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## The differential evolution of buried hills in Liaodong Bay and analysis on their reservoir forming conditions

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The Liaodong Bay area has experienced a complex tectonic evolution between the Liaodong and Liaoxi buried hills. An important control factor for hydrocarbon accumulation is the reservoir development degree inside the buried hill, the reservoir quality in relation to lithology, the structure of bedrock, thermal evolution process and secondary transformation. We research the heterogeneity in lithology and structure of the buried hills, their formation mechanism, and analyze the hydrocarbon accumulation condition, hydrocarbon translocation system, and cap condition of the two buried hills. Regional tectonic show that the bedrock ranges on the plane and the stratigraphic structure varies from the different parts of the basin in vertical direction. The lithological heterogeneities and structure are controlled by evolutionary processes and formation mechanism of the two buried hills. The Liaoxi buried hill has undergone multi-phase inversion since the Mesozoic and early Cenozoic extensional rifting. The Liaodong buried hill is part of Jiaoliao paleo-uplift formerly, but it is separated from it because of the sustained strike-slip action of Tan-lu Fault during the Eocene. Later Oligocene regional inversion and wrench strike-slip of the Tan fault zone made the Liaodong buried hill uplift further, and the tectonic pattern of the Liaodong Bay changing from "two sags clip one uplift" to "three sags clip two uplifts". In the complex evolution process of the two buried hills, multi-phase tectonic action superimposed improved the reservoir quality and also formed multiple hydrocarbon translocation systems. The Mesozoic lithostratigraphy inside the buried hill including the Sha-3 Member and the Dongying Formation consist of cap rocks. The hydrocarbon sources, reservoir and cap rock conditions of the Liaodong buried hill are inferior to those of the Liaoxi buried hill. In addition late strike-slip faults may have destroy and adjust the previous oil and gas reservoir of the Liaodong buried hill, which made its ability to gather oil and gas far less than Liaoxi buried hill.

**Keywords:** Liaodong Bay, Buried hill, Differential evolution process, Secondary fracture, Hydrocarbon accumulation factors

