Effects of Climate Change on Surface Runoff and Soil Moisture in the Source Region of the Yellow River

Supplementary materials

Table S1. The basic information about 21 CMIP5 global climate model.

Model	Research institution	Resolution
Beijjng Climate Center Climate System Model version 1 (BCC-CSM1-1)	BBC, China Meteorological Administration, China	128x64
Bejing Normal University Earth System Model (BNU-ESM)	The College of Global Change and Earth System Science (GCESS), BNU, China	128x64
Canadian Earth System Model version 2(CanESM2)	Canadian Centre for Climate Modelling and Analysis, Canada	128x64
The Community Climate System Model version 4 (CCSM4)	National Center for Atmospheric Research, USA	288x192
Centre National de Recherches Meteorologiques Climate Model version 5 (CNRM-CM5)	CNRM/Centre Europeen de Recherche et Formation Avancees en Calcul Scientifque, France	256x128
Commonwealth Scientific and Industrial Research Organization Mark Climate Model version 3.6 (CSIRO-MK3-6-0)	CSIRO in collaboration with Queensland Climate Change Centre of Excellence,Australia	192x96
Flexible Global Ocean- Atmosphere-Land System Model-grid version 2 (FGOALS-g2)	State Key Laboratory of Numerical Modeling for Atmospheric Sciences and Geophysical Fluid Dynamics, Institute of Atmospheric Physics, Chinese Academy of Sciences, and Tsinghua University, China	128X60

The First Institution of Oceanography Earth System Model (FIO-ESM)	FIO, State Oceanic Administration (SOA),Qingdao, China	128x64
Geophysical Fluid Dynamics Laboratory Climate Model version 3 (GFDL-CM3)	GFDL, National Oceanic and Atmospheric Administration. USA	144x90
Geophysical Fluid Dynamics Laboratory Earth System Model version 2 with Generalized Ocean Layer Dynamics (GOLD) code base (GFDL-ESM2G)	GFDL, National Oceanic and Atmospheric Administration, USA	144x90
Geophysical Fluid Dynamics Laboratory Earth System Model version 2 with Modular Ocean Model version 4.1 (GFDL-ESM2M)	GFDL, National Oceanic and Atmospheric Administration, USA	144x90
Goddard Institute for Space Studies Model E version 2 with Hycoml ocean model (GISS-E2-H)	GISS, National Aeronautics and Space Administration, USA	144x90
Goddard Institute for Space Studies Model E version 2 with Russell Ocean model (GISS-E2-R)	GISS, National Aeronautics and Space Administration, USA	144x90
the Met Office Hadley Centre Global Environment Models version 2 with the new atmosphere-ocean component model (HadGEM2-AO)	Jointly with Met Office Hadley Centre and National Institute of Meteorological Research (NIMR). Korea Meteorological Administration (KMA), Seoul, South Korea	192x145
Institut Pierre Simon Laplace Climate Model 5A-Low Resolution (IPSL-CM5A-LR)	IPSL, France	96x96
Model for Interdisciplinary Research on -Climate- Earth System, version 5 (MIROC5)	Atmosphere and Ocean Research Institute (AORI), National Institute for Environmental Studies (NIES) Japan Agency for Marine-Earth Science and Technology, Kanagawa (JAMSTEC), Japan	256x128
Model for Interdisciplinary Research on Climate-	JAMSTEC, AORI, and NIES, Japan	128x64

Earth System (MIROC-ESM)		
Atmospheric Chemistry Coupled Version of Model for Interdisciplinary Research on Climate-Earth System (MIROC-ESM-CHEM)	JAMSTEC, AORI, and NIES, Japan	128x64
Max-Planck Institute Earth System Model-Low Resolution (MPI-ESM-LR)	MPI for Meteorology, Germany	192x96
Meteorological Research Institute Coupled General Circulation Model version 3 (MRI-CGCM3)	MRI, Japan	320x160
The Norwegian Earth System Model version I with Intermediate Resolution (NorESM1-M)	Norwegian Climate Centre, Norway	144x96

Table S2. SWAT model parameters and their implications.

Parameters of the project	On behalf of the meaning
SOL-BD	Soil bulk density, it is closely related to soil porosity and temporal and spatial rainfall distribution
CN_2	Number of SCS runoff curves, the comprehensive reaction of underlying surface directly determines the size of runoff. When the precipitation is constant, the increase of the value leads to the increase of surface runoff and runoff production.
ESCO	Compensation coefficient of soil evaporation, contribution degree of soil evaporation to the total evaporation of the basin.
$CH\text{-}K_2$	Effective hydraulic conductivity of the main riverbed, it reflects the loss of river flow due to groundwater runoff recharge.
SOL-K	Saturated water conductivity of soil layer, the larger the value is, the larger the soil infiltration rate will be, which will increase the soil groundwater recharge and reduce the yield and discharge.
SOL-AWC	Soil available water capacity, the higher the value is, the stronger the soil water storage capacity is, and the corresponding watershed yield decreases.
ALPHA-BF	Base flow attenuation coefficient, the proportion of base flow in river runoff.
GWQMN	Shallow aquifer water storage threshold, when the threshold is exceeded, the shallow aquifer can supply base flow to the main channel and sub-watershed channel.
EPCO	Plant absorption compensation coefficient, it affects how much water plants take in from the soil

REVAPMN	Critical shallow water holding capacity, when this value is exceeded, shallow evaporation occurs again

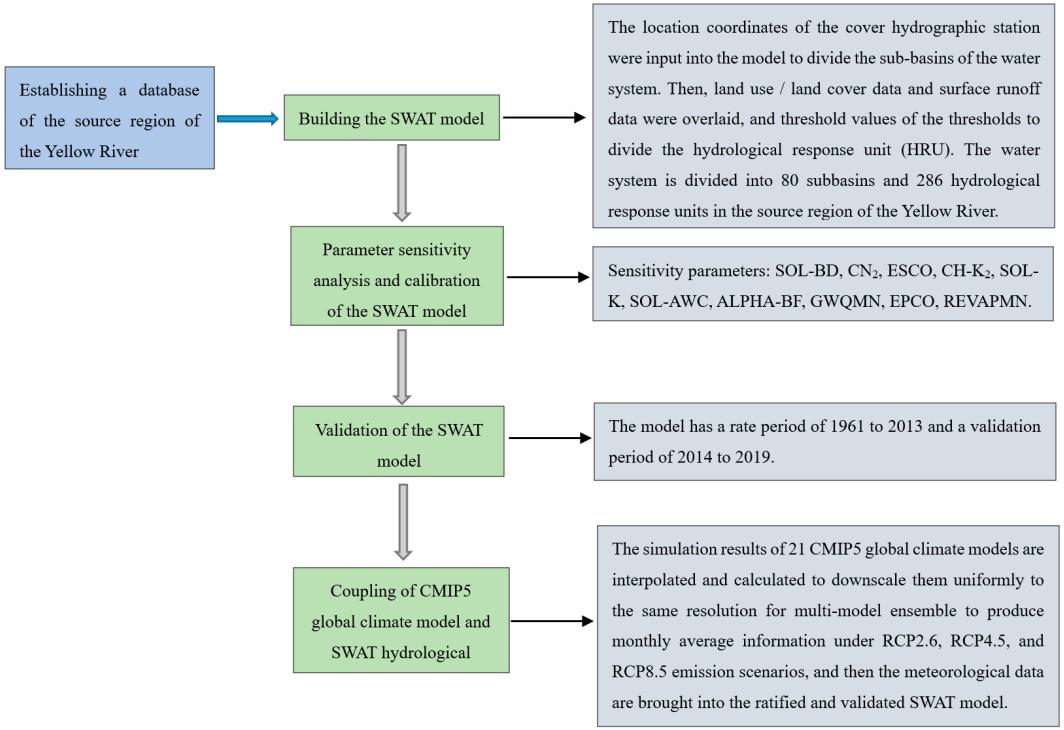

Figure S1 Flow Chart