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Application of Differential Airborne Laser Scan for effective landslide inventory mapping and activity assessment in forested areas

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Good landslide inventory maps are an essential base for any hazard and risk assessments of any area. However, these maps are usually affected by certain degree of error depending, e.g. on field lucidity, and subjectivity of an author. Especially densely forested areas perform high spatial error of the mapped features. These unfavourable conditions are being significantly limited by an airborne laser scanning (ALS), which enable producing excellent high resolution digital terrain models (DTM) of bare ground surface on the entire slope scale.

A set of 5 different ALS scenes were performed at different times, in April 2007, January, February, March and September 2008. They represent the ground surface topography of Gschliefgraben just before, during, and after the landslide occured in winter 2007/08. We used slope inclination maps in greyscale for visual inspection of the area. These inclination maps have a better and a more homogeneous performance of the ground topography than classical hillshade maps. Slope failures with different shapes and of different origin were distinguished and summarized in a landslide inventory map. The recent activity of individual slope failures was assessed by comparing the ALS digital elevation models within ArcGIS analytical tools. This final landslide inventory map of Gschliefgraben served as input for the analysis of parameters gathered by the airborne multi-sensor geophysical survey measured in September 2009.

Our results proved high efficiency of ALS DTMs and their applicability namely in remote and inaccessible areas. This analysis was supported by the 7th FP project “Safeland – Living with the landslide risk in Europe”