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Service Change Notice 17-59 Updated  
National Weather Service Headquarters Silver Spring MD  
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To:           Subscribers  
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              Other NWS Partners, Users and Employees

From:         Dave Myrick  
              NWS Office of Science and Technology Integration

Subject:      Updated: Upgrade of experimental National Blend of Models  
              guidance effective July 11, 2017, and request for  
              comments

Updated to include runtime delay in ocean products: Additional calculations are resource intensive and results in a 40 minute runtime delay relative to the current operational NBM oceanic product.

On or about Wednesday, July 11, 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 CONUS, OCONUS (Alaska, Hawaii, Puerto Rico), and Oceanic National Digital Forecast Database (NDFD) domains.

## 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. 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 (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 6 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 3 hours between 36-192 hours, and every 6 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-h prob. of a thunderstorm (3-hourly, 3-78 hours)
13. 6-h prob. 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 Satellite Broadcast Network (SBN) and NOAAPORT due to bandwidth limitations. Products will be disseminated in GRIB2 format and will contain individual WMO headers. On implementation day, current NBM products going across the SBN/NOAAPORT will no longer contain superheaders. The schedule for SBN/NOAAPORT dissemination is as follows:

NBM Window -----	Disseminated Cycles (UTC) -----
Short-term: 1-18h	0100, 0200, 0400, 0800, 1000, 1100, 1300, 1400, 1600, 2000, 2200, 2300
Short-term: 1-36h	0300, 0600, 0900, 1500, 1800, 2100
Short-term and medium-range: 1-84h	0500, 1700
Short-term and extended-range: 1-264h	0000, 0700, 1200, 1900
Oceanic products - through 264h	0000, 1200

#### 6. TGFTP/NDGD Dissemination

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

```
ftp://tgftp.nws.noaa.gov/SL.us008001/ST.expr/DF.gr2/DC.ndgd/GT.b
lend/AR.conus/ (CONUS)
ftp://tgftp.nws.noaa.gov/SL.us008001/ST.expr/DF.gr2/DC.ndgd/GT.b
lend/AR.alaska/ (Alaska)
ftp://tgftp.nws.noaa.gov/SL.us008001/ST.expr/DF.gr2/DC.ndgd/GT.b
lend/AR.hawaii/ (Hawaii)
ftp://tgftp.nws.noaa.gov/SL.us008001/ST.expr/DF.gr2/DC.ndgd/GT.b
lend/AR.puertori/ (Puerto Rico)
ftp://tgftp.nws.noaa.gov/SL.us008001/ST.expr/DF.gr2/DC.ndgd/GT.b
lend/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 superheaders. A listing of GRIB2 file names for all NBM elements that will reside on TGFTP is provided in Table 1 below.

Table 1: GRIB2 file names for NBM elements that will reside on TGFTP/NDGD in the appropriate valid period subdirectory

CONUS/ALASKA/HAWAII/PR PRODUCTS:

GRIB2 FILE NAME	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-h 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-h quant. 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-h maximum relative humidity (mean)
ds.minrhmean.bin	12-h minimum relative humidity (mean)

CONUS-ONLY PRODUCTS:

GRIB2 FILE NAME	NBM ELEMENT NAME
ds.pts03.bin	3-h Probability of a thunderstorm
ds.pts06.bin	6-h 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-h Quant. precipitation amount
ds.cprbfzrain.bin	Cond. probability of freezing rain
ds.cprbsnow.bin	Cond. probability of snow
ds.cprbrain.bin	Cond. probability of rain
ds.cprbsleet.bin	Cond. 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 FILE NAME	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 superheaders 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](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
YAxxxx	Sky cover (mean)
YBxxxx	Wind direction (mean)
YCxxxx	Wind speed (mean)
YDxxxx	12-h Probability of precipitation
YExxxx	2-m temperature (mean)
YFxxxx	2-m dewpoint temperature (mean)
YGxxxx	Daytime maximum temperature (mean)
YHxxxx	Nighttime minimum temperature (mean)
YIxxxx	6-h Quant. precipitation amount (mean)
YJxxxx	6-h Probability of a thunderstorm
YMxxxx	Precipitation potential index
YPxxxx	Visibility (mean)
YQxxxx	Ceiling height (mean)
YRxxxx	Relative humidity (mean) - NDGD only
YTxxxx	Apparent temperature (mean) - NDGD only
YVxxxx	1-h Quant. precipitation amount (mean)
YWxxxx	Wind gusts (mean)
YYxxxx	3-h Probability of a thunderstorm

CONUS Products (CCCC=KWEB)

WMO Header	Element Name
YAxxxx	Cond. probability of freezing rain
YBxxxx	Cond. probability of snow
YCxxxx	Cond. probability of rain
YDxxxx	Cond. probability of ice pellets
YExxxx	Probability of refreeze sleet
YGxxxx	12-h Maximum relative humidity (mean)
YHxxxx	12-h Minimum relative humidity (mean)
YIxxxx	Probability of cloud ice present
YNxxxx	Bourgouin negative area/energy (mean)
YPxxxx	Bourgouin positive area/energy (mean)
YQxxxx	Cloud base height (mean)
YRxxxx	Snow-liquid ratio (mean)
YSxxxx	Snow level (mean)
YWxxxx	Maximum wet-bulb temp. aloft (mean)

AK/HI/PR Products (CCCC=KWEC,KWEE,KWEG)

WMO Header	Element Name
YAxxxx	Sky cover (mean)
YBxxxx	Wind direction (mean)
YCxxxx	Wind speed (mean)
YDxxxx	12-h Probability of precipitation
YExxxx	2-m temperature (mean)
YFxxxx	2-m dewpoint temperature (mean)
YGxxxx	Daytime maximum temperature (mean)
YHxxxx	Nighttime minimum temperature (mean)
YIxxxx	6-h Quant. precipitation amount (mean)
YMxxxx	Precipitation potential index
YRxxxx	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-h Maximum relative humidity (mean)
YHAxxx	12-h 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 superheaders that are being discontinued

Listed below are representations of the superheaders 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/>

Feedback will be collected through October 15, 2017 via comments provided on the electronic survey at:

<http://www.nws.noaa.gov/survey/nws-survey.php?code=EXPNBM>

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 web page describing the NBM can be found at:

[http://w2.weather.gov/mdl/nbm\\_home](http://w2.weather.gov/mdl/nbm_home)

NWS National Service Change Notices are online at:

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

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