MIPAS QWG #16 – Minutes and Action Items

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MIPAS QWG#16
22-23 April 2008
International. University San Servolo, Venezia

List of attendants

Enrico	Arnone	UB	22-23 Apr 2008
Ginette	Aubertin	BOMEM	22-23 Apr 2008
Manfred	Birk	DLR	22-23 Apr 2008
Bruno	Carli	IFAC	22-23 Apr 2008
Massimo	Carlotti	UB	22-23 Apr 2008
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Livia	d'Alba	ESA	22-23 Apr 2008
Bianca Maria	Dinelli	ISAC	22-23 Apr 2008
Anu	Dudhia	OU	22-23 Apr 2008
Thorsten	Fehr	ESA	22-23 Apr 2008
Herbert	Fischer	IMK	22-23 Apr 2008
Jean-Marie	Flaud	LISA	22-23 Apr 2008
Roland	Gessner	Astrium	22-23 Apr 2008
Jane	Hurley	OU	22-23 Apr 2008
Michael	Kiefer	IMK	22-23 Apr 2008
Anne	Kleinert	IMK	22-23 Apr 2008
Peter	Mosner	Astrium	22-23 Apr 2008
Fabrizio	Niro	ESA	22-23 Apr 2008
Enzo	Papandrea	UB	22-23 Apr 2008
Gaetan	Perron	BOMEM	22-23 Apr 2008
Manuel	López-Puertas	IAA	22-23 Apr 2008
Piera	Raspollini	IFAC	22-23 Apr 2008
John	Remedios	ULeicester	23 Apr 2008
Marco	Ridolfi	UB	22-23 Apr 2008
Luca	Sgheri	IAC	22-23 Apr 2008
Michael	Schmitt	Astrium	22-23 Apr 2008

ACTION ITEMS

AI ID	AI description	Responsibility	Due date
	Level 0		
AI_L0_16.01	ESRIN to develop a simple html page with the links to papers available on line, e.g., ACP special issue	ESA (FN)	Next QWG
AI_L0_16.02	Astrium(RG/PM) to provide the paper on Cooler Performance	Astrium(RG/PM)	Next QWG
AI_L0_16.03	Astrium/ESRIN to check in existing data if any trend is found in the NESR values especially in the periods May – July and for D channel	ESA(FN)/Astrium(RG)	Next QWG
	Level 1		
AI_L1_16.01	DLR (MB) to redo the analysis for channel D2 with a more recent orbit (year 2008).	DLR(MB)	Next QWG
AI_L1_16.02	DLR (MB) to summarize the results for the gain monitoring investigation on a TN	DLR (MB)	Next QWG
AI_L1_16.03	ESA (FN) to investigate the usage on the proposed spectral regions	ESA (FN)	Next QWG
AI_L1_16.04	ESA (FN) to investigate means to automate the gain calibration and ADF dissemination with the target to have daily instead of weekly gains	ESA (FN)	Next QWG
AI_L1_16.05	BOMEM (GP) to redo the sun viewing simulation with an orbit around Summer solstice	BOMEM(GP)	Next QWG
AI_L1_16.06	BOMEM (GP) to redo the analysis using planned state vector to check the differences	BOMEM(GP)	Next QWG
AI_L1_16.07	BOMEM (GA) to prepare new PS1 ADF with 40 md roll / 4 md yaw, but wait for IPF v 5.0 before implementing	BOMEM(GA)	Next QWG
AI_L1_16.08	BOMEM (GP) to do the comparison also for the power spectrum	BOMEM(GP)	Next QWG
AI_L1_16.09	BOMEM (GP) to redo the analysis for reduced resolution with the same orbit used by AK (IMK)	BOMEM(GP)	Next QWG
AI_L1_16.10	BOMEM (GA) to check if the rejected spectra are contaminated by clouds as identified in the cloud monitoring implemented at ESRIN	BOMEM(GA)	Next QWG
AI_L1_16.11	ESA(FN) to monitor MIP_CO1 using IDL program and BOMEM(GA) to recompute offset if high oscillations observed in MIP_CO1 standard deviation values	ESA(FN)/BOMEM(GA)	Next QWG
AI_L1_16.12	ESA (FN) to check how often the MIP_CO1 was used instead the offset in the orbit	ESA(FN)	Next QWG
AI_L1_16.13	BOMEM (GP) to produce a plot RR NESR scaled with FR NESR	BOMEM(GP)	Next QWG
	Level 2		
AI_L2_16.01	ESRIN(FN) and IFAC to check the anomalous latitude variability of O3 ESD in the plots of the summary report	ESA(FN)	Next QWG

AI_L2_16.02	ASTRIUM to show at the next QWG meeting a simple scheme of the priority order of the OMs for the processing of the MA measurements with the nominal settings.	ASTRIUM (MS)	Next QWG
AI_L2_16.03	ASTRIUM to send the unapodized ILS to BOMEM and the ORM input files generated by ML2PP V4.0 to IFAC.	ASTRIUM (MS)	Next QWG
AI_L2_16.04	IFAC to investigate the impact on the change to layers in the ORM	IFAC	Next QWG
AI_L2_16.05	OU to prepare a presentation for the next QWG meeting on the preliminary results of the MIPAS cloud study.	OU	Next QWG
AI_L2_16.06	UL to check with University of Leeds the schedule on IG2. To be done within 2 weeks after this QWG meeting.	UL	Next QWG
AI_L2_16.07	BOMEM to generate the Level 1b files for orbit #10798 at full resolution with and without restituted attitude correction including the alignment matrix correction. The restituted attitude correction has to be reported both as raw data and calculated with harmonics. If possible to provide also the cases with and without the mirror non linearity corrections.	BOMEM	Next QWG
AI_L2_16.08	IFAC to evaluate the effect of including the alignment matrix correction and the restituted attitude correction (and if possible also the mirror non linearity correction) in the Level 1b files for the pT retrieval.	IFAC	Next QWG
AI_L2_16.09	ESA (FN) to check why duplicated orbits are frequently provided by ESRIN for NRT L1b data.	ESA (FN)	Next QWG
AI_L2_16.10	ESA to explain the 1 second time difference between NRT and OFL L1b data.	ESA (FN)	Next QWG
AI_L2_16.11	ESA to investigate the reasons of the spectral shift observed between NRT and OFL L1b data.	ESA (FN)	Next QWG
AI_L2_16.12	OU to send the orbits with spectral shift between NRT and OFL L1b data to UB.	OU	Next QWG
AI_L2_16.13	UB to determine the spectral shift between NRT and OFL L1b data	UB	Next QWG
AI_L2_16.14	ESA to coordinate with the SCIAMACHY team three days of Summer solstice NLC observations.	ESA (TF)	Next QWG
AI_L2_16.15	LISA to check the spectroscopy of the additional species CFC-11, CFC-12, ClONO2 and N2O5.	LISA	Next QWG
AI_L2_16.16	All to comment the draft version of the MIPAS handbook (available at: ftp://pcf:Ur0Fr0@uranus.esrin.esa.it/MIPAS/To_QWG/Product_Handbook/Updated_Handbook.zip) within 6 weeks.	All	Next QWG
AI_L2_16.17	BOMEM to provide the Level 1 ATBD to insert as a link in the MIPAS handbook.	BOMEM	Next QWG

Presentations:

All meeting presentations are available on the Uranus server:

ftp://pcf:Ur0Fr0@uranus.esrin.esa.it/MIPAS/To_QWG/20080422-QWG16/Presentation

0) Level 0

Welcome and Introductions by T.Fehr (ESRIN)

0.1 Introduction (T.Fehr)

- ENVISAT Status is still very promising, in fact no major anomalies were observed only one transition to YSM recently, this was a known anomaly and all the instrument were recovered without problems
- Funding of ENVISAT operations are guaranteed until end 2010. The limiting factor is the hydrazine fuel. The orbit control strategy that will allow to go beyond 2010 (Phase E4) has been agreed and the selected orbit control strategy was presented to DOSTAG
- Mission Extension: impact on MIPAS instrument
  - The worst case for MIPAS w.r.t. sun illumination is around summer solstice (21-Jun) over the southern hemisphere
  - For a short period of 10 min in the orbit MIPAS has sun incidence onto aft baffle / ASU adjacent surfaces
  - No other instrument critical items
- Mission Extension: impact on MIPAS calibration
  - No significant impact foreseen due to the new orbit scenario
  - Pointing depends on the precise orbit information and the CFIs
  - Calibration frequency and number of measurements to be reviewed
  - Proposal to perform a “mini”-commissioning
- Mission Extension: impact on MIPAS L1b processing
  - No significant impact estimated in terms of NESR
- Mission Extension: impact on MIPAS L2 processing
  - Possible impacts investigated : FOV and DS Observations
  - Field-of-View
    - Reduction due to 17.4 km lower orbit
    - Reduction estimated on the order of 1.2%
    - Uncertainty in the FoV estimate ~9%
  - Deep Space Observations (negligible effect)
    - New configuration DS measurement not lower than 204 km
  - Recommendation to include additional orbit parameters in the L2 product
- Mission Extension: impact on other atmospheric chemistry instruments (GOMOS, SCIAMACHY)
  - Investigations on instrument and products levels ongoing
  - No show-stoppers so far identified for atmospheric chemistry instruments
- MIPAS instrument status as ranked by PLSOL is “Very Good”
- Overview of MIPAS planning with the increased duty cycle and the new baseline planning
- IPF v5.00 Implementation
  - First processor to be developed under Linux for the new processing environment

  - IPF delivery expected for End of April
  - Factory Acceptance and On-Site Acceptance Testing to be done after the delivery
  - Activation for off-line processing at D-PAC
- IPF Operations
  - Start of off-line processing anticipated mid 2008
  - Reprocessing start Q3/2008, following a δ-validation
  - Full mission reprocessing with priority on Reduced Resolution
  - Overall time to reprocess may take some months (SCIA example: 3.5 months)
- NRT Mission
  - Justified with the increase duty cycle
  - Level 1b with Version 4.67 restarted February 2008
  - Level 2 should restart as soon as the IPF is ready
    - Impact of the high duty CYCLE needs to be considered
    - Possible focus on core of products (pT, ozone, …)
    - IPF settings need adjustments
    - Review on basis of the off-line processor
- Validation
  - Validation of the new Version 5.0x baseline necessary before starting reprocessing
  - Currently TASTE and EQUAL teams define a RR Validation dataset based on Level 1b information
- Reprocessing
  - Baseline: IPF Version 5.0x with possible modifications resulting from the validation
  - Complete mission re-calibration necessary for L1 ADF
  - Reprocessing at D-PAC
  - No estimates for the wall clock time frame possible at the moment, since we have new processor and new processing environment (H/W and S/W), as example the SCIAMACHY Full Mission Reprocessing Level 1b and Level 2 takes 3.5 months
- Next Upgrade Cycle
  - Clear targets identified both for Level 1b and Level 2
  - Goal is to complete an update cycle driven by schedule rather then be major innovations, considering a cycle of 12-18 months

0.2 Action Item Status (F.Niro)

Presentation of AI status (see handout);

- AI_L1_10.26 is still open, change responsibility to DLR
- AI_L1_11.13 still open
- AI_L1_13.03 still open
- AI_L2_13.07 presented at QWG16 but still open
- AI_L0.14.02 waiting for successful testing of volcanic eruption mode, profile has to be selected and then test the procedure
- AI_L1_14.02 still open
- AI_L2_14.01 still open, change the responsibility to prime (IFAC/BOMEM). L2 daily report is ready to comment.
- AI_L2_14.04 Closed by Astrium presentation
- AI_L2_14.06 To be started with next contract
- AI_L2_14.07 To be started with next contract
- AI_L2_14.08 Closed by Astrium presentation
- AI_L2_14.14 Wait for new IPF, still open
- AI_L2_14.16 Closed
- AI_L0_15.01 Closed with LdA planning 21 May

- AI_L1_15.01 will be done in Next cycle.
- AI_L1_15.02 Next cycle, input for AI_L1_15.01
- AI_L1_15.03 TN to be written later.
- AI_L1_15.04 Closed
- AI_L1_15.06 Closed by BOMEM presentation
- AI_L1_15.07 Discussion on orbit choice – offline discussion
- AI_L1_15.08 Still open
- AI_L1_15.10 Closed by BOMEM presentation
- AI_L1_15.11 Closed as included in White Paper
- AI_L2_15.01 Closed by U Leicester presentation
- AI_L2_15.04 Closed by IFAC (SC) presentation
- AI_L2_15.05 Files from Leicester received, outstanding from UB and OU
- AI_L2_15.06 Still open
- AI_L2_15.08 Change responsibility to prime instead of all.

AI_L0_16_01: ESRIN to develop a simple html page with the links to papers available on line, e.g., ACP special issue.

0.3 Mission Planning Status (L.d'Alba)

- Volcanic eruption observation planning:
  - a reference profile was agreed which implements a delta height of 1.5 km.
  - TF encourages the QWG to find information about ongoing volcanic activity.
- Recovery strategy after IDU error has been changed to manual
  - The re-initialization data gap is no more present in MIPAS data.
  - AK (IMK) asks if a list is available of the orbit gaps. This is available in previous Marta's presentations and it was provided to AK.
- Overview of the current planning scenario and of the statistics on the planned measurements since start of RR mission shows the increase of planned duty cycle since beginning 2007 and the usage of more frequent NOM mode, duty cycle is set to 100% since Dec 2007
- Calibration scenario: nothing has changed since last QWG
- Overview of future planning:
  - 5-9 May 2008: Passive Decontamination
  - IF-16 measurements to be planned before and after Ice Decontamination
  - 12 May – 26 June 2008: Teresina campaign, currently 2 weeks delay foreseen

  → AK (IMK) suggests that sideways measurements could be done to increase Teresina campaign coverage by MIPAS. The idea is to use alternating sideways/rearwards NOM mode.

  → LdA mentions that the planning is scheduled 3 weeks before commanding, the only exception is volcanic eruption planning that can be done 3 or 4 days before commanding. The volcanic eruption mode could be tested for the Teresina campaign
  - Baseline Scenario: 8 days NOM + 1 day MA + 1 day UA
  - Scenario for Summer time:
    - Solstice Cycle (1-20 July): 7 days NOM + 3 days NLC
  - Scenario for Winter time:
    - Solstice cycle (1-20 January): 7 days NOM + 3 days NLC

0.4 Data Acquisition Status (F. Niro)

- Only 5 IDU errors since Jan 2008. Since last QWG only one instrument anomaly (MCMD transfer error)

- New statistics are presented on the total availability of the instrument and of the NRT products for the whole MIPAS RR mission. The results show the increase of the planned duty cycle and the improved instrument performances since 2006
- The statistics on the availability of OFL products (L1) shows a problem during March 2007, while in the last months the availability of the data with respect to the expected time (L0 products) is always higher than 95%.
- Concerning the processing status it is noted that the L1 NRT processing was restarted on February 2008 at Kiruna and ESRIN stations, products are available via ftp rolling archive

0.5 Mission Plan Document Status (Science Team)

Herman is not present. T.Fehr (ESRIN) made a short comment on volcanic eruption mode and on the release of the latest mission planning document (v4.3).

0.6 Instrument Status (P. Mosner/Astrium)

- Interferometer performances
  - Turnaround IDU errors are nearly gone
  - Start-up IDU errors are now the most probable type of error, but their value is stable. Since it was noted that most of these errors are induced by the re-initialization procedure, the removal of this procedure will produce an extreme decrease of this type of error in the future
  - Differential -4% error in IDU speed is decreasing dramatically in the last months and it is now at about a level of 5%, at the beginning of the mission this parameter was nearly zero
- LLI analysis
  - Sweep number reached already the qualification value defined in the IOM (38 Mio Sweeps). The LLI qualification number of sweeps is number of tested sweeps during qualification program, it does not represent a limit to the device life time, therefore there is nothing to worry about
- Thermal performance
  - The temperatures of MIO, IDU, MIO/FCA Radiator during October07 – April08 are in the same range than during the same period in 2005/6 and about 0.4 K warmer than in the period 2006/7
- Cooler monitoring
  - All Cooler Telemetry Parameters are in a comparable range since September 2005 (after final switch-on of the INT Heater)
  - Since 2006 significant improvements of all cooler parameters, the reason is that the passive decontamination is performed on a regular basis
  - FCA Compressor Head and Displacer Flange Temp show nominal behaviour
  - Coarse Balance performed on March 2008 shows good results
  - Next passive decontamination is already planned for beginning May
  - The cooler is one of the most critical devices inside MIPAS instrument. It is requested whether there is any study about in-flight life duration of a cooler; RG said that there is a paper available about this.

AI L0_16.02: RG to provide the paper on the Cooler Performance

0.7 MIPAS Mission Extension Analysis (R. Gessner/Astrium)

The results of the refined illumination analysis are presented

- The following thermal model improvements were introduced
  - Refined nodal breakdown of ASU Mirror

  - Consideration of Baffle Blinds (inner and outer)
  - Yaw steering law taken into account
  - Consideration of finite size of the sun
- Results
  - The ENVISAT yaw steering law provides a sinusoidal curve on top of the nominal MIPAS attitude; negative impact for sun incidence angle
  - Sun incidence starts earlier than in the previous simulations
  - Upper parts of ASU mirror are seeing sun; however, the radiometrically active part of ASU mirror are not affected; fluxes are very small
  - Duration of impact between 1 min and 5 min; +/- 2 minutes margin to be considered
  - Illumination of mirror areas can be expected in a timeframe between 17-May and 26-Jul
  - The worst case for MIPAS w.r.t. sun illumination is around summer solstice (21-Jun) over the southern hemisphere.
  - The Beta-angle (i.e. angle between sun and orbit plane) is the critical parameter to be looked at: increasing MLST values reduce the Beta-angle
  - For the LST 22:03-22:10, illumination on ASU mirror may be expected for a duration of about 5 min. During this duration (+/- 2 minutes margin !) the ASU shutter should be closed, i.e. MIPAS to be commanded to Heater Mode
  - NESR and Detector saturation analysis could be carried out for the time periods from mid May to mid July to check whether any in-flight trend can be seen on existing data

AI_L0_16_03 Astrium/ESRIN to check in existing data if any trend is found in the NESR values especially in the periods May – July and for D channel

1) Level 1B

1.1 L1B configuration (F. Niro/ESRIN)

- Current version is IPF 4.67 corresponding to MIGSP v 2.6 the operational ADF are v6.1, no update since the last QWG
- NRT service was restarted on February 2008 with IPF 4.67, L1 NRT products are available from the ftp rolling archive
- Current IPF 4.67 is operational OFL at DPAC and L1B products available to users on D-PAC ftp server
- IPF v 5.00 is planned to be delivered at end of April 2008, and operational in July 2008.

1.2 L1B Anomaly Status (F. Niro/ESRIN)

- One anomaly was found in some L1 NRT products. In these products the field NUM_SWEEPS_PER_SCAN in the SPH is wrongly filled (# sweeps = 28 instead of 27). The analysis done by BOMEM and ESRIN has shown that this is a problem of IPF 4.67 that will be corrected with the upcoming IPF 5.00. The problem was not observed in consolidated data

1.3 L1B Monitoring (F. Niro/ESRIN)

- No changes in the baseline for the daily monitoring of L0 data
- Long term monitoring of ADC max counts in channel A1 shows the seasonal trend of instrument temperatures and the effect of decontamination
- L1 NRT data are now systematically monitored and all the daily reports are available on line http://earth.esa.int/pcs/envisat/mipas/reports/daily/Level_1_NRT/
- Weekly and long term analysis of gain shows the effect of ice contamination during the instrument lifetime. The conclusion is that the detector is more and more “ice free” in the last year due to more frequent decontamination

  - A new plot is presented showing the evolution of the gain increase on a contour plot highlighting also the spectral variability of the gain functions, this plot will be updated in the future
- Long term analysis of linear SCF doesn't show any trend
- The results of the LOS calibration showed that this calibration is less and less accurate in the last months due to 1/f increased noise in channel D2
  - Investigations on different option for performing LOS calibration will be part of the future study to be carried out by BOMEM. Possible options are to use signal from planets or from other channels or considering the cross-correlation with GOMOS/AATSR
- Detected/corrected spikes monitoring: No clear trend. Level of spikes is very low to affect L1B products quality
- Cloud flagging long term analysis shows a seasonal trend
  - This investigation could be improved by considering latitude dependent area and by scaling the values with the "Lowest Level " altitude

1.4 L1B Processor Status (G. Perron/BOMEM)

- No update of the prototype processor since last QWG
  - L1B prototype is MIGSP v2.7
  - DPM 4L (PO-RP-BOM-GS-0003)
  - IODD v5.0 (PO-TN-BOM-GS-0010)
- MIGSP v2.7 / MICAL v1.6 were delivered and installed at ESRIN in Oct 2006.
- In next ADF versions the MIP_CA1_AX will be modified to include alignment matrix pointing characterisation and the scan mirror non-linearity.

1.5 L1B Investigations (M. Birk/DLR)

Evolution of 1/f noise

- Analysis done on orbit #25426 (raw measurements).
  - The most pronounced 1/f noise can be seen on B1 and D1 channel
  - There is no evidence of large 1/f noise on D2 channel although recent problem to perform LOS Calibration using D2 channel

AI_L1_16.01: DLR (MB) to redo the analysis for channel D2 with a more recent orbit (year 2008).

Gain monitoring

- Radiation transfer through ice coating
- Depending on the thickness of the ice there are two effects
  - Thin ice → only absorption due to ice lattice bands
  - Thick ice → rough surface leads to scattering
- The absorption has the typical band shape of the ice absorption curve, while the scattering gives a broadband contribution. Mixture of absorption and scattering will lead to more complex spectral shape
- Gain monitoring requires spectral regions unaffected by ice, this is impossible in case of thick ice, due to broadband feature
- The regions least affected by ice and the ones the most affected were suggested by DLR. In band A the least affected are 685 – 700 cm-1 and 950 – 970 cm-1, the most affected is at the maximum of ice absorption 850 – 900 cm-1 and in band C is in the region 1640-1680 cm^{-1}

AI_L1_16.02: DLR (MB) to summarize the results for the gain monitoring investigation in a TN.
AI_L1_16.03: ESA (FN) to investigate the usage on the proposed spectral regions.

- AK asks whether it is now possible to use in the operational processing all the gain measurements that are performed daily. Nowadays gain auxiliary files are disseminated weekly since the requested accuracy in the radiometric calibration is of 1%. The dissemination of daily gain implies additional work in the ground segment for the automation of the procedure of the gain checking and AUX dissemination.

AI_L1_16.04: ESA (FN) to investigate means to automate the gain calibration and ADF dissemination procedures with the aim of having daily instead of weekly gains.

- For the reprocessing a linear gain interpolation between weekly gains will be used

1.5 L1B Investigations (G. Perron, G.Aubertin/BOMEM)

Mission Investigation (G. Perron):

- Sun viewing simulation with CFIs
- MIPAS FOV around 4700s close to rearward at 28 Nov 2005
- Suggest to modify RGT planning tool to include an Alarm for SUN incidence in FOV

AI_L1_16.05: BOMEM (GP) to redo the sun viewing simulation with an orbit around Summer solstice.

Pointing investigation (G. Perron):

- Main difference between commanded and L1b due to the alignment matrix used by the RGT tool and not used by the L1B processor
  - "Corrected" L1B reported altitude closed to commanded (within 250m), the remaining difference due to different orbit vectors used and/or mirror non-linearity

AI_L1_16.06: BOMEM (GP) to redo the analysis using planned state vector to check the differences.

  - Orbital harmonic strongly reduced with "Corrected" L1B reported altitudes
  - Bias with the Level 2 IMK retrieved altitude still to be investigated
- Results on orbit 16625: AE mode
  - "Corrected" L1B reported altitude closed to commanded (within 150m)
  - Differences with retrieved altitudes (via pressure) still need to be investigated
- On summary the main differences between L1B reported and commanded are now explained
- The way forward is:
  - Temporary patch (short term)
    - Modified PS1 ADF file to correct for alignment matrix effect for 25 mdeg pitch

AI_L1_16.07: BOMEM (GA) to prepare new PS1 ADF with 40 md roll / 4 md yaw, but wait for IPF v 5.0 before implementing.

  - L1 Processor modifications (long term)
    - Alignment matrix correction
    - Elevation mirror non-linearity correction
    - Allow simultaneous correction of restituted and CL1 ADF
    - Characterization CA1 ADF file will need to be modified

Forward/Reverse problem (G.Perron):

- F/R offset error is smaller than the residual error in imaginary part.
- MB mentions that F/R problem is related to microvibrations, but AK said that the F/R problem shows systematic effect and we are not expecting systematic effect from microvibrations.

AI_L1_16.08: BOMEM (GP) to do the comparison also for the power spectrum.

AI_L1_16.09: BOMEM (GP) to redo the analysis for reduced resolution with the same orbit used by AK (IMK).

AI_L1_15.07 (G.Aubertin) Scene Validation NESR threshold vs. resolution:

- The choice of the threshold for the NESR scene validation determines the number of scenes that are rejected. The actual threshold is 3, which imply a large number of rejected scene, with value equal to 4 we reduce significantly the number of rejected scene
- Mainly the last two sweeps are rejected for the threshold of 4, this can be due to presence of clouds in the FOV

AI_L1_16.10: BOMEM (GA) to check if the rejected spectra are contaminated by clouds as identified in the cloud monitoring implemented at ESRIN.

- The conclusion is to remain with the threshold of 5 as it is possible that 4 would reject valid spectra

AI_L1_15.12 (G.Aubertin) MIP_CO1 validation:

- The purpose was to implement a systematic procedure for checking the MIP_CO1_AX file before dissemination as it is done now for MIP_CG1_AX file
- The BOMEM proposal is the following:
  - Cumulate statistics from offset measurements to obtain NESR of the instrument (mean and standard deviation of offset radiances).
  - Check for validity of incoming offset measurements in L1B processing, the validation is that the standard deviation statistics should be in the same order of magnitude as the NESR0
  - Disseminate weekly the MIP_CO1_AX file after the validity check as it is done now for the MIP_CG1_AX file
- Offset validation shows unexpected oscillations in mean and standard deviation statistics for one or several bands, these oscillations are not related to fringe count errors, but they maybe related to undetected spikes in offset. Unable to reproduce the problem at BOMEM. These oscillations should be understood before starting the operational implementation of this offset validation procedure

AI_L1_16.11: ESA (FN) to monitor MIP_CO1 using IDL program and BOMEM(GA) to recompute offset if high oscillations observed in MIP_CO1 standard deviation values.
AI_L1_16.12: ESA (FN) to check how often the MIP_CO1 was used instead the offset in the orbit.

1.6 L1B Assessments (G. Perron /BOMEM)

IF10 In-Flight NESR

- $NESR_0$ measured at beginning of 2005 shows higher values than expected due to thick ice contamination. The IF10 measurements performed in 2006 and 2007 shows NESR0 values back to normal.
- AK suggests scaling FR and RR results for an easier comparison of the results.

AI_L1_16.13: BOMEM (GP) to produce a plot RR NESR scaled with FR NESR

1.7 L1B Work Plan (G.Perron/BOMEM)

Presentation of improvements candidates (see handout):

- Draft of the White Paper
- Plan for 2008
  - Pointing correction

        - It will also improve the Temperature Retrieval
    - Spectral Calibration
        - Reduce radiometric/spectral Error
    - Offset Validation
        - Reduce/remove wrong offset rejections
        - AK suggests to put in the CO1 ADF the offset from the DS gain measurements
    - Spike detection
        - Detection of small spikes

        → What is the impact of undetected spikes on the Level 2 retrieval? Analysis should be done in order to understand this impact before implementing new algorithm.

AI_L1_16.14: IFAC to study the impact of undetected spikes on L2 retrieval

    - Gain interpolation implementation before next reprocessing.
    - Test detector non-linearity new algorithm on next IF16/IF4 set of measurements (next September).

2) Level 2

2.1) Level 2 IPF configuration (F. Niro, ESA)

The current version of IPF is 4.67 with ADFs v5.2. The ADFs (V6.1), needed to process reduced resolution over-sampled data with IPF V5.00, are ready. The upgrade of the IPF is on going and the software will be delivered by industry to ESA on 25 April 2008.

2.2) Data anomaly status (F. Niro, ESA)

No anomaly was detected since last QWG.

2.3) Level 2 monitoring (F. Niro, ESA)

A new version of the Quadas report is available at the web page:
http://earth.esa.int/pcs/envisat/mipas/reports/daily/Level_2_OFL/New_report_20080421/.
With reference to AI_L2_14.01 it is decided that IFAC has to collect comments from QWG on possible improvements of this report. It contains a summary page including some general plots and a link to a technical page with more detailed information.
F. Niro (ESA) shows, as an example, some maps of the daily monitoring.
H. Fischer (IMK) notices the strange behaviour of the standard deviation of ozone that becomes very small for some latitude values.
B. M. Dinelli (ISAC) suggests that these small values of the standard deviation could be due to large values of the Levenberg-Marquardt parameter used by the retrieval.
The QWG agrees that further investigations are needed regarding the small values of the ozone standard deviation. These investigations will be performed when all the comments regarding the level 2 daily monitoring are collected.

AI_L2_16.1 ESRIN(FN) and IFAC to check the anomalous latitude variability of O3 ESD in the plots of the summary report

F. Niro (ESA) says that the monthly monitoring will be resumed when the processing of the reduced resolution mission will start. A strategy to check the large amount of data has still to be defined.

2.4) ML2PP (M. Schmitt, ASTRIUM)

He describes the documentation status and the support to IPF implementation. A discussion arises on the possibility to perform the retrieval of middle atmosphere (MA) measurements using ML2PP with

the nominal settings. M. Schmitt (ASTRIUM) says that this can be done defining appropriately the priority order of the OMs. He will prepare a simple scheme for the next QWG meeting to show the right priority order of the OMs for the processing of the MA measurements with the nominal settings.

AI_L2_16.2 ASTRIUM to show at the next QWG meeting a simple scheme of the priority order of the OMs for the processing of the MA measurements with the nominal settings.

A further problem connected with the processing of MA measurements using the nominal settings is due to the fact that nominal measurements are acquired with floating altitudes while MA measurements are acquired with fixed altitudes.
T. Fehr (ESA) asks to ASTRIUM, IFAC, OU and ESA to discuss offline this issue in order to find a solution.
M. Schimitt (ASTRIUM) continues his presentation suggesting to use a "spike mechanism" in case of corrupted band D. The QWG agrees with the proposal of M. Schmitt (ASTRIUM) which will implement it.
T. Fehr (ESA) says to implement this modification not in the current version of IPF but in a future release of it, in order to avoid delay for the start of the processing.
M. Schmitt (ASTRIUM) describes the outcome of the AI_L2_14.04 on the ILS regression. He will send the unapodized ILS to BOMEM for a check. Furthermore, in an offline discussion, it was decided that M. Schmitt (ASTRIUM) will send to P. Raspollini (IFAC) the ORM input files generated by ML2PP V4.0 for repeating the test with ORM.

AI_L2_16.3 ASTRIUM to send the unapodized ILS to BOMEM and the ORM input files generated by ML2PP V4.0 to IFAC.

2.5) Discussion points of the new proposal (P. Raspollini, IFAC)

Negative VMR
She describes the problem due to the constraint of positive VMR present in ORM and she proposes two solutions:

- To maintain the positive VMR constraint during the iterations, while providing as output the non-constrained profile retrieved at the last iteration
- To use a coarser retrieval grid that reduces the retrieval error so that the number of retrieved negative values decreases.

M. Carlotti (UB) asks whether it has been proved that the removal of the constraint of positive values reduces the observed bias in average profiles.
P. Raspollini (IFAC) answers that we know that the constraint introduces a bias, but we do not know if removing the constraint we obtain a measurement without any bias.
M. Ridolfi (IFAC) suggests comparing average profiles retrieved with and without the constraint of positive VMR.
L. Sgheri (IAC) proposes to satisfy the requirement of positive values for VMR convolving the profile with an appropriate function and afterwards normalizing the convolved profile over the integral of the used function.
M. Ridolfi (UB) notices that if the retrieval produces a large negative value the subsequent scan that uses the retrieved profile from the previous scan as initial guess, can experience serious problems.
P. Raspollini (IFAC) says that the magnitude of the retrieved negative values is generally smaller than the retrieval error.
T. Fehr (ESA) suggests to flag the retrieved negative values.
P. Raspollini (IFAC) says that the sign minus is the natural flag. Rather she suggests to flag the negative values whose magnitude is larger than an appropriate multiple of the retrieval error.

B. Carli (IFAC) suggests to flag also the retrieved values at the altitudes for which the averaging kernels have not the expected behaviour. There is a disclaimer on this issue, but also a flag is desirable.

Priorities for correction of cloud discontinuities

P. Raspollini (IFAC) describes the problem due to the intrinsic difficulty in representing discontinuities produced by clouds. She proposes two possible solutions:

- To describe the continuum in layers rather than levels;
- To add a further level at the cloud top height and a step in the continuum profile at this altitude. Both possibilities seem feasible, but they are completely independent and the work made for one does not help the other. She asks whether someone in the QWG has experience on this issue with other retrieval codes.

B. M. Dinelli (ISAC) noticed that a stepwise continuum function will need a higher order polynomial in the FOV convolution that will produce oscillations.
P. Raspollini (IFAC) says that maybe it will be necessary to increase the number of simulated spectra and to use a linear interpolation instead that a polynomial one for the FOV convolution.
M. Carlotti (UB) proposes to increase the threshold of the cloud index.
P. Raspollini (IFAC) says that the test on the cloud index threshold will be made in the frame of the maintenance, she is proposing new approaches to be studied in the new contract.
T. Fehr (ESA) proposes to study both the approaches described by P. Raspollini (IFAC)
B. Carli (IFAC) says that the study of both approaches is expensive, and asks for previous experiences on this issue within the QWG members.
From the replies it turns out that both proposed approaches have new features and the choice will depend on the results of future tests.

AI_L2_16.4 IFAC to investigate the impact on the change to layers in the ORM.

AI_L2_16.5 OU to prepare a presentation for the next QWG meeting on the preliminary results of the MIPAS cloud study.

Schedule

P. Raspollini (IFAC) describes the schedule for the three years of the new contract.
J. Remedios (UL) asks to postpone the delivery of the IG profiles that are an input for the generation of the NLTE error spectra.
M. L. Puertas (IAA) says that he can use other sources for the climatological profiles needed for the generation of the NLTE error spectra, so that the work packages of UL and IAA can overlap.

AI_L2_16.6 UL to check with University of Leeds the schedule on IG2. To be done within 2 weeks after this QWG meeting.

The expected documentation for the new first year upgrade is anticipated from IFAC in March 2009.
A. Dudhia (OU) says that probably a weaker apodization will not be needed for the species CFC-11, CFC-12, $ClONO_2$ and N_2O_5. Therefore, the work package related to the weaker apodization can be postponed to when further additional species will be considered.

2.6) AI_L2_15.04: IFAC to evaluate pressure and temperature biases between profiles retrieved from full and reduced resolution spectra when the tangent altitudes are exactly constrained at the engineering values (S. Ceccherini, IFAC)

He describes the results of the AI_L2_15.04. The use of the restituted attitude correction produces a small increase of the average chi-square values indicating the presence of a significant systematic error. When the current constraint on the tangent altitudes is used the restituted attitude correction does not change significantly the pT biases. When the tangent altitudes are constrained to the engineering

values we have a decrease of the bias in pressure profiles at 35 km, an increase of it at high altitudes and an increase of the bias in temperature profiles at almost all the altitudes. When the tangent altitudes are constrained to the engineering values and the restituted attitude correction is used the bias in pressure profiles decreases. In order to use the restituted attitude corrected tangent altitudes in the level 2 analysis an estimation of the VCM of the corrected altitudes is needed and T. Fehr (ESA) is contacting flight dynamics engineers in ESTEC for this purpose (AI_L2_15.03). The systematic error that causes the altitude dependent altitude correction is time dependent and is not reduced by the restituted attitude correction.
T. Fehr (ESA) asks BOMEM if the restituted attitude correction reported in the Level 1B files used for the tests consists in raw data or in that obtained with the harmonics.
G. Perron(BOMEM) says that it is that obtained with the harmonics.

T. Fehr (ESA) asks for a version with the raw data.
B. Carli (IFAC) suggests that the use of the alignment matrix correction in the determination of the engineering tangent altitudes can change the results of the test.
G. Perron (BOMEM) suggests that a possible cause of the problem can consist in the non linearity of the elevation angle due to the illumination of different portions of the elevation mirror.
A. Dudhia (OU) suggests that a further possible cause of the problem can consist in the fact that the hydrostatic equilibrium is applied to a vertical profile, while the tangent points of a scan are not on a vertical line. The validity of this approximation can change along the orbit producing different altitude corrections by the ORM.

AI_L2_16.7 BOMEM to generate the Level 1b files for orbit #10798 at full resolution with and without restituted attitude correction including the alignment matrix correction. The restituted attitude correction has to be reported both as raw data and calculated with harmonics. If possible to provide also the cases with and without the mirror non linearity corrections.

AI_L2_16.8 IFAC to evaluate the effect of including the alignment matrix correction and the restituted attitude correction (and if possible also the mirror non linearity correction) in the Level 1b files for the pT retrieval.

2.6) New altitude-dependent, self-adapting regularization approach (M. Ridolfi, UB)
He proposes a new method to determine an altitude dependent regularization strength minimizing an appropriate cost function by means of the simulated annealing technique. He shows the results of the application of this method on both simulated and real observations.
M. Carlotti (UB) asks whether the regularization has been applied during the iterations or a-posteriori.
M. Ridolfi (UB) says that the regularization has been applied a-posteriori. Some tests performed with the regularization during the iterations showed an increase of the number of iterations.
H. Fischer (IMK) asks the time needed for the calculation of the Λ vector.
M. Ridolfi (UB) says that it is less than the time to calculate the forward model.
M. Schmitt (ASTRIUM) asks whether the simulated annealing method requires the calculation of the forward model.
L. Sgheri (IAC) answers no because in the cost function a linearization of the chi-square function is used.
H. Fischer (IMK) criticizes the example of the regularization of the CH_4 profile shown by M. Ridolfi (UB) because the used profile is unrealistic. H. Fischer (IMK) suggests to repeat the test on a more realistic profile.

2.6) Updated IG2 CO_2 profiles and refatm comments (J. Remedios, UL)
He describes how he constructs the climatological CO_2 profiles and how he extrapolates them until 2010. He shows some artefacts in the annual averaged CO_2 profiles due to format changes in new Globalview. The modified code is now able to deal with the changes in the Globalview format. The

CO_2 has a variable concentration from surface to 20 km, it is relatively constant from 25 to 80 km and gradually decreases from 80 to 120 km. He makes a list of species with a diurnal variation.
M. Carlotti (UB) asks the reliability of the CO_2 values in stratosphere.
J. Remedios (UL) answers that the standard deviation is about 2 ppm.
H. Fischer (IMK) comments that the diurnal variability of HNO_3 should be small.

2.6) Comparison of Cloud Detection Methods (J. Hurley, OU)
She describes four methods for the cloud detection: two based on thresholding radiances or ratios of radiances and two based on Singular Vector Decomposition (SVD) analysis. She compares the performances of these methods on simulated and real MIPAS spectra showing that the SVD methods are the best.
A. Dudhia (OU) says that they will repeat the tests with ORM in order to avoid the effect of the optimal estimation method used by MORSE.
B. Carli (IFAC) asks whether the SVD is performed on all the spectra of a scan or it is altitude dependent.
J. Hurley (OU) says that the SVD is performed altitude dependent.

2.6) Recent MIPAS L2 Data Retrieved at Oxford (A. Dudhia, OU)
He describes the results of the retrievals performed at OU for Winter 2007/2008. There are no obvious problems with MIPAS retrievals. Series of major stratospheric warming has been observed during January/February (including 40 K in 4 days in January 19-23). No chemical anomaly has been observed. He shows the results of the comparison between NRT and OFL data. In L1b NRT data some anomalies are observed: frequently duplicated orbits are provided by ESRIN (but not by Kiruna), furthermore there is a one-second time difference between NRT and OFL data.

AI_L2_16.9 ESA (FN) to check why duplicated orbits are frequently provided by ESRIN for NRT L1b data.
AI_L2_16.10 ESA to explain the 1 second time difference between NRT and OFL L1b data.

A spectral shift is observed between NRT and OFL L1b data. No significant bias is observed between NRT and OFL L2 data but a scatter noise random error coming from the spectral shift.
B. Carli (IFAC) asks which are the expected differences between NRT and OFL L1b data.
F. Niro (ESA) says that both NRT and OFL processing use the same software. Differences can occur by the use of different ADFs.

AI_L2_16.11 ESA to investigate the reasons of the spectral shift observed between NRT and OFL L1b data.
AI_L2_16.12 OU to send the orbits with spectral shift between NRT and OFL L1b data to UB.
AI_L2_16.13 UB to determine the spectral shift between NRT and OFL L1b data.

2.6) New MIPAS target species (M. Kiefer, IMK)
At IMK several species beyond the key species are retrieved from the MIPAS spectra. Among these there are CFC-11, CFC-12, $ClONO_2$, and N_2O_5, which have been selected as additional species for the operational data processing. For each of these species M. Kiefer (IMK) describes the characteristic of the retrieval and shows comparisons with ACE measurements.

2.6) MA Temperature January 2005 & NLC summer 2005 (M. L. Puertas, IAA)
He shows that there is a correlation between the presence of noctilucent (NLC) clouds and low temperature values. However, work is still in progress to solve some retrieval problems. A low percentage of convergent scans is obtained in retrieving mesopause temperature in NLC mode,

probably a tuning of the convergence criteria is needed. An unexplained strong variation of the offset with altitude is observed in 15 μm region.

AI_L2_16.14 ESA to coordinate with the SCIAMACHY team three days of Summer solstice NLC observations.

2.6) $^{32}SO_2$ and $^{34}SO_2$ (J.-M. Flaud, LISA)

He shows an analysis of the HITRAN line positions and intensities for $^{32}SO_2$. The three spectral regions of $^{32}SO_2$ have been improved, but improvements are still needed for the widths. No line of $^{34}SO_2$ is present in HITRAN. He shows the results of a high resolution analysis of some rotational levels of $^{34}SO_2$. The calculated line positions are consistent with the experiment, while the line intensities have still to be calculated. For the next QWG meeting J.-M. Flaud (LISA) will produce a line list of this molecule.

A: Dudhia (OU) asks where he can find the story of the spectroscopic database update.

M. Ridolfi (UB) says that it is available at his homepage: http://www2.fci.unibo.it/~ridolfi/mipas_special_modes/db/ (username: mipas, password: geofit)

AI_L2_16.15 LISA to check the spectroscopy of the additional species CFC-11, CFC-12, $ClONO_2$ and N_2O_5.

2.7) Level 2 Workplan (P. Raspollini, IFAC)

The remaining activities of the old contract consist in the updating of ADF2 V6.1, the delivery of ADF2 for the NRT analysis (inputs from ESA are needed), the delivery of the final version of the MIPAS handbook (comments by QWG members on a first draft are needed).

The other activities consist in the finalisation of the proposal for the new contract and the implementation of the workplan of the new proposal.

A. Kleinert (IMK) asks to make the handbook shorter and to add links for the technical aspects.

T. Fehr (ESA) says that the handbook does not have to be a reference book.

B. Carli (IFAC) says that in the current draft version some links do not work, but the final version will have more links that will facilitate the consultation.

AI_L2_16.16 All to comment the draft version of the MIPAS handbook (available at: ftp://pcf:Ur0Fr0@uranus.esrin.esa.it/MIPAS/To_QWG/Product_Handbook/Updated_Handbook.zip) within 6 weeks.

A. Kleinert (IMK) asks to add a link to Level 1 ATBD in the MIPAS handbook.

AI_L2_16.17 BOMEM to provide the Level 1 ATBD to insert as a link in the MIPAS handbook.

1.5) Gain and Offset Analysis of Level-1-Data November 2003 (A. Kleinert, IMK)

She shows the relative gain change as a function of time. A weekly calibration is usually sufficient to keep the gain error due to drift below 1%. A calibration twice a week could reduce the error to 0.5% in band A. The increase of the gain function is not linear. Probably the ice on the detectors is not the only contribution, consequently the modelling is difficult. Finally she shows the comparison of gain and offset variation with baseplate temperature.

4.3) Publications and conferences

T. Fehr (ESA) asks QWG members to inform him when they publish MIPAS related papers on scientific journals.

H. Fischer (IMK) says that there are two papers in the final response phase for the MIPAS special issue on ACPD: that of J. Remedios (UL) on reference atmospheres and that of S. Payan (LPMAA) on

the validation of CH_4 and N_2O. He has solicited both in order to close the special issue before of the next summer.
A list of the next conferences of interest to the QWG is done: International Radiation Conference, HEPPA Workshop, COSPAR and Ozone Symposium.

4.4) Place and date of next QWG meetings

QWG meeting #17: from 4 to 5 September 2008 in Bologna at ISAC
QWG meeting #18: from 3 to 5 December 2008 in Frascati at ESA-ESRIN
QWG meeting #19: from 9 to 10 March 2009 in Granada at IAA

Picture of the QWG members participating to the meeting #16 in San Servolo (Venice).