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Investigating seismicity patterns preceeding the Mw 7.3 Iran earthquake on November 12, 2017

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On November 12, 2017, at 18:18 UTC, a major earthquake with moment magnitude Mw 7.3 struck the Kermanshah province of Iran, causing extended damage and casualties. We explore seismicity preceding this earthquake, with the aim to understand whether the information from past events could provide some insights about the occurrence of this and other future large earthquakes.
The instrumental earthquake catalogs available for the territory of Iran are investigated to explore the presence of specific seismicity patterns and the features of earthquake clustering. Various techniques are used for this purpose, including methods for long term forecasts of large earthquakes and the Region Time Length (RTL) algorithm. RTL has been applied in several regions of the world and different improvements of the method have been developed in the last year. Many forecasting methods, including RTL, need as input a declustered catalogue.
In this study, an innovative tecnique, based on the nearest-neigbour distances between events in the space-time-energy domain, is used to decluster the earthquake catalog of Iran. Retrospective forecast has been tested in order to verify if this method could forecast the past moderate and large events, which occurred in the Zagros region. Different input catalogs are used, whenever available, to check the stability and statistical significance of the obtained results.
The preliminary results of the study indicate that retrospective application of RTL algorithm to the Zagros region of Iran could highlight a quiescence preceding the Mw 7.3 earthquake occurred in November 2017. Given these positive results, the analysis is expanded to other major events reported in the region, to verify the generality of this pattern. Finally, the analysis is expanded to other catalogs available for the investigated territory (namely the ISC and the USGS global data sets) in order to assess the robustness of the detected features.