Atmos. Chem. Phys. Discuss.,
https://doi.org/10.5194/acp-2017-836-RC2, 2017

Atmospheric Chemistry and Physics Discussions

Interactive comment on "The Absorption Ångström Exponent of black carbon: from numerical aspects" *by* Chao Liu et al.

Anonymous Referee #2

Received and published: 20 November 2017

Inspecting aerosol AAE is important for multitude of applications, and the originally derived values are problematic, as the authors correctly point out.

The authors want to be able to break AAE (a derived particle-scale quantity) into, essentially, microphysical factors contributing to AAE, and this is indeed how I also see the field moving forward. While derived quantities are useful in same situations, BC can be argued to be too varied, either due to coating or differences in aggregation, for a single number to reliably represent all cases.

I think the work done here is important and of high quality, and is definitely worth being published. I have a few main questions I'd like to see addressed as well as a few minor comments.

Major notes:

Is the coating always observed to be a sphere encompassing the aggregate? For a less compact aggregate would the coating be a very large sphere or rather would the shape follow that of the aggregate? Is that something that could be studied with the model used here?

Individual BC particles are not perfect spheres nor perfectly smooth in reality. Is it possible to investigate the effects while taking these non-idealized factors into account? Do the authors think these factors would have significant effects or can they safely be ignored?

Is there a way to parametrize the results by using e.g. equivalent-sized (coated) Mie spheres with some kind of an effective medium approximation? This would greatly help facilitate the use of these types of particles in many applications (moreso than just a better estimate of AAE).

Minor notes:

Page 9, line 16: "straightforward", not "straight forward"

Page 10, line 13: Reference is italicized, unlike most other references. Should be consistent

Fig. 2: X-axis says "Evquivalent", should be "equivalent"

Fig. 9: Legend says "Comapct" instead of "Compact"

Interactive comment on Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2017-836, 2017.