

Landsliding Simulation and Material Displacement Assessment

Jean-François Parrot ¹ and Veronica Ochoa-Tejeda ²

¹ *Laboratorio de Análisis Geospaciales [LAGE], Instituto de Geografía, UNAM, México.
jffparrot@hotmail.com*

² *Université Paris 7 – Denis Diderot. UMR PRODIG 8586 - CNRS
beronik@hotmail.com*

Tropical mountains such as the Sierra Norte de Puebla (Mexico) are regularly affected by mass movements induced by torrential rains related to frequent tropical depressions and hurricanes. Moreover, the quaternary formation of the huge caldera of Los Humeros produced in the study region numerous collapses giving rise to various and important landslides formed at the expense of an Upper Jurassic escarpment of more than 300 meters. One of them, the landslide of La Galera has been studied in order to quantify the displaced material volume. Using a high resolution DEM, the upper part located between the present scarp and the old cliff is reconstituted as well as the curve sliding surface. Then comparing the reconstructed DEM and the original DEM, it is then possible to respectively calculate the volume of the material tumbled down from above and the volume of the debris avalanche resulting from this event. This avalanche has created a dam on the Apulco river and a lake has been formed behind the slide. The river has cut a way through the dam which material represents a source for many and recurrent shallow landslides. The assessment of the volume removed by the erosion related to the river that cuts the debris deposits allows us to define a complete balance that concerns this landslide. The simulation of landslide hazards is important to prevent natural disasters and to understand how they occur.