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Modeling near-surface water redistribution in a desert soil

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Drs. Yuan Luo (right) and Markus Berli (left) discussing the soil surface of SEPHAS Lysimeter 1 at

Drs. Yuan Luo (right) and Markus Berli (left) discussing the soil surface of SEPHAS Lysimeter 1 at the Desert Research Institute in Boulder City, NV. Photo by Ali Swallow, Desert Research Institute.

Despite the vast extent of deserts on the Earth's surface, we still know rather little about the water dynamics in desert soils, especially in the top centimeters, which host most of the biologic activities and most of the rainwater redistribution.

New research in *Vadose Zone Journal* explores the use of the Peters–Durner–Iden (PDI) instead of bimodal van Genuchten (BVG) hydraulic functions using HYDRUS-1D to better simulate water redistribution in desert soils. The PDI hydraulic functions can take capillary and film flow into account whereas BVG hydraulic functions are limited to capillary flow. By comparing simulated with measured water content data from the sandy soil of the SEPHAS Lysimeter 1 (**www.dri.edu/sephas**), the team found that

moisture redistribution simulations were improved by using PDI instead of BVG hydraulic functions. Simulation results particularly improved for drier soil conditions (i.e., volumetric water contents ranging from 6 to 10%; suction heads between pF 2 and pF 3.8, and saturation degrees between 19 and 32%, respectively).

The improved model simulates near-surface water redistribution in desert soil for a wider range of soil water content. This could help better track the dynamics of water, the limiting resource for life in desert environments.

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Luo, Y., Ghezzehei, T.A., Yu, Z., & Berli, M. (2020). Modeling near-surface water redistribution in a desert soil. *Vadose Zone Journal*, *19*, e20081. **https://doi.org/10.1002/vzj2.20081**

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