

Review on "Aerosol characteristics at the Southern Great Plains site during the HI-SCALE campaign" by Liu et al. 2020

This research work presents the general aerosol characteristics at a rural site of north-central Oklahoma during HI-SCALE campaign. Generally, the results of this work was based aerosol mass spectrometer measurement. The chemical composition and OA PMF factor analysis during spring and summer intensive campaign were shown. The characterization of PMF factors: BBOA, isoprene-derived SOA, HOA and other OOA were demonstrated and compared with previous studies.

This paper is well written and organized. I do not have many scientific and technical questions. The only thing is that I did not found very novel scientific finding in this paper. It is more like a report for the AMS measurement at north-central Oklahoma observation site, although the aerosol composition and source apportionment at this site has been reported previously as well. Some of the conclusions, which are based on deduction, are ambiguous. If this paper shall be published in ACP, I suggest it might be better to publish as a measurement report.

Other comments:

Line 177: It is hard to conclude the more acidic aerosol is another explanation for lower nitrate concentration since the acidity and ammonium nitrate partitioning influence each other. The author can give more accurate calculation on pH influenced on nitrate partitioning as done in Guo et al. (Guo et al., 2016;Guo et al., 2017)

Line 179: I do not quite get this statement. The higher ammonium than that required to fully balance AMS-measured anions usually suggests potential presence of amine in aerosol phase (Docherty et al., 2011). And the anionic species in seasalt aerosols cannot be detected separately. Usually, they were detected as NaCl in AMS under high RH (Ovadnevaite et al., 2012).

Line 270: In addition to biogenic emission dominated areas, the m/z 91 was also found enhanced in the urban areas based on the spectrum of HOA (Ng et al., 2011) or from oxidation of aromatics. Since there were also strong anthropogenic emission influences in this site. The contribution from anthropogenic influences to m/z 91 is also one of the probabilities.

Line 398-403 What makes the IEPOX-SOA being through more oxidation process in spring than in summer? I just do not understand why the oxidation of methyltetrol tend to happen in spring compared to summer. Have the authors considered the impact of PMF analysis uncertainty to this factor analysis.

Line 443 Coggon et al. (Coggon et al., 2016) has reported that the emissions of nitrogen-containing VOCs (NVOCs) strongly depend on the fuel nitrogen content. They found markedly lower concentrations of acetonitrile for residential wood Burning. The authors can check if this is one of the reasons for low acetonitrile observed here.

Reference:

- Coggon, M. M., et al.: Emissions of nitrogen-containing organic compounds from the burning of herbaceous and arboraceous biomass: Fuel composition dependence and the variability of commonly used nitrile tracers, *Geophys Res Lett*, 2016, 43, 9903-9912.
- Docherty, K. S., et al.: The 2005 Study of Organic Aerosols at Riverside (SOAR-1): instrumental intercomparisons and fine particle composition, *Atmos. Chem. Phys.*, 2011, 11, 12387-12420.
- Guo, H., et al.: Fine particle pH and the partitioning of nitric acid during winter in the northeastern United States, *Journal of Geophysical Research: Atmospheres*, 2016, 121, 10,355-310,376.
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- Ng, N. L., et al.: Real-Time Methods for Estimating Organic Component Mass Concentrations from Aerosol Mass Spectrometer Data, *Environ Sci Technol*, 2011, 45, 910-916.
- Ovadnevaite, J., et al.: On the effect of wind speed on submicron sea salt mass concentrations and source fluxes, *Journal of Geophysical Research: Atmospheres*, 2012, 117