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PNSWSH

Service Change Notification 19-92 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:         Jeffrey Craven  
              NWS Office of Science and Technology Integration  
              Meteorological Development Laboratory

Subject:      Update: Correction to properly pack low level wind  
              shear data for downstream NBM processing.  
              Implementation date has been delayed to Tuesday,  
              February 18, 2020

Update implementation date to February 18, 2020. During NCEP's Central Operations NBM 30-day IT-stability test, a failure occurred when attempting to internally pack low level wind shear data for downstream NBM processing. We have identified the coding error and have corrected the issue. After providing NCO with this correction, NCO has restarted the 30-day IT stability test which began on Friday, January 10, 2020.

On or about Tuesday, February 18, 2020, beginning with the 1200 Universal Time Coordinated (UTC) model run, the NWS Meteorological Development Laboratory (MDL) will implement an update to the National Blend of Models (NBM) guidance over the CONUS, OCONUS (Alaska, Hawaii, Puerto Rico), and Oceanic National Digital Forecast Database (NDFD) domains. A new Guam domain will also be added.

This upgrade represents a transition from an experimental service to an initial operating capability because the NBM does not yet meet all NWS requirements to be classified as fully operational, which includes (but is not limited to) a timely transmission to the field.

In the event that the implementation date is declared a Critical Weather Day (CWD), or significant weather is occurring or is anticipated to occur, implementation of this change will occur

at 1200 UTC on the next weekday not declared a CWD and when no significant weather is occurring.

## 1. Background

Comments/feedback on this upgrade were previously solicited publicly June 4-August 31, 2019:

<https://www.weather.gov/media/notification/pns19-18nbn.pdf>

This upgrade will incorporate additional global and mesoscale models over the CONUS, OCONUS and Oceanic domains. The upgrade will enable the NBM to fill gaps in several key weather elements for NWS programs including Water Resources, Aviation, Winter Weather, Fire Weather and Marine. A new Guam sector will also be added to address the needs of the far west Pacific Region.

### NBM Model Inputs:

This upgrade will incorporate the global ACCESS-G and regional ACCESS-R from the Australian Bureau of Meteorology. The ACCESS-R is limited to the Guam domain. To review which input models are currently used in NBM v3.1, please visit the following link.

[https://www.weather.gov/media/mdl/nbm/v3.1 Model Inputs.pdf](https://www.weather.gov/media/mdl/nbm/v3.1%20Model%20Inputs.pdf)

The subsequent link details the addition and adjustments of models used in NBM v3.2 as a function of weather element and region.

<https://www.weather.gov/media/mdl/nbm/New%20and%20adjusted%20models%20NBM%20v3.2.pdf>

The NBM products will be produced on the following grids:

Region	Resolution-Grid Type	Dimensions
CONUS	2.5km Lambert Conformal	NX=2345, NY=1597
Alaska	3.0km Polar Stereographic	NX=1649, NY=1105
Hawaii	2.5km Mercator	NX=625, NY=561
Puerto Rico	1.25km Mercator	NX=353, NY=257
Guam	2.5km Mercator	NX=193, NY=193
Oceanic	10.0km Mercator	NX=2517, NY=1817

Please also note that the mesh length for the Alaskan sector has been changed from 2976.5600 meters to 2976.5629 meters.

### New and improved Techniques:

1. Improved Wind Direction guidance by using blended U-V

- components rather than the binning approach used in v3.1 (CONUS, OCONUS, Oceanic)
2. Converted Probability of Weather Type (PoWT) to Bourguin energy areas rather than Top Down approach (CONUS and AK)
  3. Performed PoWT calculations for each individual model and then blend inputs, rather than using a mean sounding to calculate the Top Down values (CONUS and AK)
  4. Improved wind speed and wind gust by binning values as a function of NWS hazard criteria. (CONUS and OCONUS)
  5. Improved Cloud Base guidance by blending direct model cloud base inputs with NWS WFO relative humidity/threshold cloud base methodology (CONUS, AK, HI, PR)
  6. Added URMA Bias Correction for Significant Wave Height (AK, HI, PR)
  7. Incorporated LAMP calibrated 1-h Probability of Precipitation (PoP01) to drive Precipitation Potential Index (PPI) 1-36 hours (CONUS)
  8. Applied MOS Thunder technique to GFS, NAM-32km, European deterministic models and blended with existing 3-h and 12-h Probability of Thunder (CONUS)
  9. Applied 12-h MOS Thunder technique in (9) to the Oceanic domain
  10. Equally weighted blended LAMP and SREF for 1-hour probability of thunder for 1-36 hours. (CONUS)
  11. Used true 2.5km supplemental stations using CCPA for CONUS Hamill/Engle QMD
  12. Expanded URMA domain for Hamill/Engle QMD for CONUS
  13. Moved from Empirical CDF creation to Gamma based for Hamill/Engle QMD (CONUS)

## 2. Output Additions

### A. New NBM Elements for the CONUS and OCONUS

NBM Version 3.2 (NBM v3.2) will continue to fill existing product gaps requested by the Aviation, Fire Weather, Water Resources, and Marine NWS Service Program Offices. A few highlights associated with this upcoming release include:

-Continued infusion of cutting edge science advancements in the area of quantitative and probabilistic precipitation forecasts (especially in the mountainous West) and the addition of Alaska and Puerto Rico domains

-Uncertainty information in the form of standard deviations for MaxT, MinT, 10 m Wind Speeds, and 10 m Wind Gusts

Addition and improvement in aviation guidance routinely used in daily airport operation planning and the creation of Terminal Aerodrome forecasts (TAFs), with visibility and ceiling height guidance now through 84 hours

-Addition of new NBM guidance in the text product along with a new probabilistic text message product that provides NBM guidance at stations for various temporal horizons. A comprehensive list of these new elements by NWS Service Program is provided in the hyperlink below (See Sections 4 and 6 for data access platforms):

[https://www.weather.gov/media/mdl/nbm/ALL\\_NBM\\_V3.2\\_New\\_WX\\_Element\\_List.pdf](https://www.weather.gov/media/mdl/nbm/ALL_NBM_V3.2_New_WX_Element_List.pdf)

## B. New NBM Oceanic Products

With the implementation of NBM v3.2, the deterministic and ensemble European Centre for Medium-Range Weather Forecasts (ECMWF, ECMWF, Respectively) will be added to the suite of NBM inputs over the Oceanic domain; 35 ECMWF members plus the mean of those members will comprise the NBM's ECMWF membership. Although the seven new oceanic weather elements were already noted above, we again list them for the users convenience:

1. 12-h Probability of Precipitation (PoP12)
2. 6-h Quantitative Precipitation Forecasts (QPF06) for 10th, 50th, and 90th Percentiles
3. Water Temperature (50th Percentile)  
Categorical Freezing Spray
4. 3-h and 12-h Probability of Thunder

These new Oceanic products will continue to be produced on the current 10-km oceanic Mercator grid. With this implementation, all oceanic products will be disseminated four times daily rather than the six, as is currently being done. Please see Section 4 for further details.

## C. NBM Text Product Changes and Additions

For those customers who use the NBH, NBS, NBE and NBX station text bulletins, we have added several new weather elements and stations (an increase of 3,508 stations for a total of 6,646 stations):

[http://www.weather.gov/mdl/nbm\\_stationtable\\_v32](http://www.weather.gov/mdl/nbm_stationtable_v32)

The following new weather elements have been added to the text product suite:

NBH

1. Moved relative position of QPF01 to follow POP01
2. Precipitation Duration (DUR)
3. Snow Level (SLV)
4. Mixing Height (MHT)
5. Transport Wind Direction (TWD)
6. Transport Wind Speed (TWS)
7. Haines Index (HID)
8. Solar Radiation (SOL)

NBS

9. Precipitation Duration (DUR)
10. Mixing Height (MHT)
11. Transport wind direction (TWD)
12. Transport Wind Speed (TWS)
13. Haines Index (HID)
14. Solar Radiation (SOL)

NBE/X

15. Precipitation Duration (DUR)
16. Solar Radiation (SOL)

With NBM v3.2 moving more towards probabilistic guidance, we have also added a new probabilistic station-based text message product (NBP) for the same set of stations noted above. The new probabilistic text bulletins provide guidance covering 12-hour periods for projections 24 through 192 hours with a format very similar to the NBE text product.

The following is a list of probabilistic weather elements that can be found in the NBP text product:

NBP

1. Wind Speed interpolated from Oceanic domain model inputs(10th, 50th, 90th Percentiles)
2. 12-h Quantitative Precipitation forecasts (10th, 50th, 90th Percentiles)
3. 24-h Snowfall accumulation (10th, 50th, 90th Percentiles)
4. 24-h Flat Ice accumulation (10th, 50th, 90th Percentiles)
5. Mean Sea-Level Pressure interpolated from Oceanic domain model inputs(10th, 50th, 90th Percentiles)

The file names of the five types of NBM text messages are:

1. blend\_nbhtx.t[hh]z [where hh=00,01,02,...,23]

2. blend\_nbstx.t[hh]z [where hh=00,01,02,...,23]
3. blend\_nbetx.t[hh]z [where hh=00,01,02,...,23]
4. blend\_nbxtx.t[hh]z [where hh=00,01,02,...,23]
5. blend\_nbptx.t[hh]z [where hh=00,01,02,...,23]

For a detailed explanation of the contents and interpretation of the in the NBH, NBS, NBE/X and NBP text files please visit the following link:

[https://www.weather.gov/mdl/nbm\\_textcard\\_v32](https://www.weather.gov/mdl/nbm_textcard_v32)

### 3. NBM Runtime Changes

With the increase in NBM v3.2 model inputs noted in Section 1, NBM run times for most of the CONUS and OCONUS weather elements could take up to 95 minutes for the 0100 UTC, 0700 UTC, 1300 UTC, and 1900 UTC cycles. For example, the 0100 UTC run might finish as late as 0235 UTC. For the remaining 20 cycles, however, where no new global models are ingested, the run time will be on the order of 75 minutes. The only exception being the Oceanic runs at 0000 UTC, 0700 UTC, 1200 UTC and 1900 UTC, which could finish as late as 135 minutes after the NBM cycle initialization time. For the NBM Text files NBH, NBS, NBE, NBX and NBP, those could arrive as late as 175 minutes after initialization time for any of the 24 NBM runs per day.

### 4. Changes to SBN/NOAAPORT Dissemination

While the NBM runs hourly 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 grouped WMO headers as does NBM v3.1. For NBM v3.2, the two primary SBN/NOAAPORT dissemination changes can be summarized as follows:

1. NBM v3.2 will now disseminate a majority of its precipitation guidance (PoP, QPF, Snow and Ice) at 0100 UTC and 1300 UTC rather than 0000 UTC and 1200 UTC as in NBM v3.1.
2. NBM v3.2 will no longer disseminate the 0500 UTC and 1700 UTC Oceanic domain products. Only four cycles will be available on the SBN/NOAAPORT (0000 UTC, 0700 UTC, 1200 UTC and 1900 UTC)

To view a comprehensive list of NBM v3.2 weather elements delineated by NWS Service Programs that will be disseminated on the SBN/NOAAPORT please see the following link.

[NBM v3.2 comprehensive weather element list of products to be disseminated on the SBN/NOAAPORT](#)

Unique originating center IDs have been assigned to each geographic region. A listing of the originating center IDs is provided below.

List of originating center IDs (CCCC) for NBM products:

Three IDs are assigned to each geographic region to accommodate all weather elements (with the exception of Guam).

Geographic Region	Originating Center (CCCC)
-----	-----
CONUS and Oceanic	KWEA, KWEB, KWEI
Alaska	KWEC, KWED, KWEJ
Hawaii	KWEE, KWEF, KWEK
Puerto Rico	KWEG, KWEH, KWEL
Guam	KWEM, KWEN

NBM text bulletin WMO header information for each of the five bulletins to be disseminated every hour on the SBN and FTPPRD is listed below.

WMO header information for NBM text products:

WMO Header	NBM Text Bulletin Description
-----	-----
FOUS15 KWNO	Hourly bulletin (1-24 hours)
FOUS16 KWNO	Short-range bulletin (6-66 hours)
FEUS16 KWNO	Extended bulletin (12-192 hours)
FEUS17 KWNO	Extra-extended bulletin (204-264 hours)
FEUS18 KWNO	Probabilistic extended bulletin (12-192 hours)

NBM v3.2 SBN/NOAAPORT Header Additions and Removals:

A detailed listing of NBM WMO headers (by sector) to be added over the SBN/NOAAPORT can be found below:

[https://www.weather.gov/media/mdl/nbm/conus\\_headers\\_additions\\_sbn.pdf](https://www.weather.gov/media/mdl/nbm/conus_headers_additions_sbn.pdf)

[https://www.weather.gov/media/mdl/nbm/alaska\\_headers\\_additions\\_sbn.pdf](https://www.weather.gov/media/mdl/nbm/alaska_headers_additions_sbn.pdf)

[https://www.weather.gov/media/mdl/nbm/hawaii\\_headers\\_additions\\_sbn.pdf](https://www.weather.gov/media/mdl/nbm/hawaii_headers_additions_sbn.pdf)

[https://www.weather.gov/media/mdl/nbm/pr\\_headers\\_additions\\_sbn.pdf](https://www.weather.gov/media/mdl/nbm/pr_headers_additions_sbn.pdf)

[https://www.weather.gov/media/mdl/nbm/guam\\_headers\\_additions\\_sbn.pdf](https://www.weather.gov/media/mdl/nbm/guam_headers_additions_sbn.pdf)

[https://www.weather.gov/media/mdl/nbm/oceanic\\_headers\\_additions\\_sbn.pdf](https://www.weather.gov/media/mdl/nbm/oceanic_headers_additions_sbn.pdf)

A detailed listing of NBM WMO headers (by sector) to be removed from the SBN/NOAAPORT can be found below:

[https://www.weather.gov/media/mdl/nbm/conus\\_headers\\_removals\\_sbn.pdf](https://www.weather.gov/media/mdl/nbm/conus_headers_removals_sbn.pdf)

[https://www.weather.gov/media/mdl/nbm/alaska\\_headers\\_removals\\_sbn.pdf](https://www.weather.gov/media/mdl/nbm/alaska_headers_removals_sbn.pdf)

[https://www.weather.gov/media/mdl/nbm/hawaii\\_headers\\_removals\\_sbn.pdf](https://www.weather.gov/media/mdl/nbm/hawaii_headers_removals_sbn.pdf)

[https://www.weather.gov/media/mdl/nbm/pr\\_headers\\_removals\\_sbn.pdf](https://www.weather.gov/media/mdl/nbm/pr_headers_removals_sbn.pdf)

[https://www.weather.gov/media/mdl/nbm/oceanic\\_headers\\_removals\\_sbn.pdf](https://www.weather.gov/media/mdl/nbm/oceanic_headers_removals_sbn.pdf)

In order to keep the NBM v3.2 daily data file sizes at the same levels as NBM v3.1 which is currently in operations, some cycles will no longer be available on the SBN for the CONUS and AK. For the CONUS this includes 0200 UTC, 0500 UTC, 0800 UTC, 1100 UTC, 1400 UTC, 1700 UTC, 2000 UTC and 2300 UTC. For the AK, this includes 0200 UTC, 0800 UTC, 1100 UTC, 1400 UTC, 2000 UTC and 2300 UTC. As is currently the case, all 264 hours of all 24 daily runs will be available via NOMADS.

To view a comprehensive list of NBM v3.2 weather elements delineated by region and cycle time that will be disseminated on the SBN/NOAAPORT please see the following hyperlinks.

[https://www.weather.gov/media/mdl/nbm/NBM\\_v3.2\\_elements\\_on\\_sbn\\_by\\_cycle\\_conus.pdf](https://www.weather.gov/media/mdl/nbm/NBM_v3.2_elements_on_sbn_by_cycle_conus.pdf)

[https://www.weather.gov/media/mdl/nbm/NBM\\_v3.2\\_elements\\_on\\_sbn\\_by\\_cycle\\_alaska.pdf](https://www.weather.gov/media/mdl/nbm/NBM_v3.2_elements_on_sbn_by_cycle_alaska.pdf)

[https://www.weather.gov/media/mdl/nbm/NBM\\_v3.2\\_elements\\_on\\_sbn\\_by\\_cycle\\_hawaii.pdf](https://www.weather.gov/media/mdl/nbm/NBM_v3.2_elements_on_sbn_by_cycle_hawaii.pdf)

[https://www.weather.gov/media/mdl/nbm/NBM\\_v3.2\\_elements\\_on\\_sbn\\_by\\_cycle\\_puerto\\_rico.pdf](https://www.weather.gov/media/mdl/nbm/NBM_v3.2_elements_on_sbn_by_cycle_puerto_rico.pdf)

[https://www.weather.gov/media/mdl/nbm/NBM\\_v3.2\\_elements\\_on\\_sbn\\_by\\_cycle\\_guam.pdf](https://www.weather.gov/media/mdl/nbm/NBM_v3.2_elements_on_sbn_by_cycle_guam.pdf)

[https://www.weather.gov/media/mdl/nbm/NBM\\_v3.2\\_elements\\_on\\_sbn\\_by\\_cycle\\_oceanic.pdf](https://www.weather.gov/media/mdl/nbm/NBM_v3.2_elements_on_sbn_by_cycle_oceanic.pdf)

A. GRIB2 SBN/NOAAPORT output:

NBM v3.2 GRIB2 header identifiers delineated by weather element and region can be found here:

<https://www.weather.gov/media/mdl/nbm/NBM%20v3.2%20Header%20Document.pdf>

#### B. Text Bulletin Additions to SBN/NOAAPORT:

NBM v3.2 probabilistic guidance (NBP) discussed in this Section will also be hosted on the SBN/NOAAPORT as part of the NBH, NBS, NBE, and NBX suite of products. This station-based guidance covers 12-hour periods for projections 24-192 hours and has a very similar format to the NBM v3.1 deterministic NBM extended ASCII text bulletins.

Header information for the probabilistic and deterministic text bulletin files can be found at:

<https://www.weather.gov/media/mdl/nbm/NBM%20V3.2%20Text%20Product%20WMO%20Header%20Scheme.pdf>.

#### 5. TGFTP/NDGD NBM Data Removal

On implementation day, all NBM products will no longer be hosted on TGFTP/NDGD. Specifically, the following directories will no longer be populated with NBM data:

<ftp://tgftp.nws.noaa.gov/SL.us008001/ST.expr/DF.gr2/DC.ndgd/GT.brend/AR.conus/> (CONUS)

<ftp://tgftp.nws.noaa.gov/SL.us008001/ST.expr/DF.gr2/DC.ndgd/GT.brend/AR.alaska/> (Alaska)

<ftp://tgftp.nws.noaa.gov/SL.us008001/ST.expr/DF.gr2/DC.ndgd/GT.brend/AR.hawaii/> (Hawaii)

<ftp://tgftp.nws.noaa.gov/SL.us008001/ST.expr/DF.gr2/DC.ndgd/GT.brend/AR.puertori/> (Puerto Rico)

<ftp://tgftp.nws.noaa.gov/SL.us008001/ST.expr/DF.gr2/DC.ndgd/GT.brend/AR.oceanic/> (Oceanic)

For a comprehensive list of all Headers that will be removed with the implementation of NBM v3.2 please visit the following hyperlinks:

[https://www.weather.gov/media/mdl/nbm/16398-tgftp\\_headers\\_conus-Approved.pdf](https://www.weather.gov/media/mdl/nbm/16398-tgftp_headers_conus-Approved.pdf)

[https://www.weather.gov/media/mdl/nbm/16398-tgftp\\_headers\\_alaska-Approved.pdf](https://www.weather.gov/media/mdl/nbm/16398-tgftp_headers_alaska-Approved.pdf)

[https://www.weather.gov/media/mdl/nbm/16398-tgftp\\_headers\\_hawaii-Approved.pdf](https://www.weather.gov/media/mdl/nbm/16398-tgftp_headers_hawaii-Approved.pdf) TGFTP/NDGD

[https://www.weather.gov/media/mdl/nbm/16398-tgftp\\_headers\\_pr-Approved.pdf](https://www.weather.gov/media/mdl/nbm/16398-tgftp_headers_pr-Approved.pdf)

[https://www.weather.gov/media/mdl/nbm/16398-tgftp\\_headers\\_oceanic-Approved.pdf](https://www.weather.gov/media/mdl/nbm/16398-tgftp_headers_oceanic-Approved.pdf)

## 6. Changes to NCEP Web Dissemination

On implementation day, NBM master GRIB2 output and NBM text messages for all cycles will be made available on NCEP web services sites. These will contain all elements and projections the NBM produces. Please follow any one of the three hyperlinks below for this data:

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

The following GRIB2 files for the Oceanic domain will be discontinued on NCEP web services:

blend.\${cycle}.gust\_cdf-50p.oc.grib2  
blend.\${cycle}.mlsp\_cdf-[10,50,90]p.oc.grib2  
blend.\${cycle}.temp\_cdf-50p.oc.grib2  
blend.\${cycle}.vis\_cdf-50p.oc.grib2  
blend.\${cycle}.wspd10\_cdf-[10,25,50,75,90]p.oc.grib2  
blend.\${cycle}.wspd30\_cdf-50p.oc.grib2  
blend.\${cycle}.wspd80\_cdf-50p.oc.grib2  
blend.\${cycle}.wdir.oc.grib2  
blend.\${cycle}.sigwv.ext.oc.grib2

These will be replaced with the following Master GRIB2 file:

blend.\${cycle}.master.f\${HHH}.oc.grib2

Approximately 1 month prior to implementation, 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/>  
[https://sats.nws.noaa.gov/~nbm/nbm\\_text](https://sats.nws.noaa.gov/~nbm/nbm_text)

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:

David Rudack  
MDL/Silver Spring, Maryland  
301-427-9456  
[David.Rudack@noaa.gov](mailto:David.Rudack@noaa.gov)

or

Jeff Craven  
MDL/Silver Spring, Maryland  
301-427-9475  
[Jeffrey.Craven@noaa.gov](mailto:Jeffrey.Craven@noaa.gov)

For questions regarding the data flow, please contact:

Carissa Klemmer  
NCEP Central Operations  
Implementation and Data Services Branch Chief  
[ncep.list.pmb-dataflow@noaa.gov](mailto:ncep.list.pmb-dataflow@noaa.gov)

A web page describing the NBM can be found at:  
[http://www.weather.gov/mdl/nbm\\_home](http://www.weather.gov/mdl/nbm_home)

NWS National Service Change Notices are online at:  
<http://www.weather.gov/notification>

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