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Title: Ensemble forecast system design for high-impact weather prediction applications

Forecasting convective precipitation remains a considerable challenge for the weather community, but much progress has been made through new knowledge on convective processes, advances in numerical models, and the rapid rise in access to high-end computing resources that collectively have improved forecast guidance. Specifically, high-resolution ensemble forecasts can be used to generate probabilistic forecast guidance for high-impact weather events to improve decision-making, and creating skillful and reliable guidance now appears both practical and possible. Unfortunately, since these capabilities are just now emerging, little is currently known on best practice in storm-scale ensemble forecast system design to achieve routinely skillful and reliable predictions.

NCAR has been actively developing experimental ensemble prediction systems, including real-time, high-resolution, ensemble forecast system demonstrations. A current demonstration system is focused on next-day high-impact weather prediction that relies on a mesoscale (15 km horizontal grid spacing) ensemble analysis. Ongoing research activities include development of a high-resolution ensemble analysis system (3-km horizontal grid spacing) that includes assimilation of cloud and precipitation information to markedly improve short-term (1-12 h) high-impact weather prediction.

At the conference, I will give a brief overview of NCAR’s ensemble analysis and forecast system design for high-impact weather applications, highlight probabilistic guidance for select high-impact severe weather forecast events from our ongoing real-time forecast system, and will share our progress in developing a high-resolution ensemble analysis over the conterminous United States.