Organic markers and compounds in PM1 aerosol in small town near Prague (Czech Republic) in winter 2016

K. Křůmal, P. Mikuška, P. Coufalík and Z. Večeřa

Institute of Analytical Chemistry of the CAS, v. v. i., Veveří 97, 602 00 Brno, Czech Republic
Keywords: organic tracer, urban aerosol, PM1.
Presenting author email: krumal@iach.cz

Atmospheric particulate matter (PM) is known to play an important role in many environmental problems. During last years, much attention has been paid to the identification of emission sources of PM. To track the contributions of the main sources to composition of atmospheric aerosols, various source-specific organic tracers are analysed in collected PM (Křůmal *et al.*, 2010; Křůmal *et al.*, 2013; Křůmal *et al.*, 2015; Mikuška *et al.*, 2015).

Atmospheric aerosols in the size fraction PM1 were sampled over 24-h periods using a high-volume sampler (DHA-80, Digitel, 30 m^3/h) on quartz filters during winter period of 2016 (2. 2. – 1. 3.) in the town Kladno-Svermov (Figure 1). Sampling locality was situated in suburban residential area.

Collected aerosols were analysed for monosaccharide anhydrides (MAs), resin acids (RAs), methoxyphenols (MPs), monosaccharides (MSs), disaccharides (DSs), sugar alcohols (SAs), alkanes, hopanes/steranes (H/S) and polyaromatic hydrocarbons (PAHs). Analysis of MAs, RAs, MPs, MSs, DSs and SAs included extraction of parts of filters with mixture dichloromethane/methanol (1:1 v/v) under ultrasonic agitation, derivatization of extracts with mixture of BSTFA + TMCS, dryness, redissolution in hexane and GC-MS analysis. Analysis of alkanes, H/S and PAHs included extraction of parts of filters with mixture of dichlormethane/hexane (1:1 v/v), fractionation on column with silicagel, dryness to 1 mL and GC-MS analysis.

Analysed compounds included:

- MAs: levoglucosan, mannosan and galactosan.
- RAs: abietic and dehydroabietic acid.
- MPs: vanillic and syringic acid, vanillin and syringol.
- MSs: xylose, fructose, galactose and glucose.
- DSs: sucrose and trehalose.
- SAs: arabitol, manitol, sorbitol and inositol.
- Alkanes: C8 – C40, pristane and phytane.
- H/S: 17*α*(H),21*β*(H)-hopane, 22*RS*-17α(H),21β (H)-homohopane, 17*α*(H),21*β*(H)-norhopane and *ααα* (20*R*)-cholestane.
- PAHs: fluorene, phenanthrene, anthracene, fluoranthene, pyrene, retene, benzo[*a*]anthracene, chrysene, triphenylene, benzo[*b*+*j*+*k*]fluoranthene, benzo[*e*]pyrene, benzo[*a*]pyrene, perylene, indeno[1,2,3-*c*,*d*]pyrene, dibenzo[*a*,*h*]anthracene benzo[*g*,*h*,*i*]perylene and picene.

Figure 2 compares mass concentrations of PM1 aerosols (μg.m^{-3}) and mean day temperature (°C) during sampling in Kladno-Svermov. Detailed results including comparison of analysed organic compounds in winter 2016 in Kladno-Svermov will be presented.

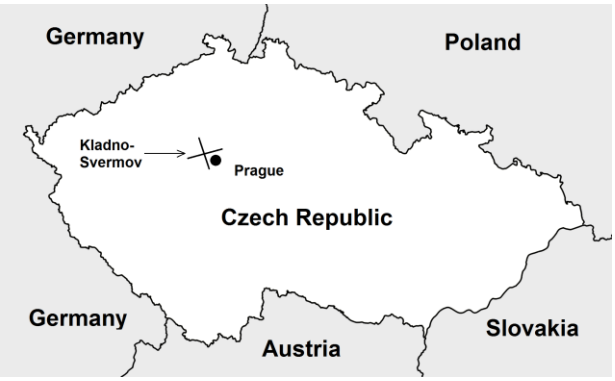

Figure 1. Location of the sampling site (Kladno-Svermov) at the map of the Czech Republic.

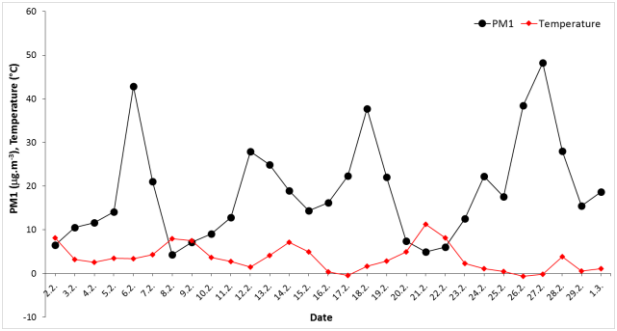

Figure 2. Mass concentrations of PM1 aerosols (μg.m^{-3}) and mean day temperature (°C) during sampling in Kladno-Svermov.

This work was supported by Grant Agency of the Czech Republic under grant P503/12/G147 and by Institute of Analytical Chemistry of the CAS, v. v. i. under an Institutional research plan No. RVO:68081715.

Křůmal, K., Mikuška, P., Vojtěšek, M., Večeřa, Z. (2010) *Atmos. Environ.* **44**, 5148-5155.
Křůmal, K., Mikuška, P., Večeřa, Z. (2013) *Atmos. Environ.* **67**, 27-37.
Křůmal, K., Mikuška, P., Večeřa, Z. (2015) *Atmos. Pollut. Res.* **6**, 917-927.
Mikuška, P., Křůmal, K., Večeřa, Z. (2015) *Atmos. Environ.* **105**, 97-108.