Non-Gaussian Hybrid Variational Data Assimilation

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Abstract

With the advancement of non-Gaussian based variational techniques the need to extend this to hybrid ensemble-variational techniques is the next step towards operational viability. However, the problem lies in the Gaussian assumptions that are made in the derivation of the Kalman filter. In this presentation we shall show a lognormal, and Gaussian-lognormal based Kalman filter which is then approximated with the Maximum Likelihood Ensemble Filter (MLEF) approach. The MLEF is a hybrid scheme that utilizes Kalman filter equations for the analysis and forecast error covariance matrices but solves a variational-based cost-function projected in the ensemble space. The hybrid nature makes MLEF a suitable system for our non-Gaussian applications. As a theoretical study, we shall present results of these new formulations with the Lorenz 1963 model.

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