Anonymous Re-Review of *In-depth study of the formation processes of single atmospheric particles in the southeastern margin of Tibetan Plateau*

Anonymous Reviewer

May 2023

1 Summary

The response by Li *et al.* addressed this reviewer's comments in a point-by-point manner. While the authors had adequately addressed many of my comments, this reviewer feels that the authors have not fully addressed several main comments. To increase the clarity of the paper, and the validity of the results, I suggest that the authors addressed the comments below.

2 General Comments

- Reviewer Point 3: I suggest that the authors start their conversation about the size distributions on Line 270, with their caveat that starts on Line 293. As it stands, the authors discuss the size distributions as if the SPAMS size distribution is quantitative–but it largely depends on the SPAMS detection efficiency as a function of size. The authors do segue into a conversation about the number fractions as a function of size, which is much more valid. The authors slide back into using the SPAMS size distribution again starting on Line 285, which again, without a quantitative sizing instrument is hard to interpret. Finally, the authors reference Figure S10a and S10b, but the current supplemental does not contain any figures with size distributions.

- Reviewer Point 4: While the authors have pointed the reviewer to additional information about the rich-K particles in the supplemental material, I would like to see the authors add a description of the rich-K particles to the main text. As currently written, the text suggests that the rich-K are one type of particle from a particular source. The supplemental information, however, suggests that the particles are from different sources (biomass burning, traffic emissions, and secondary sources). Thus,

it seems like there is a disconnect in using rich-K particles in the back trajectory cluster analysis. If this one particle type has different sources, then it seems like their relative fractions in the back trajectories could have several causes. Thus, this reviewer suggests that the authors clarify why they use this one cluster for particles with several sources–perhaps they have one distinct source in that they're anthropogenic? Finally, this reviewer is also surprised that potassium aerosol is formed in secondary reactions. I think this needs further explanation in the main text.

- Reviewer Point 8/9: To this reviewer, the results in Figures R6 and R7 seem to contradict the results in Figures 6 and 7, respectively. Figure R6 suggests that higher O_x concentrations lead to higher secondary-aerosol peaks. Similarly, in Figure R7, higher RH leads to higher secondary peaks. In some cases, the opposite conclusions are reached using Figures 6 and 7. Finally, the authors should clarify that these results are speculative, because the current O_x and RH conditions are not an indicator of the past O_x and RH conditions that a particle has experienced.