

Timing of Fabric Development in the Manzano Mountains of Central New Mexico

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The continental crust in the southwestern United States was formed dominantly in the early Proterozoic with the accretion of multiple systems of island arcs. The geologic history of continent building is complex, and interpretations are difficult because of limited Proterozoic rock exposure and overprinting of later deformations. Field work was undertaken in the Manzano Mountains in the summer of 2002 to further understand and constrain the timing and interaction of deformation and plutonism during continent building. The Manzano Mountains are a fault-bounded basement uplift on the eastern margin of the Rio Grande rift, and because of their position between two major accretionary boundaries are well suited to crustal research. Early Proterozoic quartzites and schists comprise the uplift, which is intruded locally by the granitic 1.42 Ga Priest Pluton. The dominant structures in the southern Manzano Mountains are map-scale, upright, gently plunging F2 folds with a dominant NE striking, steeply west-dipping S2 axial planar foliation. The priest pluton cross-cuts S2, but contains a weak S2-parallel magmatic foliation, suggesting late syndeformational emplacement. Early results show an S2-related west-side up shear fabric along the pluton boundary. Microstructurally, High aspect ratio grains suggest high temperatures, while grain boundary bulging and subgrain nucleation suggest lower temperatures and strain rates. Both are common in single thin sections, suggesting a complex, multi-phase deformational history. Also, textural variations in similar samples equidistant from the pluton suggest complex strain-rate curves, fluid distributions, or divergent post-pluton histories. Forthcoming monazite geochronology is essential in sorting out the timing of fabric development in the southern Manzano Mountains, and should increase understanding in crustal conditions at the time of pluton emplacement and the nature of the Proterozoic middle crust. However, these results already indicate an important, relatively late-stage deformation history during or after the cooling of the 1.42 Ga Priest Pluton.