

#### **1.0 Introduction**

The Southeast Coastal Ocean Observing Regional Association (SECOORA) is implementing a cohesive Regional Coastal Ocean Observing System (RCOOS) for the southeast US as a regional 501(c)(3) partner in the US Integrated Ocean Observing System (US IOOS<sup>®</sup>).

The Southeast (SE) coastal region is vulnerable to hurricane hazards, potential impacts from oil spills, and climate change because of low land elevations, corals and other critical habitats, and our location at the transition of tropical to subtropical latitudes.

SECOORA has established a robust data management subsystem that integrates data from variety of coastal ocean and estuarine observing and monitoring programs and delivers marine weather and other information products via SECOORA's website and data portal (http://secoora.org/maps).

### 2.0 SECOORA Regional Coastal Ocean Observing System

SECOORA is one of 11 Regional Associations established nationwide through the Integrated Ocean Observing System (IOOS<sup>®</sup>). The SECOORA region (Fig. 1) encompasses four states spanning the coastal ocean from North Carolina to the west coast of Florida. The SECOORA region is linked through large-scale circulation patterns. The western boundary current (WBC) of the North Atlantic, comprised of the Loop Current/Florida Current/Gulf Stream system (Fig. 2), interacts strongly with coastal waters, intimately coupling the SECOORA region to global circulation patterns. Rivers and estuaries in the SE connect the watersheds of the southern Appalachian mountains to the coastal waters. These varied riverine and estuarine systems, from broad lagoons to denditric marsh systems with large tidal ranges, also are influenced by shelf processes and establish a strong connectivity between the land and the sea. Strong atmospheric frontal passages and surface winds produced by tropical storms impact ocean circulation in the Gulf and eastern seaboard, and induce upwelling/downwelling regimes in the SECOORA footprint that affect the ecosystem in profound ways. Thus, implementing an RCOOS to acquire marine atmospheric and oceanographic observations in SECOORA that are linked to robust predictive models and decision-making tools is essential to improving forecasting of severe weather events and marine conditions.

SECOORA is building an RCOOS that leverages, integrates and augments existing observational, modeling, data management, education and scientific assets within the region. SECOORA is creating customized products to address these thematic areas: Marine Operations; Coastal Hazards; Ecosystems, Water Quality, Living Marine Resources; and Climate Change.



Fig. 1 The SECOORA Footprint

Fig. 2 The Yucatan Current, Loop Current, Florida Current, and the Gulf Stream created using altimetry data from 2005.

Credit: Nick Shay/Benjamin James, University of Miami

#### **3.0 SECOORA RCOOS Components 3.1 Observing Subsystem**

The observing subsystem provides the basis for the RCOOS by supporting and integrating existing assets and observations specific to the development of products addressing four SECOORA theme areas. The observing subsystem consists of a suite of coastal and offshore moored platforms, autonomous underwater gliders, satellite data receivers and high-frequency radar (HFR) surface current installations. Table 1 provides observing system assets being currently funded by SECOORA and the variables measured. Each observing system collects and provides near real-time data and information products to variety of end users and stakeholders.

In-situ Moored and Coastal Stations	<ul> <li>Observing systems:</li> <li>University of South Florida Coastal Ocean Prediction System (COMPS)</li> <li>University of North Carolina Wilmington ( Research and Monitoring Program (CORM)</li> <li>University of Georgia – Gray's Reef Nation buoy</li> <li>Variables measured:</li> <li>Meteorological: Air temperature, Relative I Pressure, Wind Speed and Direction, Shor radiation</li> <li>Oceanographic: In-water velocity and tem level and waves, pCo2, pH, dissolved oxyce</li> </ul>
High Frequency Radar (HF Radar) Stations – Seasonde CODAR and Helzel WERA systems	<ul> <li>HFR stations:</li> <li>University of South Florida West Florida S</li> <li>University of Miami WERA systems</li> <li>Skidaway Institute of Oceanography WER</li> <li>University of South Carolina WERA system</li> <li>University of North Carolina, Chapel Hill C</li> <li>Variables Measured:</li> <li>Surface currents and waves</li> </ul>

# **SECOORA's Regional Coastal Ocean Observing System Providing Critical Marine Weather Data and Information Products for the Marine Community** Debra Hernandez<sup>1</sup>, Vembu Subramanian<sup>1</sup>, Jennifer Dorton<sup>2</sup>, Dwayne Porter<sup>3</sup>, Jeremy Cothran<sup>3</sup>, Dan Ramage<sup>3</sup>, Charlton Galvarino<sup>4</sup> <sup>1</sup>Southeast Coastal Ocean Observing Regional Association (SECOORA), Charleston, SC <sup>2</sup>University of North Carolina at Wilmington, Wilmington, NC <sup>3</sup>University of South Carolina, Columbia, SC

<sup>4</sup>Second Creek Consulting, Columbia, SC



Monitoring and

**Coastal Ocean** 

nal Marine Sanctuary

humidity, Barometric rt and Long wave

nperature, salinity, water gen, water temperature

Shelf CODAR systems

RA Systems CODAR systems

### **3.2 Multi-scale Multi-Resolution Modeling Subsystem**

SECOORA follows an optimal approach to advance the implementation of SECOORA models from sub-regional to regional scales, including coupled atmosphere, surface wave, water quality, habitat and ocean circulation models. Model output and related products are either served via the SECOORA web site or member web sites. Table 2 provides the models that are currently supported by SECOORA.

**Regional Ocean Circulation Model** 

Storm surge, Inundation and Coastal Circulation	Unive
Beach Water Quality Modeling	Unive
Fisheries Habitat Modeling	ROFF Mana

Table 2. SECOORA Modeling Subsystem Activities

#### 3.3 Data Management Subsystem

SECOORA has established a robust data management and communications infrastructure, and has implemented the Integrated Ocean Observing System (IOOS<sup>®</sup>) Data Management and Communications (DMAC) recommended standards and technologies that promote interoperability, aggregation, access, visualization, utilization, archival and dissemination of coastal ocean data and information products in a timely manner to stakeholders via the SECOORA data and information portal and web services. The data management activities that are carried out by the University of South Carolina and the University of North Carolina are provided in Table 3.

University of South Carolina

 Operate and maintain SECOORA's data management infrastructure (software and hardware) Maintain SECOORA data and information portal Identify and integrate new data into SECOORA data portal • Service and provide support to data providers and end University of North Carolina, Chapel Hill Advance IOOS Parameter Vocabulary

Table 3. SECOORA Data Management Subsystem Activities

In addition to the above subsystems, SECOORA maintains Education and Outreach (E&O) and Governance subsystems. The primary focus of the E&O subsystem is to engage formal and informal education audiences and stakeholders regarding observing technologies, data, products, and services. The Governance subsystem includes administrative, SECOORA Board, IOOS, IOOS Association, RCOOS Management and Communications and Stakeholder engagement.

## **4.0 Marine Weather Data and Information Products**

SECOORA, in collaboration with stakeholders such as National Weather Service (NWS) Weather Forecast Offices (WFOs), researchers, coastal zone and emergency managers, public health officials, and commercial entities has established US IOOS recommended standards-based data management technologies to facilitate efficient ways to integrate data from a variety of coastal ocean and estuarine observing and monitoring programs.

Marine weather and other information products are delivered via the SECOORA web site and data portal (http://secoora.org/maps). For example, the Marine Weather Portal (http://secoora.org/data/marineweatherportal) application provides standardized, integrated marine weather information for coastal North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana and Texas. Development of the marine weather application was led by researchers at the University of North Carolina – Wilmington, University of South Carolina, University of South Florida and Second Creek Consulting in partnership with WFOs in the southeast US including weather forecasters, data managers and stakeholders. The WFOs of Brownsville, TX, Corpus Christy, TX and Wilmington are using the Marine Weather Portal and have customized the website to display marine weather data for their weather forecast regions.

The SECOORA DMAC is supporting the development of data and information products in the following thematic areas: Marine Operations; Coastal Hazards; Ecosystems, Water Quality, and Living Marine Resources; and Climate Change. For additional information, please visit our website (http://secoora.org)

#### **SECOORA** Data Portal: Access to real-time in-situ data and data products http://secoora.org/maps



#### Acknowledgements

SECOORA would like to thank NOAA/IOOS for the RCOOS funding support. The contributions of members of SECOORA, RCOOS Principal investigators and stakeholders are gratefully acknowledged.

North Carolina State University

ersity of Florida and North Carolina State University

rsity of South Carolina

<sup>-</sup>S<sup>™</sup>, University of Miami and South Atlantic Fisheries gement Council (SAFMC)





