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Landslides precursor triggered factors analysed by time lapse electrical survey and multidimensional statistical approach

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A temporal imagery of water circulation in a landslide by Electrical Resistivity Tomography (ERT) was conducted to identify spatially and temporally the coupling between rainfalls, consecutive water inflows in a sliding mass, and induced resistivity variations. This work is based on a multi-scale experimental approach applied on the "Vence" landslide (South-eastern France) which is characterised by a sandy-clay sliding mass on a marly limestone substratum mostly controlled by high rainfall events.
At the landslide scale, historical, geological and geotechnical data combined with field investigations and the interpretation of three ERT allowed the definition of a geometrical model of the landslide and the calibration of the resistivity values. On the basis of these results, a permanent time lapse ERT survey was designed on a specific part of the landslide, coupled with water level acquisition (piezometric levels) and rain fall events. Results covering a three months period are showed. The statistical analyses of all the physical parameters measured during the three months of investigation show that the matrix of correlations highlighted strong correlations between the rainfall, piezometric elevation and the resistivity. These first results show an accurate answer resistivity/piezometric elevation that can be associated as a precursor of the reactivation of the landslide