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PNSWSH

Technical Implementation Notice 14-16, Amended
National Weather Service Headquarters Washington DC
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From: Timothy McClung
Science Plans Branch Chief
Office of Science and Technology

Subject: Amended: Upgrade to HIRES Window:
Effective June 11, 2014

Notice is amended to change implementation date to Wednesday June 11, 2014.

Effective Wednesday, June 11, 2014, beginning with the 1200 Coordinated Universal Time (UTC) run, the National Centers for Environmental Prediction (NCEP) will upgrade the High-Resolution Window Forecast System (HIRESW). The upgrade includes:

-Changes to the model components
-Increases in horizontal and vertical resolution
-Changes in parameterized physics
-Merging of West and East domains into a single CONUS domain
-Additional runs for Alaska and western CONUS
-Additional gridded output on NDFD 2.5 to 3.0 km grids
-New product fields

Model Changes:

The HIRESW model will be updated from Weather Research and Forecasting (WRF) version 3.2 code to WRF Version 3.5 code for the Advanced Research WRF (ARW) member. The WRF Nonhydrostatic Mesoscale Model (NMM) member will be replaced by the Nonhydrostatic Multiscale Model on B-grid (NMMB).

Domain and Schedule Changes:

The model will discontinue the West and East domains and replaced by a single CONUS domain. As a result, the run schedule of the domains will be revised as follows:

00 UTC: CONUS, Hawaii, Guam
06 UTC: Alaska, Puerto Rico

12 UTC: CONUS, Hawaii, Guam
18 UTC: Alaska, Puerto Rico

This change provides Alaska and the western portion of CONUS with twice daily runs whereas, instead of one HIRESW run per day.

Resolution Changes:

The WRF-ARW model horizontal resolution will increase from 5.15 km to:

CONUS: 4.2 km
Alaska: 3.5 km
Hawaii, Guam, and Puerto Rico: 3.8 km

The WRF-NMM model horizontal resolution of 4.0 km will increase in the NMMB model to:

CONUS: 3.6 km
Alaska: 3.0 km
Hawaii, Guam, and Puerto Rico: 3.0 km

The number of vertical levels will increase from 35 to 40 in both the new WRF-ARW and NMMB systems.

Physics Changes:

- WRF-ARW will change from use of WRF Single Moment 3-Class (WSM3) microphysics to WRF Single Moment 6-Class (WSM6) microphysics
- Geophysical Fluid Dynamics Laboratory (GFDL) radiation used with WRF-NMM will be replaced by the Rapid Radiative Transfer Model (RRTM) for NMMB
-NMMB model run will use Betts-Miller-Janjic (BMJ) parameterized convection for the Guam and Puerto Rico domains only.

Initialization Changes:

- The new CONUS domain interpolates an initial condition from the Rapid Refresh (RAP) model, with boundary conditions generated from the Global Forecast System (GFS) model. The current West and East domains are initialized using North American Mesoscale (NAM) model conditions for initial and lateral boundary conditions.
- The Puerto Rico and Hawaii domains will switch from using NAM model conditions for initial and lateral boundaries to GFS conditions for both. The Guam and Alaska domains retain their use of GFS conditions.
- All NMMB runs, except for the Guam domain, replace their initial surface/soil fields with land states from the NAM.

Output Product Changes:

The current HIRESW produces output on 5 km grids for East CONUS, west CONUS, Alaska, Hawaii, Puerto Rico and Guam. These products will continue, although the East and West grids will only be distributed on NOAAPORT. The grid will no longer be available on the NCEP or NWS ftp servers.

The filenames of the existing 5 km output files will be changing. The ".tm00" appendix is dropped and an "f" is added before the forecast hour:

akarw.t18z.awpreg24.tm00.grib2 -greater than symbol akarw.t18z.awpregf24.grib2

The model descriptor "nmm" is replaced with "nmmb":

hinmm.t12z.awpreg24.tm00.grib2 -greater than symbol hinmmb.t12z.awpregf24.grib2

All domains will gain new grids of select surface fields interpolated to the higher-resolution NDFD grids (3 km for Alaska, 2.5 km for CONUS, HI, PR and Guam). Output on NDFD grids will include directly interpolated information, and information that has been processed through smartinit downscaling. Output files will have names in this format:

akarw.t06z.smartakf24.grib2
guamnmmb.t12z.smartguamf24.grib2

Three new gridded output fields will become available on all output grids, both 5km grids and NDFD grids:

-Vertically Integrated Liquid (VIL)
-Haines Index
-Surface Wind Gust

Supplementing the fine-scale NDFD grids, new output files for the CONUS will provide full-domain coverage in horizontal and vertical (see list of isobaric levels below) on the 5 km grid 227 with a filename of the form:

conusnmmb.t00z.awp5kmf24.grib2

Additional isobaric level output will be generated for the 5 km non-NDFD output grids for all domains:

Geopotential height, temperature, relative humidity, dew point temperature, and u- and v-wind components will be added at 350, 450, 525, 550, 575, 600, 625, 650, 675, 725, 750, 775, 800, 825, 875, 900, 950, and 975 hPa.

Vertical velocity will be added at 350, 450, 525, 550, 575, 625, 650, 675, 725, 750, 775, 800, 825, 875, 900, 950, and 975 hPa.

New cloud field output will be generated for the 5km non-NDFD output grids for all domains.

-Low, middle, and high cloud fractions
-Total column cloud condensate
-Total column cloud water
-Total column cloud ice
-Total column cloud rain
-Total column cloud snow

Changes to BUFR products:

The list of stations for which BUFR output is produced will be changed with this upgrade. The changes are outlined at:

www.emc.ncep.noaa.gov/mmb/mpyle/hiresw_tin/bufr_station_changes.txt

Data Availability and Schedule Changes:

As a result of the schedule changes mentioned above, areas covered by the current West domain output grid will get that output for the 00 UTC and 12 UTC cycles rather than the current 06 UTC cycle. Alaskan domain output will become available for the 06 UTC cycle to supplement the current 18 UTC cycle. On NOAAPORT, the delivery schedule will be as follows, with the East/West grids provided in lieu of the new full CONUS grid:

00 UTC: East CONUS, West CONUS, Hawaii, Guam
06 UTC: Alaska, Puerto Rico
12 UTC: East CONUS, West CONUS, Hawaii, Guam
18 UTC: Alaska, Puerto Rico

During the 2014 hurricane season, NCEP is not planning to reinstate the preemption of HIRESW runs, but in subsequent years NCEP may need to resume preemption based on resources in the NCEP Production Suite.

The HIRESW data is currently available on the NWS FTP server, the NCEP server, NOMADS and on NOAAPORT.

Product delivery timing of the current HIRESW GRIB2 products on the ftp servers and NOMADS is not expected to change as a result of this implementation. New downscaled output from CONUS and AK domains will be available as much as 30 minutes later than other gridded output. For the products available on NOAAPORT, the HIRESW output will now be disseminated as the model is running, rather than all at once at the end of the model run as it is today. The last forecast hours will still arrive at the same time, but the earlier forecast hours will come out earlier than today, and come out gradually as the model runs.

More information regarding the current operational HIRESW and associated products can be found at:

http://www.emc.ncep.noaa.gov/mmb/mmbpll/nestpage_4km/

A consistent parallel feed of data will become available on the NCEP server once the model is running in parallel on the NCEP Weather and Climate Operational Supercomputing System (WCOSS) by early-April. The parallel data will be available via the following URLs:

http://www.ftp.ncep.noaa.gov/data/nccf/com/hiresw/para

ftp://ftp.ncep.noaa.gov/pub/data/nccf/com/hiresw/para

NCEP encourages all 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 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 implementations.

For questions regarding these changes, please contact:

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

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NWS National Technical Implementation Notices are online at:

http://www.weather.gov/os/notif.htm

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