PROCESS-BASED ANALYSIS OF RESERVOIR QUALITY DISTRIBUTION IN DEEP MARINE SLOPE CHANNEL SYSTEMS

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ABSTRACT

The characteristics of deep marine sedimentary systems are mainly driven by allogenic processes, including tectonics, climate and sea-level fluctuations. Once sediment is transported into the basin, it is exposed to autogenic mechanisms, such as feedback loops between flows, sedimentation and deposition that interact with the receiving basin topography or bottom currents. These factors influence flow dynamics and therefore facies and architecture at a range of hierarchical levels. The interactions of these processes ultimately control the factors that govern the depositional reservoir quality (texture, detrital clay content). Understanding these processes will help to create more realistic and predictive reservoir models and ultimately improve the accuracy of risk assessment and flow modeling during exploration and production. The project attempts to link reservoir properties across different hierarchical elements of deep marine slope channel systems to allogenic and autogenic forcing mechanisms; with the aim of developing predictive models for slope channel systems in different settings. Fieldwork will be undertaken in the Tres Pasos Formation to map the geometry of each hierarchical element of the slope channel complex and to collect associated thin-section samples. Detailed petrographic analysis will reveal the distribution of depositional reservoir quality within the system. This information will be compared to subsurface data from slope channel complexes offshore Tanzania to bridge the gap between core data and seismic resolution. By characterizing slope reservoir elements from the micro- to the channel complex-scale predictive models for reservoir quality distribution, incorporating diagenesis, can be made for features observed in seismic data.

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