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Atmospheric Measurement Techniques Discussions

Interactive comment on "Light scattering at small angles by atmospheric irregular particles: modelling and laboratory measurements" *by* T. Lurton et al.

T. Lurton et al.

thibaut.lurton@cnrs-orleans.fr

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General comments.

The idea seems interesting, however it doesn't have sufficient theoretical foundation. If the Mie modes in a rough particle are added incoherently, they should still be defined for the same definite size x. That is, the roughness must be small, so that one can put the same Mie coefficients: $a_n(x+\delta x) = a_n(x)$ and $b_n(x+\delta x) = b_n(x)$. At the same time, the sand particles don't look like rough particles at all: they are notably nonspherical. This is not the range of applicability of the theory, that's why the coincidence of the

theory and the experiment looks embarrassing.

Indeed, sand particles are not spherical, but we believe that this matter of fact can be modelled by a roughness factor as long as some statistical averaging is operated over the measurements, which is the case in our study. We underline the fact that we are never dealing with the scattered flux of a single rough particulate, but always with averages of multiple measurements. Because of the multiple orientations and sequential measurements over nonspherical particles, we believe it is equivalent to consider a rough particle whose global shape tends towards a sphere.

Specific comments.

Authors do not specify the polarization state of the beam in the experiment. As one can guess through Eq.(7), the formula for unpolarized light is used. As the laser beam is used in the experiment, the beam is definitely polarized. It would be better, if the authors specified the polarization state of the initial beam, and therefore, what value they measured: $|S_1|^2$ or $|S_2|^2$?

We use a laser beam which is linearly partially polarised. As long as the detector is not polarized, it yields the total scattered flux. We agree that this should however be stated in the paper, and we shall correct this point. We are also conscious that roughness could alter the polarisation of the beam, however, working at a small angle of scattering makes the polarisation and depolarisation phenomena negligible for irregular grains.

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