Atmospheric
Chemistry
and Physics
Discussions

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

Anonymous Referee #1

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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 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 result, 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 great 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.

SPECIFIC COMMENTS

1. 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.,

p 23, l 12-14 "When we linearly separate ... we find that generally ..." could be written simply as "Linear separation of the DeltaAoA into changes by mixing and residual circulation shows that the contribution due to mixing (DeltaA_mix) dominates."

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

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.

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

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.

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

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

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

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

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

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

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

p 14, l 15: "In consequence"

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