

Structure and Dynamics in the North Jizhong Depression, Bohai Bay Basin, Eastern China

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Abstract

Study of structural geology in the north Jizhong Depression, Bohai Bay has achieved great breakthroughs in recent years. However, the studies of structure and dynamics remain much controversy. Based on the 3D and partial 2D seismic data, combined with regional geology and well data, the characteristics of structures in the north Jizhong Depression are analyzed, the dynamics is discussed. Our analyses show that the Cenozoic structures in the north Jizhong Depression can be subdivided into extensional system and strike-slip system. Extensional system concludes series of normal faults and transfer faults. Normal faults are mainly trend NNE and NE. They control the Paleogene sediments in sub-depressions of hanging-wall, and bottom out into a sub-horizontal detachment zone in deep level shaped like listric. Transfer faults mainly adjust displacement of normal faults, yet some like Tongbozhen and Niutuozen are transfer faults in Paleocene and Eocene but change to normal faults in Oligocene. Strike-slip system is predominantly consisted by sub-vertical right-lateral strike-slip faults such as Xin`anzhen and Maxi. From seismic profiles, Xin`anzhen and Maxi cut into basement but only influence the sediments of Ed of Paleogene and Lower Neogene. Based on the relation of sedimentary sequence and faults, the extensional system mainly develops from Paleocene to Late Oligocene, but strike-slip system predominantly develops from Late Oligocene to Miocene. From the superposed section of crustal structure and basin structure in Jizhong Depression, the Cenozoic sub-basin is just located on the thinner zones of crustal, corresponding with the location of mantle uplift. It indicates that the Paleogene development of Jizhong Depression is related to the horizontal tension caused by uplift of magma in mantle. The results illustrate that extensional deformation in Jizhong depression is caused by the uplift of magma. The right-lateral strike-slip deformation, same with Tancheng-Lujiang fault zone, is induced by the movement of plates. This study makes further steps to the research of basin evolution in Jizhong depression, especially the relationship between extensional system and strike-slip system, and provides references to the basin research of Bohai Bay, even the destruction of North China Craton.