

## **The role of saline formation in the central Tarim basin, NW China: insight into deformation evolution of Pre-Caspian Region**

Fei Ning  
LandOcean Energy Services Co., Ltd.  
E-mail: [ningfei037@yahoo.com.cn](mailto:ningfei037@yahoo.com.cn)  
Phone: 86-13552844467  
7F, Building 2A, Silicon Valley Bright City, No.1 Nongda S. Rd.,  
Haidian District, Beijing 100084  
China

Both the Pre-Caspian Basin and Tarim basins are located in the northern margin of Tethyan tectonics; they have similar evolution history and hydrocarbon-bearing characteristics. The understanding for the deformation characteristic of Tarim Basin may have inspiration for hydrocarbon exploration in Pre-Caspian Region.

The evolution and development of Tarim basin were controlled by the background of the plate tectonics in different periods, forming various types of primary basins; many saline formations were developed in Tarim basin, therefore intra-plate deformation showed complicated structural styles, which have a significant role for hydrocarbon accumulation. To better understand the influence from saline formations for structural evolution and petroleum implications, taking the central areas of Tarim basin as a study target, based on a combined seismic datum, outcrop, analogue modelling and laboratory data including mechanical properties and petrophysical properties. The mechanism, deformation intensity across basement faults and potential contribution for hydrocarbon re-migration of salt-related faults were studied.

During Sinian to middle Ordovician, the central Tarim basin experienced extensional stress field, basin inversion mainly happened in late Ordovician when orogenic process taken place around the margin of Tarim basin, which resulted in the compressional stress field within central Tarim basin. The seismic cross-section showed that the final deformation pattern of extensional basins is strongly influenced by the geometric character of early normal faults and salt strata developed in the middle Cambrian. During extension period, the resulting graben or half-graben is progressively filled with synextensional gypseous halite, laboratory data suggested that such layer is less competent strata, gypsiferous and salt beds impede normal fault reactivation, resulting in fault-decollement folding in the upper layer.

Physical analogue successfully replicate basin inversion in evolving fault systems thereby restored such structures kinematically through their complex structural history of this deformation in these prospective hydrocarbon traps. The initial development of continental extensional basins provide ideal conditions for the deposition of organic-rich source rocks, such as Yuertusi formation in the lower Cambrian. Owing to the compaction of gypseous halite in middle Cambrian, both over and under the gypseous halite developed two groups of dolomite which is high quality of reservoir. Structural inversion provides the anticlinal trap for the hydrocarbons, the new faults, propagated during inversion; act as pathway for migration of petroleum.

**Key words:** Pre-Caspian region; Tarim basin, Structural deformation; Petroleum implication