U.S. GODAE: Global Ocean Prediction with the Hybrid Coordinate Ocean Model (HYCOM)

Objectives and Goals

- A broad partnership of institutions that will collaborate in developing and demonstrating the performance and application of eddy-resolving, real-time global and basin-scale ocean prediction systems using HYCOM

- GODAE: Global Ocean Data Assimilation Experiment

- To be transitioned for operational use by the U.S. Navy at NAVOCEANO and FNMOC and by NOAA at NCEP

Opportunities

- NOAA/Navy collaboration and cooperation ranging from research to the operational level

- Global model outputs available to the community at large

- Strong participation of the coastal ocean modeling community in using and evaluating boundary conditions from the global and basin-scale ocean modeling prediction systems

HYCOM

- HYCOM is the result of a very effective collaboration between the U. of Miami, NRL/Stennis, and the Los Alamos National Laboratory. Would have not been possible without NOPP support.

- HYCOM has been configured globally (up to 3/4º ~60km mid-latitude resolution) and basin-scale (up to 1/12º ~7km mid-latitude resolution)
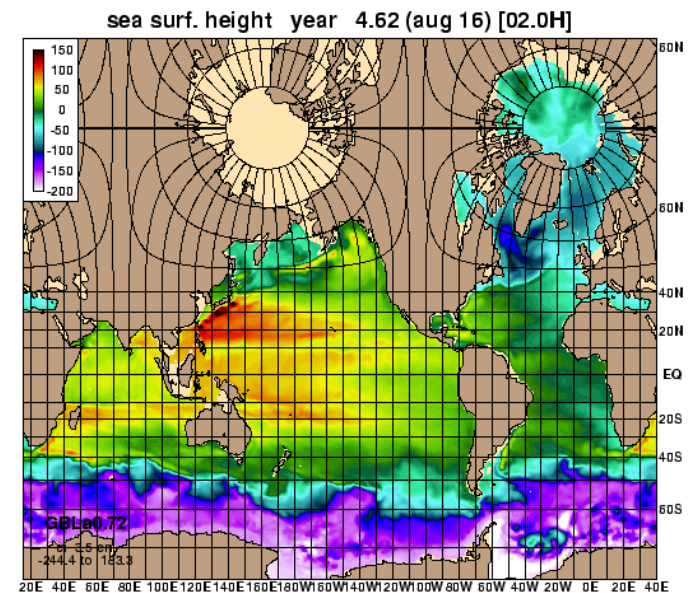
Configuration of the Prediction Systems

- Basin-scale (NRL/Miami and NOAA)
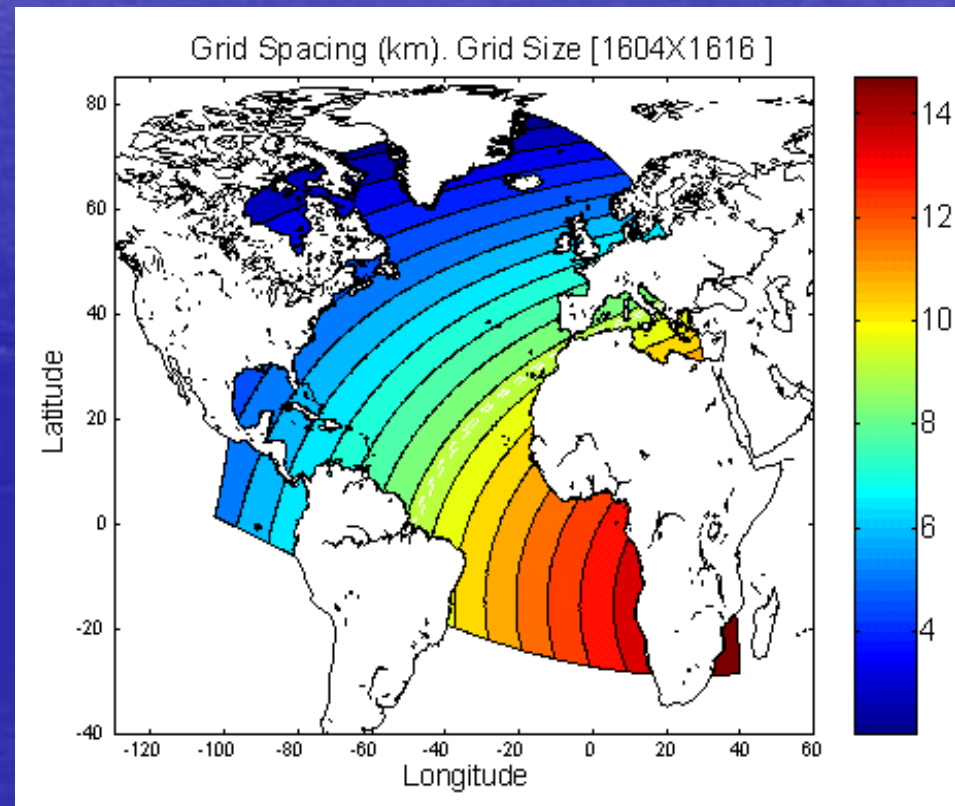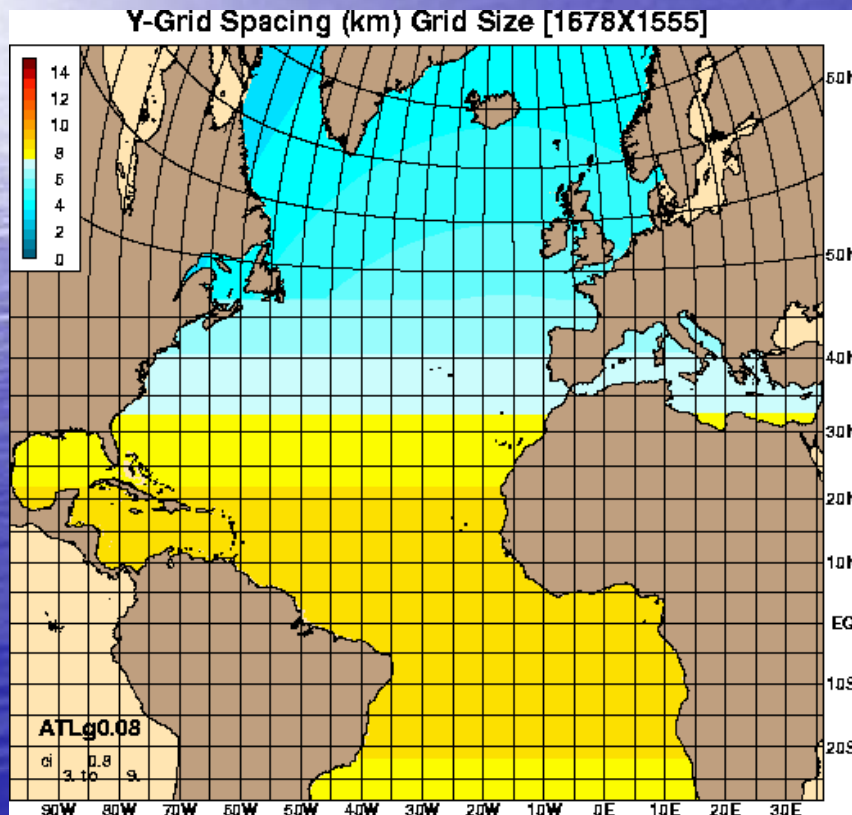
Configuration of the Prediction Systems

- Global
  - Sea Ice Options
    - Energy loan
    - 4-layer thermodynamic (Russel et al., 2000)
    - Los Alamos CICE
  - Target
    - 1/12º for NAVOCEANO
    - 1/4º (~20 km) for FNMOC (ocean component of coupled ocean-atmosphere)

sea surf. height   year   4.62 (aug 16) [02.0H]

Data Assimilation

- Several techniques are either in place or under development

- Vary in sophistication and computational requirements

- Both the SEEK (Single Evolutive Extended Kalman) filter and ROIF (Reduced Order Information Filter) will be evaluated. The SEEK filter has been implemented in the 1/3° Atlantic configuration and will soon be evaluated in the 1/12° configuration.

Data Assimilation

- Because of their simplicity, most operational prediction centers around the world (NAVO, MERCATOR, FOAM, …) are presently using OI-based assimilation techniques. Either the SEEK or ROIF will supersede the OI-technique presently used in HYCOM. SEEK will be used in MERCATOR.

- Other techniques will be evaluated such as the EnKF (Ensemble Kalman Filter), but mostly within coastal configuration or specific area of high interest because of their cost.

Product Evaluation

- Assessment of the outputs by comparison to independent observations
- Strong involvement of coastal ocean modeling groups to use and evaluate boundary conditions provided by the global and basin HYCOM real time prediction system outputs

Model Outputs

- Will be made available to the community at large within 24 hours via the U.S. GODAE and Miami Live Access Servers (LAS)
- Strong collaboration with NOAA/PMEL (S. Hankin) and OPeNDAP (P. Cornillon) to enhance the LAS and to provide an efficient distribution of the model outputs

Roadmap

- Basin-scale
  - Years 1 to 4: Improvements in the present near real time NRL/Miami 1/12º North Atlantic configuration. Evaluation of the SEEK and ROIF filter. Overlap in year 4 with the global configuration for assessment of the global system in the Atlantic.
  - NCEP Atlantic configuration will become operational in year 3 and Pacific configuration in year 5.

Roadmap

- Global configuration
  - Development will take place in years 1 to 3. The 3/4º grid will be used as the test bed.
  - Transition to NAVOCEANO (1/12º) and FNMOC (1/4º) with MvOI at the end of 2006.
  - Operational testing in year 5