Geosci. Model Dev. Discuss.,
https://doi.org/10.5194/gmd-2018-56-AC4, 2018

Geoscientific Model Development Discussions

Interactive comment on "MOPSMAP v0.9: A versatile tool for modeling of aerosol optical properties" *by* Josef Gasteiger and Matthias Wiegner

Josef Gasteiger and Matthias Wiegner

josef.gasteiger@univie.ac.at

Received and published: 17 June 2018

We appreciate the positive assessment and the useful comments of reviewer 2. In the following, comments by the reviewer are in italic font, our answers in normal font.

Moreover we want to refer to the revised manuscript where all changes can easily be tracked. We decided to not repeat all changes below for reasons of clarity.

1. Make the fonts in the Figures/plots large enough for easy visualization.

We agree that the fonts of several figures were too small. We went through the manuscript and improved the figures' font sizes where required for better visualization.

2. Section 2.1: Provide the definition of the irregular-shape radius.

Eqs. 1, 2, and 4 are valid also for irregular particles. Maybe this was a bit unclear because the previous paragraph concerns mainly spheroids. We now mention explicitly that the size definitions are valid for 'any kind of non-spherical particles'. This was included before the above mentioned equations.

3. Page 4, lines 27-28, page 5, line 1: "The real part mr determines the speed of light inside the particle and therefore the refraction of waves on the particle surface in the macroscopic sense": I think this is an over-simplification that may be misleading for a young scientist. It is better to omit it. Otherwise, please provide relevant reference.

As this part is not essential for the paper we removed it as suggested.

4. Page 7, line 21: "The minimum size parameter was selected depending on the maximum size achieved with TMM.": An evaluation of the agreement between the 2 methods is missing here. Please provide an indicative plot, containing e.g. the scattering matrix elements α_1 and $-b_1/a_1$ (two sub-plots) for indicative cases (e.g. see Fig.2 in Dubovik et al. (2006) -"Application of spheroid models to account for aerosol particle nonsphericity in remote sensing of desert dust")

We have added several plots similar to Fig. 2 of Dubovik et al. (2006) as Section S3 to the supplement. They illustrate the transition from TMM to IGOM which be briefly discuss. In Section 2.3 of the paper we refer to this Supplement.

5. Page 10, lines 8-9: "The transition size parameter between TMM and IGOM is in the range $5 < x < 125$, strongly depending on m and particle shape.": Provide the corresponding ranges for different m and particle shapes in an Appendix.

We have added an overview table as Section S2 of the Supplement and in addition have uploaded to https://zenodo.org a detailed list with maximum size parameters of TMM for all 22680 combinations of refractive indices and shapes included in our MOPSMAP data set of spheroids.

6. Page 13, lines 5-17: "In case of fixed values of . . . for each mode.": Re-write this section in a more clear way, maybe using some examples. It is not clear what your methodology is here.

Reviewer 1 also had a similar concern. We have rewritten this part and also included an example as Section S4 of the Supplement.

7. Page 20, lines 19-22: "For the continental . . . sea salt particles.": Provide relevant references.

We added relevant references (Petters and Kreidenweis, 2007; Markelj et al., 2017; Enroth et al., 2018; Psichoudaki et al., 2018) for the κ values of different aerosol types.

8. Page 25, lines 12-13: "In other words. . . radius definitions": Provide a visualization of this discussion in a plot with size distributions corresponding to the different radius definitions.

We added a new Figure 8 to clarify how the selected radius definition affects the results. The corresponding explanations in Sect. 5.4 were rephrased and extended.

9. Page 26, line 23-24: "But it also needs . . . partial derivatives": It is not clear what you mean here, it is better to omit this.

We agree that this part is not essential for the understanding of this section. So we removed it as suggested.

10. Page 27, lines 8-13: "A simple approach. . . together with MOPSMAP.": Provide relevant reference(s).

We added the following reference where the Monte Carlo error propagation is discussed: 'Evaluation of measurement data - Supplement 1 to the "Guide to the expression of uncertainty in measurement" - Propagation of distributions using a Monte Carlo method', Tech. rep., Joint Committee for Guides in Metrology, https://www.bipm.org/en/publications/guides/gum.html, 2008.

Interactive comment on Geosci. Model Dev. Discuss., https://doi.org/10.5194/gmd-2018-56, 2018.