Geophysical Research Abstracts
Vol. 20, EGU2018-6737, 2018
EGU General Assembly 2018

Constructing IDF curves for ungauged locations

Katrin Nissen, Henning Rust, and Uwe Ulbrich
Freie Universität Berlin, Institute for Meteorology, Berlin, Germany (katrin.nissen@met.fu-berlin.de)

Hydrologists use Intensity-Duration-Frequency (IDF) curves for planning and risk assessment. Here, we estimate the IDF relationship consistently for all durations using a duration-dependent General Extreme Value distribution (dd-GEV). An extension to the GEV allows simultaneous description of extreme precipitation for different durations (accumulation periods). The underlying model has been proposed by Koutsoyiannis et al. (1998) and taken up by Soltyk et al. (2014) and Ritschel et al. (2017). For regions with a sufficient number of stations with sub-daily precipitation measurements, spatial covariates (longitude, latitude and altitude) can be incorporated into the model. The underlying assumption is that IDF curves vary smoothly in space. With this approach it is possible to construct continuous maps of return-levels for a given duration and thus cover also ungauged locations. Information provided by stations which record precipitation only at daily resolution can also help to improve parameter estimation. Ideally, the methodology allows for more precise estimates of return-levels compared to a classical single-station approach as the available information is used in a more efficient way, or phrased differently "strength is borrowed from neighbouring sites".

The Wupper catchment located in Western Germany is taken as a showcase. The region has an extent of 46 km x 35 km and the maximum elevation is 465 m. It includes 6 stations which measure precipitation at hourly resolution and 39 stations which record daily precipitation sums.