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Modelling the behaviour of a large landslide at Reunion Island (Grand Ilet)

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One of the main challenges in active landslide monitoring concerns the prediction of slope's movements in the near future. Understanding the initiation mechanisms of the mass movement is a key towards predicting its evolution.

This study concerns a large landslide in the Reunion Island (Grand Ilet), where the extreme climatic conditions (cyclonic activity) produce large deformations within the active landslide, resulting in displacements large as 3 cm per 12 hours. The surficial moving layers are constituted two layers: the first one is characterised by heterogeneous volcanic terrains; the upper layer is constituted of breccia materials resulting from ancient debris avalanche. The thickness of the surficial moving layers is high, ranging from 80m to 200m.

The objective of the study is to understand the mechanisms leading to the evolution of the mass movements. For that, characterization of the site, monitoring of the movement, and modelling the hydromechanical processes are necessary. Moreover, different hypotheses of the initiation of the landslide have to be tested. In particular, the evolution of the water level correlated to the precipitations, as well as the erosion of the toe of the landslide, are analyzed.

Characterization of the landslide is performed through different *in situ* measurements, such as electrical tomography. It permits to assess both the geometrical and geomechanical characteristics of the unstable mass. *In situ* mechanical tests have also been realized to obtain geomechanical parameters useful for the hydromechanical model. All the measured geometry and parameters of layers are then included in a 2D finite element model. The computations are performed using a finite element code with an infinitesimal strain and two-phase formulation assumptions. Preliminary geomechanical simulations are realized, permitting to highlight the hydraulic conditions changes on the mechanical behavior of the landslide. The computed displacements are then compared to the recorded data. The results are analyzed and discussed.