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Balanced Cross Sections of the Arbuckle-Ardmore Region, Southern Oklahoma: Implications for Interpreting Strike-Slip Deformation

by Steve Naruk

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The structures of the Arbuckle Mountains and Ardmore Basin have long been considered definitive examples of strike-slip deformation. These interpretations are questionable, however, because estimates of the amount of strike-slip on the main fault (the Washita Valley Fault) vary from as little as 3 miles to as much as 40 miles, and both well and seismic data show that the major faults of the area dip only 40-50°.

This paper presents a series of highly constrained, balanced and palinspastically restored vertical cross sections which show that the observed structures may be entirely dip-slip compressional structures. The overall structure is that of a large scale passive duplex. The master strike-slip "propeller" fault, which appears to reverse its dip and sense of throw along strike, is interpreted as the roof and floor thrusts bounding a plunging basement wedge. The Arbuckle Anticline itself is interpreted as a fault-bend fold in the hanging-wall of the roof thrust. The apparent releasing bend in the master strike-slip fault appears to be a triangle zone in the footwall of the roof thrust. The apparent positive flower structures adjacent to the Arbuckle Anticline are interpreted as second-order, detached folds in the roof sequence of the duplex. These new interpretations suggest that many of the structural criteria thought to be characteristic of strike-slip structures, are in fact characteristic of dip-slip passive duplexes involving basement.

STEPHEN J. NARUK - Biographical Sketch

Steve Naruk is a Senior Geologist with the New Resources group of Shell Western E&P Inc. He received his Ph.D. and M.S. in structural geology from The University of Arizona, and his BS in geology and geophysics from Yale University. He is currently part of a closely integrated E & P team responsible for evaluating and developing unconventional plays such as the Austin Chalk, as well as new conventional plays in mature areas such as California. Previous assignments with Shell include structural research projects covering Alaska, West Texas, Nevada and California. He is the author of numerous journal articles on a variety of topics in structural geology.