

PS New Insights Into the Cretaceous Rayoso Formation: A Regional Overview of a Large Fluvial Fan and Implications for Reservoir Prediction*

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Abstract

The Barremian-Aptian Rayoso Formation is the late sag stage continental deposit in the Neuquén Basin (Argentina), formed subsequent to the basin disconnection from the paleo-Pacific ocean. The >1200m thick succession consists of alternating evaporites, carbonates and sandstones, and has been an object of debate. As an excellent reservoir target in northeastern portion of the basin, it is currently focus of extensive secondary and tertiary recovery studies that require an in depth understanding to explain and predict facies distribution and properties. Reservoir facies are characterized by fine-grained sandstones and siltstones, dominated by upper flow regime and high deposition rate sedimentary structures. Intraclast conglomerates, common soft-sediment deformation intervals and in channel bioturbation traces are also present. This facies association occurs in cycles developed above widely correlatable erosion surfaces (>50 km). These sedimentary features have led to previous interpretations suggesting reworked aeolian sediments discharged as hyperpicnites during an expanding lake stage. New integration of surface and subsurface data together with a comparison to recent studies, show that the above sedimentary features are common in continental fluvial-alluvial settings affected by strong variations of water and sediment discharge, due to arid climatic conditions with distinctly seasonal precipitation patterns. High-magnitude flooding events provide large discharge pulses over short time periods and promote rapid accumulation of upper flow regime deposits, triggering frequent channel avulsions, and resulting in laterally extensive fluvial depositional bodies or fans. Microfacies textures corroborate the low maturity and sorting within sandstones, disregarding an aeolian sediment source. Furthermore, the mud rich, non-reservoir intervals, with terrestrial bioturbation and dry soils, support the thesis of a subaerial arid continental alluvial system. The sedimentology of the source-to-sink cycle interpretation now changes substantially, subdividing the sandstone succession into four stratigraphic sequences associated with climatic pulses within a single fluvial fan system. Furthermore, clear sand proportion increase toward the upper sequences, suggests overall progradation of the fluvial fan complex of the Rayoso Formation.