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A Comparative Seismic Architectural Analysis of Shallow Analogue Channel Systems, Focusing on the Einstein Channel, Gulf of Mexico

Submarine channel sands are important hydrocarbon targets for many deepwater plays around the world. Consequently, their architectural geometries and potential as reservoirs are of economic interest to the oil industry. Shallow analogue channel systems show better preservation of depositional geometries than more deeply buried channels and their seismic data has a higher frequency content, which allows for a more detailed understanding of a channel system's internal architectures. A comparative seismic analysis of near-surface deepwater channels into their internal architectures and seismic facies enhances the understanding of channel evolution. Mapping the evolution of channel axis and levee deposits in this way highlights the variability between depositional channel systems. In order to realistically compare channel systems, a channel system's scale and its relative position on the slope must be known. As yet, few comprehensive architectural models have been produced from shallow analogue channel systems.

Such an in-depth architectural analysis was performed on the Einstein channel, a mid-Pleistocene, sinuous, leveed channel in the eastern Gulf of Mexico that is a representative example of an overall depositional channel. High-resolution seismic coverage allows for detailed seismic facies analysis that is partially calibrated with core and log data. The nature of the Einstein channel changes spatially and temporally from erosional to depositional, and its channel dimensions and seismic facies vary in accordance to that. Architectural details and overall evolution of the Einstein channel are compared to other depositional channels in order to determine what is representative of a sinuous, leveed channel system.