ADVANCES IN 230TH/U DATING OF PALEOSOLS, EXAMPLES FROM KYLE CANYON, NEVADA AND WIND RIVER BASIN, WYOMING, U.S.A.

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Dating of paleosols in Quaternary alluvial fans and fluvial terraces can constrain the ages not only of pedogenesis but also of the host landforms. Pedogenic carbonate rinds on the bottoms of pebbles and laminar calcretes in the B horizon of soils developed in alluvial or fluvial gravels were selected by microscopic examination of polished slabs, sampled with a micro-drill along internal horizons as thin as 1 mm, and their Th-U isotopes analyzed by TIMS. Carbonate-dominated alluvium of Kyle Canyon has rinds with low 238U/232Th (about 1), making them unfavorable for dating. Sub-horizontal sheets of calcrete in a Late Pleistocene gravel of Kyle Canyon has 1-2 ppm 238U, 0.01-0.1 ppm 232Th and (230Th/232Th) of 30-200, but ages scatter across cm-scale layers and the analyses define a horizontal array on the (230/238) vs. (234/238) diagram that suggests loss of U or inheritance of 230Th resulting from local dissolution and re-precipitation. In contrast, rinds from silicate-dominated, fluvial terrace gravels of the Wind River have consistently favorable (that is, high) 238U/232Th. Their ages pass reliability tests including consistency along a single micro-horizon, younging outward from the pebble, and coherent initial 234U/238U. Inner rind ages of 16 ka for the youngest terrace, which grades to glacial outwash correlated with the end of the last glaciation, compare favorably with published 36Cl and 10Be exposure ages of 16-23 ka for the terrace and related moraines.