Modeling Water Redistribution in a Near-Surface Desert Soil

Yuan Luo (1), Jeremy Koonce (1,2), Jelle Dijkema (1), Rose Shillito (1), Teamrat Ghezzehei (3), and Markus Berli (1)

(1) Desert Research Institute, Hydrologic Sciences, Las Vegas, United States (markus.berli@dri.edu), (2) University of Nevada Las Vegas, Department of Geoscience, Las Vegas, United States, (3) University of California Merced, School of Natural Sciences, Merced, United States

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 extent, 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.