

Denudation rates for Karoo dolerites in southern Africa determined with cosmogenic noble gas nuclides

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ABSTRACT

Southern Africa displays an anomalously elevated landscape with a modal elevation of approximately 1000 m above sea level, even though the region is not associated with convergent plate boundaries or active rifting. The origin and evolution of this region's topography may be constrained by determining the rates of surface processes on intermediate timescales ($10^3 - 10^6$ yr) with *in situ*-produced cosmogenic nuclides. Here we present minimum exposure ages and maximum denudation rates for Karoo dolerite surfaces across southern Africa, based on the cosmogenic noble gas inventories (^3He , ^{21}Ne) of pyroxene separates. Our minimum exposure ages for vertical and inclined scarp faces vary from ~20 to ~380 ka. Maximum denudation rates for horizontal surfaces are consistently low, and generally less than 3-4 m/Myr. These low denudation rates are compatible with a currently stable landscape, and suggest that southern Africa's topography developed under a significantly different tectonic and/or climatic regime.

Key words: cosmogenic nuclides, denudation, topography, Karoo dolerite, epeirogeny