

## **Tracing carbonaceous emission in an industrial conurbation in Central Europe using $^{13}\text{C}$ data.**

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Ostrava, the third largest city in the Czech Republic, has been for more than a hundred years part of the most industrialized region of the country. Heavy industry, coke production and ironworks are the main polluters here, along with local and mobile sources.

Organic carbon (OC) is a significant component of particulate emissions below 10  $\mu\text{m}$  (PM<sub>10</sub>). One component of OC is black carbon (BC) or elemental carbon (EC), which is formed by incomplete combustion of various forms of OC. The isotopic composition of  $\delta^{13}\text{C}$  OC and EC varies according to the origin of the OC and can be used to identify OC in PM<sub>10</sub> or in deposition (e.g. soil).

Atmosphere was sampled three times per year (February, July and December) for 30 days, at five sampling sites, with known to daily airflow trajectories.

Atmospheric aerosol particles PM<sub>10</sub> were collected using the automatic high volume samplers with quartz filters (QF). The effect of long-time PM deposition was monitored by soil analysis on all sites. Contents and  $\delta^{13}\text{C}$  OC and BC were determined on QF and in the soil.

Sources of emissions were identified through their typical  $\delta^{13}\text{C}$  values: for the Polish Silesian coal it is -24.5 ‰, for the local coal -25.5 ‰, for traffic input it is -26.5 ‰ and for biological residua -28.0 ‰. Most of the time (75 to 82 %) the wind direction was from S to N and from N to S.

The results showed that coal use and combustion are the dominant emitters in winter (from 55 to 74 %, the rest originates from traffic, biogenic input is not important). In summer, biogenic input forms from 40 to 50% of OC in PM, the rest originates from traffic (with exception of site 1 with additional 20% emission from the coal use). Site 8 (close to the Polish border) has a significant contribution (from 60 to 70 % in winter) of OC from the combustion of the Silesian coal coming from the Czech-Polish borderline.

BC  $\delta^{13}\text{C}$  values in the topsoil of Ostrava soils present narrow range between -24.5 and -25.5 ‰ corresponding to a mixture of Polish and Ostrava coal.