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Data assimilation experiments for severe dust storm forecasts over China using Ensemble Kalman Filter

C.Y. Lin, Z. F. Wang and J. Zhu

Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing, China

(cylin@mail.iap.ac.cn / Fax: 086-010-82995123 /Phone: 086-010-82885337)

The initial effort to apply an ensemble Kalman filter (EnKF) data assimilation method to a regional dust transport model was introduced in this study. Severe dust storm episodes occurred in March 2002 over China with this method based on surface observations of dust concentrations was investigated to explore its impacts on forecast improvement. A series of sensitivity experiments using our system reveal that EnKF is an advanced assimilation method to afford better initial conditions with surface observed PM10 in North China and lead to improved forecasts of dust storms, but forecast with large errors can be made by model errors. This result illustrates that it requires identifying and correcting model errors during the assimilation procedure in order to significantly improve forecasts. In addition, a large inflation parameter and a minimal variance should be introduced in EnKF to avoid filter divergence and then to obtain better model performance and forecast potential.