Shelf Hypoxia and the U.S. IOOS Coastal Modeling Testbed

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**U.S. IOOS Coastal Ocean Modeling Testbed**

- 5 teams, 64 scientists/analysts
- SURA is overall lead
- One year project (May 2010-11)
- NCE to Dec 2011
- Multi-sector engagement
  - federal, academia, industry
- Goals:
  - Less about models than process
  - Enable modeling and analysis
  - Stable infrastructure focus
  - tools
  - standard observations
  - transition to operations (R2O)

**Collaboration & Data**

- 4-Year, Multi-Source, Quality Controlled Hypoxia Data to Testbed & NOAA NODC
- Retrospective Navy Ocean Prediction Output
  - Now Available on NGI Developmental and NOAA NODC NCDDC Production Servers

**Collaboration & Models**

- Nesting Impact on Physical Properties
  - Testbed, NOAA CSDL, NRL
  - ROMS Salinity Skill Scores
    - (Nested in Gulf Models):
      - HYCOM 0.54
      - IASNSFS (NCOM) 0.56
      - IASNSFS 6h 0.55
      - NGOM (POE) 0.51
      - NGOM 3h 0.52
      - CLIM (unnested) 0.38

- Nesting Impact on Biogeochemistry
  - Testbed, NOAA CSDL, EPA, NRL
  - Impact of Nesting on Hypoxic Area less obvious

**AMSEAS Operational Evaluation**

- Testbed, NAVO, NOAA CSDL

**Roles of PIs**

- John Harding, NGI
- Rob Hetland, TAMU
- Katja Fennel, Dalhousie
- Jerry Wiggert, USM
- John Lebrer, EPM AEHLRL
- Alan Lewitus, NOAA CSIOR
- Bruce Lippard, U Delaware
- Chris Mooers, Portland State
- Steve Morrey, FSU
- Rich Patchen, NOAA CSIOR
- Eugene Wai, NOAA CSIOR
- Jiangtao Xu, NOAA CSIOR

**Motivation**

**Why Gulf of Mexico Shelf Hypoxia?**

- Multi-Agency [federal & State] Mississippi River/Gulf of Mexico Watershed Nutrient Task Force action step
  - "Continue to reduce uncertainty about the relationship between nitrogen and phosphorous loads and the formation, extent, duration, and severity of the hypoxic zone; to best monitor progress toward, and inform adaptive management of the Coastal Zone.“
  - (http://www.epa.gov/mba/sboin/actionsteps.html)

- A near real-time eddy-resolving shelf-hypoxia forecast capability will allow the capture of the true temporal variability of hypoxia formation, extent, duration and severity of the Gulf of Mexico Dead Zone.

**Shelf Hypoxia Testbed Approach**

- **Collaboration**
  - R2R
  - R2O (Transition)

- **Data**
  - In Situ
  - Forecast System

- **Models**
  - Development
  - Evaluation

**Planned NOAA Operational Shelf Forecast System**

**Shelf Hypoxia Initial Focus (1-2 yr)**

- Challenge the CI Team to Enhance Academic/Operational Collaboration & Transition
  - Evaluate regional model boundary conditions on current coastal/hypoxia modeling in the northern GoM
  - Compare NOAA and EPA Approaches to Gulf hypoxia
  - Transition related regional circulation component of this initial system as a baseline operational capability
  - Enable transition of NGI/NCDDC Developmental OceanNOMADs (P11 NCDDC External Milestone)

**Project Partners**

- Martinine Marta Almeida, TAMU
- Frank Bub, NAVO/NOAA
- Scott Cross, NOAA NCDDC
- Pat Fitzpatrick, MSU
- Courtney Harris, VMMS
- Matt Howard, GCDS
- Jianhua Hu, Dalhousie
- Dong Shen, POE
- Arnaud Laurent, Dalhousie
- John Lebrer, EPM AEHLRL
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- Chris Mooers, Portland State
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http://testbed.sura.org