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Geometrical Characteristics of Structural Inversion on the Offshore of Miaoli, Taiwan

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ABSTRACT

Structural deformation caused by inversion tectonics, a consequence of arc-continent collision in Taiwan since late Miocene, is well preserved in the foreland basin of the offshore Hsinchu-Miaoli area, northwestern Taiwan. Extensional fault systems of Paleogene through Miocene age had still divided the area into groups of grabens and horsts. Reactivation and inversion of pre-existing normal faults have played an important role in the structural deformation and influenced hydrocarbon accumulations in the region.

Major tectonic elements in the study area include the Waihsiangshan fault, Paishatun graben, and Wulipai graben. The Paishatun graben is bounded by the Chunan fault in the northern side and by the Paishatun fault in the southern side. The Wulipai graben is bounded by the W1 fault in the northwestern side and bounded by the W2 fault in the southeastern side. All of these faults are normal faults in origin and have been reactivated and inverted during the latest Cenozoic orogeny, the Penglai Orogeny.

A time structure map of the Nanchuang formation was prepared, and used to evaluate the characteristics of inversion structures in the study area. The Waihsiangshan normal fault been reactivated and inverted to become a dextral strike-slip fault with a series of en'echelon folds and variable structure in the hanging wall. All the boundary faults of the Paishatun graben and Wulipai graben have inversion-structure characteristics with a special arrays of the normal fault-null point-reverse fault occurring sequentially along the same boundary fault.

A null line was completed by connecting the null point in each major fault. Westward of the null line, it is difficult to find reverse faults, so that the null line could be somewhat considered as westmost boundary of the influence by the Penglai Orogeny. The east side of the null line is characterized by minor and remarkable reverse faults, and considered as the unstable inverted area, whereas the west side of the null line is dominated with normal fault, and considered as the stable area. The W1 fault and P1 fault identified as thin-skinned thrust faults could be regarded as the front thrust of the Penglai Orogeny.

The stable area is probably advantageous for the accumulation of hydrocarbon due to good horizontal fault seal rather than that of unstable area. But in the east side of the null line, structural high near the W2 fault determined as the westmost anticline influenced by the Penglai Orogeny would still be high in hydrocarbon potential in combination with good

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