

Interactive comment on “Volatility measurement of atmospheric submicron aerosols in an urban atmosphere in southern China” by Li-Ming Cao et al.

Anonymous Referee #3

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In this study, the authors deployed a TD-AMS to investigate the volatility of different chemical compositions of PM₁ in Shenzhen. Aerosol volatility studies are important but rare in China. This work, as far as I know, could be the 1st report on the online measurement of the volatilities of aerosol chemical components using a TD-AMS in China, and thus provide valuable information. In addition, OA was classified into several groups using PMF and tested their volatility separately, which help to understand their sources and characters. The manuscript is overall well written and documented. The topic fits well in the scope of ACP. I recommend this manuscript can be published after some revisions.

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1) In general, aerosol is a really complex system, especially in China. The analysis in this work is a bit too simple. Some more discussions are recommended, e.g. size-resolved volatility study, organic aerosol volatility in different events, e.g. heavy haze events or NPF events.

2) The last sentence of conclusion part, “HOA, rather than BBOA or COA, could be a potentially important source of LO-OOA”. More discussions are needed to support this statement.

3) Hong et al., 2017 has reported a similar work that estimate of the organic aerosol volatility using two independent methods including a VTDMA and HR-AMS. They compared the direct measurement result from VTDMA and PMF result from HR-AMS. It would be good to add some discussions to compare the methods and results between this two works.

Hong, J., Äijälä, M., Häme, S. A. K., Hao, L., Duplissy, J., Heikkinen, L. M., Nie, W., Mikkilä, J., Kulmala, M., Prisle, N. L., Virtanen, A., Ehn, M., Paasonen, P., Worsnop, D. R., Riipinen, I., Petäjä, T., and Kerminen, V. M.: Estimates of the organic aerosol volatility in a boreal forest using two independent methods, *Atmos. Chem. Phys.*, 17, 4387-4399, 10.5194/acp-17-4387-2017, 2017.

4) I suggest adding a summary of volatility studies in China. Although there should be no other studies using a TD-AMS, but some related work using VTMDA are still worth to be summarized, e.g. Cheung et al., 2016; Nie et al., 2017.

Cheung, H. H. Y., Tan, H., Xu, H., Li, F., Wu, C., Yu, J. Z., and Chan, C. K.: Measurements of non-volatile aerosols with a VTDMA and their correlations with carbonaceous aerosols in Guangzhou, China, *Atmos. Chem. Phys.*, 16, 8431-8446, 10.5194/acp-16-8431-2016, 2016.

Nie, W., Hong, J., Häme, S. A. K., Ding, A., Li, Y., Yan, C., Hao, L., Mikkilä, J., Zheng, L., Xie, Y., Zhu, C., Xu, Z., Chi, X., Huang, X., Zhou, Y., Lin, P., Virtanen, A., Worsnop,

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D. R., Kulmala, M., Ehn, M., Yu, J. Z., Kerminen, V. M., and Petäjä, T.: Volatility of mixed atmospheric Humic-like Substances and ammonium sulfate particles, *Atmos. Chem. Phys. Discuss.*, 2016, 1-26, 10.5194/acp-2016-839, 2016.

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