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REGIONAL FREQUENCY ANALYSIS OF EXTREME RAINFALLS USING THE FORGEX METHOD UNDER CHANGING CLIMATE

By

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Abstract

The application of extreme value theory on a short series led to high uncertainty estimation of extreme events, related to the sampling distribution (high sensibility to presence of singular values), the possible heterogeneity of populations and the choice of the probabilistic model. Applied to long time series, these approaches become relevant for the estimation of extreme values. A first way of increasing the sample size analysis is to expand the field of space observation. However, the pooling of regional data raises the question , how much information is gained by combining the rainfall records, allowing for the effects of spatial dependence.

The FORGEX method resolves this by computing a spatial dependence model which reflects the effective number of independent stations (*Ne*) in a region.

This study starts by considering both stationary and non-stationary processes (climate change) then a comparison of two methods of delineation of homogeneous regions have been made. For the estimation of Generalized Extreme Value (GEV) distribution parameters, Maximum Likelihood Estimation MLE provides a number of advantages over Linear Moments (L-moments) especially when working with long or pooled data sets. Using FORGEX method, we also studied several aspects such as: The effects of inter-site-dependence and redundancy on pooling groups; generation data for regions with varying levels of dependence and define Network Maximum (Netmax) Growth Curves .

A comparison with other methods of regionalization as the index flood method and station-years method-years demonstrated the effectiveness of the FORGEX for more accurate estimation of quantiles for millennial return periods.

KEYWORDS: FORGEX, Growth curve, Spatial dependence, Netmax, daily rainfall extremes.