



Quantification of the Transient Behaviour of Rivers draining the Southern Ecuadorian Andes

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Landscape transience means the deviation of a landscape from geomorphic equilibrium features. Denudation rates can be used to explore the differential geomorphic response on perturbations from equilibrium. Here, we report basin-wide denudation rates from the Southern Ecuadorian Andes that show a distinct spatial pattern. Along an east-west transect across the Eastern Andean Cordillera, we carefully selected drainage basins to obtain cosmogenic nuclide derived denudation rates for contrasting morphological settings. Channel and slope morphology vary systematically from east to west, reflecting the transition from high-relief, strongly dissected topography in the eastern side of the Eastern Andean Cordillera into relatively low-relief topography in the Inter-Andean valley.

A positive correlation between denudation rates and river channel and hillslope steepness indices is observed. Denudation rates in the central part of the Inter-Andean Valley are relatively low, and of the order of 30 to 70 mm/kyr where stream profile concavity is high and positive. In contrast, relatively high denudation rates ($> \sim 200$ mm/kyr) are measured in the eastern side of the Eastern Andean Cordillera, where concavity is negative. The spatial pattern of differential denudation rates across the Eastern Cordillera reflects the transient adjustment of the landscape to rapid river incision on the trunk stream propagating upstream to the Inter-Andean valley.