

ForecastBuilder Experiment in Central Region

A Project From the CR-GMAT
(Central Region Grid Methodology Advisory Team)

GMAT (Grid Methodology Advisory Team)

Formed in 8/2008 with an 80% to 20% mix of NWSEO forecasters and management team members (SOO/ITO)

Answers to CR Headquarters through the SSD (Science Services Division)

Goals/Charter

- Promote the development of science-based techniques and tools for GFE

- Review and recommend policy for creating gridded forecast for Central Region

Team values:

- Trust

- Continuous communication with the field

 - Surveys

 - Webinars

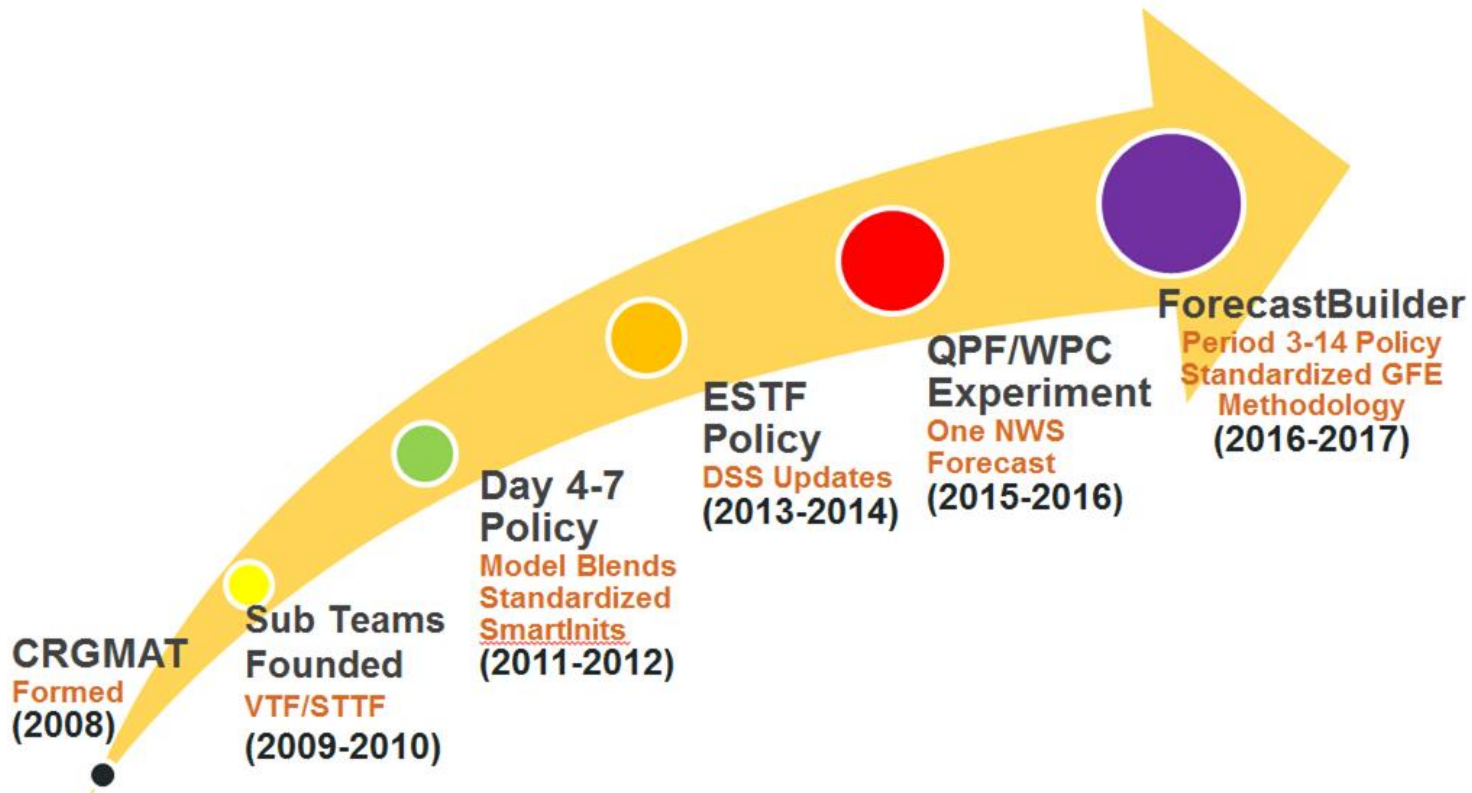
 - Feedback forms

 - VLAB (lately)

- Rapid responses to issues

- Strong working relationships with CR SSD and CR NWSEO

CRGMAT Projects Timeline



The development of ForecastBuilder

Since the GMAT inception the team looked to standardize and improve the creation of the SnowAmt, IceAccum, and Wx grids. Surveys revealed that there were many disparate ways that offices were creating these grids - some with questionable science leading to consistency issues both **internally and externally**.

Late in 2015, based on our previous projects, the team felt that the time was right to fully take on these elements.

It quickly became clear that the SnowAmt, IceAccum, and Wx grids have major dependencies and connections with many other forecast elements. Accordingly, **producing consistent, quality forecast grids required a comprehensive, science based, approach**.

The GMAT saw a need to work together both regionally and nationally to produce a gridded forecasting approach that:

Is structured, systematic, and scientifically grounded

Replicable from Office to Office and Forecaster to Forecaster

Creates SnowAmt, IceAccum, and Wx grids in the same way

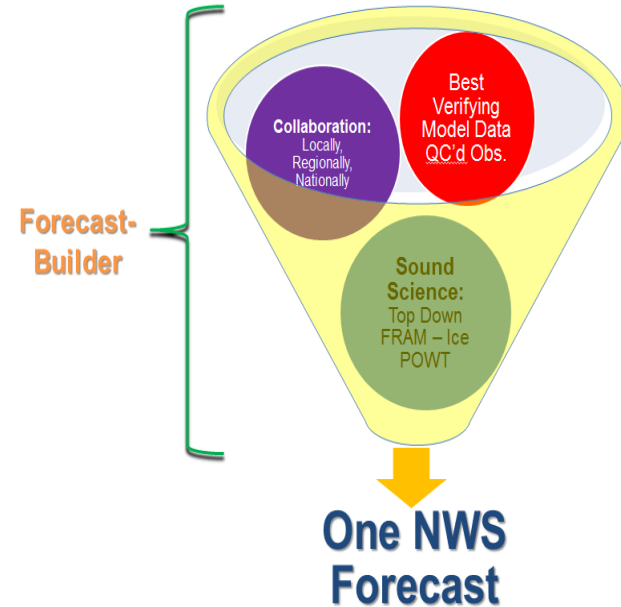
Fills the regional policy gap between the ESTF periods

Result

Accordingly, the CRGMAT, with support from CR SSD and CR NWSEO, developed a standard procedure for producing the Wx, Snow and Ice grids.

CRGMAT created the ForecastBuilder program, including its supporting components, to meet our team's goals for forecast grid creation in the region.

The GMAT strives to bolster the ForecastBuilder's effectiveness, use, and adoption throughout the region and now beyond.



CRGMAT's Answer - ForecastBuilder Procedure

A new GFE procedure which employs a **streamlined and systematic** methodology for developing the forecast

Provides a strong initialization scheme based on well verifying blended models.
This also results in a **consistent, common starting point**

Also incorporates observations

CRON based version provided for the initialization

Employs **sound science** to derive SnowAmt, IceAccum, and Wx grids - ensuring **internal consistency**

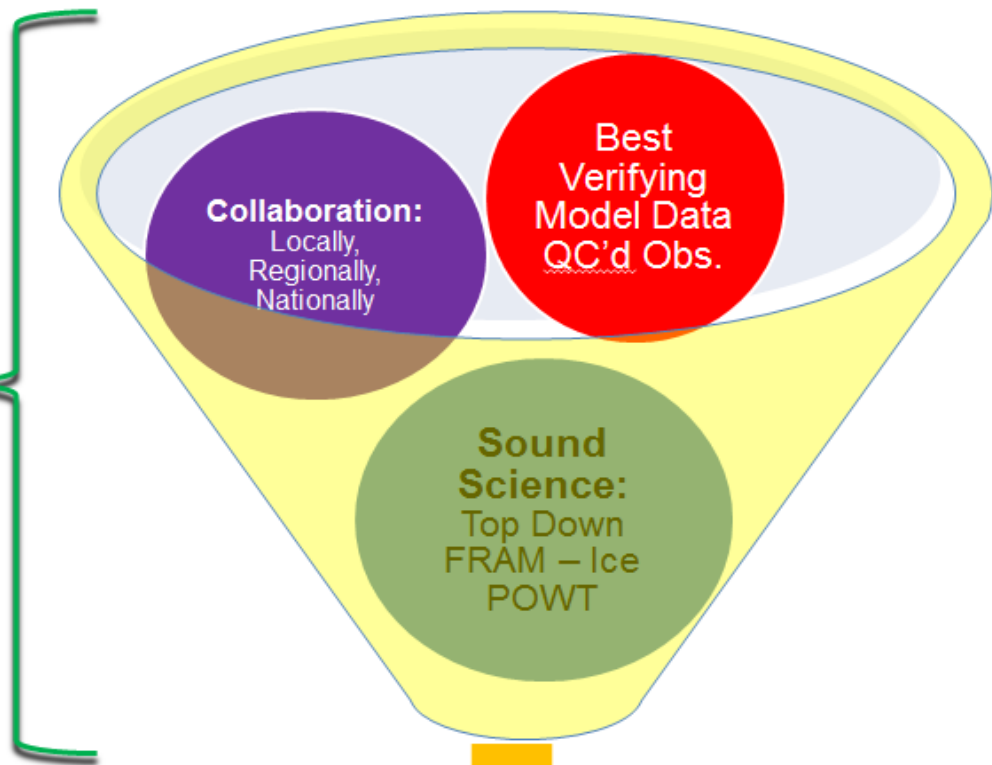
Greatly facilitates creating the Wx grid

Developed and tested by the field forecasters - those on the
“front lines”

Robust and flexible procedure with the support of regional developers **responsive** to the field

Ideally this approach would become the national delivery mechanism for the NBM - **maintaining the WFO forecaster as the ‘driver’** of the official NWS forecast and its message

**Forecast-
Builder**



**One NWS
Forecast**

ForecastBuilder was developed in collaboration with:

Upper Mississippi Valley SOO community

National SmartInit Team

NBM Wx Grid Team

CR Consistency Team

CR NWSEO

CRH Management

Immediate Benefits For Forecasters

Allows forecasters to spend **more time** on:

IDSS - especially in high impact situations

Situational Awareness / Meteorological Analysis

The forecast problem(s) of the day

Training / Professional Development

Improved **grid consistency** by *starting* from a consistent and seamless database

Forecaster remains in **control** of grids (i.e. over the loop) and the message

Immediate Benefits For Forecasters (continued)

Future training is **focused and streamlined**

Automatically ensures the **meteorological forecast integrity** of the database

An approach which allows forecasters to **share experiences, science and techniques** to all offices

This process will allow for **improvements** to be instantly spread to all offices

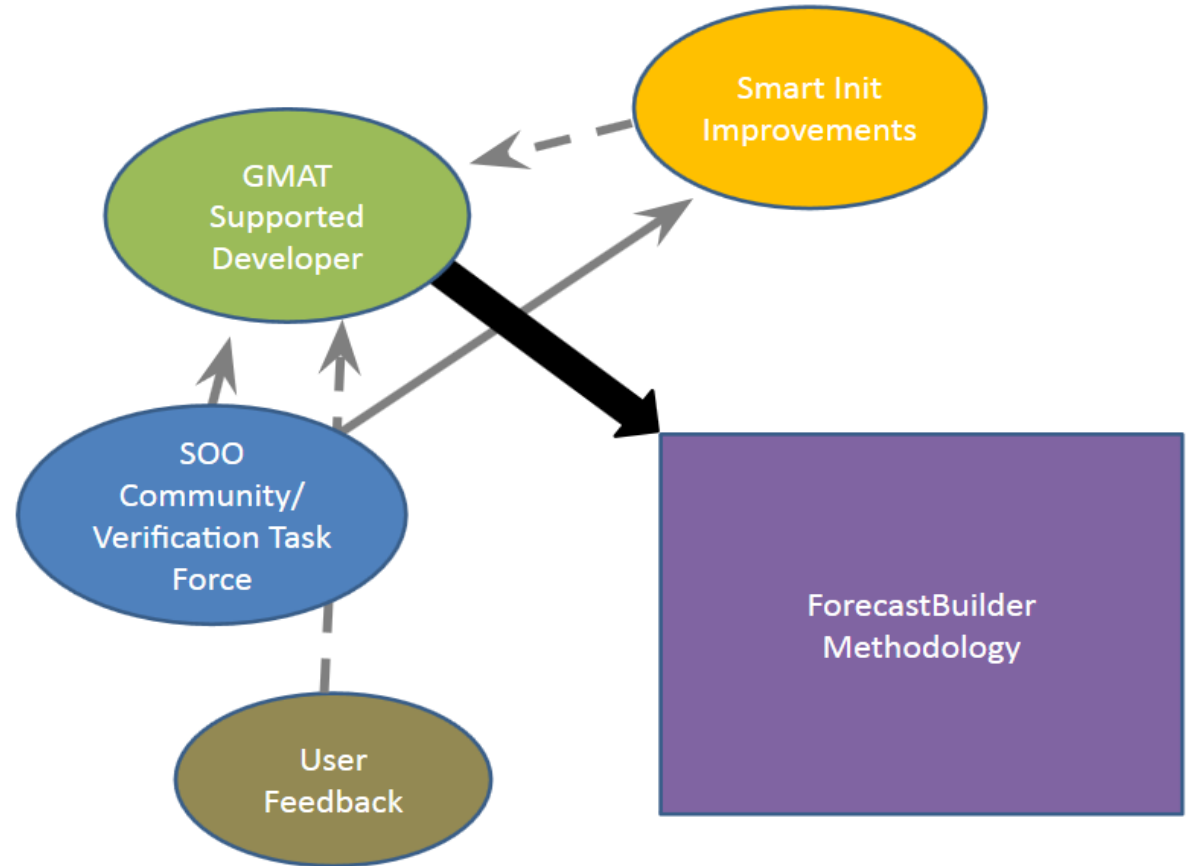
For grids - much **easier** to back up another office, or when settling into another office

GFE ForecastBuilder Evolution

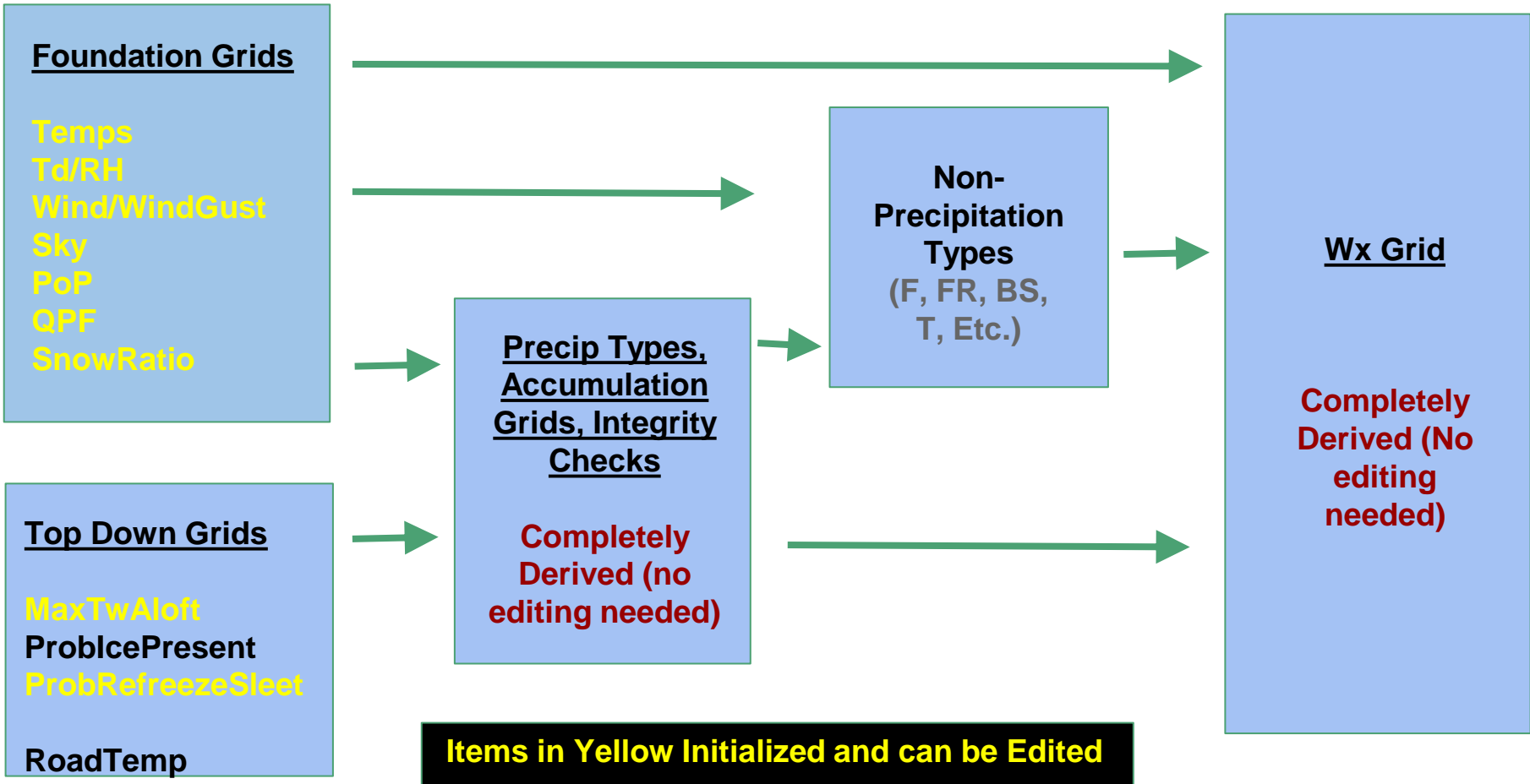
The ForecastBuilder Methodology is designed to evolve and improve with new techniques and scientific findings.

The developers will be responsive to all feedback and suggestions.

This will be maintained by the CRGMAT and become a means of science sharing resulting in a standard GFE methodology that 'grows'.



ForecastBuilder Methodology



First Step - Choose A Time Period To Work On

Other options

Jump ahead
(e.g. happy
with the
foundation
grids)

Can also
update
Aviation
and/or
FireWx Grids

The screenshot shows a dialog box titled "ForecastBuilder Values" with a tab labeled "Step 1 - Choose Time Period". The dialog is divided into four main sections:

- Start at the beginning of?**: A list of radio buttons with "Highlighted Time Range" selected and highlighted in blue. Other options include "Current Overnight (mid shift only)", "Today", "Tonight", "Tomorrow", "Tomorrow Night", "Day 2", "Day 2 Night", "Day 3", "Day 4", "Day 5", "Day 6", and "Day 7".
- Go to the End of?**: A list of radio buttons with "Day 7" selected. Other options include "Highlighted Time Range", "Current Overnight (mid shift only)", "Today", "Tonight", "Tomorrow", "Tomorrow Night", "Day 2", "Day 2 Night", "Day 3", "Day 4", "Day 5", and "Day 6".
- Place to Start?**: A list of radio buttons with "Foundation / Base Grids (e.g. MaxT, PoP)" selected. Other options include "Top-Down Grids", "Precip Types and Accumulation Grids", "Non-Precip Types", and "Wx Grids".
- Optional Items**: Two checkboxes, both of which are unchecked: "Update Aviation Grids" and "Update Fire Wx Grids".

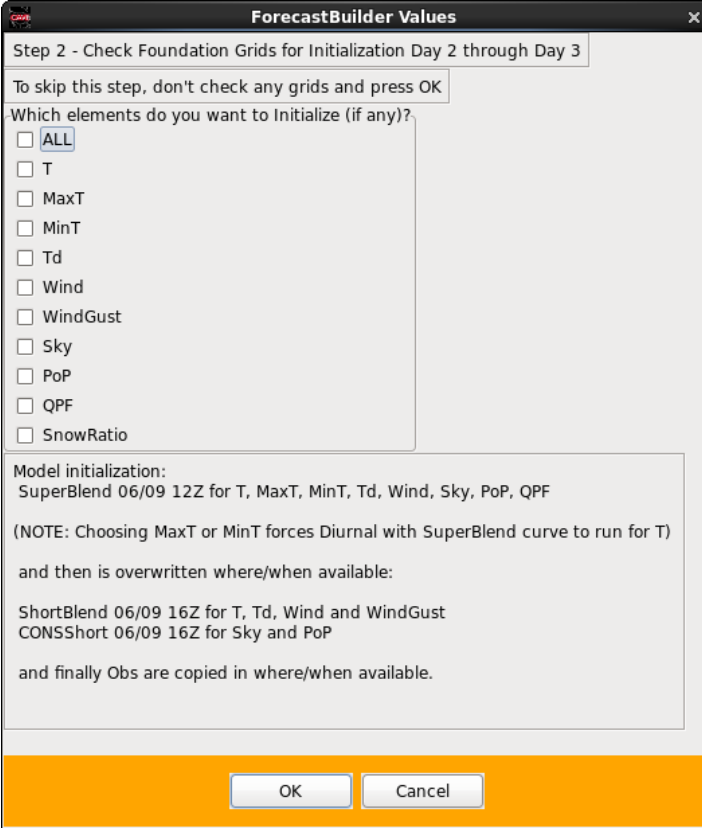
At the bottom of the dialog, there is a large orange bar containing two buttons: "OK" and "Cancel".

Step 2 - **Most Important** - Update Foundation Grids

Ability to initialize grids with best verifying data sets over the long term, and blend in the Obs

Forecasters should spend 90-95% of their total grid editing and collaboration time with these key grids

Seek “targets of opportunity” for modification, in a collaborative manner



The screenshot shows a dialog box titled "ForecastBuilder Values" with a close button (X) in the top right corner. The main title bar reads "ForecastBuilder Values". The dialog content is as follows:

Step 2 - Check Foundation Grids for Initialization Day 2 through Day 3

To skip this step, don't check any grids and press OK

Which elements do you want to Initialize (if any)?

- ALL
- T
- MaxT
- MinT
- Td
- Wind
- WindGust
- Sky
- PoP
- QPF
- SnowRatio

Model initialization:
SuperBlend 06/09 12Z for T, MaxT, MinT, Td, Wind, Sky, PoP, QPF

(NOTE: Choosing MaxT or MinT forces Diurnal with SuperBlend curve to run for T)
and then is overwritten where/when available:

ShortBlend 06/09 16Z for T, Td, Wind and WindGust
CONSShort 06/09 16Z for Sky and PoP

and finally Obs are copied in where/when available.

At the bottom of the dialog, there is an orange bar containing two buttons: "OK" and "Cancel".

Step 3 - Update Top Down Grids

Only inspect for:

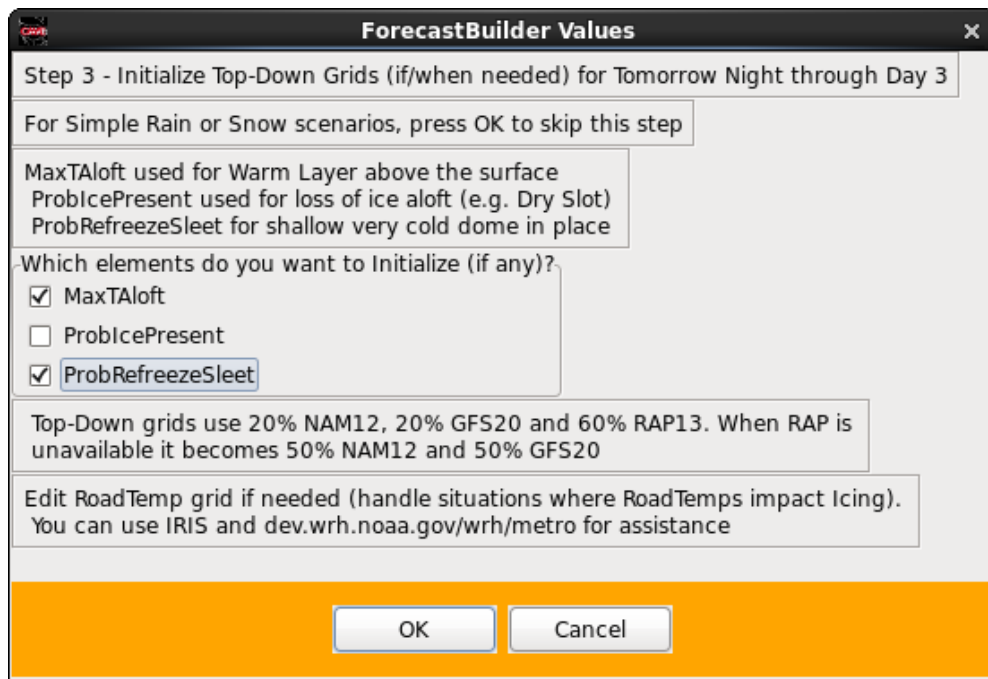
Freezing Rain

Sleet

Rain with a deep cold isothermal layer
(e.g. 1C up to 2000 ft).

This step will be skipped if coldest
hourly temp in the forecast time
range is $> 40F$

Models incorporated (those that
have good vertical resolution in

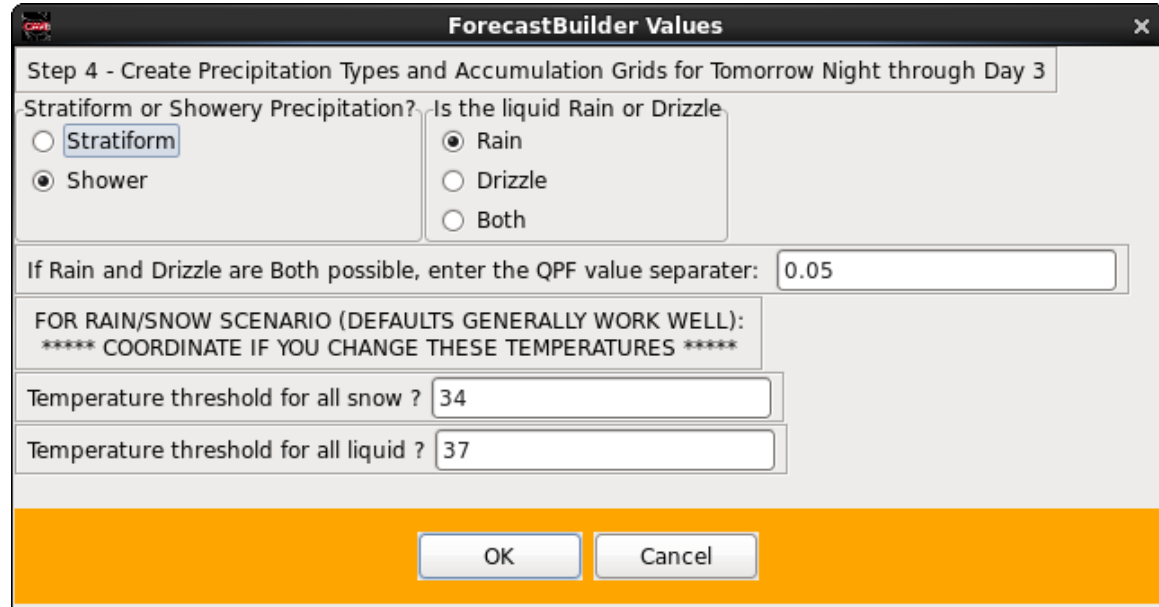


Step 4 - Precip Types, Snow/Ice and Integrity Checks

Background science and statistics will generate probabilities of precipitation types and the SnowAmt/IceAccum grids

If you don't like the output, collaboratively change either Foundation or Top-Down grids. Remember this is the One NWS forecast

Integrity checks along with updates to ApparentT, Td/RH



The screenshot shows a dialog box titled "ForecastBuilder Values" with a close button (X) in the top right corner. The main title bar reads "Step 4 - Create Precipitation Types and Accumulation Grids for Tomorrow Night through Day 3".

The dialog is divided into two main sections:

- Stratiform or Showery Precipitation?**: This section contains two radio button options: "Stratiform" (unselected) and "Shower" (selected).
- Is the liquid Rain or Drizzle?**: This section contains three radio button options: "Rain" (selected), "Drizzle" (unselected), and "Both" (unselected).

Below these sections, there is a text input field labeled "If Rain and Drizzle are Both possible, enter the QPF value separator:" with the value "0.05" entered.

Next is a text area containing the text: "FOR RAIN/SNOW SCENARIO (DEFAULTS GENERALLY WORK WELL): ***** COORDINATE IF YOU CHANGE THESE TEMPERATURES *****".

There are two more text input fields:

- "Temperature threshold for all snow ?" with the value "34" entered.
- "Temperature threshold for all liquid ?" with the value "37" entered.

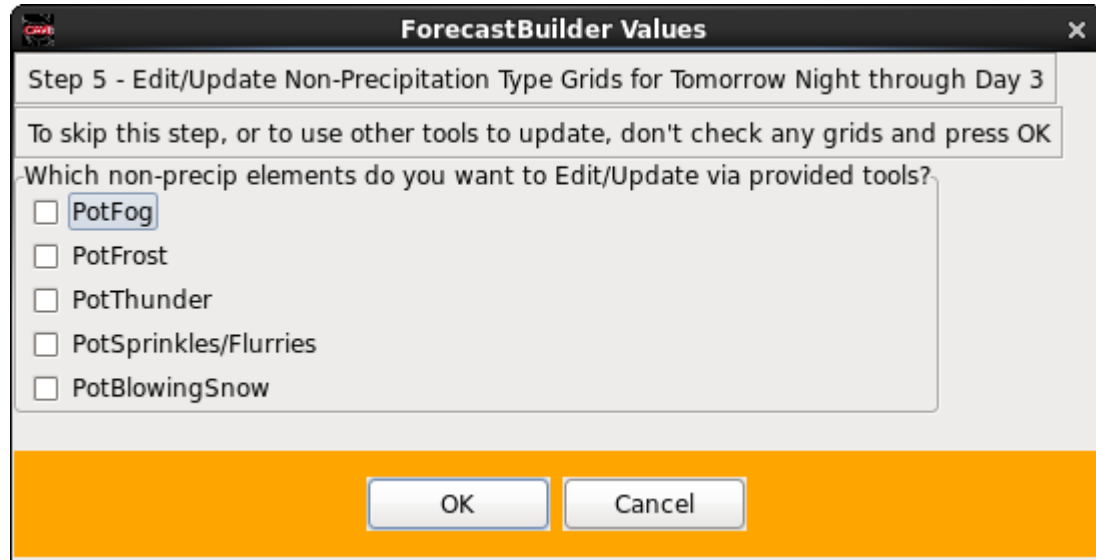
At the bottom of the dialog, there are two buttons: "OK" and "Cancel".

Step 5 - Non-Precipitation Types

Tools provided to help you produce non-precipitation types

Science-based study results incorporated - such as for BlowingSnow

One area where field-driven improvements are anticipated through more science, technology and empirical infusion



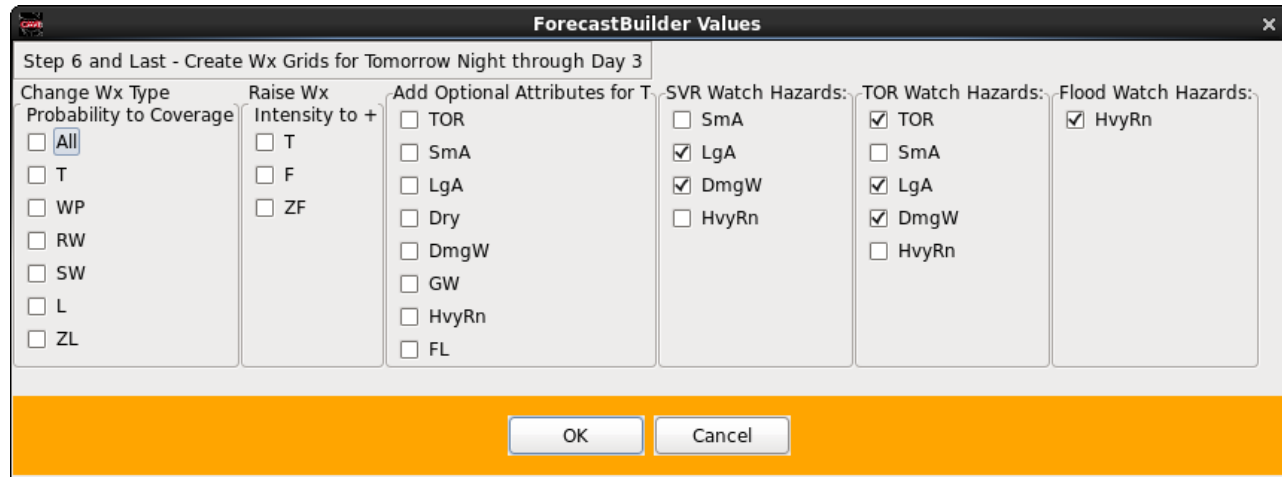
Step 6 - Update Wx Grids

95% or more of the time
these defaults are fine

Automatically brings in
convective watches to
enhance the Wx grids

Wx intensities are
derived from
QPF/SnowAmt

Adds a level of
flexibility/control before
the Wx grid is created



Training and Support Provided

ForecastBuilder employs the most current peer-reviewed scientific techniques via:

SnowRatio

The FRAM Ice Accumulation Model (produced by Kris Sanders and Brian Barjenbruch @ TOP)

The Top-Down approach for forecasting precipitation type

Operational deployment **videos** on:

ForecastBuilder usage

Ways to improve upon a consensus initialization

Winter weather training via:

Job sheets

ForecastBuilder Process

Period 2 - day 7 initialized at 0530Z and 1730Z with SuperBlend by ForecastBuilder_CRON for the **'foundation grids'** T, MaxT, MinT, Td, Wind, Sky, PoP. Additionally: WindGust, QPF, SnowRatio, MaxTAloft, ProbRefreezeSleet, SnowAmt and IceAccum through day 3.

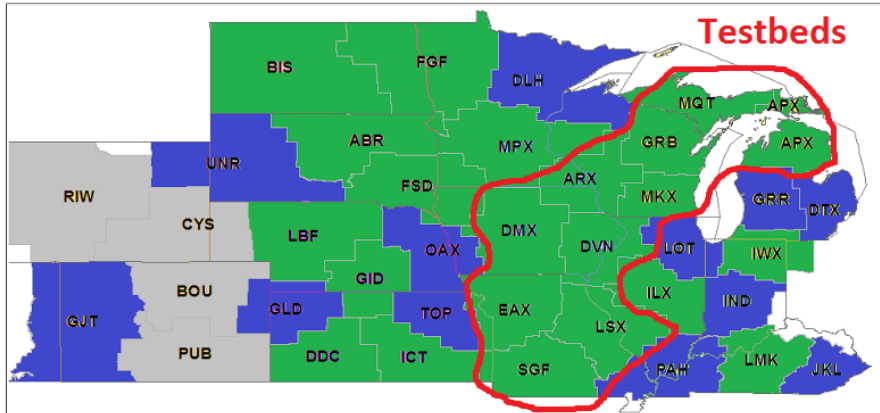
Collaborate and modify, as needed, all foundation grids

Use ForecastBuilder to produce SnowAmt and IceAccum, which incorporates the FRAM model for IceAccum

Testbed offices (a cluster of 10 WFOs) adjusted the Top Down grids and created the Wx grids via ForecastBuilder

Other WFOs joined in during the experiment

Testbed Offices - CR ForecastBuilder Usage



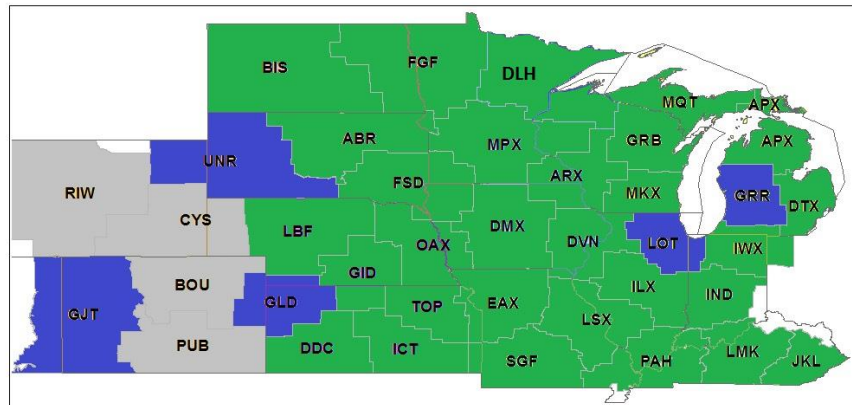
Forecast Builder Participation 2016-2017



- 22 Full Forecast Builder (Top down-PoWT)
- 12 ForecastBuilder "Lite"
- 4 Remain on previous Day 4-7 CR Policy



Late 2016



Forecast Builder Participation 2016-2017

* As of 2/21/17

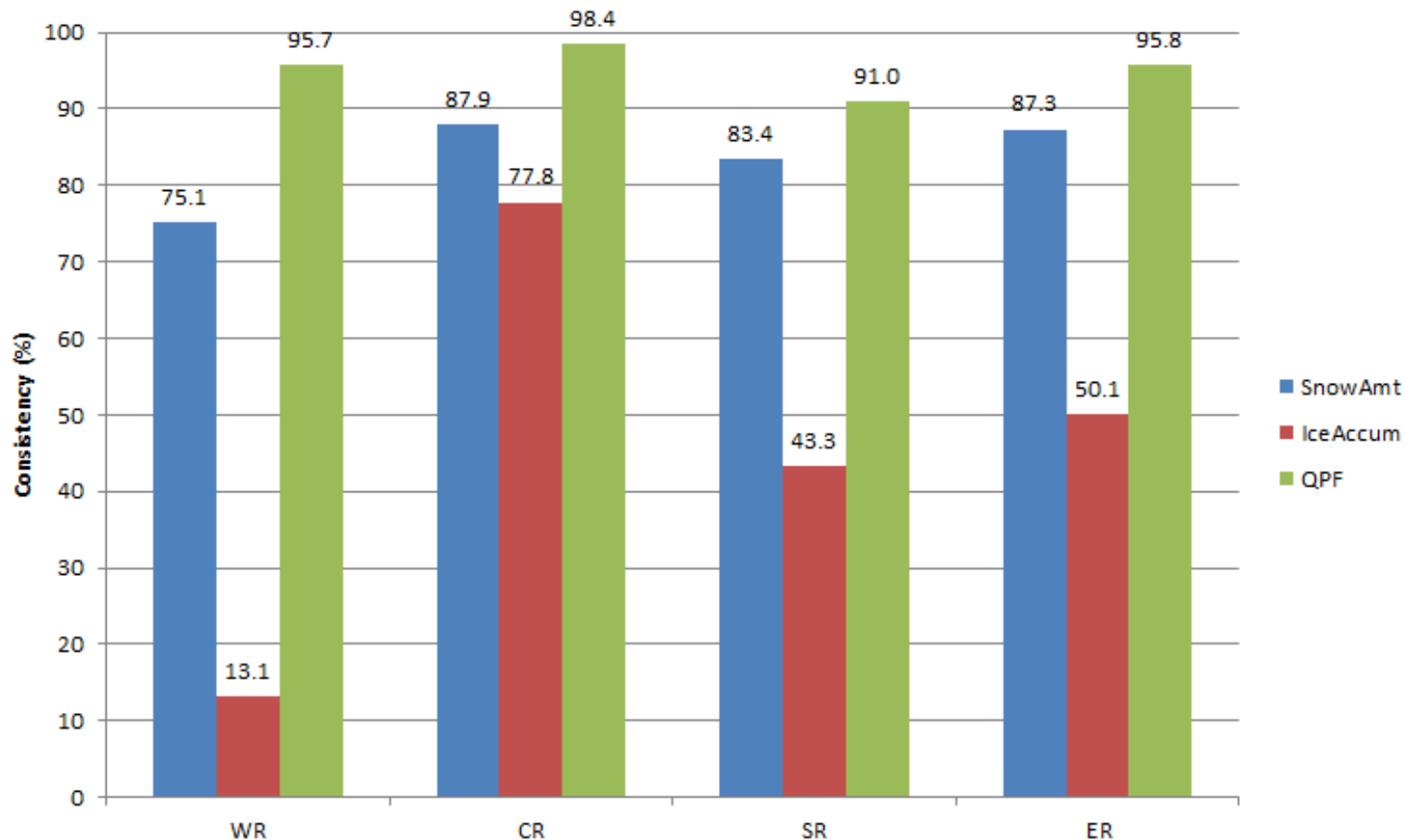


- 29 Full Forecast Builder (Top down-PoWT)
- 5 ForecastBuilder "Lite"
- 4 Remain on previous Day 4-7 CR Policy

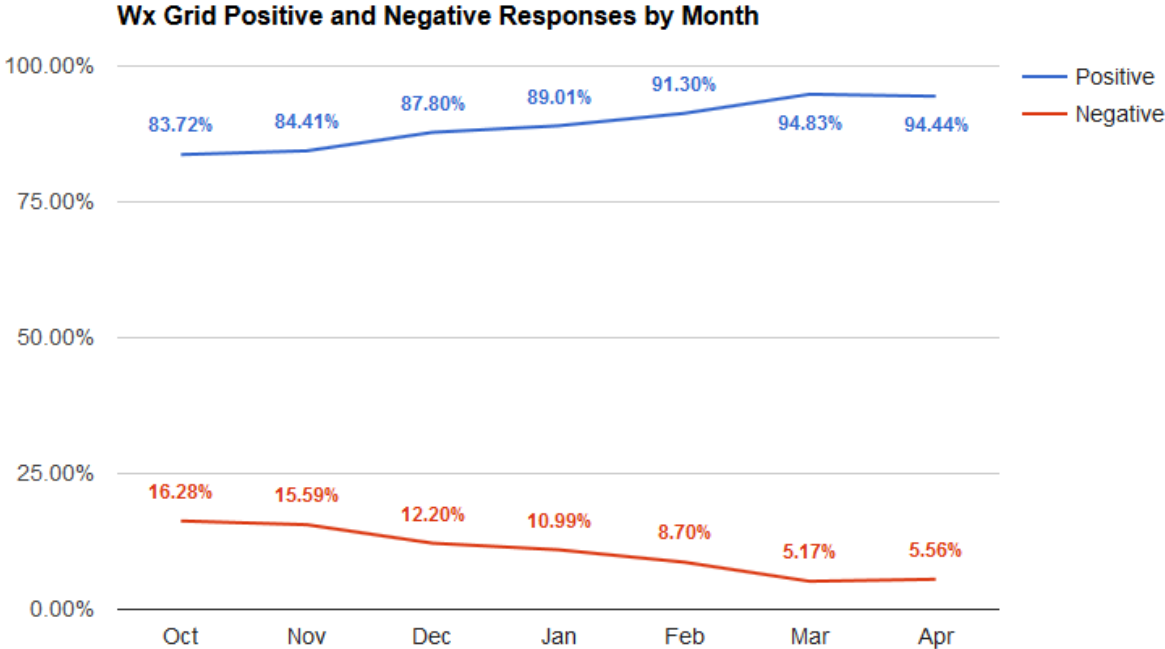


Spring 2017

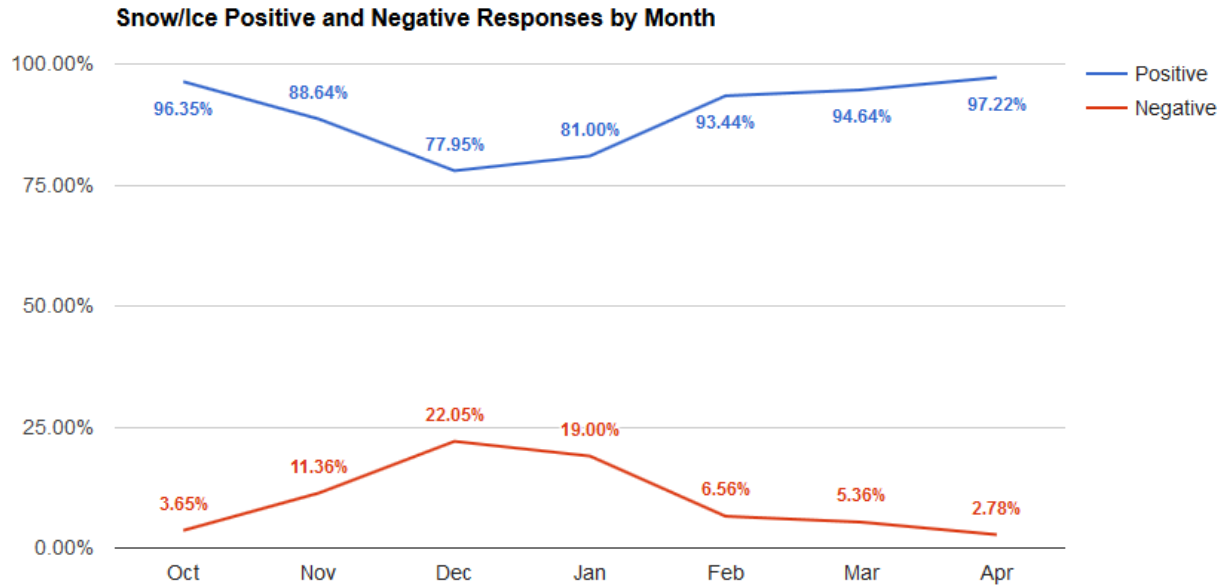
Regional Consistency Oct 2016 - Feb 2017



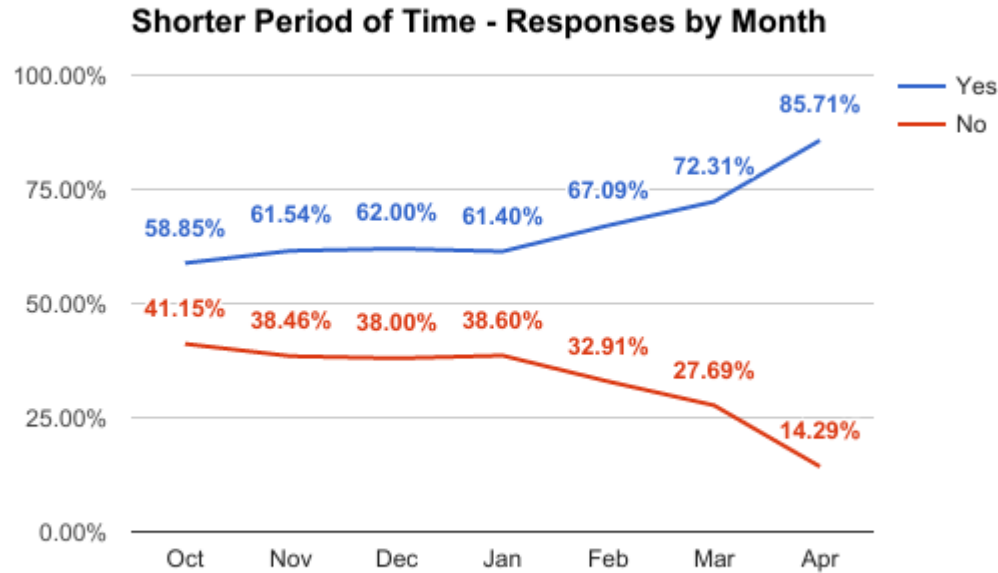
Wx Grids - Forecaster Satisfaction



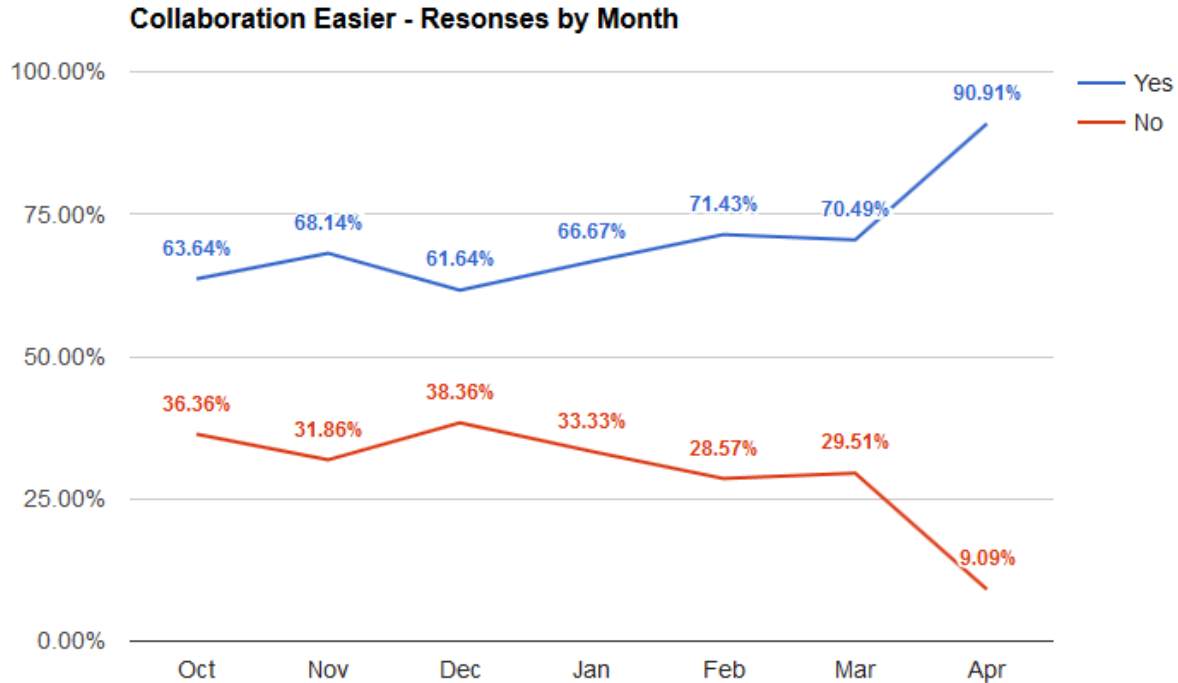
Snow/Ice Grids - Forecaster Satisfaction



Was the Forecast Created in a Shorter Amount of Time Using ForecastBuilder?



Was Collaboration Easier?



ForecastBuilder's Future

CR to use NationalBlend as starting point in ForecastBuilder **Q4 FY17 - Q1 FY18**

Gradually roll back support of Regional Blends. **FY18**

Start with NBMRegBlend, CONSMOS, BCCONSMOS

Possibly incorporate WR Impact Grids idea

ESTF (Enhanced Short Term Forecast) with ForecastBuilder **FY18**

Possible 6 hour Grid Population to align with TAF times.

“Finalize” grid updater built into FB to smoothly and effortlessly update dependent grids across the Public/Fire Wx/Aviation/Marine realms **Q1 FY17 - Q1 FY18**

Where we are heading (cont)

Target of Opportunity “Finder” **Q3 - Q4 FY 17**

Fire Wx Grid Creation within ForecastBuilder **Q3 FY17 - Q1 FY18**

Ensure AutoWSW is running CR-wide **Q1 FY18**

Encourage further expansion of ForecastBuilder beyond CR **Q2 FY17 - FY18**



Remove

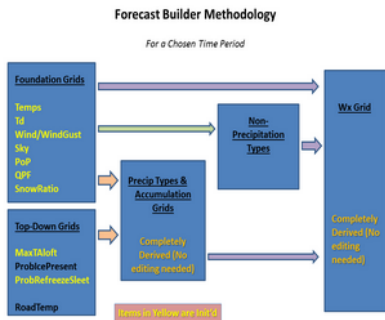
WEB CONTENT DISPLAY



Select Web Content

Forecast Builder

Producing accurate forecasts within a well-collaborated, science-based framework



- TRAINING
- FAQ
- Development Spreadsheet
- Feedback Form
- Proposal
- Full and Cron Cheat Sheets
- Quick Background Info.
- Introduction Presentation
- Forum
- Email for Help

Latest News (open each article to see links)

Add Blog Entry

RSS Subscribe

Hazard Builder Orientation Material

6/1/17 6:54 PM

- Edit
- Permissions
- Move to the Recycle Bin

The latest version of Forecast Builder includes a new integrated component called Hazard Builder which automatically generates weather hazard risk grids. In this introductory phase, Hazard Builder will essentially run in the background as part of the Forecast Builder Wx production process although output will be visible. There is no requirement to interact with Hazard Builder output...

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- Forecast Builder**
- National Blend of Models
- Probabilistic Snow Experiment
- Science Sharing
- Verification

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Forums (Forecast Builder)



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Threads

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Thread	Flag	Started By	Posts	Views	Last Post	
⚡ Visibility	Waiting for an Answer	Kevin Sullivan	1	9	Date: 7/3/17 5:32 AM By: Kevin Sullivan	Actions
⚡ Aviation Populate (Forecast Builder)	Waiting for an Answer	Kevin Sullivan	1	5	Date: 7/3/17 5:23 AM By: Kevin Sullivan	Actions
Request/Question regarding PotThunder	Waiting for an Answer	Joseph Moore	3	58	Date: 6/26/17 2:44 PM By: Andy Just	Actions
CYS Wind Verification	Waiting for an Answer	Zach Finch	2	30	Date: 6/19/17 2:01 AM By: David Barienbruch	Actions