



Quantitative Reservoir Analysis of the Fluvial Minjur Sandstone Formation; Implications for Reservoir Architecture and Heterogeneity Using Outcrop Analog, Central Saudi Arabia

Mutasim Osman and Osman Abdullatif

KFUPM, College of Petroleum Engineering & Geosciences, Geosciences, Dhahran, Saudi Arabia (osmanabd@kfupm.edu.sa)

The Late Triassic Minjur Sandstone Formation in Saudi Arabia is considered important groundwater aquifer and hydrocarbon reservoir target in the subsurface. Minjur has been subdivided into two members and the upper member is the core of this study. This study aims to characterize the reservoir heterogeneity and architecture of Minjur Formation at outcrop scale. The methods used here integrates traditional stratigraphic outcrop sections, lithofacies analysis, photomosaic and digital outcrop scanning using terrestrial LiDAR system. Five outcrop sections were logged and 100 samples were collected and about 50 selected samples were slabbed and thin sections were prepared from them. Polyworks and VRGS softwares were employed for the processing and interpretation of the digital data respectively. The lithofacies analysis indicated that Minjur sandstone was deposited within shallow braided stream system. It is characterized by lenticular to sheet geometry having vertically and laterally stacked sandstone bodies. These bodies range in thickness from 2-6 m and with channel width actually measured from the digital model about 400 m. The sand/shale ratio in Minjur is 7:1 which shows good aquifer/reservoir connectivity and continuity; however, the interbedded shales make discrete permeability within the sandstone bodies. The field observations and measurements made on the outcrop analog generally agree with quantitative models of fluvial deposits elsewhere. This study provides database for better understanding and prediction of hydrocarbon intra-reservoir/aquifer architecture and heterogeneity of Minjur in the subsurface and other formation similar depositional setting elsewhere.