

2.143 Characteristics of Submicron Aerosols in 2013 summer of Beijing: Particle Size, Density, Hygroscopicity, and Mixing State.

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Abstract:

To characterize the air pollution of North China Plain of China, CAREBEIJING-2013 field campaign was conducted in summer of 2013. Submicron aerosols were measured at an urban site PKU from July 28th to September 31st 2013. A suite of integrated instruments was used to measure the size distribution, effective density and hygroscopicity of ambient particles. The chemical composition of submicron particles were measured by using an Aerodyne HR-ToF-AMS. During the measurement, the average particle densities are between 1.3-1.5 g cm⁻³, indicating organics and sulfate were dominant in the particles. The densities of smaller particles, i.e. 46 nm, 81nm, showed single peak at 1.3-1.5 g cm⁻³, indicating the particles are internal mixed sulfate and organics. While the 150nm and 240 nm particle densities exhibited bimodal distribution with an additional small peak at ~1.1 g cm⁻³, which is considered as external mixed organic particles or aged soot particles. The particle hygroscopic growth factor for all the measured sizes at RH of 90% showed bimodal distribution, attributing to external mixed organics (or aged soot) and internal mixed organics and sulfate. Both the density and HGF were higher than Tijuana, but similar to Houston. PMF (Positive Matrix Factorization) model was deployed to quantify the contributions of different mixing state particles. Internal mixed organics and sulfate were dominant in the ambient particles in Beijing.