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Cretaceous Stress Fields Evolution and Its Geodynamic Implications in Jiaolai Basin, Northern China

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The Tan-Lu fault zone (TLFZ) along the East China continental margin experienced sinistral movement at the beginning of Early Cretaceous (ca.145) due to fast oblique subduction of the Izanagi Plate in the Pacific Ocean. It can be easily understood according to the Liddell shear model with the NNE-striking sinistral TLFZ for the NW-striking en-echelon graben system west of it. However, the formation of the NE-striking Jiaolai basin east of TLFZ contradicted with the transpressive regime geotectonic environment. The cause and geodynamic for this NE-striking extensional basin remain controversial. The evolution of the Jiaolai basins during Cretaceous has been generally referred to as the sinistral TLFZ and the eastern North China Craton lithosphere delamination and thinning, the stress field evolution models mainly consist of pull-apart model and extensional-pull-apart model. Meanwhile, the geodynamic models differ as delamination model, post-orogenic extension model and oceanic plate backarc extension model. In this paper, 2-D finite element models are generated for studying the mechanism of the

Jiaolai basin stress fields evolution with the relationship of the TLFZ, and attempt to study the geodynamic with finite element modeling. The trajectories of the horizontal maximum principal compressive stress (σ_1) of the best fit model fit well with the striking directions of the Jiaolai basin deposition centers and the formations thickness consist with the Von Mises stress concentration areas. Compared the best fit model with the other models, it can be found that the basin formation and stress fields evolution of the Jiaolai basin has been controlled by the TLFZ as well as the crustal extension, and it might formed under the NW-SE striking regional extension instead of pull-apart basin. With the development of the TLFZ from sinistral to normal and then dextral faulting, the geodynamic changed from Izanagi NW-directed subduction to Sulu Orogen post-orogenic extension and then lithospheric thinning as well as the remote effect by the movement of the plate tectonics. The Mesozoic basins along the TLFZ from west to east formed later during the Cretaceous.

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