



Restoration of paleokarst landform and its significance in petroleum geology,, A case from Ordovician Yingshan formation in main area of Tahe oilfield

San Zhang and Qiang Jin

School of Geosciences,China University of petroleum, China (zspetro@sina.com)

Tahe Oilfield is a carbonate oilfield with the largest reservoirs in China, characterized by densely and closely developed distributed karst reservoirs in the paleo-weathered crust of the Ordovician Yingshan Formation. paleo-morphology has significant control role on the reservoirs. Based on a large number data of drilling and 3D seismic, the stratigraphic development and tectonic evolution of the main area of Tahe Oilfield are analyzed in detail through Well seismic calibration and layer tracking. The analysis found that the upper and lower Paleozoic are two distinct tectonic layers in the main area of Tahe, The Upper Paleozoic tectonic deformation has little effect on the Lower Paleozoic. The traditional impression method, that is, the top leveling method would change the original paleo-morphology, and the balanced section method can effectively avoid the influence of different tectonic layers and obtain the Ordovician karst landform. The results show that the Ordovician karst landforms in the main area of Tahe Oilfield have obvious inheritance with the present structure, and their partial structure are similar, but the relative height difference is about 0.6 times that of today. With the feature of smooth slope with karst hilllock, the paleokarst landform in this area can be classified into three micro-geomorphic units, karst monadnock platform, monadnock depression and karst lake. Different karst geomorphic units have different karst reservoir distribution and hydrocarbon accumulation degree. The dense development of faults and fractures is a prominent feature of karst monadnock platform with big structure amplitude, and its mainly composed of small vugs or caves, with continuous distribution, low filling degree and high production ratio. In the small amplitude karst depression, surface or underground river and sinkhole are developed, karst cave is large in scale, mostly distributed in a curved shape, with serious sand and mud filling (the cave filling rate can reach 83%) and fast water breakthrough in oil Wells. The karst lakes with flat terrain, there is perennial water accumulation, and the karst degree is weak, Only bedding dissolution vugs are developed locally, and the proportion of high-yielding Wells is low. However, some isolated water storage cave are still developed in places where faults are developed, with high probability of drilling break and fluid leakage, production capacity also. Therefore, the karst landform is the result of karstification. study of paleokarst landform has important guiding significance for the exploration and development of carbonate reservoir.

Key words: Paleokarst landform; Balanced cross section; Karst reservoir; Ordovician Yingshan formation; Tahe oilfield;