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In-situ characterization of organic matter composition at aggregate surfaces using DRIFT spectroscopy

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In structured soils, interaction of percolating water and reactive solutes with the soil matrix is restricted to surface areas of preferential flow paths. Aggregate and biopore surfaces are mostly covered by soil organic matter (SOM) that finally controls wettability, sorption and transfer properties of such flow paths. However, directly at the flow path surfaces, the SOM-properties are largely unknown to date since the surface cover is relatively thin and vulnerable.

The objective of this study was to develop a method that allows an *in-situ* characterization of the chemical composition of SOM at aggregate surfaces. The Fourier transformed infrared spectroscopy in diffuse reflectance method (DRIFT) was tested to determine transects of CH/CO-ratios on undisturbed surfaces of soil aggregate samples (DRIFT mapping in 0.5 mm steps). The spatially distributed CH/CO- ratios were compared to the properties at the same locations. Relatively high CH/CO-ratios of a coated sample corresponded with higher water repellency as for organic coatings on root channels or litter residues, while quartz-sand grains corresponded with relatively lower CH/CO-ratios on aggregate surfaces. The results suggest that such small-distance analyses with *in-situ* DRIFT spectroscopy allow the explicit attribution of spectral characteristics to properties at 'internal' structural surfaces in aggregated soil.