

Recent Advances in Ozone Data Assimilation at the GMAO - Towards a New Reanalysis

K.Wargan, S.Pawson, J.E.Nielsen, M.Olsen, J.Witte, A.Douglass, S.Strahan, J.Joiner, P.K.Bhartia, N.Livesey, W.Read, P.Wagner, and H.Nguyen

This talk summarizes our ongoing work on improving the representation of ozone in the GEOS Data Assimilation Systems. We use data from two EOS Aura sensors: the total column ozone from the Ozone Monitoring Instrument (OMI) and high vertical resolution stratospheric profiles from Microwave Limb Sounder (MLS, version 3.3). As several previous studies have demonstrated assimilation of these data can constrain the stratospheric and tropospheric ozone columns with relatively good accuracy. However the representation of the vertical structures in the troposphere and near-tropopause region is often deficient. Since both these layers of the atmosphere are critical to our understanding of the radiative forcing as well as the ozone budget in the troposphere our current work focuses on improving the assimilated product between the surface and the 50 hPa pressure level.

We will talk about recent steps that we have taken towards refining the treatment of ozone in GEOS-5. We will discuss the impacts of improved tropospheric chemistry model, the introduction of efficiency factors ("averaging kernels") for OMI total ozone, and direct assimilation of radiances from the MLS instrument. In particular, advantages and challenges involved in assimilating limb radiances rather than retrieved product will be discussed. This work is, in part, a preparation for a planned reanalysis of the EOS Aura data from 2005 to present.