# Mixed Siliciclastic-Carbonate Deposition in Response to the Strike-Slip Reversal in the Eocene Laizhouwan Sag, Bohai Bay Basin, Eastern China

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## Abstract

Interplay between tectonism and facies variability in lacustrine rift basins is a critical issue for petroleum exploration but scarcely documented in southern slope of Laizhouwan Sag, Bohai Bay Basin, which is bounded by two parallel S-N trending strike-slip faults on the east and west margins. This contribution presents a study of an Eocene mixed siliciclastic-carbonate assemblage. Three depositional units in Eocene: Unit 1 at the base is a coarse-grained siliciclastic succession. The westward-prograding and -fining depositional feature indicates a proximal to distal facies relationship from east to west. This unit represents alluvial fan derived from the uplift close to the east margin, implying a west depocenter. Unit 2 is dominated by carbonates consisting of packstone/grainstone and interpreted to be carbonate platform facies. Extensive occurrence of carbonate across the full width of the sag indicates a flat to low gradient lacustrine condition and the scarcity of sediment input. The top Unit 3 is fine-grained detrital deposit, which is thicker and more mudstone-dominated eastward, showing the depocenter situates in the east, being opposite to Unit 1. Changes of regional tectonic stress field trigger the alternation from uplifting to subsiding, leading to a response in deposition. The matching of depositional units and tectonic evolution stages indicates the deposition of the mixed assemblage is mainly controlled by the strike-slip reversal. In Stage I, left-lateral slip dominated and the east of the sag is subject to transpression stress and uplifts to be sediment provenance of alluvial fan

in Unit 1, whereas the west is subject to transtension stress and subsides to be depocenter. In Stage II, the strike-slip faults reverse to be dextral from sinistral. So, stress field on both sides of the sag changes and the east begin to subside. The subsidence wakens the morphologic prominence across the sag and favors formation of carbonates in Unit 2. Finally, Stage III inherits the stress field of Stage II and allows the east to subside to be depocenter, leading to the deposition of fine-grained Unit 3. This study illustrates how the strike-slipping influence the shifting of facies model. Units 1 & 2 have been proven to be prolific oil reservoir by drillings. The recognition of the interplay between tectonism and deposition will subsequently strengthen the understanding of the reservoir distribution pattern.