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Xin T Tong* (mattxin@nus.edu.sg), Room 806, Block S17, 10 Lower Kent Ridge Road, Singapore, 119076. *Local ensemble Kalman filter in high dimension.*

Ensemble Kalman filter (EnKF) is an important data assimilation method for high dimensional geophysical systems. Efficient implementation of EnKF in practice often involves the localization technique, which updates each component using only information within a local radius. We rigorously analyze the local EnKF (LEnKF) for linear systems, and show that the filter error can be dominated by the ensemble covariance, as long as 1) the sample size exceeds the logarithmic of state dimension and a constant that depends only on the local radius; 2) the forecast covariance matrix admits a stable localized structure. The analysis also reveals an intrinsic inconsistency caused by the localization technique, and a stable localized structure is necessary to control this inconsistency. While this structure is usually taken for granted for the operation of LEnKF, it can also be rigorously proved for linear systems with sparse local observations and weak local interactions. These theoretical results are also validated by numerical implementation of LEnKF on a simple stochastic turbulence in two dynamical regimes. (Received September 16, 2018)