15.8 THE DATA MANAGEMENT AND COMMUNICATIONS (DMAC) FOR THE U.S. INTEGRATED OCEAN OBSERVING SYSTEM (IOOS)

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1. BACKGROUND

Management and communication of marine environmental data present special challenges due to the variety and complexity of the observations and products. Marine environmental data include not only physical measurements of the ocean and sea surface interface, but also biological (e.g. species sitings and surveys), geological (e.g. bottom type), chemical, ecological, shoreline management and public health data. At present there is no coherent data management strategy that effectively integrates these data streams across disciplines, time and space scales. The resulting lack of integration of data denies to U.S. society important benefits, such as improved climate forecasts and more effective protection of coastal marine ecosystems. Therefore, Congress has directed the U.S. marine science communities to come together to plan and implement a sustained Integrated Ocean Observing System (IOOS) [Ocean.US, 2003]. The IOOS will be a network of regional, national and global systems that rapidly and systematically acquire and disseminate data and data products to serve the needs of environmental protection, public health, industry, education, research, and recreation. The IOOS will be the U.S. contribution to the international Global Ocean Observing System (GOOS). Central to the success of the IOOS is a Data Management and Communications (DMAC) Subsystem.

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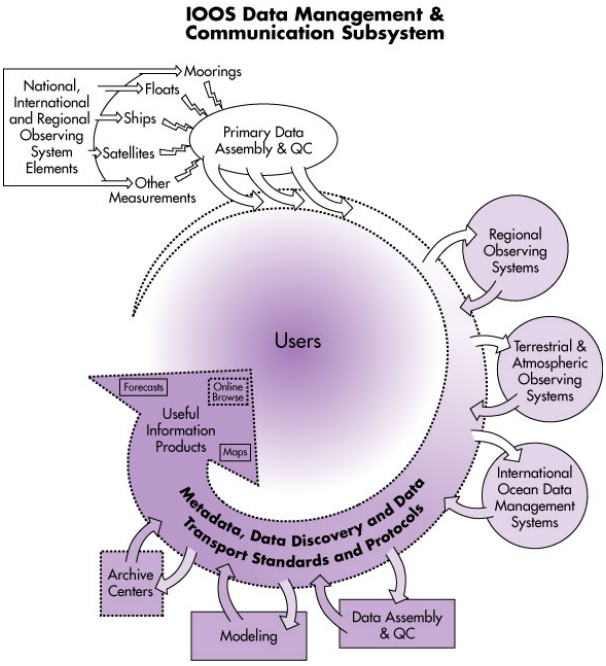

Figure 1. The Flow of Data within IOOS

2. THE IOOS DATA SYSTEM AND DMAC

Observations originate within IOOS at the International, National and Regional Observing System Elements (see Figure 1). Raw measurements from the Observing Subsystem elements are transferred by varied means, which include mail, telephone, radio and satellite transmissions, microwave and Internet, to primary data assembly centers. Primary data assembly activities may range from hand entry of numbers from log sheets to “intelligent” instruments which perform data assembly and quality control

functions at the instrument subsystem level [Delin 2002].

Starting with the output of the primary data assembly centers data circulating in the IOOS share a common Data Communication Infrastructure — standards and protocols to support 1) IOOS-wide descriptions of data sets (via Metadata); 2) the ability to search for and find data sets of interest (Data Discovery); 3) the ability to access the data in an interoperable manner from client applications (Data Transport); and 4) the ability to review the data through common Web browsers (Online Browse). The DMAC Subsystem also includes Archive Centers, which in the mature IOOS will utilize the Data Communications Infrastructure for the receipt and the distribution of data. The DMAC Subsystem formally ends at the point where data and products have been delivered in a usable form to end users who wish to have direct access to data and to the organizations and applications that produce information products for end users. Such products include text forecasts, maps of ocean variables and related coastal features, educational curricula materials and time series showing data trends useful to resource planners.

3. THE DMAC PLAN

Ocean.US, the IOOS national office, established the DMAC Steering Committee in spring 2002. The Steering Committee, with representatives from Federal and state agencies, private industry, and academia, was tasked with preparation of a detailed, phased DMAC Implementation Plan, as well as with the initial oversight of this IOOS subsystem. The Plan consists of three main parts (http://www.dmac.ocean.us/dacsc/imp_plan.jsp): Part I [Hankin, 2003] provides an overview of the subsystem requirements, the unique challenges it presents, and the plan for addressing them. Part II presents the detailed Implementation Plan, built upon a five-year schedule to reach Initial Operational Capability for the DMAC Subsystem. Part III, the Appendices, provides in-depth discussion of key technical topics. The initial steps that are needed to bring the marine data community together for the adoption and development of data standards are already underway at the time of this writing.

4. CONCLUSION

The DMAC Plan is a roadmap for the implementation of a data management and communications subsystem for IOOS that will serve the needs of data suppliers and end users. The Plan calls for community-based working groups to adopt and/or develop most of the specific standards and protocols that are needed. The information technology required to meet most of the needs of the DMAC, while challenging, can be developed from existing capabilities through the relatively straightforward software engineering tasks described in the DMAC Plan. The greatest challenge facing the DMAC is one of coordination and cooperation among IOOS partners and user communities. The DMAC can succeed only if the participants actively utilize the data and metadata standards, communications protocols, software, and policies. The creation of a successful IOOS will require that the DMAC design minimize the barriers to participation. IOOS must conduct outreach activities that achieve a significant commitment of effort across the U.S. marine community and foster continual coordination with its international counterparts.

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5. REFERENCES

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