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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Spectral dependence of aerosol light absorption over the Amazon Basin" *by* L. V. Rizzo et al.

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In using absorption Ångström coefficients (AACs), one has to distinguish between coefficients for the bulk material and for aerosols with aerosol AACs depending on bulk absorption spectra and on aerosol size distribution and morphology. This is clearly discussed in the manuscript.

However Anonymous Referee #1 comments: "2) P11561 discusses Angstrom exponent decreases being due to a shift in size. This reads like the size of particles themselves are the cause of the absorption changes, when in reality it is likely that the particles are different and just happen to be different sizes."

I do not see why "it is likely" that the change in AAC is due to changes in bulk absorption

spectra instead of being due to changes in the particle size. Indeed, we know that the change of particle size changes the AAC while here we don't know much about the change in bulk absorption spectra with particle size. A very vivid example of the change of AAC with particle diameter has been given by Gyawali et al., (2009) in their Fig. 7 for homogeneous black carbon spheres. This plot clearly demonstrates that even for black carbon particles, the AAC transfers from the small particle Rayleigh regime (AAC = 1) (Moosmüller and Arnott, 2009) to the geometric optics regime (AAC = 0) with negative values for some intermediate sizes. Also note that even in the geometric optics regime, the AAC does not equal the bulk value.

References

Gyawali, M., Arnott, W. P., Lewis, K., and Moosmüller, H.: In Situ Aerosol Optics in Reno, NV, USA during and after the Summer 2008 California Wildfires and the Influence of Absorbing and Non-Absorbing Organic Coatings on Spectral Light Absorption, Atmos. Chem. Phys., 9, 8007-8015, 2009.

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

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 11547, 2011.