

Interactive comment on “Measuring Light Absorption by Organic Aerosols: Correction Factors for Solvent Extraction-Based Photometry Techniques” by Nishit Shetty et al.

Anonymous Referee #2

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Shetty et al investigated the correction factor for converting from bulk to particle phase absorption coefficients for primary OA emitted from biomass burning. Aerosol samples were generated experimentally by using the combustion chamber, as explained in Sumlin et al. 2018b, also uses a variety of aerosol sources such as sage, cattle dug, and grass. The study was concentrated for the correction factor as a function of single scattering albedo (SSA), where SSA values are obtained from filter based observations by using integrated photoacoustic-nephelometer spectrometers (IPNs). The manuscript possesses scientifically relevant data based on experimental observation and the Mie theory. The topic of the paper is scientifically important. Scientific data and data products that are presented in the manuscript lead to a fair rating of the

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manuscript. The manuscript is well organized. The abstract and conclusion provide a reasonably complete summary of findings. Figures are clear, however, there are some missing scientific explanations of observation techniques, data analysis and uncertainty of the data in the manuscript. In summary, this manuscript, after some major revisions (as outlined below and comments posted from Anonymous Referee# 1, for this manuscript) fulfills the quality requirements for publication in ACP.

Specific Comments:

*Lines 114/116: The ratio of OC/TC were reported of ranges 0.55-1 but figure 3 (line 489) shows that ratios observed are only in the specific data ranges such as 0.55, 0.6, and 0.7. 0.8, and 1. It is not clear why the OC/TC data of ratios in between those ranges, such as of ratios 0.65, 0.75, and 0.85, were not observed and not reported. Are these ratios were rounded? And also, there is no excess data of ratios about 0.55 and 0.6 which contribute for analysis. I have the impression that the significant correlation, ~ 0.95 of SSA vs OC/TC is mainly driven by some outliers. I strongly recommend presenting error analysis on these data sets.

*Lines 124/126: Why was SMPS not used for all of the experiment? Please clarify this. Also, give a reference or a brief explanation of how the geometric mean size distribution was determined?

*Line 151: There are no references or derivation of mathematical equations used in the manuscript, for example, Eqn.1, babs, bulk (λ). Please provide the references or derivations to support the validity of the mathematical equations used in the manuscript.

*Line 154: Explain why absorbance at a given wavelength is normalized to the absorbance at 700nm. *Lines 183/185: What is the range of assumptions made along with Mie theory, as stated in the text? Reference is recommended to include for determining the imaginary complex refractive index.

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*Line 223: How were the RMSE values calculated? Please include the reference/formula or name of software which was used to get RMSE values in Table 1, such as excel MATLAB, or Igor Pro.

*Lines 223/224: Please add a line to justify the impact of BC AAE on conversion factor for particles with SSA smaller than 0.7 at 375nm and smaller than 0.825 at 405 nm.

*Line 225: What is sensitivity analysis as stated in the text? Please explain briefly.

*Line241/242: Briefly describe why the two different studies, Pokhrel et al. (2016) and the current studies give different slopes and intercepts of the resulting fits?

*Line 276: What does SI represent for?

*Lines 292/295: Briefly explain why the higher molecular weight compounds absorb more light?

*Lines 296: AAE values for OA are significantly high with wide ranges of 4.4 -14.61. How are these values related to wavelengths? Please provide some references, if there are any, to support these values.

*Lines 296/297: It is reported that overall AAE for OA decreases with increased EC. Please add a graph/or a brief note to show AAE for OA measurements with the concentration of EC.

*Line 342: Authors' names are not clearly reported: RKC, SB, WMH, NS, AP, are not previously reported with these names in the authors' list. I think it is not relevant to include author contributions in the manuscript once a list of authors is reported.

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2018-1200>, 2018.

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