

# ***Interactive comment on “Estimation of aerosol complex refractive indices for both fine and coarse modes simultaneously based on AERONET remote sensing products” by Ying Zhang et al.***

**Anonymous Referee #3**

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The paper presents a method to estimate refractive indices for both fine and coarse-mode particles. The retrieval from AERONET assumes size-independent refractive index. The paper assumes that the imaginary part of refractive index has no spectral variation except at 440 nm, while real part of refractive index has no spectral variation from 440 - 1020 nm. The size parameters are then derived by fitting log-normal distributions to the inverted size-bin data from AERONET. Mie calculation is conducted to find the sets of both fine and coarse aerosols refractive indices that give the best agreement with AOD and absorbing AOD from AERONET.

Overall, the math in this paper is sound. The results presented for Beijing are interesting. The paper needs more justification of its assumptions and more validation.

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- 1) The assumption that the imaginary part of refractive index has no spectral variation except at 440 nm, while real part of refractive index has no no spectral variation from 440 - 1020 nm. Is this assumption consistent with the assumption in AERONET's inversion algorithm?
- 2) In cases/locations when AERONET's inversion shows dominant fraction (~100%) of fine-mode aerosols, its retrieved index of refraction should be considered as appropriate for fine-mode aerosols. The same holds true when aerosols are dominated by coarse particles. There are AERONET sites close to Gobi desert. It will be valuable to look at several cases where dust particles are transported from Gobi desert to Beijing, and compare the retrieved index of refraction for coarse mode in Beijing with that directly retrieved from AERONET site close to the dust source.

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