

Cyclic Progradational Tendency of the Jurassic Lajas Shelf Successions in Neuquen Basin, Argentina from a Detailed Core Description and Outcrop Study

Eunsil Jung¹, Cornel Olariu¹, Ronald Steel², Walter Brinkworth³, Maria Laura Loss³, Flavio Almeida⁴

¹University of Texas at Austin; ²UTAustin; ³YPF; ⁴Universidade do Vale do Rio dos Sinos - Campus de Porto Alegre

9.29.2020 - 10.1.2020 - AAPG Annual Convention and Exhibition 2020, Online/Virtual

Abstract

Lower to Middle Jurassic Lajas Formation is a well-known hydrocarbon bearing coastal plain to shallow marine succession, thicker than 500 m in Neuquen Basin in Argentina. The Lajas deposits consist of regressive-transgressive cycles with the regressive deltas alternating with transgressive tidal estuary systems, open coast tidal flats or barrier-lagoon systems. Outcrop observation and 200 m of cores from a well are used for detailed description to understand the nature of the topsets of the basin scale clinoforms and the depositional system of the southern Neuquen Basin. The method of subdividing the entire succession into genetic units was by documenting the transgressive, muddy intervals and then noting that the deposits between which were mainly upward coarsening and thickening of the prograding delta followed by upward fining and thinning of coastal backstepping and landward flooding. The lower part of the succession is from outer shelf and shelf-edge deltas with intervening transgressive flooding intervals, whereas the overlying deposits are dominated by inner shelf deltas and fluvial channel systems indicating the overall progradational trend of the Lajas Formation. Six regressive-transgressive units are interpreted as delta-estuary couplets cycles, the recording back and forth patterns of the supply system transiting on the shelf. The thickness of each cycle decreases upward because the accommodation becomes smaller as this system progrades, therefore, thicker and cleaner deltaic sand units developed in this outer shelf. And the upward increasing trend of fluvial distributary

channel facies through the six deltaic units indicates facies transition into fluvial systems of the Challaco Formation, the proximal area of the Middle Jurassic shelf-margin prism. The distributary channels and deltas were also the drivers of sediment feed onto the slope and the basin floor of the Los Molles Formation. Aggradational stacking of deltas suggests an accommodation-dominated shelf with rising relative sea level, driven by tectonic subsidence based on the outcrop study. It is possible that initially the Molles-Lajas clinoform had greater tectonic relief resulting in larger sediment supply and more strongly prograding coastlines and shelf edges, but as relief diminished and sediment supply decreased, the shelf became wider and shelf deltas were less able to reach the shelf until new tectonic relief was created.