

The use of the Earth tide-seismicity compliance parameter maps for earthquake risk mitigation

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Applying the Hi(stogram)Cum(ulation) method, which was introduced recently by Cadicheanu, van Ruymbeke and Zhu (2007), we analyze the series of the earthquakes occurred in the last 50 years in seismic active areas of Greece, i.e. the areas (a) of the Mygdonian Basin (Contadakis et al. 2007), (b) of the Ionian Islands (Contadakis et al. 2012) and (c) of the Hellenic Arc (Vergos et al. 2015). The result of the analysis for all the areas indicate that the monthly variation of the earthquake frequency is in accordance with the period of the tidal lunar monthly and semi-monthly (Mm and Mf) variations and the same happens with the corresponding daily variations of the frequencies of earthquake occurrence with the diurnal luni-solar (K1) and semidiurnal lunar (M2) tidal variations. In addition the confidence level for the identification of such period accordance between earthquakes occurrence and tidal periods varies with seismic activity, i.e. the higher confidence level corresponds to time periods with stronger seismic activity. These results are in favor of a tidal triggering process on earthquakes when the stress in the focal area is near the critical level. Based on these results, we consider the confidence level of earthquake occurrence - tidal period accordance, which we call 'earth tide-seismicity compliance parameter p', as an index of tectonic stress criticality for earthquake occurrence and we construct maps of p's over all the area of Greece for each year from 1964 on. It is seen that these maps indicate roughly the seismic active areas. Thus these maps, as well as those of narrower time windows, may be used in earthquake hazard estimation.

References:

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