

Review of C. E. Clapp et al. “Distribution of cross-tropopause convection within the Asian monsoon region from May through October 2017”

The manuscript by Corey Clapp and coauthors provides an analysis of geographic and intraseasonal distribution of cross-tropopause convection in the Asian Summer Monsoon region. The analysis relies on the overshooting tops database spanning a full monsoon season in 2017 and including nearly 41,000 events derived from Meteosat-8 geostationary imagery data. The distribution of overshooting tops is compared with OLR and precipitation data. The study points out significant intraseasonal and spatial variability of tropopause-overshooting convection in the Asian monsoon region.

The study represents a valuable contribution to a better understanding of the source regions and variability of the tropopause-overshooting convection in the Asian monsoon region. With that, the presentation of the results and their current context require careful revision before acceptance to ACP.

General remarks.

- The 2017 Asian monsoon season addressed by the study was the target of StratoClim campaign, which included extensive airborne and balloon-borne measurements across the Southern slopes and the North India regions. There is a large number of studies that followed this experiment, some of which are cited in the paper however this overview is far from being complete. I suggest that the authors make sure to mention all the relevant papers and carefully discuss the present results in relation with the previous work. More specific remarks on that matter are provided hereinafter.
- The graphical material is often hard to read, this is particularly the case for the OT maps. I suggest to use a different color map or otherwise make sure that the coastlines are clearly visible in each panel.
- I wonder if is the authors could provide an estimate of the total OT area, which would help understanding the magnitude of the impact of tropopause-overshooting convection. Such information could be used to constrain the modeling studies.
- Given the content of the last section, it should rather be named “summary and discussion”

Specific remarks.

L29 – 37. Here the authors define the study objectives. I would suggest to move it towards the end of the Introduction.

L40 – 45. The referencing should be completed with StratoClim studies, such as Brunamonti et al., ACP 2018; Lee et al., 2021; Lamraoui et al., ACPD 2022). In particular, the source regions for the cross-tropopause convection are discussed in detail by Khaykin et al., ACP 2022.

L55 – 57. For the effects of eddy shedding one might refer to Fujiwara et al., ACP 2021. For the transport of Asian pollution towards midlatitudes a pertinent reference would be Khaykin et al., ACP, 2014

Fig. 1 caption. The description of the panels should be in order

L.123. Fig 1c -> Fig. 1d ?

L. 183-185. I am not sure to understand the line of logic here. What is meant by the particular efficiency of TB due to central location?

L.191-199. This paragraph is particularly difficult to follow. The term “convective activity” seems to be used for both the OT and OLR features, which renders unclear the discussion on their similarities.

L.202 I do not see any significant agreement between OT and precipitation distributions. Overall, I find the discussion that follows largely unclear.

Fig. 2. The panels are too small and barely readable. It is nearly impossible to distinguish between the different curves of similar color.

Fig.2 caption. Wrong referencing to Fig. 1

L.220-225 I believe a brief mention on the limited representativeness of OT evolution would be pertinent here.

Fig. 3 Where does an isolated feature at highest altitude come from?

L. 244. Altitude distribution -> vertical distribution

L.254 redundant with Fig. 3 caption.

L.396 I do not fully agree with the statement regarding the match between OLR, precipitation and OT, or at least it is not obvious from the figures. Alternatively, if that is indeed the case, does the OT analysis provide an added value for a better characterization of ASM convection?