



## **Detailed study of a catchment prone to debris flows along the International Road n° 7, Mendoza Province, Argentina**

E. Wick (1), V. Baumann (2), G. Favre-Bulle (1), M. Jaboyedoff (1), A. Loyer (1), H. Marengo (3), and M. Rosas (3)

(1) Institute of Geomatics and Risk Analysis, University of Lausanne, Switzerland (Emmanuel.Wick@unil.ch), (2) Geological Survey of Argentina (SEGEMAR), Buenos Aires, Argentina, (3) Geological Survey of Argentina (SEGEMAR), Mendoza, Argentina

The International Road 7 crosses Argentina from East to West, linking Buenos Aires to the Chile border. Crossing the Andes Cordillera, it is exposed to numerous natural hazards, such as avalanches, rockfalls and debris flows. This study focuses on a catchment prone to debris flows above the International Road n° 7 between Potrerillos and Uspallata (Mendoza Province, Argentina) and is part of a regional study that assesses the hazard along the mountainous section of this road.

The catchment measures 4.7 km<sup>2</sup> and is constituted of three main torrents that unite a few meters above the International Road. Heavy rainfalls triggered debris flows in each of these torrents during the evening of 11 January 2005, reaching the road apparently at a very short interval of time. A car was hit by one of these debris flows and two people were injured.

The study has been realized from Quickbird satellite imagery and field data principally. The conditions that triggered the debris flows in this catchment were established from meteorological data, as well as particle size and mineralogy of the material. Satellite imagery and a digital elevation model showed that the debris flows initiated mainly at the top of the catchment. Erosion of a highly altered granite produced abundant sandy material. The debris flows were classified as granular matrix with a collisional-frictional behavior.

Various calculations of volumes, peak discharges and velocities ( $\sim 7$  m/s) were realized using different approaches. It appears that important volumes could be mobilized, especially in the longest torrent. A new event could imply more than 65'000 m<sup>3</sup> of material.

A detailed geomorphologic study shows the effect of mitigation works on the debris flows hazard. Indeed, the torrents were deviated towards a more adequate place for the construction of a road bridge. Three propagation scenarios show the limited efficiency of these works. The road bridge is under-dimensioned and deposits of the 2005 event have not been completely evacuated. The road can be hit even in case of much smaller events than the 2005 debris flows. The results permit to propose improved protection measures, including the evacuation of debris flows deposits and the continuation of the protection dam further towards the bridge.