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Atmospheric Chemistry and Physics Discussions

# *Interactive comment on* "Spatial distribution of aerosol microphysical and optical properties and direct radiative effect from the China Aerosol Remote Sensing Network" *by* Huizheng Che et al.

**Anonymous Referee #2**

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This paper characterizes the climatology of aerosol microphysical and optical properties in China using ground-based remote sensing from the CARSNET network. This is one of the most systematic dataset of aerosol optical properties reported in the literature, and is valuable for improving the estimate of aerosol radiative effects and for evaluation of satellite data and climate models. The paper is generally well written. I think it can be considered for publication after the author addresses the following minor comments and suggestions. Besides the following comments, however, there are many outstanding grammar errors in the paper. I strongly suggest that the author ask a native speaker to carefully edit and improve the language.



(1) Line 72-77: The descriptions of the roles of AOD, absorptivity, and SSA are very similar. Please revise a bit to reflect their respective roles.

(2) Line 241-243: Which radiative transfer model is used to calculate the direct aerosol radiative effect?

(3) Line 258-259: The assumption of d single fixed aerosol vertical distribution (exponential to 1 km) may deviate from the real-world situation significantly. What's the potential impact on calculated aerosol radiative effect?

(4) Line 260-262: What does this error refer to and how is it quantified?

(5) Line 285-287: PVF and PVC have been defined before (Line 216) and the full names used in these two places are different. Please define only once and use consistent terms.

(6) Line 314-316: In urban sites, the volume concentration of coarse particles is higher than fine particles, which sounds counterintuitive. Does this agree with previous studies?

(7) Line 334-335: The several studies listed here did not support the hygroscopic growth of fine-mode particles.

(8) Line 369, Line 577: Wuhan is not located in the YRD region.

(9) Line 583-585: Why is the DARE-TOA positive in Akedala? Due to a strong absorption?

(10) Line 610-612: I think the strong cooling is not due to strong absorption.

(11) Fig. 2, 3, 8: The scales of the legend should be modified to differentiate large and small values more clearly. For example, in Fig. 8, most values fall between -40 and 0 and hence show the same color.

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