

# ***Interactive comment on “Aerosol light absorption from attenuation measurements of PTFE-membrane filter samples: implications for particulate matter monitoring networks” by Apoorva Pandey et al.***

## **Anonymous Referee #2**

Received and published: 8 October 2018

### General comments:

In this manuscript the authors investigated the relationship between absorption optical depth of aerosol carbonaceous particles derived from in situ measurements and attenuation obtained using filter based method. The authors derived empirically an estimation of the aerosol mass absorption coefficient (MAC) from PTFE filter measurements, and they applied this formulation on an independent dataset from IMPROVE. They noticed that this correction resulted in a significant change in the attenuation for low aerosol concentrations. The introduction of the paper is well written, but the au-

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thors have not clearly reported their results in the abstract. I also suggested that the authors include in the main text some of the information that is presented in the supplement, specifically sessions S1 and S4, as in my opinion those sessions are very relevant for the understanding of this study. Also, although the authors have included a reference about the filter based method applied, there is no other indication on how the reflectance and transmittance measurements were taken. At a minimum, the authors could report if those measurement are integrated quantities or if they were taken at a given angle. Finally, I think the author could discuss and explore the results found in the case study in more details.

#### Specific Comments:

P1L15: When you use the term “light absorption”, do you mean the mass absorption coefficient or absorption optical depth or the linear absorption coefficient? The same thing for “attenuation measurements”. Are you referring to extinction, absorption or something else? If something else, please define.

P1L18: In the sentence “we find the ratio between in situ absorption and bulk attenuation to be inversely proportional to aerosol single scattering albedo”, please clarify the term “absorption”. Are you referring to absorption optical depth?

P1L21: What are the results from the case study? You have not mentioned that in the abstract.

P1L27: For completeness, you could add here a few examples of known carbonaceous sources with different MAC.

P2L18: Another relevant reference here: Martins, J. V., Artaxo, P., Kaufman, Y. J., Castanho, A. D., and Remer, L.: Spectral absorption properties of aerosol particles from 350–2500nm, *Geophys. Res. Lett.*, 36, L13810, <https://doi.org/10.1029/2009GL037435>, 2009.

P3L26: You mentioned here “sampled by the four IPNs” but I don’t see any reference to

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these measurements later in the text. It might be interesting to comment if the average absorption coefficients was derived using those four instruments. Also, it would be interesting if you could report/discuss for each sample type.

P4L5: I suggest adding here a figure or table reporting the average values of the absorption coefficient in  $Mm^{-1}$  as well as the standard deviation for the different samples. Also, I would move table S1 that is currently in the abstract to the main manuscript.

P5L5: In the sentence: “the penetration of aerosols into the filter was assumed to be 10%”. Could you please clarify the meaning of that? Do you mean 10% of the mass collected? How do you estimated this number? Figure 5 shows concentrations in the range from 0.01 to near  $10\mu g m^{-3}$ . Would you expect the percentage be strongly dependent of the mass concentration collected on the filter?

P5L13: I think it is missing here an evaluation of the uncertainties in the calculation of ATN.

P6L24: I also suggest moving session and figure S4 to the main manuscript as that is important for the understanding of Figure 5.

P7L9: How these method compare/differ from the derivation of the mass absorption efficiency presented in (Martins et al., 2009)?

Figures 2, 3 and 5: These plots are missing error bars. You should also add information about the uncertainty of the measurements in the legend of each figure.

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