

Measurement of chemical composition and optical properties of aerosol particles at Mangshan near Beijing in Sept. 2007

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Intensive field campaign in Mangshan(40°15'N, 116°17'E, 170m asl), located 40 km north of the city center of Beijing, China, in September 2007 was carried out. To investigate chemical and optical property of aerosol particles, in this study, 9 or 14-hours PM_{2.5} samples were collected on the quartz filters using High-volume(500L/min) and Mini-volume(5L/min) samplers. Using these filters, EC (elemental carbon) and OC(organic carbon), water-soluble ions(SO₄²⁻, NO₃⁻, NH₄⁺, Cl⁻, Ca²⁺, Mg²⁺, K⁺, and Na⁺) and metals(Al, Fe, Cu, Mn, Zn, Pb) were measured by Sunset lab EC/OC instrument, ion-chromatography, and ICP-AES (Inductively Coupled Plasma-atomic Emission Spectrometry), respectively. During the campaign, total mass concentration ranged from 3.2 to 172.1 ug/m³ with a mean of 55.3 ug/m³, and major components were sulfate, nitrate, and organics. Scattering and extinction coefficients were reconstructed in an empirical manner by summing the contributions from various chemical species, which were calculated by multiplying observed mass concentrations of each species with empirical mass scattering (or extinction) coefficient and humidity growth factor. The reconstructed scattering and extinction coefficients had good correlation with directly measured coefficients by nephelometer and Max-doas, respectively. In the breakdown, we found the importance of ammonium sulfate and organics in determining the ambient scattering coefficient. The reconstructed scattering coefficient roughly reproduced the levels directly measured by nephelometer, while the reconstructed extinction coefficient was smaller than directly measured value by Max-doas.