



3D-Visualization of soil structure in two different plots of ‘Static Fertilization experiment’ Bad Lauchstädt

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Soil structure is a central control factor for turnover processes in soils. Due to different management activities and climate impacts the pore size distribution is changing with time. The application of organic matter is well known as a factor influencing soil structure but quantitative results of this effect are rare although very valuable to improve the turnover models.

Undisturbed soil samples were collected from two different managed plots of the ‘Static Fertilization experiment’ Bad Lauchstaedt. This site is located near Halle and it belongs to the chernozem area of Saxony-Anhalt. The objective of this experiment is to investigate the effect of organic and mineral fertilization on soil properties as well as yield and quality of crops. The site has an over 100 year old history with different inputs of organic material and for this reason it is well suited for investigations of effects of long term different energy input on soil structure. We used the following treatments of the long term experiment for our study from rAxp (0-30 cm) and Axh (30-50 cm) horizon: (i) without fertilization and (ii) 30t/ha FYM every 2nd year and NPK fertilization.

The pore structure of soil samples is measured using a X-ray micro-CT scanner to get a 3-dimensional image of the pore-solid interface. The volume of the samples is 100 cm³ and the spatial resolution is 0.02 mm/voxels so that all pores larger than this limit are detected.

The 3D pore space is segmented into different pore size classes using tools of mathematical morphology, i.e. erosion and dilation with spherical structuring elements (SERRA, 1982).

The aim of this investigation is quantify the effect of different management strategies on soil structure including the impact of different levels of energy input

Serra, J., 1982: Image Analysis and Mathematical Morphology, Academic Press, London.