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Marine Environmental Data Service Progress Report for 1979-1980

by

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1. Introduction

The Marine Environmental Data Service has been active this year in acquiring, processing and archiving oceanographic data collected in the NAFO area in 1979. This report presents a review of the data submitted to MEDS. From NAFO documents, inventory forms, and personal communications, a list of reported data collections in 1979 was compiled and this compares favourably with data received. MEDS has reviewed the contents of its report last year (ICNAF Res. Doc. 79/VI/118) to try to ascertain how much of the reported data outstanding at that time had been received subsequent to that report. Unfortunately, it appears that few of these data have reached MEDS. This is also true of the outstanding historic data collected by the USSR. From the available 1979 data, MEDS has again produced a review of environmental conditions along standard sections in the NAFO area. Finally, there is a discussion of how members of NAFO can assist MEDS to improve its services as the regional data center for NAFO.

2. Inventory of Data Collected in the NAFO Area

(a) Reported Data Collections in 1979

This year, four inventory forms listing data collections were received. These were from Denmark, Poland, the Federal Republic of Germany, and the USSR. Other reported data collections were found in NAFO documents, Canadian cruise reports, and personal communications.

Table 1 summarizes the reported data collections which have not yet been received by MEDS. Where it was possible, the number of reported stations has been included. Blanks in the table indicate that there was no information available. In total there are upwards of 3,100 stations where data were collected in 1979 and which have not yet reached MEDS.

(b) Data from 1979 Received and Processed

Table 2 lists cruises from 1979 from which data have been received and processed. There are a total of 114 cruises with 3,031 hydro stations and 4,543 BT stations. The bulk of these data were collected by Canadian vessels, although data from about 1,000 hydro stations were received from the USSR. Assuming that Table 1 contains most of the outstanding data, MEDS has received about 70% of the data collected in the NAFO area in 1979. This compares to the figures presented in 1978, when MEDS reported less than 30% of the reported data as received. Appendix A presents cruise tracks for the cruises listed in Table 2. It was not possible to present them all, as the appropriate data bases had not been updated to make the data readily available. Those for which no cruise tracks are presented have a * beside the track chart number.

(c) Historical Data Acquisition

Last year's report by MEDS listed in Table 1 data reported as collected in 1978 in the NAFO area but not yet received by MEDS. A review of MEDS data holdings from 1978 was able to identify only the Danish data as having been received at MEDS after June 1979. None of the outstanding BT or CTD data have been received, although MEDS has been less aggressive in attempting to acquire these data. It appears that unless submission to MEDS is prompt, the data are much more difficult to acquire.

Table 4 in the MEDS report for 1978-1979 listed historical data collected by the USSR from 1959 to 1977 and which was not in MEDS files. Since then, data from the May 1962 Knipovich cruise, the October to December 1972 and the June to September 1973 cruises of the Perseus III, and the Protsion cruise of April to June 1973, have been received. There are still 73 cruises outstanding. It is hoped that the individual institutes from which these cruises originated and the national representative for the USSR can hasten the provision of these data to MEDS.

3. The Flemish Cap Project and IGOSS

The data products discussed in last year's report have been compiled by J. Gagnon (1980). This document displays cruise tracks and lists the messages received from the cruises. It is available upon request from MEDS.

4. Environmental Conditions of the NAFO Area in 1979

MEDS has attempted to review some of the data received from 1979 cruises to summarize the environmental conditions. This year, data from nine of the sections are presented. Table 3 lists these sections and the dates on which they were sampled, and Appendix B contains the contoured data. These data have been machine-contoured using the same procedures as last year.

5. Discussion

(a) Subarea 1

Only one Fylla Bank section has been received by MEDS for 1979, and it was being processed at the time this report was being prepared.

(b) Subarea 2 - Seal Island

This section was run four times in 1979. The temperature data collected in August appear to have a slightly larger volume of water colder than -1°C compared to Templeman's (1975) average conditions. In contrast to the average, this water is not continuous across the shelf. In general, the conditions do not appear to be substantially different from average conditions.

The November data from this section can only be compared to those presented in MEDS report of last year. There appears to be little difference apart from there being more water colder than 0°C in 1979. The two sections, run a day apart, show substantial changes in the colder water and therefore suggest the time scale of some of the variability along this section.

(c) Subarea 3

(i) White Bay: The first time this section was sampled was in May.

Unfortunately, there are no published sections to which these data may be compared.

This section was also sampled in August about the same time last year (stations 48 and 89 coincide). Although the scales are different, there does not appear to be any striking differences.

(ii) USSR-7A: This is not a standard NAFO section, but it was sampled twice in 1979. It is included in this report because this section has been frequently sampled in the past, and therefore a sizable dataset exists for comparisons. Neither Templeman nor last year's report by MEDS present or discuss data from this section.

(iii) W. Bonavista: This was sampled once in 1979 in May, whereas last year it was sampled in August. The strong stratification apparent in the August section is not yet developed in May.

(iv) E. Bonavista: This leg of the Bonavista section was also sampled in May of 1979. Water from the inshore branch of the Labrador Current is in evidence at about 100 m on the shelf. Absent is the very warm water shown at about 200 m in figure 16 of last year's MEDS report.

(v) N. Bonavista: This was sampled in May, but there are no other published sections from May to which these data may be compared. The inshore branch of the Labrador Current is clearly visible at about 100 m on the shelf.

The section sampled in August can be compared to Templeman's average conditions and to the data presented in last year's report. There are no striking departures from the average temperatures nor from those presented in last year's report. The only difference appears to be slightly cooler surface conditions in 1979 compared to the average.

(vi) Flemish Cap: Data from this section were collected on five occasions in 1979. Only temperature sections for March, April and May are shown because of problems with the salinity data. There are no other sections to which these may be compared. The data from the April section from stations 8 to 12 were surface and bottom readings only.

The data from late May are shown, but there are no available comparisons to be made.

The section run in late July shows a temperature distribution on the Grand Banks similar to Templeman's average conditions. On Flemish Cap, however, bottom temperatures are about 0.5°C warmer than average. Comparing these data to last year, 1979 conditions are warmer on Flemish Cap.

(vii) USCG-3: This section was sampled in April and August of 1979. Only the August section may be compared to Templeman's averages. There is very little difference to be seen, except perhaps that the colder water on the shelf break does not penetrate as deeply in 1979 as Templeman shows.

(viii) S.W. Grand Banks: The section run in August may be compared to figure 20 in last year's report. This year, the conditions are warmer by about 1°C at the bottom than were seen last year. Surface temperatures appear to be about the same.

6. Summary

This report shows sustained oceanographic activity by members of NAFO in the last year. It has highlighted some difficulties which MEDS is having in fulfilling its role as a regional data centre. It is clear that data collected in past years have not all been submitted to MEDS, although the record of the last year appears to show improvement. MEDS is attempting to increase its awareness of oceanographic collections so that it may better determine the completeness of its files. MEDS would like to encourage NAFO members to continue to send inventory forms and data as promptly as possible.

This year, data from nine standard sections were available to MEDS and are presented in this report. A review of oceanographic conditions was made where comparisons to other years were available. With the recommendation of an environmental review to be done for the 1970's (SCS DOC 80/VI/25), it is hoped that the problem of basis conditions for comparisons will be addressed. This matter has come up before and was deferred pending the acquisition by MEDS of the outstanding data. This has not occurred to a significant degree, so that it would seem necessary to proceed in spite of the obvious gaps in data. Unless the data submission is sharply accelerated, it will

be impossible for those data outstanding to be included in the review, with a consequent reduction in quality. MEDS would like to encourage national representatives to increase the speed of data submission to MEDS where this is possible, and to accelerate the transmission of historic data to MEDS files. In particular, in light of the proposed decadal review, emphasis should be placed on outstanding data collected along standard sections.

7. References

(1) Gagnon, J. 1980. "Real-time Oceanographic Data Transmitted During the 1979 Flemish Cap (47°N, 45°W) International Experiment." Marine Environmental Data Service, Data Record Series No. 1, 11 pp.

(2) Templeman, W. 1975. "Comparison of Temperatures in July-August Hydrographic Sections of the Eastern Newfoundland Area in 1972 and 1973 with Those from 1951 to 1971." ICNAF Special Publication No. 10, pp. 17 - 31.

TABLE 1: Data Collections Reported in the NAFO Area in 1979 and Not Yet Received by MEDS

Subarea	Country	Ship	Date (1979)	Reference	Number of Stations			
					Unspecified	CTD	BT	BOT
1D, 1E, 1F	Germany, F.R.	Walter Herwig	28 Oct. - 15 Nov.	Inventory		62	9	12
1B	Denmark	Adolf Jensen	7 July	SCS 80/VI/17				6
1C	Denmark	Adolf Jensen	7 - 8 July	SCS 80/VI/17				5
1D	Denmark	Adolf Jensen	12 Feb.	SCS 80/VI/17				5
1D	Denmark	Adolf Jensen	13 June	SCS 80/VI/17				5
1D	Denmark	Adolf Jensen	11 July	SCS 80/VI/17				5
1A	Denmark	Adolf Jensen	?	Inventory				7
1B	Denmark	Adolf Jensen		Inventory				9
1C	Denmark	Adolf Jensen		Inventory				4
1D	Denmark	Adolf Jensen		Inventory				12
1E	Denmark	Adolf Jensen		Inventory				1
1F	Denmark	Adolf Jensen		Inventory				1
	Poland	Wieczno	7 Oct. - 21 Nov.	Inventory	193			
2J	Germany, F.R.	Walter Herwig	27 Nov. - 10 Dec.	SCR 80/VI/58		75		2
4	U.S.S.R.	Viandra	July - Nov.	SCC 80/VI/18	490			
4, 5, 6	Germany, F.R.	Anton Dohrn	10 Feb. - 20 Mar.	SCR 80/VI/93	125			
4, 5, 6	Germany, F.R.	Anton Dohrn	27 Sept. - 19 Oct.	SCR 80/VI/93	93			
5	U.S.A.	Clearview IV	Oct.	SCR 80/VI/67			X	
5	U.S.A.	Clearview IV	Aug.	SCR 80/VI/67			X	
5	Poland	Wieczno	Oct.	SCR 80/VI/67			X	
6	U.S.A.	Endeavor	Aug.	SCR 80/VI/67			X	
	G.D.R.	Eisbar	20 Apr. - 9 May	SCR 80/VI/104			X	
	U.S.S.R.	Belogorsk	10 Mar. - 13 Apr.	SCR 80/VI/98	54			
$5Z_w$	U.S.A.	Unimak	14 Jan.	SCR 80/VI/64			10	
$5Z_w$	U.S.A.	Oceanus	23 Jan.	SCR 80/VI/64			10	
$5Z_w$	U.S.A.	Mt. Mitchell	21 Feb.	SCR 80/VI/64			10	
$5Z_w$	U.S.A.	Oceanus	25 Feb.	SCR 80/VI/64			10	
$5Z_w$	U.S.A.	Endeavor	1 May	SCR 80/VI/64			10	
$5Z_w$	U.S.A.	Delaware II	17 May	SCR 80/VI/64			10	
$5Z_w$	U.S.A.	Endeavor	23 May	SCR 80/VI/64			10	
$5Z_w$	U.S.A.	Endeavor	5 June	SCR 80/VI/64			10	
$5Z_w$	U.S.A.	Endeavor	1 July	SCR 80/VI/64			10	
$5Z_w$	U.S.A.	Endeavor	8 July	SCR 80/VI/64			10	
$5Z_w$	U.S.A.	Endeavor	26 July	SCR 80/VI/64			10	
$5Z_w$	U.S.A.	Oceanus	20 Sept.	SCR 80/VI/64			10	
$5Z_w$	U.S.A.	Delaware II	10 Oct.	SCR 80/VI/64			10	
$5Z_w$	U.S.A.	Albatross IV	17 Oct.	SCR 80/VI/64			10	
$5Z_w$	U.S.A.	Endeavor	23 Oct.	SCR 80/VI/64			10	
$5Z_w$	U.S.A.	Albatross IV	10 Dec.	SCR 80/VI/64			10	
6A	U.S.A.	Delaware II	6 - 7 Jan.	SCR 80/VI/66			7	
6A	U.S.A.	Tamarda	30 Jan.	SCR 80/VI/66			12	
6A	U.S.A.	Delaware II	3 - 8 Mar.	SCR 80/VI/66			16	
6A	U.S.A.	Mormac Argo	23 Mar.	SCR 80/VI/66			21	
6A	U.S.A.	Delaware II	5 - 16 Apr.	SCR 80/VI/66			18	

Table 1 (Continued)

Subarea	Country	Ship	Date (1979)	Reference	Number of Stations Unspecified	CTD	BT	BOT
6A	U.S.A.	Advance II	20 - 21 Apr.	SCR 80/VI/66			6	
6A	U.S.A.	Mormac Rigel	5 May	SCR 80/VI/66			24	
6A	U.S.A.	Whiting	8 May	SCR 80/VI/66			12	
6A	U.S.A.	Mormac Argo	28 - 29 May	SCR 80/VI/66			14	
6A	U.S.A.	Mormac Rigel	7 June	SCR 80/VI/66			24	
6A	U.S.A.	Mormac Rigel	16 June	SCR 80/VI/66			24	
6A	U.S.A.	Albatross IV	5 July	SCR 80/VI/66			7	
6A	U.S.A.	Tamarda	18 - 19 July	SCR 80/VI/66			16	
6A	U.S.A.	Mormac Rigel	22 July	SCR 80/VI/66			23	
6A	U.S.A.	Mormac Argo	28 July	SCR 80/VI/66			22	
6A	U.S.A.	Albatross IV	1, 5 - 7 Aug.	SCR 80/VI/66			16	
6A	U.S.S.R.	Belogorsk	18 - 21 Aug.	SCR 80/VI/66			17	
6A	U.S.A.	Tamarda	23 Aug.	SCR 80/VI/66			12	
6A	U.S.A.	Kelez	17 - 18 Sept.	SCR 80/VI/66			17	
6A	U.S.A.	Mormac Rigel	23 Sept.	SCR 80/VI/66			25	
6A	U.S.A.	Mormac Rigel	4 - 5 Oct.	SCR 80/VI/66			25	
6A	U.S.A.	Vigorous	5 Oct.	SCR 80/VI/66			15	
6A	U.S.A.	Mormac Argo	26 Oct.	SCR 80/VI/66			23	
6A	U.S.A.	Mormac Argo	3 Nov.	SCR 80/VI/66			23	
6A	U.S.A.	Mormac Rigel	15 - 16 Nov.	SCR 80/VI/66			25	
6A	U.S.A.	Mormac Rigel	1 Dec.	SCR 80/VI/66			17	
6A	U.S.A.	Mormac Argo	5 Dec.	SCR 80/VI/66			20	
6A	U.S.A.	Mormac Argo	14 Dec.	SCR 80/VI/66			12	
3	Canada	Dawson	13 - 29 July	DNP List MEDS		133		133
3	Canada	Hudson	8 Jan. - 31 Mar.	DNP List MEDS				
3, 4	Canada	Hudson	14 May - 8 June	DNP List MEDS				
4	Canada	Hudson	18 Apr. - 4 May	DNP List MEDS		20		20
3, 4	Canada	Hudson	9 - 31 Aug.	DNP List MEDS				
4	Canada	Dawson	19 - 24 Mar.	DNP List MEDS		9		9
4	Canada	Dawson	9 - 22 Apr.	DNP List MEDS				
4	Canada	Dawson	24 - 30 Apr.	DNP List MEDS	500 T, S surface	37		37
4	Canada	Dawson	30 Apr. - 6 May	DNP List MEDS				
4	Canada	Dawson	14 May - 8 June	DNP List MEDS		44	44	44
4	Canada	Dawson	18 - 29 June	DNP List MEDS				
4	Canada	Dawson	5 - 11 July	DNP List MEDS				
4	Canada	Dawson	11 - 13 July	DNP List MEDS				
4	Canada	Dawson	6 - 11 Aug.	DNP List MEDS				
4	Canada	Dawson	11 - 19 Aug.	DNP List MEDS				
4	Canada	Dawson	12 Sept. - 7 Oct.	DNP List MEDS				
4	Canada	Dawson	15 - 26 Oct.	DNP List MEDS		34		
4	Canada	Dawson	26 Oct. - 9 Nov.	DNP List MEDS		19		23
4	Canada	Dawson	26 Nov. - 1 Dec.	DNP List MEDS				
6	Canada	Dawson	14 - 22 Nov.	DNP List MEDS		65		61
6	Canada	Hudson	7 Sept. - 5 Oct.	DNP List MEDS				
				TOTALS	1,455	498	706	401

TABLE 2: Data, Collected in the NAFO Area in 1979, Received and Processed by MEDS

Track Chart Number	MEDS ID	Date	Subarea	Number of Stations Bottle	BT
1	07BW79001	20 Nov. - 13 Dec.	2H, 2G, 2J	74	
2	180179051	15 May - 29 Oct.	4T	35	
3	180379001	3 - 10 Feb.	4X	41	
4	180379002	5 - 11 Mar.	4X, 4W	48	
5	180379003	23 Jan. - 2 Feb.	4W	37	
6	180379004	21 - 29 Mar.	4W, $4V_s$	73	
7	180379005	21 - 30 Mar.	4W, 4X	60	
8	180379006	23 - 30 Mar.	4X, $5Z_e$	120	
9	180379007	2 - 25 Apr.	4W, 4X	124	
10	180379008	15 May - 1 June	4W, $4V_s$	106	
11	180379009	7 - 14 July	4W, 4X	65	
12	180379010	14 - 16 July	4W	16	
13	180379011	19 - 27 July	4W, $4V_s$	74	
14	180379012	25 July - 2 Aug.	4X, 5Y	114	
15	180379015	8 - 12 Aug.	4X, 5Y	48	
16	180379016	20 - 26 Aug.	4X, 5Y	116	
17 *	180379018	24 Sept. - 12 Oct.	4W, 4X, $4V_s$	91	
18	180379019	16 - 25 Oct.	4W, $4V_s$	62	
19 *	180379020	30 Oct. - 8 Nov.	4W, 4X, $5Z_e$	67	
20	180379021	31 Oct. - 6 Nov.	4X, 5Y, $5Z_e$	115	
21	180379022	4 - 20 Aug.	4X, 4W, $4V_s$	126	
22	180379023	24 Aug. - 10 Sept.	4X, 4W, $4V_s$	125	
23	180379024	14 Nov. - 5 Dec.	4X, 4W, $4V_s$	118	
24	180579007	27 July - 13 Aug.	$3P_s$, 3O, 3L, 3M	91	
25	180579008	17 - 18 Oct.	3L	4	
26	180579009	7 - 14 Nov.	3L, 3K	34	
27	180579010	25 - 26 Sept.	3L	4	
28	180579011	24 Oct.	3L	4	
29	180579012	23 Nov. - 5 Dec.	2J, 3K, 3L	12	
30	180579019	16 - 19 Mar.	3L	17	
31	180579020	21 - 30 Apr.	3L	73	
32	180579021	2 - 13 May	3N, 3M, 3L	86	
33	180579023	4 - 10 July	3L	6	
34	180579024	14 Aug.	2H	4	
35	180579026	10 Jan. - 6 Dec.	3L	18	
36	182979005	26 - 29 Sept.	4T	61	
37	90GE79017	4 Apr. - 2 June	3N	206	
38	90GE79018	5 Aug. - 3 Dec.	3L	6	
39	90PK79032	10 May - 22 June	3L	15	
40	90SU79002	20 Mar. - 18 June	3N	311	
41	90SU79003	1 Aug. - 22 Dec.	1C, 1D, 1E, 2G, 2H, 2J, 3L, 3N, 3K	224 Σ=3,031	
42	180379001	3 - 10 Feb.	4X		26
43	180379002	5 - 11 Mar.	4X, 4W, 5Y, $5Z_e$		59
44	180379003	23 Jan. - 2 Feb.	4X, 4W		37

TABLE 2 (Continued)

Track Chart Number	MEDS ID	Date	Subarea	Number of Stations Bottle	BT
45	180379004	21 - 29 Mar.	4W		72
46	180379005	21 - 30 Mar.	4X, 4W		60
47	180379006	23 - 30 Mar.	4X		120
48	180379007	3 - 25 Apr.	4X, 4W, $4V_s$		112
49	180379008	15 May - 7 June	4W, $4V_s$, $4V_n$, $3P_s$		86
50	180379009	7 - 14 July	4X, 4W		78
51	180379010	14 - 16 July	4W		20
52	180379011	19 - 27 July	$3P_s$, 4W, $4V_s$, $4V_n$		88
53	180379012	25 July - 2 Aug.	5Y		114
54 *	180379013	12 - 21 June	4T		73
55 *	180379014	25 June - 3 July	4T		59
56	180379016	20 - 26 Aug.	5Y		115
57	180379017	5 Sept. - 2 Oct.	4T		75
58	180379018	25 Sept. - 12 Oct.	4X, 4W, $4V_s$, $4V_n$, $3P_s$		91
59	180379019	15 - 25 Oct.	4W, $4V_s$		74
60	180379020	30 Oct. - 8 Nov.	4X, 4W		82
61	180379021	31 Oct. - 6 Nov.	5Y		115
62	180379024	13 Nov. - 5 Dec.	4X, 4W		118
63	180579001	1 Jan. - 8 Feb.	3O		22
64	180579002	20 Feb. - 5 Mar.	3O, $3P_s$, $4V_s$		79
65	180579003	21 Apr. - 6 May	3N		86
66	180579004	28 Jan. - 20 Feb.	3L		209
67	180579005	15 Jan. - 26 Jan.	3L		14
68	180579006	23 - 24 Mar.	3L		2
69	180579007	27 July - 13 Aug.	2J, 3K, 3L, 3O, 3M		109
70	180579010	20 - 26 Sept.	2J, 3K, 3L		30
71	180579011	26 Oct. - 12 Nov.	2J, 3K, 3L		71
72	180579013	6 - 15 Jan.	3L, 3K, 4S, 4T, 4R		79
73	180579014	17 May - 3 June	3L		100
74	180579015	8 June - 1 July	3O, 3L, 3N		52
75	180579016	25 Aug. - 10 Sept.	3L, 3O, 3N, 3M		108
76	180579017	29 Sept. - 2 Oct.	3K, 3L		29
77	180579018	25 Feb. - 12 Mar.	3L		120
78	180579020	3 - 14 Oct.	2J, 3K		76
79	180579021	20 - 30 Apr.	3L		73
80	180579022	3 - 19 Aug.	2G, 2H		155
81	180579024	2 - 13 May	3L		87
82	180579025	12 - 25 June	3O		100
83	180679001	15 May - 16 June	$3P_n$, $3P_s$, 4R, 4S, 4T		82
84	181079025	11 Sept. - 2 Oct.	3N, 3M, 6G, 6H		36
85	181879001	30 Jan. - 1 Feb.	4W		6
86 *	181879002	5 Feb. - 2 Mar.	4X, 4W, 5Y, $5Z_e$, 6D, 6E		33
87 *	181879003	21 - 30 Mar.	3K, 3L, 3O, $3P_s$, 4R, $4V_n$		16

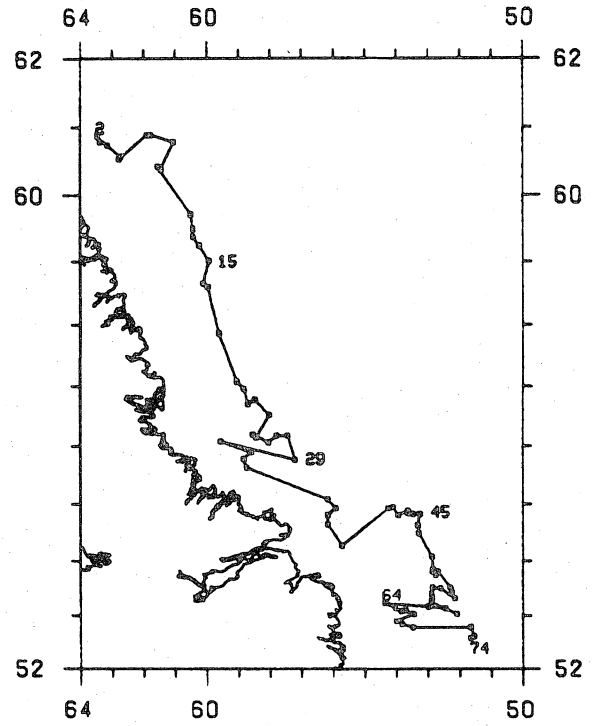
TABLE 2 (Continued)

Track Chart Number	MEDS ID	Date	Subarea	Number of Stations Bottle	Number of Stations BT
88 *	181879004	12 Sept. - 2 Nov.	1C, 1D, 1E, 1F, 2G, 2H, 2J, 3K, 3L, 3M, 3N, 3O, $3P_s$, 4R, 4S, 4T, $4V_n$, $4V_s$, 4W, 6E, 6F, 6G, 6H		72
89 *	181879005	10 - 19 Jan.	3L, 3O, 3N		15
90 *	181879006	28 Apr. - 3 June	4W, 4X, 5W, $5Z_e$, 6A, 6B, 6C, 6D, 6E		36
91 *	181879007	1 - 3 Aug.	4T, $4V_n$, 4W, 4X		8
92 *	181879008	10 Sept. - 9 Nov.	4W, 4X, 5Y, $5Z_e$, $5Z_w$, 6A, 6B, 6C, 6D, 6E		51
93 *	181879009	13 - 16 Nov.	4W		9
94 *	181879011	4 - 5 Sept.	4W		3
95 *	181879012	11 - 25 Sept.	1C, 1D, 1E, 1F, 2G, 2H, 2J, 3K, 3L, 3M, 3N, 3O, $3P_s$, $3P_n$, 4R, 4S, 4T, $4V_n$, $4V_s$, 4W, 6E, 6F, 6G, 6H		32
96 *	181879014	23 Apr. - 3 May	4X, 4W		24
97 *	181879105	20 - 24 Aug.	4X, 4W		14
98 *	181879016	8 Jan. - 8 Mar.	2J, 3K, 3L, 3M, 3N, 3O, $3P_s$, $3P_n$, 4R, 4S, 4T, $4V_n$, $4V_s$, 4W, 6E, 6F, 6G, 6H		90
99 *	181879018	14 - 17 Mar.	3O, $3P_s$, $4V_n$, $4V_s$		9
100 *	181879021	30 Jan. - 27 Mar.	4X, $5Z_e$, $5Z_w$, 6A, 6B, 6C, 6D, 6E		47
101 *	181879022	6 Aug. - 16 Nov.	1B, 1C, 1D, 1E, 1F, 2G, 2H, 2J, 3K, 3L, 3M, 3N, 3O, $3P_s$, $3V_n$, 4R, 4S, 4T, $4V_n$, $4V_s$, 4W, 4X, 5W, 5Y, $5Z_e$, $5Z_w$, 6A, 6B, 6C, 6D, 6E, 6F, 6G, 6H		98
102 *	181879024	20 - 31 Oct.	4W, 4X		49
103 *	181879025	13 - 17 Nov.	4W		23
104 *	181879026	21 - 25 Nov.	$3P_s$, 3O, $4V_n$, $4V_s$		9
105 *	181879027	31 Jan. - 7 Feb.	6E		14
106 *	181879028	9 May - 3 June	6E		71
107	183079001	15 - 25 Mar.	4T, 5Y		37
108	183079002	8 - 15 June	4T		29
109	183079003	5 - 13 July	4T		53
110 *	183079004	31 July - 8 Aug.	4T		54
111	18VY79022	4 - 20 Aug.	4W, $4V_n$, $4V_s$, $3P_s$		126
112	18VY79023	24 Aug. - 10 Sept.	4W, $4V_n$, $4V_s$, $3P_s$		125
113 *	260479001	6 - 23 Nov.	1C, 1D		7
114	90PK79032	10 May - 22 June	3K		90
					Σ=4,643

TABLE 3: Standard Sections Sampled During 1979

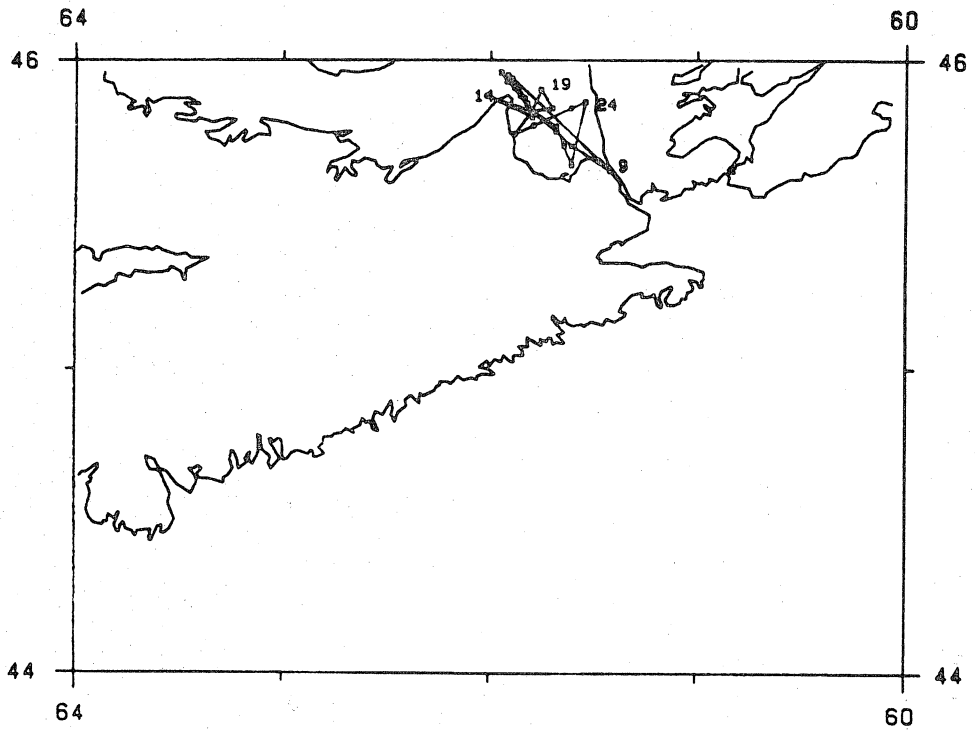
Section	Date	MEDS ID	Cruise Track	Figure
Seal Island	4 - 5 Aug.	180579007	24	B1 - 3
	1 - 2 Nov.	90SU79003	41	B4 - 6
	2 - 3 Nov.	90SU79003	41	B7 - 9
	23 - 24 Nov.	180579012	29	B10 - 12
White Bay	23 - 24 May	90GE79017	37	B13 - 15
	6 - 7 Aug.	180579007	24	B16 - 18
N. Bonavista	21 - 22 May	90GE79017	37	B19 - 21
	31 July - 1 Aug.	180579007	24	B22 - 24
W. Bonavista	26 - 27 May	90GE79017	37	B25 - 27
E. Bonavista	19 - 21 May	90GE79017	37	B28 - 30
USSR-7A	30 Apr.	180579020	31	B31 - 33
	8 - 9 Aug.	180579007	24	B34 - 36
Flemish Cap	16 - 19 Mar.	180579019	30	B37
	21 - 22 Apr.	180579020	31	B38
	3 - 5 May	180579021	32	B39
	27 May - 2 June	90GE79017	37	B40 - 42
	27 - 30 July	180579007	24	B43 - 45
S.W. Grand Bank	10 - 11 Aug.	180579007	24	B46 - 48
USCG-3	21 - 25 Apr.	90GE79017	37	B49 - 51
	12 - 13 Aug.	180579007	24	B52 - 54

APPENDIX A. CRUISE TRACKS



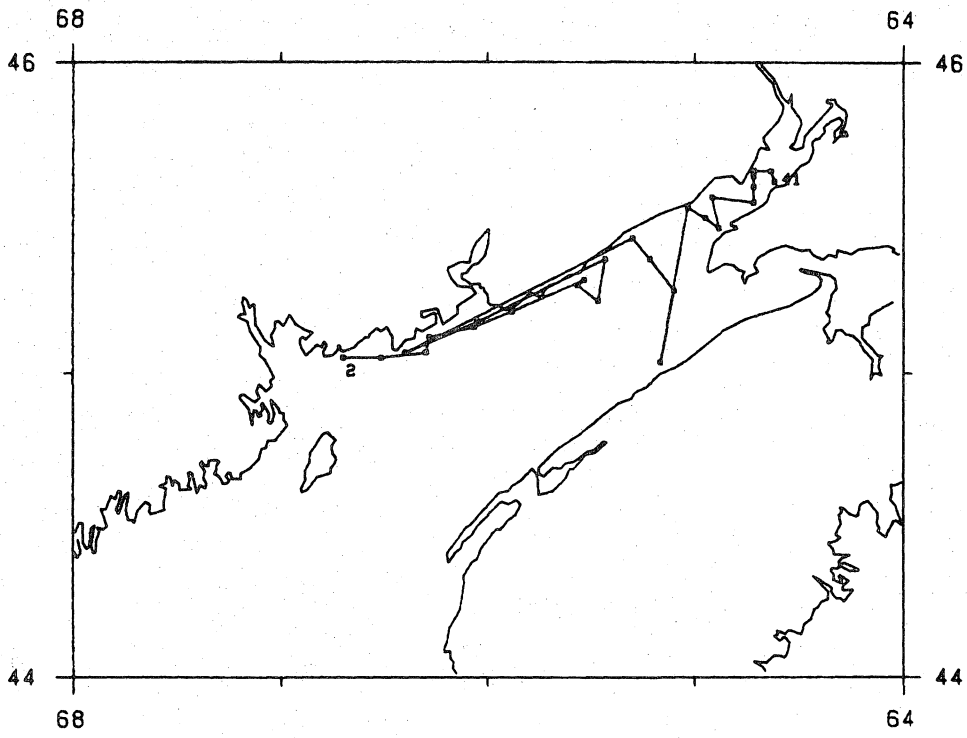
CRUISE 07BW79001 20/11/79 - 13/12/79 74 STATIONS

Figure A-1



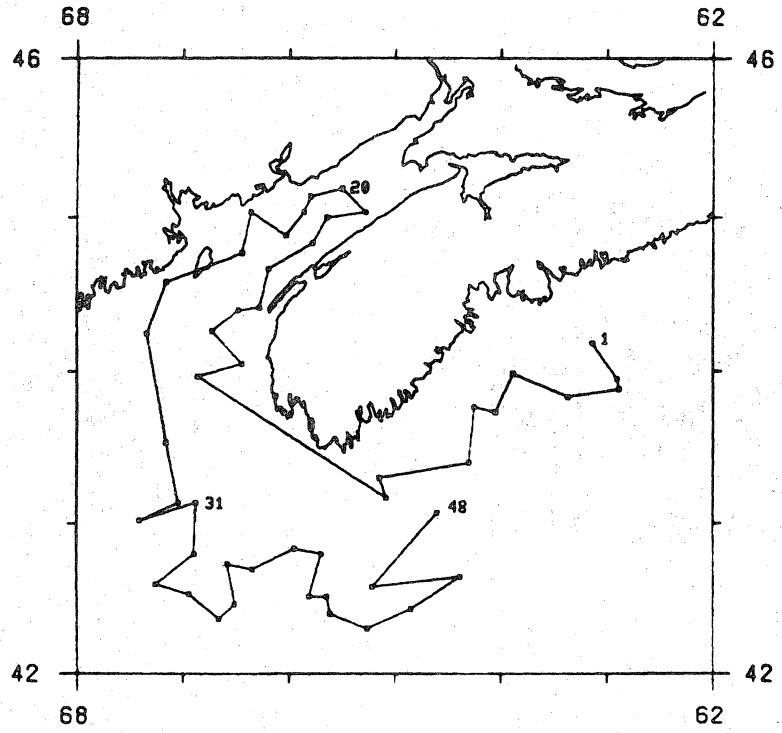
CRUISE 180179051 15/ 5/79 - 29/10/79 35 STATIONS

Figure A-2



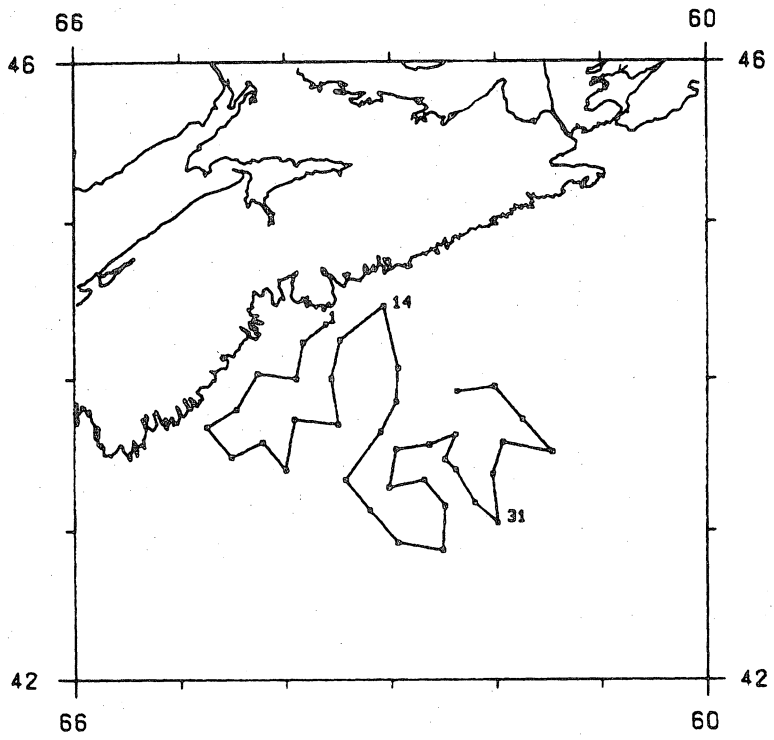
CRUISE 180379001 3/ 2/79 - 10/ 2/79 26 STATIONS

Figure A-3



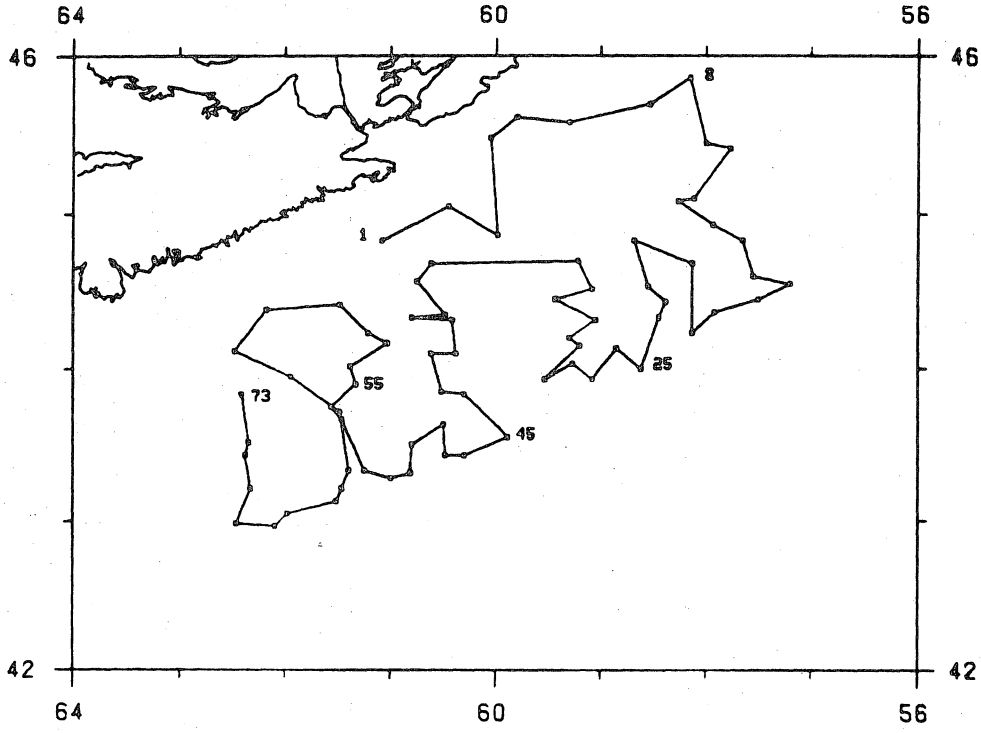
CRUISE 180379002 5/ 3/79 - 11/ 3/79 48 STATIONS

Figure A-4



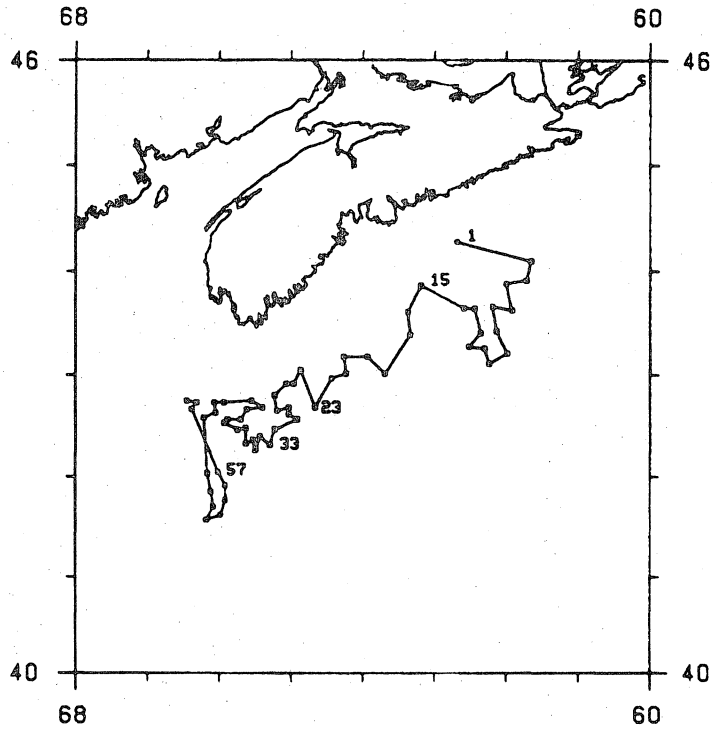
CRUISE 180379003 23/ 1/79 - 2/ 2/79 37 STATIONS

Figure A-5



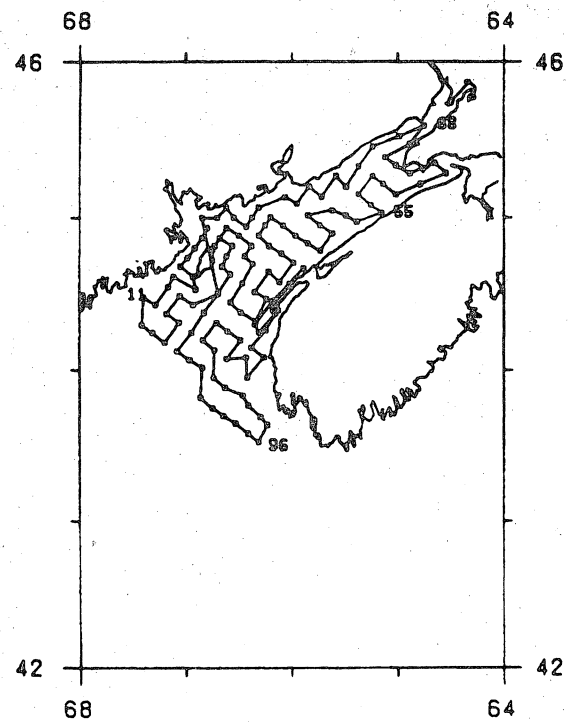
CRUISE 180379004 21/ 3/79 - 29/ 3/79 73 STATIONS

Figure A-6



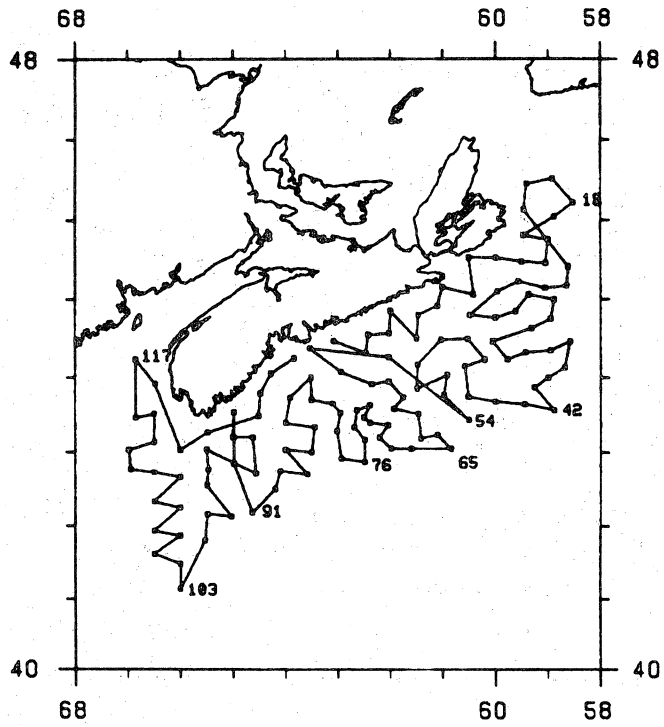
CRUISE 180379005 21/ 3/79 - 30/ 3/79 60 STATIONS

Figure A-7



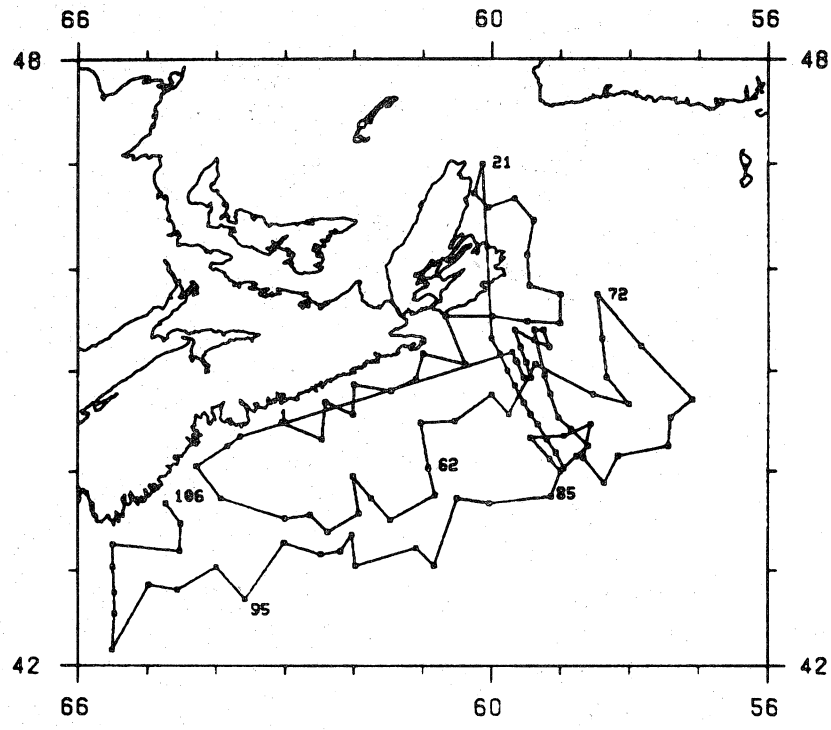
CRUISE 180379006 23/ 3/79 - 30/ 3/79 120 STATIONS

Figure A-8



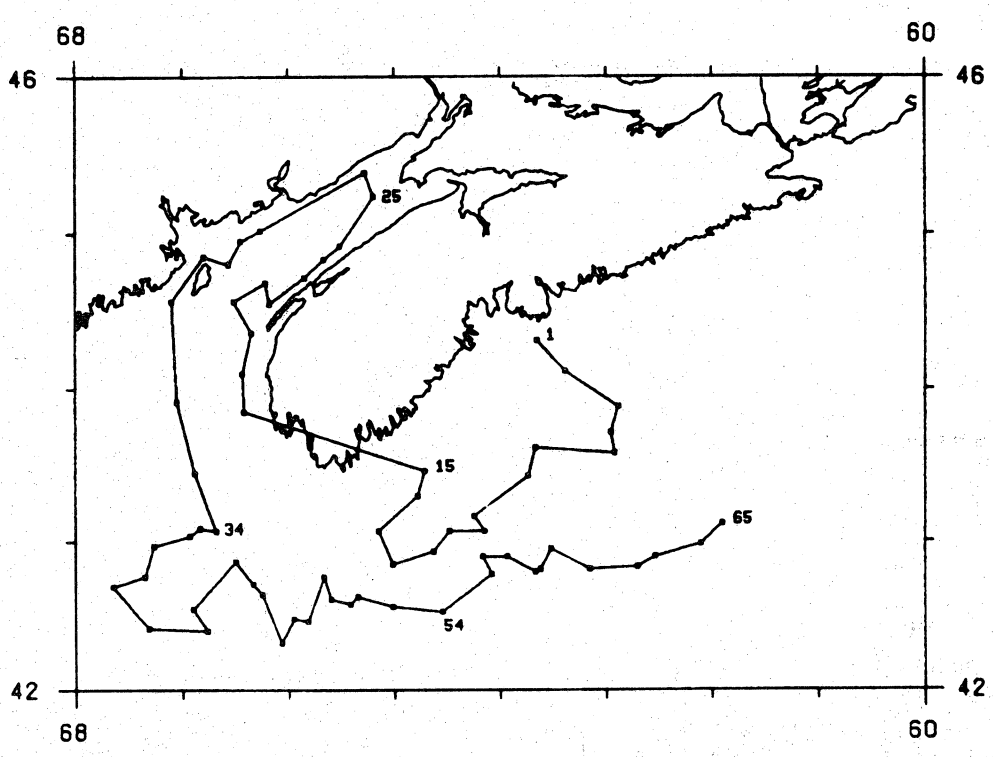
CRUISE 180379007 2/ 4/79 - 25/ 4/79 124 STATIONS

Figure A-9



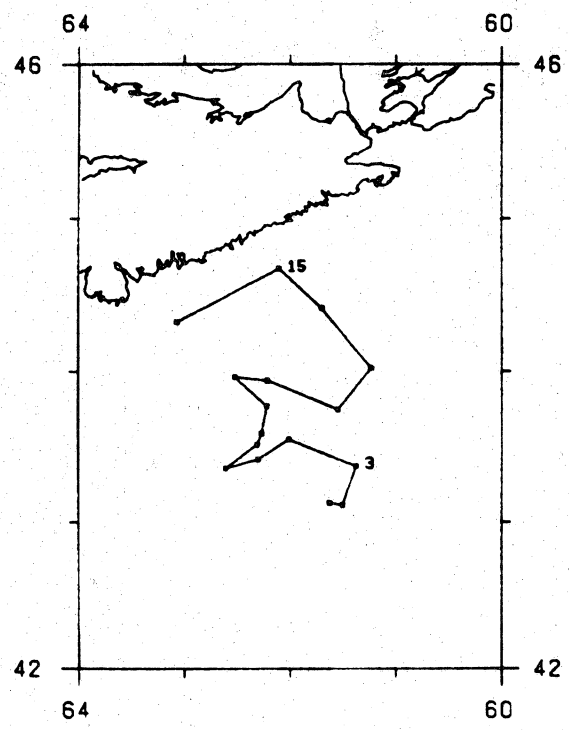
CRUISE 180379008 15/ 5/79 - 1/ 6/79 106 STATIONS

Figure A-10



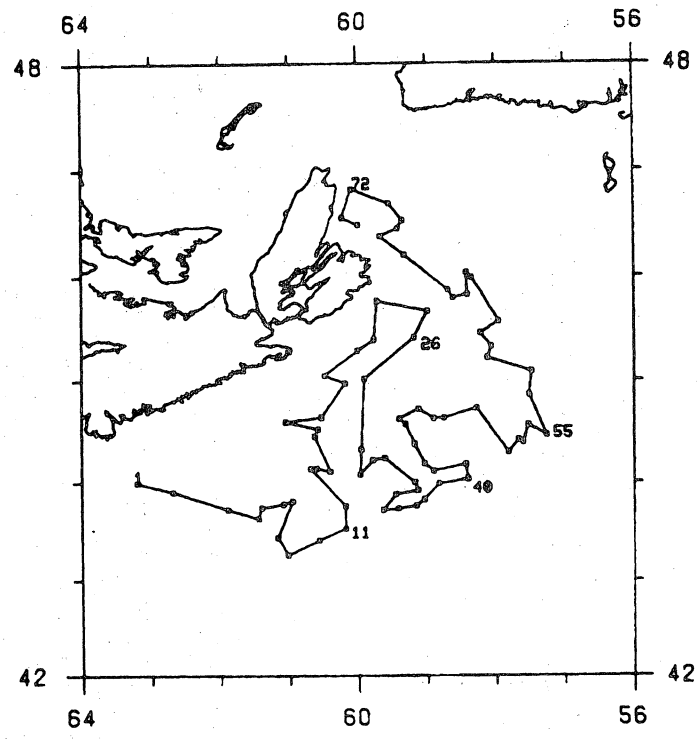
CRUISE 180379009 7/ 7/79 - 14/ 7/79 65 STATIONS

Figure A-11



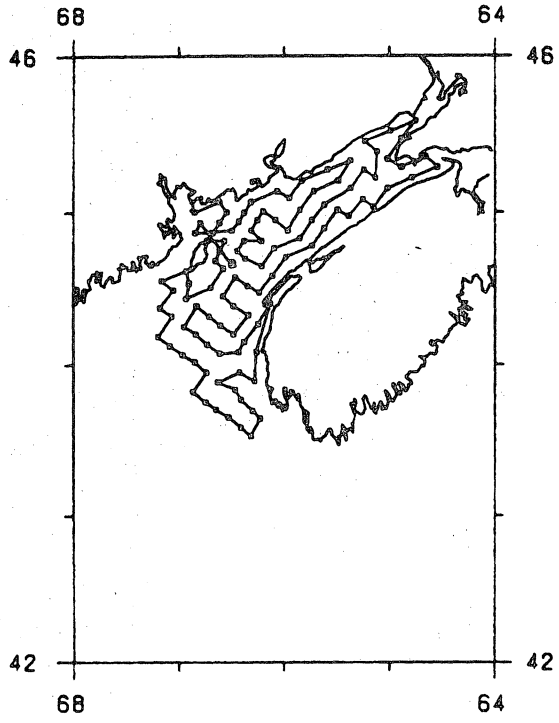
CRUISE 180379010 14/ 7/79 - 16/ 7/79 16 STATIONS

Figure A-12



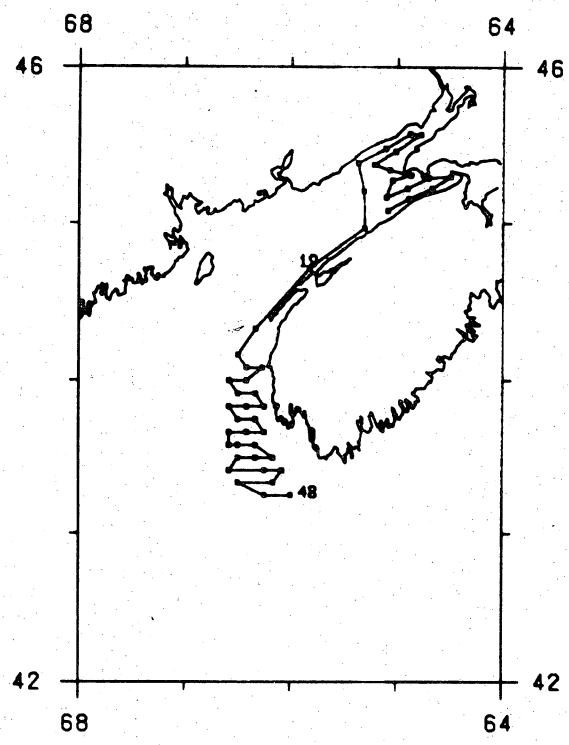
CRUISE 180379011 19/ 7/79 - 27/ 7/79 74 STATIONS

Figure A-13



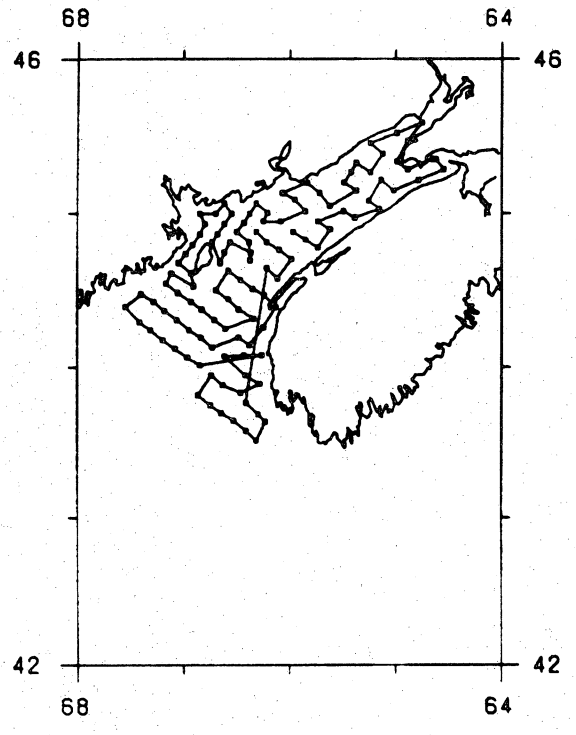
CRUISE 180379012 25/ 7/79 - 2/ 8/79 114 STATIONS

Figure A-14



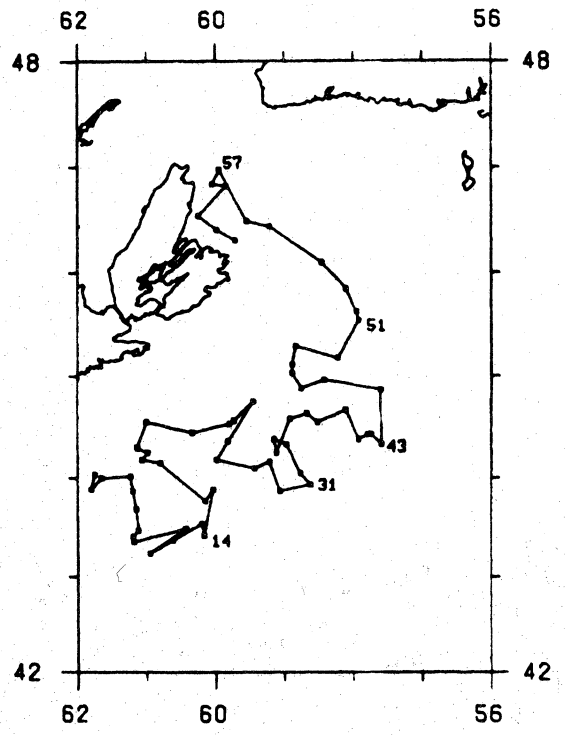
CRUISE 180379015 8/ 8/79 - 12/ 8/79 48 STATIONS

Figure A-15



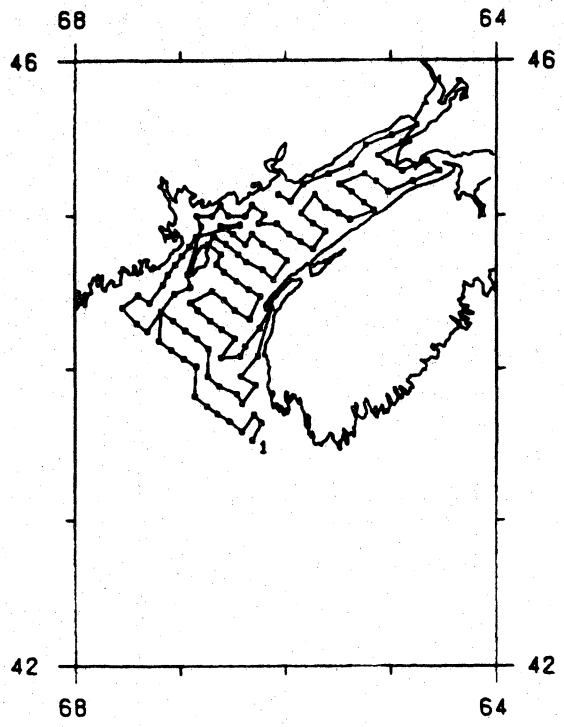
CRUISE 180379016 20/ 8/79 - 26/ 8/79 116 STATIONS

Figure A-16



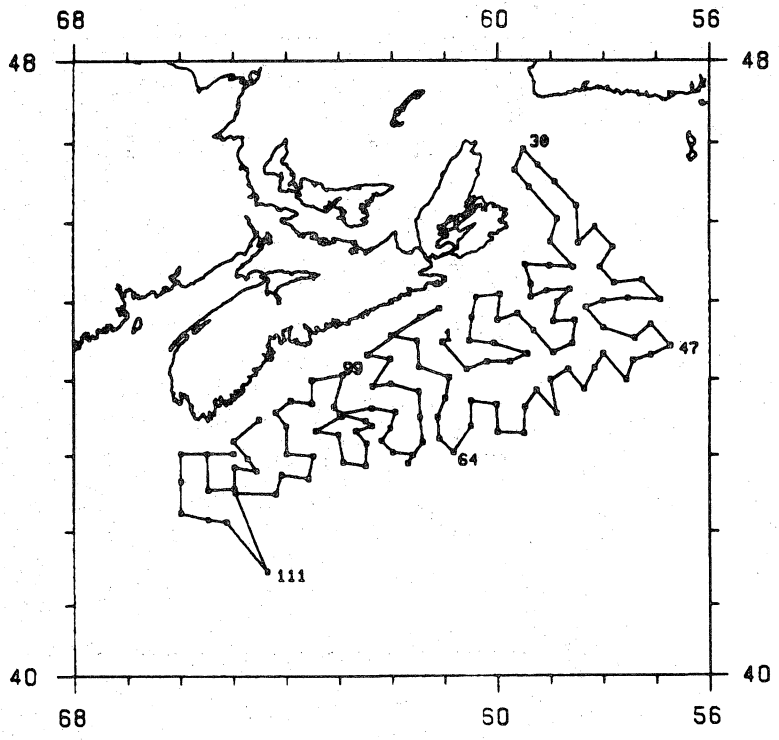
CRUISE 180379019 16/10/79 - 25/10/79 62 STATIONS

Figure A-18



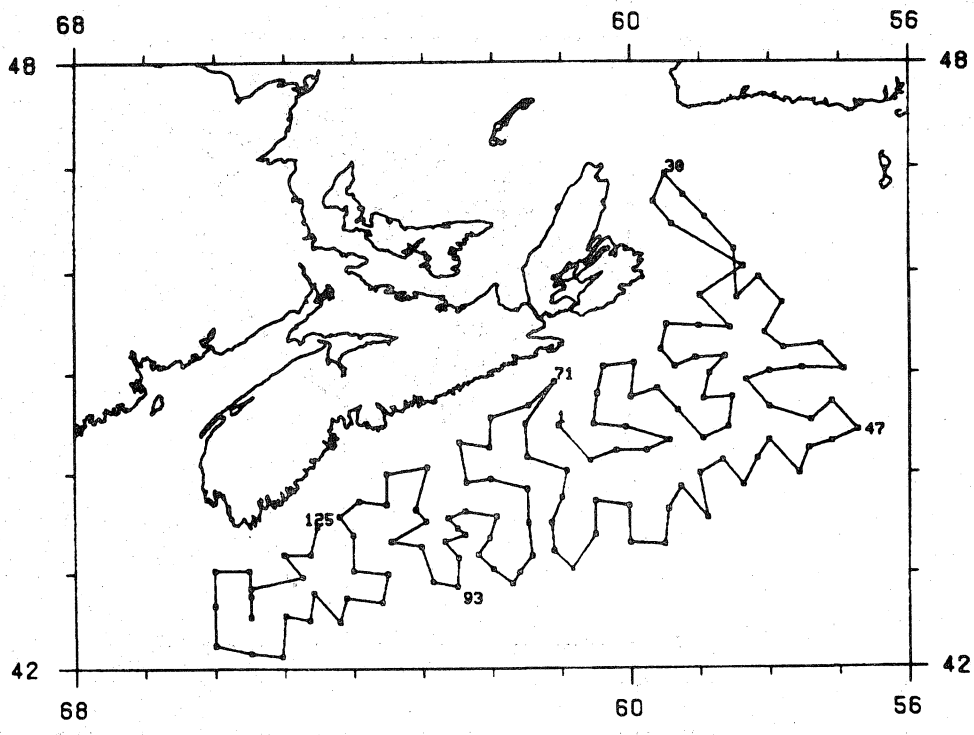
CRUISE 180379021 31/10/79 - 6/11/79 115 STATIONS

Figure A-20



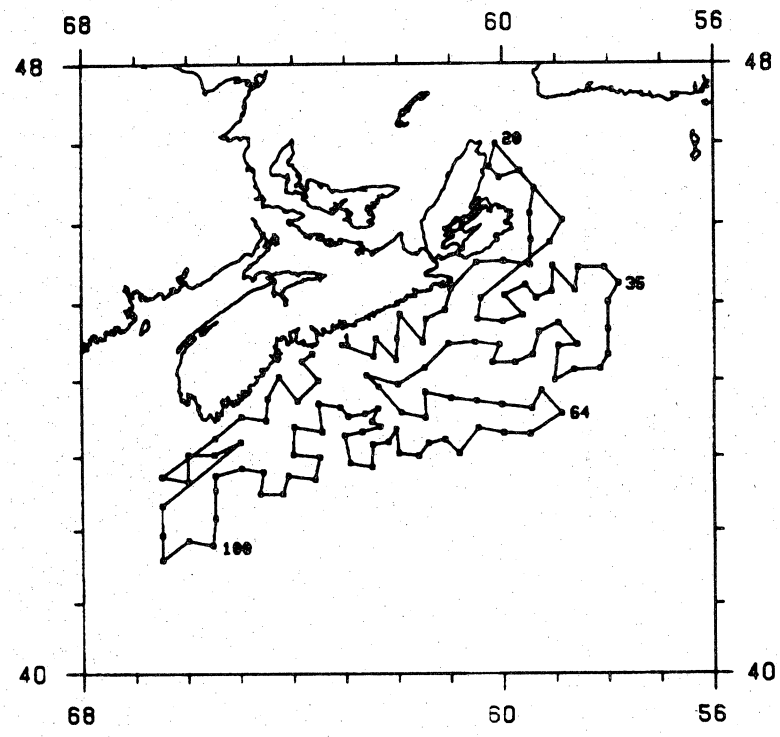
CRUISE 180379022 4/ 8/79 - 20/ 8/79 126 STATIONS

Figure A-21



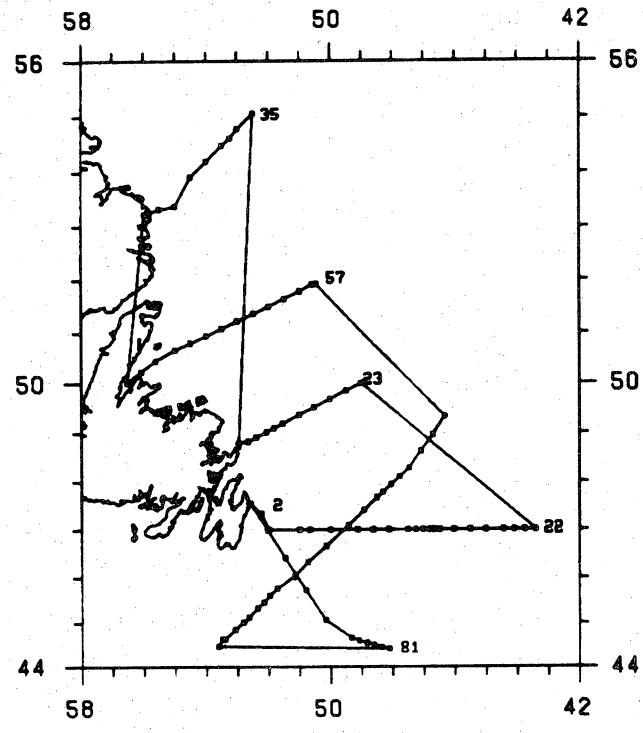
CRUISE 180379023 24/ 8/79 - 10/ 9/79 125 STATIONS

Figure A-22



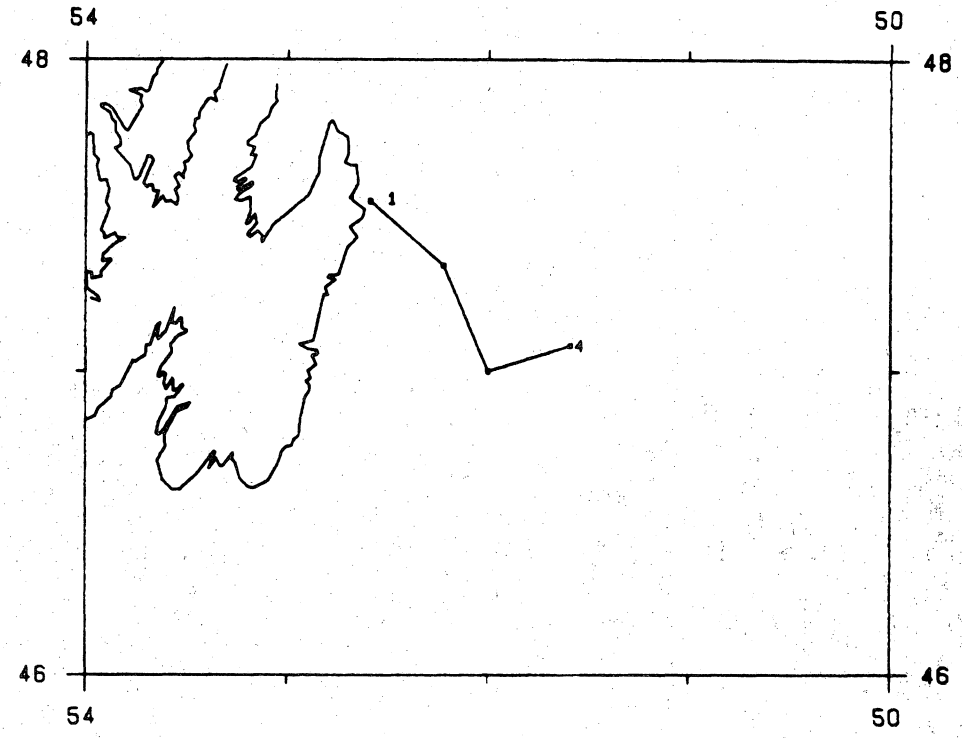
CRUISE 180379024 14/11/79 - 5/12/79 118 STATIONS

Figure A-23



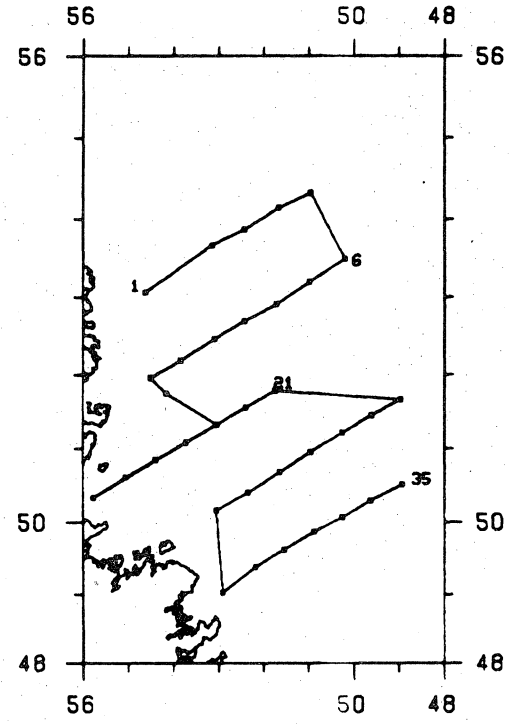
CRUISE 180579007 27/ 7/79 - 13/ 8/79 91 STATIONS

Figure A-24



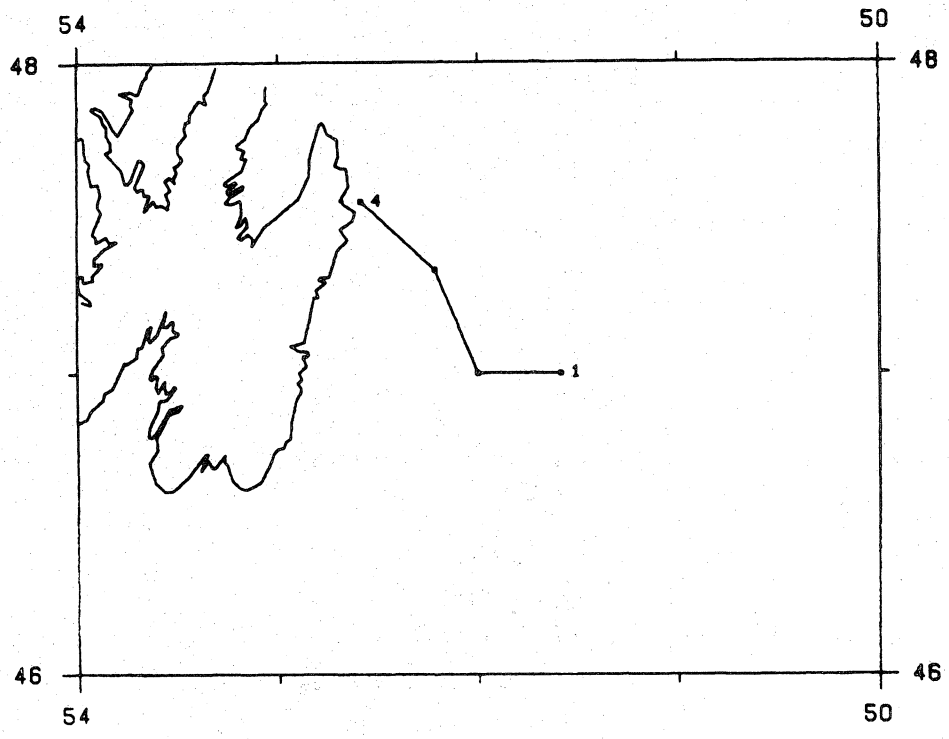
CRUISE 180579008 17/10/79 - 18/10/79 4 STATIONS

Figure A-25



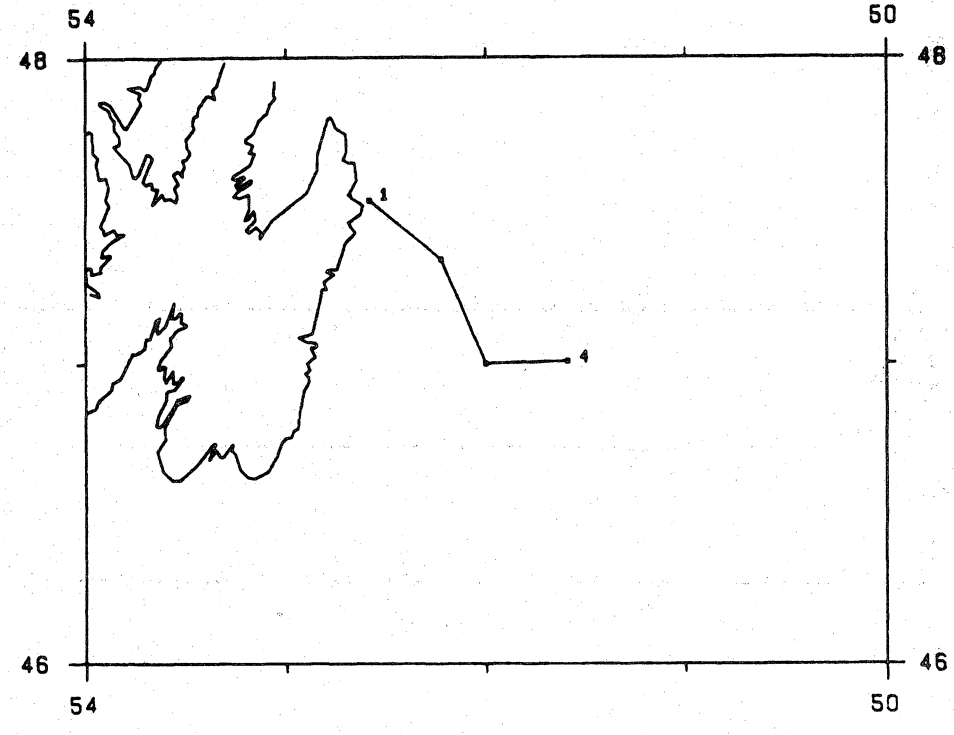
CRUISE 180579009 7/11/79 - 14/11/79 34 STATIONS

Figure A-26



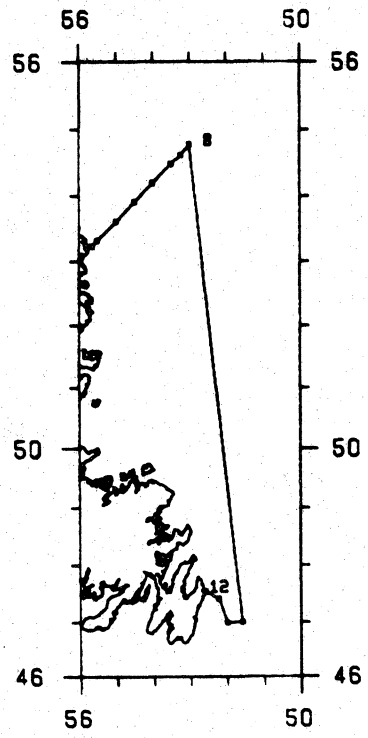
CRUISE 180579010 25/ 9/79 - 26/ 9/79 4 STATIONS

Figure A-27



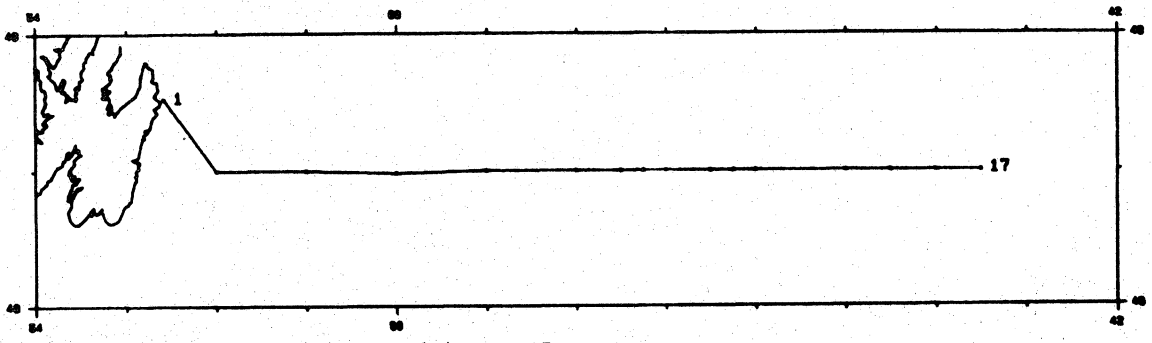
CRUISE 180579011 24/10/79 - 24/10/79 4 STATIONS

Figure A-28



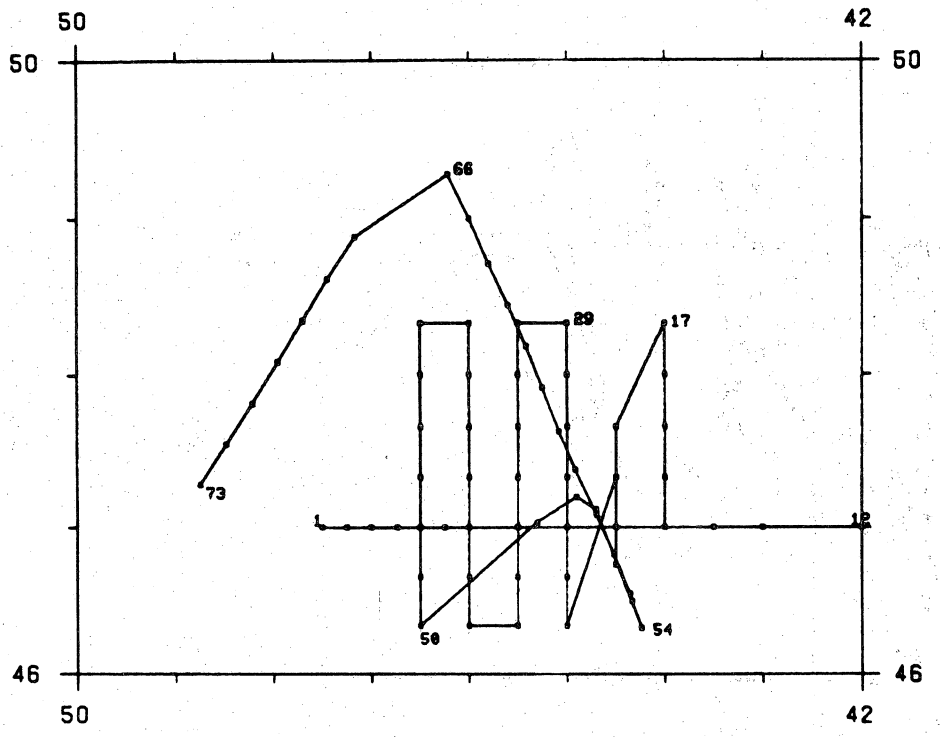
CRUISE 180579012 23/11/79 - 5/12/79 12 STATIONS

Figure A-29



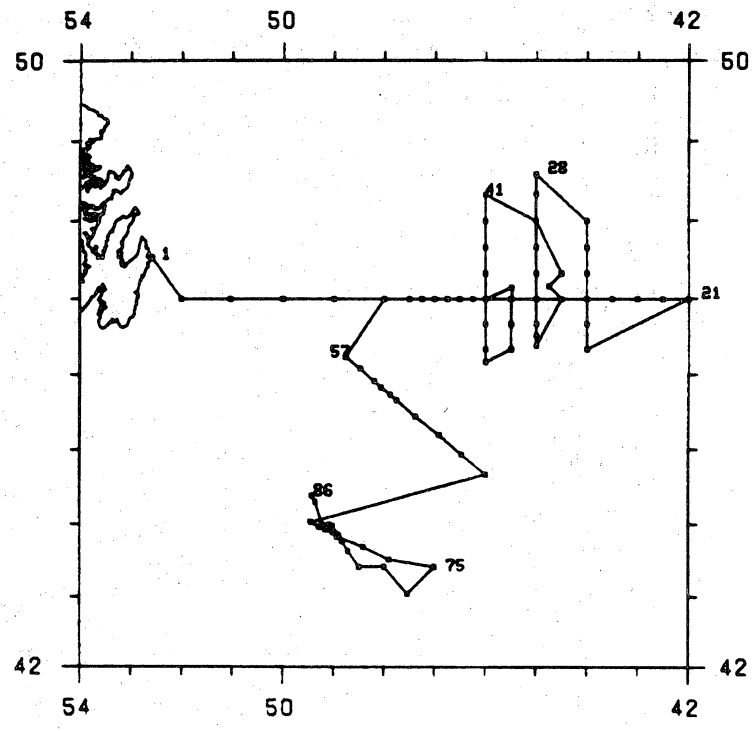
Cruise 180579019 16/3/79 - 19/3/79 17 stations

Figure A-30



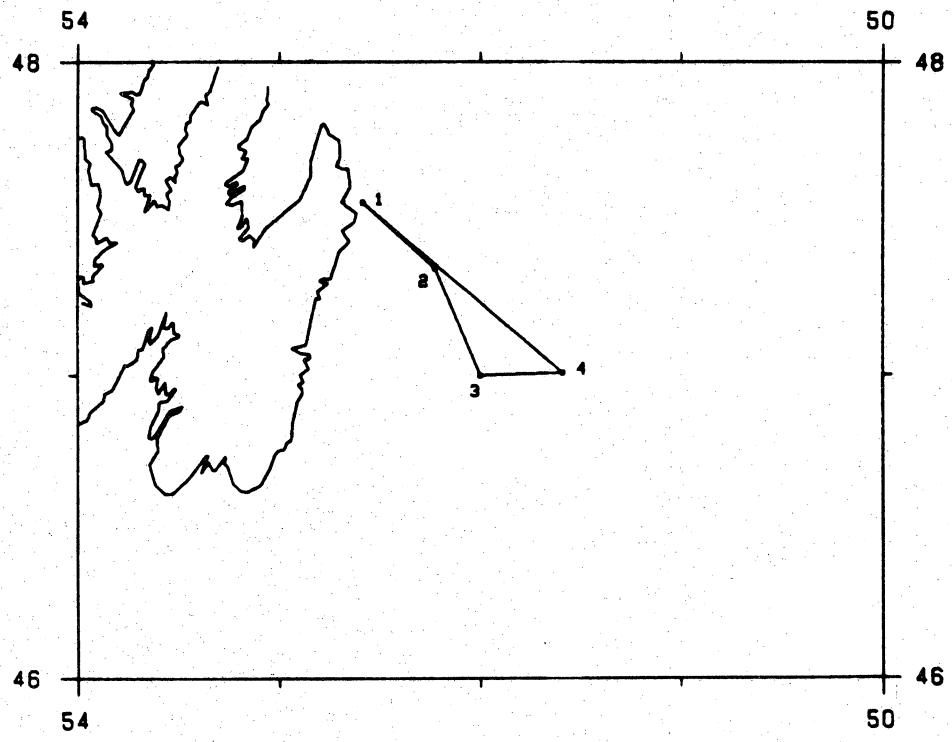
CRUISE 180579020 21/ 4/79 - 30/ 4/79 73 STATIONS

Figure A-31



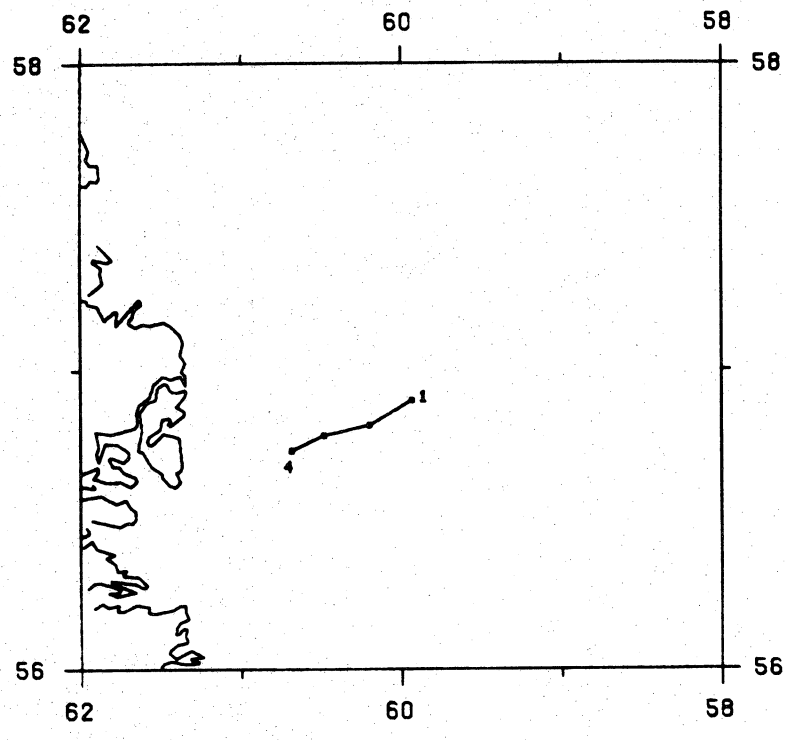
CRUISE 180579021 2/ 5/79 - 13/ 5/79 86 STATIONS

Figure A-32



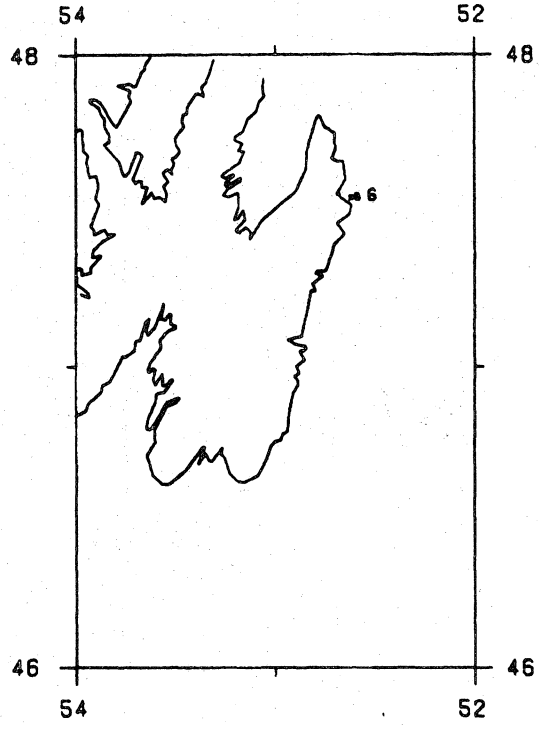
CRUISE 180579023 4/ 7/79 - 10/ 7/79 6 STATIONS

Figure A-33



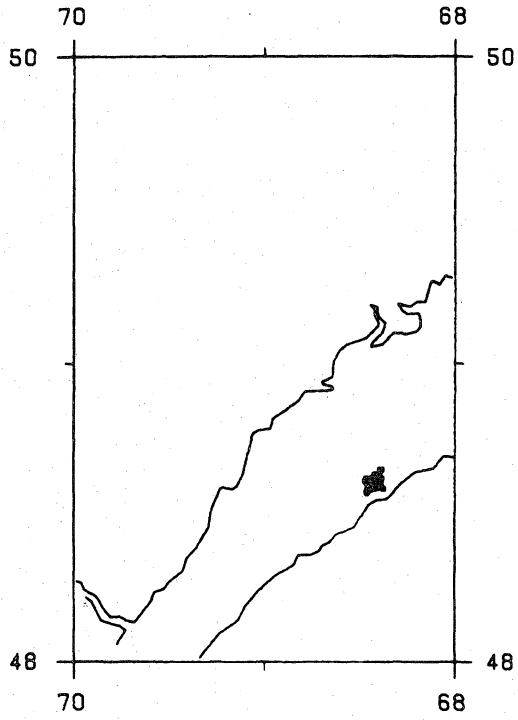
CRUISE 180579024 14/ 8/79 - 14/ 8/79 4 STATIONS

Figure A-34



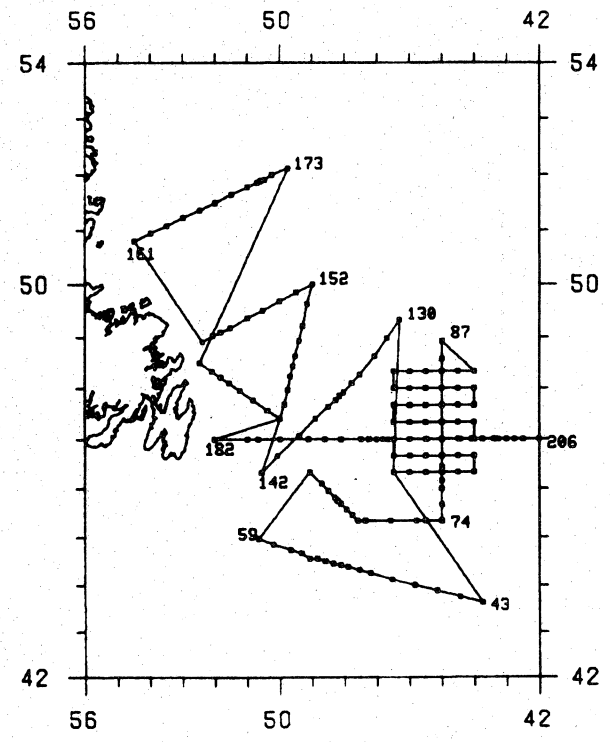
CRUISE 180579026 10/ 1/79 - 6/12/79 18 STATIONS

Figure A-35



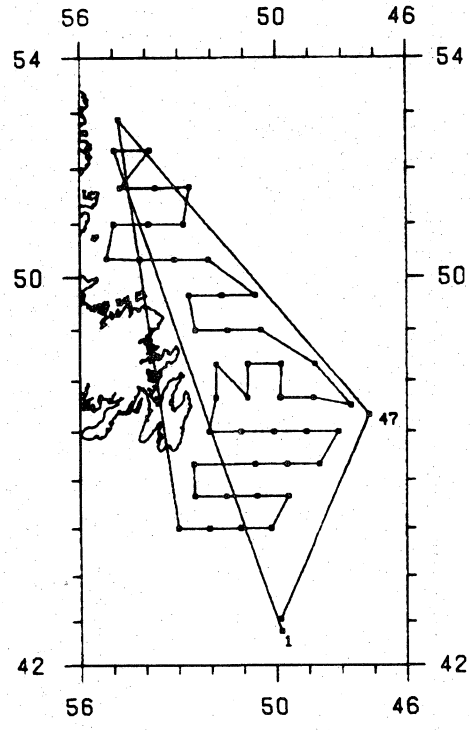
CRUISE 182979005 26/ 9/79 - 29/ 9/79 60 STATIONS

Figure A-36



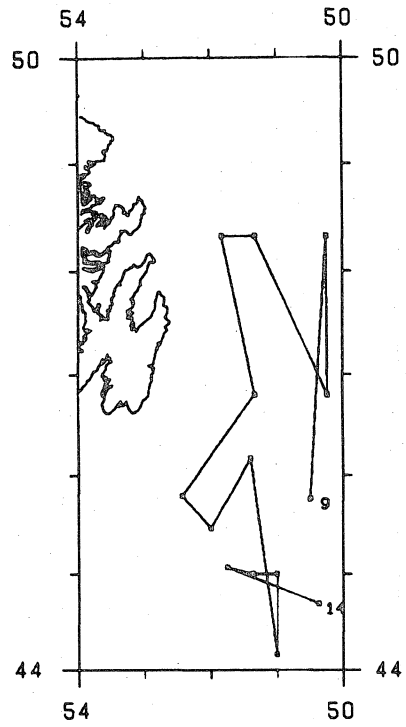
CRUISE 90GE79017 7/ 4/79 - 2/ 6/79 206 STATIONS

Figure A-37



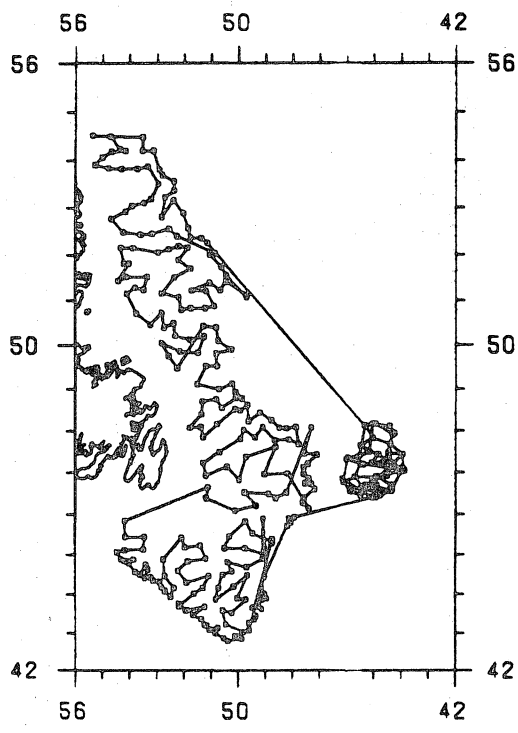
CRUISE 90GE79018 25/ 8/79 - 19/10/79 48 STATIONS

Figure A-38



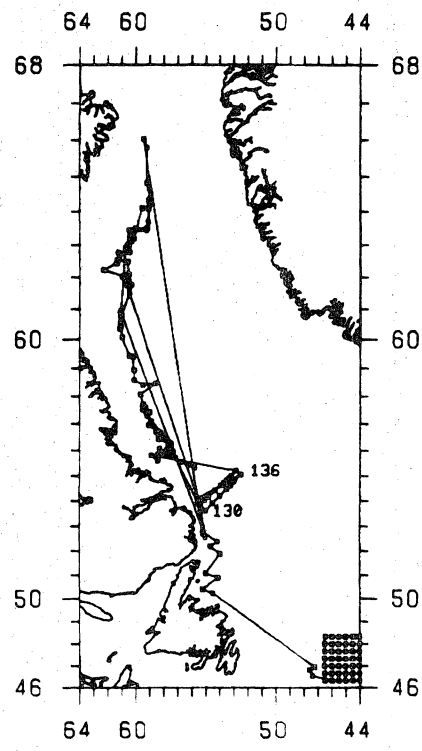
CRUISE 90PK79032 6/ 5/79 - 15/ 6/79 14 STATIONS

Figure A-39



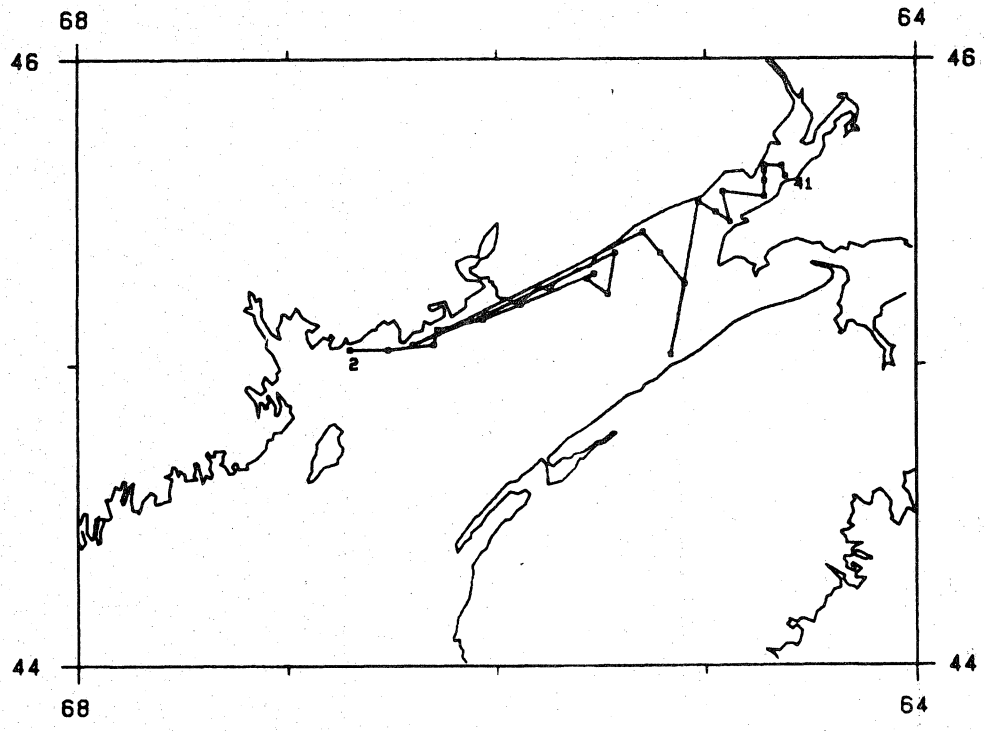
CRUISE 90SU79002 20/ 3/79 - 18/ 6/79 404 STATIONS

Figure A-40



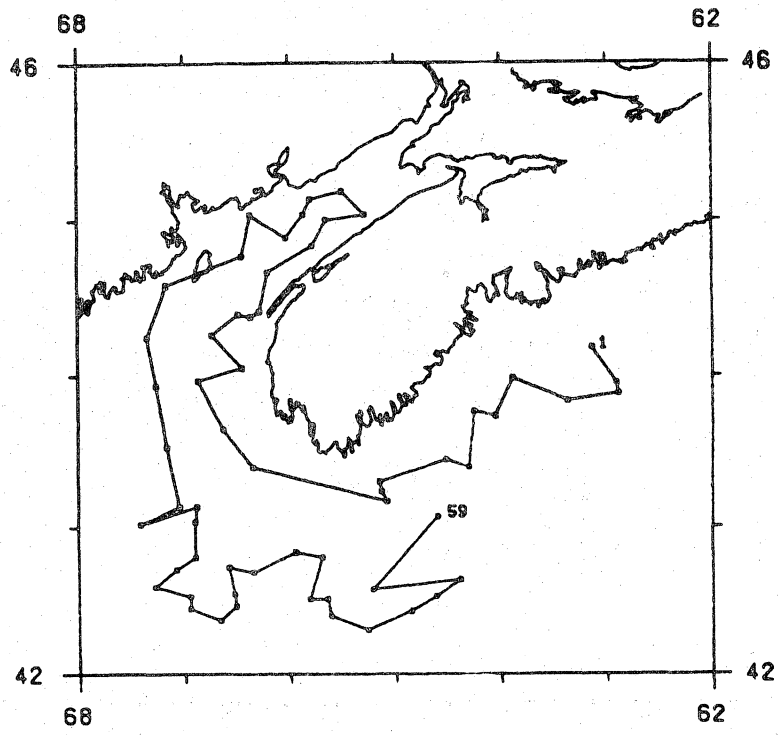
CRUISE 90SU79003 1/ 9/79 - 30/11/79 181 STATIONS

Figure A-41



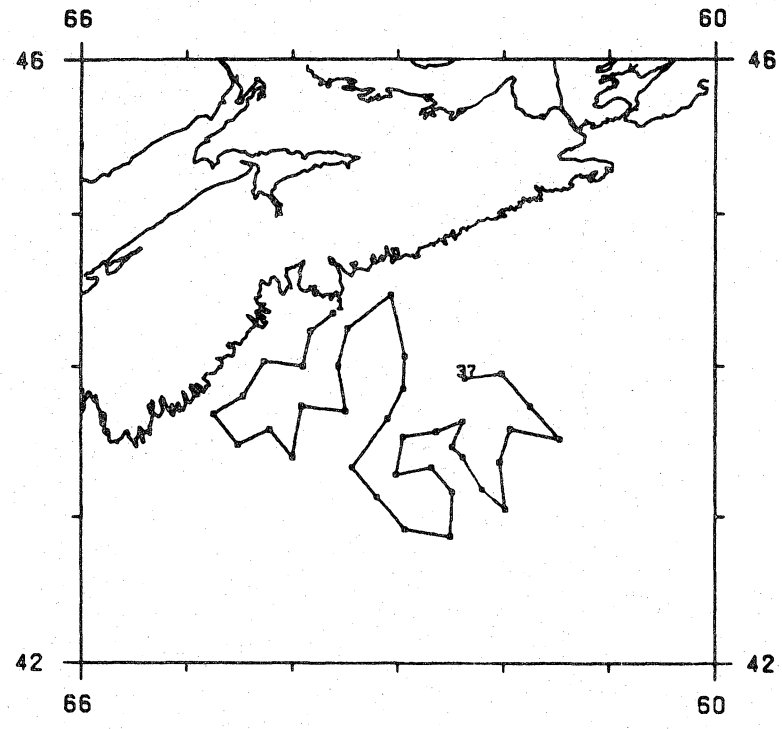
CRUISE 180379001 3/ 2/79 - 10/ 2/79 26 STATIONS

Figure A-42



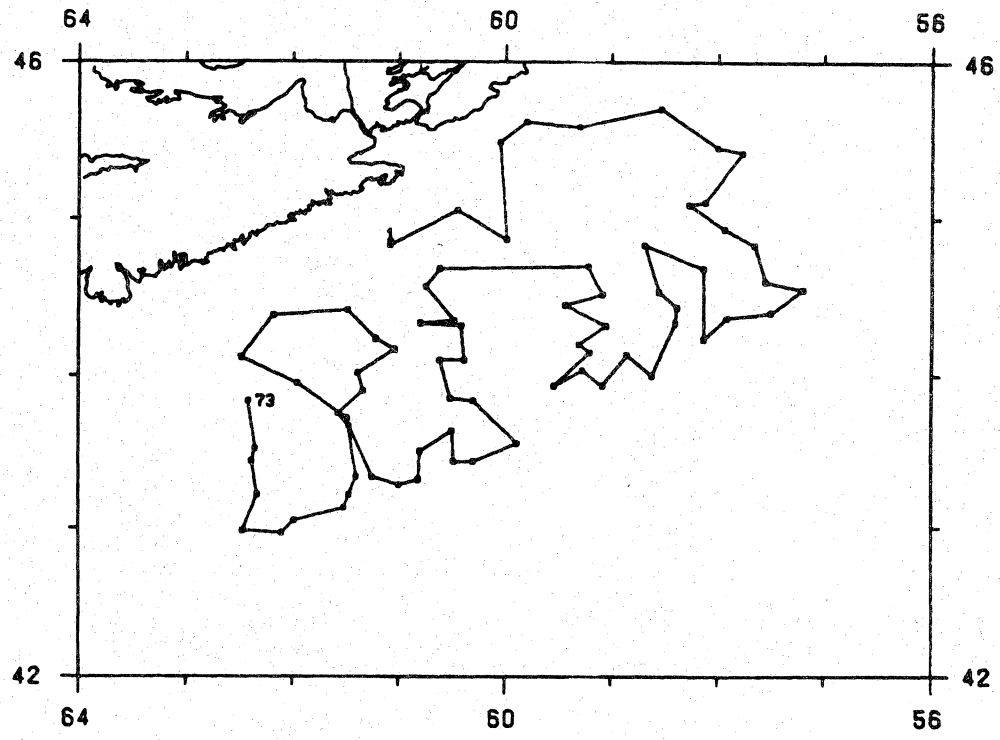
CRUISE 180379002 5/ 3/79 - 1[illegible] 3/79 59 STATIONS

Figure A-43



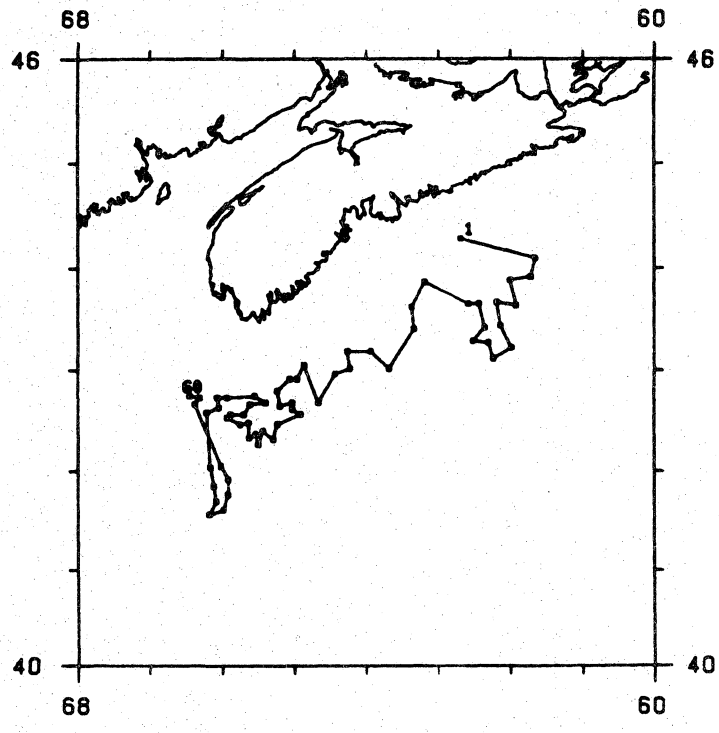
CRUISE 180379003 23/ 1/79 - 2/ 2/79 37 STATIONS

Figure A-44



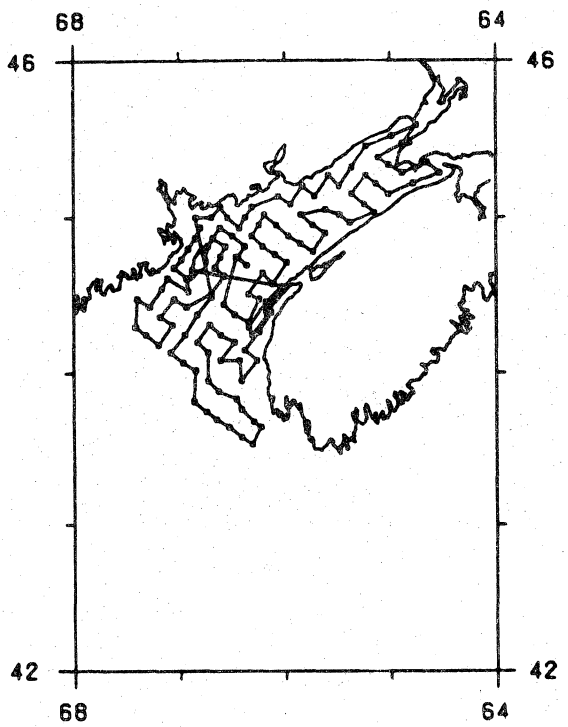
CRUISE 180379004 21/ 3/79 - 29/ 3/79 72 STATIONS

Figure A-45



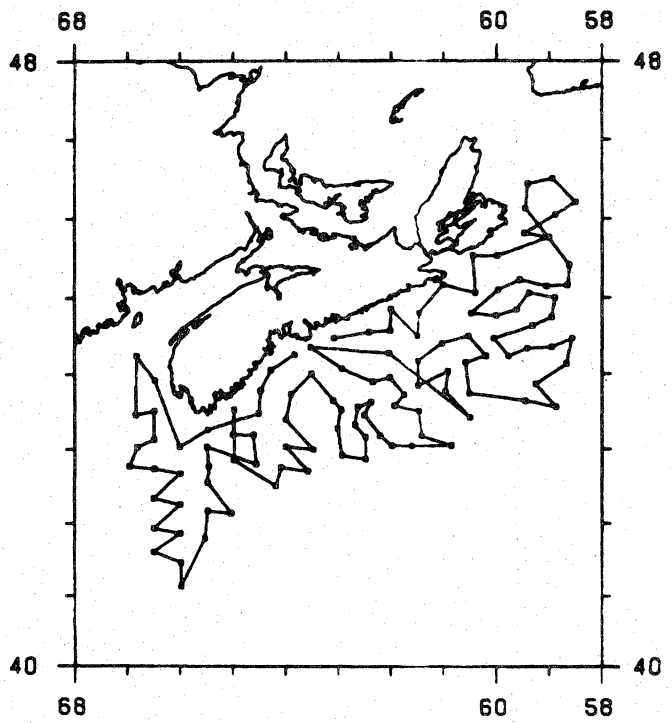
CRUISE 180379005 21/ 3/79 - 30/ 3/79 60 STATIONS

Figure A-46



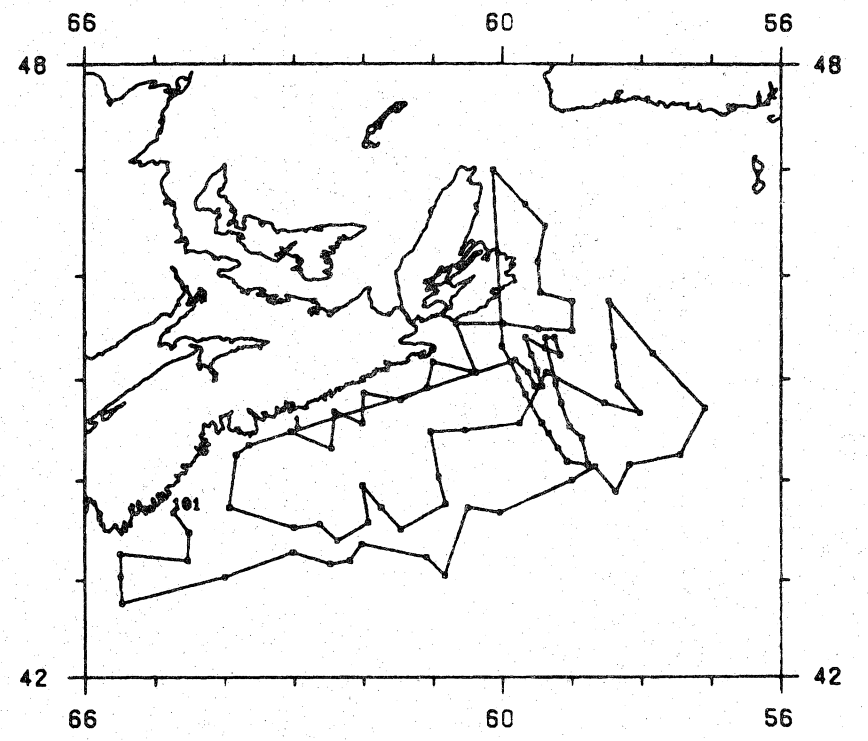
CRUISE 180379006 23/ 3/79 - 30/ 3/79 120 STATIONS

Figure A-47



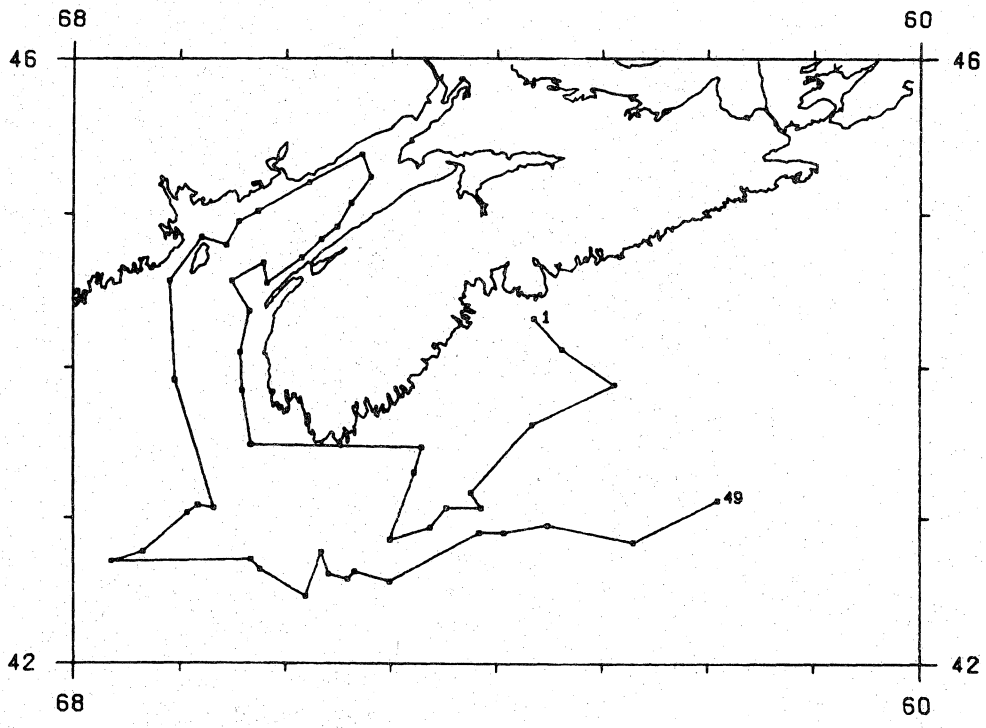
CRUISE 180379007 3/ 4/79 - 25/ 4/79 112 STATIONS

Figure A-48



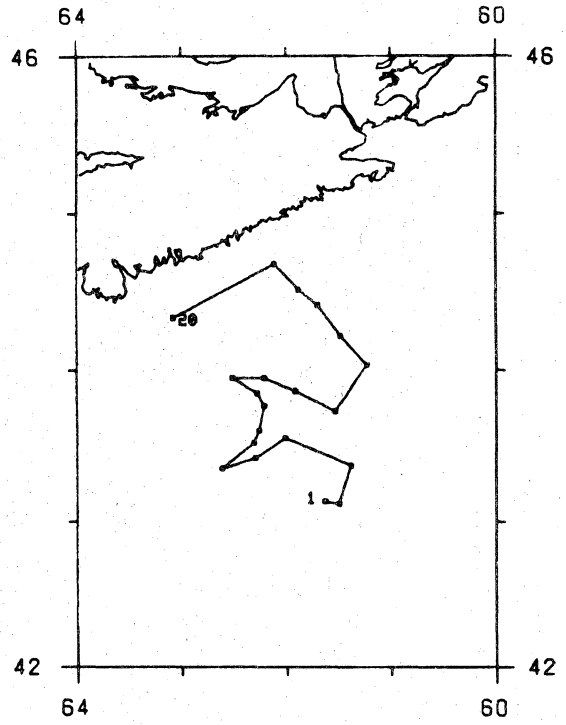
CRUISE 180379008 15/ 5/79 - 1/ 6/79 86 STATIONS

Figure A-49



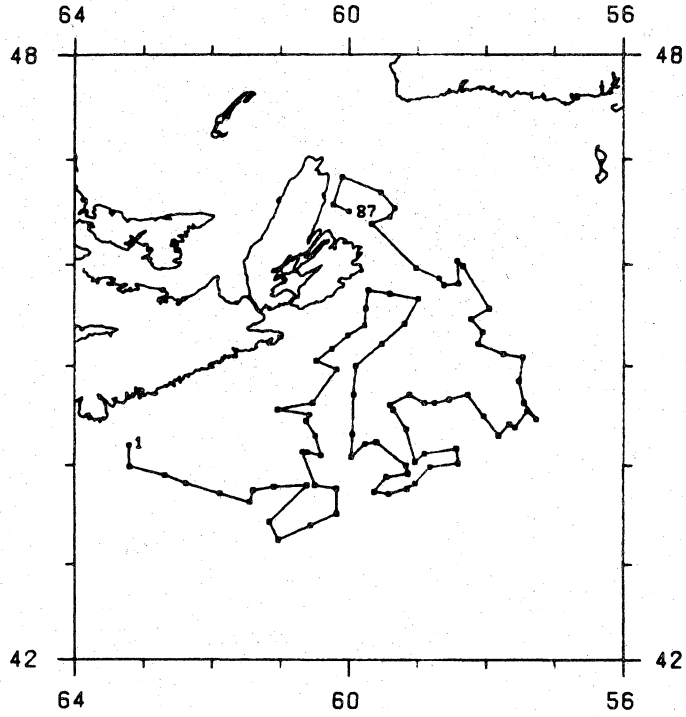
CRUISE 180379009 7/ 7/79 - 14/ 7/79 49 STATIONS

Figure A-50



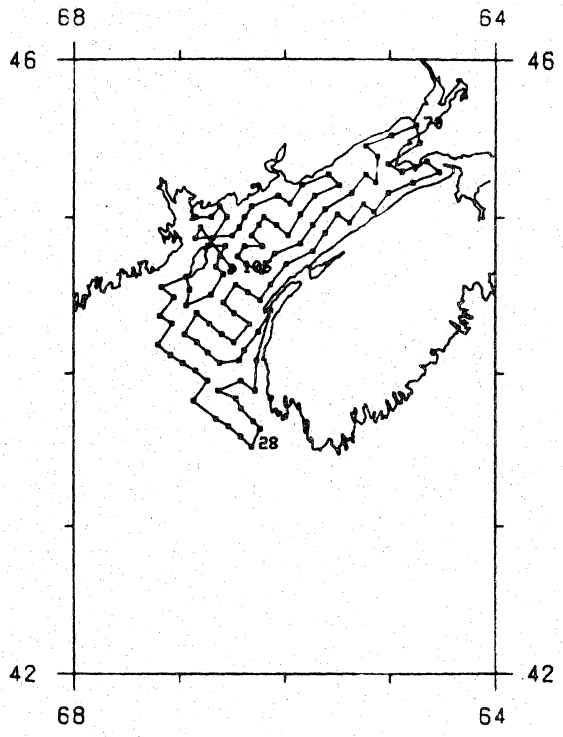
CRUISE 180379010 14/ 7/79 - 16/ 7/79 20 STATIONS

Figure A-51



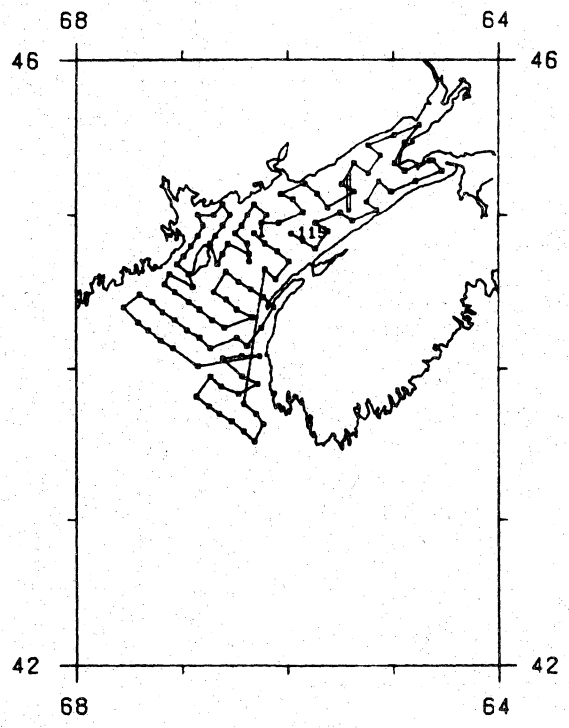
CRUISE 180379011 19/ 7/79 - 27/ 7/79 87 STATIONS

Figure A-52



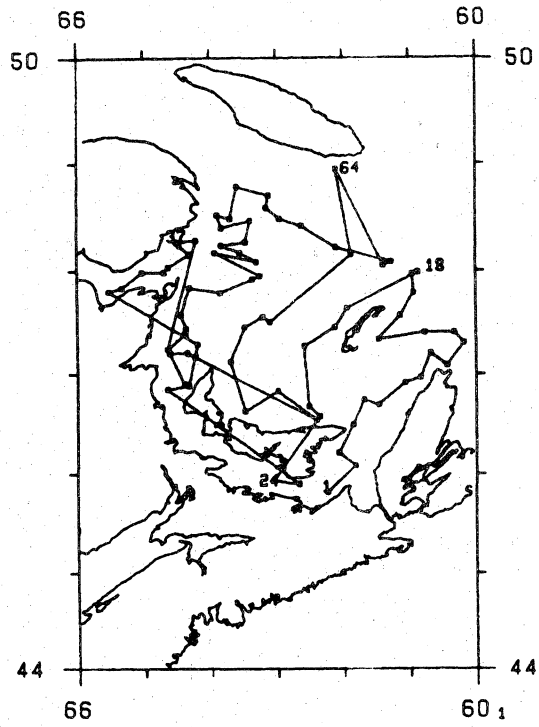
CRUISE 180379012 25/ 7/79 - 2/ 8/79 111 STATIONS

Figure A-53



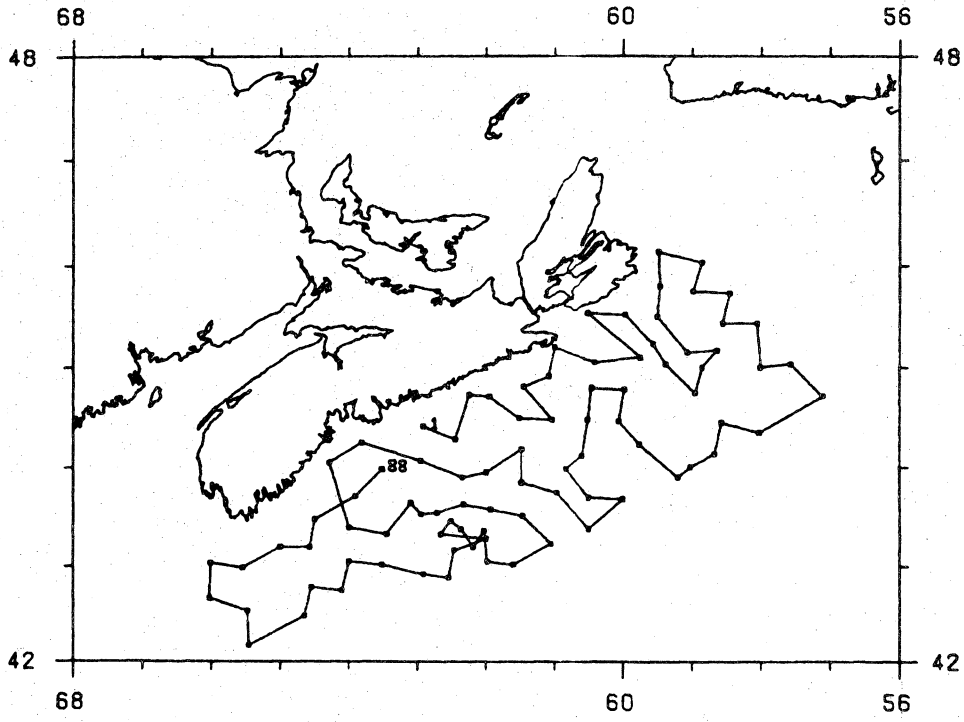
CRUISE 180379016 20/ 8/79 - 26/ 8/79 115 STATIONS

Figure A-56



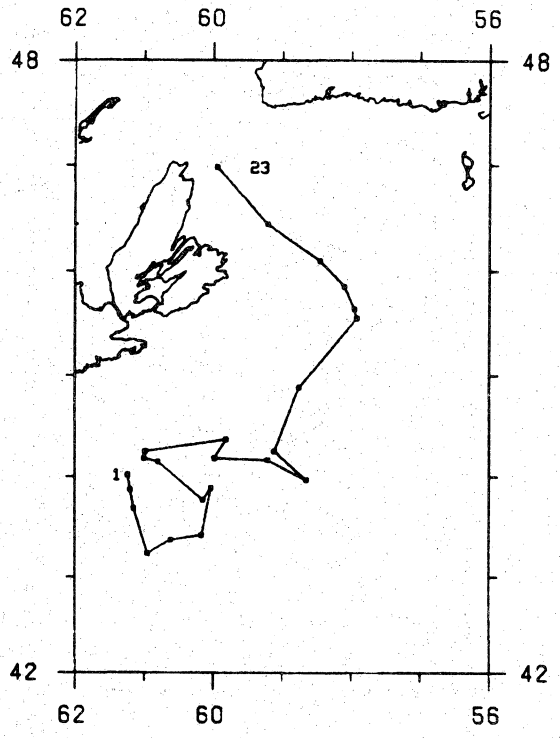
CRUISE 180379017 5/ 9/79 - 2/10/79 75 STATIONS

Figure A-57



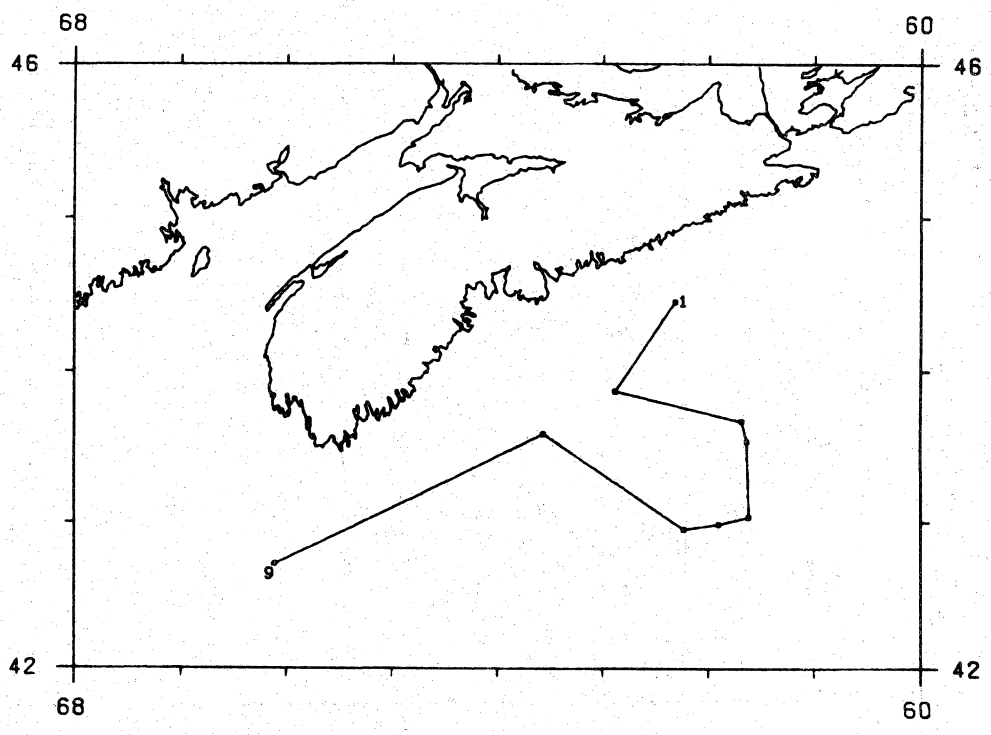
CRUISE 180379018 25/ 9/79 - 12/10/79 88 STATIONS

Figure A-58



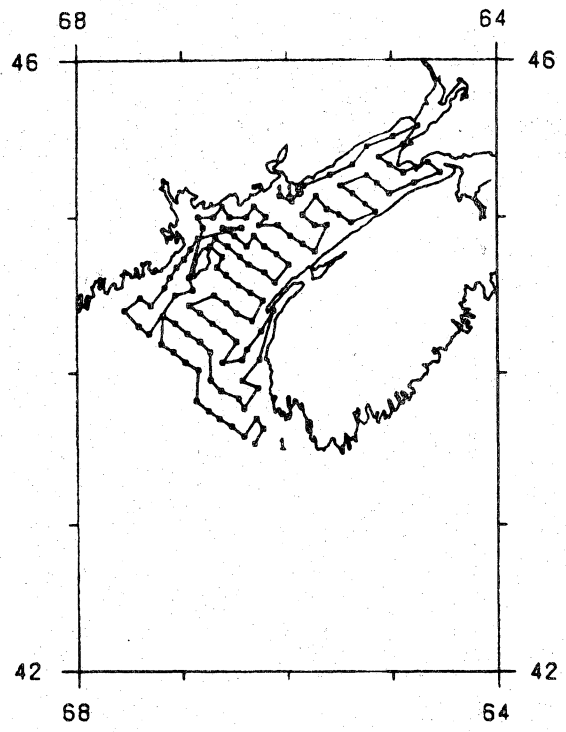
CRUISE 180379019 16/10/79 - 24/10/79 23 STATIONS

Figure A-59



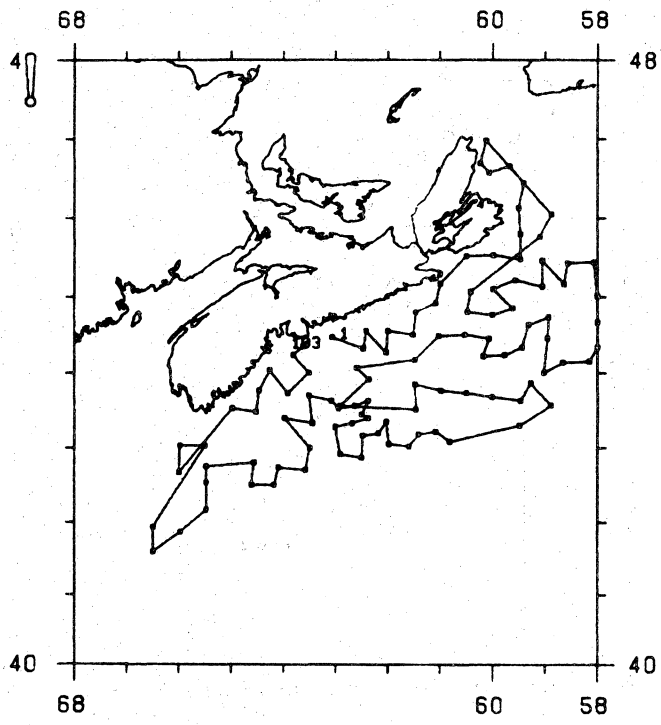
CRUISE 180379020 31/10/79 - 5/11/79 9 STATIONS

Figure A-60



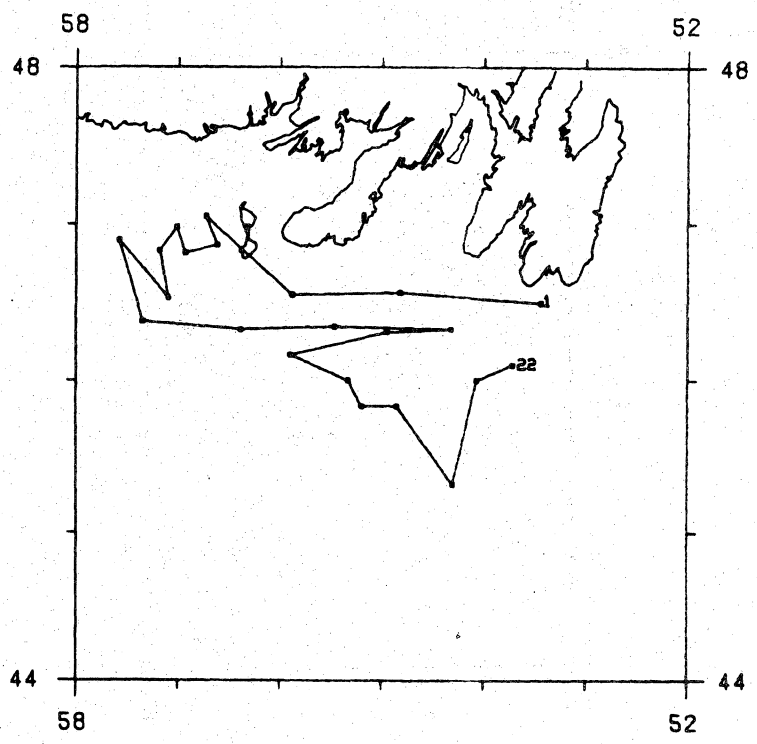
CRUISE 180379021 31/10/79 - 6/11/79 115 STATIONS

Figure A-61



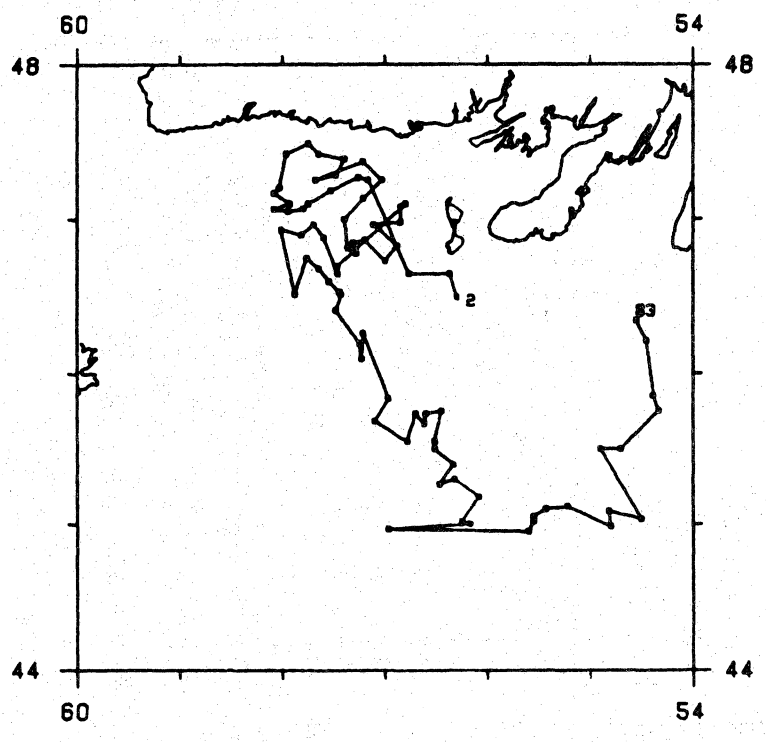
CRUISE 180379024 13/11/79 - 5/12/79 104 STATIONS

Figure A-62



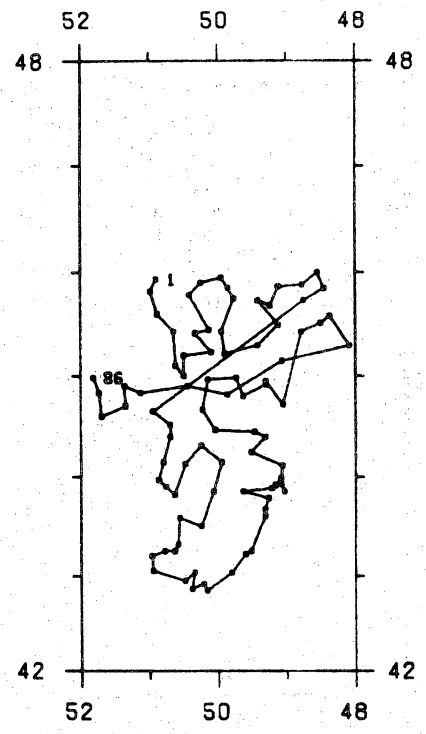
CRUISE 180579001 26/ 1/79 - 8/ 2/79 22 STATIONS

Figure A-63



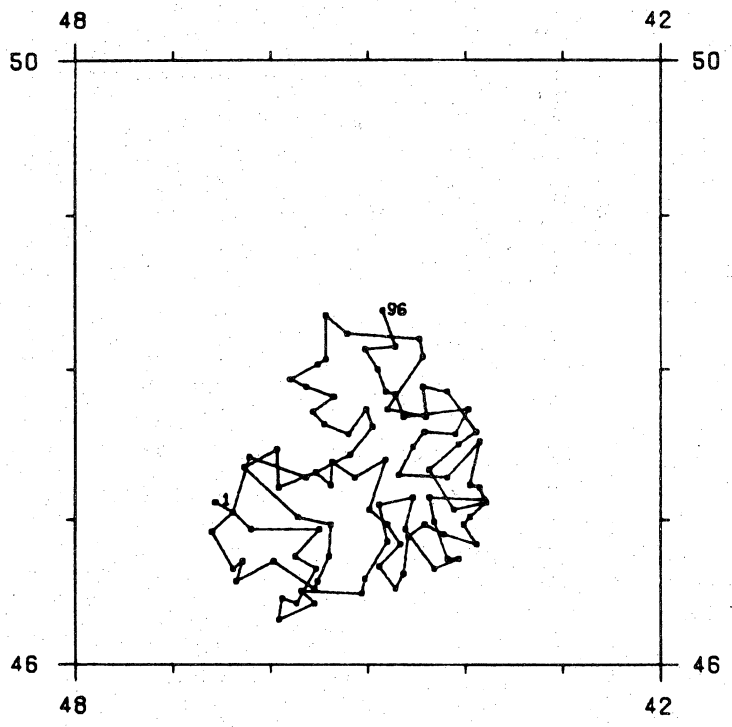
CRUISE 180579002 20/ 2/79 - 5/ 3/79 79 STATIONS

Figure A-64



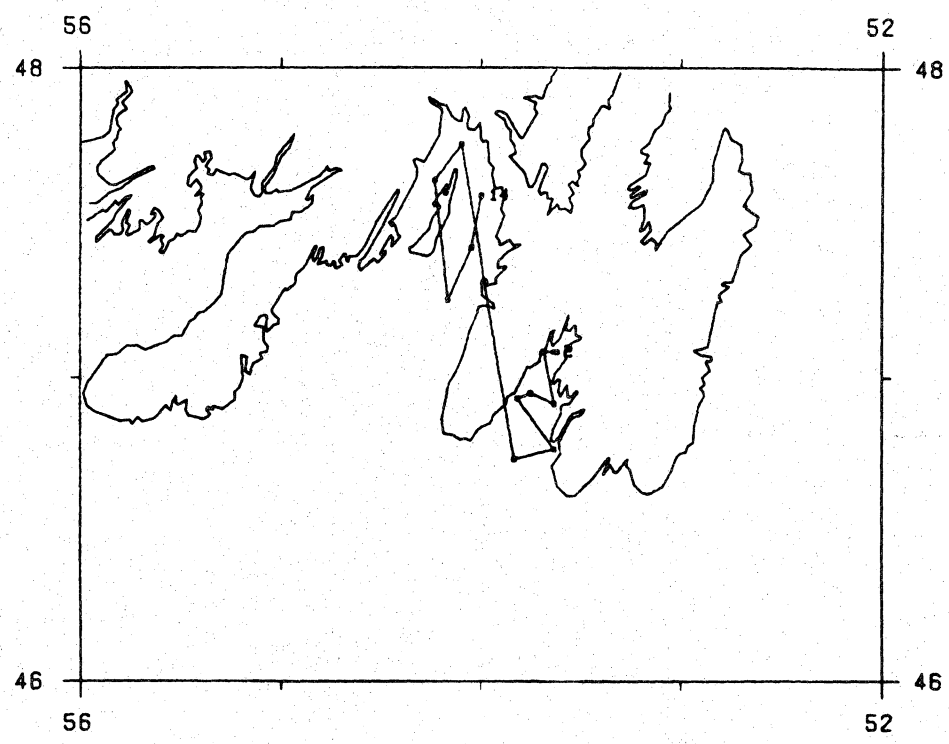
CRUISE 180579003 21/ 4/79 - 6/ 5/79 86 STATIONS

Figure A-65



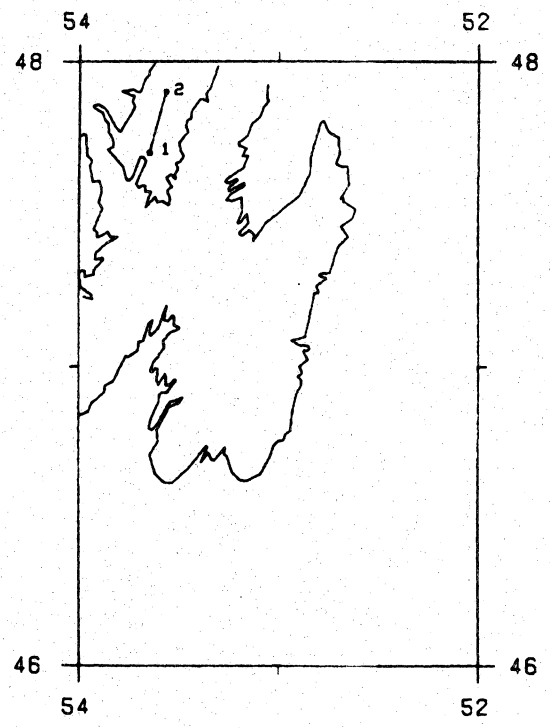
CRUISE 180579004 30/ 1/79 - 18/ 2/79 96 STATIONS

Figure A-66



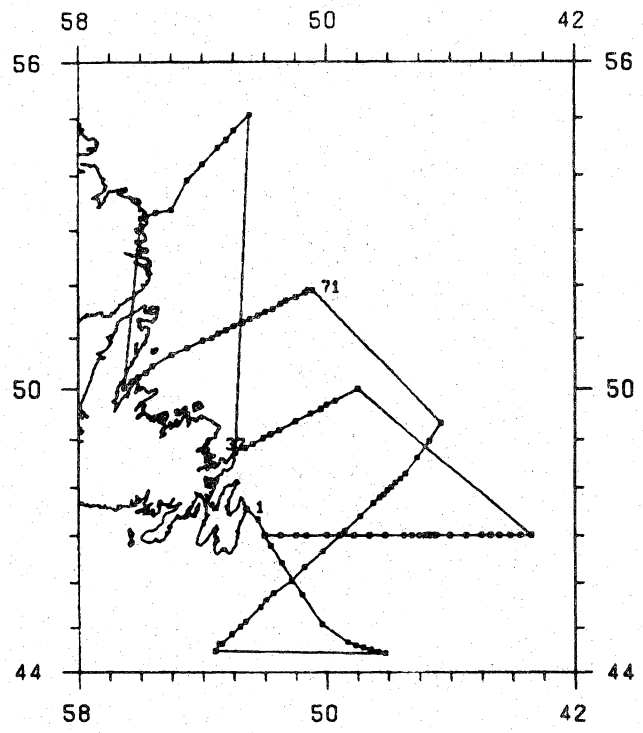
CRUISE 180579005 15/ 1/79 - 26/ 1/79 14 STATIONS

Figure A-67



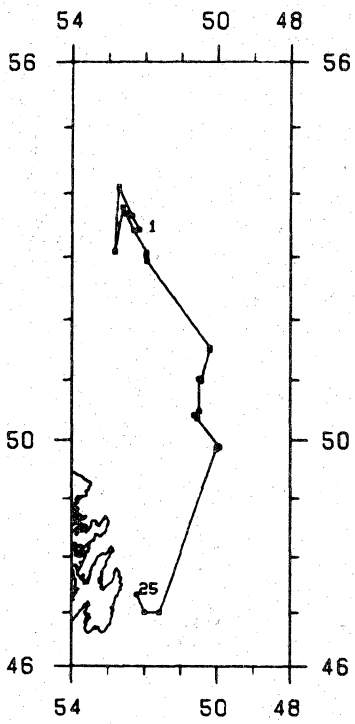
CRUISE 180579006 23/ 3/79 - 24/ 3/79 2 STATIONS

Figure A-68



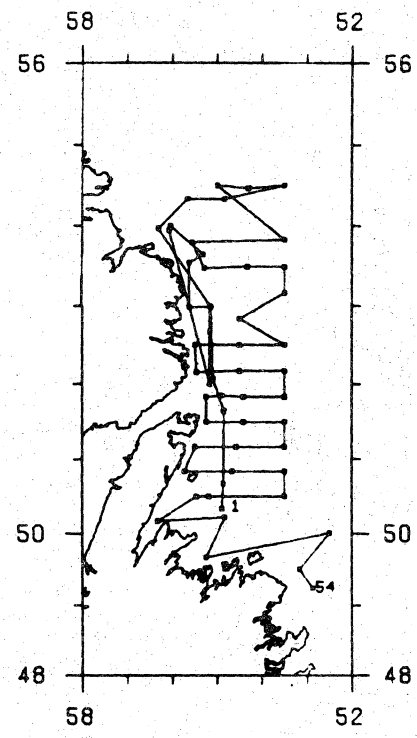
CRUISE 180579007 27/ 7/79 - 13/ 8/79 107 STATIONS

Figure A-69



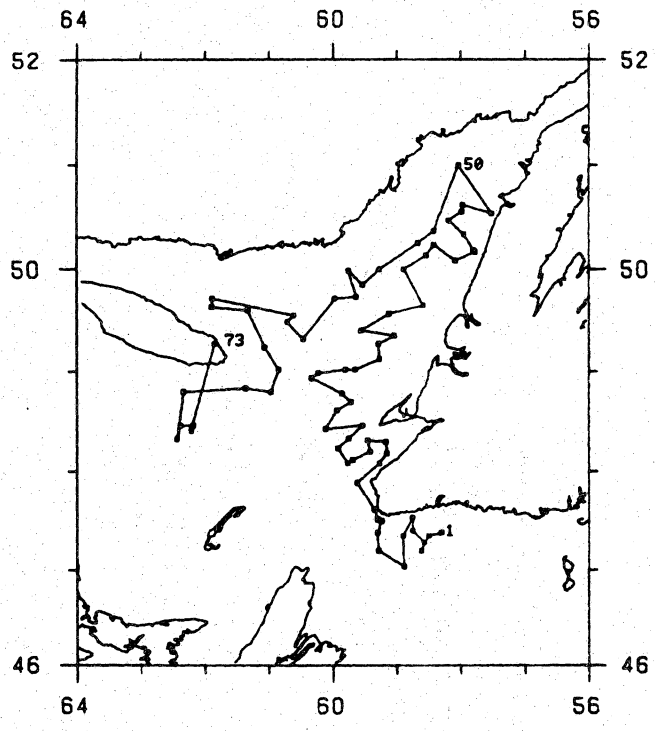
CRUISE 180579010 20/ 9/79 - 26/ 9/79 25 STATIONS

Figure A-70



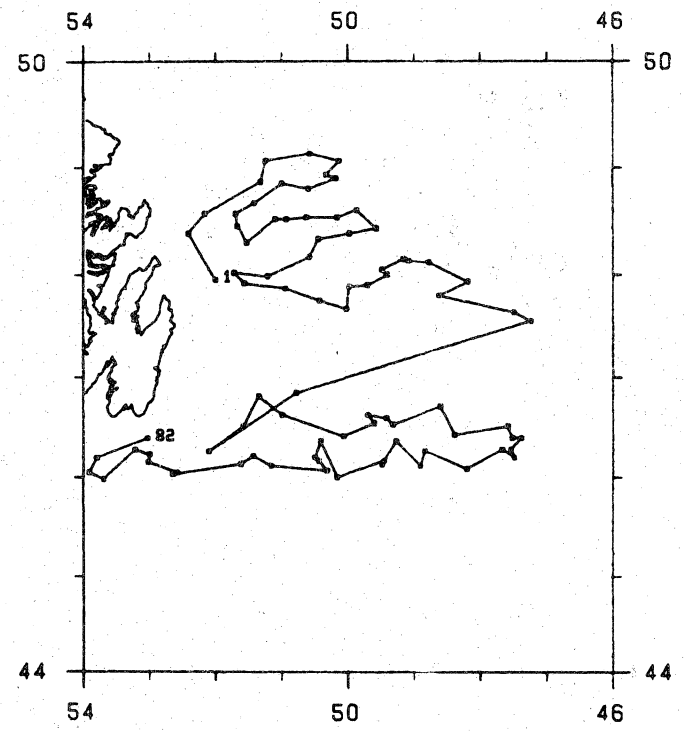
CRUISE 180579011 26/10/79 - 12/11/79 54 STATIONS

Figure A-71



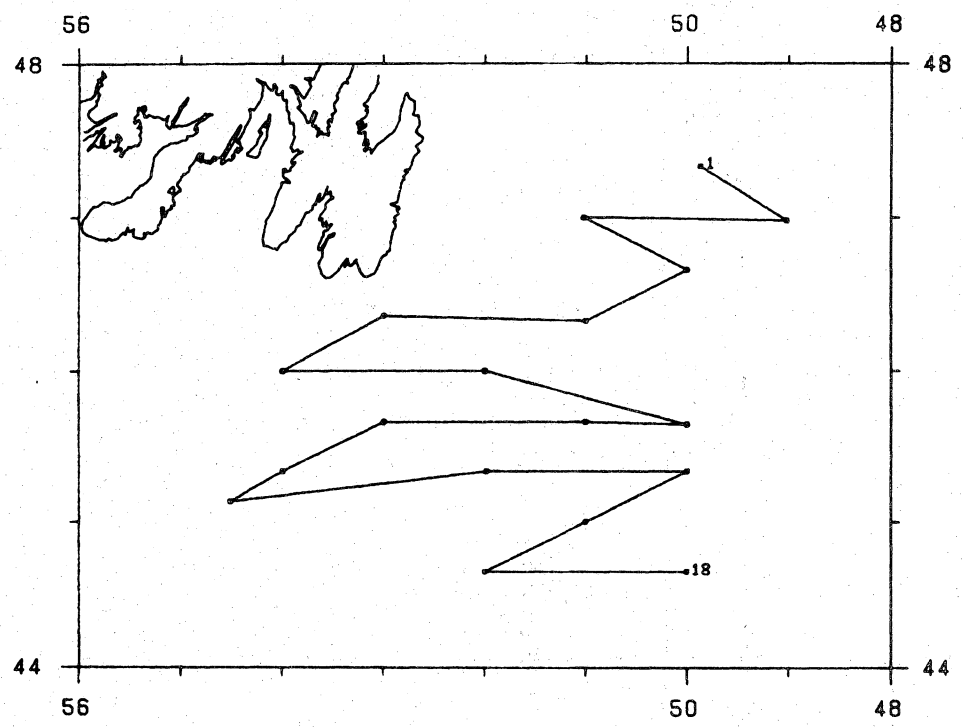
CRUISE 180579013 6/ 1/79 - 15/ 1/79 73 STATIONS

Figure A-72



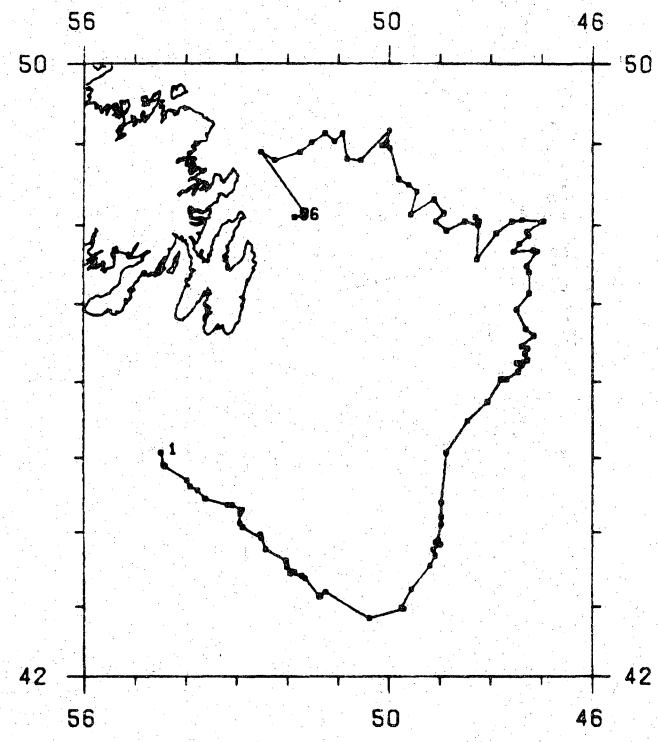
CRUISE 180579014 17/ 5/79 - 4/ 6/79 82 STATIONS

Figure A-73



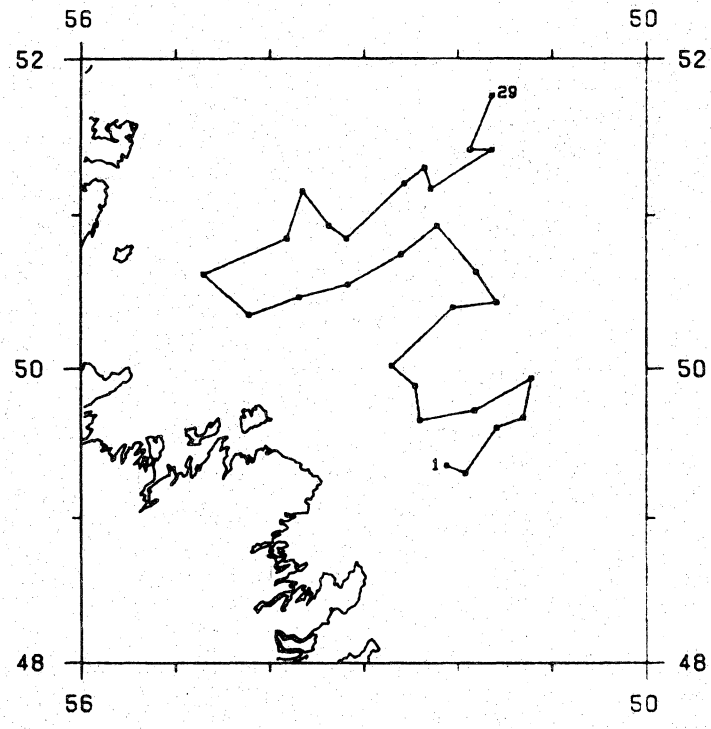
CRUISE 180579015 8/ 6/79 - 18/ 6/79 18 STATIONS

Figure A-74



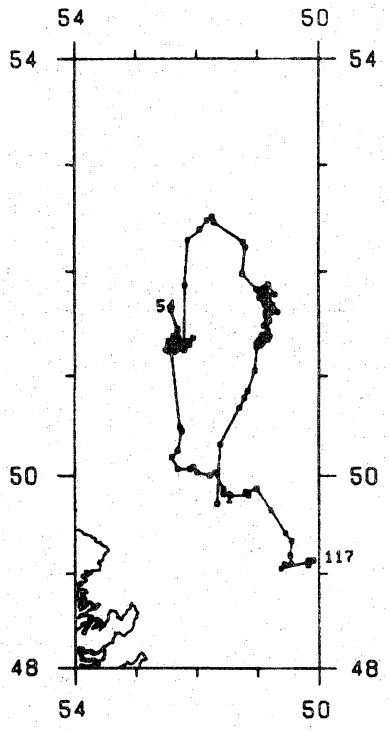
CRUISE 180579016 25/ 8/79 - 10/ 9/79 96 STATIONS

Figure A-75



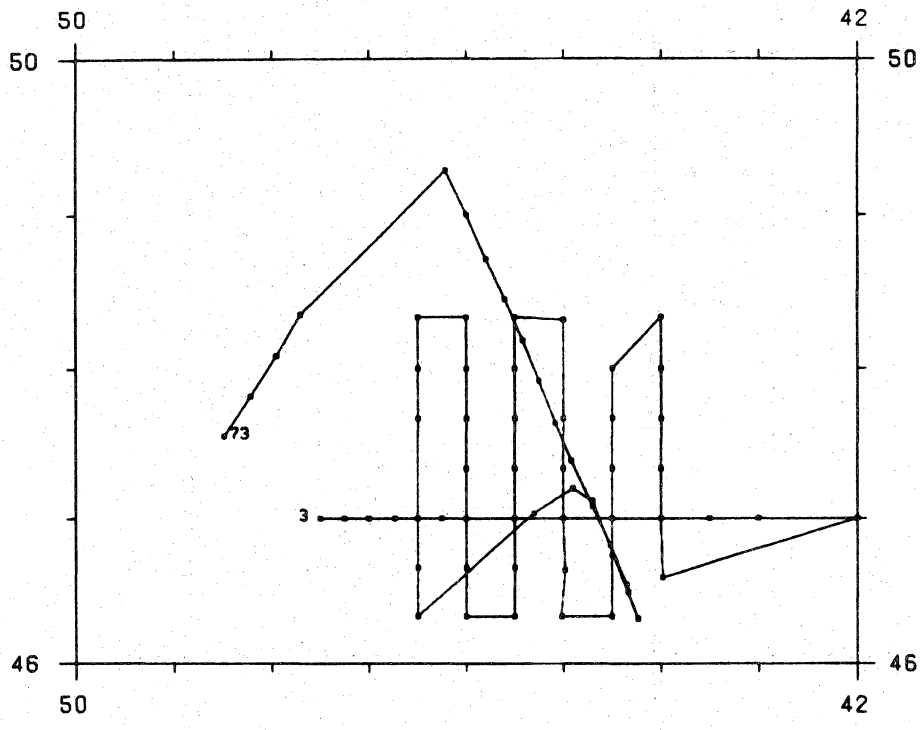
CRUISE 180579017 29/ 9/79 - 2/10/79 29 STATIONS

Figure A-76



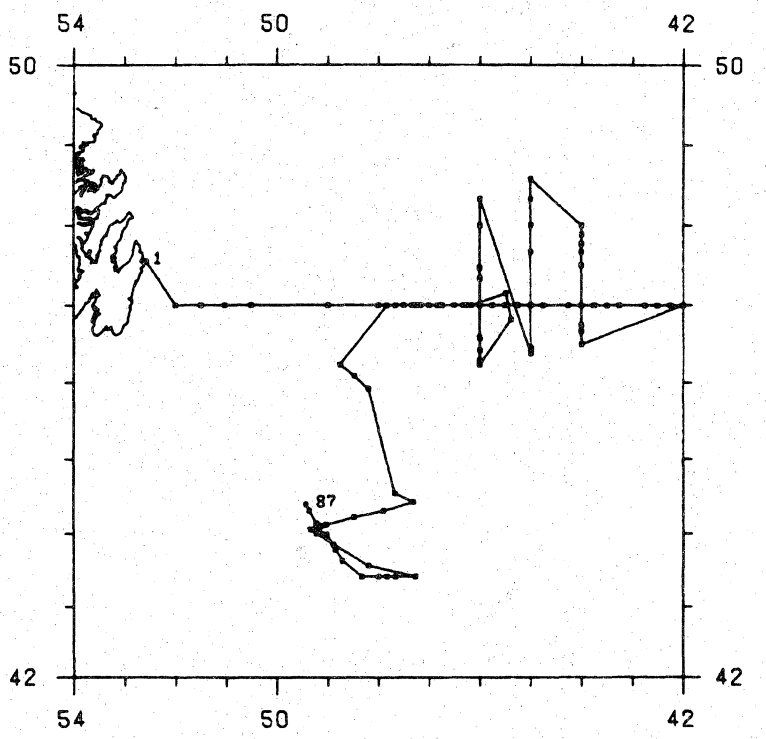
CRUISE 180579018 25/ 2/79 - 12/ 3/79 120 STATIONS

Figure A-77



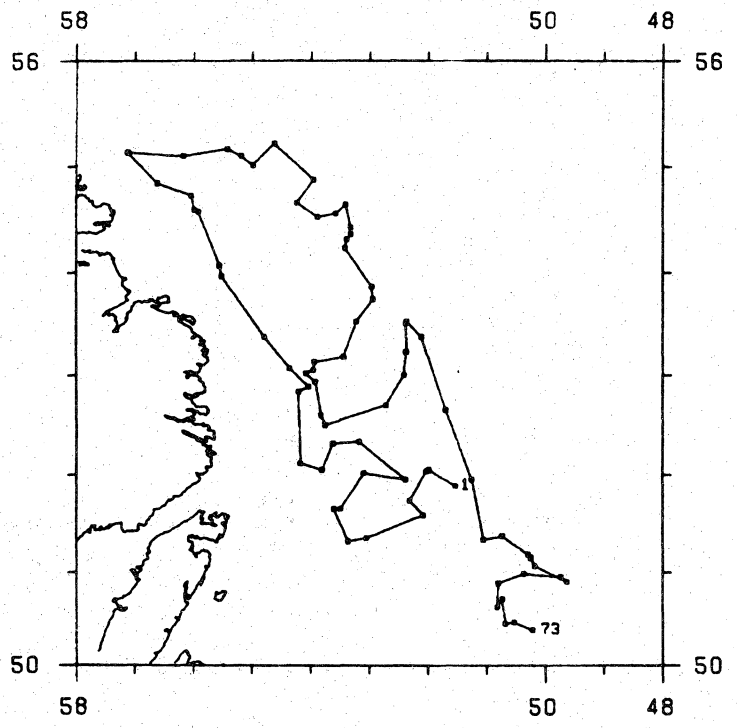
CRUISE 180579020 20/ 4/79 - 30/ 4/79 73 STATIONS

Figure A-78



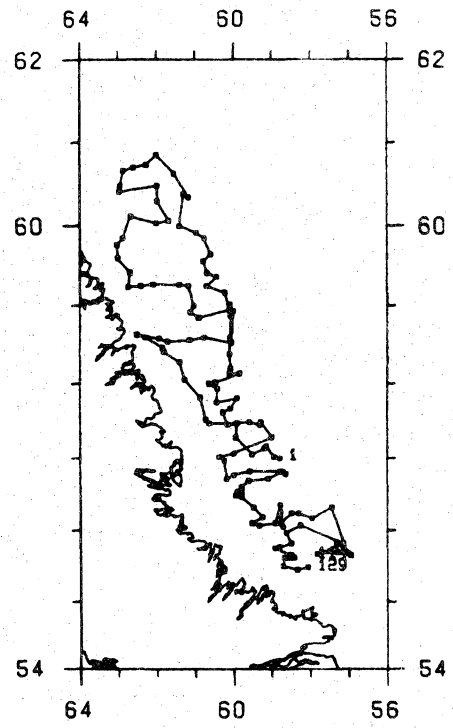
CRUISE 180579021 2/ 5/79 - 13/ 5/79 87 STATIONS

Figure A-79



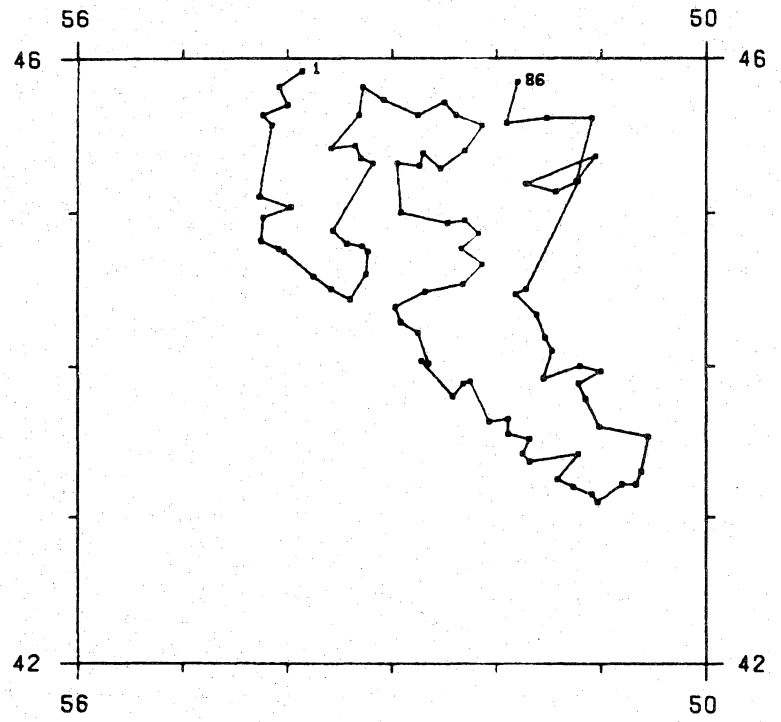
CRUISE 180579022 3/10/79 - 14/10/79 73 STATIONS

Figure A-80



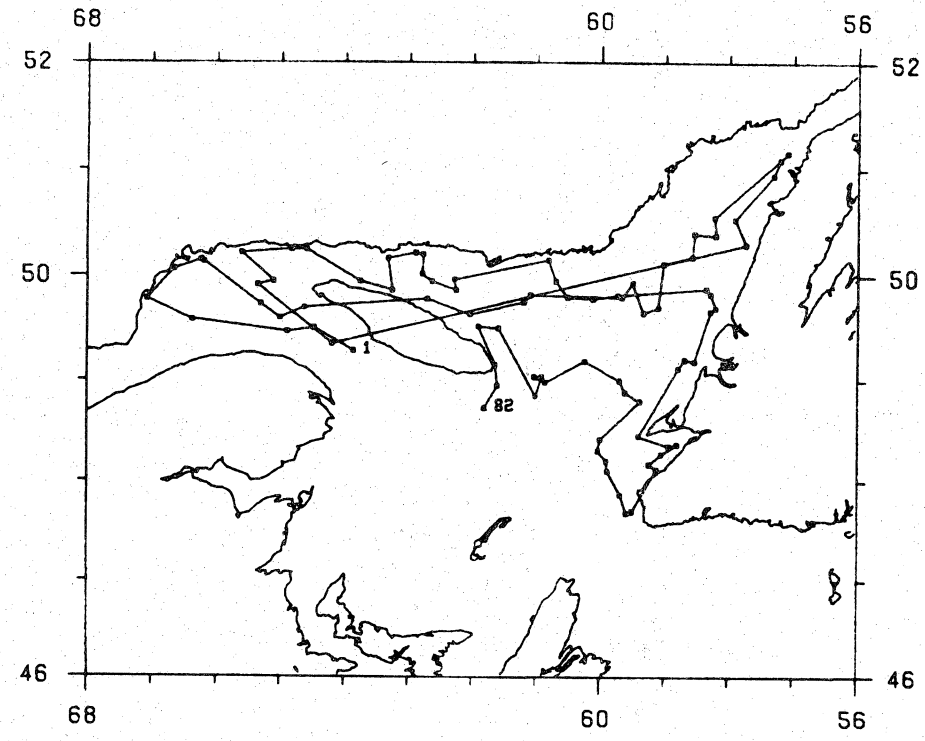
CRUISE 180579024 6/ 8/79 - 19/ 8/79 129 STATIONS

Figure A-81



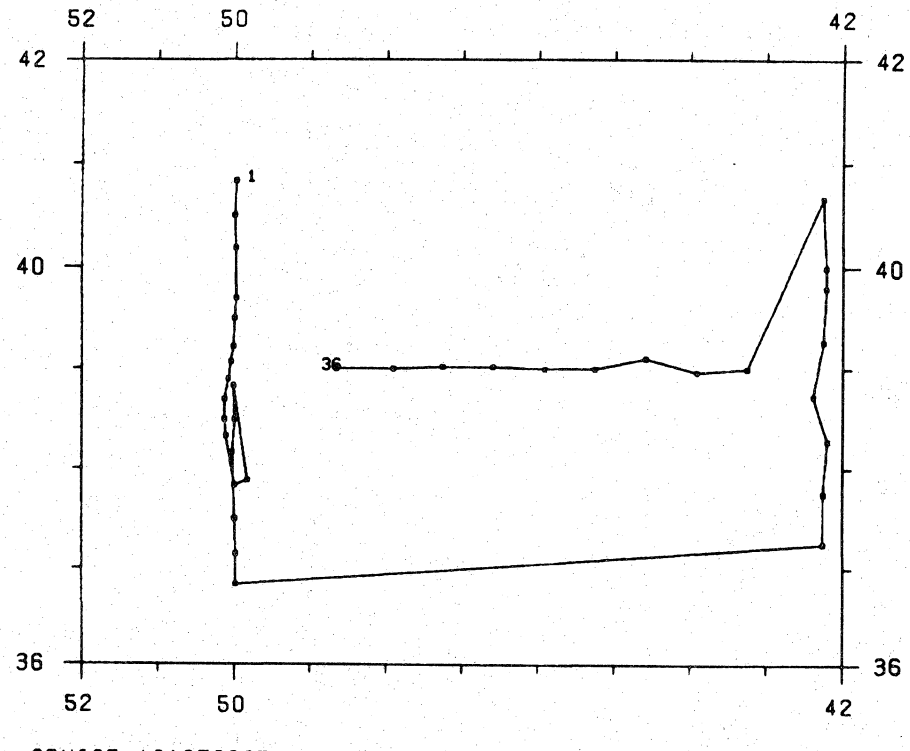
CRUISE 180579025 12/ 6/79 - 24/ 6/79 86 STATIONS

Figure A-82



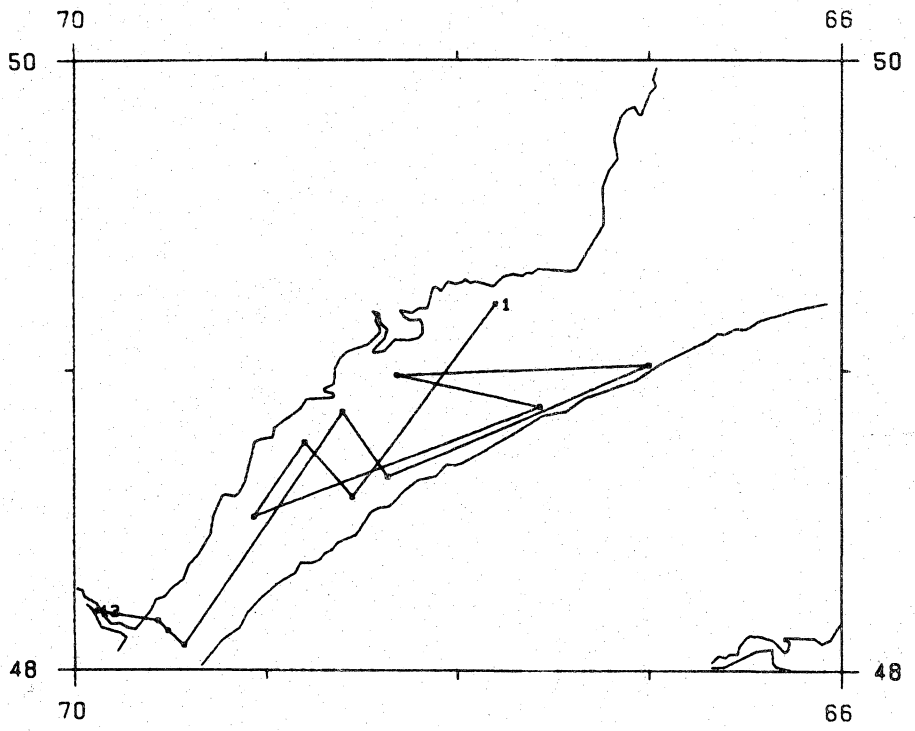
CRUISE 180679001 15/ 5/79 - 16/ 6/79 82 STATIONS

Figure A-83



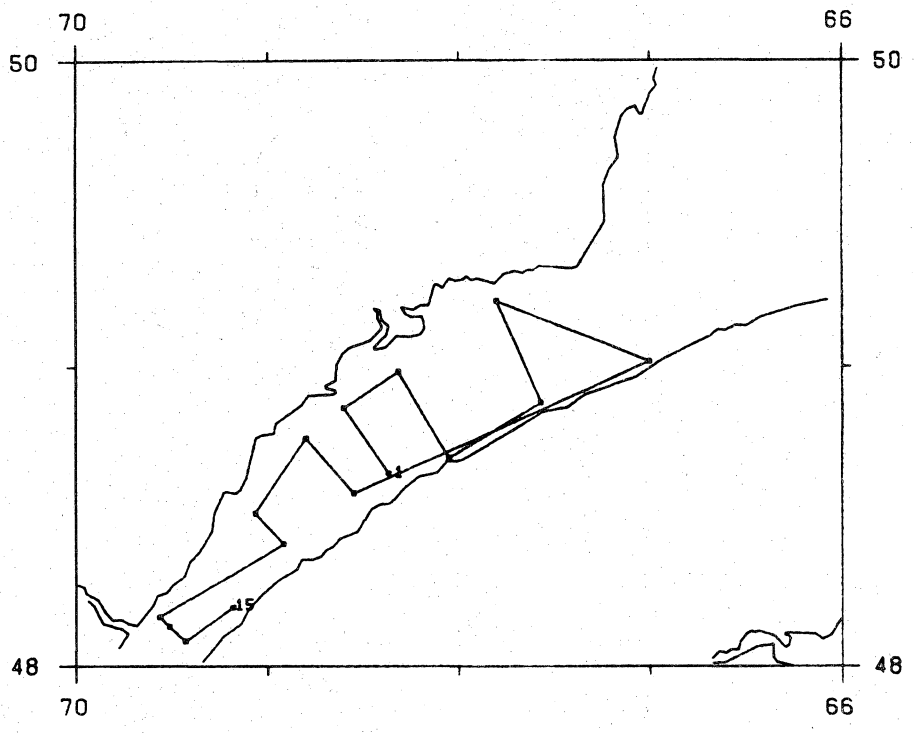
CRUISE 181079025 11/ 9/79 - 2/10/79 36 STATIONS

Figure A-84



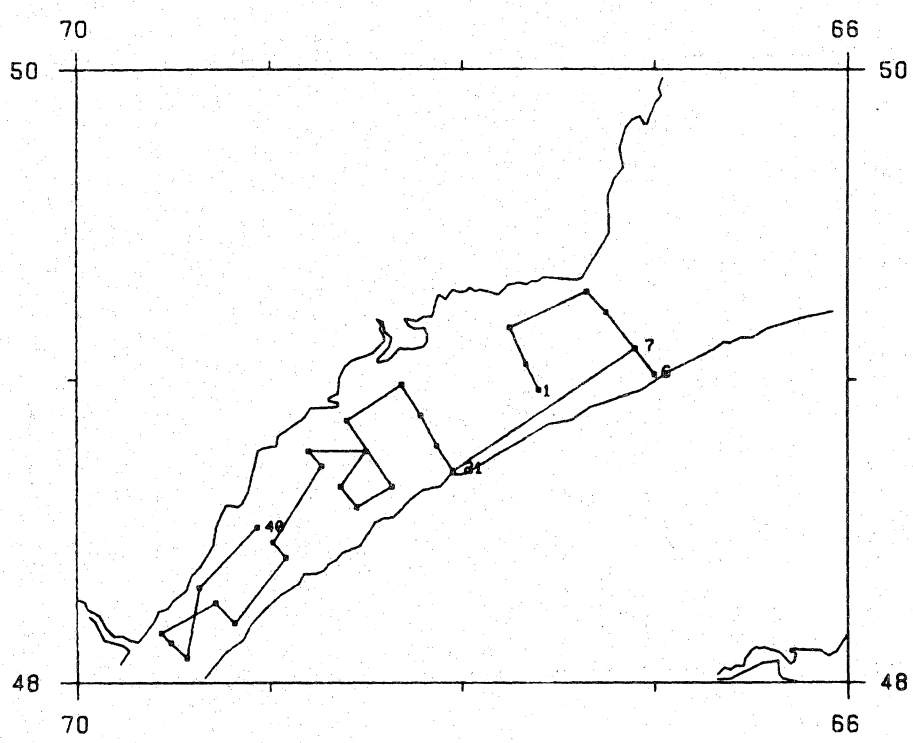
CRUISE 183079001 16/ 3/79 - 25/ 3/79 13 STATIONS

Figure A-107



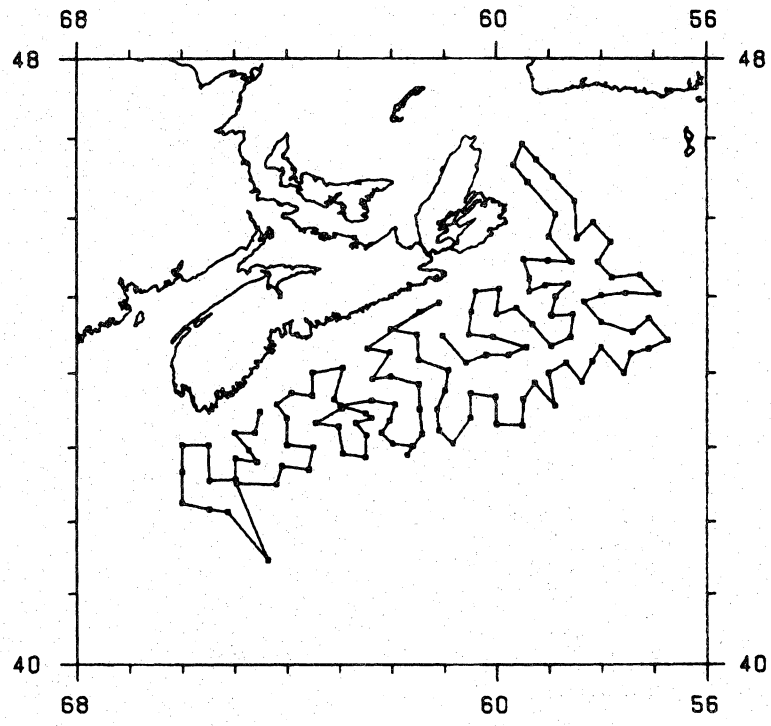
CRUISE 183079002 8/ 6/79 - 15/ 6/79 15 STATIONS

Figure A-108



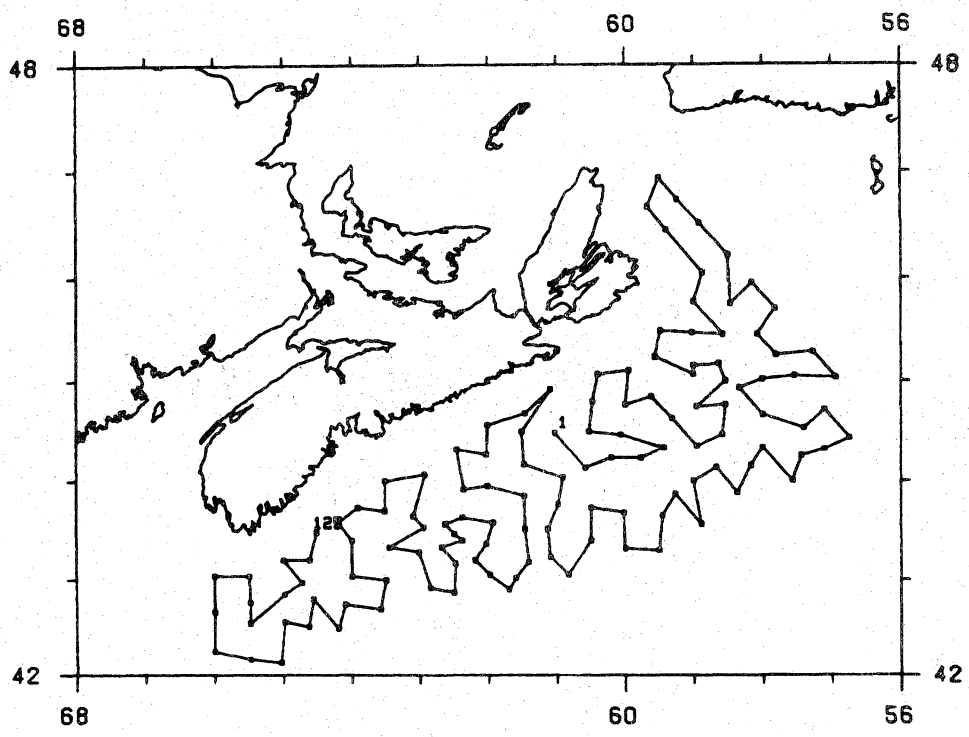
CRUISE 183079003 5/ 7/79 - 13/ 7/79 53 STATIONS

Figure A-109



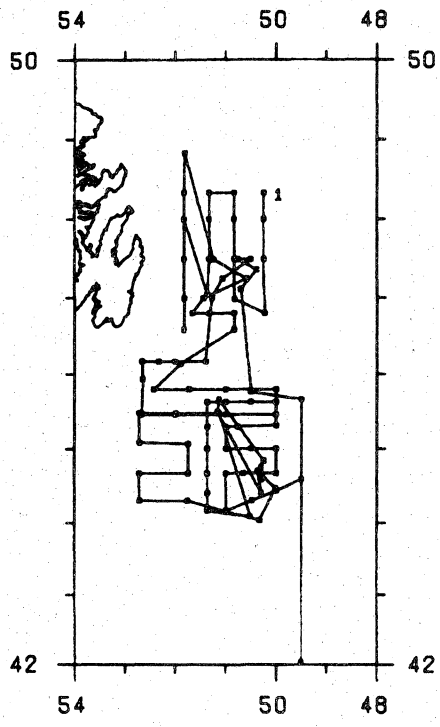
CRUISE 18VY79022 4/ 8/79 - 20/ 8/79 126 STATIONS

Figure A-111



CRUISE 18VY79023 24/ 8/79 - 10/ 9/79 125 STATIONS

Figure A-112



CRUISE 90PK79032 10/ 5/79 - 22/ 6/79 89 STATIONS

Figure A-114

APPENDIX B. SECTION PLOTS

Figure B-1

TEMPERATURE 180579007 SEAL ISLAND 4-5 AUGUST 1979

25 KM.

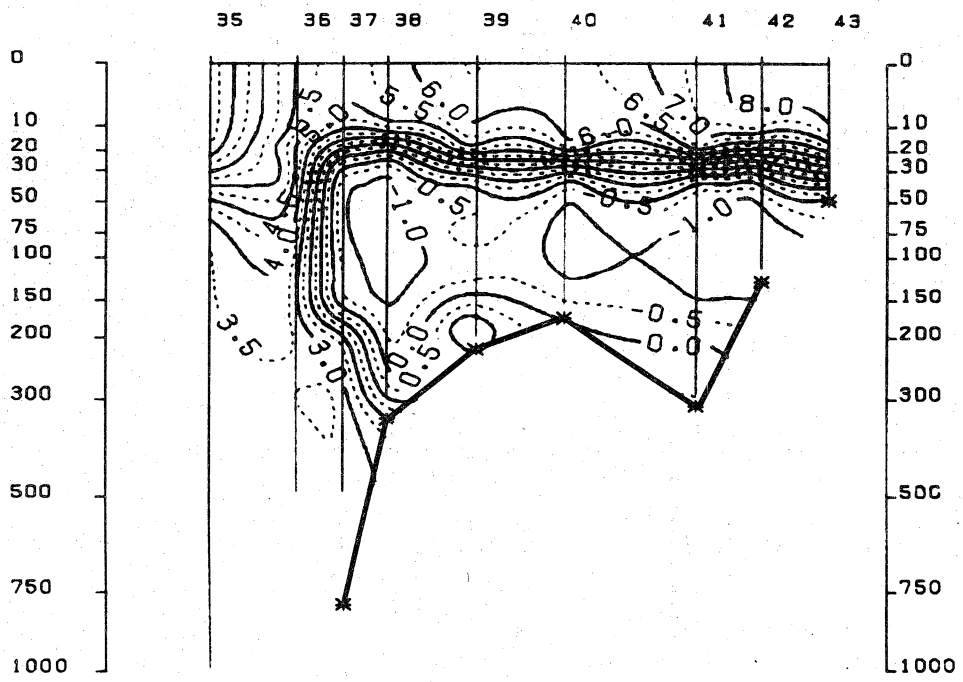


Figure B-2

SALINITY 180579007 SEAL ISLAND 4-5 AUGUST 1979

25 KM.

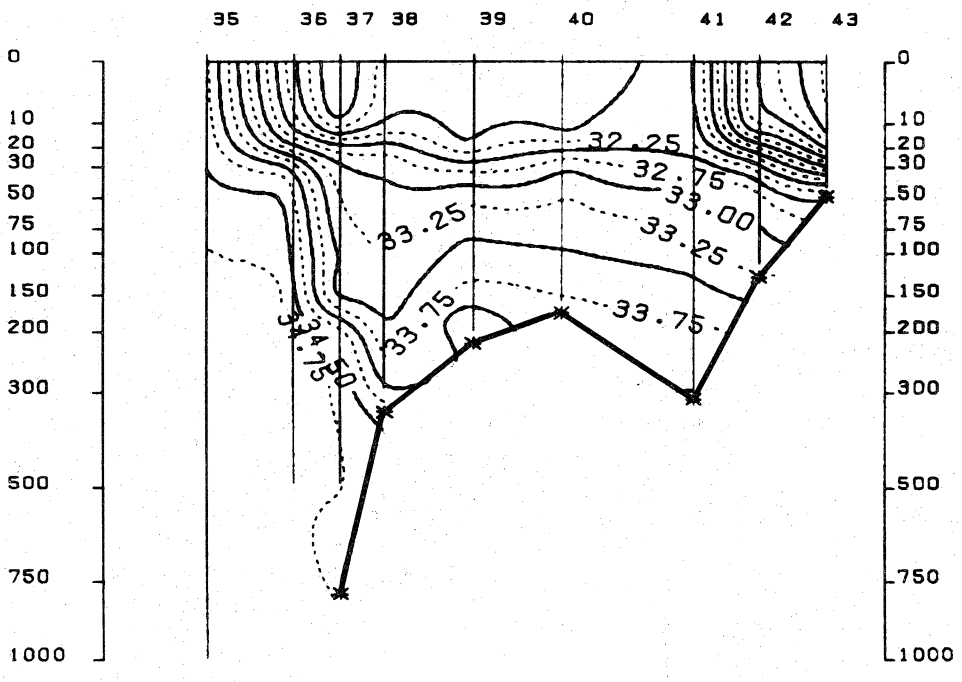


Figure B-3

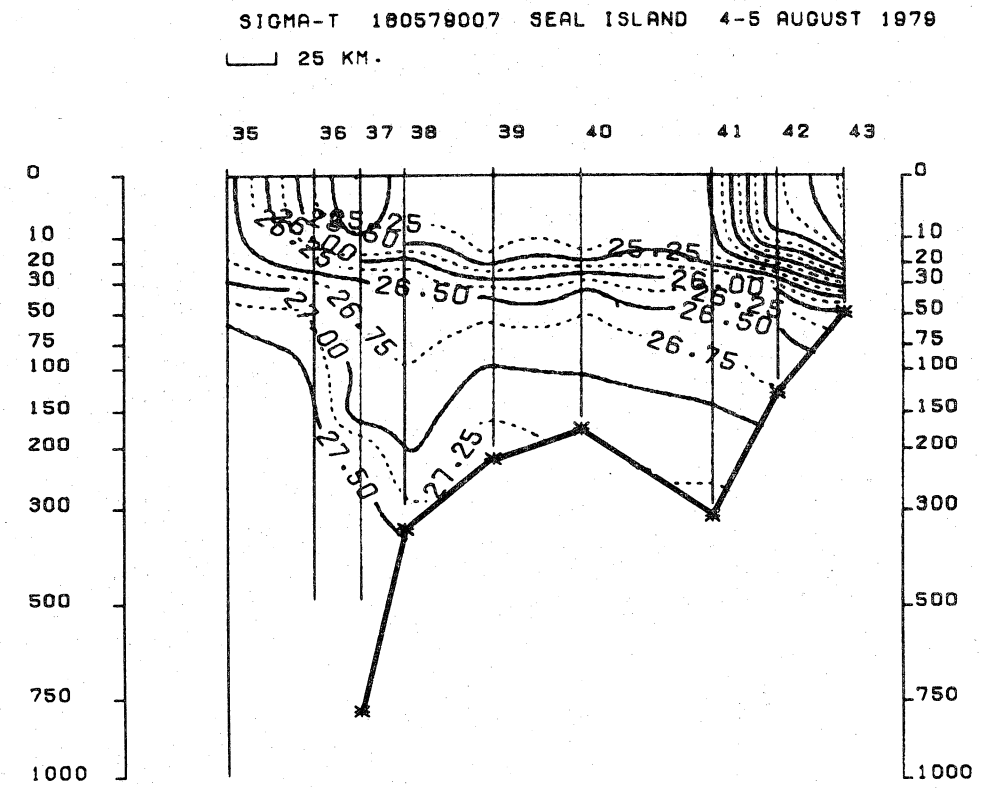


Figure B-4

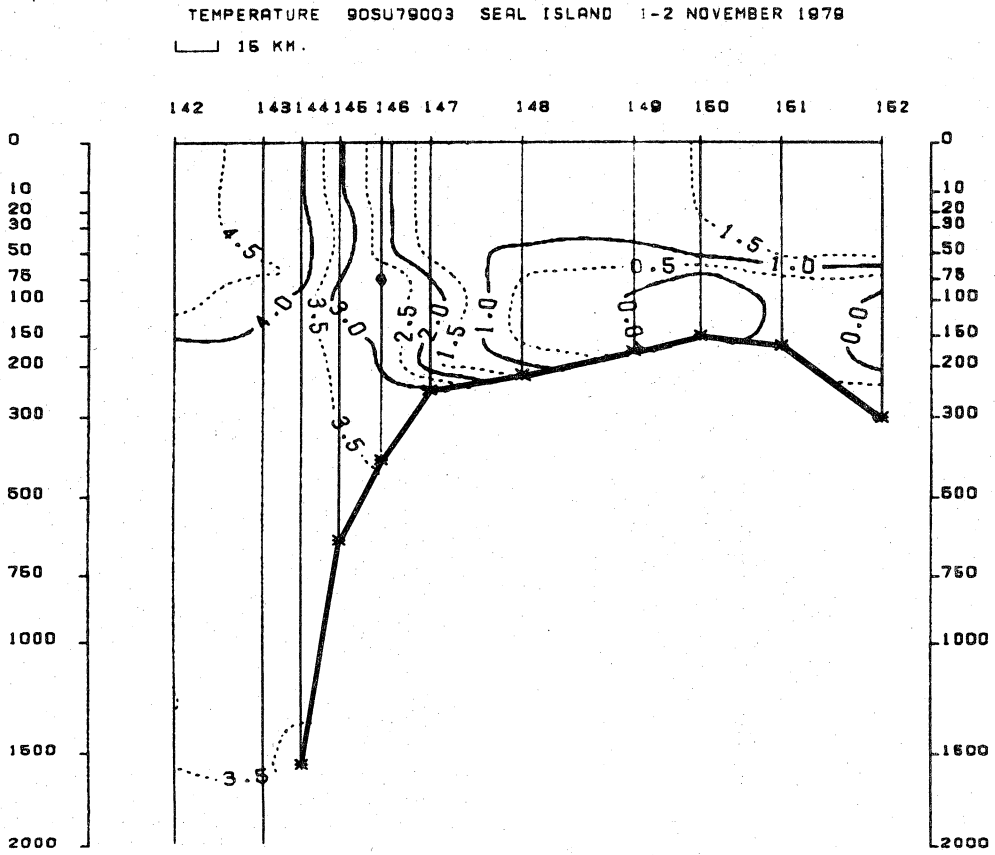


Figure B-5

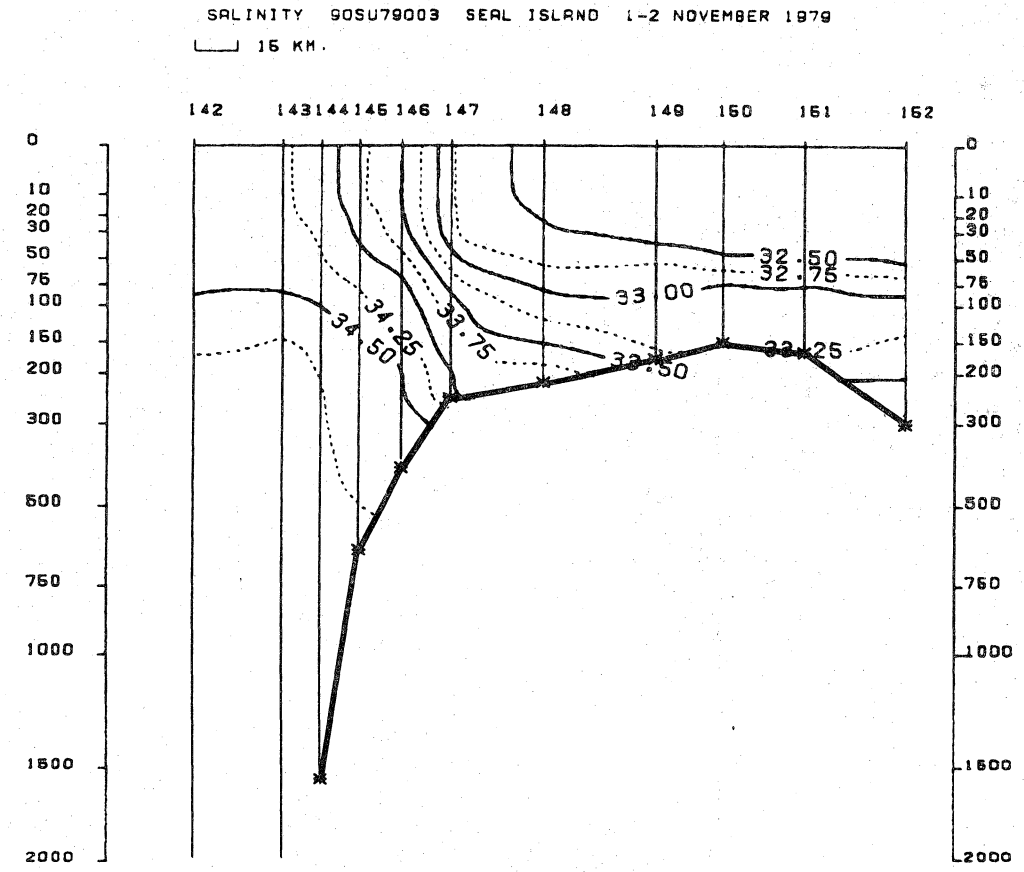


Figure B-6

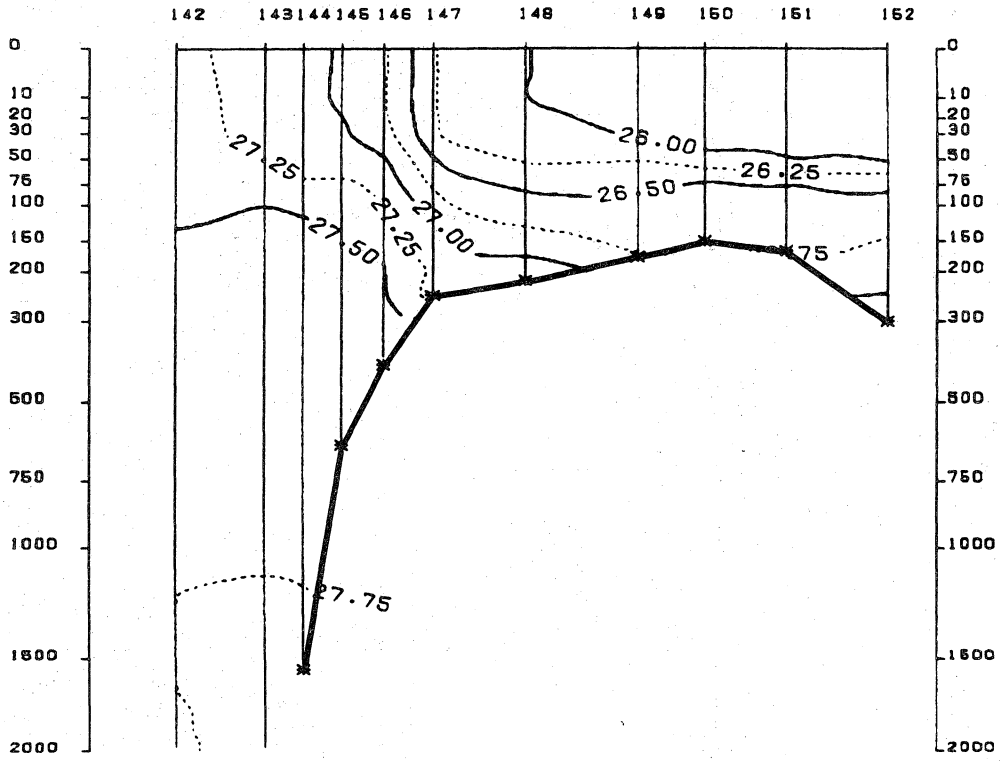


Figure B-7

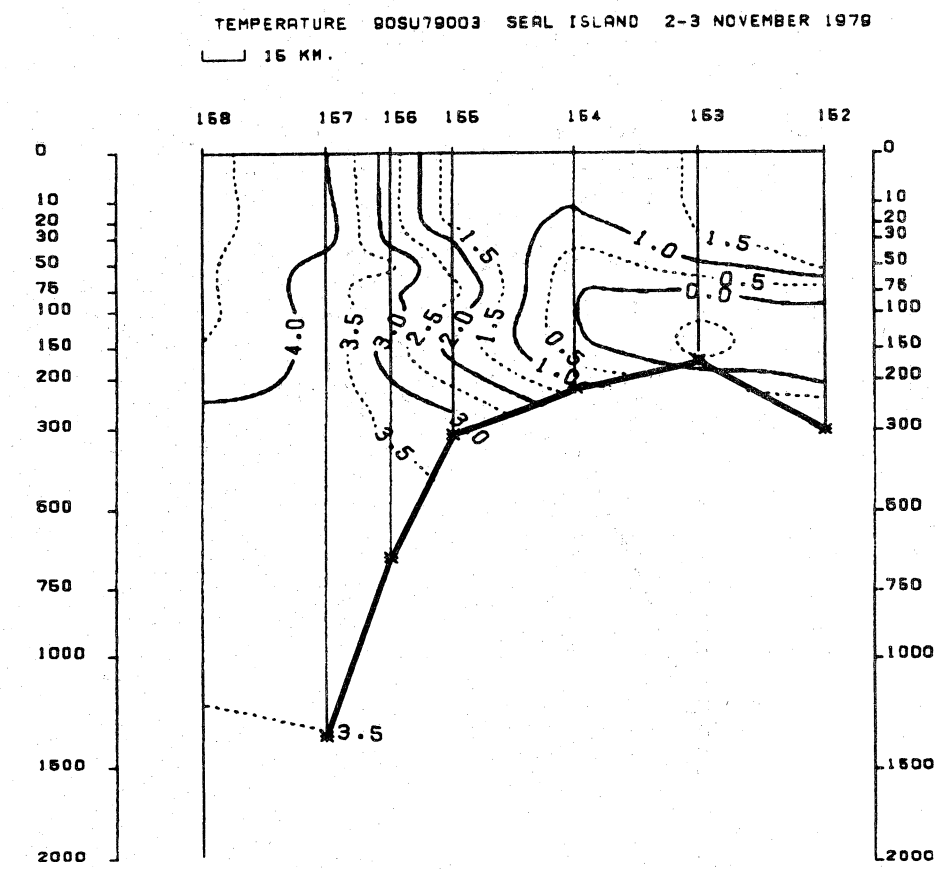


Figure B-8

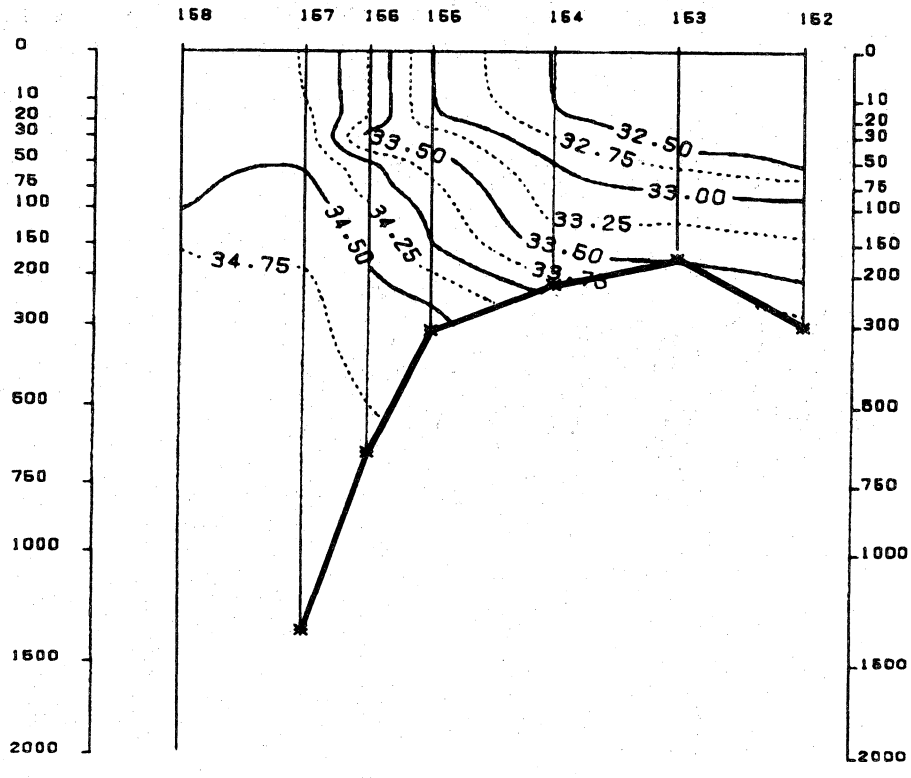


Figure B-9 .

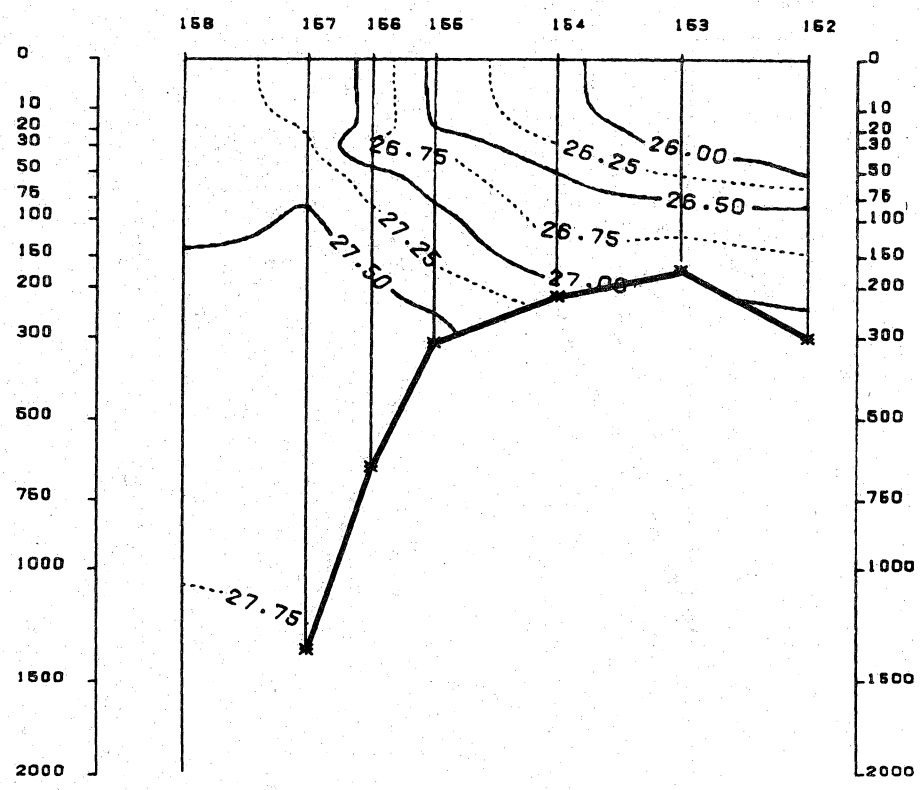


Figure B-10

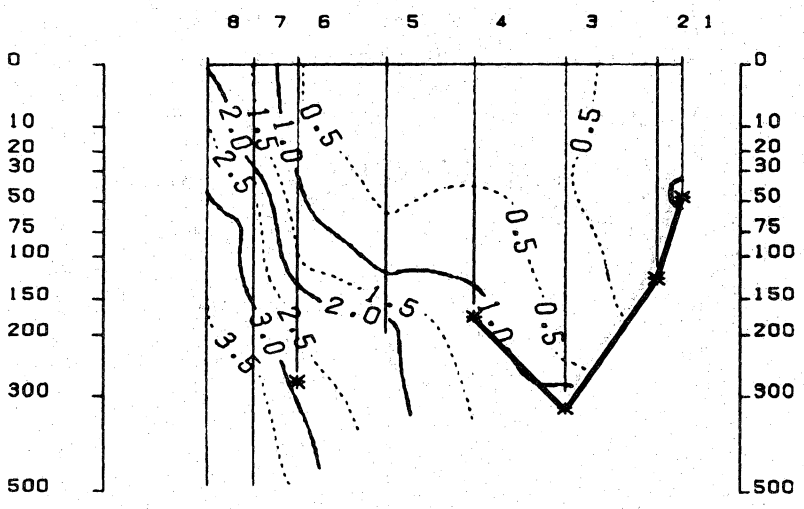


Figure B-11

SALINITY 180579012 SEAL ISLAND 23-24 NOVEMBER 1979

25 KM.

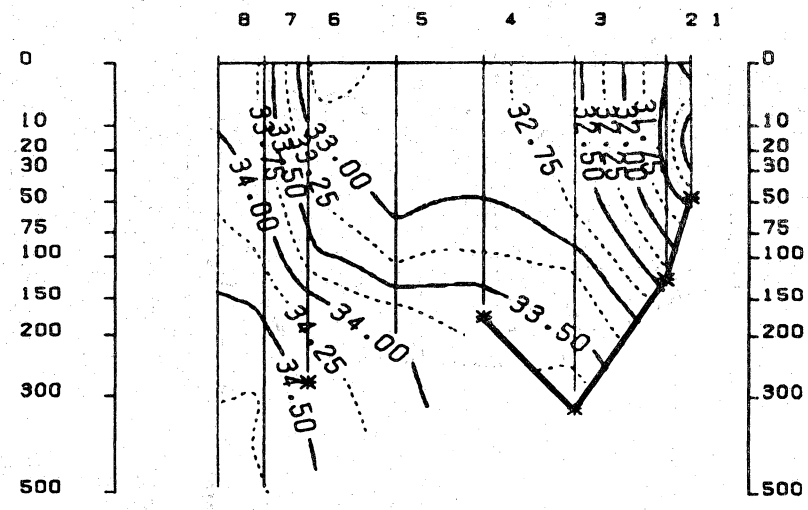


Figure B-12

SIGMA-T 180579012 SEAL ISLAND 23-24 NOVEMBER 1979

25 KM.

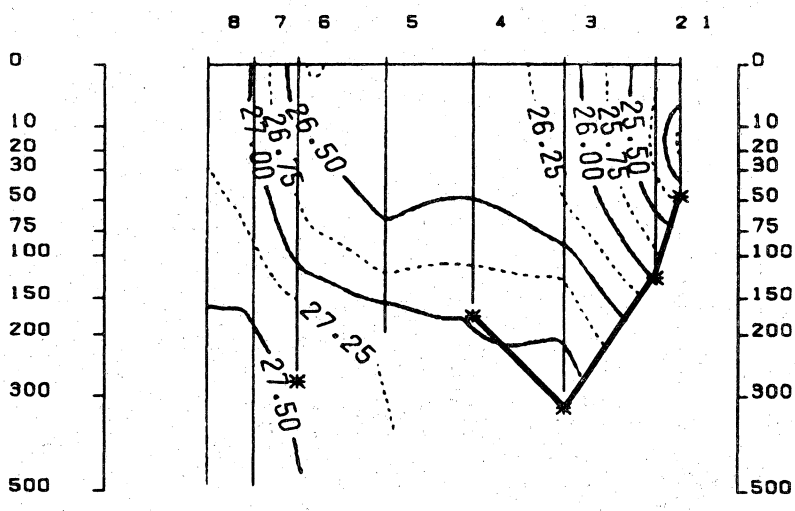


Figure B-13

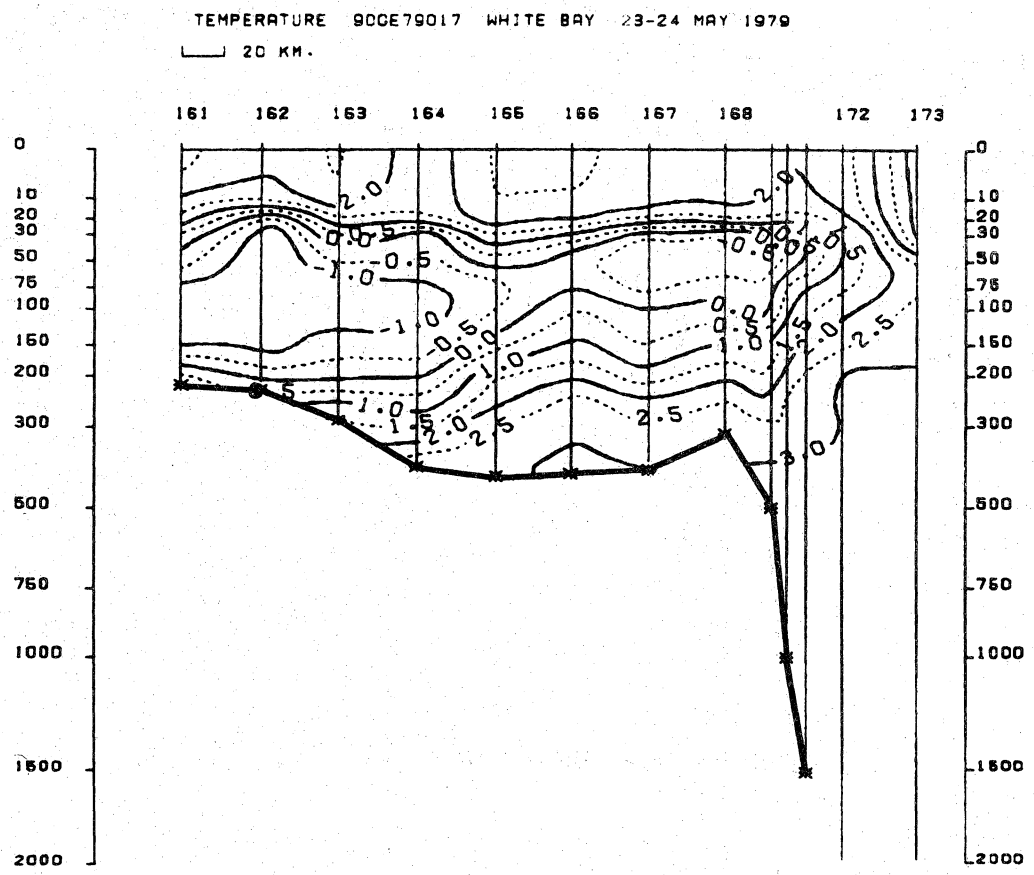


Figure B-14

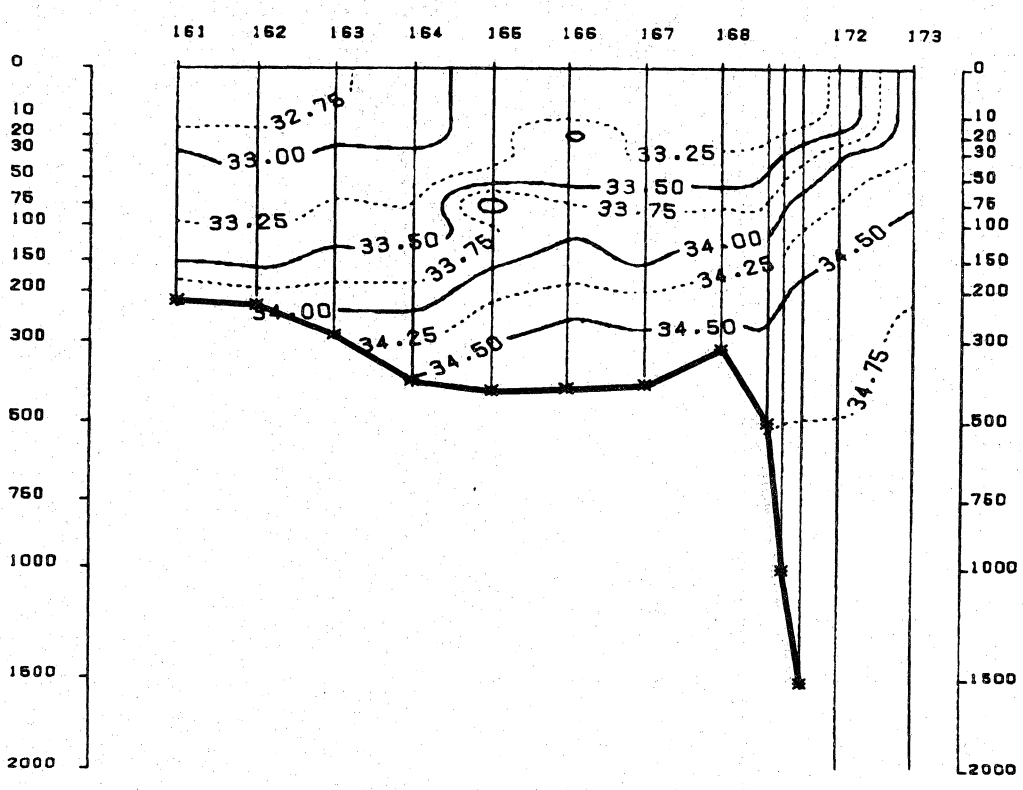


Figure B-15

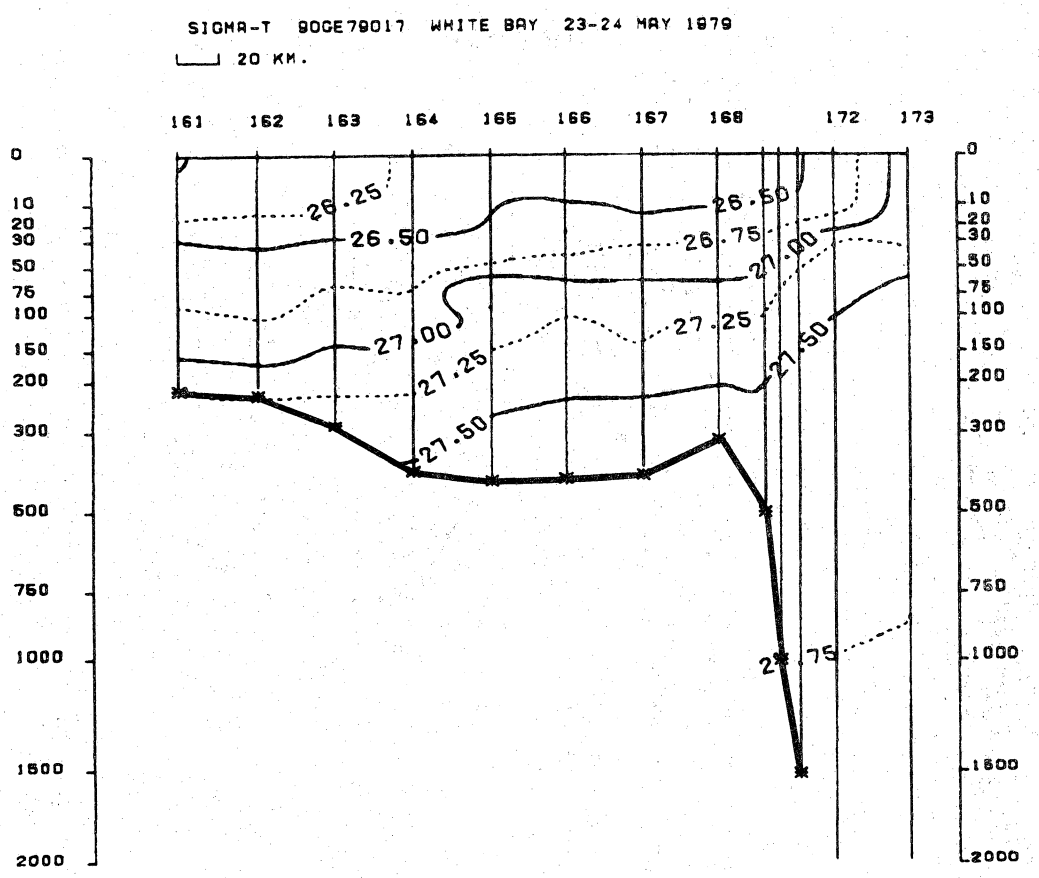


Figure B-16

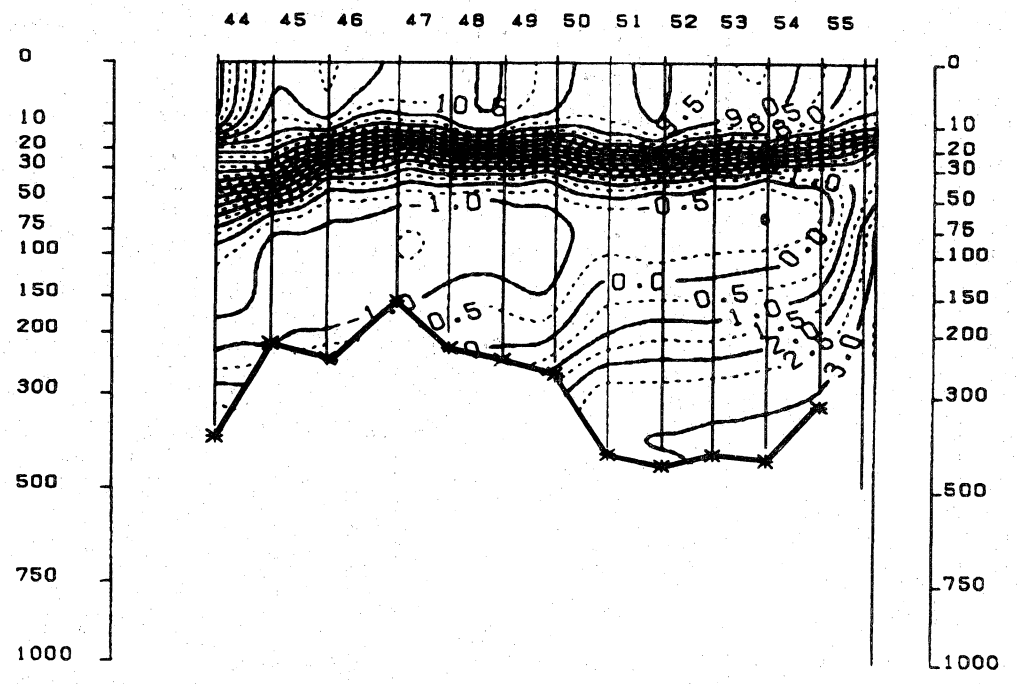


Figure B-17

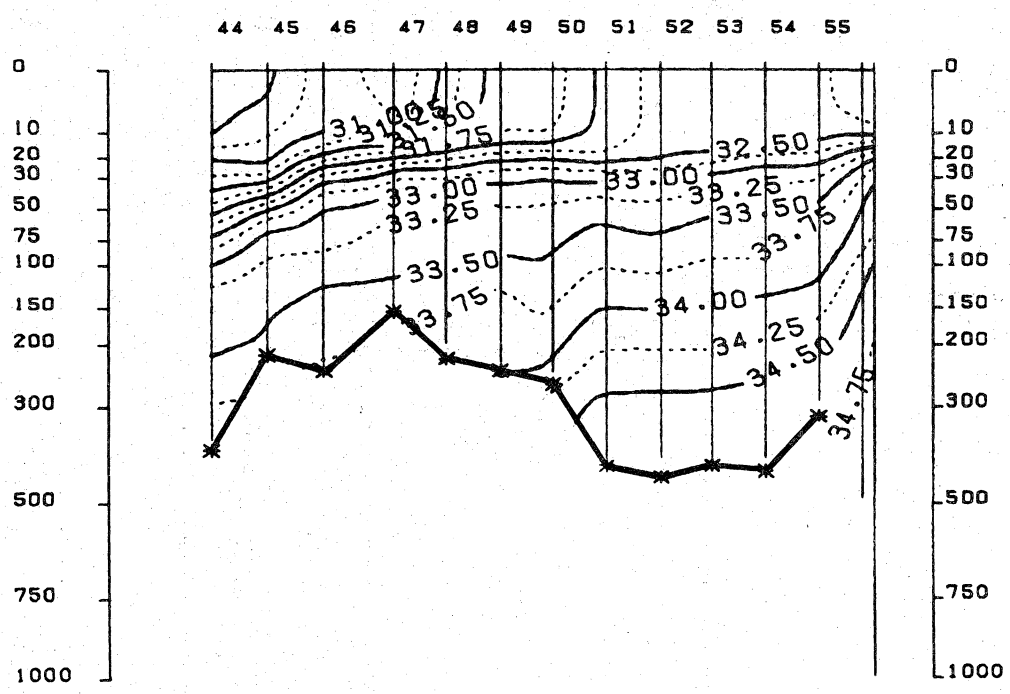


Figure B-18

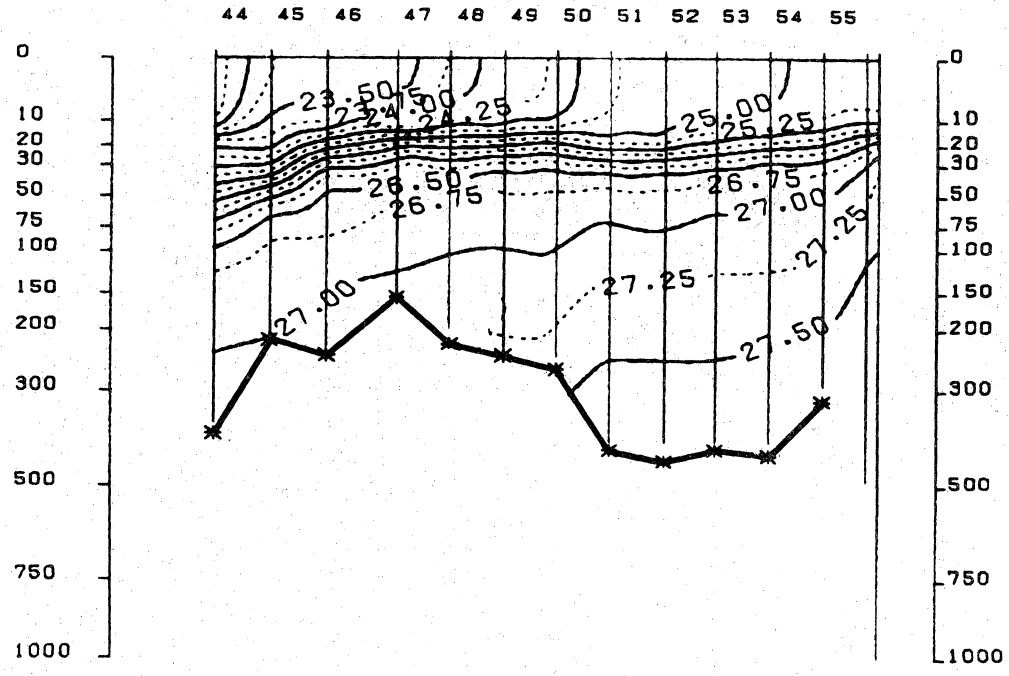


Figure B-19

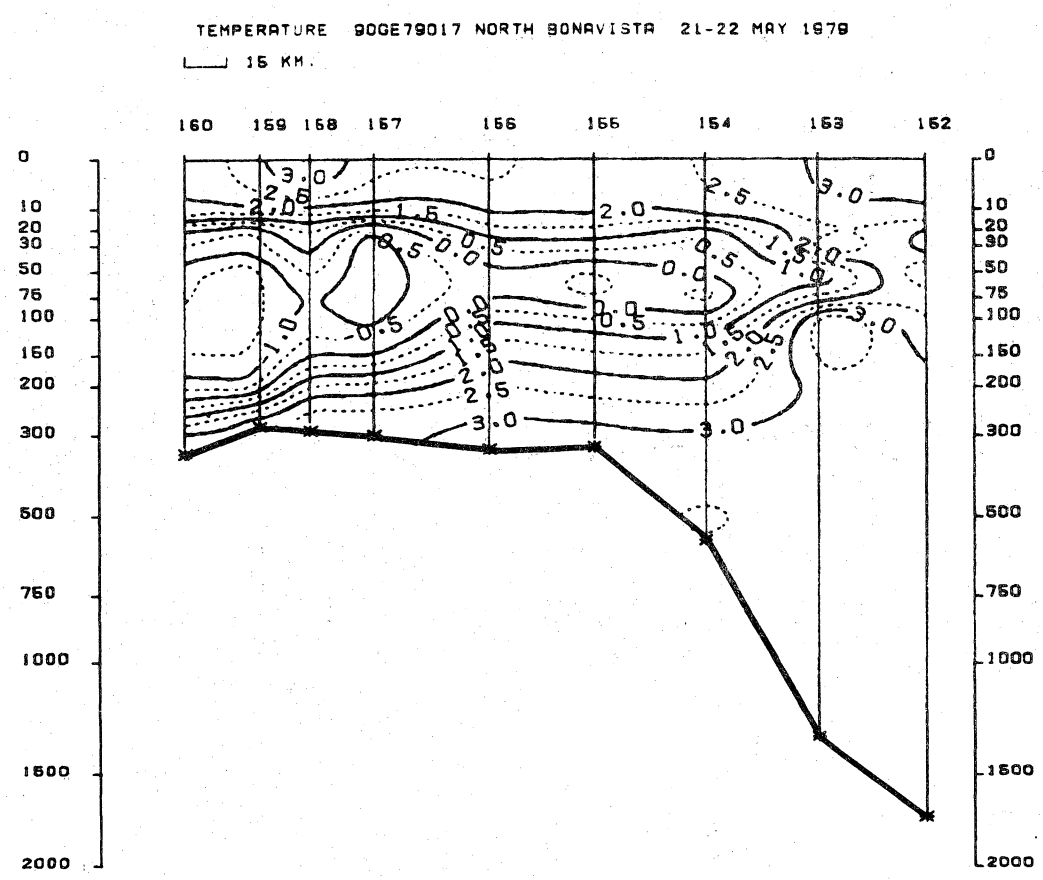


Figure B-20

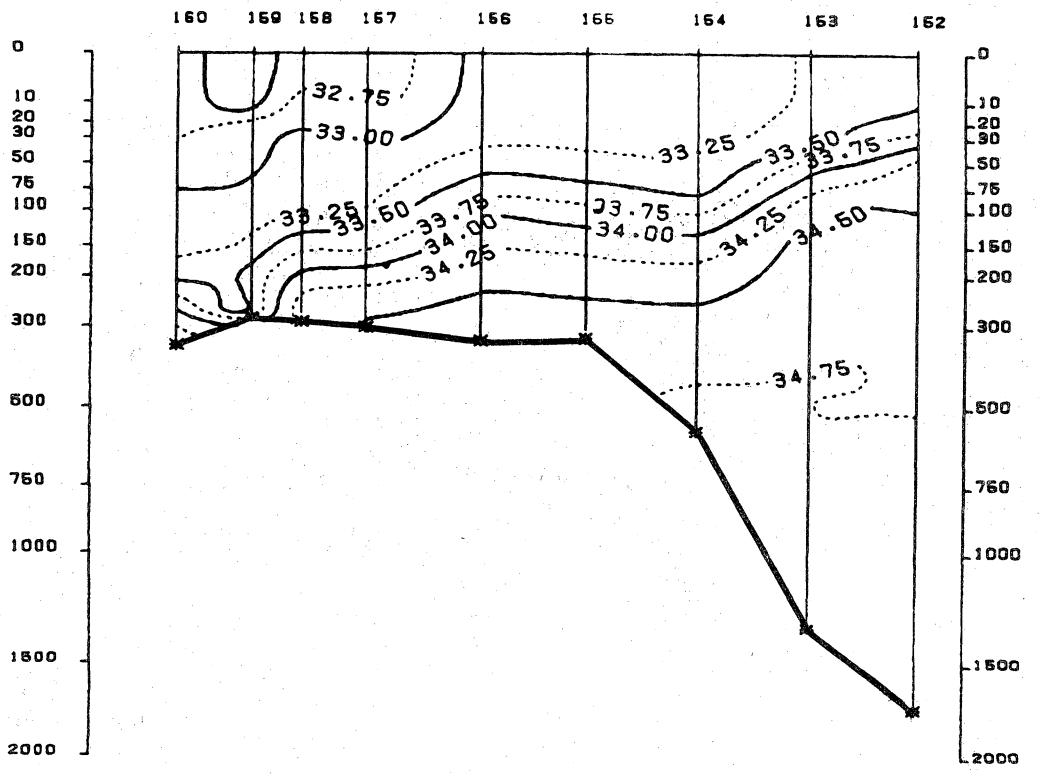


Figure B-21

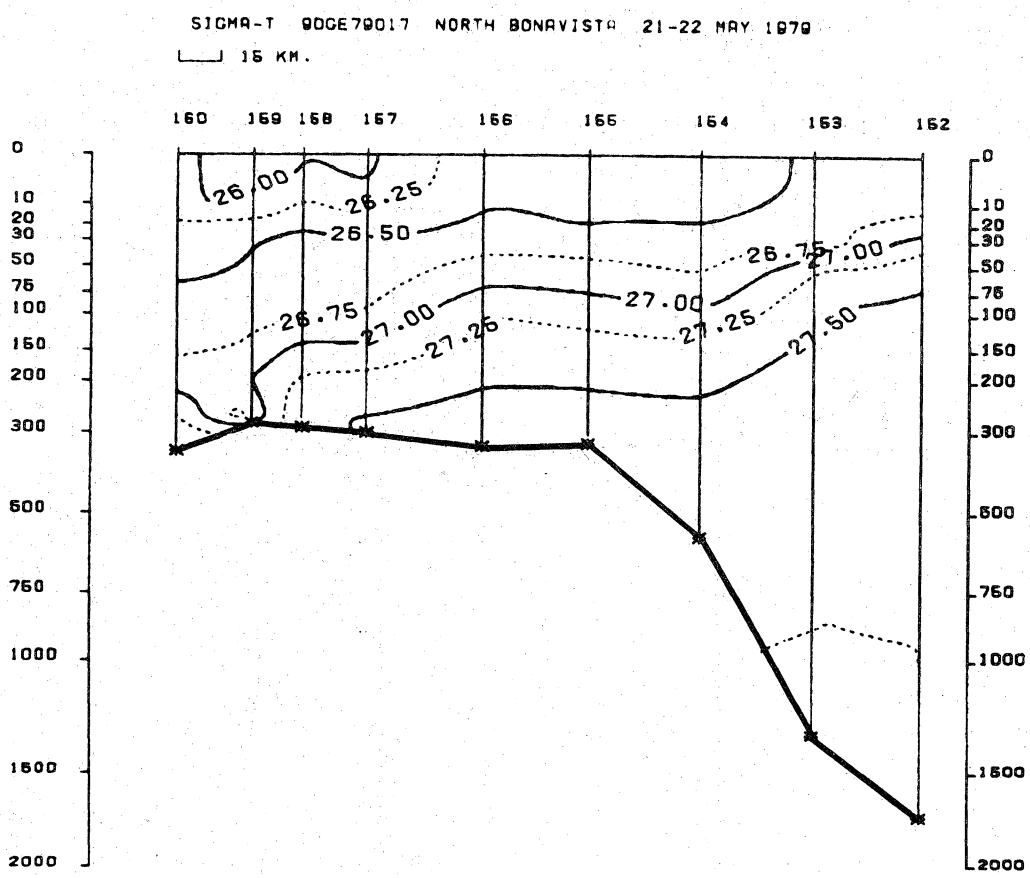


Figure B-22

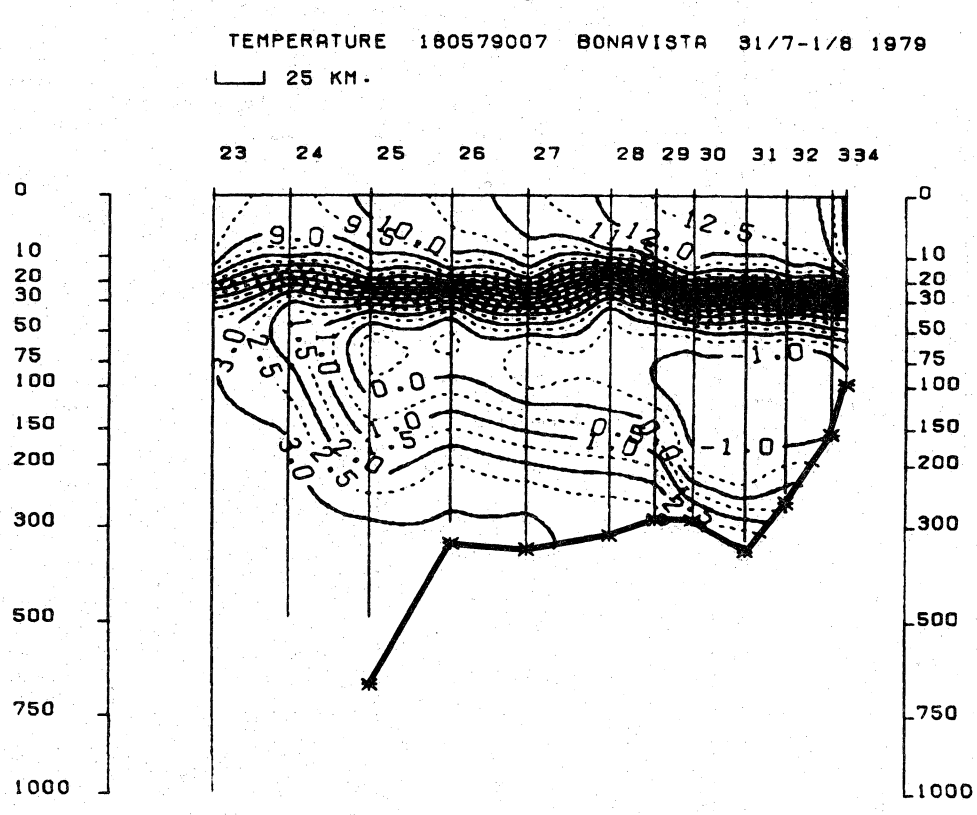


Figure B-23

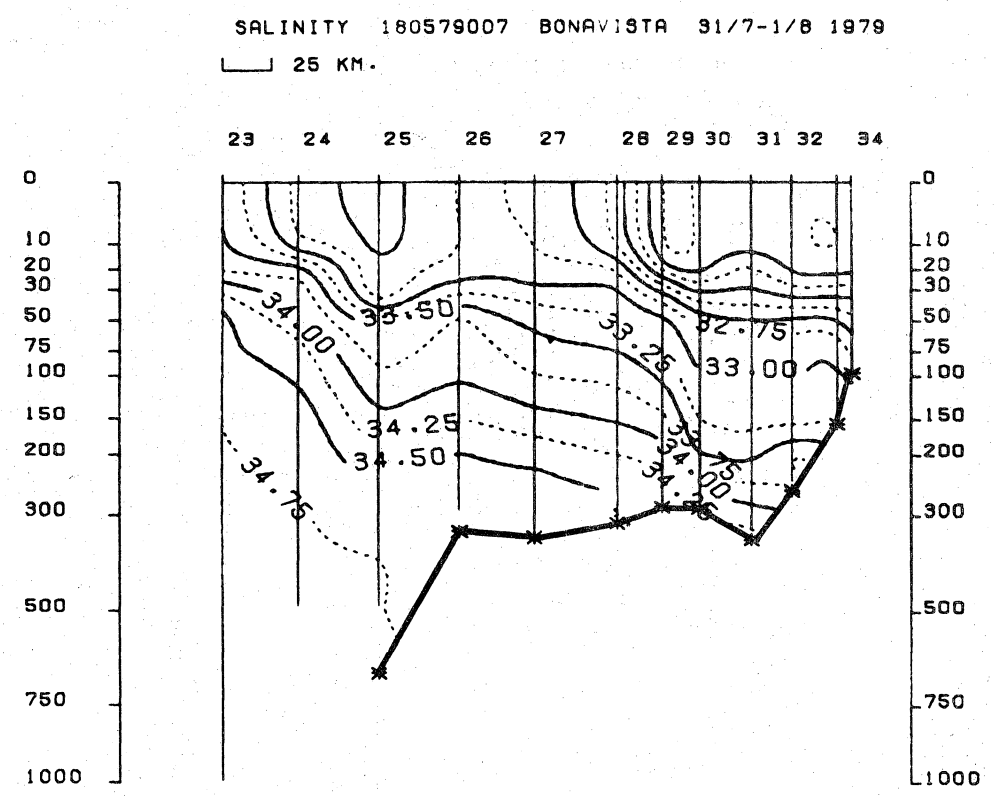


Figure B-24

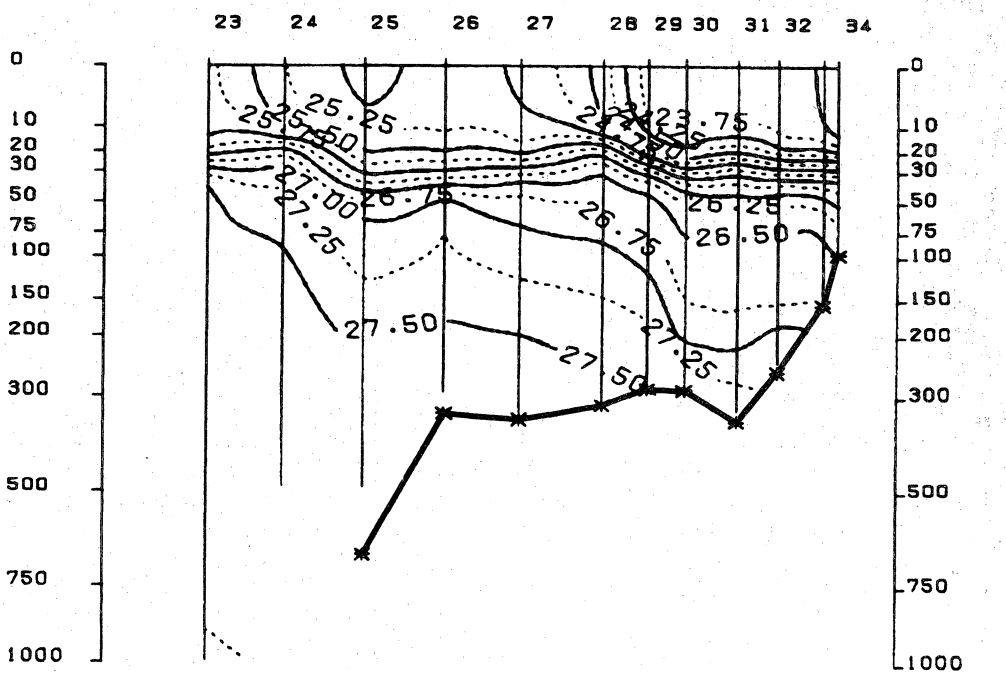


Figure B-25

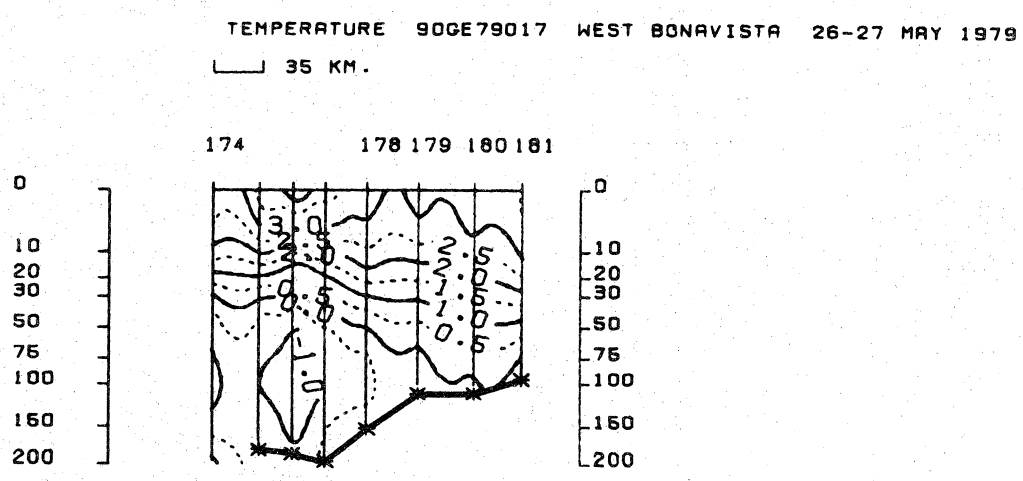


Figure B-26

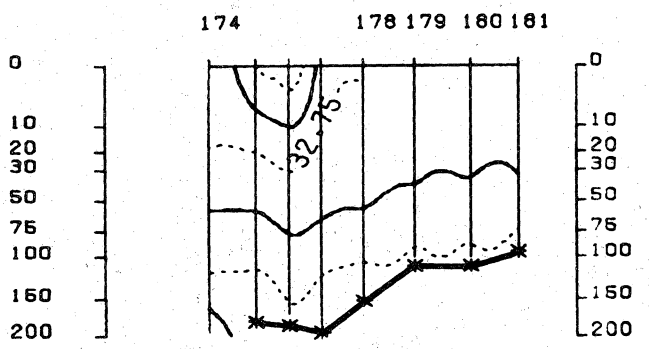


Figure B-27

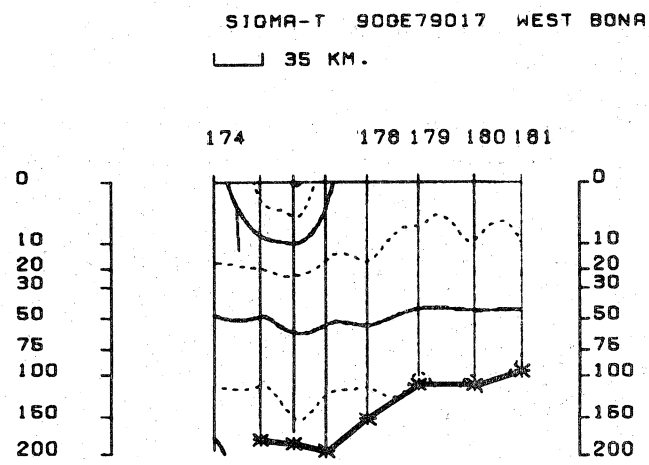


Figure B-28

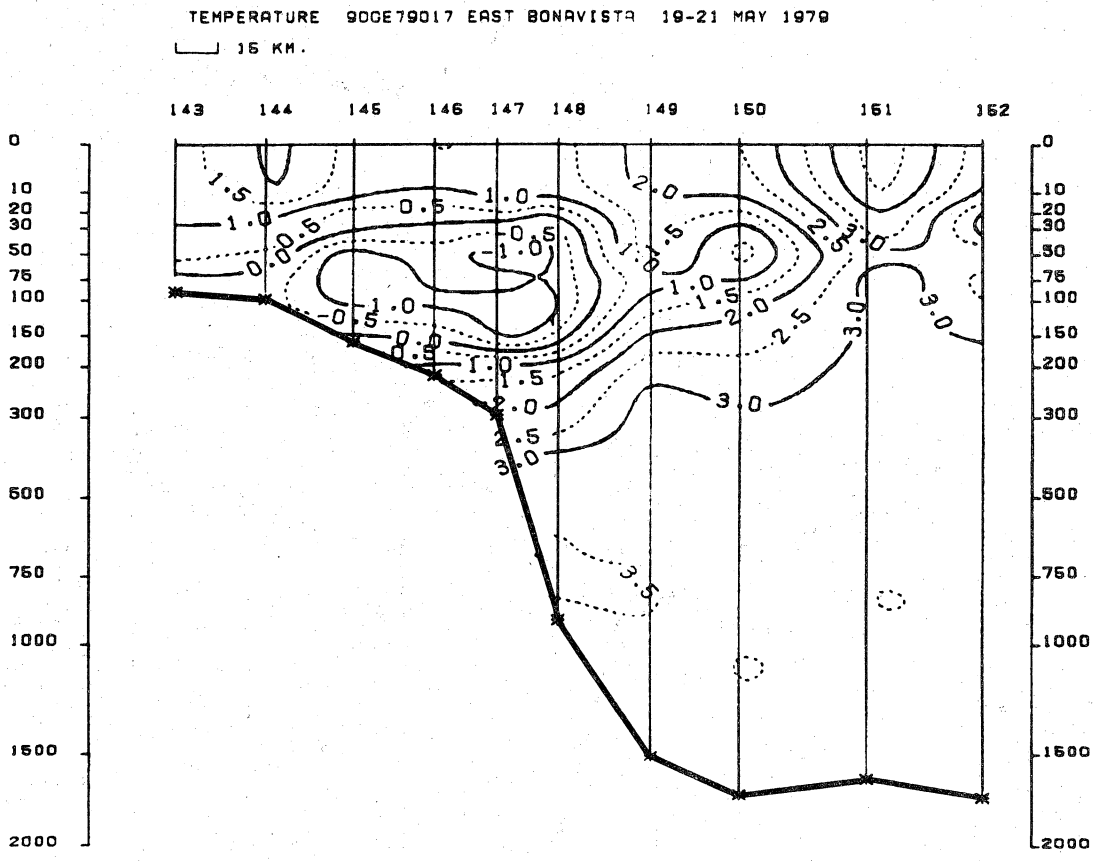


Figure B-29

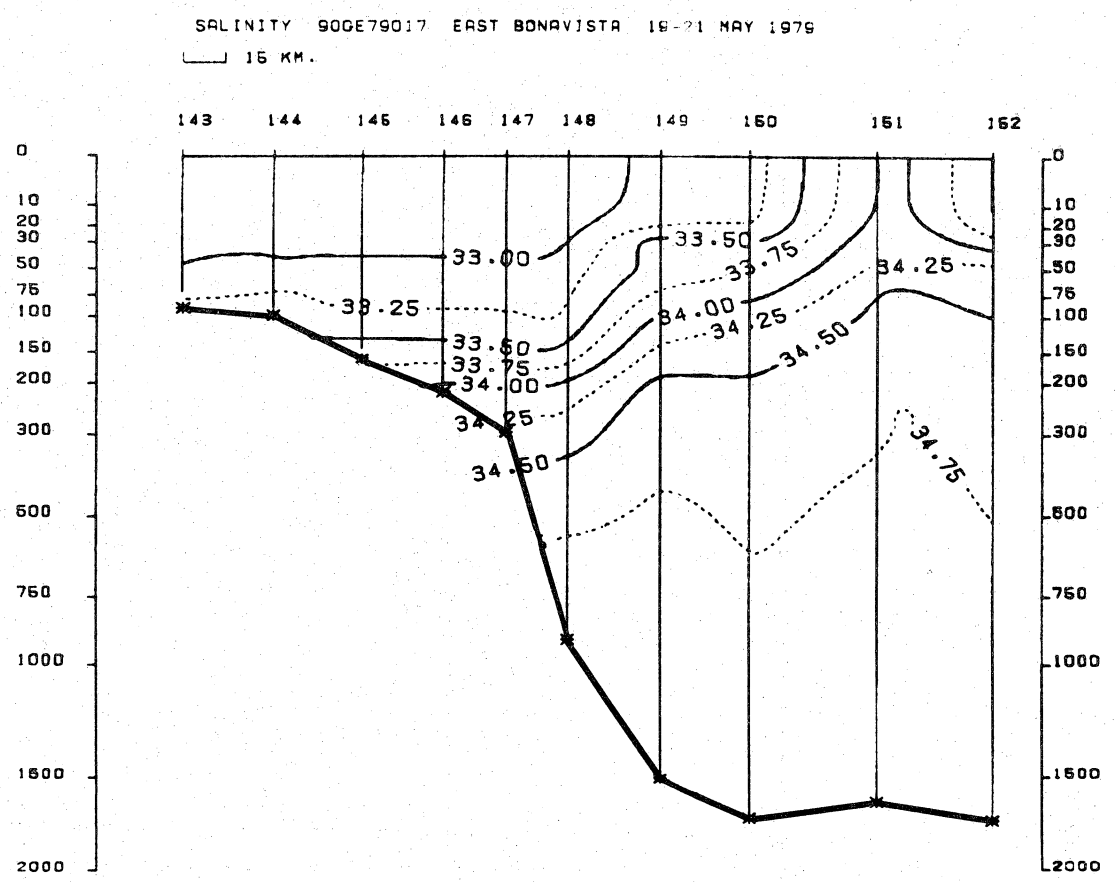


Figure B-30

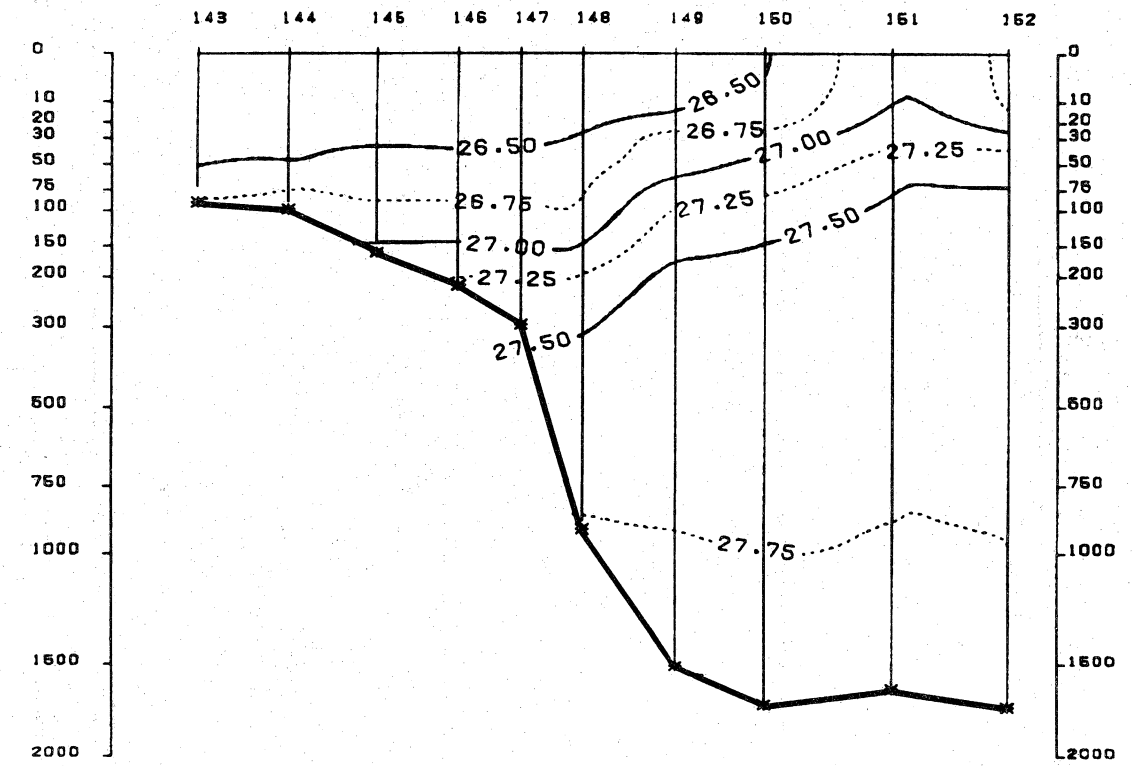


Figure B-31

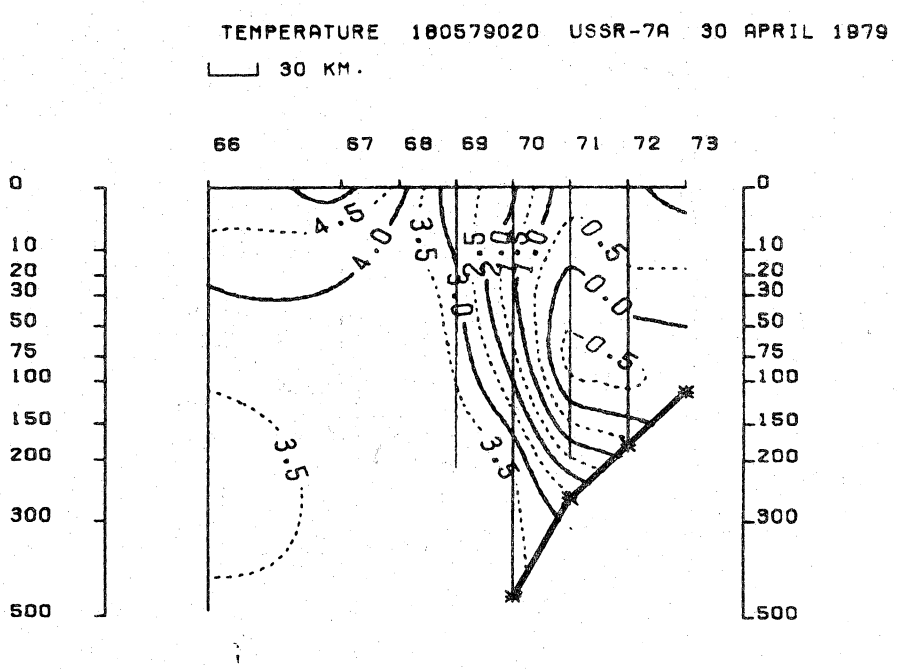


Figure B-32

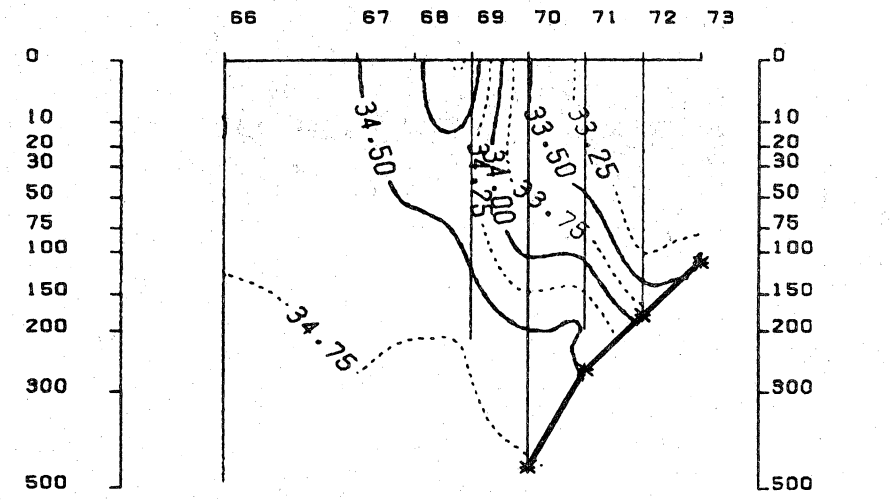


Figure B-33

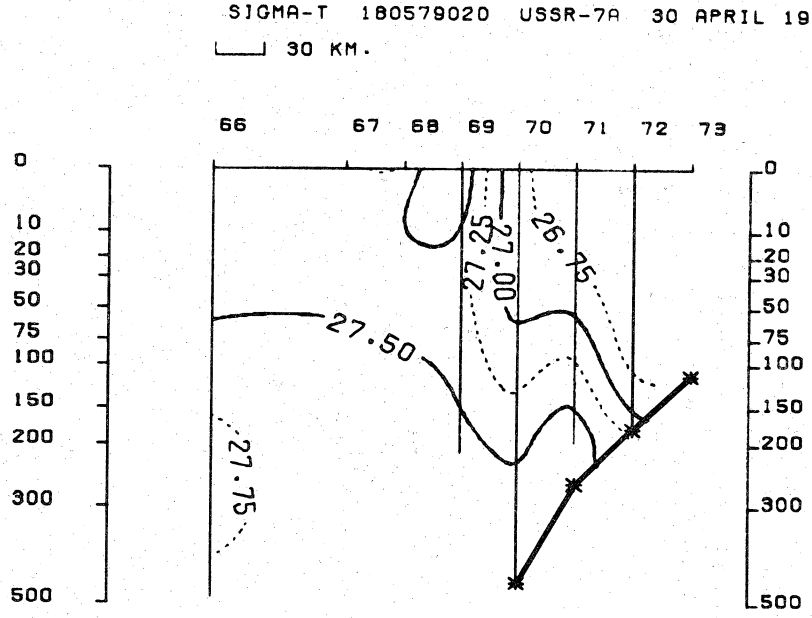


Figure B-34

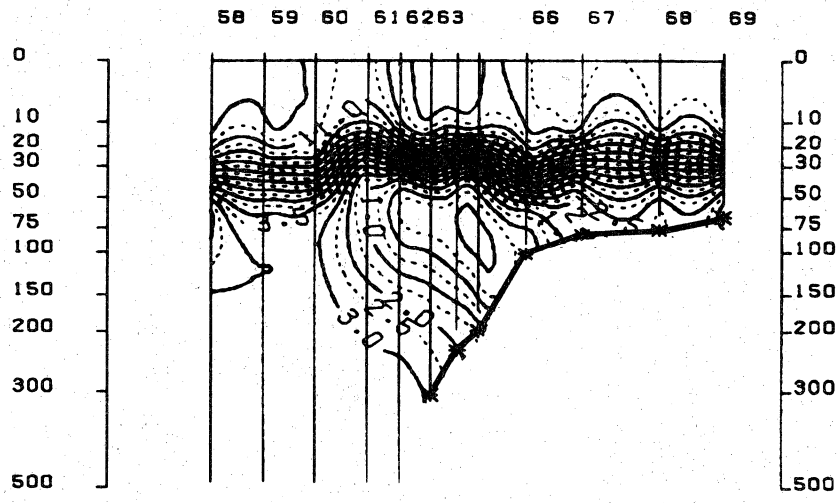


Figure B-35

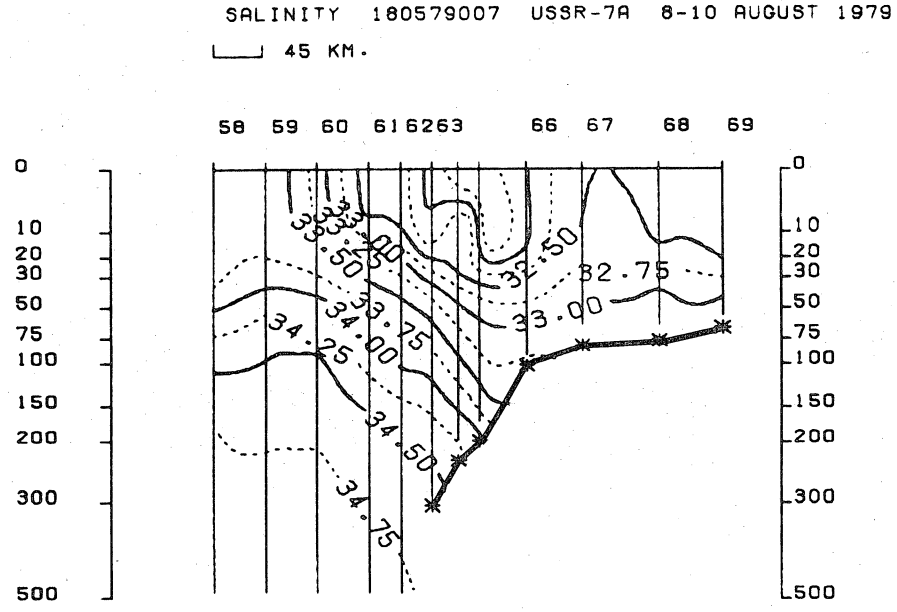


Figure B-36

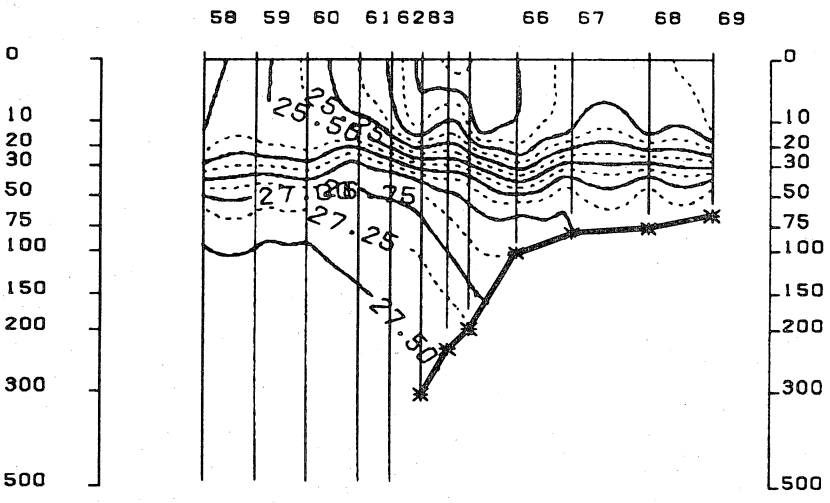


Figure B-37

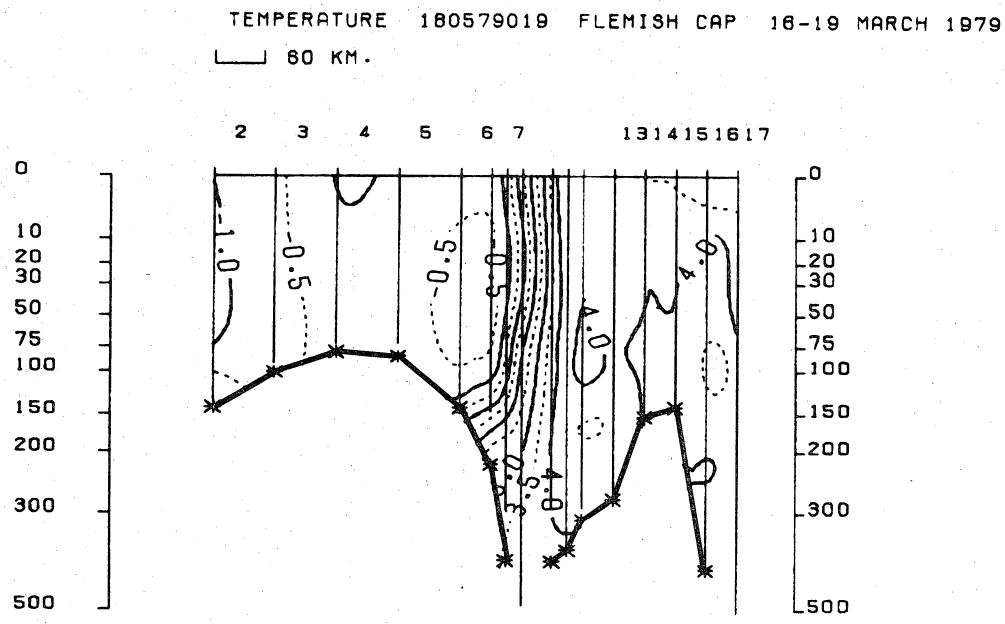


Figure B-38

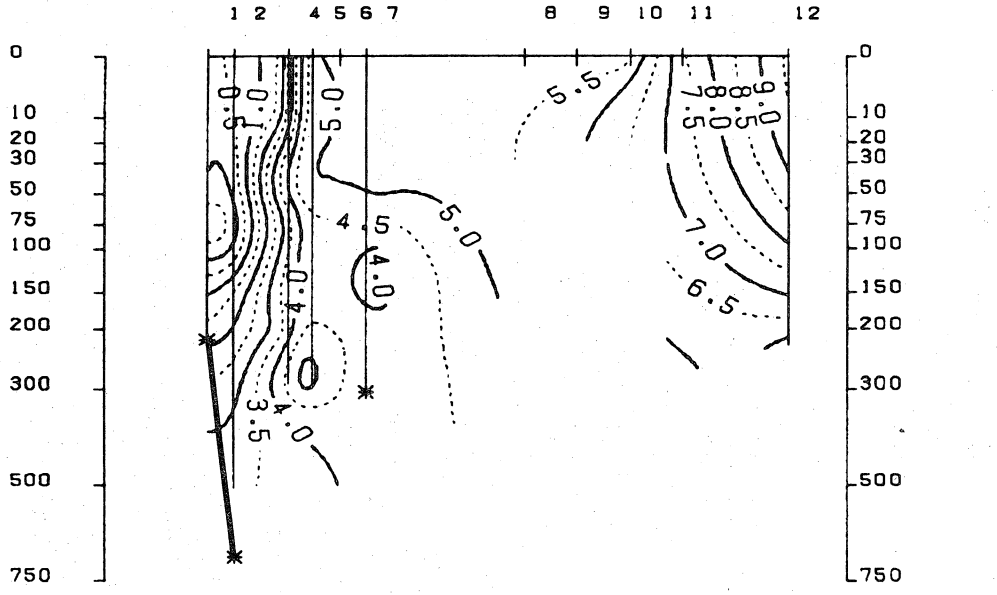


Figure B-39

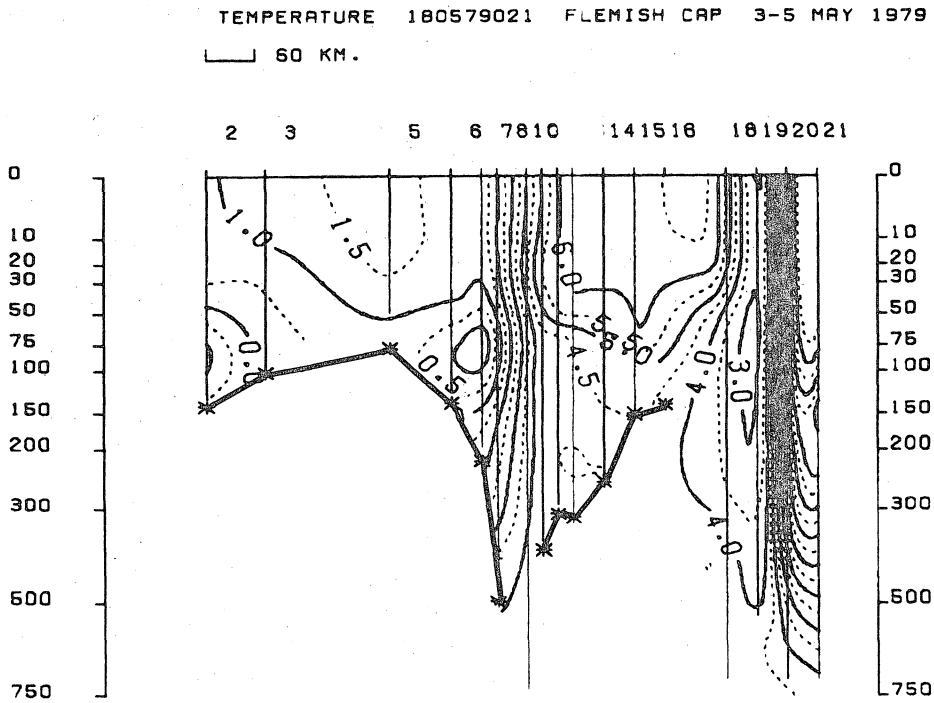


Figure B-40

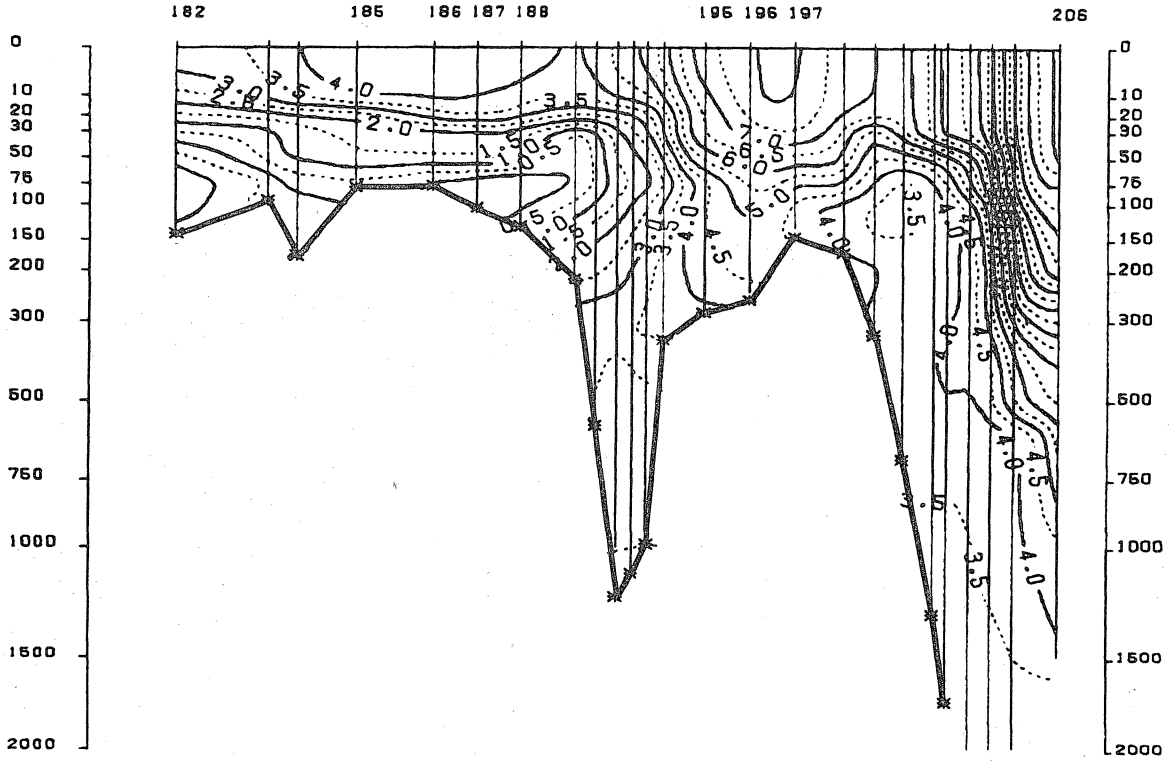


Figure B-41

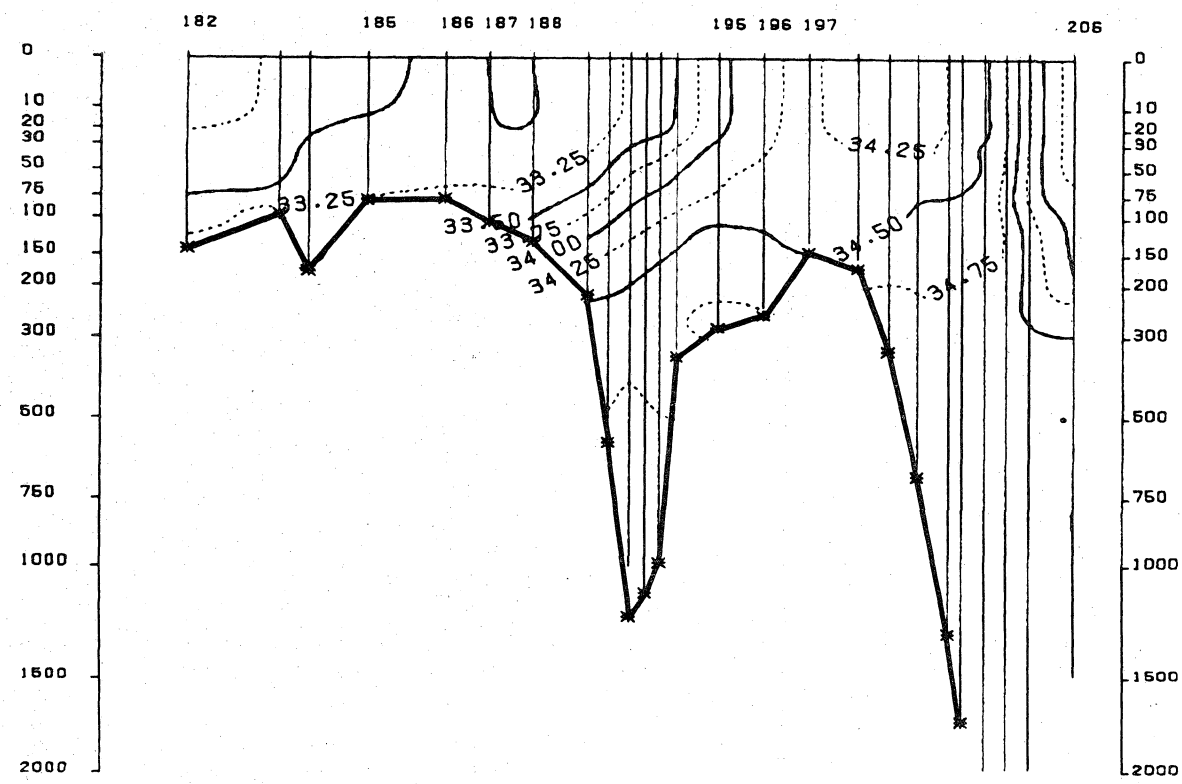


Figure B-42

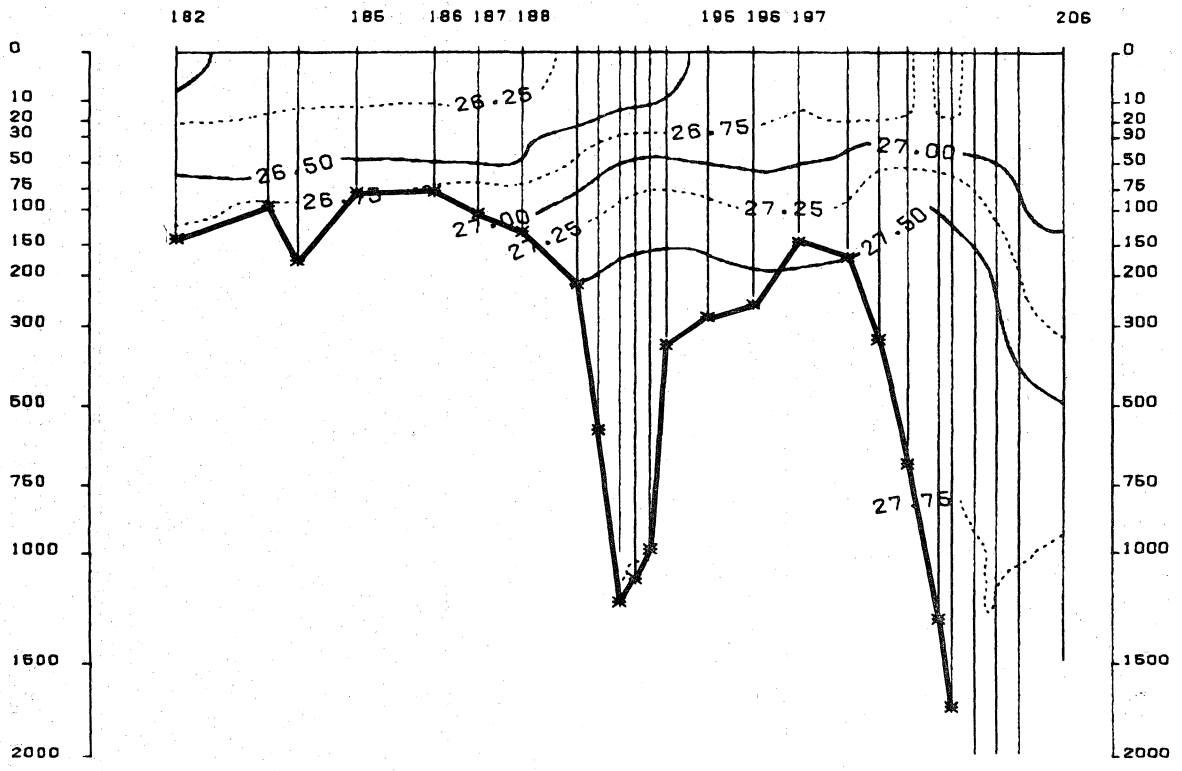


Figure B-43

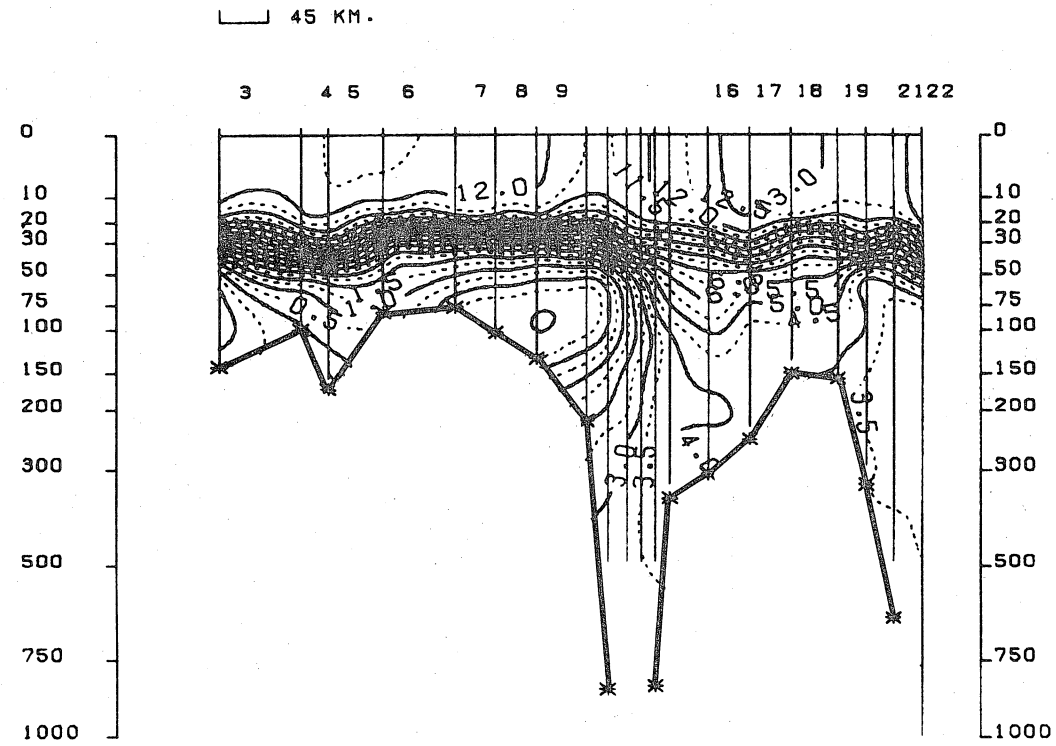


Figure B-44

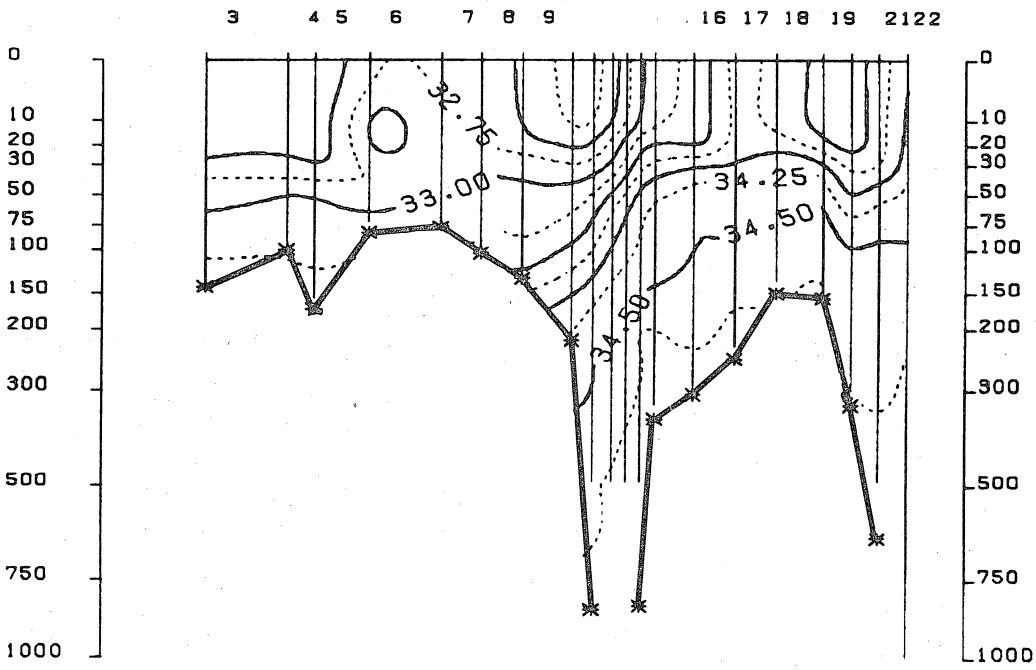


Figure B-45

SIGMA-T 180579007 FLEMISH CAP 27-30 JULY 1979

45 KM.

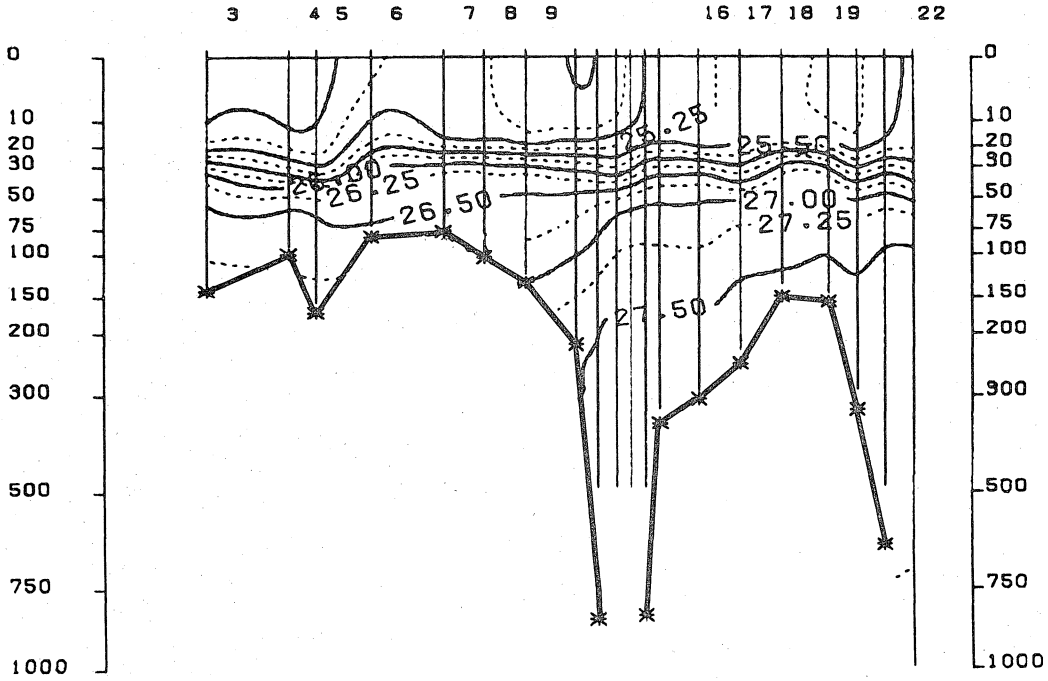


Figure B-46

TEMPERATURE 180579007 SW GRAND BANKS 10-11 AUGUST 1979

25 KM.

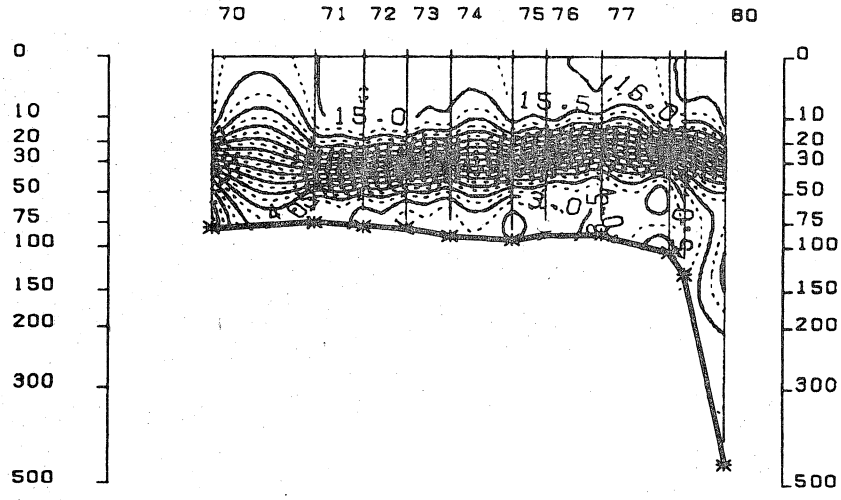


Figure B-47

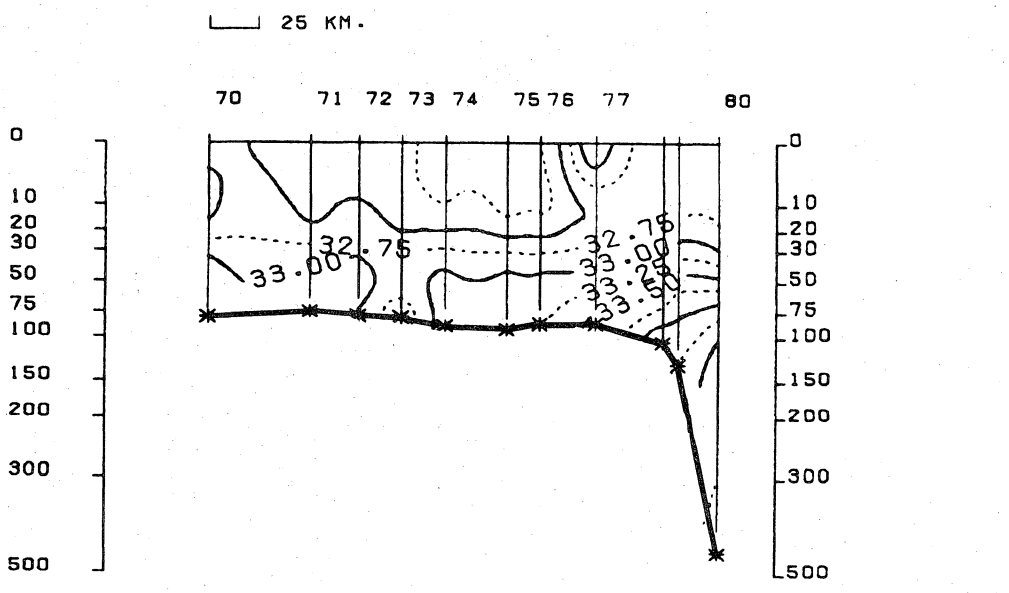


Figure B-48

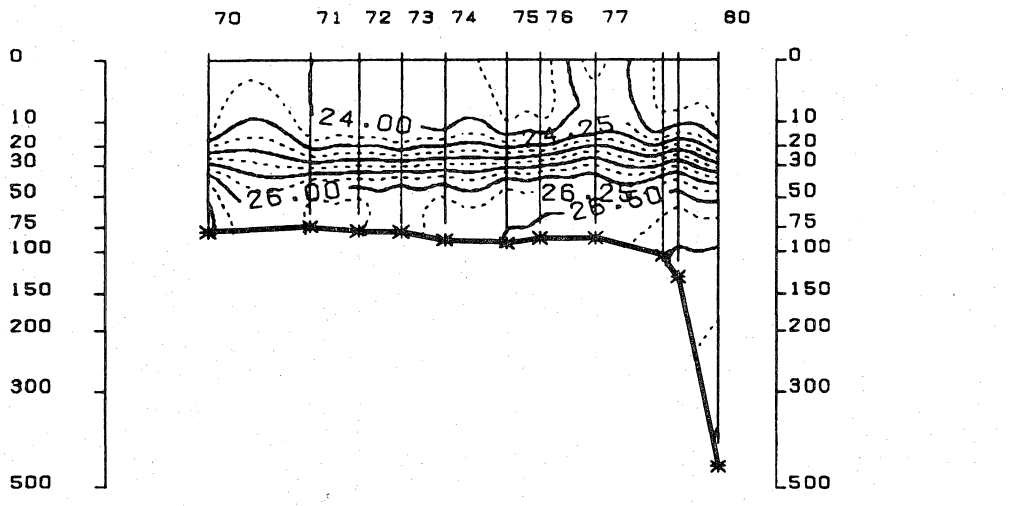


Figure B-49

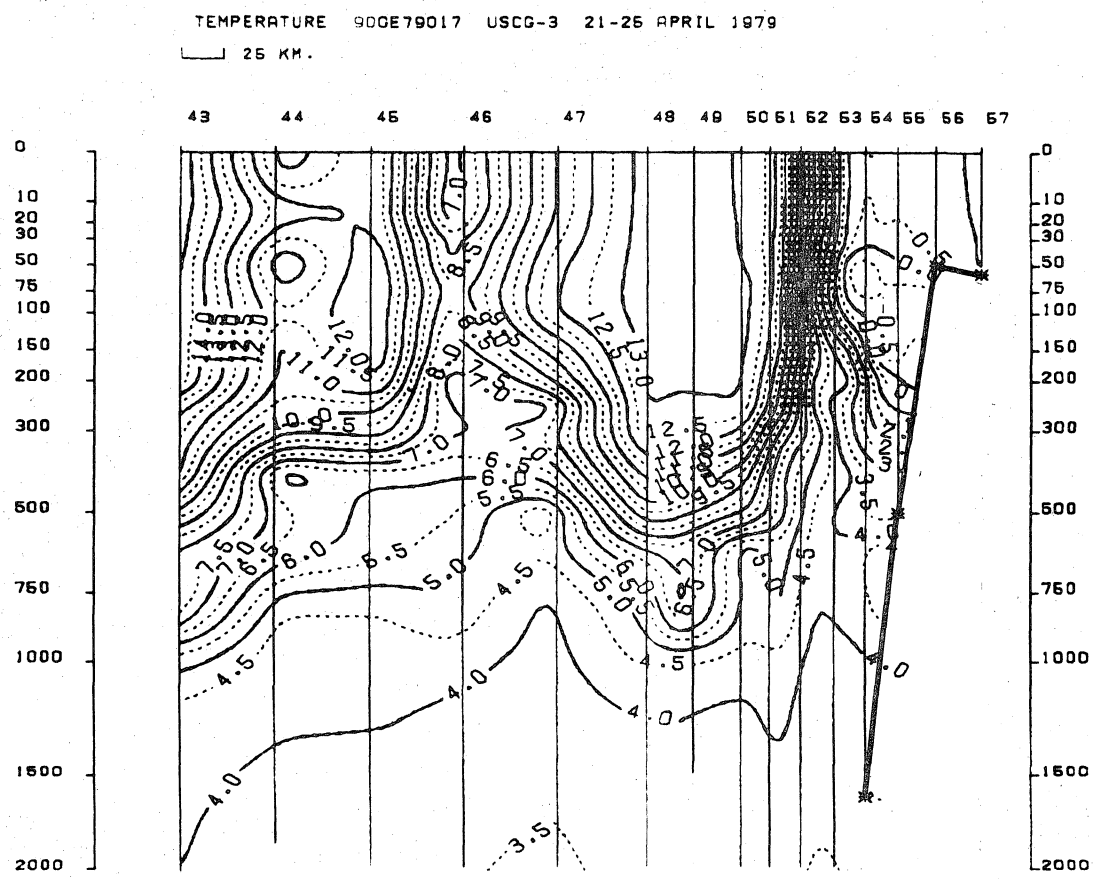


Figure B-50

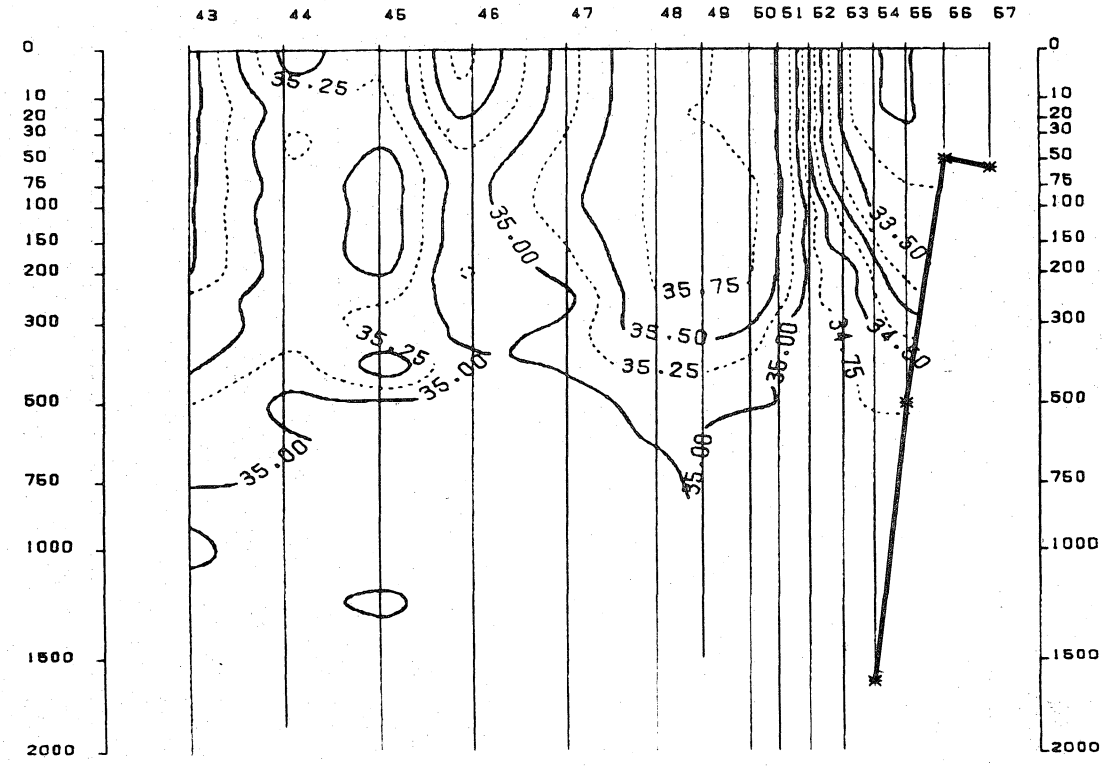


Figure B-51

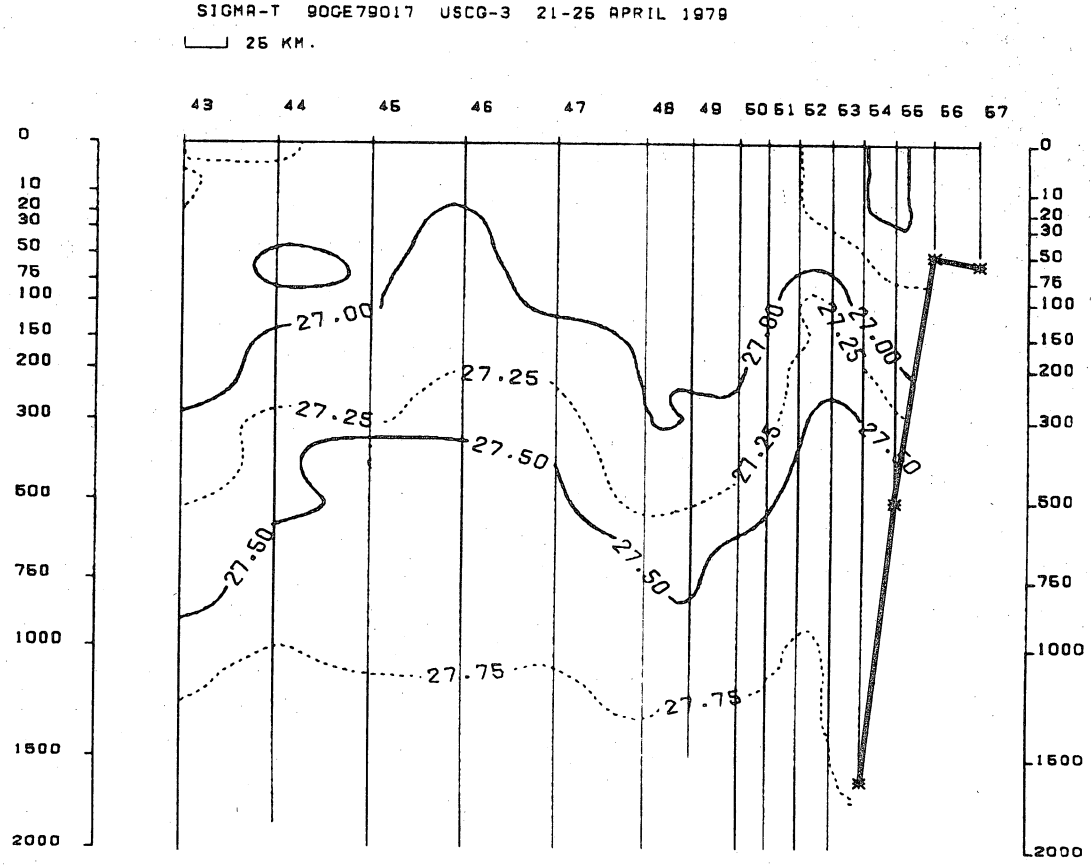


Figure B-52

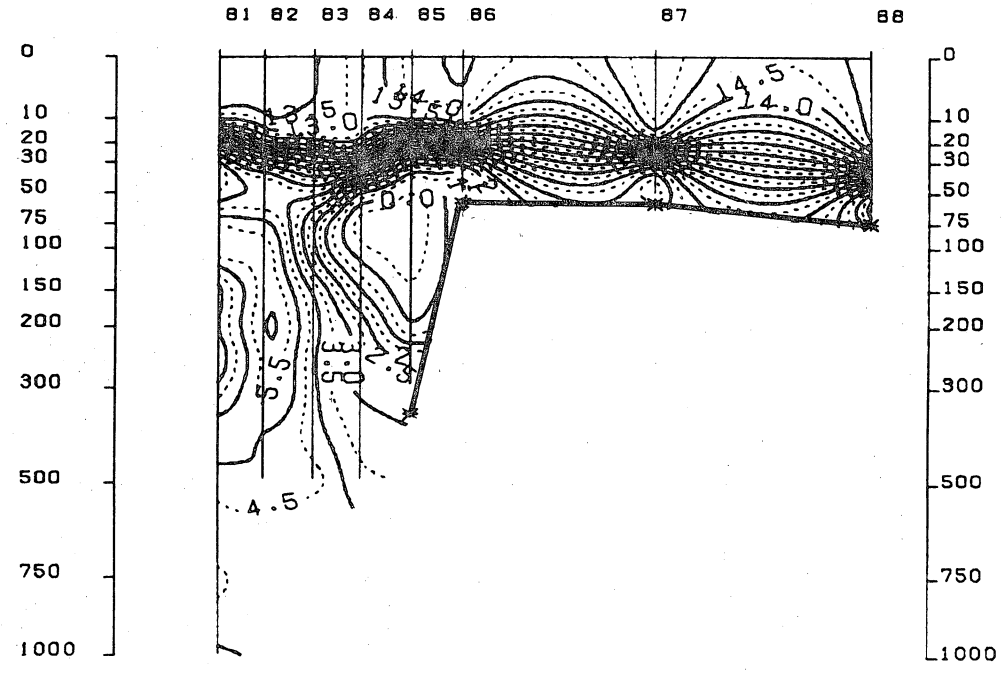


Figure B-53

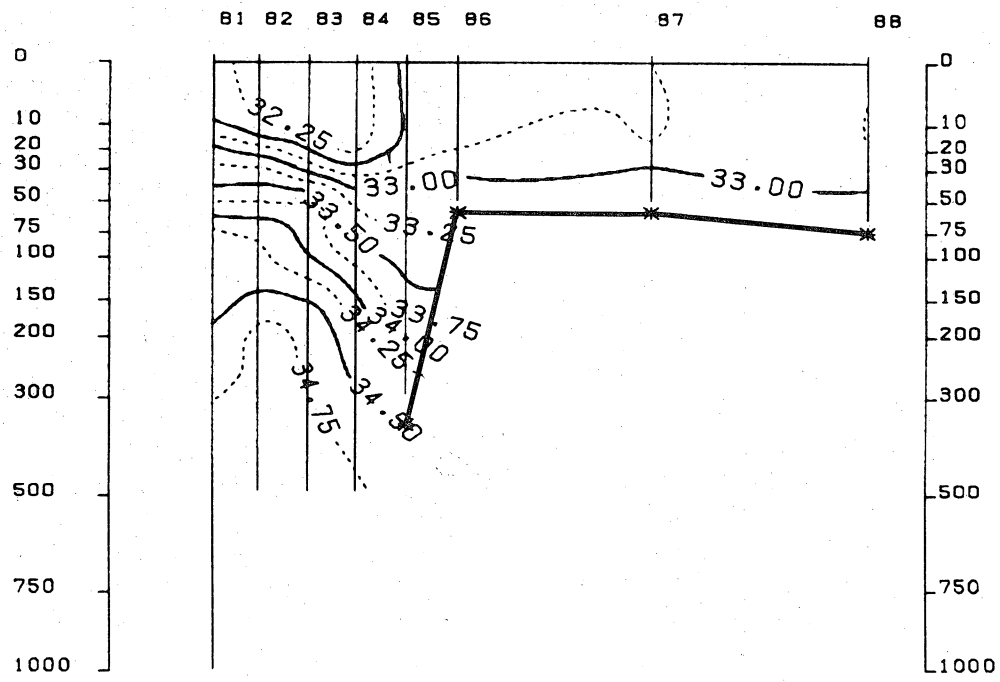


Figure B-54