Improvement of water stock predictions by using prewetting effect model supplied by field monitoring data

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Sustainable land use is impossible without understanding processes controlling water flows in the soil body. Negative alterations in soils and their ecosystem services during the agricultural land use are mostly affected by degradation of physical properties and strongly associated with soil and water conservation. In this study we used field obtained data (Chernozem soils, Kursk region, Russia) to parameterize a process-based physical model of water, vapor and heat transfer, based on equation system including Van Genuchten-Mualem equation for water retention curve and modified Van Genuchten hydraulic conductivity function. Functional relationships between model parameters and monitoring soil properties easily measured in field, such as moisture and penetration resistance, were found and introduced in the model. We feed surface run-off simulation with the results of infiltration kinetics calculated in 53 points to compare with (i) variant with constant infiltration rate, usually considered as wetness index, and (ii) field observed values of water stocks down to 80 cm. We expect improvements for water stocks and erosion estimation on a landscape scale using widespread monitoring techniques including generally accepted in agricultural production.