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# Non-isothermal infiltration and tracer transport experiments on large soil columns

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Isothermal and non-isothermal infiltration experiments were carried out in the laboratory on large undisturbed soil columns (19 cm in diameter, 25 cm high) taken at the experimental catchments Roklan (Sumava Mountains, Czech Republic) and Uhlirska (Jizera Mountains, Czech republic). The aim of the study was twofold. The first goal was to obtain water flow and heat transport data for indirect parameter estimation of thermal and hydraulic properties of soils from two sites by inverse modelling. The second aim was to investigate the extent of impact of the temperature on saturated hydraulic conductivity (Ksat) and dispersity of solute transport. The temperature of infiltrating water in isothermal experiment (20 °C) was equal to the initial temperature of the sample. For non-isothermal experiment water temperature was 5°C, while the initial temperature of the sample was 20°C as in previous case. The experiment was started by flooding the sample surface. Then water level was maintained at constant level throughout the infiltration run using the optical sensor and peristaltic pump. Concentration pulse of deuterium was applied at the top of the soil sample, during the steady state flow. Initial pressure head in the sample was close to field capacity. Two tensiometers and two temperature sensors were inserted in the soil sample in two depths (9 and 15 cm below the top of the sample). Two additional temperature sensors monitored the temperature entering and leaving the samples. Water drained freely through the perforated plate at the bottom of sample by gravity. Inflow and outflow water flux densities, water pressure heads and soil temperatures were monitored continuously during experiments. Effluent was sampled in regular time intervals and samples were analysed for deuterium concentrations by laser spectroscopy to develop breakthrough curves. The outcome of experiments are the series of measured water fluxes, pressure heads and temperatures ready for inverse modelling by dual permeability. The saturated hydraulic conductivity of soil columns was higher in the case of higher temperature of flowing water. The change was however not proportional to Ksat change induced by temperature change of viscosity only.