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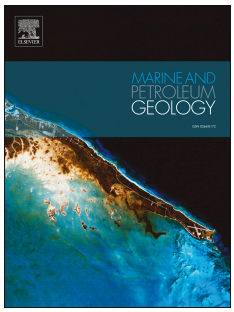

Geometry, kinematics and displacement characteristics of strike-slip faults in the northern slope of Tazhong uplift in Tarim Basin: A study based on 3D seismic data

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Geometry, kinematics and displacement characteristics of strike-slip faults in the northern slope of Tazhong uplift in Tarim Basin: A study based on 3D seismic data

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Abstract: The northern slope of Tazhong uplift is one of the key areas in the Tarim Basin with great exploration potentials. Previous exploration experiences suggest that strike-slip faults distributed therein play an important role in reservoir formation and hydrocarbon accumulation. In this study, based on the interpretations of the 3D seismic data, six strike-slip fault zones cutting through the Cambrian-Middle Devonian units are identified and characterized. On the seismic cross sections, these faults show a complex geometric feature that consists of a lower positive flower structure in the Cambrian-Lower Ordovician and an upper negative flower structure in the Lower Ordovician-Middle Devonian. On the seismic coherence slices, the lower faults show a linear geometry orienting NNE and only developed within the principal displacement zone. The upper faults are NW trending and display right-stepping en-echelon arrangements. By analyzing the change in the reverse separation of the interface and counting the fault growth index, we suggest that the lower and upper faults developed sequentially in different geological times and formed as a result of two-stage evolution. The lower strike-slip faults may have been formed no early than the Late Ordovician. The upper en-echelon normal faults were developed during the Middle Silurian-Middle Devonian due to the reactivation of the lower strike-slip faults. The horizontal displacement determined from the time slices of faults S1, Sn1 and Sn4 are 743 (±150) m, 1545 (±150) m and 1780 (±150) m, respectively. Such a variation indicates that the amount of horizontal strike-slip displacement is likely to have a tendency to decrease from the south to the north, which agrees well with the regional geodynamics that the compressive stress was transmitted from the south to the north when the strike-slip faults developed during Late Ordovician and Middle Devonian.

Key words: Strike-slip faults; Flower structures; En-echelon normal faults; The northern slope of Tazhong uplift; Tarim Basin

1. Introduction

Strike-slip faults in the Tarim Basin have significant impact on reservoir formation and hydrocarbon accumulation. Previous studies suggest that a series of Paleozoic strike-slip fault system with enriched oil and gas were developed in the northern slope of Tazhong uplift (Wu et al.,