Schmidt Hammer Exposure Dating (SHD) the Last Glacial-Interglacial Transition in Wester Ross, Scotland

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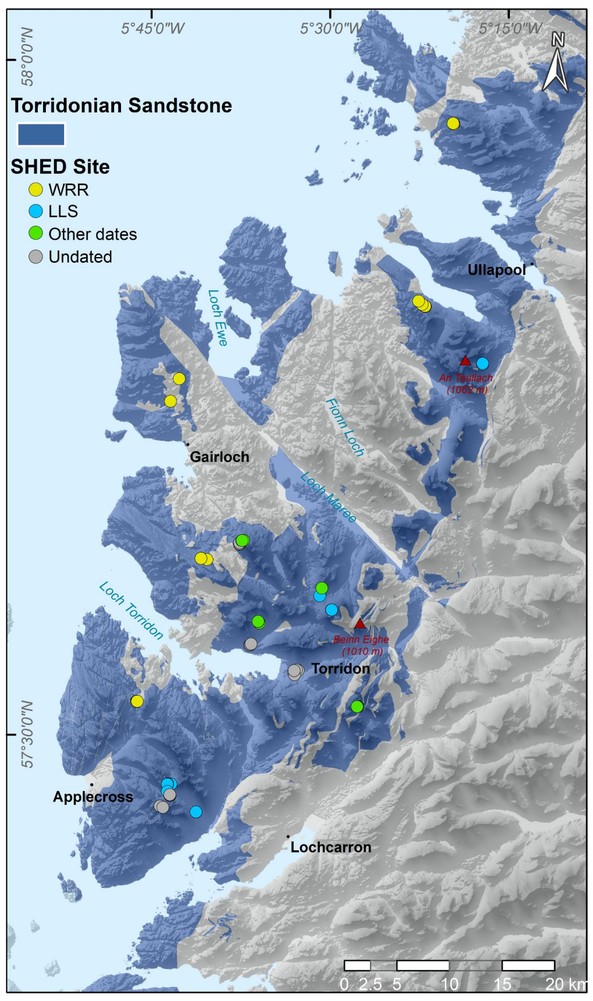


Torridonian Sandstone in Wester Ross.

INTRODUCTION

The terrestrial LGIT chronology in NW Scotland is largely based on Terrestrial Cosmogenic Nuclide Dating (TCND) methods that can yield conflicting or uncertain results, especially due to nuclide inheritance. This highlights the value of developing complementary dating methods. This project evaluates the use of SHED on Torridonian Sandstone in Wester Ross.

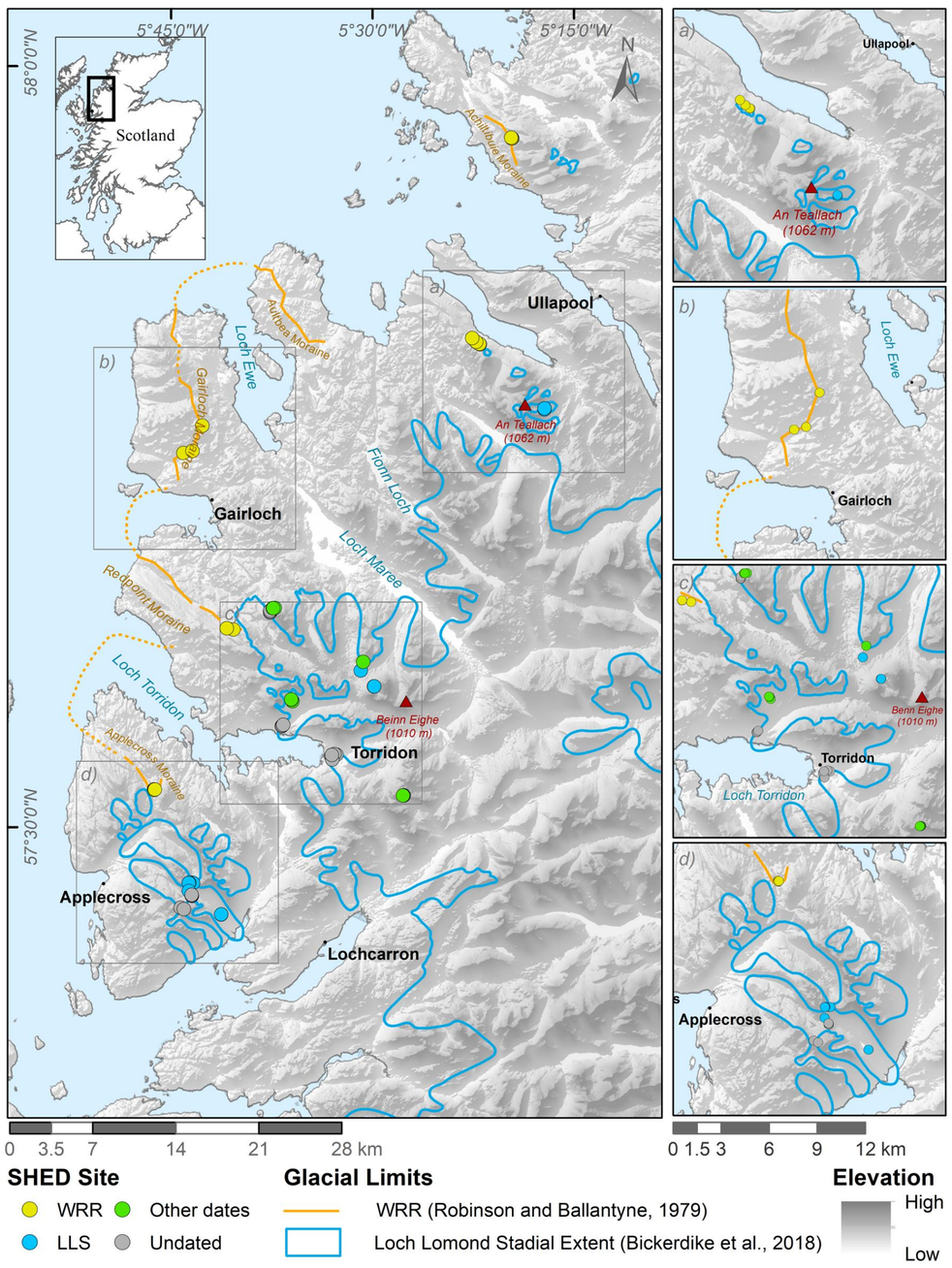
METHOD

AC obtained SHD data (50 vertical downwards impacts per boulder, 60 sites) from a 1,500 km^2 area using one N-type hammer, mild SiC pre-treatment on dry rock. 31 existing TCND ages were re-calibrated using CRONUS-Earth (v3), LSDn scaling, LLPR ^{10}Be production rate and 1 mm ka^{-1} erosion rate.

RESULTS & DISCUSSION

Mean Schmidt hammer rebound (R) values for TCN-dated Torridonian Sandstone surfaces are independent of elevation and proximity to the coast but show significant differences ($p < 0.001$) between Wester Ross Readvance (WRR, n=17) and Loch Lomond Stade (LLS, n=13) sites.

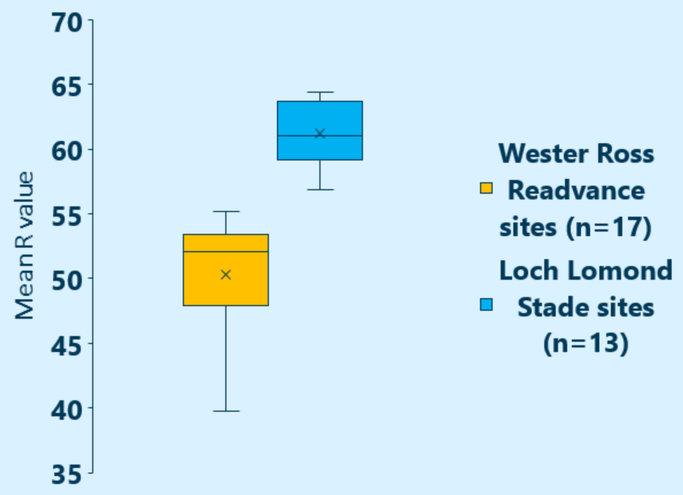
On selected lithologies and with adherence to rigorous procedures SHD can represent a cost-effective and reliable tool for obtaining large numerical dating samples for landforms in formerly glaciated terrain.



Above: *location of 60 sampling sites, WRR and LLS ice limits in Wester Ross.* ***Right:*** *OB demonstrating use of an N-type Schmidt hammer on TCN-dated roche moutonnée, Coire Mhic Fhearchair, Beinn Eighe.*

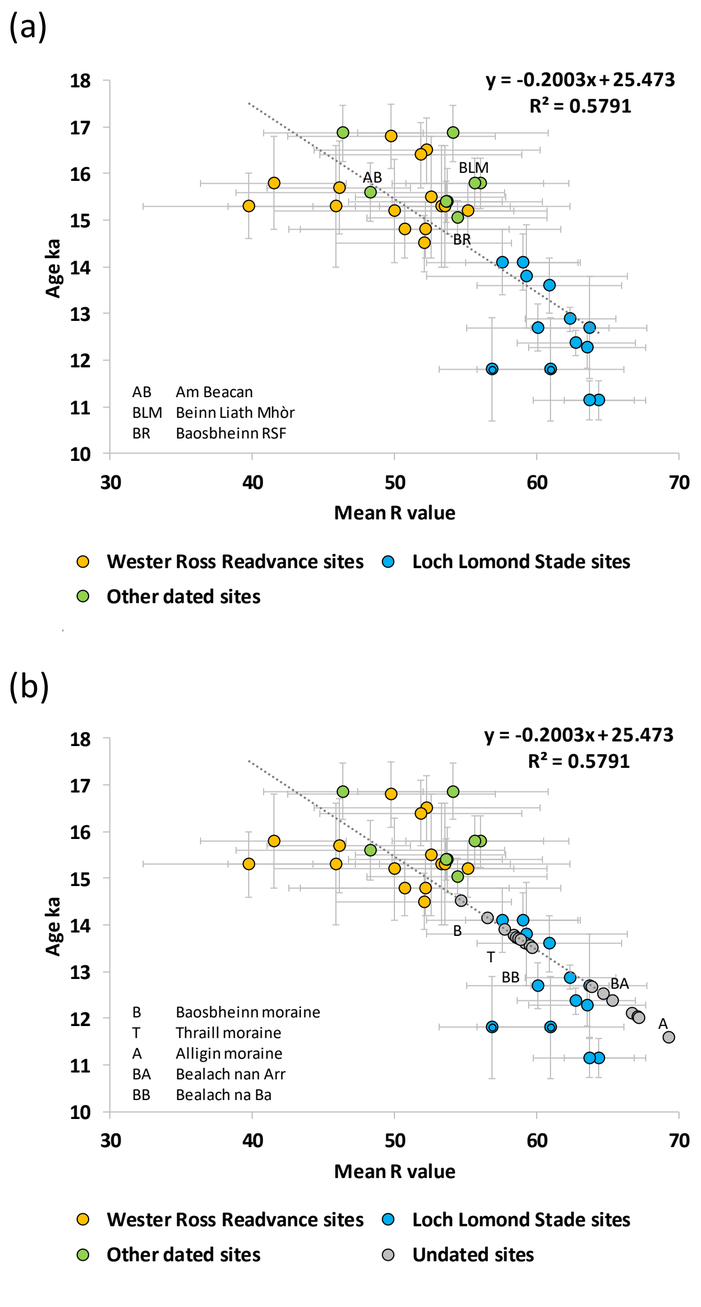
RESEARCH HIGHLIGHTS

Schmidt hammer exposure dating (SHD) distinguishes Torridonian Sandstone surfaces deglaciated during the Wester Ross Readvance and Loch Lomond Stade.



Based on 31 existing ^{10}Be ages, a calibration curve was generated for the period ~18-11 ka (R^2 = 0.58, $p < 0.001$) and applied to 17 undated surfaces.

Careful use of SHD promises to refine Lateglacial reconstructions, helping resolve uncertainties surrounding glacier ice limits, periglacial and paraglacial activity.



Above: *Schmidt hammer R-value / surface age relationships on Torridonian Sandstone in Wester Ross, Scotland: (a) linear function for ^{10}Be dated Last Glacial-Interglacial Transition sites for the period ~18-11 ka, r^2=0.58, n=31, showing 1 S.D. error; (b) the lithology-specific calibration curve applied to 17 undated landforms of Wester Ross Readvance and Loch Lomond Stadial age within the study area.*

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