



Slope-break Controlled Lacustrine Delta System in Northwest Part of Nanpu Sag, Bohai Bay Basin, Northeastern China

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Nanpu Sag is a Cenozoic sag with great potential for oil and gas in the Bohai Bay Basin. The downthrown side of Xi'nanzhuang fault in the northwest area of the sag has always been a hot spot for oil and gas exploration. The slope-break types, sequence composition patterns, sedimentary system distribution characteristics and sand control models of the Es1 (31.0Ma-28.5Ma) to Ed3 (28.5Ma-27.3Ma) Formation in the Northwest Nanpu Sag are discussed based on core, logging and 3-D seismic data.

During the sedimentary period of Es1 and Ed3, the study area shows the characteristics of episodic activity of basement subsidence and fault-controlled depression. Based on this, two types of slope breaks are summarized in the study area. We call type A is margin-fault-strength-control type, which is only controlled by boundary fault. Type B is double-intense-control type, which is controlled by both basement subsidence and fault-controlled depression. According to the features of activity intensity of fault depression and basement subsidence, the Xi'nanzhuang fault can be divided into three segments laterally in plane. Both basement subsidence and fault-controlled depression are relatively weak in the eastern and western parts of the Xi'nanzhuang fault, but more intense in the middle part. The slope breaks and their controlling effects are mainly shown as the following four aspects: (1) In terms of slope-break types, for Type A, the activity rate of the marginal faults is much higher than subsidence rate within the central basin. There is only one sub-sag in the adjacent area of the marginal fault. For type B, due to the strong basement subsidence and fault-controlled depression, it shows that two sub-sags formed at both the root area of the marginal faults and the inner basin. (2) From the perspective of systems tract within sequence stratigraphic framework, for type A, large-scale lowstand fan developed at the root of the marginal fault. But typical lake-floor fan deposits in the lowstand system tract have been preserved within the sub-sag of the inner basin for type B. (3) In terms of the distribution of sedimentary facies belts, Type A is steeper with larger accommodation space at the edge. The sediment transport distance and the fan delta extension distance are relative short whereas the fan delta front facies belt of the type B extends farther. (4) For sand control model, Type B has a more extensive delta front facies with superior quality reservoirs than type A due to of the "double-intense" controlling.