Geophysical Research Abstracts
Vol. 18, EGU2016-581, 2016
EGU General Assembly 2016

Calibration of the landsliding numerical model SLIPOS and prediction of the seismically induced erosion for several large earthquakes scenarios

Louise Jeandet (1), Dimitri Lague (1), Philippe Steer (1), Philippe Davy (1), and Mark Quigley (2)
(1) Géosciences Rennes, Université Rennes 1, France, (2) School of Earth Sciences, University of Melbourne, Australia

Coseismic landsliding is an important contributor to the long-term erosion of mountain belts. But if the scaling between earthquakes magnitude and volume of sediments eroded is well known, the understanding of geomorphic consequences as divide migration or valley infilling still poorly understood. Then, the prediction of the location of landslides sources and deposits is a challenging issue. To progress in this topic, algorithms that resolves correctly the interaction between landsliding and ground shaking are needed. Peak Ground Acceleration (PGA) have been shown to control at first order the landslide density. But it can trigger landslides by two mechanisms: the direct effect of seismic acceleration on forces balance, and a transient decrease in hillslope strength parameters. The relative importance of both effects on slope stability is not well understood. We use SLIPOS, an algorithm of bedrock landsliding based on a simple stability analysis applied at local scale. The model is capable to reproduce the Area/Volume scaling and area distribution of natural landslides. We aim to include the effects of earthquakes in SLIPOS by simulating the PGA effect via a spatially variable cohesion decrease. We run the model (i) on the Mw 7.6 Chi-Chi earthquake (1999) to quantitatively test the accuracy of the predictions and (ii) on earthquakes scenarios (Mw 6.5 to 8) on the New-Zealand Alpine fault to infer the volume of landslides associated with large events. For the Chi-Chi earthquake, we predict the observed total landslides area within a factor of 2. Moreover, we show with the New-Zealand fault case that the simulation of ground acceleration by cohesion decrease lead to a realistic scaling between the volume of sediments and the earthquake magnitude.