



Incorporating climate change projections into operational debris flow hazard mapping: Initial insights from the Toverino River Basin in South Tyrol (Eastern Italian Alps).

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Debris flows represent a typical hazard of Alpine mountainous areas, which can generate serious impacts on natural and socio-economic systems of affected territories. In the recent years, intense precipitation events caused numerous damage-causing erosional processes and mass movements, including debris flows, within Alpine torrential channels. Changes in the intensity or frequency of heavy precipitation events under climate change are likely to influence debris-flows occurrence. Understanding ongoing and future changes in debris flow hazard is essential for risk management procedures in Alpine territories, in particular for delineating current and future hazard zones. Since the underlying debris-flow simulations frequently build upon historical statistics of triggering rainfall intensities, accounting for non-stationary precipitation conditions may be relevant for further improving the management of debris-flow risk in the context of climate change.

This work tests a modelling workflow to explore how changes in the intensity and frequency of heavy rainfall, can be incorporated into official hazard assessment procedures and if such changes lead to relevant alterations in the current zonation patterns. Possible changes in the Intensity-Duration-Frequency (IDF) curves are derived from observations and climate model projections and corresponding hydrological responses are simulated through the Peakflow model. Hydraulic processes are then modelled by entering resulting hydrographs as input of the WEEZARD software and outcomes for the current and future climate conditions are compared. The contribution presents the first results obtained for the Toverino river test basin in the Province of South Tyrol (Eastern Italian Alps), and it discusses the strengths and limitations of integrating a climate-change perspective into standardized debris-flow hazard zonation procedures.

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