



An evaluation of extreme temperature events in Spain based on process control charts

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In recent decades, extreme climate events have attracted the attention of growing number of researchers due to the fact these events cause large costs in agriculture and its insurance planning associated. This work focuses in extreme temperature events in concrete, and offers an analysis of them based on statistical process control tools, which are unusual in climate studios.

Throughout this work we have evaluated the maximum and minimum temperatures for geographical areas of a Spanish region over a period from last century, in order to test statistically whether there is evidence of an increase of extreme temperature events, by applying methods of statistical process control. To this end, the temperature series have been seasonally adjusted. The analysis was performed on the anomalies temperatures series.

For each of the geographic areas under study, statistical control charts for attributes were obtained for both maximum and minimum annual anomalies. Once the specification limits have been determined, they have been used for classifying observations as extreme or normal.

This allows drawing a general assessment of the tendencies of extreme temperature events in the analyzed region. It can be concluded that there are three different cycles in maximum annual temperatures in all geographical areas analyzed: a first cycle, in which the proportion of extremes temperature days remain stable; a second period in which the proportion of the extremes days fallen slightly from the early years of the series; and a third stage, in which the proportion of days with extreme high temperatures increases significantly with respect to that observed in previous periods.

With respect to minimum extreme annual temperatures in the Spanish region evaluated, another three cycles can be observed in all geographical areas: a first cycle from the start of the series, in which the proportion of extreme minimum temperature days remains stable; a second cycle in which the proportion of extreme days decreases from the first period; and a third cycle, in which although the proportion of extreme days increases with respect to the second cycle, this proportion is still lower than that observed in the early years of the series.