



Using streamflow and hydrochemical tracers to conceptualise hydrological function of underground channel system in a karst catchment of southwest China

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Karst hydrodynamic behaviour is complex because of special karst geology and geomorphology. The permeable multi-media consisting of soil, epikarst fractures and conduits has a key influence on karst hydrological processes. Spatial heterogeneity is high due to special landforms of vertical shafts, caves and sinkholes, which leads to a high dynamic variability of hydrological processes in space and time, and frequent exchange of surface water and groundwater. Underground water in different reach were sampled over the 1996–2001 in a karst catchment of Houzhai, with 81km², located in Guizhou province of southwest China. Samples were analysed for water temperature, pH, conductivity and four solute concentrations. The monitoring sought to assess the combined utility of flow discharge and natural geochemical tracers in upscaling flow structure understanding in karst area. Based on previous researches and field investigation, the catchment characteristics were explored with the use of a GIS. Both flow discharge and solute concentrations exhibited clear seasonal patterns at every groundwater sampling sites. The variations of flow and chemistry are more dramatic in upstream site with less soil cover and more sinkholes development, which affect the hydrological pathways significantly. There was clear evidence that the differences in geology and soil were the main controls on hydrology and flow chemistry, which was spatially variable in different sites of underground channel. Conceptual flow structures in main hydrological response units for different area in the catchment were developed according to the variation of discharge and flow chemistry.