INTEGRATED OCEAN OBSERVING SYSTEM

NOAA's Integrated Ocean Observing System (IOOS®) Program

DMAC Update

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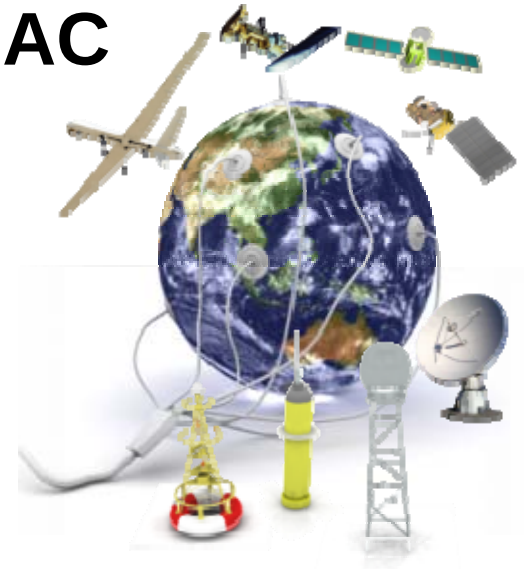
Ocean Research and Resources Advisory Panel

Orlando, Florida - November 18, 2009

IOOS

Outline

- Our Challenge - why DMAC is so important
- IOOS DMAC in Context
- Our Progress to Date
- Moving Towards National DMAC
- IOOS DMAC & OOI CI
- Next Steps



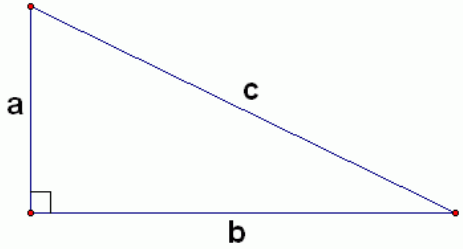
Our Challenge – why DMAC is so important

standards-based approach or <u>common language</u> is essential

example: **mathematics as the language of science**

"Philosophy is written in this grand book, the universe which stands continually open to our gaze. But the book cannot be understood unless one first learns to comprehend the language and read the letters in which it is composed. It is written in the language of mathematics, and its characters are triangles, circles and other geometric figures without which it is humanly impossible to understand a single word of it; ***without these, one wanders about in a dark labyrinth****."*

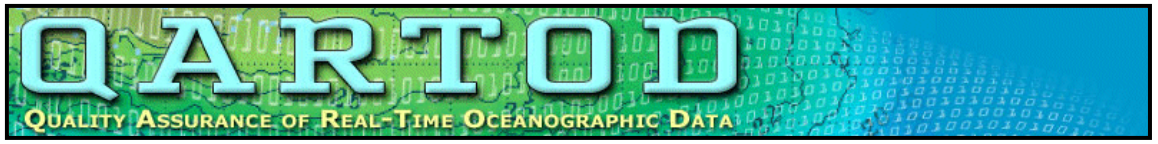
Galileo
(on the book of "Nature")



$a^2 + b^2 = c^2$

$E = mc^2$

This “language” is emerging



A brief history of IOOS® DMAC

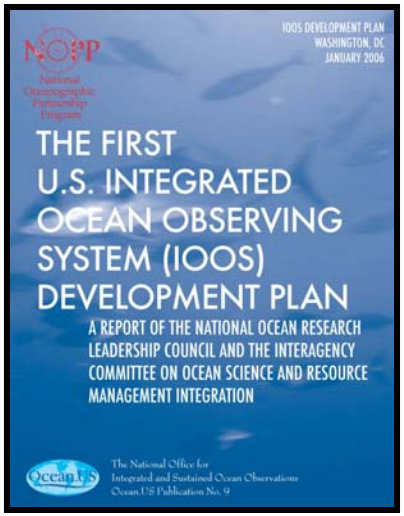
2002 **Ocean.US forms DMAC Steering Committee**

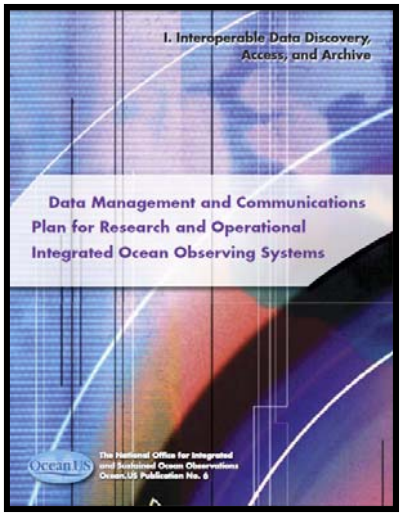
2004 **First IOOS Development Plan Highlights importance of DMAC**

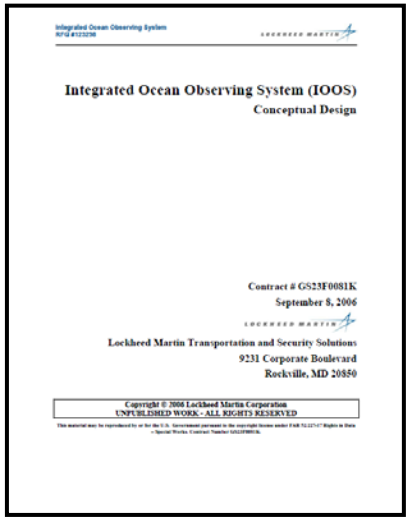
2005 **DMAC Steering Committee Publishes DMAC "plan" and DMAC Steering "Team" is formed to guide execution**

2003-2005 **NOAA/Navy IOOS Interoperability Demo (with Boeing and Northrup Grumman)**

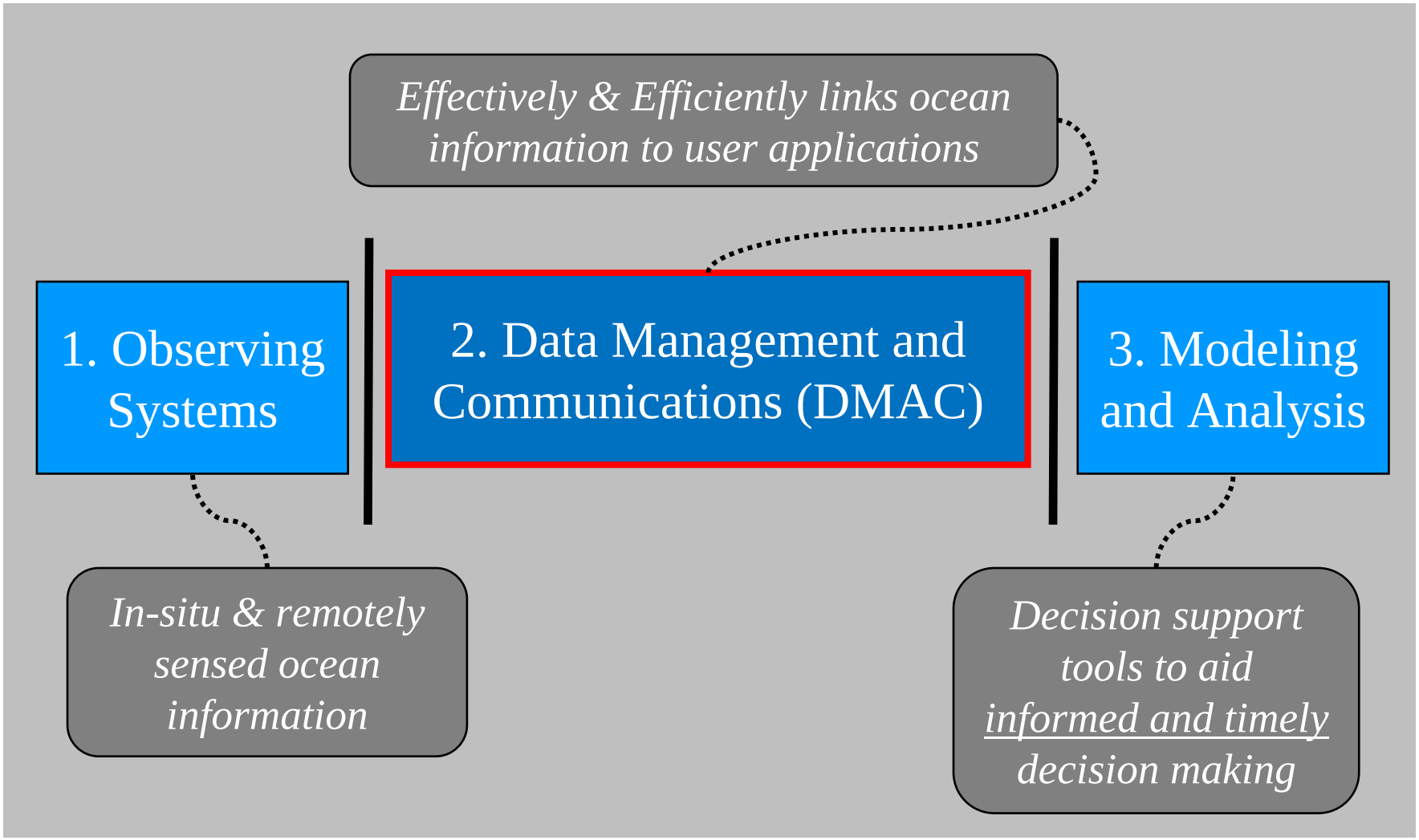
2006 **IOOS Conceptual Designs (Raytheon & Lockheed)**





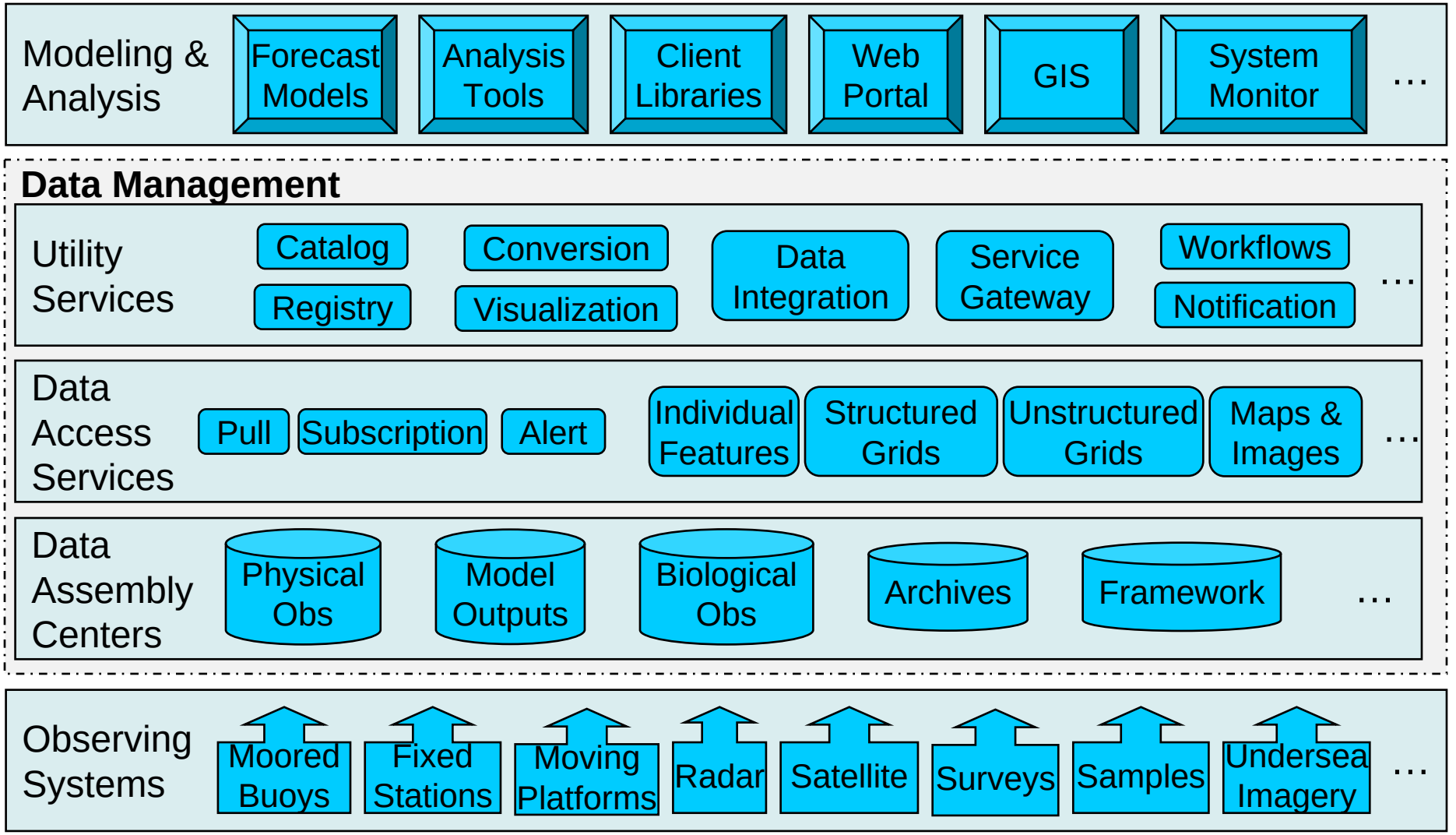


IOOS® Subsystems



Component Types Needed for IOOS®

Computational Viewpoint from Reference Model for Open Distributed Processing (RM-ODP)



DIF status: entering the last 12 months

Months 0-12	Month 18	Month 24	Month 36
Integration	Model Ingest	Benchmark	Performance Assessment

1. Temperature
2. Salinity
3. Water Level
4. Currents
5. Winds
6. Waves
7. Ocean Color

Completed

- requirements
- data standards
- protocols

Completed

- Coastal Inundation
- Harmful Algal Bloom Forecast
- Hurricane Intensity Forecast
- Integrated Ecosystem Assessment

Completed

- *Lessons learned*
- *technical assessment*
- *customer assessment*
- *write/publish final report*

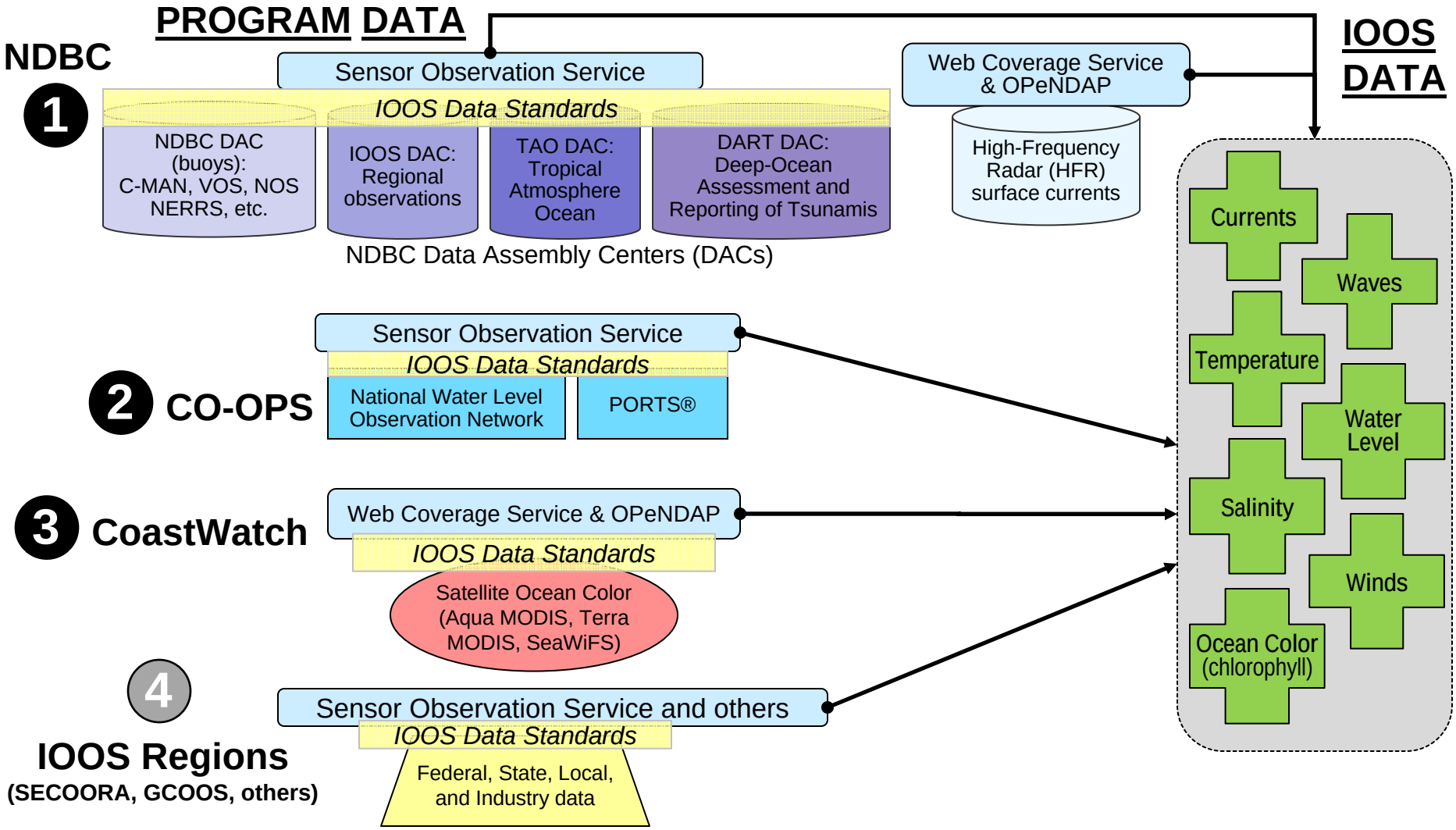
IN PROGRESS

Coastal Inundation - Performance

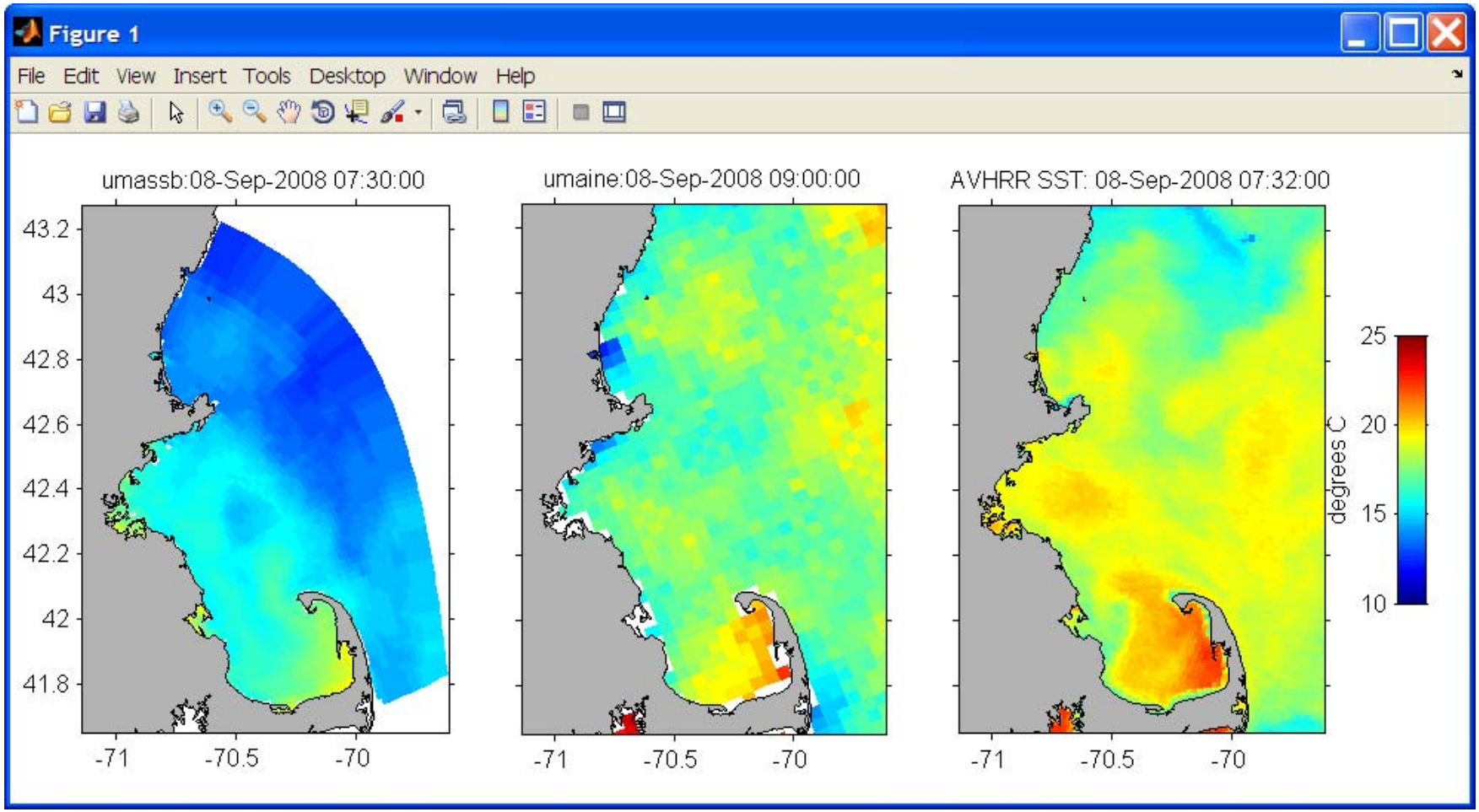
"Many of the enhancements to the SLOSH Display Program were based specifically on meeting NWS's evolving needs for producing storm surge forecasts. We are especially pleased to now have the ability to integrate water level observations now made available in one location versus the old method of collecting the data via the internet. Such an enhancement will streamline our data collection process during hurricane landfall situations. Additionally, we are pleased to see improved functionality and plotting options which greatly increases the usability of the SDP for briefings."

Bill Read, Director – National Hurricane Center

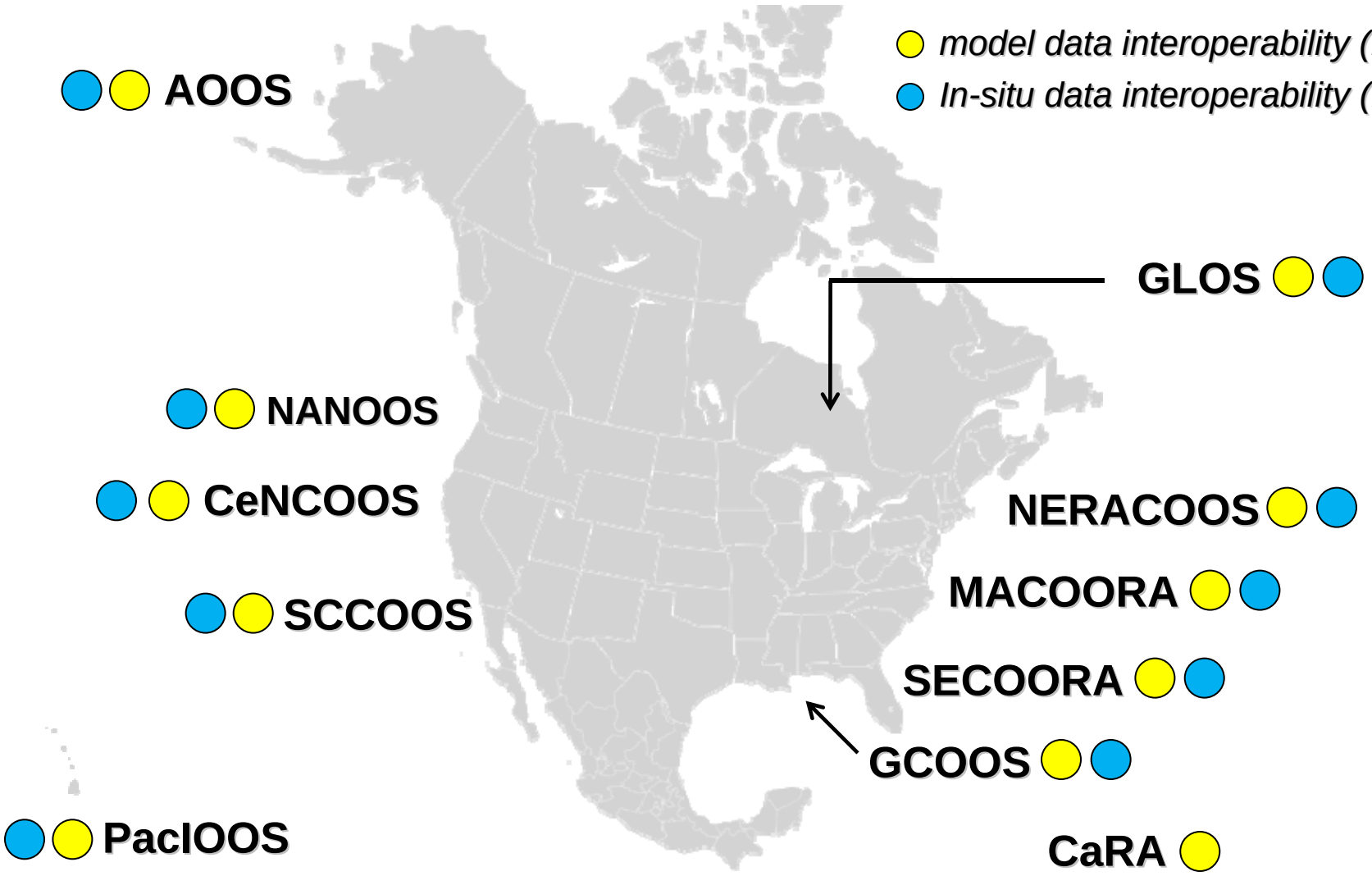
In-situ Data Interoperability



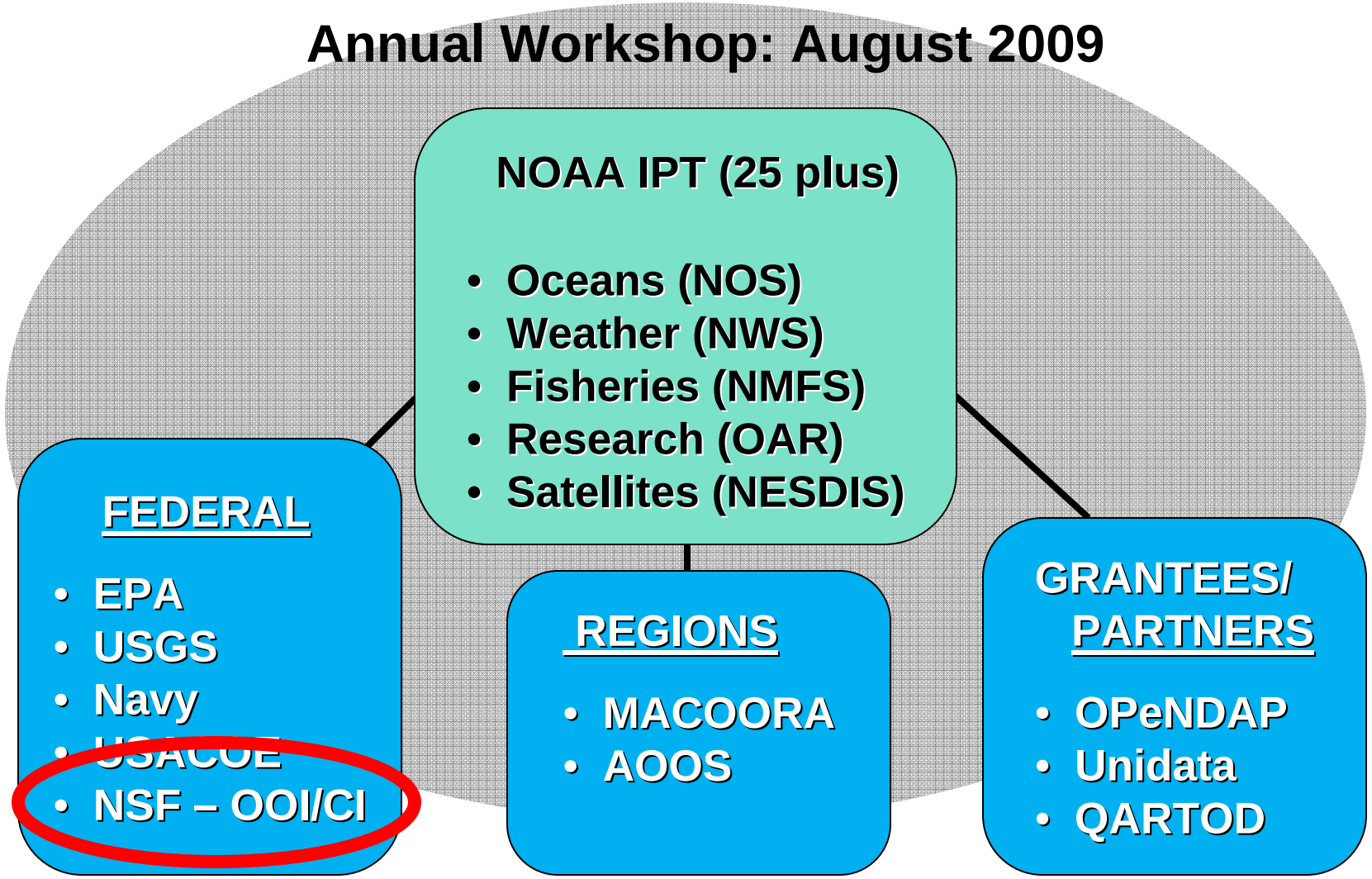
Model Data Interoperability



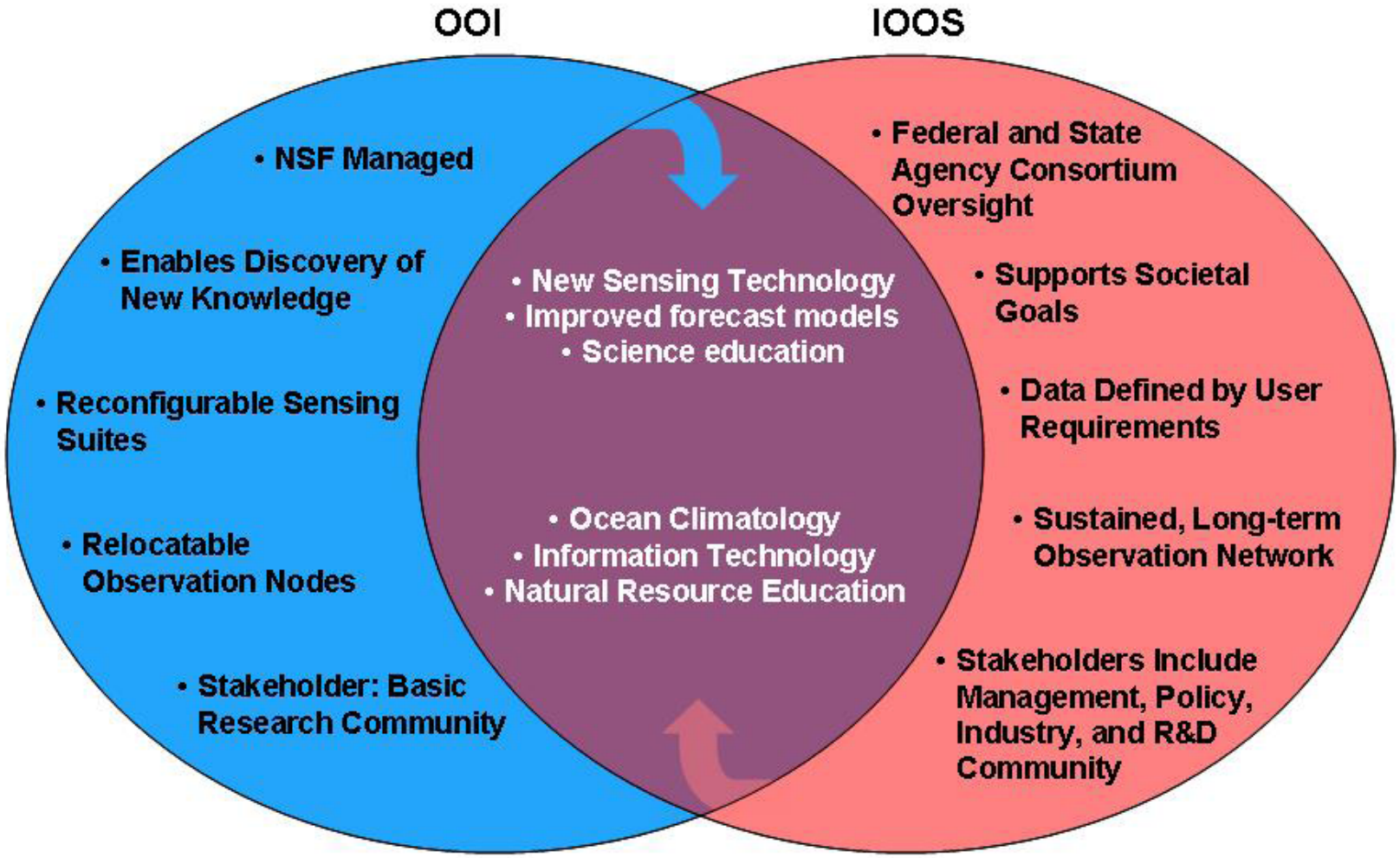
IOOS® Regional DIF Implementation



DIF Integrated Products Team

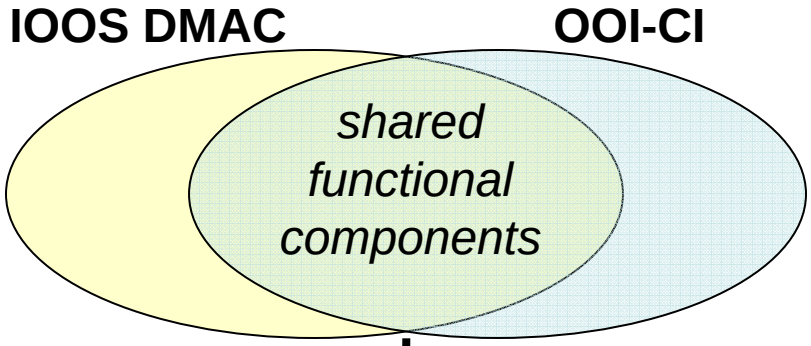


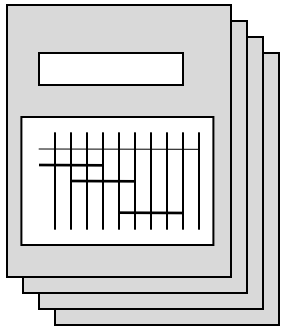
OOI-CI Collaboration



from July 2007 response to ORRAP

OOI-CI Collaboration

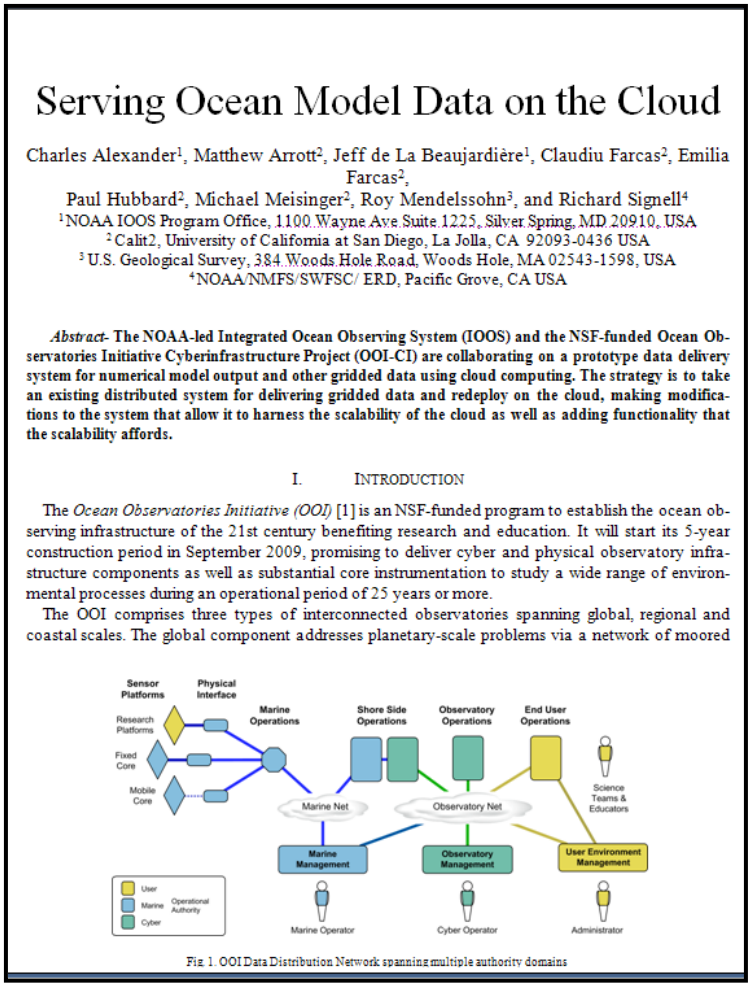




series of jointly executed demonstration projects

technical guidance

DMAC STEERING TEAM



Serving Ocean Model Data on the Cloud

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***Abstract*- The NOAA-led Integrated Ocean Observing System (IOOS) and the NSF-funded Ocean Observatories Initiative Cyberinfrastructure Project (OOI-CI) are collaborating on a prototype data delivery system for numerical model output and other gridded data using cloud computing. The strategy is to take an existing distributed system for delivering gridded data and redeploy on the cloud, making modifications to the system that allow it to harness the scalability of the cloud as well as adding functionality that the scalability affords.**

I. INTRODUCTION

The *Ocean Observatories Initiative (OOI)* [1] is an NSF-funded program to establish the ocean observing infrastructure of the 21st century benefiting research and education. It will start its 5-year construction period in September 2009, promising to deliver cyber and physical observatory infrastructure components as well as substantial core instrumentation to study a wide range of environmental processes during an operational period of 25 years or more.

The OOI comprises three types of interconnected observatories spanning global, regional and coastal scales. The global component addresses planetary-scale problems via a network of moored

Fig. 1. OOI Data Distribution Network spanning multiple authority domains

DMAC Components

types of services provided by and types of standards used by the DMAC subsystem

1. **Data Request Services**
2. **Data Subscription and Alert Services**
3. **Service Registry**
4. **Data Catalog**
5. **Viewer**
6. **System Monitor**
7. **Mapping and Visualization**
8. **Format Conversion Service**
9. **Coordinate Transformation Services**
10. **Product Generation Services**
11. **Data Integration Service**
12. **Workflows**
13. **Data Archiving and Retrieval**
14. **Information Technology Security Standards**
15. **Controlled Vocabularies**
16. **Metadata Standards**
17. **Quality Assurance and Quality Control Standards**

Next Steps

Other FY2010 Priorities

1. **Address ICOOS Legislation Requirements ( )**
2. **DIF Assessment Report (lessons/learned, recommendations)**
3. **IOOS Service Registry/Catalog & "viewer/portal"**
4. **IOOS Biological Data customer project**
5. **Certification Standards**
6. **Expanded IPT/DMAC ST**
7. **National DMAC Planning: to "IOC and to "FOC"**

Thank You

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Backup Slides

IOOS® Core Variables

1. **Temperature**
2. **Salinity**
3. **Water level**
4. **Currents**
5. **Surface Waves**
6. **Surface Winds**
7. **Ocean color**
8. Dissolved oxygen
9. pH
10. pCO^2
11. Heat flux
12. Bottom character
13. Pathogens
14. Bathymetry
15. Ice distribution
16. Contaminants
17. Stream flow
18. Dissolved nutrients
19. Optical properties
20. Total suspended matter
21. Colored dissolved organic matter
22. Fish species
23. Fish abundance
24. Zooplankton species
25. Phytoplankton species
26. Zooplankton abundance

list could be expanded based on identified needs...