Comparison of Stratospheric Composition Measurements from Multiple Satellite Instruments

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The multi-decadal SAGE (Stratospheric Aerosol and Gas Experiment) series satellite data record has made significant contributions to our understanding of how the composition of the atmosphere has been changing over the past two decades. This is clearly demonstrated by the preeminent role that SAGE II stratospheric ozone profile data have played in all international ozone assessments (e.g., WMO 1989, 1994, 1998, 2002). SAGE II is also the de facto standard for space-based stratospheric aerosol measurements and is the focus of the ongoing Stratospheric Processes And their Role in Climate (SPARC) Assessment of Stratospheric Aerosol Processes (ASAP). In order to understand long-term variability in key stratospheric components such as aerosol and ozone, it is important to link the SAGE-series observation record (1978-present) to new data sets from satellite missions such as Aura and the Atmospheric Chemistry Experiment (ACE).

In this study, we examine data from HIRDLS (High Resolution Dynamics Limb Sounder) and MLS (Microwave Limb Sounder), both on Aura, and MAESTRO (Measurement of Aerosol Extinction in the Stratosphere and Troposphere Retrieved by Occultation) aboard ACE. All common products such as ozone, water vapor, NO2, and aerosol, including polar stratospheric clouds and upper tropospheric clouds, will be examined. The validation activities will concentrate on coincident comparisons and the application of a technique that allows a more robust evaluation of aerosol measurements made at different wavelengths and using different techniques than is afforded by commonly used methods (e.g., conversion to a common aerosol parameter). In this paper, preliminary results from these comparison studies will be shown.