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Structural Development of the Kuche Fold and Thrust Belt, Northern Tarim Basin, China

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The Kuche Depression is a Mesozoic foreland basin located along the northern margin of the Tarim Basin, China. It is characterized by long, subparallel, south-directed thrust faults and folds that formed in response to uplift of the Tian Shan Mountains to the north. The structural timing of the thrust system as seen on seismic data indicates that there were two main episodes of thrusting: late Jurassic and mid to late Tertiary. This thrusting coincides with the Indonesian and early Himalayan orogenies and helps document the tectonic history of the northern Tarim region.

The earliest evidence for thrusting seen on seismic in the Kuche Depression is during the Indonesian orogeny, when the Lhasa plate collided with the Tarim plate. Re-

gional convergence along the proto-Tian Shan Mountains formed a series of stacked thrust sheets that appear to ramp over a Paleozoic-aged horst block in the Kuche foreland basin. The floor thrust of this duplex occurs in the basal Triassic lacustrine shale sequence, which may also be one of the principal source rocks in the Kuche Depression. The Paleogene and lower Neogene sections are nearly uniform in thickness across the Depression, indicating that a period of tectonic quiescence followed the first thrusting event.

The second major episode of thrusting occurred during the early Himalayan orogeny, when India collided with southern Asia. This collision reactivated uplift in the Tian Shan Mountains and caused renewed thrust-

ing in the Kuche Depression. A series of out-of-sequence thrusts is seen on seismic, resulting in the southward transport of isolated piggy-back basins, further growth of the duplexes, and refolding of previous structures. The dramatic thinning of Miocene and younger units across the crests of the shallow folds helps time the second thrust episode. Balanced cross-section modeling suggests thrust-related shortening on the order of 35 to 50% and helps unravel the complex structural style in the Kuche Depression. Understanding the structural development of this foreland basin assists in reconstructing regional tectonic events and better brackets the interaction between the various plates in northwestern China. ■

Biographical Sketch

Wayne received a B.S. in Geology in 1981 from Bates College in Maine. He worked in gold exploration in Nevada for Superior Minerals before attending Texas A&M, where he received his M.S. in 1986. After graduating, Wayne joined Amoco Production Company in Houston. His projects have varied from exploitation and water-flood projects in West Texas to exploration in the Central Mediterranean. Since 1992, Wayne has been working as a project team leader for exploration in Tarim Basin, China.