Product Quality Readme File for

MIPAS Level 1b IPF 7.11 products

Field	Contents
Document Title	Product Quality Readme File for MIPAS Level 1b IPF 7.11 products
Reference	ENVI-GSOP-EOPGD-QD-15-0130, issue 1.0, 12/05/2015
Affected Dataset	This Readme file applies to all MIPAS Level 1b products generated with the ESA Level 1b IPF processor version 7.11 (MIP_NL__1PW) and the Auxiliary Data Files version 9.1B/9.3A.
Reference Documents	[RD1] Algorithm Theoretical Baseline Document (ATBD) for MIPAS Level 1b Processing, PO-TN-BOM-GS-0012, issue 1D, 24 May 2013 [RD2] MIPAS Level 1B Processing Input/Output Data Definition (IODD), PO-TN-BOM-GS-0010, issue 6A, 27 October 2014 [RD3] MIPAS Product Specification, PO-RS-MDA-GS-2009 Volume 12, issue 5B, May 2015
Filled by	SPPA Engineer
Change log	This document shall be amended by releasing a new edition of the document in its entirety. The table below records the history and issue status of this document. | Issue	Date	Change
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1.0	12/05/2015	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 – 970
AB	1020 – 1170
B	1215 – 1500
C	1570 – 1750
D	1820 – 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**
  - correction for 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 7.11

The MIPAS Level 1b Instrument Processor Facility (IPF) version 7.11 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 major processor upgrades of the new Level 1b version 7.11 compared to the previous baseline versions 5 (i.e. 5.02, 5.05, 5.06) are the following:

- **Improved spike detection/correction algorithm**

The improved spike detection algorithm relies on the strong phase relationship (correlation) between all frequencies. Whenever a spike occurs in the interferogram, it breaks the interferogram symmetry around the Zero Path Difference (ZPD) and creates an oscillation in the phase of the spectrum. The phase variations due to the dispersion are easily discerned from the spike induced phase. Smaller spikes can be detected and corrected using the new method.

- **Improved offset validation algorithm**

The product offset validation is done against an improved Offset Calibration Auxiliary Data File (MIP_CO1_AX), which contains a reference offset measured once per week and averaged over the full orbit, the least square modulus and the standard deviation for all bands.

- **Improved non-linearity characterisation**

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 is done using an in-flight characterisation instead of the on-ground characterisation prior to launch. 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.

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 v7.11 processor.

Further analyses related to the non-linearity characterization are planned in the next algorithm improvement cycle for Level 1b.

- **Improved altitude determination**

The altitude determination is improved by taking into account the misalignment characterization matrix (MIP_CA1_AX), making use of standard refraction model instead of predefined refraction model (MIP_PS1_AX) and making use of the ENVISAT Restituted Attitude files (AUX_FRA_AX).

- **Added day/night discrimination**

The day/night discrimination flag is retrieved from the pointing ENVISAT Customer Furnished Items (CFI) library for each measurement. The day/night flag is saved in Measurement Data Set (MDS) and Scan Information Annotation Data Set (ADS) of Level 1b products (see section 4.3).

4.2. Product identifiers

The Level 1b products generated by the IPF v7.11 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	W
Processing center	DSI
Software version	MIPAS/7.11

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**WDSI**20100621_224003_000060192090_00302_43442_**0000**.N1

4.3. Product format upgrades

The following fields have been introduced in the Level 1b v7.11 products with respect to the previous baseline (versions 5.0X). Details can be found in the latest issues of the MIPAS IODD and Product Specification documents ([RD2] and [RD3]).

Record	Field name	Description
MDS	Day/Night flag	-1 Sun eclipsed by earth at tangent point +1 Sun direct sight at tangent point
Scan Information ADS	Day/Night flag	-1 Sun eclipsed by earth for all tangent points in scan 0 Transition from day to night or vice versa in scan +1 Sun direct sight for all tangent points in scan

4.4. Product format and tools

The MIPAS Level 1b products generated with IPF v7.11 have an updated format (see [RD2] and [RD3]). 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 BEAT version 6.9.1, VISAN version 3.11.0 and CODA version 2.13 are aligned to the new specifications. The format definition of the new data is also available on-line at:

http://www.stcorp.nl/beat/documentation/codadef/ENVISAT_MIPAS/products/MIP_NL__1P_v2.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 7.11 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

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 7.11

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 7.11. 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 v7.11.**

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 v7.11 products available	Percentage of L1b v7.11 availability wrt L0 products
2002	1964	1898	96.64 %
2003	4555	4421	97.06 %
2004	1198	1126	93.99 %
2005	1746	1663	95.25 %

2006	2111	2039	96.59 %
2007	3339	3266	97.81 %
2008	4835	4760	98.45 %
2009	4897	4870	99.45 %
2010	4838	4827	99.77 %
2011	4906	4800	97.84 %
2012	1360	1348	99.12 %
Total	**35749** *(*)*	**35018** *(*)*	**97.96 %**

(*) 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 v7.11 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
  – pairs of products belonging to the same absolute orbit but not overlapping in time, the duration of each file is shorter than expected (i.e. no duplications)
  – 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.

In addition products with a wrong absolute orbit assignment have been identified.

The list of all non-nominal Level 0 products is reported in section 8.1. As a consequence these anomalies affect the Level 1b v7.11 dataset.

- **Level 1b products error**

Three products of year 2002 (orbits 2967, 3368, 3496) have "PRODUCT_ERR=1", caused by incomplete Level 0 input files.

- **Satellite attitude**

The attitude information of the satellite used in the processing of the

MIPAS Level 1b version 7.11 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 v7.11 has been derived from the latest version of the DORIS data (DOR_VOR_AX, version D), 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 v7.11 products is in the range of 0.5 km for rearward observations. In sideways measurements, the engineering tangent altitudes are misplaced by approximately 2 km compared to the commanded tangent altitudes. This problem is due to a residual misalignment matrix for sideways observations that is intended to be solved with a new processor version.

- **Corrupted sweeps**

In the consolidated MIPAS Level 0 data set, some products are impacted by instrument source packets with "corruptions due to transmission error". This corruption occurred during transmission from the satellite to the ground segment and it is identified by a dedicated field in the Level 0 product. The IPF version 7.11 checks this field in the Level 0 input file and assigns quality flags in the corresponding Level 1b product MDS (see description in section 4.5). In case the new MDS quality flags indicate a corruption, the related information (including sweeps and their geolocation) is not provided in the Level 1b product.

- **Spectral characterisation**

For each spectral band, the spectral characterization factor is calculated every 4 elevation scans; for the first 4 elevation scans of the product, the spectral characterization factor is taken from the MIP_CS1_AX auxiliary data file. During Level 2 processing, a pre-processing correction on the spectral characterization is applied.

However, data assessment has shown that the spectral calibration factor is varying only slowly in time. Therefore in the next version of the Level 1b processor it is intended that the spectral characterization factor will be updated only once per week (in the MIP_CS1_AX file) and each Level 0 product will be processed using a single spectral calibration factor.

- **Backup offset**

For a small percentage (around 1.5%) of the Level 1b v7.11 products, all offset measurements acquired in both forward and rearward sweep directions are flagged as non-valid, due to the rejection threshold specified in the auxiliary data file. The impact of the usage of the backup offset contained in the MIP_CO1_AX is the introduction of a small radiance error of the order of 10-15nW/sr/cm2/cm-1. This error is three to five times below the Noise Equivalent Spectral Radiance (NESR) requirement.

- **Radiance level of non-linear bands A, AB and B**

The detector non-linearity correction introduced in Level 1b IPF v7.11, based on in-flight measurements, impacts the radiance level along the mission. Compared to previous processor versions, a small positive trend (below 2%) can be observed over the 10 year mission. The radiance level difference is more pronounced at the beginning of the mission during the Full Resolution mode of MIPAS. Radiance levels in Level 1b v7.11 products are as expected based on simulation done using new non-linearity correction coefficients.

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

Wrong orbit numbering:

Year	Orbit	Product
2008	35153	MIP_NL__0PPLRA20081119_205614_000060772074_00028_35152_0133.N1

Split products' orbits:

Year	Orbit	Product
2003	5824	MIP_NL__0PPLRA20030411_223424_000012582015_00259_05824_0959.N1
		MIP_NL__0PPLRA20030411_225007_000051102015_00259_05824_0473.N1
	6730	MIP_NL__0PPLRA20030614_053754_000016462017_00163_06730_2285.N1
		MIP_NL__0POLRA20030614_060437_000043912017_00163_06730_1337.N1
	6826	MIP_NL__0PPLRA20030620_223410_000012972017_00259_06826_0067.N1
		MIP_NL__0POLRA20030620_225557_000047372017_00259_06826_0309.N1
2005	15150	MIP_NL__0PPLRA20050122_105825_000000352034_00066_15150_0868.N1
		MIP_NL__0PPLRA20050122_105900_000060792034_00066_15150_0870.N1
	19057	MIP_NL__0PPLRA20051022_093757_000000352041_00466_19057_0713.N1
		MIP_NL__0PPLRA20051022_093832_000000152041_00466_19057_0714.N1

Non-nominal duration products:

Year	Orbit	Product
2002	2665	MIP_NL__0PPLRA20020903_060239_000076632009_00106_02665_1232.N1
	2666	MIP_NL__0PPLRA20020903_081025_000044022009_00107_02666_1228.N1
2005	19559	MIP_NL__0PPLRA20051126_112221_000073842042_00467_19559_0899.N1
	19566	MIP_NL__0PPLRA20051126_230632_000074352042_00474_19566_0902.N1
2006	20416	MIP_NL__0PPLRA20060125_081522_000075472044_00322_20416_0358.N1
2007	28027	MIP_NL__0PPLRA20070711_011253_000094962059_00418_28027_1792.N1
	28933	MIP_NL__0PPLRA20070912_081157_000000092061_00322_28933_7398.N1
2010	46136	MIP_NL__0PPLRA20101226_215921_000053443097_00001_46136_3531.N1
	46137	MIP_NL__0PPLRA20101226_232727_000067533098_00002_46137_3553.N1
2011	47718	MIP_NL__0PPLRA20110416_004833_000000273101_00290_47718_3559.N1
	48051	MIP_NL__0PPLRA20110509_050649_000036563102_00192_48051_4262.N1

Orbit duplication:

Year	Orbit	Product
2005	18206	MIP_NL__0PPLRA20050823_224021_000058222040_00115_18205_0458.N1
		MIP_NL__0PPLRA20050823_224914_000060342040_00116_18206_0460.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
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 v7.11 fileformat definition is available at: http://www.stcorp.nl/beat/documentation/codadef/ENVISAT_MIPAS/products/MIP_NL__1P_v2.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	Bojan Bojkov