Geophysical Research Abstracts
Vol. 16, EGU2014-12577, 2014
EGU General Assembly 2014

Forcing a hydrological discharge model to RCM and GCM outputs in the Euphrates-Tigris Basin: Evaluation of the model performance and projected river discharges

Deniz Bozkurt (*) (1,2), Omer L. Sen (1), and Stefan Hagemann (2)

(1) Istanbul Technical University, Eurasia Institute of Earth Sciences, Istanbul-Turkey, (2) Max Planck Institute for Meteorology, Hamburg-Germany, (*) Permanent address: University of Chile, Department of Geophysics, Center for Climate and Resilience Research (CR)2, Santiago-Chile

The Hydrological Discharge (HD) model of Max Planck Institute for Meteorology is forced by a variety of climate model datasets to investigate the future of discharges in the Euphrates-Tigris Basin. The data include the direct outputs of two GCMs (SRES A1B scenario simulation of ECHAM5/MPIOM and RCP 4.5 scenario simulation of MPI-ESM-LR) and the dynamically downscaled outputs of ECHAM5/MPIOM and NCAR-CCSM3 scenario (SRES A1FI, A2 and B1) simulations. The suite of simulations enables a comprehensive analysis of the projected river discharges as well as a thorough evaluation of the performance of the HD model for the basin. Moreover, the GCM driven simulations provide a comparison between CMIP5 simulations of MPI-ESM-LR and CMIP3 results from its predecessor of ECHAM5/MPIOM on basin scale. It is demonstrated that the HD simulations forced with relatively low-resolution GCM outputs are not able to reproduce seasonal cycle of discharge well. The simulations forced with the MPI-ESM-LR yield better results compared to ECHAM5 forced simulations in terms of annual cycle and timing of the annual peak discharge. In contrast to GCM forced simulations, high-resolution RCM forced simulations reproduce the annual cycle of discharges reasonably well. However, overestimation of the discharges during the cold season and bias in the timing of the springtime snowmelt peaks persist in the RCM forced simulations. Different RCM forced scenario simulations indicate substantial decreases in mean annual discharges of the Euphrates and Tigris Rivers by the end of century, ranging from 19% to 58%. Significant temporal shifts to earlier days (3-5 weeks by the end of the 21st century) in the center time of the discharges are also projected for these rivers. As the basin is marked as water-stressed and the region is notorious for water scarcity, these unfavorable changes have potential to increase water disputes among the basin countries.