Tectonostratigraphic Evolution of the Morichito Piggyback Basin, Eastern Venezuelan Basin

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The Morichito piggyback basin (MPB) is a SW-NE-oriented depocenter in the Eastern Venezuelan Foreland Basin (EVFB). This piggyback basin formed by overlying the Pirital thrust during the middle to late Miocene as a result of oblique collision between the Caribbean and South-American Plates. The MPB covers an area encompassing approximately 1000 km2 between the Serrania del Interior range and the Pirital high, which is a hanging-wall uplift along the Pirital thrust that acts as a confining barrier on the southern boundary of the MPB. Previous studies have tried to address the tectonostratigraphic significance of the MPB, but new biostratigraphic information and recently acquired 3D seismic data have allowed us to expand the understanding of this basin.

This work presents the tectonostratigraphic evolution of the MPB by defining four tectonostratigraphic sequences (T1 to T4). Each sequence was defined on the basis of integration of well logs, biostratigraphy, and seismic geomorphological interpretations. T1 (24-16 Ma), which was deposited in shallow-marine environments, extends to the south of the Pirital high beyond the boundaries of the MPB. T1 is equivalent to the early foredeep stage of the EVFB, having been formed when structural deformation and uplifting were already occurring to the north on the proto-Serrania del Interior range (~24-16 Ma) and the Pirital thrust was active (~22 Ma). T2 (16-11 Ma) is composed of alluvial-fan deposits derived from the proto-Serrania del Interior range. The geometry and internal configuration of T2 indicate that during this time the basin was transitioning from an open foreland basin to a confined piggyback basin. During deposition of T2, the Pirital fault was active as an out-of-sequence thrusting event. T3 (late Miocene) and T4 (early Pliocene to Recent), composed of shallow-marine and fluvial deposits, were deposited in an already restricted piggyback basin.