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Comment

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

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This manuscript contains interesting work on much needed spectral absorption properties of mineral dust aerosols and their mineral components. Currently, there are large discrepancies between published imaginary refractive indices for mineral dust components. These discrepancies seem to be largely due to the use of samples that have not been analyzed for chemical and mineralogical composition and the use of different, largely bulk measurement methods. In terms of the first problem the authors of this manuscript don't do any better, for example “limestone was collected in the Pilis Mountains of Hungary”; chemical and mineralogical analyses are totally absent. In terms of

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measurement methods, this manuscript adds a very different method, the photoacoustic instrument to the mix. The primary measurement products are MACs for largely sub-micron particles at four wavelengths. So what? What are these MACs good for? They can't be used for radiative transfer calculations because ambient particles, even after long-range (e.g., intercontinental) transport, are typically substantially larger (Formenti et al., 2011; table 3). The one important use that I could see is to derive imaginary parts of the spectral refractive index from these measurements, which should be possible if the particles are truly volume absorbers. To this subject, the authors state "The MAC data listed in Table 1 and shown in Figure 1 prove that in accordance with the expectations, the measured MD components are volumetric absorbers." With fig. 1 not containing any MAC data, the authors need to do a much better job in explaining why these sub-micron particles are volume absorbers! If these particles are indeed volume absorber (as I suspect), the authors may be able to use small particle absorption theory (Bohren and Huffman, 1998; p. 136, eq. 5.11) to retrieve the imaginary part of the refractive index. While the use of Mie theory for these highly non-spherical particles is suspect, it may actually work well for calculating the absorption of volume absorbers; but this needs to be substantiated, otherwise Mie results should not be included.

Additional more minor comments are

1) L43-44 and L69: What is this climate relevant spectral region? Are the authors talking about the tropospheric solar spectrum (300 – 2300 nm) or are they also including the thermal infrared?

2) Querry's work on hematite refractive index is generally misquoted. Querry (1987) quoted here does not contain any work on hematite, the correct reference is Querry (1985)

REFERENCES

Bohren, C. F., and D. R. Huffman (1998). Absorption and Scattering of Light by Small Particles. New York, Wiley.

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