

Interactive comment on “Correction for a measurement artifact of the Multi-Angle Absorption Photometer (MAAP) at high black carbon mass concentration levels” by A.-P. Hyvärinen et al.

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This manuscript describes the discovery of an artifact inherent in the routine operation of multi angle absorption photometer (MAAP) instruments at elevated ambient black carbon (BC) concentrations. An underestimation of the attenuation due to BC coupled with the averaging procedure used by the MAAP leads to artificially low BC mass concentration data directly after a filter spot change. The effect is apparent at BC concentrations $> \sim 3 \text{ ug m}^{-3}$ when the standard flow rate is used and is reported

for three locations characterised by relatively high black carbon concentrations. The authors describe two methodologies to minimise the impact of this effect, the magnitude of which is dependent upon the rate of accumulation of BC on the filter. Firstly, the reflectance data can be used rather than the transmittance data to quantify black carbon concentrations, because the artefact is minor for the former. However, this data is not collected using the default MAAP settings, and thus for future field measurements the collection of this data would need to be manually arranged beforehand. Secondly, a post-processing algorithm is proposed to both smooth the temporal nature of the underestimation directly after the spot change and correct for the overall mass concentration underestimation. The advantage of this method is that it can be applied to existing datasets affected by the artifact where reflectance data was not collected. Overall this manuscript is concise, well written, and is expected to be of real benefit to MAAP users both in the planning of data collection for future measurements and for accurate post-processing of data that has already been collected.

Specific Comments:

- A schematic of the MAAP instrument would be useful for the description of the photomultiplier placements etc. This is less relevant for current MAAP users but would be useful for those planning to deploy the instrument in the future
- Page 6555: Line 2: replace “observations” with “measurements”
- Page 6555: Line 4: replace “with” with “characterised by”
- Page 6556: Line 5 and 7: remove the word “instrument”
- Page 6557 line 14: replace “the” with “a” before the word wavelength
- Page 6561 line 14: insert “to” before the word erroneous
- Figure 2 caption: Although the 3 regimes are described in the text, some detail should be included here also for clarity. Perhaps “1,2 and 3 correspond to accumulation rates of x, x and x respectively”

The manuscript should be accepted subject to the minor revisions mentioned.

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