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Wildfire effects on rockfalls: a brief overview

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Forested mountain regions in Europe are at risk of wildfires and rockfalls. Almost 600,000 forest fires affecting some 7.5 M ha have been recorded in Spain over the last fifty years. This is a serious problem that threatens to intensify due to the effects of climate change. In addition to the negative consequences associated with the wildfires themselves, such as the destruction of biodiversity, increased surface runoff, desertification and reduced water quality, they can also have cascading effects, triggering other types of hazards, such as rockfalls. Understanding the processes and conditions leading to rockfalls - during and after a forest fire - is therefore a major challenge for the scientific community in order to determine the real risk to the population and infrastructure.

The increase in rockfalls associated with forest fires is related to several factors. These factors affect (i) the rock massif where the source areas are located, (ii) the propagation area and (iii) the affected area. Source areas are mainly affected by forest fires by altering the rock massif and its properties. A variety of factors may contribute to the degradation of rocks, such as thermal weathering, the opening of cracks and discontinuities, or a decrease in rock resistance. An alteration in slope material and loss of vegetation are observed in the propagation area, which affects the range of blocks. Furthermore, extinguishing activities themselves can cause blocks to become unstable, and the extreme temperatures reached degrade the protection measures (dynamic barriers, nets, bolting, etc.). Furthermore, when the vegetation is removed from burned areas, the risk perception from rockfalls in burned areas increases, leaving the threatening boulders and the rock massif itself more clearly exposed. In this contribution, the main factors influencing the increase in rockfalls after wildfires are analysed.