



Cosmogenic analysis reveals a blue-ice moraine in Antarctica survived the last glacial cycle

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Cosmogenic isotope analysis shows that the ice-cored blue-ice moraine at Patriot Hills has survived for at least 80 kyr, i.e. since before the Last Glacial Maximum. The implication is that a biological refuge may also have survived for as long. Strong winds sweep over the Patriot Hills causing accelerated ablation of the glacier edge at the hill foot. In compensation ice flows towards the hills and compressive flow at the margin brings a folded debris band, dipping at angles of 70-80°, to the ice surface. Subglacially-derived clasts emerge at the surface and ablation then concentrates them at the ice margin to form the ice-cored moraine. Cosmogenic isotope analysis reveals exposure ages of zero on stones emerging on the ice surface and a range from a few hundred to 29 kyr on the present ice-cored moraine. Relict moraines are draped across the hillside up to a height of 340 m above the ice margin and mark the thinning of the ice over the last 16 kyr. These moraines contain a mix of boulder ages ranging from a few thousand to 80 kyr with a few ages as old as 424 kyr. The implication is that the moraine has existed at the ice edge for much of at least the last glacial cycle, but that it has migrated up (?) and down the mountain front as the ice elevation has responded to global sea-level change. If substantiated, this discovery would explain why it is so difficult to date moraines reflecting Holocene thinning in Antarctica. Further, the presence of pre-LGM erratics could be used to argue that the West Antarctic Ice Sheet survived the last interglacial intact.