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Paper #96772

Hinterland Inflation in Detachment Folds: A Natural Example from the Monterrey Salient, Mexico

M. Scott Wilkerson¹, Sara M. Smaltz¹, Dannena R. Bowman¹, I. Camilo Higuera-Diaz², and Mark P. Fischer².
(1) Department of Geosciences, DePauw University, 602 South College Avenue, Greencastle, IN 46135, phone: 765-658-4666, fax: 765-658-4732, mswilke@depauw.edu, (2) Department of Geology and Environmental Geosciences, Northern Illinois University, De Kalb, IL 60115

Geologists now recognize that detachment folds exist in various contractional settings, ranging from fold-thrust belts to extensional toe structures. Because such structures are increasingly becoming targets for hydrocarbon exploration, it is important to better understand their development. Numerous 2-D geometric and kinematic models exist to describe detachment folds. These models are typically area-balanced, are interpreted to develop by hinge migration, limb rotation, or some combination of the two processes, and possess a constant regional level outside the fold itself. We present new 2-D geometric models for detachment folds that incorporate hinge migration and limb rotation as their deformation mechanisms, respectively. These models differ from previous models, however, in that they allow 'hinterland inflation' to occur, thereby creating a higher regional level in the hinterland relative to the foreland. This regional difference may reflect hinterland uplift due to thickening of the incompetent unit and/or foreland deflation of the incompetent unit as material migrates hinterland-ward during fold development.

We illustrate the application of these models by constructing pseudo-3-D representations of the western termination of the Nuncios fold complex in the Monterrey Salient, Mexico. Our results suggest that only the limb rotation model can accurately simulate the overall 3-D fold geometry, match the observed 'hinterland inflation' produced by the lower incompetent unit, and predict reasonable detachment depths for the structure along its length. These results also show the utility of pseudo-3-D models in constraining detachment fold interpretations in areas lacking quality data and/or where the 3-D detachment geometry is unknown.

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Program Selection: Theme 4: Tectonic Systems and Basin Evolution

Topic Selection: *O18*: Fold and Thrust Belts: Recent Advances and Case Studies

Title: Hinterland Inflation in Detachment Folds: A Natural Example from the Monterrey Salient, Mexico

Invited: N

Previously Presented: A preliminary model was presented at the 2003 Geological Society of America annual meeting in Seattle, WA in poster form. We've made substantial modifications/revisions and also have completed more pseudo-3D models of other detachment folds (includes those by Wes Wallace et al.) for comparison.

Presentation Format: Oral

Special Equipment Needs: electronic presentation

Author