



## **Sedimentology and sequence stratigraphy of Lower Shihezi Formation in Shenguhao area, northern Ordos basin, China**

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The structural location of Shenguhao area locates at the transition zone of Yimeng uplift and Yishan slope of northern Ordos basin, China. The study area is in erosion condition until Late Carboniferous and has deposited Taiyuan Formation (C2t), Shanxi Formation (P1s), Lower Shihezi Formation (P1x), Upper Shihezi Formation (P2s) and Shiqianfeng Formation (P2sh) in succession during Late Paleozoic, which mainly develops transition facies and alluvial plain facies. The fluvial sandstone of Lower Shihezi Formation is the major target layer of gas exploration and development in this area. This study is based on the interpretation of 38 wells and 113 seismic reflection profiles. Three significant lithofacies were identified with sedimentological analysis of cores from the Shenguhao area: fluvial conglomerates, fluvial sandstone and floodplain mudstone, which represent fluvial depositional environment. Based on sequence stratigraphy methodology, well log patterns and lithofacies analysis, Lower Shihezi Formation can be divided into four depositional sequence cycles (1-4) bounded by fluvial scouring erosional surfaces. Each sequence succession shows the trend of base level rising and overall performs fining-upward feature, which characterized by coarsening-upward lower to upper fluvial sandstone and floodplain mudstone. In ascending order, sequence 1 records the transition from the underlying braided river delta plain fine-grained sediments of Shanxi Formation into the overlying fluvial sandstone of Lower Shihezi Formation and develops scouring erosional unconformity at the base, representing a regression. Sequence 1 consists of a package of prograding thick layer of amalgamated fluvial sandstone at the lower part passing into aggrading thin layer of floodplain mudstone at the upper part, suggesting that accommodation growing rate is gradually greater than deposition supply rate under the background of base level gradual increase. Sequence 2 and 3 record similar stratigraphic stacking patterns with sequence 1, but the upper part floodplain mudstone of sequence 2 and 3 is thicker than sequence 1. Sequence 4 mainly contains several single isolated fluvial sandstones and thick layer extensive over-bank deposits or floodplain mudstones, which mainly develops aggradational stratigraphic stacking pattern, suggesting that sediments accumulate during high accommodation. The lower part coarse-grained fluvial sandstone of each sequence was interpreted as sediments of lowstand system tract; the upper part fine-grained floodplain mudstone was interpreted as sediments of transgressive system tract. The stratigraphic architecture patterns reflect that the uplifting rate of base level indicates the increasing trend from the early stage of Lower Shihezi Formation to the late stage. Channel style exhibits evolution from a thick layer multi-phase amalgamated to more solitary. Floodplain mudstone gradual tends to be more development, suggesting that accommodation inclines to be much higher. The thickness of each sequence shows uniform variable laterally, indicating that there are small influence of structure movement on sediments accumulation. The characters of sedimentary evolution under the sequence stratigraphic framework imply that sequence development and evolution is mainly controlled by sea level change.