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Contribution to the assessment of the imminent seismic hazard: Geophysical, statistical (and more) challenges in the territory of Greece

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The necessity of the imminent seismic hazard assessment stems from a strong social component which is the outcome of the need of people to inquire more in order to understand nature exhaustively and not partially, either to satisfy their inner curiosity or in favor of their self preservation instinct against the physical phenomena that the human kind cannot control. Choosing this path to follow, many seismologists have focused on forecasting the temporal and spatial distribution of earthquakes in short time scales. The possibility of knowing with a degree of certainty the way an earthquake sequence evolves proves to be an important object of research. Being more specific, the present work summarizes applications of seismicity and statistical models on seismic catalogues of areas that are specified by their tectonic structures and their past seismicity, providing information on the temporal and spatial evolution of local seismic activity, which can point out seismicity rate "irregularities" or changes as precursors of strong events, either in case of a main shock or a strong aftershock. In order to study these rate changes both preceding and following a strong earthquake, seismicity models are applied in order to estimate the Coulomb stress changes resulting from the occurrence of a strong earthquake and their results are combined with the application of a Restricted Epidemic Type Aftershock Sequence model. There are many active tectonic structures in the territory of Greece that are related with the occurrence of strong earthquakes, especially near populated areas, and the aim of this work is to contribute to the assessment of the imminent seismic hazard by applying the aforementioned models and techniques and studying the temporal evolution of several seismic sequences that occurred in the Aegean area in the near past.