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SCIAMACHY Level 1 data: calibration concept and in-flight calibration

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Abstract. The calibration of SCIAMACHY was thoroughly checked since the instrument was launched on-board ENVISAT in February 2002. While SCIAMACHY's functional performance is excellent since launch, a number of technical difficulties have appeared, that required adjustments to the calibration. The problems can be separated into three types: (1) Those caused by the instrument and/or platform environment. Among these are the high water content in the satellite structure and/or MLI layer. This results in the deposition of ice on the detectors in channels 7 and 8 which seriously affects the retrievals in the IR, mostly because of the continuous change of the slit function caused by scattering of the light through the ice layer. Additionally a light leak in channel 7 severely hampers any retrieval from this channel. (2) Problems due to errors in the on-ground calibration and/or data processing affecting for example the radiometric calibration. A new approach based on a mixture of on-ground and in-flight data is shortly described here. (3) Problems caused by principal limitations of the calibration concept, e.g. the possible appearance of spectral structures after the polarisation correction due to unavoidable errors in the determination of atmospheric polarisation. In this paper we give a complete overview of the calibration and problems that still have to be solved. We will also give an indication of the effect of calibration problems on retrievals where possible. Since the operational processing chain is currently being updated and no newly processed data are available at this point in time, for some calibration issues only a rough estimate of the effect on Level 2 products can be given. However, it is the intention of this paper to serve as a future reference for detailed studies into specific calibration issues.

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