

Atmos. Chem. Phys. Discuss., referee comment RC1  
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## Comment on acp-2021-1065

Anonymous Referee #1

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Referee comment on "Different effects of anthropogenic emissions and aging processes on the mixing state of soot particles in the nucleation and accumulation modes" by Yuying Wang et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-1065-RC1>, 2022

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This paper shows some VTDMA data from China, with the intent of investigating factors affecting the mixing state of refractory material in a polluted environment. The results are interesting and within the remit of ACP, and the manuscript is reasonably well written. Also, because measurements of this nature are particularly common, there is an element of novelty in its own right. However, this paper is slightly let down by the fact that the results are interpreted in a very self-contained manner, without really considering the wider body of knowledge. Addressing this should be fairly straightforward, however this could potentially change the character of the paper, therefore I recommend publication after 'major' corrections.

Major comments:

The authors give an interesting discussion investigating the potential reasons for the phenomena they observe, however they do not place this in the context of wider atmospheric implications. In particular, this paper would benefit from a comparison with equivalent measurements in other locations, or alternative methods of measuring BC mixing state (e.g. doi: 10.5194/acp-20-3645-2020). This will allow for a deeper insight into the processes and phenomena under investigation.

It would also better justify this as an ACP research article (as opposed to a measurement report) if either novel implications for wider atmospheric science could be specifically identified, or if newly-identified phenomena could be singled out.

Minor comments:

Line 23: Taken in isolation, “weaken the volatility of soot particles” is a strange statement to make because many use the term “soot” synonymously with the refractory components like black carbon. I would rephrase.

Page 69: Co-emitted organic carbon from biomass burning can be refractory (sometimes referred to as ‘tar’ or ‘tarballs’).

Line 157: This repeats a statement already made earlier.

Line 166: I presume the factory calibration was used to calculate MBC, but this should still be stated.

Line 217: “better atmospheric diffusion conditions” needs to be better explained

Line 222: This paragraph doesn’t really say anything substantial and can probably be removed.