



A multi-scale hydrological response unit model for semi-arid environments

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The dynamics of runoff and sediment generation in semi-arid catchments show generally a high spatial and temporal variability and are strongly influenced by the connectivity between landscape units, which have different thresholds with regard to spatial scale and their response to rainfall. The spatial and temporal variation of runoff and sediment delivery for a study area in SE Spain was investigated using a response unit based semi-distributed dynamical model based on PC-Raster that was applied at three levels of scale. -The hillslope scale modeling showed the effect of source and sink areas of water as defined by natural vegetation structures and surrounding bare areas (500m²). -The sub-catchment scale modeling (50 Ha) showed the hydrological response being defined by a spatial assemblage of landscape units, and revealed a highly heterogeneous response of runoff generated by runoff delivering and water buffering areas, via diffuse and concentrated connectivity. -Finally the hydrological response at the catchment scale (12 km²) was studied where man-made structures such as water harvesting dams become important for hydrological response. The applicability of the model will be discussed in the context of the challenge of spatio-temporal modeling at various levels of scale and its applicability for land degradation systems.