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Atmospheric Chemistry and Physics Discussions

Interactive comment on "On the spectral depolarisation and lidar ratio of mineral dust provided in the AERONET version 3 inversion product" *by* Sung-Kyun Shin et al.

Anonymous Referee #3

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This article carefully compared the two spectral characteristics of lidar ratio(S_L) and linear depolarization ratio(delta_L) for the coarse size distribution (AE < 04, and fine mode fraction < 0.1).

As well known for other scientist, these two values depend on the particle morphology(depolarization) and imaginary-refractive index(lidar ratio) of particle. But as author have described in this article at page 2 the line 5-6. Lidar ratio also depend on the particle size. So equation (2) and (3) should be changed from F_11 (λ,n=n_r+jn_i) & F_22 (λ,n) to F_11 (x=2πr/λ,n) & F_22 (x,n)(Borhen and Huffman, 1983). So, the author should consider aerosol size distribution for the all kinds of their discussion. When

this size distribution does not changes S_L and delta_L so much, the author should describe this results quatitatively also.

Linear polarization, may be, depend on the size distribution also(because scattering F_11 & F_22 depend on the wavelength and size), for this purpose they must consider this effects and include some results or referenes.

Figure 3, and 5 gives clear spectral changes of lidar ratio and linear depolarization. The author explain these results by using aerosol refractive index(Table 1). I think their explanation is correct. But they did not say anything about the spectral shape of linear depolarization. They must discuss more carefully about this spectral changes. For example, when we consider approximately, that wavelength is longer than aerosol size(x»1) the morphological shape cannot influence scattering. So, when wavelength increase linear depolarization should decrease. But their results (Figure 3) show opposite picture.

If aerosol linear depolarization ration depend only on the aging period and transportation distance. Please remove line 12-14("The spectrum of (delta_lambda)_ shows a maximum of 0.26-0.31 at 1020 nm and decreasing values as wavelength decreases. AERONET-derived (delta_lambda)_ _ at 870 and 1020 nm are close to the lidar reference while values of 0.19-0.24 at 440 nm are smaller than the independent lidar observations " at the abstract. So, I think this article can be published in this article when they consider aerosol size distribution in comparing S_L and delta_L

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