VALIDATION OF HIGH-RESOLUTION TEMPERATURE PROFILES (HRTP) RETRIEVED FROM BI-CHROMATIC SCINTILLATION MEASUREMENTS BY GOMOS

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The GOMOS (Global Ozone Monitoring by Occultation of Stars) instrument on board the Envisat satellite is equipped with two fast photometers operating at 1 kHz sampling frequency in blue (470-520 nm) and red wavelengths (650-700 nm). The bi-chromatic scintillations recorded by the photometers allow the determination of a refractive angle, which is proportional to the time delay between the photometer signals. The high resolution density and temperature profiles (with a vertical resolution of about 200 m) can be reconstructed from these data at altitudes 18-35 km. Validation of high-resolution temperature profiles is a challenging task, because the collocated data are to be selected within a very narrow space-time window. We present the results of an extensive validation of HRTP with sounding, lidar, and CHAMP measurements, as well as comparison of HRTP in GOMOS close collocations. In addition to traditional validation methods, we used also the spectral analysis approach for the validation of HRTP. The validation has shown that HRTP fluctuations are realistic (in terms of their 1D vertical spectra) in vertical occultations of bright stars. In case of oblique occultations or of dim stars, the results are ambiguous: despite of several good agreements, the HRTP fluctuations often have a larger spectral magnitude. The spectral analysis has confirmed that the actual resolution of HRTP is 150-200 m. The low-resolution temperatures profiles, which can be obtained by smoothing HRTP, show a good agreement with lidar data. The rms deviation from CHAMP profiles is $\sim$3 K. A small ($\sim$1 K) altitude-dependent bias is observed. The validation has confirmed that the quality of HRTP depends weakly on star brightness.