

Mesozoic to Cenozoic Tectonic Transition Process in Zhanhua Sag, Bohai Bay Basin, East China

Yanjun Cheng

China University of Petroleum (East China), School of Geosciences, China (chengyanyanjun@gmail.com)

The Zhanhua sag is part of the Bohai Bay intracontinental basin system that has developed since the Mesozoic in East China. The timing of this basin system coincides with the final assembly of East Asia and the development of the Western Pacific-type plate margin. Here we use 3-D seismic and drill core data to document the evolution of this basin and discuss its broad tectonic setting. Some remarkable characteristics which are rarely mentioned in previous studies of Bohai Bay Basin are present, and they are key to understanding the regional tectonic evolution. During the Mesozoic and Cenozoic, four major tectonic transitions happened in the Bohai Bay Basin, based on the case study of structure and evolution of the Zhanhua sag: (1) The first tectonic transition from Cratonization to thrusting during the Triassic was mainly caused by the South China Block subducting northward beneath the North China Block, which induced the formation of the NW-striking thrust faults. (2) The second tectonic transition was mainly characterized by a change from thrusting to extension, and this transition can be divided into two-stages. During the first stage, the initial extension happened from Early to early Middle Jurassic, and the compression happened from late Middle Jurassic to early Late Jurassic. During the secondary stage, the extension and left-lateral shearing happened from late Late Jurassic to Early Cretaceous and compression happened during the Late Cretaceous. During the second stage, the dominant structures changed from NW-striking reverse faults to normal faults and the NNE-striking lateral strike-slip shearing faults start to influence the eastern part of the basin. (3) The third transition changed to NW-SE-directed extension and NNE-striking right-lateral shearing during the Paleogene, and this peak deformation stage happen during the deposition stage of EsM sub-sequence because of the change of the subduction direction of the Pacific Plate relative to the Eurasia Plate. The NE-striking normal faults are the main structural deformation derived from the NW-SE-directed extension, and the pre-existing NNE-striking strike-slip faults change from left-lateral to right-lateral because of the change in subduction direction of the Pacific Plate. (4) The fourth transition changed to regional subsidence during the Neogene, which is probably caused by India-Asia collision. This research is important for studies of the tectonic evolution of East Asia and the petroleum exploration in this sag.