

Outcrop Expression of Continental Slope Clinoforms: Insights Into Reservoir Geometries and Distribution in a Complicated Depositional System

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Summary

Detailed sedimentological analysis of the Tres Pasos Formation in the Magallanes foreland basin of southern Chile led to a continental slope interpretation for associated sandstones and shales. The presence of extensive slumped beds and channelized sandstone bodies dominated by gravity-flow deposits support this interpretation. Recent field-based mapping coupled with satellite imagery has led to recognition of a basinward-propagating slope along an extensive outcrop belt (Sierra Dorotea), allowing detailed sedimentological observations to be put into large-scale depositional system context. Top-set deltaic units and toe-of-slope sandstones are separated stratigraphically by clinoforms on the order of 1 km thick, shedding insight into foreland basin configuration during deposition of the Cretaceous units studied.

In certain conditions, the base of slope and topographic depressions on the slope are characterized by abrupt reductions of gradient and are therefore commonly loci for deposition of coarse-grained sediment from depletive gravity flows. As a result, when these continental slope strata are preserved in the rock record, they have high reservoir potential. Units studied from the Tres Pasos Formation comprise a variety of channel complexes. Field mapping reveals a large-scale sinuous channel complex akin to those observed in high-resolution seismic data from around the globe present in a lower- to base-of-slope setting. The sedimentological characteristics, stratigraphic architecture, and position of coarse-grained depositional elements within the outcropping slope system offers insight into reservoirs from analogous, petroliferous regions such as the North Slope of Alaska, frontier Arctic basins, and the Molasse Basin of Central Europe.