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Atmospheric Measurement Techniques Discussions

Interactive comment on "Mass specific optical absorption coefficients of mineral dust components measured by a multi wavelength photoacoustic spectrometer" *by* N. Utry et al.

Anonymous Referee #1

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This manuscript presents mass absorption coefficient measurements for a range of mineral dust components. Measurements were made on re-suspended particles using a multi-wavelength photoacoustic spectrometer, with corrections applied for particle transport losses based on the MPI particle loss calculator program. Results were compared to idealised calculations based on Mie theory using literature values of refractive index.

This paper is a good application of the author's homebuilt photoacoustic spectrometer and aside from some minor comments, I have few technical suggestions for improvement. It is relatively simple in scope and in my opinion its most significant weakness is

that the technical or scientific breakthroughs presented are not extensive. This will limit its impact, but I do nevertheless believe the paper should be considered for publication in AMT following consideration of the following comments.

Specific comments:

Could the authors use their results to derive the wavelength-dependent complex refractive indices for each of the mineral components as a useful addition to Table 1? These will of course be sensitive to the size distribution. Some indication of how uncertainty propagates from the size distribution to the r.i. retrieval would be interesting.

At first read of section 2.4, I was surprised that only calculations were used to determine particle losses, with no experimental validation. Were experiments not possible? A note explaining why this was the case would be useful. I would have considered this a major deficiency if it were not for the degree of agreement observed in Figure 3.

The legend for Figure 3 indicates that error bars are from the uncertainty in PA measurements. Does this include contribution from the stability of the aerosol generation source and stability in the background measurements? How stable were these measurements?

Can the authors add a comment to justify use of the Mie model for particles that are clearly non-spherical. Is there any prior work that suggests this to be a valid approach?

Section 2.3: What fraction of the total photoacoustic signal was the background signal typically? (i.e. was this a large or a small correction?) What RH were measurements performed at?

Page 9027, lines 11-15: this statement is confusing. For an aerosol sample with e.g. 10 Mm-1 absorption and 10 Mm-1 scattering, the SSA is 0.5 not 0.9 as stated.

Page 9029, lines 17-19: can a reference be provided for this statement? While true for sub-micron particles, how large do particles need to be before heat transfer into the particle bulk during photoacoustic cycles becomes important?

Typos:

Abstract, line 15: insert ‘the’ in between ‘in case’

Page 9038, line 9: replace ‘lossess’ with ‘loss’.

Interactive comment on Atmos. Meas. Tech. Discuss., 7, 9025, 2014.