Features of seismic sequences are similar in different crustal tectonic regions

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Earthquakes cluster in both space and time. Several studies claim that clustering properties may be controlled by the tectonic regime: as an example, a recent study finds that seismic sequences tend to last longer in extensional tectonic settings compared to the compressive ones. Such evidence is usually used to claim for a calibration of the short-term earthquake forecast models and of declustering models based on the tectonic environment under consideration.

In this work, we investigate on the existence of possible differences in the earthquake clustering process in three areas related to distinct crustal tectonic regimes: Italy, Southern California and (onshore) Japan. Our approach avoids the arbitrary distinction among foreshocks, mainshocks and aftershocks and relies on a rigorous statistical analysis. Our results are compatible with the hypothesis of similar earthquake clustering properties in the three tectonic regions, superimposed to a background seismicity described by the Poisson process, whose rate may vary on short time periods. We conclude that, at least for active seismic crustal regions, the type of tectonic regime does not seem to play a key role in how seismic sequences evolve in the spatiotemporal domain.