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Title: CENOZOIC TOPOGRAPHIC EVOLUTION OF THE NORTH AMERICA CORDILLERA

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Author 1 (CONTACT AUTHOR)
Name: Page Chamberlain
Org: Stanford University
Country: USA

Author 2
Name: Andreas Mulch
Org: University of Hannover
Country: Germany

Author 3
Name: Malinda Kent-Corson
Org: Stanford University
Country: USA

Author 4
Name: Steve Davis
Org: Stanford University
Country: USA

Author 5
Name: Alan Carroll
Org: University of Wisconsin
Country: USA

Other Authors: Stephan Graham, Stanford University, USA

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Abstract: Stable isotopic studies of authigenic minerals from of lacustrine, fluvial and volcanic rocks, and paleosols from intermontane basins in the Rocky Mountains, Basin and Range and Sierra Nevada record the isotopic and sedimentologic fingerprint of an evolving landscape during the Cenozoic. This work suggests that during the early Eocene the western edge of this orogen consisted of a relatively high proto-Sierra Nevada and to the east lay a broad plateau of the Sevier hinterland bordered on its east by intraforeland basins with local basement uplifts. Topography and regional mean elevation were spatially and temporally transient. Stable isotopic and sedimentological data suggest that a landscape characterized by increased peak elevations and elevated relief migrated from northeast to southwest. This occurred between 50 to 47 Ma in SW Montana, between 40 to 35 Ma in N Nevada, and by ~22 Ma in S Nevada. The migration of high and rugged topography is evidenced by large (~6‰) negative shifts in oxygen isotopes that are diachronous in the Basin and Range. During this time the drainage basins in the Sevier foreland were reorganized which resulted in river capture events that cause rapid (<200

ka) and large (6‰) oxygen isotope shifts in these lakes. Sr isotopic studies of lacustrine rocks in the foreland basins and paleosols in the hinterland suggest that the drainage networks in some of these intraforeland basins evolved from local networks draining adjacent basement uplifts to large catchments that extended deep into the Sevier hinterland. This drainage reorganization is diachronous first occurring in the north and sweeping south with time, as evidenced by the temporal variation in oxygen isotope profiles in the foreland basins. North to south migration of a high rugged landscape is contemporaneous with the formation of core complexes and volcanism that first occurs in the north and later in the south. Our work is consistent with tectonic models calling for north to south removal of the Farallon slab or delamination of the mantle lithosphere, both of which would have caused a rise in surface elevations and may have triggered dissection of a pre-Cenozoic continental plateau. After this reorganization of surface elevations the Basin and Range collapsed as evidenced by an increase in oxygen isotope values from the Miocene to Recent. The interpretation presented here, although incomplete and certainly incorrect in some details, could only have emerged from studies of many basins using multiple isotopic proxies, several isotopic systems and stratigraphic sections that are well constrained in time.