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MARINE ENVIRONMENTAL DATA SERVICE REPORT FOR 1980-1981

by

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Introduction

Already this year, almost as much data from the NAFO area has been received as was last year. The number of oceanographic stations identified as occupied in 1980 is up over last year as well. In addition, a substantial number of station data prior to 1979 have also been received. Many of these data are still being processed.

A new cruise information management system is currently under development at MEDS. Information about cruises made available to MEDS on ROSCOP forms, cruise reports, NAFO documents, etc., will all be stored under this system. As well, there are plans to review all NAFO and ICNAF documents to identify data collections which MEDS does not have. In the end, it should permit a better assessment of the amount of data collected by NAFO members and which are contained in MEDS files.

A brief environmental summary is presented for each standard section occupied in 1980 and for which the data are processed. These are mainly from cruises conducted by the U.S.S.R.

1980 Data Not Yet Received by MEDS

Table 1 lists general information about data collections which took place in the NAFO area in 1980 but from which no data have yet been received by MEDS. The information has been obtained from the variety of sources listed as

references. Those referenced by "CAMDI" were obtained from searching MEDS new cruise information management system. The system is explained later in discussions about historical data acquisition.

There are more than 6,000 stations listed in Table 1. Blanks indicate information is missing, and an "X" indicates that the number of stations occupied was not specified in the reference. National representatives are urged to ensure these data reach MEDS.

1980 Data Received and Processed

Table 2 lists the cruises in the NAFO area in 1980 for which MEDS has received the data. Most of the cruises are Canadian, although some of these represent Canadian scientists aboard foreign vessels. The only other nation represented is the U.S.S.R. In total, there were 3,807 hydro casts and 2,430 BT casts received. Many of these cruises have not been fully processed yet. Those which are not processed are marked by an asterisk beside the track chart number and no track chart is shown. The cruise tracks of the processed data are contained in Appendix A.

If it is assumed that Tables 1 and 2 identify all of the data collected in 1980, then MEDS already has 46% of the hydro stations and 62% of the BT data. These are not disappointing figures, since MEDS often receives data up to a year after it was collected. The cruises listed in Tables 1 and 2 identify about 18% more stations occupied in 1980 compared to 1979.

Historical Data Acquisition

MEDS is currently revising its techniques to identify data collected in the Canadian area of interest. A new computer system called CAMDI (Canadian Marine Data Inventory) has been devised in which any available information will be held about past or planned oceanographic data acquisitions. The file will contain none of the observations, but rather information such as dates, ship name, types of observations, etc. Details about all types of oceanographic observations, whether physical, chemical, biological, geological, etc., will be stored. At the moment, the pilot study is underway, but already some information is available. It is planned that during 1981, MEDS will review all NAFO and ICNAF documents to identify data collections by member nations. With this completed, it will be possible to

assess more accurately the amount of data collected by NAFO members, and of that, the amount which is in MEDS possession.

A review was made of the cruises identified in last year's report as having taken place but for which no data had reached MEDS. Since last year, all of the Danish cruises, comprising about 60 stations, have reached MEDS. In addition, we have received some data from a Walter Barth cruise in November and December of 1979. Of the approximately 3,000 stations identified as outstanding from MEDS, only about 150 have been received.

In the past year, MEDS has received data from about 80 cruises which took place prior to 1979. The cruises are from Cuba, Denmark, the Federal Republic of Germany, Poland, the U.S.A., the U.S.S.R., and Canada. In total, there were about 3,000 stations received, half being data collected by the U.S.S.R.

IGOSS Messages

MEDS received a total of 1,251 BATHY and TESAC messages from 72 ships during 1980. For many of these, there are fewer than a dozen messages. The four ships reporting the most messages were the KONONOV and PORYV of the U.S.S.R. and the ALBATROSS IV and NORTHWIND of the U.S.A. At present, many of the messages in MEDS files are identified only by the four-character call sign. For this reason, a complete list has not been compiled detailing the number of messages received from each ship. Steps are now being taken to correct this deficiency.

There are still difficulties with IGOSS messages not reaching MEDS. At least one problem has been identified for messages sent by the French ship CRYOS. The Marine Radio Communications Officer in Halifax has taken steps to ensure that shore radio operators are informed about how to handle these messages. However, without knowledge of the numbers of messages sent independently of the messages received, it is difficult to identify and so correct problems. MEDS would like to encourage scientists on board all ships which transmit IGOSS messages to notify the MEDS representative, directly or through the NAFO Secretariat, of the ship, the number of messages, and the approximate area and time. Such reports would be of great value in improving the message-handling procedures.

MEDS has again produced a report showing ship tracks and the messages received in 1980 from the area of the Flemish Cap. The publication is available upon request from MEDS (Keeley, 1981).

Review of Environmental Conditions in 1980

Data from 9 sections were available for presentation in this report and are listed in Table 3. Most of these were the results of observations by the U.S.S.R., and hence the report given here will serve to supplement that given already by Burmakin (1981).

The procedures used to contour the data have been modified from those of last year. The computer program to contour the data is basically the same, but the tendency for looping contours between stations has been removed. As well, the depth at which a sample was taken is indicated by an "X".

(a) Subarea 1

No sections from this area were available when this report was being prepared.

(b) Subarea 2

No sections from this area were available when this report was being prepared.

(c) Subarea 3

(i) White Bay: Observations were taken along this section at almost the same time as last year. Comparing the contoured results to those presented in MEDS report of 1979-1980, there appears to be more colder water on the shelf this year. Surface salinities are lower, and the salinity front at the surface just east of the shelf break appears to be a little sharper this year. The sigma-t contours are more inclined this year over the shelf, implying a stronger current.

(ii) Bonavista: This section was sampled again at about the same time as last year. Cooler water temperatures are evident in the inshore branch of the Labrador Current. However, the volume of water enclosed by the 0° contour appears to be about the same as last year. The surface salinities appear to be slightly fresher than last year, and surface temperatures are slightly cooler. The pattern of sigma-t contours would appear to be basically the same as last year.

(iii) SW Triangle: Again, sampling was done the same time as last year. As seen in the other sections, there are cooler temperatures in the Labrador Current, and surface salinities are slightly fresher than last year.

(iv) SE Triangle: Colder water is also seen here in the core of the Labrador Current. Surface salinities are slightly fresher than last year. The pattern of sigma-t contours appears to be basically the same.

(v) U.S.S.R. 7-A: The sampling times between the sections run this year and last differ by about 3 weeks. As expected, because of surface heating, the upper waters are warmer than last year. Again, the Labrador Current water is colder. Surface salinities east of the shelf break appear to be fresher. The sigma-t contours again imply a strong current in about 200 m of water.

(vi) Flemish Cap: This year, there were 5 occasions when at least portions of the Flemish Cap section were sampled. The contoured data from each of these times may be compared to average conditions recently computed by Keeley (1981).

The temperature data from January show slightly warmer conditions than the mean, but the surface front is about in the same position. The salinity contours are very similar to the mean, but the contours of sigma-t imply a stronger Labrador Current on the eastern edge of the Grand Banks.

The observations in March show similar conditions to the mean, but bottom salinities on the Flemish Cap are fresher.

In early May, the salinities over the Flemish Cap are slightly fresher than the mean. Both the temperature and sigma-t contours are about the same as the mean conditions. In last May, the temperatures over the outer Grand Banks are cooler than usual, while those at the surface over the western part of the section seem to be a little warmer than the mean. The bottom water is slightly fresher than the mean.

The section sampled in June shows cooler water extending off the Grand Banks east to the Flemish Cap at about 100 m depth. The water over the Flemish Cap seems to be slightly fresher than the mean. The sigma-t contours east of the Flemish Cap imply a weaker current than is seen for the mean conditions.

(vii) U.S.S.R. 4-A: There are no available comparisons to be made for the data presented here.

(viii) U.S.C.G. - 3: This section was done about 3 weeks later this year than last. The temperature front is in the same place; but, as expected by the later date, the surface waters are slightly warmer this year. Offshore of the shelf break, there is much colder water at about 50 m depth. The sigma-t contours seem to show about the same pattern as last year.

(ix) Banquereau: There are no other data to which this can be compared.

In general, the analyses here support the conclusions of Burmakin. Colder water is in evidence in the Labrador Current, and conditions appear to resemble the mean calculated by Keeley.

Summary

The number of oceanographic stations identified by MEDS as occupied in 1980 is 18% more than last year. MEDS has received only about one-half of these, but it is hoped that more will be forthcoming in the next few months. Member nations of NAFO are encouraged to submit these and any data they collect to MEDS as soon as possible. MEDS is prepared to accept computer tapes, copies of deck sheets, or any other medium from which the data can be extracted.

A significant number of historical data was received this year to supplement the present data holdings. It is hoped that with the CAMDI system in operation a proper review of MEDS data holdings in the NAFO area can be made. MEDS would be pleased to receive copies of cruise reports from the national representatives of nations making oceanographic measurements in the NAFO area.

References

1. Burmakin, V.V. "Water Temperature in the Labrador and Newfoundland Areas in 1980." NAFO SCR Doc. 81/VI/19. 7 pages.

2. Keeley, J.R. "Mean Conditions of Potential Temperature and Salinity Along the Flemish Cap Section." MEDS Technical Report No. 9. 1981. 148 pages.

3. Keeley, J.R. "Oceanographic Data Transmitted from the Flemish Cap Area September 1979 to December 1980." MEDS Data Record No. 2. 1981. (MEDS8100501CE)

Table 1: Data collections reported from the NAFO area in 1980 and not yet at MEDS.

Country	Ship	Date (1980)	Subarea	Number of Stations				Reference
				Bottle	BT	CTD	Unspecified	
Canada	Lacuna	5 December, 1979 - 15 January	$4V_s$, W, X, 5Y, Z_e				X	CAMDI (C80346I01)
	Hudson (02)	2 - 10 January	3L, M			13		CAMDI (C81041I01)
	Gadus (35)	2 - 14 April	3K, L, M, N, O			91		Personal Communication
	Gadus (37)	18 - 30 May	3K, L, M, N, O			91		Personal Communication
	Zagreb (04)	19 July - 10 August	3K, L, M, N, O			96		Personal Communication
	Misty Sea (01)	29 September - 12 October	4T	51				CAMDI (C81042I02)
France	Cryos	10 January - 26 February	2J, 3K, L, P_m, P_s, 4R		113			ROSCOP
	Cryos	3 - 12 March	$3P_s$		40			ROSCOP
	La Perle	19 August - 4 October	4V, W, X		75			ROSCOP
	Cryos	25 September - 11 November	$3P_s$		113			ROSCOP
F. R. Germany	A. Dohrn (99)	26 April - 21 May	1C, D, E, F				X	NAFO Cir. Let. 80/56
	W. Herwig (40)	9 June - 24 July	1B, F	X				NAFO Circ. Let. 80/56
	Karlsburg	28 August - 27 October	1C, D, E, F	X				NAFO Circ. Let. 80/56
	W. Herwig (42)	29 September - 31 October	1F				X	NAFO Circ. Let. 80/56
	A. Dohrn (104)	20 October - 20 December	1B, F, 2J, 3K	X				NAFO Circ. Let. 80/56
Poland	Wieczno (02)	20 January - 30 April	5Y, Z_e, 6A, B, C				47	NAFO Ser. 80/IX/146

Table 1 (Continued)

Country	Ship	Date (1980)	Subarea	Number of Stations				Reference
				Bottle	BT	CTD	Unspecified	
U.S.A.	Albatross IV (02)	28 February - 4 April	5Y, Z_e, 6A, B, C				72	NAFO Ser. 80/IX/146
	Delaware II (03)	21 May - 30 June	5Y, Z_e, 6A, B, C	1,472	52		149	Cruise Report
	Albatross IV (10)	24 September - 30 October	4W, X, 5Y, Z_e, 6A, B, C				175	CAMDI (C81023L01)
	Delaware II (07)	20 October - 14 November	4X, 5Y, Z_e, 6A				168	CAMDI (C81023U01)
	Albatross IV (11)	3 - 13 November	$5Z_e$				42	CAMDI (C81030V01)
	Albatross IV (12)	17 November - 23 December	4X, 5Y, Z_e, 6A, B, C	1,260	25			Cruise Report
	Delaware II (09)	2 - 19 December	5Y, Z_e, 6A, B, C	520	66			Cruise Report
U.S.S.R.	V. Bugaev	15 December, 1979 - 19 March	2 to 6	341	311			ROSCOP
	G. Ushakov	7 February - 11 May	2 to 6	319	203			ROSCOP
	Musson	23 February - 20 June	2 to 6	423	444			ROSCOP
	60-Let (03)	26 September - 3 November	4W, X				8	CAMDI (C81042I01)
	Argus (04)	1 - 15 November	4W, X	42	42			Cruise Report
			TOTALS	4,428	1,484	291	661	

Table 2: Data collected in the NAFO area in 1980 and received by MEDS.

Track Chart Number	MEDS ID	Date (1980)	Subarea	Number of Stations	
				Bottle	BT
1 *	180180051	12 May - 7 October	4W	13	
2	180380001	5 - 28 February	4W, X, 5Y, Z_e	92	
3	180380002	4 - 14 March	4X, 5Y, Z_e	112	
4	180380003	5 - 14 March	4V_s, W, X	47	
5	180380004	17 - 27 March	4W, X	66	
6	180380005	7 - 30 May	4V_n, V_s, W, X	138	
7	180380006	3 - 26 June	4V_n, V_s, W, X	153	
8 *	180380007	7 - 15 July	4W, X, 5Y	63	
9 *	180380008	18 - 26 July	4V_s, W, X, 5Y	83	
10 *	180380009	12 - 20 August	4X, 5Y	160	
11 *	180380010	4 - 25 September	4T	73	
12 *	180380011	11 July - 4 August	4T, V_n, V_s, W	91	
13 *	180380012	1 - 9 October	4W, X, 5Y	70	
14 *	180380013	16 - 24 October	4V_n, V_s, W	73	
15 *	180380014	29 October - 10 November	4W	49	
16 *	180380015	20 November - 15 December	4V_n, V_s, W, X	100	
17 *	180380016	3 - 27 September	4W	233	
18 *	180380017	24 August - 1 September	4W	80	
19 *	180380018	4 - 12 November	4X	131	
20 *	180380019	3 - 29 October	4W	122	
21 *	180380020	3 - 26 October	4W	190	
22 *	180380021	15 - 31 August	4W	130	
23 *	180380022	4 - 22 September	4W	126	
24	180580001	4 - 22 January	3L, M	19	
25 *	180580002	2 - 14 February	3L, M	61	
26 *	180580003	18 - 20 January	3L, M	80	
27 *	180580004	19 July - 10 August	2J, 3K, L, M, N, O	98	
28 *	180580005	22 May - 2 June	3L, M	75	
29 *	180580006	12 - 23 April	3L, O	59	
30 *	180580007	11 March	3L	4	
31	90KV80002	23 April - 1 August	2J, 3K, L, M, N, O	343	
32	90PH80020	19 March - 11 June	3K, L, M, N	263	
33 *	90PH80021	19 September - 9 November	3K, L, M, N	410	
34 *	180380001	5 - 28 February	4W, X, 5Y, Z_e		95
35 *	180380002	4 - 14 March	4X, 5Y, Z_e		112

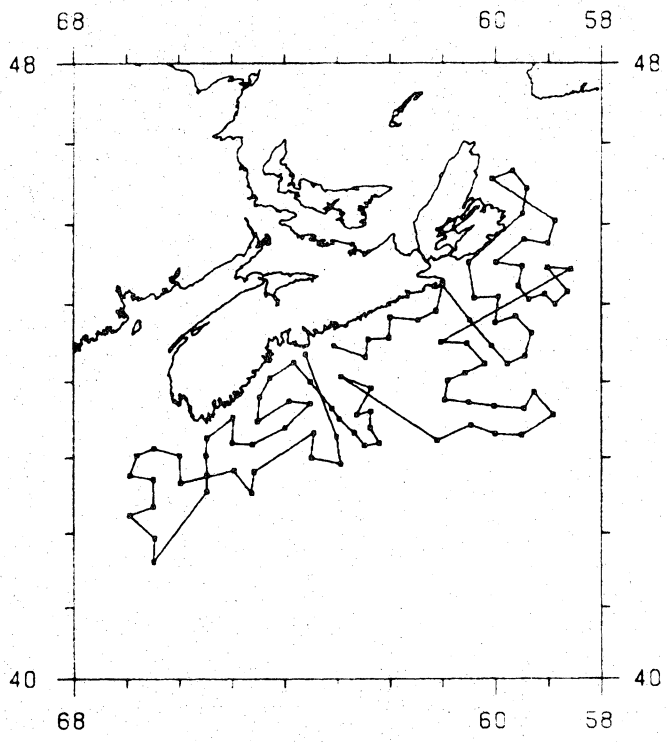
Table 2 (Continued)

Track Chart Number	MEDS ID	Date (1980)	Subarea	Number of Stations	
				Bottle	BT
36 *	180380003	5 - 14 March	$4V_s$, W, X		55
37 *	180380004	17 - 27 March	4W, X		72
38 *	180380005	7 - 30 March	$4V_n$, V_s, W, X		138
39 *	180380006	3 - 26 June	$4V_n$, V_s, W, X		153
40 *	180380007	7 - 15 July	4W, X, 5Y		75
41 *	180380008	18 - 26 July	$4V_s$, W, X, 5Y		95
42 *	180380009	12 - 20 August	4X, 5Y		160
43 *	180380010	4 - 25 September	4T		73
44 *	180380011	11 July - 4 August	4T, V_n, V_s, W		91
45 *	180380012	1 - 9 October	4W, X, 5Y		50
46 *	180380013	16 - 24 October	$4V_n$, V_s, W		88
47 *	180380014	29 October - 10 November	4W		49
48 *	180380015	20 November - 15 December	$4V_n$, V_s, W, X		96
49 *	180380016	3 - 27 September	4W		137
50 *	180380017	24 August - 1 September	4W		80
51 *	180380018	4 - 12 November	4X		131
52 *	180380019	3 - 29 October	4W		122
53 *	180380020	3 - 26 October	4W		233
54 *	180380021	15 - 31 August	4W		130
55 *	180380022	4 - 22 September	4W		126
56 *	180580003	18 - 20 January	3L, M		69
			TOTALS	3,807	2,430

Table 3: Available standard sections sampled during 1980.

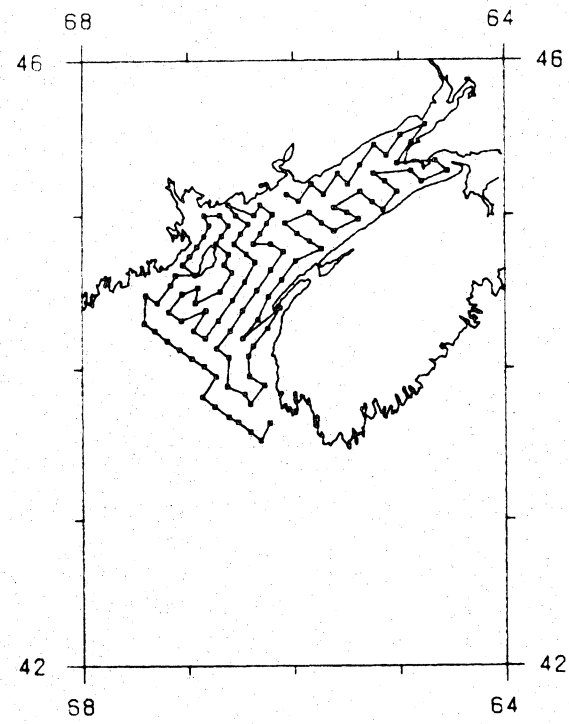
Section	Date	MEDS ID	Cruise Track	Figure
White Bay	28 - 29 May	90PH80020	A-32	B1-3
Bonavista	26 - 27 May	90PH80020	A-32	B4-6
SW Triangle	25 May	90PH80020	A-32	B7-9
SE Triangle	25 - 26 May	90PH80020	A-32	B10-12
U.S.S.R. 7-A	20 - 22 May	90PH80020	A-32	B13-15
Flemish Cap	5 - 6 January	180580001	A-24	B16-18
	26 - 27 March	90PH80020	A-32	B19-21
	7 - 8 May	90PH80020	A-32	B22-24
	23 - 24 May	90PH80020	A-32	B25-27
	5 - 6 June	90PH80020	A-32	B28-30
U.S.S.R. 4-A	16 - 18 May	90PH80020	A-32	B31-33
Coast Guard - 3	13 - 16 May	90PH80020	A-32	B34-36
Banquereau	9 - 10 May	180380005	A-6	B37-39

APPENDIX A: Cruise Tracks



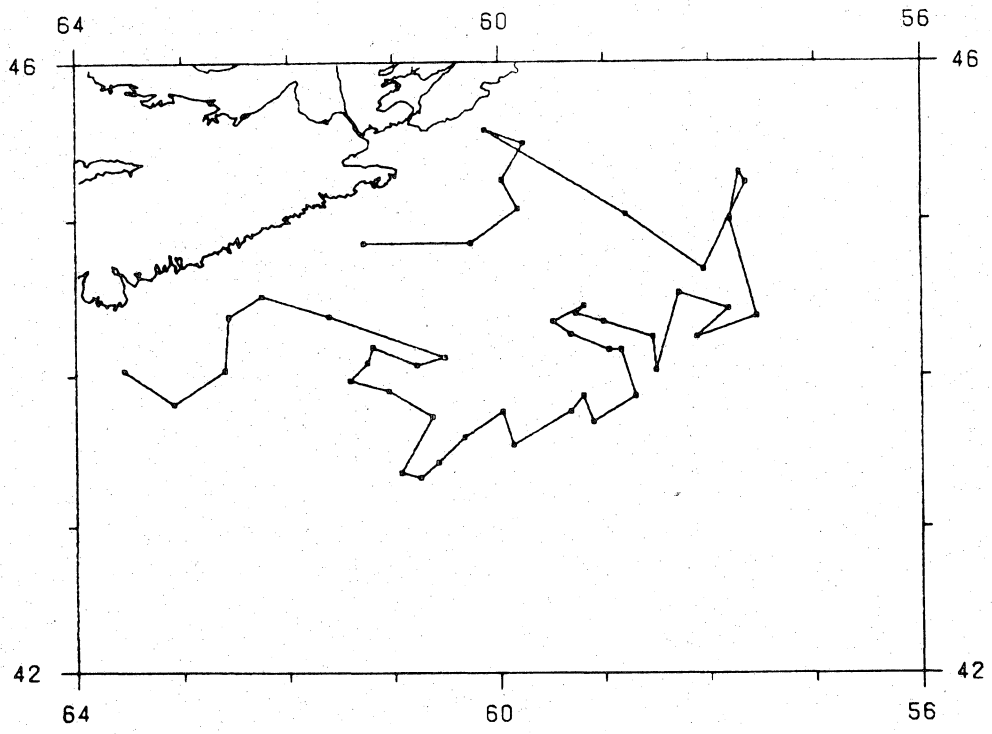
CRUISE 180380001 5/ 2/80 - 28/ 2/80 92 STATIONS

Figure A-2



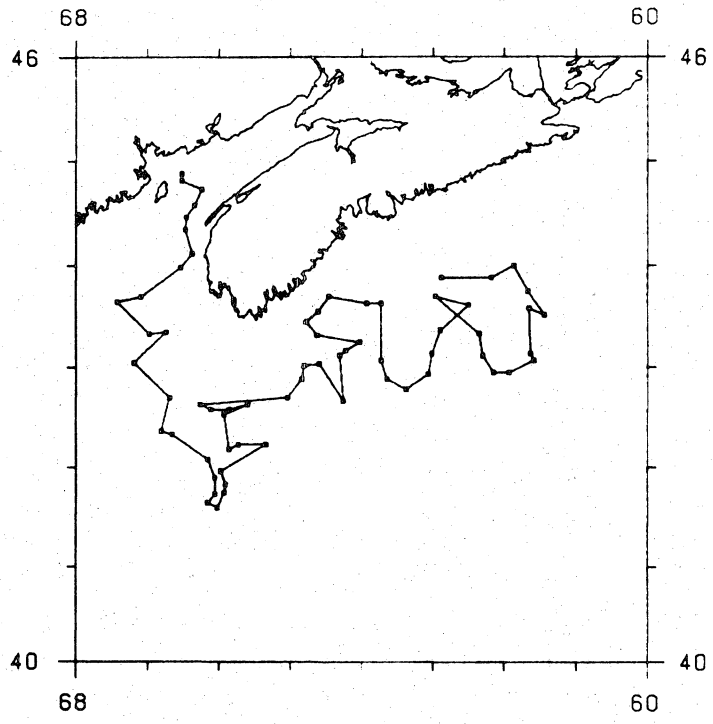
CRUISE 180380002 4/ 3/80 - 14/ 3/80 112 STATIONS

Figure A-3



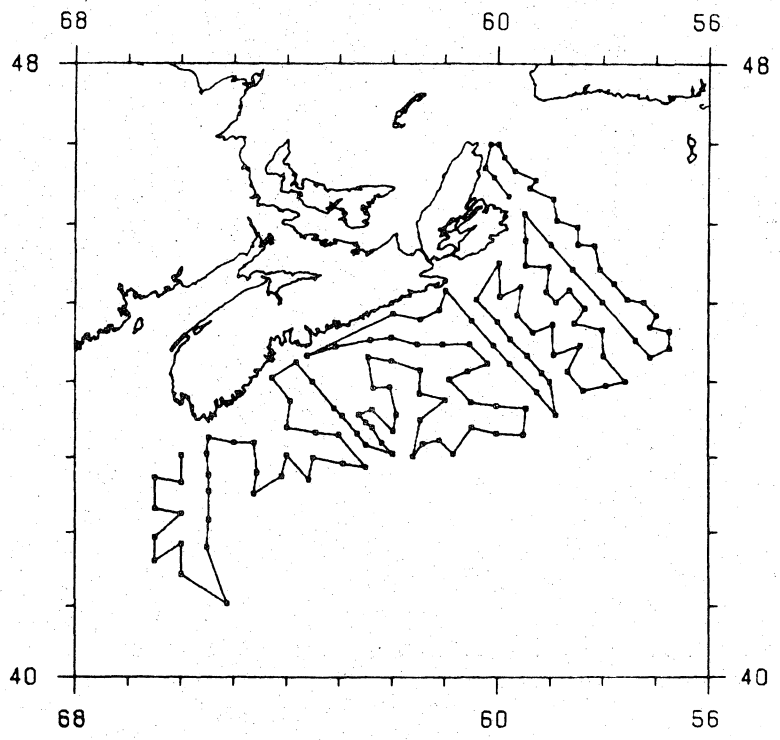
CRUISE 180380003 5/ 3/80 - 14/ 3/80 47 STATIONS

Figure A-4



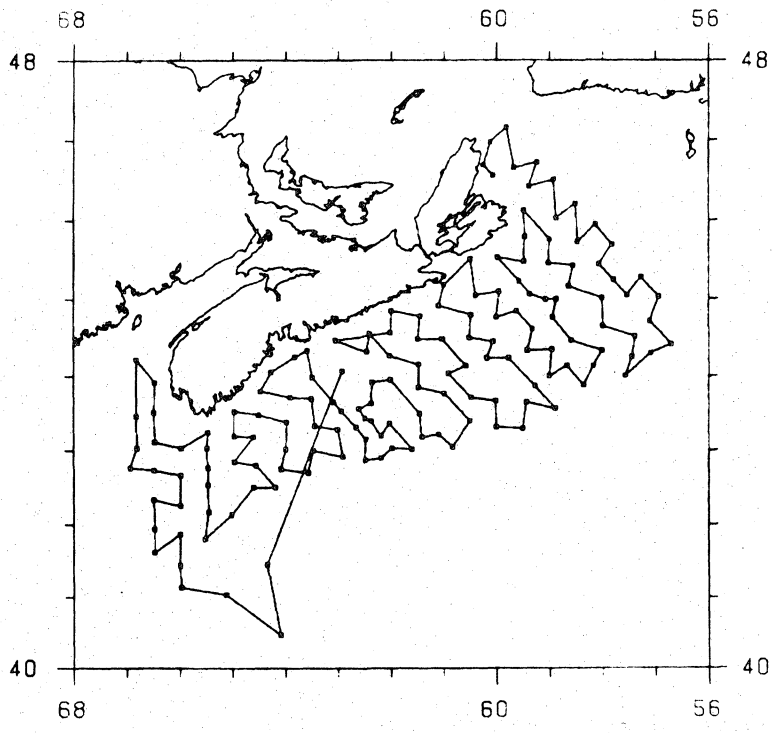
CRUISE 180380004 17/ 3/80 - 27/ 3/80 66 STATIONS

Figure A-5



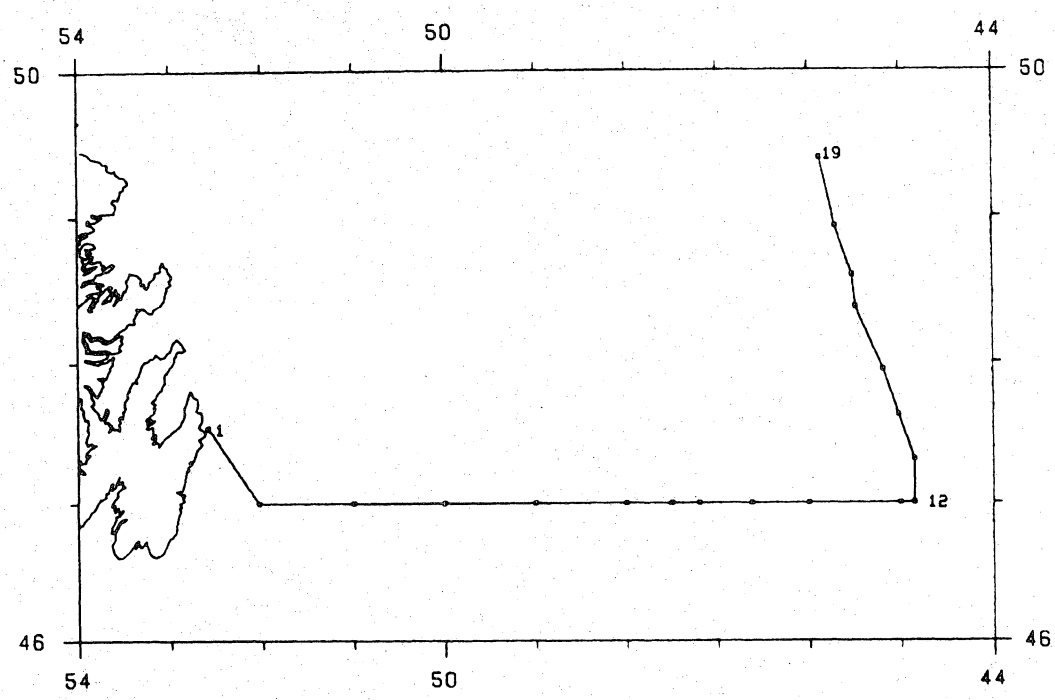
CRUISE 180380005 7/ 5/80 - 30/ 5/80 138 STATIONS

Figure A-6



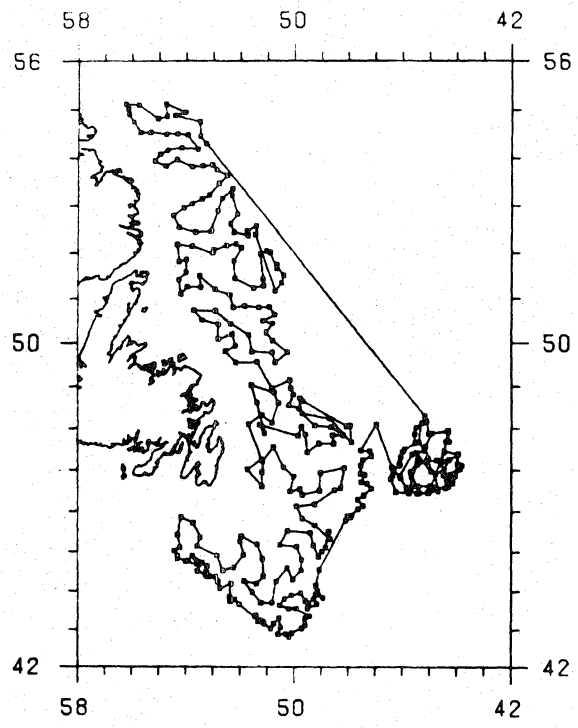
CRUISE 180380006 3/ 6/80 - 26/ 6/80 153 STATIONS

Figure A-7



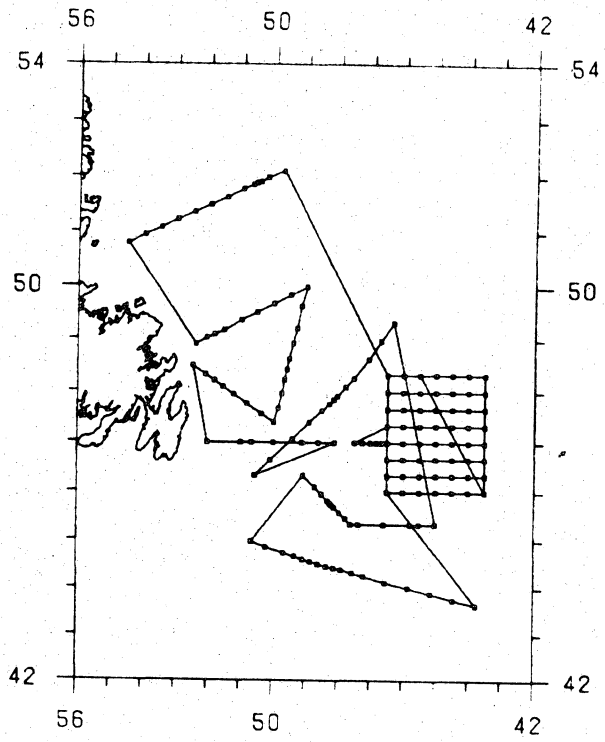
CRUISE 180580001 4/ 1/80 - 22/ 1/80 19 STATIONS

Figure A-24



CRUISE 90KV80002 23/ 4/80 - 1/ 8/80 343 STATIONS

Figure A-31

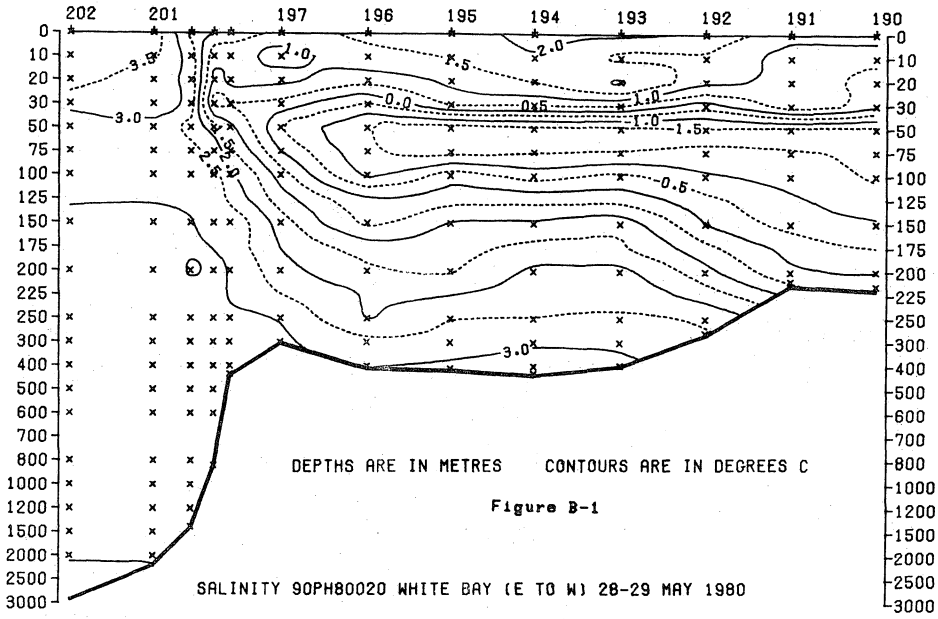


CRUISE 90PH80020 19/ 3/80 - 11/ 6/80 263 STATIONS

Figure A-32

APPENDIX B: Section Plots

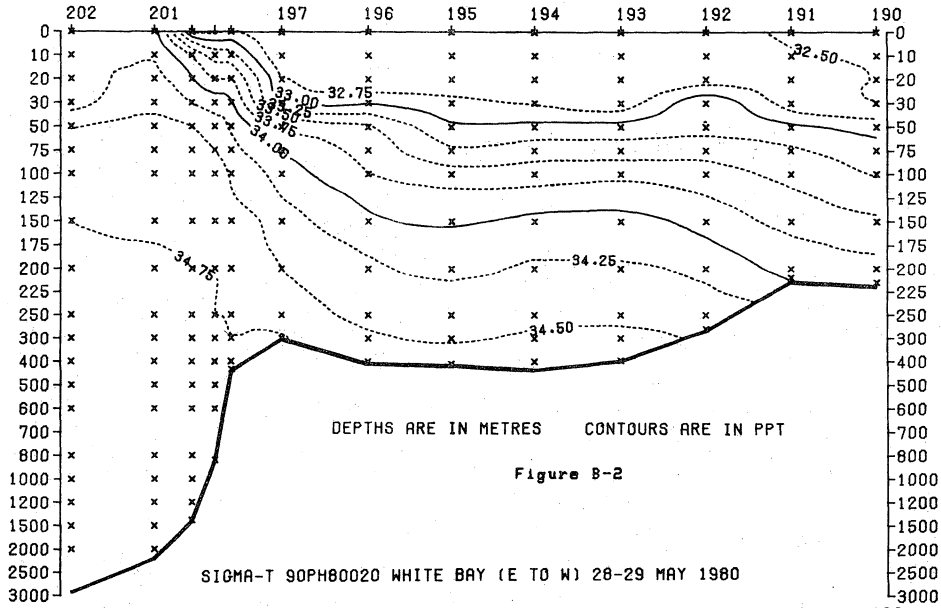
TEMPERATURE 90PH80020 WHITE BAY (E TO W) 28-29 MAY 1980



DEPTHS ARE IN METRES CONTOURS ARE IN DEGREES C

Figure B-1

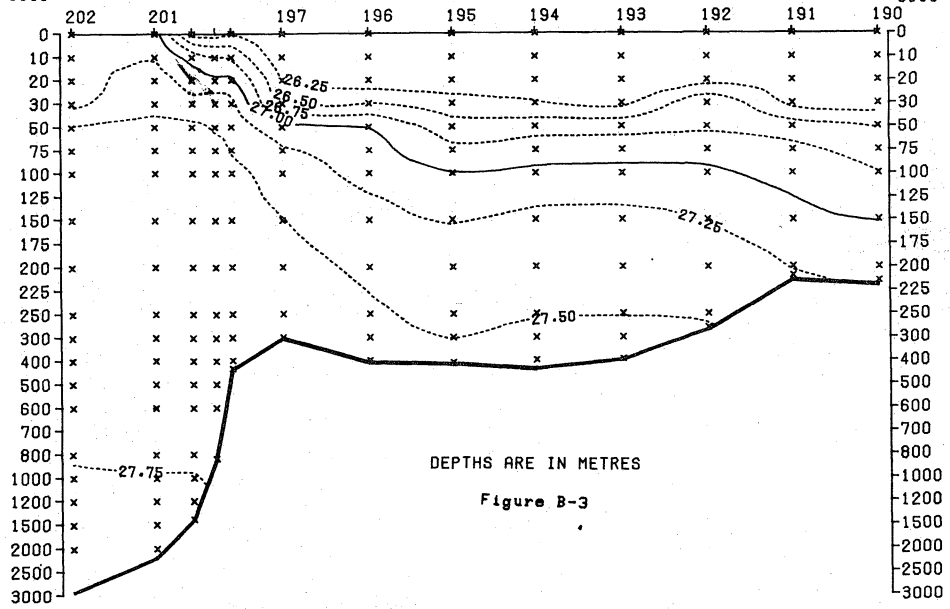
SALINITY 90PH80020 WHITE BAY (E TO W) 28-29 MAY 1980



DEPTHS ARE IN METRES CONTOURS ARE IN PPT

Figure B-2

SIGMA-T 90PH80020 WHITE BAY (E TO W) 28-29 MAY 1980



DEPTHS ARE IN METRES

Figure B-3

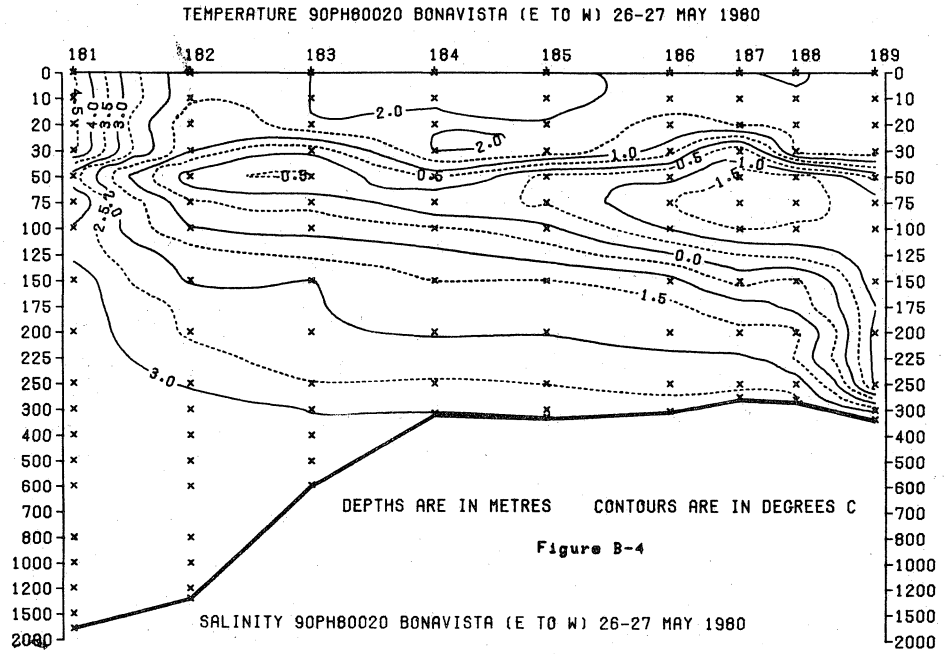


Figure B-4

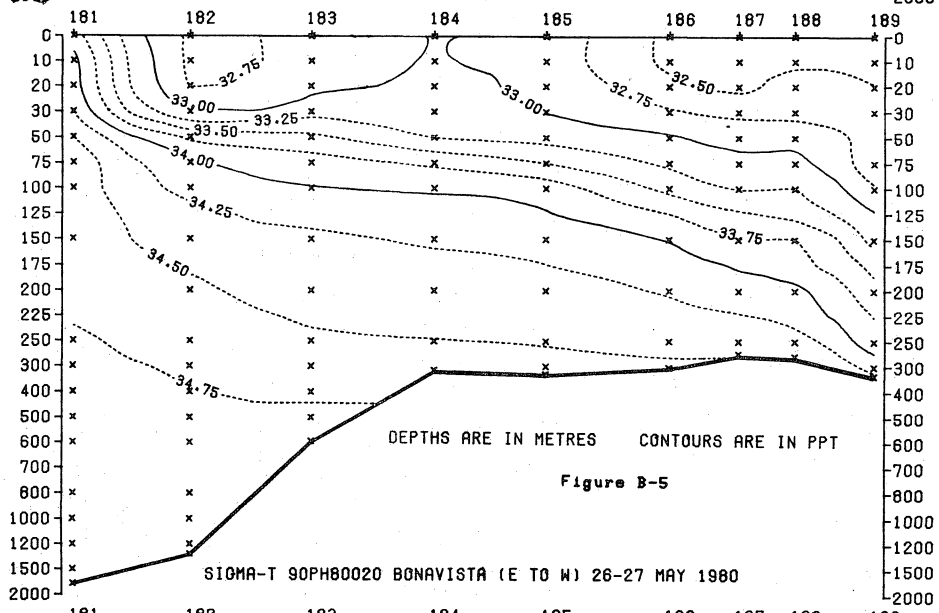


Figure B-5

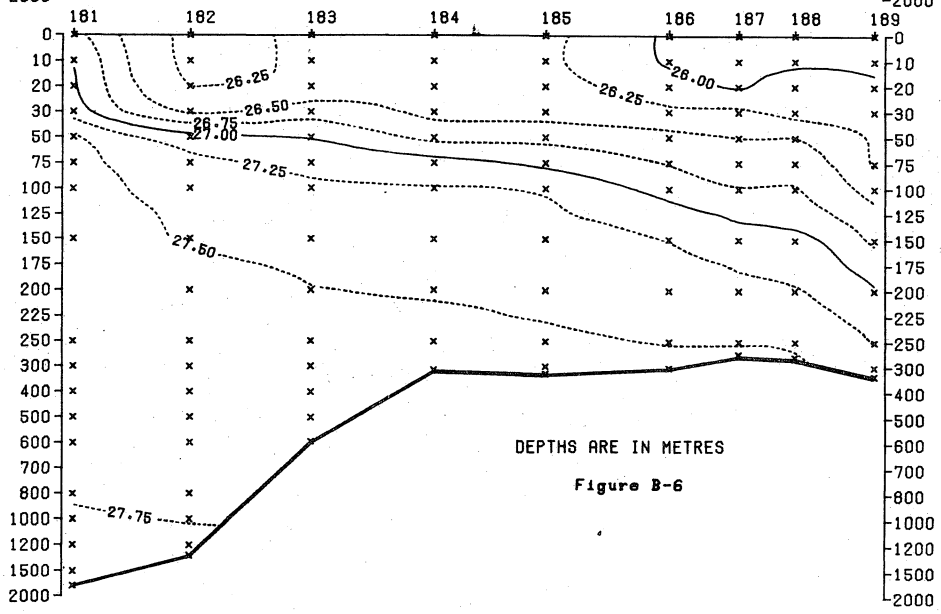
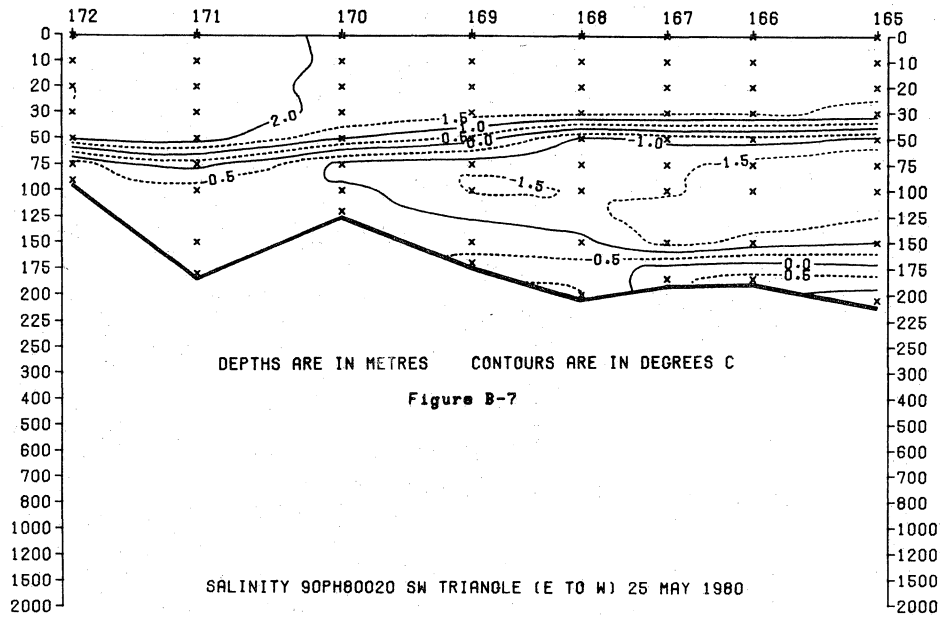


Figure B-6

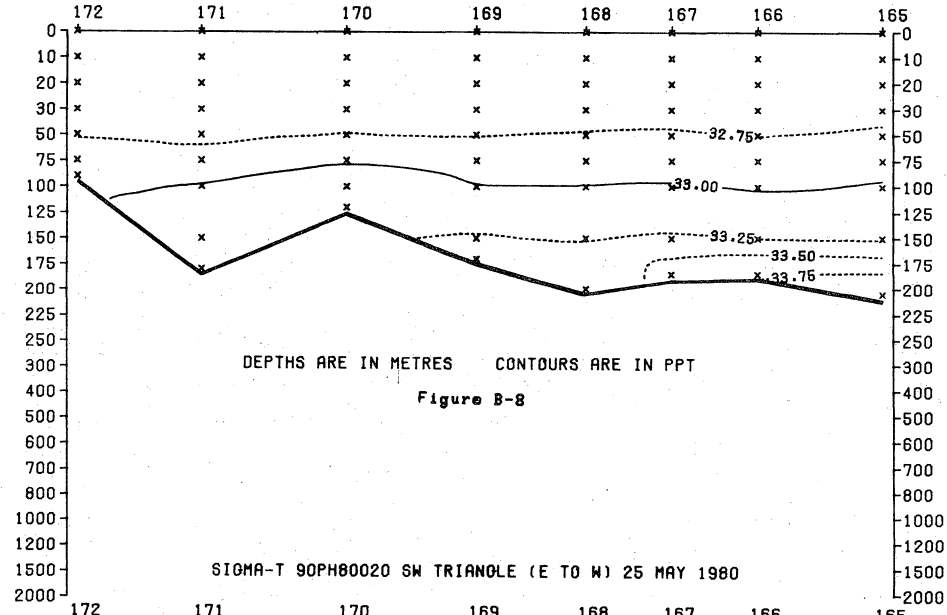
TEMPERATURE 90PH80020 SW TRIANGLE (E TO W) 25 MAY 1980



DEPTHS ARE IN METRES CONTOURS ARE IN DEGREES C

Figure B-7

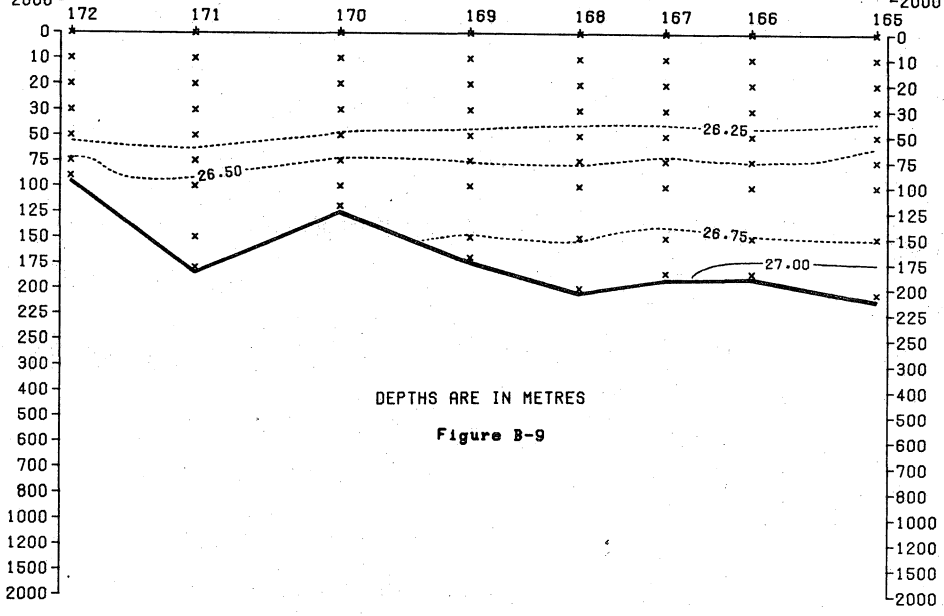
SALINITY 90PH80020 SW TRIANGLE (E TO W) 25 MAY 1980



DEPTHS ARE IN METRES CONTOURS ARE IN PPT

Figure B-8

SIGMA-T 90PH80020 SW TRIANGLE (E TO W) 25 MAY 1980



DEPTHS ARE IN METRES

Figure B-9

TEMPERATURE 90PH80020 SE TRIANGLE (S TO N) 25-26 MAY 1980

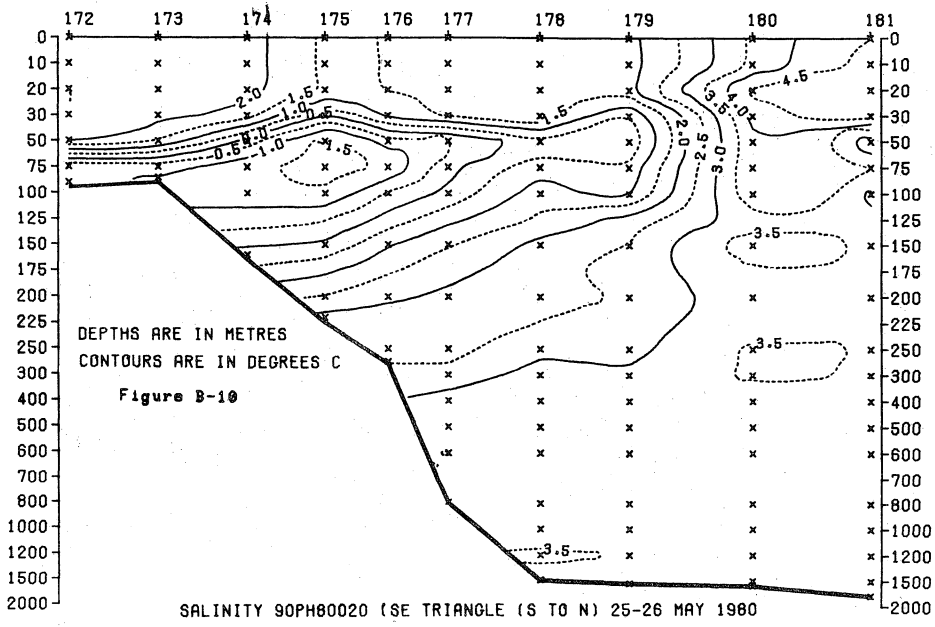


Figure B-10

SALINITY 90PH80020 (SE TRIANGLE (S TO N) 25-26 MAY 1980

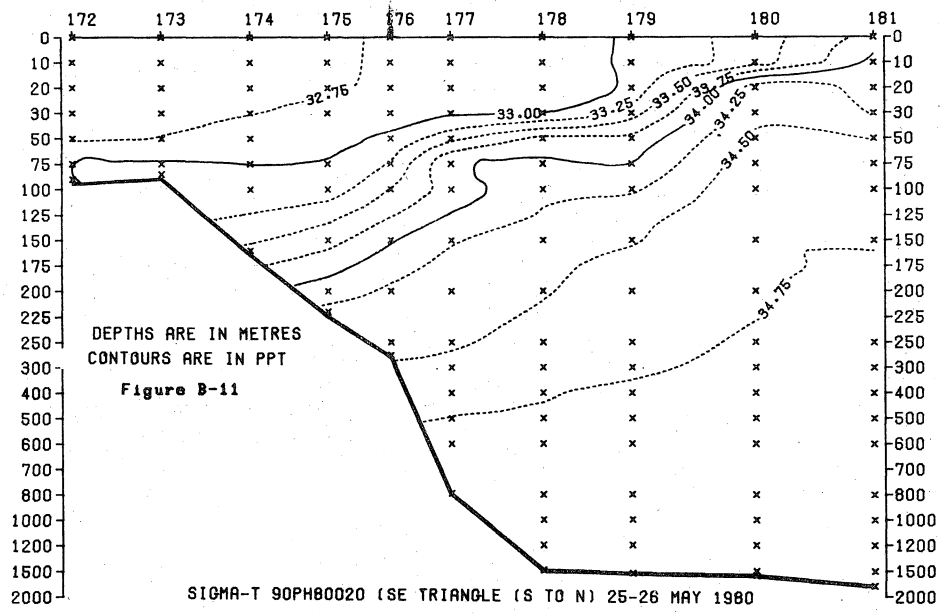


Figure B-11

SIGMA-T 90PH80020 (SE TRIANGLE (S TO N) 25-26 MAY 1980

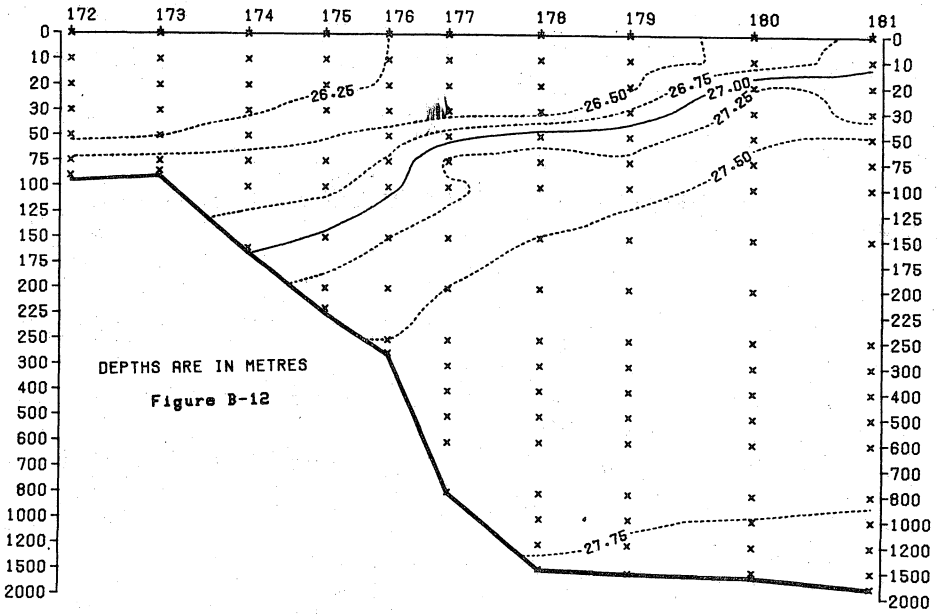


Figure B-12

TEMPERATURE 90PH80020 USSR 7-A (E TO W) 20-22 MAY 1980

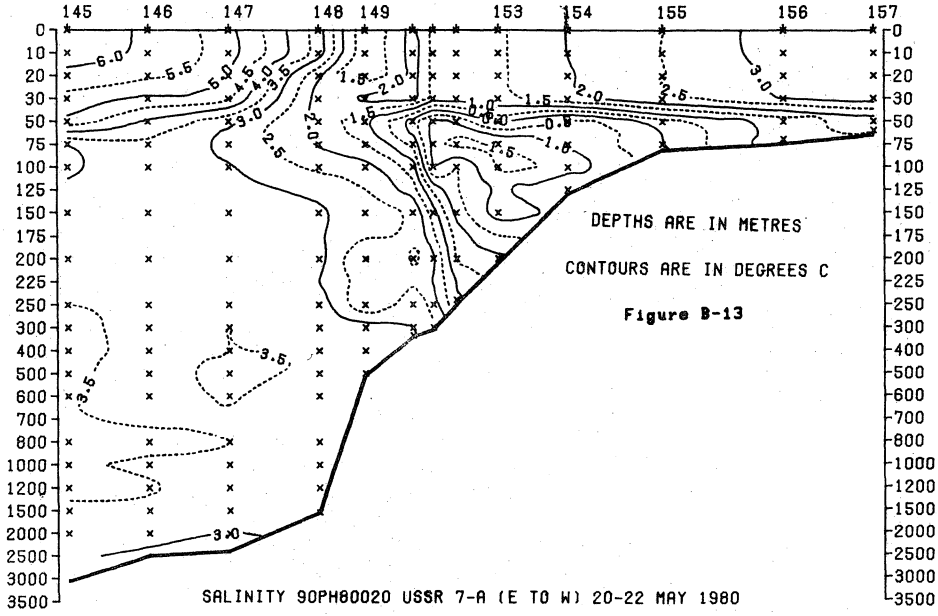


Figure B-13

SALINITY 90PH80020 USSR 7-A (E TO W) 20-22 MAY 1980

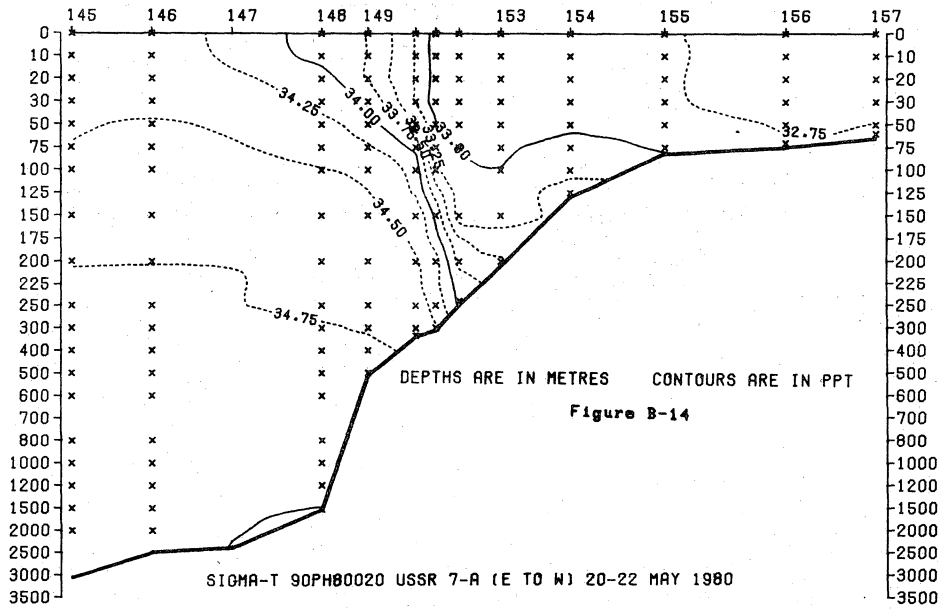


Figure B-14

SIGMA-T 90PH80020 USSR 7-A (E TO W) 20-22 MAY 1980

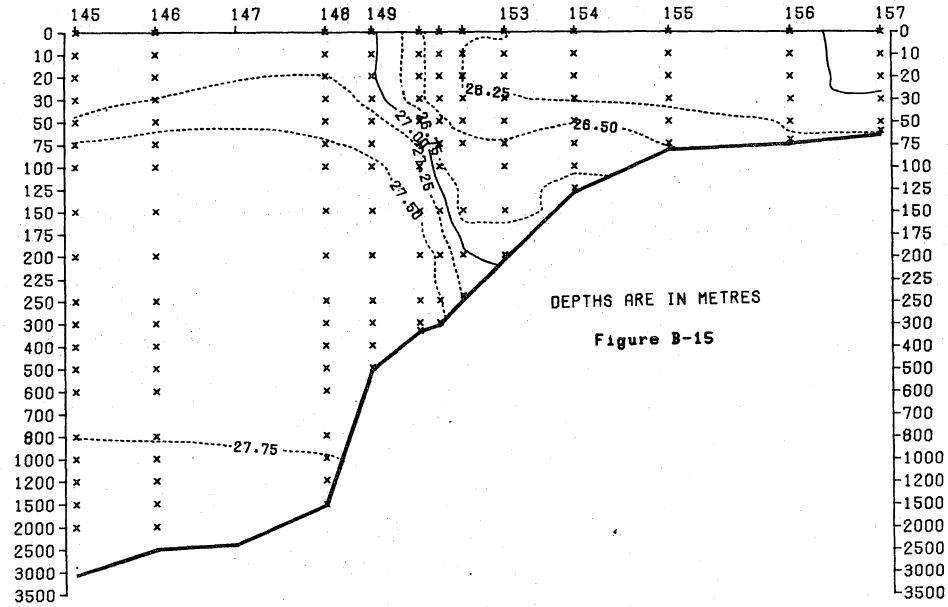


Figure B-15

TEMPERATURE 180580001 FLEMISH CAP 5-6 JANUARY 1980

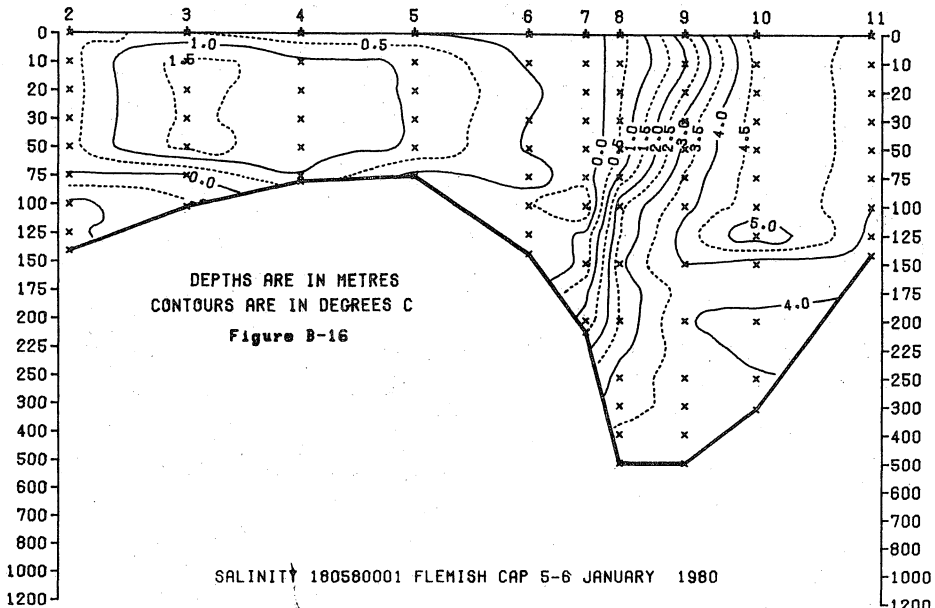


Figure B-16

SALINITY 180580001 FLEMISH CAP 5-6 JANUARY 1980

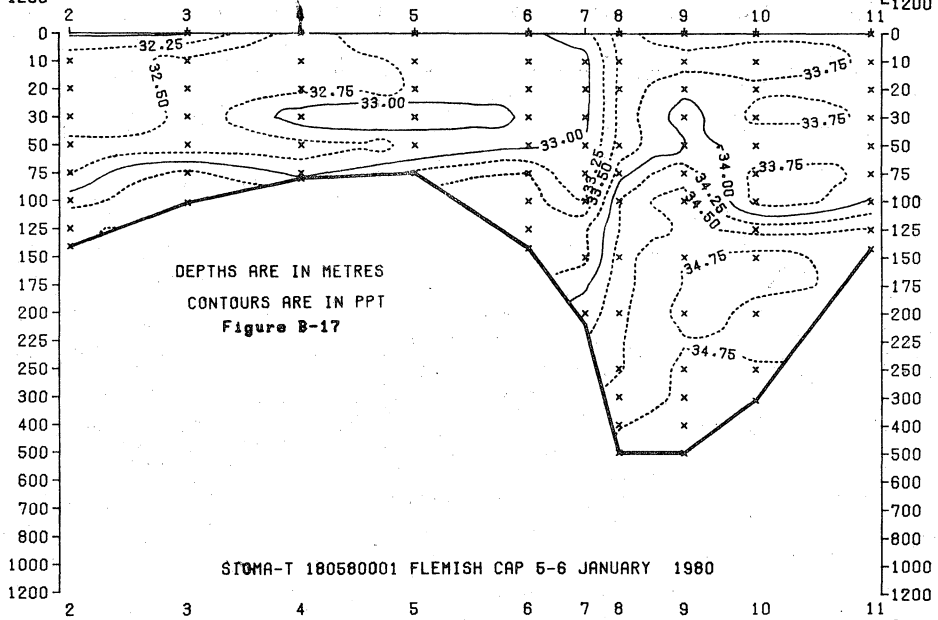


Figure B-17

SIGMA-T 180580001 FLEMISH CAP 5-6 JANUARY 1980

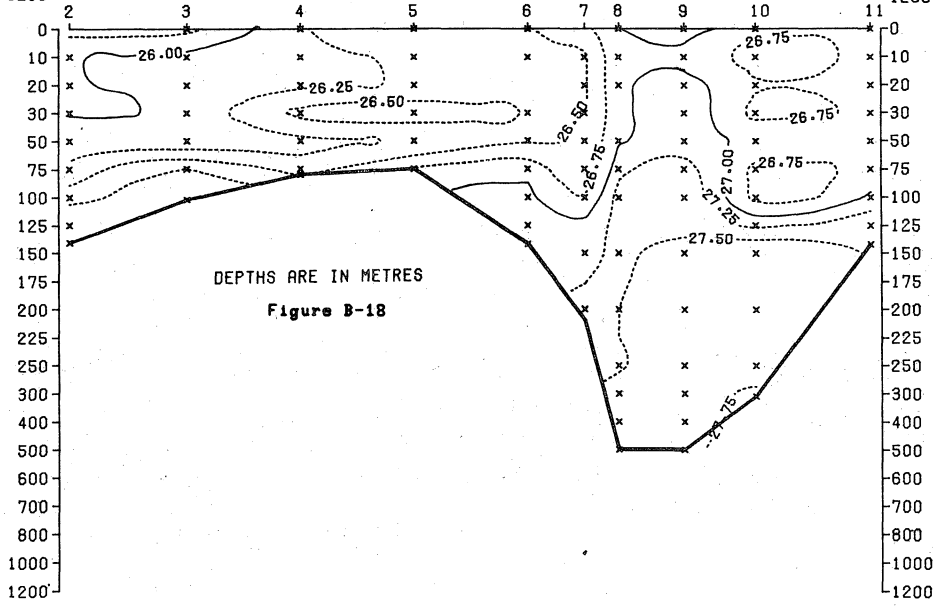


Figure B-18

TEMPERATURE 90PH80020 FLEMISH CAP (E TO W) 26-27 MARCH 1980

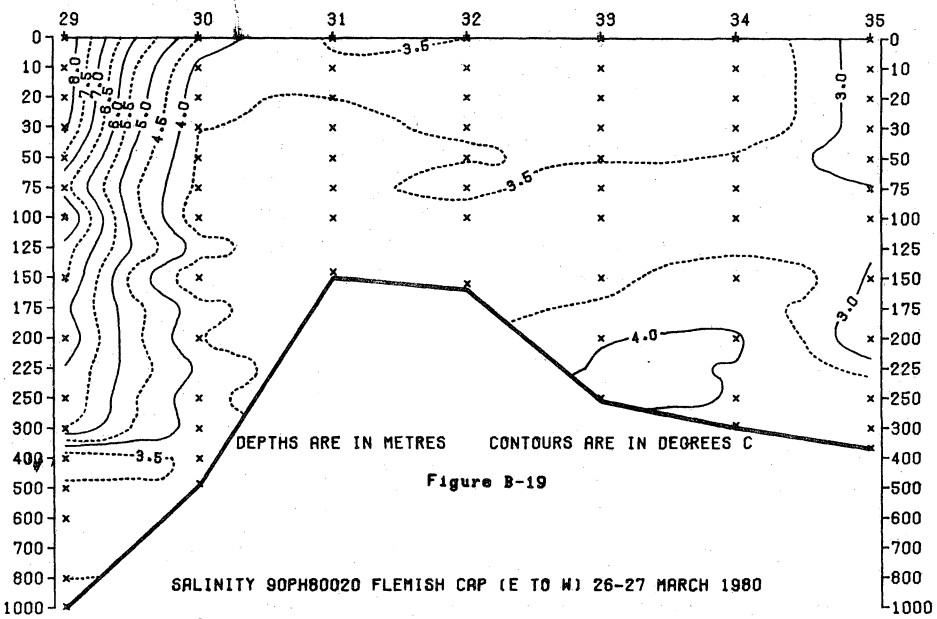


Figure B-19

SALINITY 90PH80020 FLEMISH CAP (E TO W) 26-27 MARCH 1980

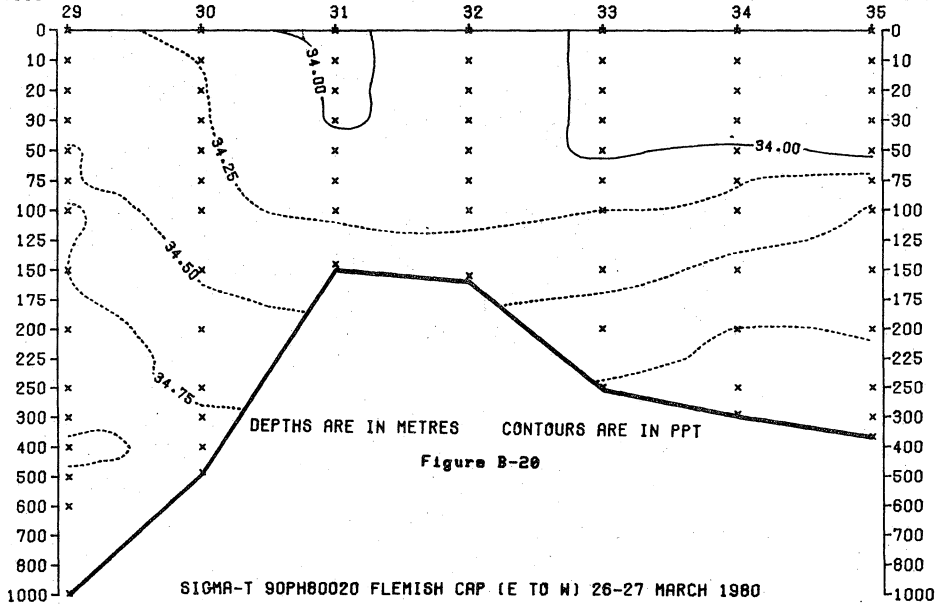


Figure B-20

SIGMA-T 90PH80020 FLEMISH CAP (E TO W) 26-27 MARCH 1980

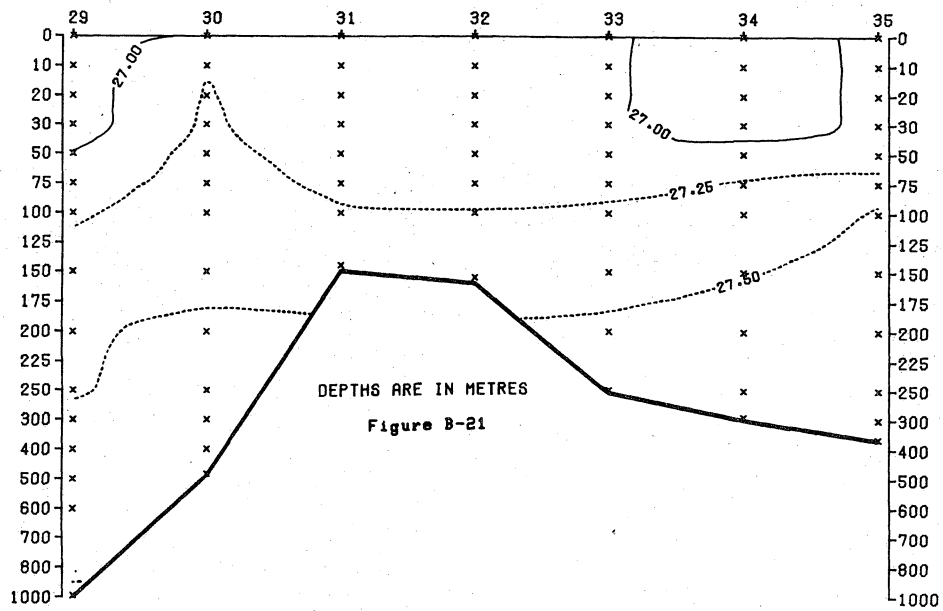


Figure B-21

TEMPERATURE 90PH80020 FLEMISH CAP (E TO W) 7-8 MAY 1980

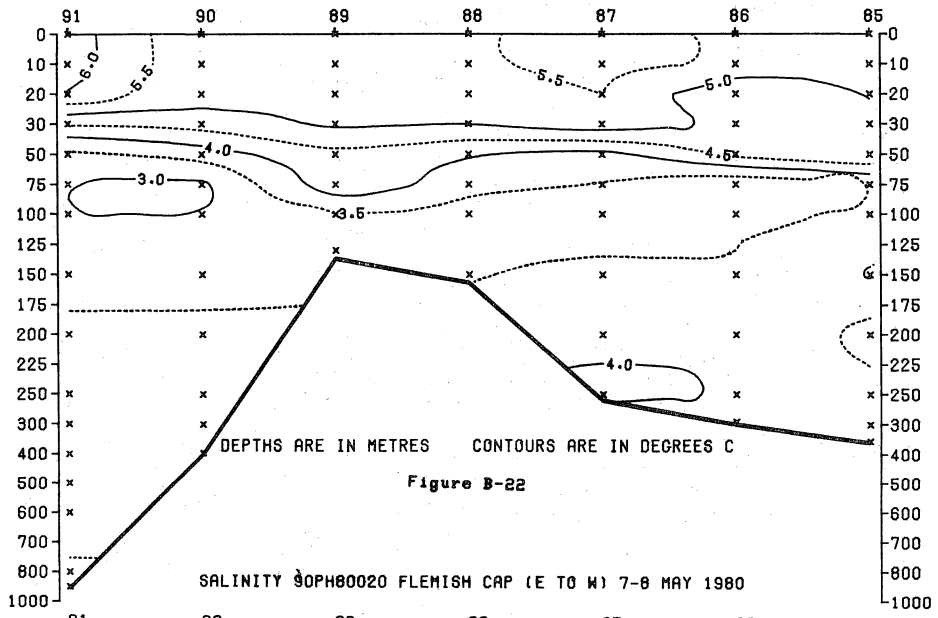


Figure B-22

SALINITY 90PH80020 FLEMISH CAP (E TO W) 7-8 MAY 1980

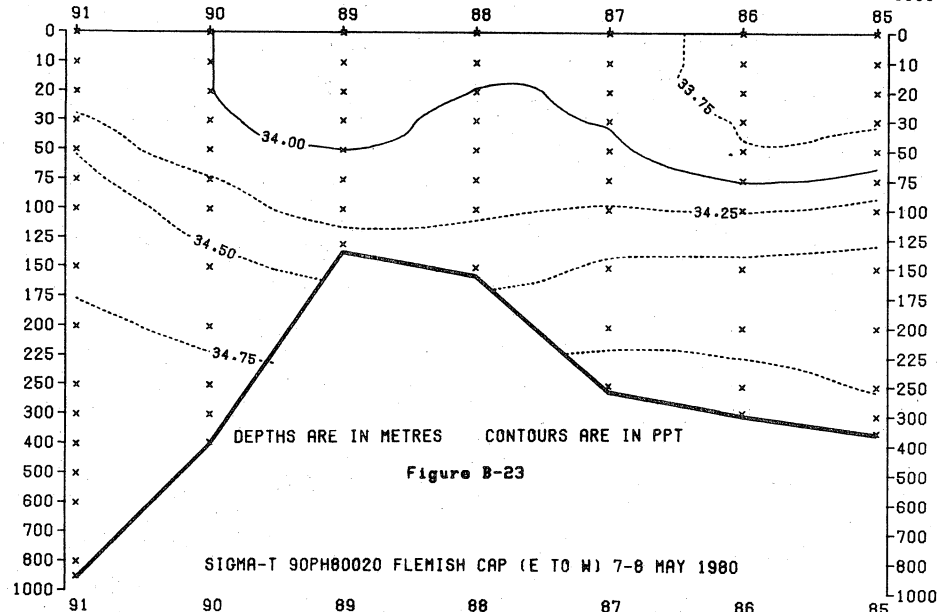


Figure B-23

SIGMA-T 90PH80020 FLEMISH CAP (E TO W) 7-8 MAY 1980

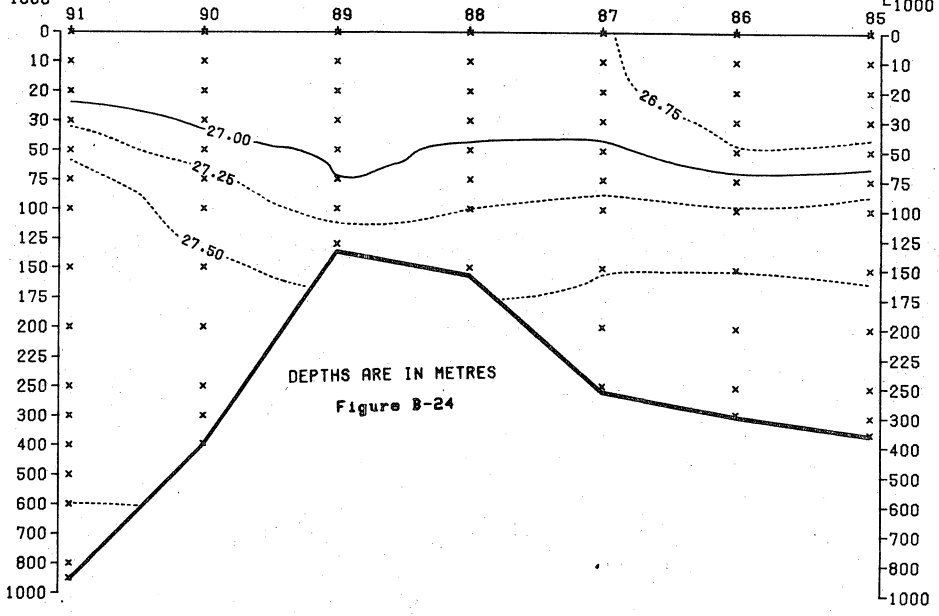


Figure B-24

TEMPERATURE 90PH80020 FLEMISH CAP (E TO W) 23-24 MAY 1980

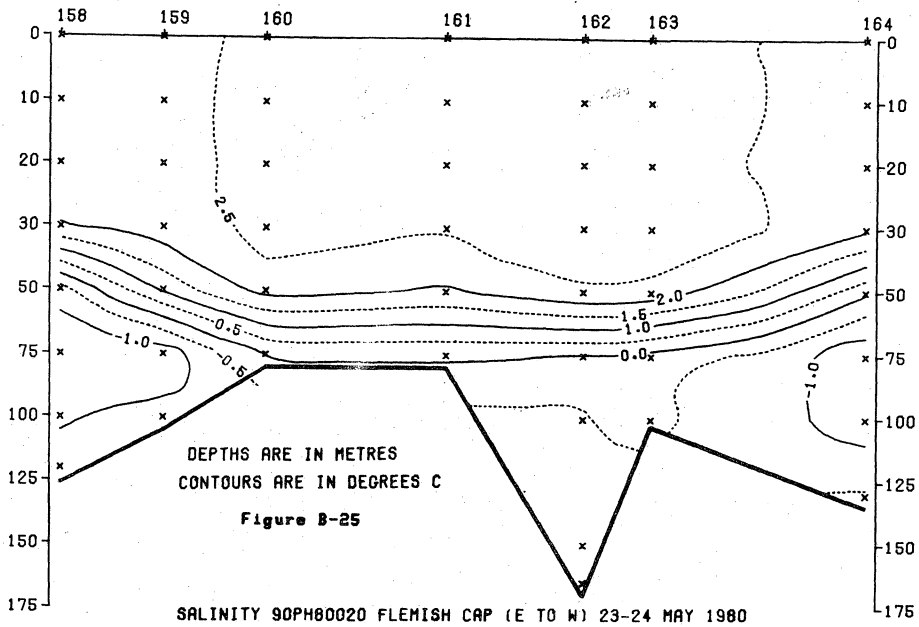


Figure B-25

SALINITY 90PH80020 FLEMISH CAP (E TO W) 23-24 MAY 1980

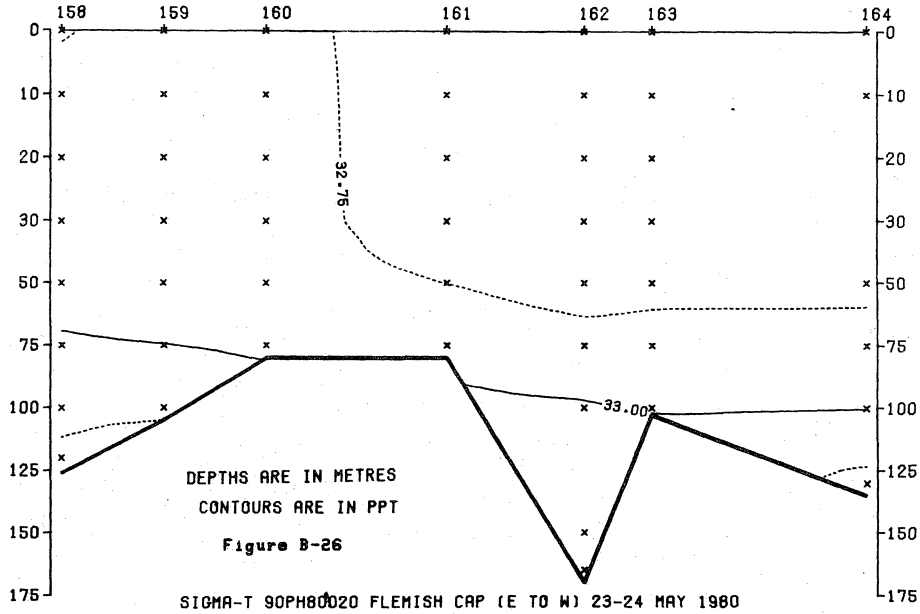


Figure B-26

SIGMA-T 90PH80020 FLEMISH CAP (E TO W) 23-24 MAY 1980

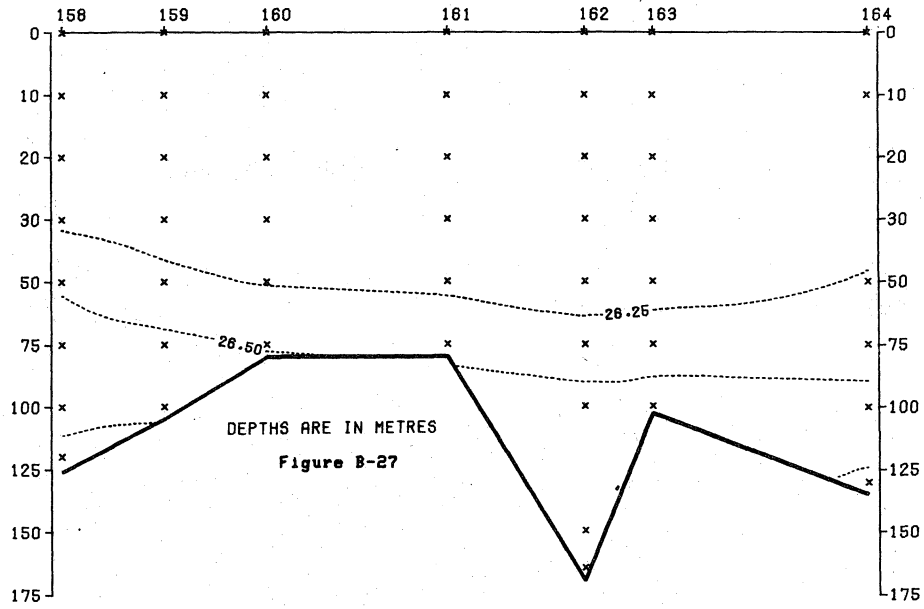


Figure B-27

TEMPERATURE 90PH80020 FLEMISH CAP (E TO W) 5-6 JUNE 1980

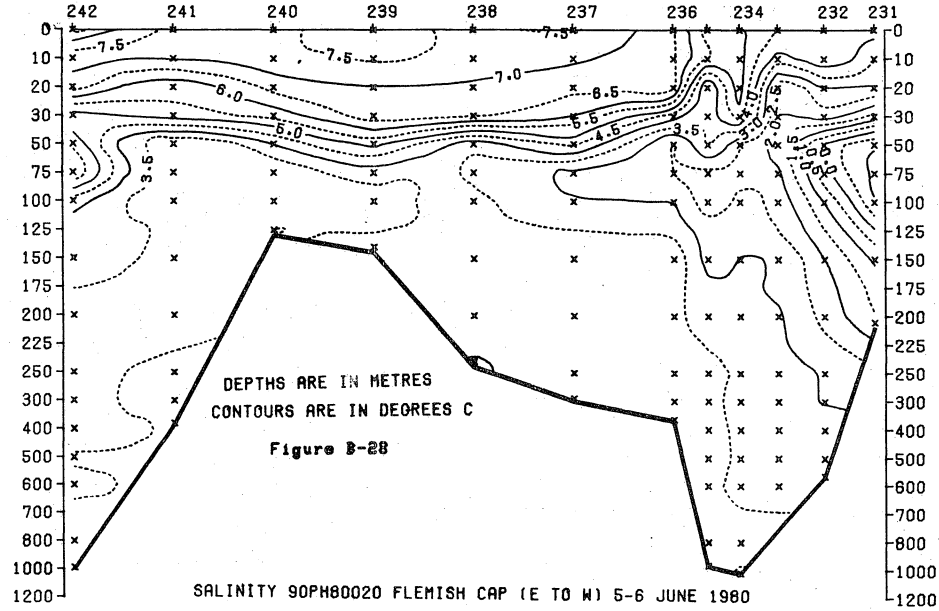


Figure B-28

SALINITY 90PH80020 FLEMISH CAP (E TO W) 5-6 JUNE 1980

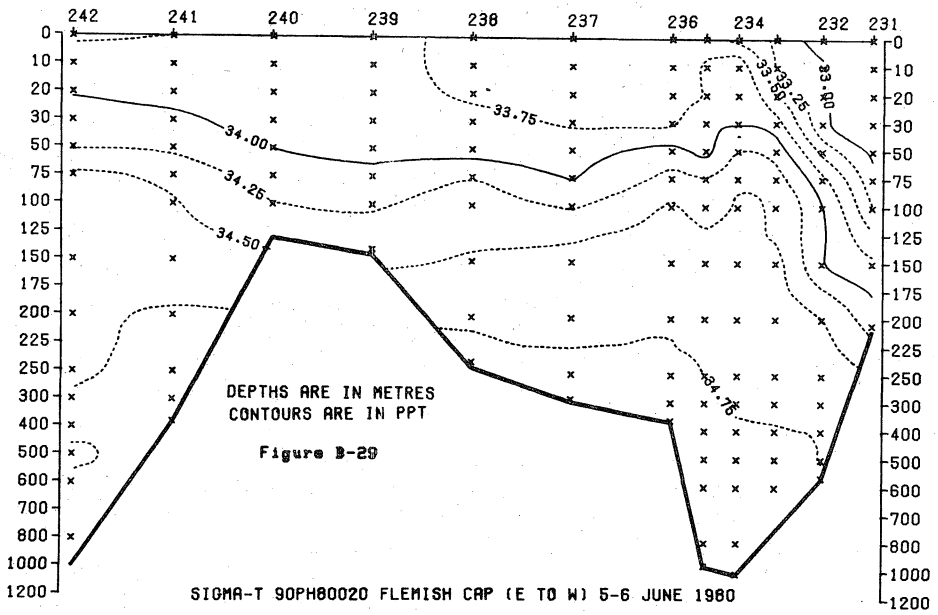


Figure B-29

SIGMA-T 90PH80020 FLEMISH CAP (E TO W) 5-6 JUNE 1980

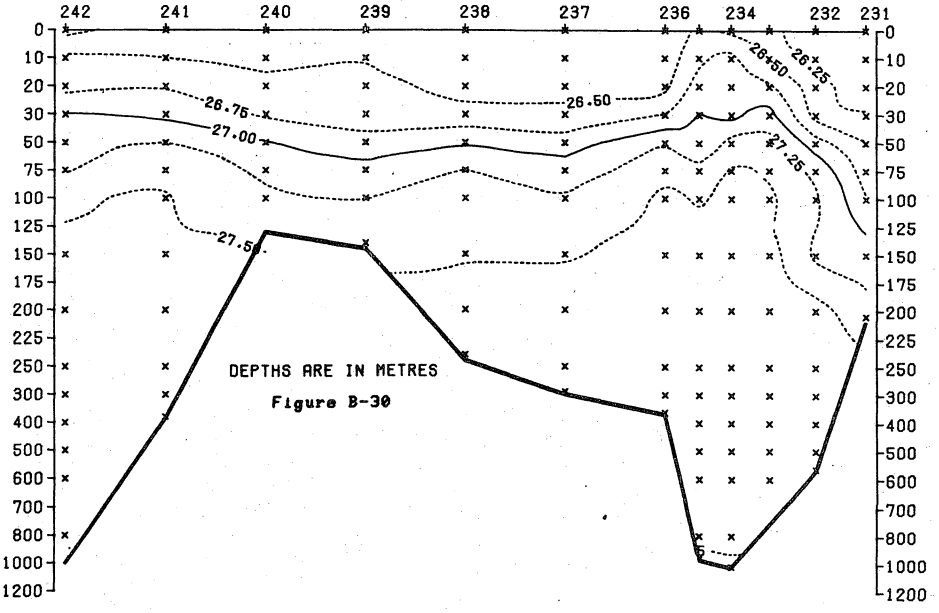


Figure B-30

TEMPERATURE 90PH80020 USSR 4-A (E TO W) 16-18 MAY 1980

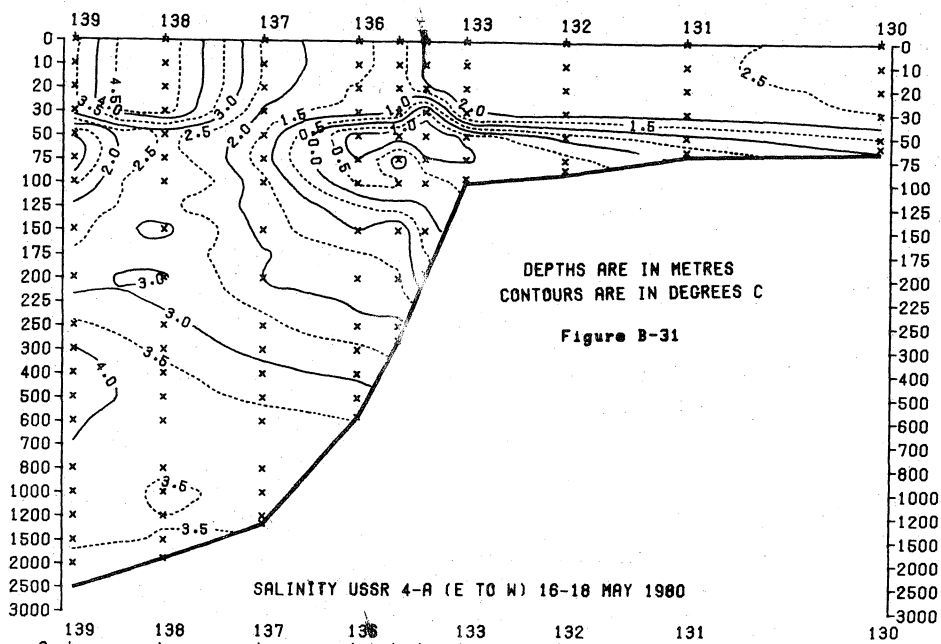


Figure B-31

SALINITY USSR 4-A (E TO W) 16-18 MAY 1980

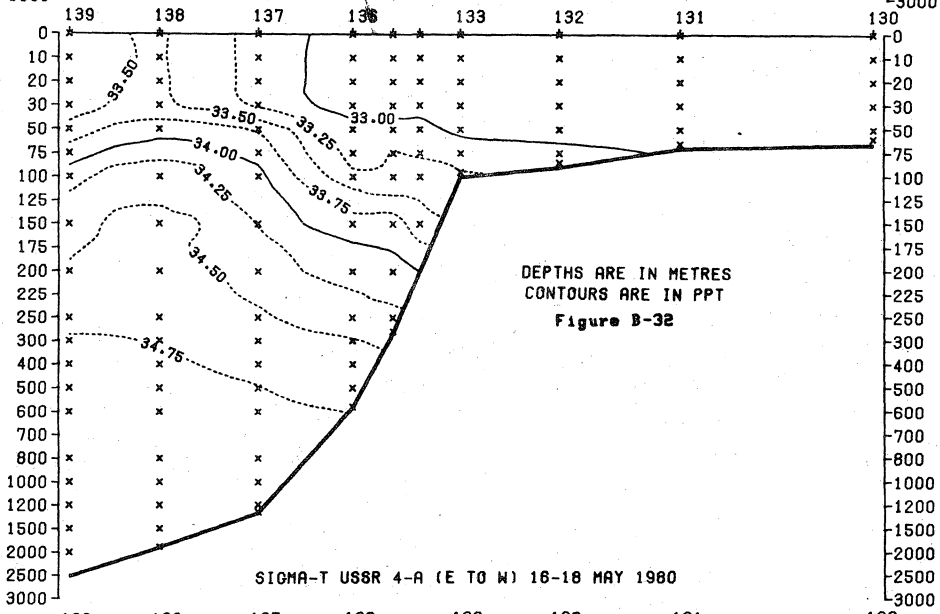


Figure B-32

SIGMA-T USSR 4-A (E TO W) 16-18 MAY 1980

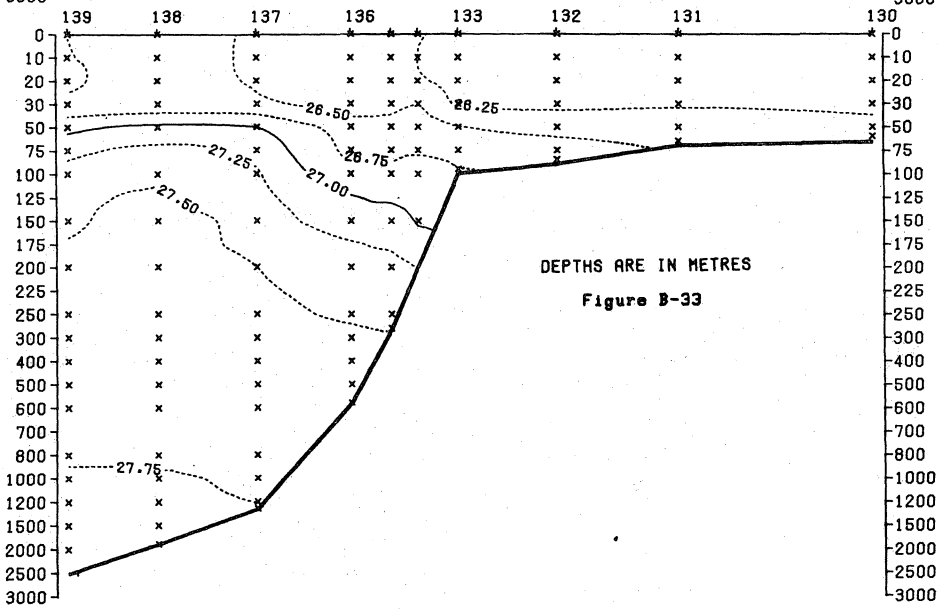


Figure B-33

TEMPERATURE 90PH80020 COAST GUARD-3 (E TO W) 13-16 MAY 1980

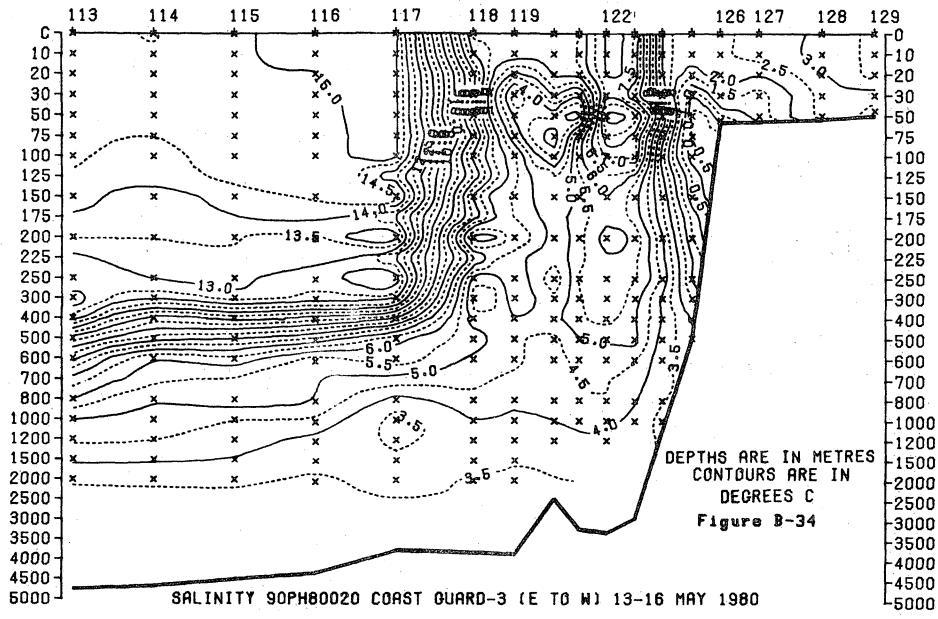


Figure B-34

SALINITY 90PH80020 COAST GUARD-3 (E TO W) 13-16 MAY 1980

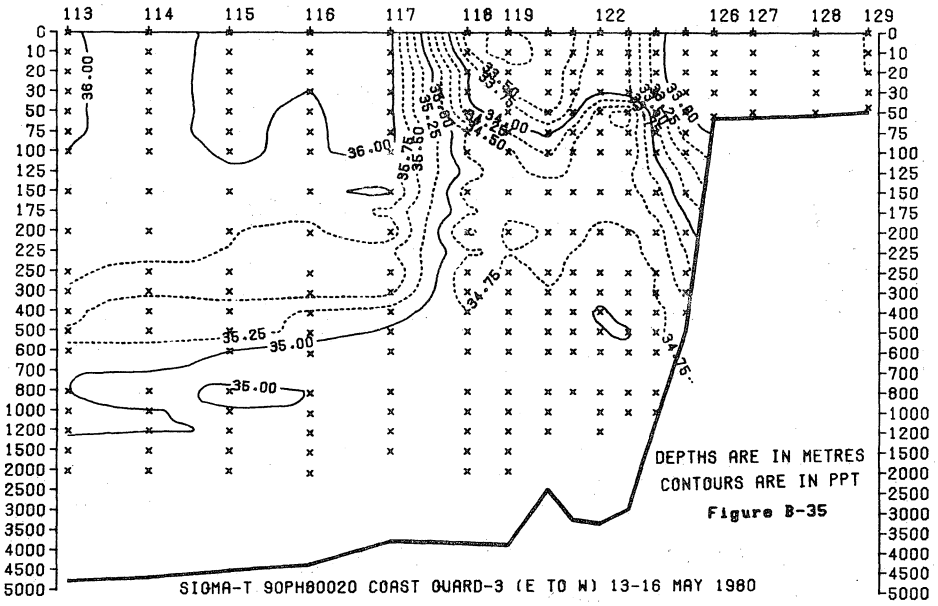


Figure B-35

SIGMA-T 90PH80020 COAST GUARD-3 (E TO W) 13-16 MAY 1980

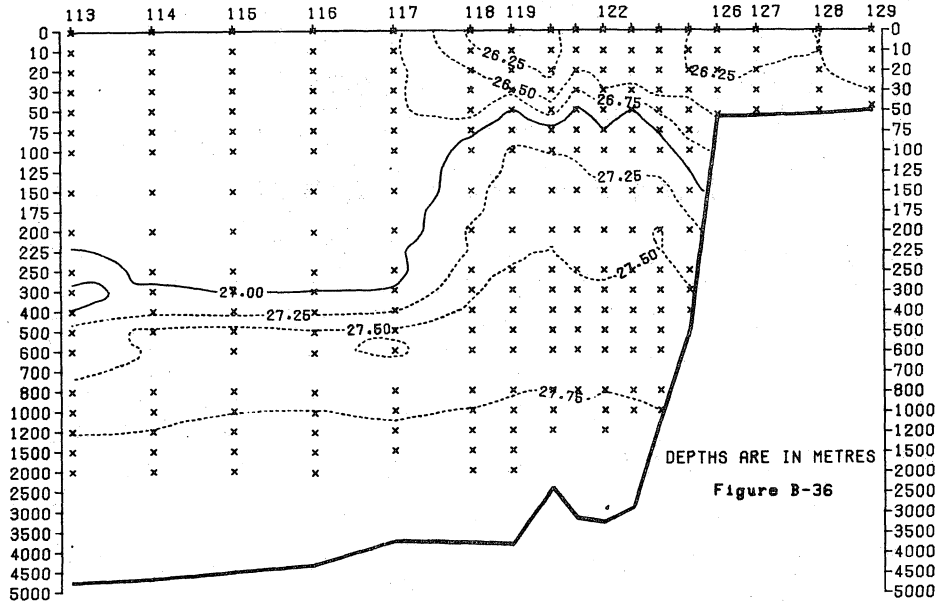
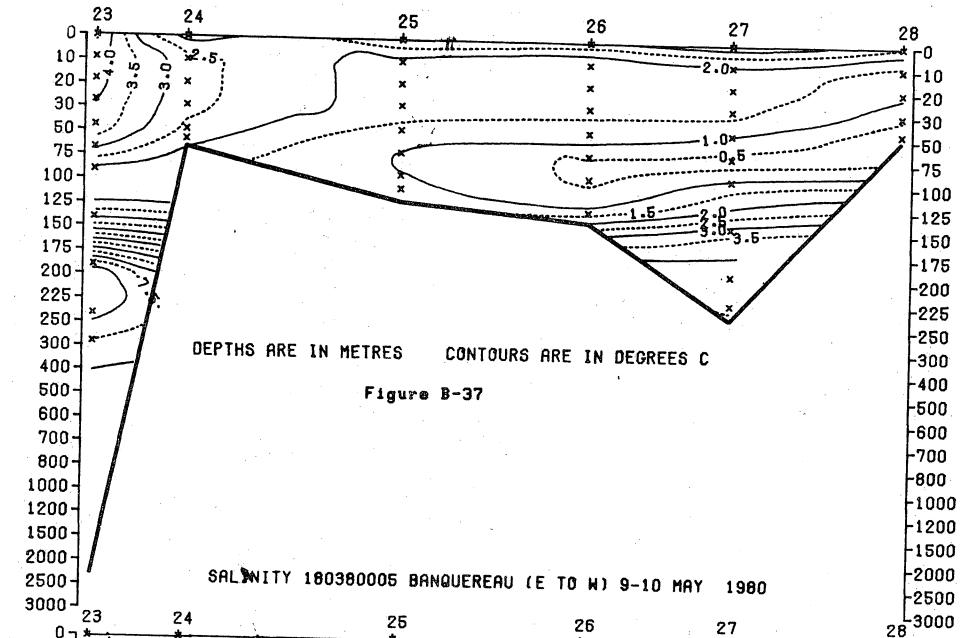


Figure B-36

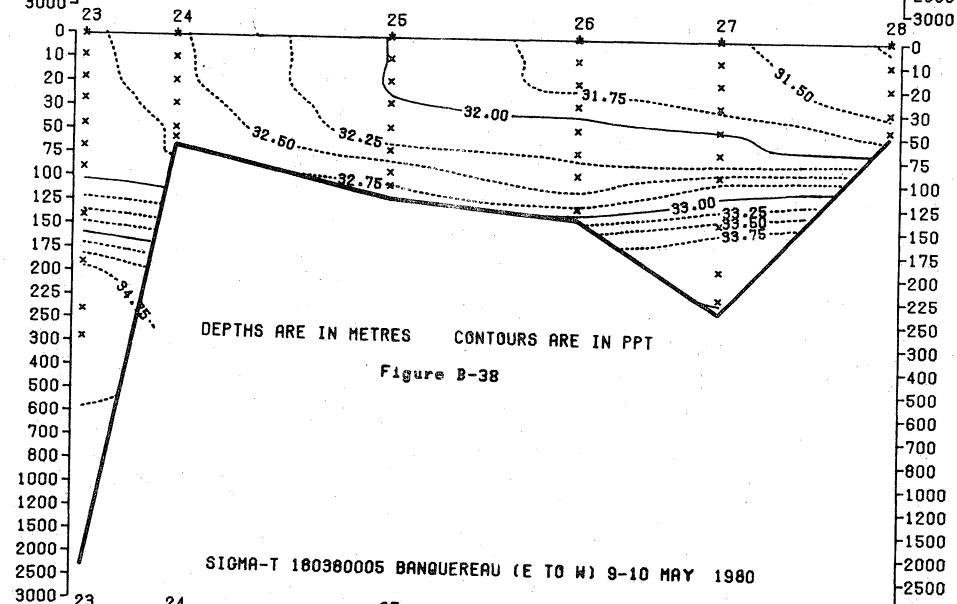
TEMPERATURE 180380005 BANQUEREAU (E TO W) 9-10 MAY 1980



DEPTHS ARE IN METRES CONTOURS ARE IN DEGREES C

Figure B-37

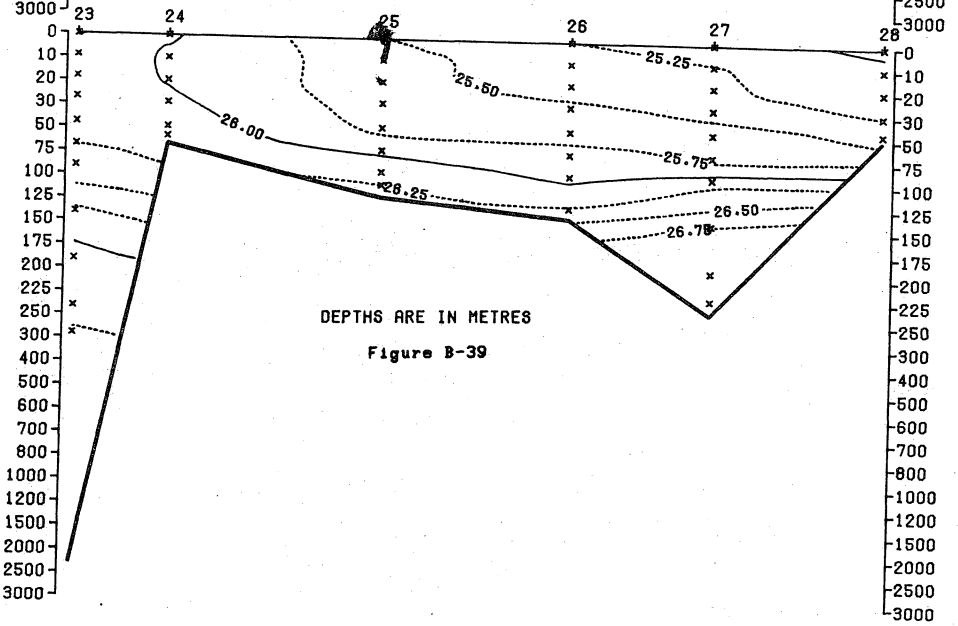
SALINITY 180380005 BANQUEREAU (E TO W) 9-10 MAY 1980



DEPTHS ARE IN METRES CONTOURS ARE IN PPT

Figure B-38

SIGMA-T 180380005 BANQUEREAU (E TO W) 9-10 MAY 1980



DEPTHS ARE IN METRES

Figure B-39