

Detrital Zircon U-Pb Geochronology and Sm-Nd Isotopic Constraints on the Evolution of the Magdalena Valley Basin, Colombian Andes

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The history of uplift, shortening, and basin development in the northern Andes is important to our understanding of convergent continental deformation and hydrocarbon generation in foreland and intermontane basin settings. However, the timing of significant shortening-related uplift in the northern Andes is poorly constrained, with most estimates ranging from Early Cretaceous to Miocene. Detrital zircon U-Pb ages from Cenozoic nonmarine fill of the Middle Magdalena Valley basin in Colombia reveal two pronounced provenance shifts. The first shift occurs between lower and upper Paleocene strata, where age spectra reveal a switch from Proterozoic-dominated to Phanerozoic-dominated detritus. We attribute this change to a reduction in craton-derived sediment during the early stages of uplift-induced exhumation in the Central Cordillera. The second shift occurs between middle-upper Eocene and upper Oligocene strata, where an increased component of Mesoproterozoic (Grenville-age) sediment and a diminished signature of mid-Jurassic-Cenozoic zircon ages is consistent with initial shortening-related uplift of the Eastern Cordillera. Ongoing Sm-Nd isotope analyses of mudstone samples from the middle Magdalena Valley basin will help test the interpretations based on the detrital zircon U-Pb geochronologic results. Additional U-Pb dating of modern river samples from the flanks of the middle Magdalena Valley basin will further provide integrated age information representative of the bedrock of the Colombian Central Cordillera and Eastern Cordillera.