Uni-variate and Bi-variate Inverted Exponential-Teissier distribution in Bayesian and Non-Bayesian framework to Model Stochastic Dynamic Variation of Climate data

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Abstract. This article provides a new Inverted Exponential Teissier (IET) distribution to model an extreme value data set and explain temporal dependence in environmental statistics employing Bi-variate probability distribution. We deduce its various statistical properties, including descriptive statistics, characterization, and different measurements of reliability. The model parameters are estimated using Bayesian and Non-Bayesian frameworks. For exploring the dependency structures between two geographical Random Variables (RV), we extend the IET to Bivariate IET distribution (BIET). We introduce a novel time-series forecasting algorithm based upon copula assuming stationarity of the data set. We validate the proposed method using extensive simulation studies with different possible combinations of parameter values. This method is applied to the seasonal rainfall data of Kerala from 1901 to 2017. We estimate the monsoon rainfall using median regression derived from BIET, where summer rainfall data is used as a significant covariate. We found the Mean Absolute Percentage Error (MAPE) is 19.242% on the test data set.