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ALTIUS Ozone Retrieval Algorithm in Bright Limb Mode Validated using OMPS LP Observations

ALTIUS (Atmospheric Limb Tracker for the Investigation of the Upcoming Stratosphere) is an atmospheric limb mission being implemented in ESA's Earth Watch program and planned for launch in 2027.

The instrument consists of three imagers: UV (250-355 nm), VIS (440-675 nm) and NIR (600-1040 nm) channels. Each channel is able to take a snapshot of the scene independently of the other two channels, at a desired wavelength and with the requested acquisition time. The agility of ALTIUS allows for series of high vertical resolution observations at wavelengths carefully chosen to retrieve the vertical profiles of species of interest.

ALTIUS will perform measurements in different geometries to maximize global coverage: observing limbscattered solar light in the dayside, solar occultations at the terminator, and stellar, lunar, and planetary occultations in the nightside. The primary objective of the mission is to measure high-resolution stratospheric ozone concentration profiles.

This work concerns the bright limb mode and the validation of the ALTIUS L2P algorithm using the Ozone Mapping and Profiler Suite Limb Profiler (OMPS LP) L1 data. The OMPS LP instrument measures solar radiation scattered from the atmospheric limb in ultraviolet and visible spectral ranges between the surface and 80 km and these data were used to retrieved ozone profiles from cloud top up to 55 km.

We performed end-to-end simulations to examine the robustness of the L2P limb-scatter algorithm using L1 OMPS LP data. The data were re-formatted to feed the simulator of the ALTIUS mission, enforcing the ALTIUS signal characteristics (and flaws) in the simulations. We compare our retrieved ozone profiles with the ones from the OMPS algorithm and we discuss the causes of the potential disagreements and biases in the results.

Topic

Upcoming Earth observation limb and occultation instruments

Author: SOTIRIADIS, Sotiris (Belgian institute of space aeronomie)

Co-authors: Dr BERTHELOT, Antonin (BIRA-IASB); FUSSEN, Didier (BIRA-IASB); PIEROUX, Didier (BI-RA-IASB); DEKEMPER, Emmanuel (BIRA-IASB); ROSE, Kristof (BIRA-IASB / UCLouvain); MATESHVILI, Nina (BIRA-IASB); BAKER, Noel (BIRA-IASB)

Presenter: SOTIRIADIS, Sotiris (Belgian institute of space aeronomie)