



Provenance and tectonic setting of the external nappe of the Southern Brasília Orogen



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ABSTRACT

The Brasília Orogen, located on the western and southern margins of the São Francisco Craton, corresponds to a horizontal nappe stack that was regionally transported eastward during the collision between the Paranapanema and Central Goiás blocks and the Sanfranciscana Plate in the Ediacaran Period.

The front of the Southern Brasília Orogen, the object of this study, is represented by metapsammites and metapelites of the Carrancas Group, with an exotic unit of metawackes which lies tectonically on top of it.

The metawackes underwent moderate chemical weathering, and the rare-earth element behavior suggests the presence, in the source area, of igneous rocks with crustal signature. The age distribution of the detrital zircon crystals is almost unimodal with dominant Neoproterozoic population and subordinate Paleoproterozoic ages. The most likely source area is a mature magmatic arc in the active continental margin of the Paranapanema Block, and the deposition occurred between 620 and 590 Ma. The correlation between these external metawackes with those occurring in the internal nappes (Santo Antônio Schist of the Andrelândia Nappe) assumes that this unit corresponds to the front of the Andrelândia Nappe. However, a syn-collisional orogenic foreland basin, installed at the edge of the Sanfranciscana Plate, must be considered.

The metapelites of the Carrancas Group (Campestre Formation) have a chemical signature of sedimentary recycling and deposition in a tectonically stable area. Detrital zircon crystals exhibit juvenile provenance in the Mesoproterozoic Era and mixed provenance in the Paleoproterozoic Era. The provenance ages correlate with the Canastra Group of the Brasília Orogen in the western craton margin but are not similar to those of the cratonic units. The likely age for the deposition of the Campestre Formation of the Carrancas Group is in the Tonian–Cryogenian Period, in the southwestern edge of the Sanfranciscana Plate.

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1. Introduction

The Brasília Orogen (Fuck et al., 1993; Dardenne, 2000), located on the west and south margins of the São Francisco Craton (Fig. 1), is part of an orogenic system involving the Central Goiás and Paranapanema blocks. The blocks are interpreted as independent microplates with their own magmatic and metamorphic histories, which were accreted to the passive continental margin of the Sanfranciscana Plate during the Ediacaran collision (Brito Neves et al., 1999; Campos Neto, 2000; Fuck et al., 2008).

The Central Goiás Block is made of orthogneisses and Archean greenstone belts, which have been orogenically reworked in the

Rhyacian (Jost et al., 1996; Queiroz et al., 1999). The eastern margin of this block consists of metavolcanosedimentary belts from the Mesoproterozoic Ectasian and Tonian Mafic–Ultramafic complexes (Danni et al., 1982; Ferreira-Filho et al., 1994; Moraes and Fuck, 2000; Moraes et al., 2006; Correia et al., 2012). Magmatic arc metavolcanics and calc-alkaline granitoids (Mara Rosa Arc) with juvenile isotopic signatures were accreted on the eastern edge of the Central Goiás Block during the Tonian–Cryogenian transition (Pimentel and Fuck, 1992; Pimentel et al., 1997, 2000).

The Paranapanema Block (Mantovani and Brito Neves, 2005), which is extensively covered by Phanerozoic sedimentary rocks of the Paraná Basin, has a Rhyacian and Statherian continental basement and a geophysical signature of thin continental crust and cratonic lithospheric keel (Cordani et al., 1984; Mantovani et al., 2001; Assumpção et al., 2006). Carbonate and terrigenous units form a passive continental margin of Mesoproterozoic Ectasian age

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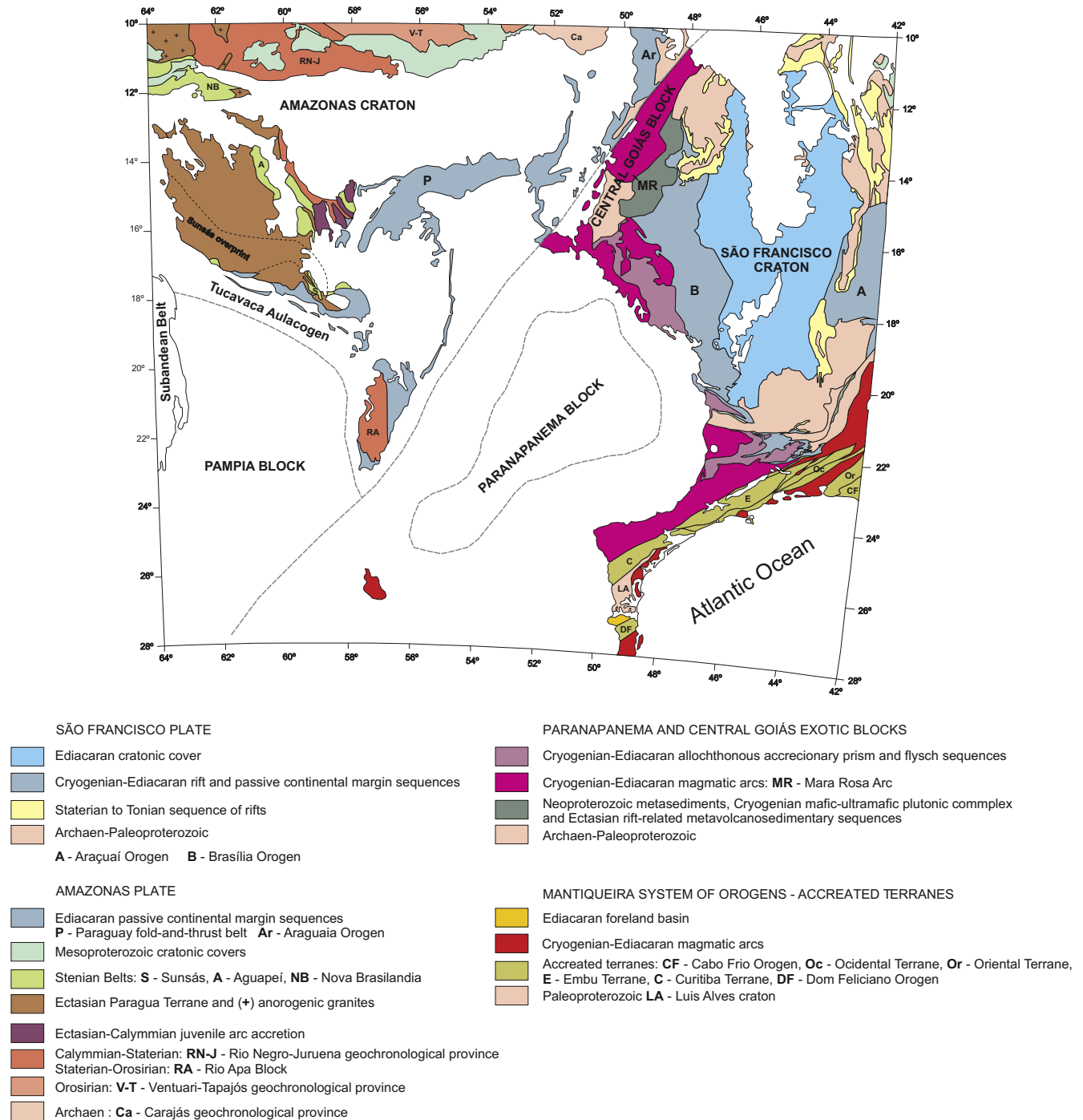


Fig. 1. Tectonic Provenance Map of the Rodinia Blocks and Western Gondwana Orogens Modified from [CGMW \(2001\)](#) Geologic Map of South America, scale 1:5000; [Campos Neto \(2000\)](#), [Ramos et al. \(2010\)](#), [Bettencourt et al. \(2010\)](#).

along the eastern margin of the Paranapanema Block ([Pires, 1991](#); [Campanha and Sadowski, 1999](#); [Siga et al., 2011](#)). The establishment of an active continental margin along the entire northern and eastern edge of this continental block occurred during the Neoproterozoic ([Campos Neto and Caby, 2000](#); [Campos Neto, 2000](#); [Pimentel et al., 2000](#); [Laux et al., 2005](#)).

The closure of the oceanic basin resulting in the collision between the Sanfranciscana Plate and the Paranapanema and Central Goiás Blocks, which was responsible for the development of the Brasília orogenic belt, occurred in the Ediacaran Period ([Brito Neves](#)

[et al., 1999](#); [Campos Neto, 2000](#); [Trouw et al., 2000](#)). The different orogen segments form horizontal nappe stacks, which grade to extensive reverse faulting along the craton margin. The assembly was regionally transported eastward ([Fig. 1](#)).

The front of the Brasília Orogen, located on the southern margin of the São Francisco Craton ([Fig. 2](#)) is the subject of this study, which seeks to determine the provenance of metasedimentary rocks and consequently, establish their depositional environment and tectonic context ([Taylor and McLennan, 1985](#); [McLennan and Taylor, 1991](#)). These objectives are achieved through studies of the

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