



Latitudinal variation (15° - 23°S) in denudation along the western Andean margin (Peru and Chile): Insights from cosmogenic 10Be.

Jessica Starke, Todd Ehlers, and Mirjam Schaller

Department of Geosciences, University of Tübingen, Tübingen, Germany (jessica.starke@uni-tuebingen.de)

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Previous studies of syntaxial regions in the Himalaya and Alaska document localized and rapid deformation and denudation due to vigorous fluvial or glacial erosional processes. This study quantifies latitudinal variation in denudation along the Andean Coastal Cordillera and Western Cordillera around an arid end-member syntaxial orogen in South America to understand the interactions between climate and tectonic processes in localizing denudation. We present 32 new cosmogenic ^{10}Be analyses of river sediments of southern Peru combined with 34 new ^{10}Be analyses from northern Chile. The controls on the denudation rates are evaluated with a multivariate statistical factor analysis that identified correlations and covariation between denudation rates with climate, vegetation, topography, and fluvial steepness index (amongst other things). Measured cosmogenic derived denudation rates range from 0.5 - 168 m/Myr. The denudation rates generally decrease from 15°S (near Nasca, Peru) to 23°S (near Antofagasta, Chile) and from the Western Cordillera to the Coastal Cordillera.

Results from the factor analysis indicate that (1) the main controls on denudation rates are local tectonic driven processes indicated by the strong correlation and covariation of the denudation rate to the channel steepness in the arid northern Chile. (2) In southern Peru the denudation rates are mainly controlled by the intensity of vegetation and show strong covariation of denudation rates, vegetation cover and precipitation. (3) Regional trends in topography in this arid to hyper-arid region suggest a decrease in maximum elevations away from the syntaxis. This trend in topography is suggestive of the rock uplift effects in response to the 3D plate geometry of the subducting plate. Thus, although the topography seems to display a north to south slightly decreasing plate corner topographic trend, it is not reflected by localized denudation rates, most likely due to the low precipitation rates in the region (mean annual precipitation rates between ~50-300 mm/a). The covariation of denudation rates with steepness index in northern Chile suggest local tectonic controls (faulting) play an important role on millennial scale denudation in this region.