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ALTIUS Stellar Occultation Ozone and Aerosol Extinction Retrieval Algorithms

ALTIUS (Atmospheric Limb Tracker for the Investigation of the Upcoming Stratosphere) is the upcoming stratospheric ozone monitoring mission of ESA's Earth Watch program. ALTIUS consists of three 2D high resolution imagers: UV (250-355 nm), VIS (440-675 nm) and NIR (600-1020 nm) channels. Each channel is independent of the others and takes snapshots of the atmosphere in limb geometry at requested wavelengths. ALTIUS will measure in three different observation modes to maximize the spatial coverage of the mission: limb scattering on the dayside of the orbit, solar occultation at the terminator and stellar (or planetary) occultations on the nightside of the orbit. Stratospheric ozone profiles are the mission's primary objectives. Secondary objectives include the retrieval of other species, such as NO2, NO3, aerosol extinction, BrO, OClO, temperature and H2O profiles. In stellar occultation, both ozone and aerosol extinction profiles will be retrieved.

As light coming from a star and passing through the atmosphere interacts with irregularities caused by turbulences and gravity waves, its signal fluctuates along with the air density on the optical path. This phenomenon is called scintillation and is one of the main challenges of stellar occultation measurements.

This work presents the latest updates on the expected retrieval quality using the measured instrumental functions in stellar occultation mode. The strategies considered to mitigate scintillation for both ozone and aerosol extinction retrievals are also discussed and the influence of scintillation on retrieved profiles is assessed. Data originating from GOMOS (Global Ozone Monitoring by Occultation of Stars), an atmospheric sensor performing stellar occultations on board the ENVISAT satellite, is used to perform this study.

Topic

Upcoming Earth observation limb and occultation instruments

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