



Pre-seismic anomalies in geomagnetic diurnal variations - relation to earthquakes' parameters

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Analysis of the pre-earthquake diurnal amplitude of magnetic Y-component reveals that it is noticeably attenuated for a week prior to the seismic events. Moreover, the effect is as stronger as deeper is the earthquake's hypocentre. This result is obtained from the analysis of 1944 earthquakes (EQs), occurred during the period 2004-2014 within the area with coordinates 80-300 longitude and 350-530N latitude. All seismic events happened in periods of increased geomagnetic activity have been preliminary excluded from the original ESMC seismic catalogue. Additional procedure for elimination of the magnetospheric currents' influence has been applied on the time series of all examined 19 geomagnetic observatories. Suggesting that all rest noise-like variations are of lithospheric origin, we have separated the impact of EQ parameters (i.e. magnitude, depth, distance of magnetic observatory to the EQ epicentre) by the use of non-linear statistical technics Machine learning – support vectors analysis. The suppressed pre-EQ geomagnetic variability has been interpreted within the light of recently published laboratory experiments, demonstrating appearance of strong magnetic structures under the influence of heterogeneous mechanical stress – at temperatures substantially exceeding the Curie point (above which the remnant magnetization of the rocks disappears). More specifically, we suggest that locally produced magnetic fabrics deeper into the lithosphere or upper mantle – due to the plastic deformation of magnetic grains, elongated along the direction of stress shearing – overwhelm the diurnal variations induced by the ionospheric currents. Spatial distribution of pre-EQ geomagnetic anomalies and their dependence on the EQs hypocentres' depth will also be presented.

Acknowledgements: This research is supported by the National Science Fund of Bulgaria, contract 14/1 from 11.12.2017.