



Characterising Mass-resolved Mixing State of Black Carbon in Beijing Using Morphology-Independent Measurement Method

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The mixing state of black carbon (BC) significantly determines its absorbing efficiency and may modify its regional and global radiative forcing impact and may also influence toxicology. Here, with the aim of identifying the mixing state of BC, an experiment was devised as part of a large joint UK-China project investigating air quality in Beijing, Air Pollution and Human Health-Beijing (APHH-Beijing). During this experiment, we successfully applied a morphology-independent mass measurement of BC for intensive measurements in both winter and summer. We directly selected the particle mass using a Centrifugal Particle Mass Analyser (CPMA, Cambustion Ltd) and passed these monodisperse particles to a single particle soot photometer (SP2, DMT inc.) to characterize refractory BC mass for each single BC-containing particle. The coupling of CPMA-SP2 can thus quantify the mixing state of BC without assuming any particle morphology. The CPMA-SP2 results have been applied to a recently published inversion algorithm to derive the full distributions of particle number according to total mass and rBC mass. Such detailed mass-resolved BC mixing information could be used as optical model input to estimate the optical properties, and also the micro-scale processing model to investigate the atmospheric processing of BC.