

Using the Ensemble Forecast Sensitivity to Observations (EFSO) technique for an adaptive sampling problem in a global observing system

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A global atmospheric data assimilation system called ALEDAS comprised of AFES (Atmospheric GCM for the Earth Simulator) and LETKF (Local Ensemble Transform Kalman Filter) has been developed and is used to generate the experimental atmospheric global ensemble reanalysis (ALERA2) dataset available from 2008 to 2013, which has been prolonged toward near real time analysis. With ALERA2 and ALEDAS, several Observing-system experiment (OSE) studies have been conducted to assess impacts of radiosonde observations obtained during some observational campaigns, especially over oceans. We have also performed some weather predictability studies using ALERA2 and/or the OSE reanalyses as initial values for AFES.

Recently, a diagnostic technique called Ensemble Forecast Sensitivity to Observations (EFSO) which can quantify how much each observation has improved or degraded the forecast without a data denial OSE experiment (in offline) has been implemented into ALEDAS. In our presentation, estimations by EFSO that spatially and temporally vary in a global observing system are compared with actual data denial experiments and whether the estimation can be helpful for our future global OSE studies is discussed. In particular, how EFSO estimations can be useful is discussed for global adaptive sampling problems in which we try to design adaptive observations in the routine global observing system to improve global weather forecasts.

Keywords: atmospheric reanalysis, FSO (Forecast sensitivity to observation), ensemble Kalman filter, atmospheric general circulation model, adaptive sampling, observing system experiment