

Atmos. Chem. Phys. Discuss., referee comment RC2
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Comment on acp-2022-276

Anonymous Referee #2

Referee comment on "Dynamics of ENSO-driven stratosphere-to-troposphere transport of ozone over North America" by John R. Albers et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2022-276-RC2>, 2022

This is a very well-written article that investigates the role of ENSO on the ozone transport from the stratosphere deep into the troposphere (i.e., STT) on sub-seasonal to seasonal timescales in the midlatitudes. The authors are trying here to reconcile a few theories that were previously suggested and disentangle some of the conflicting results from the literature using well design WACCM model simulations. The scientific questions here are within the scope of ACP and the result of this study will be of high interest to the community. The authors also provide a clear explanation for the results and conclusions, and I only have a few minor clarifications and technical comments. I recommend this article for prompt publication

Specific comments

119 "anomalies": Figure S2 only shows climatological values and not anomalies (if I read the figure S2 caption correctly).

149 - 151 You may want to mention the tracer tendency equation and cite it (if this is what you mean here by referring to the tracer gradient): O_3/dt is proportional to the $\sim -v \cdot (\partial O_3 / \partial y) + \text{mixing terms} \dots$

158 "in the lowermost stratosphere" Please provide pressure levels range (70 -100 hPa ?) here for reference as you did above to be consistent?

162 "anomalies": add at which levels

160 – 173: The idea of ENSO teleconnection needs to be explained better. In particular, what is the role of vertically deep teleconnections in the STT variability? I think what you mean here is that this ENSO teleconnection modifies the amount of available ozone for STT, which strongly depends on the time of the year.

Technical corrections:

Figure 2: Please add a few latitude circles to make it easier to locate information from the text

All figures: increase the font size for all figure labels and axis

174: "30-200hPa": change to 20-200hPa to be consistent with numbers in line: 169