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On Probability Distribution of Extreme Precipitation Events

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Understanding and characterizing climate related extreme events are the foci of several recent climate change related initiatives. Yet, the characterization of extreme precipitation remains elusive for two main reasons: lack of a generalizable model that can capture the statistical properties of precipitation distribution at both ends of the spectrum; and limited historical data to calibrate and validate such a model. Asymptotically, the Generalized Extreme Value (GEV) distribution is considered to be a suitable model for distribution for precipitation extremes and is currently used by the National Oceanic and Atmospheric Administration of the United States to predict future extreme events. The Pearson Type III (P3) distribution has recently attracted attention for its flexibility in representing daily precipitation and related extremes. Limited data record, however, makes the validation and generalization of GEV and P3 models difficult. We have used a stochastic Bartlett-Lewis type rainfall model to generate synthetic rainfall data. A key objective of the study is to evaluate the appropriateness of these two models (GEV and P3) using synthetically generated rainfall data. Monte-Carlo type experiments are performed on the synthetic data. Two set of experiments are conducted to determine the precipitation extremes. Experiment 1 is conducted on the annual maximum time series (defined as the time series of maximum daily precipitation in a given year) of the precipitation extremes. Experiment 2 consists of fitting P3 distribution to the complete (including zeros) daily precipitation time series and then the extreme precipitation events were estimated using derived P3 distribution. Prelim-

inary results, based on probability plot correlation coefficient and root mean square, indicate the P3 type distribution is preferred to the GEV distribution to estimate precipitation extremes.