

Atmos. Chem. Phys. Discuss., referee comment RC1
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Comment on acp-2021-55

Anonymous Referee #1

Referee comment on "Impact of non-ideality on reconstructing spatial and temporal variations in aerosol acidity with multiphase buffer theory" by Guangjie Zheng et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-55-RC1>, 2021

The pH values of aerosols are very important and attract lots of controversies, and are the hotspot in the investigation of aerosols properties. This article introduced a non-ideality correction factor and investigated its governing factors. Besides, a parameterization method was proposed to estimate c_{ni} at given RH, temperature and NO_3^- fraction, and was validated against long-term observations and global simulations. The results are very interest, and provides a way for pH retrieval when chemical measurements are unavailable for the ammonia-buffered regions and periods. The manuscript is suitable to be published on Atmos. Chem. Phys. after considering the following comments.

Comments:

- In the line 174-176, it is hard to understand the result that there was relatively small difference in pH predictions by E-AIM and ISORROPIA, but higher difference in estimated c_{ni} . Can the authors provide some more detail information to explain this result?
- As the authors are mentioned, the cations of Na^+ , Ca^{2+} , K^+ , and Mg^{2+} play a minor roles as their influence is more indirect. However, $\text{NH}_3/\text{NH}_4^+$ plays important roles in multiphase buffer theory. What is the role of the $\text{NH}_3/\text{NH}_4^+$ in the non-ideality coefficient?