

The Alps are turning green – but also on moving slopes?

Using remote sensing and digital terrain analysis to assess feedbacks between greening and slope movements in a Swiss mountain catchment

Department: Physical Geography

Research group: River and Delta Morphodynamics, Mountain Hydrology

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Project description

In a changing climate, shifting plants are turning the European Alps green, as widely visible from space. At the same time, however, changing rainfall regimes and thawing permafrost also render mountain slopes unstable. Can upslope shifting and densifying plants colonize and potentially stabilize moving mountain slopes? Or do increasing slope instabilities hinder upslope plant shifts, possibly decreasing biodiversity, but also offering survival space for movement-adapted plant species.

By combining satellite remote sensing with GIS-based analysis of historical imagery and digital elevation models (DEMs), you will assess if moving mountain slopes are greening, or if slope movements impose limits on mountain greening. Based on satellite imagery (Sentinel 2, possibly Planet and Landsat) and historical orthophotos, you will assess seasonal, annual and decadal greening trends and upslope tree and shrub migration in our study catchment, the Meretschitälli, in Switzerland. Using digital terrain analysis of historical DEMs, combined with detailed geomorphic maps, you can then assess how much certain landforms, such as talus slopes, rock glaciers, moraines, are moving and if they are indeed greening, or if moving slopes can limit widespread greening.

Your results will not only help our on-going research projects (GoOrGrow, GREENPEAKS, GRAIT2) investigating feedbacks between mountain greening, slope movements and hydrology, but also help to better understand limits and benefits of alpine greening and slope instabilities in terms of natural hazard protection and provision of microrefugia.

Job requirements

Most importantly, you are interested in mountains and like to work with remote sensing and GIS data and analyses. As you will probably also work in R and possibly GoogleEarth Engine, some coding skills will come in handy.