Scaling, Partial-Scaling and Classical Methods of IDF Curve Estimation

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We describe a new class of IDF curve estimation methods based on the marginal distributions of rainfall intensity in intervals of different duration d and compare them to standard procedures that use historical annual maxima. First we develop and test the new methods assuming multifractal rainfall and then generalize the procedures for partial or complete lack of scaling. In the case of multifractal rainfall, a scale-invariance condition links the marginal distributions for different values of d and makes parameterization especially lean. We compare the new and existing IDF methods using historical and synthetic rainfall records. The use of marginal rather than annual-maximum information increases the stability and robustness of the new IDF estimators against outliers. Hence the new methods are applicable also to a few years of continuous rainfall data. While conventional methods frequently assume independent multiplicative effects of duration and return period on the IDF values, the new methods are capable of modeling the dependencies that are often observed in empirical IDF curves. In complexity, the new methods are comparable to the conventional ones.