Response to the Comments of Referee

Journal: Atmospheric Chemistry and Physics
Manuscript Number: egusphere-2023-2858
Title: Exploring aerosol-cloud interactions in liquid-phase clouds over eastern China and its adjacent ocean using the WRF-Chem-SBM model
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We thank the reviewer and editor for providing helpful comments to improve the manuscript. We have revised the manuscript according to the comments and suggestions of the referee.
The referee's comments are reproduced (black) along with our replies (blue). All the authors have read the revised manuscript and agreed with the submission in its revised form.

Anonymous Referee #1

Review of "Exploring aerosol-cloud interactions in liquid-phase clouds over eastern China and its adjacent ocean using the WRF-Chem-SBM model" by Zhao et al., submitted to Atmospheric Chemistry and Physics (ACP)

[Article#: acp-2023-2858-version2]

Recommendation: Minor revisions (technical corrections)

Overall, the authors have done great work to address the problems in the presentation that I identified in the previous review. The responses and actions to my second and third major concerns in my general assessment comment in the previous review are not excellent, but acceptable. At this stage of the review, I suggest minor revisions for the revised manuscript. Once the issues listed below have been addressed, I believe the manuscript can be accepted for publication in ACP.

Table 1. The parameterization for the shortwave radiation was changed from CAM to Goddard in the revision. But the citation is still Zhong et al. (2016) for CAM. Please correct the citation.

The earliest version had a reference to (Collins et al., 2004) for CAM, and after changing CAM to Goddard, we changed the reference to (Zhong et al., 2016). The change to this citation is not reflected in the track-changes version of the manuscript due to the literature management software we used.

Fig. 8. Why are the Chloride, Sodium, and Primary Organics portions separated from the main body of the pie chart?

This is due to the default settings of the drawing scripts we use. This can be somewhat misleading and we have revised it.

Line 141: “CUP” => “CPU”

Corrected.

Line 275: “hinder” => “hinders”

Corrected.

Line 359. “temperature and water vapor changes at that time compared to the last time (the model outputs once per hour, the changes are the values of the current time minus the previous hour)” If my understanding is correct, this should simply be described as “changes in temperature and water vapor per hour”.

Thanks for the suggestion, we have revised it.

Below are some of my remaining concerns with the revised manuscript. Although the authors do not need to address these, I leave this for possible open discussion.

The authors now clearly describe how to calculate averaged supersaturation, where unsaturated grid points are included as a value of 0 for the average. The definition is fine, but I am not fully convinced that the interpretation of the results in the manuscript is correct, although the interpretation does not affect the conclusions so much.

In parts of Sections 3.3 and 3.4 on statistical analysis, I feel that the discussion of the causality between each parameter is still not well organized, the interpretation may be misleading, and some conclusions are not fully supported. However, the results presented using the state-of-the-art model are valuable to the community.

Thank you very much for your comments. The explanation for supersaturation is as relatively reasonable as we can come up with for that average variation. However, averaging over such a diverse set of samples may obscure some more nuanced processes and relationships. There is also significant room for improvement in our analytical methods. In our future research, we will attempt to specifically track a particular process and enhance our analytical approach to gain a clearer understanding of the relationship, aiming to provide a more reasonable explanation.