

THE BASEMENT OF THE SOUTHERN BRASÍLIA OROGEN: A WINDOW INTO THE REWORKED SÃO FRANCISCO PALEOCONTINENT

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A large part of the São Francisco paleocontinent history is hidden underneath the Neoproterozoic orogens that surround the São Francisco Craton. The basement complexes within these orogens can give us important clues about continental growth and reworking processes. The southern Brasília Orogen has been interpreted as the result of Neoproterozoic oblique collision between the passive margin of the São Francisco paleocontinent and the active margin of the Paranapanema block. Basement rocks related to the São Francisco paleocontinent outcrop within a ~300 km long and 25-75 km wide ENE-WSW trending tectonic window that transects the orogen. These basement rocks exhibit a prolonged geological evolution that starts with Mesoarchean TTG-type continental crust generation and ends in the Neoproterozoic with upper-amphibolite facies metamorphism related to the orogenic evolution. The southern Brasília Orogen basement comprises two main tectonic domains: (1) a Meso- to Neoproterozoic domain represented by the Amparo-Serra Negra and Heliadora-Minduri complexes and (2) the Paleoproterozoic domain of the Pouso Alegre Complex. The Archean domain displays a well-defined period of TTG-type magmatism between 3.00 and 2.96 Ga with mostly suprachondritic zircon Hf isotope signatures and whole-rock Nd T_{DM} ages between 3.2 and 3.4 Ga. These TTGs are interpreted as additions to the continental crust mostly likely generated by partial melting of a hydrous mafic crust. Neoproterozoic granitic magmatism at 2.76 Ga is interpreted to mark the transition between TTG-type and high-K granitoid magmatism in the area. These Mesoarchean igneous crystallization ages lie within the southern São Francisco Craton “magmatic gap”, which suggest that these complexes were exotic microcontinents accreted to the southern São Francisco paleocontinent. The Paleoproterozoic Pouso Alegre Complex comprises mainly calcic to calc-alkalic orthogneisses of tonalitic to granodioritic compositions with igneous crystallization ages between 2.15 and 2.08 Ga, associated with juvenile Nd-Hf isotope signatures. Geochemical signatures are consistent with continental arc margin or an evolved accreted oceanic arc as the favored setting for the Pouso Alegre Complex that is interpreted as the orogenic counterpart of the Mineiro Belt arc system and represents a significant part of a major Paleoproterozoic continental crust generation event at the southern edge of the São Francisco paleocontinent. The Neoproterozoic collisional events were responsible for intense deformation and metamorphism of the São Francisco crust in upper- amphibolite facies associated with partial melting. Thermodynamic modeling combined with Zr-in- titanite thermometry provided a robust constraint of the Pouso Alegre Complex metamorphic peak at ca. 750-775 °C, 10.5-12.5 kbar, dated at ca. 630-620 Ma with HREE+Y-depleted titanite cores. Leucosome zircons record melt crystallization during cooling at ca. 616 Ma and titanite HREE+Y- enriched titanite rims record garnet resorption during exhumation at 606 Ma. This study highlights that a great amount of information about the São Francisco paleocontinent can be retrieved from the basement complexes within the São Francisco Craton surrounding orogens. These pieces of information are crucial and must be taken into consideration in any attempt to reconstruct the São Francisco paleocontinent evolution.

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