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The role of forest deadwood in rockfall protection

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Forests with a high density and basal area of living trees are known for their function as natural and cost-efficient protection against rockfall. The role of deadwood, however, is less understood. We address this knowledge gap in this contribution as we present the results of repeated real-scale experiments in a) a montane beech-spruce forest with and without deadwood and b) in a subalpine scrub mountain pine-spruce forest with deadwood. We used artificial rocks with either an equant or platy shape, masses between 45 kg and 800 kg (≈ 0.3 m3), and equipped with in-situ sensors to gain insights into rotational velocities and impact-accelerations. Clusters of deadwood and erected root plates reduced the mean runout distance at both study sites. For site a), we found that more rocks were stopped behind lying than living trees and that the stopping effect of deadwood was greater for equant compared to platy rock shapes. Site b) revealed a braking effect of scrub mountain pines for relatively small (45 kg), but also a visible reduction in rotational velocities for the 800 kg rocks sensor stream. We conclude that deadwood must be taken into account in rockfall modeling and the management of rockfall protection forests.