Non-stationary temperature extremes in a changing climate: A Bayesian extreme value analysis

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The main focus of this study is to analyze the trends in extreme temperature over the East African region in order to aid a deeper understanding of the inherent risks associated with such extremes. Four countries' (Kenya, Ethiopia, Sudan and Somalia) maximum annual temperature datasets are considered under the stationary and non-stationary assumptions. For the non-stationary form of the Generalized Extreme Value distribution, only the location parameter is allowed to vary with time. The Maximum likelihood and Bayesian estimation techniques are used. Although both estimation techniques produce similar parameter estimates they differ when it comes to the suggested model (linear or quadratic) to use in modelling the variations through time for each country's maxima. This difference is further, deeply reflected in the forecasted non-stationary return levels for future time horizons. The Bayesian results are adopted as it takes into account prior knowledge.

Keywords: Non-stationary; Extreme temperatures; generalized extreme value distribution; Bayesian estimation; Return levels.