Changes in the Behavior of Heavy Rainfall in the Southern Brazil

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Heavy rainfalls are associated with several economic and environmental damages mainly in urbanized areas. Their analisys depends on the availability of a dense rainfall station's network that is absent or inaccessible in Brazil, especially for sub-daily information. This study compares the Intensity-Duration-Frequency (IDF) data presented by Pfafstetter (1957) and later reanalyzed by Torrico (1974), against the most recent IDF information in Southern Brazil (comprising the States of Rio Grande do Sul, Santa Catarina and Paraná). This IDFs's collection was obtained from many sources ranging from national and local symposia, municipalities publications manuals to books, resulting in a database of more than a hundred of IDFs equations. The rainfall heights with several durations (1h, 4h, 12h, and 24h) obtained from older (until 1955's) and newer (after 1970's) IDFs were interpolated by ordinary kriging using GIS tools. The interpolated rainfall from these different periods was compared side-by-side allowing the determination of the percentual change between them. With the exception of Florianópolis region (NE of the Santa Catarina State), the newer IDFs showed higher precipitations than observed in pre-1955's data. This indicates an increase of heavy rainfall in practically the whole area, with some exceptions in the South and Northern coastal regions, in agreement with some climate change forecast models. It was also observed a more pronounced increase of sub-daily rainfall. For example, in some places, the newer data show that almost 70% of the amount of 24 hours rainfall occurs in just one hour of rainfall, against less than 40% observed in the data from the first half of the 20th century. This result alerts not only for the necessity of storwater drainage design's review but, especially, for the establishment of standardized heavy rainfall information procedures taking into account the observed time series trend.