

# IOOS<sup>®</sup> Program Products

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**Charles Alexander**

Operations Division Chief, NOAA IOOS Program – Silver Spring, MD



**IOOS Product Developer's Workshop**  
May 17-19, 2010 – University of Michigan  
Ann Arbor, Michigan

# Product List

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- National Data Buoy Center DAC
- High Frequency Radar – National Network
- Prototype Web Services – NDBC/CO-OPS
- Standards for Biological Observations
- Collaboration with OOI-Cyberinfrastructure
- IOOS Data Catalog

# Product List - templates

REGIONAL PRODUCT DEVELOPERS WORKSHOP: PRODUCT SHEET May 2010

Product Name (short name): High Frequency Radar – National Network URL: <a href="http://sdf.ndbc.noaa.gov/wca/">http://sdf.ndbc.noaa.gov/wca/</a> , <a href="http://www.scoos.org/data/hfnet/">www.scoos.org/data/hfnet/</a>	Theme: MARINE OPERATIONS
Jack Harlan, IOOS/Operations Division, <a href="mailto:jack.harlan@noaa.gov">jack.harlan@noaa.gov</a>	IOOS HQ

Product Description

A National, coordinate network of High Frequency Radars that report standard data products (e.g. mass of surface currents) to a central data center at the University of Rhode Island (UMRI) and the University of Massachusetts Dartmouth (UMD) MACOORA/Rutgers.

REGIONAL PRODUCT DEVELOPERS WORKSHOP: PRODUCT SHEET May 2010

Product Name: Data standard(s) for biological observations URL: na	Theme: Ecosystems, Fisheries and Water Quality
Hassan Moustahfid, IOOS/Operations Division, <a href="mailto:hassan.moustahfid@noaa.gov">hassan.moustahfid@noaa.gov</a>	IOOS HQ/Operations Division

Product Description


Goal is to establish a common observation and a standard customer-based set of products for fisheries based on required data and perhaps life history information.

REGIONAL PRODUCT DEVELOPERS WORKSHOP: PRODUCT SHEET May 2010

Product Name: Prototype web services to expose core variables URL: <a href="http://sdf.ndbc.noaa.gov/sos/">http://sdf.ndbc.noaa.gov/sos/</a> , <a href="http://opendap.co-ops.noaa.gov/ooos-cf/ooos/">http://opendap.co-ops.noaa.gov/ooos-cf/ooos/</a>	Theme: Marine Operations, Climate Variability and Change, Ecosystems, Hazards, CMSP
Jeff de LaBeaujardiere, IOOS/Operations Division, <a href="mailto:jeff.delabeaujardiere@noaa.gov">jeff.delabeaujardiere@noaa.gov</a>	IOOS HQ/Operations Division

Product Description

The IOOS Program developed a set of Sensor Observation Service – to evaluate ocean observations to the user community.



REGIONAL PRODUCT DEVELOPERS WORKSHOP: PRODUCT SHEET May 2010

Product Name: IOOS Data Catalog URL: <a href="http://www.oceanobservatories.org/spaces/display/ITC/Confluence+Basics">www.oceanobservatories.org/spaces/display/ITC/Confluence+Basics</a>	Theme: Coastal and Marine Spatial Planning (?)
Jeff de LaBeaujardiere, IOOS/Operations Division, <a href="mailto:jeff.delabeaujardiere@noaa.gov">jeff.delabeaujardiere@noaa.gov</a>	IOOS HQ/Operations Division

Product Description

To establish an IOOS enterprise link directly to these services, an operational catalog could eventually view the "dots on the map".



IOOS Data Catalog

SOS\* (Sensor Observation Service)

WMS\* (Web Map Service)

User Community Addressed

- oceanographers
- search and rescue operations
- hazardous response
- marine transportation

IOOS Sub-system Capacity

- Observational: nearshore coastal
- Data Management and Communication: nearshore coastal

NFRA Themes: 1) Marine Operations; 4) Coastal Hazards; 5) Coastal and Marine Spatial Planning

For more information on these themes, please use your professional judgment as to which theme the product fits into.

REGIONAL PRODUCT DEVELOPERS WORKSHOP: PRODUCT SHEET May 2010

Product Name: Collaboration "use case" with OOI-Cyberinfrastructure URL: <a href="http://www.oceanobservatories.org/spaces/display/ITC/Confluence+Basics">www.oceanobservatories.org/spaces/display/ITC/Confluence+Basics</a>	Theme: Climate variability and change (possibly)
Charles Alexander, IOOS/Operations Division, <a href="mailto:charles.alexander@noaa.gov">charles.alexander@noaa.gov</a>	IOOS HQ/Operations Division


Product Description

This project will improve the process by which research modelers access data to drive their models. We will do this in two ways: (1) We will transfer observations and model output from the World Meteorological Organization's (WMO's) Global Telecommunication System (GTS) into the OOI-CI infrastructure. OOI-CI will turn present these data to the modelers via a Unidata Thematic Real-time Environmental Distributed Data Services (THREDDS) catalog and subscription service; (2) We will enhance the methods used to access data using ingestion and transformation services to support new data streams.

IOOS

Product Description

To establish an IOOS enterprise link directly to these services, an operational catalog could eventually view the "dots on the map".



The catalog will include:

- fishery stock/population
- integrated ecosystem
- fisheries scientists

IOOS Sub-system Capacity

- Observational: coastal

NFRA Themes: 1) Marine Operations; 2) Climate Variability and Change; 3) Ecosystems, Fisheries and Water Quality; 4) Coastal Hazards; 5) Coastal and Marine Spatial Planning


For more information on these themes, please use your professional judgment as to which theme the product fits into.

REGIONAL PRODUCT DEVELOPERS WORKSHOP: PRODUCT SHEET May 2010

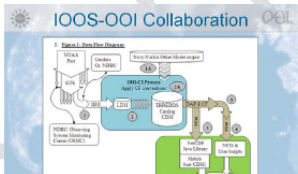
Product Name (short name): National Data Buoy Center – Regional Data Assembly Center URL: <a href="http://www.ndbc.noaa.gov/ooos.shtml">www.ndbc.noaa.gov/ooos.shtml</a>	Theme: Marine Operations, Climate Variability and Change, Ecosystems, Hazards, CMSP
Bill Burnett, National Buoy Data Center, <a href="mailto:Bill.Burnett@noaa.gov">Bill.Burnett@noaa.gov</a>	IOOS HQ (partner)

Product Description

As the IOOS\* DAC, NDBC collects data from regional ocean observing systems, quality controls the data, and distributes it via the Global Telecommunication System in real-time. NDBC also makes the quality controlled data available on their web site and via netCDF files on its DODS server.



IOOS-OOI Collaboration



Ocean Observatories Initiative

User Community Addressed

- coastal marine modelers, oceanographers

IOOS Sub-system Capacity Required:

- Observational: improved access to/use of ocean observations data for modeling
- Data Management and Communication: OOI-CI protocols per release 1 of their software will demonstrate the use of existing community tools/technology to improve overall access to ocean observations data based

NFRA Themes: 1) Marine Operations; 2) Climate Variability and Change; 3) Ecosystems, Fisheries and Water Quality; 4) Coastal Hazards; 5) Coastal and Marine Spatial Planning

For more information on these themes, please see "Providing Information in a Changing Climate" at [www.usnfrf.org](http://www.usnfrf.org). Please use your professional judgment as to which theme the product fits into.

User Community Addressed: All users of IOOS

IOOS Sub-system Capacity Required:

- Observational: a wide group of users of ocean observations including marine scientists, emergency responders, weather forecasters, storm surge experts, and many others
- Data Management and Communication: a wide variety of primarily physical observations from all eleven regional associations

NFRA Themes: 1) Marine Operations; 2) Climate Variability and Change; 3) Ecosystems, Fisheries and Water Quality; 4) Coastal Hazards; 5) Coastal and Marine Spatial Planning

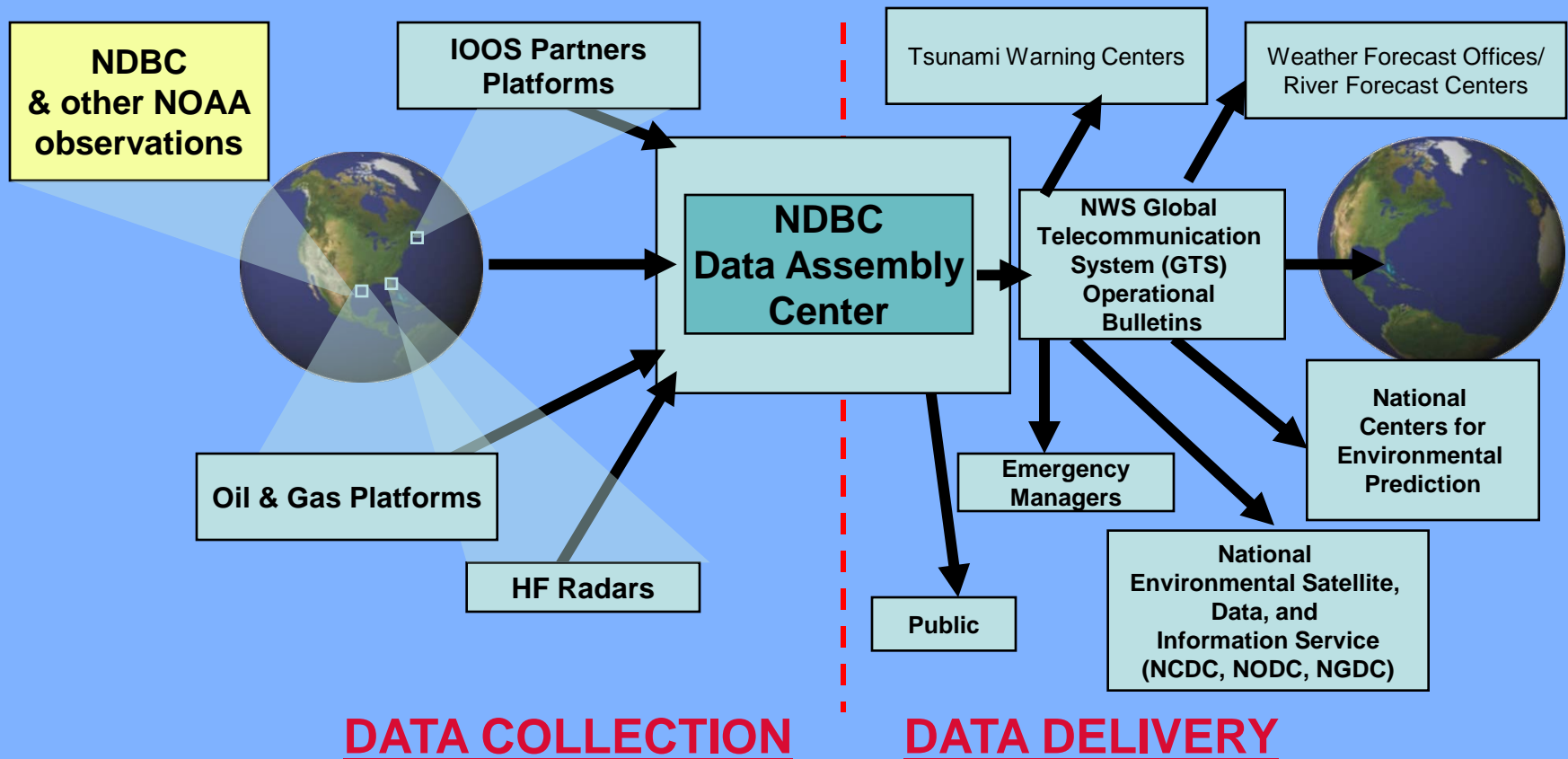
For more information on these themes, please see "Providing Information in a Changing Climate" at [www.usnfrf.org](http://www.usnfrf.org). Please use your professional judgment as to which theme the product fits into.





# National Data Buoy Center

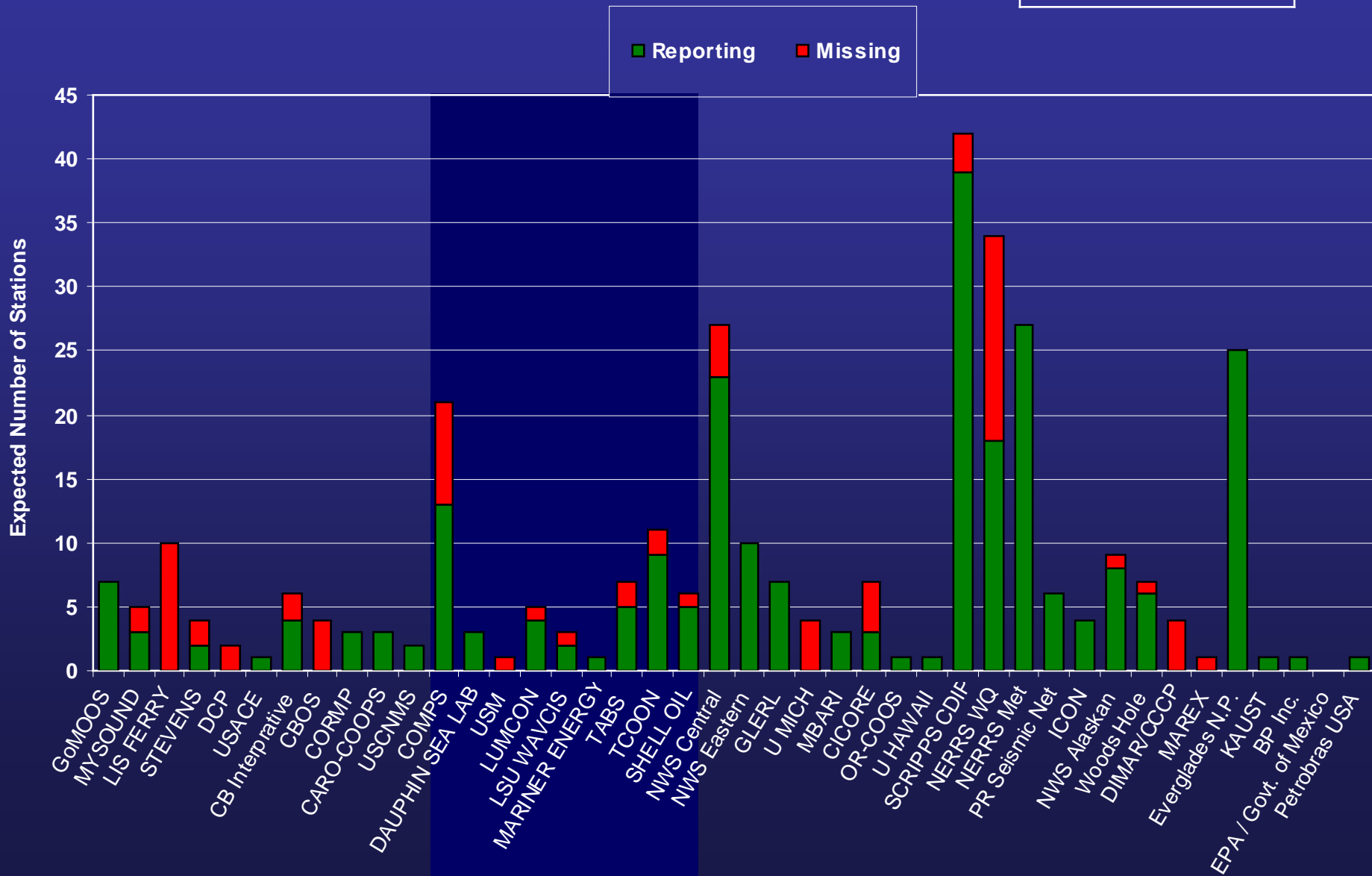
To provide a **real-time**, end-to-end capability beginning with the **collection** of marine atmospheric and oceanographic data and ending with its transmission, **quality control and distribution**.



**Electrolyte to Satellite to Website**

# Number of IOOS Partner Stations Reporting

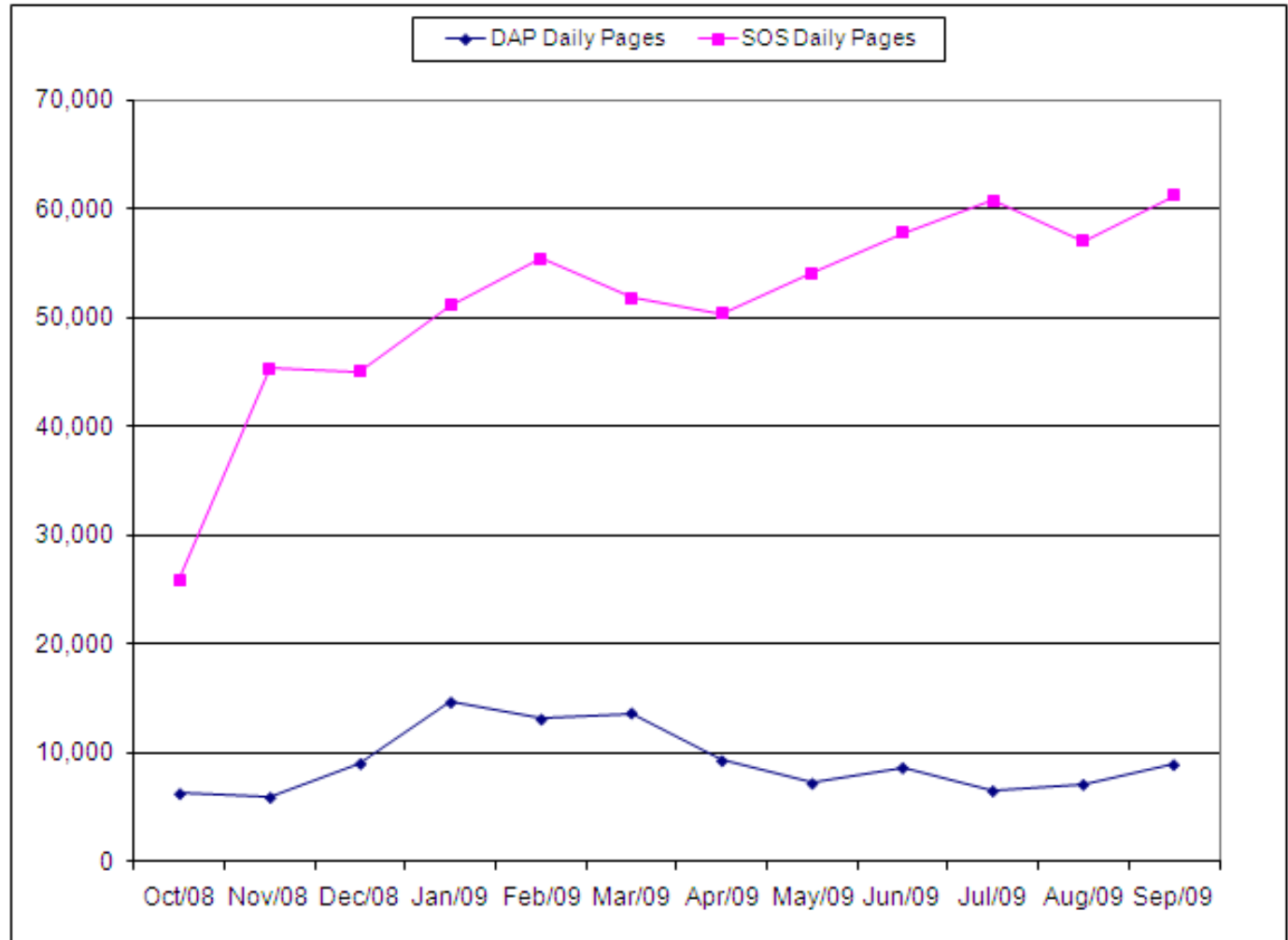
**NOS Availability**  
 Reporting **205**  
 Missing **17**



# NDBC DAC – web use stats

## NDBC Web Stats

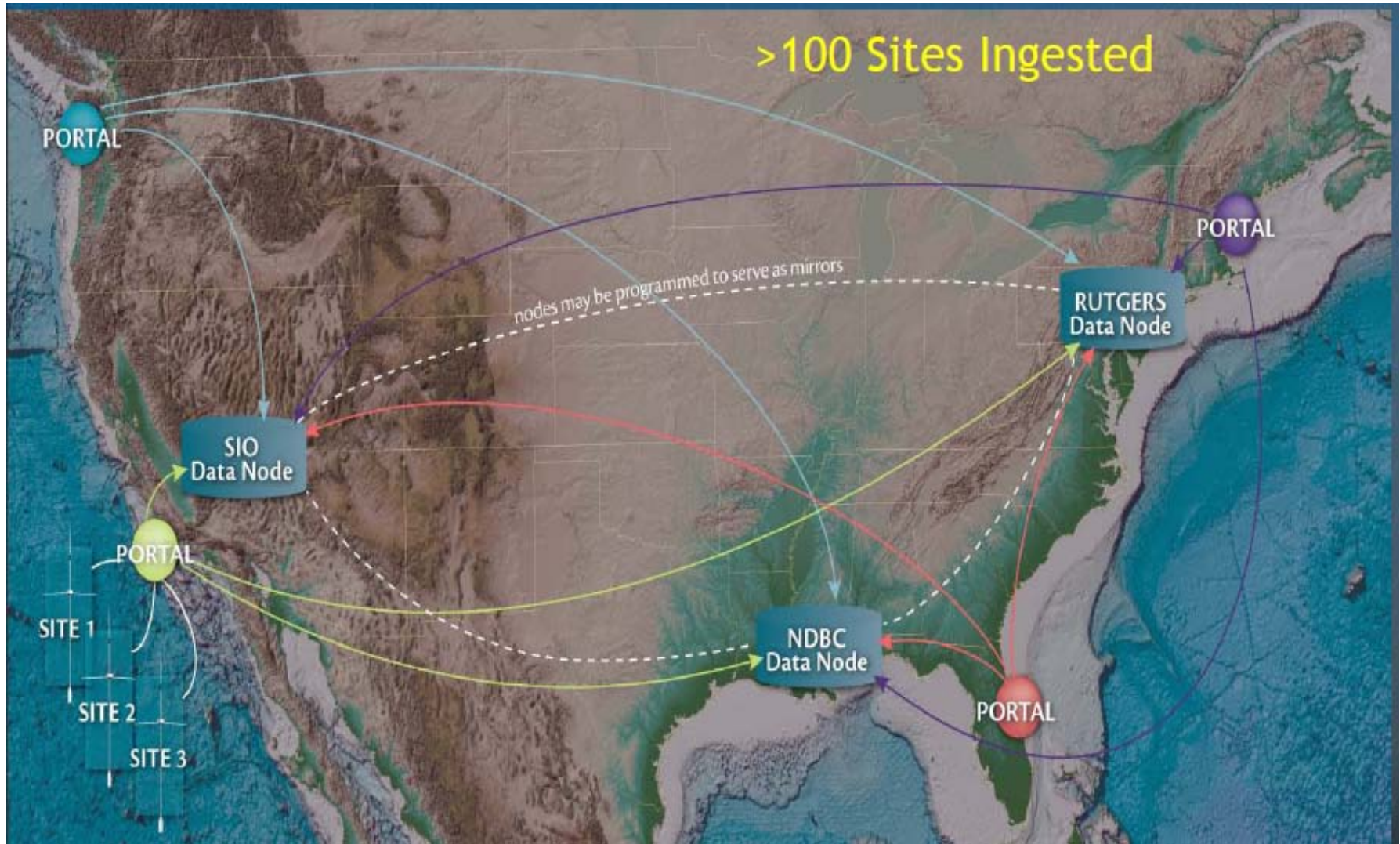
Month	DAP Daily Pages	SOS Daily Pages
2008 Oct	6,331	25,969
2008 Nov	5,980	45,359
2008 Dec	9,074	45,056
2009 Jan	14,692	51,125
2009 Feb	13,135	55,498
2009 Mar	13,698	51,863
2009 Apr	9,342	50,374
2009 May	7,262	54,086
2009 Jun	8,689	57,808
2009 Jul	6,572	60,779
2009 Aug	7,171	57,075
2009 Sep	8,976	61,273



# High Frequency Radar – National Network



# High Frequency Radar – National Network



# Prototype Web Services

## SOS\*

(Sensor Observation Service)



In situ observations

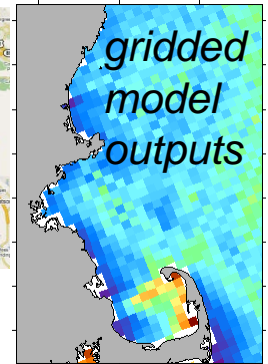
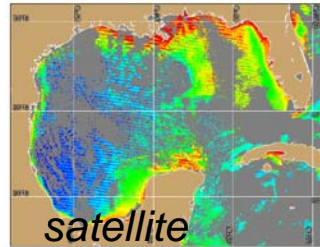
Points, Profiles,  
Collections,  
Trajectories

*Format: XML, CSV, KML*

**DAP** (Data Access Protocol)

and

**WCS\*** (Web Coverage Service)



Structured Grids

(eventually unstructured grids)

*Format: NetCDF/CF*

## WMS\*

(Web Map Service)

Georeferenced images

(of all data types)

*Format: PNG, GeoTIFF, JPEG, ...*

\*OGC (Open Geospatial Consortium) specs

# IOOS Data Providers at NOAA

National Weather Service (NWS)  
National Data Buoy Center (NDBC)

NWS  
Met/Oc  
Buoys

IOOS  
Regional  
stations

Tropical  
Atmosphere  
Ocean (TAO)  
Buoys

Deep-Ocean  
Assessment and  
Reporting of  
Tsunamis (DART)

Surface Currents  
from High-  
Frequency Radar  
(HFR)

National Ocean Service (NOS)  
Center for Operational Oceanographic Products and Services (CO-OPS)

National Water Level  
Observation Network  
(NWLON)

Physical  
Oceanographic Real-  
Time System (PORTS)

National Environmental Satellite, Data, and Information Service (NESDIS)  
CoastWatch

Satellite Ocean Color  
(Aqua MODIS)

# Standards for Biological Observations



# Standards for Biological Observations

**Fishery Data:**  
e.g., Catch, Effort, Bio-  
statistics, and Economic

**Life History Data:**  
e.g., Growth, Maturity,  
Movement, Spawning

**Ecological Data: Species-  
Species, Species-Habitat  
Interactions, Environmental  
Forcing**

**Survey Data:  
Monitoring/Synoptic  
Indices of Relative Fish  
Abundance Used for Tuning,  
e.g., trawl, acoustic, video**

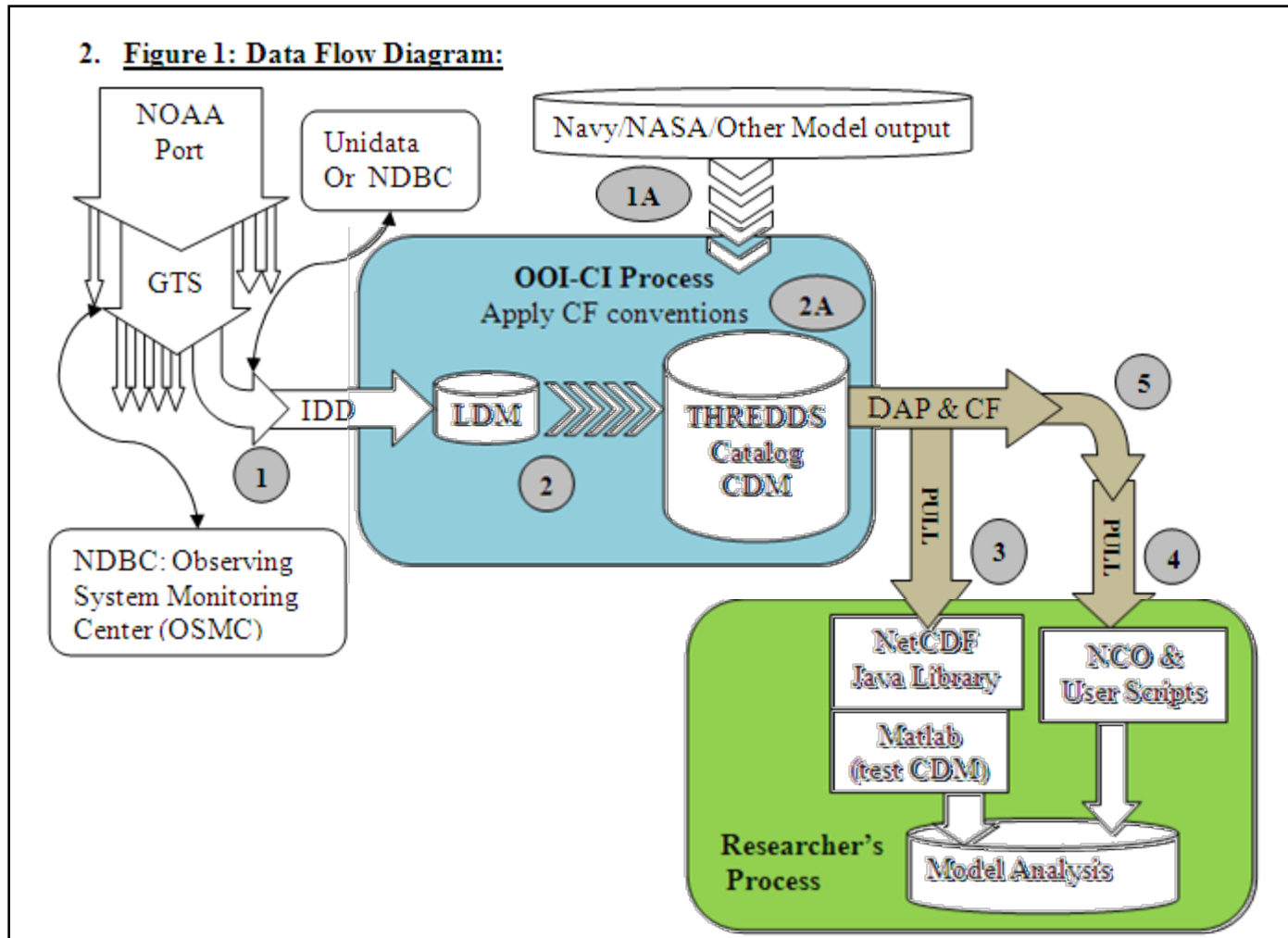
## Assessment Methods and Modeling

Age-structured  
models (ASAP);  
Spatially-explicit  
models  
(FISHMOD);  
Ecosystem-based  
models, include  
trophic  
interactions and  
environmental  
forcing  
(ECOPATH,  
ATLANTIS) .

## Management Commissions Councils

- Review stock status and biological benchmarks from assessment and modeling.
- Consider socio-economic and ecological impacts
- Set regulations

# Collaboration with OOI-Cyberinfrastructure



# IOOS Data Catalog



# Discussion/Observations

- enterprise (IOOS)-level data mgmt. solutions
- converging on common tools/technologies
- improve understanding product requirements and subsequent data mgmt. needs
- sharing/learning together important
- leveraging/external collaboration is important (e.g. Google CRADA, OGC, IWGOO, other forums)
- what do product developers see as most useful near-term tasks that IOOS Office/ OpsDiv could help with?

# Thank You!



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