

Regional Weather Forecasting using the Local Particle Filter

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Particle filters (PFs) are sequential Monte Carlo methods that can solve data assimilation problems characterized by non-Gaussian error distributions for prior model variables or measurements. Recent efforts applying PFs for geophysical models have resulted in “localized” PFs, which approximate a given data assimilation application as a large set of loosely coupled problems that can be solved independently using relatively small ensembles – an approach long used for ensemble Kalman filters (EnKFs). This seminar reveals findings from month-long experiments comparing a local PF and EnKF for medium-range forecasting using the Hurricane Weather Research and Forecasting model -- a limited-area model used for operational tropical cyclone forecasting and research in the United States. This research identifies several advantages of the local PF for applications known to pose challenges for Gaussian filters and smoothers, and describes broader implications of PFs for environmental prediction.