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Modeling Water Redistribution in a Near-Surface Desert Soil

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Desert soils cover about one third of the Earth's land surface and play an important role in the ecology and hydrology of arid environments. Despite their large extend, relatively little is known about the water dynamics of desert soils, in particular near the soil surface (top centimeters to one meter). The goal of this study was to improve the HYDRUS-1D model developed by Dijkema et al. (2017) to simulate water redistribution in near-surface desert soils by adjusting the model's water retention and hydraulic conductivity functions. Model calculations were compared to measured soil moisture distribution data from the SEPHAS weighing lysimeters located in the Mojave Desert of southern Nevada. Better simulation results were achieved primarily by improving the soil water retention curves of the model. We will continue to explore advanced hydraulic conductivity functions [e.g. the Peter-Durner-Iden (PDI) model] to further improve water redistribution simulations in near-surface desert soils.