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Service Change Notice 17-83 Updated
National Weather Service Headquarters Silver Spring MD
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From: Dave Myrick
 NWS Office of Science and Technology Integration

Subject: Updated: Implementation of the New Hurricanes in a Multi-scale Ocean-coupled Non-hydrostatic (HMON) Model Version 1.0.0: Effective August 15, 2017 and Request for Comments

Updated to change implementation date from August 1, 2017, to August 15, 2017.

Effective on or about Tuesday, August 15, 2017, beginning with the 1200 Coordinated Universal Time (UTC) run, the National Centers for Environmental Prediction (NCEP) will implement the HMON coupled modeling system.

This version, HMON v1.0.0, is the first version for the system. The release has been fully tested and compared with the discontinued Geophysical Fluid Dynamics Laboratory (GFDL) Hurricane Model (GHM) results. It has shown significant skill improvements in terms of storm track and intensity forecasts in Northern Atlantic (NATL) Basin, Eastern Pacific Basin (EPAC) and the Central Pacific (CPAC) Basin. HMON also provides a first step for the NCEP Environmental Modeling Center's (EMC's) efforts towards unification of operational models within the NOAA Environmental Modeling System (NEMS) framework.

Model Description:

The scientific and technique details are as follows:

- The dynamical core is a Non-hydrostatic Multi-scale Model on a B grid (NMMB).
- There are 43 vertical levels, where the model top is at 50 hPa.
- It includes vortex relocation, but has no data assimilation.
- Two-way Coupling is with Ocean Model (HYCOM) for EPAC and CPAC basins; uncoupled for NATL basin.

The HMON system will provide improved track forecasts in NATL, EPAC and CPAC basins. HMON also will provide improved intensity forecasts for NATL, EPAC and CPAC basins. The coupled HMON system will provide additional ocean products compared with the GFDL Hurricane Model (GHM).

This model is considered the replacement for the GHM. Due to differences in underlying physics, two variables present in the GHM gridded binary (GRIB) output will not be produced by HMON, and some others are being replaced by similar but not identical output. These differences are detailed in the Model Output section. For more information on the removal of the GFDL model, please see the following notices:

<https://www.weather.gov/media/notification/pdfs/pns17-07gfdl.pdf>
https://www.weather.gov/media/notification/pdfs/scn17-45discontinue_gdflaaa.pdf

The 2017 HMON system has been fully tested and compared with the forecast results with 2016 operational GHM. HMON has shown significant skill improvement in intensity and track forecasts in NATL, EPAC and CPAC basins. A PowerPoint presentation explaining the new HMON model and comparing its results to GHM can be found here:

http://www.emc.ncep.noaa.gov/gc_wmb/vxt/LinZhu/HMON_stats/FY17_HMON_OD_brief_042817.pptx

Model Output Information:

HMON output will be available beginning Aug 1, 2017, on the following NCEP web services:

<http://nomads.ncep.noaa.gov/pub/data/nccf/com/hur/prod/>
<http://www.ftp.ncep.noaa.gov/data/nccf/com/hur/prod/>
<ftp://ftp.ncep.noaa.gov/pub/data/nccf/com/hur/prod/>

Parallel data will be available beginning June 28, 2017 on a storm by storm basis here:

<http://para.nomads.ncep.noaa.gov/pub/data/nccf/com/hur/para/>

The directory structure will be:

hmon.YYYYMMDD

Where YYYY is year, MM is month, and DD is day.

HMON GRIB files will be available for the following domain resolutions:

domain 01 = 75 degree x 75 degree grid, resolution 0.20 degree

NAMEID.YYYYMMDDCC.hmonprs.d1.0p20.fFFF.grb2

Where NAMEID is storm name and storm identification number. CC is cycle output (00z, 06z, 12z, 18z). FFF is forecast hour valid from 000-126 at 3-hourly intervals.

d02 = 12 degree x 12 degree grid, resolution 0.06 degree

NAMEID.YYYYMMDDCC.hmonprs.d2.0p06.fFFF.grb2

Where NAMEID is storm name and storm identification number. CC is cycle output (00z, 06z, 12z, 18z). FFF is forecast hour valid from 000-126 at 3-hourly intervals.

d03 = 8 degree x 8 degree, resolution 0.02 degree

NAMEID.YYYYMMDDCC.hmonprs.d3.0p02.fFFF.grb2

Where NAMEID is storm name and storm identification number. CC is cycle output (00z, 06z, 12z, 18z). FFF is forecast hour valid from 000-126 at 3-hourly intervals.

Note: As stated above, HMON grib2 output will have most of the same variables currently present in GFDL/GHM with these differences:

- Missing with no replacement due to differences in underlying model physics
- Graupel [kg/kg]
- Temperature Tendency by All Physics [K/s]

Replaced:

- Geometric Height [m] - Replaced by Geopotential Height
- Ice Water Mixing Ratio [kg/kg] - Replaced by Cloud Ice
- U Component of Hourly Maximum 10m Wind Speed [m/s] - Replaced by max wind U-Component of wind, saved in the grib output as "max wind" level for U-wind
- V Component of Hourly Maximum 10m Wind Speed [m/s] - Replaced by max wind V-Component of wind, saved in the grib output as "max wind" level for V-wind
- Humidity Mixing Ratio [kg/kg] - Replaced by specific humidity

Track file in atcf format NAMEID.YYYYMMDDCC.trak.hmon.atcfunix
Where NAMEID is the storm name and identification, CC is the cycle.

Swath text files at 0.03 degree resolution NAMEID.YYYYMMDDCC.precip.asci
file maximum 10m wind: NAMEID.YYYYMMDDCC.sfcwind.asci

Intensity & track text files:

afos format: NAMEID.YYYYMMDDCC.afos
variables: hour, latitude, longitude, heading/speed
stats format: NAMEID.YYYYMMDDCC.stats.tpc
variables: hour, latitude, longitude, minimum surface pressure, maximum surface wind
stats short format: NAMEID.YYYYMMDDCC.grib.stats.short
variables: hour, longitude, latitude, minimum surface pressure, maximum surface wind

More details about the HMON system are available at:

http://www.emc.ncep.noaa.gov/gc_wmb/vxt/HMON/index.php

NCEP encourages users to ensure their decoders are flexible and are able to adequately handle changes in content order, changes in the scaling factor component within the product definition section (PDS) of the GRIB files, and 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 implementations.

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 model changes, please contact:

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For questions regarding the data flow aspects of these data sets, please contact:

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National Service Change Notices are online at:

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

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