

**Southeast Coastal Ocean Observing Regional Association (SECOORA):
Coordinated Monitoring, Prediction and Assessment to Support Decision-Makers Needs for
Coastal and Ocean Data and Tools**

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Award Number: NA11NOS0120033

<http://www.secoora.org>

Reporting Period: 1 June 2011 – 30 November 2011

Date submitted: 28 November 2011

Important Note on SECOORA's 1 June 2011 – 30 November 2011 Progress Report

Official notification of this award was received from NOAA on August 15, 2011, two and one-half months after the initial start of the funding period. This NOAA award is directly administered by SECOORA. After the contractual review and account establishment for the award, funding for SECOORA sub-awards were disbursed in late August and early September to subaward institutions. Due to the delay in getting sub-awards established and finalized, most of the subawardees have not expended funds from the award during the reporting period.

LONG-TERM GOALS

The long-term goal of this project is to integrate and augment existing observational, modeling, data management and education assets in the Southeast Coastal Ocean Observing Regional Association (SECOORA) domain to create an end-to-end Regional Coastal Ocean Observing System (RCOOS) in support of user-defined needs for improved coastal and ocean decision making.

OBJECTIVES

SECOORA will:

1. Ensure that stakeholder needs are met through assessment and governance mechanisms that effectively prioritize the distribution of RCOOS-related funding and other resources that are required to meet critical regional needs.
2. Coordinate and execute an operations plan for a fully instrumented RCOOS in the SE with defined service levels, commensurate with funding, that provides coordinated monitoring, assessment and prediction.
3. Maintain an observing subsystem that includes moored and coastal stations, high frequency radars (HFR), gliders and storm event monitoring subcomponents.
4. Support a multi-scale, multi-resolution modeling framework that includes shelf and estuarine circulation, estuarine and surge/inundation prediction, and user-defined modeling needs, and uses observing subsystem for verification, assimilation, and operation.
5. Build upon the SECOORA Data Management and Communication (DMAC) infrastructure to optimize existing operations, facilitate technology evolution / transfer, and address structural / project management complexities.

6. Support an education and outreach (E&O) program partnered with other RAs and marine education efforts that engages diverse education and stakeholder audiences to understand the benefits of ocean observing to society.

APPROACH AND WORK PLAN

SECOORA is a [membership](#)-based organization that seeks and invites stakeholders with interests in coastal and ocean data and information to help prioritize our activities and participate in developing stakeholder-based products. SECOORA will be responsible for overall project management. SECOORA recently transitioned to an independently operating 501(c)(3) and has implemented a strategy to acquire observations in the SECOORA domain, and support the development and implementation of predictive models and decision-making tools as identified by a broad user community. As described in the funded descope proposal, SECOORA is focusing on the following goals during Year 1 of this five-year Regional Coastal and Ocean Observing System (RCOOS) project:

1. Sustain SECOORA as a Regional Information Coordination Entity (RICE).
2. Sustain and expand a coastal and ocean observing subsystem for the Southeast (SE).
3. Support a multi-scale modeling subsystem.
4. Support the Data Management and Communication (DMAC) subsystem.
5. Support an education and outreach subsystem.

Specific approaches and key organizations in support of Year 1 goals include the following:

1. Sustain SECOORA as a Regional Information Coordination Entity (RICE)

Project management includes fiduciary oversight of all sub-awards, preparation and submission of financial and progress reports, and ensuring coordination and collaboration both among PIs within each RCOOS subcomponent and among PIs across the various RCOOS subcomponents. Sixteen PIs and 13 separate sub-awards contribute to this project necessitating a significant investment of effort for project and fiscal management, technical communications, and task coordination for effective operations. Responsibilities will be shared among the RCOOS manager (V. Subramanian), SECOORA's Executive Director (D. Hernandez), and two Program Managers (S. Sheldon and M. Treml via contract).

With Year 1 funding, SECOORA will continue to seek new members through our Web site, outreach via newsletters and direct recruitment by staff. SECOORA will also host an annual member and stakeholder meeting in Spring 2012. SECOORA will partner with stakeholders, specifically through the engagement of the South Atlantic Alliance. As opportunity allows, joint meetings will be held to solidify the relationship between the two organizations.

SECOORA will focus on facilitating the development of a Conceptual Operations Plan for a fully instrumented RCOOS with defined service levels, commensurate with funding, that provides coordinated monitoring, assessment and prediction. Hernandez and Subramanian will coordinate these efforts with ongoing IOOS efforts including the Cost Analysis Requirements Document, the National Inventory of Observation Assets, and the RA Gaps Analysis.

Additional coordination responsibilities include working closely with the Gulf of Mexico Coastal Ocean Observing System (GCOOS) in the FL region. We will continue to interact with GCOOS to ensure that messages, products, and projects are coordinated and resources are leveraged. Staff will attend NFRA, IOOS, and other RA meetings as funding allows.

2. Sustain and expand a coastal and ocean observing subsystem for the Southeast (SE)

The observing subsystem provides the basis for the RCOOS by supporting and integrating existing assets and observations specific to the development of products identified in the descope proposal. With the current funding level SECOORA is supporting the maintenance of existing systems deployed as part of pre-SECOORA programs. SECOORA is supporting the operation and maintenance of offshore moored stations, coastal stations, and HFR sites, with the caveat that assets in the SECOORA footprint have been purchased through a mix of state, research, and IOOS funding. Primary partners include the University of South Florida (B. Weisberg and C. Merz), Florida

Institute of Oceanography (J. Virmani), University of North Carolina System (L. Leonard and H. Seim), Skidaway Institute of Oceanography (D. Savidge), University of Miami (N. Shay) and the University of South Carolina (G. Voulgaris).

Each observing asset will provide near-real-time data for multiple users, and provide information required to support proposed and existing stakeholder products (e.g., those required for oil spill response, National Weather Service Marine Weather Portal, beach/shellfish water quality advisories, and search and rescue (SAR) operation surface current requests.)

3. Support a multi-scale modeling subsystem

In support of user-identified modeling needs, the modeling components funded during Year 1 include the following (primary partners):

- Regional and subregional circulation modeling (North Carolina State University, R. He)
- Forecasting of storm surge, inundation, and coastal circulation (University of Florida, P. Sheng; North Carolina State University, L. Xie)
- Species-specific habitat models that to enhance South Atlantic Fisheries Marine Council stock assessments (ROFFS, M. Roffer; University of Miami, B. Muhling; SAFMC, R. Pugliese)
- Improved models in support of issuing beach swimming advisories (University of South Carolina, D. Porter; University of Maryland, H. Kelsey).

4. Support the Data Management and Communication (DMAC) subsystem.

Key strengths of SECOORA's DMAC enterprise are the effective working relationships and collaborations fostered by the Data Management Coordinating Committee (DMCC), which is comprised of regional technical personnel responsible for operating and upgrading the data management system of SECOORA. Building on previous work, SECOORA will optimize access to regionally-aggregated data and information via a web interface that supports SECOORA's thematic priorities. Primary partners include the University of South Carolina (D. Porter), University of North Carolina at Chapel Hill (H. Seim) and the University of South Florida (B. Weisberg).

5. Support an education and outreach subsystem.

The primary focus of the education and outreach (E&O) subsystem is to engage formal and informal education audiences and stakeholders regarding observing technologies, data, products, and services. Through this subsystem, SECOORA will transition from opportunistic stakeholder engagement to a deliberate E&O engagement program designed to increase our understanding of stakeholder needs and requirements, and showcase results from investments in product development. Note that Goals 1 and 3 include outreach activities that complement and contribute to the E&O subsystem. Primary partners include Kennesaw State University (L. Adams), University of North Florida (P. Welsh), University of North Carolina System (L. Leonard), COSSEE-SE (L. Spence) and SECOORA (D. Hernandez).

WORK COMPLETED AND ASSOCIATED RESULTS

For the current reporting period, the progress to date and associated results for each respective goal are as follows:

1. Sustain SECOORA as a Regional Information Coordination Entity (RICE)

SECOORA is providing the fiscal and overall project management for this award. After receiving the award notification, 13 sub-awards to primary partner institutions were established. SECOORA has established a monthly conference call between 16 PIs to ensure coordination, collaboration among PIs within each RCOOS subcomponent and among PIs across the various RCOOS subcomponents.

2. Sustain and expand a coastal and ocean observing subsystem for the Southeast (SE)

Year 1 funds to SECOORA are supporting a continuation of a significant effort to sustain existing subregional observing networks, established previously via federal and state grants funding. While significant progress is being made via the existing SECOORA grant, progress is just ramping up on this new grant due to the delay in the receipt of funding. Specific progress and results to date include the following.

The SEAKEYS network has been operational for over 20 years and provides a long time series of observations in the Florida Keys. The instruments are mostly on a series of stationary platforms (lighthouses), the structural integrity of which has now becoming questionable due to age. SEAKEYS has seven moorings, and recently five of the seven have required servicing because of data transmission, sensor replacements, maintenance, and infrastructure issues. Year 1 funding is being utilized to support the service and maintenance of these stations. The US Coast Guard does not have plans to repair the lighthouses, but intends to sell them to non-profit entities because they are historic structures. To address the future of SEAKEYS, a meeting was held at the Keys Marine Lab in November. The user community was invited, and included representatives from NOAA/FKNMS, NOAA/NWS, NOAA/AOML, the NPS, the Ocean Reef and Gun Club (provided partial funding for the Carysfort Reef buoy), and FIO. The meeting will be summarized and the summary will be available in December.

The University of Miami operates HF-radar installations on Key Biscayne, Virginia Key and Dania Beach. These radars are estimating significant wave heights for the National Weather Service marine forecast models and provide mean radials at hourly intervals to the US National Network archive maintained by the Scripps Institution.

The University of North Carolina Chapel Hill operates two CODAR-radar installations on the Outer Banks of North Carolina. Both systems collected observations throughout Hurricane Irene, which relied on generator power at the Buxton installation. Hourly vector maps are delivered to SECOORA web site, and has continued throughout the time period with limited blackouts. Operation throughout Hurricane Irene's passage up the coast was a major accomplishment.

Skidaway Institute of Oceanography operates two WERA HF-radars on St. Catherine's Island and Jekyll Island GA. These radars measure surface ocean current vector velocities at half hourly intervals, which are being continuously provided to the national archive in near-real time. Estimates of wave and wind parameters are also made, as experimental products.

The University of South Carolina is funded to operate one WERA HF-radar with the objective of providing surface current velocities. The USC existing radar system was removed from Pritchards Island, SC due to severe beach erosion that undermined the Rx and Tx antennas. USC is tasked with finding a new location for the installation of the system that enhances coverage in the SECOORA region. This reporting period all efforts have been focused on system refurbishment and securing a new location.

3. Support a multi-scale modeling subsystem

The North Carolina State University-enhanced South Atlantic Bight Gulf of Mexico (SABGOM) model is being run on 24/7-basis, providing 3-D regional ocean predictions. The model output (temperature, salinity and currents) is made available via SECOORA web site <http://secoora.org/models/>.

The North Carolina State University is also establishing a real-time coastal ocean forecasting system for the Florida to North Carolina domain. The coastal atmospheric forecasting system is based on the Weather Research and Forecast (WRF) –ARW model configured for 3 nested domains. The outer-most domain covers the entire North Atlantic basin with a grid size of 30 km; the center nest covers the southeast coastal region with a grid size of 12 km; and the inner domain covers the coastal areas from Florida to North Carolina with 4 km grids. This nested grid system is complemented by a moving nest system when tropical cyclones are reported by the National Hurricane Center. The moving nest is embedded within the outer domain covering the surroundings of a moving tropical system with a grid size of 12 km; and the inner nest cover a moving tropical system with a grid size of 4 km. The Atlantic forecasting system and the moving nested domain system have been tested in real-time during Hurricane Irene (http://cdf.l.meas.ncsu.edu/research/TCIrene_2011.html). The forecasts are shared with SECOORA community through SECOORA newsletters.

The University of Florida is establishing a forecasting system with two domains in Florida running a CH3D-based storm surge and inundation modeling system (CH3D-SSMS) using a 2D version of CH3D model and is developing data standards and metadata to facilitate data exchange between UF, NCSU and end users. To address issues with data standards and metadata, UF is analyzing their experience with the NOAA-funded IOOS Test bed for which a set of data standards were developed based on existing Climate and Forecast (CF) conventions. In support of these efforts, a THREDDS server was established at the UF to facilitate data exchange. An existing CH3D-SSMS modeling system setup is being modified to adhere to the needs of the forecasting system that will be developed for SECOORA.

In partnership with the South Carolina Department of Health and Environmental Control (SCDHEC), the University of South Carolina and the University of Maryland are enhancing a user-requested application for prediction and analysis of a public health concern; i.e. primary contact to bacterial-laden swimming waters. CART and Linear Regression Models were developed for the SCDHEC Beach Monitoring program. Previously these models were manually driven in an Excel Spreadsheet by entering the required data. An automated system has been developed to take the new models, retrieve the data, and execute the prediction tests. The automated system is scheduled to run once a day at 6:00am or upon user request and consists of two main parts: 1) Data retrieval - The prediction system uses observational data from the SECOORA database, NEXRAD precipitation data downloaded and processed from the Southeast River Forecast Center and NOS Tide Data downloaded and processed from the NOS website, and; 2) Product output – An email of the test results and map output is made available to SCDHEC users (<http://rcoos.org/wqportlet/>). A mobile component is also in development to allow SCDHEC users access to the results via smartphones.

4. Support the Data Management and Communication (DMAC) subsystem

The SECOORA DMAC has established partnerships with the Sanibel-Captiva Conservation Foundation (SCCF) River, Estuary and Coastal Observing and FLDEP Networks to include data ingestion from water quality and water level platform stations. The DMAC is also supporting real-time delivery of COMPS in-situ observations data available in SECOORA netCDF format on the OpenDAP server.

DMAC has also improved the data query and data comparison pages to allow emailing a link to query results (for possibly longer query runs) and crosstab (timestamp, variable list) view and CSV download of platform data or comparison data. User requested enhancements to the “recent high winds/waves event map” were completed.

DMAC members participated on an IOOS Office team to draft a plan to create a Sustainable QA/QC Program modeled after QARTOD as a funded and working entity within IOOS. The team has received IOOS Office approval to develop a project plan. In support of maintaining the data portal, DMAC continues to provide WFS, WMS, and DODS web services and the initial steps have been taken to develop the next phase of the asset inventory.

DMAC members are participating in IOOS DMAC monthly calls and have initiated discussions with SECOORA and GCOOS for the provision of redundant services.

5. Support an education and outreach subsystem

The E&O team met with the KSU Biology Education Coordinator to plan and develop the aquatic observatory unit scheduled for the Spring 2012 Teaching Practicum Course for the MAT students. A partnership with the Chattahoochee Nature Center (CNC) was established. The CNC has agreed to host pre-service teachers on site to deploy the BOB unit. The team was also successful in leveraging equipment support for the MAT proposed observatory unit through the KSU MAT and Biology Education acquisition of 6 Pasco data-loggers and water quality sensor kits (approximate value of \$4,500) that will be used for the MAT Observatory unit as well as KSU MAT and Biology Education Courses. The team continued to sustain the Hilton Head BOB Monitoring station at Jarvis Creek, located at the Coastal Discovery Museum in Hilton Head Island. The team also reviewed the BOB Ocean Explorer Experience with the Smithsonian Marine Station, which entailed reviewing problems with BOB and reflecting on improvements for further deployments and assisted the FL Smithsonian Marine Station with expanding their BOB program. Work is in progress on 2012 Education and Research: Testing Hypotheses (EARTH) workshop with MBARI and SECOORA.

Two versions of the Advanced BOB buoys have been deployed to the GTMNERR at separate sites, one in the Guana River estuary and another in the Guana Lake Wildlife Management Area (WMA) managed with different ecological goals, namely conservation and wildlife habitat respectively. One of the buoys (RABOB) was removed for repair and to be replaced by a newer version of the RABOB, but slow progress has left a long data gap at the Guana Lake WMA Station. Data from the two sites is being quality controlled for submission to the SECOORA BOB data archive. The E&O team hosted the Fourth SECOORA BOB Workshop, which was held at the University of North Florida Student Union on 16 September 2011. A preliminary draft of elementary lessons and introduction to the BOB program as a vehicle for inquiry, STEM and creativity have been outlined. A plan on how to introduce the BOB concepts into elementary schools is underway. The draft has been given to participating teachers in two Charleston County schools that are currently involved with the COSEE SE's South Carolina Amazing Coast and review of the document by teachers is in progress.

IMPACT AND APPLICATIONS and TRANSITIONS

The coastal and ocean data monitoring and associated models and decision-support tools supported by SECOORA are all being collected/developed to address specific user-described needs relevant to all four of the NOPP evaluation factors. Monitoring data are used by federal, state and local municipalities for a wide range of applications including weather forecasting, water quality predictions, and search and rescue. Developed models are being used by federal and state agencies to support coastal evacuation orders, issuance of beach swimming advisories and rip tide advisories, and fisheries management. SECOORA has partnered with private industry to support the development of commercial products related to commercial and recreational fishing. Outreach and education efforts are being transitioned to K-12 and college/university programs.

RELATED PROJECTS

SECOORA was a lead PI on a proposal submitted to NOAA in December 2010 in support of the Governors' South Atlantic Alliance. A revised proposal was submitted during this reporting period and SECOORA has been notified that the proposal will be funded pending funding availability.

PUBLICATIONS AND PRESENTATIONS

Savidge, D. K., J. A. Amft, A.E. Gargett, M. Archer, D. Conley, G. Voulgaris, L. Wyatt, K.-W. Gurgel (2011), Assessment of WERA Long-Range HF-radar performance from the User's Perspective, Proceedings on the IEEE/OES/CWTM 10th Working Conference on Current Measurement Technology, pp. 31-38.

Voulgaris, G. 2011. VHF Radar Measurements of Waves and Currents in the Nearshore Region. Third Workshop on Remote Ocean Sensing (ROS 2011).

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Gurgel, K.-W., T. Schlick, J. Seemann, F. Ziemer and G. Voulgaris, 2011. HF Radar observations in the German Bight: measurements and quality control. Current, Waves and Turbulence Measurements (CWTM), IEEE/OES 10th Working Conference on., 20-23 March, 2011, pp 57-65 ISBN: 978-1-4577-0022-4.

Porter, D.E., H. Kelsey, S. Berry, S. Torres, D. Ramage, G. Scott and V. Shervette. 2011. Beach swimming advisory prediction tools using beach monitoring, remote sensing and coastal and ocean observing data. Coastal and Estuarine Research Federation 2011: Societies, Estuaries and Coasts Adapting to Change. Daytona Beach, FL. November 2011.

Scott, G., D.E. Porter, H. Scott, L. Wickliffe, F. Holland, A. Blair and M. Reiter. 2011. Integrating risk assessment of environmental stressors with impacts on ecosystem services and human health. Coastal and Estuarine Research Federation 2011: Societies, Estuaries and Coasts Adapting to Change. Daytona Beach, FL. November 2011.

Leonard, L., J. Dorton, D. Porter and M. Fletcher. 2011. Coastal ocean observing in the Carolinas. Coastal and Estuarine Research Federation 2011: Societies, Estuaries and Coasts Adapting to Change. Daytona Beach, FL. November 2011.

Adams, L. G. and G. I. Matsumoto. 2011. The Benefits and Challenges of Using Real-Time Data in the Classroom: Perspectives From the Students, Educators, and Researchers. *Marine Technology Society Journal*, (45) 5: 55–58.

Levin, D., Spence, L. and L.G. Adams. 2011. Students monitoring coastal and inland waters with the Basic Observation Buoy (BOB). *Marine Technology Society Journal*.

OUTREACH MATERIALS

Numerous outreach materials have been developed for specific audiences and are available at www.secoora.org.