Trishear Fault-propagation Folding

Eric A. Erslev, 1991
Department of Earth Resources, Colorado State University, Fort Collins, CO 80523

ABSTRACT

Previous models of fault-propagation folding used kink-band geometries to approximate folding in front of propagating thrusts. However, kink-band kinematics cannot replicate the curved fold surfaces and complex strain patterns in natural and experimental fault-propagation folds, which also occur in front of steeper reverse and normal faults. Fault-propagation fold hinges tighten and converge downward, forming a triangular zone of penetrative deformation focused on the tip of the propagating fault. The downward convergence of deformation in fault-propagation folds can be modeled as triangular shear zones. "Trishear," here defined as distributed, strain-compatible shear in a triangular (in profile) shear zone, provides an alternate kinematic model for fault-propagation folds. Trishear is analogous to simple shear in a tabular shear zone except that area balance in a triangular shear zone requires curved displacement oblique to the fault slip direction. Incremental computer models of trishear folding can replicate many geometric features of fault-propagation folds, including variably curved fold hinges, downward-tightening fold surfaces, heterogeneous strains, and multiple fault-propagation trajectories.

É Montana Geological Society, Wyoming Geological Association, and Yellowstone-Bighorn Research Association 2010 - Bighorn Basin: 50 Years on the Frontier:Evolution of the Geology of the Bighorn Basin: 1997 Field Trip Symposium, 1997.