Interpreting Climate and Landscape Controls on Spatial Pattern of Hydrologic Response in Jinghe Basin, China

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The hydrologic features of baseflow, runoff coefficient and precipitation-runoff relationship rely on climate and landscape. Jinghe basin is located in the central Loess Plateau of China with distinguishing spatial distribution of climate from semihumid to semiarid, and landscape of loess plateau (LP), rocky mountain (RM) and loess covering mountain (LCM). In this study, 23 catchments within the basin were selected to interpret the spatial pattern of hydrological features linking with climate and landscape characteristics. The results show that (1) aridity index reflecting climate feature controls the spatial variation of runoff. Annual runoff depth and runoff coefficient and baseflow index (BFI) decrease drastically with the aridity index increase while flashiness index (FI) increases as the aridity index increase. (2) Hydrological features in LP are significantly different with those in RM and LCM. Catchments in RM and LCM have much higher values of runoff depth, runoff ratio and BFI but lower FI compared with the catchments in LP. (3) Budyko equation derived from Fu's formula indicates that the equation parameter ω, representing the effect of landscape on runoff yield, exhibits high correlations with landscape and climate features in the catchments. In RM and LCM, ω in the catchments is closely related to the proportion of rocky mountain area, mean slope and mean elevation. However, ω in LP is negatively correlated with seasonality index of precipitation. The results imply the co-evolution of climate, landscape and hydrologic response in the region.