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Iterative Geological Modelling to Guide an Interpretation of Complex Structures

A field development workflow between 3D geological modelling and seismic interpretation provides an excellent example in cross-discipline data management and interpretation validation. Appropriate management of multi-discipline workflows can help to improve confidence in subsurface understanding. This is of particular importance in high-cost projects where preliminary appraisal results are required in a short time frame.

This study field is part of an elongate tightly folded and faulted deep water mid-slope turbidite channel system, offshore Angola. The seismic database consists of three angles stacks each with band-limited inversion applied and a fast track near offset high-resolution volume. Due to the quality of the seismic, and the need to control costs, appraisal of the structure with further wells is not planned. Consequently, a detailed understanding of the reservoir and structure from seismic is essential.

Where structural and stratigraphic behaviour is not impacting potential well performance, an interpretation can quickly lead to a simulation model. In contrast, when a combination of multiphase faulting, unknown stratigraphic architecture and steep-dips-on-seismic introduce ambiguity to interpretation, a more novel approach to defining the geological integrity is required.

Iterative interpretation and 3D model building resulted in improvements in fault validation, geological integrity and a reduction in seismic ambiguity. This achievement meant that an improved understanding of compartmentalisation (fault seal) and structural and stratigraphic juxtapositions could be modelled earlier in the project cycle. This in turn improved confidence in subsurface understanding to allow a forward progression to simulation and development well planning.