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APPLICATION OF ROCK PHYSICS MODELLING AND SEISMIC ATTRIBUTE IN DEVELOPING THE GEOLOGICAL MODEL — AN EXAMPLE FROM EOCENE DEEPWATER TURBIDITE IN BLOCK 21/23A, CNS, UK.

LIAU MIN HOE[1], KESTER WATERS[2], NICHOLAS PILLAR[2], HOWARD D JOHNSON[3] AND CHRISTOPHER A-L JACKSON[3]

[1]PETRONAS Carigali Sdn. Bhd.
[2]Ikon Science Ltd.
[3]Department of Earth Science and Engineering, Imperial College London, UK)

Block 21/23a is a sub-block of UKCS Block 21/23, which is located within Quadrant 21, Central North Sea, UK. A total of three fields were discovered in Block 21/23, namely the Pict, Saxon and Sheryl fields. The Pict and Saxon fields are located in Block 21/23b and operated by PetroCanada. The Sheryl field is located in Block 21/23a and operated by Oilexco.

The Sheryl field was discovered in year 2006 based on Elastic Impedance anomaly. The discovery was made in the Eocene Tay deepwater turbidite reservoir. This study is based on an integrated approach of utilising the rock physics forward modelling, seismic attribute and geological data in constructing a robust conceptual geological model for the purpose of further prospect evaluations and static model building.

Rock physics forward modelling was conducted prior to seismic data interpretation to build a geophysical database comprising the analogues of seismic responses under different rock properties and pore fluid contents. This database was used to enhance the accuracy in seismic data interpretation. The forward modelling results concluded that the MuRho ($\mu\rho$) dataset can be used as a lithology indicator, while the LambdaRho ($\lambda\rho$) dataset is a fluid type indicator. The AVO modelling showed that brine, oil and gas saturated sands are characterised by Class I, Class II to IIp and Class III AVO responses respectively.

The palaeogeographic map clearly demonstrated that the study area can be divided into four main depositional environments, namely shelf edge, slope, proximal and distal basin floors with increasing relative palaeo-water depth from SW to NE. The shelf edge setting was interpreted based on its thicker Tay stratigraphic unit observed at the proximal part of the canyon system identified on the slope setting. The proximal and distal basin floor settings were differentiated based on the sand geometries, where the former is characterised by channelised sand and the latter contained sheet-like sand geometry that was interpreted to be basin floor fans. Eventually, a conceptual geological model was developed based on the interpretation of all the available geological and geophysical data.

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