UC **SANTA BARBARA**

Department of Earth Science

Earth Science Colloquium

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Paleogene foreland basin formation and Neogene surface uplift in the Peruvian Central Andes

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Nonmarine clastic basin strata in southern Peru archive the Cenozoic construction of the northern Central Andes. To better understand the history of topographic growth in this region we take a multidisciplinary approach incorporating basin analysis, detrital geochronology, sediment mixture modeling, and stable isotope paleoaltimetry. First, we characterized 6,400 m of basin fill in the northernmost Altiplano with lithofacies descriptions, paleocurrent measurements, and compositional analysis. Next, we analyzed the H compositions of ancient water preserved in volcanic glasses from an approximately 700-by-300 km region in southern Peru (13–17°S) to determine Neogene surface uplift patterns. Stable isotopic compositions of surface water from rivers and streams were also determined to reconstruct modern catchment elevations in a proof-of-concept test of paleoaltimetry methods. The Paleogene basin record is consistent with the development and eastward migration of a flexural foreland basin system in the location of the modern Peruvian Altiplano. A revised basin chronology provided by detrital zircon U-Pb maximum depositional ages defines an upward-convex Paleogene subsidence profile with sediment accumulation rates that increase from ~40 to >300 m/Myr, which when combined with results from sediment mixture modeling suggests sediment derivation and increasing proximity to a Western Cordilleran crustal load. Rapid sediment accumulation rates coincide with the timing of flat slab subduction in the region and suggest increased coupling between the Nazca and South American plates in the late Eocene to Oligocene. Mean catchment elevations calculated from H isotopic compositions of modern water and application of a nonlinear isotopic lapse rate successfully reproduce median catchment elevation (±500m at 1σ). Ancient water preserved in Neogene volcanic glasses show spatial and temporal variability in the transition to modern isotopic compositions and are interpreted to reflect variable surface uplift patterns across southern Peru. Variable rates of surface uplift are attributed to different, but coevalgeodynamic processes that coincide with the early Miocene onset and middle Miocene intensification of hyper-arid conditions along the Central Andean Pacific coast.