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Establishing the GCOOS Regional Association's Data Portal

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The Gulf of Mexico Coastal Ocean Observing System Regional Association (GCOOSRA) received two multi-year NOAA grants to develop regional data systems supportive of the U.S. Integrated Ocean Observing System (IOOS). One grant provides modest support to ten sub-regional observatories to modify their existing data systems to allow them to become stand-alone interoperable IOOS data nodes. The other grant supports the establishment of a regional data portal. The following describes the evolution and current status of the GCOOS-RA's data portal and some of the challenges encountered by the developers.

The IOOS mission is to develop automated and largely unattended data systems that deliver high-quality data and products to consumers in support of seven societal goals. The regional data portal's mission is to aggregate data and model output from distributed providers and to provide these, and derived products, through a single access point in standardized ways to support local, regional and national needs. The data portal activity also serves to guide and test the selection and deployment of the interoperable elements of the regional and sub-regional data systems.

The portal design evolved, and continues to evolve, within many related community constraints. GCOOS-RA, like all Regional Associations, agreed to "be compatible" with the IOOS Data Management and Communications (DMAC) Plan. The DMAC Plan identifies core elements (metadata, data discovery, catalog, online browse, access, transport, and archive) required for interoperable data systems but does not specify which standards or technologies are to be used for all core elements. While the IOOS DMAC Steering and Expert Teams slowly consider and recommend standards, the Information Technology (IT) landscape shifts rapidly. GCOOS-RA and its neighbor, the Southeast Coastal Ocean Observing Regional Association (SECOORA), overlap and share data providers in Florida. Asking shared providers to offer dual systems is inappropriate and adoption of compatible technologies, vocabulary in this case, is the appropriate path to take. Finally, groups such as OOSTethys and the Marine Metadata Interoperability Project have much to offer and attention should be paid to their evolving contributions. Interoperable systems are as much about community agreements as they are about identifying technology that works.

The data portal acquires data and metadata from federal and non-federal providers through a multiplicity of feeds. These include direct ftp push, OPeNDAP, several slightly different versions of the Open Geospatial Consortium's (OGC) Sensor Observation Service (SOS) specifications,

the Global Telecommunications System (GTS), and, for some types of information — via web scraping. Each method has advantages and disadvantages and not all data types are available through all service access points. For example, the GTS was designed for weather data and has no standardized accommodation for parameters such as dissolved oxygen and nutrients. Encoding for new data types such as radar currents, and certain types of mobile platforms have yet to be standardized. Of the core IOOS DMAC Plan elements, only data transport seems to be well advanced. The need for a data service registry/catalog is acute at the present time.

The portal is designed to accommodate *ad hoc* and repetitive accesses by both humans and networked computers. It is unclear which output formats will ultimately be the most popular. The portal currently serves data in tabular ASCII for people and in XML via SOS or OGC Web Coverage Service for machine consumption. These may be sufficient to accommodate users who require access to numerical values, however, we envision most people will prefer graphical plot and map-based products. Toward this end, we are exploring methods to deliver customized web pages tailored for various user groups such as emergency responders, resource managers, and boaters. We are also exploring methods that give individual users the ability to build their own pages similar to iGoogle, NetVibes and My Yahoo. Other options include content designed for smart phones and subscription services.

The selection of which products to serve is perhaps more challenging than the technological issues of the automated production and delivery mechanisms. End user needs drive the selection of specific products. Stakeholder meetings with groups such as the oil and gas sector, emergency responders, recreational boaters, etc. have been held to elicit and prioritize their needs and requirements. The GCOOS-RA Products and Services Committee is charged with identifying the products and services necessary to meet the requirements of the broader user community. The GCOOS-RA Education and Outreach Council also represents a significant stakeholder group. Merging and prioritizing all of these needs into a manageable and addressable subset is underway, albeit difficult. We seek to avoid competing with the private sector for products that are specialized to a single user group. A balance is being made between what are basic products and what are value-added products.

Although rapid advances in the IT landscape do present a challenge to data portal developers, the most significant challenges faced are not technological but rather stem from a lack of consensus within the various provider, consumer and Information Technology (IT) communities.