

Kinematics of the Nacimiento and Gallina Uplifts in North-Central New Mexico in Relation to the Laramide Tectonic Evolution During the Late Cretaceous to Early Eocene

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During the late Cretaceous, the Farallon plate subducted eastward beneath the westward moving North American plate, causing a northeastern translation of the Colorado Plateau and resulting in the Laramide orogeny. The two main hypotheses proposed regarding the kinematics of the Laramide deformation in the southern Rocky Mountains are that deformation and uplift resulted from either right lateral transpression (north-south compression) or westward thrusting with little or no strike-slip deformation (east-west compression).

I propose to test these hypotheses by analyzing and interpreting fracture and minor fault outcrop data from the Nacimiento and Gallina uplifts in Rio Arriba County of north-central New Mexico. The 110 km extension of this Nacimiento-Gallina fault system on the western flank of these uplifts consists of four major faults from south to north: Pajarito, Nacimiento, Gallina, Tierra Montanosa (Woodward et al, 1992). Field work will focus on the northern Nacimiento and southern Gallina faults where the fault system makes a ~7 km right lateral step. This north trending Nacimiento uplift bends to the northeast and then turns into the north trending Gallina uplift.

To test these hypotheses, stereonet analyses will reveal stress directions relative to fractures and minor faults along the uplifts and relative to the time in which they formed by indicating the location of σ^1 and σ^3 . For example, in conjugate fractures, where acute angles signify σ^1 (greatest stress orientation) and obtuse angles signify σ^3 (least stress orientation), interpretations can be made regarding stress direction. Rose diagrams will also be used to help determine common fracture orientation trends along the uplifts. If my stereonet analysis reveals that stress directions are north-south, then I would support the right-lateral transpression hypothesis. If it reveals that stress directions are east-west, then I would support the westward thrusting hypothesis.