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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 PCF 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

1.3 Acronyms and abbreviations

ADC	Analogue to Digital Converter
ADF	Auxiliary Data File
ANX	Ascending Node Crossing

APSM	Aperture Stop Mechanism
ATC	Active Thermal Control
CA	Corrective Action
CTI	Configurable Transfer Item
DAC	Digital Analogue Converter
HK	Housekeeping
ICE	Instrument Control Electronics
IECF	Instrument Engineering and Calibration Facilities
LOS	Line of Sight
MR	Monthly Report
NCWM	Nadir Calibration Window Mechanism
NDFM	Neutral Density Filter Mechanism
NNDEC	Non-nominal Decontamination
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
PMD	Polarization Measurement Device
SAA	South Atlantic Anomaly
SCIAMACHY	Scanning Imaging Absorption Spectrometer for Atmospheric Chartography
SEU	Single Event Upset
SLS	Spectral Line Source
SOST	SCIAMACHY Operations Support Team
TC	Thermal Control
WLS	White Light Source
<i>Not complete</i>	

2 SUMMARY

- During the reported period Sciamachy measurements were nominal with respect to planning, except of orbits 14198 – 14217 (17-18 November 2004), when a SEU triggered an onboard parameter limit exceeding. As a consequence the instrument was unavailable between the mentioned orbits.
- Monthly Calibration was scheduled during Orbits 13909-13913 (27-Oct-2004), 14324-14328 (25-Nov-2004) and 14624-14628 (16-Dec-2004).
- No OCR related changes were required during November-December 2004.
- Thermal adjustment for detector 5, which was close to its lower temperature limit of 221.4K was commanded in orbit 14632 (17-Dec-2004).
- A non-nominal decontamination was performed, starting in orbit 14675 (20-Dec-2004) ending in orbit 14860 (02-Jan-2005).

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* 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 13970 (ANX = 01-Nov-2004, 00:31:49.352) to 14842 (ANX = 31-Dec-2004, 22:33:58.693). Three OSDF specified the planning baseline.

Orbit		ANX		OSDF
Start	Stop	Start	Stop	
13727	14170	15-Oct-2004 01:06:18.813	14-Nov-2004 23:51:34.980	MPL_OSD_SHVSH_20040915_010101_00000000_33020001_20041015_010620_20041115_013208
14171	14599	15-Nov-2004 01:32:10.909	14-Dec-2004 23:08:28.154	MPL_OSD_SHVSH_20041018_010101_00000000_33030001_20041115_013212_20041215_004902
14600	15043	15-Dec-2004 00:49:04.082	14-Jan-2005 23:34:20.250	MPL_OSD_SHVSH_20041115_010101_00000000_33040001_20041215_004906_20050115_011454

Table 3-1: SCIAMACHY OSDF planning files from November – December 2004

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

- 13909-13913 (27-Oct-2004)
- 14324-14328 (25-Nov-2004)
- 14624-14628 (16-Dec-2004): No moon related measurements were included. This was because the monthly lunar visibility period overlapped with the planned non-nominal decontamination. In order to obtain monthly calibration & monitoring data in a thermally stable instrument status, the December monthly calibration had been moved forward.

Moon occultations have been possible between orbits 14714-14770 (22-Dec-2004 to 26-Dec-2004). In all other monthly lunar visibility periods the moon was rising on the dayside.

No OCR related measurements have been executed.

3.1.2 *Instrument Measurement Status (SOST-DLR)*

Final flight status for mission scenarios, states and timelines remained unchanged throughout the reporting period. No OCR related changes were required, neither permanently nor temporarily.

3.1.3 Executed Operations and Measurements (SOST-DLR)

Measurements

The OSDF planning files have been scheduled as requested.

Detector thermal adjustment

The average temperature/orbit of detector 5 was close at its lower temperature limit of 221.4 K. A TC adjustment was therefore requested by SCIAMACHY and commanded in orbit 14632 (17-Dec-2004).

TC settings (before/after adjustment) were

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

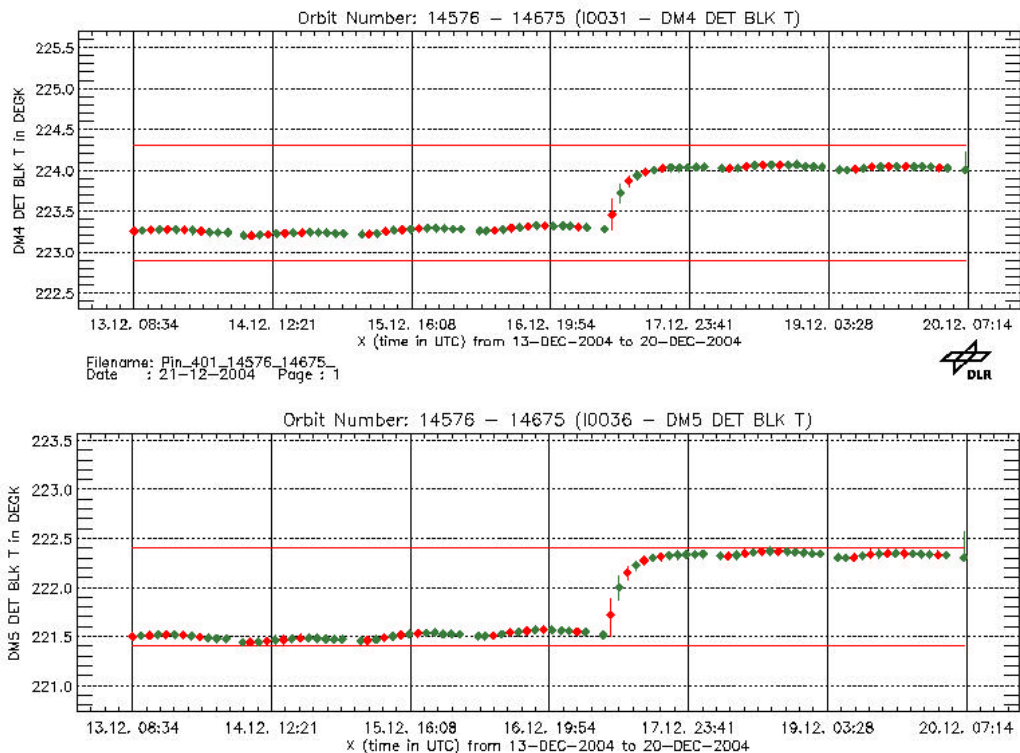


Fig. 3-1: Temperature adjustment of detectors 4 & 5

Decontamination

A non-nominal decontamination (NNDEC) was started in orbit 14675 (20-Dec-2004, 08:05 UTC). Planned end of warm-up phase and start of cool-down phase is scheduled for 02-Jan-2005. This

NNDEC will implement a new approach in the cool-down in order to mimic instrument operations in January 2004, which might have been the cause for the good throughput in detector 4 after the December 2003/January 2004 NNDEC. This approach includes a planned transfer to STANDBY with subsequent transfer back to HEATER and MEASUREMENT. Instrument warm-up was nominal until the end of the reporting period.

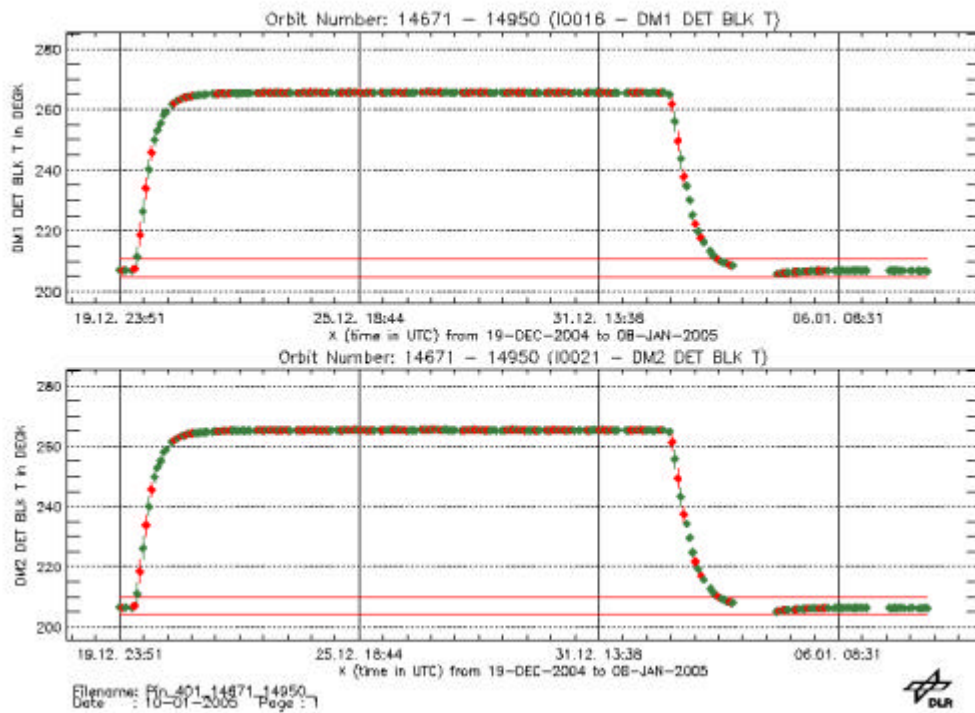


Fig. 3-2: Representative detector temperatures (detector 1 & 2) during warm-up of the NNDEC

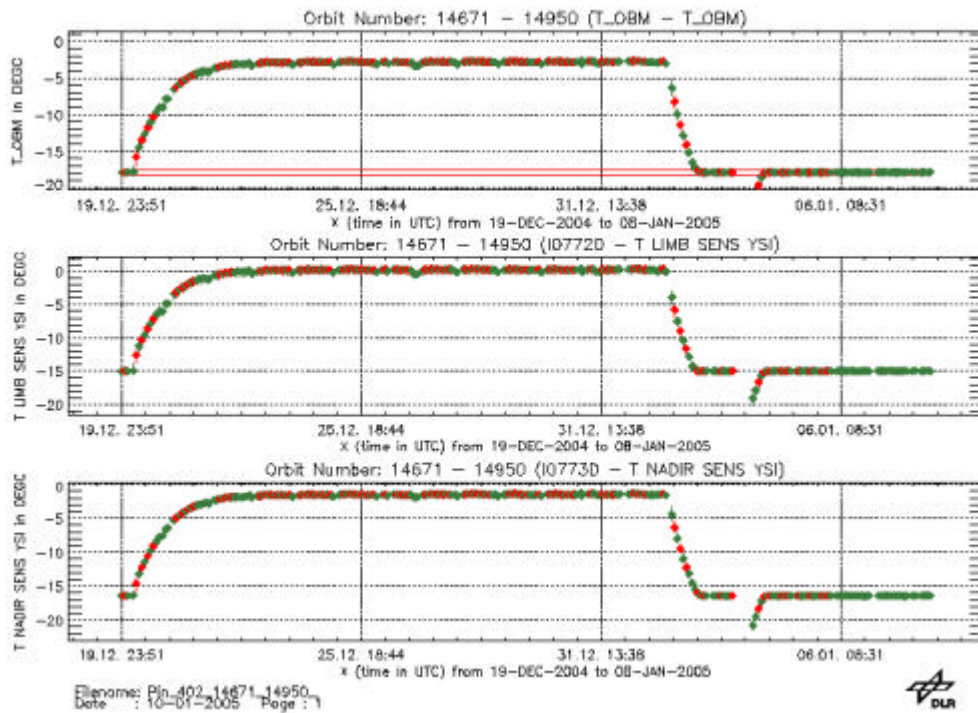


Fig. 3-3: OBM temperatures during warm-up of the NNDEC

APSM/NDFM health checks & PMD ADC cal

In the reporting period one APSM/NDFM health check and 3 PMD ADC calibrations were executed. All showed nominal results.

APSM/NDFM			PMD ADC	
Orbit	ANX	Result	Orbit	ANX
n.a.	n.a.	n.a.	13916	28-Oct-2004 07:27:23
14316	25-Nov-2004 06:13:26	ok	14318	25-Nov-2004 09:30:32
n.a.	n.a.	n.a.	14631	16-Dec-2004 06:18:56

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

Anomalies

In orbit 14198 (17-Nov-2004, 00:10:40 UTC) a SEU triggered an onboard parameter limit exceeding which caused a transfer to HEATER/REFUSE. Complementary failures in orbits 14198 and 14199 are a result of this event.

Orbit	Date	Entry - UTC	Level	Entry Type	ID Content/Transition	Mode	Remark
14198	17-NOV-2004	2004.322.00.10.40.460	Instrument	HK PARAMETER LIMIT EXCEEDING	84 (I0105)	HTR/RF	Single Event Upset (SEU)
14198	17-NOV-2004	2004.322.00.10.40.464	Instrument	AUTONOMOUS SWITCHING	goto HEATER/REFUSE	HTR/RF	Single Event Upset (SEU)
14198	17-NOV-2004	2004.322.00.20.22.867	Instrument	MACROCOMMAND EXECUTION ENTRY	START TIMELINE	HTR/RF	Complementary failure
14198	17-NOV-2004	2004.322.00.20.22.874	Instrument	COMPLEMENTARY FAILURES	---	HTR/RF	Complementary failure
14198	17-NOV-2004	2004.322.00.20.22.878	Instrument	MACROCOMMAND EXECUTION ENTRY	START TIMELINE	HTR/RF	Complementary failure
In total 4 Complementary Failures until 2004.322.00.52.07.003							
14199	17-NOV-2004	2004.322.00.52.06.992	Instrument	MACROCOMMAND EXECUTION ENTRY	START TIMELINE	HTR/RF	Complementary failure
14199	17-NOV-2004	2004.322.00.52.07.003	Instrument	COMPLEMENTARY FAILURES	---	HTR/RF	Complementary failure
14199	17-NOV-2004	2004.322.00.52.07.003	Instrument	MACROCOMMAND EXECUTION ENTRY	START TIMELINE	HTR/RF	Complementary failure
14226	18-NOV-2004	2004.323.22.02.25.753	Instrument	COMPLEMENTARY FAILURES	---	Measurement	SDPU WRONG DU COUNTER (fault indication 386)

Table 3-3: Instrument anomalies

The instrument was recovered and continued in MEASUREMENT mode in orbit 14217 (18-Nov-2004, 07:12:20 UTC). Thermal stability was achieved in orbit 14232 (19-Nov-2004, ANX = 07:48:42 UTC).

An expected fault in orbit 14226 (18-Nov-2004) triggered an onboard corrective action CA = 0. The instrument remained in MEASUREMENT mode.

Instrument unavailability

The instrument was unavailable for 18 orbits after the anomaly in orbit 14198.

Unavailability					
Orbit		UTC		Event	Remark
Start	Stop	Start	Stop		
14198	14217	17-Nov-2004 00:10:40	18-Nov-2004 07:12:20	transfer to HTR/RF	I0105 OOL Latch-up detection thermal 2 board (SEU)

Table 3-4: Instrument unavailabilities

3.1.4 Performance Monitoring - System (SOST-DLR)

Detector temperatures

Detector temperatures are monitored according to the requirements of the IOM procedure PIN-401. It requests to ensure that the average temperature/orbit remains within the specified limits. The average temperature/orbit is determined from the HK telemetry parameters I0016 (Detector 1), I0021 (Detector 2), I0026 (Detector 3), I0031 (Detector 4), I0036 (Detector 5), I0041 (Detector 6), I0046 (Detector 7) and I0051 (Detector 8). Fig. 3-4 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 is shown as horizontal lines.

The gap around orbit 14200 is the reported SEU anomaly. The gap for orbits > 14675 is caused by the scale of the temperature axis. In the warm-up phase of the NNDEC the detector temperatures were increased beyond the scale used.

OBM temperatures

OBM temperatures are monitored according to the requirements of the IOM procedure PIN-402. It requests to ensure that the average temperature/orbit remains within the specified limits. The average OBM temperature/orbit is determined from the HK telemetry parameters I0772D (Limb Sensor) and I0773D (Nadir Sensor) according to

$$T_OBM = 0.5 \times (T_LIMB + T_NADIR) - 2.2 \text{ } ^\circ\text{C}$$

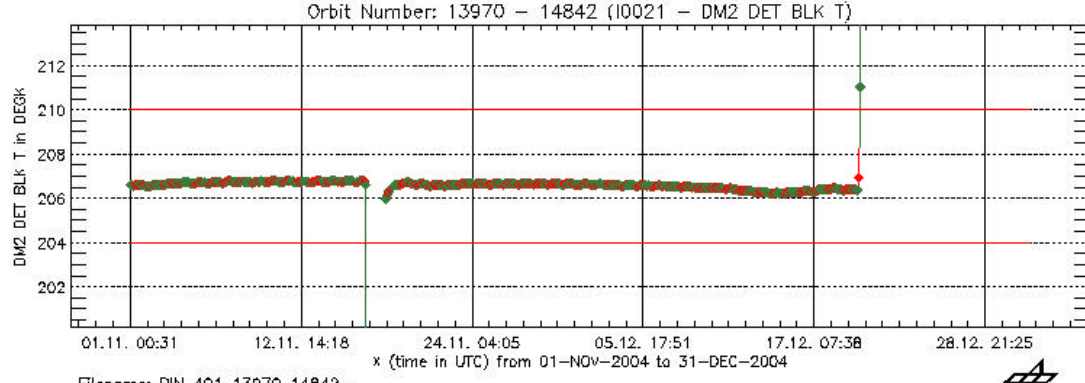
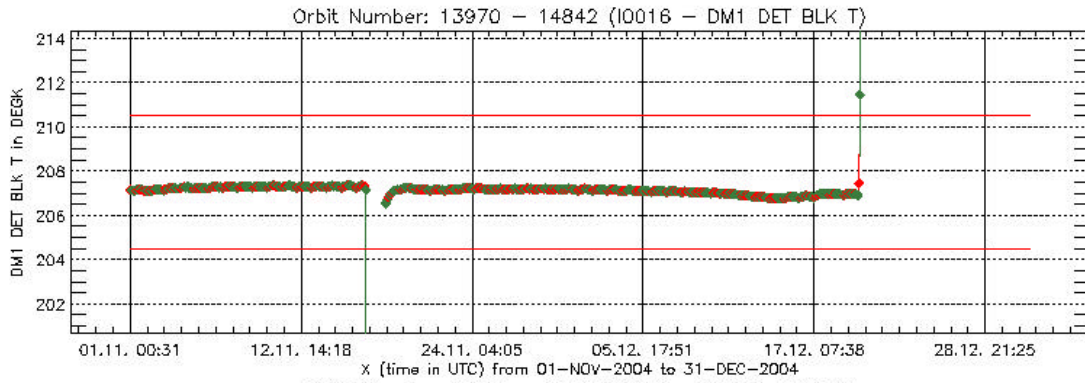
In addition, PIN-402 requires to monitor the power settings of the Active Thermal Control heaters. They are given by the HK telemetry parameters I0778D (ATC Limb), I0799D (ATC Nadir) and I0800D (ATC Rad A). Temperatures and ATC heater powers are given in fig. 3-5 and 3-6. Colour coding is as in fig. 3-4.

The gap around orbit 14200 is the reported SEU anomaly. The gap for orbits > 14675 in the temperature graph is caused by the scale of the temperature axis. In the heater power display the maximum commanded power during NNDEC can be seen in the orbit interval > 14675.

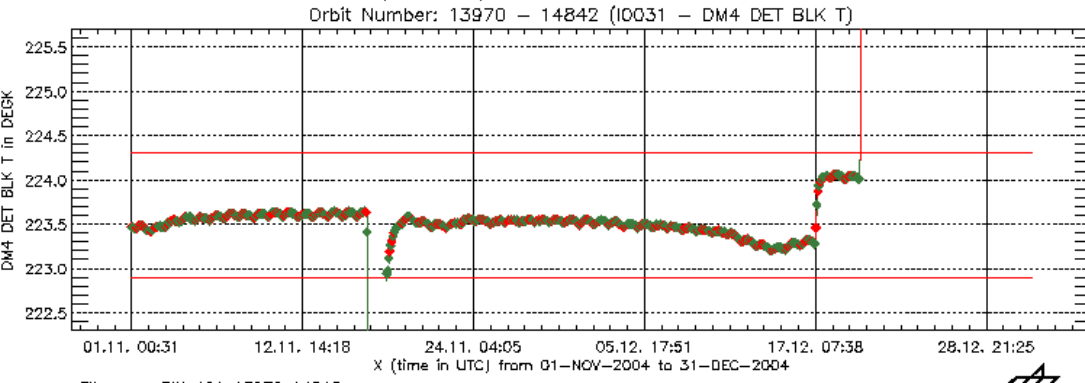
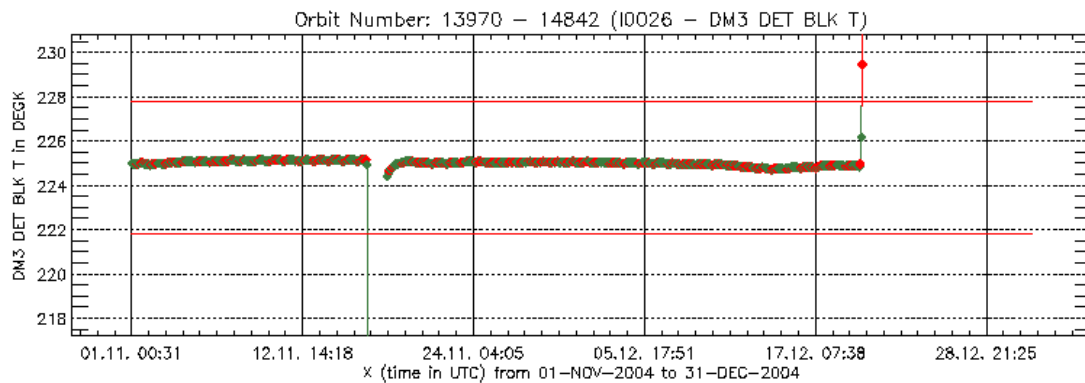
PMD ADC status

The status of the PMD ADC is monitored according to the requirements of the IOM procedure PIN-404. It requests to ensure that no glitches occur caused by an SEU. The status of the PMD ADC is inferred from the HK telemetry parameters I0009 (PMD Temperature) and I0012 (PMD Analogue Supply Voltage).

No PMD ADC glitches have been detected.



Filename: PIN_401_13970_14842
Date : 28-02-2005 Page : 1



Filename: PIN_401_13970_14842
Date : 28-02-2005 Page : 1



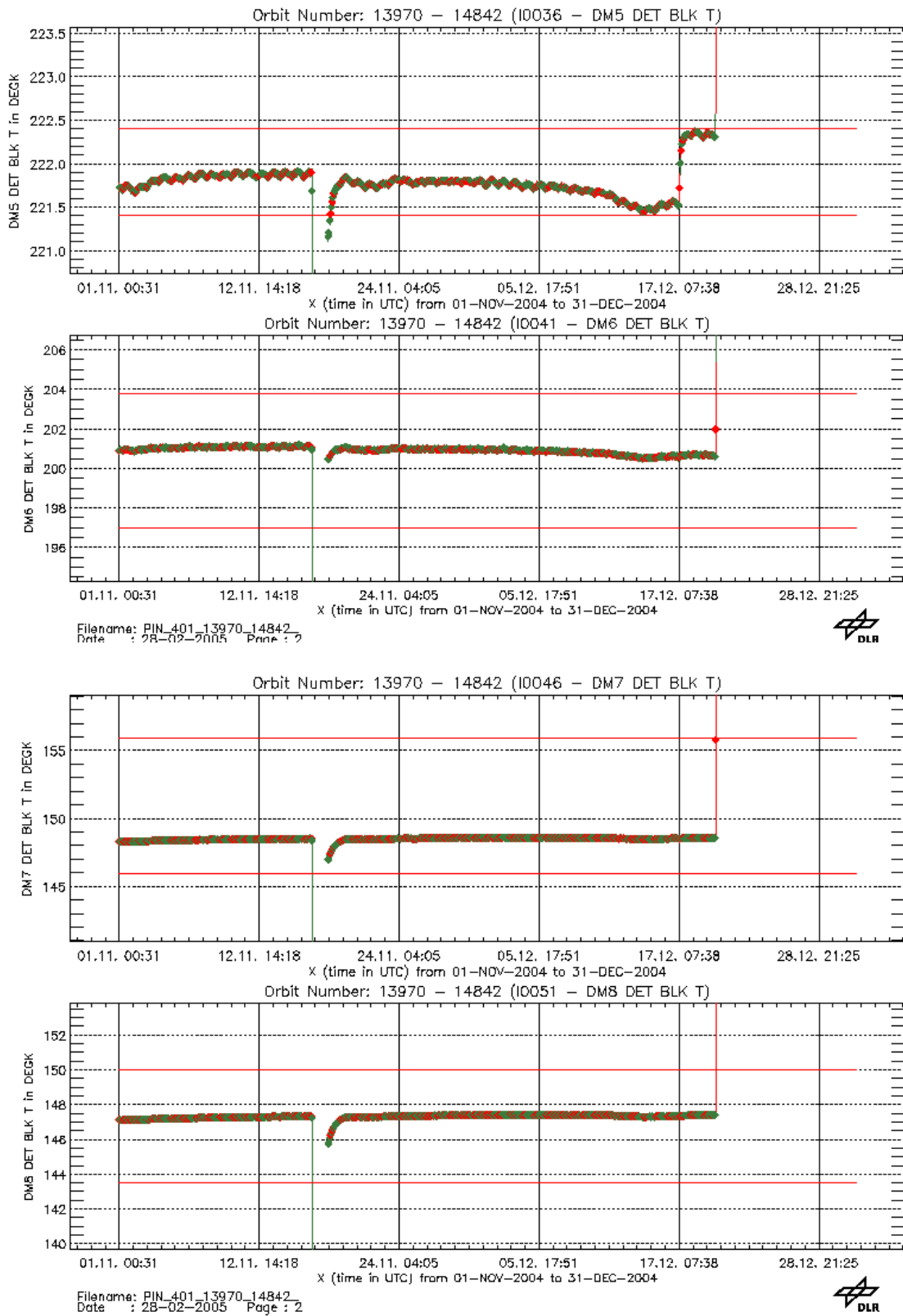


Fig. 3-4: Detector temperatures

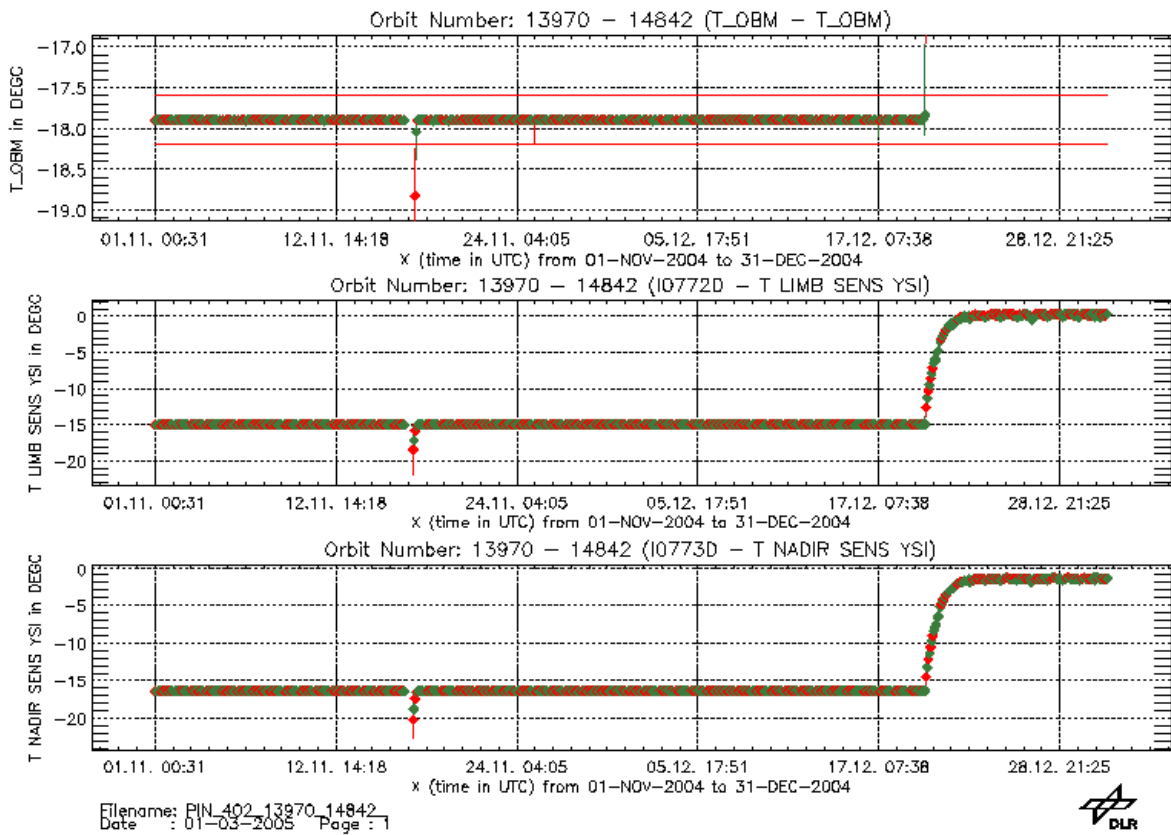


Fig. 3-5: OBM temperatures (top: derived OBM, middle: limb sensor, bottom: nadir sensor)

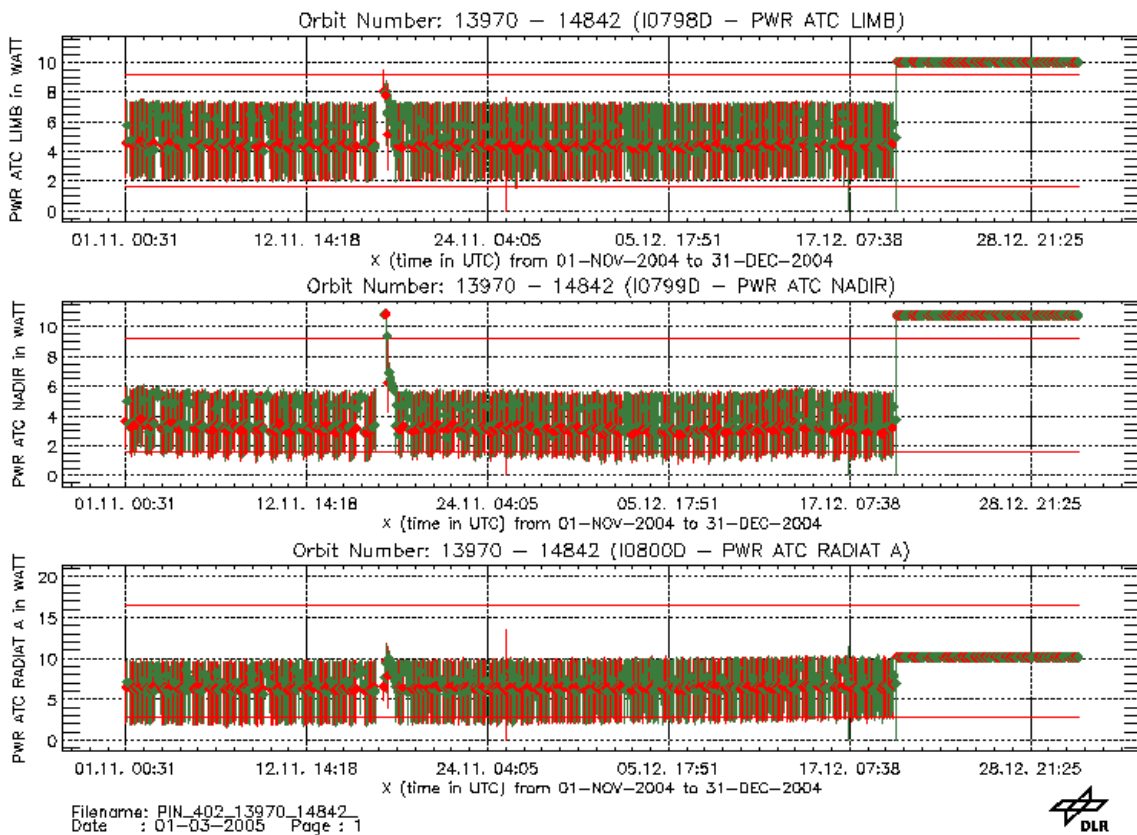


Fig. 3-6: ATC heater power (top: ATC limb, middle: ATC nadir, bottom: ATC Rad A)

LLI status

Life Limited Items are monitored based on analysis of the

- OSDF: This yields a predicted LLI usage.
- report format: This results in actually used LLI switches or 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: 0.39
- APSM: 0.35
- NCWM (sub-solar port): 0.39
- WLS (switches): 0.10

- WLS (burning time): 0.19
- SLS (switches): 0.03
- SLS (burning time): 0.01

How the relative LLI usage has accumulated since launch can be seen in fig. 3-7. 'EOL' assumes a total mission lifetime of 0.5 years of Commissioning Phase and 4.5 years of routine operations.

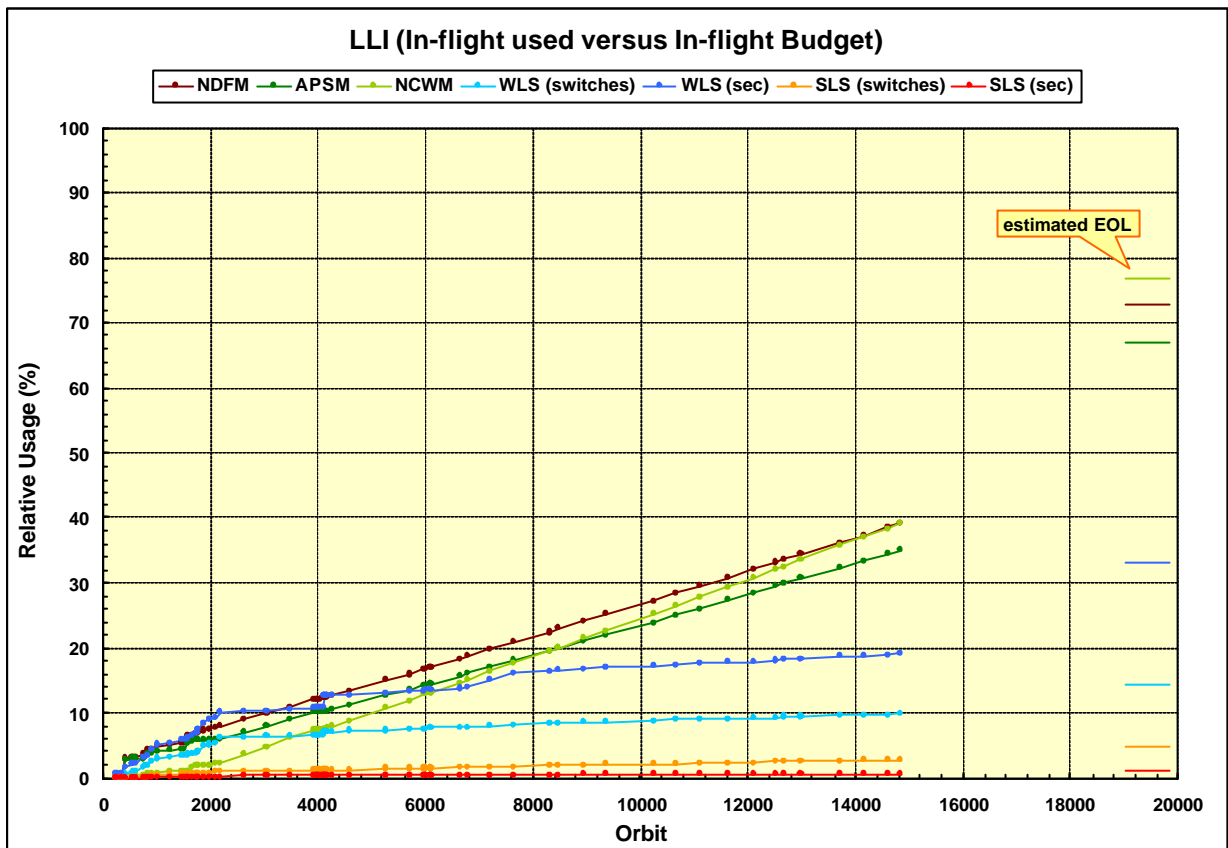


Fig. 3-7: Relative usage of LLIs. 'EOL' is derived for the currently specified mission lifetime.

The number of cryogenic heatpipe cycles was 14 at the start of the reporting period. This amounts to 35% of the allowed in-flight budget. At the end of the reporting period, the decontamination relay was in its 'closed' position due to the ongoing NNDEC. With the end of the NNDEC, the heatpipe cycle will increase by '1', increasing the usage to 38%.

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 $< \pm 10$ 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. 3-8 displays the time difference *predicted – reference*. Orbit manoeuvres cause distinct discontinuities.

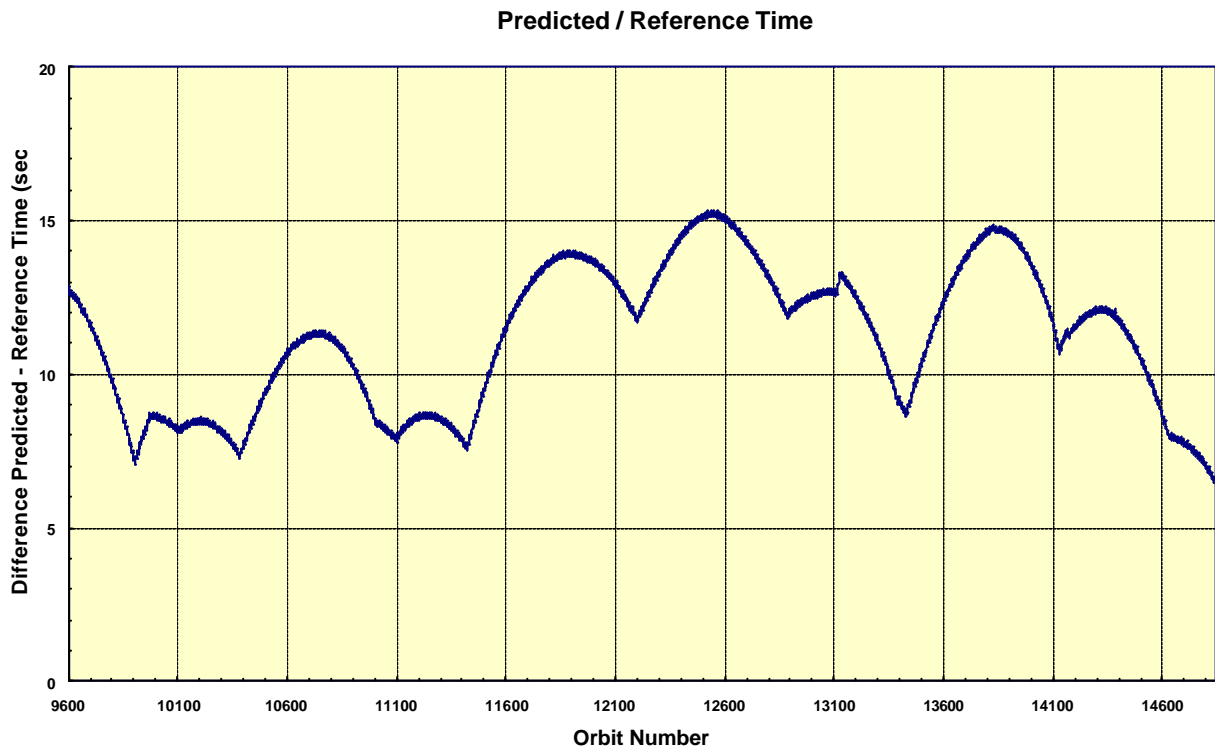


Fig. 3-8: Time difference between predicted and reference time.

3.1.5 Performance Monitoring - Light Path (SOST-IFE)

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. 3-9 show results of these monitoring activities for the time interval November 2004 to December 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. 3-9 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>).

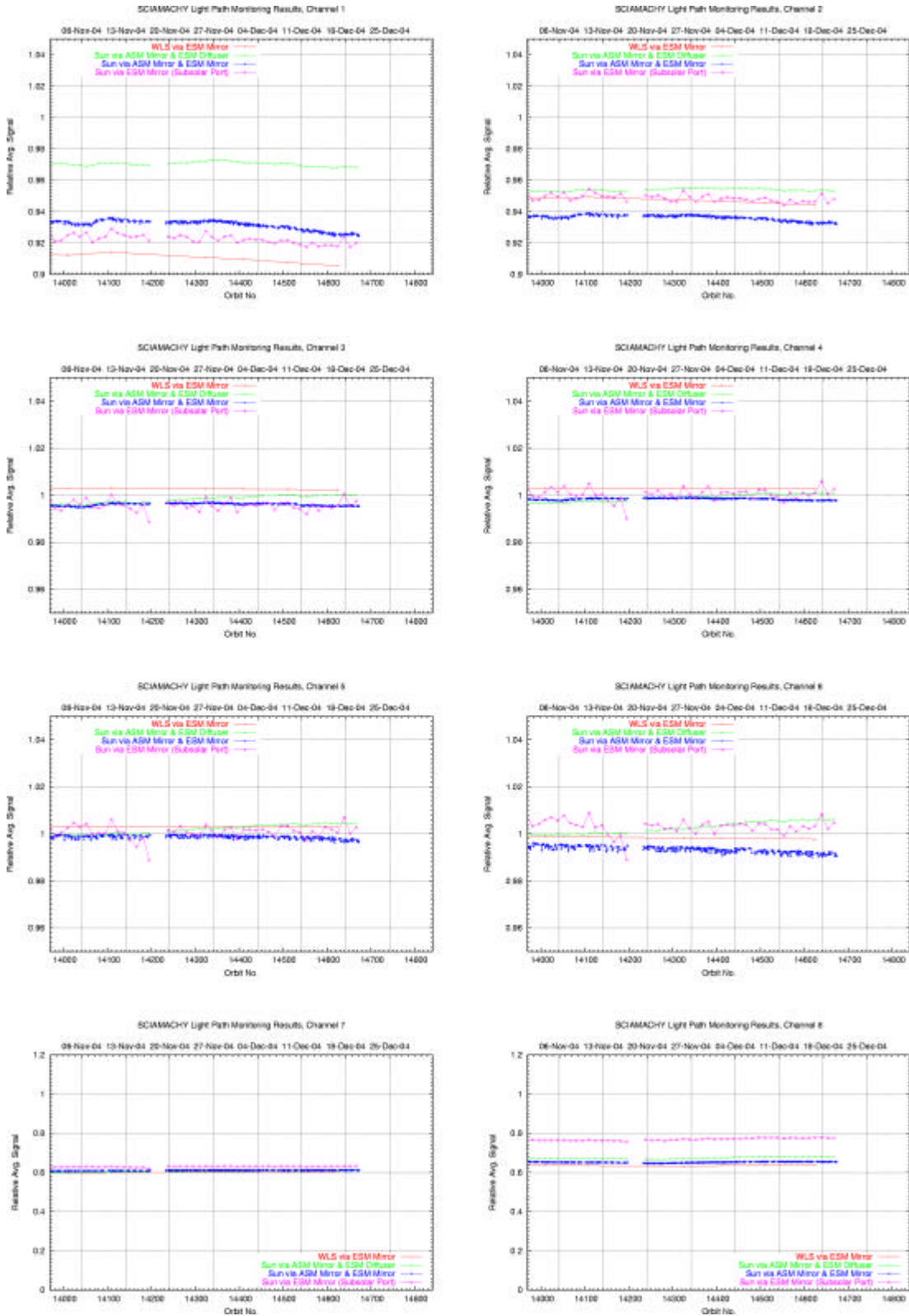


Fig. 3-9: Light path monitoring results November 2004 to December 2004.

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

- 18 – 19 November 2004 (orbits 14217 – 14232) : No data because instrument in R/W Wait due to SEU
- No data plotted after 20 December 2004 (orbit 14676) due to non-nominal decontamination.
- The small degradation in the UV (channels 1 & 2) continues; the degradation of the calibration light path is in channel 1 smaller than for other light paths, indicating that the ESM diffuser degrades less than the ESM mirror.
- Channels 3 to 6 remain radiometrically stable. The apparent throughput reduction for the limb light path in channel 6 is not caused by degradation but by an up to now uncorrected seasonal variation (probably due to insufficient calibration).
- The channel 7 & 8 throughput is largely reduced due to icing. The degradation of the subsolar light path in channel 8 deviates from the other light paths which requires further investigation.

3.1.6 Problem Report Status (DLR-BO)

In the reporting period no new problem report has been issued. None of the existing problem reports was closed.

4 DATA AVAILABILITY STATISTICS

4.1 Downlink/Acquisition Performance

Starting from orbit 14139 (on the 12th of November) an acquisition problem at ESRIN affected ENVISAT data quality and availability until orbit 14188. Sciamachy data from PDHS-E: Level 0 data is available but product size smaller than usually, the Level 1 products are anomalously small and Level 2 products are nearly not processed anymore (only two small products for orbit 14170).

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 tool. Unavailability periods due to instrument anomalies or Satellite switch-offs are excluded. The gaps considered are only interfile gaps.

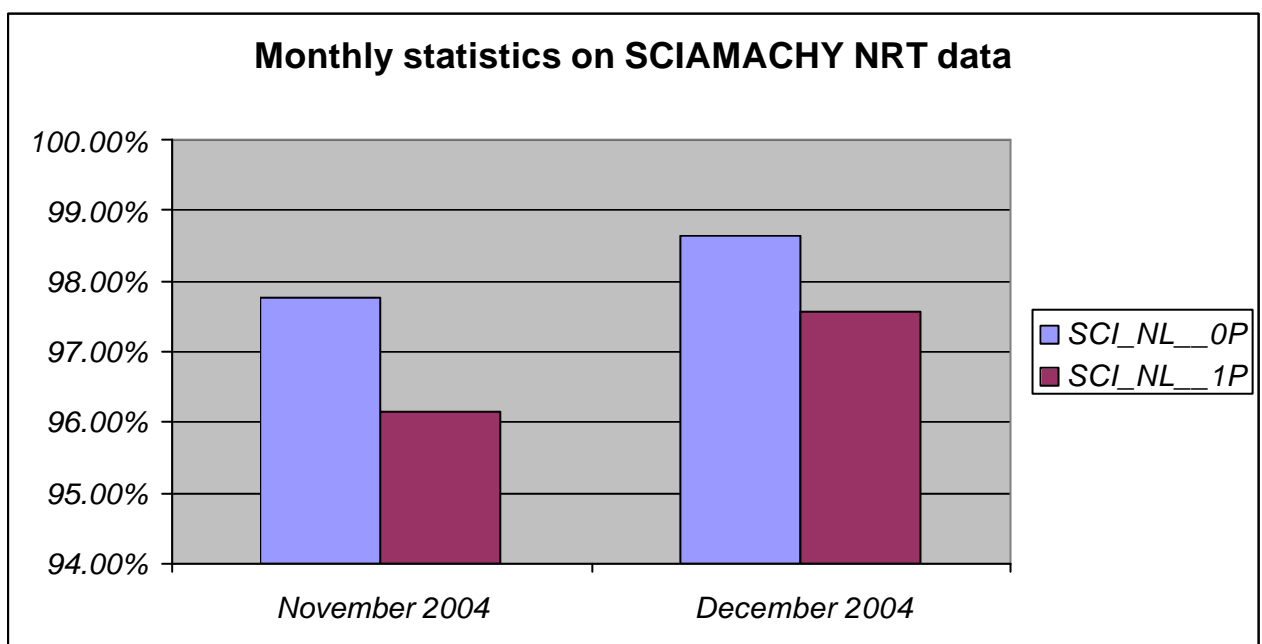


Fig. 4-1: Statistics on available unconsolidated Level 0 and Level 1 products

4.3 Statistics on consolidated data

Future reports will contain statistics on consolidated data processing.

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. 4-2 is from end of March 2005). Data sets that lie in non-nominal decontamination periods are not re-processed to L2 products as the science data are not reliable.

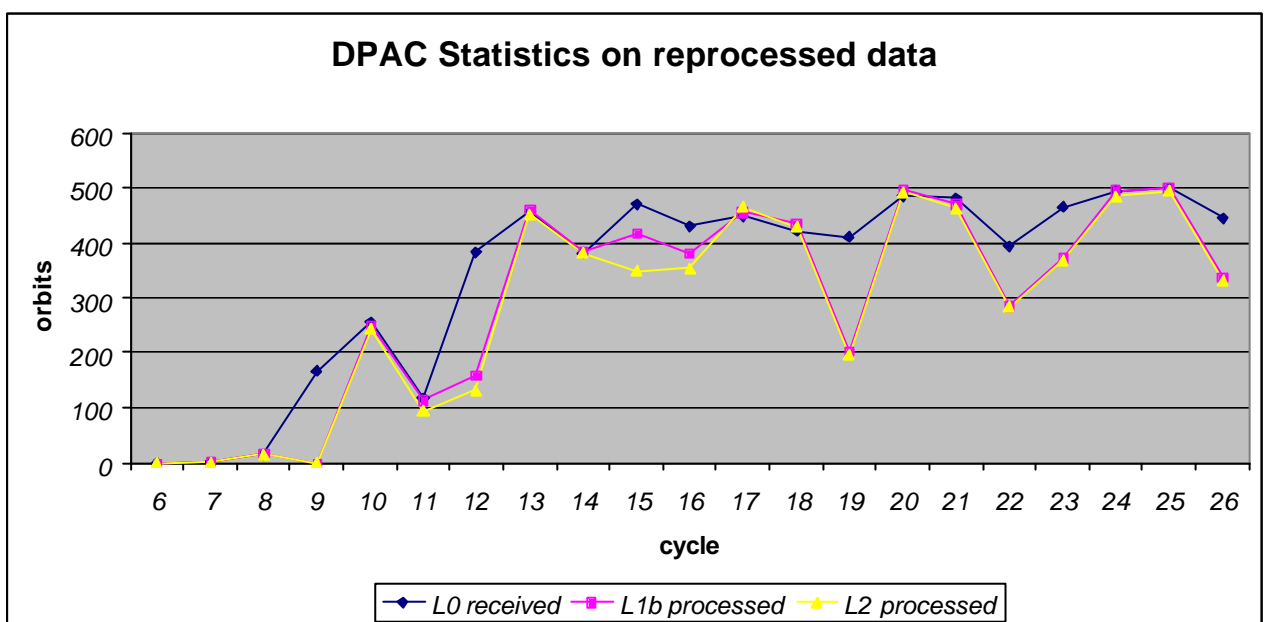


Fig. 4-2: DPAC statistics on reprocessed data

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 PO-RS-MDA-GS-2009_15_3H. The disclaimer at http://envisat.esa.int/dataproducts/availability/disclaimers/PQD_0071_SCI_NL_1P.pdf describes known artefacts.

Table 5.1: PDS Processor version and main modifications implemented

Date	Version	Description of changes
21-AUG-2004	IPF version 5.04 has been activated from orbit 12942 at: PDHS-K	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: <ul style="list-style-type: none"> • An incorrect implementation of the polarisation-ratio calculation has been corrected. • Memory leaks have been detected and eliminated • Two modifications have been performed to avoid level 1B processing crashes
20-AUG-2004	IPF version 5.04 has been activated from 12750 (+ reprocessing of some older products) at: LRAC	
16-AUG-2004	IPF version 5.04 has been activated from orbit 12823 at: PDHS-E	
12-AUG-2004	IPF version 5.04 has been activated 12879 (+ reprocessing of some older products)at: DPAC	
31-MAR-2004	IPF version 5.01 has been activated at: DPAC	
24-MAR-2004	IPF version 5.01 has been activated at: PDHS-E PDHS-K LRAC	

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 (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 November – December 2004.

Plot 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 from August to October was 100%. In May 2004 2 SU1 ADFs, in June 3 ADFs and in July 3 ADFs were missing, mainly due to hardware problems.

The LK1 ADF statistic is calculated by dividing the number of all LK1 ADFs by number of all available (to IECF) level 1 orbits. In average ADFs are 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%

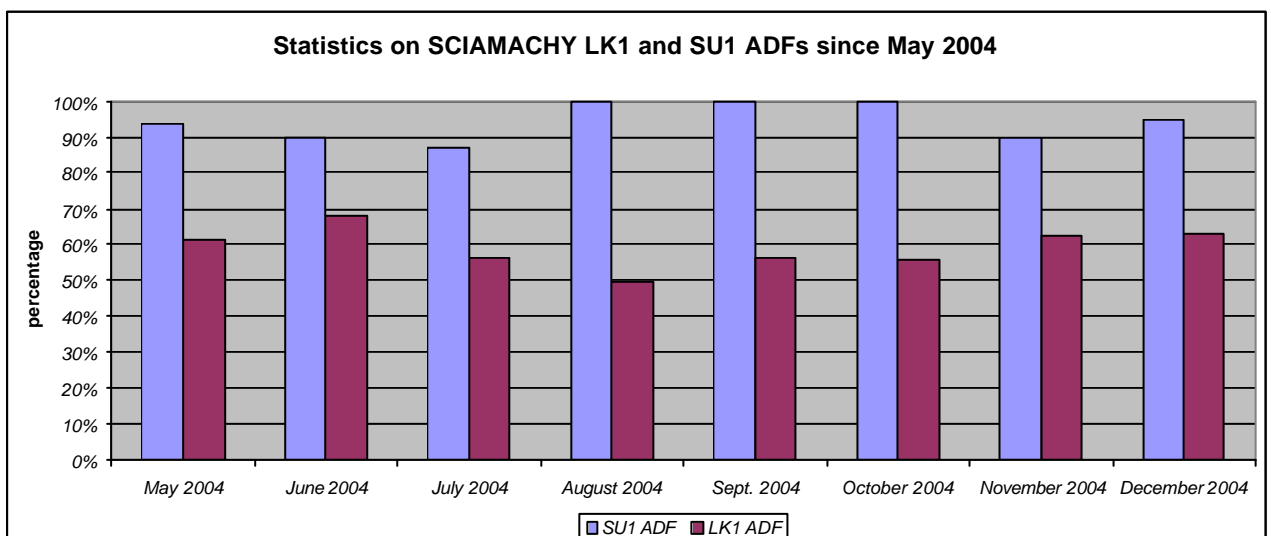


Fig. 5-1: Statistics on LK1 and SU1 processing

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, etc).

Fig. 5-2 shows the ratios of SMR spectra derived from calibrated SMR/ESM during the month November 2004, by ratioing the spectra of days 01 November (as reference) to 07, 13, 20, 24 and day 30 November 2004. The ratios are not corrected for variation of distance earth/sun.

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.

The IR channels are impacted by more noise.

ratio of smrs as a function of pixel

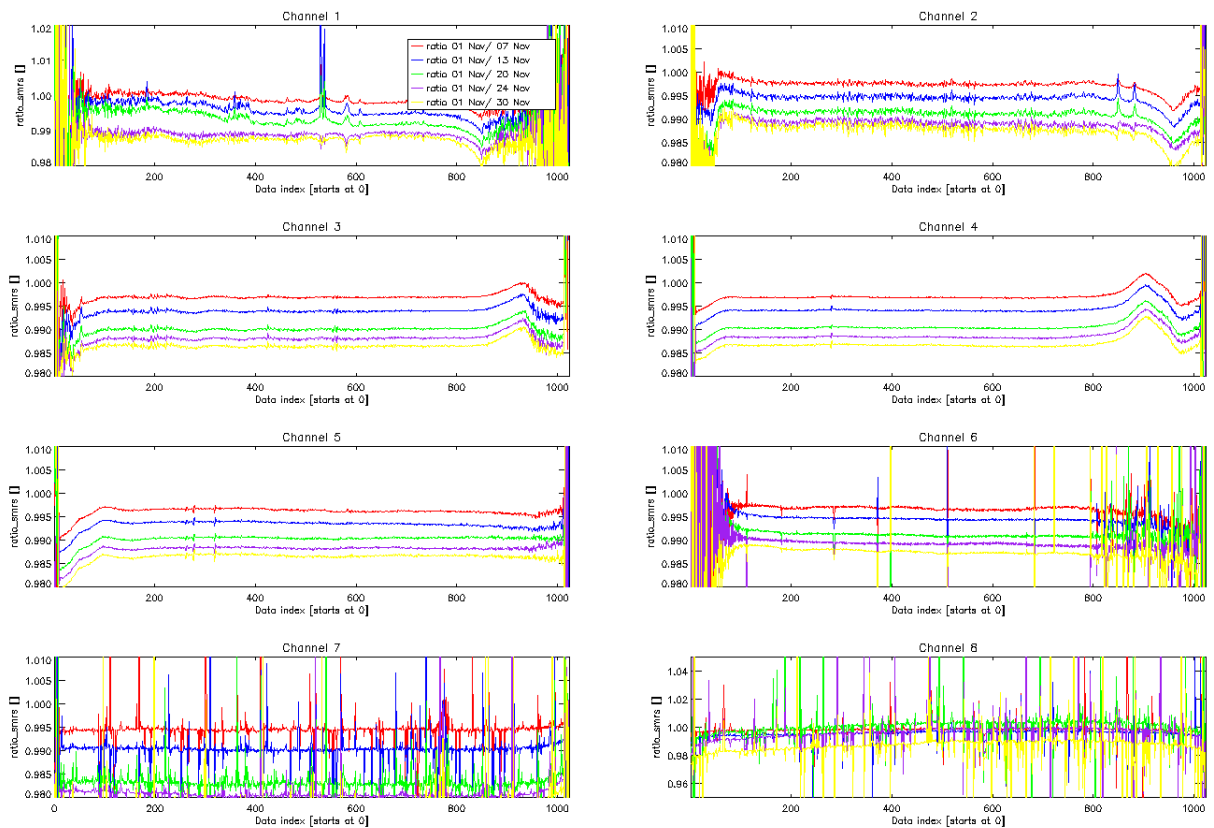


Fig. 5-2: SMR ratios per detector channel (changes during November 2004)

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 5.3 and Fig. 5-4 the leakage constant part fpn (fixed pattern noise) of the LK1 ADFs are analysed by determining the ratios of the fpn with a time distance of one orbit, one day, a week and a month.

For channels 1-5 and channel 6 the first part, during a week nearly no changes can be noticed. The IR channels show a lot of noise. Here an improvement is foreseen with a new processor version, where the time dependent part of the leakage current will be considered.

LK1 ADF analysis, ratios of fpn const, November 2004

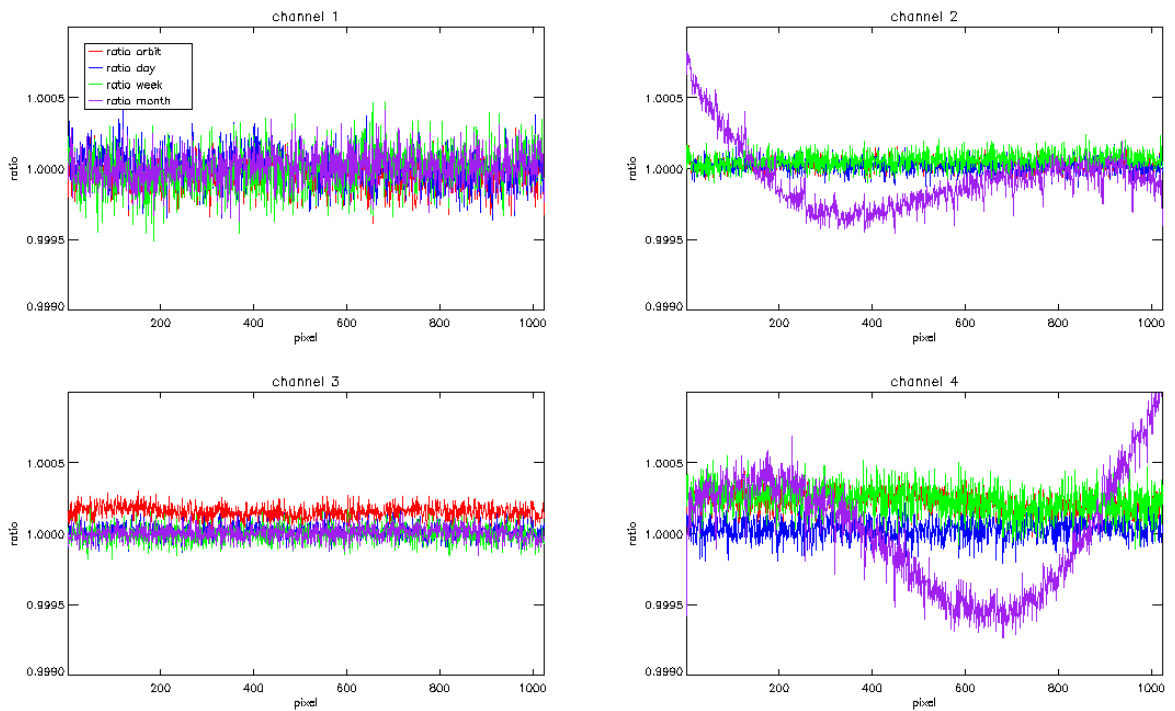


Fig. 5-3: dark current ratios (constant part) channel 1-4 during November 2004

LK1 ADF analysis, ratios of fpn const, November 2004

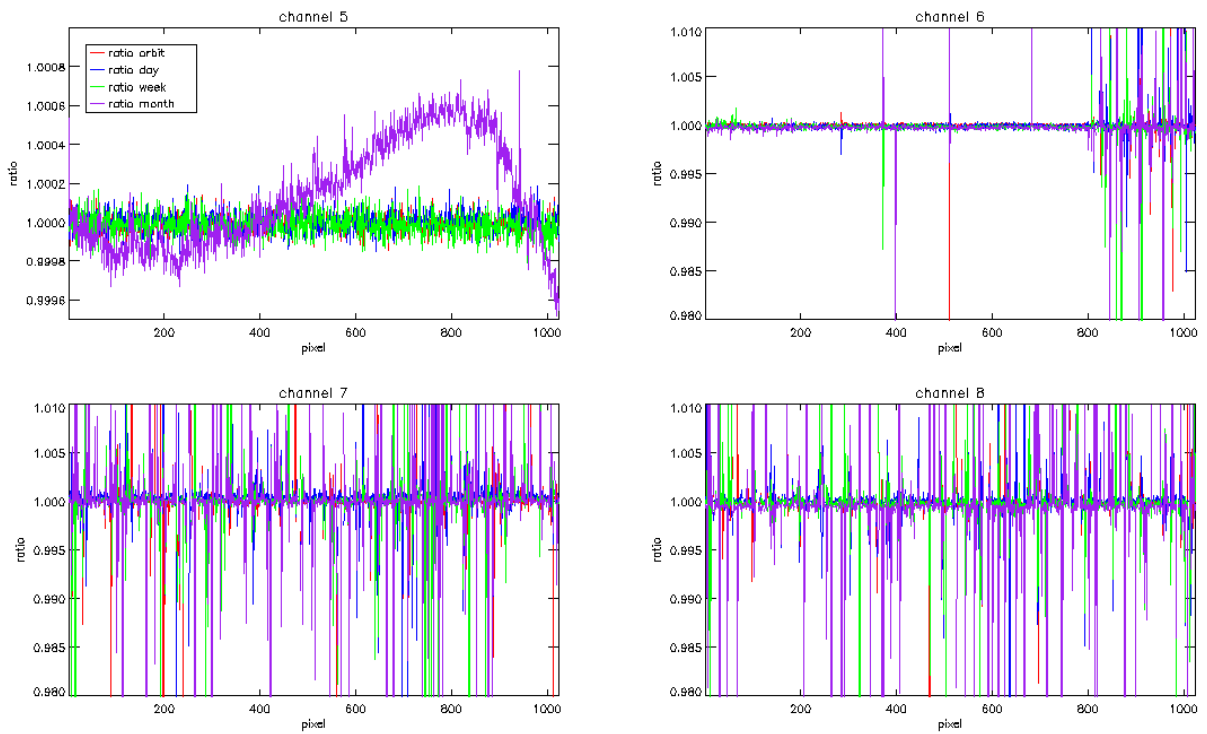


Fig. 5-4: dark current ratios (constant part) channel 5-8 during November 2004

5.1.6 Pointing Performance

Future reports will contain analyses of pointing performance.

6 LEVEL 2 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 PO-RS-MDA-GS-2009_15_3H. The disclaimer at http://envisat.esa.int/dataproducts/availability/disclaimers/PQD_0071_SCI_NL_2P.pdf describes known artefacts. Table 5.1-1 shows the implementation dates of the IPF at the different PDS processing centres and the main modifications implemented.

Date	Version	Description of changes
21-AUG-2004	IPF version 5.04 has been activated from orbit 12942 at: PDHS-K	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: <ul style="list-style-type: none"> • The incorrect handling of the season index 4 has been corrected. • 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
20-AUG-2004	IPF version 5.04 has been activated from 12750 (+ reprocessing of some older products) at: LRAC	
16-AUG-2004	IPF version 5.04 has been activated from orbit 12823 at: PDHS-E	
12-AUG-2004	IPF version 5.04 has been activated 12879 (+ reprocessing of some older products)at: DPAC	
31-MAR-2004	IPF version 5.01 has been activated at: DPAC	

24-MAR-2004	IPF version 5.01 has been activated at: PDHS-E PDHS-K LRAC	<ul style="list-style-type: none"> • minor changes in MPI and USA climatology description • latitude grids fixed • list of surface types fixed, note about vegetation index added • O₃ FM formula fixed sizes of SCIA FM spectra fixed latitude zones fixed • solar zenith angle grid fixed
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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 O₃ consistency checking

Future reports will contain information on this issue.

6.3 NO₂ consistency checking

NO₂ vertical column density values of one month were averaged using QUADAS. Diurnal variations have not been corrected (no model applied). These graphs are aimed at processing consistency checking and are not intended for geophysical interpretation.

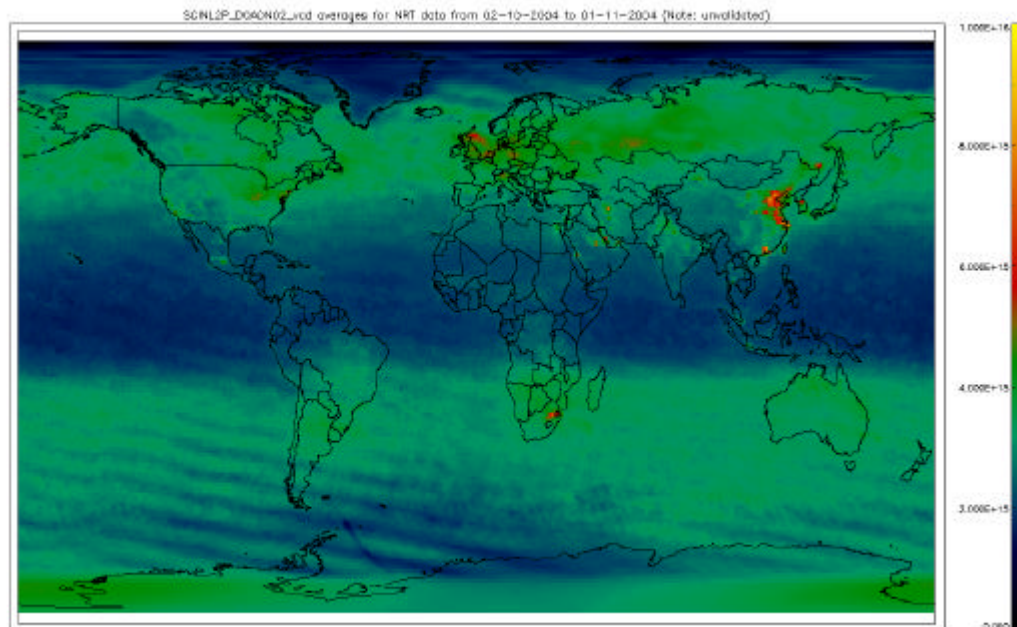


Fig. 7-1: NO₂ VCD monthly average

7 VALIDATION ACTIVITIES AND RESULTS

7.1 *SCIAMACHY-ECMWF Comparisons*

Summary of the ECMWF SCIAMACHY monthly report for November 2004 (SCI_RV__2P):

- SCIAMACHY data quality fairly stable in November.
- SCIAMACHY large drift as compared to ECMWF model in the Northern Hemisphere and throughout the month.
- SCIAMACHY data about 20 DU higher in the global mean than ECMWF ozone values.
- The monitoring report was produced with the operational ECMWF model, CY28R3.

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.

STATISTICS FOR OZONE FROM ENVISAT / SCIAMACHY
MEAN OBSERVATION [DU]
DATA PERIOD = 2004110100 - 2004113018
EXP = 0001, LAYER = 01, 0.10 - 1013.25 HPA
Min: 96.391 Max: 932.68 Mean: 293.45

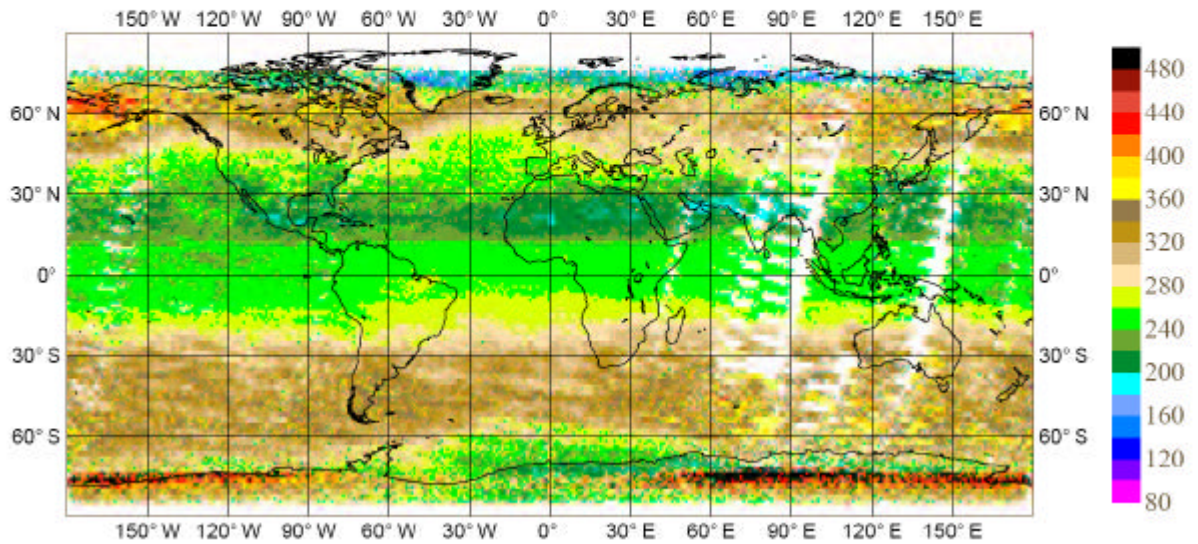


Fig. 7-2: Ozone Mean ECMWF November 2004

7.2 *Statistics from Intercomparison with External Data*

Future reports will contain information on this issue.

APPENDIX A

Type	ADF Name
PE1_AX	SCI_PE1_AXVIEC20040604_103811_20040602_000000_20900101_000000
	SCI_PE1_AXVIEC20041130_110044_20041125_000000_20900101_000000
	SCI_PE1_AXVIEC20050105_094321_20041216_000000_20900101_000000
SP1_AX	SCI_SP1_AXVIEC20041029_102928_20041027_000000_20050401_000000
	SCI_SP1_AXVIEC20041130_122710_20041125_000000_20050501_000000
	SCI_SP1_AXVIEC20050105_095309_20041216_000000_20050601_000000
SU1_AX	SCI_SU1_AXVIEC20041105_001009_20041102_013102_20041109_112319
	SCI_SU1_AXVIEC20041105_071833_20041101_002157_20041108_015751
	SCI_SU1_AXVIEC20041106_000338_20041103_053032_20041110_224228
	SCI_SU1_AXVIEC20041107_000336_20041104_002759_20041111_020132
	SCI_SU1_AXVIEC20041108_000332_20041105_013704_20041112_121625
	SCI_SU1_AXVIEC20041109_000316_20041106_035557_20041113_114500
	SCI_SU1_AXVIEC20041110_000321_20041107_003401_20041114_020914
	SCI_SU1_AXVIEC20041111_000405_20041108_000229_20041115_013822
	SCI_SU1_AXVIEC20041116_000315_20041113_033311_20041120_130452
	SCI_SU1_AXVIEC20041117_000320_20041114_014808_20041121_123349
	SCI_SU1_AXVIEC20041118_000319_20041114_225832_20041122_120213
	SCI_SU1_AXVIEC20041118_073416_20041112_022516_20041119_115704
	SCI_SU1_AXVIEC20041118_074524_20041111_000829_20041118_014409
	SCI_SU1_AXVIEC20041119_000308_20041116_070132_20041123_223455
	SCI_SU1_AXVIEC20041119_074628_20041109_011133_20041116_115027
	SCI_SU1_AXVIEC20041119_145252_20041110_065042_20041117_222256
	SCI_SU1_AXVIEC20041121_000313_20041118_071227_20041125_213210
	SCI_SU1_AXVIEC20041122_000327_20041119_005802_20041126_215725
	SCI_SU1_AXVIEC20041123_014534_20041120_002629_20041127_015916
	SCI_SU1_AXVIEC20041124_014656_20041121_012832_20041128_213523
	SCI_SU1_AXVIEC20041125_012631_20041122_010401_20041129_224649
	SCI_SU1_AXVIEC20041126_011518_20041123_064153_20041130_125201
	SCI_SU1_AXVIEC20041127_015831_20041124_013415_20041201_214316
	SCI_SU1_AXVIEC20041130_041624_20041127_043538_20041204_214937
	SCI_SU1_AXVIEC20041201_025925_20041128_010944_20041205_211824
	SCI_SU1_AXVIEC20041202_030850_20041129_003810_20041206_021500
	SCI_SU1_AXVIEC20041203_062902_20041130_025851_20041207_123039
	SCI_SU1_AXVIEC20041205_020241_20041202_004307_20041209_022121
	SCI_SU1_AXVIEC20041206_014145_20041203_015047_20041210_220119
	SCI_SU1_AXVIEC20041207_020632_20041204_012129_20041211_120549
	SCI_SU1_AXVIEC20041208_011837_20041205_005611_20041212_020212
	SCI_SU1_AXVIEC20041210_013500_20041207_060106_20041214_213609
	SCI_SU1_AXVIEC20041212_005528_20041209_003029_20041216_020417
	SCI_SU1_AXVIEC20041215_002137_20041212_174738_20041219_192501
	SCI_SU1_AXVIEC20041216_034740_20041213_013542_20041220_104229

	<p> SCI_SU1_AXVIEC20041218_131242_20041215_065113_20041222_221717 SCI_SU1_AXVIEC20041219_015603_20041216_001035_20041223_013702 SCI_SU1_AXVIEC20041220_015207_20041217_011935_20041224_211606 SCI_SU1_AXVIEC20041221_033539_20041218_004759_20041225_222127 SCI_SU1_AXVIEC20041222_023905_20041219_001624_20041226_014213 SCI_SU1_AXVIEC20041223_032451_20041220_011901_20041227_211945 SCI_SU1_AXVIEC20050110_171029_20041214_101050_20041221_115004 SCI_SU1_AXVIEC20050111_100059_20041206_110035_20041213_124203 SCI_SU1_AXVIEC20050111_102835_20041208_000000_20041215_224206 SCI_SU1_AXVIEC20050111_105550_20041210_000000_20041217_213955 SCI_SU1_AXVIEC20050111_113923_20041211_000000_20041218_114507 SCI_SU1_AXVIEC20050111_140613_20041221_000000_20041228_223602 SCI_SU1_AXVIEC20050111_144845_20041223_202248_20041230_213307 SCI_SU1_AXVIEC20050111_150656_20041226_202330_20050102_213717 </p>
<p>LK1_AX</p>	<p> SCI_LK1_AXVIEC20041102_015407_20041101_063335_20041108_074112 SCI_LK1_AXVIEC20041102_022214_20041101_092137_20041108_110311 SCI_LK1_AXVIEC20041102_023237_20041101_110117_20041108_124226 SCI_LK1_AXVIEC20041102_023557_20041101_074005_20041108_092316 SCI_LK1_AXVIEC20041102_024317_20041101_124045_20041108_142224 SCI_LK1_AXVIEC20041102_030015_20041101_142121_20041108_155856 SCI_LK1_AXVIEC20041103_031542_20041102_060204_20041109_070937 SCI_LK1_AXVIEC20041103_032304_20041102_070725_20041109_085301 SCI_LK1_AXVIEC20041103_033910_20041102_085101_20041109_103056 SCI_LK1_AXVIEC20041103_040009_20041102_121009_20041109_135022 SCI_LK1_AXVIEC20041103_041303_20041102_134854_20041109_152852 SCI_LK1_AXVIEC20041103_043457_20041102_170308_20041109_184327 SCI_LK1_AXVIEC20041103_161358_20041103_081630_20041110_095848 SCI_LK1_AXVIEC20041103_165611_20041103_071217_20041110_081813 SCI_LK1_AXVIEC20041103_171131_20041103_095706_20041110_114011 SCI_LK1_AXVIEC20041104_175432_20041103_053032_20041110_071251 SCI_LK1_AXVIEC20041104_190933_20041103_163426_20041110_181142 SCI_LK1_AXVIEC20041104_192226_20041103_181117_20041110_194720 SCI_LK1_AXVIEC20041104_193214_20041104_063937_20041111_074858 SCI_LK1_AXVIEC20041104_194911_20041104_074702_20041111_092944 SCI_LK1_AXVIEC20041104_200153_20041104_092739_20041111_110820 SCI_LK1_AXVIEC20041104_200913_20041104_110706_20041111_124917 SCI_LK1_AXVIEC20041105_010623_20041104_124755_20041111_142719 SCI_LK1_AXVIEC20041105_011607_20041104_142531_20041111_160431 SCI_LK1_AXVIEC20041105_012316_20041104_160254_20041111_173958 SCI_LK1_AXVIEC20041106_020544_20041105_060709_20041112_071555 SCI_LK1_AXVIEC20041106_021230_20041105_071422_20041112_085750 SCI_LK1_AXVIEC20041106_041438_20041105_085607_20041112_103854 SCI_LK1_AXVIEC20041106_045010_20041105_103739_20041112_121625 SCI_LK1_AXVIEC20041106_045233_20041105_121515_20041112_135422 SCI_LK1_AXVIEC20041106_045425_20041105_153122_20041112_153409 SCI_LK1_AXVIEC20041106_045425_20041105_153122_20041112_171142 SCI_LK1_AXVIEC20041107_014442_20041106_082339_20041113_100549 SCI_LK1_AXVIEC20041107_023028_20041106_114343_20041113_132415 </p>

SCI_LK1_AXVIEC20041107_023554_20041106_150304_20041113_164158
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SCI_LK1_AXVIEC20041108_010612_20041106_053538_20041113_071830
SCI_LK1_AXVIEC20041108_022946_20041107_064225_20041114_075051
SCI_LK1_AXVIEC20041108_024239_20041107_074811_20041114_093545
SCI_LK1_AXVIEC20041108_025059_20041107_093435_20041114_111443
SCI_LK1_AXVIEC20041108_030248_20041107_111320_20041114_125448
SCI_LK1_AXVIEC20041108_031249_20041107_143036_20041114_143208
SCI_LK1_AXVIEC20041108_031441_20041107_143036_20041114_161025
SCI_LK1_AXVIEC20041109_021836_20041108_061406_20041115_072310
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SCI_LK1_AXVIEC20041109_023947_20041108_104148_20041115_122155
SCI_LK1_AXVIEC20041109_024744_20041108_122020_20041115_140157
SCI_LK1_AXVIEC20041109_030734_20041108_140056_20041115_153846
SCI_LK1_AXVIEC20041110_014609_20041109_072310_20041116_082935
SCI_LK1_AXVIEC20041110_015737_20041109_082831_20041116_101234
SCI_LK1_AXVIEC20041110_023807_20041109_101112_20041116_115027
SCI_LK1_AXVIEC20041110_025047_20041109_114847_20041116_133020
SCI_LK1_AXVIEC20041110_030605_20041109_132828_20041116_150755
SCI_LK1_AXVIEC20041111_012256_20041109_054125_20041116_072439
SCI_LK1_AXVIEC20041111_014614_20041109_164434_20041116_181940
SCI_LK1_AXVIEC20041111_030832_20041110_111907_20041117_125711
SCI_LK1_AXVIEC20041111_031533_20041110_065042_20041117_075747
SCI_LK1_AXVIEC20041111_032557_20041110_125956_20041117_143757
SCI_LK1_AXVIEC20041111_033329_20041110_075603_20041117_094033
SCI_LK1_AXVIEC20041111_040116_20041110_093843_20041117_112011
SCI_LK1_AXVIEC20041111_040514_20041110_143636_20041117_161511
SCI_LK1_AXVIEC20041111_041320_20041110_135903_20041117_142105
SCI_LK1_AXVIEC20041111_041536_20041110_161301_20041117_175227
SCI_LK1_AXVIEC20041116_014439_20041114_172613_20041121_190313
SCI_LK1_AXVIEC20041116_020745_20041115_055324_20041122_070226
SCI_LK1_AXVIEC20041116_021945_20041115_070102_20041122_084357
SCI_LK1_AXVIEC20041116_022737_20041115_084234_20041122_102254
SCI_LK1_AXVIEC20041116_023727_20041115_102106_20041122_120213
SCI_LK1_AXVIEC20041116_024717_20041115_120046_20041122_134202
SCI_LK1_AXVIEC20041116_025609_20041115_134027_20041122_151925
SCI_LK1_AXVIEC20041116_083829_20041110_193222_20041117_211431
SCI_LK1_AXVIEC20041116_084218_20041110_175146_20041117_192750
SCI_LK1_AXVIEC20041116_085739_20041111_233657_20041119_011236
SCI_LK1_AXVIEC20041116_090544_20041111_190050_20041118_203749
SCI_LK1_AXVIEC20041116_091334_20041111_154322_20041118_172032
SCI_LK1_AXVIEC20041116_091740_20041111_140655_20041118_154528
SCI_LK1_AXVIEC20041116_092147_20041111_122523_20041118_140757
SCI_LK1_AXVIEC20041116_092532_20041111_104734_20041118_122658
SCI_LK1_AXVIEC20041116_092932_20041111_090807_20041118_104955
SCI_LK1_AXVIEC20041116_093350_20041111_072730_20041118_090955
SCI_LK1_AXVIEC20041116_093807_20041111_061909_20041118_072910
SCI_LK1_AXVIEC20041116_094133_20041111_025648_20041118_043922
SCI_LK1_AXVIEC20041116_094935_20041111_000829_20041118_014409

SCI_LK1_AXVIEC20041116_101309_20041112_182918_20041119_201029
SCI_LK1_AXVIEC20041116_102131_20041112_151149_20041119_165255
SCI_LK1_AXVIEC20041116_102448_20041112_133427_20041119_151344
SCI_LK1_AXVIEC20041116_102857_20041112_115542_20041119_133609
SCI_LK1_AXVIEC20041116_103255_20041112_101602_20041119_115704
SCI_LK1_AXVIEC20041116_103658_20041112_083634_20041119_101725
SCI_LK1_AXVIEC20041116_104059_20041112_065449_20041119_083824
SCI_LK1_AXVIEC20041116_104501_20041112_054737_20041119_065749
SCI_LK1_AXVIEC20041116_105313_20041112_022516_20041119_040818
SCI_LK1_AXVIEC20041116_112230_20041113_175745_20041120_193445
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