Oxygenated and water-soluble organic aerosols in Tokyo

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In many locations, organic aerosols (OA) are major component of total sub-micron aerosol mass. OA contain various functional groups. Some organic compounds are hygroscopic and can act as cloud condensation nuclei (CCN) and may play an important role in direct/indirect radiative effects.

Sub-micron organic aerosol was measured simultaneously with an Aerodyne Aerosol Mass Spectrometer (AMS) and a Particle-into-Liquid Sampler (PILS) capable of measuring water-soluble organic carbon (WSOC) in Tokyo in winter and summer 2004. Both techniques are being used to investigate the formation of secondary organic aerosol (SOA), and the combined data sets provide unique insights.

Previous AMS studies have shown that signals at m/z 44 of the AMS mass spectra are dominated by COO^+, which typically originates from oxygenated organic aerosols (OOA). The signals at m/z 44 and derived OOA were highly correlated with WSOC ($r2 = 0.78$-0.91) throughout these seasons, indicating that OOA and WSOC were nearly identical in the chemical characteristics. Approximately 88% of OOA was found to be water soluble from the comparison of the WSOC concentrations with those of oxygenated organic carbon (OOC) derived from the AMS data (WSOC/OOC = 0.88).