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Advancing a graphical method to identify extreme behavior in hydroclimatic processes

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Graphical tools have been extensively used to study the statistical properties of hydroclimatic processes as well as their extreme behavior. Their major weakness lies in the fact that they cannot be applied massively, or else, algorithmically, as inferences on data analyzed are made by visual inspection. Here, we treat this limitation by translating a graphical method into an algorithmic procedure. Particularly, we modify and extend the Mean Excess Function (MEF), which is an important tool for evaluating the type of probability tail of a random variable, based on the observed data. The MEF is related to the mean value of a variable above a threshold, and thus, its focus is on the analysis of extremes. The method is modified in order to be easily applicable in large datasets and help identify which tail, i.e. sub-exponential (heavy-tailed), exponential, and hyper-exponential (light-tailed), better describes the variable under study. We apply the method to thousands of precipitation records.