

**SURA CRC Brief (6 NOV 08)**  
**on DCL Modeling Proposal**  
**Chris Mooers, RSMAS & PSU**

**OUTLINE**

- **IOOS Modeling & Analysis Outcome**
  - **DCL vis-a-vis IOOS**
  - **DCL Modeling Proposal**

**IWGOO Brief on**  
**IOOS Modeling & Analysis**  
**Workshop**  
**22 to 24 July 2008**

**Convener:** Chris Mooers/RSMAS & MAST Chair, **plus**  
Frank Aikman/NOAA/CSDL & MAST Vice-Chair  
Bill Birkemeier/USACE & Ocean.US  
Frank Bub/Navy/NAVO & MAST  
Steve Payne/Navy/CNMOC & MAST  
Hendrik Tolman/NOAA/NCEP & MAST

# **OUTLINE**

- Introduction to the Workshop
- Principal Findings and Recommendations
- Strawman Plan-of-Action

# **INTRODUCTION TO THE** **WORKSHOP**

- Co-organized by MAST, NFRA, and OOI
- 57 attendees (31 from 6 agencies, including 17 from across NOAA; 22 from academia; and 4 from industry)
- First day: RA, National Backbone, OOI, and technical topic plenary presentations
- Second day: 3 Breakout Groups
  - Pacific Circulation and Marine Ecosystems
  - Atlantic Circulation and Marine Ecosystems
  - Coastal Inundation and Coastal Ecosystems
- Third day: plenary Breakout Group summaries, syntheses, and Plan-of-Action

# **Principal Findings and** **Recommendations**

## **Ocean Prediction & Analysis Joint Working Group** **(OPA-JWG)**

- **F1**. The IOOS Modeling & Analysis effort has fostered the developing partnership between the National Backbone and RCOOS modeling & analysis communities and has naturally evolved into an Ocean Prediction & Analysis (OPA) effort; this alternative terminology has the additional benefit of being easier to rationalize and explain in the context of IOOS
- **R1**. Replace MAST with an OPA-Joint Working Group (OPA-JWG)

# OPA Community Forums

- **F2**. The OPA Community needs periodic forums to maintain group communications on a face-to-face basis for fostering the research/operational and regional/national prediction & analysis partnerships essential for the success of IOOS
- **R2**. OPA-JWG should be charged with sustaining a series of periodic forums for the OPA Community

# Validated OPA Requirements

- **F3.** The design of an IOOS ocean prediction system, that seamlessly links the National Backbone and RCOOSes, needs to be guided by validated, always-evolving user-requirements for OPA products, preferably by working thru the pre-existing “super users” and RAs
- **R3.** OPA-JWG should be charged with developing and vetting a first-generation statement of user-driven operational requirements for the prediction of core variables, distinguishing between synoptic predictions and retrospective re-analyses

# Suite of OPA Metrics

- **F4.** Community-wide metrics for model performance and predictive skill are needed for quantitative comparisons between models and observations and between modeling techniques, and for tracking skill improvements
- **R4.** OPA-JWG should be charged with developing a first-generation suite of metrics that can be used provisionally and evaluated

# OPA Observational Data Requirements

- **F5.** The advance of operational and R&D predictive modeling would be accelerated if standards were established for data types, space-time resolution, accuracy, timeliness, etc. of various initial condition, boundary condition, and forcing information data fields
- **R5.** The OPA-JWG should be charged with developing a first-generation summary of the OPA Community's observational data requirements and their attribute standards

# OPA Need for a National Data Portal & Archival Scheme

- **F6.** The progress of the OPA Community would be greatly facilitated by a “one-stop shopping”, national data portal for synoptic and archived observational and model data fields. There are options; e.g., the NWS Numerical Weather Prediction scheme of “data tanks” and the OOI’s advanced Web services cyber-infrastructure approach; these options can be supplementary
- **R6.** The OPA-JWG should be charged with developing and vetting a first-generation design and implementation plan for a national data portal and archival strategy, in coordination with DMAC.

# OPA CONOPS

- **F7.** There is a strong basis for the IOOS National Backbone and RCOOSes OPA players working together in mutually beneficial relationships, but there are issues of roles & responsibilities that need resolution thru a CONOPS
- **R7.** OPA-JWG should be charged with developing a CONOPS for OPA activities (e.g., testbeds)

# **Global-NCOM Regional Products**

- **F8**. NAVO has been running Global NCOM operationally for several years and downscaling it in certain coastal regions for higher resolution (3 to 5 km); this capability is a major national resource that could be used to accelerate (“jump start” in the case of some RAs) OPA activities throughout the USA EEZ; in return, expanded users would provide skill assessment, etc. feedback
- **R8**. IWGOO request OON & CNMOC to authorize NAVO to provide such predictions via NCEP for use by NOAA and RCOOSes, yielding a first-generation, nation-wide OPA capability; this arrangement could be extended to future ocean prediction systems; e.g., Global HYCOM

# Systems Engineering (SE) Approach to OPA (IOOS)

- **F9**. IOOS is a complex undertaking, with many evolving pieces, players, requirements, expectations, etc., which calls for a design approach; OPA activities (e.g., data assimilation, skill assessment metrics, data denial sensitivity studies, testbeds, OSEs/OSSEs) provide “tools” that can be used in developing a SE approach to designing, operating, evaluating, representing, and evolving the IOOS ocean prediction system
- **R9**. Explore the SE approach for IOOS with a pilot study led by ocean scientists working with SE experts and focused on integration of observations and models for ocean prediction purposes

# **Strawman Plan-of-Action**

- Terminate IOOS-MAST
- Initiate Ocean Prediction & Analysis Joint Working Group (OPA-JWG) w/appropriate charge and membership drawn from National Backbone, NFRA, GODAE, and global ocean climate modeling communities

# **OPA-JWG First-Year Tasking**

## **Develop & Vet First-Generation:**

- Validated (Quantitative) Requirements for Ocean Predictions
- Skill Assessment and Performance Metrics
- Modeling Requirements for Observational Data
- Attributes for Data Portal and Archival System
- CONOPS

# **Suggested First-Year (FY09)**

## **Timeline for OPA-JWG**

- Q1 – charge, task, and appoint OPA-JWG
- Q2 – early January (small) OPA-JWG meeting at Stennis Space Center, MS (NAVO) to formulate detailed FY09 Plan-of-Action
- Q3 – early June circulate and vet draft task reports
- Q4 – late September (large) OPA Community Workshop at College Park, MD (NCEP) to further vet task reports, discuss technical topics, and plan next few years

NOTE: will require adequate COL technical staff support to “keep things moving” and funding for OPA-JWG travel & workshop

# OPA-JWG Future Tasking

- Address implementation efforts, skill assessment, and other technical issues; extensions to biogeochemical and ecological predictions
- Prioritize needed ocean model and data assimilation developments
- Foster OPA community communications via periodic forums

# SUMMARY

- Recent IOOS Modeling & Analysis Workshop was described (the PowerPoint presentations will be available at the COL Website and are commended to you)
- Nine Findings & Recommendations were presented for your consideration (others (e.g., as the need for an explicit IOOS R&D program) are embedded in the workshop report)
- Some thoughts were provided on the way ahead with OPA-JWG

# DCL vis-à-vis IOOS

- Unlike DCL, NOAA-IOOS Program does not presently have an explicit research function
- Unlike DCL, NOAA-IOOS Program does not recognize the essentiality of numerical modeling to produce ocean state estimation/information products
- NOAA and Navy R&D and operational ocean prediction personnel are concerned with skill assessment, CI, etc. and are seeking testbed opportunities, which are yet to be defined

# **DCL Modeling Proposal Strategy**

- GOAL and OBJECTIVES
- ATTRIBUTES
- FUNDING OPTIONS

# SURA DCL Proposal Goal & Objectives Statement(2 NOV 08)

- **GOAL:** Investigate the efficacy of coupled, distributed coastal oceanic, atmospheric, and hydrologic models for representing coastal processes; build upon the SURA Coastal Ocean Observing and Prediction (SCOOP) program's cyberinfrastructure by achieving interoperability among an expanded set of scientific disciplines.

# **OBJECTIVES:**

- Evaluate the results of 3-way model coupling versus 2-way and 1-way coupling thru experimentation supervised by a modeling working group.
- Design collaboratory testbeds for coupled modeling by engaging partners from academia, the NOAA/National Ocean Service (NOS) & National Weather Service (NWS), and the Naval Research Laboratory (NRL) & Naval Oceanographic Office (NAVO).
- Demonstrate the merits of distributed, coupled modeling and computing for facilitating R&D and education by participation of SURA institutions, in the spirit of the Distributed Coastal Laboratory (DCL) aims.

# PROPOSAL ATTRIBUTES

- DESIGN, IMPLEMENT, DEMONSTRATE, AND EVALUATE COMMUNITY-MODELING TESTBEDS
- INITIAL DISCIPLINARY SCOPE: COASTAL OCEANOGRAPHY, MESOSCALE METEOROLOGY, & RIVER HYDROLOGY
- VENUES: NORTHERN GULF OF MEXICO AND CHESAPEAKE BAY
- DYNAMICS: BAROTROPIC TO BAROCLINIC
- TOPICS: COASTAL INUNDATION TO HYPOXIA TO LAND-TO-SEA NUTRIENT FLUXES TO MARINE ECOSYSTEMS

# **FUNDING OPTIONS**

- Probably Not NOAA IOOS Program Office
- Possibly other NOS offices
- Other ?