

Interactive comment on “Global scale variability of the mineral dust longwave refractive index: a new dataset of in situ measurements for climate modelling and remote sensing” by Claudia Di Biagio et al.

Anonymous Referee #2

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General comments

This paper presents a new set of desert dust aerosols refractive indices, varying with the source region around the globe. As it shows strong differences with source areas, this new data set is a big step forward in refining the dust models, but also in adjusting dust aerosols retrievals from satellite data. The work is well presented, easy to read, well structured. It contains significant technical information about the experiments undertaken. I am not an expert in laboratory measurements, so it is difficult for me to provide a complete review of this part, especially all the technical choices. However,

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everything is clearly explained and understandable, and all seems logical. Uncertainties are discussed together with the results, providing the reader with tools for a full evaluation of the data.

I only have a very short list of comments/questions here under.

Specific comments

lines 86-88: could you add a reference here, or some explanation as to why aerosols have those specific effects? The cited paper of Hsu does not mention specificities about the different effects at different altitudes (surface, atmosphere, TOA), and it is not so obvious to me for example why dust LW effect would be to cool the atmosphere (at least within the dust layer where it emits its radiation).

line 102+135 (less important, as e.g. is used) +849: missing Vandebussche et al, AMT 2013 and one ref from Clarisse et al (many publication about mineral aerosol retrievals); ref to Klüser et al not needed in line 849 indeed, as their retrieval contains a retrieval of mineralogy and is therefore not based on using dust refractive indices

line 105: not so sure it's THE highest uncertainty that comes from there... there is also a huge uncertainty due to altitude or to particle size for example

line 162: why not 79/21? does it change anything?

line 202: here the samples are fully dried (I guess this is to allow generation of the aerosols) while in nature it is obviously not always the case; do the authors have information if / how humidity affects the optical properties of dust aerosols? If it requires a whole additional study it is out of the scope of this paper, obviously.

line 229: why interpolate at such a high spectral resolution? (minerals don't have sharp absorption lines)

line 246: the scattering part is 20% after injection and 10% after 2hours, while in the introduction/abstract it is said that the refractive index does not change with time

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line 284: do you have an idea to explain that discrepancy?

line 458: is non-sphericity often used in LW dust retrievals? (not that I know of). Aeronet and Polder are shortwave instruments, where non-sphericity effects are more important

Technical corrections

line 416: we combined (7a)-(7B) and ... [the "b" is missing]

line 437: lower than

line 456: This assumption could be, however, not fully -> This assumption could, however, not be fully

line 823: there is an unnecessary - at the end of the line

Interactive comment on Atmos. Chem. Phys. Discuss., doi:10.5194/acp-2016-616, 2016.