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From the São Francisco Craton to the Campos Basin: Interpretation of Integrated Potential-field Data through the Ribeira Orogen and Implications for Gondwana Assembly

Luizemara Szameitat (Observatório Nacional - Tektos/UERJ-Instituto GeoAtlantico), Emanuele Francesco La Terra (Observatório Nacional), Sergio Fontes (Observatório Nacional), Miguel Tupinambá (Universidade do Estado do Rio de Janeiro - Tektos/UERJ-Instituto GeoAtlantico), Monica Heilbron (Universidade do Estado do Rio de Janeiro - Tektos/UERJ-Instituto GeoAtlantico), Alessandra De Barros e Silva Bongiolo (Universidade Federal do Paraná)

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Introduction

In recent decades, studies on tectonic inheritance and its influence on continental-margin architecture have increased. In this context, clarifying the tectonic framework in the Ribeira Belt formation is significant to understanding the basin architecture along the southeastern Brazilian margin. The Ribeira Belt records a complex Neoproterozoic–Cambrian collision during the final assembly of Gondwana. Despite decades of geophysical and geological investigations on this issue, critical questions remain unclear about the orogenic setting and the offshore continuation of tectonostratigraphic units. This work has integrated all available high-resolution airborne magnetic datasets across the Ribeira Belt and surroundings, terrestrial gravity observations from national and international repositories and global marine gravity compilation, in order to provide a regional-scale overview of the Ribeira Belt tectonic setting. The data compilation offers a uniform coverage of the Ribeira Belt, including the lateral offshore continuation. The interpretation of obtained potential field grids and the application of recognized enhancement techniques provide anomaly patterns within orogenic domains, and suggest the influence of continent-scale shear zones on both the Proterozoic assembly and the Mesozoic dismantling of the Ribeira Belt.

Method and/or Theory

Potential field datasets were integrated for composing the overview of the Ribeira-São Francisco collision. Several magnetic datasets were applied to cover the whole area, which were acquired over the years by the Geological Survey of Brazil (SGB-CPRM) and CODEMIG. Those datasets were integrated as a mosaic of grids, which were interpolated from the original datasets with $\frac{1}{4}$ of line space and harmonized to 100 m from the ground surface. Ground gravity data from SGB-CPRM, BNDG, IBGE and BGI repositories were concatenated by an in-house Python routine for filtering repeated acquired points and clear erroneous values. The raw gravity observations were reduced and integrated to global marine Free-air Anomaly compilation for the Bouguer Anomaly calculation and interpretation. Enhancement techniques, such as upward continuation, derivatives and vertical integration were applied to the potentials in order to clarify possible sources of major anomalies, such as tectonostratigraphic units and dike swarms.

Results and Conclusions

At the time of this abstract, we are in the final stages of gravity data integration and working on the regional tectonic map of Ribeira Belt. Nevertheless, significant interpretations of key tectonic features have already been obtained. From a tectonic perspective, the integrated high-resolution magnetic data and enhancement techniques provide the primary contribution to the collisional context, whereas gravity anomalies support the interpretation of major pieces of the tectonic framework. First-order tectonic features linked to Ribeira Belt and the Gondwana closure in southeastern Brazil include a continent-scale strike-slip zone from Campos Basin to South-Southeastern Brasília Belt, a possible NW limit to the orogenic front, and a map of offshore prolongation of Ribeira Belt terranes. Our interpretation begins to shed light on longstanding geological questions about the genesis of the Ribeira Orogen.