Cruise Report

R/V ALBATROSS IV Cruise 9513 to Georges Bank

30 October - 8 November 1995

Acknowledgments

This report and preliminary data was prepared by Jim Irish, Van Holliday, Kent Bradshaw and Ted Durbin from cruise logs and notes as a first draft document of the activities, positions, data collected, etc. during AL-95-13. We acknowledge the great support provided by Captain Moakley and the crew of the National Marine Fisheries Research Vessel ALBATROSS IV. Their assistance and hard work allowed us to get the moorings deployed, complete all supportive CTD profiles and sections, and enables us to do a fall MOCNESS Georges Bank survey in the good weather windows between fall gales.

The GLOBEC research effort is sponsored by the National Science Foundation and the National Oceanic and Atmospheric Administration. Support for the Long-Term Moored Program as part of the U.S. GLOBEC Northwest Atlantic/Georges Bank Study was provided by NSF research grant OCE-9313670. Support for the USC/Tracor acoustic mooring and survey work performed on this cruise was provided by the Office of Naval Research grant N00014-91C0069 and NSF research grant OCE-9301564. Support for the MOCNESS survey work by the University of Rhode Island was provided by NSF research grant OCE-9313677 and NOAA/CNER research grant NA47FE0457. ALBATROSS IV ship time for AL-95-13 was supplied by NOAA/NMFS/WHOI to the moored program. All data and results in this report are to be considered preliminary.

Cruise Report
GLOBEC R/V ALBATROSS IV CRUISE AL-95-13

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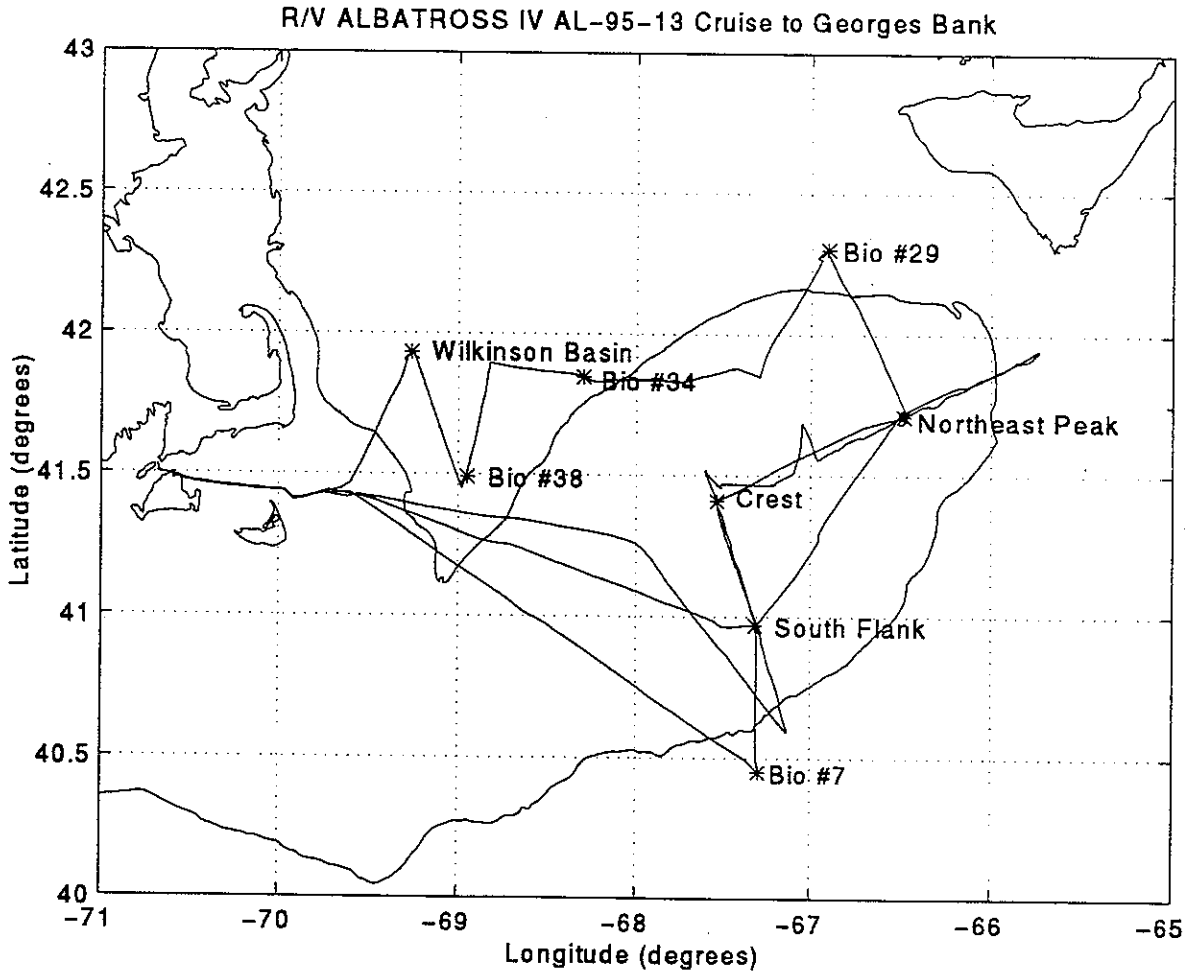

Figure 1. Ship's track of the R/V ALBATROSS IV Cruise AL-95-13 (Both Leg 1 and Leg 2) from Woods Hole to Georges Bank to Woods Hole to Georges Bank and back to Woods Hole from the ship's GPS log. The 100 meter contour is plotted to outline Georges Bank. The Crest, Southern Flank and Northeast peak mooring sites are shown as well as the MOCNESS stations. Positions and times are listed in Tables 1, 4, 5 and 6.

Cruise Results

Southern Flank Mooring Site

At the Southern Flank mooring site, a CODE style steel guard buoy was deployed first to get us acquainted with the ship and how to utilize her equipment, and to break in the National Marine Fisheries Services crew and WHOI personnel to our mooring work on the ALBATROSS. Guard Buoy "A" was deployed in 76 meters of water at the eastern side of the mooring site (see Figure 2). Then the WHOI scientific buoy E was deployed 0.2 nm away to the west and north. The USC/Tracor mooring was deployed to the southeast of the WHOI science buoy. Finally, the bottom pressure instrument was deployed in the center of the three surface buoys. The locations of the deployments are given in Table 1 and shown in Figure 3. The sensor types, serial numbers and depths for the WHOI science buoy are listed in Tables 2 and 3.

The Southern Flank WHOI science mooring (see Figure 4) has a full suite of meteorological sensors for the first time. These sensors include R.M. Young 5103 wind speed and direction (with KVH AC-75 fluxgate compass), Rotronic MP-100 air temperature and relative humidity, Eppley PIR long wave radiation and Eppley 8-48 short wave radiation and LiCor UWQ PAR (Photosynthetically Active Radiation) sensors. The water properties are measured by Sea Bird SBE-3 temperature and SBE-4 conductivity sensors at the 5 meter intervals to 50 meters, and by SeaCats at 20, 30 and 72 meters depth. Velocities are measured by a downward looking RDInstruments 307 khz Broad Band ADCP in the mooring line 3 m below the buoy. The MET sensors are sampled at 10 second intervals (wind at 1 second) and the results averaged to get hourly values. The water property sensors are sampled at 1 minute and averaged to hourly. The SeaCats record samples at 2 minute intervals to fill their internal memory. The ADCP samples for 8 minutes at 2 second pings every half hour. The hourly averages of the Sea Bird temperature and conductivity sensors and the meteorological sensors are transmitted every three hours via GOES as well as being recorded internally. A subset of the data with diagnostics is also transmitted via ARGOS, which also positions the buoy and allows us to track it in case it were to break loose.

The USC/Tracor BITS acoustics mooring, which measures zooplankton abundance and size structure, was deployed in about 76 m of water depth at the Long-Term mooring site on the Southern Flank of Georges Bank (see Table 1 and Figure 3). The mooring includes two eight-frequency sensor packages which measure acoustical scattering from zooplankton at 265, 420, 720, 1100, 1850 and 3000 KHz. The sensors were located at 25 and 50 m depths on the mooring. Each sensor package also contains a thermistor. Data are collected at all frequencies from a single small volume of water near the sensor on the hour and half hour. A larger volume several meters from the array is also ensonified on the hour at the four lower frequencies. These data are internally recorded. The mooring also contains sensors for wind speed, wind direction, air temperature and water temperature at 1 meter depth. These latter measurements are telemetered via GOES at three hour intervals.

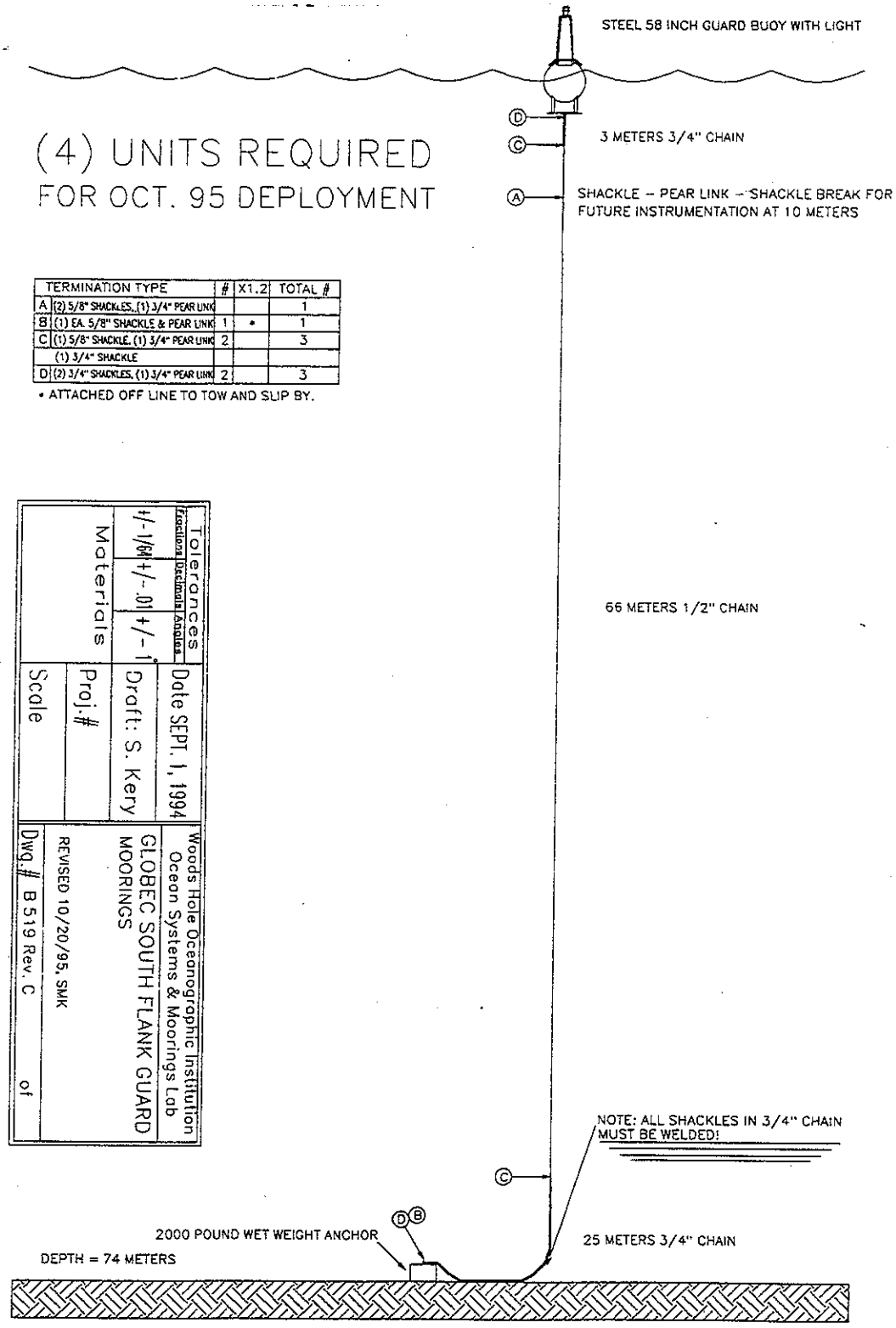

Figure 2. The Guard buoy mooring schematic used for the U.S. GLOBEC long-term moored program on the Southern Flank and Northeast Peak of Georges Bank.

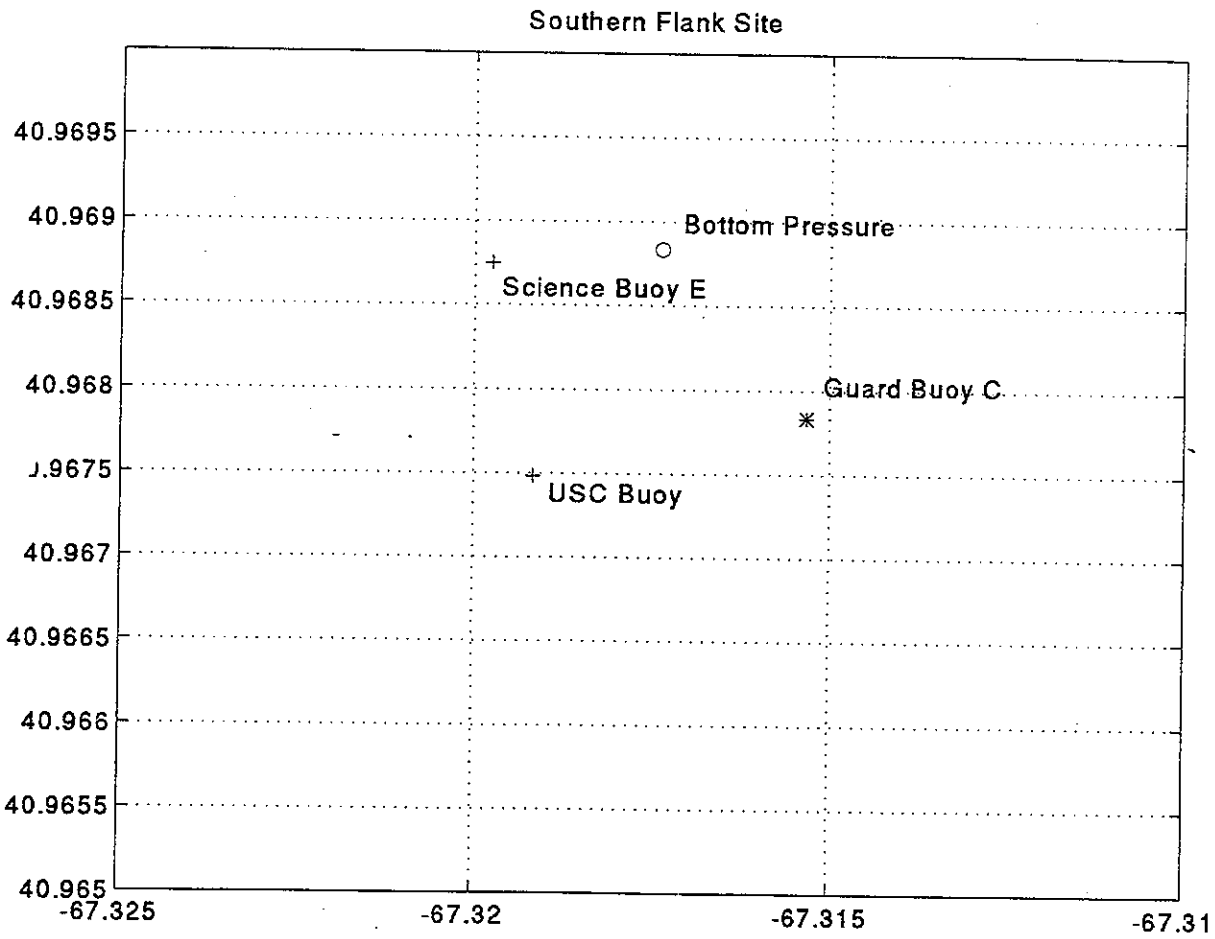

Figure 3. The locations of the moored buoys and bottom pressure instrument at the long-term moored site on the Southern Flank of Georges Bank.

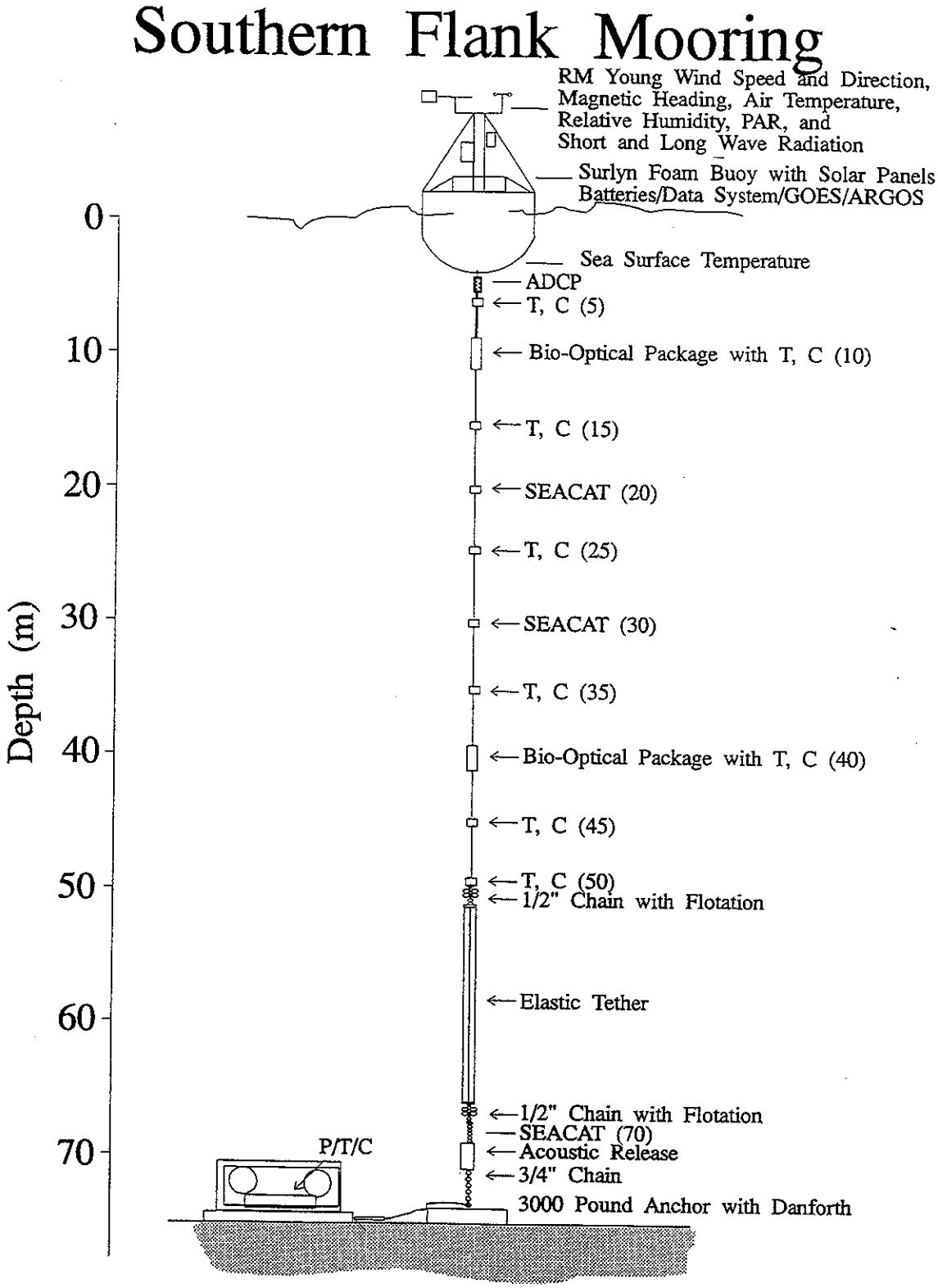

Figure 4. A schematic of the Southern Flank scientific buoy E deployed on the Southern Flank showing the depth and type of sensor (also see Table 2).

Table 1 - U.S. GLOBEC Long-Term Moored Instrument Positions

Location	Instrument	ID	Deployment Date	Time (UTC)	North Latitude	West Longitude	Depth (m)
Southern Flank Site							
	Guard Buoy	C	31-Oct-95	1357	40 58.07	67 18.92	76.2
	Science Buoy	E	31-Oct-95	1700	40 58.125	67 19.185	76.2
	USC/Tracor Buoy	USC	31-Oct-95	2041	40 58.049	67 19.150	76.2
	Bottom Pressure	none	31-Oct-95	2142	40 58.130	67 19.043	76.2
Northeast Peak Site							
	Guard Buoy	B	1-Nov-95	1339	41 42.78	66 28.73	75.5
	Guard Buoy	A	1-Nov-95	1458	41 42.73	66 28.59	75.5
	Science Buoy	D	1-Nov-95	2039	41 42.71	66 28.68	75.5

The bottom-mounted pressure instrument uses a Paroscientific pressure sensor (S/N 53084) to measure the sea level fluctuations due to tides and weather at 1 7/8 minute intervals (1/32 of an hour). Additionally, the instrument burst measures pressure with a 256 point ensemble sampled at 1 Hz every 6 hours to obtain the wave climate that penetrates to that depth. Data are recorded internally in RAM and dumped upon recovery. There is no surface expression on this instrument. It is retrieved by acoustic command (EG&G BACS acoustic release S/N 15050) which drops an anchor and allows attached flotation to bring the aluminum frame with sensor and recorder to the surface for recovery.

Northeast Peak Mooring Site

At the Northeast Peak Site (Figure 1), two guard buoys and a science buoy were deployed. The locations of the buoys are given in Table 1 and shown in Figure 5. The Guard moorings (see Figure 2) were deployed 0.1 nm apart, with the science buoy located between them. The science mooring is similar to the Southern Flank mooring shown in Figure 4, but without the complete suite of meteorology sensors. This buoy carries air and sea surface temperature and PAR sensors. Below the water, the sensor arrangement is the same as the Southern Flank mooring. The Northeast Peak sensor types and serial numbers are listed in Table 3.

Table 2 - Southern Flank Mooring Sensor Type and Depth

Sensor	Depth	Model/Type	Serial Number
Air Temperature	-2.6 m	Rotronics	17457
Relative Humidity	-2.6 m	Rotronics	17457
Wind Speed & Direction	-2.6 m	R.M.Young	
Compass	buoy	KVH	
Long Wave Radiation	-2.6 m	Eppley/PIR	28379
Short Wave Radiation	-2.6 m	Eppley 8-48	28771
PAR	-2.6 m	LiCor UWQ	5018
GOES/ARGOS Antenna	-2.6 m	Synergetics	1395A446
ARGOS Beacon	-1.5 m	Chu	?
Guard Light	-2.6 m	Automatic Power	60116
Sea Surface Temperature	0.6 m	SBE-3	31632
ADCP	3 m	RDI BB	1271
Temperature @ 5 m	5 m	SBE-3	31630
Conductivity @ 5 m	5 m	SBE-4	41379
Temperature @ 10 m	10 m	SBE-3	30485
Conductivity @ 10 m	10 m	SBE-4	40059
PAR @ 10 m	10 m	LiCor SPQA	1794
Optical Backscattering	10 m	SeaPoint	101
Transmissometer @ 10 m	10 m	SeaTech 25 cm	620
Fluorometer @ 10 m	10 m	SeaTech	295
Temperature @ 15 m	15 m	SBE-3	31628
Conductivity @ 15 m	15 m	SBE-4	41343
Temperature @ 20 m	20 m	SeaCat	1736
Conductivity @ 20 m	20 m	SeaCat	1736
Temperature @ 25 m	25 m	SBE-3	31615
Conductivity @ 25 m	25 m	SBE-4	41366
Temperature @ 30 m	30 m	SeaCat	1735
Conductivity @ 30 m	30 m	SeaCat	1735
Temperature @ 35 m	35 m	SBE-3	31631
Conductivity @ 35 m	35 m	SBE-4	41377
Temperature @ 40 m	40 m	SBE-3	30478
Conductivity @ 40 m	40 m	SBE-4	40056
PAR @ 40 m	40 m	LiCor SPQA	1660
Transmissometer @ 40 m	40 m	SeaTech 25 cm	621
Fluorometer @ 40 m	40 m	SeaTech	296
Temperature @ 45 m	45 m	SBE-3	31624
Conductivity @ 45 m	45 m	SBE-4	41342
Temperature @ 50 m	50 m	SBE-3	30484
Conductivity @ 50 m	50 m	SBE-4	41341
Temperature @ 72 m	72 m	SeaCat	1803
Conductivity @ 72 m	72 m	SeaCat	1803
Acoustic Release	75 m	EG&G BACS	15983

CTD Survey

After the scientific buoys were deployed, a one hour yo-yo series of ten profiles each was made in the area of the moorings to act as an initial *in-situ* calibration of the moored sensors. Ten profiles were made at the Northeast Peak and Southern Flank mooring sites. Location and time of the two yo-yos (CTD000 and CTD021) are shown in Figure 1 and 6, and listed in Table 4.

A section was made from the Northeast Channel up onto the crest. The locations of these stations are shown in Figure 6 and listed in Table 4. Profiles were made at 13 stations about 6 nm apart. A contour of the results for temperature, salinity and density is shown in Figures 7, 8 and 9. It is clear that over the crest of the bank, out to about 60 meters depth, the water properties are very well mixed in the vertical, although there is a horizontal gradient in temperature. In the western part of the Northeast Channel, there is evidence of cooler, fresher water (probably Gulf of Maine Intermediate Water) coming out of the Gulf of Maine around the tip of Georges Bank.

Another section was made from the crest of Georges Bank out through the Southern Flank mooring to the shelf-slope front. Locations of these stations are shown in Figure 6 and listed in Table 4. Profiles were made at 13 stations. A contour of the results for temperature, salinity and density are shown in Figures 10, 11 and 12. Again the crest of the bank out to about 60 meters is well mixed, and there is a horizontal stratification. Near the shelf break, just inside of the shelf slope front, there is a cool filament of water which probably represents the water coming out of the Gulf of Maine and mixing with adjacent waters as it moves down the shelf. The shelf-slope front is clearly visible at the far right of the plots, and extends further offshore than our survey.

Figure 13 shows the T-S relationship for the deep stations during the cruise. It is apparent that the source of cool fresh water (6°C and 32.7 PSU) is near Wilkinson Basin, and its effects are seen to extend through the Southern Flank section. Also, the warmer saltier water entering the Gulf of Maine through the Northeast Channel is the source of the saltier (34.9 PSU) water.

In addition to the CTD instrumentation, the TAPS-6, a six frequency acoustics package was used to measure profiles of volume scattering strength from the surface to approximately 3 meters above the bottom at 13 stations along the Northeast Peak section. Thirteen profiles were also made with the TAPS along the long-term moored section, beginning at 41 30.92'N, 67 36.14'W and ending at 40 35.73'N, 67 08.14'W. TAPS uses acoustical echo integration at 65, 420, 1100 and 3000 KHz to estimate zooplankton size -- abundance versus depth. Significant variations in the levels and spectral structure of the scattering were observed along both of these transects. These changes appeared to be correlated to changes in water column structure. An hour long TAPS yo-yo series was collected near the location of the BITS mooring. These data will be transformed to estimates of zooplankton abundance and size and compared with a similar time series from

the BITS mooring and co-located moorings placed at the site by other GLOBEC investigators.

Finally, CTD profiles were taken in conjunction with the MOCNESS and net samples taken on Leg II. These are tabulated with the biological samples from Leg II in Table 6 and locations shown in Figure 6.

Table 3 - Northeast Peak Mooring Sensor type and Depth

Sensor	Depth	Model/Type	Serial Number
Air Temperature	-2.6 m	Thermistor	
PAR	-2.6 m	LiCor UWQ	1793
GOES/ARGOS Antenna	-2.6 m	Synergetics	528A00392
ARGOS Beacon	-1.5 m	Chu	103
Guard Light	-2.6 m	Automatic Power	10060
Sea Surface Temperature	0.6 m	SBE-3	31627
ADCP	3 m	RDI BB	1272
Temperature @ 5 m	5 m	SBE-3	30493
Conductivity @ 5 m	5 m	SBE-4	40068
Temperature @ 10 m	10 m	SBE-3	30494
Conductivity @ 10 m	10 m	SBE-4	40070
PAR @ 10 m	10 m	LiCor SPQA	1793
Transmissometer @ 10 m	10 m	SeaTech 25 cm	617
Fluorometer @ 10 m	10 m	SeaTech	290
Temperature @ 15 m	15 m	SBE-3	30481
Conductivity @ 15 m	15 m	SBE-4	41365
Temperature @ 20 m	20 m	SeaCat	1819
Conductivity @ 20 m	20 m	SeaCat	1819
Temperature @ 25 m	25 m	SBE-3	31629
Conductivity @ 25 m	25 m	SBE-4	41367
Temperature @ 30 m	30 m	SeaCat	1818
Conductivity @ 30 m	30 m	SeaCat	1818
Temperature @ 35 m	35 m	SBE-3	31617
Conductivity @ 35 m	35 m	SBE-4	41595
Temperature @ 40 m	40 m	SBE-3	30490
Conductivity @ 40 m	40 m	SBE-4	40058
PAR @ 40 m	40 m	LiCor SPQA	1792
Transmissometer @ 40 m	40 m	SeaTech 25 cm	628
Fluorometer @ 40 m	40 m	SeaTech	306
Temperature @ 45 m	45 m	SBE-3	30482
Conductivity @ 45 m	45 m	SBE-4	41625
Temperature @ 50 m	50 m	SBE-3	31623
Conductivity @ 50 m	50 m	SBE-4	41368
Temperature @ 72 m	72 m	SeaCat	1820
Conductivity @ 72 m	72 m	SeaCat	1820
Acoustic Release	75 m	EG&G BACS	15969

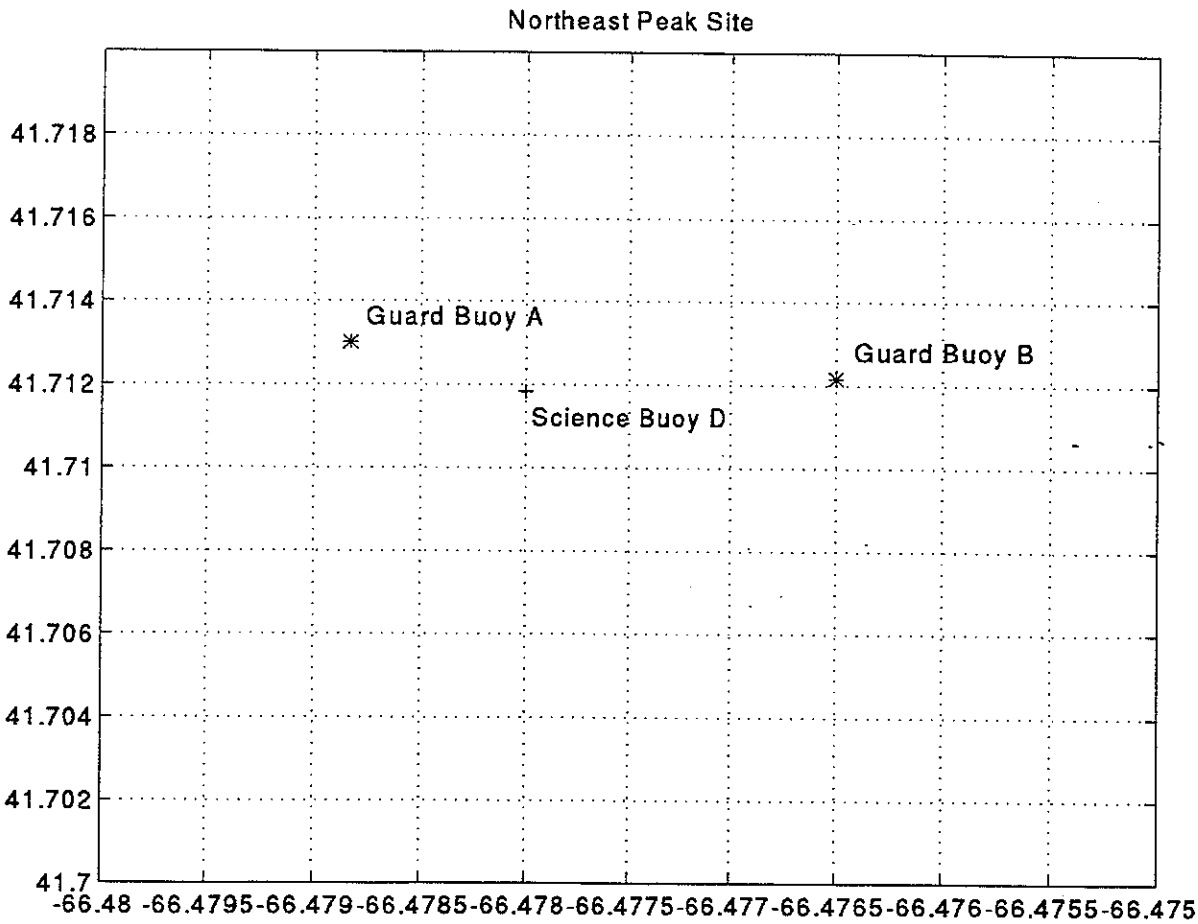

Figure 5. The location of the moorings at the Northeast Peak site on the tip of Georges Bank in the cod and haddock spawning region

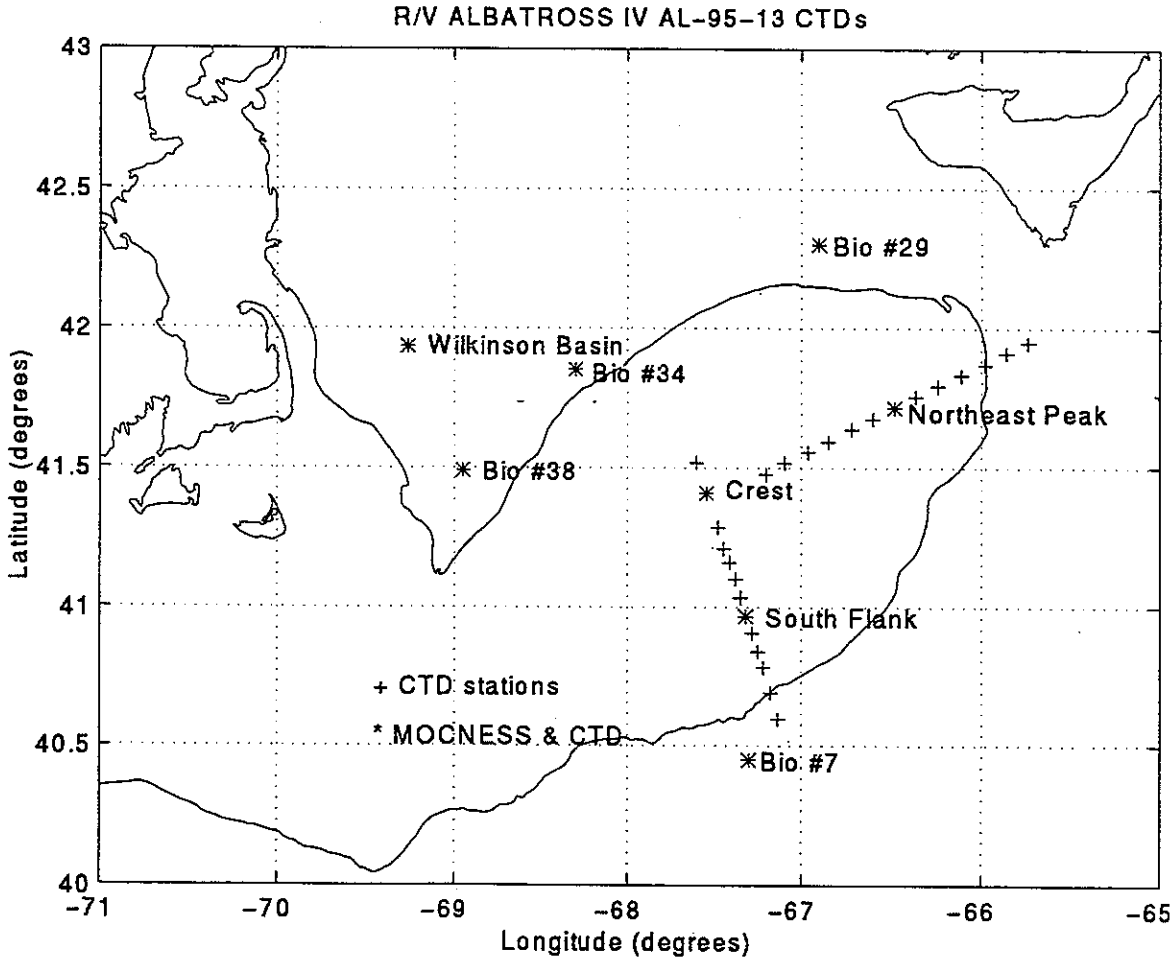

Figure 6. The location of the CTD profiles made in the two sections from the Northeast Channel up onto the crest, and from the crest out to Atlantic waters through the mooring sites.

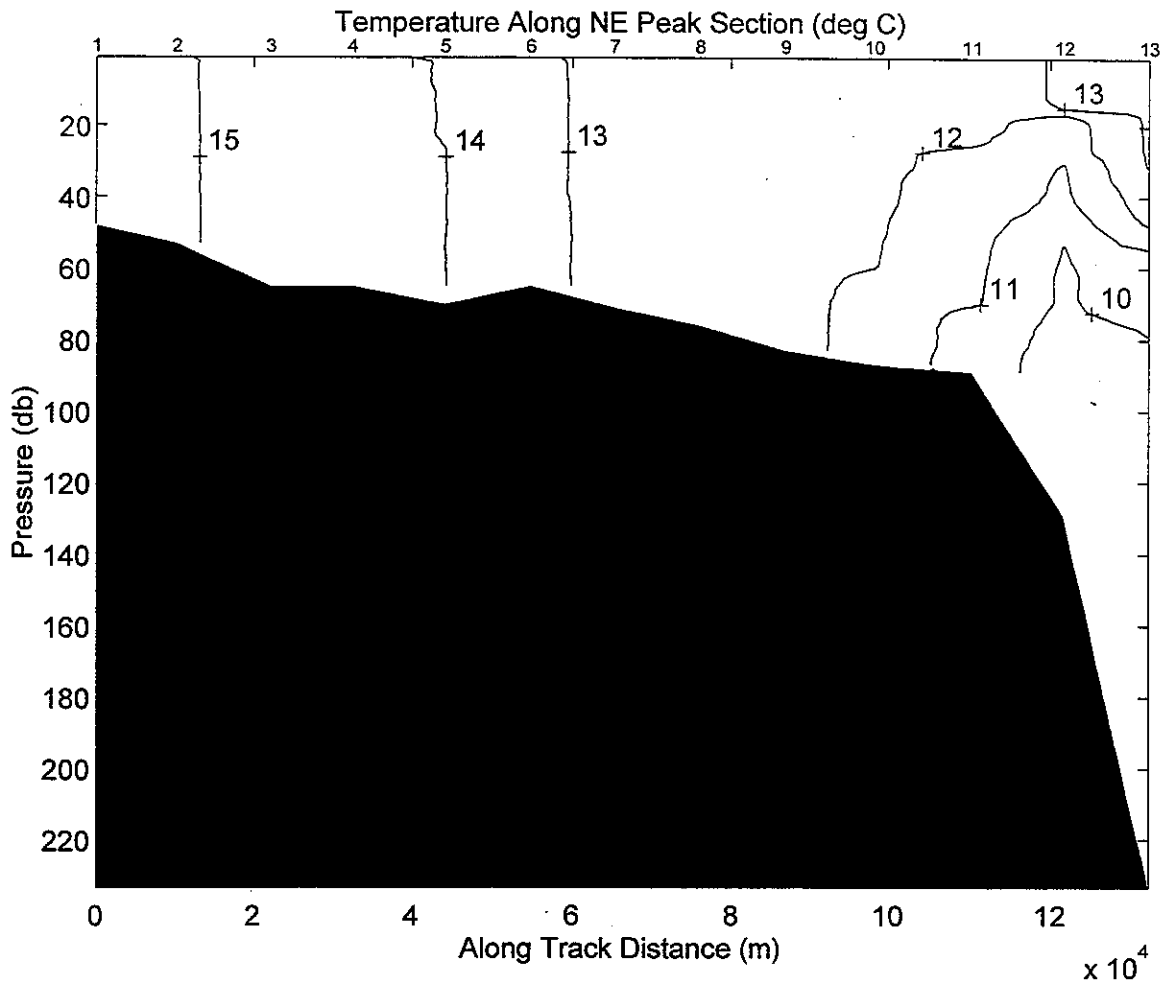

Figure 7. Northeast Peak Temperature section from the Northeast Channel up onto the crest.

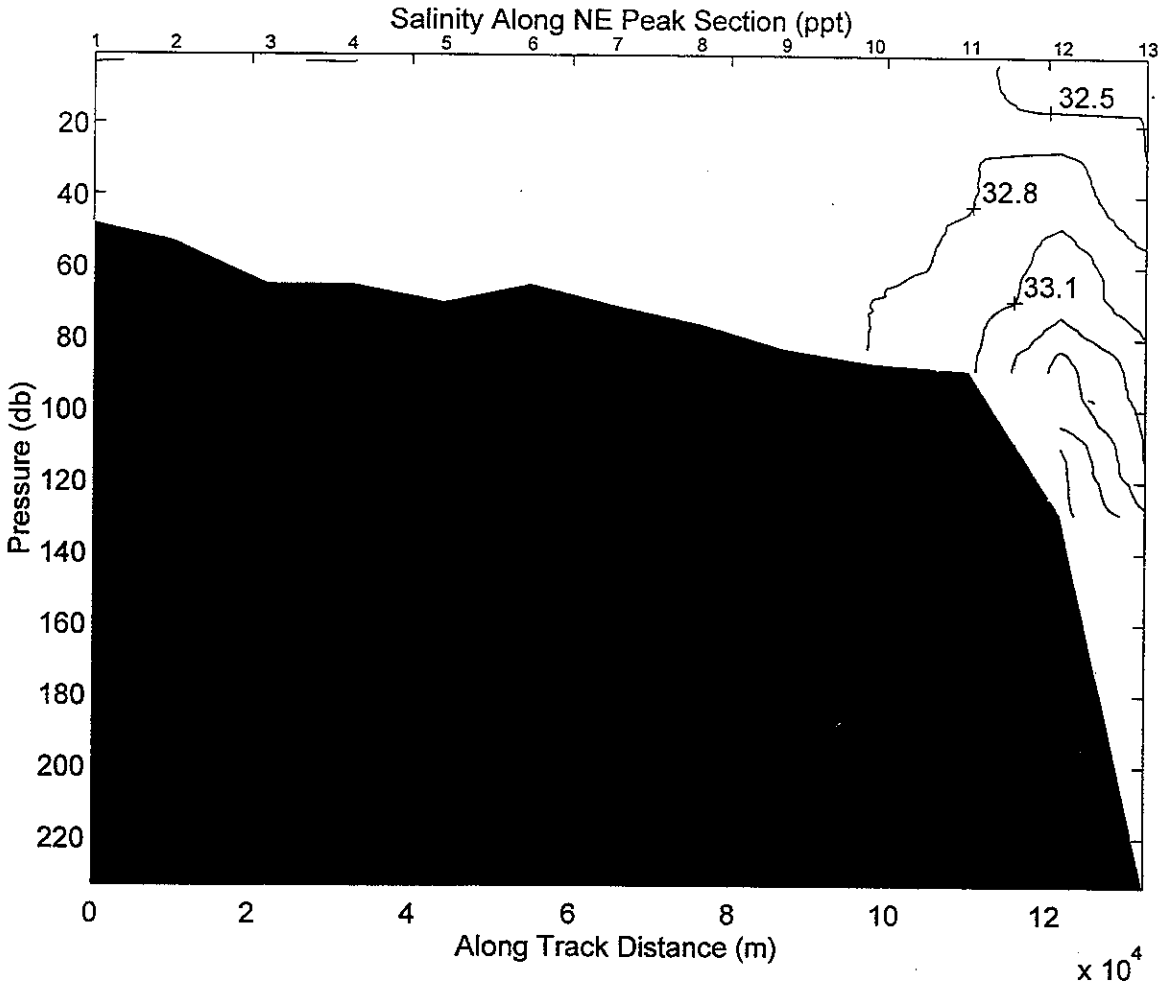

Figure 8. Northeast Peak Salinity Section taken from the Northeast Channel up onto the crest of Georges Bank.

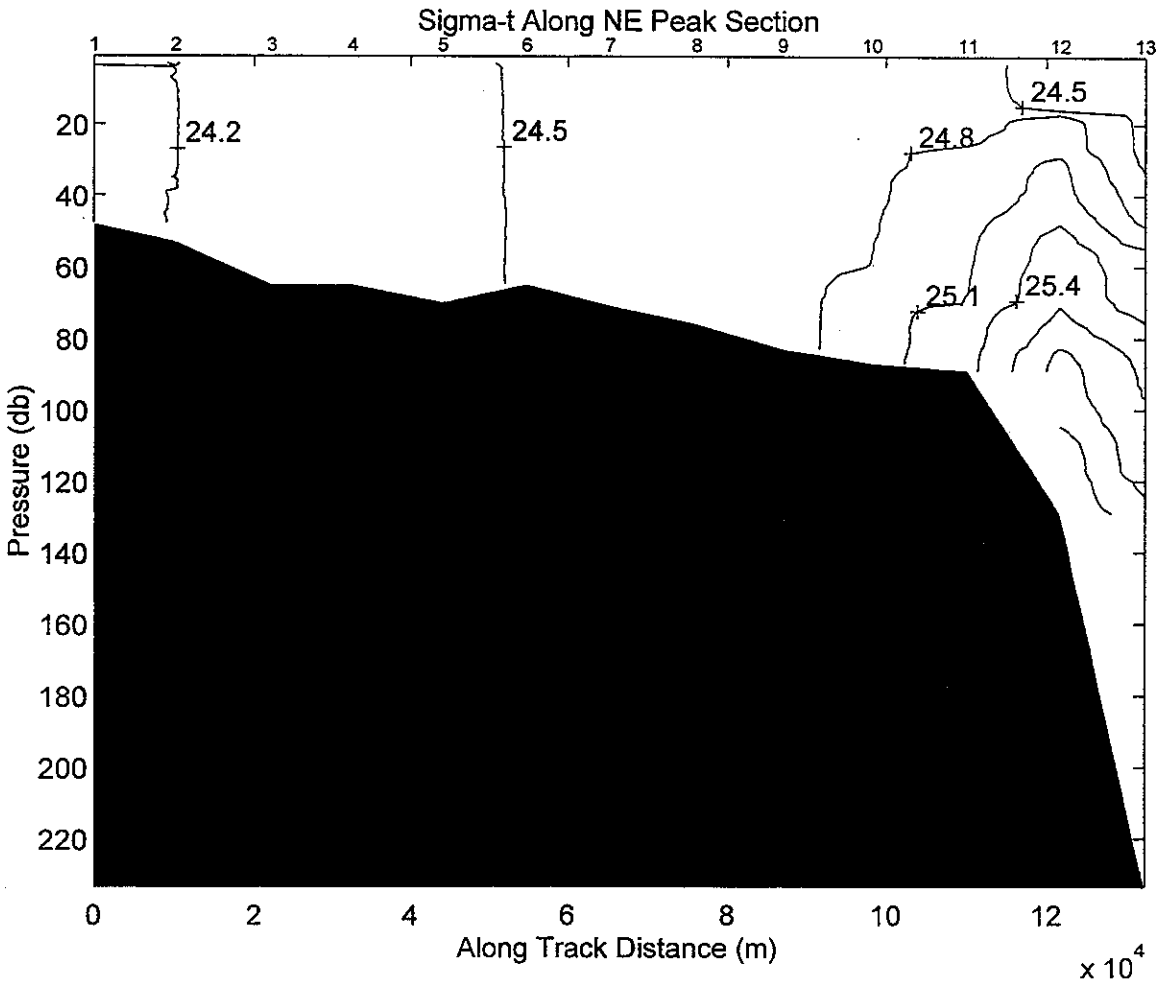

Figure 9. Northeast Peak Density Section from the Northeast Channel up onto the crest of Georges Bank.

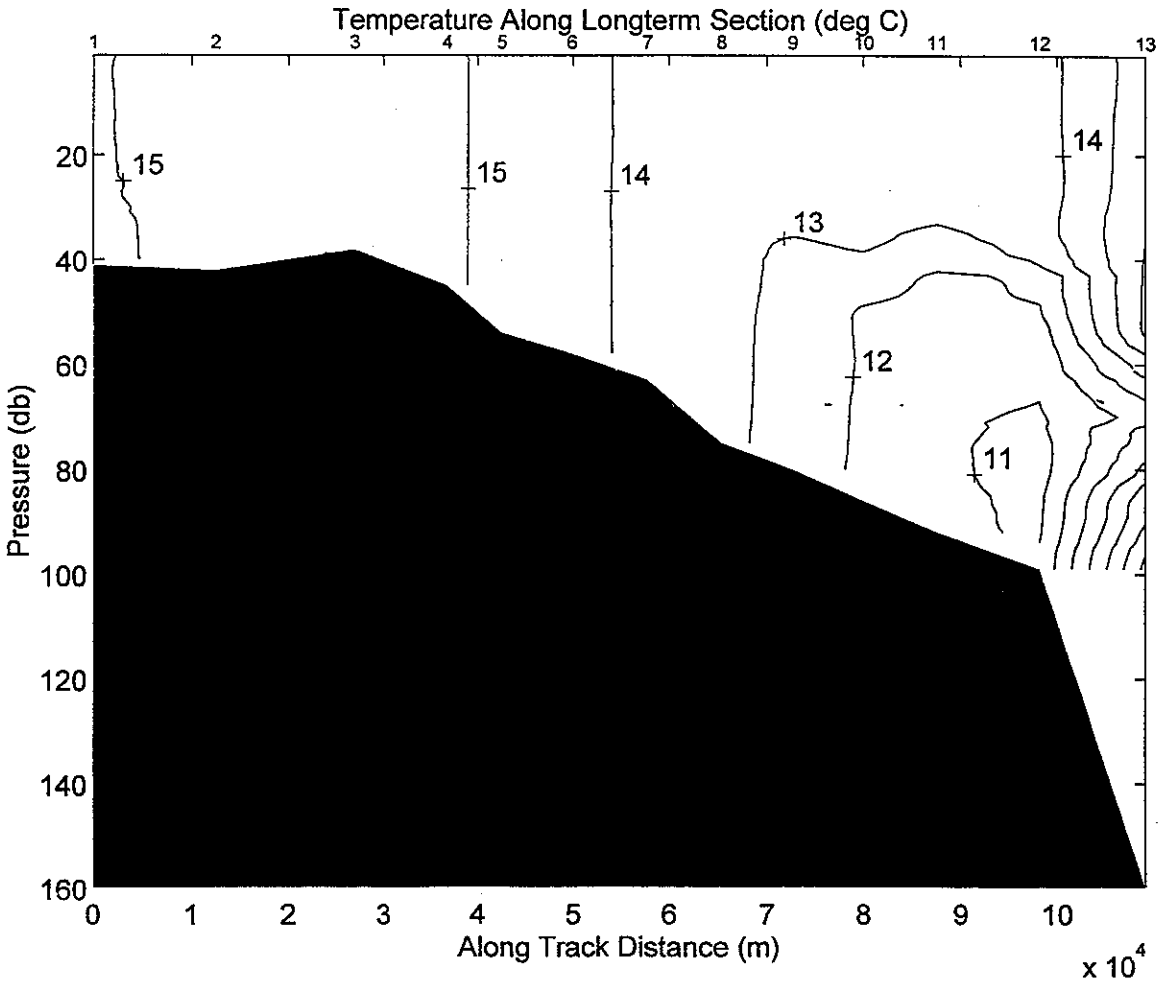

Figure 10. Long-Term Temperature Section from the Atlantic up onto the crest of Georges Bank.

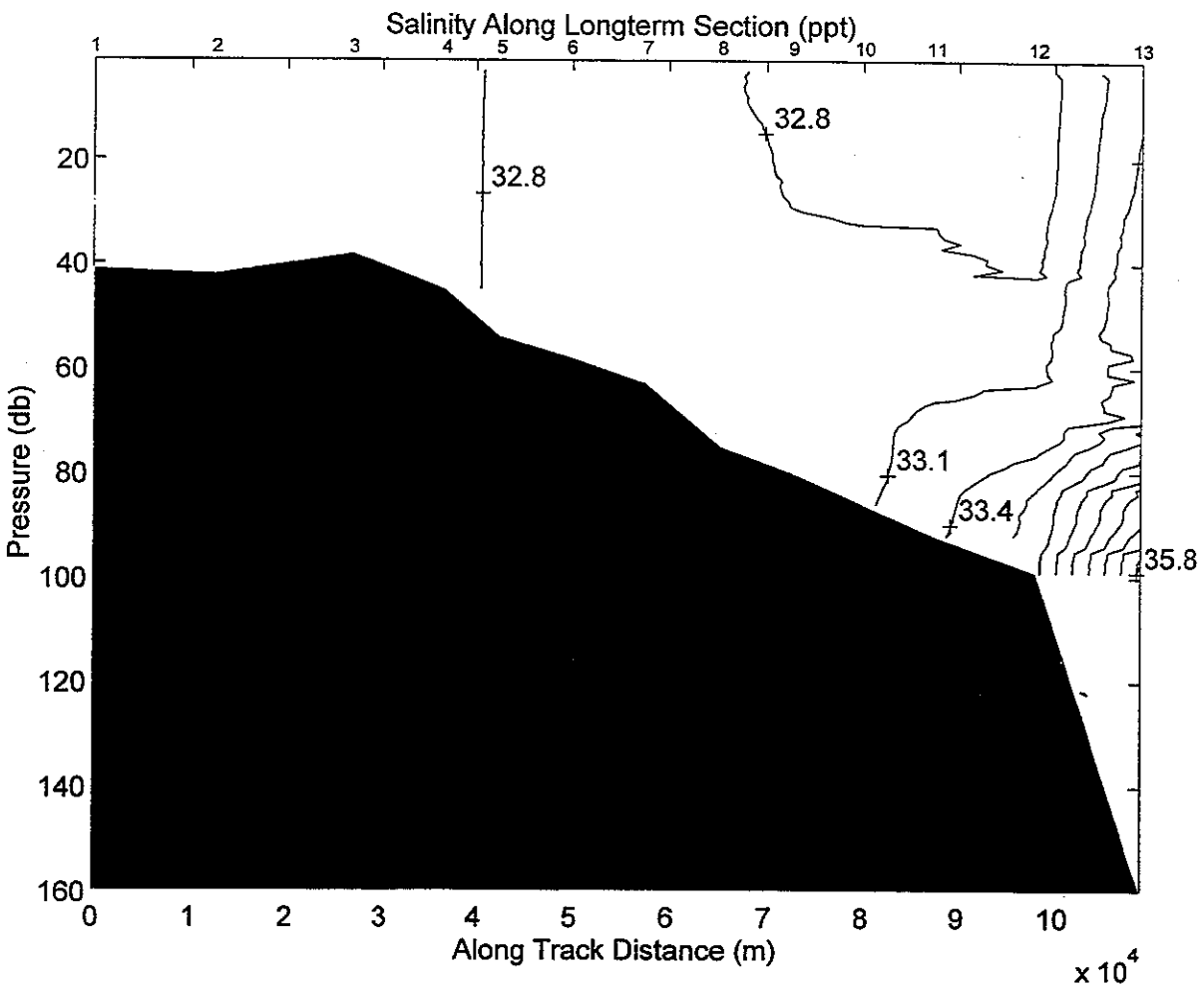

Figure 11. Long-Term Moored Salinity Section from the Atlantic up onto the crest of Georges Bank.

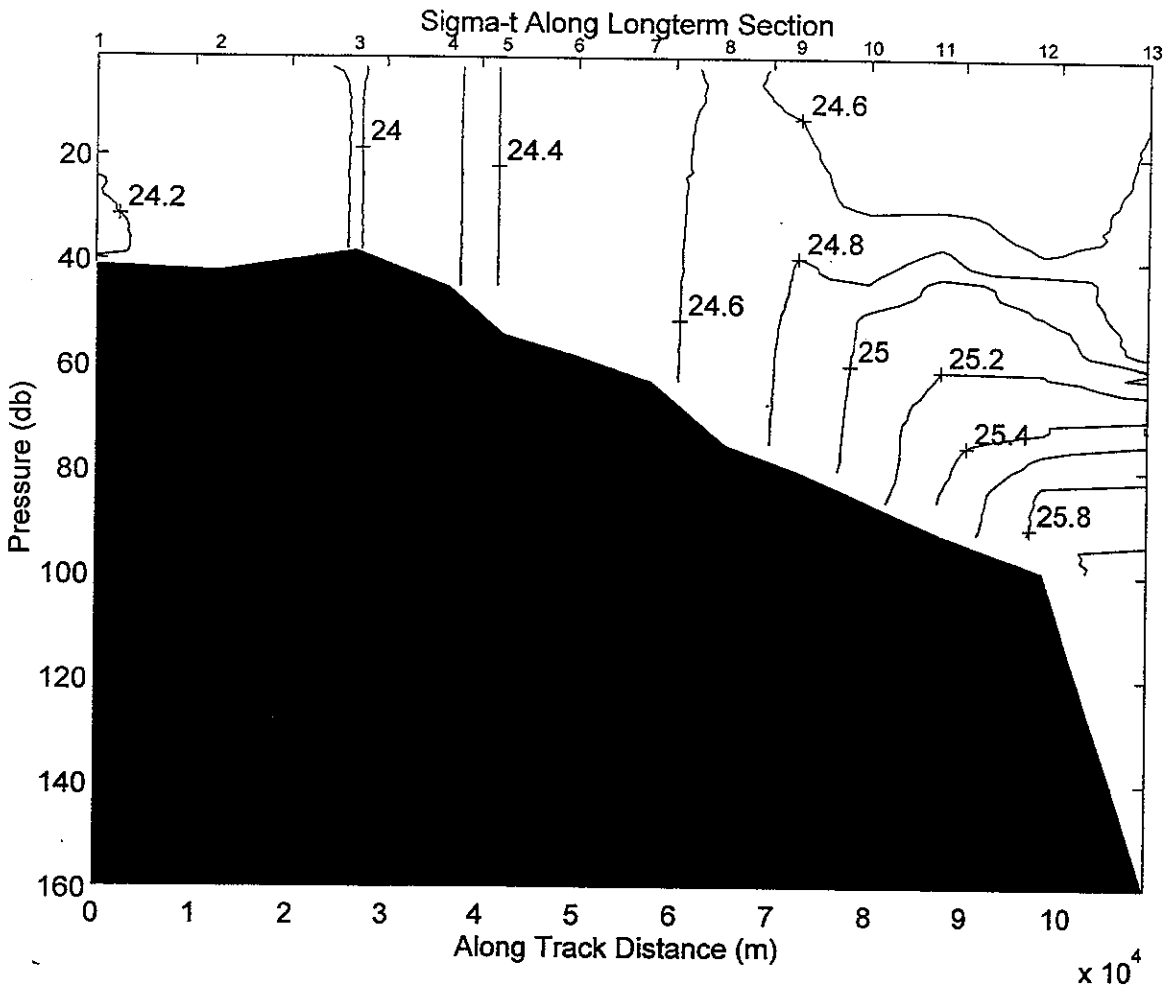

Figure 12. Long-Term Moored Density Section from the Atlantic up onto the crest of Georges Bank.

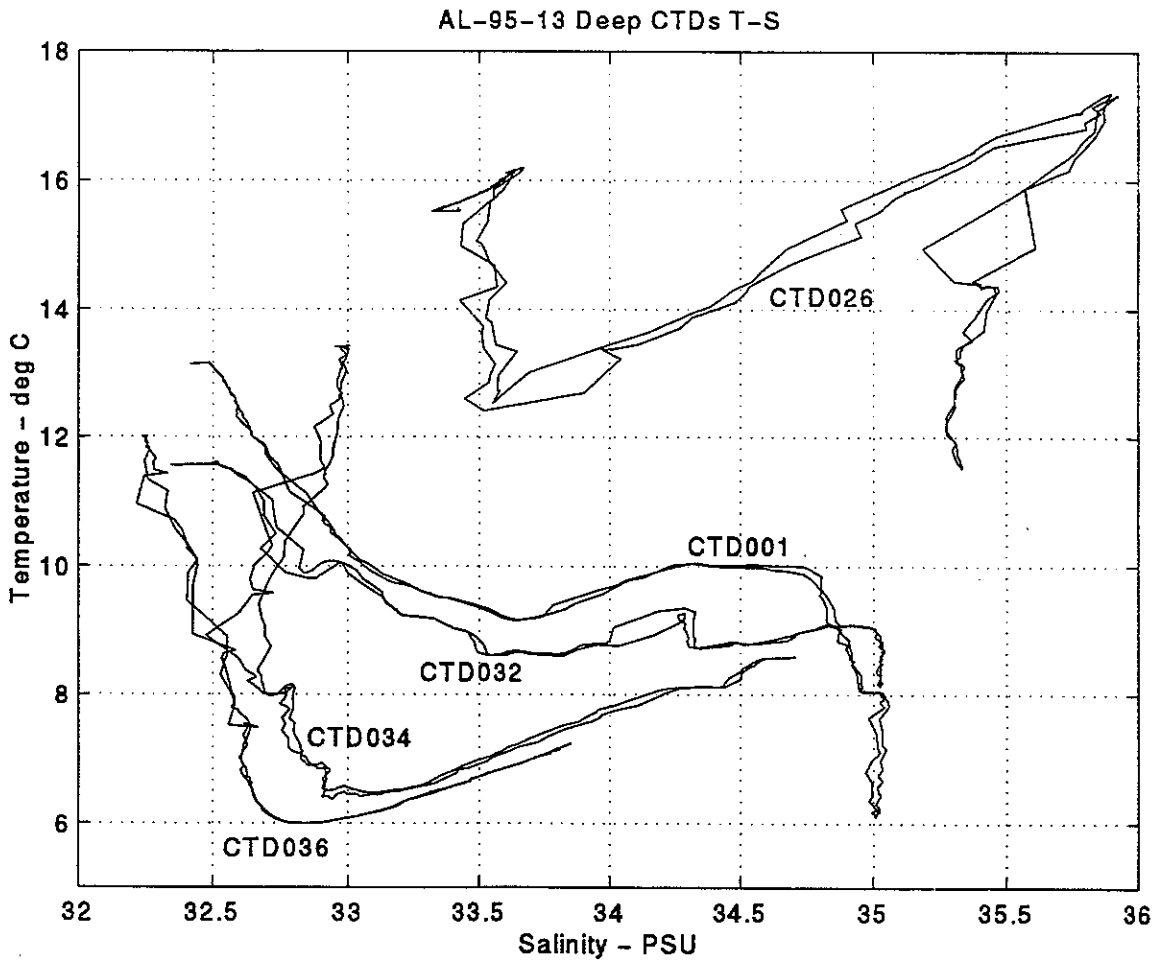

Figure 13. The Temperature-Salinity relationship from the deep stations during AL-95-13. The station numbers are given, and positions shown in Figure 6 and listed in Table 4.

Table 4. Table of CTD Times and Positions

Instrument	Cast #	Station #	Year	Month	Day	Local Time	Latitude	Longitude	Water Depth	Cast Depth	Comments
CTD yo-yo	0	NE07	95	11	1	16:39	41 43.12	66 28.55	78	73	-
end						17:34	41 43.44	66 28.63	77	72	Bottle #1
CTD	1	NE13	95	11	1	20:54	41 56.90	65 44.46	240	235	Bottle #2
CTD	2	NE12	95	11	1	21:58	41 54.66	65 67.60	133	128	Bottle #3
CTD	3	NE11	95	11	1	22:53	41 51.96	65 58.91	93	88	Bottle #4
CTD	4	NE10	95	11	1	23:49	41 49.48	66 06.94	92	87	Bottle #5
CTD	5	NE09	95	11	2	0:43	41 47.28	66 14.51	86	81	Bottle #6
CTD	6	NE08	95	11	2	1:33	41 45.07	66 21.74	80	75	Bottle #7
CTD	7	NE07	95	11	2	2:21	41 42.80	66 28.92	77	72	Bottle #8
CTD	8	NE06	95	11	2	3:11	41 40.32	66 35.90	70	65	Bottle #9
CTD	9	NE05	95	11	2	4:02	41 38.20	66 43.18	74	70	Bottle #10
CTD	10	NE04	95	11	2	5:05	41 35.60	66 50.78	70	65	Bottle #11
CTD	11	NE03	95	11	2	6:08	41 33.31	66 57.68	66	61	Bottle #12
CTD	12	NE02	95	11	2	9:05	41 30.95	67 05.69	58	52	No Trip
CTD	13	NE01	95	11	2	9:49	41 28.35	67 12.10	53	48	Bottle #13
CTD	14	LT01	95	11	2	12:22	41 30.89	67 36.17	40	40	Hit Bottom
CTD	15	LT02	95	11	2	13:34	41 24.59	67 32.65	43	37	Bottle #14
CTD	16	LT03	95	11	2	14:55	41 17.63	67 28.57	43	37	
CTD	17	LT04	95	11	2	15:47	41 12.40	67 26.45	49	45	Bottle #15
CTD	18	LT05	95	11	2	16:30	41 09.65	67 24.41	56	52	
CTD	19	LT06	95	11	2	17:24	41 05.88	67 22.63	63	58	
CTD	20	LT07	95	11	2	18:30	41 01.96	67 20.80	68	63	Bottle #16
CTD yo-yo	21	LT08	95	11	2	19:20	40 58.47	67 18.78	77	72	
end						20:20	40 57.85	67 17.94	77		
CTD	22	LT09	95	11	2	20:59	40 54.53	67 16.84	84	79	Bottle #17
CTD	23	LT10	95	11	2	21:46	40 50.77	67 15.12	91	86	
CTD	24	LT11	95	11	2	22:33	40 47.04	67 13.03	96	91	Bottle #18
CTD	25	LT12	95	11	2	23:37	40 41.57	37 10.48	103	98	
CTD	26	LT13	95	11	3	0:27	40 35.73	67 08.13	164	159	
CTD	28	BIO07	95	11	6	08:00	40 29.50	67 18.60	165	160	Bottle #19
CTD	29	LT08	95	11	6	10:59	40 57.80	67 18.28	77	72	Bottle #20
CTD	30	LT02	95	11	6	15:42	41 24.76	67 31.94	41	30	Bottle #21
CTD	31	NE07	95	11	6	20:38	41 42.60	66 29.09	76	72	
CTD	32	BIO29	95	11	7	02:38	42 16.20	66 57.17	273	268	Bottle #22
CTD	33	???	95	11	7	05:43	41 51.18	67 18.23	49	42	Bottle #23
CTD	34	BIO034	95	11	7	10:38	41 57.08	68 19.13	222	217	Bottle #24
CTD	35	BIO038	95	11	7	15:24	41 29.49	68 57.03	155	150	
CTD	36	GOM	95	11	7	20:11	41 55.35	69 16.31	207	205	Bottle #25
CTD	37	GOM	95	11	7	20:52	41 55.24	69 16.92	208	120	

Drifters

As part of the US GLOBEC drifter program (R. Limeburner and R. Beardsley, WHOI), five ARGOS tracked drifters were deployed over the crest of the bank to complement the drifters still on the bank from previous deployments. The drifters had a surface float containing the electronics and batteries for the ARGOS transmitter. Below this was a subsurface float and a 7.5 meter long 1 m diameter holey sock drogue with the center of the drogue at 10 m depth. The locations and times of the five drifter releases are given in Table 5. The fifth drifter was deployed on the northern flank on Leg II after drifter 23747 was pulled under the ship and the drogue chopped up in the ship's propeller. The undamaged electronics was salvaged, but another drifter was picked up between legs to give the deployment the full suite of five.

Table 5. ARGOS Tracked Drifter Deployments

Serial Number	Year	Month	Day	EST Time	North Latitude	West Longitude	Water Depth	Observer
23759	95	11	2	07:28	41 41.14	67 02.84	62	J.Irish
23771	95	11	2	11:40	41 27.23	67 31.11	40	J.Irish
23757	95	11	2	16:40	41 09.44	67 24.44	57	J.Irish
23769	95	11	3	05:33	41 15.37	67 59.44	51	K.Bradshaw
23763	95	11	7	07:38	41 50.06	67 44.88	38	J.Irish

Zooplankton broadscale survey and Calanus finmarchicus size and condition measurements.

Edward Durbin, Robert Campbell, and Melissa Wagner

The purpose of the biological sampling on the mooring deployment cruise was to extend the temporal coverage of the GLOBEC broadscale survey and the Calanus finmarchicus size and condition measurements. Our specific objectives were to: (1) conduct a brief broadscale zooplankton survey of the Georges Bank / Gulf of Maine region, and (2) measure the size and condition of Calanus finmarchicus C5 copepodites on the bank, in the Slope Water, and in the deep basins of the Gulf of Maine.

A total of eight MOCNESS tows were made at different stations including three stations along a transect from the Atlantic slope waters to the crest, a station on the northeast peak, and four stations in the basins of the Gulf of Maine (see Table 6 and Figure 6). The MOCNESS tows were made following the standard broadscale protocol. A 300 μm mesh net was used for the down cast (0 to bottom) and four 150 μm mesh nets for the up cast (bottom to 100m at stations greater than 100m deep, 100 to 40m, 40 to 15m, and 15m to surface). Prior to preserving the samples in 4% formaldehyde, Calanus finmarchicus C5 copepodites were sorted from the surface and bottom net hauls under anesthetic using a dissecting microscope, recorded with a video system for later length measurements, and then placed either in a tin pan and dried over desiccant for carbon and nitrogen analysis or in cryotubes and frozen in liquid nitrogen for RNA/DNA determinations. In addition, water samples were taken at each station for fractionated chlorophyll a analysis.

A brief summary of our initial findings follows: Centropages typicus was the dominant copepod on the bank and in the surface waters of the Gulf of Maine. Calanus finmarchicus was abundant at all stations with the exception of the crest site. The majority of the Calanus were found near the bottom, especially in the Gulf of Maine where an almost pure layer of Calanus was found at depth in the basins. At all stations, most of the

Calanus present were C5s; there were some C4s, and very few adult females. We also found a diatom bloom dominated by Rhizosolenia spp. on the Bank and in the Gulf of Maine. Calanus that were present in the surface waters, including C5s, had guts full of brown pigment, which is an indication that they were actively feeding on the diatoms.

Table 6. MOCNESS, Phytoplankton and Ring Net Tows

						Local			Water	Cast
Instrument	Cast	Station	Year	Month	Day	Time	Latitude	Longitude	Depth	Depth
MOCNESS	M1	Bio7	95	11	6	7:00	40 27.55	67 17.97	250	200
MOCNESS	M2	LT08 (SF)	95	11	6	11:23	40 58.09	67 18.57	77	62
MOCNESS	M3	LT02 (Crest)	95	11	6	15:20	41 24.47	67 32.46	42	30
PPN	P1	LT02 (Crest)	95	11	6	14:42	41 24.76	67 31.94	41	1
PPN	P2	NE07 (NEP)	95	11	6	20:38	41 42.60	66 29.09	76	1
MOCNESS	M4	NE07 (NEP)	95	11	6	20:55	41 42.69	66 28.76	77	65
MOCNESS	M5	Georges Basin	95	11	7	1:07	42 18.01	66 54.25	297	254
PPN	P3	Georges Basin	95	11	7	2:38	42 16.20	66.57.17	273	1
MOCNESS	M6	BIO34	95	11	7	9:55	41 50.87	68 17.84	212	200
PPN	P4	BIO034	95	11	7	10:38	41 57.08	68 19.13	222	1
PPN	P5	BIO038	95	11	7	15:24	41 29.49	68 57.03	155	1
MOCNESS	M7	BIO038	95	11	7	15:47	41 29.47	68 57.52	154	140
MOCNESS	M8	Wilkinson Basin	95	11	7	19:27	41 55.79	69 15.46	200	190
CTD/Net	36	Wilkinson Basin	95	11	7	20:11	41 55.35	69 16.31	207	205
CTD/Net	37	Wilkinson Basin	95	11	7	20:52	41 55.24	69 16.92	208	120

ALBATROSS IV Cruise AL-95-14 Personnel

LEG 1: Mooring Deployment and CTD

Jim Irish, WHOI, Chief Sci.
Kent Bradshaw, WHOI, Tech.
Nick Witzell, WHOI, Engineer
Pat O'Malley, WHOI, Engineer
Brian Racine, WHOI, Grad. Student

Van Holliday, Tracor, Scientist
John Dawson, Tracor, Engineer

Leg 2: MOCNESS tows and CTD

Jim Irish, WHOI, Chief Sci.
Nick Witzell, WHOI, Engineer
Brian Racine, WHOI, Grad. Student

Ted Durbin, URI, Scientist
Bob Campbell, URI, Tech.
Mellisa Wagner, URI, Grad. Student

Ship's Personnel

John Moakley, CO
James Meigs, XO
Denise Gruccio, OPS
Christopher Kock, OPS

Kevin Cruise, CME
Charles Hersey, 2AE
Orlando Thompson, JE

Ken Rondeau, CB
John Cravo, SF
Anthime Brunette, SF
Ernest Forster, OF
Gary McNally, SF
William Amaro, SF

Richard Whitehead, CS
Jerome Nelson, CC

Bruce Stone, RET

		U.S. GLOBEC Georges Bank Event Log											
							Local			Water	Cast		
Event #	Instrument	Cast #	Station #	Year	Month	Day	Time	Latitude	Longitude	Depth	Depth	Observer	Comments
1	Buoy C		South Flank	95	10	31	857	40 58.07	67 18.92	76		JIrish	Guard
2	Buoy E		South Flank	95	10	31	1200	40 58.125	67 19.185	76		JIrish	Science
3	USC		South Flank	95	10	31	1541	40 58.049	67 19.150	76		JIrish	Acoustic
4	Pressure		South Flank	95	10	31	1642	40 58.130	67 19.043	76		JIrish	Bottom mtg
5	Buoy B		NE Peak	95	11	1	839	41 42.78	66 28.73	75		JIrish	Guard
6	Buoy A		NE Peak	95	11	1	958	41 42.73	66 28.59	75		JIrish	Guard
7	Buoy D		NE Peak	95	11	1	1539	41 42.71	66 28.68	75		JIrish	Science
8	CTD yo-yo	0	NE07	95	11	1	16:39	41 43.12	66 28.55	78	73	BRacine	
	end						17:34	41 43.44	66 28.63	77	72	BRacine	Bottle #1
9	CTD	1	NE13	95	11	1	20:54	41 56.90	65 44.46	240	235	BRacine	Bottle #2
10	CTD	2	NE12	95	11	1	21:58	41 54.66	65 67.60	133	128	BRacine	Bottle #3
11	CTD	3	NE11	95	11	1	22:53	41 51.96	65 58.91	93	88	BRacine	Bottle #4
12	CTD	4	NE10	95	11	1	23:49	41 49.48	66 06.94	92	87	BRacine	Bottle #5
13	CTD	5	NE09	95	11	2	0:43	41 47.28	66 14.51	86	81	BRacine	Bottle #6
14	CTD	6	NE08	95	11	2	1:33	41 45.07	66 21.74	80	75	BRacine	Botle #7
15	CTD	7	NE07	95	11	2	2:21	41 42.80	66 28.92	77	72	BRacine	Bottle #8
16	CTD	8	NE06	95	11	2	3:11	41 40.32	66 35.90	70	65	BRacine	Bottle #9
17	CTD	9	NE05	95	11	2	4:02	41 38.20	66 43.18	74	70	BRacine	Bottle #10
18	CTD	10	NE04	95	11	2	5:05	41 35.60	66 50.78	70	65	BRacine	Bottle #11
19	CTD	11	NE03	95	11	2	6:08	41 33.31	66 57.68	66	61	BRacine	Bottle #12
20	Drifter	23759		95	11	2	7:28	41 41.14	67 02.84	62		JIrish	
21	CTD	12	NE02	95	11	2	9:05	41 30.95	67 05.69	58	52	NWitzell	No Trip
22	CTD	13	NE01	95	11	2	9:49	41 28.35	67 12.10	53	48	NWitzell	Bottle #13
23	Drifter	23747		95	11	2	11:40	41 27.23	67 31.11			JIrish	
24	CTD	14	LT01	95	11	2	12:22	41 30.89	67 36.17	40	40	NWitzell	Hit Bottom
25	CTD	15	LT02	95	11	2	13:34	41 24.59	67 32.65	43	37	NWitzell	Bottle #14
26	CTD	16	LT03	95	11	2	14:55	41 17.63	67 28.57	43	37	NWitzell	
27	CTD	17	LT04	95	11	2	15:47	41 12.40	67 26.45	49	45	JIrish	Bottle #15
28	CTD	18	LT05	95	11	2	16:30	41 09.65	67 24.41	56	52	JIrish	
29	Drifter	23757		95	11	2	16:40	41 09.44	67 24.44			JIrish	
30	CTD	19	LT06	95	11	2	17:24	41 05.88	67 22.63	63	58	JIrish	
31	CTD	20	LT07	95	11	2	18:30	41 01.96	67 20.80	68	63	JIrish	Botle #16
32	CTD yo-yo	21	LT08	95	11	2	19:20	40 58.47	67 18.78	77	72	NWitzell	
	end						20:20	40 57.85	67 17.94	77		NWitzell	

33	CTD	22	LT09	95	11	2	20:59	40 54.53	67 16.84	84	79	BRacine	Bottle #17
34	CTD	23	LT10	95	11	2	21:46	40 50.77	67 15.12	91	86	BRacine	
35	CTD	24	LT11	95	11	2	22:33	40 47.04	67 13.03	96	91	BRacine	Bottle #18
36	CTD	25	LT12	95	11	2	23:37	40 41.57	37 10.48	103	98	BRacine	
37	CTD	26	LT13	95	11	3	0:27	40 35.73	67 08.13	164	159	BRacine	
38	Drifter	23769		95	11	3	5:33	41 15.37	67 59.44			KBradshaw	
39	MOCNESS	M1	Bio7	95	11	6	7:00	40 27.55	67 17.97	250	200	RCampbell	Shallowed
40	CTD	28	Bio7	95	11	6	8:00	40 29.50	67 18.60	165	160	BRacine	Bottle #19
41	CTD	29	LT08 (SF)	95	11	6	10:59	40 57.80	67 18.28	77	72	BRacine	Bottle #20
42	MOCNESS	M2	LT08 (SF)	95	11	6	11:23	40 58.09	67 18.57	77	62	RCampbell	
43	MOCNESS	M3	LT02 (Crest)	95	11	6	15:20	41 24.47	67 32.46	42	30	RCampbell	
44	CTD	30	LT02 (Crest)	95	11	6	15:42	41 24.76	67 31.94	41	30	BRacine	Bottle 21
45	PPN	P1	LT02 (Crest)	95	11	6	14:42	41 24.76	67 31.94	41	1	RCampbell	
46	CTD	31	NE07 (NEP)	95	11	6	20:38	41 42.60	66 29.09	76	72	NWitzell	
47	PPN	P2	NE07 (NEP)	95	11	6	20:38	41 42.60	66 29.09	76	1	RCampbell	
48	MOCNESS	M4	NE07 (NEP)	95	11	6	20:55	41 42.69	66 28.76	77	65	RCampbell	
49	MOCNESS	M5	Georges Bas	95	11	7	1:07	42 18.01	66 54.25	297	254	RCampbell	
50	CTD	32	Geroges Bas	95	11	7	2:38	42 16.20	66 57.17	273	268	BRacine	Bottle #22
51	PPN	P3	Geroges Bas	95	11	7	2:38	42 16.20	66.57.17	273	1	RCampbell	
52	CTD	33	Extra	95	11	7	5:43	41 51.18	67 18.23	49	42	JIrish	Bottle #23
53	Drifter	23763	D5	95	11	7	7:38	41 50.06	67 44.88	38		JIrish	
54	MOCNESS	M6	BIO34	95	11	7	9:55	41 50.87	68 17.84	212	200	RCampbell	
55	CTD	34	BIO034	95	11	7	10:38	41 57.08	68 19.13	222	217	BRacine	Bottle #24
56	PPN	P4	BIO034	95	11	7	10:38	41 57.08	68 19.13	222	1	RCampbell	
57	CTD	35	BIO038	95	11	7	15:24	41 29.49	68 57.03	155	150	NRacine	
58	PPN	P5	BIO038	95	11	7	15:24	41 29.49	68 57.03	155	1	RCampbell	
59	MOCNESS	M7	BIO038	95	11	7	15:47	41 29.47	68 57.52	154	140	RCampbell	
60	MOCNESS	M8	Wilkinson B	95	11	7	19:27	41 55.79	69 15.46	200	190	RCampbell	
61	CTD/Net	36	Wilkinson B	95	11	7	20:11	41 55.35	69 16.31	207	205	BRacine	Bottle #25/s
62	CTD/Net	37	Wilkinson B	95	11	7	20:52	41 55.24	69 16.92	208	120	BRacine	Net Good

ALBATROSS IV Cruise AL-95-13

Leg 1 - Long-Term Mooring Deployment

Monday - 30 October 1995

EST

1728 - Depart WHOI dock for Southern Flank Site

1830 - Deck meeting with officers/deck crew/WHOI & TRACOR personnel

1935 - Ship orientation

2111 - Setting ADCP 1721 for Southern Flank Science mooring

Set Parameters - WP=240

WN=040

WS=0200

WF=0200

TP=00:02.00

TE=00:30:00

This gives 240 pings @ 2 s = 8 minutes

Cleaned and greased connector

CY command to reset

21:26:00 - CS command to start pinging

LED on RS232 box flashing @ 2s - OK

21:34 00 - LED on for 4 s as wrote sample - OK

21:25 - Check PCMCIA - flashing every 3 s - OK

wind 16 kts, seas slight chip - still in Vineyard Sound

Tuesday - 31 October 1995

EST

0600 - Wind 15 kts, 4' swell with 1-2' wind chip, scattered clouds

0630 - Continuous ARGOS uplink receiver log

NOTE: UPLINK RECEIVER CLOCK STILL ON DAYLIGHT SAVINGS TIME SO ALL ARGOS LOGS ARE IN DAYLIGHT SAVING TIME.

ARGOS check on buoys

12778 - STATUS=980

10-22°C, no F/R errors, 46-48 db, 13-13.5 v OK

11709 - STATUS=996

10-22°C, no F/R errors, 44-46 db, 13-13.5 v OK

12779 and 03492 beacons still working

0700 - Setting up deck for guard mooring launch

Deck holes are wrong size and spacing in deck cleats

0810 - Deck rigged, moving 1/2 mile below mooring site, winds from NW at 15 kts, current ~1 kt going 156° T

0824 - Starting to deploy Guard Buoy "C"

0827 - Buoy in water

0857 - Guard "C" anchor released in 76.2 m water

40° 58.113' N x 67° 18.973 W - P-Code

0911 - Ship run by buoy for position - Buoy 25 yards off beam

40° 58.07' N x 67° 18.92' W - P-Code
40° 58.06' N x 67° 18.95' W - non-diff GPS
Forgot to plug guard light into battery! Decided to do it with small boat later
Mooring drawings wrong:
- don't need 1 m at bottom of tethers
- we have a swivel in mooring
- 2 m shot below float to hold SeaCat
- Moorings have SeaCat below float
- Chain for bottom not provided with rigging
had to cut from spare mooring

Covers off MET sensors
Air Temperature - 17457
PAR - 5018
Radiation - 28379
Cables Dressed OK
20 m SeaCat = 1736
10 m Bio-Optical package has SeaPoint sensor
30 m SeaCat = 1735
70 m SeaCat=1803
190" = 4.8 m off bottom or ~72 m depth

1138 - Picked up Science Buoy "E" to start launch
1140 - Science buoy in water and clear of ship
ADCP over rail, top bio-op in water, streamed behind boat
Released buoy too close to ship, guard ring hit ship
Too much way on, as buoy pulled sensors out too fast for
confined area between A-frame. Two ties on sensor @ 25 m?
were pulled loose so only held on with one.
1200 - Anchor dropped - 0.16 nm from Guard "C"
40° 58.14' N x 67° 19.16' W non-diff GPS
1236 - Drive by positions of Science Buoy - about 30' to starboard
40° 58.14' N x 67° 19.19 W - non-diff GPS
40° 58.125' N x 67° 19.185' W - P-Code
Radar Positions of two buoy from 0.90 nm @ 44° from ship
C - 40° 58.11' N x 67° 19.21' W
E - 40° 58.08' N x 67° 18.98' W
1242 - Fire & Boat Drill, air temperature 13.5, wind speed 14 kts, 3' chop
1300 - End all drills
Rigging for USC/TRACOR buoy mooring deployment
1516 - USC Buoy over side
1541 - Anchor released in 76.2 meters of water
40° 57.98' N x 67° 19.15' W non-diff GPS
40° 57.995' N x 67° 19.151' W P-Code
1550 - Start small boat operations to plug in light on Guard Buoy C
1606 - Back from small boat mission, other two lights flashing, the

fixed one not. Later flashing OK, repair job worked!
1621 - Pass by USC buoy for fix
40° 58.03' N x 67° 19.12' W non-diff GPS
40° 58.049' N x 67° 19.150' W P-Code
1625 - Ranging on Science buoy acoustic release - 322 m
Vertical, not released - OK
Disabled - OK
Flashing light on bottom pressure works
Bottom Pressure sensors #53084
1640 - Preparing to launch bottom pressure
1642 - Deploy bottom pressure between buoys
40° 58.12' N x 67° 19.05' W non-diff GPS
40° 58.130' N x 67° 19.043' W P-Code
1700 - Ranging on bottom pressure sensor to position
1752 - Complete survey and on way to NE Peak site

Wednesday - 1 November
EST
0530 - wind 12 kts, seas 2', overcast
Doing PDR survey of proposed deployment site
Original site in rough bathymetry, so move
Revised deployment site - 41° 42.72' N x 67° 28.77' W
Depth about 76.0 meters
Plan to set buoys in e-w orientation
Set two guards first the science between them
0813 - Pick up Guard Buoy "B"
0814 - Buoy in water
0839 - Buoy "B" - old style UNH CODE buoy - in 75.5 m
41° 42.78' N x 66° 28.73' W - P-Code
41° 42.79' N x 66° 28.74' W - non-diff GPS
Close pass by guard buoy B with Buoy 4 m to Starboard beam
41° 42.75' N x 66° 28.75' W - P-Code
41° 42.72' N x 66° 28.73' W - non-diff GPS
Plan to set Guard Buoy A 0.12 nm west of B
Buoy "A" radar reflector full of water, poked hole low to drain
Need to get spare radar reflectors.
0931 - Pick up Guard Buoy "A"
0932 - Buoy is in water clear of ship
0958 - Deploying anchor of CODE style Guard Buoy A - in 75.5
41° 42.73' N x 66° 28.59' W - P-Code
41° 42.74' N x 66° 28.59' W - non-diff GPS
1011 Close pass by
41° 42.68' N x 66° 28.64' W - non-diff GPS
41° 42.69' N x 66° 28.63' W - P-Code

1020 - Starting to set up deck for NE Peak Science Mooring
ARGOS Status = 996 - OK
ADCP battery - 4.545 x 14 = 63.63 v OK
Science Buoy "D"
ADCP 1272
Biop #3 - PAR 1793, C 70, T 494
SeaCat@20 - 1819
SeaCat@30 - 1818
SeaCat@72 - 1820
Biop #4 - PAR 1792, Trans 628, C 58
Setting ADCP
1238 Power up, gives sign on message, not responding to commands from computer or break
Try ships notebook, no better
Wait to see if deadman timer starts on schedule
1310 - ADCP pinging at 2 Hz intervals
old schedule called for 300 pings at 2 s = 10 minutes
13:18:08 - ADCP wrote on schedule - file says 12:08:03 for first ensemble
1323 - starting pinging on second ensemble
13:33:08 wrote second ensemble
1351 - Poison Tubes on conductivity sensors
1410 - Buoy over side - smooth launch
1420 - on anchor in stern ramp - 1/3 mile to site
1430 - quick release didn't release, line tangled - try second pass
1500 - too close to buoy to deploy, try third pass
1539 - Anchor finally successfully released
41° 42.68' N x 66° 28.64' W - non-diff GPS
41° 42.689' N x 66° 28.630' W - P-Code
Radar position 41° 42.71' N x 66° 28.68' W
Close by position check
41° 42.76' N x 66° 28.67' W - non-diff GPS
41° 42.761' N x 66° 28.653' W - P-Code
Radar position 41° 42.71' N x 66° 28.68' W
1635 - Preparing CTD, TAPS and bottle yo-yo
All three buoy lights work!
1638 - CTD000 yo-yo by Northeast Peak mooring
41° 43.1' N x 66° 28.6' W
1639 - Ranging on acoustic release - 723 m horizontal range
Vertical and not released - OK
Disabling - OK
1733 - end of CTD yoyo
41° 43.4' N x 66° 28.6' W
1738 - Underway to end of NE CTD Section station NE13
2051 - Starting CTD001 at NE13

41° 56.9' N x 65° 44.4' W
2158 - Starting CTD002 at NE12
41° 54.64' N x 65° 51.58' W
2252 - Starting CTD003 at NE11
41° 51.94' N x 65° 58.97' W
2249 - Starting CTD004 at NE10
41° 49.46' N x 66° 06.96' W

Thursday 2 November
EST
0043 - Starting CTD005 at NE09
41° 47.27' N x 66° 14.6' W
0133 - Starting CTD006 at NE08
41° 45.06' N x 66° 21.80' W
0221 - Starting CTD007 at NE07
41° 42.81' N x 66° 29.03' W
0311 - Starting CTD008 at NE06
41° 40.3' N x 66° 35.9' W
0402 - Starting CTD009 at NE05
41° 38.22' N x 66° 43.27' W
0505 - Starting CTD010 at NE04
41° 35.60' N x 66° 50.82' W
0608 - Starting CTD011 at NE03
41° 33.31' N x 66° 57.68' W
0645 - Wind 22 kts, seas picking up, 4' with whitecaps
Running on one engine due to oil leak in governor
On way to CTD#3
0728 - Drifter #3 deployed - ID 23759
41° 41.10' N x 67° 02.84' W
0905 - Starting CTD012 at NE02
41° 30.93' N x 67° 05.70' W
just came into sand waves at crest region
0949 - Starting CTD013 at NE01
41° 28.28' N x 67° 12.13' W
1124 - Drifter #2 deployed - ID 23747
41° 27.84' N x 67° 31.11' W
Drogue went through screw, recovered electronics works!
1140 - Drifter #2 again - ID 23771
41° 27.24' N x 67° 31.20'W
1211 - Starting CTD014 at LT01
41° 30.89' N x 67° 36.18' W
1334 - Starting CTD015 at LT02
41° 24.59' N x 67° 32.67' W
1455 - Starting CTD016 at LT03

41° 17.06' N x 67° 28.58' W
1547 - Starting CTD017 at LT04
41° 12.43' N x 67° 26.41' W
1630 - Starting CTD018 at LT05
41° 09.64' N x 67° 24.40' W
1640 - Drifter #4 - ID 23757
41° 09.46' N x 67° 24.46'W
1724 - Starting CTD019 at LT06
41° 05.86' N x 67° 22.67' W
1830 - Starting CTD020 at LT07
41° 01.95' N x 67° 20.81' W
1920 - Starting CTD021 at LT08
40° 58.45' N x 67° 18.75' W
2059 - Starting CTD022 at LT09
40° 54.45' N x 67° 16.80' W
2146 - Starting CTD023 at LT10
40° 50.69' N x 67° 15.09' W
2233 - Starting CTD024 at LT11
40° 46.97' N x 67° 13.00' W
2337 - Starting CTD025 at LT12
41° 41.50' N x 67° 10.47' W

Friday 3 November
EST
0027 - Starting CTD026 at LT13
41° 35.7' N x 67° 08.2' W
1124 - Drifter #1 deployed - ID 23769
41° 15.35' N x 67° 59.92' W
0715 - Wind 8 kts, seas 6', overcast
Steaming for Woods Hole - ETA 1700

Leg 2 - MOCNESS/CTD Surveys

Sunday 5 November
EST
1615 - Depart NMFS dock for BIO#07

Monday 6 November
EST
0530 - Wind 15 kts out of NW, seas 4', whitecaps, some clouds
0700 - Starting MOCNESS M1 at Station BIO#7
40° 27.55' N x 67° 18.60' W

0800 - Starting CTD028 at Bio7
40° 29.50' N x 67° 18.60' W
0815 - Underway to Southern Flank Station
1059 - Starting CTD029 at Southern Flank Station
40° 57.80' N x 67° 19.28' W
Monitoring Science Buoy ARGOS
1123 - Starting MOCNESS M2 at Southern Flank Station
40° 58.09' N x 67° 18.57' W
1139 - Underway to Crest
1300 - Damage and boat drill
1350 - Secure from all drills and underway again
1520 - Starting MOCNESS M3 at Crest Station
41° 24.47' N x 67° 32.46' W
1542 - Starting CTD030 at Crest Station
41° 24.76' N x 67° 31.94' W
Phytoplankton Net Tow P1
2038 - Starting CTD046 at Northeast Peak Station
41° 42.60' N x 66° 29.09' W
Phytoplankton Net Tow P2
Monitoring Science Buoy ARGOS
2055 - Starting MOCNESS M4 at Northeast Peak Station
41° 42.69' N x 66° 28.76' W

Tues 7 November
EST
0107 - Starting MOCNESS M5 at Georges Basin Station
42° 18.01' N x 66° 54.25' W
0238 - Starting CTD032 at Georges Basin Station
42° 16.20' N x 66° 57.17' W
Phytoplankton Net Tow P3
0530 - Wind 5 kts, seas calm, scattered clouds
0543 - Starting CTD033 at extra station on Georges Bank
41° 51.18' N x 67° 18.23' W
0738 - Drifter#5 ID 23763 deployed
41° 50.06' N x 67° 44.88' W
0955 - Starting MOCNESS M6 at Franklin Basin Station Bio#34
41° 50.87' N x 68° 17.84' W
1038 - Starting CTD034 at Franklin Basin Station Bio#34
41° 51.08' N x 68° 19.13' W
Phytoplankton Net Tow P4
Wind up to 16 KTS and some whitecaps
1400 - Wind up to 25 kts out of the south and seas rapidly building, seas 6' or so with lots of white water and ship is beginning to pound. Switched order of stations so do BIO#38 which is most important first, then Wilkinson Basin Station. This gives

us a better angle into the waves than running in the tough
as we were before.
- Starting CTD035 at BIO#38
42° 16.20' N x 66° 57.17' W
Phytoplankton Net Tow P5
- Starting MOCNESS M7 at BIO#38
42° 18.01' N x 66° 54.25' W
Ring Net Tow at BIO#38
- Starting MOCNESS M6 at Wilkinson Basin Station
42° 18.01' N x 66° 54.25' W
Wind about 30 kts, seas about 8' and rising, ship rides nicely considering
- Starting CTD034 at Wilkinson Basin Station
42° 16.20' N x 66° 57.17' W
Phytoplankton Net Tow P6

Wednesday 8 November
EST
0700 - Arrive at NMFS pier in Woods Hole
0730 - Start unloading ship, try to get off by noon
0900 - Scientist/Ship's crew meeting on ship
1100 - Dumping ship's data to backpack tape for transfer