



Pre-seismic anomalous geomagnetic signature related to M8.3 earthquake occurred in Chile on September 16-th, 2015

Dr. Dragos Armand Stanica, Dr. Dumitru Stanica, and Nicoleta Vladimirescu
Institute of Geodynamics of the Romanian Academy (armand@geodin.ro)

In this paper, we retrospectively analyzed the geomagnetic data collected, via internet (www.intermagnet.com), on the interval 01 July-30 September 2015 at the observatories Easter Island (IMP) and Pilar (PIL), placed in Chile and Argentina, respectively, to emphasize a possible relationship between the pre-seismic anomalous behavior of the normalized function B_{zn} and M8.3 earthquake, that occurred in Offshore Coquimbo (Chile) on September 16-th, 2015. The daily mean distributions of the normalized function $B_{zn}=B_z/B_{perp}$ (where B_z is vertical component of the geomagnetic field; B_{perp} is geomagnetic component perpendicular to the geoelectrical strike) and its standard deviation (STDEV) are performed in the ULF frequency range 0.001Hz to 0.0083Hz by using the FFT band-pass filter analysis. It was demonstrated that in pre-seismic conditions the B_{zn} has a significant enhancement due to the crustal electrical conductivity changes, possibly associated with the earthquake-induced rupture-processes and high-pressure fluid flow through the faulting system developed inside the foci and its neighboring area. After analyzing the anomalous values of the normalized function B_{zn} obtained at Easter Island and Pilar observatories, the second one taken as reference, we used a statistical analysis, based on a standardized random variable equation, to identify on 1-2 September 2015 a pre-seismic signature related to the M8.3 earthquake. The lead time was 14 days before the M8.3 earthquake occurrence. The final conclusion is that the proposed geomagnetic methodology might be used to provide suitable information for the extreme earthquake hazard assessment.