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Summary Notes of the National Ocean and Coastal Mapping Inventory Workshop – "The Way Forward"

January 12-13, 2011

Held by the Interagency Working Group on Ocean and Coastal Mapping (IWG-OCM)

Hosted by NOAA's National Geophysical Data Center
Boulder, Colorado

1/26/11

January 2011 National Ocean and Coastal Mapping Inventory Workshop Executive Summary

In response to the findings of the U.S. Ocean Action Plan (2004) and in support of the Ocean and Coastal Mapping Integration Act of 2009, the Interagency Working Group on Ocean and Coastal Mapping (IWG-OCM) of the Subcommittee on Ocean Science and Technology (SOST) began development of a comprehensive national inventory of ocean and coastal mapping data and activities in 2007. This ocean and coastal mapping inventory was envisioned as a clearinghouse for data and interpretive information as well as a registry of completed and projected mapping activities, accessible through a single web portal. The inventory would reduce duplicate mapping efforts, facilitate cooperative mapping activities, and improve data discovery and accessibility. Although the IWG-OCM has made significant progress over the past three years with respect to registering OCM metadata in Geospatial One-Stop, for a variety of reasons we have fallen short in realizing the vision of an integrated and publically-accessible national OCM inventory.

In an effort to reinvigorate the OCM inventory development effort, the IWG-OCM sponsored a two-day workshop hosted by the National Geophysical Data Center in Boulder, CO, on 12 and 13 January 2011. The objectives of this workshop were 1) review the requirements for a national inventory, 2) understand the progress made and lessons learned by the IWG-OCM since the initial September 2007 inventory workshop, 3) understand the holdings, capabilities and roles of the primary Federal OCM data repositories, 4) understand existing or developing OCM data discovery and delivery activities and identify gaps, areas of overlap and leveraging opportunities, and 5) identify the next steps for moving forward in the development of an integrated and publically-accessible national OCM inventory.

On-site and remote workshop participants represented NOAA, USGS, USACE, BOEMRE, U.S. F&WS, NPS, NSF, National Ocean Council, and Lamont Doherty Earth Observatory. The workshop participants reaffirmed that the pending Report to Congress on Progress Made in Implementing the Ocean and Coastal Mapping Integration Act accurately captures the following inventory goals:

- it will be built on and integrate the individual web map services of the primary Federal data repositories,
- it will provide metadata and depict geographic coverages of the data,
- it will utilize common terminology/vocabularies,
- it will be dynamic in that the integrated web mapping services will reflect changes in the data repositories, and
- it will adapt to changes in technology.

The participants agreed that the inventory should be capable of searching for metadata in a meaningful way and metadata should be able to answer the basic question, “are the data useful for and in a format that supports my purposes?” Additionally, the inventory should provide users with the capability to develop data collection partnerships by providing information regarding what organizations need OCM data or are planning to collect data, where and when data is to be collected, and for what purposes.

Interagency Working Group On Ocean And Coastal Mapping

The Way Forward

Recommendations and actions emerging from the workshop include:

- Develop a high-level OCM Inventory Requirements document describing what services the inventory should provide, necessary inventory properties, constraints on the development and use of the inventory, and the requirements of customers, end-users, and inventory developers. This requirements document will guide the continued development of the national inventory.
- The national Coastal and Marine Spatial Planning (CMSP) framework will require access to a variety of dynamic data inventories, including a OCM data inventory; CMSP is an opportunity to demonstrate the requirement for and utility of a functional national OCM inventory. In particular, an inventory of ocean bathymetry and coastal topography data is essential for CMSP, and is one of the early priorities for the OCM inventory. The OCM inventory will serve as a model for other data inventories needed to support effective CMSP.
- The IWG-OCM will brief and provide updates to the SOST and the National Ocean Council on the OCM inventory development efforts.
- Knowledge of available Federal OCM data repository web mapping services (WMS) is critical. A survey of available data repository WMS will be undertaken and those repositories requiring WMS support will be identified.
- Adequate metadata and standardized vocabularies are essential to a functional OCM data inventory.
    - The IWG-OCM will review metadata requirements for supporting a national OCM inventory and minimal metadata fields will be identified and proposed for adoption.
    - The IWG-OCM will review existing or developing controlled vocabularies applicable to the OCM framework data layers (elevation: topography and bathymetry, imagery: land and seafloor, and sub-bottom data) and appropriate vocabularies will be proposed for adoption. Gaps in available vocabularies will be identified and addressed.
- To date, Geospatial One-Stop (GOS) has been the platform on which the OCM inventory has been built. However, the ongoing transition of GOS to data.gov raises a number of concerns about the future utility of GOS to the development of OCM inventory. Given the number of uncertainties, the IWG-OCM and the GOS/data.gov administrators have agreed to stay closely engaged as the transition takes place.
- Partnerships with related activities are essential to the development of a successful OCM data inventory. Partnerships will be explored with the CMSP Information Management System and Data Portal effort, the Multipurpose Marine Cadastre, and Digital Coast, and others as appropriate.

The January 2011 workshop was the first of two planned workshops that are necessary to keep the development of the OCM inventory on track. A second workshop, tentatively scheduled for April 2011, will focus on addressing the technical challenges of moving forward with the development of the inventory, proposing solutions for meeting the needs identified in the Inventory Requirements Document, and addressing gaps identified during the January workshop. Workshop location, dates, and invitees with the appropriate technical background will be identified and an agenda will be developed over the next few months.

A complete January 2011 inventory workshop summary and copies of presentations will be available at the Geospatial One-Stop Oceans and Coasts Community site (under Library): http://gos2.geodata.gov/wps/portal/gos/kcxml/04_Sj9SPykssy0xPLMnMz0vM0Y_QjzKL9443sfQASYGYfpb6kehCFgghX4_83FR9b_0A_YLc0IhyR0VFACF_vlU!/delta/base64xml/L3dJdyEvUUd3QndNQSEvNElVRS82X0tfNEFF

Summary Notes of the
National Ocean and Coastal Mapping Inventory Workshop –
"The Way Forward"

January 12-13, 2011
Department of Commerce Boulder Campus
National Geophysical Data Center
325 Broadway
Boulder, Colorado

The purpose of this meeting sponsored by the Interagency Working Group on Ocean and Coastal Mapping (IWG-OCM) was to reassess efforts to date towards the development of a National Ocean and Coastal Mapping Inventory (OCM Inventory), and to decide on the next steps.

Presenters and participants discussed mandates for developing the inventory, progress to date and lessons-learned, the National Ocean Policy, metadata, and existing products, efforts, and web services. The meeting participants then developed a plan for furthering the development of the OCM Inventory.

DAY 1

Introductions:

The meeting started with participant introductions, followed by workshop introduction by Roger Parsons. A participant list is provided at the end of the summary.

Presentations

1. Roger Parsons (NOAA IOCM Coordinator; Co-Chair, IWG-OCM)
"National Ocean and Coastal Mapping Inventory Workshop" presentation
Roger.L.Parsons@noaa.gov

For more information – refer to the presentation

Roger discussed why now is a good time to reassess the inventory efforts:

- Ocean and Coastal Mapping Integration Act, the need for federal agencies to do a better job of coordinating federal efforts, National Ocean Policy recommendations including the focus on CMSP (which serves as one of the drivers for OCM Inventory), and the tight federal budget mean our community must leverage its efforts and resources.

- We have good intentions, but have gotten bogged down a bit, so this is a good time to reassess the inventory efforts, as the need for an Ocean and Coastal Mapping Inventory is even more critical than before.

The 2004 U.S. Ocean Action Plan coordinated federal and federally-funded ocean and coastal mapping activities through JSOST; two directed activities were to:

- Develop an annual inventory of Federal, Federally-funded and non-Federal ocean and coastal mapping and charting programs, operations, and prioritized needs.
- Develop shared and standardized mechanisms for processing, archiving and distributing geospatial data, tools, products and services.

The Ocean and Coastal Mapping Integration Act of 2009 codified the U.S. Ocean Action Plan recommendations, including the requirement for an inventory:

- Develop an inventory of ocean and coastal mapping data within the territorial sea and the exclusive economic zone and throughout the Continental Shelf of the United States, noting the age and source of the survey and the spatial resolution (metadata) of the data.

The September 2007 inventory workshop objectives initially focused on low hanging fruit and included:

1. Review existing agency and interagency data management tools
2. Establish requirements for a comprehensive data inventory.
3. Develop a design for the proposed inventory, including alternative strategies for development and implementation.
4. Identify agency resources available for development and implementation.
5. Recommend an implementation program, including timelines and priorities, with the objective of rapidly implementing the inventory framework consistent with future expansion and enhancement.

An inventory was needed as there was:

- No existing readily accessible registry providing an inventory of ocean and coastal mapping data and metadata, a need to avoid duplicative data acquisition, and a need for planning tool. Also, there was a need for an interagency, single portal approach to leverage resources and capacities.

Key inventory user requirements included the ability of the user to evaluate the quality of the data as well as:

- Authoritative data (but not required)
- FGDC-compliant metadata and quality control standards
- Easy access and Web-based
- Search capability: key word and geographic/spatial
- Where are data being collected and by whom (a tool for forming partnerships)
- Evaluation or review by users
- Initially focus on framework/priority data sets (i.e. elevation; coastal and seafloor imagery; seismic data)

Conclusions from the 2007 Inventory workshop were:

- Build the inventory using Geospatial One-Stop.
- Establish an OCM Inventory Project Management Team and technical teams to implement the project.
- Develop a plan of action and milestones
- Selling the OCM Inventory to the Federal agencies as a multi-agency approach is critical.

Basically not much has changed in terms of the inventory conclusions since 2007, and the 2010 National Ocean Policy recommendations again indicate the need for a comprehensive data management system. National Ocean Policy Priority Objective #9 states:

- Ocean, Coastal, and Great Lakes Observations, Mapping and Infrastructure: Strengthen and integrate Federal and Non-Federal Ocean observing systems, sensors, data collections platforms, **data management, and mapping capabilities** into a national system and integrate that system into international observation [and mapping] efforts.

This objective supports other priority objectives including CMSP.

The IWG-OCM addressed the National OCM Inventory in the 2010 IWG-OCM Report to Congress (which is still making its way through the review process) in which we stated our priorities for an inventory. We need to decide if this is still the track we want to take or if we want to change our approach. We stated in the report that the integrated inventory:

- Would be built on the continually updated web services of the primary federal data repositories and will integrate the individual web services developed at and maintained by the data repositories, utilizing common terminology.
- Will show the geographic coverage for data in the repositories and provide metadata to obtain further information and download the data.
- Will dynamically reflect changes in the repositories as they occur.
- Will be standards-based to be sustainable and adapt to changes in technology.

The next steps are to review what happened over the last three years of interagency efforts, to identify gaps to address as we go forward, and to develop partnerships to cover the gaps. We need to identify a framework and resources needed, as well as how we can leverage human resources and capabilities. This is the first workshop of two; the next workshop will focus on technical issues and have participation by our technical staff.

<u>IWG-OCM Inventory Workshop (Jan 2011) OBJECTIVES:</u>

1. Review requirements to develop a National OCM Inventory.
2. Review the goals, objectives and efforts that sprang from the Sept 2007 workshop, progress to date and lessons learned.
3. Review the holdings, capabilities and roles of the primary OCM repositories.
4. Review existing or developing OCM data discovery and delivery activities and identify gaps, areas of overlap and opportunities to leverage.
5. Reevaluate the requirements for a National OCM Inventory and identify next steps for developing an integrated and publically-accessible OCM Inventory.
6. Consider limited resources ($, human) and be upfront with what needs to be accomplished

<u>Measures of workshop success for the Jan 2011 Workshop:</u>

- Understand various OCM data discovery and delivery activities
- Understand lessons learned from the IWG-OCM efforts to develop National OCM Inventory
- Identify the gaps needed to be addressed and partnerships with data discovery and delivery activities needed to address these gaps
- Define a framework and identify the resources for moving forward

2. Fran Lightsom (USGS Woods Hole Coastal and Marine Science Center)
"Overview of OCM Inventory Data and GOS"
fligthsom@usgs.gov

For more information – refer to the presentation

Fran reviewed the recommendations from the September 2007 workshop and actions following the workshop.

Recommendation: Establish an interagency Project Team to manage the initiative and develop the long term project Plan

- In October 2007, a project team was established by representatives of MMS (now BOEMRE), NOAA, USACE, & USGS; the team then set goals and defined the scope of the project, and developed charters for Technology, Metadata, and Communication working groups.

Project Goals and Scope

- The two initial project team goals for the inventory were that: 1) inventory users can find the data (i.e. data is discoverable, which requires metadata quality, user education and support, and portal functionality) and 2) all Federal agencies are able to successfully submit all appropriate data and activities.
- The initial inventory scope included:
    - Reduce duplicative mapping efforts and increase cooperative efforts through a single web portal providing a clearinghouse for data and interpretive information and a registry of completed and projected mapping activities.
    - Activity registry provides up to date information on planned and completed mapping activities. The registry includes federal funded activities that either fund/collect/provide data or that use or need such data.
    - Inventory includes all types of geospatial data and non-geospatial data that describes the solid earth (ex. aerial photos and seismic profiles)
    - Area covered is the EEZ, extended continental shelf areas claimed under the law of the sea, and land areas that fall within the U.S. coastal zone.

Other recommendations included working with GOS, metadata, and involving other agencies:

- The working groups met in Dec 2007 and Jan 2008 and made some decisions about using GOS, including that the inventory would consist of all GOS records within the OCM geographical boundary, a need to identify technical requirements and features to enhance GOS, and that additional filters (beyond the geographic one) were needed for the

datasets. NOAA created a shape file defining the geographic boundary which GOS implemented as a filter.

- For metadata, the initial recommendation was to use all seven sections of FGDC-compliant metadata, but at the January 2008 meeting, to encourage participation in registering data and data acquisitions, the working group instead adopted the GOS metadata requirement.
- To encourage federal agency and academic participation in registering information on GOS, the working group provided briefings to relevant groups, requested assistance from experts, and created outreach materials. A real issue is getting metadata into GOS, especially planned efforts. Even getting information distributed with agencies was a challenge.

Project results:

- GOS was very responsive, we got changes such as a geographic filter and a GOS search widget (enables customized searching from an external site). Documents were posted on the Ocean and Coasts Community, including a calendar and help documents.
- We found out that many federal folks were unaware of the requirement to add metadata to GOS. With increased awareness, in FY2008 about 25,000 records were added, many of which came from IWG-OCM agencies.
- The GOS gazetteer lacked OCM place names. To address this need, there is an ongoing USGS and NGDC marine gazetteer project to put together polygons for name features (rather than just a point for the whole Pacific Ocean). Also working with the GEBCO/SCUFN gazetteer of place names, and should have something this summer. (Participants noted that the polygon issue is also a problem on land, such as having only one point for the Rocky Mountains.)

2010 Vision and Lessons Learned:

- A key goal is to be able to reuse data and do multi-agency data collection.
- Working with the GOS project office was very successful, the group is working on creating a marine gazetteer, and we developed a spatial polygon of the inventory.
- Problems include GOS obscurity – people/users/customers do not know about GOS or that they are required to use it; also, GOS is now being subsumed by data.gov.
- Need widespread participation and agency commitment; have the vision, but need resources to get it done.
- Metadata is on ongoing issue, many still need help creating it, and there are tradeoffs involved. Complete metadata increases the utility of datasets, but may turn-off - people from adding data to the inventory. Also, there is a need to categorize data by more than one ISO theme (i.e. ocean and elevation).
- Data acquisition plans evolve – making this aspect of the inventory more complicated to manage than just the data catalog.
- For performance metrics, counting the number of items in the catalog is not a good metric; a better metric is the number of people who use the catalog to do their job.

Next steps:

- Do the previous goals, scope, and vision match the requirements of the OCMIA and the National Ocean Council?

- With GOS being migrated to Data.gov, is this still the correct inventory approach?
- How can the inventory get the agency support and broad participation it needs?

Questions and Discussion:

Terrestrial boundary:

- Right now the terrestrial side of the IOCM boundary is from CCAP and - people want more information on this in order to defend the boundary. The inland boundaries are from CZMA – the coastal counties. However, basically the IOCM boundary was to provide an initial filter for GOS (it is not cast in stone) with plans to rework it later. There are many coastal boundary definitions, making this a tricky issue. The idea of the initial filter was to get file numbers down to a more manageable level. There is NOT an official IOCM blessed number of acres within the IOCM boundary.

GOS:

- One participant noted that GOS is good for data and data mining, but not for inventories; in fact, until a year ago you couldn't query on NOAA source codes for searches. GOS is fundamentally not designed to be an inventory.
- By and large Feds are not entering data into GOS; OMB is not forcing agencies to do this.
- There are real issues of concerning discoverability of data in GOS. We need to determine user needs (who, where, why, what). Also, these efforts are very difficult with low resources and coupling new efforts with day job responsibilities.

GOS Marketplace:

- Not working very well at providing information on who needs data and where. There is a reluctance to enter info early in planning process (which is needed for coordination purposes) as funding changes and because you might be held to a plan rather than being able to change it.

3. Rob Dollison (USGS, National Geospatial Program)
"Data.gov: Geospatial Enablement and the Migration of Geodata.gov"
rdollison@usgs.gov; http://www.data.gov/

For more information – refer to the presentation

Rob Dollison provided an update on Data.gov and the migration of Geodata.gov (GOS) to Data.gov. He discussed the Administration's Open Government objectives, lessons learned from GOS, the integration of GOS with Data.gov, and plans for geospatial improvements to Data.gov.

GOS (Geospatial One-Stop) is an OMB initiative that is now managed by USGS. The purpose of GOS is to make geospatial data easier to find and use and avoid duplicative data acquisition. Challenges include metadata, agency commitment, and varied priorities. Lessons learned include

the importance of metadata quality, that easy tools are needed to encourage participation, and searches with both text and a geospatial element are tricky.

Elements learned from GOS that should be applied in Data.gov include: visualization of search results, map mash-ups, the need to facilitate data partnerships between those who plan to acquire data and those who need data, notifying users about new data, and web map services.

Rob next discussed the migration of GOS to Data.gov and provided some examples of data and data visualization currently in Data.gov. Geodata.gov is currently hosted through July 2011. It will be integrated with the Data Management System on Geodata.gov. Some of the other GOS functions are already going to be hosted on Data.gov, and discussions are under way for other functions.

In summary, many things have changed: data sharing approaches, user expectations, and technology.

QUESTIONS raised in the discussion:

- How can we work with GOS/data.gov?
- How do we get future plans and create an inventory?
- What is the vision for Data.gov as seen by Data.gov?
- Front end and back-end- how do we get the data to do inventory?
- How do we get search engines to take advantage of this and with such a large collection (tested with Google->easy search capabilities but difficulties within GOS)?

4. Mary Boatman (Ocean Policy Advisor, National Ocean Council)
"National Policy for Stewardship of the Ocean, Our Coasts, and the Great Lakes"
http://www.whitehouse.gov/administration/eop/oceans

For more information – refer to the presentation

Mary is on detail from DOI to the National Ocean Council (NOC) staff and she provided an overview of the National Ocean Policy, with a focus on the framework for coastal and marine spatial planning (CMSP).

The first National Ocean Policy was established on July 19, 2010 by Executive Order 13547; it adopts the *Final Recommendations* of the Interagency Ocean Policy Task Force and directs Federal agencies to take steps to implement the recommendations. It also creates an interagency National Ocean Council and adopts a framework for CMSP.

What is CMSP?

- CMSP is a comprehensive, adaptive, integrated, ecosystem-based, and transparent spatial planning process, based on sound science, for analyzing current and anticipated uses of ocean, coastal, and Great Lakes areas.

What does CMSP do?

- CMSP identifies areas most suitable for various types or classes of activities in order to reduce conflicts among uses, reduce environmental impacts, facilitate compatible uses, and preserve critical ecosystem services to meet economic, environmental, security, and social objectives.

CMSP is a comprehensive, integrated approach of long range planning that is independent of a specific activity, brings together all interested parties from the beginning, focuses on a region rather than a location, and includes human and ecosystem services. The planning process includes two phases: determining where we are today (a common knowledge base) and where we want to go (our vision for the future). There are nine regional planning areas aligned closely with large marine ecosystems and existing regional structures.

One aspect of CMSP under development is a robust coastal and marine scientific data IMS (Information Management System) and CMSP Data Portal. These efforts will utilize existing data systems and initiatives. The interagency working group for these development efforts reports to the NOC Steering Committee and is preparing a recommended implementation plan for the IMS/Portal that includes actions such as identifying key data needs and gaps, the core functions of the portal, criteria to identify a lead agency, and data considerations (for metadata etc.).

The IWG-OCM can support these efforts by providing information for seafloor and habitat base maps and recommending appropriate mapping scales.

Discussion:

To avoid duplication, federal efforts are being coordinated with regional planning bodies, for example the NE and West coast, as they have data available on portals. Federal efforts are focused on federal data and linking to regional data with a goal of a robust system within two years. The NOC is looking for ideas on how to enhance regional data efforts and integrate them in a larger system.

Some regional planning bodies still need to be set up, key data layers and drivers are not identified for all regions and are expected to vary in areas; however, in some areas key regional needs include planning for off-shore wind development. The first regional plan is due in 2015.

Need to consider the basic data sets that all regions will need as well as what scales are needed. Two data sets needed are cadastre (scale independent) and bathymetry (scale dependent). Regions can decide what inland boundary to use based on regional issues and goals.

Suggestions/issue to consider include: the importance of a user friendly portal for non-technical people (data accessibility and use); starting with key federal data layers already available; considering using an existing data viewer; and focusing on data at the national level with tools/processing done at the regional level. The IWG-OCM will have opportunities to coordinate/leverage with the CMSP portal efforts over the next few years.

5. Rob Dollison (USGS, National Geospatial Program Office)
New Products from the National Map
rdollison@usgs.gov; http://nationalmap.gov/

For more information – refer to the presentation

The National Map (TNM) is an on-line, seamless, nationally consistent, continually maintained, base topographic map that is developed and maintained through partnerships, and serves as a source for products and services. The goal is a seamless national map at a 20k scale (this is not a local level tool as that would require a larger scale). Data sources are a variety of national data sets, as well as scanned high-resolution historic maps, and generated metadata. TNM has five tracks supporting visualization and discovery, (1)Viewers, (2) Services, (3) Discovery, (4) Functions, (5) Download. The viewer was designed to support incident response and has some GIS web capabilities. We are working on improving the viewer.

As he worked through a demo of the site's abilities, Rob discussed aspects of the National Map. Current download capabilities allow user to download all base vector, raster, and graphics data projects. User can select multiple themes and data formats from their area of interest. The downloaded data is still raw GIS data. Feedback shows people want to be able to ingest data without doing conversions. The update cycle for the lower 48 base maps is a three years. The original refresh rate was 55 years, so the current base map refresh rate is much faster, though not up to the cartographic standards of the original maps. This issue is being worked on.

One useful aspect of the site is looking at the age of the inventory data by quad. Sometimes the imagery data might be newer than the base map. These are issues that agencies should consider for planning purposes – what is the age of the data and what are other agencies doing? You can also create your own mash-ups of data and add other services.

Next steps for the National Map include: improving documentation, best practices, awareness, and use; better interoperability and format support; and adding more features. Challenges include integrating Alaska into the workplan and integrating with Data.gov.

Discussion:

- Good to see that geo.tiff is one of download options, since this seems to be a preferred way to ingest data for CMSP.
- Are you using/incorporating the most recent magnetic data (available on-line from NGDC)? Rob will look into this.
- Certain layers could be available for CMSP portal. We are working on publishing data collection plans better; currently plans are published through FEMA, and are listed on GOS.
- What about metadata standards – can we have a common vocabulary for hydrology, etc?

LUNCH – the group broke for lunch at returned at 2:00 pm

6. Bob Arko (Lamont Doherty Earth Observatory)
"Rolling Deck to Repository (R2R)"
arko@ldeo.columbia.edu; http://www.rvdata.us/overview

For more information – refer to the presentation

Bob explained the evolution and purpose of UNOLS R2R.

The purpose of R2R is to get routine underway data to long-term repositories (not visiting scientist tools & equipment). Stakeholders include Shipboard Automated Meteorological and Oceanographic System (SAMOS) at Florida State, NSF, vessel operators, National Data Centers, UNOLS, facilities serving oceanographic research, and the user community. Bob explained the stages of the R2R development process.

- Stage 1: Define the requirements. There are over 400 cruises in a typical year with discrete sets of data created by instrument type. Currently all data fit in NODC and NGDC archives so this is a tractable approach. R2R does not serve or hold any data, all data is sent to data centers. Data quality is assessed.
- Stage 2: Inventory/evaluate. The R2R catalog includes vessels, instrument systems, cruises, and datasets. There are about 400 instrument systems across approx 25 vessels, so this size is manageable. There are probably 5 – 6 K data sets per year. The vessel profiles provide an easy way to search and browse instruments on each vessel.
- Stage 3: Obtain. Use an operator by operator approach to get data delivery from vessels and create a standard set of post-cruise products. Originally got data from hard drives, now get over-net delivery from shore server.
- Stage 4: Access. Maintain central fleet-wide catalog and deploy limited web services requested by the community. Create reciprocal links to partners data centers for cruises
- Stage 5: Maintain. Maintain activities and program. A great deal of time goes into review of data.
- Stage 6: Use/Evaluate. There a few different approaches to data QC/QA depending on data type. QA/QC results also go to archives, and are published online with alerts to operators.
- Stage 7: Archive. Data, products, and metadata are archived at NGDC and NODC, and the R2R catalog provides links to the data at data set level. About 400 cruises and 6,000 datasets per year.

Data is organized by device type. There are about 2 dozen types; echosounder data, multibeam data, and sub-bottom are three OCM types. Data is mapped to the device type. Data producers include the academic fleet plus a few SSV (sailing school vessels) and other allied vessels. (Note

from NGDC: NGDC used to focus on ocean vessel data from big ships but through R2R is getting more data from smaller ships working in coastal waters.) Another aspect of R2R is having reciprocal webpage linking between R2R and partner web pages.

Challenges facing the R2R effort include: no fleet standard directory structure for cruise data and a lack of standard/controlled vocabularies (so there is a need to make the current list available and to work on creating standard lists.) Success stories include shared semantics (vocabulary) such as ISO 19115-2:2009 cruise level metadata (R2R is working on cruise level metadata first as this will have an immediate benefit), the joint NOAA R2R effort, and having pathways to NGDC and NODC data from the R2R cruise catalog pages.

Discussion:

- Getting data from visiting sensors: If they are similar to existing devices in the catalog, then it is not overly difficult to deal with visiting device; harder if it is unique instrument R2R knows nothing about (i.e. one created/built by visiting scientist).
- Proprietary data issues: R2R does not release data to the archive till proprietary nature of data has expired. Jim Holik of NSF discussed a new data release policy under development for NSF funded cruises; the new default is that underway data will be released immediately unless the PI asks for a data hold (generally no longer than 2 years). The primary data for the PI is special equipment data, not the underway data. Regarding the issue of data not being released after the hold expires, this could be an issue if the PI asks for more funding and the program manager is aware of the previous data. As all proposals now require a data management plan, it will be a problem for the PI in the future if they do not release data. Bob also indicated that he can track in the ship catalog the funding agency for cruises and the data release policies for different agencies.
- Metadata: The archives register metadata to GOS; there is one cruise level record at cruise level and more at the data level. Although metadata are created for the planning stages of cruises, R2R just starts with the actual cruise metadata as there are usually changes between planning and execution, and some operators have security issues for not wanting planned cruise information on the webpage.
- QA/QC: The five year plan is for R2R to work with different data communities on QA/QC; some data types such as water column data may be more challenging. Currently working on ACDP data and the hope is to have some of the QA/QC be done by machine.

7. Josh Murphy, NOAA/Coastal Services Center
Digital Coast and Multipurpose Marine Cadastre
Contact: Joshua.Murphy@noaa.gov, http://www.csc.noaa.gov/digitalcoast

For more information – refer to the presentation

Digital Coast

Digital Coast (DC) brings the geospatial and coastal management communities together and provides resources to support coastal resource management. There are extensive partnerships ranging from the Coastal States Organization to the National Association of Counties (NACO), and there are many contributors to the Digital Coast (over 22 listed on slide 5), including the federal and state governments and the private sector. The Digital Coast is more than providing access to coastal data; it also provides techie and non-techie tools, training, outreach, and awareness for coastal resource management professionals. Data types available on DC are coastal LiDAR, Coastal Change Analysis Program (C-CAP) Land Cover, orthoimagery, and benthic habitat; coverage extent varies for each data type and there are significant gaps *(see the presentation for maps of coverage by data type)*. Success stories can be found on the DC, including: Digital Coast in Action: http://www.csc.noaa.gov/digitalcoast/action/index.htm and "Building Resilient Coastal Communities: Counties and the Digital Coast http://www.csc.noaa.gov/digitalcoast/inundation/_pdf/Issue_brief.pdf.

Multipurpose Marine Cadastre (MMC)

The MMC is a marine information system for the outer continental shelf and state waters that provides a data framework to support decision making. Data is managed and maintained by the authoritative source with access via the Marine Boundary Working Group data portal. CSC (Coastal Services Center) periodically harvests data to keep the viewer up to date. Data types include jurisdictional boundaries and limits, federal georegulations, geology and seafloor data, human use data, and marine habitat and biodiversity. Data Providers are BOEMRE; NOAA Office of Coast Survey, National Marine Sanctuaries, Marine Protected Areas, and National Marine Fisheries Service; U.S. Fish and Wildlife Service; National Park Service; Department of Defense; U.S. Coast Guard; and Federal Energy Regulatory Commission. Data gaps are human use, geology and seafloor, and marine habitat and biodiversity. Examples of two success stories are 1) an ongoing project on Alternative Energy Development on the Outer Continental Shelf to develop mapping applications to support energy planning and regulations and 2) another ongoing project to map critical habitat data to support hydrokinetic project permit review.

Discussion:

- Relationship between DC and MMC and why not blended together? : MMC is more of a coastal atlas and a tool to visualize and centralize data for specific issues such as CMSP; DC is driven by a variety of issues but is issue independent. Also, MMC data is all federal while DC is a larger set of data. So, while you could blend the two together, it is not necessarily feasible; however efforts are linked where they make sense, but they develop independently.
- Data age: All of the datasets are from the digital era (past 10-15 yrs).
- Datasets registered in GOS? : At least the C-CAP and LiDAR data are; not 100% of all the DC data, but a large majority.
- DC is interested in collaborating with NGDC and using the available NGDC Digital Elevation Model products and bathymetry data.
- Technology is now at a place where it is easier to use.
- If what is under the hood is the same, it is easier to integrate – the front end is just display.

- We have an opportunity to get state and local folks on the same platform; this helps with access.

<u>Facilitated Discussion/Information Synthesis (starting at 3:30 pm)</u>

The three questions listed on the agenda to consider in the discussion are:

- Do we understand the goals, approach and past efforts of the IWG-OCM to develop a National OCM Inventory? Are these efforts working? If not, why and what needs to be changed?
- Are there gaps, areas of overlap and/or opportunities for coordination between the major efforts presented today? If so, what features of these efforts and approaches being taken may be useful in the development of the OCM Inventory?
- Are there other data systems, including specific regional systems, which we should also consider as potential partners?

What did we tell Congress we will do in the Report to Congress *(see slide 10 & 11 in Roger's presentation at the start of the day):*

- Develop an integrated and publically-accessible inventory, build on web services (continually updated) from primary federal data repositories <u>(are we currently using integrated web services? – NO, but we are moving in that direction)</u>
- Show geographic coverage of data and provide metadata
- Dynamically reflect changes as they occur in repositories
- Provide standards-based services to be sustainable and adaptable to changes in technology

<u>What is an inventory?:</u> An inventory allows you to determine if data were already collected in an area (metadata, geospatial data coverage), and if the data are not available, it should help you partner in future data collection (need to enable something like the marketplace function in GOS in the OCM Inventory).

- Discovery of what data exists and geospatial coverage.
- Provide an ability to find partners and collaborate with on-going efforts.
- Provide sufficient information for an initial evaluation of whether data meets my needs (and then access to the data for assessment).
- **Key aspects of an inventory:** integrated, web services, dynamic, geographic coverage, downloadable data, and standards-based.

<u>Web Services:</u>

- Not all federal agencies have the resources to compile and serve up data on web services.
- To address this, focus on specific data sets – perhaps create a catalog with metadata & then have someone host it. Perhaps archives can support other unique data sets for those who do not have resources to do web services.
- Web services are a nice approach as agencies maintain their own data and metadata.

- Not all framework data layers are currently available on map services: most data at NGDC are available; NAMMS data is not available via web server yet – Fran would like to know what standards to use in implementing this.
- ArcServer is better than ArcIMS and there is an ongoing migration to ArcServer.
- There have been various efforts over years to develop registries of WMS services and there are services that let you query all of them at once. How hard is it to compile a list of services?

Evaluating Data Quality

- The user is interested in what information is available on the assessment of the quality of the data/ its authoritativeness. (Since it is very hard to not offend data collectors if the quality of the data is stated, a standard of evaluating quality would be good.)
- There is a place in metadata for data uncertainty (either color coded or numerical/quantitative). In fact, the space weather community is going to a red, yellow, orange, or green quality assessment marker; the community reached agreement on same criteria for doing this.

Metadata discussion:

- Need ISO as ISO allows parent-child relationships – FGDC does not; need metadata and data layers so have granularity for data you need. Surface metadata & Data metadata are different – surface metadata is what data are available; data metadata is more granular.
- FGDC … metadata should help you determine if data meets your needs now.
- Another issue is getting data from the metadata, as having metadata does not mean it is easy to access the data. We had to work with ESRI to be able to access/extract the data and the process has been clunky and difficult.
- Need to agree on which elements in metadata we want to search and sort on vs. the elements we want to download and read.
- Perhaps create "metadata lite" where we establish common vocabularies.
- Metadata should include contact information, to avoid orphan data sets and so problematic data sets can be quarantined.
- DISCOVERY - metadata needs the following fields: Start date & end date, geography, PI or chief scientist, and other information TBD
- What are the minimal needs of OCM community? And then create metadata records for this data.
- What would integrators need to know and do the same way?: Need to collect granular metadata and records for survey level, and records for service level. A lot comes down to the quality and consistency of metadata records (need common metadata so can agree on what is the level of the metadata – granular or higher level).

Common Vocabularies:

- It has been a struggle to develop common vocabularies. The issue with getting and using standard vocabularies has been one of resources, as people are generally very willing and happy to have a process and standard vocabulary to use. This has been true in the R2R metadata efforts.

- In addition to the vocab, data providers also need tools to help fill in required metadata fields (for example web service for metadata vs. writing in xml).
- An example of the development struggle is the UNOLS cruise level metadata development, which has been ongoing for 5 years. In contrast, for the Extended Continental Shelf project, in a three day workshop, providers agreed on common vocab (in this case there was funding to support the people developing the vocab).
- One idea is to require either the use of the provided standard vocabulary for the inventory (for searching fields) or to have a translation. This translation approach is similar to the topic mapping going on at NODC – cross-walking names such as street and roads so they mean the same thing.
- As FGDC transitions to ISO – can we leverage some of the translator work to be done if our vocab list is in order? – so use this translation effort to meet some of the needs (problem is editing other people's metadata records).
- IWG-OCM Inventory Working Group to develop and bless/adopt federal OCM vocabulary for search terms: Need to develop and share best practices, the vocabulary must be accessible, and someone must maintain the list.
- At the next workshop, have Bob Arko discuss the R2R vocabulary development efforts.

ISSUES to ADDRESS in Developing an Inventory:

- What is needed to support the OCM community?
- What about multiple inventories with web mapping hosted in one place?
- **Search capability**
    - How certain are you that you found all the data that is available in the database? For example, there are issues with GOS's search capability, as it is difficult to find data you know are there. May need search to look in all fields, including free text.
    - What about building a tool to parse out the summary metadata records from GOS that you want for your data needs that would include a link to where the data exists and a thumbnail sketch of what the data looks like. (All about finding a way to quickly pare down to the metadata you want, for example, coastal bathymetry.)
    - If we use GOS as the home for metadata, how do we improve data discovery?
- **Updating planned projects -** One issue with a "marketplace" of planned projects is that they are listed but not managed/updated as things change.
- **Non-compliant records -** What do we do with records that do not follow the standards? Turn them away?
- **Metadata vocabulary translations:** Explore the possibility of using the FGDC transfer to ISO to leverage some of the translator work to be done if our vocab list is in order.
- **GOS:** Should the OCM inventory still be based on GOS?
- **Metadata repository vs. web mashup:** Do we want to separate out the metadata from services (don't do from scratch – all have a limited number of search fields) (an example is the MMC)? Do we want a registry of web services to deliver data and build tools? Web services of data do not include metadata.
- **Getting metadata registered:** Metadata requirements have to be part of the data collector's day job, vs. having to go somewhere to register metadata. If the PI needs to do something more than once, it is not going to happen. What is needed is a person to do the metadata publishing (IT staff or partner).

- **Overlap with National Ocean Council:** We need to know where our interests overlap, so we can work together and leverage our efforts.
- **CMSP coordination:** Metadata and discoverability and other similar issues are also being dealt with in the CMSP community, so we need to work with them.
- **Archive:** One value of an archive vs. a repository is the data is well managed (long-term data management).

RECAP of DAY 1

At the end of the afternoon discussion, Roger Parsons reviewed and summarized the discussion from Day 1.

- The challenges and gaps in developing the inventory include vocabulary – for where, when, and other metadata fields
- Focus initially on the list of framework data layers and display geographic coverage
- Integrate individual web services, and ensure data is downloadable, dynamic, and standards based
- Need to address web services technology and identify which supporting agencies do not have the resources to deliver data through these technologies ; find out which framework data providers will need help with web services
- One lesson learned is to not put all our eggs in one basket: i.e. GOS
- We need to look for a new inventory model or revise the existing model (GOS)
- Identity our issues and gaps, seek areas of overlap and opportunities for partnerships, including with CMSP
- We do not have a timeframe, so map out what we need and once defined, go to CMSP to help them with their deadline
- Useful to document what data does not exist – something to show you did a data search but could not find the requested data. (Thus your proposed data collection is not duplicative.)

What is an inventory?

- Discovery of what data exist and plans to collect more data
- Ability to find partners
- Should provide sufficient info for initial evaluation on whether data meets user needs (and then access to the data for assessment)

ACTIONS:

- IWG-OCM Inventory Working Group to develop and bless/adopt federal OCM vocabulary for search terms
    - Need to develop and share best practices
    - The vocabulary must be accessible
    - Someone must maintain the list
- At the next workshop, have Bob Arko discuss the R2R vocabulary development efforts.
- What exactly is going to be provided by the web services? We want a displayable entity that is selectable with full links to full metadata or metadata lite when clicked on.

DAY 2

The second day of the workshop started with introductions by new participants and a summary of Day 1 discussion by Roger Parsons.

Day 1 Summary:

Inventory:

- Discovery of what data exist and plans to collect more data
- Ability to find partners and develop partnerships: who is the data collected by, when, and for what purpose?
- Should provide sufficient info for initial evaluation on whether data meets my needs (and then access to the data for assessment)
- Key user requirements from the 2007 workshop are still valid today – authoritative data important, but not all inclusive; non-authoritative data and data that is not federally funded or collected should be included as well
- Need some degree of compliant metadata – FGDC or ISO
- Web accessible
- Key words and geographic bounding boxes
- User needs to be able to provide feedback on data usefulness
- Need commitment from agencies (not just volunteers) to keep the effort going and to move the effort forward
- Need to address the complexity of dealing with data collection plans

Gaps:

- Absence of common vocabulary
- Assessment of data quality
- Not all repositories have web mapping component – so need to provide support (expertise or resources)
- Metadata and data searches (controlled vocabularies are an important piece)
- Common distribution formats for sharing data

Opportunities:

- There is value in collaboration – we need to link to NOC CMSP efforts
- Explore a possible partnership with Digital Coast and MMC efforts
- Standards:
    - Consider all using the same geospatial distribution approach – discuss GOS harvesting metadata from agency stores vs. entering metadata into GOS. Then we could control the interfaces within our agency. Each agency could have central repository for metadata to be harvested by GOS.

    - If NOAA developed metadata standards, their example and leadership may catalyze others to copy it and use it too.

Issues:

- GOS migrating to Data.gov: What is the future of this effort and how can we stay involved?
- Will Data.gov be supported by next administration? Or will it change/go away?
- Is there name recognition of GOS? (Not for the public as users generally not members of the public, users were often frustrated with using GOS, and GOS has funding issues.)
- Data commonality generally based on ISO standards:
    - IODE – International Ocean Data Exchange – deals internationally with metadata; they are ISO
    - FGDC – has a standards working group
    - JCOMM – (Don Collins) – has an expert team on data management metadata and uses common ISO standards for Oceanographic and Marine Meteorology; there are also efforts ongoing in Europe

Our framework data layers and the focus of the inventory is:

- Elevation (topography and bathymetry)
- Imagery (land and sea floor)
- Sub-bottom/seismic

<u>Presentations:</u>

After the Day 1 recap, there were several presentations.

Don Collins, NOAA's NODC
National Oceanographic Data Center Repository

For more information – refer to the presentation

Mission: To provide scientific stewardship of marine data and information.

The Goals of NODC are to: hold and provide archival services for a wide and deep collection of original data; produce metadata for data collections; make data accessible; and produce products recognized as authoritative data records.

- Activities include bringing additional data into the database (staying aware of data collection efforts), evaluating data quality, reformatting data for easier use, providing original data as well as data products generated at NODC.

Data Types, Providers, and Consumers

- Holdings have grown beyond physical water column data (temp and salinity) with the evolution in measuring technology, and now include biological data such as marine mammal distribution, and satellite data such as SST.

- Data comes from federal agencies and international exchange agreements (NODC is a world data center – WDC – for oceanography); Users include businesses, citizen scientists, public, US and Foreign government agencies.
- Includes the NOAA Library – has extensive holdings.

Services and Gaps

- Use multiple standard data access protocols, reducing number of protocols provided
- Use controlled vocabularies in our metadata – which is applied to data that comes into NODC (list is internally managed and maintained); working on coordinating with other vocab lists and mapping names to more common lists
- Working on improving Seanames list (additions to original list have not been well documents and constrained) in order build shape files so one can check and see where acquired data falls
- Transitioning from FGDC to ISO; developing and encouraging use of netCDF and CF metadata; recommending to new providers how the Archive wants data

Discussion 1:

- Group provided suggestions of sources with international boundary information, as well as using NGC for the US coastal boundaries
- Need to check and see if the data layers are available as web mapping services (may be for services but not for originator data)
- Don will check in with Anna Milan of NGDC on ICES master list, as she is working with them on synching systems and she attending the next meeting

Success Stories

- Don provided examples of success stories including SAMOS, CoRIS, Ocean Exploration and Research, and three others.
- Increasing the degree of automation in moving data to NODC for specific efforts (SAMOS and Group for High Resolution Sea Surface Temperature)
- OER – end to end data management capability primarily through NCDDC at Stennis
- Multiple international data management efforts for data stewardship; definition of criteria and standards
- Deepwater Horizon oil spill event response – archive data and developed web interface for public access (of data that is currently accessible to the public)

Discussion 2:

- All metadata is harvested by GOS, and NODC created some collection level metadata (currently ~23K records); generally try to lump into collection level metadata when specific
- Working on improving the creation and harvesting to GOS of metadata for products created by NODC
- <u>How discoverable is metadata?</u> NODC has a custom metadata interface that requires some knowledge, added a free-text search, search limited to controlled vocabulary lists; also older/historic objects have varying levels of metadata … trying to improve quantity and quality of metadata for historic records to help with searches

- Are controlled vocabularies on line?; Yes, they are on the NODC homepage (look for the data formats and code tab which sends you to statically generated lists), however, the tables need to be improved (and NODC would like to discuss this before sharing the tables)

Susan McLean, NOAA's National Geophysical Data Center (NGDC)
National Geophysical Data Center Repository

For more information – refer to the presentation

NGDC

- Archives data from the surface of the sun to the core of the earth (except for water column and weather-generating atmosphere)
- Operates multiple world data centers
- US national long-term archive for marine geological & geophysical data, some responsibilities under P.L. 373 were transferred to USGS
- Complies with NARA, including maintaining duplicate copies and migrating media every 6 to 7 years
- Adopting and implementing OAIS (Open Archival Information System) … helps ID roles and responsibilities and help support providers on metadata format and user access needs
- Have 10 gigabit connection at NGDC

Metadata:

- Annual review of metadata … go into internal metadata repository and look at holding on an annual basis… what does and does not need work …
- GAPS include common vocabulary, quality indicators, consistency of metadata quality

Ensuring Viability:

- 100 year goal, but some data is on a shorter cycle as back-up (not public data)
- Budget challenge
- GAPS include open-source archive formats (incoming data comes in sensor specific formats, is archived in this format, and is distributed in this format; an issue if the system format is not maintained; really want a bathymetry open format (currently NOS bathymetry data is saved in three formats)

Delivering Data to the Users:

- Validate metadata in FGDC/ISO standards
- Working to improve delivery services including migrating to ArcGIS Server from ArcIMS
- GAP: adopt open-source delivery formats

Data Managed:

- Coastal hazard warning & mitigation

- Ocean & coastal mapping (including NOS Hydrographic Survey data, multibeam bathymetry from UNOLS and others, serves as IHO Data center for Digital Bathymetry)
- Definition of the U.S. outer continental shelf
- Magnetic field modeling
- Marine Geophysical Trackline Data: MAJOR challenge: quality metadata; MAJOR success: ECS common seismic metadata template adopted by multiple agencies
- Marine Geology Data (designated archive for NSF funded data such as the Index to Marine and Lacustrine Geological Samples)

Success Stories:

- California Seafloor Mapping Program; state – federal partnership to plan, collect, & share data resulted in an estimated cost saving of $14M
- Others include UNOLS R2R, Hydropalooza, and working with UNH on the Extended Continental Shelf project

Summary:

- NGDC is one of three NOAA National Data Centers
- Strengths include: long-term archive, metadata, and web-service delivery of OCM data
- Partnerships with UNOLS R2R, Science Centers, and Academia are essential to support the full geospatial life-cycle
- OCM data are one of the fastest growing data streams stewarded by NGDC

Discussion:

- Question on how backscatter associated with bathymetry data and reflectance data associated with LiDAR data comes into the archive: The data does not come in as separate files, but the metadata notes if the backscatter or reflectance data is there, so you can decide if you want to download it.
- What is the delay in getting bathymetry data to the archive? : Variable. UNH submits the data within 3 months, others months to years, some take as long as 7 – 10 years. Most data come with a metadata record and NGDC also creates or updates the metadata record as needed.
- Currently the most missing item in metadata is data quality limitations.
- There is a need to add uncertainty of measurements in the data so can create uncertainty maps/grids of data.

Charlene Sylvester, USACE

Joint Airborne LiDAR Bathymetry Technical Center of Expertise (JALBTCX) Topo/Bathy Data

Charlene.S.Sylvester@usace.army.mil;

For more information – refer to the presentation

JALBTCX is an industry and federal partnership with about 30 staff at the center. In terms of the FGDC lifecycle, the center works primarily in data acquisition and the use and evaluation of

data, and leverages other for data distribution and archive. Data types/layers include shoreline, land cover, benthic habitat.

Projects include:

- Gulf of Mexico Alliance Master Mapping Plan: ID mapping needs and requirements, inventory existing capabilities, and leverage group efforts to fill in data gaps.
- USACE National Coastal Mapping Program: Began in 2004 and has a 5-year cycle of collection to acquire LiDAR elevation and imagery data in support of engineering and research needs. Focus is on sandy shorelines. Elevation data types include bathymetric LiDAR to 1000 m offshore at 5 m posting with 100% - 200% coverage and topographic LiDAR to 500M onshore, 1 m postings, and 200% coverage. RGB and hyperspectral imagery (for environmental monitoring) are collected along with the LiDAR.
- National Coastal Mapping Program (NCMP) Data Products: Create GIS friendly products for the USACE regions to use, including DEMS and hyperspectral mosaics.

Some JABLTCX customers get automatic delivery of data products via hard drive (USACE Districts; USGS St. Petersburg and EROS Data Center, and NOAA CSC and NGDC).

Interagency Support and Collaboration:

- Data discovery and access is improving; currently can access data through NOAA's Digital Coast and USGS's Hazards Data Distribution System. At some point the new national USACE database will have layers available to the public (Phase I of the database does not include DEMs, perhaps Phase II or perhaps could occur via delivery through NGDC).
- Data archive is also done through interagency support
- Using GOS and Data.gov to coordinate data collection and there are examples of regional collaboration for data acquisition, such as work in the Gulf of Mexico (Gulf of Mexico Alliance) and post-hurricane Ivan and Katrina coastal change. The multi-agency data resources were utilized for $200M of coastal reconstruction in the 2004 post-hurricane season.
- The end goal is to coordinate and maximize mapping abilities and make management decisions.

GAPS:

- <u>Spatial:</u> For the NCMP, data is only collected along sandy, wave-impacted coasts, leaving out many areas. Poor water quality impacts data collection. Sensor challenges in the 0-2m depth range.
- <u>Temporal</u>: Different data types and collection methods are added over the years. 5 year data collection cycle misses annual and event driven changes.

Success Stories:

- LiDAR data is easy to find on GOS – metadata success story (examples of metadata templates are available to review – includes ISO categories and processing lineage of software).

- Gulf of Mexico Alliance Mapping effort didn't start with data collection, it started with identifying needs and now is currently listing capabilities. Metadata effort has been funded.

Questions:

- How would the Gulf of Mexico Alliance like to use the OCM Inventory?

Jon Childs, Patrick E. Hart, and Peter Triezenberg, Pacific Coastal and Marine Science Center, USGS
NAMSS – A National Archive of Marine Seismic Surveys
http://walrus.wr.usgs.gov/NAMSS/

For more information – refer to the presentation

Jon: Pat Hart and Peter Triezenberg will also be giving parts of the presentation.

NAMMS provides public access to sub-seafloor profiles along lines of seismic surveys of the ocean floor.

- It is on-line map that uses on GoogleEarth.
- Archive covers all parts of geospatial life cycle, from getting data from owners to providing long-term archive, to using the data for off-shore hazard evaluation.
- Data is stacked or processed data – along with relevant metadata; largely in standard industry format (SEG-Y).
- Archive includes public domain data that has been released by industry, companies, or the federal government (such the BOEMRE data on a 25-year release cycle)
- NSF data is archived by University of Texas Institute of Geophysics

Pat Hart:

- Archive started in 2004 through agreements with Chevron (which no longer wanted to maintain internal archive of geophysical data and gave all records to USGS) and WesternGeco (wanted to purchase some of their offshore CA data, and also were given for public release old data of no exploration significance or that was approaching the 25 year public release schedule).
- In 2005 USGS created the first version of the website.
- Use GoogleMaps and GoogleEarth for access/searches; there are three search options, 2 of which are map based. The dialog box shows surveys and numbers, but does not yet show track lines on the map. To see the tracklines, click on a survey; you will also see a link to download data, including the pdf of scanned mylar survey data profile which provides information and the side label/metadata for the line. (This sidebar data is not currently captured in the metadata, but plan to do so. ECS is currently doing this for survey metadata.)
- Cannot download single track lines; have to download whole dataset. But you can link to USGS InfoBank database with some of specific track line data.

- Interpretation workstation display: The public and private sector can use the data to overlay an interpretation on top of the data, and then saving the new data.
- The GoogleEarth interface has more flexibility; can show all track lines available on GoogleEarth and then click one to bring up dialog box to download surveys.
- The website is just search and retrieval tool as all data actually resides in the InfoBank. InfoBank is a directory/file structure (not a true database). Do link to other sources of data.

Future plans:

- Possible discussion to distribute BOEMRE data sets as the site is not currently serving up any of their datasets.
- Include other types of data – even non digital data , such as scanned images, stacking velocities, and pre-stacked data
- Currently all data is 2D; considering including the more complicated 3D surveys that are starting to becoming available
- Considering processing pre-stack data and putting on-line
- May add a feedback utility for user comments for each survey to help future users of the data

Discussion:

- Currently do offer up single channel data and plan to try to make more of this data available.
- Survey metadata is registered on GOS (everything on InfoBank is registered on GOS), but much of the survey metadata needs to be added as it is not currently in digital form
- Have been avoiding working in the Gulf of Mexico as there is so much data there …. But a lot of GOM data is now reaching the 25 year limit for BOEMRE release

Chris Parrish, NOAA
NOAA Coastal Imagery
Chris.Parrish@noaa.gov

For more information – refer to the presentation

Chris is the lead physical scientist for NOAA's National Geodetic Survey remote sensing division. He is located at the University of New Hampshire, where he is also an affiliate professor.

NOAA/NGS Coastal Mapping Program takes stereo, tide-coordinated, aerial imagery to map the national shoreline. This is the official shoreline boundary and is applied to nautical charts; the boundary has legal, coastal science and management, climate change, and inundation modeling applications.

The program collects near IR and RGB along with images; also just purchased a new LiDAR system. Images are collected near tide states (high mean water and mean LLW levels) using a DSS Applanix Dual Cam. NGS has started using LiDAR data for shoreline mapping, it is highly

automated and NGS can share data for other uses (IOCM approach); LIDAR collected by others can also be used for shoreline determination. NGS runs data through VDatum to get tidally referenced data and extract tidally referenced shoreline. This supports the IOCM approach of sharing and using data collected by others. The LiDAR data is served up on Digital Coast. NGS also uses satellite imagery for mapping the shoreline in high priority port areas.

In addition to determining the shoreline, NGS supports emergency response through image collection such as post hurricane imagery and some oil spill work.

- Discussion: Yes, NGS did generate new shoreline for the DWH response, but it was not a standard product and did not meet the specs of usual shoreline; so NGS is looking at how to do this on a broader scale as some groups prefer more up to date data, even if it is not as accurate.
- Discussion: Coastal inundation group would love to hear about this. NGS is still working on this issue (how to produce the product and how users would apply it), so currently this is a secondary product for use by others.

Success story:

- A great IOCM success story that is ongoing and may be extended is NGS's leveraging of JALBTCX West Coast LiDAR data for derivation of outer coast shorelines. If this effort is successful, the shoreline derivation will continue from the border with Mexico up the coast. The derived shoreline is only MHW line, as MLLW is harder to get from LiDAR data (data gap at the 0-2 m depth land-water interface). While the initial focus is on the MHW line, perhaps in the future it can be extended to the MLLW line.

NGS does planning and requirements gathering from an IOCM approach. NGS looks outside of what the internal program needs to try to meet more requirements and supply data to other groups. This is more efficient, but puts a burden on the planning side.

- Discussion: To whom in NGS should tsunami inundation shoreline needs be sent? Send to requirements branch head or send to Chris and he will forward to the right person.

Metadata gets into GOS in two ways. NGS sends data and plans to NCDDC and CSC for Digital Coast and also loads information into MERMAid. Data disseminated in a variety of ways (the slide is not complete list).

- Discussion: Is this a duplication of metadata? Not sure, but the process does need improvement.

Discussion:

- There are a number of distribution mechanisms, but what is the archive for your LiDAR data?
    - The data goes to CSC for distribution, and right now we do an internal archive of data through backups and EMC Data Storage System (tape backup). We would like to archive more efficiently in future and are in discussions with CSC and NGDC and other partners at JALBTX. CSC and NGDC will follow up with discussions to make sure all data sent to CSC is archived at NGDC.
- NGDC has a nice collection of historical photos from 1920 – 60 from the old Coast & Geodetic Survey. The photos need a new home and could be useful for coastal change

analysis. NGS and SPO will discuss finding a home for the data and easily getting it out to people; they will follow up with NGDC.

Gayla Evans, Earth Resources and Science (EROS) Center Repository, USGS National Elevation Dataset (NED)
http://ned.usgs.gov

The objective of USGS EROS Topographic Science is to establish partnerships and conduct research and applications that facilitate the development and use of integrated national and global topographic datasets. The presentation highlights some of the research applications that support *The National Map*. The EROS Mission includes science, data access, and data archive.

The National Elevation Dataset (NED) is seamless national coverage of "best available" raster elevation data, and is the elevation layer of *The National Map*. NED is updated bi-monthly to incorporate new data and DEMs. Alaska data is improving, but currently most is at 2 arc-seconds. NED was created in 1999 to deal with issues such as mismatches along 7.5–minute quads; NED provides one seamless raster mosaic.

Even in a small geographic area, source data may be in multiple formats, projections, and elevation units. Source data is generally at 10m resolution or better, but some is at 30m. The complete layer is at 1/3 arc-second, which required resampling of data. Gayla also discussed issues with migrating higher resolution data to NED resolutions and changes over time in the migration policy. Issues with data sets may include: water bodies higher than land or a large number of data voids.

In response to ARRA funding for LIDAR to support the NED, developed USGS-NGP Base LiDAR Specifications, which clarify the minimum requirements for NED usage. The spec is in draft form; expect that a broader federal LiDAR spec will be developed. LiDAR derived elevation data has improved in both horizontal and vertical resolution- improving the accuracy of the NED.

NED spatial metadata includes resolution, date of update, production method, 10 m or better source data. Over 30 metadata items are recorded for each DEM. Each pixel of the layer has lots of info about the source DEM and NED processing.

Data delivery is on-line for smaller, user-defined areas; via hard drive for larger areas but can take up to 8 weeks; or on-line in canned 1-degree tiles for large areas in which data is needed immediately. NED is the base layer for a lot of research and applications, including sea-level rise, natural disasters, and DEMs merging topography and bathymetry. Gayla also discussed elevation derivation applications of LiDAR.

Discussion:

- Old versions of NED are available at USGS and are archived, but they are not online.

- NED does produce some shoreline products such as the topo/bathy for Mobile Bay. There are discussions to include bathymetry data in NED; it is at research project stage right now due to tight funding levels
- NGDC will send some DEMS they created and the technical report link to USGS – perhaps could be used in NED.
- ISSUE: Looks like there is not enough federal coordination on DEM development as there are similar efforts at different agencies.

*****13:30 Presentations Conclude *****

Facilitated Discussion and Next Steps
Lisa Taylor, facilitator

Lisa Taylor (NGDC, NOAA) facilitated the afternoon discussion about the next steps for the IOCM Inventory. The second day of discussion re-capped some PowerPoint presentation material, and started to stress the importance of determining the next steps to take, what roadblocks stand in the way, and how agencies can overcome these hurdles in order to stay on target in establishing an IOCM Inventory.

The discussion began with a list of questions:

- Have we identified the major repositories for OCM framework data types?
- Do we understand the capabilities of and services offered by these repositories? What characteristics of these repositories need to be considered in developing the OCM Inventory?
- Are there major gaps in OCM data stewardship and services in light of the previous days' presentations and can these gaps be addressed with or without new resources?
- Are the OCM framework data layers sufficient to meet near-term needs of emergent requirements (e.g., CMSP)? If not, how should this gap be addressed?
- What are the next steps in moving forward in a coordinated fashion in the development of the OCM Inventory and who needs to be involved?

Initial List of Gaps and Needs Identified at the Workshop:

- Need common vocabulary
- Data quality assurance measure/uncertainly measure
- Availability of dynamic WMS
- Metadata search capabilities
- Common/open data distribution formats
- Functional data collection registry
- Marine gazetteer
- Data/metadata exchange formats

- Need agency commitment and a leader to step up and provide resources and results (there is commitment at the working group level for the inventory but no leadership commitment; also funding issues)

<u>The group listed actions to address in the afternoon session:</u>

- Independent of resources, define succinct list of what needs to be done to fill the gaps and create an OCM inventory
- Sort the actions into two pots: 1) what we are doing anyway – so we can improve coordination, and 2) other efforts needed (that may require FY12 resources)
- Figure out how to coordinate our efforts with NIMS/CMSP planning
- Address the issue of creating a new inventory or using current effort (GOS and Data.gov) – note that dealing with oceanographic data migration to data.gov is more of an FY12 effort, and need an agency champion for this effort
- Define what is the OCM Data Inventory
- Discuss the framework data layers and the minimum of what we want in the inventory
- Metadata
- Identify Search filters (geographic, data, type) so searcher can find what they need

<u>Let's assume resources are not the issue. What do we need to do to get IOCM running?:</u>

- Coordinate/Streamline Efforts: Data servers working together w/ WMS
- Determine resources needed for next year to accomplish goals FY12
- Do existing resources exist to succeed by August (i.e. GOS, data.gov, etc.) or does the group need to start fresh?
- Identify champions at department levels/who is going to manage this?
- Take inventory of what exists and what is missing in order to move forward to make a portal
- What layers need to be included?
    - Elevation (topo + bathy)
    - Imagery (land + seafloor)
    - Sub bottom + seismic
- What applications - dynamic, web services-based, downloadable, etc.
- Establish all of the efforts and agencies already existing (what stream do they best represent?)
- Come up with OCM inventory requirements document
- Check with the IOOS group to see what they did/how they got their work done – What were their best practices for metadata distribution?

<u>Discussion:</u>

- Develop collective metadata and model/template for an inventory; metadata lite and controlled vocabularies
- OCM Inventory Model could serve as a model for the other communities/inventories that need to feed into the CMSP Portal such as: OBS, BIO, etc.

- Provide specific information at the next workshop on what the inventory should do
- Consider leveraging MMC … may be easier to re-engineer than GOS
- Ask data users – How do you want the data (how should bathy/elevation be delivered)? May vary by region. CMSP folks may not be data savvy and may be more interested in knowing what is happening where (information vs. data).
- Suggested approach:
    - Year 1: develop inventory
    - Year 2: work with regions on data delivery format
- We are not excluding any community or data from the inventory, but we are starting with the framework data layers

<u>OCM Inventory Requirements Document should allow us to answer these questions:</u>

- What data are available?
- What are the planned and needed data collections?
- How is the search conducted? Through what filters?
- How does the user link to data?

<u>Immediate Next Steps:</u>

- Take inventory of services and systems (along with versions) to see what map services are compatible. Identify the critical layers needed. The portal needs to identify and assist map service needs. Dave & Robby to come up with list of questions and send to Fran, Eddie, Roger, Doug, etc. for agency feedback)
- Discover and compile a list of those who require WMS support (technical team). Complete this effort in June 2011.
- Develop a spreadsheet to answer WMS inquiries
- Identify members of the technical/metadata team – anoint someone in their agency as the team lead (Dave Fischman and Robby Wilson coordinate)
- Work with the CMSP and the Marine Cadastre to determine what data is necessary and what the best fit is. What requirements are "we" not satisfying from the government to customer level?
- Coordinate with various projects and regional planners/providers
- Make relationships and contacts at the State level - especially states and regions that are on the forefront of CMSP such as MA, RI, etc. Get their initial feedback, concerns, and advice for developing the OCM inventory. See what they want in terms of data and data format.
- Write OCM Requirements Document – get review and feedback from other groups
- What metadata vocabulary efforts are our experts aware of? Are they sufficient to address the fields we need to develop? (check with NODC/NCDDC/NGDC, Anna Milan, Julie Bosch, Bob Arko, Adrianna at UNH, other gurus; note that R2R already has some of this for OCM data)

<u>Rough Outline of IOCM Inventory Requirements Document:</u>

Steering Committee Volunteers: Fran Lightsom, Roger Parsons, Lisa Taylor, Doug Vandergraft, John Cartwright/Eddie Wiggins (tech/metadata support)
Deadline: Monday, April 4, 2011
Length: 3-5 pages
Audience: CMSP group, policy makers, discuss with Mary Boatman/NOC and obtain endorsements

Content Outline:

- Overview
- Statement of need
- Body
    - Purpose of the Inventory
    - What does the user/customer need? What does the non-technical user require?
    - Metadata: state what is needed and how this will be done
    - How will users search for data? What will the screen look like? How do they want results fed back to them in a meaningful way?
    - Focus/Needs: Establishing controlled vocabulary, develop a model for necessary data streams, outline resources needed and agency collaboration

Issue to consider in writing the document:

- Considering focusing on elevation (bathy/topo) as the first data stream with others to follow
- The inventory requirements document will inform the software/design document
- Assume we may need to build something from scratch but hope to leverage off an existing effort
- Look nationally at a small number of layers vs. multiple layers in one region
- Could have overlap in pointing to data sources so this issue of data archive/data delivery locations needs to be considered
- Check with IOOS for a requirements document to review
- Need to define best practices for metadata and data serving, or make the archive the authoritative record
- Include info on quality assessment

<u>Major GAP: Data quality assessment</u>

- Bob Arko's team is working on quality assessment metrics
- See if UNH and JABLTCX could address uncertainty in bathymetry (at one point multibeam operators and science centers were looking at a metric based on % of good beams; JALBTCX data already has uncertainty info)
- Topo – see if EROS/NED could address this

<u>Wrap up:</u>

<u>Last Workshop Comments/Takeaways:</u>

- Currently we are biting off too much - let's get the inventory settled and this document finished. Once one agency takes the lead (i.e. NOAA, etc), others will follow…
- We have all learned a lot from this workshop and it'sit has opened our eyes to what needs to happen and where there are gaps. We have to make use of each other's strengths and collaborate to get more accomplished.
- CMSP is a blessing in disguise since all communities and agencies involved have a role in supporting these initiatives. There are many drivers and agencies (15-24) committed to developing an IOCM portal – just have to work together and leverage resources to get our goals accomplished.

Actions

1. Identify the metadata experts within the IOCM-IWG and have them define and develop the baseline terminology and vocabulary for the IOCM database. Clearly define their agenda for the next meeting.
    a. What vocabulary terms can support our efforts?
    b. What exists? What is needed?
        i. Contact Julie, Bob, Anna, and other experts
2. Create a "IOCM Inventory Requirements Document" by April 4, 2011 (see above for outline)
3. Determine the direction and future of GOS
4. NOAA specific (from Chris Parrish discussion):
    a. LiDAR data: NGS discuss with CSC and NGDC the archive of NGS LiDAR data.
    b. SPO to discuss with NGS a new home for historical photos (1920 – 60) from the old Coast & Geodetic Survey.

Flipchart Notes:

Day 1:

Purpose of Workshop/GOALS

- Review lessons learned from IWG-OCM efforts to develop National OCM Inventory
- Understanding OCM data discovery/delivery activities
- ID gaps, areas of overlap & opportunities for partnerships
- Define framework/ID resources for moving forward

Day 2:

a) TASKS: (Roger's summary notes on Day 2 of the workshop)

Metadata-Lite "Fields"
Determine controlled vocabularies

- Topo
- Bathy
- Land Imagery
- Seafloor Imagery
- Sub-bottom

Which metadata fields are essential?
What vocabularies currently exist? (for next meeting)
What "technologies" currently exist?

Develop "collections" metadata?

- OCM Inventory Requirements Document
- Check w/ IOOS for Requirements Document

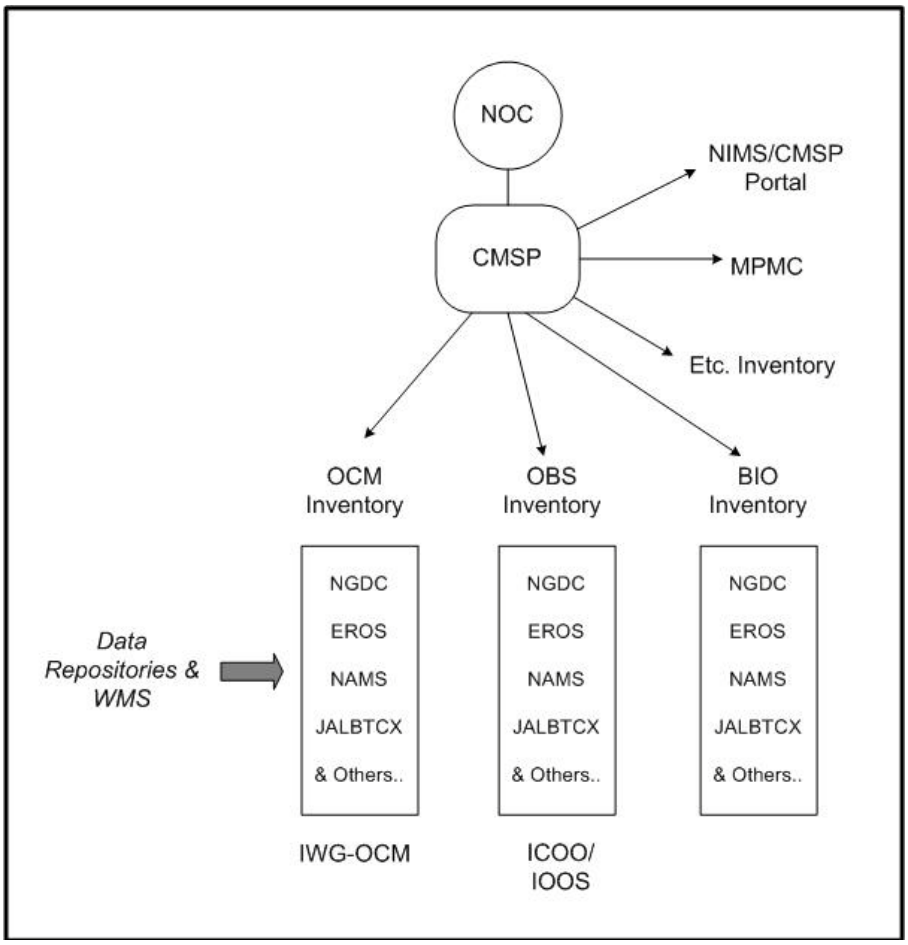

Diagram showing relationships between National Ocean Policy entities

<u>Basics of Inventory</u>

- What data are available?
- What are the planned (& needed) data collections?
- How is search conducted?
- How does user link to data?

With respect to CMSP, what do the regional planners need (data format)?

- Inquire w/ CA, RI, and /or MA

<u>OCM Inventory Requirements Document (HIGH LEVEL)</u>

- Fran, Eddie, Roger, Lisa, Doug (with guidance from John C. and Robby W.)
- Due Date April 4, 2011
- Discuss with Mary Boatman/NOC (obtain endorsement)

Content:

- Overview, purpose, statement of need
- What does the customer need?

- Metadata needs
- Consider ELEVATION as initial data layer.
- Describe “best practices”
- Approx. 5 pages at most

Capitalize on existing capabilities/systems/efforts.

Concurrent w/ high-level requirements document, development?
- Inventory existing WMS (& capabilities) – Tech Team
- Identify who needs WMS support. – Tech Team
- Develop spreadsheet to answer WMS inquiries.
    - Dave and Robby to coordinate.
- What vocabulary efforts can support the OCM efforts (Julie B., Bob Arko, Anna Milan)

Data Quality Assessments
- Bathy (CCOM & JALBTCX)
- Topo (EROS/NED)

GOS/Data.gov
- Stay engaged but…….

b) Additional Day 2 flipchart notes:

Discussion Points:
- GOS geographic filter

Federal data available as web services
- Support agencies who do not have the resources

Inventory:
- Help discover partners and data (community)
- Metadata, geospatial – knowing it exists or not
- Sufficient information for an initial evaluation of the data

Common VOCAB:
- IOCM needs to define a common vocab for OCM data

OCM Framework Data
- Elevation (topo & bathy)
- Imagery (Land & Seafloor)
- Subbottom/Seismic

Parking Lot:
- Uncertainty in data records

GAPS/NEEDS:

- Common vocabularies
- Data quality assessment measure
- Data uncertainty measure
- Availability of dynamic WMS
- Metadata search capabilities
- Common/open data distribution formats
- Functional data collection registry
- Marine gazetteer
- Data/metadata exchange formats

National Ocean and Coastal Mapping Inventory Workshop
January 12 -13, 2011

Attendees and Remote Participants

Name	Agency	Attendee (in person)	Remote Participant (via phone)	Day 1	Day 2
Roger Parsons, co-lead	NOAA/IOCM	x		x	x
Fran Lightsom, co-lead	USGS	x		x	x
Eddie Wiggins co-lead	USACE	x		x	x
Lisa Taylor, facilitator	NOAA/NGDC	x		x	x
Rebecca Arenson	NOAA/IOCM	x		x	x
Bob Arko	LDEO		x	x	
Mary Boatman	National Ocean Council		x	x	
Chris Cartwright	NOAA/NGDC	x		x	x
Jon Childs	USGS		x		x
Don Collins	NOAA/NODC		x	x	x
Siobhan Collins	NOAA/NGDC	x		x	x
Jeffrey Cross	NPS	x			x
Jihong Dai	NOAA/NMFS		x	x	x
Rob Dollison	USGS		x	x	
Gayla Evans	USGS		x		x
Dave Fischman	NOAA/NGDC	x		x	x
Chris Fox, Director	NOAA/NGDC	x		x	
Jim Holik	NSF	x		x	x
Patrick E. Hart	USGS		x		x
Jim Illg	NOAA/NGDC	x		x	
Roger Johnson	NPS	x		x	
Sue McLean	NOAA/NGDC	x		x	x
Josh Murphy	NOAA/CSC		x	x	x
Chris Parrish	NOAA/NGS		x		x
Joe Pica	NOAA/NGDC	x		x	x
Charlene Slyvester	USACE	x		x	x
Peter Triezenberg	USGS		x		x
Doug Vandegraft	BOEMRE	x		x	x
Jonathan Westcott	FEMA		x	x	x
Robby Wilson	NOAA/SPO	x		x	x

OCM Inventory Acronym List

Acronym	Full Name
ARRA	American Recovery and Reinvestment Act
BOEMRE	Bureau of Ocean Energy Mapping, Regulation and Enforcement
C-CAP	Coastal Change Analysis Program
CF	Climate and Forecast
CMSP	Coastal and Marine Spatial Planning
CoRIS	NOAA Coral Reef Information System
CSC	Coastal Services Center (part of NOAA)
CZMA	Coastal Zone Management Act
DC	Digital Coast
DEM	Digital Elevation Model
DSS	Digital Sensor System
DWH	Deep Water Horizon
ECS	Extended Continental Shelf
EEZ	Exclusive Economic Zone
EROS	Earth Resources Observation and Science (The Center is part of USGS.)
FEMA	Federal Emergency Management System
FGDC	Federal Geographic Data Committee
FY	Fiscal Year
GEBCO	General Bathymetric Chart of the Oceans
GIS	Geographic Information System
GOM	Gulf of Mexico
GOS	Geospatial One-Stop (Geodata.gov)
ICES	International Council for the Exploration of the Sea
IHO	International Hydrographic Organization
IMS	Information Management System
IOCM	Integrated Ocean and Coastal Mapping
IODE	International Ocean Data Exchange
IOOS	Integrated Ocean Observing System
IR	Infrared (re: light)
ISO	International Organization for Standardization
IWG-OCM	Interagency Working Group on Ocean and Coastal Mapping
JALBTCX	Joint Airborne Lidar Bathymetry Technical Center of Expertise
JCCOM	Joint Commission for Oceanography and Marine Meteorology
JSOST	Joint Subcommittee on Ocean Science and Technology
LiDAR	Light Detection and Ranging
MERMAid	Metadata Enterprise Resource Management Aid
MHW	Mean High Water
MLLW	Mean Lower Low Water
MMC	Multipurpose Marine Cadastre
MMS	Minerals Management Service

Acronym	Full Name
NACO	National Association of Counties
NAMMS	National Archive of Marine Seismic Surveys (part of USGS)
NCDDC	National Coastal Data Development Center (part of NOAA)
NCMP	National Coastal Mapping Program (NCMP)
NED	National Elevation Dataset (part of USGS)
NetCDF	Network Common Data Form
NIMS	National Information Management System (re: CMSP)
NPS	National Park Service
NMFS	National Marine Fisheries Service (part of NOAA)
NGDC	National Geophysical Data Center (part of NOAA)
NGS	National Geodetic Survey (part of NOAA)
NOAA	National Oceanic and Atmospheric Administration
NOC	National Ocean Council
NODC	National Oceanographic Data Center
NSF	National Science Foundation
OAIS	Open Archival Information System
OCM	Ocean and Coastal Mapping
OCMIA	Ocean and Coastal Mapping Integration Act
OMB	Office of Management and Budget
P.L.	Public Law
RGB	Red Green Blue
R2R	Rolling Deck to Repository
SAMOS	Shipboard Automated Meteorological and Oceanographic System
SCUFN	Sub-Committee on Undersea Feature Names (of GEBCO)
SPO	Special Project Office (part of NOAA)
SST	Sea Surface Temperature
SSV	Sailing School Vessel
TNM	The National Map
UNH	University of New Hampshire
UNOLS	University-National Oceanographic Laboratory System
USACE	United States Army Corp of Engineers
USGS	United States Geological Survey
WDC	World Data Center
WMS	Web Map Service