

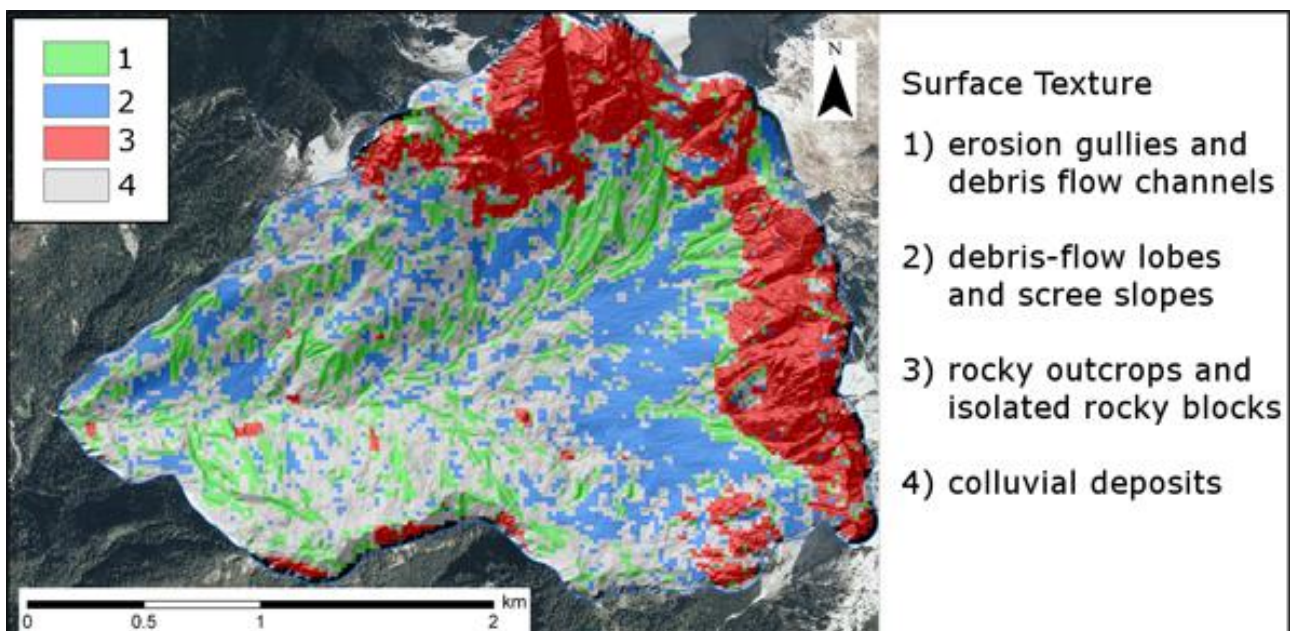
Research Institute for Geo-Hydrological Protection

in the Department of Earth System Sciences and Environmental Technology

an Institute of the Italian National Research Council (CNR)

Geomorphometric analyses in mountain catchments

We exploit very high-resolution Digital Terrain Models and new algorithms to characterize the hydrology and morphology of small catchments in mountain area



Geomorphometry complements the traditional qualitative description of landforms with a quantitative approach based on the analysis of Digital Terrain Models, which are numerical representations of the topography.

For the purpose, geomorphometry develops and exploits new algorithms in GIS (Geographical Information System) environments.

The scope of the analysis is to derive parameters (e.g., terrain slope, surface roughness), or combinations of parameters, capable of characterizing the spatial variability of specific hydro-geomorphological processes (e.g., sediment connectivity, erosion and deposit).

The rapid development of modern technologies for the accurate measurement of topographic data at increasingly high resolution and covering large portions of the territory, such as [LiDAR](#), has increased the interest in geomorphometry and its applications.

Results

During the years, we have developed a number of geomorphometric indices and simplified topography-based models for the characterization of surface roughness and texture, sediment dynamics and [connectivity](#), and the potential trigger and runout of debris flows.

We implemented our methods in freely available stand-alone software, and as GIS open source software packages.

Granting institutions

- SedAlp “Sediment management in Alpine basins”, EU Alpine Space Programme (2012–2015).
- Connecteur “Connecting European Connectivity Research”, EU Cost Action (2014–2018).
- GESTO “Gestione del trasporto di sedimento nei piccoli bacini montani”, Free University of Bolzano (2011-2014).

To know more

[Link to the Project “Preliminary recognition of debris-flow hazard areas in Trentino” in IRPI website »](#)

[Link to the Project “GESTO” in IRPI website »](#)

Cavalli M, Trevisani S, Comiti F, Marchi L. 2013. Geomorphometric assessment of spatial sediment connectivity in small alpine catchments. *Geomorphology* 188, 31-41. [DOI: 10.1016/j.geomorph.2012.05.007](#).

Trevisani S, Cavalli M, Marchi L. 2012. Surface texture analysis of a high-resolution DTM: interpreting an alpine basin. *Geomorphology* 161-162, 26-39. [DOI: 10.1016/j.geomorph.2012.03.031](#).

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