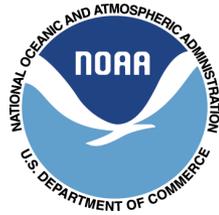# HIWPP/NGGPS Program Status Meeting

Welcome

Fred Toepfer
Ivanka Stajner
February 9, 2016

HIWPP/NGGPS Welcome

Overall Meeting Objectives

- Provide a status update of High Impact Weather Prediction Project (HIWPP) projects, products completed, and lessons learned

- Provide a status update of the R2O Initiative for the development of a Next Generation Global Prediction System (NGGPS).
  - Review status of team activities (accomplishments, goals, needs)
  - Facilitate cross-team awareness and interaction
  - Seek to identify opportunities to accelerate team progress in achieving goals

Day 1 Agenda
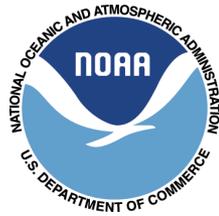
- Welcome
  - R2O/NGGPS Initiative
  - HIWPP
  - NCEP/EMC
- HIWPP Science Reports
- HIWPP Project Management Issues
- HIWPP Project Lessons Learned Discussion
- HIWPP Wrap-up
- Initial NGGPS Team Briefings
- Adjourn (Unofficial Dinner Gathering)

R2O Initiative Objectives

- The NWS R2O Initiative will expand and accelerate critical weather forecasting research to operation to address growing service demands, and increase the accuracy of weather forecasts through accelerated development and implementation of current global weather prediction models, improved data assimilation techniques, and improved software architecture and system engineering.

- The overarching initiative objective is to build a Next Generation Global Prediction System (NGGPS) that will be the foundation for the operating forecast guidance system for the next several decades.
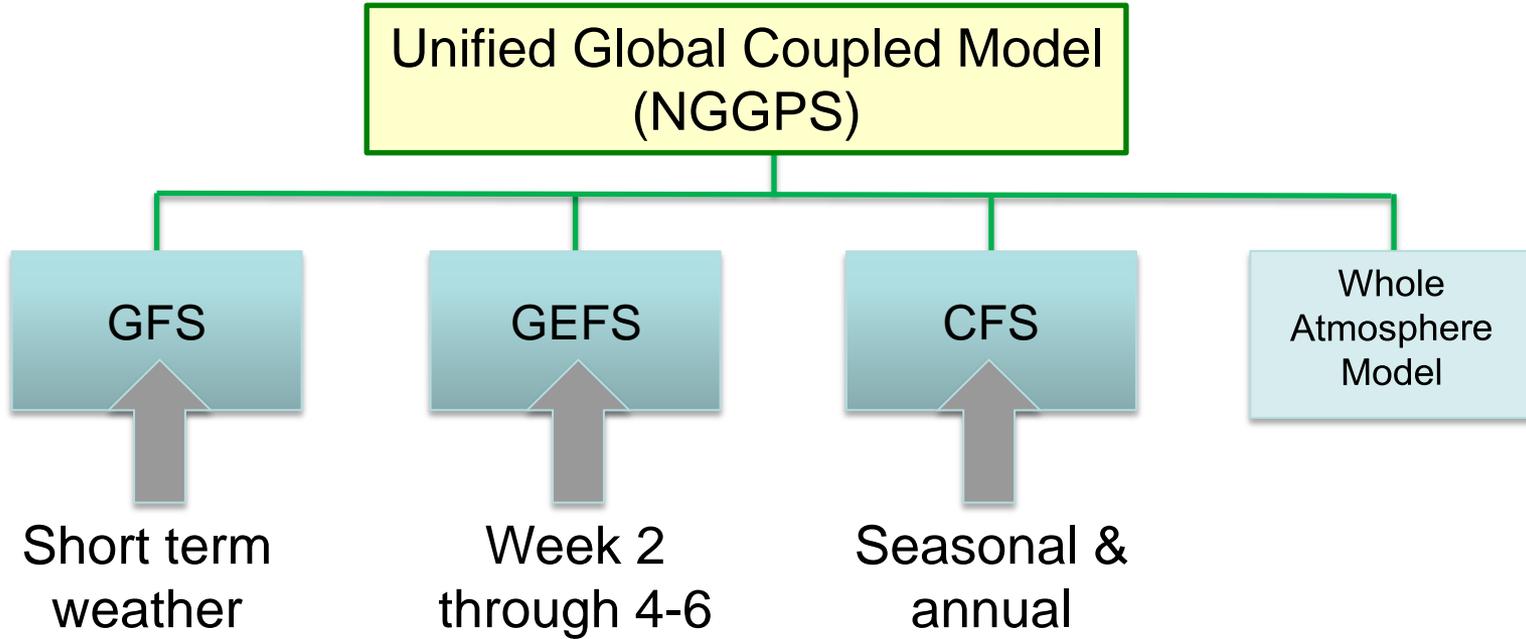
NGGPS Overarching Objectives

- Re-establish US as the world leader in global weather prediction
  - Extend forecast skill beyond 8 to 10 days
  - Improve hurricane track and intensity forecast
- Extend weather forecast to 30 days
  - Implement a weather-scale, fully-coupled numerical weather prediction system
  - Support development of products for weeks 3 and 4
- Support unification of the NWS numerical weather prediction suite
- Multi-year community effort
- Position NWS to take advantage of advanced high performance computing architectures

NGGPS
Planned Operational Applications

Unified Global Coupled Model (NGGPS)

| GFS | GEFS | CFS | Whole Atmosphere Model |

Short term weather

Week 2 through 4-6

Seasonal & annual

Application = Ensemble + Reanalysis + Reforecast

Research needs to fit into strategy

Adapted from Hendrik Tolman
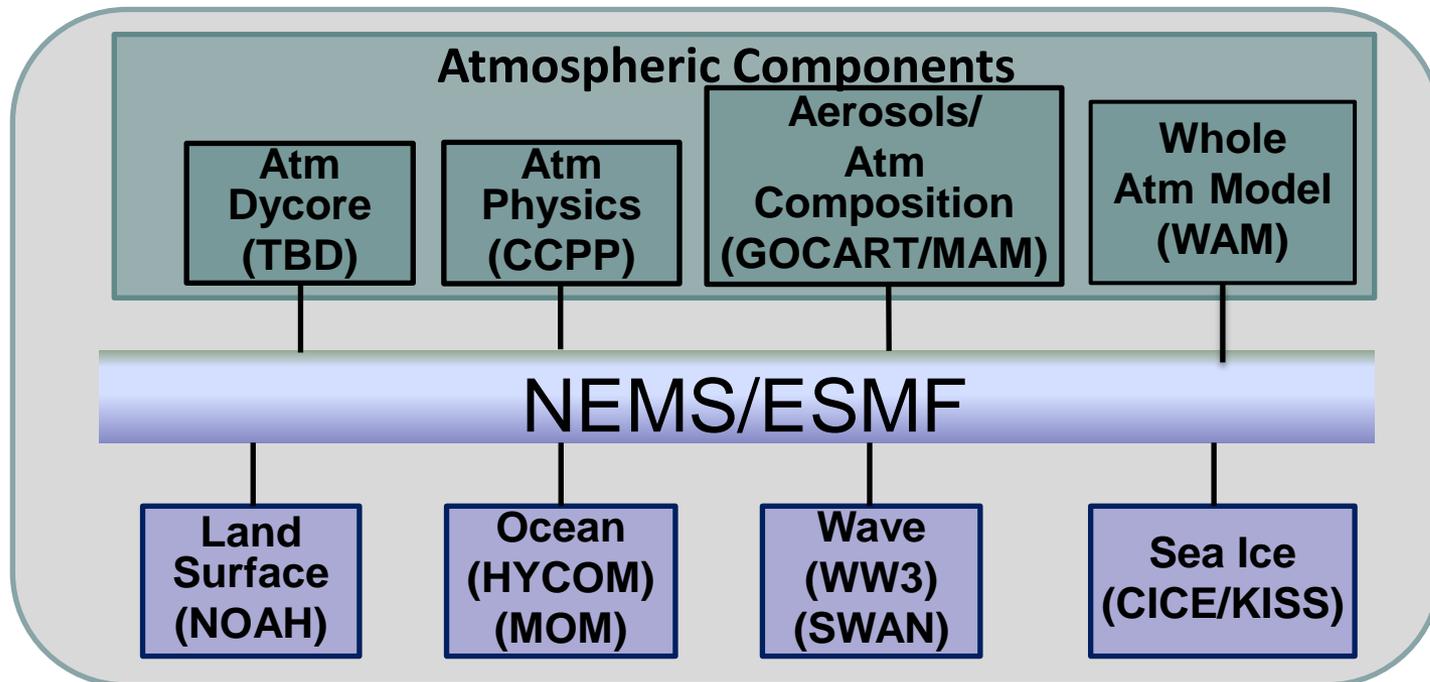
NGGPS Unified Global Coupled Model Description

- Fully-coupled system with ocean, waves, sea ice, land surface, atmosphere, aerosols and atmospheric composition model components
- Built using NEMS/Earth System Modeling Framework
- Each component model will be community code

Atmospheric Components

| Atm Dycore (TBD) | Atm Physics (CCPP) | Aerosols/ Atm Composition (GOCART/MAM) | Whole Atm Model (WAM) |

NEMS/ESMF

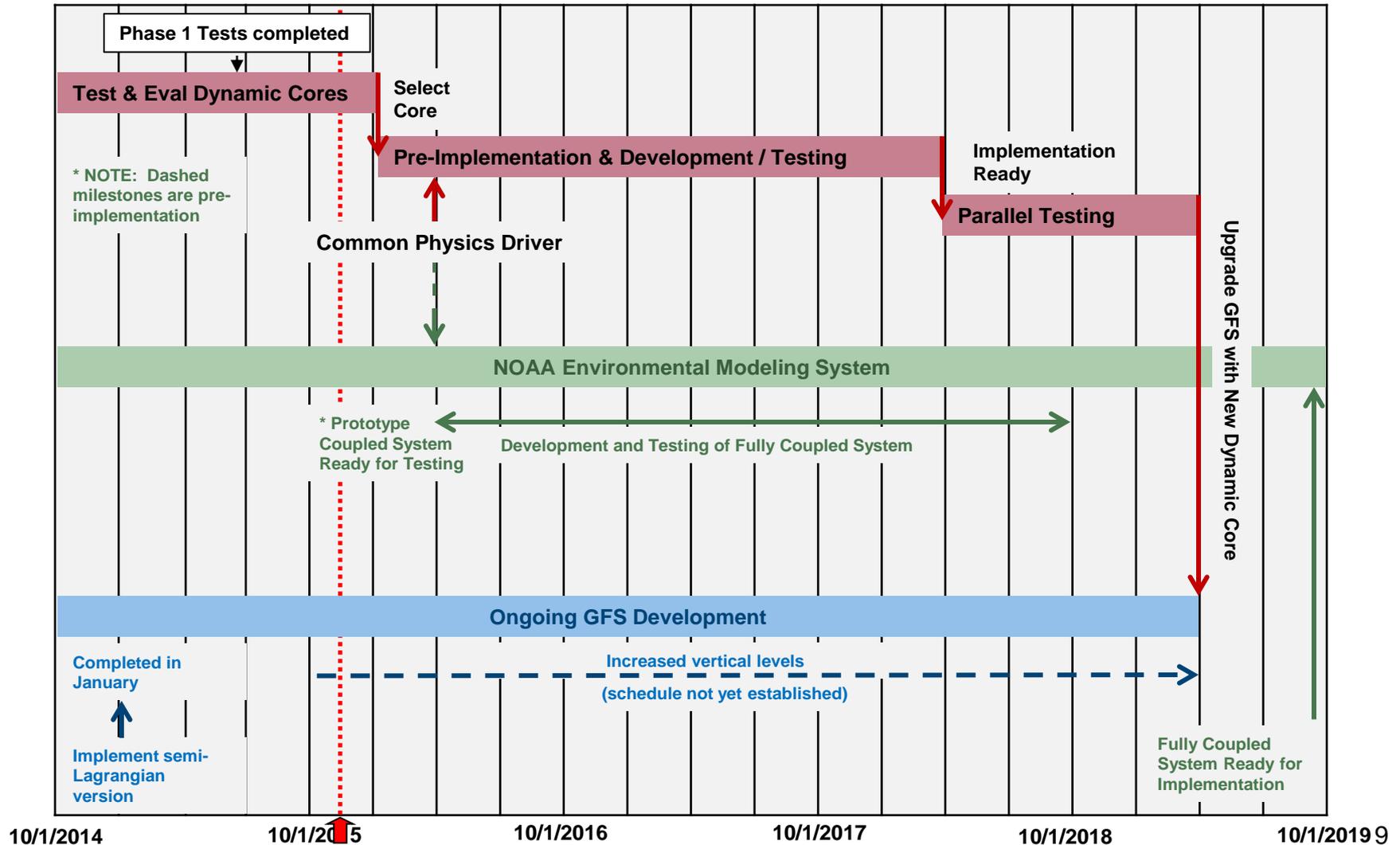| Land Surface (NOAH) | Ocean (HYCOM) (MOM) | Wave (WW3) (SWAN) | Sea Ice (CICE/KISS) |

Implementation Plan Development Teams

- Atmospheric Prediction – Dynamics/Nesting (Whitaker/Tallapragada)
- Atmospheric Prediction – Physics (Doyle/Moorthi/Kuo)
- Aerosols and Atmospheric Composition (Stajner/Hou)
- Atmospheric Data Assimilation (Derber)
- Ocean Prediction (incl waves, sea ice, and data assimilation) (Mehra)
- Land Prediction (Ek)
- Post-Processing (Hamill/Zhu)
- Ensemble Development (Hamill/Zhu)
- Overarching System (architecture/integration incl NEMS/ESMF) (DeLuca/Iredell)
- Software Architecture and Engineering (Iredell)
- Verification and Validation (Stajner/White)
- Testbeds (Davidson/Ek)
- Infrastructure (Young)

Team participation across NOAA line offices/laboratories, Navy, NASA, UCAR and coordination with the High Impact Weather Prediction Project and the National Earth System Prediction Capability program
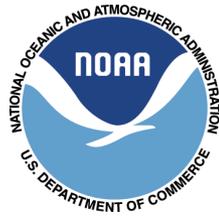
NGGPS Implementation

Phase 1 Tests completed

Test & Eval Dynamic Cores

Select Core

Pre-Implementation & Development / Testing

Implementation Ready

Parallel Testing

* NOTE: Dashed milestones are pre-implementation

Common Physics Driver

Upgrade GFS with New Dynamic Core

NOAA Environmental Modeling System

* Prototype Coupled System Ready for Testing

Development and Testing of Fully Coupled System

Ongoing GFS Development

Completed in January

Increased vertical levels

(schedule not yet established)

Implement semi-Lagrangian version

Fully Coupled System Ready for Implementation

10/1/2014   10/1/2015   10/1/2016   10/1/2017   10/1/2018   10/1/2019

Summary

- NGGPS implementation and teams research to operations activities moving forward

- Coordinating proposal driven scientific development by universities, federal labs, and testbeds

- Dynamic core testing in progress with final decision anticipated summer 2016
  - Phase 1 testing complete / selected 2 of 5 dynamic cores evaluated, leveraged HIWPP dycore data
  - Phase 2 testing underway
  - Further dynamic core development and parallel testing required after final dycore selection

- Goals include accelerated development of model components

NGGPS Website:

http://www.nws.noaa.gov/ost/nggps