

SUPPORTING REGIONAL COASTAL AND OCEAN MANAGERS: LINKING OCEAN OBSERVING TOOLS AND CAPABILITIES TO THE PRIORITY NEEDS OF MANAGERS AND USERS IN THE SOUTHEAST REGION

Hernandez, Debra*, Southeast Coastal Ocean Observing Regional Association
Sheldon, Susannah, Southeast Coastal Ocean Observing Regional Association

Ocean observing has been recognized by the US Commission on Ocean Policy, the Ocean Research and Resources Advisory Panel, the Joint Ocean Commission Initiative, and many other ocean policy entities and initiatives as foundational to meeting the nation's need for more effective coastal and ocean management. The Interim Report of the Interagency Task Force on Ocean Policy (September 2009) has called for strengthening the nation's capacity for observing the nation's ocean, coastal, and Great Lakes systems.

President Obama signed the Integrated Coastal and Ocean Observing System Act into law on March 30, 2009. Congress and the Administration recognize the importance of observing to accomplishing critical national objectives of national security, maritime safety, economic prosperity, and environmental sustainability. The Act provides a renewed impetus and a requirement to fully realize the vision of an integrated observing system. This system must be driven by the needs of stakeholders and be able to provide sustained real-time data and information. Benefits accrue to such diverse issues as climate change, coastal inundation, ocean acidification, renewable offshore energy, ecosystem-based management, marine transportation, and marine search and rescue.

The ocean and coastal waters of the southeastern United States help drive the local weather and climate, support ecologically and economically significant fisheries, and provide tourism, boating, and other recreational opportunities. The oceans and coasts in the region annually provide over \$700 billion dollars worth of impact to the regional economy. Yet, monitoring such an expansive area is a difficult task. SECOORA, the Southeast Coastal Ocean Observing Regional Association, is the regional solution to integrate extensive and widely scattered information and data being collected in the area. SECOORA coordinates coastal and ocean observing activities and facilitates dialogue with the public, local, state, and federal agencies, and public and private sector interests so that the benefits from the sustained operation of a coastal and ocean observing system can be realized. The Regional Association (RA) coalesces the significant efforts of academia, industry, government agencies, and NGOs, many of which are data and information providers and users. SECOORA's commitment to providing the most reliable marine data and information will ensure protection of people and property, a healthy marine economy, and sustainable natural coastal and ocean resources.

SECOORA is one of 11 RAs established nationwide through the NOAA Integrated Ocean Observing System (IOOS) and coordinated through the National Federation of Regional Associations for Coastal and Ocean Observing (NFRA). IOOS coordinates the multi-agency, cooperative effort to routinely collect real-time data and manage historical information based on a continuously operating network of buoys, ships, satellites, underwater vehicles, and other platforms. These data are needed for many purposes which include rapid detection and prediction of changes in our nation's ocean and coastal waters.

SECOORA's vision is to:

Protect people by providing comprehensive information and tools on:

- Weather, wind, current, and wave conditions for improved safety of marine operations;
- Inundation from storms and sea level rise to inform coastal communities and inhabitants of the risks to lives and property; and
- Pathogen and rip-currents to support beach users and communities.

Conserve our marine environment by providing ocean current, wind, and ecosystem condition information:

- to support Coastal and Marine Spatial Planning for improved ecosystem-based management;
- to predict location and movement of contaminants for better preparation and response; and
- to determine the best locations, from sea surface to seafloor, for renewable ocean energy, marine protected areas, and other offshore operations and activities.

Enhance our coastal economy by providing information and models:

- to facilitate more effective decision-making regarding commercial and recreational fisheries;
- for predicting acute and chronic beach and shoreline change affected by climate change and high energy events, such as storms and hurricanes; and
- to support tourism, offshore energy, and shipping industries.

Stakeholder needs assessment reviews revealed several themes that are reiterated, including: climate change and its impacts on habitats and sea level, marine weather and operations, and ecosystem management including fisheries and water quality. Another important expression of regional priorities is the one articulated by the newly formed Governors' South Atlantic Alliance. The Alliance has identified their four initial priorities as healthy ecosystems, working waterfronts, clean coastal and ocean waters, and disaster-resilient communities. These priorities are incorporated into SECOORA's themes: ecosystems, coastal hazards, marine operations, and climate change. The RAs priorities also align closely with the priorities of the other ten Regional Associations.

SECOORA members are working with a wide range of users in North Carolina, South Carolina, Georgia and Florida to deliver data and information to protect lives and property. This includes using high frequency radar to inform search and rescue operations, providing models and data that support harmful algae blooms and inundation forecasts, and utilizing real-time wind, wave and water level data to improve the safety of mariners throughout the region. This paper explores the capabilities of various observing platforms and makes recommendations for how these capabilities can be strengthened in the future through better connections with coastal managers and other end users. SECOORA participating members contribute to IOOS implementation in multiple ways. This region has long been a leader in ocean data management and communication (DMAC) activities, high frequency WERA coastal current radar research, locally run buoy-based research systems, estuarine nutrient enrichment and harmful algal bloom (HAB) research, high resolution coupled ocean-atmosphere modeling and wave research, and inundation models. Many SECOORA member projects are being conducted on a small, or pilot scale, that need to be expanded region-wide. For instance, expanding the buoy networks at the U.S. Weather Research Program recommended spacing of 100 km intervals in the South Atlantic Bight from Cape Hatteras to Miami would require 20 more buoys, which cost approximately \$200,000 dollars each, \$2.3 million more than SECOORA's entire FY10 IOOS funding. Similarly, tracking pathogens on our extensive beachfront is ongoing as a separate local project, but needs regional expansion to improve protection of public safety. Tracking the excessive nutrients from eutrophic rivers into our estuaries, and the harmful algal blooms they enable in our coastal ocean, should be closely tracked region-wide before another public health hazard occurs. SECOORA needs to continue to do these things at the larger scale.

One of SECOORA's priorities deals with ecosystems, living marine resources, and water quality. The Long Bay region of South Carolina, just off Myrtle Beach, realized an unprecedented flounder catch in 2004. This led to the discovery that low oxygen levels created a "dead-zone" that prompted fish to move toward the shoreline. This led to the formation of a working group, comprised of South Carolina resource managers and scientists, to understand what led to the hypoxic conditions. The goal of this effort is to develop tools for use in forecasting future hypoxic events in the Long Bay area. Working group members are researching several aspects of the event, including: marine and terrestrial factors that may affect oxygen levels in the bay, possible circulation scenarios under which low oxygen may result, surface and bottom-dissolved oxygen levels, and groundwater discharges that may contribute to the levels. These efforts will assist resource managers in identifying threshold conditions of future hypoxic events, an issue identified by state coastal zone managers as critically important.

A second of the RAs priorities is coastal hazards. Coastal hazards come in many varieties in the southeast, with the most significant being hurricanes. SECOORA will focus on two specific threats to the safety of coastal residents and visitors, inundation associated with storms and rip currents. Resilient coastal communities know their risks from inundation and have implemented measures to mitigate those risks. Improving the resilience of coastal communities is identified as a priority for the Governors South Atlantic Alliance as well as many other federal and state agencies. SECOORA's role in addressing resiliency rests with its modeling expertise, data management capability, and experience in operating observing platforms to provide community-level data necessary to improve the accuracy of inundation models.

The Digital Hurricane Consortium (DHC, www.digitalhurricane.org) is an umbrella organization, which includes academic SECOORA members in the southeast U.S. and Gulf of Mexico, focusing on tropical meteorology, wind

engineering, coastal engineering and surface hydrology research. These programs conduct experiments at hurricane landfall to collect wind, storm surge, wave, precipitation and damage data. The DHC umbrella provides coordination of the programs, which historically operated independently, at landfall. The DHC partners with the USGS and NOAA, and receives oversight from the non-profit Applied Technology Council.

The Consortium seeks to:

- coordinate the collection and analysis of wind, surge, wave and damage data acquired from mobile platforms and teams of research personnel through the development of pre-planned strategies that adapt to size of the wind field, hurricane track and intensity, coastal geography, risk of flooding, etc.;
- catalyze remote sensing of hurricane winds through real-time production of multi-Doppler radar generated velocity fields to create instantaneous situational awareness about the structure and intensity of the hurricane over the most heavily impacted areas; and
- operationalize data collection and analysis to assist decision makers. Our nation's ability to determine the severity of and the appropriate response to a hurricane impact is based on the how quickly actionable information can be relayed to public and private decision makers at the local, state and national levels, yet as of today only a small fraction of the data collected during field experiments is made available

Finally, a third priority examines safe and efficient marine operations. As a part of this, SECOORA has highlighted offshore wind energy. The Southeastern U.S. states currently have active "nontraditional" offshore initiatives. These include natural gas pipelines, potentially will include new drilling for hydrocarbons, and also involve "alternative" efforts to harness wind and currents in offshore areas with the potential to make contributions to our nation's energy options. SECOORA has the expertise to effectively investigate and provide monitoring data to support these initiatives. At a recent southeast Marine Spatial Planning workshop hosted by The Nature Conservancy and SECOORA, offshore energy was identified as a regional issue that would benefit from a marine spatial planning process. Through active partnerships with state Departments of Energy, state and local permitting authorities, industry, and other stakeholders, SECOORA can provide a network of expertise to support investigation, installation, and monitoring of offshore energy projects.

The University of North Carolina at Chapel Hill recently completed a 9-month study for the N.C. General Assembly to assess the feasibility of installing wind turbines in the sounds and off the coast of North Carolina. This study confirms that, because of a promising wind resource, large areas offshore of the North Carolina coastline are potentially well-suited for wind energy development and worthy of further investigation. A pilot project that builds on the study has just been announced, and UNC and Duke Energy have signed a contract to place up to three demonstration wind turbines in the Pamlico Sound.

Currently, approximately 200 coastal ocean observing platforms are supported in the SECOORA region. These include coastal HFR sites, offshore buoys, gliders, drifters, coastal water quality stations, and weather stations. The vast majority of these platforms are marine weather stations as opposed to ocean observing platforms, leaving significant areas of the region without buoys to provide basic information on ocean conditions. SECOORA also includes data management, regional modeling, and remote sensing components. Capabilities, including multiple gliders and moored buoys, exist in the region but bridging the science to management gap and exploring how to strengthen capabilities will allow more efficient use of the data and information collected in the southeast.

Susannah Sheldon
Southeast Coastal Ocean Observing Regional Association (SECOORA)
Post Office Box 1045
Johns Island, SC 29457
Ph (843) 696-6837
Fax (843) 737-5200
susannah@secoora.org