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Marine Environmental Data Service Report for 1992

by

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Introduction

The purpose of this report is to describe the data collected in the NAFO area, during the 1992 calendar year. Tables of subsurface, wave, current meter and drifter recorded observations are presented in the body of the report. Seasonal plots of drifter tracks are presented. And a comparison of MEDS IGOSS data to the Levitus monthly mean temperature climatology was used as the basis for a review of environmental conditions.

1992 Data Not Yet Processed by MEDS

A system has been developed to process and archive delayed mode oceans data. Format conversion is still the most time consuming of the tasks. The delayed mode system works as a core of procedures designed to find problems. And MEDS personnel solve these problems using routines and displays. It is resulting in a data archive that has a consistently correct format, errors are flagged or corrected, duplication is identified, and retrieval criteria are by area, date or cruise. The backlog of data is being processed currently.

Table 1 presents the information known about the data collections made in the NAFO area during 1992 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. 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 is able to process ocean data routinely once again. These entries do not include cruises which were received through the IGOSS channels.

Table 2 records the information about data received at MEDS this year and remain as current backlog. These cruises are data not included in those received through the IGOSS channels.

Data Received and Processed

The software for quality control and detection of duplications in real-time IGOSS data has been running for over 2 years. All MEDS IGOSS data, to dates preceding 1980, have been assessed both by computer algorithms and a visual inspection by trained personnel.

MEDS continued to issue monthly reports of data received in realtime. 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. MEDS issues a publication from the Global Temperature and Salinity Pilot Project (GTSP). It contains statistics of data receipts and articles describing various components of the GTSP.

Table 3 lists the IGOSS data (reports of BATHYS and TESACs) collected in the NAFO area from 1992. 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.

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.

Drifting Buoy Data Received

Table 4 records the drifting buoy data collected in 1992. 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.

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.

Current Meter Moorings

Table 5 records the information about current meter deployments in the NAFO area in 1992. This was not available at MEDS, at the time of the report.

Wave Data Collections

Table 6 presents information about wave spectra measurements made during 1992. Once again, there has been a substantial increase over past years. 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.

Historical Data Acquisitions

Table 7 notes the data received at MEDS in 1992 from years earlier than 1992. These data arrive on magnetic tape and because our delayed mode system for handling the data has just been completed, these data remain as backlog.

Review of Environmental Conditions

Regional water temperatures were examined for a review of the 1992 environmental conditions in the NAFO area. The analysis used MEDS Ocean data and the Levitus climatology. And, reference was made to monthly NOAA reports entitled "State-of-the-Ocean: Gulf of Main to the Grand Bank". To be consistent with MEDS reports of past years, anomaly plots were prepared. The anomalies were examined, and conclusions were made after both the Levitus climatology and the 1992 MEDS data were compared to MEDS historical data.

The 1992 data used for this review was MEDS IGOSS data. It had been quality controlled and duplicate filtered by both computer algorithms and a visual inspection. A few errors remained, and were detected and filtered at the time of this analysis.

Anomalies were calculated using the monthly mean temperature climatology file of the Levitus world atlas. The Levitus climatology is an objective analysis of the world's oceans. Large scale features are represented, but small scale systems and regional variability are smoothed over a grid of several degrees. In this context, areas such as the convergence of the Labrador and Gulf Stream currents, are described by means of a bimodal distribution. Conditions along the coast due to characteristic upwelling, and current flows, are often smoothed over several hundred kilometres with open ocean values. In the 1982 NOAA report of the atlas, it was stated that analysis of specific regions was not carried out.

MEDS contour plots of seasonal anomalies at the Sea Surface; and on the shelf or at 200 meters (where water was deeper), are presented in this report. Winter is defined to be the months of January to March, spring is April to June, summer is July to September, and autumn is October to December. Anomalies are the difference between the recorded temperature and the interpolated Levitus value for depth, time of month, and position within one degree square. The data were all IGOSS BATHY and TESAC data. These were screened for errors using the GTSPP Quality Control tests and a visual inspection during routine processing, and also by bulls eye tests and statistical filters during the contouring analysis. These have been contoured

at one degree intervals up to +/- 5 degrees anomaly. Data locations are marked by plus signs. Regions of negative anomalies are shaded with solid, horizontal lines, while positive regions are shaded with dashed, vertical lines.

The Levitus atlas did provide a useful background for the assessment of the 1992 data. The IGOSS data from the MEDS archive, showed few large errors remaining after consideration of the MEDS quality control flags. The IGOSS data did not give adequate coverage in some areas, such as the NAFO area 4 (the Scotia Shelf area). Cruises received, and not yet processed by MEDS, did have data in these areas.

In order to understand the interannual variability of the region, 1992 data was plotted on a background of historical data in the region. Two types of views were made. One was a map of data locations using colour codes to show temperature values at a selected depth. The second was a point plot of temperature and day of the year, again at a selected depth. These plots demonstrated that in many areas within the region, the 1992 conditions were normal: +/- 50km; +/- 2 degrees; +/- 1 week. This was true for a range of depths of 10 meters to 500 meters. The area over the Scotian Shelf has a highly variable climate of Gulf Stream eddies, and was possibly too variable to be assessed with the data on hand. NAFO areas are reviewed in the following sections.

Subareas 0 and 1

Very little data was available in these areas.

Subareas 2 and 3

Water over the continental shelf showed typical seasonal variations of -1 to 13 degrees at the surface and -1 to 2 degrees at depths of 150 meters. The time series plots made for subareas 3K and 3L may indicate that near surface temperatures for 1992 were 1 degree cooler than normal in late winter and spring.

Subarea 4

The Scotia Shelf and the Gulf of St. Lawrence had nearly normal conditions. Shelf bottom temperatures were between 4 to 6 degrees over the shelf, and 2 degrees in the Gulf. NOAA reports describe Gulf Stream eddies south of the shelf, which do not show in the sparse coverage of the IGOSS data.

Subareas 5 and 6

The Gulf of Maine and south along the near shore areas, were between 6 and 10 degrees at the shelf bottom. These were also normal throughout the year.

One recommendation which can be made about the use of subsurface data, is that the historical data should be used as a basis for a regional climatology. Even though data is sparse for any given location or year, the structure of ocean water masses is consistent enough that fronts may be delineated from a composite of all years of observations.

Table 1: Data collected in the NAFO area in 1992 but not yet received at MEDS.
Total = stations

Ship Name	Cruise Period	Stations	NAFO Subarea	Reference
CSS Parizeau	Jun-01 - Jun-11	80	3KL	CSR-REP
	Jun-09 - Jun-18	105	3KL	CSR-REP
	May-24 - Jun-07	140	2J, 3KL	CSR-REP
	Jul-06 - Jul-24	147	2J, 3KL	CSR-REP
	Sep-15 - Sep-22	140	3KL	CSR-REP
	Oct-16 - Nov-02	70	2J, 3KL	CSR-REP
	Nov-23 - Dec-01	90	5Ze	CSR-REP
	Apr-22 - Apr-30	22	5	CSR
	Aug-10 - Aug-17	99	4	CSR
	Nov-23 - Dec-01	86	5	CSR
Navicula	Jul-19 - Jul-25	17	4T	CSR-REP
CSS Hudson	Nov-24 - Dec-04	77	4TSR, 3P	CSR-REP
	Dec-07 - Dec-17	5	4TSR	CSR-REP
	May-27 - Jun-15	5 lines	3KM, 1F, 2HI	CSR-REP
	May-08 - May-25	16	4W	CSR-REP
EE Prince	Nov-16 - Nov-26	31	5	CSR
	May-15 - Jun-03	65	4T	CSR-REP
	Jun-06 - Jul-12	42	4T	CSR-REP
	Aug-04 - Aug-09	36	4X	CSR-REP
	Sep-08 - Sep-23	36	4X	CSR-REP
	Sep-28 - Oct-23	94	4T	CSR-REP
	Oct-26 - Nov-13	200	4WX	CSR-REP
	Nov-14 - Nov-11	90	5Ze	CSR-REP
	Nov-30 - Dec-14	40	4T	CSR-REP

A Needler	Feb-24 - Mar-10	6	5	CSR-REP
	Jun-22 - Jul-17	200	4VWX	CSR-REP
	Aug-01 - Aug-09	74	4T	CSR-REP
	Aug-10 - Sep-09	250	4BST	CSR-REP
	Sep-05 - Sep-25	147	4T	CSR-REP
	Oct-08 - Oct-19	88	4T	CSR-REP
Delaware II	Mar-03 - Mar-13	80	4VsW	CSR-REP
	Jan-06 - Jan-20	96	5ZwZeY	CSR-REP
	Jan-28 - Feb-12	137	5ZwZeY	CSR-REP
	Feb-25 - Mar-06	138	5ZwZe, 6ABC	CSR-REP
	Mar-16 - Apr-02	29	5Zw, 6AB	CSR-REP
	Jul-27 - Aug-10	112	5Y	CSR-REP
	Aug-17 - Aug-27	84	5Ze	CSR-REP
	Oct-26 - Nov-04	144	5ZeZwY	CSR-REP
Oregon II	Dec-01 - Dec-18	132	5ZwZeY	CSR-REP
	Aug-01 - Aug-22	123	6AB, 5ZeZw	CSR-REP

Table 2: Data collected in the NAFO area in 1992 and received at MEDS.

Total = 3082 stations

Ship Name	Cruise Period	BT	BOTTLE	CTD	NAFO Subarea
Gadus Atlantica	Feb-05 - Dec-14	264		447	2J, 3KLNO, 4RVnVs
Shamook	Jan-13 - Dec-15	46		168	3KLps
Marinus	Jan-23 - Nov-09	49		16	3Lps
Wilfred Templeman	Feb-05 - Nov-26	199		1030	3LNOPs
Lady Hammond	Apr-02 - Jul-13	78		629	3KLps
Alfred Needler	May-23 - May-23			7	3KL
Newfoundland Lynx	Apr-09 - Apr-13	60			3L
Northern Kingfisher	Apr-11 - Apr-15	65			2J
Atlantic Surf	Mar-29 - Mar-29	24			3Ps

Table 3: IGOSS data received during 1992.

Total = 3659 stations

Ship Name	Country	Call Sign		Cruise Period	BATHY	TESAC	NAFO Subarea
SHAMOOK	CANADA	CG2676	92	Jan-13 - Jan-23	5	0	3Ps
				Feb-01 - Feb-04	3	0	3Ps
				Feb-10 - Feb-11	2	0	3Ps
				Feb-17 - Feb-18	2	0	3Ps
				Feb-24 - Feb-24	1	0	3L
				Jun-01 - Jun-10	0	22	3L
ALFRED NEEDLER	CANADA	CG2683	92	Oct-26 - Oct-27	0	25	3L
				Feb-28 - Feb-29	17	0	5Ze
				Mar-06 - Mar-11	47	0	5Ze
				May-22 - May-28	0	7	3L
				Jun-23 - Jul-08	89	0	4WX, 5Y
PARIZEAU	CANADA	CGBS	92	Jul-17 - Jul-17	1	0	4W
				Sep-14 - Sep-20	0	109	3KL
HUDSON	CANADA	CGDG	92	Nov-27 - Nov-29	20	0	5Ze
				Mar-13 - Mar-31	0	86	3KLOPs
				May-28 - Jun-11	0	40	1F, 2HJ, 3KM
E.E. PRINCE	CANADA	CGDK	92	Nov-24 - Dec-02	0	79	3Ps, 4RSTVnVsX
				Nov-07 - Nov-10	20	0	4X, 5Y
W. TEMPLEMAN	CANADA	CGDV	92	Nov-18 - Nov-25	32	0	5YZe
				Jan-13 - Feb-25	242	0	2J, 3KLNOPsPnVs
				May-20 - Jun-14	0	136	3LN
				Aug-30 - Sep-24	0	191	3LNO
NIPIGON	CANADA	CGZP	92	Oct-18 - Dec-16	0	441	3KLNOPs
				Feb-19 - Feb-19	1	0	3N
UNKNOWN	UNKNOWN	CTU	92	Sep-17 - Sep-22	59	0	4X, 5Ze, 6BCDE
				Sep-19 - Sep-22	18	0	4X, 5Ze, 6D
				Oct-15 - Oct-16	4	0	4W
				Oct-24 - Oct-26	3	0	4W, 6E
				Nov-17 - Nov-18	3	0	6E
				Dec-02 - Dec-03	2	0	4X, 6D
KOELN ATLANTIC	FRG	DAKE	92	Jan-19 - Jan-19	6	0	3LM
				Feb-22 - Feb-23	16	16	3MN
				Mar-27 - Mar-29	24	0	3MNOVsW
				May-01 - May-01	7	0	4WX, 5Ze
				Jun-06 - Jun-07	9	0	3MN
				Jul-09 - Jul-10	21	0	4VsWX, 5Ze
				Jul-26 - Jul-26	16	12	3MN
				Aug-15 - Aug-16	3	0	3N
				Aug-30 - Sep-02	21	0	3MNO, 4VsWX
				Sep-20 - Sep-20	5	0	3MN
				Oct-24 - Oct-25	8	0	3LM
Nov-28 - Nov-29	12	0	3MN				

WALTER HERWIG	FRG	DBFP	92	Dec 24 - Dec 24	1	0	1F
YANKEE CLIPPER	FRG	DLEZ	92	Jan-18 - Jan-18	11	0	4X, 5YZw
				Feb-08 - Feb-09	13	0	4X, 5YZw
				Mar-14 - Mar-14	12	0	4X, 5YZw
				Apr-12 - Apr-12	11	0	4X, 5Y
				Apr-27 - Apr-28	12	0	4X, 5YZw
				May-16 - May-17	13	0	4X, 5YZw
				Jun-12 - Jun-13	12	0	4X, 5YZw
				Jul-24 - Jul-25	12	0	4X, 5YZw
				Aug-14 - Aug-15	9	0	4X, 5YZw
				Sep-04 - Sep-05	13	0	4X, 5YZw
				Nov-25 - Nov-29	9	0	4X, 5YZw
				Dec 19 - Dec 20	6	0	4X, 5Y
PACPRINCESS	LIBERIA	ELED8	92	Jan-14 - Jan-14	1	0	4Vs
				Feb-11 - Feb-11	1	0	3M
				May-04 - May-06	4	0	3MN, 6FG
				May-24 - May-24	1	0	6H
COLUMBUS OHIO	LIBERIA	ELHL6	92	Jan-14 - Jun-17	8	0	3MN, 4Vs, 6EFG
				Jan-24 - Jan-24	1	0	6C
				Mar-04 - Mar-04	2	0	6CD
				Jun-02 - Jun-03	3	0	6BCD
				Dec 17 - Dec 17	1	0	6C
THALASSA	FRANCE	FNIB	92	Feb-10 - Feb-10	1	0	3Ps
				Feb-18 - Feb-26	45	0	3PsPn
				Mar-05 - Mar-10	37	0	3Ps, 4Vs
				Mar-19 - Mar-19	1	0	3Ps
ANGO	FRANCE	FNOM	92	Sep-29 - Oct-01	6	0	6FGH
ROSEBANK	SAINT VINC	J8FO	92	Apr-12 - Apr-13	5	0	4X, 5Ze, 6DE
				Jul-13 - Jul-14	4	0	5Ze, 6E
DELAWARE #2	USA	KNBD	92	Aug-19 - Aug-26	8	0	4X, 5Ze
				Sep-13 - Sep-14	2	0	6C
				Oct-16 - Oct-21	3	0	4X
SEA WOLF	USA	KNFG	92	Dec 27 - Dec 27	2	0	6BC
TEXAS CLIPPER	USA	KVWA	92	Jun-15 - Jun-18	4	0	3M, 6DF
UNKNOWN	USA	KWAL	92	Sep-15 - Sep-15	0	1	6C
				Jan-06 - Jan-06	1	0	4X
				Aug-25 - Aug-26	2	0	5Ze, 5Zw
ICEPAT GROTON CT	USA	NIDK	92	Mar-20 - Mar-23	32	0	3MNO
				May-02 - May-04	8	0	3MNO
				May-16 - May-17	5	0	3LMN
				May-29 - Jun-01	10	0	3LMN
				Jun-12 - Jun-16	15	0	3KLMNO
				Jun-27 - Jun-27	4	0	3N
				Jul-08 - Jul-08	4	0	3NO
				Aug-08 - Aug-09	10	0	3KLM
				Aug-22 - Aug-23	6	0	3LMN
				Aug-31 - Aug-31	1	0	3M
SEALIFT ATLANTIC	USA	NIKA	92	Oct-24 - Oct-26	2	0	6B
USCG POLAR SEA	USA	NRUO	92	Jul-05 - Jul-11	19	0	1F, 2J, 5ZeZw, 4RVnVsWX, 6B
				Sep-08 - Sep-12	20	0	3MNO, 4VsWX, 5Ze, 6BD
OLEANDER	NETHERLAND	PJJU	92	Jan-11 - Jan-11	15	0	6AB
				Feb-02 - Feb-14	26	0	6ABD
				Mar-07 - Mar-12	29	0	6AB
				Apr-03 - Apr-04	21	0	6ABD
				May-01 - May-06	28	0	6ABD
				Jun-05 - Jun-10	23	0	6ABD
				Jul-03 - Jul-09	24	0	6ABD
				Aug-07 - Aug-08	21	0	6AB
				Sep-04 - Sep-05	19	0	6AB
				Oct-17 - Oct-17	19	0	6AB
				Nov-06 - Nov-11	24	0	6ABD
				Dec 17 - Dec 18	21	0	6ABD
UNKNOWN	UNKNOWN	SHIP	92	Jan-12 - Jan-15	4	0	3M, 6P
				Feb-10 - Feb-10	2	0	6H
				Feb-29 - Feb-29	1	0	3L
				May-05 - May-05	1	0	3N
				May-13 - May-13	1	0	3M
				Jun-21 - Jul-17	58	0	4RVnVsWX, 5Ze
				Aug-15 - Aug-15	1	0	5Zw
				Aug-24 - Aug-24	1	0	4Vs
				Sep-17 - Sep-23	26	0	4X, 5Ze, 6CD
				Sep-29 - Sep-29	2	0	4X, 5Zw
				Oct-07 - Oct-07	1	0	6C
				Oct-13 - Oct-13	0	1	6C
				Nov-28 - Nov-28	1	0	5Y

BJARNI SEAMUNDSSON	ICELAND	TFEA	92	Jul-01 - Jul-02	3	0	1F
				Aug-12 - Aug-12	1	0	1F
AKADEMIK SHULEIKIN	USSR	UBNZ	92	Apr-07 - Apr-12	16	4	3MN
KAPITAN SHAITANO	USSR	UFYN	92	Oct-22 - Nov-11	0	51	2J, 3K
				Nov-25 - Dec 15	0	50	0B, 1D, 2GH
PROF MULTANOVSKY	USSR	UJFO	92	Dec 20 - Dec 21	9	0	3M
				Dec 26 - Dec 28	16	0	3NO
GADUS ATLANTICA	CANADA	VC9450	92	Feb-05 - Mar-03	64	0	2J, 3KL
				May-28 - Jul-12	0	112	3KLNO
				Aug-07 - Aug-21	0	32	3LPsPn, 4RVnVs
				Sep-01 - Sep-01	1	0	4Vs
				Nov-12 - Dec 14	0	197	2J, 3KL
LADY HAMMOND	CANADA	VC9616	92	Apr-01 - Apr-15	24	0	3L, 3Ps
				May-22 - May-25	0	6	3L
AIRCRAFT	USA	VXN-8	92	Sep-25 - Sep-25	9	0	4Vs, 6G
				Oct-01 - Oct-04	28	0	4VsW, 6DEF
MAURICE EWING	USA	WLDZ	92	Jul-20 - Jul-20	1	0	6C
SEA-LAND ACHIEVER	USA	WPKD	92	Jan-15 - Jan-20	6	0	5Ze, 6EH
				Jan-28 - Jan-30	12	0	3MN, 6DEFG
				Feb-18 - Feb-20	7	0	3N, 4VsW, 6H
				Mar-01 - Mar-03	5	0	6DEFG
				Mar-23 - Mar-24	3	0	3N, 6H
				Apr-07 - Apr-08	10	0	6FGH
				Apr-28 - Apr-29	3	0	4Vs, 6H
				May-10 - May-13	4	0	3MN, 4W, 6D
				Jun-03 - Jun-05	8	0	3N, 4VsWX, 5Ze
				Jun-15 - Jun-16	4	0	4VsW, 6D
				Aug-13 - Aug-13	2	0	3MN
				Aug-23 - Aug-27	15	0	3MN, 4VsW, 6CD
				Sep-15 - Sep-18	4	0	3M, 4VsWX
				Sep-27 - Sep-30	19	0	3MN, 6CDEFG
				Oct-20 - Oct-23	5	0	3MO, 4VsWX
				Nov-01 - Nov-05	13	0	6CDEFGH
				Nov-25 - Nov-27	9	0	3MNO, 4VsW
				Dec 06 - Dec 09	13	0	3MN, 4Vs, 6CDEG
				Dec 29 - Dec 31	10	0	3MNO, 4VsW
OREGON II	USA	WTDO	92	Jan-27 - Jan-27	1	0	6C
				Aug-02 - Aug-20	14	5	5Ze, 6AB
MT MITCHELL	USA	WTEG	92	Jul-08 - Jul-10	2	0	6FH
				Sep-09 - Sep-30	16	3	6C
				Oct-06 - Oct-22	31	0	6C
				Oct-28 - Nov-06	11	0	6C
				Nov-11 - Nov-18	11	0	6C
WHITING CSS-29	USA	WTEW	92	Aug-05 - Aug-05	1	0	6B
				Aug-12 - Aug-15	6	0	6B
PAUL TREGURTHA	USA	WYR4481	92	Oct-07 - Oct-07	1	0	6C

Table 4 : Data collected by drifting buoys in the NAFO area in 1992.
Total = 66 buoy months

BUOY	DATE RANGE	DAYS	SST	AP	AT	WS	WD	TC	NAFO SUB-AREAS
13004	Jun-09 - Jun-23	15	X	X	X	X	X	-	5ZW
21579	Nov-27 - Dec 31	35	X	X	X	-	-	-	6B, 6C, 6D
41501	Feb-26 - Apr-13	47	X	X	X	-	-	-	6C, 6D
41503	Dec 07 - Dec 13	5	X	X	X	-	-	-	6C
41503	Dec 23 - Dec 24	2	X	X	X	-	-	-	6C
41504	Jul-03 - Jul-03	1	X	X	X	X	X	-	6E
41505	Jul-07 - Aug-05	28	X	X	X	X	X	-	6E, 6F
41903	May-25 - Jun-22	16	X	-	-	-	-	-	6F, 6G
41903	Jul-03 - Aug-05	16	X	-	X	X	X	-	6F, 6G
41903	Aug-11 - Dec 30	70	X	-	-	-	-	-	4Vs, 4W, 5E, 6F, 6G
41905	Jun-12 - Jun-13	2	X	-	-	-	-	-	6E
41909	Nov-06 - Nov-06	1	X	-	-	-	-	-	6H
41909	Nov-14 - Nov-15	2	X	-	-	-	-	-	6H
41915	Dec 20 - Dec 29	4	X	-	-	-	-	-	6H
41920	Dec 04 - Dec 10	4	X	-	-	-	-	-	6E, 6F
44142	Oct-22 - Dec 03	41	-	-	-	-	-	-	4X
44504	Apr-15 - May-21	36	X	-	X	X	X	-	3M, 3N
44505	May-07 - Sep-08	122	X	-	X	X	X	-	3L, 3M, 3N
44505	Oct-27 - Oct-30	4	X	-	-	-	-	-	3M, 6H
44505	Nov-08 - Nov-12	5	X	-	-	-	-	-	3M
44505	Dec 15 - Dec 22	6	X	-	-	-	-	-	3M, 6H
44506	May-20 - Jul-17	58	X	-	X	X	X	-	3L, 3M, 3N
44507	Jun-19 - Nov-24	153	X	-	X	X	X	-	3K, 3L, 3M
44508	Jul-16 - Nov-15	120	X	-	-	-	-	-	3K, 3L, 3M
44509	Aug-20 - Oct-28	69	X	-	-	-	-	-	5ZE, 5ZW, 6B, 6D

44516	Dec 07 - Dec 31	25	X	X	X	-	-	-	6D
44517	Dec 07 - Dec 14	8	X	X	X	-	-	-	4X, 5ZE
44517	Dec 25 - Dec 31	7	X	X	X	-	-	-	5ZE
44552	Jan-01 - Jan-02	2	X	-	-	-	-	-	3M
44553	Jan-01 - Feb-20	51	X	-	X	X	X	-	6C
44555	Jan-01 - Jan-21	21	X	-	-	-	-	-	4VS
44559	Feb-27 - Jul-29	99	X	-	X	X	X	-	3M, 3N, 4VS, 6F, 6G, 6H
44559	Aug-19 - Aug-19	1	X	-	-	-	-	-	3M
44560	Jan-02 - Jan-26	14	X	-	-	-	-	-	3M, 3N, 4VS, 6H
44560	Apr-06 - Apr-12	5	X	-	-	-	-	-	3M
44560	Apr-18 - Apr-18	1	X	-	-	-	-	-	3M
44682	Feb-27 - Mar-24	27	-	X	X	X	X	-	3K
44684	Feb-27 - Apr-19	52	-	-	X	-	-	-	3K
44685	Feb-27 - Mar-14	17	-	X	X	-	-	-	3K
44686	Feb-27 - Mar-14	17	X	X	X	-	-	-	3K
44687	Mar-09 - Apr-05	27	-	X	X	-	-	-	3K
44688	Mar-09 - Apr-12	34	-	X	X	-	-	-	3K
44689	Mar-09 - Apr-20	42	-	X	X	-	-	-	3K
44690	Mar-26 - Apr-11	17	-	X	-	-	-	-	3K
44691	Mar-26 - Apr-01	7	-	X	X	-	-	-	2J
44692	Mar-26 - Apr-24	30	-	-	-	-	-	-	2J, 3K, 3L
44693	Mar-26 - Jul-30	126	-	-	X	X	X	-	2J, 3K, 3L, 3M, 4R
44694	Mar-26 - Apr-19	25	-	X	X	-	-	-	2J, 3K
44756	Jan-30 - Jan-31	2	-	-	-	-	-	-	4X
44756	Feb-11 - Mar-02	21	-	-	-	-	-	-	2J, 3K
44763	May-05 - May-12	8	X	X	X	X	X	-	1F, 2J
44767	Sep-29 - Oct-04	6	X	X	X	-	-	-	1F, 2J
44767	Oct-11 - Oct-21	11	X	X	X	-	-	-	1F
44768	Oct-19 - Oct-19	1	-	X	-	-	-	-	1F
44769	Oct-28 - Oct-31	4	X	X	X	-	-	-	1F
44771	Nov-23 - Nov-29	7	-	X	X	-	-	-	2J, 3K
44771	Dec 07 - Dec 17	7	-	X	X	-	-	-	3K
44903	Aug-07 - Aug-07	1	X	-	-	-	-	-	3M
44903	Aug-13 - Sep-18	19	X	-	-	-	-	-	3M
44903	Oct-24 - Oct-24	1	X	-	-	-	-	-	3M
44904	May-23 - Jun-08	9	X	-	-	-	-	-	3M, 6H
44905	May-23 - Aug-06	36	X	-	X	X	X	-	6G
44905	Aug-12 - Sep-02	11	X	-	-	-	-	-	6G
45138	Aug-19 - Aug-20	2	-	-	-	-	-	-	4S
45138	Sep-11 - Nov-19	69	-	-	-	-	-	-	4S
47553	Jan-01 - Feb-23	53	-	-	-	-	-	-	0A, 0B, 2G
47556	Jan-01 - Jan-16	15	-	-	-	-	-	-	0B
47558	Jan-01 - May-14	134	-	-	X	X	X	-	0A, 0B, 2G, 2H, 2J
63656	Jun-08 - Jun-23	11	X	X	-	-	-	-	6B
64516	Jan-01 - Feb-23	52	X	X	X	X	X	-	1F
65594	Aug-27 - Aug-27	1	X	X	X	-	-	-	1F

Table 6: Location of instrumented wave data collections.
Total = spectra

Station Name	Latitude	Longitude	Area	Period	Number	1-D	2-D
Hotel	38.50	70.70	6B	Jan-01 - Dec-31	8160	X	
Gulf of Maine	42.70	68.60	5Y	Jan-14 - Dec-31	6453	X	
Nantucket	40.50	69.50	5Ze	Jan-01 - Dec-04	7529	X	
Delaware Bay	38.50	74.60	6B	Jan-01 - Oct-28	6659	X	
Georges Bank	41.10	66.60	5Ze	Jan-01 - Nov-11	5773	X	
E.Virgin Rocks	45.90	51.00	3N	Jan-01 - Feb-26	1159	X	
W.Virgin Rocks	45.90	51.00	3N	Jan-01 - Feb-23	1005	X	
E Scotian Shelf	41.19	61.13	4W	Jan-01 - Dec-31	5406	X	
SW Grand Banks	44.25	53.37	3O	Jan-01 - Dec-31	5419	X	
Banquereau	44.32	57.36	4Vs	Jan-01 - Dec-31	7082	X	
Tail of Bank	42.73	50.61	3N	Jan-01 - Dec-17	6568	X	
Laurentian Fan	42.12	56.13	4Vs	Jan-01 - Dec-31	7600	X	
La Have Bank	42.49	64.20	4X	Jan-01 - Dec-14	5632	X	
Mount Louis	49.53	65.72	4S	Jan-01 - Nov-20	3151	X	
Torbay	47.63	52.50	3L	Jan-01 - Dec-31	716	X	
Osborne Head	44.54	63.46	4W	Jan-01 - Dec-31	6290	X	
Bay de Verde I	48.08	52.90	3L	Jan-01 - Dec-31	1632	X	
Bay de Verde O	48.08	52.90	3L	Jan-01 - Dec-31	1026	X	
St-Bride's I	46.92	54.18	3L	Jan-01 - Dec-31	1390	X	
St-Bride's O	46.92	54.18	3L	Jan-01 - Dec-31	1985	X	

Table 7: Historical data received at MEDS.
Total = 6646 stations

Ship Name	Cruise Period	BT	BOTT	CTD	NAFO Subarea	
Gadus Atlantica	Feb-03 - Feb-25 91	57		2	2J, 3KL	
	Apr-16 - Apr-16 91	2			3L	
	Apr-25 - Apr-28 91			40	3OPs	
	May-12 - May-26 91	14			3L	
	Jun-01 - Jun-19 91	66			3KL	
	Jun-25 - Jul-30 91	156		29	2J, 3KLPS	
	Aug-07 - Sep-02 91	13		56	3LPsPn, 4RVnVs	
	Oct-05 - Nov-22 91	93		117	2J, 3KL	
Shamook	Dec 05 - Dec 19 91	60		39	3KL	
	Jan-17 - Jan-28 91	39		1	3L	
	Jun-04 - Jun-17 91	18			3L	
	Jul-13 - Jul-17 91			29	3L	
Marinus	Aug-02 - Aug-04 91	10			2J	
	Jul-03 - Jul-07 91			18	3L	
	Jul-16 - Jul-17 91			14	3L	
Newfoundland Hawk	Aug-07 - Aug-16 91	31			3L	
	Feb-10 - Feb-18 91	11			3KL	
Wilfred Templeman	Feb-02 - Feb-21 91	20		163	3LOPsPn, 4RVs	
	Mar-14 - Mar-28 91	17		47	3L	
	Apr-19 - May-30 91	55		274	3LNO	
	Jun-11 - Jun-19 91	8			3LNO	
	Aug-04 - Sep-26 91	12		361	3KLNO	
Lady Hammond	Oct-07 - Dec 13 91	32		335	1F, 2HJ, 3KLNOps	
	Apr-02 - Apr-17 91	27		9	3KLOPs	
	Apr-24 - Apr-24 91			2	3L	
Alfred Needler	May-14 - Jul-08 91	47		357	2J, 3KL	
	Apr-05 - Apr-09 91	31			3L	
	May-26 - May-29 91	5			3L	
CSS Dawson	Nov-20 - Dec 01 91	72			2GH, 3L	
	Jul-21 - Aug-05 91	17		22	2J, 3KLM, 4R	
Cape Adair	Sep-05 - Sep-08 91	3			3K	
	Sep-16 - Sep-28 91	14			3LM	
MV Petrel V	Jun-16 - Jun-30 91	47			3KL	
Russia						
Unknown	Mar-03 - Mar-14 88			33	3MN	
	May-07 - May-27 89			99	3MNO, 6H	
	Aug-03 - Aug-27 89			121	3MN, 6H	
	Dec 02 - Dec 14 89			79	3MNO, 4Vs, 6GH	
	Aug-06 - Aug-26 90			80	3KMN, 6H	
	Apr-16 - May-13 91			79	3MN, 6H	
	Bugaev	Jan-11 - Feb-01 84			60	3MN, 6H
		Dec 24 - Jan-02 84			45	3MN, 6H
		Feb-06 - Feb-15 84			59	3MN, 6H
		Feb-07 - Feb-12 85			29	3MN, 6H
Apr-18 - Apr-29 85				42	3MN, 6H	
Aug-14 - Aug-30 85				78	3MN, 6H	
Mar-23 - Mar-25 88				13	3M	
Jun-24 - Jun-25 88				5	3MN	
Krenkel	Jul-22 - Jul-28 82			19	3M	
	Aug-28 - Sep-07 82			21	3M	
	Jun-03 - Jun-03 83			3	3M	
	Feb-11 - Feb-17 84			20	3M	
	Jul-03 - Jul-16 84			77	3MN, 6H	
	Oct-26 - Nov-12 86			78	3MN, 6H	
	Dec 18 - Feb-15 88			272	3MNO, 6GH	
Musson	May-06 - May-15 81			21	3M	
	May-19 - Jun-03 82			20	3M	
	Feb-15 - Mar-02 83			64	3MN, 6H	
	May-09 - May-27 84			78	3MN, 6H	
	Apr-12 - Apr-19 85			36	3MN, 6H	
	Feb-02 - Mar-01 86			78	3MN, 6H	
	Jul 01 - Jul 16 86			78	3MN, 6H	
	Mar-15 - Apr-27 87			156	3MN, 6H	
	Nov-20 - Dec 07 87			78	3LMN, 6H	
	Feb-03 - Feb-12 88			37	3M, 6H	
Perkur	Mar-23 - Apr-03 88			73	3MNO, 6H	
	Jan-13 - Feb-01 89			71	3MN, 6H	
	Mar-01 - Mar-16 88			50	3LMN	
	Passat	Nov-13 - Nov-24 81			20	3M
		Oct-26 - Nov-02 82			44	3MN, 6H
Dec 05 - Dec 26 82				64	3MN, 6H	
Aug-02 - Aug-17 84			77	3MN, 6H		

Ushakov	Oct-25 - Dec 14 84	132	3MN, 6H
	May-19 - Jun-14 86	93	3MN, 6H
	Aug-22 - Aug-27 81	16	3M
	Oct-15 - Oct-27 82	20	3M
	Apr-21 - May-13 83	64	3MN, 6H
	Aug-31 - Oct-23 83	154	3MN, 6H
	Dec 28 - Jan-25 84	52	3MN
	Oct-31 - Nov-19 84	78	3MN, 6H
	Feb-04 - Feb-12 85	36	3MN, 6H
	Nov-01 - Nov-20 85	78	3MN, 6H
Volna	Feb-01 - Mar-19 86	155	3MN, 6H
	Dec 24 - Jan-18 87	78	3MN, 6H
	Nov-21 - Nov-27 85	14	3M
	Jul-19 - Aug-04 86	78	3MN, 6H
	Jun-04 - Jul-06 87	78	3MN, 6H
	Feb-07 - Feb-21 88	75	3NO, 4Vs, 6GH
	Mar-23 - Apr-02 88	61	3MN, 6H
	Nov-27 - Nov-27 89	2	3M
	Apr-23 - May-13 90	133	3MNO, 6H

CURRENT METER DATA RETURNED IN 1992

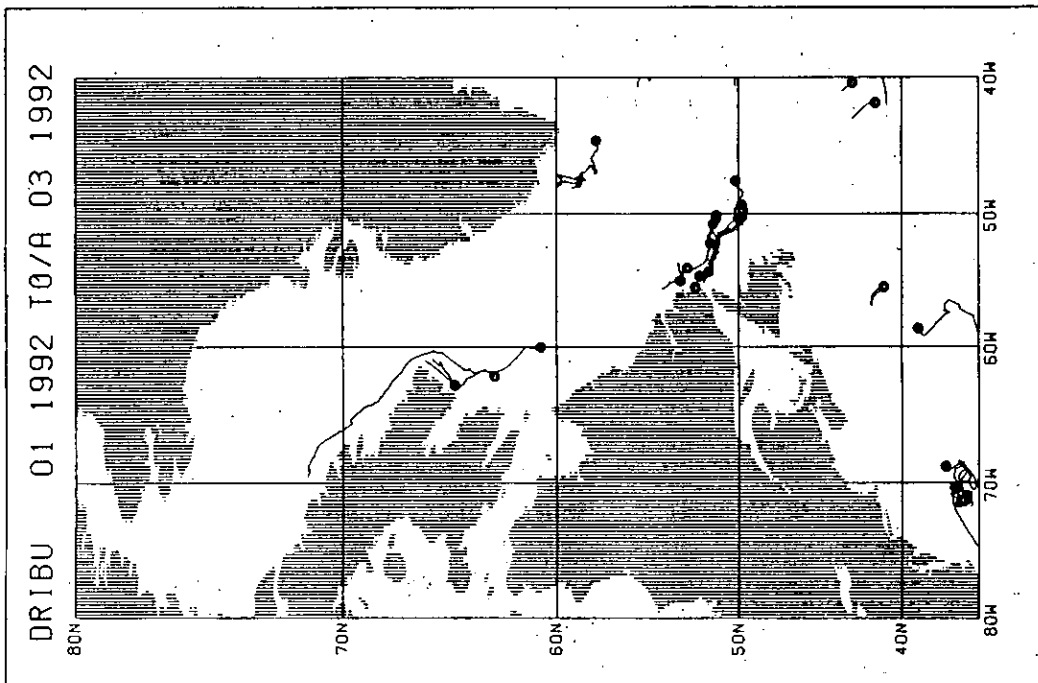
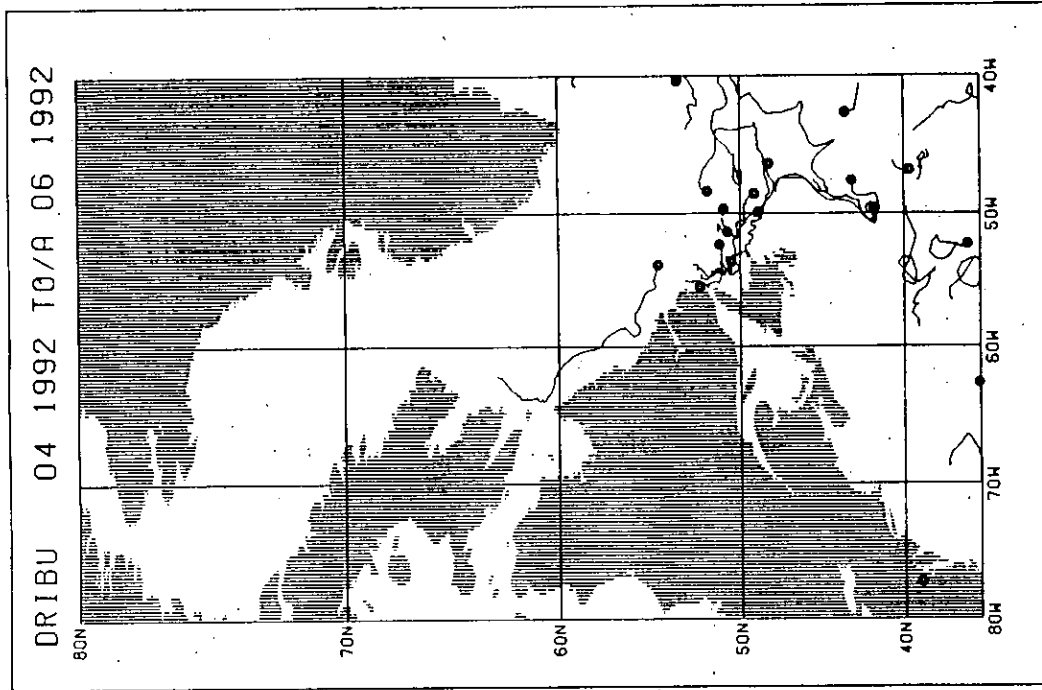
CRUISE #	LAT (N)	LONG (W)	MOORING	SERIAL	DEPTH(M)	TIME SPAN
91059	47 51.24	48 01.00	1073	828	75	01/12/91-12/05/92
"	"	"	"	4201	135	"
"	"	"	"	2664	185	"
"	"	"	"	5568	285	"
"	"	"	"	342	300	"
91059	47 28.95	48 17.84	1075	7127	75	01/12/91-21/05/91
"	"	"	"	5573	140	"
"	"	"	"	6400	165	"
"	"	"	"	380	180	"
"	"	"	"	180	44	"
"	"	"	"	744	108	"
91059	47 17.44	48 25.80	1076	3569	21	05/12/91-21/05/92
"	"	"	"	4271	75	"
"	"	"	"	8696	135	"
91059	46 52.25	48 43.09	1077	7525	20	05/12/91-15/05/91
"	"	"	"	8697	73	"
"	"	"	"	191	91	"
91059	47 34.67	48 14.52	1078	818	22	29/11/91-21/05/92
"	"	"	"	4208	75	"
"	"	"	"	7123	135	"
"	"	"	"	7131	185	"
"	"	"	"	769	43	"
"	"	"	"	108	200	"
91059	47 40.12	48 33.20	1079	3302	20	01/12/91-11/05/92
"	"	"	"	4351	75	"
"	"	"	"	5575	135	"
"	"	"	"	3196	185	"
"	"	"	"	343	200	"
91060	43 48.87	62 57.23	1059	5002	225	11/12/91-23/04/92
"	"	"	"	4602	242	"
91061	47 34.19	48 27.71	1096	239	182	15/03/92-11/05/92
"	50 53.1	51 24.3	1097	0402064	8	20/03/92-28/03/92
"	"	"	1098	0545129	15	20/03/92-22/03/92
"	"	"	"	"	"	22/03/92-24/03/92
"	"	"	"	"	"	24/03/92-28/03/92
91061	"	"	1099	0459085	40	20/03/92-20/03/92
"	"	"	"	"	"	20/03/92-21/03/92
"	"	"	"	"	"	21/03/92-24/03/92
"	"	"	"	"	"	24/03/92-28/03/92
92029	42 00.33	66 47.15	1105	0443083	66	12/08/92-13/08/92
"	"	"	"	0443085	65	"
92029	41 58.78	66 46.84	1106	0459085	17	11/08/92-12/08/92
"	"	"	"	0443083	33	"
"	"	"	"	7134	16	"
"	"	"	"	9355	32	"
"	"	"	"	9607	53	"
92029	41 58.80	66 46.60	1107	0443083	34	13/08/92-15/08/92
"	"	"	"	0459085	18	"
"	"	"	"	7134	17	"
"	"	"	"	9355	33	"
"	"	"	"	9607	53	"
92029	41 59.18	66 46.77	1108	0459085	17	15/08/92-16/08/92
"	"	"	"	0443083	33	"
"	"	"	"	7134	16	"
"	"	"	"	9355	32	"
"	"	"	"	9607	53	"

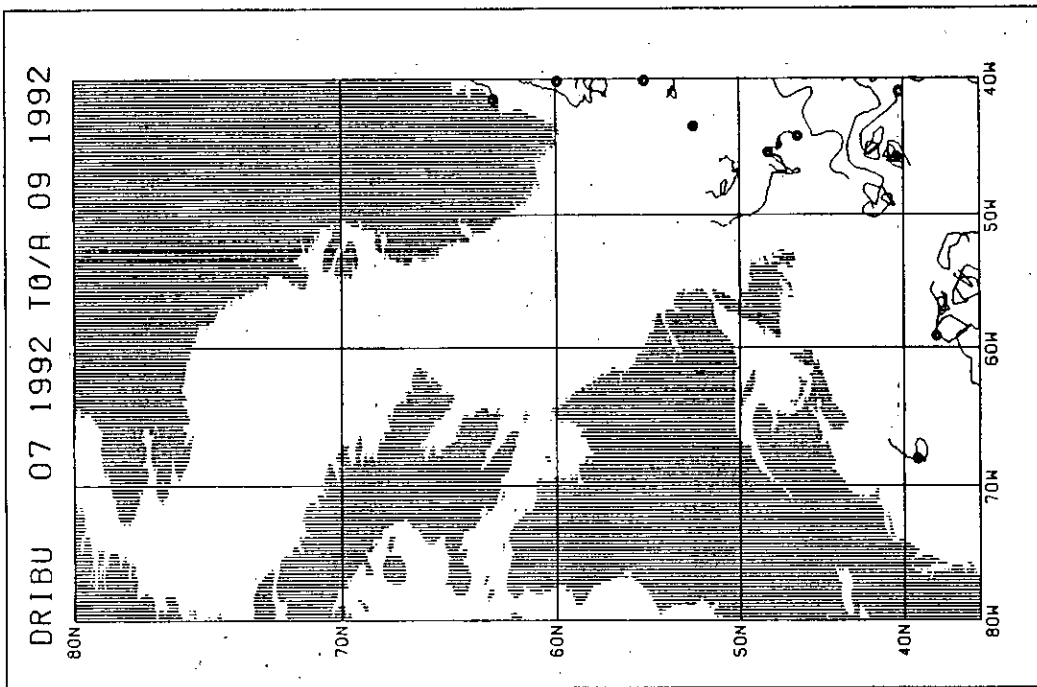
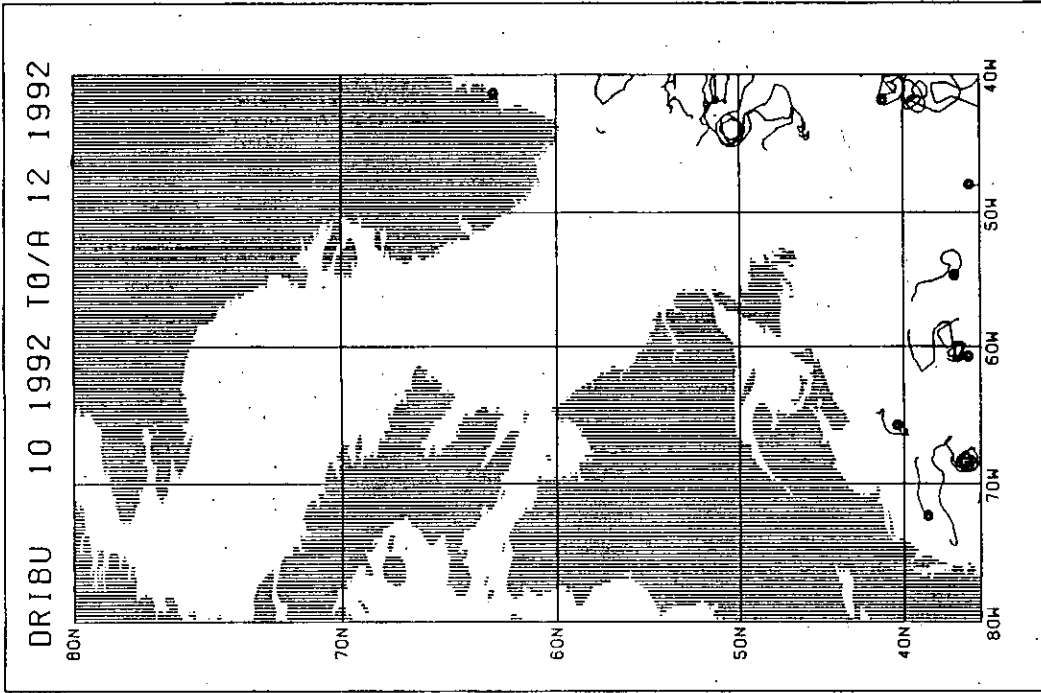
CRUISE #	LAT (N)	LONG (W)	MOORING	SERIAL	DEPTH (M)	TIME SPAN
92-04	43 48.96	62 57.57	1095	3300	225	30/04/92-23/11/92
92902	44 27.38	64 18.80	1113	0443083	4	03/11/92-19/11/92
92904	44 20.65	64 19.96	1114	7134	8	29/06/92-03/07/92
"	"	"	"	9355	"	"
92905	44 20.39	64 18.30	1117	7134	5	06/10/92-09/10/92
"	"	"	"	9355	"	"
GRIFFIN' 92	43 48.88	61 04.76		9145	20	20/04/92-05/05/92
"	"	"		989	"	"
92-31	43 50.33	61 05.84	1	334	50	26/11/92-15/12/92
"	43 51.95	61 17.51	2	335	47	"
92047	43 49.01	62 57.93	1111	7134	243	09/11/92-11/05/93
"	"	"	"	9355	207	"

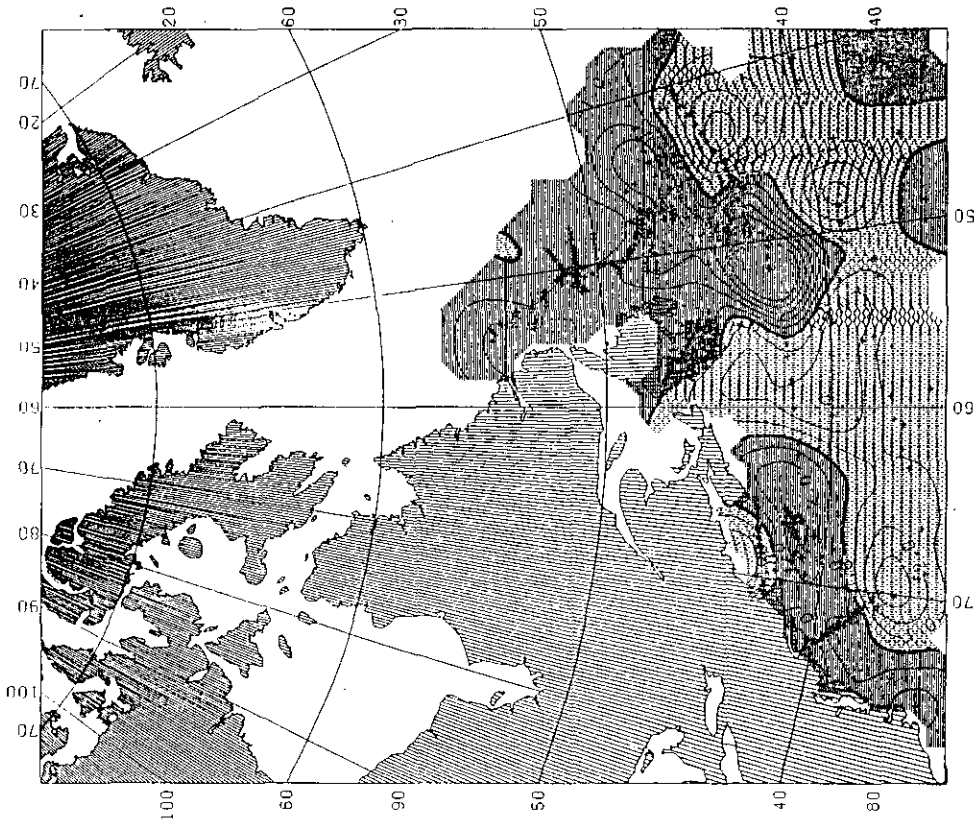
CTD DATA RETURNED IN 1992

CRUISE #	AREA	# STATIONS	DATES
91081	NFLD. SHELF, N. GRAND BANK	91	12/03/92-03/04/92
92010	HIBERNIA	51	08/05/92-25/05/92
92014	HAMILTON BANK	52	27/05/92-15/06/92
92018	BEDFORD, EMERALD BASIN	6	20/06/92-24/06/92
92029	GEORGES BANK	52	08/08/92-17/08/92
92050	GULF OF ST. LAWRENCE	77	24/11/92-02/12/92

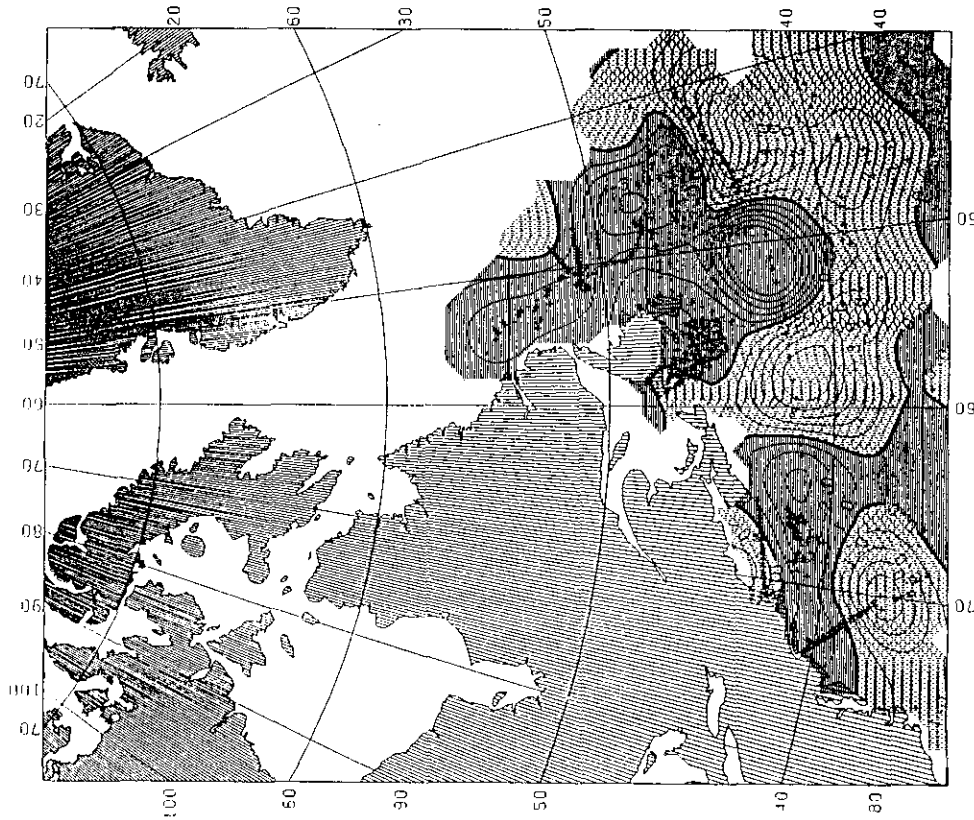
DRIFTER TYPE	# DRIFTER	JULIAN DAY	APPROX. LOCATION
SURFACE (1 METER)	8	135-145	48N 49W
"	9	300-305	43.5N 66.5W
ICE DRIFTERS	2	42-120	52N 54W
"	6	75-90	49-51N 48-51W
"	2	76-110	52N 55W
*(BARO. PRESS.&ICE TEMP.)	1	31-76	54N 57W
"	1	42-85	51N 53W
"	1	77-102	51N 54W
"	3	67-105	51N 51W
"	1	77-92	53N 55W
*(ANMOMETER&PRES&ICE TEMP)	1	74-110	53N 52W
"	6	75-100	50N 49W
*(THERM.CHAIN&BARO.&ICE TEMP)	2	42-75	52N 53W
"	1	76-110	52N 54W
"	1	77-112	50N 50W



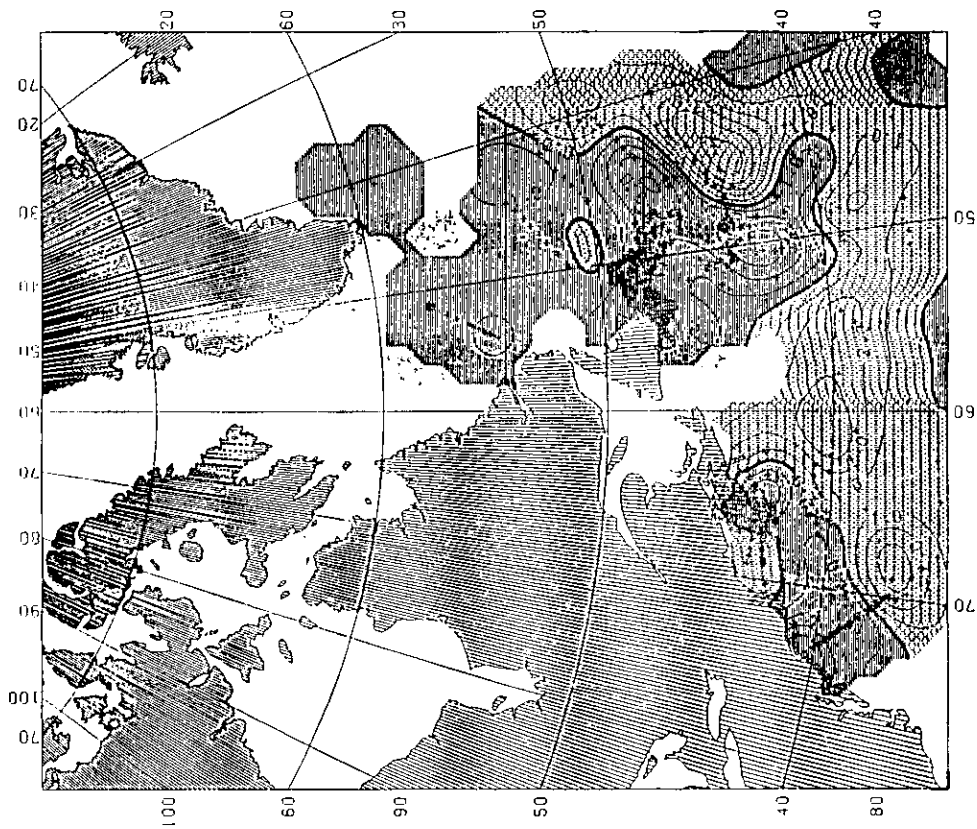




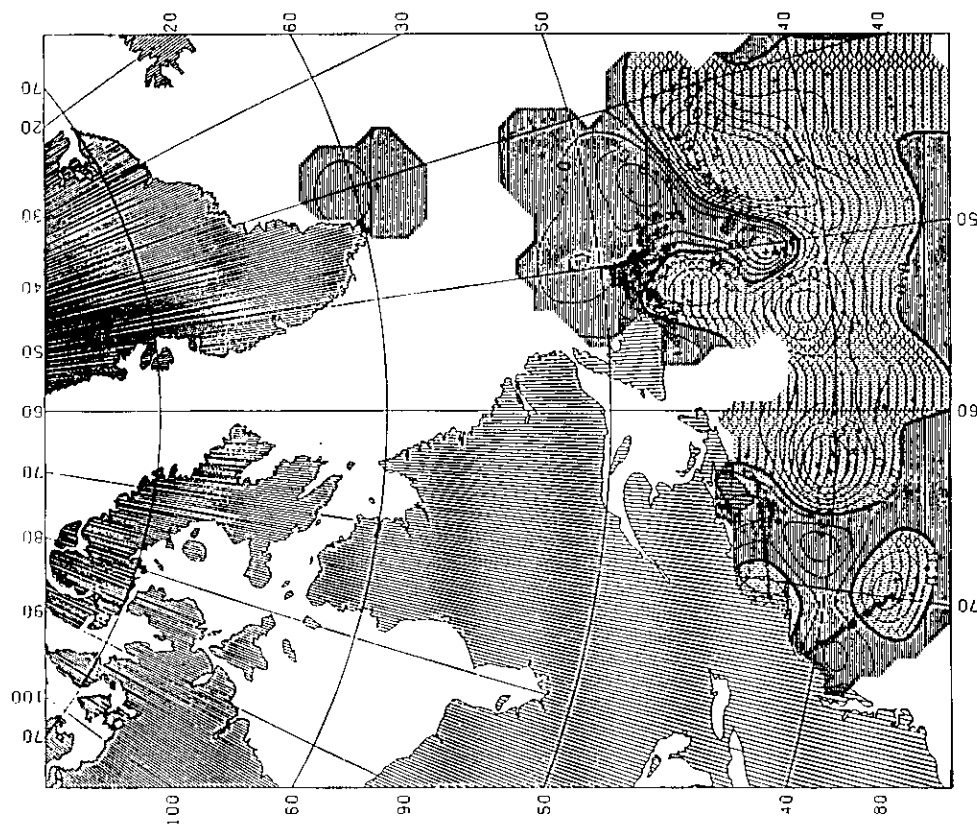
Winter Temp(C) Anomaly on Shelf or 200m, 1992



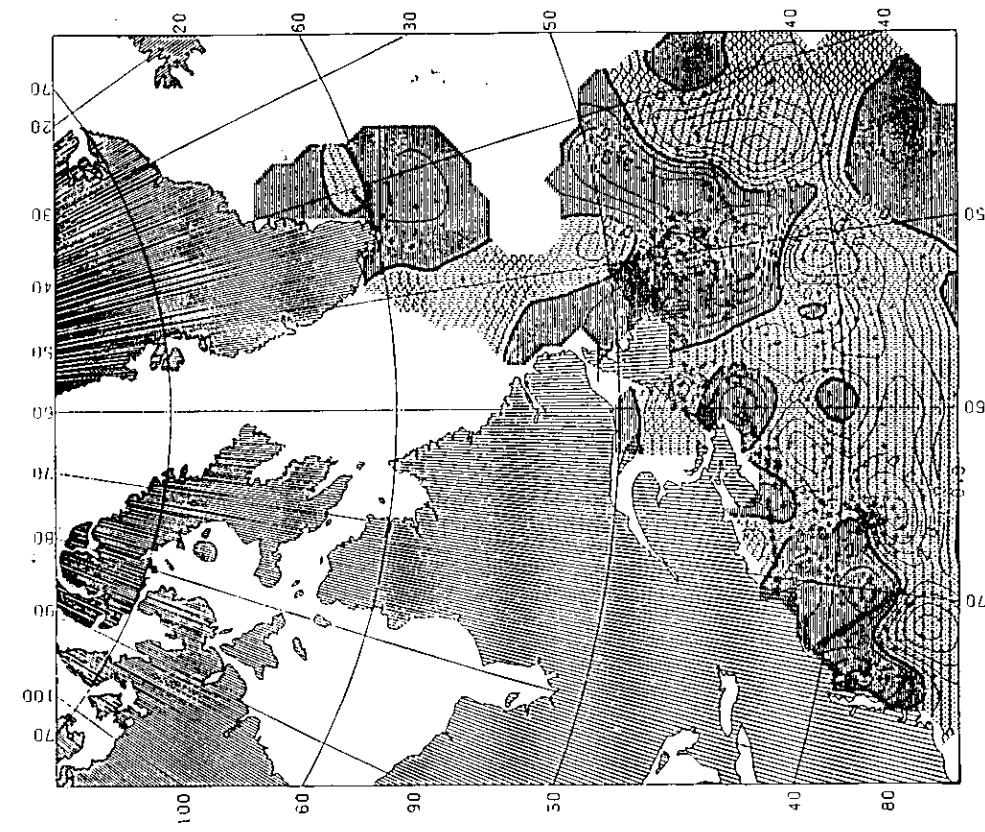
Winter SST Temp(C) Anomaly, 1992



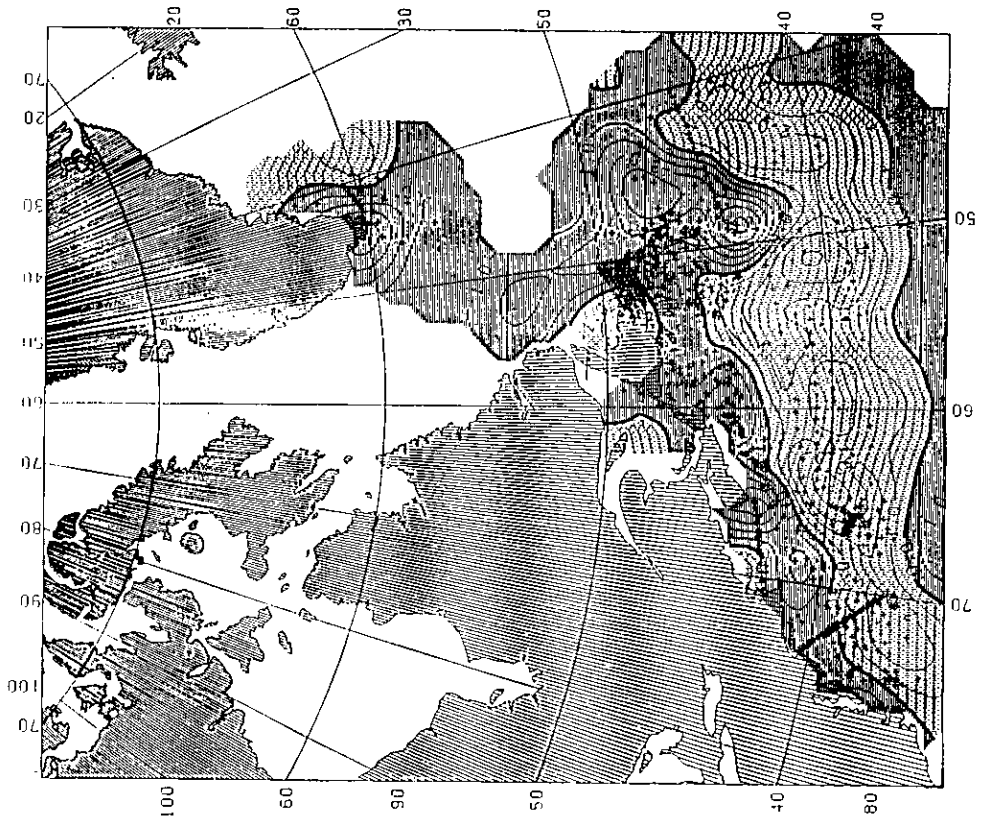
Spring Temp(C) Anomaly on Shelf or 200m, 1992



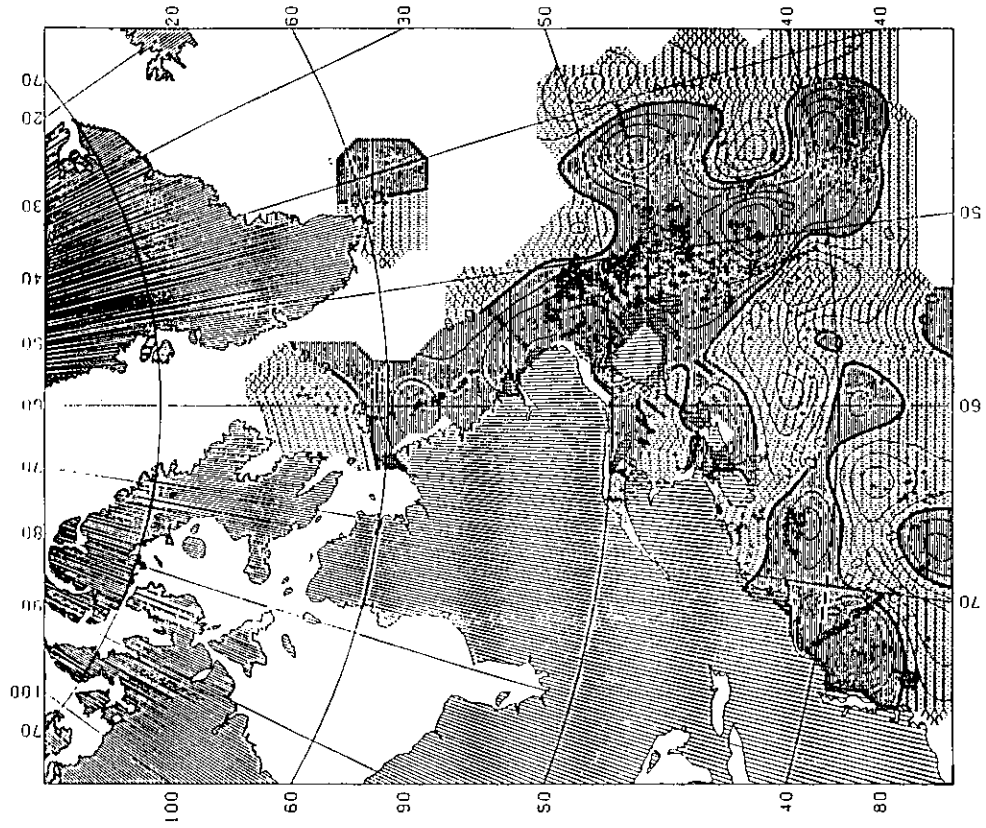
Spring SST Temp(C) Anomaly, 1992



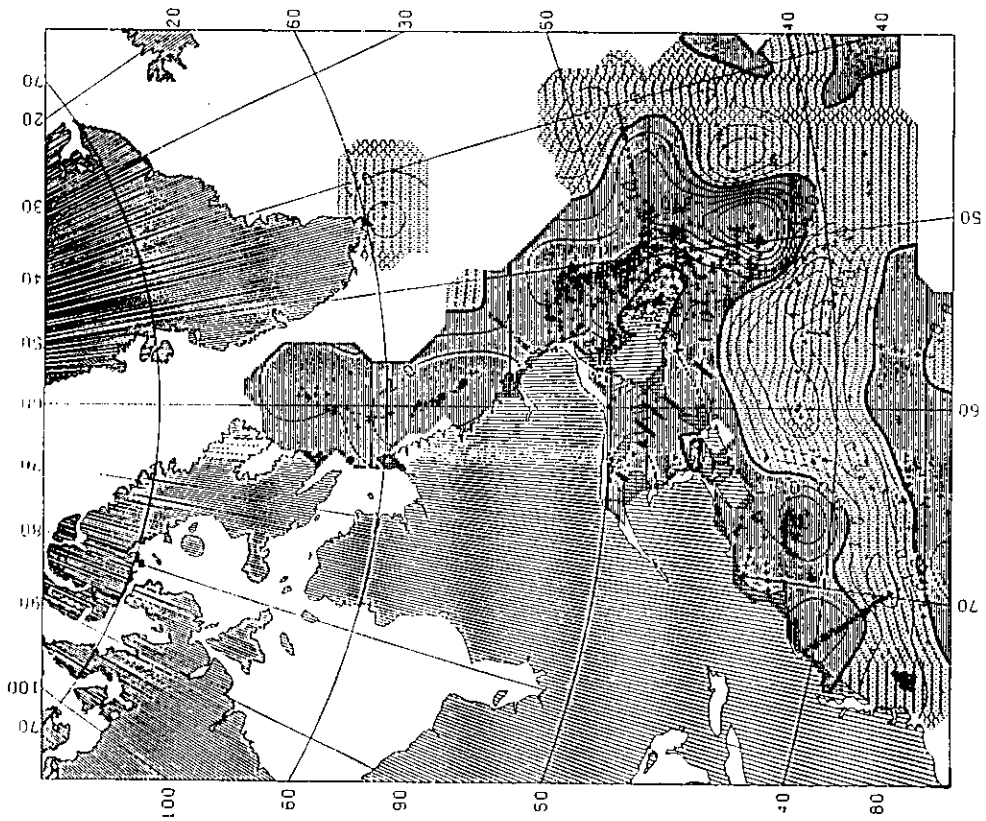
Summer Temp(C) Anomaly on Shelf or 200m, 1992



Summer SST Temp(C) Anomaly, 1992



Autumn Temp(C) Anomaly on Shelf or 200m, 1992



Autumn SST Temp(C) Anomaly, 1992