The Weather Prediction Center's Winter Weather Experiment: Plans for the 14th WWE (2023-2024)

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WWE Seminar Series - 5 December 2023

WPC's Hydrometeorology Testbed (HMT)

Who we are:

Testbed Manager:
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Testbed Facilitators:
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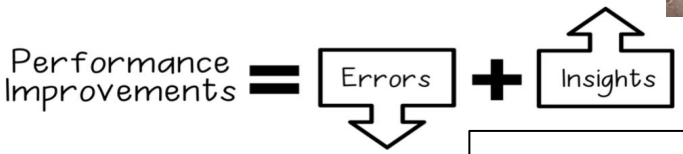
Immersive Experiments:

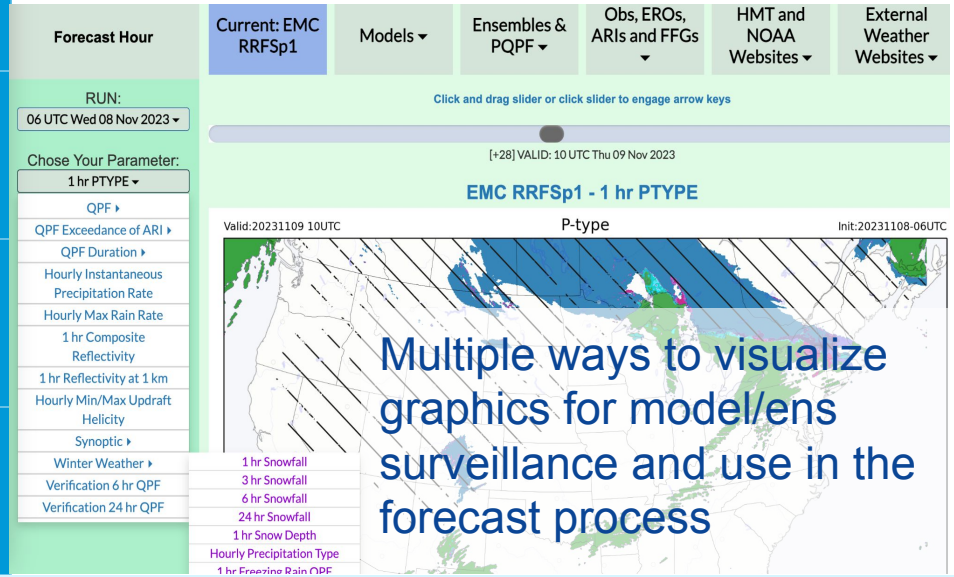


We aspire to:

- Improve forecasters' expertise via a robust ecosystem of tools and knowledge
- Generate Insight on the challenges of Forecasting & Impact-based Decision Support Services
- Improve the state of the science with real-world testing & evaluation
- Be People (not technology) Centered

What is the Winter Weather Experiment?

- Studying winter weather forecasting challenges (e.g. snowfall and mixed precip. events) in retrospective case studies
- Gaining insight into experimental model performance through interactive forecasting activities

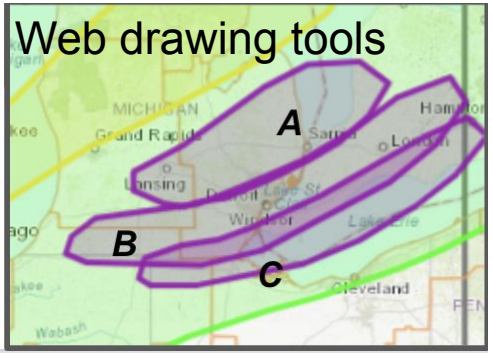


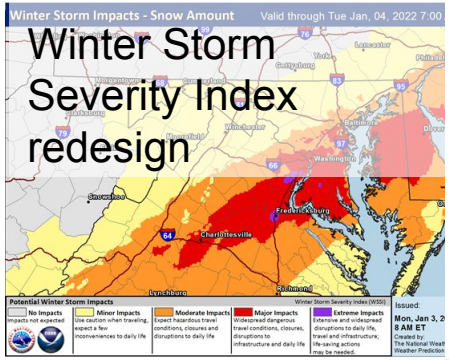
Past WWE Successes

R2O2R

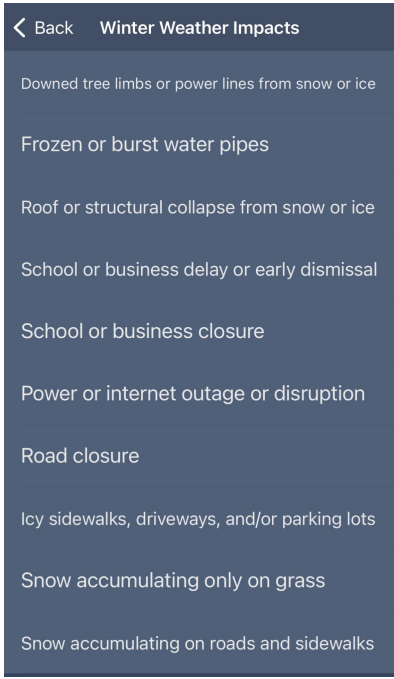
Research ⟷ Operations

- Testing of improved snowfall accumulation variables
- Testing of winter specific verification metrics for CAMs
- Enhancements to the National Blend of Models (NBM)
- Testing of fuzzy clustering for ensemble forecast scenarios





mPing observations



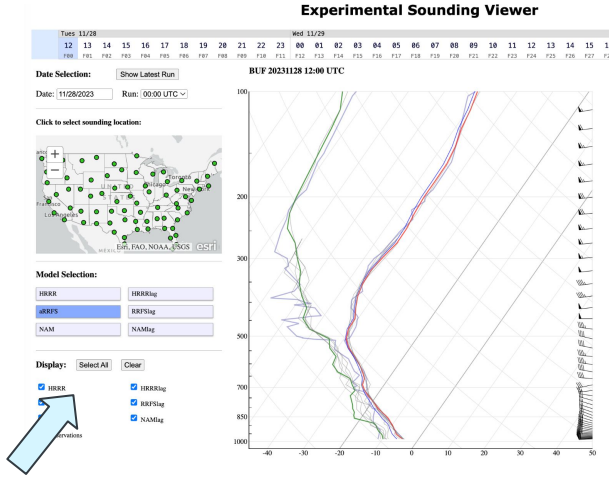
WWE: Vision for the next 5 years

- Objective evaluation of CAM freezing rain forecasts against gridded freezing rain analyses (funded project - CIWRO/NSSL)
- Greater discussion of winter weather impacts on forecast messaging (funded project - CIRES, NSSL)
  - Not just amounts but rates and timing can be very important
- Increase the Probabilistic Forecasting focus with the end goal of improved communication
- More involvement from partners to enhance communication

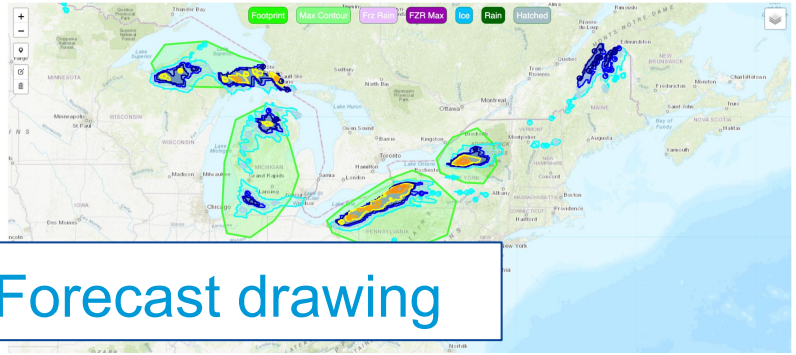
WWE 2023-2024 Plans - Projects

(*italics* = focus groups):

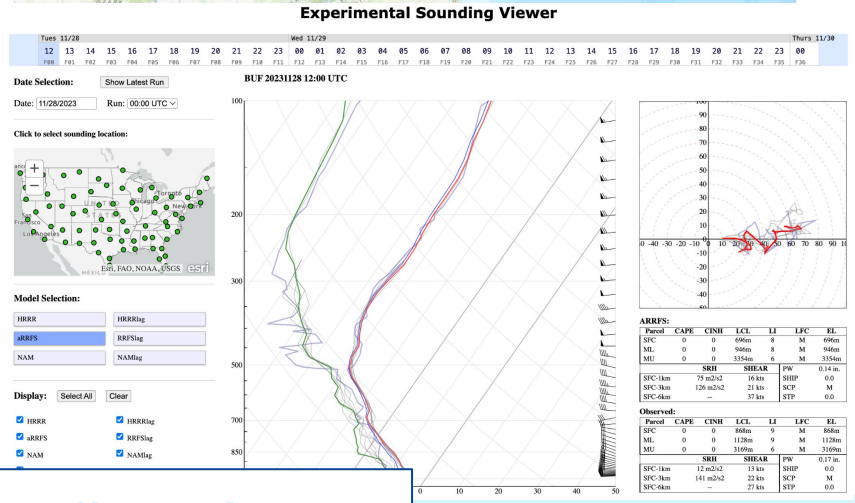
- *Observations: MRMS Freezing Rain analysis - FRANA (CIWRO/NSSL)*
- *Transportation hazards (CIRES/NSSL)*
- Convection-permitting applications:
  - Ensemble NWP and ML post-proc (OU CAPS)
  - Machine learning for SLR (Univ. of Utah)
  - Ensemble viz and verification (CIRES/NCAR)
  - RRFS_A evaluation (EMC)
  - Deterministic and ensemble soundings [may include spectral bin classifier] (HMT)



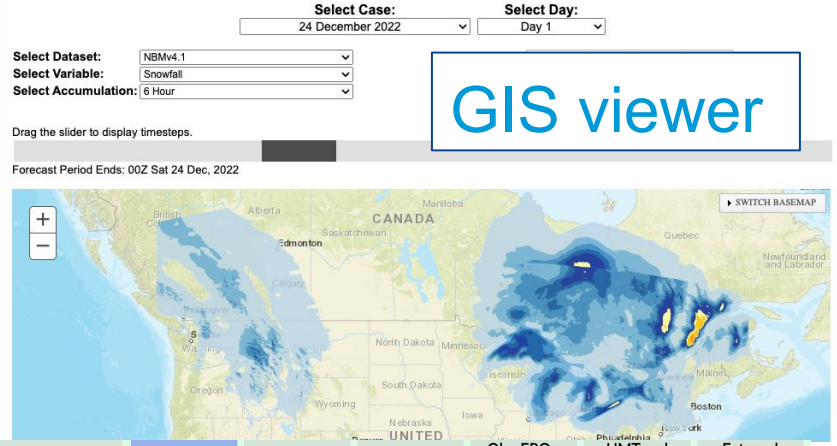
WWE 2023-2024 Plans - Activities and Tools



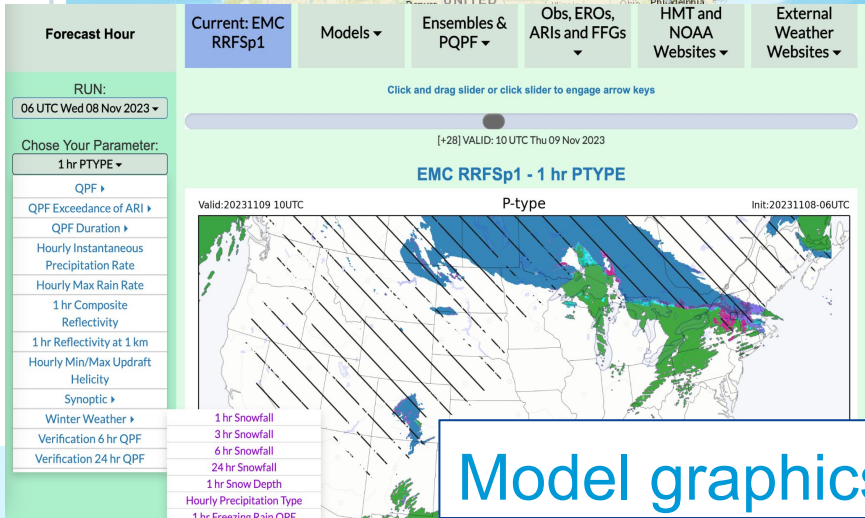
Forecast drawing



Sounding viewer



GIS viewer

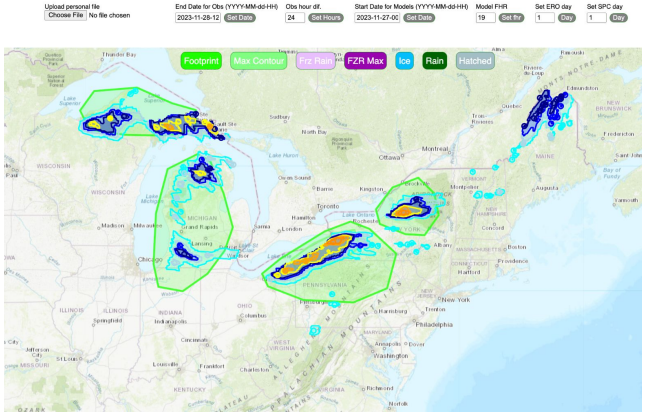


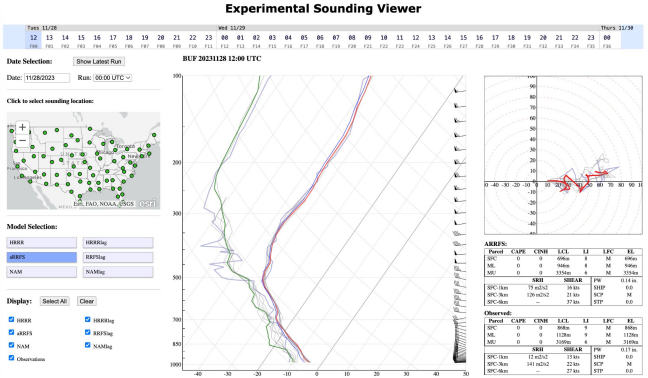
Model graphics

WWE 2023-2024 Plans - Activities and Tools

Forecasting Activities

- **MSTP** (Maximum Snowfall and Timing Product)
  - Predict snowfall and freezing rain extremes for Days 1-3: assess spatial extent, magnitude, timing uncertainty
- **Sounding Viewer Activity**
  - Assess thermodynamic profiles from CAMs for three locations of interest during a case study, predict timing of heavy snowfall, p-type transitions for each location



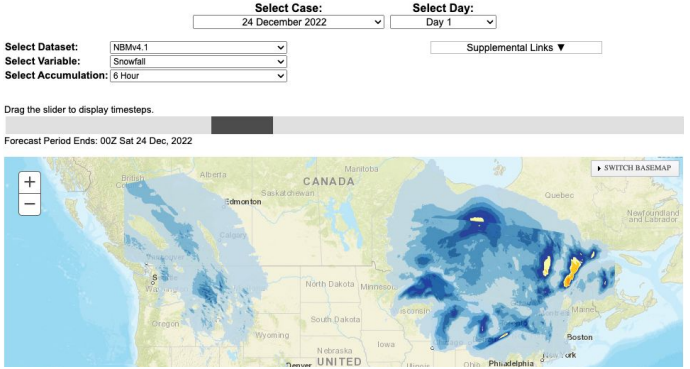


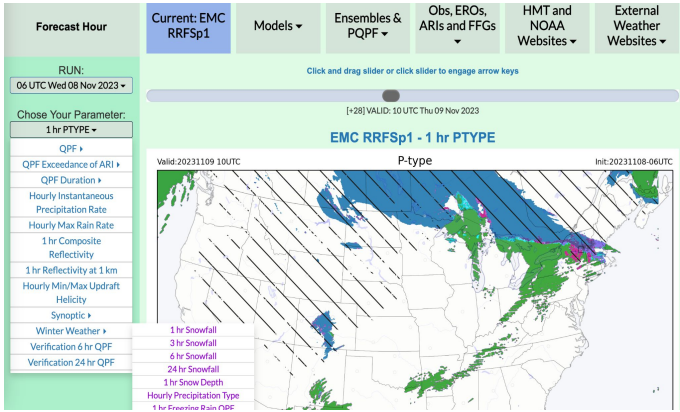
Science Seminars (Tue/Thu)

WWE 2023-2024 Plans - Activities and Tools

Evaluation/Verification Activities

- **Rapid Refresh Forecast System**
  - Help provide feedback to developers by verifying and evaluating RRFS against current operational models
  - Get forecasting experience with the RRFS, which is planned to become the new CAM ensemble for the NWS, replacing the HREF
- **Machine Learning Products**
  - Can ML methods improve ensemble products and probabilities for snowfall and SLR forecasts?





WWE 2023-2024 Plans - Activities and Tools

Monday	Tuesday	Wednesday	Thursday	Friday
9:30 am - Orientation and Introductions	9:30 am - Verification for Case 1	9:30 am - Case 2 sounding activity	9:30 am - Fcst. Brief Case 3	9:30 am - Fcst Brief Case 3
10:30 am - Fcst. Brief Case 1			10 am - Day 3 MSTP activity	10 am - Day 1 MSTP activity
11 am - Day 2 MSTP activity	11:30 am - Case 1 discussion	11:30 am - Verif. for Case 2	11:30 am - Fcst. Brief Case 3	11:30 am - Sounding activity Day 1
12 pm - Lunch	12 pm - Lunch	12 pm - Lunch	12 pm - Lunch	12 pm - Lunch
1 pm - Fcst. Brief Case 1	1 pm - WWE Seminar	1 pm - Verif. for Case 2	1 pm - WWE Seminar	1 pm - Verif. for Case 3
1:30 pm - Day 1 MSTP activity	2 pm - Fcst. Brief Case 2		2 pm - Day 2 MSTP activity	
	2:30 pm - Day 2 MSTP activity			
3 pm - Sounding activity	3:30 pm - Fcst. Brief Day 1	3:30 pm - Case 2 discussion	3:30 pm - Sounding activity Day 2	3 pm - Case 3 discussion
	4 pm - MSTP Day 1			4 pm - General Disc., Closing
5 pm - End	5 pm - End	5 pm - End	5 pm - End	5 pm - End

Intensive week schedule (draft):

- Planning to forecast and evaluate about 3 cases per intensive week
- For more details, visit: 14th WWE Science and Ops. Plan

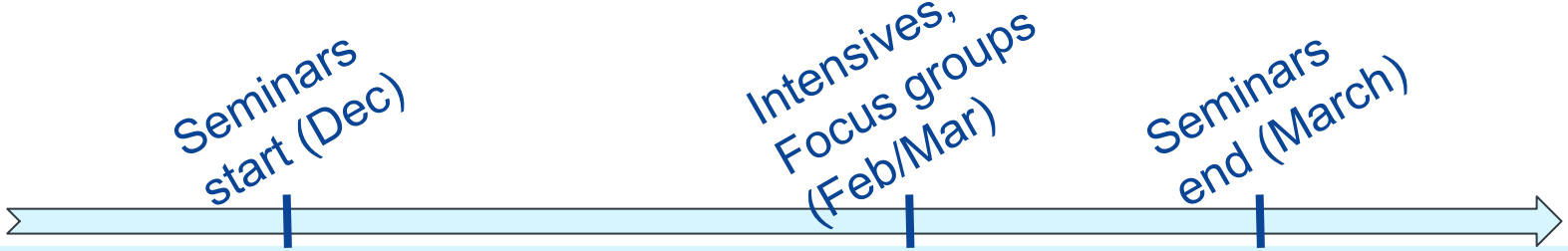
WWE Seminar Series

Seminars will be held at 1 pm ET (1800 UTC) on Google Meet from December to March

Seminar Date	Name	Affiliation	Topic
Tue, December 5, 2023	Massey Bartolini	CIRES/WPC	14th WWE Overview
Thu, December 7, 2023	Daniel Tripp	CIWRO/NSSL	FRANA
Tue, December 12, 2023	Andrew Rosenow	CIWRO/NSSL	MRMS snow rate
Tue, December 19, 2023	Ben Blake	SAIC/EMC	RRFSv1
Thu, January 4, 2024	Justin Minder	Univ. at Albany	WINTRE-MIX
Tue, January 9, 2024	Peter Veals / Jim Steenburgh	Univ. of Utah	Machine learning for SLR
Thu, January 11, 2024	Greg Carbin	WPC	Recent history of WPC Winter Weather Desk
Thu, January 18, 2024	Laura Tomkins / Sandra Yuter	NCSU	Snow banding observations
Tue, January 23, 2024	Keith Brewster	CAPS/OU	RRFS ens. and machine learning snow prods.
Thu, January 25, 2024	Andrew Lyons	SPC	SPC winter program, snow squall research
Tue, February 6, 2024	Josh Kastman	WPC	Winter Storm Severity Index development
Thu, February 8, 2024	Christiane Jablonowski	Univ. of Michigan	RRFS/FVCOM coupling for lake-effect snow
Tue, February 13, 2024	Bruce Veenhuis	WPC	PWPF research
Thu, February 15, 2024	Geoff Manikin	MDL	NBM winter updates
Tue, February 20, 2024	Eric Guillot	NWS HQ	NWS Winter Program
Tue, February 27, 2024	Nick Leonardo / Brian Colle	SBU	Idealized simulations of snow multi-bands
Thu, February 29, 2024	Anna Wilson / Jay Cordeira	CW3E	2022-2023 Western U.S. record snowfall
March schedule TBD			

WWE Participation

Links:
HMT Webpage (realtime graphics)
WWE Science and Ops. Plan

Here's how to join us:

- WWE seminar series (December-March): open to all, Google Meet
  - **Tuesdays/Thursdays, 1 pm Eastern**
- Intensive weeks: open to all, virtual (Google Meet), possible in-person (WPC)
  - **Planned dates: weeks of Feb 12 (v), Feb 26 (v), Mar 11 (v, poss. h)**
- Focus groups (FRANA and road hazards): NWS forecasters only
  - **Sessions in February and March, virtual (Google Meet)**
- Longer term:
  - Always open to suggestions for testing of new R2O ideas
  - PIs: look for calls for testbed-related funding proposals