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Multi-scale research on the hydrology processes and soil loss on the karst peak-cluster depression in southwest of China

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Land degradation, karst rocky desertification and other environmental problems caused by soil erosion, have became more serious in karst region southwest of China, which threaten the local people's life and social and economic development. However, due to the karst area has a unique geological conditions and fragile ecological environment background, soil erosion and hydrological cycle is different from other non-karst area, which also has a special environmental effects. In this study, we chose a limestone peak cluster depression catchment which belongs to one of the major karst landform type in southwest of China, carried out surface runoff and soil loss study at multi scales including slope-scale, gully or velley scale and catchment scale. Analysis the effects of different land use, vegetation cover and rainfall regimes on surface runoff and soil loss processes and mechanism at karst limestone area.

Surface runoff and soil loss on the karst hill slopes were very small compared to the non-karst areas, most rainfall water was infiltrated into underground through limestone fissures and fractures, while little was in the form of surface runoff. The highest annual surface runoff coefficients at limestone slopes were less than 5%, and annual soil loss was less than 70 Mg km-2. However, runoff coefficients in karst gullies or velley were quite high, which account for more than 30% of annual precipitation. Springs were the most important source of surface runoff in gullies and valley that account more than 90%. Using this type of gullies or velley water resource effectively and properly, on the one hand could reduce the flood threat and soil loss in karst dry valley, on the other hand, it could provide an efficient way to resolve water shortage and resist drought in karst mountain regions.