5.025 Absorption coefficient of urban aerosol in Nanjing, west Yangtze River Delta of China.

Presenting Author:
Bingliang Zhuang, School of Atmospheric Sciences, Nanjing University, blzhuang@nju.edu.cn

Co-Authors:
Tijian Wang, School of Atmospheric Sciences, Nanjing University
Shu Li , School of Atmospheric Sciences, Nanjing University
Min Xie, School of Atmospheric Sciences, Nanjing University
Yong Han, School of Atmospheric Sciences, Nanjing University
Mengmeng Li, School of Atmospheric Sciences, Nanjing University

Abstract:

Aerosol absorption coefficient (AAC) is an indicator to assess the impact of absorbing aerosols on radiative forcing. In this study, the near-surface AAC and absorption angstrom exponent (AAE) in urban Nanjing, China, are characterized on the basis of measurements in 2012 and 2013 using the 7-channel Aethalometer (model AE-31, Magee Scientific, USA). The AAC is estimated with direct and indirect corrections, which show consistent temporal variations and magnitudes at 532 nm. The mean AAC at 532 nm is about 43.23±28.13 Mm^{-1} in urban Nanjing, which is much lower than that in Pearl River Delta and as the same as that in rural areas (Lin'an) in Yangtze River Delta. The AAC in urban Nanjing shows strong seasonality (diurnal variations), high in cold seasons (at rush hours) and low in summer (in afternoon). It also show synoptic and quasi-two-week cycles in response to weather systems. Its frequency distribution follows a typical lognormal pattern. The 532 nm-AAC ranging from 15 to 65 Mm^{-1} dominates, accounting for more than 72% of the total data samples in the entire study period. Frequent high pollution episodes, such as those observed in June 2012 and in winter 2013, greatly enhanced AAC and altered its temporal variations and frequency distributions. These episodes are mostly due to local emissions and regional pollutions. Air masses from northern China to Nanjing can sometimes be highly polluted and lead to high AAC at the site. AAE at 660/470 nm from the Schmid correction (Schmid et al., 2006) is about 1.56. Low AAEs mainly appear in summer in response to the relative humidity (RH). AAC increases with increasing AAE at a fixed aerosol loading. The RH-AAC relationship is more complex. Overall, AAC peaks around RH values of 40% (1.31.6), and 80% (1.3