Atmos. Chem. Phys. Discuss., 9, C3414–C3416, 2009
www.atmos-chem-phys-discuss.net/9/C3414/2009/

Atmospheric
Chemistry
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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 #2

Received and published: 30 July 2009

The manuscript presents the results of optical measurements in the period of two months at a single site. The sampling period is divided into a 'biomass burning' and a 'normal' month. Without additional measurement data, this classification seems to be overly simplistic. Having a high time resolution database of optical parameters, one would have expected a more detailed analysis of sampled air masses (e.g. by trajectories, combined with fire locations, intensities, type of biomass burned, etc.) that would have revealed the fine structure of variations of optical properties as a function of various parameters. For lack of detailed analyses, the majority of the conclusions of this 'bulk' analysis remains trivial and does not add much to our general understanding of absorbing aerosols. What is more 'revolutionary' in this manuscript is the statement that 'the organic coating needs not to be intrinsically brown to observe effects commonly referred to as those caused by brown carbon light absorption' (Page 14067 line 3-4): if proven, this could indeed change our view of brown carbon and the like. But going through the brief modeling section of the manuscript I am not at all convinced that these conclusions are atmospherically relevant and even theoretically well founded.

It is well known that biomass burning emits BC particles that are very much different from soot particles emitted by internal combustion engines (see current literature for char EC versus soot EC). So if we observe different AAE values for biomass burning aerosols than for urban aerosols, our first idea is not that soot particles are covered with a thick layer of semi-volatiles or water, but simply that the optical properties of biomass burning absorbing aerosols are very much different from those of fossil soot (Hoffer et al., ACP 2006) . In a biomass plume of smoldering fires it is not soot that is covered with absorbed organics but more char particles or the like. If we make water solution of such biomass burning aerosols in which non-absorbing compounds do not interfere, we can observe similar wavelength-dependence (AAE) than in the airborne state.

I am also not convinced that in the smoke plume BC can be covered with vast amount of adsorbed organics: as the plume cools some adsorption may take place but as the plume mixes with ambient air and becomes diluted, the so-called dilution effect takes place and most of semi-volatiles are actually desorbed (see Grieshop et al., ACP 2009). There are only the photochemical processes related ageing and secondary aerosol formation that can indeed produce some refractory coating that can be optically relevant: but these processes may not be directly linked to emission sources. Nevertheless BC cores with thick non-absorbing shells still visible under an electron microscope are very rarely observed in individual particle studies. Since the boundary conditions of the model may not seem to be atmospherically relevant, I am skeptic about the conclusions of the second part of the manuscript, too.

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