**Atmospheric
Measurement
Techniques**

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Discussions

Interactive comment on "MIPAS IMK/IAA CFC-11 (CCl$_3$F) and CFC-12 (CCl$_2$F$_2$) measurements: accuracy, precision and long-term stability" *by* E. Eckert et al.

Anonymous Referee #3

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This is a validation paper for MIPAS CFC-11 and -12 by way of comparison to coincident measurements by other instruments. While fairly thorough, the paper is overly long, contains too much extraneous detail, and sometimes makes comparisons that add little to the result. The wording of several passages used colloquialisms that may obscure the meaning to a reader not fluent in English. I do not recommend publication in its current form. The paper needs to be rewritten to be more succinct, and clearer in its conclusions.

Abstract: The software heritage of the processing system doesn't need to be in the abstract.

Introduction: This includes the "story" of CFC-11 and -12 and its effect on ozone. This is just too much information that is likely already well known by anyone interested in this paper. The introduction could easily be reduced to one paragraph as to why you're comparing measurements of CFC-11 and -12 rather than why you're measuring these in the first place.

2.1: That Envisat was launched from Guyana is just more extraneous information (just as SCISAT was launched from Vandenberg, etc.) Most of what is the paragraph from pg 7579 line 19 through page 7580 line 19 can be put into a table.

2.2.4, 2.2.5, 2.2.6, 2.2.7: While the pertinent details of other instruments should be reported, a lot of this information can go in tables.

3.: While near-coincident observation against altitude is very useful, it does not always adequately remove meteorological variability (as noted in the paper – particularly comparisons with HIRDLS). Reading the paper, I was wondering why the authors did not compare the ratio of results to a chemical clock like N2O (or even CH4), where these measurements were available. If the N2O results are reliable, such comparisons help clarify when a difference is truly because of meteorological variability or because of retrieval bias. I would have liked to see something like this addressed, and such comparisons, where possible, would make this a stronger paper.

Pg 7388, line 22: Change "artefacts" to "artifacts."

Pg 7590, line 9: Add comma after "e.g." so it reads ". . .too small, e.g., if not all. . ."

Pg 7592, line 11: Suggest changing colloquial phrase "decently represented" to "well represented."

Pg. 7592, line 1-2: The wording of the sentence could apply to distance as well as mixing ratio. This is confusing to read. You could say "the closest co-coincident profiles have the highest bias" or something similar.

Pg. 7594, line 7: Suggest changing "supposedly" to "presumably."

Pg. 7594, line 27: I don't mean to be facetious, but "steel blue" is a color of a car, not a line produced on paper.

Section 4.1.5 : This is a long, long paragraph – more than 40 lines. Can this be made shorter, and better broken up into sections?

A "global" comparison of MIPAS and HIRDLS on an altitude grid, and over the time scale of coincident measurements is not very useful. Pole-to-pole changes in the tropopause height plus secular change in CFC-11 make comparisons on an altitude grid less than definitive. If anything, show zonal means on seasonal timescales as in the appendix. This would avoid issues of (and paragraphs written about) artificial bumps.

Section 4.1.6: Another long, long paragraph. Same issue with the global comparison on altitude grid.

Pg 7599, line 16: A profile may be curved but still "straight" within the error bar. That doesn't make it "suspicious."

Pg 7601: line 6: If a retrieval is negative, it's likely because they're retrieving the linear amount and not the logarithm, close to the noise limit. If the negative MkIV results have an error bar that crosses zero, then there's no problem.

4.2.3 : Looking the ILAS error bars in Figure 14, the results of ILAS are so uncertain as to make this comparison useless. Suggest cutting out comparisons to ILAS.

Pg 7602, line 18-19: The meaning of "general turning points of the profile" is not clear.

Pg 7606, line 3: "which provides proof of large natural variability." This is not proved beyond any metrological variability. What does "natural variability" mean here? How is this "natural variability" distinguished from the natural variability of, say, a chemically-active species like ozone, PAN or chlorine nitrate?

Pg 7606, line 18-19: Unnecessary comment about MkIV not showing negative values.

Pg 7607 line 27- pg 7608, line 6: If you're trajectory calculations are not good, then don't do the comparison. See comment about using N2O for accounting for metrological variability.

4.4.5: Paragraph too long.

Pg 7610, line 2: "seems to see" is an unnecessary colloquialism.

Pg 7610, line 10. "even though this effect is supposedly minor." Why should it be minor?

Pg 7610, line 19: "seems to see" is an unnecessary colloquialism.

4.4.6: Paragraph too long.

Pg 7611, line 25: If the "bump" is misleading, then don't do analyses that show it.

4.5.1: Refer to the profiles by dates, not "first case" or "second case."

Pg 4614, line 4: "vice-versa above that altitude" is not clear phrasing.

4.5.3: As is the case with CFC-11, the ILAS results and comparison add little to the paper.

Sec 5. Suggest reiterating what "FR" and "RR" mean for the reader who jumps to the conclusions section.

Table 2: Include standard deviations in average miss time and distance?

Figure 4 and others: It may be consistent to have the vertical axis of each graph go to 30 km, but it reduces the utility of those profiles that reach only, say, 20km. It's also a little confusing to have two plots of each comparison profile, e.g., MIPAS-STR on its grid and on a new grid. Best just to keep plots on the same grid as MIPAS.

Figure 18: To ask the reader to skip back to Figure 2 for the caption is too many figures back. Just repeat the caption using CFC-12.

Figure 26-32: Same comment as above

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