

Paper 10

Technology application in prospect evaluation, offshore Sabah

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Application of geological and geophysical technology plays an integral part of the overall evaluation of the prospectivity of Block SB1. Operating in today's difficult economic climate requires the judicious use of tools to minimise uncertainties of porefills, reservoir properties and geopressure information from seismic. The objective is to integrate the advanced technologies in overall risk reduction, in particular, the recognition of oil, in order to enhance the economic viability of some marginal prospects in SB1.

One of the most critical factors in risk reduction is the application of integrated geophysical and geological techniques of Direct Hydrocarbon Indication (DHI) detection and reservoir characterisation. In order to optimise efficiency in reaching our goals, a combination of both proprietary and commercially available software are run on powerful workstations. Techniques include post stack 3D volume image processing, optical stacking, probabilistic amplitude calibration, quantitative Amplitude vs Offset (AVO) analysis and regional rock properties calibration. To support such an integrated approach, true amplitude acoustic impedance data sets were generated for both 3D and 2D. Near and far offset 3D migrated volumes provide an additional insight into porefill and lithologic information. A rock properties database was compiled to establish different classes of lithological trends across different geological settings (proximal topset to distal turbidites), together with an AVO calibration set over fields to ascertain the AVO response for the different lithoclasses. In addition, this calibration set serves as a QC tool for evaluating subsequent true amplitude processing for AVO. To compliment the various geophysical tools, the application of quantitative forward geological modelling to simulate stratigraphic geometries and depositional environments plays an integral part in reducing reservoir risks.

Within the proximal topset stratigraphy (Stage IVD to F), there is compelling evidence in the East Baram Delta that most hydrocarbon-bearing sands, within normal compaction trend (hydrostatic) are supported by DHI. However, recognition of oil can be ambiguous. In the turbidite settings, thick units of acoustic soft shales predominate the stratigraphy and the characteristic bright spots detection are not apparent. DHI expressions in overpressured sequences are different and in some cases their total absence may not be condemnatory. Despite encouragement from AVO and amplitude calibration within numerous prospects, there are mapped amplitude anomalies that do not have a downdip fit to structure, which may imply a stratigraphic/lithological overprint, and should still be considered viable exploration targets.