



Adaptive covariance inflation in the EnKF by Gaussian scale mixtures

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We study inflation: the complementary scaling of the state covariance in the ensemble Kalman filter (EnKF). Firstly, error sources in the EnKF are catalogued and discussed in relation to inflation; nonlinearity is given particular attention. Then, the "finite-size" refinement known as the EnKF-N is shown to be a Gaussian scale mixture, again demonstrating its connection to inflation. Existing methods for adaptive inflation estimation are reviewed. One such method is selected to complement the EnKF-N to make a hybrid that is suitable for contexts with model error. Benchmarks are obtained from experiments with the two-scale Lorenz model where only the slow scale is resolved. The proposed hybrid EnKF-N method of adaptive inflation is found to yield systematic accuracy improvements in comparison with the existing methods, albeit to a moderate degree.