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Special melt characteristics as an evidence for significant basal melt rates at the tongue of Hintereisferner, Ötztal, Austria

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For several alpine mountain glaciers basal melt is a non negligible contributor to the glacial mass balance. Enhanced subglacial melt water flow during the ablation season provides an additional energy source and therefore raises the amount of internal or basal ice melt. In order to quantify the contribution of such processes to the local mass balance, detailed field measurements were carried out at the tongue of Hintereisferner in 2009 and 2010.
We present a multi-method approach applied to a rectangular test site which was defined in an area where subsidence was evident. The study includes a comparison of high resolution digital elevation models gained by airborne laserscanning (ALS), direct surface mass balance measurements, elevation models generated during four detailed differential GPS field surveys, ground penetrating radar (GPR) ice thickness measurements as well as a simple model of local ice dynamics. Furthermore horizontal and vertical ice flow velocities were measured in two profile-lines at the upper and lower margin of the test field in order to relate the glacial mass flux divergence to the measured local surface mass balance. Preliminary results indicate that subsidence rates are considerably higher than expected which leads to the assumption that subglacial melt processes play a significant role at this part of Hintereisferner.