134-24

Presentation Time: 8:00 AM-12:00 PM

THE LIFE OF DESERT PIEDMONT SEDIMENT: SEDIMENT TRACING USING COSMOGENIC NUCLIDES

NICHOLS, Kyle K.[1], *BIERMAN, Paul*[2], *EPPES, M.C.*[3], *FINKEL, Robert C.*[4], *CAFFEE, Marc W.*[5], *and LARSEN, Jennifer*[2], *(1) Department of Geosciences, Skidmore College, 815 N. Broadway, Saratoga Springs, NY 12866, knichols@skidmore.edu, (2) Geology, Univ of Vermont, Perkins Hall, Burlington, VT 05405, (3) Geography & Earth Sciences, Univ of North Carolina, Charlotte, Charlotte, NC 28223, (4) CAMS, Lawrence Livermore National Lab, Livermore, CA 94550, (5) Physics, Purdue Univ, W. Lafayette, IN 47906*

At the East Range Road piedmont in the Mojave Desert, we used cosmogenic ^{10}Be and ^{26}Al to trace sediment from the source basins to the adjacent piedmont in order to quantify millennial-scale sediment budgets, surface histories, and sediment velocities. The low-gradient East Range Road piedmont has two major geomorphic surfaces, an incised (up to a few meters) surface proximal to the upland source basins, and a low-relief surface ~1 km from the uplands. Activities of ^{10}Be and ^{26}Al decrease exponentially at depth in a 2-meter pit (EP1) dug into the incised surface. A model of the nuclide decrease at depth suggests the upper 2 meters of sediment was deposited ~76,000 ka and has been stable (or has had minimal erosion) since. The nuclide-based age of the surface is consistent with the time required to develop a massive Ck/K horizon (stage III) in the bottom meter of sediment. Activities of ^{10}Be and ^{26}Al in a 1.5-meter pit dug into the low-relief surface (EP2) neither increase nor decrease at depth. A model of the nuclide data, when set in the context of soil development - 3 buried soil horizons – presents a scenario of three stable surfaces (each lasting between 10,000 and 25,000 years) and each followed by rapid deposition (40 to 250 mm ky^{-1}). The total time represented in EP2 is between 57,000 to 75,000 years, a range also consistent with the time required to develop the soils present in EP2.

Upland basin sediment has the lowest nuclide activity, sediment from the proximal incised piedmont surface has the highest activity, and sediment from the distal low-relief surface has an intermediate nuclide activity. Using a weighted nuclide-mixing model we determined that ~75% of sediment in transport down the piedmont erodes from the upland basins while the remaining 25% is eroded from the incised piedmont surface. Nuclide activities of sediment collected from the incised channels and from the low-relief surface increased steadily down the piedmont. Based on the sediment budget and the down piedmont increase in nuclide activity, we modeled average down gradient sediment speeds of 8 to 23 cm y^{-1}.

2003 Seattle Annual Meeting (November 2–5, 2003)

Session No. 134--Booth# 102
Quaternary Geology/Geomorphology (Posters) II: Landscape Processes and Histories
Washington State Convention and Trade Center: Hall 4-F
8:00 AM-12:00 PM, Tuesday, November 4, 2003