



Addressing geomorphologic uncertainties with terrestrial cosmogenic nuclide dating (TCND) – examples from Holocene moraines in the Southern Alps of New Zealand

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Terrestrial cosmogenic nuclide dating (TCND) has made major improvements regarding laboratory precision and calibration procedures (e.g. regional production rates) over the past few years. This turns the focus of future improvement to sampling strategies and geomorphologic uncertainties affecting the representativeness of the data derived. Especially in highly dynamic geomorphic environments like the Southern Alps of New Zealand located on an active plate margin these problems are far from being only trivial ones.

Previous studies in New Zealand and elsewhere have shown that Schmidt-hammer exposure-age dating (SHD), the combination of relative-age dating using the Schmidt-hammer with TCND in a "multi-proxy approach", provides a successful strategy to tackle the geomorphic uncertainty with the dating of Holocene moraines. SHD constitutes an objective tool for mutual testing of the representativeness of boulders sampled for TCND. The construction of SHD age-calibration curves additionally helps to improve the reliability of numerical ages achieved. However, there still remains more work on the shape of these age-calibration curves and detailed measurement procedures done, especially on regional/local scale.

The results of new investigations on the shape of these SHD age-calibration curves in the Southern Alps of New Zealand will be presented. Along with some methodological studies on the Schmidt-hammer measurement design they will improve the reliability of numerical TCND ages. These studies will also be applied to test whether the controversy between existing studies on the New Zealand glacier chronology, in particular between recent studies using TCND and older ones based on different techniques, primarily results from the regionally specific geomorphologic environment and related uncertainties with the representativeness of sampled boulders.