

Author replies to referee comments – second revision

Comment: L.50, p. 2: “...the reason Robock...” instead of “...the reason, why Robock...”

Reply: We changed it as suggested.

Comment: L. 72, p. 3: The authors mean “Bingen et al., 2003”. Also need to include Wang et al. 1989, as they predate Bingen in retrieving a PSD from occultation data.

Reply: Thank you for spotting the error. We also included the citation of Wang et al. 1989 at this point in the manuscript.

Comment: L. 138-141, p.7: “the total number density N_0 (...) has to be assumed”: This is a little bit confusing, because it gives the impression that the authors do not retrieve the total number density, what is wrong. It would be less confusing to write, e.g., that “the single aerosol extinction coefficient is calculated with the Mie Code (Oxford, 2108) for a total number density equal to 1” –I guess this is the case. Please note also that “coefficient” is singular. “Extinction coefficient values” can also be used.

Reply: Thanks for pointing this out. In order to make it more clear that in these lines we are talking about the Mie calculations of the lookup-table and not the quantities we are retrieving, we changed the wording in this paragraph in several places, eg. from “To obtain a total aerosol extinction coefficient (...)” to “To obtain a theoretical total aerosol extinction coefficient (...)”. Also we changed “single aerosol extinction coefficients” to “single aerosol extinction coefficient values”.

However, although it was the case in our calculations, the number densities do not necessarily have to be set to 1 in the Mie calculations for the median radius and mode width retrieval to work. As we pointed out in L. 140-143, this is because the retrieval uses extinction ratios, which are independent of the number density, since the number density cancels out, when a ratio of two extinction coefficients is formed.

Comment:L. 161, p. 8; Figure 4: “at a different tangent height”: The authors should mention the range covered by the tangent height values used in Figure 4. It might be useful to use a color code (e.g. grey tones) on the plot for the error bars to visualize in a glance in which altitude range every measurement point is situated.

Reply: The tangent altitudes of the measurement points shown range from 18.5 km to 32 km for this particular occultation event. We included this information in the manuscript and also followed your suggestion of using different grey tones for different tangent height intervals in Figure 4.

Comment:L. 165, p. 9: “coordinates of the measurement data point”: The authors should specify which kind of coordinates they are referring to.

Reply: We replaced “coordinates of the measurement data point” by “extinction ratio coordinates of the measurement data point within the 2-D space of the lookup table”.

Comment:L.170, p.9 : “..ratios where sets...” instead of “...ratios, where sets...”

Reply: Implemented.

Comment:L. 182, p.9: “the precision”: It does not determine the precision, but the accuracy.

Reply: We changed “precision” to “accuracy”.

Comment:L. 188-190: “accuracy parameter”: The authors should indicate if this accuracy parameter is some standard parameter (e.g. by providing a reference) or a parameter they are defining (“We define the accuracy parameter as ...”).

Reply: Thanks for the suggestion. We included it as follows: “We define an accuracy parameter below, (...)”

Comment:L. 199, p.10: “plot”, lowercase.

Reply: We changed it.

Comment:L. 217, p.11: “can easily be calculated”.

Reply: Implemented.

Comment:L. 368-371, p.18: This sentence is particularly long and difficult to read. I suggest the authors to rephrase it.

Reply: We shortened the sentence to “This is a measure of the accuracy with which the retrieval algorithm assigns median radius and mode width values to the measurement data points via interpolation (see Figure 4), as well as to what extent the Angström law correctly describes the spectral dependence of the aerosol extinction.”

Comment:L. 373, p.19: The authors should specify which “relative difference” they are talking about.

Reply: We changed the sentence to “The relative differences between the Angström exponents calculated from the SAGE III/ISS data and the ones calculated with the retrieved size distribution parameters lie between -0.4 % and -0.08 %, which is very small and indicates an accurately working assignment of values in the mentioned step of the retrieval.”