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Marine Environmental Data Service Report for 1991

by

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1. Introduction

This year has again been quite busy at MEDS. The software for quality control and detection of duplications in real-time data has been running for over a year. Apart from some minor fixes, the software has remained stable.

Over the course of the year a number of software modules have been written to assist in the processing of ocean data received in delayed mode. This included extensions to the quality control software to handle other profile types beyond temperature and salinity, modifications to the duplicates detection software, software to relabel cruises, and so on. The system has been built so that all ocean profile data will pass through the same quality control and duplicates detection software. The software is menu driven and is currently in final testing. There still remains some work to handle very long profiles. We expect this system to be in production by this summer. It will then be necessary to address the backlog of data currently waiting to be processed.

Software has been written to provide some simple outputs from our archives, and we are able to provide data in both ASCII or binary forms upon request. We have interactive query software which allows a user to select one or more data files and to produce standard reports from these. All of this is menu driven and is presently working against existing archives.

During last year all of our historical ocean data archives were passed through our new quality control procedures and duplicates detection software running in automatic mode. This was a substantial undertaking but it means that all of our archives now are processed to the same level of data quality assessment and we have taken the most up to date steps to eliminate duplications within archives. In addition we have reprocessed all of our historical BATHY and TESAC archives through the manual quality control/duplicate detection software. This meant each and every profile in the historical archive was viewed by a technician. During the course of this year we have intentions to do the same for the other archives although this is dependent on resources being available.

We have begun to receive drifting buoy data in small amounts from the principal investigators. Primarily these data have come from the Atlantic Oceanographic and Meteorological Laboratory in Miami. Currently we are working with people in Miami to sort out questions arising from the data submission. The result will be a greater volume of historical drifting buoy data available to secondary users. We have also instituted a system to record information about the buoys being deployed, such as whether or not they are drogued, and who operates them. This information will be tagged to the data in our archives and will be available with the data to secondary users.

MEDS continued to issue monthly reports of data received in real-time. These are produced at the beginning of each new calendar month and are available upon request. MEDS continued to issue an annual report on drifting buoy data received. This report was delayed this year because of budgetary concerns. It is expected to be issued this summer. MEDS began to issue a new publication from the Global Temperature and Salinity Pilot Project, GTSPP. This appears once each month with a production schedule that has not yet been finalized, but which should be by the end of this summer. It contains statistics of data receipts and articles describing various components of the GTSPP. People interested in receiving these reports should contact MEDS.

Some of the usual inputs to MEDS report that come from BIO were not available this year. They are undergoing a change in computer systems and this has affected their normal operations.

This is the last year that I will be sitting as MEDS representative to NAFO. Next year the report will be prepared and presented by Graham Glenn. He has been a member of MEDS for some years now. He has played an important role in the creation of MEDS new ocean data processing system and is very capable of fulfilling MEDS obligations. He has represented MEDS in meetings in Japan concerning data exchange and data handling issues in general. I can assure you that he will provide MEDS full cooperation to NAFO in the coming years. It has been a pleasure to serve as MEDS member of this committee and I wish to thank all of you for your cooperation over the years.

2. 1991 Data Not Yet Received by MEDS

Table 1 presents the information known about the data collections made in the NAFO area during 1991 but from which the data have not yet come to MEDS. The information has been obtained from Cruise Summary Reports, NAFO documents and reporting sheets and cruise reports. There are substantial numbers of stations represented in this list compared to previous years. The majority is Canadian data and we expect to receive these shortly. Some of the data collections originating at the Bedford Institute of Oceanography may be delayed due to changes in their computer systems. The numbers in this table also reflect the work that has been going on at MEDS in rebuilding its archiving systems. That is, some data have been withheld from MEDS until we are ready to accept it. As reported above, MEDS will shortly be able to process ocean data routinely once again.

3. 1991 Data Received and Processed

Table 2 records the information about data received at MEDS this year. The numbers of stations received is very low. The reasons for this have been mentioned in the previous paragraph. We expect next year to begin to show improvements once again.

Table 3 lists the IGOSS data (reports of BATHYs and TESACs) collected in the NAFO area from 1991. Through our participation in the Global Temperature and Salinity Pilot Project, we have made links to real-time data from both the National Weather Service in Washington and the Fleet Numerical Oceanography Center in Monterey. We look at IGOSS data from all three sources each day, sort out duplications and apply a series of quality control procedures to the data. We have also been receiving IGOSS data on magnetic tape once each month from Germany and Japan and comparing these to receipts via other routes. In doing this, we have been able to increase the data received for the NAFO area. So, this year we report roughly 4600 stations while last year there were only 3600. We attribute this reported increase as due to our efforts within the GTSPP.

The IGOSS data were retrieved and split into "cruises" using software. A new cruise is defined to be if there is an interruption of more than 5 days in the reporting of data. By and large, this makes for a convenient grouping of data, with few resulting cruises with a small number of stations. The same software uses a file defining NAFO subarea boundaries to accurately locate where the data were collected.

4. Drifting Buoy Data Received in 1991

Table 4 records the drifting buoy data collected in 1991. Much of it was received in real-time from the GTS with MEDS acting in our role as a Responsible National Oceanographic Data Center for these data. Those buoys reporting over the GTS have a WMO assigned 5 digit number. In past years, buoys with a 4 digit number were deployed by Canadians and did not report in real-time. These buoys are not represented in the table this year. BIO is changing its data processing systems and was unable to supply the information for this year's report.

There is a small increase in the number of buoy-months over previous years. This reflects the greater emphasis in using drifting buoys for data collection. We expect this trend to continue as the WOCE program develops. Figure 1 presents a composite map of buoy tracks over the entire year.

5. Current Meter Moorings in 1991

Table 5 records the information about current meter deployments in the NAFO area in 1991. There has been an increase in the number of current meter months of data collected in the NAFO area in 1991 compared to 1990. Much of this information was derived from Cruise Summary Reports and so there is no information about current velocities. Information from BIO is represented in these tables.

6. Wave Data Collections

Table 6 presents information about wave spectra measurements made during 1991. Once again, there has been a substantial increase over last year. This is due to The Canadian Atmospheric Environment Service installing a number of moored wave buoys in the NAFO area. These buoys are part of a permanent network and so the level of reporting of wave spectra can be expected to be maintained at least at this level. Spectra from these buoys are received every day at MEDS and are added to our archives each week.

7. Historical Data Acquisitions

Table 7 notes the data received at MEDS in 1991 from years earlier than 1991. There is an increase over last year. Some of this is attributable to data having been received from 1989 and 1990 from the Northwest Atlantic Fisheries Centre. These data arrive on magnetic tape and because our delayed mode system for handling the data was not completed, not all of the necessary information for this table was available.

8. Review of Environmental Conditions

This review is based on examination of reports published by the Bedford Institute of Oceanography, SST anomaly maps produced by NOAA and SST anomaly maps which we generated from IGOSS data only. As remarked in other years, there are some differences between the various presentations due to what is judged to be normal conditions. Generally, the analyses from BIO use a lower temperature for climatology. As a consequence, when both NOAA or MEDS indicate colder than normal temperatures, BIO reports temperatures near normal. The narratives presented here are based more on the NOAA and MEDS products because they are available in graphic form and so are more easily summarized.

MEDS analyses, shown in figures 2 to 5, use IGOSS data and present sea surface temperature anomalies relative to the monthly Levitus atlas. Winter is defined to be the months of February to April, spring to be May through July, summer is August through October and autumn is November through to January, 1992. Data locations are marked by plus signs. Regions of negative anomalies are shaded with solid, horizontal lines while regions with positive anomalies are shaded with dashed, vertical lines. Anomalies are contoured at 0.5, 1.0, 1.5, 2.0 and 3.0 degrees C. An optimum interpolation scheme is used with a decorrelation scale of 125 Km.

Overall this year, sea surface temperatures tended to be lower than normal in the northern parts of the NAFO region. Subareas 0 through 3 all showed temperatures consistently on the low side of normal throughout most of the year. The Grand Banks region showed both positive and negative anomalies at different times. Subareas 4, 5 and the inshore parts of 6 showed no particular tendencies having temperatures both above and below normal. The offshore regions of subarea 6 was more likely to exhibit positive anomalies during the year.

Subareas 0 and 1

These areas started the year with colder than normal conditions in subarea 0 but near normal or slightly warmer in subarea 1. There appeared to be a warm anomaly to the east of Greenland and some of this penetrated to subarea 1. Conditions in subarea 0 moderated by March so that generally temperatures at the surface were near normal. In subarea 1 temperatures continued to show positive anomalies. These built in strength over the months until by April they were up to 2 degrees warmer than normal. Conditions appeared variable over the next few months, but by July, temperatures at the surface appeared to be generally above normal throughout the two subareas. There were indications of very cold water in the northern parts of subarea 0 beginning in June but these are not really evident until August. At this time the whole of Baffin Bay appears to be filled by a very cold surface temperature anomaly. The more southern regions of subareas 0 and 1 are very near normal conditions. By October, the extreme temperature anomalies seem to have disappeared but conditions are generally slightly colder than normal.

Subareas 2 and 3

These areas began 1991 generally colder than normal. These conditions persisted throughout the entire year although by the end of the year, temperatures were moderating. The offshore Grand Banks region showed the largest cold surface temperatures compared to normal in the spring.

Subarea 4

This subarea started 1991 with surface temperatures very near normal. In the far offshore regions, temperatures tended to be above normal. By March slightly colder than normal temperatures were evident near shore, but offshore there was still the warmer water. By June, surface temperatures throughout the region were dominated by colder than normal water. These conditions persisted until late summer. By August temperatures returned to near normal in the offshore regions but were still cold closer to shore. Conditions everywhere were near normal by the end of the year.

Subareas 5 and 6

The offshore portions of subarea 6 began the year with warmer than normal sea surface temperatures while the inshore regions and subarea 5 experienced colder than normal temperatures. By March, the inshore parts of subarea 6 were near normal but offshore, temperatures were still above normal. Subarea 5 continued to experience colder than normal temperatures. By early summer, the large cold water anomaly which dominated more northerly subareas was also influencing subareas 5 and 6. All of subarea 6 was experiencing slightly below normal temperatures. Subarea 5 was more strongly influenced with temperatures significantly below normal. By August, the offshore regions of subarea 6 returned to near normal temperatures, but the inshore regions and subarea 5 still were colder than normal. By the end of the year, surface temperatures in region 6 showed both warm and cold conditions.

Table 1: Data collected in the NAFO area in 1991 but not yet received at MEDS. Total = 6445 stations.

Ship Name	Cruise Period	NAFO Subarea	Standard Section	Number	Reference
		Canada			
W.Templeman	01-21 Feb	3PnPs		181	CR-REP
A.Needler	12-28 Feb	5YZe		114	CR-REP
A.Needler	04-18 Mar	4VsW		100	CR-REP
W.Templeman	14-28 Mar	3L			CR-REP
L.Hammond	01-07 Apr	3Ps		29	CR-REP
A.Needler	16-29 Apr	4RT		86	CR-REP
G.Atlantica	18-29 Apr	3Ps		42	CR-REP
Navicula	22 Apr	4,5,6		3	CSR
Hudson	24 Apr - 04 Jun	1F,2HJ,3LN,6G		260	CSR
Navicula	24 Apr - 29 Nov	2,3,4		112	CSR
Dawson	07 May - 20 Jul	3KL		67	CSR
L.Hammond	12-29 May	3L		110	CR-REP
G.Atlantica	30 May - 20 Jun	3KL		70	CR-REP
Shamook	03-17 Jun	3L		19	CR-REP
L.Hammond	18-29 Jun	3KL		96	CR-REP
G.Atlantica	24 Jun - 15 Jul	3L		127	CR-REP
L.Hammond	01-08 Jul	3L		25	CR-REP
Marinus	02-18 Jul	3L		120	CR-REP
A.Needler	03-13 Jul	4WX		88	CR-REP
L.Hammond	17-28 Jul	4VnVsW		107	CR-REP
Dawson	20 Jul - 08 Aug	2J,3KLM	Bonavista White Bay Seal Island	153	CSR
Shamook	22 Jul - 12 Aug	2J		7	CR-REP
Navicula	29-30 Jul	4W		6	CSR
W.Templeman	04-21 Aug	3LNO		143	CR-REP
Marinus	05-16 Aug	3L		23	CR-REP
A.Needler	06-16 Aug	4W		6	CR-REP
Dawson	22-29 Aug	4,5,6		92	CSR
A.Needler	24 Aug - 20 Sep	4RST		265	CR-REP
Navicula	27 Aug - 19 Sep	4W		48	CR-REP
W.Templeman	03-16 Oct	2,3			CR-REP
E.E.Prince	28 Oct - 15 Nov	4X		143	CR-REP
Dawson	02-20 Nov	2J,3KLM	Bonavista White Bay Seal Island	87	CSR
Shamook	02-13 Nov	3L		26	CR-REP
Dawson	05-23 Nov	3Ps,4NRST		191	CSR
G.Atlantica	15 Nov - 2 Dec	2J,3K		163	CR-REP

Ship Name	Cruise Period	NAFO Subarea	Standard Section	Number	Reference
		CIS			
K.Shaitanov	Jul - Sep	2		25	NAFO
K.Shaitanov	23 Oct	1F,2HJ	8-A	11	NAFO
K.Shaitanov	Oct - Dec	2		81	NAFO
Vilnius	Oct - Dec	2		18	NAFO
Vilnius	Oct - Dec	3		89	NAFO
K.Shaitanov	Oct - Dec	0		53	NAFO
K.Shaitanov	02-03 Nov	0B	34-A	7	NAFO
		Denmark			
Paamiut	Jul - Sep	1ABCD		254	NAFO
		Fed. Rep. Germany			
Meteor	02-25 Sep	1F,2J,3K		1200	CSR
		USA			
Delaware 2	03-16 Jan	5Ze		161	CR-REP
Delaware 2	06-22 Feb	5Ze		149	CR-REP
Delaware 2	05 Mar - 16 Apr	5YZe,6A		283	CR-REP
A.Maine	19 Jul - 2 Aug	4WX,5YZeZw,6ABC		87	CR-REP
Delaware 2	22 Jul - 2 Aug	5YZe		84	CR-REP
Oregon 2	29 Jul - 23 Aug	6ABC		115	CR-REP
Delaware 2	05-16 Aug	6A		64	CR-REP
Delaware 2	09 Sep - 24 Oct	5YZe		354	CR-REP
Delaware 2	04-16 Nov	5Ze		142	CR-REP
Delaware 2	03-20 Dec	4X,5YZe		9	CR-REP
Delaware 2	04-14 Dec	5Ze		150	CR-REP

CR-REP: Information from cruise reports
CSR: Cruise Summary Report
NAFO: Information from NAFO Inventory Forms

Table 2: Data collected in the NAFO area in 1991 and received at MEDS. Total = 665 stations.

Ship Name	Cruise Period	NAFO Subarea	Data type BT	BOT	CTD	Cruise Number
Margaree	14 Jan - 21 Apr	3LOPs,5Ze,6DH	9			181891003
Marinus	15 Jan - 02 Mar	3LPs	9			180590027
W.Templeman	16-29 Jan	3LNO	27		66	180590012
Nipigon	21 Jan - 14 Feb	4X	57			181891004
Skeena	21-22 Jan	4X	3			181891015
Gatineau	05-28 Feb	3LMNOPs,4VsW	32			181891008
Skeena	18 Feb - 05 Mar	3LMNOPs,4VsW	14			181891002
Ottawa	22-28 Feb	4X,6E	10			181891009
Skeena	13-14 Mar	4X	6			181891007
Skeena	18-19 Mar	4X	5			181891006
Skeena	20-22 Mar	4X	5			181891016
Skeena	25 Mar	4X	1			181891017
Skeena	02-03 Apr	4WX	6			181891018
Skeena	05-13 Apr	4X,6E	2			181891019
Ottawa	24-26 Apr	4WX	5			181891011
Nipigon	27 May - 05 Jun	4WX	49			181891001
Ottawa	27 May - 15 Jun	4WX	30			181891005
Skeena	27 May - 08 Jun	4WX,5Ze	46			181891014
Skeena	13-16 Jun	4X,6D	10			181891020
Ottawa	02-09 Jul	4TVnWX	12			181891010
Halifax	14 Aug - 25 Sep	3LOPs,4VnWX,5Ze	34			181891013
Ottawa	23 Sep - 02 Oct	3LNO,4VsW	16			181891012
		CIS				
Vilnius	09 Apr - 05 Jul	3LMNO		211		90VJ91035

Table 3: IGOSS data received during 1991.
Total = 4605 stations.

Ship Name	Country	Call Sign	Cruise Period	Message BATHY	Type TESAC	NAFO Subarea
Shamook	Canada	CG2676	02-08 Nov	20	0	3L
			28 Nov - 08 Dec	26	0	3L
Marinus	Canada	CG2680	03-07 Jul	34	0	3L
A.Needler	Canada	CG2683	18-27 Feb	90	0	5Ze
			10-18 Mar	28	0	4VsW
			18 Nov - 01 Dec	75	0	2GH,3KL
Dawson	Canada	CGBV	02 Nov - 10 Dec	0	160	2J,3KLPs, 4RSTVnW
Hudson	Canada	CGDG	26-28 Apr	0	13	3NO
			27-31 May	0	38	1F,2HJ,3LN, 6G
			28 Nov - 6 Dec	0	11	3L
W.Templeman	Canada	CGDV	04-21 Feb	164	0	3LPsPn,4RVs
			14-28 Mar	39	0	3L
			10-19 Jun	9	0	3LNO
			04-21 Aug	159	0	3KLNO
			12-26 Sep	131	0	3LOPs
			06-16 Oct	13	0	1F,2HJ,3KL
			02 Nov - 03 Dec	296	0	3LNO
K.Atlantic	FRG	DAKE	24 Mar	5	0	3MN
			21-22 Apr	3	0	3M
			17-18 May	17	0	3MNO,4VsW
			21-24 Jun	34	0	3MNO,4VsWX, 5Ze
			27-28 Jul	9	0	3LMN
			04-06 Oct	13	0	3MNO,4VsWX
			08-10 Nov	35	0	3MNO,4VsWX, 5Ze
			14-15 Dec	8	0	3MN
W.Herwig	FRG	DBFP	12-18 Nov	4	0	1DE
Y.Clipper	FRG	DLEZ	05-16 Jan	8	0	4X,5YZw
			02-03 Feb	12	0	4X,5YZw
			02 Mar	11	0	4X,5YZw
			06 Apr	10	0	4X,5YZw
			04-05 May	11	0	4X,5YZw
			01-02 Jun	12	0	4X,5YZw
			06 Jul	12	0	4X,5YZw
			17 Aug	11	0	4X,5YZw
			14 Sep	11	0	4X,5YZw
			05 Oct	8	0	4X,5YZw
			09 Nov	12	0	4X,5YZw
			07 Dec	11	0	4X,5YZw
P.Princess	Liberia	ELED7	27-30 Jul	4	0	3M,6EF
			16-19 Sep	7	0	3M,4Vs,6EF
P.Princess	Liberia	ELED8	01-22 Jul	4	0	6GH
			28-29 Aug	2	0	3M,6G
			21-22 Dec	2	0	6H
C.Ohio	Liberia	ELHL6	13-14 Oct	2	0	6BD
			28-29 Nov	2	0	6BD
Monsoon	CIS	EREA	25 Apr - 09 Jun	127	114	3LMNO,6H
V.Bugaen	CIS	ERES	21-28 Jan	23	20	3MN,6H
G.Ushakov	CIS	ERET	14 Nov - 2 Dec	46	7	3LMN
Cryos	France	FNBA	20 Feb - 28 Mar	106	0	3PnPs
Ango	France	FNOM	18-21 Nov	9	0	3M,6EFGH
Rabelais	France	FNZO	31 Jul - 3 Aug	6	0	3MN,6DEFG
			26-27 Oct	6	0	6GH
Skogafoss	Panama	HO4667	05-06 Jan	6	0	3KLM
Rowanbank	St.Vincent	J8FN	09-10 Jan	3	0	6DE
			05-07 Apr	9	0	4VsWX,6FG
Rodebank	St.Vincent	J8FO	30-31 May	4	0	6DE
			18 Aug	3	0	6D
			24 Oct	2	0	6C
			20-21 Nov	3	0	5Ze,6E

Ship Name	Country	Call Sign	Cruise Period	Message BATHY	Type TESAC	NAFO Subarea
Delaware 2	USA	KNBD	24-29 Jan	6	0	5Ze
			30 Mar	2	0	5Ze
			01-16 Apr	39	0	4X,5YZeZw
			22 May	0	2	6C
			01-17 Jun	10	13	5ZeZw,6BCD
			06-15 Aug	40	0	5Zw,6AB
			18-20 Nov	2	0	5YZw
Sea Wolf	USA	KNFG	16 Jun	2	0	6BC
Polar Star	USA	NBTM	18 Jun - 24 Jul	14	0	1ADF,2J,4W, 6D
			02-05 Aug	4	0	1ACF
IcePatrol	USA	NIDK	18-24 Apr	11	0	3LNO
			05 May	8	0	3NO
			20 May - 3 Jun	27	0	3LMN
			15-17 Jun	3	0	3N
Eagle	USA	NRCB	04-13 May	14	0	4VsX,6BDGH
			31 Jul - 16 Aug	8	0	5ZeZw,6D
M.Maersk	Denmark	OWEQ2	01-13 Jan	4	0	1F,4VsX
Oleander	Netherlands	PJJU	11-17 Jan	26	0	6AB
			24-31 Jan	36	0	5Zw,6AB
			08-09 Feb	15	0	6AB
			09-14 Mar	29	0	6AB
			23-28 Mar	35	0	6AB
			06-11 Apr	38	0	6AB
			19-25 Apr	21	0	6AB
			03-10 May	37	0	6AB
			18 May	16	0	6AB
			23-24 May	18	0	6AB
			13-19 Jul	38	0	6AB
			26 Jul - 8 Aug	69	0	6AB
			23-29 Aug	46	0	6ABD
			06-12 Sep	31	0	6AB
			20-21 Sep	18	0	6AB
			18-23 Oct	18	0	6ABD
			09-14 Nov	27	0	6AB
			22-28 Nov	38	0	6AB
			06-07 Dec	68	0	6AB
Hibiscus	Netherlands	PJYG	08-09 Jun	18	0	6AB
Anonomous		SHIP		56	3	0B,1A, 3KLMNOPs, 4VsWX 5YZe,6ABCDFH
Ijma	CIS	UFJN	12 Apr - 12 May	1	91	3LMNO
			21-24 May	0	7	3L
			04 Jun - 04 Jul	0	68	3LNO
			30 Oct - 30 Nov	0	101	2J,3KLNO
K.Shaitano	CIS	UFYN	13-29 Sep	0	20	2GHJ,3KLM
			07-12 Oct	0	17	2GH
			23 Oct - 03 Nov	0	37	0B,2GJ
			15 Nov - 04 Dec	0	74	0B,1C,2GH
Passat	CIS	UZGH	16 Apr - 04 May	59	8	3LMN,6G
G.Atlantica	Canada	VC9450	03-25 Feb	18	0	3KL
			02 Jun - 23 Jul	195	0	2J,3KLPs
			18-20 Aug	9	0	3LPs,4Vs
			18 Oct - 19 Dec	426	0	2J,3KL
L.Hammond	Canada	VC9616	01-04 Apr	16	0	3LO
			01-08 Jul	95	0	3L
			17-28 Jul	67	0	4VnVsW
Nfld.Hawk	Canada	VCLL	10-14 Feb	12	0	3KL
C.Brier	Canada	VCTF	06-30 Jan	7	0	4RVnVs
			06-08 Mar	5	0	4Vs
			02-20 Apr	8	0	4VnVsWX
Albatross 4	USA	WMVF	04-17 Dec	9	0	4X,5YZw
Unknown	USA	WMVH	23 Nov - 04 Dec	3	0	5Zw,6A
S.Achiever	USA	WPKD	06-09 Jan	8	0	6CDEFH
			30 Jan - 02 Feb	7	0	6EFGH
			10-13 Feb	10	0	6CDEFGH
			07-10 Mar	4	0	5Ze,6H
			20-23 Mar	7	0	3N,6CD
			16-18 Apr	10	0	4VsW,5Ze,

Ship Name	Country	Call Sign	Cruise Period	Message BATHY	Type TESAC	NAFO Subarea
						6FGH
			26-29 Apr	12	0	3MN,4Vs, 6BDE
			19-21 May	7	0	3MN.4WX,5Ze
			29 May - 01 Jun	21	0	4Vs,6BDEFGH
			24 Jun - 09 Jul	32	0	3MN,4VsWX, 5Ze,6BDEFH
			11-12 Sep	9	0	6GH
			12-14 Oct	10	0	3MN,4VsWX
			22-24 Oct	7	0	4W,6CD
			13-26 Nov	28	0	3MNO,4VsW, 5Ze,6BCDE
			13-16 Dec	8	0	3MN,4VsW,6H
			23-26 Dec	21	0	3MNO,4VsW,
Oregon 2	USA	WTDO	28-29 Jan	6	0	6C
			21-22 Aug	4	0	5Ze
Chapman	USA	WTED	09 Jun - 02 Jul	27	0	5ZeZw,6ABC
			10-18 Jul	12	0	4X,5Ze,6AB
Ferrel	USA	WTEZ	11-18 Apr	0	2	6AB
			14-16 Jun	4	0	6BC
P.Anderson	USA	WXQ7334	06-14 Jan	3	0	6AB
			10-15 Jul	3	0	5ZeZw

Table 4: Data collected by drifting buoys in the NAFO area in 1991.
Total = 161 buoy months

BUOY	DATE RANGE	DAYS	SST	AP	AT	WS	WD	TC	NAFO SUB-AREAS
41012	01 Jan - 26 Mar	83	X	X	X	X	X	-	6D
41503	09 Sep - 13 Oct	34	X	X	X	-	-	-	6E
41504	05 - 24 Dec	19	X	X	X	X	X	-	6D
41505	19 Dec	1	X	X	X	X	X	-	6D
41513	03 - 23 Jan	7	-	-	-	-	-	-	3M
41530	06 Apr - 30 May	55	-	X	X	-	-	X	3N,4VsWX,6BCDEH
41530	05 Jun - 09 Aug	56	-	X	X	-	-	X	6H
44016	01 Jan - 26 Mar	83	X	X	X	X	X	-	6B
44017	01 Jan - 26 Mar	82	X	-	X	X	X	-	6A
44018	02 Feb - 04 Feb	3	X	-	X	-	X	-	6B
44020	01 Jan - 26 Mar	83	X	X	X	X	X	-	6B
44021	01 Jan - 26 Mar	76	X	-	X	X	X	-	3NO,4VsWX,6BDEF
44501	28 Jun - 18 Jul	18	X	-	-	-	-	-	3MN
44501	06 Aug - 08 Aug	3	X	-	-	-	-	-	3M
44502	28 Jun - 28 Aug	55	X	-	-	-	-	-	3L
44503	16 Jul - 03 Sep	46	X	-	-	-	-	-	3KLM
44507	17 Apr - 03 Sep	133	X	-	-	-	-	-	3NOPs,4Vs
44508	17 Apr - 13 Jun	55	X	-	-	-	-	-	3KLMN
44509	30 Apr - 18 Jul	76	X	-	-	-	-	-	3MN
44509	25 Jul - 07 Aug	10	X	-	-	-	-	-	3M
44510	30 Apr - 18 Jul	77	X	-	-	-	-	-	3LMN
44511	13 May - 12 Aug	85	X	-	-	-	-	-	3KLM
44512	20 Jun - 02 Sep	68	X	-	-	-	-	-	3LMN
44514	16 Jun - 13 Dec	112	X	X	X	X	X	-	1F
44518	07 Jan - 04 Apr	16	X	-	-	-	-	-	6GH
44521	01 Jan - 13 Feb	42	X	-	-	-	-	-	3M
44522	01 Jan - 20 Jan	18	X	-	-	-	-	-	4VsW
44523	04 Jan - 14 Jan	11	-	-	-	-	-	-	6A
44523	09 Mar - 10 Jul	113	X	-	-	-	-	-	3MNO,4VsWX,6BD
44523	08 Jul - 10 Jul	3	X	-	-	-	-	-	3M
44524	01 Jan - 14 Jan	14	X	-	-	-	-	-	3MNO
44528	01 Jan - 12 Mar	69	X	-	-	-	-	-	4WX,5ZeZw,6BDE
44529	11 Jan	1	X	-	-	-	-	-	6H
44530	01 Jan - 30 Apr	115	X	-	-	-	-	-	4WX,5Ze,6BD
44530	26 May - 02 Aug	61	X	-	-	-	-	-	3MN,4VsW,6BDEGH
44532	01 Jan - 27 Feb	56	X	-	-	-	-	-	4X,5Ze,6D
44534	04 Jan - 14 Jan	11	-	-	-	-	-	-	6A
44534	31 Jan - 05 Jun	124	X	-	-	-	-	-	4VsWX,5Zw,6ABD
44535	20 Apr - 23 Aug	119	X	-	-	-	-	-	4VsWX,5Zw,6ABDE
44536	04 Apr - 17 Jul	101	X	-	-	-	-	-	3MN,4VsWX,6ABDEGH

BUOY	DATE RANGE	DAYS	SST	AP	AT	WS	WD	TC	NAFO SUB-AREAS
44537	13 Apr - 30 Apr	18	X	-	-	-	-	-	6AB
44537	17 May - 12 Aug	80	X	-	-	-	-	-	3NO, 4VsWX, 6BDE
44538	01 Jan - 02 Apr	90	X	-	-	-	-	-	3MNO, 4VsWX, 5Ze, 6BD
44539	27 Apr - 28 Aug	117	X	-	-	-	-	-	3MN, 4VsW, 6BDEGH
44540	01 Jan - 30 Jan	28	X	-	-	-	-	-	3NO, 4Vs
44541	01 Jan - 07 Mar	64	X	-	-	-	-	-	4WX, 5Ze, 6DE
44541	27 Apr - 28 Apr	2	X	-	-	-	-	-	4W
44541	20 May - 05 Sep	102	X	-	-	-	-	-	3MNO, 4VsW, 5Ze, 6BDE
44542	08 Jan - 30 Apr	111	X	-	-	-	-	-	3O, 4VsWX, 5Ze, 6BDEG
44542	20 May - 11 Sep	102	X	-	-	-	-	-	3N, 4VsW, 6BCDEGH
44543	01 Jan - 24 Apr	112	X	-	-	-	-	-	4VsW, 6BDE
44543	20 May - 18 Sep	115	X	-	-	-	-	-	4VsWX, 5Ze, 6BD
44544	18 Jan - 25 Jan	8	X	-	-	-	-	-	6A
44544	08 Feb - 12 Jun	125	X	-	-	-	-	-	5Zw, 6ABD
44545	18 Jan - 25 Jan	8	X	-	-	-	-	-	6A
44545	15 Mar - 18 Jun	96	X	-	-	-	-	-	3MNO, 4VsWX, 6BDEH
44552	31 Oct - 31 Dec	54	X	-	X	X	X	-	3MNO, 4VsW, 6BCDEGH
44553	31 Oct - 31 Dec	54	X	-	X	X	X	-	6BC
44555	31 Oct - 31 Dec	53	X	-	X	X	X	-	4VsW, 5Zw, 6BDE
44556	24 Sep - 14 Oct	20	X	-	-	-	-	-	6AB
44559	03 Oct - 10 Oct	6	X	-	-	-	-	-	6E
44559	18 Oct - 12 Nov	15	X	-	X	X	X	-	6EF
44559	20 Nov - 29 Nov	7	X	-	X	X	X	-	6F
44559	05 Dec - 12 Dec	6	X	-	X	X	X	-	6F
44560	24 Sep - 10 Oct	12	X	-	-	-	-	-	4X, 5Ze
44560	18 Oct - 12 Nov	15	X	-	X	X	X	-	4X, 5Ze, 6DE
44560	20 Nov - 29 Nov	7	X	-	X	X	X	-	4X
44560	05 Dec - 29 Dec	11	X	-	X	X	X	-	4VsX
44610	01 Jan - 17 Jan	17	X	X	-	-	-	-	1F
44631	19 Feb - 15 Mar	25	-	-	-	-	-	-	2J, 3K
44632	19 Feb - 27 Feb	5	-	-	-	-	-	-	2J, 3K
44633	19 Feb - 25 Feb	7	-	X	X	-	-	-	2J, 3K
44634	19 Feb - 10 Mar	20	-	-	-	-	-	-	2J, 3K
44635	19 Feb - 03 Jun	104	-	X	X	-	-	-	2J, 3KL
44635	18 Jul - 23 Jul	6	-	-	X	-	-	-	3L
44754	18 Mar - 18 Apr	32	-	X	X	X	X	-	3K, 4R
44755	18 Mar - 03 Jun	78	-	-	-	-	-	-	3KL
44755	18 Jul - 19 Jul	2	-	-	-	-	-	-	3M
44756	18 Mar - 06 Apr	18	-	-	-	-	-	-	3K
44757	18 Mar - 11 Apr	25	-	X	X	-	-	-	2J
44758	18 Mar - 30 Apr	44	-	-	-	-	-	-	2J, 3K
44761	20 Aug - 04 Sep	12	X	X	X	-	-	-	1F
44761	10 Sep - 20 Sep	11	X	X	X	-	-	-	1F
47531	06 Feb - 22 Mar	45	-	-	-	-	-	-	0B, 2GH
47531	24 Apr - 26 Apr	3	-	-	-	-	-	-	2J
47533	06 Feb - 17 Feb	12	-	-	-	-	-	-	2GH
47535	06 Feb - 20 Feb	15	-	-	-	-	-	-	2G
47542	06 Feb - 14 May	98	-	-	-	-	-	-	0B, 2GHJ, 3K
47553	01 Nov - 16 Dec	40	-	-	X	X	X	-	0A
47553	22 Dec - 22 Dec	1	-	-	X	X	X	-	0A
47553	28 Dec - 31 Dec	4	-	-	X	X	X	-	0A
47556	03 Nov - 13 Nov	11	-	-	X	X	X	-	0A
47556	19 Nov - 31 Dec	39	-	-	X	X	X	-	0AB
47558	01 Jan - 30 Jan	28	-	-	-	-	-	-	0B, 2G
47558	29 Nov - 31 Dec	28	-	-	X	X	X	-	0A
63593	31 Aug - 31 Aug	1	X	-	X	-	-	-	1F
63593	10 Sep - 10 Sep	1	X	-	X	-	-	-	1F
64516	16 Mar - 23 Mar	8	X	X	-	-	-	-	1F
64516	21 Jul - 31 Dec	160	X	X	X	X	X	-	1EF
64593	01 Sep - 24 Sep	23	X	X	X	-	-	-	1F
64593	30 Sep - 01 Oct	2	X	X	X	-	-	-	1F
65591	08 Mar - 05 Apr	29	X	X	X	-	-	-	1F
65591	16 Apr - 22 Apr	7	X	X	X	-	-	-	1F
65591	28 Apr - 09 May	12	X	X	X	-	-	-	1F
65591	10 Jun - 27 Sep	107	X	X	X	-	-	-	1F
65592	15 Sep - 22 Sep	8	X	X	X	-	-	-	1F
71561	02 Nov - 05 Nov	4	-	-	X	X	X	-	4X
71562	02 Nov - 05 Nov	4	-	-	X	X	X	-	4X
71563	02 Nov - 05 Nov	4	-	-	X	X	X	-	4X
71564	03 Nov - 05 Nov	3	-	-	X	X	X	-	4X

Table 5: Current meter and Thermistor chain moorings in the NAFO area in 1991.
Total = 3959 mooring days

ID	N Lat	W Long	Depth	Type	Period	Area	East Mean	North Mean
1042-1595	43.48	61.72	28	CM	19 Feb - 26 Apr	4W		
1042-5394	43.48	61.72	30	CM	19 Feb - 26 Apr	4W		
1042-828	43.48	61.72	50	CM	19 Feb - 26 Apr	4W		
1038-3392	43.38	61.39	30	CM	19 Feb - 27 Apr	4W		
1038-2664	43.38	61.39	50	CM	19 Feb - 27 Apr	4W		
1043-1596	43.48	61.72	13	CM	19 Feb - 26 Apr	4W		
1043-9610	43.48	61.72	15	CM	19 Feb - 26 Apr	4W		
1043-5568	43.48	61.72	28	CM	19 Feb - 26 Apr	4W		
1043-9664	43.48	61.72	30	CM	19 Feb - 26 Apr	4W		
1039-1593	43.23	61.85	28	CM	21 Feb - 27 Apr	4W		
1039-9355	43.23	61.85	30	CM	21 Feb - 27 Apr	4W		
1039-3579	43.23	61.85	50	CM	21 Feb - 27 Apr	4W		
1041-9145	43.71	61.59	30	CM	21 Feb - 26 Apr	4W		
1041-4271	43.71	61.59	50	CM	21 Feb - 26 Apr	4W		
1040-9354	43.57	62.04	30	CM	21 Feb - 28 Apr	4W		
1040-8695	43.57	62.04	50	CM	21 Feb - 28 Apr	4W		
1057-9607	43.71	61.59	20	CM	26 Apr - 10 Dec	4W		
1057-5001	43.71	61.59	20	CM	26 Apr - 10 Dec	4W		
1057-4342	43.71	61.59	20	CM	26 Apr - 10 Dec	4W		
1054-3300	43.38	61.39	30	CM	27 Apr - 10 Dec	4W		
1056-9145	43.57	62.04	20	CM	28 Apr - 11 Dec	4W		
1056-3392	43.57	62.04	30	CM	28 Apr - 11 Dec	4W		
1056-3579	43.57	62.04	50	CM	28 Apr - 11 Dec	4W		
BB1-3306	49.60	50.26	75	CM	10 May - 05 Nov	3K		
-5574			315	CM	10 May - 05 Nov	3K		
BB4-6401	49.75	49.75	200	CM	10 May - 09 Nov	3L		
-3584			400	CM	10 May - 09 Nov	3L		
-4406			900	CM	10 May - 09 Nov	3L		
FI3-395	50.53	51.06	75	CM	10 May - 04 Nov	3K		
-7133			275	CM	10 May - 04 Nov	3K		
-326			(11)	TC	10 May - 04 Nov	3K		
WB1-7592	51.90	51.12	75	CM	12 May - 12 Nov	3K		
-7012			325	CM	12 May - 12 Nov	3K		
-TR1			(11)	TC	12 May - 12 Nov	3K		
BB3-7011	48.82	52.68	75	CM	13 May - 05 Nov	3L		
-5358			230	CM	13 May - 01 Nov	3L		
BB2-7651	49.29	51.25	75	CM	20 Jul - 02 Nov	3K		
-7625			310	CM	20 Jul - 05 Nov	3K		
FI1-6409	49.95	52.77	75	CM	21 Jul - 04 Nov	3K		
-5578			245	CM	21 Jul - 04 Nov	3K		
-786			337	CM	21 Jul - 05 Nov	3K		
-2663			467	CM	21 Jul - 05 Nov	3K		
WB2-3583	50.86	54.31	235	CM	23 Jul - 06 Nov	3K		
WB3-3299	51.39	52.73	75	CM	23 Jul - 07 Nov	3K		
-7013			385	CM	23 Jul - 07 Nov	3K		
H1-4503	55.07	53.97	985	CM	26 Jul - 08 Nov	2J		
1080-0646	42.00	66.56	78	CM	23 Aug - 24 Aug	4W		
1080-0647	42.00	66.56	78	CM	23 Aug - 24 Aug	4W		
1081-0646	42.00	66.75	65	CM	25 Aug - 26 Aug	4W		
1081-0647	42.00	66.75	65.5	CM	25 Aug - 26 Aug	4W		
1082-0646	42.00	66.78	66.5	CM	27 Aug - 28 Aug	4W		
1082-0647	42.00	66.78	67.5	CM	27 Aug - 28 Aug	4W		
1059A-7127	42.84	62.96	229	CM	04 Sep - 05 Sep	4W		
1059A-9071	42.84	62.96	244	CM	04 Sep - 05 Sep	4W		
1059B-7127	43.82	62.96	230	CM	07 Sep - 16 Sep	4W		
1059B-9071	43.82	62.96	250	CM	07 Sep - 16 Sep	4W		
1059C-7127	43.82	62.96	230	CM	17 Sep - 01 Oct	4W		
1059C-5002	43.82	62.96	250	CM	17 Sep - 01 Oct	4W		
1059D-4602	43.81	62.96	230	CM	03 Oct - 09 Dec	4W		
1059D-5002	43.81	62.96	255	CM	03 Oct - 09 Dec	4W		
H2-10438	53.75	55.48	203	CM	08 Nov -	2J		
SP1-1607	52.49	51.32	202	CM	10 Nov -	2J		
-5569			302	CM	10 Nov -	2J		
-5572			502	CM	10 Nov -	2J		
SP2-6403	51.90	50.56	205	CM	11 Nov -	3K		
-6187			305	CM	11 Nov -	3K		
-6410			505	CM	11 Nov -	3K		

ID	N Lat	W Long	Depth	Type	Period	Area	East Mean	North Mean
CII-1	47.85	48.02	(4)	CM	28 Nov -	3L		
CII-2	47.58	48.24	(4)	CM	28 Nov -	3L		
CII-3	47.48	48.30	(4)	CM	28 Nov -	3L		
CII-4	47.29	48.43	(3)	CM	28 Nov -	3L		
				TC	28 Nov -	3L		
CII-5	46.87	48.72	(2)	CM	28 Nov -	3L		
CII-6	47.67	48.55	(4)	CM	28 Nov -	3L		
CII-7	48.27	49.56	(1)	CM	28 Nov - 02 Dec	3L		
CII-8	48.49	49.57	(1)	CM	28 Nov - 02 Dec	3L		
1059E-5002	43.81	62.95	225	CM	11 Dec -	4W		
1059E-4602	43.81	62.95	242	CM	11 Dec -	4W		

Type code: CM = current meter. Numbers in brackets in the depth column means there were 4 meters deployed.
TC = thermistor chain (the depth column is used to indicate the number of thermistors in brackets)

Table 6: Locations of instrumented wave data collections.
Total = 82,797 spectra

Station Name	Latitude	Longitude	Area	Period	Number	1-D	2-D
Hotel	38.50	70.70	6B	01 Jan - 31 Dec	4618	X	
Gulf of Maine	42.70	68.60	5Y	01 Jan - 20 Aug	4898	X	
Nantucket	40.50	69.40	5Ze	01 Jan - 31 Dec	7572	X	
Delaware Bay	38.50	74.60	6B	01 Jan - 31 Dec	7802	X	
Georges Bank	41.10	66.60	5Ze	01 Jan - 31 Dec	6178	X	
S. Barnegat	37.10	73.60	6B	01 Jan - 04 Apr	1547	X	
Accomack	37.50	74.40	6B	15 Feb - 5 Apr	1078	X	
W. Virgin Rocks	45.90	51.00	3O	17 Dec - 31 Dec	296	X	
E Scotian Shelf	41.19	61.13	4W	01 Jan - 31 Dec	6774	X	
SW Grand Banks	44.25	53 37	3O	01 Jan - 31 Dec	4018	X	
Banquereau	44.32	57.36	4Vs	01 Jan - 31 Dec	5487	X	
Tail of Bank	42.73	50.61	3N	01 Jan - 31 Dec	7356	X	
Laurentian Fan	42.12	56.13	4Vs	26 Apr - 31 Dec	5283	X	
La Have Bank	42.49	64.20	4X	01 Jan - 31 Dec	5648	X	
Mount Louis	49.53	65.72	4S	29 Oct - 21 Nov	543	X	
Torbay	47.63	52.50	3L	01 Jan - 19 Dec	3340	X	
Osborne Head	44.48	63.42	4W	01 Jan - 31 Dec	6082	X	
Bay de Verde I	48.08	52.90	3L	27 Nov - 31 Dec	221	X	
Bay de Verde O	48.08	52.90	3L	17 Dec - 31 Dec	106	X	
St-Bride's I	46.92	54.18	3L	13 Dec - 18 Dec	33	X	
St-Bride's O	46.92	54.18	3L	14 Dec - 31 Dec	96	X	
Sanford W	43.92	66.18	4X	01 Jan - 01 Mar	1150	X	
Sanford I	43.92	66.15	4X	01 Jan - 01 Mar	451	X	
Sanford O	43.92	66.15	4X	01 Jan - 01 Mar	456	X	
Stony Island W	43.47	65.57	4X	01 Jan - 01 Mar	686	X	
Stony Island I	43.47	65.57	4X	01 Jan - 01 Mar	462	X	
Stony Island O	43.47	65.57	4X	01 Jan - 01 Mar	433	X	
MEDS311	46.61	50.42	3L	10 Nov - 13 Dec	167		X
ERS-1 Cal/Val-B	46.61	51.00	3L	10-24 Nov	16		X

Table 7: Historical data received at MEDS.
Total = 4510 stations

Ship Name	Cruise Period	NAFO Subarea	Number	Reference
		Canada		
Annapolis	5 Jun '84	5Ze	3	181884025
Dawson	1989			180589035
G.Atlantica	1989		41	180589001
G.Atlantica	1989		9	180589002
G.Atlantica	1989		5	180589003
G.Atlantica	1989		43	180589004
G.Atlantica	1989		72	180589005
G.Atlantica	1989		44	180589006
G.Atlantica	1989		25	180589007
G.Atlantica	1989		23	180589008
G.Atlantica	1989		9	180589009
G.Atlantica	1989		26	180589010
G.Atlantica	1989		108	180589011
G.Atlantica	1989		17	180589012
G.Atlantica	1989		14	180589013
L.Hammond	1989		14+	180589031
L.Hammond	1989		48+	180589032
L.Hammond	1989		44+	180589033
Marinus	1989		32	180589023
Marinus	1989		11	180589024
Marinus	1989		26	180589025
Shamook	1989		25	180589026
Shamook	1989		31	180589027
Shamook	1989		10	180589028
Shamook	1989		9	180589029
Shamook	1989		14	180589030
W.Templeman	1989		94	180589013
W.Templeman	1989		33	180589014
W.Templeman	1989		103	180589015
W.Templeman	1989		213	180589016
W.Templeman	1989		172	180589017
W.Templeman	1989		39	180589018
W.Templeman	1989		98	180589019
W.Templeman	1989		11+	180589020
W.Templeman	1989		197+	180589021
W.Templeman	1989		35+	180589022
W.Templeman	1989			180589034
Margaree	13 Jan - 5 Mar '90	4X,6E	8	181890033
Marinus	15 Jan - 2 Mar '90	3LPs	9	180590027
W.Templeman	16-29 Jan '90	2J,3K	93	180590012
Fraser	21 Jan - 5 Feb '90	4X,5Ze,6D	11	181890026
Athabaskan	22 Jan - 16 Mar '90	4X,5Ze,6BCD	27	181890031
W.Templeman	31 Jan - 20 Feb '90	3P	129	180590013
G.Atlantica	01-24 Feb '90	2J,3K	66	180590001
Saguenay	06-08 Feb '90	5Ze,6CD	5	181890046
W.Templeman	22 Feb - 12 Mar '90	3KLNO	48	180590014
Ottawa	23 Feb - 14 Mar '90	4X,6CD	8	181890048
Athabaskan	26 Feb - 16 Mar '90		20	181890023
Saguenay	26-28 Feb '90	4WX	11	181890045
Athabaskan	03-10 Mar '90	4WX	11	181890029
Margaree	05-16 Mar '90	6BCD	18	181890034
W.Templeman	14-28 Mar '90	3LN	28	180590015
Margaree	18 Mar '90	4X,5Ze	3	181890035
Shamook	20-30 Mar '90	3L	8	180590025
Margaree	05-10 Apr '90	4WX	14	181890036
W.Templeman	18 Apr - 01 May '90	3O	70	180590016
G.Atlantica	25 Apr - 07 May '90	3Ps	5	180590002
W.Templeman	04-16 May '90	3NO	98	180590017
L.Hammond	06-13 May '90	3LO	4	180590030
G.Atlantica	09-28 May '90	3L	18	180590003
Nipigon	10 May '90	4X	1	181890044
Gatineau	14-25 May '90	4WX,6D	25	181890050
L.Hammond	14-22 May '90	3LPs	17	180590031
Nipigon	14-15 May '90	4X	2	181890043

Ship Name	Cruise Period	NAFO Subarea	Number	Reference
W.Templeman	18 May - 05 Jun '90	3L	168	180590018
Ottawa	19 May - 01 Jun '90	4WX,6E	13	181890049
Athabaskan	22 May - 15 Jun '90	3O,4VsWX,6E	14	181890030
L.Hammond	23-31 May '90	3KL	34	180590032
Nipigon	23 May - 06 Jun '90	4X,6E	6	181890042
G.Atlantica	31 May - 19 Jun '90	3KL	116	180590004
Margaree	02-11 Jun '90	4X,6E	31	181890037
W.Templeman	07-14 Jun '90	3LNO	10	180590019
G.Atlantica	07-25 Jul '90	2HJ,3K	134	180590005
Margaree	17-18 Jul '90	4WX	12	181890038
Shamook	23 Jul - 16 Aug '90	2J	10	180590026
G.Atlantica	27 Jul - 19 Aug '90	3P,4RST	45	180590006
Marinus	02-14 Aug '90	3KL	24	180590028
W.Templeman	07-20 Aug '90	3L	157	180590020
G.Atlantica	21 Aug - 24 Sep '90	3PS	1	180590007
W.Templeman	23 Aug - 05 Sep '90	3NO	119	180590021
W.Templeman	07-27 Sep '90	3LO	94	180590022
Margaree	01-09 Oct '90	4WX	9	181890040
G.Atlantica	03-29 Oct '90	2J,3K	34	180590008
Margaree	15-18 Oct '90	4WX	6	181890039
Marinus	18 Oct - 29 Nov '90	3KL	14	180590029
Margaree	23 Oct - 08 Nov '90	3NOPs,4Vs	23	181890041
W.Templeman	27 Oct - 19 Nov '90	3L	199	180590023
G.Atlantica	31 Oct - 15 Nov '90	2J	86	180590009
G.Atlantica	16 Nov - 03 Dec '90	2J,3K	154	180590010
W.Templeman	21 Nov - 10 Dec '90	3NO	180	180590024
G.Atlantica	05-20 Dec '90	3KL	121	180590011
Skeena	1990			181890047
		CIS		
K.Shaitanov	20 Sep - 29 Nov '90	1BCD,2HJ,3K	113	90KS90023
Kokshaisk	29 Oct - 11 Dec '90	2J,3KLNO	95	90CJ90001
		USA		
Delaware II	08-17 Jan '90	5YZeZw	33	316G85001

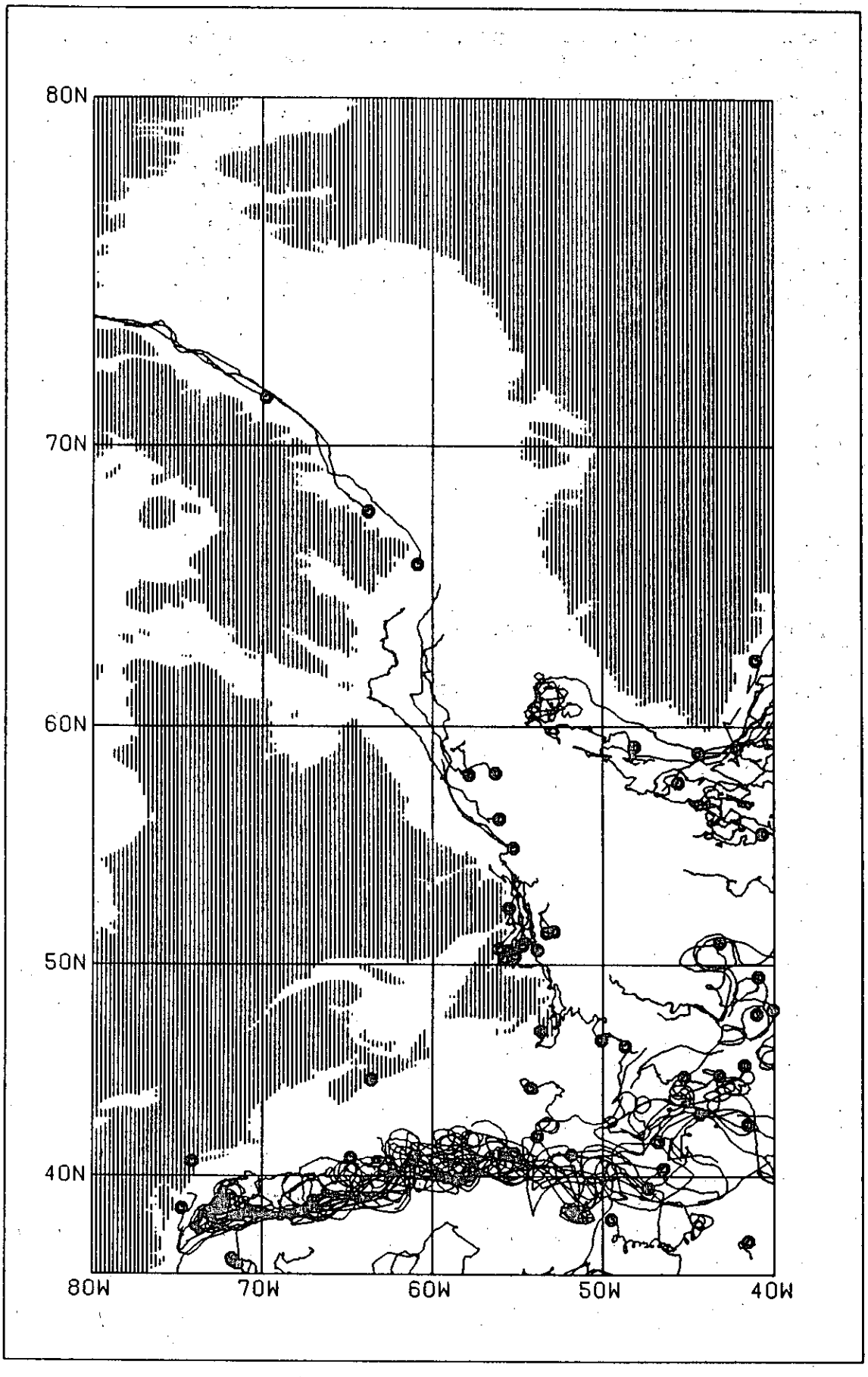

Figure 1: Drifting buoy data from 1991

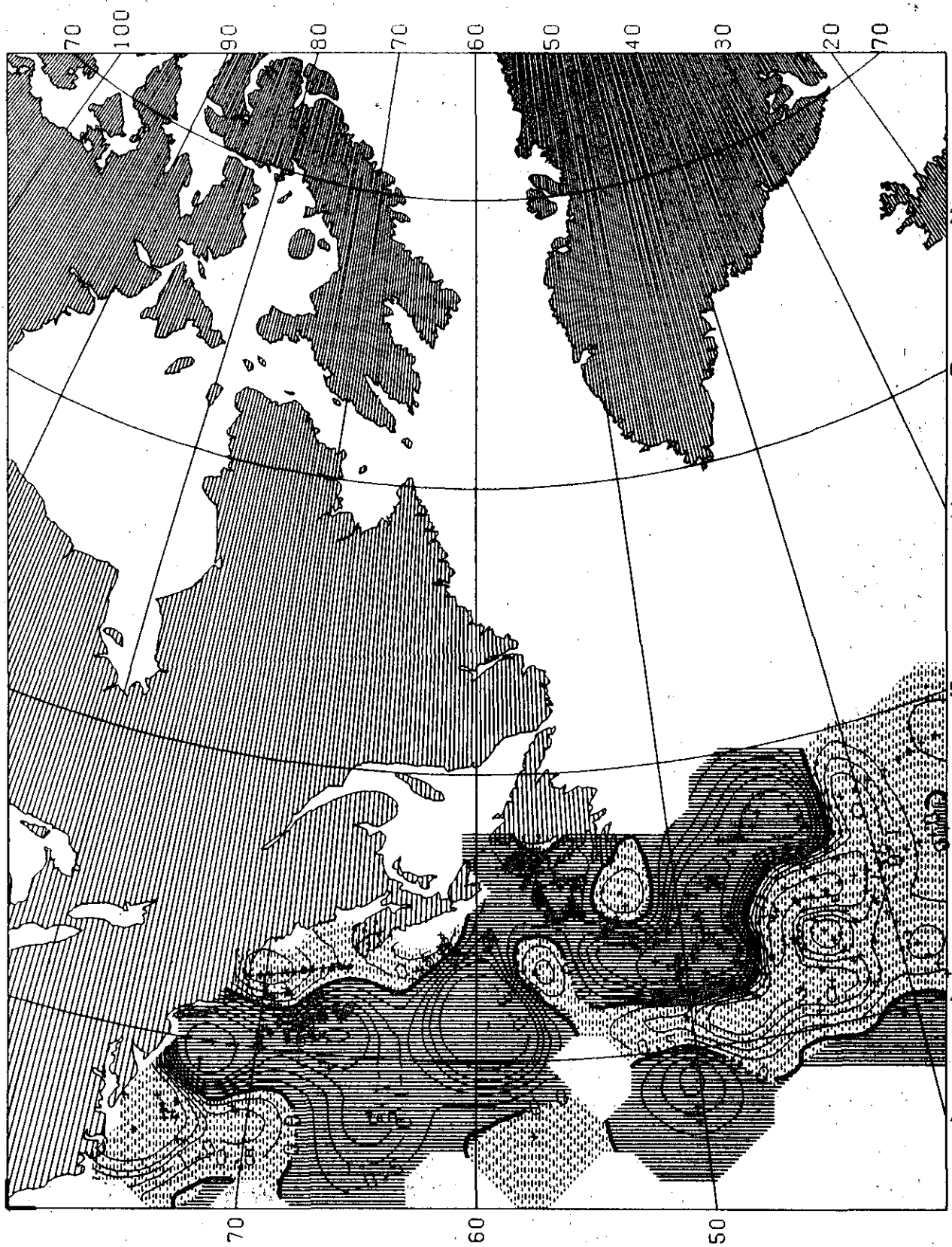

Figure 2: Winter SST Anomaly, 1991

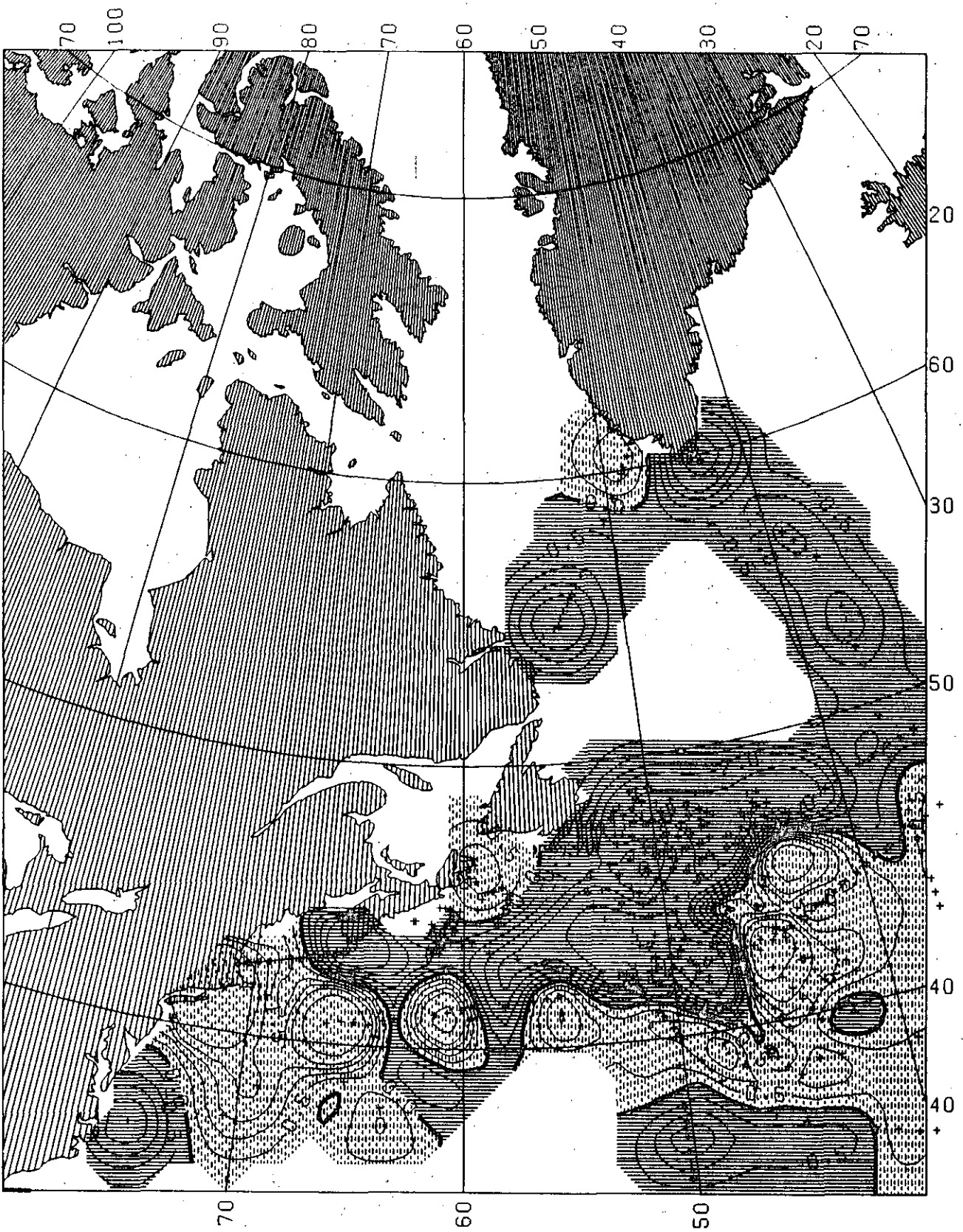

Figure 3: Spring SST Anomaly, 1991

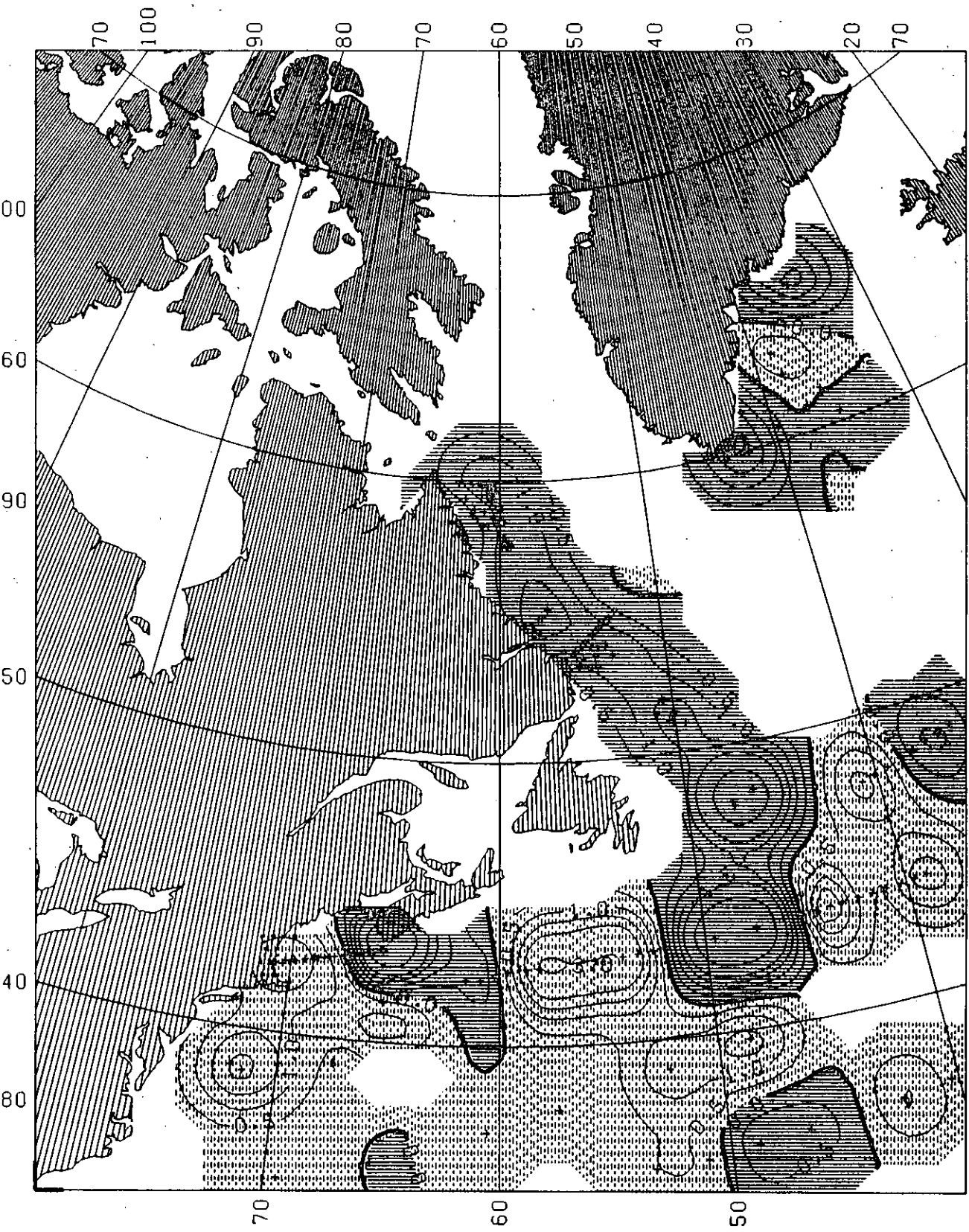

Figure 4: Summer SST Anomaly, 1991

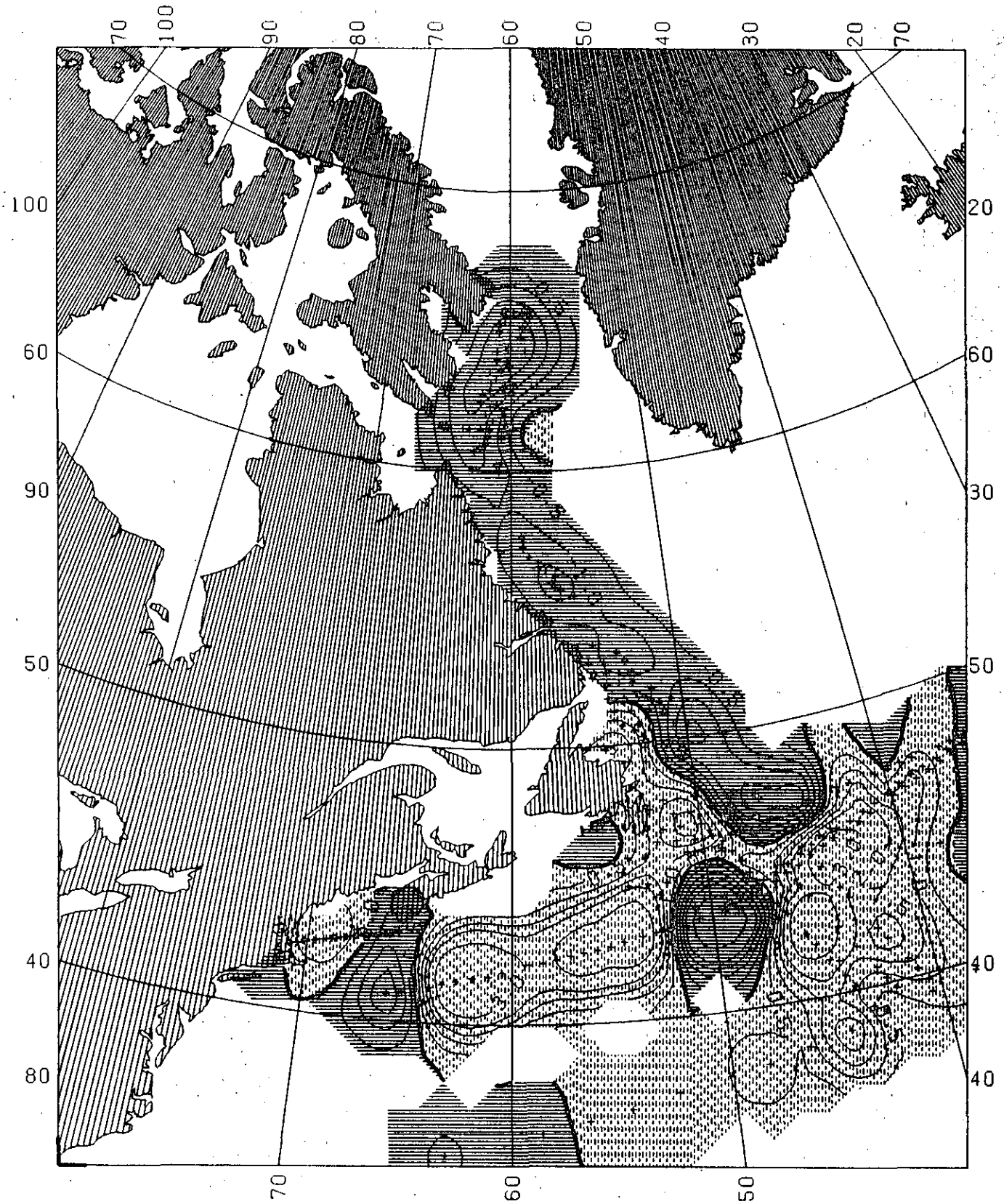

Figure 5: Autumn SST Anomaly, 1991