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A 10BE VIEW OF TROPICAL EROSION: THE RIO CHAGRES, A STEADY SUPPLY OF SEDIMENT IN PANAMA

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The rate at which steep tropical drainage basins erode is not well known; nor has the variability of erosion rate over decadal, centennial, or millennial scales been well established. Knowing such rates has important practical consequences, particularly when infrastructure such as the Panama Canal and its water supply system would be impacted by sediment accumulation. To estimate the rate and distribution of sediment generation in the upper Rio Chagres basin (a tributary to the Panama Canal) over the last 10 to 20 kyr, we measured 10Be in 24 quartz-bearing fluvial sediment samples. Results from the sand fraction (0.50 - 0.85 mm) indicate the upper Chagres Basin is generating sediment uniformly. Nuclide activities suggest basin-wide sediment generation rates of 143 and 354 tons km-2 y-1 (average = 234 ± 74 tons km-2 y-1; n = 7) for small tributary basins and 248 to 281 tons km-2 y-1 (average = 267 ± 97 tons km-2 y-1; n = 3) for large tributary basins. The weighted average of all tributaries is 269 ± 63 tons km-2 y-1; n = 10). A sample collected upstream of Lake Alhajuela suggests that the entire basin is exporting sediment at a rate of 275 ± 62 tons km-2 y-1. These data suggest that the Chagres basin (when considered on scales < 5 km2 to > 350 km2) is generating sediment at ~270 tons km-2 y-1. This long-term sediment generation rate is similar to the estimate derived from suspended sediment yield measured below the Rio Chagres – Rio Chico confluence from 1981 to 1996 (289 tons km-2 y-1), implying that decadal and millennial sediment yields are similar. Seven samples were spilt and different grain sizes were analyzed. Grains larger than 9.4 mm (n=7) have less 10Be than the sand from each location (average difference is 31 %). Such variation in 10Be content could result from landslide delivery of less-dosed grains from the subsurface or from erosion of low-elevation bedrock. The less-dosed larger grains could have been delivered by landslides with an average thickness of ~0.7 m. Alternatively, if clasts were derived from bedrock near the sampling site,

resulting sediment generation rates would be similar to those calculated from the sand fraction. Since the distribution of quartz throughout the basin is not well known, it is not yet possible to distinguish between these two hypotheses.

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