

Interactive comment on “Simplifying the calculation of light scattering properties for black carbon fractal aggregates” by A. J. A. Smith and R. G. Grainger

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I find this work very interesting and valuable, and the presentation of the results is excellent. I have two minor comments.

1. Comment on the results presented in Sect. 3.3:

Similar work has been done and discussed in Kahnert, M.: Numerically exact computations of the optical properties of light absorbing carbon aggregates for wavelength of 200 nm - 12.2 μm , Atmos. Chem. Phys. 10, 8319-8329, 2010. The fitting ansatz used there (Sect. 3.2) was slightly different from that proposed
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here and did not lend itself equally easily to analytically performing size integrations. In this regard the fitting approach proposed here by the authors is more useful. In the ACP paper by Kahnert the fitting approach was eventually dismissed and the computational results obtained for the black carbon aggregates were put into a look-up table and directly coupled to a chemical transport model and to a radiative transfer model. The rationale was that there really is no more need for parameterisations if one can perform aerosol optics calculations for all relevant sizes and wavelengths. That this is indeed possible has been demonstrated in that paper, and it has been confirmed by the work presented here by Smith and Grainger.

2. Comment on comparison between modelling results and measurements:

In the manuscript the authors mention that their modelled single-scattering albedo at visible wavelengths agrees well with observations as reviewed by Bond and Bergstrom (2006). However, Bond and Bergstrom also review measurements of the mass absorption cross section (MAC). The ACP paper by Kahnert (2010) cited above briefly mentions that existing computations for black carbon aggregates do not fully agree with available measurements. This problem is discussed in more detail by Kahnert M.: On the discrepancy between modeled and measured mass absorption cross sections of light absorbing carbon aerosols, Aerosol Sci. Technol. 44, 453-460, 2010. It would be interesting if the authors could convert their absorption cross section at 550 nm to MAC and compare to the measured values reviewed by Bond and Bergstrom, as well as to the computed values reported by Kahnert.

One more very minor thing: please correct the citation of Gustav Mie's seminal paper: "Beiträgge" should be "Beiträge".