

## **Fault Sealing Efficiency: Controls of Shale Gouge Ratio and Growth Faulting on Hydrocarbon Column Heights of Selected Fields in the Niger Delta**

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Fault sealing efficiency is simply the ability of a fault to inhibit migration of fluid across it. This assesses the sealing or non-sealing capacity of a fault. Aside juxtaposition some fault seal attributes like Clay Smear Potential, Shale Gouge Ratio (SGR) etc., can result to sealing. SGR was the fault seal attribute used and is defined as the ratio of shale content of a rock that has slipped past a particular point on the fault plane to the throw of that fault. This research is aimed at calibrating SGR against hydrocarbon column heights in producing fields (A, B and C) and to determine the reason(s) for long hydrocarbon columns in the area. An integration of detailed 3D seismic interpretation, well stratigraphic correlation across the fields, fault and horizon modelling was done. A 3D structural model was built using seven (7) major faults within the trap vicinity and thirteen (13) horizons. Volume of Shale logs of seven key wells were loaded with other relevant well information (like well tops) for lithologic definition. This enhanced generation of accurate fault/horizon cut-offs, which helped define lithology juxtaposition.

The calibration results shows that SGR value of 65%, 58% and 71% sustained 545ft, 125ft and 380ft maximum hydrocarbon columns in fields A, B and C respectively. The Growth Index (G.I) analysis showed that hydrocarbon columns are higher in fields A and C with G.I of between 1.5 and 1.9 while field B with the trap-controlling fault having G.I of 1.0 has less hydrocarbon columns. This is a qualitative explanation for the impact of growth faulting on the hydrocarbon retention capacity of a fault.