

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.

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Reply to Reviewer #3 (comments for Atmos. Chem. Phys. Discuss., 9, C3973–C3974, 2009, In situ aerosol optics in Reno, NV, USA...by Madhu Gyawali et al).

Please refer to the Author Comments for description of the added materials and for the notations AC1, AC2, etc that are used here in the reply to the particular reviewer questions.

Reviewer comments are given in bold type-face. Our replies are given in plain text.

In the manuscript Authors summarize the results of aerosol optical characteristics from two months. It is evident that the optical measurements were carefully carried out with high temporal resolution. However, other parameters (meteorology, air mass history, etc.) that could help the understanding the results are missing from the text, hopefully not because they are not considered. The inclusion of these data could probably illuminate the meaning of a “normal” month in California. (Normal means general, average or . . .?)

Reply:

We agree and have revised the manuscript to add some additional description of the measurement that clarify the impact of biomass burning aerosol and vehicular emission aerosol. See **AC4**, **AC5**, and **AC6** for revised Measurement and analysis, and Aerosol extinction variation.

No trajectory or chemical analysis was needed to verify the source of the aerosol in July or August. In July, the source was clearly the wildfires in Northern CA based on the wind directions and the intensity of the smoke from this source (more information can be found at [http://en.wikipedia.org/wiki/Summer_2008_California_wildfires, as given in the manuscript]). In addition, inhabitants of Reno were acutely aware of the heavy smoke burden as breathing conditions were at times unhealthy. In August, the measurements were similar to those obtained in previous years, and the prevalence of local urban sources dominated in that case. For the purposes of this paper, which concentrates on aerosol optical properties as a consequence of the chemical mixture, we do not need detailed chemical analysis to arrive at our main conclusions. Figure 1(a) shows clearly the vast smoke source from the fires in Northern CA, and their trajectory towards Reno. This figure was representative of the smoke source and wind directions for the month of

July. The optical phase diagram in Figure 6 also shows the distinction between the unusual smoky month of July and the more normal month of August.

In the first part of the paper I've got confused in the interpretation of LAOC and ALAOC. Authors note that the absorption properties of these terms are (or may be) characterized by strong wavelength dependence: stronger at shorter, weaker at longer wavelengths. I cannot see how LAOC and ALAOC can be distinguished by the method described in equation 1. To my opinion, the absorption coefficients measured at both wavelengths should refer to the absorption of BC, LAOC and ALAOC together. I accept that the absorption of BC is inversely related to the wavelength and using this, the BC absorption can be eliminated. But no such definite information is available for LAOC or ALAOC. If we suppose that neither LAOC nor ALAOC absorb at 870nm (which is probably not the case), in β ALAOC reflects the combined effect of LAOC and ALAOC at 405nm. Consequently the discussion on β ALAOC is not convincing for me, however, from the data clear difference can be observed.

Reply:

See AC3 for added clarification of ALAOC.

In the discussion of AEA: Authors write that in July the minimum value of AEA in the diurnal pattern is attributed to vehicular emission. Please specify whether biomass burning or vehicular emission was the dominant? I found the discussion of this part rather speculative.

Reply:

The evidence of vehicular emission dominance was described in the added Measurement and Analysis, AC4 and AC5, Aerosol extinction variation, AC6 and Simulations and Discussion, AC10.

Simulations: I think it can be regarded as a first step in modeling of uncoated/coated BC particles. In the simulations the wavelength dependence of the refractive indices are not considered. Is it unimportant or more time and modeling efforts would be necessary for it?

Reply:

See AC10.