



Study of IDF curves established by the property of scale invariance in Tunis

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This work focuses on the study of intensity-duration-frequency (IDF) curves of Tunis-Manoubia station located in Tunis (Tunisia). The assumption of simple scale invariance combined with the Gumbel distribution was used to develop the formulas of IDF curves. Indeed, firstly, the scale exponent was derived using all analyzed reference periods (5, 10, 15, 20, 30, 40, 50, 60, 90, 120, 180 minutes and 24 hours). It should be noted that the daily rainfall intensities are corrected using the coefficient of Weiss to obtain those of 24 hours. However, the study of probability weighted moments unveiled a scale break at 30 minutes. Hence, there are two intervals each one characterized by a simple scale invariance and a scale exponent namely [5 minutes - 30 minutes] and [30 minutes - 24 hours]. IDF curves obtained by simple scaling were compared with those experimental one determined by DGRE*. It proved that the maximum intensities estimated by DGRE for different return times (2, 5, 10, 20, 58, 100 years) are overestimated for durations of references less than 30 minutes which is oversize hydraulic works, whose design is based on these curves such as dams and sewage works. Since the rainfall data at high resolution (minutes to hours) are not available because most stations are equipped with non-recording gauges. Only totals are available, hence the interest of this method is the estimation of maximum intensity for periods less than one day using only daily data.

Keywords: IDF curves, scale invariance, extreme rainfall, Gumbel distribution

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