

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

2015 GSA Annual Meeting in Baltimore, Maryland, USA (1-4 November 2015)

Paper No. 268-7

Presentation Time: 11:30 AM

MAPPING EROSION OF THE APPALACHIAN MOUNTAINS USING COSMOGENIC 10-BE

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The Appalachian Mountains parallel the North American passive margin, dominating topography from the southern United States to eastern Canada and sustain considerable elevation, up to 2037 m at Mt. Mitchell, North Carolina. Here we use *in situ* ^{10}Be , a cosmogenic nuclide produced *in situ*, to map erosion throughout the orogen south of the glacial limit.

We synthesize all southern Appalachian erosion rates inferred from ^{10}Be : 449 ^{10}Be measurements made in quartz extracted from outcropping rock ($n=132$) and from river sediment ($n=317$). Bedrock samples were collected from the tops of exposed outcrops along summits, ridgelines, and interfluvies. Stream sediment samples ($n = 317$) were collected from active channels of catchments ranging in size from 0.01 km² to 29,796 km².

The median erosion rate for all sampled southern Appalachian drainage basins is 13.2 m/My; the median erosion rate for southern Appalachian rock outcrops is 7.1 m/My - low in comparison to active orogens which can erode at 100s to 1000s of m/My. Erosion rates vary in a spatially systematic fashion. For drainage basins, those at high elevation, those with higher average basin slopes, and those with higher normalized channel steepness values erode more quickly than those at low elevation, those with lower slopes, and those with less steep channels. There is no systematic change in erosion rate with basin scale. The highest basin-scale erosion rates are found in the northwestern Susquehanna River basin and in the Great Smoky Mountains (Figure 1).

In the Potomac, Shenandoah, and Great Smoky regions, basin-scale and outcrop erosion rates are indistinguishable. In the Susquehanna River basin, drainage basins are eroding almost twice as fast, on average, as bedrock outcrops suggesting that the basin is responding to a change in effective baselevel.

Session No. 268

[P5. Appalachian Geomorphology I](#)

Wednesday, 4 November 2015: 8:00 AM-12:00 PM

Room 327/328/329 (Baltimore Convention Center)

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[Back to: P5. Appalachian Geomorphology I](#)[<< Previous Abstract](#) | [Next Abstract](#)