

NEW $^{40}\text{Ar}/^{39}\text{Ar}$ DATES IN RIO MORA, NM: REGIONAL CONTEXT AND EVIDENCE FOR AN OROGENIC PLATEAU BUILT DURING THE PICURIS OROGENY

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Basement rocks in northern New Mexico provide evidence of peak tectonism at ~1.45-1.42 Ga, the Picuris orogeny, that overprints older regional metamorphism and deformation at 1.65 Ga, the Mazatzal orogeny in southern Colorado and northern New Mexico. $^{40}\text{Ar}/^{39}\text{Ar}$ dates on hornblende and muscovite constrain cooling through ~500 °C and ~350-400 °C respectively and provide insight into cooling rates of these amphibolite-grade middle crustal rocks and what was happening tectonically immediately following Picuris orogeny peak deformation, metamorphism and pluton emplacement. New $^{40}\text{Ar}/^{39}\text{Ar}$ data from exposures along the Rio Mora in the Sangre de Cristo block from the Vadito, Hondo, and Trampas groups provide plateau cooling ages of 1398 ± 3 Ma, 1381 ± 3 Ma, and 1420 ± 1 Ma in hornblende. Muscovite samples provide cooling ages of 1378.0 ± 2 Ma, 1359 ± 3 Ma, and 1367 ± 5 Ma. This indicates cooling through 350 °C, at likely depths of 15-20 km, about 70-90 million years following peak tectonism. We compile these new data with $^{40}\text{Ar}/^{39}\text{Ar}$ cooling data from muscovite from the Petaca pegmatite district (mean age of 1375 ± 10 Ma), and similar ages in neighboring basement exposures in the Santa Fe range, Rincon range, Taos range, Picuris range, and southern Tusas mountains. We find no evidence of post-Mazatzal cooling preserved in these areas as heating from the Picuris orogeny exceeded 500 °C. The data illuminate post-Picuris orogeny cooling and its tectonic implications. Slow cooling from 1420 to 1360 Ma at temperature >350 °C occurred post-amphibolite grade metamorphism during the Picuris orogeny. We propose that an orogenic plateau was present in northern New Mexico following Picuris-aged tectonism. This orogenic plateau would have extended from central New Mexico to southern Colorado and may have been similar in size to the modern Colorado Plateau. The slow erosional removal of this plateau would provide a mechanism to have protracted cooling from >500 to <350 °C between 1420 and 1360 Ma (~70 Ma), and erosion of the region to sea level by ~1.2 Ga in time for deposition of the De Baca Group. A possible orogenic plateau analog would be the construction and eventual erosional removal of the Colorado Plateau from its initial uplift ~90 Ma to its future erosion back to sea level tens of millions of years in the future. In such an analog, erosional removal of a 2 km high Colorado Plateau and progressive 4/5 isostatic rebound would require exhumation of rocks from 10-15 km depths, similar to the aftermath of the Picuris orogeny.

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