MIPAS QWG #11 – Minutes and Action Items

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Revision: **F. Niro, 06/11/2006**
T. Fehr, 23/11/2006

MIPAS QWG#11
24 – 26 October 2006
Bologna

List of attendants

Ginette	Aubertin	BOMEM	24-25 October 2006
Sven	Bartha	ASTRIUM	25-26 October 2006
Claudio	Belotti	IFAC	24-26 October 2006
Gabriele	Brizzi	UB	24-26 October 2006
Ugo	Cortesi	IFAC	25-26 October 2006
Bruno	Carli	IFAC	24-26 October 2006
Massimo	Carlotti	UB	24-26 October 2006
Simone	Ceccherini	IFAC	24-26 October 2006
Marta	De Laurentis	ESA	24-25 October 2006
Bianca	Maria Dinelli	ISAC	24-26 October 2006
Anu	Dudhia	OU	24-26 October 2006
Thorsten	Fehr	ESA	24-26 October 2006
Jean Marie	Flaud	LISA	24-26 October 2006
Anne	Kleinert	IMK	24-26 October 2006
Manuel	Lopez-Puertas	IAA	25-26 October 2006
Peter	Mosner	ASTRIUM	24-26 October 2006
David	Moore	UL	24-26 October 2006
Fabrizio	Niro	ESA	24-26 October 2006
Hermann	Oelhaf	IMK	25-26 October 2006
Enzo	Papandrea	UB	24-26 October 2006
Gaetan	Perron	BOMEM	24-25 October 2006
Chiara	Piccolo	OU	26 October 2006
Piera	Raspollini	IFAC	24-26 October 2006
Marco	Ridolfi	UB	24-26 October 2006
Paul	Snoeij	ESA	24-26 October 2006

ACTION ITEMS

AI ID	Responsibility	AI description	Due date
		Level 0 and Level 1	
AI_L0_11.01	BOMEM(GP), IFAC(BC)	Due to the large number of AIs, the L1 and L2 team leaders are asked to prioritise the current action items and provide deadlines for the next QWG	
AI_L0_11.02	ESA(MdL)	To send an e-mail to Claus Zehner with ST in cc, asking for the inputs needed for the Sideways LOS observations	
AI_L0_11.03	BOMEM(GP)	To check if LOS calibration can work on single orbit for LOS calibration in sideways	
AI_L0_11.04	ESA(TF)	To contact Herman and Marta to update the mission planning	closed
AI_L1_11.01	ESA(FN), BOMEM(GA)	To provide to BOMEM, L0 + ADFs Products (ESA). To investigate the total number of scans (BOMEM)	
AI_L1_11.02	ESA(FN), ASTRIUM (SB)	ESA(FN) to check with ASTRIUM(SB) if the baseline requires all bands for the L2 processing	
AI_L1_11.03	ESA(FN), BOMEM(GA)	ESA(FN) to send L0/L1b products showing corrupted band D problem. BOMEM(GA) to investigate	
AI_L1_11.04	ESA(FN)	To add running average to cooler monthly monitoring plot	
AI_L1_11.05	ESA(FN)	To plot F/R differences as a function of time	
AI_L1_11.06	ESA(FN)	To further investigate the monitoring of the offset	
AI_L1_11.07	ESA(FN)	To investigate if a histogram statistics can be used for the instrument performance (instead of only using the maximum).	
AI_L1_11.08	ESA(FN)	To identify periods where AATSR was switched off and MIPAS did gain measurements	
AI_L1_11.09	DLR(MB)	To extend the microvibrations study to other bands in order to investigate the spectral dependence	
AI_L1_11.10	DLR(MB)	To extend the microvibrations investigation to the periods when AATSR was not operating	
AI_L1_11.11	IMK(AK)	To update the F/R analysis	
AI_L1_11.12	BOMEM(GA)	To make an analysis on DS measurements for A1 and A2 detectors without combining the 2 detectors to verify if differences come from Non-linearity effect or Forward/Reverse effect	
AI_L1_11.13	BOMEM(GP)	To validate assumptions with latest MIPAS LOS measurements and to investigate MIPAS LOS sideways	
AI_L1_11.14	BOMEM(GP)	To propose strategy for MIP_CL1_AX updates and for Restituted Attitudes	
AI_L1_11.15	ESA(TF)	To verify with other instruments if roll mispointing or roll offset has been observed	

AI_L1_11.16	ESA(TF)	To investigate the roll offset applied to GOMOS during commissioning	
AI_L1_11.17	BOMEM(GP)	To investigate why the values for index 20-40 show reduced quality (scans over the North Pole)	
AI_L1_11.18	BOMEM(GP) IFAC(BC)	To investigate possible solutions for the ILS retrieval (options: fixing one parameter, reporting values calculated by coadding for one month or otherwise defined period,…).	
AI_L1_11.19	ESA(FN)	To provide a summary report on the spike detection based on the Level 1b flag in monthly report	
AI_L1_11.20	BOMEM(GP) IFAC(BC)	To provide the updated ATBDs for L1B and L2 processing.	
		Level 2	
AI_L2_11.01	BOMEM	To investigate further the Band D gain corruption leading the retrieval failure of 21-22/08/04.	
AI_L2_11.02	ASTRIUM (SB)	To use as ILS spectral calibration the average over an orbit of the L1 values.	
AI_L2_11.03	ESA (TF)	To check if the FEOMI LINUX GS is capable to distribute parallel processing	
AI_L2_11.04	ESA (FN)	To provide estimate for tau_ice and T_D for the model	
AI_L2_11.05	IFAC (CB)	To redo the theoretical analysis on the decontamination requirements taking the duty cycle into account (if possible also for different operation modes) and provide a Tech Note	
AI_L2_11.06	ASTRIUM (SB)	To modify ML2PP to make possible the frequency shift test at IFAC	
AI_L2_11.07	IFAC (PR)	To repeat the test on spectral coefficient using the prototype outputs	
AI_L2_11.08	UB (MR)	To redo the analysis on NO2 residuals adding statistics	
AI_L2_11.09	UL (DM)	To provide a tech note on the cloud index error estimates	
AI_L2_11.10	JMF (LISA)	To provide the updated Ethane spectroscopy to the QWG	
AI_L2_11.11	OU	Oxford University (AD), to deliver new pT MWs on Monday (30/10)	Closed
AI_L2_11.12	IFAC	IFAC, to deliver preliminary L2 ADF with reduced requirements of computing time optimisation. Possibly within 10/11/2006	10/11/2006
AI_L2_11.13	ESA (FN)	To investigate the gaps of missing data	Closed

Presentations:

All meeting presentations are available on the Uranus server:

ftp://pcf:Ur0Fr0@uranus.ESA.esa.it/MIPAS/To_QWG/20061024-QWG11 /Presentation

0) Level 0

Welcome and Introduction by T.Fehr (ESA)

0.1 Introduction (T.Fehr/ESA)

- MIPAS instrument status assessed by ESTEC/PLSO is improving from "fair" (May 2006) to "good" (October 2006), since the operations could be stabilised. It has to be noted that this assessment takes into account only the availability of the instrument compared to the originally planned duty cycle. However, the expected evolution is still rated as "bad" as the near term development of the system is uncertain.
- Presentation of the GRIMI-2 system that allows very fast reprocessing of MIPAS L2 products for validation purposes on ESRIN GRID infrastructure

0.2 Action Item Status (F.Niro/ESA)

Presentation of AI status

- AI_L1_3.07: still open, action from Johannes Frerick is missing, Astrium(PM) will get into touch with him
- AI_L2_3.03: pointing jumps study will be presented at the ACVE-3, paper on the jump to be sent to ESA(FN)
- AI_L1_4.09: ESA(MdL) explains the difficulties of LOS measurements planning in correspondence to GOMOS occultation. BOMEM(GP) will decide if this action is still needed after LOS investigation results.
- AI_L1_6.02: BOMEM(GP) said it should be kept opened
- AI_L1_8.01: Closed, should be tackled with the sideways LOS calibration. To be combined with the LOS calibration AI from QWG#10.
- AI_L1_8.05: IFAC(BC) states that DLR(MB) provided a TN and that there cannot be done further optimisation.
- AI_L1_9.04: Keep open, little recollection by AD, to check in the minutes.
- AI_L1_9.11: Closed, BOMEM(GA) had to make a decision for L1B baseline.
- AI_L2_9.09: Will be closed by IFAC(PR) presentation
- AI_L2_9.11: Partly closed with UL presentation
- AI_L2_9.16: OU (AD) problems with the PT MW. Presentation on the issue.
- AI_L1_10.02: Still open.
- AI_L1_10.04: OU(AD) said that there is ~5km difference between OU results and L1B tangent height results. BOMEM(GP) needs orbit # to redo L1B processing with restituted attitude, and LOS calibration (with roll errors).
- AI_L1_10: Still open
- AI_L1_10.11: Closed, saturated lines removed from proposed MWs list
- AI_L1_10.12: Closed. Already implemented in L1B prototype.
- AI_L1_10.19: Closed. IMK(AK) said there is no dependency on the bands.
- AI_L1_10.23: Closed

- AI_L1_10.24: Still open. General investigation for reducing the error from Gain, with respect to INT ageing.
- AI_L1_10.26: Still open. Clarification, effect of ice contamination on non-linearity.
- AI_L1_10.28: Closed by IFAC(SC) presentation
- AI_L1_10.29: Closed by BOMEM(GP) presentation
- AI_L2_10.08: Closed by IFAC(PR) presentation
- AI_L2_10.11: Closed by OU(AD) presentation
- AI_L2_10.12: New database sent by ESA(FN) to UB. Check to be done if there are changes with respect to the old database. OU (AD) involves in next MW generation (not for the current baseline).
- AI_L2_10.16: Closed, IFAC(SC) said that it is not the same problem.
- AI_L2_10.19: Closed by JMF presentation. Major improvement.
- AI_L2_10.20: Closed.

AI_L0_11.01: BOMEM(GP), IFAC(BC): Due to the large number of AIs, the L1 and L2 team leaders have to prioritise the current action items and provide deadlines for the next QWG.

0.3 Mission Planning Status (M.de Laurentis/Rhea)

- OU (AD) asks the reason for the initialisation every orbit. This is requested by PLSO to minimise data loss
- ST_AI_03, in principle "*rush planning*" can be done, the issue will be elevated to the next Mission planning Coordination Meeting
- AI_L1_9.03, Analysis on the ISP logs will be done by *Support Operation Team*
- AR ENV-998 (missing reset of PAW table), action on ESOC

AI_L0_11.02: ESA(MdL): To send an e-mail to Claus Zehner with ST in cc, asking for the inputs needed for the sideways LOS observations.

AI_L0_11.03: BOMEM(GP):To check if LOS calibration can work on single orbit for LOS calibration in sideways.

0.4 Data Acquisition Status (F. Niro/ESA)

- UB (MC) said that there are still discrepancies between the products available at D-PAC and the list provided to the QWG.

0.5 Mission Plan Document Status (Science Team)

- No discussion on the Mission Planning done.

AI_L0_11.04: ESA(TF) to contact Herman and Marta to update the mission planning (closed).

0.6 Instrument Status (P. Mosner/Astrium)

Overall Instrument Status:

- Higher Duty Cycle of ~40 %
- Cooler operates much more stable

Error Statistics:

- February 2006 peak due to motor imbalance
- Jul-Aug 2005 peak solved after INT Heater ON (Oct 2005)
- After increasing the duty cycle, even with higher "*4% differential speed error*" the number of IDU anomalies did not increase
- IDU statistics on 2006 shows a decreasing trend:
  - 1st Quarter = 1.2 errors / day
  - 2nd Quarter = 0.65 errors / day
  - 3rd Quarter = 0.5 errors / day

Motor current analysis:

- Feb/March 2006 analysis of motor current shows imbalance on motor 1
  - It was due to wind-up effect in the positive slide direction
- Explanation why the motor came back to nominal after Feb 2005:
  - Basically the actions taken (mission interruption, lower duty cycle, Heater on) helped; no clear reason for the imbalance

Thermal Performance:

- Cooler is working well to balance the temperature of the MIO
- FCA Radiator temperature performance is very dependent on the Cooler performance
- Improved cooler performance due to the periodic passive decontamination

Cooler:

- Always after the passive decontamination the cooler performs better with less vibrations
- Cooler works against the Compressor head and the Flange Temperature
- Both compressors did not change over the mission
- In May/July 2006 the cooler still performs very well even tough it was the hottest period of the year and the INT heater was on
- Since May 2005 vibrations are always well below the warning threshold of 8mg

Conclusions:

- INT performance needs further careful assessment
- Duty cycle did not show negative effects on INT operations
- Decontamination needed around 1st May, in addition one ore two during the year

Recommendations:

- FCA:
  - Conduct a MIPAS passive decontamination yearly around 1st May
  - Conduct minimum 1 additional decontamination within the year
- INT:
  - Monitor INT motor currents via NNTM and readout INT FIFO on a regular monthly basis
  - Keep duty cycle at 40%
- Optional recommendations (with actual low likelihood)
  - Consider further increase of INT temperature (in case of operational instability)
  - Consider characterisation of MIPAS operational performance on side B (in case of significant operational instability on side A)

Discussion:

→ BC: Full Resolution will be possible again?
→ PM: No, RR is an irreversible choice in order to prevent slide to get blocked
→ TF: 40 % duty cycle is it a hard limit?
→ PM: No, but the errors have to be under control, reconsider higher duty cycle at the next QWG
→ MC: Possible to go to FR for the last month of Envisat.
→ PM: In principle technically possible, but SAG decision

1) Level 1B

1.1 Level 1B Configuration ESA (FN)

- New L1B IPF 4.67 operational OFL at D-PAC since 4th September 2006, it solves two anomalies, in particular an operational processing issue at D-PAC
- No L1B ADF updates

1.2 Anomaly Investigation Status ESA (FN)

- Non valid band A at same geo-location. The NCR solved the IPF bug, but differences remain with respect to the prototype for the total number of scans.

AI_L1_11.01 ESA(FN) to provide to BOMEM, L0 + ADFs Products.
BOMEM(GA) to investigate the total number of scans.

- Missing reset of PAW Gain table after LOS measurement causes saturation of signal on band D (from 7-18 October 20006). Level 2 will not be processed as the baseline requires all bands (even if they are not used).

AI_L1_11.02 ESA(FN) to check with ASTRIUM(SB) if the baseline requires all bands for the L2 processing.

- Many corrupted band D data around same latitude.

AI_L1_11.03 ESA(FN) to send L0/L1b products showing corrupted band D problem.
BOMEM(GA) to investigate.

- Aircraft emission. No further investigations on ESA side. BOMEM(GP) will give a presentation on LOS calibration (see below).

1.3 Level 0 and Level 1B Monitoring ESA(FN)

- Cooler Monthly monitoring plot. FN asked to include a running average on top of the "raw data".

AI_L1_11.04 ESA (FN), to add running average to cooler monthly monitoring plot.

- L0 Long term monitoring of ADC counts during DS measurements on channel A1. Probably stable offset between F/R

AI_L1_11.05 ESA (FN), to plot F/R differences as a function of time.

- Plot of ADC min/max for all bands is a fast way to monitor product quality of L0 NRT data. IMK (AK) requests for offset monitoring as they are lower in variations.

AI_L1_11.06 ESA (FN), to further investigate the monitoring of offset.

- Cloud top height monitoring included in the L1 daily report
  - It allows monitoring of spectra quality, but only for band A
- L1b monitoring for the linear Spectral Calibration factor. To be noted that we will have two spectral correction factors in the new L1 baseline (linear and quadratic term)
- Weekly Gain Monitoring. Comments from AK: Aliasing Spikes can be seen in single spectra on Band B
- Accumulated gain long term monitoring: the 25% limit should serve as a baseline for the decontamination
- Fringe count Error Long Term Analysis
  - FN asking for input in order to improve this analysis
  - AK: Interested on the FCE changes from FR to RR
  - BC: Statistics on the population on the fringe count error can be interesting

AI_L1_11.07 ESA (FN), to investigate if a histogram statistics can be used for the instrument performance (instead of only using the maximum).

- ILS long term monitoring
  - Suggested during the last QWG
  - The ILS parameters show to be very noisy, BOMEM (GP) will discuss this issue with further details

1.4 Status of the L1B prototype BOMEM (GP)

- Priority was given to the validation dataset processing
- MIGSP v2.7 and MICAL V1.6: Prototype, DPM 4L and IODD already delivered.
- TDS, TDP to be delivered after the meeting (27/10/06)
- Validation Dataset: 264 L1B products processed (83%). Another ~100 still to be delivered.

1.5 L1B Investigation Status

a) Microvibrations on Radiometric Accuracy DLR (presented by AK)

- Explanation: Mechanical modulation on moveable interferometer mirrors, modulation frequency too high to be corrected by control loop
- Causes: Resonances in mechanical structure, 100-1000Hz, mechanical excitation
- Largest deviation in real part corresponds to smallest deviation in imaginary part and vice versa
- No ghosts found: modulation perhaps not sufficiently monochromatic
- Microvibration intensity appeared to be constant throughout mission and not dependent on cooler vibration cancellation
- Since no ghosts observed, line intensity is only lowered by less than 1% - result from model
- Dominant error is offset error in calibrated scene.
- Only channel A2 analysed so far
- Error real part (max=20-60 nW)
- Error imaginary (max=50 nW)
- F/R could be caused by microvibrations, but AK does not support the hypothesis
- Since forward and reverse spectra are on different ZPD, sampling grids errors by microvibration have the same frequency but different phases

Discussion:

→ PM: There is not MIPAS device that works at 100Hz, Cooler is at 43 Hz

→ PM: It can be due to AATSR

AI_L1_11.08 ESA(FN) to identify periods where AATSR was switched off and MIPAS did gain measurements.

AI_L1_11.09 DLR(MB) to extend the microvibrations study to other bands in order to investigate the spectral dependence.

AI_L1_11.10 DLR(MB) to extend the microvibrations investigation to the periods when AATSR was not operating.

b) AI-L1-7.03 investigation, A. Kleinert (IMK)

- NESR increase below 740 cm-1 due to the increase of the gain function
- Probably due to detector responsivity and/or transmission of optical components

c) Forward / Reverse IMK (AK)

- Scaling error obvious in band AB but not in band B (where the CH4-N2O-oscillations were found!)
- Amplitude of difference higher in v4.61 OFL than in v4.59 NRT in band A and band C

AI_L1_11.11 IMK(AK) to update the analysis of F/R using exactly the same dataset.

- F/R still not explained but still below NESR

AI_L1_11.12 BOMEM(GA) to make an analysis on DS measurements for A1 and A2 detectors without combining the 2 detectors to verify if differences come from Non-linearity effect or Forward/reverse effect.

d) LOS retrievals IMK (AK)

- Absolute error of engineering tangent altitudes: 0-2 km
- Error of engineering tangent altitudes is latitude dependent (about 0.01 km/deg) due to uncorrected roll-angle
- RR and FR have the same behaviour (similar latitude dependency and absolute correction)
- Probably due to uncorrected roll mispointing
- Restituted Attitude results will be shown and discussed by BOMEM(GP) (see below).

1.6 Level 1B performance assessment

a) LOS Calibration BOMEM(GP)

- Usage of all information for one orbit:
  - L1b Reported altitudes by IPF (MIP_CL1_AX)
  - L1b Reported altitudes prototype (AUX_FRA)
  - IMK retrieval
- New Assumption
  - Pitch bias ~10 mdeg
  - Roll bias 50-60 mdeg
- Only large roll bias (50 mdeg) allows fitting IMK results
- Assumptions have to be validated
- Valid assumptions with latest MIPAS LOS
- Further investigation:
  - Investígate MIPAS LOS sideways
  - Propose strategy for MIP_CL1_AX updates
  - Propose strategy for Restituted Attitudes

AI_L1_11.13 BOMEM(GP) to validate assumptions with latest MIPAS LOS measurements and to investigate MIPAS LOS sideways.
AI_L1_11.14 BOMEM(GP) to propose strategy for MIP_CL1_AX updates and for Restituted Attitudes.
AI_L1_11.15 ESA(TF) to verify with other instruments if roll mispointing or roll offset has been observed.
AI_L1_11.16 ESA(TF) to investigate the roll offset applied to GOMOS during commissioning.

b) Spectral Calibration BOMEM(GP)

- Selected MW provided to JMF
- Proposed MW are more stable
- Stability depends more on the number of fitted peaks as compared to the choice of MW

AI_L1_11.17 BOMEM(GP) to investigate why the values for index 20-40 show reduced quality (scans over the North Pole).

c) ILS retrieval BOMEM(GP)

- ILS information was never provided in NRT since it is contrary to the specifications
- So far retrievals of the two ILS parameters are too noisy
- Comparison with IMK
  - IMK co-adds several orbits, this is not possible in NRT
  - The current IPF co-adds only 5 spectra
- If L1B ILS parameters are used the L2 “temporary fix” needs to be de-activated
- Open Issue:
  - Try to improve current approach for NRT
  - Use MICAL algorithm for off-line ILS retrieval

Discussion:

→ BC: Since the two ILS parameters are highly correlated we could fix one, which is known to be stable and retrieve only the variable corresponding to the moving mirrors, which is expected to vary more

AI_L1_11.18 BOMEM(GP) / IFAC(BC) to investigate possible solutions for the ILS retrieval (options: fixing one parameter, reporting values calculated by co-adding for one month or otherwise defined period,…).

d) Others BOMEM(GP)

No progress so far for the following issues:

- LLI
- Spectral calibration
- Non-Linearity
- F/R Oscillations

1.7 Review Level 1B workplan (BOMEM/All)

Highest priority:

- Improve detector non-linearity modelling/characterization/correction. To be worked out with DLR
- Improve LOS calibration

AI_L1_11.19 ESA(FN) to report a summary on the spike detection based on the L1B flag in monthly report.

AI_L1_11.20 BOMEM(GP) / IFAC (BC) to provide the updated ATDBs for L1B and L2 processing.

2) Level 2

2.1) Level 2 Configuration Status (F. Niro, ESA)

- IPF 4.67 solves three NCRs (NO2 excessive chi2, differences between v4.61 and v4.62, format issue).
- There is no L2 ADF update.
- No update in the L2 processing status

2.2) Anomaly Investigation Status (F. Niro, ESA)

All the anomalies were investigated and closed:

- NO2 excessive chi square
  - Fixed in 4.67
- V4.61 and v4.62 difference
  - Fixed in 4.67
- L2 Retrieval failure of 21-22/08/2004 products
  - Due to corruption in the band D gain function

AI_L2_11.01: BOMEM: To investigate further the Band D gain corruption leading the retrieval failure of 21-22/08/04.

- N2O anomaly
  - Level 1b problem
  - Usage of outdated L1 ADF
- Continuum Anomaly
  - Sometimes continuum is retrieved above the threshold limit
  - Not a data quality issue, but it takes computing resources
- L2 Missing over South Pole
  - First sweep altitude sometimes higher than the highest entry in the occupation matrix
  - Seasonal variation of the platform due to pointing problem (fixed in Dec. 2003)
  - AD: stretching out the occupation matrix to higher altitude will solve the problem
  - With changing the reference tropopause altitude the complete orbit could be processed at ESRIN with reduced quality

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

There are no updates.

2.4) ML2PP Status (S. Bartha, ASTRIUM)

Status:

- All the scientific work is done
- DPM, TPD/TDD, TDS missing

Implementation Details:

- Tropopause Altitude
  - Different parameters setting for the OM/MW selection (Frame part) and PS2 for the setup of the OM of the simulation (Retrieval part)
- Variance-Covariance-Matrix (VCM) for IG2 and ECMWF
- ECMWF based altitude correction
- Spectral Correction of ILS

AI_L2_11.02: ASTRIUM (SB), to use as ILS spectral calibration the average over one orbit of the L1 values.

ML2PP How-to:

- Several tools are provided with the prototype delivery
- Source code of the tools available as well
- Batchmode ML2PP available

Schedule:

- DPM will be ready by mid November
- TPD/TDD, TDS by mid December

AI_L2_11.03: ESA to check if the FEOMI LINUX GS is capable to distribute parallel processing

2.5) Level 2 Investigation/Study Status

a) S. Ceccherini, (IFAC): L2 retrieval of gain

- He states that the gain cannot be retrieved with MW approach because of high correlations with other target quantities.
- He proposes to use a wide band multi-target retrieval this is a major effort and results are uncertain.
- TF: suggests a preliminary study, with moderate priority.

b) C. Belotti, (IFAC): AI_L1_10.28: Optimisation of decontamination occurrence

- The frequency of the decontaminations should have the target to maximise the information content between two successive decontaminations.
- Analysis shows that decontamination would be necessary 2-3 times a year, this in line with the recommendations by industry.
- This result is valid only for continuous operation. Analysis will be redone including the reduced duty cycle.

AI_L2_11.04: ESA (FN) to provide estimate for tau_ice and T_D for the model
AI_L2_11.05: IFAC (CB) to redo the theoretical analysis on the decontamination requirements taking the duty cycle into account (if possible also for different operation modes) and provide a Tech Note

c) P. Raspollini, (IFAC): L1_10.13: Check on quadratic coefficients provided by BOMEM for frequency calibration

- She shows that IFAC and BOMEM coefficients provide similar results in term of chi2 reduction.
- BOMEM coefficients appear to be consistent with L2 retrieved values even if obtained with a smaller statistics, and therefore, larger errors.

- However, tests have not been performed using MIPAS Level 2 pre-processor prototype. In order to make the test with ML2PP a small change is needed in the prototype.

AI_L2_11.06: ASTRIUM (SB) to modify ML2PP to make possible the frequency shift test at IFAC

AI_L2_11.07: IFAC (PR) to repeat the test on spectral coefficient using the prototype outputs

d) P. Raspollini, (IFAC) : L2_10.08 : Investigations on ILS error characterisation

- She shows results on truncation in the apodization function; this can cause a small correlation between residuals and 2nd order derivative.
- This effect could explain the results obtained by Oxford.

e) S. Ceccherini, (IFAC): Level 2 tests on selected MWs

- He shows comparison between retrievals using full resolution and artificially reduced resolution L1b files, using the newly selected MW for RR27
- Results show systematic differences comparable to the errors. However a problem was found on temperature mean profile at 21km
    - The temperature profile shows an anomalous peak at 21 km due to discontinuity in the OM, since MW in the 900 cm-1 region start to be used at low altitude. This is also visible in the new measurement scenario.
    - Analysis performed using two additional MWs provided by OU leaded to instabilities in the retrieval.
    - Tests made with ORM using other pT MWs (delivered by AD on 03 Aug 2006) did not provide acceptable results; Oxford is still working on the MWs definition.

Discussion:

→ BC: Any reason why introducing MWs at 900 cm-1 is causing problems?
→ JMF: Problem not related with the MW at 900 cm-1
→ Problem might be related to the spectral masks
→ MLP recalls the presence of significant non-LTE effect in the 900 cm-1 region. A 10% difference in the day/night integrated MIPAS radiance can be observed at 21 km in the CO2 laser bands (935-970 cm-1)
→ AD: NLTE in the CO2 lines starts to affect the retrieval only above 21 km

f) A. Dudhia, (OU): pT MWs status

- The problem at 21 km seems related to discontinuity of OM, since below this altitude MW in the CO2 laser band start to be switched on and the 700-800 cm-1 MW are not used anymore, only small overlap exists between the two spectral regions. However CO2 laser band was already used in the MW selected for Aug 2004 RR17 data
- New set of 10 MW is going to be delivered by OU to IFAC
- Not clear if the new set will reduce the 21 km discontinuity

g) E. Papandrea, (UB): tests on selected MWs with GMTR

- He performed multi-target (p-T,H2O,O3) 2-D Retrieval of RR27 data
    - no MW in the CO2 laser band, but in the AB and C band
    - the selected OM did not show altitude discontinuities
    - some horizontal oscillation can be observed due to horizontal over-sampling

h) M. Ridolfi, (UB): AI_L2_10.15: to investigate NO2 residuals.

- Investigation after observation by AD of large NO2 residuals, also aiming to find possible explanations for the excessive amount of NO2 retrieved in the stratosphere
- A test on orbit 2081 shows that the profile is not reasonable especially for the value at 68 km
- For the NO2 retrieval three MW in the band C are used

- Problem in one MW at 68 km
  - An intense water vapour line is not masked
  - However no difference in the average profiles appear when the line is masked
  - Suggestion to mask anyhow the water line

Discussion:

→ JMF: Not clear why the peak at 68 km is not reduced when masking the H2O line

→ AD: probably the algorithm puts all the NO2 above the maximum retrieved altitude into the last retrieved point at 68 km

→ The point at 68 km is basically retrieved to improve the retrieval below, however this point has not physical meaning

→ AK: Signal-to-Noise is 0.5 in the residuals, so individual profiles should have significant error

→ Possibly the peak is due to outliers

→ David Moore shows NO2 variability and climatology.

AI_L2_11.08: MR (UB) To redo the analysis on NO2 residuals adding statistics

i) G. Brizzi, (UB): Detection of $H^{15}NO_3$

- JMF (LISA) provided the $H^{15}NO_3$ spectroscopic data
- Investigation on residuals with REC analysis shows not modelled spectral signature in correspondence of $H^{15}NO_3$ Q branch
- First detection of $H^{15}NO_3$ in the atmosphere

l) D. Moore, (UL): cloud detection and reference atmosphere

- Cloud NESR: Investigation on AI_L2_10.09
  - Derive a cloud index error estimate based on NESR
  - Further investigations are necessary

AI_L2_11.09: DM (UL): To provide a tech note on the cloud index error estimates

- Attempt to quantify a "cloud propagation error" in L2 retrievals
  - Test on the tropics region are made on simulated cloudy and clear-sky spectra
  - Tests show that the effect of cloud is significant for O3 and H2O retrieval over the cloud top height, up to 20-60% difference on the retrieved VMR can be observed
  - Ongoing work
- Cloud MW for RR
  - CI_A and CI_B work well by resampling FR to RR (differences within 1-2%)
  - CI_D not good, differences over 10%
  - Ongoing work
- Variability and reference atmospheres: IG2
  - Considering July 2003
  - In general variability of IG2 (preliminary) looks reasonable but is smaller than standard atmosphere sigma and MIPAS data. This is under investigation.

m) M. Lopez-Puertas, (IAA): non-LTE studies N2O & CO

- Using IMK retrievals
- Non-LTE of N2O
  - Significant Day-Night differences in the radiances at 20 km (10%)
  - Very large differences (200-600%) at 60 km
  - N2O temperature difference (vibrational/kinetic) are becoming important above 40 km
  - First detection of non-LTE in N2O (001)
- CO 4.7 µm
  - Non-LTE simulated radiances agree with measurements within 5% for fundamental band, 10% for the hot band and within noise for isotopic band
- Effect of Solar storm of Jan 2005 on MIPAS spectra: NO, NO+, CO2

  - Half a day observations at high altitude (90-170km)
  - We were lucky since we got pre- and post-storm MIPAS measurements
  - Huge increase in NO radiances, that starts at the poles and then spreads
  - Modelling is planned, but the NO concentrations are not well known
  - NO+ radiances significantly increased at 160 km daytime
  - Unexpected excitation of CO2 at high altitude (100-170 km) in daytime over the South Pole
- Noctilucent Clouds (NLCs) in North Hemisphere Summer 2005
  - The NLC mode gives better vertical sampling at high altitude 80-90 km
  - For thick NLC (extreme) 50 nW change in Band A are expected from theory
  - Indications of a small peak (5 nW) in the offset of MIPAS spectra at ~82 km, this might point to the existence of NLC
  - At the South Pole no peak was observed (as expected)
  - MIPAS did measure NLCs but it is difficult to extract information
  - Latitude dependent offset in Band A, to be investigated

n) A. Kleinert, (IMK): T & LOS retrieval for orbits 19581 and 19595

- Using IMK scientific processor
  - Orbits 19581/19595
  - UTLS-1 mode
  - ECMWF 60 Levels
  - T-retrieval at 1km grid
  - MW adapted
- Improved vertical (and horizontal) resolution in the RR mission with respect to the FR, new vertical resolution goes to ~3km around the tropopause

o) Jean-Marie Flaud, (LISA): Ethane C2H6

- Large amplitude in motion makes it “nasty” the calculation
- 25 % of the intensity is due to hot bands
- HITRAN and GEISA have big differences with respect to the measurements and they don’t match together
- New work by LISA reduces significantly the residuals
- Work almost finished
  - Fit of measured spectra at 2 temperatures needs to be done in order to derive the T dependency of line intensity
  - Spectroscopy parameters will be available in a month

AI_L2_11.10: JMF (LISA) To provide the updated Ethane spectroscopy to the QWG

2.6) Level 2 Workplan (IFAC/ALL)

a) P. Raspollini, (IFAC): L2 ADF preparation status

ADFs are needed in order to generate RR27 first L2 products for the next ACVE-3 workshop

Discussion:

→ AD: A back-up solution could be to use the original MW with the problem at 21 km
→ BC: Problematic to provide data with known problems to the validation groups
→ AD: One possibility is not to retrieve the 21 km point
→ BC: Preferable back-up solution is to use the August 2004 RR17 MW for pT, including a warning that the pT is preliminary

AI_L2_11.11: Oxford University (AD), to deliver new pT MWs on Monday (30/10)

AI_L2_11.12: IFAC, to deliver preliminary L2 ADF with reduced requirements of computing time optimisation. Possibly within 10/11/2006.

- If the new pT MWs do not solve the issues reported by SC the Aug 2004 MW set (for pT only) will be used

Discussion:

→ PR asks if priority should be given to nominal mode or UTLS

→ TF answers that UTLS mode should have priority as most of the measurements taken so far are in this mode.

2.7) Feedbacks from validation activities

a) U. Cortesi, (IFAC): MIPAS O3 validation

He presents final results:

- 25-50 km bias is within the combined systematic error, confirmed by Ground Based stations
- FTIR difference: Most Stations used HITRAN2000 and showed oscillating differences, Kiruna used HITRAN2006 and yielded good result
- Comparison with MIPAS-B gives very good results also at lower altitudes
- Results indicate a high quality between 25-50 km, good quality also below and above
- End of November the final version of the paper should be ready for ACPD

b) M. Ridolfi, (UB): T validation

Presentation on the results of T validation activity:

- The V4.61 results were used
- Validation data:
  - Radiosondes (9-39km)
  - Lidars (36-60 km)
  - MIPAS B
  - ECMWF
  - SPIRALE
- Biases consistent with the systematic error reported by AD
- The detected RMS is larger than predicted by a factor of 2 or 3 depending on altitude, possible explanation:
  - Cloud flagging not conservative enough
  - Underestimated error due to profiles scaling outside the retrieval vertical range.

c) C. Piccolo, (OU): precision validation

- Mapping of radiometric noise on the retrieved species
- Random error varies with time
- Missing data gaps in the off-line reported to FN

AI_L2_11.13: FN, ESA: To investigate the gaps of missing data

- NESR is varying over time at a certain altitude
- Peaks in the random error can be explained by the Temperature variation
- Observed error is bigger than expected
- T random error follows the seasonal variation
- H2O, O3 and N2O have big oscillations (due to the methodology?)
- HNO3 and CH4 standard deviation explained by predicted random error including pT error contribution

d) H. Oelhaf, (IMK): NO2 validation

He presents results on the validation activities on behalf of G.Wetzel:

- NO2 looks reasonable between 25-40 km;
- Accuracy of stratospheric NO_2 profiles suffers from very high NO_2 values above ~50 km in polar winter
- Detected some high biases when MIPAS compared to ground based IR sensors; low biases when MIPAS compared to ground based UV-vis (some seasonal dependence).
    - SPIRALE: Well inside the error bars
    - MIPAS-B: Good agreement
    - Satellite-Satellite comparison difficult
        - HALOE/SAGE II inconclusive
    - Ground based measurements difficult
- IMK vs. ESA
    - High bias in the mesosphere
    - Temperature gradient was taken into account on the IMK

e) Hermann Oelhaf, (IMK): validation paper
Status of the validation papers

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Next Meetings:
Wed-Fri 14-16 February 2006, ESRIN, QWG 12
Tue-Wed 13-14 February2006, Validation WS (if necessary)
Tue-Thu 5-7 June 2006, IFAC, QWG 13

Reminder:
4-7 December 2006 ACVE-3, MIPAS 4 December
25-26 January, MIPAS SAG
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