# ABSTRACT DETAILS

## Relationship between $^{10}$Be-Derived Erosion Rates and Mean Annual Precipitation, Vegetation Type, and Precipitation Variability

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Goldschmidt2017 Abstract

# Relationship between $^{10}$Be-derived erosion rates and mean annual precipitation, vegetation type, and precipitation variability

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Millennial scale erosion rates derived from cosmogenic nuclides generally suggest that a relationship between precipitation and erosion rate is absent or negligible, despite the fact that water is the main agent of erosion. Here, we acknowledge that slope has a strong primary correlation with erosion rate and examine a new $^{10}$Be compilation to determine if mean annual precipitation has significant secondary control on erosion rates. Our results suggests that for areas with mean annual precipitation <900 mm/yr, there is a weak direct correlation between precipitation and erosion rate; however, precipitation emerges as a clear and strong secondary influence once the primary influence of slope is considered. At rates of precipitation that exceeds 900 mm/yr, a direct correlation between precipitation and erosion rate is non-existent and the average erosion rate is slower than that for areas with <900 mm/yr rainfall. This situation is best explained by the interrelationship between mean annual precipitation and vegetation type. In particular, the value of 900 mm/yr is roughly a transition phase when the landscape starts to have more trees. Trees slow the rate of soil erosion, but precipitation does emerge as a secondary control on erosion rate within forested areas. This implies that deforestation, particularly in regions with high precipitation, can greatly increase erosion rate. Our results also suggest that variability in precipitation also has a secondarily influences on erosion rate; however, the influence of variability in precipitation is complicated because mean annual precipitation and variability in precipitation are inversely correlated.