



On the spectral calibration of SCIAMACHY channel 8

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In order to ensure high spectral stability over the lifetime of the mission, SCIAMACHY has been equipped with a spectral calibration lamp, the "Spectral Line Source" (SLS), for determining the pixel-to-wavelength relation. Whereas the SLS has been proved to be suitable for a precise in-flight spectral calibration of channels 1–6, it is not sufficient for the calibration of channels 7 and 8 due to the lack of enough SLS spectral lines within these channels. Because of this, the pixel-to-wavelength relation of channels 7 and 8 in level-1b product is set to the on-ground calibration. Although on-ground calibration was performed under representative temperature and vacuum flight conditions, a similar spectral tuning as in the other channels should be applied to channels 7 and 8 for a precise spectral calibration.

Molecular spectral properties have been precisely determined in laboratory experiments and are publicly available into spectroscopic datasets, e.g. HITRAN and GEISA. This information can be exploited for an in-flight spectral calibration. Actually, radiative transfer models simulating Earth's radiance spectra as measured by SCIAMACHY can provide non-shifted reference spectra.

In this paper, we present an in-flight spectral calibration for the SCIAMACHY channel 8 based on absorption signatures of atmospheric methane, water vapor and carbon monoxide. The spectral correction found has roughly a two-degree polynomial dependency and its value can be as large as 0.5 nm (more than 4 pixels) at the right edge of channel 8. The correction for this deviation from the on-ground pixel-to-wavelength relation (included in the level-1b product) is mandatory for the proper retrieval of gas vertical columns in channel 8.