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19-22 October | Vancouver, BC, Canada


[Start](#) | [View Uploaded Presentations](#) | [Author Index](#) | [Meeting Information](#)

2014 GSA Annual Meeting in Vancouver, British Columbia (19–22 October 2014)

Paper No. 150-2

Presentation Time: 1:20 PM

CONSTRAINING BACKGROUND EROSION RATES USING ^{10}Be IN SELECTED BRAZILIAN WATERSHEDS

[SOSA-GONZALEZ, Veronica](#), The Rubenstein School, University of Vermont, Aiken Center, 81 Carrigan Drive, Burlington, VT 05405, BIERMAN, Paul, Department of Geology and Rubenstein School of Environment and Natural Resources, University of Vermont, Delehanty Hall, 180 Colchester Ave, Burlington, VT 05405, FERNANDES, Nelson, Department of Geography, Geosciences Institute, Federal University of Rio de Janeiro, Rio de Janeiro, Brazil and ROOD, Dylan H., AMS Laboratory, Scottish Universities Environmental Research Centre (SUERC), East Kilbride, G75 0QF, United Kingdom, vsosago1@uvm.edu

Background erosion rates – derived from cosmogenic ^{10}Be – were quantified for 14 watersheds in the states of Santa Catarina (n= 7) and Rio de Janeiro (n= 7) in Brazil. Watershed area ranges between 3 and 14990 km². Watershed mean elevation ranges between 235 and 1610 m and mean basin slopes between 11 and 30°. The basins in Rio mostly drain the Serra do Mar escarpment, with an average basin slope of 20°; average basin slope for the watersheds in Santa Catarina is 14°.

In-situ produced ^{10}Be was measured in sand fraction quartz of active river channel sediment. ^{10}Be concentrations range from $7.6 \pm 0.3 \times 10^4$ to $25 \pm 0.7 \times 10^4$ atoms/g of ^{10}Be . Erosion rates vary from 12 to 48 m/Myr (mean = 22 m/Myr; median=16 m/Myr). There is no significant difference between erosion rates in Rio and Santa Catarina. These erosion rates, though fairly low, are higher than those of watersheds also located on passive margins including Namibia and the southeastern USA.

Annual precipitation and mean basin slope are the strongest predictors of erosion in Brazil. Precipitation has a stronger relationship with erosion ($R^2=.55$, $p<0.01$) than slope ($R^2=.45$, $p=0.01$). When combined, their relationship to erosion increases ($R^2=.70$, $p=0.01$). The climate in Rio is mostly tropical, and sub-tropical in Santa Catarina. Rio experiences heavy rain during the summer; in Santa Catarina the precipitation is distributed more evenly through the year.

We collected recent debris flow sediment in Rio. Debris flow sediment had a concentration of ^{10}Be up to an order of magnitude greater than that of river sediments in the same region. One debris flow sample in Santa Catarina had a concentration of ^{10}Be much greater than river sediments in the same watershed. Though debris flows are common in these regions, their recurrence time is large enough to allow for long surface residence time, increasing its ^{10}Be concentration.

In three watersheds in Rio, river cobbles and sandy sediment were sampled. For one of the sites, the ^{10}Be concentration of the river sand was an order of magnitude greater than for river cobbles; at the other two sites, there was no significant difference in concentration. These results imply that there is no difference in material sourcing to the river; material sourced during high flow events and sandy sediments that settle on the stream have similar ^{10}Be concentrations.

Session No. 150

[T40. Records of Past Watershed Dynamics Archived in Lowland Wetlands and Lakes](#)

Monday, 20 October 2014: 1:00 PM-5:00 PM

208/209 (Vancouver Convention Centre-West)

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Back to: [T40. Records of Past Watershed Dynamics Archived in Lowland Wetlands and Lakes](#)

[<< Previous Abstract](#) | [Next Abstract >>](#)