

**Development of the Gulf of Mexico Coastal Ocean Observing  
System (GCOOS) and its Regional Association (GCOOS-RA):  
Phase II  
NA05NOS4731167**

**Progress Report  
December 1, 2005 - May 31, 2006**

**1.0 Progress on Regional Association Development**

1.1 Activities during the report period

- In late December 2005 three members of the Board of Directors due to be rotated off after one year (in August 2006) stood against other candidates for election to three-year terms and were re-elected.
- During January 10-13, 2006 the first meetings of the GCOOS Stakeholder Council and the GCOOS Parties and the second meetings of the Board of Directors and Executive Committee were held in Mobile, AL. Many useful suggestions were made by the Stakeholder Council. Complete reports of all meetings are on the GCOOS web site.
- The Board of Directors held bi-monthly telephone conferences.
- Based on inputs from the foregoing groups, the GCOOS web site (<http://www.gcoos.org>) was further revised. It is the major source of information regarding the GCOOS system of systems and development of a certified Regional Association (GCOOS-RA).
- The GCOOS Office has continued to refine its list serve of stakeholders. They receive pertinent information regarding system developments via email. This list serve also is used to solicit opinion and inputs.
- The Memorandum of Agreement for the GCOOS-Regional Association was reviewed by Council for the Texas General Land Office and recommended clarifications were suggested. The Board, meeting in January 2006, accepted these changes; these changes were then accepted without objection by the voting Parties to the MoA. The current MoA is on the GCOOS web site.
- Dr. Ann E. Jochens continued to work as the GCOOS Regional Coordinator, Dr. Matthew K. Howard as the regional DMAC Coordinator, and Susan R. Martin as the administrative assistant in the GCOOS Office.
- The number of platforms in the Gulf of Mexico producing real time data continues to increase following Hurricanes Katrina and Rita, although pre-hurricane numbers have not

yet been reached. The National Data Buoy Center of NOAA is making progress toward real-time quality control of current measurements made by the oil and gas industry at the directive of the Minerals Management Service.

- Ann Jochens attended a Gulf of Mexico Alliance community workshop January 19, 2006, in Corpus Christi, TX.
- Ann Jochens et al. presented a paper on GCOOS-RA development at the Ocean Sciences meeting in Honolulu, HI on February 21, 2006.
- Representatives from GCOOS participated in the State of the Gulf Summit 2006 organized by the Harte Research Institute for the Gulf of Mexico Alliance on March 28-30, 2006 in Corpus Christi, TX.
- Don Roman was a keynote speaker on GCOOS at the fifth Florida COOS Caucus on April 3, 2006, at Mote Marine Laboratory.
- Initial members for the Education and Outreach Council (EOC) and the Committees for Operating Systems, DMAC, and Products and Services were selected. The EOC met on April 24-25 and the 3 Committees met on April 26-27, 2006, in Ocean Springs, MS.
- Nowlin gave a paper on GCOOS at the US/EU Baltic Symposium in Klaipeda, Lithuania, May 23-25, 2006. Tom Malone and Nowlin organized a technical session at this symposium dealing with RCOOSs in IOOS.
- Active contacts have been maintained by Nowlin and Alfredo Prelat (PAR Governments) with Pemex, GOOS Mexico, and the Caribbean Regional Association. Arrangements have been made to give GCOOS presentations to GOOS Mexico and Pemex in Mexico City on June 27, 2006, to participate as moderator of a discussion panel and as keynote presenter at a Symposium on the Ecosystems of the Gulf of Mexico and Caribbean Sea to be held in Villahermosa, Mexico, on June 28-29, 2006, and to give presentations to Pemex Exploration and Production in Villahermosa.

## 1.2 Results of the activities

- The industry-GCOOS workshop held November 2005 produced prioritized lists of measurements and products desired by the oil, gas, and related sectors. In addition, this workshop resulted in a series of suggested pilot projects and some estimates of economic benefits.
- One pilot project recommended by the November 2005 Industry-GCOOS workshop (web site showing real-time upper layer currents in the Gulf of Mexico) has been undertaken by an international business.
- Prospectus for a GCOOS Operation Center has been developed as a potential pilot project. It has been posted for open review, revised, and is now posted on our web site.

- The MoA for the GCOOS-RA now has been signed by 50 Parties to the Association. It is open for signature by other qualified parties. Under the new MoA, non-U.S. entities can become Associates to the GCOOS-RA.
- The GCOOS Office has acted on many decisions taken by the Board of Directors, Executive Committee, and Stakeholder Council.
- Revisions to the GCOOS Business Plan are continuing.
- Action Plans for all GCOOS Councils and Committees now exist and are posted on our web site.

### 1.3 Plans for the next year

- Ann Jochens and Worth Nowlin will give an invited GCOOS presentation to the Gulf of Mexico Fishery Management Council on 7 June 2006 in Tampa, FL. This is an effort to engage the Council in assisting with determining fishery stakeholders' priorities for data and products from the IOOS.
- Ann Jochens will attend the annual meeting of the Association of State Floodplain Managers in Albuquerque, NM, on 12-16 June 2006.
- As part of the GCOOS efforts to develop connections with Mexico and Caribbean counterparts, Worth Nowlin and Alfredo Prelat will give a talk on GCOOS at the "Symposium on Coastal Ecosystems of the Gulf of Mexico and Caribbean Sea: Toward the Integration of Research Groups" being held on 28-30 June 2006 at the University of Tabasco in Villahermosa, Mexico.
- The third meeting of the Board of Directors and Executive Committee will be held in August 2006 in St. Petersburg, FL.
- Ann Jochens will present a paper on GCOOS at the IEEE/MTS Oceans 06 Conference in Boston, MA, on 27 September 2006.
- Worth Nowlin and other GCOOS representatives will meet with personnel from NOAA's Southeast Fisheries Science Center tentatively in fall 2006.
- The Board of Directors (and Executive Committee), Parties, and Stakeholder Council will meet in January 2007.
- Elections for Board of Directors positions that are rotating open will be arranged by the Membership Committee for the voting Parties. Results are expected to be announced at the January 2007 meeting of the Parties.

- Meetings of the GCOOS Education and Outreach Council and of the DMAC, Products and Services, and Operating Systems Committees will be held in spring of 2007.
- The Board of Directors, with inputs from workshops and the Stakeholder Council, endorsed a series of eight pilot projects and suggested for each a small group to further consider how to take the project forward. Note that pilot projects 4-8 below focused on products recommended by the GCOOS and the Private Sector: Oil and Gas and Related Industry Workshop; the priority (H: high, M: medium, L: low) for each also is indicated. These eight pilot projects are listed below along with the lead person identified for each.
  - (1) Instrument tankers that occupy regular tracks between Texas and Florida ports with flow-through surface parameters (temperature, salinity, chlorophyll, nutrients, dissolved oxygen), ADCPs, and meteorological sensors with real-time telemetry. (Mark Luther, University of South Florida)
  - (2) Most county/state health departments make regular water quality measurements for human pathogens. These take 24 to 48 hours to culture and obtain results. These observations are placed into databases that could be made internet-accessible. Linking these together into a GOM-wide beach health indicator map would be very useful to beach managers. Ultimately, such observations could be linked with physical transport observations and models to give predictive capability. (Bart Bibler, Florida Department of Health, Bureau of Water Programs)
  - (3) Initiate a pilot GCOOS Operations Center (Raymond Toll, SAIC)
  - (4) Project to develop proven forecasts of three-dimensional surface currents for the Gulf of Mexico (H). (Cort Cooper, Chevron)
  - (5) Development of a measurement and products archive for the deepwater Gulf of Mexico (H). (Worth Nowlin, Texas A&M University)
  - (6) Produce maps of marine mammals and endangered turtles in the Gulf of Mexico based on legacy information from the NMFS and MMS projects and real-time observations from the oil and gas industry (M). (Deferred as a medium priority project)
  - (7) Produce probability maps of bottom hazards (H-) and maps of hydrocarbon seeps (L) for the Gulf of Mexico. (Alfredo Prelat, PAR Governments)
  - (8) Improving forecasts of hurricane severity (H). (Cort Cooper, Chevron)
- A series of workshops that reach out to specific stakeholder sectors will be held. Tentatively these will address:
  - Fisheries—Planning presentations to the Gulf of Mexico Fisheries Management Council, Gulf States Marine Fisheries Commission, and Marine Fisheries Advisory Committee to obtain guidance on how best to bring in all fisheries sectors: regulatory, commercial, recreational, and academic. Followed by in-depth workshops to develop requirements of the sectors separately. A steering committee for this effort, including a representative of SECOORA, met by teleconference on 3 March 2005.
  - Storm surge and flooding—Emergency responders will be asked for priorities; joint CSC/NOAA-SECOORA-GCOOS sponsorship.
  - Maritime transportation elements—including tanker traffic, container ships, cruise ships, shipping agents, port authorities, pilots, LNG carriers, intercoastal waterway traffic, and commercial transportation of people.

Recreational boating—including marina operators, power squadrons, yacht clubs, marina operators, and retailers.

Urban planners/developers

Water Quality—Key on Gulf of Mexico Alliance Plans and on results of U.S. IOOS Public Health Workshop held 23-25 January 2006.

- The first GCOOS Business Plan will be completed and approved by the Board of Directors.
- A GCOOS communications plan will be drafted.

## **2.0 Priorities for Observations from Regional Perspective**

*Although the priorities given below remain in our Business Plan, we expect them to be modified based on recommendations of GCOOS Committees meeting in April 2006.*

### 2.1 Identification of top five priorities for developing the National Backbone

Along with the entire GOOS endeavor, continuation and expansion of the satellite remote sensing programs is a high priority for GCOOS. This is particularly so of developments that will lead to both better processing algorithms and spatial/temporal sampling in the coastal regime.

Priorities specific to GCOOS follow.

1. Improve DMAC compliance in the Gulf region
  - NDBC is working with several Regional Observing Systems and providing a QA/QC and real-time data distribution service using a product called the "MODEM Kit". In the Gulf of Mexico NDBC is working with TABS, COMPS, TCOON, and LUMCON. This activity will be expanded to include other data providers so as to achieve complete integration of real-time measurements in the region.
  - NDBC also places these data sets on a DODS server once a month. They will expand this to real-time on an OPENDAP server, using a Live Access Server as a user interface to keep current with the DMAC guidance.
  - Transition the NDBC Real-Time OPENDAP server to operational status
2. Enhance NDBC buoy and C-MAN networks
  - Add wave directionality to wave height—useful for rip current forecasting and sediment transport estimation
  - Add visibility measurements—needed near the Mississippi River and other areas for biological productivity estimation and for river-ocean connection
  - Add acoustic Doppler current profilers—constraints for models and for HF radar network
  - Add ecosystem measurements, as feasible
  - Add water level measurements
  - Increase the number of stations in these networks by a factor of five, including additional meteorological stations in the near coastal zone for use in forecasting surface currents for HABSOS as well as improved regional models

3. Improve and enhance monitoring of water quality in watersheds, estuaries, and coastal to shelf waters, as well as fluxes between these entities. As recommended in the USCOP report, the Council on Environmental Quality is proposing a federal water quality initiative involving EPA, NOAA, and the USGS. A demonstration project in the Mississippi River watershed and the Gulf of Mexico would focus on nutrient enrichment issues, such as hypoxia. Along these lines, GCOOS would like to see:
  - Monitoring in additional streams
  - Monitoring to include nutrients and other ecosystem indicators, as well as flow rates—uses include monitoring coastal eutrophication
4. Establish long-range HF radar monitoring of surface currents as a part of the national surface current monitoring initiative being planned by Ocean.US.
5. Integrate and assess numerical circulation models for the region One or more numerical circulation models, utilizing data assimilation, for the Gulf of Mexico should be added to the national backbone. The benefits of having both high density model data (compared to measured data density), which dynamically interpolates the observations, and the capability to forecast the ocean state, will greatly increase the usefulness of GCOOS.
  - Create a portal to outputs from all accessible full Gulf models
  - Assemble and assess the skill of these models
  - Provide boundary conditions for smaller-scale coastal and estuarine models
6. Integrate the water level network for the Gulf of Mexico.
  - Adjust all water level measurements to a common set of datums
  - Analyze all extant water level records for regional trends and assess new requirements
  - Expand NWLON (NOS National Water Level Network) as needed based on foregoing activities
7. Develop a deep-ocean, advanced capability sentinel station. Envisioned is a station with a measurement suite capable of characterizing the environment from the sea floor to the troposphere (-3000 m to +3000 m). It would serve both as a sentinel station in the U.S. EEZ but also as a test bed for advanced technology.

## 2.2 Identification of top five Regional Ocean Observing System priorities

These priorities are predicated on the assumption that the priority enhancements to the national backbone will be forthcoming. A high priority is a set aside of regional funds for education and outreach. High priority outreach areas are the identification of system users and capacity building between Gulf states (U.S. and Mexican) for harmful algal bloom measurements.

1. Enhance and expand the real-time networks of COMPS, LUMCON, TABS, TCOON, WAVCIS, and other extant observing system elements. [COMPS costs will be budgeted via SERA-COOS.] This will include:
  - Expand LUMCON observing system by one offshore station per year beginning in 2007.
  - Strengthen TCOON platforms against hurricanes.

- Upgrade TCOON with improved data communication capability to reduce data delay.
  - Place new sensors on COMPS, TABS, LUMCON, and other elements serving data in real-time via MODEM Kit to OPENDAP server.
  - Expand COMPS buoy and HF radar sites, expand types of measurements, and provide adequate auxiliary supplies.
  - Enhance and expand TABS to improve near shore coverage in southwest region and include meteorological packages on all platforms.
  - Expand CenGOOS to improve coverage in the region off eastern Louisiana, Mississippi and Alabama.
2. Develop technology for ecological monitoring, particularly for use in HABSOS, and hypoxia study.  
Moored sites will be used to test and evaluate new technology, and proven instrumentation will be added. This will be carried out at sites of TABS, COMPS (budgeted as part of SERA-COOS) and perhaps other elements.
  3. Undertake a project to develop and improve products and services  
This must be joint public-private venture from the beginning. Some new products may be envisioned as being produced and sold by the private sector. Other new products may be envisioned to be produced for the common good, and those might be handed off to NOAA's Coastal Services Center for routine production and distribution.
  4. Provide ground support for non-real-time activities, including:
    - Evaluation of developing technology
    - Calibration/validation of satellite remotely sensed measures
  5. Expand surface current measurement network near coasts and in estuaries using short-range HF radar systems.
  6. Develop and conduct a pilot project demonstrating the use of fiber optic cable for data retrieval and instrument control in the IOOS.
  7. Develop and conduct a pilot project to retrieve deep current data being collected by oil industry and MMS and to begin selected use of these data
    - Systematic monitoring of deep currents
    - Model improvements
  8. Monitor the effects of river input (e.g., the Mississippi River) on the region.  
This is of very high priority, but design will require time and effort. Sought is the ability to track outflow, spreading, stratification, and effects of river water and constituents. This likely will include:
    - Major densification of present levels of measurements, both spatially and temporally.
    - A concerted modeling effort
    - Coordinated data integration
    - Development of products and reporting

9. Develop and conduct hydrographic science projects to support the IOOS goals. This includes GPS buoys for offshore water level monitoring, surveys to provide high resolution bathymetry and topography across the land-sea interface between 30 m above and 30 m below the mean low water level, and sediment and bottom habitat characterizations.

### **3.0 Issues, Challenges and Opportunities**

- Clear and reasonable guidelines still are need as to what "certification" of a Regional Association means and how certification is achieved. *This has been suggested previously.*
- Activities to advance the IOOS DMAC Plan should receive high priority. A website of open bulletin board describing ongoing DMAC related activities, contacts, and results should be established and maintained. *This has been suggested twice before with no consequent action.*
- New funds should be openly competed for pilot programs deemed necessary for Regional Associations, without specific constraints from the funding agency.
- A national IOOS Education and Outreach Committee should be established. *This has been suggested twice.*
- Necessary workshops and meetings should be scheduled well in advance and with consideration for other meetings and for holidays. The Ocean.US Office has made some progress in this direction.
- Clear guidelines are needed for coordination between units of federal agencies within the purview of a Regional Association and the Regional Association. *This suggestion was made previously.*

### **4.0 Recommendations for Conferences and Workshops**

Recommended workshops to sharpen priorities for GCOOS actions are stated in Section 1.3.

GCOOS and SECOORA should be included at the table in future Gulf of Mexico Alliance meetings.

### **5.0 Recommendations of Additional Resource Needs**

Additional resources are needed for the following priorities:

- To advance the DMAC Plan,
- To complete formulation of the NFRA,
- To initiate a national IOOS Education and Outreach effort,
- For competitive funding of pilot projects,
- For competitive funding of enhancements to RCOOSs, and
- To hire an Education and Outreach Coordinator for the GCOOS-RA.

