Geophysical Research Abstracts
Vol. 16, EGU2014-10679-2, 2014
EGU General Assembly 2014

Changes of streamflow and sediment discharge at multi-temporal scales and the responses to human activities and climate variability in the Yanhe watershed of Loess Plateau, China

Guangyao Gao
Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences, Beijing, China (gygao@rcees.ac.cn)

To control the severe soil erosion in the Loess Plateau and reduce the sediment transported into the China's Yellow River, a great number of soil conservation measures including terracing, afforestation, pasture establishment and construction of sediment trapping check dams have been implemented across the Loess Plateau since the 1950s. These measures have resulted in large-scale land use and land cover change, which had substantial effects on streamflow and sediment discharge with combination of climate variability. In this work, the Yanhe watershed in the middle part of Loess Plateau was chosen as the study area, and hydro-climatic data during 1952-2011 were collected. The changes of streamflow and sediment discharge at multi-temporal scales (annual, flood season, monthly and daily scales) as well as those of precipitation and potential evaportranspiration were investigated. A water balance model based on Budyko hypothesis was used to quantitatively assess the impacts of human activities and climate variability on streamflow, and their contributions to changes of sediment discharge was evaluated by the regression method. The precipitation and potential evaportranspiration showed negative and positive trends, respectively, but not at significant level. Significant decreasing trends ($P<0.01$) were detected for streamflow, sediment discharge and concentration, and the abrupt change points all occurred in 1996. Overall, human activities contributed more than climate variability to streamflow (66% vs. 34%) and sediment discharge (81% vs. 19%) decline. Among the soil conservation measures, construction of sediment-trapping dams appeared to be the main cause of the reduced streamflow and sediment discharge, which also made the sediment grain more fine. Future catchment management should consider more sustainable measures such as pastureland to reduce soil erosion while not significantly affecting streamflow, and the spatial organization of land management actions deserves much more attention.