

Pore Pressure and In-situ Stress Magnitudes with Image Log Processing and Geological Interpretation in the Haoud Berkaoui Hydrocarbon Field, Northeastern Algerian Sahara

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Abstract : This work reports the first comprehensive stress field interpretation from the eleven recently drilled wells in the Berkaoui Basin, Algerian Sahara. A cumulative length of 7000+m acoustic image logs from 06 vertical wells were investigated, and a mean NW-SE (128°-145° N) maximum horizontal stress (SHMax) orientation is inferred from the B-D quality wellbore breakouts. The study integrates log-based approach with the downhole measurements to infer pore pressure, in-situ stress magnitudes. Vertical stress (Sv), interpreted from the bulk-density profiles, has an average gradient of 22.36 MPa/km. The Ordovician and Cambrian reservoirs have a pore pressure gradient of 13.47-13.77 MPa/km, which is more than the hydrostatic pressure regime. A 17.2-18.3 MPa/km gradient of minimum horizontal stress (Shmin) is inferred from the fracture closure pressure in the reservoirs. Breakout widths constrained the SHMax magnitude in the 23.8-26.5 MPa/km range. Subsurface stress distribution in the central Saharan Algeria indicates that the present-day stress field in the Berkaoui Basin is principally strike-slip faulting (SHMax > Sv > Shmin). Inferences are drawn on the regional stress pattern and drilling and reservoir development.

Keywords : stress, imagery, breakouts, sahara

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