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Stratigraphic and Reservoir Architecture of the Giant Poza Rica Field, Cretaceous, Mexico, Using Seismic Facies Based on 3D Seismic Attributes

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The Poza Rica field in eastern Mexico is the world's largest deep-water, carbonate-slope oil field. It consists of gravity-flow deposits that were sourced from the Tuxpan detached platform. Two 3D seismic datasets covering the Tuxpan platform and the Poza Rica toe-of-slope sediment wedge afford a new look at this unique reservoir. Based on core and well log analyses, the Albian Tamabra is divided into four third-order sequences that show partitioning of coarse debris flows and mud-rich turbidites in transgressive systems tracts, extensive grain-rich turbidites during highstand systems tracts, and introduction of siliciclastics and organic-rich carbonate mudstones during lowstand. Seismic data was available linking the Tuxpan Platform to the slope setting at Poza Rica, but the steep bypass slope and heavily karstified platform top inhibited the application of more classical sequence stratigraphic analysis. We used instead a seismic-facies-based approach to identify and map the main stratigraphic elements of this complex reservoir. The initial seismic facies definition was established using an unsupervised neural network classification of several 3D seismic attributes. This classification technique allows rigorous calibration of the seismic facies against instantaneous and geometrical seismic attributes. This analysis was followed by a supervised classification utilizing a rock typing approach using core description and well log-prediction. The combination of 3D seismic facies mapping and 3D acoustic seismic inversion provided crucial secondary data for building the static reservoir model of this giant reservoir.