



The effect of dynamic changes in soil bulk density on hydraulic properties: modeling approaches

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Natural and artificial processes, like rainfall-induced soil surface sealing or mechanical compaction, disturb the soil structure and enhance dynamic changes of the related pore size distribution. These changes may influence many aspects of the soil-water-plant-atmosphere system. One of the easiest measurable variables is the soil bulk density. Approaches are suggested that could model the effect of the change in soil bulk density on soil permeability, water retention curve (WRC) and unsaturated hydraulic conductivity function (HCF). The resulting expressions were calibrated and validated against experimental data corresponding to different soil types at various levels of compaction, and enable a relatively good prediction of the effect of bulk density on the soil hydraulic properties. These models allow estimating the impact of such changes on flow processes and on transport properties of heterogeneous soil profiles.