



## **Tectonic evolution and hydrocarbon accumulation in the Yabulai Basin, western China**

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The Yabulai petroliferous basin is located at the north of Hexi Corridor, western China, striking NEE and covering an area of  $1.5 \times 10^4$  km<sup>2</sup>. It is bounded on the south by Beidashan Mountain to the Chaoshui Basin, on the east by Bayanwulashan Mountain to the Bayanhaote Basin, and on the northwest by Yabulai Mountain to the Yingen-Ejinaqi Basin. It is a Meso-cenozoic compressive depression residual basin.

In view of regional geotectonics, the Yabulai basin sits in the middle-southern transition belt of Arershan massif in North China Craton. Driven by Indosinian movement at the late Triassic, two near EW normal faults were developed under the regional extensional stress along the northern fringe of Beidashan Mountain and the southern fringe of Yabulai Mountain front in the Arershan massif, forming the embryonic form of the Yabulai rift lake basin. Since Yanshan period, the Yabulai basin evolved in two major stages: Jurassic rift lake basin and Cretaceous rift lake basin. During early Yanshan period, EW striking Yabulai tensional rift was formed. Its major controlling fault was Beidashan normal fault, and the depocenter was at the south of this basin. During middle Yanshan period, collision orogenesis led to sharp uplift at the north of this basin where the middle-lower Jurassic formations were intensely eroded. During late Yanshan period, the Alashan massif and its northern area covered in an extensional tectonic environment, and EW striking normal faults were generated at the Yabulai Mountain front. Such faults moved violently and subsided quickly to form a new EW striking extensional rift basin with the depocenter at the south of Yabulai Mountain. During Himalayan period, the Alashan massif remained at a SN horizontal compressional tectonic environment; under the compressional and strike slip actions, a NW striking and south dipping thrusting nappe structure was formed in the south of the Yabulai basin, which broke the Beidashan normal fault to provide the echelon fault system and finally present the current structural framework of "east uplift and west depression, south faulted and north overlapping".

The Yabulai basin presented as a strike-slip pull-apart basin in Mesozoic and a compressional thrusting depression basin in Cenozoic. Particularly, the Mesozoic tectonic units were distributed at a big included angle with the long axis of the basin, while the Cenozoic tectonic units were developed in a basically consistent direction with the long axis. The sags are segmented. Major subsiding sags are located in the south, where Mesozoic Jurassic-Cretaceous systems are developed, with the thickest sedimentary rocks up to 5300m. Jurassic is the best developed system in this basin. Middle Jurassic provides the principal hydrocarbon-bearing assemblage in this basin, with Xinhe Fm. and Qingtujing Fm. dark mudstone and coal as the source rocks, Xinhe Fm. and Qingtujing Fm. sandstones as the reservoir formation, and Xinhe Fm. mudstones as the cap rocks. However, the early burial and late uplifting damaged the structural framework of the basin, thus leading to the early violent compaction and tightness of Jurassic sandstone reservoir and late hydrocarbon maturity. So, tectonic development period was unmatched to hydrocarbon expulsion period of source rocks. The hydrocarbons generated were mainly accumulated near the source rocks and entrapped in reservoir. Tight oil should be the major exploration target, which has been proved by recent practices.