Geophysical Research Abstracts
Vol. 20, EGU2018-16504, 2018
EGU General Assembly 2018

Light absorption of brown carbon in eastern China based on 3-year multi-wavelength aerosol optical property observations at the SORPES station and an improved Absorption Ångstrom exponent segregation method

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Brown carbon (BrC), a certain group of organic carbon (OC) characterized by an absorption spectrum that smoothly increases from the visible to ultraviolet (UV) wavelengths, makes considerable contribution to light absorption on both global and regional scales. High concentration and proportion of OC have been reported in China, but studies of BrC absorption based on long-term observations are rather limited in this region. In this study, we reported 3-year results of light absorption of BrC based on continuous measurement at the SORPES station in the Yangtze River Delta, China combined with Mie-theory calculation. Light absorption of BrC was obtained using an improved Absorption Ångstrom exponent (AAE) segregation method to calculate AAE of 'pure' and non-absorbing organic matter coated black carbon (BC) at each time step based on Mie-theory simulation and measurement of multi-wavelength aerosol light absorption. By using this improved method, the variation of AAE_{BC} over time is taken into consideration, making it applicable for long-term analysis. The contribution of BrC to light absorption and the potential sources of BrC in typical seasons are discussed. Lagrangian modeling and chemical signature observed at the site suggested that open biomass burning and residential emissions were the dominate sources in BrC-rich seasons.