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Evidence of tectonic reactivation after continental breakup in the Ceará Terrace, Equatorial margin of Brazil, from 2D reflection seismics

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The Brazilian equatorial margin has its origin in the fragmentation of the supercontinent Pangea with the separation of the South American and African continents and is composed of divergent oblique and transform segments related to large oceanic fracture zones, which are typical of the Equatorial Atlantic (e.g., Saint Paul, Romanche, and Chain). The dynamic evolution of this margin is related to the generation of marginal ridges, which are basement highs that follow the same trend of the continental-oceanic boundary in a transform margin.

The Ceará Terrace (CT), the main target of this investigation, is an E-W-striking marginal ridge located south of the western end of the Romanche Fracture Zone (RFZ) in the continental margin of Brazil. The CT has a counterpart in the African margin, the Ivory Coast-Ghana Ridge (ICGR), which is located north of the eastern termination of the RFZ. Earlier studies show that the evolution of both marginal ridges (CT and ICGR) was mainly influenced by (1) tectonic uplift due to Late Albian-Cenomanian transpressional tectonics and (2) flexural uplift due to erosion and thermal changes caused by the passage of the oceanic spreading center.

While ICGR is the most intensely studied marginal ridge in the Atlantic equatorial margin, the CT still needs further analysis to unravel its evolutionary process. The objective of the present study is thus to map and analyze the CT to understand its time and spatial evolution. Therefore, we have used and interpreted 2D reflection seismic sections and boreholes from the Brazilian Agency of Oil and Gas.

Our study shows that the CT is an intensely deformed Lower Cretaceous structure, which originates from the Atlantic opening process. The CT is controlled by the RZF and preexisting fault zones in the continent such as the Transbrasiliano lineament (TB). The interpretation of the seismic sections shows an intense ductile and brittle deformation of the CT paleo structure (syn-rift sequence) and the sedimentary units deposited after it (drift sequence). It indicates that tectonic reactivation occurred in the period where the transform movements were already restricted to the furthest spreading center. There is also evidence that some faults affect the whole

rift sequence suggesting a possible brittle reactivation of the offshore continuation of the TB due to changes in plate movements in the Late Albian. This plate shifts agrees with previous works that show compressional features concentrated in continental shelf near of CT and half-grabens linked with the offshore TB prolongation. On the other hand, there is no evidence of the influence of weakness zones in the CIGR, where the Kandi lineament (the prolongation of the TB in the African continent) is far more than 300 km of that marginal ridge.

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