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| **WORLD METEOROLOGICAL ORGANIZATION**  COMMISSION FOR BASIC SYSTEMS OPAG on DPFS  **MEETING OF THE CBS (DPFS) EXPERT TEAM ON OPERATIONAL WEATHER AND FORECASTING PROCESS AND SUPPORT (OWFPS)**  BEIJING, CHINA 12-16 MARCH 2018 |  | DPFS/ET-OWFPS/Doc. 7.1(4)  (25.I.2018)  \_\_\_\_\_\_\_  Agenda item: 7.1  ENGLISH ONLY |

**NCEP Global Forecast System**

*(Submitted by Yuejian Zhu)*

##### Summary and purpose of document

This document provides updates for NCEP Global Forecast System (GFS) to service public includes products, data access, and future plans.

##### Action Proposed

The meeting is invited to note the information in the document

**Annex(es):** - N/A

**Next Global Forecast System (GFS)**

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**Highlight of GFS upgrade ( 2019)**

The National Weather Service (NWS) of the United States (US) is in transition of the Global Forecast System (GFS) from current operational Global Spectral Model (GSM) dynamics to **Finite-Volume Cubed-Sphere Dynamical Core**(FV3: <https://www.gfdl.noaa.gov/fv3/> ) through the Next Generation Global Prediction System (NGGPS) project toward the Unified Forecast Systems in **the NOAA Environmental Modeling System** (NEMS) framework. As such, the new system is referred to as **FV3-GFS**. Currently, FV3-GFS (beta version) is run in a real-time parallel for user evaluation before it is implemented for NCEP operation which is expected to happen in early 2019.

The implementation of the FV3 dynamical core into the NOAA environmental modeling system (NEMS) infrastructure also provides 1) updates to the global data assimilation system to exchange information between the forecast model on the cubic-sphere grids and data assimilation on Gaussian lat-lon grids and, 2) a new workflow system for both research and operation. The GFS beta version has a horizontal resolution of 13 km, and has 64 levels in the vertical extending up to 0.2 hPa. It uses the same physics package as the current operational GFS except for 1) the replacement of Zhao-Carr microphysics with the more advanced GFDL microphysics, 2) an updated parameterization of ozone photochemistry with additional production and loss terms, 3) a newly introduced parameterization of middle atmospheric water vapor photochemistry and, 4) a revised bare soil evaporation scheme. A further updated version of the GFS with FV3 dynamical core is scheduled to be implemented into operation in 2019 to replace the current operational global spectral model. It will have a finer horizontal resolution and more layers in the vertical extending up to the mesopause. It will also employ more advanced physics parameterizations such as an unified orographic and convective gravity-wave drag scheme, further improved land surface and PBL schemes, and new shallow and deep convection schemes etc.

The data assimilation system will be updated to include IASI moisture channels; ATMS all-sky radiances; a fix for an issue with the Near Sea Surface Temperature (NSST) in the Florida Strait; an upgrade to the use of CrIS radiances; addition of NOAA-20 CrIS and ATMS data (will not be used until available on NESDIS operational server - expected in February 2018); addition of Megha-Tropiques Saphir data; addition of ASCAT data from MetOp-B; and several additional minor changes. The ensemble part of the hybrid data assimilation will also increase in resolution from 35 km to 25 km.

There are changes in model forecast output, post-processed fields and downstream products. More cloud hydrometers predicted by the advanced microphysics scheme will be included in the products. Radar reflectivity derived using these new cloud hydrometers will also be added to GFS products. In addition, the height, pressure, and vertical velocity will be non-hydrostatic computed in model instead of being derived hydrostatically in Unified Post Processor.

Once implemented, FV3-GFS forecast data will be made available for the public through NCEP ftp site (<ftp://ftpprd.ncep.noaa.gov/pub/data/nccf/com/> ) and NOMADS (<http://nomads.ncep.noaa.gov/> ). A detailed description of GFS data products can be found at <http://www.nco.ncep.noaa.gov/pmb/products/>. The latest WMO’s GDPFS NWP progress report contains the documentation of NCEP NWP systems.