



UFS INSIGHTS

VOLUME 7
JUNE 2025



A UFS Collaboration
Powered by **EPIC**



OUR MISSION



The Unified Forecast System

While we cannot control the weather, we can understand how to better predict it. That's where the Unified Forecast System (UFS) comes in. The UFS is a suite of Earth System Models (ESMs) developed by the science community to better predict weather and Earth system dynamics. The UFS framework includes multiple applications that span local to global scales and offer sub-hourly to seasonal predictions. These applications package together components such as numerical models, data assimilation, and other elements.

[Explore the UFS portal](#)

Earth Prediction Innovation Center (EPIC)

NOAA's Earth Prediction Innovation Center (EPIC) program supports and strengthens the UFS by nurturing a collaborative weather community. EPIC offers an environment for the growth of next-generation models, management of cloud-ready code, community engagement and user support, a pipeline for research and model transition to operations, end-to-end testing for UFS applications, and expanded support for NOAA's ESMs.

[Explore the EPIC Community portal](#)



UPCOMING EVENTS

EPIC– Artificial Intelligence in Weather Modeling Workshop

June 27, 2025 | 10am - 6pm EDT / online

Registration is now open to join EPIC – Artificial Intelligence (AI) in Weather Modeling One-day Virtual Workshop. This workshop will include a variety of AI use cases, review numerical modeling, cover running applications with Graphcast, FourCastNetv2, and PanguWeather, and utilize European Centre for Medium-Range Weather Forecasts (ECMWF's) Anemoi Core to review re-training, training, modeling, and graphing the model.

[Information and registration](#)



Unifying Innovations in Forecasting Capabilities Workshop 2025 September 8-12, 2025, Boulder, CO / online

Please join us for the [UIFCW25](#) five-day hybrid workshop to learn about and collaborate on advancing forecasting capabilities. This is an opportunity for members from the broad Weather Enterprise to focus together on the workshop's theme: 'Building a stronger UFS community through collaboration and knowledge sharing'.

[Register](#)

Please note: In-person registration must be completed by Friday, August 22, 2025; there will be no on-site registration for in-person attendance.

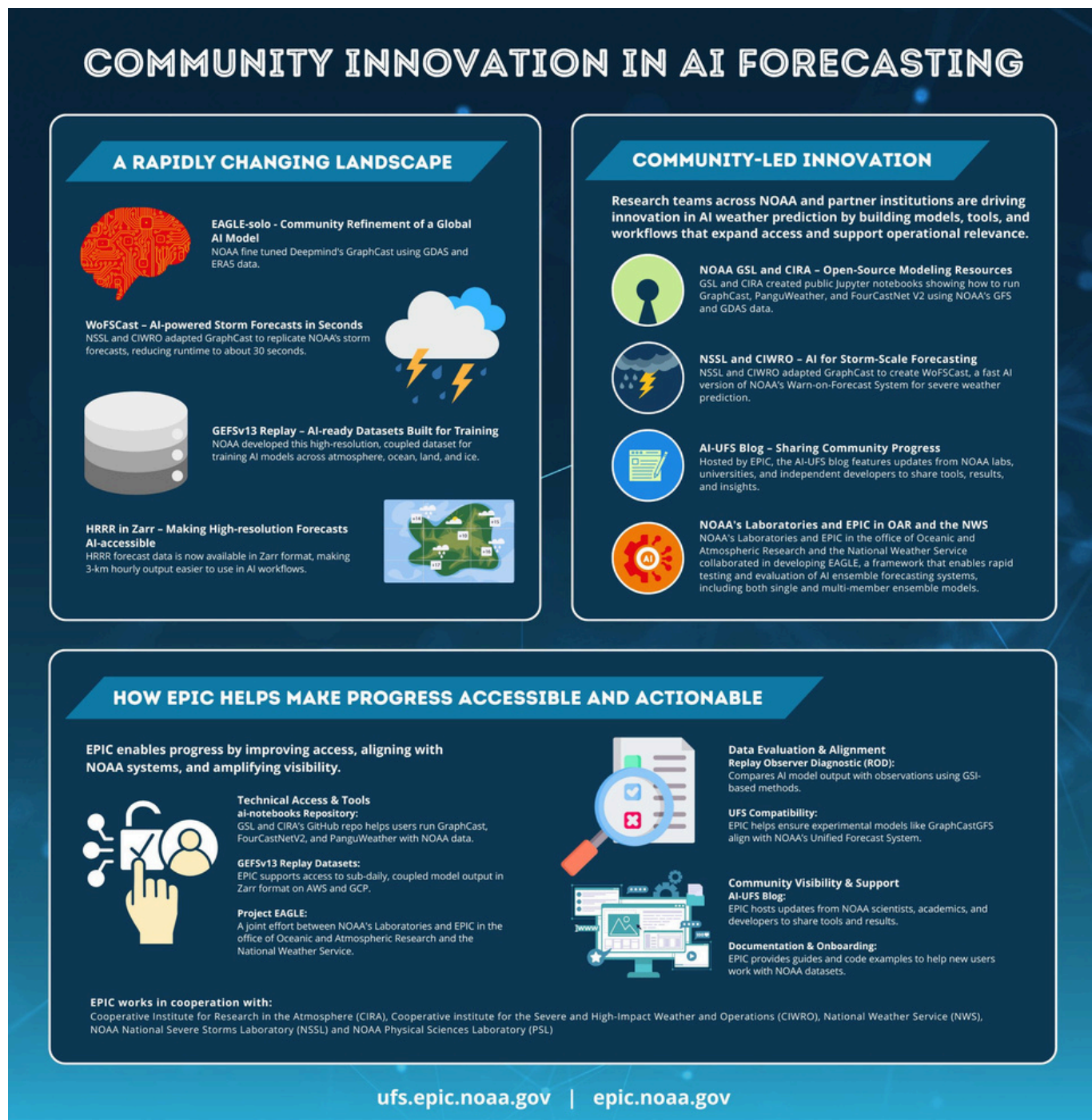
[Submit an Abstract](#) by Monday, June 30, 2025 for any of the following sessions:

- United Forecast System (UFS) Applications – Short Range Weather (SRW) Application, Rapid Refresh Forecast System (RRFS), and Model for Prediction Across Scales (MPAS)
- UFS Applications – Coastal, Marine, Oceans and Ecology
- UFS Applications – Air Quality, Atmospheric Composition, Aerosols (including smoke, dust and fire capabilities)
- Cross-Cutting – Data Assimilation
- UFS Application – Global Applications Across Scales
- Community Engagement/Collaboration
- Emerging Technologies: Artificial Intelligence (AI) / Machine Learning (ML)
- Student Session
- Poster Session

Hotel Information

EPIC has reserved a block of rooms at the Residence Inn, Boulder and Hampton Inn & Suites, Boulder-North for attendees who need hotel accommodations. Each guest must make their own reservation. Find more information on the hotel blocks on the [UIFCW25 event](#) page.

ADVANCING AI IN EARTH SYSTEM SCIENCES



This infographic highlights how NOAA's Laboratories and EPIC in the Office of Oceanic and Atmospheric Research (OAR), the National Weather Service (NWS) and partners are advancing AI innovation in Earth system science through shared tools, open data, and community collaboration. Key efforts include AI-enhanced storm forecasts, high-resolution datasets, and open-source modeling tools. EPIC supports real-time demonstration and accessibility by providing technical resources, evaluation platforms, user and onboarding support to integrate AI with NOAA systems.

View more [EPIC infographics](#)

UFS Innovators

We want to shine the spotlight and recognize 'UFS Innovators.' These are the individuals who truly put the 'innovation' in EPIC. While not all featured innovators are directly part of the EPIC program, they are integral members of the UFS community. Their efforts and contributions are what drive the program's success. These dedicated professionals are instrumental in advancing the UFS, constantly pushing boundaries to enhance its capabilities.

Sergey Frolov

Sergey Frolov is the Reanalysis and Data Assimilation Team Lead at NOAA's Physical Sciences Laboratory, where he leads development of advanced computing algorithms and AI-based models for Earth system prediction. He currently leads efforts to build a coupled reanalysis capability for NOAA's Unified Forecast System and co-leads the NOAA AI for Numerical Weather Prediction (AI4NWP) tiger team.

Prior to his current role, Dr. Frolov held research and leadership positions at the Naval Research Laboratory and the Monterey Bay Aquarium Research Institute, where he contributed to coupled data assimilation systems and operational forecasting. His work has supported a wide range of environmental initiatives, from U.S.-Canada treaty negotiations to global Subseasonal to Seasonal (S2S) forecast model development.



Dr. Frolov earned his Ph.D. in Environmental Science and Engineering from Oregon Health & Science University, an M.S. in Environmental Science and Policy from the Central European University, and a B.S. in environmental radionuclide fate from the International Sakharov Environmental University. He joined NOAA in 2019.

UFS Innovators



Jun Wang

Jun Wang is a Physical Scientist working at the Engineering and Implementation Branch (EIB) at the National Weather Service Environmental Modeling Center (EMC). She has been working on Numerical Weather Prediction (NWP) model development for more than 20 years, focusing on model infrastructure advancement including earth model component integration, coupling, input-out, and computational performance as well as data science and products. She is one of the key contributors to Global Forecast System (GFS) versions 14-17 implementations. In the last two years she has been participating in NOAA's AI4NWP project focusing on developing data-driven ML models for global weather and climate predictions at EMC.

Jacob Radford

Jacob Radford was a Research Scientist I at the Cooperative Institute for Research in the Atmosphere (CIRA), where he helped lead NOAA's efforts in AI-driven weather prediction. His work focused on developing operationally relevant tools, including a widely used AI Weather Prediction (AIWP) reforecast archive and a real-time visualization platform. He was also involved in the creation of a regional AIWP model based on the High-Resolution Rapid Refresh (HRRR) system and in building user-centric interfaces to enhance trust in AI-based precipitation type forecasts.

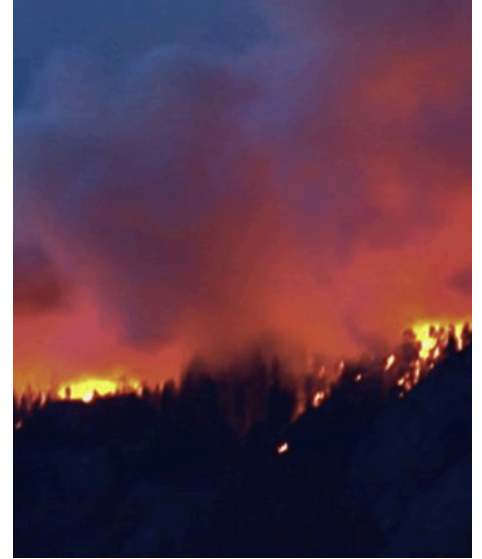


Jacob completed his Ph.D. in Atmospheric Science at North Carolina State University under Dr. Gary Lackmann, where he studied mesoscale snowbands and taught multiple meteorology courses. His research bridges meteorology and data science, with broad interests in synoptic and mesoscale meteorology, NWP, and model verification. He has also contributed to model development at the U.S. Environmental Protection Agency (EPA) and the 14th Weather Squadron.

NEWS AND INSIGHTS

UFS Short-Range Weather (SRW) Application v3.0.0 Release

EPIC, in collaboration with the National Science Foundation's National Center for Atmospheric Research (NSF NCAR) and many collaborators as part of the [Short Range Weather \(SRW\) Application Release Working Group](#), released SRW v3.0.0, adding new capabilities for modeling wildfires, smoke, and dust for ESM developers and researchers. The latest release integrates two-way fire-atmosphere feedback mechanisms allowing model developers to simulate how weather conditions influence wildfire behavior and smoke emissions, along with how fire and smoke affect nearby weather conditions. NSF NCAR's Community Fire Behavior Model (CFBM) drives this new capability, showcasing the close partnership with NOAA as outlined in the recently signed [Memorandum of Understanding \(MOU\)](#). Additional model enhancements were made to SRW v3.0.0, including increased capabilities for tracking particulate matter dispersion, and enhanced workflow and infrastructure.



[Information](#)



Support for Gaea C6 Added to UFS Short Range and Weather Model Application Codebases

As part of ongoing efforts to expand multi-platform compatibility of the UFS SRW and Weather Model (WM) Applications, a set of targeted updates was introduced to support the new Gaea C6 partition on NOAA's Research and Development High-Performance Computing (RDHPC) system. These changes ensure that the UFS SRW and WM Apps can run seamlessly on Gaea C6 for both development and production workflows, particularly for testing, forecast execution, and post-processing.

[Read more](#)

An Early look at NOAA's Project EAGLE to Accelerate AI Weather Prediction Advances for the United States

Take an early look at NOAA's Project EAGLE (Experimental AI Global and Limited-area Ensemble forecast system), a joint effort between NOAA Research Laboratories and the [Earth Prediction Innovation Center](#) (EPIC) in the [Office of Oceanic and Atmospheric Research \(OAR\)](#), and the [National Weather Service \(NWS\)](#). EAGLE is planned to provide NOAA and the Weather Enterprise with the ability to rapidly test, develop, and demonstrate in real-time AI-based models for global and ensemble forecasting. This early look consists of two demonstrations for global and regional, deterministic and ensemble forecasting.



[Read more](#)

NEWS AND INSIGHTS



EPIC – Containerized Spack-Stack Workshop Outcomes

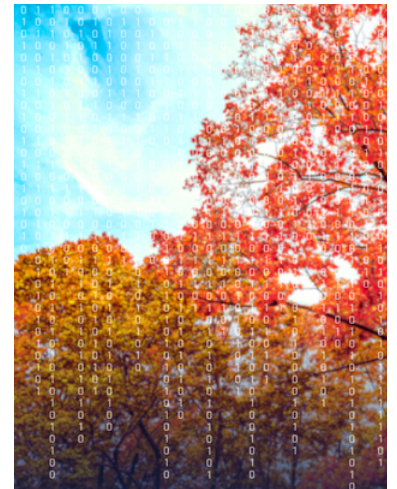
The recent EPIC-hosted workshop demonstrated how to build and run UFS software using containerized Spack-Stack environments on NOAA's Research and Development High-Performance Computing Systems (RDHPCS). Led by Mark Potts and other NOAA affiliates, the event introduced Apptainer containers as a way to simplify complex software dependencies and ensure reproducibility across Hydrometeorological Prediction Center (HPC) systems. Attendees were guided through interactive examples, including MPI-enabled test programs, and received live troubleshooting support for common issues like Earth System Modeling Framework (ESMF) initialization errors. The session also covered best practices for running UFS jobs interactively via Slurm, including resource allocation commands and job submission strategies. With 29 in-person attendees at NOAA Center for Weather and Climate Prediction (NCWCP) and 105 virtual participants, the workshop highlighted EPIC's commitment to enabling open, efficient workflows for weather modeling and research.

[Read more](#)

Community Modeling on Community Platforms - One Member's Perspective on the UFS

Doing new and interesting science with the Unified Forecast System (UFS), or any numerical model, requires completing a similar series of basic steps. These steps are easy to define but can be challenging to execute, especially for platforms and environments that are very different from where the model was developed. Working in collaboration with our partners at NOAA Earth Prediction Innovation Center (EPIC) and Environmental Modeling Center (EMC), researchers at George Mason University (GMU) have succeeded in implementing both the UFS and the EMC global-workflow on multiple community platforms. The team at GMU is now in full production, making runs and analyzing data in support of the Seasonal Forecast System development effort.

[Read more](#)



NWS Launches Warn-on-Forecast System Demonstration Project

The Warn-on-Forecast System (WoFS), developed by the National Severe Storms Laboratory (NSSL), bridges the gap between the available data imagery that indicates a possible weather threat, and the decision to issue a weather warning, by increasing forecaster confidence. This is achieved by the demonstrated success, in real-time, of the Warn-on-Forecast System (WoFS) providing decision-making guidance based on probability.

[Read more](#)

NEWS AND INSIGHTS

Forecasting Made Accessible: AI Weather Models on Google Colab

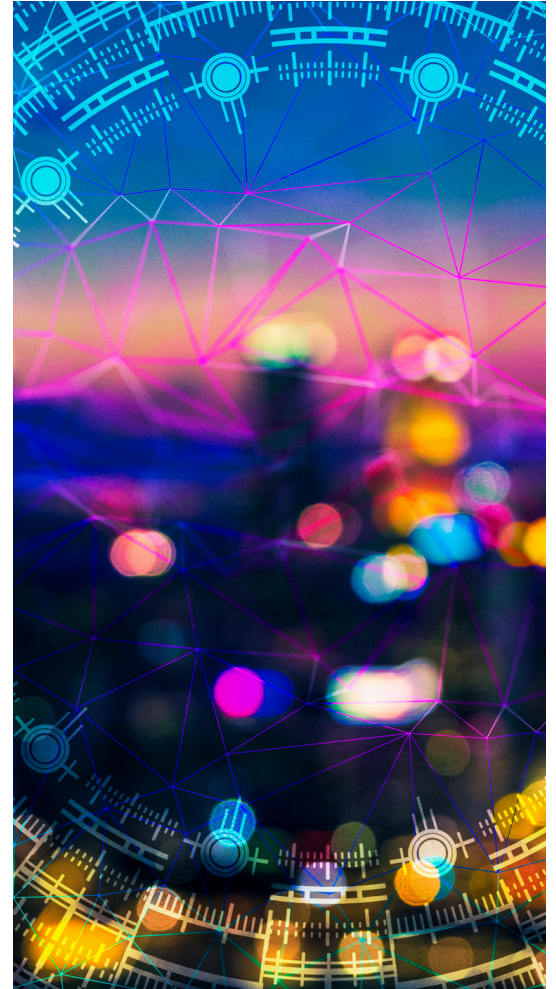
Dr. Jacob Radford (formerly GSL/CIRA) has developed a suite of Google Colab notebooks that make Artificial Intelligence Weather Prediction (AIWP) models accessible through free, cloud-based resources. His flagship notebook, [Running AIWP.ipynb - Colab](#), provides a detailed, interactive guide for running leading models like FourcastNet, Pangu-weather, Graphcast, and Aurora. Built on ECMWF's ai-models Python package, it covers model setup, execution, and performance evaluation, with a typical run time of 70 minutes.

Designed with accessibility in mind, the notebooks include clear instructions, practical examples, and helpful visualizations, making them approachable for both beginners and experienced users. They also provide insights into computational needs and optimization strategies, helping users improve model efficiency.

By using Google Colab's free environment, Dr. Radford eliminates hardware barriers and opens the door for broader experimentation with cutting-edge forecasting tools. His work exemplifies open-source collaboration and supports wider goals of education, innovation, and equity in science.

EPIC commends Dr. Radford's contributions, which empower users to explore advanced AI tools and lay a strong foundation for future research in AI-driven weather prediction.

[Read more](#)



New Idealized, Regional Tropical Cyclone Test Case Added to UFS Weather Model

NOAA Earth Prediction Innovation Center (EPIC) is announcing a new [tropical cyclone test case](#) being added into the Unified Forecast System-Weather Model's (UFS-WM) framework. This test case, developed by NOAA's NWS Environmental Modeling Center (EMC), is designed to support controlled studies of tropical cyclone dynamics and forecast development, focused exclusively on atmospheric forecasts using idealized inputs.

[Read more](#)

RESOURCES

Webinars

UFS Coastal and Applications: A Brief History, Current Status and the Path Forward

The [May UFS Webinar](#), presented by Saeed Moghimi and Ufuk Turuncoglu from NOAA's National Ocean Service, offered a comprehensive overview of the advancements in the UFS Coastal Model and its applications. The session detailed the collaborative effort between NOAA branches (NOS, OAR, NWS) and the broader coastal modeling community to develop a next-generation coastal ocean coupling infrastructure for integration into the Unified Forecast System. Highlighting the project's history, current status, and future roadmap, the presenters showcased the development of ufs-coastal-model and its downstream applications, which are being built with substantial support from developers of key ocean models like ROMS, ADCIRC, SCHISM, and FVCOM. This new infrastructure aims to significantly improve coastal forecasts, and a full recording of the webinar is available for those interested in a deeper dive into the technical developments and planned applications.

[Read more](#)

Get Code

[Short-Range Weather \(SRW\) Application](#)

[UFS Weather Model \(WM\) Application](#)

[Unified Post Processor \(UPP\) Application](#)

[Land Data Assimilation \(DA\) System Application](#)

[Unified Workflow Tools](#)

[Stochastic Physics](#)

[AI](#)

New SRW Technical FAQs

Check out our updated FAQs for the new SRW Release v3.0.0, which includes helpful information to questions on configurations, changing parameters, running new experiments and more.

[Read more](#)

Suggest a UFS News Topic

Make your voice heard by contributing to our next newsletter. We welcome ideas for future topics.

[Submit your UFS news topic](#)

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