Towards a comprehensive dynamics-chemistry assimilation for EOS-Chem: Plans and status in NASA's Data Assimilation Office

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In order to support the EOS-Chem project a comprehensive assimilation package for the coupled chemical-dynamical system is being developed by the Data Assimilation Office at NASA GSFC. This involves development of a coupled chemistry/meteorology model and of data assimilation techniques for trace species and meteorology.

The model is being developed using the flux-form semi-Lagrangian dynamical core of Lin and Rood, the physical parametrizations from the NCAR Community Climate Model, and atmospheric chemistry modules from the Atmospheric Chemistry and Dynamics branch at NASA GSFC. To date the following results have been obtained: (i) multi-annual simulations with the dynamics-radiation model show the credibility of the package for atmospheric simulations; (ii) initial simulations including a limited number of middle atmospheric trace gases reveal the realistic nature of transport mechanisms, although there is still a need for some improvements. Samples of these results will be shown. A meteorological assimilation system is currently being constructed using the model; this will form the basis for the proposed meteorological/chemical assimilation package.

The latter part of the presentation will focus on areas targeted for development in the near and far terms, with the objective of providing a comprehensive assimilation package for the EOS-Chem science experiment. The first stage will target ozone assimilation. The plans also encompass a reanalysis (ReSTS) for the 1991-1995 period, which includes the Mt. Pinatubo eruption and the time when a large number of UARS observations were available. One of the most challenging aspects of future developments will be to couple theoretical advances in tracer assimilation with the practical considerations of a real environment and eventually a near-real-time assimilation system.