

USING *IN SITU* COSMOGENIC ^{10}Be TO UNDERSTAND DEGLACIATION TIMING AND GLACIAL EROSION EFFICIENCY NEAR JAKOBHAVN ICEFJORD, WESTERN GREENLAND

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In order to better understand the latest Pleistocene deglaciation near Jakobshavn Icefjord in Western Greenland (69°N), we measured *in situ* cosmogenic ^{10}Be in 16 bedrock samples and 14 boulder samples collected in a transect normal to the ice margin. Bedrock/boulder pairs were collected from six locations over a distance of 40 km, stretching from the sea to the present-day ice margin. These samples were taken at a variety of elevations at each location, ranging between 50 and 620 m a.s.l. This “dipstick” sampling method provides a three-dimensional perspective on the characteristics of ice retreat and erosion efficiency.

In general, the ages of bedrock and boulder samples are in close agreement. Almost all sample pairs are indistinguishable at one-sigma, and the two populations are not separable. This indicates that subglacial erosion rates are sufficient to remove virtually all ^{10}Be from previous periods of exposure, suggesting that the ice in this area is warm-based and highly erosive during glacial periods. This pattern is seen at both low and high elevations, suggesting similar erosion rates regardless of ice thickness. This trend demonstrates that, as opposed to many other locations in the Arctic, most bedrock near Jakobshavn does not contain inherited ^{10}Be and should accurately record deglaciation age. Therefore, cosmogenic bedrock dating performed in this area by Briner and Young is robust. Only two bedrock samples from our dataset are appreciably older than their corresponding boulder samples, showing that small amounts (<1 ka worth) of inheritance may be present in isolated locations.

There is a strong decreasing trend in age with decreased distance from the present-day ice margin. Samples from the coast indicate that deglaciation occurred ~9 ka BP, while samples from the margin indicate a significantly younger deglaciation age of ~6.5 to 7 ka BP. This pattern suggests that ice retreated slowly and regularly across the landscape, progressively exposing rock that had previously been shielded. Our data shows that about 40 km of retreat occurred over a period of 2 to 2.5 ka, indicating retreat rates of 15-20 m yr⁻¹.

[2010 GSA Denver Annual Meeting \(31 October –3 November 2010\)](#)
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Colorado Convention Center: Hall B

8:00 AM-6:00 PM, Monday, 1 November 2010

Geological Society of America *Abstracts with Programs*, Vol. 42, No. 5, p. 244

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