Title: Development of an OSSE Framework for a Global Atmospheric Data Assimilation System

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Abstract

Observing system simulation experiments (OSSEs) are powerful tools for estimating the usefulness of various configurations of envisioned observing systems and data assimilation techniques. Their utility stems from their being conducted in an entirely simulated context, utilizing simulated observations having simulated errors and drawn from a simulation of the earth's environment. Observations are generated by applying physically based algorithms to the simulated state, such as performed during data assimilation or using other appropriate algorithms. Adding realistic instrument plus representativeness errors, including their biases and correlations, can be critical for obtaining realistic assessments of the impact of a proposed observing system or analysis technique. If estimates of the expected accuracy of proposed observations are realistic, then the OSSE can be also used to learn how best to utilize the new information, accelerating its transition to operations once the real data are available. As with any inferences from simulations, however, it is first imperative that some baseline OSSEs are performed and well validated against corresponding results obtained with a real observing system.

This talk provides an overview of, and highlights critical issues related to, the development of an OSSE framework for the tropospheric weather prediction component of the NASA GEOS-5 global atmospheric data assimilation system. The framework includes all existing observations having significant impact on short-term forecast skill. Its validity has been carefully assessed using a range of metrics that can be evaluated in both the OSSE and real contexts, including adjoint-based estimates of observation impact. A preliminary application to the Aeolus Doppler wind lidar mission, scheduled for launch by the European Space Agency in 2014, has also been investigated.