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Conference on European Tornadoes and Severe Storms

Using short-range ensemble forecasts for severe weather events

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Using numerical models to forecast the development and evolution of deep convection is a difficult problem, owing to uncertainties in both the initial condition of the atmosphere and the model physics. These errors often lead to the lack of explicit numerical guidance for severe weather events. One approach that may assist in producing forecasts of severe weather events is the use of an ensemble of model forecasts. If the ensembles are created to investigate the severe weather threat, and not just the evolution of the synoptic-scale flow patterns, they may provide guidance on the likelihood of convective initiation and evolution that surpasses that available from a single, higher-resolution deterministic forecast.

Two separate numerical model ensembles are created by using model configurations with different model physical-process parameterization schemes and identical initial conditions, and by using different model initial conditions from a Monte Carlo approach and the identical model configuration. Simulations from these two ensembles are investigated for two 24 h periods during which severe thunderstorms, including one violent tornadic supercell, are observed. These two periods are chosen because, in some respects, they span the range of severe convective-forecast problems routinely handled by operational forecasters. Results from these ensemble simulations will be discussed, along with the variance in several parameters often found to be useful in investigating the potential for the development of supercell thunderstorms. In addition, the potential for a forecaster to create an ensemble specifically focused upon the severe weather threat will be documented.