

Comparison of CLSM, X-ray CT and light microscopy for the visualization and quantification of organic matter coatings on sand particles.

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The interaction of organic substances with mineral surfaces is recognized as one of the mechanisms which protect soil organic matter (SOM) against decomposition [1]. In previous research, X-ray computed tomography (CT) images were taken from artificial and undisturbed sand particles and results showed that there appeared to be a discontinuous OM coating on the surface of the sand particles [2]. It is possible that in CT volumes, the edges of solid particles are wrongly classified as being SOM as X-ray attenuation values typical for SOM are measured on the interface borders of solid particles. This possible artifact can be countered or confirmed by the comparison of data obtained by X-ray CT, Confocal Laser Scanning Microscopy (CLSM) and optical microscopy. The combination of these three techniques balances their individual benefits and drawbacks and allows the visualization of OM coatings in three dimensions with high resolution (~400nm). Objectives are the optimization of the three techniques in the study of sand particles particularly, but also the sequence in which these visualization techniques should be applied in order to obtain the best possible images and the inter technique relation.

[1] Sollins et al., 1996. Stabilization and destabilization of soil organic matter: mechanisms and controls. *Geoderma* **74**, 65-105.

[2] Sleutel et al., 2008. Composition of organic matter in sandy relict and cultivated heathlands as examined by pyrolysis-field ionization MS. *Biogeochemistry* **89**, 253-271