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Public Information Statement 22-34 Updated
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From: Vijay Tallapragada, Chief
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Subject: Updated: Soliciting Comments on the Proposed Upgrade of the GEFS-Aerosol Ensemble Member through July 31, 2022

Updated to add three new product fields to the current output files.

NOAA/NWS selected the Geophysical Fluid Dynamics Laboratory (GFDL) finite-volume cubed-sphere (FV3) dynamical core as the NWS's Next Generation Global Prediction System (NGGPS). The Environmental Modeling Center (EMC) is seeking comments on the proposed changes to the Global Ensemble Forecast System Aerosols (GEFS-Aerosols) ensemble member running within the GFSv15 through July 31, 2022. The aerosol component (chem) of GEFS v12 is the second control member of GEFS v12. It is configured at the horizontal resolution at about a 0.25 degree (25km) grid, runs four cycles per day. It updates to the latest version of National Aeronautics and Space Administration (NASA)/Earth Systems Research Laboratory (ESRL) Goddard Chemistry Aerosol Radiation and Transport (GOCART) aerosol model with the Atmospheric Research Laboratory (ARL) Fengsha dust emissions model. It uses the Global Biomass Burning Emissions Product extended (GBBEPx) directly on the FV3 grid and the sulfate anthropogenic emissions from the Community Emissions Database System (CEDS) base version.

The minor implementation of the GEFS-Aerosols to V12.3 includes the following upgrades and bug fixes:

- Fengsha dust parameterization bug fix.
- Update to anthropogenic emissions from CEDS-2014 to CEDS-2019 base year.
- Fix a bug in Unified Post Processor (UPP) Aerosol Optical Depth (AOD) calculation that resulted in overestimates of AOD.
- Adjust aerosol physics (aerosol large-scale precipitation and convective wet scavenging removal) to improve aerosol quality forecasts in the Operational GEFS-Aerosol version 12.
- Output dust PM10 (Particulate Matter of 10 micron or less size) at surface.
- Improvement in the GBBEPx smoke Organic Carbon emission process
- Transition to Weather and Climate Operational Supercomputing System 2 (WCOS2) Cray supercomputer.
- In addition to the above updates made to the single GEFS-Aerosol member, cloud ceiling (geopotential meters), surface visibility (meters), and

surface frozen precipitation fraction (percent) from all GEFS ensemble members are also added to the 0.25-degree atmospheric products for distribution through the NOAA Operational Model Archive and Distribution System (NOMDAS).

Results and supporting documents for these changes are found here:

<https://docs.google.com/presentation/d/1zfGXgzN11Zw5G8VhCiyNFk2HBK2TU34/edit#slide=id.pl>

https://docs.google.com/presentation/d/1Pex0jiA6UvQBbL_oaBADqPFhANA4vLSLer2ApabzHNY/edit#slide=id.pl

The proposed changes in model forecast output, post-processed fields and downstream products are as follows:

- Filenames will remain unchanged.
- Data volume will not increase significantly. Only four two-dimensional (2-D) fields, dust surface PM10, cloud ceiling, surface visibility and surface frozen precipitation fraction, will be added to gridded binary version two (grib2) file output. In preparation for the official release of the 4th quarter Fiscal Year (FY) 2022 GEFS-Aerosols version, NCEP-EMC is currently running a real-time parallel. Real-time output files of the predictions in grib2 format will be available at:

<http://para.nomads.ncep.noaa.gov>

The real-time data will be available at best effort and with variable timing output.

EMC is also conducting retrospective experiments covering all of 2021 for a comprehensive evaluation of this upgrade. Updated GEFS-Aerosols Evaluation web site of near real-time parallel graphics can be found at:

https://www.emc.ncep.noaa.gov/gc_wmb/parthab/WCOSS2_GEFSAero/html/fv3_aod.png.html

A detailed summary of retrospective results is found in the presentation below:

https://docs.google.com/presentation/d/1knaOdptV0D3r0KEv56KMpan3B_0_4f4Iz5H9czJTULc/edit#slide=id.g120a8b8d1af_2_167

Send any comments on the science aspects of this upgrade to:

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The NWS will evaluate all comments to determine whether to proceed with this upgrade. If approved, a Service Change Notice (SCN) will be issued giving a minimum of 30 days' notice of the implementation date.

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<https://www.weather.gov/notification/>

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