The Formation and Evolution of Turpan-Harmy Basin and its Petroleum System, Xinjiang, China

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Turpan-Harmy basin is a compound basin that mainly consists of terrestrial sediments of Mesozoic-Cenozoic with a complex evolutional history. Since Permian, it has undergone several different stages of structural evolution as follows: the intra-continental rift in early Permian, the paraforeland in late Permian and Triassic, the down-warped basin from Jurassic to early Tertiary, and strong thrust orogence as well as basin reform in late Tertiary. Northern basin and southern-western are the two thickest areas, reaching 5000-9000m. The geothermal gradient of the basin characterizes higher in the east than in the west and higher in the past than at the present.

In Permian and Triassic, Turpan-Harmy basin had an extensional environment with a high settling rate between 43-71m/Ma and a sedimentation rate between 92-176m/Ma mostly, and deep lake as well as alluvial fan facies developed. After Jurassic, its environment became compressive with a settling rate in the range of 33-46m/Ma and a sedimentation rate in the range of 43-68m/Ma, which is suitable to form a sedimentary system of shallow lake, braided delta and marsh.

Turpan-Harmy basin has mainly three petroleum systems. The first one whose hydrocarbon rocks are mainly dark mud-stones and cannel-boghead coal is called Upper Permian—Middle and Upper Triassic(!) petroleum system. The second one which has the same hydrocarbon type as the first one is called Middle and Upper Triassic—Middle and Upper Triassic, Middle and Upper Jurassic(!) petroleum system. The Third one in which oil and gas come from coal-derived hydrocarbon is Middle and Lower Jurassic—Middle and Upper Jurassic(!) petroleum system.