New production rate estimates for *in situ* cosmogenic ^{14}C

B. DUGAN, N. LIFTON AND A.J.T. JULL

Geosciences Department and Arizona Accelerator Mass Spectrometry Lab, University of Arizona, Tucson, AZ 85721 (bdugan@email.arizona.edu, lifton@email.arizona.edu, jull@email.arizona.edu)

Under the CRONUS-Earth project, a multidisciplinary investigation of terrestrial cosmogenic nuclide (TCN) production and measurement systematics, we aim to improve the calibration of *in situ* cosmogenic ^{14}C (*in situ* ^{14}C) production rates. *In situ* ^{14}C is unique among commonly measured TCNs by virtue of its short half-life (5.73 ka). Lifton *et al.* [1] estimated the *in situ* ^{14}C production rate in quartz based on measurements of wave-cut quartzite bedrock benches associated with the highstand of Pleistocene Lake Bonneville, Utah (17.4 ± 0.2 cal ka). To allow direct comparison of production rates for commonly measured TCNs in the same samples, CRONUS-Earth resampled the Lake Bonneville sites in 2005, and sampled Late-Glacial-age (11.6 cal ka) moraine and landslide deposits in northwest Scotland in 2006, as well as glacial deposits (15.5 cal ka) from the Puget Lowlands of Washington.

A more robust quartz pretreatment protocol than was employed by Lifton *et al.* [1] and Miller *et al.* [2], combined with improved extraction procedures, may necessitate a downward revision of the Lifton *et al.* [1] time-integrated site production rate estimate of up to 13.4%, from 52.9 ± 1.7 to 45.8 ± 2.1 ^{14}C at g^{-1} yr^{-1}. Initial data from new Lake Bonneville samples yield a time-integrated site production rate of 47.3 ± 0.8 ^{14}C at g^{-1} yr^{-1} - consistent with the revised estimate. Initial measurements of samples from 2 sites in Scotland have been completed as well. We are also investigating potential grain-size effects on measured *in situ* ^{14}C concentrations.

Modern production rate estimates for sea-level high latitude (SLHL) were calculated with each of 4 published production rate scaling models in order to compare results from the various sites. The Scotland samples consistently predict slightly higher modern SLHL production rates than those from Lake Bonneville (significant at 2σ). Weighted mean modern SLHL production rates from both sites range from 15.2 ± 0.3 at g-1 yr-1 for the Lal [3]/Stone [4] model to 17.5 ± 0.3 at g-1 yr-1 for the Lifton *et al.* [5] model. We will present additional measurements from all three sites to augment these initial results.

[1] Lifton et al. (2001) *GCA* **65**, 1953. [2] Miller *et al.* (2001) *Quat. Geochron*. **1**, 74. [3] Lal (1991) *EPSL* **104**, 424. [4] Stone (2000) *JGR* **105**, 23, 753. [5] Lifton *et al.* (2005) *EPSL* **239**, 140.

Pleistocene landscape evolution of a passive margin in response to climate change

T.J. DUNAI[1]*, B. EITEL[2] AND F.M. STUART[3]

[1]School of Geosciences, University of Edinburgh, EH8 9XP, Scotland, UK (*correspondence: tibor.dunai@ed.ac.uk)
[2]Geographisches Institut, Universität Heidelberg, D-69120 Heidelberg, Germany
[3]SUERC, East Kilbride, Glasgow G75 OQF, Scotland, UK

The Quaternary landscape evolution in Namibia, which is required to link offshore climate reconstructions to onshore processes, was heretofore largely unconstrained. Traditional terrestrial climate records are largely absent in the region. Landscape features in the region have the potential to record climatic signals, unaffected by episodic tectonic activity, since the post-beakup tectonic and large-scale landscape evolution in this region was largely concluded by the late Cretaceous [1].

We use exposure dating (^{10}Be, ^{21}Ne) of abandoned fluvial terraces and planation surfaces in the Ugab catchment, the second largest ephemeral river catchment in Namibia, to constrain periods of enhanced fluvial activity in southwestern Africa.

The data record episodes of significant Pliocene erosion. Regional pediments were abandoned at 1.1 Ma, 290 ka and 150 ka, and the level of the highest fluvial terraces was abandoned at 430 ka. The timings of these major fluvial episodes coincide with the largest Pleistocene shifts in the marine isotope record (glacial terminations II, III and V) [2] and the mode shift in orbital forcing from low-amplitude 41 kyr obliquity cycles to high amplitude 100 kyr eccentricity cycles.

In agreement with the interpretation of offshore records [3] we conclude that areas at the arid/semi-arid transition, such as in our study areas, are particularly sensitive transient climate. Rapidly increasing precipitation in barren catchments that had lost continuous vegetation cover in the preceding arid glacial periods is a likely mechanism for these transient erosion episodes in Namibia.

[1] Raab *et al.* (2005) *Tectonics* **24**, TC3006. [2] Lisiecki & Raymo (2005) *Paleooceanography* **20**, PA1003, doi, 10.1029/2004PA001071. [3] Dupont (2006) *Geochemistry Geophysics Geosystems* **7**, doi,101029/2005GC001208.