

On the determination of trends in rainfall

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Abstract

The question of how to assess trends in rainfall data is very relevant to that of climate change. A short review of prior work revealed that there was little consensus on the methodology to be adopted. Many methods had been tried and abandoned. Some methods had found comparatively wide acceptance although they employed a statistical software package that is not readily available, and which does not have tools common to other more widely available packages. In the light of this review, it was decided to start from the inherent distribution of rainfall and develop a method for determining temporal trends based on the underlying distribution. Data sets from 4 different locations and covering sample periods from every 5 min to every week were assessed. In each case it was found that the data could be represented extremely well by a log-normal distribution, which meant that normal statistics could be applied to the transformed data. When it was so applied, clear trends emerged, the significance of which could be readily judged via an F-test or t-test. Some worked examples are provided. Attention is drawn to the possibility of estimating the likelihood of extreme events by this method. It is also noted that the usual method of reporting rainfall as an arithmetic average overstates the precipitation, and that on statistical grounds use of a geometric mean is to be preferred.

Keywords: rainfall, trend analysis, statistical analysis, extreme events