

We thank the reviewer for the comments. Answers to specific issues are addressed below; the original comments are in italic and our answers are in normal font.

Detailed comments:

- Page 6556 lines 5-8: The instrument should be introduced by referring to the manufacturers. The references given in this context refer to corrections methods.

This is now corrected, and references to Petzold and Schönlinner 2004, and Petzold *et al.*, 2002 are given.

- Page 6559 line 21-22: The mass-specific absorption cross section was published to be 6.6 m²/g together with the wavelength of 670 nm. Is this mass absorption coefficient still valid for the true wavelength of 637 nm?

The nominal wavelength of the instrument has always been 670 nm, and no changes in the light source have been made. The mass-specific absorption cross section, which is based on measurements (Petzold & Schönlinner 2004) against gravimetric and thermal reference methods, is still valid.

- Page 6557, line 14: From the context the reader could think that the MAAP method to derive BC concentrations was published in Mueller et al. (2011). In fact, in that publication the wavelengths was corrected to be 637 nm and not 670 as given in previous publications and the user manual of the manufacturer.

This ambiguity has been corrected.

- Equation (1a): Is it right that $b_{AP,MAAP}$ is the particle absorption coefficient? This equation corresponds to Eq. (2) in in Petzold et al. (2005) and it was written “The final relation between $b_0(MAAP)$ [equals $b_{AP,MAAP}$ in this manuscript] and the aerosol absorption coefficient b_{ap} may require correction factors. . .”. To the reviewers knowledge $b_{AP,MAAP}$ is the absorption by the particle loaded filter. Therefore $b_{AP,MAAP}$ possibly includes an enhancement factor (response function) by the filter scattering. In Petzold et al. (2005) this response function was found experimentally to be close to unity (cf. Eqn. 4 and Fig. 4). A response function of unity does not change the results of this manuscript, but the reviewer thinks that this point should be clarified.

The reviewer is correct. We have revised the equation by:

$$b_{AP,MAAP} \approx b_{ATN,MAAP} = -\frac{A}{V} (1 - \omega_{FILTER}) \times \tau_{FILTER}$$

which shows that the response function between $b_{AP,MAAP}$ and $b_{ANT,MAAP}$ is unity.

- Page 6561 line 14: typo, should be “. . .related to erroneous. . .”

Corrected.

- Page 6561 line 13-17: *The hypothesis that artifacts are caused by erroneous dark counts and the instrument internal averaging lets to following question. Do different MAAPs show same magnitude of the artefact?*

The problem is related to instrument firmware rather than hardware, and is independent of the individual instrument. The fact that all the field measurements can be corrected with the algorithm is a proof of this.

- Page 6561 line 27: *This is related to the previous comment. Was it tested to operate s/n 145 as low flow and s/n 87 as high flow instrument. This could be a test if both MAAPs show quantitatively the same artefact?*

While this comparison was not made in the lab, the s/n 87 was utilized in Gual Pahari, and the artifact magnitude corresponded with those measured with the s/n 145 in the lab.

- Chapter 3.3: *All steps of processing data are described well. Although, the reviewer thinks it would be worth to show the data and fitted curves, which let to equations 7, 9, and 10.*

This is now illustrated in the supplementary material of the manuscript.

- Page 6567 line 13 to 15: *The author should explicitly specify for which aerosols Eq. (5) is valid. Is this method applicable for highly scattering aerosols?*

We have now written: “In ambient conditions, especially of high loading with strongly scattering aerosol, eq. (5) may not be valid.”

- Page 6568 line 24 to 26: *Print format 12 is stated as being the best data format. Then the full MAAP data evaluation as described in Petzold and Schönlinner (2004) can be done based on measurement of transmittance and two reflectances. Why this method is not suggested? Are the transmittance signals given in PF12 correct or faulty? That should be stated explicitly in the manuscript.*

As stated in Paragraph 3.1, Figure 1 and Conclusions, it is the transmitted raw signal which suffers from the artifact. This is regardless of the print format used, and thus evaluation as described in Petzold and Schönlinner (2004) cannot be utilized to overcome the artifact.

- Figure 2: *The authors should think about rescaling the figure since it is difficult to see details for ‘regime 1’.*

This was considered, but it was noticed that in the current form all the three “regimes” can be displayed in one figure. Furthermore, we have provided the figure in a high-resolution form, so zooming in “regime” 1 is a simple way to observe its details.