



System for monitoring of green roof performance: use of weighing roof segment and non-invasive visualization

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Understanding the performance of technogenic substrates for green roofs is a significant task in the framework of sustainable urban planning and water/energy management. The potential retention and detention of the anthropogenic, light weight soil systems and their temporal soil structure changes are of major importance. A green roof test segment was built to investigate the benefits of such anthropogenic systems. Adaptable low-cost system allows long-term monitoring of preferred characteristics. Temperature and water balance measurements complemented with meteorological observations and knowledge of physical properties of the substrates provide basis for detailed analysis of thermal and hydrological regime in green roof systems.

The first results confirmed the benefits of green roof systems. The reduction of temperature fluctuations as well as rainfall runoff was significant. Depending on numerous factors such substrate material or vegetation cover the test green roof suppressed the roof temperature amplitude for the period analyzed. The ability to completely prevent (light rainfall events) or reduce and delay (medium and heavy rainfall events) the peak runoff was also analyzed. Special attention is being paid to the assessment of soil structural properties related to possible aggregation/disaggregation, root growth, weather conditions and associated structural changes using non-invasive imaging method. X-ray computed microtomography of undisturbed soil samples (taken from experimental segments) is used for description of pore space geometry, evaluation of surface to volume ratio, additionally for description of cracks and macropores as a product of soil flora and fauna activity. The information from computed tomography imaging will be used for numerical modeling of water flow in variable saturated porous media.

The research was realized as a part of the University Centre for Energy Efficient Buildings supported by the EU and with financial support from the Czech Science Foundation under project number 14-10455P.