

Interactive comment on “Production of particulate brown carbon during atmospheric aging of wood-burning emissions” by Nivedita K. Kumar et al.

Anonymous Referee #1

Received and published: 31 May 2018

GENERAL COMMENT

The paper presents an analysis of black carbon (BC) and organic aerosol absorption properties upon aging. The experiments were done in a laboratory using a smog chamber where aerosols were exposed to OH radical and UV radiation. Several optical and chemical properties were measured online and filter samples were collected to be analyzed later offline by a multiple wavelength absorbance measurement technique and an EC/OC analyzer. Methanol and water filter extracts were also analyzed and absorbance was measured. The data is very valuable and the paper is well written and presented. I would recommend its publication after addressing the comments I present

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below.

My main concerns are related to the following aspects:

- The offline techniques used in this study suffer of different artifacts and they are not sufficiently discussed in the manuscript.
- In this study the BC particles were not observed to be coated with other kind of particles (i.e., no internal mixing but external mixing was observed). However, ambient studies have shown that BC particles in the atmosphere are usually coated and this coating causes an enhancement of BC absorption. Given that, how representative is this study of “atmospheric aging”? Were the experiments not long enough to “age” the BC particles?

SPECIFIC COMMENTS

- Lines 107-108: How can you guarantee the correction factor C is wavelength independent?
- Line 122: “1.57 for C ”. Does this mean your Aethalometer was using TFE-coated glass fiber filters? Please mention the filter material.
- Line 128: It should be necessary to add some more discussion about possible artifacts that affect both techniques (MWAA and Sunset analyser).
- Line 136. MWAA measurements. Which artifacts are to be considered when using this technique in comparison to the Aethalometer? Can you provide more evidence on the comparison of this technique to other absorption measurements like MAAP or PAS?
- Line 171: What do you mean with the online kOA? How was this measured?
- Lines 403-411: How does this result compares to other studies? Ambient measurements have shown quick oxidation of brown carbon chromophores. Please comment about it.

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TECHNICAL CORRECTIONS

- Line 101: It would be convenient to add numbers to these headlines across the manuscript for the sake of readability (e.g., "2.2.1 Aethalometer").
- Line 123: at?
- Line 141: Which angles?
- Lines 294-295: Please rephrase this sentence to improve understanding.
- Lines 296-299: It can be found awkward that the two variables needed to calculate MAC are coming from the same measurement technique (Aethalometer). Please try to sustain the reasons why it was done this way.
- Line 372: It should be written "Eq. (19)", and "Fig. 4". Please implement this across the manuscript. Check the journal guidelines.
- Lines 542-543: Please add uncertainty intervals to the reported MAC values.
- Figures 3A, S6, and S10: The data is presented using discrete colors for each wavelength. Please make the legend discrete too.
- Figure 5: What do these boxes and whiskers mean? Please clarify.
- Figure 6: Could you please add the correlation coefficients to the figure?
- Figure S6: I guess you meant α as a function of λ or do you mean only the wavelength pair 370-880 nm?
- Figures S4, S7, and S9: Please stick to journal guidelines and avoid the use of the jet (or rainbow) color map: "For maps and charts, please keep colour blindness in mind and avoid the parallel usage of green and red. For a list of colour scales that are illegible to a significant number of readers, please visit ColorBrewer 2.0".

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2018-159>,

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