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Kommission I: Bodenphysik und Bodenhydrologie

Korrelative Analyse biogeochemischer und struktureller Komplexizität im Boden

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Titel
Soil structure formation through the action of plants

Abstract
During soil formation, the interaction of different biota (plants, soil fauna, microbes) with weathered mineral material shape unique structures depending on the parental material and the site specific climatic conditions.
We here explore soil structure formation on a chronosequence in Rheinisch lignite mining area. In this area loess material from a depth of 4-10 m is used for reclamation in a standardized procedure since 24 years. Thus, it is an ideal site for studying soil structure formation as a function of time.
Changes in soil pore system are characterised by parameters such as tortuosity, connectivity and pore size distribution. To derive these, undisturbed soil columns with a diameter of 10 cm were taken from two different depths (0-20 cm and 40-60 cm) with sites ranging in age from 0 to 24 years. X-ray CT is used for scanning the original columns as well as undisturbed subsamples of 3 and 1 cm diameter. This hierarchical sampling scheme was developed to overcome the trade-off between sample size and resolution – starting with an effective resolution of 57 µm for 10 cm cores via 19 µm for 3 cm columns to 6 µm for the smallest samples size of 1 cm. Subsamples therefore reveal information on micropores and small roots.
The importance of roots for soil structure / pore system development in not only investigated in the CT images but also by destructive analyses and determination of root length with WinRHIZO The dataset is complemented by HYPROP measurements of water retention curves and unsaturated hydraulic conductivities; both functions of the pore system.
In cooperation with project partners, VisNIR images from different slices of the soil columns will be taken to combine information about the local distribution of chemical features (iron oxides and organic compounds) with structural information of pores and roots. The current study is part of the DFG-Project Soil Structure (AOBJ: 628683).