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Geohazard cascade and mechanism of large debris flows in the Rotian river basin (NE Italy): implications to hazard monitoring and management

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Torrential risk protection works have a long tradition in the Alps, where these measures have allowed more intensive use of the landscape since the twentieth century and form the basis for rational management of the risk of torrential floods. While the maintenance and management of protective works makes it possible to control their inevitable deterioration and to extend their life, the collapse of these systems should be always considered in the frame of the residual risk management. This work aims to i) analyse the catastrophic debris flow occurred on October 2018 in the Rotian river basin (Eastern Italian Alps) during which a series of check dams collapsed magnifying the event and causing a casualty and severe damages, and ii) to identify implications for hazard monitoring and management. The work is based on post-event investigations, witness accounts, remote sensing information and local station data, hydrogeomorphic data and models, and systematically analyses the geo-environment, climate conditions and check dam structural conditions which characterized the geohazard cascade of events. In particular, results from the application of a couple hydrological and hydraulic model for the triggering and propagation of the debris flows event are used to inform the analysis. The results from this work are exploited to inform a discussion about the future of these works, which concerns not only the structural and maintenance aspects of the single work, but also involves the risk management requests of the systems of works which in recent decades have evolved significantly.