

Overlooked Explorational Insights in the Upper Gharif, North Oman

Ali Al Hajri

Petroleum Development Oman

Abstract

The Permian fluvial-dominated Gharif Formation has been long explored in the Sultanate of Oman with the most prolific reservoirs occurring within its Upper and Middle members. Previous regional thematic study on the Upper Gharif Member reported dominant NW-oriented fairway direction backed by numerous data set (e.g., outcrop, well and image logs). This was followed by extensive activities which led to gigantic commercial discoveries. As the basin matures due to intense activities, the conceptual thinking evolved to adapt to the arising challenges of exploration and appraisal. The evolution of thinking was fueled by recent discoveries in different plays with stratigraphic trapping elements.

This work presents multi-scale comprehensive play-based evaluation of the Upper Gharif which integrates drill cuttings, core data, wireline logs and seismic attributes (e.g., wide-band spectral decomposition, elevation decomposition) to refine existing gross depositional environment maps to aid into new opportunity space definition in a relatively mature basin.

Multi-scale integration of numerous datasets corroborated the presence of the main reported NW-directed fairway in the Upper Gharif. Nonetheless, the most stimulating outcome highlighted the presence of an overlooked NE-SW fairway. The findings are crucial given that the refined maps illustrate the presence of fluvial sandstone reservoirs in areas which have been initially reported to be composed of non-reservoir floodplain mudrocks. Sedimentologically, the new findings resemble tributary NE-SW channel fairway that is converging to the previously reported NW-directed fairway.

Results were integrated with structural data from seismic (structural noses and faults), well logs data (e.g., porosity and hydrocarbon saturation) and fluid phase prediction from geochemical and basin modeling analyses. This full-loop integration aided to outline new opportunity space for the Upper Gharif with the refined gross depositional environment maps being a vital component to assist exploration wells placement.