Geophysical Research Abstracts
Vol. 20, EGU2018-9635, 2018
EGU General Assembly 2018

Using a hydrological model calibrated with satellite based evapotranspiration to simulate stream flow in a data sparse tropical catchment

Abolanle Elizabeth Odusanya (1), Bano Mehdi (1,2), Christoph Schürz (1), and Karsten Schulz (1)

(1) Institute of Water Management,Hydrology and Hydraulic Engineering, University of Natural Resources and Life Sciences,Vienna(BOKU), Austria , (2) Department of Crop Science, University of Natural Resources and Life Sciences, Vienna (BOKU), 3430 Tulln, Austria

Hydrologists are still faced with challenges of accessing and obtaining measured stream flow data in many tropical catchments. The general lack and scarcity of up to date stream flow information has made water resources management challenging and difficult in most of the river basins located in Nigeria, even in catchment areas that are of high strategic importance for state and national water development plans. Recent advancements in remote sensing have enabled the calibration of hydrological models with satellite based products. Within this context, this study presents an innovative approach to simulate stream flow for individual sub-basins. We used the Soil and Water assessment Tool (SWAT) that was calibrated/validated at the monthly time step with the Global Land Evaporation Amsterdam Model actual evapotranspiration (GLEAM_v3.0a) in the Ogun river basin of 20,292km^2,which is the main source of public water supply for two major states (Lagos and Ogun state) in Nigeria. The model calibration/validation and uncertainty analysis were performed using the Sequential Uncertainty Fitting technique (SUFI-2). The model performed satisfactorily for stream flow in most sub-basins according to the Nash-Sutcliffe efficiency, Kling-Gupta efficiency, co-efficient of determination and the percent bias. By choosing non-unique parameter sets, six well-performing solutions of stream flow estimates bracketed by their 95% prediction uncertainty were obtained when an NSE was selected as the main objective function with a threshold value of 0.59. The results showed that SWAT calibrated with a satellite obtained actual evapotranspiration can be used efficiently in simulating stream flow in a data sparse tropical catchment to support decision-making for management policies when all model uncertainties are accounted for and parameter non-uniqueness are considered. Beyond the estimated stream flow simulations, the water balance components can also be obtained. Future work will examine predictions on nutrient loading in the study area.