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Long-term Observation of Aerosol Optical Properties at the SORPES station in Nanjing, China

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Atmospheric aerosols influence the earth's radiation budget by scattering and absorbing solar radiation and contribute substantial uncertainty in the estimation of climate forcing. Thorough and comprehensive measurements on different parameters including absorption and scattering coefficient, wavelength dependence and angular dependence along with their daily and seasonal variation help to understand the influence of aerosol on radiation.

2-years continuous measurement of aerosol optical properties has been conducted from June 2013 to May 2015 at the Station for Observing Regional Process of Earth System (SORPES) station, which is a regional background station located in downwind direction of Yangtze River Delta (YRD) urban agglomeration in China. A 7-wavelenths aethalometer and a 3-wavelenths nephelometer were used to measure absorption and scattering coefficient, and also other parameters like single scattering albedo (SSA), absorption angstrom Exponent (AAE), scattering angstrom exponent (SAE) and back-scattering refraction. In addtion, simultaneous measurements on chemical composition and particle size distribution were performed so as to investigate the dependencies of aerosol optical properties on chemical composition and size distribution. To get further insight on the influencing factors, Lagrangian particle dispersion modeling (LPDM) was employed for source identification in this study. The averages of absorption coefficient, scattering coefficient and SSA are 26.0±18.7 Mm-1, 426±327 Mm-1 , 0.936±0.3 at 520nm respectively for whole period. SAE between 450 and 635nm is 1.299±0.34 and have strong negative correlation with particle Surface Mean Diameter (SMD). AAE between 370 and 950nm is 1.043±0.15 for whole period but growth to more than 1.6 in all identified Biomass Burning (BB) events.