



## SEACOOS Year 2 Annual Report

August 31, 2004

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Implementation – Progress Report

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## Executive Summary

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In Year 2 of SEACOOS we have developed a process for identifying and tracking activity at each of the participating institutions. Work statements that describe anticipated activity in the coming year were developed by each investigator for the Year 2 proposal. Progress is tracked through the year in a mid-year progress report and a year-end annual report (this document). Investigators are asked to provide a percent complete estimate and brief report on accomplishments in support of the work statement.

A summary of the reports is given below, broken down by Working Group. Detailed information is available in the individual reports that follow. In general, this method of tracking has proven useful. However, the one year time frame is shorter than what most investigators are accustomed to and expectations about the amount of work that can be accomplished may be overly optimistic. Thus for some groups, particularly in observing and modeling, percent complete is low on certain tasks. Development and deployment of new sensing systems is the area experiencing the longest delays, attributable also to the many unknowns involved in this kind of work. For these tasks multi-year work plans may be appropriate.

The other drawback with the work statements is the difficulty in capturing activities not anticipated at the time the proposal was written. Given the extraordinary rate of change of ocean observing activities occurring in the US, flexibility within SEACOOS to adjust focus is vital. These mid-stream adjusts are not well captured in the reports. Consideration will be given to the best way to accommodate this aspect of reporting in the future.

**Observing** – includes a variety of *in-situ* observing platforms, HF radar, and satellite remote sensing. Summarized here are the SEACOOS-funded or partially supported elements.

- *In-situ* observing systems – a total of 11 fixed realtime offshore platforms were operating regularly at the end of year 2. Several anticipated new platform deployments are delayed until Year 3 due to a variety of issues. Another 10 shore-based real-time platforms were operating regularly at the end of year 2, with 2 more delayed until early year 3. Each platform collects a number of *in-situ* oceanographic and/or meteorological observations. Four internally recording moorings were maintained for much of the year. One moving realtime offshore platform, the cruise ship *Explorer of the Seas*, operated successfully throughout the year, and also acted as a testbed for various new sensing systems.
- New *in-situ* systems – a number were under development in year 2. With the exception of the Bottom Stationed Ocean Profiler, which was successfully tested over summer 2004, most development efforts are behind schedule. The Shallow Water Autonomous Moored Profiler is still in testing due to winch problems. The Webb Glider had not been shipped by the end of year 2; and the internally logging videocam was just finishing bench testing at the end of the year. Iridium telemetry was supported by the program with 2 platforms in regular use, and 6 in testing.
- HF Radar – strong investment in HF radar continued in year 2. At year's end there were 3 CODAR units on the west Florida shelf (WFS) (one collaborative with Mote Marine Lab/Rutgers University), 2 CODAR units on the Outer Banks of NC, and 2 WERA units on the southern east Florida shelf. Analysis of the ADCP/WERA comparison from a year 1 WFS is nearing completion.

- Satellite remote sensing - a remote sensing effort was added part way through year 2 by supporting Muller-Karger. Kearns contributed to this effort *gratis*.

**Modeling** – in keeping with year one efforts the SEACOOS modeling group concentrated on representation of the circulation in the coastal ocean of the region. The three funded groups (USF, UM and UNC) have implemented a barotropic nowcast/forecast system for the SEACOOS region as 3 subregions. This required the adoption of common bathymetry and forcing functions, and the development of output file standards, all finalized in year 2. Skill assessment of the barotropic modeling is underway. In addition to a group hindcast study that resulted in development of a manuscript for publication, each group has made progress in year 2 towards inclusion of baroclinic structure. At UNC this includes modeling of the 2003 “cool” event and beginning to work with HYCOM output as a possible source of density field initial conditions. At UM this includes some baroclinic process studies, and initial NPZ testing, which has led to some publications; and at USF there has been considerable progress with baroclinic modeling resulting in several publications.

In addition to this main focus area several other modeling activities have been pursued. At USF there has been work with a region-wide model and nested estuarine models, and completion of a coupled shelf-estuary storm surge analysis with a finite volume model.

UNC has completed a tidal modeling publication and some model/data comparisons related to fisheries recruitment issues, and at UM a good dialog has developed with NRL for use of NCOM (IAS and Global) for OBCs. Also, USC has been running SWAN (a surface wave model) locally. Only a couple of the identified work statements received little attention.

**Information Management** – after developing the data management coordinating committee (DMCC), an inter-institutional group of technically-savvy staff, in year 1, IM continued its coordination activities with ongoing networking on a regional and national basis. Among major successes, the DMCC completed an initial assessment of openDAP; began a data dictionary; and developed a system for data aggregation and display and moved forward on documentation of this process. SEACOOS also helped host QUARTOD I to further QA/QC but saw little implementation of QA/QC protocols in year 2. Access to external data streams is now established (NDBC; NOS/CO-OPS; USGS gauging stations are all accessible via the website) but is accomplished largely through screen scraping. Lastly but importantly, the DMCC oversaw the development of a common data language for use with netCDF for data standardization.

Notable institutional efforts include: USC finalized meta-door to enable standardized metadata entry and posting, and developed a popular geospatially-referenced web-portal and which enables distribution of information without transport of raw data (using OGC standards and protocols – WMS in particular); UNC has explored use of the HFRC package for radar data analysis and developed the NCCOOS website for observations merger and model display. UNC is also responsible for hosting the main SEACOOS website. A new Plone-based website was released in late 2003, with a dedicated staff person to maintain it. Exploring how to best utilize a content management system is an ongoing exercise. The website hosts the Mapserver/postGIS portal from USC. UNC has also developed a process for webpage development for specific variables. SEACOOS has also decided to abandon the initial project management choice (Celoxis) because of lack of use.

**Extension and Education** - The extension (formerly called outreach) group pursued some region-wide efforts and some subregional programs. Among the region-wide efforts were the

development of a SEACOOS 101 slideshow; the completion of an initial user community profile analysis; support of economic benefits analysis for the southeast; hosting of an outreach workshop in collaboration with OceanUS; and hiring of a regional outreach coordinator. Among the subregional effort was remarkable activity on *Explorer* (hosted a US Ambassador and a media cruise including CNN, resulting in a number of broadcast news pieces) and developing a new interactive Kiosk. Most other groups experienced moderate progress on developing and promoting local/subregional programs of interest (boat shows; pier displays, etc).

New for year two was a collaboration with SE COSEE and FL COSEE. The COSEEs, together with SEACOOS, co-sponsored and co-hosted a national ocean educators workshop. SE COSEE initiated the SEPORTS collaborative program and developed and distributed the "Making Waves" poster and interactive website. FL COSEE educators outreach efforts resulted in a DVD on ocean buoys and their maintenance.

**Administration** – UNC Office of the President provides administrative oversight. Site visits were completed to each of the participating institutions and reports developed. Governance for SEACOOS changed in year 2 with the creation of a Board of Directors, as defined in the Articles of Collaboration. The Board met twice, amended the Articles, and approved the Year 3 proposal. UNC-OP also funded a project manager, supported workshop travel and accommodations, Board meetings and travel, and managed day-to-day financial activities for the program.

## Observing

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### University of South Florida

*Observational subprogram - Workgroup Co-Chair and P.I. Robert Weisberg (WFS), and P.I. Mark Luther (Coastal stations and Tampa Bay), USF*

%complete

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- For year 2 we will continue to maintain the offshore array, assisted by SEACOOS, providing all real-time data to the general public via the COMPS and SEACOOS Internet sites as well as providing these data to NCEP via the NDBC Internet site and the GTS. Together with the offshore moorings COMPS will also maintain a set of coastal observations (<http://comps.marine.usf.edu>). 100%

Status: Maintaining 10 moorings in various states of operations. Real time data, along with mooring locations, are available at <http://comps.marine.usf.edu>. As part of our servicing schedule we removed one of the subsurface moorings in August to be replaced at a later time. At fiscal year end we have 9 moorings in place, 6 with real time capabilities, but all requiring servicing, especially following three tropical storms or hurricanes. Our next cruise is scheduled for October 2004.

%complete

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- HF Radar: 3 Long Range Seasonde (CODAR) antennas (including 1 from Rutgers Univ.) will be deployed, and we will engage in a HF radar test (WERA and CODAR) with SEACOOS colleagues this summer over the array of moored buoys. For year 2 we will continue to maintain the CODAR measurements providing data in near real time. 90%

Status: The Redington shores site became operational in August 2003. The Venice site (with Mote Marine Lab and Rutgers) became operational in May 2004. Negotiations on the Naples site are complete and preparations are underway. Radial currents were served on the web, and we had vector coverage for June 2004. Lightning disrupted both the Redington Shores and Venice sites, and equipment had to be repaired. These sites will be reactivated in fall 2004. New equipment has also been requisitioned for the Naples site. Work with RSMAS on WERA comparisons with moored ADCPS is underway. We did not have adequate overlap (in time) for the WERA/CODAR comparison and hence we conclude this year at 90% completion of proposed tasks.

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- Profilers: Along with the moorings, our BSOP (profiler) developments are progressing under separate funding, and we anticipate limited operational deployments beginning this summer. 100%

Status: Short-term field testing was accomplished followed by operational deployments of a single unit from April-September 2004. The BSOP is now a field-tested device capable of COOS use. Additional units being built under separate funding.

Observations (cont.)

## Skidaway Institute of Oceanography

### *Maintenance and upgrades of SABSOON - Workgroup Co-Chair and P.I. James Nelson, P.I. Rick Jahnke*

%complete

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- Maintenance of existing SABSOON/SEACOOS offshore systems at R2, M2 and R8 platforms. 80%

Status: Structural refurbishment of the R2 and M2R6 towers by a Navy contractor during the summer of 2003 (sand-blasting and painting) required removal of much of the exterior SABSOON equipment (instruments, cabling, antennas, etc.). A major focus of SkIO effort in Year 2 has been getting these systems reinstalled and back on-line. Cables linking bottom-mounted ADCPs to the towers (damaged at both R2 and M2R6 platforms). The R2 ADCP and cable were replaced in April, 2004. Initial work for the anchor replacement at M2R6 was carried out in August, 2004. Other repairs or exchanges have been effected for wind sensors, pressure/wave sensor and in-water package components. The tower systems are typically serviced at 6-week intervals.

%complete

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- Upgrade components of instrument, power and communications systems. 50%

Status: An ADCP frame incorporating an acoustic release/pop-up buoy system for retrieval was designed by SkIO Engineering and fabricated at SkIO. This will permit deployment and retrieval without using divers; a requirement at the R8 platform where the bottom depth (44 m) exceeds the maximum allowed for SkIO research divers. The package was deployed in late June, 2004 from the *R/V Savannah*. Additional frame/release packages are being constructed for deployment at other towers.

During the summer of 2004, Navy contractors continued upgrades of the Navy power systems on several platforms. This work has taken longer than anticipated and limited helicopter access for SkIO personnel, delaying final SkIO work on the power system at the R8 tower (installation

of a propane generator backup and power control system). These tasks are scheduled for October, 2004 following completion of the Navy contractor work.

Other system upgrades that have been completed are installation of a time server at the R2 tower and deployment of a meteorological package for the M2R6 tower. Installation of a back-up power system for the R2 tower has been initiated and targeted for completion in October. Upgrade of the data acquisition system (DAS) and analog-to-digital conversion modules (programming, integration of new components) for in-water packages is underway, with a targeted completion in the winter.

%complete

- 
- Coordinate data management with SEACOOS Data Management Working Group. 50%

Status: A DODS server has been set up at SkIO and is updated hourly with data in the SEACOOS netCDF convention. Data is shared with the SEACOOS main website (and posted locally at SkIO. Met and surface ocean data are converted each hour to CMAN and FM64 data messages and transferred by automated ftp to the National Data Buoy Center (NDBC, NOAA) for dissemination and display on the NDBC web. Data QA/QC and documentation efforts are ongoing in coordination with SEACOOS partners. An upgrade scheme for the SABSOON data processing/web display scripts has been formulated through collaboration with UNC partners. SABSOON database management and IT infrastructure work is benefiting from considerable input from SEACOOS DM personnel at USC and UNC.

%complete

- 
- Coordinate Georgia Outreach/Education efforts with Outreach Working Group. 60%

Status: Georgia State Climatologist David Stooksbury assumed the lead role in SEACOOS Outreach for Georgia during Year 2. An Outreach Workshop for Georgia SEACOOS was held in Savannah in September, 2004, and Stooksbury will hold an informational meeting with Georgia Emergency Management officials in the fall of 2004. Nelson is involved in SEACOOS-related activities of the SE COSEE program, including hosting several teachers on research cruises, and participating in the SE COSEE Leadership Conference for middle school teachers (June, 2004). Nelson is a member of the SE COSEE Advisory Board, and attended the Board Meeting in Georgetown, SC in August, 2004.

%complete

- 
- Analyses of existing SABSOON data in coordination with SAB modeling. 70%

Status: Data analyses at SkIO have focused on the winter-spring of 2003, a period of high river discharge followed by formation of a low salinity surface layer across the Georgia shelf, and the summer of 2003, when unusually cool bottom water penetrated shoreward from the shelf break. This work is combining analysis of ocean color imagery, the SABSOON, and cross-shelf ship surveys (*R/V Savannah*). Modeling studies for this period have been initiated at UNC. Studies of the summer cold water event were summarized in two presentations at the summer ASLO meeting (Savannah, GA) by J. Nelson (SkIO) and A. Arextabaleta (UNC), and a poster was

presented on the winter-spring ship, tower and satellite observations (C. Robertson, SkIO).

%complete

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- Target installations at M1 (southern Master) and R4 (SE remote). 50%

Status: SkIO personnel collaborated in the deployment of a "self-contained" system (integrated meteorological instruments, power, and satellite communications) that was designed and fabricated at UNC. This system was deployed at the R4 platform in August, 2004. SkIO provided an initial tower survey, support for helicopter transportation and assistance in the installation. This provides real time observations in the forecast area of the Jacksonville Office of the NWS and serves as a field test for the package that UNC plans to deploy on other Navy platforms off NC. Due to extensive Navy work on the structure and power systems at the M1R1 platform, SkIO activities at that location will not be pursued until after the planned work at R8 and M2R6 is completed.

%complete

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- Upgrade UW camera system (cameras, data acquisition, data processing) and consider a deeper deployment site. 90%

Status: SkIO personnel are providing support for the UW video system, developed by SC DNR colleague Charlie Barans for fisheries studies. SkIO Engineering replaced the controlling computer for the UW camera system, and SkIO divers have serviced the unit on several occasions. Good quality video has been acquired since early April, 2004, and is being distributed through the "Fish Watch" web site. A searchable data base for the video clips has been developed by Barans in collaboration with colleagues from the College of Charleston.

%complete

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- Develop near-shore directional wave/current measurement and wireless communications system off Tybee Beach, GA (with partner Paul Work, GIT, Savannah campus). 90%

Status: A wave-rider buoy system configured by GIT partner Paul Work was deployed from the R/V Savannah in July 2004 (ship time supported by another SkIO project). An Iridium SIMM card providing satellite communications for the buoy has been provided by Harvey Seim (UNC). Directional wave and SST information from the buoy has been acquired since the deployment. An initial web access site for the data has been developed and further development of web graphics for real time and archived data are underway.

%complete

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- Prepare for HF radar installations in Georgia (site surveys, initiate permitting). 25%

Status: Planning for HF Radar in Georgia and South Carolina is in its initial phase. Dana Savidge (Assistant Professor, SkIO) is assisting in this effort, and has conducted initial studies

of radial coverage patterns for various site options. Further HF Radar planning will be coordinated with USC colleague Rich Styles, with meetings scheduled for September, 2004.

(Observations cont.)

## University of North Carolina at Chapel Hill

### *Fixed platform - P.I. Harvey Seim, UNC-CH*

	%complete
<ul style="list-style-type: none"><li>• Complete instrumentation of towers off GA and NC and maintain system. It is likely that instrumentation of the NC tower will occur in year 2 due to development and legal delays. The two systems (at SABSOON and off NC) will be maintained and assessed for reliability and servicing needs.</li></ul>	50%

Status: A tower package (meteorology only) has been deployed off Georgia on SABSOON tower R4 and is functioning. An internally recording ADCP and microcat CTD has been deployed on a bottom tripod with pop-up buoy at NC tower 23 since late January 2004. Given that neither installation is complete we assess this task as half complete; nevertheless this is significant progress. Discussions continue with SKIO about installation of a pull-tube at R4 to permit cabling to a bottom-mounted package enabling in-situ ocean measurements. We are still on hold for deployment of a similar package at NC tower 23 or 21. This is because of the Navy requirement to not use a standard anemometer. Testing of a REMTECH SODAR system has demonstrated that the system regularly locks-up, typically after 2-3 days of operation, unacceptable for unattended operation.

A 2-month self-contained ADCP deployment near NDBC buoy 41008 in late 2003 permitted an intercomparison between buoy-based and bottom-mounted ADCPs (Seim and Edwards, Tech report, 2004). This first examination of NDBC current measurements from a 3 m discus buoy raised serious concerns about data quality and has generated significant dialogue with NDBC on next steps. .

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%complete

- Develop and deploy a buoy/mooring-based in-situ measurement system off Cape Lookout. To be done in collaboration with Fort Macon, NC Coast Guard station. Instrumentation will include a full meteorological suite, surface and bottom water temperature and salinity sensors, and a current profiler with directional wave capability. Primary responsibility for the mooring will lie with Dr. Rick Luettich of the Institute of Marine Sciences, UNC-CH in Morehead City, NC. 80%

*Status:* All instrumentation has been received. A Tattletale based subsystem has been developed that interfaces with the acoustic modem, collects data from the bottom tripod instrumentation system and transmits this data via the cell phone. In early August we conducted a community meeting facilitated by the NC Sea Grant office to discuss the buoy capabilities with the interested public. We are presently working on a Memorandum of Agreement with the US Coast Guard 5th district personnel that will clear the way for them to deploy the mooring anchors for the buoy. As soon as this is accomplished we intend to deploy a buoy without a full instrumentation package to test the mooring design. This will be followed by a fully instrumented buoy within a couple of months.

*Technique development (HF radar, telemetry, glider) - P.I. Harvey Seim, UNC-CH*

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%complete

- *Maintain and assess NC radar system.* We will evaluate the reliability of the HF radar system as an operational system in year 2. This will include assessment of downtime, variations in range, variations in beam pattern, and limited calibration tests (against in-situ observations). 90%

*Status:* An initial evaluation of the HF radar system was presented as a poster at the 2004 ALSO meeting in Hawaii (Stearns, Muglia, Seim, Bane, and Blanton). This included coverage maps, formation of tidal ellipse maps, monthly means and AVHRR-vector overlays. Tidal ellipses were compared with Lentz, 2001 and with predictions of ADCIRC (unpublished, Blanton) and show good accuracy in phase, orientation and ellipticity but a spatially-varying underestimate of current amplitude. A technical report is being drafted, to be completed in late 2004. The effort has led to the development of a preliminary HF radar database.

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- *Telemetry Testing.* Continue software development and testing of Iridium satellite communication technology. 100%

*Status:* A dedicated programmer was hired Dec 2003-March 2004 to develop a c-based library

to support Iridium communications. This was necessitated by un-controllable system lock-ups during file transfer when using a ppp connection in prior testing. These issues have been resolved and we are successfully using Iridium for data transmission. Calloway attended the Iridium users workshop in May 2004 and was subsequently approached by OceanUS to host an information forum on Iridium. The forum will be hosted at UNC beginning in October 2004. Thirteen of the 15 DOD Iridium cards initially acquired through ONR are now in use. Seven went to Caro-COOPs, 1 to Work (GaTech), 3 to Johns (UM) and two are being used by Seim (UNC).

	%complete
<ul style="list-style-type: none"> <li>• <i>Purchase and test a Slocum coastal glider for use in the SAB.</i> Initial testing will occur at SABSOON and be coordinated with survey cruises of the R/V Savannah. Coordinated mapping exercises will be used to test the capabilities of the instrument.</li> </ul>	15%

*Status:* A purchase request for a coastal Slocum glider to Webb Technologies was initiated in November 2003. We now anticipate delivery in October 2004.

#### Publications and Presentations

Edwards, C. R.; Haines, S. M.; Seim, H. E.; Nelson, J. R.; Moore, T.; Seasonal and Interannual Variability in the Georgia Bight, ASLO/TOS Ocean Research 2004 Conference, Honolulu, Hawaii

Stearns, L.; Muglia, M.; Seim, H.E.; Bane, J.; Surface Currents Off the Outer Banks of North Carolina, ASLO/TOS Ocean Research 2004 Conference, Honolulu, Hawaii

Observations (cont.)

#### University of South Carolina

##### *SC Nearshore Monitoring Stations - P.I. George Voulgaris, USC*

This task was a new one that was initiated in year 2 of the SEACOOS program. Therefore the report submitted describes the progress during year 1 of this task.

	%complete
<ul style="list-style-type: none"> <li>• Deploy and maintain nearshore circulation and wave direction monitoring sites at two locations along the inner-shelf of South Carolina, representing an arcuate strand (Long Bay) and barrier island (Folly Island) type coastline, respectively.</li> </ul>	70%

Status: Site locations for real-time data collection were chosen at Springmaid Pier, SC, and Folly Beach Pier, SC. The former site is a privately owned pier associated with Springmaid Beach Resort Hotel while Folly Beach Pier is owned and operated by Charleston County Park & Recreation Commission.

All necessary equipment, approvals and contracts have been obtained. The ADCPs, their trawl-resistant mounts and 2 rolls of armored cable will be transported to 2W Diving in Charleston, S.C., during the week of Sept. 20, 2004. Weather permitting, deployment of ADCPs at both Springmaid Pier and Folly Beach Pier will be carried out in the next few weeks.

	%complete
<ul style="list-style-type: none"> <li>• Springmaid Pier</li> </ul>	80%

Status: Springmaid Pier has been selected to be the first site to be developed by USC. NOAA's National Ocean Service maintains a water level station (CO-OPS Site 8661070) at the pier, and as a result USC and NOAA have agreed to enter into a collaborative agreement for facilities and data sharing.

A meteorological package consisting of two marine model RM Young anemometers and a Setra barometric pressure sensor were installed in November 2003 and are reporting data through the NOS homepage. Communication from the pier end to USC via the Internet is fully operational and awaiting ADCP deployment. A CTD will be installed at a later date once the site is up and running.

	%complete
<ul style="list-style-type: none"> <li>• Folly Beach Pier</li> </ul>	70%

Status: A Memorandum of Understanding between USC and Charleston County Park & Recreation Commission for the installation of an ADCP and electronics at Folly Beach Pier was approved and signed at the end of August 2004. Contractor installation of a DSL connection and 2 wireless Ethernet antennas should be completed by the end of September 2004. The installation was delayed by several weeks while the County decided whether wireless or fiber optic cable was preferred. USC is cooperating with NOAA's National Data Buoy Center, who is planning the installation of a CTD at this site by the end of calendar year 2004.

	%complete
<ul style="list-style-type: none"> <li>• Provide hourly wave height, direction, period, water temperature, wind speed and direction, surface, mid-depth and bottom current through via Web.</li> </ul>	25%

Status: Hourly wind speed, direction and gust, and barometric pressure have been available for the Springmaid Pier site since November 2003 via the NOS data website for CO-OPS Station No. 8661070. The CO-OPS station also provides water level and temperature data. Once the ADCP is collecting data at this site, as well as the Folly Beach site, it will be broadcasted through the SEACOOS homepage.

At Folly Beach Pier, the NDBC will be installing a CTD later this year and an existing NDBC

meteorological station (C-MAN site FBIS1) is in place approximately 2 km from the Pier on Folly Island. The C-MAN site currently provides wind direction, speed and gust, atmospheric pressure, air temperature, and dew points via the NDBC website.

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- Process and analyze incoming data and establish joint wave, wind and current climate for each location. 0%

*Status:* No progress to be reported on this objective since it requires the completion of the instrument deployment and data collection. However, the PI and his associates have been involved in the collection of directional wave data in the vicinity of Long Bay, SC as part of a USGS research program that will be used toward this objective. Data collection as part of this program was initiated in October 2003 and ended in April 2004. Some 6 stations were used for this objective.

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%complete

- Evaluate validity of Wave Information System (WIS) data with actual monitored data and suggest modifications for use by coastal managers and engineers. 0%

*Status:* No progress to be reported on this objective to date due to lack of data. Some of the data collected by the PI as part of the USGS-funded research program will be used to initiate this part of the study, until more reliable and long-term data become available through the SEACOOS operations described above.

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%complete

- Study the relationship between nearshore hydrodynamics and coastline response at a regional level. 80%

*Status:* The SWAN wave refraction wave is currently set up for operation in both deployment sites. The model is currently under calibration and tune-up and verification is expected to occur in the near future.

## South Carolina Department of Natural Resources

*Fisheries Management Observations - P.I Charles Barans*

	%complete
<ul style="list-style-type: none"> <li>Continue to maintain and upgrade the hardware and software of the present underwater/microwave video system.</li> </ul>	100%

Status: The primary video system, which is an integral part of the SABSOON sampling plan, has been inoperable during more than half of this period due to refurbishing of the tower by the USN. In April, the tower computer was reinstalled and video recordings were again obtained. Resuspended sediments stirred up by storms reduced visibility, during much of the summer.

Data from approximately 8,500 video clips recorded between 1999-2002 were annotated into an Access data-base. Preliminary analyses of the fisheries data were conducted. The education section of the Fish Watch web site has been made available to the SEACOOS Education Coordinator and the South East COSEE Director for their use.

	%complete
<ul style="list-style-type: none"> <li>Evaluate several fisheries video data logger prototypes for long-term deployments with oceanographic buoy systems.</li> </ul>	100%

Status: Laboratory testing on two types of autonomous visual data loggers was completed. This objective was expanded to include field preparations for deployment of the video data loggers in lieu of initiation of a MBARI video information system. Divers of the NURC positioned three housings for data loggers at Gray's Reef and two experimental MPAs off South Carolina. Collaborations were initiated with the NC CORMP to establish a site in Onslow Bay, NC. Several digital cameras with data logger capabilities were purchased to deploy for at sea testing.

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<ul style="list-style-type: none"> <li><i>Investigate modification of the MBRI Video Information System</i> for application to the acquisition of large data sets from all project video systems.</li> </ul>	30%

Status: Contacts at MBRI have related that the automatic annotation software has recently been fully developed and that a technical transfer workshop for application of the software is being proposed for late in 2005. Objective No. 2 was expanded in place of this effort.

## Publications and Presentations:

Barans, C., D. Schmidt, and T. Moore. Fisheries video assessment or can you see

me now? Joint meeting of the American Fisheries Society, South Carolina Chapter and the South Carolina Fisheries Workers Association. Feb. 2-3, 2004. Georgetown, SC.

Observations (cont.)

University of Miami, RSMAS

*Real-time Oceanographic Profiling Stations Along the East Florida Shelf - P.I., Bill Johns, MPO/RSMAS*

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- Begin deployments of in-situ, real-time oceanographic profiling systems within the HF Radar Testbed on the East Florida Shelf. The systems, referred to as SWAMP (Shallow Water Autonomous Moored Profiler) systems, have been developed independently from SEA-COOS with ONR DURIP and ONR program funding. These systems contain an upward-looking ADCP and a buoyant CTD probe that is periodically released to the surface and winched back to the bottom. The entire unit is housed in an acoustically recoverable, trawl-resistant bottom platform. The purpose of these units is to provide a capability for acquiring and transmitting velocity and water property (e.g., temperature and salinity) profile data from shallow environments (<100 m) without the need for vulnerable and maintenance-intensive surface buoys. 40%

*Status:* A prototype system was tested in November 2003 in South Florida waters with two-way radio communications to an antenna mounted at RSMAS. Several trial missions were completed with successful data transmission and new mission uploads. A problem was identified with the winch mechanism for the CTD probe which required a redesign of the bearing system to provide a more robust system for long-term deployments. An in-situ test of the new system was performed in August 2004 on the R/V Walton Smith; however, further problems were identified in the winch system that will require changes in the winch motor and control firmware. These changes will be implemented for our next in-situ test, scheduled for early November 2004.

- 
- %complete
- Data will be telemetered, presently by short-range radio mode but a change to Iridium or some other cell communication system is planned. 40%

*Status:* An Iridium handset has been purchased and is being incorporated into the surface probe. The system will be set up so that both radio and Iridium telemetry can be activated with swap-out of modular telemetry components. This upgrade should also be available for in-situ testing in November 2004.

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- Two SWAMP systems will be deployed early 2004 in the EFS HF-Radar Testbed, nominally off Carysfort Reef in the Florida Keys and off the northern end of Elliott Key. Both units would be deployed in - 35 m depth. The data will be transmitted to RSMAS and incorporated into the EFS Radar Testbed, EFSIS evaluation, and the SEA-COOS real-time data stream. In operational mode, we anticipate collecting hourly velocity (current) profiles and 6-hourly CTD profiles that are transmitted once per day. 0%

*Status:* Operational deployments of the SWAMP systems are still planned for the same two sites in the EFS HF-Radar domain but due to the redesign issues noted above these are now anticipated to begin in spring 2005 rather than in 2004. Due to the delays in our deployment of these systems, a conventional subsurface ADCP mooring was deployed in August 2004 at 100m depth within the EFS HF-Radar domain (25° 24.'N, 80° 06.0'W) to provide needed validation and comparison data with the HF-radar data. This mooring will be maintained through at least February 2005.

Observations (cont.)

*Observations from the Explorer of the Seas and Associated Data Systems - P.I., Edward Kearns, MPO/RSMAS*

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- The Explorer of the Seas will continue to provide daily real-time data from the Straits of Florida and the northern Caribbean Sea. These observations include ADCP, bulk and skin SST, sea surface chemistry, standard meteorological measurements, incoming radiation, aerosol characterizations, upper air wind profiles, radiosonde profiles, pCO<sub>2</sub>, and wave height estimates. ongoing

*Status:* During Year 2, the Explorer of the Seas has again reliably provided hourly real-time winds, sea-surface temperature, surface salinity, air temperature, dewpoint and atmospheric pressure which have been adapted to a SEACOOS netCDF format. These netCDF files have been available operationally since summer 2003 on an OPeNDAP/DODS and ftp server at <http://oceanlab.rsmas.miami.edu>, and have played the desired role in the SEACOOS data aggregation and display exercises.

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- The Explorer also serves as a testbed for instruments from both the oceanographic and meteorological communities, including a SeaKeepers automated sea surface and meteorological measurement system. ongoing

*Status:* In August 2003, a Microwave Radiometer was installed on the Explorer of the Seas. From February 2003 to September 2004 the Explorer of the Seas has been used for a long-term manual biological/chemical water sampling program which will be used as a basis for planning future automated water sampling. For June to July 2004, an ISAR (Infrared Sea Surface Temperature Autonomous Radiometer) unit developed by Brookhaven National Laboratory was installed for testing on the Explorer. As a next step in possibly expanding the program to other RCCL ships in the region, a wireless system for transmitting the data from the deck to the Atmospheric Laboratory was installed.

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- The Explorer also provides a significant public outreach opportunity to educate and inform passengers about oceanography in general and the SEACOOS program in particular. ongoing

*Status:* Daily lectures to passengers continue. The Explorer of the Seas program is partnering with Royal Caribbean and GLOBE in a White Water to Blue Water (WW2BW) partnership to bring science education to children in the cruise ship's youth program. This program was put on temporary hold until a new department in RCCL was identified to take over the onboard program. In June 2004, a media cruise event for Explorer/SEACOOS was held on Explorer of the Seas; CNN featured the Explorer of the Seas and a number of scientific projects on the ship in three separate episodes of their science and technology show NEXT CNN. In August 2004, the US Ambassador to Belize, Russell Freeman along with representatives from the embassy and government groups in Belize visited the Explorer of the Seas at her port stop in Belize City, Belize.

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- The Explorer's shore-side real-time data stream and the high-resolution archival data system will integrate the data streams from other Miami SEACOOS investigators (Mooers-EFSIS, Shay-WERA, Johns-profilers) and the RSMAS Remote Sensing Laboratory (Terra-& Aqua-MODIS ocean color and SST, AVHRR SST). The goal is to both conserve computer and personnel resources and to provide seamless Internet access to the available real-time and archival observations, model products, and satellite observations from the East Florida Shelf.

70%

*Status:* The Explorer of the Seas group continues to provide local archival and real-time data storage and delivery capabilities for other Miami SEACOOS investigators (Mooers-EFSIS, Shay-WERA and Johns – profilers). Explorer project personnel have also devoted time to the development of the SEACOOS community data dictionary, data/metadata storage and transmission schemes.

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- The comprehensive East Florida Shelf data distribution system will also better facilitate the production of a variety of blended and derived products for the SEACOOS domain, including validation of WERA current velocities and advective nutrient/chlorophyll fluxes from ocean color data. It will thus be a key element of the SEACOOS distributed data network.

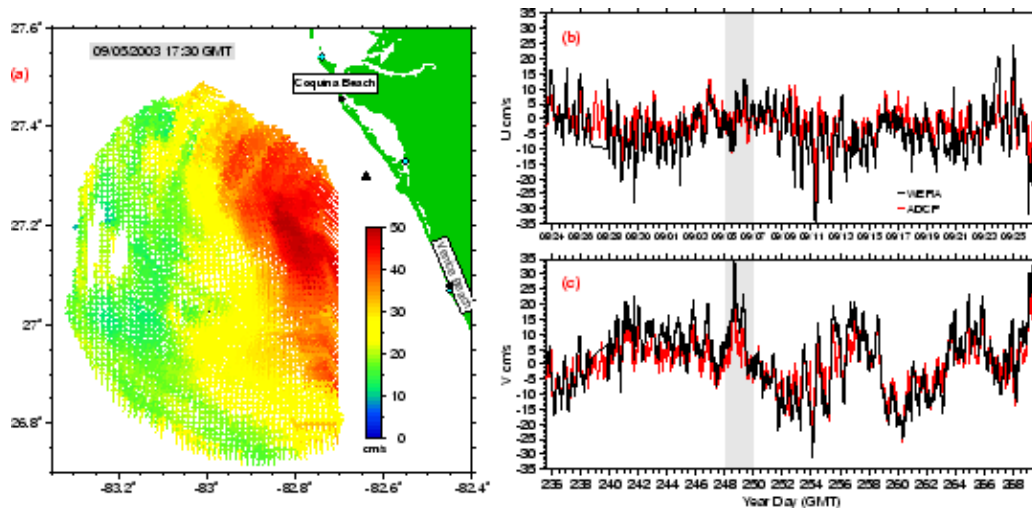
40%

*Status:* Data from the first two years of the program have been processed with experimental QA/QC protocols developed at UMiami and through community involvement through SEACOOS DMCC and QARTOD-I. Techniques have been developed for the conversion of the original flat ASCII Explorer historical data files to standard SEACOOS netCDF formats complete with supporting metadata. Initial investigations into the accuracy of the RDI OS ADCP data have shown promising results, as have initial real-time transport of ADCP vectors from the ship following the on-board deployment of the CODAS3 processing software in summer 2004.

*Technique development (HF radar) - P.I. Lynn (Nick) Shay, RSMAS-UM*

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<ul style="list-style-type: none"> <li>Process and analyze radar-derived surface currents and compare these data to moored ADCP data over the West Florida Shelf from the ~2-month deployment in July/August 03</li> </ul>	80%

*Status:* Initial evaluation of the WERA system from over a month of measurements has revealed very high correlations ( $\sim 0.83$ ) to ADCP data at 3-m that included the passage of Tropical Storm Henri as shown in Figure 1. RMS differences are 5.6 to 6  $\text{cm s}^{-1}$  in the u and v-components, respectively at the 25-m mooring site. The analysis has been expanded to the two other ADCP moorings (Courtesy of Bob Weisberg) to understand the projection of the surface currents to the subsurface structure in the cross-shelf direction. As part of this effort, we are comparing surface currents based on only 12 antennae to those acquired from 16 antennae to assess statistical differences in the velocity measurements. In addition, surface velocities are being analyzed for tidal content as well as the wind-driven flows driven by Henri to examine the surface current response. Analyses are nearly completed and we are working on a manuscript.



**Figure 1:** a) Surface current map from the deployment of WERA over the WFS in 2003 during the passage of Tropical Cyclone Henri. The location of the array is at  $27.16^{\circ}\text{N}$ ,  $82.95^{\circ}\text{W}$  (black dot) where the 3-m ADCP currents (red) are compared to the surface current from WERA (black) for b) u-component and c) v-component ( $\text{cm s}^{-1}$ ). The gray shading indicates the period of Tropical Storm Henri passage.

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- **Deploy and maintain surface current radar sites along the EFS in establishing a radar testbed (RTB) in a regime with large gradients that occur over short-time scale (compare to ADCP transect data from the Explorer of the Seas).** 95%

Status: In 2004, we have established two HF-radar sites along the EFS. One is located on Key Biscayne and the other on Key Largo. Both sites have been running since June 04. We also tried cell phone technology at the Key Largo site and found it to be too intermittent for real-time data acquisition and mapping. Thus, we are now using regular telephone lines for access to the real time data. Some tweaking of the Key Largo Site is still needed, and we are awaiting ADCP transect data from the Explorer of the Seas for comparisons.

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- **Provide hourly estimates of surface current maps via the Web** 20%

Status: This part of the work statement will begin to occur when both sites have been up and running so we can test and debug any problems in the data system. In other words we are still testing the Key Largo Site. An ADCP was deployed in the coastal regime by B. Johns to help us in assessing data quality.

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- **Add a third radar station along the EFS (probably in the vicinity of Port Everglades) in support of RTB** 50%

Status: We are in the process of working on a third WERA site in Ft. Lauderdale at the northern end of John U. Lloyd State Park (Permit has been received from the State of Florida and approval from the Department of Environmental Protection) close to the close to the US Navy Test Facility Site. For the next few months, the array will be deployed in the park away from the 8-foot chain-link fence, which may interfere with signals from the lower frequency radar of 16 MHz. Negotiations are underway for the Navy to construct a fiberglass fence so we can install WERA permanently on their site. The equipment for the third station was delivered in July 04. Expect deployment in October given that the approvals from the state and county have been finalized.

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- **Analysis of previous EFS measurements** 85%

Status: We are completing the analysis of previous experimental data sets over the EFS that have resulted in submitted and published journal articles as well as data reports that included Ocean Surface Current Radar (OSCR) data from 99-01. These high-resolution data have provided insights into the small-scale vortices and eddies that the WERA will sense along the EFS and help us in optimal array design. A report has been completed and we will submit a manuscript based on report findings.

#### References and Presentations:

Cook, T. M., L. K. Shay, and W. Drennan, 2003: Coastal surface current response to cold front passage. EOS Trans of the American Geophysical Union, 84(32), Ocean Science Meeting Suppl., Abstract OS-51D-22, 26-30 January 2004, Portland, Oregon.

Martinez-Pedraja, J. , L. K. Shay, T. M. Cook, and B. K. Haus, 2004: Very high frequency radar measurements of surface currents along the inshore boundary of the Florida Current during NRL2001: Rosenstiel School of Marine and Atmospheric Science, University of Miami, RSMAS 2004-03, 30 pp.

Martinez-Pedraja, J , L. K. Shay, T. M. Cook, and B. K. Haus, 2004: Multiple-scale vortices detected along the inshore boundary of the Florida Current. Geophys. Res. Letters (In Preparation)

Shay, L. K., 2004: Ocean surface current variability using high frequency radar technology. ONR Regional Progress Review, USF, St. Petersburg, 10-13 May 2004.

Shay, L. K., T. M. Cook, and P. An, 2003: Submesoscale coastal ocean flows detected by very high frequency radar and autonomous underwater vehicles. J. Atmos. Oceanogr. Tech., 20, 1583-1599.

Shay, L. K., T. M. Cook, B. K. Haus, J. Martinez-Pedraja, T. Helzel, K-W. Gurgel, and R. Weisberg, 2004: Surface velocity measurements from a Wellen Radar. J. Atmos. Oceanogr. Tech., (In Preparation).

Observations (cont.)

University of North Carolina at Chapel Hill

*Website maintenance and development, subcontract to OASIS, UNC-CH*

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- *Dynamic web portal development:* Application development services in support of the design, implementation, support and on-going extension of a dynamic web-based portal to meet the data dissemination needs of the SEACOOS project will be provided. 75%

Status: The new Zope/Plone based seacoos.org website went live in late October 2003. The site hosts the MapServer/PostGIS information portal operated by AIG at USC. Established a process for development and approval of data/model output products through Product Interface Committees (PICs). Significant revisions to the site were made following recommendations of the content committee and two PICs in March 2004.

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- integrate data from distributed partner collection sites; and explore and implement additional dynamic capabilities such as GIS and related technologies. 70%

Status: Several merged products are currently hosted on the production site: winds, sea surface temperature, MODIS and AVHRR layers, and merged model output of currents and water level. Jesse Cleary (MS Geography) went from part-time to full-time in August 2004. He will continue to assist in GIS-based layer development (supported out of UNC-SEACOOS budget). His work includes visualization of data and developing MapServer expertise to assist USC efforts, and development of a SEACOOS equipment inventory.

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- *Ongoing Celoxis project management/design training:* OASIS will continue to manage Celoxis-based project management services and training for SEACOOS users. These services include: task tracking; reporting; email notifications; document sharing; document versioning (check-in, check-out); user and group security; client platform neutrality (Netscape/Linux must be supported). 50%

Status: Celoxis has proved a challenge to maintain, and users have been reluctant to adopt the system. Usage of the system is largely restricted to the storage of documents and forum

communications. Investigations for Celoxis replacement are underway, and may fall to either USC or UNC (OASIS) to implement.

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<ul style="list-style-type: none"><li>• <i>Web portal maintenance and content update:</i> OASIS will continue to maintain the SEACOOS portal's application infrastructure.</li></ul>	Ongoing

Status: Chris Calloway was hired by OASIS in October, 2003 to assist in portal development. He led the effort to develop the Zope/Plone site. He worked on the SBC implementation of the Iridium communications, and returned to website development in May 2004. Efforts are underway to revisit the distributed capabilities of the content management system, and to implement a model (possibly with new/ revised tools) that will increase the rate of new content publishing on the website. The revised development model will undergo thorough user testing and training throughout Year 3.

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<ul style="list-style-type: none"><li>• <i>Software consulting services:</i> OASIS will continue to provide data integration, systems analysis, and consulting to Marine Sciences in support of this project. These services would include: technology investigation; process consulting; SEACOOS partner communications; conference attendance.</li></ul>	100%

Status: This has included work on the SBC DAQ system, and implementation of an encoder kit based on observations available on DODs server. It accommodates transmission of multiple platforms and now 2 format types. Version 1 was developed in fall 2003 and was used successfully by Skidaway to transfer SABSOON data as FM13 messages to NDBC. Version 2 was developed in early winter 2004 and enables transmission of FM64 messages, which enables transmission of previously unsupported ocean variables, and as requested by the NCEP MMS group. It has been operating since mid-February 2004 and we await the final word from NDBC on its functionality.

## Modeling

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### University of North Carolina at Chapel Hill

#### *SAB Modeling - P.I. Francisco Werner, UNC-CH*

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- *Analysis of merged model fields:* Using the DODS server and in collaboration with the Data Management Team, in year 1 we will have completed the steps required to merge the present near-real-time barotropic nowcast/forecast fields (e.g., bottom topography, coastlines, sea surface height and depth-averaged currents, etc.) from UNC, USF, and UM. The product will be available on the [www.seacoos.org](http://www.seacoos.org) website. In this coming year we will quantify the difference fields in overlap zones and correct/adjust/enhance as needed. 90%

Status: Brian Blanton at UNC-CH is the head of the MPCC and has recently begun addressing these issues. The year 3 goals also include the continued reliable execution of daily model runs by each domain. The required support methods have been implemented by each group. This support includes scripts to retrieve meteorological model files, manage the execution of the hydrodynamic models, post-process the output, and make available the output files (in a standardized netCDF formatted file) via local DODS servers. Details of the implementation are available in "Implementation of the SEACOOS Nowcast/Forecast Model System"

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- *Barotropic skill:* using sea-level gauges, ADCP velocity data and drifters, we will develop a quantitative measure of model skill of barotropic (no density) mode. One paper by He et al. is expected to be submitted in late 2004. 75%

Status: The skill analysis will include both tidal and sub-tidal (weather-band) assessments. The coastal water level will be the most immediate and useful skill metric, as the data sources available for comparison span the entire SEACOOS coastal region. Velocity observations are comparatively less available, but will yield important guidance on the need to enhance the SNFS will additional physics. We expect that tidal skill among the three model sub-regions will be good. Sub-tidal skill will vary by sub-region, as the processes that affect this frequency band vary substantially throughout the SEACOOS region and are not generally restricted to barotropic mechanisms. A paper by He et al. is in preparation and is expected to be submitted for review in late 2004.

- *Inclusion of baroclinic structure:* we will study the response of imposing heat fluxes and river discharge on the nowcast/forecast system. Data quality and model response will be assessed. This will allow the study of the formation of tidal fronts during summer, the cooling of nearshore waters and associated water-mass subduction during cold-air outbreaks, as well as the formation of low salinity fronts during wet seasons. 30%

Status: Initial progress on the inclusion of density components to the nowcast/forecast system will be restricted to river discharge and atmospheric heat fluxes obtained from the NCEP operational model analysis and forecast fields (the same source of the momentum fluxes currently being used by all three models). The background density fields, onto which these baroclinic forcings will be imposed, will initially be limited to climatological initial conditions of temperature and salinity. We examined the conditions that may have led to the 2003 cold summer signal on the shelf (Aretxabaleta et al. 2004). The availability of basin-scale ocean model forecasts of temperature and salinity structure will provide more realistic estimations for the SAB sub-region (see below).

- *Data assimilation:* we will examine the possibility of routine data assimilation into the SEACOOS modeling sub-regions in collaboration with colleagues from UM and USF. We will build on experiences gained in the SABLAM project. We anticipate that sea level and ADCP data may be available regionally for assimilation during the coming year, and we will also consider assimilation of surface current data from HF radar. The latter is an open research topic requiring development of formal methods and forms part of a community-wide effort. 25%

Status: Techniques for the assimilating coastal tide gauge water levels have been developed (Lynch et al, [full citation not available]) and used recently in the SAB. This observation source proved to be critical for improving tidal skill in the SAB (Lynch et al, 2004, Blanton 2003).

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- *Deep Ocean Model Products:* over the next years, GODAE anticipates providing basin-scale model products. We have formally established a collaboration with the HYCOM/GODAE Consortium led by Eric Chassignet (UM) and will test their forecast products to force our limited area models. Initial forcing will include initially the open boundary sea surface elevation. Based on recent findings on the seasonality of the variations on Gulf Stream transport and its effect on the sea level on the continental shelf, inclusion of offshore forced solutions should improve our forecasts. 20%

Status: In collaboration with the HYCOM Consortium, we are currently acquiring the 1/12 deg operational HYCOM/GODAE North Atlantic model output and developing methods to map these model products into the SAB sub-region model domain. The frequency of availability of this basic scale product is 1 week. This product will provide best available estimates of the regional hydrography as well as offshore barotropic elevations due to the proximity of the western boundary current to the SEACOOS region continental shelf.

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- *Applications:* we will collaborate with Dr. Jon Hare of the National Marine Fisheries Service to study and quantify the transport of larvae (of selected species) on the SAB shelf. This effort has already begun (Edwards et al. 2004; in preparation) and results of this study will be assessed in relation to their impact on the design of Marine Protected Areas (MPAs). 40%

Status:

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- *Publications:* we expect to submit three papers for publication in the peer reviewed literature on: (i) operational regional models, (ii) barotropic skill including data assimilation, and (iii) applications related to larval transport/MPAs. 60%

Status: A draft technical document on the implementation of the modeling sub-regions is available. This document describes details of the SNFS system, and will form the basis for a journal article for the SEACOOS modeling system.

## Publications (accepted and in press)

Blanton, B.O., A. Aretxabaleta, F.E. Werner, and H.E. Seim (2003) Monthly climatology of the continental shelf waters of the South Atlantic Bight, *J. Geophys. Res.*, 108(C8), 3264, doi:10.1029/2002JC001609.

Lynch, D., Smith, K., Blanton, B., Werner, F., and Luettich, R., (2004) Forecasting the coastal ocean: Resolution, tide and operational data in the South Atlantic Bight, *Journal of Oceanic and Atmospheric Technology*, 21(7):1074-1085

Blanton, B.O., F.E. Werner, H.E. Seim, R.A. Luettich, D.R. Lynch, K.W. Smith, G. Voulgaris, F.M. Bingham and F. Way (2004) Barotropic tides in the South Atlantic Bight. *J. Geophys. Research*, in press.

## Presentations at National Conferences

Aretxabaleta A., Nelson J. R., Werner F. E., Seim H. E., Blanton B. O., Blanton J. O., Li C., Moore T., Tzeng M. (2004) Hydrographic anomalies on the South Atlantic Bight Shelf during spring and summer of 2003. Presented at the ASLO Meeting, Savannah, GA., June 2004.

## Papers in preparation

Blanton, B.O. et al. (2004) Implementation of the SEACOOS Nowcast/Forecast Model System, in preparation.

Edwards, K.P., J. Hare, F.E. Werner and B.O. Blanton (2004) Lagrangian characterization of circulation on the South Atlantic Bight: comparison of observed and modeled drifters. In preparation.

He, R. et al (2004) Coastal Ocean Response to Extra-Tropical Storms: A Retrospective Analysis using Regional Coastal Ocean Models of the Southeast Atlantic Coastal Ocean Observing System (SEACOOS), in preparation.

Modeling (cont.)

## University of Miami, RSMAS

### *East Florida Shelf Information System (EFSIS), P.I. Christopher N.K. Mooers, AMP/RSMAS*

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- Sensitivity, process, and validation studies will be continued with EFS-POM (East Florida Shelf -Princeton Ocean Model). 25%

**Status:** Studies are being conducted for barotropic and baroclinic versions of EFS-POM. Sensitivity issues include resolution, value of the horizontal frictional parameter, and topographic smoothing; a major ms is in preparation. Validation studies have been limited to historical datasets such as STACS current and CTD profile data and current meter arrays,

contemporary coastal sea level data, and satellite thermal and color imagery, while awaiting SEA-COOS data; e.g., WERA-derived surface current fields and SWAMP current and CTD profiles. The baroclinic version of EFS-POM has been used for pioneering process and model testing studies. Results for simulations of frontal eddies on the EFS were validated against observed values reported in the literature and have been published (Fiechter and Mooers, 2003) and presented (Mooers et al., 2004). Those initial results have been extended to include a NPZD ecosystem model, that has been partially validated through comparison of simulated phytoplankton fields to MODIS color imagery, representing chlorophyll-a concentrations (Fiechter and Mooers, 2004a,b).

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- Alternative sources of open ocean boundary conditions will be evaluated. 15%

Status: The possibilities of various potential sources of open boundary conditions have been explored. The most promising sources are operational (1/8 deg) Global-NCOM from NAVO and quasi-operational (1/24 deg) IAS-NCOM from NRL. NCDDC has recently begun to provide the Global-NCOM fields to the civilian community on a server. Global NCOM fields, extracted for the SEA-COOS domain, will be initially assessed and utilized in coming months. Funding needs to be arranged to make IAS-NCOM fields available to the civilian community for the next few years until NAVO makes IAS-NCOM operational.

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- Participation in the initial SEACOOS storm response analysis and the initial SEACOOS merged nowcast/forecast study will be continued. 40%

Status: Tests and comparisons with the other SEACOOS models are being made in their overlapping domains. Some of the effort is directed to preparing a set of comparisons with observations and other models for the barotropic response of the SEACOOS domain to the passage of storms, an effort that is expected to lead to a MODPROD Working Group publication. These comparisons have led the three modeling groups to adopt common bottom topographies, tidal and atmospheric forcing, synchronization, and so forth.

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- Nested modeling for the Dry Tortugas subdomain will be continued, and Lagrangian trajectories will be extended to three-dimensions. 40%

Status: After achieving initially promising results for a high-resolution nested Dry Tortugas subdomain, the focus has been on improving the implementation of baroclinic EFS-POM before returning to this topic area.

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- EFSIS (East Florida Shelf Information System) will continue to be upgraded with more complete and realistic forcing. 15%

Status: The barotropic EFSIS continues to evolve even while it is running continuously and autonomously as a nowcast/forecast system with output graphics to the EFSIS Website. The baroclinic EFSIS is now also running quasi-operationally, with 12 km - resolution NCEP Eta wind forcing in use but tidal forcing yet to be added. The lack of open boundary condition data is a limiting factor which should improve with the prospective introduction of Global NCOM fields for OBCs.

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- Preparations will be made for a nested subdomain in the WERA footprint between Key Largo and Port Everglades. 10%

Status: There will be a model validation and verification phase when the WERA surface current data become available and high-resolution bottom topography are introduced, followed by design of a data assimilation and verification phase. Completion of the WERA installations is being awaited to determine the nominal radar coverage, which is needed to design the high-resolution (ca. 1 km) nested subdomain. In the interim, local interest in a high-resolution nearshore nest has increased due to sewage outfall dispersal, etc. applications. Also, in preparation for a collaborative field study, a high-resolution (ca. 1 km) nested model has been implemented for the Key Largo tract (from the coastline to the 200m isobath) and used to assess the impact of wind forcing and tidal currents on larval dispersal following a mass coral spawning event.

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- Major contributions to the governance and planning of SEA-COOS are intended, especially for the development of federal agency interfaces. 25%

Status: Coordination with Navy and NOAA entities to obtain access to Navy Coastal Ocean Model (NCOM) fields has progressed. The planned program for the SEA-COOS Spring WS was executed. The PI is engaged in numerous SEA-COOS coordination activities; such as, serving on the EXCOM, coordinating the State of the SE Coastal Ocean Report, and chairing the Federal Agency Working Group.

#### Presentations and Publications

Fiechter, J. and C.N.K. Mooers (2003). Simulation of Frontal Eddies on the East Florida Shelf. *Geophysical Research Letters*, 30 (22), 2151, doi:10.1029/2003GL018307.

Fiechter, J. and C.N.K. Mooers (2004a). Numerical Simulations of Florida Current Eddies with Implications for Mesoscale Biophysical Processes and Fisheries Oceanography. ASLO/TOS Ocean Research Conference Abstract Book, p.48.

Fiechter, J. and C. N. K. Mooers (2004b). Simulation of physical-biological interactions related to Florida Current frontal eddies and interpretation of associated satellite ocean color imagery. *Geophysical Research Letters* (under revision)

Mooers, C.N.K., J. Fiechter, and I. Bang (2004). Numerical Simulations of Mesoscale Variability in the Straits of Florida. *JONSMOD 2004 Abstract Book*, p.21.

University of South Florida

*WFS Modeling Subprogram- P.I. Robert Weisberg, USF*

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- Baroclinic hindcasts. We are presently using 3 different models, depending on application. The primary vehicle is the POM (Blumberg and Mellor, 1987), which we are using for baroclinic hindcasts and for barotropic nowcast/forecasts. Our baroclinic hindcasts are all quantitatively gauged against data. On this basis we are attempting to determine model limitations and corrections. Surface forcing appears to be the primary limitation (as contrasted with model physics). While overly simplified, surface heat flux is limiting on seasonal scales and surface momentum flux is limiting on synoptic scales.

Given adequate forcing functions we can do reasonably well on integrations of several months duration, and comparisons between independently derived momentum balances from the data and the model demonstrate that the model performance is correct. We are using optimal interpolation (O/I) techniques to 1) composite SST fields from different satellites (AVHRR and TMI) to produce cloud-free daily images (He et al., 2003 for surface heat flux relaxation and 2) composite surface wind fields from EDAS (model) and buoy and coastal observations for improved surface momentum flux forcing. The ocean model results from these O/I fields are demonstrably better than from the nominal EDAS fields alone (He, Liu, and Weisberg, 2003). From this we may conclude that the most effective way of improving ocean state specification by models is to improve the coastal marine weather forecasts used to drive the coastal ocean models. This quantitative finding underscores the importance of coastal ocean observing systems.

Status: Hindcast experiments are proceeding with three different types of models as planned.

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- Nowcast/forecast. Our barotropic nowcast/forecast uses EDAS nowcast/forecast winds to drive the WFS POM, inclusive of tidal forcing at the open boundary. For year 2 we will implement baroclinicity now that we have an SST product for surface heat flux relaxation. 90%

Status: Nowcast/forecast system is operational. It was converted from a 36 hour forecast to an 84 hour forecast and the results are now merged with other SEASCOO subdomain products. As of the end of FY2 the implementation of the baroclinic N/F remains to be done; hence the 90% completion.

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- SEACOOS domain model. For the purposes of improving the open boundary condition specifications for the WFS regional model we also implemented a larger SEACOOS domain grid. Initial experiments were with tides forced at the open boundaries along with climatology for surface dynamic height and subsurface hydrography adjusted for total transport. Coupling of the regional coastal ocean models with larger scale deep ocean models will be explored in collaboration with our SEACOOS colleagues and other modeling groups. A formal relationship through NOPP now exists between USF and the HYCOM/GODAE team of E. Chassignet, RSMAS. 100%

Status: At mid-year the climatology was complete and experiments with open boundary specifications on SEACOOS domain model were underway. The NOPP award has now been let and two new associates have been hired. Ruoying He continues as a SEACOOS associate with his new affiliation as assistant scientist at WHOI. Seasonal, monthly mean runs using the SEACOOS domain (ROMS) model are complete.

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- Estuarine applications. In use for estuarine applications is the ECOM3D-si (Blumberg, 1993). Along with the Tampa Bay PORTS applications of M. Luther, we have applied this to the Charlotte Harbor estuary (Weisberg and Zheng, 2003 and Zheng and Weisberg, 2003). 100%

Status: Two papers were published on the Charlotte Harbor estuary. Preliminary model analyses were performed on the Tampa Bay estuary.

- 100%

• Linking the estuaries with the shelf. For the purposes of achieving high resolution without nesting, and thereby being able to directly link the estuaries with the continental shelf, we are using the FVM of Chen et al. (2003). Two applications each with direct outreach implications have been performed. The first is a set of hurricane storm surge simulations for which we translate prototypical category 2 and 4 hurricanes into the Tampa Bay region, making landfall at several locations, from several directions, and with several approach speeds. By combining the flooding/drying capabilities of the model with the most recent merged NOAA/USGS bathymetric/topographic data we have a highresolution simulation with important emergency management implications. The second is an application the FVM to the Pinellas Co. Inter-Coastal Waterway (ICW). Starting sufficiently offshore to properly force the tides we pare down to 40 m resolution within the ICW to look at its time varying flow fields and how the various inlets exchange water with the coastal ocean. Year 2 activities will include FVM simulations in fully baroclinic mode to study the evolution of salinity fronts by the coalescence of estuarine and shelf processes. We will also continue our local outreach activities.

Status: Tampa Bay region hurricane storm surge analysis was completed, and Storm surge results shared with local county officials. Following Hurricane Charley we also did preliminary surge calculations for the Charlotte Harbor and explained why the surge was small in the context of lessons learned from the previous Tampa Bay simulations. A new grid for more detailed H. Charley simulations was constructed and we are pursuing collaborative efforts with the USGS to help explain the breach at N. Captiva Island. Preliminary hindcasts of the West Florida Shelf inclusive of the Tampa Bay and Charlotte Harbor estuaries were completed, we also gained more proficiency with this model and helped to identify and correct some issues with it.

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- Data analyses: Analyses will be aimed at understanding the synoptic, seasonal and interannual variations on the WFS, both for the ocean circulation and ocean-atmosphere interactions and for the biological ramifications of these. New analyses will derive from the joint HF radar experiments and from the continuation of the operational CODAR\ measurements. 100%

Status: Analyses ongoing on synoptic, seasonal, and inter-annual variability on the West Florida Shelf. CODAR radial currents being evaluated against in situ measurements. Four papers were submitted subsequent to the mid-year report; one giving an overview of the topic, another aimed at air-sea interaction and how COOS is necessary to provide data discriminating land from ocean effects on relative humidity, a third applying neural network techniques to identifying SST patterns, and a fourth on momentum budget analyses for the WFS.

## Information Management

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University of South Carolina

*Data management and communications - P.I.s Madilyn Fletcher, Dwayne Porter*

%complete

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- The networking and problem-solving activities of the DMCC will be enhanced, and constructive linkages with additional data management activities will be utilized, such as those with GoMOOS and SURA/SCOOP. 100%

Status: This is an ongoing activity, but considerable progress was achieved this year. At SEACOOS workshops, discussions on SEACOOS efforts and mutual needs and interests have taken place with representatives from NDBC, NCDDC, and other NOAA entities. SEACOOS personnel attended the OOSTECH'04 meeting in Washington, D.C., which was jointly sponsored by SURA, Cast-Net, and SEACOOS. This provided a forum for interactive discussions among a number of attendees from a variety of institutions in the U.S. Some aspects of SEACOOS progress have been documented for general access, such as the general document outlining several technology components, which have been assessed and are being used by SEACOOS (<http://caro-coops.org/bb/viewtopic.php?t=249>). Additional documents are available on the SEACOOS internal Celoxis site and the SURA twiki; these detail some of the data aggregation efforts and issues.

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- DODS and LAS functions will continue to be tested by exchange of information among the partner institutions. 100%

Status: SEACOOS has completed its initial assessment of DODS/OPeNDAP. The primary utility of DODS within SEACOOS is for the accessing and retrieval of SEACOOS data, by both internal and external users. LAS was installed and reviewed at the USC institution. While LAS might be a useful tool for others in the scientific community, SEACOOS is utilizing MapServer GIS to achieve the same goals of integrated data discovery and display. The MapServer GIS supports additional features such as multiple data layer overlays for visual comparison and is better supported technically from the larger GIS community from which it draws.

A full review of DODS/OPeNDAP and LAS is available as part of the Celoxis documentation.

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- Efforts will continue to establish consistency among vocabularies, where needed. 100%

Status: A standard vocabulary has been established for all information now used by SEACOOS. This data dictionary exists as an Excel spreadsheet, which was circulated and edited by all SEACOOS institutions and is part of the Celoxis documentation. We have also established an online database version of the data dictionary ([http://nautilus.baruch.sc.edu/seacoos\\_dd](http://nautilus.baruch.sc.edu/seacoos_dd)), which can be modified with trackable suggested edits or additions, for subsequent review and approval by the DMCC.

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- One anticipated demonstration will be to identify and test a concrete example of model data (stored on a DODS server) over-laid with integrated data product utilizing real-time data (also stored on a DODS server). 100%

Status: This is an ongoing development product, which requires input from multiple working groups. The interface required for merging real-time data with model products has been completed. It is now ready for scientific review by SEACOOS investigators.

%complete

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- Evaluation of OPeNDAP to non-gridded datasets. 100%  
Historically OPeNDAP is better suited to supporting gridded data, but efforts are being made to better support in situ datasets which may have data and metadata collected in Relational Database Management Systems(RDBMS) utilizing commercial systems such as Oracle and SQL Server, and open source systems such as mySQL and PostgreSQL.

**Status:** Both netCDF and Relational Data Base (RDB) DODS servers have been established. The DODS RDB server has been shown to be technically feasible and is in place for use when needed.

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- Enhancement of Web portals for dissemination of data and metadata. This will involve the maintenance and further development of the SEACOOS portal ([www.seacoos.org](http://www.seacoos.org)), as well as linkages and clarification of relationships among the various related Web locations. Particular attention will be paid to communication with various user communities. Community bulletin boards have been established at several sites ([www.carocoops.org/bb](http://www.carocoops.org/bb), <http://redington.me3.com/php/gomoos/phpbb/index.php>), which cross-reference discussion and documentation as it affects data management issues within the community. These discussion threads are keyword searchable within the bulletin board and also searchable by popular search engines such as 'Google'.

**Status:** This is an ongoing activity involving all SEACOOS Working Groups and the Product Interface Committees (PICs). We are 100% on track with interface design in response to PIC requests, as well as for production of visualizations of new data that are offered via SEACOOS. We have also developed the code necessary for alternate tools that allow third parties to generate their own products from SEACOOS data. Current bulletin boards can be found at (<http://twiki.sura.org>),

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Further development of data integration software and processes. These include:

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- (1) QA/QC procedures, including those for (near)real-time data streams; 20%

**Status:** This task is largely deferred until the various SEACOOS data providers have had the

opportunity to assess individual QA/QC procedures and how commonality can best be achieved. Various schemes, flagging, and tests are being evaluated in SEACOOS. Some real-time data being utilized in SEACOOS are being provided by NOAA's NDBC and NWLON, and consequently has undergone their QA/QC processes.

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- (2) procedures for updating, refining, or correcting QA/QC documentation; 10%

Status: SEACOOS plans to develop code libraries, which would (a) accept input variables with appropriate necessary metadata to be processed by matching QA/QC functions defined for range limits, time continuity, and internal consistency and (b) output one or several string flags which correspond to the QA/QC documentation standard being used. However, these details are being deferred until (1) above is addressed.

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- (3) documentation of metadata, identification and establishment of metadata standards; and (4) implementation of processes to facilitate metadata documentation. 100%

Status: Federal Geographic Data Committee (FGDC) metadata has been generated to facilitate data discovery via the FGDC Clearinghouse. Metadata documentation was primarily focused on the overall themes and data procedures of the SEACOOS program. Individual observing system efforts within SEACOOS are responsible for developing metadata specific to data collection efforts. The Meta-door metadata development tool developed by the Caro-COOPS observing system effort is being used for metadata development.

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- Access to external data streams to support modeling and outreach efforts. Required data will be (1) static data, i.e. those that do not change or change only slowly in time, and (2) the real-time or near-real-time data. The management of those data will evolve as finer resolution or more accurate static data become available and as new technologies affect the delivery of data. 40%

Status: This is an ongoing activity. However, steps needed for current year projects are 100% on track. Within the IOOS effort, SEACOOS has provided semantic templates that others have used as well as MapServer-specific code for the group. With the help of USF, color schemes were established for all remote-sensing and in-situ IOOS participants to follow. SEACOOS also assimilated UC Santa Cruz' in-situ SST data by providing them with the SEACOOS netCDF in-situ SST format and instructions, and pushed their data via the WMS service to IOOS.

SEACOOS has assimilated external satellite data from JPL and external In situ data from NOAA NBDC, NWLON/CO-OPS, and NWS.

	%complete
<ul style="list-style-type: none"> <li>Development of geospatially-referenced, web-based products from data streams and model outputs, which include information and overlays. The development of GIS applications and presentations of data, model outputs, and other data products will be initiated in Year 2 and are expected to be important SEACOOS products. Visual and layered presentations are particularly useful and instructive for a variety of user groups, ranging from resource managers to education platforms. We anticipate that some of this activity will be closely allied to the Outreach Working Group's work and SURA/SCOOP activities.</li> </ul>	100%

Status: This is an ongoing effort, and SEACOOS activities are 100% on track. Development of initial GIS interfaces and data workflows for in-situ observations, merged model output, and remote sensing observations has been completed. SEACOOS has participated in the IOOS integration efforts by supplying map images representative of in-situ wind speed and direction and sea surface temperature via the OpenGIS Consortium (OGC) Web Mapping Service (WMS) protocol, and all SEACOOS data has been made OGC-compliant and are being accessed by IOOS participants and other users. The SEACOOS GIS interface has been enhanced with additional raster (image) querying capabilities, as well as visualization elements such as more refined color legends.

Information Management (cont.)

University of North Carolina at Chapel Hill

*UNC-CH Data management - P.I. Harvey Seim, UNC-CH*

	%complete
<ul style="list-style-type: none"> <li><i>DODS Evalutaion:</i> We will continue to evaluate the use of DODS Servers for near, real-time data dissemination. This also includes participating in a workshop hosted by Peter Cornillion (University of Rhode Island) scheduled for Fall of 2003 on NVODS to provide feedback about OPeNDAP protocol and software.</li> </ul>	100%

Status: The DODs server (nemo.unc.edu) has been operational since April 2003 and continues to work well. Sara Haines has participated in a number of conferences, including the NVODS

workshop, on this topic. A general SEACOOS perspective document is being developed.

	%complete
<ul style="list-style-type: none"><li>• <i>Data Integration:</i> Collaboration with SEACOOS data management personnel to develop and implement processes to aggregate external data streams for modeling and outreach products. These external data streams are from federal data providers such as NBDC, NWS, and USGS.</li></ul>	50%

Status: Haines, Stearns and Semone at UNC have actively participated in the development and refinement of the CDL standards adopted by SEACOOS DMCC. Haines/UNC has been responsible for ingestion, formatting, and DODs presentation of NWS/METAR and NOS observations, including recent development of a water level CDL. She also help USC implement their access to USGS gauging stations.

	%complete
<ul style="list-style-type: none"><li>• <i>Data Quality and Control:</i> We will participate in the identification, design, and documentation of QA/QC practices to be used by SEACOOS data partners. We will implement QA/QC practices as identified by SEACOOS partners. This includes procedures for near real-time observational data, as well as after-the-fact. This also includes participating in a workshop with NDBC on real-time QA/QC practices.</li></ul>	40%

Status: Haines attended the QUARTOD workshop in December 2003. Discussions continue about how to implement the QA/QC standards conventions discussed at the workshop within SEACOOS but no definitive action has been taken.

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<ul style="list-style-type: none"><li>• <i>Establish metadata and data structure for NC observations:</i> We will assist in identifying SEACOOS minimums for data structure and metadata needs for HF radar and in-situ measurements. These will be made available in a manner that are consistent with those throughout SEACOOS.</li></ul>	100%

Status: Initial implementation is complete. Haines has played a central role in the SABSOON database development and continues to lead efforts to update it. The structure adopted by her and Luke Stearns is similar for NC-COOS tower observations but with a greater inclusion of metadata throughout. Stearns has led the development of the HF radar database, and is currently using the HFRC package from David Kaplan/UCDavis and Mike Cook/Naval Postgraduate School.

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- *Operational data streams:* Scripts and programs will be developed to automate the processes of converting, calibrating, and aggregating data as they are received from remote sites and pushed to data servers for Internet access. These automated processes will need to be sensitive to when sensors and equipment are brought online and offline or when there is a telemetry failure. Also, these scripts will need to access information about changes in calibrations and maintenance. 100%

Status: Active data feeds enabled. HF radar and NC-COOS tower data are available, both to SEACOOS and MARA, via DODs and ASCII interfaces. We have adopted SEACOOS CDL; formatting requirements within MARA are less clear.

%complete

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- *Design relational equipment database:* A relational database will be designed to hold information about field equipment and sensors, history of maintenance, calibration data and threshold standards. This will improve the communication of very detailed and pertinent information between the field personnel and data management personnel. This database will be updated by field personnel and used by operational scripts and programs—a crucial step towards operational function. 75%

Status: Underway. A SEACOOS inventory was initiated at the fall 2003 workshop and an initial version presented at the Spring 2004 meeting. Stearns, Muglia, and Cleary were involved in this initial observing WG technical activity, with Cleary leading the web implementation. We are also implementing a more thorough database for NC-COOS but this effort is ongoing at present.

## Publications and Presentations

Edwards, C. R.; Haines, S. M.; Seim, H. E.; Nelson, J. R.; Moore, T.; Seasonal and Interannual Variability in the Georgia Bight, ASLO/TOS Ocean Research 2004 Conference, Honolulu, Hawaii

Seim, H and C. R. Edwards; Comparison of buoy-mounted and bottom-moored ADCP performance at Gray's Reef, draft technical report; to be submitted to JAOT.

Stearns, L.; Muglia, M.; Seim, H.E.; Bane, J.; Surface Currents Off the Outer Banks of North Carolina, ASLO/TOS Ocean Research 2004 Conference, Honolulu, Hawaii

University of South Florida

*USF Data management-P.I. Mark Luther, USF*

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- We are participating in all areas of data management integrating efforts with colleagues at USC, UNC and RSMAS. Data are being served at the COMPS, NDBC, and SEACOOS websites.

Satus: Our SEACOOS/COMPS real time data (winds in particular) are available to the NDBC for inclusion in their data streams.

- We installed an OPeNDAP (DODS) NetCDF server on a newly acquired Dell PowerEdge 2650 server running Red Hat Linux 7.3. This server is currently being populated with available real time and historical data collected on the WFS, and it is linked to the COMPS and the SEACOOS web sites.
- We are providing real time wind measurements from all of our stations in NetCDF format through the OPeNDAP (DODS) server for the production of a total SEACOOS area merged wind product that will be made available in near real time on the SEACOOS web site. All additional parameters collected on our buoy and coastal platforms may also be transmitted in the same manner.
- Metadata records for our WFS real time meteorological and oceanographic data have been prepared using the Cast-Net on-line metadata entry tool. These records were submitted to the Dauphin Island Sea Lab server and are ready for submission to an Isite node. The html and xml versions of these records are available on the COMPS website.

## Outreach and Education

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### *North Carolina Sea Grant Outreach - P.I. Jack Thigpen, NCSG*

%complete

- Explain SEACOOS capabilities to potential NC users. Establish a rapport with coastal resource management groups, emergency management agencies, recreational boating associations, ports and harbors, recreational and commercial fishing associations, commercial shipping and barge operators. Attend scheduled meetings of probable user groups and present information about the system and its capabilities.

25%

Status: State and regional associations and organizations have been identified. A timetable of upcoming annual meetings is being developed. At these meetings SEACOOS materials (brochure, poster and PowerPoint presentation) will be used to create an awareness of ocean observations potential and SEACOOS projects and products. This will also be used as a test-bed for the web products that are under development.

%complete

- *Determine Local Needs for CODAR information and products:* As HF radar system situated on the northern Outer Banks come on-line, work with local commercial fishermen and recreational boaters to identify useful products and methods of delivery.

25%

Status: Jack Thigpen is working with Mike Muglia, SEACOOS and Coastal Studies Institute, and Sara Mirabilio, NC Sea Grant fisheries specialist, to determine offshore fishermen's needs and preferences for CODAR information. We are scheduled to visit the Rutgers University CODAR project in April 2004 to learn how they developed products for New Jersey fishermen and how to best deal with public-private issues with CODAR and other ocean observing products. Product review committees of commercial fishermen and offshore recreational anglers. In February 2004 the current CODAR prototype products we displayed along with other SEACOOS information at the North Carolina Fishermen's Association annual meetings. There was considerable interest from commercial fishermen.

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- Evaluate information delivery scheme for Cape Lookout buoy measurement system: determine the information needs and delivery methods of a real-time wind and wave monitoring system that would improve the safety for recreational boaters, anglers, commercial fishermen, commercial and recreational underwater divers, and wind powered sailors in the central NC coastal region (Morehead City). Establish user preference for combinations of web-based, radio and telephone delivery methods.

20%

Status: This buoy is slated for deployment for Fall 2004. Preliminary outreach efforts include contacting local commercial fishermen, recreational anglers and boaters about their information needs are preferred delivery methods. More activity will occur this summer as the time of deployment gets closer.

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%complete

- Develop outreach brochure and publication. A tri-fold color brochure and an eight-page color brochure will be designed and produced. These materials will serve as an introduction to SEACOOS and coastal ocean observing and will be distributed to potential users.

40%

Status: A draft brochure is being edited and produced by the management team with input from Outreach and Education workgroup members. This will be ready for the Spring 2004 workshop. The eight-page color brochure has transformed into a combination brochure and annual report that will do double duty as an awareness outreach product and serve as a report of Year 2 progress.

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- Assessing regional impacts of coastal observing: The known literature covering the economic and social impacts of coastal observing for the southeast region will be reviewed and compiled. Additional research will be conducted in areas of weakness.

20%

Status: Proposals for this project have been requested from NC universities. Negotiations are underway and we expect to award this contract by end of April 2004. Report must be delivered by August 2004.

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%complete

- Partner with OCEAN.US on national workshop on outreach methods for regional ocean observing projects. To advance outreach and education methodologies, a workshop for all regional observing efforts is planned to enable the cross-fertilization of practices. 25%

Status: OCEAN.US was planning a Spring 2004 outreach workshop when this particular project was included. Jack Thigpen is working to initiate such a workshop for August 2004.

Outreach & Education (cont.)

*Florida Sea Grant Outreach - P.I.s Mike Spranger and Jim Cato (FLSG)*

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- Regional outreach coordinator (Chris Simoniello) was hired to work with Florida, Georgia, South Carolina and North Carolina Sea Grant Programs in designing, developing, and implementing regional education and outreach programs and products; worked with Sandy Bernard, SECOORA Coordinator to develop case studies on use and application of ocean observation system products and services in the region; Worked with Blanche Meeson, Oceans US in regional IOOS Education Workshop; assisted in redesign of SEACOOS Community and Classroom website. 100%

Status: Regional outreach coordinator (Chris Simoniello) was hired to work with Florida, Georgia, South Carolina and North Carolina Sea Grant Programs in designing, developing, and implementing regional education and outreach programs and products; worked with Sandy Bernard, SECOORA Coordinator to develop case studies on use and application of ocean observation system products and services in the region; Worked with Blanche Meeson, Oceans US in regional IOOS Education Workshop; assisted in redesign of SEACOOS Community and Classroom website. This activity will be ongoing in Year 4 (2004-2005).

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- Florida Information meetings and development of outreach materials. Informational meetings will be held to gain an understanding of capabilities of the observation system, focus on potential uses and to identify targeted user groups. In addition, convene at least 3 in-state meetings with local community user groups and project scientists to better design the observing systems, data collection and product development to optimize usefulness to local interests and needs

100%

Status: Held more than twenty informational meetings and presentations; developed posters, displays, fact sheets, and PowerPoint presentations that provide an understanding of capabilities of ocean observation system, focusing on potential uses and targeted user groups in Florida. Developed static, three-panel display and one-page fact sheet that was used and distributed at number of meetings. See below for listing of presentations. This activity will be ongoing in Year 4 (2004-2005).

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- Determine the needs and requirements of a real-time wind, tide, and current monitoring system. Determine needs and wants of clientele groups on application of real-time observational systems in their daily activities, monitoring and communication equipment, and support personnel that might be needed to implement real-time systems. Investigate pilot project sites.

100%

Status: A planning meeting was held for Florida Sea Grant county faculty on SEACOOS in Gainesville, Florida (August 2003). These faculty provided presentations and needs assessment on SEACOOS to individual coastal advisory committees. It is planned that these faculty will continue to provide presentations on SEACOOS to their individual coastal advisory committees in 2004-05, as part of their individual plans of work. These groups will help to determine needs and wants of on application of real-time observational systems in their daily activities, monitoring and communication equipment, and support personnel that might be needed to implement real-time systems. Potential pilot project sites in their specific locales will also be explored. This activity will be ongoing in Year 4 (2004-2005).

- Contact first responders, inform them of SEACOOS objectives and potential and ask them to list services that would be the most useful from a real-time coastal observing system: Meet with the emergency managers in Florida's coastal counties brief them on SEACOOS efforts and potential assistance in their operations, obtain a comprehensive list of their needs, transform the list of needs to a practical plan of instruments and personnel to implement those needs, and develop a projected budget and timeline to implement the Emergency Management component of SEACOOS. 50%

Status: We are exploring opportunities to combine a NOAA Coastal Storms Initiative (CSI) project directed at "first responders" with the SEACOOS project. A presentation on CSI and SEACOOS was presented at the CSI work group meeting, held in Astoria, OR (October 2003). Both the CSI and SEACOOS projects were explained. A planned, combined meeting with the NOAA Coastal Storms Initiative (CSI) project directed at "first responders" was postponed until November 2004. We will also continue work with Sandy Bernard, SECOORA Coordinator who has developed a regional needs assessment and will be working with the coastal hazards community, as part of her duties. This task will be completed in Year 4 (2004-2005).

#### Publications and Presentations:

Jackson, D. SEACOOS Outreach and Education Display. Florida Association of Extension Professionals Annual Conference. Jacksonville, Florida. September 2003,

Jackson, D. SEACOOS Outreach and Education. International Boat Builders Exposition. Miami, Florida. September 2003.

Jackson, D. SEACOOS and NOAA's Coastal Storm Initiative Project: Examples of Ocean Observation Systems at Work. Coastal Storm Initiative Work Group Meeting. Astoria, Oregon, October 2003.

Merz, C. SEACOOS: Opportunities for Educators. Gulf of Mexico – Center for Ocean Science Education Excellence (COSEE) Informal Educators Workshop, December 2003, Gainesville, Florida.

Jackson, D. SEACOOS Outreach and Education Display and Presentation. 2004 Miami Boat Show, Miami, Florida. February 2004.

Jackson, D. SEACOOS Outreach and Education Display and Presentation. American Boat Builders and Boat Repairers Association's (ABBRA) and Marine Environmental Education Foundation's annual meeting. Ft. Lauderdale, Florida,

February 2004.

McGuire, M. Ocean Circulation and Ocean Observation Systems. Exploring Our Environmental Workshop. St. Augustine, Florida. March 2004.

Spranger, M. SEACOOS: A New Management Tool in Ocean Management? Coastal Zone Management Seminar. Gainesville, Florida. March 2004.

Simoniello, C. SEACOOS Instrumentation and Application. John Hopkins Middle School. St. Petersburg, Florida, March, 2004.

Simoniello, C. SEACOOS Outreach and Education Display. Oceans Day Celebration at Florida State Capitol, Tallahassee, Florida, April 2004.

Simoniello, C. SEACOOS Instrumentation and Application. Frontier Elementary School, Tarpon Springs, Florida, April 2004.

Simoniello, C. SEACOOS: A Regional Model for the Sea Grant Network. National Assembly of Sea Grant Extension Program Leaders Annual Conference. Brunswick, Georgia. April 2004.

Spranger, M. SEACOOS: New Education Opportunity for Florida Sea Grant Extension. Faculty Program Planning Meeting, Gainesville, Florida. April 2004.

Jackson, D., Spranger, M. SEACOOS: A New Integrated Research and Education Model in the Southeast United States. Display. National Sea Grant Rip Current Workshop. Jacksonville, Florida. April 2004.

Simoniello, C. SEACOOS, Ocean Circulation and Ocean Observation Systems. University of South Florida GK-12 Outreach and Education Staff Workshop. St. Petersburg, Florida, May 2004.

Simoniello, C. SEACOOS: Opportunities for Educators. Gulf of Mexico – Center for Ocean Science Education Excellence (COSEE) Summer Teachers Institute, Cedar Key, Florida, June 2004.

Simoniello, C. SEACOOS, Ocean Circulation and Ocean Observation Systems. Presentation and Facilitator. First Annual SECOORA Regional Association Meeting. Jekyll Island, Georgia, June 2004.

Simoniello, C., Spranger, M. SEACOOS: A New Tool for Educators. National Marine Educators Association Annual Conference, St. Petersburg, Florida, July 2004.

McGuire, M., Simoniello, C. SEACOOS and Ocean Observation Systems. Tour of Center for Ocean Technology, St. Johns County 4-H Youth Program. St. Petersburg, Florida, July 2004.

Simoniello, C. SEACOOS, Ocean Circulation and Ocean Observation Systems. Cutting Edge Career Planning Workshop, St. Paul, Minnesota. July 2004.

McGuire, M. SEACOOS, Ocean Circulation and Ocean Observation Systems. Florida School for the Deaf and Blind Workshop. St. Augustine, Florida. August 2004.

Simoniello, C. SEACOOS and Ocean Observation Systems: A Tool for Emergency Management Planners and Resource Managers? Georgia SEACOOS Workshop. Savannah, Georgia. August 2004.

Outreach & Education (cont.)

*South Carolina Sea Grant Outreach - P.I. Robert Bacon, SCSGC*

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<ul style="list-style-type: none"><li>• Coastal hazards extension education and technology transfer program: recruit and hire a Coastal Hazards (CH) specialist. Under the leadership of the CH Specialist, a SCSGEP/SEACOOS Coastal Hazards Outreach Advisory Committee will be formed to oversee a coastal hazards/ocean observing system outreach needs assessment, extension and communications products, and research in subsequent SEACOOS project years.</li></ul>	90%

Status: A Coastal Hazards Specialist was hired in November, 2003 and a Coastal Hazards Outreach Advisory Committee has been formed. Completed and ongoing activities associated with this effort include:

- The completion of a draft slide presentation to familiarize stakeholders with the SEACOOS efforts.
- The development of a draft Outreach web page interface for the SEACOOS web site.

- Ongoing completion of user community profile interviews to develop an assessment of stakeholder interests and needs in the COOS arena. This interview process is 100% complete on a sub-regional level (primarily SC) and is approximately 75% complete for regional expansion. Community groupings include representatives from the following sectors:
  - Weather & Climate
  - Disaster Response
  - Public Health
  - Recreation & Tourism
  - Commercial Shipping
  - Education
  - Commercial Fishing
  - Industrial
  - Financial
  - Coastal Resource Management
  - Military
  - Scientific Community (External)
- Completion of stakeholder review focus group sessions to provide feedback for ongoing SEACOOS product development efforts.
- Participation in product development and review efforts for SEACOOS Website, Integrated Wind Product, Integrated Sea Surface Temperature Product, and Modeling Product.
- Partial completion (50%) of inventory of coastal ocean observation-related assets and research in SEACOOS area.
- Partial completion (30%) of inventory of coastal ocean observation data in SEACOOS area.

Outreach & Education (cont.)

*South Carolina Sea Grant Education - "SouthEast COSEE, serving the regional education of NC, SC and GA". P.I. Lundie Spence, SCSGC*

%complete

- Develop a regional SEACOOS educational forum. 100%  
 SouthEast COSEE (NC, SC, GA) and FL with representatives from the educational and SEACOOS communities will meet to discuss SEACOOS in light of educational application. State standards will be identified and existing courses (physical science, physics, chemistry, science, biology) that could apply SEACOOS data, processes and technology. Additional "satellite" workshops will result.

Status: This regional workshop has been expanded to a national workshop. SouthEast COSEE is co-hosting with Ocean.US, NOAA/CSC and South Carolina Sea Grant Consortium-- March 22-24, 2004, held at NOAA/CSC, Charleston, SC. Over 60 participants have been invited which include people from SEACOOS and other regional COOS, data visualization experts, representatives from other COSEE sites and researchers. The two objectives are to develop a national network of COOS educators resulting in shared initiatives and ideas and to identify and review some of the best ways educators access COOS type data for inclusion into formal and free choice institutions. This partnership has resulted in leveraging SEACOOS funds with outside fundin at a 1:3 ratio. A National Report is in progress by Blanche Meeson, Education Coordinator Ocean.US.

A series of partnerships were initiated with 12 "free choice" institutions to conduct a SEPORT (South East Portals to Ocean Sciences for Teachers) Ocean Awareness Day (6 hour professional development). The objective was to develop an infrastructure by which ocean science research, such as SEACOOS. can be passed to local teachers (near the SEPORT sites). In the first year SEPORTs, the objectives were to 1) identify sites; 2) develop funding format; 3) initiate models of programs; 4) assess effort.

	%complete
<ul style="list-style-type: none"> <li>• Electronic newsletter for educators: An electronic newsletter, located on the SouthEast web site</li> </ul>	100%

Status: The first issue of "Passport to the Sea) was up loaded Jan 4, 2004 and is available on the SouthEast COSEE website. The second issue was uploaded July, 2004. The third issue will be developed fall 2004. The content of the newsletter includes SEACOOS information and events from FL COSEE as well as SouthEast COSEE. An evaluation component of the newsletter is included on the web. A 7-minute DVD video is being produced to complement the FL COSEE workshop for teachers in which they participated on a cruise to check on an instrumented PORTS buoy.

## "Passport to the Sea"

[http://www.scseagrant.org/se-cosee/newsletter/passport\\_current.htm](http://www.scseagrant.org/se-cosee/newsletter/passport_current.htm)

%complete

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- SEACOOS Education Program poster to introduce educators and students to oceanography and to SEACOOS—thus a education and awareness objective. Targeted at Middle school students, with SEACOOS, SE COSEE, FL COSEE and Gulf of Mexico COSEE, SC Sea Grant Consortium, NC Sea Grant and GA Sea Grant working together for content and distribution.

100%

Status: 5,000 copies of "Making Waves," a 36 x 24" four color poster were distributed to FL, GA, SC and NC Sea Grant programs, COSEE Directors for further distribution A web section to support the poster has been developed and submitted to Chris Callaway for uploading to the SEACOOS web site. Margaret Olsen, SECOSEE Education Specialist representing GA Sea Grant, contributed four lessons on waves. Leslie Sautter, PhD., association professor of geology, College of Charleston and PI of the SCSGC COASTeam project has contributed a sample lesson, Dances with Waves: Energy in Motion to the web site. Lundie Spence, Jennifer Jolly Clair and Terri Hathaway presented a session on Waves and SEACOOS at the National Marine Educators Association conference, Tampa, Florida, July 2004. An abstract, "Making Waves: When Scientists Works with Educators" has been submitted as a session to AGU Conference, December 13-16, 2004. Five thousand revised copies of the poster will be printed fall 2004 for extended distribution.

Outreach & Education (cont.)

### *Georgia Sea Grant Outreach - P.I. David Stooksbury*

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- Georgia Ports and Coastal Hazards. A SEACOOS Advisory Panel will be formed to provide technical and programmatic direction for the Georgia outreach initiative and help determine the needs and requirements of a real-time wind, tide, and current monitoring\ system that would greatly improve the safety and profitability of the Savannah and Brunswick Ports. The specific needs of Brunswick and Savannah Port clients for a real-time observational system will be determined.

100%

Status: A SEA-COOS advisory panel has been formed and will have its initial meeting in January 2005 in Brunswick. A meeting was held with the Georgia Ports Authority. Outside wanting to know when afternoon and evening thunderstorms would strike the ports, they have

no interest in coastal data. They look at their operations the way an airport does. They are only concerned once the ship docks at their port, they don't care how it gets there. Our results were consist with what other members of the SEA-COOS community has found in trying to interest the Georgia Ports Authority.

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- First Responder and Weather Hazard Decision Makers: The GA outreach team will meet with the emergency managers of the eleven coastal zone management counties and with Georgia Emergency Management Agency (GEMA) officials to brief the officials SEACOOS efforts and potential assistance to their offices and agencies; obtain a comprehensive list of their needs, and transform the list of needs to a practical plan of instruments and personnel to implement those needs. Then a projected budget and timeline to implement the Emergency Management component of SEACOOS will be developed.

Status: First Responder and Weather Hazard Decision Makers are scheduled to meet in the September of 2004. David Stooksbury is arranging for the inclusion of a SEACOOS awareness presentation in the agenda. Based on discussion, GEMA is still very interested in the possibilities of coastal observing systems.

*Florida Sea Grant Education*

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%complete

- A presentation will be made on SEACOOS and ocean observation systems at a Graduate Class on Ecotourism, attended by 45 students at the University of Florida (October 2003). 100%

*Florida Sea Grant Education - P.I. Paula Coble (USF)*

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- Summer Physical Science workshop: A one-week, summer Physical Science workshop will introduce SEACOOS science concepts to secondary teachers and provide them with training and resources needed to use SEACOOS data products in the classroom. Alignment with needs of teachers and state science standards will be based on feedback from regional forum activity. In addition, Florida COSEE at USF will develop a pilot program.

Status: The week long summer physical science workshop took place June 7-June 11 with five educator participants. The focus of this initiative was to bring research scientists, university level science educators, and second teachers together to develop a template for future professional development experiences. Portions of the research cruise were videotaped and video clips will be used to introduce SEACOOS science to a broad audience via the SEACOOS website. Additional footage will be used in future projects such as a SEACOOS training DVD targeting teachers. Results include development of a model-“How to Manual” for other COOS educators, and development of lesson plans to be disseminated in the “How to Manual”, on the COSEE Florida web portal, and through the SEACOOS website.

## Operations

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### University of North Carolina System

*Sarah Smith, Grants Manager, and P.I. Russ Lea, VP of Research and Sponsored Programs, University of North Carolina*

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%complete

- Financial and administrative oversight: The University of North Carolina will provide financial and administrative oversight for the project including compliance monitoring, budget management, and project coordination for governance. In year 2, systems will be developed for tracking periodic progress against project milestones. Budget management systems will also be upgraded to allow more comprehensive analysis and monitoring of the project budget and subawards. 95%

#### Financial and administrative oversight:

Subrecipients have until October 31, 2004 or December 31, 2004 to complete billings against year 2 budget allocations. Anticipated Year 2 expenditures will constitute approximately 87% of funds awarded for that period, approximately the same burn rate as Year 1. All Year 3 awards were issued prior to the end of the second program year assuring continued operations.

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%complete

- provide financial and administrative oversight for the project including compliance monitoring, budget management, and project coordination for governance. 98%

Status: All but 2 carry over requests have been reviewed and approved. Subrecipients with approved carry over have until October 31, 2004 or December 31, 2004 to complete billings against approved Year 2 carry over. Any funds unspent as of October 31<sup>st</sup> or December 31<sup>st</sup> will revert to the main SEACOOS account and will be distributed in accordance with goals and priorities adopted by the SEACOOS Executive Committee and Board of Directors

A process was formalized for the review and allocation of annual carry over funds. UNC continues to maintain and improve financial tools for the purposes of budget allocation and management at the macro level and conducts monthly drawdowns against the grant award from the Office of Naval Research.

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%complete

- Administrative Site Visits 100%

Status: The UNC Contracts and Grants Manager conducted administrative site visits with all

SEACOOS subrecipients in Year 2. The Vice President for Research attended the site visits to the Skidaway Institute of Oceanography, the University of Georgia, and the University of South Florida. Copies of the completed site visit reports, which were provided to the subrecipient PI, the subrecipient financial and/or administrative compliance specialist, Dr. Lea, Dr. Seim and the Chair of the SEACOOS Board of Directors, are attached.

UNC implemented a schedule for conducting administrative site visits with all collaborating entities that receive funding under SEACOOS. Things that are covered in the site visits include an overview of project activities to date, a review of award/contract documents, including the SEACOOS Master Agreement, discussion of institutional compliance with cost accounting standards, if applicable, OMB Circulars A-21 and A-110, assurances and certifications, reporting requirements and internal controls for the review and approval of expenditures. Formal site visit reports (see Appendix) are issued and become part of the official award file for SEACOOS.

Governance: The SEACOOS Board of directors voted to approve the amended SEACOOS Articles of Collaboration. The amended Articles of Collaboration were circulated to all collaborating institutions and facsimile approval has been received. Amendment 01 removed specific reference to “Initial Implementation” funding and to MCNC, which is no longer associated with SEACOOS. Paragraph 2 section C was amended to change reference from specific people to roles relative to the Principal Investigator and UNC Vice President for Research and removed references to specific Co-PIs. The amendments to the Articles of Collaboration are now available at:

[http://intranet.northcarolina.edu/docs/aa/research/initiatives/SEACOOS Gov Amended 11 14 03.pdf](http://intranet.northcarolina.edu/docs/aa/research/initiatives/SEACOOS_Gov_Amended_11_14_03.pdf)

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<ul style="list-style-type: none"> <li>• <i>Project management services:</i> through a subcontract to OASIS/UNC-CH provide staffing and office services support for SEACOOS Project Investigator (PI). These services would include: gathering information and creating status reports; handling day-to-day management details for the SEACOOS P.I.; coordinating conferences, meetings; facilitating partner communications; managing day-to-day office tasks (filing, answering/making calls, etc.); and expediting project-level goals and specific tasks.</li> </ul>	100%
<ul style="list-style-type: none"> <li>• UNC will administer funds for programmatic support including the recruitment of a project manager, who will oversee the day-to-day operations of the project and the continued development and enhancement of the SEA-COOS web portal.</li> </ul>	100%

Status: OASIS/UNC-CH provided staffing and office services support for SEACOOS Principal Investigator (PI) by recruiting a Project Manager (Claire Eager). Ms. Eager’s duties include expediting project-level goals and specific tasks; handling day-to-day management details for the SEACOOS COO; coordinating conferences and meetings; facilitating partner communications; technical consulting on information management and website development;

gathering information and creating status reports; maintaining a clearinghouse of materials produced bearing the SEACOOS logo; Celoxis training and functional assistance; and managing basic operations tasks.

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