Particle Filters, Covariance Localization and Numerical Weather Prediction

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Abstract

Although forecasting and data assimilation for geophysical processes are common tasks, the application to numerical weather prediction (NWP) poses difficult statistical problems. Characteristic of the NWP problem are nonlinear dynamics and non-Gaussian forecast distributions in high dimensions, making the need for on-line prediction and assimilation particularly challenging. This talk will focus on how Bayesian ideas in nonlinear filtering theory (i.e., particle filters) may be applied in context of NWP. We make use of recent advances in data assimilation research pertaining to localization of covariance structures. Our methods are illustrated using simulations. This is joint work with Doug Nychka and Chris Snyder.