



## **Integrated bayesian estimation of IDF curves: consolidation and extensive testing of a method**

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Intensity-duration-frequency (IDF) curves are one of the most common rainfall model used for instance for the design of urban drainage systems. The uncertainties related to the elaboration of these IDF curves have nevertheless seldom been evaluated in the past. The presentation will recall the existing link between the IDF relationship and some properties of the rainfall series that are often observed such as simple scaling. The resulting IDF relationship is the product of a dimensionless (i.e. reduced) distribution function for the annual maximum rainfall intensities and a duration-dependent scaling factor. Its parameters can be evaluated in an integrated way (i.e. based on a unique mixed sample of peak intensities over a range of durations: 15 minutes to 24 hours). The use of likelihood based Bayesian Monte-Carlo Markov Chain (MCMC) statistical inference methods for this evaluation provides consistent uncertainties for all the parameters of the IDF relationships and the corresponding rainfall quantiles. This methodology has been tested on a large dataset of 48 rain-gauge records, spread over the North Central part of Algeria (25000 km<sup>2</sup>), under various climatic regimes. The integrated approach is undoubtedly consistent with estimates from annual maximum rainfall fitted to a single duration. Furthermore, credibility intervals are significantly reduced. Also, this approach provides robustness in the sense where the integrated inferential process applied on short observation series (8 to 12 years) provides rational estimates, which represents a significant advantage for engineering applications.