

Differentiated sedimentary models and inner architectural characteristics of wave-dominated shoreface deposits: a case of Devonian 'Donghe sandstones' deposits in Tarim Basin, China

*Weilu Li¹

1. National Marine Data and Information Service

The wave-dominated shoreface deposits shows differentiated sedimentary characteristics in different backgrounds. Taking the Devonian Donghe sandstones which located in Tarim Basin as example, based on seismic, core and logging data, the regional distribution, lithological features and sedimentary structures in different target areas were compared to analysis, the influence of main controlling factors like relationships between material supply and sea level fluctuation, hydrodynamic force conditions and ancient landform features to wave-dominated shoreface deposits were dissected, and three types of genetic models for wave-dominated shoreface deposits were raised, including wave-dominated shoreface deposits with reworked delta background, transgressive-regressive wave-dominated shoreface deposits with shoal background, and transgressive wave-dominated shoreface deposits with gentle-slope background. The superposition of the sand bodies under controls of different sedimentary mechanism causes the complexity of oil-water distribution in current situation, which greatly limits further exploitation. Under the guidance of genetic models and application of drilling and dynamic data, three levels of architecture are characterized, which are composite sand bodies (fifth-order architectural unit), single sand body (fourth-order architectural unit) and internal component unit (third-order architectural unit). The identification marks and spatial distribution of the architectural units in wave-dominated littoral reservoir are discussed to establish the corresponding sedimentary models. Methods for recognizing the single bar sands and its inner units like pattern matching control, surface identification using well data and production data analysis are summarized. In composite sand bodies of transgression, the superposition of single sand bodies shows spatial distribution patterns like continuous on-lap, step migration and filling thick layer, while that in composite sand bodies of regression shows thick layer accumulation, step migration and continuous superposition. The single sand body can be divided into one or several internal component units by the third-order interface, with the pattern of low-angle migration towards sea or land. Controlled by the architecture of sand bodies, isolated fluid systems are divided by the fourth-order interface between single bars and the internal third-order interface interior of single bar, thereby leading to the differences in oil-bearing properties.

Keywords: Wave-dominated shoreface deposits, Differentiated sedimentary models, Reservoir architecture, Donghe sandstones, Tarim Basin