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PNSWSH

Technical Implementation Notice 14-29 Amended  
National Weather Service Headquarters Washington DC  
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From:         Timothy McClung  
              Chief, Science Plans Branch  
              Office of Science and Technology

Subject: Amended: Changes to the North American Mesoscale (NAM) Analysis and Forecast System: Effective August 12, 2014

Amended to add notice that some downscaled guidance products will be delivered later than in current operations, and mention in section 3 the change to use the mesonet data reject list from the RTMA in the NAM/NDAS.

Effective August 12, 2014, beginning with the 1200 Coordinated Universal Time (UTC) run, the National Centers for Environmental Prediction (NCEP) will make the following modifications to the NAM Analysis and Forecast System:

1) Changes to the NEMS-NMMB forecast model in the NAM Data Assimilation System (NDAS) and the NAM:

- Replace the legacy Geophysical Fluid Dynamics Laboratory (GFDL) radiation scheme with the NCEP Rapid Radiation Transfer Scheme (RRTM).
- Extensively modify the gravity wave drag/mountain blocking scheme by making it more responsive to subgrid-scale terrain variability, leading to improved large-scale synoptic performance without degrading 10-m winds.
- Add a new version of the Betts-Miller-Janjic (BMJ) convective parameterization scheme, with moister convective profiles and less convective triggering, which improves the QPF bias on the 12-km NAM parent domain during the warm season.
- Replace the Ferrier microphysics with the new, retuned Ferrier-Aligo microphysics, with changes targeting improved convective- storm structures in the NAM 4 km contiguous U.S. (CONUS) and 1.33 km fire weather nests.
- Reduce the roughness length for five vegetation types, with the target of improving the 10-m wind bias in the eastern CONUS:
  - Evergreen Needleleaf Forest
  - Deciduous Broadleaf Forest
  - Mixed Forests
  - Croplands
  - Cropland/natural vegetation mosaic

All NMMB model changes will be simultaneously implemented into the Downscaled GFS by NAM Extension (DGEX) system.

## 2) Changes specific to the NAM nested domains

- Run all nests except the 6 km Alaska domain with explicit convection instead of reduced convective triggering in the BMJ scheme.
- Improve severe storm signatures:
  - Ferrier-Aligo microphysics
  - Reduce 2nd order diffusion
  - Separate microphysics species advection for all nests except the 6 km Alaska nest.

## 3) Analysis/NDAS changes

- Use the hybrid variational ensemble GSI analysis with the NCEP Global Ensemble Kalman Filter (EnKF).
- Add new satellite bias correction scheme.
- Add Variational Quality Control.
- Enhance Rawinsonde level.
- Use the mesonet wind observation reject list from the NCEP Real-Time Mesoscale Analysis (RTMA).
- Use GFS ozone analysis in the satellite radiance assimilation.
- Add diabatic digital filter initialization (NDAS analyses only).
- Use new observation types:
  - Replace the use of refractivity with GPS radio occultation bending angle observations.
  - Add Meteosat-10 winds subtypes with different data thinning.
  - Add GOES-15 radiances.
  - Add new VAD winds with higher vertical resolution and temporal resolution.
- Resume the calculation of the NDAS long-term precipitation budget adjustment (used to bias-correct the Stage II/IV precipitation analyses that are used as input to the NDAS forecast land-surface model) using the NCEP Climatologically- Calibrated Precipitation Analysis.
- Use a modified mesonet data reject list from the Real-Time Mesoscale Analysis (RTMA), which has most of the stations in NWS Western Region removed from the list.

## 4) Other changes

- Discontinue the use of the Air Force Weather Agency (AFWA) 23 km snow depth product in lieu of higher resolution snow depth that will be continuously cycled in the NDAS. Once per day (at the start of the 0600 UTC NDAS cycle), snow will be removed at any NAM grid point that is snow-free in the NOAA Interactive Snow and Ice Mapping System (IMS product); snow will be added at any NDAS snow-free point that is snow covered in the IMS product.
- For Great Lakes water temperatures, switch from using values provided by the Great Lakes Environmental Research Laboratory (GLERL) to using the high-resolution (1/12th degree lat/lon) NCEP Real-Time Global High Resolution Sea Surface Temperature (RTG\_SST\_HR) analysis (the SST analysis used over the rest of the NAM domain).

- Add the following stations to the 12 km NAM hourly Binary Universal Form for the Representation of meteorological data (BUFR) station list:

-- First Column: Numerical Station ID  
-- Second/Third Column: Station Latitude/Longitude  
-- Fourth Column: Station Identifier  
-- Fifth Column: Station Name

000345	42.80N	109.81W	KPNA	Pinedale, WY
000346	39.15N	122.15W	WLM	William, CA
000347	40.88N	121.66W	BNY	Burney, CA
000348	37.99N	120.38W	SON	Sonora, CA
000349	37.74N	118.59W	YSV	Yosemite Valley, CA
000350	36.20N	119.10W	LSY	Lindsay, CA
000351	35.97N	118.54W	JHN	Johnsontdale, CA
000352	34.83N	118.95W	FZP	Frazier Park, CA
000353	36.14N	120.35W	COA	Coalinga, CA
000354	36.65N	118.48W	TBM	Table Mountain, CA
000355	42.47N	73.29W	KPSF	Pittsfield, MA
000356	39.21N	82.23W	KUNI	Athens/Albany, OH
000357	40.48N	111.43W	K36U	Heber Valley Municipal Airport, UT
000358	33.02N	114.24W	B40	Yuma, AZ
000359	31.49N	110.30W	B41	Fort Huachuca, AZ
000360	32.02N	107.87W	B42	Deming, NM
000361	30.43N	104.33W	B43	Marfa, TX
000362	28.39N	110.29W	B44	Eagle Pass, TX
000363	26.57N	98.82W	B45	Rio Grande City, TX
000364	28.71N	95.96W	B46	Matagorda, TX
000365	29.81N	91.66W	B47	Morgan City, LA
000366	24.70N	80.51W	B48	Cudjoe Key, FL
000367	17.98N	67.08W	B49	Lajas, PR
723066	35.33N	77.97W	KGSB	Seymour-Johnson_Air Force Base, NC
724397	40.48N	88.92W	KBMI	Bloomington/Normal, IL
725490	42.55N	94.20W	KFOD	Fort Dodge, IA
725635	42.05N	102.80W	KAIA	Alliance, NE
726710	42.58N	110.11W	KBPI	Big Piney, WY

These stations have been replaced by nearby locations:

Old: 000037 42.00N 95.00W CRL Near Carroll, IA

New: 000037 42.04N 94.79W CRL Carroll, IA

Old: 000050 40.90N 92.80W AIA Near Albia, IA

New: 000050 42.11N 92.92W MAR Marshalltown, IA

Old: 000080 40.69N 94.47W RDD Redding, IA

New: 000080 41.02N 94.36W CSQ Creston, IA

Old: 724754 37.08N 113.60W KSGU Saint\_George\_(AWOS), UT

New: 724754 37.04N 113.50W KSGU Saint\_George\_(AWOS), UT

5) Changes to the NAM Gridded Output:

- Added 0-6 km wind shear to these output grids from the NAM 12 km parent (file name on the NCEP ftp server given in quotes):

- #212 (40 km Lambert Conformal over the CONUS "awip3d")
- #216 (45 km Polar Stereographic over Alaska "awipak")
- #218 (12 km Lambert Conformal over the CONUS "awphys")
- #242 (11.25 km Polar Stereographic over Alaska "awak3d").

- Added cloud bottom height and 2-m specific humidity to the 12 km Lambert Conformal grid #218 ("awphys").

- Added 0-6 km wind shear to the output grids for all NAM nests.

- Added Radar-derived vertically integrated liquid (VIL) to the NAM four km CONUS nest and the NAM 1.33 km fire weather nest.

- For all NAM output grids with snow water equivalent, increased the GRIB precision so that it is output in tenths of kg/m\*\*2 (e.g., 358.3 instead of 358).

- Since convective parameterization will be turned off in the CONUS, Hawaii, Puerto Rico, and fire weather nests, the following fields that are derived from the convective parameterization will no longer be output from these nested runs:

- Total convective precipitation
- Convective precipitation rate
- Convective cloud efficiency
- Total convective cloud fraction
- Total convective cloud top and bottom pressure
- Deep convective cloud top and bottom pressure
- Shallow convective cloud top and bottom pressure
- Derived radar reflectivity from parameterized convection (was only output previously in the Fire weather nest).

- The NAM Downscaled Numerical Guidance (DNG) (smartinit) code was changed by including a diagnostic wind adjustment scheme to better adjust 10-m winds over high-resolution topography.

6) Added the following fields to the 12 km gridded output from the Downscaled GFS with Eta Extension (DGEX):

- Ventilation Rate
- Haines Index
- 1-hour Minimum Shelter
- Relative Humidity
- Transport Wind
- Planetary Boundary Layer (PBL) Height
- PBL Height computed from Richardson number.

7) Added New DGEX Gridded Datasets:

- Added six km National Digital Forecast Database (NDFD) Alaska gridded dataset. Files are named:

dgex.tCCz.smartakHHH.tm00.grib2

- Added five km NDFD CONUS gridded dataset. Files are named:

dgex.tCCz.smartconusHHH.tm00.grib2

Based on the most recent timing tests of the NAM change package, we anticipate the NAM product delivery times to be several minutes later than the current operational NAM.

For more information on this NAM/DGEX upgrade, see:

[http://www.emc.ncep.noaa.gov/mmb/mmbp11/misc/NAM\\_2014Q3\\_19mar2014.pptx](http://www.emc.ncep.noaa.gov/mmb/mmbp11/misc/NAM_2014Q3_19mar2014.pptx)

A consistent parallel feed of data will be available on the NCEP server by late June via the following URLs:

<http://www.ftp.ncep.noaa.gov/data/nccf/com/nam/para>  
<ftp://ftp.ncep.noaa.gov/pub/data/nccf/com/nam/para>

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.

For questions regarding these changes, please contact:

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

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National Technical Implementation Notices are online at:

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

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