

# ***Interactive comment on “Dehydration and low ozone in the tropopause layer over the Asian monsoon caused by tropical cyclones: Lagrangian transport calculations using ERA-Interim and ERA5 reanalysis data” by Dan Li et al.***

## **Anonymous Referee #2**

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### General comments:

This study presents low ozone and low water vapor layers observed in the tropopause layer over Kunming, southern China and discusses them from the perspective of air mass transport and dehydration. The balloon-borne observation results are unique and interesting. The analysis method combining satellite measurement data with trajectories driven by state-of-the-art reanalysis data is adequate and persuasive. The results are impressively presented and it seems to be fascinating for wide range of readers, even though the study is based only on two case studies. In my view, the

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paper should be published in ACP after minor revision. Some specific comments and suggestions are listed below, they are all minor.

Specific comments:

- Line 104–106: What is definitional or calculational difference between TBB and CTT? How about making a brief explanation of the two, here. Further, are the coloring somewhat different between Figs. 7 and 14? Region where  $> 295$  K is colored in deep red for Fig. 7, but in white for Fig. 14?

- Section 3.1: How about adding the definition or citation for “lapse rate tropopause.”

- Line 204–206: The authors describe “Three days later, the mean water vapour mixing ratio of the same air parcels are about 3 ppmv, marked with red dot (right-hand side). The minimum SMR observed by CFH is approximate 2.7 ppmv in Kunming on 8 August,” From this statement, I expect that the supersaturation had been observed because the water vapor mixing ratio is higher than the SMR. However, the RHFP shown in Figure 4 is lower than 100% through the whole altitude. Is the “SMR” in line 205 a mistake of “water vapor mixing ratio”?

- Line 209–211: I feel the descriptions are a little sudden. How about writing a little more particularly about what you are assuming and what you are comparing? For example, how about adding a statement, such as “If we assume that the air mass retains water vapor mixing ratio when it had been observed by the CFH,” at the beginning of the sentence “air parcels have experienced supersaturation (RH<sub>i</sub> up to 180%) over ...”

In addition, the following is just a suggestion, but if the Lagrangian minimum SMR (SMR<sub>min\_i</sub>) that the each trajectory (trj<sub>i</sub>) has experienced after the final convective encountering (latest T<sub>bb</sub> < T<sub>trj</sub>) is estimated, and the average SMR<sub>min</sub> of all trajectories is calculated, can it make additional discussion or provide interesting insight by comparing the average SMR<sub>min</sub> with the water vapor mixing ratio observed by CFH? Also the case 2 is.

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