

An Ensemble Kalman Filter for Estimation and Prediction of Severe Thunderstorms

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Abstract

Severe thunderstorms are of great interest not only to fans of the Weather Channel but also to homeowners, businesses and travelers in the path of such storms. Copious, real-time observations of these storms are available in the US from the network of Doppler radars installed in the 1980's. Because the radars provide measurements only of the power of the returned signal (which is related to the amount and size of precipitation and other particles in the beam path) and the component of velocity along the beam, it has proven difficult to use these observations to initialize numerical weather forecasts, where estimates of temperature, pressure, moisture, and all three components of velocity are typically required on a grid of $O(10^6)$ points. I will review recent progress in developing sequential Monte-Carlo methods for state estimation in this problem and discuss several unresolved issues of statistical interest.