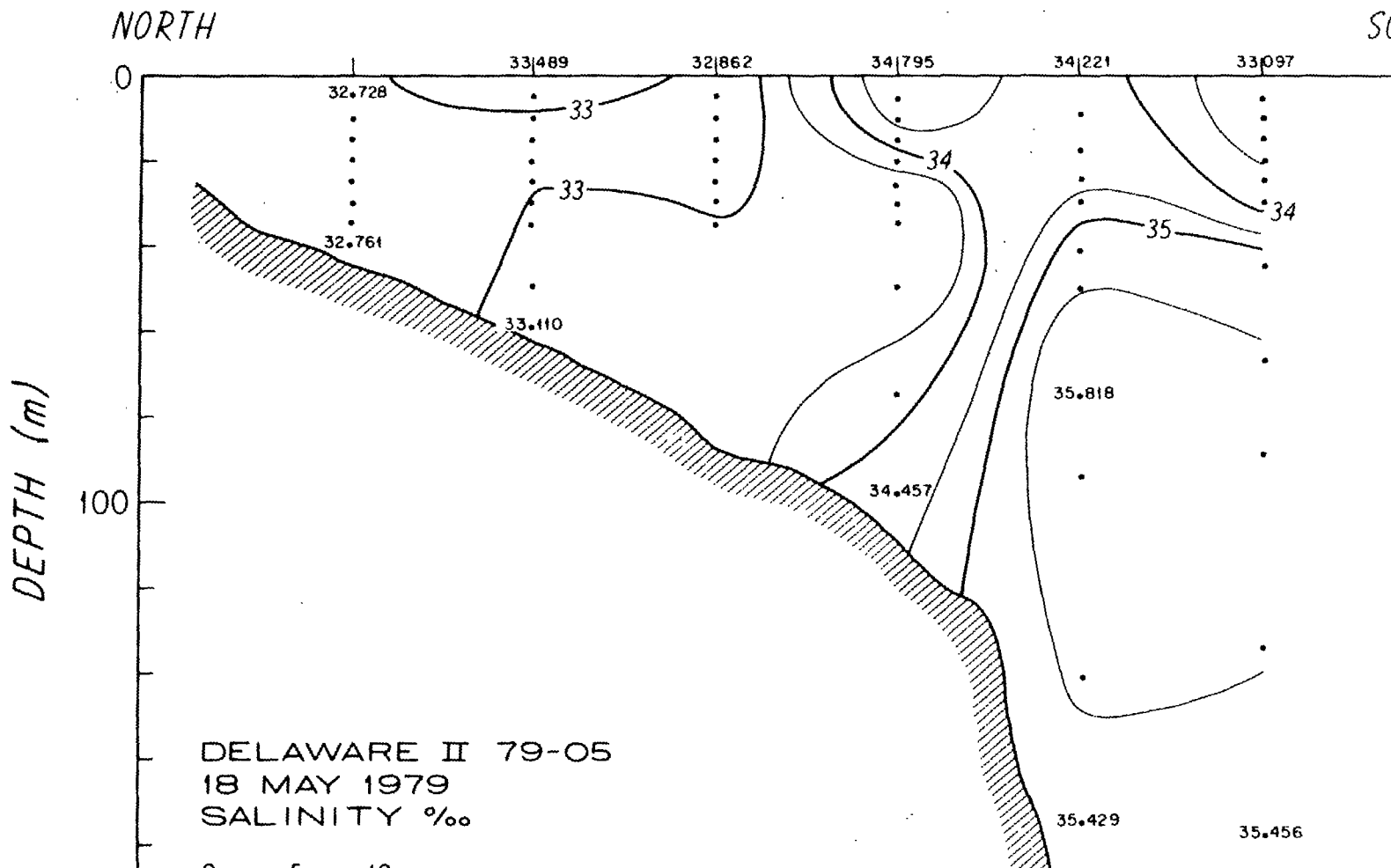

NORTH
SOUTH
DEPTH (m)
0
100
200
32|924
33|020
33|111
33|282
35|957
36|007
33
32.926
33.055
33.277
34
35
35.126
36.023
36
35.432
35.477
OCEANUS 60
27 APRIL 1979
SALINITY ‰
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

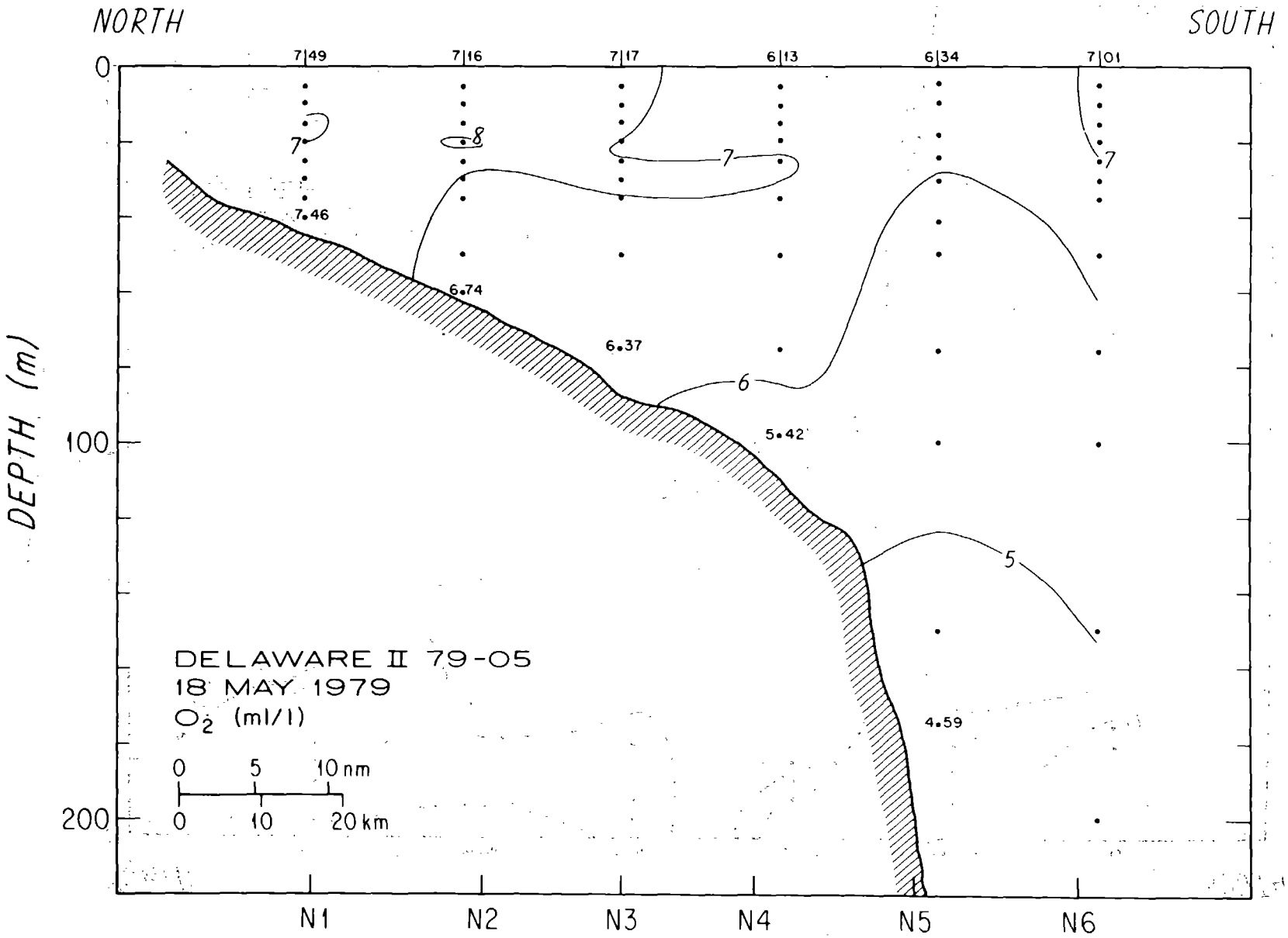

NORTH
SOUTH
25|837
25|866
25|844
26|204
26|579
26|263
0
100
200
DEPTH (m)
26
26.5
26.5
27
25.857
26.198
26.269
26.748
26.958
OCEANUS 60
27 APRIL 1979
DENSITY σ_t
0 5 10 nm
0 10 20 km

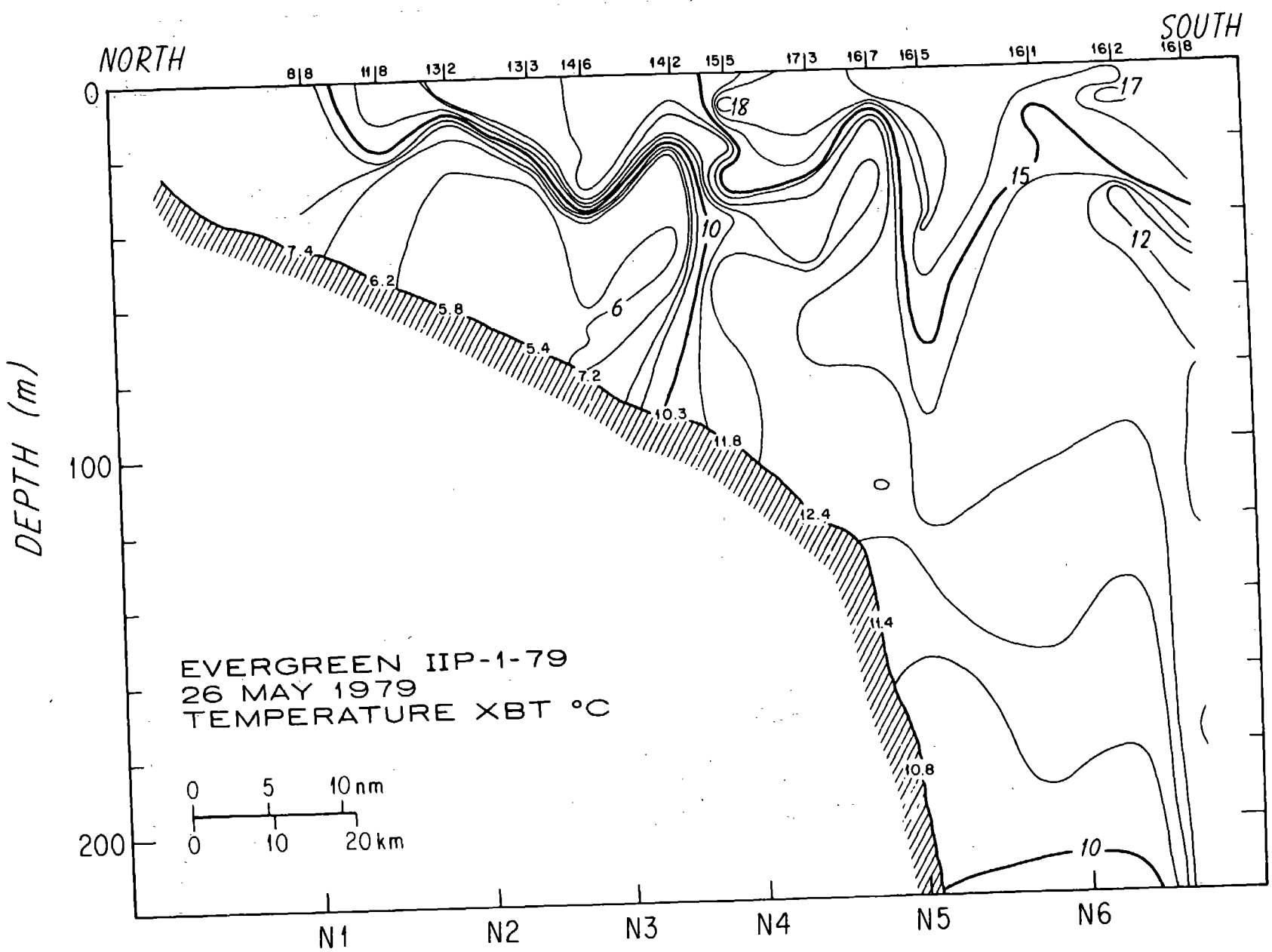

NORTH
SOUTH
DEPTH (m)
0
100
200
8|3
9|0
9|6
9|3
9|6
10|6
10|2
9|5
11|5
10|9
10|2
18|7
18|4
10
10
5
5.8
5.5
5.1
4.9
4.9
6.9
11.4
11.7
11.8
11.2
15
ENDEAVOUR 036
9 MAY 1979
TEMPERATURE XBT °C
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

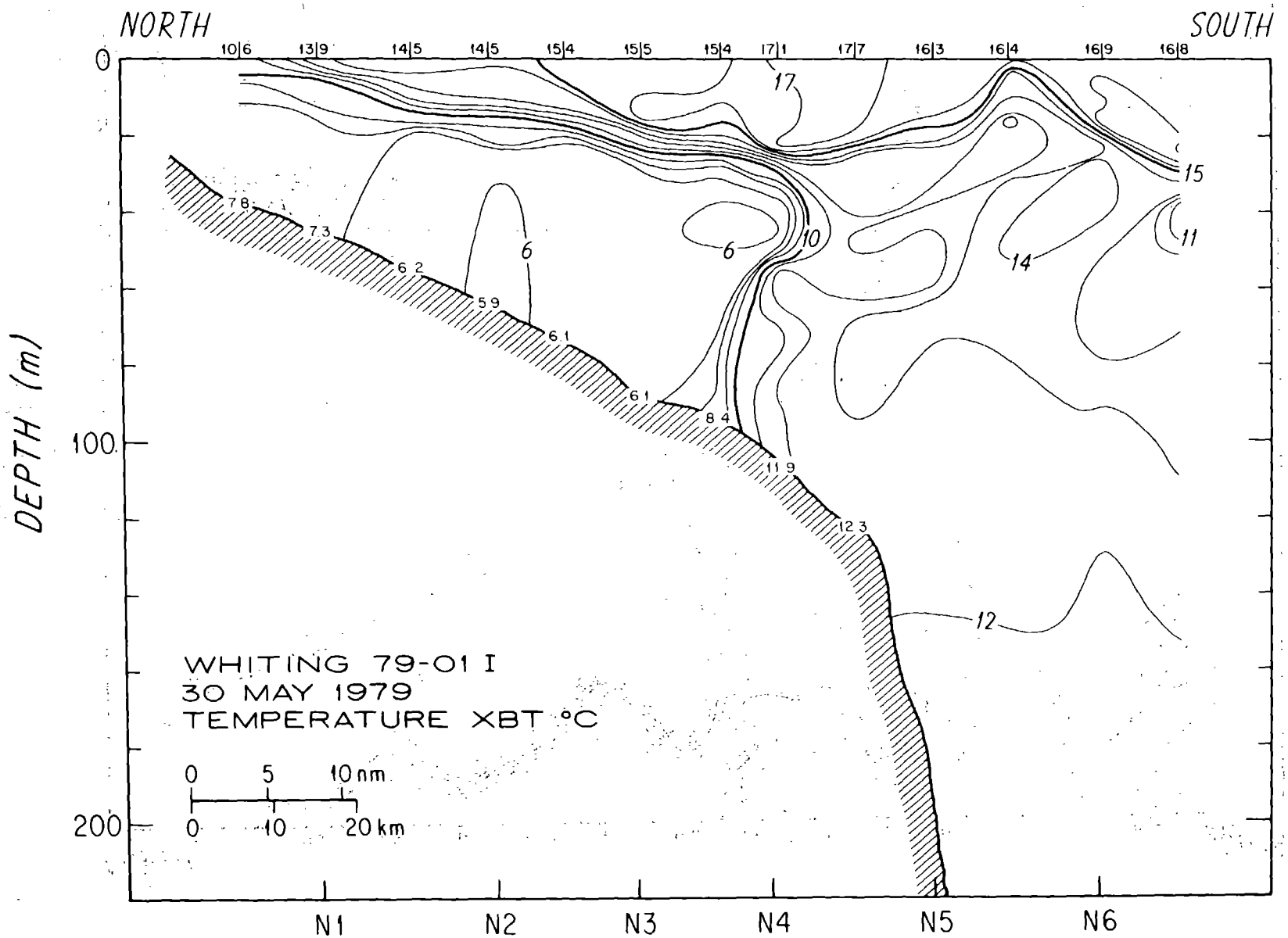

NORTH
SOUTH
DEPTH (m)
0
100
200
10|0
10|0
10|3
11|2
11|9
11|9
11|8
11|6
11|7
11|9
16|3
14|9
18|8
10
15
15
15
10
5
5.5
5.4
5.3
5.1
4.7
7.9
12.3
11.9
OCEANUS 63
15 MAY 1979
TEMPERATURE XBT °C
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

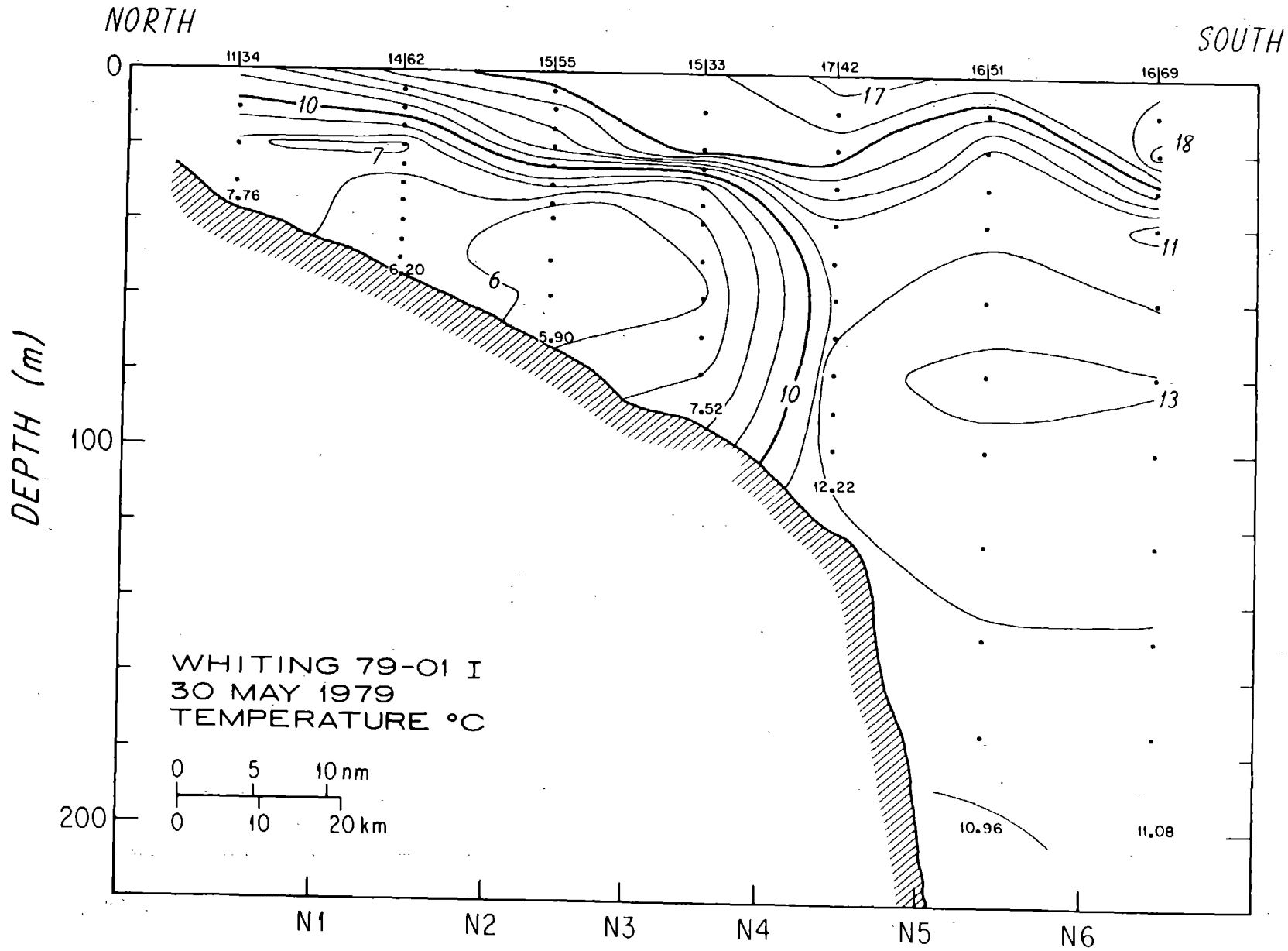

NORTH
SOUTH
DEPTH (m)
0
100
200
8|72
11|06
10|32
14|29
11|56
11
10
14
10
10
5.83
5.17
6
6
6.28
14
12.86
12
DELAWARE II 79-05
18 MAY 1979
TEMPERATURE °C
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

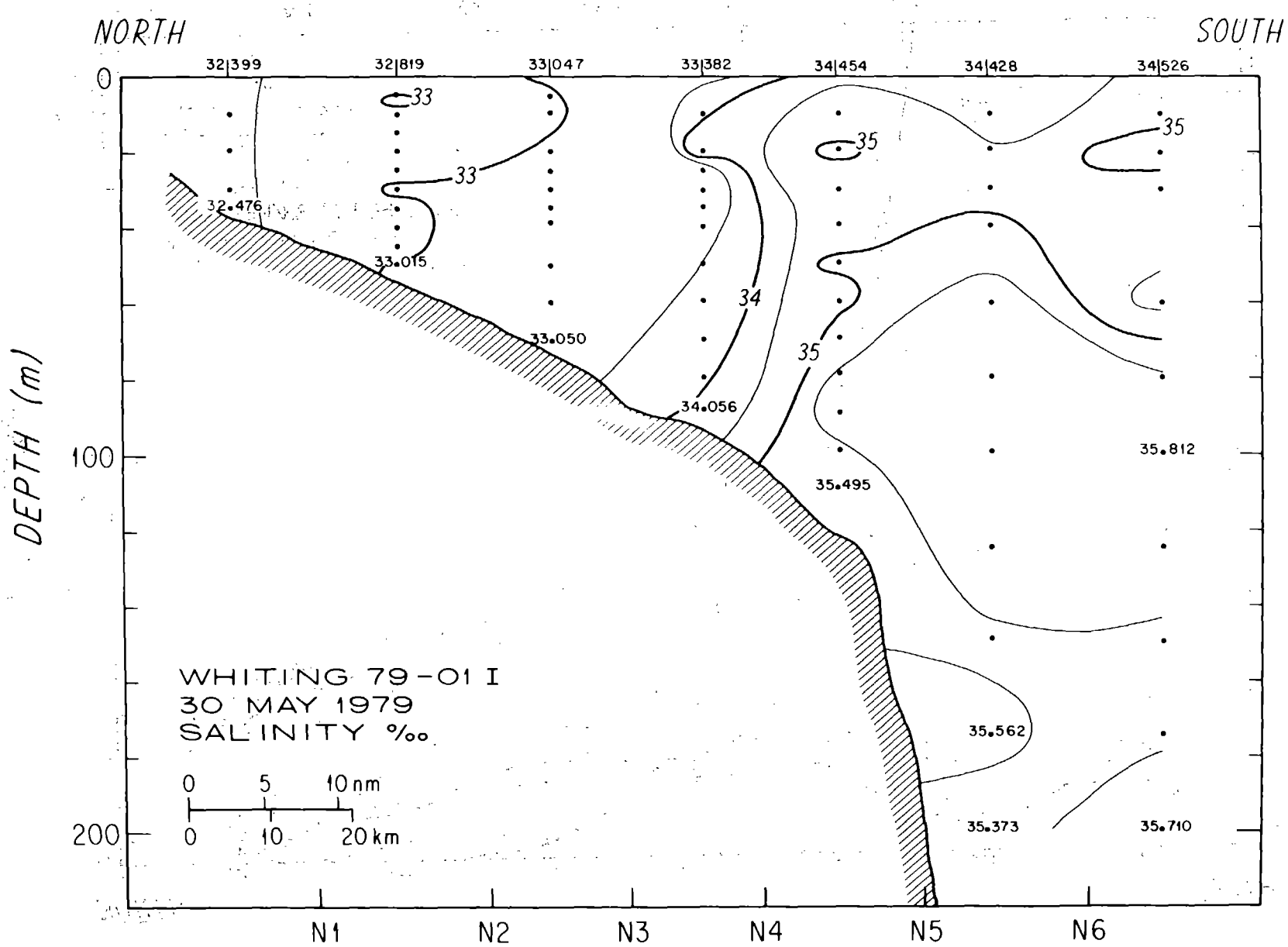

NORTH
SO
DEPTH (m)
0
100
33.489
32.862
34.795
34.221
33.097
32.728
32.761
33.110
34.457
35.818
35.429
35.456
33
33
34
34
35
DELAWARE II 79-05
18 MAY 1979
SALINITY ‰

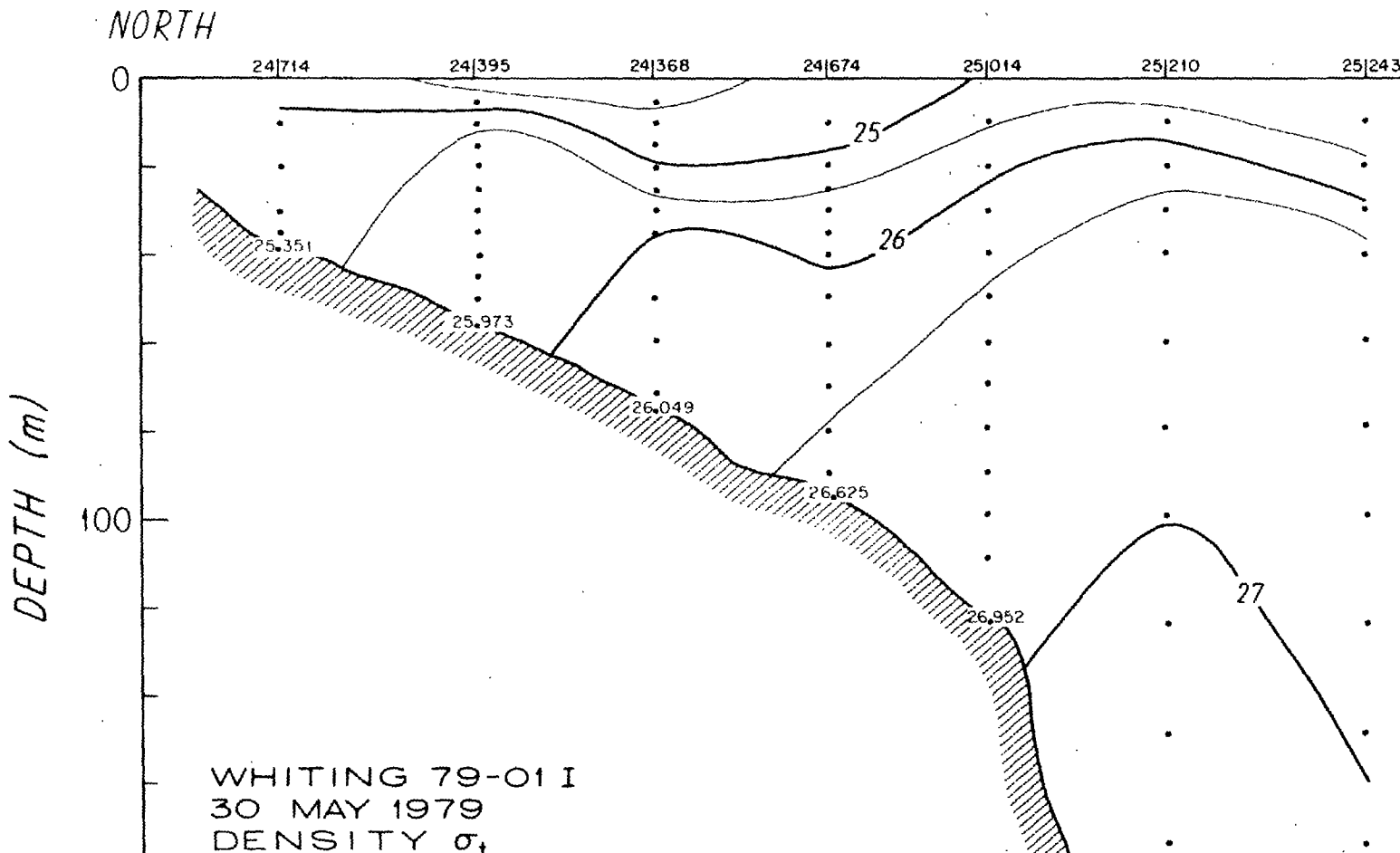

NORTH
SOUTH
7|49
7|16
7|17
6|13
6|34
7|01
DEPTH (m)
0
100
200
7
8
7
7
7.46
6.74
6.37
6
5.42
5
4.59
DELAWARE II 79-05
18 MAY 1979
O2 (ml/l)
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

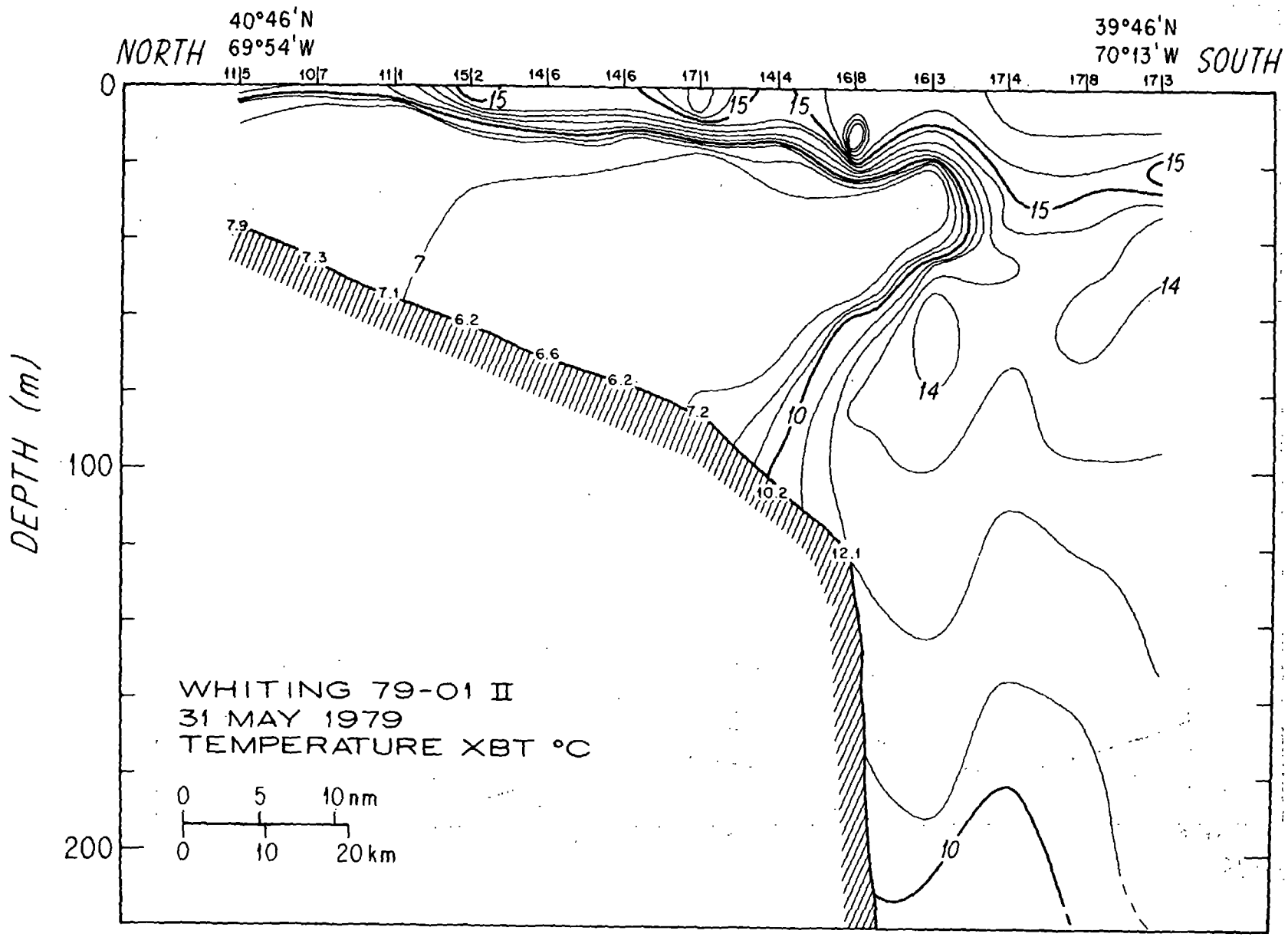

NORTH
SOUTH
8|8
11|8
13|2
13|3
14|6
14|2
15|5
17|3
16|7
16|5
16|1
16|2
16|8
DEPTH (m)
0
100
200
7.4
6.2
5.8
5.4
7.2
10.3
11.8
12.4
11.4
10.8
18
17
15
12
10
6
0
10
EVERGREEN IIP-1-79
26 MAY 1979
TEMPERATURE XBT °C
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

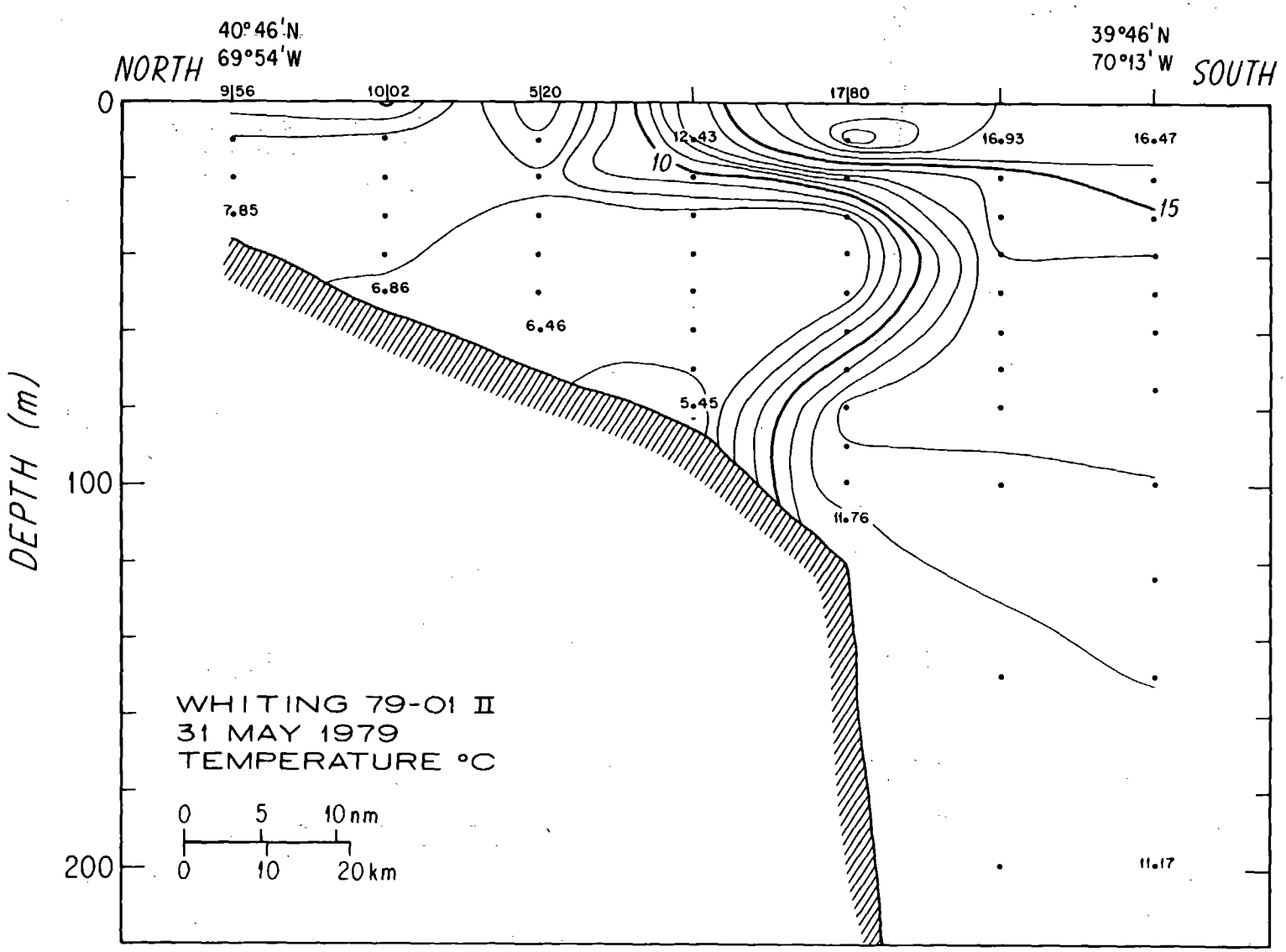

NORTH
SOUTH
10|6
13|9
14|5
14|5
15|4
15|5
15|4
17|1
17|7
16|3
16|4
16|9
16|8
DEPTH (m)
0
100
200
17
15
11
14
10
6
6
12
7.8
7.3
6.2
5.9
6.1
6.1
8.4
11.9
12.3
WHITING 79-01 I
30 MAY 1979
TEMPERATURE XBT °C
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

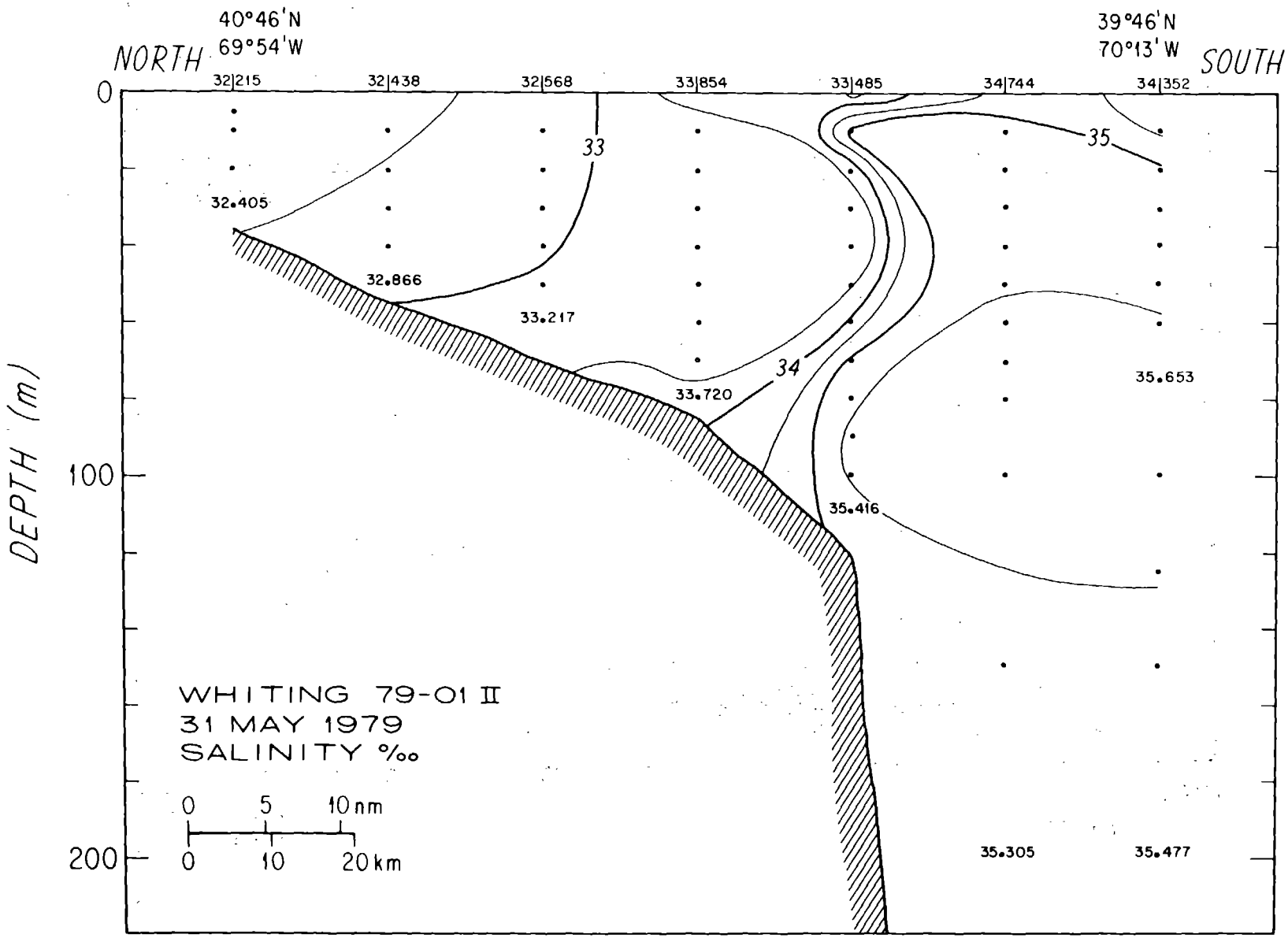

NORTH
SOUTH
DEPTH (m)
0
100
200
11|34
14|62
15|55
15|33
17|42
16|51
16|69
10
7
17
18
11
13
6
10
7.76
6.20
5.90
7.52
12.22
10.96
11.08
WHITING 79-01 I
30 MAY 1979
TEMPERATURE °C
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

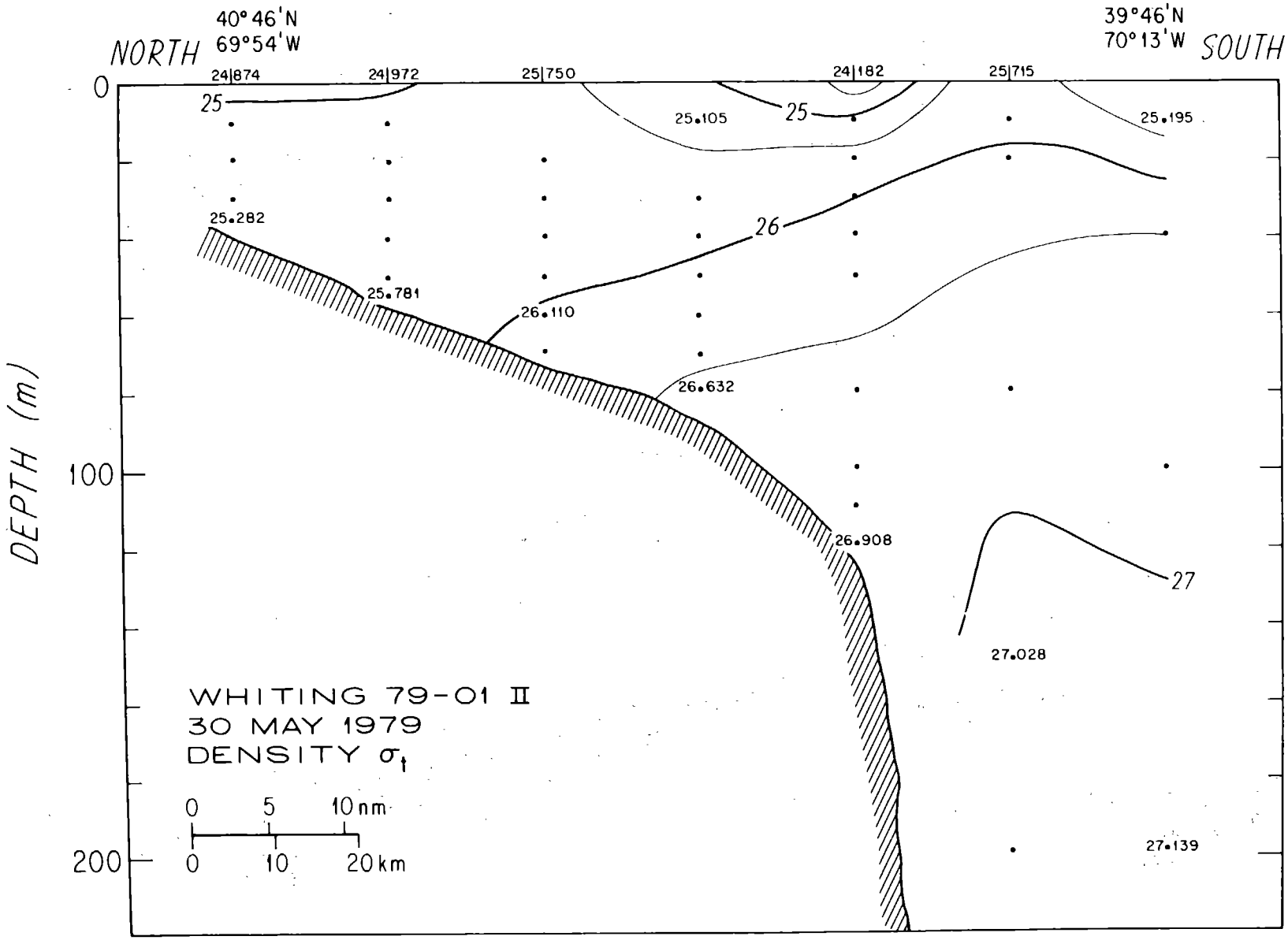

NORTH
SOUTH
32|399
32|819
33|047
33|382
34|454
34|428
34|526
0
100
200
DEPTH (m)
33
33
35
35
34
35
32.476
33.015
33.050
34.056
35.495
35.812
35.562
35.373
35.710
WHITING 79-01 I
30 MAY 1979
SALINITY ‰
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

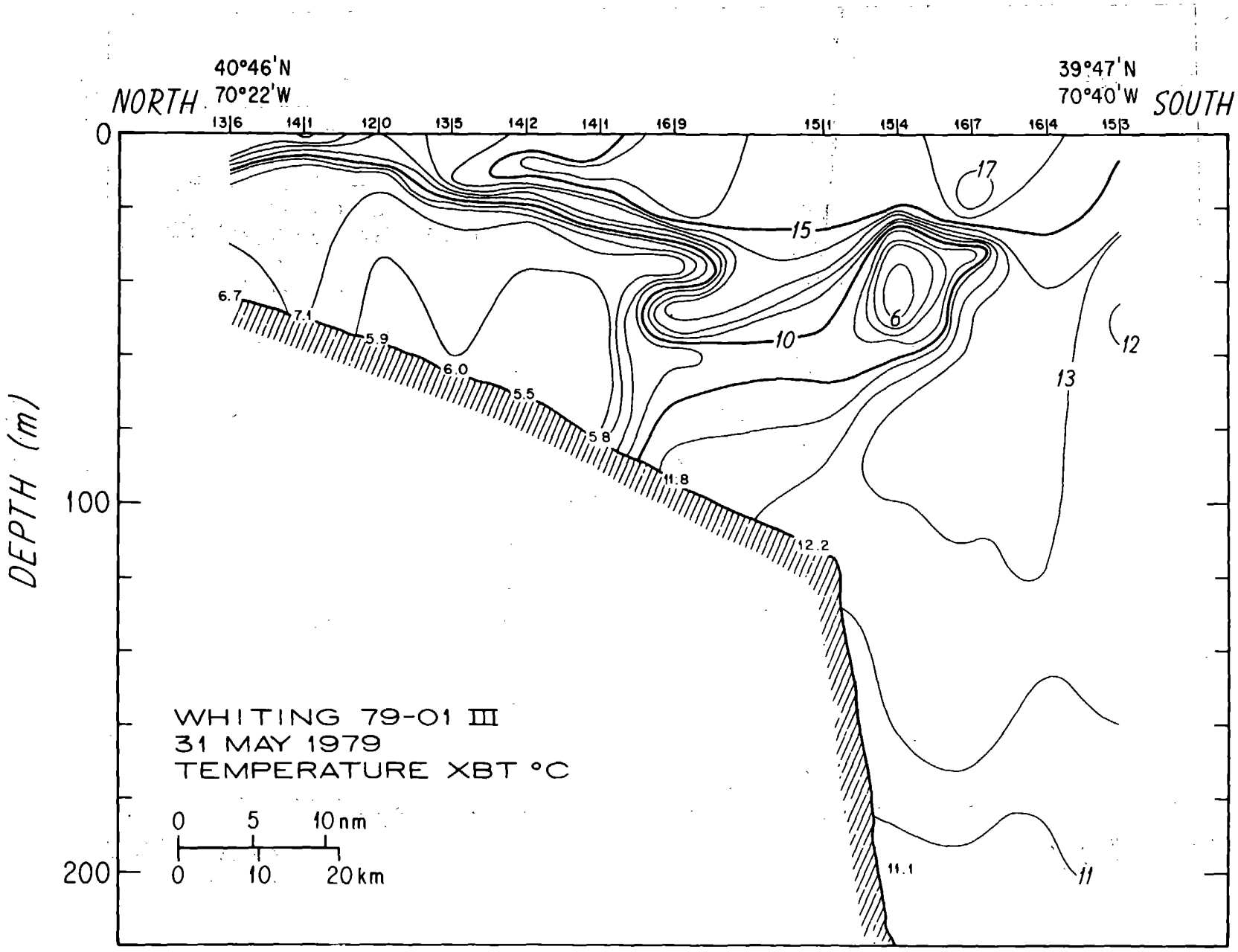

NORTH
24|714
24|395
24|368
24|674
25|014
25|210
25|243
0
100
DEPTH (m)
25
26
27
25.351
25.973
26.049
26.625
26.952
WHITING 79-01 I
30 MAY 1979
DENSITY σt

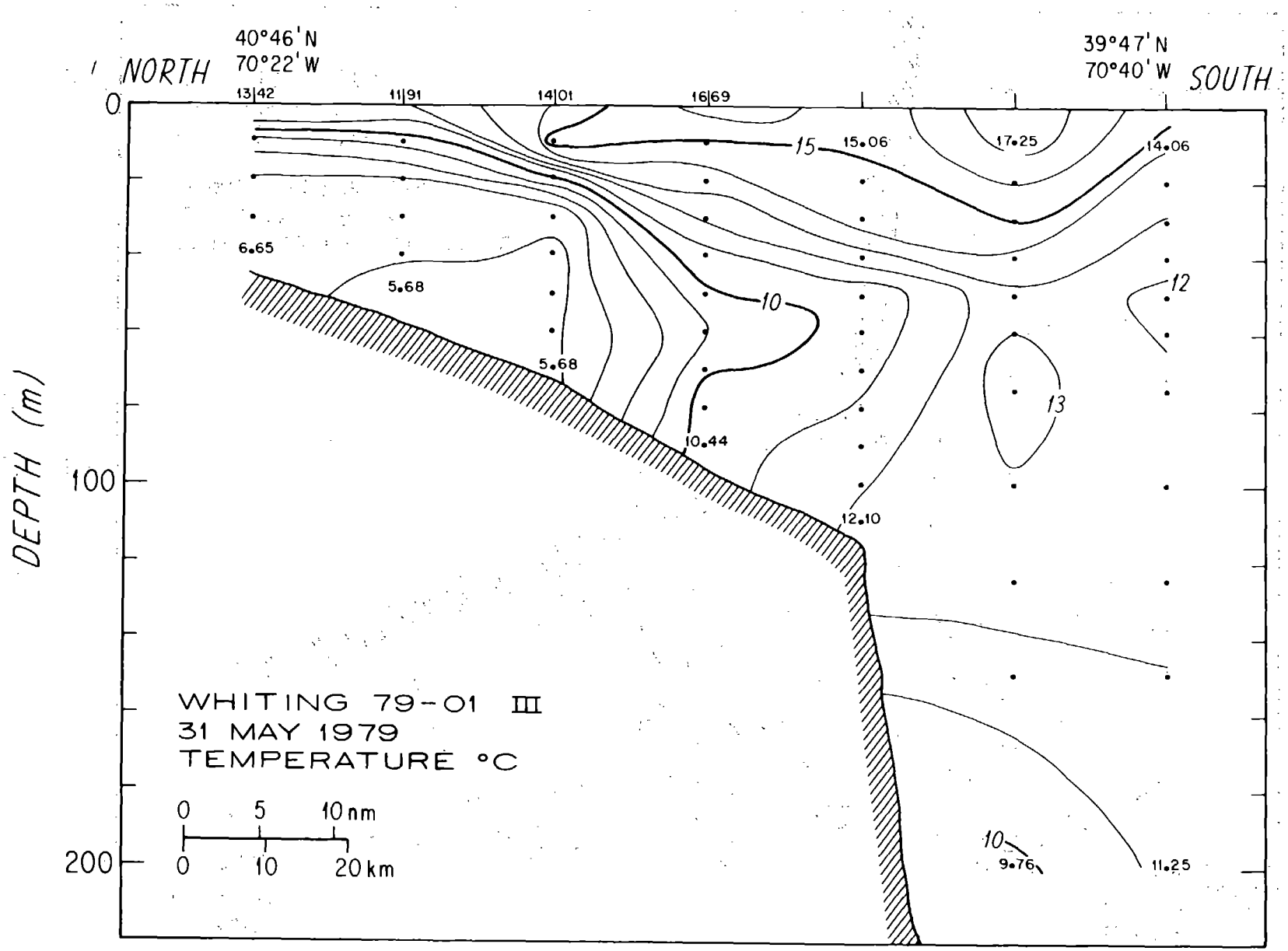

NORTH
40°46'N
69°54'W
39°46'N
70°13'W
SOUTH
DEPTH (m)
0
100
200
11|5
10|7
11|1
15|2
14|6
14|6
17|1
14|4
16|8
16|3
17|4
17|8
17|3
15
15
15
15
15
14
14
10
10
7
7.9
7.3
7.1
6.2
6.6
6.2
7.2
10.2
12.1
WHITING 79-01 II
31 MAY 1979
TEMPERATURE XBT °C
0 5 10 nm
0 10 20 km

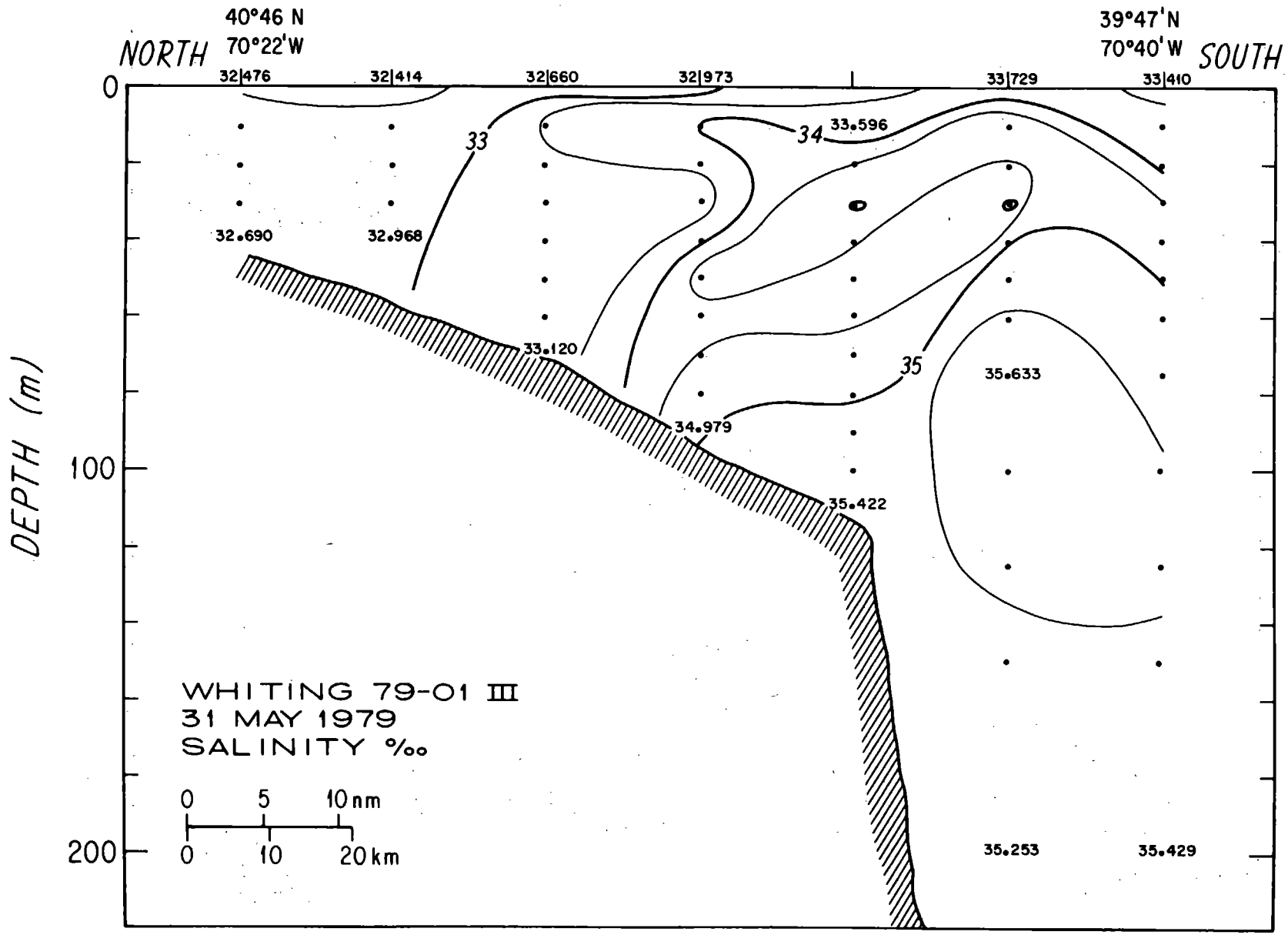

40°46'N
69°54'W
NORTH
39°46'N
70°13'W
SOUTH
9|56
10|02
5|20
17|80
0
100
200
DEPTH (m)
12.43
16.93
16.47
10
15
7.85
6.86
6.46
5.45
11.76
11.17
WHITING 79-01 II
31 MAY 1979
TEMPERATURE °C
0 5 10 nm
0 10 20 km

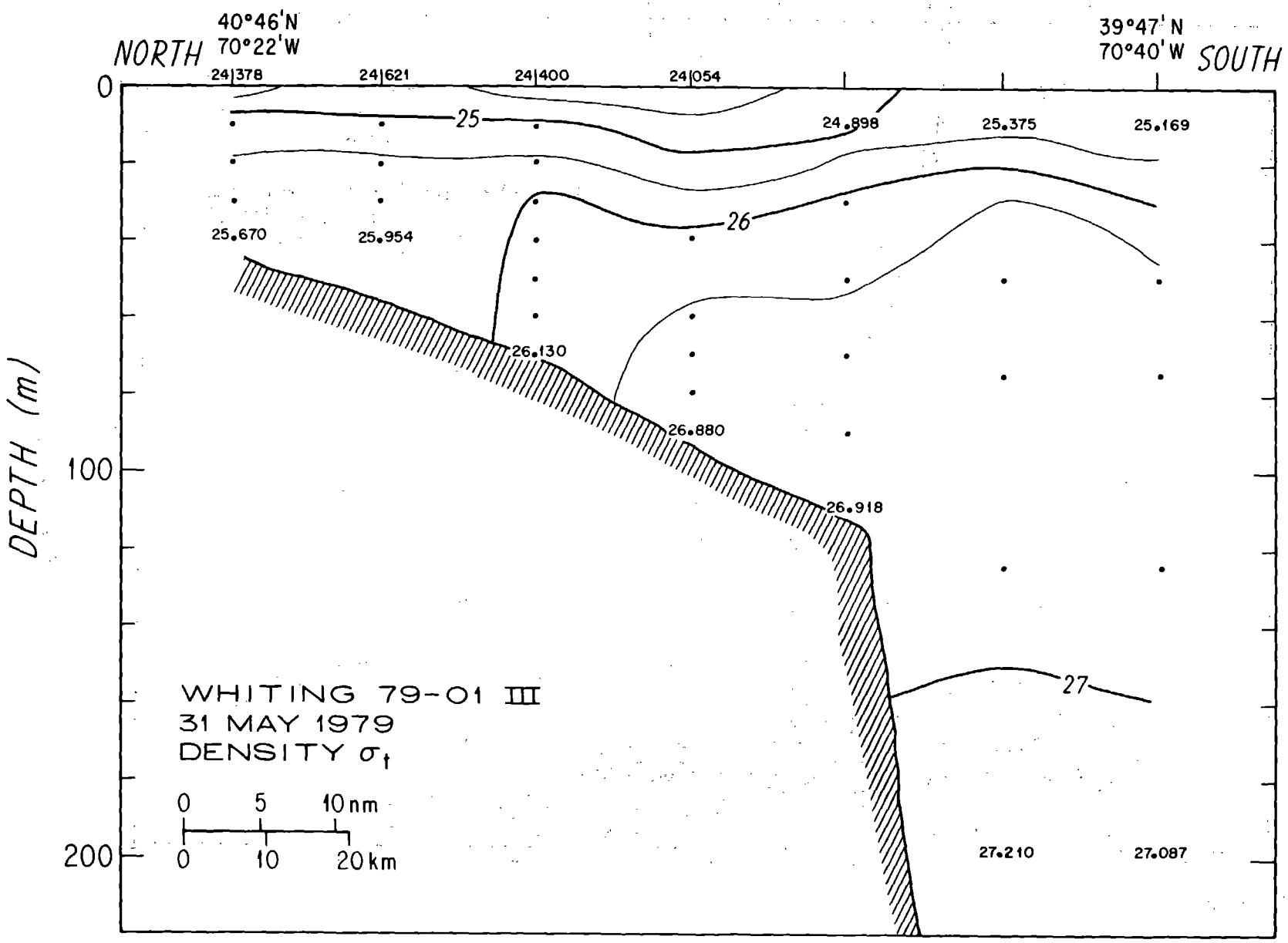

40°46'N
69°54'W
NORTH
39°46'N
70°13'W
SOUTH
32|215
32|438
32|568
33|854
33|485
34|744
34|352
0
100
200
DEPTH (m)
33
34
35
32.405
32.866
33.217
33.720
35.416
35.653
35.305
35.477
WHITING 79-01 II
31 MAY 1979
SALINITY ‰
0 5 10 nm
0 10 20 km

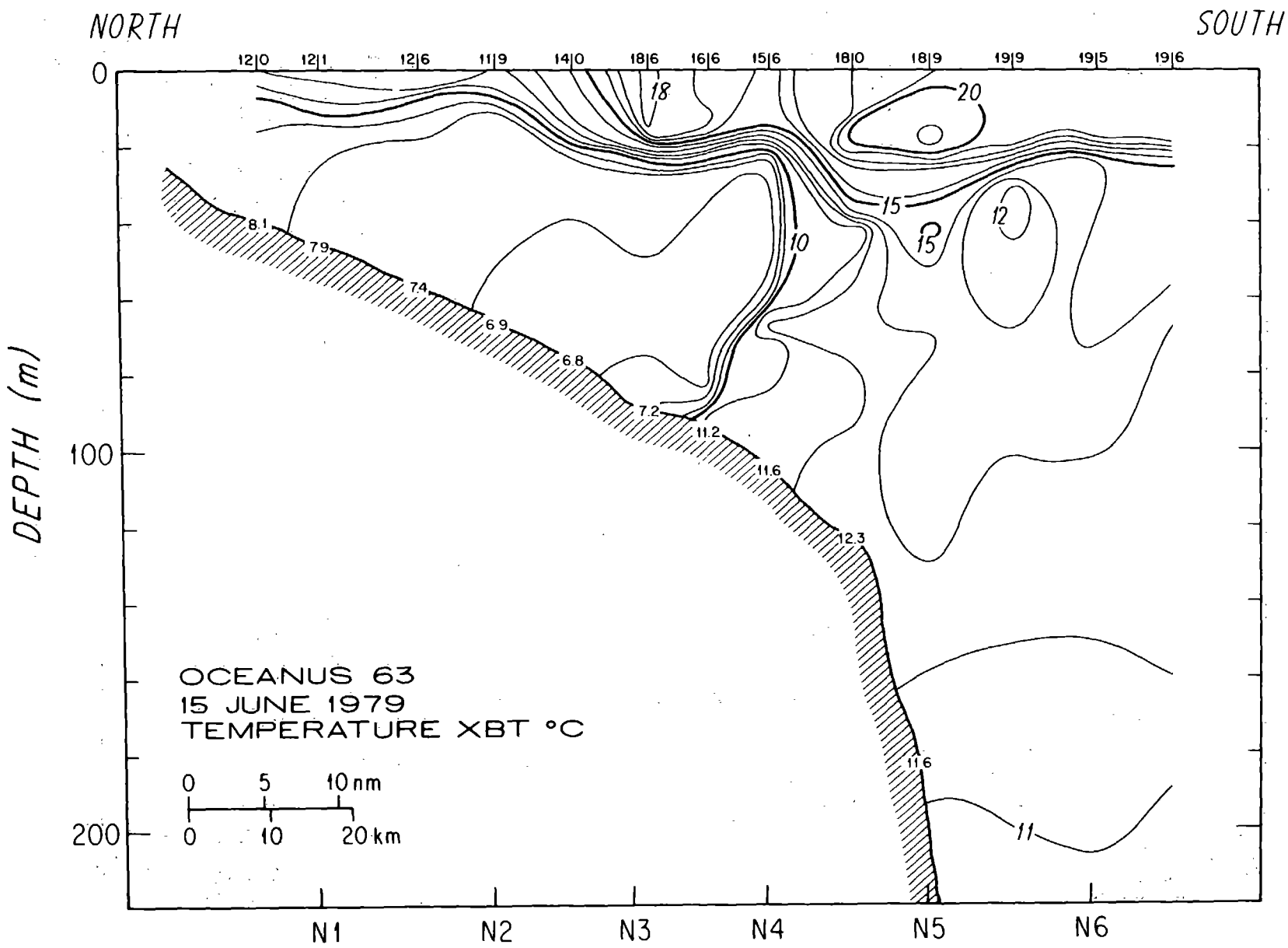

40°46'N
69°54'W
NORTH
39°46'N
70°13'W
SOUTH
24|874
24|972
25|750
24|182
25|715
DEPTH (m)
0
100
200
25
25
26
27
25.105
25.195
25.282
25.781
26.110
26.632
26.908
27.028
27.139
WHITING 79-01 II
30 MAY 1979
DENSITY σ_t
0 5 10 nm
0 10 20 km

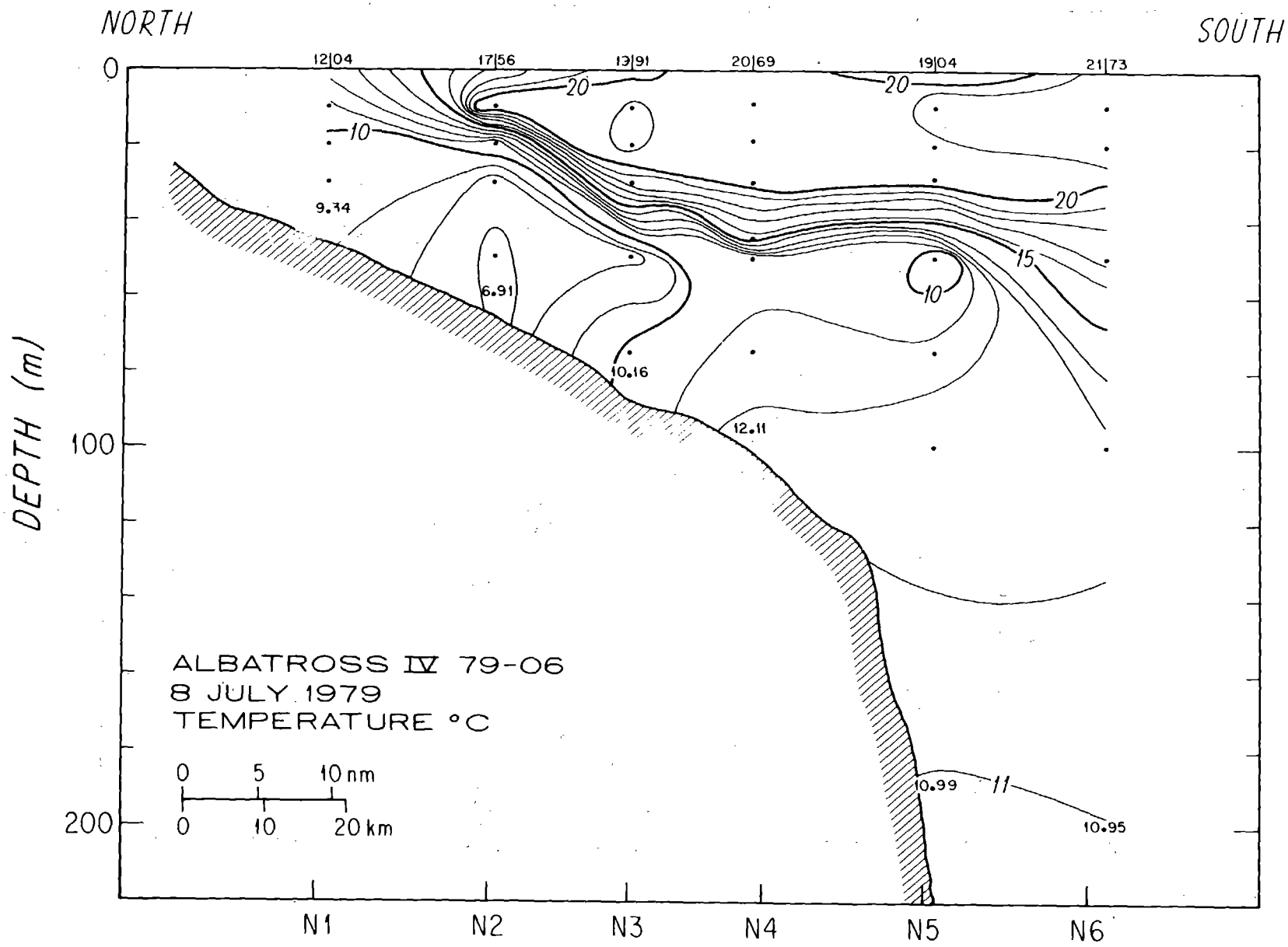

40°46'N
70°22'W
NORTH
39°47'N
70°40'W
SOUTH
13|6
14|1
12|0
13|5
14|2
14|1
16|9
15|1
15|4
16|7
16|4
15|3
DEPTH (m)
0
100
200
17
15
10
6
12
13
11
6.7
7.1
5.9
6.0
5.5
5.8
11.8
12.2
11.1
WHITING 79-01 III
31 MAY 1979
TEMPERATURE XBT °C
0 5 10 nm
0 10 20 km

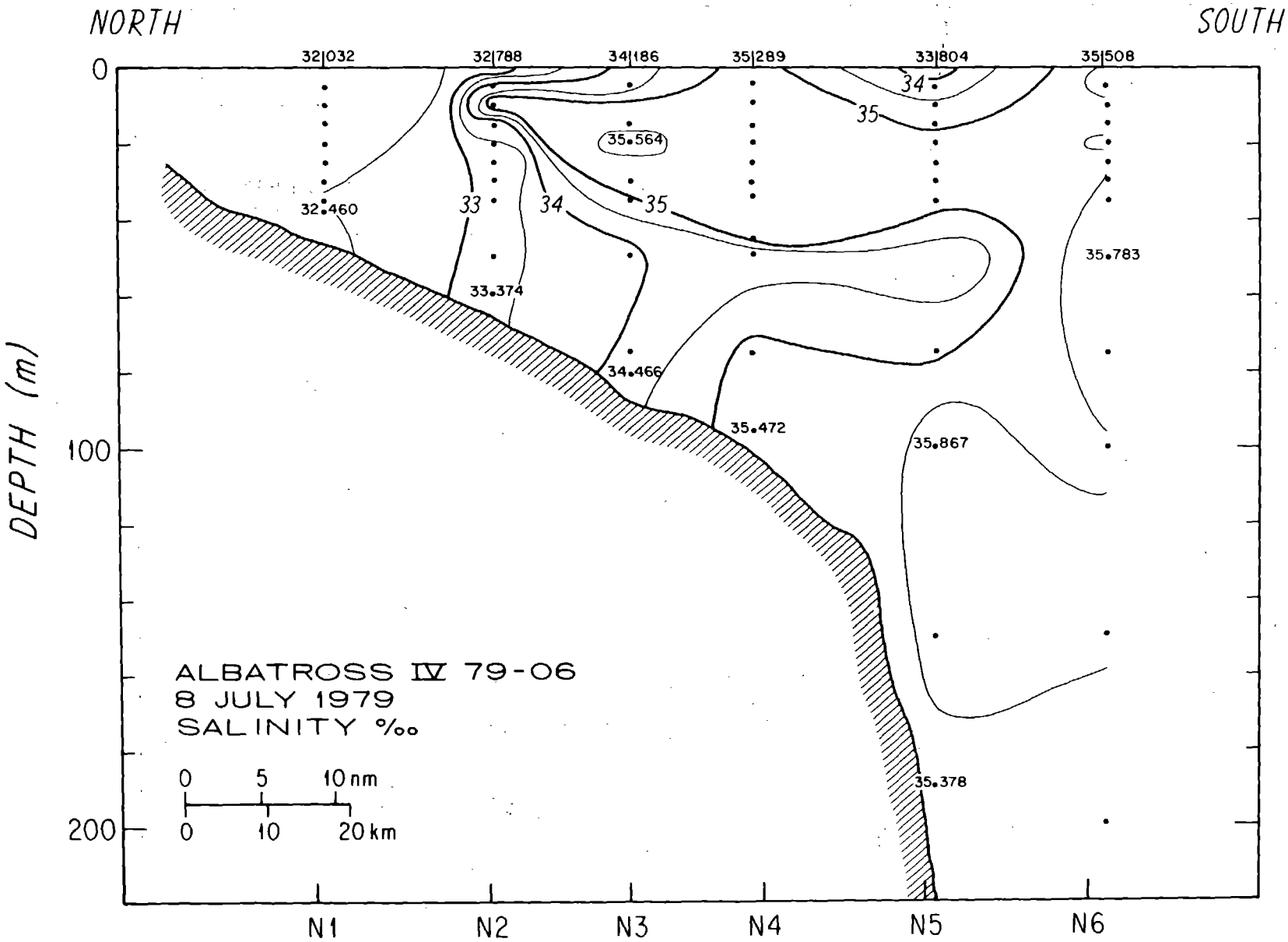

NORTH
40°46'N
70°22'W
39°47'N
70°40'W
SOUTH
DEPTH (m)
0
100
200
13|42
11|91
14|01
16|69
15
15.06
17.25
14.06
6.65
5.68
5.68
10
12
13
10.44
12.10
10
9.76
11.25
WHITING 79-01 III
31 MAY 1979
TEMPERATURE °C
0 5 10 nm
0 10 20 km

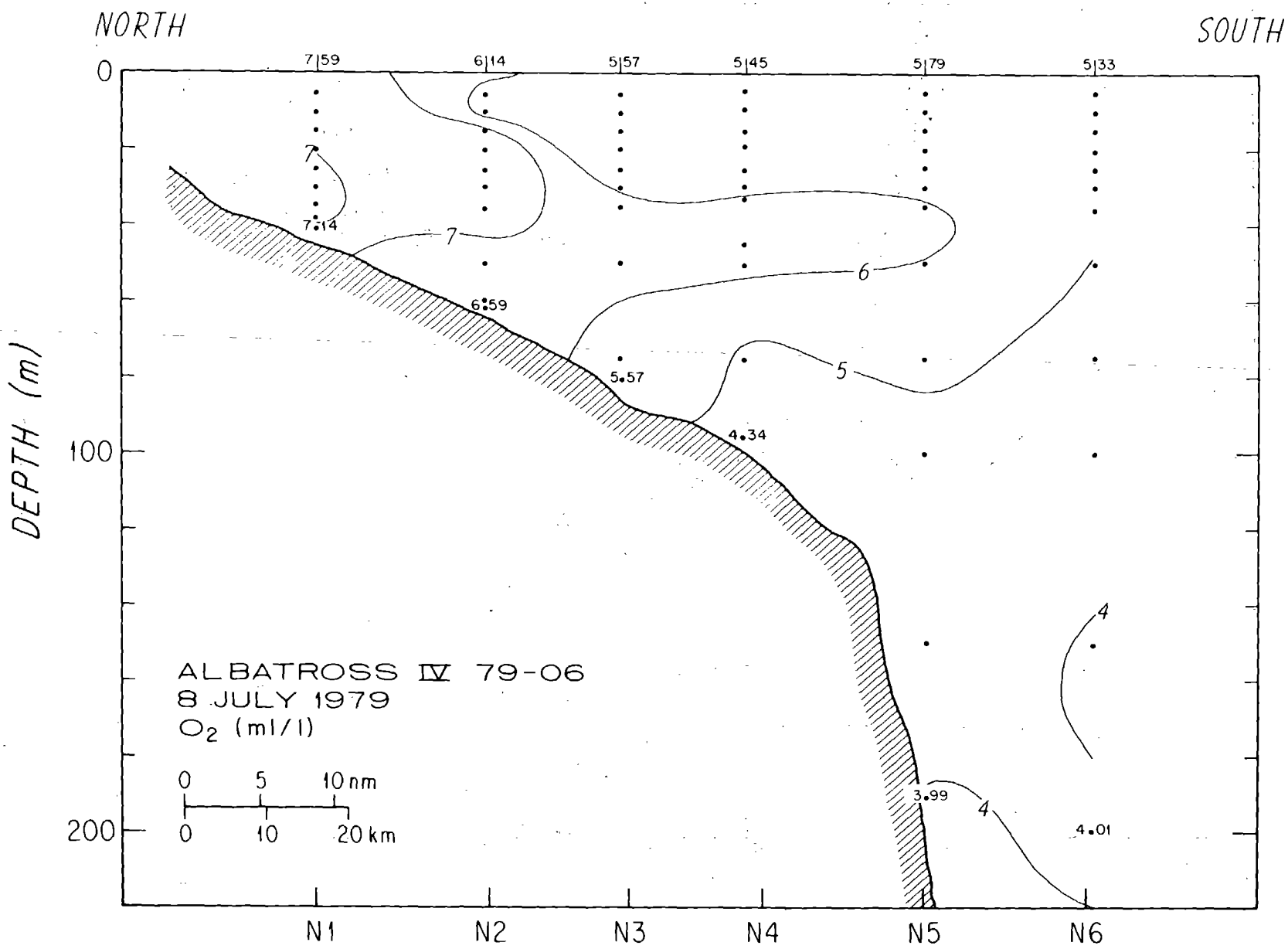

40°46 N
70°22'W
NORTH
39°47'N
70°40'W
SOUTH
32|476
32|414
32|660
32|973
33|729
33|410
33
34
33.596
32.690
32.968
33.120
35
35.633
34.979
35.422
35.253
35.429
DEPTH (m)
0
100
200
WHITING 79-01 III
31 MAY 1979
SALINITY ‰
0 5 10 nm
0 10 20 km

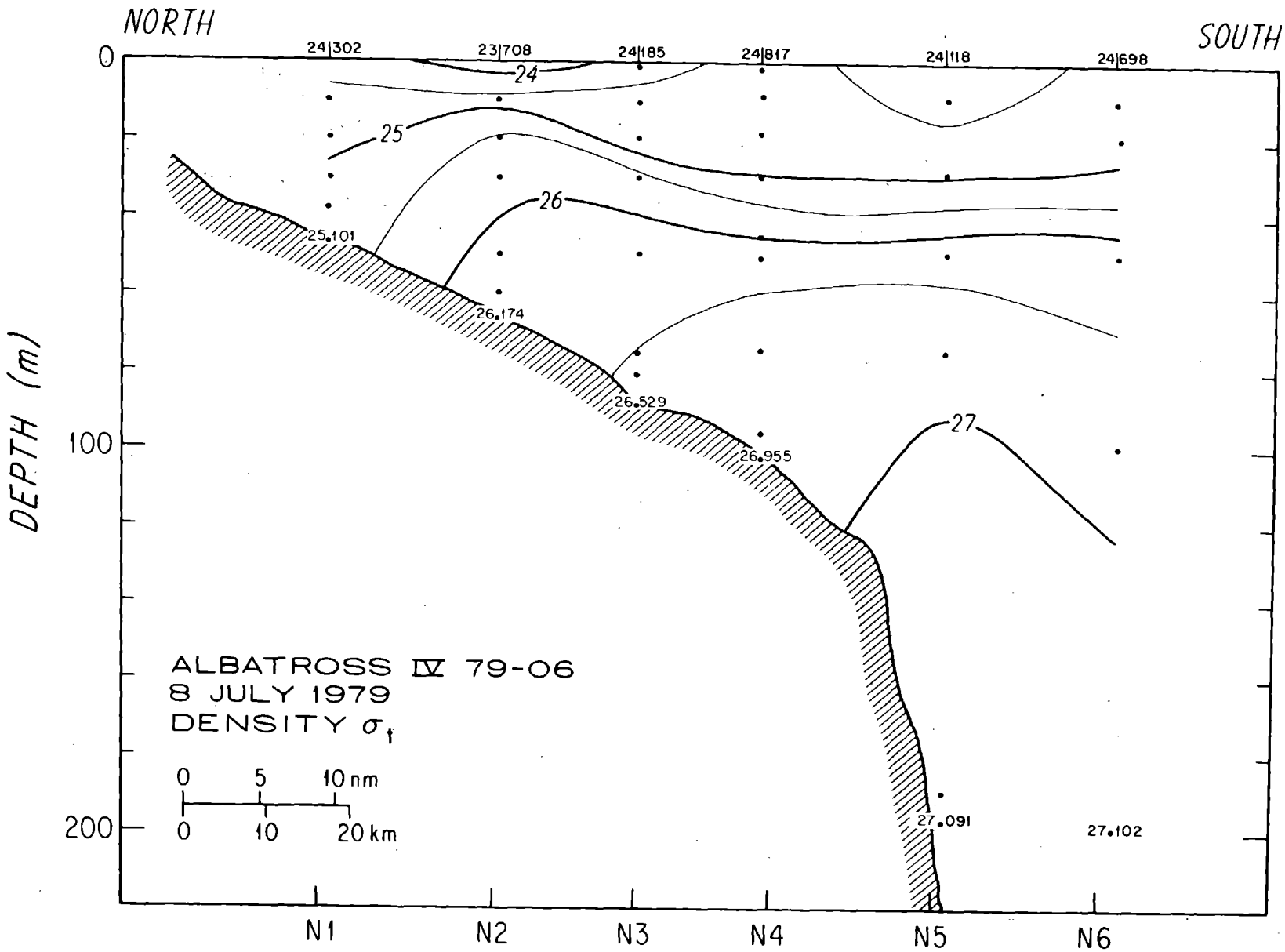

NORTH
40°46'N
70°22'W
39°47'N
70°40'W
SOUTH
24|378
24|621
24|400
24|054
0
100
200
DEPTH (m)
25
26
27
24.898
25.375
25.169
25.670
25.954
26.130
26.880
26.918
27.210
27.087
WHITING 79-01 III
31 MAY 1979
DENSITY σ_t
0 5 10 nm
0 10 20 km

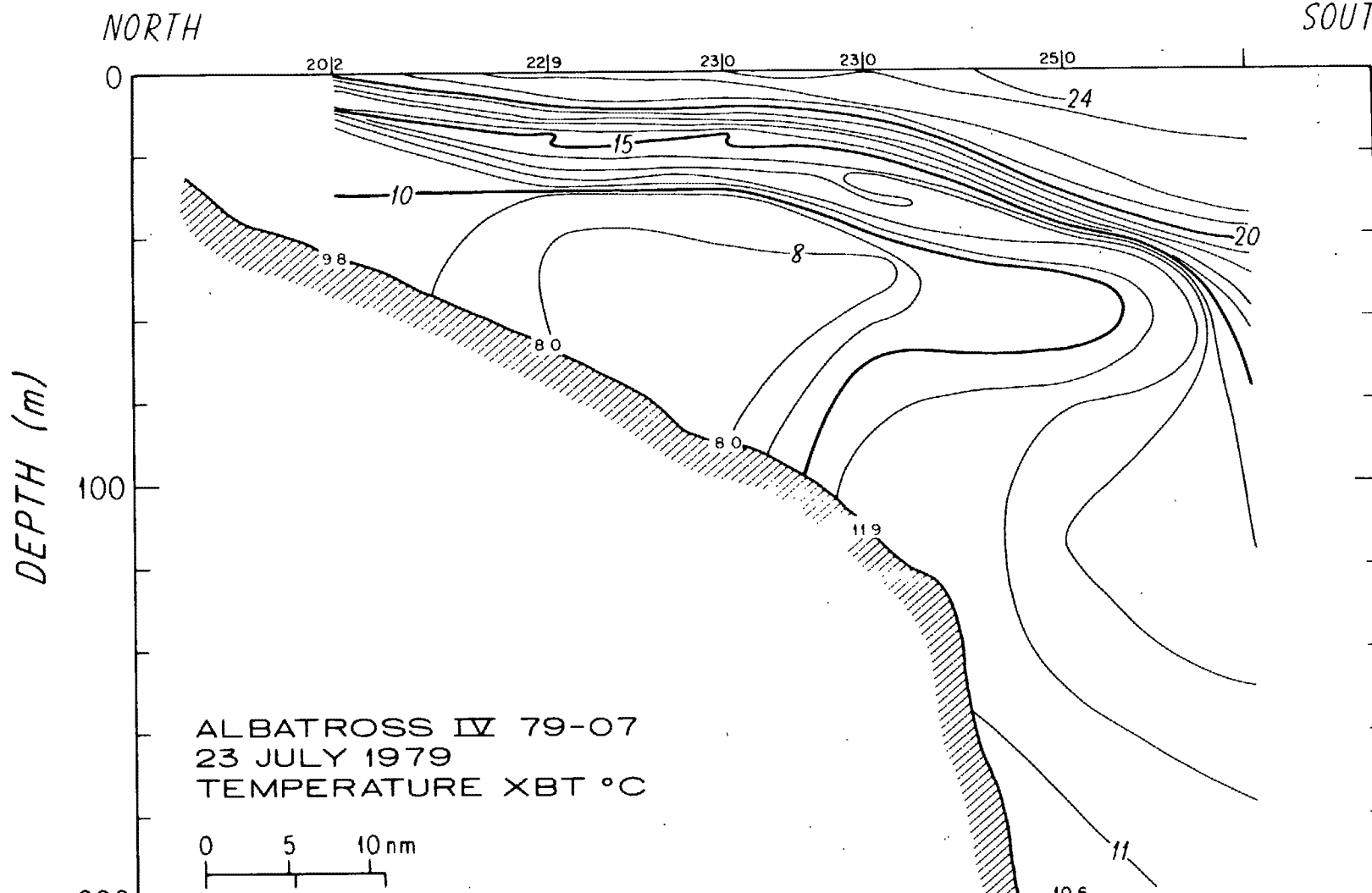

NORTH
SOUTH
DEPTH (m)
0
100
200
12|0
12|1
12|6
11|9
14|0
18|6
16|6
15|6
18|0
18|9
19|9
19|5
19|6
18
20
15
12
13
10
8.1
7.9
7.4
6.9
6.8
7.2
11.2
11.6
12.3
11.6
11
OCEANUS 63
15 JUNE 1979
TEMPERATURE XBT °C
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

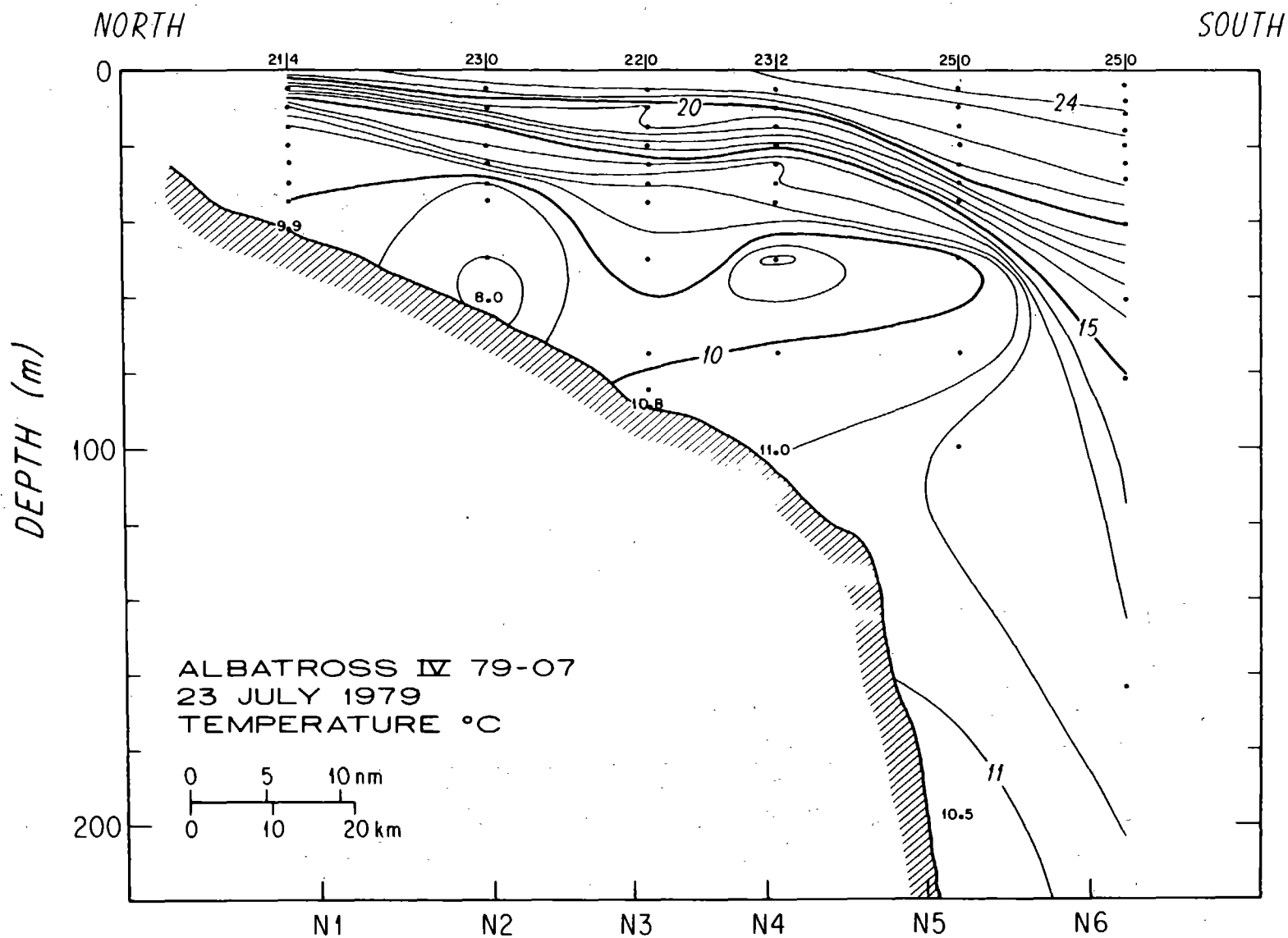

NORTH
SOUTH
DEPTH (m)
0
100
200
12|04
17|56
13|91
20|69
19|04
21|73
20
10
20
20
15
10
9.34
6.91
10.16
12.11
10.99
11
10.95
ALBATROSS IV 79-06
8 JULY 1979
TEMPERATURE °C
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

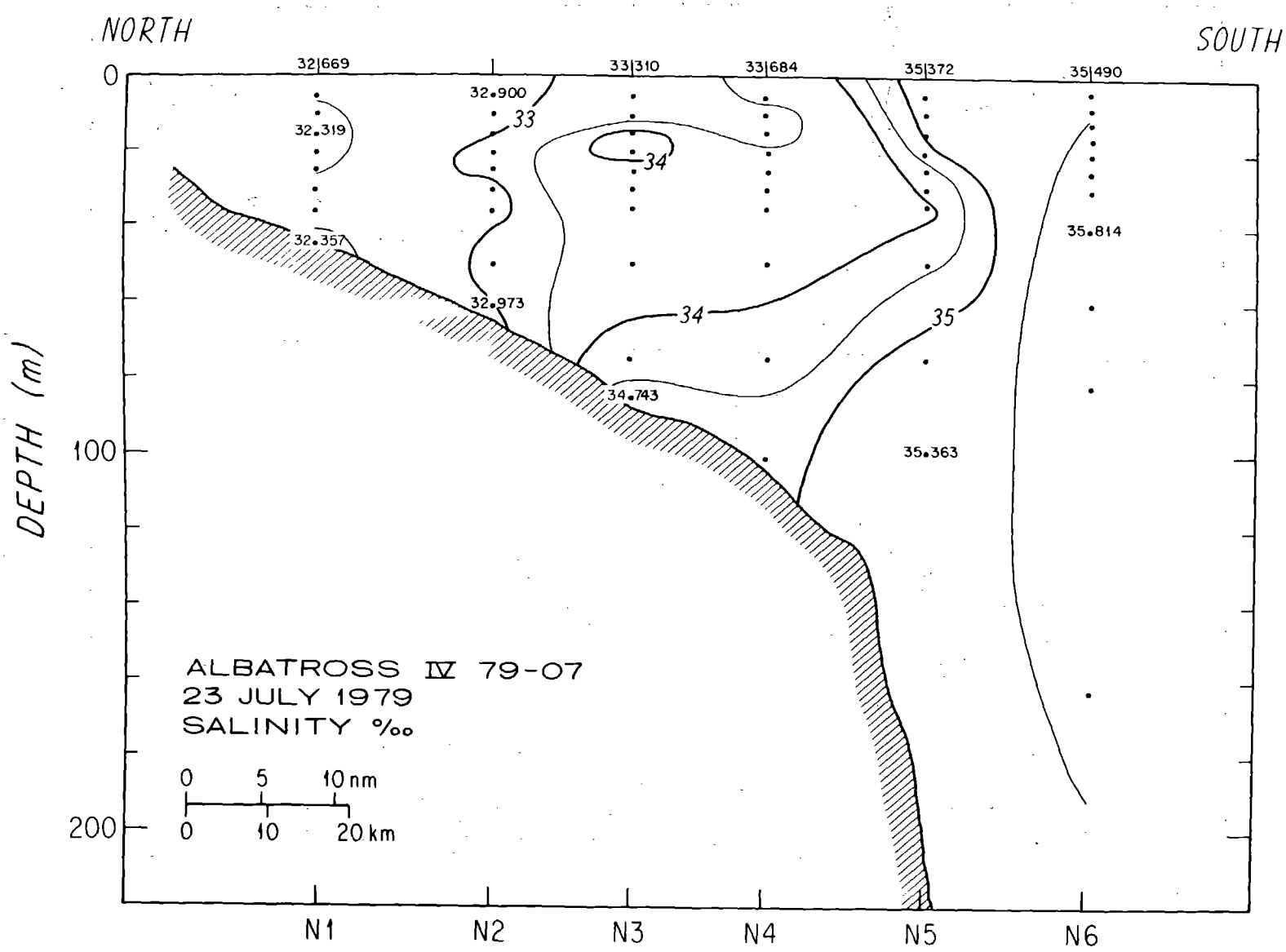

NORTH
SOUTH
DEPTH (m)
0
100
200
32|032
32|788
34|186
35|289
33|804
35|508
32.460
33
34
35
35.564
33.374
34.466
35.472
35.867
35.783
35.378
ALBATROSS IV 79-06
8 JULY 1979
SALINITY ‰
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

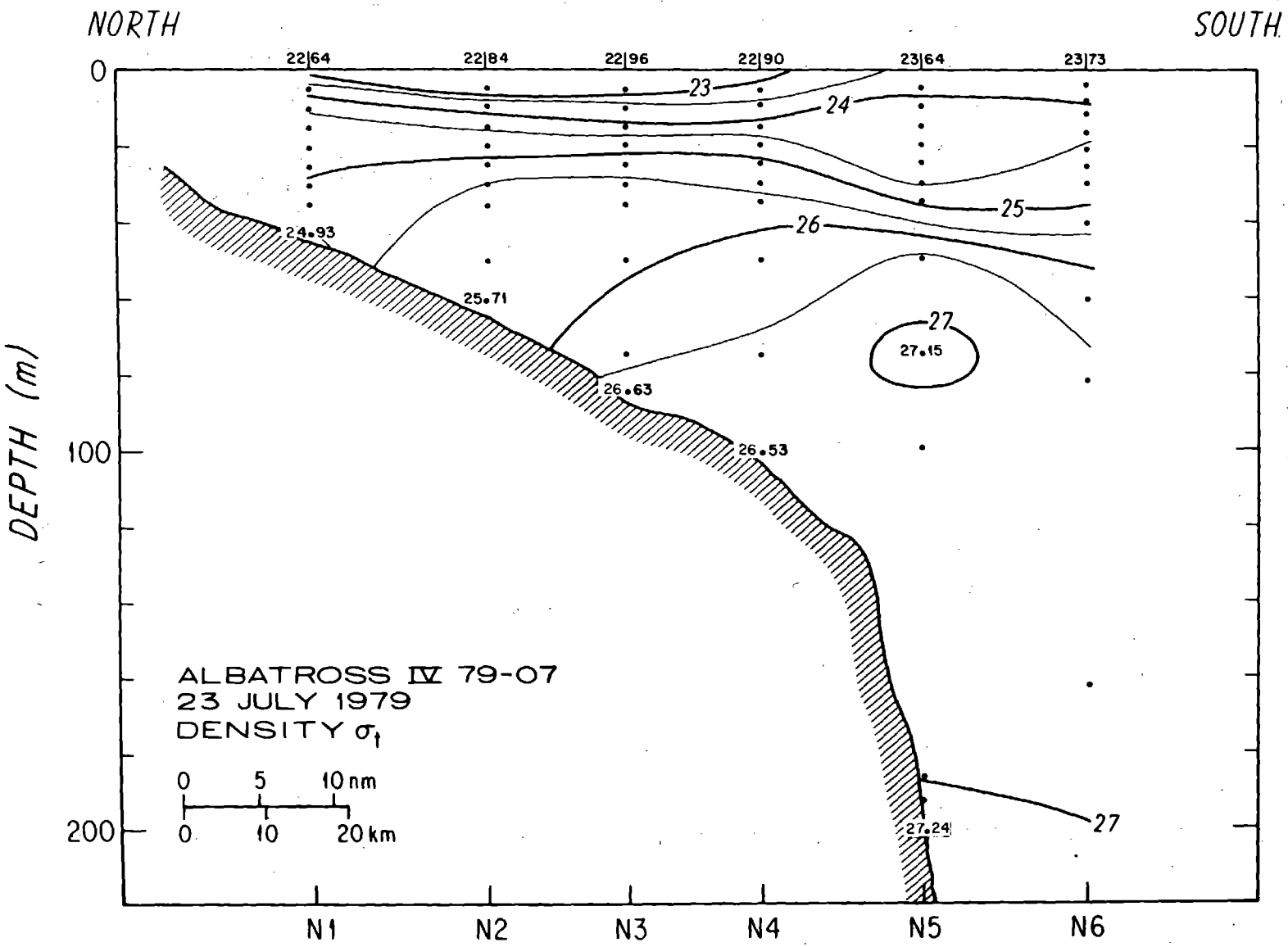

NORTH
SOUTH
7|59
6|14
5|57
5|45
5|79
5|33
0
100
200
DEPTH (m)
7
7
6
5
4
4
7.14
6.59
5.57
4.34
3.99
4.01
ALBATROSS IV 79-06
8 JULY 1979
O2 (ml/l)
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

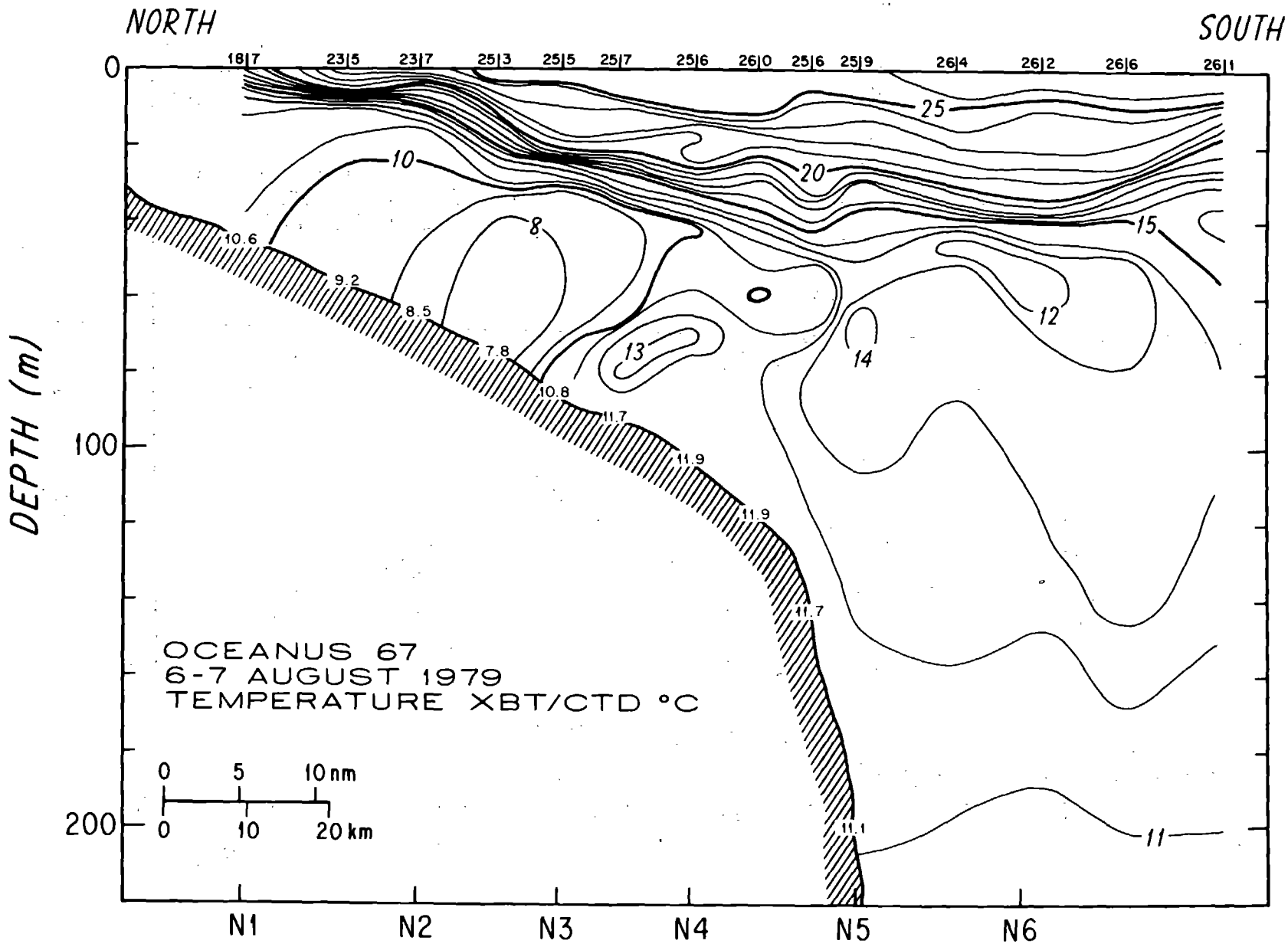

NORTH
SOUTH
DEPTH (m)
0
100
200
24|302
23|708
24|185
24|817
24|118
24|698
24
25
26
27
25.101
26.174
26.529
26.955
27.091
27.102
ALBATROSS IV 79-06
8 JULY 1979
DENSITY σ_t
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

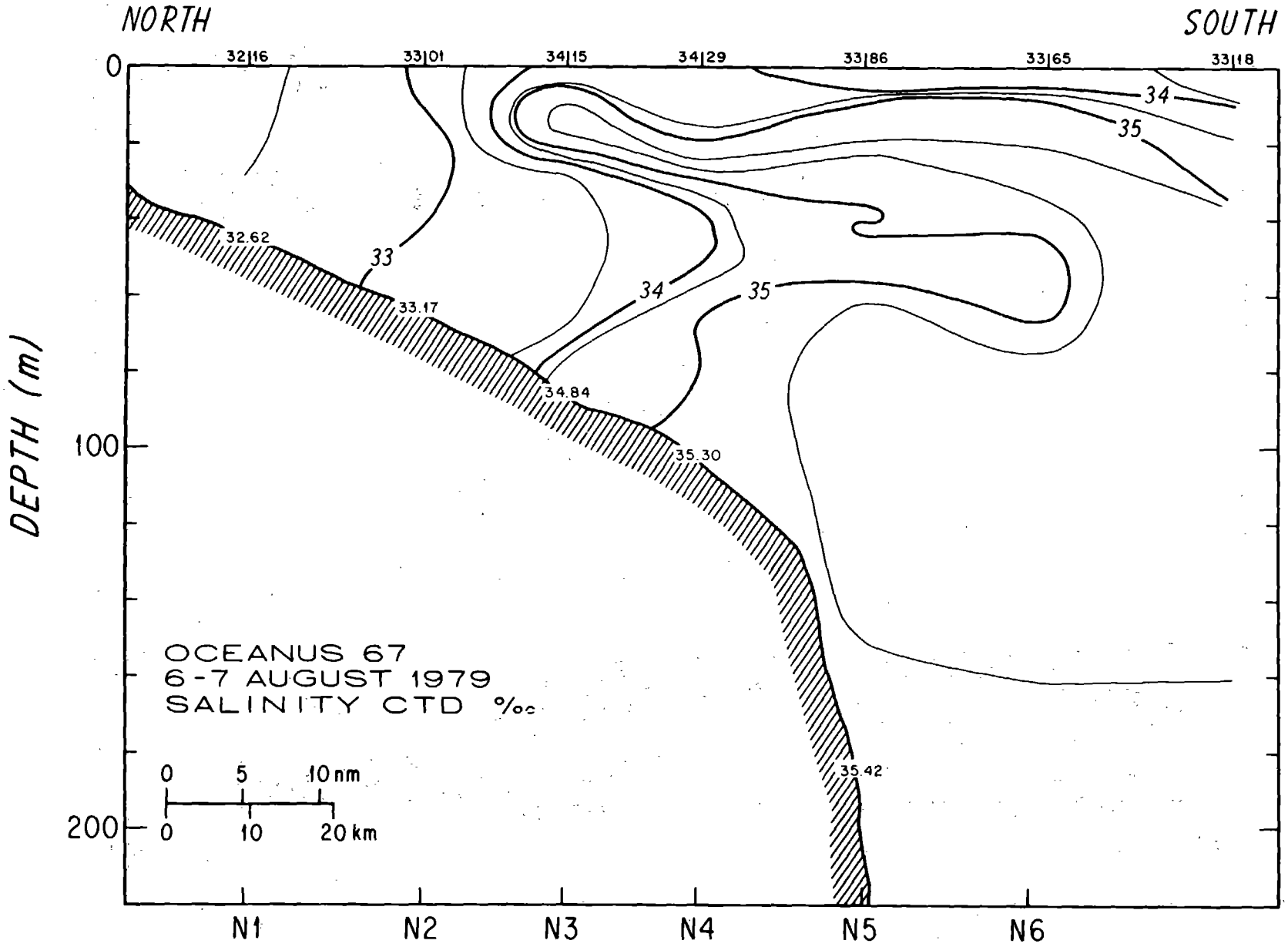

NORTH
SOUT
DEPTH (m)
0
100
20|2
22|9
23|0
23|0
25|0
24
15
10
20
8
9.8
8.0
8.0
11.9
11
ALBATROSS IV 79-07
23 JULY 1979
TEMPERATURE XBT °C
0 5 10 nm

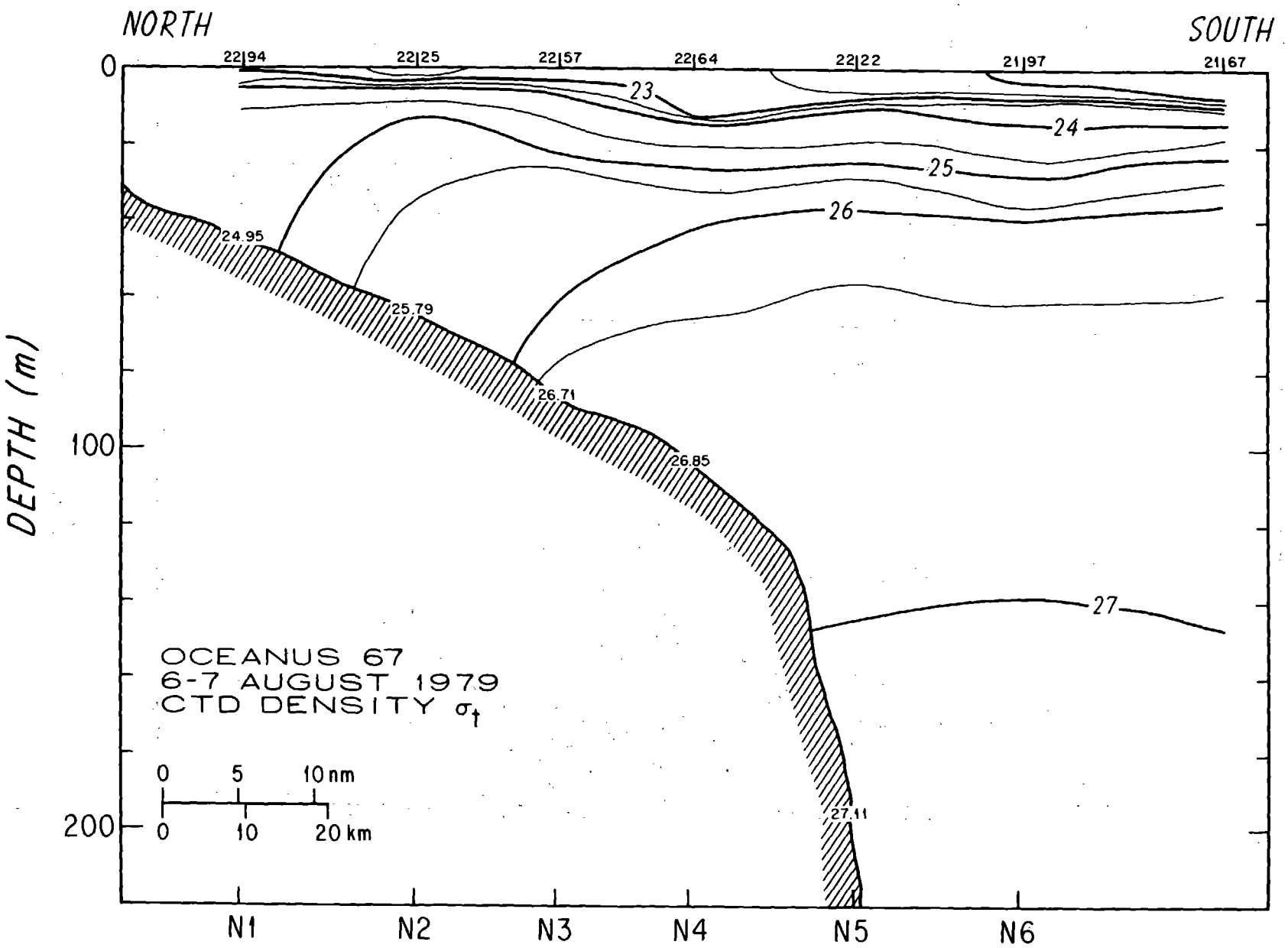

NORTH
SOUTH
21|4
23|0
22|0
23|2
25|0
25|0
0
100
200
DEPTH (m)
20
24
15
10
11
9.9
8.0
10.8
11.0
10.5
ALBATROSS IV 79-07
23 JULY 1979
TEMPERATURE °C
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

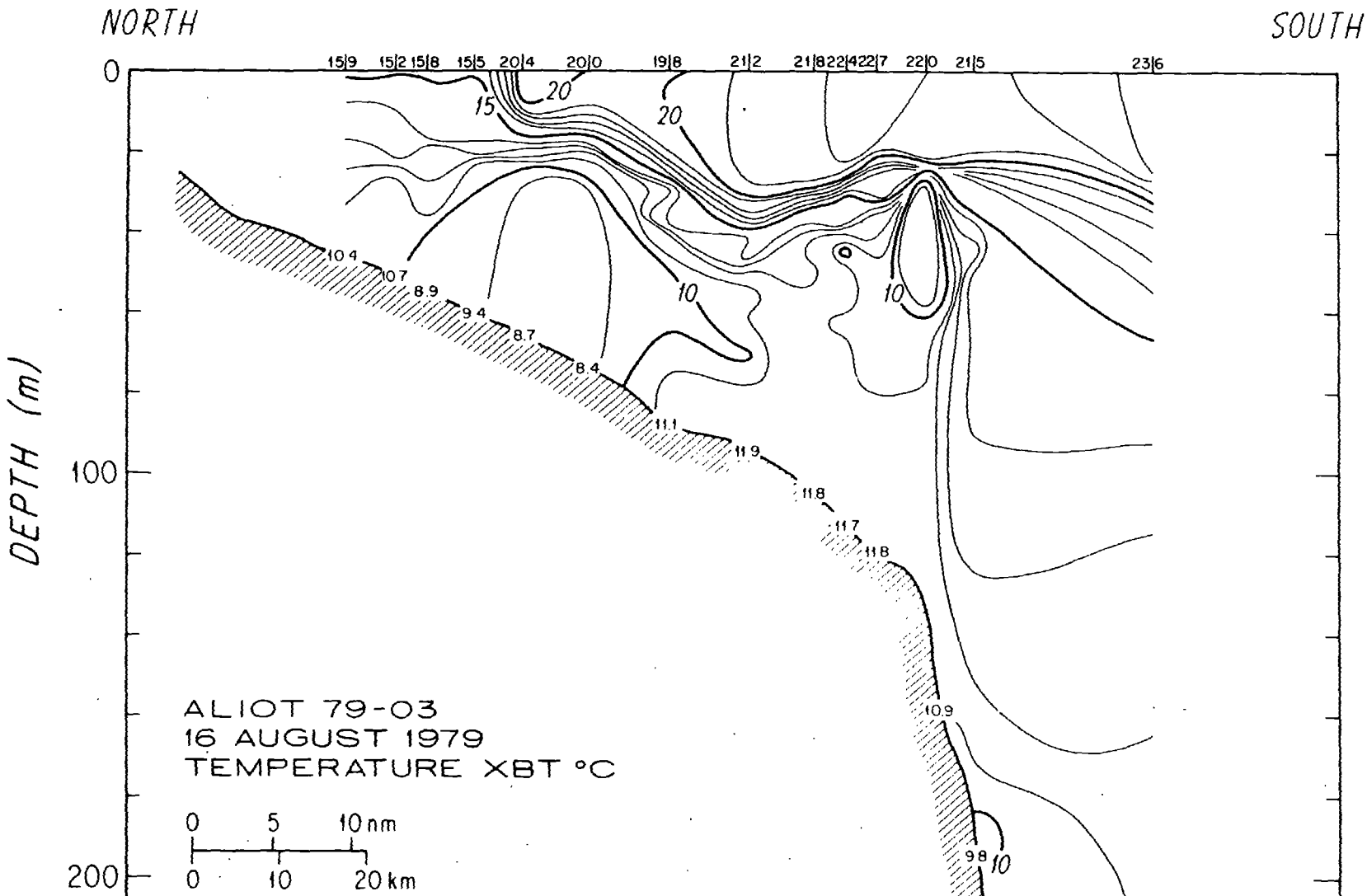

NORTH
SOUTH
DEPTH (m)
0
100
200
32|669
33|310
33|684
35|372
35|490
32.900
32.319
33
34
32.357
32.973
34
35
34.743
35.814
35.363
ALBATROSS IV 79-07
23 JULY 1979
SALINITY ‰
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

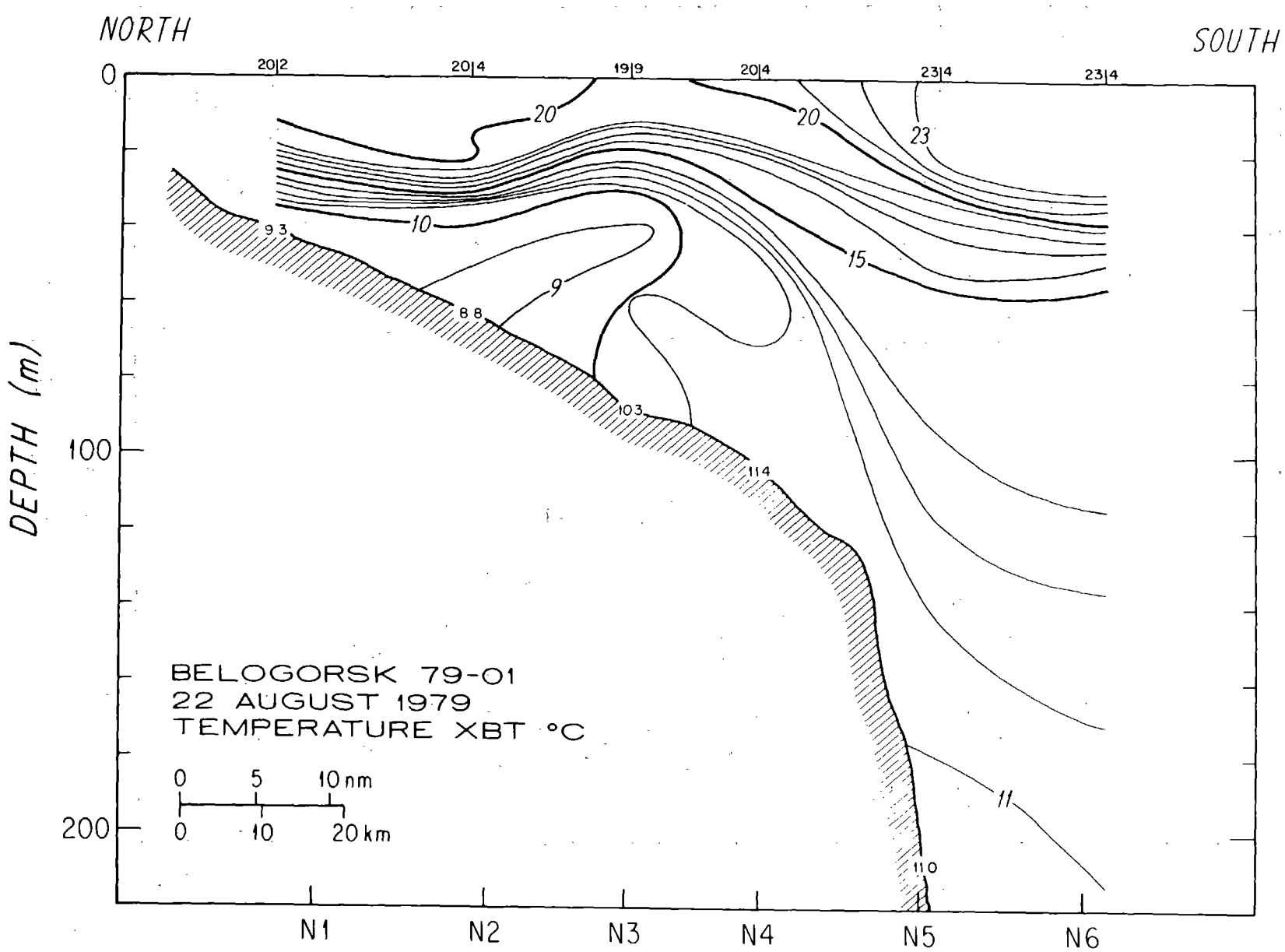

NORTH
SOUTH
22|64
22|84
22|96
22|90
23|64
23|73
0
100
200
DEPTH (m)
23
24
25
26
27
27
24.93
25.71
26.63
26.53
27.15
27.24
ALBATROSS IV 79-07
23 JULY 1979
DENSITY σ_t
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

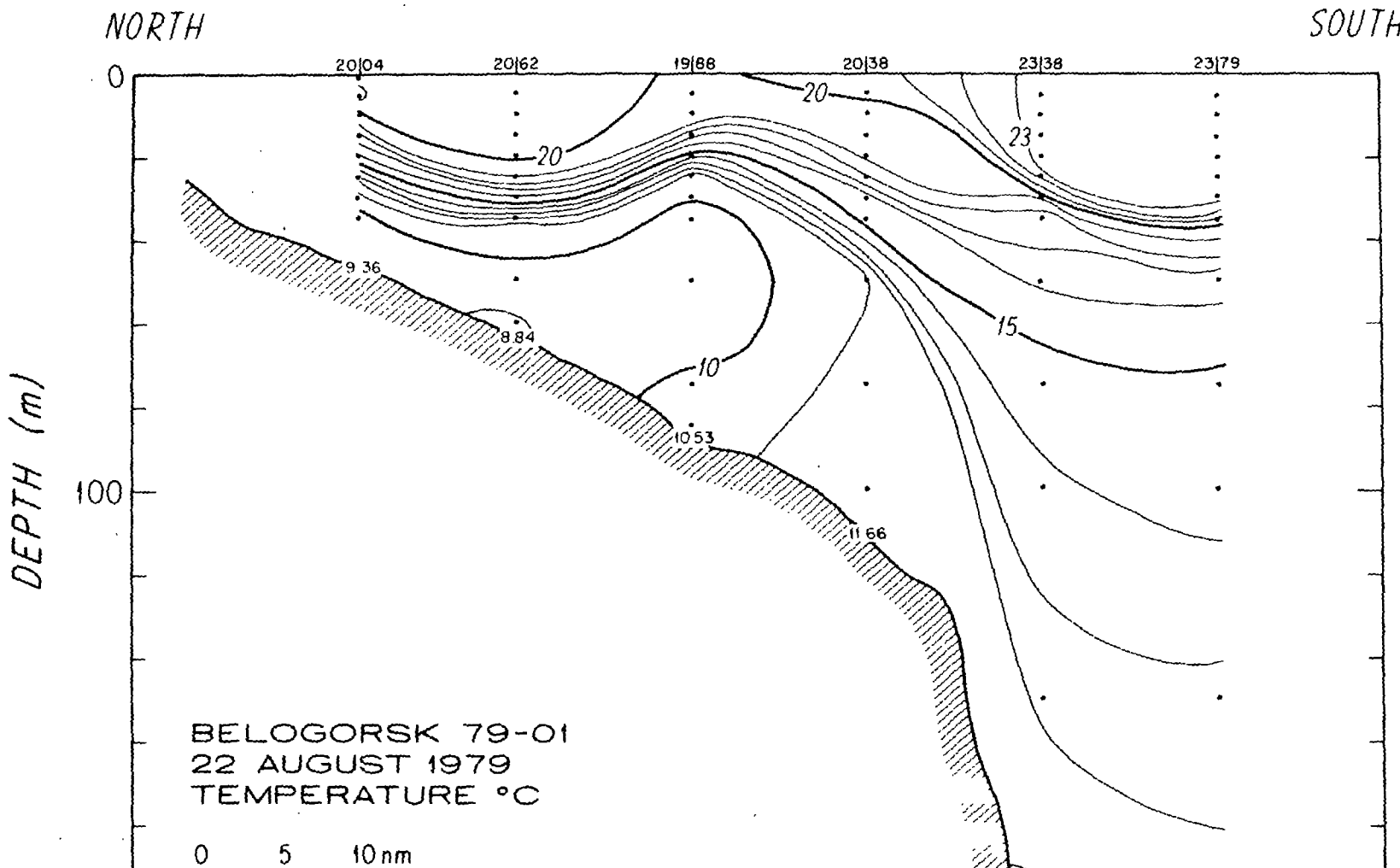

NORTH
SOUTH
18|7
23|5
23|7
25|3
25|5
25|7
25|6
26|0
25|6
25|9
26|4
26|2
26|6
26|1
DEPTH (m)
0
100
200
25
20
15
12
14
13
10
8
11
10.6
9.2
8.5
7.8
10.8
11.7
11.9
11.9
11.7
11.1
OCEANUS 67
6-7 AUGUST 1979
TEMPERATURE XBT/CTD °C
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

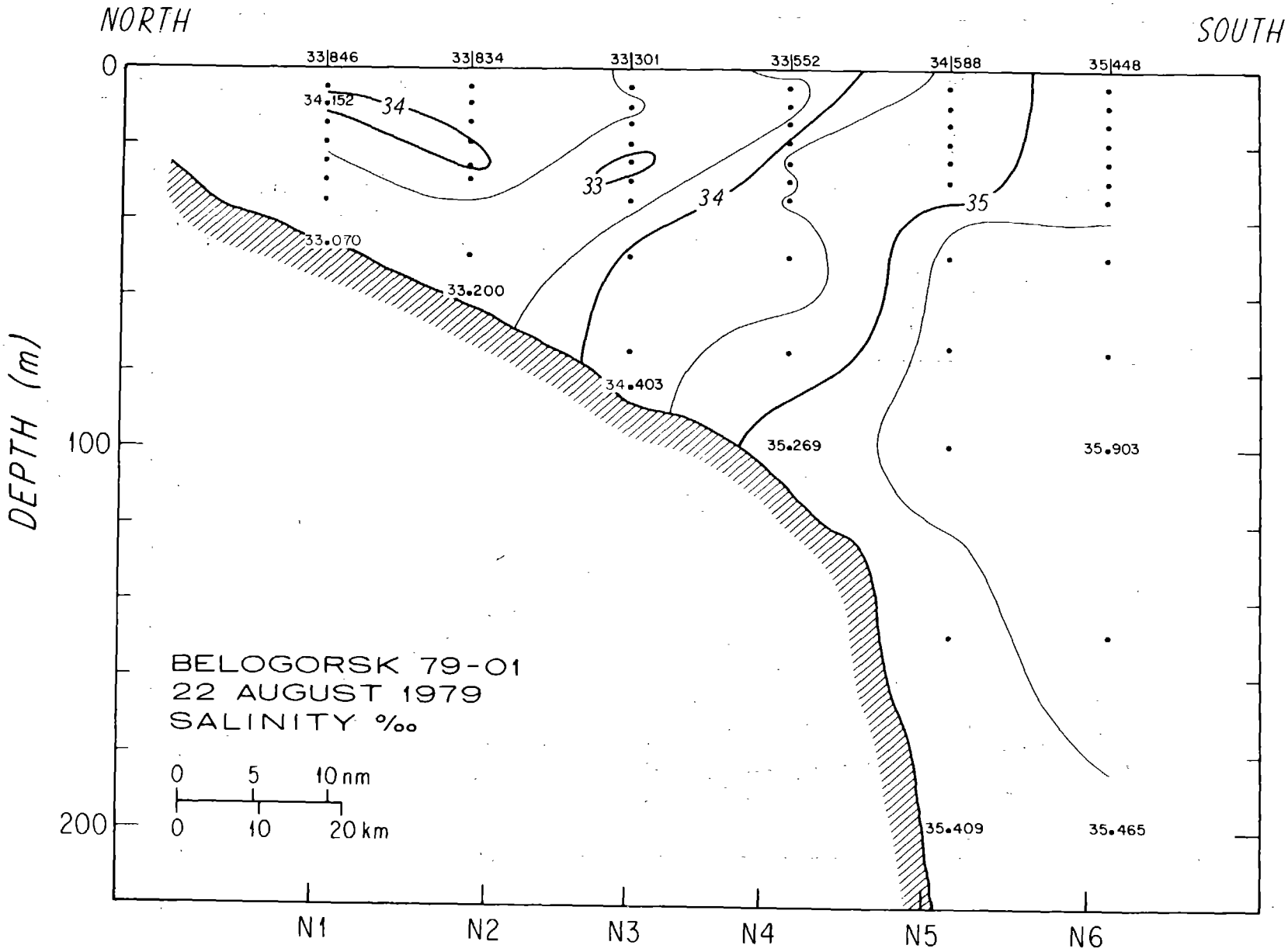

NORTH
SOUTH
32|16
33|01
34|15
34|29
33|86
33|65
33|18
0
100
200
DEPTH (m)
34
35
32.62
33
33.17
34
35
34.84
35.30
35.42
OCEANUS 67
6-7 AUGUST 1979
SALINITY CTD ‰
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

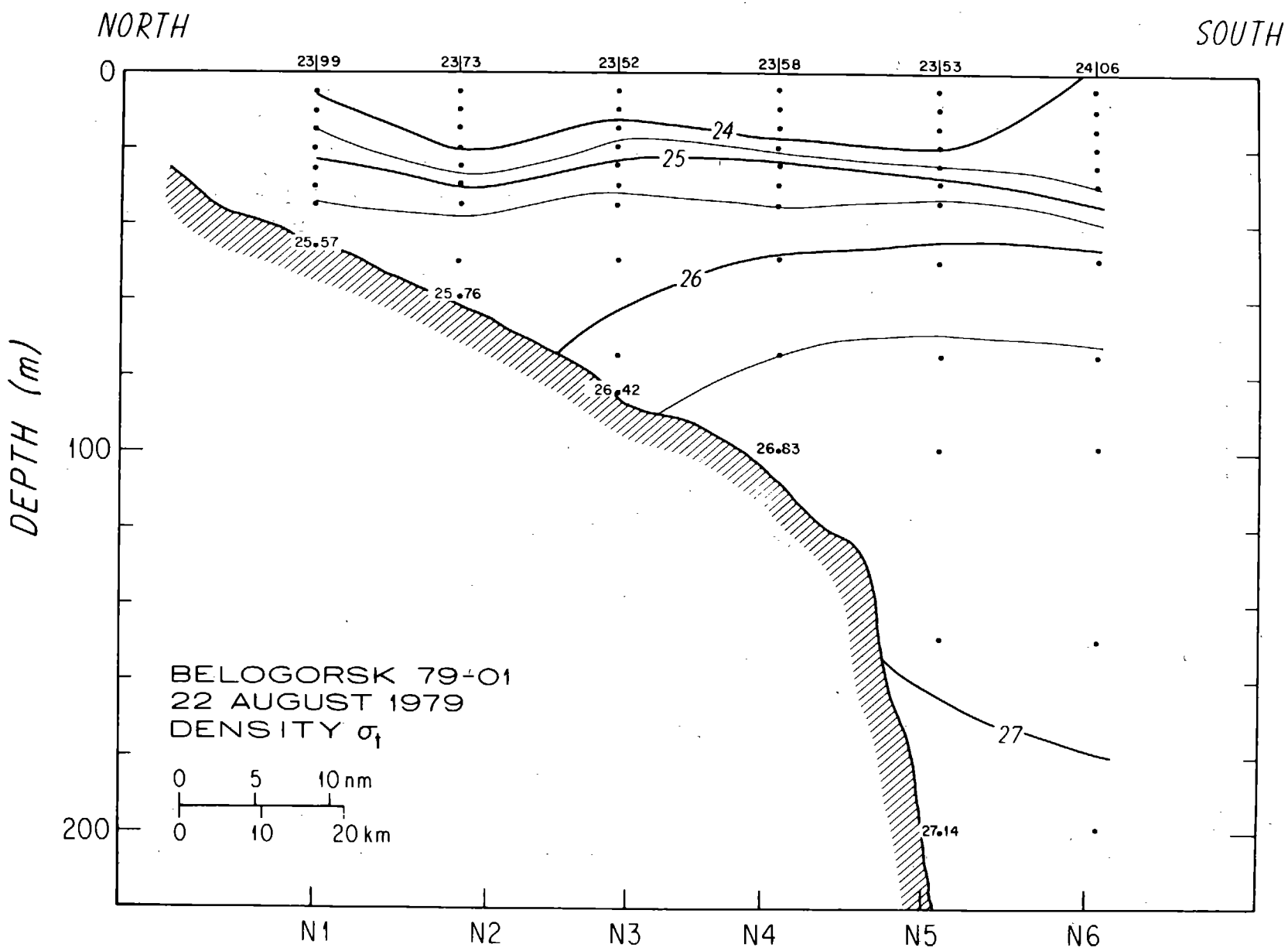

NORTH
SOUTH
22|94
22|25
22|57
22|64
22|22
21|97
21|67
23
24
25
26
27
24.95
25.79
26.71
26.85
27.11
DEPTH (m)
0
100
200
OCEANUS 67
6-7 AUGUST 1979
CTD DENSITY σ_t
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

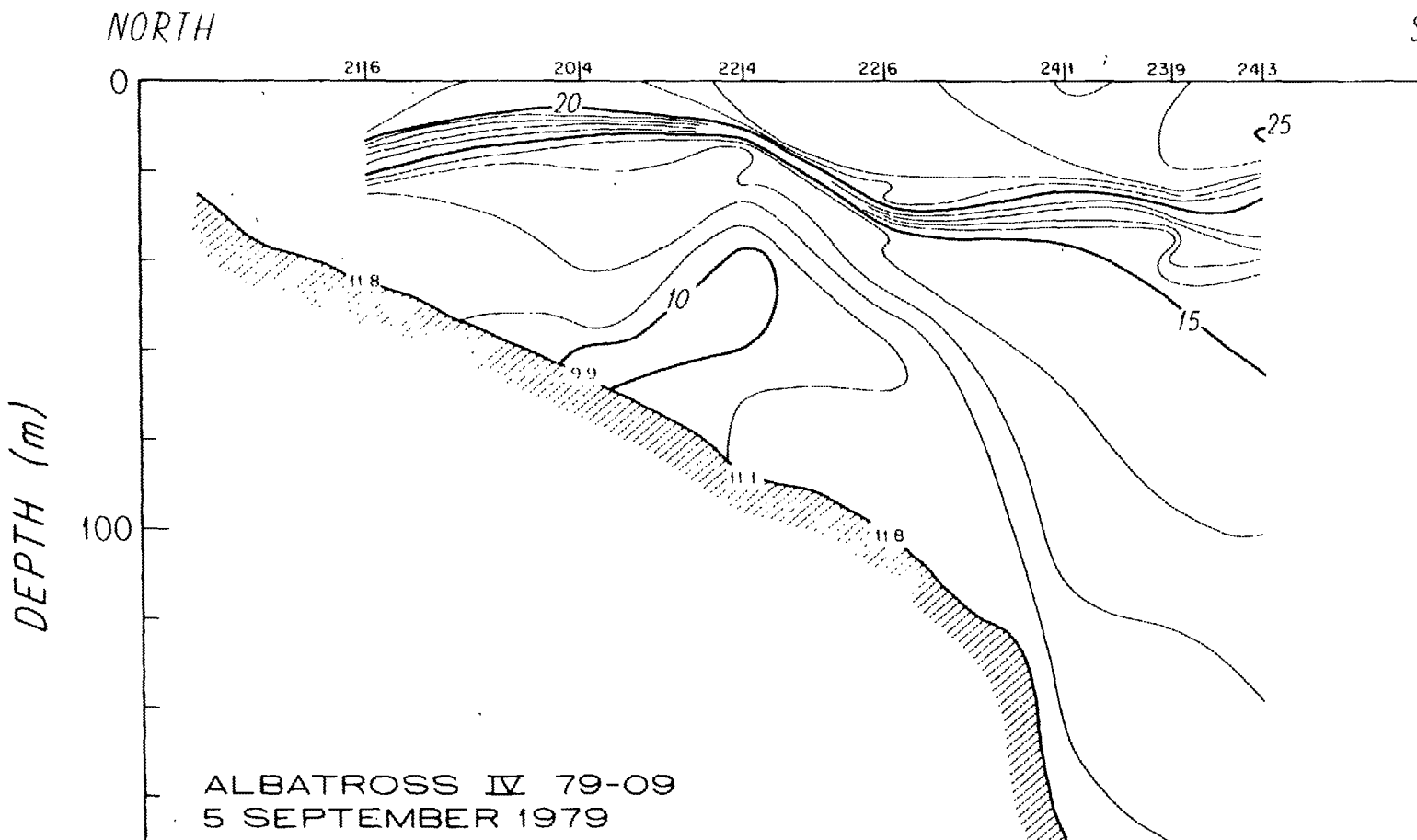

NORTH
SOUTH
DEPTH (m)
0
100
200
15|9 15|2 15|8 15|5 20|4 20|0 19|8 21|2 21|8 22|4 22|7 22|0 21|5 23|6
15
20
20
10
10
10.4
10.7
8.9
9.4
8.7
8.4
11.1
11.9
11.8
11.7
11.8
10.9
9.8
10
ALIOT 79-03
16 AUGUST 1979
TEMPERATURE XBT °C
0 5 10 nm
0 10 20 km

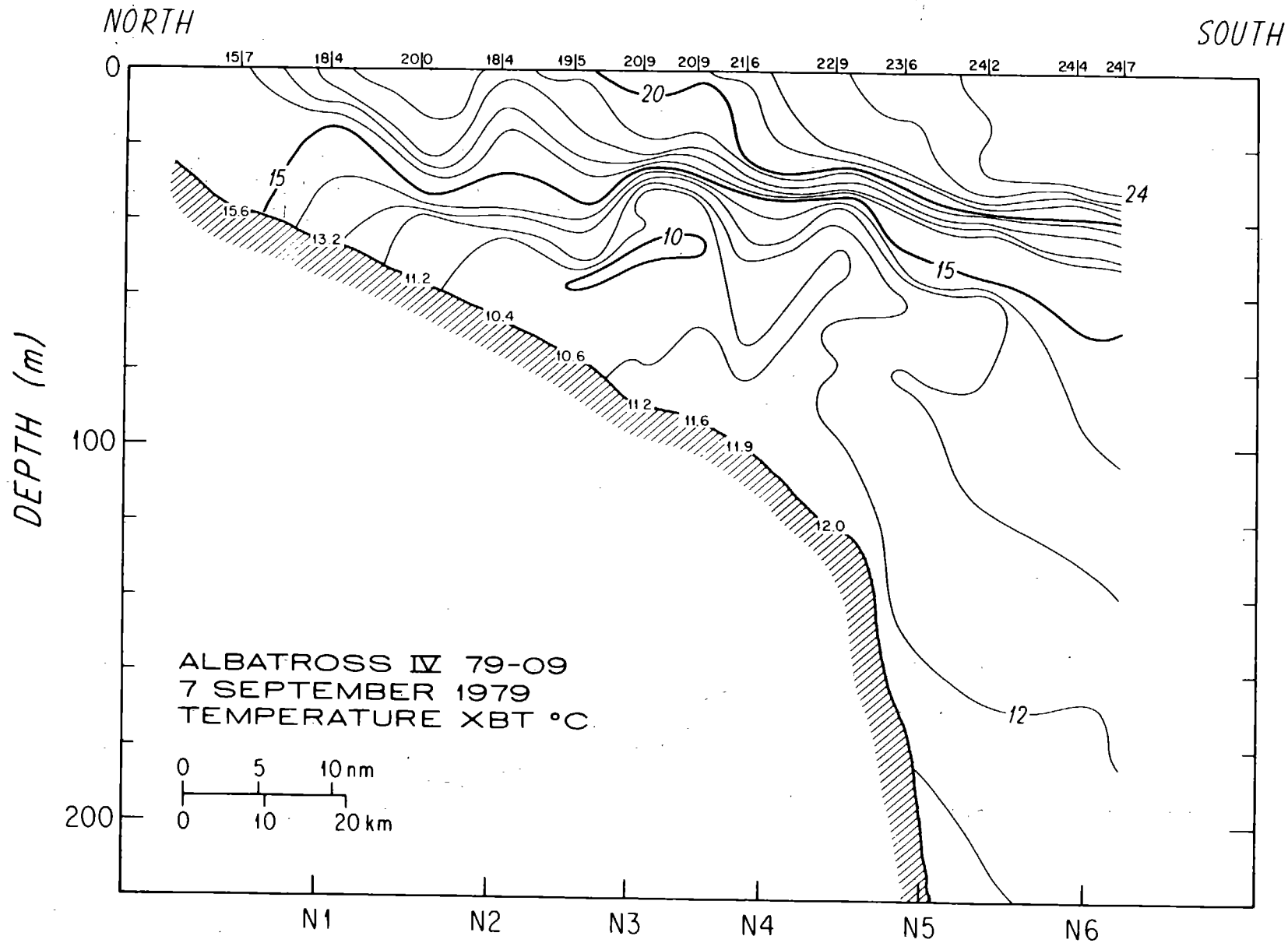

NORTH
SOUTH
DEPTH (m)
0
100
200
20|2
20|4
19|9
20|4
23|4
23|4
20
20
23
10
15
9
9.3
8.8
10.3
11.4
11
11.0
BELOGORSK 79-01
22 AUGUST 1979
TEMPERATURE XBT °C
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

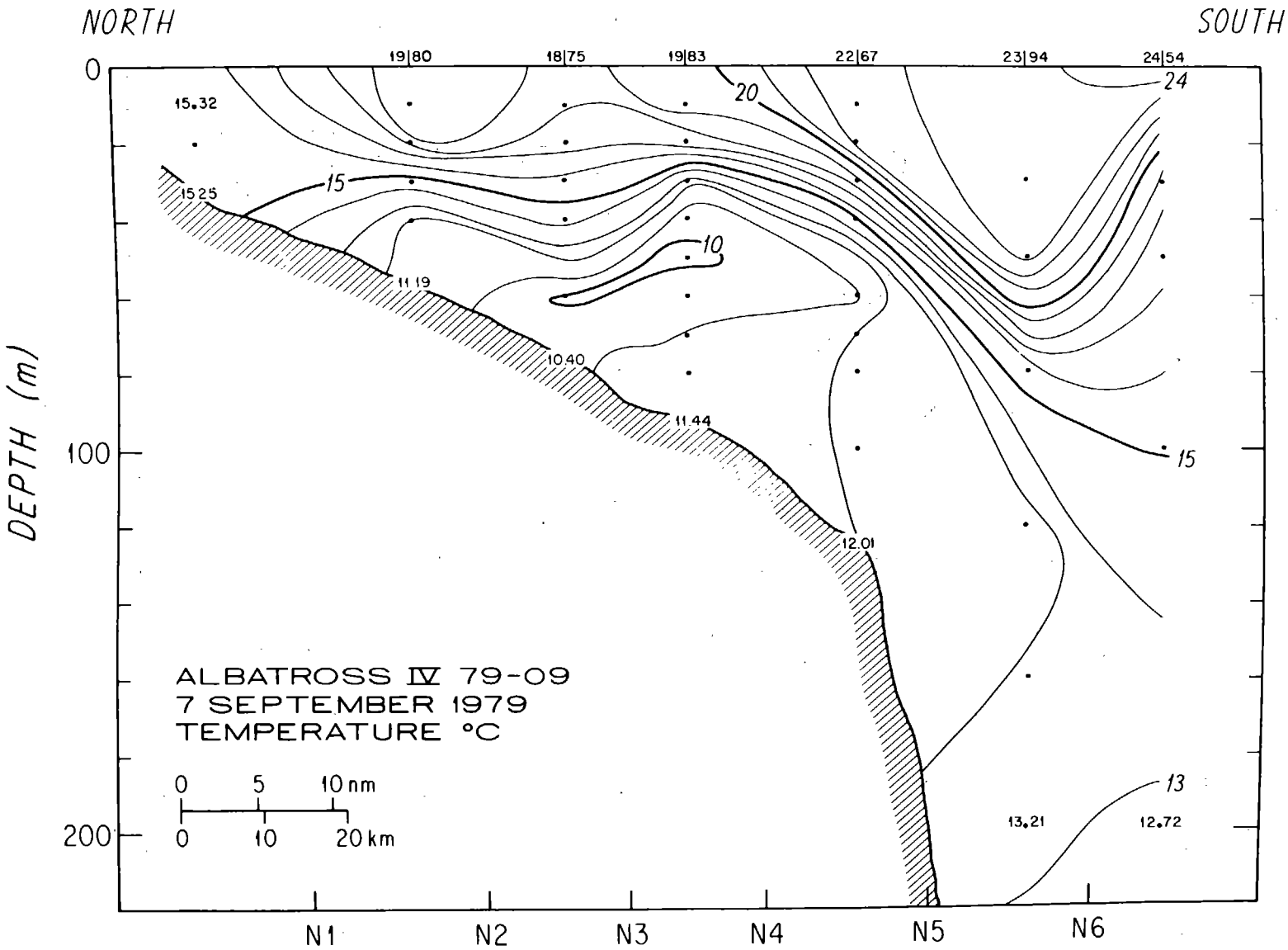

NORTH
SOUTH
DEPTH (m)
0
100
20|04
20|62
19|88
20|38
23|38
23|79
20
20
23
15
10
9.36
8.84
10.53
11.66
BELOGORSK 79-01
22 AUGUST 1979
TEMPERATURE °C
0 5 10 nm

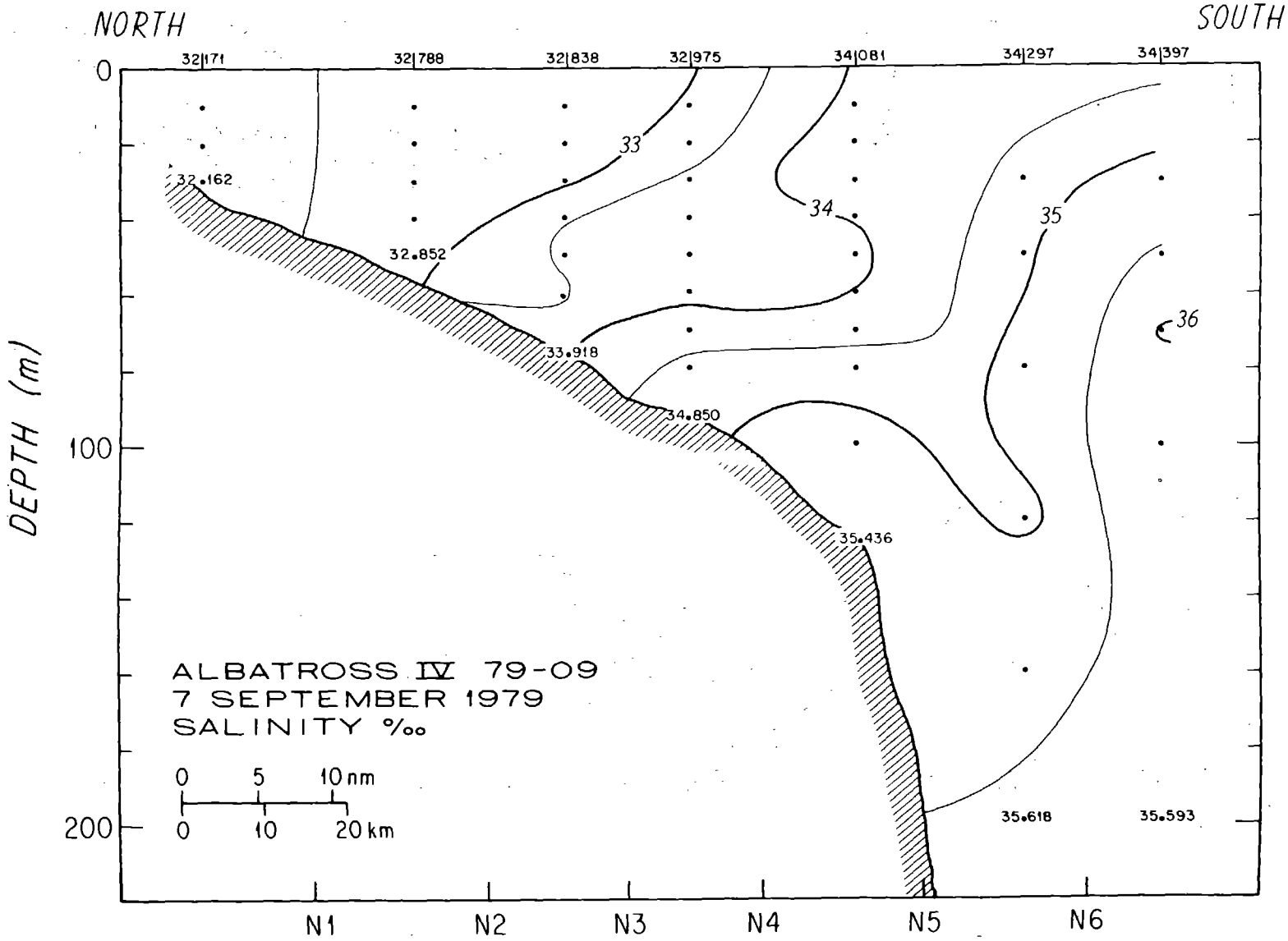

NORTH
SOUTH
DEPTH (m)
0
100
200
33|846
33|834
33|301
33|552
34|588
35|448
34.152
34
33
34
35
33.070
33.200
34.403
35.269
35.903
35.409
35.465
BELOGORSK 79-01
22 AUGUST 1979
SALINITY ‰
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

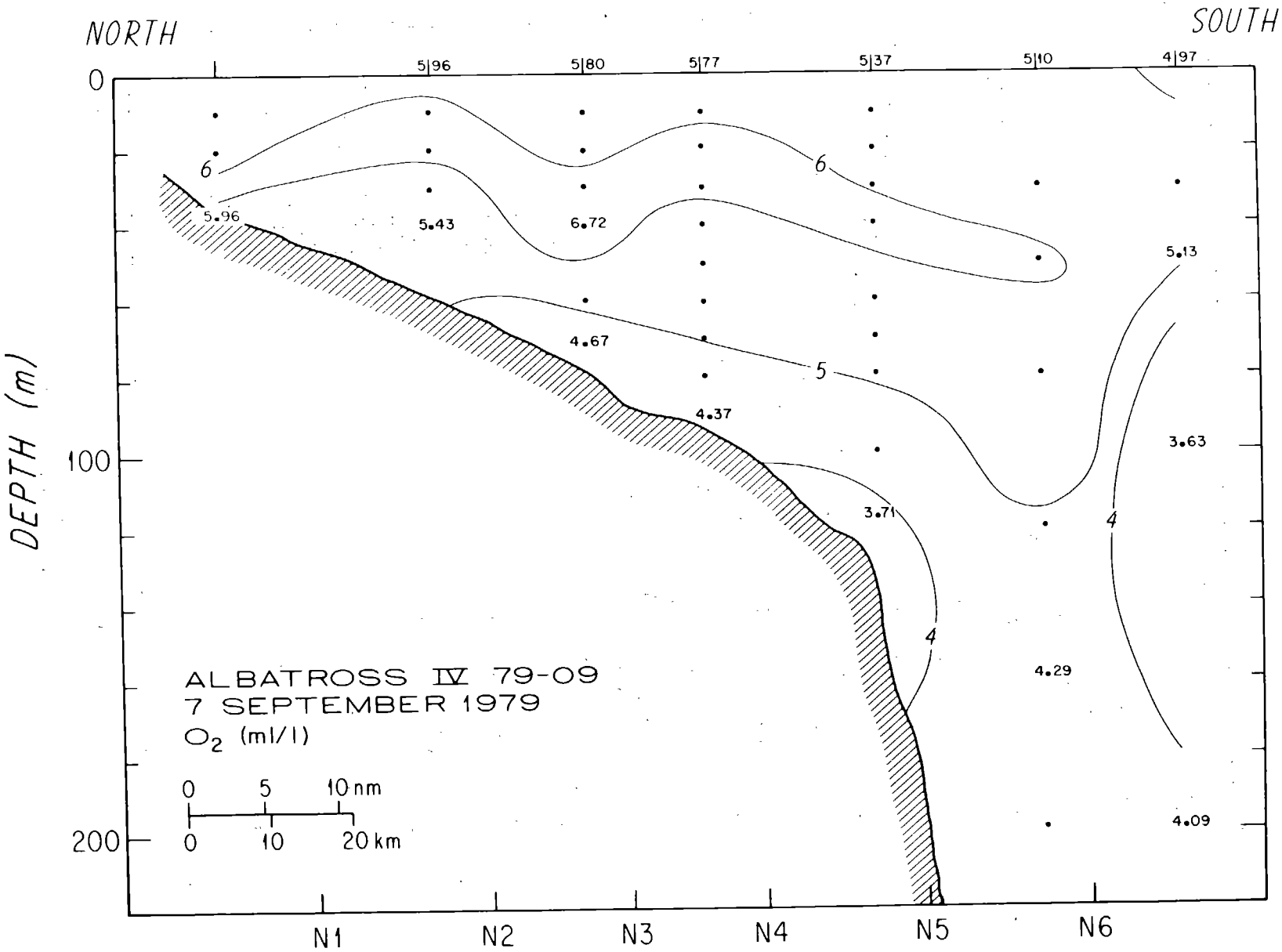

NORTH
SOUTH
DEPTH (m)
0
100
200
23|99
23|73
23|52
23|58
23|53
24|06
24
25
26
27
25.57
25.76
26.42
26.83
27.14
BELOGORSK 79-01
22 AUGUST 1979
DENSITY σ_t
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

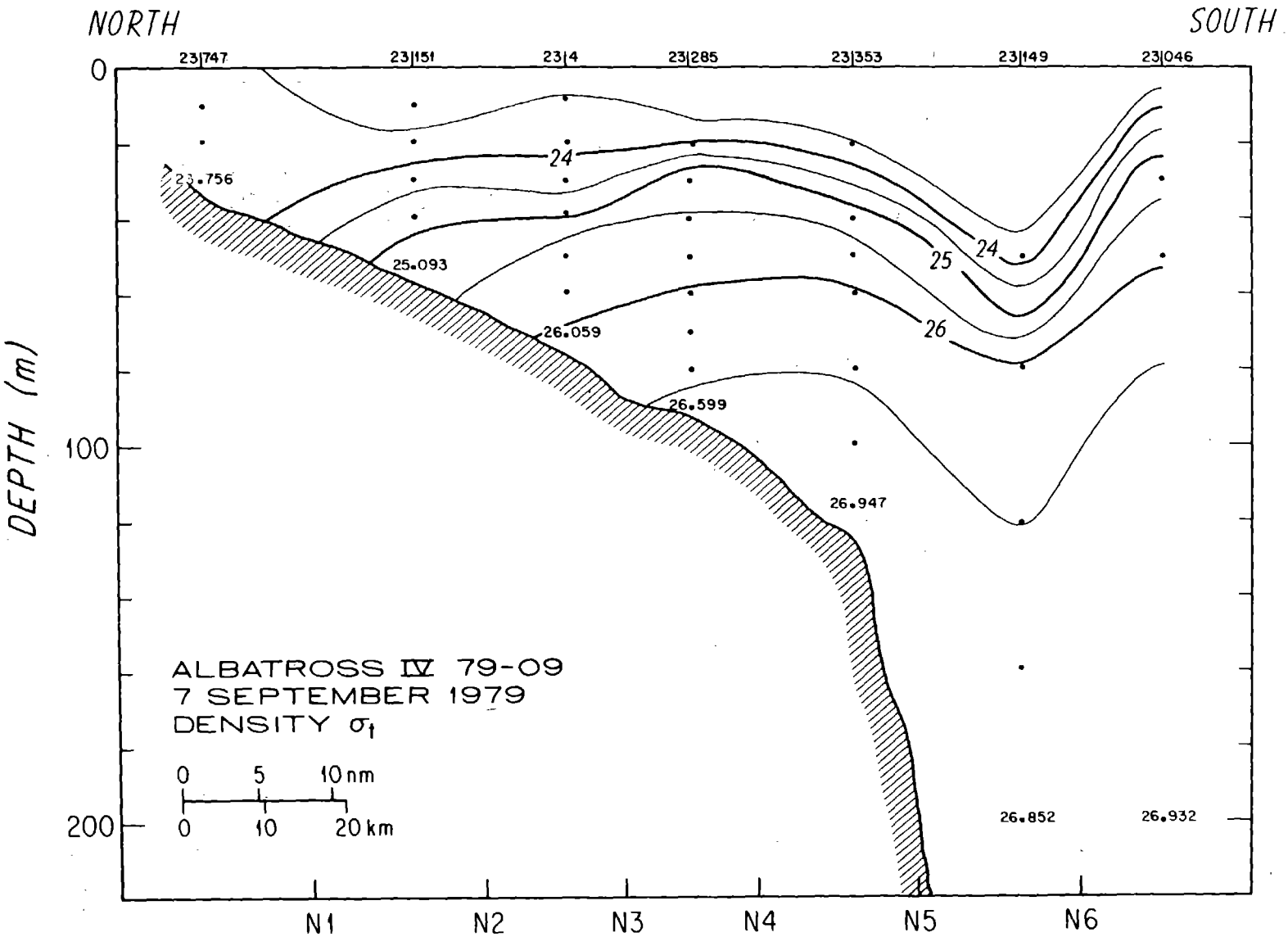

NORTH
21|6
20|4
22|4
22|6
24|1
23|9
24|3
0
100
DEPTH (m)
20
25
10
15
11.8
9.9
11.1
11.8
ALBATROSS IV 79-09
5 SEPTEMBER 1979

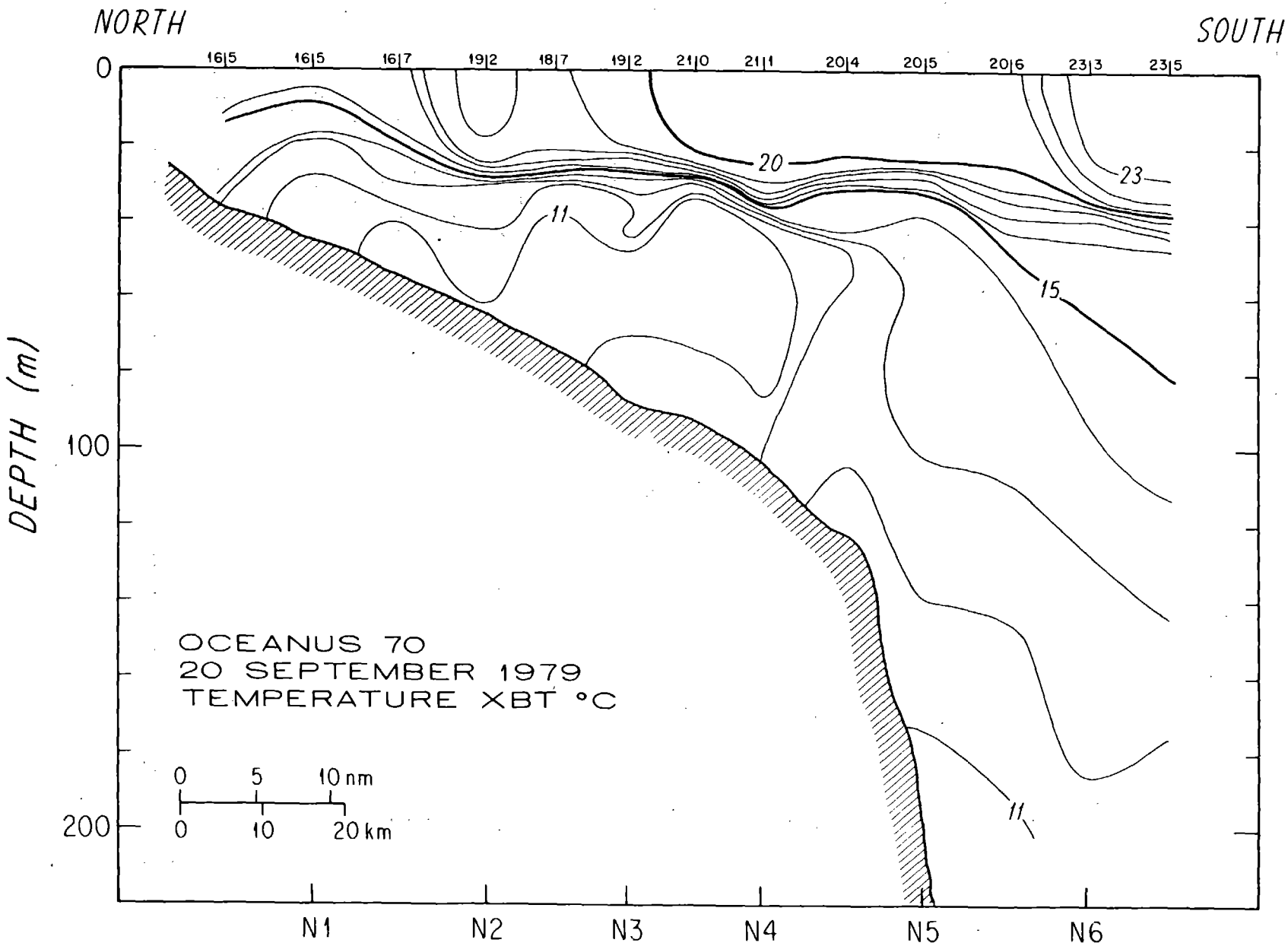

NORTH
SOUTH
DEPTH (m)
0
100
200
15|7
18|4
20|0
18|4
19|5
20|9
20|9
21|6
22|9
23|6
24|2
24|4
24|7
20
15
10
15
24
12
15.6
13.2
11.2
10.4
10.6
11.2
11.6
11.9
12.0
ALBATROSS IV 79-09
7 SEPTEMBER 1979
TEMPERATURE XBT °C
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

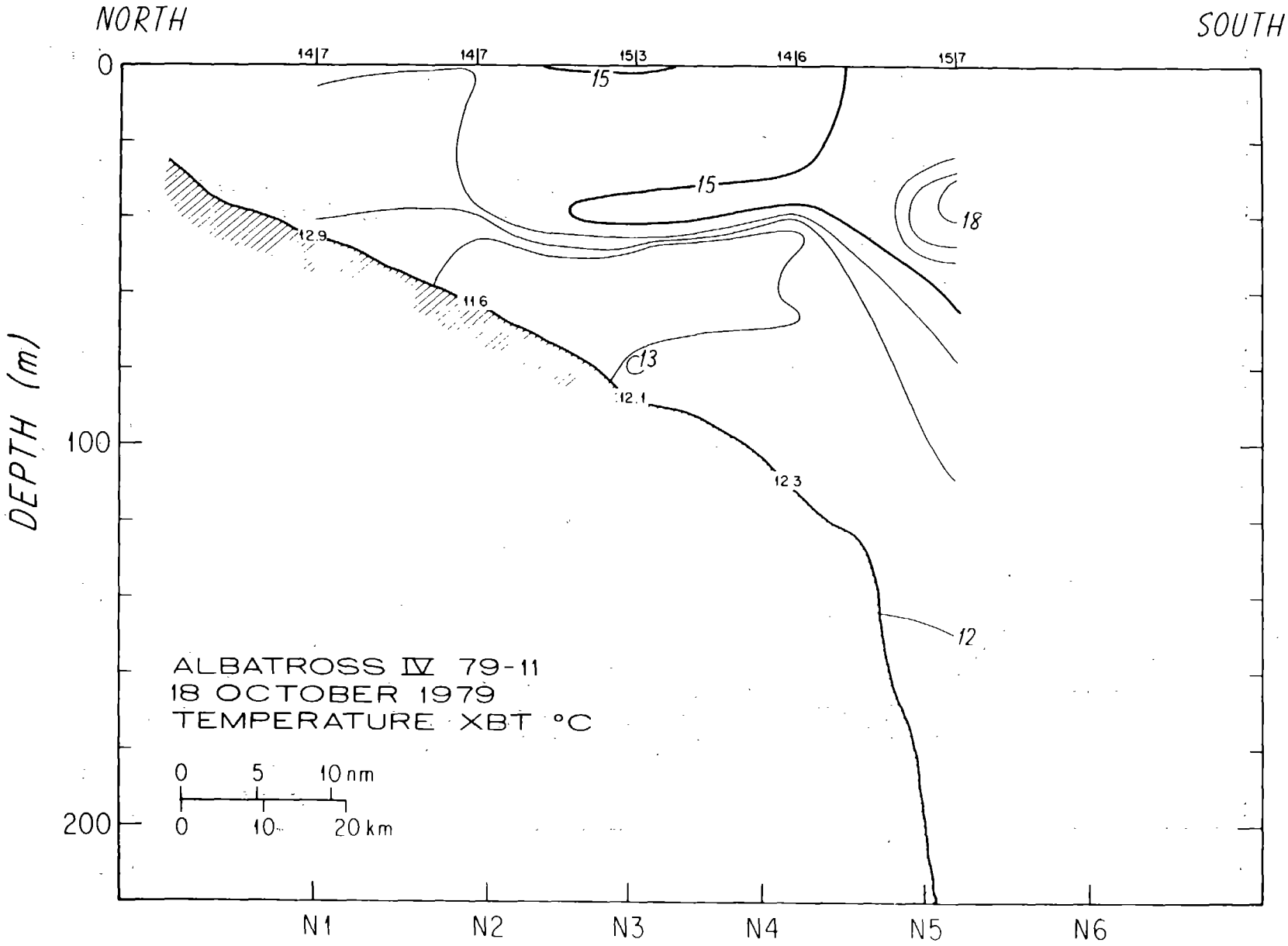

NORTH
SOUTH
DEPTH (m)
0
100
200
19|80
18|75
19|83
22|67
23|94
24|54
15.32
15.25
11.19
10.40
11.44
12.01
13.21
12.72
24
20
15
10
15
13
ALBATROSS IV 79-09
7 SEPTEMBER 1979
TEMPERATURE °C
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

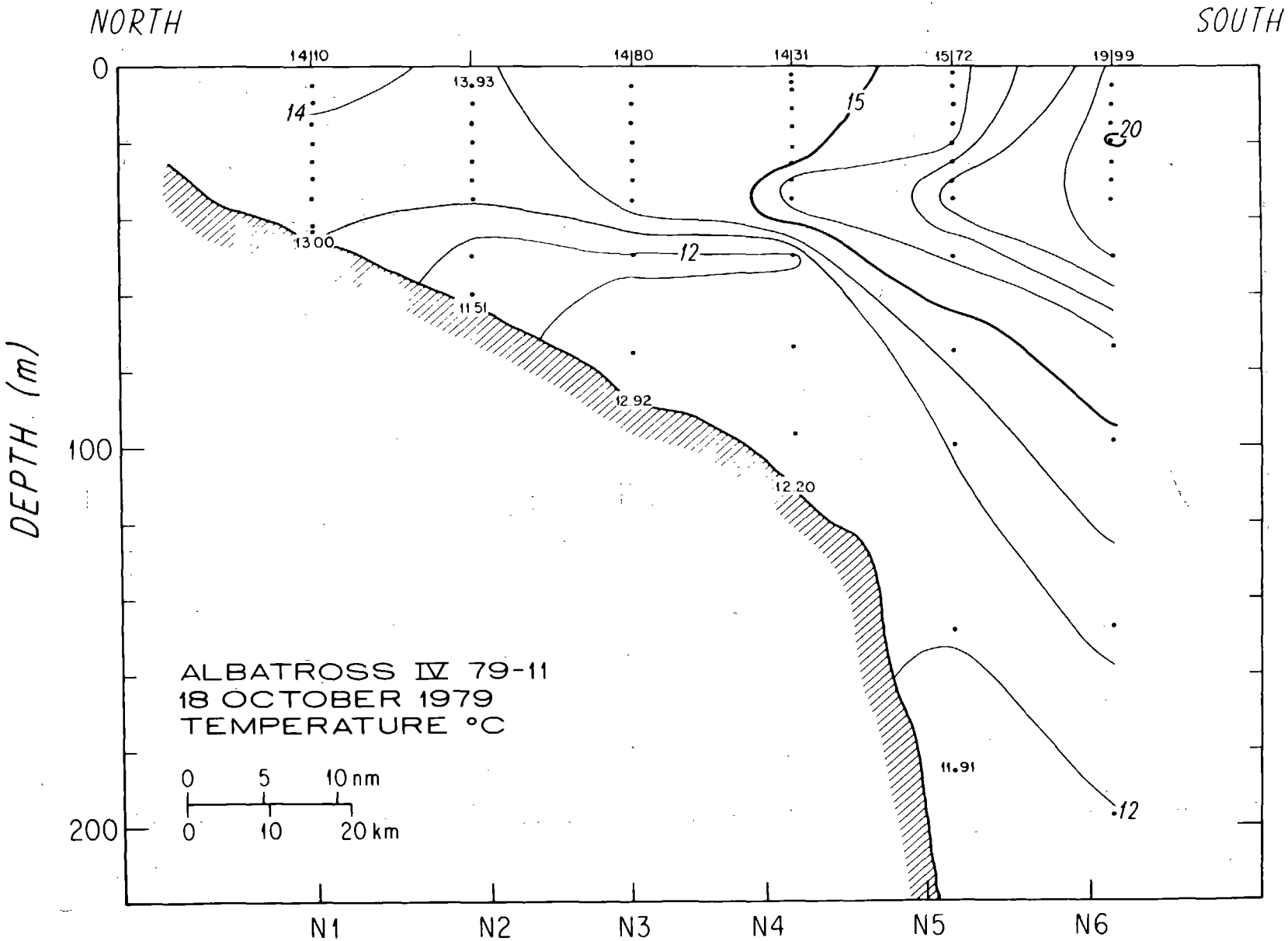

NORTH
SOUTH
32|171
32|788
32|838
32|975
34|081
34|297
34|397
0
100
200
DEPTH (m)
32.162
32.852
33.918
34.850
35.436
35.618
35.593
33
34
35
36
ALBATROSS IV 79-09
7 SEPTEMBER 1979
SALINITY ‰
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

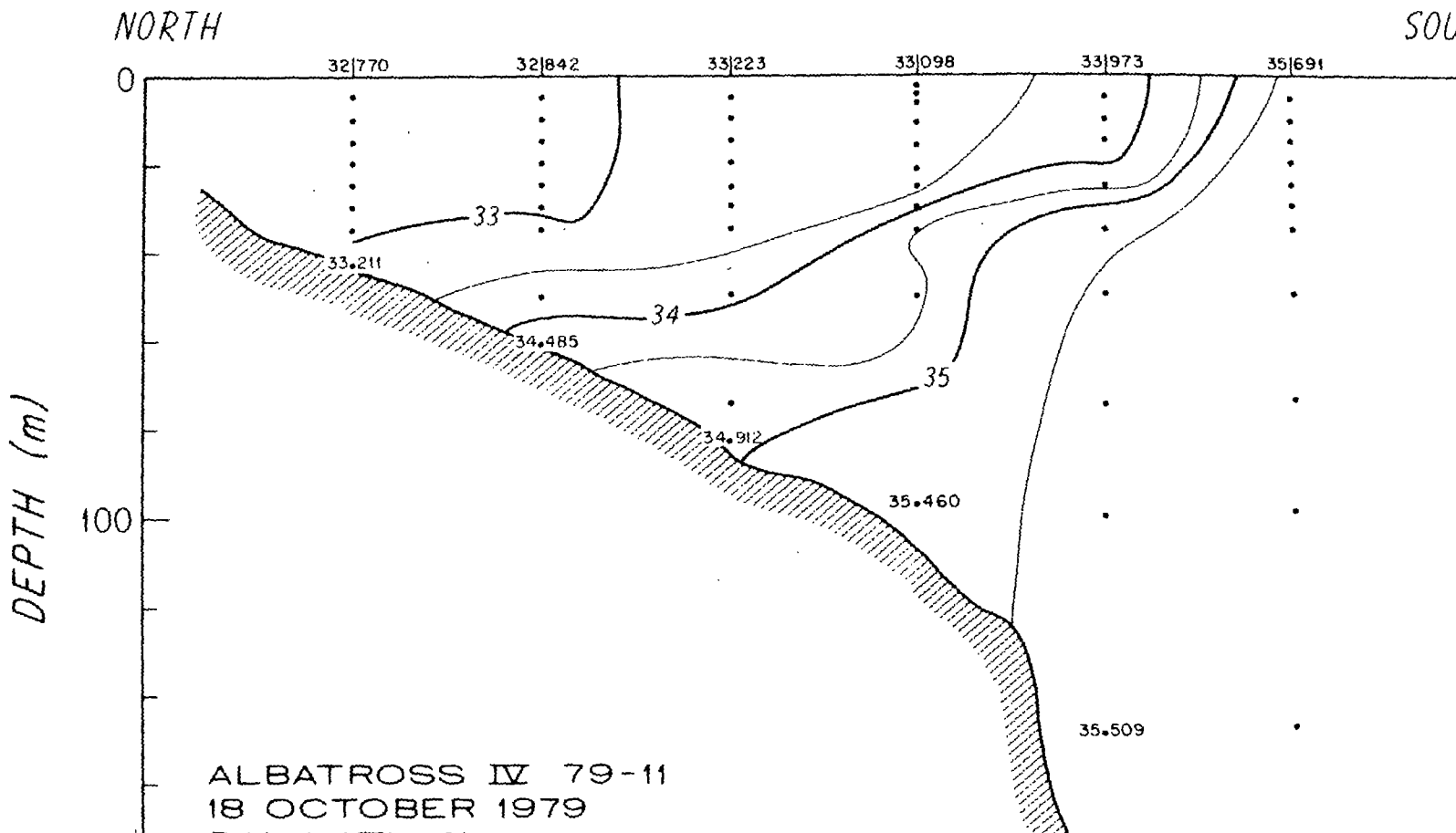

NORTH
SOUTH
5|96
5|80
5|77
5|37
5|10
4|97
0
100
200
DEPTH (m)
6
6
5
4
4
5.96
5.43
6.72
4.67
4.37
3.71
5.13
3.63
4.29
4.09
ALBATROSS IV 79-09
7 SEPTEMBER 1979
O2 (ml/l)
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

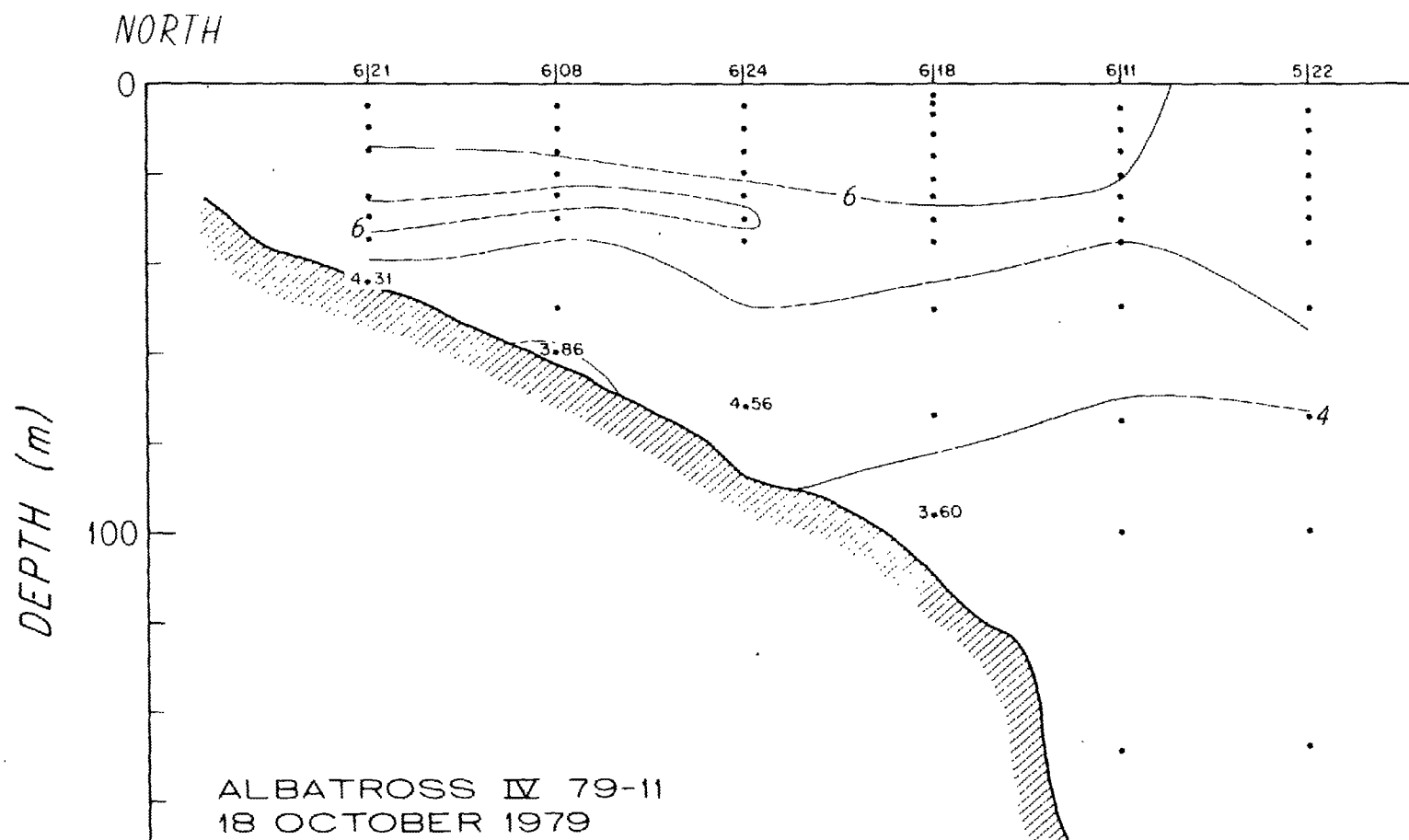

NORTH
SOUTH
23|747
23|151
23|4
23|285
23|353
23|149
23|046
0
100
200
DEPTH (m)
24
25
26
23.756
25.093
26.059
26.599
26.947
26.852
26.932
ALBATROSS IV 79-09
7 SEPTEMBER 1979
DENSITY σ_t
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

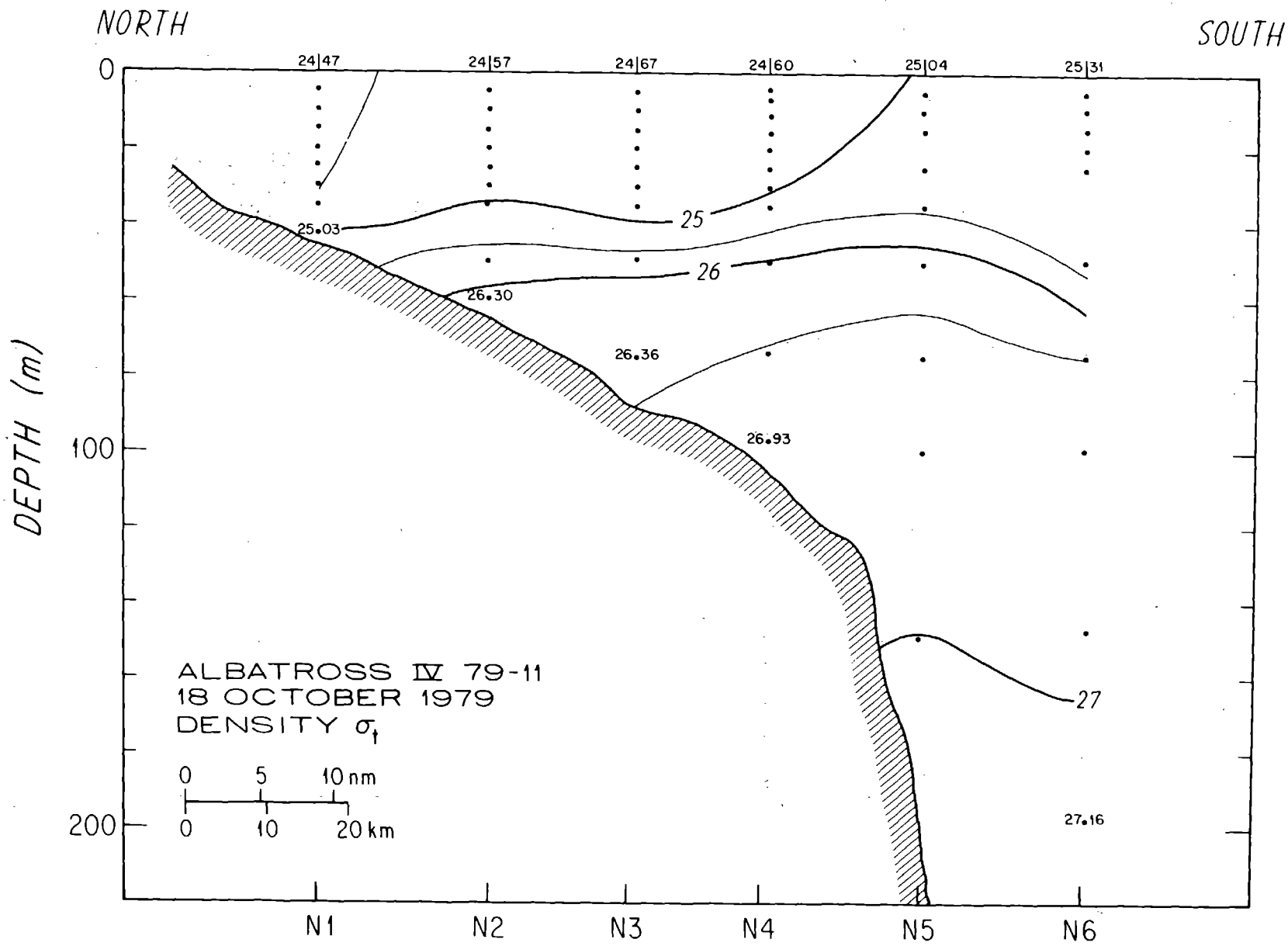

NORTH
SOUTH
16|5
16|5
16|7
19|2
18|7
19|2
21|0
21|1
20|4
20|5
20|6
23|3
23|5
0
100
200
DEPTH (m)
20
23
11
15
11
OCEANUS 70
20 SEPTEMBER 1979
TEMPERATURE XBT °C
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

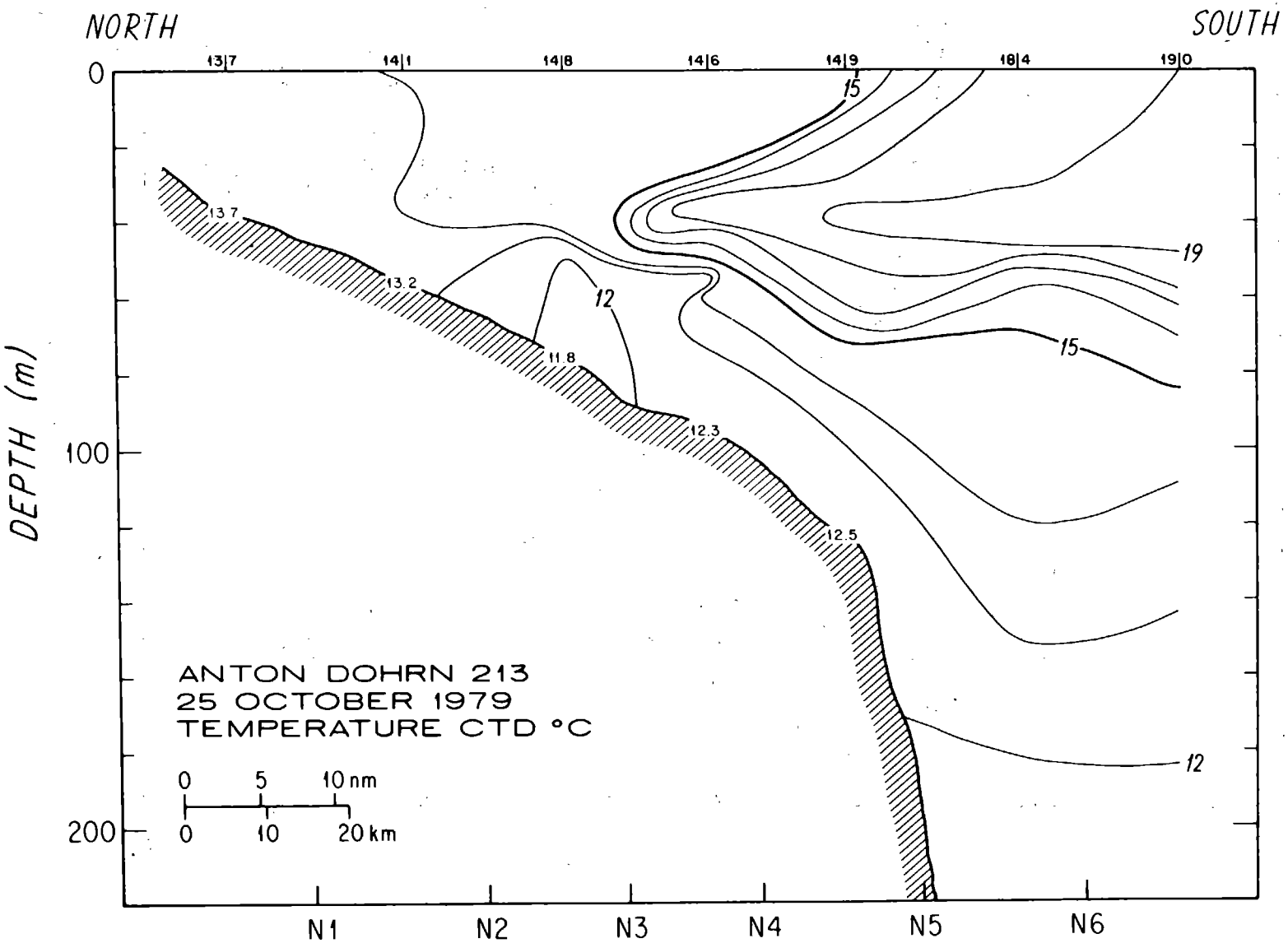

NORTH
SOUTH
DEPTH (m)
0
100
200
14|7
14|7
15|3
14|6
15|7
15
15
18
12.9
11.6
13
12.1
12.3
12
ALBATROSS IV 79-11
18 OCTOBER 1979
TEMPERATURE XBT °C
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

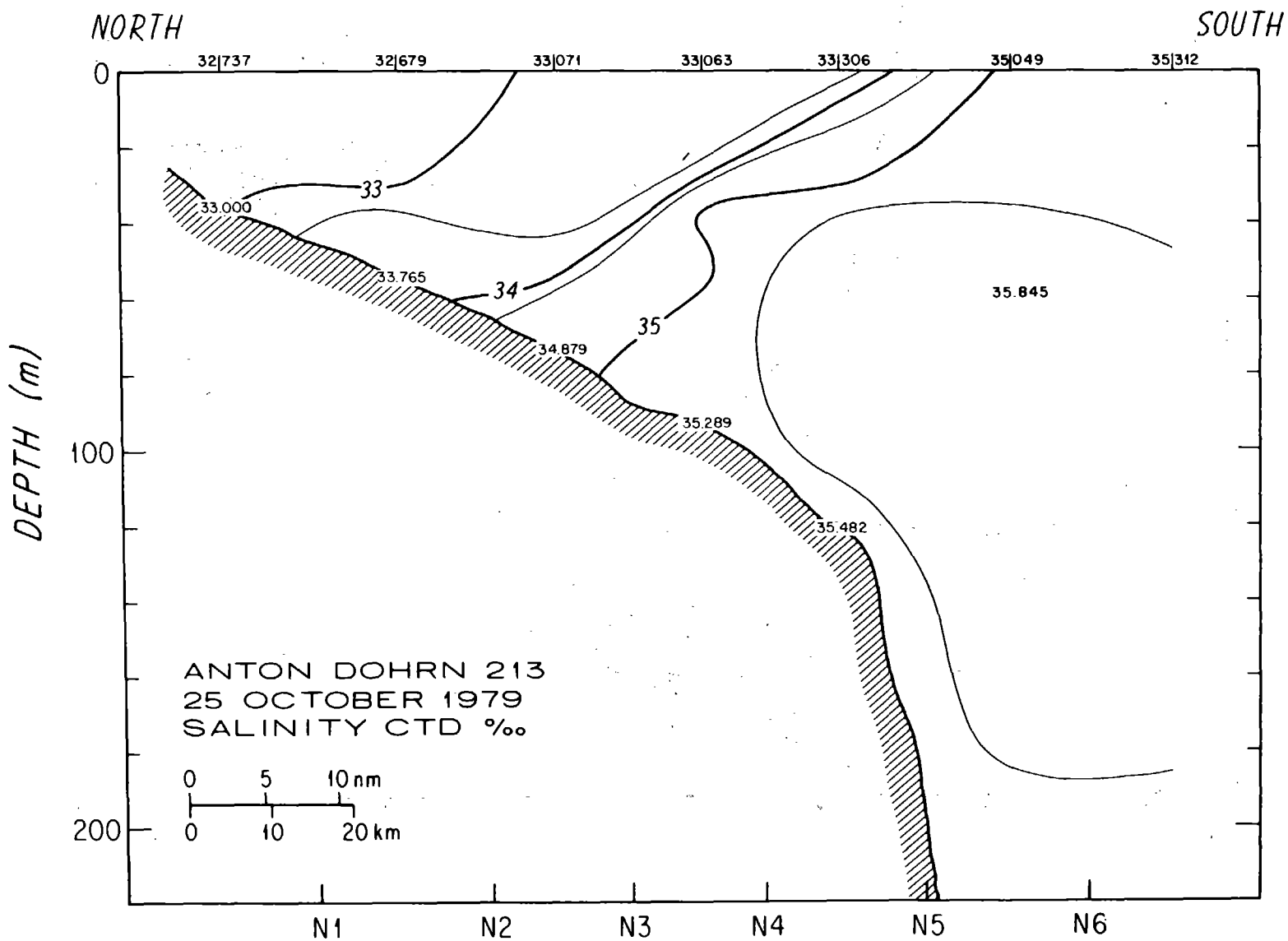

NORTH
SOUTH
DEPTH (m)
0
100
200
14.10
13.93
14.80
14.31
15.72
19.99
14
15
20
13.00
12
11.51
12.92
12.20
11.91
12
ALBATROSS IV 79-11
18 OCTOBER 1979
TEMPERATURE °C
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

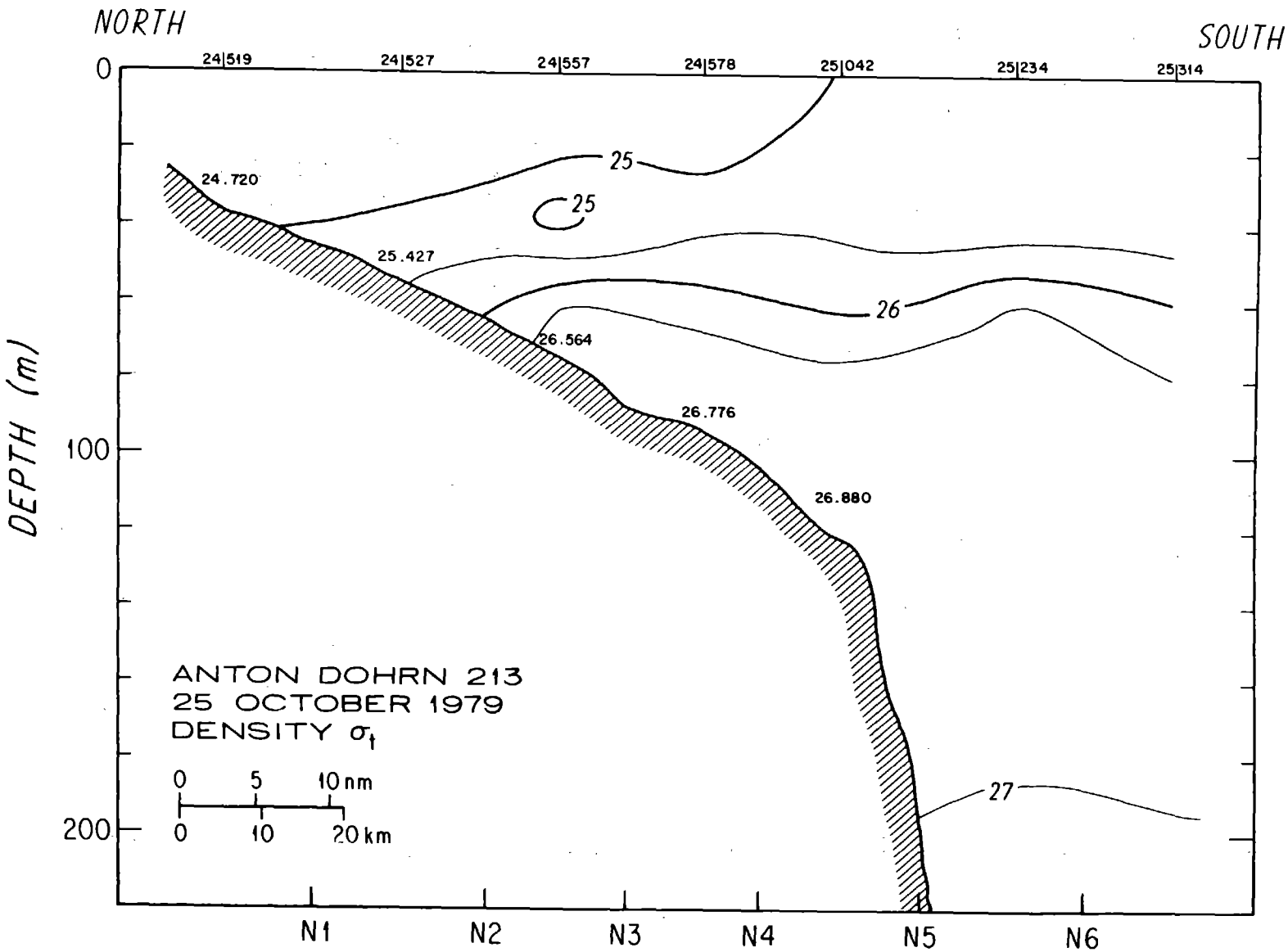

NORTH
SOU
32|770
32|842
33|223
33|098
33|973
35|691
0
100
DEPTH (m)
33
34
35
33.211
34.485
34.912
35.460
35.509
ALBATROSS IV 79-11
18 OCTOBER 1979

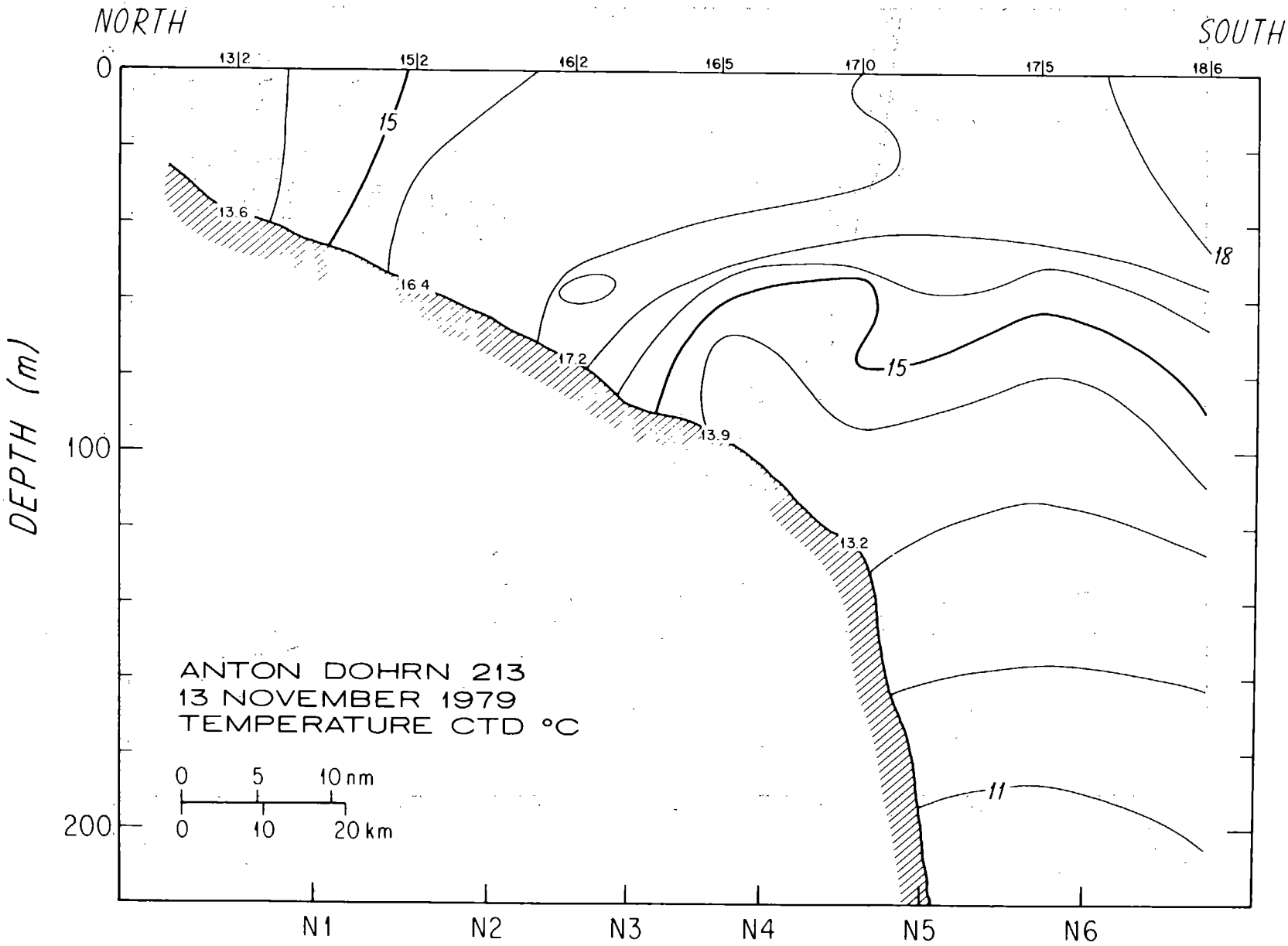

NORTH
6|21
6|08
6|24
6|18
6|11
5|22
0
100
DEPTH (m)
6
6
4
4.31
3.86
4.56
3.60
ALBATROSS IV 79-11
18 OCTOBER 1979

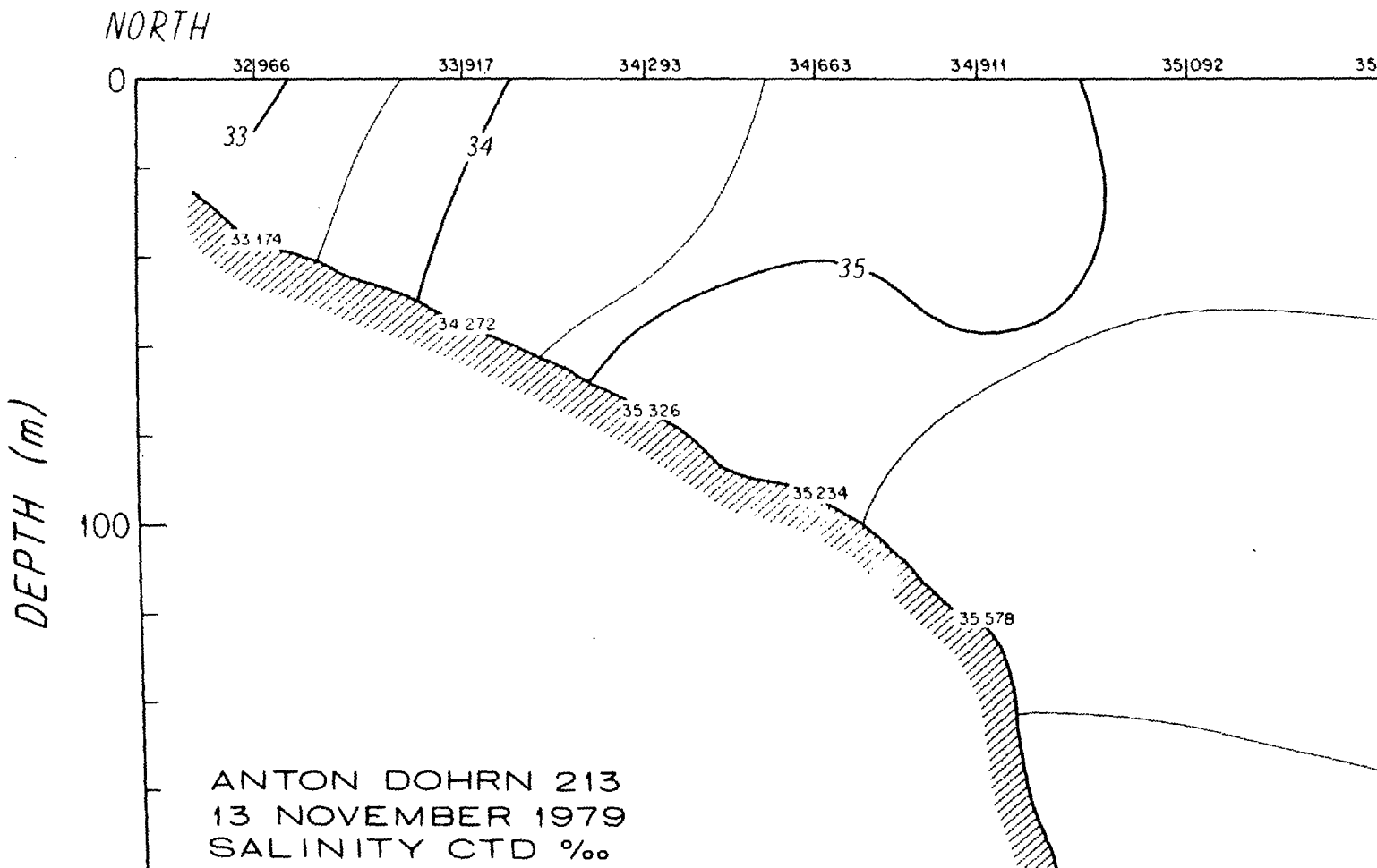

NORTH
SOUTH
DEPTH (m)
0
100
200
24|47
24|57
24|67
24|60
25|04
25|31
25.03
25
26
26.30
26.36
26.93
27
27.16
ALBATROSS IV 79-11
18 OCTOBER 1979
DENSITY σ_t
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

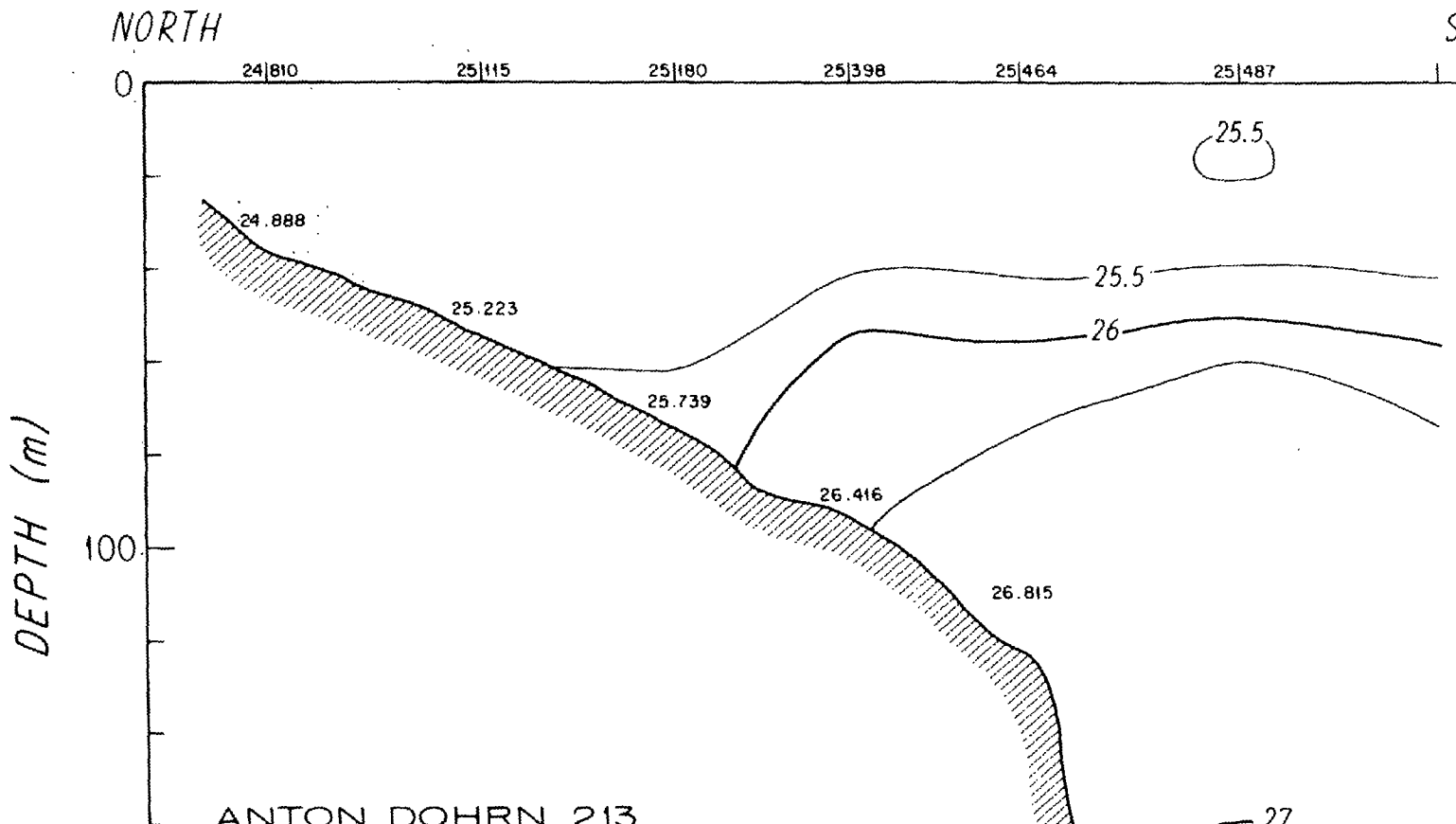

NORTH
SOUTH
13|7
14|1
14|8
14|6
14|9
18|4
19|0
0
100
200
DEPTH (m)
15
19
15
12
12
13.7
13.2
11.8
12.3
12.5
ANTON DOHRN 213
25 OCTOBER 1979
TEMPERATURE CTD °C
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

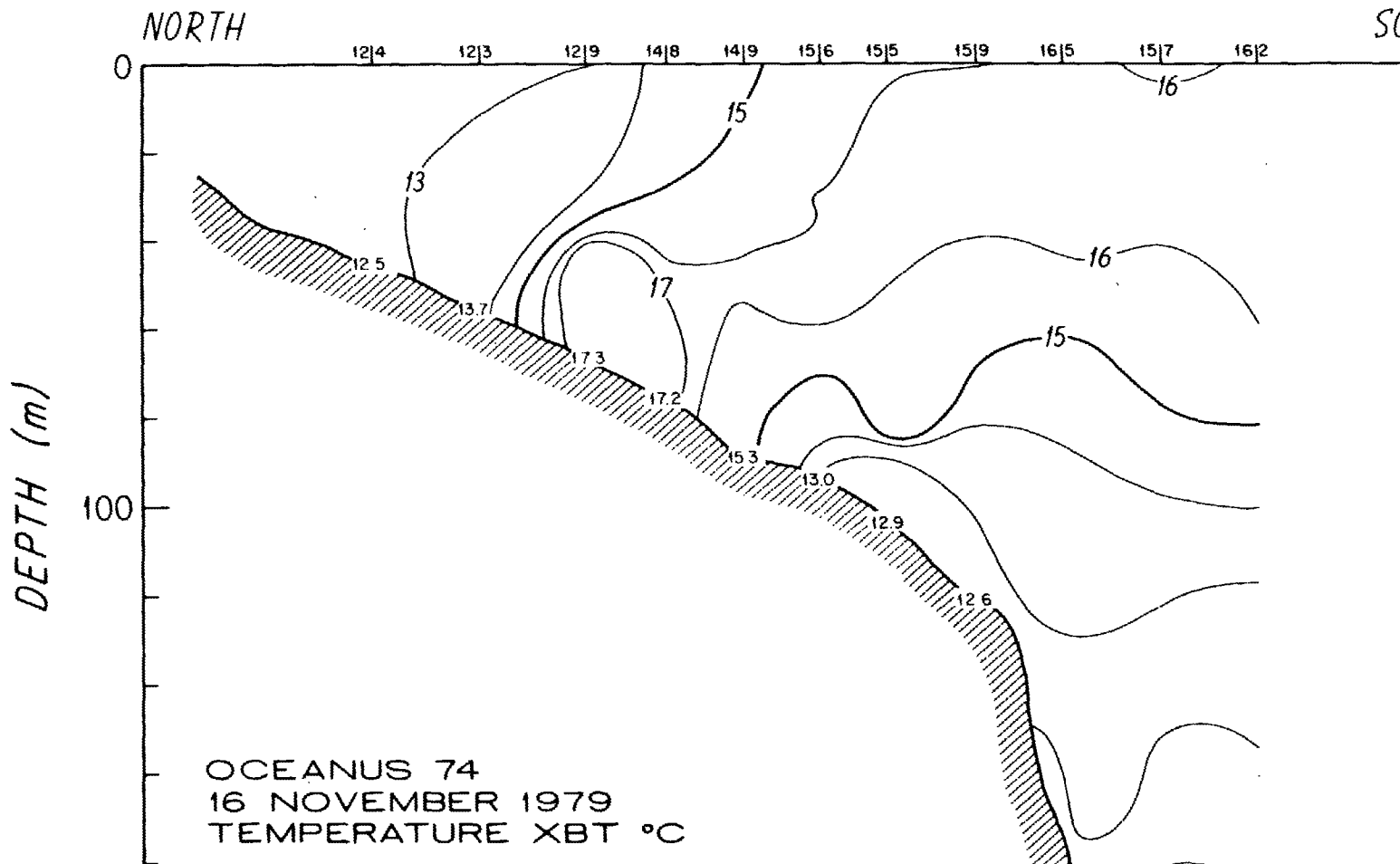

NORTH
SOUTH
32|737
32|679
33|071
33|063
33|306
35|049
35|312
0
100
200
DEPTH (m)
33
34
35
33.000
33.765
34.879
35.289
35.482
35.845
ANTON DOHRN 213
25 OCTOBER 1979
SALINITY CTD ‰
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

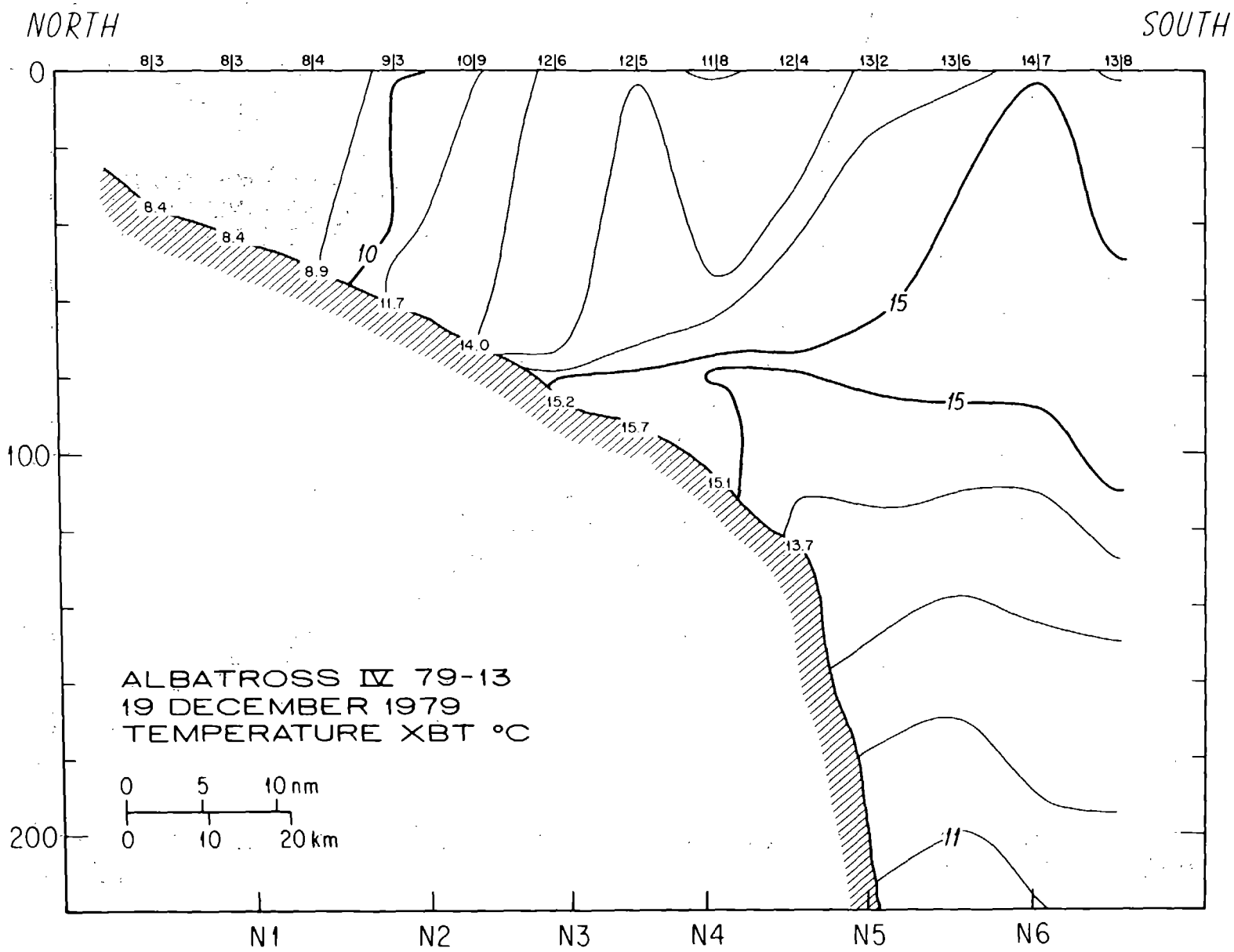

NORTH
SOUTH
24|519
24|527
24|557
24|578
25|042
25|234
25|314
0
100
200
DEPTH (m)
24.720
25
25
25.427
26
26.564
26.776
26.880
27
ANTON DOHRN 213
25 OCTOBER 1979
DENSITY σ_t
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

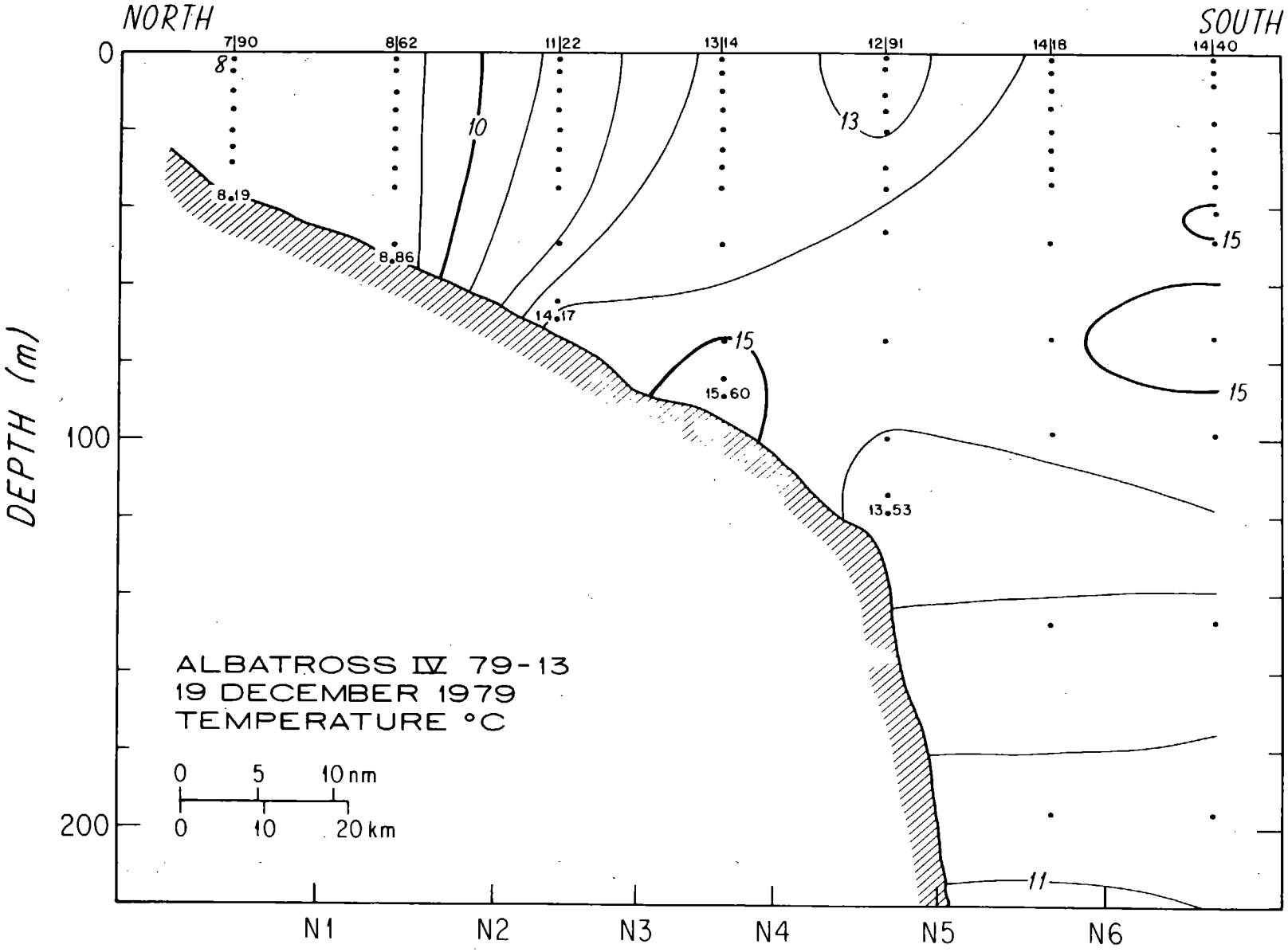

NORTH
SOUTH
DEPTH (m)
0
100
200
13|2
15|2
16|2
16|5
17|0
17|5
18|6
15
18
15
11
13.6
16.4
17.2
13.9
13.2
ANTON DOHRN 213
13 NOVEMBER 1979
TEMPERATURE CTD °C
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

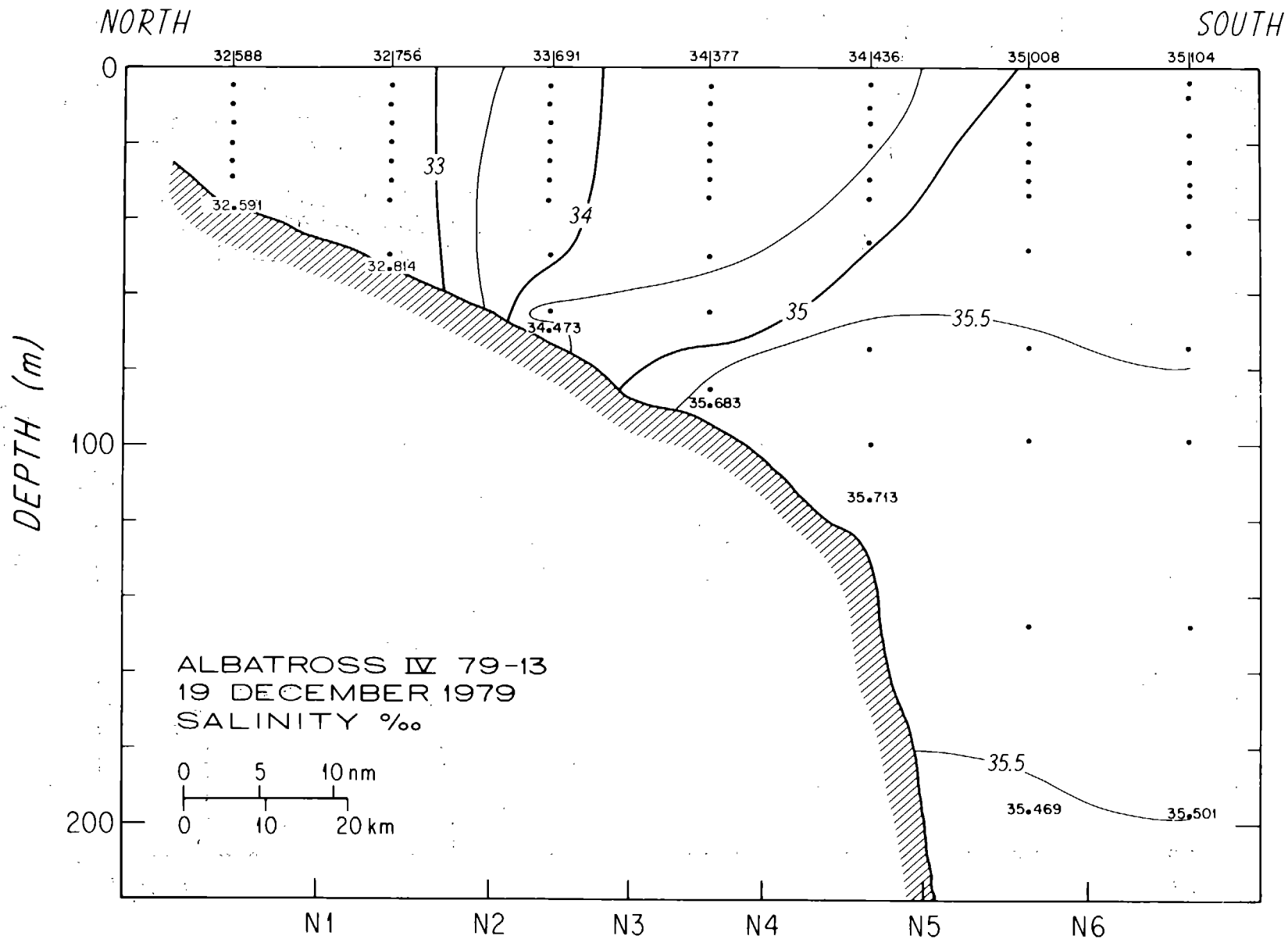

NORTH
32|966
33|917
34|293
34|663
34|911
35|092
0
100
DEPTH (m)
33
34
35
33 174
34 272
35 326
35 234
35 578
ANTON DOHRN 213
13 NOVEMBER 1979
SALINITY CTD ‰

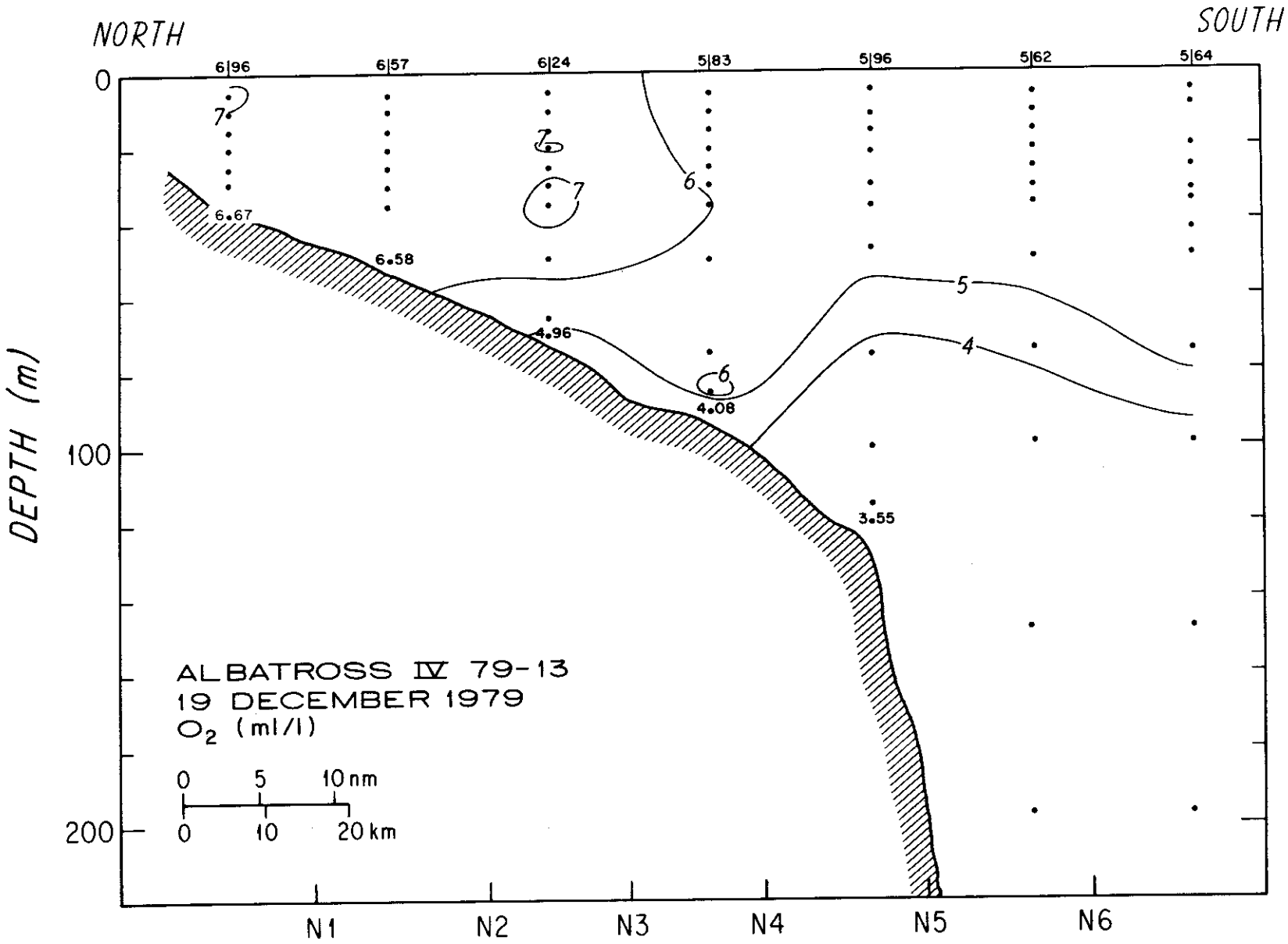

NORTH
S
24|810
25|115
25|180
25|398
25|464
25|487
0
100
DEPTH (m)
25.5
24.888
25.223
25.739
26.416
26.815
25.5
26
27
ANTON DOHRN 213

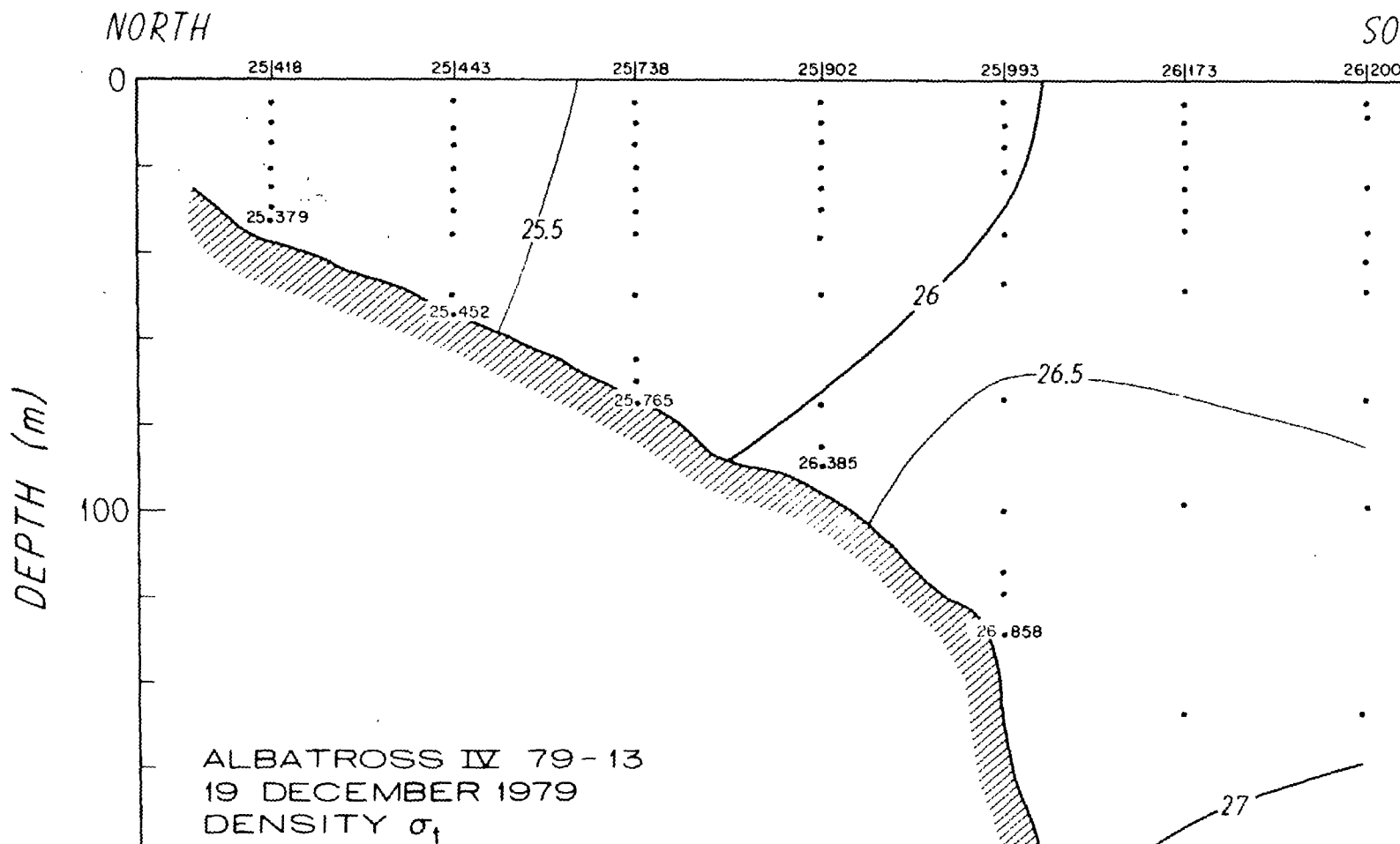

NORTH
SO
DEPTH (m)
0
100
12|4
12|3
12|9
14|8
14|9
15|6
15|5
15|9
16|5
15|7
16|2
13
15
16
17
12.5
13.7
17.3
17.2
15.3
13.0
12.9
12.6
OCEANUS 74
16 NOVEMBER 1979
TEMPERATURE XBT °C

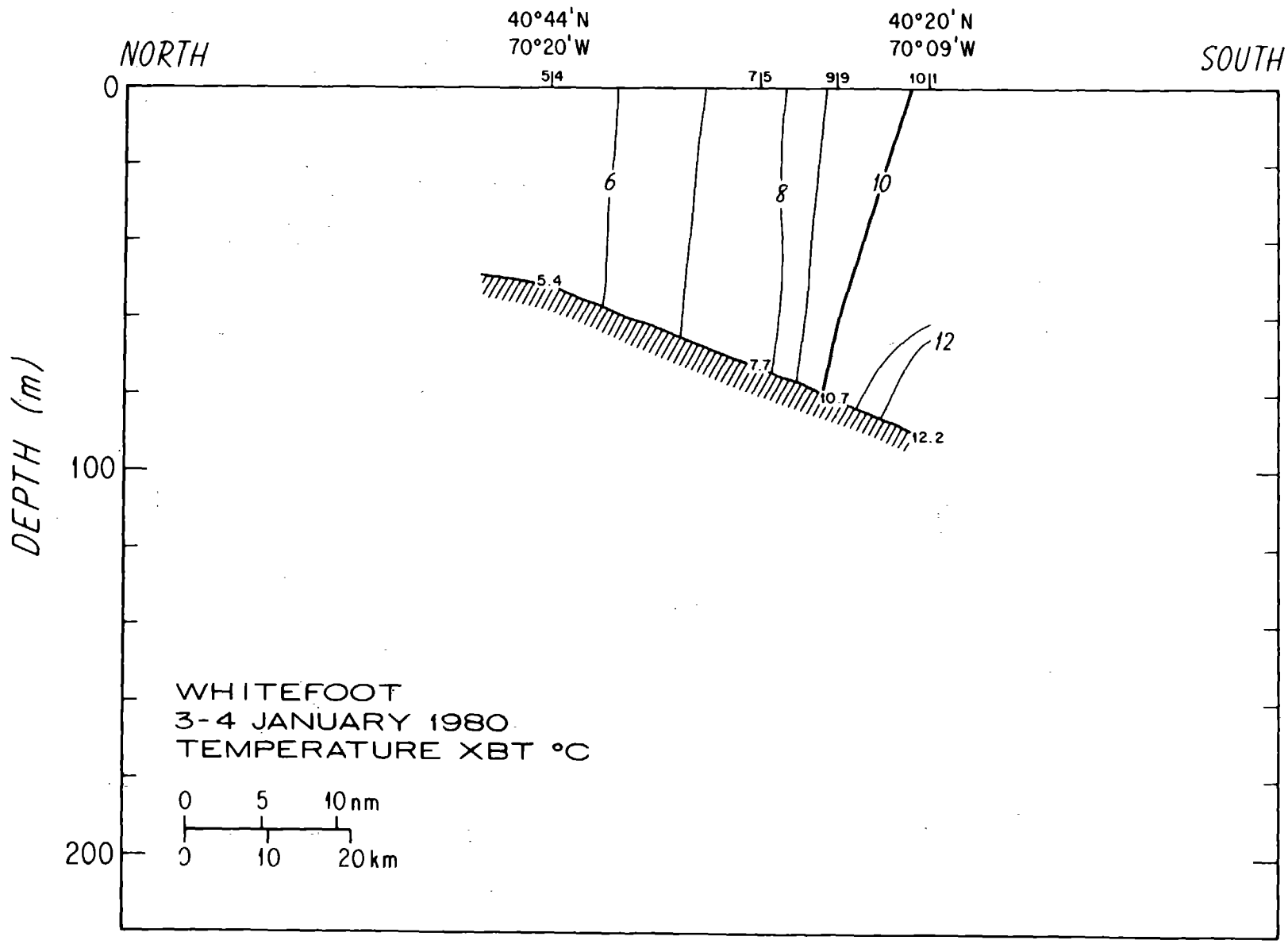

NORTH
SOUTH
8|3
8|3
8|4
9|3
10|9
12|6
12|5
11|8
12|4
13|2
13|6
14|7
13|8
0
100
200
8.4
8.4
8.9
11.7
14.0
15.2
15.7
15.1
13.7
10
15
15
11
ALBATROSS IV 79-13
19 DECEMBER 1979
TEMPERATURE XBT °C
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

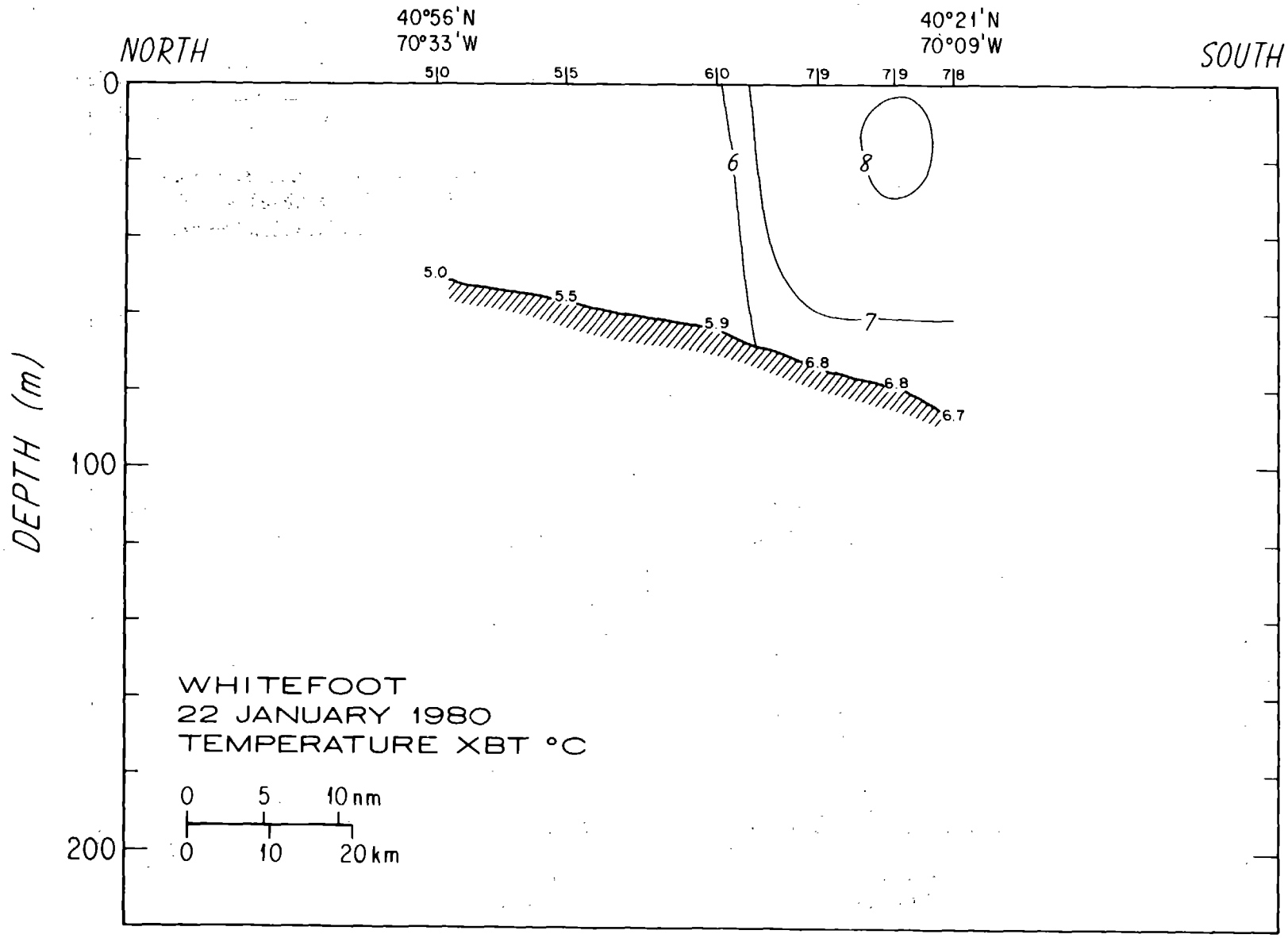

NORTH
SOUTH
7|90
8|62
11|22
13|14
12|91
14|18
14|40
DEPTH (m)
0
100
200
8
10
13
15
11
8.19
8.86
14.17
15.60
13.53
ALBATROSS IV 79-13
19 DECEMBER 1979
TEMPERATURE °C
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

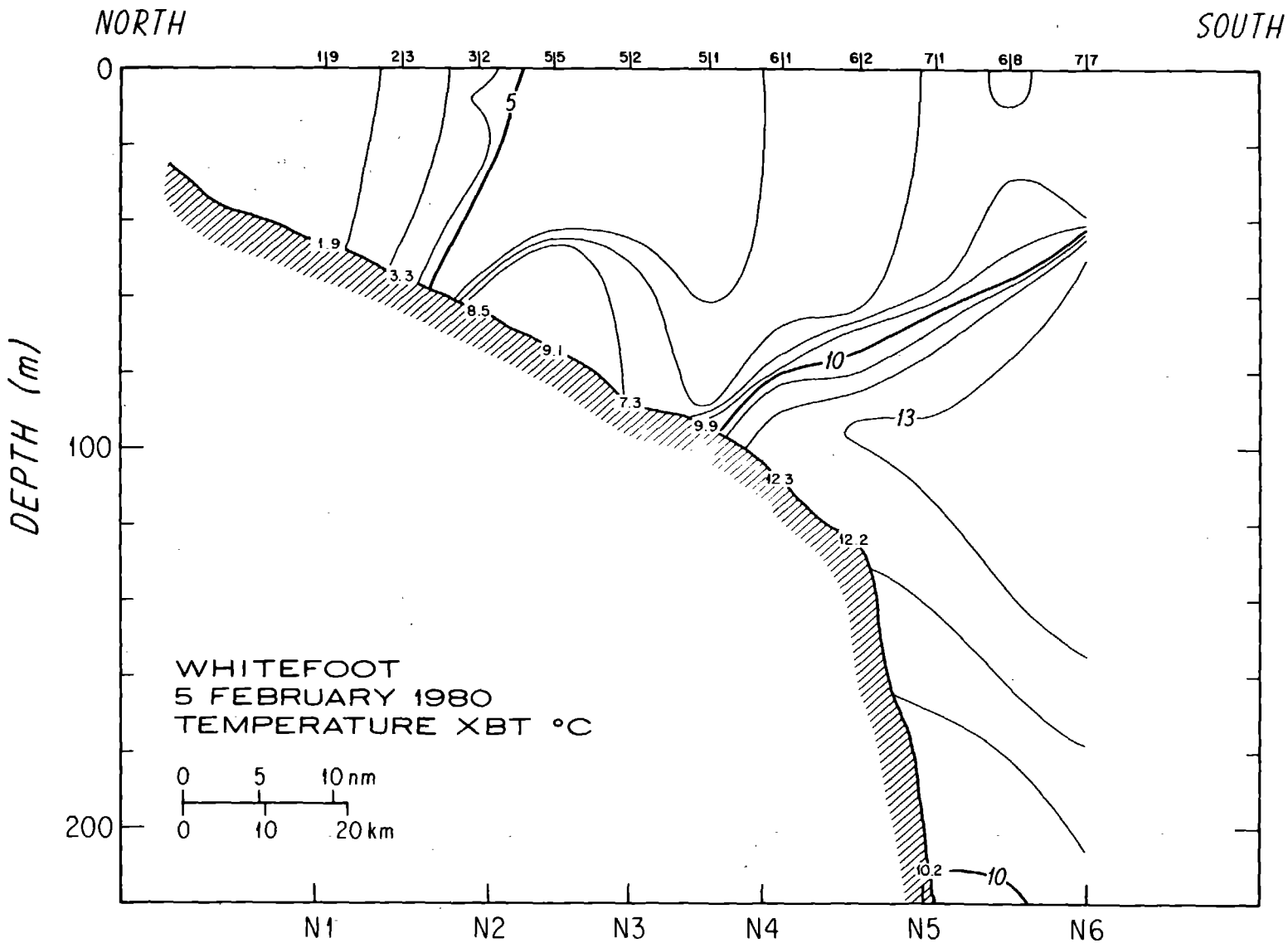

NORTH
SOUTH
32|588
32|756
33|691
34|377
34|436
35|008
35|104
DEPTH (m)
0
100
200
33
34
35
35.5
32.591
32.814
34.473
35.683
35.713
35.469
35.501
ALBATROSS IV 79-13
19 DECEMBER 1979
SALINITY ‰
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

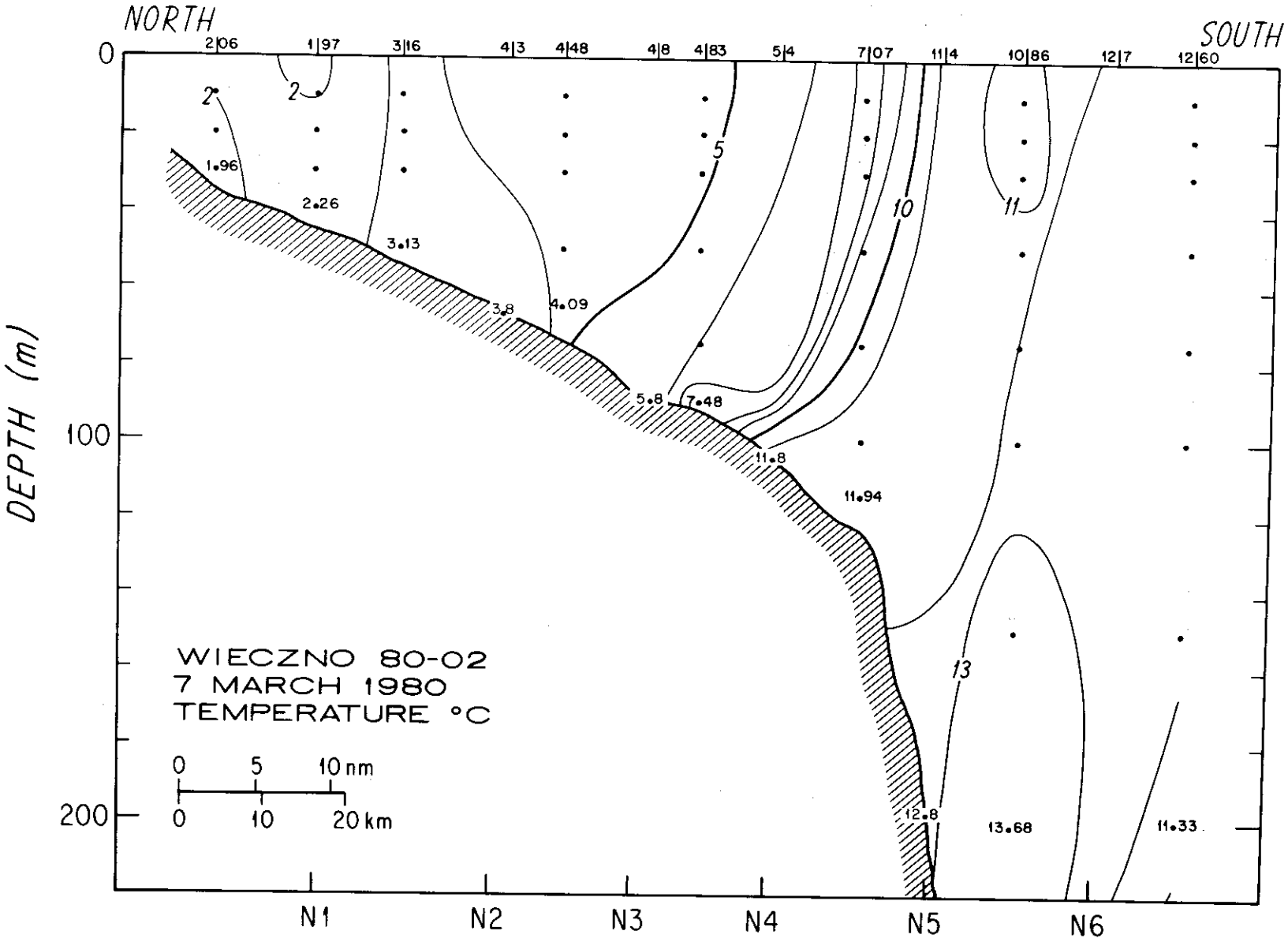

NORTH
SOUTH
DEPTH (m)
0
100
200
6|96
6|57
6|24
5|83
5|96
5|62
5|64
7
7
7
6
6.67
6.58
4.96
6
4.08
5
4
3.55
ALBATROSS IV 79-13
19 DECEMBER 1979
O2 (ml/l)
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

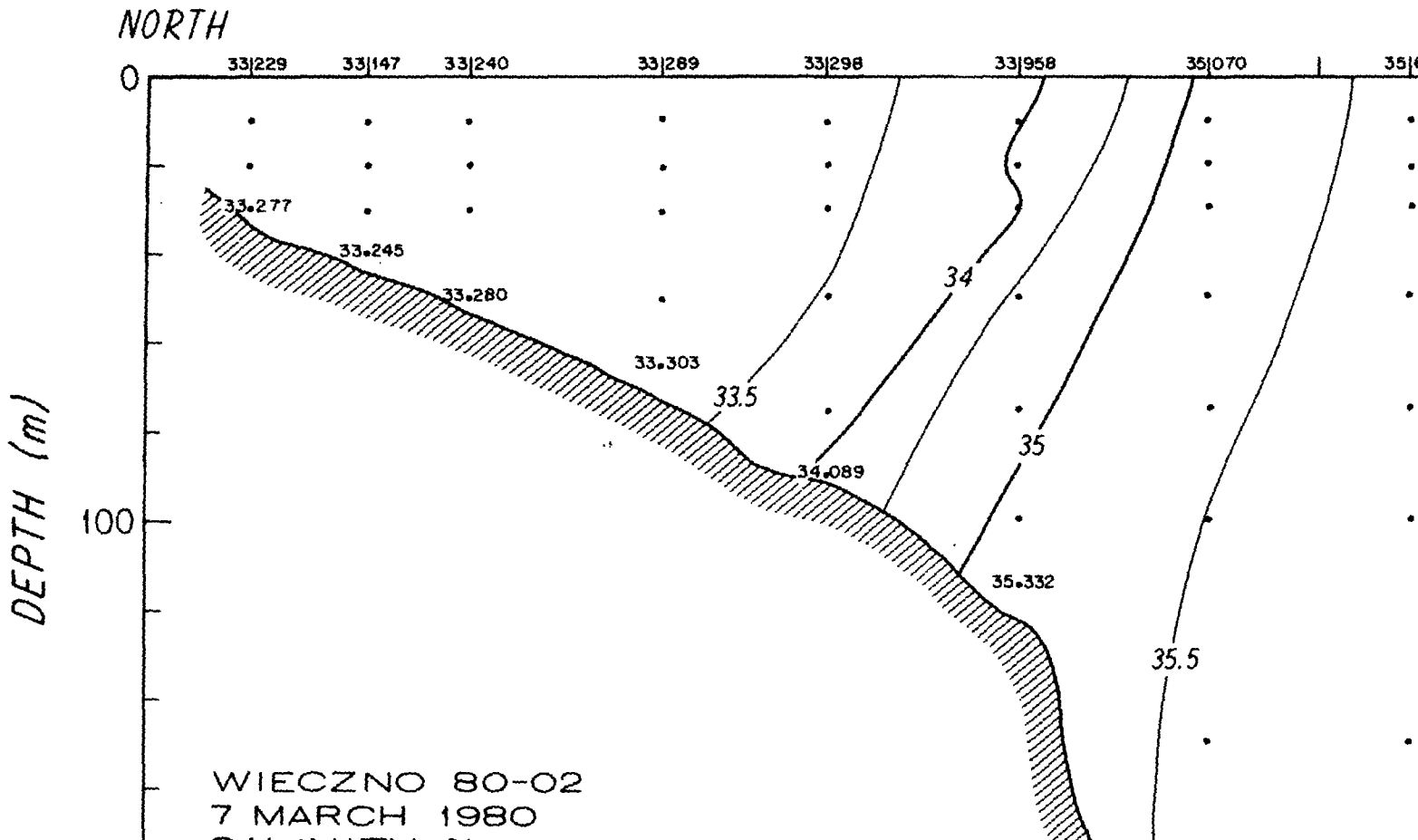

NORTH
SO
0
100
DEPTH (m)
25|418
25|443
25|738
25|902
25|993
26|173
26|200
25.379
25.452
25.765
26.385
26.858
25.5
26
26.5
27
ALBATROSS IV 79-13
19 DECEMBER 1979
DENSITY σ_t

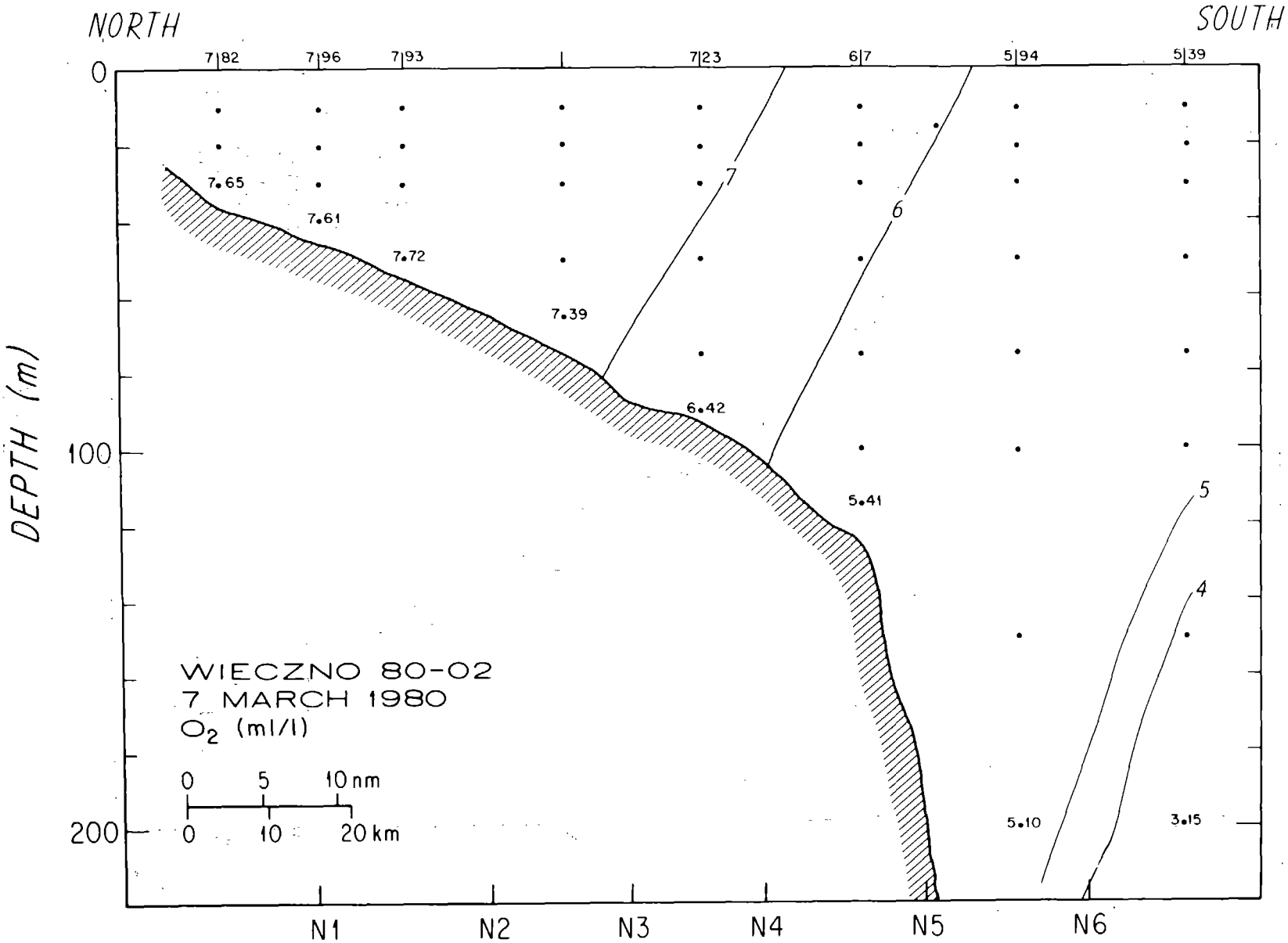

40°44'N
70°20'W
40°20'N
70°09'W
NORTH
SOUTH
5|4
7|5
9|9
10|1
6
8
10
12
5.4
7.7
10.7
12.2
DEPTH (m)
0
100
200
WHITEFOOT
3-4 JANUARY 1980
TEMPERATURE XBT °C
0 5 10 nm
0 10 20 km

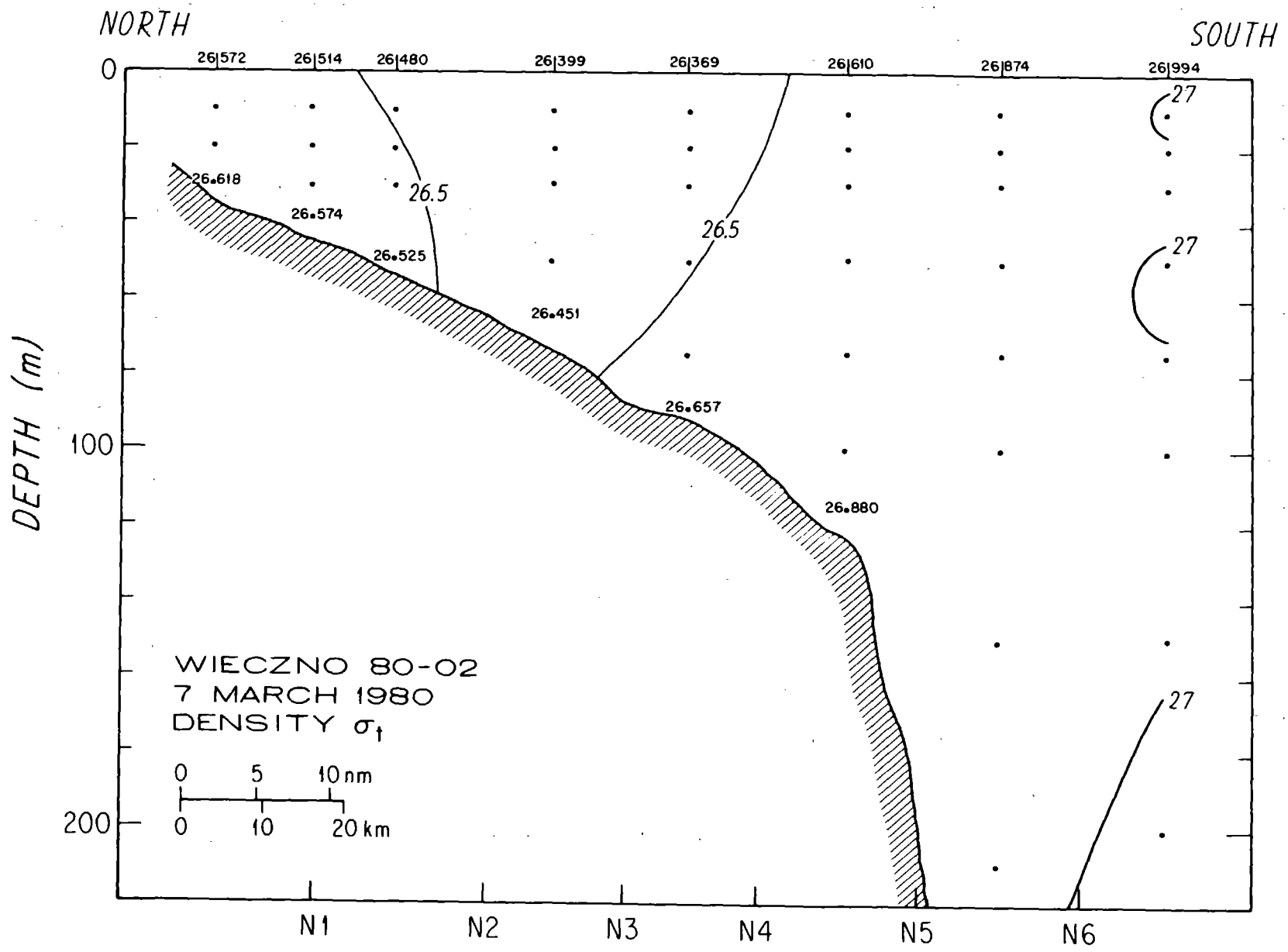

NORTH
SOUTH
40°56'N
70°33'W
40°21'N
70°09'W
5.0
5.5
6.0
7.9
7.9
7.8
DEPTH (m)
0
100
200
6
8
7
5.0
5.5
5.9
6.8
6.8
6.7
WHITEFOOT
22 JANUARY 1980
TEMPERATURE XBT °C
0 5 10 nm
0 10 20 km

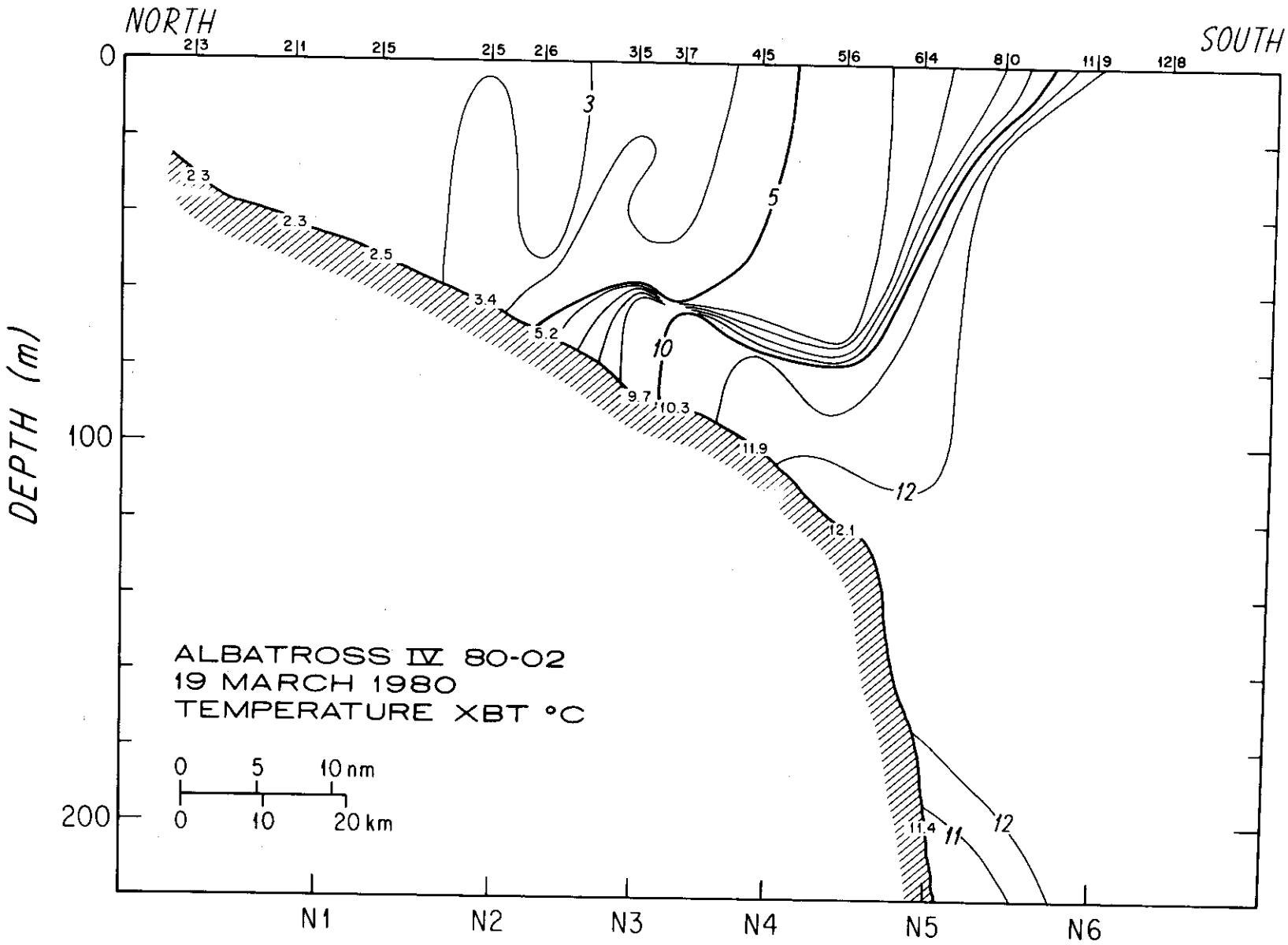

NORTH
SOUTH
1|9
2|3
3|2
5|5
5|2
5|1
6|1
6|2
7|1
6|8
7|7
0
100
200
DEPTH (m)
5
1.9
3.3
8.5
9.1
7.3
9.9
12.3
12.2
10.2
10
13
WHITEFOOT
5 FEBRUARY 1980
TEMPERATURE XBT °C
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

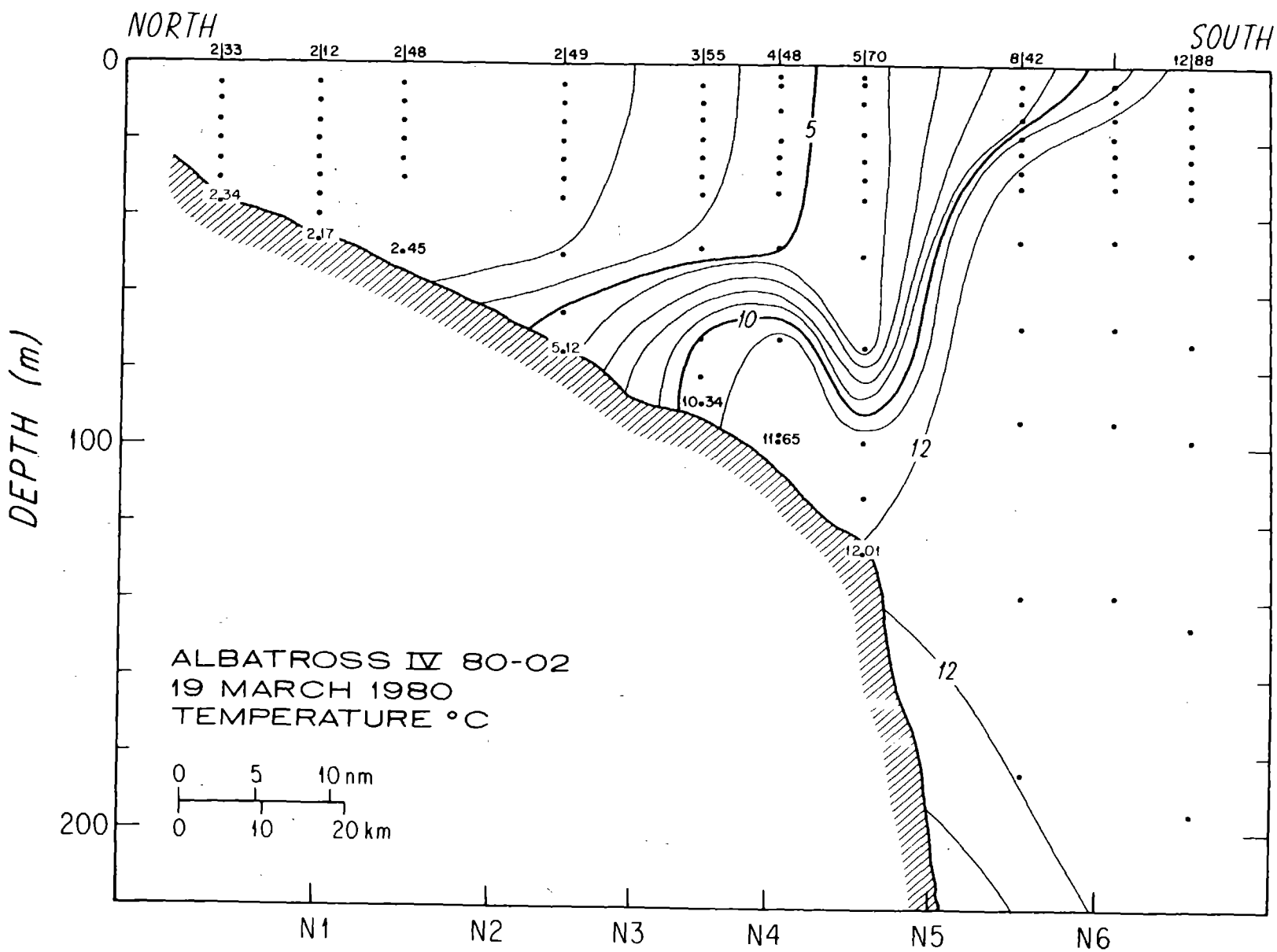

NORTH
SOUTH
2|06
1|97
3|16
4|3
4|48
4|8
4|83
5|4
7|07
11|4
10|86
12|7
12|60
DEPTH (m)
0
100
200
2
2
1.96
2.26
3.13
3.8
4.09
5
5.8
7.48
10
11
11.8
11.94
13
12.8
13.68
11.33
WIECZNO 80-02
7 MARCH 1980
TEMPERATURE °C
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

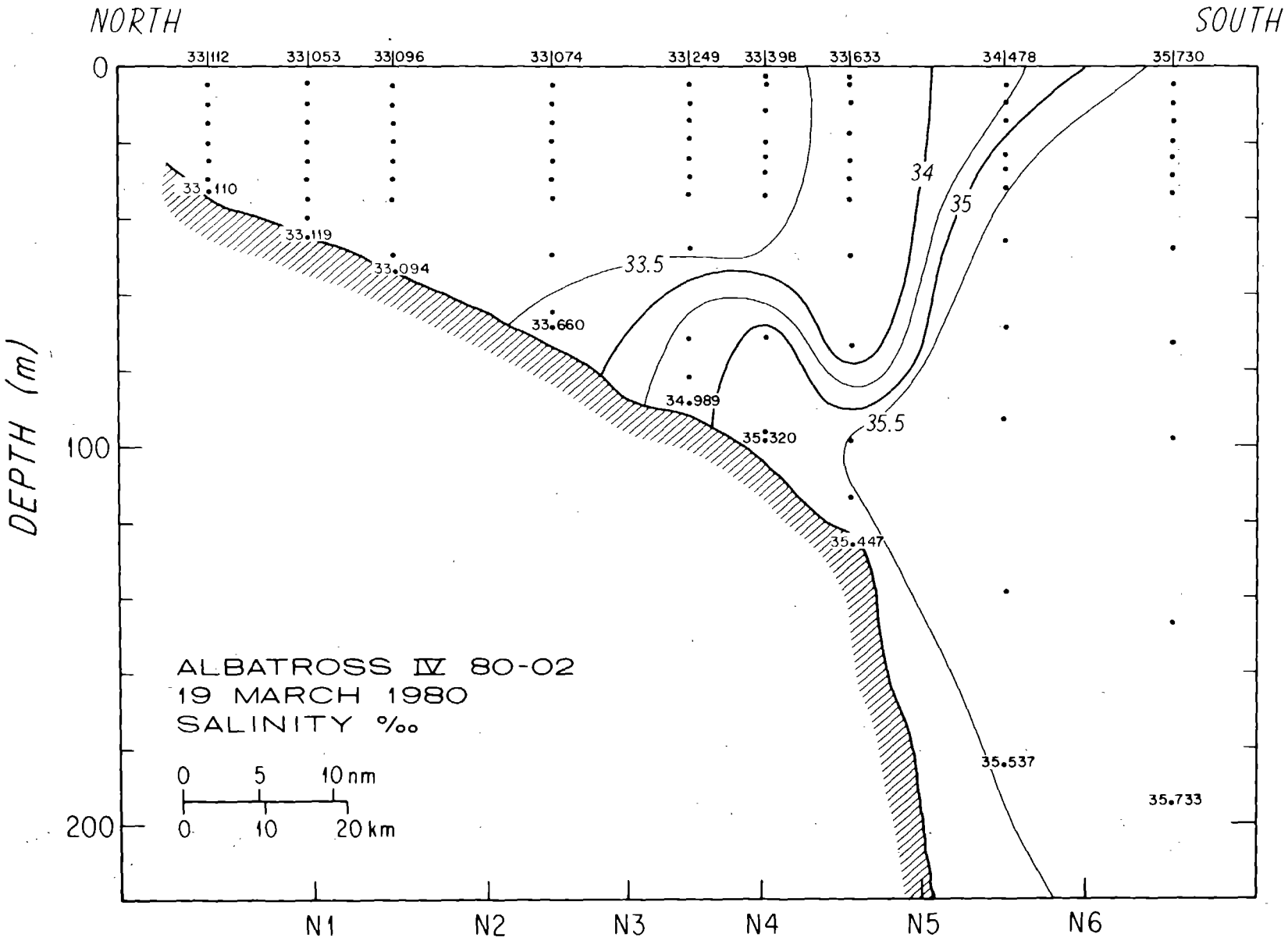

NORTH
33|229
33|147
33|240
33|289
33|298
33|958
35|070
0
100
DEPTH (m)
33.277
33.245
33.280
33.303
33.5
34
34.089
35
35.332
35.5
WIECZNO 80-02
7 MARCH 1980

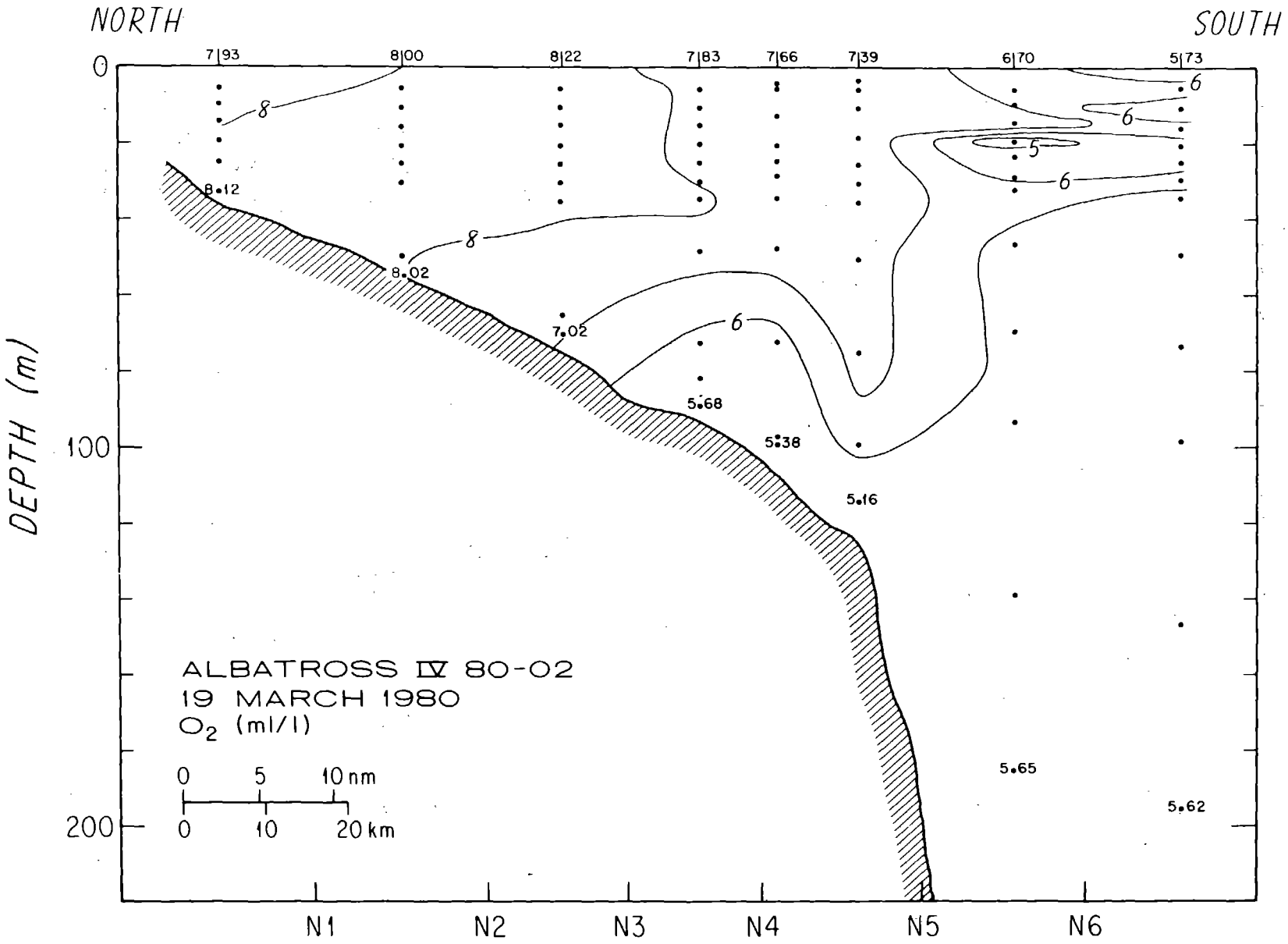

NORTH
SOUTH
7|82
7|96
7|93
7|23
6|7
5|94
5|39
0
100
200
DEPTH (m)
7.65
7.61
7.72
7.39
6.42
5.41
5.10
3.15
7
6
5
4
WIECZNO 80-02
7 MARCH 1980
O2 (ml/l)
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

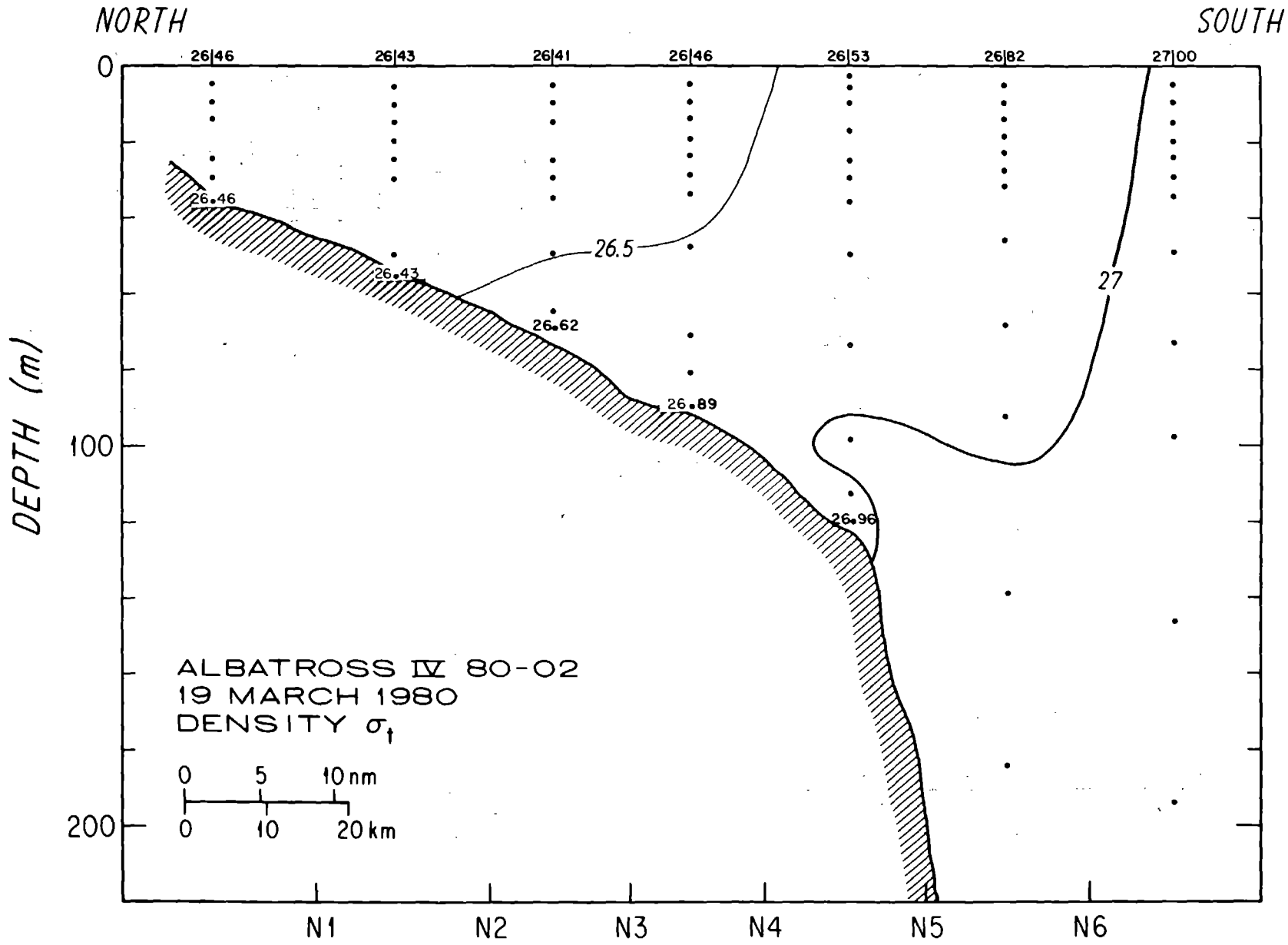

NORTH
SOUTH
26|572
26|514
26|480
26|399
26|369
26|610
26|874
26|994
0
100
200
DEPTH (m)
26.618
26.574
26.525
26.451
26.657
26.880
26.5
26.5
27
27
27
WIECZNO 80-02
7 MARCH 1980
DENSITY σ_t
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

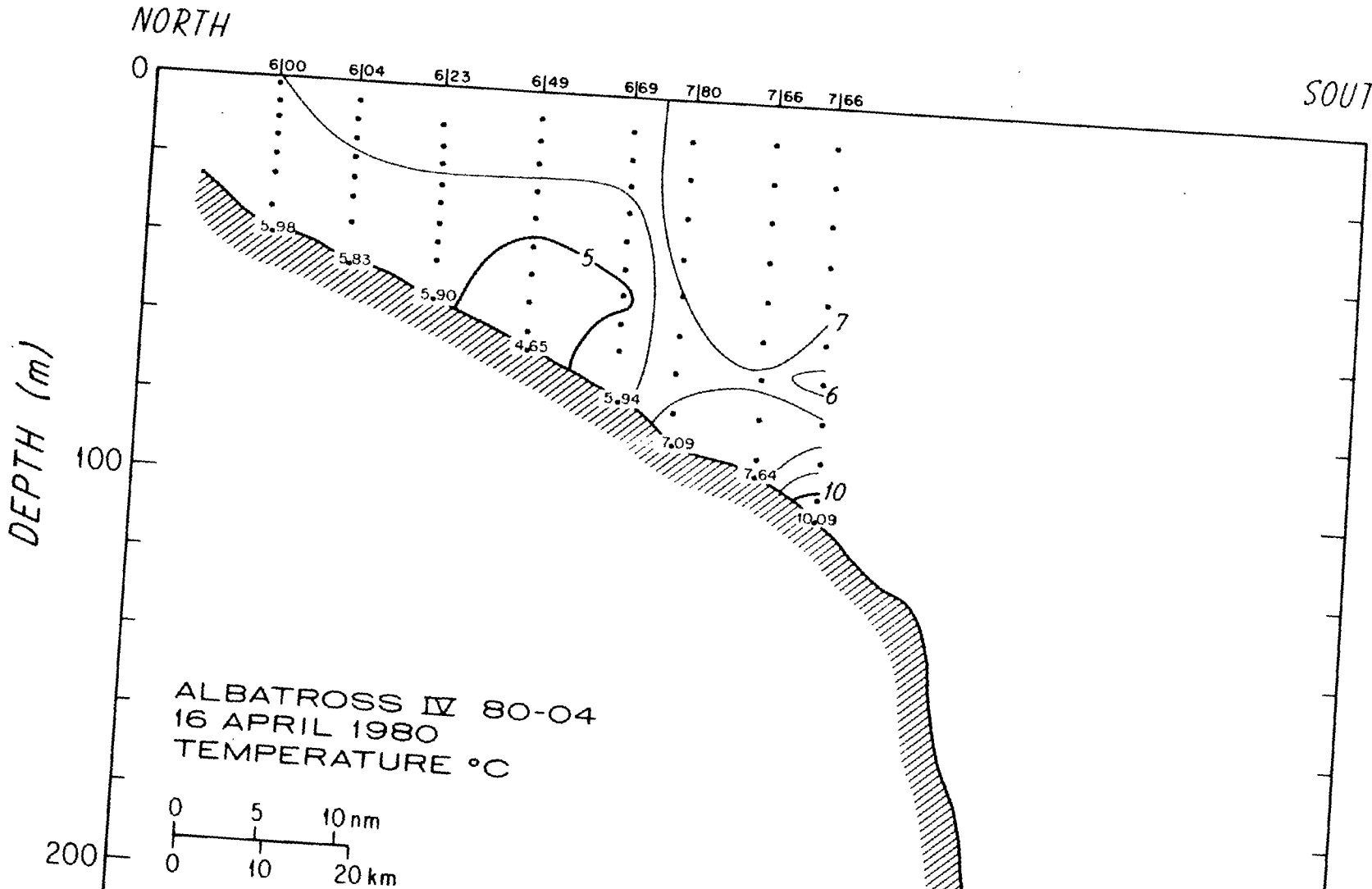

NORTH
SOUTH
DEPTH (m)
0
100
200
2|3
2|1
2|5
2|5
2|6
3|5
3|7
4|5
5|6
6|4
8|0
11|9
12|8
3
5
10
12
11
2.3
2.3
2.5
3.4
5.2
9.7
10.3
11.9
12.1
11.4
ALBATROSS IV 80-02
19 MARCH 1980
TEMPERATURE XBT °C
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

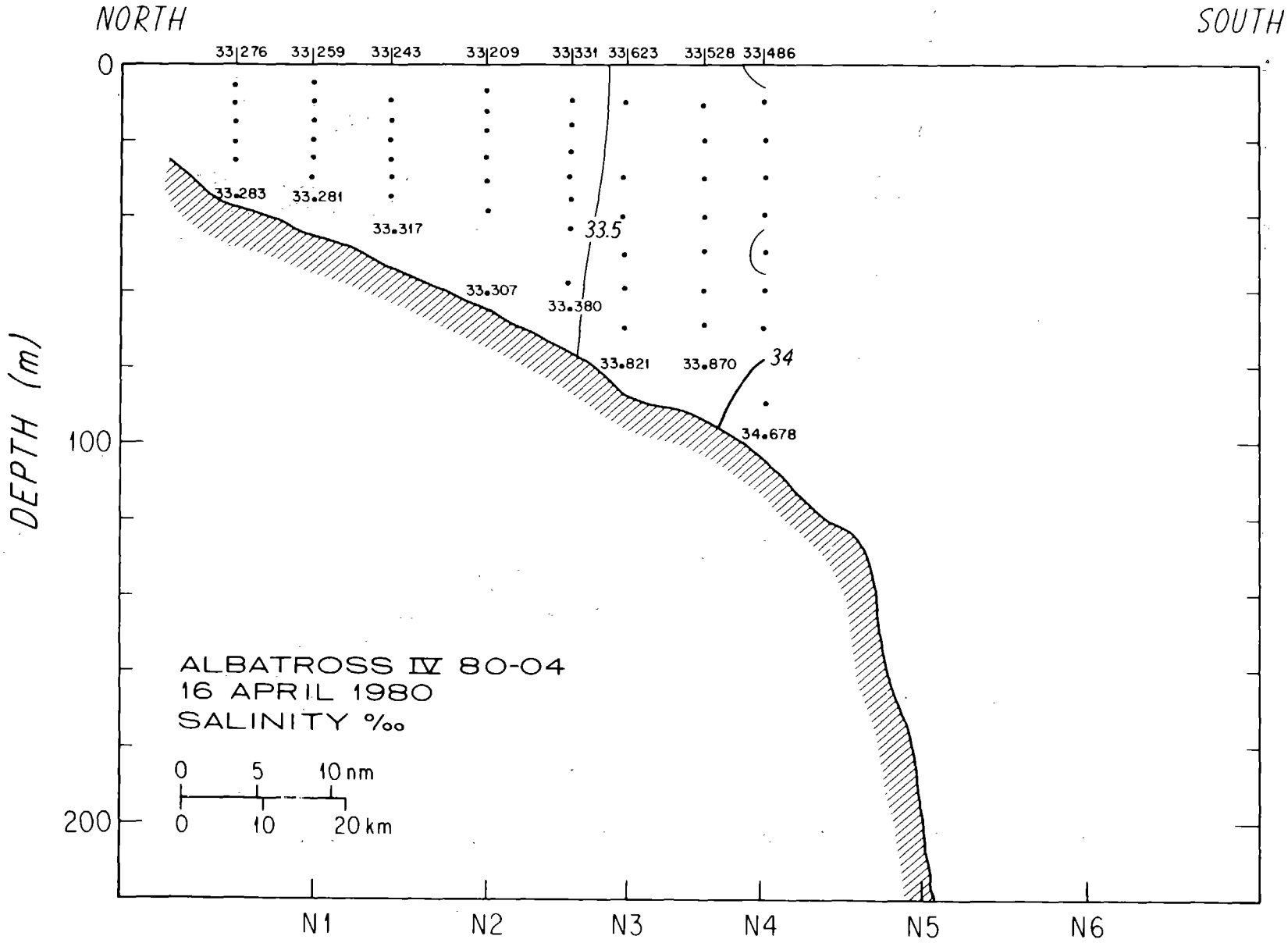

NORTH
SOUTH
2|33
2|12
2|48
2|49
3|55
4|48
5|70
8|42
12|88
0
100
200
DEPTH (m)
2.34
2.17
2.45
5.12
10.34
11.65
12.01
5
10
12
12
ALBATROSS IV 80-02
19 MARCH 1980
TEMPERATURE °C
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6

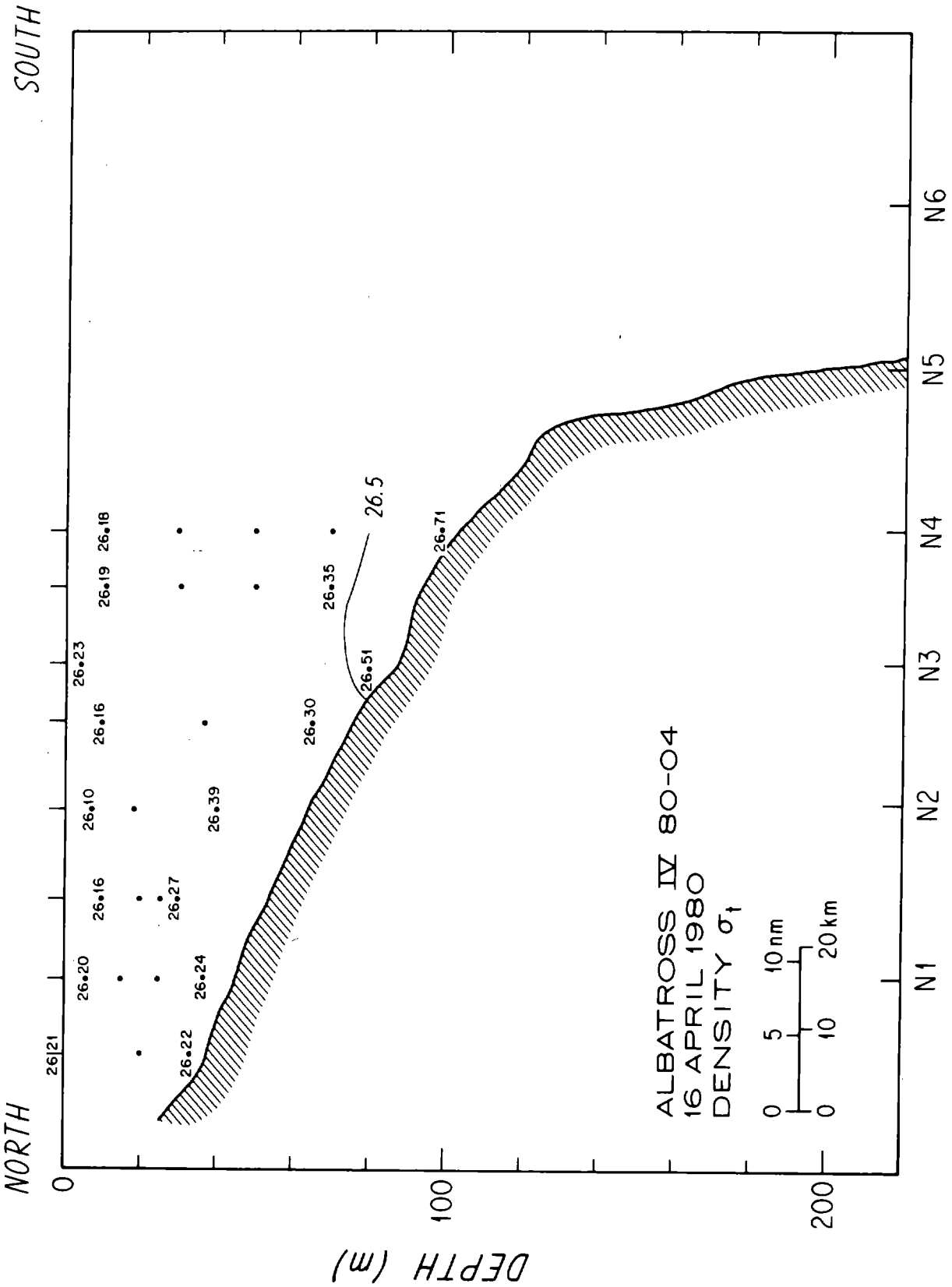

NORTH
SOUTH
33|112
33|053
33|096
33|074
33|249
33|398
33|633
34|478
35|730
0
100
200
DEPTH (m)
33.110
33.119
33.094
33.660
34.989
35.320
35.447
35.537
35.733
33.5
34
35
35.5
ALBATROSS IV 80-02
19 MARCH 1980
SALINITY ‰
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6


NORTH
SOUTH
7|93
8|00
8|22
7|83
7|66
7|39
6|70
5|73
DEPTH (m)
0
100
200
8
8
6
6
6
5
8.12
8.02
7.02
5.68
5.38
5.16
5.65
5.62
ALBATROSS IV 80-02
19 MARCH 1980
O_2 (ml/l)
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6


NORTH
SOUTH
26|46
26|43
26|41
26|46
26|53
26|82
27|00
0
100
200
DEPTH (m)
26.46
26.43
26.62
26.89
26.96
26.5
27
ALBATROSS IV 80-02
19 MARCH 1980
DENSITY σ_t
0 5 10 nm
0 10 20 km
N1
N2
N3
N4
N5
N6


NORTH
SOUT
DEPTH (m)
0
100
200
6|00
6|04
6|23
6|49
6|69
7|80
7|66
7|66
5.98
5.83
5.90
4.65
5.94
7.09
7.64
10.09
5
7
6
10
ALBATROSS IV 80-04
16 APRIL 1980
TEMPERATURE °C
0 5 10 nm
0 10 20 km


NORTH
SOUTH
33|276
33|259
33|243
33|209
33|331
33|623
33|528
33|486
33.283
33.281
33.317
33.307
33.380
33.821
33.870
34.678
33.5
34
DEPTH (m)
0
100
200
N1
N2
N3
N4
N5
N6
ALBATROSS IV 80-04
16 APRIL 1980
SALINITY ‰
0 5 10 nm
0 10 20 km



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