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On the uplift anomaly of the Arica Bend, Western Central Andes

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The architecture of the Western Andes is remarkably constant between southern Peru and northern Chile. An exception, however, is present near Arica at 18°S, where the Andes change their strike direction by ca. 50° and the Coastal Cordillera is absent over a lateral width of 50 km. Here, we propose a large-scale model to explain the Ma-long low-uplift rate of the Arica Bend in connection with interplate coupling and continental wedge-top basin evolution. We complement new geomorphic and sedimentological observations with structural, stratigraphic and seismic data compiled from the literature. We additionally present a new set of 14C ages to infer the Holocene uplift pattern of the region, which we support with stream profile analysis. Results show that the absence of a sediment barrier and the amphitheater-shaped topography at the Arica Bend has conditioned a relatively high sediment discharge to the corresponding trench segment since 2.7 Ma and possibly earlier. However, the 14C ages and the river profile analyses yield contradicting high coastal uplift rates for the past 10 ka. It appears that, at the large scale, higher sediment supply likely reduced the friction at the interplate boundary, keeping the uplift push at lower levels and the Coastal Cordillera submerged below Arica, thereby explaining the lower frequency of large subduction earthquakes in the area. Nonetheless, at a smaller scale, Quaternary sea-level fluctuations repeatedly shifted the water-load on the accretionary wedge, thereby inducing short-term elastic buckling, which has perturbed the trunk stream's profile.