2006 Philadelphia Annual Meeting (22–25 October 2006)
Paper No. 112-9
Presentation Time: 1:30 PM-5:30 PM

COSMOGENICALLY DERIVED EROSION RATES FOR THE BLUE RIDGE ESCARPMENT, SOUTHERN APPALACHIAN MOUNTAINS

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The Blue Ridge escarpment, located within the southern Appalachian Mountains of Virginia and North Carolina, forms a distinct boundary between the less rugged surfaces of the low-elevation Piedmont and higher-elevation Blue Ridge physiographic provinces. While most researchers agree that passive margin escarpments are the result of rifting with morphology maintained by ongoing erosion, the rugged topography of the Blue Ridge escarpment and the antiquity of the passive margin of eastern North America have lead some to question the processes that have sustained this landform. To investigate further the geomorphic evolution of the Blue Ridge escarpment, we are using cosmogenic ^{10}Be, measured in stream sediment, to estimate erosion rates on the scale of 10^4-10^5 years. These data build upon previous investigations that have attempted to explain the morphology and erosion of the Blue Ridge escarpment as well as its migration over time.

All 26 samples analyzed so far contain significant ^{10}Be (>10^5 atoms/g) indicating that erosion rates are modest. Basins in the Piedmont province (n=4) are eroding at rates of 9.8-13.0 m/My. Erosion rates for two basins in the Blue Ridge province are 8.8 and 10.8 m/My, while erosion rates for two basins draining only the escarpment are 10.5 and 19.7 m/My. Basins range from 1-21 km^2 with average slopes of 12-19° in the Piedmont, 2-4 km^2 and 8-9° in the Blue Ridge, and 0.5-1 km^2 and 16-22° along the escarpment. Sediment from 6 of these 8 basins was split into four grain-size fractions (sand to cobbles) to investigate the relationship between grain size and cosmogenic isotope concentration. Only 1 of 6 samples shows any relationship between grain size and ^{10}Be concentration strongly suggesting that, in this environment, all grain sizes are similarly dosed by cosmic rays.

Our results are similar to those reported by Spotila et al. (2004), who used apatite (U-Th)/He dates to calculate long-term (10^8 years) erosion rates of 11-18 m/My across the escarpment from the Blue Ridge toward the inner Piedmont. In contrast to Spotila's findings, there is no cosmogenic evidence for a rapidly eroding inner Piedmont. We conclude that the majority of erosion that shaped the Blue Ridge escarpment occurred immediately following rifting, and since then, this feature has remained relatively stable.

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General Information for this Meeting

Session No. 112--Booth# 14
Erosion: Processes, Rates, and New Measuring Techniques (Posters)
Pennsylvania Convention Center: Exhibit Hall C
1:30 PM-5:30 PM, Monday, 23 October 2006

Geological Society of America *Abstracts with Programs*, Vol. 38, No. 7, p. 279