

SAGE III/ISS temperature and pressure research products

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The Stratospheric Aerosol and Gas Experiment (SAGE) III instrument was deployed on the International Space Station (ISS) in early March 2017 and began routine measurements in June 2017. SAGE III/ISS is the latest in the NASA lineage of solar occultation satellite instruments designed to monitor the vertical distribution of aerosol, ozone and other trace gases in the upper atmosphere. SAGE III retrieves profiles of temperature and pressure from multi-spectral measurements of the oxygen A-band absorption feature centered near 762 nm. The A-band is located in a favorable spectral region where molecular oxygen is the dominant absorber with only minor contributions from ozone absorption, Rayleigh scattering, and aerosol extinction. Since the vertical distribution of molecular oxygen is well known, variations in the measured A-band spectra reveal information about the temperature and pressure structure of the atmosphere. Temperature/pressure products from the predecessor SAGE III METEOR/3M mission were of limited science value due to instrument issues. Preliminary examination of the SAGE III/ISS oxygen A-band spectra indicate that the measurements are of higher fidelity than from the METEOR/3M instrument and the initial temperature/pressure products are in reasonable agreement with MERRA-2 (Modern-Era Retrospective analyses for Research and Applications, Version 2) data. Additional refinements to wavelength registration and forward model parameters should improve the overall quality of the products. In this paper, we will present an overview of the temperature/pressure retrieval approach, results of the forward model studies, and an assessment of the quality of the temperature and pressure research products.

Key words: SAGE III; International Space Station; temperature; pressure,