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PNSWSH

Technical Implementation Notice 16-41 Updated
National Weather Service Headquarters Silver Spring MD
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To: Subscribers:
-NOAA Weather Wire Service
-Emergency Managers Weather Information Network
-NOAAPort
Other NWS Partners, Users and Employees

From: Dave Myrick
NWS Office of Science and Technology Integration

Subject: Updated: Upgrade to the North American Mesoscale (NAM) Forecast System and Discontinuation of Downscaled GFS by NAM Extension (DGEX) Forecast System: Effective March 21, 2017

Updated to change the implementation date from March 15, 2017, to March 21, 2017 due to critical weather declaration.

Effective on or about March 21, 2017 beginning with the 1200 Coordinated Universal Time (UTC) run, the National Centers for Environmental Prediction (NCEP) is proposing to implement Version 4 of North American Mesoscale (NAM) and discontinue the Downscaled GFS by NAM Extension (DGEX) Forecast System.

Discontinue all DGEX model output
Remove legacy NAM products on NOAAPORT and NCEP/NWS servers
Make resolution changes for NAM nests
Implement major changes to NAM Data Assimilation System (NDAS)
Implement model changes: convection, microphysics, land- surface upgrades; frequency of physics calls increased

FORECAST MODEL CHANGES

Resolution changes to the CONUS (from 4 to 3 km), Alaska (from 6 to 3 km), and CONUS fire weather (from 1.333 to 1.5 km) nests.

More frequent calls of physics (now every 2nd time step for all domains); change frequency of radiation updates for the NAM 12 km parent domain from hourly to every 20 minutes.

Advect specific humidity every dynamics time step.

Changes to Betts-Miller-Janjic convective scheme to improve 12 km parent QPF bias, especially during the cool season.

Updated Ferrier-Aligo microphysics to improve stratiform precipitation, better anvil reflectivity, reduce areas of light/noisy reflectivity over oceans.

Improved effect of frozen soil on transpiration and soil evaporation, leads to reduced cold/moist bias during cool season.

Radiation/microphysics changes to reduce incoming surface shortwave radiation; reduced warm-season 2-m temperature bias.

DATA ASSIMILATION / ANALYSIS CHANGES

Replace 12-h NAM Data Assimilation System (NDAS) with 3-h analysis updates for the 12 km parent domain with a 6-h data assimilation cycle with hourly analysis updates for the 12 km parent and the 3 km CONUS/Alaska nests. The Hawaii/Puerto Rico/Fire weather nests will be initialized from the 12-km first guess at the end of 6-h assimilation cycle.

Use of lightning data (from NLDN and ENL networks) and radar reflectivity-derived temperature tendencies in the diabatic digital filter initialization.

Add execution of the diabatic digital filter initialization prior to the NAM forecast (was only run during NDAS in current ops NAM version 3).

Assimilate new observation types:
- Aircraft data: Aeromexico, ADS-C, Air-Wisconsin
- New satellite radiance data: NOAA NPP (ATMS, CRIS), METEOSAT-10 SEVIRI, DMSP-F17 SSMIS; METOP-B AMSUA, MHS, IASI New GPS Radio Occultation data: METOP-B 3 (subtype) New satellite winds: Himawari-B, METEOSAT-7, 10 Imager WV AMV, NOAA-15, 18, 19 AVHRR IR AMV, METOP-A, B AVHRR AMV

OTHER SCIENCE CHANGES

Reinstate use of 557th Weather Wing (formerly AFWA) 23 km snow depth analysis using envelope adjustment.

Use a new climatology of fresh water lake temperatures (FLAKE) for inland water bodies not resolved by the 1/12th degree RTG_SST_HR analysis in the CONUS, Alaska, and fire weather

nests.

Reduce terrain smoothing in all NAM nest domains.

Use NESDIS burned area data (30-day and 2-day average) in the fire weather nest; greenness fraction and albedo are adjusted based on the 30-day average, top-layer soil moisture based on the 2-day average.

Perform tropical cyclone relocation for the 12 km parent domain at the start of the 6-h catchup cycle and for the NAM forecast first guess.

OUTPUT CHANGES TO WEB SERVICES

Files below can be found on the following NCEP services:
nomads.ncep.noaa.gov/pub/data/nccf/com/nam
www.ftp.ncep.noaa.gov/data/nccf/com/nam
ftp://ftp.ncep.noaa.gov/pub/data/nccf/com/nam

The output grid for nests will change:
CONUS nest: change from grid #227 to the same output grid as the HRRR (see link below for difference)
http://www.emc.ncep.noaa.gov/mmb/namgrids/conusoutgrid.jpg

nam.tCCz.conusnest.hiresfFF.tm00.grib2
Where CC is cycle and FF is forecast hour 00-60
Alaska nest: change from the 6 km NDFD grid to the 3 km NDFD grid
nam.tCCz.alaskanest.hiresfFF.tm00.grib2

All NAM nests grids will be output hourly from 0-60 hour; in the current ops NAMv3 they were output hourly from 0-36h and 3-h from 39-60 hour.

Added 1-h maximum precipitation rate (PRATE) and frozen precipitation rate (SRWEQ) to the following grids:
nam.tCCz.awip32FF.tm00.grib2 nam.tCCz.awip12FF.tm00.grib2
nam.tCCz.awak3dFF.tm00.grib2 nam.tCCz.##nest.hiresfFF.tm00.grib2
Where CC is cycle and FF is forecast hour and ## is either:
alaska, conus, prico, hawaii, firewx

Add a new visibility field based on the GSD algorithm to the following output grids (this field is labeled with vertical level=cloud top (VIS)
nam.tCCz.awip3dFF.tm00.grib2 nam.tCCz.awipakFF.tm00.grib2
nam.tCCz.awip12FF.tm00.grib2 nam.tCCz.awphysFF.tm00.grib2

nam.tCCz.awip32FF.tm00.grib2 nam.tCCz.awak3dFF.tm00.grib2
nam.tCCz.awiphiFF.tm00.grib2
nam.tCCz.(alaska|conus|prico|hawaii|firewx)nest.hiresfFF.tm00.gr
ib2
Where CC is the cycle time and FF is the forecast hour

Ceiling height (HGT) in the NAMv4 is changed from height above ground level to height above mean sea level for all output files

The NAM 12km CONUS grid #218 file will be renamed
nam.tCCz.awphysFF.grb2.tm00 -> nam.tCCz.awphysFF.tm00.grib2

The 0.108 deg lat/lon Caribbean grid will be renamed
nam.tCCz.afwacaFF.grb2.tm00 -> nam.tCCz.afwacaFF.tm00.grib2

The 0.108 deg lat/lon Hawaii grid will be renamed
nam.tCCz.afwahiFF.grb2.tm00 -> nam.tCCz.afwahiFF.tm00.grib2

The current NAM 12km Alaska grid #242 file contains both surface and upper level data. In NAMv4 it is being renamed and will contain mostly pressure level data:
nam.tCCz.awak3dFF.grb2.tm00 -> nam.tCCz.awak3dFF.tm00.grib2

A second grid #242 file called is being added to the server, this contains mostly surface fields that will not be in the new awak3d file:
nam.tCCz.awp242FF.tm00.grib2

The GRIB2 labeling for 0-6 km integrated vertical u- and v-components of the wind shear is changing from "6000-0 m above ground" to "0-6000 m above ground"), this field is output in the following grids:
nam.tCCz.awak3dFF.tm00.grib2 nam.tCCz.awip3dFF.tm00.grib2
nam.tCCz.awipakFF.tm00.grib2 nam.tCCz.awphysFF.tm00.grib2
nam.tCCz.(alaska|conus|prico|hawaii|firewx)nest.hiresfFF.tm00.gr
ib2

The GRIB2 sigma value label for 0.33-0.67 sigma RH and 0.67-1.00 sigma RH will change to 0.33-0.66 sigma RH and 0.66-1.00 sigma RH in the following grids: nam.tCCz.awipakFF.tm00.grib2
nam.tCCz.grbgrdFF.tm00.grib2

The GRIB2 sigma level label for 0.7848 sigma temperature and 0.8967 sigma temperature will change to 0.78483 sigma temperature and 0.89671 sigma temperature for the following grids:
nam.tCCz.awip32FF.tm00.grib2 nam.tCCz.awipakFF.tm00.grib2

nam.tCCz.grbgrdFF.tm00.grib2

With the NAM Alaska nest horizontal grid resolution changing from 6 km to 3 km, it will no longer run with convective parameterization. Therefore, the following convective-type fields will no longer be output for the Alaska nest: Accumulated convective precipitation; Convective precipitation rate; Convective cloud top/bottom pressure; Deep convective cloud top/bottom pressure; Shallow convective cloud top/bottom pressure; Total convective cloud cover; Deep convective heating rate

The total snow water equivalent on the ground will be added to the file:
nam.tCCz.awip20FF.tm00.grib2

The GRIB2 processing for the NAM nests has been streamlined so that all 6 NAM nests will output the same variables. Thus, the following fields that are now only available from the NAM CONUS nest will also be output from the Alaska, Hawaii, Puerto Rico, and Fire weather nests:

- 80 meter above ground pressure, specific humidity, temperature, and wind.
- 0-6 km integrated vertical u- and v-components of the wind shear.
- Vertically-integrated liquid water.

As part of the streamlining of the GRIB2 processing for the NAM nests, the following variables will be removed from the output grid for the NAM Fire Weather nest:

- Dew point temperature on pressure levels except for 300, 400, 500, 700, 850, 925, and 1000 mb.
- Dew point temperature at the 1st and 2nd model levels above ground.
- Absolute vorticity at 200 and 300 mb levels.
- Vertical velocity, relative humidity, and specific humidity at 2, 5, 7, 70 mb levels.
- Turbulent kinetic energy at 2, 5, 7, 10, 20 mb levels.
- Cloud ice, cloud water, rain, and snow mixing ratio and rime factor at 2, 5, 10, 20, 70 mb levels, and on the 2nd model level above ground.
- Grid-point latitude and longitude PBL Regime.
- 1-h average non-convective cloud cover.
- Equivalent radar reflectivity factor for snow and rain 1-h average total cloud cover.

- Height, pressure, temperature, and reflectivity on the 2nd model level above ground.

NAMv4 output files on the NCEP/NWS web servers will be written as GRIB2 format from the post-processing, instead of first being written out in GRIB1 format and converted to GRIB2. The GRIB2 compression type for each NAM domain will be as follows:

JPEG2000: Hawaii, Puerto Rico and Fire Weather nests Complex packing with 2nd order spatial differencing: CONUS nest, Alaska nest and all output from 12km NAM parent domain.

Variables in those grids created with GRIB2 complex compression may occasionally contain invalid negative numbers.

Users may see some differences with the encoding and are encouraged to upgrade their software to handle this. Please see the links below for upgraded code:
http://www.nco.ncep.noaa.gov/pmb/codes/GRIB2
http://www.cpc.ncep.noaa.gov/products/wesley/wgrib2
ftp://ftp.cpc.ncep.noaa.gov/wd51we/wgrib

The number of days archived on the NCEP web services will be changed from 28 days to 7 days.

Based on feedback from PNS 16-43, remove NAM-driven Great Lakes Wave (GLW) model, on this date, the following products will be removed from /com/wave/prod/glw.YYYYMMDD/: glw.tCCz.spec_tar.gz glw.grlc_2p5km.tCCz.grib2 glw.wstp.grlc_2p5km.tCCz.grib2

Several bulletins provided within glw.tCCz.bull_tar
Several bulletins provided within glw.tCCz.cbull_tar
Several bulletins provided within glw.tCCz.csbull_tar
Several bulletins provided within directory bulls.tCCz
Where CC is cycle at 00, 06, 12 and 18Z

PRODUCT REMOVALS FROM WEB SERVICES

NCEP solicited public feedback through the PNS 16-34 NAM Removals, after balancing user comments with the code management of the production suite the following changes will be made:
https://www.weather.gov/media/notification/pdfs/pns16-34nam_removalaaa.pdf

Files below can be found on the following NCEP servers via
nomads.ncep.noaa.gov/pub/data/nccf/com/nam
www.ftp.ncep.noaa.gov/data/nccf/com/nam

ftp://ftp.ncep.noaa.gov/pub/data/nccf/com/nam Or NWS servers via
http://tgftp.nws.noaa.gov/SL.us008001/ST.opnl/MT.nam_CY.CC
ftp://tgftp.nws.noaa.gov/SL.us008001/ST.opnl/MT.nam_CY.CC

NAM Products listed will be discontinued from all NCEP web services
nam.tCCz.awip12FF.tm00.10m.uv.grib2
nam.tCCz.awp217FF.tm00_icwf.grib2
nam.tCCz.awipakFF.tm00_icwf.grib2
nam.tCCz.awip218tiles_fFF.grib2.tar.gz
nam.tCCz.awip32tiles_fFF.grib2.tar.gz tiles.tCCz directory

NOTE: Users who wish to obtain a subset of NAM grids can generate then directly using the grid sub setting option on the NCEP NOMADS server at http://nomads.ncep.noaa.gov (click on "grib filter" option)
nam.tCCz.grb5fmFF.tm00.grib2 nam.tCCz.grb_fmFF.tm00.grib2
NOTE: Users can replace these with the 90 km North American polar stereographic grid #104: nam.tCCz.grbgrdFF.tm00.grib2
nam.tCCz.smartconusFF.tm00.grib2 nam.tCCz.smartakFF.tm00.grib2

NOTE: Users should instead be using the higher resolution 2.5/3km NAM DNG products

The following will be removed from the NWS servers and can instead by found on the NCEP servers fh.00FF_tl.press_gr.awp218
fh.00FF_pa.sw10m_tl.press_gr.awip12 fh.00FF_tl.press_gr.awip20
fh.00FF_tl.press_gr.awip3d fh.00FF_tl.press_gr.awp211
fh.00FF_tl.press_gr.awip12 fh.00FF_tl.press_gr.awipak
fh.00FF_tl.press_gr.grbgrd fh.00FF_tl.press_gr.icwf20
fh.00FF_tl.press_gr.icwf3d

NOTE: Users can access these exact data sets on the NCEP servers as direct grib output or by using NOMADS grib filter and are encouraged to transition to the NCEP servers at any time.

Please reference this page for file name changes:
http://www.nco.ncep.noaa.gov/pmb/products/nam/

The "ndas.YYYYMMDD" directories on the NCEP servers will be discontinued. All grids and BUFR observation files from the NAMv4 6-h assimilation cycle will be written into the "nam.YYYYMMDD" directory. Since the 12-h NDAS will be replaced by a 6-h data assimilation cycle with hourly analyses, the grid #212 files from the current NDAS, for example:
./ndas.YYYYMMDD/ndas.tCCz.awip3d(00|01|02|03).tm12|09|06|03.grib2

will be replaced by:
./nam.YYYYMMDD/nam.tCCz.awip3d(00|01).tm06|05|04|03|02|01.grib2
where YYYYMMDD is the cycle date, CC the cycle time

All DGEX model output from the NCEP servers under dgex/prod/dgex.YYYYMMDD will be discontinued. The DGEX model will no longer be run within the NCEP model suite.
Where YYYYMMDD is year, month, day

Remove the GRIB1 NAM grid 215 products under directory "PT.grid_DF.bb/" on the NWS web servers.

NOAAPORT PRODUCT TERMINATIONS
NCEP solicited public feedback through the PNS 16-34 NAM Removals, after balancing user comments with the code management of the production suite the following changes will be made:
http://www.nws.noaa.gov/om/notification/pns16-34nam_removalaaa.htm

1) All 00z and 12z cycle NAM FAX charts will be removed
Description WMO Headers
00 Hour 200MB Isobar/Temp QHUA17 KWBC 00 Hour 500MB Isobar/Temp QHTA11 KWBC 00 Hour 700MB Isobar/Temp QHTA07 KWBC 00 Hour 850MB Isobar/Temp QHUA04 KWBC Analysis 300MB Isobar QHUA15 KWBC
UPA PYMA[357]0 KWBC
UPA PYMA[28]5 KWBC
This legacy code can no longer be supported on the next generation supercomputer. If users are interested in the code to create the charts please contact EMC below. NCEP will also investigate the possibility of the MAG creating replica charts.

Please see the link below for the exact WMO headers for items 2-4:
http://www.nco.ncep.noaa.gov/pmb/changes/nam TIN AWIPS grids.shtml

Removal of the lower resolution only for: NAM NDFD 5km CONUS (grid 197) and 6km Alaska grids (grid 198)
Removal of grid 217, 22 km Alaska region Polar Stereographic
Removal of grid 215, 20km Regional CONUS
Removal of all DGEX products

PARALLEL DATA:
A consistent parallel feed of data is available on the NCEP server via the following URLs:
http://para.nomads.ncep.noaa.gov/pub/data/nccf/com/nam/para
http://para.nomads.ncep.noaa.gov/pub/data/nccf/noaaport/nam

For more general information about the NAM, please see:
http://www.emc.ncep.noaa.gov/?branch=NAM

NCEP urges all users to ensure their decoders can handle changes in content order, changes in the scaling factor component within the product definition section (PDS) of the GRIB files, and volume changes. These elements may change with future NCEP model implementations. NCEP will make every attempt to alert users to these changes before 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 the science aspects, please contact:

Eric Rogers
NCEP/EMC/Mesoscale Modeling Branch
College Park, MD
301-683-3682
eric.rogers@noaa.gov

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

Carissa Klemmer
NCEP/NCO Dataflow Team Lead
College Park, MD
301-683-0567
ncep.list.pmb-dataflow@noaa.gov

NWS National Technical Implementation Notices are online at:

https://www.weather.gov/notification/archive#tin

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