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Service Change Notice 17-59 Updated
National Weather Service Headquarters Silver Spring MD
830 AM EDT Fri Oct 20 2017

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: Slight Adjustments to Satellite Broadcast Network (SBN)
and NOMADS Transmission of National Blend of Models (NBM) Guidance and Bug
Fix: Effective on October 24, 2017

Updated for the addition and removal of NBM data on Tuesday, October 24,
2017.

On or about Tuesday, October 24, 2017, beginning with the 1200 Coordinated
Universal Time (UTC) model run, the NWS Meteorological Development
Laboratory (MDL) will implement an update to the experimental National
Blend of Models (NBM) guidance over the contiguous U.S. (CONUS), outside
the CONUS (OCONUS; Alaska, Hawaii, Puerto Rico), and Oceanic National
Digital Forecast Database (NDFD) domains.

- NBM product additions and removals in NOAAPort:

The NBM 0500 UTC and 1700 UTC cycles will now extend its transmission of
guidance from 84 hours to 187 hours on the SBN for CONUS only. In
addition, Daytime maximum temperature (MaxT), Nighttime minimum
temperature (MinT), Nighttime maximum relative humidity (MaxRH), and
Daytime minimum relative humidity (MinRH) fields will no longer be
transmitted at 0700 UTC and 1900 UTC. Rather, they will be transmitted at
0600 UTC and 1800 UTC through 264 hours. For reference, SBN transmissions
are roughly one hour later than the NBM cycle times listed above (For
example, the NBM 0500 UTC run cycle is available in Advanced Weather
Interactive Processing System (AWIPS) via SBN by about 0600 UTC).

- NBM product correction for NCEP Web dissemination and the NOAA
Operational Model Archive and Distribution System (NOMADS):

An error was also recently discovered, preventing blending of 88-hour
temperature and 94-hour, 6-hour quantitative precipitation forecasts
(QPF06) on the 0200, 0800, 1400, and 2000 UTC NBM cycles. This also
impacted the 131-hour wind gust at 0400, 1000, 1600, and 2200 UTC NBM
cycles. With this corrected, the elements listed above will now be
populated in gridded binary version two (GRIB2) in the National Centers
for Environmental Prediction (NCEP) Web Dissemination and NOMADS data
flow. There are no changes to SBN/NOAAPort with this error correction.

1. Background

This upgrade will incorporate additional global and mesoscale models over the CONUS and OCONUS domains. The upgrade will enable the NBM to routinely generate key aviation weather elements for digital aviation services, fire weather and several meteorological fields used to derive a predominant weather grid at local Weather Forecast Offices (WFOs). The location and cycle availability of all NBM products is outlined in Sections 4-6 below.

2. NBM Elements

A list of weather elements that will be available at hourly time steps through 36 hours is provided below:

1. 2-m temperature
2. 2-m dewpoint
3. 10-m wind speed
4. 10-m wind direction
5. 10-m wind gust
6. Sky Cover
7. Ceiling height (CONUS Only)
8. Lowest cloud base height (CONUS Only)
9. Visibility (CONUS Only)
10. Precipitation potential index (CONUS Only)
11. Quantitative precipitation amount (1-hour, CONUS Only)
12. 2-m relative humidity (National Digital Guidance Database (NDGD) only, No SBN)
13. 2-m apparent temperature (NDGD only, No SBN)

The following NBM weather elements will be available over the CONUS and OCONUS domains at 3-hour time steps between 39-192 hours and every six hours thereafter through 264 hours:

1. 2-m temperature
2. 2-m dewpoint
3. Daytime 2-m Maximum temperature
4. Nighttime 2-m Minimum temperature
5. 10-m wind speed
6. 10-m wind direction
7. 10-m wind gust
8. Sky Cover
9. Precipitation potential index (6-hour)
10. Probability of precipitation (12-hour)
11. Quantitative precipitation amount (6-hour)
12. 2-m Maximum relative humidity (12-hour)
13. 2-m Minimum relative humidity (12-hour)
14. 2-m relative humidity (NDGD only, No SBN)
15. 2-m apparent temperature (NDGD only, No SBN)

For CONUS only, the following NBM weather grid elements will be available at hourly time steps between 1-36 hours, every three hours between 36-192 hours, and every six hours through 264 hours:

1. Maximum wet-bulb temperature aloft
2. Bourgouin positive area/energy
3. Bourgouin negative area/energy
4. Probability of cloud ice present
5. Conditional probability of rain
6. Conditional probability of snow
7. Conditional probability of freezing rain
8. Conditional probability of sleet
9. Conditional probability of refreeze sleet
10. Snow-liquid ratio
11. Snow level
12. 3-hour probability of a thunderstorm (3-hourly, 3-78 hours)
13. 6-hour probability of a thunderstorm (6-hourly, 84-180 hours)

3. This upgrade will incorporate additional global and mesoscale models and statistically post-processed guidance over the CONUS and OCONUS domains:

Current inputs:

1. NAM (North American Mesoscale Forecast System - 12km)
2. NAMNest (NAM 3km high resolution nest)
3. GFS (Global Forecast System)
4. GEFS (Global Ensemble Forecast System)
5. GDPS (CMC - Environment Canada Global Deterministic - PoP12/QPF06 only)
6. GEPS (CMCE - Environment Canada Global Ensemble)
7. EKDMOS (Ensemble Kernel Density Model Output Statistics)
8. Gridded GFS MOS (GMOS or MOSGuide)

New inputs:

9. HRRR (High Resolution Rapid Refresh), CONUS only
10. RAP (Rapid Refresh)
11. Gridded LAMP (GLMP Localized Aviation MOS Product), CONUS only)
12. HiResWindow ARW NCEP (High-Resolution Window Forecast System (HIRESW))
13. HiResWindow NMMB NCEP (High-Resolution Window Forecast System (HIRESW))
14. SREF (Short Range Ensemble Forecast) CONUS, Alaska, Puerto Rico sectors
15. NAVGEME (Navy FNMOC Global Ensemble)

The CONUS NBM products will be disseminated on a 2.5-km Lambert Conformal grid with dimensions NX=2345 and NY=1597. This represents an expansion to the west by 200 grid lengths compared to the current operational NBM domain to provide coverage for the Nearshore Wave Prediction Model (NWPS) along the U.S. West Coast.

NBM products for Alaska will be produced on a 3-km Polar Stereographic grid with dimensions NX=1649 and NY=1105. The Hawaii NBM products will be produced on a 2.5-km Mercator grid with dimensions NX=625 and NY=561. Products for Puerto Rico will be produced on a 1.25-km Mercator grid with dimensions NX=353 and NY=257.

4. NBM Oceanic Products

NBM guidance for the Oceanic domain will now incorporate all ensemble members from the Global Ensemble Forecasting System (GEFS) and the Canadian Meteorological Centre Ensemble (CMCE). This upgrade provides additional 10-m wind speed percentile thresholds and a blended wind direction field using a clustering technique. The Oceanic products will continue to be produced on a 10-km Mercator grid with dimensions NX=2517 and NY=1817.

Guidance for the following elements will be available for the 0000 and 1200 UTC cycles at 3-hourly time steps between 3-192 hours and at 6-hourly time steps thereafter through 264 hours:

1. 10-m wind speed 10th Percentile
2. 10-m wind speed 25th Percentile
3. 10-m wind speed 50th Percentile
4. 10-m wind speed 75th Percentile
5. 10-m wind speed 90th Percentile
6. 10-m blended wind direction

Please note that these additional calculations are resource intensive and results in a 40-minute runtime delay relative to the current operational NBM oceanic product.

5. SBN/NOAAPort Dissemination

While the NBM will run every hour and produce output to 264 hours with each run, only a subset will be sent across the SBN and NOAAPort due to bandwidth limitations. Products will be disseminated in GRIB2 format and will contain individual World Meteorological Organization (WMO) headers. On implementation day, current NBM products going across the SBN/NOAAPort will no longer contain super headers. The schedule for SBN/NOAAPort dissemination is as follows:

NBM Window	Disseminated Cycles (UTC)
-----	-----
Short-term: 1-18 hours	0100, 0200, 0400, 0800, 1000, 1100, 1300, 1400, 1600, 2000, 2200, 2300
Short-term: 1-36 hours	0300, 0600, 0900, 1500, 1800, 2100
Short-term and medium-range: 1-187 hours	0500, 1700
Short-term and extended-range: 1-264 hours	0000, 0600*, 0700, 1200, 1800*, 1900
Oceanic products - through 264 hours	0000, 1200

*For 0600 and 1800 UTC, only MaxT, MinT, MaxRH, MinRH transmitted to 264 hours; other elements just to 36 hours.

6. TGFTP/NDGD Dissemination

Output for the 0000, 0700, 1200 and 1900 UTC cycles will be placed in the experimental area of the NDGD in GRIB2 format at the following locations:

<ftp://tgftp.nws.noaa.gov/SL.us008001/ST.expr/DF.gr2/DC.ndgd/GT.blend/AR.conus/> (CONUS)
<ftp://tgftp.nws.noaa.gov/SL.us008001/ST.expr/DF.gr2/DC.ndgd/GT.blend/AR.alaska/> (Alaska)
<ftp://tgftp.nws.noaa.gov/SL.us008001/ST.expr/DF.gr2/DC.ndgd/GT.blend/AR.hawaii/> (Hawaii)
<ftp://tgftp.nws.noaa.gov/SL.us008001/ST.expr/DF.gr2/DC.ndgd/GT.blend/AR.puertorico/> (Puerto Rico)
<ftp://tgftp.nws.noaa.gov/SL.us008001/ST.expr/DF.gr2/DC.ndgd/GT.blend/AR.oceanic/> (Oceanic)

Each domain directory will contain subdirectories for each valid period as follows:

VP.001/	Day 1
VP.002/	Day 2
VP.003/	Day 3
VP.004/	Day 4
VP.005-007/	Days 5-7
VP.008-450/	Days 8 and beyond

Each element-specific GRIB2 file will reside in the appropriate valid period subdirectory and contain individual WMO headers. On implementation day, NBM files residing in NDGD will no longer contain super headers. A listing of GRIB2 file names for all NBM elements that will reside on TGFTP is provided in Table 1 below.

Table 1: GRIB2 Filenames for NBM Elements that will Reside on TGFTP/NDGD in the Appropriate Valid Period Subdirectory

CONUS/Alaska/Hawaii/Puerto Rico Products:

GRIB2 Filename	NBM Element Name
-----	-----
ds.skymean.bin	Sky cover (mean)
ds.wdirmean.bin	Wind direction (mean)
ds.wspdmean.bin	Wind speed (mean)
ds.pop12.bin	12-hour probability of precipitation
ds.tempmean.bin	2-m temperature (mean)
ds.tdmean.bin	2-m dewpoint temperature (mean)
ds.maxtmean.bin	Daytime maximum temperature (mean)
ds.mintmean.bin	Nighttime minimum temperature (mean)
ds.qpf06.bin	6-hour quantitative precipitation amount
ds.rhmean.bin	2-m relative humidity (mean)
ds.apptmean.bin	2-m apparent temperature (mean)
ds.wgustmean.bin	Wind gust (mean)
ds.ppi.bin	Precipitation potential index
ds.maxrhmean.bin	12-hour maximum relative humidity (mean)
ds.minrhmean.bin	12-hour minimum relative humidity (mean)

CONUS-Only Products:

GRIB2 Filename	NBM Element Name
-----	-----
ds.pts03.bin	3-hour Probability of a thunderstorm
ds.pts06.bin	6-hour Probability of a thunderstorm
ds.vismean.bin	Visibility (mean)
ds.cigmean.bin	Ceiling height (mean)
ds.cldbsemean.bin	Cloud base height (mean)
ds.qpf01.bin	1-hour Quantitative precipitation amount
ds.cprbfzrain.bin	Conditional probability of freezing rain
ds.cprbsnow.bin	Conditional probability of snow
ds.cprbrain.bin	Conditional probability of rain
ds.cprbsleet.bin	Conditional probability of ice pellets
ds.prbrefzslt.bin	Probability of refreeze sleet
ds.probcldice.bin	Probability of cloud ice present
ds.negemean.bin	Bourgouin negative area/energy (mean)
ds.posemean.bin	Bourgouin positive area/energy (mean)
ds.slrblend.bin	Snow-liquid ratio (mean)
ds.snowlvlmean.bin	Snow level (mean)
ds.maxwbmean.bin	Maximum wet-bulb temp. aloft (mean)

Oceanic Products:

GRIB2 Filename	NBM Element Name
-----	-----
ds.wdirmean.bin	Wind direction (mean)
ds.wspd10p.bin	Wind speed - 10th percentile
ds.wspd25p.bin	Wind speed - 25th percentile
ds.wspd50p.bin	Wind speed - 50th percentile
ds.wspd75p.bin	Wind speed - 75th percentile
ds.wspd90p.bin	Wind speed - 90th percentile

7. NCEP Web Dissemination

On implementation day, the NBM output for all cycles, elements, and projections will now be made available on NCEP web services sites:

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

8. WMO Headers

Unique originating center IDs have been assigned to each geographic region. A listing of the originating center IDs is given in Table 2 below. WMO headers for all NBM elements and discontinued super headers are listed below in Tables 3 and 4, respectively.

A document outlining the new WMO header scheme for NBM products can be found here:

http://www.weather.gov/media/mdl/NBM_WMO_header.pdf

Table 2: List of Originating Center IDs (CCCC) for NBM Products

Two IDs are assigned to each geographic region to accommodate all weather elements. Oceanic products are disseminated under KWEA.

Geographic Region	Originating Center (CCCC)
CONUS and Oceanic	KWEA and KWEB
Alaska	KWEC and KWED
Hawaii	KWEE and KWEF
Puerto Rico	KWEG and KWEH

Table 3: WMO Headers for All NBM Products that will be Disseminated over the SBN/NOAAPort and Placed on TGFTP/NDGD

Listed below are representations of the WMO headers where xxx is a placeholder for the forecast valid day and hour (see header document linked above for further details).

CONUS Products (CCCC=KWEA):

WMO Header	Element Name
YAAxxx	Sky cover (mean)
YBAxxx	Wind direction (mean)
YCAxxx	Wind speed (mean)
YDAxxx	12-hour Probability of precipitation
YEAxxx	2-m temperature (mean)
YFAxxx	2-m dewpoint temperature (mean)
YGAxxx	Daytime maximum temperature (mean)
YHAxxx	Nighttime minimum temperature (mean)
YIAxxx	6-hour Quantitative precipitation amount (mean)
YJAxxx	6-hour Probability of a thunderstorm
YMAxxx	Precipitation potential index
YPAxxx	Visibility (mean)
YQAxxx	Ceiling height (mean)
YRAxxx	Relative humidity (mean) - NDGD only
YTAxxx	Apparent temperature (mean) - NDGD only
YVAxxx	1-hour Quantitative precipitation amount (mean)
YWAxxx	Wind gusts (mean)
YYAxxx	3-hour Probability of a thunderstorm

CONUS Products (CCCC=KWEB):

WMO Header	Element Name
YAAxxx	Conditional probability of freezing rain
YBAxxx	Conditional probability of snow
YCAxxx	Conditional probability of rain
YDAxxx	Conditional probability of ice pellets
YEAxxx	Probability of refreeze sleet
YGAxxx	12-hour Maximum relative humidity (mean)
YHAxxx	12-hour Minimum relative humidity (mean)
YIAxxx	Probability of cloud ice present
YNAxxx	Bourgouin negative area/energy (mean)
YPAxxx	Bourgouin positive area/energy (mean)

YQAxXX	Cloud base height (mean)
YRAxXX	Snow-liquid ratio (mean)
YSAxXX	Snow level (mean)
YWAxXX	Maximum wet-bulb temperature aloft (mean)
AK/HI/PR Products (CCCC=KWEC, KWEE, KWEG)	
WMO Header	Element Name
-----	-----
YAAxXX	Sky cover (mean)
YBAxXX	Wind direction (mean)
YCAxXX	Wind speed (mean)
YDAxXX	12-hour Probability of precipitation
YEAxXX	2-m temperature (mean)
YFAxXX	2-m dewpoint temperature (mean)
YGAxXX	Daytime maximum temperature (mean)
YHAxXX	Nighttime minimum temperature (mean)
YIAxXX	6-hour Quantitative precipitation amount (mean)
YMAxXX	Precipitation potential index
YRAxXX	Relative humidity (mean) - NDGD only
YTAxXX	Apparent temperature (mean) - NDGD only
YWAxXX	Wind gusts (mean)
AK/HI/PR Products (CCCC=KWED, KWEF, KWEH)	
WMO Header	Element Name
-----	-----
YGAxXX	12-hour Maximum relative humidity (mean)
YHAxXX	12-hour Minimum relative humidity (mean)
Oceanic Products (CCCC=KWEA)	
WMO Header	Element Name
-----	-----
OBAxXX	Wind direction (mean)
OCCxXX	Wind speed - 10th percentile
OCMxXX	Wind speed - 25th percentile
OCGxXX	Wind speed - 50th percentile
OCNxXX	Wind speed - 75th percentile
OCKxXX	Wind speed - 90th percentile

Table 4: List of WMO Super Headers that are Being Discontinued

Listed below are representations of the super headers where "ii" represents the valid period of the forecasts (ii=93-98)

CONUS (CCCC=KWEA):

LAAZii LBAZii LCAZii LDAZii LEAZii LFAZii LGAZii LHAZii LIAZii LRAZii
LTAZii LWAZii

Alaska (CCCC=KWEA):

MAAZii MBAZii MCAZii MEAZii MFAZii MGAZii MHAZii MRAZii MTAZii MWAZii

Hawaii (CCCC=KWEA):

ZAAZii ZBAZii ZCAZii ZEAZii ZFAZii ZGAZii ZHAZii ZRAZii ZTAZii ZWAZii

Puerto Rico (CCCC=KWEA):

YAAZii YBAZii YCAZii YEAZii YFAZii YGAZii YHAZii YRAZii YTAZii YWAZii

Oceanic (CCCC=KWEA):

HCAZii

Users may find parallel NBM data for download:

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

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 implementation of NBM guidance, please contact:

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For questions regarding the data flow, please contact:

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A webpage describing the NBM can be found at:

http://w2.weather.gov/mdl/nbm_home

National Service Change Notices are online at:

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

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