Interoperability and Common Model Architecture

National Unified Operational Prediction Capability

The Common Model Architecture Committee is working to:

- Enhance interoperability and accelerate transition of research into operations at the primary U.S. operational Numerical Weather Prediction (NWP) centers
- Develop common architecture and guidelines for Global Numerical Weather Prediction (GNWP) systems
- Implement a NUOPC layer in the Earth System Modeling Framework (ESMF) to provide for a common implementation and improved interoperability
- Provide tools for developing, maintaining and monitoring compliance with NUOPC standards

Impact:

- Modelers can create interoperable systems, reusing code and patterns
- Standardizes initialize phases to help models fit together
- Common Field structures and meta-data ensures communication of data between components
- NUOPC Layer reports when components don't *"play"* together during execution
- Detailed reporting helps modelers to debug quickly

Progress to date:

- Implementing agreed-to standards into NUOPC Layer
- Developed:
  - NUOPC Interoperability Standards in ESMF v5.2.0r
  - NUOPC Layer as development tool for community
  - Prototype Coupling Code
  - Common guidance on Model Metadata
  - NUOPC Compliance Checker
  - Component and Coupler Templates
  - Examples and use guidance

More information at:
http://www.earthsystemmodeling.org/plans/milestone_1105_nuopc.shtml

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About NUOPC:

NUOPC (National Unified Operational Prediction Capability) is an agreement to coordinate activities between the Department of Commerce (National Oceanic and Atmospheric Administration) and the Department of Defense (Oceanographer and Navigator of the Navy and Air Force Directorate of Weather), in order to accelerate the transition of new technology, eliminate unnecessary duplication, and achieve a superior National global prediction capability.

The NUOPC partners determined that the Nation's global atmospheric modeling capability can be advanced more effectively and efficiently with their mutual cooperation to provide a common infrastructure to perform and support their individual missions.

Why a Common Model Architecture?

- Common model interface code developed, tested and maintained centrally
- Saves development and maintenance resources
- Can link/swap models of atmosphere, ocean, land, wave, etc., from many developer sites
- Accelerates comparative testing
- Reduces duplication
- More rigorous maintenance and testing
- More reliable

Systems Implementing NUOPC Layer:

- Global Forecast System (GFS)
- Global Ensemble Forecast System (GEFS)
- Nonhydrostatic Mesoscale Model (NMM)
- Finite Element Icosahedral Model (FIM)
- NOAA Environmental Modeling System (NEMS)
- Global Assimilation of Ionospheric Measurements (HAF-GAIM)
- Weather Research and Forecasting Model (WRF)
- Land Information System (LIS)
- Naval Operational Global Atmospheric Prediction System (NOGAPS)
- Coupled Ocean Atmosphere Mesoscale Prediction System (COAMPS)
- Navy Coastal Ocean Model (NCOM)
- Hybrid Coordinate Ocean Model (HYCOM)
- Wave Watch 3 (WW3)
- Community Ice Code (CICE)
- Ensemble Forecast System (EFS)
- Simulating Waves Near Shore (SWAN)
- Advanced Circulation Model (ADCIRC)