

Current Status of One Company's Exploration on Marine Facies and Subtle Trap Plays

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SINOPEC has recently made significant progress in hydrocarbon exploration in marine facies and subtle trap reservoirs and has maintained a steady annual growth in proven reserves. The exploration success is attributed to the improved understanding on a number of challenging issues relating to marine facies and subtle trap plays.

In the marine facies exploration SINOPEC made three major findings. (1) shale, calcareous shale and marl with Type II-I kerogen and TOC over 0.5% are required to form giant or large fields in marine sequences, and marine carbonate requires higher thermal maturity for kerogen cracking but lower maturity for oil cracking compared with siliciclastics; (2) three major stages of Caledonian Karsting are recognized in addition to the Hercynian Karsting, in Tarim Basin, extending the exploration scope to the Ordovician carbonate; (3) the recognition of the importance of the structural-lithologic reservoir plays led to the discovery of the largest gas field so far in the Sichuan Basin with a single-field proven reserve of 114.4X10⁹ m³.

In the investigation of subtle traps, we proposed the concept of “slope break zone-lowstand fan” plays and “meshwork-carpet” style hydrocarbon migration and accumulation models for the non-marine rifted basins, which led to the discovery of over 100 million tonnes additional oil reserves annually in the Shengli Oilfield for several years. In the Junggar Basin, a major exploration breakthrough was achieved by employing a reservoir-control model of “uplifting-control, facies-control and double faulting-pressure-control” and has discovered over 200 million tonnes of oil reserves.