document title/ titre du document

SCIAMACHY Bi-MONTHLY Report: March – April 2006

prepared by/*préparé par* Angelika Dehn

reference/*réference* ENVI-SPPA-EOPG-TN-06-0024
issue/*édition* 1
revision/*révision* 0
date of issue/*date d'édition* 22 June 2006
status/*état*
Document type/*type de document* Technical Note
Distribution/*distribution*

APPROVAL

Title *titre*	SCIAMACHY Bi-Monthly Report: March - April 2006	issue 1 *issue*	revision 0 *revision*

author *auteur*	A. Dehn, SERCO, Manfred Gottwald, SOST-DLR, Stefan Noël, SOST-IFE	date 16/06/2005 *date*

approved by *approuvé by*	S. Slijkhuis, DLR (DPQC) T. Fehr ESA/ESRIN, D/EOP-GOQ	date 22/06/2006 *date*

CHANGE LOG

reason for change /*raison du changement*	issue/*issue*	revision/*revision*	date/*date*

CHANGE RECORD

Issue: 1 Revision: 0

reason for change/*raison du changement*	page(s)/*page(s)*	paragraph(s)/*paragraph(s)*

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SCIAMACHY Bi-monthly Report March – April 2006

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
[3] ‘SCIAMACHY cL0 Statistics, PO-TN-DLR-SH-0012, Issue 1, Rev. 1 14 April 2005’
[4] SCIAMACHY cL0 Statistics 2003, PO-TN-DLR-SH-0013, Issue 1, Rev. 0 14 April 2005

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

2 SUMMARY

- During the reported period SCIAMACHY measurements were nominal with respect to planning, except for three anomalies and one out-of-plane orbit manoeuvre (OCM). The unavailabilities occurred during following orbits:

  - 21298-21306 (28-Mar-2006) OCM
  - 21428-21479 (06-09 -Apr-2006) ENVISAT anomaly
  - 21534-21547 (13-14 -Apr-2006) instrument anomaly
  - 21584-21634 (16-20-Apr-2006) instrument anomaly

- Monthly Calibration was executed during Orbits:

  - 21080-21084 (12-Mar-2006)
  - 21510-21514 (11-Apr-2006)

- Occultations with the moon rising on the night side were executed between orbits:

  - 21003-21106 (07-14-Mar-2006)
  - 21425-21529 (05-13-Apr-2006)

- One OCR has been implemented:

  - OCR_24 (19-Mar-2006 – 15-Apr-2006)

- One TC adjustment was required in order to increase the temperatures for detectors 4 & 5 during orbit:

  - 21245 (24-Mar-2006)

- Light Path monitoring:

  - Channel 1&2: degradation in UV for all light paths involving ESM increases with a rate of 0.5-1 % per month. The average throughput loss in channel 1 is about 20%.
  - Channels 3 small throughput loss (about 2%)
  - Channel 4 throughput shows now a small loss
  - Channel 5 throughput remains stable
  - Channel 6 throughput is slightly varying in different ways for different light paths (less than 2%)
  - Channel 7 throughput rather stable over time interval
  - Channel 8 throughput remains stable at about 75-80%

- 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

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.caf.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 20913 (ANX = 01-Mar-2006, 01:29:18.453) to 21785 (ANX = 30-Apr-2006, 23:31:27.795). One OSDF specified the planning baseline.

Orbit		ANX		OSDF
Start	Stop	Start	Stop	
20913	21785	01-Mar-2006 01:29:18.453	30-Apr-2006 23:31:27.795	MPL_OSD_SHVSH_20060119_010101_00000000_33150001_20060301_012920_20060501_011201

Table 3-1: SCIAMACHY OSDF planning file from March – April 2006

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

- 21080-21084 (12-Mar-2006)
- 21510-21514 (11-Apr-2006)

The moon was in the limb TCFoV between orbits

- 21003-21124 (07-Mar-2006 until 15-Mar-2006)
- 21425-21563 (05-Apr-2006 until 15-Apr-2006)

Occultations with the moon rising on the nightside were executed between orbits

- 21003-21106 (07-Mar-2006 until 14-Mar-2006)
- 21425-21529 (05-Apr-2006 until 13-Apr-2006)

OCR_24 has been implemented between March 19th and April 15th.

3.1.2 Instrument Measurement Status (SOST-DLR)

Final flight status for mission scenarios, states and timelines remained unchanged throughout the reporting period.

3.1.3 Executed Operations and Measurements (SOST-DLR)

Measurements

The OSDF planning file has been scheduled as requested except for three anomalies (see below) and one Orbit Control Manoeuvre (OCM, see below).

Detector thermal adjustment

One TC adjustment was required in order to increase temperatures for detectors 4 & 5. This occurred in orbit 21245 (24-Mar-2006, 07:31:16 UTC). The TC settings were (before/after adjustment)

- DAC1 = 0.53/0.53 W
- DAC2 = 0.70/0.70 W
- DAC3 = 0.03/0.00 W

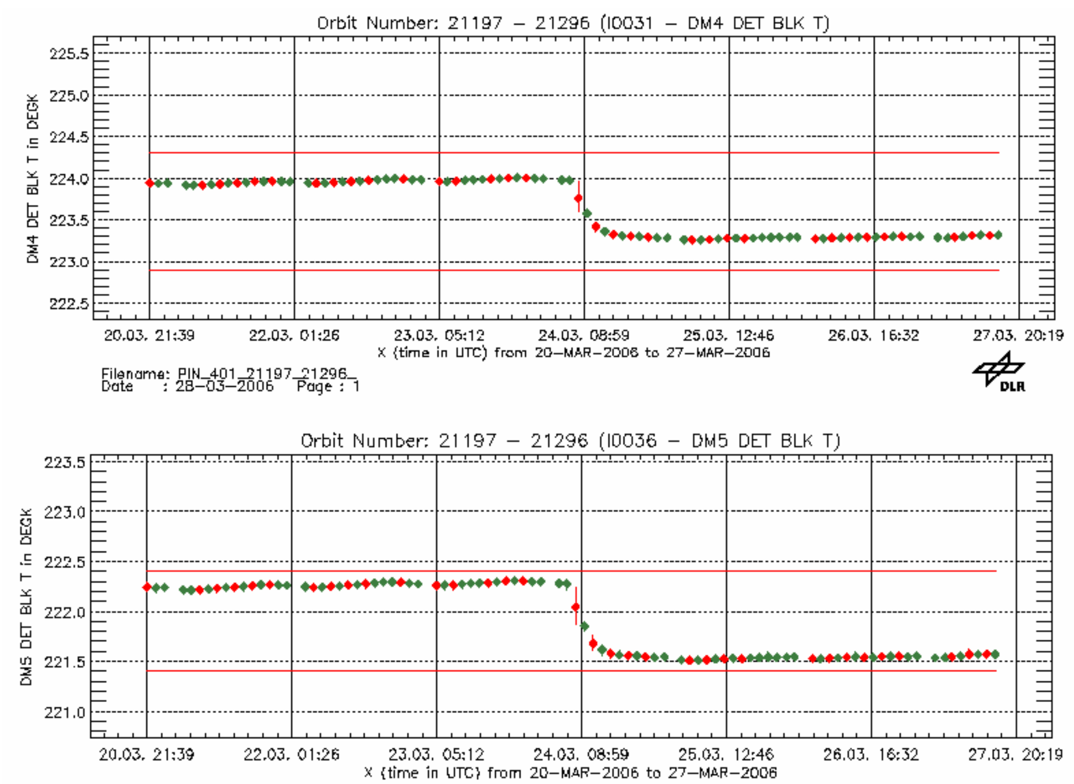


Fig. 3-1: Response of detectors 4 & 5 to TC adjustment

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
21331	30-MAR-2006 07:46:01	ok	21332	30-MAR-2006 09:22:30
n.a.	n.a.	n.a.	21718	26-APR-2006 08:30:25

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

Anomalies

Three anomalies had occurred.

- In orbit 21428 (06-Apr-2006, 02:09:26 UTC) a platform anomaly (service module depointing signal line – SM DSL) switched off all instruments. Likely cause for this error was a Single Event Upset (SEU). In orbit 21479 (09-Apr-2006, 14:42:34 UTC) the MPS schedule was resumed.
- In orbit 21534 (13-Apr-2006, 10:51:38 UTC) a SEU triggered a transfer to HTR/RF. Recovery ended in orbit 21547 (14-Apr-2006, 09:51:45 UTC) when the MPS scheduled was resumed.
- In orbit 21584 (16-Apr-2006, 23:08:44 UTC) another SEU triggered a transfer to HTR/RF. Recovery ended in orbit 21634 (20-Apr-2006, 10:47:20 UTC) when the MPS scheduled was resumed.

Orbit	Date	Entry - UTC	Level	Entry Type	ID Content/Transition	Mode	Remark
21428	06-APR-2006	2006.096.02.09.26.446	ENVISAT	SWITCHING	SM DSL	OFF-SAFE	ENVISAT payload switch-off
21534	13-APR-2006	2006.103.10.51.38.011	Instrument	AUTONOMOUS SWITCHING	ID406 / goto HTR/RF	HTR/RF	SDPU-Tx_Buffer_Overflow (suspected SEU)
21534	13-APR-2006	2006.103.10.55.11.500	Instrument	MACROCOMMAND EXECUTION ENTRY	START TIMELINE	HTR/RF	Complementary Failure
21534	13-APR-2006	2006.103.10.55.11.508	Instrument	COMPLEMENTARY FAILURES	---	HTR/RF	Complementary Failure
21584	16-APR-2006	2006.106.23.08.44.996	Instrument	AUTONOMOUS SWITCHING	ID406 / goto HTR/RF	HTR/RF	SDPU-Tx_Buffer_Overflow (suspected SEU)
21584	16-APR-2006	2006.106.23.53.36.675	Instrument	MACROCOMMAND EXECUTION ENTRY	START TIMELINE	HTR/RF	Complementary Failure
21584	16-APR-2006	2006.106.23.53.36.687	Instrument	MACROCOMMAND EXECUTION ENTRY	START TIMELINE	HTR/RF	Complementary Failure
21584	16-APR-2006	2006.106.23.53.36.687	Instrument	COMPLEMENTARY FAILURES	---	HTR/RF	Complementary Failure
continuous Complementary Failures until 2006.107.03.46.36.499 (13 entries)							
21587	16-APR-2006	2006.107.03.46.36.483	Instrument	MACROCOMMAND EXECUTION ENTRY	START TIMELINE	HTR/RF	Complementary Failure
21587	16-APR-2006	2006.107.03.46.36.495	Instrument	COMPLEMENTARY FAILURES	---	HTR/RF	Complementary Failure
21587	16-APR-2006	2006.107.03.46.36.499	Instrument	MACROCOMMAND EXECUTION ENTRY	START TIMELINE	HTR/RF	Complementary Failure

Table 3-3: Instrument anomalies between March and April 2006

Orbit Control Manouevre

Between orbits 21298 (28-Mar-2006, 00:25:34 UTC) and 21306 (28-Mar-2006, 13:49:34 UTC) SCIAMACHY was in MEASUREMENT IDLE mode during an out-of-plane OCM.

This OCM was executed such that the first z-slew started and ended inside eclipse and the second slew occurred partially outside eclipse (4 min). No thermal impact of direct solar irradiance was observed.

Instrument unavailability

The instrument was unavailable during an OCM, one platform and two instrument anomalies.

Unavailability					
Orbit		UTC		Event	Remark
Start	Stop	Start	Stop		
21298	21306	28-Mar-2006 00:25:34	28-Mar-2006 13:49:34	transfer to MEASUREMENT/IDLE	OCM
21428	21479	06-Apr-2006 02:09:26	09-Apr-2006 14:42:34	transfer to OFF-SAFE	ENVISAT SM DSL
21534	21547	13-Apr-2006 10:51:38	14-Apr-2006 09:51:45	transfer to HTR/RF	SDPU_Tx buffer overflow (SEU)
21584	21634	16-Apr-2006 23:08:44	20-Apr-2006 10:47:20	transfer to HTR/RF	SDPU_Tx buffer overflow (SEU)

Table 3-4: Instrument unavailabilities between March and April

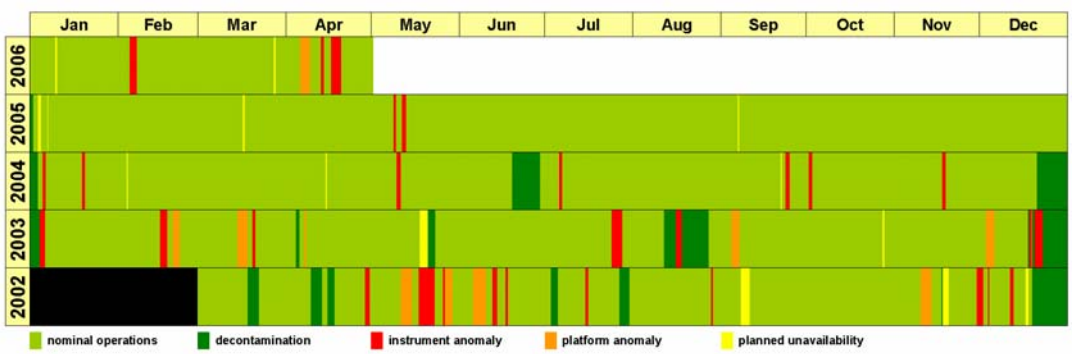


Fig. 3-2: Current instrument availability status including the reporting period

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. 3-3 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.

Temperature violations (cooling below the lower limits) occurred only as a result of the platform/instrument anomalies (see above). One TC adjustment was required (see above).

OBM temperatures

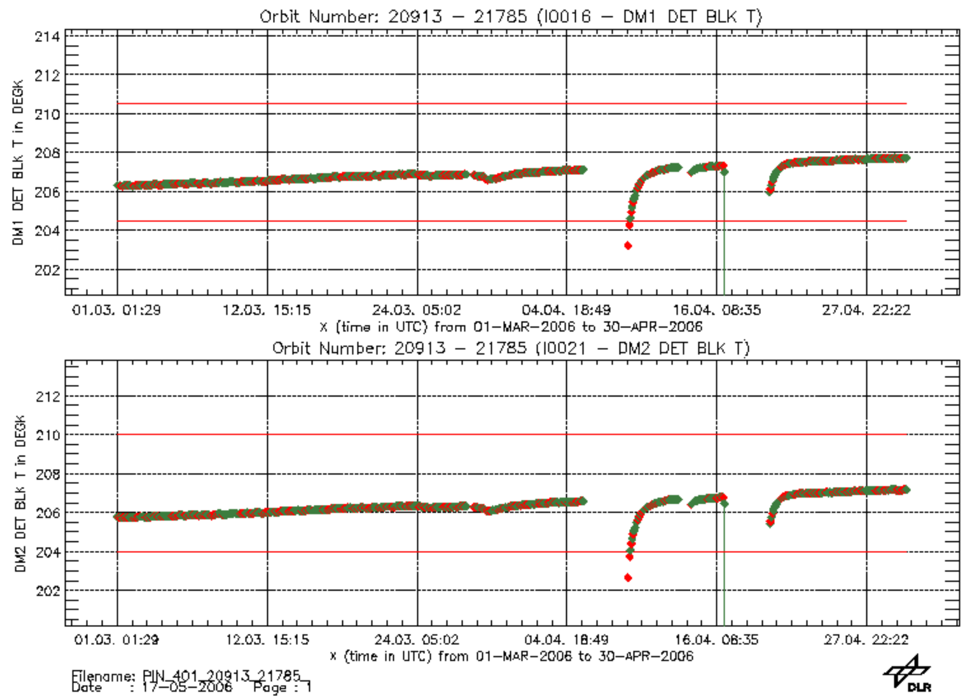
OBM temperatures are monitored according to the requirements of the IOM *[1]*. It requests to ensure that the average temperature per orbit remains within the specified limits. The average OBM temperature per orbit is determined from specific HK telemetry parameters. In addition power readings for the ATC heaters are monitored. Temperatures and ATC heater powers are given in Fig. 3-4 and 3-5. Colour coding is as in Fig. 3-3.

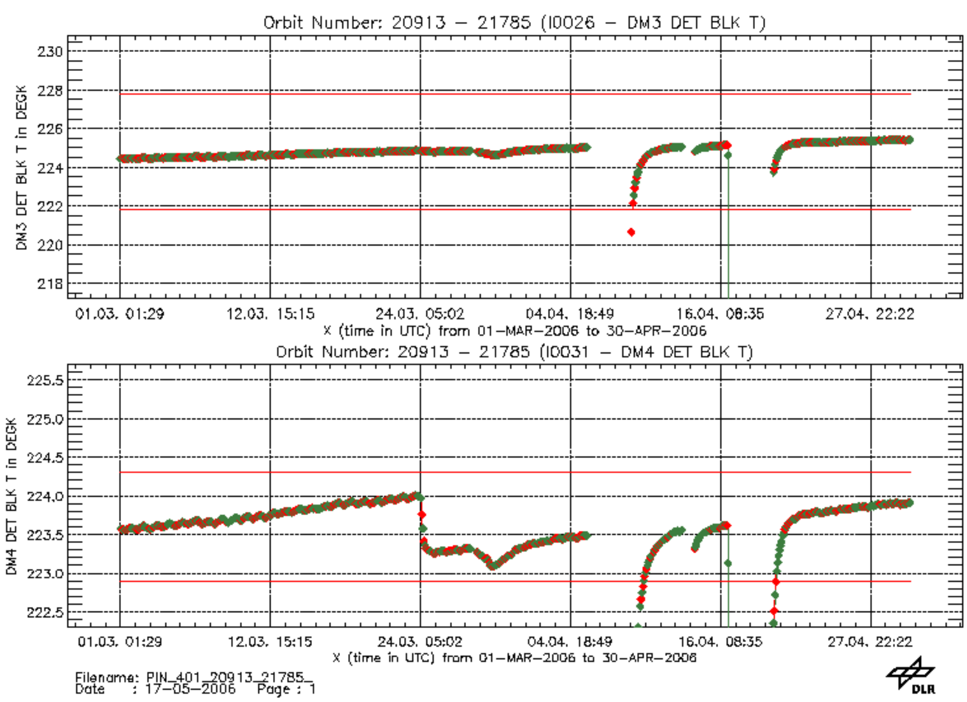
OBM temperatures and ATC heater powers remained within limits except for the time when the platform/instrument anomalies occurred (see above).

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: 20913 – 21785 (I0016 – DM1 DET BLK T)
DM1 DET BLK T in DEGK
X (time in UTC) from 01–MAR–2006 to 30–APR–2006
01.03. 01:29
12.03. 15:15
24.03. 05:02
04.04. 18:49
16.04. 08:35
27.04. 22:22
Orbit Number: 20913 – 21785 (I0021 – DM2 DET BLK T)
DM2 DET BLK T in DEGK
X (time in UTC) from 01–MAR–2006 to 30–APR–2006
Filename: PIN_401_20913_21785_
Date : 17–05–2006 Page : 1
DLR


Orbit Number: 20913 – 21785 (I0026 – DM3 DET BLK T)
DM3 DET BLK T in DEGK
X (time in UTC) from 01–MAR–2006 to 30–APR–2006
01.03. 01:29
12.03. 15:15
24.03. 05:02
04.04. 18:49
16.04. 08:35
27.04. 22:22
Orbit Number: 20913 – 21785 (I0031 – DM4 DET BLK T)
DM4 DET BLK T in DEGK
X (time in UTC) from 01–MAR–2006 to 30–APR–2006
Filename: PIN_401_20913_21785_
Date : 17–05–2006 Page : 1
DLR

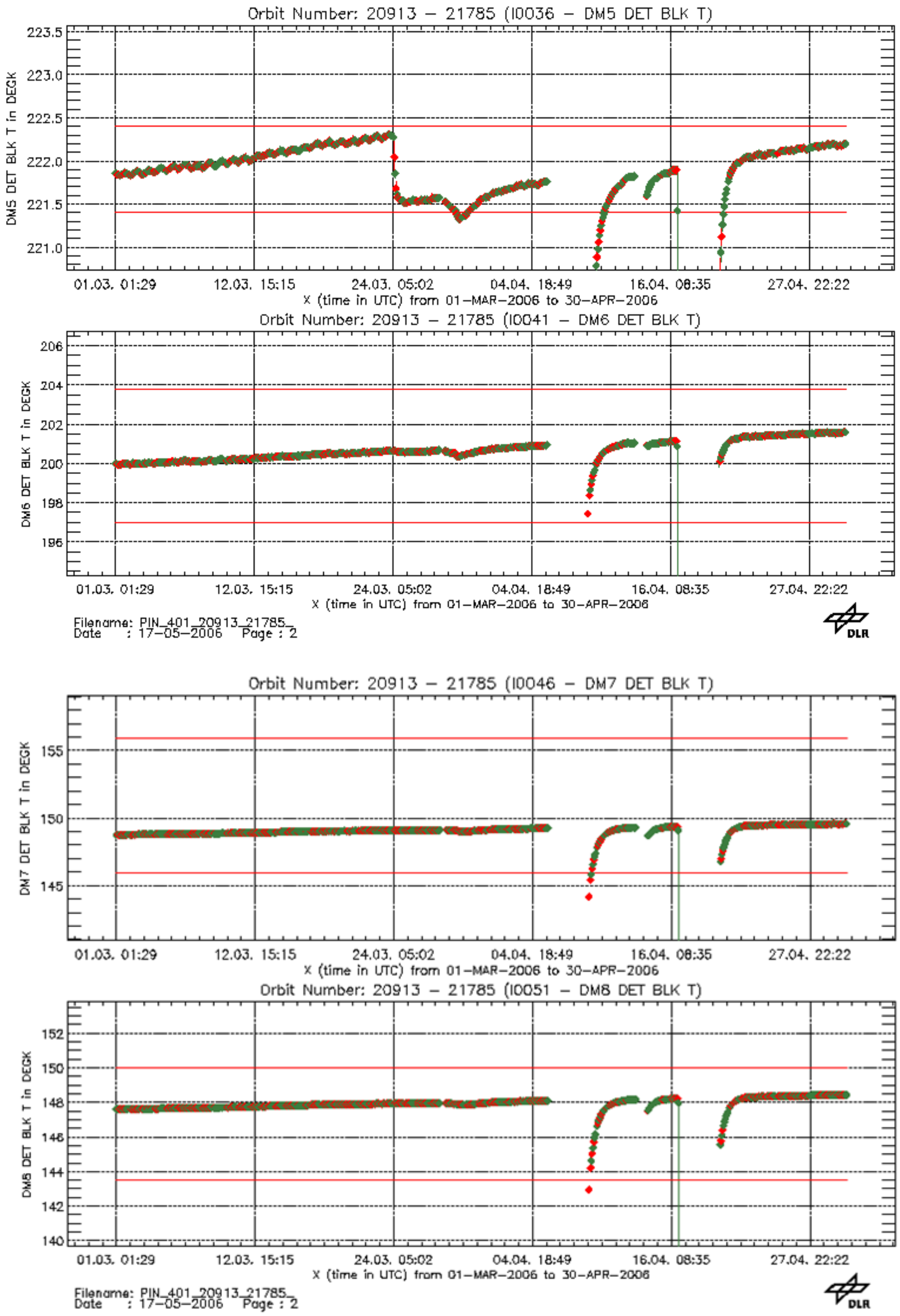


Fig. 3-3: Detector temperatures

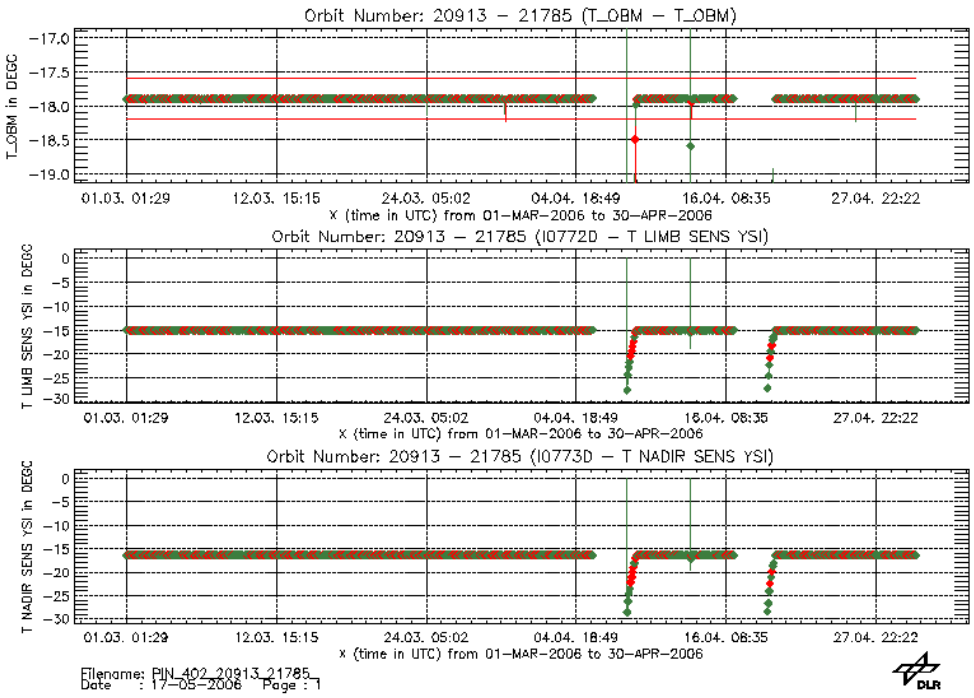


Fig. 3-4: OBM temperatures (top: derived OBM, middle: limb sensor, bottom: nadir sensor)

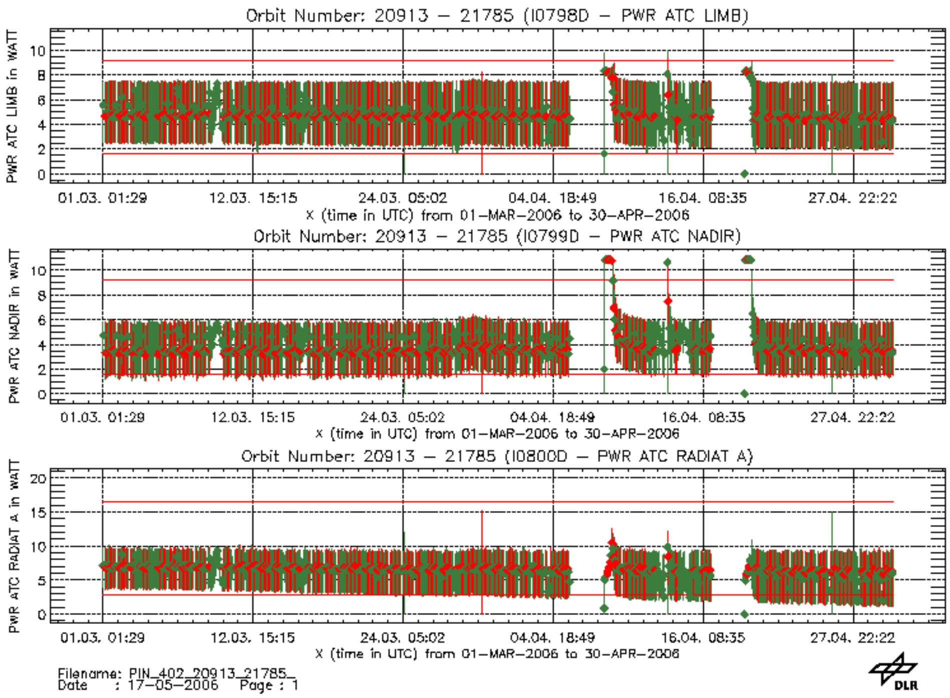


Fig. 3-5: ATC heater power (top: ATC limb, middle: ATC nadir, bottom: ATC Rad A)

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: 0.57
- APSM: 0.52
- NCWM (sub-solar port): 0.61
- WLS (switches): 0.11
- WLS (burning time): 0.22
- SLS (switches): 0.04
- SLS (burning time): 0.01

How the relative LLI usage has accumulated since launch can be seen in fig. 3-6. ‘EOL’ assumes a total mission lifetime of 0.5 years of Commissioning Phase and 4.5 years of routine operations (note that discussions are ongoing to adapt the LLI usage to the agreed mission extension).

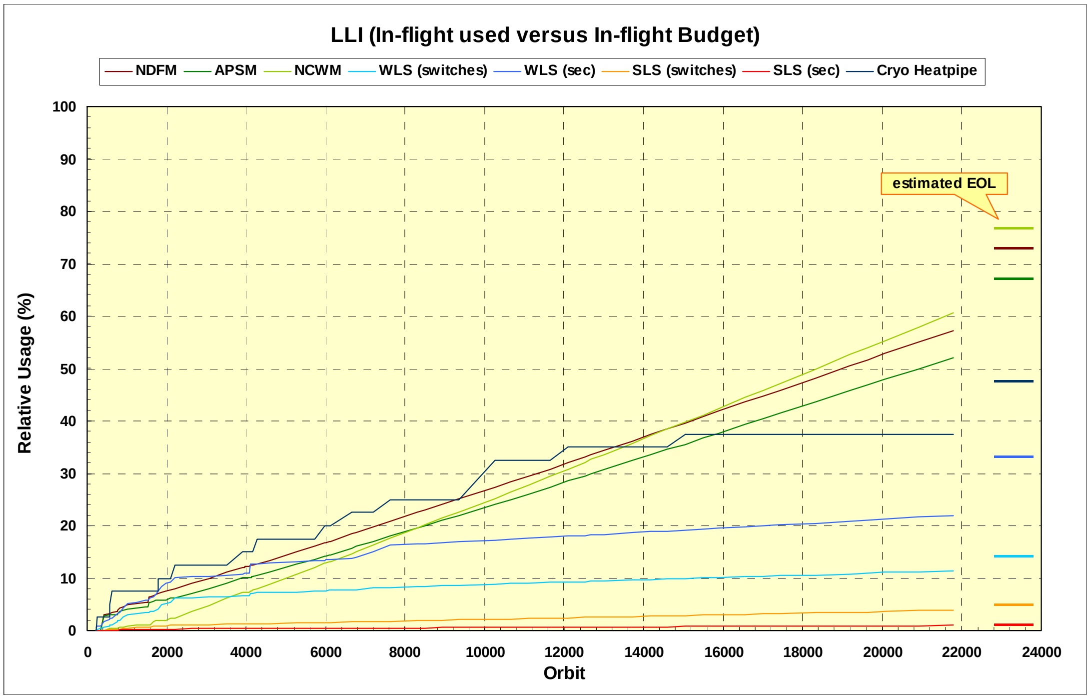


Fig. 3-6: Realtive usage of LLIs. 'EOL' is derived for the currently specified mission lifetime.

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 also do 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. 3-7 displays the time difference *predicted – reference*. Orbit manouevres cause distinct discontinuities.

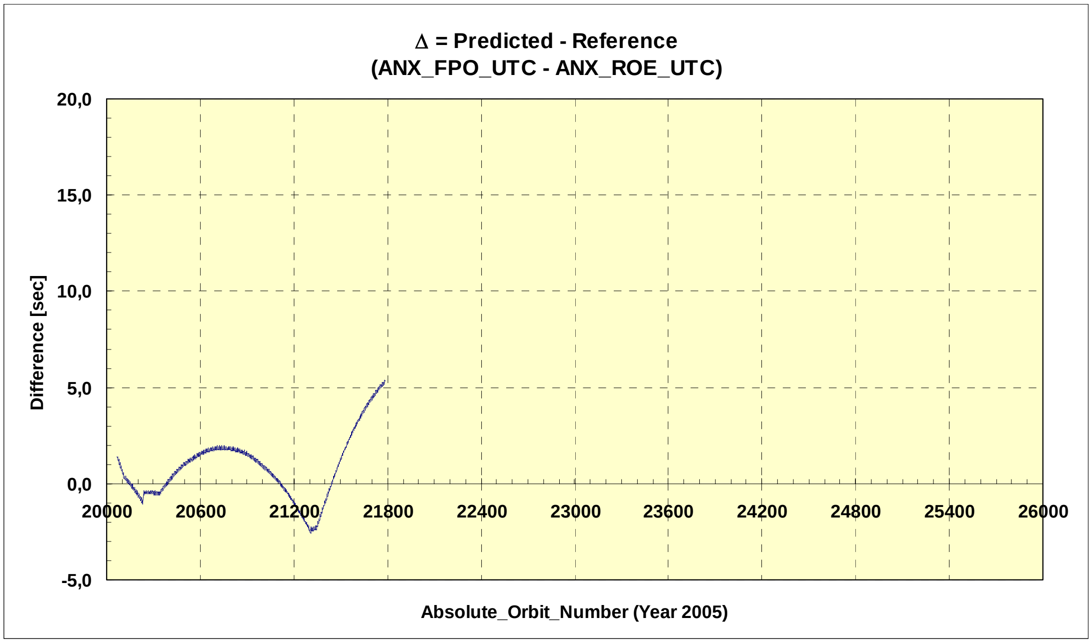


Fig. 3-7: Time difference between predicted and reference time.

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. 3.8 show results of these monitoring activities for the time interval March to April 2006.
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 March 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. 3.8 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 interpretation.
Furthermore, there exists a systematic offset between the throughput results for the subsolar light path and those for the other viewing geometries. This offset is most prominent in the IR and most likely caused by the specific subsolar scan mode (fast sweep) analysed.

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).

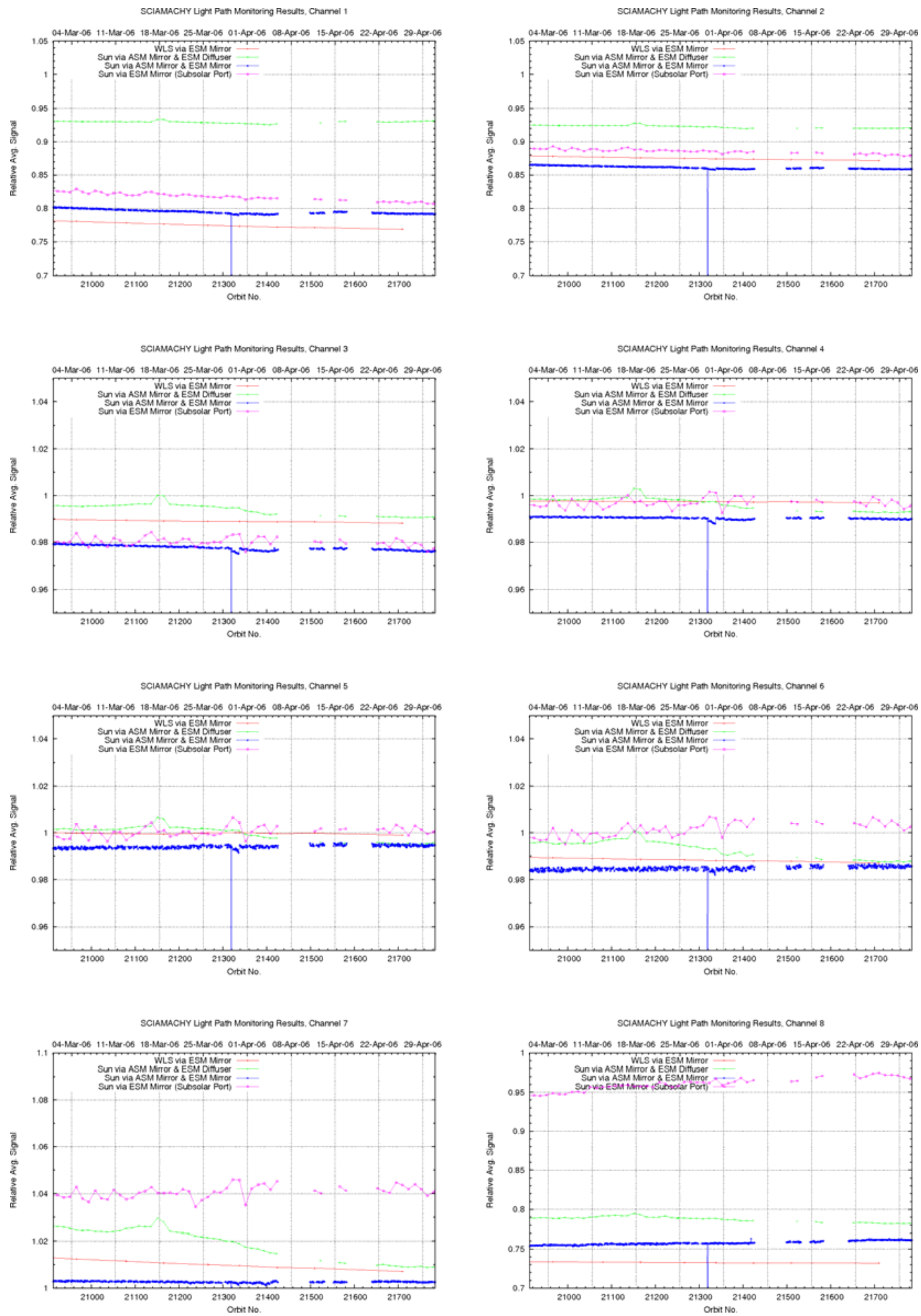


Fig. 3.8: Light path monitoring results March to April 2006.

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

- The gaps in the data result from three instrument switch-downs which occurred during the time period of this report
- The short signal drop end of March in the limb/occultation light path data is caused by a solar eclipse occurring at that time.
- For all light paths involving the ESM mirror the degradation in the UV (channels 1 & 2) increases with a rate of about 0.5-1% per month, slightly smaller than observed during the previous time interval. The average throughput loss in channel 1 is still about 20%. The calibration light path which involves the ESM diffuser instead of the ESM mirror remains rather stable over the two months covered by this report. However, uncorrected seasonal effects which overlay a small degradation may not be excluded here.
- The overall degradation of channel 3 is very small (about 2%) compared to channels 1 and 2, but is still slowly increasing.
- There is now also a small throughput loss in channel 4 visible, but channel 5 remain stable.
- The throughput in channel 6 is slightly varying in a different way for different light paths. Especially for the calibration light path the overlaid seasonal component mentioned already in previous reports plays a role here.
- The throughput of channel 7 is still rather stable. Variations in the calibration light path throughput are probably due to seasonal effects (similar as for channel 6) which had been masked by the influence of icing during previous years. The WLS light path throughput seems to decrease slightly whereas the limb light path throughput remains rather stable. This may also be caused by a seasonal effect and should be observed further.
- Channel 8 transmission still remains quite stable at about 75-80% (depending on light path; note that the subsolar results are not reliable here because of the scan mode analysed).

3.1.5.2 Spectral light path monitoring results

Fig. 3.9 – 3.12 show 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 of course without spectral averaging).
Because the variation in spectral direction is very small within two month, Fig. 3.9 – 3.12 show the complete time series from 2 August 2002 to the end of April 2006.

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.
- 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.

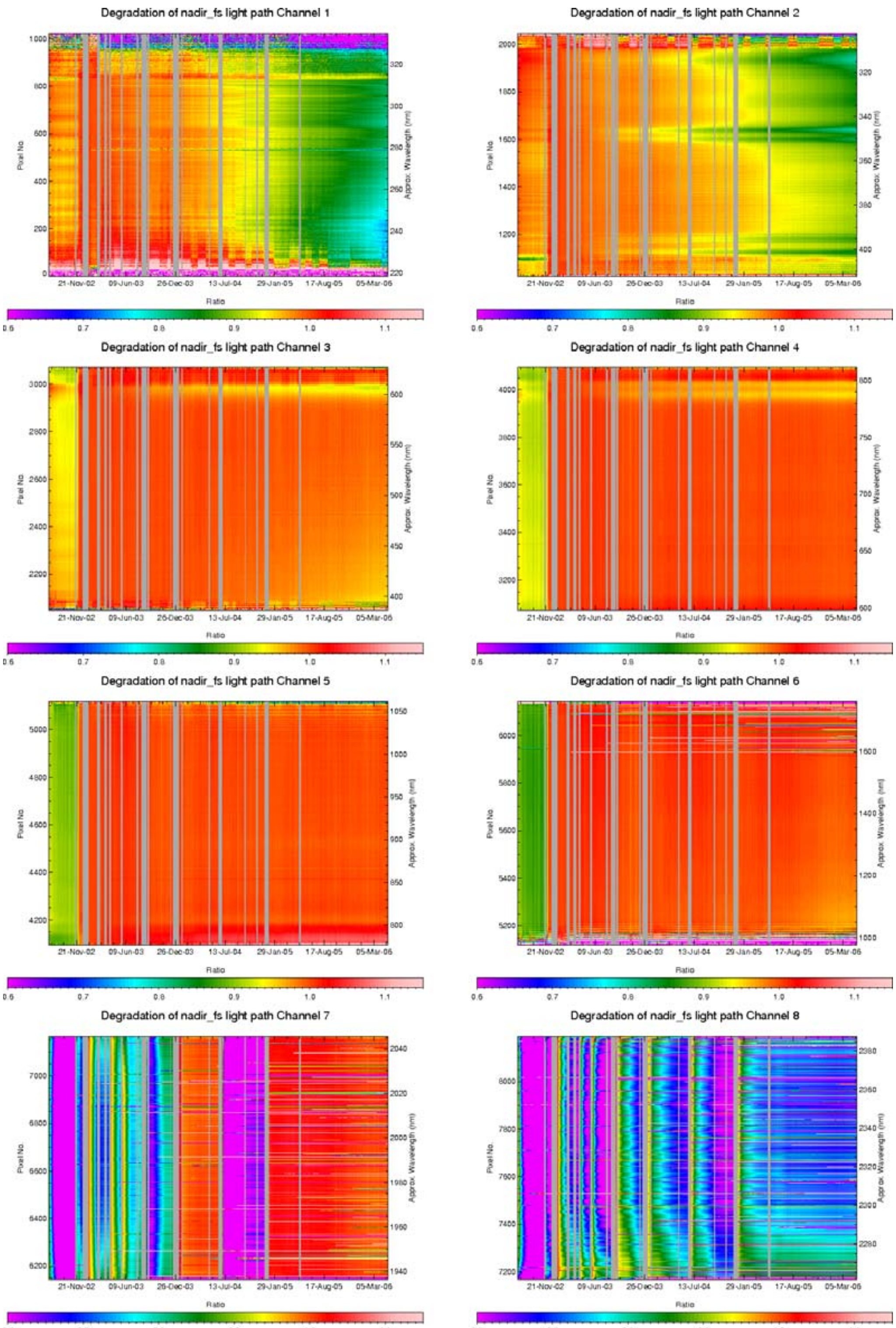


Fig. 3.9: Spectral light path monitoring results August 2002 to April 2006 (nadir light path)

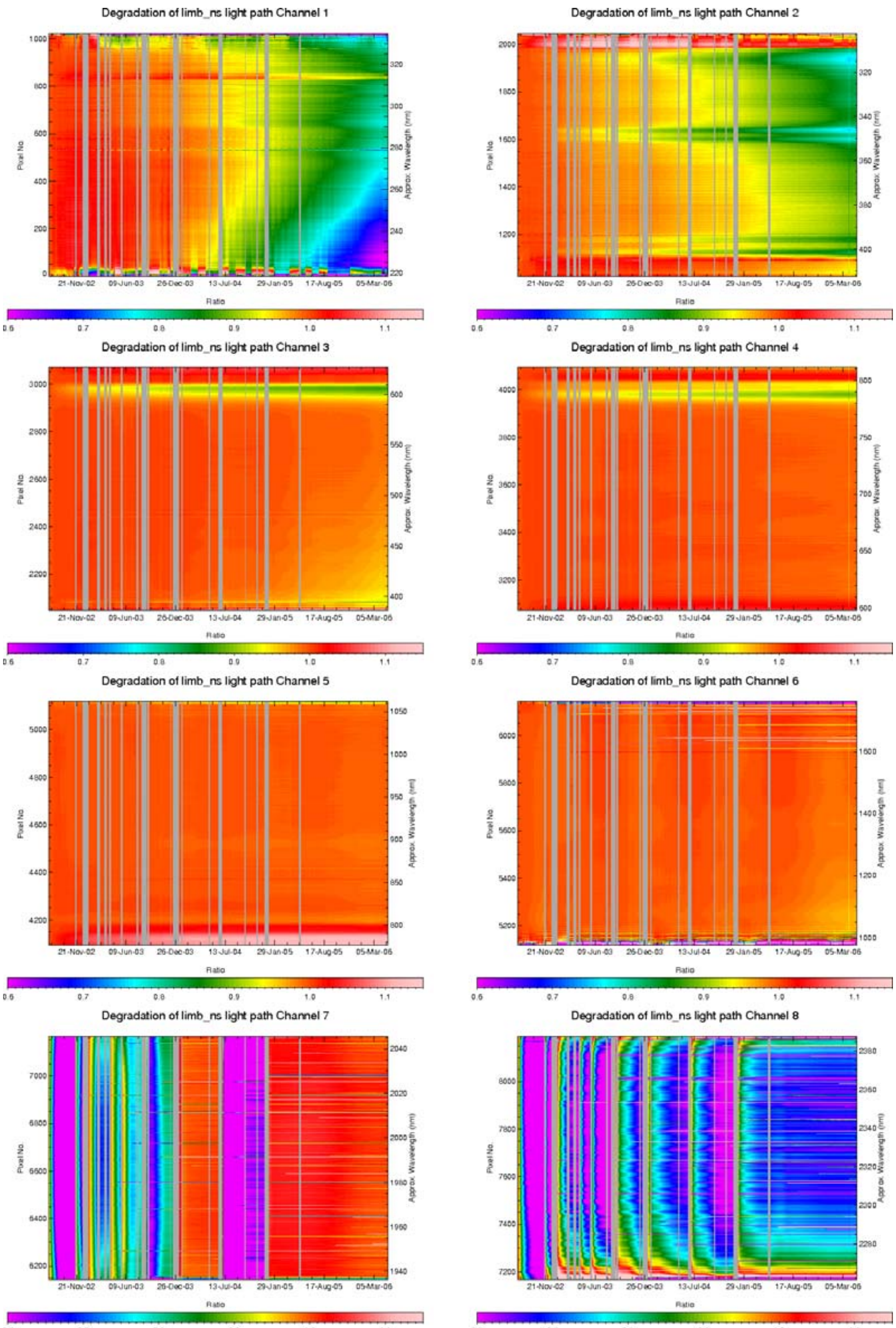


Fig. 3.10: Spectral light path monitoring results August 2002 to April 2006 (limb light path)

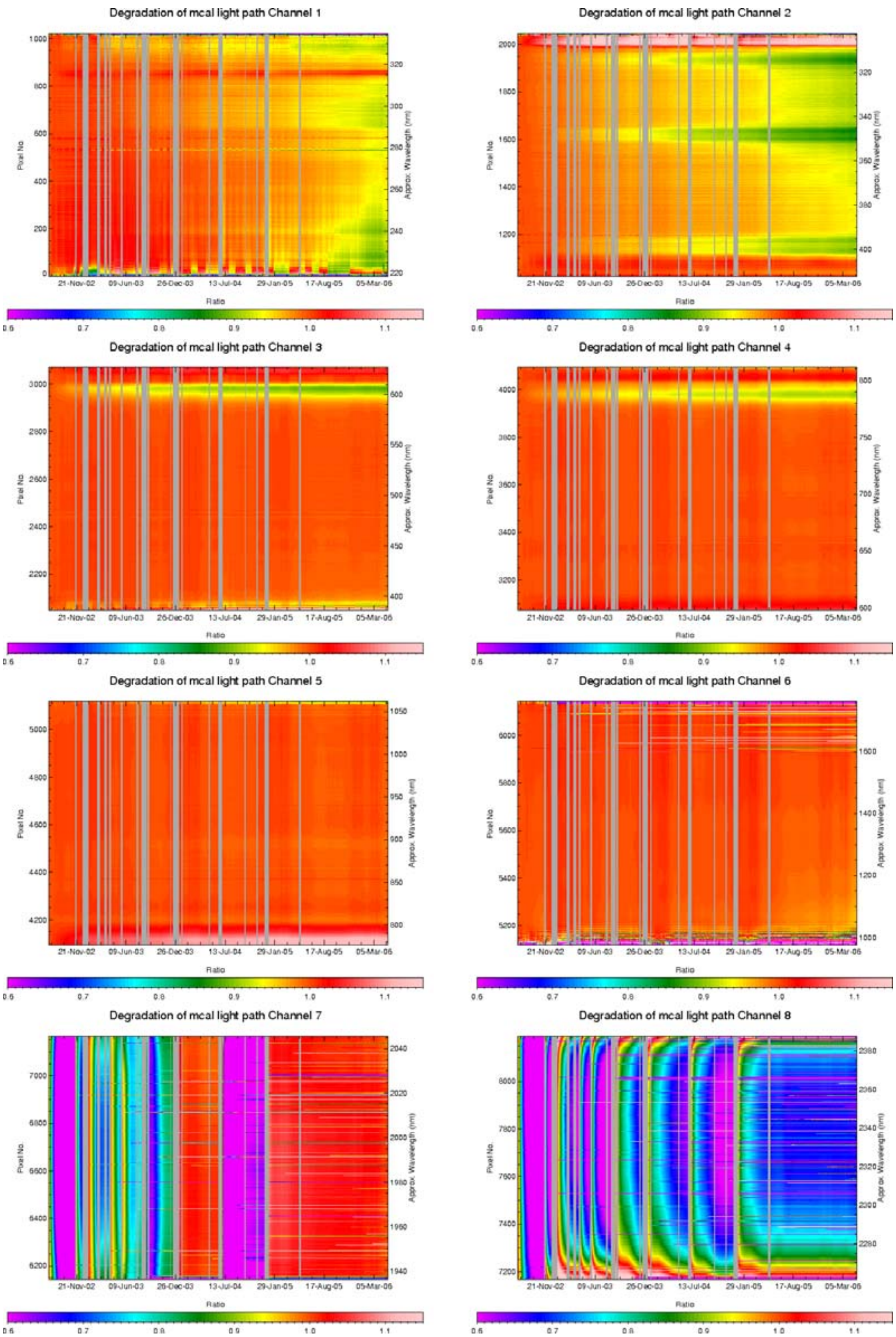


Fig. 3.11: Spectral light path monitoring results August 2002 to April 2006 (calibration light path)

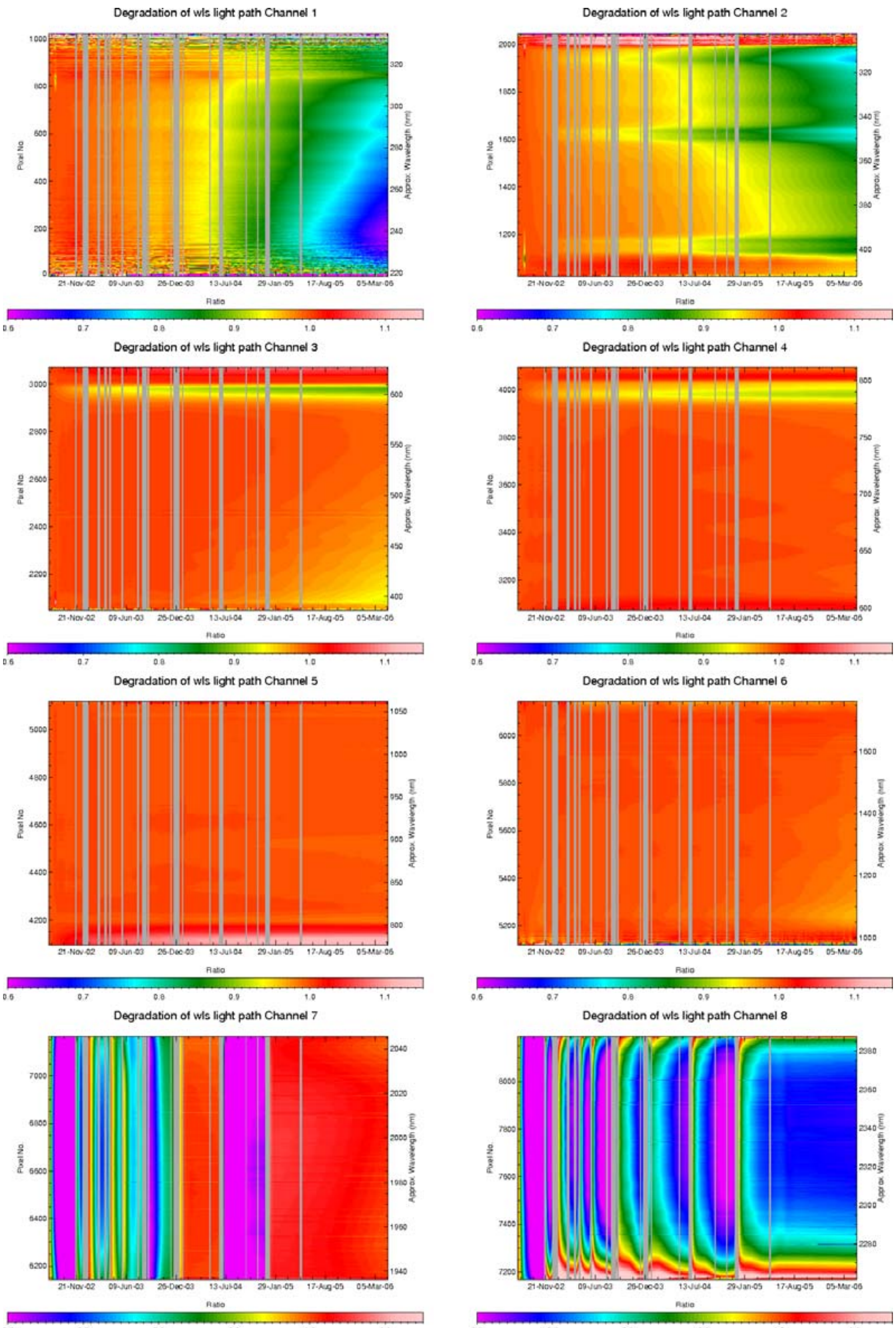


Fig. 3.12: Spectral light path monitoring results August 2002 to April 2006 (WLS light path)

The following main features can be identified in the spectral monitoring plots:

- As expected, the UV degradation generally decreases with increasing wavelength.
- 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, e.g. the peak around 350 nm).
- The minimum throughput reaches about 60% for the limb and WLS (nadir) light paths at the short wavelength edge of channel 1.
- 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.
- The degradation in channel 3 which was already indicated by the channel integrated results is much better visible in the spectrally resolved plots, where the propagation of this effect in time to higher wavelengths can be clearly identified.
- The difference in degradation between the diffuser light path and the other light paths is also visible in the plots; however, the spectral regions where degradation is strongest coincide quite well.
- The spectral plots also show that the stability for channels 4 and 5 observed in the integrated data is not present over the whole spectral range; also these channels show variations, but these are restricted to the overlap regions close to the channel edges. However, the spectral results indicate the slow throughput loss observed in the channel 4 integrated results is mainly restricted to a small region at the upper wavelength edge.
- Channel 6 spectral results confirm the assumption of a slight degradation in this channel which is concentrated at the lower wavelength edge and independent of the overlaid remaining seasonal cycle.
- For channels 7 and 8 the spectral behaviour of the throughput loss is consistent with (broadband) ice absorption features. The effect of the decontaminations is of course also clearly visible in these channels.
- Especially channel 8 shows a large pixel dependence of the throughput variation caused by the different sensitivity of the pixels. This variation is much higher for light paths where the small aperture is involved (i.e. nadir (subsolar) and limb), indicating that the small aperture causes additional effects which need to be considered when applying these results to Earthshine data.
- In general, the WLS data are much smoother than the solar data.

3.1.5.3 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.
For the nadir light path it is not possible to use subsolar fast sweep measurements for PMD monitoring, because these show a too large scatter. This is probably caused by a combination of the very time-sensitive measurement type and scan mode and the fact that the PMDs measure a sampled signal, not an integrated one. Therefore, subsolar pointing measurements are used for monitoring of the PMD nadir light path, because the pointing

signal is much more stable. Unfortunately, subsolar pointing measurements are only performed once per month, therefore the temporal sampling is much less than for the other light paths.
This reduced temporal sampling is also the reason that Fig. 3.13 shows the PMD throughput variation for the whole time period between 2 August 2002 and 30 April 2006 (instead of only the two month time interval of this report). Note that a constant dark signal for each of the PMDs has been assumed. To verify this assumption, Fig. 3.12 also shows the variation of the PMD dark signal over time, which is usually quite low.
Note that PMD 7 results are most likely 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 still unexplained (but may be related to the specific detector material).
- 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. This issue is still unresolved.
- The PMD 6 dark signal shows a strange variation over time which is still under investigation.

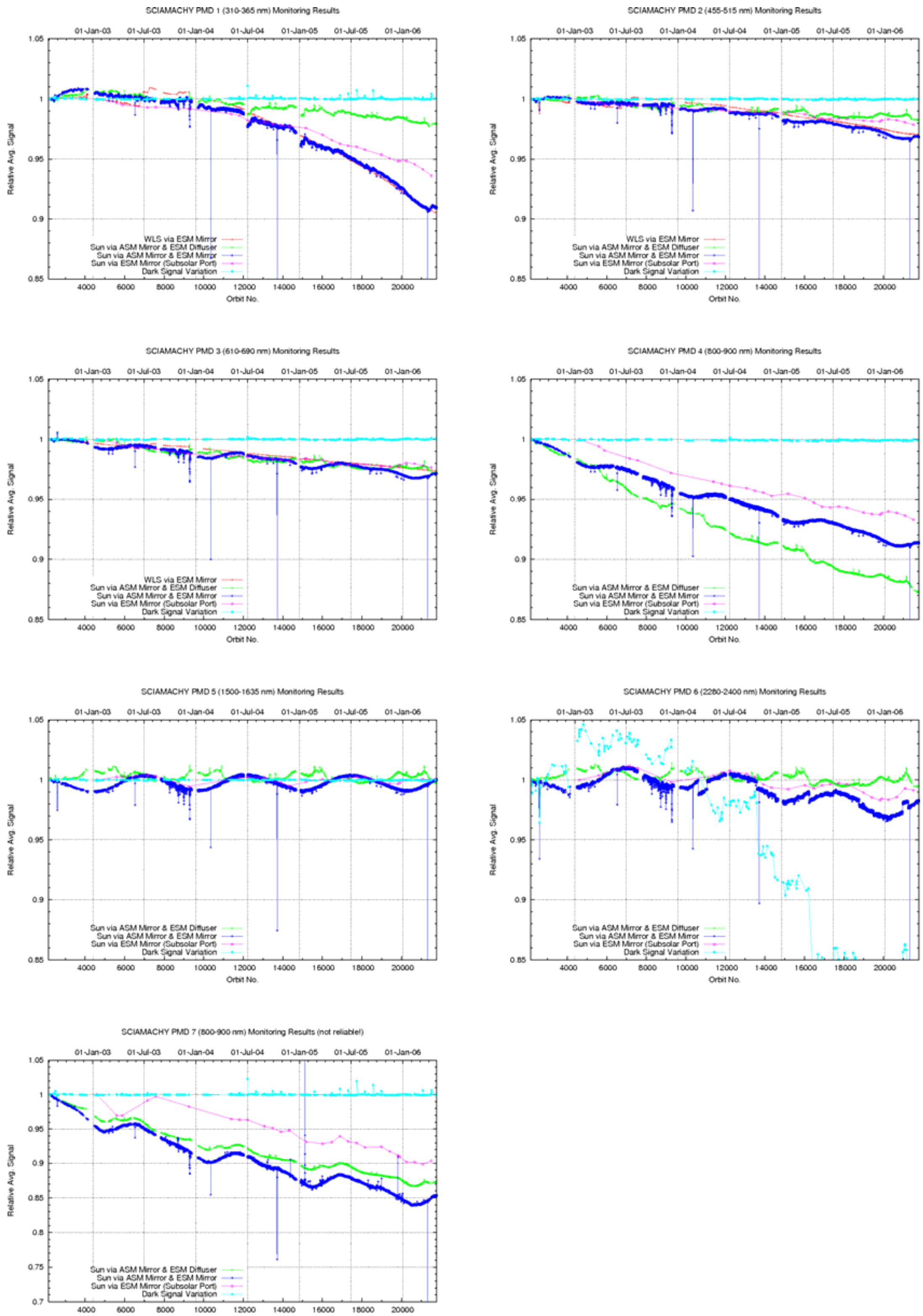


Fig. 3.13: PMD monitoring results August 2002 to April 2006

3.1.6 Problem Report Status (DLR-BO)

The problem report statistics is as follows (same status as during period July-August 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 Products listed in Tab. 4.1:

Product	Day	Filename	description
SCI_NL__0P	14-Mar-2006	SCI_NL__0PNPDK20060314_115025_000059102046_00009_21105_0056.N1 SCI_NL__0PNPDK20060314_150727_000059792046_00011_21107_0058.N1	products have a high number of ISP Errors; the data format is not correct
SCI_NL__0P	22-Mar-2006	SCI_NL__0PNPDK20060322_073937_000060352046_00121_21217_0123.N1	products have a high number of ISP Errors; the data format is not correct
SCI_NL__0P	25-Mar-2006	SCI_NL__0PNPDK20060325_092538_000060482046_00165_21261_0152.N1 SCI_NL__0PNPDK20060325_110518_000059662046_00166_21262_0153.N1	products have a high number of ISP Errors; the data format is not correct
SCI_NL__0P	22-Apr-2006	SCI_NL__0PNPDK20060422_144253_000059232047_00068_21665_0410.N1	products have a high number of ISP Errors; the data format is not correct
SCI_NL__0P	28-Apr-2006	SCI_NL__0PNPDK20060428_113556_000060352047_00152_21749_0457.N1	products have a high number of ISP Errors; the data format is not correct

These occurrences of data corruptions are currently under investigation.

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.

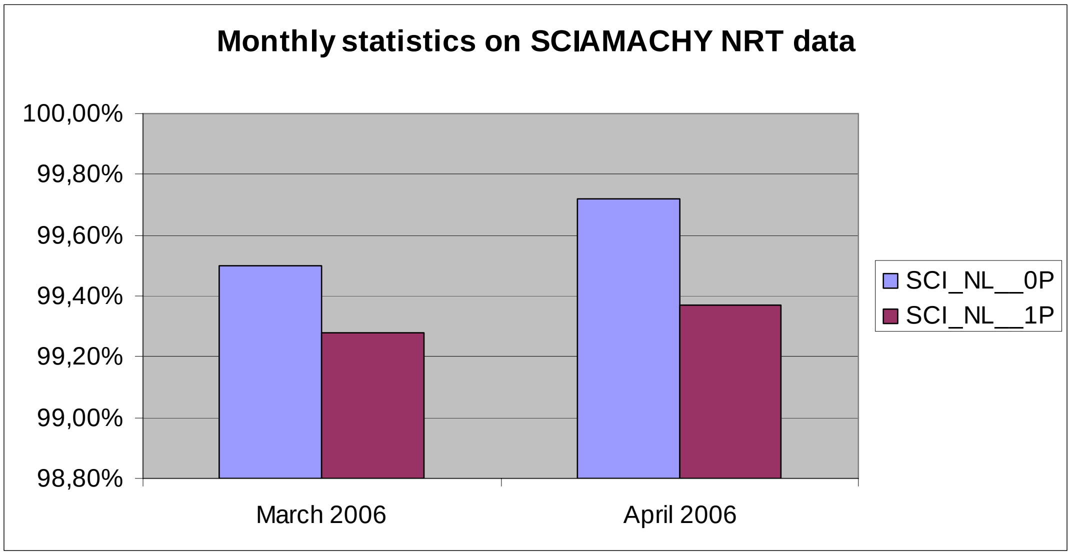


Fig. 4-1: Statistics on available unconsolidated Level 0 and Level 1 products

4.3 Statistics on consolidated data

Statistics on consolidated data products L0 and L1 are currently not available. They will be included again into the report in the next reports.

4.3.1 Anomalies on L0 consolidated data products

In the past it had been reported by SOST-DLR, that the SCIAMACHY consolidated L0 data contain errors and are not complete. Following specific problems have been identified and are reported in detail in the technical notes *[3]* and *[4]*:

- For one orbit there can be more than one cL0 product. These products may be identical or different in content (disregarding the product type file counter).
- Some orbits are not covered by cL0 products although SCIAMACHY was operational.
- Some orbits are covered by cL0 products but the product duration does not comply with the actually planned and executed instrument operations in that particular orbit.
- Some cL0 products exceed the Reed Solomon correction threshold and are flagged accordingly. The occurrence of Reed Solomon errors is non-uniform.
- Until late October / early November 2003 cL0 data are hampered by an incorrect orbit number.

More details on cL0 anomalies can be found on the SOST web page, which contains a catalogue of available L0 consolidated data and description of errors.
http://atmos.caf.dlr.de/projects/scops/data_availability/availability.html

The errors contained in the consolidated L0 data have been formally transferred into Observation Anomaly Reports (OARs) towards the PDS.
As a consequence in the beginning of December 2005 a dedicated meeting was held at ESA to implement a strategy to improve the product quality of cL0 data and to reprocess erroneous products in the historic data set.
A recovery plan was initiated in order to reprocess erroneous data. This activity has been completed, it remains the flagging of duplicate products in the PDS inventory.

4.4 Statistics on reprocessed data

The reprocessing of products from the time interval July 2002 to May 2004 (corresponding to cycles 7 -26, each cycle consisting of 501 orbits) with IPF 5.04 has been completed. See also BMR September-October 2005 for details.

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 for Limb/Occultation measurements 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.
The upgraded IPF version 6.02 became operational on day 07 June 2006. Details about the changes implemented in this new IPF will be summarized in the corresponding BMR May-June 2006.

IPF Version	Description	Proc Centre	Date	Start Orbit
5.04	No algorithm specification changes were implemented, but two algorithm	PDHS-K	21-AUG-2004	12942
		LRAC	20-AUG-2004	12750
		PDHS-E	16-AUG-2004	12823

	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	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.
One subset of these auxiliary files 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 (if measurements do not lie in the SAA area or orbit phase constraints occur).
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 March - April 2006.
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 March and April 2006 was 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 March (53.4%) and April 2006 (44.1%) represent a nominal level of ADFs generated. 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%.
Hardware problems caused a delay of the generation of in flight SU1 ADFs, which needed to be generated manually with a time delay of up to 1 week.

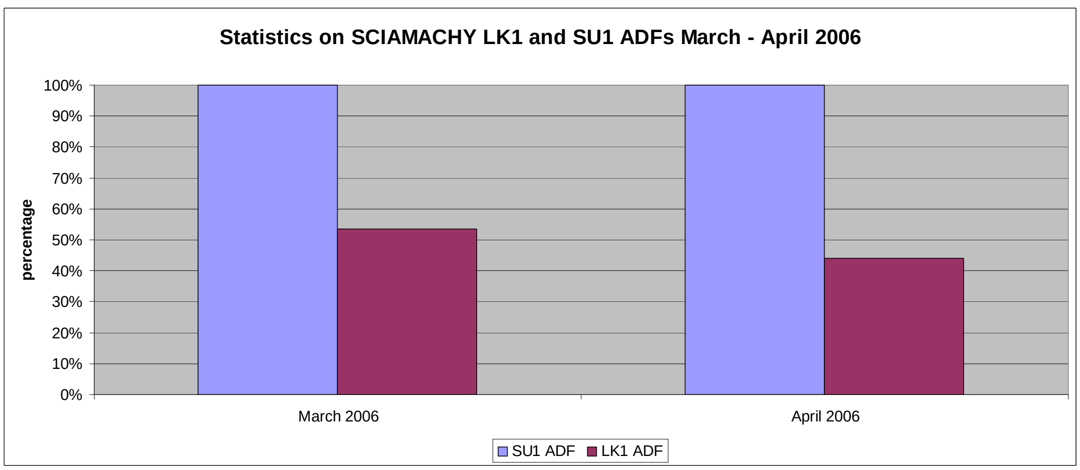


Fig. 5-1: Statistics on LK1 and SU1 processing

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 months March – April 2006. 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:

- **March 2006**
  Reference SMR - 01 March 2006
  SMR used for ratios: 02, 03, 04, 05, 06, 07, 14, 21, 28 March 2006
- **April 2006**
  Reference SMR - 01 April 2006
  SMR used for ratios: 02, 03, 04, 05, 09, 10, 14, 21, 28 April 2006

The overall changes lie between 1 - 2 % during one month. In channel 1 around pixel 550 (at 282 nm) some strong features can be noticed, as well as in channel 2 near pixel 840 (near 393 nm). These strong features coincide with the Mg II and Ca Fraunhofer lines respectively. These lines are partially formed in the solar chromosphere and are known to change with solar variability.
The weaker spectral features in channel 2 (e.g. near pixels 550, 650,750), on the other hand, correlate with strong Fraunhofer lines, which are not chromospheric. These features probably arise from small wavelength shifts (order of 1/100 of a pixel).

Generally a spectral feature could have significant impact on the product quality, especially when the affected spectral parts are used for DOAS retrieval.

Etalon like patterns as noticed during January/February 2006 do not occur in the actual reporting period. This correlates to the fact that no new SCI_PE1_AX ADF was processed and disseminated.

The large features in the end of channel 6 (channel 6+) and channels 7 and 8 are due to bad pixels (no bad pixel correction applied).
Note that the bad pixel mask used is still from the on ground calibration.
A regular update of the bad pixel mask will be foreseen starting with IPF 6.02. However a bad pixel correction will not be applied to the SMR spectra, but only to PMD out-of-band factors, in order to enable the user to apply a different mask from the one provided by the ADF.

Due to the instrument switch offs in April the SMR ratios are not decreasing with time, as could be noticed in previous reports (e.g. ratio 09/01 April in yellow in Fig. 5-4). This can be explained with the thermal environment that has not yet reached stability after the switch off.

Fig. 5-6 and Fig. 5-7 show SMR ratios on a long term trend dividing the ESM spectra from days 31-Mar-2003 and 31-Mar-2003, respectively 29-Apr-2003 and 29-Apr-2006. 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 7% is observed, channels 3 degrades by about 2% and channels 4-6 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.

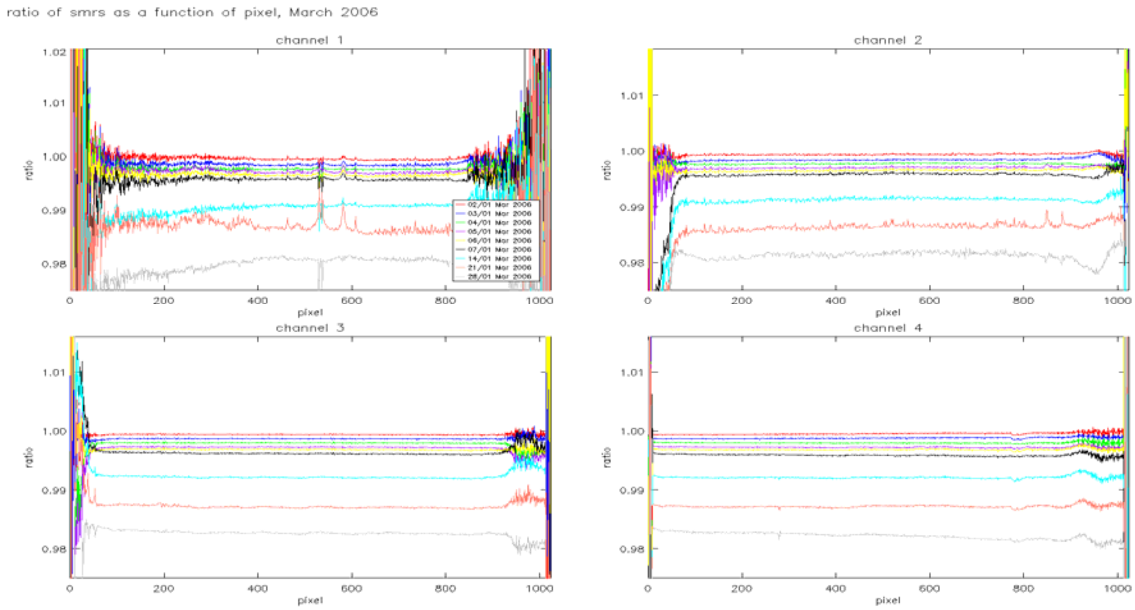


Fig. 5-2: SMR ratios per detector channel 1-4 (changes during March 2006)

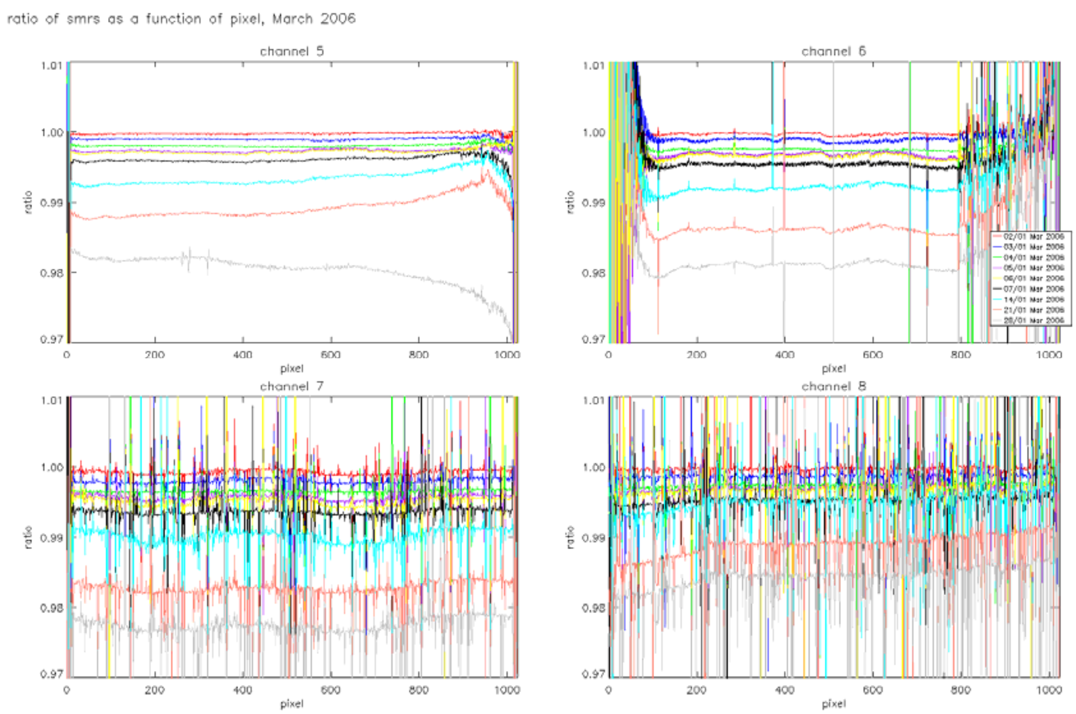


Fig. 5-3: SMR ratios per detector channel 5-8 (changes during March 2006)

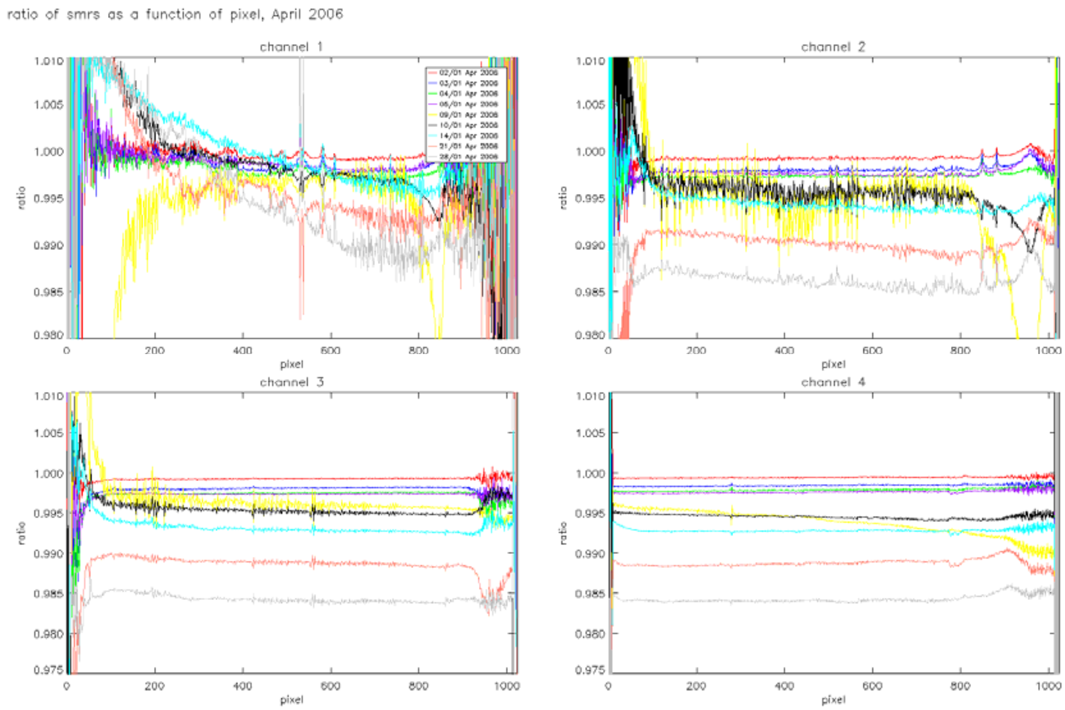


Fig. 5-4: SMR ratios per detector channel 1-4 (changes during April 2006)

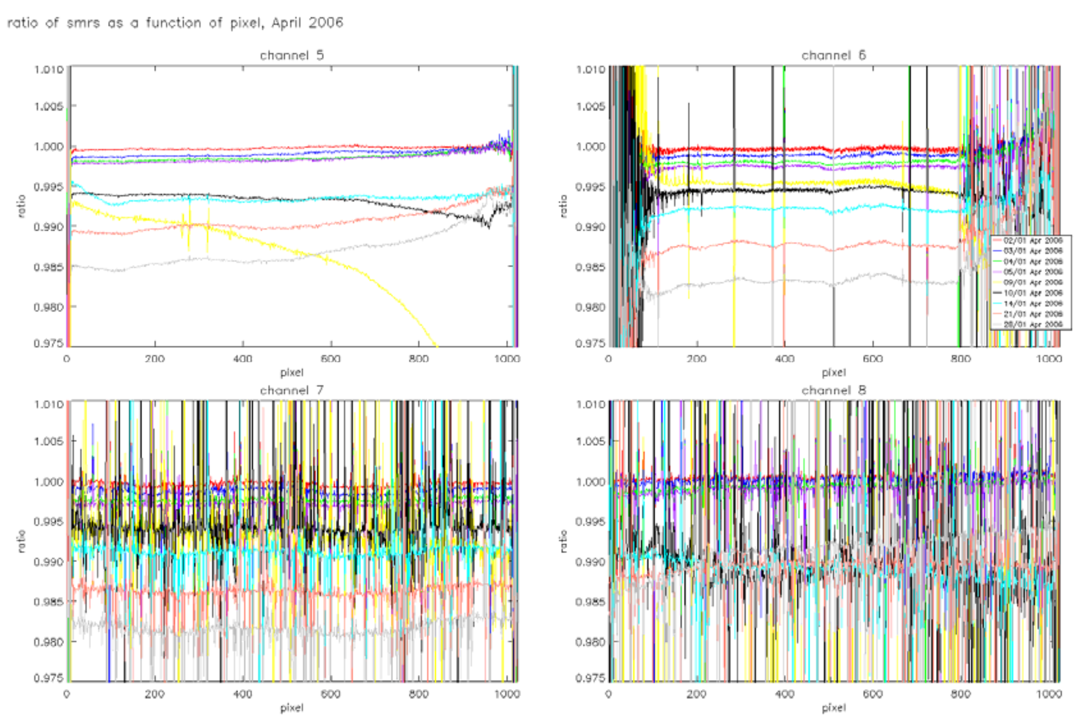


Fig. 5-5: SMR ratios per detector channel 5-8 (changes during April 2006)

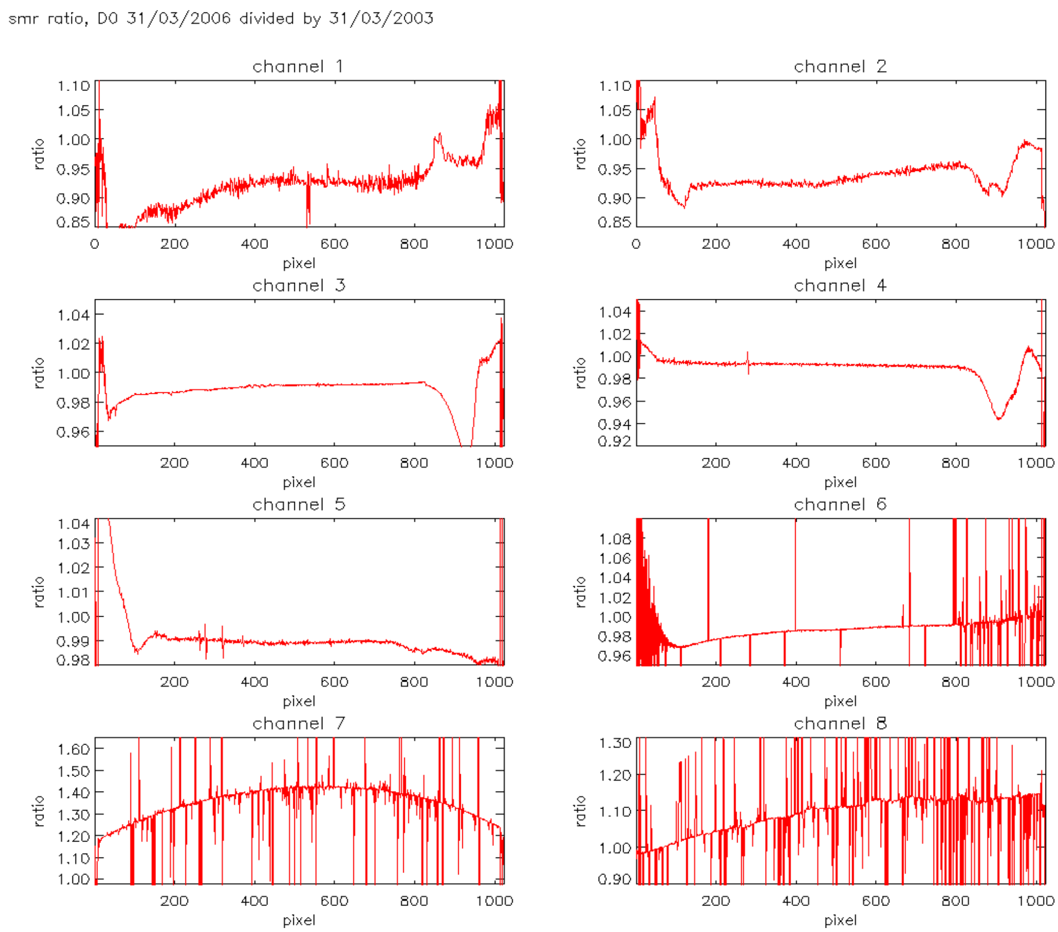


Fig. 5-6: SMR ratios per detector channel on Long Term Trend

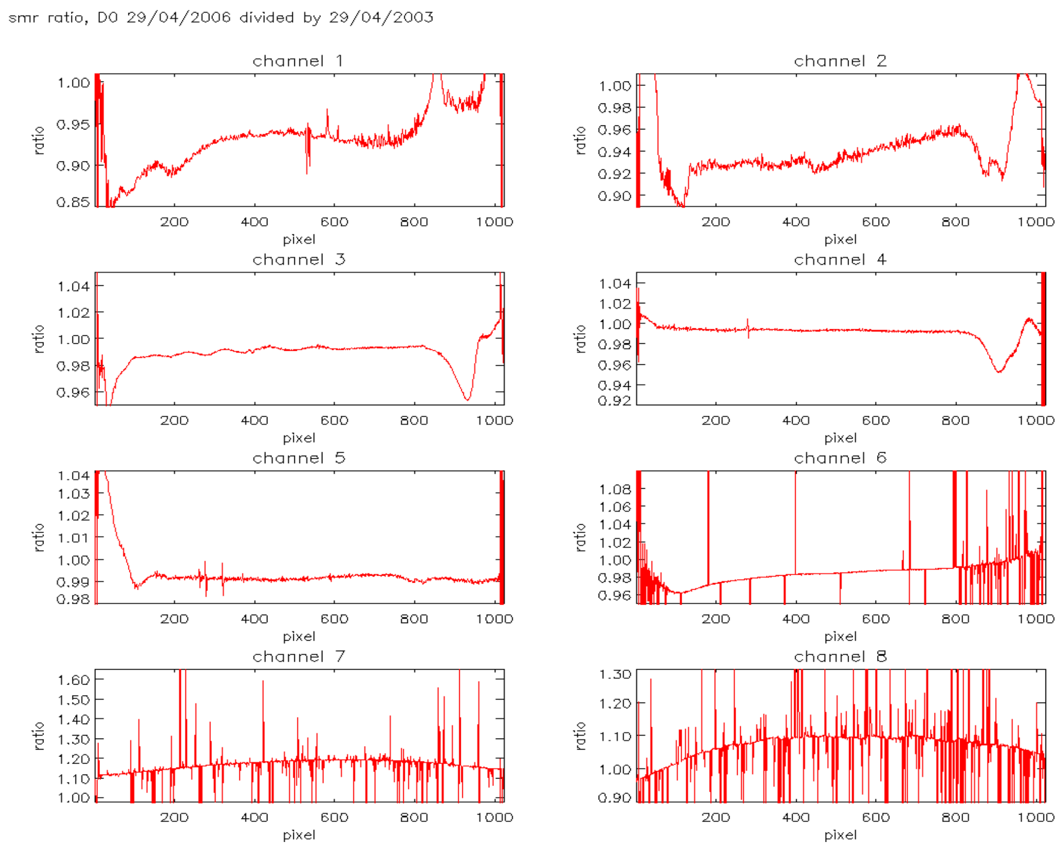


Fig. 5-7: SMR ratios per detector channel on Long Term Trend

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 6.02, where the time dependent part of the leakage current will be considered.

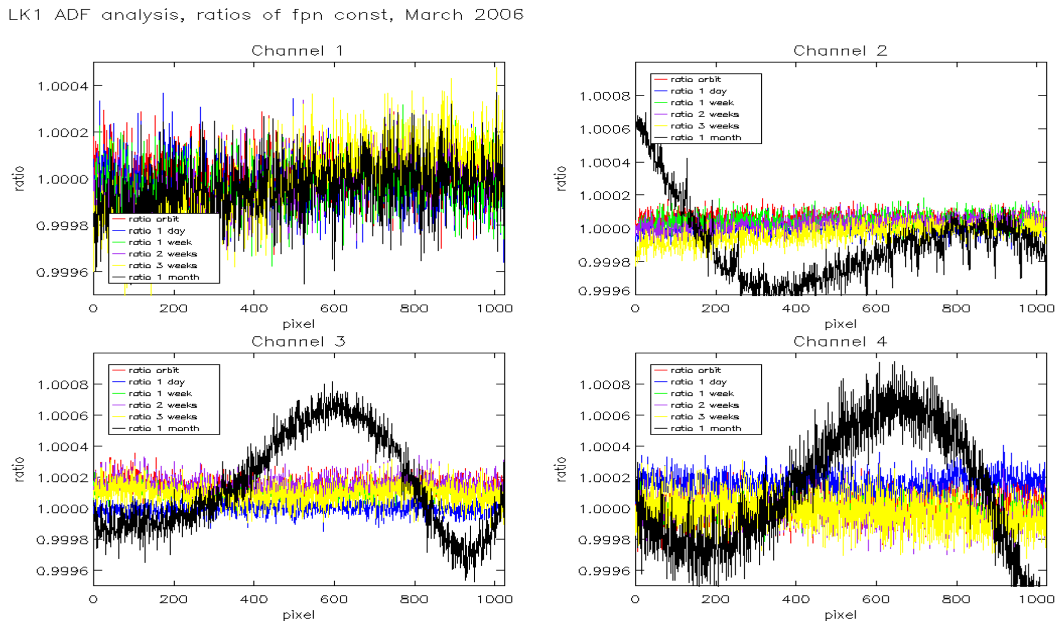


Fig. 5-7: dark current ratios (constant part) channel 1-4 during March 2006, Reference Spectrum used: Orbit 20916, 01-March-2006

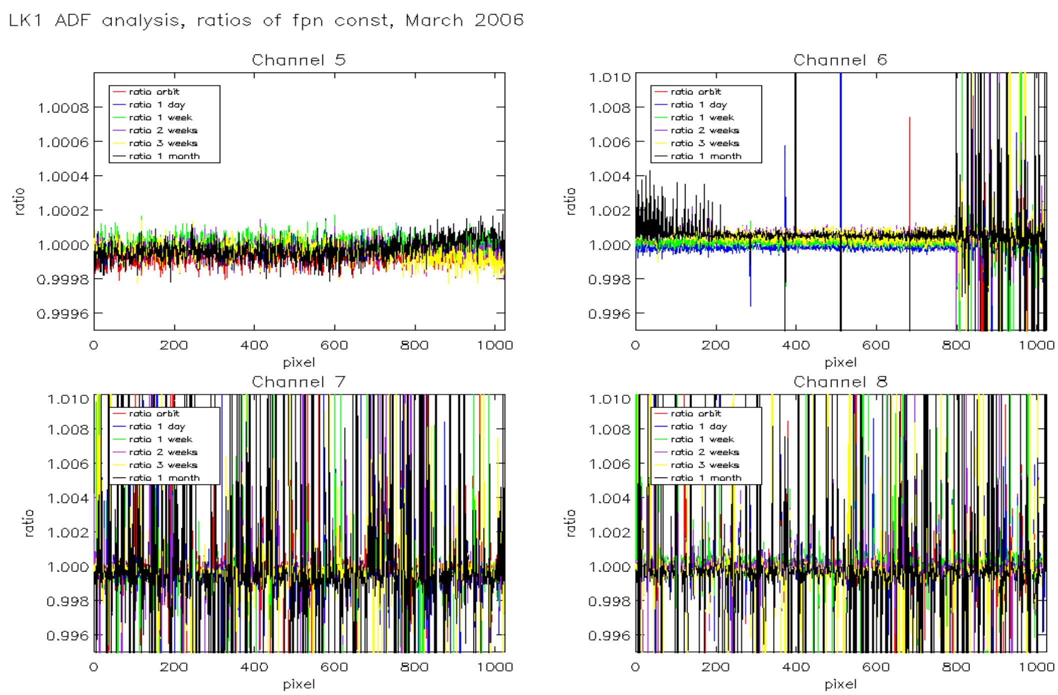


Fig. 5-8: dark current ratios (constant part) channel 5-8 during March 2006, Reference Spectrum used: Orbit 20916, 01-March-2006

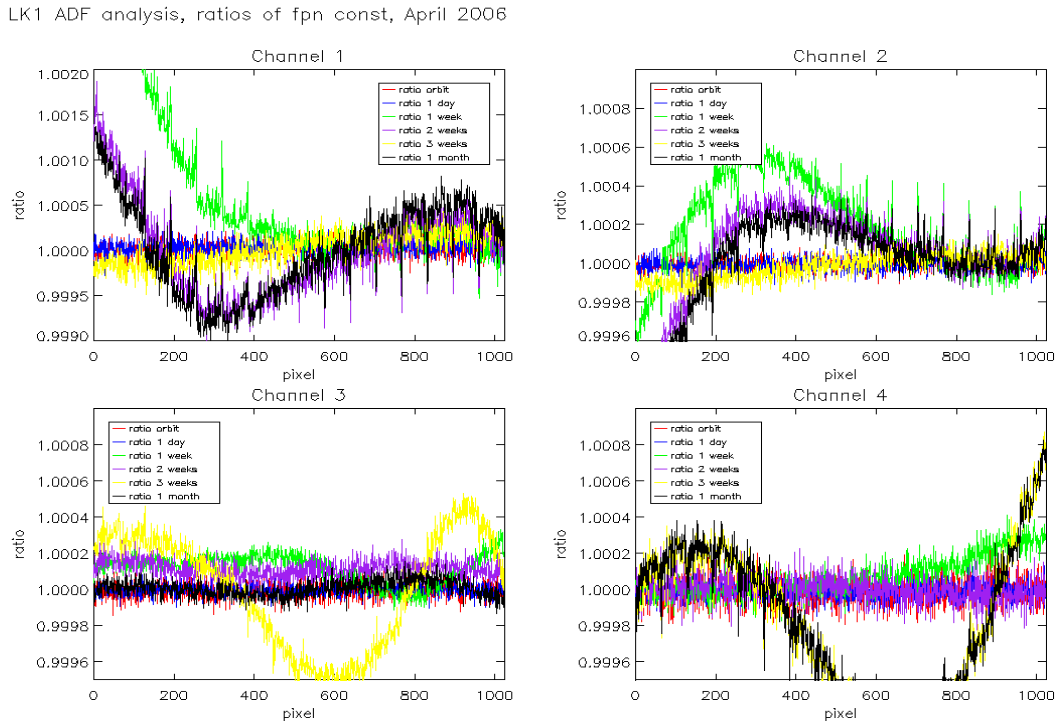


Fig. 5-9: dark current ratios (constant part) channel 1-4 during April 2006, Reference Spectrum used: Orbit 21360, 01-Apr-2006

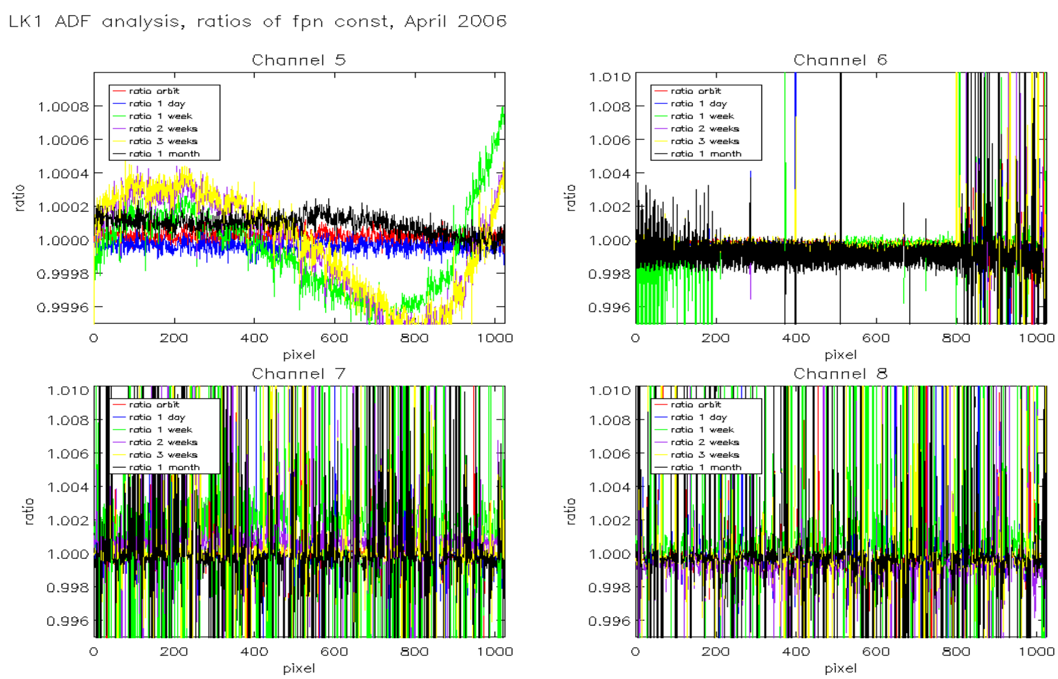


Fig. 5-10: dark current ratios (constant part) channel 5-8 during April 2006, Reference Spectrum used: Orbit 21360, 01-Apr-2006

5.1.5.3 *PE1 analysis*

During the reporting period monthly calibration new SCI_PE1_AX files were generated.

5.1.6 Pointing Performance

The new SCIAMACHY processor IPF 6.02 contains the implementation of a limb pointing correction scheme. IFE Bremen was analysing first products generated with the prototype of the new IPF and presented the results during the last SSAG 23/24 March 2006, using the Tangent Height retrieval algorithm TRUE.
Two prototype versions 6.0 A and 6.0 B were used to generate L1b products for analysis:

- 6.0 A uses the AUX-FRA file and the default IPF 6 init file with SCIAMACHY pitch and azimuth misalignment w.r.t. ENVISAT from on ground calibration
- 6.0 B uses the AUX-FRA file and an init file without SCIAMACHY pitch misalignment

Further L1b data generated with IPF 5.04 (no pointing correction implemented) were used for comparison.
Conclusions from that analysis were the following:

- Both TRUE and validation results show indications for horizontally tilted azimuthal scanning
- The tilts seen in TRUE and the O3 validation results are qualitatively consistent
- East-west difference for versions 6.0A and B about 80 m larger than for version 5.04
- Additional correction for possible roll misalignment reduces East-west difference in TH offset by about 160 m
- East-west TH difference by about 100 m larger since December 2003 orbit model update

Fig 5-11 shows the result for the long-term variations in the East-West TH difference.

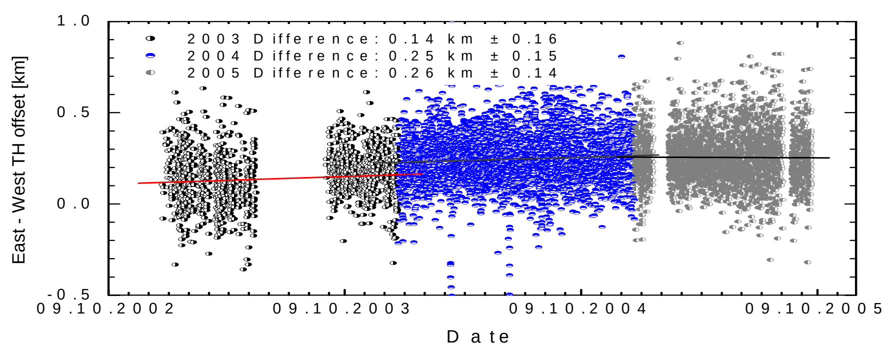


Figure 5-11: Long Term variations in the East-West TH difference

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. SCIAMACHY NRT products generated with IPF 5.04 contain wrong ozone and AMF values due to a wrong handling of the seasonal index 3. This occurs to data starting from day 15 October 2005 until 31 December 2005 (as well as for previous years).

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	PDHS-K	21-AUG-2004	12942
		LRAC	20-AUG-2004	12750
		PDHS-E	16-AUG-2004	12823

	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	DPAC	12-AUG-2004	12879
5.01	• description for cloud MDS updated • minor changes in MPI and USA 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	DPAC PDHS-E PDHS-K LRAC	31-MAR-2004 24-MAR-2004	

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 and Fig. 6-3 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 March 2006

High NO_2 VCD values can be seen over industrial regions.

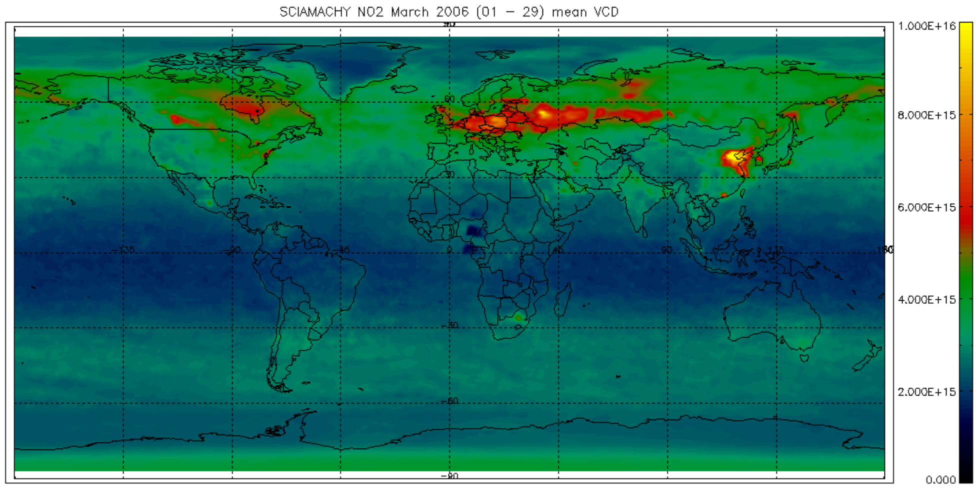


Fig. 6-1: NO_2 VCD world map 01- 29 March 2006 – monthly average

6.3.1.1 NO_2 VCD anomalous values during 30-31 March 2006

During days 30 and 31 March anomalous high NO_2 VCD values were noticed in the latitude range 40-60 degree. Fig. 6-2 shows the NO_2 world map for day 30 March with anomalous high values in red. During daily systematic monitoring the anomalous values were appearing only in NRT products and not in the Level 2 Offline product. Neither could these values be reproduced with the prototype. The same anomaly occurred in year 2005 for exactly the same days: 30-31 March. The reason is a wrong climatology lookup table.

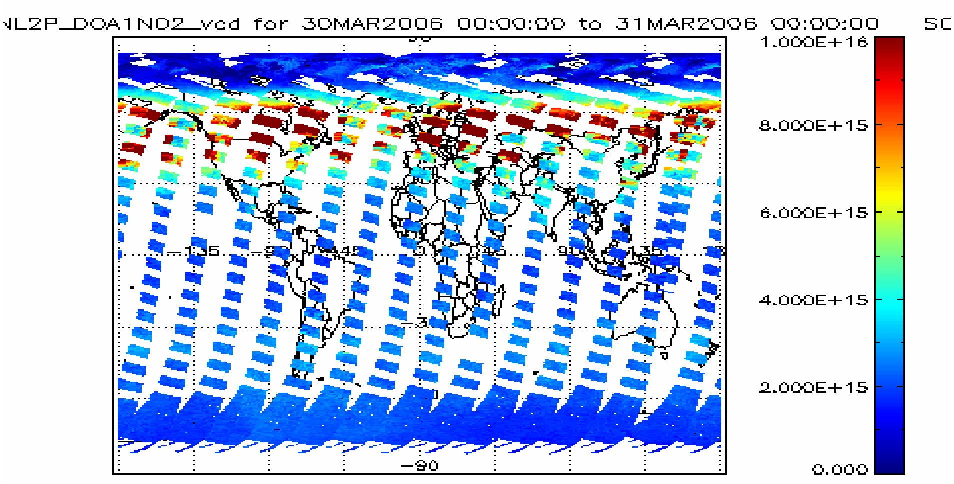


Fig. 6.2: NO_2 VCD world map 30 March 2006

6.3.2 NO_2 VCD map April 2006

The world map showing the distribution of mean values of NO_2 VCD values of April 2006 contains unphysical values at low latitudes which need to be investigated.

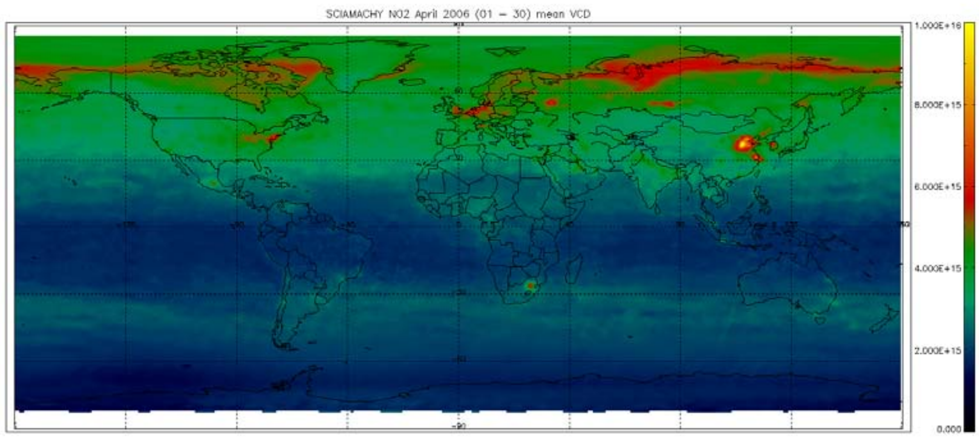


Fig. 6-3: NO_2 VCD world map 01-30 April 2006 – monthly average

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 geo-located vertical column amounts of O_3, NO_2 Nadir measurements, as well as stratospheric Limb profiles of O_3, NO_2. Additionally the fractional cloud coverage is derived and provided as product to the user.

A major upgrade of the L1b-L2 Offline processor to version 3.0 is currently in progress. The FAT took place 26-27 April 2006 with this up-coming version.

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 March 2006

- SCIAMACHY SCI RV 2P data quality is mainly stable.
- SCIAMACHY data about 10 DU lower than ECMWF values in the global mean until the 23*th* of March. Slightly smaller departures were found during the last week of March.
- Large scatter of SCIAMACHY ozone data, in particular at high latitudes in the northern hemisphere.
- The monitoring statistics for March were produced with the operational ECMWF model, CY30R1

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.

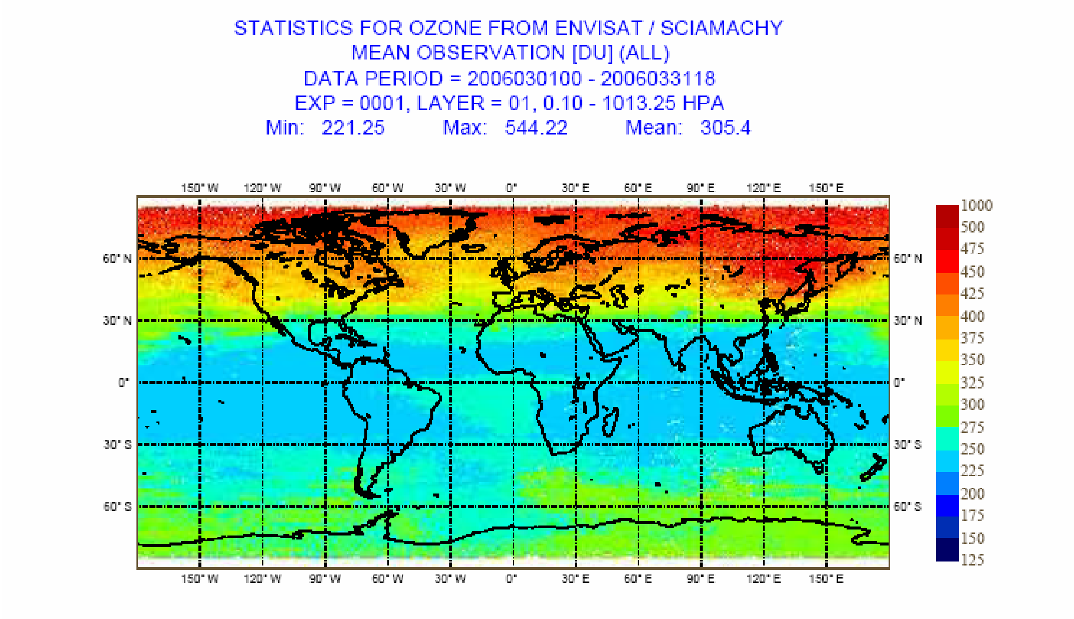


Fig. 8-1: Ozone Mean ECMWF March 2006

8.1.2 Summary of the ECMWF SCIAMACHY monthly report for April 2006

- Degraded SCIAMACHY SCI RV 2P data quality following the ENVISAT anomaly on April, 6*th*, and the switch offs and restarts of SCIAMACHY during April 2006.
- On global average, the departures between the SCIAMACHY ozone data and the ECMWF ozone analyses degraded from -10DU in March to -15DU during the week between 10*th* and 17*th* of April. A further degradation (from -15DU to -20DU) was seen during the last week of April.
- Large scatter of SCIAMACHY ozone data, in particular at high latitudes in the northern hemisphere.
- Large scatter of the first guess departures vs. latitudes, at high latitudes in both hemispheres.
- The monitoring statistics for April were produced with the operational ECMWF model, CY30R1.

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.

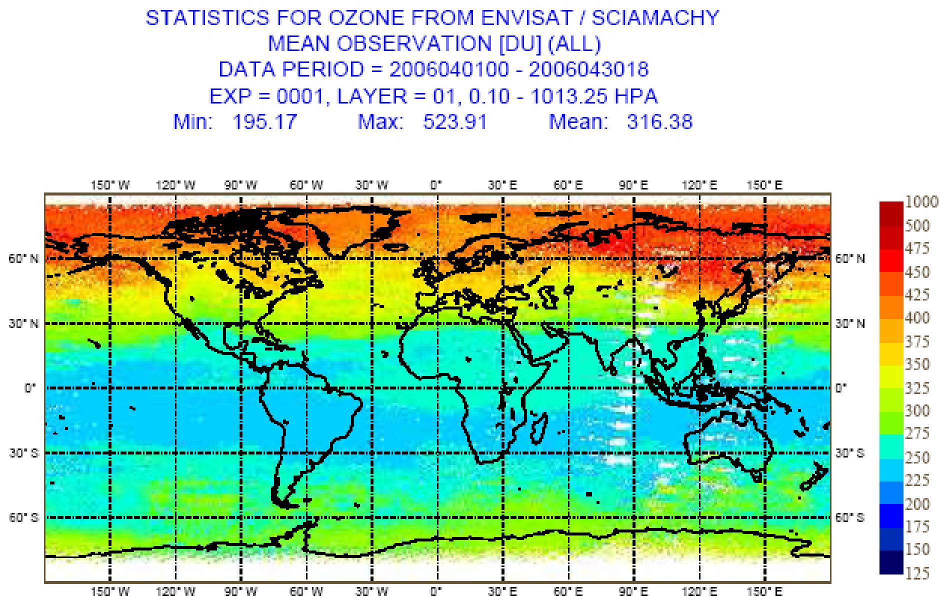


Fig. 8-2: Ozone Mean ECMWF April 2006

8.2 Statistics from Inter comparison with External Data

Future reports will contain information on this issue.

APPENDIX A - OVERVIEW OPERATIONAL ADFS

Type	ADF Name
PE1_AX	SCI_PE1_AXVIEC20060116_105439_20060112_000000_20900101_000000
SP1_AX	SCI_SP1_AXVIEC20060213_090208_20060211_000000_20060701_000000 SCI_SP1_AXVIEC20060314_114829_20060312_000000_20060701_000000 SCI_SP1_AXVIEC20060413_074612_20060411_000000_20060801_000000
SU1_AX	SCI_SU1_AXVIEC20060307_110353_20060301_201211_20060315_211853 SCI_SU1_AXVIEC20060307_113233_20060302_004552_20060316_022024 SCI_SU1_AXVIEC20060307_115651_20060303_001407_20060317_014840 SCI_SU1_AXVIEC20060307_131328_20060304_201638_20060318_212429 SCI_SU1_AXVIEC20060308_061057_20060305_005156_20060319_224029 SCI_SU1_AXVIEC20060309_061124_20060306_020003_20060320_124148 SCI_SU1_AXVIEC20060310_060949_20060307_012817_20060321_213525 SCI_SU1_AXVIEC20060311_060846_20060308_005632_20060322_020809 SCI_SU1_AXVIEC20060312_060821_20060309_002530_20060323_020131 SCI_SU1_AXVIEC20060313_060756_20060310_013337_20060324_214059 SCI_SU1_AXVIEC20060314_060619_20060311_010319_20060325_114650 SCI_SU1_AXVIEC20060315_060657_20060312_003134_20060326_020736 SCI_SU1_AXVIEC20060316_060730_20060313_013939_20060327_214713 SCI_SU1_AXVIEC20060317_060603_20060314_010754_20060328_210856 SCI_SU1_AXVIEC20060318_061215_20060315_003609_20060329_021004 SCI_SU1_AXVIEC20060319_061014_20060316_000423_20060330_014503 SCI_SU1_AXVIEC20060320_060749_20060317_011313_20060331_211953 SCI_SU1_AXVIEC20060321_060747_20060318_004245_20060401_021541 SCI_SU1_AXVIEC20060322_061228_20060319_000942_20060402_014953 SCI_SU1_AXVIEC20060323_060847_20060320_011916_20060403_120305 SCI_SU1_AXVIEC20060324_060810_20060321_004859_20060404_022054 SCI_SU1_AXVIEC20060325_061042_20060322_001501_20060405_014910 SCI_SU1_AXVIEC20060327_065114_20060324_005410_20060407_105738 SCI_SU1_AXVIEC20060327_094304_20060323_201819_20060406_213248 SCI_SU1_AXVIEC20060328_061135_20060325_002151_20060408_020024 SCI_SU1_AXVIEC20060331_144033_20060326_202344_20060409_213708 SCI_SU1_AXVIEC20060331_150857_20060327_100355_20060410_114336 SCI_SU1_AXVIEC20060331_154510_20060328_210311_20060411_221600 SCI_SU1_AXVIEC20060405_103109_20060329_202909_20060412_214332 SCI_SU1_AXVIEC20060405_124106_20060330_200007_20060413_210403 SCI_SU1_AXVIEC20060405_130442_20060331_003304_20060414_005221 SCI_SU1_AXVIEC20060405_131815_20060401_203751_20060415_215018 SCI_SU1_AXVIEC20060405_132841_20060402_101558_20060416_115316 SCI_SU1_AXVIEC20060406_060922_20060403_004039_20060417_021055 SCI_SU1_AXVIEC20060407_135621_20060404_001017_20060418_014449 SCI_SU1_AXVIEC20060410_095259_20060405_201021_20060419_212437 SCI_SU1_AXVIEC20060410_100324_20060409_205329_20060423_223904 SCI_SU1_AXVIEC20060412_060434_20060409_205329_20060423_223904 SCI_SU1_AXVIEC20060413_060822_20060410_001524_20060424_015705 SCI_SU1_AXVIEC20060414_060827_20060411_012619_20060425_213636 SCI_SU1_AXVIEC20060415_060740_20060412_005435_20060426_020903

	SCI_SU1_AXVIEC20060416_060501_20060413_002627_20060427_020247 SCI_SU1_AXVIEC20060417_060553_20060414_090027_20060428_214122 SCI_SU1_AXVIEC20060421_160337_20060415_100557_20060429_114629 SCI_SU1_AXVIEC20060421_163203_20060420_203807_20060504_215128 SCI_SU1_AXVIEC20060424_172534_20060421_182637_20060505_212135 SCI_SU1_AXVIEC20060425_085216_20060422_033412_20060506_223103 SCI_SU1_AXVIEC20060426_060547_20060423_014724_20060507_123336 SCI_SU1_AXVIEC20060427_060751_20060424_011614_20060508_212736 SCI_SU1_AXVIEC20060428_060746_20060425_004807_20060509_223733 SCI_SU1_AXVIEC20060429_060711_20060426_001456_20060510_015417 SCI_SU1_AXVIEC20060430_060704_20060427_012319_20060511_120919 SCI_SU1_AXVIEC20060501_060938_20060428_005210_20060512_020614 SCI_SU1_AXVIEC20060502_060648_20060429_002151_20060513_015957 SCI_SU1_AXVIEC20060503_060725_20060430_013000_20060514_213758
LK1_AX	SCI_LK1_AXVIEC20060306_105500_20060301_022711_20060315_041013 SCI_LK1_AXVIEC20060306_112528_20060301_055122_20060315_073447 SCI_LK1_AXVIEC20060306_115922_20060301_230601_20060316_003936 SCI_LK1_AXVIEC20060306_121643_20060302_022628_20060316_033714 SCI_LK1_AXVIEC20060306_123954_20060302_051843_20060316_065946 SCI_LK1_AXVIEC20060306_131432_20060302_223416_20060317_000752 SCI_LK1_AXVIEC20060306_133432_20060303_015443_20060317_030537 SCI_LK1_AXVIEC20060306_135554_20060303_044755_20060317_062853 SCI_LK1_AXVIEC20060306_161236_20060303_220147_20060317_233608 SCI_LK1_AXVIEC20060306_163348_20060304_012258_20060318_023508 SCI_LK1_AXVIEC20060306_170552_20060304_041515_20060318_055650 SCI_LK1_AXVIEC20060306_174801_20060305_005156_20060319_020219 SCI_LK1_AXVIEC20060306_181142_20060305_034427_20060319_052550 SCI_LK1_AXVIEC20060306_181516_20060305_052502_20060319_070540 SCI_LK1_AXVIEC20060306_183625_20060305_205032_20060319_224029 SCI_LK1_AXVIEC20060306_202035_20060301_073402_20060315_083910 SCI_LK1_AXVIEC20060306_204917_20060301_083718_20060315_102211 SCI_LK1_AXVIEC20060306_205638_20060301_102054_20060315_115958 SCI_LK1_AXVIEC20060306_211101_20060301_115829_20060315_133910 SCI_LK1_AXVIEC20060306_212713_20060301_133756_20060315_151705 SCI_LK1_AXVIEC20060306_213746_20060301_151531_20060315_165451 SCI_LK1_AXVIEC20060307_022657_20060306_031039_20060320_045346 SCI_LK1_AXVIEC20060307_030057_20060302_094705_20060316_112708 SCI_LK1_AXVIEC20060307_032006_20060302_112549_20060316_130806 SCI_LK1_AXVIEC20060307_033805_20060302_130612_20060316_144640 SCI_LK1_AXVIEC20060307_035333_20060302_144455_20060316_162457 SCI_LK1_AXVIEC20060307_040852_20060302_162231_20060316_180048 SCI_LK1_AXVIEC20060307_042258_20060302_175952_20060316_194128 SCI_LK1_AXVIEC20060307_043349_20060303_062722_20060317_073649 SCI_LK1_AXVIEC20060307_045004_20060303_073459_20060317_091801 SCI_LK1_AXVIEC20060307_052247_20060303_091630_20060317_105557 SCI_LK1_AXVIEC20060307_053759_20060303_105405_20060317_123638 SCI_LK1_AXVIEC20060307_055546_20060303_123428_20060317_141507 SCI_LK1_AXVIEC20060307_061259_20060303_141312_20060317_155309 SCI_LK1_AXVIEC20060307_061344_20060303_155047_20060317_173021 SCI_LK1_AXVIEC20060307_061934_20060303_172808_20060317_190903 SCI_LK1_AXVIEC20060307_063928_20060304_055538_20060318_070509

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	SCI_LK1_AXVIEC20060411_034210_20060410_110053_20060424_124208
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	SCI_LK1_AXVIEC20060412_042806_20060411_170315_20060425_184304
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	SCI_LK1_AXVIEC20060413_083200_20060412_163133_20060426_181255
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	SCI_LK1_AXVIEC20060416_034325_20060415_132408_20060429_150236
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