



The use of long range laser scanners in terrestrial monitoring of glacier dynamics, Pasterze glacier (Hohe Tauern, Austria)

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Terrestrial laser scanning is a quite new technique for glacier monitoring. The ability to acquire high-resolution 3D data of surface structures makes long-range laser scanners a very interesting instrument for measuring glacier dynamics. These scanners work within measuring distances up to a few kilometres of range with accuracy in the range of a few centimetres. Single time-of-flight measurements are automatically combined to a measurement grid that enables the generation of a dense digital elevation model (DEM) of the glacier surface. Repeatable sensor orientation is performed using reflective targets fixed on stable surfaces somewhere in the spherical field of view of the sensor. The differences between DEMs of subsequent measurement epochs are used to describe the 3D surface deformation.

We report on an integrated system that is capable of describing 3D motion and deformations of glacier surfaces within a single day's measurement campaign, including logistics and evaluation.

The Pasterze glacier in the Hohe Tauern National Park (Central Alps, Austria) is object of a comprehensive monitoring network beginning in 1879. Since the middle of the last decade the glacier retreat increases dramatically, as a consequence thereof a massive modification of the proglacial areas is in progress. To quantify these landscape dynamics with an accurate resolution, terrestrial laser scanning has been used the last years beginning in 2001. This method was selected due to several reasons and advantages: the steep terrain is unfavourable for airborne or satellite data resulting in a better resolution of terrestrial data, a perfect accessibility keeps costs low respec-

tively. In 2004 we started to increase the temporal resolution with four measurements in the summer period to get a better picture of the interannual ablation dynamics. The results gathered through these four years of monitoring are analyzed and presented for the first time.