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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Effects of mixing on resolved and unresolved scales on stratospheric age of air" *by* Simone Dietmüller et al.

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This paper uses output from two global models to examine in detail the individual components that determine the modeled mean age of air. This analysis is unique and very interesting in that it shows specifically how different the mean age can be among the same model free running vs. nudged, and two different models using the same meteorology as input. The unresolved mixing contribution to the age of air is not large overall but still interesting to see it's contribution and how different it is among the models. This type of analysis can help explain why models differ among themselves and from observations.

My only criticism of the paper is the poor grammar in many places. I've tried to make comments on some obvious errors but the paper could use further editing. Overall the

techniques of the paper are well described and the figures are clear. I recommend publication with consideration of the minor grammatical comments below.

Specific comments:

Pg 1, line 22: add comma after "AoA", add "such" before "as" and remove "e.g."

Pg. 2, line 4: ". . .which used the output from 15 CCMs. . ."

Pg. 2, line 7: remove "if"

Pg. 2, line 13: ". . .(Stiller et al., 2012), which show. . ."

Pg. 3, line 27: add comma after "EMAC"

Pg. 5, line 20: 340 K is much below the tropical tropopause, why not use 380 K?

Pg. 6, line 3: ". . .simulation output, RCTTs are. . ."

Pg. 6, line 22: remove the comma

Pg. 6, line 24: ". . .poleward of about. . ."

Pg. 6, line 32: ". . .as the difference. . ."

Pg. 8, line 2: remove "building"

Pg. 8, line 8: remove "is"

Pg. 8, line 12: change "is" to "are"

Pg. 8, line 16: change "is" to "are"

Pg. 8, line 22 ". . .RCTT follows the. . ."

Pg. 8, line 32: change "this" to "these"

Pg. 9, line 2: change "is showing" to "shows"

Pg. 9, line 4: change "is leading" to "leads"

Pg. 10, line 6: ". . .60S thus. . ."

Pg. 11, line 4: change "are ending" to "end"

Pg. 11, line 15: change "to" to "with"

Pg. 11, line 16-18: Not sure what you are trying to say in this sentence.

Pg. 11, line 18: ". . .mixing also leads to. . ."

Pg. 11, line 30: remove comma after "fact"

Pg. 11, line 31: change "estimates"

Pg. 12, line 3: "In contrast, in the. . ."

Pg. 12, line 4: move comma from after "clear" to after "Thus"

Figure 4a: The label on the x-axis, "rel. contribution to upwelling", is a bit confusing. I assume what you're showing here is the magnitude of the upwelling relative to the direct RC1SD estimate expressed as a fraction. If that's the case, the label should read more like "Relative Magnitude Compared to RC1SD direct".

Pg. 12, line 8: change "presents" to "has"

Pg. 12, line 28: change "as" to "than"

Pg. 12, line 29: "model system" is two words

Pg. 13, line 5: remove "already"

Pg. 14, line 7: change to "Stippling"

Pg. 14, line 17: change "also" to "including"

Pg. 14, line 19: change to "surprising"

Pg. 15, line 35: change to "not explaining" to "does not explain"

Pg. 16, line 3: change "depended" to "dependent"

Pg. 17, line 10: Aspects of the uncertainties in the observed AoA trend that you mention were examined in Ray et al. (2015) so that should at least be included as a reference along with Garcia et al.

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