



## **Wildfires in the Northern Limestone Alps - the thin line between recovery and degradation**

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In the sub-alpine krummholz zone of the Northern Limestone Alps, numerous slopes can be observed which were severed by wildfires in the last centuries. Several historical blazes burned the thick humus layers on the limestone bedrock which led to long lasting degradation. The affected areas are sharply separated from the surrounding slopes and are still noticeably bare of vegetation. An outweighing number of fires in the study area are due to anthropogenic influence like forestry, charcoal burning and arson for gaining pastures. Natural causes like strokes of lightning play a tangential role.

Charcoal particles can be found almost everywhere in the soils of the study areas which shows that wildfire is an ubiquitous phenomenon in the northern Alps. The (by now) oldest black carbon samples were found on an apparently undisturbed slope and date back to 2,850 BP, which shows that full recovery is possible. However, under unfavourable conditions the time for the recovery of the ecosystems is estimated to be several centuries, if not centennials due to soil destruction and intensified geomorphological processes.

However, not all of the known historical wildfires had equally devastating effects. At the south-exposed side of the Inn valley, a mosaic of different stages of recovery and degradation is found today. Almost fully recovered *Pinus mugo* stands are adjoining slopes with no signs of shrub cover even 70 years after the respective fire. Combinations of certain habitat features like elevation, geology, soil type, soil thickness and fire intensity are probably responsible for the spatially different characteristics observed. For example, slopes inclined close to the dip angle of the outcropping Wettersteinkalk limestone are particularly prone to degradation when the humus-rich soils

are destroyed by severe fire. In the same elevation but on different bedrock, higher portions of mineral soil develop which is less vulnerable to erosion. At a krummholz slope burned in 2003 in the Karwendel Mountains, we have the opportunity to monitor in situ the patterns of soil destruction, downwash, BC accumulation and vegetation succession.