SEASONAL CHANGE DETECTION OF THE STEINLEHNEN LANDSLIDE BY MULTI-TEMPORAL LONG-RANGE TERRESTRIAL LASER SCANNING (TYROL, AUSTRIA)

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The recent development in terrestrial laser scanning (TLS) operating in the long-range domain, allows for operational monitoring of environmental changes such as landslides in high temporal frequency. We observed the landslide Steinlehnen located in Sellrain (Tyrol, Austria), which is composed of several parts with different activity. In June 2003, acceleration up to several metres per day of one of these parts has been documented. After that event, the movement rates decreased considerably. Following up this observation our research aims at the investigation of the landslide`s current movement rates within one year by separating and dating landslide accelerations, geomorphological processes, and changes due to vegetation growth. Between November 2014 and November 2015 five TLS acquisitions have been conducted with the long-range TLS Riegl VZ-6000. First results identify an active part with displacements in order of centimetres per year. In the long-range domain, footprint size and distortion due to incidence angle and range effects have a larger impact on registration, accuracy and detail of object representation. Thus, for landslide monitoring the uncertainties in the error-budget make it difficult defining a threshold for the minimum detectable change occurring between two measurements. In our test case vegetation has been filtered and geomorphological processes such as rockfalls and debris flows, have been detected and assigned to specific periods of time within the year of measurement. The presented results contribute to the knowledge of potentials and limitations regarding activity- and movement-measurements as well as geomorphological questions by using long-range-TLS. The results help estimating the hazard potential within the landslide Steinlehnen. For additional validation and continuity of the time series, further TLS measurements are planned during summer 2016.