

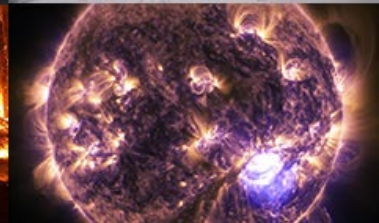
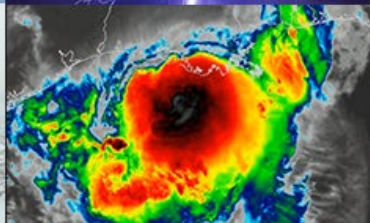
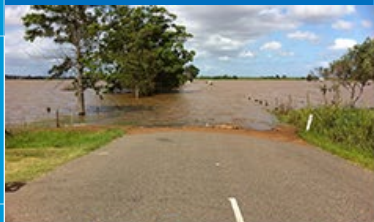


**NATIONAL
WEATHER
SERVICE**

Plans for the High-Resolution Rapid Refresh (HRRR) Model

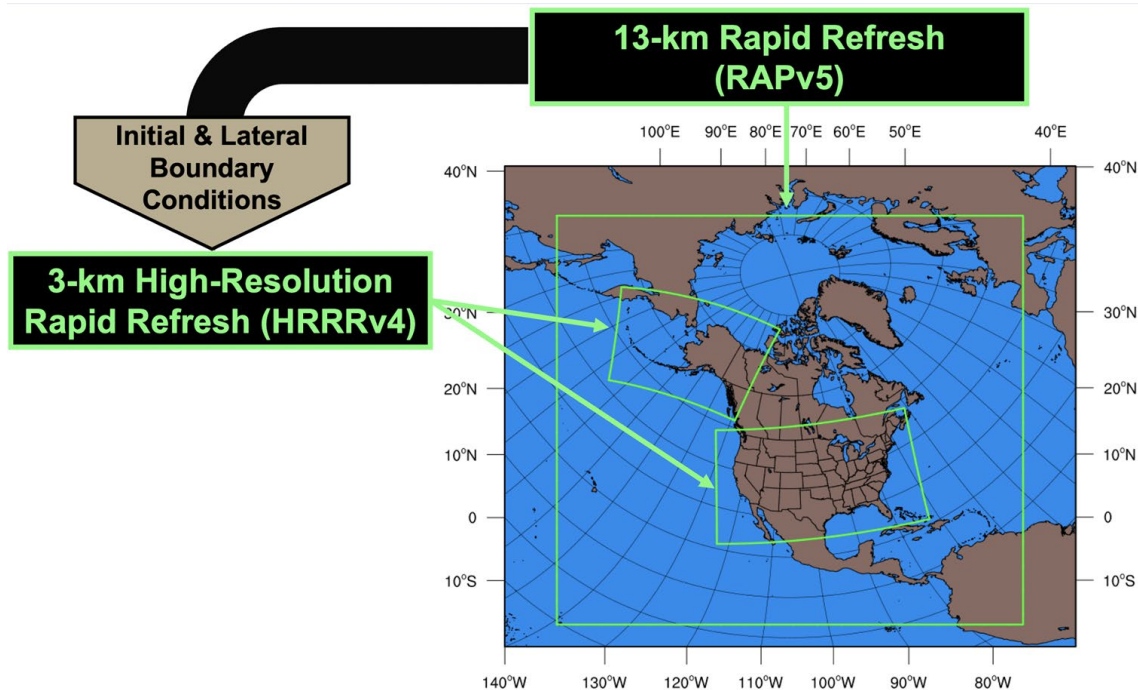
**NODD Office Hours
March 15, 2023**

Geoff Manikin
National Centers for Environmental Prediction
Environmental Modeling Center



HRRR Uses

- Aviation
- Severe Weather
- Wind Energy
- Fire Weather and Smoke Transport
- Winter Weather
- Hydrological Impacts
- General Forecasting





The Proposed Retirement of the HRRR





The Unified Forecast System

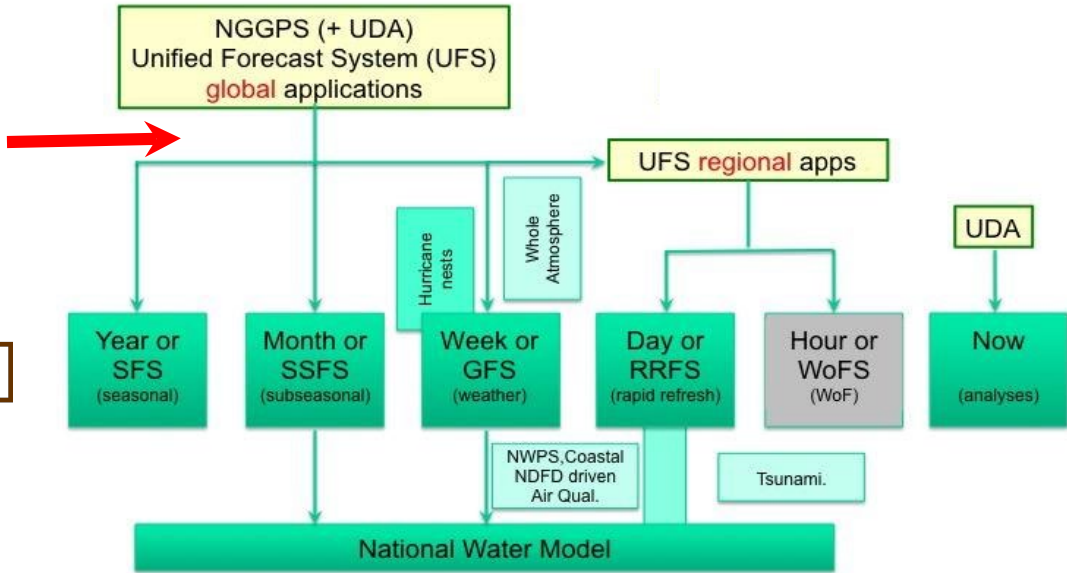
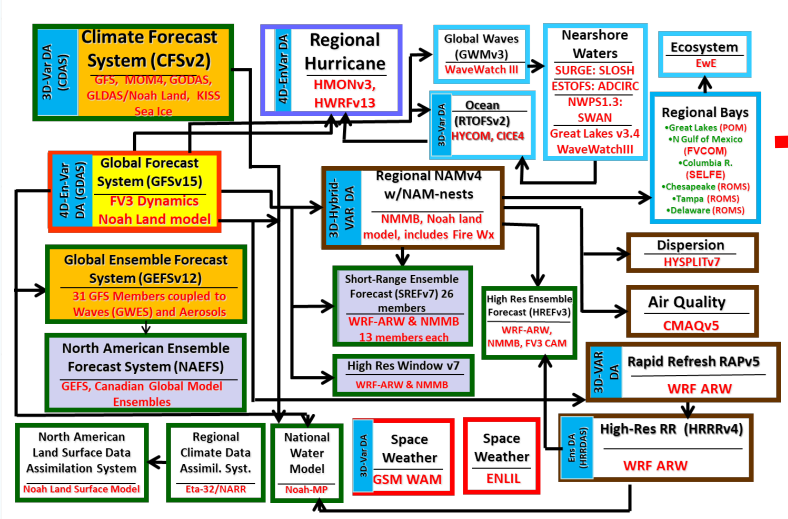


- The NCEP Production Suite has become too complex
- It is a poor use of resources to develop and maintain multiple model cores
- Need a unified modeling system (based on a single model core) driven by a set of clearly-defined product needs, instead of building new models to meet selected (sometimes poorly-defined) requirements
- The Finite-Volume Cubed-Sphere Dynamical Core (FV3) is the core that is being used to construct the Unified Forecast System (UFS)



Future Plans: Unified Forecast System (UFS)

NCEP Production Suite Simplification through implementing UFS Applications in operations



UDA: Unified Data assimilation
 SFS: Seasonal Forecast System
 SSFS: Subseasonal Forecast System

GFS: Weather Forecast System
 RRFs: Rapid Refresh Forecast System
 WoFS: Warn on Forecast System



Future Plans: Unified Forecast System (UFS)



Simplifying NOAA's Operational Forecast Suite Reducing the 21 Stand-alone Operational Forecast Systems into Eight Applications

21 Independent Stand-alone Systems

- Global Weather, Waves & Global Analysis - GFS/ GDAS
- Global Weather and Wave Ensembles, Aerosols - GEFS
- Short-Range Regional Ensembles - SREF
- Global Ocean & Sea-Ice - RTOFS
- Global Ocean Analysis - GODAS
- Seasonal Climate - CDAS/ CFS
- Regional Hurricane 1 - HWRF
- Regional Hurricane 2 - HMON
- Regional High Resolution CAM 1 - HiRes Window
- Regional High Resolution CAM 2 - NAM nests/ Fire Wx
- Regional High Resolution CAM 3 - RAPv5/ HRRR
- Regional HiRes CAM Ensemble - HREF
- Regional Mesoscale Weather - NAM
- Regional Air Quality - AQM
- Regional Surface Weather Analysis - RTMA/ URMA
- Atmospheric Transport & Dispersion - HySPLIT
- Coastal & Regional Waves - NWPS
- Great Lakes - GLWU
- Regional Hydrology - NWM
- Space Weather 1 - WAM/IPE
- Space Weather 2 - ENLIL

Unified Forecast System (UFS)



UFS Applications

- Medium Range & Subseasonal
- Marine & Cryosphere
- Seasonal
- Hurricane
- Short-Range Regional HiRes CAM & Regional Air Quality
- Air Quality & Dispersion
- Coastal
- Lakes
- Hydrology
- Space Weather



Retiring Models

- NCEP is working to consolidate the production suite, which involves the retirement of several legacy models that do not use the FV3 core and which will not be updated again – this includes the NAM, RAP/**HRRR**, and HiResWs / HREF
- There are plans for each system that will be retired to be subsumed by a Unified Forecast System (UFS) application
- UFS working groups and application teams are working with broad communities to
 - 1) identify and build appropriate products to cover the needs of the user community (especially with regards to models being retired)
 - 2) identify key performance metrics and build verification tools to help guide an evidence-based approach to turning off models
 - 3) build appropriate testing and evaluation plans
 - 4) ensure that certain strengths of retired systems are covered by replacements

Rapid Refresh Forecast System (RRFS)

A UFS Application

- Based on the FV3 dynamical core Limited Area Model (LAM) capability
- Rapidly-updated
- Convection-allowing (~3 km grid spacing)
- 65 vertical layers
- Storm-scale data assimilation (30 members)
- Deterministic forecasts to 18h every hour
- Ensemble forecasts to 60h every 6 hours
 - 5 members (+1 deterministic control)
 - IC perturbations, stochastic physics, & (likely) multi-physics
 - Time-lagging



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Specific Takeaway Messages for the HRRR Retirement

- The RRFS is targeted for implementation in late 2024
- The HRRR is one of the regional models that will be subsumed by the RRFS, and it's impossible to run the RRFS and the legacy systems together in operations, so the HRRR will be retired when the RRFS is implemented
- Appropriate verification of RRFS real-time and retrospective tests will be done so that timelines are guided by an **evidence-based approach**
- A critical goal is to have the entire set of existing operational HRRR products matched in RRFS

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Specific Takeaway Messages for the HRRR Retirement

- EMC's [Model Evaluation Group](#) hosts webinars on model topics, including assessments of new and replacement models; send an email to geoffrey.manikin@noaa.gov to be added to the listserv
- We recommend subscribing to the NWS Notification listserv for Public Notification Statements and Service Change Notices
<https://www.weather.gov/notification/>

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