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Seismotectonic properties with implications on faulting identification revealed from recent seismicity in Greece

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The essence of studying microseismicity variations in time and space lies upon the observation that the occurrence of small events in a seismogenic region often delineates areas which hide the potential of an upcoming strong earthquake. Revealing a strong societal impact, studying the spatio-temporal properties of small earthquakes is inevitable. The spatial distribution of the epicentres and the accurately determined hypocenters illuminate fault geometry, often difficult to distinguish in any other way. This approach reveals additional information on the development of the seismogenic structures that exist within an active seismotectonic environment such as the seismically active grabens that are met in Greece.

Recordings for different sub regions within the prevailing extensional stress field, which are provided by the national seismological network, are analysed in detail and they are relocated. Therefore, complete seismicity data sets have been constrained for the purpose of the present study. The relocation of the available events incorporates the operation of a dense established network surrounding the study areas and the application of an appropriate seismic velocity model that approximates in the best way the brittle structure of the earth's crust. For this reason, the Wadati method was applied, in order to constrain a crustal model that seismically describes best the study area. For this reason, arrival times of well recorded events that occurred were taken into account and the focal parameters of all earthquakes were re-estimated. Accurate determination of hypocenters is provided, giving a measure for a better characterization of the seismogenic zone and its depth, where fault populations are initiated and developed.

Earthquake activity is characterised by spatial properties that often defines clusters in space in association with the underlying presence of the active seismogenic sources. Cross sections normal to the long axis of each cluster illustrate the structural and to some extent, kinematic properties of the faults. Finally an additional stochastic analysis of the well defined seismic events gives an insight of the seismicity behaviour that dominates in the study areas. The results from such an investigation provide an important contribution to the study of fault interaction, seismotectonic zoning and seismic hazard assessment, in areas where background seismicity is an important process.