# Examining the Performance of the National Blend of Models During High Impact Winter Weather in New England

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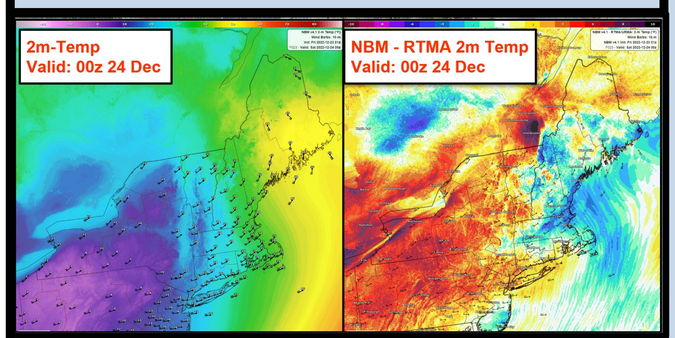
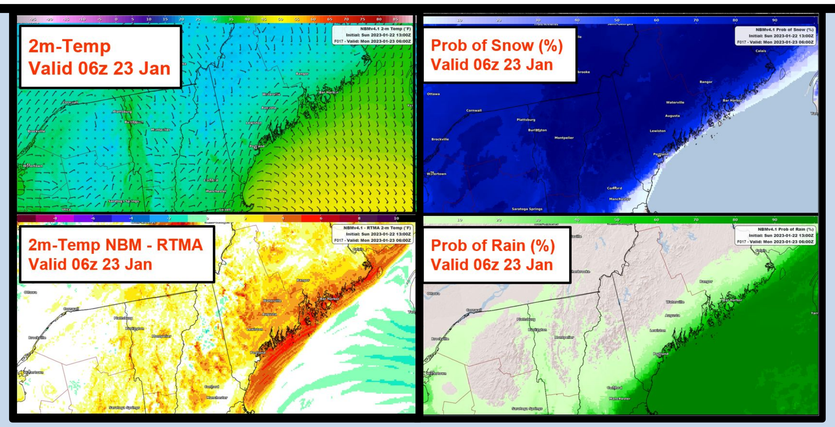
## 1. Introduction

- The **National Blend of Models** (NBM) is a highly sophisticated blend of dozens of deterministic and ensemble guidance sources.
- This project aims to inform on where NWS forecasters in New England can **make targeted improvements to NBM guidance** during high impact winter weather events.
- Analysis of NBMv4.1 completed using Meteorological Development Laboratory (MDL) Big Data Archive Viewer, evaluating temperature, dew point, wind, QPF, p-type, snowfall, and snow-to-liquid ratio forecasts for winter 2022-2023.

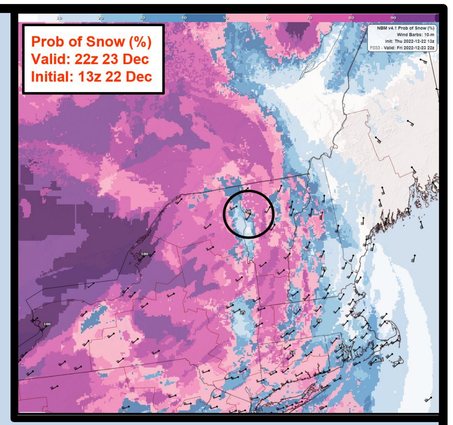
## 2. Temperature and Precipitation Type Forecasts



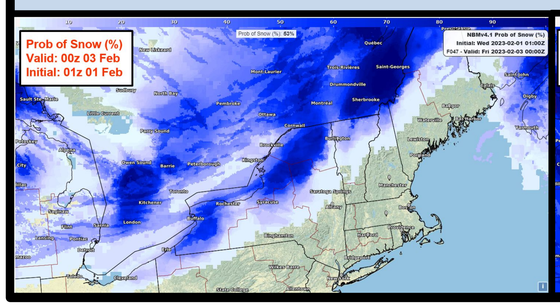

Large temperature errors behind strong cold front for Dec. 23-27 Winter Storm. Warm bias at cold temperatures, cool bias at warmer temperatures.

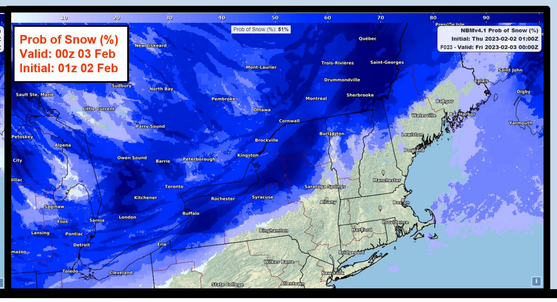



**Cold air damming** leading to temperature errors (warm bias) along coastal New England during Jan 23 Winter Storm. Major implications to p-type forecast along coast with near freezing temperatures. With just a 24h lead time, the NBM forecast a 51% prob. of snow and 49% prob. of rain in Portland, ME for 06z 23 Jan. In reality, cold air damming and heavy snow occurred and coastal Maine received up to a foot of snow.




**Precipitation type forecasts** improved significantly at short lead times for high uncertainty events. For the Dec. 23-27 Winter Storm, Burlington, VT received ~4" snowfall, but it took until a 33hr lead time just to forecast a >50% chance of snowfall.

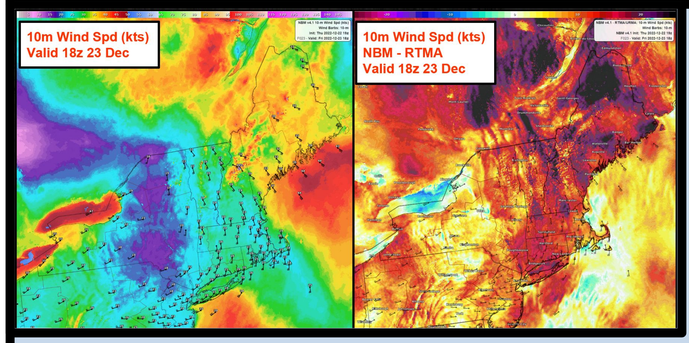


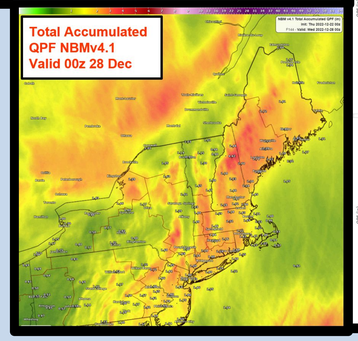

**Snow Squalls** well predicted up to 3 days in advance. 2 day lead time forecast shown, with up to 80% chance of snow in squall area at this lead time.

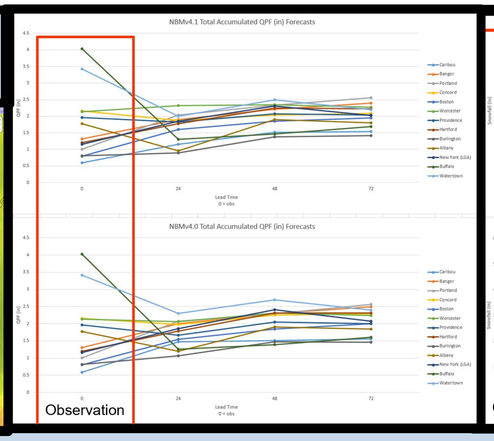
Scan **QR code** for powerpoint containing more details and more results!

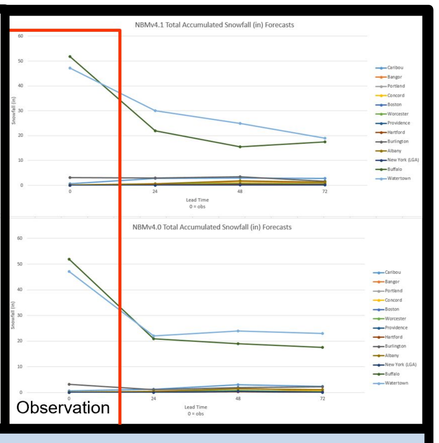
## 3. Wind, QPF, Snow Accumulation Forecasts




Large wind speed forecast errors for Dec. 23-27 Winter Storm. Errors in some locations up to 25+ kts too high.




QPF forecasts performed generally well, especially for synoptic events. Also able to pick up on orographic enhancement with ~3 day lead time. QPF and therefore snowfall forecasts did struggle greatly with extreme lake effect (forecast ~50% of observed QPF and Snowfall). Synoptic precip. forecasts had much lower error.

## 4. Key Points

- While the NBM is becoming increasingly useful for forecasters as the NWS shifts toward providing **Decision Support Services**, human intervention is still invaluable to make accurate forecasts, improving on NBM output.
- Forecaster **pattern recognition is key** to make effective and targeted improvements to guidance provided by the NBM.
- **Continued evaluation** necessary to ensure effective model development and enhance forecaster pattern recognition.

## 5. Acknowledgements

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