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Service Change Notice 22-90
National Weather Service Headquarters Silver Spring MD
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To: Subscribers:
           -NOAA Weather Wire Service
           -Emergency Managers Weather Information Network
           -NOAAPort
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From: Michael Farrar, Director
           National Centers for Environmental Prediction

Subject: Announcement of Upgrade of the Global Ensemble Forecast System
(GEFS) Aerosols member (GEFS-Aerosols): Effective October 19, 2022

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.

The aerosol component (chem) of GEFS v12 is the 2nd control member of
GEFS v12. It is configured at the horizontal resolution of about 0.25
degree (25km) grid, and runs 4 cycles per day. The aerosol component is
updated to the latest version of NASA/ESRL GOCART aerosol model with the
ARL Fengsha dust emissions model. It uses the Global Biomass Burning
Emissions Product extended (GBBEPx) directly on the FV3 cubed sphere C384
grid and sulfate anthropogenic emissions from the Community Emissions
Database System (CEDS) base version.

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.

The Environmental Modeling Center (EMC) conducted retrospective
experiments covering the whole of 2021 for a comprehensive evaluation of
this upgrade.

GFFS-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 North America and biomass burning areas.

In preparation for the official release of the fourth quarter fiscal year (Q4FY) 2022 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.

Real-time output will be available during the 30 day test:

https://nomads.ncep.noaa.gov/pub/data/nccf/com/gens/para
ftp://ftpprd.ncep.noaa.gov/data/nccf/com/gens/para
https://nomads.ncep.noaa.gov/pub/data/nccf/com/gens/v12.3
ftp://ftpprd.ncep.noaa.gov/data/nccf/com/gens/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, percent)
- 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 World Meteorological
Organization (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 gridded binary (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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For questions regarding the dataflow aspects, please contact:

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National Service Change Notices are online at:

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

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