Developing the National Blend of Models for National Weather Service Operations

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NBM Background

The National Weather Service (NWS) is developing the National Blend of Models (NBM) to provide a nationally consistent and skillful suite of calibrated forecast guidance based on a blend of NWS and non-NWS deterministic, ensemble, and statistically post-processed model output.

The first version of the NBM was implemented on the NOAA supercomputer in January 2016 and contains blended guidance for 10 National Digital Forecast Database (NDFD) elements over the conterminous United States (CONUS) based on output from the deterministic Global Forecast System (GFS), GFS ensemble (GEFS), Canadian ensemble (CMCE), Gridded Model Output Statistics (GMOS), and Ensemble Kernel Density MOS (EKDMOS).

The second version of the NBM, implemented November 2016, expanded the blend to NDFD's Alaska, Hawaii, Puerto Rico, and Oceanic domains, and added precipitation probability and amount (PoP12 and QPF06) guidance over the CONUS. This version of the blend included two versions of the North American Model (NAM12 and NAMnest).

The third version of NBM, planned for implementation this summer, introduces the following mesoscale models: Gridded Local Aviation MOS Program (GLMP) and GLMP guidance melded with High-Resolution Rapid Refresh predictors (GLMP Meld), the High-Resolution Window forecast system (HiResARW), the High-Resolution Rapid Refresh (HRRR) model, the High-Resolution Nonhydrostatic Multiscale Model (HiResNMMB), the Navy Global Environmental Model (NAVGEM) ensemble, the Rapid Refresh model (RAP), and the Short-Range Ensemble Forecast (SREF) system. This version of NBM provides hourly resolution for the first 36 hours of the forecast, including hourly ceiling, visibility, precipitation probability index (PPI) and quantitative precipitation (QPF01) forecasts in support of digital aviation services. It will update every hour using the latest available model guidance. Further, the existing global blend will be augmented to include PoP12 and QPF06 over Alaska, Hawaii, and Puerto Rico, and provide inputs to support local production of predominant weather, snow amount, and ice accumulation grids.

Verification of the first two versions of the NBM show that post-processing model output adds value (i.e., blended guidance outperforms individual model components). When verified at station locations, NBM verification scores are comparable to the forecaster-produced NDFD. When verified at grid points using the Unrestricted Real-time Mesoscale Analysis (URMA) to which it is tuned, NBM generally outperforms NDFD. Users with NOAA email accounts can view NBM forecast guidance and verification scores at: https://veritas.nws.noaa.gov/blend/.

NBM v1 - January 2016

Update Frequency: 2x per day

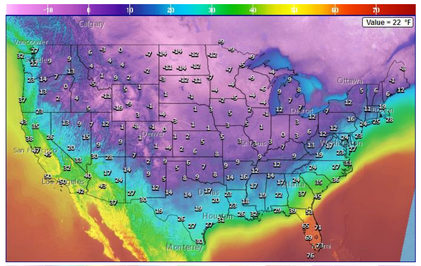
Temporal Resolution: 3-h to 7 days; 6-h to 10 days

Model Components: GFS, GEFS, CMCE, GMOS, EKDMOS

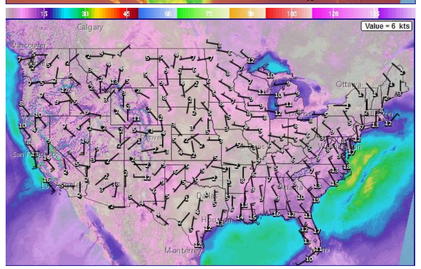
NDFD Domains: CONUS

NDFD Elements: Max/Min Temperature; Temperature; Dewpoint; Wind Direction, Speed and Gust; Sky Cover, Relative Humidity; Apparent Temperature

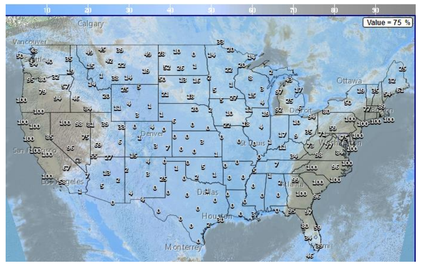
NBM CONUS Temperature



NBM CONUS Winds



NBM CONUS Sky Cover



NBM v2 - November 2016

Update Frequency: 2x per day

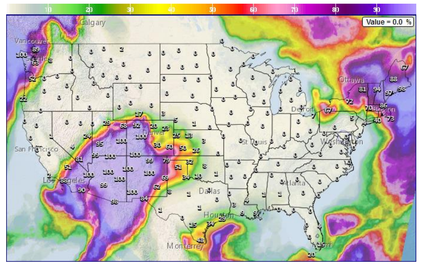
Temporal Resolution: 3-h to 7 days; 6-h to 10 days

Model Components: GFS, GEFS, CMCE, GMOS, EKDMOS, *NAM12, NAMnest*

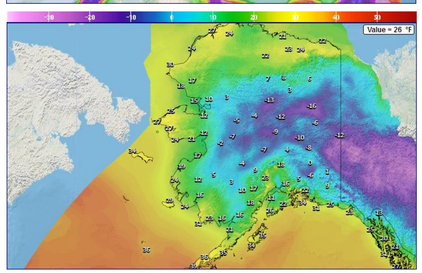
NDFD Domains: CONUS, *Alaska, Hawaii, Puerto Rico, Oceanic*

NDFD Elements: Max/Min Temperature; Temperature; Dewpoint; *PoP12; QPF06*; Wind Direction, Speed and Gust; Sky Cover, Relative Humidity; Apparent Temperature

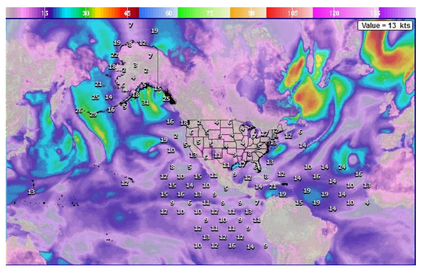
NBM CONUS PoP12



NBM Alaska Max Temp



NBM Oceanic Winds



NBM v3 - June 2017

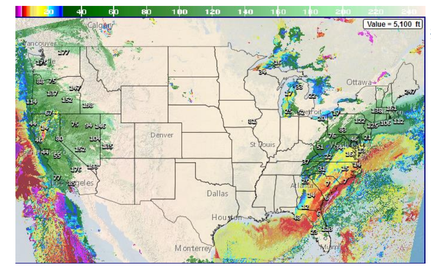
Update Frequency: *24x per day*

Temporal Resolution: *1-h to 36 hours*; 3-h to 7 days; 6-h to 10 days

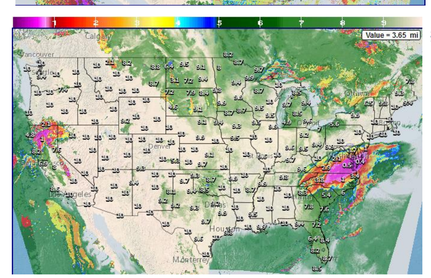
Model Components: GFS, GEFS, CMCE, GMOS, EKDMOS, NAM12, NAMnest, *GLMP, GLMP Meld, HiResARW, HiResNMMB, HRRR, NAVGEM, RAP, SREF*
NDFD Domains: CONUS, Alaska, Hawaii, Puerto Rico, Oceanic

NDFD Elements: Max/Min Temperature; Temperature; Dewpoint; PoP12, QPF06; Wind Direction, Speed, and Gust; Sky Cover*; Ceiling and lowest Cloud Base; Visibility; PPI; QPF01;* Relative Humidity; *Max/Min Relative Humidity*; Apparent Temperature; *blended inputs to Predominant Weather, Snow Amount, and Ice Accumulation*

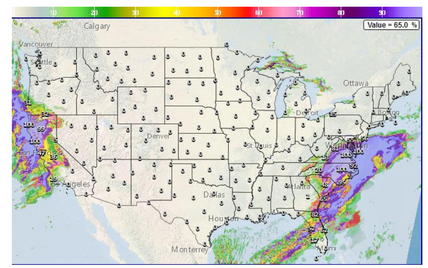
NBM CONUS Ceiling



NBM CONUS Visibility



NBM CONUS PPI



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