**Atmospheric
Measurement
Techniques
Discussions**

Interactive
Comment

Interactive comment on "Position error in profiles retrieved from MIPAS observations with a 1-D algorithm" *by* M. Carlotti et al.

Anonymous Referee #1

Received and published: 16 November 2012

Review of 'Position error in profiles retrieved from MIPAS observations with a 1-D algorithm' by Carlotti et al.

This is a nice well written and well structured paper that does a very good job of quantifying an issue affecting most atmospheric limb-sounding instruments. While the core issue has probably been recognized and understood in principal by most people working closely with this technique, this is the first time (to my knowledge) that it has been quantified in this nicely systematic way and presented in a peer-reviewed manuscript As such the paper, while not a dramatic new result, is a worthy and welcome addition to the literature.

The figures are all clear and the level of detail in terms of the number of figures and

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

equations and the amount of discussion feels perfectly appropriate to me.

The standard of English is generally very good. I have noted a few places where minor wording changes could improve the clarity, but I may have missed some.

I am very happy to recommend this paper for publication in AMT pending a few minor clarifications and fixes I suggest below.

—- Abstract

Line 2: Spell out MIPAS first time? Also the first time it is used in the main text?

Line 6: "permits *us* to define"

Line 7: Somehow "position error is made" doesn't quite feel like the right way to say it. How about turning it around to "Therefore defining the geo-location of the retrieved profile to be at the tangent points leads to a 'position error'"?

While we're on this topic, many non-initiated readers might be confused that you're using "profile" to refer to something that is not truly vertical (with the point at each altitude having a different horizontal location). While, on reading the text and seeing the figures, it becomes clearer (though an explicit discussion of this point wouldn't hurt), I wonder if there is any way to make this point early on, such as in the abstract?

Line 9/10: By "targets" do you mean spectral regions or products such as O3, Temperature etc.?

Line 11: What is meant by "observations"? Is it target species (O3 etc.) or radiances/MWs. I think it's the latter, but you should probably make it clear. How about "spectral regions"?

Line 21: "entity" -> "concern"

— Page 6521

Line 26: Actually I believe Livesey and Read 2000, GRL were the first to document the

2-D approach.

Line 28: You might want to cite the MLS team who, I believe, use a 2-D approach for their operational retrievals. Also, consider mentioning the approach taken for HIRDLS on Aura and ISAMS on UARS (and potentially others), where an initial retrieval was followed by a gridding to obtain line-of-sight gradients which were then used in second retrieval.

—- Page 6522

Line 4: Not sure what is meant by "The entity of the possible...products"? Was "entity" supposed to be "entirety?" Even if so, I'm still not clear what is meant.

Line 11: You talk about temperature retrievals, but doesn't pressure play into this too? Given the strong link between pressure and density I would have expected this to dominate. I presume you're using an altitude grid for your retrievals rather than pressure, correct? It might be worth a few words giving a bit more detail on the way T/P/alt. and hydrostatic balance is handled. I know it gets more complicated when there are horizontal temperature gradients (e.g., the pressure at the tangent point is no longer the largest pressure along the ray).

Line 17: It is also possible to "jointly" retrieve temperature and composition? Do you want to cite cases where that is done also? Any thoughts on how your approach would work in this case? Probably best to do the full 2-D retrieval I guess.

—- Page 6523

Line 1: "on" -> "of"?

Line 6: "definitions" -> "the definition"

Line 8: "highlight" -> "the definition of"?

Line 15: Given the tragic loss of Envisat, do we want to consider rephrasing this discussion in the past tense? Sorry to bring it up.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

Line 20: "observation geometries" feels like the wrong wording. To me, it broadly implies "limb viewing" rather than, as you're using, one particular spacecraft position and viewing angle. How about changing it to "limb views" or something like that?

Line 26: Consider deleting "For the analyses", it makes the reader wonder if you're still referring to the "ESA ground processor" or to the approach you'll be adopting in this paper.

—- Page 6524

Line 8: I think it would be helpful to describe the typical resolution (along track in degrees/km, and vertical in km) of the grid you use, and how the along-track spacing compares to the along-track spacing of the MIPAS scans.

Line 11: "capable to" -> "capable of"

—- Page 6525

Equation 1: So the information is "inside" the cloves, and you're retrieving "clove means" correct? Others retrieve the vertices and assume 2-D interpolation of T/VMR etc. within the cloves.

Line 9: Again, perhaps better wording than "observation geometries". Use "limb views" instead?

—- Page 6527

Lines ∼4-10: A lot of the discussion here is redundant with the information in the caption. Consider thinning it down in the main text?

Line 12: "should be" feels a bit too strong to me. How about softening it to something like "hence they indicate the 'optimal' geo-location for the retrieved profiles, being the one that is where the bulk of the atmospheric information has derived"? Or something like that?

Line 16: Somehow this doesn't feel quite right to me, perhaps just adding "effective" before "error" would help?

Line 25/26: This makes me wonder if some kind of "width" measure is needed (e.g., a horizontal averaging kernel). Just an observation for your consideration.

—- Page 6528

Line 14: Is (c) for all points along the orbit (i.e., like b), or just for the south pole again (i.e., like a).

Line 25: Move the close parenthesis to after "measurements"

—— Page 6530

Line 17: This begs the question of why you don't just set it to zero.

—— Page 6531

Lines 7-13: I'm not sure I follow this. For the longitude discussion are we talking about the top/bottom of the orbit (it's not 90-degree inclined is it?) Which "halves" are we talking about?

—- Page 6532

Line 5: Does this mean there are no correlations above/below? Sounds a bit like you're picking the "nicest result". Perhaps describe what it's like elsewhere?

Line 17: "blank tests" is rather odd wording. Why not use "control tests" or something.

Line 23: So you mean at the tangent points, correct? If so, make that clear, if not, I guess it needs to be clearer also.

Line 29: I presume you are advocating doing only one interpolation from the provided field, rather than interpolating from the field to the blue points, and then from there to the red ones? It might be good to make that clearer in the text.

—- Page 6533

Lines 5 and 6 (once on each line): "left panel" of which figure?

—- Page 6534

Line 19: "sort of" is unscientific. Just delete and say "an effective".

—- Page 6536

Line 2: "evidence" -> "display"

Line 5: insert "factor" before "responsible"

Line 19: Then why not add a priori information to enable your analysis in more cases?

While all this error quantification is nice to have, I do think you should make the point here that in order to do it "right" one should really simply do a full 2-D retrieval, as you've outlined in your previous papers.

—- Page 6537

Line 3: Are temperature gradients required? I would have thought that this was linear enough that the position error would be there all the time, and change little with the structure of the atmosphere.

Line 14: "effectively perform within the VMR retrievals" is rather unclear.

—- Figure 2

"The polynomial fitting the crosses" -> "A polynomial fit to the crosses"

"The vertical" -> "The blue vertical"?

(c) is this for all latitudes or back to the south pole again?

—- Figure 3

Add "The" before "MIPAS ground segment"

—- Figure 6

"shadowed" -> "shaded"

—- Figure 9

"blu" -> "blue". Also why "r.m.s." when you have "VMR"? Probably better to be consistent.

Interactive comment on Atmos. Meas. Tech. Discuss., 5, 6519, 2012.