



A free tool integrating GIS features and workflows to evaluate sediment connectivity in alpine catchments

Stefano Crema, Luca Schenato, Beatrice Goldin, Lorenzo Marchi, and Marco Cavalli

National Research Council, Research Institute for Geo-Hydrological Protection, Padova, Italy (stefano.crema@irpi.cnr.it)

The increased interest in sediment connectivity has brought the geomorphologists' community to focus on sediment fluxes as a key process (Cavalli et al., 2013; Heckmann and Schwanghart, 2013). The challenge of dealing with erosion-related processes in alpine catchments is of primary relevance for different fields of investigations and applications, including, but not limited to natural hazards, hydraulic structures design, ecology and stream restoration.

The present work focuses on the development of a free tool for sediment connectivity assessment as described in Cavalli et al. (2013), introducing some novel improvements.

The choice of going for a free software is motivated by the need of widening the access and improving participation beyond the restrictions on algorithms customization, typical of commercial software.

A couple of features further enhance the tool:

- being completely free and adopting a user-friendly interface, its target audience includes researchers and stakeholders (e.g., local managers and civil protection authorities in charge of planning the priorities of intervention in the territory),
- being written in Python programming language, it can benefit from optimized algorithms for high-resolution DEMs (Digital Elevation Models) handling and for propagation workflows implementation; these two factors make the tool computationally competitive with the most recent commercial GIS products.

The overall goal of this tool is supporting the analysis of sediment connectivity, facing the challenge of widening, as much as possible, the users' community among scientists and stakeholders. This aspect is crucial, as future improvement of this tool will benefit of feedbacks from users in order to improve the quantitative assessment of sediment connectivity as a major input information for the optimal management of mountain areas.

References:

1. Cavalli, M., Trevisani, S., Comiti, F., Marchi, L., 2013. Geomorphometric assessment of spatial sediment connectivity in small Alpine catchments. *Geomorphology* 188, 31–41.
2. Heckmann, T., Schwanghart, W., 2013. Geomorphic coupling and sediment connectivity in an alpine catchment - Exploring sediment cascades using graph theory. *Geomorphology* 182, 89–103.