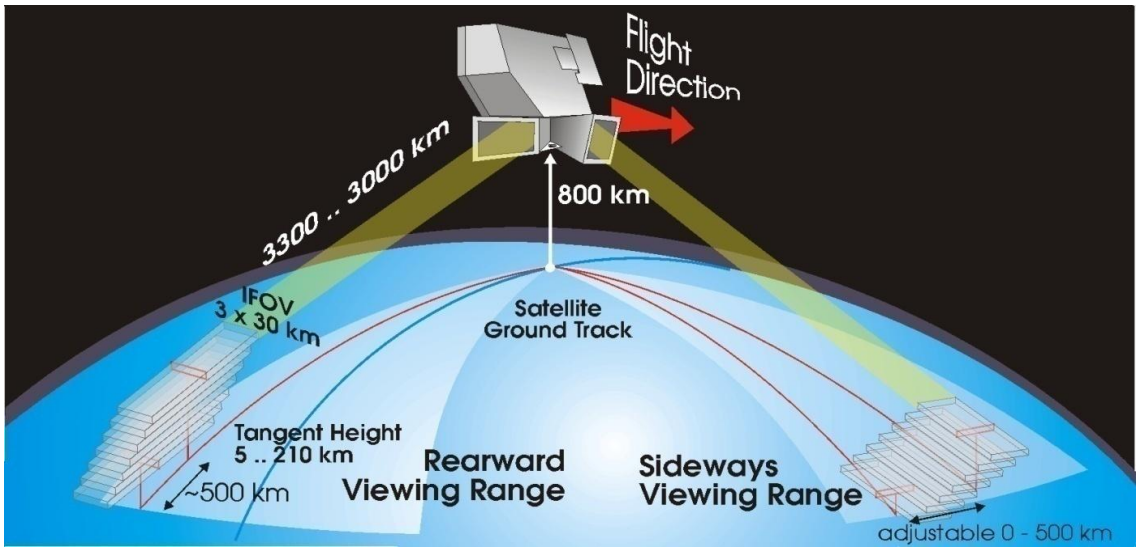
DOCUMENT

ENVISAT MIPAS MONTHLY REPORT:

MARCH 2012



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1 INTRODUCTION

The MIPAS Monthly Report (MR) document describes current status and recent changes of the ENVISAT MIPAS instrument, its data processing chain and data products. The MR is based on the analysis results obtained by the IDEAS (Instrument Data quality Evaluation and Analysis Service) team, merged with inputs received from the different groups working on MIPAS operations, calibrations, products validation and data quality.

The following teams are part of the MIPAS Quality Working Group (QWG):

- ESRIN-IDEAS
- ESOC
- ESTEC
- ABB BOMEM
- Oxford University (OU)
- IFAC-CNR
- EADS-Astrium GmbH
- Leicester University
- LISA
- IMK
- University of Bologna
- ISAC-CNR
- IAA
- DLR
- ECMWF

In addition, the QWG interfaces with the Atmospheric Chemistry Validation Team (ACVT).

1.1 Scope

The main objective of the MR is to give, on a regular basis, the status of MIPAS instrument and data acquisition performances, results of anomaly investigations, calibration activities and validation campaigns.

1.2 Highlights

- **MIPAS instrument performance and quality of operational products are nominal for the reporting month.**
- **A single known instrument unavailability has occurred during the month (i.e. IDU Velocity Error Slide 2).**
- **No products' anomalies have been detected during this month. Details on all MIPAS detected anomalies can be found in the Anomaly Report web page: http://earth.eo.esa.int/pcs/envisat/mipas/reports/anomalies/**
- **No special operations have been commanded during the reporting month; the baseline planning (4 days NOM + 1 day UA + 4 days NOM + 1 day MA) has been followed.**
- **The IPF 5.06 is nominally running in NRT and OFL processing centres for the generation of Level 1 and Level 2 MIPAS products.**
- **MIPAS re-processing to Level 2 products for the whole mission was completed with IPF 5.05. The re-processed products are available at D-PAC in the eoa-dp.eo.esa.int ftp server.**
- **MIPAS full mission Level 2 re-processing with the processor prototype ML2PP V6 has been completed (till year 2010) and the data are available at D-PAC for validation purpose only by the expert and validation teams.**

1.3 Report Summary

- The instrument temperatures long term analysis doesn't show any significant degradation; the seasonal trend is clearly visible as well as the overall increase of around 1.2 K after the ENVISAT orbit lowering (see § 2.3.1).
- The cooler performs well during the reporting month; the vibrations are below the warning level of 8 mg (see § 2.3.3).
- The gain calibration has been nominally performed during the reporting month and the associated auxiliary files have been disseminated in the Ground Segment. During the reporting month the maximum of gain increase in all the MIPAS bands remains well below the acceptance criterion of 1%/week (see §3.1).
- The line-of-sight calibration has been nominally performed in the reporting month. No auxiliary files have been disseminated since the mispointing remains within the chosen range of variability of -30 mdeg – last disseminated file (see §3.2).
- MIPAS weekly NRT statistics show the improvement of the instrument performances since 2005 and the increase of duty cycle in the last years. The availability of L1 NRT products is also presented in this paragraph (see §4.2).
- The availability of L1 OFL products with respect to the expected time is stable around 95% during the last months (see §4.3).
- The analysis of the accumulated gain allows monitoring the level of detector ice contamination. During the last years we observed a decreasing slope of the gain curve, showing that the detector is more and more "ice-free". This is due to the better performances of the cooler obtained with more frequent decontamination. On a long term basis we observe that the gain in band A after each decontaminations is slightly increasing due to the loss of sensitivity in channel A (see §6.2.1).
- The absolute mispointing is stable around a value of -25 mdeg. The seasonal variations of the pointing error are small and below the fixed threshold of 8 mdeg. Less and less stars are available in the last months for the LOS calibration, as a result the mispointing estimation is less precise now with respect to the beginning of mission (see §6.2.2).
- The monitoring of the linear spectral correction factor shows that the variations over more than two years of operations are really small (~2 ppm). The observed spreading of the points is due to the noise in the determination of this parameter (see §6.2.3).
- The long term trend of ADC max counts in channel A1 shows a strong correlation with the instrument self-emission and with the detector ice contamination. The long term trend of ADC Max counts in the MIPAS channels highlights sensitivity degradation in channels A and B (in the order of 0.2%/month). The C and D channels don't show any degradation with time (see §6.2.4).

- The long term monitoring of the detected spikes shows that the number of detected spikes in channels A1, A2, B1 and B2 is varying with time with some peaks probably related to variation of the solar activity. The channels C and D (the detector most affected by spikes) didn't show any trend so far. From this analysis we can conclude that the number of detected spikes is too small to impact the L1b products quality (see §6.2.5).
- The NRT and OFL MIPAS daily reports for all levels of production can be accessed at the following web page:
  http://earth.esa.int/pcs/envisat/mipas/reports/daily/
- The NRT daily maps and OFL monthly maps for MIPAS Level 2 products can be accessed at the following web pages:
  http://earth.eo.esa.int/pcs/envisat/mipas/reports/dailymaps/
  http://earth.eo.esa.int/pcs/envisat/mipas/reports/monthlymaps/

2 INSTRUMENT STATUS

2.1 Instrument Planning

The MIPAS planning for the reporting month is briefly described in this section:

- The duty cycle is set to 100% since 1st December 2007
- The automatic IDU re-initialization was disabled on 3rd March 2008; a manual recovery is now implemented at ESOC in case of instrument anomaly
- All measurement modes are acquired in double slide operations with medium resolution (41% - 1.64 sec sweeps) and asymmetric transitory sweeps
- Radiometric Gain calibrations (RGC) are planned once per day
- Deep Space (DS) offset is planned every 800 sec
- Rearward Line-Of-Sight (LOS) calibrations are planned every 10 days
- The baseline planning is applied for the reporting month consisting of 4 days NOM + 1 day UA + 4 days NOM + 1 day MA.
- No special operations have been commanded during the reporting month.

An overview of the instrument modes planned during the reporting month is presented in Table 1. In this table the calibration measurements are not reported. Detailed information about MIPAS mission planning can be found in the mission planning excel sheet available on Uranus server at the following location:

ftp://uranus.esrin.esa.it/Mission_Planning/MIPAS/

Table 1 – Overview of the instrument mode changes planned during the reporting month

Date	Orbits	Instrument Mode
01 – 03 Mar	52315 – 52357	NOM – Nominal
04 Mar	52358 – 52372	MA - Middle Atmosphere
05 – 08 Mar	52373 – 52429	NOM – Nominal
09 Mar	52430 – 52444	UA - Upper Atmosphere
10 – 13 Mar	52445 – 52501	NOM – Nominal
14 Mar	52502 – 52516	MA - Middle Atmosphere
15 – 18 Mar	52517 – 52573	NOM – Nominal
19 Mar	52574 – 52587	UA - Upper Atmosphere
20 – 23 Mar	52588 – 52645	NOM – Nominal
24 Mar	52646 – 52659	MA - Middle Atmosphere

Date	Orbits	Instrument Mode
25 – 28 Mar	52660 – 52717	NOM – Nominal
29 Mar	52718 – 52731	UA - Upper Atmosphere
30 – 31 Mar	52732 – 52760	NOM – Nominal

2.2 Instrument Availability

The instrument unavailability for the reporting month is provided in the table below.

Table 2 – List of MIPAS unavailability during the reporting month

Start time	Stop time	Orbits		Planned	Reference	Description
		start	stop			
29 Feb 2012 22:18:05	1 Mar 2012 06:00:00	52313	52318	YES	EN-UNA-2012-0042	ENVISAT OCM manoeuvre
15 Mar 2012 01:52:50	15 Mar 2012 07:21:00	52517	52520	No	EN-UNA-2012-0050	Heater/Refuse mode due to IDU SYS TOL ERR

2.3 Instrument Performances

2.3.1 THERMAL PERFORMANCE

The following two plots (**Figure 1** and **Figure 2**) show the long-term trend of the IDU and MIO baseplate temperatures (analysis performed by EADS-Astrium GmbH). The yearly seasonal variations and the interferometer heater switching (see Table 3) are clearly visible within these plots. Furthermore the effect of instrument decontamination is also evident with a reduction of the instrument temperatures.

After the ENVISAT orbit lowering a temperature increase of about 1.2 K was observed in all MIPAS HK data. The temperature increase is likely due to the permanent KBS-3 switch on (whereas KBS-2 – used for few orbital windows of data transfer to ARTEMIS – is definitively switched off) rather than to the commanded ENVISAT altitude decrease.

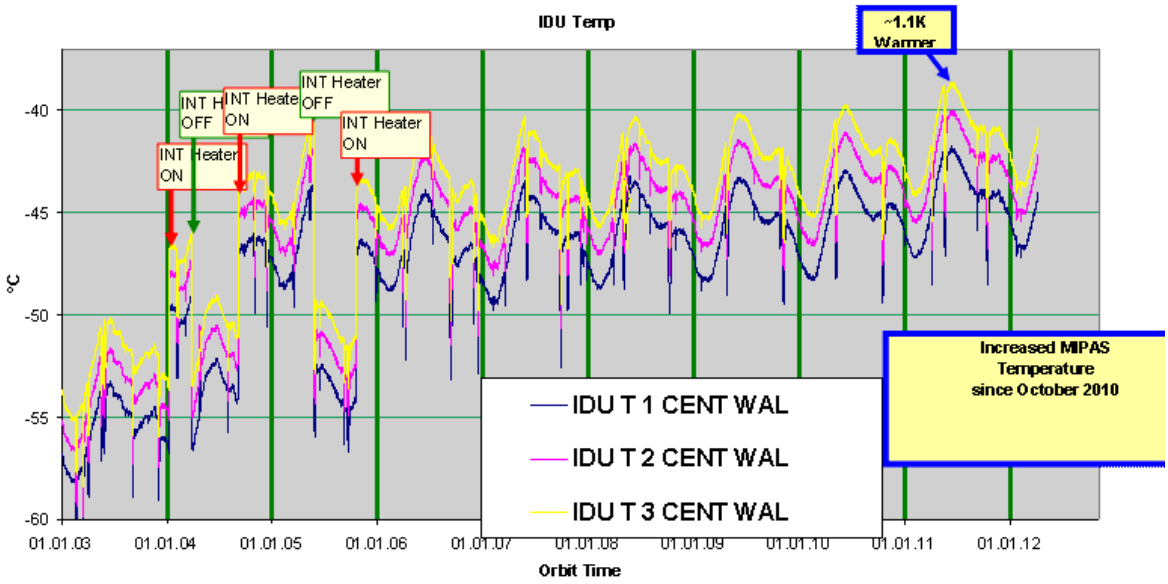

Figure 1 – IDU temperatures since January 2003 (courtesy of Astrium)

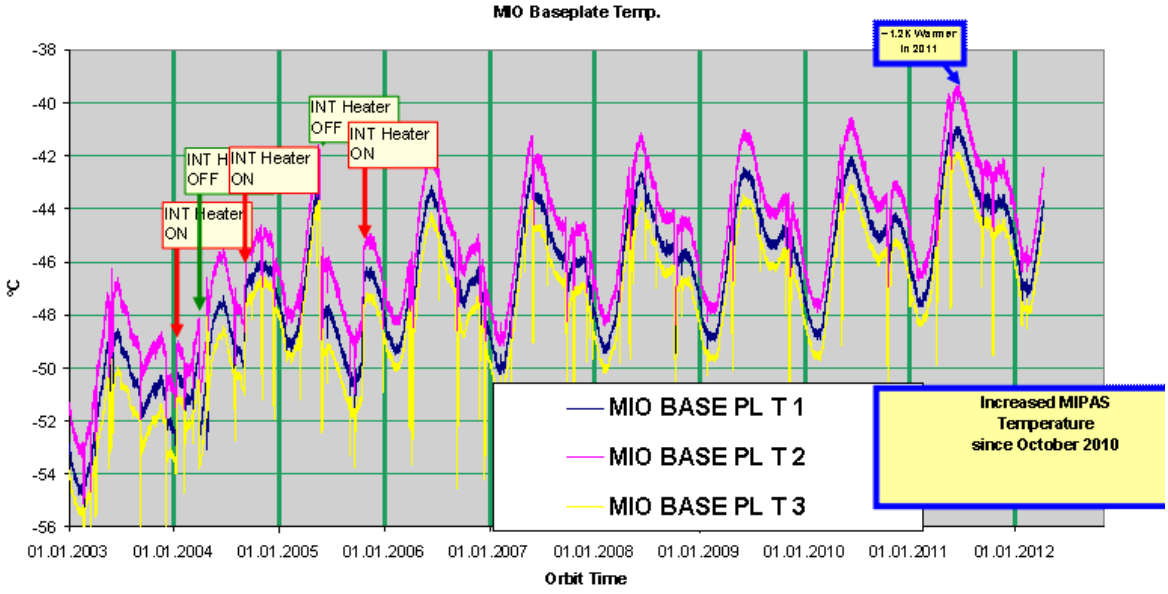

Figure 2 – MIO baseplate temperatures since January 2003 (courtesy of Astrium)

The time of switch-on/off of the INT heater are reported in the table below.

Table 3 – Schedule of the interferometer heater switch-on/off

Date	Description
09 Jan 2004	Heater on
26 Mar 2004	Heater off
03 Sep 2004	Heater on
25 May 2005	Heater off
17 Oct 2005	Heater on

2.3.2 INTERFEROMETER PERFORMANCE

The historical record of differential speed errors can be seen in Figure 3 (analysis carried out by Astrium). The -4% differential speed error is an indicator for non-perfections in the IDU system. This historical trend can be summarized in the following bullets:

- The very bad periods of August 2005, October 2005 and February 2006 can be distinguished. During these periods the INT velocity errors occurred with high frequency and the differential speed errors reached the maximum value of about 70%. It was noticed that when this parameter reaches such value the number of turn-around anomalies starts to increase significantly.
- The positive effect of the heater switch-on (end of October 2005) can be appreciated with a drastic reduction of the occurrence of differential speed errors.
- The impact of the ENVISAT anomaly on 6th April 2006 is manifest in this plot; this anomaly yield to improved cooler performances, due to the not intended decontamination, and reflected into a significant improvement of the INT performances, with a reduction of -4% differential speed errors.
- The effect of the planned decontamination of September 2006 is not visible within this plot; in fact the instrument performances were already very good before the decontamination and the situation did not changed afterward.
- During the last months of year 2006 the -4% differential speed error remained constant around a value of 30%. A further reduction of this parameter to 15 – 20% was observed since Sep 2007.
- Finally the parameter reached a level close to beginning of mission since March 2008. This observation confirms that the instrument performances are continuously improving despite the fact that the duty cycle was progressively increased since May 2006.

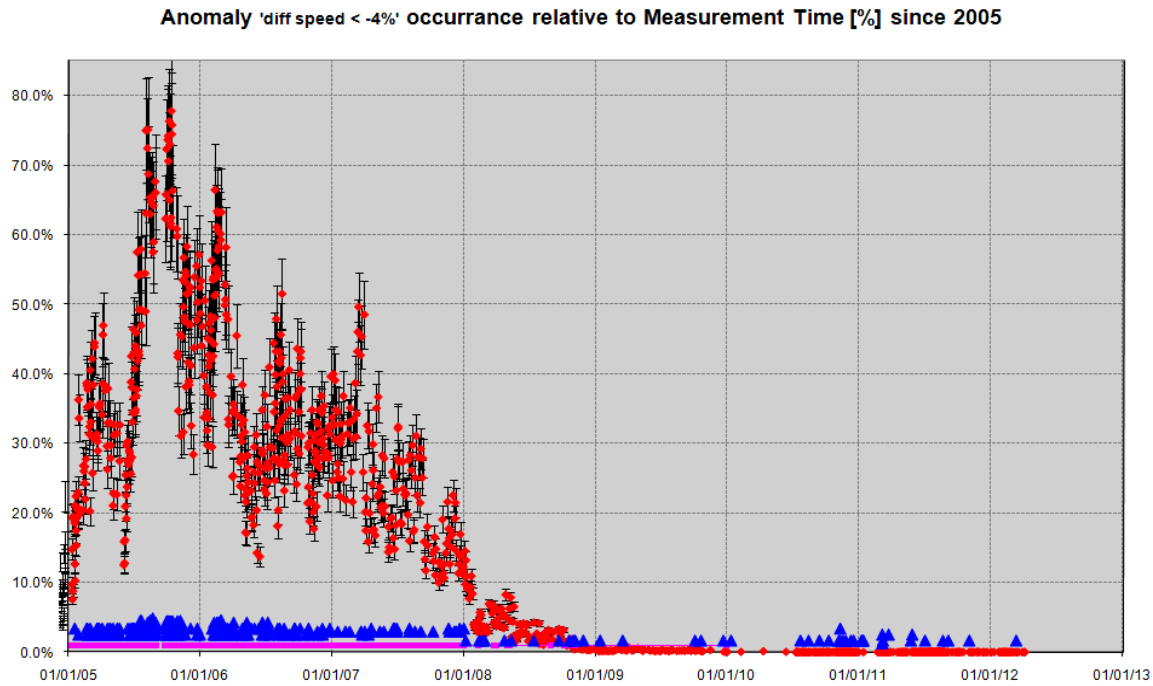

Figure 3 – Occurrence of -4% differential speed error relative to measurement time (%) since January 2005 (courtesy of Astrium)

The number of INT errors per quarter and the different type of errors since 2006 can be seen in the Figure 4 (analysis carried out by Astrium). The following points can be highlighted from this long term monitoring:

- The occurrence of turn-around errors was drastically reduced demonstrating that the switch-on of the INT-heater (Oct 2005), the better performances of the cooler and the more frequent decontaminations improved significantly the instrument performances.
- It is important to stress that since Oct 2006 only 3 turn-around errors have been detected. This type of error was the most frequent during the first year of the RR mission (2005) and it significantly increased when the INT heater was switched off (Aug – Oct 2005).
- On the other hand the frequency of the start-up failures that occur after an instrument interruption didn't change significantly in the last months, showing that this type of error is not correlated with INT temperatures or cooler performances.
- It has to be noted that the start-up failure in 2006 and 2007 were often caused by the automatic re-initialization procedure. In fact in an ARB held in Dec 2007 it was decided to stop the automatic recovery and resume the manual

intervention at ESOC. This new procedure is operational since March 2008; since that date we had very few IDU anomalies.

- Nowadays the turn-around errors have almost disappeared and we have about one start-up failure per quarter of continuous operations.
- In conclusion the analysis of the INT anomaly historical record demonstrates that the instrument is performing very well in the last years and that the increase of duty cycle (up to 100%) did not affect the instrument performances.

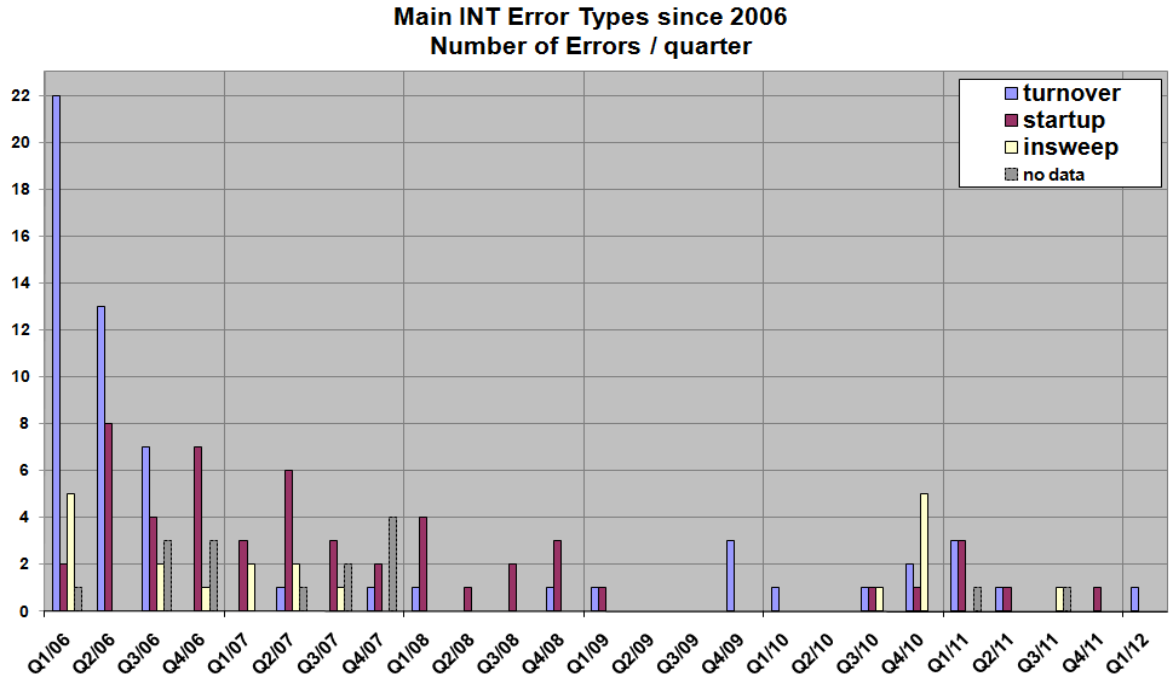

Figure 4 – Main INT error types since January 2006 (courtesy of Astrium)

2.3.3 COOLER PERFORMANCE

The **Figure 5** shows the historical trend of the cooler displacer and compressor vibration level. The variations of the cooler vibrations are linked to INT heater switching and decontamination events; the decontaminations can be planned or caused by platform switch-off. Furthermore the seasonal dependency of the cooler vibrations can be clearly appreciated, indeed the vibrations increase during the hottest period of the year (May–Jun), while are decreasing on winter time (Dec–Jan). From the plot the following historical events can be distinguished:

- A significant decrease of the cooler vibrations was detected on June 2005 after the decontamination and the switch-off of the INT-heater. In general the strategy of

periodic decontamination helped to improve significantly the cooler performances since 2006.

- The cooler compressor reaches the highest level around the hottest period of the year (May–Jun), when the cooler needs to work much more to keep the instrument at working temperature.
- After the ENVISAT orbit lowering a temperature increase of about 1 K was observed in all MIPAS HK data, as described previously. The temperature increase caused a degradation of the cooler performances during the hottest period of the year; in particular during June 2011 the cooler compressor vibrations reached several times the warning level of 8 mg. A work-around solution will be put in place starting from 2012, switching off the INT Heater during the hottest period of the year, i.e. May – September.

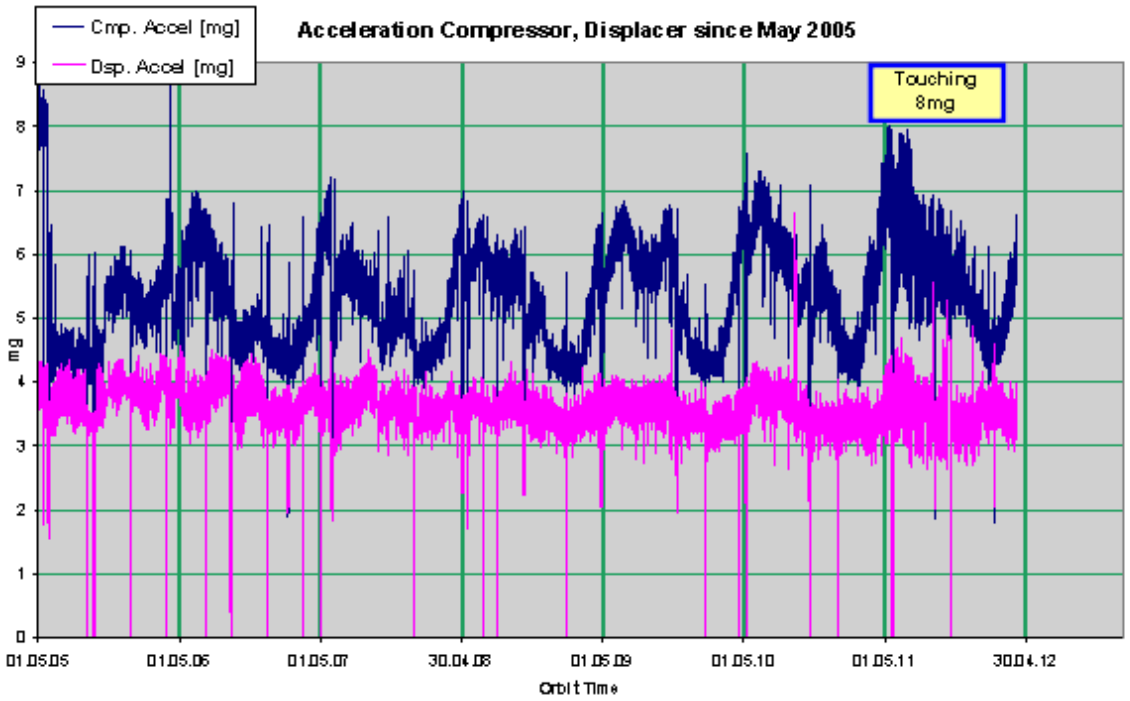

Figure 5 – Cooler Displacer and Compressor vibration level, historical trend since May 2005 (courtesy of Astrium)

3 INSTRUMENT CALIBRATION

3.1 Radiometric Calibration

The radiometric calibration is performed on a weekly basis; in addition the gain is always updated after long mission interruptions, in case of instrument anomalies or when the instrument thermal conditions change (e.g. heater or cooler switching). The maximum of the gain increase between two consecutive disseminated gains in band A (where we expect the maximum of gain variation due to ice contamination) is closely monitored. The increase of gain in band A is expected to be less than 1%/week at its maximum.

The following plots show the relative changes of gain for the reporting month from one week to the other and for all the bands. Some non-corrected spikes are observed on *band AB* and *B* always at the same spectral position, this behaviour is well known and it is due to the aliasing spike caused by the on-board IGM rounding and decimation.
The maximum of the gain increase is obtained as the maximum of the curves of gain relative difference presented in the previous plots. The maxima in *band A* are reported in Table 4. In this table it is also reported the long term increase, in this case a reference gain corresponding to low contaminated conditions is used; note that the reference gain was updated on September 2006 after the yearly planned decontamination.

We can observe that during the reporting month the weekly increase remains well below the acceptance criterion of 1% per week. On a long term basis we observe that we have to slightly increase the gain in band A after each decontamination; this is due to the sensitivity degradation of channel A, which is of the order of 0.2%/month.

Table 4 – Weekly and long term gain increase for gains disseminated during the reporting month in *band A*. In red the decrease of gain factor after decontaminations planned in the reporting month.

Orbit	Date	Weekly max increase [%]	Long term max increase[1] [%]
52404	07/03/2012	0.78	16.22
52506	14/03/2012	0.55	16.69
52623	22/03/2012	0.90	17.42
52708	28/03/2012	0.38	17.70

[1] Note that the long term increase is calculated using a different reference gain function, therefore this value doesn't correspond to a cumulative sum of the weekly increase.

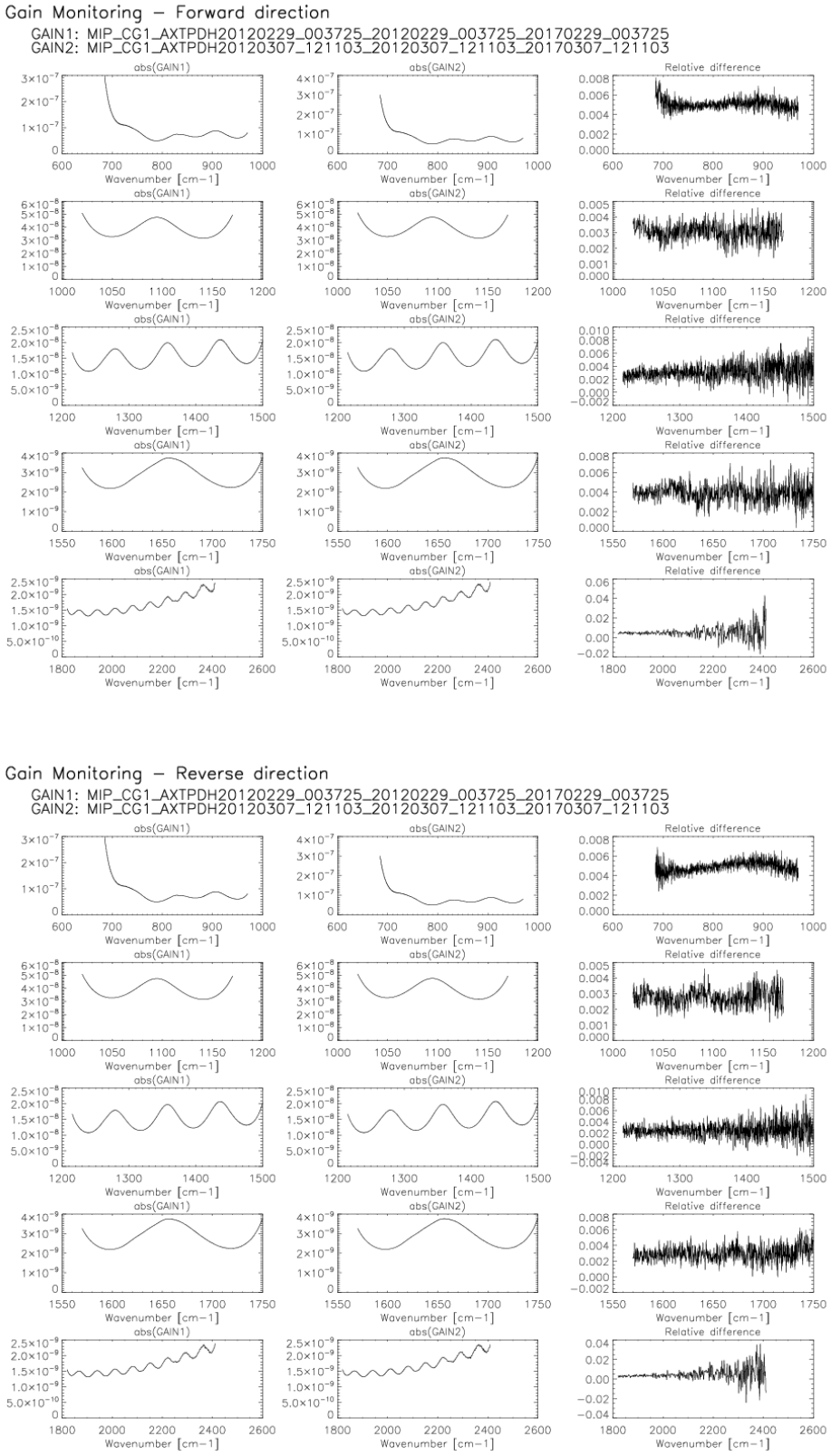

Figure 6 – Relative variations of radiometric gain for consecutive disseminated gains in band A for forward and reverse directions

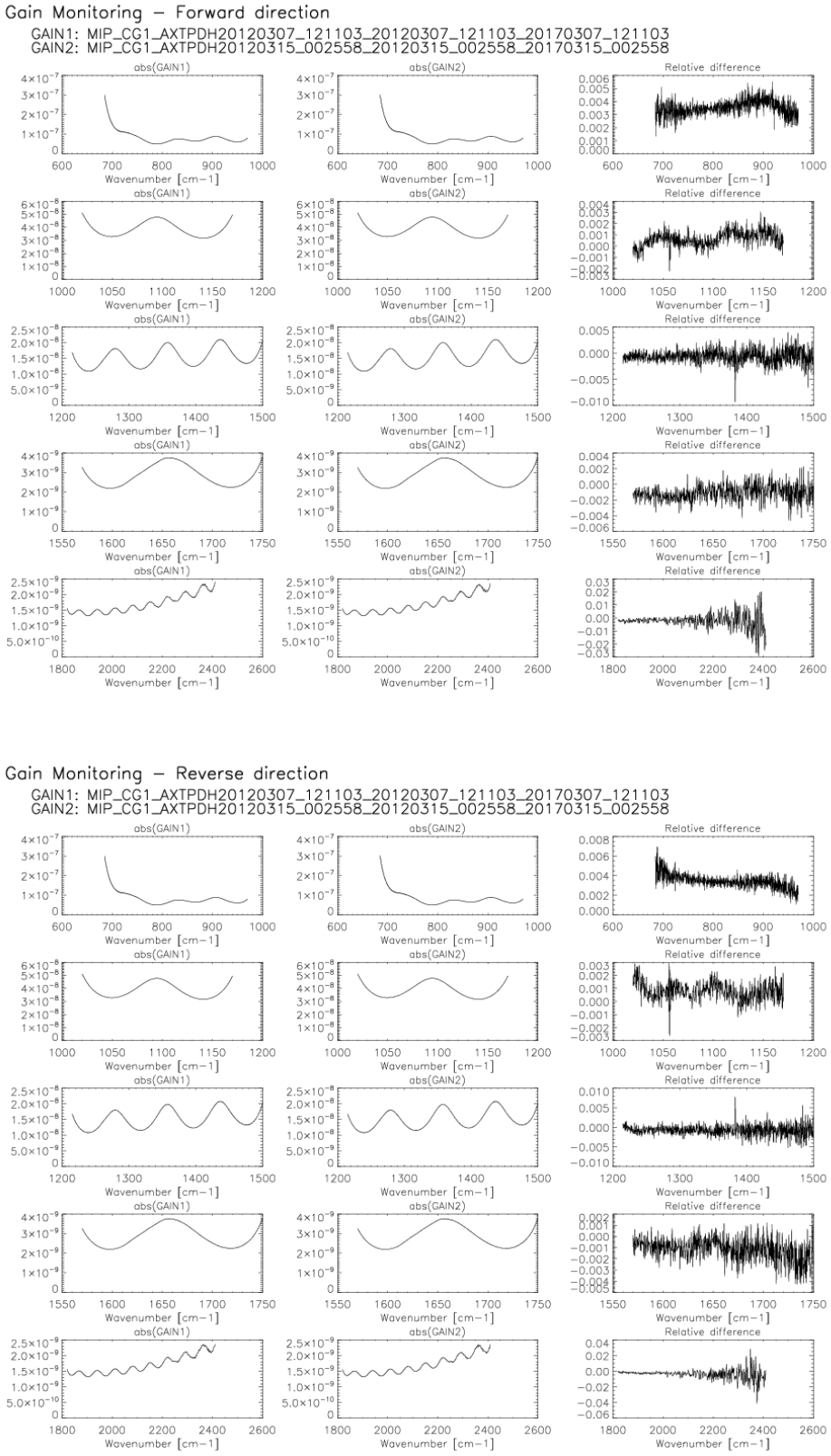

Figure 7 – The same as Figure 6 but for a subsequent gain measurement

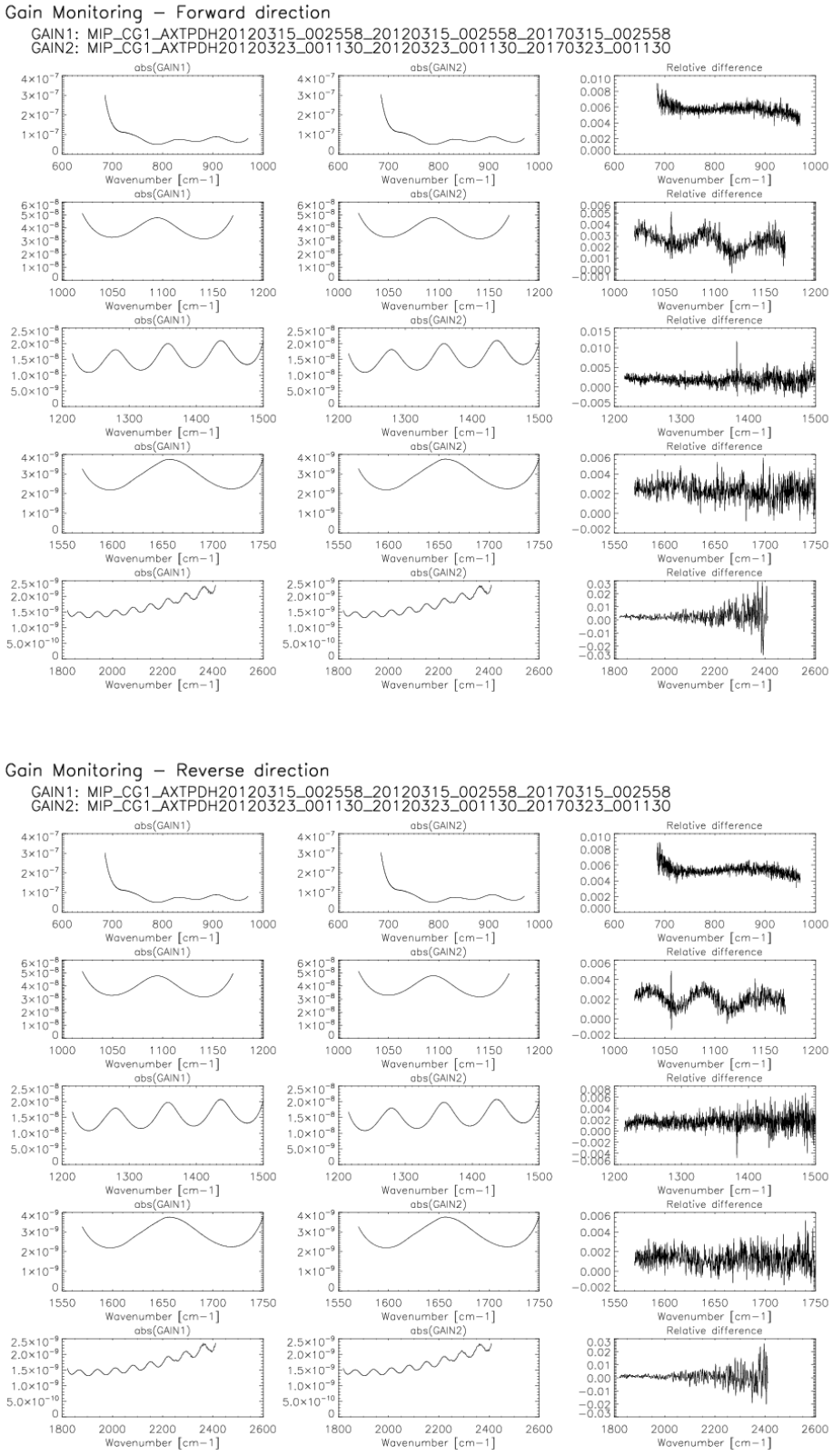

Figure 8 – The same as Figure 6 but for a subsequent gain measurement

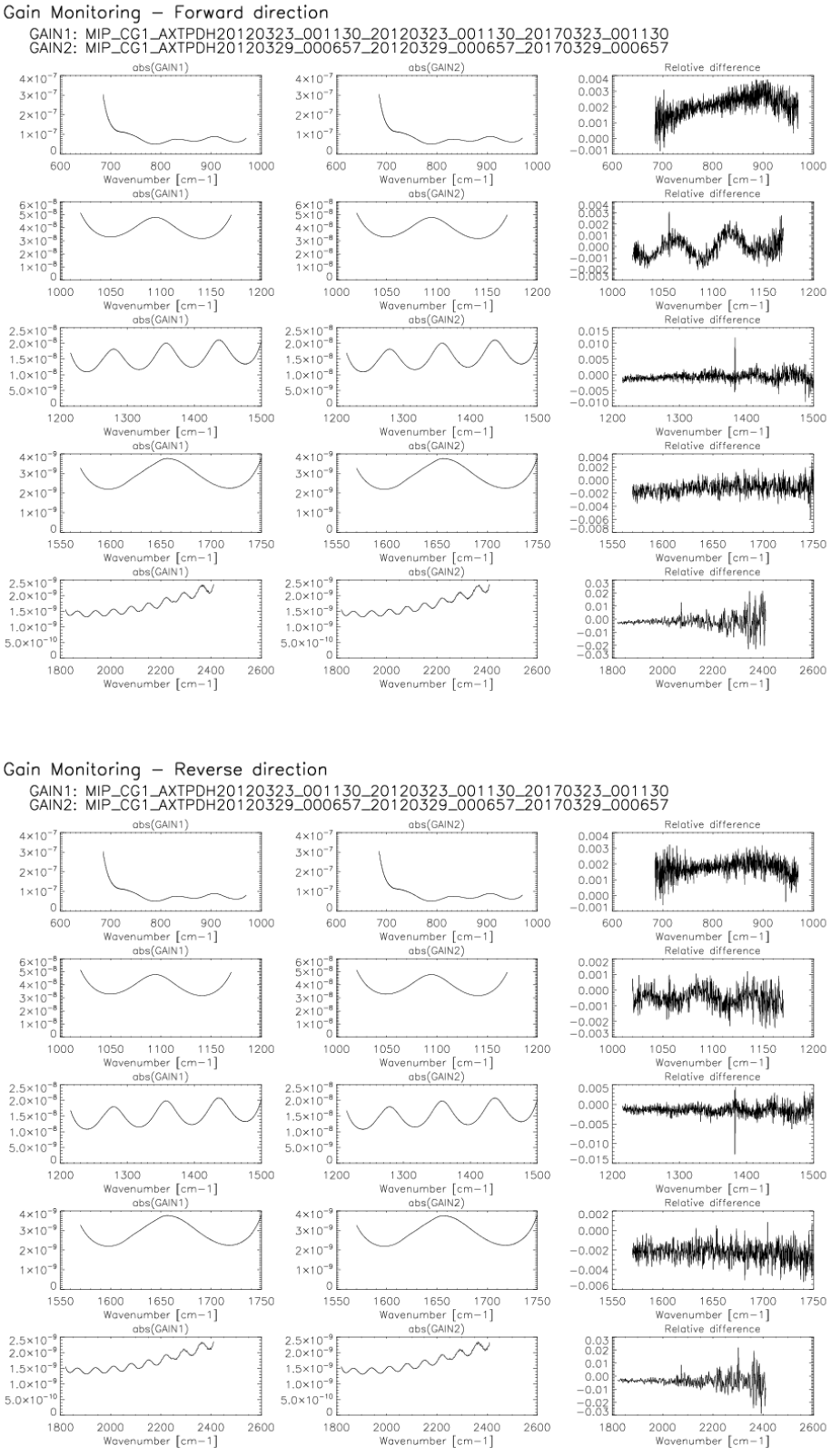

Figure 9 – The same as Figure 6 but for a subsequent gain measurement

3.2 Line Of Sight Calibration

The LOS calibration measurements are performed every week and the mispointing is analyzed on a monthly basis. This plan allows the pointing stability to be analyzed and guarantees the availability of the data in case of missing products. The baseline for LOS calibration is that the absolute bias is compared to last disseminated one; a new LOS calibration Auxiliary Data File is disseminated only if the difference between the two is higher than 8 mdeg.

So far no results are available for sideways LOS calibrations, which were routinely planned since March 2007. The problem in processing sideways data is the poor signal recorded. For such reason, LOS measurements in sideways have been removed from the planning baseline in June 2008.

During the reporting month the calculated absolute bias remains in the range [-20;-35] mdeg. The acquisition and processing status of the LOS calibration for the reporting month is presented in the table.

Table 5 – LOS rearward calibrations performed during the reporting period

Orbit	Date	Pointing error [deg]
52462	11/03/2012	-0.031952
52606	21/03/2012	-0.030961

3.3 Calibration Auxiliary Data Files

3.3.1 GAIN CALIBRATION

The following auxiliary files were disseminated in the Ground segment to correct for the long term increase of the gain factor along the mission.

Table 6 – Gain calibration AUX files disseminated during the reporting period

Filename	Start validity	Stop validity
MIP_CG1_AXVIEC20120309_110706_20120308_000000_20170308_000000 MIP_CO1_AXVIEC20120309_110806_20120308_000000_20170308_000000 MIP_CS1_AXVIEC20120309_113050_20120308_000000_20170308_000000	08/03/2012	08/03/2017

Filename	Start validity	Stop validity
MIP_CG1_AXVIEC20120319_115156_20120315_000000_20170315_000000 MIP_CO1_AXVIEC20120319_125613_20120315_000000_20170315_000000 MIP_CS1_AXVIEC20120319_130046_20120315_000000_20170315_000000	15/03/2012	15/03/2017
MIP_CG1_AXVIEC20120323_141429_20120323_000000_20170323_000000 MIP_CO1_AXVIEC20120323_141719_20120323_000000_20170323_000000 MIP_CS1_AXVIEC20120323_142129_20120323_000000_20170323_000000	23/03/2012	23/03/2017
MIP_CG1_AXVIEC20120402_095422_20120329_000000_20170329_000000 MIP_CO1_AXVIEC20120402_095550_20120329_000000_20170329_000000 MIP_CS1_AXVIEC20120402_095833_20120329_000000_20170329_000000	29/03/2012	29/03/2017

3.3.2 LINE OF SIGHT CALIBRATION

In the reporting period, no auxiliary files were disseminated for the update of MIPAS pointing information, since the mispointing calculated is still within the limit of variability of 8 mdeg with respect to the last disseminated auxiliary file.

4 PROCESSING STATUS

4.1 ESA Products Availability

The MIPAS nominal processing of Level 1 and Level 2 NRT and off-line products was restarted during June 2010. The status of the MIPAS-ESA operational products is depicted in the table below.

Table 7 – MIPAS-ESA available products

Product description			Dissemination system and retention time	
Product name	**IPF version**	**Max size per orbit [MB]**	**NRT at ESRIN and Kiruna**	**Consolidated/ Re-processed at D-PAC**
MIP_NL__1P	**5.06**	250	DDS and FTP (retention: 7 days)	Available via FTP for the whole mission (retention: permanent)
MIP_NL__2P	**5.06**	20	FTP (retention: 7 days)	Available via FTP for the whole mission (retention: permanent)
MIP_NLE_2P	**5.06**	2	FTP (retention: 7 days)	-

The accounts currently available for MIPAS users are the following below (for additional details, concerning account and password, please contact eohelp@esa.int):

NRT products
Data available on ftp servers at ESRIN and Kiruna: *oa-es.eo.esa.int / oa-ks.eo.esa.int*

- single account for Level 1 products: *mipa1usr*
- single account for Level 2 products: *mipausr*

Off-line and re-processed products
Data available on ftp server at D-PAC: *eoa-dp.eo.esa.int*

- single account for Level 1 products: *mip1usr*
- single account for Level 2 products: *mip2usr*

4.2 Near Real Time Production Statistics

In Table 8 it is reported the weekly statistics on the instrument and products availability. The table shows the planned duty cycle, the instrument availability w.r.t. the planning and the products availability. The L0 NRT availability is calculated with respect to the planning, while the L1 NRT availability is calculated with respect to the L0 data production.

Table 8 – MIPAS NRT products statistic for the reporting month

Start time	Stop time	Planned duty cycle [%]	Instrument availability [%]	L0 availability at PDHS [%]	L1 availability w.r.t. L0 [%]
02/03/12 21:24	08/03/12 22:44	99.90	100.00	98.87	100.00
08/03/12 22:44	14/03/12 22:24	97.52	100.00	100.00	100.00
14/03/12 22:24	20/03/12 22:04	99.85	96.19	96.19	100.00
20/03/12 22:04	26/03/12 21:44	97.58	100.00	100.00	100.00
26/03/12 21:44	01/04/12 21:24	97.65	100.00	100.00	100.00

The Figure 10 shows the instrument availability w.r.t the planning and the planned duty cycle. This figure confirms the increased planned duty cycle and the improved instrument performances in the last months.

The weekly statistics have been calculated for the entire MIPAS RR mission (since Jan 2005) and are presented in the Figure 11; in this plot the blue line is the instrument availability with respect to the total time, the green and red lines represent the total availability of L0 and L1 NRT products.
The total availability of the instrument increased from about 30% in 2005-2006 to 90%-100% during the last years, owing to the increased duty cycle and the improved instrument performances. The L0 availability shows the performance of PDS; in the best case the green line should match the instrument availability (blue line), any anomaly in the Ground Segment results in a loss of data. The L1 NRT availability (red line) is reported since February 2008, when the NRT processing was restarted at ESRIN and Kiruna sites.

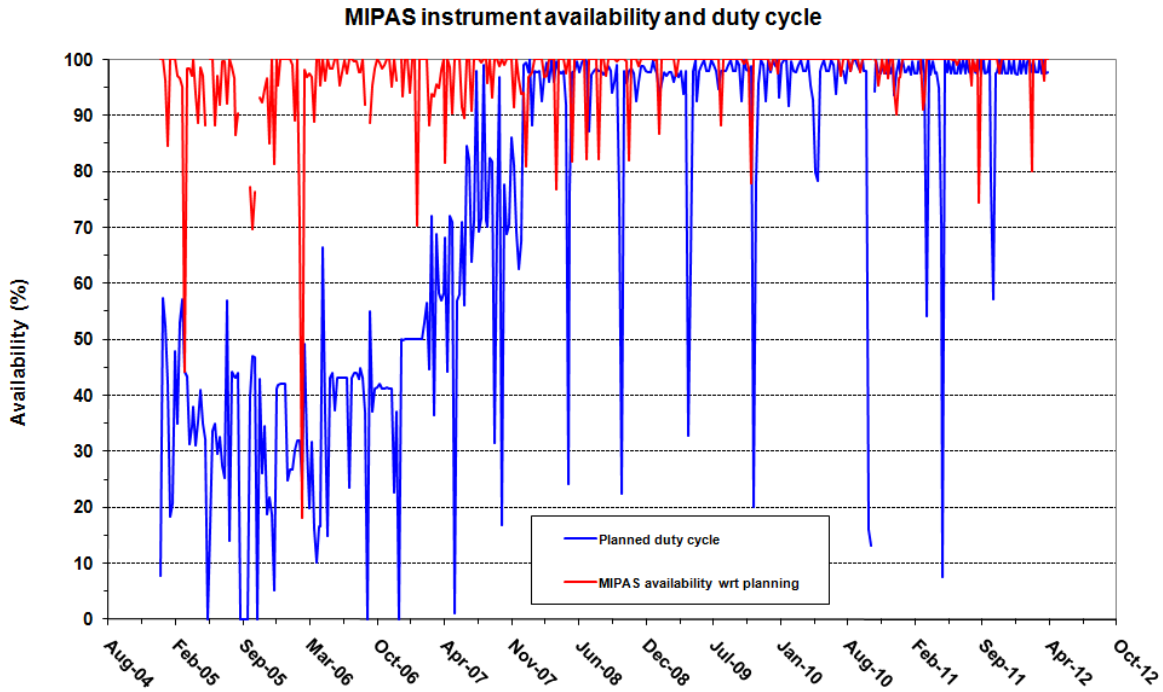

Figure 10 – MIPAS instrument availability w.r.t. planning and planned duty cycle since January 2005

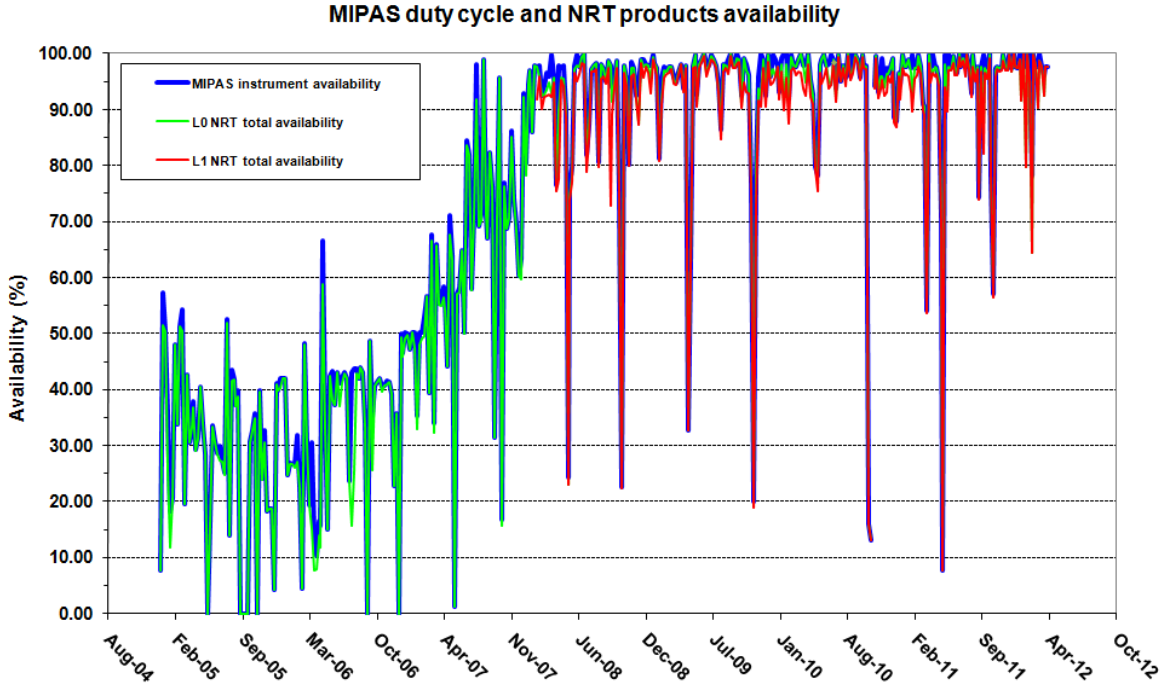

Figure 11 – MIPAS NRT long term statistics since January 2005

4.3 Off-line Production Statistics

In this chapter the long term statistics of L1 products availability at D-PAC server are reported. This is presented in Figure 12, where the statistics since June 2006 are plotted with respect to the total time.

From this figure a problem can be observed in the data generation during March 2007, while in the last years the data availability is around 95% of the total time.

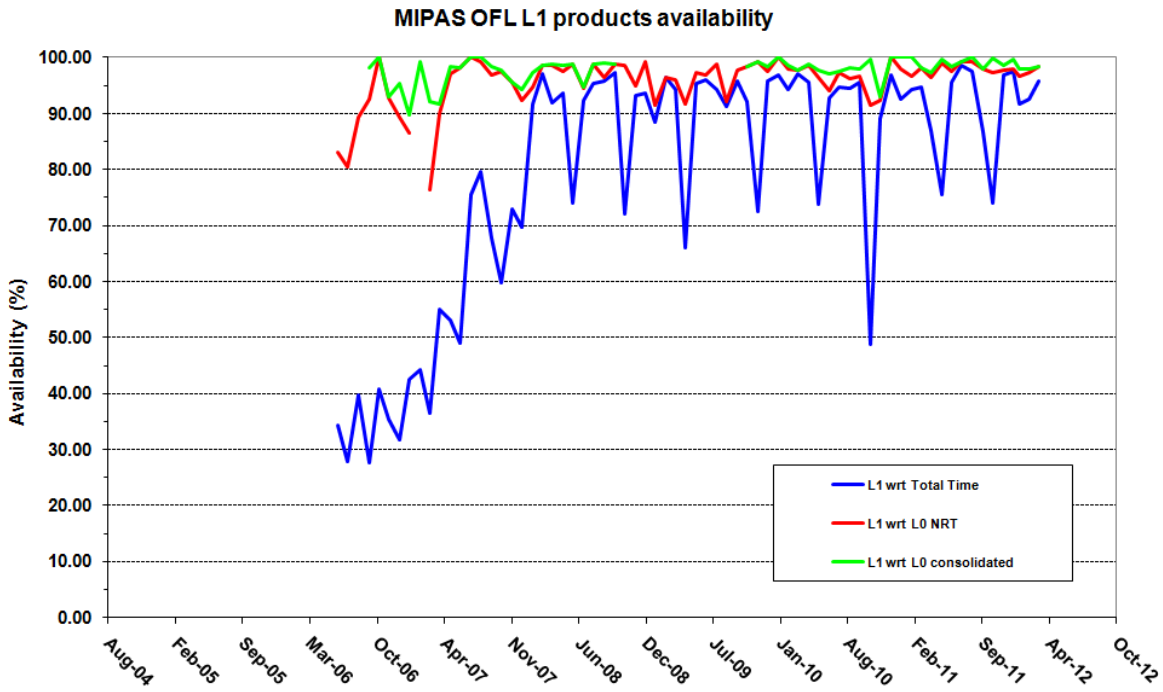

Figure 12 – MIPAS L1 OFL long term statistics since June 2006

4.4 Re-processing Status

4.4.1 SECOND RE-PROCESSING WITH VERSION 4

The first re-processing of the MIPAS FR-Full Resolution mission (Jul 2002 – Mar 2004) was completed at D-PAC using IPF software versions 4.61 and 4.62.

All the received consolidated L0 products were processed to L1 and L2.

Processing flag for this re-processing is set to “P”.

4.4.2 THIRD RE-PROCESSING WITH VERSION 5

The Level 1 re-processing of the full mission (Jul 2002 – Jan 2010) with IPF version 5.02 was completed at D-PAC and data are available to the users on the eoa-dp ftp server. The Level 2 re-processing with IPF version 5.05 was completed for the whole mission during January 2011. They are also available on D-PAC ftp server.

Processing flag for this re-processing is set to “R”.

4.4.3 RE-PROCESSING WITH PROCESSOR PROTOTYPE ML2PP VERSION 6

The Level 2 re-processing of the full mission (Jul 2002 – Dec 2010) with processor prototype ML2PP version 6 has been completed in a cloud environment and data are now available at D-PAC for validation purpose only by the QWG and the validation teams. The new products contain the retrievals of four new target species: CFC-11, CFC-12, ClONO2 and N2O5.

Level 2 products generated with ML2PP V6 are identified by the following flags, reported both in MPH and product filename:

Processing flag = “U”
Processing center ID = “CDEMO”
Software version = “ML2PP/6.0”

5 PROCESSOR CONFIGURATION

5.1 Processor Baseline

The table below shows the list of IPF updates and the aligned prototypes, DPM, IODD documents and related NCR/SPRs.

Table 9 – Historical updates of MIPAS processor, related prototypes, DPM, IODD and NCR/SPRs. In green the operational version

IPF	Prototype		DPM		IODD		TDS		ADF		Processor updates	
	L1	L2	L1	L2	L1	L2	L1	L2	L1	L2	Level 1	Level 2
Linux version												
5.06	**2.7**	**5.0**	**4L**	**5.2**	**5B**	**5E**	**7.1**	**4.4**	**8.6**	**6.4**	**Fixed : PR-11-05502, PR-11-05499, PR-10-05458, PR-10-05457, PR-10-05442 PR-10-05434, PR-10-05313, PR-10-05312**	
5.05	2.7	5.0	4L	5.2	5B	5E	7.1	4.4	8.6	6.4	Aligned to L1 DPM 4L and L2 DPM 5.2, CFI 5.8.1 integrated	
5.02	2.7	-	4L	-	5B	-	7.1	-	8.6 (*)	-	Aligned to L1 DPM 4L. No L2 processing is foreseen with this IPF version. New Mical 1.6 switched.	
4.67L02	2.6	4.0	4Ia	4.1	4E	4.0	6.0	3.4	6.1	5.2	IPF 4.67 AIX version ported to Linux IPF 4.67L02	
AIX version												
4.67	2.6	4.0	4Ia	4.1	4E	4.0	6.0	3.4	6.1	5.2	Fixed NCR_1594 NCR_1676	Fixed NCR_1458 NCR_1521 NCR_1522
4.65	2.5	4.0	4I	4.1	4E	4.0	6.0	3.4	6.1	5.2	Fixed SPR-121O0-2011 SPR-120O0-2000 SPR-120O0-2001	Fixed NCR_1310 NCR_1278 NCR_1308 Rejected NCR_1310 NCR_1317
4.62	2.5	4.0	4H	4.0	4E	4.0	6.0	3.3	4.0	3.8	Fixed NCR_1157 NCR_1259	Fixed NCR_1128 NCR_1275 NCR_1276

(*) Version 8.6 is activated in synchronization with the new calibration chain (Mical 1.6)

5.2 History of Processor Switches

The historical updates in the MIPAS L1 processor are detailed in "Appendix B – Level 1 IPF historical updates" with all the information on the related NCRs and SPRs. The historical update of the IPF at each processing site is shown in the following table.

Table 10 – Historical updates of MIPAS processor at near real time (NRT) processing sites (PDHS-K and PDHS-E) and off-line (OFL) processing sites (LRAC and D-PAC). In green the operational version

Centre	Processor Version	Date
D-PAC PDHS-E PDHS-K	**V5.06**	**03-05-2011**
D-PAC	V5.05	21-06-2010
PDHS-E PDHS-K	V5.05	10-06-2010
PDHS-E PDHS-K	V5.02	28-01-2010
D-PAC	V5.02	24-01-2010
PDHS-E PDHS-K D-PAC	V4.67L02 (Switch to ESA Linux PDS)	28-09-2009
D-PAC	V4.67	04-09-2006
D-PAC	V4.65	09-02-2006
D-PAC	V4.62	06-09-2004
LRAC	V4.62	02-09-2004
D-PAC	V4.61	15-03-2004
LRAC	V4.61	18-03-2004
PDHS-K PDHS-E	V4.61	17-03-2004
LRAC	V4.59	20-08-2003
D-PAC	V4.59	06-08-2003
PDHS-K PDHS-E	V4.59	23-07-2003
PDHS-K LRAC	V4.57	22-07-2003
PDHS-K LRAC	V4.59	21-07-2003
LRAC	V4.57	19-03-2003
PDHS-K	V4.57	18-03-2003
D-PAC	V4.57	05-03-2003

Centre	Processor Version	Date
PDHS-E	V4.57	04-03-2003

5.3 Open Issues on current IPF

The quality issues on the operational ESA products currently provided to the users are reported in the corresponding Level 1 and Level 2 products disclaimers, available at the following web addresses:

Level 1 product disclaimer
http://envisat.esa.int/handbooks/availability/disclaimers/MIP_NL_1P_Disclaimers.pdf

Level 2 product disclaimer
http://envisat.esa.int/handbooks/availability/disclaimers/MIP_NL_2P_README_V5.pdf

5.4 Auxiliary Data Files

5.4.1 LEVEL 1 ADF

The strategy for the Level 1 ADFs update is the following:

- MIP_CO1_AX, MIP_CG1_AX and MIP_CS1_AX are updated every week and after a long detectors/cooler switch-off or after a long instrument unavailability
- MIP_CL1_AX is analyzed every two weeks and updated when the pointing error differs from last disseminated one by more than 8 mdeg
- MIP_CA1_AX is updated when new characterization parameters are defined
- MIP_MW1_AX is updated when the micro-windows selection is changed
- MIP_PS1_AX is updated every time there is a setting update.

The static Level 1 ADFs applicable for the reporting period are listed in the following table.

Table 11 – Static Level 1 ADFs valid for the reporting period

Auxiliary Data Files	Start Validity	Stop Validity

Auxiliary Data Files	Start Validity	Stop Validity
Static ADF for NRT processing MIP_CL1_AXNIEC20100125_145256_20100128_000000_20150128_000000 MIP_CA1_AXNIEC20100125_145055_20100128_000000_20150128_000000 MIP_MW1_AXNIEC20100125_145445_20100128_000000_20150128_000000 MIP_PS1_AXNIEC20100125_145601_20100128_000000_20150128_000000	2010-01-28	2015-01-28
Static ADF for OFL processing MIP_CL1_AXNIEC20100125_145256_20100122_000000_20150122_000000 MIP_CA1_AXNIEC20100125_145055_20100122_000000_20150122_000000 MIP_MW1_AXNIEC20100125_145445_20100122_000000_20150122_000000 MIP_PS1_AXNIEC20100125_145601_20100122_000000_20150122_000000	2010-01-22	2015-01-22

The characterization Level 1 ADFs (MIP_CA1_AX, MIP_MW1_AX and MIP_PS1_AX) are generated by BOMEM. The following table lists the history of level 1 ADF deliveries; more details can be found in "Appendix C – Level 1 ADF historical updates".

Table 12 – Historical deliveries of Level 1 ADFs by Bomem; in green the operational version

ADFs Version	Updated ADF	ADF Start Validity Date	IPF Version	Dissemination Date
8.6	**MIP_PS1_AX MIP_CL1_AX**	**RR mission (NRT and OFL)**	**5.02 + Mical 1.6**	**28 Jan 2010**
6.1	MIP_PS1_AX	09-Aug-2004	4.63 – 4.67	27-Jun-2005
6.0	*MIP_PS1_AX*	-	*4.63*	*Not disseminated*
4.1 TDS6	MIP_PS1_AX	09- Aug-2004	4.63	15-Mar-2005
3.2	MIP_PS1_AX	26-Mar-2004	4.61	21Apr-2004
3.1	MIP_PS1_AX	09-Jan-2004	4.61	17-Mar-2004
3.0	MIP_CA1_AX MIP_MW1_AX MIP_PS1_AX	April-2002	4.61	4-Nov-2003

5.4.2 LEVEL 2 ADF

The Level 2 ADFs are generated by IFAC and delivered to ESRIN, where they are verified for format issues and disseminated to the processing centres. A New set of Level 2 ADFs is generated as soon as there is an improvement of the data quality.

The Level 2 ADF files applicable to the current Ground Stations configuration are reported in next table.

Table 13 – Level 2 ADFs valid for the current GS configuration

Auxiliary Data Files	Start Validity
OR-27 data (since Jan 2005)	
ADFs V6.5 (NOM) MIP_CS2_AXVIEC20100601_142603_20050101_000000_20150101_000000 MIP_MW2_AXVIEC20100601_151110_20050101_000000_20150101_000000 MIP_PI2_AXVIEC20100601_152202_20050101_000000_20150101_000000 MIP_PS2_AXVIEC20100601_152623_20050603_000000_20150101_000000 MIP_SP2_AXVIEC20100601_153126_20050101_000000_20150101_000000 **OM2 to be used with IPF 5.06** MIP_OM2_AXVIEC20110504_081105_20050101_000000_20150101_000000 **IG2 seasonally updated** MIP_IG2_AXVIEC20100601_143357_20100601_000000_20110601_000000 MIP_IG2_AXVIEC20100921_161720_20100920_000000_20110121_000000 MIP_IG2_AXVIEC20101213_142459_20101221_000000_20110421_000000 MIP_IG2_AXVIEC20110418_133850_20110321_000000_20110721_000000 MIP_IG2_AXVIEC20110418_133850_20110621_000000_20111021_000000 MIP_IG2_AXVIEC20110623_140033_20110621_000000_20111021_000000 MIP_IG2_AXVIEC20111021_081608_20110921_000000_20120121_000000 MIP_IG2_AXVIEC20120105_135915_20111221_000000_20120421_000000 MIP_IG2_AXVIEC20120319_140115_20120321_000000_20120721_000000	2005-01-01
RR-17 data (Aug – Sep 2004)	
ADFs V5.2 MIP_CS2_AXVIEC20060105_121012_20040809_000000_20040917_220643 MIP_IG2_AXVIEC20060105_113531_20040901_000000_20040917_220643 MIP_IG2_AXVIEC20060105_114108_20040809_000000_20040901_000000 MIP_MW2_AXVIEC20060105_130642_20040809_000000_20040917_220643 MIP_OM2_AXVIEC20060105_130954_20040809_000000_20040917_220643 MIP_PI2_AXVIEC20060105_131141_20040809_000000_20040917_220643 MIP_PS2_AXVIEC20060105_131340_20040809_000000_20040917_220643 MIP_SP2_AXVIEC20060105_131744_20040809_000000_20040917_220643	2004-08-09
FR data (Jan 2002 – Mar 2004)	
ADFs V4.1 *NRT* MIP_PS2_AXVIEC20040421_095623_20040326_143428_20090326_000000 *Off-line* MIP_PS2_AXVIEC20040421_095923_20040326_143428_20090326_000000	2004-03-26
ADFs V3.7 *NRT* MIP_MW2_AXVIEC20031021_145505_20020706_060000_20080706_060000 MIP_OM2_AXVIEC20040302_110723_20020706_000000_20080706_000000 MIP_PS2_AXVIEC20040302_110923_20040109_000000_20090209_000000	2002-07-06

Auxiliary Data Files	Start Validity
MIP_PI2_AXVIEC20031021_145745_20020706_060000_20080706_060000 MIP_CS2_AXVIEC20031021_145337_20020706_060000_20080706_060000 MIP_SP2_AXVIEC20031021_150016_20020706_060000_20080706_060000 *Off-line* MIP_MW2_AXVIEC20031027_100858_20020706_060000_20080706_060000 MIP_OM2_AXVIEC20040302_110823_20020706_000000_20080706_000000 MIP_PS2_AXVIEC20040302_111023_20040109_000000_20090209_000000 MIP_PI2_AXVIEC20031027_101146_20020706_060000_20080706_060000 MIP_CS2_AXVIEC20031027_100559_20020706_060000_20080706_060000 MIP_SP2_AXVIEC20031027_101441_20020706_060000_20080706_060000	

The Level 2 ADFs historical deliveries by IFAC are reported in the following table. Further details on the Level 2 ADF deliveries provided by IFAC are reported in the "Appendix E – Level 2 ADF historical updates".

Table 14 – Historical updates of Level 2 ADFs provided by IFAC

ADFs Version	Updated ADF	ADF Start Validity Date	IPF Version	Dissemination Date
For RR-o mission (from Jan 2005 onward)				
6.5	MIP_OM2_AX MIP_IG2_AX	01-Jan-2005 RR-o mission	5.05	14 Oct 2010
6.4	MIP_SP2_AX MIP_IG2_AX MIP_PI2_AX	01-Jan-2005 RR-o mission	5.05	Disseminated on 10 June 2010 with the switch of IPF 5.05
6.3	MIP_PS2_AX MIP_MW2_AX MIP_CS2_AX MIP_OM2_AX	01-Jan-2005 RR-o mission	5.05	*Not disseminated* *To be used with IPF 5.00*
6.2	*MIP_OM2_AX* *MIP_IG2_AX*	*01-Jan-2005* *RR-o mission*	*5.00*	*Not disseminated* *To be used with IPF 5.00*
6.1	*MIP_PS2_AX* *MIP_MW2_AX* *MIP_CS2_AX* *MIP_SP2_AX* *MIP_OM2_AX* *MIP_IG2_AX*	*01-Jan-2005* *RR-o mission*	*5.00*	*Not disseminated* *To be used with IPF 5.00*
6.0	*MIP_PS2_AX* *MIP_MW2_AX* *MIP_CS2_AX* *MIP_SP2_AX* *MIP_OM2_AX* *MIP_IG2_AX*	*01-Jan-2005* *RR-o mission*	*5.00*	*Not disseminated used only for GRIMI-2*

For RR-17 mission (Aug – Sep 2004)				
5.2	MIP_SP2_AX MIP_PS2_AX	09-Aug-2004 RR-17 mission	4.65/ 4.67	5-Jan-2006
5.1	*MIP_SP2_AX* *MIP_OM2_AX* *MIP_MW2_AX*	*09-Aug-2004* *RR-17 mission*	*4.65/* *4.67*	*Not used for processing due to a format error*
5.0	*MIP_PS2_AX* *MIP_MW2_AX* *MIP_PI2_AX*	*09-Aug-2004* *RR-17 mission*	*4.65/* *4.67*	*/*
For FR mission (Jun 2002 – Mar 2004)				
4.1	NRT: MIP_PS2_AX_NRT_V4.1 OFL: MIP_PS2_AX_OFL_V4.1	FR mission	4.61/ 4.62	13.02.2004
4.0	NRT: MIP_PS2_AX_NRT_V4.0 OFL: MIP_PS2_AX_OFL_V4.0	FR mission	4.61/ 4.62	03.09.2004

6 MONITORING RESULTS

6.1 Daily Monitoring

6.1.1 LEVEL 0 NRT PRODUCTS

The quality control of Level 0 data processed NRT in ESRIN and Kiruna is going-on in parallel with the processing; the L0 daily reports are uploaded on the web as soon as they are generated.
They can be accessed at the following address:
http://earth.esa.int/pcs/envisat/mipas/reports/daily/Level_0_NRT/

6.1.2 LEVEL 1 NRT PRODUCTS

The quality control of Level 1 data processed NRT in ESRIN and Kiruna is going-on in parallel with the processing; the L1b daily reports are uploaded on the web as soon as they are generated.
They can be accessed at the following address:
http://earth.esa.int/pcs/envisat/mipas/reports/daily/Level_1_NRT/

6.1.3 LEVEL 1 OFL PRODUCTS

The quality control of Level 1 data processed off-line at D-PAC is going-on in parallel with the OFL processing; the L1b daily reports are uploaded on the web as soon as they are generated.
They can be accessed at the following address:
http://earth.esa.int/pcs/envisat/mipas/reports/daily/Level_1_OFL/

6.1.4 LEVEL 2 NRT PRODUCTS

The quality control of Level 2 data processed NRT in ESRIN and Kiruna is going-on in parallel with the processing; the L2 daily reports are uploaded on the web as soon as they are generated.
They can be accessed at the following address:
http://earth.esa.int/pcs/envisat/mipas/reports/daily/Level_2_NRT/

6.1.5 LEVEL 2 OFL PRODUCTS

The quality control of Level 2 data processed off-line at D-PAC is going-on in parallel with the OFL processing; the L2 daily reports are uploaded on the web as soon as they are generated.
They can be accessed at the following address:
http://earth.esa.int/pcs/envisat/mipas/reports/daily/Level_2_OFL/

6.1.6 LEVEL 2 NRT DAILY MAPS

The quality control of Level 2 data processed NRT in ESRIN and Kiruna is going-on in parallel with the processing; the L2 daily maps are uploaded on the web as soon as they are generated.
They can be accessed at the following address:
http://earth.eo.esa.int/pcs/envisat/mipas/reports/dailymaps/

6.1.7 LEVEL 2 OFL MONTHLY MAPS

The quality control of Level 2 data processed off-line at D-PAC is going-on in parallel with the OFL processing; the L2 monthly maps are uploaded on the web once per month.
They can be accessed at the following address:
http://earth.eo.esa.int/pcs/envisat/mipas/reports/monthlymaps/

6.1.8 LEVEL 2 ORM VALIDATION DATASET

The products generated with the scientific code of IFAC (ORM) for the validation dataset were monitored and daily reports are available on the web.

The monitoring results for the validation dataset processed with ORM1 (corresponding to IPF5) can be accessed at the following address:
http://earth.eo.esa.int/pcs/envisat/mipas/reports/daily/Level_2_ORM/

The monitoring results for the validation dataset processed with ORM2 (corresponding to ML2PP v6) can be accessed at the following address:
http://earth.eo.esa.int/pcs/envisat/mipas/reports/daily/Level_2_ORM_V2/

6.1.9 LEVEL 2 IPF 5 RE-PROCESSED DATASET

The results of the daily monitoring for the full mission re-processing performed with IPF 5.05 can be accessed at the following address:
http://earth.eo.esa.int/pcs/envisat/mipas/reports/daily/Level_2_repro/

6.2 Long-Term Monitoring

6.2.1 GAIN MONITORING

The long term plot of gain changes in band A between two consecutive disseminated gains is shown in the following Figure 13, where the maximum of gain increase is normalized with respect to the time between two consecutive gains. The acceptance criterion of 1% of weekly increase is reported in the plot with the dashed blue line.
The anomalous increase of gain during Jan–May 2005 can be observed in this figure. After the decontamination (end of May 2005) the gain rate suddenly decreased and it remained always lower than the acceptance level unless some peaks due to instrument temperatures changes, instrument outages or decontamination. The plot also shows the effect of the ice contamination is a seasonal variation of the gain weekly increase with maxima around May, corresponding to the hottest period of the year.
Note that the high variations observed after decontamination events are not reported in this plot since at this stage the goal is only to verify that the acceptance criterion of 1% of weekly increase is verified in nominal condition (i.e. excluding mission interruption or decontamination events). The effect of decontaminations and changes in the instrument thermal conditions can be appreciated by analyzing the accumulation of gain over time as discussed in next paragraph.

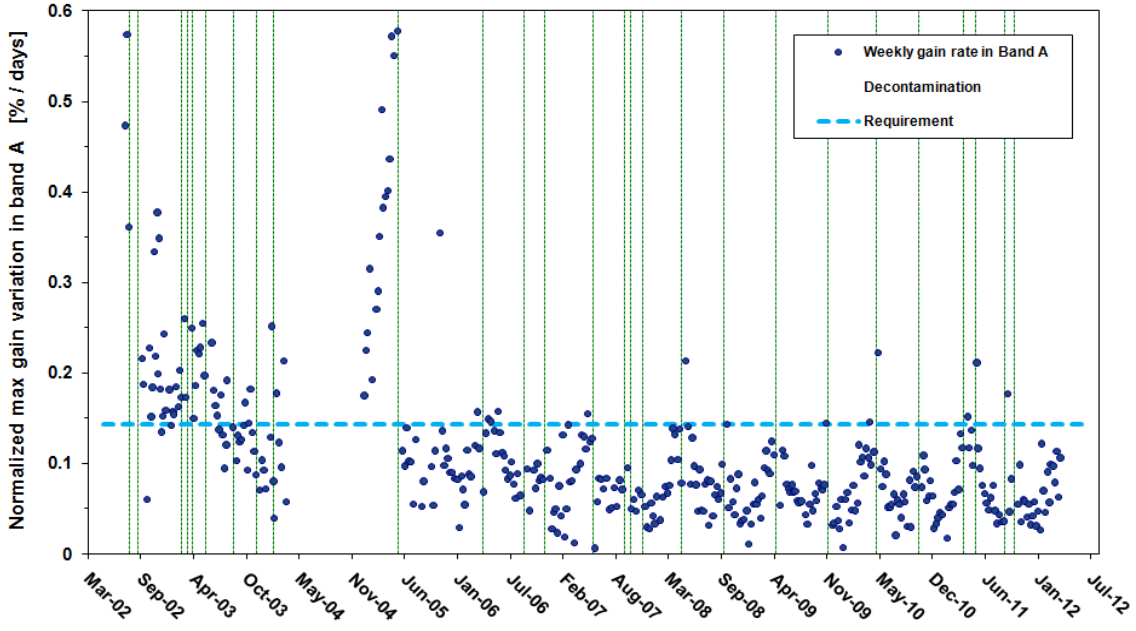

Figure 13 – Gain maximum increase normalized to the time difference between consecutive disseminated gains. The blue line represents the expected gain increase (1%/week).

The long term monitoring of the gain accumulation increase in band A is presented in **Figure 14**. This plot shows the increase of gain taking as reference the first calibration of January 2005 for the period Jan–May 2005 and the first calibration of June 2005 for the period June 2005–September 2006. The reference gain was updated after the planned decontamination of September 2006.
This long term investigation is useful in order to plan possible decontamination along the mission. As suggested by M. Birk (DLR) the decontamination should be planned when the gain has increased by more than 20%, in order to prevent NESR value to become not acceptable for Level 2 products retrieval precision.

The following main points can be highlighted in this figure:

- The very high increase of gain during the period Jan–May 2005. At the end of this period the gain increase reached a value of about 60%. The situation was resolved with the decontamination of June 2005.
- The linear increase of gain in the period Jun–Oct 2005.
- A sudden increase of gain due to the INT heater switch-on of October 2005.
- The significant decrease of gain after the PLSOL anomaly of April 2006 was due to ENVISAT platform (and cooler) switch-off and the consequent warming up of the detector. As a result the gain was dramatically reduced by more than 25%. After this non-intended decontamination the gain increased with a constant slope up to September 2006.
- The decrease of gain by about 10% after the decontamination of September 2006 and the PLSOL of 28th November 2006.
- The decrease of gain by about 5% after the decontamination planned at the beginning of June 2007 and the other decrease due to the PLSOL of end September 2007. A slight gain decrease was also obtained with the passive decontamination planned in October 2007.

As a result of this analysis the following conclusions can be drown:

- Planned decontamination and platform switch-off always cause ice removal action from the detector and a consequent increase of the signal; as a result the gain factor is reduced.
- The dramatic increase of gain that was observed at the beginning of 2005 was never observed again due to the improvement of the cooler performances obtained with more frequent decontaminations.
- The slope of the gain increase is progressively decreasing in the last months demonstrating that the detector is more and more “ice-free”.
- The gain of the first point after each decontamination is slightly increasing with time, demonstrating the effect of the sensitivity degradation in channel A.

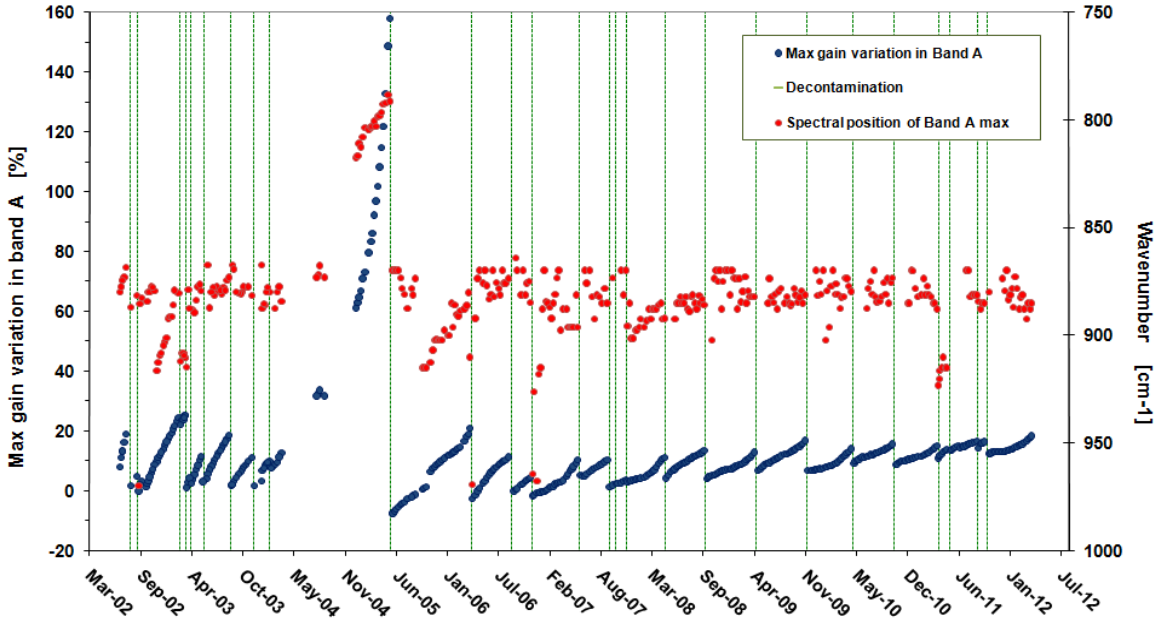

Figure 14 – Gain accumulation increase

During the period Jan-May 2005, a strong gain increase was observed in the gain variation, as mentioned in the previous paragraph. This increase acted on the data quality in two ways:

- If the gain functions are only determined once per week, the drift leads to a scaling error in the calibrated spectra of up to 3.5 % in band A.
- The increase of the gain function corresponds to a decrease of the instrument response. This also decreases the signal-to-noise-ratio and leads to higher NESR-values.

In order to reduce the scaling error in the calibrated spectra the solution was to calculate and disseminate further gain values in between the already disseminated ones in order to comply with the condition for the gain weekly increase to be lower than 1%.

6.2.2 POINTING MONITORING

The long term trend of instrument mispointing since beginning of the mission is reported in the plot below; the figure shows the absolute pointing error (considered taking into account the commanded elevation angle for the LOS calibration).
The very pronounced annual trend at the beginning of the mission was not due to MIPAS instrument itself, but to a mispointing of the entire ENVISAT platform resulting from the software response to the orbit control information. In fact, after the update of such pointing software (December 2003) the deviation trend was drastically reduced. During the last months the absolute bias is stable around a value of -25 mdeg with a seasonal oscillation.
The problem on LOS calibration observed firstly during October 2006 – namely the increase of channel D2 noise with a resulting degradation of the star signal – is still present. Indeed the number of available stars for the mispointing determination is much lower than one year ago; in average 3-5 stars are now available for each calibration session.

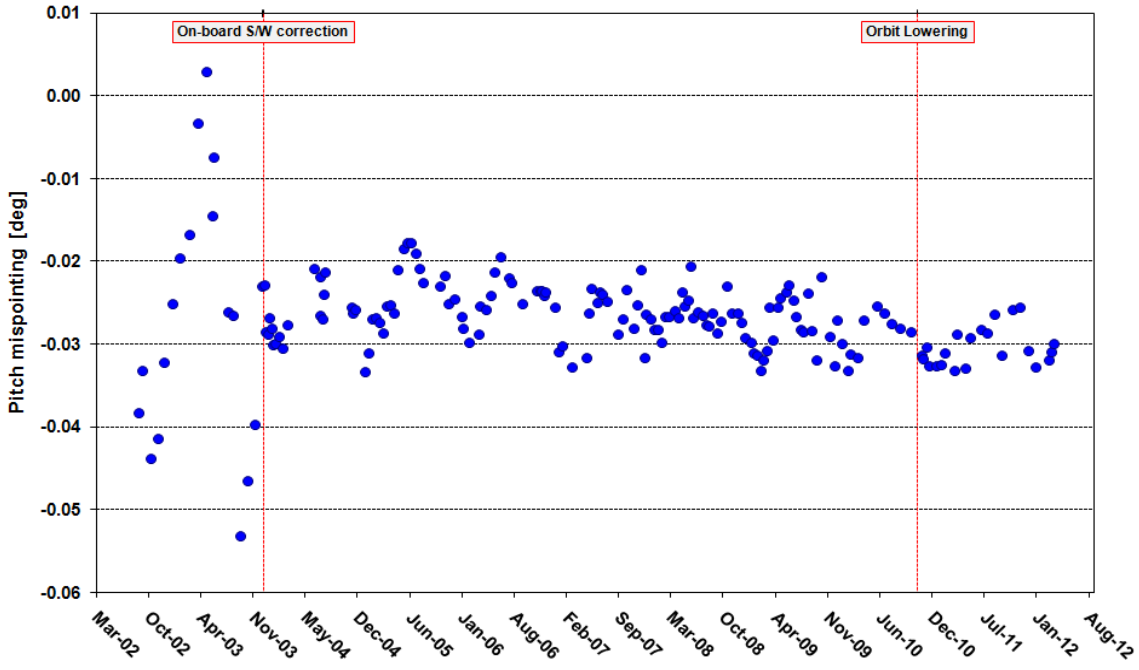

Figure 15 – MIPAS long-term pointing error as a function of time since September 2002

The following table shows the history of the commanded angle for LOS measurements. Starting from the second part of September 2003, only measurements from channel D2 are processed because of the increased noise affecting channel D1. In order to reduce that noise, from 21 November 2004 (orbit 14265), the planning strategy for LOS

measurements has been changed and the number of observations per star has been doubled.

Table 15 – Updates of the LOS commanded angle

Start Date	Stop Date	Start Orbit	Stop Orbit	Angle [mdeg]
beginning	28 Sep 2002	/	3024	0
05 Oct 2002	26 Oct 2002	3123	3424	- 22
02 Nov 2002	30 Nov 2002	3524	3926	- 25
07 Dec 2002	01 Nov 2003	4025	8738	- 40
08 Nov 2003	08 Nov 2003	8835	8836	- 25
10 Nov 2003	10 Nov 2003	8864	8865	0
15 Nov 2003	6 Mar 2004	8934	10538	- 25
13 Mar 2004	20 Nov 2004	10639	14250	0
21 Nov 2004	up to now	14265	/	- 30

6.2.3 SPECTRAL CALIBRATION MONITORING

The linear spectral correction factor is applied to the spectra for the spectra calibration, it is a multiplicative factor applied to the frequency axis in order to match the position of well known atmospheric line. Variations of this factor are an indication of metrology problems or ageing of the laser.

During MIPAS QWG #23 it was suggested to monitor the Linear Spectral Correction Factor as it is written in the Level 1 products (i.e. aging of the laser). This is presented in Figure 16 since January 2010 – in fact this parameter was not ingested in the database before this date.

In the plot a very stable situation it is shown, with a slight seasonal trend and a large spreading of points, indicating noise in the retrieval of such parameter. This monitoring will be part of the standard monitoring baseline for the continuation of the mission.

Note: the monitoring is temporary holding because of a L1 database corruption problem. It will be resumed as soon as the problem is solved.

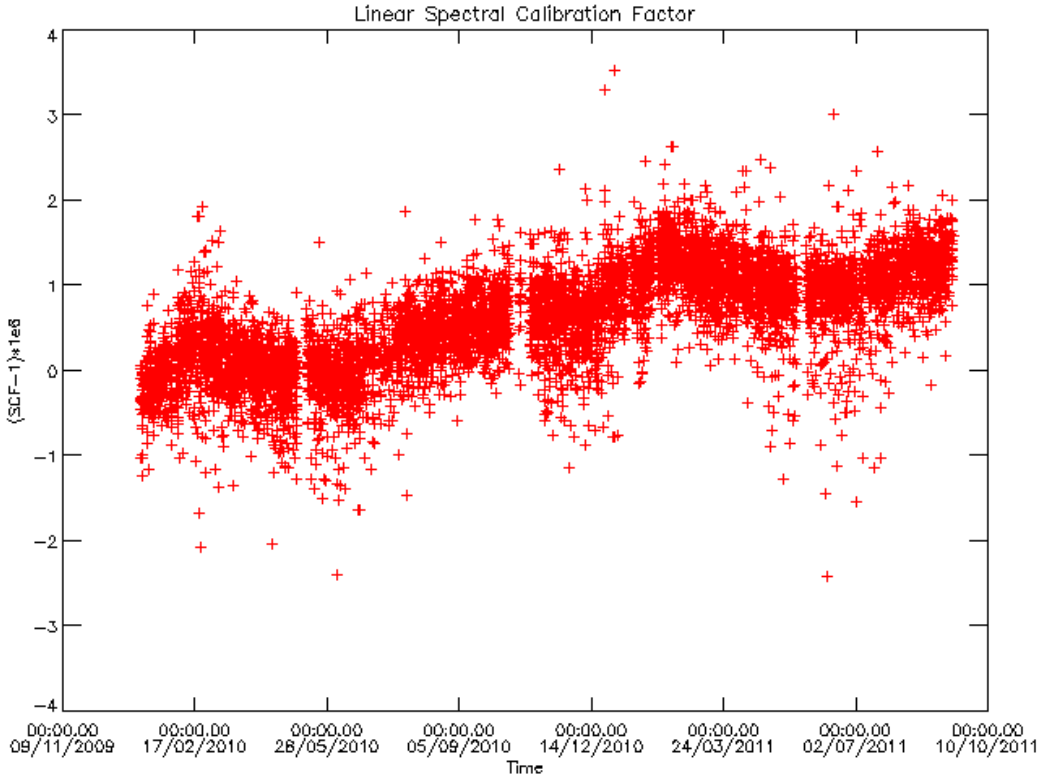

Figure 16 – MIPAS Spectral Calibration Factor (SCF) from January 2010 to September 2011

6.2.4 ADC COUNTS MONITORING

The long term monitoring of the ADC min/max counts along the mission is presented in this paragraph. The ADC counting is monitored only for deep-space measurements, when the instrument is looking at the cold space; indeed for the other measurement modes the value depends on the measurement scenario (e.g. when looking down in the atmosphere the signal increases). The monitoring of ADC counts could give interesting insight into different instrument-related topics such as instrument self-emission, forward/reverse effects, detectors non-linearity and gain increase.
The long term trend of the ADC max counts in all 8 MIPAS channels since June 2005 is shown in the following plots. In these figures the seasonal variation of the thermal condition of the instrument is clearly visible, demonstrating the effect of instrument self-emission.
The split of the curve in two is due to the forward/reverse effect and it is coming from a different sampling of the IGM at its maximum in the two directions. Another effect that is superimposed to the seasonal variation is the impact of the decontamination events that result in an increase of the signal due to the ice removal (e.g. see September and December 2006). From these plots we learn that a detector sensitivity degradation is visible for channels A and B, but not for channels C and D, where an increase of signal is found due to the increased instrument temperature.

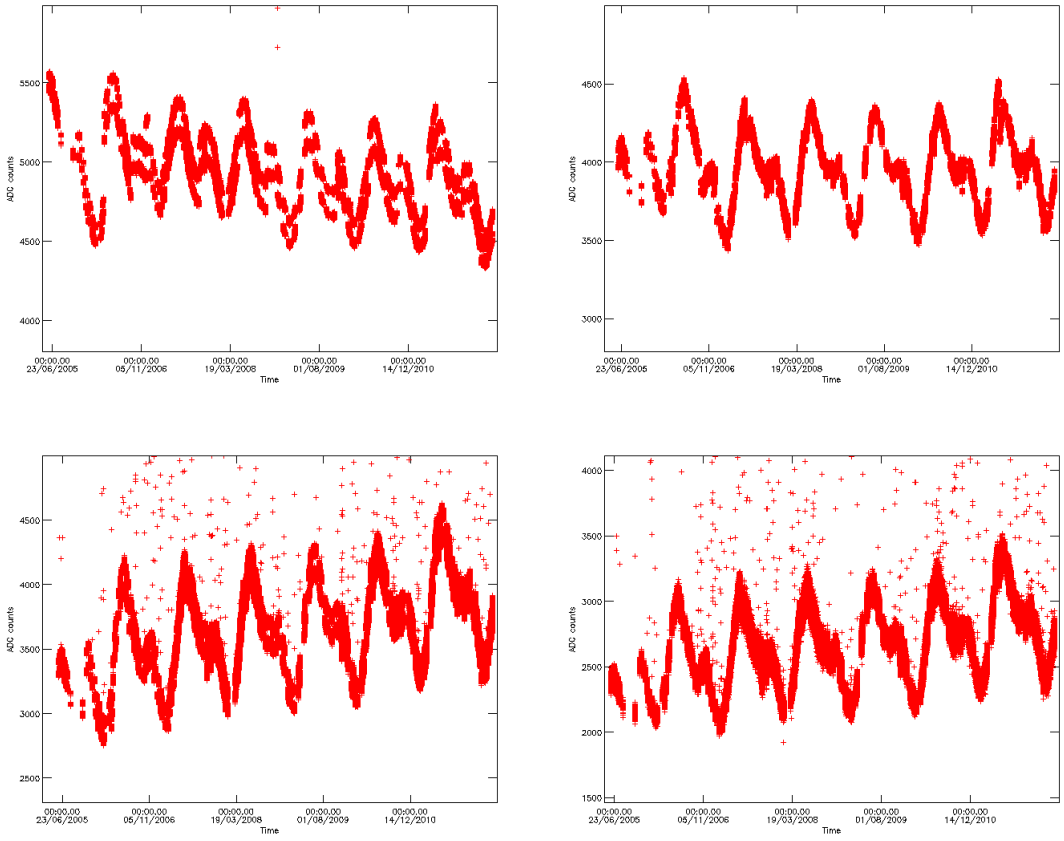

Figure 17 – ADC max counts in channel A1, B1, C1 and D1 during DS measurements since June 2005

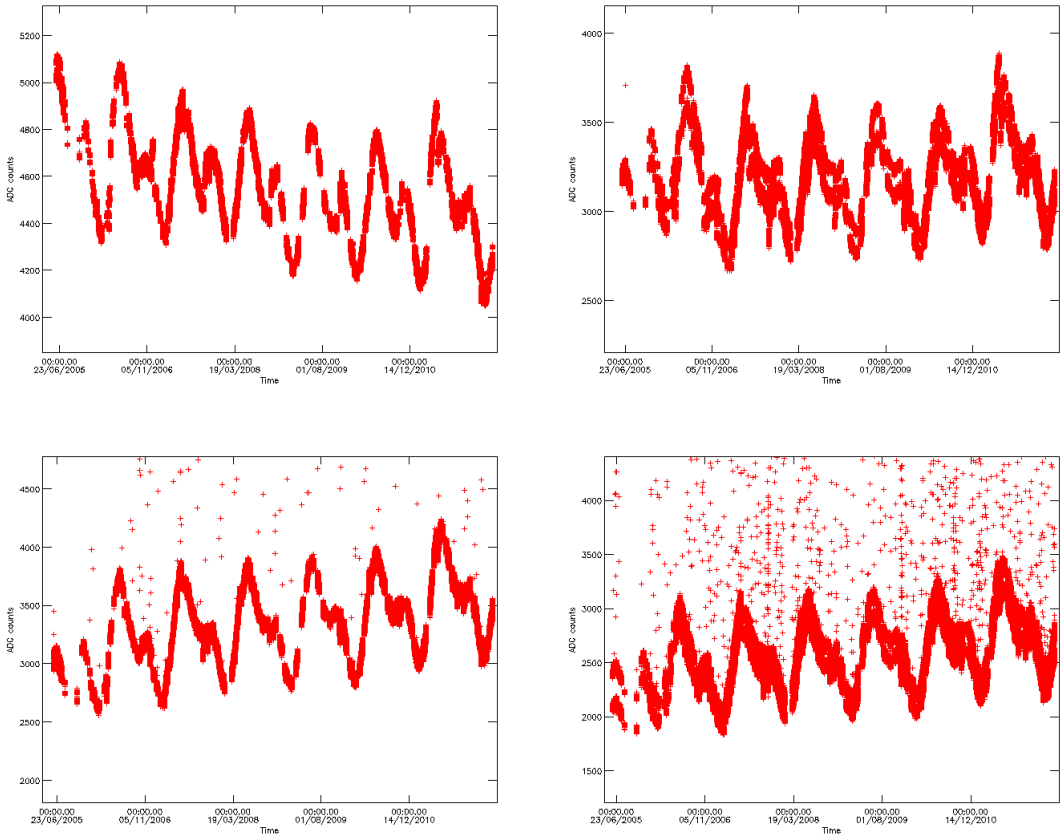

Figure 18 – ADC max counts in channel A2, B2, C2 and D2 during DS measurements since June 2005

6.2.5 SPIKES MONITORING

During QWG#11 it was suggested to investigate the number of spikes detected in each MIPAS detectors. We recall here that the presence of spikes in the interferogram can be caused by cosmic radiation or transmission errors.

Since the presence of a spike in the IGM will give an artefact (sinusoidal component) in the Fourier transformed spectrum, the scenes IGM affected by spikes are corrected during the L1b processing by taking the mean between adjacent non affected points. Note that when the spike is detected during black body or deep space calibration measurement the corresponding IGM is discarded in order to avoid contamination in the co-addition of IGM.
The IPF reports in the Level 1 products the number of detected and corrected spikes for each measured scene IGM. This number is used to derive a long term statistic of detected spikes for each channel. The results are shown in Figure 19 and Figure 20 for the Reduced Resolution mission (starting from January 2005) in terms of percentage of sweeps affected by spikes and number of spikes/sweep.

A significant variability of the number of detected spikes can be observed in channels A1, A2, B1 and B2; this could be related to variations in the solar activity, but that correlation is still under investigation.
Channels C and D are the most affected by spikes, since they are more sensitive to high energy particles generated by cosmic rays; they don't show any significant trend.
In general the percentage of sweeps affected by spikes is small for the most important MIPAS bands (A, AB) while it is about 3% for band D; however the number of detected spikes is always very low for all MIPAS bands. Finally taking into account that the spike's signal is smoothed out by the L1 processing we can conclude that the presence of spikes does not impact the quality of MIPAS L1b data.

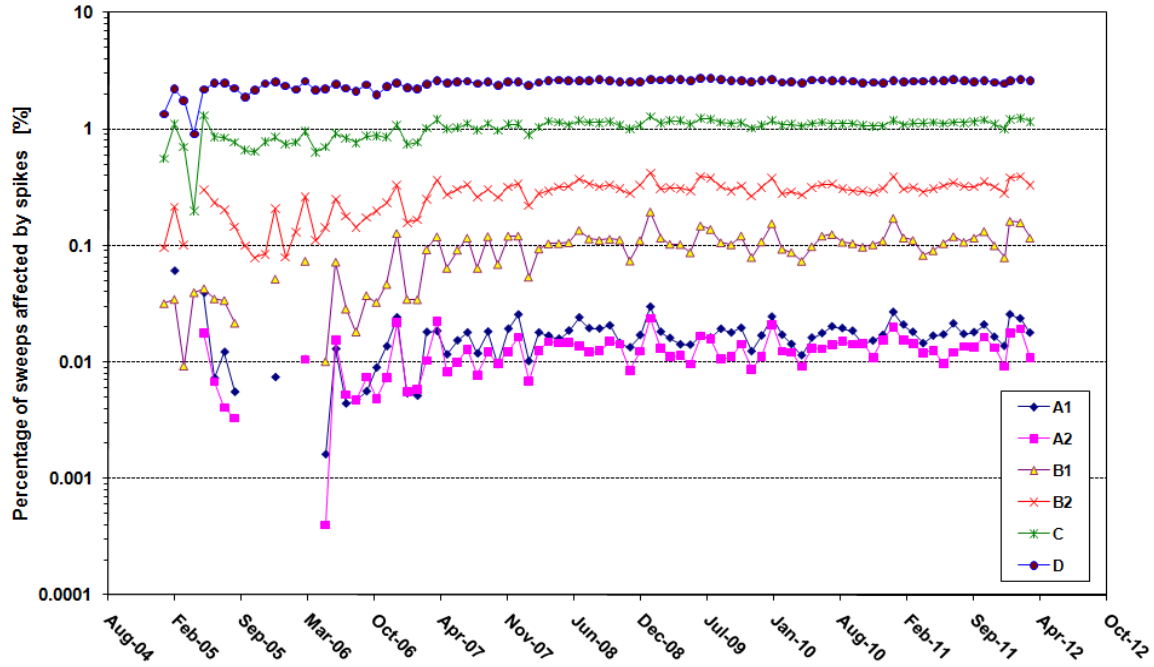

Figure 19 – MIPAS long-term monitoring of spikes: percentage of spike-affected sweeps since Jan 2005

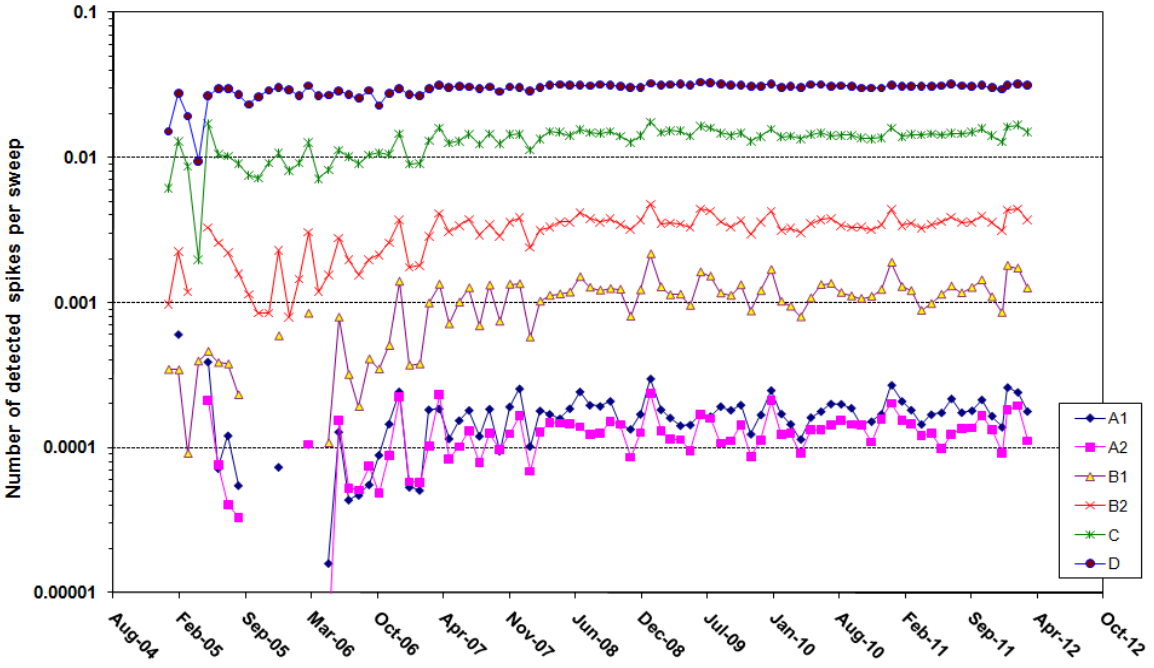

Figure 20 – MIPAS long-term monitoring of spikes: number of detected spikes per sweep since Jan 2005

6.2.6 RETRIEVAL PERFORMANCES

The quality control of Level 2 NRT data has been started with the switch to IPF 5.05; the monitoring baseline will be refined with the upcoming Monthly Reports.

The first monitoring plots are presented here.
The plots show the evolution of the final chi square value for NRT retrieval parameters. We can observe in the first products generated NRT a general high value of chi square for CH4 and N2O retrieval, this issue is currently under investigation.

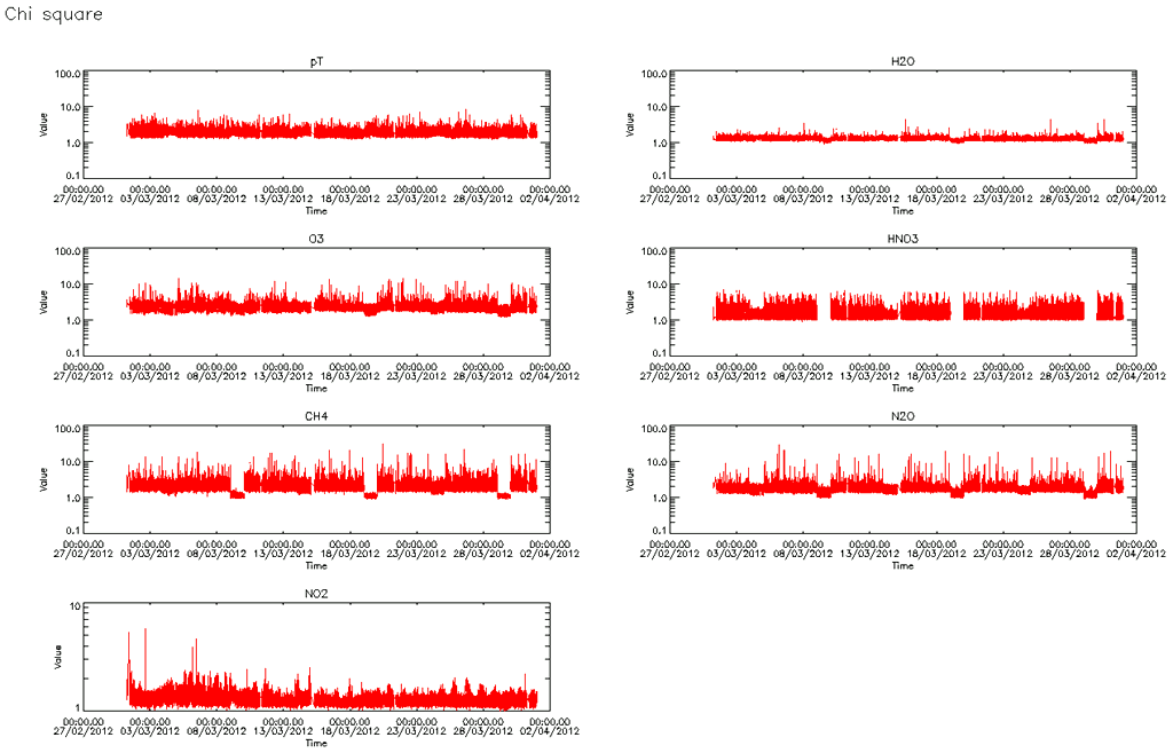

Figure 21 – MIPAS last chi square values for NRT retrieval parameters

6.2.7 ZONAL MEAN PLOTS

The following plots show the zonal mean of Temperature and VMR of H20 and 03 at different pressure levels for the past three months.

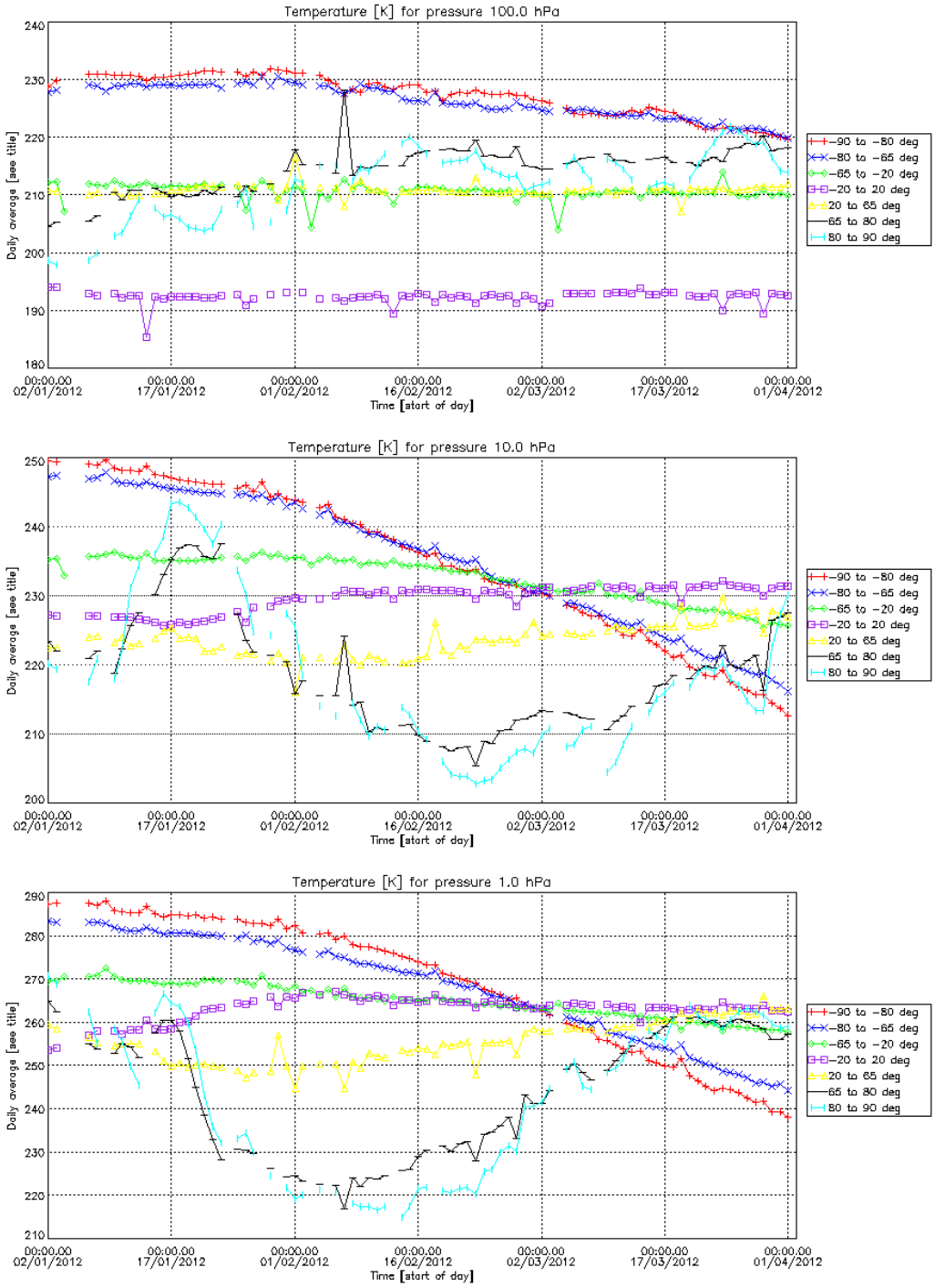

Figure 22 – MIPAS Temperature zonal mean at three pressure levels

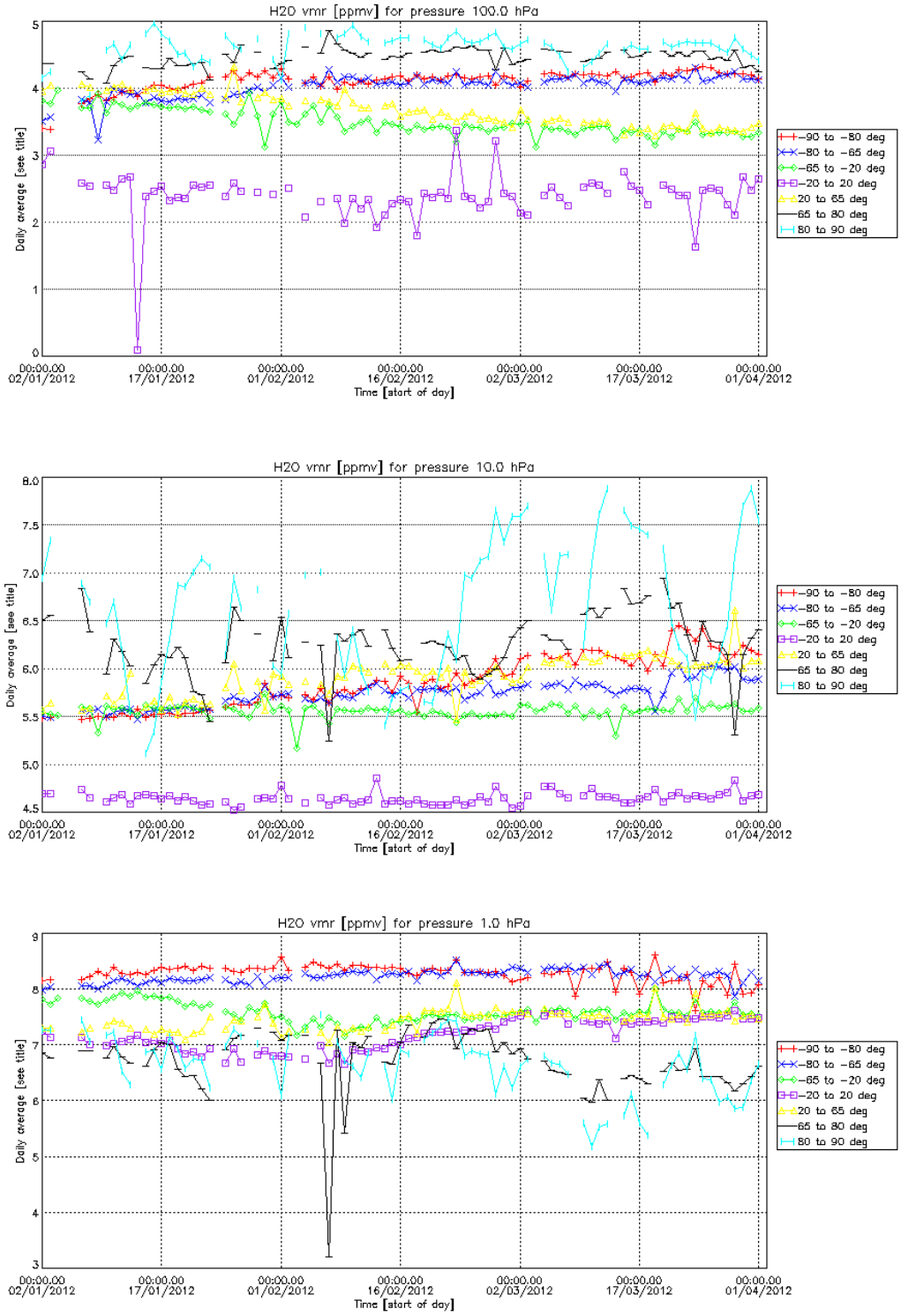

Figure 23 – MIPAS H2O VMR zonal mean at three pressure levels

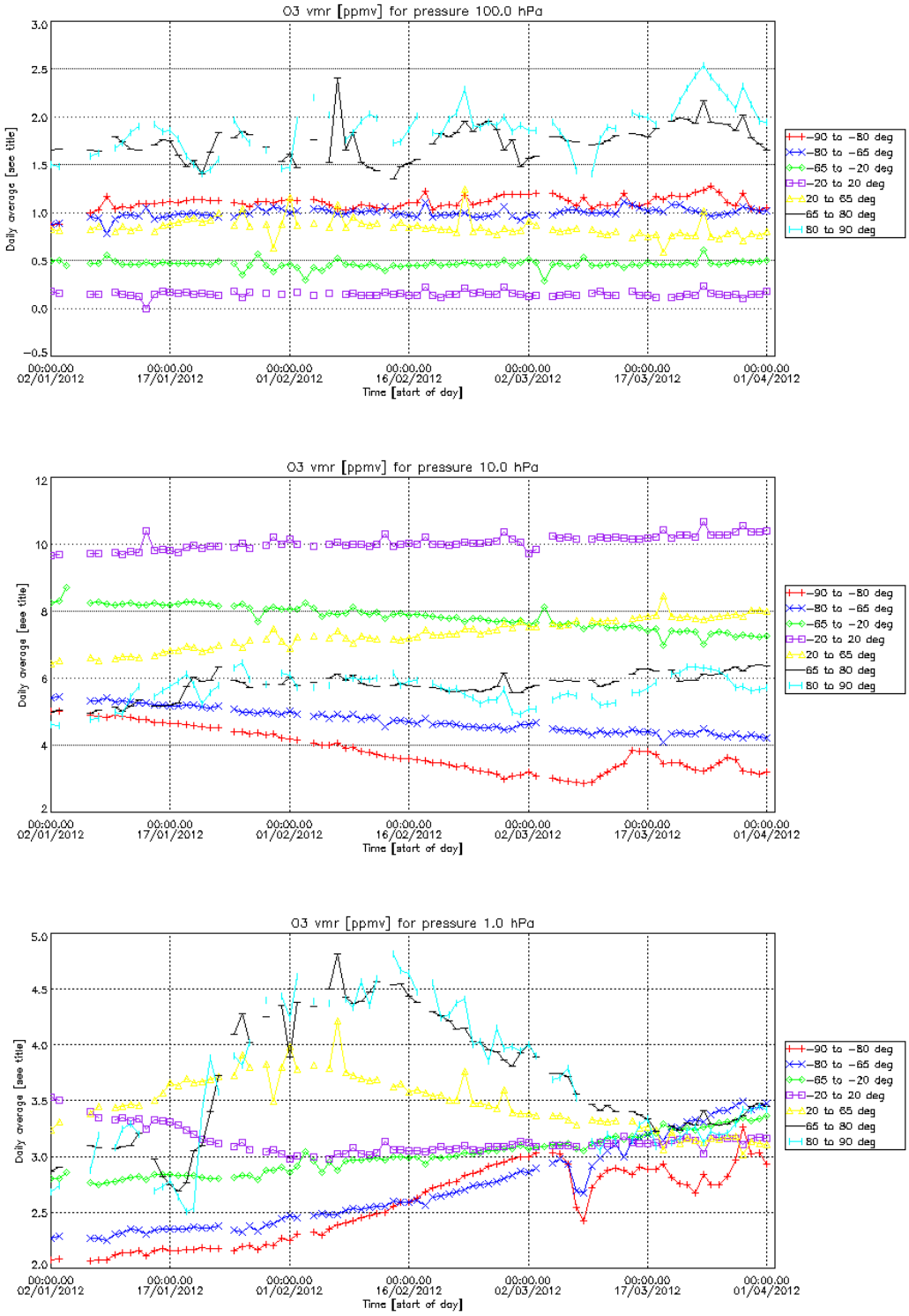

Figure 24 – MIPAS O3 VMR zonal mean at three pressure levels

6.3 *Instrument and Products Monitoring after the ENVISAT Orbit Lowering*

The first two critical steps of the ENVISAT orbit lowering manoeuvre were successfully completed during 22 – 26 October 2010; all payloads were slowly switched back on starting from 27 October. Further details can be found at the following web page:
http://www.esa.int/esaCP/SEMEZX1PLFG_index_0.html

Between 22 October and 02 November ENVISAT was in Yaw Steering Mode (YSM). Since 2 November at 10:25 UTC, ENVISAT is in Stellar Yaw Steering Mode (SYSM), which is the nominal mode of operations. Since 4 November 2010 ENVISAT has been moved into the final orbit corresponding to the new scenario of the mission phase 3.

MIPAS successfully resumed operations in Nominal measurement mode on 28 October 2010 at 9:46:48 UTC. The instrument performances and the products quality in the new mission phase are briefly described in this paragraph.

6.3.1 INSTRUMENT PERFORMANCES IN NEW SCENARIO

The status of instrument performances after the start of the new mission phase is fully nominal, since all instrument parameters are within the expected range of variability. The detectors ice contamination is within the expected trend.
The only issue in the new phase was an anomaly in the Cooler Displacer observed after the switch-on of the instrument.

Cooler Anomaly

The Cooler Displacer monitoring showed some Out Of Limit (OOL) values after the switch-on, during 28 October 2010 (see the picture below). The analysis seems to show that these OOL were most likely due to a Single Event Upset (SEU), however an investigation is still on-going at PLSO.

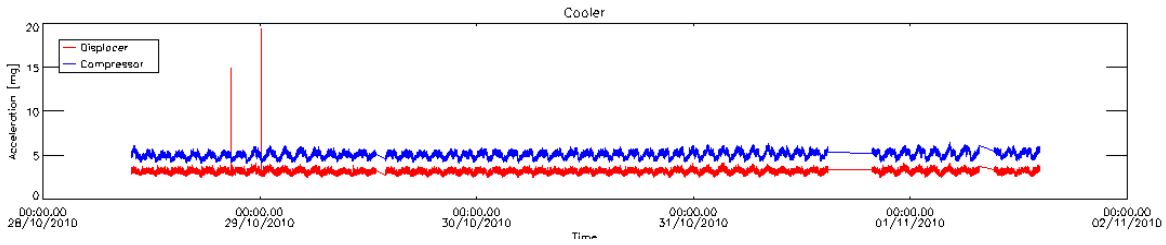

Figure 25 – MIPAS cooler acceleration level after the ENVISAT orbit lowering

6.3.2 OPERATIONAL PRODUCTS PERFORMANCES IN NEW SCENARIO

The quality of the ESA operational products in the new orbit scenario is fully nominal for both level 1 and level 2 NRT products and for the off-line processing chain. The monitoring of the most critical quality indicators in the level 1 and level 2 data shows no major issues.
The only significant problem observed so far is the pointing degradation during the period 28 Oct – 2 Nov 2010.

Pointing Degradation in YSM

A degraded MIPAS pointing accuracy was observed for the period: 28 Oct – 2 Nov 2010. The result of the investigation performed in ESRIN, in agreement with independent results obtained by University of Oxford, has shown that the issue is due to the ENVISAT Yaw Steering Mode (YSM) attitude that was used during this part of the mission. The MIPAS pointing accuracy is back to nominal values since the switch to the ENVISAT nominal attitude control, i.e. the Stellar Yaw Steering Mode (SYSM), performed on 2 Nov 2010 at 10:25 UTC.
The figures below show the variation of the average corrected altitude in MIPAS level 2 processing during October 2010. The increase in the altitude correction during the period where ENVISAT was operated in YSM is clear in these plots. On the right, the zoom shows that the altitude correction was back to nominal values exactly at the time when the nominal SYSM was resumed.

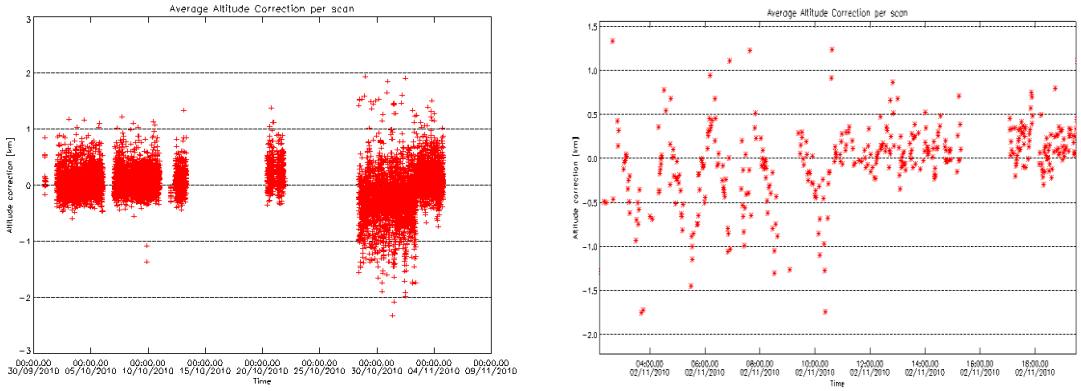

Figure 26 – MIPAS altitude correction in the Level 2 processing averaged over a scan during October 2010 (left) and zoom at the time when the ENVISA SYSM was resumed after the orbit lowering (right).

6.3.3 INSTRUMENT PLANNING IN THE NEW SCENARIO

The planning was resumed after the orbit lowering with 6 days of nominal operations. The nominal baseline planning (4 days NOM + 1 day UA + 4 days NOM + 1 day MA) was restarted on 4 November 2010.

An issue was detected in the planning of nominal mode after the MIPAS switch-on, owing to this, the actual altitude scan pattern along the orbit moderately deviated from the baseline. The issue is illustrated in the figure below, where the tangent altitudes are reported as a function of time. We can see that the tangent altitudes did not follow the cosines law for the floating altitudes as a function of latitude, but a linear interpolation was used. This issue was recognized to be related to a bug in the mission planning tool; the issue didn't impact the quality of the data.
The patch of the planning tool was applied on 30 November 2010. Since that date, the elevation scan pattern in nominal measurement mode is fully in-line with the baseline.

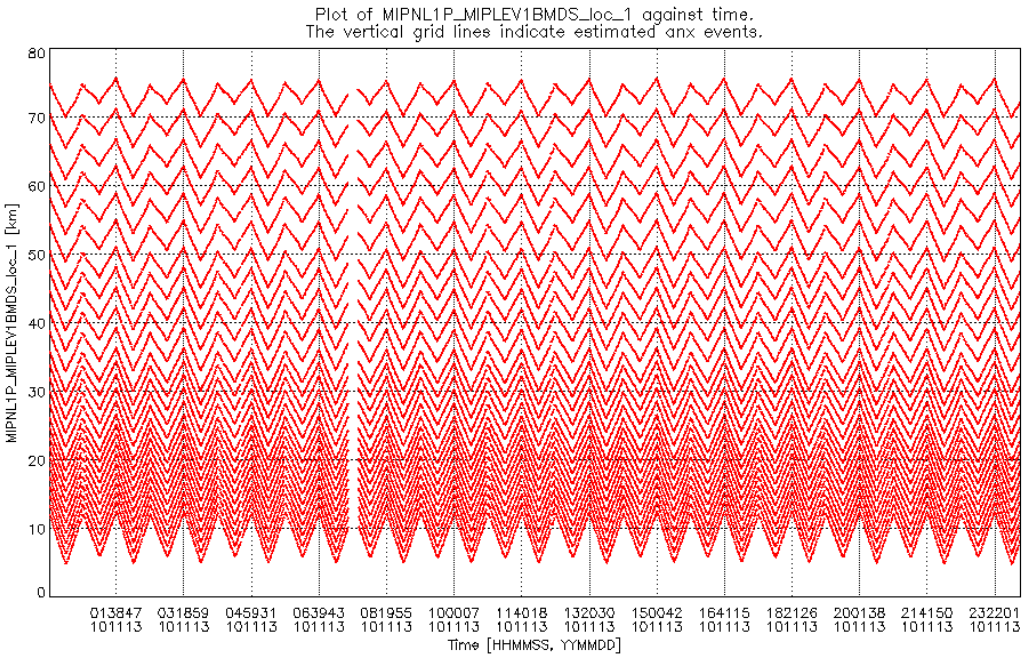

Figure 27 – MIPAS tangent altitudes during 13 November 2010, showing the mission planning anomaly

6.3.4 INSTRUMENT CALIBRATION IN NEW SCENARIO

No issues were detected in the routine radiometric calibration of MIPAS instrument. The detector ice contamination is in line with the expected trend.
Three Line-of-Sight calibrations were performed after the orbit lowering, the pitch mispointing observed by MIPAS with respect to the platform in the new orbit scenario is within the expected range (i.e. -30 mdeg).

7 APPENDICES

7.1 Appendix A – Acronyms and Abbreviations

ACVT	Atmospheric Chemistry Validation Team
ADF	Auxiliary Data File
ADS	Annotated Data Set
AE	Aircraft Emission
AMT	Anomaly Management Tool
ANX	Ascending Node Crossing
AR	Anomaly Report
AUX	Auxiliary
BB	Black Body
CBB	Calibration Black-Body
CTI	Configuration Table Interface
D-PAC	German Processing and Archiving Centre for ENVISAT
DPM	Detailed Processing Model
DPQC	Data Processing and Quality Control
DS	Deep Space
DSD	Data Set Description
ECMWF	European Centre for Medium-Range Weather Forecasts
ESF	Engineering Support Facility
FCA	FPS (Focal Plane Subsystem) Cooler Assembly
FCE	Fringe Count Error
FOCC	Flight Operation Control Centre
FOS	Flight Operations Segment
FR	Full Resolution
GS	Ground Station
HD	Help-Desk
HK	House Keeping
HSM	High-Speed Multiplexer
ICU	Instrument Control Unit
IDU	Interferometer Drive Unit
IECF	Instrument Engineering and Calibration Facilities
IF	In-Flight
IG	Initial Guess
IGM	Interferogram
ILS	Instrument Line Shape
INT	Interferometer
I/O DD	Input/Output Data Definition
IOP	In-orbit Performance
IPF	Instrument Processing Facility
L0	Level 0

L1	Level 1
L2	Level 2
LOS	Line of Sight
MA	Middle Atmosphere
MCMD	Macro-Command
MDS	Measurements Data Set
MIO	MIPAS Optics Module
MIPAS	Michelson Interferometer for Passive Atmospheric Sounding
MPH	Main Product Header
MPS	Mission Planning System
MR	Monthly Report
MW	Micro-Window
NCR	Non-Conformance Report
NESR	Noise Equivalent Spectral Radiance
NLC	NoctiLucent Cloud
NOM	Nominal
NRT	Near-Real-Time
OAR	Operational Anomaly report
OBT	On-board time
OCM	Orbit Control Manoeuvre
OFL	Off-Line
OM	Occupation Matrix
PCD	Product Confidence Data
PCF	Product Control Facility
PDS	Payload Data Segment
PFHS	Processing Facility Host Structure
PLSOL	Payload Switch off-line
PPM	Part per million
QC	Quality Control
QWG	Quality Working Group
RGC	Radiometric Gain Calibration
RR	Reduced Resolution
SCF	Spectral Calibration Factor
SEM	Special Event Measurement
SPH	Specific Product header
SPR	Software Problem Report
ST	Science Team
UA	Upper Atmosphere
UTLS	Upper Troposphere Lower Stratosphere
VCM	Variance Covariance Matrix
VMR	Volume Mixing Ratio
WCC	Wear Control Cycle

7.2 Appendix B – Level 1 IPF historical updates

The historical updates of the MIPAS Level 1 IPF processor are listed below:

- **Version V5.06** it fixes some bugs of previous version, in particular for Level 1:
  - IDEAS-PR-11-05499: Wrong 'Number of sweeps in current scan' for special mode
  - IDEAS-PR-10-05442: Wrong REF_DOC in MPH of MIPAS products

- **Version V5.05** it is equivalent to IPF 5.02, but the new CFI 5.8.1 for the ENVISAT mission extension are integrated

- **Version V5.02** (aligned with L1 DPM 4L and L1 ADFs V8.6) upgrade of the Level 1 processor. The L2 processing with this IPF is disabled, due to the investigation on-going on the discrepancies between IPF and reference prototype processor. For Level 1 the following upgrades were included:
  - Truncation of the Interferogram to 8.0 cm in order to avoid under-sampling the spectrum for the Optimized Resolution mission
  - Improved Level 1b engineering heights calculation
  - Calculation of the quadratic terms for spectral calibration that are provided in the output products
  - Additional fields in the Level 1b products, such as the auxiliary L0 data packets that provide information about housekeeping data

- **Version V04.67L02** Linux porting version of 4.67 AIX processor

- **Version V4.67** the following updates were introduced for L1 processing
  - Fixed NCR-1522 → The MIPAS IPF (from version 4.61 to version 4.65) generates L1b products with wrong "NUM_DSR" value in the SPH; in particular this value differs by one unit from the "TOT_SCAN" value, while the two should be the same. The L1 prototype doesn't show this anomaly.
  - Fixed NCR-1676 → This problem was detected at D-PAC during OFL L1 processing of MIPAS RR data; in particular it was observed that the MIPAS IPF 4.65 is violating the shared memory area of PFHS. PFHS performance is seriously affected, because too many manual re-starts become necessary.

- **Version V4.65** no update of Level 1 for this version

- **Version V4.64** (aligned with DPM 4I and ADFs V4.1) introduced modifications only for the Level 1 processor, with the following update:
  - Fixed internal SPR-121O0-2011: Problem with the block sequence

- **Version V4.63** (aligned with DPM 4I and ADFs V4.1) introduced modifications for both Level 1 and Level 2 processors. For the Level 1 processor, the following updates were introduced:
  - Processing of low resolution measurements, with reduced resolution also for offset and gain data.
  - Solution of internal SPR-120O0-2000: Band D oscillations in forward sweeps for MIPAS reduced-resolution products
  - Solution of internal SPR-120O0-2001: NESR data problem

- **Version V4.62** (aligned with DPM 4H and ADFs V4.0) introduced modifications for both Level 1 and Level 2 processors. For the Level 1 processor, the following updates were introduced:
  - Processing of low resolution measurements, without reduced resolution for offset and gain data that will be implemented in IPF 4.63.
  - Fixed NCR_1157: Bug in the MIPAS processor ILS retrieval.
  - Fixed NCR_1259: Scans with null NESR.

- **Version V4.61** consists of updates for both Level 1 and Level 2:
  - Fixed NCR_1143: Sparse corruption of bands between 1 and 4 January 2004.

- **Version V4.59** has introduced only upgrade on Level 2 processor.

- **Version V4.57** involved only Level 1 processor update, introducing the following modifications:
  - Modification of FCE algorithm
  - Elimination of strong anomalous oscillations in the spectra
  - Modification of NESR reporting
  - ADC saturation flagging
  - Addition of aliasing spike suppression algorithm

7.3 Appendix C – Level 1 ADF historical updates

The Level 1 characterization files (MIP_CA1_AX, MIP_MW1_AX, MIP_PS1_AX) are provided by Bomem and updated when needed, the activation date of these ADFs with respect to the operational processor are reported in the table below.

Table 16 – Level 1 ADF start validity date

ADFs Version	Updated ADF	Start Validity Date	IPF Version	Dissemination Date
8.6	**MIP_PS1_AX MIP_CL1_AX**	**09 Aug 2004 RR mission**	**5.02 + Mical 1.6**	**28 Jan 2010**
6.1	MIP_PS1_AX	09 Aug 2004 RR mission	4.65 4.67	27 Jun 2005
5.0	MIP_PS1_AX	/	/	Not used for processing
4.1	MIP_PS1_AX	/	/	Not used for processing
3.2	MIP_PS1_AX	26 Mar 2004	4.61	21 Apr 2004
3.1	MIP_PS1_AX	09 Jan 2004	4.61	17 Mar 2004
3.0	MIP_CA1_AX MIP_MW1_AX MIP_PS1_AX	April 2002 FR mission	4.61	4 Nov 2003

When one ADF is modified the three AUX files are disseminated with the same START/STOP time and that corresponds to a new level 1 ADF delivery, this prevents confusion.

A more detailed description of the historic updates of the L1 ADF is reported hereafter.

Version 8.6

MIP_PS1_AX

- Rejection Threshold NESR assessment = 1.0
- Changing the pitch, roll and yaw bias taking into account the alignment matrix correction introduced in the planning for reduced resolution data.
- The OPD is set also to 8.0 instead of 8.2 cm.
- Attitude flag set to 0 since for the IPF 5.02 the usage of AUX_FRA is disabled

MIP_CL1_AX

- A specific MIP_CL1_AX files has to used with ADF 8.6m, this ADF LOS calibration files has no pitch bias correction and allows to correct for the problem in the alignment matrix when used with the MIP_PS1_AX file of version 8.6

Mical 1.6

- The version 8.6 is activated in correspondence with the new Mical chain 1.6

Version 6.1

MIP_PS1_AX

- OPD set to 8.2 cm
- Spike detection standard deviation threshold set to 10
- Spike detection number of points per block set to 256
- Set standard deviation threshold to 5 for Scene measurement quality

Version 6.0

MIP_PS1_AX

- OPD set to 20 cm
- Spike detection standard deviation threshold set to 10
- Spike detection number of points per block set to 256
- Set standard deviation threshold to 5 for Scene measurement quality

Version 5.0 draft

MIP_PS1_AX

- OPD set to 10 cm
- Channel A set to 5701 points
- Channel AB set to 3001 points
- Channel B set to 5701 points
- Channel C set to 3601 points
- Channel D set to 11801 points
- Set standard deviation threshold to 5 for Scene measurement quality

Version 4.1 (TDS 6)

MIP_PS1_AX

- OPD set to 8.2 cm
- Channel A set to 4561 points
- Channel AB set to 2401 points
- Channel B set to 4561 points
- Channel C set to 2881 points
- Channel D set to 9441 points
- Number of co-additions for ILS retrieval was set to 5
- Set standard deviation threshold to 5 for Scene measurement quality

Version 4.0 draft

MIP_PS1_AX

- OPD set to 8.2 cm
- Channel A set to 4561 points
- Channel AB set to 2401 points
- Channel B set to 4561 points
- Channel C set to 2881 points

- Channel D set to 9441 points
- Number of co-additions for ILS retrieval was set to 5

Version 3.2

MIP_PS1_AX

- Changed the threshold to take into account the modified noise level

Version 3.1

MIP_PS1_AX

- Changed the threshold to take into account the modified noise level

Version 3.0

MIP_CA1_AX

- Modify non-linearity coefficients for reverse sweep. Coefficients for forward are kept as is
- Neutral equalization filter for band A

MIP_MW1_AX

- Removal of band D microwindow D_H20b at 1870.8049 cm-1
- Set spectral calibration microwindow altitude to 32 km

MIP_PS1_AX

- Number of co-additions for spectral calibration was set to 4
- Number of co-additions for ILS retrieval was set to 10

7.4 Appendix D – Level 2 IPF historical updates

The historical updates to the MIPAS Level 2 IPF processor are listed here below:

- **Version V5.06:** it fixes some bugs of previous version, in particular for Level 2:
  - IDEAS-PR-11-05502: MIP_NL__2P: Invalid information in DATASET STRUCTURE ADS for 'empty' products
  - PRD-PR-10-05464: MIP_NLE_2P conversion fail on BUFR (ESRIN and Kiruna)
  - IDEAS-PR-10-05458: MIPAS IPF 5.05 crashes for one orbit in NRT operations
  - IDEAS-PR-10-05457: High chi square for CH4 and N2O retrieval
  - IDEAS-PR-10-05434: MIPAS wrong flag in ADS in case of empty MDS
  - IDEAS-PR-10-05313: Microwindow Occupation ADS corrupted records
  - IDEAS-PR-10-05312: MIPAS: problem with GRIBEX

- **Version V5.05** first IPF that allows L2 processing of Optimized Resolution mission, it is aligned with DPM 5.2 and ADF 6.4

- **Version V5.02** No L2 processing will be made with this version since some inconsistencies are still present with respect of the reference algorithm.

- **Version V04.67L02** Linux porting version of 4.67 AIX processor

- **Version V4.67** the following updates were introduced for L2 processing:
  - Fixed NCR-1458 → NO2 MIPAS products relative to orbit #7000 (3 July 2003) came with high values of chi2, that were not reproduced in the retrievals performed with the prototype using the same set of auxiliary files.
  - Fixed NCR-1521 → Some Level 2 products processed at DPAC with IPF 4.62 differ from the corresponding products processed with IPF 4.61, revealing a problem in the new 4.62 data. In fact the IPF 4.61 results were carefully validated using a balloon flight with very good space and time collocation.
  - Fixed NCR-1522 → Some L2 products processed at DPAC with IPF 4.61 and IPF 4.62 give beat-check format error. The same L2 production made with the prototype doesn't show this anomaly.

- **Version V4.65** (aligned with DPM 4.1 and ADFs V5.1, under validation) introduces modifications only for the Level 2 processor, with the following update:
  - Solution of NCR_1310: Problem with MIP_NL__2P

- **Version V4.64** no update for the Level 2 processor in this version

- **Version V4.63** (aligned with DPM 4.1 and ADFs V5.1) has introduced the following modifications:
  - Processing of reduced resolution measurements in old configuration (17 sweeps per scan and fixed altitude – August/September 2004 measurements).
  - Solution of NCR_1278: Some MIPAS profiles have zero pressure
  - Solution of NCR_1308: MIPAS Level 2 failure.
  - Rejection of NCR_1310: Problem with MIPNL__2P
  - Rejection of NCR_1317: One second discrepancy in IPF 4.61

- **Version V4.62** (aligned with DPM 4.0) has solved the following problems:
  - Fixed NCR_1128: Cloud-detection anomaly.
  - Fixed NCR_1275: Inconsistent values in MIPAS files.
  - Fixed NCR_1276: Level2 profile counting bug.

- **Version V4.60, V4.61** has solved the following problems:
  - Fixed NCR_992: Inconsistency in number of profiles in MIPAS Level_2.
  - Fixed NCR_1068: Number of computed residual spectra not consistent with the number of observations.

- **Version V4.59**, operational since 23 July 2003, has introduced only Level 2 processing modifications. The main improvements introduced via both the processor V4.59 and the installation of a new set of ADFs have been:
  - Fixed NCR_892: Inconsistency in number of scans.
  - Fixed NCR_893: Different values for same scans.
  - The cloud filtering (that is, every time a cloud is detected at a given altitude, the retrieval is performed only above that altitude)
  - The removal of the gaps between the altitude validity ranges (allowing retrievals in the Antarctic region not feasible with the old MIP_MW2_AX)
  - Altitudes margins fixed to +/- 4 km
  - MIPAS-SPR-MAINT-0011 Wrong DSD name in L2 product in case of not requested VMR
  - MIPAS-SPR-MAINT-0012 Filling of SPH field 22 of MIPAS Level 2 ProductsMIPAS-SPR-MAINT-0013 Filling of the MIPAS MPH and MIPAS Level 2 SPH fields
  - MIPAS-SPR-MAINT-0014 Wrong writing of PCD String to the PCD Information ADS
  - MIPAS-SPR-MAINT-0015 Too strong test and skipping retrieval
  - MIPAS-SPR-MAINT-0016 Not initialised nucl1 and nucl2 in R 8.5.6.3-7A
  - ENVI-GSOP-EOAD-NC-03-0539 MIPAS L2 processing aborted

7.5 Appendix E – Level 2 ADF historical updates

This paragraph reports the historical update of the level 2 ADF.
The latest delivery for processing FR mission is the v3.8, whereas for the processing of RR data of Aug 2004 the latest delivery is the v5.2. The ADF version 5.2 was used for the L2 processing of RR not over-sampled data (Aug – Sep 2004).
The versions 6.0 – 6.2 were not used for operational processing. Version 6.4 was used for the switch to IPF 5.05.

Table 17 – Historical update of Level 2 configuration ADFs. In green are the operational ones.

ADFs Version	Delivery Date	Updated ADF	Reason
ADF V6.0: to be used to process MIPAS measurements from January 2005 on, characterized by reduced spectral resolution and new measurements scenario (1.5 km step at low altitudes). To be used with ML2PP V5.0			
ADF V6.4	10.06.2010	MIP_IG2_AX_V6.4_2010_january MIP_SP2_AX_V6.4 MIP_PI2_AX_V6.4	Bug correction in MIP_IG2 and MIP_SP2 file. MIP_PI2 file updated to handle UA mode where 35 sweeps per scan are measured, VCM matrix of LOS increased in size up to 35.
ADF V6.3	29.03.2010	MIP_OM2_AX_V6.3 MIP_CS2_AX_V6.3 MIP_PS2_AX_V6.3_nom_before_5june2005_l MIP_PS2_AX_V6.3_nom_after_5june2005_l MIP_PS2_AX_V6.3_utls1_ECMWF_l MIP_PS2_AX_V6.3_ma_ua MIP_MW2_AX_V6.3	MIP_MW2_AX: correction of an error in the MW_PT ascii file for cloud detection microwindow pairs that brought an inconsistency in the MIP_MW2_AX binary file. • MIP_OM2_AX: inclusions of OMs used to process MA and UA measurement modes. • MIP_PS2_AX: 1. Modification in the threshold defining minimum value of eigenvalue (for inversion of matrix) for all species: old value: 1.e-30; new value: 1.e-17 2. Regularization for H2O set to 'off' Added a dedicated file to be used for processing MA and UA modes (these 2 modes, despite NOM and UTLs-1 modes, do not have floating altitudes). • MIP_CS2_AX: added LUTs per MWs contained in OMs for MA e UA modes (respectively OM_*_70* and OM_*_80*)
ADF V6.2	27.06.2008	MIP_IG2_AX_V6.2_2005_january MIP_OM2_AX_V6.2	New IG2 files (IG2 V4.1) Extended altitude bands for both UTLS1 and NOM OMs (± 4 km). Inserted pT error propagation matrices in nominal OMs for both NOM and UTLS-1 modes.

ADFs Version	Delivery Date	Updated ADF	Reason
ADF2 V6.1	21.12.2007	MIP_CS2_AX_V6.1 MIP_OM2_AX_V6.1 MIP_SP2_AX_V6.1 MIP_PS2_AX_V6.1_nom_before_5june 2005 MIP_PS2_AX_V6.1_nom_after_5june2 005 MIP_PS2_AX_V6.1_utls1 MIP_MW2_AX_V6.1 MIP_IG2_AX_V6.1_2005_april MIP_IG2_AX_V6.1_2005_january MIP_IG2_AX_V6.1_2005_july MIP_IG2_AX_V6.1_2005_october MIP_IG2_AX_V6.1_2006_april MIP_IG2_AX_V6.1_2006_january MIP_IG2_AX_V6.1_2006_july MIP_IG2_AX_V6.1_2006_october	New MW of O3. Extended altitude range for UTLS-1 OMs. New cloud MW to allow cloud filtering algorithm to discard from the analysis measurements with tangent altitudes below 4.5 km. Reduced vertical resolution for CH4 and N2O profiles. New settings for retrieved tangent altitude correction with ECMWF.
ADF2 V6.0	21.11.2006	MIP_CS2_AX_V6.0_nom MIP_OM2_AX_V6.0_nom MIP_PS2_AX_V6.0_nom MIP_SP2_AX_V6.0_nom MIP_PS2_AX_V6.0_nom_before_05jun e2005 MIP_PS2_AX_V6.0_nom_after_05june 2005 MIP_PS2_AX_V6.0_utls1 MIP_MW2_AX_V6.0_nom_patch MIP_IG2_AX_2005_april MIP_IG2_AX_2005_january MIP_IG2_AX_2005_july MIP_IG2_AX_2005_october MIP_IG2_AX_2006_april MIP_IG2_AX_2006_january MIP_IG2_AX_2006_july MIP_IG2_AX_2006_october	New MW database and LUTs (MW_330 for pT, MW_360 for the other species.) New occupation matrices. New line list database New cloud indices and cloud microwindows New climatological profiles IG2 V4.0 New PS settings with several new items added required by new or modified functionalities in ML2PP V5.0.
ADF2 V5.*: to be used for processing MIPAS measurements of August/September 2004, characterized by reduced spectral resolution, old measurements scenario (3 km step at low altitudes)			
ADF V5.2	16.12.2005	MIP_SP2_AX_V5.2 MIP_IG2_october_V5.2	Corrected error in binary files
ADF V5.1	05.07.2005	MIP_MW2_AX_V5.1 MIP_SP2_AX_V5.1 MIP_OM2_AX_V5.1	Spectroscopic line list relative to the new microwindow database for reduced spectral resolution; PT error propagation matrices for nominal OMs added in file MIP_OM2_AX; extension of a microwindow for cloud detection corrected.

ADFs Version	Delivery Date	Updated ADF	Reason
ADF V5.0	18.03.2005	MIP_PS2_AX_V5 MIP_CS2_AX_V5 MIP_MW2_AX_V5 MIP_PI2_AX_V5 MIP_I2_AX_V5 MIP_OM2_AX_V5	New microwindows selected for reduced spectral resolution, and corresponding cross section LUT, occupation matrices and Initial Guess for continuum. New Pointing Information (PI) with a smaller error in LOS, new settings (PS) for handling reduced resolution measurements and optimised convergence criteria thresholds for reduced resolution mws.
ADF2 V4.*: to be used for processing MIPAS FR mission			
ADF V4.0	03.09.2004	NRT: MIP_PS2_AX_NRT_V4.0 OFL: MIP_PS2_AX_OFL_V4.0	Changed the flag in PS2 file spec_events_flag from "B" (dec 66) to "N" (dec 78). Increased NESR threshold in PS2 files as in V3.7.
ADF V4.1	03.09.2004	NRT: MIP_PS2_AX_NRT_V4.1 OFL: MIP_PS2_AX_OFL_V4.1	Changed the flag in PS2 file spec_events_flag from "B" (dec 66) to "N" (dec 78). NESR threshold in PS2 files as in V3.6.
ADF2 V3.*: to be used for processing MIPAS FR mission			
ADF V3.7	13.02.2004	NRT: MIP_OM2_AX_NRT_V3.7 MIP_PS2_AX_NRT_V3.7 OFL: MIP_OM2_AX_OFL_V3.7 MIP_PS2_AX_OFL_V3.7	Increased NESR threshold in PS2 files to face the increase of NESR after the switch-on of the heater (since the middle of January 2004). Eliminated the OMs with fewer than 3 sweeps from the OM database.
ADF V3.6	20.10.2003	NRT: MIP_PS2_AX_V3.6_NRT OFL: MIP_PS2_AX_V3.6_OFL	Increased dimension of some vectors in MIP_PS2_AX files
ADF V3.5	26.09.2003	OFL: MIP_OM2_AX_V3.5	Introduced PT error propagation matrices different of 0 in MIP_OM2_AX_Offline
ADF V3.4	29.08.2003	NRT: MIP_MW2_AX_V3.4 OFL: MIP_MW2_AX_V3.4 MIP_OM2_AX_V3.4_OFL	Two set of aux ADF: one for NRT and one for Off-line. NRT: old conv. criteria, nom. altitude range, ILS bug correction ; Off-line : new conv. criteria, altitude range 6-68 km, ILS bug correction
ADF V3.3	08.08.2003	MIP_PS2_AX_V3.3	Short-term bug fix for ILS in PS2 file
ADF V3.2	31.07.2003	MIP_OM2_AX_V3.2 MIP_PS2_AX_V3.2 MIP_CS2_AX_V3.2	OMs for retrieval range 9-68 km, PS2 for improved convergence criteria, modification in the name of some cross-section files

ADFs Version	Delivery Date	Updated ADF	Reason
ADF V3.1	19.06.2003	MIP_MW2_AX_V3.1_CD MIP_MW2_AX_V3.1_noCD MIP_OM2_AX_V3.1	In reply to SPR MIPAS_OM2_AX_3.0: no gaps between altitude validity range and improved validity mask range in MW db.
ADF V3.0	14.05.2003	MIP_CS2_AX_V3.0 MIP_MW2_AX_V3.0_CD MIP_MW2_AX_V3.0_noCD MIP_OM2_AX_V3.0 MIP_PS2_AX_V3.0 MIP_SP2_AX_V3.0	MIPAS dedicated spectroscopic db. hitran_mipas_pf3.1, cloud detection enabled mws, improved OM for the nominal altitude range