



Formation and evolution of faults in extension –strike slip condition: A case study in the Qingxi area of the Dongying Sag, Bohai Bay Basin, China

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Abstract: As an important condition, faults restrict the next study on the structural characteristics and tectonic evolution of basin. In extensional basin area, the formation of faults usually reflects the combination of extension and strike slip, which is not only controlled by extension. The Qingxi area, located in the southeast of the Dongying Sag, is in the island arc environment formed by the westward subduction of the Pacific plate since the Late Mesozoic. The strike slipping caused by the east boundary Tan-Lu fault maintains throughout in the whole time. There are many faults in this area, with NW-trending faults in the north, near EW-trending, SN-trending faults in the middle and NE-trending faults in the south. These faults of different trending cut each other and developed in multiple stages. Based on balanced profile method, two selected EW and SN direction evolution profiles have been used to quantitatively calculate the kinematical parameters of each main tectonic evolution stages since Late Mesozoic. In addition, combined with tectonic stress field in Dongying Sag, the complex tectonic evolution of Qingxi area can be demonstrated. The results show that NW-trending faults, widely distributed in the northwest of Qingxi, are controlled by the NE-SW extension and sinistral of Tan-Lu fault. They developed during the sedimentary period of the Es4 formation and peaked during the early sedimentary period of the Es3 formation. The fault activities are earlier in north than that in south. The EW and SN-trending faults, mainly distributed in the Xinzhen structural zone, are controlled by SN extension and weak dextral strike slipping, cutting into each other on the surface to form a grid. They developed during the middle sedimentary period of the Es3 formation and peaked during the sedimentary period of the Es2 formation. The NE-trending faults, distributed in the Guangli structural zone, are controlled by NW-SE extension and dextral strike slipping. They developed during the late sedimentary period of the Es3 formation. The change of Pacific plate subduction direction and velocity since the Cenozoic, the strike slip of the Tan-Lu fault zone and the compression stress at the end of the Ed sedimentary period, are the fundamental causes of current structural pattern of Qingxi area.