



Source apportionment of submicron organic aerosols at an urban site in Zurich (Switzerland) by factor analytical modeling of aerosol mass spectra

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Non-refractory submicron aerosol was analyzed using an Aerodyne aerosol mass spectrometer (AMS) during a three week measurement campaign in summer 2005 at an urban background site in Zurich, Switzerland. Positive matrix factorization (PMF) was applied to the AMS data for identification of the main components of the total organic aerosol and their sources. In order to verify the interpretation of retrieved factors in terms of emission sources and aerosol components, the similarity of the retrieved factors and available reference mass spectra was evaluated. In addition, the obtained source activities were correlated with tracer species that are indicative for sources of primary particles (e.g. CO, NO_x) and secondary aerosol components (e.g. gaseous oxidants, particulate nitrate and sulphate).

Six factors were found to explain virtually all variance in the data. Our analysis suggests that at the measurement site only a small (<10%) fraction of organic PM₁ originates from freshly emitted fossil fuel combustion. Other primary sources identified to be of similar or even higher importance are charbroiling (10-15%) and wood burning (~10%), along with a minor source interpreted to be influenced by food cooking (6%). A high fraction (60-69%) of the measured organic aerosol mass is OOA which can be separated into two fractions, OOA I and OOA II. OOA I accounts for 40-50% of OOA and represent a highly aged fraction with low volatility and a mass spectrum similar to that of fulvic acid. OOA II is a more volatile and probably less processed

fraction that accounts for about 20% of OOA.