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Marine Environmental Data Services Progress Report 1978-1979

by

J. Gagnon
MEDS, Department of Fisheries and Oceans
Ottawa, Ontario, Canada

Introduction

The Marine Environmental Data Services Branch, acting as regional data centre for oceanographic data for ICNAF since September 1974, has maintained a dual commitment to ICNAF: One, the processing and maintenance of data bases of oceanographic data collected and exchanged by the Member Countries; and two, scientific support for the Environmental Subcommittee.

MEDS has been active in acquiring, processing and archiving data collected during 1978, as well as attempting to acquire outstanding historical datasets not yet in MEDS databanks. MEDS has also attempted a summary of environmental conditions within the ICNAF area for 1978 with the data at its disposal. Participation in the Flemish Cap Experiment with respect to real-time data exchange and graphic product summaries by cruise has enabled MEDS to provide participants, during 1979 cruises, with real-time data and products which have proven useful in planning future cruises to the Flemish Cap.

Data Inventory for 1978 Data in the ICNAF Area

The inventory form, approved for use at the 1977 Annual Meeting and subsequently modified at the 1978 Annual Meeting, was distributed by the Secretariat to all Member Countries. Responses this year have come from Canada, Denmark, the Federal Republic of Germany, Poland, the U.S.A., and the U.S.S.R. Table 1 summarizes the temperature and salinity data by ICNAF subarea and season. The Table shows a substantial increase in data reported as collected in 1978 compared with 1977 figures. In total, 5,206 stations of temperature-salinity and 5,736 stations of temperature observations were reported for 1978, as compared to the 2,561 temperature-salinity and 1,630 temperature stations reported for 1977. When added to the 1,691 temperature-salinity

and 2,482 temperature stations already received and processed for 1978 within the ICNAF area, one begins to get a better impression of total data collected during 1978. We know that this inventory is still incomplete; however, it is an improvement over previous years' summaries and MEDS wishes to recommend the continued use of these inventory forms by all Member Countries as distributed by the Secretariat.

Data Received and Processed for 1978 in the ICNAF Area

Table 2 summarizes the data collected during 1978 and submitted to MEDS. A total of 1,691 bottle stations and 2,482 bathythermograph stations are listed. Oceanographic data was submitted to MEDS directly by Denmark, Cuba, and the U.S.S.R. in time for MEDS to merge these data with those collected by Canada and to be used to prepare an overview of environmental conditions within the ICNAF area for 1978. A total of 65 cruise station position tracks were plotted. Numbers 1 through 46 in Table 2 are of bathythermograph cruises by Canada, numbers 47 through 53 are of bottle observations directly submitted to MEDS by Member Countries, and numbers 54 through 65 are of bottle observations by Canada for 1978.

Summary of Environmental Conditions During 1978

(1) Introduction

At the 1977 Annual Meeting, it was decided that MEDS should attempt to prepare a review of environmental conditions observed during each previous calendar year prior to the Annual Meeting. It was recognized that this would require very prompt submission of data to MEDS if these were to be summarized, analyzed and assessed in time. Again this year MEDS fell short of its goal to prepare a complete overview of 1978 environmental conditions with the limited data at its disposal. However, encouraged by the increased participation by Denmark, Cuba and the U.S.S.R. in promptly submitting their data for 1978, MEDS has attempted to summarize the temperature conditions on the ICNAF Standard Sections (selected papers No. 3).

Table 3 summarizes the Standard Section occupations from cruises listed in Table 1. Both bottle and bathythermograph temperature data were machine-contoured using computer program CONMAP (Taylor, 1976). Because of the lack of observations between discrete levels in bottle data, a higher degree of confidence is always given to figures produced from continuous depth traces.

(2) Discussion

Subarea 1: The two Fylla Bank sections (Fig. 6 and 7) submitted by Denmark show the January and February conditions for Subarea 1-D. Historical data for this time of year is absent from our databanks, and hence no intercomparisons with previous years was done.

Subarea 2: The Seal Island section (Fig. 8), during August 4 - 5 is warmer than the 1951 - 1965, 1969 - 1971 average conditions as described by Templeman (1975). Along the same section (Fig. 9), as submitted by the U.S.S.R., we see the November conditions, but again MEDS lacks the historical data for this time period to comment any further.

Subarea 3: Partial Coast Guard - 4 section (Fig. 10) displays a temperature front just south of the Grand Banks. Historical data for this time period is absent from our databanks, as are those for the SW Grand Banks section displayed in Fig. 11. Figures 12, 13 and 14 show the Flemish Cap section January conditions, as observed by both Canada and the U.S.S.R. Figures 13 and 14 are from the same cruise but are of different observation instrument types (bottle and bathythermograph data respectively). Lack of historical data for this time of year precludes any further comment. The Flemish Cap section at the end of July (Fig. 15) displays warmer conditions than shown by Templeman (1975) for his 1951 - 1971 average, and very little water colder than -1°C is observed. Bonavista Triangle sections SE and SW (Figs. 16 and 19), White Bay (Fig. 18), and SW Grand Banks (Fig. 20) for August are displayed. Lack of historical data again precludes further comment for these sections. However, Bonavista Triangle NW section (Fig. 17), when compared with the 1951 - 1971 average as reported by Templeman (1975), displays a much warmer surface (0 - 20 m) layer than average. Below 20 m, the section appears similar, if not slightly warmer than this 1951 - 1971 average.

Subareas 4, 5 and 6: No data has yet been submitted along Standard Sections for these subareas in 1978.

(3) Conclusions

The Seal Island section in Subarea 2, as well as the Flemish Cap and Bonavista NW sections in Subarea 3, all display warmer-than-average conditions for July - August 1978 as compared to the 1951 - 1971 averages reported by Templeman

(1975). Lack of historical data along the Standard Sections during the winter months, and in some sections for all years, is apparent from Res. Doc. 77/VI/48. Member Countries are urged to compare their relevant national databanks to ensure that all historical data for the ICNAF area along the Standard Sections is submitted to MEDS as soon as possible. MEDS will endeavour to acquire the data listed in Table 2 via the respective national representatives.

Historical Data Acquisition from the U.S.S.R.

At the 1978 Annual Meeting, MEDS was asked to investigate the lack of success in acquiring historical U.S.S.R. physical oceanographic data for the ICNAF area. MEDS has since conducted a literature search of all ICNAF Annual Reports, Research Documents, Redbooks, and Special Publications. The results are summarized in Table 4, which lists U.S.S.R. cruises which have specific reference to ship name, dates and area for oceanographic data collected by the U.S.S.R. for the ICNAF area. A previous attempt at identifying historical data reported in the 1976 ICNAF Research Documents had been presented at the 1977 Annual Meeting (ICNAF Res. Doc. 77/VI/52). Two letters were then sent to World Data Centre A in Washington requesting the data reported in Res. Doc. 77/VI/52 and the data listed in Table 4. The first reply from WDC-A was that less than 2 percent of the data requested resided at WDC-A and the request therefore was forwarded to WDC-B in Moscow. To date, no reply as to the bulk of the historical data has been received. Some of the data listed in Res. Doc. 77/VI/52 has arrived and has been input into MEDS databanks; however, included with this data was a comment that data from the Protsion, Persei III, Ayaks and Odyssey 1975 cruises mentioned in Res. Doc. 77/VI/52 were not available for exchange and were not held by WDC-B in Moscow. MEDS does not know why the data is unavailable but would like to reaffirm that we are interested in getting the data and that we are willing to receive it in any convenient form.

Report on IGOSS Data Exchanged During the Flemish Cap Experiment

In 1977, the Flemish Cap Working Group had identified a need for rapid exchange of oceanographic data by Member Countries participating in the Flemish Cap Experiment. The IGOSS system for real-time data exchange was agreed upon by the Working Group, and MEDS further proposed that it would provide graphic products of the data transmitted during the Flemish Cap Experiment. Since the installation in MEDS of a Global Telecommunications System (GTS) link in the fall of 1978, MEDS has maintained a databank of all data received over this network. MEDS also maintains an active data

input and quality control over all the incoming data. From these data, graphic data products for the Flemish Cap, as outlined in Redbook 1978, have been produced after the end of each cruise. The primary purpose of the latter was to supply a quick analysis of the data, by cruise, to all participants of the Experiment in order to aid in planning future cruises. The following is a summary of IGOSS data and data products exchanged during the Experiment.

Ship	Dates (1979)	IGOSS Messages	Products	Parameter
CSS Hudson	19 - 28 January	133 TESAC	49 plots	T, S, σ_t
Gadus Atlantica	4 - 19 February	74 BATHY	3 plots	T
Gadus Atlantica	16 - 31 March	19 TESAC	4 plots	T, S, σ_t
Gemma (U.S.S.R.)	8 - 20 April	46 TESAC	10 plots	T
Gemma	21 April - 10 May	79 TESAC	*	T
Gadus Atlantica	2 - 17 May	59 TESAC	*	T, S, σ_t

* Analysis of incoming data incomplete.

IGOSS data quality initially was very poor because of infrequent prior use of the communications system and inexperienced communications operators. However, these have been improved to the point where less than 1 percent error only may be attributed to message handling by the communications system itself. The majority of the errors now appear to be effected by the originating source on-board ship, due to lack of proper adherence to IGOSS codes and improper structure of the IGOSS radio messages. MEDS has published an "Instruction Manual for Radio Transmission of Oceanographic Data using BATHY/TESAC Formats" (J. Gagnon, April 1979), which should help reduce these sources of errors. MEDS plans are to produce a technical data report of all IGOSS data from the Flemish Cap cruises during 1979 prior to the next Annual Meeting.

Summary

1978 has been a very active year for MEDS oceanographic data processing, analysis and archival of 1978 data collected within the ICNAF area. The inventory forms reported by Member Countries show that a total of 5,206 temperature-salinity stations and 5,736 temperature stations were observed, in addition to the 1,691 temperature-salinity stations and 2,482 temperature stations received and processed at MEDS for the ICNAF area during 1978. From the data submitted, the ICNAF Standard Sections for the July - August 1978 period along the Seal Island, Flemish Cap and Bonavista NW sections for Subareas 2 and 3 show that 1978 was a warmer-than-average year when compared to the 1951 - 1971 averages reported by Templeman (1975). Lack of historical data, in

particular those reported by the U.S.S.R. in previous ICNAF documents, will always make the task of producing an overall environmental summary very difficult. MEDS has attempted to demonstrate its capabilities of processing data submitted, as well as producing computer-generated summaries of these data, where applicable. MEDS has also been active in encouraging the use of the IGOSS system for real-time data exchange, where possible, in order that a more complete synoptic picture of the ICNAF area might be achieved on an annual basis. MEDS is encouraged by the improved data submissions from PINRO (U.S.S.R.), Cuba and Denmark directly to MEDS and encourages more Member Countries to do the same.

References

Taylor, J.D. 1976. "CONMAP: A Computer Program for Contouring Oceanographic Data." MEDS Technical Note No. 12.

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 reported as collected during 1978 within the ICNAF area but not yet submitted to MEDS.

Sub-Area	Country/INSTITUTE	Season	No. of Stations Bottle	MBT/XBT	CTD
0, 1	Canada/BIO	JAS			64
1	Denmark/GF	JFM	10		
1	Denmark/GF	AMJ	7		
1	Denmark/GF	JAS	22		
1	Denmark/GF	OND	6		
2	Canada/BIO	JFM			130
2	Canada/BIO	OND			22
1, 2	FRG/BF	OND	41	2	50
3	Poland/MIR	AMJ	32	83	
3	Canada/BIO, MEM	AMJ		39	56
3	Canada/BIO	OND			7
3, 4, 5	FRG/BF	OND		148	292
4	Canada/BIO	JFM			17
4	Canada/BIO	AMJ			70
4	Canada/BIO	JAS			224
4, 5	Canada/BIO	OND			681
4, 5, 6	USA/NMFS	JFM	342	727	31
4, 5, 6	USA/NMFS	AMJ	481	655	43
4, 5, 6	USA/NMFS	JAS	443	1197	40
4, 5, 6	USA/NMFS	OND	450	709	34
5	Poland/MIR	AMJ		30	
5	Poland/MIR	OND	55	244	
5, 6	USSR/ATL	JFM	179	179	
5, 6	USSR/ATL	AMJ	1015	1122	
5, 6	USSR/ATL	JAS	154	535	
5, 6	USSR/ATL	OND	208		
6	Poland/MIR	AMJ		14	
6	Poland/MIR	OND		52	
		TOTALS	3445	5736	1761

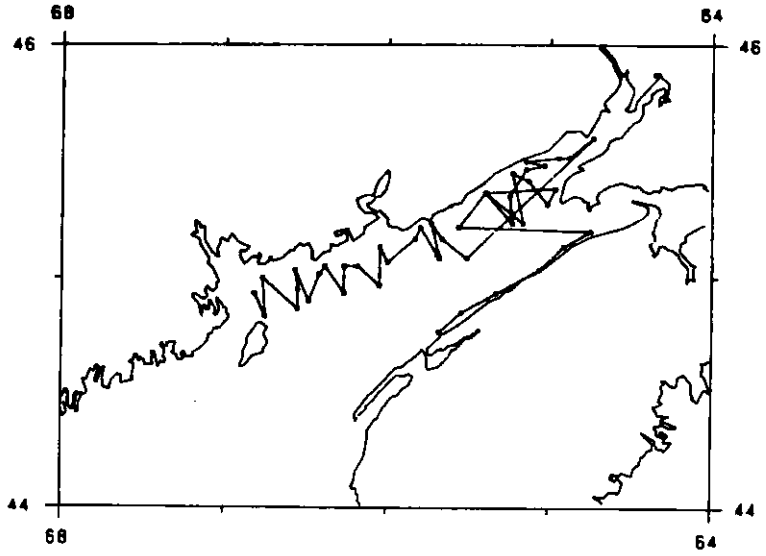
		JFM	JANUARY, FEBRUARY, MARCH
BIO	BEDFORD INSTITUTE OF OCEANOGRAPHY	AMJ	APRIL, MAY, JUNE
GF	GRONLANDS FiS KERIUNDERSOGELSER	JAS	JULY, AUGUST, SEPTEMBER
BF	BUNDESFORSCHUNGSANSTALT f. FISCHEREI	OND	OCTOBER, NOVEMBER, DECEMBER
MIR	MORJKI INSTYTUT RYBACKI		
MEM	MEMORIAL UNIVERSITY OF NEWFOUNDLAND	MBT	Mechanical Bathythermograph Probe
NMFS	NATIONAL MARINE FISHERIES SERVICES	XBT	Expendable Bathythermograph Probe
ATL	ATLANTNIRO	CTD	Conductivity Temperature Depth Probe

Table 2. Data Received and processed by MEDS for 1978 within the ICNAF area.

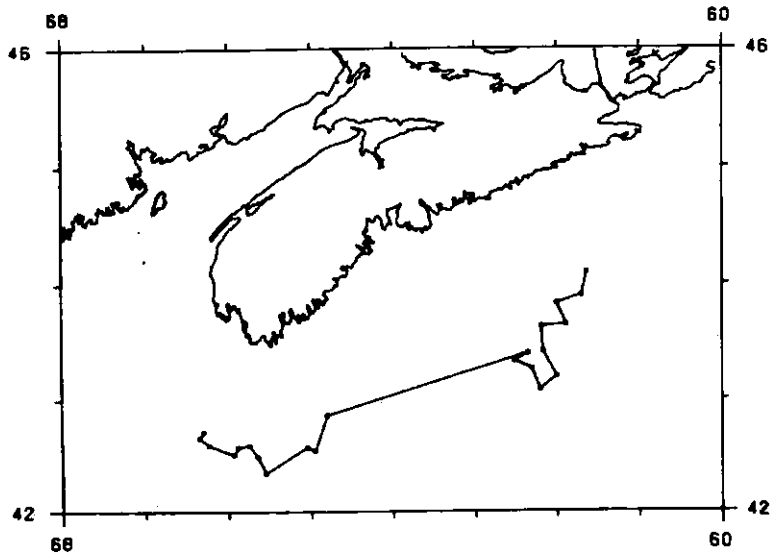
Track Chart No.	MEDS ID	Date - Span	Sub-Area	No. of Stations Bottle	BT
1	180378001	15 FEB - 1 MAR	4X		44
2	180378002	12 MAR - 19 MAR	4X,W		22
3	180378003	15 MAR - 2 APR	4X		94
4	180378004	8 APR - 11 APR	4X		19
5	180378005	16 MAY - 24 MAY	4T		60
6	180378006	17 MAY - 14 JULY	4X,W,V		326
7	180378010	9 JULY - 19 JULY	4X,W		83
8	180378011	23 JULY - 31 JULY	4W,V		64
9	180378012	1 AUG - 3 AUG	4X		22
10	180378013	9 AUG - 16 AUG	4X		48
11	180378014	16 AUG - 20 AUG	4X		82
12	180378015	20 AUG - 1 SEPT	4W		91
13	180378016	22 AUG - 30 AUG	4X		23
14	180578001	14 JAN - 24 JAN	3L		10
15	180578002	2 FEB - 13 FEB	3Ps		12
16	180578003	23 FEB - 28 FEB	3Ps		43
17	180578004	6 APR - 14 APR	3Ps		60
18	180578005	6 MAY - 17 MAY	3L		96
19	180578006	26 MAY - 8 JUNE	3N,Ø		80
20	180578007	15 JUNE - 27 JUNE	3N,Ø		89
21	180578008	28 JULY - 12 AUG	2J,3K,L,M,Ø		126
22	180578009	26 JAN - 27 JAN	3L,M		13
23	180578010	27 JAN - 13 FEB	3L,M		118
24	180578011	20 FEB - 25 FEB	2J		4
25	180578012	11 APR - 13 APR	3L		10
26	180578013	5 MAY - 15 MAY	3Ø		68
27	180578014	13 JUNE - 3 JULY	3Ø		93
28	180578015	7 JULY - 21 JULY	3L,M,Ø		69
29	180578016	30 JULY - 31 AUG	2J,3K,L,N		160
30	180578017	14 JAN - 1 FEB	3Ps		17
31	180578018	11 FEB - 16 FEB	3Ps		4
32	180578019	26 FEB - 18 MAR	3Ps		32
33	180578020	16 JUNE - 26 JUNE	3K		9
34	183078001	2 AUG - 6 AUG	4T		97
35	183078002	17 OCT - 20 OCT	4T		91
36	183078003	11 JULY - 12 JULY	4T		12
37	183078004	13 NOV - 14 NOV	4T		8
38	181878001	27 FEB - 16 MAR	6C		24
39	181878002	13 JAN - 16 MAR	6C		63
40	181878003	11 JAN - 28 FEB	4X		26
41	181878004	5 JAN - 19 JAN	4W,Vs,3Ps,L,K,2J		20
42	181878005	21 JAN - 27 JAN	5Zw,4X		2

Table 2. (Cont'd)

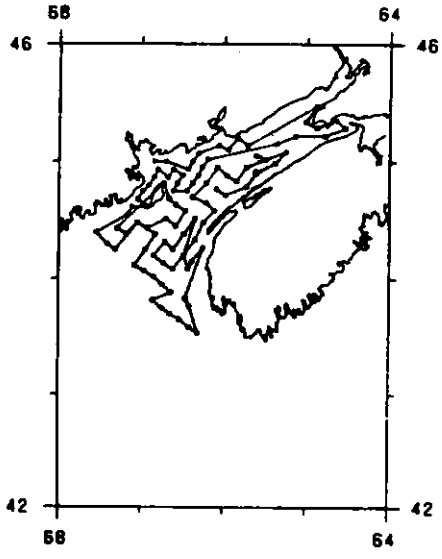
Track Chart No.	MEDS ID	Date - Span	Sub-Area	No. of Stations Bottle	BT
43	181878006	1 FEB - 15 FEB	4Vn,3Ps,3L,2J		20
44	181878007	11 MAR - 23 MAR	4W,3L,3Ø		15
45	181878008	15 MAR - 17 MAR	4X		4
46	181878009	17 MAR - 23 MAR	4X		9
47	26--79002	2 JAN - 19 MAY	1C,1D	30	
48	cu--79001	16 JULY - 23 JULY	4X,4W	40	
49	cu--79002	4 JULY - 14 JULY	3L,N,Ø	32	
50	90PE78001	15 OCT/77- 12 JAN	0B,2G,H,J,3K,3M	102	
51	90PH78001	26 NOV/77- 27 FEB	3K,L,M,N,Ø	291	
52	90--79001	1 SEPT - 1 OCT	3K,L,Ø	40	
53	90PE79001	6 SEPT - 21 DEC	2J,3K	66	
54	180378001	15 FEB - 1 MAR	4X	62	
55	180378002	12 MAR - 19 MAR	4X,W	22	
56	180378003	15 MAR - 2 APR	4X	113	
57	180378006	17 MAY - 14 JULY	4X,W,V	395	
58	180378009	2 JULY - 6 JULY	4T	24	
59	180378010	9 JULY - 19 JULY	4X,W	84	
60	180378011	23 JULY - 31 JULY	4W,V	64	
61	180378012	1 AUG - 3 AUG	4X	22	
62	180378014	16 AUG - 20 AUG	4X	115	
63	180378016	21 AUG - 30 AUG	4X	61	
64	180378020	1 NOV - 7 NOV	4X	115	
65	180578009	25 JAN - 27 JAN	3L,M	13	
			TOTALS	1691	2482



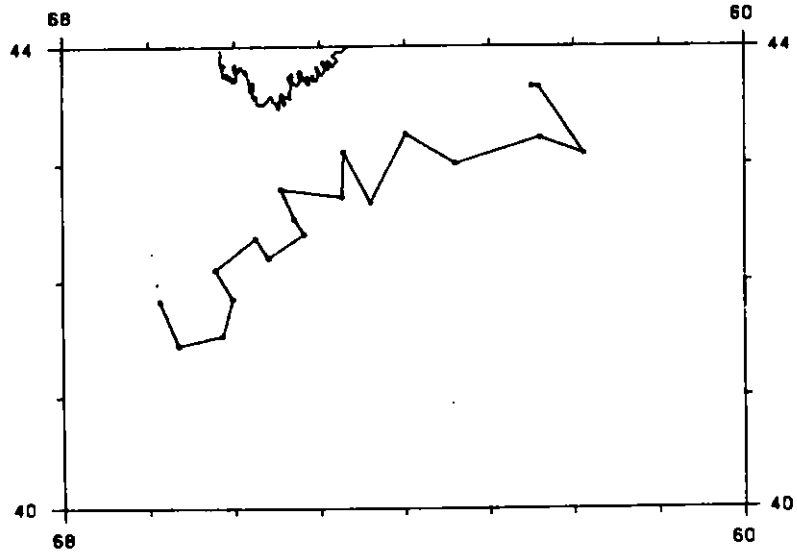
1. CRUISE 180378001 15/ 2/78 - 1/ 3/78 44 STATIONS



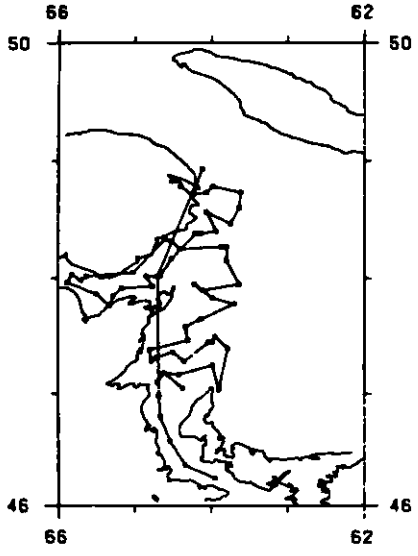
2. CRUISE 180378002 12/ 3/78 - 19/ 3/78 22 STATIONS



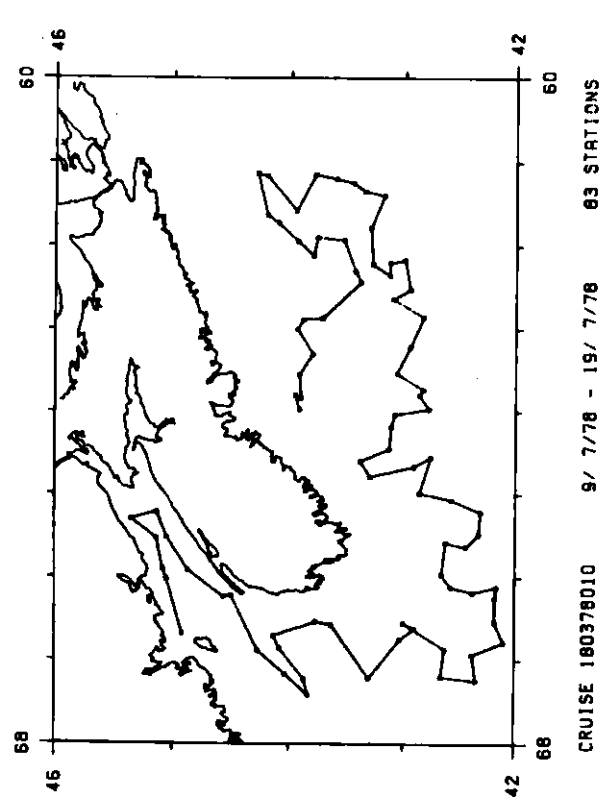
3. CRUISE 180378003
15/ 3/78 - 2/ 4/78
94 STATIONS



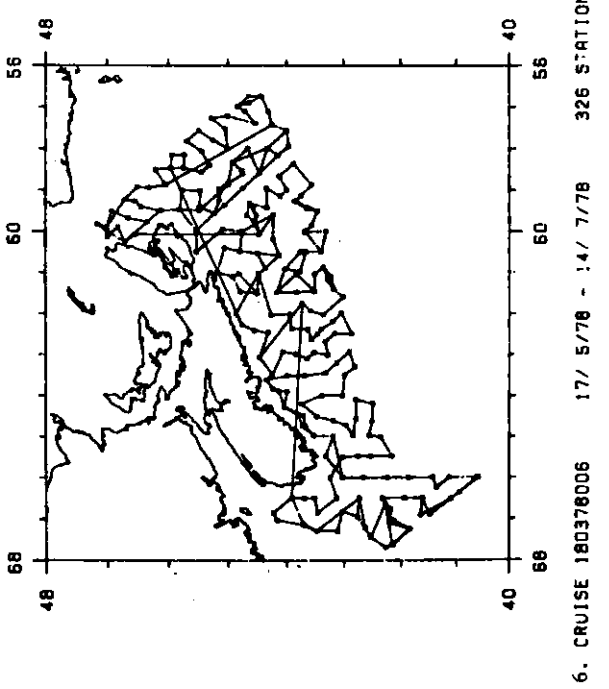
4. CRUISE 180378004 8/ 4/78 - 11/ 4/78 19 STATIONS



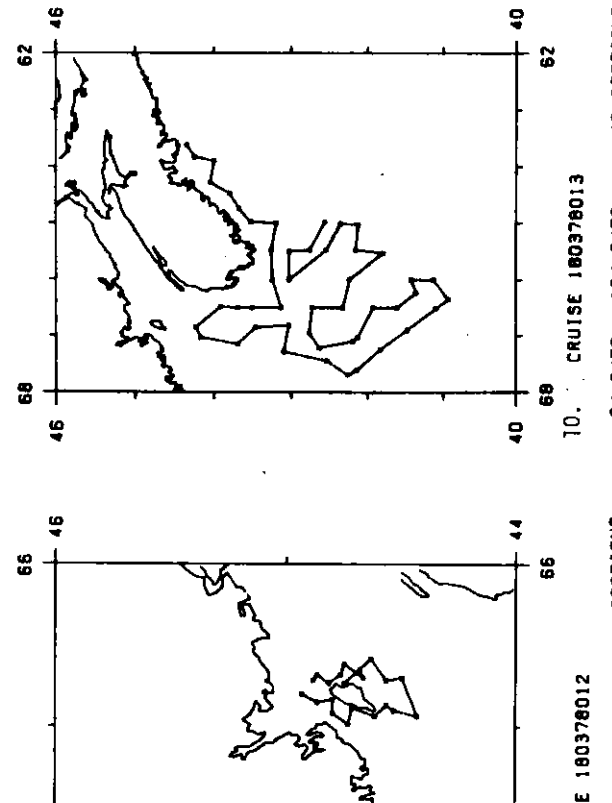
5. CRUISE 180378005
16/ 5/78 - 24/ 5/78
60 STATIONS



7. CRUISE 180378010 9/ 7/78 - 19/ 7/78 83 STATIONS

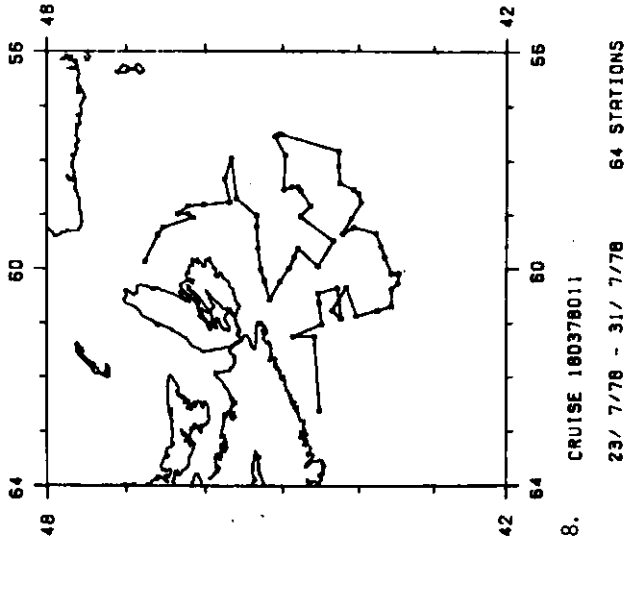


6. CRUISE 180378006 17/ 5/78 - 14/ 7/78 326 STATIONS

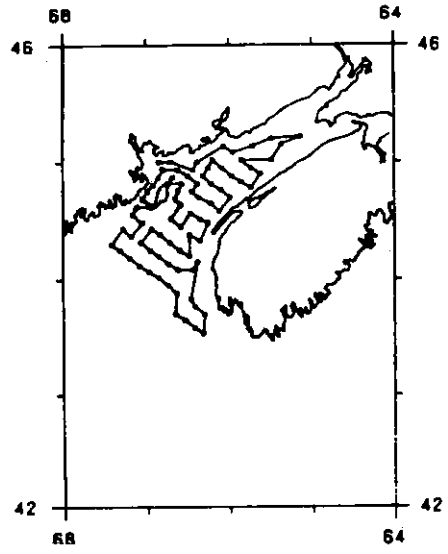


10. CRUISE 180378013 9/ 8/78 - 16/ 8/78 48 STATIONS

9. CRUISE 180378012 1/ 8/78 - 3/ 8/78 22 STATIONS

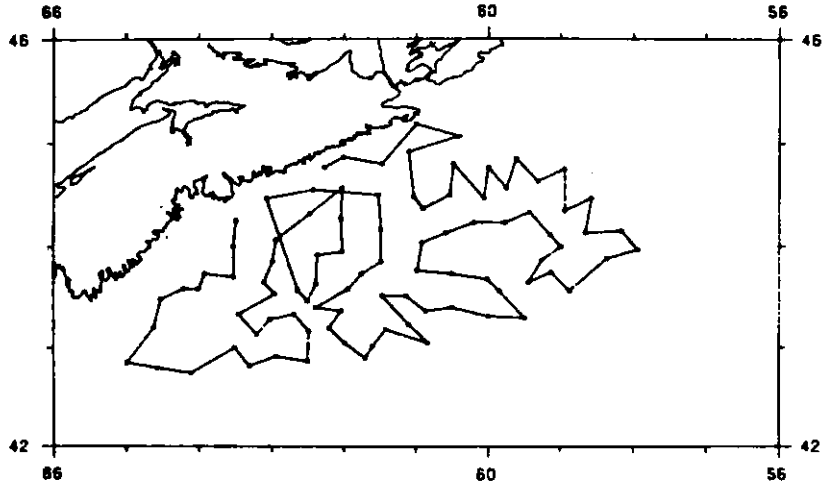


8. CRUISE 180378011 23/ 7/78 - 31/ 7/78 64 STATIONS

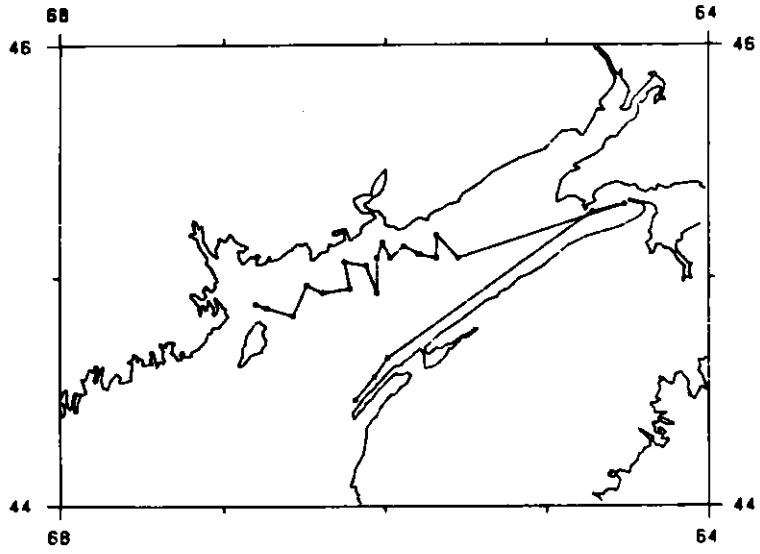


11. CRUISE 180378014

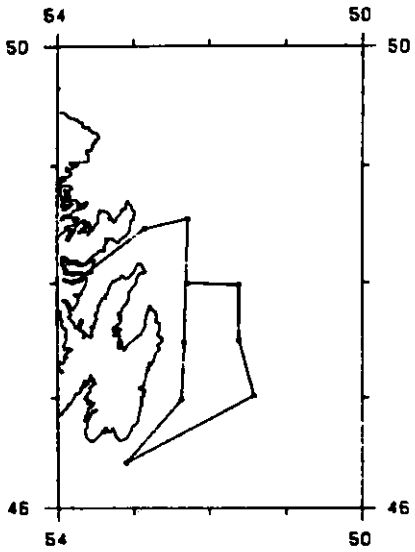
16/ 8/78 - 20/ 8/78 82 STATIONS



12. CRUISE 180378015 20/ 8/78 - 1/ 9/78 91 STATIONS

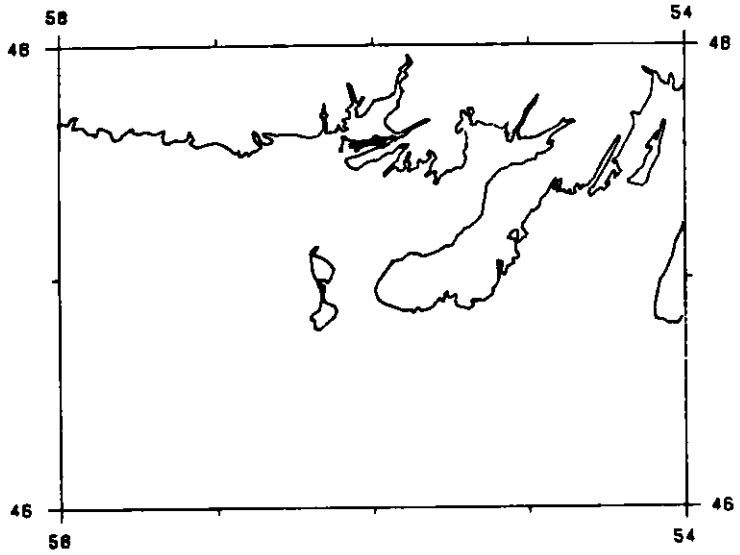


13. CRUISE 180378016 22/ 8/78 - 30/ 8/78 23 STATIONS

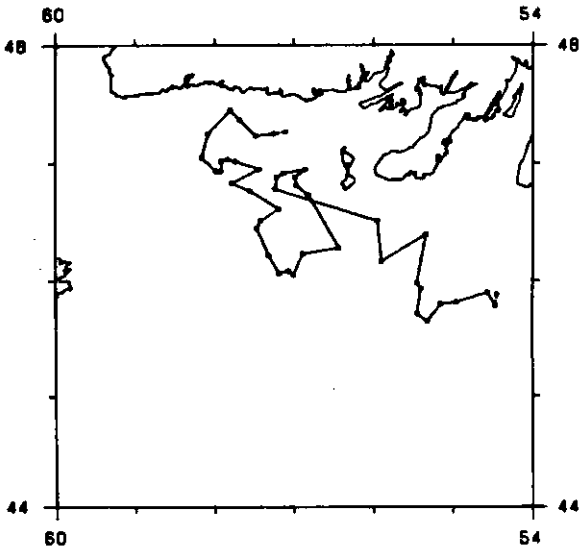


14. CRUISE 180578001

14/ 1/78 - 24/ 1/78 10 STATIONS

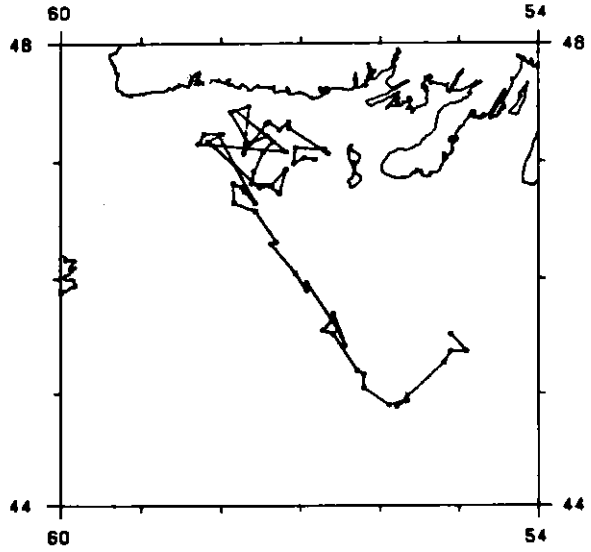


CRUISE 180578002 2/ 2/78 - 13/ 2/78 12 STATIONS

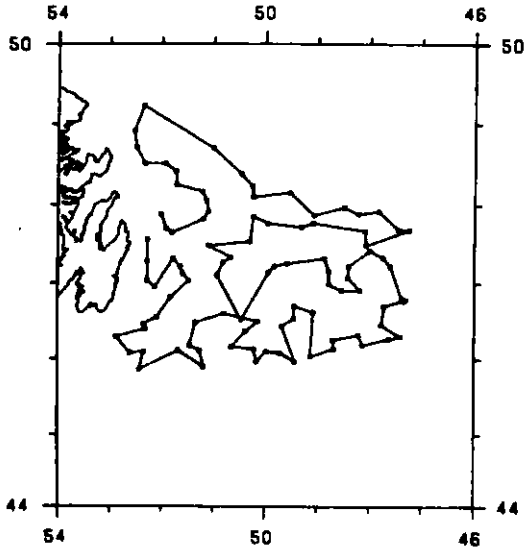


16. CRUISE 180578003

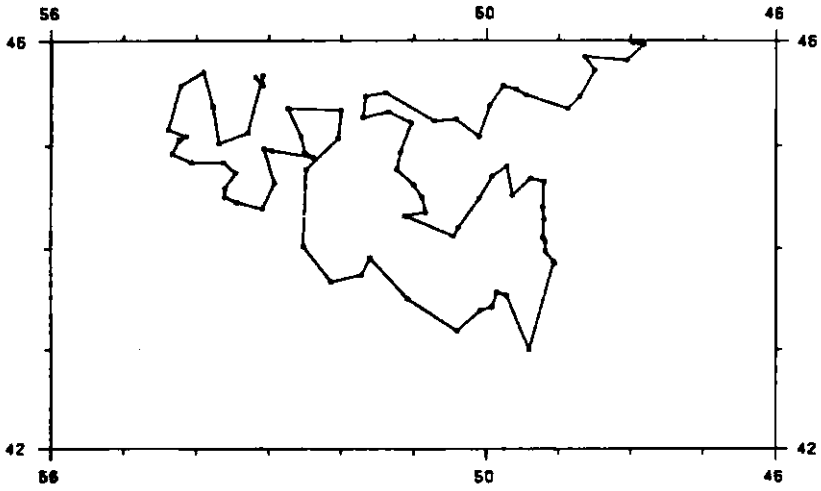
23/ 2/78 - 28/ 2/78 43 STATIONS



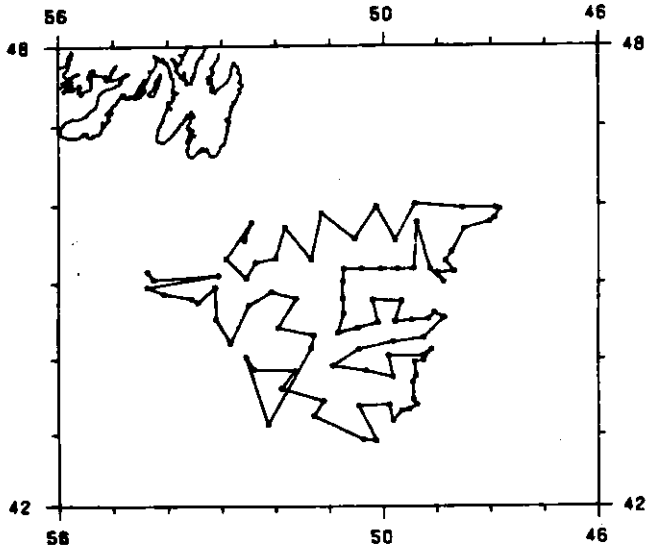
17. CRUISE 180578004
6/ 4/78 - 14/ 4/78 60 STATIONS



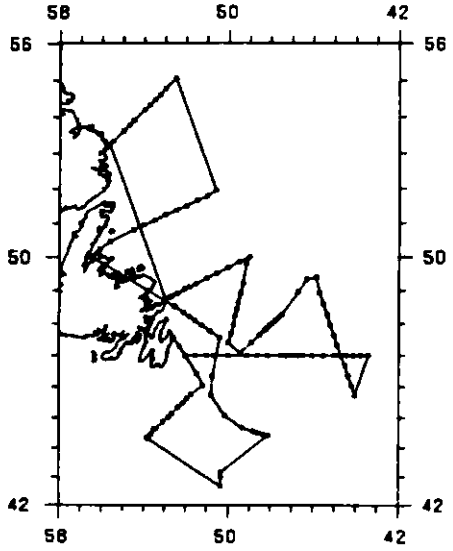
18. CRUISE 180578005
6/ 5/78 - 17/ 5/78 96 STATIONS



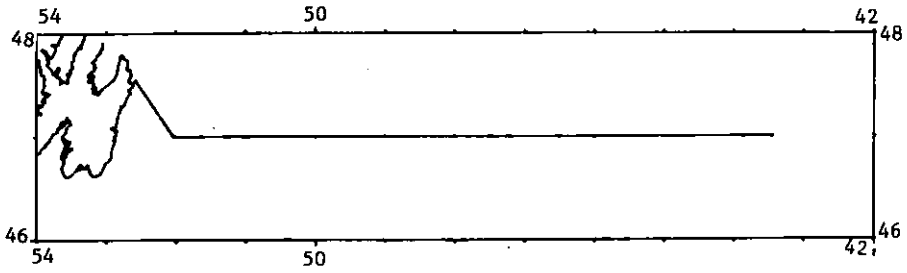
19. CRUISE 180578006 26/ 5/78 - 8/ 6/78 80 STATIONS



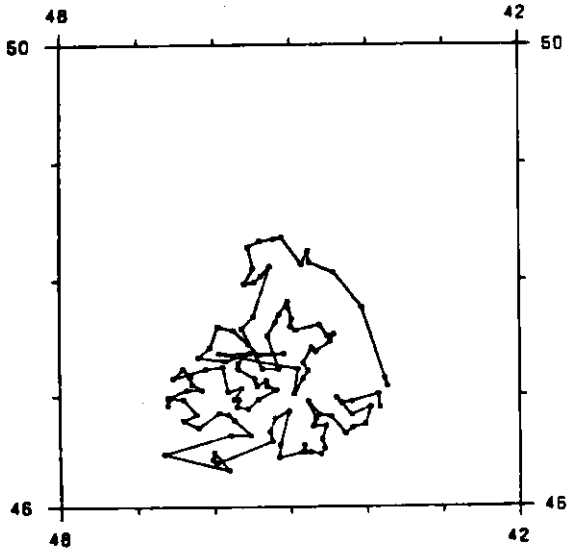
20. CRUISE 180578007
15/ 6/78 - 27/ 6/78 89 STATIONS



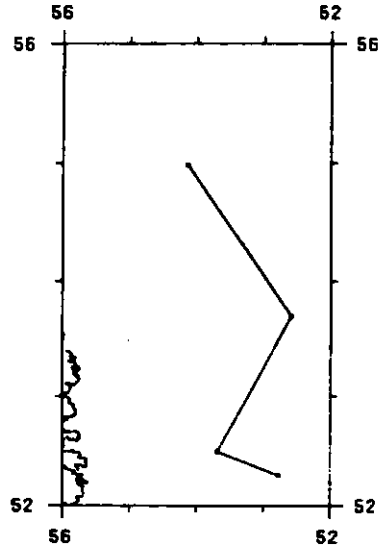
21. CRUISE 180578008
28/ 7/78 - 12/ 8/78 126 STATIONS



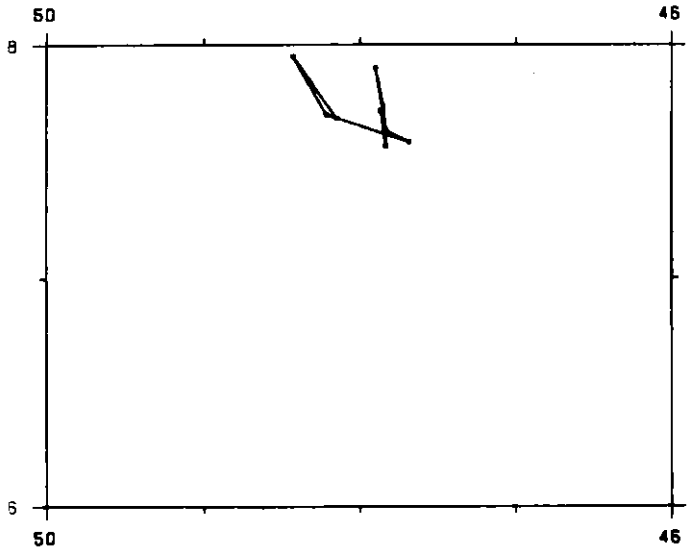
22. CRUISE 180578009 26/1/78 - 27/1/78 13 STATIONS



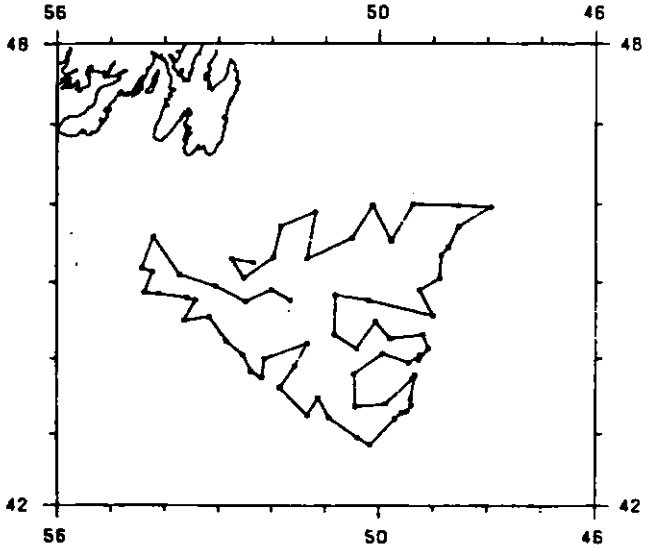
23. CRUISE 180578010
27/ 1/78 - 13/ 2/78 :18 STATIONS



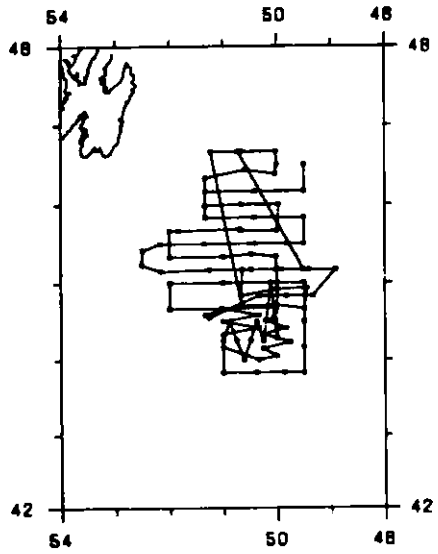
24. CRUISE 180578011
20/ 2/78 - 25/ 2/78 4 STATIONS



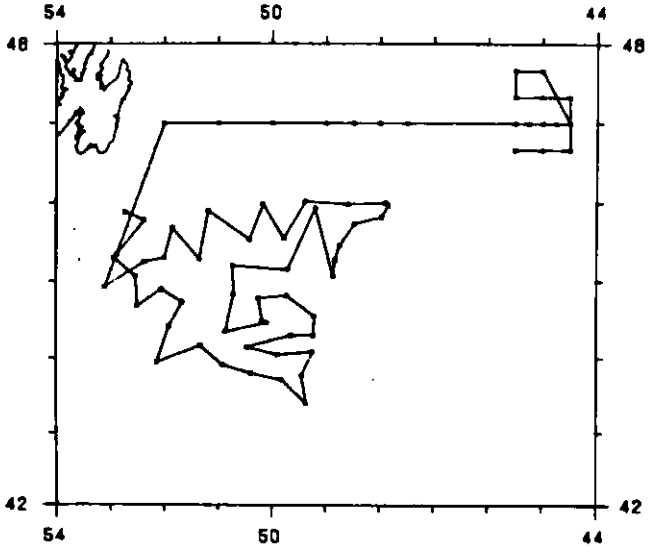
25. CRUISE 180578012
11/ 4/78 - 13/ 4/78 10 STATIONS



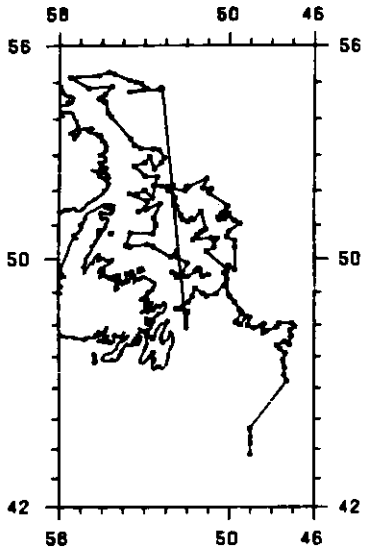
26. CRUISE 180578013
5/ 5/78 - 15/ 5/78 68 STATIONS



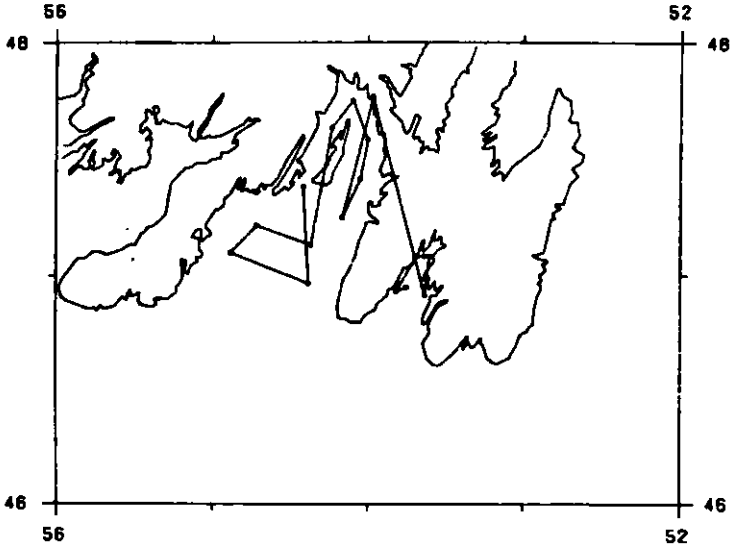
27. CRUISE 180578014
13/ 6/78 - 3/ 7/78 93 STATIONS



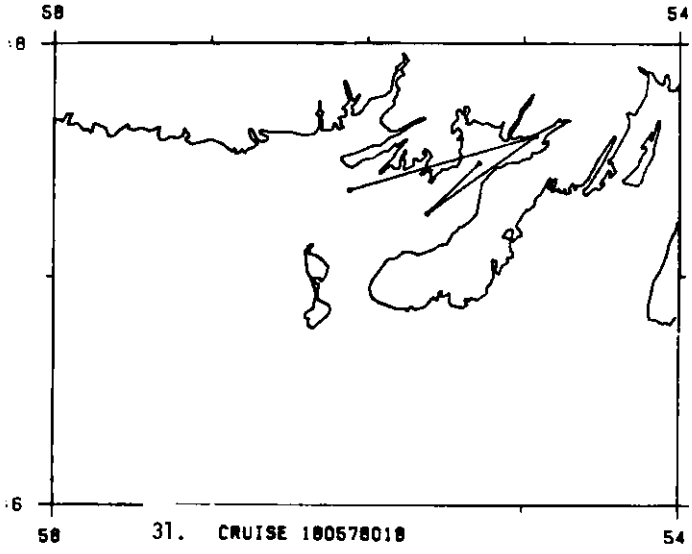
28. CRUISE 180578015
7/ 7/78 - 21/ 7/78 69 STATIONS



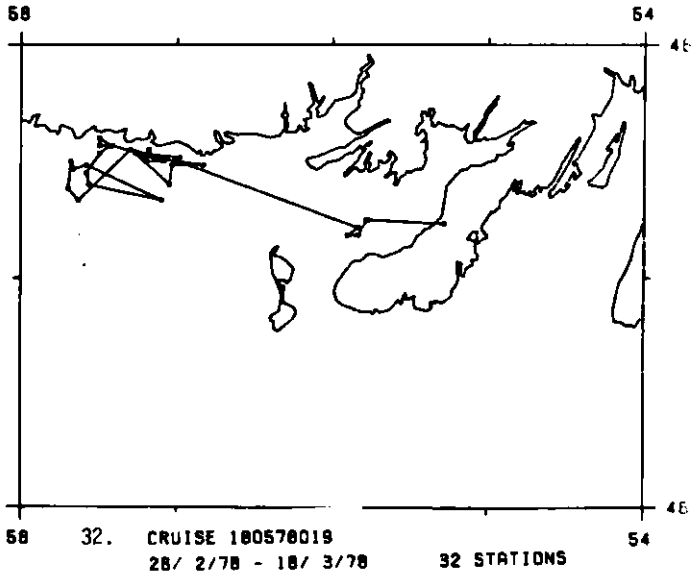
29. CRUISE 180578016
30/ 7/78 - 31/ 8/78 160 STATIONS



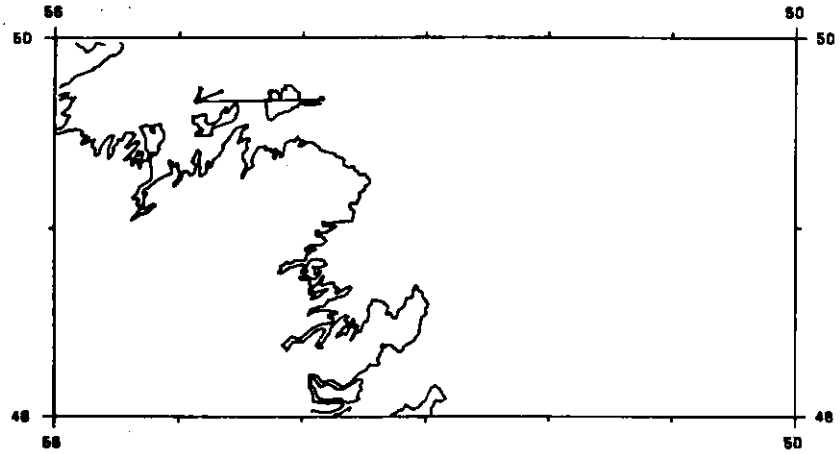
30. CRUISE 180578017 14/ 1/78 - 1/ 2/78 17 STATIONS



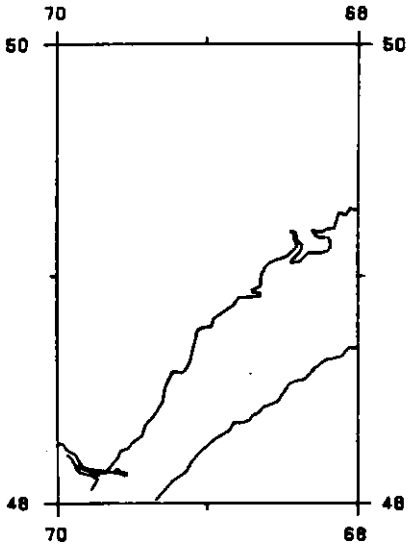
31. CRUISE 180578018
11/ 2/78 - 16/ 2/78 4 STATIONS



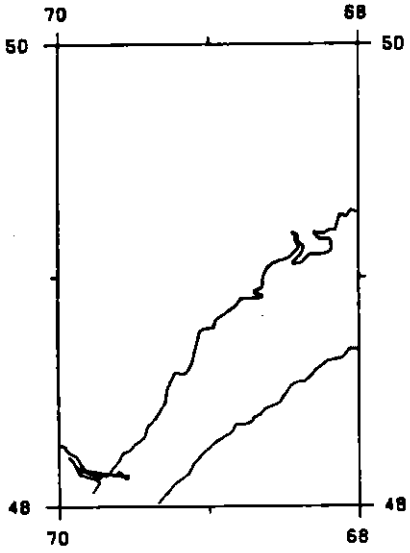
32. CRUISE 180578019
28/ 2/78 - 18/ 3/78 32 STATIONS



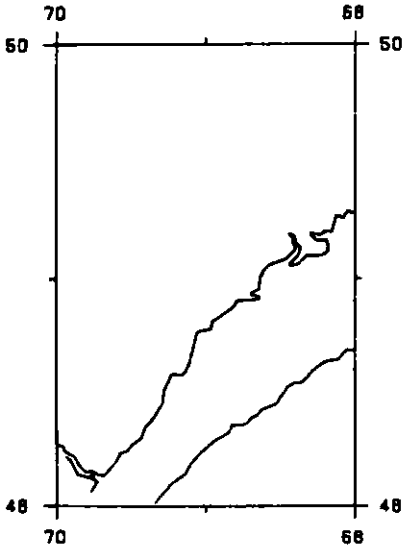
33. CRUISE 180578020 16/ 6/78 - 26/ 6/78 8 STATIONS



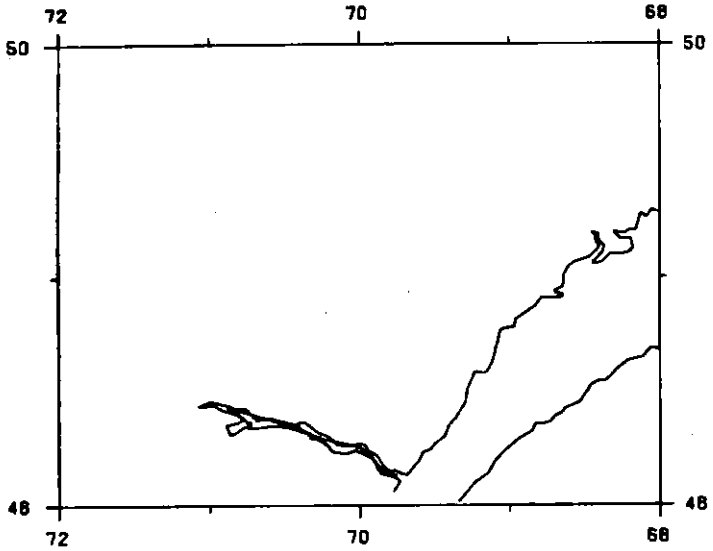
34. CRUISE 183078001
2/ 8/78 - 6/ 8/78 97 STATIONS



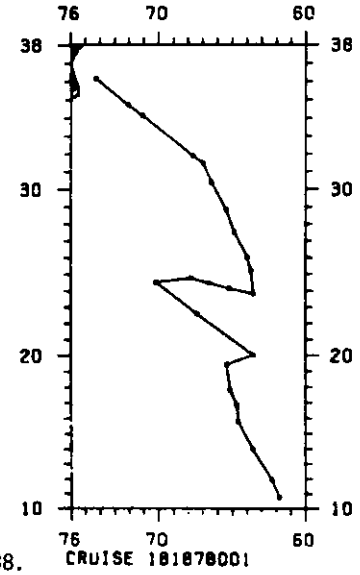
35. CRUISE 183078002
17/10/78 - 20/10/78 91 STATIONS



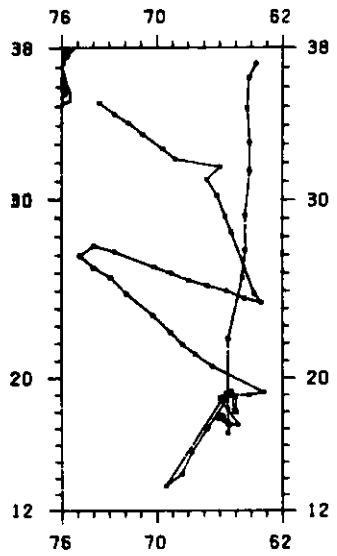
36. CRUISE 183078003
11/ 7/78 - 12/ 7/78 12 STATIONS



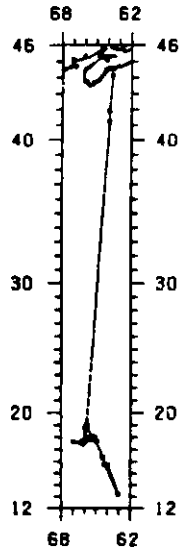
37. CRUISE 183078004 13/11/78 - 14/11/78 8 STATIONS



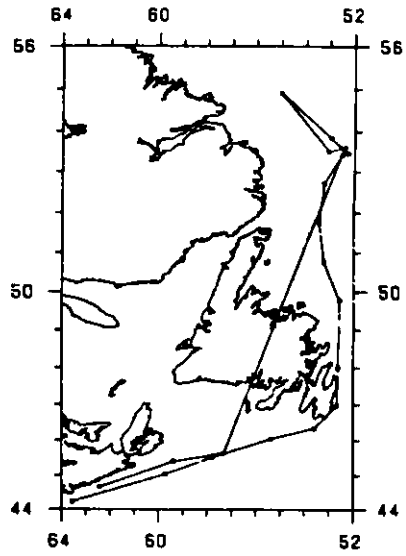
38. CRUISE 181078001
27/ 2/78 - 16/ 3/78 24 STATIONS



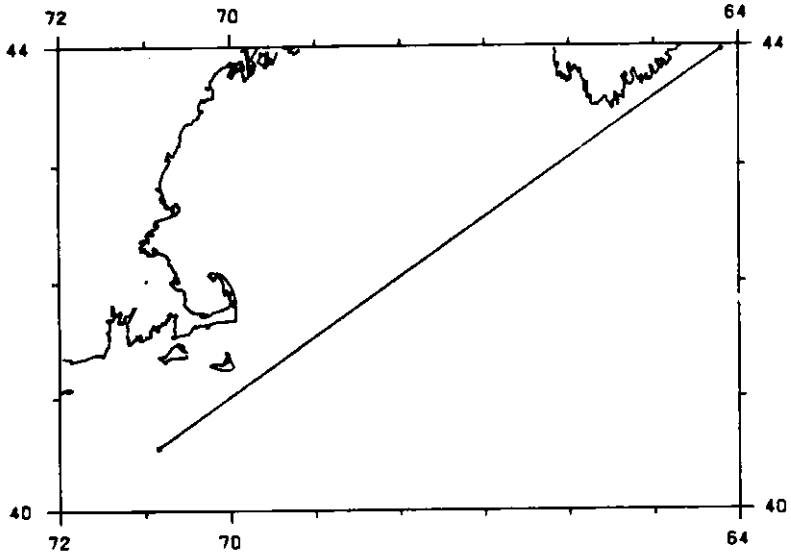
39. CRUISE 181878002
13/ 1/78 - 16/ 3/78 63 STATIONS



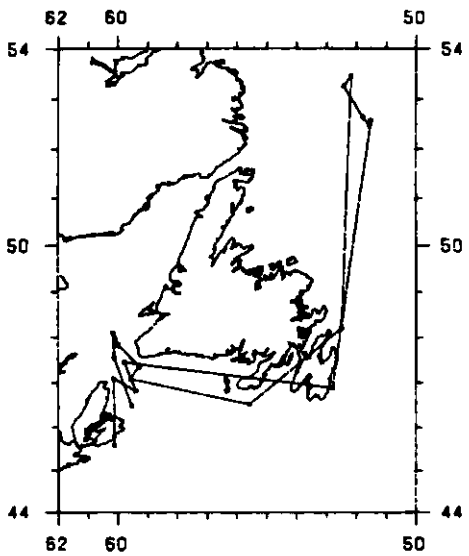
40. CRUISE 181878003
11/ 1/78 - 28/ 2/78
26 STATIONS



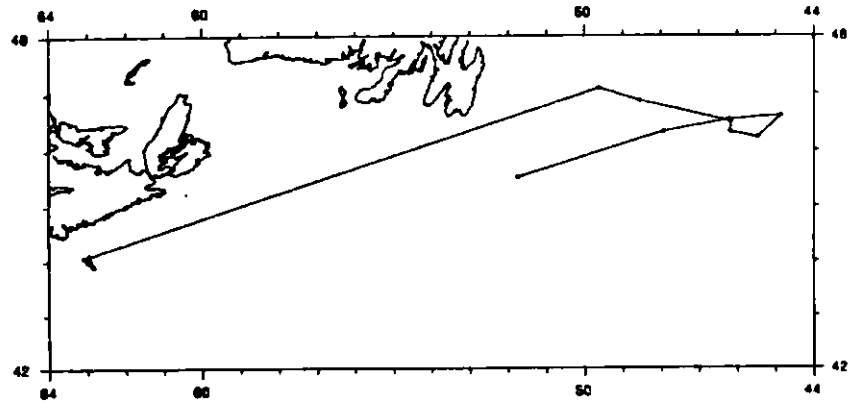
41. CRUISE 181878004
6/ 1/78 - 19/ 1/78 20 STATIONS



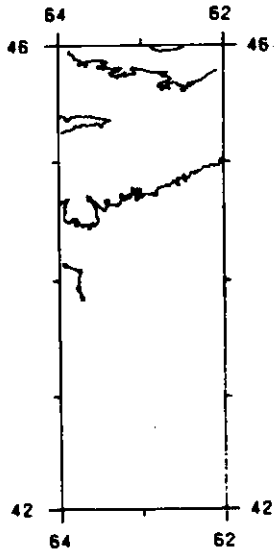
42. CRUISE 181878005 21/ 1/78 - 27/ 1/78 2 STATIONS



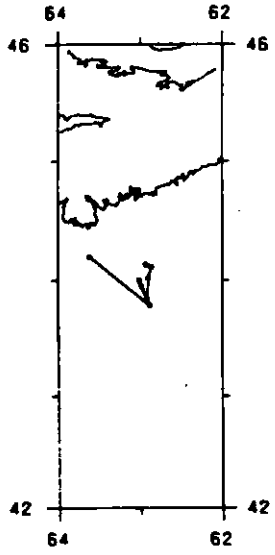
43. CRUISE 181878006
1/ 2/78 - 15/ 2/78 20 STATIONS



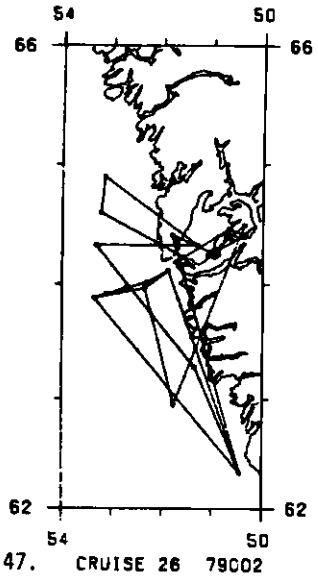
44. Cruise 181878007 11/3/78 - 23/3/78 15 Stations



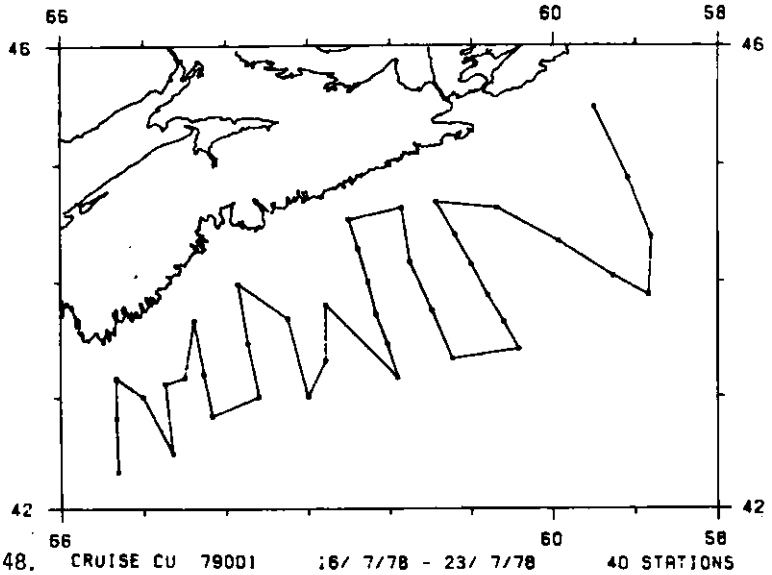
45. CRUISE 181878008
15/ 3/78 - 17/ 3/78
4 STATIONS



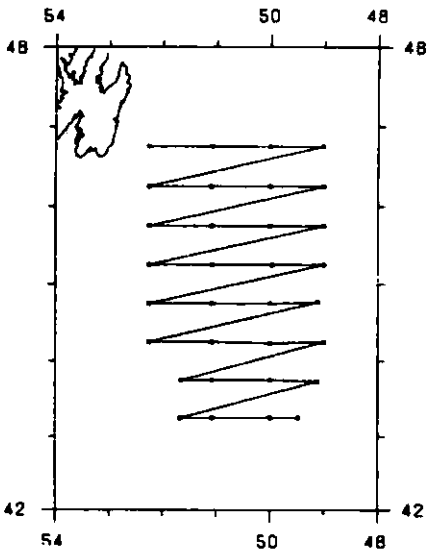
46. CRUISE 181878009
17/ 3/78 - 23/ 3/78
9 STATIONS



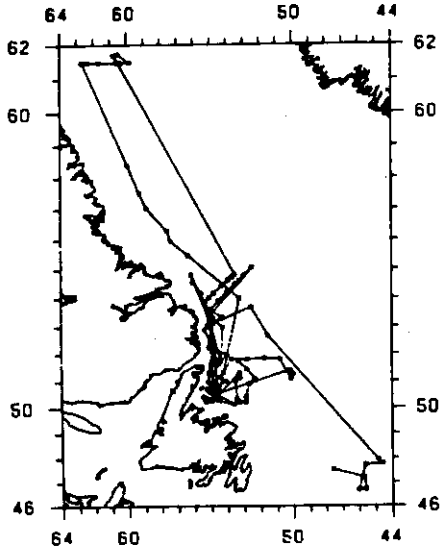
47. CRUISE 26 79002
2/ 1/78 - 19/ 5/78
30 STATIONS



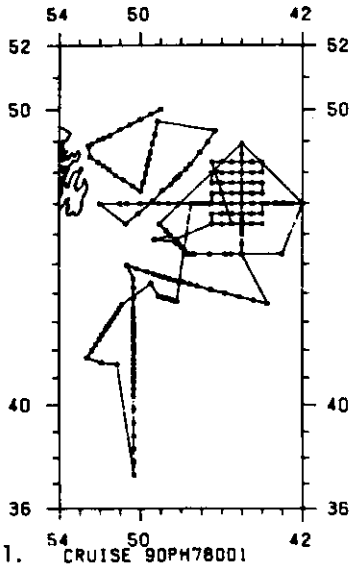
48. CRUISE CU 79001 16/ 7/78 - 23/ 7/78 40 STATIONS



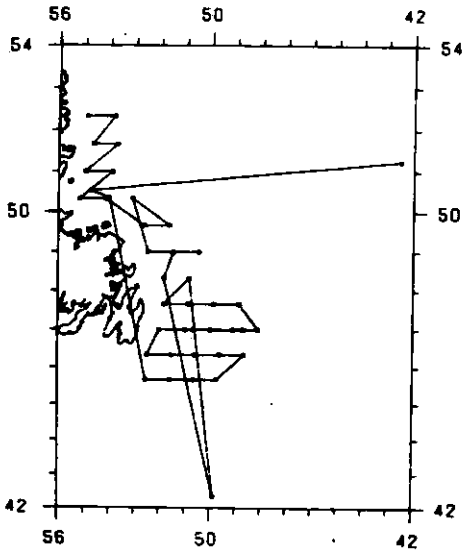
49. CRUISE CU 79002
4/ 7/78 - 14/ 7/78 32 STATIONS



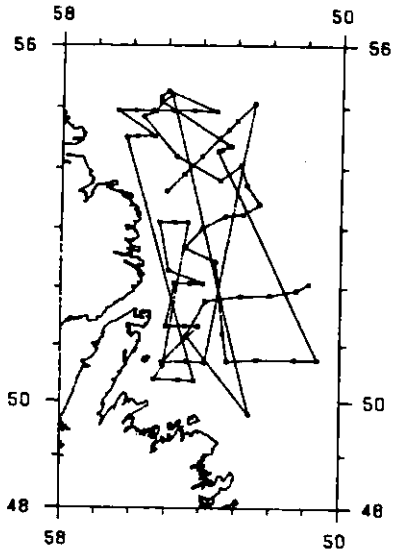
50. CRUISE 90PE78001
15/10/77 - 12/ 1/78 102 STATIONS



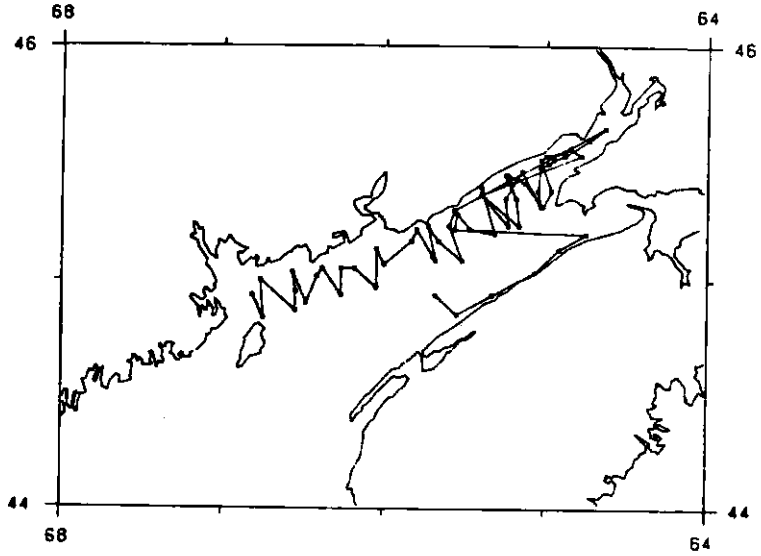
51. CRUISE 90PH78001
25/11/77 - 27/ 2/78 291 STATIONS



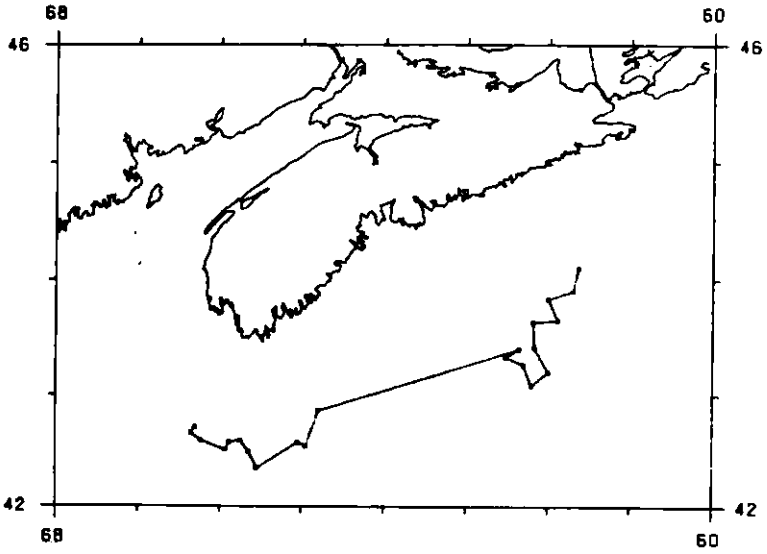
52. CRUISE 90 79001
1/ 9/78 - 1/10/78 40 STATIONS



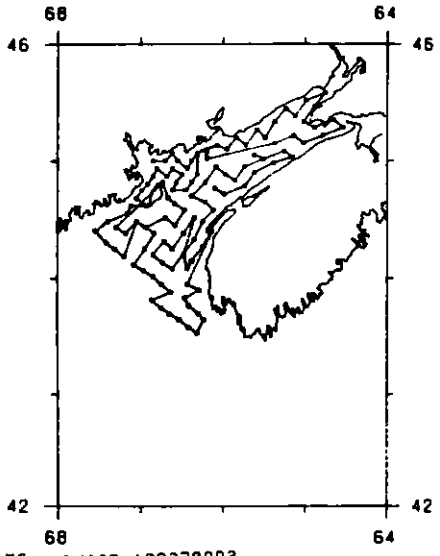
53. CRUISE 90PE79001
6/11/78 - 21/12/78 66 STATIONS



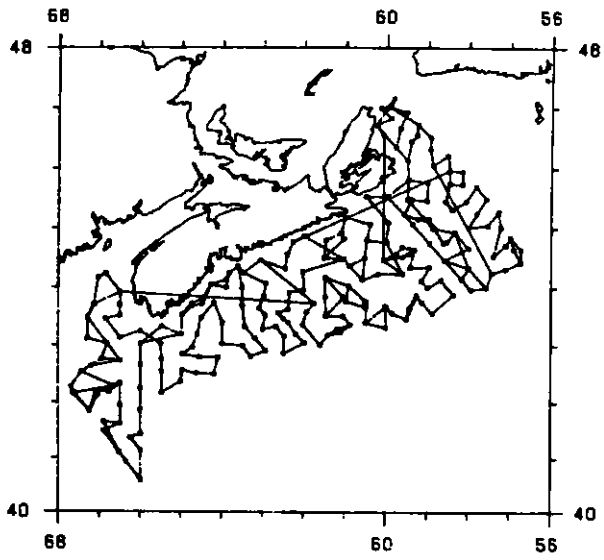
54. CRUISE 180378001 15/ 2/78 - 1/ 3/78 62 STATIONS



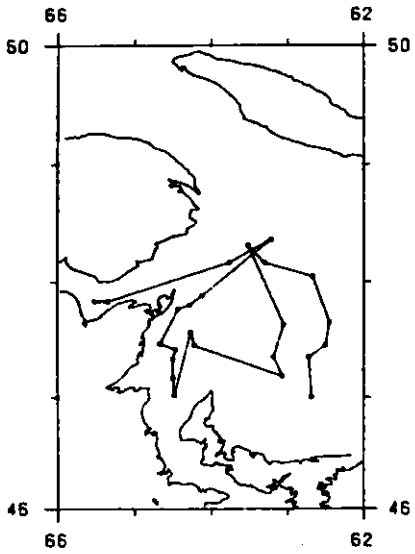
55. CRUISE 180378002 12/ 3/78 - 19/ 3/78 22 STATIONS



56. CRUISE 180378003
15/ 3/78 - 2/ 4/78 113 STATIONS

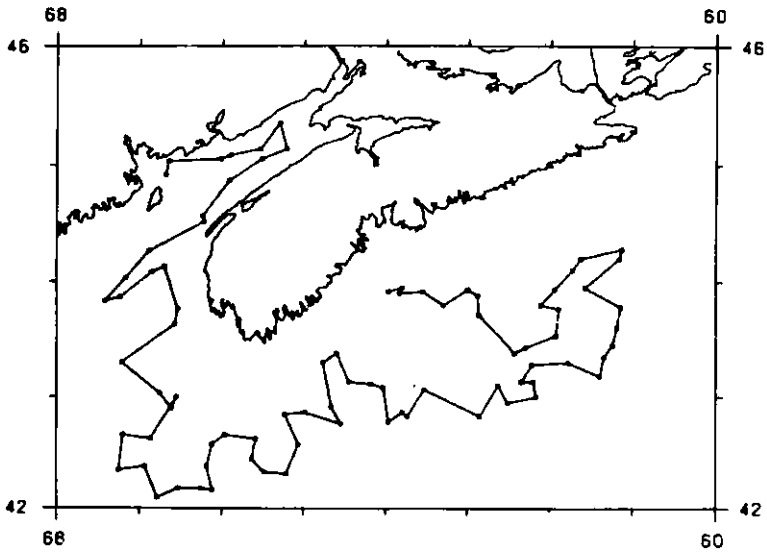


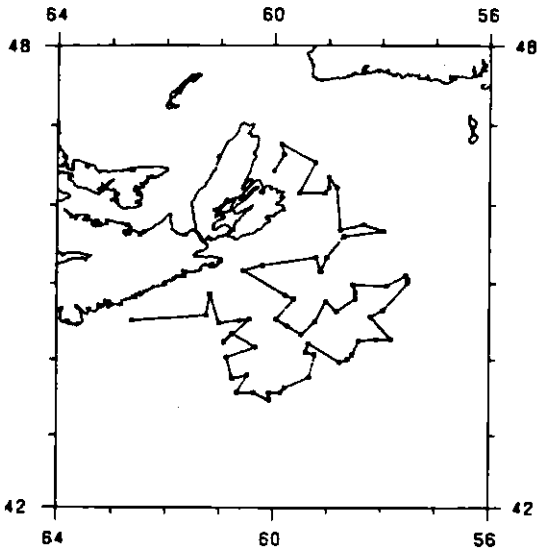
57. CRUISE 180378006
17/ 5/78 - 14/ 7/78 395 STATIONS



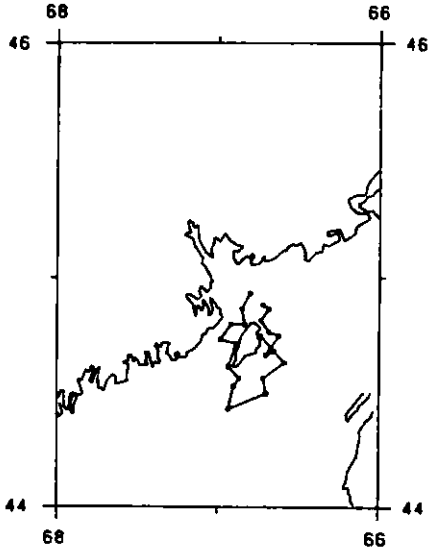
58. CRUISE 180378009
2/ 7/78 - 6/ 7/78 24 STATIONS

59. CRUISE 180378010 9/ 7/78 - 19/ 7/78 84 STATIONS

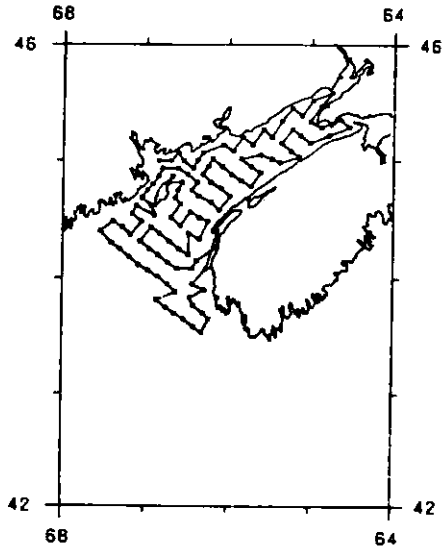




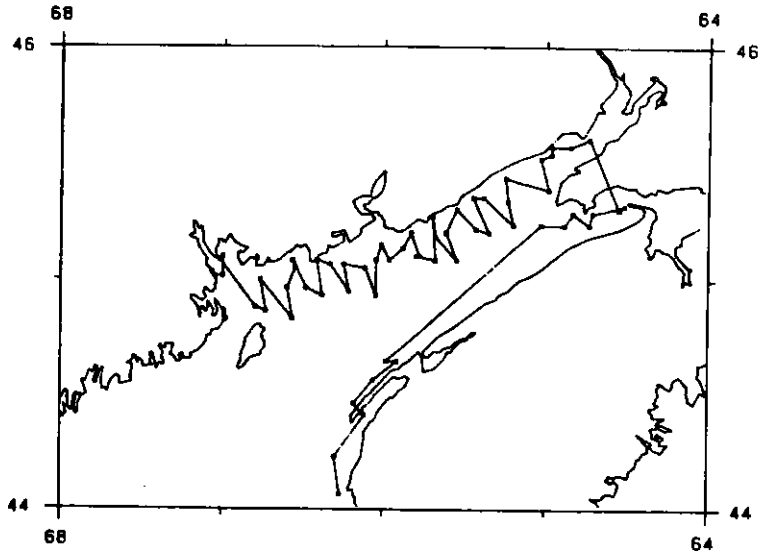
60. CRUISE 180378011
23/ 7/78 - 31/ 7/78 64 STATIONS



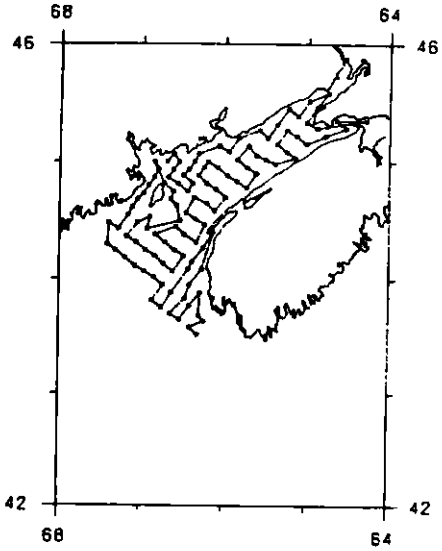
61. CRUISE 180378012
1/ 8/78 - 3/ 8/78 22 STATIONS



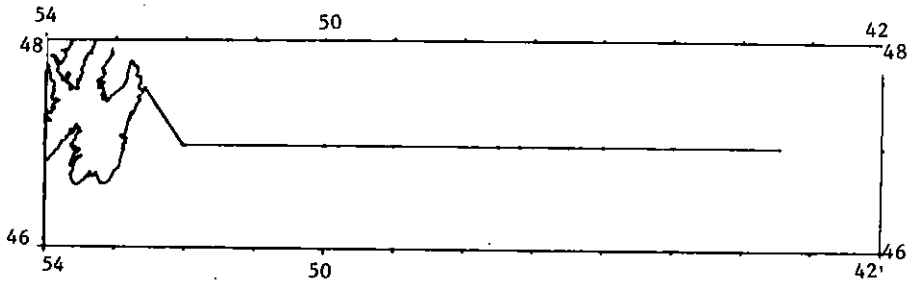
62. CRUISE 180378014
16/ 8/78 - 20/ 8/78 115 STATIONS



63. CRUISE 180378016 21/ 8/78 - 30/ 8/78 61 STATIONS



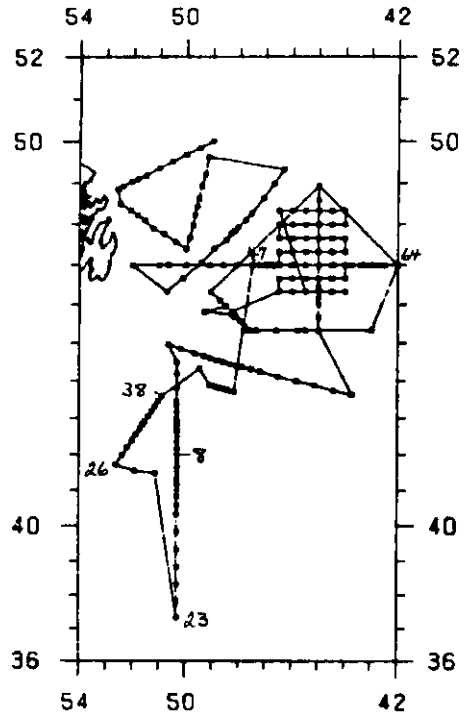
64. CRUISE 180378020
1/11/78 - 7/11/78 115 STATIONS



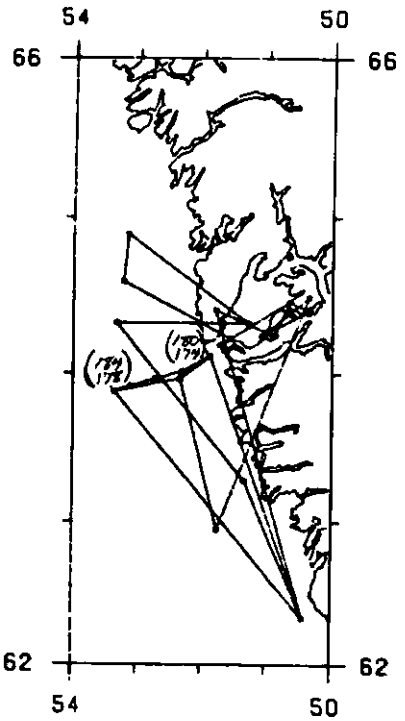
65. CRUISE 180578009 25/1/78 - 27/1/78 13 STATIONS

Table 3. ICNAF standard sections collected in 1978 within the ICNAF area.

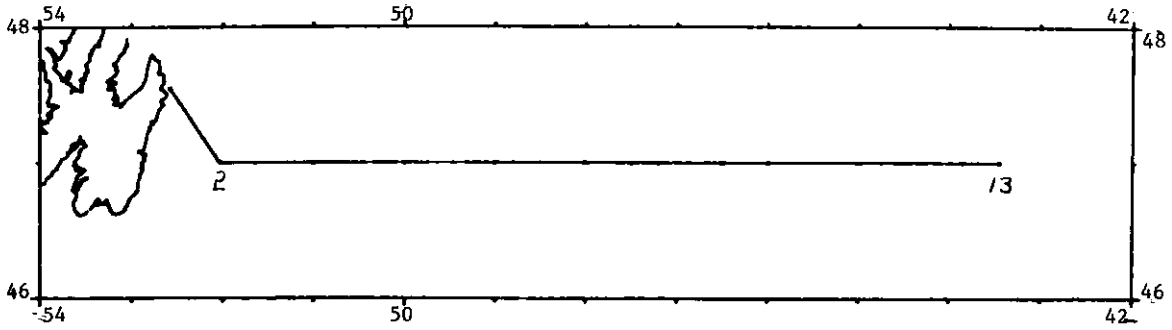
Appendix Track Chart No.	Sub-Area	Cruise	Date	Section	Data Type
6	1	26--79002	2 JANUARY	FYLLA BANK	T,S
7	1	26--79002	8 FEBRUARY	FYLLA BANK	T,S
8	2	180578008	4-5 AUGUST	SEAL ISLAND	T
9	2	90PE79001	6-7 NOVEMBER	SEAL ISLAND	T,S
10	3	90PH78001	1-5 JANUARY	COAST-GUARD 4	T,S
11	3	90PH78001	8 JANUARY	SW GRAND BANK	T,S
12	3	90PH78001	12-13 JANUARY	FLEMISH CAP	T,S
13	3	180578009	26-27 JANUARY	FLEMISH CAP	T,S
14	3	180578009	26-27 JANUARY	FLEMISH CAP	T
15	3	180578008	28-30 JULY	FLEMISH CAP	T
16	3	180578008	2 AUGUST	BONAVISTA SE	T
17	3	180578008	3 AUGUST	BONAVISTA NW	T
18	3	180578008	6-7 AUGUST	WHITE BAY	T
19	3	180578008	8 AUGUST	BONAVISTA SW	T
20	3	180578008	11 AUGUST	SW GRAND BANK	T



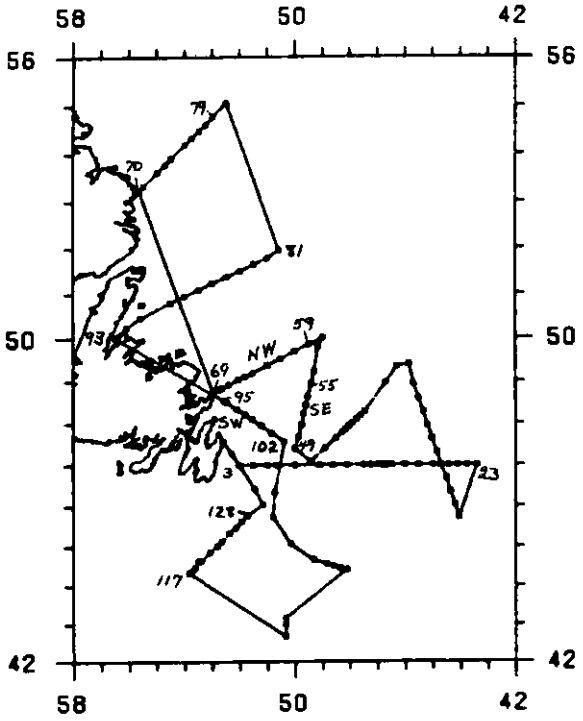
Appendix Figure 1. CRUISE 90PH78001
25/11/77 - 27/ 2/78 291 STATIONS



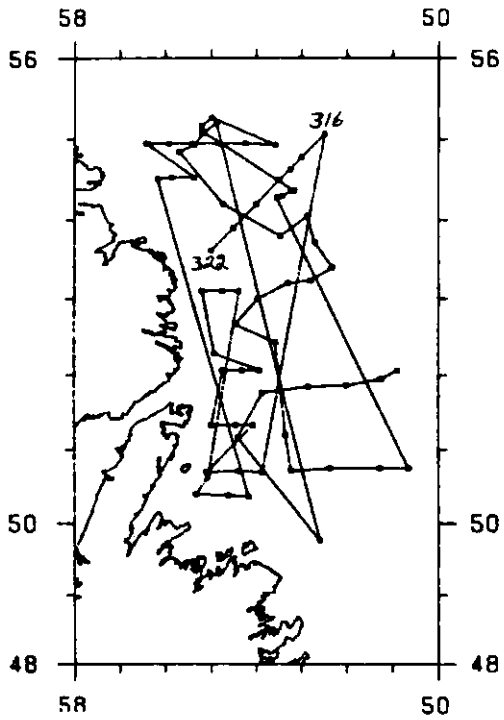
Appendix Figure 2. CRUISE 26 79002
2/ 1/78 - 19/ 5/78 30 STATIONS



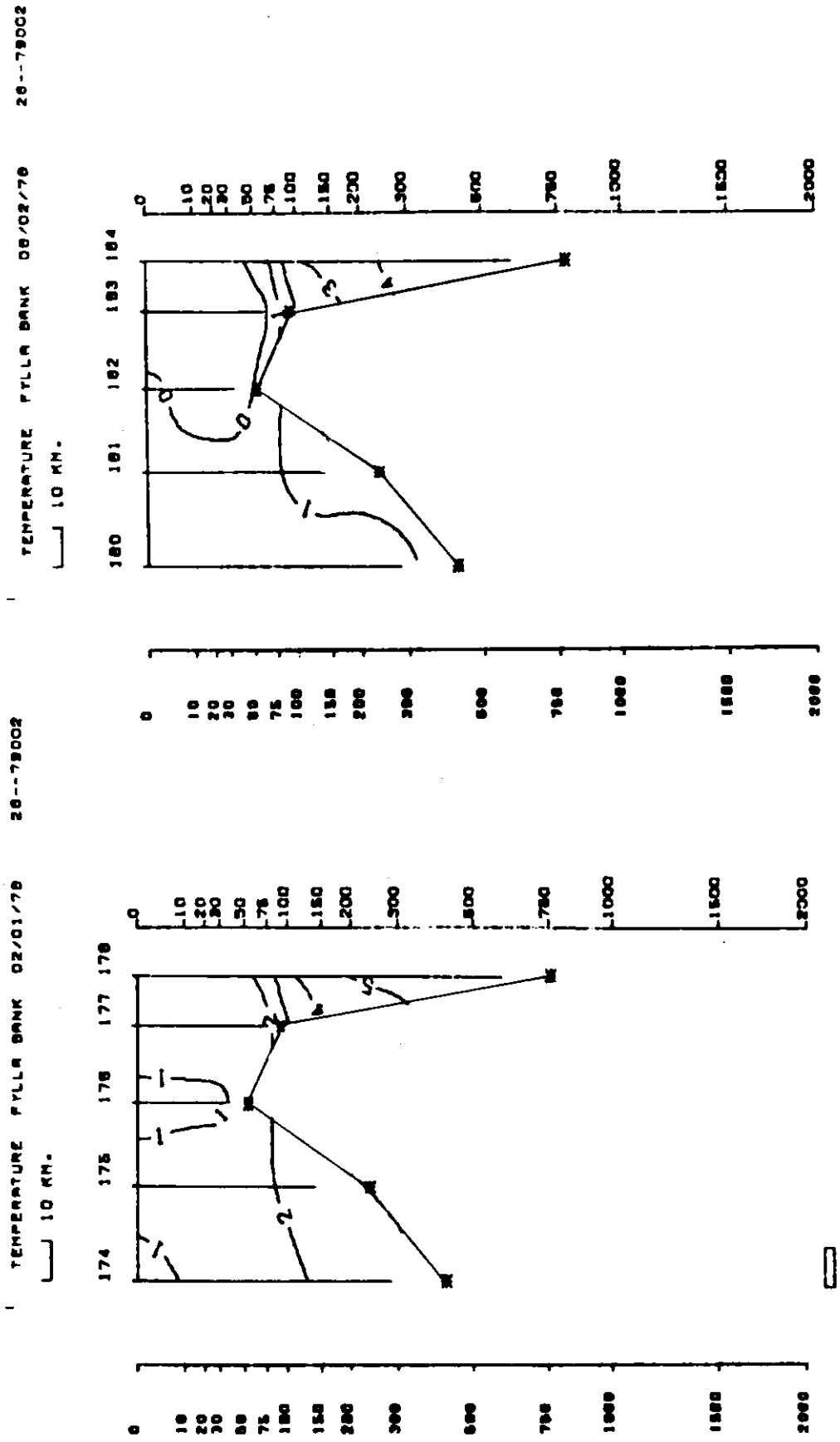
Appendix Figure 3. CRUISE 180578009 26/01/78 - 27/01/78 13 STATIONS



Appendix Figure 4. **CRUISE 180578008**
28/ 7/78 - 12/ 8/78 126 STATIONS

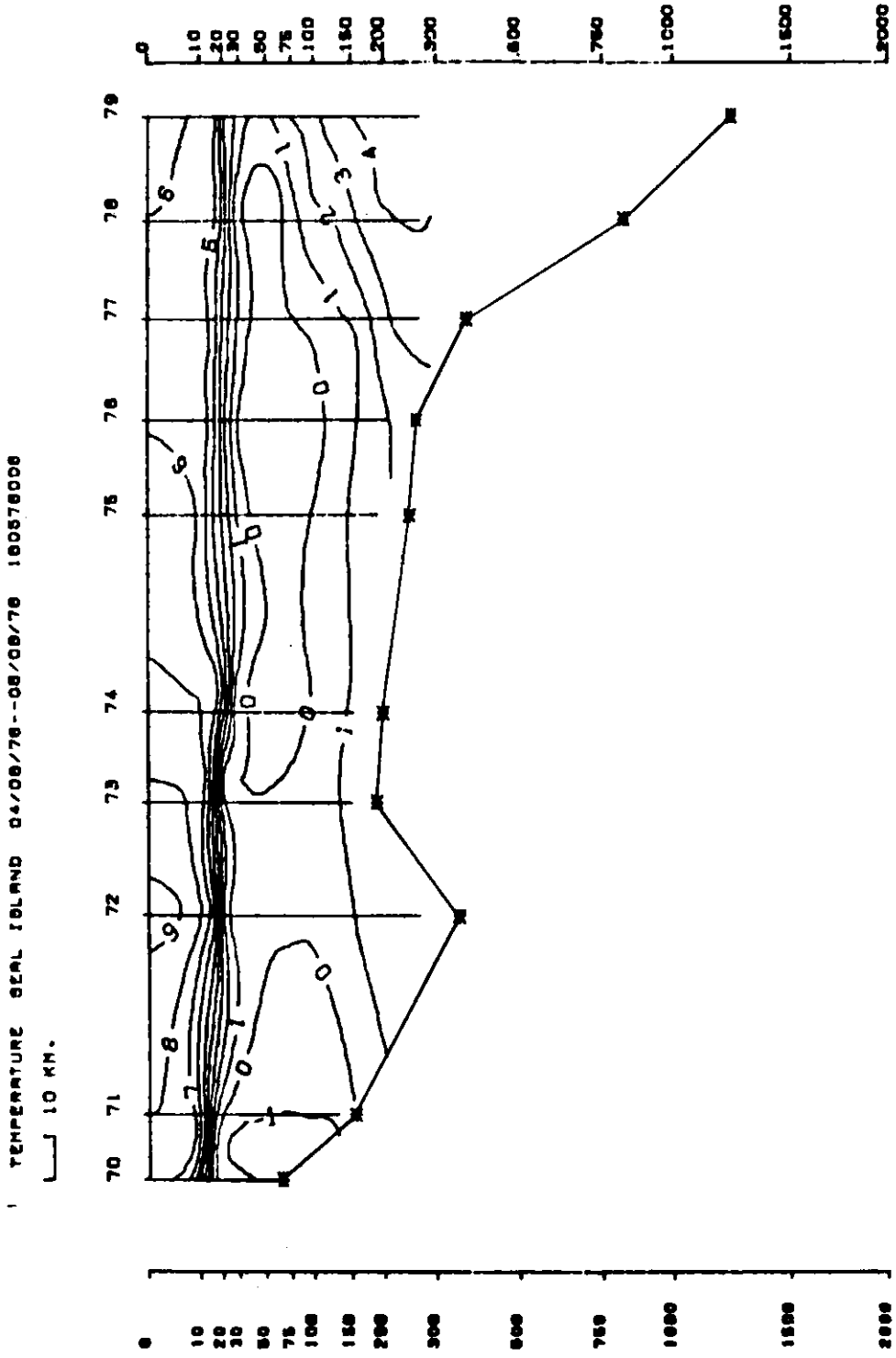


Appendix Figure 5. CRUISE 90PE79001
6/11/78 - 21/12/78 66 STATIONS

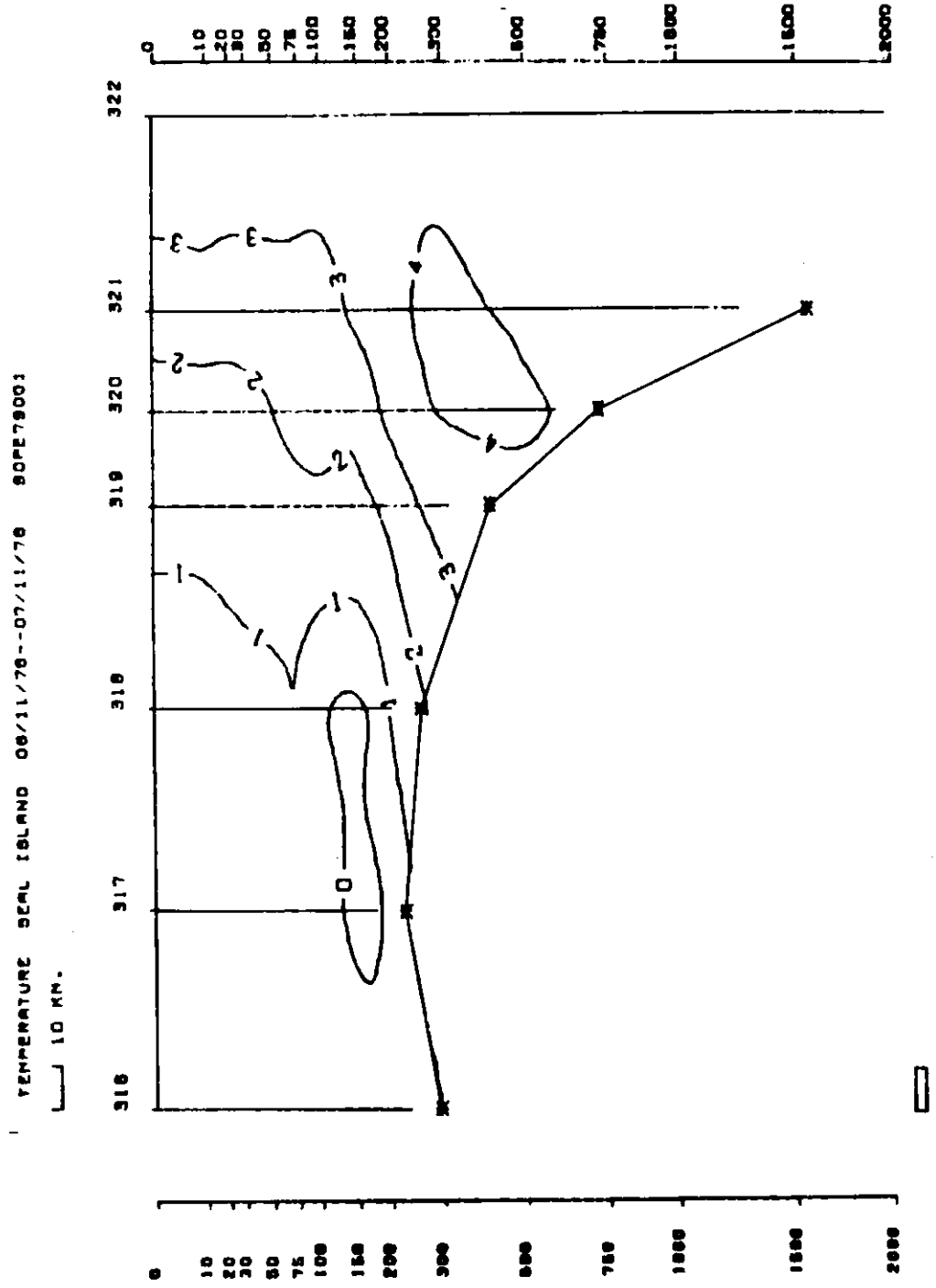


Appendix Figure 6.

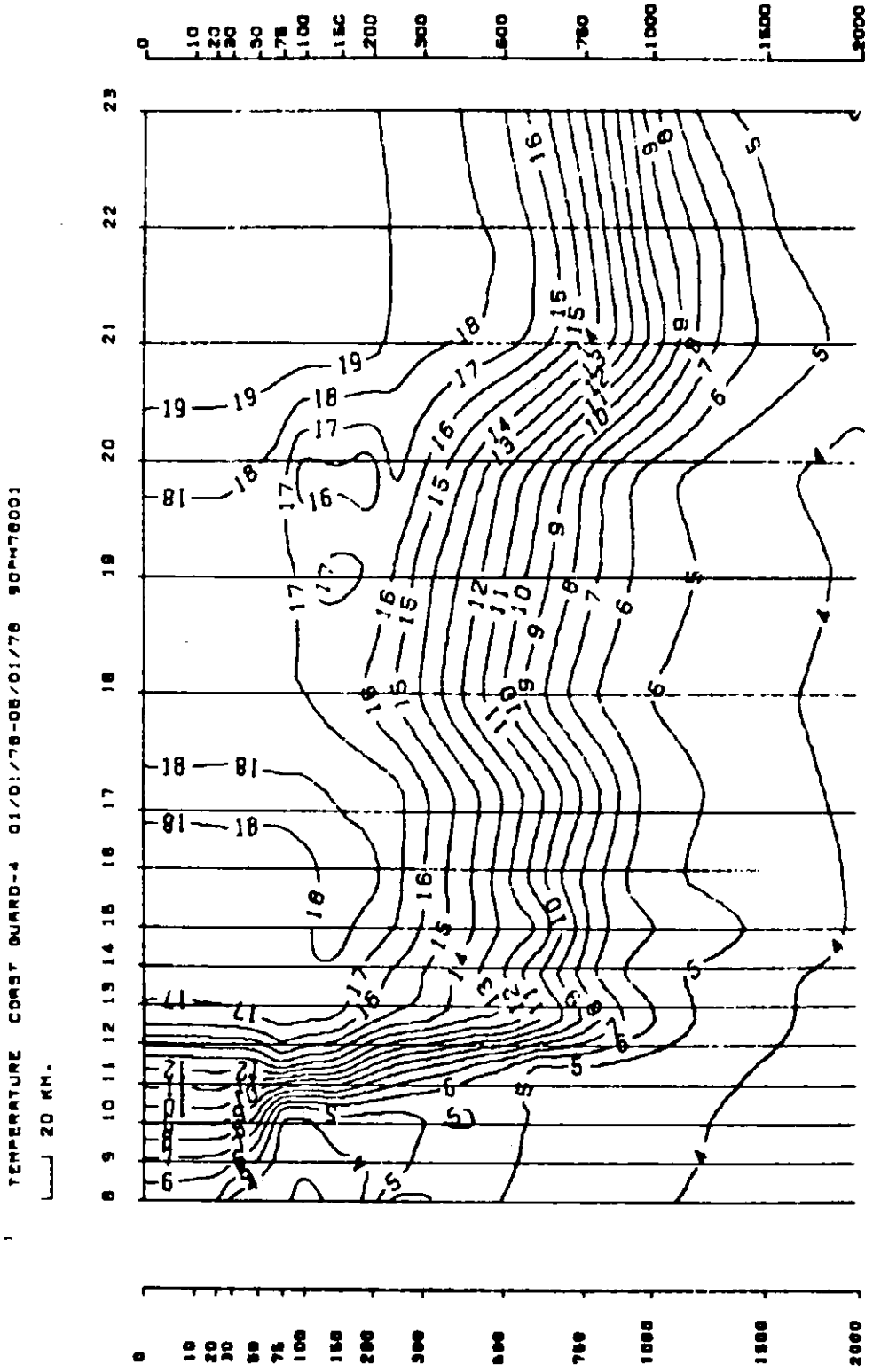
Appendix Figure 7.



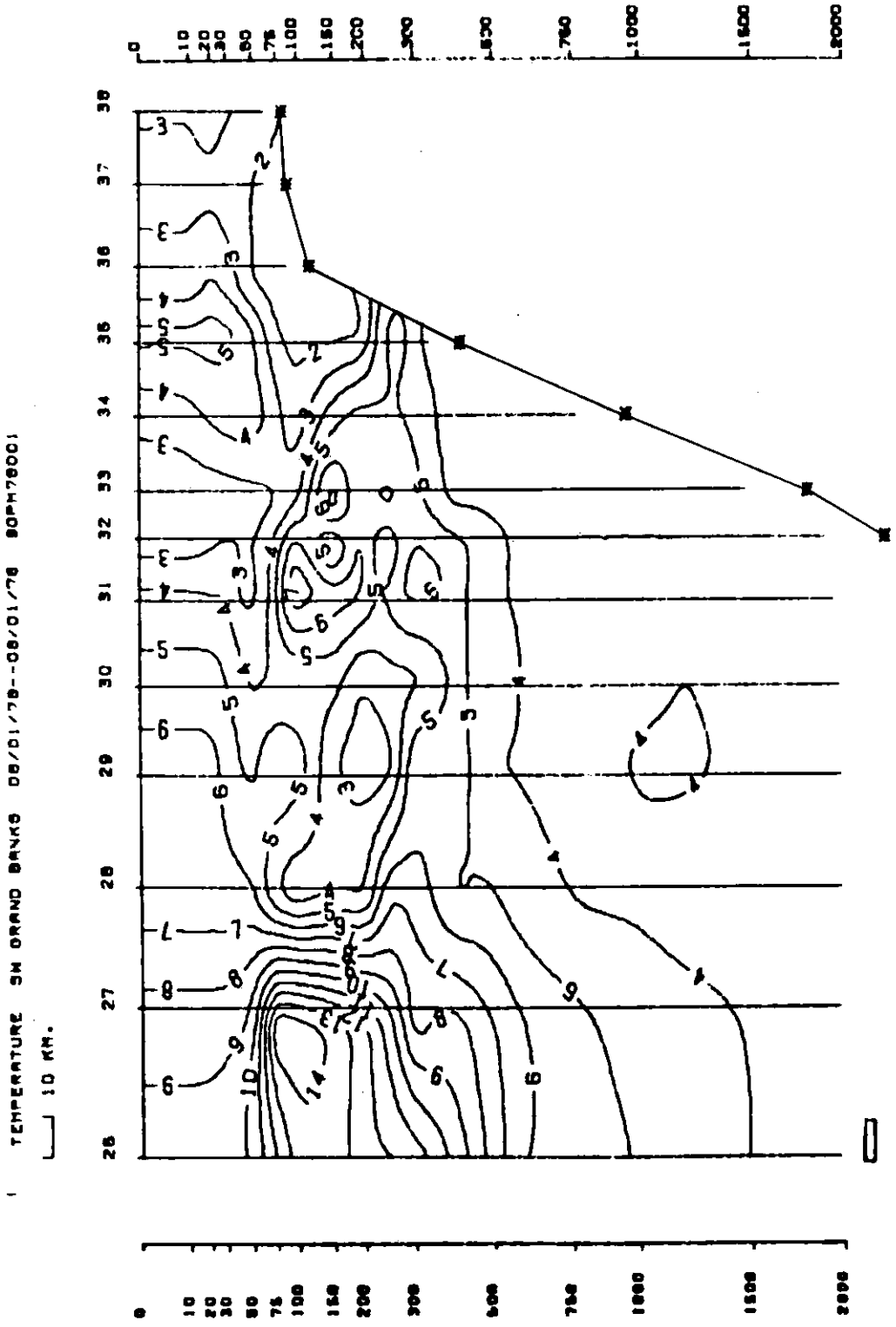
Appendix Figure 8.



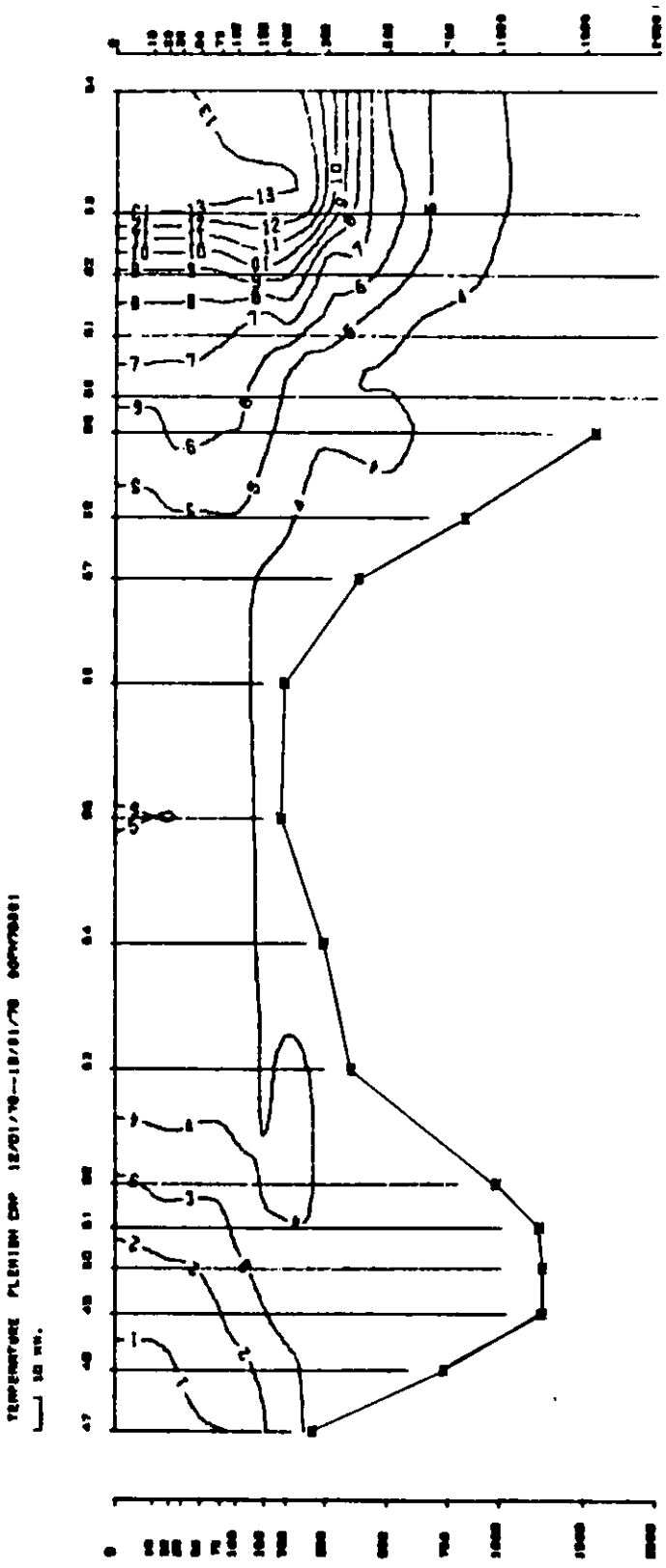
Appendix Figure 9.



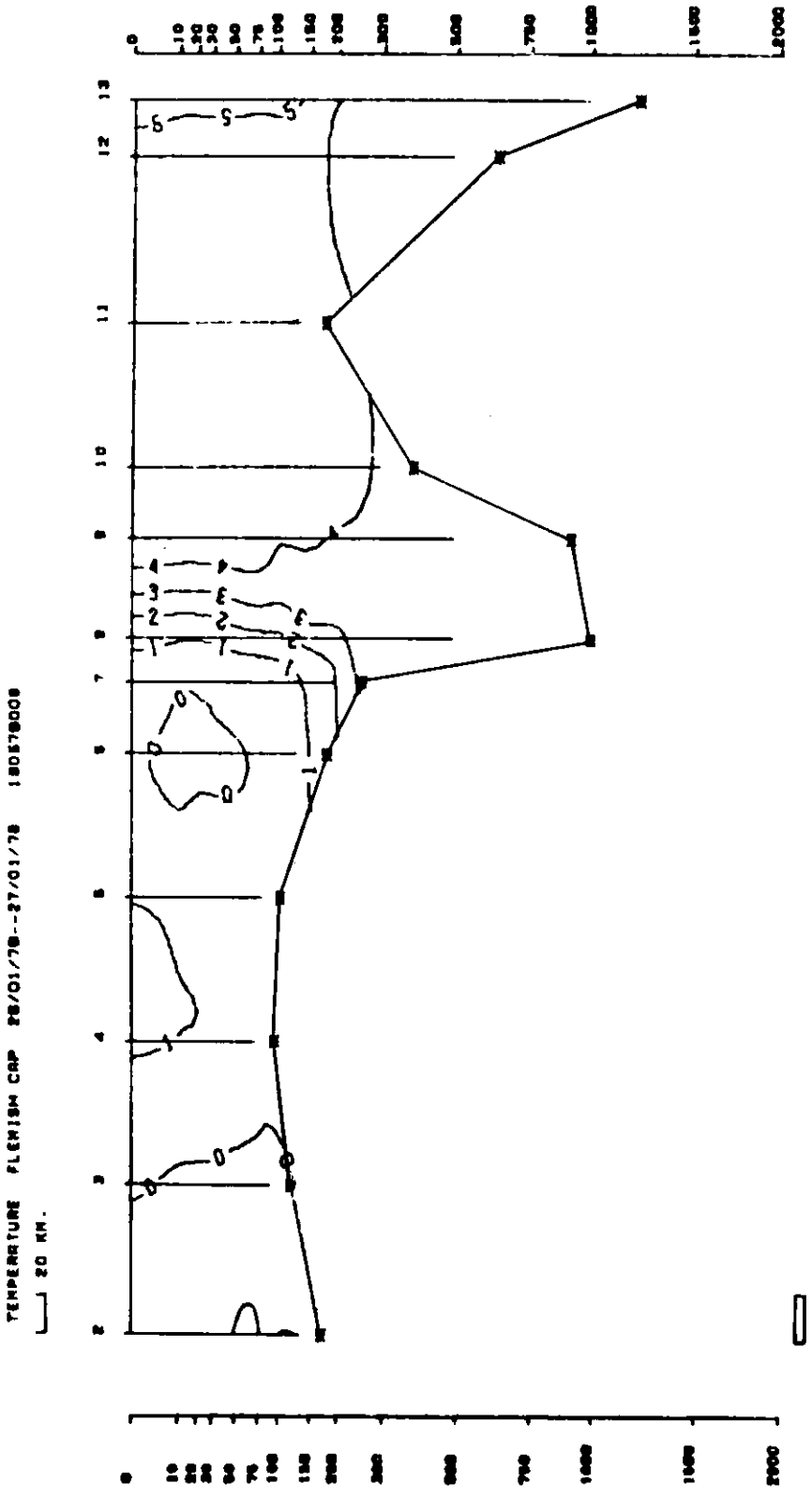
Appendix Figure 10.



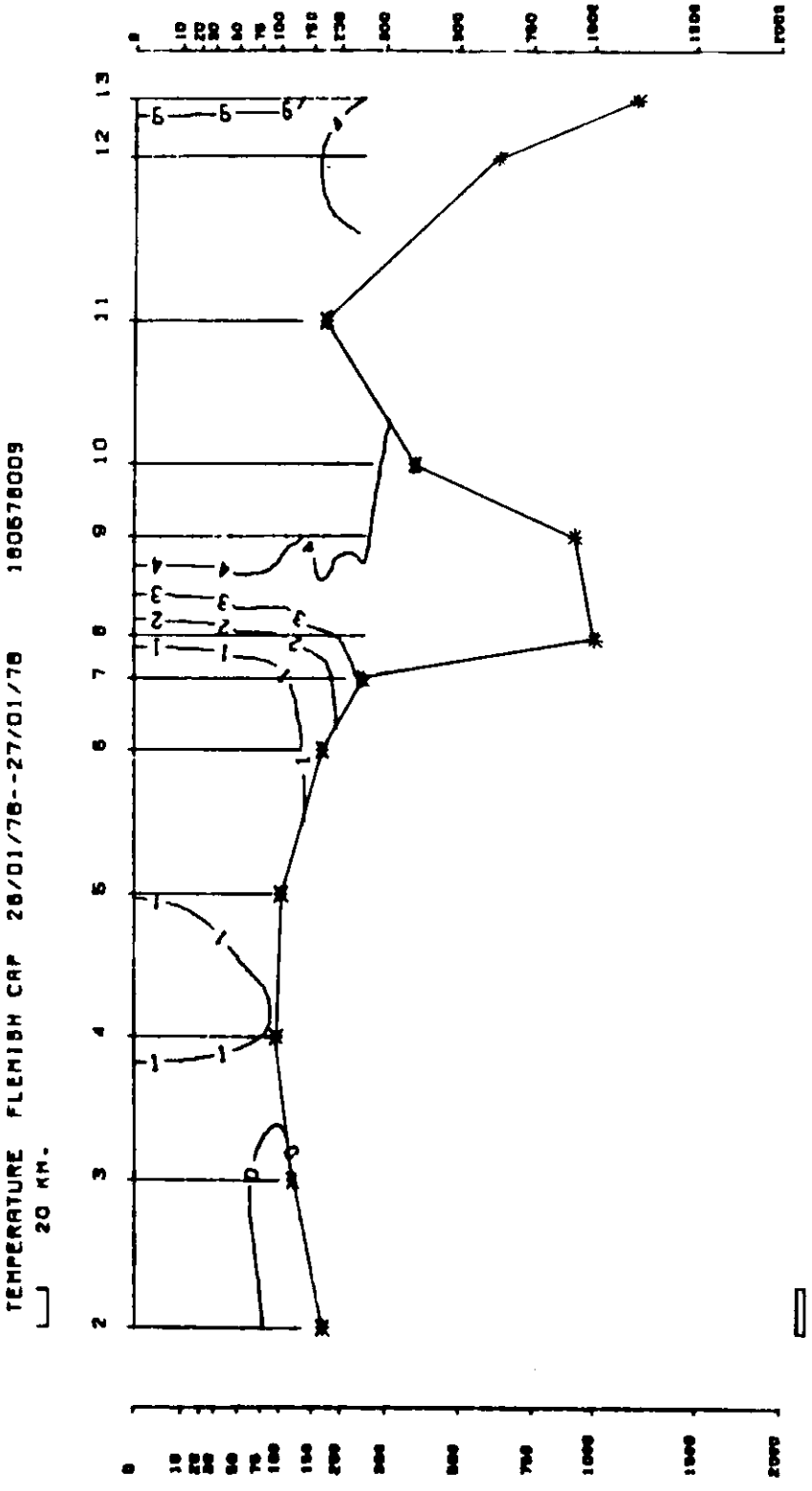
Appendix Figure 11.



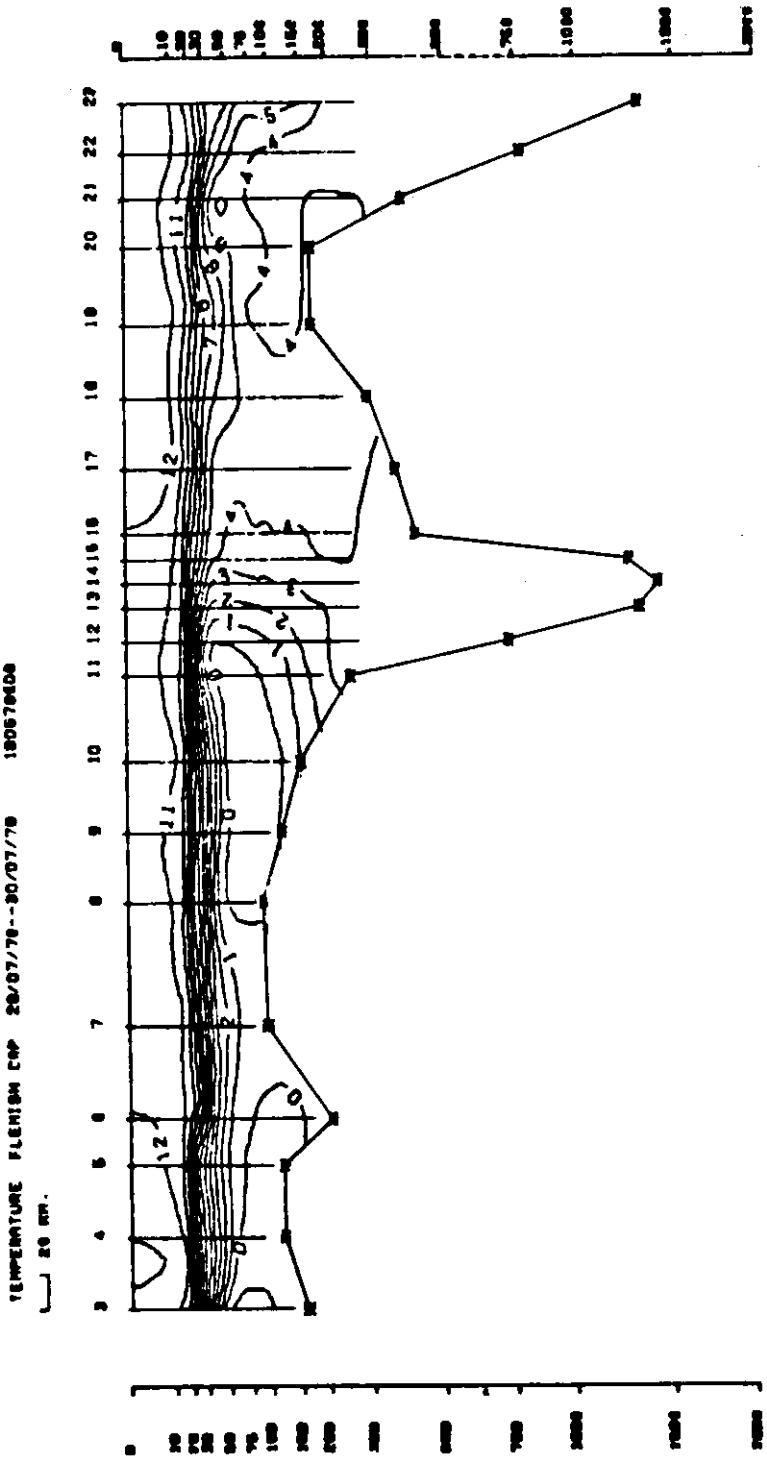
Appendix Figure 12.



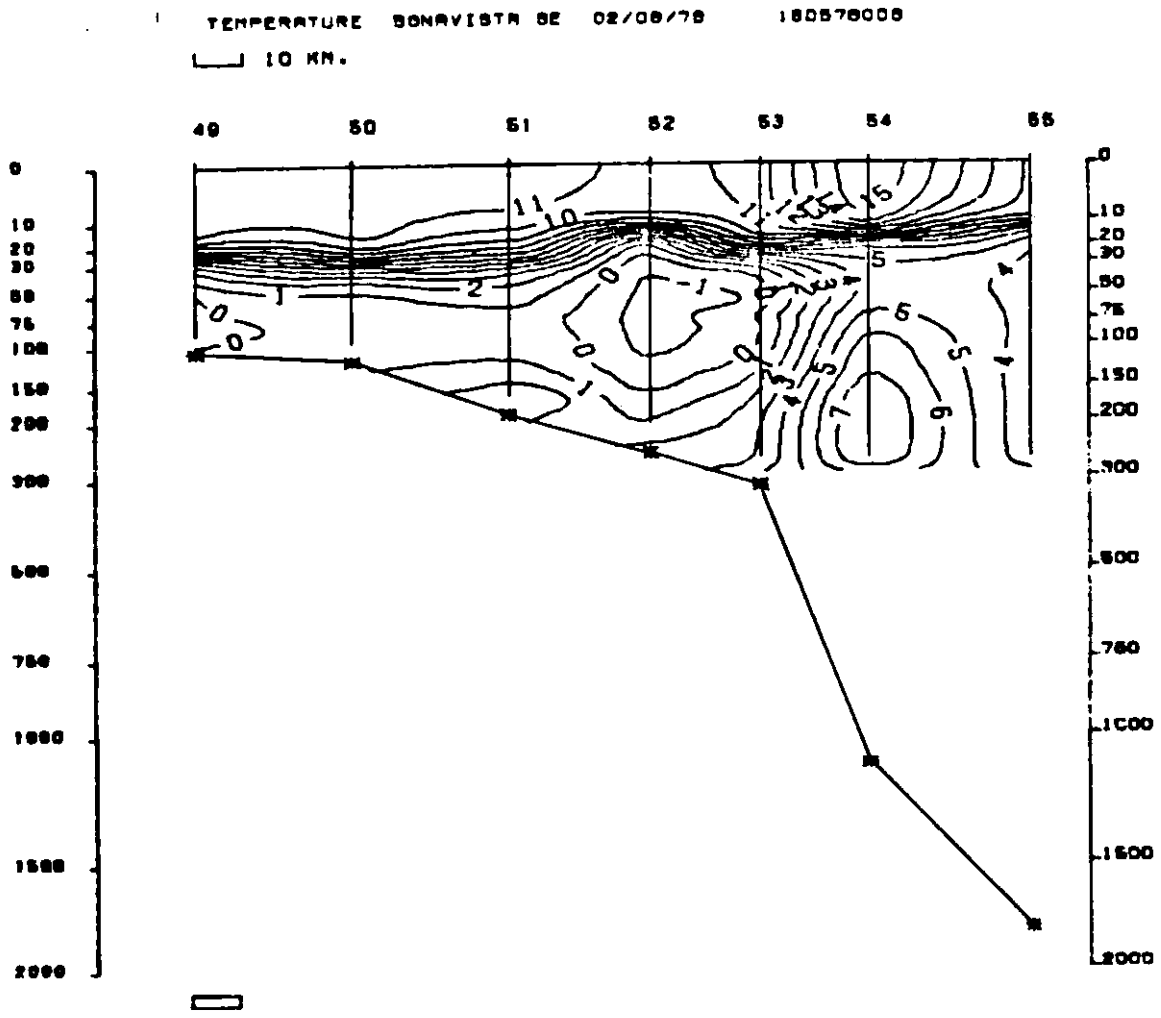
Appendix Figure 13.



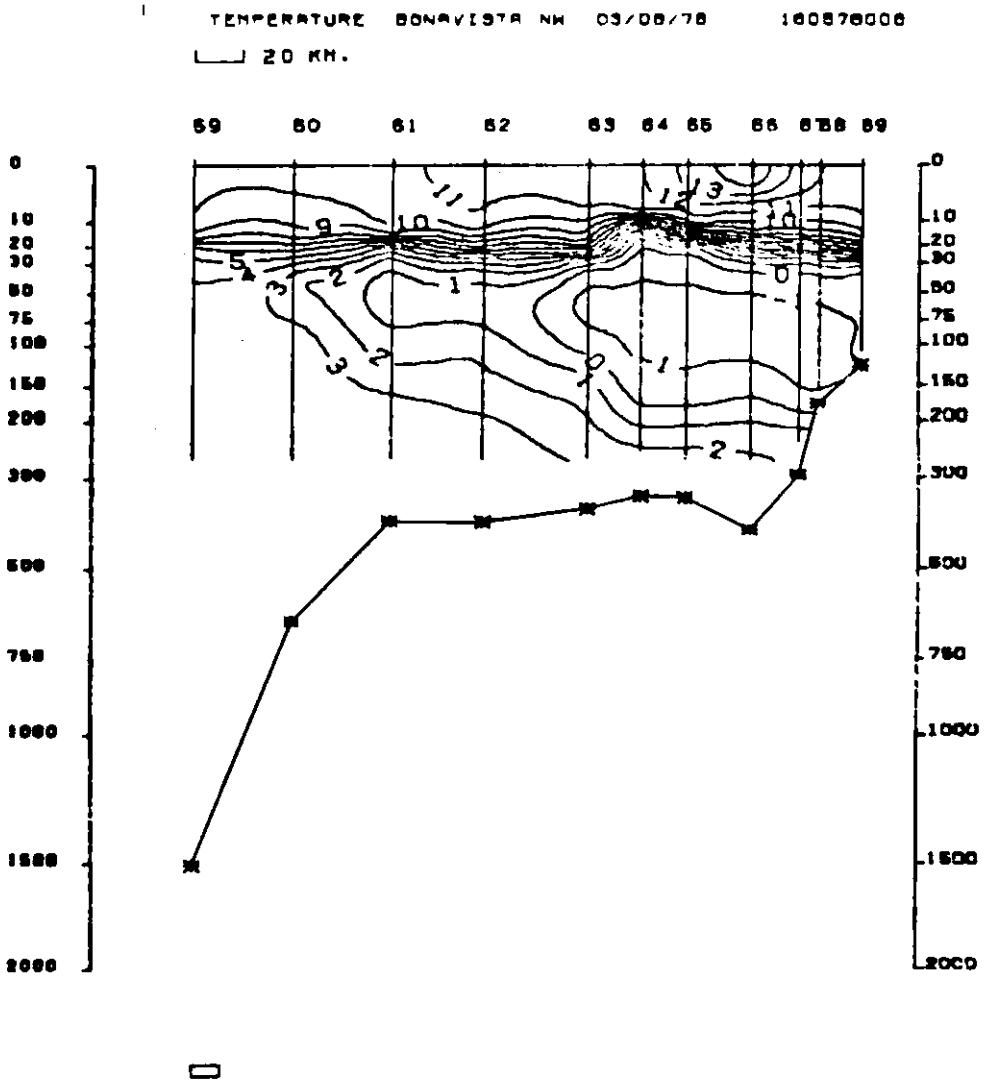
Appendix Figure 14.



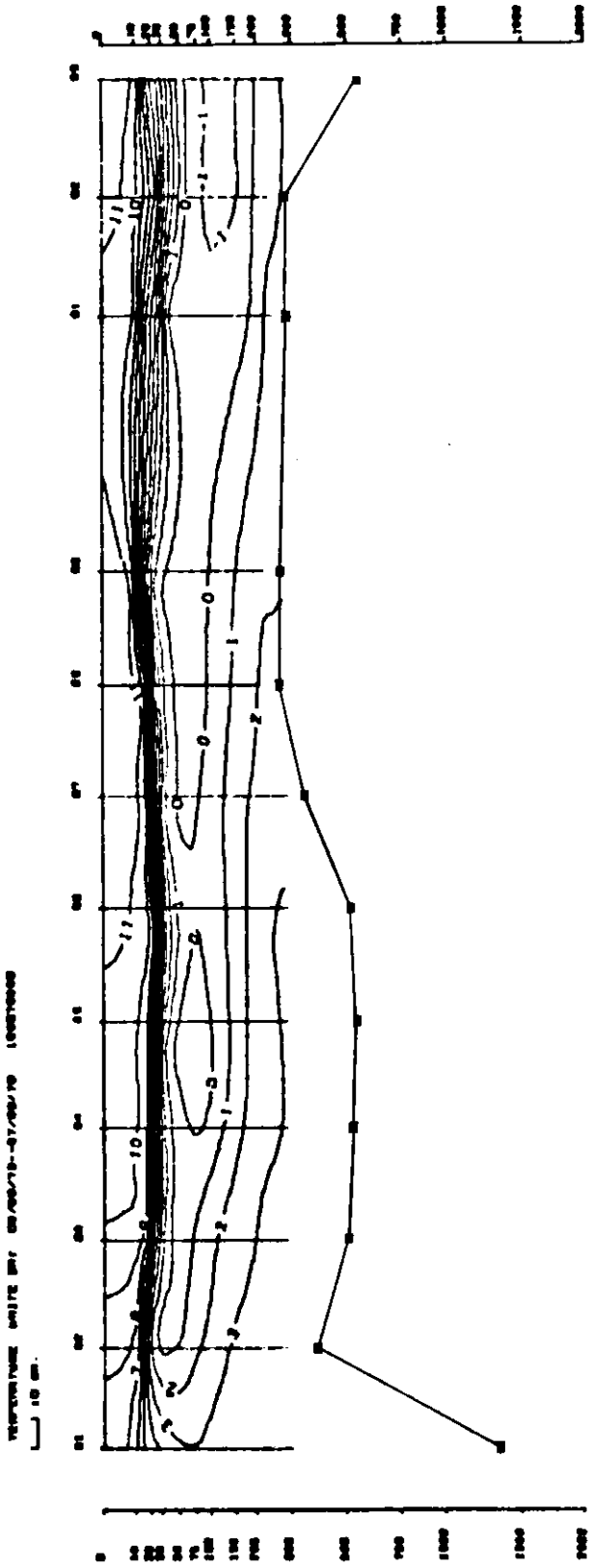
Appendix Figure 15.



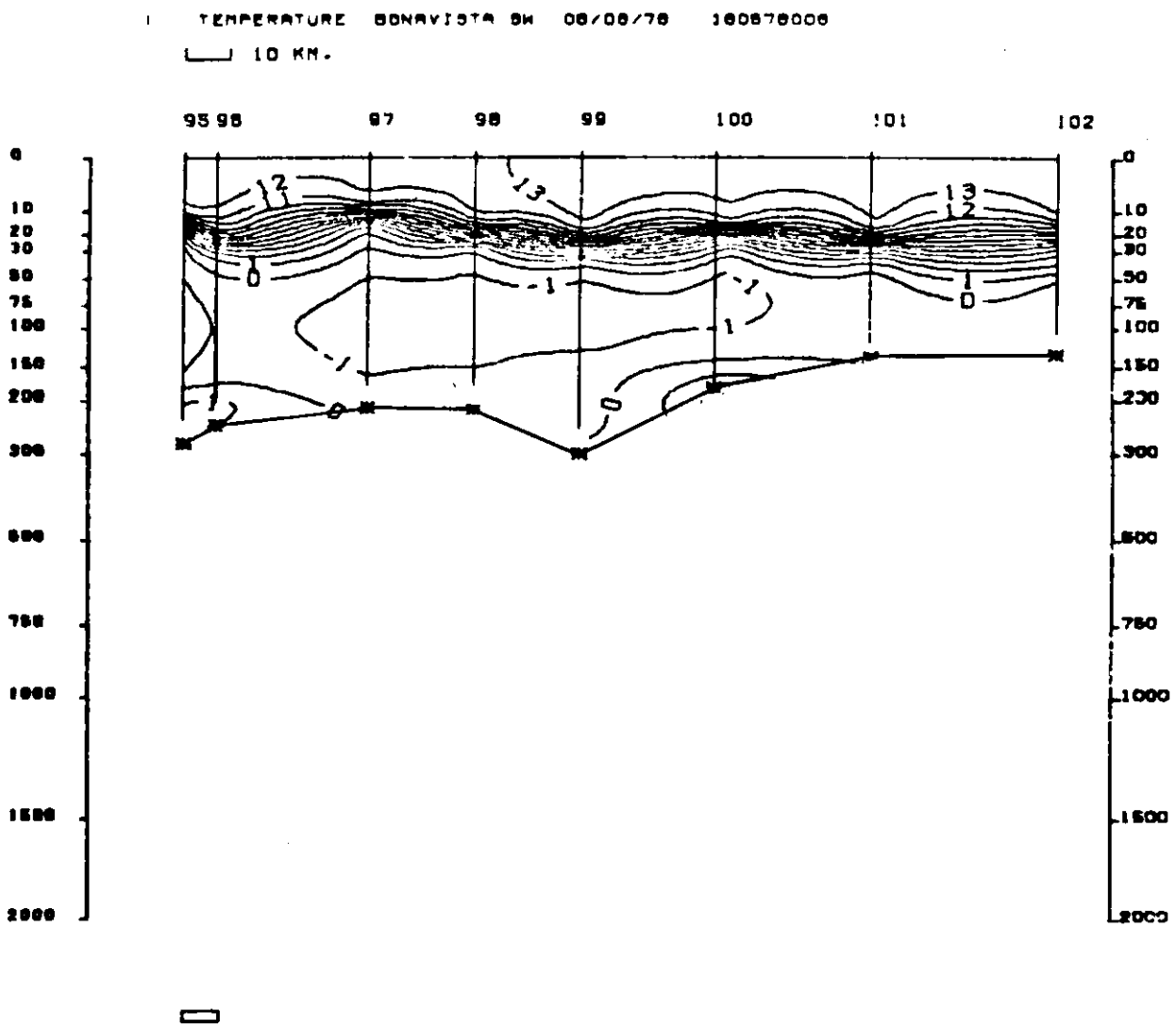
Appendix Figure 16.



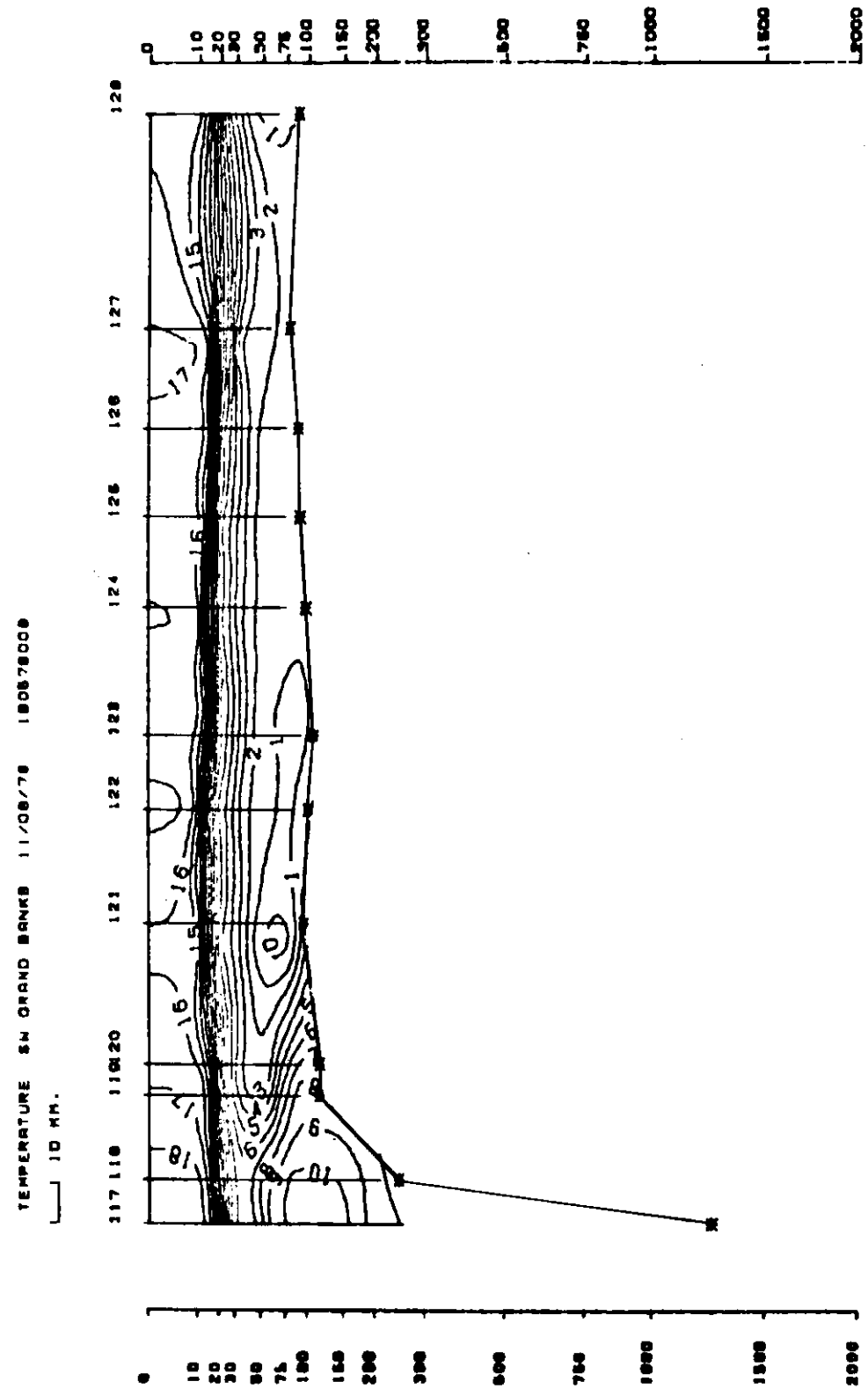
Appendix Figure 17.



Appendix Figure 18.



Appendix Figure 19.



Appendix Figure 20.

Table 4. USSR Cruises in ICNAF Area.

- from ICNAF Annual Reports (AR), Research Documents (RD), Redbook, and Special Publication No. 10
- T indicates temperatures quoted but no instrument type

Ship and/or Institute	Dates	Sub-Area					Sections	Instrument				Reference and Comments	Stations In MEDS
		1	2	3	4	5		NB	MBT	XBT	STD		
	1959												
Sevastopol and other scouting vessels: Rossiya Odessa Stalingrad Zapad	7 July - 20 Aug.		x	x			x	x				AR, Vol. 10 P. 95, "Cruise 14"	7
		x	x	x	x			x				P. 103 "820 Hydrographic Stations" "9 trips"	No
Novorossijsk	9 Oct. - 10 Oct.			x				x				P. 100, Fig. 4 Special study at 48°25'N 49°46'W	No
	1960												
Sevastopol	Feb. - April		x	x	x			x				AR, Vol. 11	No
	June - Aug.		x	x	x			x					57
Odessa	April - June	x					2	x				AR, Vol. 11	No
	1961												
Topseda	May - June	x	x	x	x			x				Redbook, 1962	No
	Aug. - Sept.	x	x	x	x			x					No
Volgograd	April - May	x						x				Redbook, 1962	No
Novorossijsk	Sept. - Oct.	x						x				Redbook, 1962	No
	1962												
Knipovich													No
SRT-R9048	Spring											Redbook, 1963	No
Topseda	Summer			All				"Hydrological"				"25 cruises,"	474
Novorossijsk	Autumn			ICNAF								p. 79	No
Pobeda													No
	1963												
Topseda		x						x				"Norwestlant"	16
Knipovich	April - July	x						x				1 - 3	39
and scouting vessels			x					x					54
	1964												
Sevastopol	Dec/64 - Feb/65		x	x			x	x				RD 67/116	No

Table 4. (Cont'd)

Ship and/or Institute	Dates	Sub-Area					Sections	Instrument				Reference and Comments	Stations In MEDS
		1	2	3	4	5		NB	MBT	XBT	STD		
	1965												
Topseda	June - Sept.	x	x	x			x	x					No
Sevastopol	July - Oct.		x	x	x		x	x				Redbook, 1965	No
	Dec/65 - Feb/66	x	x	x	x		x	x				Pt. II; and AR, Vol. 16	No
Pobeda	Feb. - May		x	x			x	T				and RD 67/116	No
Novorossijsk	Nov/65 - Mar/66		x				x	x					No
	1966												
Sevastopol	May - June		x	x	x		x	x				RD 67/116	No
Pobeda	May - Aug.	x						T				RD 67/116	No
	Sept. - Oct.	x		x				T				RD 67/116	No
Novorossijsk	May - July			x	x	x		T				RD 67/116	No
Kreml	July - Oct.		x	x			x	x				RD 67/116	No
	Dec/66 - Feb/67		x	x			x	x				RD 68/37	No
Rossiya	May - July		x	x	x		x	T				RD 67/116	No
	Dec/66 - Apr/67		x				x	x				RD 68/37	No
	1967												
Novorossijsk	Jan. - May		x	x			x	x				RD 68/37	No
	12 Aug. - 1 Dec.	x	x	x			x	x				RD 68/37	411
Sevastopol	Feb. - May			x	x		x	x				RD 68/37	No
Kreml	30 Mar. - 18 May			x				x				RD 68/37	No
Volgograd	17 July - 18 Oct.	x	x	x			x	x				RD 68/37	No
Pobeda	March	x						T				Redbook, 1968, Pt. II	No
	1968												
Volgograd	Jan. - (Apr.)	x	x				x	T				Redbook, 1969, Pt. II and	No
Neptun	Nov. - Dec.		x				x	T				Pt. III	No
Rossiya	April - June			x				x					No
Blesk	Oct. - Nov.					x	x		x			Redbook, 1969, Pt. III, p. 145	No
	1969												
Persey III	July	x	x				x	T					111
	Sept. - Nov.	x	x					T				RD 70/49	No
Rossiya	30 Apr. - 2 Aug.		x					T				Redbook, 1970, Pt. II	No
	November		x					T					No

Table 4. (Cont'd)

Ship and/or Institute	Dates	Sub-Area					Sections	Instrument				Reference and Comments	Stations In MEDS
		1	2	3	4	5		NB	MBT	XBT	STD		
	1970												
Perseus III	May - Aug.	x	x	x			x	T					229
	Aug. - Oct.	x	x	x			x	T				Redbook, 1971, Pt. II	No
Procyon	Late October	x	x	x			x	T					No
Rossiya	May			x			x	T				RD 71/57	190
	1971												
Perseus III	March - July			x			x	x					No
	Early November	x	x				x	x				Redbook, 1972, Pt. II	No
Procyon	March - July			x			x	x					No
	October	x					x	x					No
Protsion	Dec/71 - Feb/72	x	x	x			x	T				RD 73/43	No
Argus	June - October					x		28				Redbook, 1972, Pt. II	No
Prof Vize	June - Aug.							174				RD 77/VI/52	No
	1972												
Perseus III	April - July		x	x			x	x				Redbook, 1973, Pt. II; ICNAF Sp. Pub. X (RD 77/VI/52); and RD 73/43	No
	24 Oct/72 - 20 Jan/73		x					81					No
													No
Protsion	April - May		x	x			x	x				ICNAF Sp. Pub. X	No
	Dec/72 - Feb/73		x	x			x	x				ICNAF Sp. Pub. X	No
Argus	June - October				x			x				RD 74/51	No
Bakchizarai	Jan. - March					x		x				RD 74/51	No
	1973												
Perseus III	June - Sept.			x				457					No
Protsion	April - June			x				330				RD 75/79	No
Artemida	Sept. - Nov.		x	x			x	x					No
Belogorsk	15 Oct. - 1 Nov. (co-op cruise)					x		119				RD 74/05	No
Neptun	August		x	x			x	x				ICNAF Sp. Pub. X	No
	1974												
Gemma	April - July	x		x				x				RD 76/VI/70	No
	Nov/74 - Jan/75			x				x				RD 76/VI/72	No

Table 4. (Cont'd)

Ship and/or Institute	Dates	Sub-Area					Sections	Instrument				Reference and Comments	Stations In MEDS
		1	2	3	4	5		NB	MBT	XBT	STD		
Perseus III	May - August		x	x				x				RD 75/79	No
	Dec/74 - Mar/75	x	x					x				RD 76/VI/70 and 72	No
Protsion	October	x	x					x				RD 76/VI/70	No
Zarnitsa	Oct. - Nov.	x						T				RD 76/VI/113	No
Medvezhi	Oct. - Nov.	x						T					No
	1975												
Perseus III	21 June - 23 Sept.	x		x			x	T				RD 77/VI/36 RD 76/VI/72	No
Belogorsk	25 Sept. - 30 Oct.					x	x	181				RD 77/VI/43 RD 76/VI/36	No
Ayaks	September	x		x			x	T				RD 76/VI/72	No
Odissey	October	x		x			x	T				RD 76/VI/72	No
N. Kononov	March	x					x					RD 76/VI/71	No
P. Siyanie	July	x					x					RD 76/VI/71	No
Zarnitsa	December	x					x					RD 76/VI/71	No
	1976												
Perseus	March - Dec.	x	x	x			x	T				RD 77/VI/35 Total 665 Stns.	No
Odysseus	June	x	x	x			x	T					
Medvezhy	July - October	x						x				RD 76/XII/156	No
Kronstadt	July - October	x						T					No
Belogorsk	16 - 19 April					x		x				RD 76/VI/86	No
	1977												
Perseus III	Jan. - Feb.		x	x			x	35				RD 78/VI/70	35
	April - July		x	x			x	393				RD 78/VI/70	397
	Nov. - Dec.		x				x	150				RD 78/VI/70	102
Protsion	Nov. - Dec.		x	x			x	150				RD 78/VI/70	291
Foton	21 Sept. - 14 Oct.			x				162				RD 78/VI/32	No

NOTE: 1977 data directly exchanged through ICNAF only.