

Atmos. Chem. Phys. Discuss., referee comment RC1
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Comment on acp-2022-774

Anonymous Referee #1

Referee comment on "Unambiguous identification of N-containing oxygenated organic molecules using a chemical-ionization Orbitrap (CI-Orbitrap) in an eastern Chinese megacity" by Yiqun Lu et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2022-774-RC1>, 2022

General comments

In this work, the authors characterized ambient OOMs in a densely populated urban site in Shanghai using an ultra-high resolution orbitrap coupled with a nitrate inlet. With its high mass resolving power, CI-Orbitrap gives more accurate identification of molecular composition and better separates N-containing OOMs in complex ambient data. The authors showed that aliphatic 2N-OOMs were the most abundant 2N-OOMs with significant contributions from those derived from long-chain aliphatic compounds, whose fraction was further increased on polluted days. This paper is overall well designed and nicely written. There is one point I am not very convinced about: the authors seemed to directly use the correlation between 2N-OOMs with solar radiation over NO_3 radicals to reference daytime and nighttime formation pathways without considering the effects of meteorological dilution (e.g. the diurnal variation of boundary layer height). It can change or even flip the correlation in some cases. I also have some minor questions as listed below. I recommend publication after these issues are addressed.

Specific comments

Line 40-43: Most field measurements cited here were conducted in the United States and China. There are many available works from Europe, too. For example, the European sites included in Ng et al. (2017) show up to >70% ON in ambient submicron OA. Can the authors also include these data points to the paper, and if possible, more from other parts of the world?

Line 128, 131: Some references are needed for "widely used in previous studies" and "+-50% according to error propagation".

Line 142: Some references are needed for “one of our companion studies”.

Figure 1a: The font for pie chart percentages is too small (same for other figures).

Figure 1b: How did the authors explain 3N-OOMs fraction decreased when $nC > 12$?

Line 185: How is the 2N-OOMs enhancement in polluted days compared to the enhancement of total OOMs?

Reference

Ng, N. L., Brown, S. S., Archibald, A. T., Atlas, E., Cohen, R. C., Crowley, J. N., Day, D. A., Donahue, N. M., Fry, J. L., Fuchs, H., Griffin, R. J., Guzman, M. I., Herrmann, H., Hodzic, A., Iinuma, Y., Jimenez, J. L., Kiendler-Scharr, A., Lee, B. H., Luecken, D. J., Mao, J., McLaren, R., Mutzel, A., Osthoff, H. D., Ouyang, B., Picquet-Varrault, B., Platt, U., Pye, H. O. T., Rudich, Y., Schwantes, R. H., Shiraiwa, M., Stutz, J., Thornton, J. A., Tilgner, A., Williams, B. J., and Zaveri, R. A.: Nitrate radicals and biogenic volatile organic compounds: oxidation, mechanisms, and organic aerosol, *Atmos. Chem. Phys.*, 17, 2103–2162, <https://doi.org/10.5194/acp-17-2103-2017>, 2017.