



## Paved urban soils as sinks for black carbon

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Although fossil fuel consumption in urban areas is an important source of black carbon (BC), the sink function of urban soils, especially the paved roadside urban soils has never been assessed.

In this study, we quantified the BC contents in these soils and approximated the BC masses stored in urban roadside soils worldwide. Furthermore, we evaluated the sink function of urban roadside soils in Berlin by comparing deposited masses of BC with accumulated masses. PAHs were used as markers to identify the source of the accumulated BC.

Paved urban soils of Paris, Berlin and Warsaw have been analysed for BC using benzene polycarboxylic acids as markers and for the EPA-PAHs using methanol ASE and HPLC-FD.

The BC contents for the upper layer show an average of  $3.4 \text{ g kg}^{-1}$  ( $\text{SE} = 0.3 \text{ g kg}^{-1}$ ). BC makes 17 % of the  $C_{org}$  in the upper layer. In the 1 to 5 cm layer below, representing the unaltered construction material, the average BC content is significantly lower than in the upper layer ( $0.5 \text{ g kg}^{-1}$ ). The concentrations of the sum of the EPA-PAHs varies from 2.3 to  $11 \text{ mg kg}^{-1}$ .

An approximation of the total masses of BC stored in paved soils on the global scale demonstrates the importance of urban soils for global carbon balances: Although only 15 % of the global urban area has been considered as traffic area and only 30 % of this area has been considered to be open soil surface and only the first 5 cm has been considered to contain BC, a mass of up to  $2 \times 10^{12} \text{ g}$  is stored. Although this is only up to 25% of the annual BC emissions caused by fossil fuel burning, at certain urban sites the sink function can be much higher. In a Berlin residential area we found accumulated BC masses which equal 15 % of the BC depositions of the last 60 years.