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<i>Meeting place lieu de la réunion</i>	ESRIN	<i>Chairman</i>	C. Zehner	<i>Secretary</i>	S. Casadio
<i>minute's date dates de minute</i>	20 October 2004	<i>participants</i>	Enclosed Listing		
<i>subject/objet</i>	<b>1<sup>st</sup> MIPAS Science Team Meeting</b>		<i>copy/copie</i>	G. Kohlhammer, S. Briggs, H. Laur, M. Doherty, E. Herland, YL. Desnos	
<i>description/description</i>		<i>action/action</i>		<i>due date/date limite</i>	
<b>ACTIONS</b>					
A1 to check if S1 and S6 data contain floating altitudes		IMK/Univ. Bologna		mid Nov.	
A2 to perform MIPAS reduced resolution test measurements in coincidence with balloon campaigns that will take place during November 2004		ESA		mid Nov.	
A3 to check the feasibility to have a floating altitude grid within the operational MIPAS processing system		ESA		Dec.	
A4 to demonstrate the scientific benefits for MIPAS operations with a floating altitude grid and to provide this new grid information to ESA		IMK		Dec.	
A5 to check the stability of the ORM retrieval algorithm, when using 1.5 vertical sampling with reduced resolution		IFAC/Univ. Bologna		Dec.	
A6 to provide to Univ. Bologna special mode products		ESA		Dec.	
A7 to check the lowest altitude height to be chosen for the UA mode based on best wavelength calibration results		Bomem		Dec.	

## 1. Welcome and Introduction

The ENVISAT mission manager H. Laur explains that the MIPAS Science Team is replacing the MIPAS Scientific Advisory Group. ESA gets regular feedback from ENVISAT data users. However there is a need to get specific advise on MIPAS issues, which is the task of the MIPAS Science Team. As a consequence meetings of the MIPAS Science Team will be organized on a case-by-case basis. This is now happening, as ESA is experiencing problems with the MIPAS instrument.

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ESRIN

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## 2. Review of Agenda

C. Zehner reviews the purpose of the 1<sup>st</sup> MIPAS Science Team Meeting, which is to define scientific priorities on future MIPAS operations with reduced spectral resolution. The agenda of this meeting includes half a day of presentations on results using MIPAS special modes measurements and on simulations of reduced spectral resolution measurements. The second half-day is dedicated to discussions on future MIPAS instrument operations.

## 3. MIPAS Instrument Status

### Koopman (ESA)

A study was performed to test new MIPAS operation modes (ASTRIUM). Based on the results gained so far it is not possible to decide if this new mode will be using 'two slides' (reduced resolution mode) or a 'single slide' (back-up mode). Further tests will be performed during November 2004 in reduced resolution mode.

The MIPAS Science Team recommends performing these tests in coincidence with balloon campaigns that will take place in November 2004.

During December 2004 the MIPAS instrument will be operated for diagnostic purposes only. The final decision on future MIPAS operations will be taken during January 2005.

## 4. Presentations on MIPAS Special Modes Measurements

### Carli (CNR)

Analysis of special modes S1 and S2 have been carried out using the ORM code without implementing any changes (e.g. using existing Micro-Windows (MW) which are not optimised for such modes). Intercomparison to correlative data from NILU database shows good results, although large oscillations have been found for, CH<sub>4</sub> and N<sub>2</sub>O.

The detected problems could be due to the MW used, that were optimised for a 3 km vertical resolution (nominal mode). A. Dudhia suggests that adding new MW would solve these problems (in theory). H. Fischer proposes to merge S1 and S2 into a single mode.

### Oelhaf (IMK)

S2 mode has been studied using IMK code by M. Milz using standard regularisation in the retrieval algorithm and nominal H<sub>2</sub>O microwindows. Comparison with MIPAS-B shows that a finer vertical sampling (1.5 km – S2 mode) is necessary to investigate the troposphere-stratosphere exchange processes. B. Kerridge states that in the cases shown regularization is degrading the vertical resolution significantly. H. Oelhaf states that neither regularization nor Microwindows had been adjusted/optimized to the sampling obtained with the S2 mode.

The impact of clouds for lower scans is very important, limiting the analysis to the tropopause height in many cases. A floating lower altitude (following the tropopause height) is proposed to avoid the loss of many scans at lower altitudes. The feasibility to implement this modulation into the operational retrieval code has to be verified by ESA. Significant errors were detected in tangent altitude values.

### **Carlotti (Univ. Bologna)**

A comparison between Nominal mode and S1 and S2 profiles has been performed using GEOFIT-MTR software (not using regularisation). Results show good consistency, although the estimated accuracy for S1 and S2 is degrading, which rose the question that regularisation might be necessary for the retrieval of data sampled at 1.5 km vertical resolution.

### **Ridolfi (Univ. Bologna)**

A trade-off study between precision and vertical resolution was carried out. Results show that a high horizontal sampling is possible (down to 130 km) by reducing the spectral resolution. A new MIPAS mode was suggested leading to a horizontal resolution of 180 km (12 scans), which should be suitable for 2D retrieval.

### **Lopez-Puertas (IAA)**

Results on upper atmospheric modes analysis were presented. The study was limited to  $\pm 60$  degrees latitude range. Non-LTE parameters (NLTE in CH<sub>4</sub> and H<sub>2</sub>O, Co and O<sub>3</sub> NLTE emissions etc.) could be retrieved and noctilucent clouds could be observed. For NO, spin and rotational temperatures could be derived. This results show that upper atmospheric modes are very important to discriminate NLTE effects and that MIPAS provides unique observations capabilities in the mesosphere. It was suggested to increase the vertical sampling to 3 km, and to perform UA modes more frequently (covering full days). The reduced spectral resolution of MIPAS could be a problem for NLTE studies, but this has to be confirmed.

### **Steck (IMK)**

A study on single sequence averaging kernels yielded an horizontal resolution of 300 km. An even higher oversampling would not improve this. However, this conclusion must be revised for 2D retrieval schemes in which case the horizontal resolution may be further improved. Vertical sampling of 2 km rather than 3 km improves the vertical resolution by 0.3 km. Vertical sampling of 1.5 km leads to additional improvement below 15 km (tropopause region) but not at higher altitudes in the case of the studied temperature profile.

### **Ridolfi (Univ. Bologna)**

Test on ORM with reduced spectral resolution was carried out and results were presented. Oscillation, error and information quantifiers were defined. A significant benefit for O<sub>3</sub> and H<sub>2</sub>O was observed when passing from 3 km to 2 km sampling, while a factor of 2 in computation time is observed when passing from 3 to 1.5 km sampling, leading also to increased precision errors.

### **Oelhaf (IMK)**

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A review of all MIPAS special mode was presented. A new nominal mode was proposed using a floating altitude (function of latitude), with 27 scans and a horizontal sampling of 400 km. S1 and S2 should be merged into a new UTLS mode with 18 scans and 270 km horizontal sampling. The team agreed that S3 mode (aircraft emission) should be run in any case to assess the information that could be extracted. Action Item on H. Oelhaf and M. Carlotti: to check if S1 and S6 data contain floating altitudes.

### Lopez-Puertas (IAA)

Two new Upper Atmosphere modes were suggested; with altitude sampling of 3 km. Tests should be performed acquiring several consecutive orbits (1 day) on such modes, in order to fully verify the usability of such modes and to cover all longitudes. The only major effect of MIPAS instrument operations with reduced spectral resolution on these measurements is to get larger noise values.

## 5. Open Discussion/Conclusions

### Proposed Future Nominal Mode

The team agreed to first define the new nominal mode before passing to discuss the new special modes. The nominal mode should cover the 6-70 km altitude, including a floating altitude-sampling grid.

6 - 21 at 1.5 km,  
21 - 31 at 2 km,  
31 - 46 at 3 km,  
46 - 70 at 4 km.

N=27, along track sampling: ~ 400 km

Action Item on ESA: to check the feasibility to have a floating altitude grid within the operational processing system.

Action Item on IMK: to demonstrate the scientific benefits for MIPAS operations with a floating altitude grid and to provide this new grid information.

Action Item on IFAC/Univ. Bologna: to check the stability of the ORM retrieval algorithm when using 1.5 vertical sampling with reduced resolution.

Action Item on ESA: to provide Univ. Bologna with special mode products.

### Proposed Future Special Modes

The team agreed on defining five new special modes (replacing the existing 11 special modes):

UTLS-1	Upper Troposphere Lower Stratosphere
UTLS-2	Upper Troposphere Lower Stratosphere
MA	Middle Atmosphere
UA	Upper Atmosphere
AE	Aircraft Emissions

UTLS-1 (trade-off between vertical and horizontal resolution as well as vertical coverage):

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(5.5-11.5) km – (19-25) km at 1.5 km (n=10)  
 (19-26) km – (25-32) km at 2 km (n=3)  
 (25-32) km – (31-38) km at 3 km (n=2)  
 (31-38) km - (46-53) km at 5 km (n=3)  
 N=18, along track sampling: ~ 270 km

UTLS-2 (to support 2D retrieval and test horizontal oversampling):

12 - 20 at 2 km,  
 20 - 29 at 3 km,  
 29 - 37 at 4 km,  
 37 - 42 at 5 km.  
 N=11, along track sampling: ~ 165 km

MA: 18 - 102 at 3 km

UA: 42-102 at 3km (the lowest height is still not fixed as it depends on wavelength calibration – AI7)  
 102-172 at 5 km

AE: 8-15 at 1.5 km, 17, 20, 25, 30, and 38

### Time Schedule

**The MIPAS Science Team clearly expresses the need to perform Special Mode measurements with highest priority (before nominal mode measurements).** To fully assess the quality of products in these new modes MIPAS should operate in each mode for the following amount of time:

UTLS-1	3 days
UTLS-2	1 day
MA	3 days (close to Solstice if possible)
UA	1 day
AE	2 days

**Key species to be retrieved in near real time are: P, T, O3 and H2O.**

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## 6 Any Other Business

The reprocessing status of MIPAS data has already been reported to all Science Team members as they are participating in the ACVT. The reprocessing of all data should be ready by March 2005.

There is a clear need for MIPAS publications on validation results. H. Fischer volunteers to organize a meeting (end Feb. 2005 at IMK) and to organise task distribution within ACVT members working on MIPAS validation on such publications within a European Journal. The team agrees that this publication will deal with the ESA MIPAS products.

**The next Science Team Meeting is scheduled for February 18, 2005 at ESRIN. A short splinter meeting is planned to close open issues on the definition of a future nominal MIPAS mode during the next MIPAS Quality Working Group (mid Jan. 2005 – Florence).**

## Agenda:

09.00-09.20	Brief Introduction (H. Laur/C. Zehner)
09.20-09.40	MIPAS Instrument status (R. Koopman)
09.40-10.00	Results on MIPAS Special Modes Measurement using ORM (B. Carli)
10.00-10.20	Results on MIPAS Special Modes Measurements at IMK (H. Oehlaf)
10.20-10.40	Coffee Break
10.40-11.00	Results on MIPAS Special Modes Measurement using the GEO-MTR software system (M. Carlotti)
11.00-11.20	Results on MIPAS UA Mode Measurements (M. Lopez-Puertas)
11.20-11.40	Results on new MIPAS modes simulations by IMK (T. Steck)
11.40-12.00	Results on new MIPAS modes simulations by University Bologna (M. Ridolfi)
12.00-12.15	Assessment of special modes in light of the new MIPAS operation characteristics (H. Oehlaf)
12.15-12.30	Proposed new UA measurements scenario (M. Lopez-Puertas)
12.30-13.30	Lunch Break
13.30-16.15	Scientific Priorities on future MIPAS operations: <ul style="list-style-type: none"> <li>• Campaign scenario (limited instrument operations on specific issues)</li> <li>• Continuous operations (with 1 moving mirror)</li> <li>• Limited number of trace gases to be provided in near real time to the user community due to increased processing time</li> <li>• Vertical resolution to be used</li> </ul> Any Other Business: <ul style="list-style-type: none"> <li>• Status of reprocessing of MIPAS data (R. Koopman)</li> <li>• Planning of validation papers for MIPAS products (H. Fischer)</li> </ul>
17.00	Closing

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## List of Participants:

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