Hydrocarbon Exploration in Ordovician Carbonates, Tarim Basin, Western China

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The Ordovician Carbonates in the Tarim Basin in west China are deeply buried, thickly deposited, and widely distributed. They form a very important hydrocarbon exploration target in the basin. The primary (groundmass) porosity of the carbonate strata is extremely low with reservoir porosities coming primarily from the secondary pores, caves, and fractures. The Ordovician carbonate facies are also extremely heterogeneous with hydrocarbon accumulation being mainly controlled by the reservoir (facies) quality. The major challenge of hydrocarbon exploration in the generally tight Ordovician carbonate strata, is to delineate and predict the favorable reservoir bodies.

This paper combines evolutionary models for the carbonate reservoirs, with high-resolution 3-D seismic data to delineate and predict suitable reservoir plays in the Ordovician carbonates. This has been achieved by tackling some key challenges in the seismic data acquisition, processing and integrated interpretation of heterogeneous carbonates systematically. Special emphasis has also been given to the detailed characterization of reservoir facies using cores, logs, outcrops and seismic data with an innovative exploration procedure for heterogeneous carbonate reservoirs developed. The exploration results in the Tarim Basin so far, have attested the effectiveness of such an approach for hydrocarbon exploration and development in heterogeneous carbonates.