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Insitu measurement of bedrock erosion

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While long term erosion rates may be estimated by dating methods, current day erosion rates are – if at all available – based on rough estimates or on point measurements. Precise quantification of short term erosion rates are required to improve our understanding of short term processes, for input in landscape evolution models, as well as for studying the mechanics and efficiency of different erosion processes in varying geomorphological settings. Typical current day erosion rates in the European Alps range from sub-millimetre to several millimetres per year depending on the dominant erosion processes. The level of surveying accuracy required for recurring sub-millimetre to millimetre measurements in the field is demanding.
A photogrammetric technique was developed to measure surface changes on the bedrock samples. For field tests three bedrock samples of different lithology were installed in a debris flow channel (Illgraben in Switzerland). Samples were placed in a bed of concrete and fixed to a check dam already present in the flow channel. The expected erosion rate in this channel was assumed to allow for recurrent measurements after single debris flow events. Control points providing an absolute reference frame and were embedded in the concrete next to the bedrock samples.
Results and experiences after two years of monitoring will be presented. While the methodology was able to provide data with the desired resolution and sub-millimetre accuracy in the field, further tests will be needed for optimization of the methodology itself as well as for an independent measurement of the ground control points.