



Modeling surface runoff and infiltration in soil with mobile and immobile water regions

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In sloping areas, nutrient and pesticide losses from agricultural fields may occur both via overland flow and via subsurface runoff leading to impaired surface water and groundwater quality. In case of subsurface drainage, surface and subsurface solute pathways may end up both in surface water. Both for water resources protection and for crop production efficiency, the soil and water management should balance and minimize losses via both pathways. Models have been developed that can be used to assess relative contributions of solute losses by surface and subsurface runoff for homogeneous soils, but not for soils with preferential flow paths. Here, we present a HYDRUS-2D based model that considers both surface runoff and water movement in soils with mobile and immobile flow regions. The effect of immobile water regions on variably-saturated soil water movement and surface runoff is assessed using different scenarios. The extension of the model to account for solute transport is also shown.