

The Reservoir Characteristics of Dengying Formation of Simian System in South of Sichuan Basin

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Abstract

The study indicates that The southern sichuan area was controlled by the paleogeomorphology during the sedimentary period, Dengying formation beach facies reservoir is widely distributed, The main types of reservoir rocks are algal clot dolomite, algal binding rocks, algal sand clastic dolomite and powder crystal dolomite, The reservoir space is mainly intergranular pore, followed by intense recrystallization fuzzy original rock fabric and the formation of the intergranular pore and intergranular dissolved pore, reservoir physical property is poor, Mainly low porosity and low permeability reservoirs .In the early stage, the Algal clot dolomite, algal sand clastic dolomite and powder crystal dolomite formed in the relatively strong hydrodynamic environment were lifted and denuded by the tongwan movement in the later stage, resulting in long-term exposure to the atmospheric environment. The dissolution of atmospheric fresh water formed a series of pores and became a set of high-quality reservoirs.

Keywords

Sichuan, Reservoir characteristics, Dengying formation.

1. Introduction

The sinian dengying formation in sichuan basin is the oldest natural gas reservoir in China [1], In recent years, great progress has been made in sinian studies, with the discovery of weiyuan, ziyang and other large gas fields, indicating that dengying formation reservoirs have great exploration potential. Much research has been done on this area [2]. However, due to the large depth of strata and complex diagenesis in this area, there are still disputes over the characteristics of the reservoir. Therefore, based on the geological data in this area and previous studies, the author studies the reservoir characteristics of sinian dengying formation in the south of sichuan province, in order to provide a theoretical basis for oil and gas exploration in the later period.

2. Geological setting

Located in the southern part of the sichuan basin, the area stretches from Emei in the west to Chongqing in the east, from Ziyang to Hechuan in the north, and from Xuyong in the south [3]. The regional structures include southwest sichuan low-steep fold belt and south sichuan low-steep fold belt, with an area of about 40000km² (Fig.1). The sinian to lower Paleozoic in the area of south sichuan has the alternation of uplift and depression, the dengying formation on both sides of Anye-Changning rift area is high in paleogeomorphology, and the dengying formation in Datachang-Huangjinba area is local highlands after deposition. Before the sinian period, affected by the Jinning movement, the basement presented a landform pattern of uplift and depression. Four ancient uplifts

were developed, namely Leshan-Weiyuan, Suining-Guang 'an and Dazhou-kaijiang underwater uplift areas. One ancient land was Hannan ancient land. Before the Cambrian, under the influence of the Tongwan movement, the dengying formation in the south of sichuan was uplifted and denuded in a large area, and the dengying formation monadnock were developed in the Datachang-Huangjinba area [4].

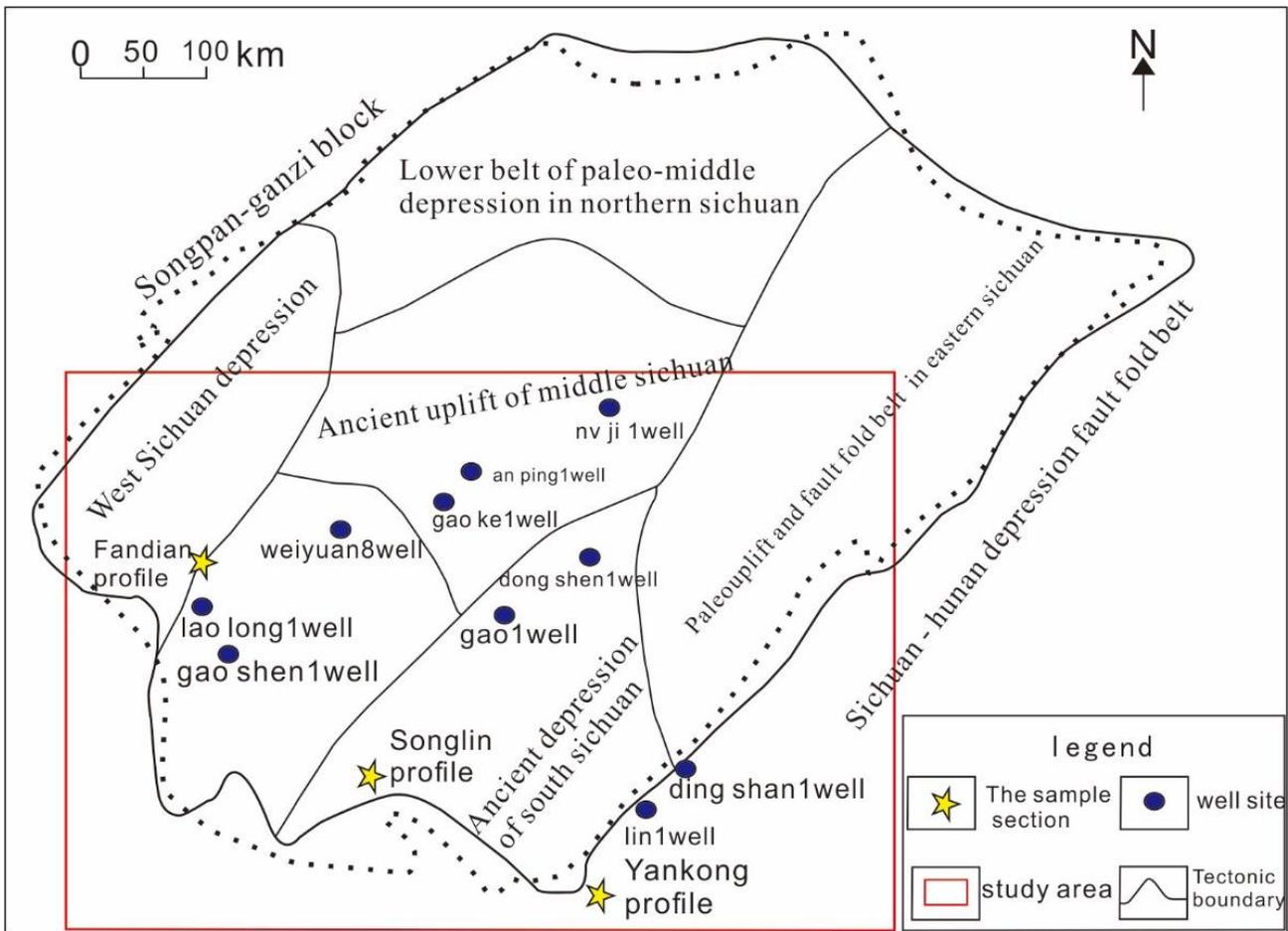


Fig. 1 Structural location map of the study area

3. The reservoir characteristics

3.1 Sedimentary characteristics

Using outcropping data and regional drilling data, combined with sedimentary landform of dengying formation, the distribution map of sedimentary facies of dengying formation 4 and dengying 2 is compiled. It can be seen that there is a large area of contiguous development of hilly flat facies at the edge of platform of stage 4 and stage 2 in south sichuan, and the research area is located in the favorable area of hilly flat facies of dengying formation.

3.2 Reservoir rock types and spatial characteristics

Similar to central sichuan [5]. Therefore, the algal clot dolomite and algal sand clastic dolomite in the hilly and shoal facies in southern sichuan were controlled by the uplift and denudation of the tongwan movement[6]. Through detailed observation of field, core and thin section data, the reservoir of dengying formation is mainly light gray, light gray algal clot rock, algal binding rock, algal sand clastic dolomite and powder crystal dolomite .According to its origin, morphology, size and distribution, the reservoir space of dengying formation is divided into the following types: pores

(including intragranular pore, intergranular pore, intercrystalline pore and residual intergranular pore), Cracks and caves.

3.2.1 Pore

Pore types include intergranular (dissolution) pore, intragranular dissolved pore, intercrystalline (dissolution) pore, lattice pore and non-fabric selective dissolution pore, etc., the formation of which is mainly related to the preservation of intergranular (dissolution) pore, penecontemporaneous period, early diagenetic dissolution and multi-period buried karst superposition. The pore development of dengying formation is dominated by intergranular (dissolved) pore under the microscope, followed by intercrystalline pore and intercrystalline dissolved pore formed by strong recrystallization and fuzzy original rock fabric.

3.2.2 Cave

The reservoir rocks of dengying formation in the south of sichuan province are mainly algal clot dolomite and algal arenaceous dolomite. The size of the hole is generally 5-20mm, and the maximum size is more than 50mm. The shape is mostly irregular and oval, with good connectivity.

3.2.3 Cracks

The fractures are mainly developed in Section four of dengying formation, and they all belong to structural fractures in terms of their structural characteristics. A number of fractures were observed under the microscope. The fractures developed in the early stage were mostly filled with dolomite and asphalt, and some of the fractures filled with dolomite were partially eroded, while the fractures developed in bending were generally not filled.

4. Conclusion

The main rock types of dengying formation reservoir in south sichuan are algal clot dolomite, algal binding rocks, algal sand clastic dolomite and powder crystal dolomite. The storage space is mainly composed of intergranular pore, intercrystalline pore and lattice pore. There are various types of reservoirs in dengying formation in southern sichuan, including pore-cave, pore-hole and karst cave, The pore-cavern reservoir is the main high-quality reservoir.

The reservoir of dengying formation is formed by the combined action of dissolution and platform margin high shoal, whose sediments provide the material basis for the formation of the reservoir.

References

- [1] W.Z. Chen. On the gas source of the weiyuan sinian gas reservoir in sichuan basin. *Natural gas industry*, vol. 12 (1992), 28-32.
- [2] Q. Sang, Y. Wei, C. Cheng, et al. Gas and water distribution characteristics and control factors of maokou formation gas reservoirs in the south of sichuan province. *China geology*, vol.39(2012),634-644.
- [3] Q. Li, B.Q. Du, H. Long, et al. Geological characteristics and exploration direction of natural gas in shunan area .*Natural gas industry*, vol.29(2009), 21-23. (in Chinese)
- [4] T. Li, H.Q. Song. Oil and gas enrichment rules of the jialing river formation in southeast sichuan province [J].*Natural gas industry*, vol .2007(06):35-38.
- [5] W.K. Deng, X. Liu, Y.S. Li. Study on formation and evolution of sinian dengying formation reservoir in central sichuan .*Natural gas exploration and development*, vol.38(2015),12-16.
- [6] C.S. Si, Y. Hao, J.G. Zhou, et al. Reservoir characteristics and main controlling factors of dengying formation in sichuan basin. *Journal of chengdu university of technology (natural science edition)*, vol.41(2014),266-273. (in Chinese)