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Monitoring rock fall events in a changing permafrost environment applying terrestrial laserscanning: the examples Hoher and Mittlerer Burgstall mountain, Hohe Tauern Range, Austria

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In late spring 2007 a massive rock fall event occurred at the SE-facing ridge of the mountain Mittlerer Burgstall (2933 m a.s.l., 47° 06' 07" N; 12° 42' 36" E) located within the Pasterze Glacier area, Hohe Tauern Range, Austria. During this event about 0.5 km³ of rock material was transported to the hillslopes and glacier surface below. This event was presumably triggered by an increasing amount of available water in the joint system due to a rather mild winter in 2006/07. Since there exists a monitoring network for quantifying glacial and periglacial changes around the Pasterze Glacier since more than 10 years, we decided to initiate a further scanning position in order to monitor the rock fall area at Mittlerer Burgstall as well as the neighbouring area of Hoher Burgstall mountain (2972 m a.s.l.). Mt. Hoher Burgstall is of particular interest for mountain safety reasons because of an observed increase of rock falls close to the track leading up to the alpine hut Oberwalder Hütte (2972 m a.s.l.). In July 2009 first field campaigns were carried out to locate a reasonable scanning position regarding scanning geometry, accessibility, logistics and safety. The scanning position was installed in September 2009 beneath the S-ridge of Hoher Burgstall. Beginning in 2010 scanning campaigns (using the long range scanner Riegl LMS Z620) have been carried out annually at mid-September measuring three scanning areas: (SA1) the NE-face of the Mittlerer Burgstall and the (SA2) S-face as well as the (SA3) SE-face of the Hohe Burgstall. Results at all three scanning areas indicate significant changes in the rock faces with quantified rock fall events.