The age of the Simpson Desert, Australia

Ed Rhodes, John Chappell

Research School of Earth Sciences, The Australian National University, Canberra, ACT 0200, Australia

The results of 30 luminescence dates of sand cored from the centre of several large longitudinal sand dunes in the western Simpson Desert provide evidence that these significant geomorphological features are of a surprisingly great antiquity. The sediments were dated using optically stimulated luminescence (OSL) determinations of sand-sized quartz. This method provides an age estimate for the time of burial since the grains were last exposed to daylight, during the construction of the dune by aeolian processes.

The age estimates that we have derived from dune sediments in the Simpson Desert, near the community of Finke, NT, are in stark contrast to similar dates from the Szelecki and Tirari Deserts. DEMS PhD student Kat Fitzsimmons has measured over 80 samples from dunes at locations throughout the Szelecki and Tirari Deserts using a similar approach, and of these, fewer than 4% provide age estimates over 150,000 years (Rhodes et al. 2003). For the Simpson dataset, more than 50% provide age estimates of beyond 150,000 years. Of those that are younger, the majority were deposited before 60,000 years ago, again, providing a contrast to the age estimates from the Szelecki and Tirari Deserts. Many of the older sediments from the Simpson are beyond the range of conventional OSL methods, and preliminary results from novel “slow component” OSL methods provide encouragement that this method will allow us to date deposition on time scales up to one million years.
We have also measured 12 paired $^{10}$Be/$^{26}$Al cosmogenic nuclide concentrations in quartz from the Simpson dunes. This allows us to assess total burial time (possibly in multiple burial and erosion cycles) and approximate exposure time prior to burial for these bulk samples. The mean of the total burial age estimates is $850 \pm 300$ ka, while the mean of the pre-burial exposure ages is $210 \pm 100$ ka. We note that these exposure ages are similar to surface samples from the Macdonnell Ranges (which represents the source of sand in this region), suggesting that transport from the ranges into the desert was relatively rapid.