



Using spatial patterns of fluvial incision to constrain continental-scale uplift

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Rates of fluvial incision reconstructed for the last 11 Ma from the major E-W fluvial systems of the western margin of the Andes (18°00'S to 20°15'S) highlight the existence of 3 distinct sectors. In Sector 1 (the northernmost part of Chile) the fluvial systems are exohieric with a terminal base level in the Pacific Ocean and span the Coastal Cordillera, Longitudinal Valley, Precordillera and edge of the Western Cordillera, constraining the uplift of this region to a minimum of ~200 m/Ma (11-7 Ma), 150 m/Ma (7-3 Ma) and 120 m/Ma (3-0 Ma). In Sector 2, to the immediate south, the rivers are shorter and terminate in the Longitudinal Valley, spanning only the Precordillera and part of the Western Cordillera with incision rates of 100-50 m/Ma (11-7 Ma) to 50 m/Ma (7-3 Ma and 3-0 Ma). In southernmost Sector 3 the fluvial systems terminate in the Longitudinal Valley, spanning only the western Precordillera with incision rates of 50 m/Ma (11-7 Ma), 30m/ma (7-3 Ma) and 25 m/Ma (3-0 Ma). Comparison of incision rates between Sectors 1 and 2 constrains the uplift of the Coastal Cordillera to 60m/Ma in keeping with previous studies from the region. Differences between Sectors 2 and 3 (25-50 m/Ma) are attributable to drainage loss by tectonic beheading of catchments by the uplift of the Cordillera de Domeyko fault system. The data suggest that a substantial amount of surface uplift has occurred over the last 11 Ma along the western edge of the Andes which is in agreement with rapid but sustained uplift of the Andes in the Late Miocene. The study highlights the value of regional assessments of fluvial incision for quantifying the impacts and timing of uplift on a continental scale.