

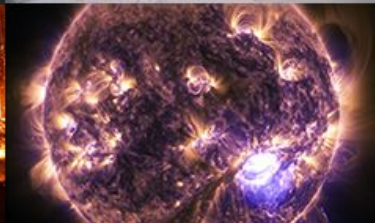
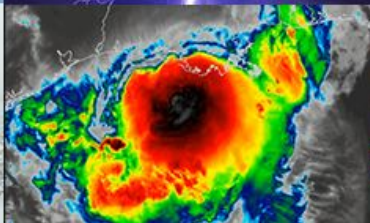
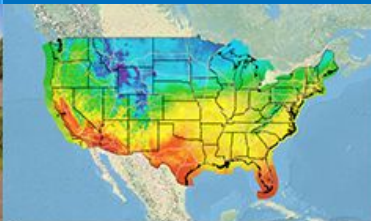
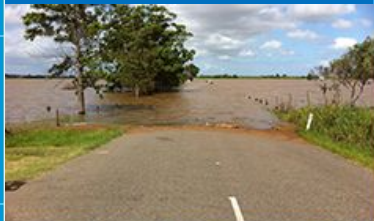


**NATIONAL  
WEATHER  
SERVICE**

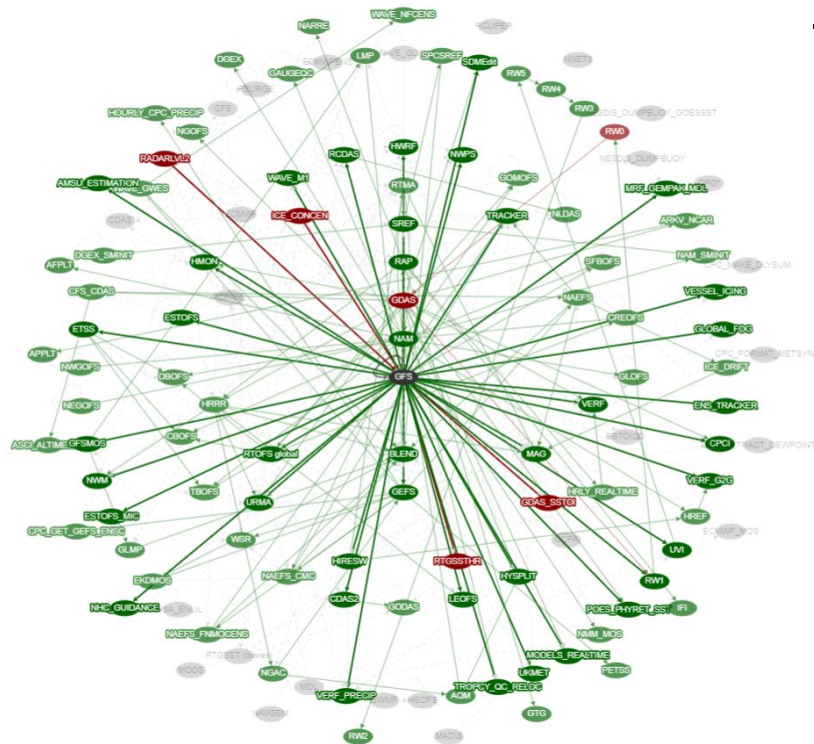
# Moving to Community Modeling In the National Weather Service

May 5, 2020

Presenter: Brian Gross, Director, EMC



# Current State of NCEP Production Suite



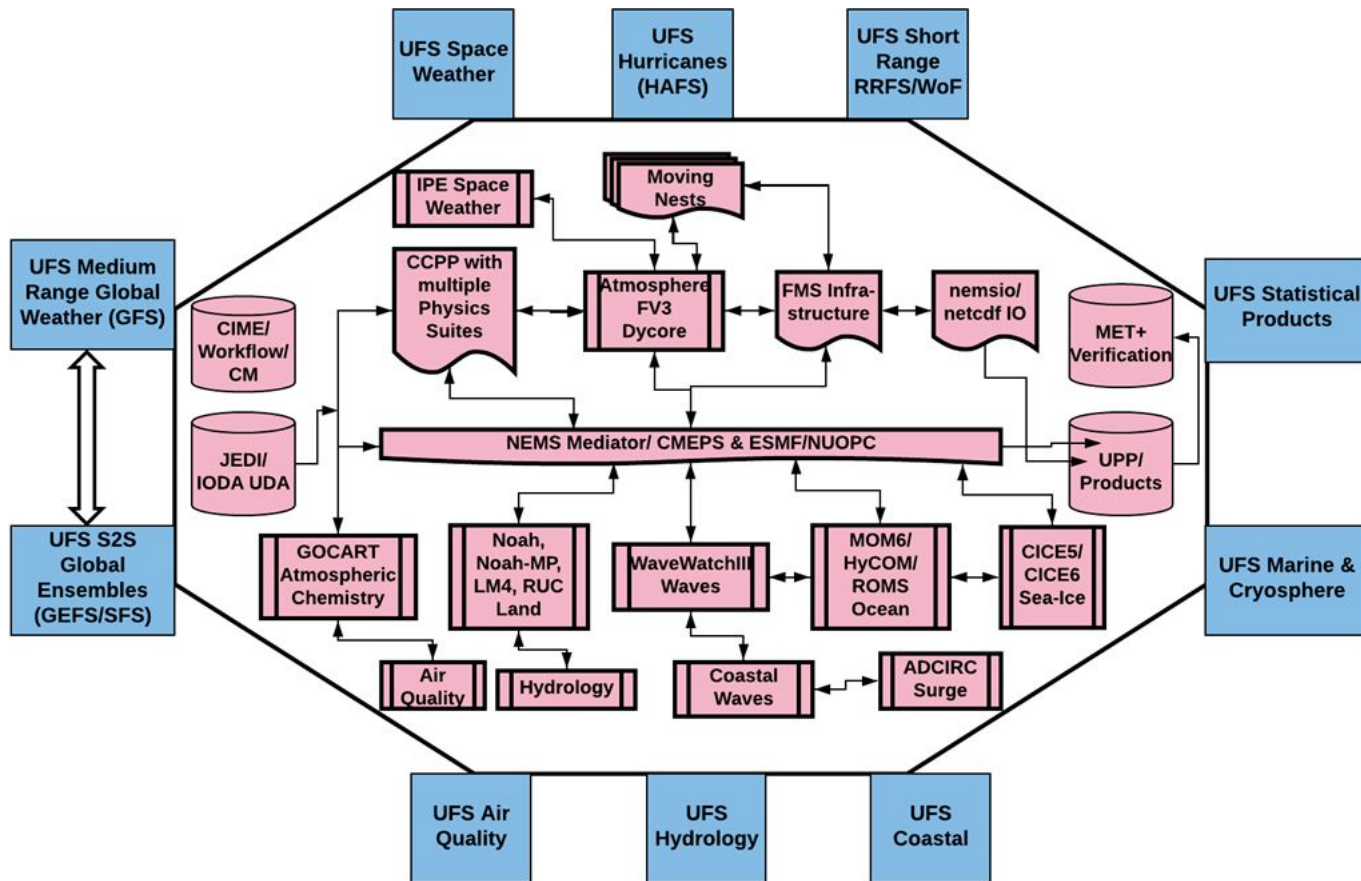
## Distinct Modeling Systems of NPS:

- AQM: CMAQ North American Air Quality Model (84 hrs)
- CFS: Spectral model coupled to ocean and ice & weakly coupled DA for seasonal forecasts (9 months)
- GDAS/GFS: FV3 based atmospheric model with GSI based DA (16 days, medium range)
- GEFS: Spectral model with 21 member ensemble (16 days)
- HiRes Window: Regional NMMB (72 hrs)
- HREF: Ensembles of WRF ARW and NMMB (72 hrs)
- HRRR/RAP: Regional WRF ARW with ensemble DA (36 hrs)
- HWRF: Regional WRF NMM-E hurricane model coupled to ocean and waves (126 hrs)
- HMON: Regional NMMB hurricane model coupled to ocean (126 hrs)
- HySPLIT: Regional on-demand dust/smoke/volcanic ash prediction
- NAM: NMMB North American Mesoscale Model (84 hrs)
- NAM Nests: High-Resolution NMMB Nests (84 hrs)
- NWPS: SWAN Near Shore Wave Prediction System
- NGAC: Global Spectral Model for Aerosols (5 days)
- NLDAS: Regional Land Data Assimilation System
- NAEFS: North American Ensemble Forecast System (GEFS+Canadian Ensembles)
- NWM: WRF Hydro for Water Prediction (5 days)
- RTMA/URMA: Regional Mesoscale Analysis
- RTOFS: HyCOM Global Ocean Model (5 days)
- SREF: Short Range Ensemble with WRF ARW, NMMB (84 hrs)
- Waves: Global multigrid WaveWatch III Model (10 days)
- Wave Ensembles: Global WaveWatch III Ensembles (10 days)
- Great Lakes: WaveWatch III for great lakes (10 days)
- Space Weather: Global Spectral Whole Atmosphere Model
- Space Weather: WSA EnLil Solar Wind Prediction Model

# NPS Transitioning to UFS Applications

“UFS is configurable into multiple applications that span local to global domains and predictive time scales from less than an hour to more than a year.”

Conceptual UFS applications in production covering all NPS applications, maintaining the dependencies between the applications and products.



# Community-Based Development

The Unified Forecast System (UFS) is a comprehensive, **community-based** Earth modeling system, designed as both a research tool and as the basis for NOAA's operational forecasts.



**Partner Organizations:  
Federal, Private and Educational  
Research, Development, and Use  
of Environmental Prediction Software**



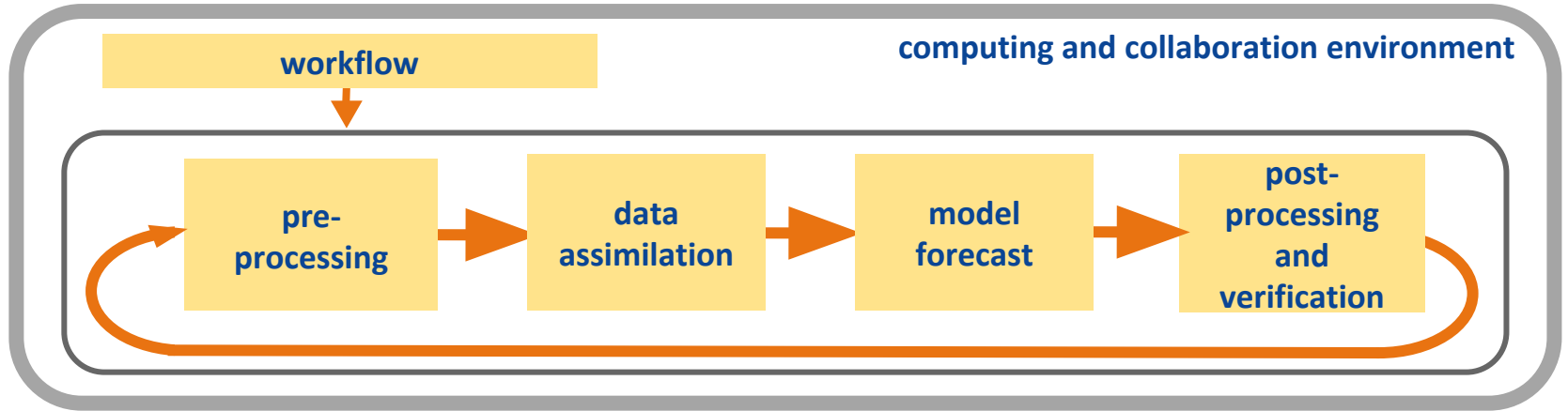
**UFS Community  
Research  
and Development**

Transition  
UFS Applications to  
Operations

Implementation of  
Operational Applications  
Based on UFS



# Parts of a UFS Application



Pre-processing and data assimilation

- Stages inputs, performs observation processing, and prepares an analysis

Model forecast

- Integrates the model or ensemble of models forward

Post-processing and verification

- Assesses skill and diagnoses deficiencies in the model by comparing to observations

Workflow






- Executes a specified sequence of jobs

Computing and collaboration environment

- May be different for research (experiment focus) and operations (forecast focus)
- Provides actual or virtualized hardware, databases, and support



# What does this mean for model data?

- 
- 
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- 
- EMC receives requests for operational model output
  - EMC must retain key datasets to evaluate upgrades and to serve the research community (e.g., [CFS Reanalysis](#))
  - Community-based development imposes limitations on reproducibility -> agreed-to metrics (“basket of metrics”)
  - Accepted metadata standards
  - Limitations on reproducibility from restricted data

# What does this mean for model data?

- Resolution catastrophe =>
  - In situ product generation
  - Subsampling for I/O => knowing product needs *a priori*
  - See previous comment on metrics!
- Obsolescing of computing environments limits reproducing simulations
  - Use of github should improve code provenance
- 5-year lifetime for NCEP model output on RDHPCS data archive
  - NCEP Production Suite archives ~1 petabyte/month
  - NCEP Development archives ~2.5 petabyte/month

# Takeaways....

- Access to model output is crucial for model improvement
  - The more eyes on it, the better
  - Community!
- Decisions are required regarding what to save, how frequently, and for how long
  - Constrained by resources and technology





# Thank you!

## Questions?

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# Sample Title Here

Here's some text for this presentation.



# R202R: Improving by Doing

- Use FV3-GFS release to increase community engagement, advance UFS plans (e.g. graduate student test), develop linkages across applications
- Use the two planned cycles of physics development and ongoing coupled system development to define and improve the R20 process

Atm Physics, Dynamics

Coupling

Data Assimilation

Initialization

Tools, Products

Candidate for Operations

Real-time, Quasi-operational testing

Implementation

NCEP

Yes

NCO\*

No

Who: UFS research community

Who: developers including EMC, customers, and NCO

*UFS – SC Informs Research Priorities to Program Offices*





# Outline

- Section One
- Section Two
- Section Three
- Section Four





# Section Title



