



Vulnerability to floods: a simplified model for exposed buildings

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Vulnerability of buildings exposed to torrential floods in European mountain regions is often conceptualized as an empirical function of the hazard magnitude and of the associated degree of damage, the latter being a relation between the building value and the economic loss. Usually, this approach leads to high uncertainties due to the observed spread in the data, in particular because the damage-causing mechanisms on the building envelope remain unclear. In order to contribute to close this gap, this paper focuses on the structural vulnerability of buildings in alpine areas where impulsive torrential processes might threaten their stability and, as a consequence, people safety. A simplified conceptual model to be applied on large building stocks when only a limited amount of data is available is proposed. The physical resistance of a wall impacted by an impulsive flood is studied through a yield line analysis considering different geometric ratios and building configurations. The resulting stability thresholds, expressed in dimensionless form as a function of the water depth, were positively compared with the results provided by a numerical finite elements model of the investigated geometries. The application of the proposed vulnerability model could provide reliable information for a first-level risk assessment to be implemented in risk mitigation strategies.