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Responses of streamflow to climate change in Kadongjia River Watershed, South Tibet, China

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Runoff estimation and its response to climate change in ungauged or poorly gauged basins based on hydrological models are frontier research issues of the hydrological cycle. For Kadongjia River Watershed (KRW), a poorly gauged watershed located in South Tibet, China, the Soil and Water Assessment Tool (SWAT) was adopted to model streamflow and its responses to climate change. The average annual streamflow was simulated roughly 124.62 mm with relatively small inter-annual variation during 1974-2010. The seasonal distribution of streamflow was uneven with a maximum in summer and a minimum in winter. Snowmelt, which was mainly produced in April-May, accounted for 3.96% of annual streamflow. Correlations and regression analysis between the inter-annual variations of major climatic and hydrological variables indicated that precipitation (temperature) had positive (negative) influence on the annual streamflow variation. For the inter-annual streamflow variations, the warming temperature was slightly more important than the variation of winter precipitation but less significant in the other seasons. Streamflow variations were more sensitive to changing climate in winter and spring than that in the other two seasons comparing streamflow changes in the current years (1980-1999) with the future (2030-2049). With model improvement is expected to enhance the simulation efficiency of SWAT and the analyses of hydrological responses to climatic change in KRW, thus supporting the model's credibility for hydrological cycle research in alpine regions.