STRATOSPERIC TEMPERATURE AND OZONE SOUNDING WITH ENVISAT/GOMOS STELLAR OCCULTATION

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The Global Ozone Monitoring by Occultation of Stars (GOMOS) instrument performs high accuracy altitude-resolved global ozone monitoring as well as measurements of other atmospheric trace gases and of temperature. The instrument is mounted on board ENVISAT, the so far largest and most versatile satellite for environmental research. The GOMOS sensor is dedicated to provide measurements from 15 km to 100 km. Due to its high sensitivity, GOMOS is a promising tool to retrieve profiles of atmospheric constituents with high accuracy based on its optical limb transmission data within 250 nm and 940 nm. Ozone is measured, in particular, with spectrometer A covering the spectral range 250 nm to 675 nm.

We developed a realistic forward model for simulating GOMOS transmission measurements, which also is a core ingredient for our ozone retrieval algorithm based on the optimal estimation technique. Besides the objective to retrieve ozone profiles using channels within 250 nm to 340 nm, we involve a simultaneous retrieval of NO2 as well as an exploitation of bending angles from GOMOS star tracking data. GOMOS provides information on bending angles via pointing data of its Steering Front Assembly (SFA) and Stellar Tracking Unit (SATU). From the bending angle we retrieve refractivity profiles (used to improve bended-raypath information within the ozone retrieval process) and, in turn, pressure and temperature profiles (used to improve cross-section modeling, in particular of Rayleigh scattering). The expected precision of the SFA and SATU pointing data enables bending angle errors < 3 murad (at 10 Hz sampling rate). We show first ozone and temperature retrieval results based on our algorithm, which indicate retrieval errors of < 1.5 % in ozone throughout the stratosphere/stratopause region and of < 2 K in temperature in the lower stratosphere.