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Atmospheric Chemistry and Physics Discussions

Interactive comment on "In situ aerosol optics in Reno, NV, USA during and after the summer 2008 California wildfires and the influence of aerosol coatings" *by* M. Gyawali et al.

Anonymous Referee #1

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I found this paper to be not very detailed in its content and believe there is a fundamental problem in the modeling discussion. The paper summarizes some aerosol optical properties, more specifically aerosol absorption, from 2 months of measurements in 2008. The paper shows absorption angstrom exponent and single scattering albedo measurements for a biomass burning free month and one that had significant biomass burning influence. There is very little provided in terms of data analysis, rather it simply presents the data with some very minor discussion. An attempt is made at connecting Mie theory modeling to the observed measurements however, the authors have ignored a fundamental aspect of BC optics (see below). In its current form it requires significant changes.

Specific Comments:

P14062, L9: 'ALAOC' is not an appropriate term. If non-absorbing organic carbon is externally mixed it will not appear to absorb at all. It only enhances absorption when is surrounds an absorbing core. 'Organic' missing when defining 'ALAOC'.

Figure 3: Add a right axis that shows % of absorption that is ALAOC.

P14066, L14: 'becomes minimum' should read 'is minimized'

Section 2.5: It seems that the associated figure is not needed. This could be easily summarized in 1 sentence without the figure.

Section 2.6: Why use 1.55, 0.8i for the RI of BC? Many studies use values as high as 2.0, 1.0i.

P14066, L14: You have used 'Mie Theory' and 'coated sphere calculations' prior to this to describe 'electromagnetic theory'. Be consistent.

Figure 7. The AEA for BC is around 1, even for larger sizes because it is comprised of smaller spherules of 20 - 60nm diameter, which dictate the optics. Interactions of light with multiple spherules creates a complicated optical medium yet the absorption is still dominated by the optics of the spherules. Your modeling here ignores the fact that raw BC at large sizes is made up of these spherules rather than a solid core (as you have modeled it here). Figure 7, therefore does not represent reality.

Section 2.5: because you have assumed a solid spherical core of BC the baseline for Figures 8 and 9 are not valid, therefore the conclusions drawn from these figures are not appropriate. There may well be some AEA effect that differs from traditional thinking but you haven't identified it in this manuscript. BC cores made up of spherules will collapse to be more spherical however they are still made up of spherules, even in low temperature combustion like biomass burning. If the OA coating is not wavelength dependent (which you have assumed in Figure 8) then the AEA difference is due to BC alone. The AEA differences you observe are therefore due to your treatment of the

BC core, not necessarily an atmospherically relevant process. A significant amount of additional modeling and discussion would be required to ensure that the discussion here is valid.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 14059, 2009.