
Outcrop Analog For a Paleozoic Shallow Marine Sandstone Reservoir: Geological And Geostatistical Models of Quwarah Member, Saudi Arabia

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This study present geological and geostatistical models, using an outcrop analogue, for the Paleozoic oil and gas sandstone reservoir in central and eastern Saudi Arabia. The late Ordovician Quwarah sandstone member of Qasim Formation is selected as outcrop reservoir analogue in this study. Field facies analysis and examination of the petrographic and petrophysical properties were used to document the macro and micro-scale heterogeneity. The Quwarah sandstone represents the top of a coarsening shallowing upward succession. At the base it is mainly an offshore/shelf shale (Ra'an member) and passes up to a tide-dominated sandstone. The lower Quwarah section is characterized by burrowed thinly interbedded fine grained sandstone and siltstone facies. Then it passes up to moderately to thickly bedded fine to medium grained herringbone cross-bedded, trough cross-bedded and horizontally laminated sandstone. The depositional and diagenetic heterogeneities have an impact on porosity and permeability development and evolution. These include depositional architectural elements, vertical and lateral facies changes, the Quwarah sandstone composition and sorting, cement and clay matrix. The outcrop studies were used to develop a geostatistical of the porosity/permeability variations within the Quwarah sandstone. The results show a good accord with the outcrop porosity and permeability distribution.
