

MIPAS QWG Validation Telecon

24 September 2019

Summary + Action Items List

A summary of the main conclusions of the meeting and the list of the new Action Items are provided in the present document.

- Angelika Dehn (ESA) introduces the objectives of the telecon clarifying that it is dedicated to the validation results and the sharing of the potential issues on L2v8.
- Gerald Wetzel (KIT) presents the results of the comparisons between MIPAS-B (there are 8 MIPAS-B flights: 2 Tropics, 1 Mid-latitude, 1 Arctic Summer, 4 Arctic Winter):
 - MIPAS-E L2v8 Full Mission, and
 - MIPAS-E L2v8 DDS.
- The results of the intercomparison are good, in particular for difficult to measure species (like HCN, C2H2) VMR differences between both MIPAS sensors are smaller compared to L1v8/L2v8 DDS;
- The error analysis “Correct” systematic errors of MIPAS (error budget analysis is still in processing).
- Piera Raspollini (IFAC) asks to Gerard to present at the final meeting the results of full mission differences for V7 and V8.

AI_QWG_Validation_telecon_24_09_19_01: G. Wetzel (KIT) to prepare in presentation at final meeting on 28/30 October the results of full mission differences for V7 and V8.

- Daan Hubert (BIRA-IASB) presents the results of Ground-based validation of Level-2 temperature, ozone and altitude of MIPAS ORM 8.22 Full Mission data:
 - For the **Temperature**:
 - ORM V8 warmer than ML2PP V7 in stratosphere, colder in UT/LS;
 - Spread smaller for ORM V8 by 0.2- 0.5K at high & mid-lat;
 - Positive drift V8 smaller than that of V7 in middle stratosphere;
 - Larger positive drift for V8 in troposphere and upper stratosphere;
 - Annual cycle of bias is clearly reduced for V8 in middle stratosphere;
 - For the **Altitude**:
 - Bias of V7 & V8 altitude data (ECMWF-corrected) is nearly identical;
 - The spread in the V7 & V8 comparisons are similar, V8 slightly better;
 - Annual cycle of bias is even more reduced for V8;
 - For the **Ozone**:
 - No (significant) differences between data versions, generally less than ~2%;
 - Spread: No noticeable differences between V8 and V7;
 - Uncertainty: Values are generally nearly identical for V7 & V8 data sets;
 - Drift V8 consistent with that of V7;
 - Time series do not provide clear picture of whether V7 or V8 is more stable wrt ground-based data;
 - Annual cycle of V8 bias similar to V7.
- Daan Hubert (BIRA-IASB) clarifies that the ground based facilities (the sondes) have improved the quality of data. Daan will look into this in more detail.
- Angelika Dehn (ESA) comments that the results show that the ozone trend that was shown based on the DDS at the meeting in Florence in October 2018 have not been confirmed,

which is a good result. As the DDS approach was considered to be a very good method the reasons shall be explained well and reported into the lesson learnt.

- Arno Keppens (BIRA-IASB) presents the results of NDACC Ground-based validation of Level-2 CH₄, HNO₃, N₂O MIPAS ORM 8.22 Full Mission data:

Conclusions for **CH₄**:

- 5-10 % pos. bias and spread for both subcolumns (9-12 km and 12-30 km);
- V7 & V8 FR bias reduction with respect to V6;
- At cost of small OR bias increase;
- Limited vertical dependence (note column-prof discrepancy);
- Hard to detect trends;

Conclusions for **HNO₃** (12-30 km data only):

- ~5 % neg. bias for L2V8 (reduced w.r.t. previous versions);
- ~10-15 % spread (for all versions);
- Yet strong vertical dependence;
- Hard to detect trends;
- Take into account ~25 % ground instrument precision;

Conclusions for **N₂O** (12-30 km data only):

- 5-10 % pos. bias for V8 for both subcolumns (slightly increased);
- ~10 % spread overall;
- V7 & V8 FR bias reduction with respect to V6;
- At cost of small OR bias increase;
- Limited vertical dependence (station-dependent features);
- Hard to detect trends;

Overall conclusions:

- Results roughly within uncertainties (~10 % MIPAS spread);
- Consistent FR and OR results (since V7);
- Hard to detect trends.

- Piera Raspollini (IFAC) says that the reduction of bias could be related to the new MWs selected by Anu.

AI_QWG_Validation_telecon_24_09_19_02: A. Keppens (BIRA-IASB) to prepare in presentations at final meeting on 28/30 October the comparisons with also V5 and V6.

- David Moore (Uni-Leicester) presents the results of MIPAS v8 /ACE v4 comparisons with the following conclusions:
 - Excellent agreement between ACE and MIPAS **O₃** and **HNO₃** data across all seasons (MIPAS/ACE differences generally below 10% across all seasons);
 - O₃ – MIPAS higher by 10-30% between 20-25 hPa in August/September at high Southern Hemisphere latitudes;
 - HNO₃ – MIPAS higher by 50-70% between 20-60 hPa in August/September at high Southern Hemisphere latitudes;
 - Good qualitative agreement between MIPAS and ACE **C₂H₂** and **C₂H₆**:
 - ACE C₂H₂ vmrs generally higher than MIPAS;
 - No clear sign for C₂H₆;
 - MIPAS **HDO** profiles are generally a little noisier than ACE:

- ACE vmrs generally higher than MIPAS in the UTLS, differences generally less than 10% throughout low-mid stratosphere;
 - Further work will include observations of mid-upper stratosphere;
 - **Further gases to study:**
 - CH₃Cl, COCl₂, H₂O, COF₂, HCN, CCl₄
 - (CH₄, N₂O, OCS, F₂₂ [CHClF₂], F₁₄ [CF₄])
 - The large spatial coincidence needs to be further tested:
 - Particularly gases with biomass burning sources;
 - Reducing the spatial (and temporal) matchup criteria severely limits number of matchup due to nature of ACE measurement approach.
- Anu Dudhia (Uni-Ox) reports about the systematic error budgets (the major omission in the systematic error calculations is the joint retrieval of the continuum).

AI_QWG_Validation_telecon_24_09_19_03: A. Dudhia (Uni-Ox) to finalize the error budget calculation, and update webpage and to provide details in Technical Note.

Conclusions

- A. Dehn (ESA) concludes the telecon confirming that from the validation point of view there seem to be not critical issues (the main open point is related to the error calculations to be finalized). All discussed aspects shall be inserted by the teams in the dedicated sections of the L2v8 Read-me file (draft version to be prepared for the Final meeting).

The MIPAS QWG Final Meeting shall take place on 28th/30th October in Frascati.

Days 28 and 29 October the meeting will be in Villa Mercede:

<https://www.villamercede.com/en/>

On 30 October the meeting will be in ESRIN in room G