Characterization of Submicron Organic Aerosol in Prague by ME 2 Factor Analysis of Summer AMS Data

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2013

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Keywords: AMS, organic aerosol, PMF, ME-2
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Real-time measurement of submicron aerosol was performed at Prague – Suchdol site (Czech Republic) during six weeks in June and July 2012. Highly time-and-size resolved data were obtained from measurements carried out by a Compact Time-of-Flight Aerosol Mass Spectrometer (C-ToF-AMS, Aerodyne). The retrieved organic data were deconvoluted using the Multilinear Engine (ME-2) algorithm (Paatero, 1999), and analyzed with the newly developed GUI provided by Paul Scherrer Institute (Canonaco *et al.* in prep.). The preliminary results are presented in this abstract.

The first step consisted of an unconstrained positive matrix factorization (PMF) on the organic aerosol (OA) data, of which main sources could be identified as a hydrocarbon-like organic aerosol (HOA), an oxygenated organic aerosol (OOA) and a biomass burning organic aerosol (BBOA). The identified PMF factors were compared with the aerosol and gaseous tracers (e.g. NO, O_3, CO, NO_3, SO_4) from collocated instruments.

In the second step, the PMF factor solutions were compared with reference spectra and an analysis of the data by the chemical mass balance (CMB) model followed. It was found that the four-factor solution obtained from PMF explained more than 95% of all the variance in the data.

In the next step, the four-factor solution attained by the previous analyses (PMF, CMB) was used to be further treated by constraining techniques. In this case we exploited the *a*-value approach (Lanz *et al.* 2007), which can be viewed as a combination of PMF and CMB. An external factor profile (a reference spectrum) and *a*-value were defined for each factor. The *a*-value determines the extent to which the output factor profile is allowed to vary from the input factor profile. These four factors, related to four aerosol sources, were fixed by the ME-2 model: HOA factor (*a*-val = 0,3) related to the road traffic, BBOA factor (*a*-val = 0,5), and two kinds of oxygenated organic aerosol factors (OOA I and OOA II). OOA I factor (*a*-val = 0,9) is most frequently interpreted as an aged aerosol with low volatility. On the contrary, diurnal patterns of OOA II factor (*a*-val = 0,9) exhibit maxima at night and high anti-correlation with temperature. Therefore it can be assumed that OOA II factor represents a volatile fraction of OOA.

Acknowledgement:
Financial support by the Czech Science Foundation (CSF P209/11/1342) is gratefully appreciated.

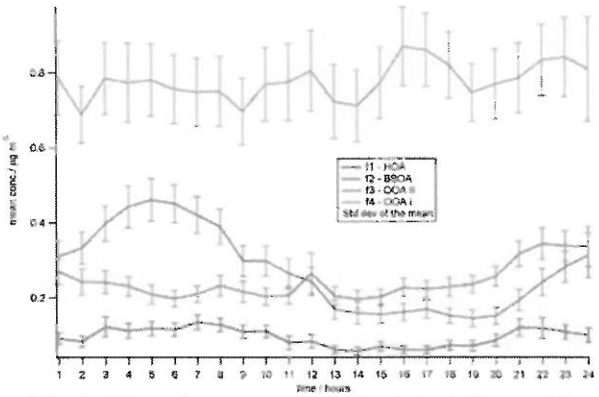

Fig. 1. Diurnal means and standard deviations of the contributions of all identified factors

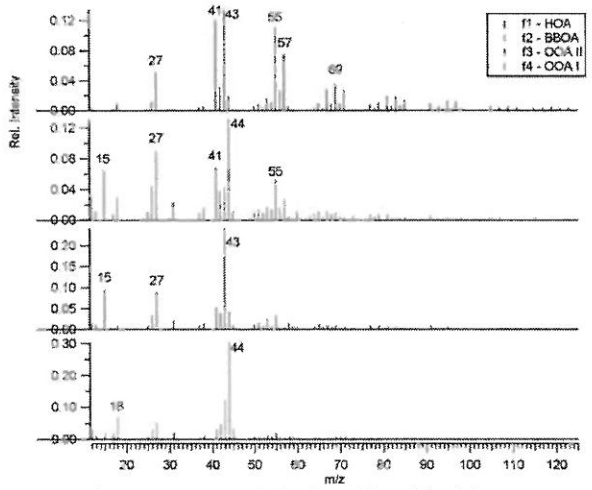

Fig. 2. Spectra of the four identified factors

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