

Comparison of Ensemble Kalman Filter with Optimal Interpolation in different observational networks

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The performance of data assimilation using the “flow-dependent” statistics calculated from an ensemble of short-range forecasts (termed as Ensemble Kalman Filter, EnKF) with 100 members compared with Optimal Interpolation (OI) is examined in an idealized environment. Using a 2-dimension diffusion equation and simulated observations, a series of 10-day data assimilation cycles are performed in a perfect model context with different observational networks. The results indicate that as the resolution of observations decreases, EnKF improves much more than OI, especially when the resolution becomes much higher than the estimated relatively accurate correlation scale used in OI. The diffusion equation describes well air transport, which further indicates that EnKF is an effective method to assimilate dust observations which are usually quite sparse. Further study to assimilate in-situ observational data using EnKF for dust-storm prediction gives encouraging results.

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