

Paleopressure Evolution Controlled by Activities of Hydrocarbon and Faults, Linnan Sag, Bohai Bay Basin, East China

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Linnan Sag is located in southwestern Bohai Bay Basin, East China. It was developed under an extensional and shearing background, and controlled by two boundary faults trending north-east. Currently, besides normal pressure, Linnan Sag is characterized by underpressure coexisting with overpressure. Overpressure distributes mainly in the center of the sag, while underpressure companies mainly with faults, especially the northern boundary fault, around which are hydrocarbon accumulation areas. To understand the process of hydrocarbon generation, migration and accumulation well in Linnan Sag, it is necessary to unveil the paleopressure evolution.

Measured formation pressure exhibits three zonations in vertical: the upper zone with normal pressure above 1700m, the middle zone with coexisting of normal pressure and underpressure between 1700m and 3200m, and the lower zone with coexisting underpressure, normal pressure and overpressure below 3200m. 73 core samples of Es3 formation from the middle and the lower zones were collected to perform fluid inclusion analysis and thermodynamic modeling of petroleum inclusion with VTFLINC software to reconstruct paleopressure at different time.

The results of fluid inclusion analysis suggested that two episodes of hydrocarbon charging happened during 21-13Ma and 8-0Ma. And the results of thermodynamic modeling indicated that the paleopressure decreased with time. The main decreasing periods are corresponding to the active stages of faults. Where the fault activity is stronger, the pressure decrease is larger. Although hydrocarbon charging caused pressure increase to a certain extent, it was not enough to compensate for the pressure released through faults. Integrated with the results of basin modeling and structural analysis, it comes to the conclusion that the activities of hydrocarbon and faults controlled the paleopressure evolution in Linnan Sag.

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