



## **Multitemporal Error Analysis of LiDAR Data for Geomorphological Feature Detection**

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Since 2001 airborne LiDAR measurements have been carried out regularly at the Hintereisferner region (Ötztal, Tyrol, Austria). This results in a worldwide unique data set, which is primarily used for multitemporal glacial and periglacial analyses. Several methods and tools i) to delineate the glacier boundary, ii) to derive standard glaciological mass balance parameters (e.g. volume changes), iii) to excerpt crevasse zones or iv) to classify glacier surface features (e.g. snow, firn, glacier ice, debris covered glacier ice) have been developed as yet. Furthermore, the available multitemporal LiDAR data set offers the opportunity to identify surface changes occurring outside the glacier boundary, which have not been recognized until now. The respective areas are characterized by small variations of the surface topography from year to year. These changes of the surface topography are primarily caused by periglacial processes further initiating secondary gravitative mass movements. The present study aims at quantifying the error range of LiDAR measurements. The error analysis, which is based on (at least) 66 cross-combinations of the single LiDAR measurement campaigns, excluding areas which are obviously related to glacial surface changes, results in statistically derived error margins. Hence, surface changes which exceed these error margins have to be assigned to periglacial or gravitative process activities. The study further aims at identifying areas which are explicitly related to those periglacial and gravitative processes.