



ASGi (WaSiM-ETH): Systematic comparison of the topmodel- and richards- approach for modelling the vadose zone

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In recent years the hydrological model WaSiM-ETH, which is one root of ASGi, has been developed in a tremendous way. Amongst others the conceptual Topmodel-Approach for modelling the vadose zone has been replaced by the physically based Richards-Approach. Therefore it is possible to simulate the unsaturated water flow, the base flow, interflow and surface runoff in a more realistic manner.

With the Topmodel-Approach the water balance within the vadose zone and the generation of discharges are calculated by using a modified variable saturated area approach after Beven and Kirkby (1979). The soil zone is divided in 3 active storages which interact with each others. Consequently no real water fluxes can be simulated within the vadose zone. In contrast to this the Richards-Approach uses the Richards-equation to simulate the water fluxes within the unsaturated soil zone. This is done vertically within a layer discretised soil column for each grid cell. Furthermore it is possible to implement a 2 dimensional groundwater model in order to improve the simulation of the base flow as well as the real location of the groundwater table in the case of the Richards-Approach.

This presentation discusses to what extent an improvement of the simulation of water fluxes within the vadose zone can be achieved by using the physically based Richards-Approach instead of the conceptual Topmodel-Approach. This is done by a systematic comparison of the calibration problems which appear due to sensitive model parameters and the amount of time which has to be spent to calibrate them. In addition it will be discussed which of both approaches seems to be more reasonable to be coupled with an erosion model like AGNPS, which is another root of ASGi.