Aerosol optical properties and their impacts on cloud remote sensing

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Aerosols, by scattering and absorbing solar radiation, reduce the energy reaching the ground surface. The absorptive properties of aerosols could result in different impacts on the surface radiation. In general, for the same amount of aerosols, the larger the absorption of aerosols, the more the reduction of solar radiation at the surface. Based on the slope ratio of surface radiation to the atmospheric visibility, we first determine the relative strength of aerosol absorption in different regions in China. It is found that the aerosols in Central China have strong absorption [1].

The strong absorption of aerosols in China could further impact the cloud remote sensing based on spectral radiation in visible wavelengths. In principle, it could make the cloud optical depth overestimated and cloud droplet effective radius underestimated for ground-based retrievals since the aerosols reduce the downwelling solar radiation reaching the surface. In contrast, the aerosols could make the cloud optical depth underestimated and cloud droplet effective radius overestimated for satellite-based retrievals since they reduce the cloud albedo by absorbing the solar radiation. These two different effects of aerosols on ground- and satellite-based cloud remote sensing could make the retrievals from these two different methods different from each other [2].

References

[1] Yang, X., C. Zhao, L. Zhou, Y. Wang, and X. Liu, 2016: Distinct impact of different types of aerosols on surface solar radiation in China. *J. Geophys. Res. Atmos*. **121**, 6459–6471.

[2] Li, Z., F. Zhao, J. Liu, M. Jiang, C. Zhao, and M. Cribb, 2014: Opposite effects of absorbing aerosols on the retrievals of cloud optical depth from spaceborne and ground-based measurements. *J. Geophys. Res. Atmos*. **119**, 5104–5114.

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