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## **REACTIVATIONS ALONG THE CRUZEIRO DO SUL DEFORMATION ZONE**

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## REACTIVATIONS ALONG THE CRUZEIRO DO SUL DEFORMATION ZONE

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### **Introduction (Font: Arial Bold, 10).**

Major preexisting zones of weakness oriented subparallel to the directions of relative continental breakup appear to control the locations of transform faults that develop in a new ocean. In the South Atlantic there are well studied examples in the Florianopolis Fracture Zone (Asmus, 1978; Gamboa & Rabinowitz, 1981; Brandão et al., 2022) and the Rio de Janeiro Fracture Zone (Brandão et al., 2024). This study applies an integrated geophysical and structural approach to investigate the magmatic and tectonic zone that extends from the Rio Grande Rise in the southwestern south Atlantic into the continent along the Paranaiba High Alkaline Province. Gravity, and magnetometry data were obtained from repositories such as the Topex/Poseidon project (<https://topex.ucsd.edu>), and the National Oceanic and Atmospheric Administration (NOAA) (<https://www.ngdc.noaa.gov/geomag/emag2.html>), respectively. These high-resolution data, allows reliable regional studies on structural lineaments (e.g., Maus et al., 2009; Sandwell et al., 2014; Tozer et al., 2019). The gravimetric data, derived from the gravity models of Cryosat-2 and Jason-1 (Sandwell et al., 2014), have an approximate accuracy of 2 mGal and a resolution of 1 arc minute (~1,850 meters).

The Cruzeiro do Sul deformation zone is 220 km wide, extending for at least 3500 km from the southwest Rio Grande Rise to the intracratonic Paranaiba High. The events that occur along this belt are described and a tectonic hypothesis is formulated. The magmatic events occur in at least two pulses recognizable in the entire area. The first in the Upper Cretaceous (90-80 ma) followed by the Eocene (50-40 ma) uplift. Seismic interpretation shows that there are several magmatic bodies hidden beneath the sedimentary pile of the Santos Basin, mainly in the Cabo Frio High. Neotectonics activity drive by the high geothermal gradient in the form of NW-SE faults and seismic events with consistent NE-SW ShMax focal mechanisms. In the offshore portion underplating and mantle exhumation recognizable in ultradepth seismic sections indicates that high geothermal gradient also occurs modifying the strength profile of the local crust. The Cruzeiro do Sul Deformation Zone comprise a region of recurrent magmatism between the Upper Cretaceous and Eocene. Its activity is also registered during the Pleistocene, therefore characterizing neotectonic activity, registered by seismicity, thermal springs, hydrogen formation and percolation.