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Earthquakes induced landslides reflected by DC resistivity and high frequency electromagnetic data

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The main objective of this paper is to present the DC resistivity and high frequency electromagnetic (HFEM) monitoring system that may provide in near real-time the landslide hazard level related to the intermediate depth earthquakes occurred in the seismic active Vrancea zone (Romania). Thus, the specific methodology and software packages have been applied for obtaining all the important HFEM parameters and to point out their anomalous behavior versus the specific pattern pre-established in non geodynamic conditions. Consequently, by analyzing the data carried out at the Provita de Sus landslide (test-site), placed in Subcarpathians area, at about 100 km far away of epicenter zone, it was possible to assign the increase of the landslide motion related to the local active fault which has been reactivated by the earthquakes of magnitude higher than 4, triggered in the Vrancea zone in a span of two years (2009 and 2010). There were three more important aspects that became the major selection criteria of this landslide as test site: (i) it is an earthquake triggered landslide followed by post seismic slow slipping ground motion that can be monitored; (ii) it is situated nearby Provita de Sus locality and can endanger life and property, owing to a high probability of flood, which might be produced by damming Provita river due to rock falls into the watercourse; (iii) the existence of logistic base (Geodynamic Observatory Provita de Sus) able to supply optimal monitoring conditions and wireless connection with the Center of Bucharest. In the end, this paper illustrates the stage of the monitoring system implementation and the results highlight the utility of merging the electric (DC resistivity) and electromagnetic precursory parameters (normalised function B_{zn} , anisotropy, skewness and strike) with different 2D tomographic images associated with post seismic landslide processes. Subsequently, in the Provita de Sus test site, it was possible to provide information regarding the both specific ground motion produced by the interference between seismic triggered factors with local geotectonic conditions and landslide hazard level.

Keywords: EM data, earthquakes, landslides