

Atmos. Chem. Phys. Discuss., referee comment RC2
<https://doi.org/10.5194/acp-2021-704-RC2>, 2021
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Comment on acp-2021-704

Anonymous Referee #3

Referee comment on "Offline analysis of the chemical composition and hygroscopicity of submicrometer aerosol at an Asian outflow receptor site and comparison with online measurements" by Yange Deng et al., Atmos. Chem. Phys. Discuss.,
<https://doi.org/10.5194/acp-2021-704-RC2>, 2021

This manuscript performed offline analysis of both chemical composition and hygroscopicity of submicrometer particles and then compared the results with those from online measurements. In traditional view, the offline filter analysis is tedious and time-consuming but this work presents a very interesting approach to compliment the online results. It is worthy of exploration since it might provide a more affordable way to measure the aerosol hygroscopicity, especially when online instruments are not available and offline analytical analysis can be easily accessible. Although it is found very interesting, the manuscript needs to be improved and the following issues should be fully resolved, before it can be publishable.

Major comments:

- Although the authors made great efforts to elaborate how to avoid artifacts and those artifacts indeed can be minimized. However, the authors should also give some more details on how errors are propagated, for example, the errors generated from exaction of organics from filters and the nebulization of organics, subsequent growth measurement etc. To what extent, the errors are associated with the offline analysis presented in this study?
- Recent literatures present a growing interest in the effects of surfactants on modification of surface tension of the particles and hence affect the hygroscopicity of the aerosol particles, including measurement inland, at sea, etc. The use of surface tension of pure water neglecting the above-mentioned effect and apparently it is problematic. How organics affect the surface properties of the particles and what surface tension range of values would be estimated from this study? Could the authors elaborate a bit more on this aspect?
- It is quite interesting to see how the AMS spectra from extracted WSM are different from the average online AMS spectra for the same time period. Could the authors do some comparisons and present some results for the spectra between the two methods?

What would make those differences?

- Following the above question, how if the authors performed some factorization analyses based on the offline AMS method and then compared with those from online AMS data if available. Do they have the similar results?

Minor:

- Quite a few instruments were employed to perform the offline analyses, corresponding to many chemical components as presented in the paper. It might be beneficial to the readers if the authors can provide a table showing all the measured components with their measurement techniques.
- Line 19 on p2, "serve as"?
- Line 11 on p7, "were obtained"?
- Line 15 on p9, explain why values of 1.8 and 1.2 were used.
- Line 29 on p11, "under highly acidic conditions..."?
- Line 15 on p13, how large is large? Do you have a criterion?
- Line 1 on p14, "at a supersite"; Line 4, "suggest the importance on considering" or something better instead of using "to"; Line 14, "estimated to be"? Lines 31-32, this sentence seems awkward, please change it.
- Lines 3&18 on p15, using "as" here is not right, please rephrase the sentences. Line 30, "causal"?
- Line 8 on p16, please rephrase "another important point is that..."