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One-Year Observation of Water-Soluble Organic Aerosol Components in Fine and Coarse Aerosol Particle Samples

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In this study, fine and coarse aerosol particle filter samples (3 μm cut-off diameter) were collected with a high-volume dichotomous sampler over a period of one year from May 2006 to May 2007 in Mainz, Germany. The water-soluble organic components have been extracted and analyzed by liquid chromatography coupled to electrospray ionization mass spectrometry (LC-ESI-MS). The detected and quantified compounds comprise nitrophenols, aliphatic and aromatic dicarboxylic acids, and a C8-tricarboxylic acid (204 Da) which is likely to be formed upon oxidation of pinic acid and may be useful as a tracer of aerosol aging processes.
Kubátová et al. (2000) found the C8-tricarboxylic acid as a major component of pinene SOA in tropical rainforest aerosol from the Amazon basin and summertime aerosol from Ghent, Belgium. Recently, Szmigielski et al. (2007) identified it as 3-methyl-1,2,3-butanetricarboxylic acid.
The concentrations of the C8-tricarboxylic were closely correlated with the concentrations of pinic acid in the coarse particle samples, but not in the fine particle samples. Seasonal variations and the influence of solar radiation and atmospheric oxidizing capacity on the ratios of the C8-tricarboxylic acid to pinic acid and to other quantified compounds will be discussed.

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