

Interactive comment on “Aethalometer multiple scattering correction C_{ref} for mineral dust aerosols” by Claudia Di Biagio et al.

Anonymous Referee #3

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This is a very interesting manuscript of great importance for measuring mineral dust absorption coefficients with the AE31 aethalometer. It should be accepted for publication in AMT after the following comments have been taken into account.

1. Would these results be relevant to the currently sold AE33 aethalometer and would the authors expect the same C_{ref} values?
2. L9-10: The abstract needs a better definition of C_{ref} .
3. L83 and elsewhere: “Shadowing Effect”: While this has a meaning in the geometric optics regime ($x \gg 1$), it is completely meaningless for particle sizes comparable to or smaller than the wavelength. As this study encompasses both cases, a different expression (e.g., loading effect) should be used.

C1

4. As three different kinds of aerosol absorption measurements (AE31, MAAP, difference method) form the core of this manuscript, general references on absorption measurements should be added such as the two major reviews of atmospheric and aerosol absorption by Horvath (1993) and Moosmuller et al. (2009).
5. L239-255: The Nephelometer truncation correction needs error estimations for both methods. Also were the particles sampled approximately spherical (SEM) images and what errors are expected from the assumption of spherical dust particles.
6. L374-375: “The wide range of [SSA] values indicates the occurrence of particles with very different absorption properties, henceforth chemical composition.” It either indicates different chemical composition (or complex refractive index) and/or different size distribution as SSA strongly depends on both (e.g., Moosmuller and Arnott, 2009).
7. L415-427: When discussing particle size distributions, please always clarify if you are talking about number size or volume (mass) size distribution.
8. L457: “Given that the maximum intensity of the solar spectrum occurs at about 700 nm, . . .” I always thought that the maximum intensity (per wavelength interval) occurred around 500 nm. Please explain!
9. Some reference citations are inappropriate. For example, replace (Sokolik et al., 1999; L40) with (Sokolik and Toon, 1999; L40). Please check others!
10. P. 15-18: REFERENCES. This listing is incomplete and needs to be checked and completed! For example, Highwood and Ryder, 2014 (L38), Arnott et al., 2005 (L86), Petzold et al., 2004 (L114) are missing in the list of references.

REFERENCES

- Horvath, H. (1993). “Atmospheric Light Absorption - A Review.” *Atmospheric Environment* 27A(3): 293-317.
- Moosmuller, H., R. K. Chakrabarty and W. P. Arnott (2009). “Aerosol Light Absorption

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and its Measurement: A Review." *Journal of Quantitative Spectroscopy & Radiative Transfer* 110(11): 844-878.

Moosmuller, H. and W. P. Arnott (2009). Particle Optics in the Rayleigh Regime. *J. Air & Waste Manage. Assoc.*, 59, 1028-1031.

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