Product Quality Readme File for

MIPAS Level 1b IPF 8.03 products

Field	*Contents*
Document Title	Product Quality Readme File for MIPAS Level 1b IPF 8.03 products
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Affected Dataset	This Readme file applies to all MIPAS Level 1b products generated with the ESA Level 1b IPF processor version 8.03 (MIP_NL__1PY) and the Auxiliary Data Files version 10.
Reference Documents	[RD1] Algorithm Theoretical Baseline Document (ATBD) for MIPAS Level 1b Processing, PO-TN-BOM-GS-0012, issue 2, 14 October 2016 [RD2] MIPAS Level 1B Processing Input/Output Data Definition (IODD), PO-TN-BOM-GS-0010, issue 7A, 17 March 2017
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Issue	Date	Change
1.0	16/01/2019	First release

Summary

Description

1. MIPAS mission overview

The ENVISAT mission with on-board the MIPAS instrument lasted ten years, from the 1st of March 2002 until the 8th of April 2012. In 2004 MIPAS suffered a major anomaly affecting the Interferometer Drive Unit (IDU) with serious impact on performances. To avoid the mechanical blockage of the instrument, ESA took the decision to interrupt the MIPAS regular operations on the 26th of March 2004 (orbit 10823). Different tests with different slides configurations and spectral resolutions were performed for the identification of the error source, also for recovering the instrument. Despite such a serious problem, ESA succeeded the recovery of the instrument on January 2005, after a test campaign that lasted only a few months.
MIPAS was operated at 100% of its duty cycle from July 2002 to March 2004. Due to the above described instrument anomaly, MIPAS was operated with a reduced duty cycle of about 30% at the beginning of 2005 which was progressively increased until December 2007, when MIPAS was successfully recovered back to a 100% duty cycle, after 3.5 years since the first failure. The adopted duty cycle had a direct consequence on the overall number of observations acquired by MIPAS in different periods.

2. MIPAS observation modes

The MIPAS acquisition baseline was defined by a Science Team, and had been regularly revised along the mission in order to adapt the measurements scenario to scientific requirements, like special operations in support to calibration campaigns or special validation campaigns. Different measurement modes were thus implemented.
Moreover the MIPAS major anomaly in 2004 obliged ESA to modify the acquisition scenarios and to completely re-characterize the instrument. Different phases can be identified along the MIPAS mission characterized by:

- a different spectral resolution,
- a different limb scanning pattern with different vertical and horizontal sampling.

- **Full Resolution (FR) phase: 1st July 2002 – 26th March 2004**

In the original measurement mode, the MIPAS instrument was acquiring

data with full spectral resolution (0.025 cm^{-1}). During this phase, MIPAS measurements were mainly acquired in Nominal Mode with 17 sweeps per scan; only a few orbits were commanded in the Special observation modes and in the Upper Atmosphere observational scenarios for scientific purposes.

- **Mission suspended: 26th March 2004 – 9th August 2004**

- **Reduced Resolution (RR) phase: 9th August 2004 – 17th September 2004**

MIPAS was tested for acquiring 41% reduced spectral resolution measurements (0.0625 cm^{-1}) and asymmetric transitory sweeps (3.3 mm asymmetry). During this phase, Nominal Mode operations have 17 sweeps per scan.

- **Mission suspended: 17th September 2004 – 10th January 2005**

- **Optimized Resolution (OR) phase: 10th January 2005 – 21st October 2010**

MIPAS was operated in double slides configuration for acquiring 41% reduced spectral resolution measurements (0.0625 cm^{-1}) and asymmetric transitory sweeps (3.3 mm asymmetry). Operations were based on an "event driven scenario", with priority to validation campaigns and special observations. The instrument duty cycle was increased from 30% up to 100%, with continuous operations since the 1st of December 2007. During this phase, beside the most frequent Nominal Mode, several measurements have been acquired in UTLS-1 (Upper Troposphere-Lower Stratosphere), MA (Middle Atmosphere) and UA (Upper Atmosphere) modes. The new Nominal Mode has 27 sweeps per scan. The other observation modes were updated for the new instrument configuration and optimized respect to vertical and horizontal spacing.

- **ENVISAT extended mission: 21st October 2010 – 8th April 2012**

MIPAS continued to be operated in Optimized Resolution (OR) but the ENVISAT platform was moved to a lower altitude with drifting orbit.

3. Level 1b products overview

The MIPAS Level 1b products are engineering products obtained from limb observations converted into relevant physical units after applying suitable calibrations. The Level 1b products consist of a set of localized,

radiometrically and spectrally calibrated spectra of the atmosphere, with various annotated datasets on calibrations and data quality indications.
MIPAS detectors were designed to cover the spectral range from 685 cm^{-1} to 2410 cm^{-1}. Eight detectors were adopted and the spectral range was split into five bands, each band being covered by one or two specific detector(s). The spectral ranges of the single bands are depicted in the following table:

Band	Optical Range [cm^{-1}]
A	685 – 980
AB	1010 – 1180
B	1205 – 1510
C	1560 – 1760
D	1810 – 2410

During the sounding of the atmospheric limb, for each height step represented by a single interferometric stroke (sweep), MIPAS generated five spectra (one for each band) and a corresponding set of auxiliary data, all band measurements recorded during the same time interval. The Level 1b file contains the calibrated spectra with reference to calibration data and to the auxiliary data used during calculations. Each elevation scan header contains specific data corresponding to an individual elevation sequence belonging to the actual scene.
The Level 1b processor algorithm is fully described in the ATBD document [RD1]; the major processing steps are reported below:

- **Radiometric calibration**
- correction for instrument offset and gain;
- conversion to spectral radiance units (W/cm-1 sr cm2).

- **Spectral calibration**
- determination of the wavenumber axis.

- **Instrument Line Shape (ILS) calibration**
- Determination of the instrument response function.

- **Geolocation**
- determination of pointing correction (from Line Of Sight [LOS] calibrations);
- determination of the tangent point location using orbit data, satellite attitude data and pointing correction.

4. Level 1b IPF version 8.03

The MIPAS Level 1b Instrument Processor Facility (IPF) MICAL version 8.03 was developed introducing both scientific improvements and format updates, and was adopted for the reprocessing of the MIPAS full-mission data set.

4.1. Processor upgrades

The new MICAL Level 1b processor Baseline 8.0 implements software changes and new processing elements discussed in the framework of MIPAS QWG activities for the fix or the enhancement of the MIPAS Level 0 to 1b processing. The major changes in the algorithms of the new Level 1b version 8.03, compared to predecessor IPF version 7.11, are reported below:

- **New detectors non-linearity coefficients**

A special issue is the aging of the detectors which caused a reduction of the sensitivity and a decrease of the non-linearity over the mission. The inflight detector non-linearity takes this into account and helps to derive reliable trends of species and temperature over the mission. The detector non-linearity correction in Level 1 IPF v7.11 was done using an in-flight characterisation and of the on-ground characterisation. The new in-flight detector non-linearity characterisation method is developed using:

- nominal Calibration Blackbody (CBB)/Deep Space (DS) measurements and raw mode CBB/DS/Scene measurements from the whole mission, in order to re-characterise the non-linearity coefficients as a function of the ice contamination, the instrument temperature and the time since the beginning of the mission. The new non-linearity characterization method was tested by means of overlapping spectral regions of adjacent detector bands and checking calibrated blackbody spectra measured at different blackbody temperatures.

In L1 v8.03 new Nonlinear contributions have been calculated from the ice level and temperature determination (with v5 gains). A new data set of Auxiliary Data Files, composed of non-linearity coefficients (MIP_CA1_AX) and calibration (MIP_CG1_AX, MIP_CO1_AX and MIP_CS1_AX) parameters, has been recalculated for the whole mission and was used for the Level 1b reprocessing with the IPF v8.03 processor.

- **Orbit State Vector DOR/VOR**

The orbit determination is improved making use of accurate DORIS Precise Orbit State Vectors DOR/VOR files (DOR_VOR_AXVF).

- **Upgraded pointing correction model**

The upgraded pointing function compute the effective mispointing angles taking into considerations the MIPAS alignment matrices defined in the new MIP_CA1_AX. It is assumed that commanded elevation angles are only partially corrected with respect to known pointing errors according to the best knowledge based on-ground characterization and LOS calibration measurements.
The remaining elevation error, obtained from LOS calibration measurements, has been be computed in the ground segment and be used to correct in measurement mode the measured elevation angles. The corrected elevation angles and the measured azimuth angles are used to compute the geolocation (height/longitude/latitude) of the actual scene (target).

- **Longitude and latitude error fields addition**

Rearward measurements has a pointing correction and that the new fields latitude and longitude error are reported in the level 1b.

- **Removal of elevation mirror WCC scans**

The processor provides the removal of WCC (wear control cycle) sweeps from L1B product (the WCC automatically performed after every transition to Heater, 1 scan of 12 sweeps).

- **Upgraded offset validation (threshold and handling of invalid)**

Offset calibration is performed when a new non-corrupted offset measurement becomes available. A 'closest in time strategy' has been applied to select the calibrated offset that is subtracted from the scene measurements, which means that a complete scan is calibrated with the closest calibrated offset. In case the closest calibrated offset is flagged as invalid by the “NESR Assessment and Offset Validation” function, it is used anyway for the subtraction but a warning flag is be associated with the scene.

If no offset at all is found in the input data, then the offset calibration data contained in the offset validation file is used but a warning flag will be associated with the scene.

In case of there is no offset measurements in a Level 0 product, the processor is able to generate level-1b using the backup offset in the MIP_CO1 ADF file.

In case the offset validity threshold is exceeded, the offset measurements in a level 0 product still taken.

- **Non-rejection of scene with Level 0 transmission error flag**

In case a Level 0 input product has a transmission error flag set to 1, the processor is able to ignore the transmission flag error and proceed anyway with the processing of products. This adaptation was implemented as in the past the product was not processed even if the scientific contents was not affected by errors.

- **Extended spectral wave number range**

The bands spectral range have been extended as in table below (in bold the new values):

Band A Range cm-1	Band AB Range cm-1	Band B Range cm-1	Band C Range cm-1	Band D Range cm-1
685 - **980** (970)	**1010** (1020) **– 1180** (1170)	**1205** (1215) **– 1510** (1500)	**1560** (1570) **– 1760** (1750)	**1810** (1820) - 2410

- **Processing of daily gain (and flagging of extreme variation)**

The product gain validation have been improved with the new Gain Calibration Auxiliary Data File (MIP_CG1_AX), which contains a reference gain measured once per day (note: this was once per week in the previous version 7.11).

- **Precise spectral calibration**

The product spectral calibration has been improved with the new ILS and spectral calibration Auxiliary Data File (MIP_CS1_AX).

4.2. Product identifiers

The Level 1b products generated by the IPF v8.03 are identified by the following fields reported in the product filename and/or Main Product Header (MPH) to unambiguously summarize the processing configuration adopted:

MPH Field	Value
Processing stage flag	Y
Processing center	DSI
Software version	MIPAS/8.03

The default product filename counter is set to "0000", and it is increased in case of corrective processing activities; however only one product per orbit is available in the L1b data set.

Filename
MIP_NL__1P**YDSI**20100621_224004_000060142090_00302_43442_**0000**.N1

4.3. Product format upgrades

The following fields have been introduced in the Level 1b v8.03 products with respect to the previous baseline (versions 7.11). Details can be found in the latest issues of the MIPAS IODD and Product Specification documents ([RD2] and [RD3]).

Record	Field name	Description
SPH	qual_pcd	Overall Quality Product. Set to '+000' if product is OK, '+001' Warning flag, backup offset was used, '+002' Warning flag, gain is more distant than 7 days from measurements, '+003' Warning flag, both conditions (backup offset and distant gain) are present.
MDS	Tangent point geolocation Error (lat/long.)	Latitude: unit: "1e-6 degrees_north" Longitude: unit: "1e-6 degrees_east"

4.4. Product format and tools

The MIPAS Level 1b products generated with IPF v8.03 have an updated format (see [RD2]). Owing to this, the BEAT, VISAN and CODA software have been updated in order to read the new products, allowing fields' extraction and data handling. Latest VISAN version 3.19 and CODA version 2.20 are aligned to the new specifications. The format definition of the new data is also available on-line at:
http://www.stcorp.nl/coda/codadef/ENVISAT_MIPAS/products/MIP_NL__1P_v3.html

4.5. Product quality filtering

Users are recommended to check the quality flags listed in the table below, in order to make use of the highest quality spectra data of the new MIPAS Level 1b version 8.03 dataset.

Record	Field name	Description	Expected Value
MPH	Product Error	Possible values: 1 or 0. If 1, the total number of corrupted sweeps is greater than 10% of the total number of sweeps in the product.	0
SPH	qual_pcd	Overall Quality Product. Set to '+000' if product is OK, '+001' Warning flag, backup offset was used, '+002' Warning flag, gain is more distant than 7 days from measurements, '+003' Warning flag, both conditions (backup offset and distant gain) are present.	0
MDS	Quality flag	Quality indicator PCD (Product Confidence Data). Possible values: 1 or 0. If 1, one or more bands are corrupted.	0
	Quality flag	Band validity PCD (5 values, for band A, AB, B, C, D). Possible values: 0, non-corrupted 2, corrupted due to transmission errors 4, corrupted due to observational validation 8, corrupted due to ADC saturation.	0

5. Data reprocessing with Level 1b version 8.03

Data reprocessing is fundamental to improve the quality of the existing data sets and generate coherent long term series of geophysical parameters to be used for atmospheric applications, such as climate studies and trend analysis.

The latest MIPAS Level 1b full-mission reprocessing campaign has been performed using the Instrument Processing Facility (IPF) version 8.03. The reprocessed dataset covers the entire MIPAS operational mission lifetime period, from the 1st of July 2002 up to the 8th of April 2012. **Users are strongly recommended to use the new reprocessed MIPAS Level 1b products v8.03.**

The existing MIPAS Level 0 dataset has been successfully processed to Level 1b; in total 35018 products*(*)* have been generated, with a total data volume of about 9TB. The following table gives an overview of the number of orbits available per year. The status of the MIPAS consolidated Level 1b data set version 7.11-W is also available at:

https://earth.esa.int/web/sppa/mission-performance/esa-missions/envisat/mipas/products-availability/level-1

Year	Level 0 products available	Level 1b v8.03 products available	Percentage of L1b v8.03 availability wrt L0 products
2002	2054	2005	97.61 %
2003	4580	4575	99.89 %
2004	1205	1166	96.76 %
2005	1764	1689	95.75 %
2006	2111	2052	97.21%
2007	3353	3303	98.51 %
2008	4855	4828	99.44 %
2009	4905	4866	99.20 %
2010	4861	4841	99.59 %
2011	4908	4885	99.53 %
2012	1360	1354	99.56 %
Total	**35956**	**35564**	**98.91 %**

(*) some orbits are split in two separate products.

Access to MIPAS products can be provided through ESA Fast Registration.

5.1. Known processing features

Please find below a list of known reprocessing features, which might affect the intended data usage.

- **Non-nominal Level 0 input files**

The Level 1b v8.03 dataset has been processed starting from the MIPAS Level 0 consolidated dataset, covering a time window between the 1st of July 2002 and the 8th of April 2012 (end of the mission).
In a few cases the Level 0 products have non-nominal duration:

- products shorter than 30 seconds but not adjacent to any instrument unavailability
- products belonging to adjacent orbits but wrongly cut (i.e. not at the satellite ascending node crossing)
- products longer than 7000 seconds, covering more than one orbit.

The list of all non-nominal Level 0 products is reported in section 8.1. As a consequence these anomalies affect the Level 1b v8.03 dataset.

- **Satellite attitude**

The attitude information of the satellite used in the processing of the MIPAS Level 1b version 8.03 products has been derived from the ENVISAT Restituted Attitude auxiliary files (AUX_FRA_AX); this information is mandatory during the generation of Level 1b products. Therefore no products of the 8th of April 2012 (last day of MIPAS operations) were reprocessed, since the proper ENVISAT Restituted Attitude file is not available for that day.

- **Satellite precise orbit**

The orbit state vector information of the satellite needed for the Level 1b processing with IPF v8.03 has been derived from the latest version of the DORIS data (DOR_VOR_AX, version E), which represents the most accurate orbit estimate produced from the ENVISAT platform.

- **Instrument pointing**

The accuracy of the engineering tangent altitudes provided in the Level 1b v8.03 products is in the range of 0.4 km for rearward observations.
The lowest tangent point commanding is different during FR/RR and OR. For the case FR/RR period with 17 sweeps the lowest altitude was commanded to be 6km.
For the OR period, they were using 'floating altitude', the lowest altitude was varying from 3 to 9km to follow the tropopause.

6. Transient data quality degradation events

The most significant deficiencies in the products are originated by the following causes:

- **Decontaminations**

Along the mission, ice accumulated on the MIPAS optics with loss of signal at the detector. For this reason regular instrument decontaminations (cooler switch-off) were executed in order to remove the ice contamination. During these events, MIPAS was not in measurement mode. After decontamination periods the noise error was reduced.

- **Temperatures stabilization**

After planned or unplanned instrument switch-offs, the detector temperatures needed some time to reach operational thresholds and stabilise. During those time intervals the MIPAS measurements might be quality degraded.

- **Platform pointing anomalies**

The instrument pointing accuracy might be reduced during ENVISAT pointing anomalies, or when platform attitude modes different from the Stellar Yaw Steering Mode (SYSM) were operated (e.g. Yaw Steering Mode [YSM] or Fine Pointing Mode [FPM]).
The list of affected mission intervals is provided in section 8.2.

- **Anomalous measurement events**

In few cases along the MIPAS mission lifetime, wrong instrument commanding CTI tables were uplinked to the satellite. This happened especially during manual recovery procedures after platform/instrument unavailability. As a result non-intended scanning patterns were commanded. All MIPAS measurements acquired during those periods are not meaningful for atmospheric species retrieval.
In addition in a single case, the uplink of nominal gain tables failed, so that the instrument acquired measurements with high gain tables, nominally used for Line-of-Sight calibrations only. The resulting band D spectra are all saturated.
The list of affected mission intervals is provided in section 8.3.
The list of all events affecting the MIPAS mission can be found at:
https://earth.esa.int/web/sppa/mission-performance/esa-missions/envisat/mipas/mission-highlights

7. Acronyms

ADC	Analogue to Digital Converter
ADF	Auxiliary Data File
ADS	Annotation Data Set
ATBD	Algorithm Theoretical Baseline Document
BEAT	Basic ENVISAT Atmospheric Toolbox
CBB	Calibration Blackbody
CFI	Customer Furnished Items
CODA	Common Data Access Toolbox
CTI	Configuration Table Interface
DORIS	Doppler Orbitography and Radiopositioning Integrated by Satellite
DS	Deep Space
DSI	Data Service Initiative
ESA	European Space Agency
FPM	Fine Pointing Mode
FR	Full Resolution
IDEAS	Instrument Data quality Evaluation and Analysis Service
IDU	Interferometer Drive Unit
ILS	Instrument Line Shape
IODD	Input / Output Data Definition

IPF	Instrument Processor Facility
L0	Level 0
L1b	Level 1b
L2	Level 2
LOS	Line Of Sight
MA	Middle Atmosphere
MDS	Measurements Data Set
MIPAS	Michelson Interferometer for Passive Atmospheric Sounding
MPH	Main Product Header
NESR	Noise Equivalent Spectral Radiance
NOM	Nominal
OR	Optimized Resolution
PCD	Product Confidence Data
QWG	Quality Working Group
RR	Reduced Resolution
SPPA	Sensor Performance, Products and Algorithm
SYSM	Stellar Yaw Steering Mode
UA	Upper Atmosphere
UTLS-1	Upper Troposphere Lower Stratosphere
YSM	Yaw Steering Mode
ZPD	Zero Path Difference

8. Annex

8.1. Non-nominal Level 0 input files

Non-nominal duration products:

Year	Orbit	Product
2004	10199	MIP_NL__1PYDSI20040211_141146_000000262024_00125_10199_0000.N1
	13903	MIP_NL__1PYDSI20041027_100549_000000002031_00322_13903_0000.N1
2009	36667	MIP_NL__1PYDSI20090305_170427_000000012077_00040_36667_0000.N1
	40413	MIP_NL__1PYDSI20091122_094727_000000012084_00279_40413_0000.N1

Year	Orbit	Product
2002	1929	MIP_NL__1PYDSI20020713_200209_000068682007_00372_01929_0000.N1
	2250	MIP_NL__1PYDSI20020805_061431_000077182008_00192_02250_0000.N1
	2252	MIP_NL__1PYDSI20020805_105352_000073532008_00194_02252_0000.N1
	2665	MIP_NL__1PYDSI20020903_060241_000076562009_00106_02665_0000.N1
	3809	MIP_NL__1PYDSI20021122_053018_000070992011_00248_03809_0000.N1
2003	4992	MIP_NL__1PYDSI20030212_195216_000061072013_00429_04992_0000.N1

	6990	MIP_NL__1PYDSI20030702_093254_000074152017_00423_06990_0000.N1
	6992	MIP_NL__1PYDSI20030702_125407_000072392017_00425_06992_0000.N1
2004	11227	MIP_NL__1PYDSI20040423_093014_000061482026_00151_11227_0000.N1
2005	19559	MIP_NL__1PYDSI20051126_112251_000073222042_00467_19559_0000.N1
	19566	MIP_NL__1PYDSI20051126_230702_000074002042_00474_19566_0000.N1
2006	20416	MIP_NL__1PYDSI20060125_081553_000074732044_00322_20416_0000.N1
	24400	MIP_NL__1PYDSI20061030_160141_000068692052_00298_24400_0000.N1
2007	27536	MIP_NL__1PYDSI20070606_180337_000065752058_00428_27536_0000.N1
	28027	MIP_NL__1PYDSI20070711_011329_000094532059_00418_28027_0000.N1
2008	31610	MIP_NL__1PYDSI20080317_083449_000061022066_00494_31610_0000.N1
	31615	MIP_NL__1PYDSI20080317_165748_000061012066_00499_31615_0000.N1
	31619	MIP_NL__1PYDSI20080317_234012_000061032067_00002_31619_0000.N1
	31905	MIP_NL__1PYDSI20080406_231126_000061032067_00288_31905_0000.N1
	32040	MIP_NL__1PYDSI20080416_093216_000061032067_00423_32040_0000.N1
	32045	MIP_NL__1PYDSI20080416_175514_000061032067_00428_32045_0000.N1
	32459	MIP_NL__1PYDSI20080515_160311_000061022068_00341_32459_0000.N1
	33351	MIP_NL__1PYDSI20080716_233721_000061032070_00231_33351_0000.N1
	33493	MIP_NL__1PYDSI20080726_214220_000061012070_00373_33493_0000.N1
	33780	MIP_NL__1PYDSI20080815_225410_000061012071_00159_33780_0000.N1
	34916	MIP_NL__1PYDSI20081103_073425_000061022073_00293_34916_0000.N1
2009	36019	MIP_NL__1PYDSI20090119_085450_000061042075_00394_36019_0000.N1
	36024	MIP_NL__1PYDSI20090119_171749_000061012075_00399_36024_0000.N1
	36038	MIP_NL__1PYDSI20090120_164612_000061012075_00413_36038_0000.N1
	36042	MIP_NL__1PYDSI20090120_232837_000061012075_00417_36042_0000.N1
	36715	MIP_NL__1PYDSI20090308_235138_000061012077_00088_36715_0000.N1
	38814	MIP_NL__1PYDSI20090802_150833_000061032081_00183_38814_0000.N1
	38819	MIP_NL__1PYDSI20090802_233131_000061012081_00188_38819_0000.N1
	38958	MIP_NL__1PYDSI20090812_163445_000061042081_00327_38958_0000.N1
	39105	MIP_NL__1PYDSI20090822_230246_000061012081_00474_39105_0000.N1
	39244	MIP_NL__1PYDSI20090901_160600_000061032082_00112_39244_0000.N1
	39668	MIP_NL__1PYDSI20091001_065952_000061032083_00035_39668_0000.N1
2010	41219	MIP_NL__1PYDSI20100117_152834_000061032086_00083_41219_0000.N1
	41224	MIP_NL__1PYDSI20100117_235132_000061012086_00088_41224_0000.N1
	41672	MIP_NL__1PYDSI20100218_065948_000061032087_00035_41672_0000.N1
	41676	MIP_NL__1PYDSI20100218_134212_000061022087_00039_41676_0000.N1
	41677	MIP_NL__1PYDSI20100218_152246_000061032087_00040_41677_0000.N1
	42245	MIP_NL__1PYDSI20100330_074258_000061022088_00107_42245_0000.N1
	42388	MIP_NL__1PYDSI20100409_072834_000061032088_00250_42388_0000.N1
	42961	MIP_NL__1PYDSI20100519_081140_000061022089_00322_42961_0000.N1
	42962	MIP_NL__1PYDSI20100519_095213_000061042089_00323_42962_0000.N1
	43104	MIP_NL__1PYDSI20100529_075717_000061012089_00465_43104_0000.N1

	43113	MIP_NL__1PYDSI20100529_230237_000061012089_00474_43113_0000.N1
	43248	MIP_NL__1PYDSI20100608_092329_000061032090_00108_43248_0000.N1
	43390	MIP_NL__1PYDSI20100618_072833_000061022090_00250_43390_0000.N1
	43391	MIP_NL__1PYDSI20100618_090906_000061032090_00251_43391_0000.N1
	43534	MIP_NL__1PYDSI20100628_085444_000061032090_00394_43534_0000.N1
	43819	MIP_NL__1PYDSI20100718_064526_000061032091_00178_43819_0000.N1
	43820	MIP_NL__1PYDSI20100718_082558_000061052091_00179_43820_0000.N1
	43963	MIP_NL__1PYDSI20100728_081141_000061022091_00322_43963_0000.N1
	43964	MIP_NL__1PYDSI20100728_095212_000061052091_00323_43964_0000.N1
	43969	MIP_NL__1PYDSI20100728_181511_000061022091_00328_43969_0000.N1
	44106	MIP_NL__1PYDSI20100807_075718_000061022091_00465_44106_0000.N1
	44392	MIP_NL__1PYDSI20100827_072834_000061022092_00250_44392_0000.N1
	44393	MIP_NL__1PYDSI20100827_090905_000061062092_00251_44393_0000.N1
	44535	MIP_NL__1PYDSI20100906_071411_000061022092_00393_44535_0000.N1
	44965	MIP_NL__1PYDSI20101006_081135_000061022093_00322_44965_0000.N1
	44966	MIP_NL__1PYDSI20101006_095206_000061072093_00323_44966_0000.N1
	46137	MIP_NL__1PYDSI20101226_232727_000067503098_00002_46137_0000.N1
2011	48052	MIP_NL__1PYDSI20110509_060733_000083473102_00193_48052_0000.N1
	48052	MIP_NL__1PYDSI20110509_060733_000084123099_00403_48052_0000.N1

Orbit duplication:

Year	Orbit	Product
2002	2250	MIP_NL__1PYDSI20020805_061431_000077182008_00192_02250_0000.N1
	4278	MIP_NL__1PYDSI20021224_222832_000060272012_00216_04278_0000.N1
2003	4661	MIP_NL__1PYDSI20030120_164646_000054942013_00098_04661_0000.N1
	4746	MIP_NL__1PYDSI20030126_153155_000046392013_00183_04746_0000.N1
	4797	MIP_NL__1PYDSI20030130_043920_000060262013_00234_04797_0000.N1
	4822	MIP_NL__1PYDSI20030131_223418_-00803732013_00259_04822_0000.N1
	4837	MIP_NL__1PYDSI20030201_234317_000060262013_00274_04837_0000.N1
	5776	MIP_NL__1PYDSI20030408_141405_000049732015_00211_05776_0000.N1
	5824	MIP_NL__1PYDSI20030411_225058_000050542015_00259_05824_0000.N1
	5824	MIP_NL__1PYDSI20030411_225525_000047872015_00259_05824_0000.N1
	6114	MIP_NL__1PYDSI20030502_044800_000060262016_00048_06114_0000.N1
	6153	MIP_NL__1PYDSI20030504_221121_000060262016_00087_06153_0000.N1
	6153	MIP_NL__1PYDSI20030504_223015_000048922016_00087_06153_0000.N1
	6157	MIP_NL__1PYDSI20030505_045344_000060262016_00091_06157_0000.N1
	6167	MIP_NL__1PYDSI20030505_213943_000060262016_00101_06167_0000.N1
	6167	MIP_NL__1PYDSI20030505_215717_000049722016_00101_06167_0000.N1
	6725	MIP_NL__1PYDSI20030613_211429_000060122017_00158_06725_0000.N1
	6725	MIP_NL__1PYDSI20030613_212808_000051932017_00158_06725_0000.N1

	6730	MIP_NL__1PYDSI20030614_053756_000059852017_00163_06730_0000.N1
	6826	MIP_NL__1PYDSI20030620_223412_000060372017_00259_06826_0000.N1
	6943	MIP_NL__1PYDSI20030629_024427_000060262017_00376_06943_0000.N1
	6945	MIP_NL__1PYDSI20030629_060539_000060152017_00378_06945_0000.N1
	6990	MIP_NL__1PYDSI20030702_093254_000074152017_00423_06990_0000.N1
	6992	MIP_NL__1PYDSI20030702_125407_000072392017_00425_06992_0000.N1
	6993	MIP_NL__1PYDSI20030702_145725_000047252017_00426_06993_0000.N1
	7245	MIP_NL__1PYDSI20030720_050520_000060152018_00177_07245_0000.N1
	7503	MIP_NL__1PYDSI20030807_053951_000060272018_00435_07503_0000.N1
	7516	MIP_NL__1PYDSI20030808_032727_000060382018_00448_7516_0000.N1
	8027	MIP_NL__1PYDSI20030912_201340_000060272019_00458_08027_0000.N1
	8048	MIP_NL__1PYDSI20030914_072615_000060462019_00479_08048_0000.N1
	8052	MIP_NL__1PYDSI20030914_140838_000060262019_00483_08052_0000.N1
	8343	MIP_NL__1PYDSI20031004_220250_000060262020_00273_08343_0000.N1
	8343	MIP_NL__1PYDSI20031004_222305_000048112020_00273_08343_0000.N1
2004	10591	MIP_NL__1PYDSI20040309_230845_000060372025_00016_10591_0000.N1
	10591	MIP_NL__1PYDSI20040309_233032_000047242025_00016_10591_0000.N1
	10595	MIP_NL__1PYDSI20040310_055119_000060162025_00020_10595_0000.N1
	10595	MIP_NL__1PYDSI20040310_061830_000043852025_00020_10595_0000.N1
	10614	MIP_NL__1PYDSI20040311_134242_000060262025_00039_10614_0000.N1
	10614	MIP_NL__1PYDSI20040311_140832_000044702025_00039_10614_0000.N1
	10615	MIP_NL__1PYDSI20040311_152318_000060152025_00040_10615_0000.N1
	10615	MIP_NL__1PYDSI20040311_154626_000046272025_00040_10615_0000.N1
	10619	MIP_NL__1PYDSI20040311_222315_000049672025_00044_10619_0000.N1
2005	15071	MIP_NL__1PYDSI20050116_223150_000053522033_00488_15071_0000.N1
	15150	MIP_NL__1PYDSI20050122_105901_000060752034_00066_15150_0000.N1
	17736	MIP_NL__1PYDSI20050722_024824_000045852039_00147_17736_0000.N1
	17738	MIP_NL__1PYDSI20050722_062722_000049642039_00149_17738_0000.N1
	17740	MIP_NL__1PYDSI20050722_093048_000027182039_00151_17740_0000.N1
	17741	MIP_NL__1PYDSI20050722_112910_000049642039_00152_17741_0000.N1
	17900	MIP_NL__1PYDSI20050802_141024_000058482039_00311_17900_0000.N1
	17998	MIP_NL__1PYDSI20050809_100404_000051112039_00409_17998_0000.N1
	19559	MIP_NL__1PYDSI20051126_112251_000073222042_00467_19559_0000.N1
	19566	MIP_NL__1PYDSI20051126_230702_000074002042_00474_19566_0000.N1
2006	20416	MIP_NL__1PYDSI20060125_081553_000074732044_00322_20416_0000.N1
2007	28027	MIP_NL__1PYDSI20070711_011329_000094532059_00418_28027_0000.N1
2008	35152	MIP_NL__1PYDSI20081119_205615_000060732074_00028_35152_0000.N1
2009	36050	MIP_NL__1PYDSI20090121_143359_000060442075_00425_36050_0000.N1
	36217	MIP_NL__1PYDSI20090202_063359_000060312076_00091_36217_0000.N1
2011	48052	MIP_NL__1PYDSI20110509_060733_000084123099_00403_48052_0000.N1

8.2. Platform pointing anomalies

Mission interval		Affected orbits	Anomaly
9 Dec 2003 10:00:00	12 Dec 2003 17:48:32	9280 - 9328	Platform attitude test
21 Jun 2004 07:56:33	22 Jun 2004 11:50:18	12070 - 12087	Platform attitude anomaly
13 Mar 2008 03:16:37	13 Mar 2008 19:28:44	31553 - 31559	Platform attitude anomaly
5 Mar 2009 19:18:01	6 Mar 2009 15:10:02	36664 - 36681	Platform attitude anomaly
15 Feb 2009 03:38:34	16 Feb 2009 13:09:00	36402 - 36422	Platform attitude anomaly
11 Jan 2010 11:34:56	11 Jan 2010 19:05:37	41130 - 41135	Platform attitude anomaly
26 May 2010 12:12:12	26 May 2010 16:26:04	43063 - 43066	Platform attitude anomaly
22 Oct 2010 04.20.01	02 Nov 2010 10.25.02	45191 - 45353	Orbit lowering manoeuvres

8.3. Anomalous measurement events

Mission interval	Affected orbits	Anomaly
28 - 30 January 2005	15242 - 15265	Anomalous scan pattern
6 - 8 August 2006	23178 - 23216	Anomalous scan pattern
7 - 18 October 2006	24070 - 24227	Saturated signal in band D
3 - 11 April 2007	26610 - 26710	Anomalous scan pattern
15 May 2008	32453 - 32462	Anomalous scan pattern
23 September 2008	34324 - 34329	Anomalous scan pattern
22 - 23 October 2009	39975 - 39982	Anomalous scan pattern

WWW References

- **Instrument operations**

The list of events affecting the MIPAS mission can be found at:
https://earth.esa.int/web/sppa/mission-performance/esa-missions/envisat/mipas/mission-highlights

- **Processors documentation**

https://earth.esa.int/web/sppa/mission-performance/esa-missions/envisat/mipas/products-and-algorithms/products-information

	• **Consolidated data sets** https://earth.esa.int/web/sppa/mission-performance/esa-missions/envisat/mipas/products-availability/level-1 • **Products' format and tools** The MIPAS Level 1b v8.03 fileformat definition is available at: http://www.stcorp.nl/coda/codadef/ENVISAT_MIPAS/products/MIP_NL__1P_v3.html The Basic ENVISAT Atmospheric Toolbox (BEAT) can be downloaded at: http://www.stcorp.nl/beat/
Inputs	MIPAS Quality Working Group, MIPAS validation teams, MIPAS IDEAS (Instrument Data quality Evaluation and Analysis Service) team
Originator	Angelika Dehn
Approver	Philippe Goryl