Geophysical Research Abstracts
Vol. 21, EGU2019-11947, 2019
EGU General Assembly 2019

Parameter sensitivity analysis and land surface model calibration of a flood prone river basin in India

Shaini Naha, Miguel Rico-Ramirez, Rafael Rosolem, and Dawei Han
University of Bristol, Civil Engineering, Bristol, United Kingdom (sn17546@bristol.ac.uk)

Current land surface models involve complex processes and numerous model parameters which might lead to the uncertainties in the prediction of extreme hydrologic events. Therefore, appropriate reduction in the number of model parameters is an effective way to reduce the impacts of parameter uncertainties on model simulations. This study aims to provide a comprehensive sensitivity assessment of three-layer Variable Infiltration Capacity (VIC-3L) model parameters using an efficient global Sensitivity Analysis (SA) technique, One-At-the-Time method for global Sensitivity Analysis (EET) or 'method of Morris' at the flood prone Mahanadi river basin (140,000 Km2) located in the eastern part of India. VIC-3L model uses 10 vegetation and 21 soil parameters apart from the meteorological forcings to represent the surface and subsurface hydrologic processes on spatially distributed grid cells. Lohmann routing model is further used to rout the surface and sub-surface runoff within a grid to the channel network using a unit hydrograph approach. After looking at all the parameters in details and performing some model simulations at a grid resolution of 5 km, 10 soil parameters and 2 routing parameters are selected to be included in the Sensitivity Analysis. The physically reasonable ranges of the parameters are decided based on previous literatures and the model simulations validated with the available measured discharge. SA shall help in evaluating the identifiability of the parameters controlling runoff generation and routing in VIC model. The sensitive parameters can then be used to facilitate more efficient calibration of the model to quantify the flood frequency and magnitude in the Mahanadi river basin.