

# Diurnal variability of aerosol type and vertical distribution and its implication for satellite aerosol remote sensing

Jing Li\* and Chong Li

*Department of Atmospheric and Oceanic Sciences, School of Physics, Peking University, Beijing 100871, China*

*\*Presenting author (jing-li@pku.edu.cn)*

Aerosols vary on different time scales. Compared to seasonal or interannual variability, the diurnal variability of aerosol properties is less studied, mainly because continuous monitoring of aerosol properties over the course of a day is only available at scattered ground sites. However, with the increasing attention being paid to satellite retrievals using geostationary platforms, accurate evaluation of diurnal changes of aerosol properties becomes essential. In this study, we investigate the changes of aerosol optical parameters and vertical distribution using aethalometer, nephelometer, sunphotometer, and lidar measurements in Beijing. A distinct diurnal cycle is found in all these parameters, which are mainly related to the development of the planetary boundary layer but also to other meteorological factors such as winds and humidity. We further use AERONET data to classify aerosols into four major types: dust, fine absorbing, fine scattering, and mixed. We find that in addition to Beijing, significant diurnal changes of aerosol type are noticed at many world-wide locations, in particular, Western US, Southwestern Europe, and South Africa. We further use the 6s radiative transfer model to evaluate the impact of these diurnal changes on aerosol retrievals from geostationary platforms. Specifically, we compare the difference between the retrieved aerosol optical thickness using the mean aerosol model and vertical distribution and that using diurnally resolved values. Large discrepancies, up to 50%, are found between these two values. Our results indicate that diurnal changes of aerosol type and vertical distribution represent a common phenomenon and must not be neglected in aerosol retrievals using geostationary satellites.

Preferred mode of presentation: Oral