



Debris-flow sediment transfer in Alto Adige, central Eastern Alps (Italy)

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Debris flows are the most efficient processes of sediment transfer from slope base to alluvial fan terminus in mountain drainage basins. To advance current understanding of debris-flow sediment dynamics at the regional scale we analyze historical debris-flow events in 82 basins of the Alto Adige Province, north-eastern Italy. By combining historical information on event-based debris-flow volumetric deposition and high-resolution (LiDAR-derived) digital topography we (i) identify seasonal trends in debris-flow activity; (ii) characterize the principal topographic conditions at which debris-flow initiation, transportation, and deposition occur; (iii) detail debris-flow sediment transfer at the basin and the regional scales; and (iv) identify lithologic dependences on debris-flow activity. For the first time, we show that basin-wide specific sediment yield describes a negative scaling relation with basin area, which in turn, is modulated by dominant bedrock geology and chiefly by the abundance of glacial and paraglacial surficial materials.