Facies Modeling of of Dam and Hofuf Formations: Outcrop Analog of Mixed Carbonate and Siliciclastic (Miocene-Pliocene) Succession, Eastern Saudi Arabia

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This study investigates the lithofacies types distribution of the carbonate and siliciclastic rocks of Dam and Hofuf Formations in eastern Saudi Arabia. The shallow burial of these formations and limited post depositional changes allowed significant preservation of porosity at outcrop scale. The mixed carbonate-siliciclastic succession represents important reservoirs in the Mesozoic and Tertiary stratigraphic succession in the Arabian Plate.This study integrates field work sedimentological and stratigraphical and lithofacies data to model the spatial distribution of facies of this shallow marine and fluvial depositional setting. The Dam Formation is characterized by very high percentage of grain- dominated textures representing high to low energy intertidal deposits a mixed of carbonate and siliciclastic succession. The middle Miocene Dam section is dominated by intra-clasts, ooids and peloids grainstones. The Hofuf Formation represents fluvial channel and overank facies which is characterized by mudclast abd gravel-rich erosive bases overlain by pebbly conglomerates which passes upward into medium to very coarse grained massive, horizontally stratified and trough cross-stratifed sandstone facies. Lithological stratigraphic sections data distributed over the Al-lidam escarpment were correlated on the basis of facies types and sequences. This allow mapping and building a framework for modeling the spatial distribution of the carbonate and siliciclastic facies in the area. The geological model shows variations in the facies distribution patterns which mainly reflect both dynamic and static depositional controls on facies types distribution. The geological model may act as a guide for facies types distribution, and provide better understanding and prediction of reservoir quality and architecture of stratigraphically equivalent carbonate-siliciclastic successions in the subsurface.