

Original article

Hydrocarbon origin and reservoir forming model research of Longwangmiao Formation, Moxi-Gaoshiti area, Sichuan Basin



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ARTICLE INFO

Article history:

Received 27 January 2016

Received in revised form

7 April 2016

Accepted 11 April 2016

Keywords:

Gas reservoir

Bitumen

Accumulation evolution

Longwangmiao formation

Sichuan basin

Moxi-Gaoshiti area

ABSTRACT

This paper focuses on the Longwangmiao gas reservoir in Moxi-Gaoshiti area, Sichuan Basin. Starting from the tectonic evolution perspective, though comparing biological marker compound and analyzing fluid inclusions, the oil & gas origin and accumulation evolution of Longwangmiao Formation are systematic studied with reference to the burial-thermal evolution of single well geological history in the study area. It is suggested that the oil & gas reservoir is generally characterized by early accumulation, multi-stage filling, late cracking and later adjustment. The oil and gas were mainly sourced from lower Cambrian Qiongzhusi Formation, partly from the Permian source rock. During the geological period, 3 major oil & gas fillings occurred in the Longwangmiao Formation, namely Caledonian-Hercynian filling that was small in scale and produced the first phase of paleo-oil reservoir that soon destroyed by Caledonian movement uplift, large-scale Permian filling that gave rise to the second-phase of paleo-oil reservoir and the Triassic-Jurassic filling that enriched the second phase of paleo-oil reservoir. Finally, the paleo-oil reservoir experienced an in-situ cracking during the cretaceous period that gave rise to a natural gas reservoir and left behind carbonaceous bitumen and oily bitumen in the holes of the Longwangmiao Formation.

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1. Introduction

The Longwangmiao Formation in Moxi-Gaoshiti area is one of the hotspot in domestic natural gas exploration. In 2014, the biggest single mono-block marine-facies carbonate gas field so far was found in the Longwangmiao Formation, with a proven reserve of $4403.85 \times 10^8 \text{ m}^3$, which reveals the great exploration potential of the high-evolution natural gas reservoir in Sichuan Basin. Studies show that the Moxi-Gaoshiti area has favorable

conditions for petroleum geology, with massive Sinian – Quaternary depositional thickness, multiple sets of high-quality hydrocarbon source rocks and broad exploration field [1]. The current research has mainly focused on the controlling factors and depositional model of the reservoir [2–5], rather than the accumulation mechanism of Longwangmiao Formation. However, knowledge of this is the key to further high-efficient exploration of oil & gas reservoirs [6,7]. For this reason, this essay, based on the sufficient investigation of preliminary exploration and research results, start from the source of bitumen in Longwangmiao Formation, combined with the analysis of fluid inclusion composition and structural evolution, conducted the reconstruction of the accumulation process, and systematically studied the characteristics of oil and gas enrichment and accumulation, in hope of providing more scientific basis to expand the exploration of the Longwangmiao Formation in Sichuan Basin.

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Peer review under responsibility of Southwest Petroleum University.



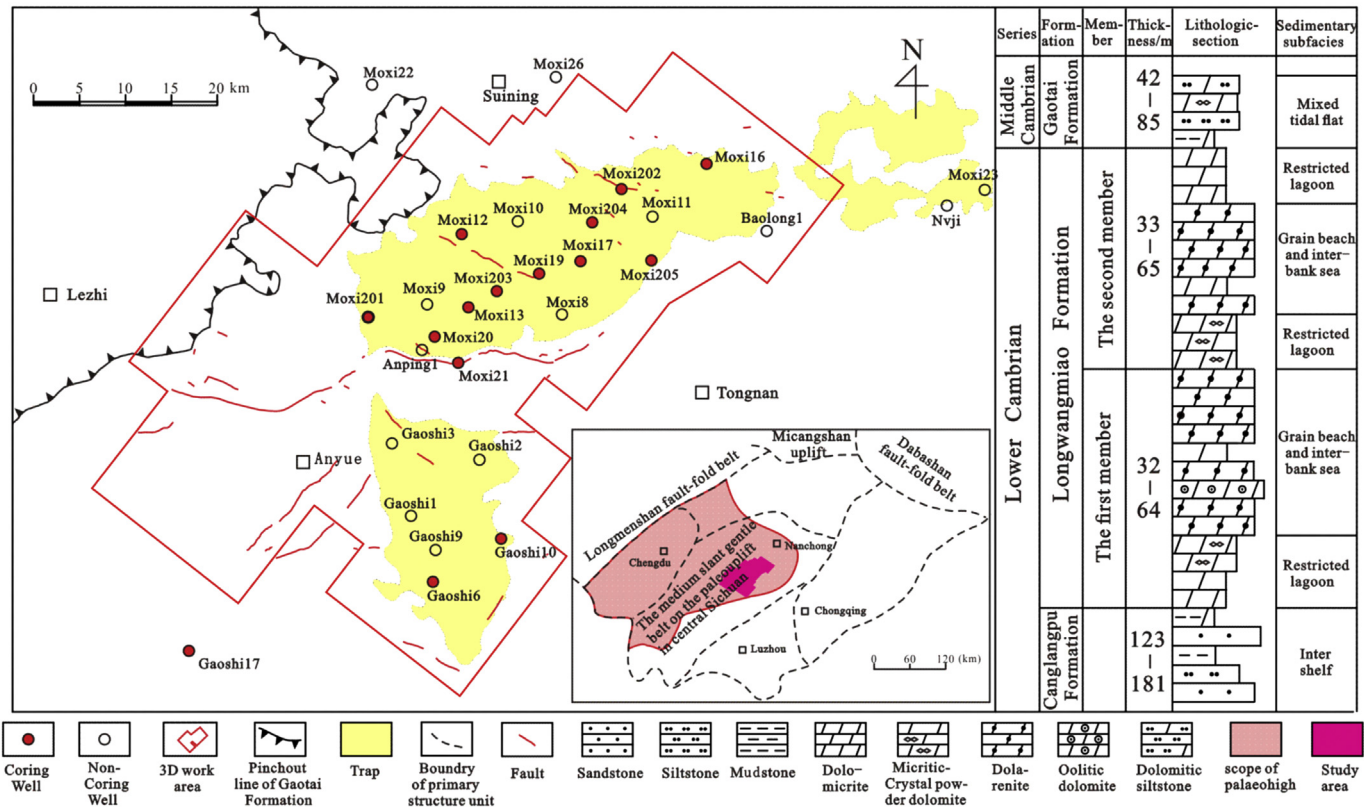


Fig. 1. Location, structure and stratigraphic column of the study area.

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