

Tectono-Stratigraphic Architecture, Depositional Systems and Salt Tectonics to Strike-Slip Faulting in Kribi-Campo-Cameroon Atlantic Margin with an Unsupervised Machine Learning Approach (West African Margin)

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Abstract : Located in the Gulf of Guinea, the Kribi-Campo sub-basin belongs to the Aptian salt basins along the West African Margin. In this paper, we investigated the tectono-stratigraphic architecture of the basin, focusing on the role of salt tectonics and strike-slip faults along the Kribi Fracture Zone with implications for reservoir prediction. Using 2D seismic data and well data interpreted through sequence stratigraphy with integrated seismic attributes analysis with Python Programming and unsupervised Machine Learning, at least six second-order sequences, indicating three main stages of tectono-stratigraphic evolution, were determined: pre-salt syn-rift, post-salt rift climax and post-rift stages. The pre-salt syn-rift stage with KTS1 tectonosequence (Barremian-Aptian) reveals a transform rifting along NE-SW transfer faults associated with N-S to NNE-SSW syn-rift longitudinal faults bounding a NW-SE half-graben filled with alluvial to lacustrine-fan delta deposits. The post-salt rift-climax stage (Lower to Upper Cretaceous) includes two second-order tectonosequences (KTS2 and KTS3) associated with the salt tectonics and Campo High uplift. During the rift-climax stage, the growth of salt diapirs developed syncline withdrawal basins filled by early forced regression, mid transgressive and late normal regressive systems tracts. The early rift climax underlines some fine-grained hangingwall fans or delta deposits and coarse-grained fans from the footwall of fault scarps. The post-rift stage (Paleogene to Neogene) contains at least three main tectonosequences KTS4, KTS5 and KTS6-7. The first one developed some turbiditic lobe complexes considered as mass transport complexes and feeder channel-lobe complexes cutting the unstable shelf edge of the Campo High. The last two developed submarine Channel Complexes associated with lobes towards the southern part and braided delta to tidal channels towards the northern part of the Kribi-Campo sub-basin. The reservoir distribution in the Kribi-Campo sub-basin reveals some channels, fan lobes reservoirs and stacked channels reaching up to the polygonal fault systems.

Keywords : tectono-stratigraphic architecture, Kribi-Campo sub-basin, machine learning, pre-salt sequences, post-salt sequences

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