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How rare is that storm or flood?

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For over 50 years, analysis of annual maxima of floods and rainfall has assumed that the data are a representative sample of long term conditions. Consequently thousands of published papers attempt to fit a particular frequency distribution to the data, comparing results of different methods. This approach may be suitable when the data conform to the criterion of being independent, identically distributed, random variable, but this is not the case in many studies. A simple test for this condition has not been presented. Sometimes the highest values are treated as outliers. In this paper a simple rank size test is proposed. The data which conform to the needs of frequency analysis are then used to produce a flood and rainfall frequency equation. The results were tested on a wide variety of catchments in the UK, Spain, America, and Canada. Traditional frequency methods predict extreme floods which have already been exceeded by a factor up to 3. The use of data that conform to the needs of the method produce realistic estimates of the rarity of floods that have taken place, when tested against the rarity of the causative rainfall.