



Sedimentary characteristics of lacustrine beach-bars and their formation in the Palaeogene Weixinan Depression of Beibuwan Basin, northern South China Sea

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Abstract: The beach-bar reservoir play has become an important exploration target within the Beibuwan Basin, especially in the WZ12-2 area within the Weixinan Depression. The sedimentary characteristics, distribution patterns and formation mechanisms of beach-bar sand bodies in the middle second and third member of the Palaeogene Liushagang Formation (L22, L23) in WZ12-2 area within the Weixinan Depression were studied in detail based on seismic, well log data and core data. The L22 and L23 in the WZ12-2 area is composed of a third-order sequence consisting of one systems tracts, i.e. the lowstand systems tract. Beach-bar sand bodies were deposited widely in the WZ12-2 area during the lowstand systems tract period. The sandy beach-bars can be divided into five stage, with three stages in psL23 and two stages in psL22. The five stages sands retrograded from bottom to top. The sandy beach-bars are characterized by siltstones, fine-grained silty sandstones interbedded with thin mudstone units. The presence of well-developed sedimentary structures, such as swash bedding, parting lineation, parallel bedding, ellipsoidal mud clasts, ripples, terrestrial plant debris and vertical burrows, suggests that beach-bars were deposited in a relatively shallow water environment under the influence of strong hydrodynamics. Laterally, the sandy beach facies occurred as a more continuous sheet-like body around the sandy bar in most parts of the sag. Stratigraphically, beach-bars were distributed mainly in the lowstand systems tract. The gentle nose structure, relatively weak structural activities and shallow-water condition with a strong hydrodynamic environment were probably the factors that were responsible for the occurrence of the large-scale beach-bars during the lowstand systems tract period. In psL23, the provenance of beach-bars is mainly from the fan delta in southwest while the nose structure in southeast provide the beach-bars with the sediments in psL22. As the provenance direction, water depth and hydrodynamic condition is different, the sand body shape varied with time. Among the five stage sands, the fifth sand (top) has the most favorable reservoir quality after long time's sorting and weak diagenesis.

Keywords: Beach-bars, Beibuwan Basin, Weixinan Depression, Palaeogene, Sedimentary characteristics, Reservoir quality.