A Depositional Model on Chicontepec Turbidite Reservoirs, Mexico

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Deepwater sedimentation in foreland basin system often gives rise to a complex turbidite facies association due to the interaction of tectonic forces on multiple active depositional systems. Chicontepec Formation was deposited within a foredeep, in front of Sierra Madre Oriental fold-thrust belt (SMO) in East-Central Mexico during Late Paleocene-Early Eocene time. Existing depositional models of the Chicontepec Formation have not yet been successful in explaining the complexity of deepwater deposits and its relation with the reservoir quality and performance. A new model has been proposed from an integrated study including outcrop study, analysis of core and well logs along with 3D seismic geomorphologic studies within a sequenc stratigraphic framework in northern part of Chicontepec basin. In this model the zone of interest has been divided into five third order depositional sequences (named as 1-5 from base to top) demarcated by six regionally extensive shale layers indicating marine flooding surfaces. The basal sequence within this model proposes an axial channel system, which provided majority of sedimentation within the basin. The axial channel system continued in the above sequence, but with enhanced tectonism during the Late Upper Paleocene-Early Eocene, sedimentation predominantly started coming from the direction of SMO in the form of channel-fan systems and mass transport complexes which gave rise to a mixed sedimentary system. As tectonic pulses continued, the upper three sequences were dominated by the axis perpendicular channel- fan systems with reduced presence of the axial channel component. The changes in depositional patterns within the model can be calibrated with the changes in rock types from sequence 1 to 5. Improved reservoir quality from basal to mid sequence also results in improved reservoir performance.