



Constraining local subglacial bedrock erosion rates with cosmogenic nuclides

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The constant buildup of cosmogenic nuclides, most prominently ^{10}Be , in exposed rock surfaces is routinely employed for dating various landforms such as landslides or glacial moraines. One fundamental assumption is that no cosmogenic nuclides were initially present in the rock, before the event to be dated. In the context of glacially formed landscapes it is commonly assumed that subglacial erosion of at least a few meters of bedrock during the period of ice coverage is sufficient to remove any previously accumulated nuclides, since the production of ^{10}Be ceases at a depth of 2-3 m. Insufficient subglacial erosion leads to overestimation of surface exposure ages. If the time since the retreat of the glacier is known, however, a discordant concentration of cosmogenic nuclides delivers information about the depth of subglacial erosion.

Here we present data from proglacial bedrock at two sites in the Alps. Goldbergkees in the Hohe Tauern National Park in Austria and Gruebengletscher in the Grimsel Pass area in Switzerland. Samples were taken inside as well as outside of the glaciers' Little Ice Age extent. Measured nuclide concentrations are analyzed with the help of a MATLAB model simulating periods of exposure or glacial cover of user-definable length and erosion rates.