

3D seismic interpretation and reservoir modelling of deltaic sandstone in the onshore Niger Delta Basin, Nigeria

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A three-dimensional model is valuable in reducing uncertainty imposed by reservoir heterogeneity during field development and prospect identification. The Miocene sedimentary deposits in the onshore Niger Delta Basin host prolific hydrocarbon reservoirs. In this study, the reservoir parameters, as well as the 3D model of the deltaic deposits have been developed. The four available wells were subjected to conventional well log analyses and reservoir units were mapped in the 3D seismic volume. The resulting facies and property logs were upscaled and together with the interpreted seismic horizons and faults formed the input data for facies, property and structural modelling. The well log analysis reveals sandstone, siltstone and claystone as the dominant lithologies in the field. Available literature data further reveal the deposition of these sediments in rapidly changing environments varying from distributary channel, mouth bar, delta plain to pro delta. The facies model indicates the dominance of distributary channel sand and mouth bar deposits within the reservoirs. A moderate to good total porosity ranging from 12.12 – 24.68% in reservoir unit A, 9.27 – 29.53% in reservoir unit B, 4.19 – 41.38% in reservoir unit C and 9.04 – 28.01% in reservoir unit D has been deduced. The fault model revealed the dominance of generally W–E trending normal faults. Fault assisted anticlinal closure is likely the prominent trapping mechanism revealed by the structural model.