



Tangential rows of traumatic resin ducts in *Larix decidua* trees impacted by debris flows

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Coniferous trees injured by geomorphic processes such as debris flow, rockfall or snow avalanches may react to the impact with the formation of tangential rows of traumatic resin ducts (TRD) on both sides of the lesion. The appearance of TRD has regularly been used to date past geomorphic activity. However, there is still little knowledge on the exact timing of their occurrence as well as on their distribution around the injury. Therefore, it was the aim of this study to assess the onset of TRD after wounding, as well as their vertical and tangential extensions. We analyzed 28 injuries in eight *Larix decidua* Mill. (182 cross-sections) resulting from debris-flow activity in October 2000 and November 2004. As the events occurred outside the vegetation period, the onset of TRD normally started within the first layers of the tree ring formed in the year following the disturbance. However, the intra-annual position of TRD moved in 30% of the injuries to later portions of the tree ring with increasing distance from the wound. The vertical extent of TRD after wounding averaged for 78 cm but with a much greater extent above the injury than below. Above the injury, a certain delay in the onset of the reaction could be observed with increasing distance from the wound. At the height of the wound, the axial extent of TRD reached 18% of the circumference remaining vital after the impact. In the subsequent rings, TRD were mainly present at the height of the injury, but were no longer formed above or below the wound. In general, injury size significantly influenced the tangential and vertical extension of TRD. Results obtained in this study considerably improve the knowledge on the spread of TRD and therefore help improving the sampling strategy for dendrogeomorphological studies.