

Faults characteristics and evolution history based on seismic data in Hangjinqi area [U+FF0C] Ordos basin

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Hangjinqi area structurally located in Yimeng uplift in the northern Ordos basin, is one of the major area of natural gas exploration. Nearly one hundred faults with different size, different properties and different strikes were developed in Hangjinqi area, of which Boerjianghaizi Fault, Wulanjilinmiao Fault and Sanyanjing Fault were in larger scale, regarded as the main faults.

Boerjianghaizi Fault is a reverse fault dipping north, the displacement of fault in the plane gradually becoming smaller from bottom to top. Seismic section interpretation results show the following features: Boerjianghaizi Fault dipping north, cutting all the layers below T3 horizon; fault plane is steep in upper part and gentle in lower part. The line 639.5 statistical results display that the dip of the lower part is small, the dip angle of Shihezi Formation and below is about 35° , the fault plane above Shihezi Formation is steep, about 65° .

Seismic sections display that Wulanjilinmiao Fault dislocated all horizons from T3 to T9, and this fault plane showed steep dip of more than 80° with little change in sedimentary succession. The displacement of fault is small, the largest displacement occurred in Zhidan Group with the displacement of 55m at bottom. Its salient features are that different layers show different fault properties, there are both normal fault and reverse fault, reflecting this region has experienced many times of stress field changes and multiple phase of fault activities.

Seismic profile interpretation results reveal that the Sanyanjing Fault broke the T3 horizons and below, The dip of lower part of this fault is about 39° , up to the Sanxi Formation-lower Shihezi Formation, the dip becomes to 62° , and up again to upper Shihezi-Quaternary strata, the dip increases to 78° . In general, Sanyanjing Fault is characterized by smaller displacement in lower and larger displacement in upper. The statistical results of fault displacement in Line523 show that the lower part (Shanxi formation-Upper Shihezi Formation) has small displacement of 10 ~ 30 m, middle part (Shiqianfeng-Yanchang Formation) is 30 ~ 90m, and the upper part (Yan'an formation and above strata) shows vertical fault with fault throw of more than 160m.

Evolution history of three main faults has both similarities and significant differences. Since the late Permian, Boerjianghaizi Fault underwent four stages of tectonic movement, which are upper Shihezi formation sedimentary period, early Triassic Liujiagou-Heshanggou sedimentary period, middle Jurassic, and Cenozoic. Wulanjilinmiao Fault experienced early Permian, early Triassic, middle-late Jurassic and middle Cenozoic tectonic movement. Sanyanjing Fault went through three phases of tectonic events, Permian-early Triassic, Jurassic and Cenozoic. Among of each fault activities, the compressional tectonic movement in the late cretaceous-Cenozoic is the strongest.