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

(over)

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:

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