Multi-method characterization of a landslide in Champagne vineyards: the case study of the Jacotines landslide (Marne, France)

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The Champagne region is strongly impacted by landslides. Usually inactive, these landslides suffer from partial reactivations leading to important damages, especially when they occur in the vineyards. In the Marne valley, and particularly in the center of Champagne vineyards area (Reuil), the Jacotines site is representative of such landslides since it presents typical surface characteristics widely observed in the region. However, its size, and especially its internal structure, can't be deduced from the surface analysis only. The aim of this work is to combine surface patterns analysis, geophysical data and borehole data to produce an interpretative model of the landslide.

Preliminary geomorphological cartography was used for determining the influence of the landslide. From this information, geophysical investigations were carried out to image the internal structure of the landslide. Geophysical data fusion (combination of seismic and geoelectrical tomograms) was used to estimate the mechanical behavior and the fissuring pattern of the slope. Three transverse and longitudinal tomograms were used to define an heterogeneous area between 20 and 50 meters depth and a weathered zone from 0 to 10-20 meters depth. A 60 meters depth borehole on the main transverse tomogram found the shear plane and clarified the structure of the heterogeneous area as well as the uppermost weathered layer composed by debris flows resulting from partial reactivations processes.