



Rainfall-infiltration-runoff relationships in a semi-arid hillslope and their interactions with vegetation cover

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The hydrological response of semiarid watersheds to rainfall events is complex due to feedbacks between water fluxes, vegetation patches, topography, and soil properties. This study investigates the combined impact of rainfall intensity, infiltration contrast between bare and vegetated areas, horizontal extension of the root zone beyond the canopy size, slope steepness, and vegetation cover on surface hydrological processes in a semiarid hillslope. Two modeling approaches are applied to study the related rainfall-runoff relationships: a simple analytical model and a two-dimensional numerical model coupling between surface runoff and infiltration. Results indicate that the infiltration contrast is the predominant factor allocating additional water to the local vegetation.