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How strong will be the following earthquake?

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In this study, we have applied to northeastern Italy and western Slovenia medium-low seismicity an algorithm for strong aftershock forecasting we originally developed for medium-high seismicity in Italy (Gentili and Di Giovambattista, 2017). The method, called NESTORE (Next STrOng Related Earthquake), analyzes the seismicity after medium and strong earthquakes, in order to forecast if a subsequent large earthquake (SLE) will follow. A SLE following a main shock can cause significant damages to already weakened buildings and infrastructures, therefore a timely advisory information to the civil protection is of great interest for effective decision-making. We performed the analysis on different time-spans after the mainshock, in order to simulate the increase of information available as time passes during the seismic clusters. NESTORE subdivides the clusters of seismicity into two classes: “A” if the difference in magnitude between the mainshock and the strongest aftershock is lower than 1, and B otherwise. Several statistical features based on time-space and energy evolution of seismicity are analyzed separately and, if they are sufficiently informative for SLE forecasting, they are used for independent decision trees training. The results are merged together by a Bayesian approach, obtaining a time-dependent probability Prob(A) to have an A cluster, i.e. to have at least one SLE. This study is possible thanks to the OGS bulletins, an accurate local catalogue, characterized by low completeness magnitude, compiled by the National Institute of Oceanography and Experimental Geophysics. We tested the method on 1976 highly destructive Friuli cluster (mainshock magnitude 6.5 — the strongest in the last 80 years in the region) and on two small clusters of seismicity in NE Italy in 2019, obtaining encouraging results: 6 hours after the mainshock, for two A clusters NESTORE supplies Prob(A)=98% while for the B one Prob(A)=2%.