



An evaluation study of DRP-4DVar approach with Lorenz-96 model

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The current study evaluates the performance of the Dimension-Reduced Projection four dimensional variational data assimilation (DRP-4DVar) with the Lorenz-96 model. The idealized experiments over a period of 200 days have been conducted. The results show that the DRP-4DVar works well. It generates analysis equivalent to that of the Ensemble Kalman Filter (EnKF) before the two methods diverge if the synchronous observations are assimilated at the analysis time, while it produces more accurate analysis than the EnKF does when assimilating asynchronous observations at the correct time in an 18-hr assimilation window. The experiments also reveal that the impact of tangent linear assumption for the Lorenz-96 model in the DRP-4DVar over a 24-hr or shorter assimilation window is negligible. Furthermore, with a background error covariance matrix that has the nonsingular projection onto the ensemble space or is globally flow-dependent, the DRP-4DVar performs even better.