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Interactive comment on “Optical closure experiments for biomass smoke aerosols” by L. E. Mack et al.

Anonymous Referee #2

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General comments:

This is an interesting, short paper presenting measured SSAs for relatively fresh biomass smoke, and an exploration of the various factors affecting retrieval of optical properties from combustion aerosol.

Frankly, I was a little underwhelmed by the paper, as the “useful” results from the paper appear restricted to the measured SSA. There are a lot of caveats associated with the retrievals, which are nicely pointed out by the authors (though they appear to miss at least one additional factor.)

But there is something to be said for science that bravely ends by acknowledging the difficulties in a particular technique, and so I would recommend publication of this

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manuscript, after the authors have addressed some of the questions I raise below.

One final note: Perhaps the authors could list what additional experiments or measurement techniques are needed to overcome the difficulties in the retrieval methods they use?

Page 7473:

Line 4: “Corrections to Bscat... assuming only sub-micron particles were present” – what is the effect of this assumption on the results, given that the Lasair OPC measured super-micron and potentially larger than 2.0 μm particles due to undersizing of absorbing aerosol?

Line 24: “protocal” should be “protocol”

Page 7476:

The lack of correlation between measured SSA and MCE should probably be attributed to the mixing of flaming and smoldering phases in the samples collected during these experiments, in contrast to the way the results are explained in the manuscript as an add-on (“Further,...”) Since the Babs and Bscat values are measured at a much faster time-resolution than 10-minutes, and likely so are the CO/CO₂ values, the authors could potentially look at the relationship between MCE and SSA on a faster time resolution than an experimental average.

Page 7477:

“However, the calculations were lower than the measurements by a factor of 0.884.” – does this mean “Calculated = (1-0.884)*Measured”, or “Calculated = 0.884*Measured”?

Page 7479:

As in Hand et al., do the authors also use an OC multiplier based on mass closure? This can easily be affected by semivolatile organic compounds that can adhere to quartz fiber filters and/or are lost from Teflon filters used for the gravimetric measure-

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ments. The authors could perhaps consider the effects of these issues, in addition to variability in the OC density (I believe Barbara Turpin recommended a value of 1.2 g/cm³.)

Page 7480:

“These separate estimates are shown in Fig. 2 as 15 squares and diamonds, with the uncertainty bars indicating the ranges obtained for the two assumed EC properties, as discussed above” – No uncertainty bars are visible in Figure 2 – is that because the uncertainty bars are too small, or due to bad formatting?

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 7469, 2010.

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