



## **Modelling of source areas and run out for debris flow susceptibility assessment: from analysis at basin scale to national scale mapping (Norway)**

C. Melchiorre (1), M-H. Derron (1), P. Horton (2), and M. Jaboyedoff (2)

(1) NGU, Norges geologiske undersøkelse, Geological survey of Norway, Trondheim, Norway (caterina.melchiorre@ngu.no),

(2) IGAR, Institute of Geomatics and Risk Analysis, University of Lausanne, Lausanne, Switzerland

This contribution focuses on the use at national scale of models developed at basin scale for the assessment of debris flow susceptibility. An index approach framework, based on topographic/hydrological characteristics, was used to discriminate debris flow source areas, whereas run out areas were assessed by means of an energy-limited model coupled with a routing algorithm based on the random walk concept.

Those two models were tested at basin scale in two areas, located in two different geological, geomorphological, and geographic settings: Otta (in central Norway) and Tromsø (in Northern Norway). For those two areas a DEM at 5 m, a quaternary map at 5:000, a map of debris flow tracks and source areas at 5:000 are available. A preliminary analysis of the results shows a good agreement between mapped and modeled source and run out areas. A complete validation of the model for the run out area was not possible, since some parts of the deposition areas have been modified by anthropogenic activities. But for the areas where the spatial extension of debris flow deposits is known, the model results match quite good with the quaternary map.

In order to evaluate the potential application of those two models for susceptibility assessment at national scale, simulations were run using a DEM at 25 m as input. This DEM covers the entire territory of Norway. As expected, the accuracy of the model simulations decreases: specifically, we have an underestimation of the source areas that suggests us the necessity to refine the parameters of the index model. Concerning the results of the run out models, the simulations show a general overestimation of the area affected by debris flow, mainly evident for not confined debris flows. In general, the results of this preliminary tests area promising.

Future works will be to test the model at basin scale in other sites, the modification of the parameters to assess source areas, the qualitative estimation of the model fitting, and the evaluation of the degrees of error for the model at national scale.