Abstract

Water in porous rocks (e.g. sandstone) plays a fundamental role in their disintegration. However, the places where water enters the sandstone rocks are somewhat overlooked. At two sites in the Český ráj region, I use Karsten tube to measure capillary water absorption (CWA) of natural sandstone exposures and, using TDR (Time Domain Reflectometry) method, I study movement of water in a shallow zone of ruiniform sandstone landscape. The CWA differed up to four orders of magnitude at a distance of tens of meters, mostly depending on the type of the surface. The highest CWA was measured at highly weathered surfaces, the second most absorbent were less weathered surfaces covered with a biologically-initiated rock crust. The horizontal surfaces on the tops of the rock formations were even less absorbent, probably due to clogging by fine particles from soil. Surfaces covered with iron crust were the least absorbent. The differences between those surfaces are significant. After simulated infiltration, the maximum rate of the propagation of the wet front in the sandstone was from 5,5.10-6 do 1,9.10-4 m.s-1 measured by TDR. The water propagated at this rate only to a certain depth (the first tens of cm), but then the propagation stopped or slowed down rapidly. From a long-term measurement of volumetric moisture content, it was found that the soil cover at the top of the rock formations retains water to some extent depending on the initial water content and total precipitation, but at higher degree of saturation (above 17–27 vol. %), the water can move from the soil profile into the sandstone environment for up to several days which is significantly longer than in case of rainwater run-off over a sandstone surface. When considering the places where water enters the sandstone, it is therefore necessary to take into account not only the permeability of the surface, but also the time for which the surface is in contact with the water. The measured data can be used in a conceptual model of water flow in a shallow zone of ruiniform sandstone landscape.