# Improving Forecast Consistency, Accuracy, and Efficiency

to Help Implement the Central Region WRN Roadmap in the Great Lakes

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#### **Forecast Evolution - Roadmap Connection**

Central Region Weather Ready Nation Roadmap - Evolving Central Region

"The Central Region Grid Methodology Advisory Team (CRGMAT) has led efforts to improve grid consistency and accuracy, while concurrently developing techniques that increase the efficiency of the process." - CR WRN Roadmap

### The Challenge of Consistency in the Great Lakes

Contributors to the challenge

- Many tools struggle requires hand editing
- Most WFOs using differing tools for years no common set of tools
- Poor model performance

## ForecastBuilder - What it is

- A forecast management tool that guides the forecaster by utilizing common tools, science, and process
- A delivery vehicle for a consistent, common starting point (e.g. National Blend of Models)
  - Approach very successful for years across CR
  - Forecasters "target" adjustments (tools provided)
  - Also brings Observations into the Forecast
- Employs **sound science** to <u>derive</u> Snow Amount, Ice Accumulation, and Weather, thus ensuring **internal consistency**
- "HazardBuilder" extension for IDSS graphics



### The ForecastBuilder Experiment

- Official time period: 2016 Oct 4 2017 Mar 31
- All NWS Central Region offices applied a common starting point a blend of models called SuperBlend for days 2-7 twice per day
- 10 offices were required to utilize the "Full" ForecastBuilder version:
  - Manipulate and collaborate adjustments as needed, including "top-down" grids
  - Utilize ForecastBuilder to create Snow, Ice, and Weather forecasts
- The rest of Central Region, excluding mountain offices, could choose between a "Lite" or "Full" version:
  - Top-down done automatically in the background in Lite version
  - Lite version offices only had to utilize ForecastBuilder to create Snow and Ice not Weather

### ForecastBuilder Usage



Testbed offices in the ForecastBuilder experiment

## ForecastBuilder Experiment Findings

- Consistency improved dramatically due to:
  - Utilizing a common starting point
  - Having an organized and standardized forecast process
  - Same scientific process and tools to generate Snow and Ice accumulations
- Related, the common starting point resulted in more effective collaboration - focus on "targets of opportunity"



One of many examples of high consistency in Snow and Ice accumulation

## ForecastBuilder Experiment Findings (continued)

- For forecasters: No loss in time to produce forecast in fact time spent to create forecast has decreased
- For IT personnel: Maintaining a consistent regional blend has been very difficult
  - Forecasters now demand the consistent regional blend
  - Strong desire to switch to the National Blend of Models once AWIPS system is ready



### ForecastBuilder - Adapting to meet field needs

- ForecastBuilder development team and CR-GMAT are listening
  - <u>nws.forecastbuilder@noaa.gov</u>
  - ForecastBuilder VLAB page
  - "forecastbuilder" NWSChat room
  - Feedback forms
  - Conference calls prior to new tech releases
- In the Great Lakes
  - PoP/QPF Enhancements for lake effect
  - Raw guidance blend for marine winds
  - Blowing snow enhancements
  - Working closely with NBM Developers
  - WW3 population

Model enhancements for lake effect PoP/QPF

- Models (especially lower resolution) struggle with lake effect snow (LES)
- Automatic enhancements to model derived PoP and QPF
  - Lake Snow Parameter (LSP) used as basis for LES potential
    - Looks at 850mb T, 850-700 RH, and 1000-850mb Wind Speed
    - Potential for high snowfall rates, but adapted some for this use
    - Developed at WFO Gaylord by Bruce Smith and John Boris
  - Pre-determined edit areas assigned by model wind direction
  - Linear regressions assign LSP to PoP and QPF values
    - QPF also incorporates a Topo enhancement
  - Utilized for GFS, ECMWF, GEM-Global

Before and After - PoP in a NW flow event



Before and After - QPF in a NW flow event



- Amount of time editing grids in the mid-long term greatly reduced
- Consistency improved
- Still plenty of room for improvement
- NBM V3.1 will take over for this effort
  - Converted QPE training dataset to 2.5km for PoP
  - Investigating a 90th percentile QPF



### Conclusion

- Grid methodologies and tools are not perfect but beginning to lay a foundation for IDSS via a consistent science based process
- This remains an evolutionary process, with <u>forecasters</u> providing continuous feedback on how to make it better
- Always looking for more offices/regions to utilize ForecastBuilder
  - WR starting and they've already influenced the process via the incorporation and utilization of SnowLevel for precipitation type production
  - Some SR and ER offices have started utilizing ForecastBuilder as well.
  - Operational usage further improves not only ForecastBuilder, but also the NBM and URMA/RTMA
  - ForecastBuilder is a means to spread the knowledge base of forecaster experience and techniques to all offices - "crowdsource development"

#### **Questions and Feedback**

- ForecastBuilder Virtual Lab site: <u>https://vlab.ncep.noaa.gov/web/cr-soo/forecastbuilder</u>
  - Note: website may change
- "forecastbuilder" NWSChat room
- E-mail: <u>nws.forecastbuilder@noaa.gov</u>



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