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Wetting kinetics and water repellency in urban soils

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Although the wettability is an important factor for sorption and transport processes in soils, the knowledge about the reasons for hydrophobicity and its effects on other soil properties is still insufficient. The kinetics of wetting are an important factor for understanding ecologically relevant processes in humous soil layers, especially when processes in field studies are in the center of interest. Wetting kinetics are strongly related with the mechanism of wetting, and thus may serve as means to investigate possible reasons for water repellency.

In the study presented in this contribution, pairs of water repellent and wettable soil samples from the location of the interurban research group (Berlin, Tiergarten and Berlin-Buch) were compared in terms of drying and remoistening characteristics, IR spectra, the properties of dissolved organic matter and surface tension of aqueous soil extracts. Furthermore, wetting kinetics were characterized by ^{1}H-NMR-Relaxometry and compared with the WDPT test.

Wettability was interrelated with the surface tension on both sites, while the pH may serve as possible factor of influence in one of the sites.

Wetting kinetics point at slow water redistribution processes during wetting, which last for more than one week in a sample with a WDPT of 10 hours. This emphasizes that even in regions with only weak water repellency, water redistribution due to rewetting may still be slow, and is expected to affect water flow as well as the environmental availability of enclosed pollutants.