

Interactive comment on “Scattering matrices of mineral dust aerosols: a refinement of the refractive index impact” by Yifan Huang et al.

Anonymous Referee #2

Received and published: 14 January 2020

This paper by Huang et al. reveals by model simulations the importance of the dust refractive indices (RIs) for the model development of its optical properties. They show that the scattering matrix elements of different kinds of dust particles can be reasonably reproduced by choosing appropriate RIs even using a fixed particle geometry and that a change in the RI can strongly affect the appropriate shape parameters to reproduce the measured dust phase matrix elements. The study indicates that the development of corresponding optical models can potentially be simplified by considering only variations over different RIs. The study should be a welcome addition to the literatures on modeling and measurements of dust optical properties and their radiative effects. The paper is well written in general, though the model used needs to be introduced more specifically and the parameters presented to be described more clearly. I would

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recommend the paper be published after minor revisions.

Minor/Technical issues:

P2, L5: What implications of this study for better quantifying these two fundamental parameters? This issue may also need to be highlighted in the conclusions.

P2, L7: There are two literatures given in the References corresponding to Xu et al., 2017 here.

P2, L10: There are two literatures given in the References corresponding to Bi et al., 2018 here.

P3, L20: There are two literatures given in the References corresponding to Bi et al., 2011 here.

P4, l11: Several types of dust particles?

P6, Eq. (2): What are i and j stand for, respectively? Their ranges should be given in the equation. Should it be P_{ij} in the denominator?

P6, L6: Is this summation really used in the following sections? If so, an equation might be given here.

P7, L1-2: Do you mean element(s) or element ratio(s) here?

P7, L17: the literature for Nousiainen, 2014 is missing in the References.

P8, L1-2: Where is d_{11} shown in the figure? The phrase “element ratios” might be more suitable for $P_{11}/P_{11}(30 \text{ degree})$, P_{12}/P_{11} , and P_{33}/P_{11} ? Are all P_{11} in the denominator for 30 degree? Since these ratios are frequently used, their definitions (or meanings) need to be given in Sect. 2.

P14, L2-3, L16-17, and L24-25; P16, L3-4; P17, L5-6 and L10-12; P18, L14-15 and L16;

P19, L1-2 and L5-7: Are these literatures referred in the main-body text?

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P22, Fig. 3 and P23, Fig.4: Is P11 for 30 degree in all the Y-axis?

P24, Fig.5: Are measurements referred by black dots? Legends (or descriptions) of the plots need to be given.

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2019-812>, 2019.