



Facies and Depositional Styles of Phanerozoic Fluvial Systems: Examples and Lessons from Outcrop Analogs Studies in the Arabian Plate

Osman Abdullatif, Mutasim Osman, and Mohammed Yassin

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

During the Phanerozoic (Cambrian to Miocene) the Arabian Plate has evolved through several phases of tectonic, geological, paleogeographic and paleoclimatic developments. These phases have influenced the types and distribution of facies types and paleoenvironments of fluvial systems through space and time within the Arabian Plate. These fluvial systems are important aquifer and reservoir targets in the subsurface. This study describes and characterizes the facies, paleoenvironments, sequential and stratigraphic architecture. The study integrates different techniques including facies analysis, bed thickness, sequence and stacking patterns, quantitative facies percentages, sand/mud ratio, channel width/depth ratio. These parameters and sedimentologic data were compared and correlated among several outcrop sections representing different Cambrian to Miocene fluvial deposits in the Arabian Plate. Outcrop observation and analysis revealed variation from proximal to distal parts of these systems. This is manifested in lithofacies types, percentages, stacking pattern, sequential arrangement and stratigraphic architecture. Moreover, variations were also noted in facies texture, composition and petrophysical properties. Macro- to micro-scale variations in the studied fluvial depositional styles indicated the effects of both intra-basinal and extra-basinal controls in different parts of the Arabian Plate. The outcrop study of fluvial systems are useful analogs that might help to provide guides for understanding the processes and controls and the prediction of the properties of their equivalent formations in the subsurface in the Arabian Plate and similar fluvial deposits in other geological settings.