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Paper #87333

**Three-dimensional Geometry and Kinematics of an Evaporite-cored
Detachment Fold Complex: An Example from the Sierra Madre Oriental, NE
Mexico**

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Using 1:20,000-scale geologic maps, digital elevation data, aerial photos, and a series of 2-D balanced cross sections, we constructed a 3-D interpretation of the structural geometry of a westward-plunging detachment fold complex in the Sierra Madre Oriental near Saltillo, Mexico. This fold complex defines the northwestern-most boundary of the Monterrey Salient, beyond which lies the Parras Basin. The boundary between these provinces is distinct. Major structures in the Parras Basin are south-verging, low-amplitude folds that trend E-W and root to a shallow detachment in shales of the Upper Cretaceous Parras Formation. In contrast, the fold complex and the adjacent Sierra Madre exhibit high amplitude folds in the underlying Lower Cretaceous carbonates. These folds possess curvilinear axes, which trends WSW-ENE, and which root to a deeper detachment in evaporites of the Jurassic Minas Viejas Formation.

This lithologic arrangement produces a detachment fold complex that exhibits a cylindrical fold geometry with a higher regional level in the hinterland than in the foreland. We interpret that this "hinterland inflation" was caused by the Minas Viejas Formation being extruded from the anticline core during fold tightening, and/or migrating from the hinterland during shortening. We incorporated the area of "hinterland inflation" into our depth-to-detachment calculations as we constructed seven area-balanced serial cross sections through the fold complex. Our results suggest that the lower evaporitic detachment may be deeper than previously thought and may dip SW in a direction similar to the fold complex plunge.

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