FY2007: Regional Integrated Ocean Observing System Development

NOAA initiated a competitive funding process in 2007 to continue building capacity for regional ocean observing systems towards three long-term outcomes; establishing coordinated regional observing and data management infrastructure, developing applications and products for regional stakeholders, and establishing regional and national data management and communications protocols. These projects are contributing to these outcomes.

SOUTHEAST ATLANTIC REGION

The Southeast Atlantic Region includes the coastal states from North Carolina to Florida. Five awards were made to three organizations totaling $3,245,000.

Project Title:

Enhancing the Regional Coastal Observing System in the Southeastern United States

Recipient/ Lead Principal Investigator:

University of North Carolina at Chapel Hill/ Dr. Harvey Seim (*seimh@email.unc.edu*)

Cost:

Funded: $750,000

Performance:

This effort is intended to lead to the development of a region-wide coastal ocean observing system (RCOOS) in the southeast. In addition to integrating observing system elements into a regional network, the formal program management structure for engaging RCOOS partners and information users through the Southeast Coastal Ocean Observing System Regional Association will be established. In this one-year program, a prototype end-to-end RCOOS will be developed that builds from existing and recently-funded programs in the region and their associated observing, modeling, information management and outreach/ education efforts and coordinates with elements of the federal observing system. The work plan will also support, to the maximum extent possible, the ongoing operation of the four high frequency radar systems to ensure the broadest depiction of the region's coastal circulation as presently feasible for the Southeast.

Schedule:

- Establish program management between SECOORA governance and management of the RCOOS. Committees to be formed include Operations and Maintenance, Data Management and Interoperability, and a Science Advisory Committee.
- Incorporate additional data providers into the Ocean Data Partnership and develop/adapt the procedures required to aggregate their databases into user-targeted information products.
- Adopt a set of standards within the broader SECOORA ODP community, insuring that is it consistent with standards adopted within the IOOS community.
- Maintain four shore-based HF radar systems for surface current mapping (West Florida Shelf, North Carolina, southeast Florida, and at the Georgia/South Carolina border).

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Project Title:

Integration of Coastal Observations and Assets in the Carolinas in Support of Regional Coastal Ocean Observation System Development in the Southeast Atlantic

Recipient/ Lead Principal Investigator:

University of North Carolina at Wilmington/ Dr. Lynn Leonard (*lynnl@uncw.edu*)

Cost:

Funded: $1,200,000
Proposed (subject to available funds): Year 2 – $2,997,069; Year 3 – $3,001,575

Performance:

This project will focus on the integration of existing assets and observations specific to the development of wave, water quality, and public health safety products in the Carolinas coastal region. Investigators will support and use a subset of existing platforms currently operated by academic and federal entities and eventually install two new wind, wave and current monitoring stations in the North Carolina Pamlico and Albemarle Sounds and two additional coastal wave stations off the outer banks. Initially, the work will focus on core variables and observations needed to support weather and rip current forecasting as well as US Army Corps of Engineers process modeling. Investigators will use existing environmental data and adapt selected NOAA National Estuarine Research Reserves non-real time stations to real-time in support of environmental modeling applications and development of estuarine water quality standards. In addition, they will evaluate the use of these integrated water quality observations in support of predictive modeling of *Enterococcus* concentrations at public beaches in Long Bay. Since most of the data collection infrastructure is in place, this project is immediately executable and creates a test bed to evaluate observing system design criteria, such as the ability of a system to directly support specific user-driven application needs, as put forth by the Southeast Coastal Ocean Observing Regional Association.

Schedule:

1. Maintain and enhance observing system.
    - Years 1 – 3: Maintain inner-shelf and nearshore monitoring stations.
    - Years 1 – 3: Provide operational data streams for existing USACE stations.
    - Years 1 – 2: Upgrade NERR stations to real time.
    - Years 1 – 2: Deploy Pamlico and Albemarle Sound observing stations.
    - Years 2 – 3: Deploy two additional coastal wave/current stations.

2. Support data analysis and modeling for USACE coastal process model skill assessments.
    - Year 1: Develop prototype validations module linkage to RCOOS archive.
    - Year 2: Demonstrate RCOOS-wide wave/current validation.
    - Year 3: Deliver fully operational RCOOS-wide validation module.

3. Support data analysis and modeling for nearshore forecasting system.
    - Years 1 – 3: Develop Surf Conditions Nowcasting System (SCNS).
    - Years 2 – 3: Evaluate Simulated WAve NearShore (SWAN) model as an approach to forecast wave conditions in Long Bay.
    - Year 3: Integrate SCNS with model wave forecasts.

4. Develop improved water quality information products.
    - Years 1 – 3: Assess, assimilate and disseminate water quality information.

- Years 2 – 3: Support development of estuarine nutrient standards.
- Years 2 – 3: Develop approach to provide South Carolina Department of Health and Environmental Control near-real-time access to relevant variables for use in statistical models for beach closures.

5. Ensure delivery of high-quality, DMAC-compliant data and products in a timely fashion.
   - Years 1 – 3: Optimize and ensure access to near-real-time, delayed mode, and model output data via web browser.
   - Years 2 – 3: Develop rigorous procedures for assessment of real-time data and relay information to users.
   - Years 2 – 3: Integrate standards and processess with other SECOORA data management activities.

6. Assessment of system design and products.
   - Years 1 – 3: Assess system function.
   - Year 3: Verify model improvement.
   - Year 3: Assess Surf Conditions Nowcasting System.

7. Engage regional partners, stakeholders, and end-users to implement a sustainable RCOOS.
   - Years 1 – 3: Conduct public outreach.
   - Years 2 – 3: Develop standards-based curriculum materials for SECOORA.
   - Year 3: Develop standards-based visualization tools for SECOORA.

Project Title:

A Regional Storm Surge and Inundation Model Test Bed for the Southeast Coastal Ocean Observing System Regional Association

Recipient/ Lead Principal Investigator:

University of Florida/ Dr. Peter Sheng (*pete@coastal.ufl.edu*)

Cost:

Funded: $500,000
Proposed (subject to available funds): Year 2 – $500,000; Year 3 – $500,000

Performance:

Using a community-based approach and working with the National Weather Service, Federal Emergency Management Agency and state and county departments of Emergency Management, this project will conduct a comprehensive validation and comparative study of four leading storm surge and inundation models developed by the academic community. The goals of this project are to enhance the storm surge and inundation modeling capabilities, establish common standards for storm surge and inundation modeling, bridge the gap between the leading academic storm surge modelers and the operational agencies, and potentially improve maps of inundation, e.g. the SLOSH surge atlas and Flood Insurance Rate Maps (FIRMs), for enhanced emergency planning and management.

Schedule:

Year 1:

- Establish a panel of experts and users from to produce a set of objective protocols and criteria for model-data and model-model comparisons.
- Produce an updated inventory of storm surge, wave, and inundation modeling activities.
- Identify the major products (e.g., SLOSH surge atlas, FIRMs, and inundation maps) produced by NWS and FEMA and used by Emergency Managers and determine possible enhancements.
- Develop a common data framework, and design realistic test problems with archived field and analytic data, for model-data comparison and inter-comparison of storm surge and inundation models while leveraging current advances in DMAC and Marine Metadata Interoperability (MMI).
- Develop a set of common model quality and performance standards for all surge, wave, and inundation models to be used in the region.
- Select past hurricanes for model validation and inter-comparison, gather and store data in a Storm Archive, as part of a virtual computing "Grid" that will leverage and build upon a Virtual Grid.

Year 2:

- Conduct simulations of selected hurricanes.
- Compare model results to data and with each other in terms of a number of model variables and skill assessment methods and to determine if these models meet existing federal standards.
- Determine the sensitivity of models' skills to model attributes, coefficients, and input data
- Using the four storm surge models and the Sea, Lake and Overland Surges from Hurricanes (SLOSH) model, produce and compare a surge atlas for a coastal region in FL and NC, following the method used to produce SLOSH surge atlas.
- Determine the sensitivity of a surge atlas to various model attributes and input data and improve the storm surge and inundation models if necessary.
- Working with NWS and Emergency Managers, recommend ways to potentially enhance the SLOSH surge atlas or produce ensemble surge atlas.

Year 3:

- Conduct ensemble model runs for a coastal region in FL and NC, following the FEMA method for producing FIRMs for a 100-yr storm.
- Provide the results from the four storm surge models to FEMA and produce FIRMs for inter-comparison and comparison with the FEMA FIRM.
- Identify the sensitivity of FIRMs to various model features and input data.
- Working with FEMA, identify ways to enhance their FIRMs.
- Using the four models, produce real-time inundation maps for a coastal region during a hurricane, and compare them with the corresponding SLOSH surge atlas.
- Using the model comparison results, develop "best practice" guidelines for optimal application of storm surge models.

Project Title:

A Prototype Operational Modeling System for Waves, Coastal Currents, Inundation and Hydrologic Flooding for Eastern North Carolina

Recipient/ Lead Principal Investigator:

University of North Carolina at Chapel Hill/ Dr. Richard Luettich (*rick_luettich@unc.edu*)

Cost:

Funded: $500,000
Proposed (subject to available funds): Year 2 – $499,924; Year 3 – $1,499,573

Performance:

This project will develop a modular, integrated modeling system that provides 24/7/365 forecasts of waves, storm surge, inundation, coastal circulation, and hydrologic runoff for Eastern North Carolina, a region highly susceptible to catastrophic impacts of severe coastal weather. Resultant data and products will be developed using ensemble-based procedures and routinely evaluated against extensive existing in-situ observations. The overall goal is to demonstrate the relevance to regional stakeholders of an operational watershed-to-coastal ocean modeling system that provides information on offshore and nearshore wave conditions, information to assess rip current threats, regional wave and current conditions in high traffic areas such as tidal inlets, nearshore currents for search and rescue operations, and inundation data associated with coastal storm surge and hydrologic runoff. Information will be transmitted in compatible formats to three regional National Weather Service Forecast Offices the to the U.S. Coast Guard (USCG) to be applied during moderate conditions and severe storms for use in marine forecasts, search and rescue operations, decision-making by emergency managers, and the U.S. Army Corps of Engineers for evaluating near shore sediment transport budgets.

Schedule:

Year 1:

- Develop and refine model domains and associated data bases.
- Implement quasi-operational, 24/7/365 high-resolution coupled wave-current model and develop data streams to distribute output to WFOs and to USCG.
- Ingest regional IOOS observational data streams and develop skill assessment scheme.
- Evaluate strategies for establishing boundary conditions at the dynamic interface between the hydrologic and coastal models; determine the type and spatial/temporal frequency of shared information.
- Develop initial project web site.
- Conduct annual survey/workshop with users to document and discuss feedback on product value and provide tech transfer.

Year 2:

- Develop storm suite to be used for ensemble modeling of tropical cyclones.
- Implement methodology to blend 24/7/365 model runs with event-based tropical cyclone ensemble forcing.
- Evaluate model skill including development of methodology for directional wave spectra.
- Implement initial coupling of hydrologic and coastal models in quasi-operational job stream.
- Expand web site based on user feed back and to provide OpenDAP based data products.
- Pursue distribution of data to alternate partners.

- Conduct annual survey/workshop with users to document and discuss feedback on product value and provide tech transfer.

Year 3:

- Evaluate and pursue coupled system enhancements based on user feedback.
- Validate coupled modeling system against historical data (e.g., Hurricane Floyd).
- Continue evaluation of system wide model skill.
- Develop classroom education material.
- Conduct annual survey/workshop with users to document and discuss feedback on product value and provide tech transfer.

Project Title:

Expansion of the Carolinas Coast Marine Weather Template within the SECOORA Region

Recipient/ Lead Principal Investigator:

University of North Carolina at Wilmington/ Dr. Jennifer Dorton (*dortonj@uncw.edu*)

Cost:

Funded: $295,504
Proposed (subject to available funds): Year 2 – $285,042

Performance:

Investigators will work with NOAA's National Weather Service (NWS) – Southern Region Headquarters and Weather Forecast Offices (WFOs) to expand the NWS's experimental Carolinas Coast marine portal (*www.weather.gov/carolinascoast*) into Florida, thereby creating a standardized Southeast Marine Weather Portal that covers the entire Southeast Coastal Ocean Observing Regional Association (SECOORA) domain. The goals of this proposal are to provide 24/7 access to critical marine information for the commercial and recreational marine communities within the SECOORA region; and, to support the transfer of the developed information technology product to WFOs with marine forecasting responsibilities. Primary objectives are : 1) expand the Carolinas Coast template into Florida; 2) provide data management capabilities to ensure 24/7 marine weather portal accessibility; 3) develop appropriate documentation and provide workshops to ensure the transfer of the marine weather portal over to the NWS; and, 4) provide outreach within the SECOORA region to inform the NWS-WFO constituents and other identified marine organizations and individuals about the improved NWS marine weather information portal.

Schedule:

Year 1:

- Expand Carolinas Coast marine weather template throughout Georgia and Florida and rename as the Southeast Marine Weather Portal.
- Develop hardware, software, and communications redundancy as part of the data management protocol to ensure 24/7 access (University of South Carolina and University of South Florida will each install and maintain synchronized application and database servers).

Year 2:

- Develop appropriate protocol and documentation in support of transfer and implementation of the developed technology to NWS forecasting and to information technology staff in the Southern Region.
- SECOORA and NWS outreach personnel will inform the NWS community including NSW/WFO constituents and other marine organizations about the improved NWS marine weather information portal.

NOAA Contacts:

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