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ENVISAT MIPAS Bi-Monthly Report: May - June 2005

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1 INTRODUCTION

The MIPAS Bi-Monthly Report (BMR) documents the current status and recent changes to the MIPAS instrument, its data processing chain, and its data products.

The BMR is composed of analysis results obtained by the Product Control Facility (PCF), combined with inputs received from the different groups working on MIPAS operation, calibration, product validation and data quality. The following groups participate in the MIPAS Quality Working Group (QWG):

- ESRIN-PCF
- ESOC
- ESTEC
- ABB BOMEM
- Oxford University
- IFAC-CNR
- EADS-Astrium GmbH
- Leicester University
- LISA
- IMK
- University of Bologna,
- ISAC,
- IAA
- DLR
- ECMWF

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

1.1 Scope

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

1.2 Acronyms and Abbreviations

ACVT	Atmospheric Chemistry Validation Team
ADF	Auxiliary Data File
ADS	Annotated Data Set
ANX	Ascending Node Crossing
AE	Aircraft Emission
AR	Anomaly Report
BMR	Bi-Monthly Report

CBB	Calibration Black-Body
CTI	Configuration Table Interface
DPM	Detailed Processing Model
DS	Deep Space
DSD	Data Set Description
ECMWF	European Centre for Medium-Range Weather Forecasts
FCE	Fringe Count Error
FOCC	Flight Operation Control Centre
HD	Help-Desk
IDU	Interferometer Drive Unit
IF	In-Flight
IG	Initial Guess
ILS	Instrument Line Shape
INT	Interferometer
I/O DD	Input/Output Data Definition
IPF	Instrument Processing Facility
LOS	Line of Sight
MA	Middle Atmosphere
MDS	Measurements Data Set
MIPAS	Michelson Interferometer for Passive Atmospheric Sounding
MPH	Main Product Header
MW	Micro-Window
NCR	Non-Conformance Report
NESR	Noise Equivalent Spectral Radiance
NOM	Nominal
NRT	Near-Real-Time
OFL	Off-Line
PCD	Product Confidence Data
PCF	Product Control Facility
PDS	Payload Data Segment
QWG	Quality Working Group
RGC	Radiometric Gain Calibration
SEM	Special Event Measurement
SPH	Specific Product header
SPR	Software Problem Report
UA	Upper Atmosphere
UTLS	Upper Troposphere Lower Stratosphere
VCM	Variance Covariance Matrix
VMR	Volume Mixing Ratio
WCC	Wear Control Cycle
1RR	Single Slide Reduced Resolution
2RR	Double Slide Reduced Resolution

2 THE REPORT

2.1 Summary

- During May and June 2005 operations 17 unavailability have been caused by IDU velocity error. Mainly they occurred in correspondence of long measurements period, so reducing the duty-cycle there is a possibility to reduce the unavailability.
- A passive decontamination has been commanded to remove ice from MIPAS detectors. The related unavailability interval has been from 23 May to 1st of June 2005. This procedure allowed to stop the anomalous radiometric gain increase observed from Jan to May 2005 (see 2.4.3), furthermore this has a positive effect to the cooler performance (see 2.3.3.1). After the decontamination the gain increase and the Compressor vibration level come back to nominal value.
- Currently the Near-Real Time (NRT) mission is suspended, and no systematic operational Off-Line (OFL) processing is performed as processing algorithms are being adapted to the new observation modes.
- During May and June 2005 the new Nominal scenario (using floating altitude) has been commanded, starting from the 3rd of June the Teresina Campaign has been supported. Special Aircraft Emission measurement (AE) has been acquired during 5-6 May 2005.

2.2 Unavailability

2.2.1 INSTRUMENT UNAVAILABILITY

During May and June 2005 operations, MIPAS switched 17 times to Heater/Refuse mode due to IDU velocity error. The related unavailability intervals are listed below:

Start time: 4 May 2005 21:49:00, 16616
Stop time: 4 May 2005 22:44:27, 16617

Start time: 15 May 2005 18:37:30, 16772
Stop time: 15 May 2005 20:17:51, 16773

Start time: 16 May 2005 08:42:30, 16780
Stop time: 16 May 2005 09:42:39, 16781

Start time: 17 May 2005 05:46:43, 16793
Stop time: 17 May 2005 05:49:50, 16793

Start time: 17 May 2005 12:41:50, 16797
Stop time: 17 May 2005 14:35:04, 16798

Start time: 22 May 2005 15:45:21, 16870

Stop time: 22 May 2005 16:36:32, 16871

Start time: 22 May 2005 16:38:44, 16871
Stop time: 22 May 2005 18:17:08, 16872

Start time: 23 May 2005 00:27:53, 16875
Stop time: 23 May 2005 00:59:31, 16876

Start time: 14 Jun 2005 14:30:17, 17199
Stop time: 14 Jun 2005 14:39:36, 17199

Start time: 20 Jun 2005 14:38:41, 17285
Stop time: 20 Jun 2005 14:51:07, 17285

Start time: 21 Jun 2005 11:37:50, 17297
Stop time: 21 Jun 2005 12:38:54, 17298

Start time: 21 Jun 2005 16:18:44, 17300
Stop time: 21 Jun 2005 17:46:17, 17301

Start time: 27 Jun 2005 00:50:15, 17376
Stop time: 27 Jun 2005 01:06:13, 17377

Start time: 27 Jun 2005 12:22:58, 17383
Stop time: 27 Jun 2005 12:50:24, 17384

Start time: 27 Jun 2005 14:59:40, 17385
Stop time: 27 Jun 2005 16:17:12, 17386

Start time: 29 Jun 2005 02:30:33, 17406
Stop time: 29 Jun 2005 03:24:11, 17407

Start time: 29 Jun 2005 03:24:24, 17407
Stop time: 29 Jun 2005 05:10:22, 17408

MIPAS went in RS/WT INI state owing to a MCMD TRANSFER ACKNOWLEDGE ERROR. The related unavailability interval has been the following:

Start time: 15 Jun 2005 03:13:26, 17206
Stop time: 16 Jun 2005 10:15:11, 17225

A passive decontamination has been commanded to remove ice from MIPAS detectors. The related unavailability interval has been the following:

Start time: 23 May 2005 11:03:07, 16882

Stop time: 1 Jun 2005 08:27:40, 17009

2.2.2 DATA GENERATION GAPS

Only Level 0 data coverage is reported below, as currently the Near-Real Time (NRT) mission is suspended, and no systematic operational Off-Line (OFL) processing is performed as processing algorithms are being adapted to the new observation modes.

Tab. 1 List of missing intervals for MIP_NL__0P: 1 May - 30 June 2005.

Start Time		Stop Time		Duration [s]	Start Orbit	Stop Orbit
04-May-2005	22.44.27	04-May-2005	22.44.42	15	16617	16617
07-May-2005	10.56.29	07-May-2005	10.56.43	14	16652	16652
14-May-2005	10.37.20	14-May-2005	10.37.34	14	16752	16752
15-May-2005	18.33.26	15-May-2005	18.37.30	244	16772	16772
15-May-2005	20.17.51	15-May-2005	20.18.06	15	16773	16773
21-May-2005	10.10.08	21-May-2005	10.10.22	14	16852	16852
22-May-2005	18.17.08	22-May-2005	18.17.22	14	16872	16872
23-May-2005	00.59.31	23-May-2005	00.59.46	15	16876	16876
23-May-2005	10.59.17	23-May-2005	11.03.07	230	16882	16882
04-Jun-2005	09.34.29	04-Jun-2005	09.34.43	14	17052	17052
06-Jun-2005	22.10.03	06-Jun-2005	22.13.58	235	17089	17089
07-Jun-2005	21.38.26	07-Jun-2005	21.42.21	235	17103	17103
08-Jun-2005	11.03.13	08-Jun-2005	11.07.08	235	17111	17111
09-Jun-2005	10.31.36	09-Jun-2005	10.35.31	235	17125	17125
09-Jun-2005	22.15.48	09-Jun-2005	22.19.43	235	17132	17132
10-Jun-2005	20.03.36	10-Jun-2005	20.07.30	234	17145	17145
11-Jun-2005	10.55.05	11-Jun-2005	10.55.19	14	17153	17153
11-Jun-2005	19.31.59	11-Jun-2005	19.35.53	234	17159	17159
12-Jun-2005	10.37.22	12-Jun-2005	10.41.16	234	17168	17168
13-Jun-2005	10.05.45	13-Jun-2005	10.09.40	235	17182	17182
13-Jun-2005	21.49.57	13-Jun-2005	21.53.51	234	17189	17189
14-Jun-2005	11.14.44	14-Jun-2005	11.18.39	235	17197	17197
16-Jun-2005	10.15.11	16-Jun-2005	10.15.25	14	17225	17225
17-Jun-2005	11.20.30	17-Jun-2005	11.24.24	234	17240	17240
18-Jun-2005	10.35.12	18-Jun-2005	10.35.26	14	17253	17253
19-Jun-2005	08.36.40	19-Jun-2005	08.40.35	235	17267	17267
20-Jun-2005	11.26.15	20-Jun-2005	11.30.09	234	17283	17283
21-Jun-2005	10.54.38	21-Jun-2005	10.58.33	235	17297	17297
22-Jun-2005	10.23.01	22-Jun-2005	10.26.56	235	17311	17311
23-Jun-2005	23.16.12	23-Jun-2005	23.20.06	234	17333	17333
25-Jun-2005	10.18.08	25-Jun-2005	10.18.22	14	17353	17353
25-Jun-2005	22.12.58	25-Jun-2005	22.16.53	235	17361	17361

26-Jun-2005	21.41.21	26-Jun-2005	21.45.16	235	17375	17375
27-Jun-2005	11.06.09	27-Jun-2005	11.10.03	234	17383	17383
27-Jun-2005	14.59.40	27-Jun-2005	16.13.57	4457	17385	17386
28-Jun-2005	10.34.32	28-Jun-2005	10.38.26	234	17397	17397
28-Jun-2005	22.18.43	28-Jun-2005	22.22.38	235	17404	17404
29-Jun-2005	02.30.32	29-Jun-2005	05.07.07	9395	17406	17408
29-Jun-2005	21.47.06	29-Jun-2005	21.53.27	381	17418	17418
29-Jun-2005	21.53.27	29-Jun-2005	22.00.32	425	17418	17418
29-Jun-2005	22.00.32	29-Jun-2005	22.00.32	0	17418	17418
29-Jun-2005	22.00.32	29-Jun-2005	22.07.37	425	17418	17418
29-Jun-2005	22.07.37	30-Jun-2005	02.20.30	15173	17418	17420
30-Jun-2005	11.11.54	30-Jun-2005	11.15.48	234	17426	17426
30-Jun-2005	13.09.00	30-Jun-2005	18.00.17	17477	17427	17430

Tab. 2 List of missing intervals for MIP_LS__0P: 1 May - 30 June 2005.

Start Time		Stop Time		Duration [s]	Start Orbit	Stop Orbit
14-May-2005	07.21.30	14-May-2005	07.21.33	3	16751	16751

2.3 Instrument Configuration and Performance

2.3.1 MIPAS OPERATIONS

Here the Planning for the MIPAS operations for the period May - June 2005 is shortly described.

Planning strategy:

- All activities have been planned in nominal mode (double slide operation) with medium resolution (41% - 1.64 sec sweeps) with asymmetric transitory sweeps.
- Compensation times, transitory times and other planning parameters have been planned according to the new operational baseline.
- The new Nominal Scenario (using floating altitudes) defined by the 1st Science Team meeting will be commanded.
- According to the implementation of the Auto-recovery Sequence in the FOS-MPS, the new MPL_CAL_MP file has been generated as follow:
    - ILS: REPETITION=+001<orbit> ANX_TIME=+0200.000000;
    - RGC and WCC REPETITION fields set to zero.
- Radiometric Gain calibrations (RGC) have been planned using the MPL_ORS_MP file.
- The WCC activity cannot be explicitly requested trough the MPL_ORS_MP file, anyway it will be performed after every transition to Heater.
- No files related to the SEM activity have been sent (CTI_SEM, CTI_S22, CTI_S23).
- 2 LOS orbits during the week-end with the following inputs:

- 2 consecutive PRIME orbits + 2 consecutive BACKUP orbits;
- PITCH BIAS=-0.030<deg>, no harmonics (INT_AUX_MP.27);
- EL_OFFSET=+000.100000<deg> and NUM_STEPS=+15 (INT_AUM_MP.23);
- Rearward observations only.

- The new **Nominal scenario** (using **floating altitudes**) defined by the 1st Science Team meeting has been commanded: 4-7 May (16608-16649), 14-17 May (16755-16798), 22-25 May (16867-16911); starting from the 3rd of June, the Teresina campaign has been supported as scheduled in Tab. 3.
- During the NOM scenario (5-6 May, 16618-16646) several acquisitions in **Aircraft Emissions mode** has been commanded over the North Atlantic Corridor, both ascending and descending passes.
- Starting from the 3rd of June, a new algorithm for floating altitude has been implemented:
  Old algorithm
  minimum_tangent_altitude = A + B * cos (2 * tangent_point_latitude), with A=6 km and B=3 km;
  New algorithm
  minimum_tangent_altitude = C – D * cos (90° – |tangent_point_latitude|), with C=12 km and D=7 km.

RGT files already transferred to the FOCC:

AVI_UAV_TLVFOS20050414_124000_00000000_00000163_20050430_093935_20050504_074308.N1
AVI_UAV_TLVFOS20050414_124400_00000000_00000164_20050507_110053_20050531_120000.N1
AVI_UAV_TLVFOS20050415_113700_00000000_00000165_20050507_044601_20050507_073541.N1
AVI_UAV_TLVFOS20050415_113900_00000000_00000166_20050507_110053_20050531_120000.N1
AVI_UAV_TLVFOS20050427_091900_00000000_00000167_20050507_110053_20050514_071514.N1
AVI_UAV_TLVFOS20050427_092100_00000000_00000168_20050514_104144_20050514_141109.N1
AVI_UAV_TLVFOS20050427_093100_00000000_00000169_20050517_143514_20050521_065522.N1
AVI_UAV_TLVFOS20050427_104200_00000000_00000170_20050521_101433_20050522_095813.N1
AVI_UAV_TLVFOS20050427_105200_00000000_00000171_20050525_120254_20050528_063531.N1
AVI_UAV_TLVFOS20050427_105700_00000000_00000172_20050528_095451_20050630_120000.N1
AVI_UAV_TLVFOS20050518_135300_00000000_00000173_20050528_095451_20050603_101933.N1
AVI_UAV_TLVFOS20050518_135800_00000000_00000174_20050603_171156_20050604_061541.N1
AVI_UAV_TLVFOS20050518_141000_00000000_00000175_20050604_093854_20050604_094756.N1
AVI_UAV_TLVFOS20050518_142500_00000000_00000176_20050604_164019_20050605_091619.N1
AVI_UAV_TLVFOS20050518_143200_00000000_00000177_20050605_160842_20050606_102518.N1
AVI_UAV_TLVFOS20050518_144200_00000000_00000178_20050606_171741_20050630_120000.N1
AVI_UAV_TLVFOS20050520_141000_00000000_00000179_20050606_171741_20050606_220929.N1
AVI_UAV_TLVFOS20050520_141200_00000000_00000180_20050607_050153_20050607_213752.N1
AVI_UAV_TLVFOS20050520_143200_00000000_00000181_20050608_024940_20050608_110239.N1
AVI_UAV_TLVFOS20050520_143400_00000000_00000182_20050608_175503_20050609_103102.N1
AVI_UAV_TLVFOS20050520_143700_00000000_00000183_20050609_154250_20050609_221514.N1
AVI_UAV_TLVFOS20050520_144000_00000000_00000184_20050610_050738_20050610_200301.N1
AVI_UAV_TLVFOS20050520_144900_00000000_00000185_20050611_025525_20050611_073253.N1
AVI_UAV_TLVFOS20050520_145900_00000000_00000186_20050611_105930_20050611_193124.N1
AVI_UAV_TLVFOS20050520_150300_00000000_00000187_20050612_022348_20050612_103647.N1
AVI_UAV_TLVFOS20050520_150500_00000000_00000188_20050612_154835_20050613_100510.N1
AVI_UAV_TLVFOS20050520_151000_00000000_00000189_20050613_151658_20050613_214922.N1
AVI_UAV_TLVFOS20050520_151200_00000000_00000190_20050614_044146_20050614_111409.N1

AVI_UAV_TLVFOS20050520_152000_00000000_00000191_20050614_162557_20050615_104232.N1
AVI_UAV_TLVFOS20050520_152200_00000000_00000192_20050615_173456_20050616_101055.N1
AVI_UAV_TLVFOS20050520_152500_00000000_00000193_20050616_152243_20050616_215507.N1
AVI_UAV_TLVFOS20050520_152700_00000000_00000194_20050617_030655_20050617_111954.N1
AVI_UAV_TLVFOS20050520_153000_00000000_00000195_20050617_181218_20050618_071244.N1
AVI_UAV_TLVFOS20050520_153100_00000000_00000196_20050618_103936_20050618_104817.N1
AVI_UAV_TLVFOS20050520_153500_00000000_00000197_20050618_160005_20050619_083604.N1
AVI_UAV_TLVFOS20050520_153700_00000000_00000198_20050619_152828_20050619_220052.N1
AVI_UAV_TLVFOS20050520_154000_00000000_00000199_20050620_031239_20050730_120000.N1
AVI_UAV_TLVFOS20050603_160500_00000000_00000200_20050620_031239_20050620_112539.N1
AVI_UAV_TLVFOS20050603_160800_00000000_00000201_20050620_181803_20050621_105402.N1
AVI_UAV_TLVFOS20050603_161000_00000000_00000202_20050621_174626_20050622_102225.N1
AVI_UAV_TLVFOS20050603_161200_00000000_00000203_20050622_153413_20050622_220637.N1
AVI_UAV_TLVFOS20050603_161800_00000000_00000204_20050623_045900_20050623_231535.N1
AVI_UAV_TLVFOS20050603_163800_00000000_00000205_20050624_060759_20050625_065238.N1
AVI_UAV_TLVFOS20050603_164600_00000000_00000206_20050625_102231_20050625_102810.N1
AVI_UAV_TLVFOS20050603_165000_00000000_00000207_20050625_153958_20050730_102810.N1

MPL_LOS_MPVRGT20050412_114529_00000000_00000155_20050507_074041_20050508_102443.N1
Group_21490 RGTv_216
MPL_LOS_MPVRGT20050426_114751_00000000_00000156_20050514_072013_20050515_100535.N1
Group_22010 RGTv_217
MPL_LOS_MPVRGT20050426_130430_00000000_00000157_20050521_070021_20050522_093818.N1
Group_22011 RGTv_218
MPL_LOS_MPVRGT20050426_134115_00000000_00000158_20050528_064030_20050529_105915.N1
Group_22030 RGTv_219
MPL_LOS_MPVRGT20050517_180808_00000000_00000159_20050604_062041_20050605_104313.N1
Group_22350 RGTv_220
MPL_LOS_MPVRGT20050517_183743_00000000_00000160_20050611_073753_20050612_102314.N1
Group_22351 RGTv_221
MPL_LOS_MPVRGT20050517_191422_00000000_00000161_20050618_071743_20050619_100322.N1
Group_22352 RGTv_222
MPL_LOS_MPVRGT20050603_095954_00000000_00000162_20050625_065738_20050626_094613.N1
Group_22650 RGTv_223
MPL_LOS_MPVRGT20050603_101945_00000000_00000163_20050702_063736_20050703_110641.N1
Group_22651 RGTv_224
MPL_LOS_MPVRGT20050603_104940_00000000_00000164_20050709_061738_20050710_104640.N1
Group_22652 RGTv_225

Radiometric Gain Calibration (daily at ANX=900 sec)

MPL_ORS_MPVRGT20050414_112115_00000000_00000063_20050504_164427_20050506_155524.N1
Group_21670 RGTv_84
MPL_ORS_MPVRGT20050426_154216_00000000_00000064_20050514_163005_20050524_130842.N1
Group_22050 RGTv_85
MPL_ORS_MPVRGT20050518_110907_00000000_00000065_20050603_120508_20050606_122504.N1
Group_22373 RGTv_86
MPL_ORS_MPVRGT20050524_095621_00000000_00000066_20050606_221609_20050612_105738.N1
MPL_ORS_MPVRGT20050524_102124_00000000_00000067_20050613_101150_20050619_222142.N1
MPL_ORS_MPVRGT20050603_135935_00000000_00000068_20050620_113219_20050626_220135.N1
Group_22670 RGTv_91
MPL_ORS_MPVRGT20050603_142720_00000000_00000069_20050627_111212_20050703_113752.N1
Group_22671 RGTv_92
MPL_ORS_MPVRGT20050603_150622_00000000_00000070_20050704_105204_20050710_230157.N1
Group_22672 RGTv_93

ESOC Stop/Restart automatic procedure (night-side, from 25° to 40°N, at ANX=430 sec)

MPL_CAL_MPVRGT20050412_120634_00000000_00000060_20050504_091203_20781231_235959.N1
Group_21491 RGTv_84
MPL_CAL_MPVRGT20050518_102329_00000000_00000061_20050603_101532_20781231_235959.N1
Group_22370 RGTv_85

NOM scenario using floating altitudes and new algorithm (start orbit #17039 at ANX=900 sec)

CTI_E02_MPVRGT20050518_105931_00000000_00000076_20050603_102327_20781231_235959.N1
Group_22372
CTI_E01_MPVRGT20050518_105931_00000000_00000076_20050603_102330_20781231_235959.N1
CTI_AST_MPVRGT20050518_105932_00000000_00000076_20050603_102333_20781231_235959.N1
CTI_N01_MPVRGT20050518_105931_00000000_00000038_20050603_102336_20781231_235959.N1
CTI_S06_MPVRGT20050518_105931_00000000_00000018_20050603_102339_20781231_235959.N1
CTI_NOC_MPVRGT20050518_105931_00000000_00000076_20050603_102342_20781231_235959.N1

Aircraft Emissions SEMs (during NOM scenario) (orbits #16617-16621)

Group_21591
CTI_S23_MPVRGT20050413_180738_00000000_00000127_20050504_224814_20050505_054109.N1
CTI_S22_MPVRGT20050413_180738_00000000_00000127_20050504_224817_20050505_054109.N1
CTI_SEM_MPVRGT20050413_180738_00000000_00008345_20050504_224819_20050504_224918.N1
...
CTI_SEM_MPVRGT20050413_180743_00000000_00008439_20050505_054037_20050505_054109.N1

Aircraft Emissions SEMs (during NOM scenario) (orbits #16621-16625)

Group_21610
CTI_S23_MPVRGT20050413_184028_00000000_00000128_20050505_054716_20050505_124011.N1
CTI_S22_MPVRGT20050413_184028_00000000_00000128_20050505_054719_20050505_124011.N1
CTI_SEM_MPVRGT20050413_184028_00000000_00008440_20050505_054721_20050505_054821.N1
...
CTI_SEM_MPVRGT20050413_184033_00000000_00008534_20050505_123939_20050505_124011.N1

Aircraft Emissions SEMs (during NOM scenario) (orbits #16632-16636)

Group_21630
CTI_S23_MPVRGT20050414_090606_00000000_00000129_20050505_235648_20050506_064943.N1
CTI_S22_MPVRGT20050414_090606_00000000_00000129_20050505_235651_20050506_064943.N1
CTI_SEM_MPVRGT20050414_090606_00000000_00008535_20050505_235652_20050505_235752.N1
...
CTI_SEM_MPVRGT20050414_090611_00000000_00008629_20050506_064910_20050506_064943.N1

Aircraft Emissions SEMs (during NOM scenario) (orbits #16636-16640)

Group_21650
CTI_S23_MPVRGT20050414_102707_00000000_00000130_20050506_065723_20050506_135018.N1
CTI_S22_MPVRGT20050414_102707_00000000_00000130_20050506_065726_20050506_135018.N1
CTI_SEM_MPVRGT20050414_102707_00000000_00008630_20050506_065728_20050506_065827.N1
...
CTI_SEM_MPVRGT20050414_102712_00000000_00008724_20050506_134946_20050506_135018.N1

Tab. 3 Scheduling of MIPAS availability for the Teresina validation campaign in South America.

Absolute orbit				UTC time	
START	**ANX**	**STOP**	**ANX**	**START**	**STOP**
17039	900	17043	900	03 Jun 2005 10:24:33	03 Jun 2005 17:06:56
17053	900	17057	900	04 Jun 2005 09:52:56	04 Jun 2005 16:35:19
17067	900	17071	900	05 Jun 2005 09:21:19	05 Jun 2005 16:03:42
17082	900	17086	900	06 Jun 2005 10:30:18	06 Jun 2005 17:12:41
17089	17093	900	900	06 Jun 2005 22:14:29	07 Jun 2005 04:56:53
17103	17106	900	900	07 Jun 2005 21:42:52	08 Jun 2005 02:44:40
17111	17115	900	900	08 Jun 2005 11:07:39	08 Jun 2005 17:50:03
17125	17128	900	900	09 Jun 2005 10:36:02	09 Jun 2005 15:37:50
17132	17136	900	900	09 Jun 2005 22:20:14	10 Jun 2005 05:02:38
17145	17149	900	900	10 Jun 2005 20:08:01	11 Jun 2005 02:50:25
17159	17163	900	900	11 Jun 2005 19:36:24	12 Jun 2005 02:18:48
17168	17171	900	900	12 Jun 2005 10:41:47	12 Jun 2005 15:43:35
17182	17185	900	900	13 Jun 2005 10:10:10	13 Jun 2005 15:11:58
17189	17193	900	900	13 Jun 2005 21:54:22	14 Jun 2005 04:36:46
17197	17200	900	900	14 Jun 2005 11:19:09	14 Jun 2005 16:20:57
17211	17215	900	900	15 Jun 2005 10:47:32	15 Jun 2005 17:29:56
17225	17228	900	900	16 Jun 2005 10:15:55	16 Jun 2005 15:17:43
17232	17235	900	900	16 Jun 2005 22:00:07	17 Jun 2005 03:01:55
17240	17244	900	900	17 Jun 2005 11:24:54	17 Jun 2005 18:07:18
17254	17257	900	900	18 Jun 2005 10:53:17	18 Jun 2005 15:55:05
17267	17271	900	900	19 Jun 2005 08:41:04	19 Jun 2005 15:23:28
17275	17278	900	900	19 Jun 2005 22:05:52	20 Jun 2005 03:07:39
17283	17287	900	900	20-Jun-2005 11.30.39	20-Jun-2005 18.13.03
17297	17301	900	900	21-Jun-2005 10.59.02	21-Jun-2005 17.41.26
17311	17314	900	900	22-Jun-2005 10.27.25	22-Jun-2005 15.29.13
17318	17322	900	900	22-Jun-2005 22.11.37	23-Jun-2005 04.54.00
17333	17337	900	900	23-Jun-2005 23.20.35	24-Jun-2005 06.02.59
17354	17357	900	900	25-Jun-2005 15.34.58	25-Jun-2005 22.17.21
17361	17365	900	900	26-Jun-2005 04.59.45	26-Jun-2005 21.45.44
17375	17379	900	900	27-Jun-2005 04.28.08	27-Jun-2005 11.10.32
17383	17386	900	900	27-Jun-2005 16.12.20	28-Jun-2005 10.38.55
17397	17400	900	900	28-Jun-2005 15.40.43	28-Jun-2005 22.23.06
17404	17408	900	900	28-Jun-2005 22.23.06	29-Jun-2005 05.05.30
17418	17422	900	900	29-Jun-2005 21.51.29	30-Jun-2005 04.33.53
17426	17430	900	900	30-Jun-2005 11.16.17	30-Jun-2005 17.58.40

Table 4 summarizes the status of special measurements done in May-June 2005.

Tab. 4 Status of the MIPAS special measurements done in May-June 2005.

Measurement	Date	Orbit	Execution
AE	5-6 May 2005	16618-16646	Successful

2.3.2 THERMAL PERFORMANCE

During March-April 2005 an evident increase of MIPAS instrument temperature has been observed with temperatures reaching tolerance threshold values. The drift was related to a nominal seasonal trend, and the high temperature values were related to the interferometer heater switching. So it was decided to switch-off the interferometer heater. The following two plots (Fig. 1 and Fig. 2) show the long-term trend of IDU and MIO Baseplate temperature. The yearly seasonal variations and the Interferometer heater switching (see Tab. 5 for schedule of heater switch-on/off) are clearly visible within the plots.

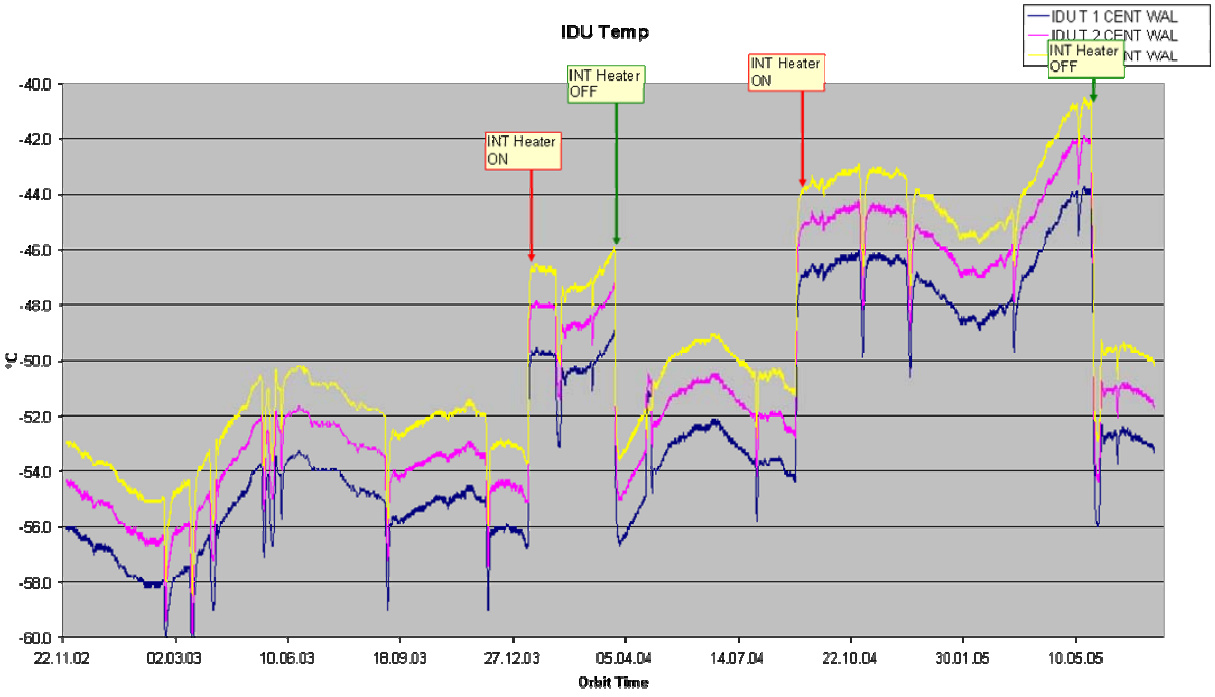


Fig. 1 IDU temperature as a function of time: November 2002 – June 2005.

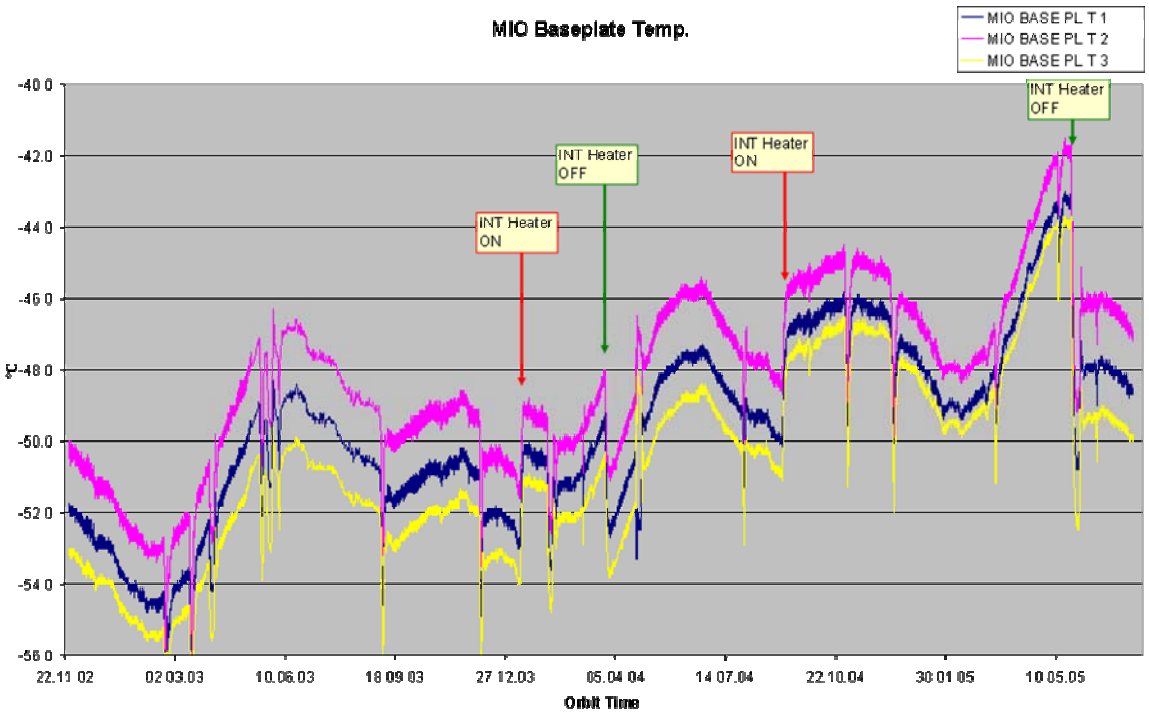


Fig. 2 MIO Baseplate temperature as a function of time: November 2002 – June 2005.

Tab. 5 Schedule of Interferometer heater switch-on/off.

Heater on	**09-Jan-2004**
Heater off	**26-Mar-2004**
Heater on	**03-Sep-2004**
Heater off	**25-May-2005**

After the last Interferometer heater switch-off, there was a reduction of the temperature on the Interferometer and all MIO equipments:

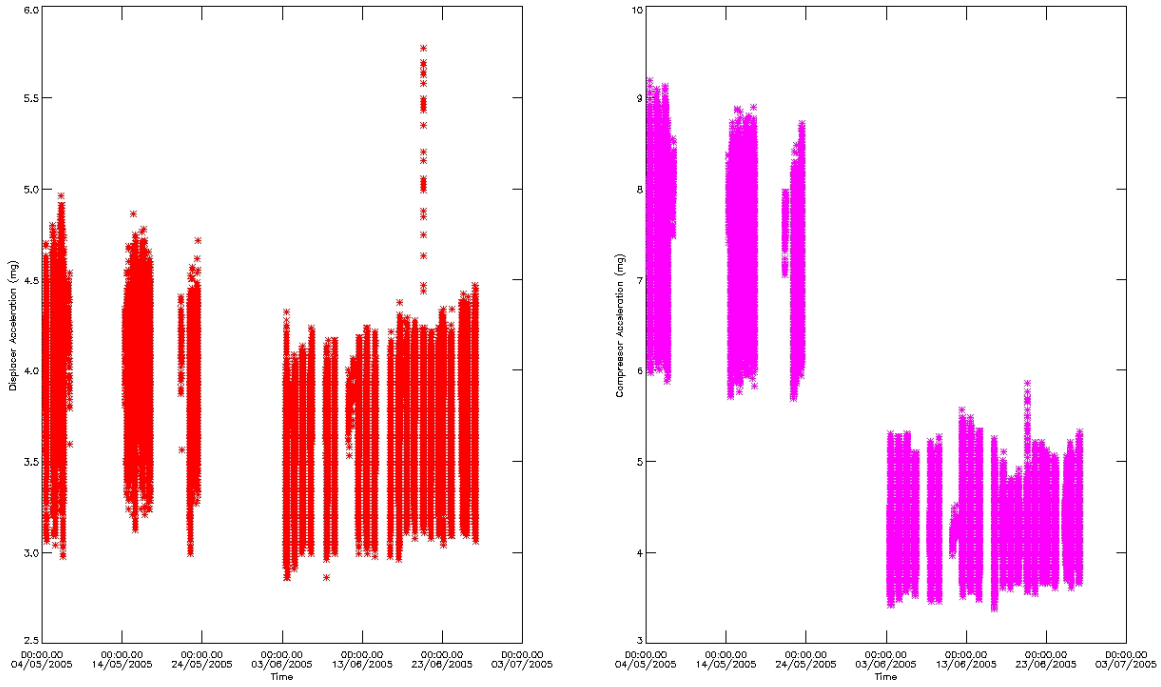
- The Interferometer cooled down by almost 9°C;
- The MIO Baseplate temperature was decreased by about 4°C;
- The temperature at all MIO mounted equipments was decreased by the similar value as the MIO Baseplate.

The high value of temperature reduction can be explained by the Interferometer heater switch-off (75%) and further due to the reduced dissipation of the cooler (25%). The cooler dissipation was reduced by approximately 10 W due to the colder compressor and displacement environment (see Section 2.3.3.1).

2.3.3 MECHANICAL PERFORMANCE

2.3.3.1 Cooler Performance

During March and April 2005 an evident increase in Compressor vibration level has been observed, and starting from second part of April 2005 the warning threshold of 8 mg has been exceeded many times. After an analysis done by Astrium, it has been found that the MIPAS cooler was not well balanced. On March, 16th MIPAS has been restarted after the last suspend. At this time both the compressors A and B were rebalanced by performing a compressor coarse balance. This balancing wasn't 100% perfect at that time so that the Compressor B was running with amplitude of 103.5 % of the amplitude applied to the compressor A. The values during characterizing the earlier periods were been always in the area of 102.6% and 103.2%. So the compressor wasn't performing at its optimum. Additionally to that we are in the warm period of the year causing a higher powering of the compressor. The situation has not been considered critical, but Astrium proposed to perform a transition to Standby and back to Heater mode. This procedure will automatically re-set the compressor balance. The cooler rebalancing has been performed from 11 May 07:39 to 12 May 12:14, during an interval of non-planned measurements. As clearly visible in Fig. 7, the rebalancing didn’t introduce the expected reduction of Compressor vibration level because of the relative warm environment. For this reason it has been decided to switch-off the interferometer cooler the 25 May 2005. After the decontamination (23 May – 1 June 2005) and the Interferometer heater switch-off, the cooler performs extremely well (as clearly visible in Fig. 7). This can be explained at first, because the relevant cooler environment temperatures are lower than one year ago. Further, the decontamination has had a positive effect to the cooler and its performance. This is related to the detector temperature and to the power needed to reach the temperature. The power applied to the compressors to hold the temperature at 70 K is very low. It's comparable to the values we had during the same season 2 years ago, with effects to the compressor acceleration that reaches extremely low values we never saw before, since the 'Vibration Cancellation' switch-off.



(a) (b)

Fig. 7 May-June 2005: (a) Displacer and (b) Compressor vibration level.

Starting from 3rd June 2005, a spike characterizes the Compressor vibrations and it is observed more or less at the same orbital position (see Fig. 8). This is a behavior already observed in the past, and the spike peak is well below the warning threshold. These spikes are caused either to quick voltage transition (battery charger) or to a temperature transition on the edge of the cooler external structure elements and this is the reason why they occur always at nearly the same orbit position. At the moment, we observe spikes with amplitude of about 1 mg, which are well below our observation warning level of 8 mg. So the situation is at moment uncritical, but need to be observed. If too extreme values are reached, a re-coarse balance is needed.

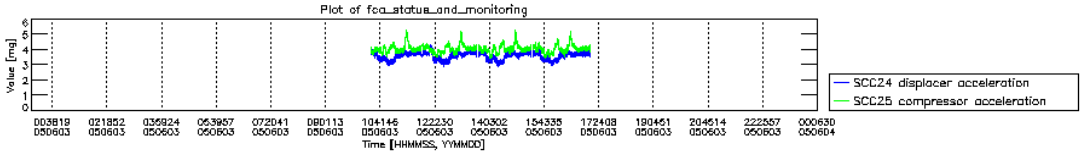


Fig. 8 Displacer and Compressor vibration level: 3rd June 2005.

2.4 Level 1 Product Quality Monitoring

2.4.1 PROCESSING CONFIGURATION

Figure 9 schematises the IPF updates, the resolution with which MIPAS has been operated, the activation and deactivation of the interferometer heaters and the dissemination of related ADFs. Currently the Near-Real Time (NRT) mission is suspended, and no systematic operational Off-Line (OFL) processing is performed as processing algorithms are being adapted to the new observation modes.

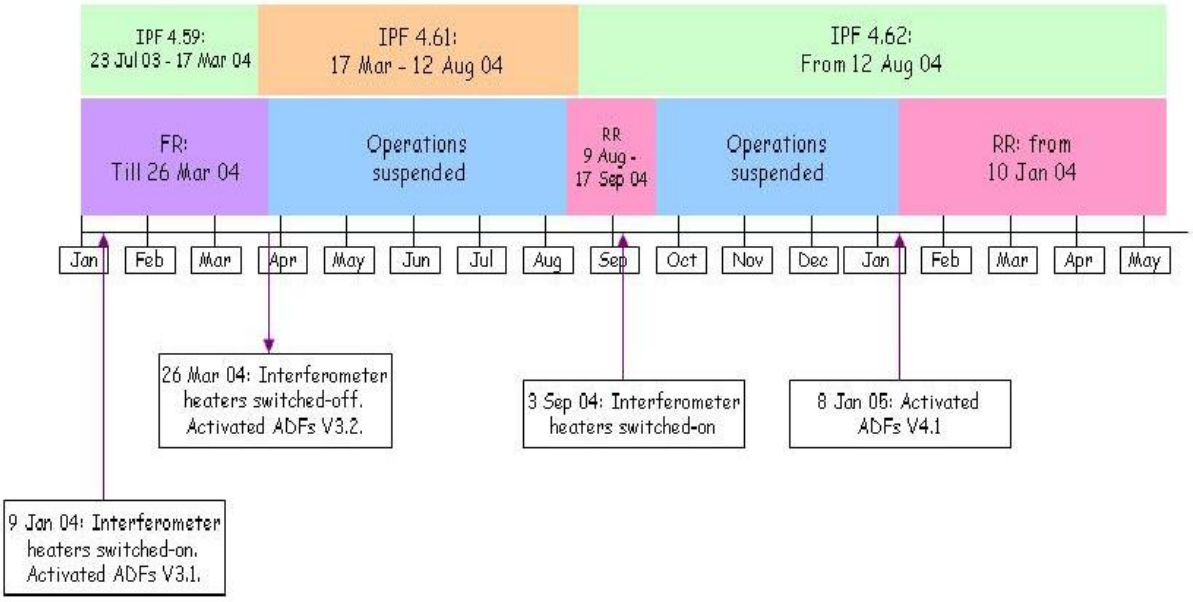


Fig. 4 Scheme for IPF update, interferometer heaters switch-on/off, resolution and ADFs version.

2.4.1.1 Processor Version

Table 5 lists the historical updates of the MIPAS processor:

- **Version V4.64** (aligned with DPM 4I and ADFs V4.1) has introduced introduce variations only for Level 1 processor, with the following update:
  - Fixed internal SPR-121O0-2011: Problem with the block sequence (see review of Level 1 anomalies in Section 2.4.5.5).
- **Version V4.63** (aligned with DPM 4I and ADFs V4.1) has introduced variations for both Level 1 and Level 2 processor. For Level 1 processor, the following updates will be 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 (see review of Level 1 anomalies in Section 2.4.5.2).
- Solution of internal SPR-120O0-2001: NESR data problem (see review of Level 1 anomalies in Section 2.4.5.4).

- **Version V4.62** (aligned with DPM 4H and ADFs V4.0) has introduced variations for both Level 1 and Level 2 processor. For Level 1 processor, the following updates have been 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

Tab. 5 Historical updates of MIPAS processor at near real time (NRT) processing sites (PDHS-K and PDHS-E) and off-line processing sites (LRAC and D-PAC).

Centre	Facility Software	Date
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	V4.61	17-03-2004
PDHS-E	V4.61	17-03-2004
LRAC	V4.59	20-08-2003
D-PAC	V4.59	06-08-2003
PDHS-K	V4.59	23-07-2003
PDHS-E	V4.59	23-07-2003
PDHS-K	V4.57	22-07-2003
LRAC	V4.57	22-07-2003
PDHS-K	V4.59	21-07-2003
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
PDHS-E	V4.57	04-03-2003

2.4.1.2 Auxiliary Data Files

Table 6 lists the ADFs valid in May and June 2005: ADFs V4.1 is the set of auxiliary files for processing of data with IPF 4.63 and 4.64. A patch has been applied to mical for routine generation of MIP_CO1_AX, MIP_CG1_AX and MIP_CS1_AX suitable for processing with IPF 4.63 and IPF 4.64. Also received from Bomem, but not disseminated, ADFs V4.0 and V5.0 respectively for processing of 2RR measurements with IPF 4.62 and 1RR measurements with IPF 4.63.

Tab. 6 Level 1 ADFs valid in May and June 2005.

Auxiliary Data File	Start Validity	Stop Validity	Updated in May/June 2005
V4.1 MIP_CA1_AXVIEC20050315_102713_20050108_000000_20090108_000000 MIP_PS1_AXVIEC20050315_102931_20050108_000000_20090108_000000 MIP_MW1_AXVIEC20050315_102419_20050108_000000_20090108_000000	08-JAN-05	08-JAN-09	No
MIP_CL1_AXVIEC20050308_113825_20050108_000000_20090108_000000	08-JAN-05	08-JAN-09	No
MIP_CL1_AXVIEC20050420_152028_20050420_095747_20100420_095747	20-APR-05	20-APR-10	No
MIP_CS1_AXVIEC20050509_151534_20050506_143508_20100506_143508 MIP_CO1_AXVIEC20050509_150103_20050506_161805_20100506_161805 MIP_CG1_AXVIEC20050509_150546_20050506_153444_20100506_153444	06-MAY-05	06-MAY-10	Yes
MIP_CS1_AXVIEC20050523_090431_20050515_000000_20090515_000000 MIP_CO1_AXVIEC20050523_090247_20050515_000000_20090515_000000 MIP_CG1_AXVIEC20050523_090017_20050515_000000_20090515_000000	15-MAY-05	15-MAY-09	Yes
MIP_CS1_AXVIEC20050524_082016_20050522_000000_20090522_000000 MIP_CO1_AXVIEC20050524_081912_20050522_000000_20090522_000000 MIP_CG1_AXVIEC20050524_081749_20050522_000000_20090522_000000	22-MAY-05	22-MAY-09	Yes
MIP_CS1_AXVIEC20050616_090921_20050603_000000_20090603_000000 MIP_CO1_AXVIEC20050616_090308_20050603_000000_20090603_000000 MIP_CG1_AXVIEC20050616_085854_20050603_000000_20090603_000000	03-JUN-05	03-JUN-09	Yes
MIP_CS1_AXVIEC20050627_084317_20050609_000000_20090609_000000 MIP_CO1_AXVIEC20050617_090408_20050609_000000_20090609_000000 MIP_CG1_AXVIEC20050617_090045_20050609_000000_20090609_000000	09-JUN-05	09-JUN-09	Yes
MIP_CS1_AXVIEC20050721_081614_20050616_000000_20090616_000000 MIP_CO1_AXVIEC20050617_132252_20050616_000000_20090616_000000 MIP_CG1_AXVIEC20050617_132141_20050616_000000_20090616_000000	16-JUN-05	16-JUN-09	Yes
MIP_CS1_AXVIEC20050623_215049_20050623_131313_20100623_131313 MIP_CO1_AXVIEC20050627_083058_20050623_143459_20100623_143459 MIP_CG1_AXVIEC20050627_082758_20050623_140434_20100623_140434	23-JUN-05	23-JUN-10	Yes

The strategy for the ADFs update is the following one:

- The MIP_CO1_AX, MIP_CG1_AX and MIP_CS1_AX are updated every week and after a long detectors cooler switch-off.
- The MIP_CL1_AX is analysed every two weeks and updated when the pointing error differs with respect to the last disseminated one more than 8 mdeg.
- The MIP_PS1_AX is updated every time there is a setting update.
- The MIP_MW1_AX is updated when the micro-window are changed.
- The MIP_CA1_AX is updated when new characterization parameters are defined.

2.4.2 SPECTRAL PERFORMANCE

Dissemination of MIPAS calibration files (MIP_CG1_AX, MIP_CO1_AX and MIP_CS1_AX) has been done on a weekly basis during the period May-June 2005. Among them, the spectral calibration file MIP_CS1_AX contains the spectral correction factor (SCF), which compensate for instrument metrology variation e.g., aging of laser. Figure 10 below gives the variation trend over the period. We observe a very stable situation.

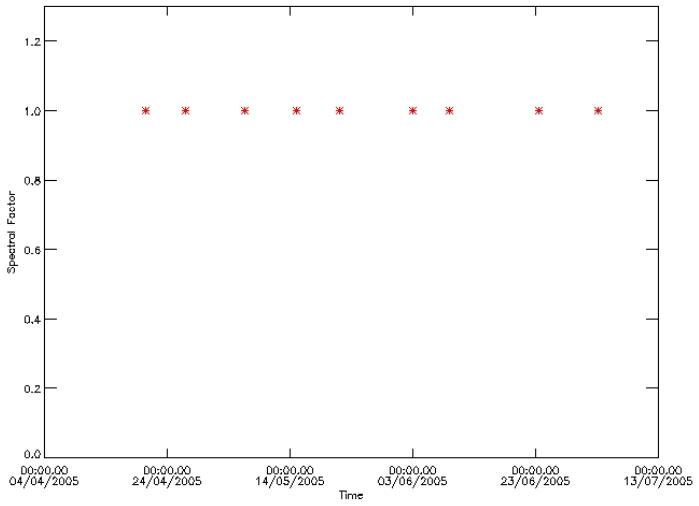


Fig. 10 MIPAS Spectral Calibration Factor (SCF) variation over May-June 2005.

2.4.3 RADIOMETRIC PERFORMANCE

Figure 11 shows the rate of the gain increase for band A, during the period January-June 2005. As clearly visible, an evident drift characterizes the gain increase. After consultation with QWG, the ice contamination of MIPAS detectors has been proposed as possible cause for gain increase, and a passive decontamination has been executed as anticipated in section 2.1.1. The gain rate came back to nominal values (around 1%) after decontamination.

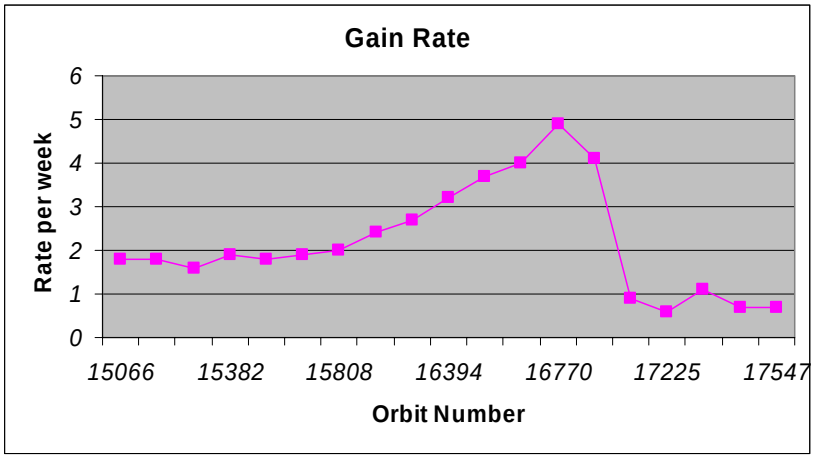


Fig. 11 Rate of gain increase for band A as a function of the orbit number. Covered period: January-June 2005.

During the period January-May 2005, they have been disseminated gain ADFs not satisfying the radiometric requirement (increase below 1%). A gain reprocessing has been planned and the results will be reported with next bi-monthly report.

2.4.4 POINTING PERFORMANCE

The LOS calibration measurements are performed every week. This configuration allows the analysis of the pointing stability and guaranties the availability of the data in case of missing products. Initial analysis has evidenced a marked annual cycle (as shown in Fig. 12) covering the period September 2002 – June 2005. The figure shows the relative and the absolute (evaluated taking into account the commanded elevation angle for the LOS calibration) pointing error. That annual trend is not due to the MIPAS instrument itself, but to a mispointing of the entire ENVISAT satellite resulting from software response to orbit control information. In fact, the update in the platform pointing software implemented on 12 December 2003 (orbit 9321) has evidently reduced the pointing deviation trends (see last points in Fig. 12).

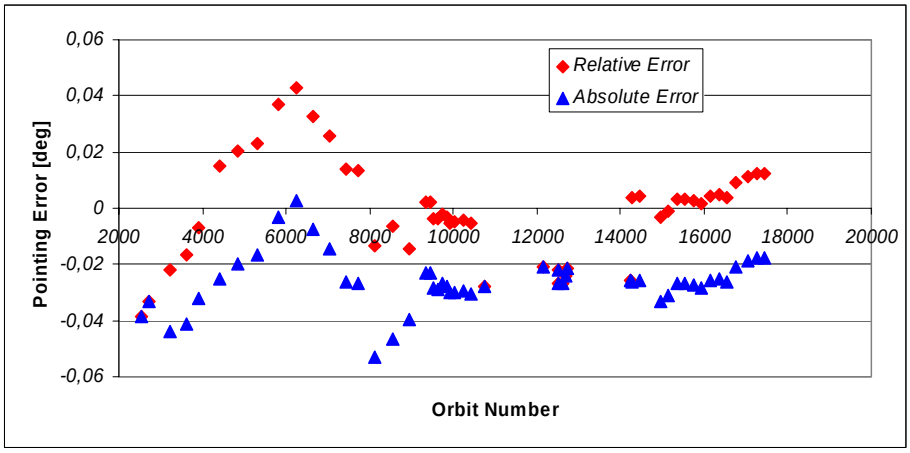


Fig. 12 MIPAS pointing error as a function of the orbit number: September 2002- June 2005.

As it can be seen in Fig. 12, there are points were relative and absolute errors are coincident because the angle for LOS measurements has been commanded to 0 mdeg. Table 7 shows the history of the commanded angle for LOS measurements.

Tab. 7 LOS commanded angle updates.

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

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.

During the anomaly investigation in winter 2005, the absence of interferometer operations has been used for a dedicated Line of Sight campaign. MIPAS LOS data have been inter-compared with restituted attitude information from the Envisat star trackers, in preparation of future operational use of restituted attitude in off-line processing. Figure 13 presents results from July 29th, 2004. Note that a bias of 24 mdeg was subtracted from pointing error. Apart from this bias, results from MIPAS LOS campaign agree with star tracker information. Investigations are currently ongoing to find the cause of this bias.

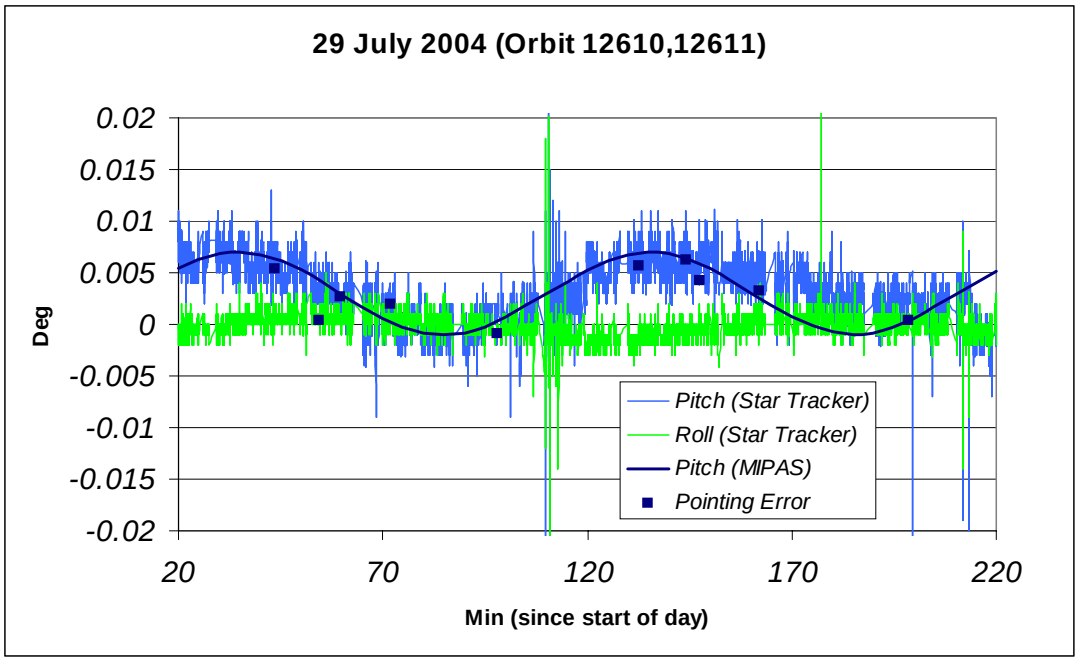


Fig. 13 Comparison between MIPAS pointing and star tracker information.

2.4.5 ANOMALY STATUS

Table 8 summarises the anomalies affecting Level 1 products and shows the associated SPR, NCR, AR and HD code.

Tab. 8 Level 1 anomaly list.

Anomaly	Prototype/DPM SPR	IPF NCR	OAR	HD
Number of sweeps per scan	128	/	/	HD/01-2005/1010
Truncated MIPAS Gain measurements	132	1421	1828	/
MIPAS Aircraft Emission measurements	/	/	1843	/

2.4.5.1 Number of Sweeps per Scan

The affected product is orbit 12963 generated with IPF 4.62. SPH gives: "NUM_SWEEPS_PER_SCAN=+00018", but 17 is the correct value (although the last scan has 18 sweeps). The problem has been investigated by Bomem and it has been found that the auxiliary data block is missing in the last sweep of the orbit, so detection of beginning/end of scan can't be done. The prototype is not affected by the problem because Bomem has solved this particular problem by rejecting last sweep when its auxiliary data block is missing. This specific case is not documented in the DPM and an SPR will be raised.

2.4.5.2 Truncated MIPAS Gain Measurements

Starting from June 2005, the DS (Deep-Space) and BB (Black-Body) sequence of measurements for MIPAS Gain calibration is truncated at the end of a product and continues in the next one. The anomaly prevents automatic processing of Gain measurements with related delay of Auxiliary Data Files (CS1_AX, CO1_AX, CG1_AX) generation and dissemination.

2.4.5.3 MIPAS Aircraft Emission Measurements

Looking at the AE L1B file taken on 5/6 May 2005 (processed with Migsp), the tangent altitudes seem to be approximately 2km below the 7-38km range specified in Mission_Plan_V4.1.pdf dated 3 May 2005 (feed-back from Anu Dudhia).

2.4.6 RE-PROCESSING STATUS

Figure 14 shows the reprocessing status at the end of April 2005. L0 Expected field takes into account all instrument and product generation unavailability, so it describes what it's actually expected. The discrepancy between expected and received is caused by a delay in the generation of consolidated Level 0 at LRAC.

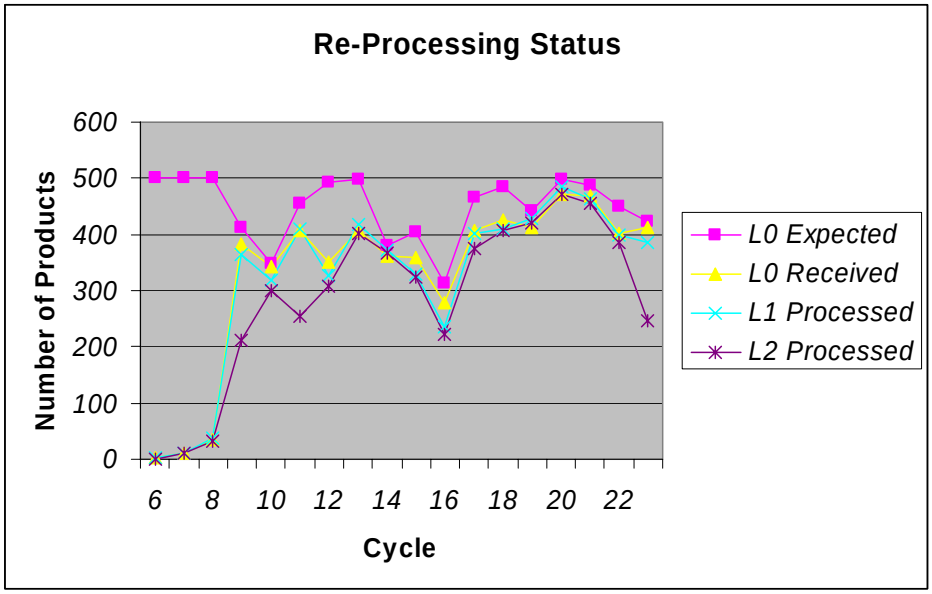


Fig. 14 Re-processing status at the end of April 2005

2.4.7 OTHER RESULTS

As said before, no NRT product generation is foreseen for now. For Science team and for QWG, the following products have been generated using migsp prototype:

MA
MIP_NL__1PPLRA20050111_014126_000060332033_00404_14987_0765.N1

UTLS-1
MIP_NL__1PPLRA20050117_115639_000060122033_00496_15079_0824.N1

UA
MIP_NL__1PPLRA20050121_113027_000060312034_00052_15136_0855.N1

UTLS-2
MIP_NL__1PPLRA20050123_120742_000060732034_00081_15165_0874.N1

Nominal Measurements (2RR, 27 sweeps per scan) with fixed altitude
MIP_NL__1PPLRA20050128_125114_000060542034_00153_15237_0908.N1
MIP_NL__1PPLRA20050128_143210_000060212034_00154_15238_0909.N1
MIP_NL__1PPLRA20050128_161233_000060212034_00155_15239_0910.N1

Nominal Measurements (2RR, 27 sweeps per scan) with floating altitude
MIP_NL__1PNPDK20050301_113042_000060482035_00109_15694_0774.N1
MIP_NL__1PNPDK20050301_131032_000059792035_00110_15695_0766.N1

July 2003 S6 reprocessing

MIP_NL__1PNPDK20030704_121645_000060262017_00453_07020_0120.N1
MIP_NL__1PNPDK20030704_135638_000059212017_00454_07021_0127.N1
MIP_NL__1PNPDK20030704_153445_000058952017_00455_07022_0122.N1
MIP_NL__1PNPDK20030704_171226_000058622017_00456_07023_0123.N1
MIP_NL__1PNPDK20030704_184910_000061052017_00457_07024_0124.N1
MIP_NL__1PNPDK20030704_202907_000062392017_00458_07025_0125.N1
MIP_NL__1PNPDK20030705_050206_000045322017_00463_07030_0133.N1
MIP_NL__1PNPDK20030705_093800_000017672017_00466_07033_0134.N1

5-6 May Aircraft Emission (AE) Measurements

Only 6 orbits have been processed, due to processing problem we have one file for each measured scan. The following files have been delivered to QWG team.

AE_Canada_US_a:
MIP_NL__1PNPDE20050506_031821_000000632037_00047_16634_0806.N1
MIP_NL__1PNPDE20050506_031922_000000332037_00047_16634_0795.N1
MIP_NL__1PNPDE20050506_031954_000000332037_00047_16634_0792.N1
MIP_NL__1PNPDE20050506_032025_000000332037_00047_16634_0791.N1
MIP_NL__1PNPDE20050506_032056_000000332037_00047_16634_0796.N1
MIP_NL__1PNPDE20050506_032128_000000332037_00047_16634_0800.N1
MIP_NL__1PNPDE20050506_032159_000000332037_00047_16634_0799.N1

MIP_NL__1PNPDE20050506_032231_000000332037_00047_16634_0793.N1
MIP_NL__1PNPDE20050506_032302_000000332037_00047_16634_0794.N1
MIP_NL__1PNPDE20050506_032334_000000332037_00047_16634_0797.N1

AE_Canada_US_d:
MIP_NL__0PNPDK20050505_122836_000000542037_00038_16625_1245.N1
MIP_NL__0PNPDK20050505_123002_000000632037_00038_16625_1261.N1
MIP_NL__0PNPDK20050505_123103_000000332037_00038_16625_1253.N1
MIP_NL__0PNPDK20050505_123134_000000332037_00038_16625_1251.N1
MIP_NL__0PNPDK20050505_123206_000000332037_00038_16625_1256.N1
MIP_NL__0PNPDK20050505_123237_000000332037_00038_16625_1262.N1
MIP_NL__0PNPDK20050505_123308_000000332037_00038_16625_1264.N1
MIP_NL__0PNPDK20050505_123340_000000332037_00038_16625_1252.N1
MIP_NL__0PNPDK20050505_123411_000000332037_00038_16625_1258.N1
MIP_NL__0PNPDK20050505_123443_000000332037_00038_16625_1257.N1
MIP_NL__0PNPDK20050505_123514_000000332037_00038_16625_1263.N1
MIP_NL__0PNPDK20050505_123545_000000332037_00038_16625_1259.N1
MIP_NL__0PNPDK20050505_123617_000000332037_00038_16625_1246.N1
MIP_NL__0PNPDK20050505_123648_000000332037_00038_16625_1247.N1
MIP_NL__0PNPDK20050505_123720_000000332037_00038_16625_1248.N1
MIP_NL__0PNPDK20050505_123751_000000332037_00038_16625_1250.N1
MIP_NL__0PNPDK20050505_123822_000000332037_00038_16625_1260.N1
MIP_NL__0PNPDK20050505_123854_000000332037_00038_16625_1254.N1
MIP_NL__0PNPDK20050505_123925_000000332037_00038_16625_1249.N1
MIP_NL__0PNPDK20050505_123957_000000352037_00038_16625_1255.N1
MIP_NL__0PNPDK20050505_124030_000052612037_00038_16625_1244.N1
MIP_NL__1PNPDK20050505_122836_000000542037_00038_16625_1245.N1
MIP_NL__1PNPDK20050505_123002_000000632037_00038_16625_1261.N1
MIP_NL__1PNPDK20050505_123103_000000332037_00038_16625_1253.N1
MIP_NL__1PNPDK20050505_123134_000000332037_00038_16625_1251.N1
MIP_NL__1PNPDK20050505_123206_000000332037_00038_16625_1256.N1
MIP_NL__1PNPDK20050505_123237_000000332037_00038_16625_1262.N1
MIP_NL__1PNPDK20050505_123308_000000332037_00038_16625_1264.N1
MIP_NL__1PNPDK20050505_123340_000000332037_00038_16625_1252.N1
MIP_NL__1PNPDK20050505_123411_000000332037_00038_16625_1258.N1
MIP_NL__1PNPDK20050505_123443_000000332037_00038_16625_1257.N1
MIP_NL__1PNPDK20050505_123514_000000332037_00038_16625_1263.N1
MIP_NL__1PNPDK20050505_123545_000000332037_00038_16625_1259.N1
MIP_NL__1PNPDK20050505_123617_000000332037_00038_16625_1246.N1
MIP_NL__1PNPDK20050505_123648_000000332037_00038_16625_1247.N1
MIP_NL__1PNPDK20050505_123720_000000332037_00038_16625_1248.N1
MIP_NL__1PNPDK20050505_123751_000000332037_00038_16625_1250.N1
MIP_NL__1PNPDK20050505_123822_000000332037_00038_16625_1260.N1
MIP_NL__1PNPDK20050505_123854_000000332037_00038_16625_1254.N1
MIP_NL__1PNPDK20050505_123925_000000332037_00038_16625_1249.N1

MIP_NL__1PNPDK20050505_123957_000000352037_00038_16625_1255.N1

AE_Europe_a:
MIP_NL__1PNPDE20050505_235709_000000632037_00045_16632_0749.N1
MIP_NL__1PNPDE20050505_235913_000000332037_00045_16632_0756.N1
MIP_NL__1PNPDE20050505_235945_000000332037_00045_16632_0765.N1
MIP_NL__1PNPDE20050506_000016_000000332037_00045_16632_0755.N1
MIP_NL__1PNPDE20050506_000047_000000332037_00045_16632_0760.N1
MIP_NL__1PNPDE20050506_000119_000000332037_00045_16632_0753.N1

AE_Europe_d:
MIP_NL__0PNPDK20050505_072856_000000202037_00035_16622_1195.N1
MIP_NL__0PNPDK20050505_072915_000000332037_00035_16622_1193.N1
MIP_NL__0PNPDK20050505_072946_000000332037_00035_16622_1188.N1
MIP_NL__0PNPDK20050505_073429_000000332037_00035_16622_1182.N1
MIP_NL__0PNPDK20050505_073501_000000332037_00035_16622_1174.N1
MIP_NL__0PNPDK20050505_073635_000000332037_00035_16622_1185.N1

AE_Ocean_a:
MIP_NL__1PNPDE20050506_013745_000000632037_00046_16633_0787.N1
MIP_NL__1PNPDE20050506_013846_000000332037_00046_16633_0786.N1
MIP_NL__1PNPDE20050506_013918_000000332037_00046_16633_0777.N1
MIP_NL__1PNPDE20050506_013949_000000332037_00046_16633_0788.N1
MIP_NL__1PNPDE20050506_014021_000000332037_00046_16633_0778.N1
MIP_NL__1PNPDE20050506_014052_000000332037_00046_16633_0783.N1
MIP_NL__1PNPDE20050506_014123_000000332037_00046_16633_0773.N1
MIP_NL__1PNPDE20050506_014155_000000332037_00046_16633_0771.N1
MIP_NL__1PNPDE20050506_014226_000000332037_00046_16633_0781.N1
MIP_NL__1PNPDE20050506_014258_000000332037_00046_16633_0785.N1

AE_Ocean_d:
MIP_NL__1PNPDK20050505_090850_000000632037_00036_16623_1186.N1
MIP_NL__1PNPDK20050505_090951_000000332037_00036_16623_1194.N1
MIP_NL__1PNPDK20050505_091331_000000332037_00036_16623_1209.N1
MIP_NL__1PNPDK20050505_091402_000000332037_00036_16623_1212.N1
MIP_NL__1PNPDK20050505_091434_000000332037_00036_16623_1219.N1
MIP_NL__1PNPDK20050505_091505_000000332037_00036_16623_1217.N1
MIP_NL__1PNPDK20050505_091536_000000332037_00036_16623_1214.N1

2.5 Level 2 Product Quality Monitoring

2.5.1 PROCESSOR CONFIGURATION

Figure 15 schematises the IPF updates, the resolution with which MIPAS has been operated, the activation and deactivation of the interferometer heaters and the dissemination of related ADFs.

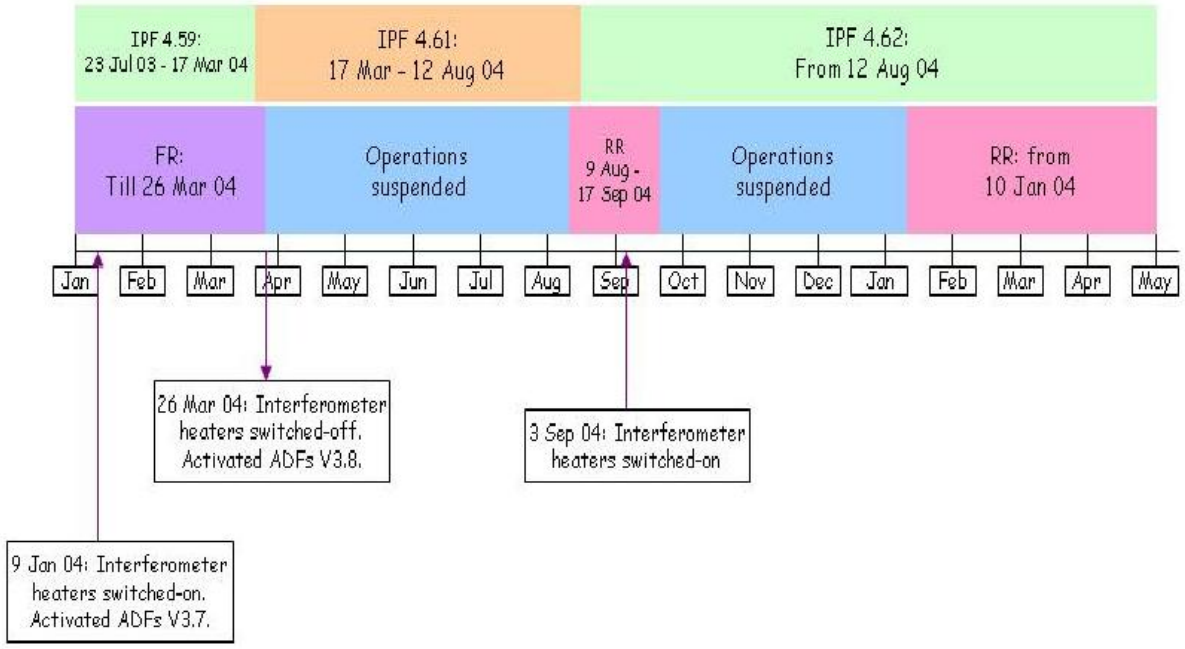


Fig. 15 Scheme for IPF update, interferometer heaters switch-on/off, resolution and ADFs version.

2.5.1.1 Version

As already explained in Section 2.4.1.1, Tab. 6 lists the historical updates of the MIPAS processor:

- **Version V4.65** (aligned with DPM 4.1 and ADFs V5.1, under validation) introduces variations only for Level 2 processor, with the following update:
  - Solution of NCR_1310: Problem with MIP_NL__2P (see review of Level 2 anomalies in Section 2.4.5.5).
- **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 (see review of Level 2 anomaly in Section 2.5.2.2).

- Solution of NCR_1308: MIPAS Level 2 failure.
- Rejection of NCR_1310: Problem with MIPNL__2P (see review of Level 2 anomaly in Section 2.5.2.4).
- Rejection of NCR_1317: One second discrepancy in IPF 4.61 (see review of Level 2 anomaly in Section 2.5.2.3).

- **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** 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 variations. 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

2.5.1.2 Auxiliary Data Files

Table 9 shows the historical dissemination (from January 2003) of Level 2 ADFs till the mission interruption occurred in March 2004. The ADFs have not been updated since the mission interruption.

Tab. 9 Historical update of Level 2 ADFs.

Auxiliary Data File	Start Validity	Description
ADFs V3.1: MIP_MW2_AXVIEC20030722_134301_20030723_000000_20080722_000000 MIP_OM2_AXVIEC20030722_134602_20030723_000000_20080722_000000 MIP_PS2_AXVIEC20030722_102142_20030723_000000_20080722_000000 MIP_PI2_AXVIEC20030722_134848_20030723_000000_20080722_000000	23-JUL-03	Cloud detection enabled and improved validity mask range in

MIP_CS2_AXVIEC20030722_133331_20030723_000000_20080722_000000 MIP_SP2_AXVIEC20030722_093046_20030723_000000_20080722_000000		Microwindows files; improved Occupation Matrices (no gaps between altitude validity ranges).
MIP_IG2_AXVIEC20030214_130918_20030301_000000_20080301_000000	01-MAR-03	Seasonal update of climatological initial guess: This auxiliary file turned out to be corrupt, and a corrected version has been disseminated on 10 March 2003.
MIP_IG2_AXVIEC20030307_142141_20030310_000000_20080301_000000	10-MAR-03	Seasonal update of climatological initial guess: This dissemination substitute the corrupt file disseminated previously.
MIP_IG2_AXVIEC20030522_104714_20030601_000000_20080601_000000	01-JUN-03	Seasonal update of climatological initial guess.
MIP_IG2_AXVIEC20030731_134035_20030901_000000_20080901_000000	01-SEP-03	Seasonal update of climatological initial guess.
ADFs V3.6: NRT MIP_MW2_AXVIEC20031021_145505_20020706_060000_20080706_060000 MIP_OM2_AXVIEC20031021_145630_20020706_060000_20080706_060000 MIP_PS2_AXVIEC20031021_145858_20020706_060000_20080706_060000 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_AXVIEC20031027_101029_20020706_060000_20080706_060000 MIP_PS2_AXVIEC20031027_101319_20020706_060000_20080706_060000 MIP_PI2_AXVIEC20031027_101146_20020706_060000_20080706_060000 **MIP_CS2_AXVIEC20031027_100559_20020706_060000_20080706_060000** MIP_SP2_AXVIEC20031027_101441_20020706_060000_20080706_060000	06-JUL-02	Activation of cloud detection; removal of the gaps between the altitude validity ranges; altitudes margins fixed to +/- 4 km; short-term ILS bug fix. **NRT** Old convergence criteria; nominal altitude range. **Off-line** Improved convergence criteria; altitude range extended to 6-68 km.
MIP_IG2_AXVIEC20031118_151533_20031201_000000_20081201_000000	01-DEC-03	Seasonal update of climatological initial guess.

MIP_IG2_AXVIEC20040227_081527_20040301_000000_20090301_000000	01-MAR-04	Seasonal update of climatological initial guess.
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 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	06-JUL-02 and 09-JAN-04	With respect to V3.6: Eliminated scans with one or two altitude levels; adjusted the threshold to the new noise level.
ADFs V3.8 NRT MIP_PS2_AXVIEC20040421_095623_20040326_143428_20090326_000000 Off-line MIP_PS2_AXVIEC20040421_095923_20040326_143428_20090326_000000	26-MAR-04	With respect to V3.7, adjusted the threshold to the new noise level.

IFAC provided three sets of ADFs still not disseminated:

- **ADFs V4.0**

ADFs for processing of full resolution measurements, with MIP_PS2_AX file with noise level adjusted to interferometer heaters switched-on and flag set for processing of only nominal measurements.

- **ADFs V4.1**

ADFs for processing of full resolution measurements, with MIP_PS2_AX file with noise level adjusted to interferometer heaters switched-off and flag set for processing of only nominal measurements.

- **ADFs V5.0**

ADFs for processing of double-slide reduced resolution measurements in old configuration (17 sweeps per scan, fixed altitude – August/September 2004 data). Those ADFs contain new settings (convergence criteria, NESR threshold in MIP_PS2_AX) and new MWs (MIP_MW2_AX) and OMs (MIP_OM2_AX) optimised for the reduced resolution mode. They also contain a new MIP_PI2_AX updated taking into account the results of an investigation done by Bologna University on LOS. In fact, a new definition of the pointing covariance data was performed according to the available pointing characterization measurements. In particular, the errors on tangent altitude increments obtained from the analysis of LOS-specific measurements were found to be smaller (87 m versus 120 m) than those derived using an empirical model based on the pointing specifications. Tests on Level 2 p, T retrievals confirmed that a LOS pointing error of about 80 m provides a constraint for p, T retrieval that is perfectly compliant with the observed limb radiances. Eighty metres is a reasonably conservative estimate of the error on tangent altitude increments that can be used in the PDS for operational MIPAS retrievals. Reduction of the LOS error from 120 to 80 m leads to a reduction of both p and T errors. Namely, on average, p error turns-out to be reduced from 1.27 to 1.1 % and T error turns-out to be reduced from 1.1 to 1.0 K. The delivered auxiliary data file containing LOS

VCM data (MIP_PI2_AX) can be used in Level 2 to process both high and low resolution measurements acquired either in the new or in the old measurement scenario.

2.5.2 ANOMALY STATUS

Table 10 summarises the anomalies affecting Level 2 products and shows the associated SPR, NCR, AR and HD code.

Tab. 10 Level 2 anomaly list.

Anomaly	Prototype/DPM SPR	IPF NCR	AR	HD
Anomalous processing time	33	1127	1361	/
Zero pressure values	36	1278	1527	HD/06-2004/973
One-second discrepancy	/	1317	1577	HD/06-2004/970
Problem with PCD data set	/	1310	1570	HD/06-2004/1150
Wrong MIP_IG2_AX	/	/	1689	HD/12-2004/746
Jump anomaly	/	/	/	HD/01-2005/1013

2.5.2.1 Anomalous Processing Time

An anomalous processing time characterises processing of some offline products generated with IPF 4.59. Two different anomalies have been observed:

- 9 hours of processing instead of nominal 6 hours. Example:
MIP_NL__1POLRA20031006_005226_000060272020_00289_08359_1882.N1
MIP_NL__2PODPA20031006_005226_000060262020_00289_08359_0261.N1
- Processing failure after 24 hours of processing. Example:
MIP_NL__1POLRA20031024_012653_000060272021_00046_08617_0043.N1

For the first case, the anomaly is still under investigation. The second problem has been temporary solved with a new MIP_OM2_AX that filter scans composed by only one vertical level (generating a loop that causes the processing failure). For a definitive solution, the DMP will be changed (SPR 33) and the modifications will be implemented in next IPF delivery.

2.5.2.2 Zero Pressure Values

It was found a number of cases for which the retrieval in MIP_NL__2P has ended with a pressure value of zero, while the pressure-error for these cases is non-zero. Examples:
MIP_NL__2PODPA20020926_090044_000060362009_00437_02996_0041.N1
Scans #61, #62 and #63

MIP_NL__2PODPA20020926_123036_000055162009_00439_02998_0115.N1
Scans #54 and #58
MIP_NL__2PODPA20020926_140242_000060262009_00440_02999_0042.N1
Scans #60 and #61
MIP_NL__2PODPA20020926_154318_000060162009_00441_03000_0043.N1
Scan #60
MIP_NL__2PODPA20020926_172344_000060362009_00442_03001_0306.N1
Scan #60
MIP_NL__2PODPA20020926_190430_000060262009_00443_03002_0212.N1
Scans #64 and #65

The I/O DD has been changed (SPR 36) and the problem has been fixed in IPF 4.63.

2.5.2.3 One-Second Discrepancy

There are products where a one-second discrepancy between off-line and NRT products has been observed. Example:
Off-line
MIP_NL__2PPDPA20040321_032435_000060372025_00176_10751_0959.N1
SCAN GEOLOG ADS: dsr_time 21-MAR-2004 04:13:18.120870
NRT
MIP_NL__2PNPDE20040321_041241_000005672025_00176_10751_0878.N1
SCAN GEOLOG ADS: dsr_time 21-MAR-2004 04:13:17.120870

The problem has been rejected because the error has not been detected with IPF 4.63.

2.5.2.4 Problem with PCD Data Set

A byte mismatch affects the PCD dataset of some products.

The problem has been rejected because it has been classified as a problem not related to MIPAS IPF.

2.5.2.5 Wrong MIP_IG2_AX

In February 2004 (IPF 4.59), some MIPAS Level 2 has been processed with a not updated MIP_IG2_AX. The anomaly affected only ESRIN products. The anomaly report has been rejected because considered too obsolete (log files lost).

2.5.2.6 Jump Anomaly

Oxford University detected a jump in the zonal means of all Level 2 NRT data produced after switch-on on 8th February until 16th February 2004, compared with Level 2 data generated from 17th March 2004 but also with the data until switch-off on 9th February 2004. The anomaly is still under investigation, but aux data activation can already be excluded as potential cause.