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Estimating background activity based on interevent-time distribution

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The statistics of the time delays between successive earthquakes has been recently claimed to be universal and to show the existence of clustering beyond the duration of aftershock bursts. We show that neither of them is true. By analyzing the interevent-time distributions on different spatial and magnitude scales in California, we find that the shape of the distribution is correlated to the percentage of mainshocks in the region which varies between 10% and 90%. Additionally, we analyze simulations of the Epidemic Type Aftershock Sequence (ETAS) model which only consists of a Poissonian background activity and triggered Omori type aftershock sequences. We find that these simulations reproduce the observed interevent-time distributions showing that the empirical distribution can be explained without any additional long-term clustering. Furthermore, the investigation of the ETAS simulations indicates that the mainshock distribution can be better estimated through the interevent-time distribution than with standard declustering algorithms.