

## **Structural Characteristics and Giant Gas Field in Ultra-Deep Layer of Salt-Bearing Basin, Kuqa Foreland Basin, NW China**

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### **Abstract**

Kuqa foreland basin is located along the southern flank of the Tian Shan orogenic belt in western China. After years of exploration, serious gas fields were found in Cretaceous sandstone reservoirs which have a low porosity (3%-5%) and very deep depth (6500m~7800m) in ultra-deep subsalt layer. The total resource is over 1000 billion cubic meters and the daily production per well is 300~1000 thousand cubic meters. The structure plays important roles for the gas accumulation. Our main findings are as follows: (1) Four layers dominate the stratigraphy: post-salt overburden, salt, subsalt strata, and basement. There are two dominant deformation zones, the Kelasu structural belt in the north and the Qiulitage structural belt in the south. A series of subsalt thrusts occur across the Kelasu belt, and some paleo-uplifts formed below salt along the Qiulitage belt. There are three related structural styles across the region: contractional features (thrusts, folds), salt structures, and strike-slip faults. (2) The structural evolution of the Kuqa foreland basin can be divided into four stages which we describe via the settings of ongoing deposition: late Permian-Triassic paleo-foreland basin, Jurassic-Cretaceous depressional basin, Paleogene-Miocene weak contractional flexure basin, and Pliocene-Quaternary intra-continental foreland basin. (3) Rich oil and gas resources occur in Cretaceous sandstone reservoirs below salt layers across the Kuqa fold-thrust belt. Widely distributed Triassic and Jurassic coal layers comprise the region's high quality source rocks. Thrusting of subsalt layers formed a series of anticlines which are the main traps for gas exploration, with the thick salt providing very good seals for hydrocarbon preservation. Hydrocarbon migration primarily occurred during the Himalayan period, i.e., the main shortening period across the Kuqa fold-thrust belt.