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Title: SURFACE UPLIFT OF THE CENTRAL ANDES: A VIEW FROM THE WEST

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Abstract: he history of topographic rise of the Andes must reveal the response of South American lithosphere to first-order changes in its contact with the subducted plate, as well as second-order tectonic and magmatic variations. To distinguish among theoretical causes of surface uplift, such as loss of dense mantle, crustal thickening accommodated on thrust faults, and/or deep crustal flow or loss, the chosen measures of surface uplift need to be independent of measures of those possible causes. Recent considerations of the elevation history of the Altiplano plateau, in the core of the Central Andes, have advanced beyond a simplistic inference of uplift from known thrust-shortening history. For example, measures of the passage of the surface environment through atmospheric elevation contours are now being employed. To date, uncertainties about the time(s) of several-kilometer-magnitude surface uplift persist, and with them persist uncertainties about the causes of uplift. We report on measures of uplift history based on the western flank of the Altiplano, where extreme aridity has caused extraordinarily slow erosion, which greatly simplifies recognition of surface uplift. We used two approaches to measure uplift of the Andes relative to the topographic surface of neighboring non-marine sedimentary basins: measurement of long-wavelength (6-8 km) dips of several initially sub-horizontal Neogene surfaces, and stream profile modeling. The long-wavelength dips of geomorphologic surfaces of known age are measured from seismic reflection profiles and surface strata of three forearc basins: Salar de Atacama (23-24 degrees S), Calama (~22.5 degrees S), and Tamarugal (~20 degrees S). Overshadowing local variability are the generalities that long-wavelength westward rotation of the western flank of the Central Andean plateau was sufficient to accommodate surface uplift by ~1000 m during the latter early and middle Miocene, and by more than 1000 m during

the late Miocene to Recent. Locally, age resolution is sufficient to show that more than 700 m of this relief increase occurred since 6 Ma. Likewise, profiles of streams that flow down the western Andean slope reveal ~1000 m of increased relief between the Andes and the forearc basins since 10 Ma. Early and middle Miocene surface uplift accommodated by short wavelength faults and folds, shown by other workers, must be summed with these long-wavelength rotations. Likewise, bulk uplift of the entire Chilean forearc, in which the western Andean slope is embedded, may be superimposed. These data are broadly consistent with the climate-inferred uplift interpretations of some other workers, for both middle Miocene topographic uplift of the Andean spine, and a rise of the Andean plateau during the late Miocene. In summary, this view from the west is providing a quantified topographic history, which is deduced independent of data for phenomena that may cause the uplift.