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IR06

Using Multiple Seismic Attributes to Improve Characteristics of the Complex Mishrif Carbonate Reservoir, Rumaila Field, South East Iraq

O.J. Olatoke* (BP), K. Tough (BP), C. Lehmann (BP) & J. Gardner (BP)

SUMMARY

The first 3D seismic dataset over the giant Rumaila field in South East Iraq was acquired in 2012. Over 1800 km2 of high-fold, wide-azimuth seismic was acquired using the ISSN™ simultaneous source technique. The dataset underwent a bespoke ISSN processing sequence that included a Kirchhoff Pre-Stack Time Migration (Pre-STM) imaging in 2013. This paper highlights how the 3D seismic is being used to improve the geological understanding of the Upper Cretaceous Mishrif carbonate reservoir. In particular, it demonstrates the importance of using interpreted seismic horizons for multi-attribute generation at field-wide and localised scale. Understanding these seismic attributes is underpinned by comprehensive well-to-seismic ties, and draws on well-based geological insight captured in the geomodel. These multiple seismic attributes are used to highlight depositional trends, seismic facies variations, and potential changes in reservoir quality across this giant field.

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The seismic data quality at the Mishrif reservoir level of the Rumaila field is generally good. Confident interpretation of the top and base of the two main reservoir zones (mA and mB) can be made field-wide, as well as interpretation of more detailed internal architecture in parts. On first inspection of field-wide seismic attributes extracted for each zone, some gross depositional trends are observed, however variations in reservoir quality cannot be clearly identified. This is due to geological heterogeneity within each reservoir zone, and over such a large area. It is only when looking at a local (smaller) scale, and by comparing a variety of seismic attributes extracted over finer windows, that a clearer indication of reservoir quality variation can be made. This approach has also led to the identification of geological features such as tidal channels, sinkholes and faults.

These observations on seismic have improved our geological understanding, enabled us to update Gross Depositional Environment (GDE) models, and will be used to support future well target selection and reservoir model updates. This demonstrates that even on a field with over 1000 well penetrations, 3D seismic can still play an important role in field development.