



The fossil carbon fraction of European clean-air aerosol

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Based on a two-year comprehensive sampling performed within the CARBOSOL project, contemporary and fossil source contributions to carbonaceous aerosol is attempted for five sites in Europe using radiocarbon analyses. Sample preparation was done using a in line system dedicated to combustion and CO₂ extraction of low carbon masses from aerosol samples with a relative overall uncertainty in the aerosol pmC results of less than 5 % for samples larger than 500 μgC. Thereby it is shown that both in winter as well as in summer, roughly 75 % of the continental carbonaceous aerosol comes from non-fossil sources, while this contribution drops to about 68 % under free tropospheric clean air conditions. Supplementary data evaluation using a simple mixing model, that considers bomb-radiocarbon stored in the biosphere and emitted by biomass burning, revealed still large uncertainties on the anthropogenic versus natural contribution to the carbonaceous aerosol inventory. Estimates assuming biomass burning to be completely of anthropogenic origin then show, that the natural fraction might be as low as 40 % in winter, while not changing much in summer. The continental background level of organic aerosol might drop to about 55 % natural contribution.