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The Stratospheric Aerosol & Gas Experiment III (SAGE III) on the International Space Station (ISS): Mission Overview and Validation Description

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The Stratospheric Aerosol and Gas Experiment III (SAGE III) is the fifth in a series of occultation instruments developed by NASA Langley Research Center (LaRC), used to develop measurement techniques to monitor aerosol, ozone, water vapor, and other gaseous constituents in the stratosphere and troposphere. The multi-decadal SAGE ozone and aerosol data sets have undergone intense scrutiny, and are the international standard for accuracy and stability. SAGE III on the International Space Station (ISS) will provide scientific measurements of five of the nine critical constituents identified in the U.S. National Plan for Stratospheric Monitoring including aerosol, ozone (O_3), nitrogen dioxide (NO_2), air density using O_2, and water vapor (H_2O). The SAGE III payload is scheduled to be installed on the ISS in 2016, collecting 16 sunrise and 16 sunset occultation measurements per day in an orbital inclination and period similar to the SAGE II orbit.

Along with solar occultation events, SAGE III will perform lunar occultations between the first and third quarters of each lunar month providing a radiant source for retrieval of key nighttime atmospheric constituents such as nitrogen trioxide (NO_3) and chlorine dioxide (OClO). SAGE III will also perform limb scattering measurements allowing for retrievals of atmospheric gases and particulates (aerosol and cloud) using the scattered sunlight from the Earth's atmosphere.

LaRC will manage the validation and calibration campaign during the first 3 years of SAGE III on ISS operations. The validation and calibration campaign will consists of aerosol backscatter, water vapor, and ozone sondes launched during local day and night times in both the northern and southern hemispheres during SAGE III Instrument/ISS orbital overpasses of the local sonde launch sites. Monthly planned solar/lunar occultation and limb scatter events will be available on the SAGE III Validation Planning web-page accessible from the SAGE III web-site http://sage.nasa.gov/ for use by our validation partners as a planning tool for correlative measurements.