



Seasonal variability of near-saturated hydraulic conductivity on cultivated soil

Vladimír Klípa, David Zumr, and Michal Sněhota

Czech Technical University in Prague, Faculty of Civil Engineering, Czech Republic (vladimir.klipa@fsv.cvut.cz)

The soil structure and hydraulic properties of arable soils considerably vary during the year due to the periodical tillage and fertilization activities, soil compaction, plant and root grow, climate impact etc. The knowledge of the effect of temporal soil variability is essential when assessing water regime and associated dissolved substance transport in soils. The main aim of this contribution is to describe the temporal development of unsaturated hydraulic conductivity on arable land during a year.

The experimental site is located in Nucice catchment (Central Bohemia, Czech republic), where also rainfall-runoff and soil erosion processes are studied. The soil is classified as Cambisol, typical texture ranges from loam to clay loam classes. Soil is conservatively tilled till depth of approximately 17 cm, below the topsoil a compacted subsoil was observed.

Tension infiltration experiments were performed repeatedly at single location in order to determine the unsaturated hydraulic conductivity of the topsoil. So far four tension infiltration campaigns were carried out under tension $h_0 = -3.0$ cm with different field conditions: (i) young winter barley (October 2012), (ii) between postharvest stubble breaking and seeding (April 2013), (iii) full-grown oat (June 2013) and (iv) after fresh postharvest stubble breaking (October 2013). Measurements were carried out using newly introduced automated multi minidisk tension infiltrometer (Klipa et al., EGU2014-7230). All experiments were performed on the levelled soil surface after removing upper soil layer (1 to 3 cm). A thin layer of quartz sand (thickness 1 - 2 mm, grain size 0.1 - 0.6 mm) was applied to improve contact between the infiltrometer and the soil surface. Each infiltration campaign consisted of six tension infiltration experiments, the total number of 24 infiltration data sets was obtained for this study.

Results show that unsaturated hydraulic conductivity was significantly smaller in April, but rather the same in the remaining cases. Based on the monitoring of the water regime on the catchment, the infiltration capacity of the soil profile is decreasing during the season. This indicates that the hydraulic properties of the aggregates are stable. The limited infiltration is caused by the changing ratio of the inter-aggregate voids and the soil crusting (Zumr et al., EGU2014-7292). Measured data are part of a broader data base which is formed in order to the study the rainfall runoff and erosion processes on the agriculturally managed catchment.