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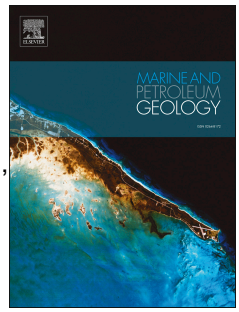

In-situ stress orientations in the Xiagou tight oil reservoir of Qingxi Oilfield, Jiuxi Basin, northwestern China

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In-situ stress orientations in the Xiagou tight oil reservoir of Qingxi Oilfield, Jiuxi Basin, northwestern China

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Abstract: Knowledge of the present-day in-situ stress orientation is important for borehole stability, fluid flow in fractured reservoirs, and hydraulic fracture stimulation, etc. The Qingxi Oilfield of Jiuxi Basin, northwestern China, is an old oilfield; however, within which there were no systematic investigations into the present-day in-situ stress orientation prior this study. In the present study, the orientation of horizontal maximum stress (S_{Hmax}) in the Qingxi Oilfield was interpreted and analyzed based on 149 borehole breakouts (BOs) and 131 drilling induced fractures (DIFs) from electrical borehole imaging logs in 23 wells. Our interpretations revealed a prevailing ~NE-SW-trending (14.94°N~52.74°N) S_{Hmax} orientation in the Xiagou tight oil reservoir of Qingxi Oilfield. However, the S_{Hmax} orientation indicated various tendencies both laterally and with burial depth within single wells, which were influenced by well-developed faults, natural fractures and bedding planes. The presence of these structures caused great contrasts of rock mechanical properties, influencing stress orientation variations. In addition, the effects of present-day in-situ stress orientation on natural fractures, hydraulic fracture stimulation and borehole stability were discussed. In the Qingxi Oilfield, ~NE-SW-trending natural fractures indicated favorable contributions to subsurface fluid flow. Hydraulic fractures would propagate vertically following ~NE-SW-trending. Wells were more likely to experience borehole instability issues if they were deviated towards ~NE-SW-trending. The results can provide geological references for subsequent tight oil production in the Qingxi Oilfield of Jiuxi Basin.

Keywords: in-situ stress orientation; drilling induced tensile fracture; borehole breakout; Xiagou tight oil reservoir; Qingxi Oilfield; natural fracture