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Extreme temperature events analyzed with Fast Fourier Transform

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Extreme weather and climate events have received increased attention in the last few years, due to the often large loss of agriculture business and exponentially increasing costs associated with them and insurance planning. This increased attention raises the question as to whether extreme weather and climate events are truly increasing, whether this is only a perceived increase exacerbated by enhanced media coverage, or both.

There are a number of ways extreme climate events can be defined, such as extreme daily temperatures, extreme daily rainfall amounts, and large areas experiencing unusually warm monthly temperatures, among others. In this study, we will focus our attention in frost and heatstroke events measuring it as the number of days under 0 ºC and number of days with daily maximum over 30ºC monthly respectively. We have studied the trends in these extreme events applying a Fast Fourier Transform to the series to clarify the tendency.

Lack of long-term climate data suitable for analysis of extremes is the single biggest obstacle to quantifying whether extreme events have changed over the twentieth century, including high temporal and spatial resolution observations of temperatures. However, several series have been grouped in different ways: chosen the longest series independently, by provinces, by main watersheds and altitude. On the other hand, synthetic series generated by Luna and Balairón (AEMet) were also analyzed.

The results obtained by different pooling data are discussed concluding the difficulties to assess the extreme events tendencies and high regional variation in the trends.