Interevent times distribution properties for earthquakes in Southern California and the Mexican Subduction zone.

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The hypothesis that earthquakes can be considered as the result of a self- organized critical process (SOC) has been in favor by many researchers in recent years. Some have even argued that due to their nature, there is no operational way to distinguish between main shocks and aftershocks, since the latter are just the result of looking at a short time limit of the same hierarchical process. That is, the statistics of aftershocks occurring within minutes of an earthquake can be related to the statistics of earthquakes separated tens of years. Others have also stated that since earthquakes follow SOC properties, we can not forecast the future occurrence of a large event, other than in terms of probabilties.
However, the observational clues which were used to point toward this paradigm may be the result of the same problem which pervades some of these studies, i.e. the inclusion of several types of environments in too large a region which produces a regular behavior out of several irregularly occurring processes at a smaller scale.
In this work we analyze the interevent properties of earthquakes from two types of tectonic situations: strike slip faults in Southern California and the most active part of the Mexican subduction zone. We separate different smaller volumes from the overall regimes and try to discriminate between clusterered events and mainshocks. We compare the observed interevent distributions of dependent and independent events to synthetic distributions according to the tectonic regime in order to highlight probable differences. The resulting distributions show that some regions exhibit distributions which depart from a Poissonian rate, including the possibility of semi-periodic occurences of clusters. Results indicate that the hypothesis of earthquakes being a case of SOC needs to be revaluated.