



Particle pollution in Beijing: features, source and secondary formation

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As the capital of China and a major mega city, Beijing has been experiencing great changes the last few years. Particulate pollution is reported to be the major air pollutant in Beijing for about 85% of days in the last 5 years (Beijing Environmental Bulletin, 2004-2008). Meanwhile totally 15 stages control measures for air pollution have been taken since 1998, and enhanced strongly for the 2008 Olympic Games.

Although great effort has been made by Beijing's government to mitigate atmospheric particulate pollution, PM10 levels are still over the target levels and have become the major air pollution problem in Beijing. Moreover, the presence of regional and secondary pollution has been recently recognized. Organic matter constitutes a major fraction of PM2.5 mass, and the difference in OC/EC ratios from other cities indicates a distinct source in Beijing. A two-year measurement of organic species and source apportionment by receptor models showed that coal combustion and cooking emissions are unique in Beijing. Coal combustion and vehicle emissions as well as various dusts are important sources for particle pollution in China. Secondary organic carbon comprises a major fraction of OC, with the highest contribution to total OC in summer (45%) and the lowest in winter (19%). However, because some uncertainties still exist, the contributions and formation mechanisms of secondary compounds will require intense investigation in the future. New particle formation events as a source of secondary aerosol are observed on about 20% of the days each year in Beijing, with the highest frequency in spring and lowest in summer. An optical closure study showed that a Mie model can acceptably reproduce the aerosol optical properties in Beijing. This study also highlights the importance of coating on soot in enhancing the aerosol absorption and scattering coefficients.