

New Insights on Late-Ordovician Glacial Reservoirs Using Spectral Decomposition

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ABSTRACT

For more than 40 years, oil and gas exploration in North Africa has targeted Palaeozoic plays consisting of Late Ordovician clastic sediment fills of glacial incisions genetically associated with the Hirnantian glaciation. For this reason, good subsurface data sets (i.e. wells and 3D seismic) exist and in some cases can be used to improve our understanding of these heterogeneous and challenging reservoirs. This paper focuses on new insights provided by seismic spectral decomposition on a 3D seismic data set from the Murzuq Basin in North Africa. This approach helped us to improve the detail mapping of glacial erosion morphologies and validate spectral decomposition responses using well core data. In detail, spectral decomposition workflows have significantly improved the insight of the paleogeography, assisting the identification of topographic highs and lows (glacial incisions) in which reservoirs are accumulated. This paper shows the workflow performed in order to define the optimum frequency and algorithm selection and the specific steps used to optimize the resultant RGB combinations. The use of the results as “cognitive pre-interpretation” provides a visual model that improves horizon picking thus leading to a meaningful geological and paleoenvironmental interpretation.