



## **Evaluation of potential landslide initiation zones triggered by volcanic earthquakes on Tenerife. Applications of GIS techniques.**

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Seismic ground acceleration generated by volcanic processes is one of the major triggering factors of volcanic landslides. Earthquakes can produce different types of mass movement depending on the magnitude and epicentre distance. Minor earthquakes only trigger small-scale slides or falls while major events can provoke large-scale landslides.

On Tenerife Island, seismicity has increased since May 2004 and some events reached magnitudes up to  $M = 3$ . The exact origin of the seismic growth is not clear, but surveillance at Teide-Pico Viejo volcano and at the NW volcanic ridge has been intensified. Till the end of 2004, however, no significant landslides were observed.

In this preliminary analysis, we evaluated the potential areas which may be affected by landsliding during a future volcanic earthquake. Since this analysis was carried out on the whole island (this means at regional scale), a Geographic Information System (GIS) was the ideal tool to process the available data in an easy and rapid way. The Digital Elevation Model of Tenerife was generated at a 50m pixel size and the information on slope angles were calculated in each raster cell. Then, the geologic map was digitized and subsequently all the lithologic materials were reclassified into 7 geotechnical units. Finally, the seismic events that occurred during 2004 were incorporated into the GIS and the ground acceleration was estimated by both GIS buffer functions and well-known seismic formulae. The Factor of Safety (FS) was calculated for each cell applying the infinite slope method.

The results showed that the reliability of the geologic map, and thus of the geotechnical parameters in each cell, is of great influence on the final FS and some unrealistic low FS-values were caused by wrong data in the geological map. Moreover, the uncertainties of the necessary input-data on the failure depth and the water saturation of the slope play an important role. The sensitivity analysis indicated that the stability strongly depends on the predefined value of the failure depth. Surprisingly, the strato-volcano Teide-Pico Viejo was characterised by rather stable slopes because its slopes are not higher than about 35°.