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Environmental Extremes Observed in 1983 *in-situ* Wave Recording and  
Coastal Tide Gauge Records Within Canadian East Coast Waters

by

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**Introduction**

The Marine Environmental Data Services Branch of the Department of Fisheries and Oceans, CANADA, acts only as the responsible National Data Centre for oceanographic data collected by NAFO countries, but is also the National Data Centre for Tides and Water Levels data, as well as for surface wave observations within the Canadian Area of Interest. There exist a number of environmental data sets that are utilized in preparing environmental overviews which enhance the usefulness and reliability of such an assessment. With this in mind, the author wishes to point out some specific observations about the 1983 tidal and wave records collected within the ICNAF area, and in particular, the meteorological storm during the latter half of December 1983 whose severity has caused exceedances in all-time observations in both tidal and wave records.

**METHODS**

**Tidal Gauge Records**

MEDS processes Tide and Water Level data for more than 140 stations along the Canadian coastline and in the St. Lawrence River, Great Lakes, and other navigable waters. The earliest data begins before the turn of the century and are presently operated by the Water Survey of Canada for the Canadian Hydrographic Service.

Although present technology allows MEDS to access some tidal gauges in real-time, most gauges still record in analog and are subsequently reduced to digital hourly records, which form the basis of our historical databanks. Several decades of hourly observations at many permanent stations are presently available.

Some of the East Coast Stations are represented in Figure 1 with their exact locations listed in Table 1. Extremes of observations were abstracted from hourly records at these locations and are presented in Table 2. Note that the entire periods of record for each station are not represented here, however, the majority have more than a decade of observations for this presentation.

**Wave Records**

MEDS' Wave Climate Study program began in 1968 and has grown in scope over the years to its present level of support of approximately 40 stations annually, the majority of which are connected with the offshore hydrocarbon industry.

Although present technology allows MEDS to receive real-time satellite transmissions of recorded wave spectra, most observations are still recorded as a frequency modulated signal transmitted from moored waverider buoys. The data are recorded at 7.5 Hz for 20 minutes every 3 hours, as a norm. MEDS performs a reduction of these data by storing approximately 60 spectral estimates between the periods from 2 to 20 seconds. The significant wave height and peak period for each record are estimated for each 20 minute record. Directional information however is not available from this instrumentation.

Figures 2, 3 and 4 show the positions of historical observations of wave data collected for the East Coast of Canada presently stored at MEDS. A current list of wave stations is available from MEDS. Two stations on the East Coast in particular have been maintained as long term stations to yield information on the variability of the level of wave activity from year to year and over longer time scales. These are Station 37, OSBORNE HEAD (44°-32'-40"N, 63°-32'-15"W) and Station 16, LOGY BAY (47°-37'-00"N, 52°-25'-27"W) both of which now have over 10 years of data and are still actively recording. Most offshore records are in direct response to hydrocarbon exploration activities.

### Discussion

Exceedance of all-time values in long period records in tidal records are indicative of severity of conditions for short time frames and of local trends or changes in conditions on longer time scales.

During 1983, five tidal stations recorded changes to their instantaneous elevations. Four of these changes occurred in December of 1983, which indicate a severe storm or storms for these regions. Of particular note are the exceedances at Argentia (0835), St. John's (0905), and West St. Modeste (2595) in NAFO SUBDIVISION 3K during the last week of December 1983.

Long time DAILY MEANS (averages of a minimum of 22 hours of data per day at a tidal station) were exceeded at seven stations during 1983. The stations were mainly within NAFO regions 4S, 4R and 4T and four of the seven exceedances in daily means occurred on December 7, 1983.

Long time MONTHLY MEANS (averages of a minimum of 20 days of data) were exceeded at 9 stations during 1983. Of note is that 7 out of the 9 stations show a monthly exceedance for November of 1983. These seven stations were distributed throughout the east shore of Nova Scotia and western shore of the Gulf of St. Lawrence in NAFO sub-divisions 4W, 4N and 4T.

Long time ANNUAL MEANS (averages of a minimum of 180 Daily Means) were exceeded at 7 stations during 1983. The stations in the region near Prince Edward Island, in NAFO subdivision 4T, in particular, all show annual exceedance in water levels from their long periods of record.

In-situ waverider accelerometer buoys provide information on local surface gravity wave conditions as well as longer period swell waves which may have originated from another more distant region. Statistical information acquired over long periods of time provide a basis from which general conclusions may be drawn about the wave climate regime. With the advent of the offshore petroleum research and exploration industry during the last decade, more information concerning the wave regime on the shelves and banks within the NAFO area have become available.

Figure 5 illustrates the positions at which in-situ wave records were collected during 1983 and Table 3 lists their exact positions, depths and recording periods. Of particular interest is the storm in December of 1983 in region 3L of the NAFO area. Figure 6 shows the December time series of the significant wave height at Station 16, 134, and 168. Logy Bay, Station 16, is the long period station (1972 to 1983) for this area. Note that at Station 16 significant wave height of 10.1 meters was recorded on December 22, 1983, an all time highest value. The two offshore oil drilling platforms SEDCO 706 (STATION 134) and JOHN SHAW (STATION 168), recording at the Hibernia offshore oil exploration area registered significant wave heights of 12.5 m and 13.3 meters respectively on the same day of December 22, 1983. This latter wave height of 13.3 meters is the highest recorded significant wave height ever recorded for all of MEDS historical wave databanks to date. The peak periods (maximum of the wave frequency spectrum) for all three instances was 17 seconds.

### Conclusion

The implications of such exceedances in both tidal and wave records on the water column itself may or may not be termed severe depending on the spatial and temporal scales being researched; however, the broad-scale low pressure system that such meteorological events produce would affect locally generated currents on a very broad scale. The storm which occurred during 22-26 December 1983 in NAFO Subdivision 3L presents itself well to further studies to establish extremes of variability induced on a region at these time scales.

TABLE 1. Coastal tide gauge locations.

Location and Station Number	Latitude North	Longitude West	Bench Mark Elevation Number	
Saint John, N.B. (0065)	45°16.06'	66°03.76'	10.796	1924
Parkers Cove, N.S. (0320)	44°48.00'	65°32.00'	9.276	69-N-019
Yarmouth, N.S. (0365)	43°50.20'	55°07.30'	22.875	2034
Boutilier Point, N.S. (0482)	44°39.33'	63°57.35'	5.279	TS-3-1968
Halifax, N.S. (0490)	44°39.66'	63°35.23'	5.532	1180-B
Point Tupper, N.S. (0576)	45°36.00'	61°22.00'	7.994	WSC No. 1
North Sydney, N.S. (0612)	46°13.00'	60°15.00'	4.210	229-M
Port aux Basques, Nfld. (0665)	47°34.47'	59°08.41'	5.613	WSC No. 1
Argentia, Nfld. (0835)	47°18.00'	53°59.00'	4.136	WSC No. 3
St. John's, Nfld. (0905)	47°33.50'	52°42.60'	3.602	77-K
Nain, Labrador, Nfld. (1430)	56°32.52'	61°41.42'	8.681	YARD
Pictou, N.S. (1630)	45°40.51'	62°42.09'	5.674	TS-1907
Charlottetown, P.E.I. (1700)	46°13.84'	63°07.32'	5.067	TS-1-1949
Pointe-du-Chene, N.B. (1805)	48°15.00'	64°32.00'	4.374	H.S.-1940
Rustico, P.E.I. (1915)	46°28.00'	63°17.00'	3.274	W.S.C.-3
Lower Escuminac, N.B. (2000)	47°04.70'	64°53.40'	5.118	12-1972
Dalhousie, N.B. (2165)	48°04.37'	66°22.87'	4.118	3-1964
Riviere-au-Renard, Que. (2330)	48°59.83'	64°23.00'	24.643	MDCCCXXIII
Harrington Harbour, Que. (2550)	50°29.81'	59°28.68'	3.257	HS "5"
West St. Modeste (Labrador), Nfld. (2595)	51°35.80'	56°42.10'	14.402	W.S.C.-1
Lark Harbour, Nfld. (2685)	49°06.08'	58°21.88'	2.787	HS-1-1959
Sept-Iles, Que. (2780)	50°11.80'	66°23.62'	8.385	1217-R
Baie-Comeau, Que. (2840)	49°13.77'	68°07.88'	58.987	1327-R
Sainte-Anne-des-Monts, Que. (2935)	49°08.00'	66°29.00'	7.407	MCCCLXXXIX

TABLE 2. Extremes in East Coast tidal stations.

EXTREME LEVELS			
STATION 85 SAINT JOHN N B		DATA FROM 1 1963 TO 12 1983	
	HIGHEST EVER		LOWEST EVER
YEARLY MEAN ELEVATION	4.46 IN 1981	YEARLY MEAN ELEVATION	4.36 IN 1964
MONTHLY MEAN ELEVATION	4.58 IN 5 1972	MONTHLY MEAN ELEVATION	4.27 IN 4 1964
DAILY MEAN ELEVATION	4.88 ON 7 12 1983	DAILY MEAN ELEVATION	3.84 ON 31 12 1963
INSTANTANEOUS ELEVATION	9.22 AT 15 6 4 1977	INSTANTANEOUS ELEVATION	-.34 AT 1728 30 12 1963
STATION 320 PARKERS COVE N S		DATA FROM 9 1970 TO 12 1983	
	HIGHEST EVER		LOWEST EVER
YEARLY MEAN ELEVATION	4.70 IN 1973	YEARLY MEAN ELEVATION	4.42 IN 1982
MONTHLY MEAN ELEVATION	5.16 IN 12 1973	MONTHLY MEAN ELEVATION	4.41 IN 6 1973
DAILY MEAN ELEVATION	5.39 ON 6 12 1973	DAILY MEAN ELEVATION	3.93 ON 5 11 1979
INSTANTANEOUS ELEVATION	9.88 AT 1152 11 12 1973	INSTANTANEOUS ELEVATION	-.30 AT 1815 26 2 1971
STATION 385 YARMOUTH N S		DATA FROM 8 1966 TO 12 1983	
	HIGHEST EVER		LOWEST EVER
YEARLY MEAN ELEVATION	2.57 IN 1983	YEARLY MEAN ELEVATION	2.47 IN 1974
MONTHLY MEAN ELEVATION	2.62 IN 3 1983	MONTHLY MEAN ELEVATION	2.32 IN 9 1975
DAILY MEAN ELEVATION	3.08 ON 16 12 1972	DAILY MEAN ELEVATION	2.02 ON 8 1 1968
INSTANTANEOUS ELEVATION	5.90 AT 1225 2 2 1976	INSTANTANEOUS ELEVATION	-.51 AT 1655 9 1 1974
STATION 482 BOUTILIER POINT N S		DATA FROM 1 1968 TO 6 1983	
	HIGHEST EVER		LOWEST EVER
YEARLY MEAN ELEVATION	1.26 IN 1981	YEARLY MEAN ELEVATION	1.12 IN 1974
MONTHLY MEAN ELEVATION	1.53 IN 2 1979	MONTHLY MEAN ELEVATION	1.02 IN 4 1969
DAILY MEAN ELEVATION	1.94 ON 17 3 1981	DAILY MEAN ELEVATION	.62 ON 3 2 1976
INSTANTANEOUS ELEVATION	2.88 AT 830 7 3 1981	INSTANTANEOUS ELEVATION	-.34 AT 1440 18 1 1976
STATION 490 HALIFAX N S		DATA FROM 1 1963 TO 12 1983	
	HIGHEST EVER		LOWEST EVER
YEARLY MEAN ELEVATION	1.32 IN 1981	YEARLY MEAN ELEVATION	1.23 IN 1963
MONTHLY MEAN ELEVATION	1.47 IN 11 1983	MONTHLY MEAN ELEVATION	1.11 IN 4 1964
DAILY MEAN ELEVATION	1.83 ON 29 1 1979	DAILY MEAN ELEVATION	.72 ON 3 2 1976
INSTANTANEOUS ELEVATION	3.09 AT 1935 23 2 1967	INSTANTANEOUS ELEVATION	-.30 AT 1319 24 1 1963
STATION 876 POINT TUPPER N S		DATA FROM 1 1971 TO 12 1983	
	HIGHEST EVER		LOWEST EVER
YEARLY MEAN ELEVATION	1.36 IN 1979	YEARLY MEAN ELEVATION	1.25 IN 1982
MONTHLY MEAN ELEVATION	1.47 IN 11 1983	MONTHLY MEAN ELEVATION	1.17 IN 2 1981
DAILY MEAN ELEVATION	1.75 ON 19 11 1976	DAILY MEAN ELEVATION	.86 ON 18 1 1982
INSTANTANEOUS ELEVATION	2.95 AT 1133 20 10 1974	INSTANTANEOUS ELEVATION	-.06 AT 100 4 10 1975
STATION 812 NORTH SYDNEY N S		DATA FROM 1 1970 TO 12 1983	
	HIGHEST EVER		LOWEST EVER
YEARLY MEAN ELEVATION	1.05 IN 1981	YEARLY MEAN ELEVATION	.99 IN 1982
MONTHLY MEAN ELEVATION	1.23 IN 12 1970	MONTHLY MEAN ELEVATION	.75 IN 3 1980
DAILY MEAN ELEVATION	1.62 ON 19 11 1976	DAILY MEAN ELEVATION	.51 ON 14 3 1980
INSTANTANEOUS ELEVATION	2.60 AT 1900 5 2 1974	INSTANTANEOUS ELEVATION	-.18 AT 1615 18 3 1980
STATION 885 PORT AUX BASQUES NFLD		DATA FROM 1 1963 TO 12 1983	
	HIGHEST EVER		LOWEST EVER
YEARLY MEAN ELEVATION	1.20 IN 1977	YEARLY MEAN ELEVATION	1.08 IN 1967
MONTHLY MEAN ELEVATION	1.31 IN 12 1970	MONTHLY MEAN ELEVATION	.97 IN 4 1968
DAILY MEAN ELEVATION	1.67 ON 19 11 1976	DAILY MEAN ELEVATION	.69 ON 16 3 1968
INSTANTANEOUS ELEVATION	2.61 AT 1105 4 2 1969	INSTANTANEOUS ELEVATION	-.20 AT 528 20 1 1965

Table 2 (cont'd)

**STATION 835 ARGENTIA NFLD**

HIGHEST EVER  
 YEARLY MEAN ELEVATION 1.34 IN 1972  
 MONTHLY MEAN ELEVATION 1.52 IN 12 1972  
 DAILY MEAN ELEVATION 1.92 ON 22 12 1983  
 INSTANTANEOUS ELEVATION 3.38 AT 1135 25 12 1983

**DATA FROM 2 1971 TO 12 1983**

LOWEST EVER  
 YEARLY MEAN ELEVATION 1.26 IN 1982  
 MONTHLY MEAN ELEVATION 1.14 IN 6 1982  
 DAILY MEAN ELEVATION .93 ON 16 5 1979  
 INSTANTANEOUS ELEVATION -.41 AT 1405 5 4 1981

**STATION 905 ST. JOHN'S NFLD**

HIGHEST EVER  
 YEARLY MEAN ELEVATION .80 IN 1968  
 MONTHLY MEAN ELEVATION 1.01 IN 11 1983  
 DAILY MEAN ELEVATION 1.45 ON 16 2 1966  
 INSTANTANEOUS ELEVATION 2.28 AT 907 22 12 1983

**DATA FROM 1 1983 TO 12 1983**

LOWEST EVER  
 YEARLY MEAN ELEVATION .73 IN 1969  
 MONTHLY MEAN ELEVATION .60 IN 5 1976  
 DAILY MEAN ELEVATION .25 ON 8 2 1965  
 INSTANTANEOUS ELEVATION -.47 AT 1450 16 3 1968

**STATION 1430 NAIN (LABRADOR) NFLD**

HIGHEST EVER  
 YEARLY MEAN ELEVATION 1.61 IN 1974  
 MONTHLY MEAN ELEVATION 1.66 IN 12 1963  
 DAILY MEAN ELEVATION 2.84 ON 1 12 1980  
 INSTANTANEOUS ELEVATION 3.43 AT 810 22 11 1972

**DATA FROM 10 1983 TO 11 1983**

LOWEST EVER  
 YEARLY MEAN ELEVATION 1.43 IN 1967  
 MONTHLY MEAN ELEVATION 1.22 IN 3 1967  
 DAILY MEAN ELEVATION 1.03 ON 25 3 1967  
 INSTANTANEOUS ELEVATION -.36 AT 1250 26 3 1967

**STATION 1630 PICTOU N S**

HIGHEST EVER  
 YEARLY MEAN ELEVATION 1.25 IN 1983  
 MONTHLY MEAN ELEVATION 1.45 IN 12 1970  
 DAILY MEAN ELEVATION 2.16 ON 7 12 1977  
 INSTANTANEOUS ELEVATION 3.04 AT 2315 20 1 1973

**DATA FROM 8 1985 TO 12 1983**

LOWEST EVER  
 YEARLY MEAN ELEVATION 1.08 IN 1981  
 MONTHLY MEAN ELEVATION .92 IN 6 1966  
 DAILY MEAN ELEVATION .57 ON 3 2 1976  
 INSTANTANEOUS ELEVATION -.39 AT 545 4 1 1972

**STATION 1700 CHARLOTTETOWN P E I**

HIGHEST EVER  
 YEARLY MEAN ELEVATION 1.72 IN 1983  
 MONTHLY MEAN ELEVATION 1.90 IN 12 1970  
 DAILY MEAN ELEVATION 2.53 ON 7 12 1977  
 INSTANTANEOUS ELEVATION 7.80 AT 2115 2 5 1982

**DATA FROM 1 1983 TO 12 1983**

LOWEST EVER  
 YEARLY MEAN ELEVATION 1.60 IN 1964  
 MONTHLY MEAN ELEVATION 1.41 IN 4 1964  
 DAILY MEAN ELEVATION 1.10 ON 28 3 1964  
 INSTANTANEOUS ELEVATION -.55 AT 506 31 12 1963

**STATION 1805 POINTE-DU-CHENE N B**

HIGHEST EVER  
 YEARLY MEAN ELEVATION 1.24 IN 1971  
 MONTHLY MEAN ELEVATION 1.26 IN 11 1971  
 DAILY MEAN ELEVATION 2.26 ON 7 12 1977  
 INSTANTANEOUS ELEVATION 2.90 AT 1405 17 3 1976

**DATA FROM 11 1971 TO 12 1983**

LOWEST EVER  
 YEARLY MEAN ELEVATION 1.04 IN 1976  
 MONTHLY MEAN ELEVATION .85 IN 2 1981  
 DAILY MEAN ELEVATION .17 ON 3 2 1976  
 INSTANTANEOUS ELEVATION -.66 AT 200 2 2 1974

**STATION 1915 RUSTICO P E I**

HIGHEST EVER  
 YEARLY MEAN ELEVATION .67 IN 1983  
 MONTHLY MEAN ELEVATION .82 IN 11 1983  
 DAILY MEAN ELEVATION 1.64 ON 2 1 1983  
 INSTANTANEOUS ELEVATION 1.90 AT 1945 25 10 1983

**DATA FROM 8 1972 TO 12 1983**

LOWEST EVER  
 YEARLY MEAN ELEVATION .34 IN 1972  
 MONTHLY MEAN ELEVATION .25 IN 8 1972  
 DAILY MEAN ELEVATION -.04 ON 3 2 1976  
 INSTANTANEOUS ELEVATION -.43 AT 30 23 10 1972

**STATION 2000 LOWER ESCUMINAC N B**

HIGHEST EVER  
 YEARLY MEAN ELEVATION .81 IN 1981  
 MONTHLY MEAN ELEVATION .90 IN 11 1983  
 DAILY MEAN ELEVATION 1.74 ON 7 12 1977  
 INSTANTANEOUS ELEVATION 2.35 AT 1325 7 12 1977

**DATA FROM 12 1972 TO 12 1983**

LOWEST EVER  
 YEARLY MEAN ELEVATION .72 IN 1974  
 MONTHLY MEAN ELEVATION .60 IN 2 1981  
 DAILY MEAN ELEVATION -.03 ON 3 2 1976  
 INSTANTANEOUS ELEVATION -.48 AT 20 18 2 1980

Table 2 (cont'd)

STATION 2185 DALHOUSIE N B

HIGHEST EVER  
 YEARLY MEAN ELEVATION 1.59 IN 1983  
 MONTHLY MEAN ELEVATION 1.65 IN 11 1983  
 DAILY MEAN ELEVATION 2.21 ON 17 3 1981  
 INSTANTANEOUS ELEVATION 3.92 AT 1730 26 10 1980

DATA FROM 1 1975 TO 12 1983

LOWEST EVER  
 YEARLY MEAN ELEVATION 1.52 IN 1982  
 MONTHLY MEAN ELEVATION 1.41 IN 2 1982  
 DAILY MEAN ELEVATION .41 ON 18 1 1982  
 INSTANTANEOUS ELEVATION -1.01 AT 2203 10 12 1977

STATION 2330 RIVIERE-AU-RENARD QUE

HIGHEST EVER  
 YEARLY MEAN ELEVATION 1.16 IN 1970  
 MONTHLY MEAN ELEVATION 1.28 IN 12 1970  
 DAILY MEAN ELEVATION 1.70 ON 4 2 1969  
 INSTANTANEOUS ELEVATION 3.65 AT 1655 4 2 1969

DATA FROM 1 1968 TO 12 1983

LOWEST EVER  
 YEARLY MEAN ELEVATION .95 IN 1982  
 MONTHLY MEAN ELEVATION .81 IN 4 1980  
 DAILY MEAN ELEVATION .54 ON 2 2 1982  
 INSTANTANEOUS ELEVATION -.40 AT 1011 20 1 1969

STATION 2550 HARRINGTON HARBOUR QUE

HIGHEST EVER  
 YEARLY MEAN ELEVATION 1.11 IN 1970  
 MONTHLY MEAN ELEVATION 1.23 IN 1 1970  
 DAILY MEAN ELEVATION 1.56 ON 17 12 1972  
 INSTANTANEOUS ELEVATION 2.90 AT 1040 27 1 1971

DATA FROM 1 1963 TO 12 1983

LOWEST EVER  
 YEARLY MEAN ELEVATION 1.02 IN 1982  
 MONTHLY MEAN ELEVATION .90 IN 4 1979  
 DAILY MEAN ELEVATION .66 ON 1 2 1973  
 INSTANTANEOUS ELEVATION -.54 AT 347 25 1 1963

STATION 2595 WEST ST. MODESTE (LABRADOR) NFLD

HIGHEST EVER  
 YEARLY MEAN ELEVATION 1.00 IN 1971  
 MONTHLY MEAN ELEVATION 1.18 IN 1 1970  
 DAILY MEAN ELEVATION 1.53 ON 12 3 1974  
 INSTANTANEOUS ELEVATION 2.27 AT 815 10 12 1977

DATA FROM 10 1968 TO 12 1983

LOWEST EVER  
 YEARLY MEAN ELEVATION .85 IN 1983  
 MONTHLY MEAN ELEVATION .58 IN 4 1983  
 DAILY MEAN ELEVATION .21 ON 31 12 1983  
 INSTANTANEOUS ELEVATION -.49 AT 125 31 12 1983

STATION 2885 LARK HARBOUR NFLD

HIGHEST EVER  
 YEARLY MEAN ELEVATION 1.12 IN 1976  
 MONTHLY MEAN ELEVATION 1.28 IN 2 1978  
 DAILY MEAN ELEVATION 1.91 ON 1 11 1983  
 INSTANTANEOUS ELEVATION 2.79 AT 1120 27 1 1971

DATA FROM 9 1963 TO 12 1983

LOWEST EVER  
 YEARLY MEAN ELEVATION 1.02 IN 1980  
 MONTHLY MEAN ELEVATION .88 IN 4 1964  
 DAILY MEAN ELEVATION .46 ON 12 11 1979  
 INSTANTANEOUS ELEVATION -.41 AT 504 31 12 1963

STATION 2780 SEPT-ILES QUE

HIGHEST EVER  
 YEARLY MEAN ELEVATION 1.58 IN 1983  
 MONTHLY MEAN ELEVATION 1.72 IN 11 1983  
 DAILY MEAN ELEVATION 2.40 ON 7 12 1983  
 INSTANTANEOUS ELEVATION 4.14 AT 1501 7 12 1983

DATA FROM 4 1972 TO 12 1983

LOWEST EVER  
 YEARLY MEAN ELEVATION 1.49 IN 1979  
 MONTHLY MEAN ELEVATION 1.40 IN 2 1974  
 DAILY MEAN ELEVATION .91 ON 18 1 1982  
 INSTANTANEOUS ELEVATION -.65 AT 845 18 3 1976

STATION 2840 BAIE-COMEAU QUE

HIGHEST EVER  
 YEARLY MEAN ELEVATION 1.91 IN 1970  
 MONTHLY MEAN ELEVATION 2.01 IN 12 1970  
 DAILY MEAN ELEVATION 2.74 ON 7 12 1983  
 INSTANTANEOUS ELEVATION 4.91 AT 255 6 4 1977

DATA FROM 2 1968 TO 12 1983

LOWEST EVER  
 YEARLY MEAN ELEVATION 1.76 IN 1982  
 MONTHLY MEAN ELEVATION 1.63 IN 2 1982  
 DAILY MEAN ELEVATION 1.00 ON 18 1 1982  
 INSTANTANEOUS ELEVATION -.92 AT 811 15 4 1976

STATION 2935 SAINTE-ANNE-DES-MONTS QUE

HIGHEST EVER  
 YEARLY MEAN ELEVATION 1.68 IN 1969  
 MONTHLY MEAN ELEVATION 1.76 IN 12 1968  
 DAILY MEAN ELEVATION 2.37 ON 7 12 1983  
 INSTANTANEOUS ELEVATION 4.30 AT 1557 4 2 1969

DATA FROM 12 1967 TO 12 1983

LOWEST EVER  
 YEARLY MEAN ELEVATION 1.57 IN 1974  
 MONTHLY MEAN ELEVATION 1.51 IN 5 1982  
 DAILY MEAN ELEVATION .99 ON 29 11 1975  
 INSTANTANEOUS ELEVATION -.67 AT 859 18 3 1976

TABLE 3. 1983 wave stations on East Coast.

MEDS NO.	STATION NAME	LATITUDE DD-MM-SS	LONGITUDE DD-MM-SS	DEPTH METERS	START DATE DD/MM/YY	END DATE DD/MM/YY
16	Logy Bay	47-37-00	52-25-27	162.0	10/06/82	28/01/83
16	Logy Bay	47-37-00	52-25-27	162.0	10/06/83	ACTIVE
23	Petrel	55-48-58	58-51-18	576.0	17/07/83	16/08/83
37	Osborne Head	44-29-25	63-24-15	56.7	01/09/76	ACTIVE
133	Sedco 709	43-38-00	60-07-12	77.0	12/03/83	08/11/83
133	Sedco 709	43-36-48	60-40-26	68.0	05/12/83	ACTIVE
134	Sedco 706	47-13-08	47-36-47	222.0	29/11/82	14/01/84
135	Nedril II	56-05-25	58-12-09	450.0	29/07/83	08/10/83
137	Pelerin	58-48-41	60-34-26	192.0	22/08/83	03/09/83
140	Zapata Uglan	46-35-46	48-51-40	73.5	16/05/83	06/08/83
140	Zapata Uglan	46-46-12	48-49-12	80.0	28/08/83	19/11/83
142	Rowan Juneau	43-52-36	59-29-12	50.0	29/04/82	03/01/83
142	Rowan Juneau	44-01-17	59-38-49	19.0	19/01/83	11/10/83
152	Pointe Sapin	46-59-30	64-43-45	14.6	10/05/83	12/11/83
154	Pacnorse I	59-10-52	62-16-47	130.0	04/09/83	11/09/83
165	Zapata Scotian	44-00-30	59-47-18	36.5	03/11/82	10/01/83
165	Zapata Scotian	44-05-43	59-31-10	53.0	03/02/83	11/07/83
165	Zapata Scotian	44-03-38	59-33-44	21.0	08/08/83	16/04/84
166	Bowdrill I	44-03-53	58-51-02	85.3	26/02/83	22/08/83
166	Bowdrill I	47-10-55	60-14-32	183.0	01/10/83	17/12/83
167	Vinland	44-47-03	58-26-11	100.0	16/01/83	01/05/83
167	Vinland	44-12-18	59-42-35	160.0	30/05/83	04/04/84
168	John Shaw	44-07-00	59-21-36	85.0	16/01/83	11/02/83
168	John Shaw	44-06-38	59-22-10	64.0	20/02/83	31/08/83
168	John Shaw	46-56-33	47-58-46	142.0	25/11/83	19/02/84
169	West Venture	46-45-49	48-52-27	80.0	20/01/83	31/07/83
169	West Venture	46-43-24	48-48-06	80.0	02/10/83	14/12/83
170	Sable Island	44-01-57	59-35-09	24.0	04/04/83	26/08/83
170	Sable Island	44-01-52	59-35-20	22.0	03/11/83	ACTIVE
171	Bowdrill II	43-12-34	62-11-08	99.0	12/08/83	02/01/84
173	Glace Bay	46-11-56	59-56-54	4.0	06/05/83	13/01/84
183	Sept-Iles (I)	50-12-21	66-23-33	5.5	03/05/83	07/12/83
184	Sept-Iles (O)	50-12-21	66-23-33	6.0	05/05/83	07/12/83
185	Sedco 710	46-28-17	48-31-14	86.0	07/08/83	06/12/83
186	Glomar IX	46-43-24	62-30-54	65.9	25/06/83	04/09/83
186	Glomar IX	45-09-13	65-56-43	57.5	25/09/83	06/11/83
187	Cape Norman	51-41-00	55-55-00	60.4	09/07/83	24/07/83
188	CGS Cornwallis	44-30-00	63-00-00	90.0	11/09/83	17/09/83
189	Glomar Labrador	44-26-17	58-21-04	66.0	21/11/83	ACTIVE

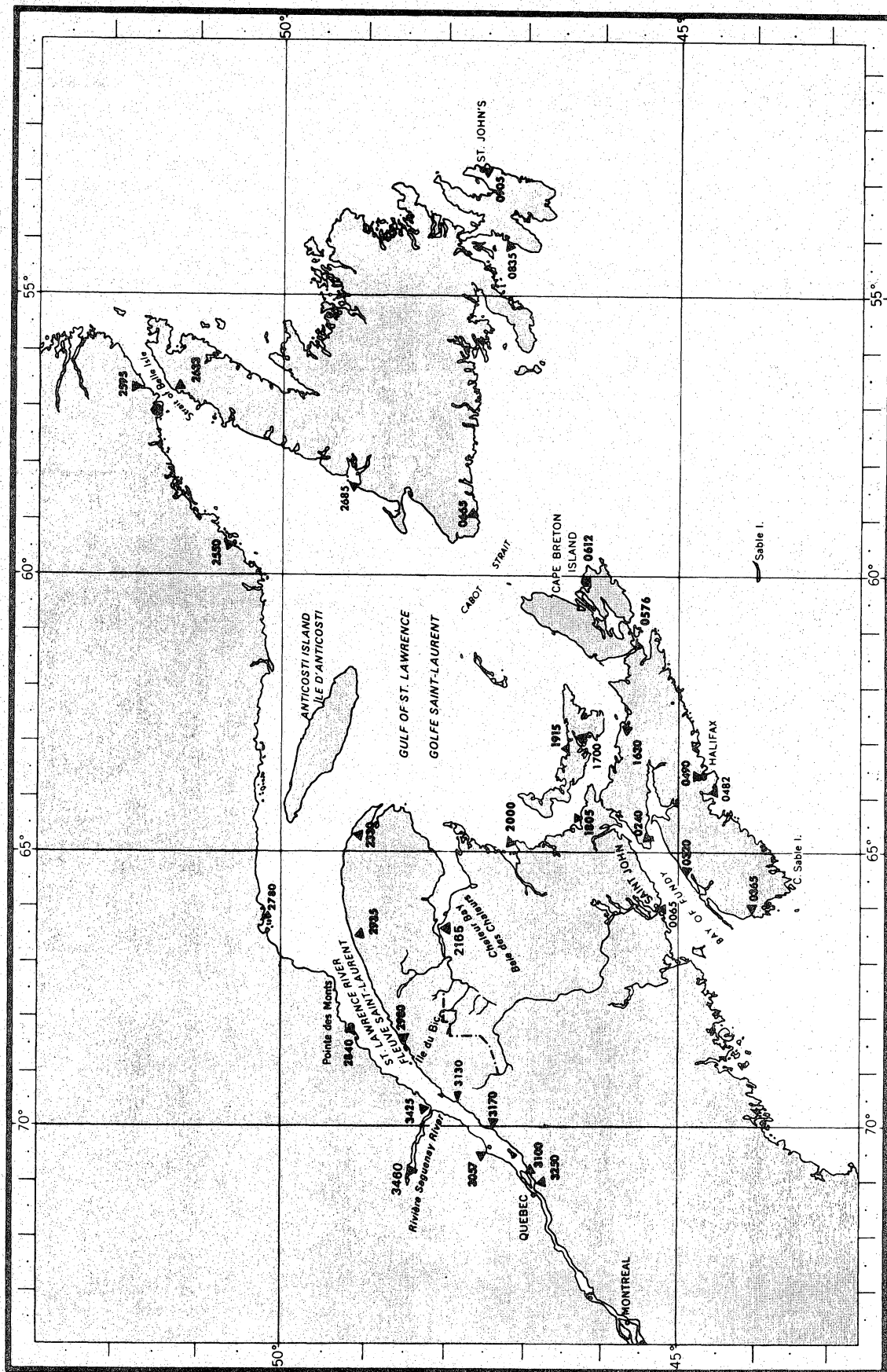


Fig. 1. East Coast tide gauge locations.



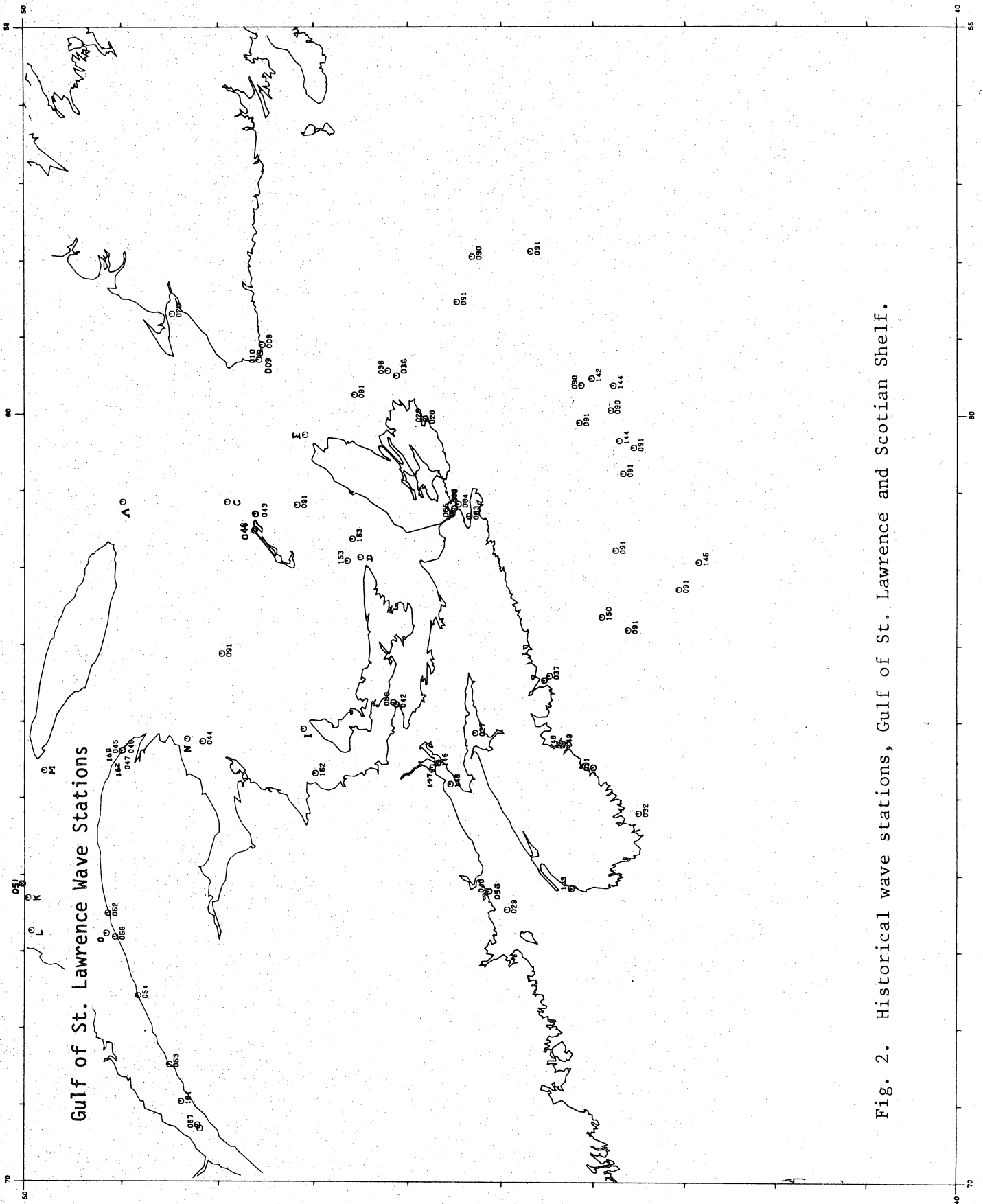


Fig. 2. Historical wave stations, Gulf of St. Lawrence and Scotian Shelf.

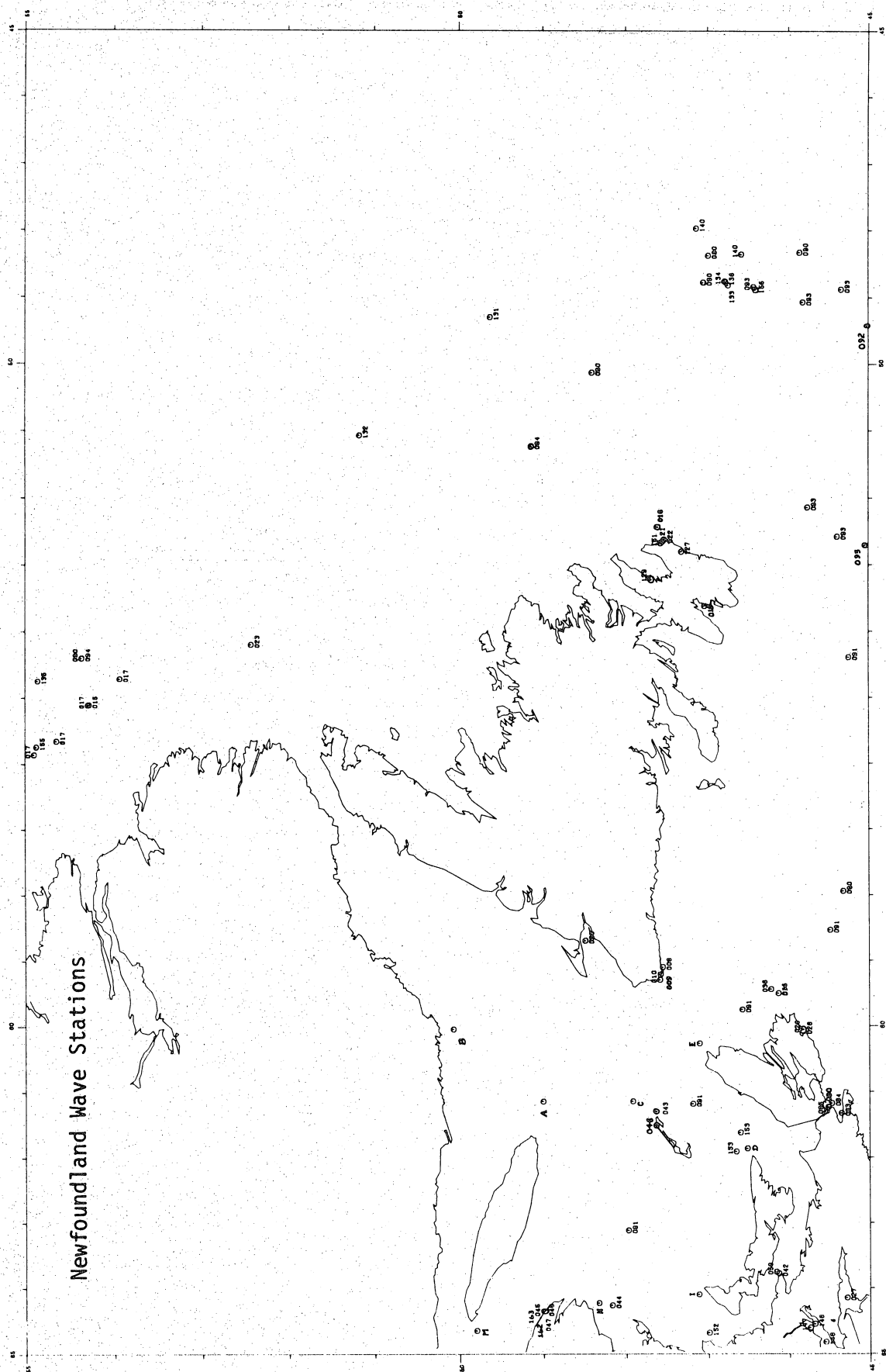


Fig. 3. Historical wave stations, Newfoundland and Southern Labrador.

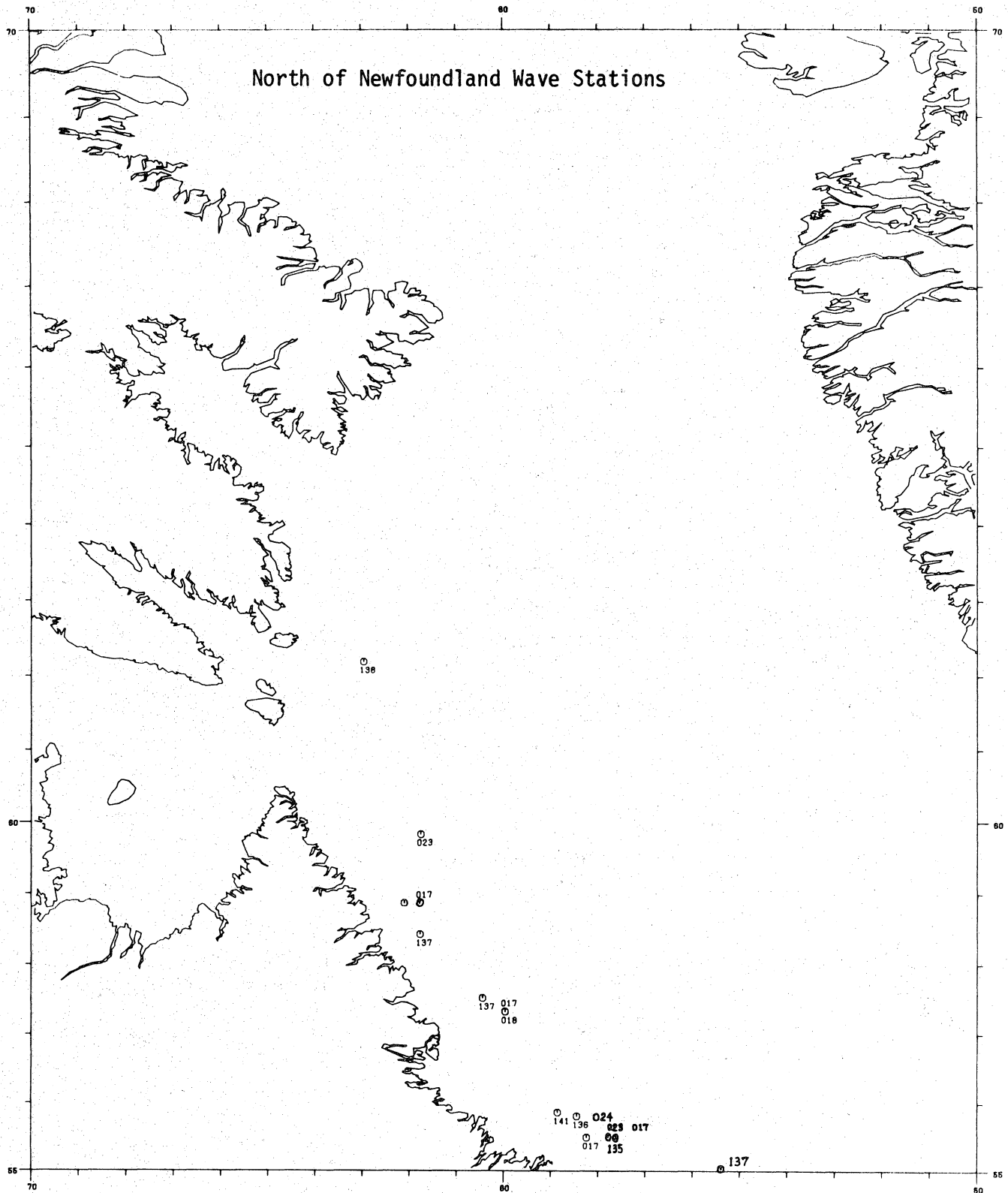


Fig. 4. Historical wave stations, Northern Labrador and Baffin Island.

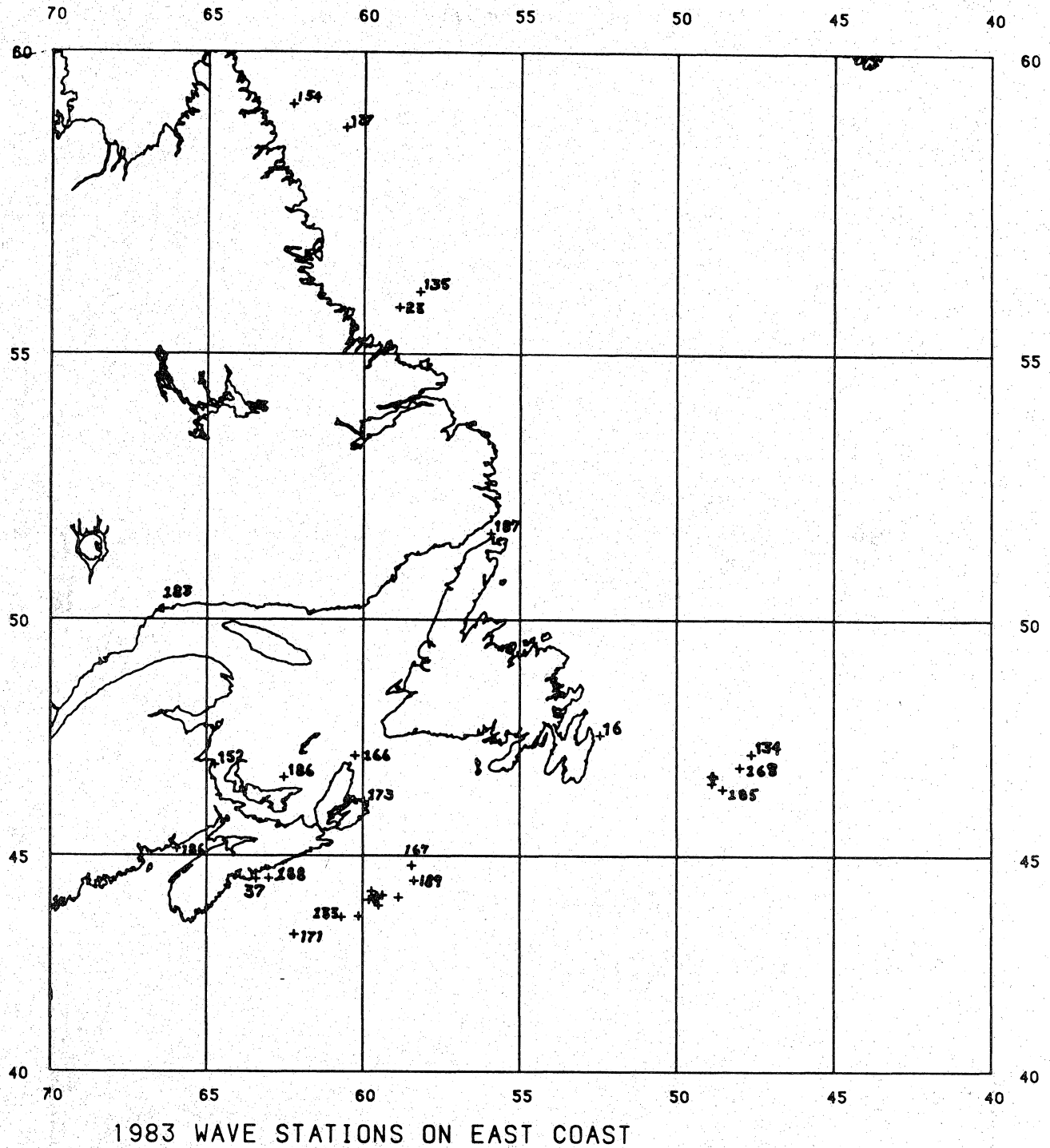


Fig. 5. Wave stations off the East Coast of Canada, 1983.

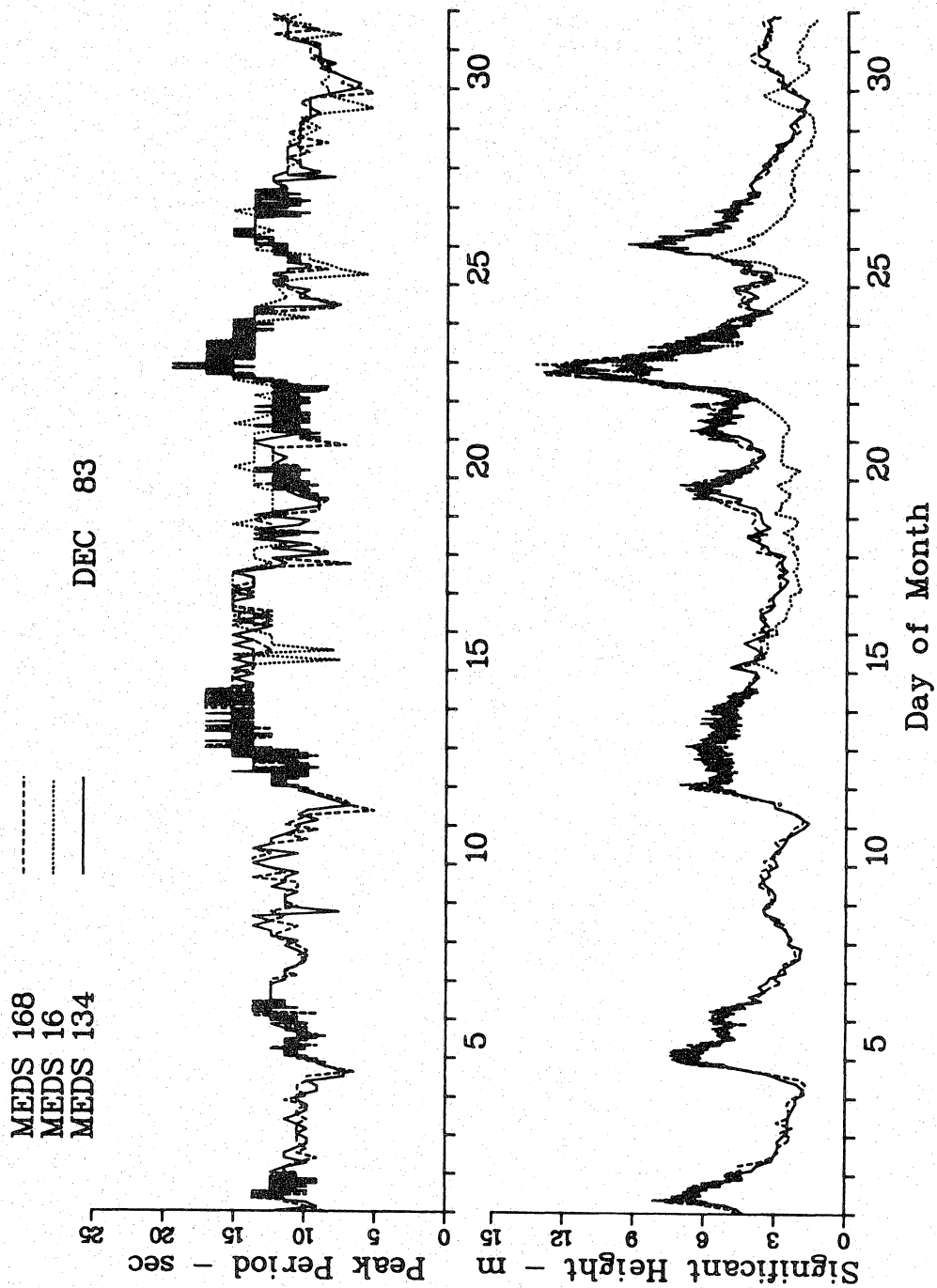


Fig. 6. December 1983 wave records at stations 16, 134 and 168.

