

Fault Seal Analysis in downthrown fault block prospects, North Melut Sub Basin, Sudan.

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Abstract

The Melut Basin is a Late Cretaceous to Tertiary rift basin and formed the southern part of the extensive White Nile rift system which is itself, part of the extensive Central Africa Rift System; The Central Africa Rift System was formed due to a series of extensional episodes. In extensional regime, the majority of all hydrocarbon-bearing traps are fault-related. These faults can break up communications between different layers within oil and gas reservoirs, as well as degrading communications across the faults. The decision to drill/drop and the estimation of the maximum height of a hydrocarbon column that can be supported by the fault is very much dependant on exercise. At Petrodar, fault seal has been a necessary task that conventional prospects (up thrown fault block prospects) have to go through. The success rate for encountering hydrocarbons in up thrown traps is quite high and a number of giant field were associated with them. Recently and the we are running out of up thrown fault block prospects, we are busy dusting off prospects that located on the downthrown fault blocks as a sealing mechanism that were considered too risky to drill when prices were low.

There is a common belief that the footwall seal is the most critical element of a downthrown' hydrocarbon accumulation, with three-way dip closure. There is a lesser chance of hydrocarbon being trapped in downthrown structures, compared with up thrown ones. Considering our knowledge and geological models on the up thrown fault blocks, we have tested our fault seal models to quantify the hanging wall trap risk.

This talk will illustrate a workflow for the assessment of downthrown fault block prospects seal risk. With 3D seismic data a significant proportion of the prospect faults can be interpreted producing a fault framework of the main target. The fault properties applied to the framework will be dependent upon the stratigraphic variation, geohistory and the lithologies at the present day. Fault zone clay contents obtained from a range of prospect specific depositional models integrated with the fault framework and a fault zone clay percentage estimation technique. This talk describes the application of fault seal analysis on some Case studies.