

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

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We have discussed your publication with pleasure within our literature group seminar (Laboratory of Atmospheric Chemistry (Aerosol Physics Group), Paul Scherrer Institut, Villigen, Switzerland) and will give here a short summary of the major comments and questions that came up during our discussion and hope that they might help to improve your manuscript.

Comment: What are the wavelengths in Tab. 2? Did you neglect the wavelengths dependency when calculating ω_0 for the PAS wavelength of 532 nm? This should be mentioned in the table caption. Lide(2008) is not found in the references.

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Comment: Page 7472, Line 19 “...the chamber was diluted with clean outside air and prepared for the next experiment.”: Did you use only filtered air (particle free) or air from a clean air generator? Was the “clean outside air” used as background?

Comment: Page 7472, Line 28: Explain the abbreviation SUVA.

Comment: Page 7473, Line 4: The nephelometer integration time of 2 seconds seemed to be very short to us. Did you apply the Anderson and Ogren correction scheme on those 2 second values or on the average?

Comment: Page 7473, Line 7: Explain the abbreviation CSU.

Comment: Page 7475, Line 3: Did you derive Eq. 1 from Gaussian error propagation? Why do you divide the relative error $\Delta\omega_{\text{meas}}$ by ω_{meas} ? We were a bit confused. Therefore we tried it ourselves and came up with the following equation :

$$d\omega_{\text{meas}} = \sqrt{\left(\frac{b_{\text{abs}}}{(b_{\text{scat}} + b_{\text{abs}})^2} db_{\text{scat}}\right)^2 + \left(\frac{b_{\text{scat}}}{(b_{\text{scat}} + b_{\text{abs}})^2} db_{\text{abs}}\right)^2} \quad (1)$$

where db_{scat} , db_{abs} , and $d\omega_{\text{abs}}$ are absolute errors. We tested our equation to yours and came up with definitely larger errors.

Comment: Page 7475, Line 12-17: There is an inconsistency between the text and Tab. 1: Douglas fir needles and branches (ID 247) were dry not fresh. The number of digits of ω_{meas} is different in the table compared to the text.

Comment: Page 7477 Line 7 to 24: The correction of all measured size distributions by a factor of 0.884 seems to be quite a critical thing to us. What was the correlation coefficient of the measured to calculated scattering coefficients? How can you

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be sure that this factor (which you attribute to losses) is similar for all fuels which will probably have a totally different size distribution? Apart from impaction losses, we would expect diffusion losses, but they are less critical because those small particles don't contribute much to scattering. Did you also consider an ill-defined flow within the DMPS for these differences? You could also interpolate the refractive index of ammonium sulfate to the exact wavelength used. Is this factor valid for all three wavelengths of the nephelometer?

Comment: Page 7480 Line 15: The error bars you refer to at this point are missing in Fig. 2 (or are they realistically so small of being noticed?). See comment above about the error calculations.

Comment: Tab. 1: We thought it might be helpful if you would add the exact latin scientific name (species and genus) to the individual fuel type.

Comment: When you discuss the differences in the DMPS and OPC due to shape effects, you should extend this discussion to the shape effect of aerosol particles on the nephelometer measurement itself (and how you possibly correct for them).

Comment: The single scattering albedo ω_0 was measured and presented for 21 samples. Why is the refractive index retrieved and discussed only for 6 species?

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