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299-7 Estimating Pre-Disturbance Rates of Sediment Generation and Erosion with *in Situ* and Meteoric 10-Be: Waipaoa River Basin, New Zealand

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Near total conversion of forest to pastureland in the erosion-prone Waipaoa River Basin, along the active eastern margin of New Zealand's North Island, has resulted in some of the most dramatic and widespread erosional features found on the planet. Due to high frequency of shallow landsliding and continual gully erosion in the headwaters initiated by land-clearance, the 2200 km2 catchment delivers a disproportionately large 15 Mt of sediment to Poverty Bay annually, suggesting an average denudation rate of > 2 m/ky.

To establish baseline rates of erosion during the late Holocene and to trace sediment movement, we collected 46 samples of active channel sediment within and around the Waipaoa Basin for in situ and meteoric 10-Be analysis. 19 of the 46 samples contained sufficient quartz for in situ measurement, and yielded model erosion rates ranging from 224 to 6054 mm/ky. Meteoric 10-Be concentrations modeled as erosion rates for all 46 samples range from 89 to 3494 mm/ky.

The lowest 10-Be concentration and thus highest model erosion rates are from the northern headwaters of the Waipaoa where deeply sourced sediment from gully complexes enters the channel network. Erosion rates for samples collected along the mainstem decrease predictably downstream as more highly dosed sediment from less-disturbed tributaries mixes with the gully-derived sediment from the north. Samples from the more stable eastern and western tributaries (n=7) yield consistent average in situ and meteoric erosion rates; 294+/-64 and 325+/-79 mm/ky respectively, representing background rates of erosion. Both in situ and meteoric rates estimates agree with an independent estimate of pre-clearance erosion (~395 mm/ky) generated using hydrologic-transport modeling (Kettner et al, 2007). These finding demonstrate that meteoric 10-Be can be used to study erosion in terrains with fine-grained lithologies containing little to no quartz where in situ measurements are often impossible.

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