

QUANTITATIVE ANALYSIS OF TECTONIC SUBSIDENCE IN THE POTIGUAR BASIN - PRELIMINARY DATA

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ABSTRACT: The evolution of rift basins can be explained by simple models, which assume that these basins are developed from two steps: extension and thinning of the continental lithosphere, associated with block faulting and initial subsidence; and thermal relaxation, associated with thermal subsidence. In the Potiguar Basin, easternmost basin of the Brazilian equatorial margin, formed by extensional efforts during the Early Cretaceous, the mechanisms of subsidence responsible for vertical tectonics were: a) the isostatics response to the extension and thinning of the crust and lithosphere, in syn-rift phase, which promoted the formation of asymmetric grabens and internal highs; b) the cooling and thickening of the lithosphere, mostly in post-rift phase; and c) sediment loading, which occurred in both phases. Using the backstripping technique, that involves the removal of sedimentary and water loads in order to obtain the depth of the basement without these surface charges, it was possible to infer the rates of tectonic subsidence of the Apodi, Umbuzeiro and Boa Vista grabens, in onshore portion of the Potiguar Basin, and to quantify the contribution of sediment load during the total subsidence of the basin. This technique was applied using the BACKSTRIP program, which calculates the total and tectonic subsidence for a given well. This algorithm is based on Airy isostatic model and takes into account parameters related to compression, thickness of the sedimentary layers, paleobathymetry, sea level rise, besides density values for the mantle, water and sediments. In this issue, synthetic wells data were used, constructed from the correlation between actual well data and seismic profiles, whose positions have been chosen to represent the thickest sedimentary packs in each graben. Due to the few studies related to paleobathymetry in the onshore portion of the Potiguar rift, it was decided not to include this variable in the backstripping approach, given its secondary effect compared to sedimentary loading. Preliminary analysis of the data indicates that during the Early Cretaceous (Valanginian to Eoaptian), corresponding to the Potiguar rift phase, the rate of tectonic subsidence in the Boa Vista graben was up to 20.7 m/Myr, while in the Umbuzeiro and Apodi grabens the rates were 96.7 m/Myr and 84.5 m/Myr, respectively. During the post-rift time, when transitional and fluvial-marine sequences were deposited, rates of tectonic subsidence reached 8.1 m/Myr in Apodi graben, 6.4 m/Myr in Umbuzeiro graben and 7.7 m/Myr in Boa Vista graben. These reduced subsidence rates may reflect that only the thermal subsidence would have acted at this stage. Regarding the effect of the sedimentary load in the total subsidence of the basin, it is noteworthy that the Apodi graben suffered a contribution of 149.35% in subsidence, while in the Umbuzeiro and Boa Vista grabens this contribution were 142.87% and 100.53%, respectively. Transfer of transform shear from the development of the Brazilian Equatorial margin to the plate interior could play an important role to the more intense subsidence rate in the SW Potiguar rift termination.

KEY-WORDS: POTIGUAR BASIN, TECTONIC SUBSIDENCE, BACKSTRIPPING.