#94023rpt

BRANCH OF ATLANTIC MARINE GEOLOGY
U.S. GEOLOGICAL SURVEY
Woods Hole, MA 02543

CRUISE REPORT

1. Ship Name/Owner Operator: R/V CAPE HENLOPEN/Univ. Delaware

2. Cruise No.: Cruise 94-18

3. Project Number: 9470-66487

4. Funding Agency: Office of Naval Research

5. Area of Operation: Block Island Sound

6. Cruise Dates: 29 July-8 August, 1994

7. Chief Scientists:
   Neal W. Driscoll, Lamont-Doherty Earth Observatory
   David C. Twichell, USGS

8. Scientific Party:
   Elizabeth Elliot - Wesleyan College
   Parker Hackett - Univ. of Vermont
   Barbara Hecker - Hecker Environmental Consultants
   Barry Irwin - USGS
   John Ladd - Hudson Highlands Museum
   David Nichols - USGS
   Eric Schmuck - USGS
   Earl Young - Woods Hole Oceanographic Institution

9. Ship's Captain:
   Mathew Hawkins

10 Purpose of Cruise:

A sidescan sonar survey of a 7x8 km area in Block Island Sound was completed in 1991, and a 7x17 km area, which included the 1991 survey area, was resurveyed during this cruise in 1994 to document the changes that have occurred. Since the original survey, Hurricane Bob

and two large winter storms have crossed this area, and this resurvey was a unique opportunity of assess the affect storms have on reshaping the shelf surface. A sidescan sonar survey, 3.5-kHz subbottom profiler and bathymetry survey was completed during the first 5 days of the cruise with a sidescan sonar mosaic being built during the cruise. The last 4 days were spent doing camera tows (using a system developed by Barbara Hecker), box coring (using a system that belonged to the Univ. of Delaware), and grab sampling. Approximately 884 line kilometers of sidescan sonar, bathymetry, and subbottom profiler data were collected during the first part of the cruise, and 12 camera tows, 23 box cores, and 211 grab samples were collected during the second part. 35-mm slides were taken at 8 second intervals during the camera tows.

11. Navigation Techniques:
    Differential GPS

12. Scientific Equipment:
    Klein sidescan sonar (USGS)
    QMIPS (USGS)
    3.5-kHz subbottom profiler (USGS)
    Odem fathometer (USGS)
    DEC 3100 workstation for processing sidescan data (USGS)
    Van Veen grab sampler (USGS)
    Box corer (Univ. of Delaware)
    Camera sled (Hecker Environmental Consultants)

13. Days at Sea: 11

14. Sidescan Surveys: area (km^2)
    124 km^2 of sidescan sonar data
    884 km of 3.5 kHz subbottom profiles and digital bathymetry

15. Remarks:

This was a very successful collaborative cruise that drew on the scientific and technical expertise of people from a variety of institutions. The USGS component of the operation included providing navigation, acquisition and processing of the underway geophysical data, and the grab sampler. The camera work was overseen by B. Hecker with technical support by E. Young (WHOI), and the sampling was overseen by N. Driscoll with technical support by T. Deering (Univ. Delaware). Post cruise processing of the sidescan data is being done by D. Twichell, the photo processing and analysis is being done by B. Hecker, and the sediment analysis is being overseen by N. Driscoll. The geological analysis is being coordinated between N. Driscoll, J. Ladd, B. Hecker, and D. Twichell. The sidescan sonar and QMIPS systems worked well, and there was minimal down time. The sidescan data was of good quality although a strong thermocline

resulted in strong refraction patterns in some of the data. The 3.5-kHz subbottom profiler worked reliably for the entire cruise, and subbottom penetration ranged from 0 to about 25 m depending on the seafloor geology. The weather was excellent, and the primary problem for the geophysical part of the survey were the numerous lobster pots that were present in many parts of the study area. The primary limitation for the camera tows was the amount of suspended matter in the water and the strong tidal currents. The photos did not cover large areas because of the suspended matter in the water, and because of the strong tidal currents, it was difficult to keep the ship on course at the slow speeds that were needed for the camera tows.

GEOPHYSICAL SURVEY SUMMARY

LINE	START			END		
	DATE	JD	TIME (GMT)	DATE	JD	TIME(GMT)
1	30/7/95	211	1045	30/7/95	211	1134
2	30/7/95	211	1134	30/7/95	211	1334
3	30/7/95	211	1342	30/7/95	211	1623
4	30/7/95	211	1627	30/7/95	211	1804
5	30/7/95	211	1835	30/7/95	211	2027
6	30/7/95	211	2045	30/7/95	211	2201
7	30/7/95	211	2208	30/7/95	211	2340
8	30/7/95	211	2340	31/7/95	212	0109
9	31/7/95	212	0116	31/7/95	212	0256
10	31/7/95	212	0303	31/7/95	212	0453
11	31/7/95	212	0459	31/7/95	212	0643
12	31/7/95	212	0651	31/7/95	212	0829
13	31/7/95	212	0853	31/7/95	212	1044
14	31/7/95	212	1054	31/7/95	212	1241
15	31/7/95	212	1247	31/7/95	212	1425
16	31/7/93	212	1438	31/7/95	212	1618
17	31/7/95	212	1625	31/7/95	212	1751
18	31/7/95	212	1757	31/7/95	212	1924
19	31/7/95	212	1931	31/7/95	212	2104
20	31/7/95	212	2109	31/7/95	212	2236
21	31/7/95	212	2243	1/8/95	213	0016
22	1/8/95	213	0021	1/8/95	213	0202
23	1/8/95	213	0208	1/8/95	213	0345
24	1/8/95	213	0355	1/8/95	213	0546
25	1/8/95	213	0554	1/8/95	213	0732
26	1/8/95	213	0743	1/8/95	213	0955
27	1/8/95	213	1000	1/8/95	213	1138

28	1/8/95	213	1145	1/8/95	213	1351
29	1/8/95	213	1356	1/8/95	213	1534
30	1/8/95	213	1543	1/8/95	213	1722
31	1/8/95	213	1728	1/8/95	213	1910
32	1/8/95	213	1918	1/8/95	213	2053
33	1/8/95	213	2100	1/8/95	213	2234
34	1/8/95	213	2242	2/8/95	214	0020
35	2/8/95	214	0032	2/8/95	214	0154
36	2/8/95	214	0205	2/8/95	214	0342
37	2/8/95	214	0351	2/8/95	214	0527
38	2/8/95	214	0535	2/8/95	214	0713
39	2/8/95	214	0721	2/8/95	214	0900
40	2/8/95	214	0907	2/8/95	214	1041
41	2/8/95	214	1050	2/8/95	214	1226
42	2/8/95	214	1232	2/8/95	214	1410
43	2/8/95	214	1417	2/8/95	214	1546
44	2/8/95	214	1556	2/8/95	214	1736
45	2/8/95	214	1742	2/8/95	214	1917
46	2/8/95	214	1928	2/8/95	214	2058
47	2/8/95	214	2104	2/8/95	214	2244
48	2/8/95	214	2249	3/8/95	215	0026
49	3/8/95	215	0027	3/8/95	215	0201
50	3/8/95	215	0206	3/8/95	215	0402
51	3/8/95	215	0409	3/8/95	215	0450
52	3/8/95	215	0500	3/8/95	215	0534
53	3/8/95	215	0546	3/8/95	215	0620
54	3/8/95	215	0627	3/8/95	215	0704
55	3/8/95	215	0710	3/8/95	215	0745
56	3/8/95	215	0750	3/8/95	215	0827
57	3/8/95	215	0916	3/8/95	215	0951

CAMERA TOW INFORMATION

camera tow 1

failure

camera tow 2

on	-71.735	41.201	215:13:15
in	-71.710	41.164	215:15:27
off			215:16:48

out			215:17:03
camera tow 3			
on	-71.692	41.175	215:18:02
in			215:18:08
off	-71.757	41.224	215:21:36
out			215:21:49
camera tow 4			
on	-71.794	41.196	215:22:56
in			215:23:29
off	-71.748	41.177	216:02:30
out			216:02:45
camera tow 5			
on			216:13:29
in	-71.784	41.187	216:13:31
off			216:16:59
out			216:17:15
camera tow 6			
on	-71.768	41.202	216:18:20
in			216:18:23
off			
out	-71.732	41.255	216:21:58
camera tow 7			
on	-71.869	41.200	217:11:14
in			217:11:15
off			217:14:37
out	-71.879	41.248	217:14:50
camera tow 8			
on	-71.862	41.186	217:16:01
in			
off			217:19:29
out			217:19:40
camera tow 9			
on			217:20:56

in			217:21:05
off			217:22:20
out			217:22:32

camera tow 10

on	-71.792	41.206	218:11:58
in			218:12:05
off	-71.873	41.176	218:15:20
out			218:15:30

camera tow 11

on	-71.865	14.248	218:16:33
in			
off			218:20:05
out	-71.816	41.185	218:20:20

camera tow 12

on	-71.805	41.217	218:20:54
in			218:20:57
off			218:00:20
out	-71.761	41.166	218:00:27

BOX CORES (b) and VAN VEEN GRAB SAMPLES (v)

longitude	latitude	core type & number
-71.42.5356	41.9.7644	v1
-71.42.7377	41.9.8678	b1
-71.42.8655	41.9.9312	b2
-71.42.9411	41.10.0111	b3
-71.43.1322	41.10.1739	v2
-71.41.3640	41.10.2224	b4
-71.43.1291	41.10.1748	b5
-71.43.6193	41.10.5895	b6
-71.43.5658	41.10.5588	b7
-71.43.6791	41.10.4775	v3
-71.43.9961	41.10.8864	v4
-71.43.9713	41.10.8662	b8
-71.43.9776	41.10.8682	b9

-71.44.3802	41.11.2199	b10
-71.44.3643	41.15.6232	v5
-71.47.1312	41.11.4813	b11
-71.47.3013	41.11.9256	b12
-71.11.9712	41.11.9712	v6
-71.47.4930	41.12.2974	v7
-71.47.5189	41.12.2748	b13
-71.47.6677	41.12.6591	b14
-71.47.6405	41.12.7272	v8
-71.47.8724	41.13.0355	v9
-71.47.8537	41.13.0573	b15
-71.47.7510	41.13.5623	v10
-71.47.7510	41.13.5623	b16
-71.48.1426	41.13.8178	v11
-71.48.1517	41.13.7872	b17
-71.48.2849	41.14.0834	v12
-71.48.2107	41.14.0768	b18
-71.48.7302	41.13.7234	v13
skipped v14		
-71.48.3780	41.13.9506	v15
-71.48.3378	41.14.0020	v16
-71.48.2367	41.14.0814	v17
-71.48.1339	41.14.1697	v18
-71.48.0383	41.14.2544	v19
-71.47.9445	41.14.3461	v20
washout v21		
-71.47.7782	41.14.5273	v22
-71.47.7090	41.14.6186	v23
-71.47.6499	41.14.6758	v24
-71.47.5641	41.14.7718	v25
-71.47.5333	41.14.8250	v26
-71.47.4247	41.14.9346	v27
-71.47.3246	41.15.0352	v28
-71.47.2850	41.15.1127	v29
washout v30		
-71.47.1752	41.15.2733	v31
-71.45.9834	41.11.7809	v32
-71.46.0825	41.11.8167	v33
-71.46.2217	41.11.7386	v34

-71.46.0960	41.12.0406	v35
-71.46.1547	41.11.9819	v36
-71.46.2244	41.11.9701	v37
-71.46.13	41.12.34	v38
-71.46.19	41.12.29	v39
-71.46.26	41.12.41	v40
-71.46.3023	41.12.5496	v41
-71.46.3413	41.12.5419	v42
-71.46.3929	41.12.5545	v43
-71.46.4334	41.12.7383	v44
-71.46.4591	41.12.7803	v45
-71.46.4167	41.12.6999	v46
-71.46.6150	41.13.0289	v47
-71.46.5853	41.12.9743	b19
-71.46.7963	41.13.2016	v48
-71.46.7691	41.13.1004	v49
-71.46.7104	41.13.0698	v50
-71.46.8519	41.13.6071	v51
-71.46.8207	41.13.5432	v52
-71.46.7530	41.13.5338	v53
-71.47.2474	41.13.6417	v54
-71.47.1973	41.13.6062	v55
-71.47.1284	41.13.5191	v56
-71.50.5179	41.14.4483	v57
-71.50.5207	41.14.4259	v58
-71.50.3219	41.13.9212	v60
-71.50.2811	41.13.9143	v61
-71.50.2994	41.13.9426	v62
-71.50.8595	41.14.2614	v63
-71.50.8221	41.14.2406	v64
-71.50.8602	41.14.2469	v65
-71.50.6274	41.13.7599	v65
-71.50.5873	41.13.7795	v67
-71.50.6619	41.13.7801	v68
-71.51.0957	41.14.1393	v69
-71.51.1419	41.14.1108	v70
-71.51.1115	41.14.1233	v71
-71.50.9801	41.13.6311	v72
-71.50.9610	41.13.6119	v73
-71.50.9577	41.13.6148	v74

-71.51.3552	41.14.0452	v75
-71.51.3370	41.14.0229	v76
-71.51.2976	41.14.0126	v77
-71.51.6850	41.14.0482	v78
-71.51.7136	41.14.0405	v79
-71.51.6725	41.14.0427	v80
-71.51.2451	41.13.5107	v81
-71.51.2073	41.13.4746	v82
-71.51.2774	41.13.4896	v83
-71.48.8303	41.11.1926	v84
washout v85		
-71.48.8266	41.11.2364	v86
-71.48.8705	41.11.1981	v87
-71.49.3176	41.11.3359	v88
-71.49.3180	41.11.3425	v89
-71.49.3294	41.11.3302	v90
-71.49.3393	41.11.3136	b20
-71.49.7683	41.11.5124	v91
-71.49.7488	41.11.4722	v92
-71.49.7616	41.11.5080	v93
-71.50.2991	41.11.6359	v94
-71.50.3540	41.11.6194	v95
-71.50.2869	41.11.6848	v96
-71.50.7109	41.11.7383	v97
-71.50.7339	41.11.7801	v98
-71.50.7259	41.11.7478	v99
-71.50.6971	41.11.7500	b21
-71.51.1900	41.11.8639	v100
-71.51.1238	41.11.8089	v101
-71.51.1898	41.11.8184	v102
-71.51.1113	41.11.8985	v103
-71.51.5968	41.11.9883	v104
-71.51.6175	41.11.9840	v105
-71.51.5672	41.11.9682	v106
-71.51.6526	41.11.9526	v107
-71.51.9838	41.12.1079	v108
-71.52.0514	41.12.0993	v109
-71.52.0867	41.12.0590	v110
-71.52.5828	41.12.1951	v111

-71.52.4965	41.12.1898	v112
-71.52.5078	41.12.2003	v113
-71.53.0197	41.12.3852	v114
-71.53.0224	41.12.3352	v115
-71.52.9759	41.12.3121	v116
-71.53.4107	41.12.4763	v117
-71.53.4528	41.12.5062	v118
-71.53.4726	41.12.4489	v119
-71.53.3816	41.12.3376	v120
-71.53.3420	41.12.2831	v121
-71.53.3488	41.12.3426	v122
-71.53.3298	41.12.2766	b22
-71.53.0670	41.12.4678	v123
-71.53.0981	41.12.5501	v124
-71.53.1854	41.12.5099	v125
-71.52.3049	41.12.6098	v126
-71.52.3361	41.12.6658	v127
-71.52.1824	41.12.7047	v128
-71.52.3915	41.12.5896	v129
-71.52.3062	41.12.5547	v130
-71.52.3985	41.12.5867	v131
-71.52.6855	41.13.4129	v132
-71.52.6407	41.13.4155	v133
-71.52.6508	41.13.4006	v134
-71.52.7232	41.13.8679	v135
-71.52.7665	41.13.7999	v136
-71.52.7249	41.13.8513	v137
-71.52.9240	41.13.9668	v138
-71.52.9183	41.13.9704	v139
-71.52.0020	41.14.0914	v140
-71.52.0028	41.14.1586	v141
-71.51.0070	41.14.2772	v142
-71.51.0055	41.14.2982	v143
-71.50.0080	41.14.2936	v144
-71.50.0284	41.14.2992	v145
-71.52.0507	41.15.0019	v146
-71.52.0340	41.15.0043	v147
-71.51.0064	41.14.9588	v148
-71.51.0242	41.14.9818	v149
-71.49.9980	41.14.6379	v150

-71.50.0639	41.14.6445	v151
-71.49.0550	41.14.0995	v152
-71.49.0449	41.14.0823	v153
-71.49.0283	41.14.0824	v154
-71.49.0395	41.14.0902	v155
-71.48.3036	41.13.0282	v156
-71.48.2942	41.12.9930	v157
-71.48.6804	41.12.9758	v158
-71.48.6787	41.12.9841	v159
-71.48.8751	41.12.4693	v160
-71.48.8645	41.12.4848	v161
-71.48.6411	41.12.2858	v162
-71.48.6075	41.12.2964	v163
-71.49.0236	41.12.1020	v164
-71.48.9981	41.12.0751	v165
-71.46.0146	41.13.5038	v166
-71.46.0201	41.13.4742	v167
-71.45.0417	41.13.5336	v168
-71.44.9949	41.13.4819	v169
-71.45.0450	41.13.5815	b23
-71.43.0065	41.12.7883	v170
-71.42.9769	41.12.7690	v171
-71.43.6001	41.12.1370	v172
-71.43.5753	41.12.2025	v173
-71.43.7988	41.12.1896	v174
-71.43.7683	41.12.1846	v175
-71.43.9905	41.12.2201	v176
-71.43.9681	41.12.1864	v177
-71.44.2218	41.12.2173	v178
-71.44.1321	41.12.1887	v179
-71.44.3609	41.12.1571	v180
-71.44.3660	41.12.2213	v181
-71.44.9404	41.12.4861	v182
-71.44.9663	41.12.5285	v183
-71.45.1491	41.12.4858	v184
-71.45.1759	41.12.4723	v185
-71.45.3664	41.12.5201	v186
-71.45.3263	41.12.4936	v187
-71.45.5390	41.12.5113	v188

-71.45.5590	41.12.4959	v189
-71.45.7489	41.12.4921	v190
-71.45.7828	41.12.4889	v191
-71.45.7792	41.12.4775	v192
-71.45.7890	41.12.4847	v193
-71.46.0032	41.12.4786	v194
-71.45.9983	41.12.4826	v195
-71.46.1956	41.12.4817	v196
-71.46.2070	41.12.4714	v197
-71.42.7876	41.9.5988	v198
-71.42.8295	41.9.6060	v199
-71.43.0021	41.9.7105	v200
-71.43.0058	41.9.7095	v201
-71.43.2292	41.9.7592	v202
-71.43.1954	41.9.7471	v203
-71.43.4034	41.9.8806	v204
-71.43.3939	41.9.8622	v205
-71.43.5924	41.9.9696	v206
-71.43.5799	41.9.9509	v207
-71.43.9709	41.10.0646	v208
-71.43.9792	41.10.0543	v209
-71.44.1040	41.10.2144	v210
-71.44.1229	41.10.2092	v211

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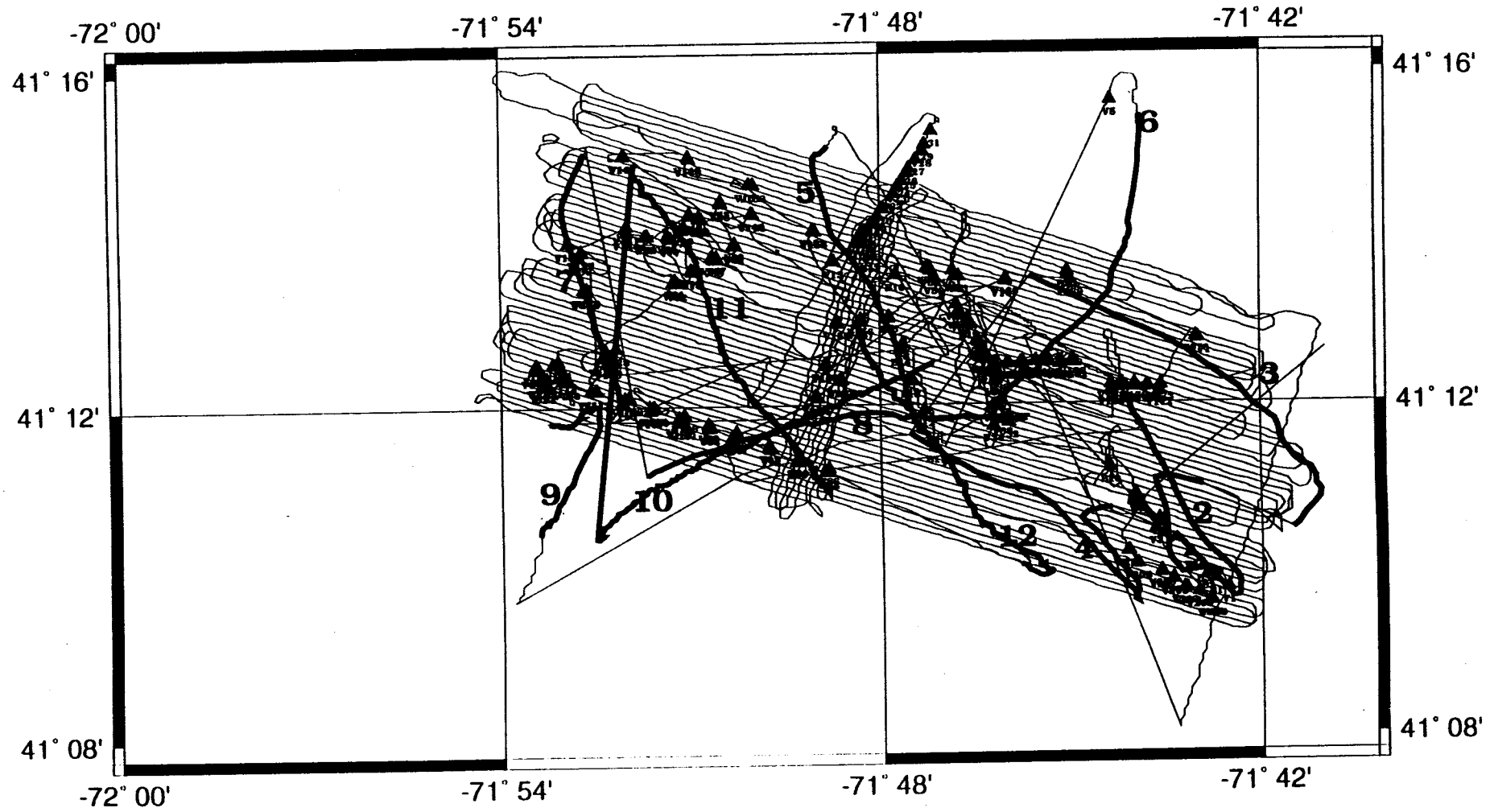

Figure 3