

Interactive comment on “Long term validation of ESA operational retrieval (version 6.0) of MIPAS Envisat vertical profiles of methane, nitrous oxides, CFC-11 and CFC-12 using balloon borne observations and trajectory matching” by A. Engel et al.

Anonymous Referee #3

Received and published: 18 August 2015

This paper is fairly well written, scientifically sound, and presents material that is appropriate for Atmospheric Measurement Techniques. However, one major issue, concerning vertical resolution matching between the instruments, does need to be addressed before it should be considered for publication. There are a few other minor details, listed below, that also need to be addressed.

Specific issues

C2630

It seems that no effort was made to match the vertical resolutions of the two instruments, which, in some regions, will undoubtedly have a significant impact on the comparison results. The cryosampler data needs to be smoothed either by the MIPAS averaging kernels or by convolving with the MIPAS vertical resolutions for accurate comparisons. This would most likely diminish the effect of the dynamical feature in flight B45, and help explain why some comparison results are better in the “reduced resolution” measurements (as the reduced spectral resolution naturally led to improved vertical resolution).

The discussion of comparison results tends to be solely qualitative. Throughout the results discussion, phrases like “excellent agreement” and “large variance” should be quantified (e.g. within ± 1 ppb, or up to 10 ppt, etc.)

Technical issues

Throughout, dashes are used after instrument names that aren’t needed, e.g. “MIPAS-E-profiles or CH₄-validation” should just be “MIPAS-E profiles or CH₄ validation”.

Throughout, terms “older” and “younger” data are used to refer to data prior to early 2005 and after this time, respectively. These should probably be changed to “earlier” and “more recent”.

Similarly, this data is referred to as high resolution and low resolution. It should be made clear throughout that this refers to spectral resolution, as the degradation yielded measurements with a finer vertical resolution (which as previously mentioned needs to be discussed and properly dealt with). Alternatively, these could be called original resolution and optimized resolution.

The name of the university should be constant throughout. Sometimes it is referred to as the University of Frankfurt, and at other times University Frankfurt.

Throughout the almost equal sign (\approx) is used when it should probably be the approximately sign (\sim)

C2631

P7457 lines 4-5: "MIPAS-Envisat" should probably be moved to between "the" and "operational".

P7457 line 11: "as of" could be "in"

P7457 lines 11-15: Please put in specific results

P7457 line 19: "traces" should be "trace"

P7457 lines 20-22: the different types of studies should all have references, not just relative lifetimes.

P7457 lines 22-23: what is meant by "relative changes"? And does "gradients" mean vertical gradients?

P7458 line 10: "should" instead of "can"

P7458 lines 11-12: ". . .one single vertical profile." This assumes that the satellite only gets one profile in the time coincident with the in situ measurements. It should probably be something like "However, this typically can only be achieved for a single vertical profile from a given satellite data set."

P7458 line 14: May want to define, or be more specific than, "trajectories"

P7458 line 16: MIPAS has yet to be defined

P7458 line 24: "that spans nearly" instead of "for about"

P7458 line 27: insert "MIPAS" between "the" and "data"

P7459 line 2: insert "comparison" between "the results"

P7459 line 6: MIPAS should have already been defined.

P7459 line 12: "to combine" should be "for both"

P7460 line 14: "scales" instead of "scale"

C2632

P7460 line 18: "in addition" is unnecessary

P7461 line 4: "the" instead of "our", and "were" instead of "have been"

P7461 line 6: "qualities" instead of "quality"

P7461 line 20 and 24: "Flights" instead of "flight"

P7461 line 21: insert "during these flights" between "gases show"

P7461 line 22: much smaller than what?

P7462 line 4: insert "during this flights" between "tracers" and "are"

P7462 line 19: what is meant by "the altitude interval"?

P7463 line 15: "with" instead of "of", insert "of an individual flight" between "profile gives", and "qualitative" isn't necessary.

P7464 line 1: "multiple" instead of "a number of", and "are" instead of "is"

P7464 line 7: "In the case where there are. . ."

P7464 line 9: "error bars are plotted."

P7464 line 11: "data product" instead of "datafiles"

P7464 line 19: "is not reproduced"

P7464 line 25: "extent" (or possibly "feature") not "extend"

P7465 line 4: "clearly" isn't needed

P7465 line 5: "a" isn't needed

P7465 line 6: "number of data which are available" do you mean "amount of data used"?

P7465 line 7: "data points available"

C2633

P7465 line 14: "up to" instead of "until"

P7465 line 16: nowhere have you shown correlations. Do you mean systematic differences between the instruments?

P7465 line 17: Please be specific with what is meant by differences.

P7465 line 23: What is meant by "becomes smoother"? that the disagreement is lessened?

P7466 line 4: "clearly" is unnecessary

P7466 line 5: something like "show excellent agreement" instead of "fit together perfectly"

P7467 line 4: It is unclear what is meant by "An overall display"

P7468 line 13: "thus" is unnecessary

P7468 line 15: It is unclear what is meant by "already"

P7468 line 17: Insert "MIPAS-E" before "CFC-11"

P7468 line 20: "clearly" is unnecessary

P7468 line 24: Should refer to Figure 15

P7469 line 2: second "of" should be "between"

P7469 line 10: second "in" should be "between"

P7469 line 23: "elimination of one flight that exhibited a dynamical feature in the mixing ratio profiles. . ."

P7469 line 23: It is unclear what is meant by "caught"

P7470 line 2: "mixing ratio"

Table 1 caption: Last sentence is information that should be in the main text.

C2634

Figure 1 caption: "corresponding" might be better than "related"

Figure 4 caption: The first sentence needs to be clearer, i.e. state what it is that is without this data. Also, it would be helpful to give the altitude range of the feature.

Figures 5-15: should start with "Same as"

Figures 6, 10, 14: "Same as left panel of. . ."

Interactive comment on Atmos. Meas. Tech. Discuss., 8, 7455, 2015.

C2635