

Interactive comment on “On the impact of future climate change on tropopause folds and tropospheric ozone” by Dimitris Akritidis et al.

Anonymous Referee #2

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The authors explore the roles of future climate change in tropospheric ozone changes using a global chemistry-climate model with artificial stratospheric ozone tracer. The results of this study emphasize the importance of downward transport of stratospheric ozone associated with tropopause folds. You've convinced me that changes in tropopause folds are regulated by upper-level jet. Also, I agree that projected increase of tropospheric ozone is associated with changes in BDC and STT. However, I find the linkage between the presence of folds and changes in ozone is relatively weak. I would expect shallow tropopause folds, which are located above 200hPa, account for the most changes in folding frequency. How do these shallow folding activities affect the ozone near 400-500hPa or even below? We know that summertime large-scale subsidence at 500hPa over Mediterranean is projected to change [Cherchi et al., Clim

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Dyn (2016)]. Perhaps the large changes in ozone near 400hPa are primarily associated with changes in descent, while the presence of tropopause folds is secondary. Except the one concern I've pointed out, this paper is very well structured and is certainly within the scope of ACP, although improvements can be applied to make it clearer. Therefore, I only have some minor comments.

1. What's your rationale for choosing RCP6?
2. Ozone is difficult to simulate in models due to biases in photochemistry processes and precursor emissions. Have you evaluated model performance in ozone? Discussion regarding how biases in EMAC would affect the estimated changes is necessary.
3. In Fig.1, wintertime medium and deep fold frequency are much higher than those shown in Škerlak et al. (2015). Will it affect your results? Also, it'd be good to address that the climatological distribution of tropopause folds in your model is consistent with what shown in previous studies.
4. I'm worried whether the future changes of tropopause folds are robust. Have you compared with other models?

Detailed comments:

1. P18, Fig.4 caption, “black” -> “green”, “circles” -> “dots”
2. P6, line 13, “contrary” -> “on the contrary”
3. P7, “positevely” -> “positively”

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