

Interactive comment on “The influence of mixing on stratospheric circulation changes in the 21st century” by Roland Eichinger et al.

Roland Eichinger et al.

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Dear anonymous referee #1,

thank you for investing time and effort to review the paper.

Please find below our point by point answers (in black) to your comments (in blue).

Best regards

Roland Eichinger, Simone Dietmüller and Hella Garny

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This manuscript presents an examination of the changes in the age of stratospheric air in CCMI model projections for the 21st century. This includes not only an analysis of the change in the age but also an analysis of the relative role of changes in mixing and residual circulation in these changes and an analysis of changes in the mixing efficiency. This analysis shows that changes in the mixing rather than just advection by the residual circulation plays a major role in simulated decreases in the age of air. Further, differences in the mixing efficiency are related to differences in PV gradients. These are very important results, and greatly improve our understanding of modeled changes in stratospheric age of air.

This manuscript is certainly worth publishing in ACP, and it could be accepted as is. However, I think it would be greatly improved if the writing was made more concise and if numerous grammatical errors were corrected. The specific comments below include some examples, but the need for more concise and grammatically correct writing applies throughout the paper.

We have corrected the errors you found, those of reviewer #2 and also went through the paper again and found and corrected a few more. We are convinced that proof reading will capture the remainders. The same accounts for conciseness of the article, but see also the marked-up "diff" file that will be attached to the final response.

I think the manuscript would be improved if it was more concise. This applies for the whole manuscript, but I think is highlighted by the final section. The final section should summarize the results of the study, and does not need to repeat information on the analysis steps. Nearly all paragraphs start with 1-2 sentences that are not needed, e.g.,

See above, we have made efforts to make the paper more concise.

p 23, l 12-14 When we linearly separate ... we find that generally ... " could be written

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simply as "Linear separation of the DeltaAoA into changes by mixing and residual circulation shows that the contribution due to mixing (DeltaA_mix) dominates."

Thanks, done.

p23, l 27-29 "In order to gain ... " These 2 sentences could be removed and just say "We have shown that mixing efficiency controls ..."

Done.

p24, l 7: First 2 sentences again not needed, or at least replaced by a short sentence. The method of separation does not need to be described in summary. 2. I think "age of air" rather than "circulation" should be in the title. The focus of the paper is on the age, and many people will read "circulation" as the residual mean circulation.

Done.

3. The order of first and last names of the authors need to be reversed in the author list.

Done.

4. There are lots of grammatical errors. A few are listed below, but this is only a small subset. The paper needs a very careful proof reading.

See above, we have corrected many mistakes now, proof reading will certainly find the remainders.

pg 7, l 21: "They found out that ... " should be "They showed that ... "

Done.

p 12, l 6: "Moreover, as the only model, ULAQ"

Changed to read:

Moreover, ULAQ is the only model that ...

pg 12, l 11: "reddish colours" refer to values and not colors.

Changed to

regions where the differences of residual transport accounts for less than 50% of ΔA_oA

p 12, l 23: "vstar integral". Should at least be "v*" but even then not a good description.

Done.

p 12, l 27: "Note that for this, data"

Done.

p 13, l 8: "have found out" See above.

Done.

p 13, l 11: "we now lay our focus"

Changed to

we now focus

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p 14, l 15: "In consequence"

Done.

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2018-1110>, 2018.

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