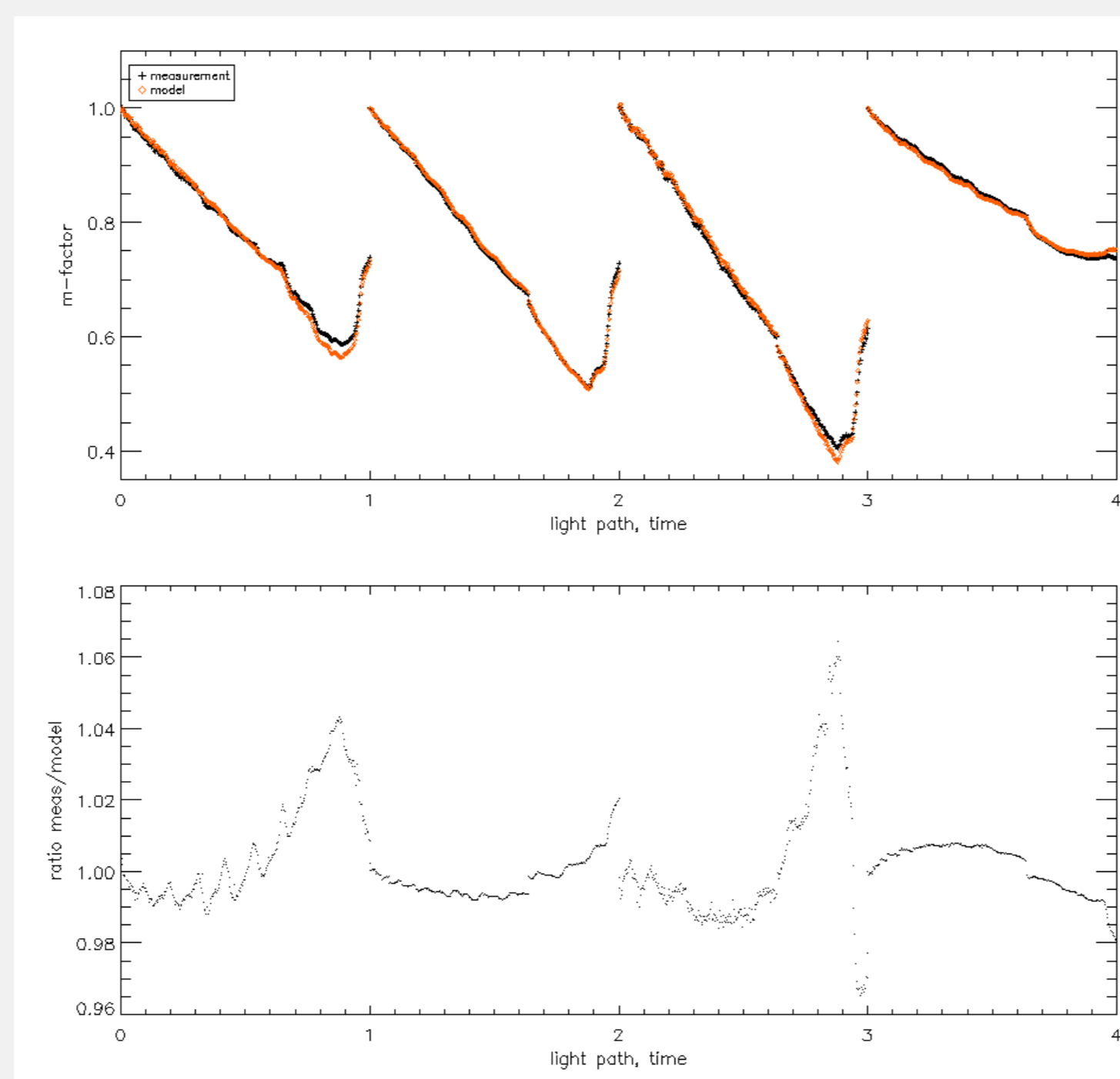


## Introduction

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

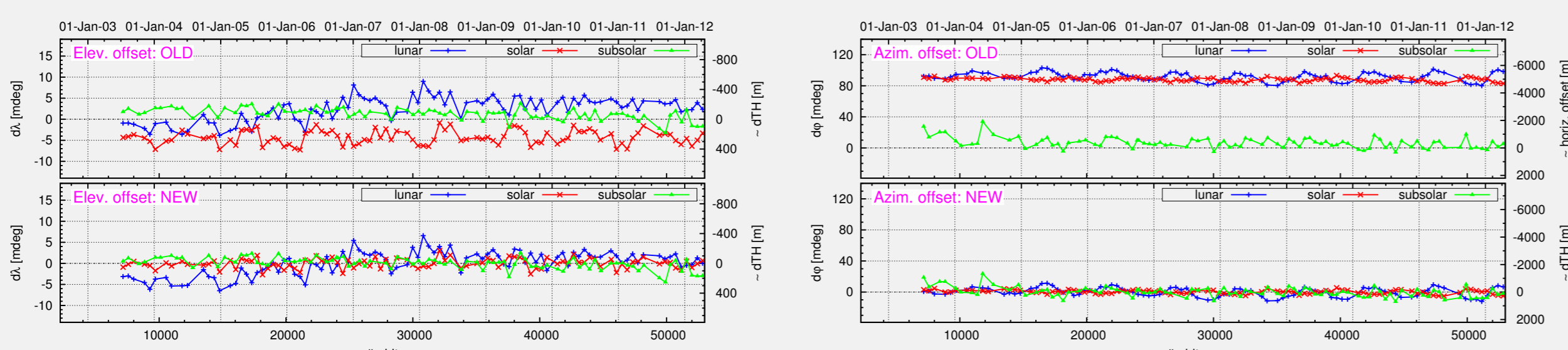
The degradation correction is based on a scan mirror model that fits the thickness of contaminant layers. The scan mirror model was first implemented in Version 8 of the processor. In version 9 several improvements were added that lead to a better correction of the optical bench degradation. Together with the recalculated 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*



**Figure 1:** Top: Measured and modelled 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)

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

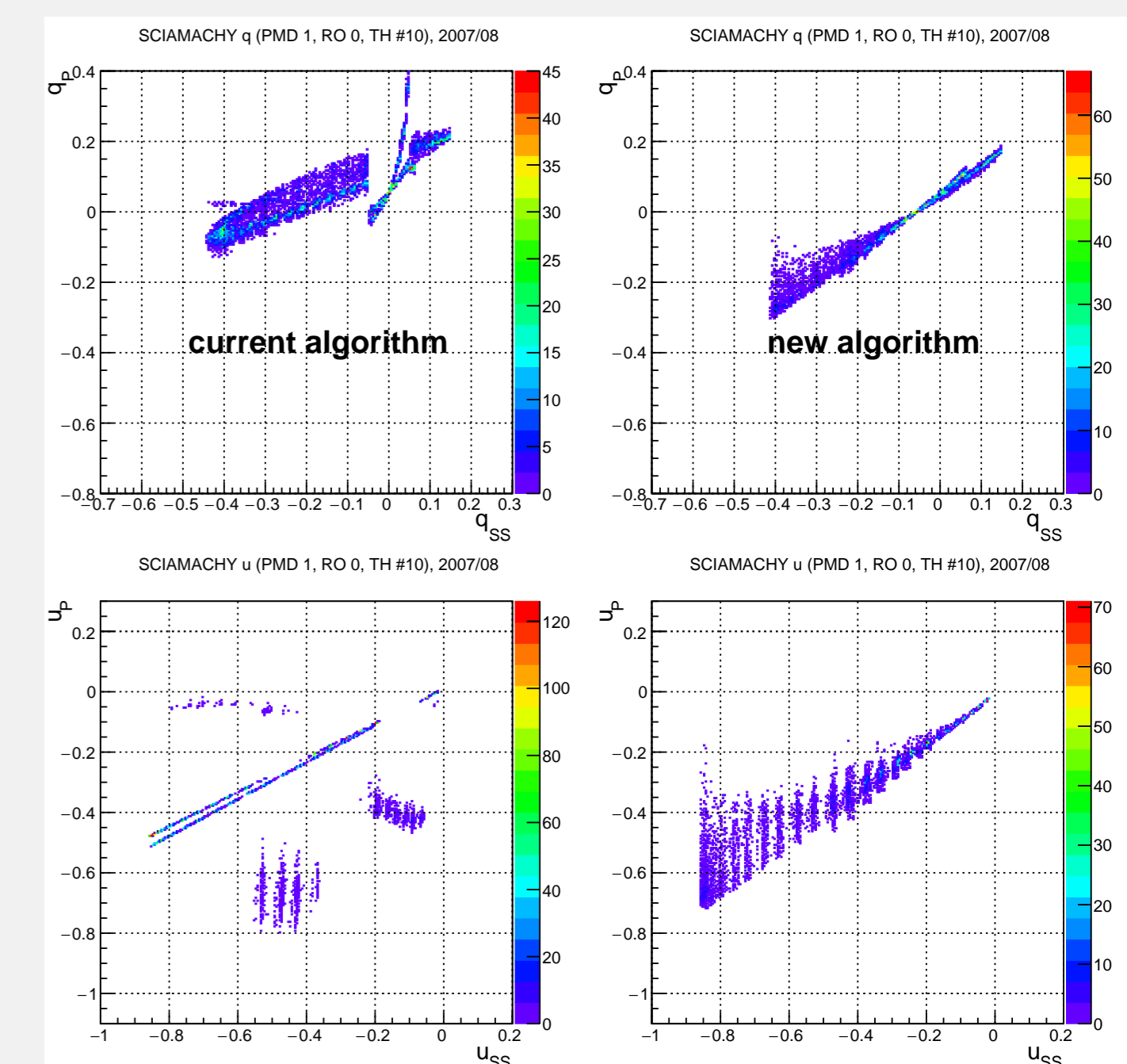
## Further Information

- ▶ Level 0-1c ATBD: [http://atmos.caf.dlr.de/sciamachy/documents/level\\_0\\_1b/scia01b\\_atbd\\_master.pdf](http://atmos.caf.dlr.de/sciamachy/documents/level_0_1b/scia01b_atbd_master.pdf) (will soon be updated for Version 9)
- ▶ Gottwald, Manfred, and Heinrich Bovensmann, eds. *SCIAMACHY – Exploring the changing Earth's Atmosphere*. Springer Science & Business Media, 2010.

## 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:

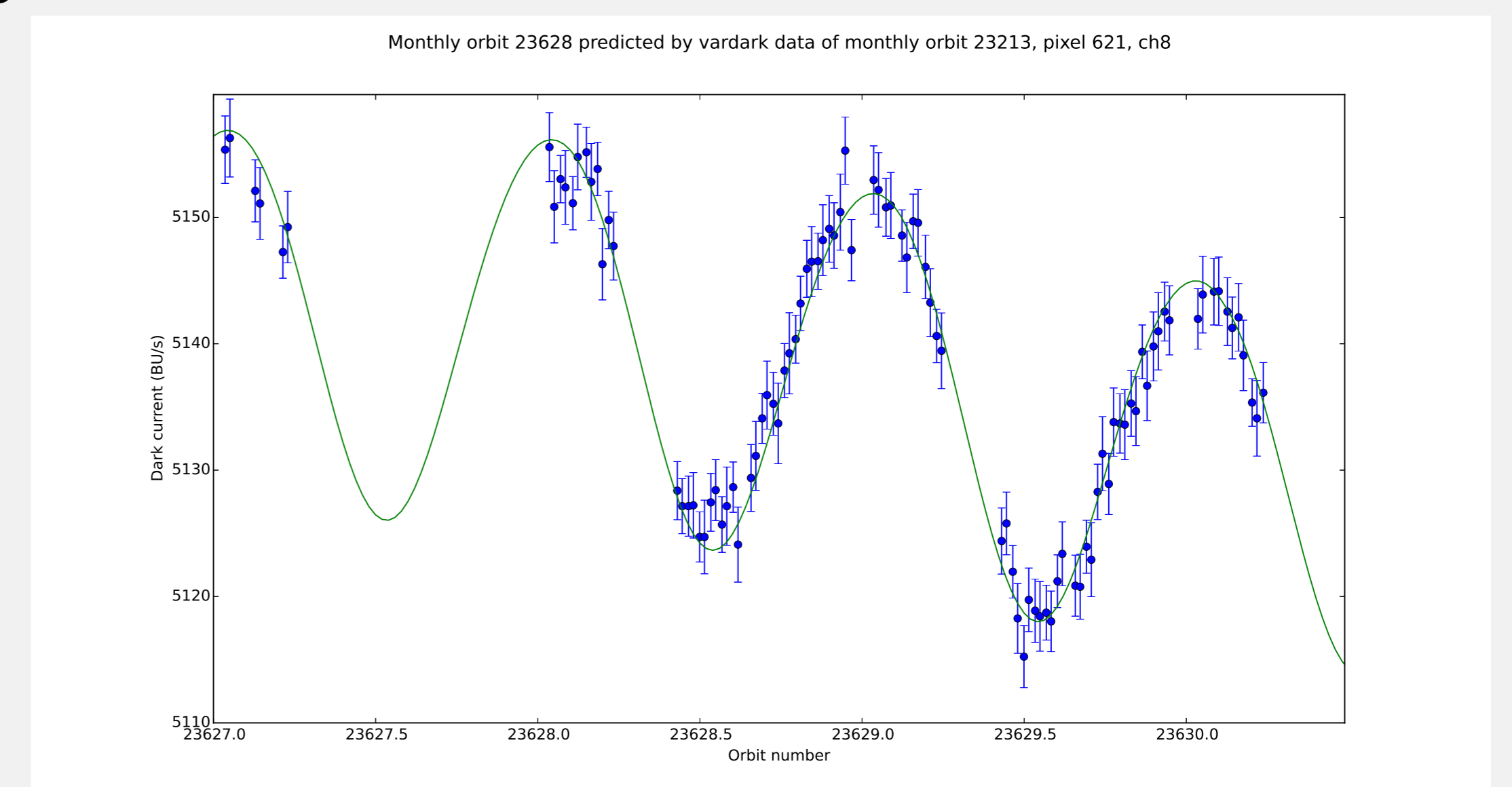
- ▶ Implementation of the CHEOPS correction already used in GOME-1 for a better correction in the UV
- ▶ Addition of a retarder matrix to the scan mirror model to consistently handle the phase shift that is caused by the OBM of SCIAMACHY
- ▶ Better handling of anomalous PMD data (spike filtering and 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)