

Interactive comment on “How robust are stratospheric age of air trends from different reanalyses?” by Felix Ploeger et al.

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We thank the Reviewer for her/his positive judgement of the manuscript and the good comments. In the following, we address all comments and questions raised (Reviewer's comments in italics). Text changes in the manuscript are highlighted in color (except minor wording changes).

General comments:

This study presents an inter-comparison of three reanalyses with respect to the simulation of the Brewer Dobson circulation (BDC). Age of air (AoA) was used as a metric for the BDC and estimated by using the Chemical Lagrangian Model of the Stratosphere (CLaMS) driven by the respective reanalyses. Beside stratospheric mean age, the

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full age spectrum was calculated to investigate the robustness of the representation of climatology, seasonality, and trends of the BDC in reanalysis data sets. The paper is well written and clearly structured and provides a comprehensive analysis of the stratospheric BDC in different reanalysis data sets. It is suitable for publication in ACP after minor revision.

1. The first general comment refers to the usage of terms like "older age". It is a similar expression like "warmer temperatures (instead of higher temperatures)" and used in common speech (everyone knows clearly, what is meant), although it is a false use. I would suggest to replace this notion by "higher age" or "older air", that are in form and content correct descriptions. This replacement should be done throughout the text.

Thanks for pointing this ill formulation out. We changed it according to the Reviewer's suggestion throughout the manuscript.

2. Some of the coloured figures are hard to read, because the description of contour lines are too small or the colour is too dark (Fig. 6c, dark blue contour lines on dark grey colour), Fig 7d-f, Fig. 13.

Thanks for this remark. We agree that the choice of line colours is not optimal for some of the panels (e.g., Fig. 6c, Fig. 7e). Unfortunately, for such multi-panel figures it is almost impossible to find colour schemes which are optimal for all panel. The colour choices in the manuscript are already the result of trying to optimize readability for all sub-panels with using one common colour scheme.

3. Please explain how you estimated the AoA trends and significance. Did you consider correlations between near by values, when you calculated the trend patterns?

We calculated the trends simply from linear regression of monthly mean time series after deseasonalizing (by subtracting the mean annual cycle). The significance (e.g., in Fig. 7) is measured in multiples of standard deviation of the linear trend (as stated in the figure caption). We compared our results also to results from the more sophisticated

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regression method by Diallo et al. (2017), but found no significant differences.

Minor comments:

Page 1, line 2: “analyze” or “analyse” ?, please be consistent throughout the text.

We changed it everywhere to “analyse”.

Page 2, line 27: *Please, do not cite publications, which are in preparation and not available to the reader.*

The publication by Hauck et al. is now accepted and available, and the reference is updated to ACP.

Page 9, line 25: *Did you mean Fig. 2c? Fig. 2f does not exist.*

Thanks for the careful reading. The respective remark actually refers to all three sub-panels of Fig. 2, and we simply removed the “f”.

Page 22, line 10: *“Birner, personal communication”*

Changed.

Page 24, line 4: *The corresponding finding by Chabrillat ...*

The entire sentence has been rephrased, also including the comments by Reviewer 3.

Page 28, line 32-33: *Please cite correctly: Chabrillat, S., Vigouroux, C., Christophe, Y., Engel, A., Errera, Q., Minganti, D., Monge-Sanz, B. M., Segers, A., and Mahieu, E.: Comparison of mean age of air in five reanalyses using the BASCOE transport model, Atmos. Chem. Phys., 18, 14715-14735, <https://doi.org/10.5194/acp-18-14715-2018>, 2018.*

Corrected.

Page 30, lines 24-26: *Please cancel the citation “Hauck, M ...”*

The citation by Hauck et al. has been updated now to “accepted for publication in ACP”.

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Page 32, line 2: *Please cancel “in preparation”.*

The publication by Podglajen and Ploeger also has been updated for the correct ACP reference.

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2018-1281>, 2019.

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