

## Abstract

Flow and mean residence time in epikarst and unsaturated zone was studied above the Ochoz cave in the Moravian Karst.

I studied various flow components with different residence time in unsaturated zone and the influence of soil and epikarst on seepage composition and residence time by means of several methods (longterm monitoring of conductivity, flowrate of seepage and soil water, use of environmental tracers -  $^{18}\text{O}$ ,  $^3\text{H}$ , CFC and  $\text{SF}_6$ , flow into the soil and detailed sampling during intensive rain events). Seepage sites Kašna in the Rudické propadání cave system and Mapa Republiky in Býčí skála were reference localities in unsaturated zone. For comparison I modeled residence time in saturated zone: at Kaprálka outlet close to the Ochoz cave, at Stará řeka (Rudické propadání) and Konstantní přítok (Amatérská cave). Mean residence time in unsaturated zone above the Ochoz cave reaches 7 – 20 years, while it is only few months in the soil (1 – 8 months, depending on the depth). At Kašna seepage site, the residence time is similar to the Ochoz cave - about 18 – 20 years, at Mapa republiky seepage site, it reaches 150s year due to unusual geological settings. Mean residence time in order of 10 – 20 years corresponds to storativity values (0.6 % in average) calculated from parallel water level recession in boreholes in unsaturated zone and flowrate decrease of a local spring. Mean residence time in outlets from saturated zone, which drain water both from unsaturated and saturated zone, is 5 – 23 years. The main water storage in unsaturated zone of the Moravian karst is apparently placed above the regional water level.

Even during intensive infiltration events, pre-event water prevails in the epikarst. Monitoring of seepage conductivity and  $\delta^{18}\text{O}$  composition proved that freshly infiltrated water component doesn't exceed 20 %.

Unsaturated zone represents a huge water reservoir. Despite significant hydraulic reaction (which spreads in tens of hours or first days after rain or snowmelting),  $\delta^{18}\text{O}$  and conductivity values don't change substantially.

Epikarst and unsaturated zone are more important reservoirs for water accumulation than soil. Based on all data a conceptual model of water flow and mixing in karst unsaturated zone was created. This model consists of four storage zones: soil reservoir, epikarst, lower unsaturated zone and perched aquifer in fissures above the cave ceiling.