Geophysical Research Abstracts
Vol. 20, EGU2018-11987, 2018
EGU General Assembly 2018

Event based Intensity-Duration model for changing climate

Rajendran Vinnarasi and Chandrika Thulaseedharan Dhanya
Department of Civil Engineering, Indian Institute of Technology Delhi, India.

Dynamic behaviour of extreme rainfall characteristics has been of great interest to the hydrologic community over the past decades. Since, warming world has altered the hydrological cycle, it is expected to result in high intensity short duration rainfall events. A convenient method to understand these events is through Intensity-Duration-Frequency (IDF) curves, which involves a univariate modelling technique and helps in extracting the maximum intensity of rainfall for the intended design duration. Though, this method is very crucial for hydrological designs, it is not adequate for a comprehensive water resources planning and management. The appalling problem is that the amount of rainfall which is traditionally expected in a month or two might be received in a day or two. Recent studies observed a negative trend (decrease) in duration, while no trend in the depth of rainfall, in most of the regions. Especially, urbanized regions have direct runoff based on the intensity and duration. Therefore, it is important to study the joint characteristics of intensity and duration. Hence, this study aims to derive IDF curves using bi-variate rainfall frequency analysis using dynamic copula for non-stationary environment. Traditionally, the observed non-stationarity in the time series is incorporated in the extreme value distribution in terms of changing parameters. However, this raises a question of which parameter needs to be changed, i.e. location or scale or shape, since either one or more of these parameters vary at a given location. In this study, we detect the changing parameters, to reduce the complexity involved in the development of non-stationary model and to provide the uncertainty bound of estimated time varying return level using Bayesian Differential Evolutionary Monte Carlo (DE-MC) algorithm. The results of this study emphasize that the time varying parameters also change spatially and the IDF curves should incorporate non-stationarity only if there is change in the parameters, though there may be significant change in the extreme rainfall series. Our results emphasize the importance of adopting event based non-stationary IDF curves for devising long-term decision making strategies to address the changing climate.