Frameworks: Large Scale Atmospheric Research Using an Integrated WRF Modeling, Visualization, and Verification Container Framework (I-WRF)

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Summary:

- Cornell and NCAR are implementing a coordinated containerized framework for the Weather Research and Forecasting Model that seamlessly integrates a new multi-node WRF container, an optimized Model Evaluation (METplus) container, and an enhanced Analysis and Visualization container for more productive research.
- The *Integrated WRF framework (I-WRF)* will support multi-node simulations, enabling research-grade applications, i.e., covering large domains at high spatial discretization.
- Ease of use will enable a wider range of researchers—environmental engineering, transportation, civil engineering, air quality policy, agriculture, urban planning, etc.—to run their own modeling activities, followed by convenient interaction with results.
- Users will not have to configure and deploy individual elements separately. Containers will include the entire environment and recipes required for conducting collaborative and extremely complicated workflows.
- Usable tools for atmospheric science research will be put in the hands of a larger number of next-generation researchers.

Approach:

- Integrated framework and container features will be tested and validated on the latest parallel HPC and cloud platforms by CI researchers and use case scientists who will scale studies on the evolution of renewable energy generation in a changing climate, the effect of land use and climate change on severe weather events, and the relation between air quality and human morbidity and mortality.
- On the other end of the computational spectrum, these exact same containers will serve as vehicles for introducing students to numerical atmospheric simulations and output evaluation at WRF and METplus tutorials and in classroom curricula.

Image: Understanding how renewable energy sources will be impacted by a changing climate is one of the project's science use cases

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