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.

ALASKA REGION

The Alaska Region includes the entire state of Alaska. The 2007 award to this region is $750,000.

Project Title:

Alaska Regional Coastal and Ocean Observing Systems

Recipient/ Lead Principal Investigator:

Seward Association for the Advancement of Marine Science/
Molly McCammon (*mccammon@aoos.org*)

Cost:

Funded: $750,000

Performance:

The Alaska Ocean Observing System (AOOS) is focused on four key issues: climate change and its impacts, sustainability of fisheries and marine ecosystems, mitigation of natural hazards, especially coastal erosion, and safety of marine operations and health of coastal communities. Priorities in FY07 include continuing the development of the Prince William Sound (PWS) Ocean Observing System pilot project that collects observations for use by stakeholders and develops and tests forecast models as a demonstration of an end-to-end observing system in Alaska. The project will complete development of the three primary models for Alaska: ocean circulation (Regional Ocean Model System (ROMS)), waves (Simulating WAves Nearshore (SWAN)), and Nutrient-Phytoplankton-Zooplankton (NPZ). The high-resolution wind, wave, and ocean current forecast products provide expanded and improved marine safety for recreational and commercial vessel operators and enhance the security to oil tanker traffic in PWS.

Schedule:

1. Continue the capture, archive, and dissemination of real-time (and other) data streams at the AOOS Data Management and Analysis Group (DMAG) at the University of Alaska Fairbanks.
2. Create animations of ocean forecasts, current trajectories, and interpretation of real-time data streams by the AOOS DMAG.
3. Maintain Prince William Sound (PWS) observing system to provide high-resolution wind, wave and ocean current forecast products. Assess which observing system components are critical to

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meeting the needs of the major stakeholder groups in PWS and should be maintained over the long term.

4. Complete the development of a real time data assimilation model for PWS based on the ROMS as well as the SWAN wave model, and add the Nutrient-Phytoplankton-Zooplankton (NPZ) component.

NOAA Contacts:

NOAA Coastal Services Center: Mary Culver (*Mary.Culver@noaa.gov*)
NOAA IOOS Program Office: Charles Alexander (*Charles.Alexander@noaa.gov*)

FY2007: Regional Integrated Ocean Observing System Development

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PACIFIC NORTHWEST REGION

The Pacific Northwest Region includes the coastal states of Washington, Oregon, and northern California. The 2007 award to this region is $1,500,000.

Project Title:

Enhancing the Pacific Northwest Regional Coastal Ocean Observing System of the Northwest Association of Networked Ocean Observing Systems (NANOOS)

Recipient/ Lead Principal Investigator:

University of Washington/ Dr. David Martin (*dmartin@apl.washington.edu*)

Cost:

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

Performance:

This project to develop the Northwest region will be executed in four subcomponents: observing systems, modeling and products, data management and communications (DMAC), and education and outreach. The work will be applied in four observational domains: coastal ocean shelf, coastal ocean surface currents, estuaries, and shorelines. The primary goals of the project are to: 1) maintain existing surface current mapping capabilities and expand with new HF radar sites by extending the current radar array with additional operation, maintenance, and products; 2) expand coverage and range of observations on the coastal ocean shelf in coordination with emerging national programs with fixed buoys and gliders that will provide information on hypoxia/anoxia and harmful algal blooms (HABs); 3) maintain and expand observations in estuaries through improved maintenance and staff support, including partnerships at local, state, and federal levels; and 4) maintain and expand core elements of existing beach and shoreline observing programs in Oregon and Washington.

Schedule:

Year 1:

- Survey and obtain permits for three Washington HF radar sites.
- Develop conceptual systems architecture design in compliance with IOOS standards and protocols, network engineering design, and Web interface specifications.
- Hire a full time NANOOS Education and Outreach Specialist.

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- Develop education materials for NANOOS focus areas (fisheries, maritime operations, coastal hazards, and ecosystem impacts).
- Purchase equipment for coastal buoy at Juan de Fuca eddy for HAB warning focus.

Years 1 – 3:

- Maintain Oregon HF radar sites.
- Maintain moorings in Puget Sound, Columbia River, Willapa Bay, Gray's Harbor, and South Slough.
- Maintain OrCOOS buoy in Newport line for hypoxia/anoxia alerts.
- Maintain quarterly topographic profiles (47 sites) and 3-D topographic beach surface mapping of beach (16 sites).
- Maintain expanded NANOOS Pilot monitoring efforts (46 sites).
- Develop state of the art cross-shore profile change models and probabilistic shoreline change models.

Year 2:

- Maintain OR sites and purchase two long-range HF systems.
- Purchase and install one X-Band port radar system at high priority port.
- Purchase equipment to refurbish Oregon buoy.
- Initiate establishment of 24/7 operational modeling center. Investigate federal/state organizations for future transition opportunities.
- Implement training of prioritized target groups throughout region.

Years 2 – 3:

- Maintain OrCOOS glider transects on Newport line for extended range hypoxia assessment.
- Integrate and enhance existing forecasting capabilities at OSU, OHSU, and UW.

Year 3:

- Maintain Oregon HF radar sites, and purchase one long range HF systems.
- Install three Washington HF radar systems.
- Purchase and install one X-Band port radar system at second priority port.
- Move 24/7 operational modeling center to fully developed status and confirm federal/state organizations for operational transition.
- Stabilize fully mature NANOOS DMAC systems architecture, network engineering protocols and user products web interface across NANOOS domain.
- Ensure exportability to other regional efforts and national enterprise.
- Deliver marine education material via web (Ed-Web).

NOAA Contacts:

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NOAA IOOS Program Office: Charles Alexander (*Charles.Alexander@noaa.gov*)

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CENTRAL AND NORTHERN CALIFORNIA REGION

The Central and Northern California Region runs from the California/Oregon border south to Point Conception. The 2007 award to this region is for $500,000.

Project Title:

A Regional System for Observations and Decision Support in Central and Northern California Bays and Coastal Waters

Recipient/ Lead Principal Investigator:

University of California at Davis, Bodega Marine Lab/ Dr. John Largier (*jlargier@ucdavis.edu*)

Cost:

Funded: $500,000

Performance:

The project will develop the Central and Northern Coastal Ocean Observing System (CeNCOOS) in open and semi-enclosed bays in the region including San Francisco Bay, Monterey Bay, Bodega Bay, Humboldt Bay, and Morro Bay. The focus will be on water temperature and salinity and relating these changing conditions to ecosystem and human health. This effort will link with state-sponsored HF-radar mapping of surface currents and numerical modeling of San Francisco and Monterey Bays and also the Gulf of Farallones. The temperature and salinity data will be the basis of specific decision-support indices directed toward harmful algal blooms, contamination, and integrated ecosystem assessment.

Schedule:

1. Operate a core of observing elements.
   - Inventory existing observations.
   - Fully develop plan for sustaining existing observations in area Bays.
   - Maintain existing assets for water temperature and salinity observations.

2. Establish working group to assess the use of water type information in managing HAB and contaminant events, identify products, and begin development.
   - Conduct user workshop.
   - Develop temperature- and salinity-based indicators.

NOAA Contacts:

NOAA Coastal Services Center: Mary Culver (*Mary.Culver@noaa.gov*)
NOAA IOOS Program Office: Charles Alexander (*Charles.Alexander@noaa.gov*)

FY2007: Regional Integrated Ocean Observing System Development

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SOUTHERN CALIFORNIA REGION

The Southern California Region runs south from Point Conception to the Mexico border. Four awards were made to recipients at the University of California at San Diego, Scripps Institution of Oceanography totaling $1,580,000.

Project Title:

Southern California Coastal Ocean Observing System (SCCOOS): Shelf to Shoreline Observatory Development

Recipient/ Lead Principal Investigator:

University of California at San Diego, Scripps Institution of Oceanography/
Dr. Eric Terrill (*eterrill@ucsd.edu*)

Cost:

Funded: $500,000

Performance:

The project will support the development of optimal nowcasts and forecasts of ocean surface currents and trajectory computations based upon synthesized surface currents. This focus is in response to the need identified by the SCCOOS stakeholder community and leverages California's existing investment in HF radar and associated observations directed toward coastal ocean circulation monitoring. Product development will focus on water quality related problems in Southern California. To support this effort, in-situ assets including gliders, drifters, and autonomous underwater vehicles will be deployed to track a discharge plume from the Hyperion Outfall that is tentatively scheduled to have a diversion in 2008. These observations will contribute to those provided by the HF radar and a single mooring located in Santa Monica Bay, and feed into a data assimilating model. During the planned three-week diversion, over 7 billion gallons of sewage will be dispersed in a surface plume in Santa Monica Bay, introducing potential human health and ecosystem risks that will necessitate careful environmental management. SCCOOS will support this effort as a milestone activity to demonstrate capability.

Schedule:

1. Operate a core of observing elements.
   - Continue operation of a single automatic shore station located on the Santa Monica Pier.
   - Provide low level maintenance (beam pattern and telemetry) of two long range HF radar systems.

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- Maintain the mooring in Santa Monica Bay to provide measurements during the Hyperion Discharge, and to provide baseline data for this Marine Protected Area.

2. Maintain data management and modeling efforts.
   - Continue data management and product development/delivery efforts for SCCOOS observations.
   - Continue ocean model operations that will assimilate HF radar surface current data, and be driven by atmospheric and tidal forcing.

3. Provide ocean circulation information to support support a response activity – Hyperion sewage outfall diversion or similar.
   - Provide nowcasts and forecasts for ocean currents during a planned 3-week diversion of the Hyperion sewage outfall.
   - Conduct a small focused deployment of drifters, autonomous underwater vehicles, and a single glider to assist in tracking.
   - Optimize surface currents and trajectory product development.

4. Provide surf zone current forecasts.
   - Support surf zone current forecasts and model developments used for products related to estimating the fate and transport of stormwater and for products in use by the Southern California marine safety community.

Project Title:

Long Beach/Los Angeles Harbor IOOS Demonstration Project

Recipient/ Lead Principal Investigator:

University of California at San Diego, Scripps Institution of Oceanography/
Julianna Thomas (*jot@splash.ucsd.edu*)

Cost:

Funded: Years 1 – 3 $99,999

Performance:

This project will integrate regional assets by leveraging existing observations, models, and data management to develop products that contribute to the safety and efficiency of maritime transportation. The proposed customized website for Long Beach/Los Angeles Harbor entrance is designed to provide critical marine conditions necessary for the safe passage inbound and outbound from Long Beach/Los Angeles Harbor.

Present infrastructure and methodology is used to collect, analyze, and disseminate wave and surface currents data in near real-time. The following parameters will be integrated in the web display: wave measurements, model wave nowcasts and forecasts, sea surface temperature (in-situ and remote), HF radar-derived surface currents, tides, and modeled winds. The final website design will include information windows activated on the display map for areas of interest as selected by the stakeholders. The intent is that maritime traffic users will access near real-time data for immediate transit decisions or forecast information for planning purposes.

Schedule:

1. Obtain stakeholder input throughout project development.
   - Years 1 – 3: Meet with Long Beach/Los Angeles Harbor stakeholders at project start, mid-point, and end of year to obtain input and feedback.
   - Year 2: Hold tutorial in Long Beach/Los Angeles area to train stakeholders in the most efficient and productive use of the website, and assure the optimum use of site as a decision-support tool.
   - Year 2: Begin meeting with stakeholders for a second harbor.
   - Year 3: Meet with both harbor stakeholders to evaluate the applicability and usefulness of the product.

2. Develop website product.
   - Year 1: Aggregate existing relevant assets.
   - Years 1 – 3: Refine website development.

3. Establish data management processes.
   - Year 1: Develop Federal Geographic Data Committee (FGDC) compliant XML metadata and use a common data model.
   - Years 1 – 3: Transmit data to NOAA National Data Buoy Center.

Project Title:

Using Ocean Data Assimilation to Incorporate Environmental Variability into Sardine and Squid Assessments

Recipient/ Lead Principal Investigator:

University of California at San Diego, Scripps Institute of Oceanography/
Dr. Arthur J. Miller (*ajmiller@ucsd.edu*)

Cost:

Funded: $377,559
Proposed (subject to available funds): Year 2 – $381,246; Year 3 – $367,705

Performance:

This project will study the influence of physical oceanography on the populations of sardine and squid by selecting key El Niño and La Niña time periods (which represent environmental extremes) for intensive analysis, comparison, and contrast to typical conditions. The project will include extensive analysis of the various IOOS data using sophisticated ocean data assimilation tools. The overall goals are to develop a coupled ecological and hydrologic model for assessing and predicting the physical oceanographic influences on sardine and squid stocks using both IOOS and federal and state fisheries data.

The primary steps in accomplishing this project are: 1) study the physical oceanographic state during the key years using sophisticated ocean data assimilation tools of the Regional Ocean Modeling System (ROMS); 2) relate the biological observations to the time-evolving physical state using statistical models; and 3) evaluate the predictive capability of the physical-biological system using independent years of data. The end goal is to deliver the system to stock assessment managers through the Southwest Fisheries Science Center. The resulting forecast will be presented to the

sardine and squid stock managers and scientists for consideration in the catch quotas for these species.

Schedule:

1. Assimilate physical oceanographic and biological datasets to provide coastal conditions that inform fisheries stock assessment.
   - Year 1: Assemble physical oceanographic datasets for key years to assimilate into ocean model and test model with first key time period.
   - Year 1: Assemble biological datasets.
   - Years 1 – 3: Collect and analyze zooplankton samples, analyze squid egg beds habitats, and conduct plankton and diet investigations.
   - Years 1 – 2: Conduct sardine feeding morphology and diet studies.
   - Year 2: Test model for second key time period.
   - Years 2 – 3: Analyze ocean model fits for physical processes affecting biology.

2. Improve ability to incorporate environmental data into harvest guidelines for sardine and squid.
   - Year 2: Examine model ability to accurately predict temporal and spatial variation in sardine recruitment.
   - Years 1 – Year 3: Discuss results with Pacific Marine Fisheries Management Council.

3. Year 3: Evaluate which environmental variables will add value to squid stock assessments.

Project Title:

Coordination of Ocean Observatories Initiative Cyberinfrastructure with the NOAA IOOS DMAC - Transparency of Data Access Across the Observatories

Recipient/ Lead Principal Investigator:

University of California at San Diego, Scripps Institution of Oceanography/
Dr. John Orcutt (*jorcutt@ucsd.edu*)

Cost:

Funded: $599, 975
Proposed (subject to available funds): Year 2 - $599,998

Performance:

The National Science Foundation (NSF) implemented the Ocean Observatories Initiative to focus on science, technology, education, and public awareness activities needed to develop and deploy a network of science-driven ocean observing systems. The OOI infrastructure, will provide users with the means to characterize and interact with the ocean for decades. The OOI comprises three types of interconnected observatories spanning global, regional and coastal scales. The global component addresses planetary-scale problems via a network of moored buoys and platforms linked to shore via satellite. A regional cabled observatory will 'wire' a single region in the Northeast Pacific Ocean with a high speed optical and power grid. The coastal component of the OOI will expand existing coastal observing assets, providing extended opportunities to characterize the effects of high frequency forcing on the coastal environment. The OOI CyberInfrastructure (CI) constitutes the integrating element that links and binds the three types of marine observatories and particularly the associated sensors into a coherent system-of-systems. Indeed, it is most appropriate to view the OOI as a whole, which will allow scientists and citizens to view particular phenomena irrespective of the observing

elements (e.g. coastal, global, regional, ships, satellites, IOOS…) to which the observations belong.

This project will exercise and establish the core aspects of data management and interoperability between IOOS and OOI. This will be realized through a set of specific deliverables that expand the integrated set of real-time data streams produced by SCCOOS and delivered to the NOAA data systems at NODC, NDBC and others. Building on the work the Coastal Observing Research and Development Center (CORDC) has developed at SCCOOS, with NOAA support, for a national integrated HF Radar data system for current monitoring off the coastal U.S., the goal is to have data available by the end of the first year using OOI CI web display and middleware technologies.

Schedule:

Year 1:

- Schedule and complete stakeholder meetings on modeling (12/1/07)
- Develop system architecture for WWW tools for OOI/IOOS toolkits (11/1/07)
- Develop candidate software architecture linking OOI and IOOS CI systems to review scalability issues (2/1/08)
- Determine as many as 5 observables in consultation with NODC and NDBC (2/1/08)
- Develop system architecture for QA/QC review of RCOOS data and for integrating autonomous vehicles into OOI and IOOS in near real-time (2/1/08)
- Develop architecture for extending regional ocean or wind models to scales larger than the southern CA Bight (2/1/08)
- Agree upon NOAA/NDBC data to be made available to OOI (3/1/08)
- Document science requirements for modeling (4/1/08)
- Complete V1.0 OOI/IOOS middleware to support evaluation of scalability (6/30/08)
- Implement architecture for 1-3 measured variables from RCOOS data and 1-3 observables from NOAA data for delivery to the OOI (6/30/08)
- Implement transfer of 1-3 data types from NOAA/NDBC to OOI
- Develop and test tools for web-based display of 2-3 heterogeneous data sets (6/30/08)
- Demonstrate delivery of near-real-time data from a single autonomous vehicle type (6/30/08)
- Extend regional ocean wind model to CA scale and demonstrate to US scale (6/30/08)
- Complete planning to extend ocean or wind model to continental US off-shore scale (8/1/08)
- Review effectiveness of implementation of RCOOS data (8/1/08)

Year 2:

- Extend architecture to 5-10 measured variables for delivery to NOAA from OOI
- Extend program to 5-10 data types for NDBC data and 5-10 variables from NOAA data sources (6/30/09)
- Demonstrate command and control capabilities for OOI and IOOS for autonomous vehicles (AUVs – gliders) (6/30/09)
- Provide complete web-based toolkit allowing users to readily develop and display data sets of interest from IOOS and OOI (6/30/09)

NOAA Contacts:

NOAA Coastal Services Center: Mary Culver (*Mary.Culver@noaa.gov*)
NOAA IOOS Program Office: Charles Alexander (*Charles.Alexander@noaa.gov*)

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PACIFIC ISLANDS REGION

The Pacific Islands Region is defined as the Commonwealth and Territories of the United States in the Pacific and the Freely Associated States in the Pacific. The 2007 award to this region is $1,700,000.

Project Title:

Developing the Hawaii-Pacific Ocean Observing and Information System

Recipient/ Lead Principal Investigator:

University of Hawaii/ Dr. Brian Taylor (*taylorb@hawaii.edu*)

Cost:

Funded: $1,700,000
Proposed (subject to available funds): Year 2 – $2,814,811; Year 3 – $2,698,353

Performance:

The objective of this project is to integrate and expand ocean observing and forecasting first in the Hawaiian Islands, and later among the Pacific Islands as part of a larger Pacific Integrated Ocean Observing System (PacIOOS). Investigators will begin with four integrated "catalyst" projects focused initially on waters along the southern shore of Oahu, Hawaii's most populous island. These catalyst projects support one another to enhance community capabilities and respond to the needs of a diverse constituency of stakeholders are (1) coastal ocean-state and forecast; (2) coastal resiliency; (3) automated water quality sensing; and (4) marine ecosystem stewardship. Resultant products will contribute to nearshore and offshore safety, shipping and marine commerce, water quality assessments, marine ecosystem indicators, and marine inundation forecasts.

For the coastal ocean-state and forecast project, investigators will utilize an array of high frequency Doppler radios along with gliders, wave buoys, coastal cameras, and numerical models. This project will monitor, model, and predict channel and nearshore circulation, waves, coastal run-up, and water levels. Observations and model output will feed into a dynamic, web-based coastal ocean atlas providing interpretive products such as most efficient inter-island shipping lanes, hazardous conditions at beaches and in harbors, pollutant dispersion, and high water levels in vulnerable communities. The coastal resiliency project products will include: frequently updated maps of specific beach safety conditions; coastal inundation and erosion alerts; and vulnerability projections related to sea-level rise, chronic erosion, and high wave and water level events. The automated water quality sensing project efforts will expand and implement modifications of existing coastal water quality monitoring. The proposed system, when combined with circulation models, will provide early warning of impending water quality problems, improve prediction of affected areas, and decrease

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response time for mitigation efforts. The marine ecosystem stewardship project team will focus on expanding existing cetacean monitoring arrays. Stewardship products will include fishing and marine mammal forecasts to help interpret impacts of long-term climate change on living marine resources.

Schedule:

Year 1:

- Deploy one to two gliders continuously.
- Bring key data and products on-line (glider subsurface temp/salinity, sea level heights/trends, wave state, NLOM/NCOM ocean state products, autonomous underwater vehicle (AUV) survey products, surface winds).
- Deploy observation equipment (Koko Head and Barbers Point Coastal Radars, nearshore water quality stations, beach cameras, directional wave buoys, Ecological Acoustic Recorders (EAR) at Kilo Nau, 150 yellowfin tuna transmitters)
- Deploy AUV monthly surveys and event surveys.
- Upgrade water level station at Haleiwa and Waianae.
- Conduct topographic LIDAR surveys.
- Operate circulation models (RSM/MSM atmospheric model, Regional Ocean Modeling System (ROMS) model, regional wave model).
- Develop software for real time detection of cetacean sounds.
- Develop database and web system.
- Bring key data and products on-line.

Year 2:

- Deploy additional observation equipment (Waikiki coastal radar, Barbers Point water level/seiche stations, deep EAR sensor).
- Conduct routine thermal infrared imaging overflights.
- Operate priority models (weather research and forecast (WRF) atmospheric model, HYCOM/POM, Oahu south shore model, ecosystem model).
- Continue development of database and web system.
- Bring additional key products on-line.

Year 3:

- Bring additional products/data on-line.
- Continue development of database and web system.
- Assimilate data into WRF and ROMS models.

NOAA Contacts:

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NOAA IOOS Program Office: Charles Alexander (*Charles.Alexander@noaa.gov*)

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GREAT LAKES REGION

The Great Lakes Region includes the coastal states of New York, Pennsylvania, Ohio, Indiana, Illinois, Wisconsin, Minnesota, and Michigan. The 2007 award to this region is for $500,000.

Project Title:

Implementation Projects for the Great Lakes Observing System

Recipient/ Lead Principal Investigator:

Great Lakes Observing System/ Roger Gauthier (*gauthier@glc.org*)

Cost:

Funded: $500,000

Performance:

The Great Lakes Observing System (GLOS) will focus on four tasks that support regional observation priorities: 1) initiation, validation, testing, and training of multi-dimensional hydrodynamic modeling for the lakes Huron-to-Erie Corridor (HEC); 2) prototype development, user assessments, and market analysis of customized integrated harbor specific products (Great Lakes HarborView); 3) implementation of the Great Lakes Modeling and Assessment Center (GLMAC); and 4) a workshop to create an offshore observation system implementation plan. Implementation of these four tasks will provide distinct and material benefits to a wide array of constituents within the region.

Schedule:

1. Develop Huron-to-Erie Corridor hydrodynamic modeling products.
   - Link existing 2-dimensional (2d) models for the corridor with the NOAA 2d Great Lakes Coastal Forecasting System (GLCFS) and run this linked model in a pre-operational setting.
   - Generate a 3-dimensional (3d) public domain hydrodynamic model for the St. Clair River.
   - Perform risk assessments on contaminant transport mechanisms with proprietary code 3d hydrodynamic model for the St. Clair River.

2. Develop web-based nearshore currents, winds, waves and prevailing weather for five high traffic harbors on each of the five Great Lakes (e.g., Duluth/Superior, Ashland, Marquette, Muskegon, Calumet Harbor, Chicago). Market, distribute and assess user responses to harbor products.

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3. Establish the Great Lakes Modeling and Assessment Center.
   - Engage partners to stand-up the GLMAC facility.
   - Hire a part-time GLMAC Coordinator position.
   - Develop an online inventory of models, modeling tools and related resources, including comprehensive documentation of software.

4. Develop plans for an offshore observation system.
   - Hold multi-day workshop to identify core observations and requirements from operational forecasters, managers, researchers and educators.

NOAA Contacts:

NOAA Coastal Services Center: Mary Culver (*Mary.Culver@noaa.gov*)
NOAA IOOS Program Office: Charles Alexander (*Charles.Alexander@noaa.gov*)

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GULF OF MEXICO REGION

The Gulf of Mexico Region includes the coastal states from Florida to Texas. Two awards were made to Texas A&M University totaling $798,000.

Project Title:

Integration of the Gulf of Mexico Coastal Ocean Observing System through Development of a Regional Data Portal

Recipient/ Lead Principal Investigator:

Texas A&M University/ Dr. Ann Jochens (*ajochens@tamu.edu*)

Cost:

Funded: $500,000

Performance:

This project will design and build a centralized Data Portal for the Gulf of Mexico Coastal Ocean Observing System Regional Association (GCOOS-RA). The Data Portal will aggregate data and model output from the region and serve these and selected products to the full range of GCOOS stakeholder communities, including local, state, and federal government agencies, private industry, and academics. The Portal design process will include a survey and ranking of elements of existing portals, a determination of regional user needs and requirements, and a system architecture design process modeled after the Department of Defense Architecture Framework (DoDAF). Project staff will closely monitor and participate in regional and national efforts to set and implement standards that meet the IOOS Data Management and Communication (DMAC) goals of regional and national machine-to-machine interoperability. They will work closely with the GCOOS councils and committees to arrive at a set of products that meet community needs. Staff will assess user satisfaction and, as feasible, the economic benefits derived from the Portal.

Schedule:

1. Develop GCOOS Portal.
    - Define vision, mission, and life-cycle requirements of GCOOS Data Portal.
    - Survey and assess extant portals and rank technologies employed.
    - Develop architectural views and design artifacts for Portal construction.
    - Build and test Portal.
    - Deploy and review the Portal.

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2. Determine needs of the Education and Outreach (E/O) community for the data portal.
   - Establish linkages between selected GCOOS Education and Outreach volunteers and data management to obtain effective and timely E/O input to the Portal development.
   - Conduct workshop on data portal with education and outreach community to identify targeted E/O data and products to be served by the Portal.

Project Title:

Standardization of Local Data Network Nodes in the Gulf of Mexico Coastal Ocean Observing System Regional Association (GCOOS-RA)

Recipient/ Lead Principal Investigator:

Texas A&M University/ Dr. Ann Jochens (*ajochens@tamu.edu*)

Cost:

Funded: $297,868
Proposed (subject to available funds): Year 2 – $299,577; Year 3 – $300,859

Performance:

This project will standardize elements of the near real-time marine data delivery systems of ten major non-federal data providers of the Gulf of Mexico Coastal Ocean Observing System Regional Association (GCOOS-RA). Uniform data delivery systems will be developed that maximize interoperability within the region, between regions, and with the federal backbone to facilitate the production of operational data and model products in support of the regional and national needs. The three specific objectives are to: 1) establish a single common vocabulary for variables served; 2) serve point and vector data via an Open Geospatial Consortium (OGC) compliant Web Service interface; and 3) serve satellite data via a OCG Web Coverage Service (WCS) service interface.

Schedule:

1. Years 1 – 3: Conduct planning, coordination, and IT workforce entrainment.
   - Node managers to attend one regional DMAC planning and coordination meeting per year.
   - Node IT staff to attend two technical meetings per year on DMAC-centric topics e.g., metadata, ontology, Web Services.

2. Years 1 – 3: Establish a single common vocabulary for variables served by region.
   - Develop common vocabulary to be used by GCOOS data nodes with due consideration of guidance from IOOS Data Management and Communications (DMAC), Marine Metadata Interoperability (MMI) Project, and Regional Associations.
   - Implement vocabulary changes at each node.
   - Document process and outcomes on MMI web site.

3. Provide point and vector data via XML-based Web Service interface.
   - Year 1: Develop a common data model for and serve near real-time scalar data (e.g., temperature and salinity).
   - Year 2: Develop a common data model for and serve near real-time vector data (e.g., current speed and direction).
   - Years 3: Serve archived scalar and vector data via the Web Service interface.

4. Serve satellite products via an OGC Web Coverage Services (WCS) interface.
   - Year 1: Satellite provider nodes to select which satellite data to serve.
   - Year 2: Select/develop method for and serve near real-time satellite data through WCS interface.
   - Years 3: Serve archived satellite data through WCS interface.

5. Years 1 – 3: Build Education and Outreach user utility by establishing a working group to train those who will interface with stakeholders on communicating technologies, protocols, and standards.

NOAA Contacts:

NOAA Coastal Services Center: Mary Culver (*Mary.Culver@noaa.gov*)
NOAA IOOS Program Office: Charles Alexander (*Charles.Alexander@noaa.gov*)

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:

NOAA Coastal Services Center: Mary Culver (*Mary.Culver@noaa.gov*)
NOAA IOOS Program Office: Charles Alexander (*Charles.Alexander@noaa.gov*)

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.

MID-ATLANTIC REGION

The Mid-Atlantic Region includes the coastal states from Cape Cod to Cape Hatteras. Two awards were made to two recipients totaling $2,200,000.

Project Title:

Phased Deployment and Operations of the Mid-Atlantic Regional Coastal Ocean Observing System (MARCOOS)

Recipient/ Lead Principal Investigator:

Rutgers, the State University of New Jersey/ Dr. Scott Glen (*glenn@marine.rutgers.edu*)

Cost:

Funded: $1,700,000
Proposed (subject to available funds): Year 2 – $3,498,881; Year 3 – $3,498,529

Performance:

This project will have a region-wide focus and be conducted by leveraging extensive existing regional observation assets. The primary themes are maritime safety and ecological decision-support though coastal inundation and water quality are also important areas of emphasis. Investigators will coordinate, sustain, and expand on-going ocean observing and forecasting activities to generate regional-scale data and other products in real-time across the full Mid-Atlantic region and extending in the Bays and Sounds.

The focus in Year 1 will be on the observation and forecasting of two-dimensional surface currents to support maritime safety. Priority is given to operating the full regional HF Radar network, and linking the surface currents to short-term ocean forecasts, the Coast Guard's Environmental Data Server (EDS) and Search and Rescue Optimal Planning System (SAROPS). Three dynamical ocean forecast models will be run with surface meteorological products from both NOAA National Centers for Environmental Prediction and the NOAA Weather Research and Forecasting (WRF). The models will be adapted to assimilate satellite, HF Radar, glider, and drifter data as available. Year 1 Mid-Atlantic regional glider flights leveraged from existing ONR assets will be partially supported as part of the ongoing Department of Defense Multidisciplinary University Research Initiative (MURI). Education efforts will leverage Sea Grant expertise to include HF Radar wave and current nearshore products into NWS rip current forecasting activities, and leverage the Centers for Ocean Science Education

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Excellence (COSEE) Mid Atlantic's expertise to coordinate product development with the recreational, commercial, and fishing management communities.

Schedule:

1. Develop surface current forecasts for maritime safety.

Year 1:

- Support existing HF Radar operations (26 sites) producing hourly surface current maps.
- Expand U. Conn's Short Term Prediction System (STPS) for surface currents to a regional scale.
- Test data assimilation schemes of three dynamical models.
- Evaluate surface current models using drifters.

Years 2 – 3:

- Maintain/sustain Phase 2 regional network operations for HF Radar surface current maps.
- Install additional HF radar stations based on USCG needs.
- Sustain STPS forecasts.
- Expand models to full regional MARCOOS domain.
- Validate data assimilation models.
- Assimilate USCG drifter velocities into each model.
- Evaluate operational dynamical model surface currents.
- Conduct pilot project on standardizing information delivery of products.

2. Develop three-dimensional observations for ecological decision support.

Year 1:

- Ingest and distribute regional satellite sea surface temperature and water mass products.
- Support existing regional glider operations (deployment/recovery, data synthesis and distribution).
- Purchase and operate new MARCOOS glider.
- Build initial MARCOOS web site and implement project management tools.
- Begin to assess the use and economic value of observation data and products.

Years 2 – 3:

- Maintain glider operations support.
- Purchase up to six additional gliders (three in Year 2, three in Year 3).
- Sustain fully 3-D assimilation and forecasting capability by Year 3.
- Maintain web site.
- Survey target audiences on use and impacts of observation products.
- Assess education and outreach value of prototype data products.

Project Title:
Chesapeake Inundation Prediction System (CIPS): Flood Forecast Prototype for Coastal-Bay-Estuary Resiliency to Storm Surge

Recipient/ Lead Principal Investigator:

Chesapeake Bay Research Consortium/Kevin Sellner (*sellnerk@si.edu*) and Chesapeake Bay Observing System (CBOS)/Elizabeth Smith (*exsmith@odu.edu*)

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

Performance:
The Chesapeake Inundation Prediction System (CIPS) will be developed to improve the accuracy, reliability, and capability of flood forecasts for tropical cyclones and non-tropical wind systems such as nor'easters. Investigators from government, industry and academia will construct, evaluate, and deliver a prototype inundation forecasting system to facilitate emergency management and decision-making in the challenging case of intricate coastlines-semi-enclosed coastal bays and estuaries.

The first major task will expand the technique of ensemble forecasting in the atmospheric domain and translate it to the hydrodynamic and hydrologic domains. To accomplish this, parallel, high-resolution atmospheric forecasts for the region will be produced on an operational schedule. The ensemble will then include hydrodynamics, combining models with the stochastic hydrologic flow to produce high-resolution, operational forecasting in the region. The primary benefits are improved accuracies and quantitative estimates of forecast uncertainties. For the second major task, investigators will exploit a successful prototype visualization, validation, and information-delivery system for emergency managers. Part of this system is a new, rapid system to deploy inundation sensors immediately before storms to obtain direct measurements of water levels. A dynamic outreach program with Emergency Managers (EMs) will integrate and assess the value of this system, not only for the immediate storm response by EMs, but also for their advance planning and decision-making during recovery. The project team will work to address their requirements and deliver the visual inundation information at city-block resolution at a variety of sites for the purposes of immediate storm response and advance planning and decision-making during recovery. CIPS ultimately will provide an end-to-end system that defines users' needs, integrates the subsystems for observation, forecasting, visualization, validation, data and product development, and communicates high-resolution products to EMs, and then to a broad spectrum of users, including the general public.

Schedule:
Year 1:

- Assemble data sets for at least three representative storms and run initial forecasts and inundation visualizations for three areas in the Chesapeake Bay: Washington, DC-Alexandria, VA; Norfolk-Virginia Beach, VA; and Dorchester-Talbot Counties, MD.
- Form emergency manager (EM) user teams in each area to develop and review CIPS products, information delivery techniques, and accompanying economic impact evaluation.
- Develop rapid deployment overland sensor network design for one of the two selected overland areas. If current forecast capability indicates, obtain all relevant observational data and information needed to model one (tropical or extratropical) overland flooding event with

CIPS and validate the model output. The targeted storm period is March 1, 2008 through November, 2008.

Year 2:

- Evaluate and refine prototype forecast products and configure models for operational use. Use any new significant (i.e., tropical or extrtropical) event that results in major flooding in Year 1 to aid in this evaluation and refinement.
- Develop and refine visualization and information products, configure delivery system for operational use, and conduct economic impact assessment with EM user teams. Use any new significant (i.e., tropical or extrtropical) event that results in major flooding in Year 1 to aid in this evaluation and refinement.
- Develop rapid-deployment, overland sensor network for second of two overland areas. If current forecast capability indicates, obtain all relevant observational data and information needed to model one (tropical or extratropical) overland flooding event in the second overland area with CIPS and validate the model output. Also obtain all relevant observational data and information needed to model the overland flooding event (tropical or extratropical) in the first overland area. The targeted storm period is March 1, 2009 through November, 2009.

Year 3:

- Evaluate the ensemble forecasts and explore how simple data assimilation techniques might improve forecast accuracies by incorporating data from the Chesapeake Bay Observing System (CBOS). Use any new significant (i.e., tropical or extratropical) event in Year 2 that results in major flooding to aid in this refinement.
- Finalize operational prototype inundation forecast-delivery system and deliver to WFOs.
- Transfer prototype capability and documentation of end-to-end process to MACOORA and work with other regions to transfer the CIPS capability.
- Complete performance evaluation and economic impact assessment.
- If current forecast capability indicates, obtain all relevant observational data and information needed to model one (tropical or extratropical) overland flooding event in each of two overland areas with CIPS and validate the model output. The targeted storm period is March 1, 2010 through November, 2010.

NOAA Contacts:

NOAA Coastal Services Center: Mary Culver (*Mary.Culver@noaa.gov*)
NOAA IOOS Program Office: Charles Alexander (*Charles.Alexander@noaa.gov*)

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.

NORTHEAST ATLANTIC REGION

The Northeast Atlantic Region includes the coastal states from Maine to Rhode Island. Three awards were made to three recipients in this region totaling $2,330,000.

Project Title:

Development of the Northeast Regional Coastal Ocean Observing System

Recipient/ Lead Principal Investigator:

Woods Hole Oceanographic Institution/ Dr. John Trowbridge (*jtrowbridge@whoi.edu*)

Cost:

Funded: $1,200,000
Proposed (subject to available funds): Year 2 – $3,498,881; Year 3 – $3,498,529

Performance:

This project will develop the Northeastern Regional Coastal Ocean Observing System. Regional user requirements identified inundation, harmful algal blooms, water quality, and living marine resources as specific concerns in the Northeastern Region. There are three objectives of this proposal: (1) operate a core of observing elements; (2) establish new observing capabilities for inundation, water quality, and harmful algal bloom, and (3) develop the design for the user-driven core observing system.

Schedule:

1. Operate a core of observing elements.
   - Years 1 – 3: In the Gulf of Maine, maintain five of 11 existing buoys, the University of NH's Coastal Ocean Observing Center (COOA) buoy in Great Bay; and one buoy in the Long Island Sound Coastal Ocean Observing System.
   - Years 1 – 3: Maintain HF radar, operational circulation model, surface wave model, and satellite data analysis and dissemination for the Gulf of Maine.
   - Years 1 – 3: Extend shipboard surveys associated with the Atlantic Zone Monitoring Program emphasizing nutrient measurements to five new stations;
   - Years 1 – 2: Develop data management and communication systems.
   - Years 2 – 3: Support an additional three buoys in the Gulf of Maine; support other existing moorings and buoys in Long Island Sound and Block Island Sound.
   - Year 3: Implement data management and communication systems.

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2. Establishing new observing capabilities for coastal inundation, nutrients, and harmful algal blooms.
   - Year 1: Complete development of the Northeast Coastal Ocean Forcast (NECOFS) model that features three core model components (mesoscale weather, waves, and coastal ocean) to provide forecast capacity for marine surface weather, ocean environment, and inundation.
   - Years 2 – 3: Deploy nutrient sensors on existing buoys and moorings in the Gulf of Maine, Great Bay, Long Island Sound, and Block Island Sound; deploy an in-situ sensor for detecting the presence of harmful algal blooms on an existing platform; deliver products for inundation.

3. Develop an optimized design for a user-driven core observing system for the Northeast.
   - Year 1: define system requirements; develop performance evaluation criteria; adapt a model suite for observing system simulation experiments (OSSEs).
   - Years 2 –3: Execute OSSEs for physical processes to support inundation and for nutrients and HABs. Develop and evaluate alternative designs.

4. Provide education and outreach materials.
   - Year 1: Establish a steering team of educators and scientists to share ideas on education and outreach products.
   - Year 2: Develop education products based on real-time and historical data for water quality, harmful algal blooms, living marine resources, and coastal inundation.

Project Title:

Maximizing the Economic Return from Northeast Regional Association of Coastal Ocean Observing Systems (NERACOOS): Prioritized End User Needs and Tools for Tracking Use and Value of Observing System Information

Recipient/ Lead Principal Investigator:

Woods Hole Oceanographic Institution/ Dr. Hauke L. Kite-Powell (*hauke@whoi.edu*)

Cost:

Funded: $156,000
Proposed (subject to available funds): Year 2 – $147,783; Year 3 – $157,785

Performance:

The purpose of this project is to: 1) work with prospective end-users of ocean observing system products in the Gulf of Maine/New England area to ensure that information generated by Northeast Regional Association of Coastal Ocean Observing Systems (NERACOOS) effectively addresses end-user needs; and (2) develop and implement a system to track the use of regional observing system information by end-users and document the economic value generated by this information. This will involve three main activities: 1) identify user priorities and information products to address inundation, harmful algal blooms, water quality, and living marine resources management, 2) develop usage tracking and economic assessment tools, and 3) adapt the tools to be used by other regional ocean observing systems.

Schedule:

1. Engage stakeholder user groups to identify and prioritize information needs.
   - Years 1 – 2: Conduct meetings for assessment and feedback.
   - Year 2: Characterize products and coordinate with NERACOOS.

2. Develop tools to track use of NERACOOS information by end users.
   - Year 1: Develop and review prototype tools and develop training materials.
   - Year 2: Provide training on tracking tools.
   - Year 3: Collect and analyze data on the use of NERACOOS products.

3. Develop economic valuation models to estimate the value generated by NERACOOS information.
   - Year 1: Design model and establish data requirements.
   - Year 2: Develop model and baseline scenarios.

4. Estimate the economic value generated by the use of NERACOOS information.
   - Years 2 – 3: Conduct assessment of usage data and benefit.
   - Year 3: Provide final report and tools with documentation.

Project Title:

A Northeast Benthic Observatory (NEBO) to Support Multi-Species Fisheries and Ecosystem Management

Recipient/ Lead Principal Investigator:

Woods Hole Oceanographic Institution/ Dr. Scott Gallager (*sgallager@whoi.edu*)

Cost:

Funded: $569,506
Proposed (subject to available funds): Year 2 – $582,403; Year 3 – $596,156

Performance:

This project will collect and analyze spatially comprehensive high resolution seafloor imagery to quantify key taxa, benthic community structure, species diversity, seafloor habitat characteristics, and coincident water column properties with repeated measurements on time scales of weeks to years. Data collection will be at locations with high fisheries and conservation value, such as the western Gulf of Maine. Project objectives are to: 1) establish four locations to collect imagery where benthic community structure, the coupling between the water column and benthic community, and system change over time scales of days to years will be quantified; 2) develop tools for integration of fisheries relevant data to segment and classify epi-benthic targets and substrate, and to visualize the results in near real-time; and 3) establish metrics for quantifying change in benthic community structure, organism abundance and size distribution of a variety of taxa relative to substrate composition in relation to water column processes.

Schedule:

Year 1:

- Develop tools for automated image processing and classification.
- Co-register optical and acoustic data.

- Serve raw image data over web.
- Integrate data on water column and benthic processes.
- Define data products relevant to end users.
- Begin extracting image information for development of data products.

Years 2 – 3:

- Finalize data extraction protocols and process archived data.
- Produce data products in near real-time during each survey and serve over web.

Year 3:

- Compile and statistically analyze time series data products.
- Provide temporal/spatial context for events during study (e.g., storms, climate change).

NOAA Contacts:

NOAA Coastal Services Center: Mary Culver (*Mary.Culver@noaa.gov*)
NOAA IOOS Program Office: Charles Alexander (*Charles.Alexander@noaa.gov*)