MIPAS

Introduction

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ESA SPPA

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1.1 The MIPAS Quality Working Group: Composition

- ESA
  - ESA SPPA: Sensor Performance and Product Assessment

  Interacting with ESA's Post Launch Support Office, Flight-Operations Team, Mission Analysis Team
- Expert Support Laboratories
  - ASTRIUM
  - ABB BOMEM
  - Istituto di Fisica Applicata 'Nello Carrara' (IFAC)
  - Dipartimento di Chimica Fisica e Inorganica– Università di Bologna (UB)
  - Institut fuer Methodik der Fernerkundung, (DLR-IMF),
  - Instituto de Astrofisica de Andalusia (IAA)
  - Laboratoire de Photophysique Moleculaire Université de Paris Sud (LPPM)
  - Istituto di Scienze Atmosferiche e Climatologiche (ISAC)
  - University of Leicester (UL)
  - Oxford University (OU)
  - Universität Karlsruhe, Institut fuer Meteorologie und Klimaforschung (IMK)
  - ECMWF

1.2 The MIPAS Quality Working Group: Role

- Anomaly Investigation
  - Review of Anomalies detected by PCF, QWG, ACVT or other users
  - Investigations with prototype
- Calibration and Characterisation
  - Periodic characterisation
  - Calibration Improvement Analysis and Implementation
- Processor Configuration
  - Maintenance of processor configuration files
  - Configuration Improvement Analysis and Implementation
- Algorithm Baseline Maintenance
  - Correction of errors
  - Interpretation of Validation Analysis Results
  - Maintenance/evolution of prototype and calibration facility
  - Verification of pre-operational products
- Mission Planning Analyses
  - Investigations in support of mission planning

2.0 MIPAS Space Segment Status: General

In general, the instrument has displayed a measurement performance level compliant with or exceeding its performance target values.

This nominal performance has been interrupted by increasingly-frequent instrument unavailabilities due to anomalous behaviour of its interferometer subsystem

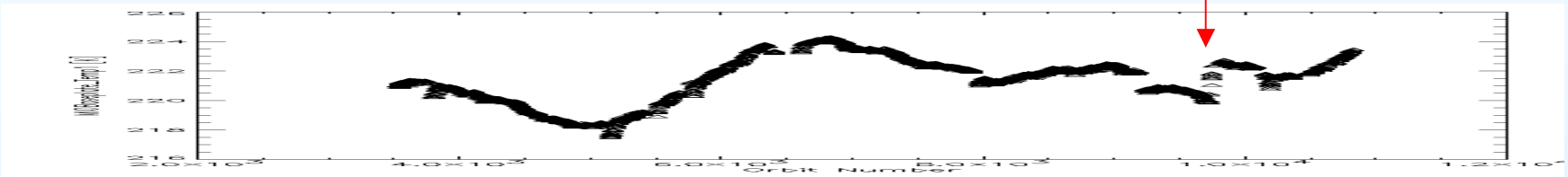
To allow investigations and study alternative operation settings, the MIPAS mission has been temporarily interrupted.

Investigations have indicated that an alternative operations mode is expected to allow operations to resume, although with some risk. Implementation of this mode is in preparation, as input to an ARB next week where risk assessment and planning will be reviewed.

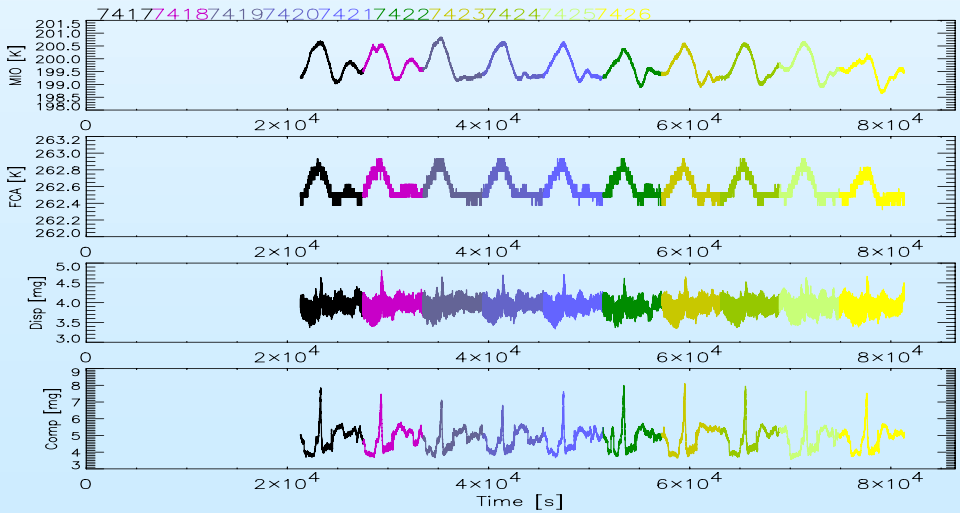
2.1 MIPAS Space Segment Status: Performance

Interferometer heaters activated on the 9 January 2004

- Thermal Performance

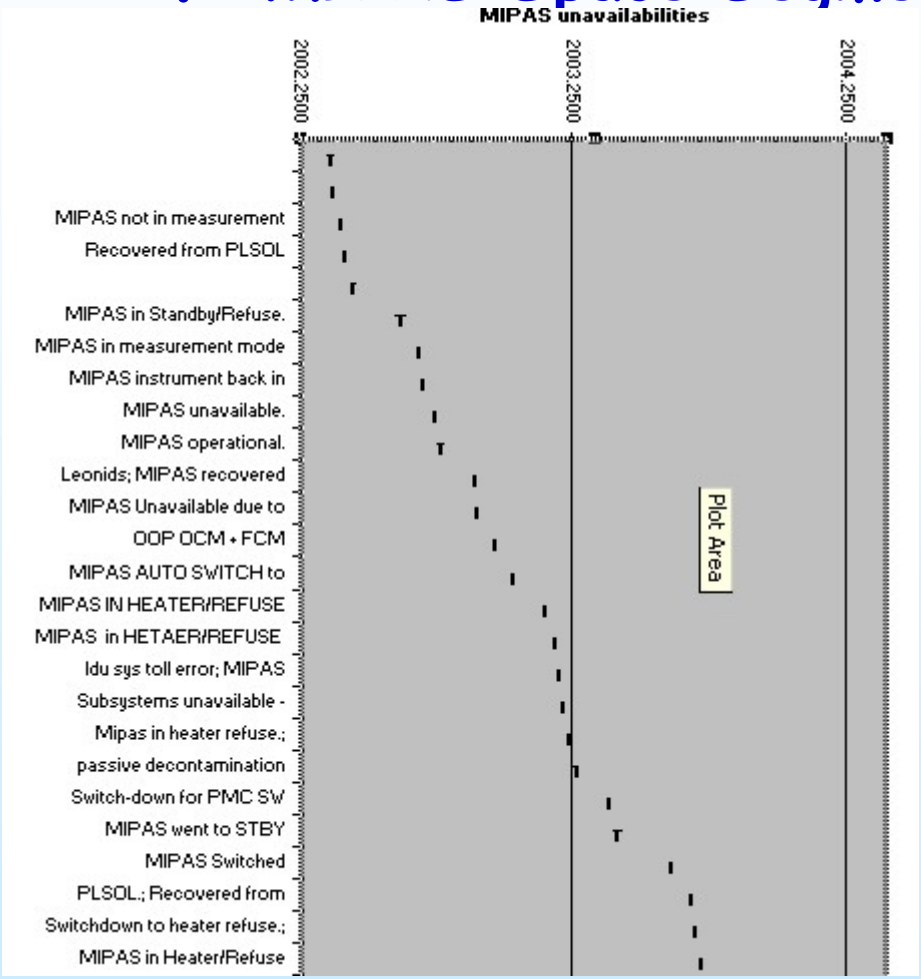


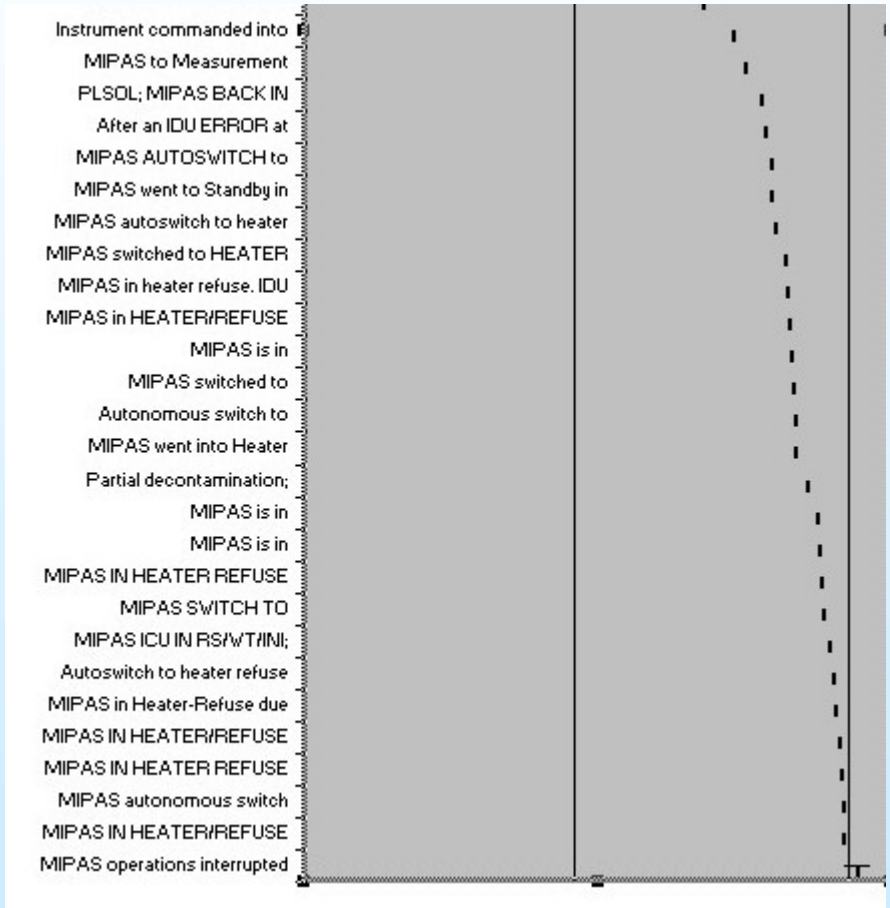
- Cooler Performance



- The level 1 presentation hereafter addresses:
  - Radiometric Performance
  - Spectral Performance
  - Pointing Performance

2.1 MIPAS Space Segment Status: Unavailabilities





2.2 MIPAS Space Segment Status: Anomalies (1/6)

- Vibration Cancellation System of the Stirling Cooler sensitive to electronic cross talk:
  - VCS has been disabled in 2002.
  - The cooler has operated fine since then, albeit at a slightly increased vibration amplitude compared to optimal VCS periods.

No degradation of data quality

- In September 2003, Channel D1 noise has suddenly increased to such a level that LOS calibration star signals are below noise level.
  - The spectral region affected is not relevant to science data processing: the on-board signal processing used in nominal mode already eliminates this range.
  - For LOS calibration, channel D2 is now used operationally, and successfully

No degradation of data quality

2.2 MIPAS Space Segment Status: Anomalies (2/6)

- Interferometer excessive absolute slide velocity anomalies

Since January 2003, several times per month the instrument switched to HEATER/REFUSE mode due to detection of excessive slide velocities

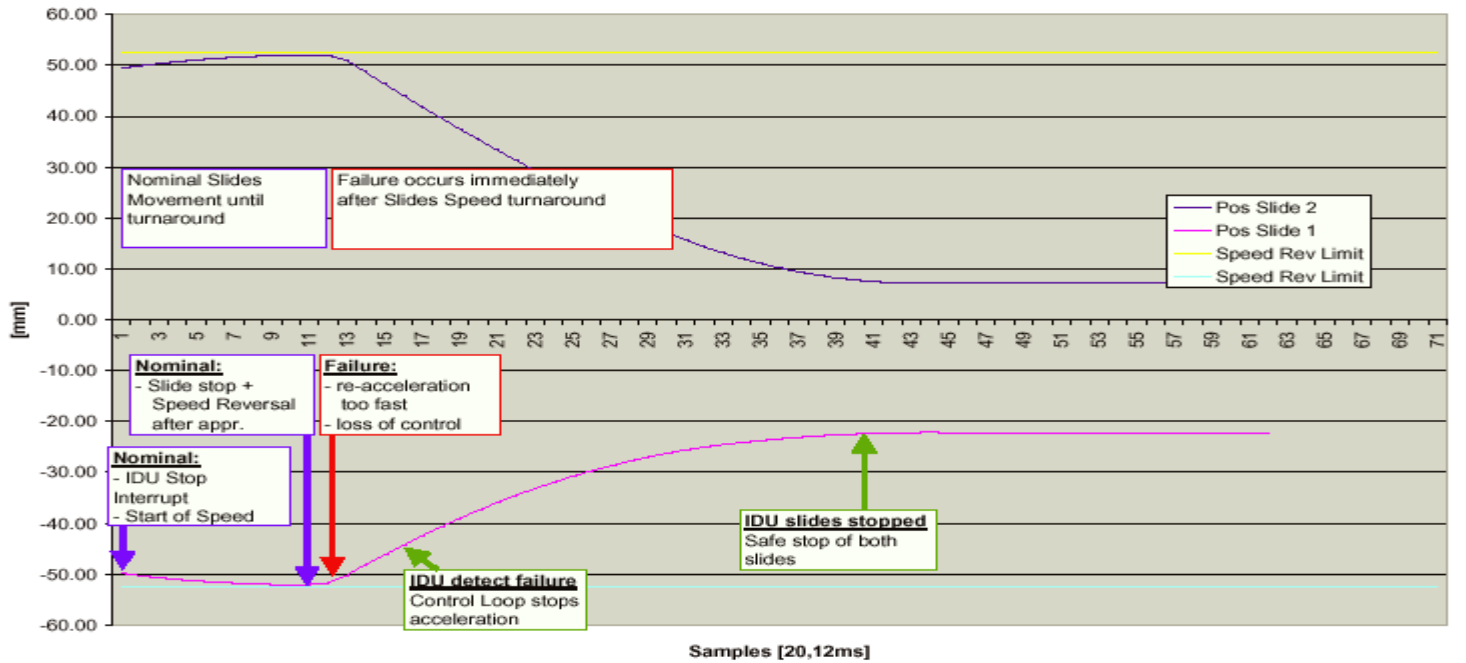


Figure 3-2: FIFO data analysis (08.03.2003)

2.2 MIPAS Space Segment Status: Anomalies (3/6)

- Interferometer differential slide velocity warnings

Since May 2003 a gradual increase of transient slide differential velocity excess has been observed. The amplitude of this anomaly normally remained below the intervention threshold, and the electro-optical closed-loop slide-motion control system compensates to keep the joint path length constant. Although data quality has not been affected, the strong increase (to one event per several sweeps by March 2004) requires intervention.

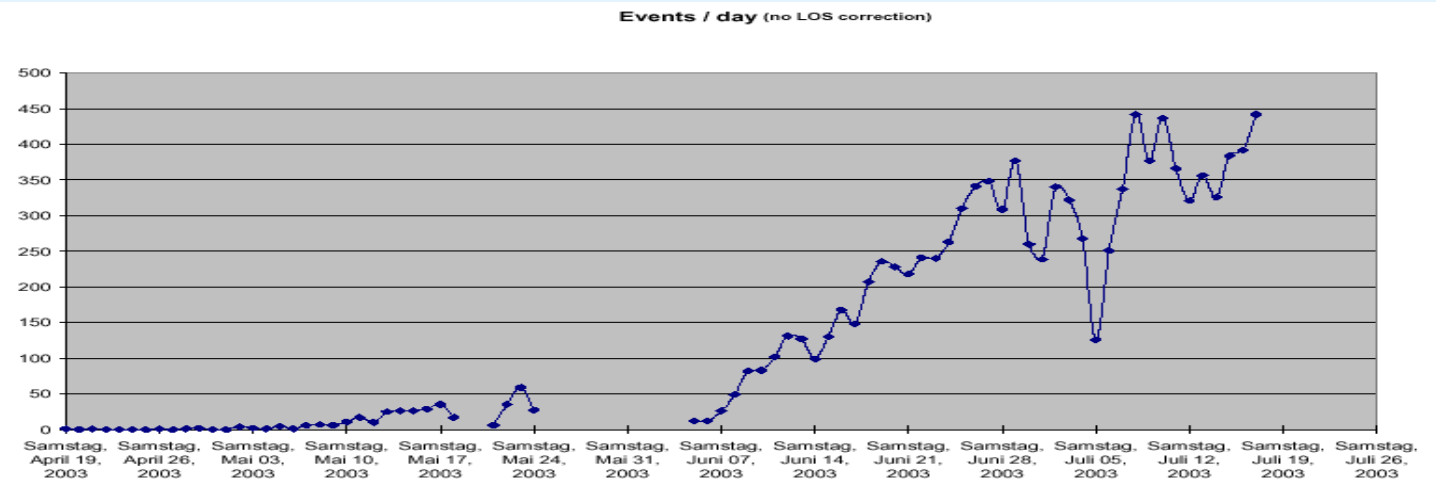
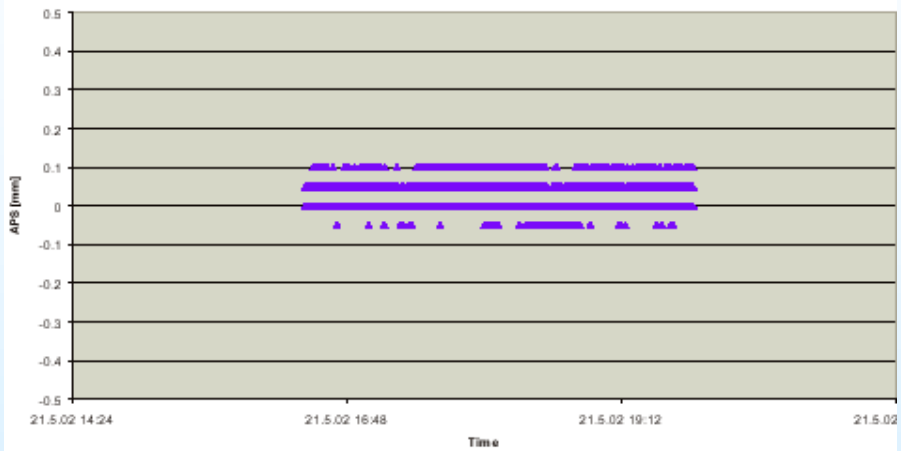


Figure 3-1: MIPAS differential speed error statistics

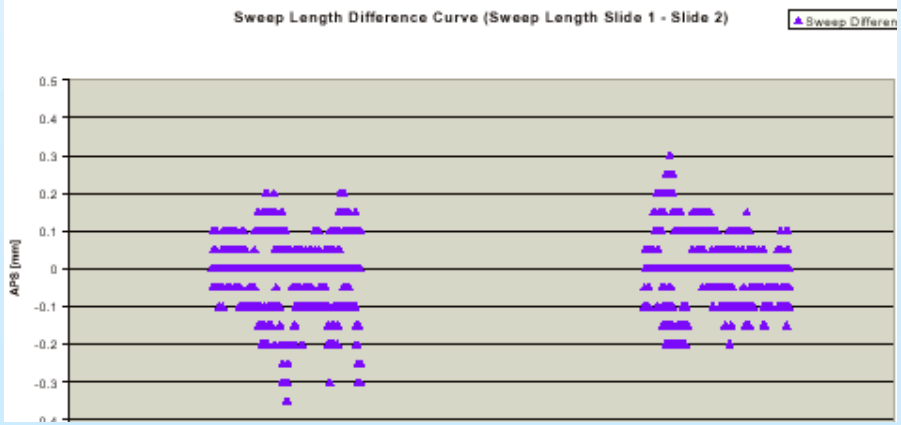
2.2 MIPAS Space Segment Status: Anomalies (4/6)

- Interferometer differential slide velocity warnings

Beginning of Life



ig. 7a APS difference between both slides at begin of mission.



January 2004

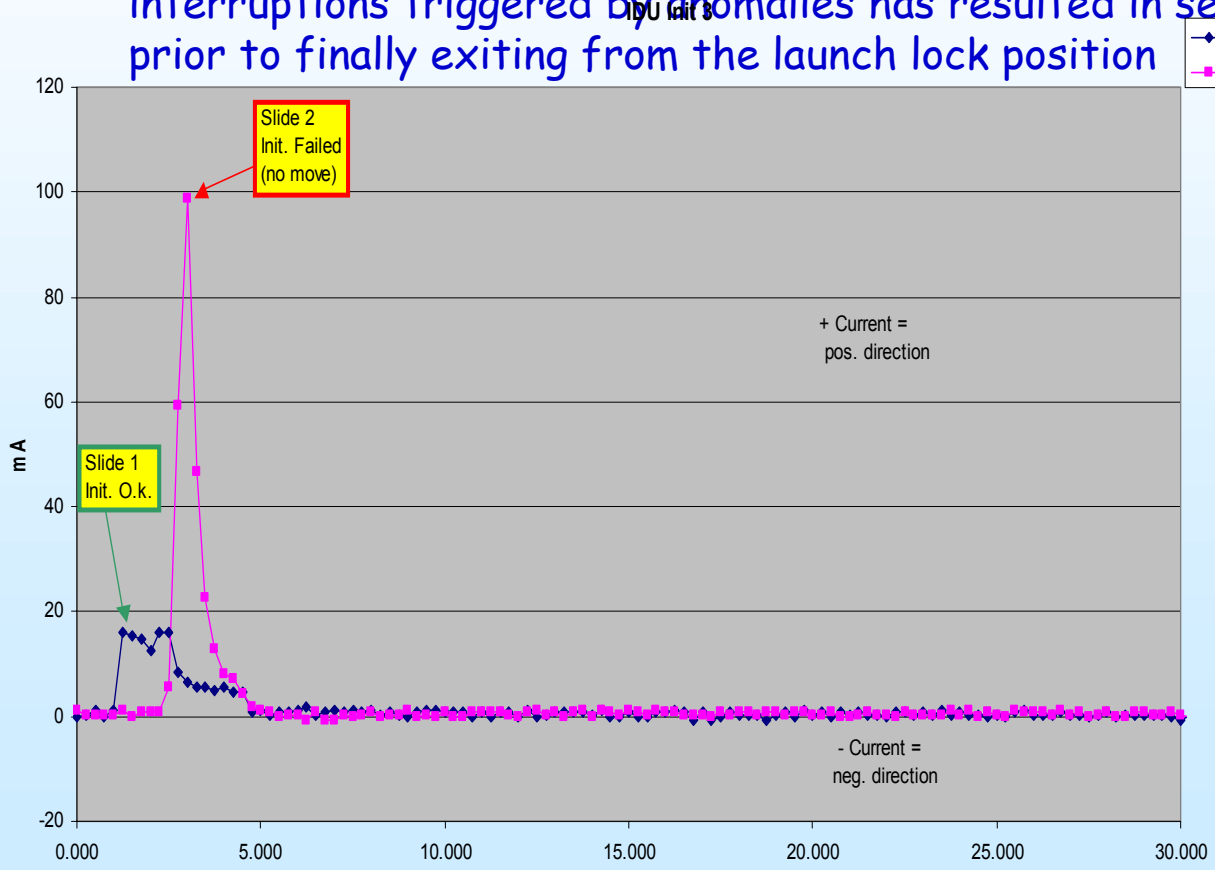
Sweep Length Difference S1 – S2

(ODS succeeds in keeping sum of sweep lengths constant within APS resolution: **No degradation of data quality**)

2.2 MIPAS Space Segment Status: Anomalies (5/6)

Interferometer initialisation errors

In April 2004 restart of the interferometer after autonomous operations interruptions triggered by anomalies has resulted in several failed attempts, prior to finally exiting from the launch lock position



The slide 2 only reaches the launch-lock position if other anomalies result in switch off with this slide in a specific region. The high rate of anomalies increases the risk of recurrence of these conditions.

2.2 MIPAS Space Segment Status: Anomalies (6/6)

- On 26 March, MIPAS operations have been interrupted to perform dedicated tests defined by ASTRIUM
- All tests have been successfully completed, including operation on side B
- Analysis of test results indicates that the cause of the differential slide anomaly must be in the non-redundant components of the interferometer subsystem. In practice this shows that the anomaly is mainly of mechanical origin

Modification of MIPAS instrument configuration should to allow operations to resume

- It has been important to avoid the current turnaround points and avoid entry into launch-lock position. An optimal new resolution of 41% of the nominal resolution has been calculated (62400 FC's = 41 mm, 1.64 seconds).
- Operations will resume with this single resolution value for ALL interferometer operation modes (atmospheric observations, black-body calibrations, offset calibrations, wear-control-cycles).
- Schedule for return to operations will be established shortly after additional tests with the newly calculated configuration

3.0 MIPAS Ground Segment Status

1. Calibration Data Processing Status
2. Operational NRT + OFL Data Processing Status
3. Full-Mission Data Processing Status
4. Validation Data Processing Status
5. Re-characterisation for modified operations
6. Mission Planning

3.1+2 MIPAS Ground Segment Status

- **3.1 Calibration Data Processing Status**
  - Forward calibration is routinely performed. (*CO1,CG1,CS1,CL1*)
  - NRT data affected by cooler switching
  - *A posteriori* Gain Recalibration for OFL data after cooler switching
  - Mission recalibration completed from July 2002 to March 2004.

- **3.2 Operational NRT + OFL Data Processing Status**
  - IPF 4.61 operationally used for NRT and OFL processing
  - Two L1 initialisation file changes coincident with INT heater switch on and switch off.
  - For OFL processing, more stringent convergence criteria and larger altitude range are used
  - remaining software problems affect the IPF 4.61:
    - Cloud-Detection discrepancy: remaining deviations under investigation
    - Offset calibration discrepancy: processor patch developed

3.3+4 MIPAS Ground Segment Status

- **3.3 Full-Mission Data Processing Status**
  - Auxiliary Data available [07/2002 – 03/2004]
  - OFL configuration is used for reprocessing
  - Cycles 15 and 14 (02/2003-04/2003) level 0 products now available for processing at D-PAC
  - Level 0 product recovery proceeds backward in time

- **3.4 Validation Data Processing Status**
  - A subset of 900 orbits selected from the Validation Data Set identified by ACVT was retrieved from unconsolidated data storage.
  - All data were reprocessed with the reconstructed calibration history, and the new IPF4.61

3.3+4 MIPAS Ground Segment Status

- **3.5 Reconfiguration for modified operations**
  - Redefinition of calibration scenarios
  - Re-characterisation of NESR
  - Optimisation of Spectral and ILS microwindows
  - Optimisation of Level 2 retrieval microwindows
  - Optimisation of level 1 and level 2 processor settings

- **3.6 Mission Planning**
  - Nominal mode planning performed in 2002-2003 with three test periods for Special/Upper Atmosphere Modes.
  - Reformulation to be performed of NOM/SM/UA/SEM in view of new fixed resolution (sweep duration)

4.Communications

- Your ACVT-SGL is your dedicated interface for validation issues:
  - (Validation) Data access and VDS definition/evolution
  - Synchronisation of observations (overpass information)

- MIPAS-QWG@esa.int
  - Exceptional interface during ACVE-2 preparation only

- **EOHELP@esa.int**: for MIPAS data users:
  - Unique interface for all MIPAS product information requests
  - Unique interface to report anomaly observations
- **MONTHLY INSTRUMENT REPORT** on envisat.esa.int