Integrated Ocean and Coastal Mapping

Data Supporting Science and Sound Decision-Making

Ashley Chappell, NOAA IOCM Coordinator
Hydrographic Services Review Panel Meeting
May 7, 2013

“Map Once, Use Many Times”
What is IOCM?

IOCM is planning, acquiring, integrating, and managing ocean and coastal geospatial data and derivative products for easy access and use by the greatest range of users.

Three primary tasks:

1. Data Acquisition
2. End-to-End Data Management
3. Maximum Use and Re-Use of data
Opportunities
Maximizing Benefits of IOCM

Oceans, coasts = economy...

- Navigation, transportation, security
- Climate change and hazard resiliency
- Ecosystem-based management
- Energy siting and resource extraction

...Overlapping data requirements
Recent Mandates

Ocean and Coastal Mapping Integration Act, 2009:
• Validated NOAA’s vision for IOCM
• Provided focus for interagency coordination
• Authorized previously ad-hoc efforts

Natl Ocean Policy Implementation Plan, 2013:
• Identifies mapping actions to meet OCMIA
• Provides long term road map
• Coordinates across mapping agencies

Administration/Congressional Budgets
• FY12 Approps supported IOCM approach
• Sandy Supplemental takes IOCM approach
• FY14 PresBud pushes collaboration

The term “ocean and coastal mapping” means the acquisition, processing, and management of physical, biological, geological, chemical, and archaeological characteristics and boundaries of ocean and coastal areas, resources, and sea beds through the use of acoustics, satellites, aerial photogrammetry, light and imaging, direct sampling, and other mapping technologies.

“Map Once, Use Many Times”
Who is IOCM?

• NOAA IOCM Coordination Team
  – Core staff to coordinate/promote IOCM efforts
  – 21 programs/offices across NOAA
  – Reports to NOAA Oceans and Coasts Council

• IOCM ROAD MAP
  – NOAA R2R
  – IOCM std, Geophysical Data Stewardship Policy
  – Benthic habitat maps
  – Multi-mission cruises
  – Shoreline mapping/LIDAR
  – Baseline data for coastal Digital Elev. Models
  – Modeling (tsunami, ports and estuaries)
  – Developing methods to reprocess data for additional uses

• Foundation for external collaboration

“Map Once, Use Many Times”
### IOCM Balanced Scorecard: Maturity Index

**CURRENT IOCM BSC:**

**Performance Measure:**
Initial datasets processed for IOCM seafloor/water column mapping data products (annual snm)

<table>
<thead>
<tr>
<th>FY 2011 Actual</th>
<th>FY 2012 Target</th>
<th>FY 2013 Target</th>
<th>FY 2014 Target</th>
<th>FY 2015 Target</th>
<th>FY 2016 Target</th>
<th>FY 2017 Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>226</td>
<td>352</td>
<td>17,100</td>
<td>22,800</td>
<td>37,000</td>
<td>47,950</td>
<td>47,950</td>
</tr>
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</table>

**Description:** This measure highlights existing datasets that the IOCM center will focus on re-processing. The metric illustrates the large quantities of data available but not accessible for multiple uses. These datasets were collected for a single purpose, but can be rendered more useful to other applications such as Marine Geospatial Products, habitat mapping, tsunami and storm surge models, and nautical chart updates in areas less critical for navigation than above.

### PROPOSED: Percent progress made toward implementing NOAA’s IOCM vision for “Map Once, Use Many Times” to increase efficiency, maximize value, and enable greatest range of use

<table>
<thead>
<tr>
<th></th>
<th>FY13 Target</th>
<th>FY14 Target</th>
<th>FY15 Target</th>
<th>FY16 Target</th>
<th>FY17 Target</th>
<th>FY18 Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data Acquisition</td>
<td>20%</td>
<td>40</td>
<td>60</td>
<td>80</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Illustrative Milestone A</td>
<td>Met? Yes</td>
<td>Met? No</td>
<td>Yes</td>
<td>Yes+ (caught up with target)</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>End to End Data Mgmt</td>
<td>33%</td>
<td>66</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Milestone L</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes+</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Maximum Use/Re-use</td>
<td>15%</td>
<td>25</td>
<td>40</td>
<td>65</td>
<td>80</td>
<td>100</td>
</tr>
<tr>
<td>Milestone X</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes+</td>
<td>Yes</td>
</tr>
<tr>
<td>Total Actual (rate of progression to IOCM maturity)</td>
<td>15%</td>
<td>32%</td>
<td>55%</td>
<td>76%</td>
<td>93%</td>
<td>100%</td>
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</tbody>
</table>
Interagency Coordination

- **IWG-OCM**
  - coordinate and promote OCM efforts
  - share information
  - Sits under SOST
  - NOAA co-chairs with USGS, USACE

- **Heavy focus on OCM Inventory**
  - 2007, 2011 workshops

- **OCM outcomes**
  - Shoreline mapping/LIDAR
  - National Ocean Policy Obs/Infra/Mapping

- **Now working to build more direct collaboration**
  - Sandy Supplemental, SeaSketch
  - National Coastal Mapping Strategy
Shoreline Mapping

NOAA using USACE-collected LiDAR, along with V-Datum (NOAA’s vertical datum transformation tool), to map the National Shoreline.

- Data meets multiple agency requirements
- NOAA taking advantage of USACE 5-year shoreline mapping cycle
- Efficiency gains and cost savings.
Arctic Mapping

Working with USCG on Trackline Surveys

- Buoy Tenders as mapping Vessels of Opportunity
- Technical support and expertise
- Hands-on direction and training
- Ship Trackline Guidance
- Abbreviated Survey Reporting documents
- Future planning for expanding USCG capabilities in Arctic surveying efforts

“Map Once, Use Many Times”
Long Island Sound

LIS Study requested NOAA assistance

• Led mapping prioritization workshop
• Providing expertise
• Common data acquisition guidelines
• Standards facilitate data re-use
• Map products:
  – Benthic habitats and ecological processes
  – Physical and geochemical sedimentary environments
• Efficiency gains and cost savings

“Map Once, Use Many Times”
Oscar Dyson - Multipurpose Surveying
NOAA AFSC acoustic/trawl pollock stock assessment

Untrawlable Habitat

Critical Tools:
- Fisheries Echo Sounder (EK 60)
- Multibeam (ME-70)
- Augmenting w/trained personnel
NOAA R2R
Ensuring Data Availability

- Following successful UNOLS – NOAA R2R
  - Send data direct from ship to archive
  - Use common data description & format
  - Develop common data processing methods

- Accomplishments:
  - Data Stewardship Policy
    - Implemented Geophysical Data Policy
    - Published Oceanographic Data Policy
  - Business Plan
    - Leverages existing programs and resources
  - IOCM Seafloor Mapping Standard
    - Developed and shared with partners
  - NEW! NMFS pipeline to archive and access
    - Prototyped fisheries sonar with Oscar Dyson
## Sandy Supplemental: An IOCM Approach

<table>
<thead>
<tr>
<th>Program</th>
<th>$50M to NOS for Mapping and Charting: Activities</th>
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<tbody>
<tr>
<td>OCS</td>
<td>Hydrographic survey contracts in Sandy impact area (NC-ME, *NY-NJ)</td>
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<tr>
<td></td>
<td>Charting backlog reduction in Sandy impact area</td>
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<td>Enhance/transition large scale, hi-res storm surge models to ops (with NWS)</td>
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<tr>
<td>NGS</td>
<td>Shoreline topo/bathy Lidar, imagery acquisition contracts (NC-ME, *NY-NJ)</td>
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<tr>
<td></td>
<td>Lidar system/camera upgrades for improved topo/bathy response capacity</td>
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<tr>
<td></td>
<td>GRAV-D: gravity for new vertical datum, avg 50cm error correction (NC-ME)</td>
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<tr>
<td>CO-OPS</td>
<td>Water level support for contracted surveys</td>
</tr>
<tr>
<td>NGS/CO-OPS</td>
<td>Vdatum upgrades to validate model uncertainty (NC to ME)</td>
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<tr>
<td>ORR</td>
<td>Updates and revisions to East Coast Environmental Sensitivity Indices</td>
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<tr>
<td></td>
<td>Marine debris impact assessments</td>
</tr>
<tr>
<td>NGDC</td>
<td>Data management and Digital Elevation Model development (with USGS)</td>
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<tr>
<td>JHC</td>
<td>Temporary IOCM Data Processing Center for Sandy data</td>
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</tbody>
</table>
SeaSketch and Sandy Supplemental

“Map Once, Use Many Times”
Back-up Slides
Why coordinate & collaborate on Data Acquisition?

• Avoid costly duplication of effort
• Maximize survey time
• Meet science & mission requirements

• IOCM:
  – Identifies mapped areas
  – Improves planning
  – Enables cross-agency collaboration
Why manage data?

- Enable NOAA’s mission requiring scientific data
- Maximize use of data for multiple purposes
- Avoid costly data loss

**IOCM:**
- Ensures data collected are available for use
- Processes data for multiple uses
- Delivers bang for the buck

“Map Once, Use Many Times”
Why re-use data?

• Scientifically sound decisions require data
• Data are expensive to collect
• Scientific data management is cost-effective
  – 3-month study, 2000% return on investment

• IOCM:
  – Ensures data are available
  – Enables use and re-use of data
  – Supports scientific and management missions
Why Do We Need IOCM?

IOCM addresses multiple issues:

• Data Collection
  – Data acquisition standards
  – Maximize use of platforms
  – Coordinate efforts
  – Identify common priorities

• Data Management
  – Ensure proper data archive
  – Use common data processing
  – Describe with standard metadata, vocabularies

• Data Access & Use
  – Data discovery
  – **Cost effective**
  – Common formats
  – Consistent science products
NOAA IOCM Coordination Team Members

**National Environmental Satellite, Data and Information Service:**
- National Coastal Data Development Center (NODC)
- National Geophysical Data Center

**National Marine Fisheries Service:**
- Chesapeake Bay Office
- Office of Habitat Conservation
- Office of Science and Technology
- Regional Science Centers

**Office of Marine and Aviation Operations**

**Office of Oceanic and Atmospheric Research:**
- Climate Program Office
- Office of Ocean Exploration and Research

**National Ocean Service:**
- Center for Operational Oceanographic Products and Services
- IOOS: Integrated Ocean Observing System Program
- NOAA/UNH Joint Hydrographic Center
- National Centers for Coastal Ocean Science
- National Geodetic Survey
- NOAA Coastal Services Center
- Office of Coast Survey
- Office of National Marine Sanctuaries
- Office of Ocean and Coastal Resource Management
- Office of Response and Restoration
- Special Projects Office
- NOAA Coral Reef Conservation Program

“Map Once, Use Many Times”