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No 7841

## PRE-PLEISTOCENE, BARE ROCK LANDFORMS OF AUSTRALIA HAVE COMPLEX GEOMORPHIC AND COSMOGENIC HISTORIES

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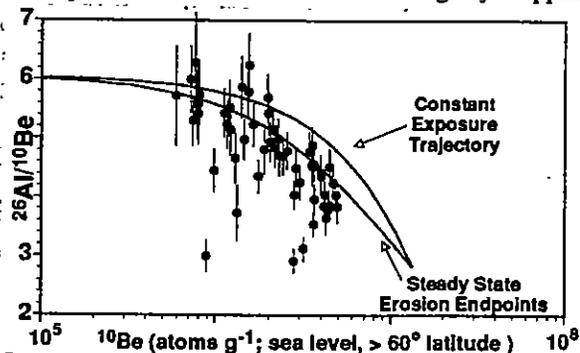
Paired analyses of in-situ-produced  $^{10}\text{Be}$  and  $^{26}\text{Al}$  in 68 samples, demonstrate that the spectacular granitic inselbergs of Australia have exceptionally long and in many cases, complex exposure histories including burial and re-exposure of rock surfaces.

We sampled exposed granite at 10 sites along a transect from the southern Australia Eyre Peninsula ( $35^\circ\text{S}$ ) to the Kakadu area in the Northern Territory ( $14^\circ\text{S}$ ). We collected 61 exposed samples from inselberg surfaces and 7 shielded samples from adjacent quarries (ranging in depth from 4 to 11 m) in order to determine maximum limiting model erosion rates and minimum limiting model exposure ages. Abundance (quartz, SL,  $>60^\circ$ , neutron scaling only) of  $^{10}\text{Be}$  and  $^{26}\text{Al}$  in exposed samples range from  $4.9 \times 10^6$  to  $5.5 \times 10^7$  at  $\text{g}^{-1}$  and  $2.1 \times 10^7$  to  $3.4 \times 10^8$  at  $\text{g}^{-1}$ , respectively. Abundances of  $^{10}\text{Be}$  and  $^{26}\text{Al}$  in shielded samples are much lower, ranging from  $2.6 \times 10^4$  to  $7.1 \times 10^4$  at  $\text{g}^{-1}$  and  $1.8 \times 10^5$  to  $2.5 \times 10^5$  at  $\text{g}^{-1}$ , respectively.  $^{26}\text{Al}/^{10}\text{Be}$  ratios of exposed samples range from 2.91 to 6.29 suggesting long exposure ages, exposure under shallow cover or periods of burial punctuating surface exposure, and possibly lower long-term nuclide production rates than those of Nishiizumi et al (1989) which we used for calculation.

Our data demonstrate that the most stable granitic surfaces on the semi-arid Eyre Peninsula are eroding  $< 0.5 \text{ m/My}$ , the equivalent of at least 700,000 years of surface exposure. Rock surfaces farther north in Australia erode more quickly ( $1\text{-}3 \text{ m/My}$ ) and have correspondingly lower model exposure ages (130-420 ky). Most samples from the upper surfaces of inselbergs have higher nuclide abundances than those collected from the sides suggesting sequential exposure of some but not all inselbergs by stripping of eolian, saprolite, or colluvial cover.

Australian bedrock surfaces are some of the most stable in the world and many large inselbergs must pre-date the dawn of the Pleistocene. Yet, none of the rock surfaces we sampled have remained uneroded and continuously exposed over millions of years as should be the case if these landforms were actually, as they have been previously interpreted, the isolated remnants of large-scale erosion surfaces.

R. Twidale, the ARC, NSF, UVM, and LLNL supported this research.



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cosmogenic, erosion rate, Australia, granite, inselberg

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