

2-D seismic reflection evidence for Mio–Pliocene tectonic inversion along the southwestern boundary of the Miocene Manabí Basin, Ecuador

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The southwestern boundary of the Manabí Basin is characterized by a tectono-stratigraphic succession that records the Miocene filling episode and the contemporaneous Mio-Pliocene tectonic inversion involving both the igneous rock basement and the onlapping marine sedimentary infill. Lithostratigraphy and structural mapping were carried out only in onshore area along the eastern side of the Coastal Cordillera. The upper crustal structure of the basin boundary was inferred from seismic reflection profile analysis and fieldwork evidence. The Ecuadorian forearc, regionally composed of three sedimentary successions ranging from Upper Cretaceous to Pleistocene, is underlain by a thickened Cretaceous igneous basement of the Piñón Fm., which represents a buoyant plateau sequence accreted to the South-American plate. The basal sedimentary succession roughly is dominated by volcanoclastic and carbonate sediments, greywacke turbidites and thinly-bedded black chert deposits. The Paleogene sequence represents a proto-forearc basin system composed by variable siliceous or carbonate platform deposits. The Neogene succession often fills individualized fault-controlled basins distributed throughout the region. The Miocene Basins reach up to 3 km thick and define three well-extended upward-fining sedimentary cycles controlled basically by the contemporaneous tectonic uplifting of the adjacent Andean Cordillera and the associated growth of the magmatic arc along the Ecuadorian Andes. 2-D seismic reflection profiles from Jama area show cross-sectional evidence of three distinct tectonic processes. A regional extensional episode occurred during Early Miocene lead to a widespread subsidence event marked by extensional structures dominated by demi-grabens and largely listric normal faults separated by basement-involved structural highs. Subsequently, a compressive episode, occurred probably during Pliocene period, produces basin tectonic inversion particularly along the southwestern boundary of the Manabí Basin with associated folding, blind thrusting and surficial ruptures. A right-lateral transpressive episode evidenced by a regional positive flower structure (Jama System Fault) that roughly deforms the previous structures along the Jama area, defines the current surficial architecture of the present-day raised forearc basin. Thrusting inversion processes and strike-slip movements are attributed to the subduction of the Carnegie Aseismic Ridge and lateral escape of the Nor-Andean Sliver during Pleistocene, respectively.