FY2008: Regional Integrated Ocean Observing System Development

NOAA continued a merit-based funding process in 2008 to enhance regional ocean observing systems and achieve three long-term outcomes: establishing coordinated regional observing and data management infrastructures, developing applications and products for regional stakeholders, and crafting regional and national data management and communications protocols. In addition, regional associations received planning grant awards designed to assist them in stakeholder engagement, education and outreach, and long-range planning activities.

MID-ATLANTIC REGION

The Mid-Atlantic Region includes the coastal states from Cape Cod to Cape Hatteras. In 2008, implementation funds were provided to two recipients totaling $2,072,200. The 2008 Regional Association Planning Grant award to this region is $400,000.

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: FY 2007 (Year 1) - $1,700,000
FY 2008 (Year 2) - $1,700,000
Proposed (subject to available funds): Year 3 - $3,500,000

Performance:

This project will leverage existing regional observation assets to achieve three primary objectives: observations, modeling, and data management. 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 was on the observation and forecasting of two-dimensional surface currents to support maritime safety. The work in Years 2 and 3 will continue the progress made in Year 1, furthering observation activities such as current mapping, glider observations, and satellite data forecasts. In addition, the region will focus on statistical and dynamical ocean modeling, and will increase data management and communications (DMAC) and education and outreach efforts.

Schedule:

1. Years 1-2
    - Inventory 26 HF Radar Sites in online database
    - Standardize hardware and software setting throughout HF Radar network
    - Standardize Quality Assurance/Quality Control (QA/QC) radial data settings throughout HF Radar network
    - Implement Short Term Prediction System (STPS) throughout MARCOOS domain

(over)

- Define data streams for assimilation, quality control, error estimate, and DMAC
- Develop real-time data streams for assimilation
- Format WeatherFlow data in Network Common Data (NetCDF) format
- Bring HF Radar OPeNDAP combiner online
- Share HF Radar and STPS data via OPeNDAP
- Demonstrate MARCOOS-wide glider capability
- Engage NJ coastal community on near-shore currents and waves
- Leverage MACOORA grant to assess 3-D visualization techniques for fisheries
- Conduct background assessment of economic impact of fisheries

2. Years 1-3
    - Operate and update HF Radar system consistent with existing best practices
    - Evaluate other vector algorithms with West Coast sites for HF QA/QC
    - Operate and maintain STPS
    - Support MACOORA DMAC needs, coordinate with national DMAC efforts
    - Operate and maintain local L-Band and X-Band satellite systems
    - Evaluate Drifter assimilation
    - Formulate quantitative skill metrics for dynamical modeling
    - Develop assimilation methodology for real-time ready models

3. Year 2
    - Build network-wide HF Radar diagnostic monitoring
    - Install redundant/high speed communications for HF Radar where possible
    - Perform HF Radar site relocations as identified in the first 6 months
    - Test and evaluate new merging algorithm and vector metrics (HF Radar QA/QC)
    - Bring local satellite data to WEO-GEO (global mapping) data server online for leveraged product development
    - Develop concept of operations, recovery resource list, decision tree for underwater glider operations
    - Implement CTD (a measurement of temperature and depth) database through OPeNDAP

4. Years 2-3
    - Analyze and re-measure antenna patterns for best HF Radar performance
    - Draft best practices document consistent with national HF Radar network
    - Test and evaluate HF Radar antenna pattern sensitivity, revisit settings with hardware group based on tests
    - Develop web-portal for requests to the combiner
    - Share dynamical forecasts via OPeNDAP
    - Incorporate levered products from other satellite sources in MARCOOS
    - Participate in fisheries summit
    - Conduct underwater glider demonstration project
    - Expand education through region with Sea Grant partnerships
    - Leverage NSF grant to build web-based fisheries learning community
    - Conduct initial assessment of economic benefits demonstration impacts

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

Recipients/ Lead Principal Investigators:

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

Cost:

Funded: FY 2007 (Year 1) - $500,000
FY 2008 (Year 2) - $372,200
Proposed (subject to available funds): 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:

1. 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
- Develop an initial automated visualization processing capability to ingest and display hydrodynamic modeling results

2. Year 2
    - Evaluate and refine prototype forecast products and configure models for operational use. Use any new significant (i.e., tropical or extratropical) event that results in major flooding in Year 1 to aid in this evaluation and refinement
    - Develop and refine visualization and information products
    - Improve methods for tracing how inundation information is used and what benefits it generates
    - Continue to interview EMs for economic impact evaluation

3. 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
    - Expand the applications of the 12-hour ensemble hydrodynamic forecast technique (to areas such as Annapolis and Baltimore)
    - Develop visualization tools for most efficient use by forecasters
    - Convey products to emergency managers and other end-users
    - 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

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