Spring NR-PM1 Aerosol Measured at a Rural Background Site in Central Europe.

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Carbonaceous aerosols are major part of atmospheric aerosol. Recent advances in measurement techniques enabled its highly time resolved chemical analysis with time resolution as short as 1 s. Aerosol mass spectrometry, that enabled this progress, can provide insight into fast atmospheric processes as aerosol growth, evaporation, transport, aging etc.

In this work, aerosol concentration dynamics and NR-PM1 chemical composition behaviour was studied during transition period between winter characterized in Czechia mainly by residential coal and wood combustion primary emission and secondary products related to the same source, and summer months featured mainly by secondary aerosol of biogenic origin together with sulphates. Traffic related aerosols are common for both periods. To provide base for studying this transition the on-line measurement using c-ToF-AMS was conducted at National Atmospheric Observatory Košetice (NAOK). The measurement period started at 14th March 2014 and ended 29th April 2014. Besides the AMS, number size distribution, and PM1 mass, water soluble ions and EC/OC using field OC/EC analyser were measured. Meteorological parameters (T, RH, WS, WD, global radiation, …) and trace gases (O_3, SO_2, NO_2, NO_x, CO) are available from CHMI on site.

The average collection efficiency (CE) for given period was obtained from parallel PM1 daily concentration of sulphates determined by ion chromatography and its value was 0.45. When composition dependent collection efficiency (CDCE, Middlebrook et al. 2012) was applied with CE=0.45 as initial CE for CDCE calculation, the time dependent CDCE was obtained as shown in Fig. 1 where basic (green) and high nitrate (blue) cases prevailed.

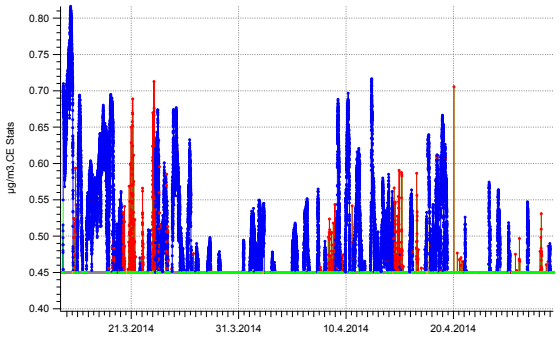

Figure 1: Time dependent CDCE during the study.

The Fig. 2 shows CE uncorrected time series for the whole studied period. High share of nitrates, although often seen during spring in Europe, will be slightly decreased by using CDCE. Similarly, relative share of sulphate will be higher after this correction. In case of organics some effects can be expected based on their association with both basic inorganic species. Therefore, using CDCE correction can have an influence on PMF analysis of AMS data. In this study the PMF results on uncorrected and CDCE corrected data will be presented.

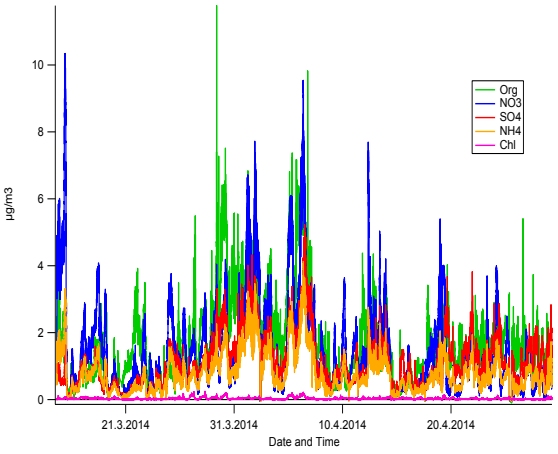

Figure 2. Time series of individual components of NR-PM1 aerosol during spring at NAOK site.

As concentrations of most aerosol components shown in Fig. 2 exhibit very high variations, the influence of the time resolution selected for PMF calculation will be also presented.

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Middlebrook, A. M., Bahreini, R., Jimenez,J. L., and Canagaratna M. R., (2012), *Aerosol Science and Technology*, 46:258–271.