



Patterns of debris-flow erosion, transport, and deposition across the upper Adige River, Italy

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Debris flows are effective agents of sediment transfer in mountain drainage basins. They typically convey colluvial and/or glacial deposits to basin mouth, connecting hillslopes and low-order streams to alluvial fans and major valley floors. They dominate topographic change and sediment dynamics in steep, low-order streams and pose serious hazards to residential areas and infrastructure. To advance understanding of the debris-flow geomorphic process domain at the regional scale we analyze a historical database of debris flows from 82 headwater basins of the upper Adige River, north-eastern Italy.

This database reports systematically (since 1998) a number of quantitative attributes on single debris-flow events including the classification of the drainage network into initiation, transportation, and deposition reaches. By combining information on channel-reach mapping, LiDAR-derived digital topography, and geological and Quaternary materials mapping we: (i) characterize the principal topographic conditions in which debris-flow initiation, transportation and deposition occur; and (ii) constrain shallow landslide, debris flow, and alluvial domains, yet documenting the variability associated with different lithological units and glacial sediment availability.