

Variation of the earth tide –seismicity compliance parameter p the last 17 years for the area of Italy

Dimitrios Arabelos (1), Michael E. Contadakis (1), George Vergos (1), Spyrous Spatalas (1), and Emmanouel M. Scordilis (2)

(1) Aristotle University of Thessaloniki, Department of Geodesy and Surveying, AUTH RESEARCH COMMITTEE EL-090049627, Thessaloniki, Greece (arab@eng.auth.gr), (2) Department of Geophysics, Aristotle University of Thessaloniki, Greece

Applying the Hi(stogram)Cum(ulation) method, which was introduced by Cadicaneanu, van Ruymbecke and Zhu (2007), we analyze the series of the earthquakes with magnitude $M > 2.4$ occurred in the last 16 years in Italy (area:36-480, 6-190E). The result of the analysis for all the areas indicate that the monthly variation of the frequencies of earthquake occurrence 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 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, p, as an index of tectonic stress criticality for earthquake occurrence and we construct maps of p's and we check on posterior if the variation of the confidence level index, p, indicate the fault maturity for earthquake occurrence in the case of the recent seismic activity at Central Italy. The result of this test is positive encouraging the inclusion of the following up of the compliance index p in earthquake risk assessment procedure.

References

Cadicaneanu, N., van Ruymbeke, M and Zhu P., 2007: Tidal triggering evidence of intermediate depth earthquakes in Vrancea zone (Romania), NHESS 7, 733-740.
Contadakis, M. E., Arabelos, D. N., Spatalas, S., 2009, Evidence for tidal triggering on the shallow earthquakes of the seismic area of Mygdonia basin, North Greece, in Terrestrial and Stellar Environment, eds. D. Arabelos, M.E. Contadakis, C. Kaltsikis, I. Tziavos, Ziti Press Thessaloniki, Greece, pp 223-235
Contadakis, M. E., Arabelos, D. N., Spatalas, S. D., 2012, Evidence for tidal triggering for the earthquakes of the Ionian geological zone, Greece, Annals of Geophysics, Vol. 55, No. 1, p. 73-81
Vergos, G., Arabelos, D. N., Contadakis, M. E., 2012, Evidence for Tidal triggering on the earthquakes of the Hellenic Arc, Greece., Geoph. Res. Abs., Vol 14, 2325