Geosci. Model Dev. Discuss.,
https://doi.org/10.5194/gmd-2018-56-AC1, 2018

Geoscientific Model Development Discussions
Open Access
EGU

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 short comment by Maxim Yurkin with his positive judgement and helpful suggestions. In the following, comments by Maxim Yurkin 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. Sect. 2.2.4 of the manuscript and Sect. S1 of the new Supplement are attached to this reply.

1) The authors describe the discretization grid for the DDA in terms of the number

Printer-friendly version

Discussion paper

of number of dipoles per wavelength. But this quantity is not relevant for particles smaller than the wavelength. I guess, the authors used some fixed number of dipoles for smaller particles, but that is not reflected in the text.

Yes, Maxim Yurkin is right, we overlooked this point when writing our discussion paper. It is now included in the ADDA section (2.2.4) of the revised version. We use the dipole set that has 11 dipoles per wavelength at $x = 10$ (with about 23000 dipoles) also for size parameters $x < 10$.

2) The orientation-averaging scheme (described in the Appendix A) seems fine, but it is a bit complicated. Thus, it would help if the authors test it for some simple problem (e.g. moderately-sized spheroid), where a reference solution is available. Or at least, mention the results of such tests in the text.

We agree that the description of the orientation-averaging scheme is a bit complicated in the discussion paper, mainly Eq. A2. In the revised paper we replaced Eq. A2 by a more simple equation describing the same method. We feel that it is not necessary to further simplify the scheme as the idea behind is straightforward. Note, that we moved the Appendix of the discussion paper to the Supplement (Section S1.1) of the revised version (to extend it with more details of the accuracy test, see below).

We decided to provide more details of the orientation averaging accuracy tests. However, in order to limit the size of the paper, details are swapped to Section S1.2 of the Supplement whereas our main results are still summarized in the paper. Furthermore, we considered a third irregular shape (F) for the orientation averaging accuracy tests.

Following the suggestion of testing our scheme for a simple problem like spheroids, we also added a test with spheroids at size parameter 2, 4, and 10 as Section S1.3 to the Supplement. We applied ADDA together with our orientation averaging scheme (for simplicity without considering the symmetry of spheroids) and compare the orientation-averaged properties of the spheroids to those calculated with TMM. A brief discussion of the agreement is also included in the Supplement.

3) Finally, I wonder if the DDA can be used for cases where neither TMM or IGOM is available (e.g., for 1:3 spheroids with $m_r < 1.04$ and size parameters of about 30). The DDA is known to be particularly efficient for such regime (mr close to 1), due to the fast convergence of the (internal) iterative solver. So the authors may at least mention such possibility to extend their dataset.

As we are not very familiar with atmospheric applications in this refractive index range we did not put much effort in maximizing the size coverage for $m_r < 1.04$. However this suggestion points to a useful future extension of the data set, which is now mentioned in the outlook.

Please also note the supplement to this comment:
https://www.geosci-model-dev-discuss.net/gmd-2018-56/gmd-2018-56-AC1-supplement.pdf

---

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

Printer-friendly version

Discussion paper