Interplay Between Local Tectonics And Deepwater Channel Process in the Mahanadi Deepwater Offshore Basin: Insight from High Resolution 3D Seismic

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Deepwater channels act as conduits for coarse-grained sediment, connecting the outer shelf to the basin floor bypassing the lower slope and often serve as important hydrocarbon reservoir targets in many deepwater offshore basins around the world. Although deepwater channels are widely observed in 3D seismic datasets routinely, the detailed mechanism for channel processes and their evolutionary ehavior has got sparse attention in literature. The present study brings out how local tectonics can play a major role influencing the subtle channel process itself and more precisely how it can trigger in the meandering and incision of the main channel course by a contemporaneous interplay between tectonics and channel building process. The study is based on an interpretation of a high resolution 3D Q-marine seismic data set in one of the deepwater hydrocarbon exploration blocks of the Mahanadi Basin in the East Coast of India.

Unlike 2D seismic data, 3D seismic reflection data is an ideal tool to study the complex process of channel building, channel course meandering, its overall morphological geometry, the channel fill type and also the possible link between local tectonics and evolution of the entire channel process. One of the Miocene channels in the study area displays characteristic meandering geometry and channel incision almost contemporaneous with strike-slip compressional structuring in the area. Sequential analysis of time structure maps along with detailed analysis of seismic facies in the channel complex through seismic attributes suggest the intricate relationship between how turbidity flow along a deepwater channel can incise and erode as a response to the structuring process caused by contemporaneous strike-slip compressional forces. The episodic nature of such structure building in the area can be seen to have resulted in some typical deepwater deposits anomalously distinct from the surrounding area.