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Application of the chemothermal oxidation method for the analysis of black carbon in Swiss soils

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Black carbon (BC) was analysed in 23 soil samples (0 to 10 cm layer) from the Swiss soil monitoring network (NABO) together with total organic carbon (TOC), polycyclic aromatic hydrocarbons (PAH), as well as some PAH source diagnostic ratios and molecular markers.

This first application of the chemothermal oxidation method (Gustafsson et al. 1997, 2001) to temperate topsoils yielded the following results:

1) NABO soils contained BC in concentrations from 0.4 to 1.8 mg/g dw, except for two sites with markedly higher levels. These numbers corresponded to 1 to 6% of TOC and were comparable to the limited published BC data in soil and sediments obtained with comparable analytical methods.

2) Correlation of light PAHs was stronger with TOC than with BC, and none of the heavier PAHs was correlated with either of the two. At forest stations, however, BC was correlated with a series of molecular combustion markers, whereas TOC was not. This indicates that wood combustion might have contributed significantly to BC burdens in some soils of remote/alpine (forest) sites

3) The PAH concentrations in some urban soils was very well predicted by their BC content and the PAH/BC ratio was very similar to the ratio on Diesel soot, which points to the importance of this emission source at such sites.

References:

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