



Study of heat transport in structured soil under grass cover: dual-continuum approach

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Simulation study of coupled water and heat transport in soil profile under natural conditions was conducted. The data analyzed were obtained at the experimental site Na Lizu (Volynka headwater catchment, Sumava Mountains, southern Bohemia). The site is located on a mild slope covered with grass. The soil is Cambisol developed upon biotite paragneiss bedrock. It is coarse sandy loam with clay content less than 1%. The groundwater table is about 8 m below the surface. For this site, significant preferential flow effects were observed and reported.

One-dimensional dual-continuum model with semi-separate flow domains representing the soil matrix and the network of preferential pathways (SID) is employed. Hydraulic parameters of the model are set based on laboratory retention curve measurements and in-situ measurements of hydraulic conductivity. Thermal parameters are estimated using methodology of Cote and Konrad (2005). Simulation is conducted for the summer season of 2009. The in-situ monitored precipitation and soil surface temperatures are used as the model upper boundary condition. Model performance was evaluated through comparison with soil water pressure and soil temperatures monitored at 3 depths. The differences between the model response and the observed data are analyzed. The soil heat budget is discussed with respect to the soil water preferential flow.

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