



## Assessing the reconstruction of landslide activity using anatomical changes in stems and exposed roots.

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Landslides constitute a widespread hazard in mountain areas where they repeatedly cause severe damage and destruction to settlement areas, transportation corridors, and infrastructure or even lead to loss of life. Nonetheless, the spatio-temporal behavior of landslide activity remain often imprecise in historical archives.

During the last decades, dendrogeomorphology was used to reconstruct past landslide events and has been used in various mountain environments around the globe. Dendrogeomorphic analyses mainly focused on anatomical changes that occurred in stem. However, a major limitation of tree-ring analysis is that, while a tree is recovering from damage sustained by one landslide event and forming very narrow annual rings or compression wood sequences, it may be hard to detect a subsequent landslide event.

In this paper, the reconstruction is assessed by coupling classical dendrogeomorphic analyses with the study of anatomical changes that occur in exposed roots. Root and stem cross sections of *Pinus Uncinata* were sampled on a shallow landslide located in the French Alps. A comparative analysis demonstrates that an abrupt reduction of the cell lumen area in earlywood tracheids of exposed roots is a reliable indicator to assess the spatio-temporal reconstruction of landslide events. Our coupled approach could therefore be used in future research to determine and to map past landslide events in mountain regions.