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# Long-range correlations in the fire sequences with Detrended Fluctuation Analysis

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Forest fires have been found to exhibit good power-law relation in the frequency-size distribution over many orders of magnitude in different countries, which identifies that forest fires behave as self-organized criticality (SOC). And in the temporal aspect, it is also found that the frequency-interval distributions of fires obey power-law with periodic fluctuations. The fire sequences cannot generally be described as Poisson point process, because the distribution of the occurrence times is not homogeneous and shows a clustering behavior. So the power-law distributions, the scaling behavior of the parameters are usually used to describe the sequence. Inter-event time series, the waiting-time between consecutive events, were studied in the similar earthquakes system in recent years, focusing on the distributions and the intrinsic mechanism. In order to find the long-range correlations of fire sequences, we analyzed the scaling behavior of the fires occurred in some places of Asia by means of the detrended fluctuation analysis (DFA), which provides the information of the scaling behavior and long-range characteristics in non-stationary time series. The scaling exponents, larger than 0.5, indicate the presence of persistent long-range correlations, while it performs white noise at 0.5. The detail fire data were investigated in several places, and with the different thresholds of the burned areas or losses. The result reveals the existence of long-range correlations in the fire interval sequences, and the scaling exponents are quite constant over several orders of magnitude. But the exponents are different from each other, possibly due to the orientation of the places we analyzed and other local influencing factors: human activity, weather, economic etc. Besides, the fire sequences of different types were studied in the same way, to find out the possible different long-range behaviors and their possible reasons. The results seem to be helpful to understand the underlying dynamics of the fire sequences.