

## Response to Editor: Hemispheric asymmetry in recent stratospheric age of air changes

Thank you for the suggestions, we have implemented the changes, as described here in blue text.

L19: Please consider alternative phrasing to avoid two parenthesis sets together “... (BDC) (e.g., Stiller et al., 2017; Bonisch et al., 2011; Fu et al., 2019)”

It is difficult to reword the sentence in this case as it is necessary to both define the BDC acronym and provide references. We have instead changed the text so that the acronym definition and the references are in the same set of parentheses: “[...]an altered Brewer-Dobson Circulation (BDC, e.g., Stiller et al., 2017; Bönisch et al., 2011; Fu et al., 2019), amongst others.”

L46: Please consider alternative phrasing to avoid two parenthesis sets together “... (CTM) (Chipperfield, 2006)”. Please consider alternative reference as this one is used in the immediately following sentence. I suggest Monge-Sanz et al. (2007), which used the same CTM and focused on comparing different reanalyses, instead of comparing model configurations.

The sentence has been changed to “A Chemical Transport Model (CTM) can be used to calculate AoA using reanalysis fields as input (e.g., Monge-Sanz et al., 2007).”

L 108: Please add “in CLaMS simulations” --> “..for each reanalysis in CLaMS simulations ..”

The sentence has been changed to “The same CLaMS simulations for each reanalysis are used here.”

P 10, Table 1: Please Include in the caption the fact that the results shown here come from the average of the four runs driven by the corresponding four reanalyses. This is specified in the main text, it will be clearer to have it here as well.

The caption has been changed to “Trends in AoA interhemispheric difference (SH–NH) for 2004–2017. Values are the mean AoA trend derived from ACE-FTS and four CLaMS runs, each using input from a different reanalysis. Trend units are year/decade. Errors are the  $2\sigma$  uncertainty.”

P 11, Figure 5: Please add to the caption that the hatching for those two reanalyses is found at the top levels at the highest latitudes shown (they are difficult to spot).

The caption now specifies that the hatching is at the highest latitude and pressure levels.

L 236: Please delete “for” and replace “at latitudes  $>-40^\circ$ ” with “at latitudes larger than  $40^\circ\text{S}$ ”

The sentence has been changed to “The AoA trend in the SH is largely insignificant, except between 10 hPa and 30 hPa at latitudes larger than  $40^\circ\text{S}$ , where the air is getting younger by up to 0.2 years/decade.”

L 244: Correct typo “are”

Done

L245: Delete “do”

Done

L 251: Please add one sentence clarifying that these differences when adding ACE-FTS information specifically apply to CLaMS, not necessarily to all CTMs. Please also add a brief mention about the overall agreement between your ACE+ERA-Int results in Fig.7 and those from Fig. 5.38 in Monge-Sanz et al. (2022).

We have specified that are results are for the CLaMS model: “The dissimilarity between the CLaMS-only AoA trends for each reanalysis, compared to the similarity of the AoA trends derived from ACE-FTS and CLaMS for each reanalysis clearly illustrate the value of using observations when determining AoA trends, rather than relying solely on the CLaMS model and reanalysis results.”

Comparison to Fig. 5.38: As our manuscript discusses the large dependence of the AoA trends on the time period considered in the analysis, we find it difficult to directly compare our results to those presented in Fig. 5.38 of Monge-Sanz et al. (2022), as that figure shows trends for 2003-2011 (and is based on the TOMCAT CTM). We instead include the following sentence:

“The differences between AoA trends derived from a CTM forced with different reanalyses are also apparent in other time periods and for CTMs besides CLaMS, as demonstrated by Monge-Sanz et al. (2022).”

L 284: Please specify that this is for ERA5 --> “With ERA5 we also found that...”

Done

L 442: Please also add the url identifier for this reference:

<https://orfeo.belnet.be/handle/internal/9819>

This URL has been added to the bibtex file. Note that it does not appear in the compiled pdf with the current settings on the latex template- the copyeditor for the journal will have to make sure that the URL appears in the paper once it has received the final formatting.