

Characteristics of Tidal-Littoral Sedimentary System and Distribution of Favorable Reservoir of Silurian in Northern Tarim Basin

Ge Chen¹

¹PetroChina Hangzhou Research Institute of Geology

Abstract

The Silurian of Tarim Basin, with an area of 236,000 km², oil and gas resources of 598 million tons, and an asphalt sandstone area of about 15,100 km², is one of the most important marine clastic rocks exploration target. This article is based on the digital outcrop, drilling, seismic, experimental analysis and the theory of sequence stratigraphy. The results show that the Lower Silurian Kepingtage Formation developed in a tidal flat-coastal sedimentary system controlled by paleogeomorphology in the northern part of the basin, which had nearly a thousand kilometers long ancient coastline from east to west. Different types of sand bodies and sedimentary formations were developed owing to the types and energy of main water action. The ancient coast outward, which had high energy wave action, developed foreshore, flushing and shoreface low-angle wash and cross-bedding coastal sand bar, with a single sand body thickness of 1.2-4 m, high sandstone composition and structure maturity, fine quartz sandstone, fine silt lithic quartz sandstone, such as in the Ying Mai Li and Hala Ha Tang areas.

The ancient coast inward gulf area, which had weak energy wave action, developed high mud cuttings or boulder clay content in the sandstone, with low composition and structure maturity, and single sand body thickness of less than 1m, such as the Yue Nan area. The ancient coast flat area, which had tidal action, developed subtidal channels and intertidal sand flat, where subtidal channels show significantly banded distribution vertical to the coast with a complete three-tier structure. Vertical multiphase channel sand body, superimposed with scour surface and bedding boulder at the bottom, bidirectional, tabular cross bedding in the middle, intertidal mudflat lenticular or ripple bedding in the upper part, has a single sand body thickness of 0.6-2.7 m, such as in the Ke Ping area. From this research, the depositional model of tidal flat-coastal in northern Tarim Basin was established and the distribution of favorable sand bodies could be predicted. It is believed that the coastal sedimentary system with stable sand distribution, large thickness, good reservoir qualities and weak heterogeneity, is favorable for oil and gas accumulation and exploration in the area.