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3D modelling of slow landslides: the Portalet case study (Spain)

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Abstract
Slow landslide deformation evolution is generally cast using 1D or 2D numerical models. This paper aims to explore 3D effects on the kinematic behavior of a real landslide, the Portalet landslide (Central Spanish Pyrenees). This is a very well characterized and documented active paleo-landslide that has been reactivated by the construction of a parking area at the toe of the slope. The proposed 3D model is based on a time dependent hydro-mechanical finite element formulation that takes into account i) groundwater changes due to daily rainfall records and ii) viscous behavior and delayed creep deformation through a viscoplastic constitutive model based on Perzyna's theory. The model reproduces the nearly constant strain rate (secondary creep) and the acceleration/deceleration of the moving mass due to hydrological changes. Furthermore, the model is a able to catch the superficial 3D kinematics revealed by advanced in-situ monitoring like ground based SAR or DInSAR processing of satellite SAR images.

References
[1] Herrera G, Fernández-Merodo JA, Mulas J, Pastor M, Luzi G, Monserrat O (2009) A landslide forecasting model using ground based SAR data: The Portalet case study. Engineering Geology 105: 220–230
[2] Fernández-Merodo JA, Herrera G, Mira P, Mulas J, Pastor M, Noferini L, Me-catti D and Luzi G (2008). Modelling the Portalet landslide mobility (Formigal, Spain). iEMSs 2008: International Congress on Environmental Modelling and Software. Sànchez-Marrè M, Béjar J, Comas J, Rizzoli A and Guariso G (Eds.) International Environmental Modelling and Software Society (iEMSs)
[3] Fernández-Merodo JA, García-Davalillo JC, Herrera G, Mira P, Pastor M (2012). 2D visco-plastic finite element modelling of slow landslides: the Portalet case study (Spain). Landslides, DOI: 10.1007/s10346-012-0370-4