

Interactive comment on “MICS-Asia III: Multi-model comparison and evaluation of aerosol over East Asia” by Lei Chen et al.

Anonymous Referee #1

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General comments: East Asia is always undertaken serious haze pollutions in recent years with rapid population and economic growths. And aerosols have significant influences on the air qualities, human health and climate changes through their direct and indirect affections on solar radiation and atmospheric chemistry. The chemical transport models (CTMs) have become critical tools and widely used to address the properties of atmospheric aerosols and their impacts. In this study, 14 CTMs are participate in the MICS–Asia Phase III to evaluate their ability in simulating aerosol species and to document similarities and differences among model performances, also to reveal the characteristics of aerosol chemical components over big cities in East Asia. The topic of this study is interesting and novel to some degrees. And the paper has a potential for publication in the journal after revisions.

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Major comments: 1. Aerosols in East Asia are complex in their compositions and temporal-spatial variations. As a more and more important component of the particles, secondary organic aerosol is not taken into account in CTMs, which might lead to the underestimation of PM_{2.5}, PM₁₀ or AOD. 2. Are the natural aerosols such as sea salt and dust included in the simulations? Similar to SOA, dust aerosol also plays an important role in regional air quality in East Asia. If the natural aerosols have been taken into account, what kinds of emission mechanisms are used? 3. A full name is needed when the abbreviation appears in the first time, such as some chemical species and statistical words in Abstract. 4. Is the resolution 45 km accurate enough for air quality simulation? Why not using the nesting framework in some important regions in East Asia. 5. What kinds of methods are used when investigating the ensemble means of the multi-model values? Just averaged from the 14 models or others? 6. In Results and Conclusions, it would be better if the authors could also quantify or highlight the differences among the results from the same mode but with different inputs or physical/chemical processes. 7. Similar to my last comments, in Results and Conclusions, the authors should also quantify or highlight the differences among the results from the different models with the same or different inputs/physical/chemical processes. 8. All kinds of observed sites can be plotted in one panel with different markers and colors in Figure 2 to make it more readable. 9. There are too many figures in the manuscript. The authors can delete some similar figures. 10. Conclusions should be shortened and more concise. 11. English should be improved substantially throughout the whole manuscript.

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