Unlocking More Upper Gharif Opportunities through a Robust Work Flow Integrating Core Data, Well Logs, Seismic and Updated Regional Framework

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Abstract

The Sultanate of Oman has long been interested in the Permian fluvial-dominated Gharif Formation, with its Upper and Middle members containing the most abundant reservoirs. A regional investigation on the Upper Gharif Member revealed a prominent fairway direction that was NW-oriented and supported by a variety of data sets. Subsequently, there were massive activities that resulted in enormous commercial discoveries and conceptual thinking has changed to meet the new problems of exploration and appraisal. Recent findings and discoveries in many plays with stratigraphic trapping aspects drove the progress of thought.

The study objective was to predict channels presence and their directions in which will support to define trapping geometry (structural/stratigraphy), to identify reservoir properties i.e., channels width (to be used in static modeling), to support upcoming exploration activities (well placement), and to update the GDE map to mature the upcoming drilling activities. The study was done to unlock new structural enhanced by stratigraphic opportunity in Upper Gharif by integrating different type of data. Starting with rock data (cores, side wall cores, ditch cuttings) wireline logs data (GR, DEN, NEW, BHI, POR), and seismic attributes and extractions (wide-band spectral decomposition). The integration of the different type of data managed through different software like IC, ArcGIS Pro, and decision space.

From the integration study of different data available (Rock data, well data, wide-band spectral decomposition, BHI, thickness map & correlation, new GDE maps were produced for the 5 different units of Upper Gharif in North Oman with a new main channel direction and sediments input is reported NE-SW fairway in the Upper Gharif, with an estimate width of the channel belts per the different units. Along with the GDEs produced, a thickness map of Upper Gharif was produced supported with a sub-regional correlation across and beyond the study area. The results are significant because the updated maps show that there exist fluvial sandstone reservoirs in places that were previously reported to be of non-reservoir floodplain deposits. New opportunity space for the Upper Gharif was outlined from this integration and the updated GDEs.