

2-D simulation analysis of hydrocarbon migration and accumulation characteristics in Hangjinqi area

guiping zhao

University of Chinese Academy of Sciences, College of Earth Sciences, Beijing, China (zhaogp@ucas.ac.cn)

Hangjinqi, one of key region of the gas exploration, is located in the north of Ordos Basin, crossing over two tectonic units of Yimeng uplift and Yishan sloop, which can be further divided into 3-order tectonic zones, Shiguahao, gaoraozhao, Xinzha, Shilijiahuan. The coal-bearing strata and dark claystones of the Upper Carboniferous Taiyuan Formation and the Lower Permian Shanxi Formation are the main source rocks in this area. The coarse and medium-grain sandstones in the Lower Permian Shanxi Formation and the Lower Shihezi Formation are the main exploration target layers.

In order to make the simulation results meet with the actual geological settings, the following factors should be considered when selecting the 2-D simulation profiles: First, the profile should be through well as near as possible, so that the actual geological model of the profile can be used to calibrate the simulated model of the profile and ensure that the established geological model is in line with the actual geological conditions; second, the selected section should pass through the Taiyuan Formation and Shanxi Formation of coal and the shale source rocks distribution area, so as to simulate the evolution of source rocks and hydrocarbon migration; Third, the selected sections should pass through the main fault zones and different tectonic units as much as possible, so that the migration of oil and gas between different tectonic units can be simulated, especially the case of migration through the faults; and the fourth is that the selected sections should accord with the equilibrium profiles. The structural sections recovered at different periods can be used as paleo-structural models to calibrate the simulation models of key tectonic periods to ensure the reliability of the simulation results.

The results of two-dimension section simulation show that the source rocks of the Taiyuan Formation and the Shanxi Formation of the Xinzha and Shilijiahuan areas located in the southern part of the Hangjinqi began to generate and expulse gas during the Late Triassic-Early Jurassic. The direction is mainly vertical migration, and the upper parts of the lower Shihezi Formation and the upper Shihezi Formation are favorable accumulation beds for natural gas. With the increase of burial depth, natural gas basically maintained the characteristics of vertical migration during the Middle Jurassic-Early Cretaceous period; Until the Late Cretaceous, accompanied by the strong tectonic activities, faults can be acted as pathway for natural gas migration, upward migrating along the fault zone of natural gas. At same time, lateral migration through the sandstone layer in contact with the fault zones occurred; during the fracture initiation period, the combination of sandstone beds within source rocks succession, fracture zones and overlying sandstone beds constitute a stepped pathway system of lateral migration for natural gas Guide system