

Geometry and Kinematics of Ai-Ka Fold Belt in the West Segment of Southern Junggar Fold-and-Thrust Belt, Northern Tian Shan, China

Zhenyu Peng, Xin Wang, Rao Gang
Zhejiang University

9.29.2020 - 10.1.2020 - AAPG Annual Convention and Exhibition 2020, Online/Virtual

Abstract

The Southern Junggar Fold-and-Thrust Belt (SJFTB) has relatively complete Cenozoic sedimentary and deformation records, which provides important insights into orogenic processes of the Tian Shan in the north (one of the largest and most active intra-continental mountain belts in the world). Although many types of research on the SJFTB have been conducted, the western SJFTB has not been investigated in sufficient detail due to the lack of subsurface data. Recently, benefiting from the breakthrough of petroleum exploration (Well Gantan-1; 6000bbl/d oil gas flow) in 2019, a large amount of new seismic datasets in this region has been obtained, providing excellent chances for exploring characteristics of the structural deformation in further detail. Based on interpretations of seismic reflection profiles, we demonstrate the geometry and kinematic features of Ai-Ka fold belt in the western SJFTB, providing new insight into the Cenozoic evolution in this area. As two decollements exist in this region (early Cretaceous mudstones and early Jurassic coal layer), folds including the Dushanzi, Xihu, Xihubei and Kayindike anticlines display an en echelon pattern. Specifically, deformation of the first two anticlines is controlled by both decollements, resulting in vertically stacked folds. In contrast, the latter two further in the foreland are only controlled by the deeper decollement. Based on the forward modeling by using the StructureSolver software, we estimated amounts of the fault slip that decrease northward, from 7 km in Dushanzi to 3.6 km in Xihu and then 1.5 km in Kayindike anticline. Furthermore, combining the identified growth strata of these folds with the published ages of magnetostratigraphic dating of the Jinggou river section

(Charreau et al., 2009), the onset of the deformation in the Dushanzi anticline is constrained to ~7.6Ma, and the other anticlines become younger northward. Collectively, the Ai-Ka foldbelt deforms in a foreland propagating mode.