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Responses of Karst Spring Flow Recession Process to Different Types of Rainfall

Wei Chang (1), Junwei Wan (1), Jiahua Tan (2), and Kun Huang (1)

(1) China University of Geosciences, School of Environmental Studies, Department of hydrology, Wuhan, China (1195079793@qq.com), (2) China Railway Siyuan Survey and Design Group Co., Ltd., Wuhan, China (350056332@qq.com)

The recession curve of karst springs were used to identify constitute information of karst aquifer media by dividing the curve into three phases which respectively represent water drainage from conduits, fracture and matrix. It is assumed that the origin of the recession curve is from the moment when aquifers are saturated. However, it is difficult to determine the saturation of unconfined karst aquifers after a rain for a certain recession process. Therefore, the responses of karst spring flow recession process to different kind of precipitation were investigated by continuously monitoring both precipitation and karst spring flow (monitoring frequency is half an hour) at a field site in southwest China. The results show that the shape of the recession curve was changed under different rainfall conditions. Three attenuation stages were observed in the spring recession curve under heavy rain conditions , but only one attenuation stage in the case of light rain. It is found that the calculated attenuation coefficients using the exponential decay equation to fit the recession curve vary with different amount and intensity of precipitation, even for the same recession period. The calculated values of attenuation coefficients decrease with increasing last time of precipitation process for the same type of rainfall. It could be attributing to various response times to precipitation for different kinds of aquifer media. Water filling and releasing speed of conduit medium is obviously faster than that of fissure and matrix medium, therefore, the rainfall intensity controls the speed of water filling of medium and the rainfall duration control the saturation degree of the aquifers. The calculated attenuation coefficients increases with the increase of rainfall intensity at the conduit and fracture drainage stages for similar rainfall, while the decay period decrease with the increase of rainfall intensity.