



## **The magnitude of events following a strong earthquake: and a pattern recognition approach applied to Italian seismicity**

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In this study, we propose an analysis of the earthquake clusters occurred in Italy from 1980 to 2015. In particular, given a strong earthquake, we are interested to identify statistical clues to forecast whether a subsequent strong earthquake will follow.

We apply a pattern recognition approach to verify the possible precursors of a following strong earthquake. Part of the analysis is based on the observation of the cluster during the first hours/days after the first large event. The features adopted are, among the others, the number of earthquakes, the radiated energy and the equivalent source area. The other part of the analysis is based on the characteristics of the first strong earthquake, like its magnitude, depth, focal mechanism, the tectonic position of the source zone. The location of the cluster inside the Italia territory is of particular interest.

In order to characterize the precursors depending on the cluster type, we used decision trees as classifiers on single precursor separately. The performances of the classification are tested by leave-one-out method. The analysis is done using different time-spans after the first strong earthquake, in order to simulate the increase of information available as time passes during the seismic clusters. The performances are assessed in terms of precision, recall and goodness of the single classifiers and the ROC graph is shown.