



Soil connectivity at different bulk densities

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With the advent of modern non-destructive tomography techniques there have been many attempts made to analyze pore space features mainly concentrating on the visualization of soil structure. One of these quantifications can be the spectral dimension (d) to estimate the connectivity of the pore space.

Aggregates of an arable sandy loam were packed into polypropylene cylinders: 6 cm diameter and 5 cm high. Several bulk densities were then obtained: 1.2, 1.4 and 1.6 Mgm^{-3} . At each bulk density the air-filled pore volume was 0.17.

The soil samples were imaged using an mSIMCT at 155keV and 25 mA. An aluminium filter (0.25 mm) was applied to reduce beam hardening and later several corrections were applied during reconstruction. All 3D volumes were converted using VGStudioMax v.1.2.1 into 260x260x525 image stacks with voxel-thick slices.

In order to describe porosity connectivity a threshold value was applied based on the analysis of the histogram region corresponding to 5 voxels. The spectral dimension was estimated for each of the binary image corresponding to each bulk density.