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Applying spatiotemporal statistics to derive vulnerability patterns resulting from torrent events

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Damages to the built environment resulting from torrent events are a considerable threat to Alpine societies. However, apart from the documentation of such events in terms of observed deposition heights or modelled geomorphological parameters, only little is known so far with respect to spatial and temporal patterns of the resulting loss ratio. Considerable ranges in the loss ratio for medium process intensities only provide a hint that there might be mutual reasons for lower or higher damage. Moreover, damage rates are not necessarily spatially overlapping with areas of high process intensities. We used the software SaTScan to analyse the spatiotemporal patterns behind the data of well-documented torrent events in the European Alps. Clusters of high damage ratios and clusters of low damage ratios were detectable in the test sites, but partially with only low statistical significance. By artificially modifying the dataset we derived a threshold necessary for an application of such a method in order to obtain statistically significant results. The method is targeted at a better understanding of the spatiotemporal vulnerability patterns of buildings exposed to torrent events.