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^{10}BE CONCENTRATION IN GREENLAND SEDIMENT INDICATES SOURCE AND EXPOSURE HISTORY

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Greenland Ice Sheet extent is dynamic and when ice margins retreat, the exposed landscape accumulates ^{10}Be. Our objective is to understand the *in situ* ^{10}Be concentration in sediment as it is eroded by the ice sheet and moves across the landscape to the fjords. Greenland sediment is sourced both sub-glacially and sub-aerially and is mixed and stored within lakes and fjords until a period of glacial advance, when the ice sheet erodes and transports surficial materials off shore. Understanding the ^{10}Be concentration in sediment entering the marine realm will help us decipher sediment records from the deep ocean, potentially providing a 5–6 million year history of ice sheet dynamics.

We measured the concentration of *in situ* ^{10}Be in fluvial quartz sand collected in 2011 and 2012 from Kangerlussuaq (n=14), Narsarsuaq (n=12), and Tasiilaq (n=7) on the west, south, and east coasts of Greenland, respectively. We collected sand sourced from the ice, from tributaries draining exposed hill slopes, and from intermediate locations along ice marginal drainages.

Spatial patterns in data are similar between regions studied, indicating broad consistency in processes controlling *in situ* ^{10}Be accumulation on the landscape and subsequent erosion and transportation of sediment. ^{10}Be concentration in ice marginal sediment is relatively low (~2–5 x 10^3 atoms/g), because the landscape from which the sediment is sourced is shielded from cosmic rays by ice. At least some of the ^{10}Be in sub-glacially sourced samples likely accumulated during mid-Holocene exposure when climate was warmer and the ice sheet smaller.

^{10}Be concentration in sub-aerially sourced sediment is much higher (~10–35 x 10^3 atoms/g) because of exposure to cosmic rays. The highest ^{10}Be concentrations are in sediment sourced from terrain that has been accumulating ^{10}Be since the Last Glacial Maximum.

^{10}Be concentration in drainages spanning the ice margin to the fjord mouth reflects the combined contribution of sediment sourced sub-glacially and sub-aerially. In drainages with little sub-aerial input, ^{10}Be concentrations are low and consistent whereas in drainages receiving sediment from exposed hill slopes, concentrations are higher, and may show a downstream trend towards higher ^{10}Be as sediment is sourced from an increasing area of exposed terrain.

Handouts
- NEGSA_ANelson.pdf (8.9 MB)

Session No. 33

T11. Dates and Rates: Two Decades of Cosmogenic Studies in Eastern North America, the Canadian Arctic, and Greenland
Tuesday, 19 March 2013: 8:00 AM-12:00 PM

Dartmouth Room (Omni Mount Washington Resort)

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