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Bayesian estimation of intensity-duration-frequency curves and of the return period associated to a given rainfall event. (English) [Zbl 1420.62466](#)

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Summary: Intensity-duration-frequency (IDF) curves are used extensively in engineering to assess the return periods of rainfall events and often steer decisions in urban water structures such as sewers, pipes and retention basins. In the province of Québec, precipitation time series are often short, leading to a considerable uncertainty on the parameters of the probabilistic distributions describing rainfall intensity. In this paper, we apply Bayesian analysis to the estimation of IDF curves. The results show the extent of uncertainties in IDF curves and the ensuing risk of their misinterpretation. This uncertainty is even more problematic when IDF curves are used to estimate the return period of a given event. Indeed, standard methods provide overly large return period estimates, leading to a false sense of security. Comparison of the Bayesian and classical approaches is made using different prior assumptions for the return period and different estimation methods. A new prior distribution is also proposed based on subjective appraisal by witnesses of the extreme character of the event.

MSC:

[62P12](#) Applications of statistics to environmental and related topics

[62F15](#) Bayesian inference

Keywords:

[urban drainage](#); [extreme hydrological event](#); [Bayesian statistic](#); [return period](#)

Software:

[BayesDA](#); [IPython](#); [ismev](#); [Matplotlib](#); [Python](#); [QUADPACK](#); [SciPy](#)

Full Text: [DOI](#)

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