

Response to Editor

Please apologize for the delay in editing this paper. I believe the paper was greatly improved after you took into account comment from both reviewers.

Response: Thanks for the positive comment.

It is not necessary to go through another round of external reviews, but I would like to subject publishing to a number of small revisions, listed below:

1) I suggest to keep Black Carbon in title and not equivalent Black Carbon, as it can be used as a generic term in this case (in agreement with Petzold et al., recommendation). In the text, please systematically use eBC (avoiding to switch from equivalent-BC to eBC) as recommended in Petzold et al..

Response: Thanks for your suggestion. We changed the “equivalent Black Carbon” into “Black Carbon” in the title and systematically used eBC in the text according to your advice.

2) In Experimental methods, I would keep the section titles with the full name, not abbreviations (or full name (abbreviation)).

Response: Thanks for your comment. The section titles were replaced with full name.

3) P4, line 103, I believe the comment from Rev. was referring to the fact that referring to the place where Zhao et al. performed their measurements. This is important that measurements were performed at the same place, considering geographical variability of BC properties. In addition, please check exact reference for Zhao et al., 2020b.

Response: Thanks for your comments. The Zhao et al., 2020b performed their measurement in Beijing and Taizhou of China, respectively. Beijing and Taizhou were 890 km part and the scattering parameter C_f was measured to be 2.9 in both Beijing and Taizhou. The measurement site in this study (Changzhou) was close to (70 km away from) Taizhou. The pollution condition in Changzhou was similar to that in Taizhou. Both Changzhou and Taizhou were in the Yangtze River Delta and between two megacities, namely Nanjing and Shanghai. Therefore, C_f was set 2.9 in this study.

4) Please, provide a check for English in section 2.1.3. Some sentences might be improved.

Response: Thanks for your comment. English in section 2.1.3 was improved in the revised manuscript.

5) P7, line 209, I am wondering if the term “exclusively” would rather be “independently” or “separately”.

Response: Thanks for your suggestion. “exclusively” was changed into “independently” in the revised

manuscript.

6) P7, line 211, I am wondering if the use of past tense is appropriate. I have the impression that the sentence should be rather “Therefore, it IS highly necessary to measure BCMSD with wider Dp range for better estimation of $m_{BC,bulk}$ and deeper understanding of BC evolution in the atmosphere”, indicating a more general statement than a step in your scientific analysis.

Response: Thanks for your suggestion. We changed “was” into “is”.

7) P10, line 310, an overall conclusion on uncertainty could be added, then used again in the conclusions. In it important that, at the end, a reader can rapidly evaluate how performant is, considering all uncertainties, your technique for retrieving size-distribution. I am not surprised that MAC is the higher source of uncertainty but was expecting higher values. At one single place, MAC variability is quite important (see Zanatta et al. (2018)).

Response: Thanks for your comments. An overall conclusion on uncertainty was add in line 310.

As shown in the study by Zanatta et al. (2018), the lensing effect could lead to 54% increase of MAC and Fig. 7 in Zanatta et al. (2018) clearly illustrated the large variability of MAC. The reason why the uncertainty from MAC was lower than expected might be that one of the various factors influencing variability of MAC, namely lensing effect, was considered in our study by adopting method developed by Zhao et al. (2021).

8) P10, line 312, again, use of past tense does not seem appropriate here. Perhaps, “not sufficient” is better than “very limiting”.

Response: Thanks for your suggestion. The past tense was changed to present tense and “very limiting” was replaced with “not sufficient”.

References

Zanatta, M., Laj, P., Gysel, M., Baltensperger, U., Vratolis, S., Eleftheriadis, K., Kondo, Y., Dubuisson, P., Winiarek, V., Kazadzis, S., Tunved, P., and Jacobi, H. W.: Effects of mixing state on optical and radiative properties of black carbon in the European Arctic, *Atmospheric Chemistry and Physics*, 18, 14037-14057, 10.5194/acp-18-14037-2018, 2018.

Zhao, W. L., Tan, W. S., Zhao, G., Shen, C. Y., Yu, Y. L., and Zhao, C. S.: Determination of equivalent black carbon mass concentration from aerosol light absorption using variable mass absorption cross section, *Atmospheric Measurement Techniques*, 14, 1319-1331, 10.5194/amt-14-1319-2021, 2021.