



First results of repeated Terrestrial Laserscanning monitoring processes at the rock fall area Burgstall/Pasterze Glacier, Hohe Tauern Range, Central Austria

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In July 2007 a large rock fall event at the NW-SE tending ridge of the mountain Mittlerer Burgstall ($N47^{\circ}05'$, $E12^{\circ}44'$) released appr. 57.000 m^3 of rock accumulated at both sides of the ridge partly covering the tongue of Pasterze Glacier, the largest glacier in the Eastern European Alps. First analyses on the event were carried out based on pre- and post event airborne laserscanning as well as photogrammetric data. Ongoing large rock falls in 2008 led to the decision to establish a Terrestrial Laser Scanning (TLS) network to acquire high resolution 3D-surface data. The TLS position is complementary to the existing monitoring network installed in 2006, consisting of ground surface and near surface temperature sensors (projects: ALPCHANGE 2006 – 2011; permaNET 2008-2011; permAfrost 2010 – 2012).

In August 2009 first investigations to install a permanent position for TLS to monitor affected rock fall areas were carried out. Unfavourable geometric as well as terrain conditions inhibited the installation of a position to monitor the SW-facing flank of Mittlerer Burgstall mountain. An ideal position to monitor the NE-facing area as well as the S- and E-flank of the nearby Hoher Burgstall was installed in September 2010 at the proglacial area of the Wasserfallwinkelkees glacier. This glacier was once contributing ice masses to the tongue of Pasterze Glacier and is now located about 400 m above the present surface of Pasterze Glacier. Similar to Mittlerer Burgstall, also both flanks of Hoher Burgstall show evidences of imminent larger rock falls which can be hazardous due to the fact that a frequented hiking trail leads to the Oberwalder Hütte alpine hut crosses the lower left part of the E-flank. This hut is a high alpine training centre of the Austrian Alpine club (OEAV) and well visited in during summer.

First measurements of both study areas were carried out in September 2010 in mean distances of 600m to the scanning area of Mittlerer Burgstall (MBUG) and 100m to the scanned area of Hoher Burgstall (HBUG) leading to a mean point spacing of 22 cm (MBUG) and 6 cm (HBUG), respectively. As a consequence of different point spacing analysis at MBUG study larger variations of the scarp and vertical variations of the accumulation area are feasible, at HBUG additionally possible horizontal movements are given attention to.

In September 2011 the first repeated measurements for both scanning areas MBUG and HBUG with the same point spacing as in 2010 were carried out ensuring comparable data sets. First results of these measurements are presented.