Moisture Dynamic of A Near-surface Desert Soil

Desert soils cover about one third of the Earth’s land surface. However, our understanding of desert soil hydraulic processes and properties is still rather limited. In particular with respect to the near-surface (top centimeters) of the soil profile, which hosts most of the biologic activity and controls runoff, erosion as well as the emission of dust. Deserts are also ideal locations for electricity generation with solar energy using large-scale photovoltaic (PV) facilities with considerable impacts on desert environments. Our recently developed numerical model is able to quite accurately forward simulate soil moisture redistribution in the top 50 mm of the soil profile for a wide range of soil moisture contents ranging from 15% to over 90% saturation using only independently determined soil physical parameters as well as precipitation and evaporation as flux boundary conditions.

Overall, this study has improved our understanding and ability to simulate the moisture dynamic of bare, near-surface desert soils and may help to guide human activities in the desert such as renewable energy generation while minimizing their impact on the fragile desert environments.

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