

Broadband 3D Land Data Benefits in Seismic Imaging and Interpretation

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ABSTRACT

Several broadband, high density, full azimuth 3D land seismic surveys have been acquired recently in Saudi Arabia over producing fields and exploration areas. Quantitative interpretation of 3D seismic data is extremely useful for reducing uncertainty in the placement of delineation and exploration wells in terms of reservoir presence and quality prediction, as well as for pre-drill prediction of hydrocarbon presence. In the exploration realm, this can be very challenging due to limited well control.

In those surveys, increased bandwidth, improved signal-to-noise ratio and better subsurface sampling have had a beneficial impact on both qualitative and quantitative interpretation of the data. In particular, recording of lower frequencies has significantly improved the interpretation of deep levels, improving the structural clarity and the resolution of the seismic data, as well as faster performance with more accuracy. It has also improved the seismic inversion, making it more data driven with less bias from external low frequency models. This has resulted in a reliable indicator of subsurface heterogeneity away from well control, both laterally and vertically. This latter aspect is extremely useful for pursuing our deep exploration targets. The estimation of rock properties from seismic AVO inversion has also significantly improved, and calculated properties match closely with the well data. In certain scenarios, this has enabled the identification and isolation of hydrocarbon-bearing clastic reservoirs with a much higher degree of confidence.