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Topsoil moisture patterns in arid and semi-arid hillslopes as related to shrubs

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The topsoil moisture distribution is a key factor in understanding eco-geomorphic processes in arid and semi-arid hillslopes. Remotely sensed thermal infrared data acquired by a ground-based platform were used for high-spatially detailed measurement of the temporal changes of the topsoil moisture contents in arid and semi-arid sites in Israel. The results highlight the effect of native shrubs on the soil moisture content, distribution, and dynamics during desiccation following runoff events. At the shrub scale, there was a general spatio-temporal pattern of topsoil moisture behavior manifested as a dynamic moist patch and controlled by pedo-hydrological properties, hillslope aspect, and micro-topography. At the hillslope scale, the areas of higher soil moisture at the end of runoff events are closely associated with the vegetation pattern. The topsoil moisture dynamics indicate patchiness in the hydrological response of arid and semi-arid hillslopes to rainfall events, and thereby improve our understanding of the mosaic-like patterns of source and sink areas for runoff and sediments in these systems.