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Discussions

Interactive comment on "Amplification of black carbon light absorption induced by atmospheric aging: temporal variation at seasonal and diel scales in urban Guangzhou" *by* Jia Yin Sun et al.

Anonymous Referee #2

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The manuscript presents a comprehensive study on the black carbon light absorption enhancement (Eabs) in urban China. They used a newly developed method for Eabs determination, which utilizes measurements from a filter-based absorption instrument and a thermal-optical analysis OC/EC analyzer. The seasonal and diurnal patterns of Eabs were analyzed, and the potential influencing factors were discussed. This manuscript includes sufficient originality, and the topic seems to fit the scope of ACP. In general, the overall quality of the manuscript is good yet the logic of some contents, especially the introduction, can be improved. I believe that the points below should be addressed. I therefore recommend a Minor Revision before publication in ACP.

C1

Major comments:

1) The introduction is long but the motivation of this study seems missing. The authors should state clearly what's the scientific question that this study is trying to answer. 2) Since this study uses a new method for Eabs quantification, a comparison with previous studies should be given in more details. Table 2 provides a useful summary but corresponding discussions seems too simple in the current manuscript. 3) Figure 6 shows a clear dependency of Eabs on SOC/OC. However, the correlation between organics and Eabs is not that good as expected. The authors should explain why a good dependency was observed in Figure 6 but meanwhile a low r2 was found in Figure 7. 4) As related to comment # 3) above, one of the most interesting findings of this study is that Eabs exhibits dependency on SOC/OC ratio and has good correlation with nitrate. For Eabs dependency on SOC/OC ratio, one might believe that it is the "concentration" of SOC in total OC that affects the absorption enhancement. For good correlation between nitrate and Eabs, is there any possible reason other than partitioning behavior that would potentially contribute to the good correlation? 5) How measurement uncertainties would affect Eabs determination by MRS method? 6) The MAE values reported in this study seems higher than those reported in the literature. Any reasons? 7) The authors suggest that the correlation between Eabs and nitrate was associated with the volatility of nitrate. If that is the case, would that be applied to the organics that have a volatility similar to nitrate?

Technical comments: Line 27. "exhibit" should be "exhibited" Line 30. "were" should be "was" Line 37. "exhibit" should be "exhibited" Line 104. "to low" should be "too low" Line 592. "a Aethalometer" should be "an Aethalometer" Line 606. "two component" should be "two-component"