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3D Modelling of Seismically Active Parts of Underground Faults via Seismic Data Mining

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During the last few years rapid steps have been taken towards drilling for oil in the western Mediterranean sea. Since most of the countries in the region benefit mainly from tourism and considering that the Mediterranean is a closed sea only replenishing its water once every ninety years careful measures are being taken to ensure safe drilling. In that concept this research work attempts to derive a three dimensional model of the seismically active parts of the underlying underground faults in areas of petroleum interest. For that purpose seismic spatio-temporal clustering has been applied to seismic data to identify potential distinct seismic regions in the area of interest. Results have been coalesced with two dimensional maps of underground faults from past surveys and seismic epicentres, having followed careful reallocation processing, have been used to provide information regarding the vertical extent of multiple underground faults in the region of interest. The end product is a three dimensional map of the possible underground location and extent of the seismically active parts of underground faults.

Indexing terms: underground faults modelling, seismic data mining, 3D visualisation, active seismic source mapping, seismic hazard evaluation, dangerous phenomena modelling

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References
[1] Alves, T.M., Kokinou, E. and Zodiatis, G.: 'A three-step model to assess shoreline and offshore susceptibility to oil spills: The South Aegean (Crete) as an analogue for confined marine basins', Marine Pollution Bulletin, In Press, 2014
[2] Ciappa, A., Costabile, S.: 'Oil spill hazard assessment using a reverse trajectory method for the Egadi marine protected area (Central Mediterranean Sea)', Marine Pollution Bulletin, vol. 84 (1-2), pp. 44-55, 2014
[3] Ganas, A., Karastathis, V., Moshou, A., Valkaniotis, S., Mouzakiotis, E. and Papathanassiou, G.: 'Aftershock relocation and frequency–size distribution, stress inversion and seismotectonic setting of the 7 August 2013 M=5.4 earthquake in Kallidromon Mountain, central Greece', Tectonophysics, vol. 617, pp. 101-113, 2014
[4] Maravelakis, E., Bilalis, N., Mantzorou, I., Konstantaras, A. and Antoniadis, A.: '3D modelling of the oldest olive tree of the world', International Journal Of Computational Engineering Research, vol. 2 (2), pp. 340-347, 2012
[5] Konstantaras, A., Katsifarakis, E, Maravelakis, E, Skounakis, E, Kokkinos, E. and Karapidakis, E.: 'Intelligent spatial-clustering of seismicity in the vicinity of the Hellenic seismic arc', Earth Science Research, vol. 1 (2), pp. 1- 10, 2012
[6] Georgoulas, G., Konstantaras, A., Katsifarakis, E., Stylios, C., Maravelakis, E and Vachtsevanos, G.: 'Seismic-mass" density-based algorithm for spatio-temporal clustering', Expert Systems with Applications, vol. 40 (10), pp. 4183-4189, 2013
[7] Konstantaras, A.: 'Classification of Distinct Seismic Regions and Regional Temporal Modelling of Seismicity in the Vicinity of the Hellenic Seismic Arc', Selected Topics in Applied Earth Observations and Remote Sensing, IEEE Journal of', vol. 99, pp. 1-7, 2013