Coastal Ocean Monitoring Program

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Semi-Annual Progress Report, 1 September 2000 to 28 February 2001

Submitted by:

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INTRODUCTION

The Coastal Ocean Monitoring Program, entitled the Southeast Marine Monitoring and Prediction Center in appropriations language, was established on September 1, 1999. As described in the original proposal, the purpose of the program is to assess the effects of natural and anthropogenic influences on coastal processes in the South Atlantic Bight. The program is based at the University of North Carolina at Wilmington's Center for Marine Science, located on the Intracoastal Waterway (ICW) opposite Masonboro Island (Figure 1a). This progress report summarizes accomplishments during September 2000 through February 2001 for grant award # NA96RP0259.

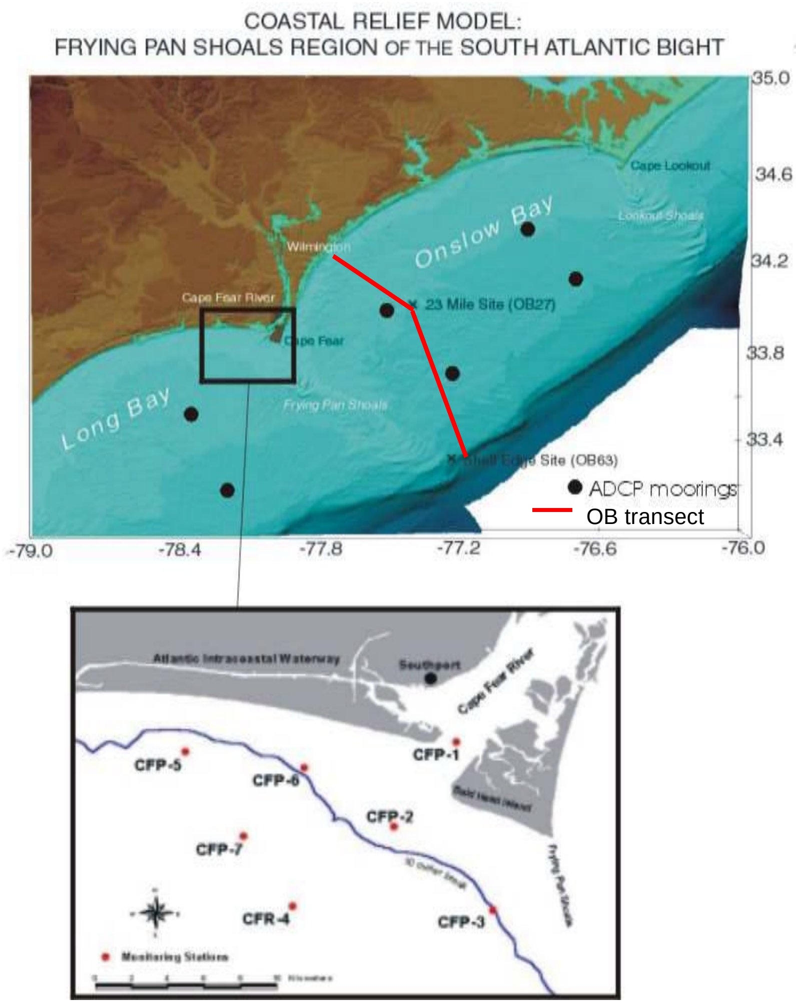

Figure 1. Chart of COMP study area showing Onslow Bay transect (red line), permanent stations at OB27 and OB63, NCSU ADCP moorings (dots, to be deployed in 2002), and Cape Fear River plume sampling stations (inset).

OBJECTIVES

The primary scientific objectives for the program include:

- understand and model the dynamics of cross shelf transport of materials (including nutrients, sediments, and biota)
- define the relationship between physical properties (circulation, weather, storms) and coastal environmental health
- determine the influences of oceanographic forces on the recruitment of commercially important fisheries
- assess the impact of riverine input on coastal water quality and productivity

In order to accomplish these objectives, the following tasks were proposed that apply to this six month period:

- conduct monthly sampling cruises to long-term stations across the continental shelf off Wilmington, NC (Figure 1a)
- conduct monthly sampling cruises to long-term sampling stations in the Cape Fear River plume (Figure 1b)
- maintain a permanent, long-term mooring and seafloor instrumentation on a mid-shelf "live bottom" reef and on the outer shelf near the west wall of the Gulf Stream
- integrate observations from the at-sea sampling, in situ instrumentation, and satellite imagery

RESULTS

Monthly sampling cruises in Onslow Bay and the Cape Fear River plume continued (see www.uncwil.edu/cmsr/comp for cruise logs and monthly data tables and graphs). The data from the optical characterization study component (Figure 1 and http://www.uncwil.edu/cmsr/comp/biooptical/biiopticalindex.htm) will be used to produce an optical database for shelf and river plume waters that will be used to calibrate and develop algorithms for remotely sensed data. Temporal and spatial changes in the optical classification within and adjacent to the River plume can be used for event-response detection. Specific optical characteristics may be used as metrics for establishing response targets for management actions.

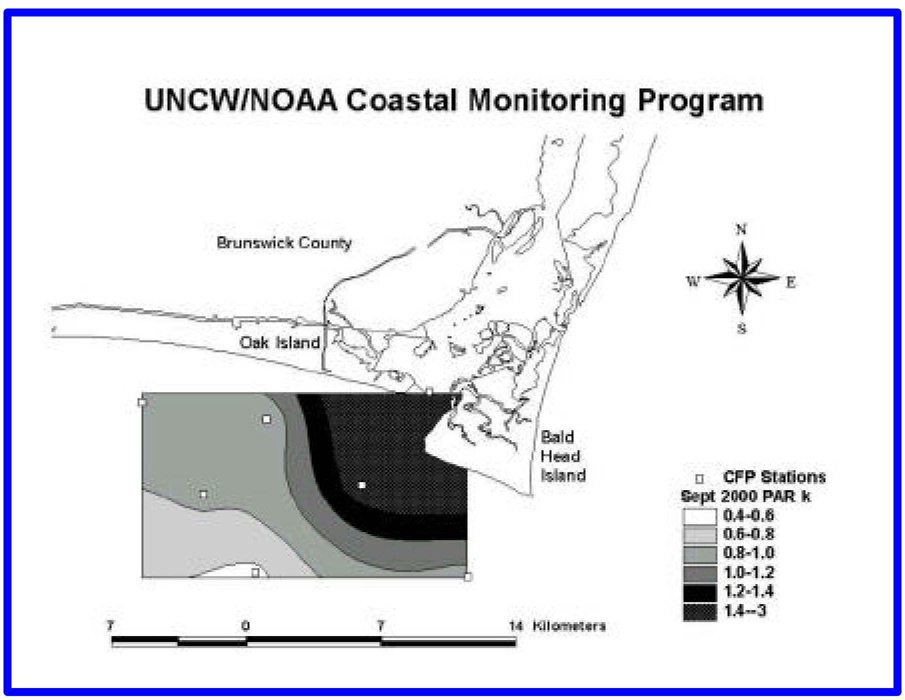

Figure 1. Light attenuation data in the Cape Fear River plume for September 2000. Kriged graphs clearly show plume position.

The first data was downloaded from the shelf moorings during this period. Results from the 23 nm reef stations were reported on at the 37th Annual Meeting of the Society of Engineering Science in October 2000 (http://www.uncwil.edu/people/lynnl/comp/data.htm). The instruments documented the impact of a small "noreaster" storm during September 2000. The ADCP, OBS, and seabed elevation data, combined with wave data from the NOAA C-Man station at Frying Pan Shoals, showed significant sediment mobility during the storm. These data help constrain the threshold needed to move sands adjacent to reefs. This information is critical in understanding the stability of "live bottom" reefs in the context of their potential role as marine protected areas.

Data from the mid-shelf and outer-shelf stations show several differences in circulation dynamics (Table 1 and http://152.20.30.33/onslow/comp/compseminar/).

Table 1. Comparison of data collected from mid-shelf (OB27) and outer shelf (OB63) COMP moorings.

	OB27	**OB63**
General	Flows less energetic. Fluctuations have typical amplitudes of ~20 cm/s.	Flows more energetic. Fluctuations have typical amplitudes of 50-100 cm/s
	Across-shelf tidal flows are most important	Low frequency, along shelf flow is most important
Mean Flows	5 cm/s towards the northeast near the surface; 3 cm/s towards the north near the bottom.	14 cm/s towards the northeast near the surface; 6 cm/s towards the southwest near bottom.
	Standard deviation 7-15 cm/s	Standard deviation 20-40 cm/s.
Tides	Tidal flow is mainly across shelf	ditto
	Tidal ellipses are oriented at ~123ƒ from east; rotate counterclockwise	Tidal ellipses are oriented at ~142ƒ from east; rotate counterclockwise.
	Tides have little vertical variation	Tides have strong vertical variation; near zero at bottom
	M2 (12.42 hrs) is dominant component	Tidal flow is a "broadband" process; no dominant component
Inertial Band	Strongly depth dependant. Equal along and across shelf energy.	Apparently nonexistent
Synoptic Frequency	Energy found mainly in 4-10 day band	Record not long enough to resolve these flows very well in frequency space, but does show they are strong
	Along-shelf component dominates	ditto
Temperature	Seasonal cycle dominant, with 4-10 day events superimposed	Seasonal cycle not apparent, but record may be too short
	Stratification found only in summer	Constant stratification, but record may be too short to observe winter mixing
Salinity	Relatively constant (~36) with 4-10 day low salinity events superimposed	Relatively constant (~36.4) with 4-10 day low and high salinity events superimposed