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Marine Environment Data Service Report for 1994

by

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Abstract

The purpose of this report is to describe the data collected in the NAFO area, during the 1994 calendar year. Tables of subsurface, wave, current meter and dribu recorded observations are presented in the body of the report. Seasonal plots of ocean stations and dribu tracks are presented. Also included in the report, is an overview of the methods and results of an analysis by MEDS, of the environmental conditions in the NAFO area in 1994.

Introduction

The Marine Environmental Data Service, (MEDS) is Canada's national centre for the management and care of oceanographic data. MEDS is a branch of Physical and Chemical Science, a major component of the Department of Fisheries and Oceans, and works closely with DFO regional institutes. MEDS services include participating in national and international programmes, and in developing and incorporating techniques and software to ensure timely provision of high quality oceanographic data to the marine community.

An important feature of any national data centre is international data exchange. Through bilateral and multilateral agreements with other agencies and countries, MEDS receives copies of oceanographic data collected by foreign ships in waters of Canadian interest. More than 20 countries exchange data with Canada through MEDS on a regular basis.

International activities also include acting as the regional oceanographic data centre for the Northwest Atlantic Fisheries Organization (NAFO) and as Canada's archival centre for ocean data reported in real time by the Integrated Global Ocean Station System (IGOSS) on the Global Telecommunication System (GTS). In 1986, MEDS was accepted as the National Oceanographic Data Centre for Drifting Buoys (RNODC/DB) on behalf of the Intergovernmental Oceanographic Commission (IOC) and the World Meteorological Organization (WMO). MEDS also manages real time data for the Global Temperature Salinity Pilot Project (GTSPP) and is an active participant in the World Ocean Circulation Experiment (WOCE) and the Joint Global Ocean Flux Study (JGOFS).

MEDS is the designated data archive and distribution centre for satellite acquired international oceans data for scientific and research users in Canada. Data are received from the GEOSAT, ERS-1 and the TOPEX/POSEIDON satellites.

National activities include the processing and archiving of Canadian physical oceanographic data. Data sources include regional DFO research institutes such as the Northwest Atlantic Fisheries Centre (NAFC) in St. John's, Newfoundland; the Bedford Institute of Oceanography (BIO) in Dartmouth,

Nova Scotia; the Maurice Lamontagne Institute (MLI) in Rimouski, Quebec; and the Institute of Ocean Sciences (IOS) in Patricia Bay, British Columbia. Occasionally, universities, the private sector, and the Ontario Ministry of Natural Resources contribute oceanographic data.

DFO's Canadian Hydrographic Service (CHS), through its regional offices, are responsible for the collection of canadian tide and water level data. Theses offices provide MEDS with daily near real time and delayed mode information.

MEDS processes and archives real time and delayed mode wave data as collected by our own Canadian Wave Climate Study in support of marine construction. Other sources of real time data include the Canadian Atmospheric Environment Service (AES) and the National Oceanographic and Atmospheric Administration (NOAA)in the U.S.

Environmental data sets are archived on behalf of the National Energy Board as collected by the offshore oil and gas industry. MEDS is working with all of the DFO regions in the design of a Contaminants Information System inventory and with BIO in the creation and maintenance of a climatology of temperature and salinity for the east coast of Canada.

Several hundred requests, from engineers, research scientists, and professionals in the private sector, federal and provincial agencies, universities, and foreign countries, are handled per year.

Oceanographic Station Data...

Vertical profiles are collected worldwide with water sampling bottles, and electronic instruments. These subsurface measurements include temperature, salinity, oxygen and a wide variety of nutrients and chemicals. Derived parameters, such as sigma-t and geopotential anomaly can be computed upon request. The data contain approximately one million profiles,some dating back to 1900.

Tide and Water Level Data...

Observed hourly heights and monthly instantaneous extremes collected from the Atlantic, Pacific, and Arctic coasts, the Great Lakes and the St. Lawrence River, are archived. The earliest data begins before the turn of the century.

Wave Data...

The wave data archive includes measurements from over 400 locations around Canada, including offshore East and West Coasts, the Beaufort Sea, the Great Lakes, and the St. Lawrence River. The file contains calculated wave spectra, significant wave height and peak period and the digital water surface elevation. The results of wave hindcast models conducted for waters around Canada have also been archived. The archive dates back to the early 1970s.

Drifter Data...

MEDS as the RNODC for drifting buoy data, has holdings of 8 million (as of 1994) DRIBU records for the world's oceans, beginning in 1978 and growing at a rate of more than one million messages per year. The message is comprised of the buoy position and some of the following parameters: surface and subsurface water temperature, air pressure and temperature, wind speed and direction.

Satellite Data...

Data holdings include altimeter data from the GEOSAT satellite for the period of 1985 to 1990. Low Bit Rate (LBR) data of altimeter, scatterometer and wave mode SAR from the ERS-1 satellite began in July 1991. Holdings of TOPEX/POSEIDON satellite altimeter data commenced in July 1992.

Other...

A variety of other data sets are also archived including daily seawater observations from the east and west coasts, and environmental data collected by offshore drilling operators for the National Energy Board.

NAFO Benefits from MEDS Data Processing and Archival

MEDS contributes to the knowledge of the environmental conditions of the Northwest Atlantic Fisheries, by collecting, processing, and distributing to scientists, oceanographic observation data. In this past year, data has been received by MEDS, for the NAFO area, from NAFC, BIO, the IGOSS system, the DRIBU system and the operating network of wave measurement buoys. The tables and diagrams, of this report, describe what data MEDS has been aware of, and to what extent these data have been made available to scientists in 1994/95 for 1994 and past years.

Ocean Subsurface Data

MEDS becomes aware of surveys of the physics and chemistry of the water column, directly: by delivery of these data to MEDS from responsible institutions and the IGOSS reporting system, and, indirectly: from Cruise Summary Reports and other reports of ocean cruise activity. Table 1 lists data collected in the NAFO area in 1994, but not yet received at MEDS as described in these Cruise Summary Reports. Table 2 lists data collected in the NAFO area in 1994, received at MEDS but not yet archived. Table 3(a) gives a summary of the MEDS IGOSS archive for data received during 1994. Table 3(b) gives a summary of the data received from its originator for 1994, which has been processed and archived. Table 7 lists data processed and archived, in the past year, which was in the NAFO area, but for years prior to 1994.

Ocean subsurface data is processed at MEDS in much the same way for each of the data sets described in tables 3(a), and 3(b). Electronic files are converted from a wide range of formats, into a common Ocean's format. Quality control is carried out by a combination of specially designed software and trained personnel. The quality control has four main functions. The first is to check and ensure that each data message is properly formatted. The second is to identify duplication, and select the best version of a message, based on data type, source of the data, and general qualities in analysis and reporting of the observations. The third check, identifies and if possible, corrects, the date/time and geographical positioning information of each message, using computer tests and visual inspection of the track for each cruise. The final quality control procedure, uses a series of algorithms to find and flag, common instrument failures found in profiles of subsurface measurements. Each subsurface profile, of temperature, salinity and other subsurface constituents, is also visually inspected using software to plot the data, and allow a technician to set quality flags to individual points on a profile.

The tables showing summaries of data, list over 30,000 stations for the NAFO area. Much of the data MEDS has been aware of, for 1994, has been processed and made available to scientists conducting environmental assessments of the NAFO area. These show station locations, as found in MEDS archives, for each of the four seasons.

Processing and Archival of the 1994 NAFO Drifting Buoy (Dribu) Data

Table 4 lists data collected by Drifting Buoys in the NAFO Area in 1994. Maps of DRIBU tracks for each season of 1994, processed and archived by MEDS, are show in figures1,2,3 and 4.

Drifting buoy (or DRIBU) data is received at MEDS over the GTS. Measures taken to assure its quality are much the same as those for the ocean subsurface data described above. DRIBUs report via satellite, at rates of up to every 15 minutes. These messages are for format errors, and reformatted for quality control procedures and subsequent archival. Checks, flags and possible corrections to the data are carried out by trained personnel, using a system of MEDS software which organize, analyze and display plots of the data. Quality checks use algorithms which check drifting speed and position, and ranges of sea surface temperatures and sea level pressure. The range checks include a comparison to NOAA's Ashville SST Climatology (2.5x2.5 degrees and monthly). Duplicate checking is done, and is important to discriminate between data directly from buoys and messages routed through other data centers. Lower quality data (which are this type of duplicate) are flagged as such.

Processing and Archival of the 1994 NAFO Wave Data

Table 6 lists wave measurement data in the NAFO area for 1994. These data are visually inspected and using MEDS software, to set flags on data showing instrument failures. An inventory of wave data, in the NAFO area, will show many locations with a time series of data spanning many years.

Environmental Analysis of the 1994 NAFO Area

Methods of regional water climatological analysis, for the NAFO area, have evolved substantially over the past several years. In this past year,MEDS has concentrated its effort to providing complete and timely access to high quality data, for Ken Drinkwater's group at BIO , for their analysis of the region.

Conclusion

As sparse as oceanographic observations are, environmental analysis of the NAFO region is still based on the ability of an oceanographer to assimilate billions of measurements into a meaningful model of the ocean. Broad range and classical statistical methods have little value when trying to interpret these sparse observations in a complicated physical system. Each measurement must be scrutinised for accuracy. MEDS has been using methods developed by its computer and scientific staff to ensure that the data used in analyses, by oceanographers, is accurate and, as far as possible, complete. These procedures and software analyses have implemented much expertise under several national and international programmes, and have been accepted widely as viable methods of creating large sets of useful data.

Table 1: Data collected in the NAFO area in 1994, not yet received at MEDS.

Ship Name	Cruise Period	Stations	Reference	NAFO Subarea
CSS Navicula	Sep-12 - Sep-22	18	94-025	4VN
METEOR	Nov-15 - Dec-19			
WALTHER HERWIG III	Oct-12 - Nov-19			

Table 2: Data collected in the NAFO area in 1994, recieved at MEDS but not yet archived.
Total = 102

Ship Name	Cruise Period	BT	Bottle	CTD	NAFO Subarea
Vilinus	Apr-01 - Sep-31	0	102	0	3

Table 3(a): IGOSS data recieved during 1994, and archived.
Total = 5557 stations

Ship Name	Country	Call Sign		Cruise Period	BATHY	TESAC	NAFO Subarea
		32070	94	Jul-20 - Jul-20	1	0	6F
SEAS EIFFEL	PANAMA	3EET4	94	Aug-03 - Aug-03	1	0	6H
RECIFE	PANAMA	3EGR6	94	Jan-20 - Jan-21	4	0	4VS,4W
UNKNOWN	PANAMA	3EJT9	94	Apr-12 - Apr-14	6	0	4VS,4W,6F,6G
				Jul-01 - Jul-03	7	0	4W,4X,6F,6G
				Jun-16 - Jun-17	5	0	4W,6F,6G
				Aug-28 - Aug-30	11	0	6C,6D,6E,6F,6G
OLIVEBANK	PANAMA	3ETQ5	94	Jun-21 - Jun-22	5	0	6B,6D
				Sep-02 - Sep-04	6	0	4W,4X,6F,6G
				Nov-16 - Nov-21	6	0	3N,4VS,4W,6H
UNKNOWN	BAHAMAS	C6HQ8	94	Jun-19 - Jun-22	6	0	3M,3N,6E,6F,6G
				Aug-02 - Aug-06	8	0	3M,3N,4VS, 6B,6C,6D,6E
AMERICAN STAR	BAHAMAS	C6JZ2	94	Jul-04 - Jul-04	1	0	6C
SHAMOOK	CANADA	CG2676	94	Jan-05 - Jan-08	4	2	3L
				Feb-10 - Feb-13	0	8	3L
				May-11 - May-18	19	0	3L
				Jun-20 - Jun-30	3	19	3L
				Jul-12 - Aug-05	0	119	3L
				Aug-11 - Aug-17	19	0	3L
				Sep-28 - Oct-06	21	8	3L
				Oct-17 - Oct-20	1	9	3L
MARINUS	CANADA	CG2680	94	Jan-13 - Feb-02	54	0	3L,3PS
ALFRED NEEDLER	CANADA	CG2683	94	Jan-01 - Jan-01	1	1	5ZE
				Feb-16 - Mar-14	129	105	3PS,4VS,4W,5ZE
				Jul-01 - Jul-28	0	159	3N,4VN,4VS, 4W,4X,5Y
				Aug-19 - Sep-07	0	132	4R,4S,4T
ANN HARVEY	CANADA	CGAH	94	Mar-03 - Mar-08	8	0	2J,3K,3L
				Mar-15 - Mar-29	9	0	2J,3K,3L
PARIZEAU	CANADA	CGBS	94	Jun-24 - Jun-29	0	42	4X,5ZE
				Oct-17 - Oct-18	0	16	3L
				Nov-14 - Nov-27	0	85	3PS,4R,4S,4T, 4VN,4VS,4X,5ZE
HUDSON	CANADA	CGDG	94	May-03 - May-11	0	55	3L,3N,3O,3PS, 4VS,4W

				May-25 - Jun-09	0	47	1F,2H,2J,3K, 3L,4VS
				Jul-05 - Jul-20	0	83	2J,3K,3L,3PS, 4VS
				Oct-13 - Nov-02	0	82	3L,3M,3N,4VS, 6G,6H
W. TEMPLEMAN	CANADA	CGDV	94	Jan-04 - Jan-14	0	59	3K,3L
				Jan-25 - Feb-09	7	43	3L,3O
				Apr-05 - Jun-22	29	585	3K,3L,3N,3O, 3PS,3PN,4R
				Jul-08 - Jul-08	0	1	3L
				Jul-15 - Jul-15	0	1	3L
				Aug-25 - Sep-03	0	46	2J,3K,3L
				Oct-24 - Dec 20	25	391	3K,3L,3N,3O
QUEST	CANADA	CZDO	94	Jan-25 - Jan-26	4	0	4X,6E
				Feb-22 - Feb-23	5	0	5ZE,6D
				Apr-06 - Apr-11	10	0	4W,6E
				Apr-22 - May-08	34	0	4VS,4W
				May-17 - May-19	2	0	4X,6E
				Jun-02 - Jun-02	1	0	6D
				Sep-25 - Sep-26	2	0	4W
				Oct-18 - Nov-01	9	0	4X
ST. LUCIA	LIBERIA	D5ND	94	Jun-22 - Jun-22	2	0	6H
KOELN ATLANTIC	FRG	DAKE	94	Jan-10 - Jan-11	5	0	3M,3N
				Jan-24 - Jan-24	4	0	3M
				Apr-18 - Apr-20	26	0	3M,3N,3O,4VS, 4W,4X,5ZE
				Jun-23 - Jun-26	27	0	3M,3N,3O,4VS, 4W,4X,5ZE
				Jul-09 - Jul-11	31	0	3M,3N,3O,4VS, 4W,4X,5ZE
				Sep-15 - Sep-17	28	0	3M,3N,3O,4VS, 4W,4X,5ZE
				Dec 19 - Dec 19	8	0	3L,3M
METEOR	FRG	DBBH	94	Nov-06 - Nov-10	28	3	3M,3N
				Nov-16 - Nov-24	32	17	1F,2H,2J,3K
ANTON DOHRN	FRG	DBFR	94	Nov-13 - Nov-13	1	0	1F
TROLL FORREST	USA	ELDM8	94	Aug-05 - Aug-05	1	0	6H
ENDURANCE	UK	GXRH	94	May-10 - May-10	1	0	3N
AMERICAN MICHIGAN	USA	KJLV	94	Apr-18 - Apr-18	2	0	6C
				Aug-23 - Aug-23	2	0	6B,6C
SEA WOLF	USA	KNFG	94	Apr-05 - Apr-06	2	0	6B
				May-19 - May-19	1	0	6C
				Aug-08 - Aug-08	3	0	6C
				Nov-03 - Nov-03	1	0	6C
UNKNOWN	USA	KRHG	94	May-14 - May-17	9	0	6C,6D,6E,6G,6H
				Jun-08 - Jun-10	5	0	6F,6G,6H
				Jun-20 - Jun-20	2	0	4VS
				Jul-10 - Jul-14	9	0	3M,3N,4VS,4W, 4X,6F
				Jul-20 - Jul-22	2	0	6C,6H
				Aug-07 - Aug-09	4	0	3M,3N,4VS
				Oct-31 - Oct-31	1	0	4X
U.S. NAVAL OCEANOGRAPHY	USA	NAVOCE	94	Dec 07 - Dec 07	26	0	5ZE,6B,6C,6D
UNKNOWN	USA	NCSG	94	Jan-06 - Jan-06	1	0	6C
				Apr-22 - Apr-24	6	0	6C
				May-10 - May-10	1	0	6C
				May-20 - May-20	1	0	6C
				Aug-09 - Aug-09	1	0	6C

ICEPAT GROTON CT	USA	NIDK	94	Feb-26 - Feb-26	1	0	3M
				Mar-11 - Mar-13	8	0	3M,3N
				Mar-25 - Mar-27	5	0	3N
				Apr-05 - Apr-15	21	0	3L,3M,3N
				Apr-28 - May-05	7	0	3L,3N
				May-17 - May-17	1	0	3N
				May-23 - Jun-15	22	0	3K,3M,3N,3O
				Jun-24 - Jun-24	1	0	3L
				Jun-29 - Jun-29	3	0	3M
				Jul-10 - Jul-13	9	0	3M,3N
				Aug-26 - Aug-26	6	0	3L,3M
UNKNOWN	USA	NNJB	94	Apr-16 - Apr-16	1	0	6C
				May-21 - May-27	9	0	4VS,6A,6C
OLEANDER	NETHERLAND	PJJU	94	Jan-08 - Jan-08	20	0	6A,6B,6D
				Feb-05 - Feb-10	18	0	6A,6B,6D
				Mar-05 - Mar-09	29	0	6A,6B,6D
				May-13 - May-18	30	0	6A,6B,6D
				Jun-11 - Jun-15	67	0	6A,6B,6D
				Jul-08 - Jul-13	14	0	6A,6B,6D
				Aug-05 - Aug-06	15	0	6A,6B,6D
				Sep-02 - Sep-07	27	0	6A,6B,6D
				Oct-08 - Oct-13	11	0	6A,6B,6D
				Oct-22 - Oct-22	2	0	6D
				Dec 10 - Dec 10	17	0	6A,6B,6D
UNKNOWN	UNKNOWN	SHIP	94	Jan-05 - Jan-05	1	0	5Y
				Jan-14 - Jan-15	3	0	3K,3L
				Jan-22 - Jan-26	3	0	4VS,6E,6H
				Feb-14 - Feb-14	1	0	3PS
				Mar-05 - Mar-10	1	4	3L,6A
				Mar-28 - Mar-28	1	0	4X
				Apr-08 - Apr-09	3	0	3K,3M,3N
				May-03 - May-05	4	0	2J,3K,4W
				May-14 - May-21	4	15	3PS,6D,6E,6H
				May-28 - Jun-02	4	0	3M,3N,6H
				Jun-07 - Jun-20	13	0	3N,6B,6C,6D, 6E,6F
				Jul-09 - Jul-13	3	0	1F,6B
				Jul-19 - Jul-24	20	0	3L,3N,6H
				Aug-17 - Aug-17	1	0	3PS
				Sep-02 - Sep-04	3	0	4W,6A,6F
				Oct-08 - Oct-31	11	0	0B,3L,4X,6A, 6B,6C,6D
				Nov-06 - Nov-06	1	0	6B
				Nov-20 - Nov-22	3	0	4W,6H
				Dec 01 - Dec 13	5	1	3L,3N,6A
				Dec 19 - Dec 19	1	0	6C
BJARNI SEAMUNDSSON	ICELAND	TFEA	94	Jul-02 - Jul-14	15	0	1F
IJMA	USSR	UFJN	94	Jun-09 - Jul-10	0	100	3L,3N,3O
				Jul-29 - Jul-29	0	1	3L
SKOGAFOSS	ANTIGUA AN	V2QT	94	Jan-04 - Jan-05	10	0	4X,5Y
				Jan-15 - Jan-16	11	0	3K
				Jan-27 - Feb-01	15	0	2J,3K,3L,4X, 5Y,5ZW
				Feb-22 - Feb-23	3	0	3K,3M
				Feb-28 - Mar-01	5	0	4X,5Y,5ZW
				Mar-23 - Mar-29	9	0	3K,3M,3N,4X,5Y
				Apr-08 - Apr-09	10	0	3K,3M,3N
				May-03 - May-09	13	0	1F,3K,4X,5Y, 5ZW

				Jun-16 - Jun-17	23	0	1F,2J,3K,3L
				Jun-27 - Jul-04	20	0	1F,2J,3K,4X, 5Y,5ZW
				Jul-25 - Aug-01	28	0	1F,2J,3K,4X, 5Y,5ZE,5ZW
				Aug-22 - Aug-28	18	0	1F,2J,3K,4X, 5Y,5ZW
				Sep-09 - Sep-11	36	0	1F,2J,3K,3L,3M
				Oct-17 - Oct-25	20	0	1F,2J,3K,4X, 5Y,5ZW,6C
				Nov-14 - Nov-21	18	0	1F,2J,3K,4X, 5Y,5ZW
				Dec 12 - Dec 19	22	0	1F,2J,3K,3L, 4X,5Y,5ZW
GADUS ATLANTICA	CANADA	VC9450	94	May-21 - May-28	0	6	3L,3PS
				Jun-08 - Oct-31	151	284	2J,3K,3L,3M, 3N,3O,3PS,3PN, 4R,4VN,4VS,4W
				Nov-08 - Dec 20	12	271	2J,3K,3L
M/V POLAR EXPLORER	CANADA	VGWW	94	Jan-25 - Feb-07	14	0	3K,3L
AIRCRAFT	CANADA	VP26	94	Dec 09 - Dec 13	5	0	3N,6H
BIBI	UK	VSBI3	94	Jan-10 - Jan-10	2	0	6H
				Apr-14 - Apr-16	5	0	6E,6F,6G,6H
				May-28 - May-29	3	0	6G,6H
				Jul-12 - Jul-13	3	0	4VS,6E
				Aug-23 - Aug-25	10	0	3M,4VS,6E,6F, 6G
				Oct-10 - Oct-10	1	0	6H
ZANDVOORT	CANADA	VY3574	94	Feb-05 - Feb-06	3	0	3N
				Feb-13 - Mar-14	59	0	3K,3L,3M,3N
SEA-LAND ACHIEVER	USA	WPKD	94	Jan-25 - Jan-27	5	0	3M,3N,4W
				Mar-04 - Mar-06	5	0	3M,3N,3O,4VS, 4X
				Mar-16 - Mar-17	2	0	3M,4VS
				Apr-06 - Apr-08	8	0	3M,3N,4VS
				Apr-19 - Apr-19	2	0	3M
				May-14 - May-16	11	0	3M,6E,6F,6H
PRESIDENT MCKINLEY	USA	WVFZ	94	Aug-28 - Aug-28	2	0	6B,6C
				Sep-11 - Sep-11	1	0	6B
				Oct-09 - Oct-10	2	0	6B,6C
				Oct-16 - Oct-16	1	0	6B
				Nov-07 - Nov-07	1	0	6C
				Nov-14 - Nov-14	1	0	6C
				Nov-20 - Nov-20	1	0	6C
				Nov-28 - Nov-28	1	0	6C
				Dec 04 - Dec 05	3	0	6A,6B,6C
				Dec 12 - Dec 12	2	0	6B,6C
				Dec 18 - Dec 18	1	0	6C
				Dec 27 - Dec 27	2	0	6C
STAR DRIVANGER	UK	ZCKP	94	Feb-08 - Feb-08	3	0	6H
				Jul-18 - Jul-18	1	0	6H
				Aug-22 - Aug-23	3	0	6H
				Oct-21 - Oct-22	2	0	6H
STAR DROTTANGER	UK	ZCKU	94	Mar-08 - Mar-10	5	0	3N,4VS,6D,6E, 6F
				Apr-07 - Apr-10	6	0	3N,6E,6F,6G

Table 3(b): Ocean Subsurface Data (other than IGOSS) for 1994.
Total = 776 stations

Country	Cruise Num	Cruise Period	BT	CTD	BOTTLE	NAFO Subarea
CANADA	181093102	Jan-04 - Jan-05	12	0	0	4X,5Y
CANADA	181094100	Jan-26 - Feb-01	21	0	0	1F,2J,3K,3L,4X,5Y,5ZW
CANADA	181094101	Feb-22 - Feb-23	6	0	0	3K,3M
		Feb-28 - Mar-01	12	0	0	4X,5Y,5ZW
CANADA	181094102	Mar-23 - Mar-29	17	0	0	3K,3M,3N,4X,5Y
CANADA	181094103	Apr-08 - Apr-09	19	0	0	3K,3L,3M,3N
CANADA	181094104	May-03 - May-09	19	0	0	1F,2J,3K,4X,5Y,5ZW
CANADA	181094105	May-29 - May-30	10	0	0	1F
CANADA	181094106	Jun-16 - Jun-17	23	0	0	1F,2J,3K,3L
		Jun-27 - Jul-03	20	0	0	1F,2J,3K,4X,5Y,5ZW
CANADA	181094107	Jul-25 - Jul-31	20	0	0	1F,2J,3K,4X,5Y,5ZW
CANADA	181094108	Aug-22 - Aug-28	19	0	0	1F,2J,3K,4X,5Y,5ZW
CANADA	181094109	Sep-10 - Sep-11	23	0	0	1F,2J,3K,3L
CANADA	181094110	Oct-17 - Oct-23	21	0	0	1F,2J,3K,4X,5Y,5ZW
CANADA	181094111	Oct-25 - Oct-25	1	0	0	6B
		Nov-14 - Nov-21	22	0	0	1F,2J,3K,4X,5Y,5ZW
CANADA	181094112	Dec 12 - Dec 19	25	0	0	1F,2J,3K,3L,4X,5Y,5ZW
CANADA	18FR94004	May-30 - Jun-11	43	0	0	4W,4X
CANADA	18HL94002	Jan-17 - Jan-28	32	0	0	4W,4X,5ZE,6B,6C
		Feb-03 - Feb-11	17	0	0	6C
CANADA	18MP94008	Jan-17 - Feb-08	50	0	0	4W,4X,5ZE,6B,6C,6D
CANADA	18MP94009	Feb-28 - Feb-28	1	0	0	6E
		Mar-26 - Mar-26	1	0	0	6C
CANADA	18NE94038	Aug-19 - Sep-07	0	132	0	4R,4S,4T
CANADA	18TN94006	Apr-06 - Apr-21	42	0	0	4W,4X,5ZE,5ZW,6B,6C
CANADA	18TR94001	Jan-14 - Feb-12	67	0	0	4W,4X,5ZE,5ZW,6B,6C

Table 4: Data Collected by Drifing Buoys in the NAFO Area in 1994

BUOY	DATE RANGE	DAYS	SST	AP	AT	WS	WD	TC	NAFO Subareas
12509	Jan-30 - Feb-03	5	X	X	-	-	-	-	4X
13507	Feb-13 - Feb-15	3	X	X	-	-	-	-	4X
13510	Feb-12 - Feb-15	4	X	X	-	-	-	-	4X
13571	Mar-13 - Mar-13	1	X	X	-	-	-	X	6H
13574	Mar-23 - May-22	61	X	X	-	-	-	X	3M,6H
13579	Feb-01 - Feb-02	1	X	X	-	-	-	X	5Y
13927	Jan-13 - Jan-13	1	X	X	-	-	-	-	4VS
25561	Feb-19 - Mar-08	18	-	X	X	-	-	-	1F
31504	Feb-09 - Feb-15	6	X	X	-	-	-	-	4X
41525	Jun-16 - Jun-18	3	-	X	-	X	X	-	6B
41902	Jun-12 - Aug-11	60	X	X	-	-	-	-	6F,6E
41903	Jun-04 - Jul-01	28	X	X	-	-	-	-	6C,6B,6D,6E,4W,4VS,6F
41904	Jun-12 - Dec 10	181	X	X	-	-	-	-	6G,6H,3N,3O,4VS
41905	Mar-25 - May-25	61	X	X	-	-	-	-	6C,6B,6D,6E,6G
41906	Sep-15 - Oct-25	40	X	X	-	-	-	-	6D,6C
41907	Apr-05 - Apr-29	25	X	X	-	-	-	-	6H
41908	Jun-25 - Jul-01	7	X	X	-	-	-	-	6H
41909	Nov-01 - Nov-23	22	X	X	-	-	-	-	6D
41910	Nov-13 - Nov-25	13	X	X	-	-	-	-	6F,6G
41919	Jun-09 - Aug-17	70	X	X	-	-	-	-	6C,6B,6D,5ZE,6E,4W,4X
41922	Nov-22 - Dec 31	40	X	X	-	-	-	-	6F
41925	Aug-21 - Nov-23	94	X	X	-	-	-	-	6E,6D

43512	Feb-13 - Feb-15	3	-	X	-	-	-	-	4X
44501	Jul-05 - Aug-07	34	X	X	-	-	-	-	3N,3M,3K
44502	Jul-15 - Nov-13	121	X	X	-	-	-	-	3K,3L,3N,3M
44503	Jul-26 - Dec 20	148	X	X	-	-	-	-	2J,3K,3L,3M
44504	Jan-20 - Mar-10	49	X	X	-	-	-	-	3O,3N,3PS,4VS
44505	Apr-01 - May-14	44	X	X	-	-	-	-	3N,3M
44506	Apr-01 - Sep-30	182	X	X	-	-	-	-	3O,3N,3M,3K,2J
44507	Apr-21 - Apr-23	2	X	X	-	-	-	-	3N
44509	May-04 - May-05	2	X	X	-	-	-	-	3L
44510	May-20 - Jul-30	71	X	X	-	-	-	-	3L,3N,3M
44511	Jun-06 - Sep-17	103	X	X	-	-	-	-	3K,3L,3M,2J
44512	Jun-17 - Aug-16	61	X	X	-	-	-	-	3K,3L,3M
44520	Sep-10 - Sep-18	8	X	X	-	-	-	-	5ZW,6A
44614	Dec 01 - Dec 08	8	X	X	X	-	-	-	3K,3M
44617	Sep-21 - Dec 15	86	X	X	X	X	X	-	1F,3K,2J
44624	Dec 22 - Dec 31	10	X	X	X	-	-	-	2J,3K
44646	Apr-18 - Apr-19	1	-	-	-	-	-	-	4X
44682	Mar-07 - Apr-29	54	-	X	-	-	-	-	2J,3K
44683	Mar-07 - Apr-29	53	-	X	-	-	-	-	2J
44684	Mar-07 - Apr-23	48	-	X	-	-	-	-	2J,3K
44685	Mar-07 - Apr-29	54	-	-	-	-	X	-	2J,3K
44686	Mar-09 - Apr-27	50	-	-	-	-	-	-	2J,3K,3L
44687	Mar-09 - May-01	54	-	-	-	-	-	-	2J,3K,3L
44690	Mar-09 - Apr-30	53	-	-	-	-	-	-	2J,3K,3L
44691	Mar-09 - Apr-25	48	-	-	-	-	-	-	2J,3K
44692	Mar-10 - Mar-27	18	-	-	-	-	-	-	2J
44693	Mar-10 - Mar-21	11	-	-	-	-	-	-	2J
44694	Mar-10 - Jun-06	89	-	-	-	-	-	-	2J,3K,3L,3M
44762	Oct-03 - Nov-23	52	X	X	X	X	X	-	1F,2J
44764	Jul-25 - Aug-02	9	X	X	X	X	X	-	1F
44766	Jun-22 - Dec 31	193	-	X	X	-	-	-	1F,1E,1D,0B,1C,2G,2H,2J,3K
44769	Dec 16 - Dec 17	1	X	X	X	-	-	-	0A
44770	Nov-02 - Dec 22	50	-	X	X	-	-	-	1F
44772	Jan-08 - Jan-19	12	X	X	X	-	-	-	1F
44774	Jun-01 - Jun-06	6	X	X	X	-	-	-	2J,3K
44775	Aug-02 - Nov-21	112	X	X	X	-	-	-	2J,1F,3K
44776	Aug-02 - Aug-03	2	X	X	X	X	X	-	1F
44905	Aug-27 - Sep-05	10	X	X	-	-	-	-	6H
44906	Sep-16 - Dec 31	106	X	X	-	-	-	-	3L,3PS
44909	Sep-17 - Dec 31	106	X	X	-	-	-	-	3K,3L,3M
47031	Jan-01 - Jun-06	157	-	-	-	-	-	-	0A,0B,1D,2G,2H,2J,3K
47032	Jan-01 - Jul-08	189	-	-	-	-	-	-	0A,0B,1F,2G
47033	Jan-01 - Jul-05	186	-	-	-	-	-	-	0A
47540	Jul-11 - Jul-11	1	-	-	-	-	-	-	2H
47541	Jul-10 - Jul-12	3	-	-	-	-	-	-	3K,2G
47542	Nov-21 - Dec 31	41	-	-	-	-	-	-	0A
47543	Jul-11 - Nov-24	136	-	-	-	-	-	-	2G,1A,0A
47606	Jan-01 - Jan-21	20	-	X	-	-	-	-	1F,2G
48553	Apr-22 - Apr-22	1	-	-	-	-	-	-	4X
52538	Feb-09 - Feb-15	6	X	X	-	-	-	-	4X
54531	Jan-30 - Feb-04	6	X	X	-	-	-	-	4X
54532	Feb-12 - Feb-15	4	X	X	-	-	-	-	4X
57031	Jan-20 - Jan-20	1	-	-	-	-	-	-	0A
62929	Aug-25 - Sep-13	19	X	X	-	-	-	-	1F,0B
64429	Jan-01 - Jan-11	10	X	X	-	-	-	-	2J
64431	Jan-11 - Jan-11	1	X	X	-	-	-	-	1F
64528	Nov-12 - Nov-27	16	-	X	X	-	-	-	1F
64544	Nov-20 - Dec 31	42	X	X	-	X	X	-	1F,2G
64927	Feb-09 - Feb-09	1	X	X	-	-	-	-	1A

65503	Jan-03 - Jan-03	1	X	X	-	-	-	-	2G
65571	Nov-09 - Nov-22	14	-	X	X	-	-	-	1F
65581	Jan-08 - Apr-05	88	X	X	X	-	-	-	1F,1E
65592	Sep-02 - Sep-03	1	X	X	X	-	-	-	1F
65901	Jan-02 - Nov-29	331	X	X	-	-	-	-	1F,1E,2G,2H,2J,3K,3L,3M
65902	Oct-27 - Dec 31	66	X	X	-	-	-	-	2G,2H,2J,3K
65903	Nov-03 - Dec 12	40	X	X	-	-	-	-	1F

Table 6: Wave measurement data in the NAFO area for 1994. Total Spectra = 91170

STATION NAME	LATITUDE	LONGITUDE	INST TYPE	WATER DEPTH (M)	START TO END DATE (DD/MM)		NUMBER OF GOOD SPECTRA	NAFO SUBAREA
HOTEL	38.5000	70.7000	WA	3231.0	01/01	31/12	7978	6B
GULF OF ME	42.6000	68.6000	WA	204.0	01/01	31/12	7051	5Y
NANTUCKET	40.5000	69.4000	WA	60.0	01/01	31/12	8206	5ZE
DEL BAY	38.5000	74.7000	WA	28.0	30/06	31/12	4063	6B
GEORGES BANK	41.1000	66.6000	WA	88.0	12/01	31/12	8093	5ZE
LONG ISLAND	40.3000	73.2000	WA	40.0	01/01	31/12	8094	6A
East Scotian Slope	41.2330	61.4330	AE	4500.0	01/01	30/12	4861	4W
SW Grand Banks	44.2330	53.6330	AE	1500.0	01/01	30/12	3880	3O
Banquereau	44.3170	57.3500	AE	1100.0	01/01	01/11	5462	4VS
Tail of the Bank	42.7330	50.5170	AE	1430.0	12/09	15/12	1816	5Y
Laurentian Fan	42.0670	56.1500	AE	4500.0	02/07	30/12	1188	4VS
La Have Bank	42.4670	64.2330	AE	1500.0	01/01	30/12	5037	4X
Irving Whale	47.3670	63.3330	AE	73.0	02/07	01/12	1560	3P
Prince Edward Point	43.7830	76.8670	AE	72.0	01/07	06/12	52	5Y
Mont Louis	49.5670	65.7670	AE	180.0	01/07	06/10	1006	4S
Pt. Colbourne	42.7330	79.2830	AE	24.0	01/07	27/11	906	5Y
TORBAY	47.6330	52.5000	WA	164.4	01/01	10/02	4041	3L
OSBORNE HEAD	44.4830	63.4170	WA	56.7	01/01	05/12	7829	4W
Port-Aux-Basques Inn	47.5670	59.1330	WA	27.4	01/01	31/12	2646	3P
Port-Aux-Basques Out	47.5670	59.1000	WA	61.6	01/01	31/12	2020	3P
Point Petre	43.8330	77.3670	ME	40.0	30/05	19/10	5239	5Y
PARIZEAU WAVEC	46.0000	54.0050	WD	200.0	30/11	06/12	142	3P

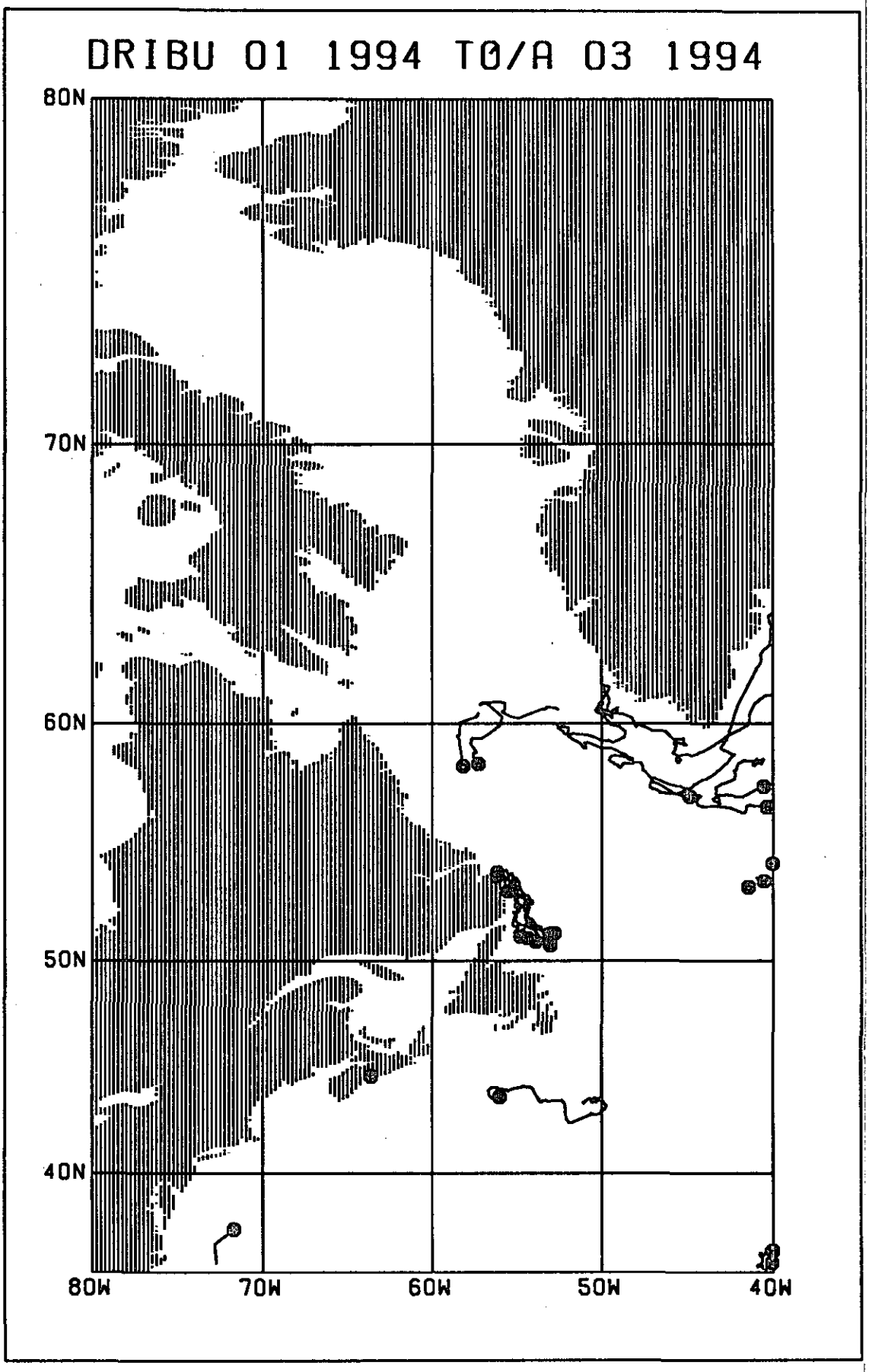
Table 7: Historical data (from years prior to 1994), recieved at MEDS since last NAFO report for 1993. Total Stations = 5569

MEDS Cruise No	Year	BT	Bottle	CTD	NAFO Subarea
180589001	1989	0	1	0	3L
180589002	1989	0	3	0	3L,3K
180589003	1989	0	1	0	3L
180589004	1989	0	1	0	3L
180589005	1989	0	1	0	3L
180589006	1989	0	1	0	3L
180589008	1989	0	1	0	3L
180589009	1989	0	1	0	3L
180589010	1989	0	1	0	3L
180589013	1989	0	1	0	3L
180589014	1989	0	12	0	3O,3N
180589015	1989	0	68	0	3P,3L
180589016	1989	0	3	0	3L,3N,3O
180589017	1989	0	21	0	3L,3K
180589020	1989	0	4	0	2J,3L

180589021	1989	0	1	0	3L
180589022	1989	0	1	0	3L
180589026	1989	0	1	0	3L
180589028	1989	0	2	0	2J
180589034	1989	0	13	0	3K,3L
180589035	1990	0	46	0	3L,3K,3M
180590003	1990	0	2	0	3L
180590004	1990	0	1	0	3L
180590005	1990	0	2	0	3L
180590006	1990	0	1	0	3L
180590007	1990	0	1	0	3L
180590012	1990	0	1	0	3L
180590016	1990	0	2	0	3L
180590017	1990	0	2	0	3L
180590018	1990	0	2	0	3L
180590019	1990	0	2	0	3L
180590020	1990	0	2	0	3L
180590021	1990	0	2	0	3L
180590022	1991	0	1	0	3L
180591003	1991	0	2	0	3L
180591005	1991	0	1	0	3L
180591012	1991	0	1	0	3L
180591014	1991	0	1	0	3L
180591017	1991	0	2	0	3L
180591019	1991	0	1	0	3L
180591022	1991	0	2	0	3L
180591033	1991	0	1	0	3O
180591036	1991	0	1	0	3L
180591047	1991	0	1	0	3L
180591050	1992	0	1	0	3L
180592013	1992	0	2	0	3L
180592016	1992	0	2	0	3L
180592019	1992	0	2	0	3L
180592024	1992	0	2	0	3L
180592029	1992	0	1	0	3L
180592033	1987	0	2	0	3L
181087001	1987	0	0	43	3M,3N,XX
181087002	1987	0	0	116	3L,3O
181087005	1987	0	0	49	4X,5Z,4W
181087012	1987	0	0	65	3N,3O,3L,3M
181087015	1987	0	0	127	4X
181087026	1987	0	0	46	2J,2H,3K
181087035	1987	0	0	755	4V
181087038	1987	0	0	39	4X
181087041	1987	0	0	115	3N,3O
181087045	1987	0	0	53	4V,4T,4S,4R,3P,4W
181087918	1988	0	0	5	2H
181088003	1988	0	0	76	4W,5Z,4X
181088017	1988	0	0	33	5Z
181088023	1988	0	0	193	5Z,4X
181088025	1988	0	0	57	2J,3L,2H,3M,XX,3K
181088036	1988	0	0	227	5Z
181088037	1988	0	0	115	1B,0A,1C,0B
181088042	1989	0	0	66	4S,4T,4V,4R
181088043	1988	0	0	1	3K
181088918	1989	0	0	7	2H
181089016	1990	0	0	22	1B,2J,0B,3K,1F,XX
181089036	1990	0	0	29	4S,4T,4R,4V
181089041	1989	0	0	121	3L,3K,3M,3N

181089918	1990	0	0	5	2J,2H
181090008	1990	0	0	14	3L
181090012	1990	0	0	31	2H,1F,2J
181090014	1990	0	0	69	4W
181090022	1990	0	0	117	1B,1A,0A,1C,0B,XX
181090904	1984	0	0	197	4T,XX
181884019	1984	1	0	0	6B
181884022	1986	1	0	0	4W
181886028	1986	1	0	0	4W
181886030	1986	1	0	0	4V
181886033	1986	1	0	0	4W
181886036	1987	1	0	0	4W
181887002	1987	2	0	0	4X,6C
181887005	1987	1	0	0	4X
181887007	1987	1	0	0	4X
181887008	1987	1	0	0	4X
181887012	1987	1	0	0	6C
181887024	1987	1	0	0	4W
181887037	1987	1	0	0	4W
181887044	1987	1	0	0	4W
181887055	1987	1	0	0	4X
181887056	1987	1	0	0	4X
181887063	1987	1	0	0	4X
181887065	1988	1	0	0	6E
181888013	1988	1	0	0	4V
181888014	1988	2	0	0	4W
181888018	1988	1	0	0	4X
181888022	1988	1	0	0	4W
181888041	1989	1	0	0	4X
181889001	1989	13	0	0	4W,4X
181889002	1989	7	0	0	4X,3O,3N,4V
181889003	1989	16	0	0	4X,4W
181889004	1989	1	0	0	4X
181889005	1989	3	0	0	4W
181889007	1991	1	0	0	4T
181891005	1991	30	0	0	4W,4X,6D,6E
181891012	1991	1	0	0	3N
181891025	1991	3	0	0	4T,4W
181891026	1991	17	0	0	4W,4X,4V,4T
181891027	1991	1	0	0	4W
181891028	1991	13	0	0	4X
181891029	1991	37	0	0	4X,4W
181891030	1991	66	0	0	4W,4X
181891031	1992	29	0	0	5Z,4X
181892001	1992	3	0	0	4W
181892002	1992	8	0	0	4W,4X,5Y
181892003	1992	1	0	0	4X
181892007	1992	24	0	0	3N,3L,3O,4W,4V
181892008	1992	13	0	0	4W,4X
181892009	1992	7	0	0	4X,4W
181892010	1992	31	0	0	3P,4W,3L,4X,3O,4V
181892016	1992	46	0	0	4X,4W,5Z,4V,3P,3L
181892017	1992	7	0	0	5Z,6D,4X,4W
181892018	1992	16	0	0	3N,4X,3O,4W,6B,5Z,3M,4V
181892020	1992	31	0	0	3L,3O,4V,3P,3N
181892021	1991	35	0	0	4X,4V,3P,3L,4W,3O
181892022	1992	41	0	0	6B,5Z
181892023	1992	29	0	0	4X,4W,5Y
181892025	1992	5	0	0	4W

181892026	1992	3	0	0	4V,4T,4W
181892027	1992	4	0	0	4T,4W,4V
181892028	1992	17	0	0	4X
181892029	1992	3	0	0	3M,3N
181892030	1992	18	0	0	3M,5Z,6B,6C,4X,4V,6D,4W,3O
181892031	1992	10	0	0	4W,4X
181892032	1992	4	0	0	3M,3L,3O,4W
181892033	1992	9	0	0	4X,4W
181892034	1992	12	0	0	4W
181892035	1992	25	0	0	4W,4X
181892039	1992	8	0	0	4X,4W
181892040	1992	6	0	0	4X,4W
181892041	1993	2	0	0	4W,4X
181893001	1993	21	0	0	4W,4X
181893002	1993	5	0	0	4X,4W
181893003	1993	24	0	0	4X,4W,4V
181893004	1993	8	0	0	4X
181893005	1993	19	0	0	4W,4X
181893006	1993	43	0	0	6C,5Z,6B,4X,XX
181893007	1993	5	0	0	4W,4X
181893008	1993	11	0	0	4X
181893009	1993	15	0	0	6B,6C,6D,5Z,4X
181893010	1993	10	0	0	4X,6B,5Z
181893011	1993	6	0	0	4W
181893013	1993	12	0	0	4X,4W
181893014	1993	31	0	0	4X,4W
181893015	1993	40	0	0	3N,3L,3O,4W,3M,4V
181893016	1993	10	0	0	4W,4X
181893017	1993	12	0	0	6C,5Z,6D,XX,4X
181893018	1993	13	0	0	6E,4X,4W,XX
181893019	1993	45	0	0	4W,4X
181893020	1993	60	0	0	4X,4W
181893021	1987	15	0	0	4X,4W
181987018	1987	1	0	0	4X
181987034	1987	3	0	0	3N,3O
181987035	1991	1	0	0	4W
181991023	1991	5	0	0	4V,4T,4W,4S
181991024	1991	18	0	0	4X,4W
181991025	1992	45	0	0	4W,4X
181992009	1993	19	0	0	3M,4X,XX,6B,5Z,6D,3O,3N,6C
18VQ93051	1993	9	0	0	4X,4W
18VQ93052	1993	13	0	0	4W,4X
18VQ93053	1993	2	0	0	4X
18VQ93054	1993	13	0	0	4W,4X
18VQ93055	1993	2	0	0	4W
18VQ93056	1978	2	0	0	4X,4W
26AJ78001	1979	0	96	0	1D,1B,1C,1E,1A
26AJ79001	1991	0	60	0	1D,1A,1B,1C,1E,1F
RUKS91025	1992	0	182	0	2G,0B,2H,1D,3K,3L,2J,1C,3M
RUKS92029	1990	0	125	0	2G,2J,0B,2H,3K,3M,3L,1D,1E
RUP390048	1991	0	354	0	3N,3L,3K,3O,3M
RUVJ91035	1991	0	211	0	3O,3N,3L,3M
RUVJ91037	1993	0	105	0	3N,3K,3L,2J,3O,3M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70N
60N
50N
40N
80W
70W
60W
50W
40W

FIGURE 1.

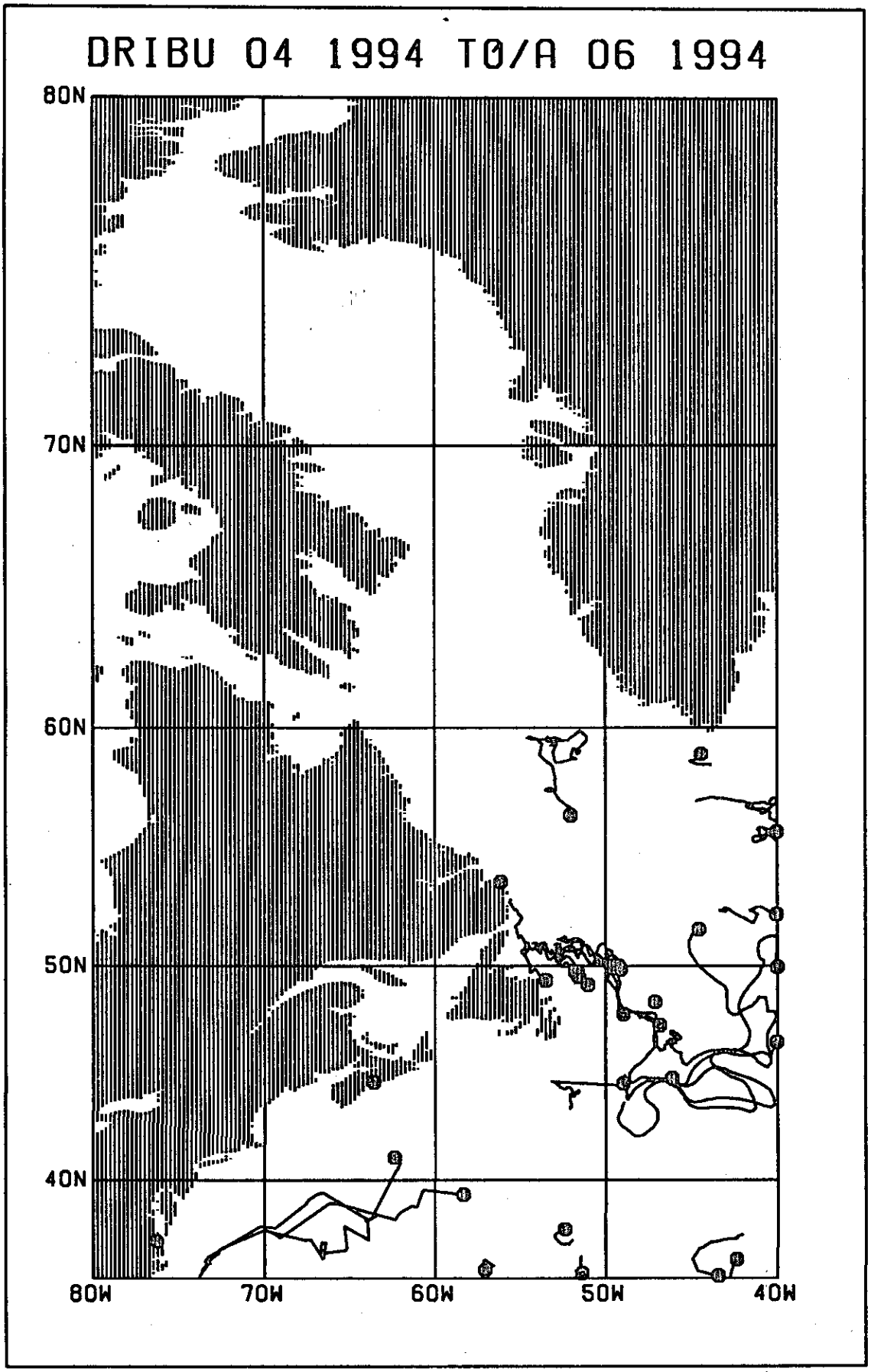
DRIBU 04 1994 T0/A 06 1994
80N
70N
60N
50N
40N
80W
70W
60W
50W
40W

FIGURE 2.

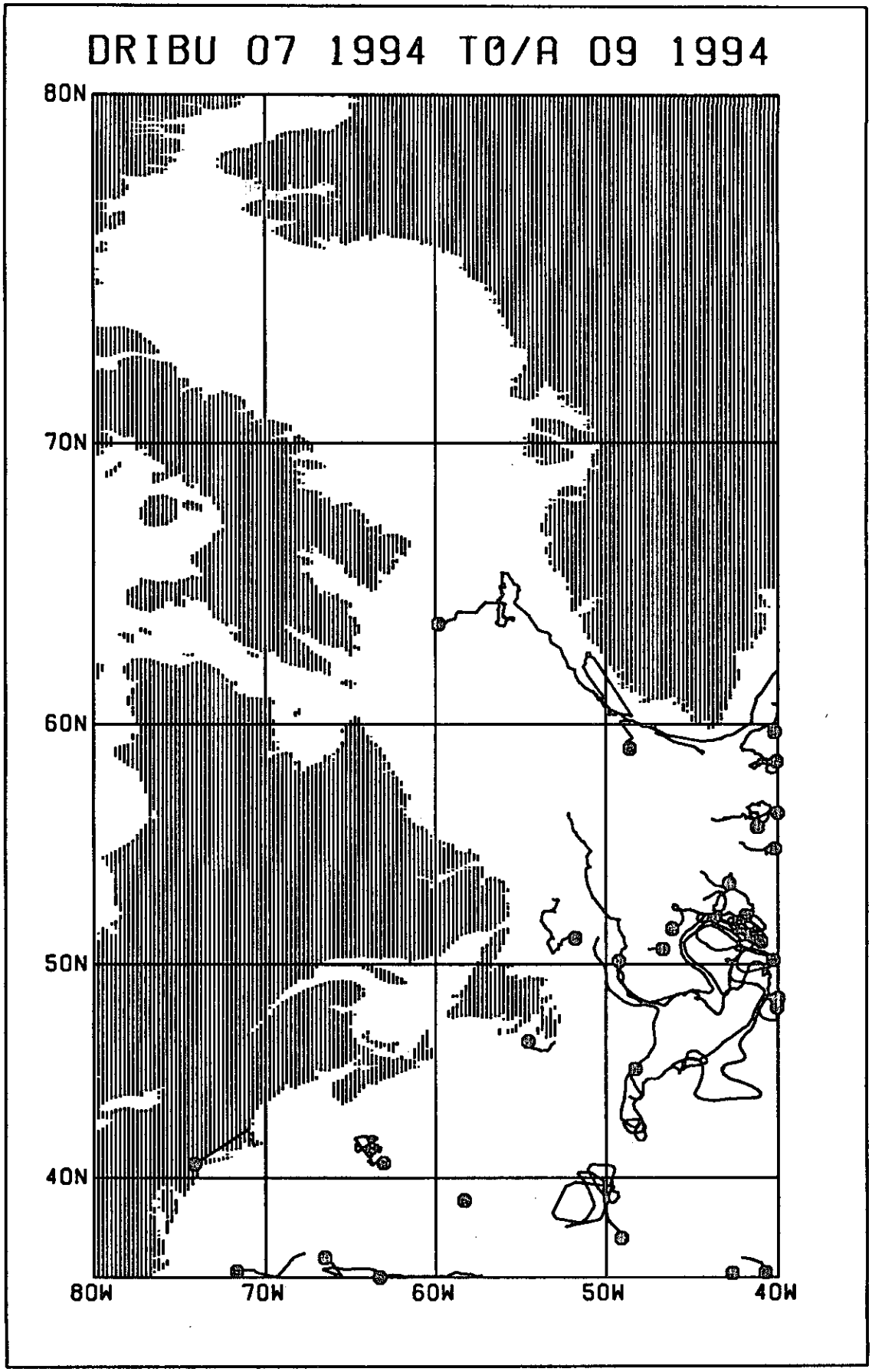
DRIBU 07 1994 T0/A 09 1994
80N
70N
60N
50N
40N
80W
70W
60W
50W
40W

FIGURE 3.

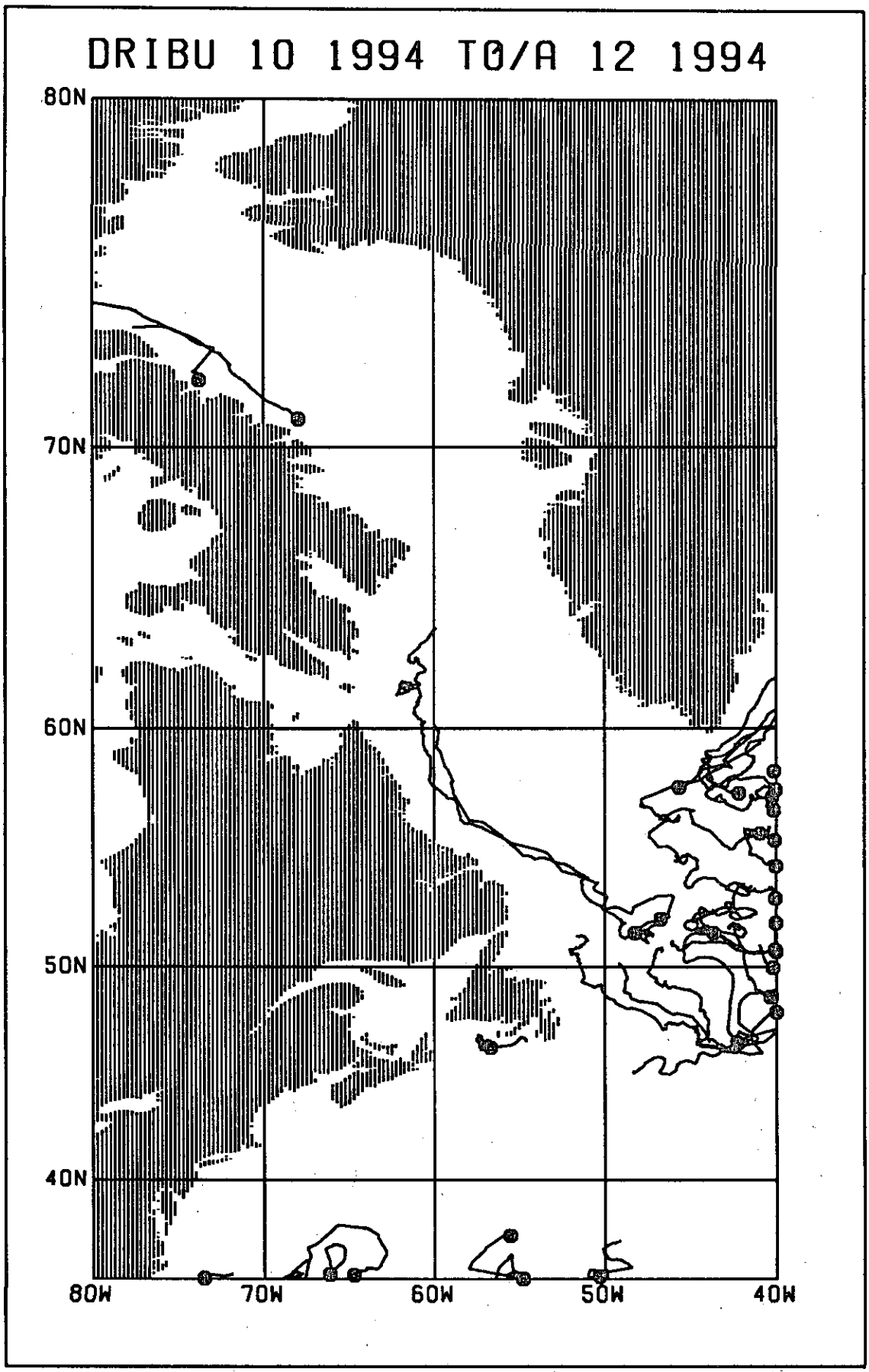
DRIBU 10 1994 TO/A 12 1994
80N
70N
60N
50N
40N
80W
70W
60W
50W
40W

FIGURE 4.