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TRACKING SOIL TRANSPORT DOWNSLOPE USING IN SITU-PRODUCED 10-BE

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Measuring soil transport rates down steep slopes is not easy; here, we present a new, field-based approach using 10Be. In order to track changes in average in-situ-produced 10Be concentration as a function of distance downslope, we modified the transect/amalgamation soil sampling approach that Nichols et al. (2002) first applied to low-gradient arid region piedmonts. Here, we report data from three of five humid region sites, the Great Smoky Mountains (GSM) of NC, the central plateau of Madagascar, and the Valley and Ridge (PA); bedrock types are sandstone, gneiss, and sandstone, respectively.

For the GSM (n = 40 samples), 10Be concentrations (4.1-6.1*105 atoms/g) for the upper three transects increased downslope, but the concentrations decreased for the final, lowest elevation transect. Here, tree throw is the dominant soil transport mechanism. In Madagascar (n = 8), 10Be concentrations (3.2-11.2*105 atoms/g) had a similar "humped" trend with an initial increase followed by a decrease downslope. Here, the hillslope is armored by laterite, with surface wash and animal burrowing moving most sediment. In contrast, 10Be concentrations (1.5-3.6*105 atoms/g) for PA (n = 6) systematically decrease with distance downslope. The PA slope is mantled with a layer of periglacial colluvium. For the GSM and Madagascar, samples were also collected at different depths within the soil profile: the A-horizon, top and bottom of the B-horizon, and from clasts at ~65cm. Based on differences between 10Be concentrations within these depth profiles, we infer the degree and depth of mixing for each site. To test for variability across the slope, we kept samples (n = 4 per pit) for individual pits (n = 7) separate along one

transect in the GSM. 10Be concentrations for these "internal variance" samples range from 4.3-6.9*105 atoms/g.

Data we have collected so far suggest that: 1) 10Be concentrations vary systematically with distance downslope; 2) the pattern of this systematic variation is not universal but differs between various tectonic and climatic settings; 3) systematic change in 10Be concentrations downslope allow inference of residence times, transport rates, and the loci of production for hillslope soils.

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General Information for this Meeting
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