

**Paper No. 4-12**

**Presentation Time:** 10:45 AM-11:00 AM

## **LOW RATES OF BEDROCK OUTCROP EROSION IN THE CENTRAL APPALACHIAN MOUNTAINS INFERRED FROM *IN SITU* <sup>10</sup>BE CONCENTRATIONS**

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We collected 72 samples from spur-ridge and ridge-top bedrock outcrops within the Potomac and Susquehanna River basins and calculated erosion rates utilizing *in situ* <sup>10</sup>Be concentrations measured in quartz. Over one hundred basin-scale erosion rates have been estimated cosmogenically in this region (Reuter, 2005; Duxbury, 2008; Trodick, this meeting); however, only 17 outcrop erosion rates have been measured until now.

Outcrop erosion rates in the Potomac River basin ( $n=46$ ) range from  $1.0\pm 0.11$  to  $66\pm 4.8$  m/My, average  $15\pm 1$  m/My, and have a median of  $7.1\pm 0.6$  m/My; outcrop erosion rates in the Susquehanna River basin ( $n=26$ ) range from  $1.8\pm 0.2$  to  $28\pm 2$  m/My, average  $10\pm 0.7$  m/My, and have a median of  $8.3\pm 0.7$  m/My. The average bedrock outcrop erosion rate for the region is  $13\pm 1$  m/My which is greater than the few other erosion rates measured on bedrock outcrops in the region (4-7 m/My, Reuter, 2005, Hancock and Kirwin, 2007; Duxbury, 2008). Outcrop erosion rates are significantly indistinguishable from the average basin rate of 12 m/My for 62 Potomac River sites (Trodick, this meeting) and significantly lower than the average basin rate of 20 m/My for 79 Susquehanna River sites (Reuter, 2005). Similar rates of erosion for bedrock outcrops and drainage basins suggest that the Central Appalachians as a whole have reached a general state of equilibrium. This is in contrast to some studies which suggest an increase in relief near our study sites (Reuter, 2005; Hancock and Kirwin, 2007).

We observe a weak, positive correlation between bedrock outcrop erosion rates and relief in meters within a 5km radius ( $R^2=0.24$ ;  $p<0.0001$ ), and an even weaker positive correlation between bedrock outcrop erosion rates and elevation ( $R^2=0.11$ ;  $p=0.0042$ ). A weak, negative correlation is observed between bedrock outcrop erosion rates and latitude ( $R^2=0.14$ ;  $p=0.0013$ ). Bedrock outcrop erosion rates were analyzed against mean annual precipitation and temperature but no correlations were significant.

[2010 GSA Denver Annual Meeting \(31 October –3 November 2010\)](#)  
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Session No. 4

[Recent Advances in Quaternary Geology and Geomorphology](#)

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