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# Flow-type landslides magnitude evaluation: the case study of the Campania Region (Southern Italy)

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In the last years studies concerning the triggering and the run-out susceptibility for different kind of landslides have become more and more precise. In the most of the cases the methodological approach involve the production of detailed thematic maps (at least 1:5000 scale) which represent a very useful tool for territorial planning, especially in urbanized areas. More recently these researches were accompanied by the growth of other studies dealing with landslide magnitude evaluation (especially in terms of volume and velocity estimate).
In this paper the results of a flow-type landslides magnitude evaluation are presented. The study area is located in Southern Italy and is very wide (1,500 square kilometres) including all the Campania region.
In this context flow type landslides represent the most frequent instabilities as shown by the large number of victims and the huge economic damage caused in the last few centuries.
These shallow landslides involve thin cohesionless, unsaturated pyroclastic soils found over steep slopes around Somma-Vesuvio and Phlegrean district, affecting a wide area where over 100 towns are located.
Since the potential volume of flow-type landslides is a measure of event magnitude we propose to estimate the potential volume at the scale of slope or basin for about 90 municipalities affecting 850 hierarchized drainage basins and 900 regular slopes.
An empirical approach recently proposed in literature (De Falco et al., 2012), allows to estimate the volume of the pyroclastic cover that can be displaced along the slope. The method derives from the interpretation of numerous geological and geomorphological data gathered from a vast amount of case histories on landslides in volcanic and carbonatic contexts and it is based on determining the thickness of the pyroclastic cover and the width of the detachment and erosion-transport zone. Thickness can be evaluated with a good degree of approximation since, in these landslides, the failure surface is always very superficial (from 0.3 to 2 m) and positioned in pyroclastic covers resting on a generally rigid bedrock (calcareous rocks, lava or tuffs). The area of the detachment and erosion-transport zone (Af) is calculated by a mathematical function (statistical correlation) which link this factor with the difference in height (H) between a point on the slope with the highest susceptibility and a point, the first break at the foot of the slope, where the deposition starts to take place and the landslide loses velocity. Finally, potential volumes are calculated by using Af and a constant thickness of the pyroclastic cover for the whole slope. The volumes estimated were classified using the size classification proposed by Jacob (2005) to view the spatial distribution at regional and municipal scales.
At the regional scale the study showed a variability of the volume potentially mobilized that ranging from 500 to 200,000 cubic meters; a non-random distribution of volumes mobilized that allows to show different macro-areas with several degrees of hazard.
At the municipal scale the distribution of the volumes mobilized allows to identify the most dangerous landslides scenario.
The result could represent a useful tool to define the most critical area in the Civil Protection and to detect the main areas where risk mitigation works are required.