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# Droplet infiltration dynamics on intact surfaces of preferential flow paths in structured soil

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The surfaces of preferential flow paths in structured soils can be formed by clay-organic coatings (i.e., cutanes) on soil aggregates or by linings on biopores (i.e., worm burrows and decayed root channels). The outermost layer of such coatings are mostly covered by organic matter (OM), which finally controls wettability, mass transfer, and sorption properties that are relevant for flow and transport along the flow paths. However, the local hydraulic properties along such surfaces are largely unknown to date mainly because of problems to analyze it without disturbing the coating layer surface.

The objective of this study is to compare the droplet infiltration dynamics with that of the local distribution of OM composition at intact aggregate and biopore surfaces. The OM composition is determined using Fourier transformed infrared spectroscopy in diffuse reflectance mode (DRIFT) in terms of the ratios of CH/CO functional groups. Intact surfaces of aggregated soil samples are scanned using a DRIFT mapping procedure in a 1 mm by 1 mm grid. Droplet infiltration dynamic is observed by means of volume change and contact angle measurements using a Goniometer with a high-speed camera.

The aggregate sample surfaces can be distinguished into regions of earthworm burrows, root channels, and clay-organic coatings. Organic coatings on worm burrows and root channels correspond with relatively lower CH/CO-ratios. For the same locations, relatively high CH/CO-ratios generally corresponds with higher degrees of water repellence in term of larger droplet infiltration times. However, the droplet infiltration depends on both the capillarity of the pores and the wettability of the coatings. The temporal changes of contact angles and drop volumes seem to be characteristic for the surface properties. We will present the dynamic behaviour of contact angle and volume of the water droplet at different sample surfaces. The results indicate yet unknown implications for preferential flow and transport.