



Thin soil layer of green roof systems studied by X-Ray CT

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The popular non-invasive visualization technique of X-ray computed tomography (CT) has been used for 3D examination of thin soil layer of vegetated roof systems.

The two categories of anthropogenic soils, usually used for green roof systems, were scanned during the first months after green roof system construction. First was represented by stripped topsoil with admixed crushed bricks and was well graded in terms of particle size distribution. The other category represented a commercial lightweight technogenic substrate. The undisturbed soil samples of total volume of 62.8 ccm were studied by means of X-ray Computed Tomography using X-ray Inspection System GE Phoenix Nanomex 180T with resulting spatial resolution about 57 μm in all directions. For both soil categories visible macroporosity, connectivity (described by the Euler characteristic), dimensionless connectivity and critical cross section of pore network were determined. Moreover, the temporal structural changes of studied soils were discussed together with heat and water regime of the green roof system.

The analysis of CT images of anthropogenic soils was problematic due to the different X-ray attenuation of individual constituents. The correct determination of the threshold image intensity differentiating the soil constituents from the air phase had substantial importance for soil pore network analyses. However, X-ray CT derived macroporosity profiles reveal significant temporal changes notably in the soil comprised the stripped topsoil with admixed crushed bricks. The results implies that the technogenic substrate is structurally more stable over time compared to the stripped topsoil.

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