Atmospheric
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Techniques

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Discussions

Interactive comment on "Technical note: Absorption aerosol optical depth components from AERONET observations of mixed dust plumes" *by* Sung-Kyun Shin et al.

Anonymous Referee #5

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"Absorption aerosol optical depth components from AERONET observations of mixed dust plumes" by Sung-Kyun Shin, Matthias Tesche, Detlef Müller, and Youngmin Noh

Reviewer's comments

Manuscript presents a new technique to distinguish between contributions of dust and non-dust aerosols to the total aerosol optical depth (AOD) measured by AERONET. The approach is based on utilizing the particle linear depolarization ratio (PLDR) which is now available as one of aerosol products in AERONET Version3. Due to PLDR sensitivity to aerosol particle shape, the dust/non-dust separation is based on the particles shape differences rather than on difference in aerosol size. This, for example, allows

excluding contribution of coarse spherical particles from dust AOD component.

I believe that the subject of manuscript is in scope of AMT, it is very well written, and presented results are interesting. I recommend it to be published with minor revisions.

Comments.

1. My main comment is regarding Eq. (15). It is not clear how it was derived and what model of non-dust aerosol component was assumed. Equation suggests that black carbon (BC) is not the only absorber in non-dust component (both BC and non-dust single scattering albedos are present in (15)). However if the second absorber is present its properties need to be described. In addition, the right side of the equation suggests that AAODnd should be equivalent to BC extinction AOD, which is not obvious without knowing what model of non-dust component was employed. I was able to derive the equation assuming the presence of the second very low absorbing component in non-dust component mixture. However, it still not clear how it was done by authors. I suggest to include discussion on how the Eq. (15) was derived and what assumptions were used.

2. Page 3, between lines 5 and 10 authors write: "The AERONET inversion is performed for measurements with a 440-nm AOD larger than 0.4". Actually inversion is performed for all the values of AOD, but only inversions for AOD (440)>0.4 are included in Level 2 product.

3. Page 3, line 10. For reference on uncertainty in SSA retrievals is more appropriate to use Dubovik (2000) uncertainty paper.

4. Page 5. "Re-arranging Eq. (11)". I think it should be Eq. (12).

5. Page 8. "using Eqs. (6) and (6),". Probably typo.

6. Page 8. Why analysis of AAOD (BC) was conducted at all four AERONET wavelength? The earlier discussion suggested using just 1020 nm PLDR product as being more reliable.

7. Figure 7 caption. Upper and lower panels should be probable left and right panels.

8. You may consider using AERONET SDA product to compare to dust AOD in addition to coarse mode AOD inferred from particle size distribution retrievals.

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