

Cruise Report

**RV/ISELIN Cruise CI9405  
to Georges Bank**

**US GLOBEC**



May 7-10, 1994

Cruise Report

R/V COLUMBUS ISELIN Cruise 9405

Woods Hole to Georges Bank to Woods Hole

May 07 - May 10, 1994

## Acknowledgments

This report was prepared by Jim Irish and Ann Martin from cruise notes and logs as a first draft at documenting the activities and position, etc. We gratefully acknowledge the excellent support provided by the Captain and crew of the R/V COLUMBUS ISELIN who filled in for the R/V ENDEAVOR at the last minute. Their hard work and dedication allowed this cruise to accomplish our primary goals.

This research effort was sponsored by the National Science Foundation under research grant OCE-9313670 as part of the U.S. GLOBEC program, the Northwest Atlantic/Georges Bank Study. All data in this report are to be considered preliminary.

# **Cruise Report**

## **R/V COLUMBUS ISELIN Cruise CI9405**

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**Cruise Report**  
**R/V COLUMBUS ISELIN Cruise CI9405**  
**US State Department Cruise No. 94-014**  
**Woods Hole to Georges Bank to Woods Hole**  
**May 07 - May 10, 1994**

**Purpose:**

The primary purpose of CI9405 was to conduct Precision Depth Recorder (PDR) surveys of the proposed sites for the U.S. GLOBEC NW Atlantic/Georges Bank Program's Long-Term Moorings. Additionally, (1) test deployments of bottom stress measuring instrument frames were to be conducted in Vineyard Sound, (2) guard buoys were to be deployed at the WHOI buoy farm for later ADCP instrument tests, and (3) CTDs were to be taken on the Southern Flank of Georges Bank as time permitted.

**Accomplishment Summary:**

Two bottom stress tripods and a marker buoy were deployed for A.J. Williams III (WHOI) at 41° 31.15' N x 70° 38.83' W in Vineyard Sound on 7 May 1994 and then successfully recovered on 10 May 1994. Diver studies were conducted independently to study the stability of the instrument frames in strong currents. These instruments will be deployed as part of the Stratification Experiment's study of the bottom boundary layer in 1995. No scientific data were collected.

Three uninstrumented guard buoys were successfully deployed at the WHOI buoy farm in 43 meters of water as protection for future scientific instrument development tests. Buoy C was deployed in the Southwest Corner of the Buoy Farm at 41° 15.906' N x 71° 01.804' W in 43.0 meters (141') of water. Buoy B was deployed in the Northwest corner at 41° 15.792' N x 71° 01.814' W in 43.3 meters (142') of water. Buoy A was deployed near the center of the buoy farm at 41° 15.823' N x 71° 01.666' W in 43.3 meters (142') of water. Buoy B contained a Synergetics ARGOS PTT for testing. The unit did not transmit adequate signals for good satellite reception, although the Telonics uplink receiver said it was working on deck. The new radar reflectors on the buoys made them visible on radar for greater than 20 nm in calm seas.

A systematic PDR survey was made at both 12 kHz and 3.5 kHz around the NE Peak Mooring site (41° 44' N x 66° 32' W). A grid made up of 5 nm long legs separated by 0.5 nm centered on the proposed mooring location was run.

Then exploratory PDR lines were run through the proposed Crest sites A and B (41° 25' N x 67° 33' W & 41° 25' N x 67° 56' W). A PDR line was run from the Crest Site A through the Southern Flank mooring site (40° 58' N x 67° 19' W) and into deeper water.

Three CTD profiles were made along this last PDR line: CTD01 was made at 40° 47.6' N x 67° 14.6' W in 93 meters of water through the shelf-slope front, CTD02 was made at 40° 57.9' N x 67° 19.0' W in 75 meters of water at the Southern Flank mooring site in the stratified region, and CTD03 was made at 41° 07.8' N x 67° 23.7' W in 58 meters of water toward the Crest.

## Cruise Results:

CI9405 was successful. We were able to deploy and recover two tripods and a marker buoy in local waters to test the mechanical design for Dr. Albert J. Williams III. These instruments will be deployed as part of GLOBEC in 1995. Then three buoys were deployed at the Woods Hole Buoy Farm to act as guard buoys for instrument testing. The moorings used old CODE style steel buoys and chain anchor cables. The configuration is shown in Figure 1 for reference. We had intended to deploy a new bottom mounted Broad Band Acoustic Doppler Current Profiler (ADCP) on this cruise between the buoys, but we were still having problems making the ADCP work reliably in the laboratory. It will be deployed for testing between these buoys at a later date. The positions for the tripods and buoy deployments are given in the accompanying Cruise Log and Table of Stations.

The main effort on CI9405 was the survey of the Northeast Peak of Georges Bank at the potential site of the proposed GLOBEC Long-Term Mooring. Figure 2 shows Georges Bank, the three long-term mooring sites and the NOAA/NDBC buoys 44011, 44008 and 44005. A series of 5 nm long lines were run at half nm spacing as shown in Figure 3. The center of the survey was the proposed NE Peak mooring site. Both the 12 kHz and 3.5 kHz bottom echo sounders were run continually during the survey. The ship slowed down to 8 kts during the survey in order to keep the return signal on the recorders strong. We guess that bubbles being trapping under the ship scattered the acoustic signal if the speed were any faster, so that good depths could not be determined. A quick computer contour plot of the digitized depth data from the SAIL system on the ISELIN is shown in Figure 4. The fairly flat 74 meter region to the south and west of the initial site should be an ideal mooring location. As the seas were large enough to slow down the ISELIN, the bottom records show ship heave, so any small-scale sand waves cannot be resolved. Therefore, we shall have to do detailed side scan surveys to determine if there are active features in this regions which might put the bottom-mounted ADCP at risk.

Two smaller bathymetric surveys were run at the GLOBEC Crest site on top of Georges Bank (see location in Figure 2). Here two crosses were run through each of the proposed sites to determine if our interpretation of the published bathymetric charts was accurate. We had anticipated seeing depressions in a 20 to 30 meter deep bottom. In reality the region appears to be about 40 meters deep with large sand/gravel waves/ridges sticking up from it. Some of these features extended more than 12 meters above the bottom. It appears that these large features are not very mobile, so that we should be able to pick a mooring site that will last for six months, but more detailed survey work will need to be done from the R/V ENDEAVOR in June 1994 at these sites to determine the best location.

In order to determine the bathymetric section going from the Crest through the South Flank site, a 60 nm line was run off Georges Bank. There were no surprises, and the section showed a regular, increasing depth with distance from the Crest. Coming back up the line, three CTD stations were taken at locations indicated in the Cruise Log and Table. The Neil Brown Mark III CTD included standard temperature, conductivity and pressure sensors as well as a transmissometer and fluorometer tuned to chlorophyll a fluorescence. Additionally, a General

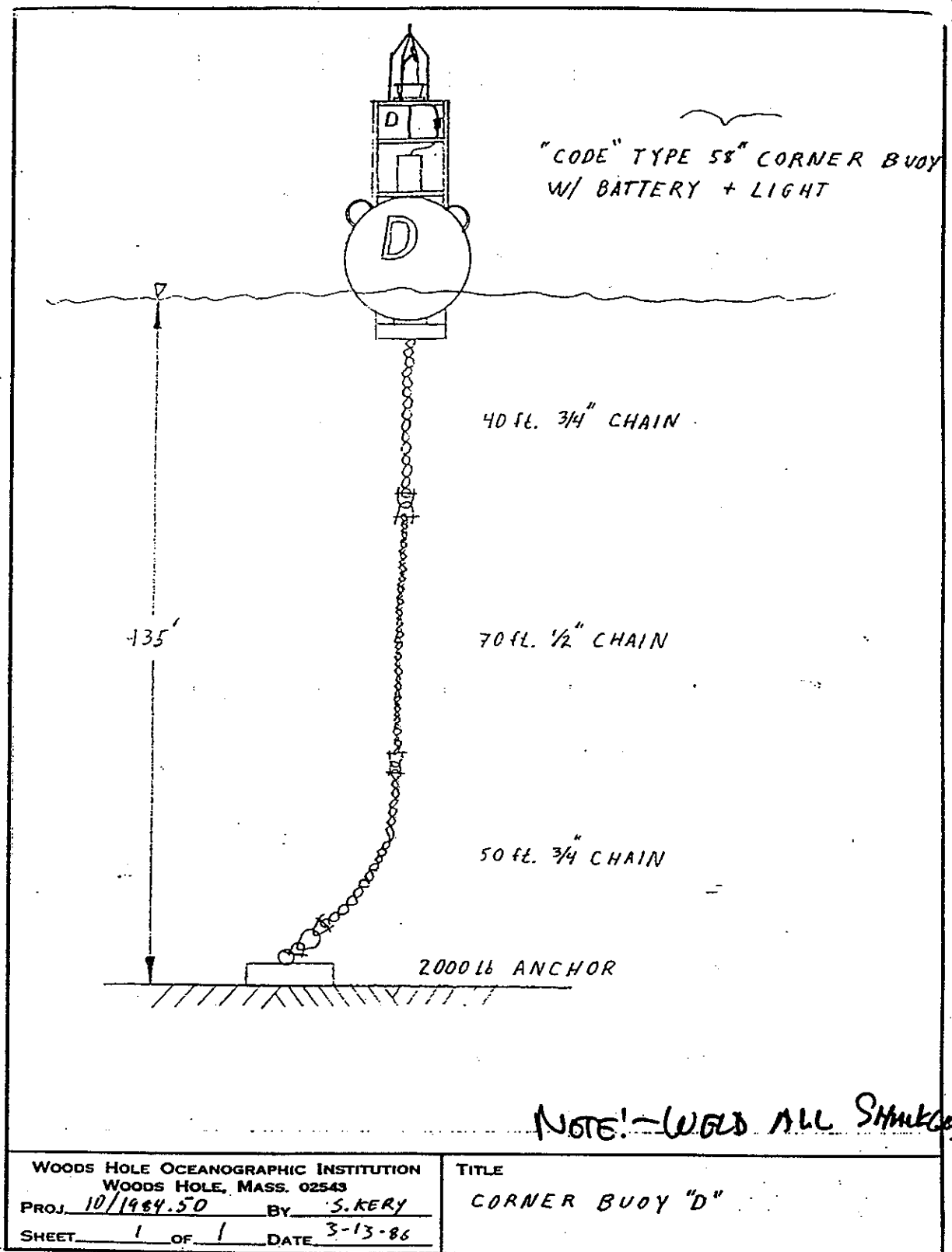


Figure 1. Buoy configuration for Buoy farm marker buoys. Buoys are CODE style steel buoys with light and radar reflector. Mooring hardware is 1/2 and 3/4" galvanized chain, and the anchor is a steel 2000 lb weight.

# GLOBEC Long-Term Moorings

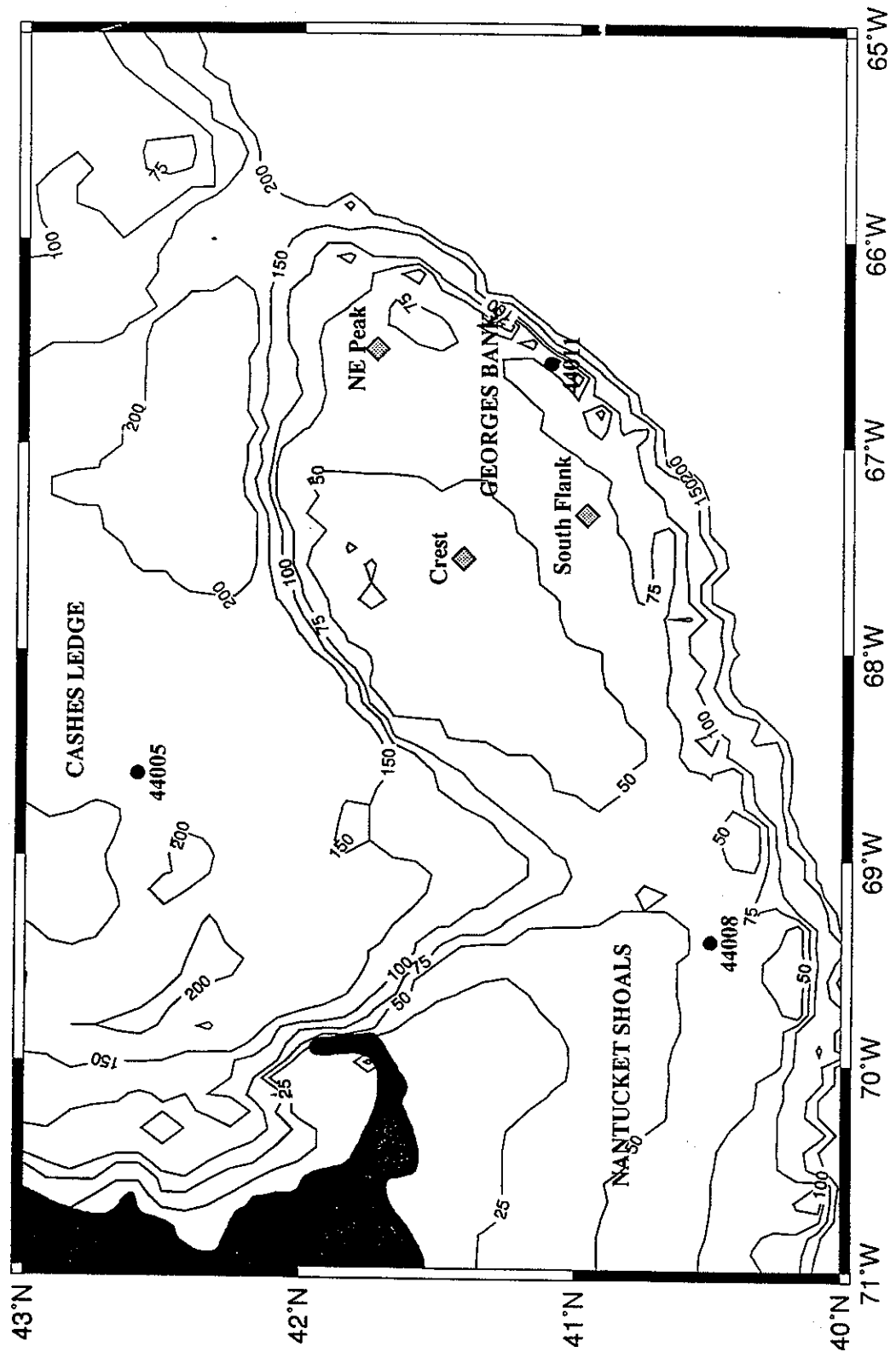


Figure 2. Chart of the Georges Bank region with the locations of the three GLOBEC Long-term Moorings (Crest, NE Peak and South Flank) and NDBC buoys (44005,44008,44011) shown.



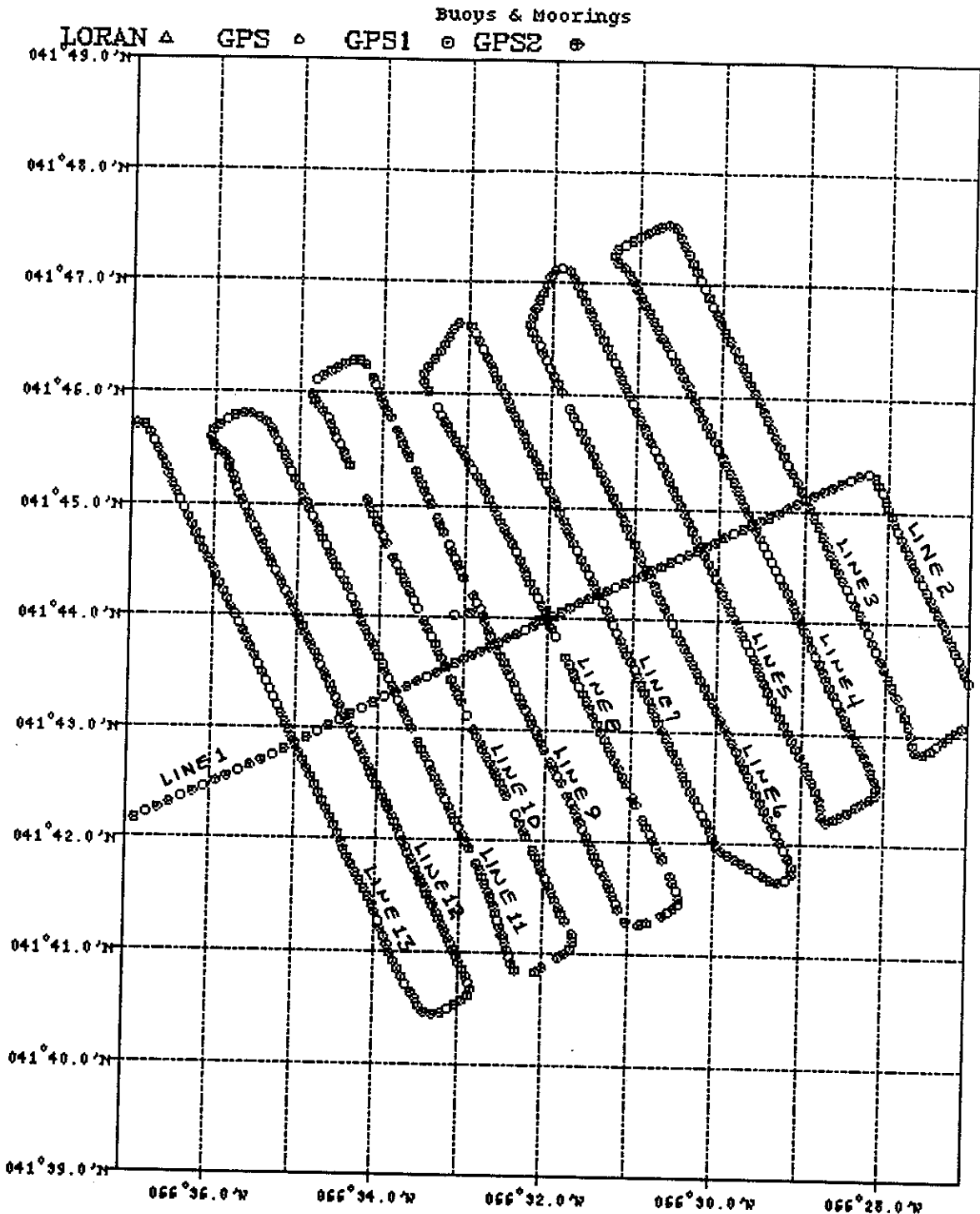


Figure 3. NE Peak survey track from the raw, unedited GPS fixes. The survey lines are numbered for comparison with the Table of Stations.

# SAIL depths -- CI9405

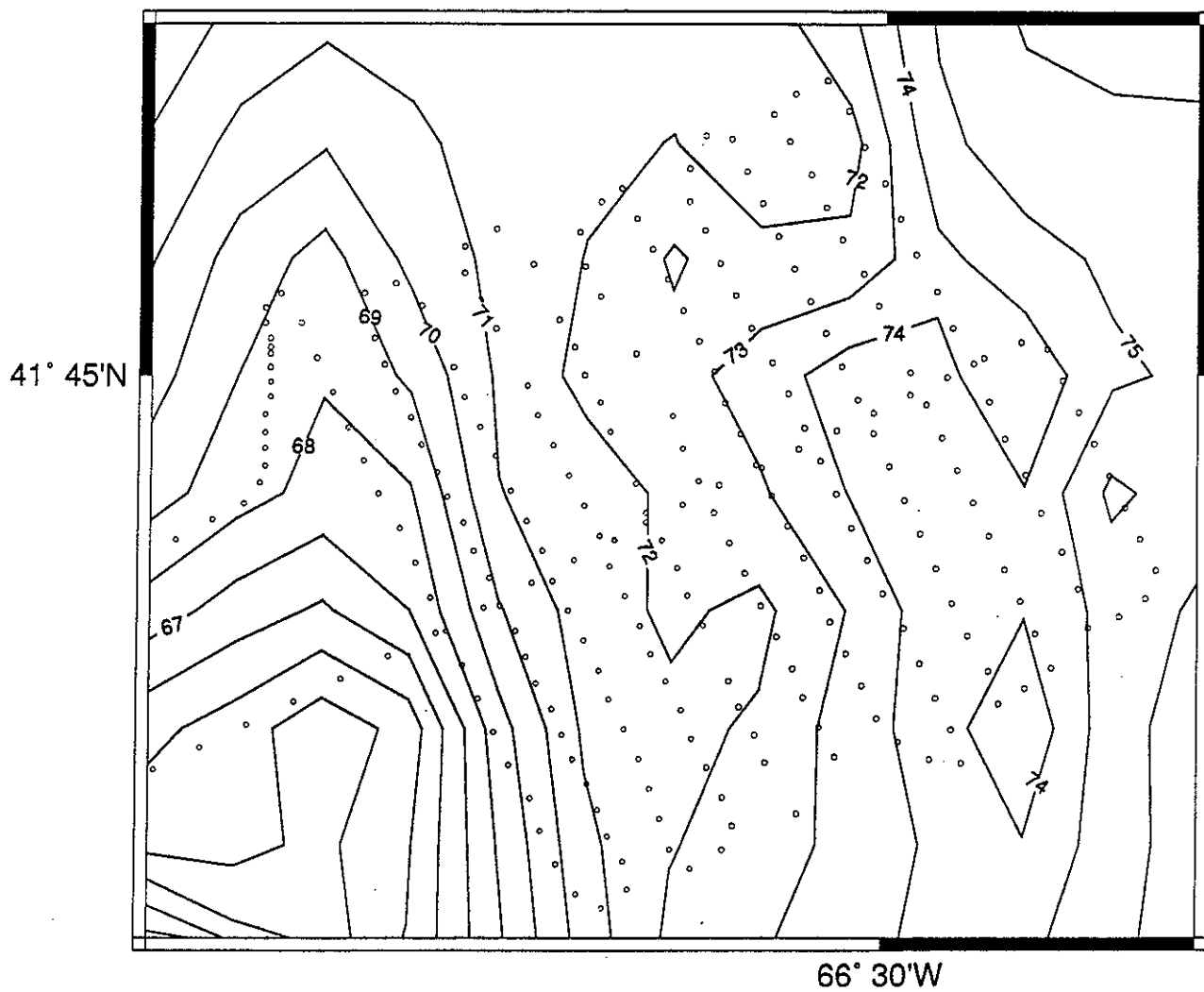


Figure 4. A computer contour plot of the NE Peak digitized depths at the locations of the GPS survey shown in figure 3. The positions of the digitized survey depths are shown as open circles.

Oceanics water sampler allowed samples to be collected at the bottom of each profile for salinity calibrations. A brief one page summary of these three raw, unedited profiles is given in Figure 4. One station was made in the shelf slope front (CTD01), one at the stratified location at the South Flank mooring (CTD02) and one up toward the Crest (CTD03). See the Cruise Log and Table of Stations for exact locations. CTD01 started out in shelf water, but around 20 meters depth showed a change to the warmer, saltier slope water indicating that we had crossed the shelf slope front which extends up from the bottom at an angle. CTD02, at the South Flank mooring, showed that the stratification was due largely to temperature (as the salinity was fairly uniform with depth). At the shallowest station, CTD03, the salinity was well mixed, and the temperature cooler and less stratified. The fluorometer profiles showed a marked chlorophyll a peak just below 20 meters in the offshore station, which was at the bottom of the transition from shelf to slope water. A lesser but broader peak was seen in CTD02, and no real chlorophyll a peak was seen at the shallowest site. No real features were observed in the transmissometer. All the raw data was contaminated to some extent by ship's rolling and heaving effects; these effects will have to be removed in order to obtain good profiles for scientific analysis.

During the entire cruise, two ship's ADCP profilers were run continuously. They consisted of RDI 150 and 600 kHz units, each with its own PC and logging system. They were initialized and set to standard GLOBEC sampling by Dr. Julio Candela of WHOI. Successful profiles were obtained for the duration of the cruise. In addition, the standard shipboard parameters of meteorology, and underway data were collected during the entire cruise. The 12 kHz bathymetry was recorded by this system only during the bathymetric surveys, and used for the quick contour plot given in Figure 4. All the data obtained on the cruise will be edited and processed and made available via Internet on our workstation at WHOI. This data eventually will be merged into the GLOBEC data base which is being set up at WHOI. An annotated ship's track of the cruise is given for reference in Figure 6.

## **CRUISE PERSONNEL:**

### **Long-Term Survey Program**

James D. Irish, Chief Scientist  
Patrick O'Malley, Deck Chief  
Sean Kery, Engineer  
Ann Martin, Programmer  
Audrey Rogerson, Post Doc Observer

### **Short term instrument test participants:**

Albert J. Williams, III, Scientist  
Janet Fredericks, Programmer  
Allan G. Gordon, Engineer  
Tod Morrison, Grad. Student  
Fred Thwaites, Grad. Student

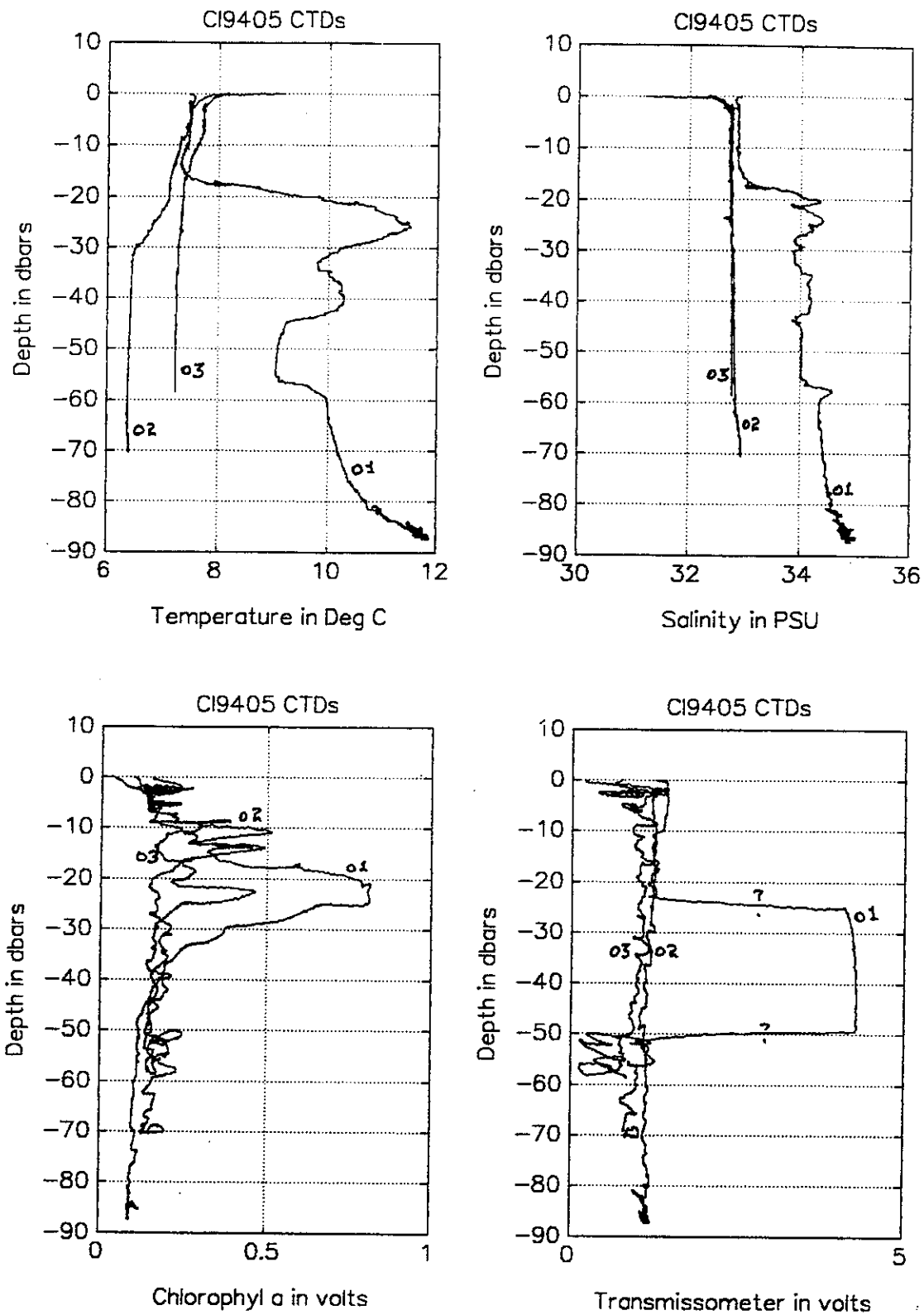


Figure 5. Summary plot of the three CTDs. The raw, unedited temperature, salinity, fluorometer and transmissometer output are plotted versus depth and marked for identification.

GPS1

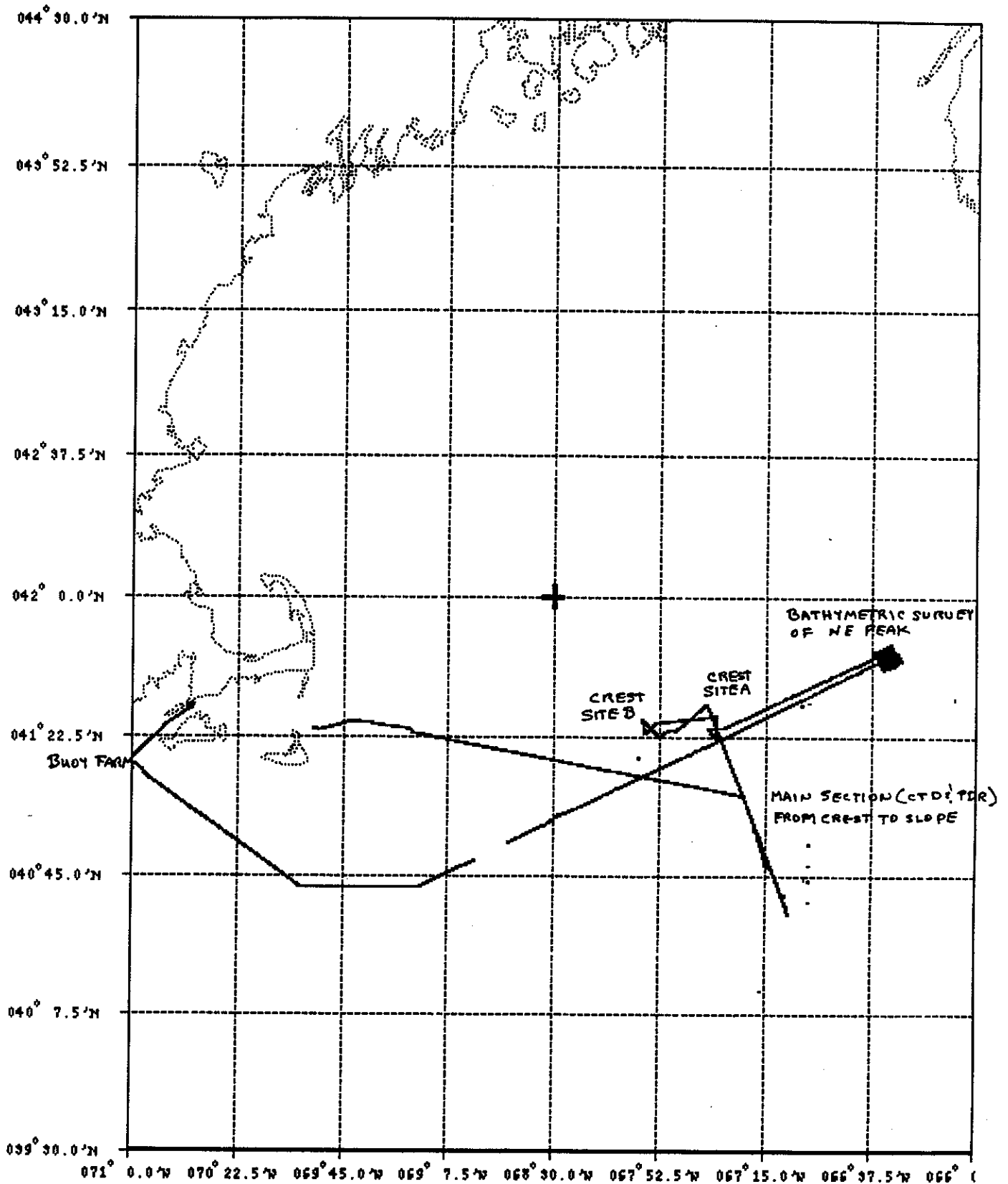


Figure 6. Computer screen dump of the ship's track for CI9405 from the unedited GPS positions gathered during the entire cruise and plotted in the ships lab during the cruise.

# Cruise Log

## COLUMBUS ISELIN CI9405

Friday 6 May (JD126) 1994

Load buoys, anchor, chain, deck boxes etc. on board ship. Williams tripods not ready, so will load them at 0700 of the morning we sail.

Computer equipment in ship's laboratory and connected to ship's PC on ship's network

Saturday 7 May (JD127) 1994

EDT - (GMT=EDT+4)

0650 - Arrive at COLUMBUS ISELIN at WHOI dock

0700 - Pat O'Malley will run crane to load Sandy's tripods

0730 - Moving tripods to ship

0805 - Loading tripods on ship

Leg 1 - Tripod Deployment off Nobska Point

0830 - Departing WHOI dock for tripod launch site (1/4 nm from shore on 30' contour)

0857 - Marker Buoy over side and towing to position

0919 - Marker Anchor aweigh - rigging 12' tripod for launch

0925 - Picking up 12' tripod for launch

0931 - holding over rail at water level

0935 - 12' tripod released

0940 - Picking up hex-tripod and moving to launch position

0953 - hex-tripod released

1000 - MYTALIS alongside and transferring Sandy, Allen, Todd, Fred, and Janet

Leg 2 - Buoy Deployment at Buoy Farm

1005 - heading slowly for site while transferring Gulf of Maine/Buoy C into launch position

1100 - rigging deck for launch - ETA 1200

1200 - Near Buoy Farm - given positions are slightly out - water depth 135'

1220 - NW corner first, then 0.13 nm south, then 0.13 nm at 60° to put buoys into a triangle

1227 - Moving into position

1247 - Buoy C over side

1257 - Buoy being towed on chain to anchor - ready to deploy

1310 - Anchor aweigh, buoy position: 41° 15.906'N x 71° 01.804'W in 43.0m (141') water  
Moving Buoy B (ARGOS & ODAS) into position

1342 - Electronics hooked up - light working, solar panels connected - anchor in position

1350 - Steaming into launch position

1411 - Buoy B in water

1419 - Buoy on chain to anchor - ready to deploy

1423 - Anchor aweigh, buoy position: 41° 15.792'N x 71° 01.814'W in 43.3 m (142') water

Moving anchor into position, moving buoy A into launch cradle  
1445 - Buoy A laying down on deck - hooking up light, solar panels, anchor chain, etc.  
1450 - Electrical hooked up - dressing wires  
1458 - Moving into launch position - turning upwind  
1505 - Buoy A in water  
1535 - Anchor aweigh, buoy position: 41° 15.823N x 71° 01.666W in 43.3 m (142') water  
1549 - Drive-by Buoy Positions and Check positions - buoys to starboard just off bridge:  
    Buoy A (Center of Farm): 41° 15.823' N x 71° 01.666' W  
    Buoy B (Northwest Corner): 41° 15.792' N x 71° 01.814' W  
    Buoy C (Southwest Corner): 41° 15.906' N x 71° 01.804' W  
1600 - depart Buoy Farm for NE PEAK  
    Observing buoys on radar - can see reflection out to 12.2 nm!

### Sunday 8 May (JD128) 1994

#### Leg 3 - Survey on Georges Bank at NE PEAK

0800 - Wind 22 kts and strengthening, seas growing, barometer falling  
0930 ETA at NE PEAK site - changed orientation of survey to  
best align with wind and seas. Way points for NE PEAK Survey are:  
0 - 41° 35.288' N x 66° 55.490' W  
1 - 41° 44.000' N x 66° 32.000' W  
2 - 41° 45.315' N x 66° 28.397' W  
3 - 41° 43.067' N x 66° 26.934' W  
4 - 41° 42.847' N x 66° 27.534' W  
5 - 41° 47.343' N x 66° 30.465' W  
6 - 41° 47.123' N x 66° 31.065' W  
7 - 41° 42.627' N x 66° 28.139' W  
8 - 41° 42.407' N x 66° 28.739' W  
9 - 41° 46.903' N x 66° 31.670' W  
10 - 41° 46.648' N x 66° 32.270' W  
11 - 41° 42.187' N x 66° 29.344' W  
12 - 41° 41.968' N x 66° 29.944' W  
13 - 41° 46.463' N x 66° 32.873' W  
14 - 41° 46.244' N x 66° 33.474' W  
15 - 41° 41.747' N x 66° 30.548' W  
16 - 41° 41.528' N x 66° 31.148' W  
17 - 41° 46.023' N x 66° 34.077' W  
18 - 41° 45.804' N x 66° 34.678' W  
19 - 41° 41.307' N x 66° 31.752' W  
20 - 41° 41.088' N x 66° 32.353' W  
21 - 41° 45.583' N x 66° 35.281' W  
22 - 41° 45.364' N x 66° 35.882' W  
23 - 41° 40.867' N x 66° 32.957' W  
24 - 41° 40.648' N x 66° 33.557' W

- 25 - 41° 45.143' N x 66° 36.486' W
- 0922 - Setting up 3.5 and 12 kHz PDRs, 0.25 sec/scan, or:  
 6.25 m per division and 187.5 m overall depth  
 Set automatic time and position labels for fifteen minute annotations, didn't work on  
 both units at same time always  
 System #1 is 3.5 kHz on right as facing aft  
 System #2 is 12 kHz on left as facing aft
- 0926 - Adjusting 3.5 kHz for sub-bottom profiling - no go  
 Use manual gain in low mode, rather than fast or slow AGC
- 0940 - Start survey of NE PEAK site - reduce ship speed to 10 kts  
 3.5 kHz still noisy and skipping bottom occasionally
- 1024 - Turning from end of Line 2
- 1030 - Turning to start Line 3
- 1054 - 12 kHz recorder having problems - slippage in pen drive
- 1141 - Start of Line 5
- 1245 - Tightening set screw in 12 kHz drive
- 1254 - End of Line 6 starting turn
- 1339 - Start of Line to SE, Winds about 24 kts from SE
- 1354 - Over NE PEAK site
- 1459 - End of Line 9
- 1502 - 12 kHz out of paper
- 1508 - 12 kHz back on line
- 1530 - 3.5 kHz doing poorly - (skipping because of bubbles under hull?)
- 1544 - Completed Line 10
- 1550 - Started Line 11
- 1626 - End Line 11
- 1753 - End Line 13 - terminate survey ops and shut down PDRs  
 proceeding to Crest Site A. Winds down to 18 kts from south

**Monday 9 May (JD129) 1994**

- 0240 - Nearing Crest Site, setting up PDR's - 3.5 kHz still skipping
- 0251 - Start E to W pass across site A - Steady on 265-270° T.
- 0255 - Sand waves up to 25 m from 38 m depth - ships speed 10 kts
- 0304 - On top of Crest A site - flat bottom! Some sand ridges at ends of line.
- 0316 - End of line & heading SE to next line.
- 0340 - Steady on N-S line heading north, Line 2.  
 3.5 kHz unit slowed down sampling by about factor of 2, then fixed itself??
- 0359 - Over Crest A site, sand wave nearly on this site
- 0420 - End of Line 2 at Crest A site heading for Crest B
- 0600 - Ann and Pat on watch



0612 - Start of Crest B line 1  
 0615 - Depth gets up to 12 m!  
 0630 - Depth 29 m  
 0704 - Start of Line 2 of Crest B site  
 0741 - end of Line 2 at Crest B site  
 0915 - Start of Main Section from the Crest off the shelf passing through the South Flank mooring site (from 41° 30.89' N x 67° 35.889' W to 40° 35' N x 67° 07' W).  
 1312 - Wind down to 16 kts  
 1320 - Slowing down for fishing boat  
 1327 - At South Flank Site (40° 58.7' N x 67° 19.3' W)  
 1330 - Only 12 kHz working well  
 1342 - VAX clock appears 1 minute ahead of lab GPS receiver  
 1539 - Depth 103 meters, deepest yet. 600 kHz ADCP shows larger currents than 15- kHz unit. 600 kHz set to 3 minutes averaging and 150 to 2 minutes averaging.  
 1613 - 3.5 kHz on 1/2 second sweep or 375 meters full scale  
 1615 - 12 kHz switched to 1/2 second sweep  
 1618 - End PDR survey, and steam back to first CTD  
 1810 - Setting up for CTD01  
 1823 - moving CTD to rail and setting up deck  
 1827 - Start CTD01 (40° 47.92' N x 67° 14.43' W) in 93 meters at 30 meters/minute  
 1839 - End of CTD01 (40° 47.539' N x 67° 14.614' W) in 93 meters of water  
 1842 - Proceeding to Station for CTD02 (Southern Flank Site)  
 1959 - On station getting set up, water depth 75 m  
 2005 - Start CTD02 (40° 57.86' N x 67° 18.98' W) in 75 meters at 30 meters/minute  
 2018 - End CTD02 - Shipboard software died on way back to surface @ about 17 m depth.  
 2125 - On station getting set up, water depth 58 m  
 2131 - Start CTD03 (41° 07.28' N x 67° 23.67' W) in 58 meters at 30 meters/minute  
 2142 - End CTD03 (41° 07.17' N x 67° 23.84' W)  
 2150 - secured operations and heading for WHOI.

**Tuesday 10 May (JD130) 1994**

1123 - At buoy "26" and R/V Asterias alongside for personnel transfer  
 1149 - surface marker buoy from large tripod hooked  
 1214 - Recovering Large tripod  
 1230 - Large (West) tripod on deck  
 1303 - Recovering small hexpod  
 1312 - Small (East) hexpod on deck  
 1324 - Marker buoy hooked  
 1329 - Marker buoy on deck and heading for WHOI dock  
 1400 - Moored at WHOI dock unloading.

## Table of Stations CI9405

Date	GMT Time	N Latitude	W Longitude	Comments
7 May 1994	1319	41 31.15	70 38.83	Deploy marker buoy for tripods off Nobska Point lighthouse.
	1335			Large Stress tripod 50' west of marker
	1353			Hex vorticity tripod 50' east of marker
	1710	41 15.906	71 01.804	Buoy C marked ODAS with ARGOS Southwest Corner of Buoy Farm
	1823	41 15.792	71 01.814	Buoy B Northwest Corner of Buoy Farm
	1924	41 15.823	71 01.666	Buoy A Center of Buoy Farm
8 May 1994	1340	41 35.288	66 55.490	Started Crest Survey on line 1 from crest
		41 44.000	66 32.00	Turning to Southeast for line 2
	1424	41 43.067	66. 26.934	Turning from end of line 2
	1430	41 42.847	66 27.534	Steady on start of line 3
		41 47.343	66.30.465	Turning from end of line 3
		41 47.123	66 31.065	Steady on start of line 4
		41 42.627	66 28.139	Turning from end of line 4
	1541	41 42.407	66 28.739	Steady on start of line 5
		41 46.903	66 31.670	Turning from end of line 5
		41 46.648	66 32.270	Steady on start of line 6
	1654	41 42.187	66 29.344	Turning from end of line 6
		41 41.968	66 29.944	Steady on start of line 7
		41 46.463	66 32.873	Turning from end of line 7
		41 46.244	66 33.474	Steady on start of line 8
	1754	41 44.000	66 32.000	Over proposed NE Peak mooring site
		41 41.747	66 30.548	Turning from end of line 8
		41 41.528	66 31.148	Steady on start of line 9
	1859	41 46.023	66 34.077	Turning from end of line 9
		41 45.804	66 34.678	Steady on start of line 10
	1944	41 41.307	66 31.752	Turning from end of line 10
	1950	41 41.088	66 32.353	Steady on start of line 11
	2026	41 45.583	66 35.281	Turning from end of line 11
		41 45.364	66 35.882	Steady on start of line 12
		41 40.867	66 32.957	Turning from end of line 12
		41 40.648	66 33.557	Steady on start of line 13
	2153	41 45.143	66 36.486	Turning from end of line 13 and survey

## Table of Stations CI9405

Date	GMT Time	N Latitude	W Longitude	Comments
9 May 1994	0651			Start of West to East survey across Crest site A
	0704	41 25.00	67 33.00	Over Crest site A
	0716			End of West to East survey across Crest site A
	0740			Start of South to North survey across Crest site A
	0759	41 25.00	67 33.00	Over Crest site A
	0820			End of South to North survey across Crest site A
	1012			Start of line 1 across Crest B site
	1104			Start of line 2 across Crest B site
	1141			End of line 2 across Crest B site
	1315	41 30.89	67 35.889	Start of main section off Georges Bank
	1727	40 58.7	67 19.3	At South Flank Site
	2018	40 35.00	67 07.00	End of Main Section
	2227	40 47.92	67 14.43	Start of CTD01 in 93 meters
	2239	40 47.539	67 14.614	End of CTD01
10 May 1994	0005	40 57.86	67 18.98	Start of CTD02 in 75 meters
	0018			CTD computer stopped on way back up
	0131	41 07.28	67 23.67	Start of CTD03 in 58 meters
	0142	41 07.17	67 23.84	End of CTD03