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Developmental Characteristics of Structural Styles in Western Liaodong Bay Depression

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Abstract-The Liaoxi Area located in the western part of the Liaodong Bay Depression. The whole body is NNE-oriented and develops into a narrow and long strip structure. In Liaoxi Area, there are mainly four sub-structural units: Liaoxi sag, Liaoxi uplift, Liaoxi South uplift and Liaoxi South sag. There are four main faults, most of which are tensional or strike-slip-tensional faults. A penetrating strike-slip fault zone is developed in the western Liaoning sag. Due to the joint action of early extension and late strike-slip, the tectonic deformation in Western Liaoning is very complicated.

According to the mechanical mechanism of structural genesis, the structural styles in Liaoxi Area are divided into extensional structural styles, strike-slip structural styles, extensional-strike-slip structural styles and inversion structural styles.

Based on the detailed anatomy of different types of structural styles in Liaoxi Area, it is found that there are obvious differences in the developmental location and stratigraphic position of different types of structural styles. Extensional tectonic styles are widely developed in the whole region. In terms of main faults, most of them are extensional faults in the early stage and listric normal faults or y-shaped structures are developed in the section. The styles of rolling anticline and sliding fault steps are mostly developed in the upper plate of large extensional faults, and the multistage y structure is more developed in Liaoxi Area. The upward-dip fault block structure style mainly appears in the secondary faults, mostly develops in the slope zone or the sag zone.

The dolphin effect caused by strike-slip is obvious in the strata thickness along the strike on both sides of Liaoxi 2 Fault. The strike-slip strength is relatively large in the Paleogene, and the major strike-slip faults are all developed with strong strike-slip style. And flower structure is developed on the section. In the process of strike-slip activity, strike-slip derived structures are extremely developed due to the different occurrence and combination patterns of fault planes. The extensional horsetail fan structure (such as the southern end of Liaoxi 1 Fault, etc.) is developed at the end of the Paleogene main fault. The extensional lateral-extension double structure is developed between Liaoxi 2 Fault and Liaoxi 3 Faults. In addition, strike-slip tensile bending and compressive bending developed in different parts of Liaoxi 1 Fault. Some of the major faults in Liaoxi Area stopped their activities in Neogene.

Affected by the superposition effect of extension and strike-slip action, the southern part of South Liaoxi 1 Fault was an extensional fault in the early stage, and after the transformation by strike-slip action, the section showed flower-like structure. The strike-slip activity still exists in Neogene period, but its intensity is somewhat weakened. The spatial and temporal differences of tectonic styles in Liaoxi Area reflect the superposition of tectonic stresses of different evolution stages and different properties in different regions. It further reflects the difference of regional and local tectonic stress field and causes the difference of structural characteristics of different tectonic units and basins.

Key words-Western Liaodong Bay Depression, strike-slip, extension, differences of structural style