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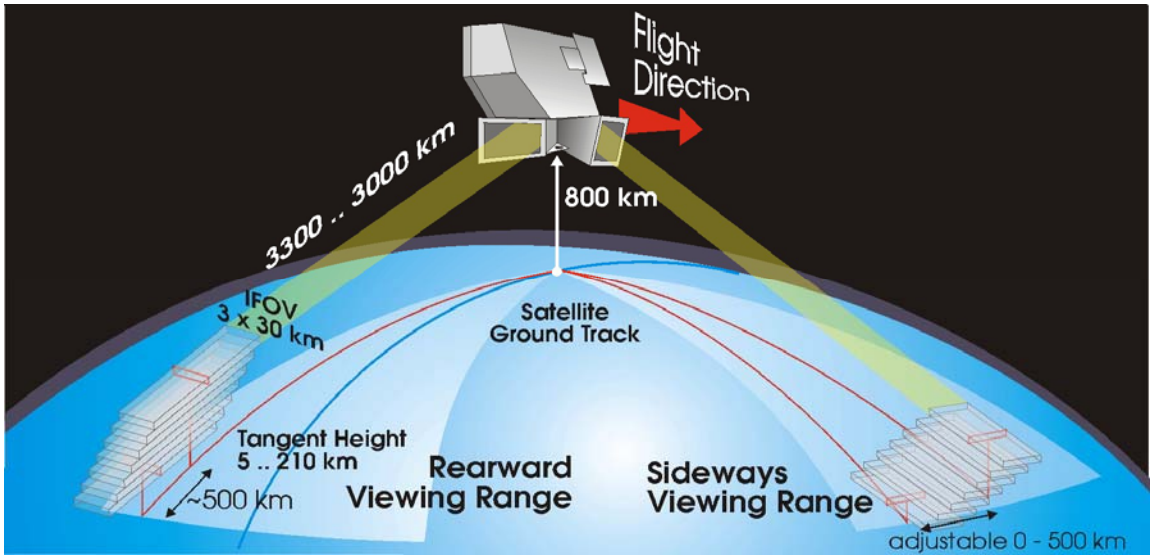
ENVISAT MIPAS Bi-Monthly Report: July - August 2005



prepared by/*préparé par* F. Niro (MIPAS DPQC)

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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. Indeed this issue is still performed on a bi-monthly basis due to the backlog caused by the hand-over on MIPAS. Starting from next report the monthly issue will be adopted.

The BMR is composed of analysis results obtained by the DPQC (Data Processing and Quality Control), 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-DPQC
- ESOC
- ESTEC
- ABB BOMEM
- Oxford University
- IFAC-CNR
- EADS-Astrium GmbH
- Leicester University
- LISA
- IMK
- University of Bologna
- ISAC-CNR
- 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
LL	Launch Lock
LOS	Line of Sight
MA	Middle Atmosphere
MDS	Measurements Data Set
MIPAS	Michelson Interferometer for Passive Atmospheric Sounding
MIO	MIPAS Optical Module
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
SCF	Spectral Calibration Factor
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 July-August 2005 the numbers of unintended MIPAS IDU anomalies increase up to critical values, even tough a planned mission interruption of few days at the end of July for relaxing IDU system was carried out. The probability of occurrence of these IDU anomalies is related to the duty-cycle, hence an instrument switch-off is expected to act as a "self-healing" procedure. Therefore is was decided to have a long mission interruption to relax the IDU system. In order to minimize the impact on the planned MIPAS activities, the most suitable interval was found to be from the 30th August to the 26th September. The performance of the INT after this long interruption will be discussed in the next report.
- In particular a turnaround failure occurred on August 29th where slide 2 got blocked in the launch lock (LL) position. The situation was resolved after 8 h of recovery procedure, but the measurements performed during that time should not be used since no crossover point exists.
- Some important special measurement suffer from these unavailabilities, in particular the AE mode planned for the end of July and the special in-flight characterization measurements planned for the 29th of August are not available to the user, but were postponed to a later period.
- 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.

2.1.1 INSTRUMENT UNAVAILABILITY

During July and August 2005 operations, MIPAS was unavailable 107 times. The related unavailability intervals are listed below. Highlighted in red are the planned unavailabilities of MIPAS from 26th to 29th of July and from 30th of August to the 19th on September (later extended to up to the 26th of Sept), when the instrument was switched-off for relaxing IDU system.

Tab. 1 List of MIPAS unavailability in the period: 1 July - 31 August 2005.

Start time		Stop time		Duration	Orbit start	Orbit end
Date	UTC	Date	UTC	sec		
02-JUL-2005	21.53.24	02-JUL-2005	21.56.31	187	17461	17461
03-JUL-2005	11.17.19	03-JUL-2005	13.01.54	6275	17469	17470
08-JUL-2005	12.55.02	08-JUL-2005	13.45.01	2999	17541	17542
08-JUL-2005	22.30.25	08-JUL-2005	23.48.37	4692	17547	17548
13-JUL-2005	16.06.02	13-JUL-2005	16.15.28	566	17615	17615
19-JUL-2005	9.23.17	19-JUL-2005	11.03.39	6022	17696	17697

19-JUL-2005	15.21.42	19-JUL-2005	16.05.27	2625	17700	17700
19-JUL-2005	16.06.58	19-JUL-2005	17.46.03	5945	17701	17701
19-JUL-2005	21.52.18	19-JUL-2005	22.47.51	3333	17704	17704
20-JUL-2005	2.37.26	20-JUL-2005	3.49.38	4332	17707	17707
22-JUL-2005	4.04.50	22-JUL-2005	4.45.56	2466	17736	17737
22-JUL-2005	5.43.38	22-JUL-2005	6.26.32	2574	17737	17738
22-JUL-2005	10.16.09	22-JUL-2005	11.27.58	4309	17740	17741
22-JUL-2005	19.29.03	22-JUL-2005	19.50.58	1315	17745	17746
26-JUL-2005	**0.48.46**	**29-JUL-2005**	**0.54.30**	**259544**	**17792**	**17835**
01-AUG-2005	10.40.12	01-AUG-2005	11.13.34	2002	17883	17884
02-AUG-2005	1.11.58	02-AUG-2005	2.18.57	4019	17892	17893
02-AUG-2005	13.04.36	02-AUG-2005	14.03.30	3534	17899	17900
08-AUG-2005	20.24.33	08-AUG-2005	20.57.22	1969	17989	17990
09-AUG-2005	4.13.58	09-AUG-2005	5.20.22	3984	17994	17995
09-AUG-2005	11.29.17	09-AUG-2005	12.02.45	2008	17998	17999
09-AUG-2005	13.59.03	09-AUG-2005	15.23.57	5094	18000	18001
09-AUG-2005	20.24.33	09-AUG-2005	20.57.22	1969	18004	18004
10-AUG-2005	5.07.50	10-AUG-2005	6.29.20	4890	18009	18010
15-AUG-2005	4.02.44	15-AUG-2005	4.22.44	1200	18080	18080
15-AUG-2005	14.43.16	15-AUG-2005	16.07.17	5041	18086	18087
15-AUG-2005	16.24.58	15-AUG-2005	17.47.53	4975	18087	18088
15-AUG-2005	19.21.07	15-AUG-2005	19.28.29	442	18089	18089
16-AUG-2005	19.15.26	16-AUG-2005	20.37.28	4922	18103	18104
17-AUG-2005	10.17.14	17-AUG-2005	11.42.29	5115	18112	18113
17-AUG-2005	13.29.50	17-AUG-2005	15.03.41	5631	18114	18115
17-AUG-2005	18.19.38	17-AUG-2005	18.25.15	337	18117	18117
17-AUG-2005	20.19.58	17-AUG-2005	21.46.27	5189	18118	18119
18-AUG-2005	0.07.13	18-AUG-2005	0.30.33	1400	18120	18121
22-AUG-2005	6.02.43	22-AUG-2005	7.24.10	4887	18181	18182
22-AUG-2005	7.24.38	22-AUG-2005	9.04.46	6008	18182	18183
22-AUG-2005	11.50.58	22-AUG-2005	12.25.58	2100	18185	18185
22-AUG-2005	20.39.41	22-AUG-2005	20.48.57	556	18190	18190
22-AUG-2005	22.44.23	23-AUG-2005	0.10.09	5146	18191	18192
23-AUG-2005	4.26.15	23-AUG-2005	5.11.57	2742	18195	18195
23-AUG-2005	5.17.14	23-AUG-2005	6.52.33	5719	18195	18196
23-AUG-2005	21.36.49	23-AUG-2005	21.57.56	1267	18205	18205
24-AUG-2005	3.06.15	24-AUG-2005	4.40.20	5645	18208	18209
24-AUG-2005	10.02.19	24-AUG-2005	11.22.59	4840	18212	18213
24-AUG-2005	16.53.03	24-AUG-2005	18.05.07	4324	18216	18217
29-AUG-2005	9.55.06	29-AUG-2005	10.25.14	1808	18284	18284
29-AUG-2005	13.55.03	29-AUG-2005	15.27.02	5519	18286	18287
29-AUG-2005	15.30.21	29-AUG-2005	17.07.38	5837	18287	18288
29-AUG-2005	17.20.06	29-AUG-2005	18.47.52	5266	18288	18289
29-AUG-2005	18.49.49	29-AUG-2005	20.28.28	5919	18289	18290
29-AUG-2005	20.37.37	29-AUG-2005	22.09.04	5487	18290	18291

29-AUG-2005	23.21.24	29-AUG-2005	23.49.40	1696	18292	18292
30-AUG-2005	9.56.53	30-AUG-2005	11.34.13	5840	18298	18299
30-AUG-2005	**14.13.34**	**19-SEP-2005**	**2.00.38**	**1684024**	**18301**	**18580**

2.1.2 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. 2 List of missing intervals for MIP_NL__0P: 1 July - 31 August 2005.

Start time		Stop time		Duration	Start Orbit	Stop Orbit
date	**UTC**	**date**	**UTC**	**sec**		
01-JUL-2005	10.40.17	01-JUL-2005	10.44.11	234	17440	17440
01-JUL-2005	22.24.28	01-JUL-2005	22.28.23	235	17447	17447
02-JUL-2005	21.52.51	02-JUL-2005	21.53.24	33	17461	17461
02-JUL-2005	21.56.31	02-JUL-2005	21.56.46	15	17461	17461
03-JUL-2005	13.01.54	03-JUL-2005	13.02.09	15	17470	17470
05-JUL-2005	21.58.36	05-JUL-2005	22.02.31	235	17504	17504
06-JUL-2005	23.07.35	06-JUL-2005	23.11.30	235	17519	17519
08-JUL-2005	22.04.21	08-JUL-2005	22.08.16	235	17547	17547
08-JUL-2005	23.48.37	08-JUL-2005	23.48.51	14	17548	17548
09-JUL-2005	9.37.57	09-JUL-2005	9.38.11	14	17553	17553
09-JUL-2005	23.13.20	09-JUL-2005	23.17.14	234	17562	17562
10-JUL-2005	22.41.43	10-JUL-2005	22.45.37	234	17576	17576
13-JUL-2005	16.15.28	13-JUL-2005	16.44.48	1760	17615	17615
17-JUL-2005	10.27.03	17-JUL-2005	10.27.17	14	17668	17669
19-JUL-2005	9.19.14	19-JUL-2005	9.23.17	243	17696	17696
19-JUL-2005	11.03.39	19-JUL-2005	11.03.54	15	17697	17697
19-JUL-2005	17.46.03	19-JUL-2005	17.46.17	14	17701	17701
19-JUL-2005	22.47.51	19-JUL-2005	22.48.05	14	17704	17704
20-JUL-2005	1.54.36	20-JUL-2005	2.37.26	2570	17706	17707
02-JUL-2005	9.57.59	02-JUL-2005	9.58.13	14	17453	17453
20-JUL-2005	3.49.38	20-JUL-2005	3.49.53	15	17707	17707
22-JUL-2005	18.06.54	22-JUL-2005	18.10.58	244	17745	17745
22-JUL-2005	19.29.01	22-JUL-2005	19.29.03	2	17745	17745
22-JUL-2005	19.50.58	22-JUL-2005	19.51.34	36	17746	17746
23-JUL-2005	10.38.32	23-JUL-2005	10.38.46	14	17754	17755
30-JUL-2005	10.15.32	30-JUL-2005	10.15.46	14	17854	17854
02-AUG-2005	2.18.57	02-AUG-2005	2.19.33	36	17893	17893
02-AUG-2005	17.20.53	02-AUG-2005	17.24.57	244	17902	17902
02-AUG-2005	19.01.29	02-AUG-2005	19.05.32	243	17903	17903

02-AUG-2005	20.41.48	02-AUG-2005	21.54.24	4356	17904	17904
03-AUG-2005	0.03.16	03-AUG-2005	1.47.56	6280	17906	17907
06-AUG-2005	9.55.29	06-AUG-2005	9.55.43	14	17954	17954
08-AUG-2005	17.32.21	08-AUG-2005	17.36.25	244	17988	17988
08-AUG-2005	19.12.57	08-AUG-2005	19.17.01	244	17989	17989
08-AUG-2005	20.57.22	08-AUG-2005	20.57.37	15	17990	17990
09-AUG-2005	5.20.22	09-AUG-2005	5.20.36	14	17995	17995
09-AUG-2005	20.21.55	09-AUG-2005	20.24.33	158	18004	18004
10-AUG-2005	6.29.20	10-AUG-2005	6.29.35	15	18010	18010
13-AUG-2005	9.35.40	13-AUG-2005	9.35.54	14	18054	18054
15-AUG-2005	16.07.17	15-AUG-2005	16.07.31	14	18087	18087
15-AUG-2005	17.47.53	15-AUG-2005	17.48.07	14	18088	18088
16-AUG-2005	19.14.44	16-AUG-2005	19.15.26	42	18103	18103
16-AUG-2005	20.37.28	16-AUG-2005	20.37.42	14	18104	18104
16-AUG-2005	21.14.48	16-AUG-2005	21.53.48	2340	18104	18105
17-AUG-2005	11.42.29	17-AUG-2005	11.43.05	36	18113	18113
17-AUG-2005	15.03.41	17-AUG-2005	15.04.17	36	18115	18115
17-AUG-2005	21.46.27	17-AUG-2005	21.46.41	14	18119	18119
20-AUG-2005	10.56.36	20-AUG-2005	10.56.50	14	18155	18155
22-AUG-2005	6.02.41	22-AUG-2005	6.02.43	2	18181	18181
22-AUG-2005	7.24.10	22-AUG-2005	7.24.25	15	18182	18182
22-AUG-2005	9.04.46	22-AUG-2005	9.05.00	14	18183	18183
22-AUG-2005	12.25.58	22-AUG-2005	12.26.12	14	18185	18185
23-AUG-2005	0.10.09	23-AUG-2005	0.10.24	15	18192	18192
23-AUG-2005	6.52.33	23-AUG-2005	6.52.47	14	18196	18196
23-AUG-2005	19.42.25	23-AUG-2005	19.46.27	242	18204	18204
24-AUG-2005	4.40.20	24-AUG-2005	4.40.34	14	18209	18209
24-AUG-2005	10.01.35	24-AUG-2005	10.02.19	44	18212	18212
24-AUG-2005	18.05.07	24-AUG-2005	18.05.22	15	18217	18217
29-AUG-2005	5.35.16	29-AUG-2005	7.15.11	5995	18281	18282
29-AUG-2005	10.25.14	29-AUG-2005	10.25.29	15	18284	18284
29-AUG-2005	13.18.13	29-AUG-2005	13.19.06	53	18286	18286
29-AUG-2005	13.19.08	29-AUG-2005	13.19.26	18	18286	18286
29-AUG-2005	13.19.26	29-AUG-2005	13.19.27	1	18286	18286
29-AUG-2005	13.19.31	29-AUG-2005	13.21.39	128	18286	18286
29-AUG-2005	13.21.41	29-AUG-2005	13.21.43	2	18286	18286
29-AUG-2005	13.21.43	29-AUG-2005	13.21.47	4	18286	18286
29-AUG-2005	13.21.47	29-AUG-2005	13.21.49	2	18286	18286
29-AUG-2005	13.21.53	29-AUG-2005	13.24.00	127	18286	18286
29-AUG-2005	13.24.02	29-AUG-2005	13.24.04	2	18286	18286
29-AUG-2005	13.24.04	29-AUG-2005	13.24.29	25	18286	18286
29-AUG-2005	13.24.31	29-AUG-2005	13.25.30	59	18286	18286
29-AUG-2005	13.25.32	29-AUG-2005	13.26.30	58	18286	18286
29-AUG-2005	13.26.32	29-AUG-2005	13.27.31	59	18286	18286
29-AUG-2005	13.27.33	29-AUG-2005	13.28.31	58	18286	18286

29-AUG-2005	13.28.33	29-AUG-2005	13.29.28	55	18286	18286
29-AUG-2005	15.27.02	29-AUG-2005	15.27.16	14	18287	18287
29-AUG-2005	17.07.38	29-AUG-2005	17.07.52	14	18288	18288
29-AUG-2005	18.47.52	29-AUG-2005	18.48.28	36	18289	18289
29-AUG-2005	20.28.28	29-AUG-2005	20.29.04	36	18290	18290
29-AUG-2005	22.09.04	29-AUG-2005	22.09.40	36	18291	18291
30-AUG-2005	11.34.13	30-AUG-2005	11.34.27	14	18299	18299

In the period July-Aug 2005 no missing intervals for the LOS measurements (MIP_LS__0P) occurred.
On the other hand important MIP_RW__0P measurements were affected by unintended unavailability, as reported on Tab. 3. These measurements correspond to raw mode acquisition for special in-flight characterisation that were lost and should be re-planned for the future mission.

Tab. 3 List of missing intervals for MIP_RW__0P: 1 July - 31 August 2005.

Start time		Stop time		Duration	Orbit Start	Orbit end
Date	UTC	Date	UTC	sec		
29-AUG-2005	13.19.04	29-AUG-2005	13.19.10	6	18286	18286
29-AUG-2005	13.19.24	29-AUG-2005	13.19.33	9	18286	18286
29-AUG-2005	13.21.37	29-AUG-2005	13.21.43	6	18286	18286
29-AUG-2005	13.21.47	29-AUG-2005	13.21.54	7	18286	18286
29-AUG-2005	13.23.58	29-AUG-2005	13.24.04	6	18286	18286
29-AUG-2005	13.24.27	29-AUG-2005	13.24.33	6	18286	18286
29-AUG-2005	13.25.27	29-AUG-2005	13.25.34	7	18286	18286
29-AUG-2005	13.26.28	29-AUG-2005	13.26.34	6	18286	18286
29-AUG-2005	13.27.29	29-AUG-2005	13.27.35	6	18286	18286
29-AUG-2005	13.28.29	29-AUG-2005	13.28.36	7	18286	18286
29-AUG-2005	14.56.42	29-AUG-2005	15.07.10	628	18287	18287

2.2 Instrument Configuration and Performance

2.2.1 MIPAS OPERATIONS

Here the Planning for the MIPAS operations for the period July - August 2005 is shortly described.

Planning strategy:

- All activities 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 planned according to the new operational baseline

- The new **Nominal scenario (using floating altitudes and new algorithm), the Noctilucent Clouds mode and the Upper Atmosphere mode** defined by the 1st Science Team meeting were commanded, beside the **Aircraft Emissions** SEM single scans
- According to the implementation of the Autorecovery Sequence in the FOS-MPS, new MPL_CAL_MP files have been sent with the following setting:
  RGC and WCC REPETITION fields set to zero
- Radiometric Gain calibrations (RGC) planned using the MPL_ORS_MP file
- The WCC activity cannot be explicitly requested trough the MPL_ORS_MP file, it is performed after every transition to Heater
- 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

RGT files already transferred to the FOCC

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MPL_LOS_MPVRGT20050621_133743_00000000_00000166_20050723_071830_20050724_100639.N1
MPL_LOS_MPVRGT20050621_144109_00000000_00000167_20050730_065843_20050731_094341.N1
MPL_LOS_MPVRGT20050621_151951_00000000_00000168_20050806_063858_20050807_110417.N1
MPL_LOS_MPVRGT20050622_144022_00000000_00000169_20050813_061609_20050814_104430.N1
MPL_CAL_MPVRGT20050622_105853_00000000_00000063_20050713_055051_20781231_235959.N1
MPL_CAL_MPVRGT20050622_163934_00000000_00000064_20050719_010033_20781231_235959.N1
MPL_CAL_MPVRGT20050622_164825_00000000_00000065_20050722_010618_20781231_235959.N1
MPL_CAL_MPVRGT20050623_092128_00000000_00000066_20050726_004026_20781231_235959.N1
MPL_CAL_MPVRGT20050623_092806_00000000_00000067_20050801_005156_20781231_235959.N1
MPL_ORS_MPVRGT20050622_112801_00000000_00000071_20050713_080127_20050716_082123.N1
MPL_ORS_MPVRGT20050622_173217_00000000_00000072_20050719_103013_20050722_100649.N1
MPL_ORS_MPVRGT20050623_093826_00000000_00000073_20050726_101006_20050728_092103.N1
MPL_ORS_MPVRGT20050623_101043_00000000_00000074_20050801_093816_20050810_100941.N1

NLC scenario

CTI_E02_MPVRGT20050622_183555_00000000_00000077_20050719_010748_20781231_235959.N1
CTI_E01_MPVRGT20050622_183555_00000000_00000077_20050719_010751_20781231_235959.N1
CTI_AST_MPVRGT20050622_183555_00000000_00000077_20050719_010754_20781231_235959.N1
CTI_N02_MPVRGT20050622_183555_00000000_00000039_20050719_010757_20781231_235959.N1

CTI_S08_MPVRGT20050622_183554_00000000_00000020_20050719_010800_20781231_235959.N1
CTI_NOC_MPVRGT20050622_183555_00000000_00000077_20050719_010803_20781231_235959.N1

Upper Atmosphere scenario
CTI_E02_MPVRGT20050622_184941_00000000_00000078_20050722_011333_20781231_235959.N1
CTI_E01_MPVRGT20050622_184941_00000000_00000078_20050722_011336_20781231_235959.N1
CTI_AST_MPVRGT20050622_184942_00000000_00000078_20050722_011339_20781231_235959.N1
CTI_N01_MPVRGT20050622_184941_00000000_00000039_20050722_011342_20781231_235959.N1
CTI_S02_MPVRGT20050622_184941_00000000_00000021_20050722_011345_20781231_235959.N1
CTI_NOC_MPVRGT20050622_184941_00000000_00000078_20050722_011348_20781231_235959.N1

NOM scenario using floating altitudes and new algorithm
CTI_E02_MPVRGT20050622_190032_00000000_00000079_20050726_004741_20781231_235959.N1
CTI_E01_MPVRGT20050622_190032_00000000_00000079_20050726_004744_20781231_235959.N1
CTI_AST_MPVRGT20050622_190032_00000000_00000079_20050726_004747_20781231_235959.N1
CTI_N02_MPVRGT20050622_190032_00000000_00000040_20050726_004750_20781231_235959.N1
CTI_S04_MPVRGT20050622_190031_00000000_00000020_20050726_004753_20781231_235959.N1
CTI_NOC_MPVRGT20050622_190032_00000000_00000079_20050726_004756_20781231_235959.N1

Aircraft Emissions SEMs (during NOM scenario)
CTI_S23_MPVRGT20050623_122215_00000000_00000131_20050726_223937_20050727_053232.N1
CTI_S22_MPVRGT20050623_122215_00000000_00000131_20050726_223940_20050727_053232.N1
CTI_SEM_MPVRGT20050623_122215_00000000_00008725_20050726_223941_20050726_224041.N1
…
CTI_SEM_MPVRGT20050623_122225_00000000_00008819_20050727_053200_20050727_053232.N1
CTI_S23_MPVRGT20050623_125234_00000000_00000132_20050728_064846_20050728_134141.N1
CTI_S22_MPVRGT20050623_125234_00000000_00000132_20050728_064849_20050728_134141.N1
CTI_SEM_MPVRGT20050623_125234_00000000_00008820_20050728_064850_20050728_064950.N1
…
CTI_SEM_MPVRGT20050623_125240_00000000_00008914_20050728_134108_20050728_134141.N1

Tab. 4 summarizes the status of the special measurements done in July-August 2005. It is important to note that AE measurements planned for July were not acquired due to the instrument switch-off planned for 26 – 29 July 2005, furthermore the in-flight characterisation measurements (IF9, IF10, IF11, IF16) planned for 29th of August failed due to the unintended unavailability of the instrument (see the Tab.1).

Tab. 4 Status of the MIPAS special measurements done in July-August 2005.

Measurement	Date	Orbit	Execution
NLC	**19 – 22 July**	17692 - 17735	Successful
UA	**22 – 23 July**	17735 - 17749	Successful
AE	**27 – 28 July**	17805 – 17809 17824 – 17828	Failed due to planned unavailability
UTLS1	**15 – 18 August** **22 – 25 August**	18078 – 18121 18179 – 18222	Successful
IF 9 + IF 10 + IF 11 + IF 16	**29 August**	18279 – 18287	Failed due to not planned unavailability

2.2.2 THERMAL PERFORMANCE

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.

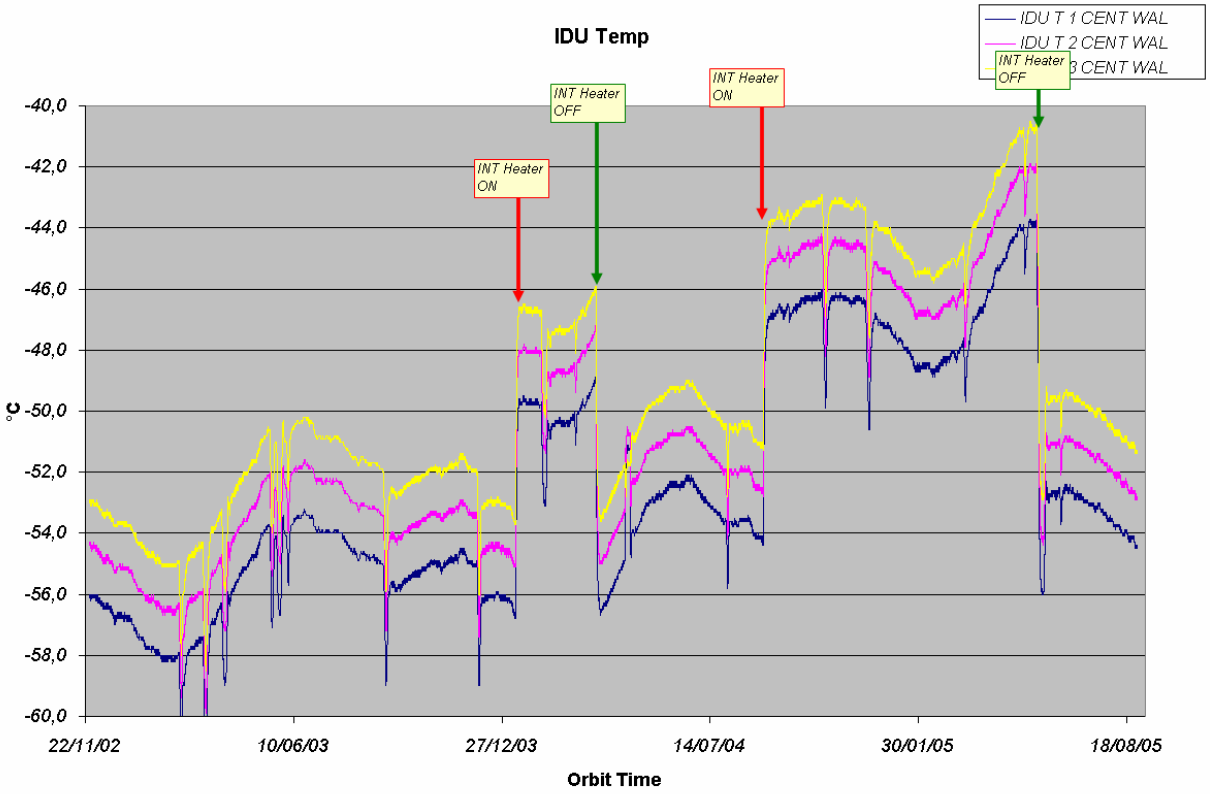


Fig. 1 IDU temperature as a function of time: November 2002 – August 2005.

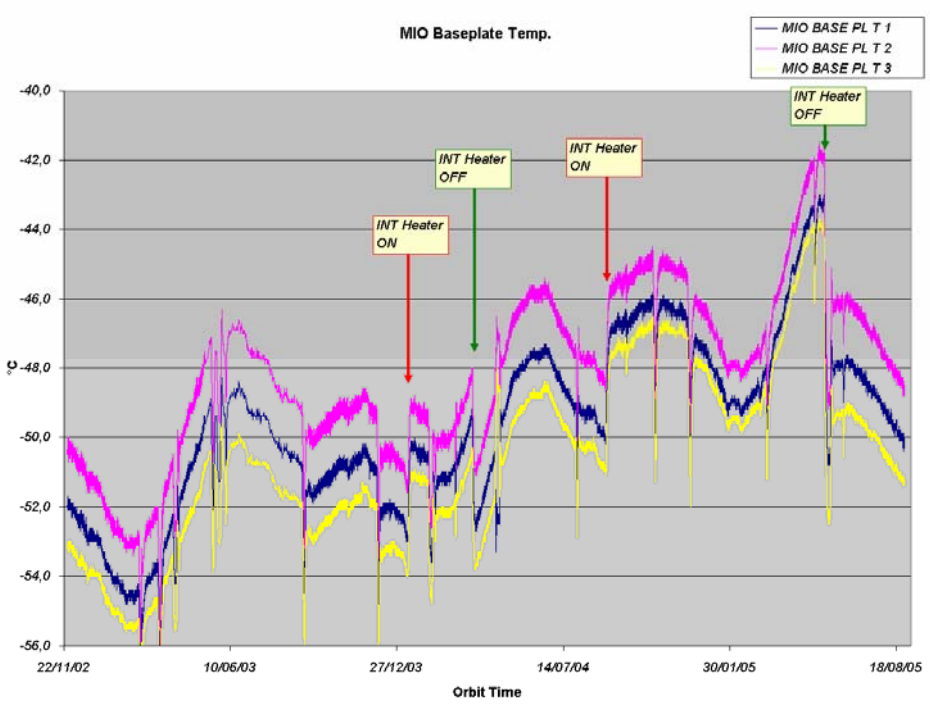


Fig. 2 MIO baseplate temperature as a function of time: November 2002 – August 2005.

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).

At the end of August the temperature was still about 4 K warmer than during the critical period at the beginning of 2003. This temperature is not critical, nevertheless the analysis of the trend shows that an INT heater switch-on will be required by mid November/December.

2.2.3 MECHANICAL PERFORMANCE

2.2.3.1 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. The cooler rebalancing has been performed from 11 May 07:39 to 12 May 12:14, during an interval of non-planned measurements. 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.
The performances of the displacer and compressor during the period July-August 2005 are shown in the Figs 3-4. The level of vibrations for the period July-Aug 2005 is well below the warning threshold of 8 mg. The gaps in the plots of Fig. 3-4 are due to a corruption in the QUADAS database of August, which are just related to a hardware failure in the DPQC facilities.

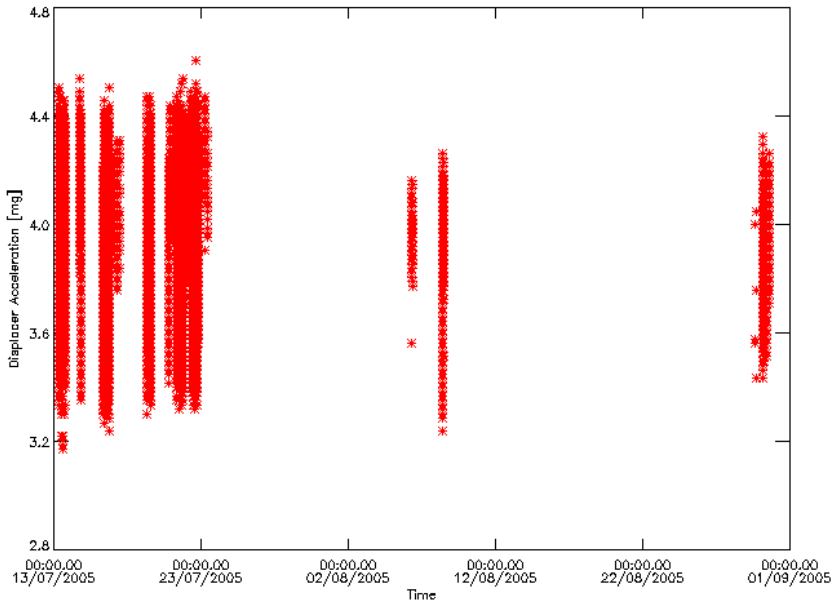


Fig. 3 July-August 2005: Displacer vibration level.

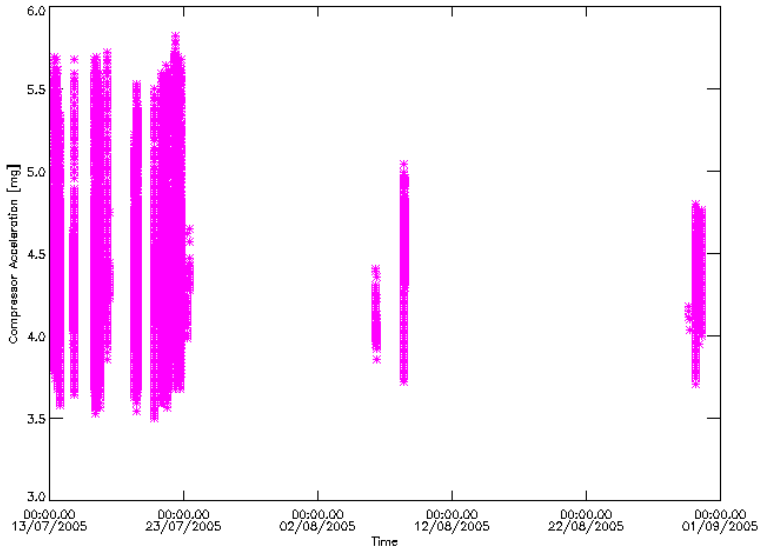
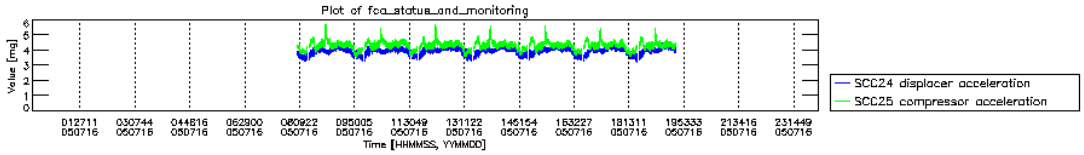
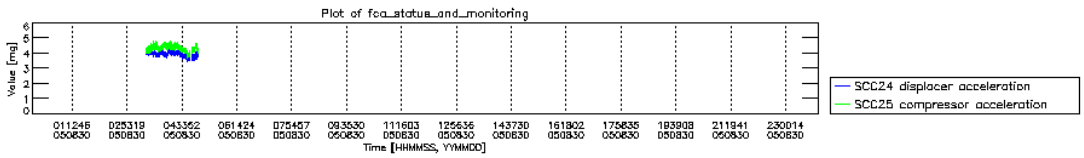


Fig. 4 July-August 2005: Compressor vibration level.

Starting from 3rd of June 2005, a spike characterizes the Compressor vibrations and it is observed more or less at the same orbital position. These spikes are caused either by too quick voltage transition (battery charger) or to a temperature transition on the edge of the cooler external structure elements. This is the reason why they occur always at nearly the same orbit position. This behaviour persists during July operations (see Fig. 5a) while it seems to be reduced during August (see Fig. 5b). Nevertheless the amplitude of the spike is of about 1 mg, which is well below our observation warning level of 8 mg. Therefore the situation is at moment uncritical, but needs to be monitored with care. If too extreme values are reached, a re-coarse balance is needed.



(a)



(b)

Fig. 5 Displacer and Compressor vibration level: (a) 16th July 2005 and (b) 30th Aug 2005.

2.2.3.2 Interferometer Performance

The Fig. 6 shows the -4% differential speed errors between June 2004 and August 2005, showing also the observed anomalies (red triangles) and the nominal operations time according to the new measurement scenario. The -4% differential speed error is an indicator of anomaly in the IDU system. A significant increase of such anomalies since June 2004 can be observed in Fig. 6, in particular the increase become critical during August 2005, when the error rate reaches the value of 75% corresponding to the highest value on 2005. This happens even though an outage period from 23rd July to 1st of August was considered in order to relax the IDU mechanical system. The reason for this is not related to INT temperature and an investigation is ongoing at Astrium to understand this behaviour.

Indeed an ARB was called on August 23rd, in this meeting we agreed another period of intended mission interruption for relaxing the IDU system. In this meeting the period August, 30th to September, 19th (afterwards extended to September 26th) was identified as the most suitable interval for mission interruption. This allows minimizing interferences with the currently planned measurements and ensures that:

- The instrument will be given about twice as much time to relax than last time.
- The instrument will be on duty again in time for "Southern France Validation Campaign".
- All measurements, planned in the period of August 30 to September, 26, can and will be re-planned at a later moment in time.

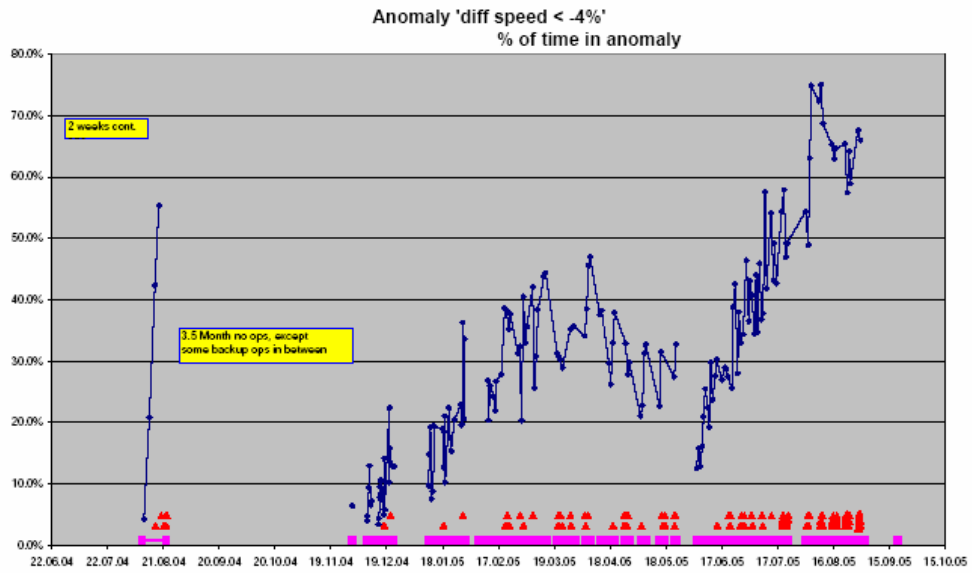


Fig. 6 Interferometer -4% differential speed error statistics (June 2004-Aug 2005)

The instrument performance after this long mission interruption interval will be monitored with care. From the experience acquired during 2005 it was noted that the probability of unintended IDU anomalies increases with the time in duty, 40% duty cycle being the maximum for the planning

baseline. The future mission plan will then be modified in order to find the best trade-off between scientific needs and instrument health. In the next cyclic report the interferometer performance will be updated according to the investigations on IDU anomalies after the long mission interruption period.

2.2.3.3 Turnaround failure on 29th August 2005

On 29th August at 13.55.03 (2005.241.13.55.03) a turnaround error happened where the slides were moved into the "false" direction. In this special turnaround failure case, the two slides do accelerate to the outside of the rails, imbedding the risk that slides end up into a position that a re-init of slide 2 via the so-called launch lock (LL) position is required. Exactly that happened during this event. As known from former times (when operating the INT with full resolution) there is a risk that the slide 2 gets blocked at the launch lock insert. During the followed re-initialisations the automatic recovery procedure worked properly, but the slide 2 was blocked at the launch-lock insert and so only slide 1 was re-initialised. Shortly (3 minutes) after the automatic recovery MIPAS was commanded into measurement and due to the fact that only slide 1 was operational the backup mode with slide 1 was started within the interferometer. Because of the reduced resolution for the measurement and as well for the transitory sweeps there was enough INT rail-length available to perform this non-intended back-up mode measurement. But nevertheless the measurement data are useless due to the point that slide 2 was blocked outside the operational range at the LL position and no crossover-point exists. The non-intended back-up mode measurement failed always after a short time due to a further turnaround failure of slide 1. The slide 2 remained blocked for the next 5 attempts to recover automatically and at the 6th attempt the slide 2 got free and initialized. At 23:49:41 the measurement was finally re-started successfully. Since no crossover point exists all data obtained between Aug-29, 15:27:03 and Aug-29, 23:49:40 is invalid. This unintended unavailability is the cause of the failure of the important in-flight characterisations planned for 29th August (see Tab. 4).
That critical turnaround failure with a slide acceleration into the "false" direction occurred for the last time on 26th March 2003, however the failure on 29th August 2005 was less severe than the one on 2003, because slides didn't hit the end-stops with high speed.

2.3 Level 1 Product Quality Monitoring

2.3.1 PROCESSING CONFIGURATION

Tab. 6 shows the list of IPF updates, the DPMs, the ADFs and the related NCR/SPRs. 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.
The Fig. 7 shows the alignment between the measurement mode (high resolution, reduced resolution with 17 sweeps and double-slide reduced resolution with 27 sweeps) and the corresponding valid IPF and ADF for the processing of both Level 1 and Level 2 products.

Tab. 6 Historical updates of MIPAS processor and related DPM, ADF and NCR/SPR.

IPF Version	DPM L1/L2	ADF L1/L2	Validity L1	Validity L2	Level 1 update	Level 2 update
4.65	**4I/4.1**	**4.1/5.1**	**From Start up to now**	**From start to March 2004 + Aug/Sept 2004**	---	-Fixed NCR_1310: Problem with MIP_NL__2P
4.64	**4I/4.1**	**4.1/5.1**	**From Start up to now**	**From start to March 2004 + Aug/Sept 2004**	-Fixed SPR-121O0-2011: Problem with the block sequence	---
4.63	**4I/4.1**	**4.1/5.1**	**From Start up to now**	**From start to March 2004 + Aug/Sept 2004**	Processing of low resolution measurements, with reduced resolution also for offset and gain data. - Fixed SPR-120O0-2000: Band D oscillations in forward sweeps for MIPAS reduced-resolution products - Fixed SPR-120O0-2001: NESR data problem	Processing of reduced resolution measurements in old configuration (Aug/Sept 2004 measurements). - Fixed NCR_1278: Some MIPAS profiles have zero pressure - Fixed NCR_1308: MIPAS Level 2 failure. - Rejected NCR_1310: Problem with MIPNL__2P - Rejected NCR_1317: One second discrepancy in IPF 4.61
4.62	**4H/4.0**	**4.0/3.8**	**From Start up to now**	**From Start to March 2004**	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.	-Fixed NCR_1128: Cloud-detection anomaly. -Fixed NCR_1275: Inconsistent values in MIPAS files. -Fixed NCR_1276: Level2 profile counting bug.

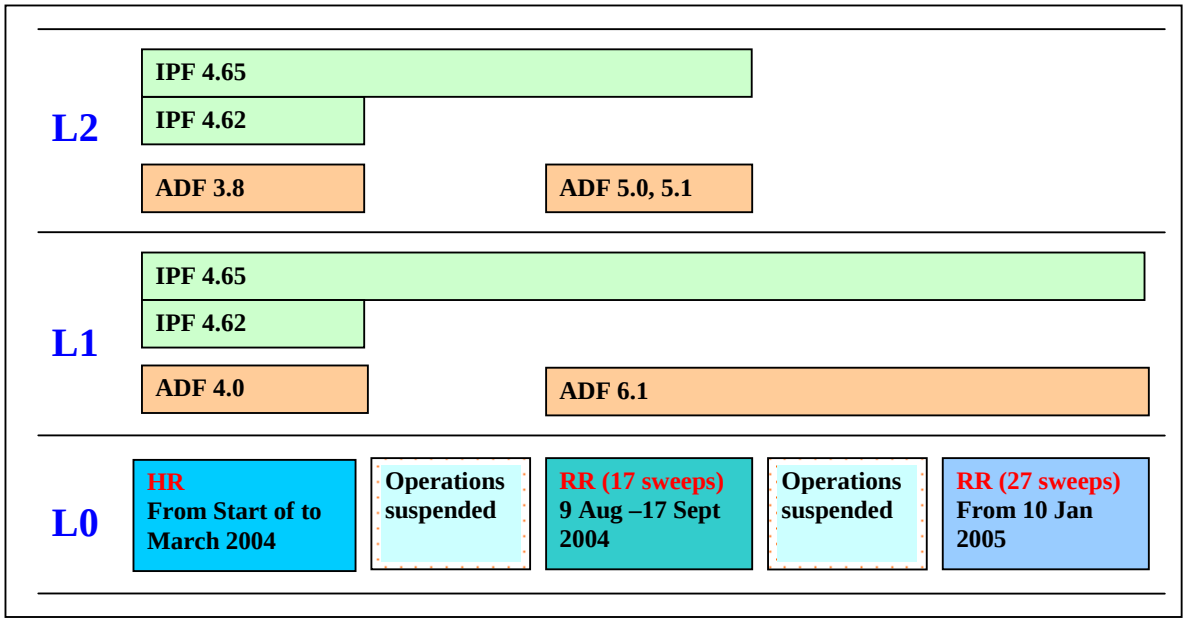


Fig. 7 Scheme for IPF validity for L1/L2, resolution and ADFs version.

2.3.1.1 Processor Version

The historical updates in the MIPAS Level 1 IPF processor are listed hereafter:

- **Version V4.65** no update of Level 1 for this version
- **Version V4.64** (aligned with DPM 4I and ADFs V4.1) has introduced changes 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) has introduced changes for both Level 1 and Level 2 processors. 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
  - Solution of internal SPR-120O0-2001: NESR data problem
- **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

The historical update of the IPF in the processing site is shown in the following table.

Tab. 7 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

2.3.1.2 Auxiliary Data Files

The strategy for the ADFs Level 1 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 or after a long unavailability
- The MIP_CL1_AX is analysed every two weeks and updated when the pointing error differs with respect to the last disseminated of more than 8 mdeg.
- The MIP_PS1_AX is updated by Bomem every time there is a setting update.
- The MIP_MW1_AX is updated by Bomem when the micro-window are changed.
- The MIP_CA1_AX is updated by Bomem when new characterization parameters are defined.

The ADF files generated and disseminated during July-August 2005 are listed in the following table.

Tab. 8 Level 1 ADFs valid in July and August 2005.

Auxiliary Data File	Start Validity	Stop Validity	Updated in July/Aug 2005
V 6.1 (IPF 4.63) MIP_MW1_AXVIEC20050627_094928_20040809_000000_20090809_000000 MIP_PS1_AXVIEC20050627_100609_20040809_000000_20090809_000000 MIP_CA1_AXVIEC20050627_094412_20040809_000000_20090809_000000	08-AUG-04	08-AUG-09	Yes
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_AXVIEC20050705_134920_20050703_033129_20100703_033129 MIP_CO1_AXVIEC20050705_134752_20050703_044401_20100703_044401 MIP_CG1_AXVIEC20050705_134101_20050703_041658_20100703_041658	03-July-05	03-July-10	Yes
MIP_CS1_AXVIEC20050712_102627_20050709_004440_20100709_004440 MIP_CO1_AXVIEC20050712_094917_20050709_005809_20100709_005809 MIP_CG1_AXVIEC20050712_093914_20050709_005611_20100709_005611	09-July-05	15-July-10	Yes
MIP_CS1_AXVIEC20050725_133304_20050718_190838_20100718_190838 MIP_CO1_AXVIEC20050724_045915_20050718_205546_20100718_205546 MIP_CG1_AXVIEC20050725_190442_20050718_201007_20100718_201007	18-July-05	18-July-10	Yes
MIP_CS1_AXVIEC20050810_180640_20050730_000000_20100803_104839 MIP_CG1_AXVIEC20050810_180640_20050730_000000_20100803_170424 MIP_CO1_AXVIEC20050811_181639_20050730_000000_20100803_113811	30-July-05	03-Aug-10	Yes
MIP_CS1_AXVIEC20050914_172141_20050814_000000_20100814_000000 MIP_CG1_AXVIEC20050914_090901_20050814_000000_20100814_000000 MIP_CO1_AXVIEC20050914_091912_20050814_000000_20100814_000000	14-AUG-05	14-Aug-10	Yes
MIP_CS1_AXVIEC20050908_153717_20050821_000000_20100821_000000 MIP_CG1_AXVIEC20050908_153511_20050821_000000_20100821_000000 MIP_CO1_AXVIEC20050914_094904_20050821_000000_20100821_000000	21-Aug-05	21-Aug-10	Yes
MIP_CS1_AXVIEC20050909_164437_20050828_000000_20100828_000000 MIP_CG1_AXVIEC20050908_153511_20050821_000000_20100821_000000 MIP_CO1_AXVIEC20050909_164336_20050828_000000_20100828_000000	28-Aug-05	28-Aug-10	Yes

It's important to point out that the following characterisation L1 AUX file (reported in the last bi-monthly report):

MIP_CA1_AXVIEC20050315_102713_20050108_000000_20090108_000000
MIP_PS1_AXVIEC20050315_102931_20050108_000000_20090108_000000
MIP_MW1_AXVIEC20050315_102419_20050108_000000_20090108_000000

Have been removed from all the processing centres, in order to activate the last disseminated ones:

MIP_CA1_AXVIEC20050627_094412_20040809_000000_20090809_000000
MIP_PS1_AXVIEC20050627_100609_20040809_000000_20090809_000000
MIP_MW1_AXVIEC20050627_094928_20040809_000000_20090809_000000

These AUX files are the latest delivery of Level 1 ADF by Bomem. The following table illustrate the history Table of Level 1B ADF deliveries.

ADFs Version	Updated ADF	Start Validity Date	IPF version	Dissemination date
3.0	MIP_CA1_AX MIP_MW1_AX MIP_PS1_AX	April-2002	4.61	4-Nov-2003
3.1	MIP_PS1_AX	09-Jan-2004	4.61	17-Mar-2004
3.2	MIP_PS1_AX	26-Mar-2004	4.61	21-Apr-2004
4.0 draft	MIP_PS1_AX	Not disseminated	4.62	-
4.1 TDS6	MIP_PS1_AX	09- Aug-2004	4.63	15-Mar-2005
5.0 draft	MIP_PS1_AX	Not disseminated	4.63	-
6.0	MIP_PS1_AX	Not disseminated	4.63	-
6.1	MIP_PS1_AX	09-Aug-2004	4.63	27-Jun-2005

When one ADF is modified the three AUX file are disseminated with the same START/STOP time and this correspond to a new version, this allows avoiding confusion. The history of modifications done by Bomem is summarized in the following paragraph.

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

Version 3.1

MIP_PS1_AX

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

Version 3.2

MIP_PS1_AX

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

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 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 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 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 6.1
The tenth set is the result of changing thresholds for spike detection and for scene validation.
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

2.3.2 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 July-August 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. Fig. 8 gives the variation trend over the period July-Aug 2005. We observe a very stable situation since the variations are of the order of 1 ppm (nominal situation).

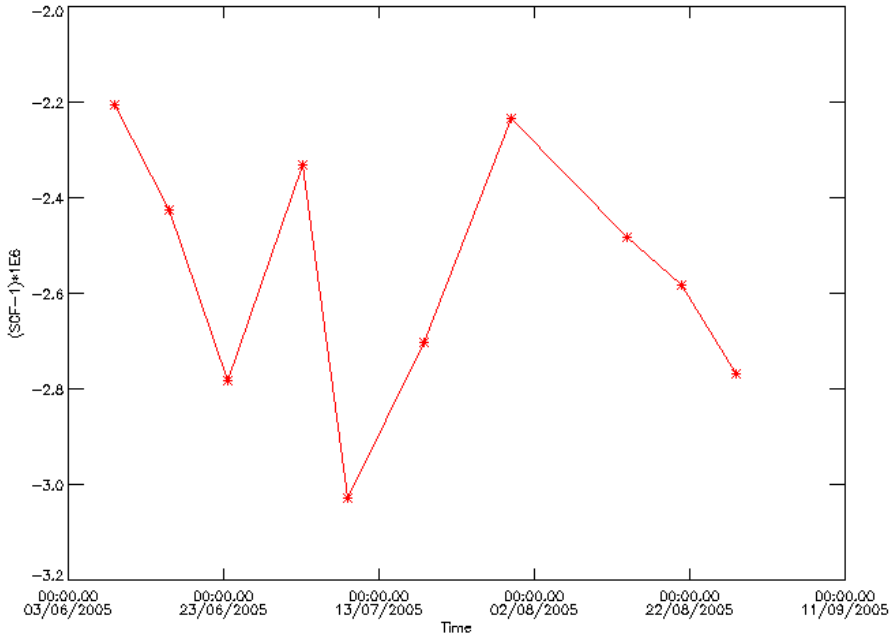


Fig. 8 MIPAS Spectral Calibration Factor (SCF) variation over July-August 2005.

2.3.3 RADIOMETRIC PERFORMANCE

During the period January-May 2005, there have been gain ADFs disseminated which do not satisfying the radiometric requirement (gain increase below 1%). A gain reprocessing has been planned with the support of Bomem and the results will be reported soon.
During July-August the weekly increase of gain was always below the 1% warning threshold, as illustrated in Fig. 9. In this figure it is shown the variation of radiometric gain for Jul-Aug 2005 taking as a reference the first gain measurement performed at the beginning of July 2005.

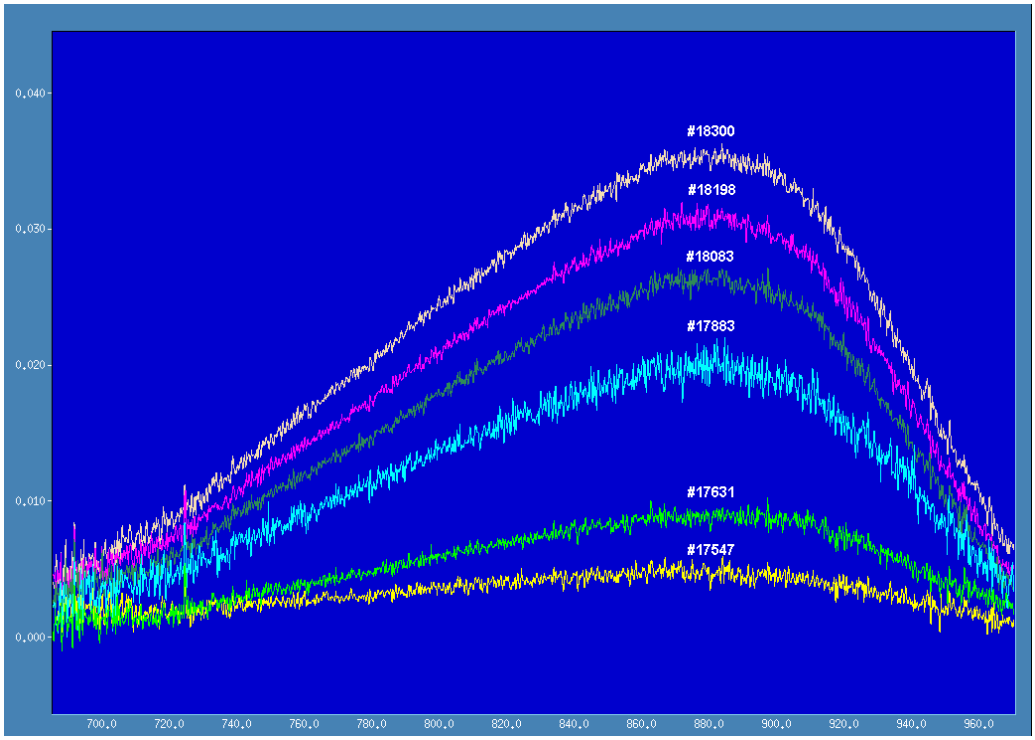


Fig. 9 Relative variation of radiometric gain ((abs(wi)-abs(w0))/abs(w0) during July-August 2005, w0 is the gain for the reference orbit #17461 measured at the beginning of July.

2.3.4 POINTING PERFORMANCE

The LOS calibration measurements are performed every week. This configuration allows the analysis of the pointing stability and guarantees the availability of the data in case of missing products. Initial analysis has evidenced a marked annual cycle (as shown in Fig. 10) 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 platform resulting from software response to orbit control information. In fact, the update in the pointing software implemented on 12 December 2003 (orbit 9321) has evidently reduced the deviation trend (see last points in Fig. 12).
During July-August the LOS calibrations were performed 4 times, the related orbits and pointing errors are shown in Tab. 9. In this period a slight mispointing was observed, with a maximum value of about 10 mdeg and a seasonal trend. This behaviour will be investigated in details in the next cyclic report also in relation with GOMOS mispointing.

Tab. 9. LOS calibration performed on July-Aug 2005.

Date	Orbit #	Relative bias	Absolute bias
02-Jul-05	17452	0,012148	-0,017852
23-Jul-05	17753	0,010915	-0,019085
06-Aug-2005	17953	0,009134	-0,020866
20-Aug-2005	18155	0,007421	-0,022579

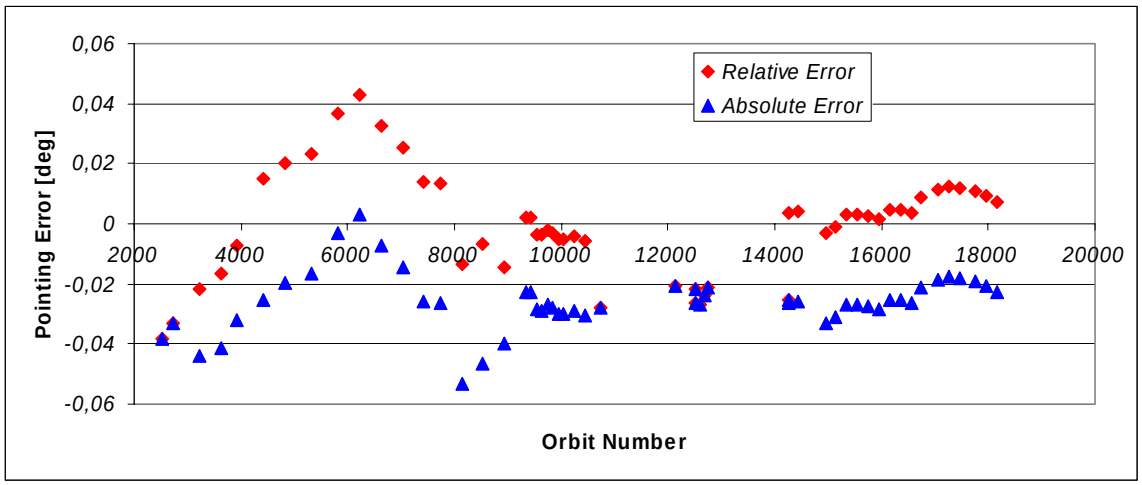


Fig. 10 MIPAS pointing error as a function of the orbit number: September 2002- August 2005.

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. Tab. 10 shows the history of the commanded angle for LOS measurements.

Tab. 10. 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 2004, 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. Fig. 11 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.

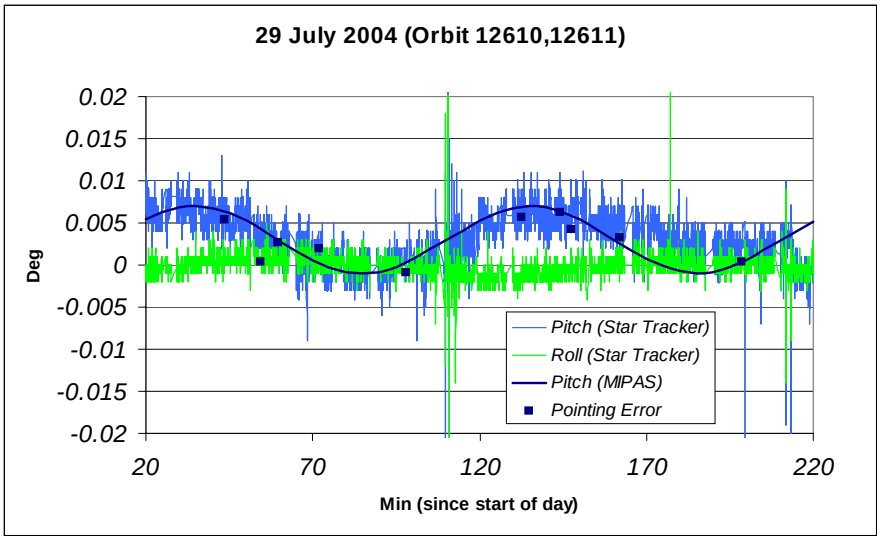


Fig. 11 Comparison between MIPAS pointing and star tracker information.

2.3.5 ANOMALY STATUS

The following table summarises the anomalies affecting Level 1 products and shows the associated SPR, NCR, AR and HD code.

Tab. 11 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	/

2.3.5.1 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 cannot 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.

2.3.5.2 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 MICAL chain 06 algorithm) with related delay of Auxiliary Data Files (CS1_AX, CO1_AX, CG1_AX) generation and dissemination.
The investigation shows that in the planning the Kiruna/Artemis dump times were not taken into account, therefore some calibrations have been split into 2 different Level 0 files.
A workaround was found with the support of Bomem. This consists in using one MIGSP special function, in order to "reconstruct" the calibration L0 file (by merging two products) and give it as input for the processor, than finally to get ADF calibration files.
Since the source and the solution of this problem were found, this anomaly can be considered closed and the L0 calibration files affected by this problem will be processed in order to get ADF calibration files.

2.3.5.3 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 7-38 km range specified in Mission_Plan_V4.1.pdf dated 3 May 2005.
Bomem check these L1B products and the problem does not seem to be due to processing (MIGSP 2.5). The problem was found to be due to the commanding, in particular to the software (SEM mode algorithm) used for the AE measurements. The software was designed only for localized SEM measurements, such as volcano eruption. The use of this algorithm over a wide area around the globe (such is the case of AE measurements) can lead to very important deviations owing to the earth ellipsoid. This is the cause of the deviation between planned and measured tangent altitude for these AE measurements. In this sense this anomaly is closed, nevertheless Anu Dudhia reported at the last QWG a further anomaly affecting these products, it consists in a difference of almost 3 km between retrieved and engineering altitude. This anomaly is not relating to the planning and will need a different anomaly report and a deeper investigation in collaboration with Bomem and OU.

2.3.6 RE-PROCESSING STATUS

Figure 14 shows the reprocessing status at the end of August 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.

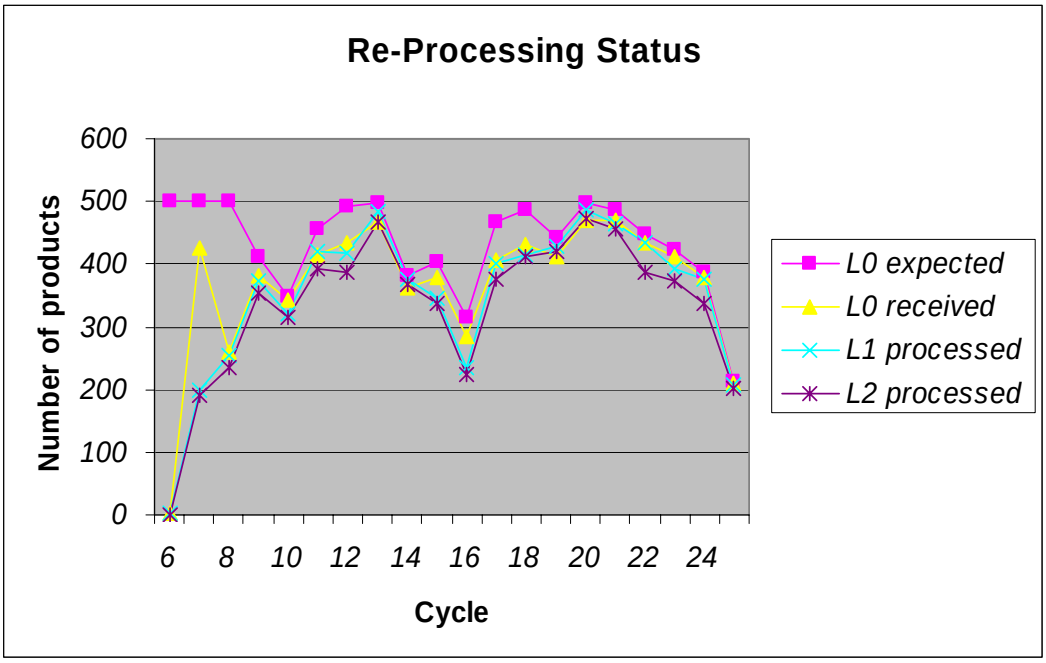


Fig. 12 Re-processing status at the end of August 2005

2.3.7 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 the 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__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_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

2.4 Level 2 Product Quality Monitoring

2.4.1 PROCESSOR CONFIGURATION

2.4.1.1 Version

The historical updates in the MIPAS Level 2 IPF processor are listed hereafter and in Table 6:

- **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
- **Version V4.64** no update for 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** 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

2.4.1.2 Auxiliary Data Files

Tab. 12 shows the historical dissemination (from January 2003) of Level 2 ADFs until the mission interruption occurred in March 2004. The ADFs have not been updated since the mission interruption.

Tab. 12. 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 MIP_CS2_AXVIEC20030722_133331_20030723_000000_20080722_000000 MIP_SP2_AXVIEC20030722_093046_20030723_000000_20080722_000000	23-JUL-03	Cloud detection enabled and improved validity mask range in 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	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

MIP_PI2_AXVIEC20031027_101146_20020706_060000_20080706_060000 MIP_CS2_AXVIEC20031027_100559_20020706_060000_20080706_060000 MIP_SP2_AXVIEC20031027_101441_20020706_060000_20080706_060000		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 four sets of ADFs still not disseminated, the main features of these ADF are summarised in Table 13. The version 4. corresponds to a set of ADFs for processing of full resolution measurements, with noise level adjusted to interferometer heaters switched-on and flag set for processing of only nominal measurements. The version 5. corresponds to ADFs for processing of reduced spectral resolution measurement (17 sweeps operations), then is able to process the measurements done on Aug-Sept 2004 period.

- **ADFs V5.1**

In this latest release of ADF it was updated the spectroscopic line list relative to the new microwindow database for reduced spectral resolution. Furthermore it was changed the PT error propagation matrices for nominal OMs (file MIP_OM2_AX) and the upper limit of a microwindow for cloud detection.

- **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.

- **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 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.

Tab. 13 Level 2 ADF provided by IFAC and still not disseminated.

Version	Date of delivery	List of files upgraded by IFAC	Main modifications
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.
ADF V5.0	18.03.2005	MIP_PS2_AX_V5 MIP_CS2_AX_V5 MIP_MW2_AX_V5 MIP_PI2_AX_V5 MIP_IG2_AX_V5_july MIP_IG2_AX_V5_october MIP_OM2_AX_V5	New microwindows selected for reduced spectral resolution, and corresponding cross section LUT, occupation matrices and Initial Guess for continuum (July and October seasons). Boundaries of the microwindows for cloud detection modified to match the new spectral grid at reduced resolution. 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.
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; upper limit of a microwindow for cloud detection changed.

2.4.2 ANOMALY STATUS

Table 12 summarises the anomalies affecting Level 2 products and shows the associated SPR, NCR, AR and HD code.

Tab. 14 Level 2 anomaly list.

Anomaly	Prototype/DPM SPR	IPF NCR	AR	HD
Anomalous processing time	33	1127	1361	/
Jump anomaly	/	/	/	HD/01-2005/1013
Strange Impossible values	/	/	/	HD 2005003487

2.4.2.1 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.

2.4.2.2 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.

2.4.2.3 Strange Impossible values

Considering 6971 L2 product files (processed by D-PAC with IPF 4.61 and 4.62) from all the mission (464546 profiles) Fricke found strange or impossible values in 231 profiles. “Impossible values", are negative variances in the corrected altitude, pressure, and temperature profiles. “Strange values" are geophysically strange values, such as pressure higher than 1.5 bar, pressure below 1 microbar, temperatures below 130 K or above 450 K, differences among LOS altitudes and corrected altitudes larger than 5 km. The anomaly is still under investigation.