Geophysical Research Abstracts
Vol. 20, EGU2018-5450, 2018
EGU General Assembly 2018


# The SAGE III/ISS Lunar Algorithm

Robert Manion (2), David Flittner (1), Michael Heitz (2), David Huber (2), Marsha Larosee (2), James Moore (2), and Joseph Zawodny (1)

(1) NASA Langley Research Center, Hampton, Virginia, USA, (2) Science Systems and Applications, Inc., Hampton, Virginia, USA

In December 2017, the first set of SAGE III/ISS lunar occultation data products was released. This limited release included vertical profiles of ozone and nitrogen trioxide. The profiles of gas species are retrieved by an inversion algorithm that uses an absorption cross section database to calculate molecular concentrations which explain the atmospheric extinction spectrum observed by the SAGE III/ISS instrument.

While similar in principal to the retrieval for solar occultations, the lunar inversion algorithm must account for radiance from the lunar surface that is irregular and orders of magnitude dimmer than the Sun. These conditions necessitate the use of a differential retrieval in which a relatively broad wavelength range (approximately 380 to 680 nanometers) is considered with all major gas species retrieved simultaneously through a multiple linear regression (MLR). Along with the gas absorption cross sections, the MLR is provided filters which account for wavelength-dependent lunar albedo, aerosol extinction, Rayleigh scattering, and minor instrument-apparent wavelength shifts. The dependent input for the MLR is a proxy of the optical depth spectrum which is computed from the ratio of radiance during occultation to an average of the radiance observed above the atmosphere. Retrievals are performed individually for each illuminated data packet to produce slant-path densities for each species. The results are then binned and inverted using an onion peeling technique to create vertical profiles.