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The architecture of buried reverse fault zone in sedimentary basin: A case from the northwest margin of Junggar Basin, China

Liu, Y.[1], Wu, K. Y.[1], Wang, X.[2], Pei, Y. W.[1]

[1]China University of Petroleum (East China), Qingdao, China, liuyin@upc.edu.cn
[2]Nanjing University, Nanjing, China

It is widely accepted that the faults can act as the conduits or the barrier for oil and gas migration. A lot of studies also confirmed that the fault zone is very complicated and composed of distinct components (Caine et al., 1996; Faulkner et al., 2010). Experimental studies indicated that different components of fault zone usually have different physical features, which can highly influence the migration of oil and gas along the fault. Nowadays, due to the restriction of data and methods, the studies of fault zone architecture are more focused on the field observation. In the petroleum exploration, what should be concerned is the buried faults in the sedimentary basin. However, this question is no cause enough attention in today's research. In order to solve this problem, we analysed four reverse faults in the northwest margin of Junggar Basin, Xinjiang Province, China. Combining with the seismic data, well logging data and drill cores of 104 wells, we set up a new method to analyse the architectures of buried faults. High-precision 3D seismic data reflect that the fault zone show up as a chaotic seismic reflection belt. The well logs that can well reflect the cracks are used to fitting a new logging curve, which can easily distinct the fault core and damage zone. The components of fault zone can be obvious observed in the drill cores, the fault core shows as a mylonite zone in the reverse fault and the cracks in the damage zone are usually filled with calcite, quartz, clay and so on. Thin sections are used to observe the characteristics of cements in hydrothermal veins, and five stage hydrothermal activities are identified in the northwest margin of Junggar Basin. Systematic statistics suggested that there is an exponential relationship between the width of fault core and damage zone of the reverse faults. This research can be very helpful in analysing the architecture and development of fault zone of reverse fault.

References:

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