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Heavy rainfall – estimation of IDF curves for Hungary

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The impacts of climate change on society come forward mainly through extreme weather and climate events. The warming climate evokes increasing frequency of extreme precipitation in some region. In the Pannonian basin the lack of precipitation such as drought events and the frequency of heavy rainfall increased too. The heavy rainfall could trigger floods on rivers and flash flood on leats. In urban area the more intense rainfall events necessitates the redesign of the drainage systems. Moreover rainfall is one the main drivers of soil erosion.
The measuring practice of short-term precipitation has completely changed with installing automatic climate stations in Hungary. In the period preceding the automatization ombrographs registered the quantity of precipitation. Evaluation of the rain register paper was carried out by selecting the largest precipitation amounts during 5, 10, 20, 30, 60, 180 minute periods within a wet event, considering the slope of the curve of accumulated precipitation and registering these partial amounts. Automatic stations replaced the ombrographs in many places in Hungary making the short term equidistant sampling possible particularly from the late 1990s. In the Hungarian Meteorological Service the amount of precipitation is stored in the meteorological database in every ten minutes. The precipitation sum derived from the 10 minutes data for several time intervals can be analysed. This paper reports an examination of extreme large 10 minutes and some derived rainfall amounts for several durations e.g. 20, 30 minutes, 1, 2 and 3 hours, 1, 2 and 3 days which are used for design purposes. The rainfall amounts from 1998 are examined to avoid the inhomogeneity caused by the change of the measuring practice. The results of the daily homogenization (MASH method, Tamás Szentimrey) is used to validate the data where it is possible. The estimation of IDF curves are performed for 30 automatic meteorological stations equally distributed in the territory of Hungary. Generalized Extreme Value Distribution is fitted to estimate the parameters of the asymptotic probability distribution function of the maxima to estimation of the Intensity-Duration-Frequency curves. IDF curves based on the observations for the 1998-2013 period are introduced on graphs. The design values for 10, 20, 50, 100, 200 and 500 return periods are presented in this study for several meteorological stations. A new methodology is established to apply when the parent distribution varied during the examined period due to climate change for example. A case study for 17-18 at Budapest makes the paper complete.