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Tectonic stress evolution and a new origin model of Bohai Bay basin, China Tong, H.

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Bohai Bay Basin is a very important petroliferous basin in China, and its tectonic features (especially the fault system) is very complicated. There are a variety of tectonic model to explain the origin mechanism: 1) Northwest-southeast extension model (Ma et al., 1983); 2) Strike-slip pull-apart model (Mann et al, 1983), 3) Northwest-southeast extension superimposed by dextral strike-slip model (Qi & Yang, 2010), 4) North-south extension model (Zhou, 2006). However, the above models were unable to reasonably explain the whole structural phenomenon of Bohai Bay Basin. Origin mechanism of the Bohai Bay Basin has been significant controversy.

In this paper, with the Generalized Fault Model (faulting model of dynamics with pre-existing weaknesses, Tong et al., 2011; 2014) as the theoretical basis, through systematic structural analysis of seismic data in Bohai Bay Basin, the tectonic stress evolution of Bohai Bay Basin in Cenozoic is determined: 40Ma ago, rifting, northwest-southeast direction extension, but the start time of rifting is different in different regions; after 38Ma, second-phase rifting (38-23Ma), post rifting (23-5.5Ma) and further rifting (5.5-0 Ma), but the direction of minimum principal stress (extension direction) are keeping north-south direction. 40-38Ma is a transition period of stress transformation. Superimposition model of Multi-stage, two directions of oblique extension can reasonably explain the formation and evolution of the entire structure of the Bohai Bay Basin. The tectonic stress state is similar in different regions in whole Bohai Bay Basin, the difference of structural features (particularly in fault system) is caused by differences of pre-existing weaknesses.

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