



Strategic Plan

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The **Southeast Atlantic Coastal Ocean Observing System (SEACOOS)** is a regional partnership formed to foster and promote the development of the coastal observing system for the Southeastern U.S., and to advance scientific understanding of the SE coastal ocean processes and systems.

SEACOOS will support the national need for improved environmental information from the coastal ocean, and facilitate access to this information for the Southeastern Atlantic region. It will provide information to a wide range of end-users, in the scientific, academic, resource management, commercial and governmental sectors, including coastal environmental and emergency management agencies, marine resource managers, marine operations interests, coastal industries, researchers, educators, and the general public.

The SEACOOS domain is comprised of the coastal ocean of North Carolina, South Carolina, Georgia, and Florida, from the inland head of tide to the seaward boundary of the Exclusive Economic Zone. This region is linked by the Loop, Florida and Gulf Stream currents; is impacted by the effects of common weather systems, is strongly influenced by runoff from watersheds within these four states, and shares a similar biogeography over much of its expanse.

2. The SEACOOS Mission

Goal: To significantly increase the quantity and quality of environmental information from the coastal ocean of the SE U.S. and make this readily available for a range of societal, scientific and educational applications.

Among the core objectives of SEACOOS are:

- Deploy, operate and evaluate state-of-the-art *in situ* measurement and remote sensing systems for the southeastern coastal ocean region;
- Evaluate emerging observational technologies in field operations;
- Develop, implement, and evaluate state-of-the-art numerical modeling systems for the SE coastal ocean for research and operational forecasting applications;
- Generate and distribute information products in near real-time that combine observational data and model output and are based on up-to-date oceanographic knowledge;
- Develop a regional information management system to access, distribute and archive data, metadata, and visualization products, and to ensure data formats and delivery systems are coordinated, interoperable, and compliant with national systems and standards;

- Coordinate with governmental agencies and the private and public sectors to enhance the development and efficiency of the observing system and to expand the economic opportunities that it provides;
- Promote the use of coastal information by decision-makers, educators and the general public through outreach and education activities.

3. SEACOOS and the National IOOS

The national coordinating activities of OceanUS and the U.S. GOOS Steering Committee have emphasized that the IOOS must be integrated, sustained, and multidisciplinary, with information freely shared in near real-time. It is envisioned that this system will evolve as technological and oceanographic discoveries are incorporated. No single sector (public, private, or academic) has all the skills and resources necessary to implement the envisioned system. Progress will require the formation of partnerships among the different sectors. Regional Associations and their regional coastal ocean observing systems will play a critical role in the development of the national IOOS by serving as stakeholders in shaping the “national backbone” for their regions, augmenting the capabilities of the “national backbone” system and providing information products targeting regional needs.

SEACOOS seeks to provide leadership in the research and development that will help build a coastal ocean observing system for the Southeast U.S. Because an integrated regional coastal ocean observing system (RCOOS) for the Southeast does not currently exist, SEACOOS is undertaking the development of a prototype RCOOS. To ensure that the development and implementation within SEACOOS is consistent with the national IOOS strategy, SEACOOS has been organized around the four central functions (or sub-systems) defined in various IOOS planning documents: Observations; Modeling; Information Management; and Outreach and Education. To ensure that an appropriate governance structure, consistent with OceanUS goals, is created, SEACOOS will support and foster development of the Southeast Coastal Ocean Observations Regional Association (SECOORA) as the Regional Association for the southeast. SECOORA is needed to manage funding and program reviews; provide oversight to the RCOOS; and assure coordination with adjoining regional associations, the national IOOS, and adjoining international elements of the Global Ocean Observing System (GOOS).

4. SEACOOS Subsystems

a. OBSERVING SYSTEM. Observing systems provide the nucleus of any environmental information system. The deployment of SEACOOS observing assets will complement the federal coastal ocean environmental monitoring system, or the “national backbone” (the plans for which are currently under development). SEACOOS will utilize several types of instrument systems, including *in situ* moored or fixed installations; drifters, profilers, gliders, and autonomous underwater vehicles; coastal

installations; remote sensing from satellites and aircraft; and shore-based remote sensing with radar. Evaluating and incorporating emerging technologies will be an important function for the SEACOOS Observing System. While the initial sensor focus is on physical variables, developing technologies show promise for a variety of chemical and biological sensors in the foreseeable future that will be important for addressing regional water quality and ecosystem and fisheries management issues.

Major activities will include:

- augmenting, based on sound scientific rationale, the core observations of the “national backbone” for the region encompassing the watersheds to the boundaries of the EEZ.
- planning and coordinating the deployment of observing system assets to promote efficient use of regional resources and infrastructure.
- promoting appropriate standardization and calibration practices for instrumentation.
- providing operational test-beds for new sensing systems as candidates for incorporation into the “national backbone,” the regional observing systems, or the research “observatories”.
- developing and improving observing system infrastructure (e.g., instrument deployment, power and communications systems).
- providing data and data products for the purposes of ocean state variable description, gauging model performance, and assimilation into models.

b. MODELING SYSTEM. Modeling is an essential component of an environmental information system. It provides a means for dynamical interpolation of inevitably sparse and incomplete observations, is fundamental to many research applications, and is the basis for coastal ocean predictions (i.e., simulations, hindcasts, nowcasts, and forecasts). Thus, a range of activities will be undertaken by the SEACOOS modeling group. This will include the development of diagnostic software (for kinematical, dynamical, and energetics analyses) that will be used in system analysis products. For societal applications, there will be an emphasis on the equivalent of “weather charts” for the coastal ocean.

Major activities will include:

- integration of oceanic and atmospheric observations in the SEACOOS region through state-of-the-art regional circulation and wave models to provide physical coastal ocean state variable estimates.

- implementation and assessment of modeling approaches that include biogeochemical and ecological quantities relevant to the SEACOOS domain.
- coupling the SEACOOS regional with larger scale models to capture non-locally forced phenomena.
- coupling the SEACOOS regional with smaller scale estuarine and coastal lagoonal models to examine estuarine/shelf interactions.
- conducting validation experiments to quantitatively examine model behaviors against observed data and to assess model strengths and weaknesses.
- conducting data assimilation experiments for the purposes of improving model performance.
- establishing, maintaining, and upgrading the SEACOOS nowcast/forecast systems and its Web-based products.
- aiding in observing system design through the conduct of Observing System Experiments (OSEs) and Observing System Simulation Experiments (OSSEs).
- conducting regional and larger scale Coastal Ocean Data Assimilation Experiments (CODAE).
- as the modeling elements progress, work toward fully coupled coastal ocean, atmospheric, and terrestrial models in the context of an earth system science approach to environmental modeling.

c. INFORMATION MANAGEMENT SYSTEM. By linking the distributed sets of observing and modeling system activities and providing the connection to both external and internal users, information management will play a central role in SEACOOS. The SEACOOS information dissemination system is Web-based and utilizes the methods of modern information management, including GIS, animations, other forms of visualization, and data exchange standards set by the national ocean science community. It will also provide access to the distributed data archives at the partner institutions, develop a regional archive, and build links to an ultimate national “deep archive”. The archives are to be populated with selected historical data sets as well as contemporaneous data. Further, it is concerned not only with the flow of SEACOOS observed and model-based data within SEACOOS and to external users but also with the flow of selected data sets and real-time data streams from external sources to internal users. Software development for the sub-domain products as well as for the regional products will be pursued.

Major activities will include:

- developing avenues of access to data and data products through establishment of distributed subregional “nodes” and the development, adoption, and dissemination of techniques for cataloging and documenting data and metadata.
- enabling tools for sharing observations and model products among SEACOOS primary partners, as well as the broader community, which includes rapid exchange of selected information for different strategic purposes.
- developing software and procedures needed for data integration; e.g., QA/QC procedures, identification and establishment of data and metadata standards.
- enabling interactive visualization of merged SEACOOS observations and model products through a Web-based portal.
- developing Web-based products from data streams and model outputs, which include geospatial information and overlays.
- establishing archives and mirror sites for data and information products.
- establishing functional relationships with external partners, including identifying data complementary to those produced by SEACOOS primary partners and forming linkages for data exchange, compilation, and archiving.
- working with national data centers e.g. NCDC, NCDDC, NDBC, NODC, and NGDC, to maximize IOOS data management capabilities.
- working with emergent regional associations and OceanUS to establish national information management standards and tools.

d. OUTREACH AND EDUCATION. The vital components of a regional coastal ocean observing system include integral outreach and education activities. Outreach efforts are being lead by the NOAA Sea Grant programs from each of the four states. The outreach process facilitates the two-way flow of information between user groups and the scientific community. As a result, user groups receive useful science-based information and SEACOOS is provided feedback on the emerging issues that may warrant further investigation. SEACOOS outreach works directly with marine operations businesses and agencies, national security providers, coastal and marine ecosystem mangers, coastal hazards and emergency management, public health officials, fisheries managers and coastal recreation businesses. The educational aspects are being addressed through collaboration with the three NSF- and NOAA-sponsored COSEE units in the region. Education refers to information, which can be included in formal education (K-16) and free-choice institutions, such as museums, aquariums, and science centers.

Major activities will include:

- Providing a structure and process for conducting region-wide efforts to increase public awareness of SEACOOS and expand the user base for regional products.
- Supporting the development of regional products and extending those products to the intended user audiences.
- Establishing a strong feedback loop between users and scientists to maximize the relevancy and usefulness of information products.
- Incorporating SEACOOS information into educational applications through the development of an educator network.
- Making the K-16 and free-choice institutional audiences aware of SEACOOS as a platform for teaching science principles.

5. PRODUCTS AND PRODUCT DEVELOPMENT

The ultimate utility of the regional information system is to enable the creation of products that address scientific and societal issues heretofore inaccessible. The number and variety of new products needed to significantly impact the many societal themes identified by OceanUS in the coastal zone is large; an equivalent or larger number of products will be needed to advance our scientific understanding. Many products will be highly specialized and require concerted development programs.

Responsibility for product development lies with academia, industry and government. Clear separation of responsibility for individual products does not, and should not, exist, but health and safety products are generally the responsibility of government, private sector needs are often satisfied by private industry, and product development that requires significant research are typically subjects of academic enterprise.

As coastal ocean observing systems are first established, and the IOOS emerges, initial product development is critical, to popularize the system as a whole, and to ensure interoperability between all parties involved. SEACOOS will therefore support initial product development necessary to demonstrate capabilities, engage users and promote the IOOS model. An active dialogue with all provider sectors will be maintained to strike an equitable partition of product development effort. Within SEACOOS, product development is the responsibility of all working groups because each must play an active role to ensure high quality and accessibility. Product development will be overseen by a committee with representation from each of the working groups and can include representatives from the affiliate members.

6. GOVERNANCE

A governance structure will establish the mechanisms and procedures for program development and strategic decision-making. The governance structure will facilitate and coordinate interactions amongst the SEACOOS members, and affiliate members, and between SEACOOS and other organizations within and outside of the southeast region, i.e., SECOORA, the National Federation of Region Associations, and other COOS activities within the auspices of OceanUS.

Major activities will include:

- Providing a structure for decision-making and for receiving and distributing funds for SEACOOS.
- Providing a structure for strategic, sound, and timely program development, based on functional Working Groups, focused on the Observing, Modeling, Information Management, and Outreach and Education, and including a Federal Affiliates Working Group to promote synergistic interactions with the “national backbone”.
- Providing mechanisms for collaborating with other observing systems, government agencies, industries, and other interested groups.
- Providing program cohesion through periodic workshops and meetings to maintain short-term and long-term implementation plans.
- Coordinating activities with other regional and subregional observing efforts, state agencies, and private industry.