Geophysical Research Abstracts
Vol. 16, EGU2014-5736-1, 2014
EGU General Assembly 2014

Flood risk under future climate in West Africa: linking extreme value models and flood generating processes

Yves Tramblay (1), Ernest Amoussou (2), Wouter Dorigo (3), and Gil Mahé (1)

(1) HydroSciences Montpellier (UMR CNRS, IRD, UM1, UM2), Montpellier, France (ytramblay@gmail.com), (2) Département de Géographie et Aménagement du Territoire de l'Université de Parakou, BP 123 Parakou, Bénin, (3) Remote Sensing Research Group, Department of Geodesy and Geoinformation Vienna University of Technology, Vienna, Austria

For many areas in the world, there is a need for future projections of flood risk in order to improve the possible mitigation actions. However, such an exercise is often made difficult in data-sparse regions, where the limited access to hydrometric data does not allow calibrating hydrological models in a robust way under non-stationary conditions. In this study we present an approach to estimate the possible changes in flood risks, which incorporates flood generating processes into statistical models for extreme values. This approach is illustrated for a West African catchment, the Mono River (12900km^2), with discharge, precipitation and temperature data are available between 1988 and 2010 in a few stations and where the dominant flood generating process is soil saturation. A soil moisture accounting model, calibrated against a merged surface soil moisture microwave satellite dataset, is used to estimate the annual maximum soil saturation level that is then related to the location parameter of a Generalized Extreme Value model of annual maximum discharge. With such a model, it is possible to estimate the changes in flood quantiles from the changes in the annual maximum soil saturation level. An ensemble of regional climate models from the ENSEMBLES-AMMA project are then considered to estimate the potential future changes in soil saturation and subsequently the changes in flood risks for the period 2028-2050. A sensitivity analysis of the non-stationary flood quantiles has shown that with the projected changes on precipitation (-2%) and temperature (+1.22°) under the scenario A1B, the projected flood quantiles would stay in the range of the observed variability during 1988-2010. The proposed approach, relying on low data requirements and few assumptions, could be useful to estimate the projected changes in flood risks for other data-sparse catchments.