Marine Spatial Data Infrastructure

-- An Overview --

Presentation of behalf of Maureen Kenny
Chair, IHO Marine Spatial Data Infrastructure Working Group
Gerd Glang, Captain, NOAA
NOAA National Ocean Service
Office of Coast Survey

Definition
Spatial Data Infrastructure

- Used to summarize
    - *activities*   - *relationships*
    - *processes*   - *physical entities*

  that provide for integrated management of
    - *spatial data*
    - *information, and*
    - *services*

- Promotes geospatial data sharing and facilitates data use
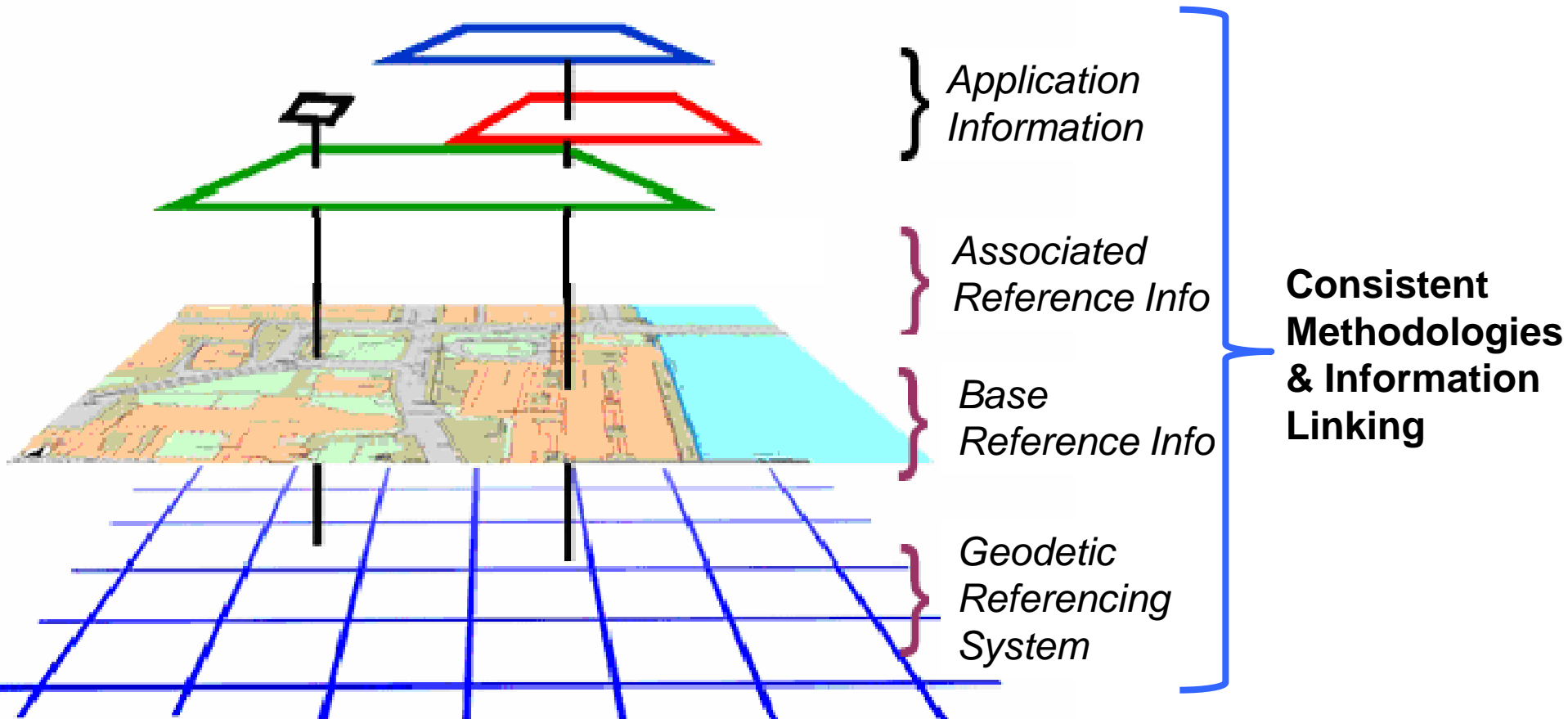
Definition
Spatial Data Infrastructure

- SDI provides infrastructure for digital data
  - *Distributed across many repositories*
  - *Managed by different organizations*

- Common set of standards and policies for
  - *Data*
  - *Metadata*
  - *Data quality*

- Provides for
  - *Distribution*
  - *Coordinate transformation*
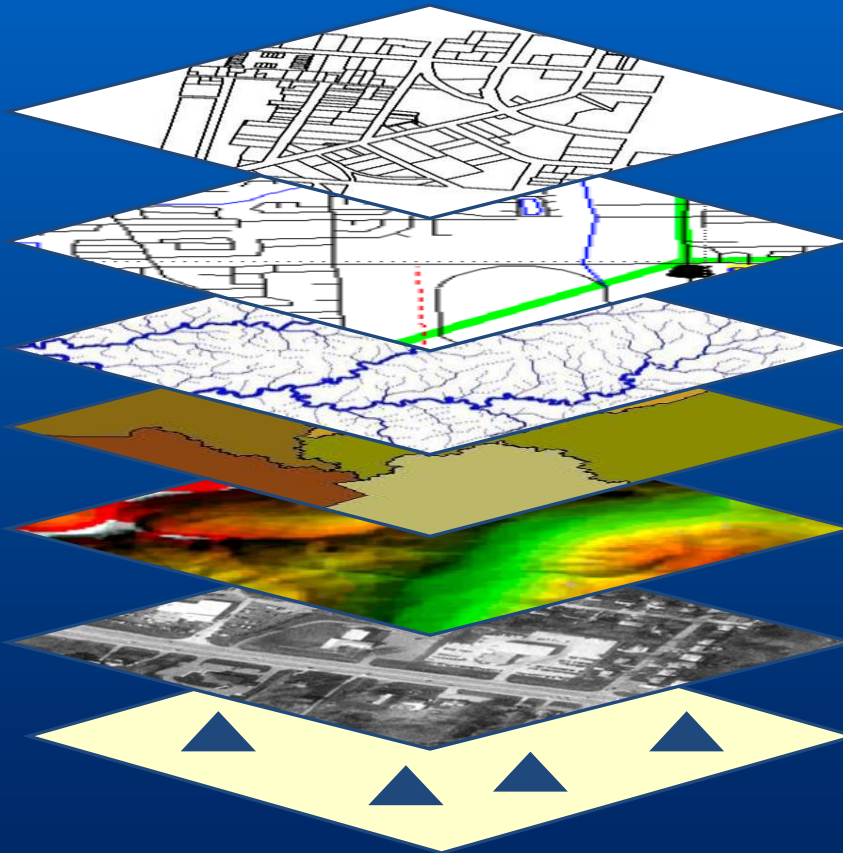
What Constitutes an SDI

- Policy
  - Defines need to create information that is interoperable

- People and Organizations
  - Willingness
  - Cooperation

- Essential building blocks
  - Standards
  - Technology
  - Metadata

- Information/Data

Information in an SDI

Application Information

Associated Reference Info

Base Reference Info

Geodetic Referencing System

Consistent Methodologies & Information Linking

Source: DNF, 2004

Examples of Base Information

Land Ownership

Transportation

Surface Waters

Boundaries

Elevation/Bathymetry

Aerial Imagery

Geodetic Control

Benefits of supporting a MSDI to Hydrographic Organizations

- Wider use of hydrographic data

- Reduce data acquisition duplication

SURVEY ONCE, USE MANY TIMES

- Cost savings, effective use of funds

- Common reference data

- Facilitates cooperation with other information providers

- Improved decision making, such as…

Coastal Management
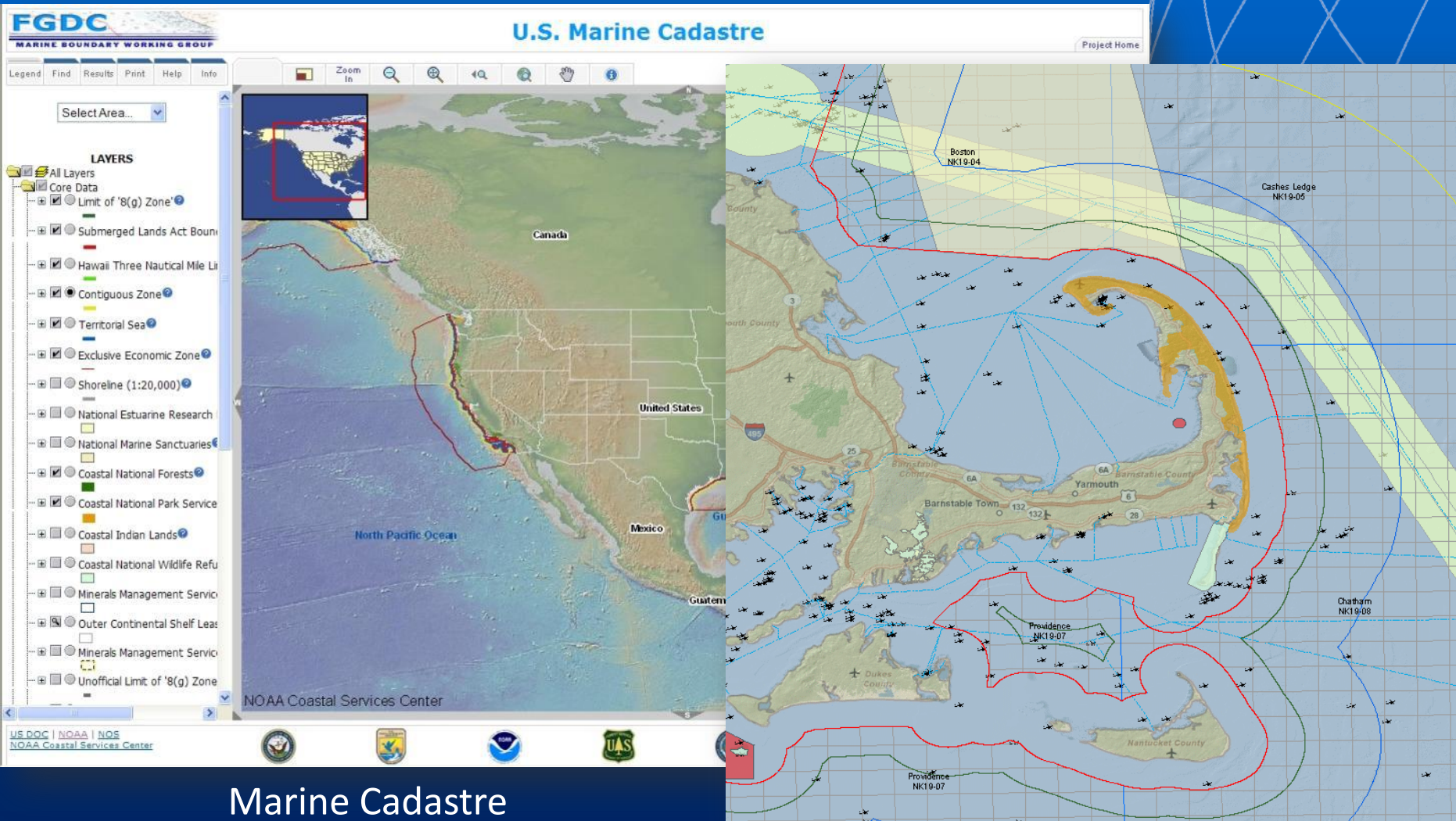
Watersheds

Restoration Sites

Fisheries Management

Tracking of Fish Stocks/Marine Mammals

Killer Whale Tracks
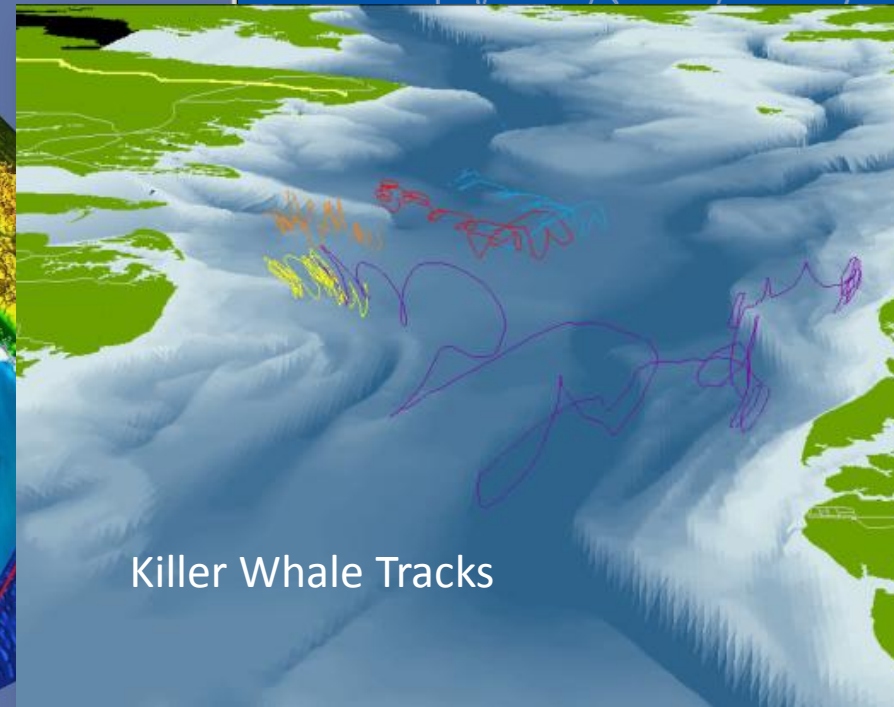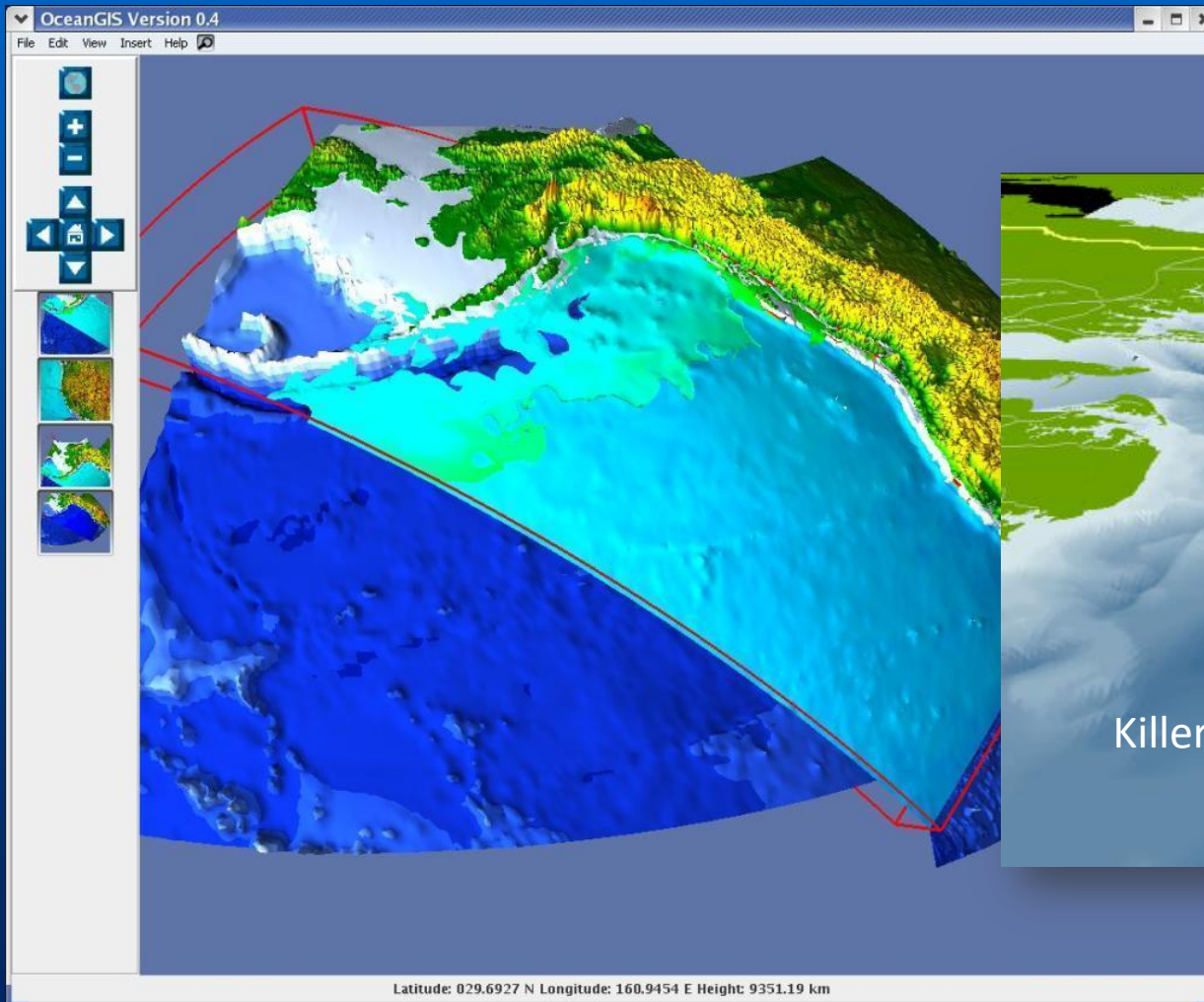
Alternative Energy Development on the Outer Continental Shelf

Marine Cadastre

Hazards Mapping

Post-Katrina Marine Debris Interactive Map

Oil Spill Tracking
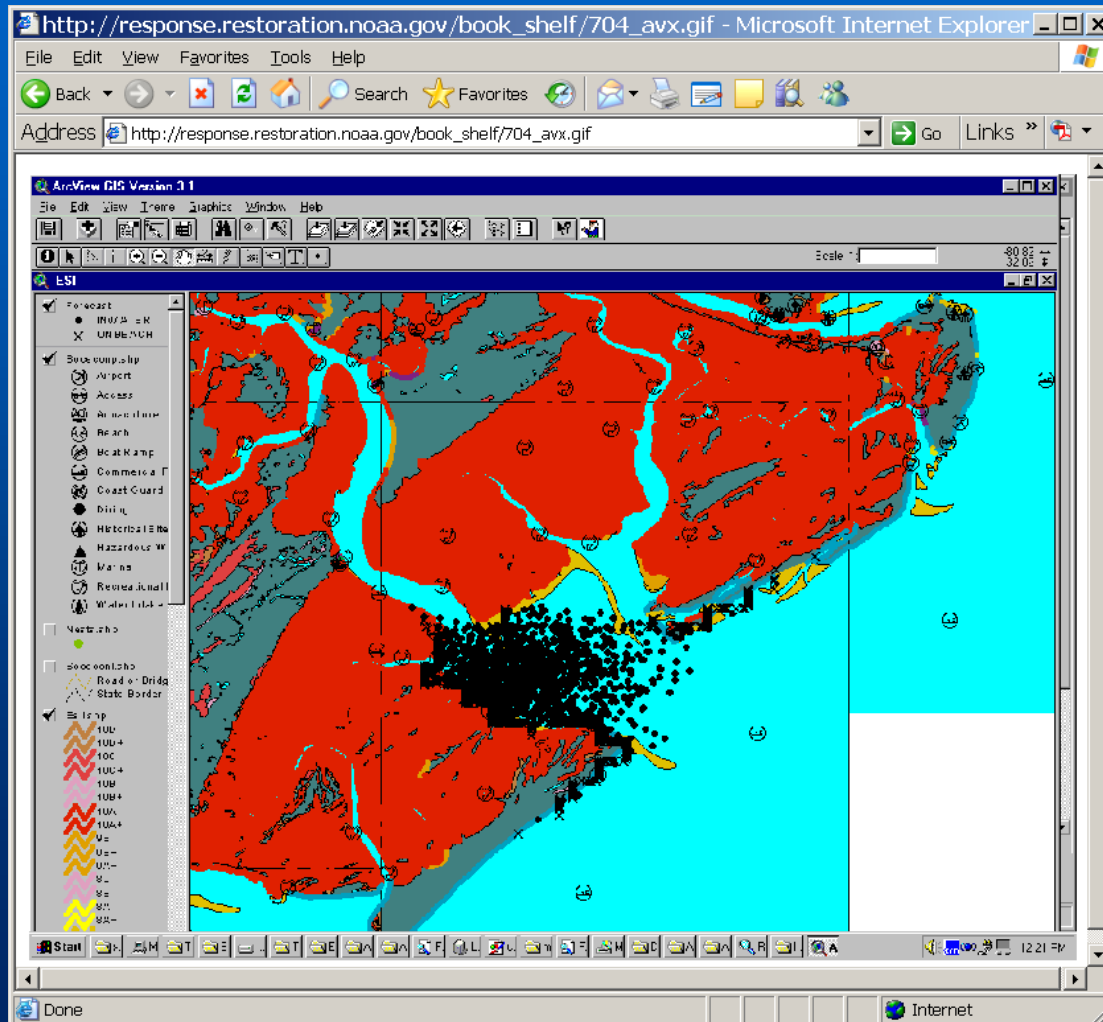
Mapping Benthic Habitats
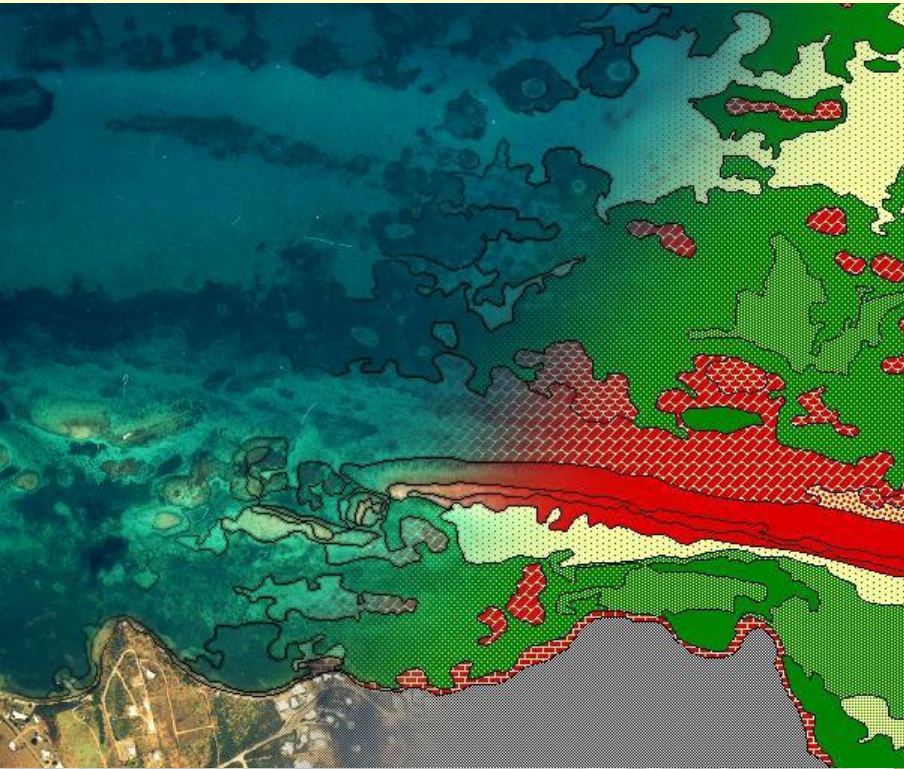
Habitat Maps

Ecosystem Monitoring

Challenges

- Developing joint policy approaches with other organizations

- Investing in improved business processes/ information management
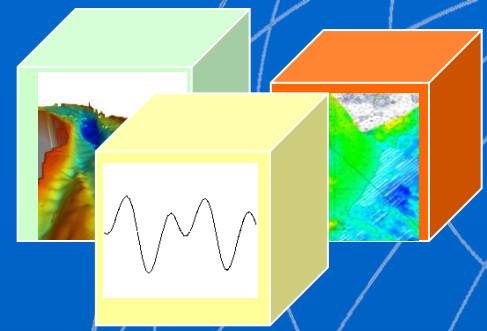
- Difficulty by non-marine community to understand marine SDI components

- Resources

- Gathering support for SDI activities from decision makers and budget managers

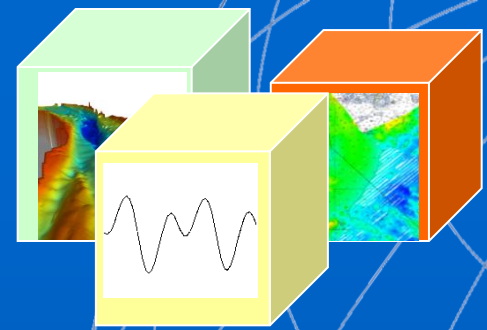- Ensuring correct knowledge, skills, and training

Working Toward a MSDI

- Identify data holders/service providers

- Determine user requirements

  Used to determine formats for distribution, metadata required, data needs, areas for focus

- Develop road map for SDI implementation

- Develop policies

- Establish support and engagement

Working Toward a MSDI

Ensure necessary skills and knowledge available

- Identify existing data that you are authorized to distribute (focus on base data and digital data first)

- Capture non-digital data of interest by scanning or vectorizing at original scale

- Establish data access levels

  - *Internal vs. external, Government vs. public*

  - *Cost vs. free of charge*

  - *Full data set vs. data thinning or gridding*

Working Toward a MSDI
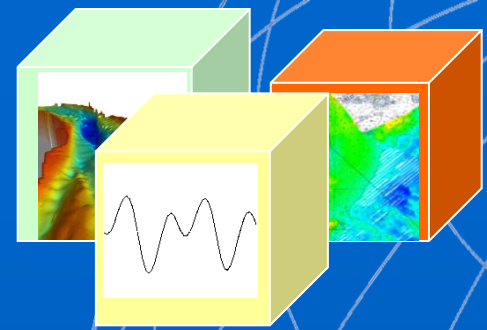
- Create metadata if doesn't exist, ensure appropriate information included

  Characterize data, facilitate discovery, use standards to ensure interoperability

- Enable search of metadata on Website or through portal for spatial data

- Make data available

  – *Initially could be by ftp, or mail on media*

  – *Preferably, via automated search and download*

  – *Later move to Web mapping/features services*

Examples of MSDI at Work

ENC Direct to GIS

http://nauticalcharts.noaa.gov/Staff/gisintro.htm

ENC Direct to GIS

Download all or specified layers in .shp files and other user selectable formats

CMSP Data Registry

CMSP Data Registry

Selection from Map (multiple layers)
ESRI's ArcGIS.com Map Viewer
REST Servers
Web Mapping Services
KML
Download Data
View Metadata

...tial Planning Data Registry
...tration

...anning (CMSP) Data Registry is a collection of Web-accessible NOAA geospatial data deemed
...al-level CMSP processes. Registry data sets are provided in a variety of formats accessible for
...eviewed using ESRI's new ArcGIS.com map viewer.

...ta mash-up

Elevation, Bathymetry, and Shoreline

Jurisdictional Boundaries and Limits

Marine Transportation, Infrastructure, and Obstructions

Raster Nautical Charts
Anchorage Areas
Marine Collision Regulation Lines
Precautionary Areas for Navigation
Restricted Areas
Dredge Disposal Areas Affecting Navigation
Shipping Lanes

Living Marine Resources

Human Uses (Commercial, Recreational, and Industrial)

Coastal Population and Socioeconomic Data
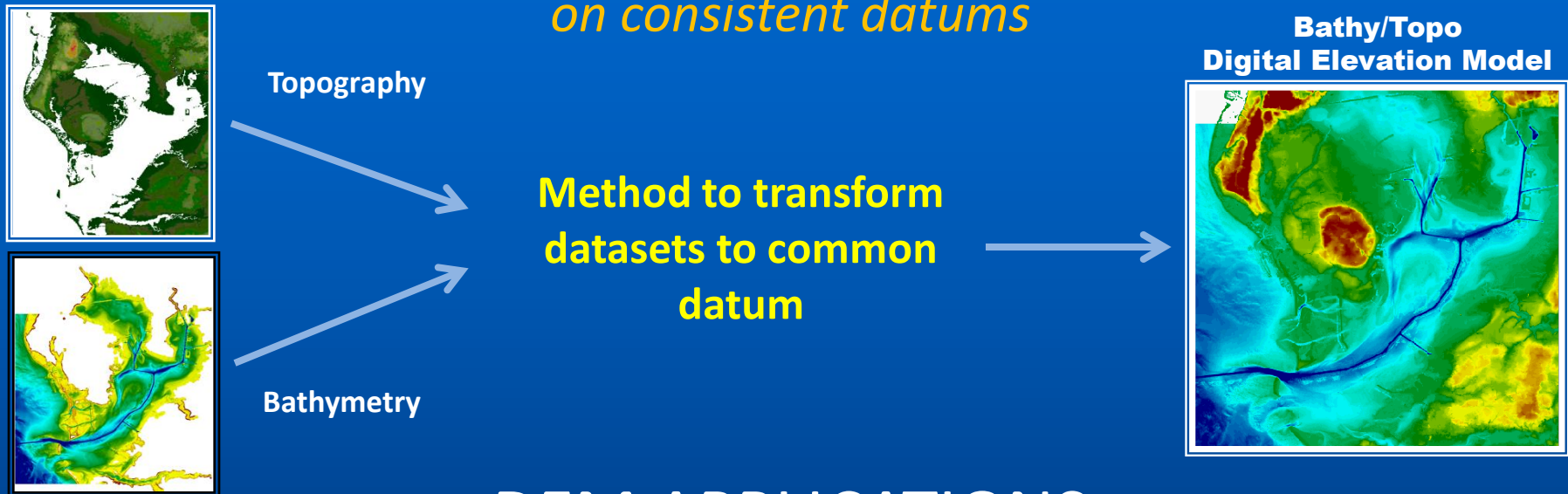
Ocean Observations Data

Digital Elevation Models

Possible because of bathymetric/topographic datasets on consistent datums

Topography

Bathymetry

Method to transform datasets to common datum

Bathy/Topo Digital Elevation Model

DEM APPLICATIONS

- Inundation modeling for storm surge, tsunamis, and sea level rise
- Erosion, accretion, re-nourishment
- Analyzing storm impacts
- Determining setback lines
- Determining local, state, and national boundaries

- Navigation products and services
- Habitat restoration
- Shoreline change analysis
- Analyzing environmental and natural resources
- Permitting
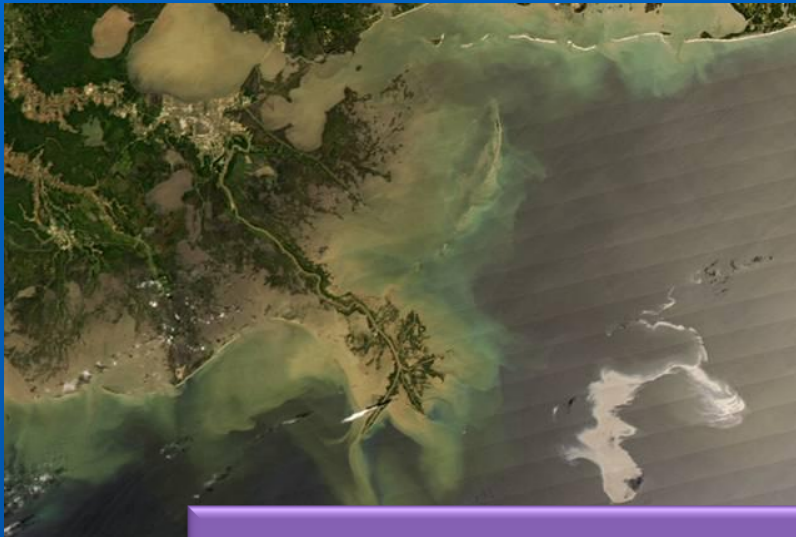
Environmental Response Management Application (ERMA)

Web-based GIS system supporting environmental response efforts and operations

- ➢ developed by NOAA as pilot project in 2008
- ➢ expanded for use in Haiti after earthquake
- ➢ full operations for Gulf Oil Spill

Site Basics

Readily accessible via web browsers

Initially secure access, then expanded to public

Data from multiple federal agencies & academia

Incident Information

- Trajectories
- Asset tracking
- Field team locations
- Shoreline cleanup and assessment data
- Sample collection & results

Real-Time Feed

- Weather, buoys, ship tracking, etc.

Background Layers
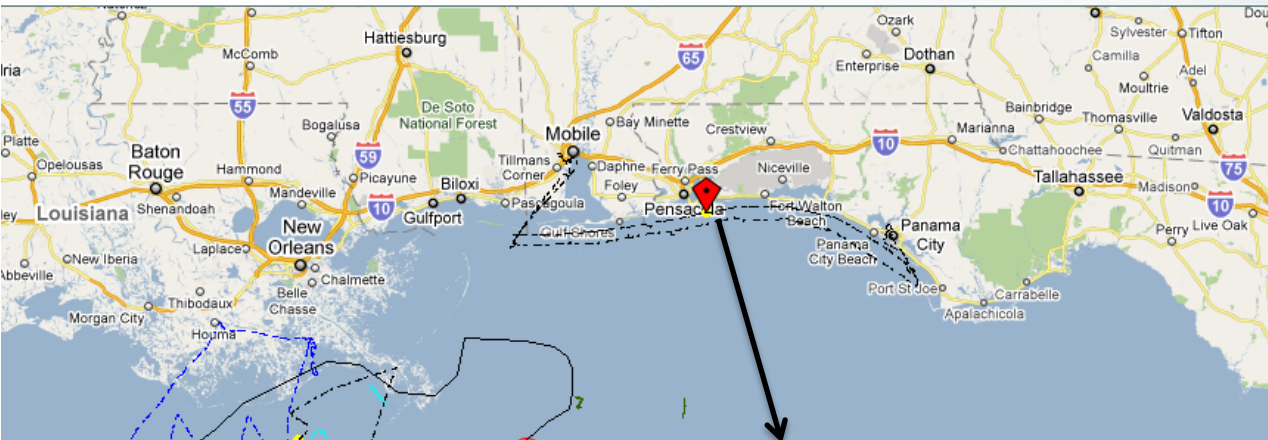
- Nautical charts
- Aerial, terrain, roads

Resources at Risk

- Shoreline information
- Local habitat and species datasets
- Fisheries Closures

Document & Photo Links

- Field Photos
- External links

Overflight oil observations and photos uploaded

Subsurface monitoring data displayed

Something was needed for the general public

Public display of response asset locations and weather feeds
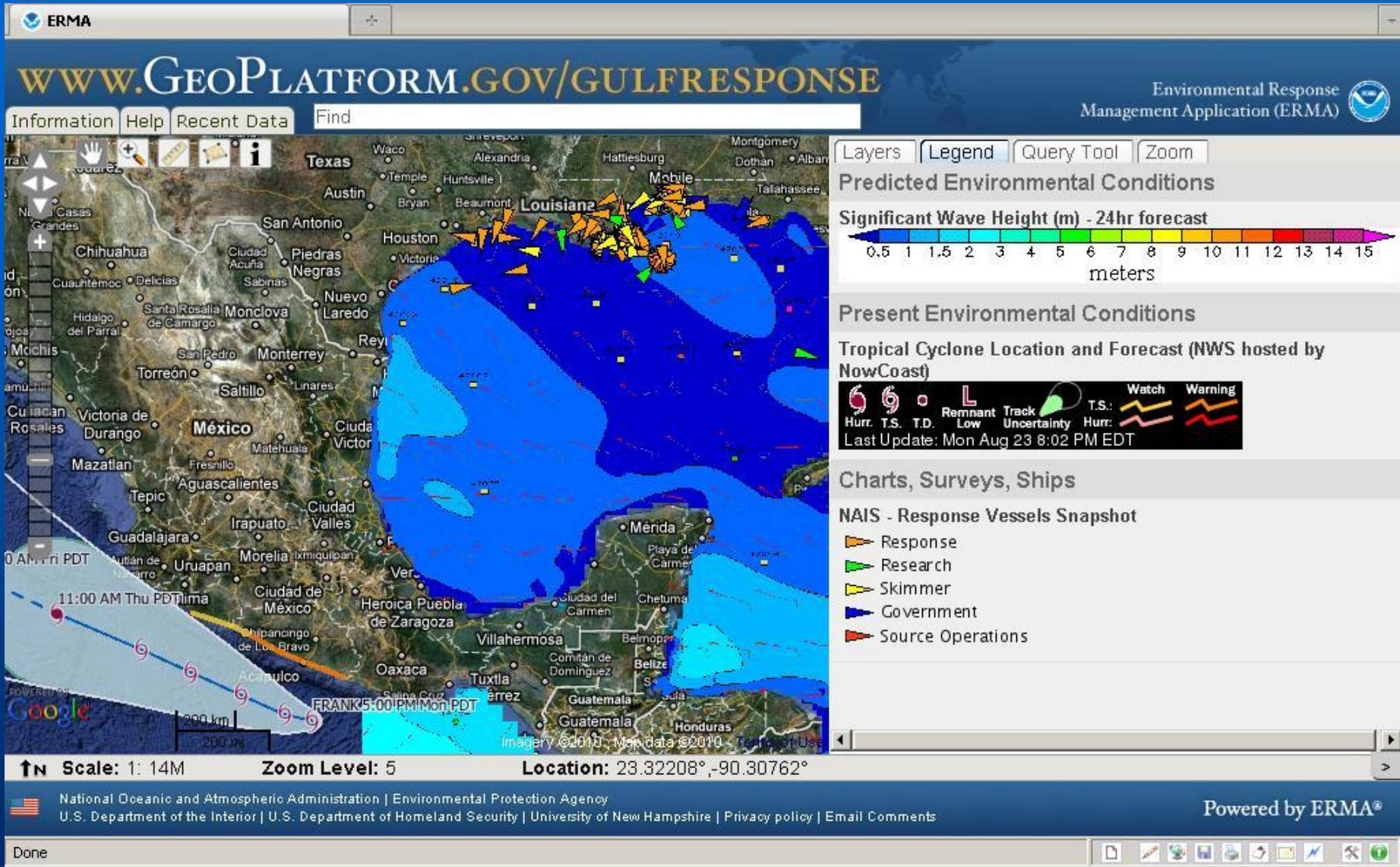
3.4 million hits first day of release

Resources

- *IHO SDI Guide for Hydrographic Offices*

  → Benefits
  → Definition
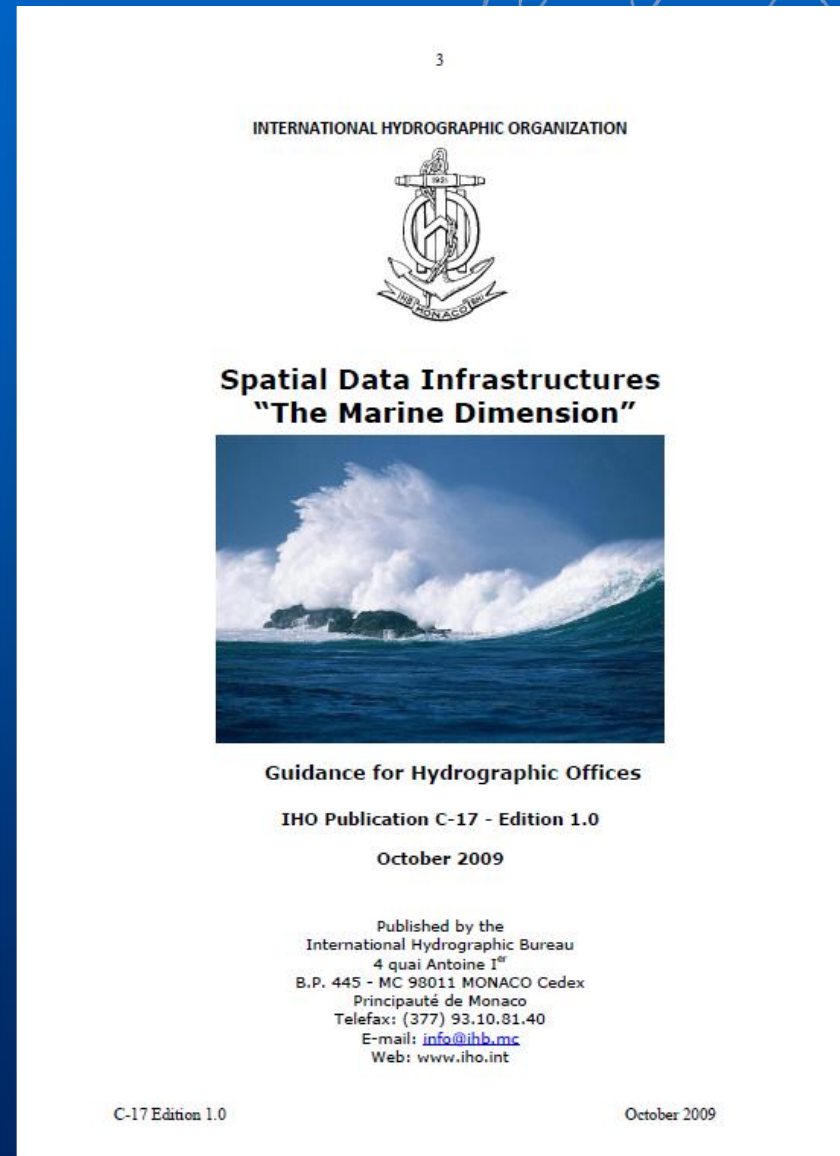 → Getting ready for SDI
  → Making it happen
  → SDIs in perspective

- *Also Provides*

  → Frequently Asked Questions
  → Stakeholders List
  → Hydro Data Policy Best Practice Guidelines for HOs
  → SDI Awareness Training Course Template

3

INTERNATIONAL HYDROGRAPHIC ORGANIZATION

Spatial Data Infrastructures "The Marine Dimension"

Guidance for Hydrographic Offices

IHO Publication C-17 - Edition 1.0

October 2009

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4 quai Antoine Ier
B.P. 445 - MC 98011 MONACO Cedex
Principauté de Monaco
Telefax: (377) 93.10.81.40
E-mail: info@ihb.mc
Web: www.iho.int

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Resources

- GSDI (Global SDI Association)
  - *The SDI Cookbook*

- INSPIRE (Infrastructure for Spatial Information in the European Community)

- FGDC (U.S. Federal Geographic Data Committee)

- IHO Baltic Sea Hydrographic Commission (Established Baltic Sea MSDI Working Group)

IHO Marine Spatial Data Infrastructure Working Group
Updated Terms of Reference

- Monitor national and international SDI activities (focus marine)

- Liaise with appropriate groups to discuss efforts

- Identify and recommend possible solutions to significant technical issues related to interoperability looking at:
  - Datum issues
  - S-100 interoperability

- Identify IHO capacity building requirements

Correspondence Group

IHO Web Site: www.iho.int

Standards and Publications C-17
Spatial Data Infrastructures
"The Marine Dimension"
Guidance for Hydrographic Offices

SDI Needs to Address Datum Transformations

Ellipsoid Datums

There are a many different vertical datums in use

Relationship of vertical datums for Tampa Bay:

86.39 ft	WGS 84 (G873)	26.33 m
81.33 ft	NAD 83 (NSRS)	24.79 m
0.792 ft	MHHW	0.241 m
0.409 ft	MHW	0.125 m
0.0 ft	NAVD 88	0.0 m
-0.535 ft	LMSL	-0.163 m
-0.850 ft	NGVD 29	-0.259 m
-1.495 ft	MLW	-0.456 m
-1.919 ft	MLLW	-0.585 m

For elevation data sets to be blended together they must be referenced to <u>same</u> vertical datum.
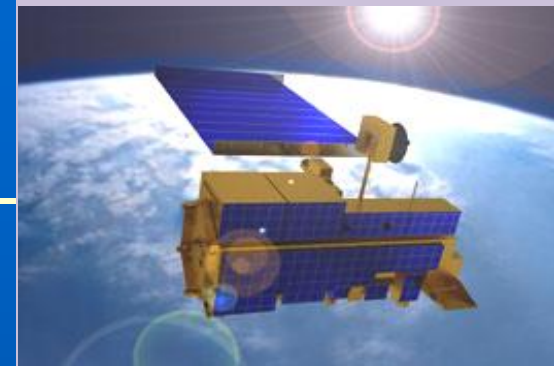
Orthometric Datums

Tidal Datums

nowCOAST

http://nowcoast.noaa.gov/
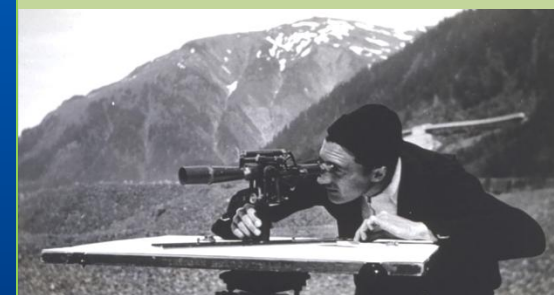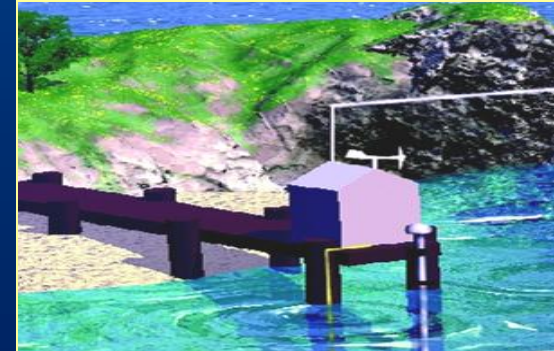
NOAA Map-Based Web Portal to
Real-Time Coastal Observations & NOAA Forecasts

meteorological, oceanographic, & river observations
from national and regionally operated networks as well as NOAA
(NOS & NWS) forecasts for U.S. coastal areas.

nowCOAST

http://nowcoast.noaa.gov/

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