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Contribution of seismic tomography for taking soil variability into account in landslide stability numerical modelling

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The Ballandaz landslide (Le Planay, France) has been studied for years. Geotechnical characterization, geophysical surveys and geomechanical modelling have been performed to characterize its behaviour, but these different approaches were not deeply analysed in a common way. This work aim to study what kind of contribution geophysical data could provide in geomechanical modelling. In particular, seismic and borehole data, obtained during previous campaigns are used for taking into account the soil variability in a finite element modelling. Instead of constructing the slope model from geological interpretations, themselves derived from geophysical sections – as it is generally done – we use the P-wave velocity distribution obtained from seismic tomography computations to fill the mesh with different mechanical properties. Those properties are given by geotechnical tests for some of them, and deduced from P-wave velocities for the others. The model thus obtained takes into account the spatial variability of the materials, the presence of streaks and values of mechanical parameters consistent with geophysical data. Simulations are carried out with the GEFDYN code, using the Drucker-Prager constitutive law. A parametric study is also performed for determining the optimal number of materials, the optimal element size, the velocity classification algorithm, etc. Finally, our results are compared to a classical 3-layers model for discussion.