2007 GSA Denver Annual Meeting (28–31 October 2007)
Paper No. 93-4

Presentation Time: 2:20 PM-2:40 PM

SCRATCHING BENEATH THE SURFACE: ALLUVIAL HISTORIES RECORDED IN COSMOGENIC NUCLIDE DEPTH PROFILES

NICHOLS, Kyle K., Department of Geosciences, Skidmore College, 815 North Broadway, Saratoga Springs, NY 12866, knichols@skidmore.edu and BIERMAN, Paul R., Geology Department and School of Natural Resources, University of Vermont, Burlington, VT 05405

Recent advances in geochronology have rekindled interest in alluvial fan research. One such technology, cosmogenic nuclides, has shown promise for surface age dating by using surface clasts or depth profiles; however, unknown nuclide inheritance or non-uniform deposition can preclude simple interpretation of the data. Interestingly, these complexities in the depth profiles can provide valuable information by quantifying process changes and unraveling alluvial fan surface histories.

Cosmogenic nuclide profiles in soil pits can either decrease with depth (quantify surface age), increase with depth (quantify deposition rates), or be a composite of both (indicate deposition and stability). While it is possible to determine the local surface history at the spatial-scale of a single soil pit, it is more difficult to understand the larger-scale geomorphic system because alluvial surfaces are usually multi-aged and multi-surfaced. Therefore, depth profiles in soil pits must be set into the larger geomorphic context to understand fully the history of alluvial surfaces.

We use cosmogenic nuclide depth profiles, and their geomorphic context, for five Mojave Desert piedmonts to highlight the utility of cosmogenic nuclide depth profiles and to demonstrate the complexity of alluvial processes. At the landscape-scale, each data set is internally consistent revealing process rates and ages. However, at the regional-scale, data correlation is difficult because it is complicated by local geomorphic processes. For example, geomorphic process modifying surfaces dominated by grus are different than the processes acting on surfaces covered by well-formed pavements. Such local differences may cause a lag-time in the propagation of geomorphic change down gradient from sediment source basins, depending on the magnitude of the change and the speed of sediment transport. Thus, only the largest regional events, such as Mojave-wide deposition at OIS 4 and a change in process at the Pleistocene-Holocene transition, are present in most soil pits, while

smaller-scale, local events, such as new sediment sources, piracy, or reworking of alluvium appear at the local-scale.

2007 GSA Denver Annual Meeting (28–31 October 2007)
General Information for this Meeting
Session No. 93
Evidence of Climatic and Tectonic Change Recorded in Alluvial Fans
Colorado Convention Center: 406
1:30 PM-5:30 PM, Monday, 29 October 2007

Geological Society of America Abstracts with Programs, Vol. 39, No. 6, p. 260