Northeastern Section - 50th Annual Meeting (23–25 March 2015)

Paper No. 6
Presentation Time: 3:15 PM

GLACIAL CHRONOLOGY AND LANDSCAPE EVOLUTION ON BAFFIN ISLAND, CANADA, CONSTRAINED BY A COMPILATION OF PAIRED ^{26}AL/^{10}BE ANALYSES

CORBETT, Lee B.[1], BIERMAN, Paul[1] and DAVIS, P. Thompson[2], (1)Department of Geology and Rubenstein School of Environment and Natural Resources, University of Vermont, Delehanty Hall, 180 Colchester Ave, Burlington, VT 05405, (2)Department of Natural & Applied Sciences, Bentley University, 175 Forest St, Waltham, MA 02452, Ashley.Corbett@uvm.edu

Constraining glacial history through cosmogenic isotope analysis in areas of cold-based ice can be challenging because the lack of deep erosion violates the assumption of no inheritance. On Baffin Island, cosmogenic isotope measurements indicate that the land surface, especially at high elevations, has been progressively modified but not deeply eroded over multiple glacial/interglacial cycles. The Baffin Island landscape preserves a long and rich history of glacial events, so it is important to constrain erosion efficiency and develop approaches for extracting information about past glaciation from landscapes with complex exposure/erosion histories.

Here, we compile the data from 149 paired ^{10}Be and ^{26}Al analyses of Baffin Island samples prepared at University of Vermont. All apparent exposure ages have been recalculated in CRONUS. Measured ^{10}Be concentrations in samples range from 3.5 to $180 \cdot 10^4$ atoms g^{-1}, yielding calculated apparent exposure ages of 6.3 to 160 ka. Measured ^{26}Al concentrations in samples range from 1.2 to $83 \cdot 10^5$ atoms g^{-1}, yielding calculated apparent exposure ages of 4.3 to 124 ka. Calculated ^{26}Al/^{10}Be ratios range from 3.3-8.7, excluding three outliers that likely had measurement error in one or both isotopes.

The dataset allows us to use a large number of samples to construct a three-part test for inherited cosmogenic nuclides indicative of complex exposure histories resulting from ineffective erosion and repeated exposure. For the 149 samples compiled here, ^{10}Be and ^{26}Al apparent exposure ages are closely related (R^2 = 0.97, p < 0.01), but ^{26}Al ages are consistently lower (regression line slope = 0.77). For paired bedrock/boulder samples, bedrock apparent exposure ages exceed boulder ages in 8 of the 11 bedrock-boulder pairs for which the sample ages differ by more than the one-sigma analytical uncertainties. Finally, both bedrock (R^2 = 0.35, p = <0.01) and boulder (R^2 = 0.22, p = <0.01) sample ages increase with elevation (although the ^{26}Al/^{10}Be ratio has no trend with elevation, possibly due to poorer ^{26}Al data reproducibility, as shown with both field and laboratory replicate analyses). The above observations are consistent with a relatively thin ice sheet with limited erosive capabilities that led to the development of surfaces with complex exposure histories.

Session No. 16

S4. Contributions of Cosmogenic-Nuclide Geochronology to Glacial Geology and Geochronology in Northeastern North America—and Vice Versa
Monday, 23 March 2015: 1:30 PM-5:30 PM

Grand Ballroom North (Omni Mount Washington Resort)

Geological Society of America *Abstracts with Programs.* Vol. 47, No. 3, p.63

Back to: S4. Contributions of Cosmogenic-Nuclide Geochronology to Glacial Geology and Geochronology in Northeastern North America—and Vice Versa

<< Previous Abstract | Next Abstract >>