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SCIAMACHY Bi-MONTHLY Report: July - August 2005

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SCIAMACHY BI-MONTHLY REPORT JULY - AUGUST 2005

1 INTRODUCTION

The SCIAMACHY Bi-Monthly report documents the current status and recent changes to the SCIAMACHY instrument, its data processing chain, and its data products.
The Bi-Monthly Report (hereafter BMR) is composed of analysis results obtained by the Product Control Facility, combined with inputs received from the different groups working on SCIAMACHY operation, calibration, product validation and data quality.
The first part of the report is dedicated to Instrument Configuration and Performance. It is composed of contributions from SOST-DLR and SOST-IFE.
The remainder of the report is dedicated to Level 1 and Level 2 performance assessment and is generated by ESA/ESRIN DPQC with contributions from ESA/ESTEC PLSO and DLR-IMF.

The structure of the report will be in constant evolution through the ENVISAT mission, as experience with SCIAMACHY data and quality control grows.

1.1 Scope

The main objective of the BMR is to give, on a regular basis, the status of SCIAMACHY instrument performance, data acquisition, results of anomaly investigations, calibration activities and validation campaigns. The BMR is composed of the following six sections:

- Summary;
- Instrument Configuration and Performance;
- Data Availability Statistics;
- Level 1 Product Quality Monitoring;
- Level 2 Product Quality Monitoring;
- Validation Activities and Results.

1.2 References

[1] 'Instrument Operation Manual', MA-SCIA-0000DO/01, Issue F R2, 16 Dec. 2004
[2] 'ENVISAT-1 Products Specifications Volume 15: SCIAMACHY Products Specifications', PO-RS-MDA-GS-2009, Issue 3, Rev: J, Alberto Pellegrini

1.3 Acronyms and Abbreviations

ADC	Analogue to Digital Converter
ADF	Auxiliary Data File
ANX	Ascending Node Crossing
AOCS	Attitude and Orbit Control System
APSM	Aperture Stop Mechanism
ASM	Azimuth Scan Mechanism
ATC	Active Thermal Control
BMR	Bi-Monthly Report
CA	Corrective Action
CCA	Communication Area
CTI	Configurable Transfer Item
DAC	Digital Analogue Converter
DLR-IMF	Deutsches Zentrum fuer Luft- und Raumfahrt
DPQC	Data Processing Quality Control
ESM	Elevation Scan Mechanism
FPN	Fixed Pattern Noise
HK	Housekeeping
ICE	Instrument Control Electronics
ICU	Instrument Control Unit
IECF	Instrument Engineering and Calibration Facilities
IOM	Instrument Operation Manual
LK1	Leakage Current Auxiliary File (SCI_LK1_AX)
LOS	Line of Sight
MCMD	Macro Command
MR	Monthly Report
NCWM	Nadir Calibration Window Mechanism
NDFM	Neutral Density Filter Mechanism
NNDEC	Non-nominal Decontamination
NRT	Near Real Time
OBM	Optical Bench Module
OCR	Operations Change Request
OSDF	Orbit Sequence Definition File
PCF	Product Control Facility
PDHS	Payload Data Handling Station (PDS)
PDHS-E	Payload Data Handling Station – ESRIN
PDHS-K	Payload Data Handling Station – Kiruna
PDS	Payload Data Segment
PE1	Pixel to Pixel/ Etalon Auxiliary File (SCI_PE1_AX)
PLSO	Payload Switch OFF
PMD	Polarization Measurement Device
QUADAS	Quality Analysis of Data from Atmospheric Sounders
SAA	South Atlantic Anomaly
SCIAMACHY	Scanning Imaging Absorption Spectrometer for Atmospheric Chartography

SEU	Single Event Upset
SLS	Spectral Line Source
SMR	Sun Mean Reference
SOST	SCIAMACHY Operations Support Team
SP1	Spectral Calibration Auxiliary File (SCI_SP1_AX)
SU1	Sun Reference Auxiliary File (SCI_SU1_AX)
SZA	Sun Zenith Angle
TC	Thermal Control
TCFoV	Total Clear Field of View
TOA	Top of Atmosphere
TRUE	Tangent height Retrieval by UV-B Exploitation
VCD	Vertical Column Density
WLS	White Light Source

Not complete

2 SUMMARY

- During the reported period SCIAMACHY measurements were nominal with respect to planning.

- Monthly Calibration was executed during Orbits

  - 17731-17735 (21/22-Jul-2005)
  - 18146-18150 (19/20-Aug-2005)

- Moon occultations were not executed as the moon was rising on the dayside.

- No OCR has been implemented during July - August 2005.

- No TC adjustment was required. The average temperature/orbit of detector 5 closely approached its upper limit but the seasonal maximum did not exceed this value.

- Light Path monitoring:

  - Small degradation in UV continues (channel 1 – 1%, channel 2 – 0.5%); sun over ESM diffuser degradation smaller than for other light paths – indication that ESM diffuser degrades less than ESM mirror
  - Channels 3-6 radiometricly stable besides slight throughput loss in channel 3 (less than 1%)
  - Channel 7 throughput rather stable over time interval
  - Channel 8 transmission is stable at a level of 80%

- PMD monitoring:

  - UV degradation visible in science channels is also visible in PMD 1 to 3
  - PMD 4 and 7 show a large decrease in throughput which is currently unexplained.
  - PMD 6 results still under investigation

- Spectral light path monitoring results are presented for the first time in this BMR (see chapter 3.1.5.3)

3 INSTRUMENT CONFIGURATION AND PERFORMANCE

3.1 In-Flight Status and Performance

Detailed operations, planning and instrument status information can be found on the website of the *SCIAMACHY Operations Support (SOST)* under http://atmos.af.op.dlr.de/projects/scops/. These pages are maintained on a daily basis and show the history and actual progress of the SCIAMACHY mission.

3.1.1 Planned Operations and Measurements (SOST-DLR)

The reporting period covers the orbits 17434 (ANX = 01-July-2005, 00:26:04.441) to 18321 (ANX = 31-August-2005, 23:37:12.705). One OSDF specified the planning baseline.

Orbit		ANX		OSDF
Start	Stop	Start	Stop	
17434	18321	01-Jul-2004 00:26:04.441	31-Aug-2005 23:37:12.705	MPL_OSD_SHVSH_20050531_010101_00000000_33100001_20050701_002606_20050901_011746

Table 3-1: SCIAMACHY OSDF planning files from July – August 2005

All measurements were nominal, i.e. timelines executed on the dayside of the orbit limb/nadir sequences with wide swath settings. In-flight calibration and monitoring measurements occurred on daily, weekly and monthly timescales according to the mission scenarios. Monthly calibration was scheduled between orbits

- 17731-17735 (21/22-Jul-2005)
- 18146-18150 (19/20-Aug-2005)

The moon was in the limb TCFoV between orbits 18081 (15-Aug-2005) and 18158 (20-Aug-2005) but no occultations were executed since the moon was rising on the dayside.

No OCR has been implemented between July and August.

3.1.2 Instrument Measurement Status (SOST-DLR)

Final flight status for mission scenarios, states and timelines remained unchanged throughout the reporting period. Details are available on the SOST web page.

3.1.3 Executed Operations and Measurements (SOST-DLR)

Measurements

The OSDF planning files have been scheduled as requested.

Detector thermal adjustment

No TC adjustment was required. The average temperature/orbit of detector 5 closely approached its upper limit but the seasonal maximum did not exceed this value.

TC settings throughout the reporting period were

- DAC1 = 0.53 W
- DAC2 = 0.70 W
- DAC3 = 0.00 W

APSM/NDFM health checks & PMD ADC cal

In the reporting period 1 APSM/NDFM health check and 2 PMD ADC calibrations were executed. All showed nominal results.

APSM/NDFM			PMD ADC	
Orbit	ANX	Result	Orbit	ANX
17809	27-Jul-2005 06:31:56	ok	17810	27-Jul-2005 08:08:26

Table 3-2: APSM/NDFM health check and PMD ADC calibration

Anomalies

Only two anomalies, which were complementary failures, occurred in the reporting period. They led to Corrective Actions (CA) 0 or 9, i.e. the instrument continued operations.

Orbit	Date	Entry - UTC	Level	Entry Type	ID Content/Transition	Mode	Remark
17676	17-JUL-2005	2005.198.22.34.58.652	Instrument	COMPLEMENTARY FAILURES	---	Measurement	PRIM_CMD_OVERDUE (RTCS STT_01 primitive cmd
18014	10-AUG-2005	2005.222.13.51.06.554	Instrument	COMPLEMENTARY FAILURES	---	Measurement	PRIM_CMD_OVERDUE (RTCS STT_01 primitive cmd

Table 3-3: Instrument anomalies

Instrument unavailability

The instrument was available throughout the reporting period.

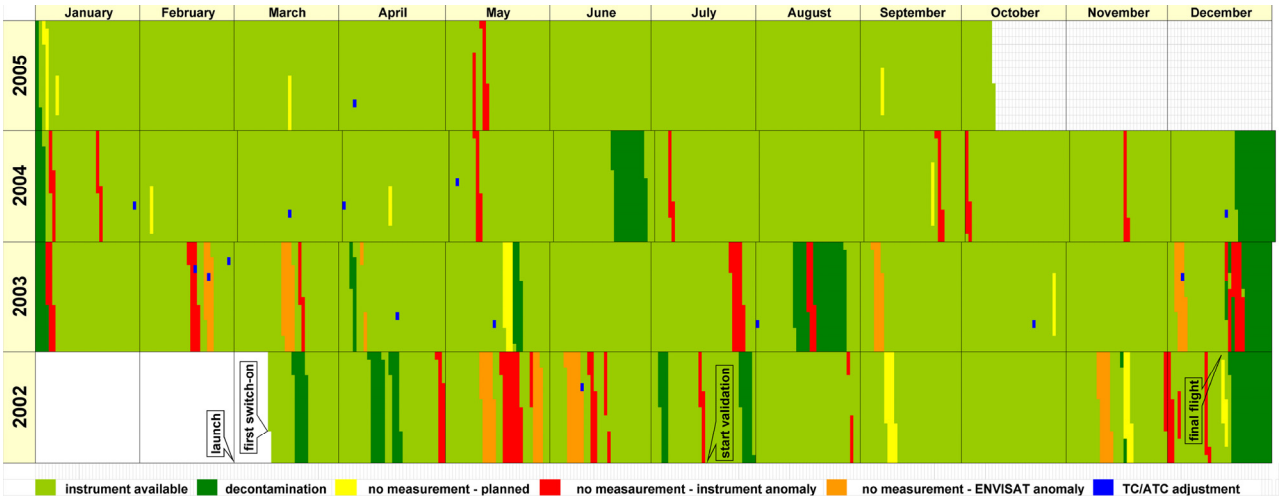


Fig. 3-1: Current instrument availability status including the reporting period

3.1.4 Performance Monitoring - System (SOST-DLR)

Detector temperatures

Detector temperatures are monitored according to the requirements of the IOM *[1]*. It requests to ensure that the average temperature per orbit remains within the specified limits. For each detector the average temperatures per orbit are determined from HK telemetry parameters. Fig. 3-2 displays the temperatures of all 8 detectors. Colour coding is as on the operational monitoring website, i.e. data from orbits with HK telemetry coverage > 90% are shown in red, for < 90% in green. Minimum/maximum values per orbit are indicated as vertical bars. The temperature limits of each detector are shown as horizontal lines.

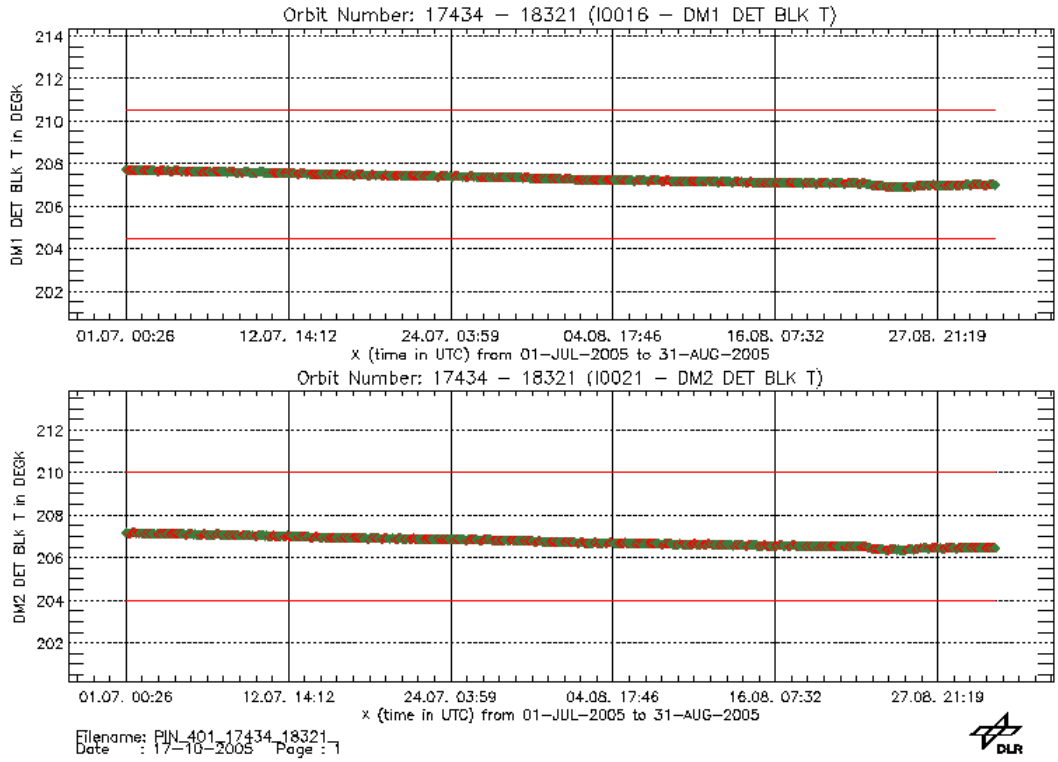
OBM temperatures

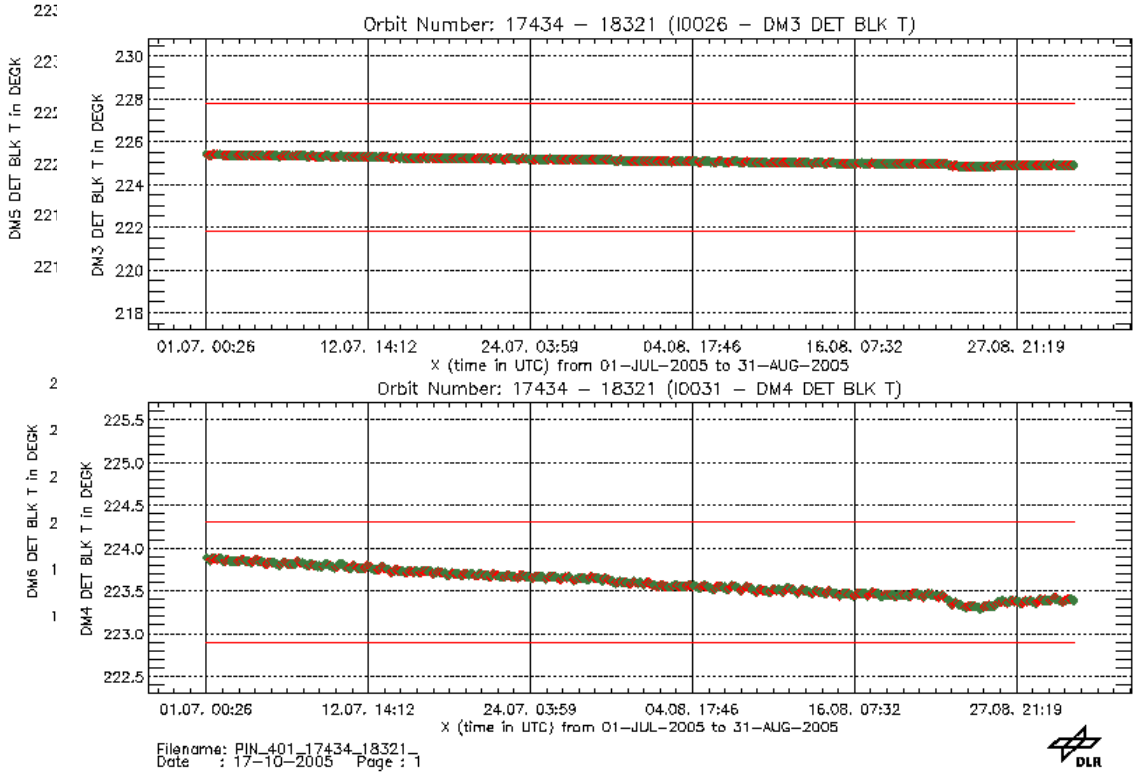
OBM temperatures are monitored according to the requirements of the IOM *[1]*. It requests to ensure that the average temperature per orbit remains within the specified limits. The average OBM temperature per orbit is determined from specific HK telemetry parameters. In addition power readings for the ATC heaters are monitored. Temperatures and ATC heater powers are given in Fig. 3-3 and 3-4. Colour coding is as in Fig. 3-2.

PMD ADC status

The status of the PMD ADC is monitored according to the requirements of the IOM *[1]*. It requests to ensure that no glitches occur caused by an SEU.

No PMD ADC glitches have been detected.


Orbit Number: 17434 – 18321 (I0016 – DM1 DET BLK T)
DM1 DET BLK T in DEGK
214
212
210
208
206
204
202
01.07. 00:26
12.07. 14:12
24.07. 03:59
04.08. 17:46
16.08. 07:32
27.08. 21:19
X (time in UTC) from 01–JUL–2005 to 31–AUG–2005
Orbit Number: 17434 – 18321 (I0021 – DM2 DET BLK T)
DM2 DET BLK T in DEGK
212
210
208
206
204
202
01.07. 00:26
12.07. 14:12
24.07. 03:59
04.08. 17:46
16.08. 07:32
27.08. 21:19
X (time in UTC) from 01–JUL–2005 to 31–AUG–2005
Filename: PIN_401_17434_18321_
Date : 17–10–2005 Page : 1
DLR


Orbit Number: 17434 – 18321 (I0026 – DM3 DET BLK T)
DM5 DET BLK T in DEGK
DM3 DET BLK T in DEGK
230
228
226
224
222
220
218
01.07. 00:26
12.07. 14:12
24.07. 03:59
04.08. 17:46
16.08. 07:32
27.08. 21:19
X (time in UTC) from 01–JUL–2005 to 31–AUG–2005
Orbit Number: 17434 – 18321 (I0031 – DM4 DET BLK T)
DM6 DET BLK T in DEGK
DM4 DET BLK T in DEGK
225.5
225.0
224.5
224.0
223.5
223.0
222.5
01.07. 00:26
12.07. 14:12
24.07. 03:59
04.08. 17:46
16.08. 07:32
27.08. 21:19
X (time in UTC) from 01–JUL–2005 to 31–AUG–2005
Filename: PIN_401_17434_18321_
Date : 17–10–2005 Page : 1
DLR

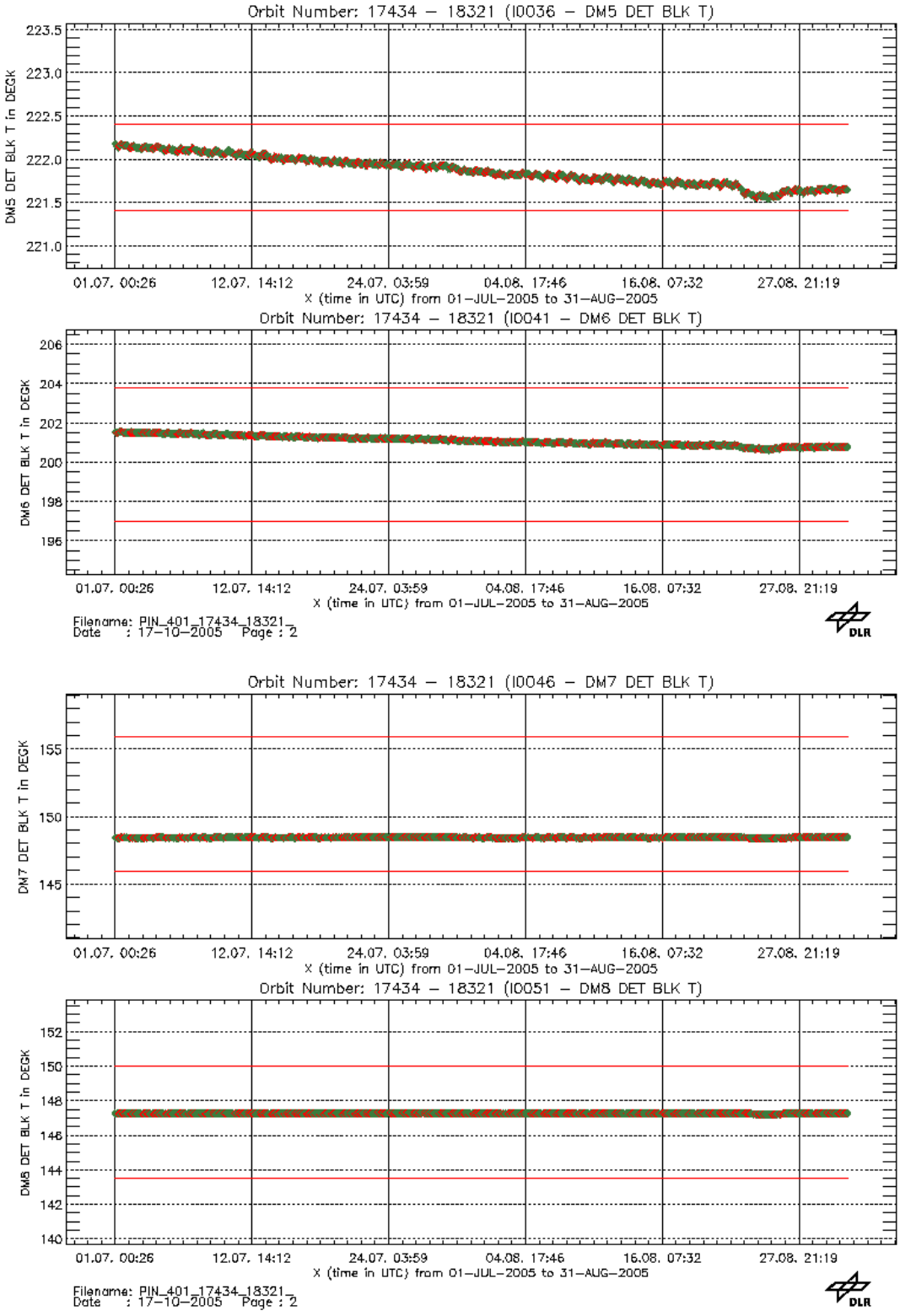


Fig. 3-2: Detector temperatures

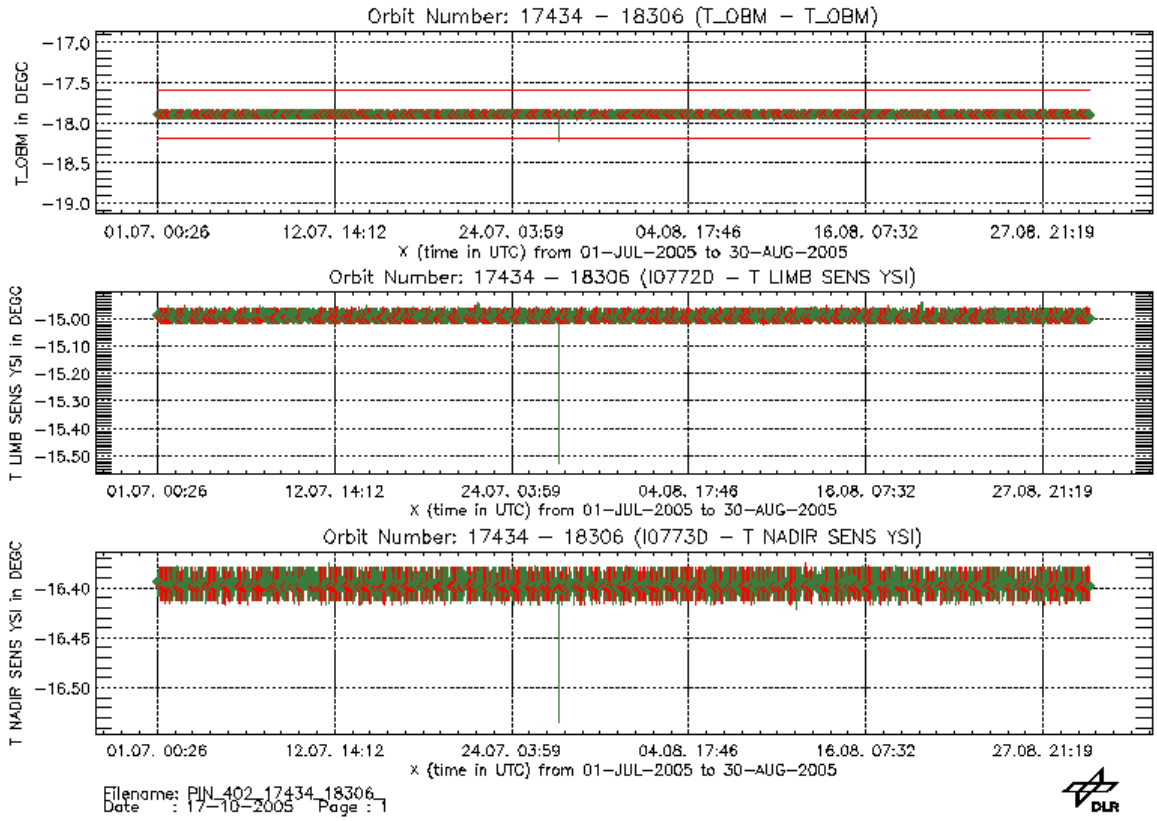


Fig. 3-3: OBM temperatures (top: derived OBM, middle: limb sensor, bottom: nadir sensor)

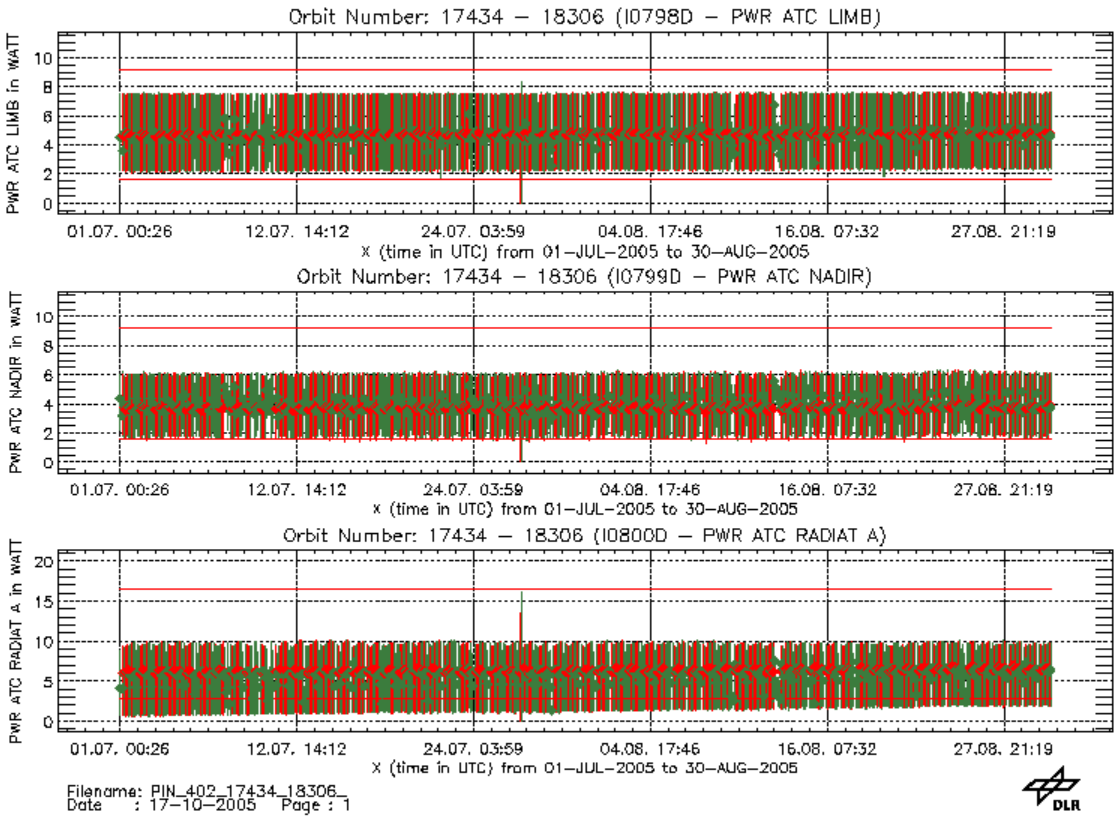


Fig. 3-4: ATC heater power (top: ATC limb, middle: ATC nadir, bottom: ATC Rad A)

LLI status

Life Limited Items are monitored based on analysis of the

- OSDF: This yields a predicted LLI usage.
- Report format: This counts the actual LLI switches or used LLI cycles. No WLS/SLS burning times can be derived thereof.

In addition, the in-flight usage of the cryogenic heat pipe is recorded. This subsystem has a limited number of cycles. Each decontamination increases the accumulated number of cycles by 1.

At the end of the reporting period the fractional usage of the LLI relative to the allowed in-flight budget was

- NDFM: 0.48
- APSM: 0.44
- NCWM (sub-solar port): 0.50
- WLS (switches): 0.11
- WLS (burning time): 0.21
- SLS (switches): 0.03

- SLS (burning time): 0.01

How the relative LLI usage has accumulated since launch can be seen in fig. 3-5. 'EOL' assumes a total mission lifetime of 0.5 years of Commissioning Phase and 4.5 years of routine operations.

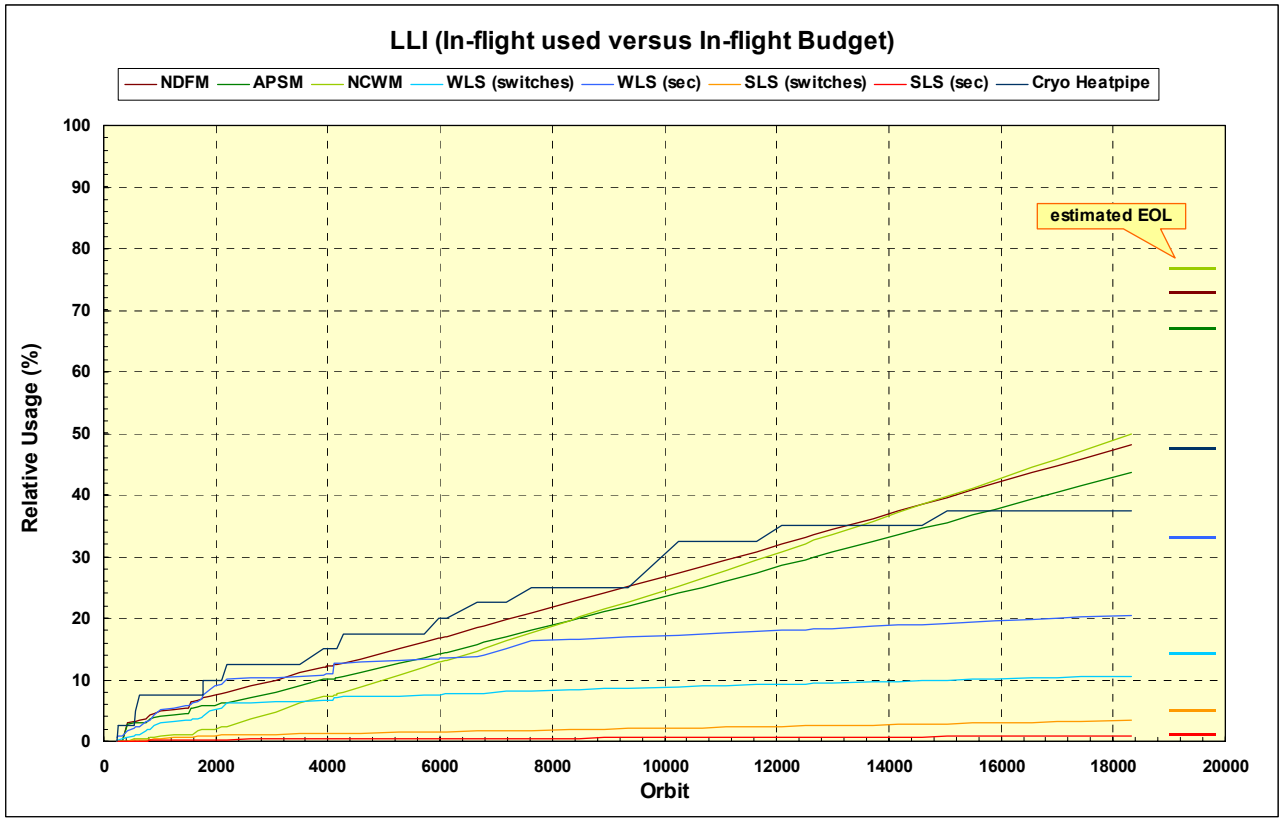


Fig. 3-5: Relative usage of LLIs. 'EOL' is derived for the currently specified mission lifetime.

The number of cryogenic heatpipe cycles did not increase (no decontamination). The budget used remained at 38% of the allowed in-flight budget.

Time reference

The times quoted in all planning files refer to the reference orbit. Since the actual orbit differs from the reference orbit (e.g. orbit drift), the times given w.r.t. the reference orbit does not reflect exactly the actual absolute times of events along the orbit (e.g. ANX, sunrise, sub-solar, moonrise, eclipse). The requirements for orbit maintenance may result in time differences of usually < ±10 sec. In some cases this value may even reach ±1 min, however.
SOST monitors how the reference time deviates from the actual time. This is done by using the predicted time which comes very close to the actual = restituted time. If the predicted times are delayed w.r.t. the reference orbit, then the difference *predicted – reference time* is > 0 sec; in the other case it is < 0 sec.

Fig. 3-6 displays the time difference *predicted – reference*. Orbit maneuvers cause distinct discontinuities.

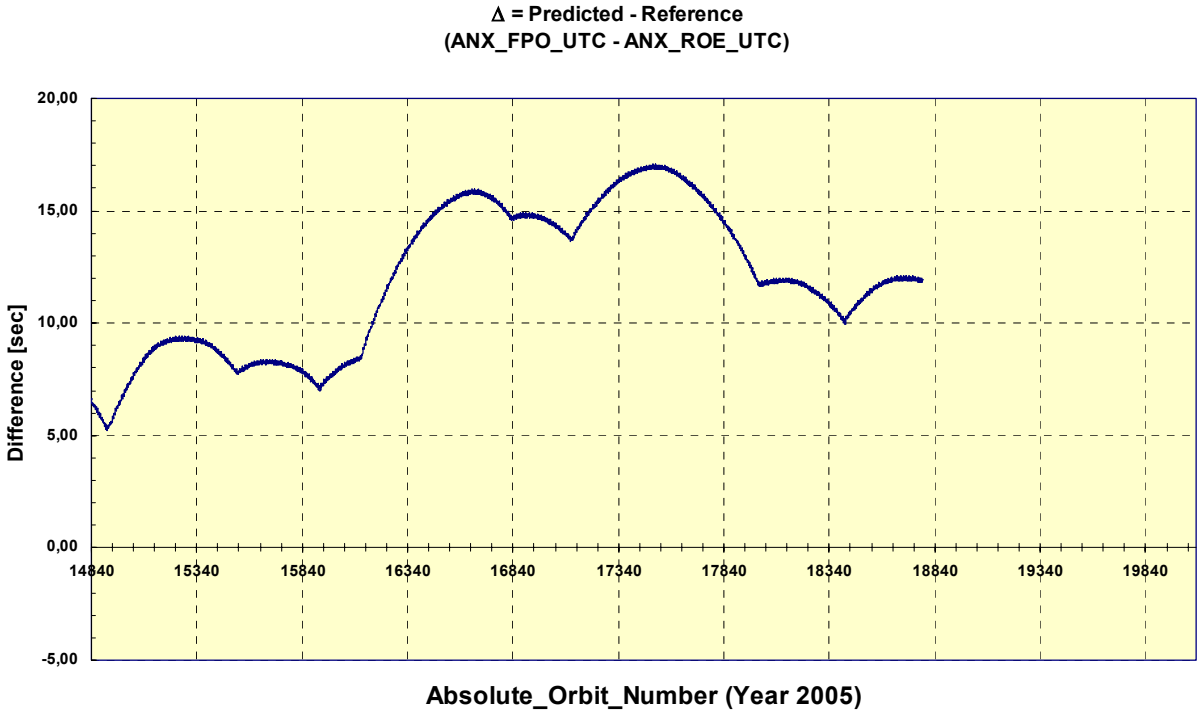


Fig. 3-6: Time difference between predicted and reference time.

3.1.5 Performance Monitoring - Light Path (SOST-IFE)

3.1.5.1 Science Channel Averages

One part of the SOST long-term monitoring activities is the trend analysis of measurements with the internal White Light Source (WLS) and of observations of the unobscured Sun above the atmosphere. In order to monitor the different SCIAMACHY light paths solar measurements are taken in various viewing geometries: In limb/occultation geometry (via ASM and ESM mirrors), in nadir geometry (via the ESM mirror through the subsolar port), and via the so-called calibration light path involving the ASM mirror and the ESM diffuser.
SCIAMACHY long-term monitoring comprises a regular analysis of these measurements.

The plots displayed in Fig 3.7 show results of these monitoring activities for the time interval July to August 2005.

All measured signals have been averaged over the entire channel and then divided by the corresponding measurement at a reference time (currently 2 August 2002, at about orbit 2200), yielding an effective instrument throughput for the different light paths.
The timing of subsolar measurements before 30 November 2002 (about orbit 3922) did not consider the known yaw misalignment of SCIAMACHY on ENVISAT. Therefore all subsolar measurements after 30 November 2002 have been referred to orbit 4519 (10 January 2003, just after a long decontamination phase).
Note that measurements performed during times of reduced instrument performance (e.g. switch-offs or decontamination periods) have been omitted.

The results presented in Fig 3.7 are based on the analysis of Level 0 data, which have been corrected for dead/bad pixels, dark current (fixed value from August 2002), scan angle dependencies, quantum efficiency changes, and the seasonally varying distance to the sun. Additional calibration steps have not been performed, like for example a straylight correction. Therefore, variations smaller than about 1% require careful investigation.

The light path monitoring results presented in this section may be regarded as a first step towards spectrally resolved monitoring factors (m-factors) which will be produced based on Level 1b data.
Daily updated light path monitoring results can be found on the SOST or IUP web site (http://www.iup.physik.uni-bremen.de/sciamachy/LTM/LTM.html).

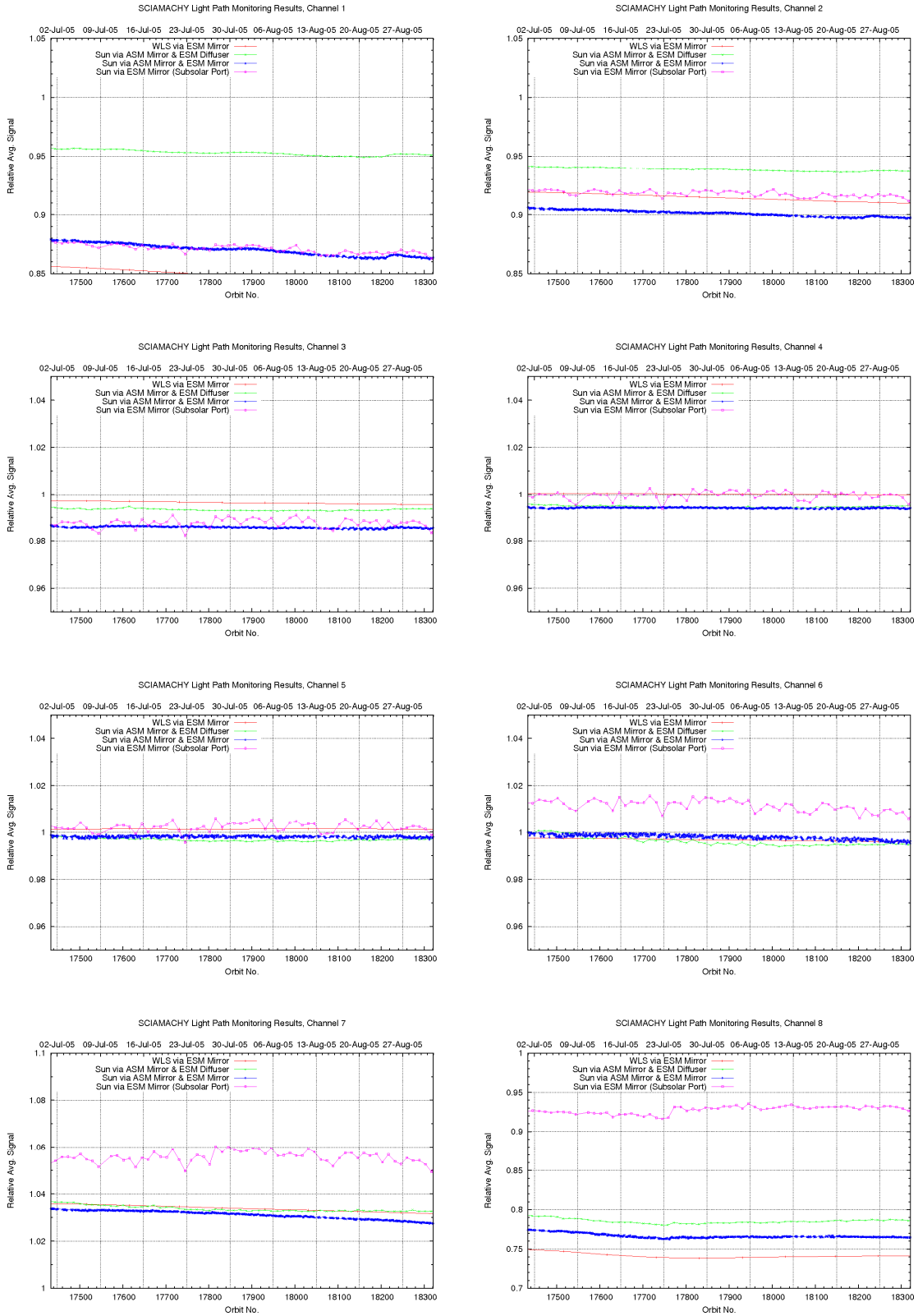


Fig. 3-7: Light path monitoring results July 2005 to August 2005

The following specific features can be identified from the light path monitoring results during the time interval of this report:

- The degradation in the UV (channels 1 & 2) continues. Currently, the throughput loss for all light paths involving the ESM mirror is about 1% (for channel 1) and 0.5% (for channel 2) within the shown two months. The degradation of the calibration light path which involves the ESM diffuser instead of the ESM mirror is smaller than for other light paths, indicating that the ESM diffuser degrades less than the ESM mirror.
- Channel 3 also shows a slight degradation which is, however, much less than 1% in the two month interval.
- Channels 4 to 5 remain stable.
- The throughput loss in channel 6 is not caused by degradation but by a seasonal variation of the signal which has not been corrected out.
- The channel 7 throughput slowly decreases, but this is almost negligible compared to the formerly observed throughput losses. Seasonal effects may also not be excluded here.
- Channel 8 reached a stable transmission of about 75-80% (depending on light path) at around orbit 17800. The higher throughput for the subsolar light path is most likely caused by the specific scan mode (fast sweep) analysed which causes a systematic offset. Pointing measurements provide more consistent results, but they are only performed on a monthly basis.

3.1.5.2 PMD monitoring results

The SCIAMACHY PMDs are monitored in a similar way as the science channels, but of course no channel averaging is performed. However, the results presented here are based on the same measurements as the science channel results (but using the PMD low gain signal), and they have been normalized to the same reference times, with one exception: Subsolar PMD data based on fast sweep measurements show a much too large fluctuation to be useful for monitoring purposes, therefore (the central part of) pointing measurements has been used instead. Since these measurements are only performed during monthly calibration there are less data points for the subsolar light path.
As PMD results are presented here for the first time, Figure 3.8 shows the PMD throughput variation for the whole time period between 2 August 2002 and 31 August 2005. Note that a constant dark signal for each of the PMDs has been assumed. To verify this assumption, Figure 3.10 also shows the variation of the PMD dark signal over time, which is usually quite low.
Note that PMD 7 results are probably dominated by straylight and not reliable. They are only shown for completeness. Furthermore, WLS data are only available for PMD 1 to 3 because of saturation in the other PMD channels.

Considering the broadband character of the PMDs, the observed PMD throughput changes are (except for PMD 4 and 7) very similar to those of the science channels with the following features:

- The UV degradation apparent in the science channels is also visible in PMD 1 to 3
- PMD 4 and 7 (which cover the same wavelength interval) show a considerably large decrease in throughput which is currently unexplained.
- There are remaining seasonal variations in the data which could up to now not be corrected out. The amplitude of these seasonal variations increases with the wavelength range covered by the PMD.
- The PMD 6 dark signal shows a strange variation over time which is still under investigation.

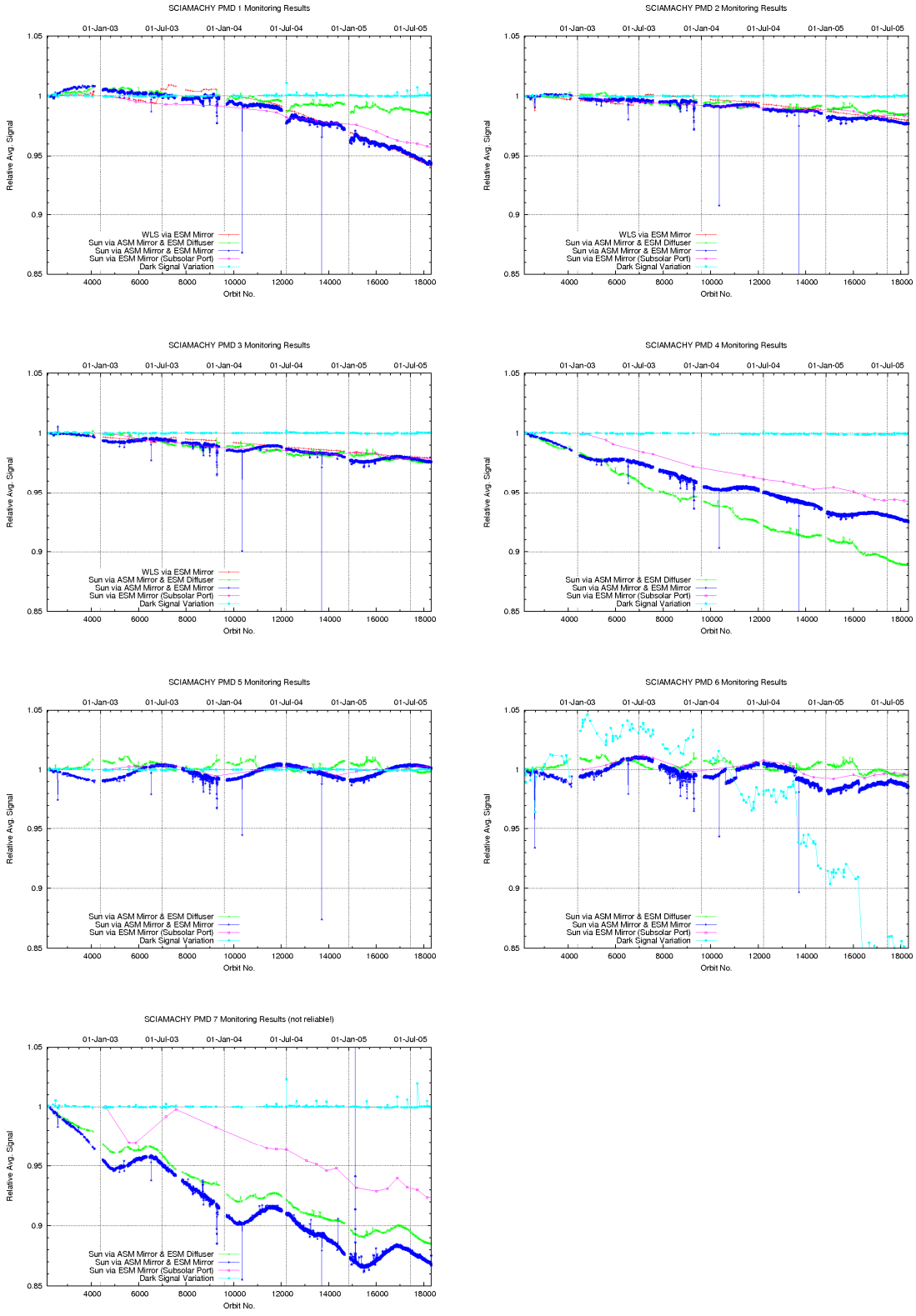


Fig 3.8: PMD monitoring results August 2002 to August 2005.

3.1.5.3 Spectral light path monitoring results

Fig. 3.9 – Fig 3.12 show first results of spectral throughput monitoring performed by SOST-IFE for the different light paths (nadir, limb, calibration, and WLS). These results have been derived from Level 0 data analysed in a similar way as for the channel averaged throughput data, but without spectral averaging.
Since spectral monitoring results are presented in this report for the first time, Fig. 3.9 – Fig 3.12 show the complete time series from August 2002 to the end of August 2005.

Notes:

- Dates in the graphs refer to UTC noon (12:00).
- The data have been interpolated over dead/bad pixels (using the on-ground list).
- Data from times of reduced instrument performance (like decontaminations or instrument switch-offs) have not been considered. These times are masked out by grey vertical bars.
- All data have been transformed to a daily grid, involving averaging and interpolation. "v"s on the top of each graph denote those times where measurement data were available.
- Ratios have been performed on a pixel axis without any spectral interpolations. The wavelength axis is just for illustration and gives only approximate values, assuming a linear relation between pixel number and wavelength.
- Depending on the availability of measurement data, features close to large data gaps (especially before and after a decontamination) may be caused by interpolation.
- WLS data have not been corrected for a potential degradation of the lamp. Only the intensity jump after the extended WLS usage in June 2003 has been removed.
- As mentioned before, the timing of subsolar measurements before 30 November 2002 did not consider the known yaw misalignment of SCIAMACHY on ENVISAT. The timing has been corrected in the final flight settings. To take this change into account, all subsolar measurements have been referred to orbit 4519 (10 January 2003).
- Therefore, subsolar results before 30 November 2002 are not reliable.

As can be seen from the graphs, the SCIAMACHY degradation strongly depends on wavelength and is largest at the channel edges and at spectral regions of high polarisation sensitivity (especially visible in channel 2). Note that also solar activity variation can be seen in the plots, e.g. the intensity change of the solar Mg II Fraunhofer line at about 280 nm.

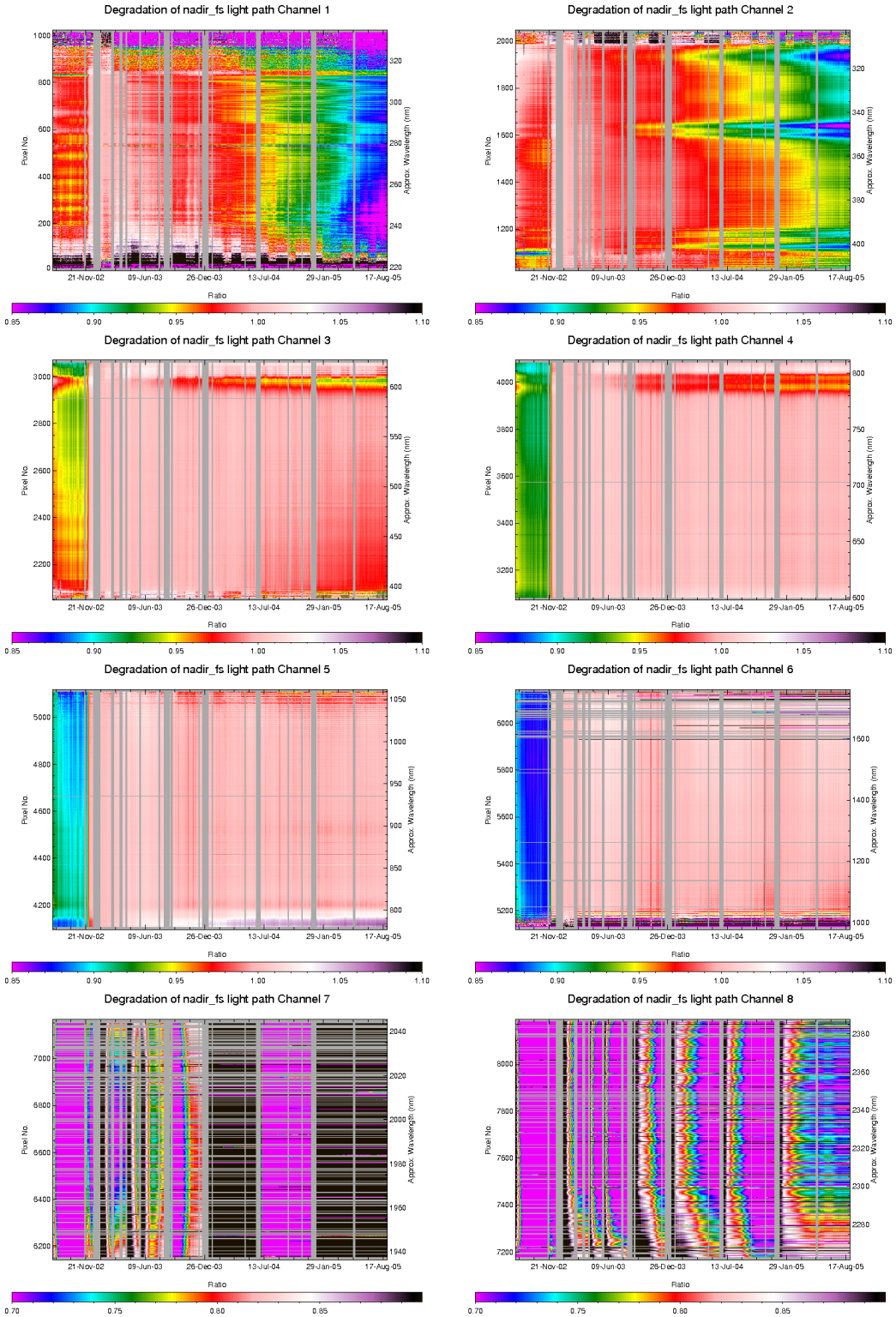


Fig 3.9: Spectral light path monitoring results August 2002 to August 2005 (nadir light path).

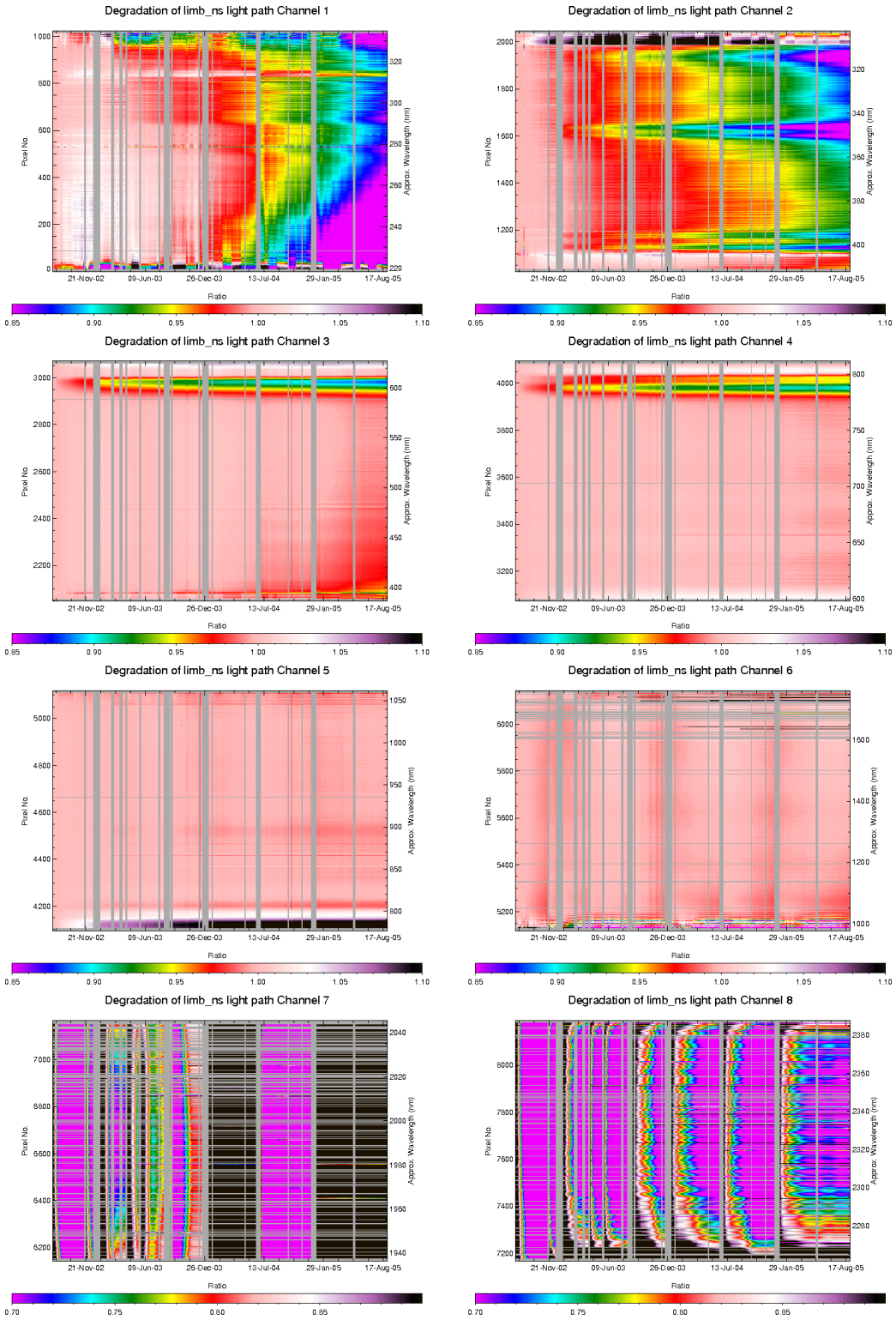


Fig 3.10: Spectral light path monitoring results August 2002 to August 2005 (limb light path).

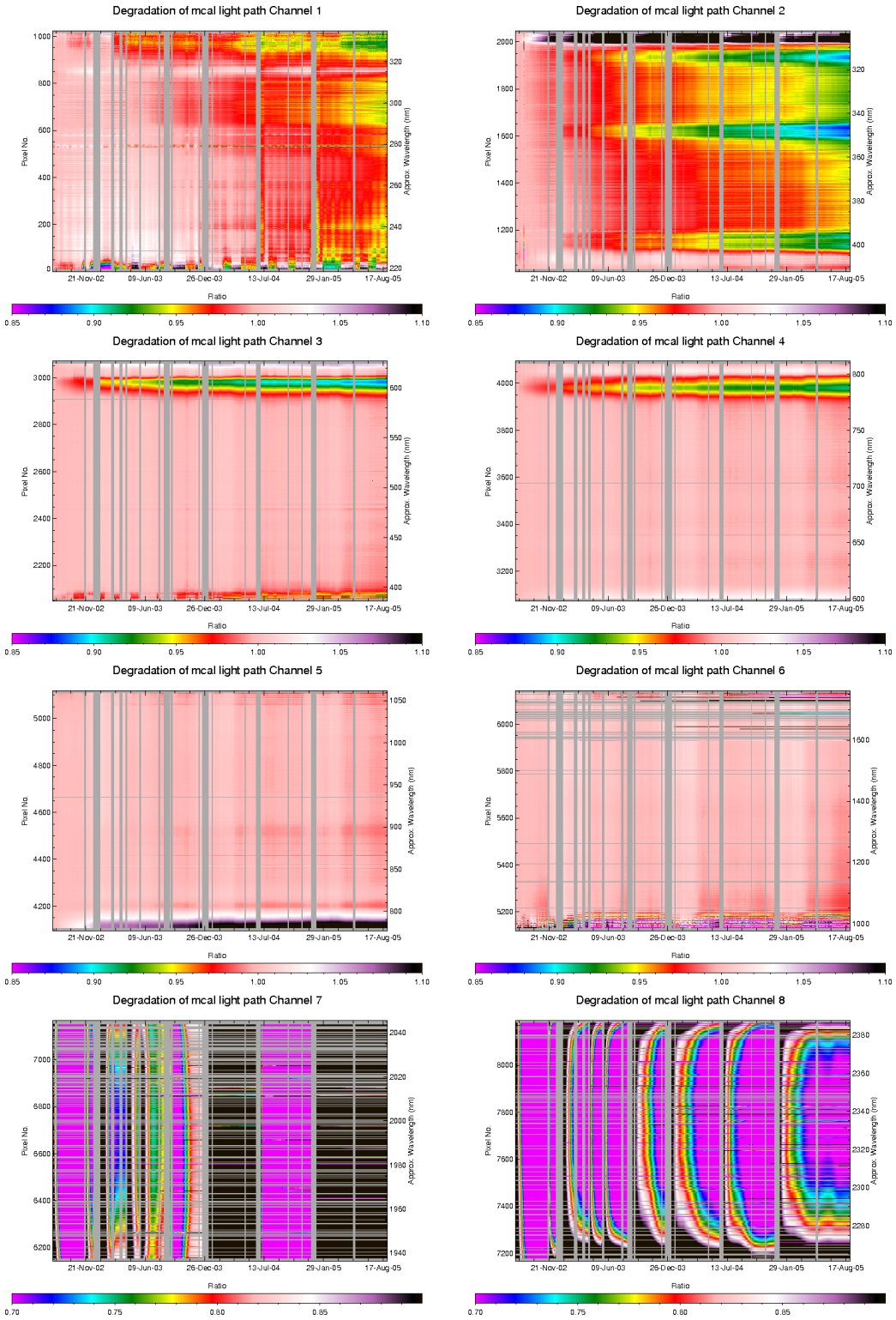


Fig 3.11: Spectral light path monitoring results August 2002 to August 2005 (calibration light path).

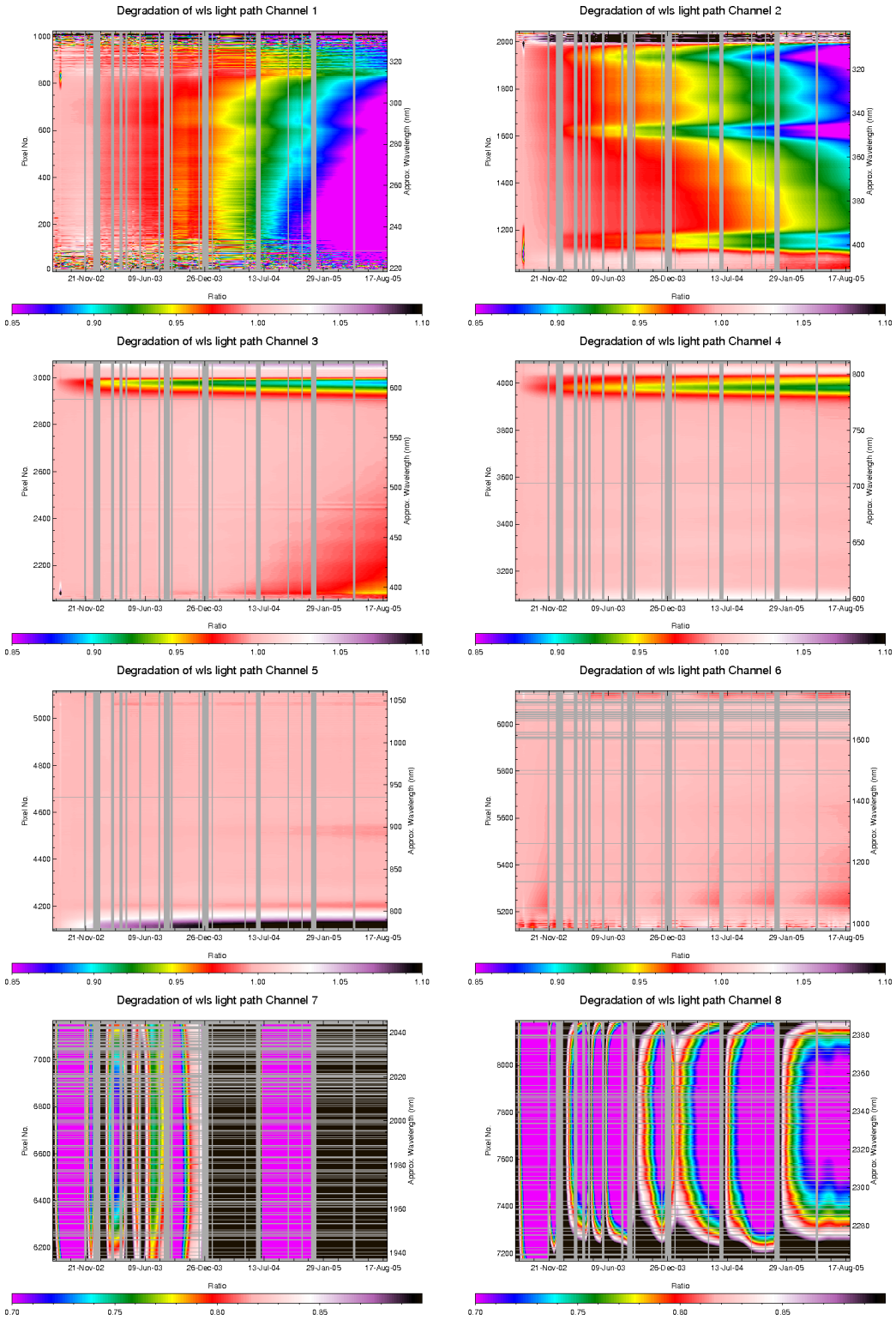


Fig. 3.12: Spectral light path monitoring results August 2002 to August 2005 (WLS light path).

3.1.6 Problem Report Status (DLR-BO)

The problem report statistics is as follows (same status as during period May-June 2005):

- Total number of problem reports: 43
- Open problem reports: 5
- New problem reports during the reporting period: 0

4 DATA AVAILABILITY STATISTICS

4.1 Downlink/Acquisition Performance

Problems are known for the following day:

15-July-2005, orbit 17640:
The NRT products listed here were of bad data quality resulting in bad data quality also for L1b data and L0 consolidated data generated from the same NRT L0 product.

SCI_NL__0PNPDK20050715_101730_000059112039_00051_17640_0376.N1

4.2 Statistics on unconsolidated data (SCI_NL__0P, SCI_NL__1P)

This paragraph reports the availability of NRT data on a monthly basis. The statistics are based on Level 0 data and Level 1 data inventoried in the ground segment. Unavailability periods due to instrument anomalies or Satellite switch-offs are excluded. The gaps considered are only interfile gaps.

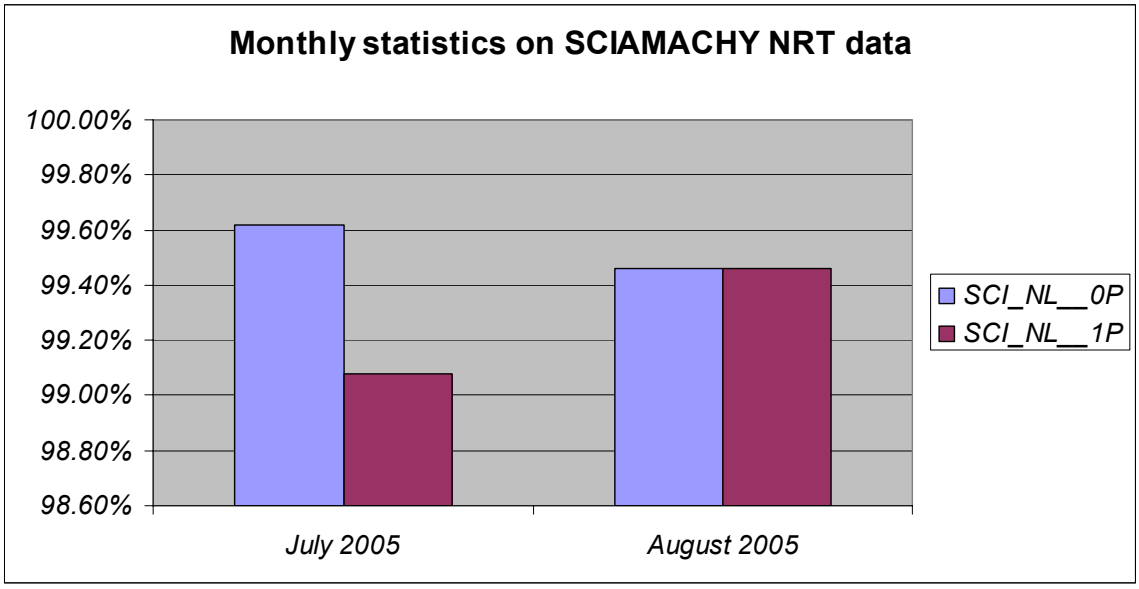


Fig. 4-1: Statistics on available unconsolidated Level 0 and Level 1 products

4.3 Statistics on consolidated data

In this paragraph statistics on consolidated data products L0 and L1 are presented.

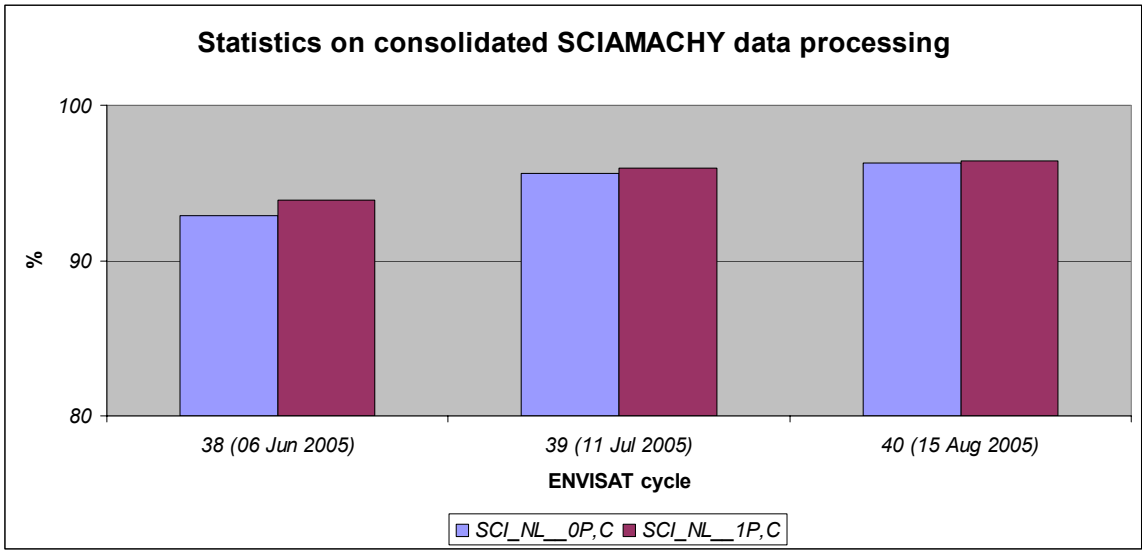


Fig. 4-2: Statistics on consolidated Level 0 and Level 1 products

4.4 Statistics on reprocessed data

Information about statistics on SCIAMACHY reprocessed data is made available by D-PAC.
Products from the time interval July 2002 to May 2004 (corresponding to cycles 7 -26, each cycle consisting of 501 orbits) are being reprocessed with IPF version 5.04 on consolidated L0/L1 data using the re-processed Auxiliary files (LK1, SU1, SP1, PE1). Data after that time interval have already been processed operationally with IPF 5.04 version and Auxiliary files had been processed operationally since then (the last status for the statistics in Fig. 4-3 is from 06/12/2005).
Data sets that lie in non-nominal decontamination periods are not re-processed to L2 products as the science data are not reliable.

It may occur that the availability of L1b products is slightly higher than L0 (e.g. cycle 17). This could be due to a multiple processing for some orbits. An anomaly report was opened to investigate the reason.

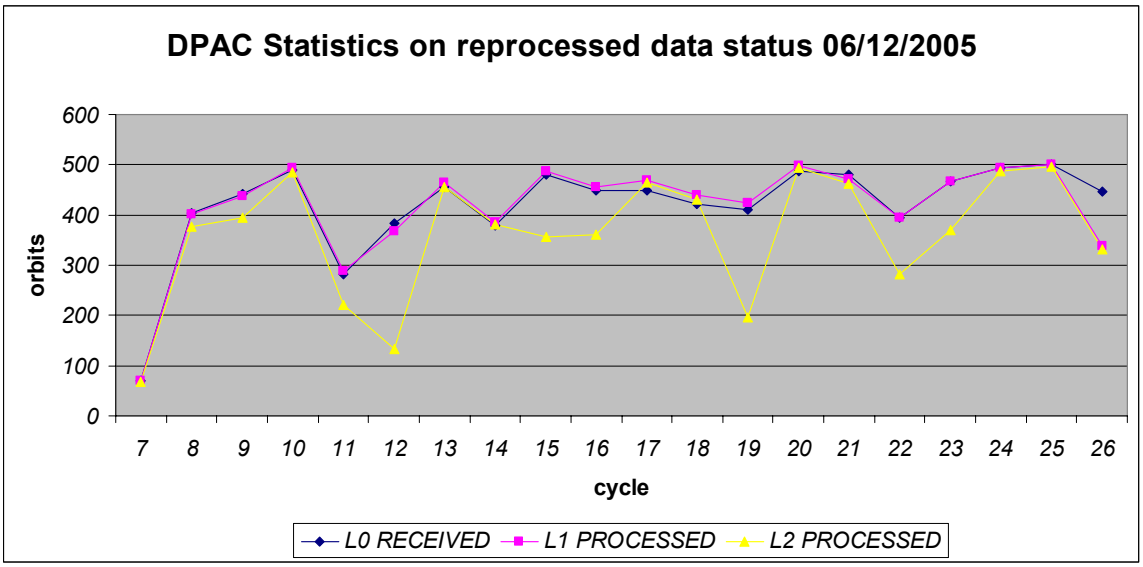


Fig. 4-3: DPAC statistics on reprocessed data

5 LEVEL 1 PRODUCT QUALITY MONITORING

5.1 Processor Configuration

5.1.1 Version

The current IPF version used for processing (and re-processing) of SCIAMACHY level 1 data is 5.04. The corresponding product specification is *[2]*. The disclaimer at http://envisat.esa.int/dataproducts/availability/disclaimers/SCI_NL__1P_Disclaimers.pdf describes known artefacts.
Table 5.1 gives an overview of changes implemented with processor versions IPF 5.04 and 5.01.
In addition here is a summary on the definition of the SZA used in previous and actual IPFs.
For IPF versions 4.02, 5.00, 5.01, 5.04 the SZA is defined with respect to Top of Atmosphere (TOA).
Instead for IPF versions 4.03, 4.01 and earlier versions the SZA is defined with respect to Tangent Height. IPF versions 4.02 and 5.00 however were not used operationally but to generate the validation dataset for the ACVT workshop in 2004.
A new upgrade on the IPF to version 6.00 is currently in progress. A verification meeting with results on the corresponding prototype L1b has taken place on day 14-Jul-2005.

IPF Version	Description	Proc Centre	Date	Start Orbit
5.04	No algorithm specification changes	PDHS-K	21-AUG-2004	12942
		LRAC	20-AUG-2004	12750

	were implemented, but two algorithm implementation errors have been corrected. In addition, code adaptations have been performed to resolve performance problems encountered during reprocessing. The list of modifications is as follows: • An incorrect polarisation-ratio calculation has been corrected, to remove radiance discrepancies up to 1% between prototype and operational processor. • Memory leaks have been detected and eliminated • Two modifications have been performed to avoid level 1B processing crashes	PDHS-E	16-AUG-2004	12823
		DPAC	12-AUG-2004	12879
5.01		DPAC	31-MAR-2004	
		PDHS-E PDHS-K LRAC	24-MAR-2004	

Tab. 5-1: Processor Version and main changes

5.1.2 Auxiliary Data Files

For operation of the SCIAMACHY level 1 processor a set of Auxiliary files as input is required.
These Auxiliary files consist of a subset that usually changes only in correspondence with a new IPF version, namely the Initialisation file (SCI_LI1_AX), the Key Data File (SCI_KD1_AX). In addition there is the m-factor file (SCI_MF1_AX), which shall describe the degradation of the instrument during its stay in orbit (note that the m-factor file has not been changed so far).

Another subset of Auxiliary Files are the In-flight calibration Data files which are generated when calibration measurements are included in the set of level 0 data to be processed. Four types of In-flight calibration Auxiliary files exist:

- Leakage Current Calibration (SCI_LK1_AX - updated on orbital basis)
- Solar Reference Spectrum (SCI_SU1_AX - updated on daily basis)
- Spectral Calibration Parameters (SCI_SP1_AX - updated on a monthly basis)

- Pixel-to-Pixel Gain and Etalon Parameters (SCI_PE1_AX - updated on a monthly basis)

Since 04 May 2004 LK1 Auxiliary Files (Leakage Current Calibration) were processed operationally by the IECF. A SCI_LK1_AX is generated about every orbit.
SU1 Auxiliary Files were operationally processed starting from day 08 May 2004, a new SCI_SU1_AX file is generated every day with a validity time of two weeks.
PE1 and SP1 Auxiliary files are generated once per month with measurements of the monthly calibration orbits.
The table in Appendix A gives an overview about the Auxiliary files for the reporting period July - August 2005.
Fig. 5.1 shows statistics of the SU1 and LK1 ADFs generated operationally with the IECF. It has to be noted that unavailability periods are excluded from statistics. Generation of SU1 ADFs for July 2005 was 96.7 %, during August 2005 100%.
The LK1 ADF statistic is calculated by dividing the number of all LK1 ADFs by number of all available (to IECF) level 1 orbits. The statistics on available LK1 ADFs during July (42.5%) and August 2005 (50.6%) is lower than during previous months. In average ADFs used to be available about 58% per month. The statistic does not take into account SAA and orbit phase constraints. Special analysis showed that only 6-8 orbits per day can be used for LK1 ADF processing, and therefore the performance is at 80-100%.
During the reported period hardware failures at ESRIN caused a delay of the generation of in flight ADFs. Especially during the first part of July (01-20) and the last week of August (25-31) most ADFs were generated with a time delay of average 1 week. This had impact for processing L1b Near Realtime products being processed with ADFs older than 1 week and the low availability of LK1 ADFs.

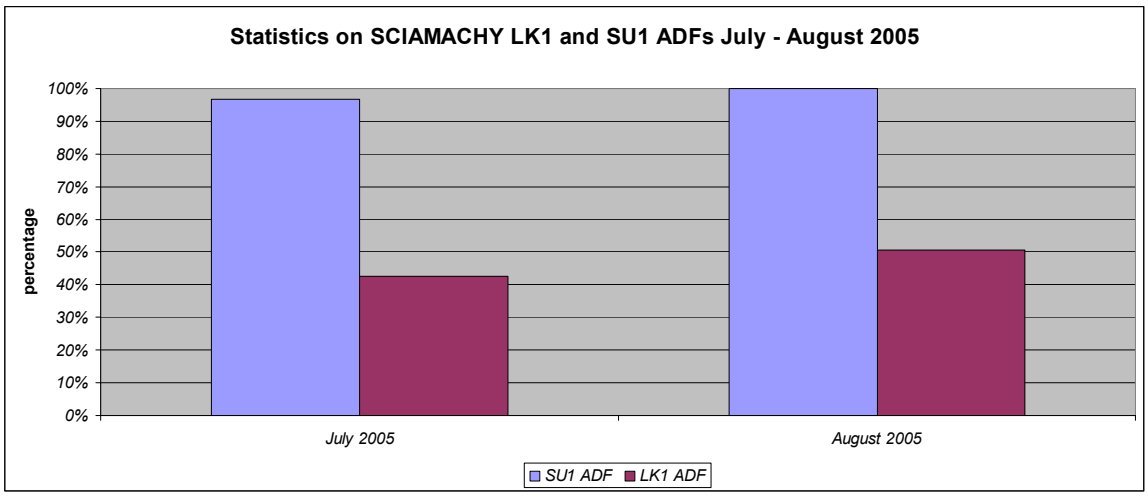


Fig. 5-1: Statistics on LK1 and SU1 processing

5.1.3 Spectral Performance

Future reports will contain analyses of spectral performance.

5.1.4 Radiometric Performance

Future reports will contain analyses of spectral performance.

5.1.5 Other Calibration Results

5.1.5.1 SMR analysis

The IECF generates daily SU1 Auxiliary Files, that contain new sun mean reference spectra for the different possible modes (e.g., subsolar, ESM diffuser, occultation).
Fig. 5-2 to Fig. 5-5 show the ratios of SMR spectra derived from calibrated SMR/ESM during the month July - August 2005. The ratios were determined by dividing the spectra of the beginning of each month to a set of days during each month. All ratios are not corrected for variation of distance earth/sun.
In detail the spectra used for the ratios of each month are the following:

- **July 2005**
  Reference SMR - 01 July 2005
  SMR used for ratios: 02, 03, 04, 06, 07, 14, 21, 28 July 2005
- **August 2005**
  Reference SMR - 01 August 2005
  SMR used for ratios: 02, 03, 04, 05, 06, 07, 14, 21, 28 August 2005

The overall changes lie between 1 - 2 % during one month. In channel 1 around pixel 550 some features can be noticed as well as in channel 2 at pixel 840. The reason for these features need to be investigated. A possible explanation could be a solar variability causing Fraunhofer lines with different intensities. Generally a spectral feature could have significant impact on the product quality, especially when the affected spectral parts are used for DOAS retrieval.
During the first 6 days in August the ratio is equal to 1, as no SMR had been updated in the SU1 ADF.

The IR channels are impacted by more noise than the UV-visible channels.

Fig. 5-6 and Fig. 5-7 show SMR ratios on a long term trend dividing the ESM spectra from days 24-Jul-2002 and 24-Jul-2005, respectively 27-Aug-2002 and 27-Aug-2005. The first spectrum available exists for 18-Jul-2002. However to consider sun/earth distance, the ratio was performed with spectra from same calendar days. What can be concluded is that for channels 1-2 an average degradation of about 5% is observed, channels 3-6 degrade by less than 1%. The signal in channels 7 and 8 has increased with respect to the SMR of year 2002. This is consistent with the Light Path monitoring at SOST-IFE. The effect is due to ice contamination for the last two channels.

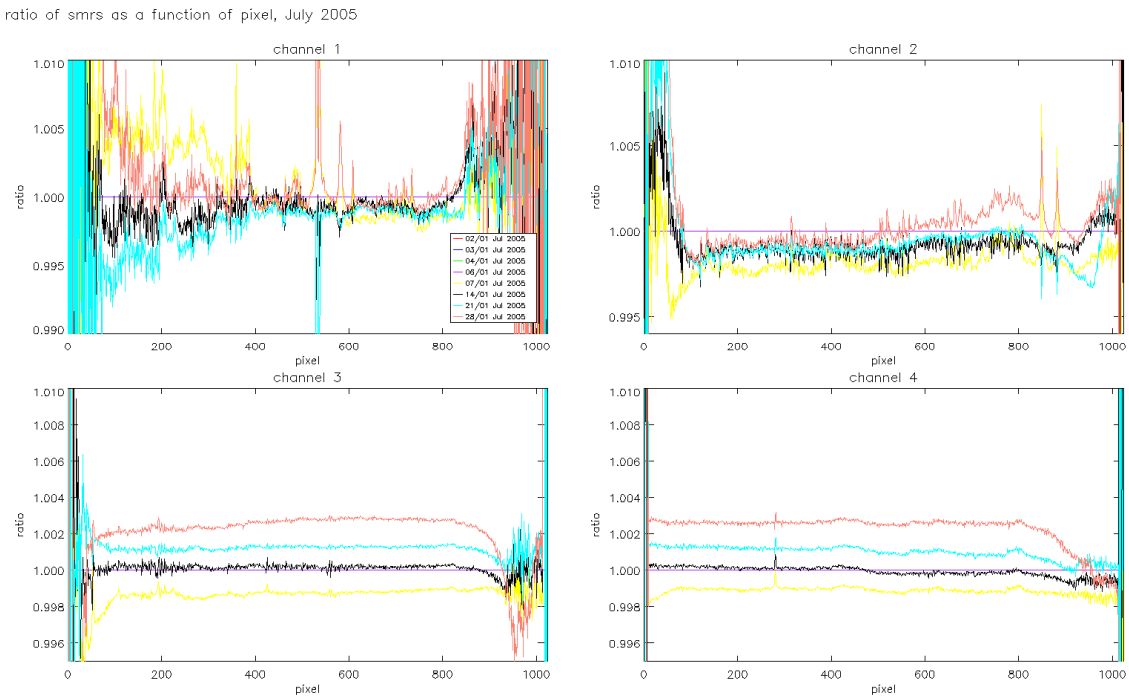


Fig. 5-2: SMR ratios per detector channel 1-4 (changes during July 2005)

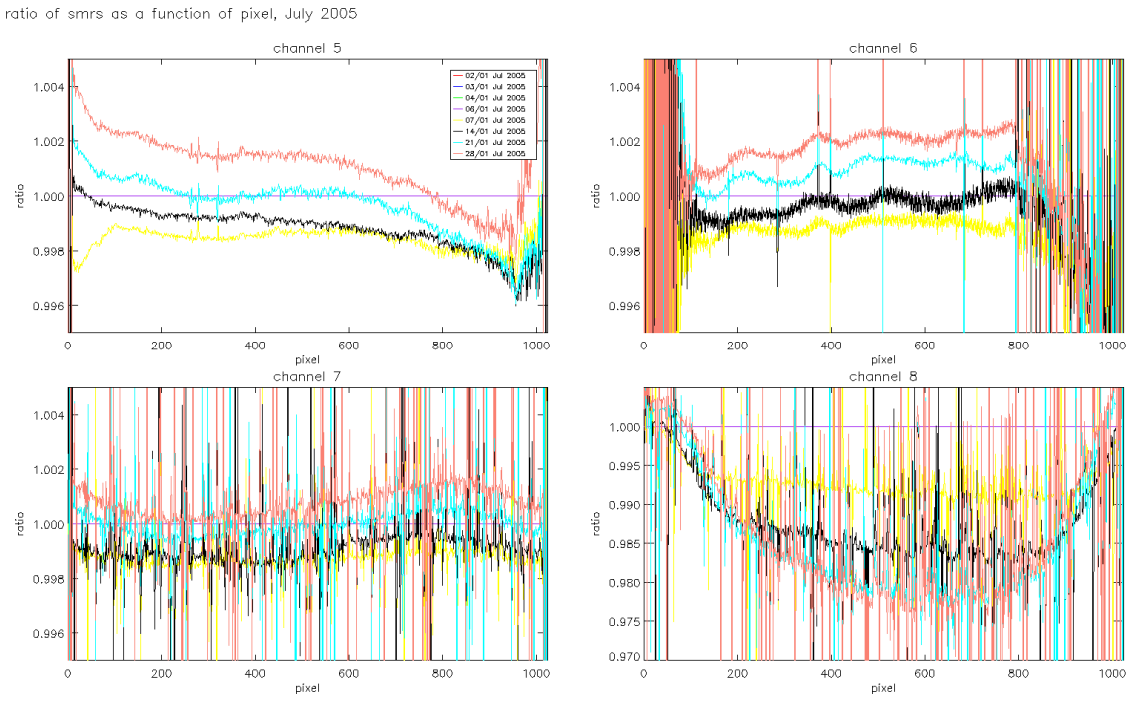


Fig. 5-3: SMR ratios per detector channel 5-8 (changes during July 2005)

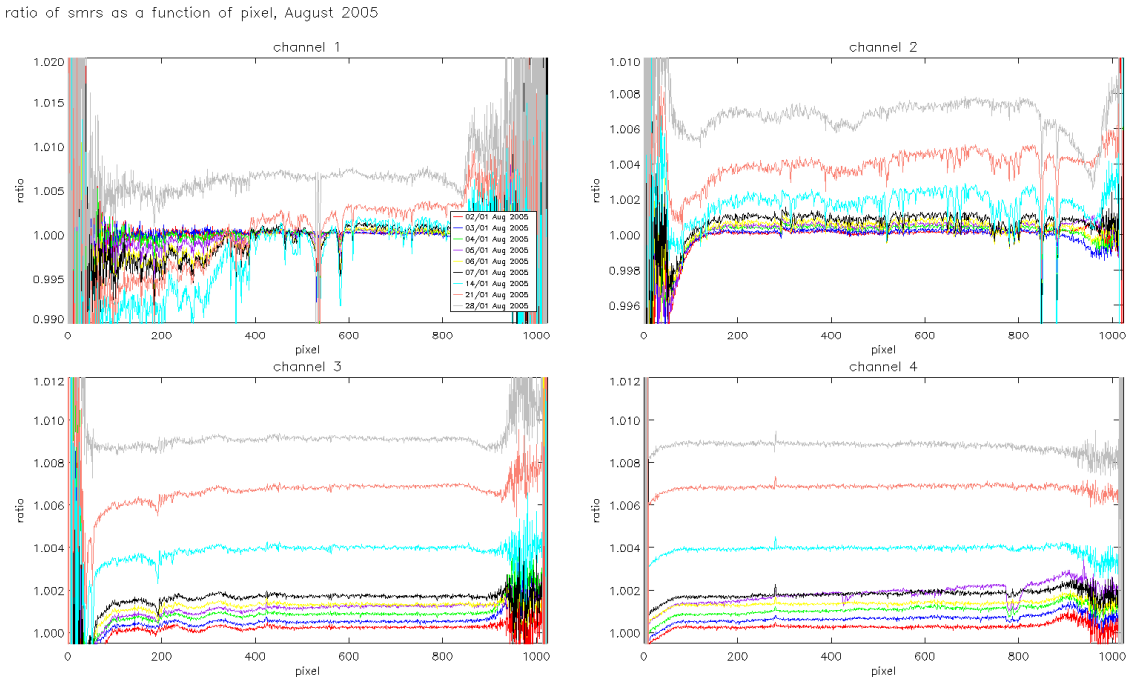


Fig. 5-4: SMR ratios per detector channel 1-4 (changes during August 2005)

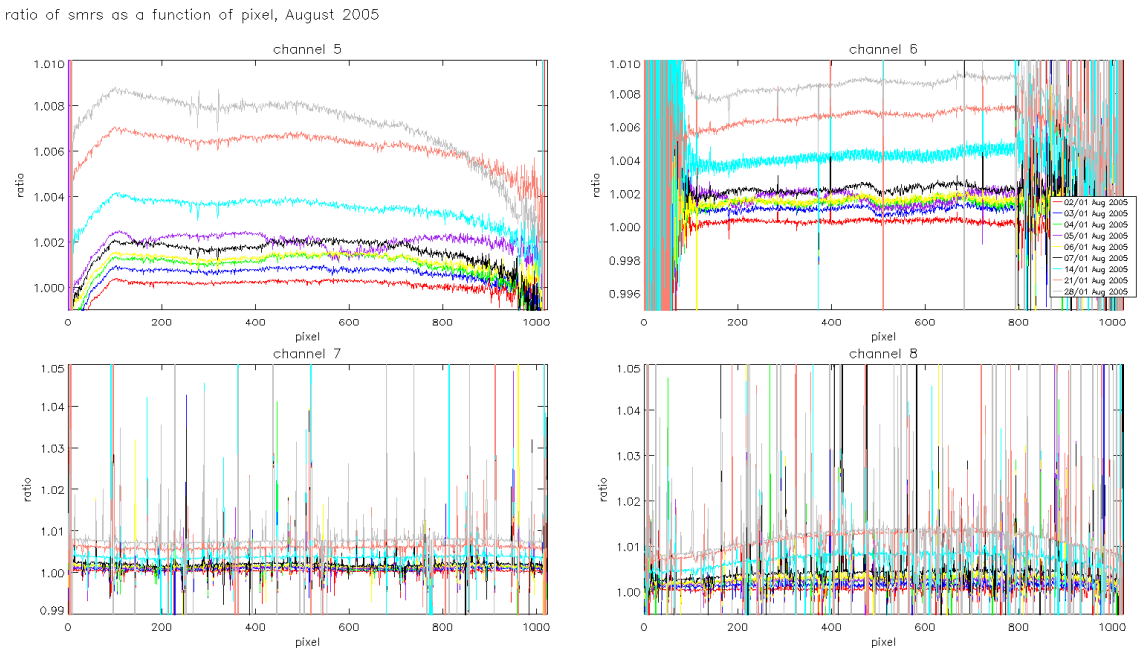


Fig. 5-5: SMR ratios per detector channel 5-8 (changes during August 2005)

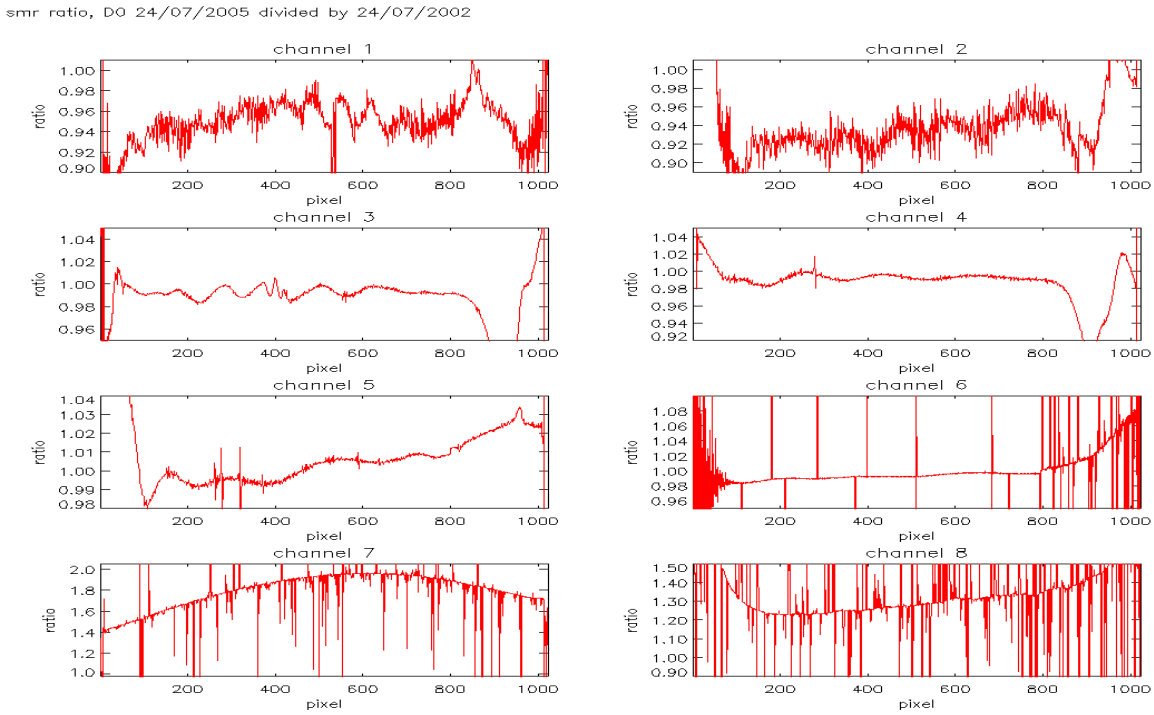


Fig. 5-6: SMR ratios per detector channel on Long Term Trend

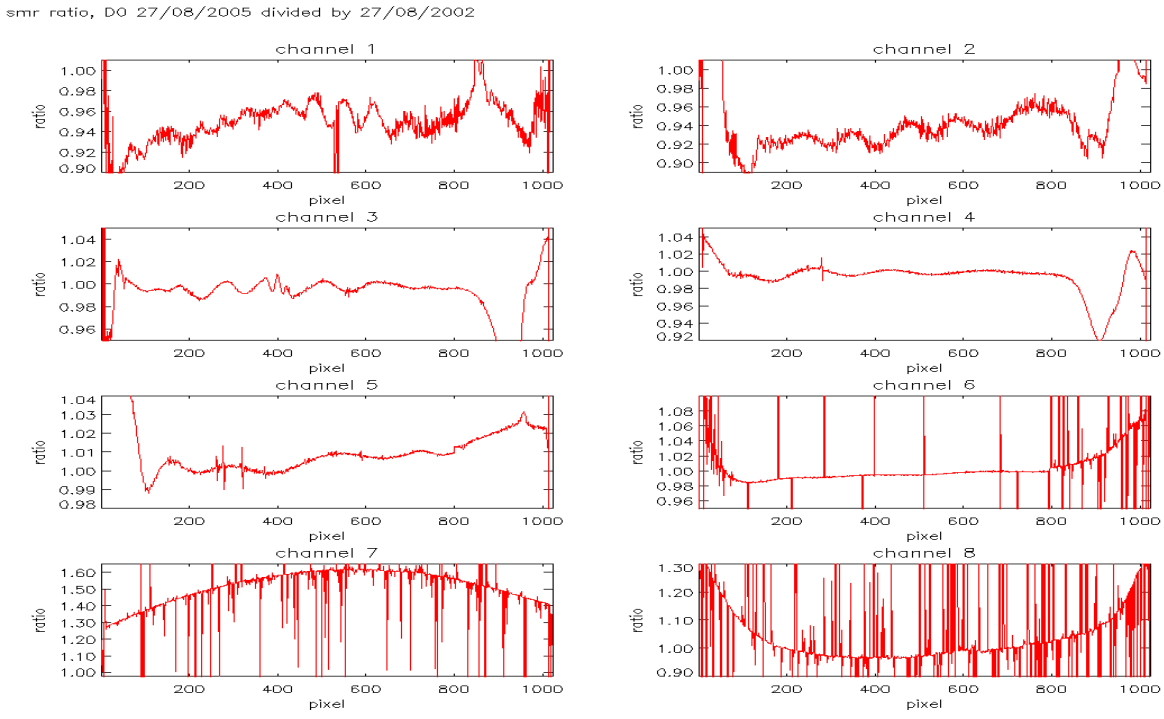


Fig. 5-7: SMR ratios per detector channel on Long Term Trend

5.1.5.2 LK1 analysis

On an orbital basis a leakage current calibration is performed, if measurement data do not lie in the South Atlantic Anomaly region.
In Fig. 5-8 to Fig. 5-11 the leakage constant part FPN (fixed pattern noise) of the LK1 ADFs are analysed by determining the ratios of the FPN of each month with a time distance of one orbit, one day, one week, two weeks, three weeks and a month.
For channels 1-5 and the first part of channel 6, during up to three weeks nearly no changes can be noticed. Sudden jumps however between the different dark current ratios can be seen for channels 1, 2, 4 and 5 between 2 and 3 weeks. They are very small but above the noise level.
The IR channels show a lot of noise. Here an improvement is foreseen with the new processor version IPF 6.00, where the time dependent part of the leakage current will be considered.

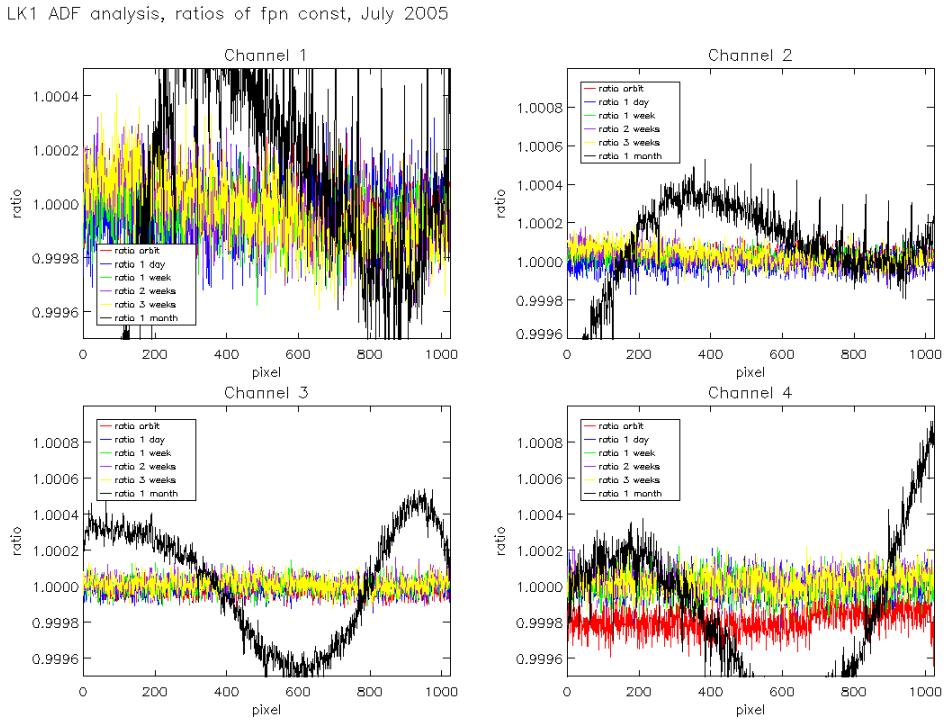


Fig. 5-7: dark current ratios (constant part) channel 1-4 during July 2005, Reference Spectrum used: Orbit 17438, 01-July-2005

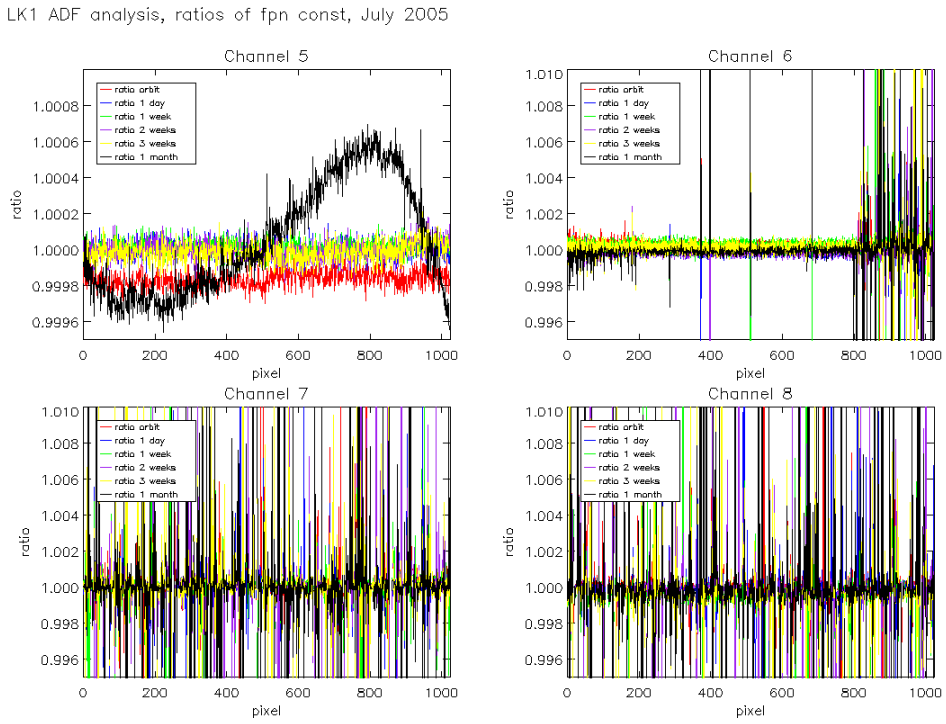


Fig. 5-8: dark current ratios (constant part) channel 5-8 during July 2005, Reference Spectrum used: Orbit 17438, 01-July-2005

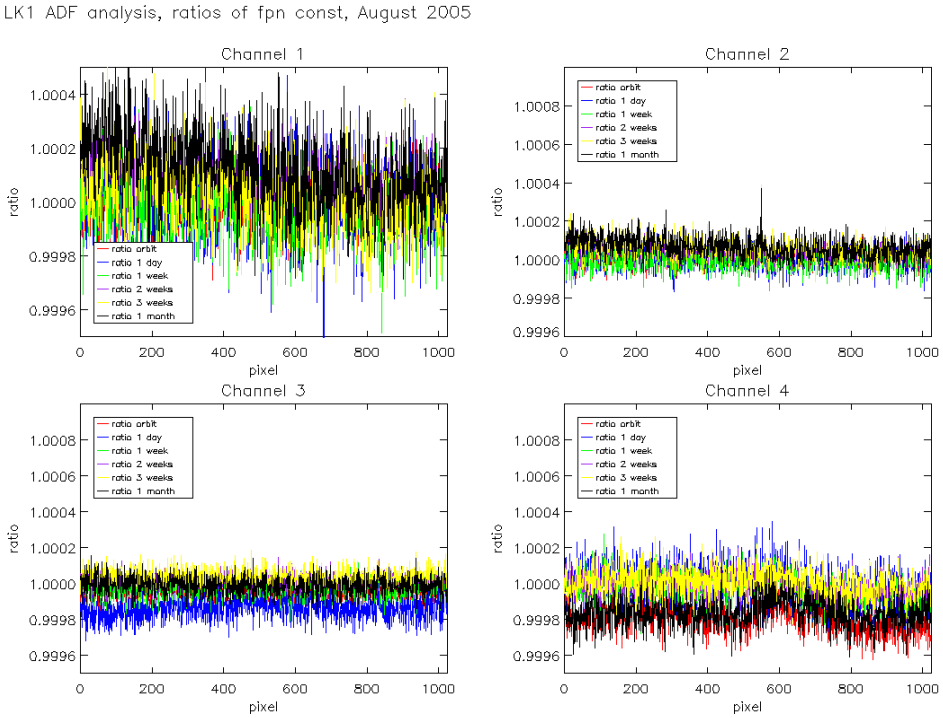


Fig. 5-9: dark current ratios (constant part) channel 1-4 during August 2005, Reference Spectrum used: Orbit 17882, 01-Aug-2005

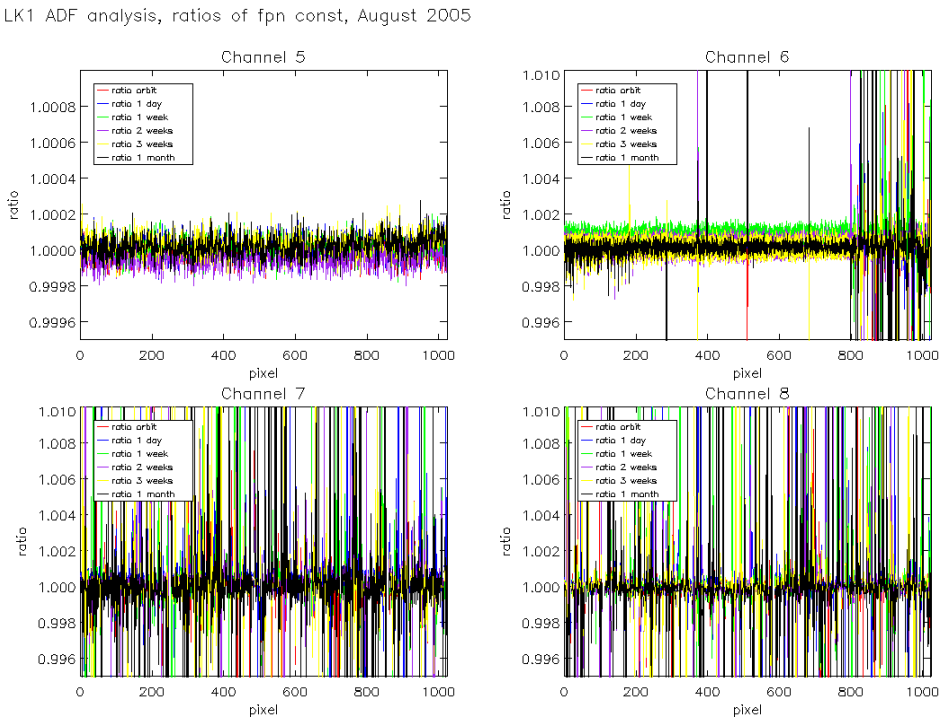


Fig. 5-10: dark current ratios (constant part) channel 5-8 during August 2005, Reference Spectrum used: Orbit 17882, 01-Aug-2005

5.1.6 Pointing Performance

The results on the analysis with respect to the Pointing Performance were presented in previous BMR.
The results of this study are being implemented in the new SCIAMACHY processor IPF 6.0.

6 LEVEL 2 NRT PRODUCT QUALITY MONITORING

6.1 Processor Configuration

6.1.1 Version

The current IPF version used for processing (and re-processing) of SCIAMACHY level 2 data is 5.04. The according product specification is *[2]*. The disclaimer at http://envisat.esa.int/dataproducts/availability/disclaimers/SCI_NL__2P_Disclaimers.pdf describes known artefacts. Table 6.1 shows the implementation dates of the IPF at the different PDS processing centres and the main modifications implemented.

IPF Version	Description	Proc Centre	Date	Start Orbit
5.04	No algorithm specification changes were implemented, but two algorithm implementation errors have been corrected. In addition, code adaptations have been performed to resolve performance problems encountered during reprocessing. The list of modifications is as follows: • The incorrect handling of the season index 4 has been corrected. • An incorrect polarisation-ratio calculation has been corrected, to remove radiance discrepancies up to 1% between prototype and operational processor. • Memory leaks have been detected and eliminated • An adaptation has been implemented to allow co-existence with the initialisation file used by the Off-Line processor	PDHS-K	21-AUG-2004	12942
		LRAC	20-AUG-2004	12750
		PDHS-E	16-AUG-2004	12823
		DPAC	12-AUG-2004	12879
5.01	• description for cloud MDS updated • minor changes in MPI and USA	DPAC	31-MAR-2004	
		PDHS-E PDHS-K	24-MAR-2004	

	climatology description • latitude grids fixed • list of surface types fixed, note about vegetation index added • O_3 FM formula fixed sizes of SCIA FM spectra fixed latitude zones fixed • solar zenith angle grid fixed	LRAC		

Tab. 6-1: Level 2 Processor Configuration

6.1.2 Auxiliary Data Files

Auxiliary Files being used as input for SCI_NL__2P products are listed in table 6-2. These ADF files are generally not changed.

SCI_FM2_AXVIEC20040309_092553_19990101_000000_20991231_235959
SCI_BL2_AXVIEC20020220_093709_20020101_000000_20200101_000000
SCI_CC2_AXVIEC20020220_094004_20020101_000000_20200101_000000
SCI_CL2_AXVIEC20020220_094214_20020101_000000_20200101_000000
SCI_CS2_AXVIEC20020220_094417_20020101_000000_20200101_000000
SCI_MF2_AXVIEC20040309_093236_19990101_000000_20991231_235959
SCI_PF2_AXVIEC20020220_100450_20020101_000000_20200101_000000
SCI_PR2_AXVIEC20020220_100642_20020101_000000_20200101_000000
SCI_RC2_AXVIEC20020220_100912_20020101_000000_20200101_000000
SCI_UC2_AXVIEC20040309_092027_19990101_000000_20991231_235959
SCI_SF2_AXVIEC20020220_101039_20020101_000000_20200101_000000
SCI_LI2_AXVIEC20040308_170000_20020101_000000_20200101_000000

Tab. 6-2: Level 2 Auxiliary Files

6.2 O_3 consistency checking

Future reports will contain information on this issue.

6.3 NO_2 consistency checking

NO_2 vertical column density (VCD) values of one month were averaged using QUADAS, filtering those data where the VCD flags are 0. Diurnal variations have not been corrected (no model applied). Fig. 6-1, Fig. 6-2, Fig. 6-3, Fig. 6-4 are aimed at processing consistency checking and are not intended for geophysical interpretation.

Generally, high concentration of NO_2 is expected over industrial regions, as over North America, especially the East coast, over central Europe, China and South Africa.

6.3.1 NO_2 VCD map July 2005

High NO_2 VCD values at high latitudes need to be reviewed.

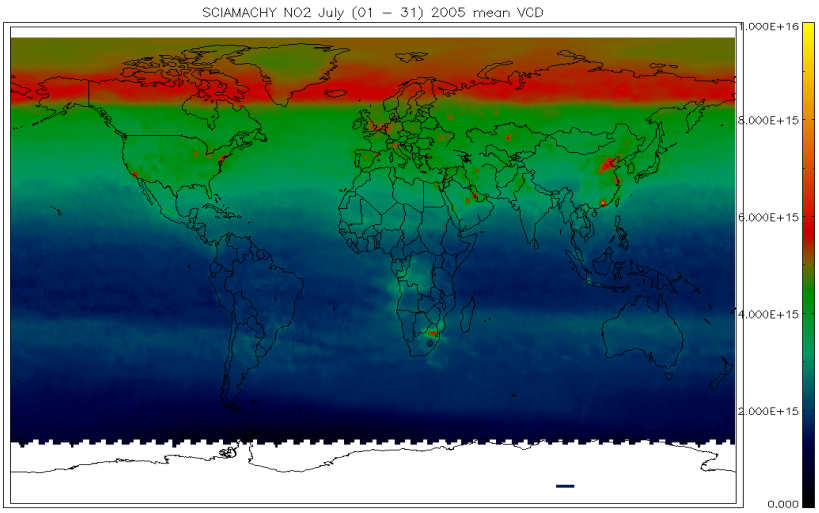


Fig. 6-1: NO_2 VCD world map 01-31 July 2005 – monthly average

6.3.2 NO_2 VCD map August 2005

Also for the August world map showing the distribution of mean values of NO_2 VCD, a review is needed to understand unphysical values at high latitudes, though the values are not as high as in July.

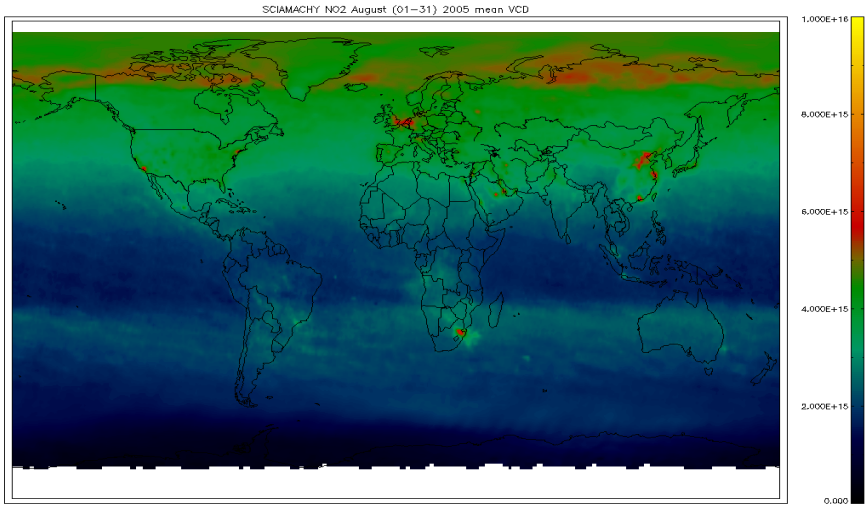


Fig. 6-2: NO_2 VCD world map 01-31 August 2005 – monthly average

7 LEVEL 2 OFFLINE PRODUCT QUALITY MONITORING

7.1 Processor Configuration

7.1.1 Version

In January 2005 the SCIAMACHY Level 2 Offline product SCI_OL__2P was released, data are generated with processor version 2.5.
The according product specification is PO-RS-MDA-GS-2009_15_3H. The disclaimer at http://envisat.esa.int/dataproducts/availability/disclaimers/SCI_OL_2P_Disclaimers.pdf describes known artefacts.
SCI_OL__2P products contain geolocated vertical column amounts of O_3, NO_2 Nadir measurements as well as stratospheric Limb profiles of O_3, NO_2.

7.1.2 Auxiliary Data Files

Input for Level 2 Offline processing is the Initialization File SCI_IN_AXNPDE20041221_112322_000000000000_000000 _000000_0000.N1, that usually is changed only in case of a processor upgrade.

7.1.3 Monitoring results

In future reports results on Limb and Nadir products will be presented here.

8 VALIDATION ACTIVITIES AND RESULTS

8.1 SCIAMACHY-ECMWF Comparisons using SCI_RV__2P

8.1.1 Summary of the ECMWF SCIAMACHY monthly report for July 2005

- SCIAMACHY data quality stable.
- SCIAMACHY data about 5 DU lower in the global mean than ECMWF ozone values.
- Slight increase of the (negative) global mean departures (SCIAMACHY-ECMWF) from 28 July onwards.

- No data on 4 July (00 UTC) and 10 July (06, 12, 18 UTC).

The full report is available at **http://earth.esa.int/pcs/envisat/tmp_calval_res/**

Below see the ECMWF plot on SCIAMACHY mean observation in DU.

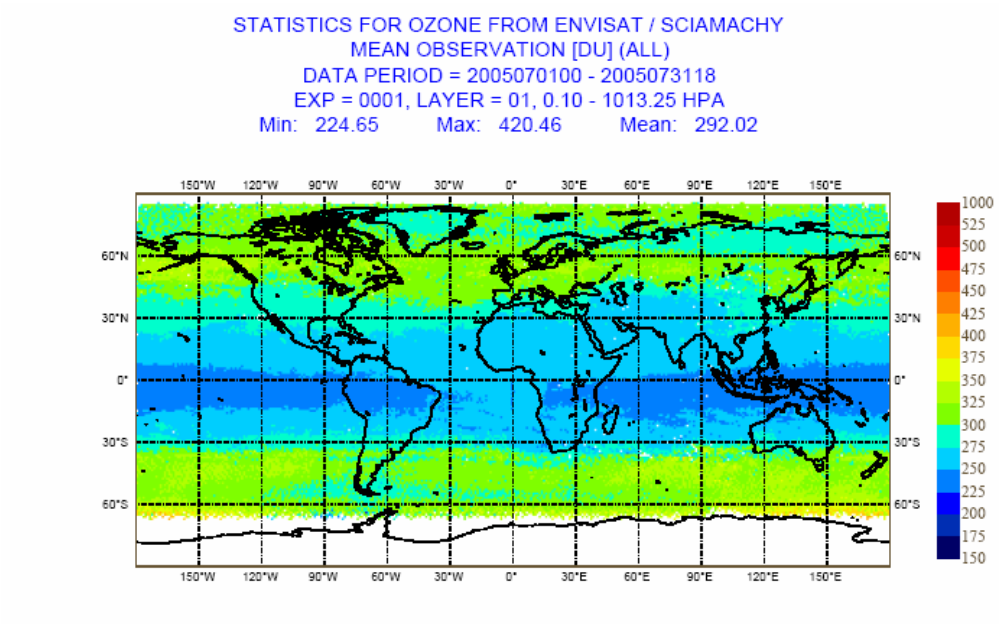


Fig. 8-1: Ozone Mean ECMWF July 2005

8.1.2 Summary of the ECMWF SCIAMACHY monthly report for August 2005

- SCIAMACHY data quality is stable.
- SCIAMACHY data about 5 DU lower in the global mean than ECMWF ozone values.
- Increase of SCIAMACHY data standard deviations and a slight decrease of mean departures standard deviations in the southern mid- and high latitudes
- The operational ECMWF model version used was CY29R2.

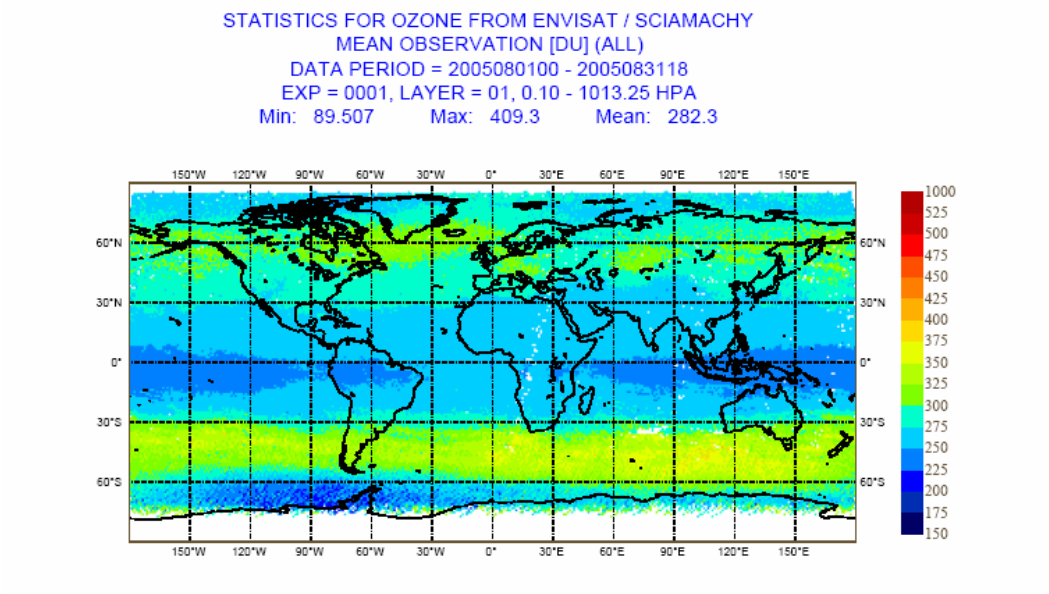


Fig. 8-2: Ozone Mean ECMWF August 2005

8.2 Statistics from Inter comparison with External Data

Future reports will contain information on this issue.

APPENDIX A

Type	ADF Name
PE1_AX	SCI_PE1_AXVIEC20050627_154704_20050621_000000_20900101_000000
SP1_AX	SCI_SP1_AXVIEC20050627_160323_20050621_000000_20051201_000000 SCI_SP1_AXVIEC20050728_085923_20050721_000000_20060101_000000 SCI_SP1_AXVIEC20050901_074503_20050819_000000_20060201_000000
SU1_AX	SCI_SU1_AXVIEC20050704_111554_20050701_123706_20050715_220136 SCI_SU1_AXVIEC20050705_161556_20050702_201318_20050716_212924 SCI_SU1_AXVIEC20050706_010404_20050703_005055_20050717_011035 SCI_SU1_AXVIEC20050707_001536_20050704_002208_20050718_014152 SCI_SU1_AXVIEC20050709_011124_20050706_005801_20050720_114006 SCI_SU1_AXVIEC20050710_094542_20050707_092934_20050721_211847 SCI_SU1_AXVIEC20050711_002852_20050708_013159_20050722_121837 SCI_SU1_AXVIEC20050712_003113_20050709_010236_20050723_021522 SCI_SU1_AXVIEC20050721_071911_20050716_204328_20050730_223031 SCI_SU1_AXVIEC20050722_171427_20050711_203328_20050725_214737 SCI_SU1_AXVIEC20050727_001728_20050724_012910_20050807_213744 SCI_SU1_AXVIEC20050728_000826_20050725_005908_20050808_021227 SCI_SU1_AXVIEC20050728_092217_20050710_101512_20050724_111516 SCI_SU1_AXVIEC20050728_100612_20050712_200005_20050726_211634 SCI_SU1_AXVIEC20050728_105608_20050713_003725_20050727_021510 SCI_SU1_AXVIEC20050728_144232_20050714_000353_20050728_014311 SCI_SU1_AXVIEC20050729_000824_20050726_002734_20050809_020707 SCI_SU1_AXVIEC20050729_100051_20050715_200404_20050729_212214 SCI_SU1_AXVIEC20050729_102256_20050717_000900_20050731_014849 SCI_SU1_AXVIEC20050729_104115_20050718_200957_20050801_212629 SCI_SU1_AXVIEC20050729_110142_20050719_205014_20050802_223745 SCI_SU1_AXVIEC20050729_132759_20050720_001615_20050803_015437 SCI_SU1_AXVIEC20050729_140821_20050721_101156_20050804_102911 SCI_SU1_AXVIEC20050729_143101_20050722_005352_20050805_010721 SCI_SU1_AXVIEC20050729_153138_20050723_002303_20050806_020037 SCI_SU1_AXVIEC20050730_004623_20050727_013339_20050810_214514 SCI_SU1_AXVIEC20050731_003315_20050728_010418_20050811_114933 SCI_SU1_AXVIEC20050801_095855_20050729_093757_20050812_222058 SCI_SU1_AXVIEC20050802_001717_20050730_013942_20050813_215046 SCI_SU1_AXVIEC20050803_002002_20050731_010933_20050814_211717 SCI_SU1_AXVIEC20050804_001415_20050801_003800_20050815_021636 SCI_SU1_AXVIEC20050805_002249_20050802_014536_20050816_215526 SCI_SU1_AXVIEC20050806_002154_20050803_011408_20050817_212520 SCI_SU1_AXVIEC20050807_001807_20050804_004604_20050818_223418 SCI_SU1_AXVIEC20050808_001928_20050805_001432_20050819_015224 SCI_SU1_AXVIEC20050809_002928_20050806_012216_20050820_212820 SCI_SU1_AXVIEC20050810_003212_20050807_005000_20050821_020325 SCI_SU1_AXVIEC20050812_001124_20050809_012816_20050823_213635 SCI_SU1_AXVIEC20050812_142108_20050808_001956_20050822_015845 SCI_SU1_AXVIEC20050813_001657_20050810_005645_20050824_020908 SCI_SU1_AXVIEC20050814_000923_20050811_002513_20050825_020300

	SCI_SU1_AXVIEC20050815_001535_20050812_013207_20050826_121748 SCI_SU1_AXVIEC20050816_001846_20050813_071634_20050827_114543 SCI_SU1_AXVIEC20050817_001452_20050814_064502_20050828_125355 SCI_SU1_AXVIEC20050818_001601_20050815_061126_20050829_122346 SCI_SU1_AXVIEC20050819_000857_20050816_072440_20050830_115208 SCI_SU1_AXVIEC20050826_184955_20050822_201330_20050905_212741 SCI_SU1_AXVIEC20050827_084443_20050824_205238_20050907_220456 SCI_SU1_AXVIEC20050828_144344_20050825_152435_20050908_213231 SCI_SU1_AXVIEC20050830_100619_20050817_161517_20050831_175359 SCI_SU1_AXVIEC20050830_134808_20050818_104810_20050901_122857 SCI_SU1_AXVIEC20050830_151230_20050819_101652_20050902_115726 SCI_SU1_AXVIEC20050831_082048_20050820_004156_20050903_021901 SCI_SU1_AXVIEC20050831_084955_20050821_000942_20050904_014941 SCI_SU1_AXVIEC20050831_091428_20050823_205106_20050906_223725 SCI_SU1_AXVIEC20050831_092950_20050828_202520_20050911_213802 SCI_SU1_AXVIEC20050831_095835_20050826_005238_20050909_020620 SCI_SU1_AXVIEC20050831_102641_20050827_001944_20050910_020126 SCI_SU1_AXVIEC20050901_124056_20050829_132242_20050912_224906 SCI_SU1_AXVIEC20050902_000950_20050830_002802_20050913_020549 SCI_SU1_AXVIEC20050903_001007_20050831_060822_20050914_214229
LK1_AX	SCI_LK1_AXVIEC20050704_100224_20050701_062644_20050715_073735 SCI_LK1_AXVIEC20050704_104823_20050701_073614_20050715_091901 SCI_LK1_AXVIEC20050704_111431_20050701_091758_20050715_105759 SCI_LK1_AXVIEC20050705_122645_20050701_105617_20050715_123818 SCI_LK1_AXVIEC20050705_123345_20050701_123706_20050715_141626 SCI_LK1_AXVIEC20050705_123738_20050701_141524_20050715_155150 SCI_LK1_AXVIEC20050705_082452_20050701_155000_20050715_173048 SCI_LK1_AXVIEC20050705_083101_20050701_172807_20050715_190638 SCI_LK1_AXVIEC20050705_124108_20050701_204835_20050715_220136 SCI_LK1_AXVIEC20050705_102144_20050702_084718_20050716_084752 SCI_LK1_AXVIEC20050705_105128_20050702_102441_20050716_120633 SCI_LK1_AXVIEC20050706_173323_20050702_134348_20050716_152348 SCI_LK1_AXVIEC20050707_160341_20050702_152232_20050716_170139 SCI_LK1_AXVIEC20050707_155803_20050702_170051_20050716_183713 SCI_LK1_AXVIEC20050705_125726_20050702_201318_20050716_212924 SCI_LK1_AXVIEC20050706_223217_20050703_072400_20050717_081350 SCI_LK1_AXVIEC20050707_163625_20050703_081229_20050717_095611 SCI_LK1_AXVIEC20050707_114626_20050703_141500_20050717_141456 SCI_LK1_AXVIEC20050707_153604_20050703_164659_20050717_180838 SCI_LK1_AXVIEC20050725_161132_20050703_190812_20050717_192932 SCI_LK1_AXVIEC20050707_234721_20050703_200418_20050717_205340 SCI_LK1_AXVIEC20050710_183927_20050704_063231_20050718_074230 SCI_LK1_AXVIEC20050710_061438_20050704_081933_20050718_092436 SCI_LK1_AXVIEC20050710_051218_20050704_092333_20050718_110321 SCI_LK1_AXVIEC20050721_171034_20050704_110217_20050718_124352 SCI_LK1_AXVIEC20050707_171237_20050704_142124_20050718_160023 SCI_LK1_AXVIEC20050708_163753_20050704_155943_20050718_173633 SCI_LK1_AXVIEC20050708_164257_20050704_173355_20050718_191442 SCI_LK1_AXVIEC20050711_101340_20050705_085305_20050719_103300 SCI_LK1_AXVIEC20050722_061815_20050705_103137_20050719_121209 SCI_LK1_AXVIEC20050723_033911_20050705_121104_20050719_135148

	SCI_LK1_AXVIEC20050711_115224_20050705_152711_20050719_170641 SCI_LK1_AXVIEC20050711_115450_20050705_170447_20050719_184224 SCI_LK1_AXVIEC20050711_120227_20050706_081925_20050720_100100 SCI_LK1_AXVIEC20050711_120534_20050706_100001_20050720_114006 SCI_LK1_AXVIEC20050711_120853_20050706_113832_20050720_131913 SCI_LK1_AXVIEC20050711_121159_20050706_131813_20050720_145803 SCI_LK1_AXVIEC20050711_121449_20050706_145631_20050720_163506 SCI_LK1_AXVIEC20050709_144210_20050706_163311_20050720_181132 SCI_LK1_AXVIEC20050709_152241_20050706_181010_20050720_195151 SCI_LK1_AXVIEC20050709_143646_20050707_002418_20050721_020358 SCI_LK1_AXVIEC20050709_152819_20050707_063928_20050721_074804 SCI_LK1_AXVIEC20050709_215854_20050707_074641_20050721_093026 SCI_LK1_AXVIEC20050709_220910_20050707_092934_20050721_110950 SCI_LK1_AXVIEC20050710_064645_20050707_124733_20050721_142645 SCI_LK1_AXVIEC20050710_081336_20050707_142604_20050721_160411 SCI_LK1_AXVIEC20050709_215214_20050707_173835_20050721_124853 SCI_LK1_AXVIEC20050725_130447_20050707_205806_20050721_221255 SCI_LK1_AXVIEC20050710_153749_20050707_220339_20050721_221339 SCI_LK1_AXVIEC20050710_065032_20050707_235407_20050722_013315 SCI_LK1_AXVIEC20050710_072627_20050708_071613_20050722_085847 SCI_LK1_AXVIEC20050710_064025_20050708_085758_20050722_103859 SCI_LK1_AXVIEC20050710_064304_20050708_103725_20050722_121837 SCI_LK1_AXVIEC20050709_191329_20050708_121705_20050722_135601 SCI_LK1_AXVIEC20050709_192217_20050708_135524_20050722_153449 SCI_LK1_AXVIEC20050709_193436_20050708_153409_20050722_171047 SCI_LK1_AXVIEC20050710_055947_20050708_170808_20050722_185036 SCI_LK1_AXVIEC20050711_045618_20050708_202726_20050722_213939 SCI_LK1_AXVIEC20050723_083816_20050709_150437_20050723_164202 SCI_LK1_AXVIEC20050723_045901_20050709_164052_20050723_181609 SCI_LK1_AXVIEC20050725_131459_20050709_225225_20050724_003057 SCI_LK1_AXVIEC20050723_050157_20050710_064613_20050724_075451 SCI_LK1_AXVIEC20050723_024141_20050710_083111_20050724_093516 SCI_LK1_AXVIEC20050722_221842_20050710_093414_20050724_111516 SCI_LK1_AXVIEC20050722_224606_20050710_111354_20050724_125447 SCI_LK1_AXVIEC20050726_222444_20050710_174533_20050724_174726 SCI_LK1_AXVIEC20050721_222041_20050711_221200_20050725_232719 SCI_LK1_AXVIEC20050726_230741_20050712_072339_20050726_083119 SCI_LK1_AXVIEC20050723_020404_20050713_003725_20050727_021510 SCI_LK1_AXVIEC20050726_231322_20050713_075928_20050726_101252 SCI_LK1_AXVIEC20050726_232100_20050713_094113_20050727_094217 SCI_LK1_AXVIEC20050726_232750_20050713_112040_20050727_112144 SCI_LK1_AXVIEC20050727_012836_20050713_130021_20050727_143938 SCI_LK1_AXVIEC20050727_015735_20050713_143840_20050727_161550 SCI_LK1_AXVIEC20050720_194241_20050713_161410_20050727_175412 SCI_LK1_AXVIEC20050727_040653_20050713_175220_20050727_193228 SCI_LK1_AXVIEC20050725_151806_20050713_211150_20050727_222447 SCI_LK1_AXVIEC20050725_190753_20050714_000354_20050728_014311 SCI_LK1_AXVIEC20050727_041334_20050714_072657_20050728_172319 SCI_LK1_AXVIEC20050727_041446_20050714_072657_20050728_090948 SCI_LK1_AXVIEC20050727_042113_20050714_122737_20050728_104940 SCI_LK1_AXVIEC20050727_042702_20050714_172045_20050728_154457

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