

Response to Anonymous Referee #2:
(our response in italics)

This paper analyzes trends in age of air, the stratospheric circulation, mixing and wave driving in CCM output. A novel aspect of the analysis is the inclusion of an adjustment for the change in geopotential height of pressure surfaces. This adjustment explains one of the main features in the age of air trends. The analysis is well done and helps further our understanding of model age of air trends in the recent past and future. My main criticism is on the section describing the individual wave forcing trends that is too detailed and would be better off mostly moved to the supplement. I suggest publication with consideration of the specific comments below.

We are grateful for the reviewer's positive review, valuable comments and suggestions, which helped us to improve the quality of the paper.

We have adapted all of your suggestions, please refer to the revised, marked up version of the manuscript.

Following is our reply to the comments that led to more substantial changes than rewording:

- Figure 2: Colorbar tick marks are so thick it's hard to see the colors.
- Lines 240-245: Really hard to see the changes in trends between the periods due to the different scaling as you mention. You might think about how to adjust this if you really want the readers to see the differences between the time periods.

Figure 2 has been modified to a uniform colour scale and the problem with tick marks has been fixed.

- Lines 311-314: The description of the trends and how they're shown in Figure 5 is a bit confusing. It took me a while to figure out that you're showing the same value in the blue bars in both the NH and SH sides of the plot, and that the red and green bars don't have to do with NH or SH but only with the different corrections. I would suggest thinking about a different way of showing this. Probably best to have a third plot labeled 'Tropics' that just shows the bars, blue, green and red so it's clear that you're comparing the tropical upwelling flux trends. Then the NH and SH plots could be narrowed quite a bit since they will just have the symbols.

Figure 5 has been modified according to your comments. Third plot "Tropics" has been added, plots narrowed and the symbols are thicker in the revised version.

- Figure 6 (and 2): Since you show trends in days/decade in Figure 5 it would be nice to see the other trend figures in those units. Also helpful to label the colorbars in the figures.

Figure 6 and 2 has been modified accordingly to the units days/decade.

- Section 3.3: This section is tough to get through without getting bogged down in trying to understand all of the different trends shown in Tables 1 and 2 and what they mean. I would highly suggest trying to distill this section and put the tables in the supplement. You really get the main points across in the first and last two paragraphs of the section.

Thank you very much for your suggestion. Section 3.3 has been shortened, Tables 1 and 2 have been moved to the Appendix (Tabs. A1, A2) together with the description of the seasonality of the trends.

New table (Tab. 1) has been created showing only annual local residual circulation and wave driving trends. One paragraph has been rephrased and one added to summarize that neither the annual nor seasonal local trends can be unambiguously linked to the AbM and RCTT trends.

See also our response to the Referee #1 regarding the wave driving section.