

Spatial Heterogeneity in Lacustrine and Marine Carbonates of the Yacorite Formation, (Salta Group), Argentina

Maria Mutti¹, Wera Schmidt¹, Claudia Galli², Michele Vallati³, Gerd Winterleitner⁴

¹UP; ²National University of Salta, Argentina; ³University of Potsdam; ⁴University of Potsdam

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Abstract

Since the discovery of pre-sal carbonates, significant progress has been made in the understanding of biogeochemical processes leading to the formation of microbialites in lacustrine and brackish settings. Yet, because of the rarity of adequate surface analogues, still little is known about the controls over their stratigraphic architecture, a fundamental step to be able to predict spatial heterogeneities in reservoir properties. Mixed, clastic-carbonate strata of the Yacorite Formation (Salta Group, Argentina) provide an ideal setting to identify vertical and lateral variations of lacustrine and brackish carbonate and mixed carbonate-clastic systems in a syn- and post-rift basin with significant lateral and vertical facies heterogeneity. The focus of this study is the Tres Cruces subbasin, which is the northernmost extension of the greater Salta basin, situated on the Andean Puna Plateau in the region of Jujuy in northwestern Argentina. The outstanding outcrop quality and the lateral continuity of the strata enables to integrate basin-scale depositional geometries with detailed facies description across different scales. A set of sedimentological criteria has been developed to differentiate lacustrine and brackish environments. Outcrop studies, quantitative facies analysis and the correlation of stratigraphic sections enable the understanding of facies spatial distribution and heterogeneity. These data also provide the foundation for reconstructing and modelling the 3D facies variability (PETREL) as well to evaluate the controls by modeling basin variations using forward stratigraphic modelling tools and ultimately predict spatial heterogeneities in reservoir properties in this unique carbonate setting.

