

Atmos. Chem. Phys. Discuss., referee comment RC2
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Comment on acp-2022-194

Anonymous Referee #1

Referee comment on "Chemical properties, sources and size-resolved hygroscopicity of submicron black-carbon-containing aerosols in urban Shanghai" by Shijie Cui et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2022-194-RC2>, 2022

This manuscript by Cui et al. investigate the submicron refractory black-carbon containing (rBCc) particle sin Shanghai, via a combination of laser-only Aerodyne SP-AMS and a HR-AMS. The former allowed the determination of rBC-containing particles exclusively and the latter was for total submicron particles. Chemical properties, sources as well as derived size-resolved hygroscopicity of the rBCc were characterized in great details. The paper is overall very comprehensive, with in-depth analyses and discussions of the rBCc properties. This reviewer finds the major findings of this work are also of importance to advance our current understanding on rBCc properties as well as its environmental impacts, in particular, the primary sources and secondary ageing processes, hygroscopicity of the coating materials. I recommend a minor revision before its acceptance, my specific comments are listed below:

- PMF analysis resolved 6 factors that is well supported by relevant interpretation. I suggest to provide the mass spectra of 5 factors and 7 factors for reference (probably in the supplement) and support the best choice of 6 factors.
- ALWC calculation in Figure 3 and Figure S4 is less clear. I suggest briefly describe the E-AIM model and its procedures to obtain ALWC.
- The fact that the BBOA was resolved for rBCc but not in NR-PM1 OA, requires a bit more explanation in 346-358.
- It is interesting to find that only a small portion of sulfate was coated on rBC cores while the fraction of coated nitrate on rBC was relatively large. Any educated explanation? Since sulfate had lower volatility than nitrate, this is a bit surprising.
- Is it possible to provide the uncertainties of the regressed parameters for the expression of k_{rBCc} and k_{CT} ?