

## **Title: Global Assimilation of EOS-Aura Data as a Means of Mapping Ozone Distribution in the Lower Stratosphere and Troposphere**

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*Submission to Aura Science Team Meeting*

### **Abstract**

Ozone in the lower stratosphere and the troposphere plays an important role in forcing the climate. However, the global ozone distribution in this region is not well known because of the sparse distribution of in-situ data and the poor sensitivity of satellite based observations to the lowermost of the atmosphere. The Ozone Monitoring Instrument (OMI) and Microwave Limb Sounder (MLS) instruments on EOS-Aura provide information on the total ozone column and the stratospheric ozone profile. This data has been assimilated into NASA's Global Earth Observing System, Version 5 (GEOS-5) data assimilation system (DAS).

We will discuss the results of assimilating three years of OMI and MLS data into GEOS-5. This data was assimilated alongside meteorological observations from both conventional sources and satellite instruments. Previous studies have shown that combining observations from these instruments through the Trajectory Tropospheric Ozone Residual methodology (TTOR) or using data assimilation can yield useful, yet low biased, estimates of the tropospheric ozone budget. We show that the assimilated ozone fields in this updated version of GEOS-5 exhibit an excellent agreement with ozone sonde and High Resolution Dynamics Limb Sounder (HIRDLS) data in the lower stratosphere in terms of spatial and temporal variability as well as integrated ozone abundances. Good representation of small-scale vertical features follows from combining the MLS data with the assimilated meteorological fields. We then demonstrate how this information can be used to calculate the Stratosphere - Troposphere Exchange of ozone and its contribution to the tropospheric ozone column in GEOS-5. Evaluations of tropospheric ozone distributions from the assimilation will be made by comparisons with sonde and other in-situ observations.