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Do geomorphological processes constrain vegetation zones in mountain regions?

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Climate change is forcing many plant species to colonise higher elevations, and is expected to effect changes in vegetation zones in mountain regions worldwide. Ecotones, such as the treeline and the upper limits of Alpine vegetation, are considered likely to shift upslope, with consequences for the survival of high altitude specialist species as they are squeezed into smaller areas around mountain peaks. However, geomorphological processes such as landslides, avalanches and slope instability can constrain the colonisation of high altitudes by woody and herbaceous vegetation, and may provide refuges for high altitude species in the future. Using MODIS Vegetation Continuous Field data, geological maps and a digital terrain model, we use topographic information to model the upper limits of woody and herbaceous vegetation in the European Alps. Using a landslide inventory, we map landslide domains, characterising the dominant forms of active geomorphological processes based on topography, climate and geology, across the region. Finally, we investigate to what extent this geomorphological information can improve the accuracy of modelled vegetation maps, and hence to what extent the location of ecotones are constrained by geomorphology, rather than climate.