BAMS
Meeting Summary

The Second Real-Time, Virtual Spring Forecasting Experiment to Advance Severe Weather Prediction

Adam J. Clark, Israel L. Jirak, Burkely T. Gallo, Kent H. Knopfmeier, Brett Roberts, Makenzie Krocak, Jake Vancil, Kimberly A. Hoogewind, Nathan A. Dahl, Eric D. Loken, David Jahn, David Harrison, David Imy, Patrick Burke, Louis J. Wicker, Patrick S. Skinner, Pamela L. Heinselman, Patrick Marsh, Katie A. Wilson, Andrew R. Dean, Gerald J. Creager, Thomas A. Jones, Jidong Gao, Yunheng Wang, Montgomery Flora, Corey K. Potvin, Christopher A. Kerr, Nusrat Yussouf, Joshua Martin, Jorge Guerra, Brian C. Matilla, and Thomas J. Galarneau

The 2021 NOAA Hazardous Weather Testbed Spring Forecasting Experiment

What: More than 130 researchers and forecasters convened virtually to test forecasting applications of convection-allowing models at lead times from an hour to two days, and evaluate various convection-allowing modeling and postprocessing strategies.

When: 3 May–4 June 2021

Where: Virtual

KEYWORDS: Ensembles; Forecast verification/skill; Operational forecasting; Model evaluation/performance; Postprocessing; Machine learning

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Corresponding author: Adam J. Clark, adam.clark@noaa.gov

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AFFILIATIONS: Clark, Wicker, Heinselman, and Potvin—NOAA/OAR/National Severe Storms Laboratory, and School of Meteorology, University of Oklahoma, Norman, Oklahoma; **Jirak, Marsh, and Dean**—NOAA/NWS/NCEP/Storm Prediction Center, Norman, Oklahoma; **Gallo, Vancil, Dahl, Jahn, and Harrison**—NOAA/NWS/NCEP/Storm Prediction Center, and Cooperative Institute for Mesoscale Meteorological Studies, University of Oklahoma, Norman, Oklahoma; **Knopfmeier, Hoogewind, Skinner, Wilson, Creager, Jones, Wang, Flora, Kerr, Martin, Guerra, and Matilla**—NOAA/OAR/National Severe Storms Laboratory, and Cooperative Institute for Mesoscale Meteorological Studies, University of Oklahoma, Norman, Oklahoma; **Roberts**—NOAA/NWS/NCEP/Storm Prediction Center, and NOAA/OAR/National Severe Storms Laboratory, and Cooperative Institute for Mesoscale Meteorological Studies, University of Oklahoma, Norman, Oklahoma; **Krocak**—NOAA/NWS/NCEP/Storm Prediction Center, and Cooperative Institute for Mesoscale Meteorological Studies, and Center for Risk and Crisis Management, University of Oklahoma, Norman, Oklahoma; **Loken, Yussouf, and Galarneau**—NOAA/OAR/National Severe Storms Laboratory, and Cooperative Institute for Mesoscale Meteorological Studies, and School of Meteorology, University of Oklahoma, Norman, Oklahoma; **Imy, Burke, and Gao**—NOAA/OAR/National Severe Storms Laboratory, Norman, Oklahoma

The 2021 NOAA Hazardous Weather Testbed Spring Forecasting Experiment (2021 SFE) was held virtually 3 May–4 June 2021. SFEs are co-led by the NWS/Storm Prediction Center (SPC) and OAR/National Severe Storms Laboratory (NSSL), and test new severe weather prediction tools, study how end users apply severe weather guidance to forecasting, and facilitate experiments for optimizing convection-allowing model (CAM) ensemble design informing Unified Forecast System (UFS; https://ufscommunity.org) development. Well-vetted virtual meeting tools enabled the most SFE participation ever: 133 forecasters, researchers, and students from around the world. Gathering a diverse community to learn from one another has been a hallmark of SFEs that has continued in virtual experiments. However, science-based discussions and establishing new collaborations are more difficult in the virtual environment. Nevertheless, lessons learned could benefit a future hybrid approach involving both in-person and virtual participation.

SFE 2021 forecasting activities involved SPC operational product and service improvements and "data denial experiments" with CAM guidance withheld from a control group. Model evaluations emphasized the 64-member Community Leveraged Unified Ensemble (CLUE; Clark et al. 2018), with CLUE experiments examining data assimilation methods, strategies for single-model CAM ensemble design, and impact of regional domain size on day 2 model performance. Other evaluations studied machine-learning applications for severe weather, mesoscale analyses, NSSL's Warn-on-Forecast System (WoFS), and calibrated severe weather guidance from operational global and regional ensembles.

Some highlights of the 2021 SFE

To explore short-term forecasting applications of WoFS and other CAMs, participants used this guidance to generate mesoscale discussions and present the product to a group of participants. This was a popular activity pushing participants to synthesize CAM output. One participant noted, "I loved doing that! … As a model developer/researcher, I don't get to sit in 'the hot seat' … It gave me a chance to be more creative and thoughtful in my forecasting process."

In another activity, two groups generated Day 2 Convective Outlooks. One group used CAMs and all other available data (All Data), while CAMs were withheld from the other (No CAMs).

There was little difference overall in the subjective ratings between the groups for hail and tornado outlooks, but the All Data wind forecasts were rated significantly better than No CAMs because of several cases where CAMs accurately depicted severe-wind-producing mesoscale convective systems that were not evident in the non-CAM guidance.

In one CLUE evaluation, configuration strategies for a Rapid Refresh Forecast System (RRFS) were examined. The RRFS is a rapidly updating CAM ensemble that will use the UFS Short-Range Weather Application (currently the FV3-LAM), and will subsume several operational regional models simplifying NOAA's modeling suite. Encouraging subjective evaluation results indicated that a prototype RRFS from NOAA's Global Systems Laboratory, which uses stochastic physics and initial conditions from the operational High-Resolution Rapid Refresh data assimilation system (HRRRDAS), performed almost as well as the current operational CAM ensemble, the High-Resolution Ensemble Forecast System.

More information on the 2021 SFE

In the second virtual SFE, progress was made in key areas to accelerate R2O for models and tools that improve operational severe weather forecasts. The full 2021 SFE Summary Report is at https://hwt.nssl.noaa.gov/sfe/2021/docs/HWT_SFE_2021_Prelim_Findings_FINAL.pdf.

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Reference

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