1.209 New Insights into Sources of Organic Aerosol in PM2.5 in a Polluted Urban Environment.

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Abstract:

Air pollution caused by fine particles is of great concern in megacities because of its significant effects on visibility, radiation, and human health. In recent years, on-line instruments like Aerodyne aerosol mass spectrometer and aerosol chemical speciation monitor are commonly used to characterize the aerosol composition and the sources of organic aerosol (OA) in China. Most of these instruments can only detect the submicron domain. However, particles having diameters of 1 to 2.5 μm may have significant contribution to the mass of fine particles in the urban environment. In this study, we deployed a time-of-flight aerosol chemical speciation monitor equipped with 2.5-μm aerodynamic lens, a capture vaporizer, and a novel sampling-size auto-switching system in Beijing during 2016 to 2018. Non-refractory submicron and fine particles were alternatively detected for every half an hour by the same mass spectrometer, which allows source apportionments of OA in two size domains without complications from instrument differences. Submicron particles usually contribute to the majority of fine-particle mass. During the haze events, the ratio of submicron- to fine-mode non-refractory particle mass can decrease to about 0.5. The mass fractions of chemical components are similar for submicron and fine particles, although in some cases, the fractions differ in the two size domains. In summer, the sources of OA identified by positive matrix factorization are different for submicron and fine size domains. Four

factors such as hydrocarbon-like OA, cooking OA, and two types of oxidized OA were resolved for submicron particles, which is consistent with the findings of previous studies. In winter, the contribution of hydrocarbon-like OA to total OA are greater in fine particles than in the submicron size domain, which may be explained by the difference of the volatility distributions of different OA factors.