

Supplementary:

Soil data

Soil is an important input for hydrological model SWAT, which is used to define the hydrologic response unit together with landuse and soil distributions. In this study, soil map for the region in China is obtained from Xinjiang Institute of Ecology and Geography, Chinese Academy of Sciences, and for the region in Kyrgyzstan is from the Food and Agriculture Organization of the United Nations, and main soil types include alpine meadow soil, subalpine meadow soil, and rocky soil. There are other soil types, such as light chestnut soil, high mountains and cold desert soil and rock (Figure S1).

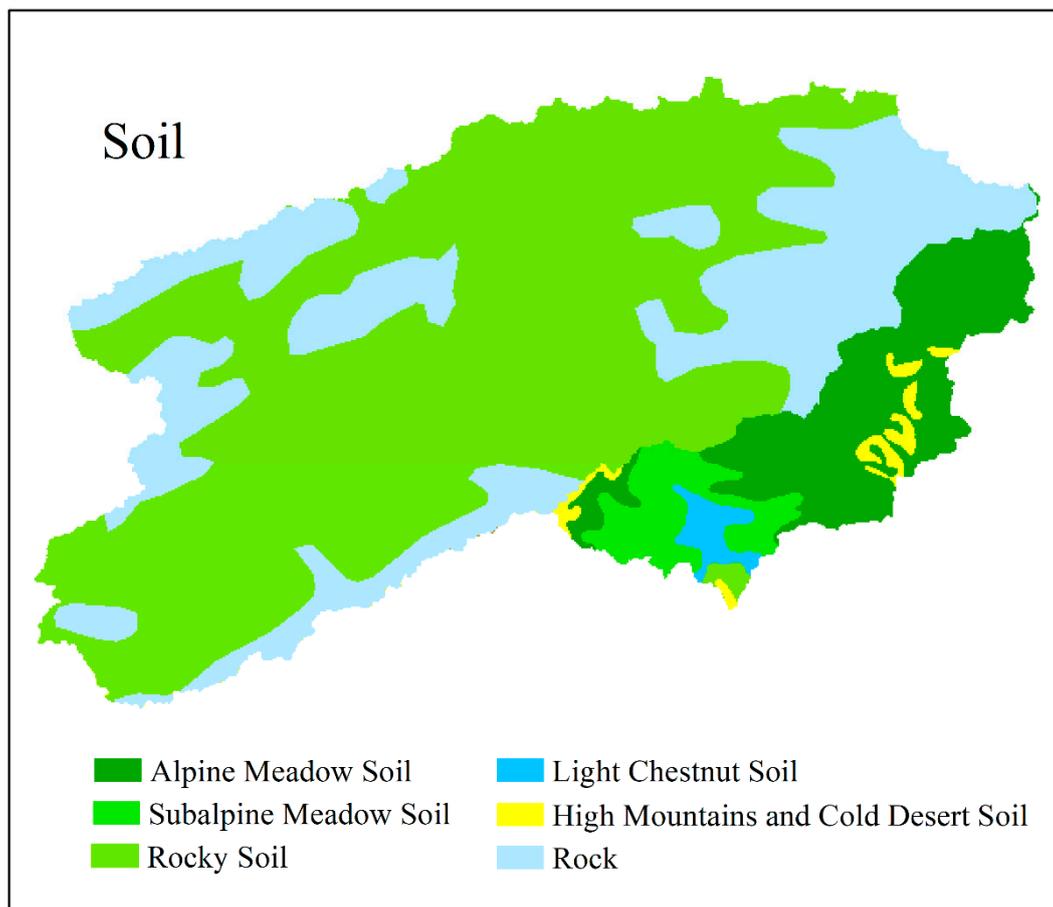


Figure S1 The Soil map of the SaryDjaz-Kumaric River (SDKR) basin

Observed and simulated flow time series

The following three figures show daily observed discharge and simulations by SWAT and SWAT_Glacier model at the Xiehela hydrological station, respectively. Each figure includes the calibration and validation periods. Comparing Figure S2 and Figure S3, observed and simulated hydrographs in the SWAT_Glacier model were highly consistent, and both the peaks and the baseflow were well simulated. Figure S4 shows that the SWAT model only had a good simulation in the baseflow, while the simulated discharge has a small annual fluctuation and the peak value is relatively flat, which means that SWAT model is unable to give a good performance for peak flows in summer.

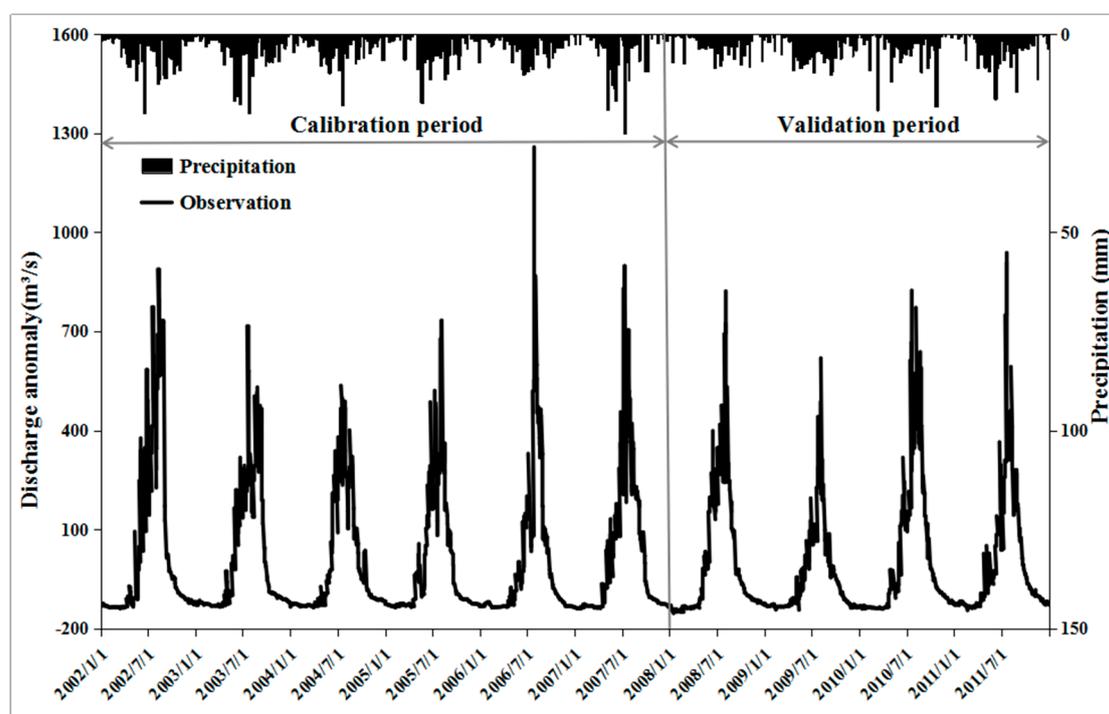


Figure S2 Observed streamflows in the SDKR basin for the calibration and validation period.

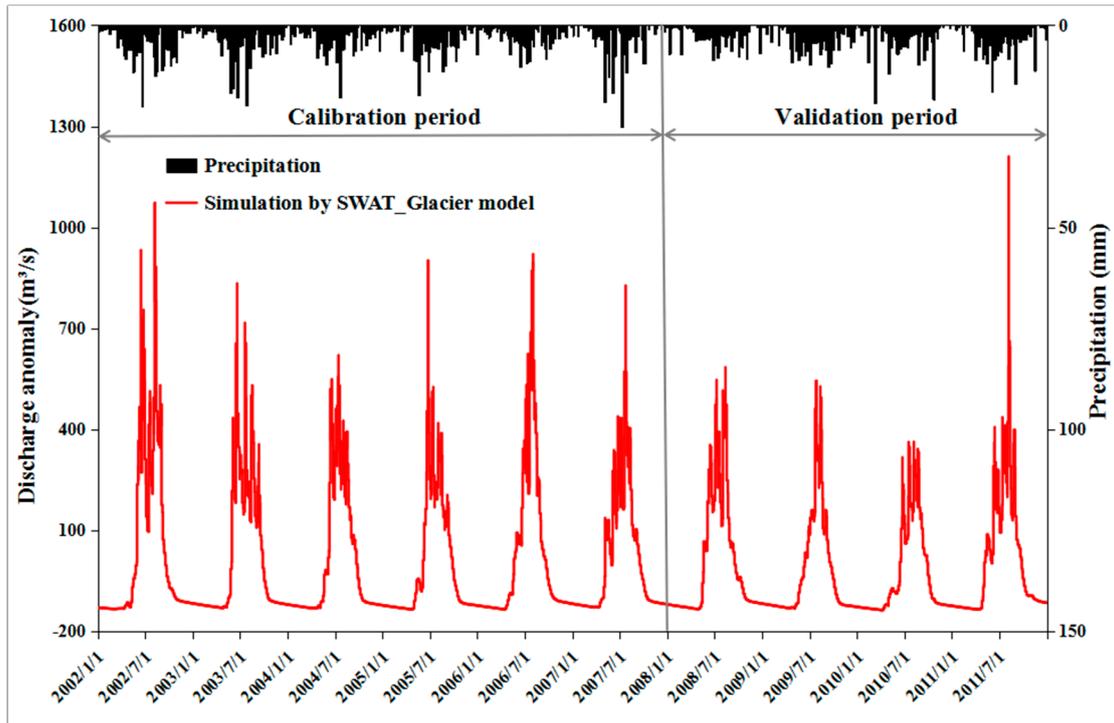


Figure S3 Simulated streamflows by SWAT_Glacier model in the SDKR basin for the calibration and validation periods.

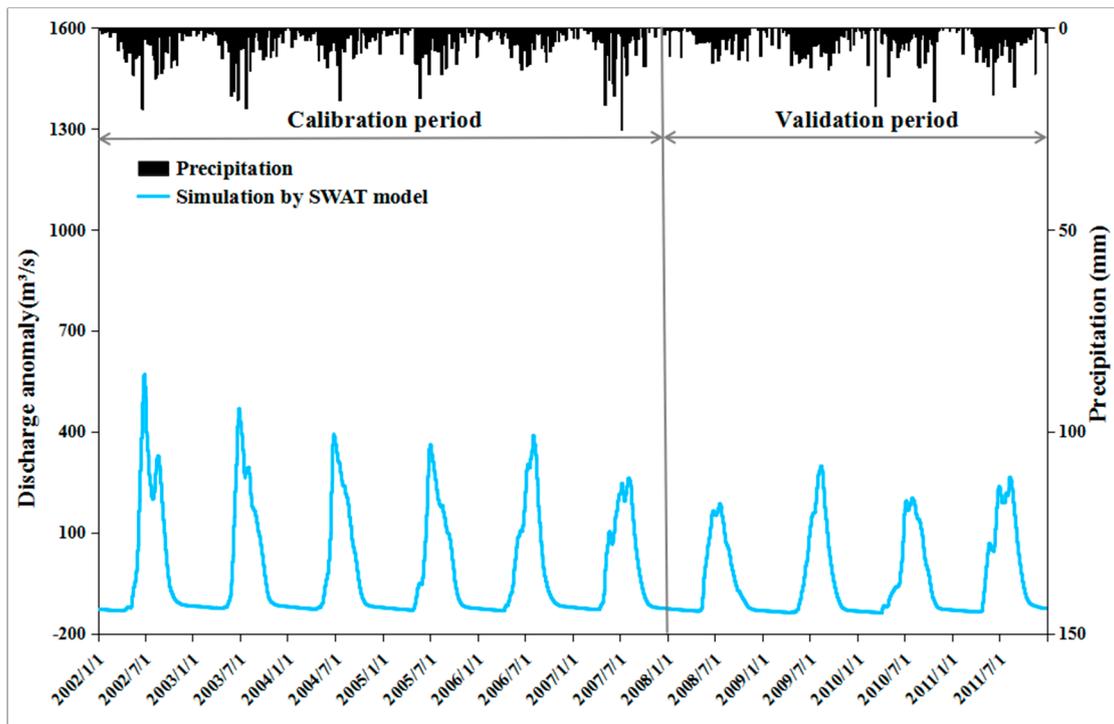


Figure S4 Simulated streamflows by SWAT model in the SDKR basin for the calibration and validation periods.