STRUCTURAL STUDY ON BOHAI AREA, BOHAI BAY BASIN

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Bohai area is the offshore part of Bohai Bay basin where is a major hydrocarbon production base in China. In order to understand better the basin structural evolution with its impact on hydrocarbon accumulation and to get higher hydrocarbon exploration success ratio, China National Offshore Oil Corporation (CNOOC) carried out the structural study project on the offshore from 1996 to 1999.

The studies of the basin structural geometry & kinetics, stress regime evolution, sedimentary tectonics, thermal history, structural subsidence and also natural seismic velocity tomography of lithosphere showed that the basin evolution in Bohai offshore was complicated with superimposition of multi-episode faulting and combinations of multi-genetic mechanisms. In the initial rifting phase of Eogene, the basin experienced two sub-rifting episodes: earlier extensional-wrench rifting episode from 55Ma to 38Ma and later strike-slipping pull apart rifting episode from 32.8Ma to 24.6Ma. In the earlier episode, the basin was dominated by NW-SE extensional-wrench stress regime leading to the formation of a series of half-grabens which controlled the sedimentation of Kongdian & Shahejie 3-4 Formations. But during the later episode, the basin was dominated by dextral strike-slip movement stress regime of Yingkou-Weifan fault system (a segment of Tancheng-Lujiang fault) inducing the typical strike-slip structures such as flower-structures, pull-apart sub-basins and partial basin inversions developed and controlled sedimentation of Dongying Formation. Between the two episodes there was a short time of thermal subsidence process (38-32.8Ma) controlled the sedimentation of Shahejie 1-2 Formations. In the post-rifting thermal subsidence phase of Neogene, it also could be divided two episodes: the first thermal subsidence (24.6-5.1Ma) and then the basin rejuvenation with rapid subsidence (0-5.1Ma) related to the Tan-Lu fault reactivation and to the crustal isostasy induced by upper mantle delamination which was proved by natural seismic tomography.