



Evaluating processes and rates of surface denudation at the Eastern Altiplano margin, Bolivia

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For the Andes Mountains, it has been hypothesized that variations in climate govern variations in erosional intensity that acts as a first-order control on topographic evolution [1]. However, to test these geodynamic models the erosional history of the mountains has to be quantified independently. While absolute erosion rates are known for the Eastern and Western Cordillera, few data exists on erosional processes and rates on the large, internally drained, high-elevation Altiplano plateau. We investigate the Late Quaternary erosional history of the eastern Altiplano based on paired terrestrial cosmogenic nuclide analyses (^{10}Be and ^{26}Al).

The Eastern margin of the Bolivian Altiplano is a flat, low-relief landscape with erosion dominated by diffusive hillslope processes and eolian processes. Low precipitation with a strong interannual variability causes episodic fluvial transport of sediment in often small, ephemeral channels. For 13 river sediment samples collected from catchments along the Altiplano margin, catchment wide denudation (CWD) rates have been obtained by ^{10}Be and ^{26}Al . CWD rates based on ^{10}Be are very low and vary between 0.003 to 0.026 mm/yr, with an integration time of 24-230 ky. ^{26}Al data indicate also low, though slightly higher single CWD rates between 0.004 to 0.032 mm/yr. In combination with ^{10}Be , this suggests a complex exposure history with a significant component of sediment storage. These results agree with geomorphological observations of (a) very low slopes, (b) low relief and (c) transient river channels that might account for locally and/or temporarily ineffective erosional and transport processes on the eastern Altiplano. Inter-catchment comparison shows a positive correlation between CWD rates and geomorphometric catchment parameters, but also further influence by lithology and anthropogenic interferences.

The slow and complex erosion transport processes on the Altiplano differ significantly from those of the neighbouring Rio La Paz basin and the Eastern Cordillera, which also corresponds to dramatic changes of geomorphological parameters across the drainage divide.

References:

[1] Montgomery et al. (2001), *Geology* 29, 579–582.