A method for on-line measurement of water-soluble organic carbon in ambient aerosol particles: Results from an urban site

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Abstract
An instrument for on-line continuous measurement of the water-soluble organic carbon (WSOC) component of aerosol particles is described and results from an urban site in St. Louis are presented. A Particle-into-Liquid Sampler impacts ambient particles, grown to large water droplets, onto a plate and then washes them into a flow of purified water. The resulting liquid is filtered and the carbon content quantified by a Total Organic Carbon analyzer providing continuous six-minute integral measurements with a detection limit of 0.1 µg C/m³. Summer and fall measurements of WSOC and organic carbon (OC) indicated WSOC/OC ratios typically ranged from 0.40 to 0.80. A diurnal variation in WSOC/OC that correlated with ozone was observed over extended periods in June; however, other periods in August had no correlation. The results suggested that WSOC was composed of a complex mixture of compounds that may contain a significant fraction from secondary organic aerosol formation.


Figure 3. Time series of PM2.5 OC, WSOC, the fraction of OC that was water-soluble, and O₃ concentration for two 14-day periods (June and August, 2003). Dashed vertical lines represent midnight CST.