Geophysical Research Abstracts
Vol. 15, EGU2013-8205, 2013
EGU General Assembly 2013

Proposed method for hazard mapping of landslide propagation zone

Manole-Stelian Serbulea, Radu Gogu, Daniel-Marcel Manoli, Dragos Stefan Gaitanaru, Adrian Priceputu, Adrian Andronic, Alexandra Anghel, Adrian Liviu Bugea, Constantin Ungureanu, and Alexandru Niculescu
Technical University of Civil Engineering Bucharest, Romania (mserbulea@gmail.com)

Sustainable development of communities situated in areas with landslide potential requires a fully understanding of the mechanisms that govern the triggering of the phenomenon as well as the propagation of the sliding mass, with catastrophic consequences on the nearby inhabitants and environment. Modern analysis methods for areas affected by the movement of the soil bodies are presented in this work, as well as a new procedure to assess the landslide hazard.
Classical soil mechanics offer sufficient numeric models to assess the landslide triggering zone, such as Limit Equilibrium Methods (Fellenius, Janbu, Morgenstern-Price, Bishop, Spencer etc.), blocks model or progressive mobilization models, Lagrange-based finite element method etc. The computation methods for assessing the propagation zones are quite recent and have high computational requirements, thus not being sufficiently used in practice to confirm their feasibility.
The proposed procedure aims to assess not only the landslide hazard factor, but also the affected areas, by means of simple mathematical operations. The method can easily be employed in GIS software, without requiring engineering training. The result is obtained by computing the first and second derivative of the digital terrain model (slope and curvature maps). Using the curvature maps, it is shown that one can assess the areas most likely to be affected by the propagation of the sliding masses.
The procedure is first applied on a simple theoretical model and then used on a representative section of a high exposure area in Romania. The method is described by comparison with Romanian legislation for risk and vulnerability assessment, which specifies that the landslide hazard is to be assessed, using an average hazard factor Km, obtained from various other factors.
Following the employed example, it is observed that using the Km factor there is an inconsistent distribution of the polygonal surfaces corresponding to different landslide potential. For small values of Km (0.00..0.10) the polygonal surfaces have reduced dimensions along the slopes belonging to main rivers. This can be corrected by including in the analysis the potential areas to be affected by soil instability. Finally, it is shown that the proposed procedure can be used to better assess these areas and to produce more reliable landslide hazard maps.
This work was supported by a grant of the Romanian National Authority for Scientific Research, Program for research – Space Technology and Advanced Research – STAR, project number 30/2012.