Paper No. 244-39

Presentation Time: 9:00 AM-6:00 PM

WHERE IS THE SEDIMENT COMING FROM AND WHERE IS IT GOING – A 10Be EXAMINATION OF THE NORTHERN QUEENSLAND ESCARPMENT, AUSTRALIA

BIERMAN, P., Geology and School of Natural Resources, University of Vermont, Delehanty Hall, 180 Colchester Ave, Burlington, VT 05405, pbierman@uvm.edu, REUSSER, Lucas J., Department of Geology, University of Vermont, Delehanty Hall, 180 Colchester Ave, Burlington, VT 05405, NICHOLS, Kyle K., Department of Geosciences, Skidmore College, 815 North Broadway, Saratoga Springs, NY 12866, MATMON, Ari, Institute of Earth Sciences, Hebrew University, Givat Ram, Jerusalem, 91904, Israel, and ROOD, Dylan, Center for Accelerator Mass Spectrometry, Lawrence Livermore National Laboratory, Livermore, CA 94550-9234

In order to estimate the erosion rate of the northern Queensland escarpment and the adjacent upland plateau and to track the source of sand-sized sediment delivered to the Coral Sea, we collected 16 sand samples and measured both their in situ and meteoric 10Be content. 15 samples were collected from rivers and streams including large regional drainages and small tributaries - both from the low-relief, dry upland and from the steep, wet escarpment. One sample is quartz sand from the beach at Yorkey's Knob, below the escarpment.

We measured in situ 10Be in 4 samples including beach sand, a sample from a small, steep drainage on the escarpment, and 2 samples from the large, upland, Barron River watershed. Upland river samples have the same in situ 10-Be concentrations (2.70 and 2.66 x10^5 atoms/g), which are similar to the concentration in beach sand (3.07x10^5 atoms/g). Erosion rates for the upland samples, depending on assumed exposure elevation, fall between 9 and 14 m/My. The stream heading on the escarpment has about half as much 10-Be (1.1x10^5 atoms/g) as the upland samples suggesting more rapid erosion, 16 to 25 m/My. These erosion rates are similar to those measured on the SE Australian escarpment (Heimsath). The pattern of stable uplands and more rapidly eroding escarpments matches that seen at the arid Namibian and the temperate Blue Ridge (southern Appalachian Mountains) escarpments. It also appears that climate does not strongly control escarpment erosion.

We measured meteoric 10Be in all samples; concentrations are low and variable, 0.2 to 1.7 x 10^8 atoms/g. Upland samples have three-fold lower meteoric 10Be concentrations (0.31 +/-0.11 x10^8 atoms/g, n=6) than escarpment samples (1.0+/- 0.44 x10^8 atoms/g, n=9) despite the uplands having lower in-situ based erosion rates. This discrepancy is consistent with the observation that 10Be delivery rates scale with mean annual precipitation; less 10Be falls on the arid uplands than on the humid escarpment. Beach sand (0.40x10^8 atoms/g) has a meteoric 10Be concentration similar to upland river sand (0.31 +/-0.11 x10^7 atoms/g).

The isotopic similarity between quartz beach sand and river sand from the extensive, weathered uplands (in both meteoric and in situ 10Be concentrations) suggests that the beach sand is derived primarily from upland sources, not from the steep, wet, more rapidly eroding but aerially restricted escarpment.

2009 Portland GSA Annual Meeting (18-21 October 2009)
General Information for this Meeting

Session No. 244--Booth# 80
Geomorphology (Posters)
Oregon Convention Center: Hall A
9:00 AM-6:00 PM, Wednesday, 21 October 2009