



Linking coastal uplift with the earthquake cycle along the Central Andes

Daniel Melnick

Institut für Erd- und Umweltwissenschaften, Universität Potsdam, Karl-Liebknecht-Str. 24, 14476 Potsdam, Germany

The largest subduction-zones earthquakes commonly drown the adjacent coastline, even as geomorphic features evidence permanent emergence of such coastlines at global scale. Deformation rates are needed to understand the mechanisms linking coastal emergence with the earthquake cycle, and to gain insight into the along-strike segmentation of megathrust ruptures. Here uplift rates are estimated from a coastal geomorphic feature exposed ubiquitously along >2,000 km of the Central Andes at 104 sites using morphometric analysis combined with a landscape evolution model of wave erosion under an oscillating sea level and tectonic uplift. The results suggest slow but steady emergence during the Quaternary, with long-wavelength variations along-strike. The obtained long-term uplift rates are compared with decadal rates estimated from space geodesy, depth to the plate interface, simulated uplift resulting from coseismic slip along the A-B-C deep domains of the plate boundary, and uplift rates resulting from interseismic coupling. The relation between short- and long-term deformation suggests stable downdip seismotectonic segmentation of the plate boundary over hundreds to millions of years.