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Interactive comment on "Light absorption by organic carbon from wood combustion" *by* Y. Chen and T. C. Bond

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We thank Ross Mitchell for the interest in our paper. Below are our response on:

(a) The plausibility of the organic materials they consider in producing the differential absorption we observed (decrease in single scattering albedo from 0.61 at 670nm to 0.58 at 440nm – see Fig. 9 of our paper, lower red line)

Response: We agree that the differential absorption of class 3 aerosols in Qin and Mitchell (2009) could be possibly produced by organic carbon; however, it is difficult to compare exactly without an estimate of the BC content. We have also observed low single-scattering albedo (SSA) from cook stoves operating on biofuel (at 530nm, ranging from 0.4 to 0.5, Roden et al., 2009). Resinous wood, especially used in lighting,

could have contributed to high black carbon concentrations. These SSA values are lower than the values measured in open biomass burning but closer to the values of class 3 aerosols.

In the paper we present here, we observed absorption Angstrom exponents of OC ranging from 7 to 11 among samples, indicating a monotonic significant decrease of absorption towards longer wavelength. This may result in the increase of single scattering albedo (SSA) in longer wavelengths though this was not confirmed due to the unavailability of a multi-wavelength measurement of scattering.

(b) Suggested approach to including the organic material in Mie theory calculations (e.g., black carbon spheres with organic mantles etc)

Response: We believe that further work should examine two extreme cases: (1) black carbon spheres with concentric organic shells, with the refractive indices given here; and (2) black carbon mixed as inclusions throughout an organic particle, using the Bruggeman theory to combine refractive indices. However, a full investigation of the differences in these models is beyond the scope of this paper.

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