

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

Anonymous Referee #1

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Review of “Spectral Dependence of Aerosol Light Absorption over the Amazon Basin” by Rizzo et al.

This manuscript describes the variability in wavelength dependent aerosol absorption over a number of field campaigns within the Amazon Basin. This dataset contains valuable information and I recommend publication, following minor revisions suggested below.

The major comment I have relates to the link between absorption optics and size. This issue arises in a number of sections of the manuscript.

1) A 10 micron size cut for the Aethalometer was used for the Pasture/Dry 1999 experiment. Also, in general filter based absorption was used for all campaigns. Some

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filter-based methods have shown to have size-dependent biases (Lack et al. 2009; Nakayama et al. 2010). Please discuss these issues related to the assessment of absorption between campaigns. 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. 3) Please add a figure that shows the size distribution shifts between seasons (i.e related to P11561)

What do the results presented mean in terms of radiative effects? Presenting this as the final section would provide some needed context and significance of these results. A first order assessment based on the information presented should be achievable.

P11562: and Figure 6: Add shading which shows sunrise and sunset times. How will diurnal variability that you discuss affect radiative forcing? Will this 20% difference have an impact?

P11563 L10: The absorption variability may also be due to chemical composition of the primary organic as it is emitted. Your statements assume that the primary emission has a constant optical character.

P11564 L18: Many other studies indicate caution also. I think this work should be discussed with this in mind.

Figures 3 – 5: Uncertainty should be added to these figures.

P11550 L13: ‘Soot’ Angstrom is size dependent, but likely to be 1 ± 0.1 around sized of interest. P11551 L19: What does biogenic origin include? Primary bio-aerosol, secondary organic, primary particles from biomass combustion?

P11554 L 12: Is this the exact reverse procedure used by the instrument?

References:

Lack, D. A., Cappa, C. D., Cross, E. S., Massoli, P., et al. (2009). Absorption en-

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hancement of coated absorbing aerosols: validation of the photo-acoustic technique for measuring the enhancement Aerosol. Sci. Tech. 43:1006-1012

Nakayama, T., Hagino, R., Matsumi, Y., Sakamoto, Y., et al. (2010). Measurements of aerosol optical properties in central Tokyo during summertime using cavity ring-down spectroscopy: Comparison with conventional techniques. Atmos. Environ. 44:3034-3042, Doi 10.1016/J.Atmosenv.2010.05.008.

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