

I congratulate the authors of the manuscript for the extensive re-work implemented in the paper and for positively accepting the comments provided in the first round. I think the quality of the manuscript has been improved with respect to the first submission. I still have two major points that need to be addressed and some minor/technical considerations that you can find below.

Major points

- The errors analysis has been substantially improved but the paragraphs from line 262 to 279 needs a major revision. First, if the objective is to assess the sensitivity to the a-priori, then you could skip lines 262-264, as AK are meant to assess, as you say, the sensitivity to the true profile and not to the a-priori. I suggest to move this to the description of MART, mentioning that the algorithm doesn't explicitly provide AK and directly start with "We assess the sensitivity of the retrieval to the prior....". Fig. 4a is still not consistent with 4b: according to the right panel, the error from perturbing the a-priori profiles is small outside the tropical UTLS. As a consequence, the sensitivity of the retrieved profile to the a-priori is small in the middle stratosphere and A_0 should also show close to zero peaks above 15 km. The sensitivity to the a-priori gets larger in the lowermost altitudes and above 35 km, as your retrieval has not enough information from Vis radiance. Unfortunately, Fig. 4a shows the opposite. The only reason I can think of, is that you are plotting the wrong quantities: can you specify what is δx and δx_0 in Eq.6? In my opinion the correct quantity for δx is the difference between the profile retrieved with the perturbed a-priori and the profile retrieved with the unperturbed a-priori. This should be small in the middle stratosphere and getting larger at the altitude boundaries.
- It is not clear to me what has been done with the profiles affected by clouds. Especially in the conclusion, the authors stress that the lower stratospheric biases are linked to the presence of clouds and that the profile is constrained to the a-priori. For the validation, have you included values at altitudes affected by cloud? In case you have, I strongly suggest to filter out these values in the validation, to avoid obvious biases that come from the impossibility to actually retrieve ozone at those altitudes. This might already reduce some of the biases in the tropics. Why do you expect ozone abundances above the cloud top to be also overestimated by 25 % (as you say at line 547)? Other than aerosols, another source of biases could be the usage of an outdated ozone cross-section, and not having taken into consideration NO_2 in the forward modelling.

Minor considerations

I still don't find really informative the plots 7, 9, 12, 15, but I leave it to the discretion of the authors. I also point out the fact that using Eq. 7 would inflate the resulting values in panels (b) of these pictures, as the very large relative differences in the tropical UTLS are possibly having a large weight in the annual mean relative difference that you are plotting. If you use the mean of the absolute differences and then divide by the mean profile this would be reduced.

The description of Fig. 11 raises a couple of questions. First, the positive bias at southern high latitudes is attributed to surface albedo biases: have you retrieved surface albedo as well? I haven't found this information in the retrieval description. If you haven't, then the missing albedo retrieval can also cause biases in the lower stratosphere. Second, why is here introduced the transition between UV and Vis ranges if you only used the visible range? I think that the positive bias above 35 km is simply related to the lack of sensitivity of the visible range at these altitudes.

Technical corrections

L14-15: You could introduce first limb profiler (LP) at line 14 and then use it at line 15.

L30: "in low-altitude tropical regions." → "in the tropics at low altitudes."

L60: What does "with operations" mean?

L154: “adheres” → “corresponds”

L155: Add “ensuring” before consistency

L161: The first sentence of this paragraph is not really informative, I would remove it.

L173: Add “perturbed” after “aerosol extinction profiles”

L174: “When the aerosol varies... the radiance profiles is...” → “We perturbed the aerosol extinction profiles with factors from 0.1 to 10 and we found that the radiance profile is...”

L182: I suggest “Variations in radiance and CTV due to perturbed aerosol extinction coefficients as reported in the legend”.

L199: Add “the” before “cloud top height”

L217: I would remove “During the ozone retrieval process,” and leave the rest of the sentence.

L226: “as the forward modelling” → “as forward model”

L233: “referenced from the research results of” → “taken from”

I would remove the last sentence at line 244-245.

L251: “achievements” → “studies”

L309: “relative to” → “with respect to”

L358: “lower boundaries of retrieval” → “lower retrieval boundaries”

L369: “may be caused” → “is caused”

L385: “The MLS obtained” → “MLS provides”

L400: “with in altitude” → “with altitude”

L419: Can you please better describe what is shown in Fig. 11? The sentence is hard to read.

L425: “retrieval uncertainties.” → “the discrepancies in relative values.”

L451: “(/cm³)” → “(molecule/cm³)”

L512: “bias are” → “bias is”

L523: “applies the ozone...” → “applies an ozone...”

Dear Lars,

I think the authors have addressed most of the provided comments and extensively revised the manuscript. The quality of the retrieved product is the same as before: rather an initial retrieval version applying a different methodology with respect to the existing OMPS products, than a mature data set. I suggested some more points that need a revision. With these additional changes I think I would give them the chance to publish their results, or in case ask for a third opinion on this.

Kind regards

Carlo