
Seismic Architecture of an Early Cretaceous Platform-to-Slope System, Santa Agueda and Poza Rica Fields, Mexico

Xavier Janson¹, Charles Kerans², Robert Loucks¹, and Alfredo Marhx³

¹Bureau of Economic Geology, The University of Texas at Austin,
University Station, Box X, Austin, Texas 78713-8924

²Bureau of Economic Geology, 1 University Station C1100, Austin, Texas 78712

³PEMEX Exploracion y Produccion, Poza Rica, Mexico

ABSTRACT

Two 3D seismic datasets over the Albian western Golden Lane margin and time-equivalent basinal deposits of Poza Rica Field allowed us to investigate the linked architecture of a steep-sided carbonate platform (El Abra Formation) and a thick accumulation of redeposited carbonate sediment at the toe of slope and in the basinal area (Tamabra Formation). Regional seismic cross sections show that the mostly aggrading Albian platform has an eroded platform top, a scalloped margin, and a channelized slope that are equivalent to a 20-km-wide, westward-thinning, toe-of-slope apron made of chaotic, contorted, and mounded, moderate- to high-amplitude reflections. Detailed reflection geometries in the Albian toe-of-slope and basinal deposits consist of chaotic to short, discontinuous, low amplitude reflection at the toe of slope of the Golden Lane Platform, laterally changing to a discontinuous mounded, shingling reflection, which ultimately turns into high-amplitude parallel reflections. We interpret this lateral change to reflect the seismic signature of the change from the block- and debris-flow-dominated toe-of-slope area, to debris flow and concentrated density-flow deposits in the basin that ultimately grade laterally into pelagic deposits. On a flattened seismic slice, mounded reflections correspond to lobate to fan-shaped seismic events several kilometers wide that are interpreted as a carbonate basin-floor fan. Comparison between core and seismic data show a dominance of debris flows in the lower Albian sequence that grade vertically into more lobate, concentrated density flows and turbidites in the upper Albian 2 sequence. Seismic features identified as basin-floor-fan, channel, and debris-flow deposits have a shape and size that are similar to those of other redeposited basinal carbonate deposits elsewhere. Seismic data used in this study, combined with core observations, do not support the interpretation of the Albian Tamabra Formation's being of shallow-water origin.