Geophysical Research Abstracts
Vol. 12, EGU2010-12265, 2010
EGU General Assembly 2010

Modelling of Source Areas and Runout for Debris Flow Susceptibility Assessment at Regional Scale (Norway)

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This contribution focuses on combined methods to map debris flow susceptibility at regional scale. Classification of watersheds and an index approach framework, based on topographic/hydrological characteristics, was used to discriminate debris flow source areas, whereas runout areas were assessed by means of an energy-limited model coupled with a routing algorithm based on the random walk concept. Those methods were tested at basin scale in the Balsfjord municipality in northern Norway, where debris flows frequently affect road transportation. For this area a DEM at 5 m, a quaternary map at 5:000, and a map of debris flow tracks and source areas at 5:000 are available.

The classification of watersheds was performed first by extracting attributes related to sediment production and internal relief, and then by means of multivariate analysis. The selection of source area cells was done only on debris flow watersheds by following an index approach framework. The runout model was then executed on those cells. The model uses hydrological routines to calculate the runout path and empirical relationship of debris flow trajectories to assess the runout distance.

A preliminary analysis of the results shows that circa 90% or the debris flow watersheds were correctly classified. A good correlation between mapped and modelled source and runout areas was found.

Future work will consist of evaluating different strategies to quantitatively assess the quality of the obtained susceptibility map. A complete validation of the model is difficult due to the sparse information on debris flows in the area.