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A multiscaling intensity-duration-frequency model for extreme precipitation

Hans Van De Vyver

Royal Meteorological Institute of Belgium, Meteorological and Climatological Research, Brussels, Belgium (hvijver@meteo.be)

Rainfall intensity-duration-frequency (IDF) curves are a standard tool in urban water resources engineering and management. They express how return levels of extreme rainfall intensity vary with duration. The simple scaling property of extreme rainfall intensity, with respect to duration, determines the form of IDF relationships. It is supposed that the annual maximum intensity follows the generalized extreme value (GEV) distribution. As well known, for simple scaling processes the location- and scale-parameter of the GEV-distribution obey a power law with the same exponent. Although, the simple scaling hypothesis is commonly used as a suitable working assumption, the multiscaling approach provides a more general framework. We present a new IDF relationship that has been formulated on the basis of the multiscaling property. It turns out that the GEV-parameters (location and scale) have a different scaling exponent. Next, we apply a Bayesian framework to estimate the multiscaling GEV-model, and to choose the most appropriate model. It is shown that the model performance increases when using the multiscaling approach.