Paper No. 244-10

Presentation Time: 9:00 AM-6:00 PM

IN SITU COSMOGENIC 10Be ESTIMATES OF DEGLACIATION TIMING AND GLACIAL EROSION EFFICIENCY, WESTERN GREENLAND

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To investigate the retreat of the Greenland Ice Sheet during interglacial periods and the erosivity of the Greenland Ice Sheet during glacial periods, we measured *in situ* cosmogenic ^{10}Be in 12 samples from Western Greenland.

Boulder/bedrock pairs from three locations near Upernavik (72°N) were sampled in a transect stretching from the sea to the present-day ice margin. Two low-elevation (~ 25 m a.s.l.) erratic boulders located 35 km apart have exposure ages of 11.1 and 12.5 ka, providing an estimated deglaciation age for central-western Greenland. Adjacent bedrock samples are discordant, having modeled exposure ages of 13.3 and 16.7 ka, respectively. It appears that low-elevation ice was not erosive enough to completely remove rock containing ^{10}Be accumulated during previous interglacial periods. One high-elevation (~1000 m a.s.l.) erratic boulder (43 ka) and a corresponding bedrock sample (80 ka) indicate that high-elevation ice during the latest Pleistocene glaciation was even less erosive and failed to remove cosmogenic ^{10}Be inherited from previous periods of exposure. One possible scenario is that warm-based, erosive ice existed in the valleys, while cold-based, less-erosive ice existed in the highlands. It is also possible that the ice grew thinner after 40 ka BP, exposing the high-elevation boulder we sampled. Analytic uncertainties of exposure ages are 2 – 4%.

To determine the amount of inherited ^{10}Be in clasts carried by the Greenland Ice Sheet, icebound rocks were removed from the glacier margin near Kangerlussuaq (67°N), Ilulissat (69°N), and Upernavik (72°N). These clasts were sourced up-ice of the present-day ice margin. So far, two clasts from each site (n = 6) have been analyzed for cosmogenic ^{10}Be; only one (from Kangerlussuaq) yielded a ^{10}Be concentration robustly above blank level, indicative of about 1 ka of surface exposure. We hypothesize that the ice sheet retreated or thinned enough during a previous interglacial period to expose this clast or its source outcrop to cosmic radiation, suggesting that the ice sheet was at some point smaller than it is at present.

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General Information for this Meeting

Session No. 244--Booth# 51
Geomorphology (Posters)
Oregon Convention Center: Hall A
9:00 AM-6:00 PM, Wednesday, 21 October 2009