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Regional assessment of debris-flow hazards: a method to characterize temporal changes in debris flow exposure.

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Debris flows represent one of the most dangerous natural hazards that occur in mountainous environment. At regional scales, debris flow hazard is generally assessed by the combination of environmental factors wit GIS procedures and statistical techniques in order to identify the main productive source areas on the hillslopes and then the possibility of flow runout downslope. This allows to identify 'hot spot' hazard areas where detailed analyses with sophisticated technologies and modelling procedures should be conducted.
The objective of this paper is to present a regional assessment of debris flow hazard on the Barcelonnette Basin (South French Alps) by using the GIS-based approaches developed by Horton et al. (2008). The results of the simulations are compared to an ancillary map of debris source areas and to the geometry of recent debris flow deposits on alluvial fans. Locally, for some torrential fans, the GIS-based model is also compared to detailed numerical analysis of debris flow spreading on the most active torrents of the area. Finally, estimation of debris flow hazards is carried out for several periods (2004, 1974, 1956) because of the important changes in landcover observed in the area in the last 50 years. The results indicate a decrease in debris flow hazards because of the development of the protection forest.