

**SCOOP Project Update
SURA Board Meeting
Nov 4-5, 2004**

DATA GRID TASKS

Regional Association Data Grid Funding

Demo 9: Mid-Atlantic Regional Association (MARA)

SubTask Lead: University of Delaware

Sponsor: ONR & NOAA

Project Summary:

The Mid-Atlantic Regional Association (MARA) has formed to build an integrated observing system covering the watershed, bays, estuaries, and open shelf waters of the Middle Atlantic Bight (Cape Cod to Cape Hatteras). MARA has chosen to begin organization into a regional entity by assembling representatives from commerce, navigation, state coastal environmental management/protection, homeland security and science communities to build a Coastal Ocean Observing System capable of providing observations, analyses, interpretations, and forecasts to fill both regional and national needs, thereby, justifying sustained investment. As a nascent Regional Association, there has been one workshop of the MARA Steering Committee to determine the best way to approach full participation from the users and data providers in the nine states (MA, RI, CT, NY, NJ, PA, DE, MD, and VA) that contain five major estuarine systems (South New England Bight, Long Island Sound, New York Bight, Delaware Bay, and Chesapeake Bay) and ~23% of the nation's population. The approach determined as most representative and comprehensive is to host five sub-regional workshops.

Demo 10: South East Coastal Ocean Observing Regional Association (SECOORA)

SubTask Lead: South Carolina SeaGrant Consortium

Sponsor: NOAA

Project Summary: N/A

Demo 11: Gulf of Main Ocean Observing System (GoMOOS)

SubTask Lead: GoMOOS

Sponsor: ONR

Project Summary: N/A

Demo 12: Gulf Coast Ocean Observing System (GCOOS)

SubTask Lead: Texas A&M University

Sponsor: ONR

Project Summary: The Texas General Land Office (TGLO) is the Texas state government agency responsible for oil spill response and mitigation in Texas coastal waters and was an early signatory to the resolution to form the Gulf of Mexico Coastal Ocean Observing System (GCOOS) regional association. TGLO provides financial support and Texas A&M University operates, the Texas Automated Buoy System (TABS) comprised of 7 instrumented platforms deployed along the Texas continental shelf and the associated operational ocean current model and forecast system. The modeling/forecast system is largely autonomous, employs OPeNDAP and Live Access Server (LAS) technologies and has been operating continuously since 1998. While the system meets the user's (TGLO) basic needs, additional resources are needed to modernize the system and make it interoperable with other models and data sets. TGLO is both a stakeholder and a realworld user that derives a well-defined societal benefit from their regional ocean observing system. TGLO and Texas A&M University intend that this system will continue to evolve and will conform to emerging data management standards for ocean observing systems (OOS). Toward this goal we propose the following.

The TABS/forecast system evolved before the Data Management and Communications (DMAC) plan was written. We will revamp our systems to conform with and implement as feasible the recommendations of the DMAC plan with respect to data discovery, access, transport, archival, and products. We will produce metadata following the recommendations of the DMAC plan including evolving XML definitions (namespace, sensor, etc.) as appropriate. This will greatly facilitate the end-to-end machine processing of data from sensor to archive. We will document our efforts, successes and failures, obstacles and solutions as "Lessons Learned" to be submitted as a deliverable. We will share these findings with other OOS. We will enhance our web presence to employ open GIS consortium (OGC) technologies similar to those used on the openioos demonstration, (<http://dev1.dmsolutions.ca/ioos2/>) and the SEACOOS (<http://www.seacoos.org/>) websites. This will allow us to pull down and overlay information from other providers such as SST from LSU, buoy data from NDBC and model output from USF/COMPS to name a few. We will generate and display model-data comparisons and model performance metrics for our and perhaps other circulation models. We will work with NOAA/Hazmat to make our system and their GNOME Oil Spill Model interoperable for the use and benefit of TGLO resource managers.

Surface Current Mapping

SubTask Lead: SURA

Sponsor: ONR

Project Summary: N/A

*** Metadata Standards**

SubTask Lead: Woods Hole Oceanographic Institution (WHOI)

Sponsor: NOAA

Project Summary: Dr. Al Plueddemann and Dr. Bob Weller will represent the international mooring community in the collaborative nationwide effort to develop marine metadata community guidance and to work toward interoperable community standards. Plueddemann and Weller will participate, along with other SCOOP partners and partners from the related NSF-funded initiative involving the lead principal investigators, John Graybeal from the Monterey Bay Aquarium and Research Institute (MBARI) and Stephanie Watson from the Central California Coastal Ocean Observing System (CenCOOS).

*** Community Building**

SubTask Lead: SURA/SCOOP

Sponsor: NOAA

Project Summary:

SURA/SCOOP will work with nascent and existing Regional Associations (e.g., MARA, GCOOS, GoMOOS, SECOORA) to assess their technical needs. The focus will be on regional data centers that can support development of information products that target specific, well-defined user sectors and user needs. In addition, the program will support the establishment and implementation of data centers and/or provide specific support services as required by the Regional Associations. Finally, SURA/SCOOP will provide the necessary outreach to RAs so that they can leverage the technical capabilities and data-management and communications capabilities of other, relatively well-established RAs.

MODEL GRID TASKS

Task 1: Data Standards

Task Lead: Texas A&M University

Sponsor: NOAA

Task Requirements:

- Engage SCOOP partners to determine what they're doing and what they need as regards data and metadata standards;
- Provide an assessment and compendium of existing standards and mandated standards;
- Produce a glossary of recommended definitive terms, data dictionary, data model, metadata model, etc. drawn from other activities and approved by SCOOP partners;
- Provide coordination and management of all task activities, maintain updated task wiki topic (with weekly updates), oversee development of all

task-related documents, and convene & coordinate regular communications & meetings necessary for specific task activities (conference calls, face-to-face, etc).

- Deliverables from this task will be used to inform the data-translation activities being led by UAH and funded by ONR.

Task 2: Software Modules for Data Transport

Task Lead: University of Alabama, Huntsville

Sponsor: ONR

Task Requirements:

- compatibility and interoperability with both server and client components within the SCOOP data flow(s), the needs/requirements of data consumers, optimizing performance and ensuring security and reliability.
- designing and implementing data management systems for scientific data that have involved the full spectrum of data transport components across a variety of Earth science domains, as well as expertise in the developing grid-based system services.
- leverage experience in the collection of requirements from the coastal research and operational user communities, investigation of existing and new technologies that will be appropriate for SCOOP and ultimately the guidance and direction of design and implementation of transport protocols, interfaces and standards for SCOOP.
- UAH will draw on experience gained in the NSF ITR Linked Environments for Atmospheric Discovery (LEAD) project, in metadata conventions, distributed catalogs, data interoperability and other data management tasks. The Data Transport partners include Texas A&M University (TAMU) and other modeling partners.

Part of Task 2: Demo 4: Model-Data Interchange Interface

Task Lead: University of Alabama, Huntsville

Sponsor: ONR

Task Requirements:

- Development of a Data-to-Model (D2M) middleware component to provide programmatic interpretation and translation of incoming data formats into the format necessary for integration with targeted modeling functionality.
- A standard definition for structural metadata to enable the interoperation of data access and analysis tools with a wide variety of different scientific data file formats and structures.
- Earth Science Markup Language (ESML), developed at UAH, allows data “descriptions” to be written in a standard fashion in external files. ESML

descriptions will be generated for each type of data to be assimilated, as well as for data input requirements for the various models.

- D2M middleware will be able to read and interpret any data that has an associated ESML definition and extract only those instrument channels or geophysical parameters specified by a user and required by a model.

Task 3: Software Modules for Data Translation and Management (DTM)

Task Lead: UAH

Sponsor: ONR

Task Requirements:

- the integration of several existing ocean observing systems, with heterogeneous and distributed data sources for both observations and model output;
- provide interoperability for data discovery across heterogeneous systems, translation from a data set's native format to that required for a particular application, and other related services;
- draw on experience gained in the NSF ITR Linked Environments for Atmospheric Discovery (LEAD) project, in metadata standards, distributed catalogs, data interoperability and other data management tasks;
- leverage existing capabilities, and where necessary, develop software modules that provide data translation and management services for the data from the various regional ocean observation systems to provide services as part of an integrated system.

Task 4: Coupled Modeling

Task Lead: University of Miami

Sponsor: NOSS

Task Requirements:

- A fully automated operational model system for winds, waves and surge that provides output of variables describing the wind forcing on the ocean surface, the sea state, and the water elevation changes at high spatial resolution and near time, and radiation stress for use in coupled surge calculation.
- Computational performance must be fast enough to be of value as a tool for forecasting and fit within the 3-hourly advisory cycle of the National Hurricane Center.

Task 5: Nested Modeling

Task Lead: Virginia Institute of Marine Science (VIMS)

Sponsor: NOAA

Task Requirements:

- Provide Accurate near real-time boundary conditions at the seaward edge of the domain for both circulation and wave information.
- Furnish data and model products in near real-time.
- Provide technical requirements and advise other tasks, such as: data standards, data retrieval, data translation, and data serving will need to be included as an integral part of current task.
- Run ADCIRC and local fine-scale model simultaneously for a specified time interval in a grid computing environment
- Specify ADCIRC water level files as boundary forcing for local scale model within each time step
- Invoke recommended middle-ware to extract water-level values from ADCIRC solution to be applied as forcing for local scale model

SubTask of Nested Modeling Task 5: Model-Model Exchange Interface:

SubTask Lead: UNC

Sponsor: ONR

SubTask Requirements:

- model to model interaction
- distributed data management for collecting, archiving, and providing access to data
- web-based model portal interface; and
- model availability/execution in Grid computing environment.

Task 6: Tool Set for Customized Configuration of Modeling

Task Lead: Texas A&M University

Sponsor: NOAA

Task Requirements:

- Engage community to determine what they're doing and what they need in terms of a configurable interface for modular predictive models;
- Produce a prototype of toolset that allows SCOOP professionals to customize and configure their models in a flexible yet efficient manner;
- Provide coordination and management of all task activities, maintain updated task wiki topic (with weekly updates), oversee development of all task-related documents, and convene & coordinate regular communications & meetings necessary for specific task activities (conference calls, face-to-face, etc).

Task 7: Visualization Services

Task Lead: Louisiana State University working closely with TAMU, GoMOOS, and UF

Sponsor: NOAA

Task Requirements:

- Provide GIS based visualization tools and support for SCOOP partners to allow display of model parameters.
- Provide coordination and management of data format compatible to GIS format which enables community to visualize in standard formats.
- Support partners in development of an interactive GIS based webpage.
- Provide coordination and management of task activities; maintain the task wiki and communication for specific task activities in form of conference calls.
- Integrate data provided by different groups to LSU, coordinate with different task leaders and groups for data sharing and exchange, enabling us to develop visualization routines for easy access to the user community.

SubTask of Visualization Services Task 7:

SubTask Lead: LSU

Sponsor: ONR

SubTask Requirements:

- Provide indigenously developed GIS based visualization tools for display of model computed parameters.
- Provide coordination and management of data format compatible to GIS format which enables community to visualize in standard formats.
- Support partners in development of an interactive GIS based webpage.
- Provide coordination and management of task activities, maintain the task wiki and communication for specific task activities in form of conference calls.
- Integrate data provided by different groups to LSU, coordinate with different task leaders and groups for data sharing and exchange, enabling us to develop visualization routines for easy access to the user community.
- Directional wave energy spectra at user desired location (on real time and in forecast mode) can also be provided and visualized in graphic interface.
- Development and maintenance of GIS based visualization tools for proficient display of spatially varying information in real-time/forecast mode (derived from numerical models).
- Data storage will be maintained by LSU which will be accessible by different groups for easier data sharing/communication focusing on the users need.

Task 8: Verification and Validation

Task Lead: University of Miami

Sponsor: NOAA

Task Requirements: This task is defined as the validation and verification of coupled model output using all available observational data in near-real time. The requirements to achieve this goal are:

- Standardized data dictionary, data format for task
 - Coordinate with data standards group
- Initialization of a validation and verification database (VVDB)
- The ability to ingest archived model output to VVDB
- The ability to ingest archived observation data to VVDB
 - NOS water level data
 - Topex, ERS altimetry data
- Comparison of model output to observations (archived mode)
 - Bias and rms error
 - Maximum and minima over time/space intervals
 - Phase and lag comparisons
- Production of a quantitative skill assessment
 - Publish in numerical and graphical form for dissemination
- Establishment of real time model data feed
- Establishment of real time observational data feed
 - GTS data feed
 - Direct delivery from data providers (e.g. NOS, ESA)
- Comparison of model output to observations (near-real time mode)
 - 'rolling' statistics with the inclusion of available data throughout forecast period
 - update quantitative skill assessment as new data are available
- Completion of documentation on VVDB and skill assessment system

Task 9: Computing and Storage Resources

Task Lead: LSU

Sponsor: ONR

Task Requirements:

- Identify hardware and software requirements for the SCOOP Grid, taking into account the modeling, Grid and security activities.
- Build the SCOOP Grid based on these requirements, using machines from the SCOOP partners.
- Provide a Grid and Collaborative portal for the SCOOP project.
- Provide web based documentation on the structure and use of the SCOOP Grid
- Provide a monitoring and testing apparatus for the Grid machines and services.

- Support the use of the SCOOP Grid through working towards demonstrations of other tasks.

Task 10: Security

Task Lead: Texas A&M University

Sponsor: NOAA

Task Requirements:

- Engage community to determine what they're doing and what they need;
- Produce a glossary for definitive terms, security model, countermeasure methods, etc. drawn from other activities;
- Provide a compendium of existing standards and best practices;
- Provide coordination and management of all task activities, maintain updated task wiki topic (with weekly updates), oversee development of all task-related documents, and convene & coordinate regular communications & meetings necessary for specific task activities (conference calls, face-to-face, etc).

Task 11: Grid Management Middleware

Task Lead: Louisiana State University

Sponsor: NOAA

Task Requirements:

- Identify Grid service requirements for supporting the SCOOP data and model grid efforts.
- Survey existing Grid services and middleware for best fits to SCOOP requirements.
- Work with modeling and data tasks to amend SCOOP application layer to utilize GAT-API where appropriate.
- Develop needed GAT adaptors for Grid chosen Grid services.
- Work with Task 9 to deploy services on the SCOOP Grid.
- Disseminate information about status and use of Grid middleware through project Wiki, tutorials at project meetings, documentation, etc.

Demo 1: Web Mapping

Task Lead: GoMOOS

Sponsor: ONR

Task Requirements:

- Add Will Perrie's wave model output as a raster layer to the hurricane demo;
- Development version of the interoperability demo
- List of potential data products that can be added to the openioos site, and issues associated with getting them there.
- Hurricane Ivan as a test case using all applicable data products from the SCOOP modeling partners
- Create a tool that takes netCDF output from ADCIRC and published to the OGC spec