Geophysical Research Abstracts
Vol. 18, EGU2016-3104, 2016
EGU General Assembly 2016

Assimilating Observations with Spatially and Temporally Correlated Errors in a Global Atmospheric Model

Jeffrey Anderson
NCAR, Boulder, CO, United States (jla@ucar.edu)

Ensemble data assimilation systems for large geophysical problems like the atmosphere and ocean often ignore the possibility of correlated errors between observations at different spatio-temporal locations. However, most instruments are known to have correlated errors. The correlated errors can range from simple time-averaged bias to complicated functions of both the state of the geophysical system and the observation geometry for instruments like satellite radiometers. One possible solution is to construct a statistical model that predicts the correlated part of the error for a given instrument and remove the estimated error before assimilation. Here, a complementary approach is studied in which differences between correlated observations are assimilated rather than the raw observations. Low-order model results comparing assimilation of raw observations with correlated errors to assimilations of various types of differences are presented. Results from OSSEs using an atmospheric general circulation model with simulated observations with correlated errors are presented to illustrate the impacts of assimilating differences for numerical weather prediction. The relative performance of assimilating observations that are temporal differences versus spatial differences provides insight into the strength of correlations between various differences and the model's nonlinear dynamics.