



Modelling dynamic water redistribution patterns in arid catchments in the Negev Desert of Israel

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In arid climate regions redistribution of runoff water is highly relevant for vegetation development. The process of water redistribution at catchment scale is studied with the landscape process model LAPSUS, mainly used for erosion and sedimentation modelling. LAPSUS, formerly applied in Mediterranean climates, is modified to deal with the arid climate of the Negev Desert of Israel. Daily event based model runs were used instead of yearly model runs, and the infiltration module was modified to better represent the spatial diversity in water availability in an arid catchment. The model is calibrated for two small catchments in the Negev Desert of Israel, Halluqim and Avdat. First, a sensitivity analysis of the modified LAPSUS is done. Especially pore volume appears to have a strong influence on the modelling results. Second, the capability of LAPSUS to deal with varying surface characteristics is assessed by comparing the water redistribution patterns in the two catchments with field data. Simulation results demonstrate that the catchments respond very different to precipitation. Water redistribution is larger in the dominantly bedrock covered Halluqim compared to the dominantly loess covered catchment of Avdat. Consequently, Halluqim has more positions with water accumulation than Avdat, and can sustain a larger vegetation cover including Mediterranean species. Finally the modelled infiltration patterns are compared with vegetation cover in the catchments. The results indicate that there is a broad agreement between infiltration and vegetation patterns, but locally there is a strong mismatch indicating that part of the involved processes are still missing in the model. We conclude that process models are capable to handle dynamic patterns.