ASSESSMENT OF THE INFLUENCE OF PREFERENTIAL FLOW ON THE WATER BALANCE AT CATCHMENT SCALE

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Preferential flow is by-pass flow of water and solutes through porous media, enhancing flux through certain channels, such that a small fraction of soil participates in most of the flow. The physical processes underlying preferential flow have been and still are the subject of many studies. Also measuring techniques and parameterisation of the soil moisture distribution and water flow caused by preferential flow have been studied intensively. Various modelling attempts, on a spatially small scale, have been made and are continuously studied and improved.

On a small spatial scale it is known that preferential flow may enhance a large variability in infiltration, percolation and surface runoff or lateral throughflow. This way it may create a fast reaction of the groundwater table after a rainfall event and a streamflow component which is slower than surface runoff but faster than base flow. On a catchment scale research on preferential flow has remained restricted to the analysis of different factors resulting in or resulting from preferential flow.

The aim of this research is thus to assess the influence of preferential flow on the water balance at catchment scale, by elaborating a theory-based module for the simulation of preferential flow in a catchment scale hydrological model. The model will then be calibrated and validated with field data.

The experimental set-up is designed to obtain both detailed information of the water
balance and soil-physical characteristics of a few hillslopes in the catchment and spatial distribution of the degree of preferential flow and soil physical characteristics throughout the catchment.