



## **Regional scaling based estimation of IDF curves in Slovakia**

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Rainfall intensity-duration-frequency (IDF) curves are of a great practical importance in water resources management e.g. for the design of hydraulic structures and urban drainage systems, and for the estimation of flash flood risk. However the lack of rainfall data with sufficient temporal resolution (usually caused by limited number of rain gauges with continuous recording and short series of measurements) does not generally allow for constructing maps of extreme short-duration rainfall with the desired spatial resolution. In such cases the simple scaling model, which has proved its applicability in various regions of the world, offers a solution to this problem. Using the scaling hypothesis, it is possible to estimate design values of rainfall of selected recurrence intervals and durations shorter than a day by using only the daily data, which are available from a considerably denser network with long series of measurements.

In this study the simple scaling theory was applied in the whole territory of Slovakia for the estimation of the intensity-duration-frequency characteristics of short duration rainfall. For the analysis the data series in one minute time step from 21 rainfall gauging stations were used. To estimate T-year rainfall quantiles of sub-daily duration at ungauged sites, two methodologies are combined: the regional index value approach, and the local concept of simple scaling. The former approach is used to estimate the quantiles of 1-day rainfall maxima in the warm season, supposing that the so called index value can be estimated locally and the dimensionless quantiles (the regional growth curve) can be derived by means of regional frequency analysis. The latter approach is employed to estimate the local IDF curves by downscaling the T-year quantiles of 1-day rainfall maxima using the regionally averaged scaling exponent. The derived IDF curves for these stations are finally compared with those defined by Šamaj and Valovič (1973), which are widely applied in engineering hydrology in Slovakia.