

Paper Number: 1289

Up-warp and down-warp characteristic of strike-slip fault zone and its geological significance in the mid-eastern part of the Trim Basin Northwest China

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Abstract: Three sets of vertical strike-slip faults spread in the NNE, NEE and NWW directions in mid-eastern part of the Trim Basin Northwest China. Strata of different ages cut by those faults presented upwarp or downwarp change in geometry along the fault surface in 3D seismic profiles (Fig.1). The reason for the change in horizon shape along the fault surfaces has not been unknown. Recent research show that this phenomenon associated with the change in stratigraphic thickness along the fault surfaces can facilitate the judgment of stress property and fault stages. Using the well and 3-D seismic data, It is found that the decrease in strata thickness of the fault zone compared with its surrounding zone is rightly respond to up-warp of fault zone, and increase in strata thickness of the fault zone compared with its surrounding zone is rightly respond to downwarp of fault zone. Hence the upwarp strata and increase in fault zone thickness is considered to result from compresso-shear activities of the fault; downwarp strata and increase in thickness in fault zone is caused by tenso-shear fault activities. Therefore, NNE fault could be inferred to start at late Ordovician to early Silurian as left-lateral compresso-shear activities. And then to cretaceous they further experienced three different stress stages: left-lateral tenso-shear activities during Middle Silurian, static during Carboniferous and tenso-shear activities during Permian-Cretaceous. NEE and NWW trending faults started as tenso-shear X conjugate process during Middle Cambrian. The later activity stopped after the Middle Cambrian, however, the former kept tenso-shear action until the late Ordovician. These faults exerted important impacts on the volcanoes and hydrothermal-karst related reservoir which widely distribute as beads-shaped and sheet-shaped seismic reflections in Ordovician carbonate rocks.

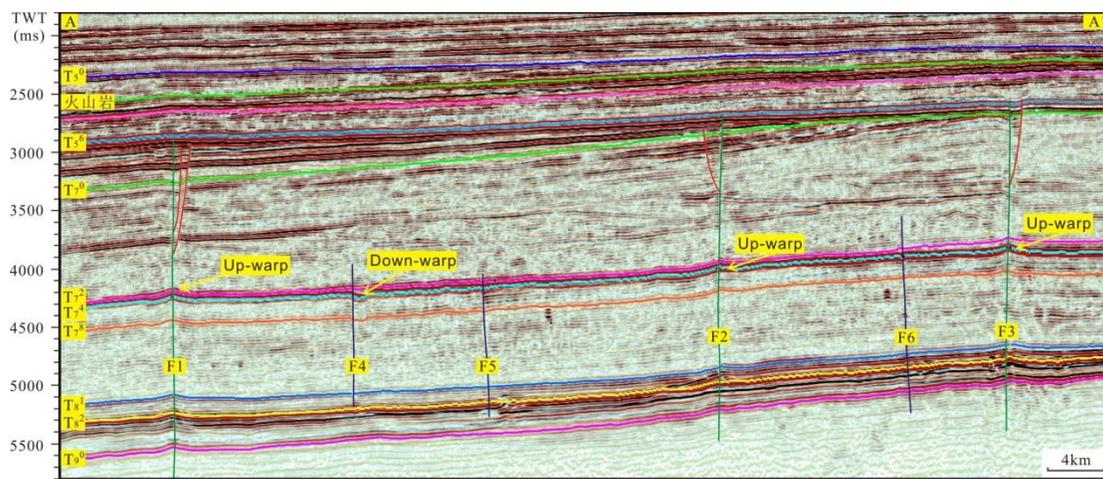


Fig.1 The upwarp of NNE spreading fault F1, F2, F3 and downwarp NEE spreading fault F4, F5, F6 .

