Atmospheric
Chemistry
and Physics
Discussions

ACPD

Interactive
comment

Interactive comment on "Quantifying the effect of mixing on the mean Age of Air in CCMVal-2 and CCMI-1 models" *by* Simone Dietmüller et al.

E. Ray (Referee)

eric.ray@noaa.gov

Received and published: 2 February 2018

This paper examines the age of air and mixing, both horizontal and vertical, among a suite of chemistry-climate model output spanning two projects over the past decade. This is a very nice analysis that highlights key aspects of mixing that lead to discrepancies among modeled age of air. It's surprising to see the importance of vertical mixing and diffusion as compared to horizontal mixing on the mean ages. Ideally this work will point to areas of focus to help reduce the persistent spread in the modeled age of air.

The results are well organized and described and the topic is appropriate for ACP. I recommend publication with consideration of the specific comments below.

Specific comments:

Printer-friendly version

Discussion paper

Pg. 2, line 11: switch "also" and "be"

Pg. 7, line 13: "Karlsruhe, Germany" seems to be a mistake

Pg. 8, line 30: remove "allows" and change to "separates"

Pg. 10 and references: Problem with the "Ray and Andrews, 2017" reference.

Pg. 11, line 22: add "of" after "question"

Pg. 16: I was unsure in reading the first paragraph of Section 4.2 whether the correlations shown in Figure 4 were done for all of the models or not. At the end of the paragraph you do mention the sample size of 17 models but I would mention that up front to make it clearer. How much variability in the correlations is there between models?

Pg. 16, lines 22,23: add commas after "RCTTs" and "tropical pipe"

Pg. 17, line 16: add "a" before "measure"

Pg. 18, line 10: change to "different" and remove "strong relative"

Pg. 18, line 20: remove "exemplary"

Pg. 22, line 5: remove "also" and add comma in that space, change "in parts" to something like "partly"

Pg. 24, line 3: change "to" to "by"

Pg. 24, line 6: remove "here"

Pg. 24, lines 8-9: ". . .twice in the figure, once each for the CCMI-1 and CCMVal-2 simulations."

Pg. 24, figure 8: A more descriptive title on the figure would be helpful.

Pg. 25, lines 2-3: The statement that wave driving differences can't explain mixing efficiency differences might be too strong based on the small sample size statement

made later in the paragraph.

Pg. 25, line 9: change to "explain"

Pg. 25, line 12: change to "influence"

Pg. 25, line 31: change to "sample"

Pg. 25-26: The discussion of the model's advection schemes and resolution in these two pages could be shortened in my opinion. The results are interesting but the discussion section is long. Since there is no systematic relationship found among the advection schemes it would be sufficient to just mention that without going into the details.

Pg. 27, line 23: remove "could" and change to "showed"

Pg. 27, line 25: add comma after "Thus"

Pg. 28, line 3: change "is" to "were"

Pg. 28, line 4: change "do" to "did", change "also do except" to "expect"

Pg. 28, line 6: remove "does" and change to "caused"

Pg. 29, line 6: change to "explain"

Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2017-1143, 2017.