



Improvement of a free software tool for the assessment of sediment connectivity

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Sediment connectivity expresses the degree of linkage that controls sediment fluxes throughout landscape, in particular between sediment sources and downstream areas. The assessment of sediment connectivity becomes a key issue when dealing with risk mitigation and priorities of intervention in the territory.

In this work, the authors report the improvements made to an open source and stand-alone application (SedInConnect, <http://www.sedalp.eu/download/tools.shtml>), along with extensive applications to alpine catchments. SedInConnect calculates a sediment connectivity index as expressed in Cavalli et al. (2013); the software improvements consisted primarily in the introduction of the sink feature, i.e. areas that act as traps for sediment produced upstream (e.g., lakes, sediment traps). Based on user-defined sinks, the software decouples those parts of the catchment that do not deliver sediment to a selected target of interest (e.g., fan apex, main drainage network). In this way the assessment of sediment connectivity is achieved by taking in consideration effective sediment contributing areas.

Sediment connectivity analysis has been carried out on several catchments in the South Tyrol alpine area (Northern Italy) with the goal of achieving a fast and objective characterization of the topographic control on sediment transfer. In addition to depicting the variability of sediment connectivity inside each basin, the index of connectivity has proved to be a valuable indicator of the dominant process characterizing the basin sediment dynamics (debris flow, bedload, mixed behavior). The characterization of the dominant process is of great importance for the hazard and risk assessment in mountain areas, and for choice and design of structural and non-structural intervention measures. The recognition of the dominant sediment transport process by the index of connectivity is in agreement with evidences arising from post-event field surveys and with the application of morphometric indexes, such as the Melton ruggedness number, commonly used for discriminating debris-flow catchments from bedload catchments.

References:

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