An Overview of the National Blend of Models (NBM)

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Outline

- What is the NBM?
- General Process / Products / Domains
- Challenges
- NBMv5.0
- Timeline / Future Plans
- Q & A

National Blend *of* Models

A nationally consistent and skillful suite of calibrated forecast guidance based on a blend of both National Weather Service and external numerical weather prediction model data and post-processed model guidance.

A highly accurate, skillful and consistent starting point for the gridded forecast.

Probabilistic and bias-corrected weather elements across several service areas.

Providing forecasters with a suite of information to use for their forecasts.

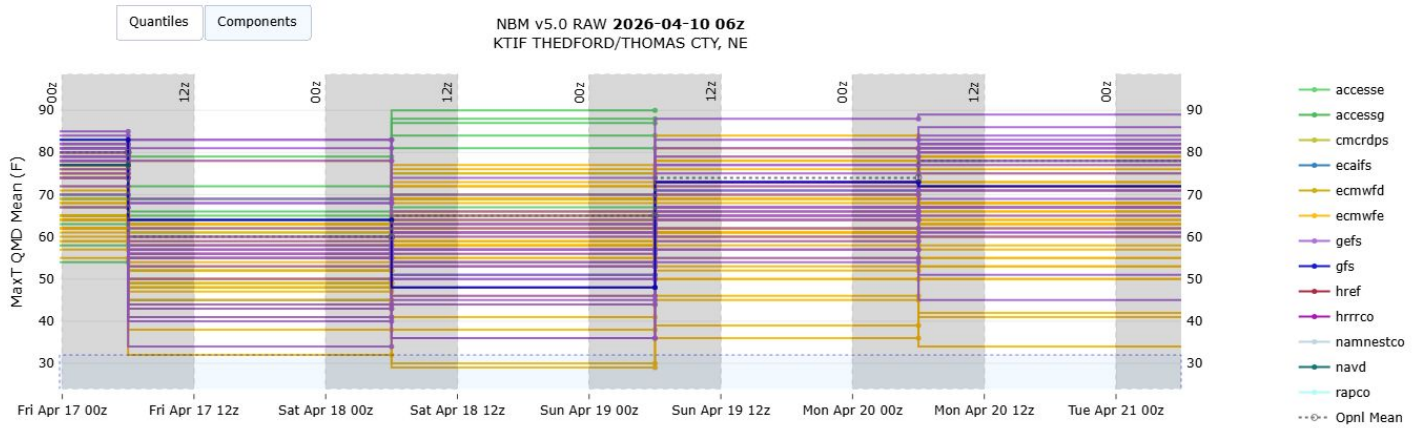
An important part of the efforts to evolve NWS capabilities to achieve a Weather-Ready Nation.

NBM Inputs

- NOAA
- Canadian Meteorological Centre
- European Centre for Medium-Range Weather Forecasts
- U.S. Navy Fleet Numerical Meteorology and Oceanography Center
- Australia Bureau of Meteorology

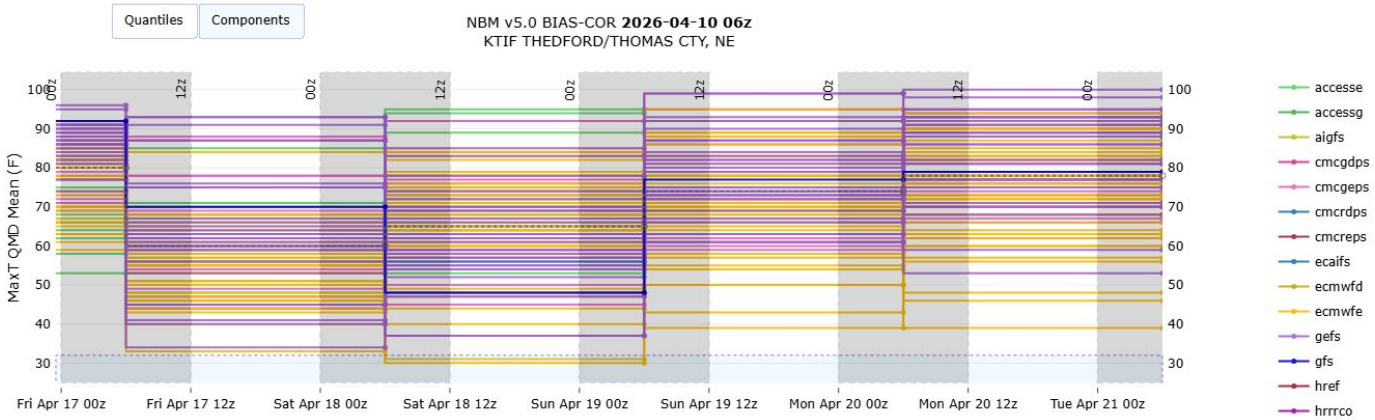
- The NBM is not a model! It's a post-processed BLEND of available models

The Concept



- For a forecast of a particular weather element at a chosen forecast hour, when we consider available model runs and their complete ensembles, there are often a LOT of forecasts with a significant range of solutions

The Concept



- Individual forecasts can be bias corrected, and they can then be combined into a single forecast value as well as a range of outcomes and probabilities of exceeding different thresholds

General NBM Process

NWP Models

GFS, ECMWF, NAVGEM, ACCESS

Regional

NAM, RAP, RDPS

Hi-Resolution

HRRR, HAFS, NAM-Nest HiResARWs HiResFV3

Ensembles

GEFS, ECMWFE, CMCE NAVGEME, ACCESSE, SREF, REPS

Statistical

GMOS GLAMP

Calibration

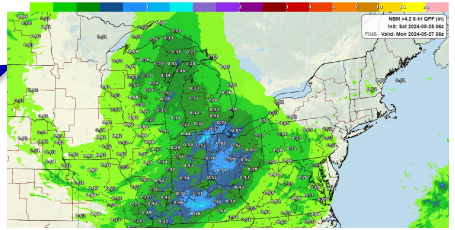
Calibration of each model using recent verification to adjust the forecast and improve accuracy and detail

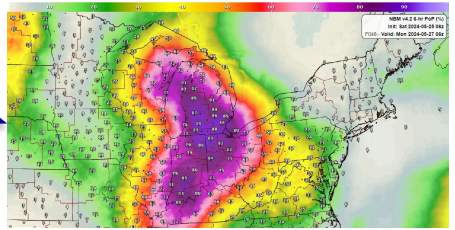
Verification based on URMA

Blending

Based on skill of each model input

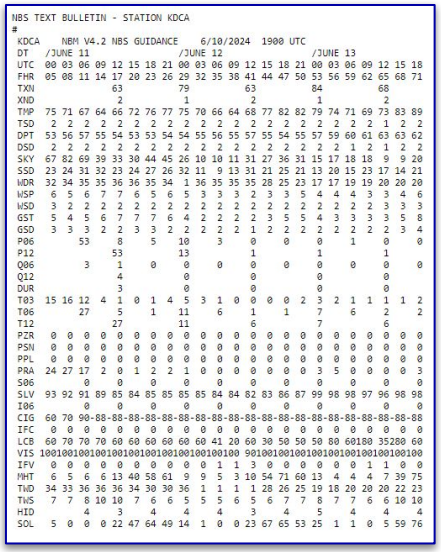
Better-performing models during the recent period influence the blend more (fields with no analysis, such as PoP, are "expert" -weighted)





Types of Products

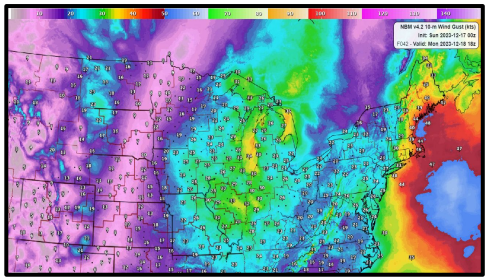
Please see the full list of outputs at:
https://vlab.noaa.gov/web/mdl/nbm



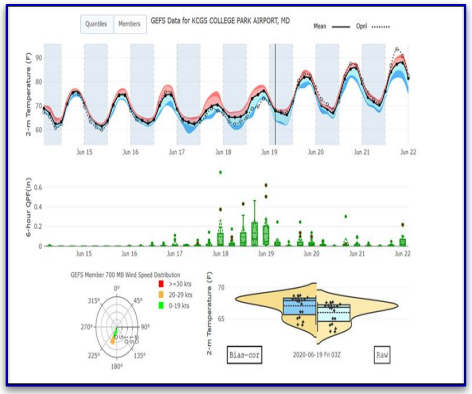
NBS TEXT BULLETIN - STATION KDCA

```
#
 KDCA     NBM V4.2 NBS GUIDANCE    6/10/2024  1900 UTC
 DT   /JUNE 11                /JUNE 12                /JUNE 13
 UTC  00 03 06 09 12 15 18 21 00 03 06 09 12 15 18 21 00 03 06 09 12 15 18
 FHR  05 08 11 14 17 20 23 26 29 32 35 38 41 44 47 50 53 56 59 62 65 68 71
 TXN                 63                  79                  63                  84                  68
 XND                  2                   1                   2                   1                   2
 TMP  75 71 67 64 66 72 76 77 75 70 66 64 68 77 82 82 79 74 71 69 73 83 89
 TSD   2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  1  2  2
 DPT  53 56 57 55 54 53 53 54 54 55 56 55 57 55 54 55 57 59 60 61 63 63 62
 DSD   2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  1  2  1  2  2
 SKY  67 82 69 39 33 30 44 45 26 10 10 11 31 27 36 31 15 17 18 18  9  9 20
 SSD  23 24 31 32 23 24 27 26 32 11  9 13 31 21 25 21 13 20 15 23 17 14 21
 WDR  32 34 35 35 36 36 35 34  1 36 35 35 35 28 25 23 17 17 19 19 20 20 20
 WSP   6  5  6  7  7  6  5  6  5  3  3  3  2  3  3  5  4  4  4  3  3  4  6
 WSD   3  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  2  3  3  3
 GST   5  4  5  6  7  7  7  6  4  2  2  2  2  3  5  5  4  3  3  3  3  5  8
 GSD   3  3  3  2  2  3  3  2  2  2  2  2  1  2  2  2  2  2  2  2  2  3  4
 P06         53     8     5    10     3     0     0     0     1     0     0
 P12                53                 13                 1                  1
 Q06          3     1           0     0           0     0           0     0
 Q12                4                 0                  0                  0
 DUR                3                 0                  0                  0
 T03  15 16 12  4  1  0  1  4  5  3  1  0  0  0  0  2  3  2  1  1  1  1  2
 T06         27     5     1    11     6     1     1     7     6     2     2
 T12                27                 11                 6                  7                  6
 PZR   0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 PSN   0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 PPL   0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 PRA  24 27 17  2  0  1  2  2  1  0  0  0  0  0  0  0  3  5  0  0  0  0  3
 S06          0     0     0     0     0     0     0     0     0     0     0
 SLV  93 92 91 89 85 84 85 85 85 85 84 84 82 83 86 87 99 98 98 97 96 98 98
 I06          0     0     0     0     0     0     0     0     0     0     0
 CIG  60 70 90-88-88-88-88-88-88-88-88-88-88-88-88-88-88-88-88-88-88-88-88
 IFC   0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0
 LCB  60 70 70 70 60 60 60 60 60 60 41 20 60 30 50 50 50 80 60180 35280 60
 VIS 10010010010010010010010010010010010 90100100100100100100100100100
 IFV   0  0  0  0  0  0  0  0  0  0  1  1  3  0  0  0  0  0  0  1  1  0  0
 MHT   6  5  6  6 13 40 58 61  9  9  5  3 10 54 71 60 13  4  4  4  7 39 75
 THD  34 33 36 36 36 34 30 30 36  1  1  1  1 28 26 25 19 18 20 20 20 22 23
 TWS   7  7  8 10 10  7  6  6  5  5  5  6  5  6  7  7  8  7  7  6  6 10 10
 HID          4     3     4     4     4     3     4     5     4     4     4
 SOL   5  0  0  0 22 47 64 49 14  1  0  0 23 67 65 53 25  1  1  0  5 59 76
```

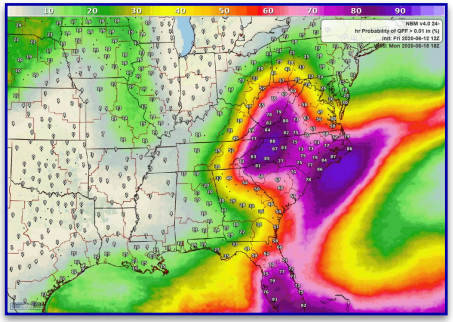
Text Bulletins



Grids



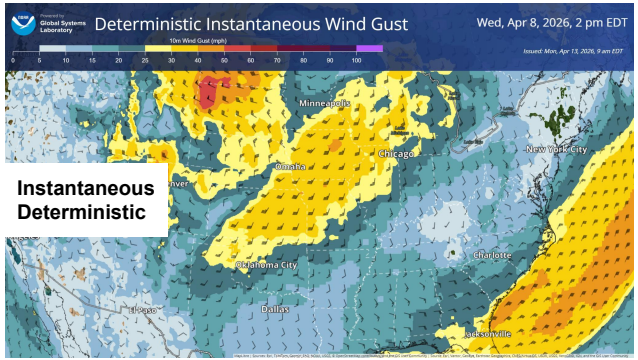
Probabilistic Info



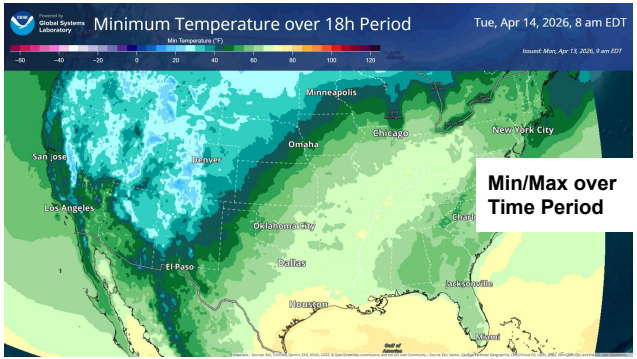
- **Updated hourly**
- **1-263h** (Day 11) **fcsts**
- **7 domains:**
  (Conus, AK, HI, PR, Guam, Oceanic, Global)

[List of Products by Region]

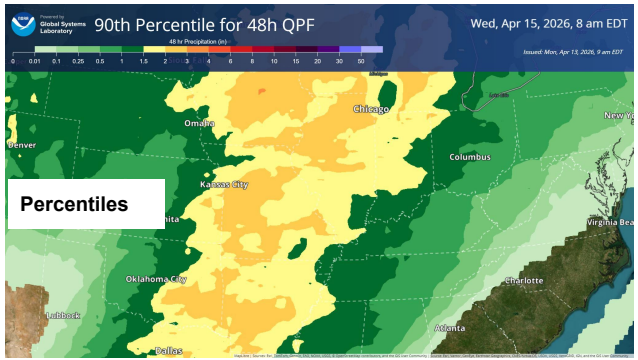
Gridded Products



Instantaneous Deterministic



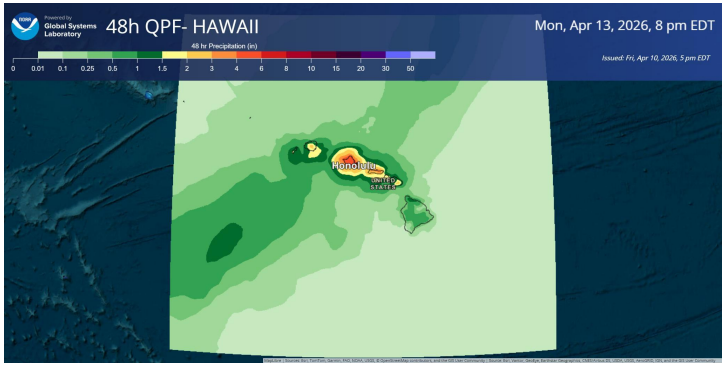
Min/Max over Time Period

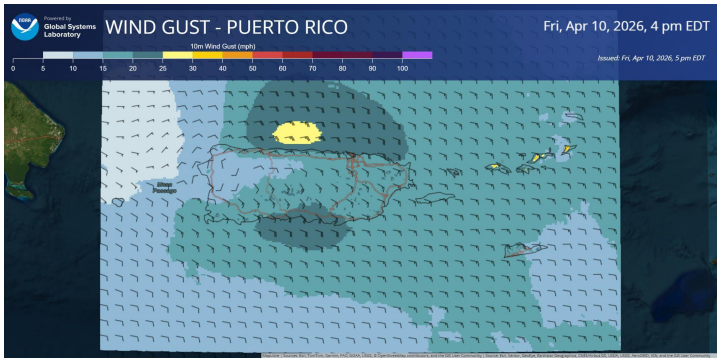


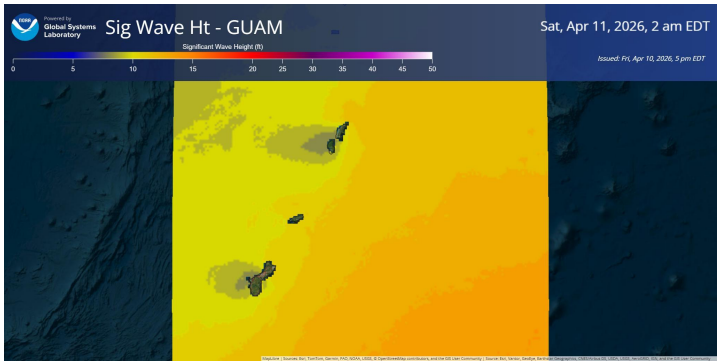
Percentiles

Exceedance Probabilities

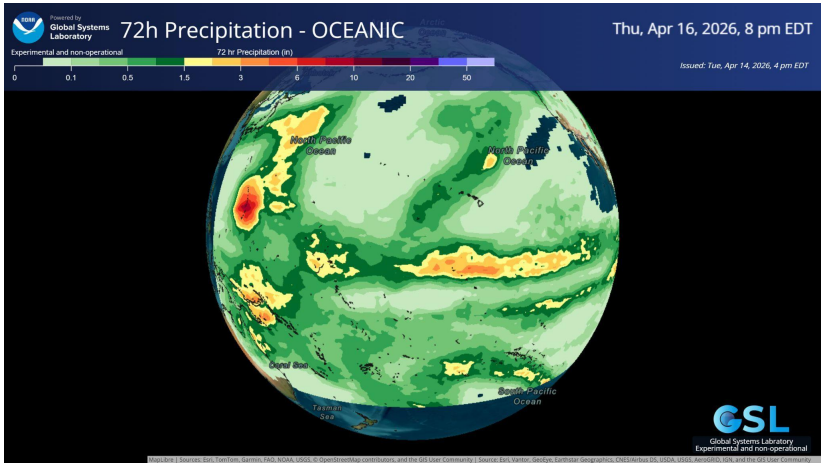
OCONUS Domains

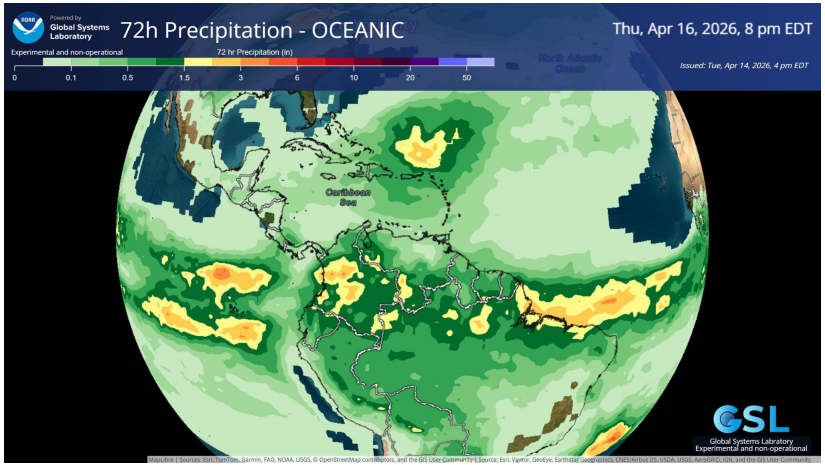






OCONUS Domains - Oceanic





NBM Uses

- The NBM now serves as the NWS gridded forecast during the Days 4-7 period for CONUS, with only minor edits made by the Weather Prediction Center, in consultation with local Weather Forecast Offices (WFOs). This will soon be done over Alaska as well

- The NBM is also used as the starting point for the NWS gridded forecast in the Days 0-3 period. The WFOs make their own edits. A national process, similar to what is done in the Days 4-7 period, will be pursued soon

- The NBM provides key tools to support NWS Impact-Based Decision Support Services (IDSS)

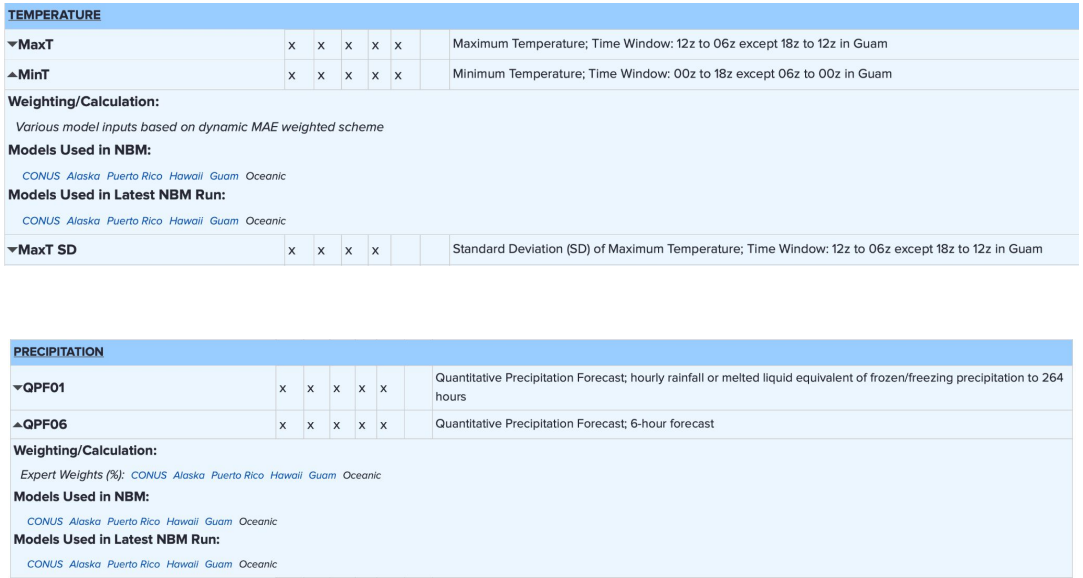
Information on NBM Elements

NBM V4.2 SURFACE WEATHER ELEMENTS

Surface Weather Elements	CO	AK	PR	HI	GU	OC	Definition
TEMPERATURE							
MaxT	x	x	x	x			Maximum Temperature; 12z to 06z except in Guam 18z to 12z
MinT	x	x	x	x			Minimum Temperature; 00z to 18z except in Guam 06z to 00z
MaxT SD	x	x	x	x			Standard Deviation (SD) of Maximum Temperature; 12z to 06z except in Guam 18z to 12z
MinT SD	x	x	x	x			Standard Deviation (SD) of Minimum Temperature; 00z to 18z except in Guam 06z to 00z
PMaxT	x	x					Percentiles from 1-99 of Maximum Temperature; 12z to 06z except in Guam 18z to 12z
PMinT	x	x					Percentiles from 1-99 of Minimum Temperature; 00z to 18z except in Guam 06z to 00z
PMaxT Mean	x	x					True mean of Maximum Temperature percentiles; 12z to 06z except in Guam 18z to 12z
PMinT Mean	x	x					True mean of Minimum Temperature percentiles; 00z to 18z except in Guam 06z to 00z
PMaxT SD	x	x					Standard Deviation (SD) of Maximum Temperature percentiles; 12z to 06z except in Guam 18z to 12z
PMinT SD	x	x					Standard Deviation (SD) of Minimum Temperature percentiles; 00z to 18z except in Guam 06z to 00z
Temp	x	x	x	x	x	x	Top of hour value of temperature; hourly through 36 hours, then 3 hourly to 192 hours, then 6 hourly to 264.
Temp SD	x	x	x	x	x		Top of the hour value Temperature Standard Deviation (SD)
AppT	x	x	x	x			Apparent Temperature; derived parameter from Temp, Td, and wind speed
WBGT	x		x	x	x		Wet Bulb Globe Temperature; measure of heat stress using NBM Temp, Td, Sky, Wspd, and MSLP
PRECIPITATION							
QPF01	x	x	x	x	x		Quantitative Precipitation Forecast; hourly rainfall or melted liquid equivalent to 264 hours
QPF06	x	x	x	x	x		Quantitative Precipitation Forecast; 6-hour forecast

- This element page contains tables featuring a description and weighting and region information for Surface, Aviation, Fire, Winter, and Marine elements
- Highlighting weather element provides tooltip for long name of variable and highlights cell

Information on NBM Elements



TEMPERATURE							
▾MaxT	x	x	x	x	x		Maximum Temperature; Time Window: 12z to 06z except 18z to 12z in Guam
▴MinT	x	x	x	x	x		Minimum Temperature; Time Window: 00z to 18z except 06z to 00z in Guam
Weighting/Calculation: *Various model inputs based on dynamic MAE weighted scheme* **Models Used in NBM:** *CONUS Alaska Puerto Rico Hawaii Guam Oceanic* **Models Used in Latest NBM Run:** *CONUS Alaska Puerto Rico Hawaii Guam Oceanic*							
▾MaxT SD	x	x	x	x			Standard Deviation (SD) of Maximum Temperature; Time Window: 12z to 06z except 18z to 12z in Guam

PRECIPITATION							
▾QPF01	x	x	x	x	x		Quantitative Precipitation Forecast; hourly rainfall or melted liquid equivalent of frozen/freezing precipitation to 264 hours
▴QPF06	x	x	x	x	x		Quantitative Precipitation Forecast; 6-hour forecast
Weighting/Calculation: *Expert Weights (%): CONUS Alaska Puerto Rico Hawaii Guam Oceanic* **Models Used in NBM:** *CONUS Alaska Puerto Rico Hawaii Guam Oceanic* **Models Used in Latest NBM Run:** *CONUS Alaska Puerto Rico Hawaii Guam Oceanic*							

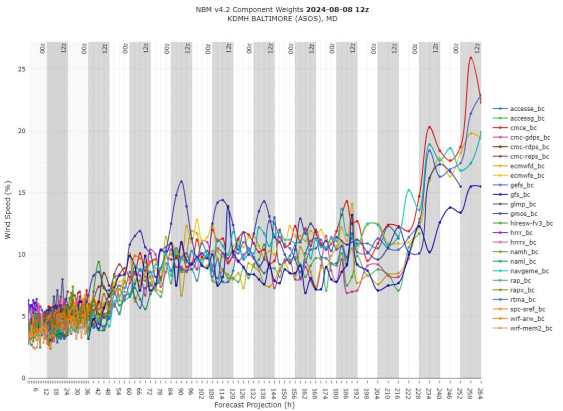
- Clicking on element name toggles row to provide information on weighting scheme
- For expert weighted elements, links are provided per region (or if upper air, per pressure level)

How Inputs are Blended

- Different blending approaches are used for different forecast parameters
- To determine the methodology, the key question is whether a reliable and skillful analysis (representation of the true state) exists for a particular parameter. If yes, we can potentially perform bias correction.
- Quality analyses are available for fields like temperature and precipitation
- Quality analyses are not available for fields like visibility and PoP

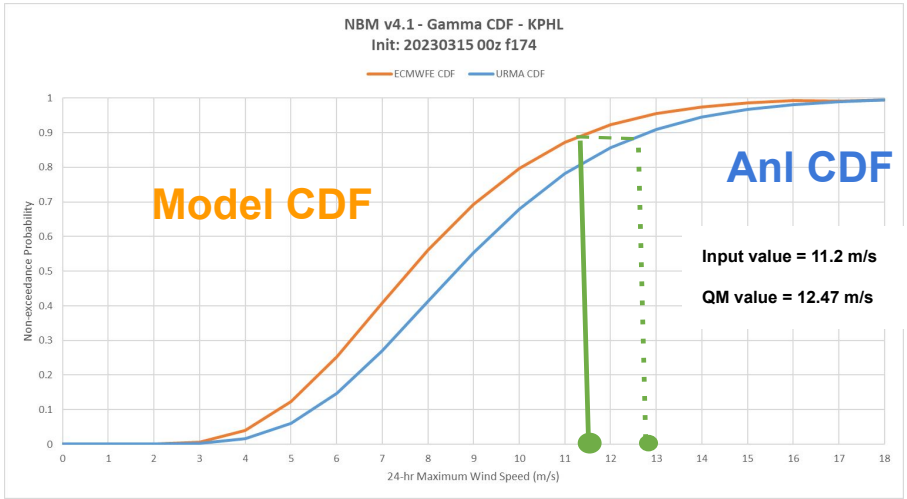
If a quality analysis exists, BIAS CORRECT

- Examples: temperature, wind speed, cloud cover
- We keep track of errors in the individual models over the past X (generally 60-120, depending on the parameter) days, the current forecast is bias-corrected based on recent errors, and more weight is given in the blending to models that have recently performed well for that parameter at that particular forecast range
- The weighting therefore changes cycle to cycle and forecast hour to forecast hour separately for each element



Quantile Mapping

- Quantile mapping is a bias correction method leveraging cumulative distribution functions (CDFs)
  - Entire distribution taken into account
- Ingredients:
  - forecast amount *(i.e. a value to correct)*
  - forecast CDF
  - analysis CDF
- In NBM, we use quantile mapping for
  - Precipitation: Gamma distribution
  - Wind Speed/Gust, Sig Wave Ht: Gamma distribution
  - Temperature, Dew Point: Gaussian distribution



If a quality analysis does not exist or is not possible, apply EXPERT WEIGHTING

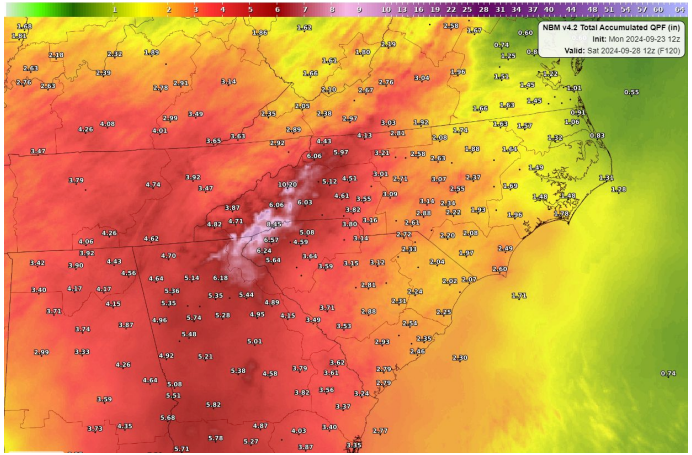
- Examples: probability of precipitation, visibility, snow accumulation
- We assign “expert weights” in which multiple forecasters and researchers determined which inputs deserve the most weighting
- There is no variation cycle to cycle
- These decisions were very subjective, and we are trying to use some performance metrics to improve the weighting

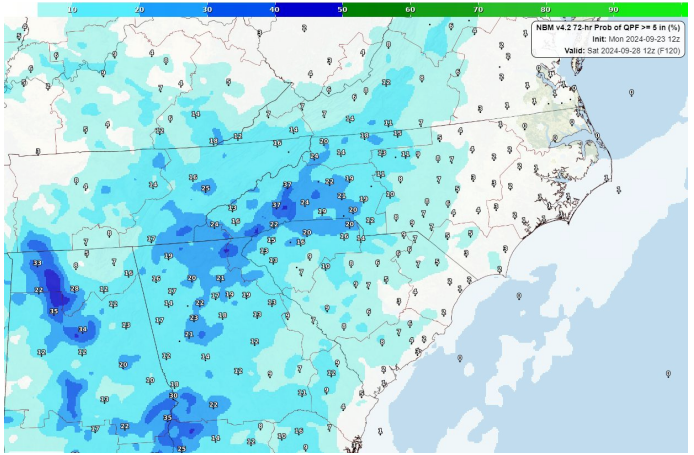
Expert Weighting (%) for SNOICEACCUM - CONUS

Model	Proj for 01-16hrs	Proj for 17-19hrs	Proj for 20-42hrs	Proj for 43-60hrs	Proj for 61-84hrs	Proj for 84+hrs
10 SREF ARW	1/MEM	1/MEM	1/MEM	3/MEM	3/MEM	0
30 GEFS	0.15/MEM	0.15/MEM	0.15/MEM	0.4/MEM	0.825/MEM	1.2/MEM
50 ECMWF	0.15/MEM	0.15/MEM	0.15/MEM	0.4/MEM	0.825/MEM	1.2/MEM
GFS	2	2	3	4	4	4
HRRR	16	0	0	0	0	0
HRRRX	6	17	17	0	0	0
HIRESARW	10	11	12	0	0	0
HIRESARW2	12	12	13	0	0	0
HIRESFV3	12	13	14	14	0	0
NAM	0	0	0	0	0	0
NAMNEST	12	15	16	17	0	0
RAP	5	5	0	0	0	0
RAPX	3	3	3	0	0	0
total	*100*	*100*	*100*	*100*	*100*	*100*

Challenges with Using the NBM

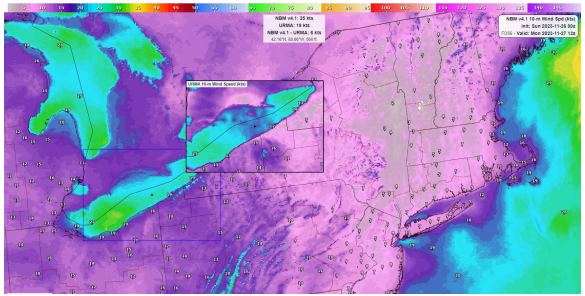
Inconsistencies

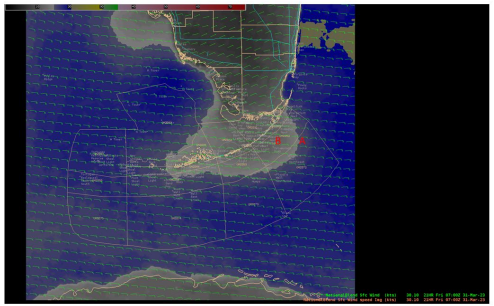


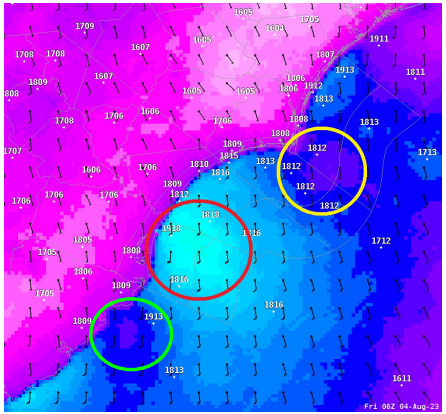


Here, there are sizable areas with deterministic rainfall totals > 6”, including some amounts > 10”, but the probability of greater than 5” is < 50% everywhere

Artifacts

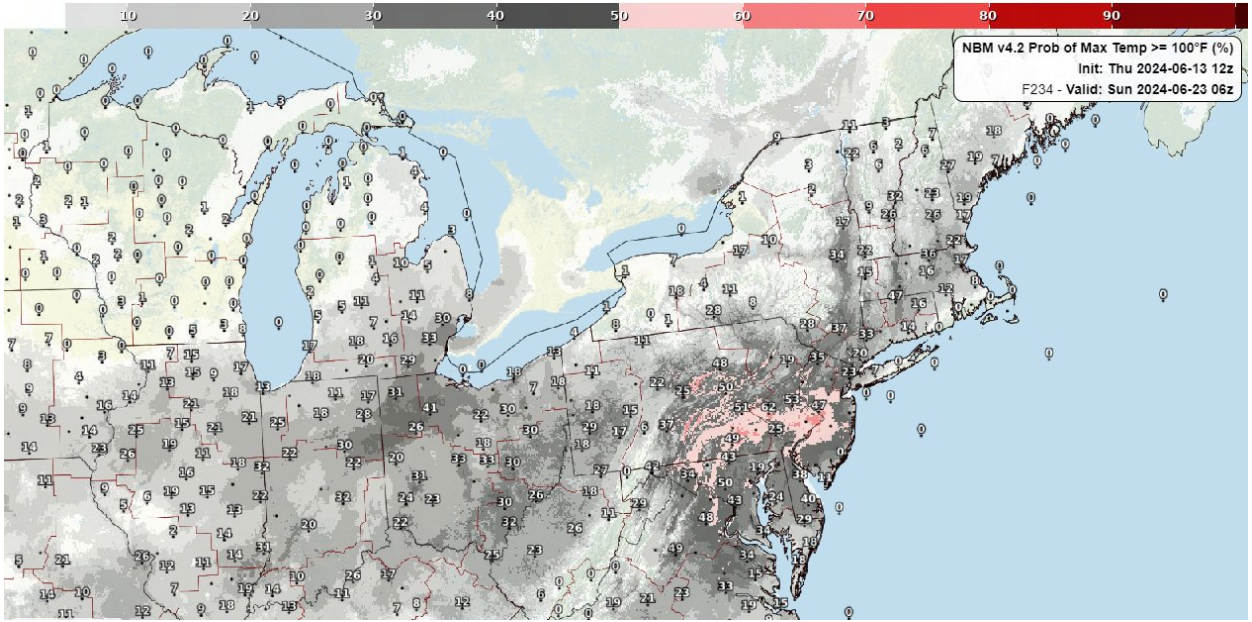






- Undesirable features in NBM output are usually driven by corresponding odd features in the NWS Analysis of Record (the RTMA/URMA) which is used for most NBM bias correction

Seasonal Transitions



In this example, the first modeled heat wave of the season causes issues, as the bias correction is working off of the biases during the end of winter and spring and increases already predicted hot values; the forecasted values are also in the tails of the distribution which complicates the bias correction

Pixels

Prob of Max Temp < 0 F)

RTMA/URMA doesn't match METAR observations directly, which is considered the "gold standard" of observations, so at METAR sites, we bias correct directly to the METAR observations (while we correct to the URMA at all other points); this leads to "bullseye features"

Version 5.0 of the NBM

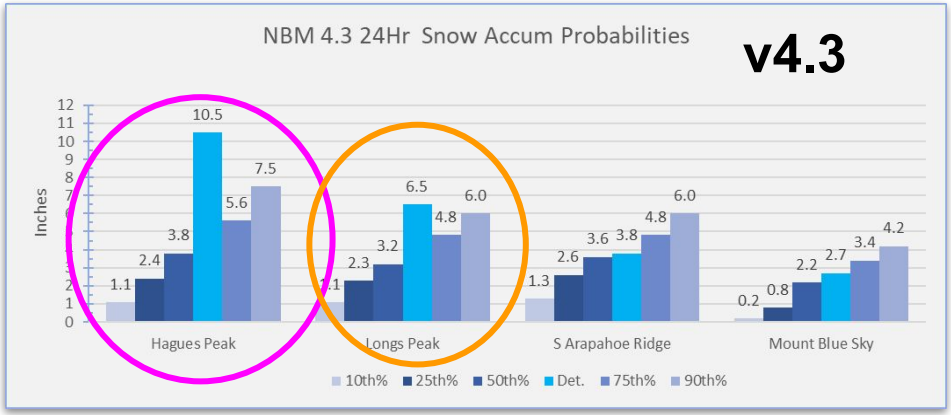
- Consistency
- Winter
- Winds
- QPF
- Waves
- New Products

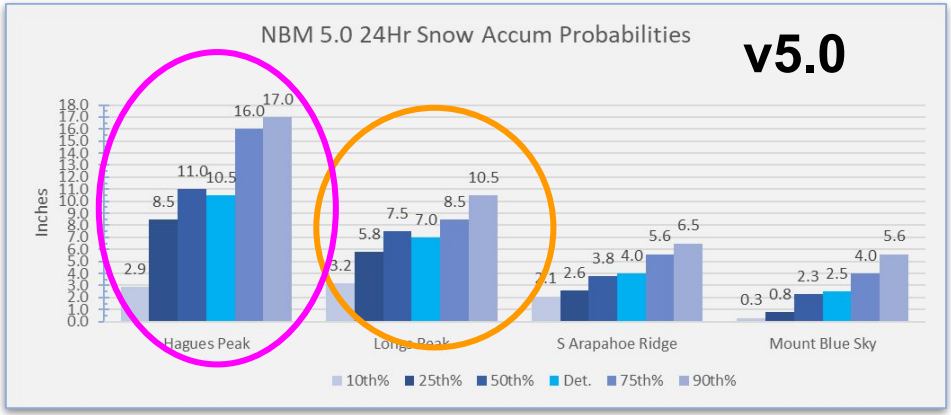
Deterministic / Probabilistic Consistency

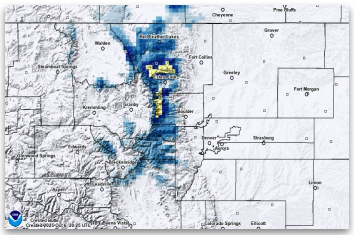
- **Inconsistencies between the NBM probabilistic and deterministic fields** have long been a source of much user confusion. These are caused by:
  - Using different approaches for the deterministic and probabilistic computations
  - Assigning different weighting for the deterministic and probabilistic computations

- **v5.0 reconciles these differences**
  - For most parameters now, the deterministic value is derived from the distribution instead of being computed separately

Consistency in v5.0

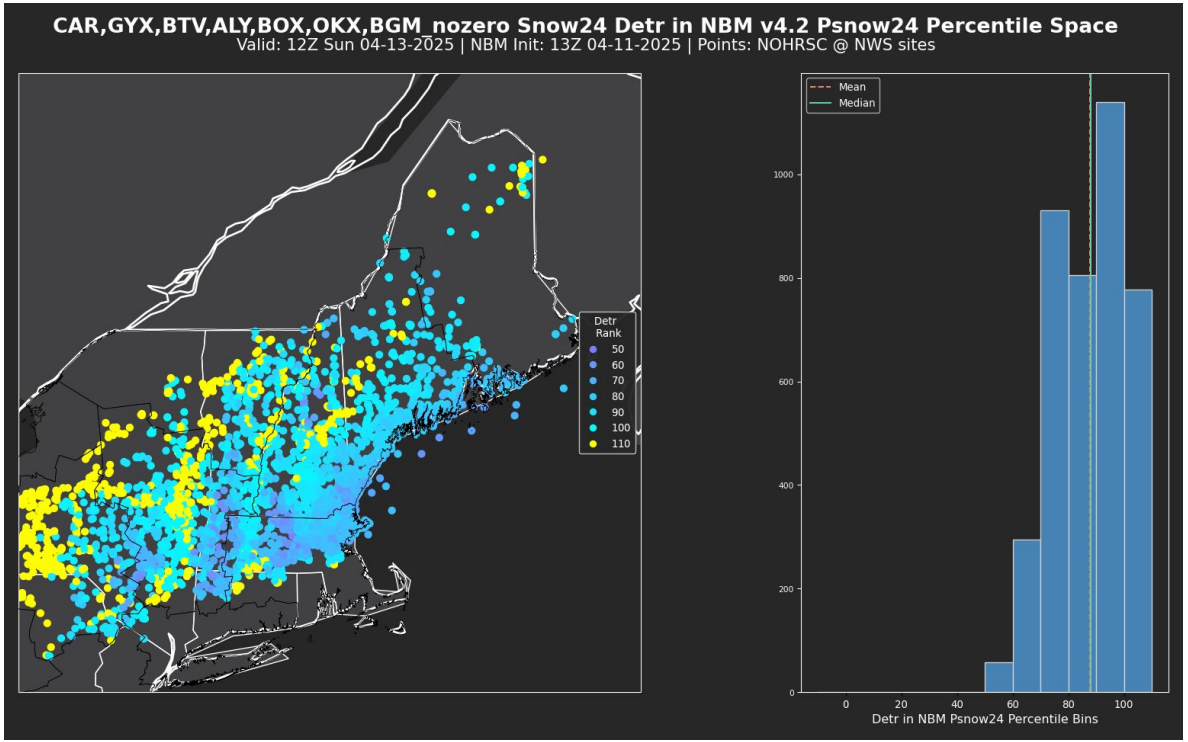






- Courtesy WFO Boulder
- Deterministic amounts in v4.3 are often outside of the distribution
- They fall nicely inside of the distribution in v5.0

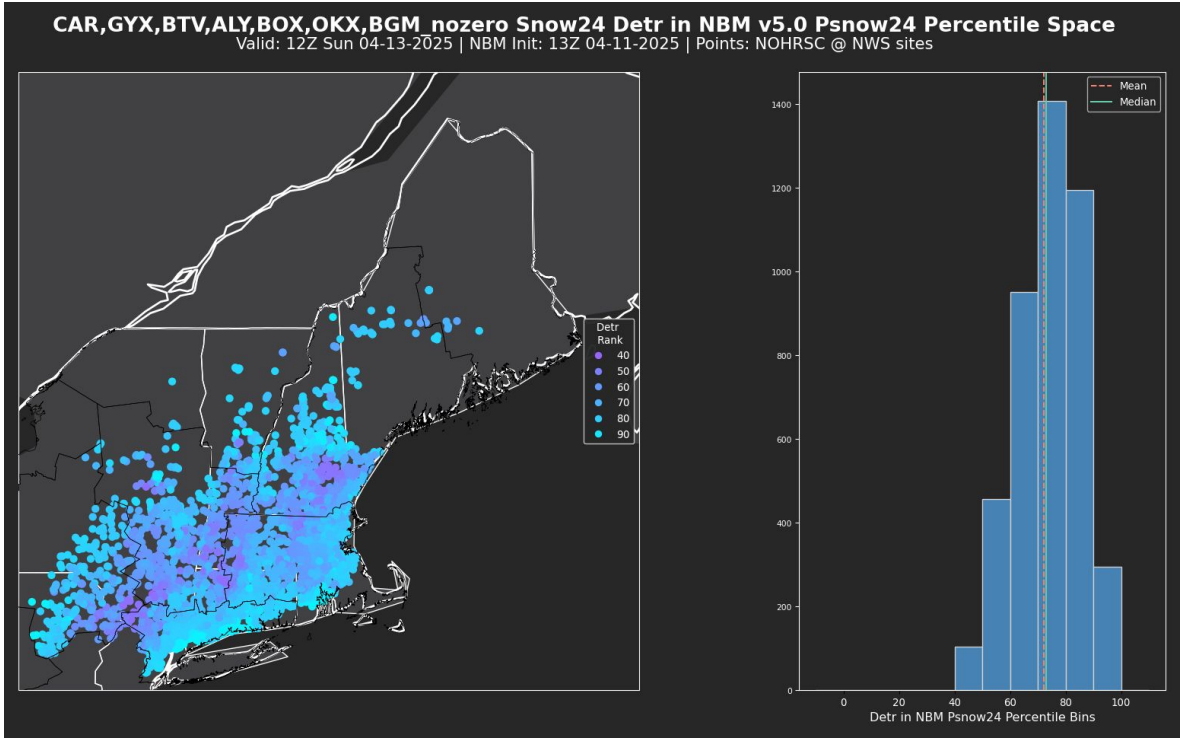
Inconsistency in Ops



Yellow points: the deterministic value of total snowfall was higher than 99th percentile
(777 out of 8309 ob sites)

The distribution of the deterministic values on the right image is heavily skewed towards the upper percentiles

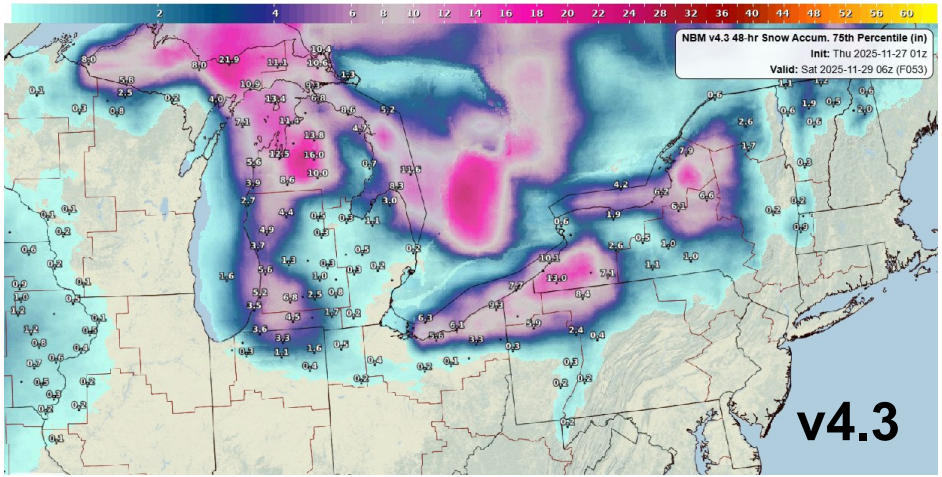
More Consistency in v5.0

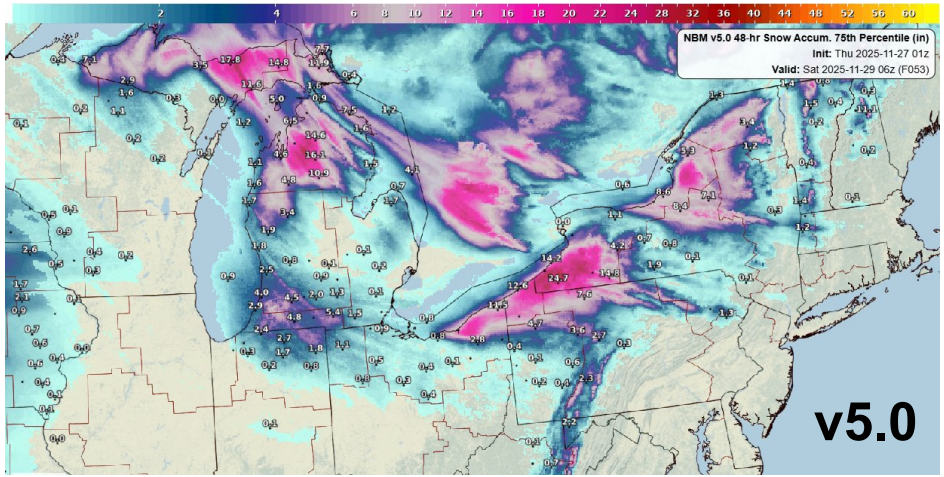


There are no yellow points for this case in v5.0

The distribution of the deterministic values on the right image is closer to a normal distribution (although still skewed a bit to the right)

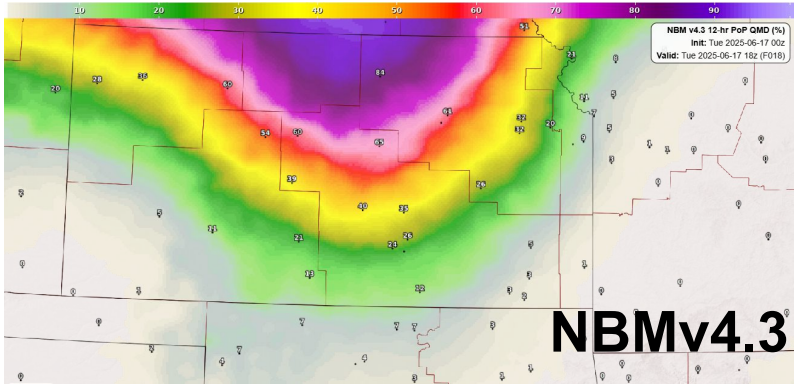
Higher Weight for Higher-Res Inputs in Winter and QPF Fields

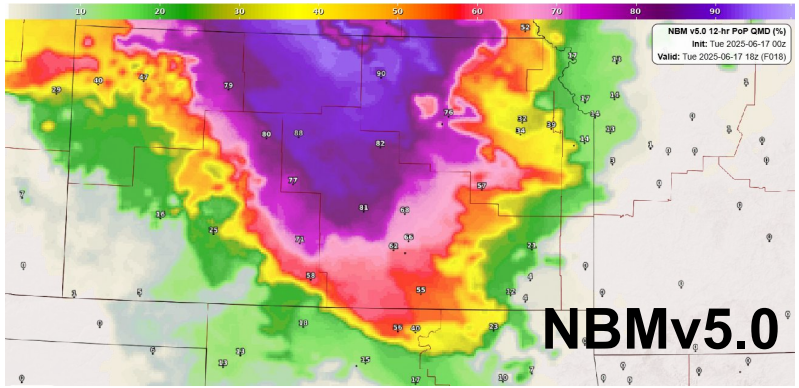




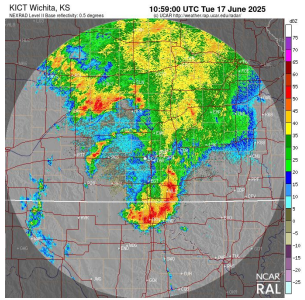
- More weight given to hi-res inputs in the probabilistic side of the winter suite leads to far more mesoscale detail in the probabilistic fields

PoP Example

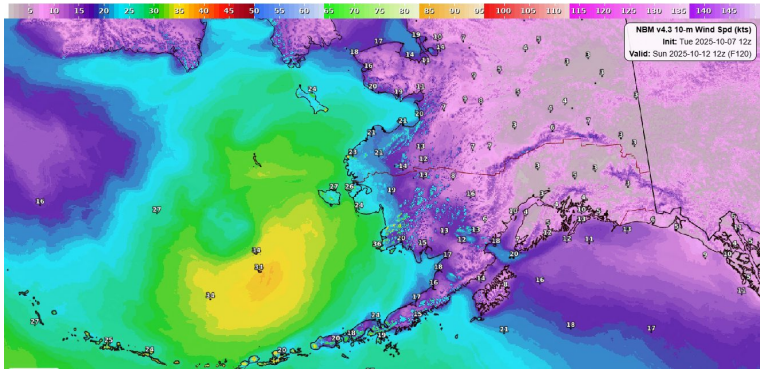




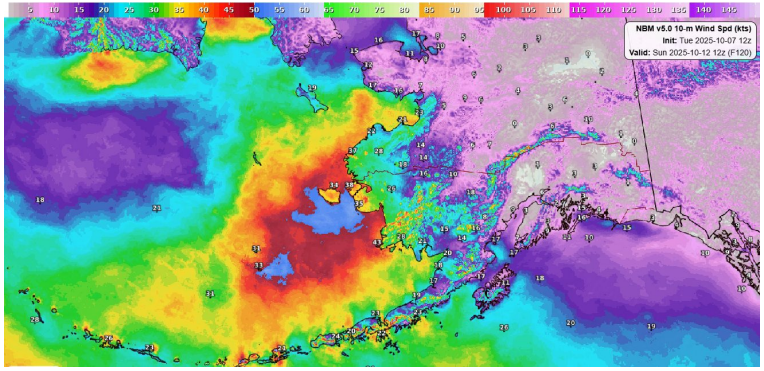
- Increased influence of the CAMs is very clear (and generally useful) in weakly-forced convective events



New Approach for Deterministic Wind / Gust

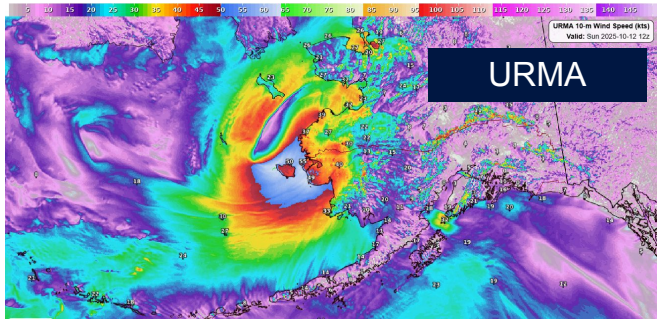


v4.3



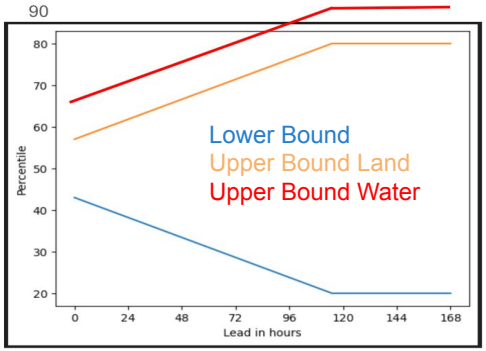
v5.0

In the ops NBM, we take the mean value of the distribution to serve as the deterministic wind value

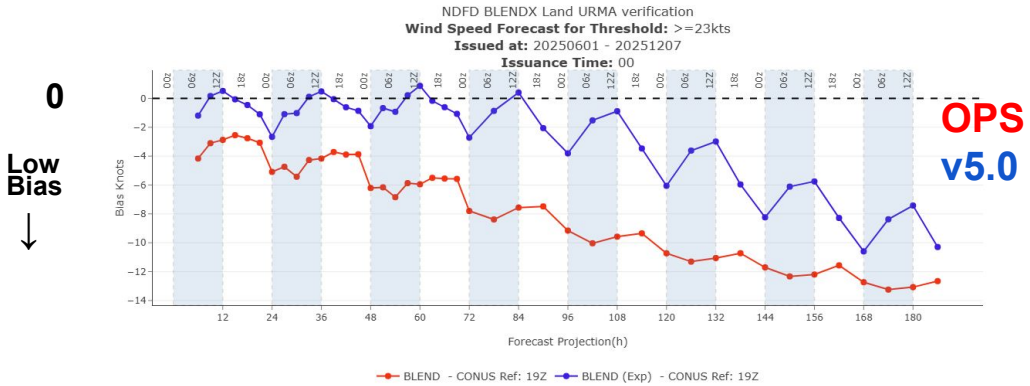


In v5.0, we use climo to select a percentile more likely to verify than the mean

New Approach for Deterministic Wind / Gust

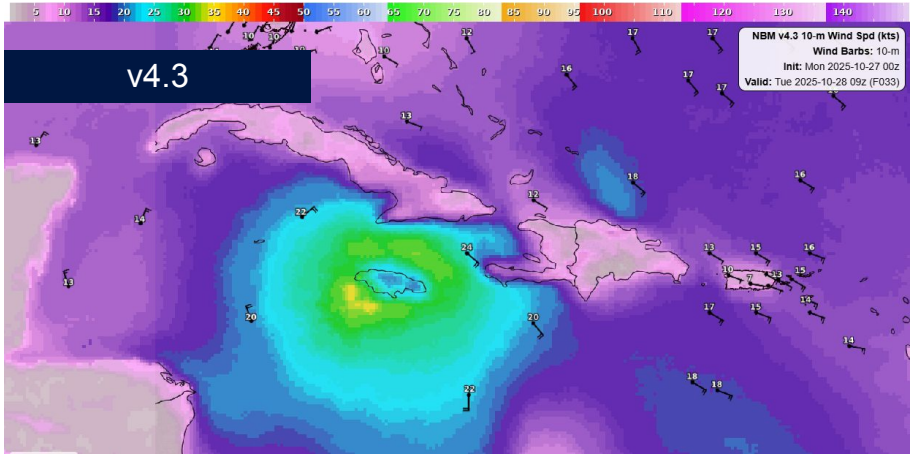


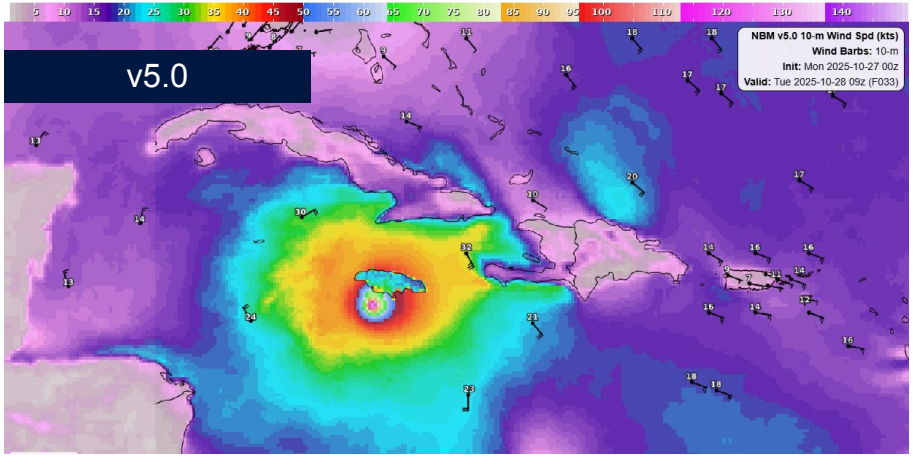
- Can choose a higher or lower value
- Allowable percentile range is larger for longer lead times; the range is constrained at early forecast projections
- Upper bound is higher for water than land



- CONUS **bias** for wind speeds > 23 kt is significantly improved, especially beyond Day 2

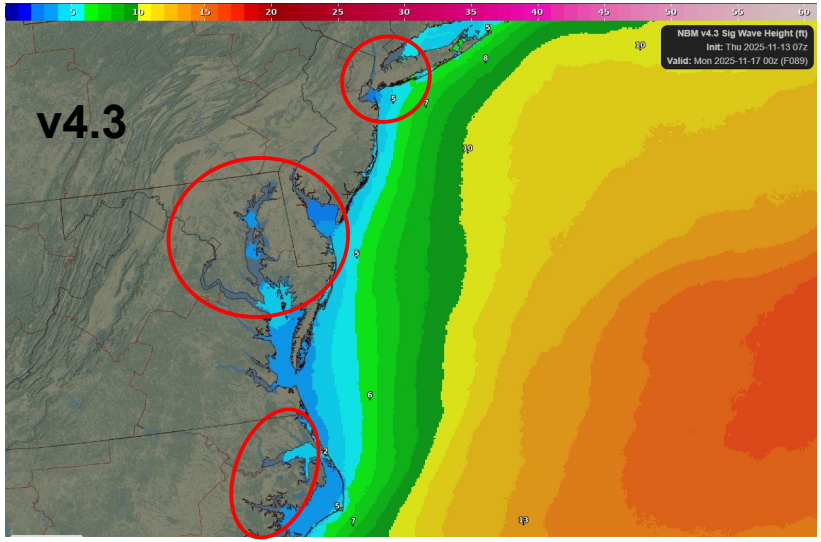
Melissa Wind Speed

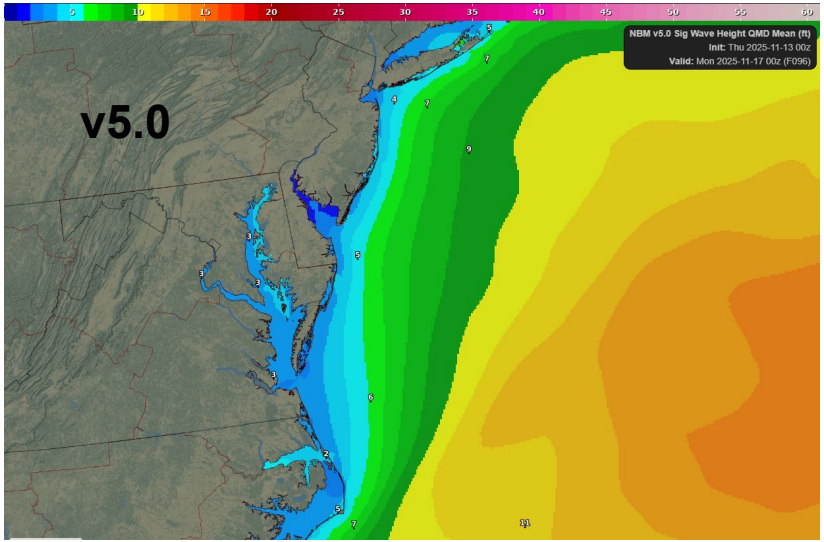




- V5.0 uses the GTCM data from NHC in the 10m wind products
- The improvement in this 33h forecast is impressive
- The top speed in the ops forecast is below 40 kt

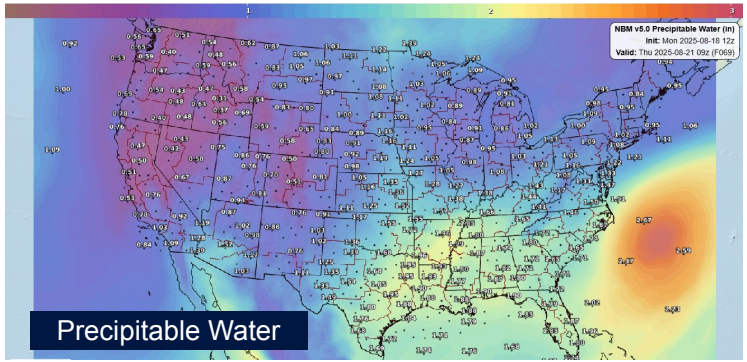
Sig Wave Height Differences

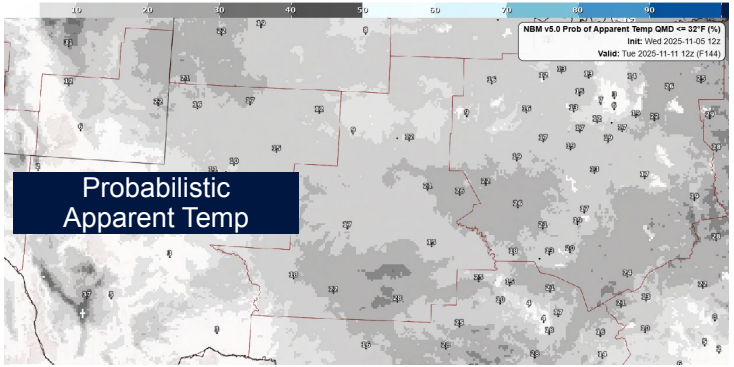


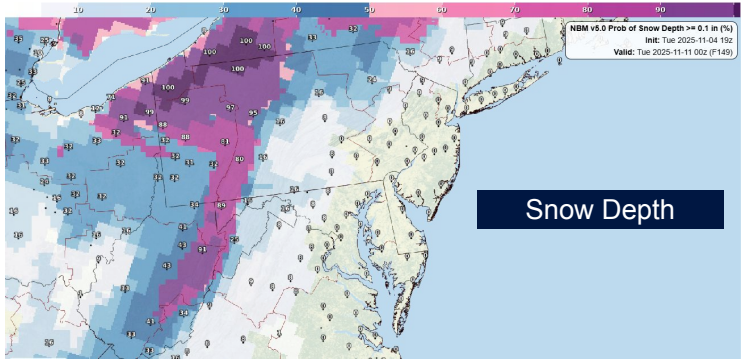


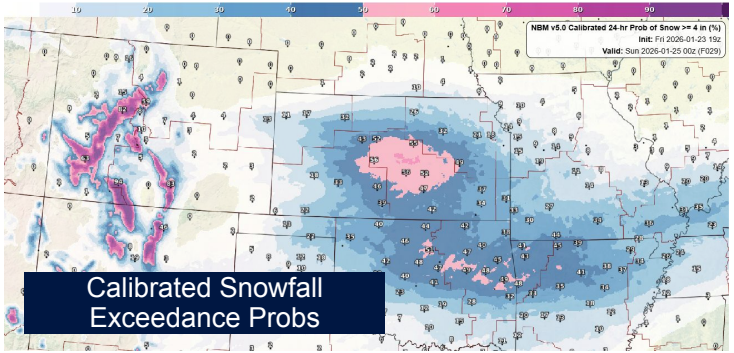
- v5.0 fills in the wave field in more of the bays / estuaries
- From the NWS: “Resolving the issue of the missing significant wave heights along the coast is a greatly needed enhancement. Previous NBM versions were not usable for several East Coast WFOs due to the missing data areas”

New Products

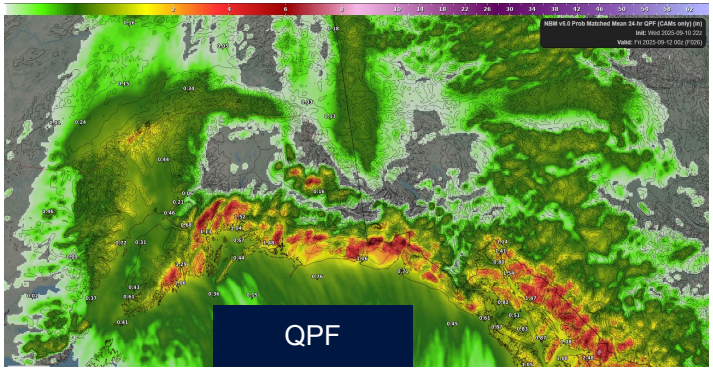




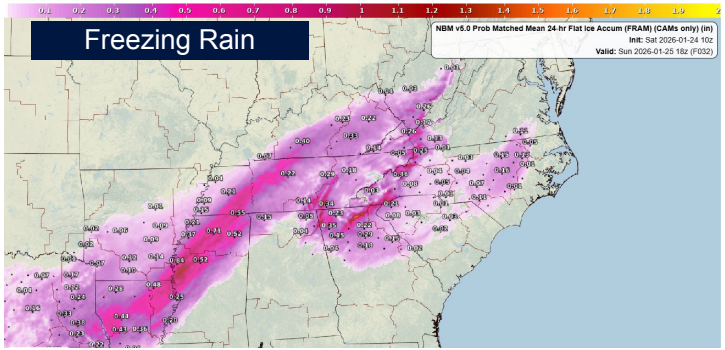


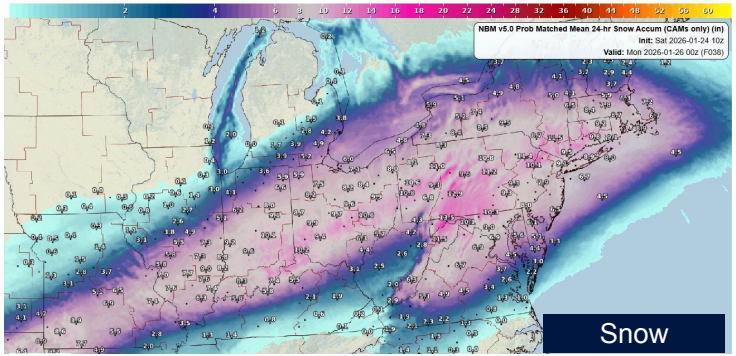


New Probability-Matched Mean Products

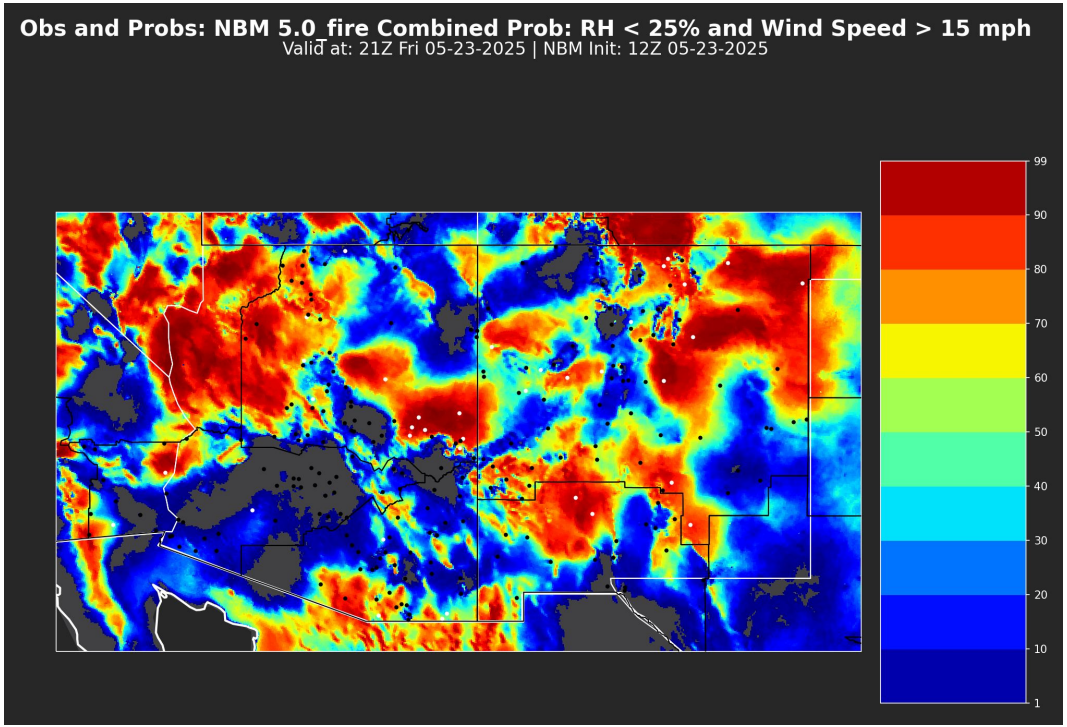


Short-range products derived from hi-res inputs; goal is to restore amplitude from the individual solutions





New Joint Probabilities for Fire Weather



- NBMv5 is generating **joint probabilities for various combinations of RH and wind speed or gust**
- This example shows the probability of RH <= 25% and Wind Speed >= 15 mph
- White dots indicate where the combination was achieved in the observations, while black dots indicate where it was not achieved

Towards a Fully Probabilistic NBM

OPS v4.3

	DET INST TEMP	PROB INST TEMP	DET INST DEW	PROB INST DEW	DET MAX TEMP	PROB MAX TEMP	DET MIN TEMP	PROB MIN TEMP	DET APP TEMP	PROB APP TEMP	DET INST RELH	PROB INST RELH	DET MAX RELH	PROB MAX RELH	DET MIN RELH	PROB MIN RELH	PROB FIRE WX
CONUS	✅	❌	✅	❌	✅	✅	✅	✅	✅	❌	✅	❌	✅	❌	✅	❌	❌
ALASKA	✅	❌	✅	❌	✅	✅	✅	✅	✅	❌	✅	❌	✅	❌	✅	❌	❌
PUERTO RICO	✅	❌	✅	❌	✅	❌	✅	❌	✅	❌	✅	❌	✅	❌	✅	❌	❌
HAWAII	✅	❌	✅	❌	✅	❌	✅	❌	✅	❌	✅	❌	✅	❌	✅	❌	❌
GUAM	✅	❌	✅	❌	✅	❌	✅	❌	❌	❌	✅	❌	✅	❌	✅	❌	❌
OCEANIC	✅	❌	❌	❌	❌	❌	❌	❌	❌	❌	❌	❌	❌	❌	❌	❌	❌

Towards a Fully Probabilistic NBM

PARA v5.0

	DET INST TEMP	PROB INST TEMP	DET INST DEW	PROB INST DEW	DET MAX TEMP	PROB MAX TEMP	DET MIN TEMP	PROB MIN TEMP	DET APP TEMP	PROB APP TEMP	DET INST RELH	PROB INST RELH	DET MAX RELH	PROB MAX RELH	DET MIN RELH	PROB MIN RELH	PROB FIRE WX
CONUS	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅
ALASKA	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅
PUERTO RICO	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅
HAWAII	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅
GUAM	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅
OCEANIC	✅	❌	✅	❌	✅	❌	✅	❌	✅	❌	❌	❌	❌	❌	❌	❌	❌

Towards a Fully Probabilistic NBM

OPS v4.3

	DET SKY	DET CEIL	DET VIS	DET PWAT	PROB PWAT	DET QPF	PROB QPF	DET SNOW ICE	PROB SNOW ICE	DET INST WIND	PROB INST WIND	DET MAX WIND/ GUST	PROB MAX WIND/ GUST	DET SIG WAVE	PROB SIG WAVE	DET CAPE	PROB CAPE
CONUS	✅	✅	✅	❌	❌	✅	✅	✅	✅	✅	✅	✅	✅	✅	☑️	✅	❌
ALASKA	✅	✅	✅	❌	❌	✅	✅	✅	✅	✅	❌	❌	❌	✅	☑️	✅	❌
PUERTO RICO	✅	✅	✅	❌	❌	✅	✅	N/A	N/A	✅	❌	❌	❌	✅	☑️	✅	❌
HAWAII	✅	✅	✅	❌	❌	✅	✅	N/A	☑️	✅	❌	❌	❌	✅	☑️	✅	❌
GUAM	✅	✅	✅	❌	❌	✅	❌	N/A	N/A	✅	❌	❌	❌	✅	☑️	✅	❌
OCEANIC	❌	❌	✅	❌	❌	✅	✅	N/A	N/A	✅	☑️	❌	❌	✅	☑️	❌	❌

Towards a Fully Probabilistic NBM

PARA v5.0

	DET SKY	DET CEIL	DET VIS	DET PWAT	PROB PWAT	DET QPF	PROB QPF	DET SNOW ICE	PROB SNOW ICE	DET INST WIND	PROB INST WIND	DET MAX WIND/ GUST	PROB MAX WIND/ GUST	DET SIG WAVE	PROB SIG WAVE	DET CAPE	PROB CAPE
CONUS	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	☑️
ALASKA	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	✅	❌
PUERTO RICO	✅	✅	✅	✅	✅	✅	✅	N/A	N/A	✅	✅	✅	✅	✅	✅	✅	❌
HAWAII	✅	✅	✅	✅	✅	✅	✅	N/A	☑️	✅	✅	✅	✅	✅	✅	✅	❌
GUAM	✅	✅	✅	✅	✅	✅	❌	N/A	N/A	✅	✅	✅	✅	✅	✅	✅	❌
OCEANIC	✅	❌	✅	✅	✅	✅	✅	N/A	N/A	✅	✅	✅	✅	✅	✅	❌	❌

Changes to Inputs

- v5 now uses the **Hi-Res ECMWF** data
- We will also be using the **deterministic ECAIFS and AIGFS** as inputs
- SREF retirement appears certain within the next 1-2 years, so we are preemptively ending its usage in NBMv5.0
- **Work to integrate the RRFS/REFSv1 into the NBM has been completed**; we will implement these changes (v5.0.1) when RRFS/REFSv1 is implemented later this summer; that means that the NAM and HiResWs will no longer be used in the NBM starting in v5.0.1

How to View NBM Data

- Some web sites (like Pivotal Weather, NCEP's MAG….) provide a very limited set of NBM graphics
- The public DESI site has a significant number of NBM fields (01,07,13,19Z cycles), including percentiles and probabilities
- Text products (01/07/13/19Z cycles) can be viewed on the MDL page

How to Obtain NBM Data

NOMADS

The NOAA Operational Model Archive and Distribution System

https://nomads.ncep.noaa.gov/

⇦ 2-day retention

⇦ Realtime

⇦ Archived May 2020-Present

https://registry.opendata.aws/noaa-nbm/

Data Formats

- GRIB2
- ASCII/Text

*Operational NBM data is made fully available to the public

NBM Text Bulletin Products			
Label	**Product Name**	**Time Step**	**Forecast Hours**
NBH	Hourly	Hourly	1-25 hrs
NBS	Short	3-Hourly	6-72 hrs
NBE	Extended	12-Hourly	24-192 hrs
NBX	Super-Extended	12-Hourly	204-264 hrs
NBP	Probabilistic (Extended)	12-hourly	24-264 hrs

Timeline / Future Plans

- **Implementation of v5.0 scheduled for 21 April 2026**
- **v5.1 planned for October 2026**
  - Address some remaining winter issues
  - Add new NBM domain in Southwest Pacific
- **Next-Generation Probabilistic Forecast Guidance Suite (PRO-GUIDES)**
  - A Blueprint, outlining what is needed to achieve a more skillful and useful suite for delivering support services, has been drafted
  - A technical feasibility team has been tasked with producing an assessment of current vs needed resources to achieve the Blueprint objectives
  - Modern machine learning/AI techniques will be applied to perform smarter blending and bias correction and better predict high-impact events

Questions?

National Blend of Models - MDL Virtual Lab

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