

Determination of ^{10}Be surface exposure ages and erosion rates using shallow depth profiles

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^{10}Be surface exposure ages for the Mackenzie Basin in New Zealand were determined using ^{10}Be depth profiles, and compared with those from the Macraes Flat, New Zealand. The mean ^{10}Be surface exposure age of moraine boulders from Mackenzie Basin was determined to be 19.6 ± 1.4 kyr. The model erosion rates for the Mackenzie Basin were found to be 7 m Myr^{-1} for 19.6 kyr of exposure time. An observed attenuation length of $180 \pm 14 \text{ g cm}^{-2}$ for ^{10}Be core samples from Mackenzie Basin indicated that the muon contribution at the surface, there is negligible, and confirms the ^{10}Be surface exposure age at this site to be reliable. However, while the unexpectedly long apparent attenuation lengths at the surface of the Macraes Flat indicates a significant inherited muon component these requiring muon correction to be applied. This paper provides new direction in determination of surface exposure age and erosion rate using short depth profiles for some geomorphological applications associated with active landscape changes.