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Kinematic evolution of the Ivancich landslide: analysis, characterization and numerical modelling

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The Ivancich landslide is an ancient phenomenon composed of a stratified detritum mass with fragments of limestone blocks sliding on a substratum of in-place marly-sandstone. The landslide affects a densely inhabited marginal area of the famous historical town of Assisi (Central Italy), producing severe damages to private and public buildings hereby located. The landslide body is overlain by the karstic massif of Mt. Subasio, which represents a large high-permeability reservoir that supplies most part of groundwater to the underlying slope. The sliding surface lies within the most weathered portion of the marly-sandstone substratum, close to the contact with the overlying detritum mass, and its depth increases from 20 to 60 m below g.l. from the landslide toe to the top. The whole length of the landslide body is about 1500 m.
A large field monitoring dataset of the landslide process is available, composed of piezometric and in-depth inclinometric measurements acquired for about a decade all over the landslide body. Furthermore surface displacement time-series have been retrieved via an advanced space-based Differential SAR interferometry analysis (SBAS-DInSAR, being discussed in a contribution presented by the Authors in a parallel session). In this work, we aim at developing numerical models for the interpretation of the mechanism of Ivancich landslide reactivation as well as of the related controlling factors. To this end, we are currently processing the available geomorphological information, field monitoring data, in-situ and laboratory investigations. As first analysis, we will investigate the flow process occurring within the slope through both steady-state and transient seepage finite element analyses, and compare the results with the available field piezometric measurements. Then, drained and coupled stress-strain finite element analyses will be performed to investigate the kinematic evolution of the landslide, and define the corresponding displacement trend from a quantitative point of view. The results will be calibrated by considering the available field inclinometric data and the DInSAR time-series observations.