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COMBINING COSMOGENIC BE, C, AL AND CL - Quantifying depth of glacial erosion and timing of deglaciation

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Over the course of the next years, we are aiming to combine signals of cosmogenic Be-10, C-14, Al-26 and Cl-36 to constrain depth and rate of glacial erosion at several study sites in the Alps and to determine the timing of local deglaciation.
Within this suite of nuclides, the system of Be is the best understood. It is routinely used and often combined with Al for various applications in Quaternary Geology, i.e. dating rock avalanches. Cl-36 is an important addition due to its unique depth profile: complicated production pathways cause the maximum concentration not to form at the top of the rock, but at a depth of some centimetres [1]. Furthermore, extending the suite by in-situ produced C-14 is crucial. Its short half-live enables the detection of brief periods of ice coverage that could not be noticed in the other nuclides. Measurement of in-situ produced C-14 in bedrock is not trivial, but has been achieved with reliable results [2].
Concentration-depth profiles for all of these nuclides can be modelled for diverse scenarios of past ice coverage. If the local Quaternary history is known independently, (glacial) erosion rates can be determined.
As a first study site, Grueben glacier in the Grimsel region was chosen. The area was recently mapped in detail by C. Kämpfer allowing to draw robust conclusions based on field observations. Here we will present and discuss exposure ages of four bedrock samples taken to be analysed this winter for a first assessment of the local situation and to identify promising sites for intense examination in the future.

[1] Alfimov and Ivy-Ochs, Quat. Geochr. 4, 2009
[2] Hippe et. al., Quat. Geochr. 4, 2009