

Cruise Report: R/V Oceanus 296

Acknowledgments

The array of moorings completed during this cruise could not have been done without long hours of work under severe conditions by both the scientific party and shipboard personnel. The Boatswain, Jeff Stolp, and A.B., Horace Medeiros, deserve special recognition for their skill on deck.

This report was prepared by R. Schlitz and J. Manning.

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R/V OCEANUS Cruise OC296

Woods Hole, MA to Woods Hole, MA

12-17 January 1997

1. Purpose of Cruise

The primary purpose of the cruise was to set an array of nine moorings in the vicinity of Great South Channel as part of the U.S. GLOBEC Program Northwest Atlantic Field Studies, Phase 2. A secondary purpose was to describe the hydrographic regime in the vicinity of the moored array. The overall goal is to examine retention (in the form of recirculation around the inner part of Georges Bank) and losses from the southern flank of the Bank into Slope Water or westward into the Middle Atlantic Bight.

2. Cruise Narrative

The R/V OCEANUS departed Woods Hole at approximately 1500 EST on Sunday, 12 January 1997 after delaying two days due to weather and sea conditions at the mooring sites. The cruise track is found on [Figure 1](#). Upon leaving, the shipboard alongtrack sensors began recording, including meteorological (IMET) and sea surface parameters as well as 150 kHz narrow-band and 300 kHz broad-band ADCP systems. We arrived at mooring site 9 ([Figure 2](#)) before dawn on Monday, 13 January with the intention of setting a surface mooring. The sea conditions were too rough to allow the safe deployment of the surface marker (carried forward on the starboard side) so we moved to site 3 and set the first mooring. This and each subsequent surface mooring were set anchor last. Steaming to site 2, a second surface mooring was set. We returned to site 9 with the intention of trying to set the entire mooring. We finished the surface buoy but decided to wait until the next day for the tripod as darkness and fatigue came.

During Monday night CTD stations 1-4 ([Figure 3](#)) were completed at mooring sites 9, 2, 3, and 4 (planned). On each station one salinity sample was collected at the bottom of the cast for calibration of the conductivity sensor on the instrument. An offset in the pressure of 9-10 db was noted in the data. This was later traced to a setting in the configuration files and corrected.

Mooring work resumed at site 5 on Tuesday morning. A tripod containing the ADCP was prepared and lowered using a polypropylene slip-line. When the line was released to be retrieved after going slack as the tripod settled on the bottom, tension returned indicating a problem. As the line was carefully hauled back a large wuzzle appeared with the tripod at the end. We successfully recovered the tripod and unsnarled the line. The probable cause was a swivel that did not function well causing the line to twist around itself. After some changes in the rigging, the tripod was lowered on a single line containing flotation and an acoustic release attached to the tripod. This time the tripod was deployed with no problems about 0.1 nm from the surface mooring. We then set the tripod at site 3 keeping the same distance from the surface mooring. Finally the entire mooring at site 4 was deployed, surface buoy followed by the tripod, before stopping mooring operations for the day.

A line of CTD stations (5-13) starting at mooring 4 and running along the line of planned moorings across the southern flank of Georges was then done, as well as one station (14) toward the east in deep water. The AVHRR images showed either a warm-core ring or meander of the Gulf Stream (clouds prevented any clear view) impinging the continental shelf east of the mooring line. These CTD stations were completed during Tuesday night before steaming back to site 8.

On Wednesday morning the first mooring was set at site 8. The original design called for a single length of elastic tethers. This plan was modified to include a second length of tethers in line, adding a margin of safety in high waves for this mooring on the southern flank of Georges Bank. After setting the mooring at site 8, sites 7 and 5 (surface mooring and tripod) were completed before going to site 7. The tripod at site 5 needed to be set before mooring 7 since the sub-surface sphere to be used on mooring 7 was required as flotation above the release in the lowering line for the tripod. Finally mooring 6 was set about 2200 local time on Wednesday at the end of a very long day.

Since the weather report was for increasing winds leading to gale conditions beginning during Thursday morning we decided to steam directly to site 1 and to be in a position to set the mooring as soon as possible in the morning. This also allowed rest for those who had spent most of Wednesday day on deck. The mooring at site 1 was set early in the morning under the most favorable sea conditions for all mooring work.

A series of CTD stations then began west of site 1 across Great South Channel along the mooring line. Four stations (15-18) were completed as winds and seas rapidly increased. An updated weather forecast now called for storm warnings in our area without appreciable improvement for three days. A discussion between the Master and Chief Scientist resulted in cancellation of the remaining scientific program and immediate return to Woods Hole. R/V OCEANUS steamed under heavy conditions south of Nantucket and Martha's Vineyard into Vineyard Sound arriving in Woods Hole at about 0900 EST on Friday, 17 January 1997. Both the main and 01 decks were covered with 5-8 cm of slush and icicles hung from the rail and CTD cage.

3. Cruise Results

The primary goal of OC296, deployment of an array of moorings to examine factors leading to retention or loss of water and plankton along the southern flank of Georges Bank, was successful. A window of favorable weather and seas allowed the work to be done between 13 and 16 January 1997. [Figure 4](#), [5](#), [6](#), [7](#), [8,9](#), [10](#), [11](#), and [12](#) show the surface moorings at each site and [Figure 13](#) shows the tripods that were deployed at sites 3-5 and 9. Data for the moorings in the array are summarized in Table 1.

A second related goal, characterization of the hydrography in the area surrounding the moored array was only partially successful. Sections across Great South Channel and the southern flank of Georges Bank along the mooring lines can be synthesized from the data. However near-synoptic sections with the array in place are missing. Also examination of the warm-core ring/meander was not possible due to weather and sea conditions.

Temperature and salinity sections across Great South Channel along the mooring line are shown in [Figure 14](#). The temperature structure is typical of conditions during the winter season, horizontal variations across Great South Channel were greater than vertical changes. Only at station 16 was any vertical structure apparent with a variation of $\sim 0.3^{\circ}$ C from surface to bottom. Salinity was nearly constant at each station and showed a relative maximum in the horizontal corresponding to the region of deepest bathymetry in the channel. The reason for this is not obvious from the data. The temperature and salinity plots at stations in the well mixed area are shown in [Figure 15](#). Noticeable variations of temperature and salinity with depth occur only at station 16 as stated above.

The section across the southern flank ([Figure 16](#)) shows typical weakly stratified conditions over the shelf for this season. From the 200m isobath seaward, in the slope regime, the temperature and salinity characteristics at depths between 100-150m are consistent with values at the inner edge of the Gulf Stream. In fact two partial AVHRR images of the area on 22 January 1997 clearly show a warm-core ring just southwest of the hydrographic section.

The event log for R/V OCEANUS 296 is presented in [Table 22](#).

Table 1. Summary of information on the moorings set during OC296. This is an array to study physical factors causing recirculation around Georges Bank and losses from the region.

Mooring #	Surface	Latitude	Latitude Min	Longitude	Longitude Min	Depth (m)	Argos Ident
1	Y	40°	49.001′	69°	09.003′	70	14315
2	B	40°	51.247′	68°	49.011′	72	14212
3	C	40°	51.752′	68°	40.012′	62	14311
4	D	40°	52.020′	68°	30.609′	52	14309
5	E	40°	42.997′	68°	24.502′	61	14314
6	L	40°	37.610′	68°	21.363′	80	14316
7	A	40°	31.005′	68°	17.174′	101	14308
8	I	40°	14.722′	68°	10.198′	325	14310
9	F	40°	42.017′	68°	40.524′	61	14313
Tripod #							ADCP Ident
3		40°	51.851′	68°	39.998′	64	164
4		40°	51.993′	68°	30.503′	59	165
5		40°	42.947′	68°	24.400′	61	139
9		40°	41.871′	68°	40.530′	67	136

Table 2: Event log

The event log is available on-line using the URL <http://globec.who.edu/jg/serv/globec/gb/eventlogs.html1?cruiseid=OC296>.

4. Scientific Personnel on Cruise, 12-17 January 1997

Name		Position		Organization
Ronald Schlitz		Chief Scientist		NOAA/NMFS, Woods Hole, MA
James Manning		Oceanographer		NOAA/NMFS, Woods Hole, MA
Judith Gray		Meteorologist		NOAA/COP, Washington, DC
William Strahle		Electrical Engineer		USGS, Woods Hole, MA
Marinna Martini		Electrical Engineer		USGS, Woods Hole, MA
Richard Rendigs		Geologist		USGS, Woods Hole, MA
Peter Gill		Geologist		USGS, Woods Hole, MA
Dann Blackwood		Photographer		USGS, Woods Hole, MA
Andrew Eliason		Electrical Engineer		Eliason Data Services, Mashpee, MA

Jennifer Frese		Student		Bowdoin College, Brunswick, ME
Steven Cross		Technician		WHOI, Woods Hole, MA
Laura Stein		SSSG Technician		WHOI, Woods Hole, MA