



Source apportionment of PM10 carbonaceous aerosols in winter 2005/2006 in Swiss rural and urban sites using radiocarbon analyses of the EC and OC fractions

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Carbonaceous aerosols are believed to be mainly composed of primary and secondary aerosols from fossil fuel combustion and biomass burning, as well as of secondary aerosols from oxidation of biogenic emissions. Fossil fuel is ^{14}C -depleted, whereas the other sources are characterized by contemporary $^{14}\text{C}/^{12}\text{C}$ ratios. Therefore, radiocarbon represents a useful tracer that enables to quantify different contributions to the organic carbon (OC) and the elemental carbon (EC) fractions of the carbonaceous aerosol.

During our winter 2005/2006 campaigns, PM10 from ambient air were collected on quartz-fibre filters at four different sites in Switzerland: one located in an Alpine valley village close to a motorway, and three on the Swiss Plateau, representing an urban background, a motorway-influenced location and a rural environment. The sampling periods for the last three sites coincided with heavy PM10 pollution episodes that exceeded by up to three times the legal threshold of $50 \mu\text{g}/\text{m}^3$ for the daily average.

Source apportionment for particulate carbon was very uniform at these three sites. EC contributions came to 5% for biomass-burning and 15% for fossil material, whereas fossil and non-fossil OC contributed up to 23% and 57%, respectively. This suggests a several-day accumulation of the regional sources on the Swiss Plateau, due to persistent strong temperature inversions over a large area. Also influenced by strong inversion conditions in winter, the Alpine valley site exhibited a high contribution from biomass burning, consistent with an ingrained tradition of residential wood burning.