



## Comparing two arms of an orogenic belt during Gondwana amalgamation: Age and provenance of the Cuiabá Group, northern Paraguay Belt, Brazil

Marly Babinski<sup>a,\*</sup>, Ben McGee<sup>a</sup>, Cláudia do Couto Tokashiki<sup>b</sup>, Colombo C.G. Tassinari<sup>a</sup>,  
Gerson Souza Saes<sup>b</sup>, Francisco Egidio Cavalcante Pinho<sup>b</sup>

<sup>a</sup> Instituto de Geociências, Universidade de São Paulo, Rua do Lago, 562, CEP 05580-080, São Paulo, SP, Brazil

<sup>b</sup> Instituto de Geociências, Universidade Federal do Mato Grosso, Cuiabá, MT, Brazil

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### ABSTRACT

The Cuiabá Group is the basal part of the sequence of passive margin sediments that unconformably overly the Amazonian Craton in central Brazil. Despite these rock's importance in understanding Brazil's path in the supercontinent cycle from Rodinia to Gondwana and their potential record of catastrophic glaciation their internal stratigraphy and relationship to other units is still poorly understood. The timing of deposition and source areas for the subunits of the Cuiabá Group sedimentary rocks are investigated here using integrated U-Pb and Sm-Nd isotope data. We sampled in the northern Paraguay Belt, a range that developed in response to the collision between the Amazonian Craton, the Rio Apa Block, the São Francisco Craton and the Paranapanema Block. 1125 detrital zircon LA-ICPMS U-Pb ages were calculated and 22 whole rock samples were used for Sm-Nd isotope analysis. The U-Pb ages range between Archean and Neoproterozoic and the main source is the Sunsás Province. Moving up stratigraphy there is a subtle increase in slightly younger detritus with the youngest grain showing an age of  $652 \pm 5$  Ma, found at the top of the sequence. The age spectra are similar across each of the sampled units and when combined with the Sm-Nd data, indicate that the source of the detritus was mostly similar throughout deposition. This is consistent with the analysis here that indicates sedimentation occurred in a passive margin environment on the southern margin of the Amazonian Craton. The maximum depositional age of  $652 \pm 5$  Ma along with the age of the overlying cap carbonate of the Mirassol d'Oeste Formation suggests that part of this section of sediments were deposited in the purportedly global  $\sim 636$  Ma Marinoan glaciation, although we give no sedimentological evidence for glaciation in the study area. Compared to the southern Paraguay Belt where no direct age constraints exist, the glacial epoch could be either Cryogenian or Ediacaran. In addition, available data in the literature indicates a diachronous evolution between the northern and southern arms of the Paraguay Belt in the final stages of deposition and deformation.

### 1. Introduction

Our planet's paleogeography is vital to our understanding of changes in Earth's spheres, which influenced past climate and the evolution of life. For this reason the formation of the Palaeozoic supercontinent Gondwana has received substantial attention in the literature for many decades. Early interpretations of a collision between two large continents called East Gondwana and West Gondwana at  $\sim 650$  Ma (Stern, 1994) have evolved to incorporate current evidence that identify a network of collisional events between relatively small Neoproterozoic continents that amalgamated to form Gondwana during the Ediacaran and Cambrian (Collins and Pisarevsky, 2005; Meert, 2003; Pisarevsky et al., 2008).

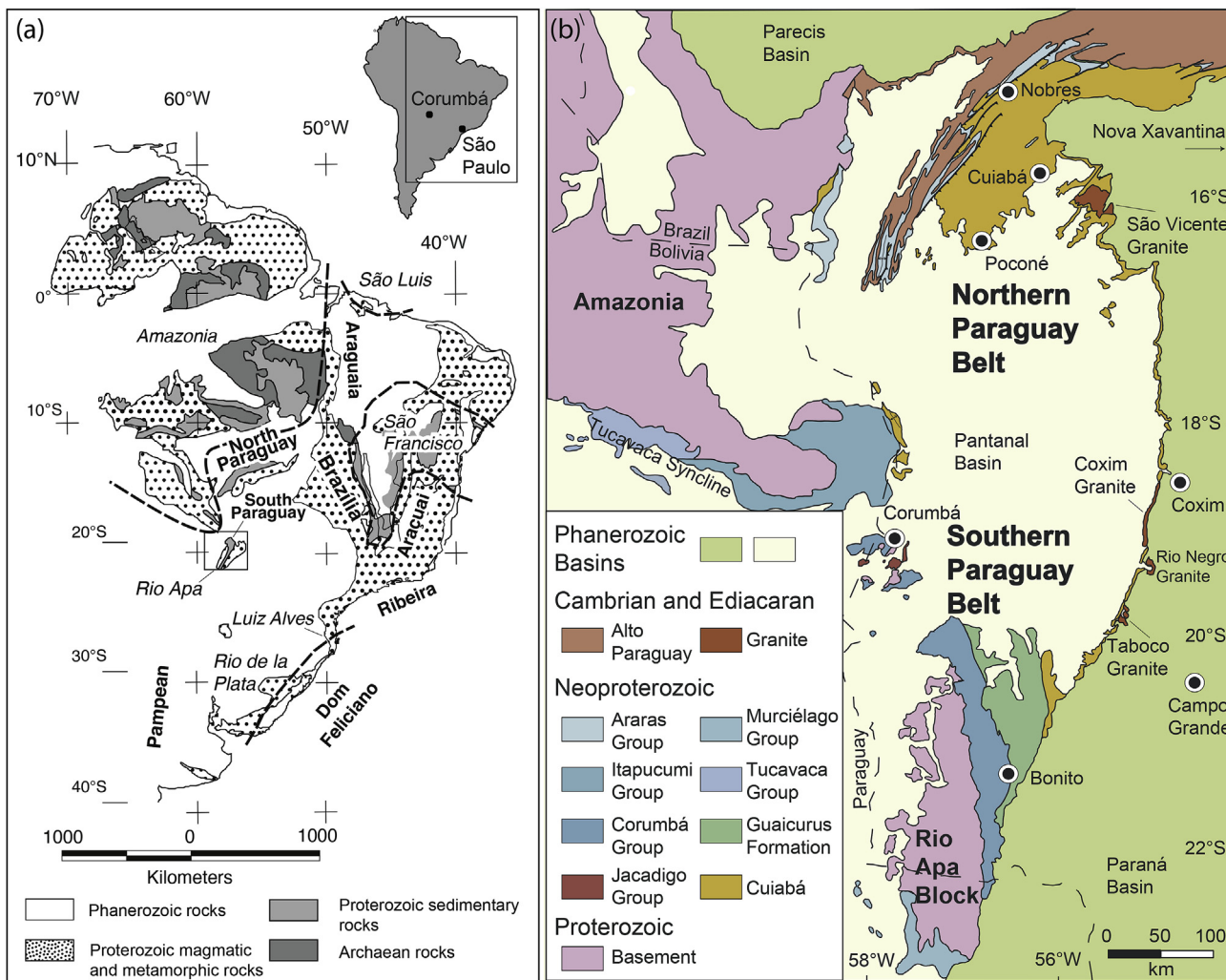
The Paraguay Belt in Brazil is part of this network of orogens

suturing Gondwana that for some time has been considered as 'Brasiliano' (ca. 940–630 Ma) in age (Cordani et al., 2009). More recent contributions (Bandeira et al., 2012; McGee et al., 2012; Tohver et al., 2012; Trindade et al., 2006) have demonstrated that the Paraguay Orogen is part of a larger orogenic belt that can be traced south to Argentina and north to the Amazonia, and that is considerably younger than many Gondwana-amalgamation orogens—forming in the early Cambrian—therefore representing one of the final collisional belts in Gondwana. Despite these important works, there are still gaps in our knowledge of the specific links, in particular the stratigraphy, between the northern and southern Paraguay Belt.

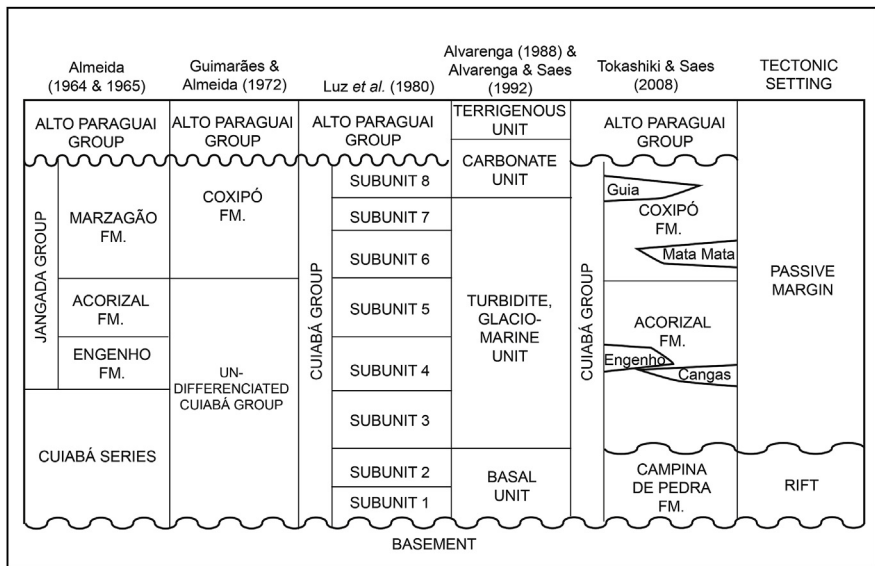
This work addresses both the tectonic and palaeoenvironmental issues outlined above and the links between the northern and southern arms of the belt. Analysis of the highly resistant mineral zircon is an

\* Corresponding author.

E-mail address: [babinski@usp.br](mailto:babinski@usp.br) (M. Babinski).



**Fig. 1.** (a) Location map of eastern South America. Cratonic fragments are written in italics and Proterozoic orogenic belts in bold after Collins and Pisarevsky (2005). (b) Northern and southern Paraguay Belts in relation to Amazonian and Rio Apa Cratons.



**Fig. 2.** Comparison between the stratigraphic columns proposed by several authors for the Cuiabá Group.

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