Continued Development of the Gulf of Mexico Coastal Ocean Observing System

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This is the December 2013 Semi-Annual Supplement for the project, Continued Development of the Gulf of Mexico Coastal Ocean Observing System, under NOAA Cooperative Agreement NA11NOS0120024.

1.0 Products and Services

- New or improved regional Products and Services: 6 new products; 5 improved services
  - The Data Portal has been enhanced to include new capabilities, including mapping assets by observation type or source of the data (see Figure 1), improved accuracy in monitoring the status of stations and sensors (see Figure 2), and new coding that is available as open source. The Data Portal is at [http://data.gcoos.org](http://data.gcoos.org).
  - The Products Portal web page was enhanced to show new web map capabilities and products, new or improved outreach products (e.g., lionfish distributions, clean marinas, recreational boaters page, sea level rise scenarios, glider deployments, and oil and gas platforms. Products Portal is at [http://gcoos.org/products/](http://gcoos.org/products/) (see Figure 3).
  - The recreational boaters web page is continually improved ([http://gcoos.org/products/maps/boaters/](http://gcoos.org/products/maps/boaters/)).
  - The data display for the Texas Observatory for Algal Succession Time-series from Port Aransas, TX, is being enhanced. It includes a plotting of four major Harmful Algal Bloom (HAB) species from the region ([http://gcoos.org/products/index.php/hab/time-series/](http://gcoos.org/products/index.php/hab/time-series/)).
  - The Model Resources Center of the GCOOS Products Portal is being enhanced and includes a new tool for accessing animations and data of sea surface height anomaly ([http://gcoos.org/products/index.php/model-resources/ssha/](http://gcoos.org/products/index.php/model-resources/ssha/)).

- New or improved national products and services: none this reporting period, although the GCOOS local data nodes that collect meteorological data, such as the LUMCON Environmental, DISL Mobile Bay Environmental, and FSU Tower N7 Monitoring Systems, and others report to the NOAA's National Data Buoy Center.

2.0 Data Management

- Progress towards a standards-based foundation for DMAC capabilities: GCOOS continues to maintain and enhance their established data management system in response to changes in system hosting, network security, the IOOS ocean informatics community and IOOS Program Office DMAC initiatives. GCOOS staff participate at all levels of the interoperability enterprise from testing software code to developing national policy.

- Demonstrated progress:
  - **52°North SOS**: GCOOS volunteered to be an early adopter of 52°North’s implementation of the Sensor Observation Service (SOS), and we took part in the early debugging of the 52°N SOS. However, our decisions to (1) redeploy the data portal to new development and production servers in an operationally monitored (24/7) machine room, (2) migrate database engines from SQLite to PostgreSQL for performance reasons and (3) greatly enhance the Data Portal’s capabilities, have delayed adoption of 52°North’s SOS until after these migrations and changes are complete and stable. As of 19 December the deployment of the 52°N SOS was imminent.
  - **IOOS Biological Observations Data Project (BDP)**: A small part of the current grant provided for GCOOS’ participation in the development of standards for serving biological data. Toward that end Howard attended a BDP kick-off workshop in St. Petersburg, FL, in
June 2012, participated in numerous conference calls and a final program review in St. Petersburg, FL, in March 2013. As a result, GCOOS published fisheries data through an ERDDAP server using a newly-developed IOOS vocabulary as a demonstration of the value of standardized exposure of biological data sets. These data were exposed through an ERDDAP server at http://barataria.tamu.edu/erddap/info/index.html. From March through August 2013, numerous changes in the data structure were developed by the data provider and OBIS USA. These changes were made, and a new instance of ERDDAP was deployed on the new data portal servers. Though some bugs remain to be eliminated the new server is located at http://gcoos1.tamu.edu:8080/erddap/info/index.html. Once the bugs are removed the old server will be retired.

- **National Glider Network Plan**: Howard attended the IOOS National Glider Strategy workshop in La Jolla, CA, in July 2012. He subsequently became a member of the Glider Plan writing team for the DMAC sections. He has reviewed early drafts of the document and provided comments. In late summer and early fall 2013, glider deployments were made by the unit of Texas A&M University that operates the TABS system. GCOOS handled the data integration and registered with the IOOS Glider DAC. Glider tracks and data plots appeared on the GCOOS and IOOS web sites.

- **Using support from GCOOS, Sanibel-Captiva Conservation Foundation contracted Satlantic Inc. to build and deploy an SOS endpoint into their LOBO system. This is the first known deployment of IOOS-compatible services by the private sector, [http://satlantic.com/sos-lobo](http://satlantic.com/sos-lobo).**

- **U.S. IOOS Office QARTOD Project**: This project will document standard practices for Quality Assurance and Quality Control of IOOS data. Adherence to these practices will be part of the requirements for Regional certification. Howard is a member of the Board of Advisors for the U.S. IOOS QARTOD Project and has participated in conference calls and provided written reviews of interim documents. The team has nearly completed the manuals for temperature and salinity, and is well underway with water level. The group recently discussed conventions for the meanings of flags. We will likely register flag definitions with the Marine Metadata Interoperability website. Note: through introductions made by GCOOS staff, the two Marine Metadata Interoperability websites (https://marinemetadata.org and [http://mmisw.org](http://mmisw.org)) were transferred to the control of the GCOOS System Architect and are now housed on servers at the Harte Research Institute at Texas A&M University-Corpus Christi.

- **IOOS Association Common Product Initiative (CPI)**: Howard is a member of the IOOS Association’s Common Product Initiative Steering Team. The team held frequent teleconference calls in 2013 toward organizing a workshop to follow the IOOS Regional Data Integration Team’s annual meeting. The CPI workshop was held in September 2013. Results were presented to the executive directors at the IOOS meeting in La Jolla, CA in November. The Steering Team continues to work toward developing a plan for a national level product.

- **IOOS Regional Data Integration (RDI) Team**: The RDI team is composed of Regional DMAC managers and related members of the IOOS Program Office. They hold an annual meeting to plan joint activities and to inform the IOOS Program Office’s Planning for the next fiscal year. Howard is the GCOOS representative. He attended the meeting in September 2013.

- **Open data sharing**: The GCOOS Data Portal aggregates data from local data nodes, aka data providers (see [http://data.gcoos.org](http://data.gcoos.org)), and makes these data available through standards-based web services. A Data Sharing/Use Policy is in revision. New providers are continually added to the system.

- **Provision of data to WMO GTS**: Most GCOOS data providers submit their data to NDBC
directly. Additionally, NDBC may harvest data from the Data Portal directly through the Portal’s SOS access point, which currently uses the same as SOS implementation as does NDBC. NDBC injects much of this data into the WMO/GTS stream.

- **Implementation of a service-oriented architecture:** The GCOOS Data Portal was constructed to be a service-oriented architecture. The portal provides maps of assets, shows the status of asset operations, and includes a tool to download specific data according to the user needs.

- **Use of common vocabularies and identifiers:** GCOOS implements the common vocabulary and identifiers in our Data Portal, which also includes information on the vocabulary (http://data.gcoos.org/vocabularies.php). GCOOS produced the IOOS Parameter Vocabulary Version 1.0 which was the foundation for Version 2.0 produced by Sara Haines. Howard was a co-author with Sara and others on the 2012 IOOS Summit white paper on vocabularies.

- **Data storage and archiving:** Data providers store their data locally. GCOOS stores data aggregated from the local providers as part of the Data Portal development. NDBC stores copies provided to them. All of these copies may differ from one another in terms of temporal or numerical resolution or completeness. GCOOS is developing plans to achieve long-term archiving at national repositories for all of the region’s near real-time data. We anticipate this will be a requirement for certification.

### 3.0 Observing Assets

- Platforms of opportunity that are being used to support monitoring of ocean acidification: Two USM CenGOOS discus buoys are being modified to incorporate the NOAA/Pacific Marine environmental Laboratory (PMEL) MPACO2 system. Wave gliders are being tested at USM for trackers of ocean acidification and the GCOOS Products Portal includes a tool to display the data; see http://gcoos.org/products/maps/waveglider/usm/. Funding for the MPACO2 activities is provided by NOAA PMEL, not the GCOOS project. This is an example of GCOOS leveraging to work on Data Portal enhancements to accommodate CO2 data. OA monitoring activities were proposed to a NOAA funding opportunity in November 2013 but the project was not selected for a full proposal.

- Current inventory of regional observing assets:
  - Figure 1 shows the locations of all assets being served by the GCOOS Data Portal as of 12/18/2013 (223 stations and 1,555 sensors are monitored and reported).
  - A listing of all operational assets together with summary statistics (Figure 2) can be downloaded from the GCOOS Data Portal using a tool under the Monitoring tab (http://data.gcoos.org/monitoring.php). Information can be downloaded in ASCII text format as all assets, as federal assets only, and as non-federal assets only. Information included consists of owner, platform name, location, data type, and vertical datum. Information on the status of specific, local data node assets is also available.
  - GCOOS does not own any of its own assets. All assets are owned and operated by GCOOS partners. Thus information on anticipated changes (e.g., additions, deletions, upgrades, etc.) is not readily available. Due to diminishing fiscal support for operational systems, stations have been removed from some systems (e.g., WAVCIS is down to 2 stations from 6) and others are struggling to maintain their systems and selected stations are under consideration for removal. Leveraging has been successful for several systems (e.g., FSU COAPS station on the Air Force Tower N7, DISL Mobile Bay Environmental Monitoring System that expanded), but as the leveraging funding sources end the associated observational systems must find new leveraging sources or cut back. A few systems remain relatively robust for now (e.g., TABS, TCOON).
Figure 1. Initial page of the GCOOS Data Portal showing locations of existing stations with oceanic data sets available through the GCOOS Data Portal on 18 December 2013 (http://data.gcoos.org).

Figure 2. Summary statistics for Monitoring tab for 18 December 2013.
Figure 3. Introductory page for the GCOOS Data Products Portal with the Web Map Applications set for Education and Outreach (http://gcoos.org/products/).