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experimental investigation of soil ecohydrology on rocky desert slopes in the Negev Highlands, Israel

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Dryland vegetation is expected to respond sensitively to climate change and the projected variability of rainfall events. Rainfall as a water source is an obvious factor for the water supply of vegetation. However, the interaction of water and surface on rocky desert slopes with a patchy soil cover is also vital for vegetation in drylands. In particular, runoff on rocky surfaces and infiltration capacity of soil patches determine plant available water. Process-based studies into such rock-soil interaction benefit from rainfall simulation, but require an approach accounting for the micro-scale heterogeneity of the slope surfaces. In this study, a suitable procedure for examining rock-soil interaction, in particular the relevance of limited soil volume for storing plant available water on rocky desert slopes in the northern Negev, Israel, is presented. The design of the rainfall-simulator, the selection of the plots and the simulated rainfall scenarios aimed specifically at observing infiltration into small soil patches on a micro-scale relevant for the prevalent vegetation cover. The preliminary results of the study in the Negev Desert indicate that the ratio between soil volume and frequency of rainfall events determine the effect of climate change on plant available water and thus ultimately vegetation cover. Based on the experiments examining runoff and soil moisture the qualitative understanding of hillslope eco-hydrology in a rocky desert environment could be expanded into a quantitative assessment of the potential impact of varying rainfall conditions on vegetation. The study therby illustrates the contribution of rainfall simulation experiments to dryland ecohydrology.