

Delimiting the Neoproterozoic São Francisco Paleocontinental Block with P-wave travel-time tomography

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Abstract

The São Francisco Paleocontinental Block (SFPB) represents part of the Congo-São Francisco Paleocontinent (CSFP), amalgamated around 2 Ga. In the Neoproterozoic, a branched continental rift system evolved to ocean basins around most edges of the SFPB that remained only partially linked to the Congo Paleocontinent by means of the Bahia-Gabon Continental Bridge. After the Brasiliano – Pan-African orogeny, two relatively preserved CSFP sectors formed the São Francisco and Congo cratons, surrounded by Neoproterozoic orogenic belts. Recent results of upper mantle P-wave seismic tomography allowed us to suggest a delimitation in lithospheric depths of the Neoproterozoic SFPB, which comprise the São Francisco Craton, and that this would have been connected with the Congo Paleocontinent along the Araçuaí Belt. It is characterized by high-velocity anomalies and its boundaries with other blocks are marked by low-velocity anomalies at lithospheric depths. We tested the resolution of the tomographic results through synthetic models obtained by a raytracing scheme using the observed ray configuration. We observe that the lateral resolution is adequate, but the method used was not able to set the depth reached by the SFPB. Our results indicate that the SFPB area in lithospheric depths is larger than the surface area ascribed to the São Francisco craton, and thus, the SFPB basement deeply extends beneath neighboring orogenic regions, suggesting that these Neoproterozoic mobile belts, such as Araçuaí Orogen and the Brasília Fold Belt, reworked the continental crust. We observe a low-velocity anomaly in the SFPB central region, corresponding to the Pirapora aulacogen. Our results have a good spatial correspondence with the low Bouguer anomalies used to define the SFPB in previous studies. The limits of the SFPB are consistent with deviation of the mantle flow, as suggested by SKS fast polarization.

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