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MILLENNIAL-SCALE SEDIMENT SPEEDS DOWN LOW-GRADIENT DESERT PIEDMONTS: NEW DATA FROM THE GOLDSTONE PIEDMONT, MOJAVE DESERT

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At the Goldstone piedmont in the Mojave Desert, we used cosmogenic ^{10}Be to trace sediment from the source basins down the adjacent piedmont in order to quantify millennial-scale sediment velocities and surface histories. The low-gradient, grus-dominated Goldstone piedmont has two major geomorphic surfaces: a surface incised by channels several meters deep that extends only a few hundred meters from the source basins and a distal, low-relief surface that formed where the incised channels coalesce. The distal surface has poorly-defined channels (compared to many other Mojave Desert piedmont surfaces). The nuclide activities of sediment collected along transects spaced at 0.25 km intervals away from the range front increase steadily down the piedmont. Based on the down-piedmont increase in nuclide activity, we modeled average down gradient sediment transport sediment speeds of 15 cm/y. These speeds are similar to the millennial-scale sediment speeds on other Mojave Desert surfaces: 9 - 22 cm/y for the East Range Road piedmont, and decimeters per year for the Chemehuevi, Iron, and Granite Mountain piedmonts. These results, combined with the depth of active sediment transport for all studied surfaces (based on the depth to the top of the B-horizon), suggests that many Mojave Desert piedmonts move sediment decimeters per year in layers that average a couple of decimeters thick.

At Goldstone, activities of ^{10}Be decrease exponentially at depth in two, 2-meter pits: one dug into the proximal surface (GSP1) and one dug into the distal surface (GSP3: 1.2 km down gradient of GSP1). Models of the ^{10}Be decrease at depth suggest the upper 2 meters of sediment were deposited quickly at ~11.7 ka (GSP1) and ~12.4 ka (GSP3). The nuclide-based model ages are consistent with minimal soil development observed in the field. The rate of change in nuclide activity down piedmont for the modern surface sediment is similar to the difference nuclide inheritance between GSP1 and GSP3, potentially suggesting similar sediment speeds during deposition ~12 ka and today.

Session No. 332

T45. Tracking Sediment Movement across Earth's Surface
Wednesday, 22 October 2014: 1:00 PM-5:00 PM

208/209 (Vancouver Convention Centre-West)

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