A simple Hillslope Hydrology Model based on 1D Kinematic Wave Unsaturated Flow and the Hillslope-Storage Boussinesq Equation

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Recently, *Troch et al.* (2003) developed a relatively uncomplicated hillslope hydrology model, the hillslope-storage Boussinesq (hsB) model, which describes subsurface flow and saturation along hillslopes of complex geometry. Here we propose a simple extension to the hsB model to accurately quantify the timing and intensity of the recharge flux to the (perched) groundwater table.

For that purpose, we couple an unsaturated vertical flow model, based on the kinematic wave approximation of Richards' equation, with the hsB model. We compared a numerical solution of the kinematic wave equation for the unsaturated zone to numerical solutions of the Richards' equation by means of HYDRUS_1D. Our results show that the kinematic wave routing of unsaturated fluxes and associated soil moisture profiles is an acceptable method for different initial and boundary conditions.

We set up a laboratory experiment with a $6.0 \times 2.5 \times 0.5$ m artificial hillslope to measure soil water contents and phreatic levels on various locations along the hillslope during several artificial rain events of different intensity and duration. We will present the experimental results and compare them to our model predictions based on numerical solutions of the uncoupled and coupled kinematic wave and hsB equation.