

# Sentinel-2-based annual forest changes across the European Alps

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Forest covers more than 40% of the European Alps and fulfills an important role in protecting against avalanches and rockslides. Forest changes are often small-scaled, but fundamental for forest management to assess the state of protection forest. Earth observation has become a key instrument for monitoring forest cover dynamics at high spatial resolution and across large areas especially since the opening of the Landsat archive in 2008. Yet, only with the launch of ESAs Sentinel-2 mission, it has become possible to accurately derive forest disturbances that match the scale of relevant changes in alpine forest. Our objective was to map and analyze spatial patterns of forest changes across the European Alps.

We first set up a pixel-based compositing approach to mosaic Sentinel-2 10 m resolution reflectance data using the images acquired over the summer seasons of 2016 and 2017. Subsequently, we applied a bi-temporal change detection method to detect forest changes. To mask out changes outside the forested area, we classified forest area for 2016 using a support vector machine algorithm and training data from the Copernicus High Resolution Forest Layer. We then focus on spatial differences in forest changes and patch size distribution with respect to topography (slope, aspect and altitude) to identify areas of concentrated forest changes that require forest intervention measures and to understand underlying drivers of change.

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