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Prediction of Reservoir Distribution and Quality in Tectonically Active NW Borneo Slope

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Abstract

Reservoir distribution and quality in an active slope setting are controlled by the evolution of slope accommodation and patterns of sediment input onto the slope.This presentation outlines the workflows and key findings of a regional study attempting to reconstruct the slope depositional history and improve reservoir prediction in an area of 8,000km2 offshore Sabah, Malaysia.

To identify depositional systems and map their evolution through time, a high-resolution sequence stratigraphic framework needs to be defined. Deepwater stratigraphy in the NW Borneo relies on the interpretation of gross seismic architecture supported by bio-stratigraphic analysis. The loop-scale seismic architecture calibrated t over 35 wells is a basis for the interpretation of depositional environments within each sequence. On a smaller scale, core-based sedimentary facies combined with wireline log motifs is used to elucidate sub-seismic reservoir heterogeneity.

Clear definition of the architectural elements of different scales is key to ensure consistency of the interpretations. It also creates a basis for the statistical analysis of reservoir properties and depositional body geometries. The focus is on distinguishing between different depositional system elements, such as the high net:gross amalgamated distributary channels occurring in the slope aprons and the more heterolithic meandering type of submarine valleys. Equally important is the correct placement of sheet-like layered deposits in a levee or lobe fringe environment.

Depositional system elements (DSE) define basic semi-regional reservoir characterization units, which differ from each other in geometry and the degree of internal sand body connectivity. At a higher level, DSEs merge into distinctive depositional environments with specific sand distribution patterns and the chances of reservoir-seal occurrence.

Hierarchical reservoir classification workflow allows the comparison of various data types from different parts of the basin and increases the chance of correctly predicting reservoir presence and quality in un-explored deepwater acreage.