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**Supplemental File. Pebble sampling and Cosmogenic nuclide sample preparation (**http://dx.doi.org/10.1130/GES01134.S2)

**Pebble Sampling**

We collected 47 pebbles from three different locations on the same geomorphic surface. Each of these locations was on a different part of this surface, with each part separated by channels that have begun to dissect it. We identified these surfaces as being remnants of the same, originally continuous, surface based on their shared elevation, characteristics of the underlying soil, surface morphology, clast composition, and degree of pavement and varnish development. Pebbles were collected from the middle parts of each surface remnant, as far away from the dissecting channels as possible. Because we were concerned about material loss during sample preparation, we selected the largest pebbles we could find while attempting to keep the grain size of pebbles from each part of the surface uniform.

In the lab, the mass of each pebble was recorded and the volumes measured by displacement. We selected the 10 pebbles for 10Be determination by ranking each pebble 1 through 47 based on mass, summing the ranks, and then selecting the 10 largest pebbles from the surface with the lowest rank sum. This also turned out to be the most laterally extensive remnant of the now dissected surface.

**Cosmogenic 10Be sample preparation**

Each pebble was crushed, pulverized and sieved to a grain size of 0.25 - 0.5 mm at the U.S. Geological Survey campus in Menlo Park, CA. Crushed samples were then brought to the Cosmogenic Nuclide Preparation Laboratory in the Department of Geological and Environmental Sciences at Stanford University, Palo Alto, CA, where quartz was cleaned and 10Be isolated using standard methods (Kohl and Nishiizumi, 1992; Clifton and Granger, 2005; Clifton et al., 2005). Following an overnight bath in 3:1 concentrated HCl/HNO3, samples were subjected to three ~8-hour leaches in a warm, continuously agitated 5% by volume solution of HF/HNO3. This treatment winnowed accessory phases from the quartzite, as well as etched the quartz in order to remove any meteoric 10Be. After rinsing and drying, quartz purity was evaluated by ICP-MS determination of Al, Fe, Ti, Mg, Mn, and Be. Once determined pure (Al ≤ 150 ppm), samples were spiked with ~350 g of 9Be in a weak HNO3 carrier solution and dissolved in a 5:1 solution of concnetrated HF/HNO3. Carrier was derived from deep-mined beryl, and has a nominal concentration of 345.18 ± 4.13 g 9Be/g (mean and standard error) and 10Be/9Be ratio of 1.83 x 10-15 to 3.70 x 10-15. After the quartz was completely dissolved the solution was brought to dryness, and the resulting cake treated 4 times with a 3:1 solution of concentrated HCl/HNO3 and then dried in order to decompose fluoride compounds. The resultant chloride cake was dissolved in 6N HCl, dried, and then dissolved in 0.4M oxalic acid. Beryllium was isolated by standard ion chromatography methods following von Blanckenburg et al. (1996) and Clifton et al. (2005). Beryllium hydroxide was precipitated at pH ~9 using 1:1 NH4OH, centrifuged and rinsed 3 times, loaded into quartz crucibles, and dried in a dry cell incubator. The resulting BeOH was oxidized to Be) at 1100 ºC for 1 hour. BeO was crushed, mixed with niobium powder, and loaded into stainless steel holders for analysis by accelerator mass spectrometry (AMS) at the Center for AMS - Lawrence Livermore National Laboratory. Be isotope ratios were normalized at the time of measurement to the standards KNSTD549, KNSTD1032, KNSTD3110, and KNSTD9422 (Nishiizumi et al., 2007).

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