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Using Stratal Slicing To Enhance Structural And Stratigraphic Analysis In A Complexly Faulted Growth Fault Province, Columbus Basin, Trinidad

The Pliocene sequence in the Red Mango Complex, Columbus Basin, represents a complexly faulted growth fault system which has been affected by different tectonic episodes. The effects of this tectonism and associated sedimentation impacted both prospect and play analysis in that early wells did not always optimally target hydrocarbon pools because of lack of 3D seismic data. The subsequent use of 3D seismic data and the addition of well data from exploration/appraisal drilling and producing field data contributed towards a better understanding of the geologic model and hydrocarbon trapping mechanism.

3D seismic data was analysed systematically by a method of 'stratal slicing' to better understand both the structural and stratigraphic framework in a prograding mid to outer shelf delta system. Seismic facies, amplitude and coherency extractions from windows above and below several horizons calibrated to well data enabled structural and stratigraphic analysis. Depositionally, thick, stacked shallow water reservoirs transitioned into deeper water reservoirs with depth into more laminated reservoirs (Prograding Complexes) capped by thicker sand units. Channelised systems cross cut the extensional fault structures by breaching. This had added impact on trapping mechanism and reservoir continuity. In the deeper sections where anomalies exist due to gas shadowing, further complexity in the form of slumping or existence of channelised features can be inferred. These were apparent at two key horizons. Use of seismic facies analysis further enhanced interpretation in good data areas and suggests more structural and stratigraphic complexity caused by subseismic faulting and other unmapped events.