Assessment on the impact of climate change on water resource at watershed scale: a case study in River Xiangxi

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The objective of this study is to compare the impact of different climate datasets (station versus gridded) on the parameterization of a hydrological model (SWAT2005) of the discharge of the River Xiangxi, the largest tributary of Yangtze River in Hubei part of Three Gorges Reservoir. The climate data used in this study derive from two sources: point observations from the Xingshan meteorological station (OBS) and gridded (0.5ºx0.5º) monthly observations of the CRU TS3.0 global dataset (CRU) downscaled to daily data using a weather generator. We apply data from 1970 to 1974 for sensitivity analyses and autocalibration and subsequently validate predictions over the period of 1976 to 1986. Slight differences exist between OBS and CRU over the period 1961 to 1990 in mean annual P (1003 mm vs. 1074 mm), number of rain days (136 vs. 117) and wet days standard deviation (11.75 mm vs. 18.71mm) of precipitation. For SWAT parameter sensitivity analysis results, slight differences exist between the results from OBS and CRU before rank 8, and autocalibrated parameter caused smooth streamflow hydrograph simulated based on OBS than CRU. Modelled river discharge based on OBS more closely matches observed discharge during calibration and validation periods compared to that based on CRU. The climate scenario used forcing SWAT2005 derive from GCMs output for CCCMA_CGCM3, CSIRO_MK30, IPSL_CM4, MPI_ECHAM5, NCAR_CCSM30 under scenarios A1B, and has been produced by the ClimGen tool, and the response of hydrologic precesses to climate change in River Xiangxi were simulated under the calibarated and validated model.

Keywords：SWAT2005; Hydrologic modeling; River Xiangxi, CRU and OBS data; scenarios