New Developments in the SCIAMACHY L2 Ground Processor

Gretschany, S., Lichtenberg., G., Meringer, M.
Remote Sensing Technology Institute (IMF-DLR), German Aerospace Center (DLR), Oberpfaffenhofen, Weßling, Germany

Theys, N., Lerot, C.
Belgian Institute for Space Aeronomy (IASB-BIRA), Brussels, Belgium

Liebing, P., Noël, S.
Institute of Environmental Physics / Remote Sensing (IUP/IFE), University of Bremen, Bremen, Germany

Dehn, A., Fehr, T.
ESA-ESRIN, Via Galileo Galilei, Casella Postale 64, Frascati, Rome

SCIAMACHY (SCanning Imaging Absorption spectroMeter for Atmospheric ChartographY) aboard ESA's environmental satellite ENVISAT observed the Earth's atmosphere in limb, nadir, and solar/lunar occultation geometries covering the UV-Visible to NIR spectral range. It is a joint project of Germany, the Netherlands and Belgium and was launched in February 2002. SCIAMACHY doubled its originally planned in-orbit lifetime of five years before the communication to ENVISAT was severed in April 2012, and the mission entered its post-operational phase.
In order to preserve the best quality of the outstanding data recorded obtained by SCIAMACHY, data processors are still being updated. This presentation will highlight three new developments that are currently being incorporated into the forthcoming Version 7 of ESA's operational Level 2 processor:

1. Tropospheric BrO, a new retrieval based on the scientific algorithm of (Theys et al., 2011). This algorithm had been originally developed for the GOME-2 sensor and later adapted for SCIAMACHY. The main principle of the new algorithm is to utilize BrO total columns (already an operational product) and split them into stratospheric VCD_{STRAT} and tropospheric VCD_{TROP} fractions. BrO VCD_{STRAT} is determined from a climatological approach, driven by SCIAMACHY O_3 and NO_2 observations. VCD_{TROP} is then determined simply as a difference: $VCD_{TROP} = VCD_{TOTAL} - VCD_{STRAT.}$

2. Improved cloud flagging using limb measurements (Liebing, 2015). Limb cloud flags are already part of the SCIAMACHY L2 product. They are currently calculated employing the scientific algorithm developed by (Eichmann et al., 2015). Clouds are categorized into four types: water, ice, polar stratospheric and noctilucent clouds. High atmospheric aerosol loadings, however, often lead to spurious cloud flags, when aerosols had been misidentified as clouds. The new algorithm will better discriminate between aerosol and clouds. It will also have a higher sensitivity w.r.t. thin clouds.

3. A new, future-proof file format for the level 2 product based on NetCDF. Although the final concept for the new format is still under discussion within the SCIAMACHY Quality Working Group, main features of the new format have already been clarified. The data format should be aligned and harmonized with other missions (esp. Sentinels and GOME-1). Splitting of the L2 products into profile and column products is also considered. Additionally, reading routines for the new formats will be developed and provided.

References:

K.-U. Eichmann et al., Global cloud top height retrieval using SCIAMACHY limb spectra: model studies and first results, *Atmos. Meas. Tech. Discuss.*, 8, 8295-8352, 2015.

P. Liebing, *New Limb Cloud Detection Algorithm Theoretical Basis Document*, 2015.
N. Theys et al., Global observations of tropospheric BrO columns using GOME-2 satellite data, *Atmos. Chem. Phys.*, 11, 1791–1811, 2011.