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Nonstationarity of daily rainfall annual maxima in Puglia (Southern Italy)

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Extreme flood events occurring in the last decades, due to climatic conditions in rapid evolution and/or changes in land cover, has lead the scientific community to develop and improve probabilistic techniques in order to take into account these effects, as also requested by the EU Floods Directive 2007/60. In the recent literature are becoming more popular studies that investigate the nonstationarity of the variables usually treated in hydrology through the analysis of their trend behavior. In this context it is also useful to assess the impact that the climate and /or land cover modifications have on the performances of the probabilistic stationary models used to predict hydrological variables such as rainfall and flood peaks.
Among several proposed approaches, we use the redefined concept of return period and risk by considering the variability over time of the position parameter of the GEV distribution, with the subsequent discussion about the implications of analytical and technical characters. The analysis was carried out on the time series of annual maximum of daily precipitation available for a broad number of rainfall gauged stations in Puglia (Southern Italy). The investigation, conducted at the regional scale, leads to the identification of areas with different significativity of the statistical tests usually performed in order to assess nonstationarity. The evaluated change of return period leads to considerations useful to redesign methods for regional analysis of flood frequency.