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Addressing Uncertainties in Projected IDF Relationships under Climate Change

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The Intensity-Duration-Frequency (IDF) relationships are commonly used in urban hydrologic designs. A major source of uncertainty arises due to small samples of data and use of multiple GCMs, in developing the IDF for future periods. A major objective of this study is to address uncertainties in the IDF relationships for future periods, under climate change. The study proposes a Bayesian method for addressing the parameter uncertainty in the Generalized Extreme Value (GEV) distribution for the Annual Maximum Series (AMS). Uncertainties due to the use of multiple GCMs are addressed through the Reliable Ensemble Averaging (REA) method. The posterior distributions of the three parameters of GEV distribution are obtained using Markov Chain Monte Carlo (MCMC) method. Twenty-three CMIP5 GCMs with four RCPs are considered for studying the effect of climate change on the IDF relationship for the case study of Bangalore, India. Change Factor Method (CFM) is used for spatially downscaling the projected time series of precipitation and scale-invariance theory is used for temporal disaggregation. Results are compared across different CFM schemes considering multiple bin sizes. Uncertainties in design intensities are quantified through probabilistic IDF relationships.