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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The influence of dust optical properties on the colour of simulated MSG-SEVIRI Desert Dust imagery" *by* Jamie R. Banks et al.

Anonymous Referee #2

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First, I sincerely apologize for the delay of my revision.

The paper by Banks et al. analyses the sensitivity of SEVIRI imagery retrievals to dust optical properties and shape based on simulations with the COSMO-MUSCAT model and optical calculations. COSMO-MUSCAT generate the 3-D filed of dust aerosol concentration as a function of the size distribution, then used as input to an optical code to estimate the dust extinction and absorption at different wavelengths. The impact of using different refractive index datasets and different assumptions on the particle shape are evaluated through comparison with the RGB and brightness temperatures retrievals from SEVIRI.

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Discussion paper

The paper is well written and well organized. The broad context and the specific problematic are described in a clear way, and the methods and objectives clearly identified. The number of figures is appropriate and they well illustrate the main findings.

I have nonetheless some remarks concerning the size and refractive index (RI) assumptions in the study and their impact on the results.

1. The representation of the size distribution of dust and the sensitivity to the coarse fraction is not discussed. In the paper it is shown that the fifth bin above about 8μm in diameter as simulated by COSMO-MUSCAT basically do not contribute to the dust load. I wonder how this compares to field observations of the size distribution in particular from FENNEC close to source regions. Moreover, and based on the comparison with field observations, a sensitivity of the results to the coarse size of dust should be added in the paper.

2. When comparing the different refractive index datasets in Figure 4, it is evident a strong difference at 10.8 and 12μm between Volz, Sokolik, and OPAC data compared to the new laboratory estimates of the RI. This difference may strongly impact the results of this study. I wonder if this is not due to a bias of some of the datasets at some wavelengths. This is for instance discussed for OPAC at 12μm due to the large assumed quartz content for this dataset, but I would like a similar discussion also for the strong Volz peak at 10.8μm. Is this strong peak reasonable or the dataset is biased/shifted in wavelength compared to the other datasets due to differences in the retrieval procedure or other? I suppose this point should be better addressed given that the sensitivity to the refractive index is the core of the paper.

3. On the same line, I would appreciate that all the refractive index datasets are included in Fig. 9. I have the impression looking at this figure that the BT is overestimated at 10.8 μm in the Volz dataset and I wonder if this is not linked to a possible bias of the Volz dataset at 10.8μm compared to all the other estimates of the dust RI used in the paper.

Minor comments

The right panel of figure 9 is not very clear to me; please, better explain its content and message.

I agree with the other reviewer in asking to add the word “infrared” in the title.

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