NGGPS-MAPP Principal Investigator’s Meeting
August 2-3 2017

• **NGGPS**: Next Generation Global Prediction System (NWS/STI)
• **MAPP**: Modeling, Analysis, Predictions and Projections (OAR/CPO)
PI Meeting Agenda

• Wednesday, August 2
  – Introduction (Ming Ji, Christopher Hedge, Annarita Mariotti)
  – Session I: Testbeds
  – lunch
  – Session II: Model Physics and Modeling Framework

• Thursday, August 3
  – Session III: Data Assimilation
  – Poster session
  – lunch
  – Session IV: Verification and Validation
  – Session V: Multi-model Ensembles, Post-processing and Applications
Administrative Notes

• For those on the phone: **mute your phones** during the talks
  – During Q&A, use “raise hand” or “chat” option in GoToMeeting
• For those in the audience: **silence your phones**
  – During Q&A, use microphones in the aisles
• Facility: (1) access and security (2) Restroom locations
• Meals and coffee breaks: **no food/drinks in auditorium!**
  – $10 for beverage/snacks
  – Lunches on your own. Pre-order boxes will be labeled & on table
• **Wifi:** (NOAAGuest): type your email into browser, click button
• Note there are two other global modeling planning meetings going on: SIP and UMAC. Please be respectful and keep noise levels down when outside of the auditorium.
• Safety and evacuation (see next slides)
Auditorium Evacuation Route

Exit from the doors at each end of the auditorium and use the exit facing the parking garage. Continue past the garage and exit the NOAA grounds to the parking lot across the street.

If there is a Shelter In Place incident, we stay in the conference center & the rest of NCWCP will join us there.
STI Modeling
Program Overview

Dr. Ming Ji, Director
Office of Science and Technology Integration (STI)
# Implementation Plan for FV3-GFS (FY2017-2020)

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<th>FY17 Q1</th>
<th>FY17 Q2</th>
<th>FY17 Q3</th>
<th>FY17 Q4</th>
<th>FY18 Q1</th>
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<tr>
<td>Q1</td>
<td><strong>Evaluate, prepare and document FV3 dycore for GFS</strong></td>
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<td>Q2</td>
<td><strong>Implement FV3 dycore in NEMS</strong></td>
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<td>Q3</td>
<td><strong>Couple FV3 to GFS physics (NUOPC physics driver) perform forecast-only experiments, tuning and</strong></td>
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<td>Q4</td>
<td><strong>Develop DA techniques</strong> <em>(native grid vs physics grid; New data)</em></td>
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<td>Q1</td>
<td><strong>Cycled experiments, benchmarking, efficiency and optimization</strong></td>
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<td>Q2</td>
<td><strong>Real-time parallel FV3GFS forecasts to the field</strong></td>
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<td>Q3</td>
<td><strong>Pre- and post-processing, verification &amp; downstream</strong></td>
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<td>Q4</td>
<td><strong>3-year retrospective + real-time parallels, EMC and Community Evaluation</strong></td>
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<td><strong>Experimental (beta) implementation of FV3GFS</strong></td>
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<td><strong>NCO Parallel</strong></td>
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<td><strong>NEMS/FV3GFS in operations</strong></td>
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<td><strong>Further advancements of FV3GFS with inputs from NGGPS and community contributions &amp; Global-Meso unification</strong></td>
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* Q3FY18 FV3GFS will be very similar to operational GFS being implemented in May 2017

* Q3FY18 FV3GFS target resolution is ~10km grid with 127 layers, extends up to 80 km.

* & Advanced physics: Scale-aware convection, SHOC PBL, Double-moment microphysics, Unified convective and orographic gravity wave drag etc

* % DA system will be @35 km 127 levels using 4d-Hybrid EnVAR
Extra slides
NGGPS
Description

• Fully coupled system: ocean, waves, sea ice, land surface, atmosphere, aerosols and atmospheric composition
• Built using NEMS/Earth System Modeling Framework
• Each component model will be community code
NGGPS
Planned Operational Applications

Unified Global Coupled Model
(NGGPS)

- GFS
- GEFS
- CFS
- Whole Atmosphere Model

Short term

Week 2 through 4-6

Seasonal & annual

Application = Ensemble + Reanalysis + Reforecast

Adapted from Hendrik Tolman
Weather Bill

• H.R.353 - Weather Research and Forecasting Innovation Act of 2017
• Authorization not an Appropriation
• Requires NOAA to prioritize weather research to improve weather data, modeling, computing, forecasts, and warnings
• OAR must collaborate with and support the non-federal weather research community by making funds available through competitive grants, contracts, and cooperative agreements (30%)
• NOAA must establish a tornado warning improvement and extension program
• NWS must plan and maintain a project to improve hurricane forecasting
• NWS must collect and utilize information to make reliable and timely foundational forecasts of subseasonal and seasonal temperature and precipitation.
Initial implementation configuration for FV3GFS in FY19

• Planned/Projected FY19 FV3GFS configuration

  • **Resolution**: ~9 km 128 levels
  • **Physics**: New physics options implemented in FY18 tuned for FV3
    • Scale and aerosol aware Chikira-Sugiyama Convection Scheme with Arakawa-Wu extension
    • Unified representation of turbulence and shallow convection (SHOC)
    • Double moment microphysics
    • Upgraded LSM, radiation, GWD and Ozone Physics
  • **DA configuration**: Similar to FY18 NEMS/GSM GDAS with additional developments required for FV3 dynamic core, new datasets (GOES-R, JPSS etc.)
    • Run times optimized for production suite requirements
    • End-to-end system testing for stability, robustness of scientific and technical solutions, non-negative impact for downstream dependencies
  • **Modern workflow** (CROW* for development, T&E; ecflow for production)

*CROW: Community Research and Operational Workflow*
Strategic Implementation Plan (SIP) merged with NGGPS Working Groups

- **Governance**
  - Decision making, roles/responsibilities, advisory boards, org. alignment, etc.

- **Communications and Outreach**
  - Common messaging strategy

- **Convective Allowing Models (CAMs)**
  - Intermediate steps to CAM ensembles, Warn on Forecast; test/eval w/community

- **System Architecture**
  - NEMS evolution; community approach

- **Infrastructure**
  - Standards/doc; CM; code repository; etc.
  - Role of testbeds; regression testing; etc.

- **Verification & Validation (V&V)**
  - V&V of ops forecasts vs. R&D testing/eval
  - Unified/standard tools and data formats

- **Dynamics and Nesting**
  - FV3 transition on global wx/S2S/climate
  - Nests for hurricanes (moving?)

- **Model Physics**
  - Common Comm. Physics Pkg (CCPP); stochastic, scale-aware physics

- **Data Assimilation**
  - NOAA, NASA integ. w/FV3; coupled DA
  - Joint Effort for DA Integration (JEDI)

- **Ensembles**
  - Strategy across scales; model uncertainty

- **Post-Processing**
  - Comm. PP infrastructure; std formats/tools

- **Component Model groups**
  - Marine models + *NOS coastal/bay models*
  - Aerosols and Atmospheric Composition
  - Land Sfc Models (LSMs) + *hydrology (OWP)*

- **New WG or addition**

- Augmentation of existing NGGPS group
Community Modeling

- The UMAC emphasized the importance of NCEP to more effectively work with the community: private sector, federal, and academic

With NGGPS selection of the FV3 dynamical core, NCEP is seeking to assure that the global model is developed as a community model

- Goals and needs of a community unified modeling system including governance, infrastructure, and modeling component priorities
- Balance between operations and research
  - Degree of support
  - Well-defined path for research to operations transition
- Resources to support the research community participation
  - Partnership with R&D agencies and universities
Schematic of NEMS FV3GFS