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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Dynamic shape factor and mixing state of refractory black carbon particles in winter in Beijing using an AAC-DMA-SP2 tandem system" *by* Xiaole Pan et al.

Dantong Liu

dantongliu@zju.edu.cn

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This study uses novel coupling of several instruments to derive the particle morphology and optical properties, typically for soot particle in the ambient environment. The results will provide valuable information for the ambient soot particle influenced by intensive anthropogenic sources in megacity, which is of potential great importance to evaluate the information of BC from surface sources under such environment and also indicate the evolution of BC properties in real environment.

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Discussion paper

Firstly, combining aerodynamic and mobility diameter to reflect particle morphology has been a widely accepted method, which was mostly used in laboratory studies before. This study has applied this on the ambient measurement which is a good approach but the connection between the method and ambient measurement should be improved, possibly through the following suggestions.

I would suggest to give a distribution of χ for each period, given you have scanned mobility diameter for a fixed aerodynamic diameter.

For each χ, you could use the SP2 incandescence signal to separate the BC and non-BC containing particle, then you could move the focus to BC-containing particle, but this connection is missing right now.

I would like to suggest to reduce discussion about the core-shell ratio as you derived from calculated diameter because you have made a lot of effort to describe the particle morphology but simply using this will then turn the story back, which is not what you expected I believe. You could try if you could get the particle mass or volume, then combing with the refractory BC mass from the SP2 to see how the possible particle morphology could be in terms of how the coating and rBC had been combined.

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