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# THE SPEED AND HISTORY OF PIEDMONT SEDIMENT

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

At the Chemehuevi Mountain piedmont in the Mojave Desert, we used *in situ*- produced cosmogenic $^{26}$Al and $^{10}$Be, analyzed in sediment, to quantify sediment supply rates to the piedmont, sediment speeds across the piedmont, and the timing of deposition, erosion, and surface stability of the piedmont surface over the $10^4$ year time scale. $^{26}$Al and $^{10}$Be data acquired from numerous transects across distal, medial and proximal landscape positions suggest that sediment supplied to the Chemehuevi Mountain piedmont is mainly from the mountain source basins ($4 \times 10^4$ kg km$^{-2}$ y$^{-1}$) and the proximal bedrock pediment ($3.3 \times 10^4$ kg km$^{-2}$ y$^{-1}$). Relatively little of the sediment currently at the ground surface across the piedmont appears to be derived from erosion of incised alluvium and from the channel bed ($0.2 \times 10^4$ kg km$^{-2}$ y$^{-1}$ and $0.3 \times 10^4$ kg km$^{-2}$ y$^{-1}$, respectively). Nuclide activities of sediment collected from active channels increase steadily down the 12 km - long piedmont. Based on the sediment budget, the down piedmont increase in nuclide activity, and the thickness of sediment in active transport (~32 cm to ~17 cm from the rangefront to the distal piedmont, respectively) we modeled average sediment speeds of 8 to 39 cm y$^{-1}$.

Nuclide analyses and soil development of two soil pits, located ~6 km and ~12 km from the rangefront, suggest complex histories of sediment deposition, surface erosion, and surface stability. Nuclide analyses of sediment from the pit 12 km from the rangefront suggests sediment deposition rates of 20 to 37 mm ky$^{-1}$ until ~8,000 years ago when deposition was replaced by sediment transport. This interpretation is consistent with the observed soil characteristics that indicate that late Holocene sediments overlie early Holocene sediments at this pit. Soil development and nuclide analyses of sediment from the pit ~6 km from the rangefront suggests a complex history of sediment deposition (18 mm ky$^{-1}$), surface erosion (truncated soil horizons), and surface stability (buried soils, as well as varnished pavement at the current ground surface) over the past ~70,000 years. By using cosmogenic nuclides we provide a new window into understanding the behavior of these enigmatic features over large spatial- and long temporal-scales.

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