Effective on or about October 19, 2022, beginning with the 1200 Coordinated Universal Time (UTC) run, the NCEP Global Ensemble Forecast System (GEFS)-Aerosols will be updated from Version 12.2.0 to Version 12.3.1.

A. Updates and fixes to model code and underlying science

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
- Improvement in the GBBEPx smoke Organic Carbon emission process

EMC conducted retrospective experiments covering the whole of 2021 for a comprehensive evaluation of this upgrade.

GFS-Aerosols v12.3 showed improved forecast skills in the following areas:
- Reduced GEFS-Aerosols AOD bias against MODIS and MERRA2
- Reduced GEFS-Aerosols AOD RMSE against AERONET stations over N. America and biomass burning areas

In preparation for the official release of the Q4FY22 GEFS-Aerosols version, NCEP-EMC is currently running a real-time parallel. https://www.emc.ncep.noaa.gov/gc_wmb/parthab/WCOSS2_GEFSAero/html/fv3_aod.png.html#picture

B. Changes to output on NCEP web services

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

1) Version number will change on NCEP web services from v12.2 to v12.3


NOTE: The ftpprd links only work for FTP-enabled web browsers

During the 30-day test, “para” is a link to the v12.3 directory. When v12.3 is officially implemented, the “prod” link will change to point to v12.3, and v12.2 will be removed from all NCEP web services.

2) Addition of variables to the 0.25deg atmospheric products for all GEFS members under gefs.$PDY/$CYC/atmos/

New variables are:
- CPOFP(surface frozen precipitation fraction, precent)
- VIS (surface visibility, meters)
- HGT (cloud ceiling, geopotential meters)

Changed files are:
pgrb2sp25/ge${mem}.t${CYC}z.pgrb2s.0p25.f${hhh}
Where:
${mem}=ensemble member/product; e.g. avg (mean); spr (spread); c00 (control); p01; p02; ...; p30
${CYC}=Cycle of the day; e.g. 00/06/12/18 UTC
${hhh}=forecast hour; e.g. 000; 003; 006; ...; 240

3) Addition of a new variable to data under gefs.$PDY/$CYC/chem/

New variable is:
- PMTC (dust surface PM10)

Changed files are:
pgrb2ap25/gefs.chem.t${CYC}z.a2d_0p25.f${hhh}.grib2
Where:
${CYC}=Cycle of the day; e.g. 00/06/12/18 UTC
${hhh}=forecast hour; e.g. 000; 003; 006; ...; 240
C. New products on NOAAPort

This upgrade will add a subset of GEFSv12 data with WMO headers for Hydrologic Ensemble Forecasting System (HEFS) ensemble river forecasting operations.

The new variables are:
- APCP[QPF]: total precipitation [kg/m^2] ensemble mean
- TMAX:2m: maximum temperature [K] ensemble mean at 2 meters above the ground
- TMIN:2m: minimum temperature [K] ensemble mean at 2 meters above the ground

The list of new WMO headers can be found here: https://www.nco.ncep.noaa.gov/pmb/changes/new_headers_gefs_v12.3.pdf

Disclaimer: NCEP encourages all users to ensure their decoders are flexible and are able to adequately handle changes in content order, parameter fields changing order, changes in the scaling factor component within the Product Definition Section (PDS) of the GRIB files, and also any volume changes which may be forthcoming. These elements may change with future NCEP model implementations. NCEP will make every attempt to alert users to these changes prior to any implementation.

Any questions, comments, or requests regarding this implementation should be directed to the contacts below. We will review any feedback and decide whether to proceed.

For questions regarding these changes, please contact:
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National Service Change Notices are online at:
https://www.weather.gov/notification/

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