Introduction

Level 0-1 processing provides calibrated radiances. The calibration of the data is done with a combination of on-ground thermal vacuum and ambient measurements and in-flight measurements. Currently version 9 of the processor is implemented. The Level 1 products with the updates shown here will be released in 2017 after thoroughly testing the changes on the basis of retrieval results. For details of the new Level 2 processor see ATMO-37 - New Developments in the SCIAMACHY L2 Ground Processor

Updated Degradation Correction

The degradation correction is based on a scan mirror model that fits the thickness of contaminant layers. The scan mirror model was first implemented in Version 8 of the processor. In version 9 several improvements were added that lead to a better correction of the optical bench degradation. Together with the re-calculated polarisation and radiometric calibration data from on-ground measurements it is expected that the calibrated radiances will be improved over the whole mission life time. Details Poster ATMO-26 - Mirror Contamination in Space: On-ground SCIAMACHY modelling

Better Pointing Correction

- Limb and occultation retrievals need very accurate pointing information for proper tangent heights.
- First update of mispointing parameters was already applied in 2007.
- IUP fitted new correction parameters by adjusting calculated solar and lunar positions to measured ones.
- For the first time, lunar measurements have been utilized for this purpose. Details at poster ATMO-30, Bramstedt et. al.

Figure 1: Top: Measured and modeled degradation of SCIAMACHY at 350 nm for 4 different lightpaths: Subsolar, limb, extra mirror and diffuser, from left to right over 9 years of data. Bottom: Ratio of measured and modelled m-factors at 350 nm. (SRON)

Figure 2: Elevation and azimuth angle offsets. OLD: Mispointing with the current processor. NEW: Remaining mispointing with the improved pointing parameters (IUP).

Improved Polarisation Correction

The polarisation correction for V. 9 of the processor will be improved by implementing several additions and revisions to the polarisation correction:

- Implementation of the CHEOPS correction already used in GOME-1 for a better correction in the UV
- Addition of a retarder matrix to the scan mirror model to consistently handle the phase shift that is caused by the OBM of SCIAMACHY
- Better handling of anomalous PMD data (spike filtering and electronic delays)
- Better handling of cases where U cannot be measured because of insufficient instrument sensitivity
- Complete Revision of the Limb polarisation calculation

Figure 3: Plot of determined Limb polarisation values q (top), u (bottom) vs single scattering values for the old (left) and new (right) algorithm (IUP).

Improvements to SWIR Channel Calibration

- Bad Pixel Mask based on Individual Pixels: The new algorithm analyses each pixel individually over time to decide if it still useful
- Better Dark Correction
- Spectral Calibration
- SRON derived new polynomial coefficients for the calibration of channel 8
- For channel 6 (Methane) a new adaptive scheme for spectral calibration is investigated.

Figure 4: Prediction and measurement of the orbital variation of the dark signal in channel 8 (SRON).

New Level 1 Product Format

- Both products, Level 1 and Level 2 will be transferred from the current ENVISAT format to netCDF V4 format
- Guidelines:
  - Product structure will be as far as possible similar to those developed for Sentinels (SCIAMACHY is more complicated though)
  - All information in the current product will also be in the new products
  - Level 1 will additionally contain all relevant operations information for LTDP
  - The geolocation will be available for all pixels (the ENVISAT format required users to calculate the coordinates from the provided fine grid)

Further Information

- Level 0-1c ATBD: http://atmos.caf.dlr.de/sciamachy/documents/level_0_1c/scia01b_atbd_master.pdf (will soon be updated for Version 9)