Possible Relations between Organic Aerosol Analysed by Aerosol Mass Spetrometer and EC/OC Analyzer

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Possible relations between organic aerosols analysed by aerosol mass spectrometer and EC/OC analyzer

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Analysis of carbonaceous aerosols by elemental and organic carbon (EC/OC) analyzer can provide additional information in the form of OC fractions. These may improve characterization of organic aerosol [1].

We compared two sets of PM1 aerosol data – summer (22.-26.6. and 13.-31.7.2012) and winter (12.-29.1.2013) – measured at a Prague urban background site (50°7′36.47″N, 14°23′5.51″E, 277 m ASL). We wanted to determine whether the OC fractions from EC/OC analyzer can indirectly provide also information on the chemical composition or in other respects improve aerosol characterisation. In addition to EC and OC, also concentrations of pyrolytic carbon (PC), OC fractions (temperature ranges – OC1: <200°C, OC2: 200-300°C, OC3: 300-450°C and OC4: 450-650°C) and their share in organic aerosol (OCx/OC) were studied. The study involved following data obtained by the Aerodyne aerosol mass spectrometer (AMS): Total organic mass (Org) and characteristic organic aerosol fragments m/z 43 (Org43), 44, 57 and 60 and their share in organic mass named as f43 (Org43/Org), f44, f57, f60. Furthermore, meteorology, trace gases concentrations, and resulting factors from ME-2 (multilinear engine) PMF analyses of AMS organic aerosol were used in this comparison.

We observed very low or insignificant correlations between specific OCx/OC and AMS fractions in summer. However, during winter we observed correlations that can associate individual OC fractions with different sources. Most volatile OC1/OC fraction correlated positively with f57 (0.46), f60 (0.35) and with wood burning org. aerosol factor (0.42), while anti-correlations were observed with f44 (-0.54) and O_3 (-0.36). Conversely, OC3/OC correlated with f44 (0.41) and O_3 (0.57) and anti-correlated with f43 (-0.45), SO_2 (-0.42), CO (-0.72), which indicated that it is a kind of oxidized background aerosol. Share of PC correlated with f43 (0.41), SO_2 (0.52) and CO (0.63) which suggested it is a part of the carbonaceous aerosols associated with combustion.

[1] Vodička *et al*. (2015), *Sci. Total Environ*., **518-519**, 424-433. Ack: CSF P209/11/1342. EU H2020: 654109