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Analysis of multitemporal laserscanned DTMs of an active landslide (Doren, Western Austria) using a robust planefitting segmentation

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Structural geomorphometric analysis of high-resolution laser scanned DTMs is a straightforward method to study microtopographic components of dynamically forming landscapes, and thus areas affected by mass movements. However, results for multitemporal DTMs may turn out to be difficult to evaluate.
In our approach, a robust plane fitting algorithm is used to create various segmentations to filtered lidar point cloud (ground surface points) by applying different sets of parameters. The resulting sets of planes are analyzed in terms of their geologic meaning and compared in order to detect changes.
Our study area, the Doren landslide (Bregenzerwald, Vorarlberg, Western Austria), an actively forming landslide developed in molasse sediments has been measured several times by laser scanning (lidar).
These DTMs form the input to our procedure. The DTMs are analyzed by the segmentation algorithm, using varying parameter sets (i.e. number of minimum points, standard deviation, point-to-plain distance). The segmented results are checked for indications of geological structures as well as for features belonging to the moving material of the landslide. Finally the segments of the different years are compared.
Results show that patterns composed of segments of steep and less steep valley sides can be correlated with the tectonic and lithological setting of the study area. Furthermore some narrow linear or curvilinear zones appear that can be related to the outlines of some small internal mass movements. Interestingly, the various years show sometimes similar patterns despite the continuous displacement of the sliding material.
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