



Climate change and its effects on erosion in arid landscapes

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The importance of climatic and tectonic processes in driving erosion rates has long been debated, with tectonic forcing generally considered to be of paramount importance. However, there has been little work to date which investigates how a variable climate can affect erosion. The transition from arid to semi-arid climate has great potential to cause profound changes in how precipitation affects erosion rates, because during climatic changes barren ground changes into ground that is continuously covered by soil-stabilizing vegetation.

The study area, the Chilean Coastal Cordillera (25-35°S), encompasses one of the steepest climatic gradients on Earth, and there is sufficient evidence to suggest that movement of the Southern Westerlies on glacial-interglacial timescales has shifted the climatic zones north and south along the coast, causing profound changes in precipitation. The study area therefore provides an ideal setting for studying the causal factor influencing erosion in the transition from arid to semi-arid climate. The study area experiences continuous tectonic uplift, maintaining relief and potential for erosion.

Analysis of concentrations of ^{10}Be in quartz-rich fluvial sediments can provide a quantitative measure of catchment-wide erosion rates in the Coastal Cordillera, averaged over timescales ranging from 10^3 to 10^6 years. Comparison of these erosion rates to palaeoclimate proxies will elucidate any relationships between climatic variability and erosion rates over glacial timescales. Investigation of present-day covariance of precipitation and vegetation cover will provide information about the role of a dynamic vegetation cover in regulating landscape response to climate change. Preliminary results of ^{10}Be analyses indicate a close relationship of catchment-averaged erosion

rates to latitude, and thus to mean precipitation.