Journal of the Geological Survey of Brazil

Pernambuco-Alagoas, Riacho do Pontal, and Sergipano domains of the Borborema Province, Northeastern Brazil: a geological and geochronological synthesis

Jocilene dos Santos Santana[1*], Reginaldo Alves dos Santos[2], Basílio Elesbão da Cruz Filho[1], Frank Gurgel Santos[3], Camila Franco Basto[4], José Alberto Rodrigues do Vale[5], Vladimir Cruz de Medeiros[5], Tercyo Rinaldo Gonçalves Pineo[6], Débora Melo Ferrer de Morais[3]

[1]SGB-CPRM - Serviço Geológico do Brasil (GEREMI/SUREG-SA) Avenida Ulysses Guimarães, 2862, Sussuarana - Centro Administrativo da Bahia, Salvador, BA, Brazil. CEP: 41.213-000.
[2]Independent consultant – Avenida Arnaldo Lopes da Silva, 108, Stiep, Salvador, BA, Brazil, CEP: 41770-850.
[3]SGB-CPRM - Serviço Geológico do Brasil (GEREMI/SUREG-RE) Avenida Sul, 2291, Afogados, Recife, PE, Brazil. CEP: 50.770-011.
[4]SGB-CPRM - Serviço Geológico do Brasil (GEREMI/SUREG-BH) Avenida Brasil, 1731, Funcionários, Belo Horizonte, MG, Brazil. CEP: 30.140-002.
[5]SGB-CPRM - Serviço Geológico do Brasil (NANA/SUREG-RE) Rua Alexandrino de Alencar, 1402, Tirol, Natal, RN, Brazil. CEP: 59015-350.
[6]SGB-CPRM - Serviço Geológico do Brasil (GEREMI/REFO) Avenida Antônio Sales, 1418, Joaquim Távora, Fortaleza, CE, Brazil. CEP: 60.135-101

Abstract

TIn recent years, there has been an increasing number of studies seeking to advance the geological and geotectonic understanding of the Borborema Province, northeastern Brazil. However, in the Southern Borborema Province, few regional synthesis studies and data integration from the available literature have been conducted. In this regard, this paper presents a review of the main lithostratigraphic units and published geochronological data for the Pernambuco-Alagoas, Riacho do Pontal, and Sergipano domains, located in the southern portion of the province. The Southern Borborema Province fully encompasses the state of Alagoas and partially covers the states of Pernambuco, Sergipe, Bahia, and Piauí, bordered to the north by the Pernambuco Shear Zone and to the south by the São Francisco Craton. The methodology involved literature review, geological mapping, construction of regional geological profiles, and geochronological compilation with the creation of histograms of detrital zircon ages for metasedimentary rocks and magmatic barcodes for ortho-derived rocks. The tectonic evolution of the Southern Borborema Province began with the rifting of the Rodinia supercontinent (1.0 Ga) during the Cariris Velhos event. The processes involved in the interaction of the Rodinia-derived fragments were diachronic, within a broad accretionary scenario that culminated in the stabilization of the West Gondwana supercontinent. The Pernambuco-Alagoas Domain presents a complex tectonic history, preserving remnants of Archean and Proterozoic rocks. The Riacho do Pontal and Sergipano domains are part of a large fold system formed from the collision of the Pernambuco-Alagoas Domain with the São Francisco Craton, with tangential deformation converging towards the craton during the Brasiliano/Pan-African Orogeny. Based on the ages of syn-collisional granites, we infer that the orogenic event that gave rise to these fold belts occurred over closely related time intervals, with slight diachronism. The syn-tectonic magmatism is recorded within the following time frames: 630–624 Ma (Sergipano Domain), 635–570 Ma (Riacho do Pontal Domain), and 657–555 Ma (Pernambuco-Alagoas Domain).

Article Information

Publication type: Review Article
Received 20 November 2024
Accepted 14 September 2024
Online pub. 2 October 2024
Editor: J.M. Lafon

Keywords:
Southern Borborema
Southern Subprovince
Brasiliano orogenesis
Fold belts
Geochronology

*Corresponding author
Jocilene dos Santos Santana
E-mail address: jocilene.santana@sgb.gov.br

ISSN: 2595-1939
https://doi.org/10.29396/jgsb.2024.v7.n3.1
Open access at https://jgsb.sgb.gov.br

1. Introduction

The Pernambuco-Alagoas, Riacho do Pontal, and Sergipano domains form the Southern Borborema Province (SBP) (Delgado et al., 2003). This area corresponds to the central part of a wide orogenic belt formed by the convergence between the São Luís/West African and São Francisco/Congo cratons during the Neoproterozoic (Almeida, 1977, 1981), which resulted in the formation of the West Gondwana Supercontinent. The objective of this study is to present a synthesis of the lithostratigraphy and a review of the geochronological data available in the literature related to the SBP. We define the Southern Borborema Province as the area bounded to the north by the Pernambuco Shear Zone and to the south by the São Francisco Craton, encompassing the Pernambuco-Alagoas, Riacho do Pontal, and Sergipano domains (Figure 1), which span the states of Pernambuco, Alagoas, Sergipe, Bahia, and Piauí.

Figure 1. Geotectonic compartmentalization of the Borborema Province (Medeiros et al. 2021).

2. Materials and Methods

The methodology applied involved literature review, interpretation of remote sensing products (satellite images, SRTM, and airborne geophysical maps), geological mapping, and regional integration. The reviews of the lithostratigraphic units and geochronology were based on geological maps published by the Geological Survey of Brazil (SGB-CPRM), as well as scientific articles, theses, dissertations, and conference abstracts. Thus, geological maps and reports at a scale of 1:100,000, state geological maps, geophysical-geological maps, and regional geological maps were consulted, primarily the Geological Map of the Borborema Province (Santos et al., 2021).

A compilation of geochronological data, acquired by the U-Pb method in zircon using techniques such as Sensitive High-Resolution Ion Microprobe (SHRIMP) and Laser-Ablation Inductively Coupled Plasma Mass Spectrometry (LA-ICP-MS), Isotope Dilution Thermal Ionization Mass Spectrometry (ID-TIMS), and Pb-Pb in zircon, was carried out. Priority was given to the first two methods, given that the rocks studied underwent deformation and metamorphism, for which in situ analyses, with proper spot positioning in core or rim domains, provide greater analytical control and facilitate the interpretation of results (Sato and Kawashita, 2002).

For the construction of detrital zircon histograms and sedimentary provenance studies, the 207Pb/206Pb ages were used for zircons older than 1.0 Ga, and the $^{206}Pb/^{238}U$ ages were used for zircons younger than 1.0 Ga (Stern, 1997). Furthermore, only data with a discordance of less than 10% were compiled (Gehrels, 2011). The discordance of the compiled data was recalculated from the U-Pb data by the relative difference between the $^{206}Pb/^{238}U$ and $^{207}Pb/^{206}Pb$ ages. The histograms were generated using the Isoplot extension for Excel, utilizing the Probability Density Plot function (Ludwig, 2009).

All maximum sedimentation ages presented in this study were cited according to the original data sources. For information on how these maximum ages were calculated, see the references.

3. Geological Context

The Borborema Province, located in the northeastern tip of Brazil, corresponds to an orogenic segment resulting from the collision between the São Francisco-Congo and Amazonian cratons around 600 Ma (Silva Filho et al., 2014). It comprises intensely deformed Paleoproterozoic rocks, locally incorporating Archean fragments, interspersed with metamorphosed Neoproterozoic volcanosedimentary belts and Tonian to Ediacaran continental crust with various Brasiliano granite intrusions. This province is subdivided into the Northern, Central, and Southern subprovinces (Van Schmus et al., 1995), which are delimited by frontal and strike-slip shear zones.

The Southern Borborema Subprovince is subdivided into the Pernambuco-Alagoas, Riacho do Pontal, and Sergipano domains. Several episodes of deformation, metamorphism, and magmatism are responsible for the diversified and complex geological configuration of this subprovince. The Archean period is marked in the approximate interval between 2758–2734 Ma (Brito Neves et al., 2015; Cruz et al., 2014), while the Paleoproterozoic is represented between 2095–1987 Ma (Silva Filho et al., 2014; Silva Filho et al., 2021; Garcia et al., 2017). The Cariris Velhos Event occurred between 1000–942 Ma (Caxito et al., 2010; Brito Neves et al., 2015), and the Brasiliano Event occurred between 657–552 Ma (Brito Neves et al., 2019; Teixeira, 2015).

3.1 Pernambuco-Alagoas Domain

The Pernambuco-Alagoas Domain, or Pernambuco-Alagoas Superterrane (Brito Neves et al., 2019), consists of a set of lithologies formed in distinct geological settings. Recent studies have recognized the presence of Archean, Paleoproterozoic, Mesoproterozoic, and Neoproterozoic units (Figure 2). Noteworthy is the widespread distribution of Neoproterozoic granitic stocks and batholiths of various origins (Brito Neves et al., 2019).

Figure 2. Lithostratigraphic units and geological profile of the Pernambuco-Alagoas Domain. Vertical exaggeration of the geological profile is 5x.

3.1.1 Archean unit

The Entremontes Complex, representative of the Archean Unit in the Pernambuco-Alagoas Domain, is mainly composed of granitic to granodioritic gneisses interlayered with amphibolite lenses.

3.1.2 Paleoproterozoic units

The Paleoproterozoic records of the Pernambuco-Alagoas Domain include the migmatitic orthogneiss units Cachoeira Grande, Camará, Mucunã (Figure 3A), and Fulgêncio, the Serra do Caju Suite, and the Riacho Seco Complex.

The orthogneiss units have monzodioritic, granodioritic, quartz-dioritic, and dioritic/gabbroic compositions and may present tonalitic to trondhjemitic neosomes (Accioly et al., 2018; Silva Filho et al., 2008; Cruz et al., 2014). The Serra do Caju Suite is formed by granodioritic orthogneisses and tonalitic augen gneisses (Accioly, 2015).

The Riacho Seco Complex consists of the Lagoa Redonda, Riacho do Angico, Lagoa do Massapê, and Orocó units (Melo et al., 2019). The Lagoa Redonda Unit comprises metaplutonic rocks with compositions ranging from tonalitic to granitic, containing remnants of supracrustal rocks. The Riacho do Angico Unit is composed of kyanite-garnet-biotite schists, kyanite-garnet-biotite gneisses, leucogneisses, calc-silicate rocks, and marbles. The Lagoa do Massapê Unit includes calc-silicate rocks and marbles associated with metabasalts, which are important from a metallogenic standpoint, containing copper sulfide deposits. The Orocó Unit is made up of muscovite-quartzite, grayish-white feldspathic quartzites, strongly foliated, with medium to fine grain sizes.

3.1.3 Mesoproterozoic units

Mesoproterozoic units are represented by the Serra da Taquaritinga Suite, Vila Amaro Complex, and Manguape Orthogneiss. These units consist predominantly of locally migmatized orthogneisses with varied compositions (syenogranite, monzogranite, quartz-diorite, and tonalite), with subordinate paraderived rocks (Sá et al., 1997; Angelim et al., 2004; Brasilino and Miranda, 2017; Accioly et al., 2018; Silva Filho et al., 2008).

3.1.4 Mesoproterozoic-Neoproterozoic units

In the Mesoproterozoic-Neoproterozoic transition, the Cabrobó Complex and Peraluminous Leucocratic Suite occur. The Cabrobó Complex is composed of paragneisses, occasionally migmatized, schists, marbles, calc-silicate rocks, and amphibolites (Santos, 1999; Carmona et al., 2002) (Figure 3B), and the Peraluminous Leucocratic Suite includes Mesoproterozoic and Neoproterozoic plutonism, represented by leucogneisses of granitic to granodioritic composition (Medeiros, 2000).

3.1.5 Neoproterozoic Units

The Neoproterozoic in the Pernambuco-Alagoas Domain encompasses the Belém do São Francisco, Rio Una, and Abaré complexes, the Lobo, Tucutu, Rocinha, and Caetés suites, and the Riacho Alegre, Serra das Flores, Pinhões, and Agrestina orthogneiss units.

According to Santos (1995, 1999), the Belém do São Francisco Complex is composed of orthogneisses with tonalitic to granitic compositions and migmatites, with remnants of supracrustal rocks from the Cabrobó Complex.

The Rio Una (Figure 3C) and Abaré complexes are composed of three units each (units 1, 2, and 3 for the Rio Una Complex; Icozeira, Lagoa do Mato, and Riacho do Espinheiro for the Abaré Complex), consisting of a wide variety of metavolcano-sedimentary rocks, mainly metapelites (schists), paragneisses, quartzites, calc-silicate rocks, marbles, iron formations, and subordinate metabasaltic-ultramafic rocks. The Lobo, Tucutu, and Rocinha suites are made up of orthogneisses of granitic to granodioritic compositions, sometimes mylonitic or migmatitic (Brito and Freitas, 2011; Cruz, 2015). The Caetés Suite consists of diatexites associated with migmatized supracrustal rocks (Silva Filho et al., 2008). The orthogneiss units consist of lithotypes with sienogranitic, monzogranitic, granitic, quartz-monzonitic, granodioritic, and tonalitic compositions (Uchôa Filho et al., 2019; Mendes and Brito, 2017; Santos et al., 2015; Neves et al., 2012).

In the Pernambuco-Alagoas Domain, there are several Ediacaran granitoid bodies. These granitoids correspond to quartz syenites, syenogranites, granites, monzogranites, granodiorites, tonalites, and diorites, grouped into different magmatic suites (Silva Filho et al., 2008; Mendes and Brito, 2017; Accioly et al., 2018): 1) Conceição, Itaporanga, and Águas Belas suites (metaluminous to shoshonitic calc-alkaline rocks); 2) Serrote dos Macacos, Xingó, and Ouro Branco suites (peraluminous calc-alkaline rocks); 3) Saloá Suite (high-K calc-alkaline rocks); 4) Buíque Suite (subalkaline metaluminous rocks); 5) Serra do Catu Suite (shoshonitic rocks).

Other indiscriminate granitoids occur as batholiths and stocks with irregular to elongated shapes. They have irregular contacts and occupy the central-western portion, near the boundaries of the Pernambuco-Alagoas and Sergipano domains. These are essentially leucocratic types, with light gray, whitish pink to yellowish colors, represented by various petrographic types such as metagranitoids, orthogneisses, and migmatitic orthogneisses. They exhibit monzogranitic and granodioritic compositions and occasionally quartz-monzonitic and tonalitic (Mendes and Brito, 2017).

Figure 3. Field photographs of the lithostratigraphic units present in the Pernambuco-Alagoas Domain. (A) Migmatitic orthogneiss Mucunã northeast of Japecanga (Pedra/Pernambuco); (B) Quartzites of the Cabrobó Complex in the Garanhuns/Pernambuco region; (C) Paragneiss of the Rio Una Complex northeast of Japecanga (Pedra/Pernambuco); (D) Granodiorite of the Conceição Suite northeast of Garanhuns/Pernambuco.

3.2 Riacho do Pontal Domain

The Riacho do Pontal Domain, or Riacho do Pontal Fold Belt (Brito Neves, 1975), borders the northern portion of the São Francisco Craton, near the boundary between the states of Bahia, Pernambuco, and Piauí. The northern limit of this fold belt is defined by the western segment of the Pernambuco Lineament, while its northwestern portion is covered by the Parnaíba Basin (Figure 4). To the south, it is thrusted over the rocks of the Pernambuco-Alagoas Domain (Silva Filho et al., 2002). The deformation in this domain is complex, involving south-verging thrusts and E-W striking transcurrent shear zones (Caxito et al., 2016).

3.2.1 Archean units

The Archean basement of the Riacho do Pontal Domain is represented by the Morro do Estreito Complex (Figure 5A), composed of tonalitic to granodioritic orthogneisses, generally migmatized, and interlayered with supracrustal rocks.

3.2.2 Neoproterozoic units

The Neoproterozoic units of the Riacho do Pontal Domain include the Afeição Suite, the Paulistana, Brejo Seco, Monte Orebe, and Santa Filomena complexes, and the Casa Nova Group. The Afeição Suite (Angelim, 1988; Caxito et al., 2014b) comprises augen gneisses and porphyry granite to granodiorite, with a calc-alkaline and peraluminous affinities (Angelim, 1988; Caxito et al., 2013; Caxito et al., 2014b; Brito Neves et al., 2015). The Paulistana Complex is composed of schists, quartz-schists, and quartzites metamorphosed under greenschist to amphibolite facies, along with an association of metabasalt and ultramafic rocks consisting of amphibolites, ultramafic schists, and metagabbros (Figure 5B). The Brejo Seco Complex corresponds to a low-grade metamorphic metavolcano-sedimentary unit represented by clastic-chemical sedimentary rocks, metavolcanic rocks (Figure 5C), and basic to acidic metatuffs (Gava et al., 1983; Marimon, 1990; Caxito, 2013; Caxito et al., 2016; Uchôa Filho et al., 2019), associated with intrusive bodies of mafic-ultramafic rocks, consisting of serpentinites, troctolites, anorthosites, magnetitites, and gabbros. The Monte Orebe Complex is characterized by a clastic-chemical metavolcano-sedimentary association, composed of schists, phyllites, metagreywackes, marbles, metacherts, metatuffs, amphibolites, and sparse lenses of ultramafic schists (Figure 5D) (Siqueira Filho, 1967; Angelim, 1988; Caxito et al., 2014a, 2016). Moraes (1992) and Caxito et al. (2014a), based on whole-rock geochemical data, suggest a tholeiitic (T-MORB) affinity for the metavolcanic rocks of the complex. The Santa Filomena Complex is composed of marbles and calc-silicate schists, interlayered with metabasic schists (Figure 5E; Caxito et al., 2016; Santos et al., 2017).

Figure 4. Lithostratigraphic units and geological profile of the Riacho do Pontal Domain. Vertical exaggeration of the geological profile: 5x.

3.2.3 Cambrian unit

The Massapê Suite (Caldasso et al., 1973) consists of gabbronorites, pyroxenites, amphibolites, and alkaline carbonates, generated by Cambrian intraplate magmatism. It is represented by two mafic-ultramafic bodies, elongated in a NE-SW direction, intruding the metasediments of the Casa Nova Group (Uchôa Filho et al., 2019).

Figure 5. Field photographs of the lithostratigraphic units present in the Riacho do Pontal Domain. (A) Migmatitic orthogneiss from the Morro do Estreito Complex; (B) Metagabbro from the Paulistana Complex; (C) Amphibolite interlayered with mica schist from the Brejo Seco Complex; (D) Amphibolite with high-angle dip from the Monte Orebe Complex; (E) Sillimanite-garnet-biotite schist from the Santa Filomena Complex; (F) Biotite schist from the Casa Nova Group.

3.3 Sergipano Domain

The Sergipano Domain corresponds to an orogen trending ESE-WNW, bounded to the north by the Pernambuco-Alagoas Domain and to the south by the São Francisco Craton (Figure 6). Its origin is interpreted as the result of the oblique collision between the Pernambuco-Alagoas Domain and the São Francisco-Congo Craton during the Brasiliano/Pan-African Orogeny (Brito Neves et al., 1977; Silva Filho et al., 1978; D'el-Rey Silva et al., 2007; Silva et al., 2008, 2011). Davison and Santos (1989) interpreted the Sergipano Domain as the result of the amalgamation of five distinct tectono-stratigraphic domains, separated by shear zones, from south to north: Vaza Barris, Macururé, Marancó, Poço Redondo, and Canindé.

Figure 6. Lithostratigraphic units and geological profile of the Sergipano Domain. Vertical exaggeration of the geological profile: 5x.

3.3.1 Archean unit

The Archean unit of the Sergipano Domain is the Itabaiana-Simão Dias Complex, which is composed of mylonitic orthogneisses (Figure 7A) and boudinaged interlayers of amphibolites and gabbros, sometimes with migmatitic features (Santos et al., 2001). It has a dome structure with granitic to granodioritic composition.

3.3.2 Paleoproterozoic Units

The Paleoproterozoic in this domain is represented by the Jirau do Ponciano, Nicolau-Campo Grande, and Arapiraca complexes. The Jirau do Ponciano Complex has the shape of an inverted anticline, representing the basement inlier of the Sergipano Domain, similar to the Simão Dias and Itabaiana domes. It is composed of banded to migmatitic orthoderived rocks, with tonalitic, dioritic, monzonitic, granodioritic, and granitic compositions, along with supracrustal portions (Amorim, 1995). The Jirau do Ponciano Plutonic-Metamorphic Dome is overlain by the metavolcano-sedimentary rocks of the Nicolau-Campo Grande Complex (Lima, 2018). According to Mendes and Brito (2017), the Nicolau-Campo Grande Complex consists predominantly of banded quartz-feldspathic gneisses, as well as interlayers of marbles, mica schists, quartzites, metabasalts, metaultramafic rocks, banded iron formations, metavolcanic rocks, and acidic metatuffs. The Arapiraca Complex is formed by mica schists, paragneisses, amphibolite lenses, quartzites, and mafic-ultramafic rock intrusions mineralized in iron. Tesser et al. (2022) described, for the first time, the presence of ultra-high temperature sapphirine diatexites in the Arapiraca Complex.

3.3.3 Neoproterozoic units

The Neoproterozoic in the Sergipano Domain is composed of the Poço Redondo Migmatitic Complex, the Marancó, Canindé do São Francisco, and Araticum complexes, the Serra Negra, Garrote, and Cocorobó suites (Melo et al., 2019), and the Macururé, Miaba, Vaza-Barris, and Estância groups, in addition to Ediacaran magmatism. The Poço Redondo Migmatitic Complex consists predominantly of granodioritic-tonalitic migmatite/gneisses, with enclaves of amphibolites (Figure 7B), calc-silicate rocks, and marbles, along with biotite and garnet-rich supracrustal rocks (Santos et al., 2001). The Marancó Complex comprises a metavolcano-sedimentary sequence containing metaconglomerates, metagreywackes, metasiltstones, marbles, iron formations, metacherts, mafic/felsic metavolcanic rocks, and metabasalt and metaultramafic rocks. The granitoids of the Serra Negra Suite are restricted to the Marancó subdomain, forming elevated reliefs, with prominence given to the mountain range that gave rise to its name, located near the Sergipe-Bahia border. The suite has a granodioritic to quartz-monzonitic composition, sometimes with garnet. The Macururé Group is composed of the Santa

Cruz (basal) and Rio Macururé (top) formations. The Santa Cruz Formation consists, in general, of homogeneous quartzites and variations ranging from massive pure types to banded facies (Mendes and Brito, 2017). The Rio Macururé Formation was defined by Santos et al. (2021) within the scope of the Borborema Province Cartography Project (SGB-CPRM). It corresponds to the upper formation of the Macururé Group, consisting of mica schists, quartzites, metaconglomerates, metasiltstones, metagreywackes, metarenites, metagabbros, metabasalts, metaperidotites, and talc-schists (Figure 7C). The Cocorobó Suite intrudes the Macururé Group schists, elongated in a NW-SE direction, marking the record of Cryogenian granite magmatism. It is a muscovite-biotite granitic orthogneiss of light gray color and medium grain size (Melo, 2019). The Miaba Group is formed, from base to top, by the Itabaiana, Ribeirópolis, and Jacoca formations. The Itabaiana Formation consists of conglomeratic metarenites with lenticular bodies of polymictic metaconglomerates supported by matrix (Santos et al., 2001). The Ribeirópolis Formation mainly consists of phyllites, metagreywackes, and metaconglomerates (Figure 7D), in addition to subordinated acidic to intermediate metavolcanic rocks (Santos et al., 2001). According to Santos et al. (2001), the Jacoca Formation consists of lenticular bodies of predominantly metacarbonate rocks (limestone and dolomite) interlayered with metachert (Figure 7D). The Canindé do São Francisco Complex is characterized by the dominance of amphibolites (metabasalts and metadiabases), marbles, gneisses, mica schists, quartzites, metacherts, calc-silicate rocks, graphitic phyllites, and locally, pyroclastic rocks. The Araticum Complex is composed of a metavolcano-sedimentary sequence consisting of migmatized paragneisses, biotite schists, and metagreywackes interlayered with metabasalts, marbles, graphitic schists, metamarls, calc-silicate rocks, banded iron formations, and metaultramafic rocks. The Vaza-Barris Group consists, from base to top, of the Palestina, Olhos d'Água, and Frei Paulo formations. The Palestina Formation is predominantly composed of metadiamictites, with subordinated metapelites, arcosean metarenites, and metagreywackes (Uhlein et al., 2011). The Olhos d'Água Formation consists of interlayered metacalcareous arenites, metacalcilutites, and metarhythmites (Uhlein et al., 2011). The Frei Paulo Formation is mainly composed of phyllites, rhythmically interlayered with fine-grained metarenites and metacarbonates (Figure 7E) (Santos et al., 2001). The Estância Group is structured, from base to top, by the Acauã, Lagarto, and Palmares formations. The Acauã Formation is characterized by massive or laminated dolomites and limestones with oolitic levels (Santos et al., 2001). The Lagarto Formation consists of alternations of fine-grained sandstones, argillites, and siltstones in variable proportions (Figure 7F) (Santos et al., 2001). The Palmares Formation is mainly composed of feldspathic fine-grained greywackes and conglomerates (Santos et al., 2001). According to the stratigraphic model proposed by Santos et al. (1998) and D'el-Rey Silva (1999), the Lagarto Formation corresponds to a basal sequence of a basin and can be correlated with the Frei Paulo Formation of the Vaza Barris subdomain.

Figure 7. Field photographs of the lithostratigraphic units present in the Sergipano Domain. (A) Migmatitic orthogneiss from the Itabaiana-Simão Dias Complex southwest of Itabaiana/Sergipe; (B) Poço Redondo Migmatitic Complex at its type locality; (C) Phyllites/schists of the Rio Macururé Formation in Coronel João Sá/Bahia; (D) Contact between the Ribeirópolis (metadiamictites at the base of the outcrop) and Jacoca (metacarbonate at the top of the outcrop) formations of the Miaba Group, at Fazenda Capitão in Macambira/Sergipe; (E) Alternation between phyllites and fine metarenites of the Frei Paulo Formation (Vaza Barris Group) in Mocambo/Sergipe; (F) Alternation of sandy/silty-clay layers of the Lagarto Formation (Estância Group) in Lagarto/Sergipe.

4. Geochronological compilation

4.1 Ortho-derived rocks

4.1.1 Pernambuco-Alagoas Domain

The main ages available in the literature for the ortho-derived rocks of the Pernambuco-Alagoas Terrane are compiled in Table 1. These ages have been spatially plotted in a magmatic barcode-type graph to facilitate visualization and correlation with regional geotectonic events (Figure 8). In the western Pernambuco-Alagoas Domain, the Archean unit corresponds to the Entremontes Complex (2734 ± 11 Ma) (Cruz et al., 2014), which was reworked by Paleoproterozoic and Neoproterozoic deformations. The Paleoproterozoic basement is characterized by the Fulgêncio Orthogneiss with a crystallization age of 1996 ± 8 Ma (Cruz et al., 2014) and a model age of 2.79 Ga (Nd-TDM), by the Mucunã Orthogneiss with a U-Pb zircon age of 2156 ± 11 Ma (Silva Filho et al., 2008), by the Lagoa Redonda Unit (1992 ± 27 Ma) of the Riacho Seco Complex with a model age of 3.14 Ga (Nd-TDM) (Cruz et al., 2014), and by the Serra do Caju Suite with a U-Pb zircon age of 2124 ± 4 Ma (Accioly, 2015). Garcia (2017) analyzed two samples of amphibolite from the Lagoa do Massapê Unit and obtained ages of 2020 ± 31 Ma, 2037 ± 14 Ma, and 2634 ± 48 Ma, the latter being interpreted as an Archean inheritance. It is worth mentioning that Cruz (2014) also obtained an Archean age of 2704 ± 12 Ma for the orthogneiss of the Lagoa Redonda Unit. The Serra da Taquaritinga Suite, with an age of 1521 Ma (U-Pb in zircon), marks the beginning of the Mesoproterozoic, a period that corresponds to a broad interval with few magmatic activity records in the Borborema Province. The Cariris Velhos Event is marked by the Lobo Suite with ages of 994 ± 25 Ma (Brito and Marinho, 2017) and 974 ± 8 Ma (Cruz et al., 2014), by the Rocinha Suite with an age of 956 ± 2 Ma (Cruz, 2015), by the Serra das Flores Orthogneiss with an age of 947 ± 63 Ma (Mendes and Brito, 2017), and by the Pinhões Orthogneiss with an age of 869 ± 9 Ma (Neves et al., 2015). U-Pb zircon isotopic data (LA-ICP-MS) obtained from a sample of (meta) leucogranite from the Caetés Suite provided an age of 730 ± 45 Ma (Accioly et al., 2018). The Cariris Velhos Event was followed by extensional tectonics, with the formation of sedimentary basins, such as those where the Rio Una and Inhapi Formations were deposited (Brito Neves et al., 2019). This period is also marked by intense granitogenesis during the Brasiliano Orogeny, with the emplacement of various Cryogenian and Ediacaran granitoids (Serra do Catu Suite, Altinho Orthogneiss, Itaporanga Suite, Água Branca Pluton, Águas Belas-Canindé Batholith, among others, see Table 1) with crystallization ages, defined by the U-Pb zircon method, between 632 and 587 Ma (Neves et al., 2008; Silva Filho et al., 2013; Mendes and Brito, 2017).

Table 1 – Published U-Pb zircon ages of ortho-derived rocks in the Pernambuco-Alagoas Domain.

Figure 8. Magmatic barcode graph with the ages of ortho-derived rocks in the Pernambuco-Alagoas Domain compiled from the literature.

4.1.2 Riacho do Pontal Domain

The magmatic barcode graph for the Riacho do Pontal Domain (Figure 9) presents the data in Table 2 and allows us to visualize the evolution of this domain within the context of geotectonic events. The Archean is represented by the Morro do Estreito Complex, which has two U-Pb dated samples presented in Brito Neves et al. (2015). The first sample yielded a U-Pb age (LA-ICP-MS) of 2624 ± 22 Ma in granodioritic orthogneiss, while the second U-Pb age (TIMS) was 2745 ± 59 Ma in partially migmatized pink orthogneisses. The Tonian period is represented by the Cariris Velhos Event. Its recognition is marked by magmatism of the Afeição Suite and the development of the Paulistana, Brejo Seco, Monte Orebe, and Santa Filomena plutono-volcanosedimentary complexes. The augen gneisses and porphyritic granitoids of the Afeição Suite present robust geochronological data in the literature. This suite has been the subject of U-Pb zircon studies in several works. Among them, Van Schmus et al. (1995) obtained an age of 966 ± 10 Ma using the TIMS method, and Brito Neves et al. (2015) determined a crystallization age of 942 ± 11 Ma using LA-ICP-MS. Caxito et al. (2014b) performed U-Pb dating on two samples using the LA-ICP-MS method and established crystallization ages of 1001 ± 4.5 Ma for a metagranite intruding metapelites of the Brejo Seco Complex and 966 ± 4.6 Ma for an augen gneiss. Brito Neves et al. (2015) provided a new U-Pb (LA-ICP-MS) age for an orthogneiss from the suite, determining a crystallization age of 942 ± 11 Ma. Finally, Caxito et al. (2020) presented new U-Pb (SHRIMP) geochronological data for an augen gneiss intruding mica schists of the Santa Filomena Complex, obtaining an age of 974 ± 11 Ma. Geochronological studies indicated detrital zircon grains with ages around 700 Ma (Santos et al., 2017).

Although the Tonian age for the rocks of the Afeição Suite is well-established in the literature, its evolutionary nature remains the subject of debate, with no consensus on the tectonic setting of the suite. Caxito et al. (2014b) and Santos et al. (2024) propose that the Afeição Suite was generated in a continental arc environment. However, based on compiled data, Guimarães et al. (2016) interpret the geochemical data of the Afeição Suite as indicative of magmatism related to a continental extensional environment. Amaral et al. (2023) studied orthogneiss and augen gneiss samples that had not yet been classified in terms of stratigraphy. These authors determined the U-Pb zircon ages (LA-ICP-MS) of these rocks to be 963 ± 4 Ma, 965 ± 3 Ma, and 956 ± 8 Ma, correlating them with the Afeição Suite.

The Brejo Seco Complex's Tonian crystallization age was determined in the studies by Salgado et al. (2016), through a Sm-Nd isochron in layered gabbros of the intrusion, defined as 903 ± 20 Ma. Its genesis is also debated in the literature, with initial interpretations relating the rocks of the Brejo Seco Complex to an ophiolitic complex (Marimon, 1990), later reinterpreted based on lithochemical data as a layered mafic-ultramafic intrusion related to an extensional regime (Salgado et al., 2016).

Table 2 – Published U-Pb zircon ages of ortho-derived rocks in the Riacho do Pontal Domain.

Figure 9. Magmatic barcode graph of the ortho-derived rocks in the Riacho do Pontal Domain compiled from the literature.

4.1.3 Sergipano Domain

The compilation of available geochronological data for the ortho-derived rocks of the Sergipano Domain (Table 3) enabled the creation of a magmatic barcode, where the main units marking the geotectonic cycles are distributed (Figure 10). The Archean is represented by the Itabaiana and Simão Dias domes, which correspond to the basement inliers of the Sergipano Domain. These domes consist of gneisses and migmatites, occurring in the central portion of the Vaza-Barris subdomain. An age of 2729 ± 12 Ma (U-Pb, LA-ICP-MS) was obtained by Santiago et al. (2017) when analyzing zircon from migmatitic leucosome of the Itabaiana Dome. Rosa et al. (2020) found an age of 2831 ± 6 Ma (U-Pb in zircon, SHRIMP) when analyzing a sample of melanosome in trondhjemitic migmatitic gneiss in the central part of the Itabaiana Dome.

The Paleoproterozoic units correspond to the Nicolau-Campo Grande, Jirau do Ponciano, and Arapiraca complexes. Ages of 3051 ± 13 Ma, 2838 ± 23 Ma, and 2904 ± 37 Ma (U-Pb in zircon, LA-ICP-MS) were obtained from an amphibolite sample from the Nicolau-Campo Grande Complex, dated by Lima et al. (2019). These ages are considered by the authors to represent Archean inheritance. According to the data obtained by Lima et al. (2019), the crystallization age of the protolith is Paleoproterozoic, recorded in an amphibolite sample (2054 ± 21 Ma), metarhyodacite (2061 ± 8.6 Ma and 2074 ± 7 Ma), and metarhyolite (2055 Ma). The Arapiraca Complex presents an approximate U-Pb zircon age of 2.0 Ga for mafic-ultramafic rock (Brito, 2005). Three U-Pb ages were obtained using the LA-ICP-MS method by Tesser et al. (2022) in ultra-high-temperature sapphirine diatexites from the Arapiraca Complex (2032 ± 4 Ma, 2029 ± 12 Ma, and 1957 ± 2 Ma).

The Cariris Velhos Event in the Sergipano Domain is represented by the Poço Redondo migmatites (U-Pb in zircon, SHRIMP age of 979.8 ± 3.5 Ma) obtained by Carvalho (2005) and by the Serra Negra granitoids, which correspond to the basement of the metasedimentary rocks of the Marancó subdomain (Oliveira et al., 2010). For the Serra Negra granitoids, a U-Pb zircon age (SHRIMP) of 951 ± 2 Ma was obtained (Carvalho, 2005).

The Canindé Domain is characterized by metavolcanic, metagranitoid, and gabbroic intrusive rocks. An amphibolite sample from the Novo Gosto Unit was dated by Passos et al. (2021), resulting in a U-Pb zircon age of 743 ± 3 Ma. Later works published by Passos et al. (2022) present new ages obtained by the U-Pb (LA-MC-ICP-MS) and SHRIMP methods for the igneous and metasedimentary rocks of the Canindé subdomain. Three samples of layered gabbroic intrusive rocks were dated, presenting ages of 717 ± 23 Ma, 716 ± 2 Ma, and 719 ± 2 Ma. A U-Pb age of 700 Ma was reported by Oliveira et al. (2010) for the Canindé do São

Francisco Complex. The Garrote, Curralinho/Boa Esperança suites, and the amphibolite of the Gentileza Unit were also dated (see Table 3).

The dating of a sample collected from a syntectonic leucogranitoid sheet with two micas provided a U-Pb zircon age of 611 ± 17 Ma, interpreted as the minimum sedimentation age of the Araticum Complex (Mendes and Brito, 2017). During the Brasiliano event, several granitic plutons were intruded into the Sergipano Domain, mainly in the Macururé subdomain (see Table 3).

Table 3 – Published U-Pb ages of ortho-derived rocks in the Sergipano Domain.

Figure 10 – Magmatic barcode graph with the main U-Pb ages of ortho-derived rocks in the Sergipano Domain compiled from the literature.

4.2 Sedimentary Record and Detrital Provenance

4.2.1 Pernambuco-Alagoas Domain

The ages of detrital zircons from the Cabrobó and Riacho Seco complexes published in the works of Cruz et al. (2014) were compiled for the western portion of the Pernambuco-Alagoas Domain. The samples from the Cabrobó Complex show a larger population of zircons in the range between 500 Ma and 1.0 Ga (Figure 11A), with small proportions of zircons in the ranges between Statherian-Calymmian, Orosirian, and Neoarchean. The schist and quartzite samples from the Riacho Seco Complex exhibited two main populations of detrital zircons, one in the Neoarchean and another in the Orosirian (Figure 11B). According to Cruz (2014), the maximum sedimentation ages for the quartzite and schist were 1950 Ma and 2020 Ma, respectively.

U-Pb SHRIMP ages from two quartzite samples from the Rio Una Sequence, obtained by Neves et al. (2009), and three paragneiss samples dated by Silva Filho et al. (2014) (Units 1, 2, and 3) were compiled. The data obtained from samples of units 2 and 3 indicate a maximum Neoproterozoic deposition age between 760 Ma and 600 Ma (Silva Filho et al., 2014). The data for unit 1 are more comprehensive, including a variety of ages ranging from 760 Ma to the Archean.

Figure 11. (A) Histogram of U-Pb zircon ages from the Cabrobó Complex; (B) Histogram of U-Pb zircon ages from the Riacho Seco Complex. Data compiled from Cruz et al. (2014). NP: Neoproterozoic, MP: Mesoproterozoic, PP: Paleoproterozoic, NA: Neoarchean, MA: Mesoarchean, PA: Paleoarchean, EA: Eoarchean.

The ages of detrital zircons from the metasedimentary rocks of the Rio Una Complex (Figure 12) show a main population in the Tonian (900–1000 Ma), a population in the Paleoproterozoic (1.6–2.2 Ga), some grains between 600 and 700 Ma, and a few crystals of Archean age. According to Neves et al. (2009), the youngest detrital zircon suggests a maximum deposition age of 917 Ma, while metamorphic zircons indicate a metamorphic peak between 600 Ma and 617 Ma. According to Silva Filho et al. (2014), unit 2 of the Rio Una Sequence has a maximum deposition age of around 761 ± 9 Ma (youngest detrital zircon). According to Cruz (2014), the detrital zircon ages from the metasedimentary rocks of the Rio Una Complex in the eastern portion of the Pernambuco-Alagoas Domain can be correlated with the detrital zircon ages from the metasedimentary rocks of the Cabrobó Complex in the western portion of the Pernambuco-Alagoas Domain. U-Pb zircon (SHRIMP) data compiled from a garnet-biotite gneiss sample of the Inhapi Sequence, obtained by Silva Filho et al. (2014), show a dominant population between 900 and 1000 Ma, with minor contributions from Paleoproterozoic and Archean zircons (Figure 13), indicating that the provenance of the zircons in this sequence includes igneous rocks from the Tonian basement.

Figure 12. Histogram of U-Pb zircon ages from the Rio Una Complex. Data compiled from Neves et al. (2009) and Silva Filho et al. (2014).

Figure 13. Histogram of U-Pb zircon ages from the Inhapi Sequence. Data compiled from Silva Filho et al. (2014).

4.2.2 Riacho do Pontal Domain

The detrital zircon ages for the Paulistana, Santa Filomena, Monte Orebe complexes, and the Mandacaru and Barra Bonita formations were compiled. For the Paulistana Complex, 70 detrital zircons from two samples dated by Santos et al. (2017) (Figure 14) were compiled: a mica schist (RPE-58) and a paragneiss (RPE-103). This unit shows a larger contribution of detrital zircons with Tonian ages (0.9–1.1 Ga). The geochronological data suggest that the main source area for the sediments belongs to the Cariris Velhos Event. A few zircon crystals indicated Mesoproterozoic ages (1.5–1.6 Ga).

Figure 14. Histogram with U-Pb detrital zircon ages from the Paulistana Complex. Data compiled from Santos et al. (2017).

A total of 179 detrital zircons from the Santa Filomena Complex were compiled, based on analyses performed on three samples: RPE 26, RPE 28 (Santos et al., 2017), and SRP-Xis-Jug (Brito Neves et al., 2015). The source areas for the Santa Filomena Complex correspond to three age intervals: Neoarchean rocks (2.5–2.7 Ga); rocks ranging from the Rhyacian to the Calymmian (1.5–2.2 Ga); and rocks from the Stenian to the Cryogenian (0.6–1.2 Ga) (Figures 15A and 15B). The Neoarchean zircon grains are likely sourced from adjacent basement units of the Riacho do Pontal Domain.

According to Santos et al. (2017), the metasedimentary rocks of the Paulistana and Santa Filomena complexes were deposited in a rift environment, with deposition ages around 900 Ma and between 750 and 700 Ma, respectively. The wide range of zircon ages highlights the need for further studies on this unit. However, according to Brito Neves et al. (2015), the presence of Neoproterozoic zircon populations (partially concordant), with peaks around 800–750 Ma, was critical in suggesting a Neoproterozoic age for the Santa Filomena Complex.

Figure 15. (A) Histogram with U-Pb detrital zircon ages from the Santa Filomena Complex. (B) Histogram with ages classified by lithologies of the Santa Filomena Complex. Data compiled from Caxito et al. (2016).

For the Monte Orebe Complex, data from Caxito et al. (2016) (samples FRP 009 and FRP 294) and data from Brito Neves et al. (2015) (SRP-Qx-SMO, SRP-TF-AF), totaling 170 detrital zircons, were compiled. These indicated two age peaks (Tonian and Paleoproterozoic). The obtained data reflect a sedimentary provenance with distinct ages in the Monte Orebe Complex. According to the authors, the Tonian peak can be correlated to the erosion of units related to the Cariris Velhos Event to the north, while the Paleoproterozoic peak may represent the contribution of zircons from basement rocks of the Borborema Province and/or erosion of units from the São Francisco Craton to the south (Figure 16).

Figure 16. (A) Histogram with U-Pb detrital zircon ages from the Monte Orebe Complex. (B) Histogram with ages classified by lithologies of the Monte Orebe Complex. Data compiled from Caxito et al. (2016) and Brito Neves et al. (2015).

Data from two samples of the Mandacaru Formation were compiled based on the work of Brito Neves et al. (2015): SRP-MGV-PF and SRP-Gn-33, and two samples based on the work of Caxito et al. (2016): FRP 266 and FRP 298. The samples of the Mandacaru Formation presented three different zircon populations, with the most representative showing Tonian ages (0.9–1.0 Ga). The other populations displayed Cryogenian, Paleoproterozoic, and a few records of Archean ages (Figure 17). These widely dispersed ages may reflect the presence of zircons inherited from different sources. This formation has a maximum sedimentation age of ca. 650 Ma, based on geochronological data (U-Pb in zircon) from a garnet-biotite gneiss sample (Brito Neves et al., 2015; Caxito et al., 2016). The sedimentary provenance studies (U-Pb in detrital zircon) combined with Nd isotope data (TDM age of 1.2 to 1.6 Ga and $eNd_{600\ Ma}$ between -9.2 and -0.2) obtained by Caxito et al. (2016) suggest that these ages resulted from the reworking of Proterozoic sequences in an active margin tectonic setting.

Figure 17. Histogram with U-Pb detrital zircon ages from the Mandacaru Formation. Data compiled from Brito Neves et al. (2015).

The compilation of data from the Barra Bonita Formation (Sample FRP-106) based on Caxito et al. (2016) shows ages ranging from the Statherian to the Calymmian (1.5 to 1.8 Ga). According to these authors, these ages are compatible with samples from the Una Group, which forms the cratonic cover in the northern São Francisco Craton. The obtained ages may represent the erosion of units from the Chapada Diamantina/ Espinhaço Supergroup, which developed in a Mesoproterozoic rift system within the São Francisco Craton (Oliveira et al., 2010). The histogram of the Barra Bonita Formation is dominated by Mesoproterozoic ages. However, it is worth noting that the data from Brito Neves et al. (2015) show a strong contribution of Neoproterozoic zircons with peaks at 600 Ma, 800 Ma, and 950 Ma. According to Brito Neves et al. (2015), the Barra Bonita Formation has a maximum sedimentation age of ca. 640 Ma, based on U-Pb detrital zircon geochronology from a garnet-biotite schist sample. Given the occurrence of zircons ranging from the Mesoproterozoic to the Neoproterozoic, we can affirm that the Barra Bonita Formation exhibits a zircon age distribution similar to that of the Mandacaru Formation. However, further studies are necessary to verify the possibility of correlation between the two formations.

4.2.3 Sergipano Domain

Detrital zircon ages from the Marancó, Canindé do São Francisco, and Araticum complexes, the Ribeirópolis, Frei Paulo, and Palestina formations, the Estância Group, and the Macururé Group were compiled. Data from 129 zircons from quartzites and metaconglomerates of the Marancó Complex obtained by Oliveira et al. (2015) show an age peak in the range of 0.9–1.0 Ga, with a small contribution of Paleoproterozoic zircons (Figure 18). Carvalho (2005), based on U-Pb detrital zircon ages, suggests a maximum sedimentation age of around 980 Ma.

Figure 18. Histogram with U-Pb detrital zircon ages from the Marancó Subdomain. Data compiled from Oliveira et al. (2015).

The zircons from the Canindé do São Francisco Complex show Neoproterozoic ages with a peak in the range of 0.9–1.0 Ga (Figure 19). The U-Pb detrital zircon ages (LA-MC-ICP-MS) obtained by Lima et al. (2018) from sillimanite-garnet-biotite schist and garnet-biotite paragneiss samples for the Araticum Complex show a main population in the range of 600–700 Ma and some crystals in the range of 0.9–1.0 Ga (Figure 20).

Figure 19. Histogram with U-Pb detrital zircon ages from the Canindé do São Francisco Complex. Data compiled from Oliveira et al. (2015).

Figure 20. Histogram with U-Pb detrital zircon ages from the Araticum Complex. Data compiled from Lima et al. (2018).

The detrital zircon data from four samples of metasedimentary rocks from the Novo Gosto Unit (Passos et al., 2022) were plotted on the histogram and show an age peak in the Tonian period, with a few Paleoproterozoic zircon crystals (Figure 21). U-Pb data obtained by these authors for the metasedimentary rocks of the Novo Gosto Unit suggest a maximum depositional age of 676 ± 5 Ma.

Figure 21. Histogram of U-Pb detrital zircon ages from samples of the Novo Gosto Unit. Data compiled from Passos et al. (2022).

The histogram for the Ribeirópolis Formation (Figure 22A) shows a main population of Paleoproterozoic detrital zircons and a maximum depositional age of 780 Ma. The same histogram also plots the ages of detrital zircons from the Itabaiana Formation, which has a primary zircon population of Paleoproterozoic age (2.0 to 2.2 Ga), with a few contributions from Archean zircons. The data compiled from the Frei Paulo and Palestina formations (Figure 22B) were extracted from Oliveira et al. (2015) and indicate three distinct zircon populations. The histogram shows sediment provenance with important contributions from the Paleoproterozoic and Neoproterozoic, along with some Archean zircons. The youngest zircons from the diamictites of the Palestina Formation have an average age of 672 Ma (Oliveira et al., 2015), indicating a maximum depositional age of around 670 Ma.

The histogram for the Estância Group shows a significant zircon population from the Acauã Formation (Figure 22C) in the Paleoproterozoic (2.1–2.2 Ga), and the Palmares and Lagarto formations fall within a range of approximately 0.5 to 1.0 Ga. A maximum depositional age of 570 Ma (U-Pb in detrital zircons) was obtained for the Lagarto and Palmares formations by Oliveira et al. (2015). According to these authors, this age may correlate with high-K and ultrapotassic plutons in the Pernambuco-Alagoas Domain (e.g., Ferreira et al., 1998; Mariano et al., 2009; Silva Filho et al., 2013; Van Schmus et al., 2003, 2011).

The histogram with samples from the Macururé Group (Figure 22D) presents a broad range of detrital zircon ages, with records from the Archean to the Neoproterozoic (Van Schmus et al., 2011; Oliveira et al., 2015; Neves et al., 2019). The data show a primary population between 0.9 and 1.0 Ga. A less prominent population occurs between 2.0 and 2.1 Ga. According to Neves et al. (2019), the youngest zircon crystal has a 206Pb/238U age of 939 ± 36 Ma, which is considered the maximum depositional age. Conversely, Oliveira et al. (2010), based on detrital zircon ages from a quartzite sample, suggest a maximum depositional age of around 856 Ma.

Figure 22. (A) Histograms of U-Pb detrital zircon ages from the Itabaiana and Ribeirópolis formations. (B) Histogram of U-Pb detrital zircon ages from the Frei Paulo and Palestina formations. (C) Histograms of U-Pb detrital zircon ages from the Palmares, Acauã, and Lagarto formations. (D) Histograms of U-Pb detrital zircon ages from the Rio Macururé Formation. Data compiled from Oliveira et al. (2015), Van Schmus (2011), and Neves et al. (2019).

5. Discussion

5.1 Tectonic evolution of the Southern Borborema Province

The tectonic framework of the Southern Borborema Province is represented by a Paleoproterozoic basement and a superimposition of tectonic, sedimentary, magmatic, and metamorphic events from the Cariris Velhos Cycle (~1.0 Ga–900 Ma) (Brito Neves, 1995) and the Brasiliano Cycle (650–530 Ma) (Pereira et al., 2023). Extensional processes formed a complex paleogeographic scenario of continental crusts (continents/plates, microplates, microcontinents, terranes), transitional zones (rift systems, aulacogens, gulfs), and oceanic domains (large and small basins).

The peak of granitoid magmatism associated with the closure of oceans and the formation of magmatic arcs in the province occurred around 630 Ma (Caxito and Alkmim, 2023), accompanied by the formation of foreland basins with flysch-type sedimentation. This was followed by a period of lateral escape tectonics between 590 and 530 Ma (Caxito et al., 2016), which shaped the current structure of the province, culminating in extensional collapse. The southern part of the Borborema Province consists of Archean and Paleoproterozoic fragments, Neoproterozoic metavolcano-sedimentary sequences, and several generations of Tonian and Brasiliano granitic intrusions.

5.1.1 Archean and Paleoproterozoic cores

The Archean and Paleoproterozoic fragments, remnants of Rodinia, occur within the Brasiliano orogenic systems as plates/microcontinents/blocks, such as the Pernambuco-Alagoas Domain, or as structural and erosional windows (inliers), among other types of basement highs. Exposures of this basement in the Brasiliano belts demonstrate the predominance of Paleoproterozoic lithostructural units. These Archean and Paleoproterozoic cores, involved in Neoproterozoic deformation, are represented by the Entremontes and Riacho Seco complexes (Pernambuco-Alagoas Domain), the Morro de Estreito Complex (Riacho do Pontal Domain), and the Itabaiana-Simão Dias, Jirau do Ponciano, Nicolau-Campo Grande, and Arapiraca complexes (Sergipano Domain).

5.1.2 Mesoproterozoic supracrustal sequences and metaplutonic rocks

The metasedimentary and metavolcano-sedimentary sequences are primarily represented by the Cabrobó Complex (Western Pernambuco-Alagoas) and the Rio Una Complex (Eastern Pernambuco-Alagoas). According to the detrital zircon histogram, the Cabrobó Complex presents three main zircon populations (600–700 Ma, 0.9–1.0 Ga, and 1.6–1.7 Ga). The Rio Una Complex displays two main populations: 1.6–1.8 Ga and 2.0–2.2 Ga. This broad dispersion of detrital zircon ages indicates the availability of multiple source areas for the basin's sediments, including basement rocks, which suggests an intracratonic basin environment, rather than a positioning on an active continental margin. According to Cruz (2014), these complexes can be correlated, as they show very similar detrital zircon age patterns. These data suggest that the rifting that led to the formation of the "Cabrobó Basin" may be related to the breakup of the Rodinia supercontinent, with deposition continuing into the Ediacaran (the youngest detrital zircon age being 554 Ma).

5.1.3 Tonian metavolcano-sedimentary sequences and metaplutonic rocks

These sequences are represented by the migmatitic gneisses and metavolcano-sedimentary sequences of the Poço Redondo-Marancó region, interpreted as a continental arc formed during the collision between the Pernambuco-Alagoas Block and the Northern Borborema Block (Caxito et al., 2014), in the orogenesis known as Cariris Velhos (~1000–900 Ma). However, Guimarães et al. (2016) interpret these rocks as having formed in extensional environments due to the geochemical signature of A-type granites. In the Pernambuco-Alagoas Domain, the Cariris Velhos Event is represented by the Abaré Complex, Belém do São Francisco Complex, and the Tonian granites of the Lobo, Rocinha, and Serra das Flores suites. In the Sergipano Domain, the Cariris Velhos Event is represented by the Poço Redondo Migmatitic Complex and the Serra Negra Suite. In the Riacho do Pontal Domain, an extensional event from 900 Ma led to crustal rifting, which evolved into an ocean. This rifting allowed for the deposition of the Tonian supracrustal sequences of the Paulistana Complex, the mafic-ultramafic intrusions of the Brejo Seco Complex, and metabasalts with ocean crust signature of the Monte Orebe Complex. Associated with these sequences are the sediments of the Mandacaru Formation (TDM between 1.2 and 1.6 Ga, deep marine environment) and the Barra Bonita Formation (shallow marine environment) (Caxito et al., 2016).

5.1.4 Brasiliano supracrustal sequences and metaplutonic rocks

In the Sergipano Domain, extensional tectonics enabled the intrusion of A-type granitoids from the Garrote Suite in the Canindé Complex and passive margin sedimentation of the Vaza Barris and Macururé groups. Various models have been proposed to explain the origin and evolution of the Canindé Subdomain due to its complex lithostratigraphy and inconsistencies between geochemical and isotopic data from different authors. The first model was proposed by Silva Filho et al. (1979), who considered the ultramafic rocks in the region to be part of an ophiolitic suite. Bezerra (1992) suggested that the Canindé Domain formed in either an anorogenic intracontinental or a syn-orogenic arc setting. Nascimento et al. (2005) proposed that this domain corresponds to an intracontinental rift sequence, while Passos et al. (2021) interpreted it as an arc-back-arc environment. Despite the lack of consensus, the most accepted theory considers these rocks to be associated with an extensional setting (Oliveira et al., 2010).

According to Carvalho (2005), the Brasiliano Orogeny began with the closure of the forearc basin in the Macururé Subdomain (south of the Poço Redondo-Marancó Subdomain) and the Canindé Subdomain basin, forming a new continental margin arc, followed by the accretion of the Marancó-Poço Redondo Subdomain to the northern margin of the São Francisco Craton, and the formation of major shear zones in the Sergipano orogen. This collisional event deformed the platform sediments and gave rise to the Sergipano Domain. Passos et al. (2021) obtained a U-Pb zircon age of 743 ± 3 Ma from an amphibolite sample in the Novo Gosto Unit of the Canindé Subdomain. This sample has a geochemical signature of arc-back-arc volcanic rocks and may be interpreted as the beginning of the collision that formed the Sergipano orogen. Between 590 and 550 Ma, lateral strike-slip tectonics predominated in an intracontinental setting, with the emplacement of late- to post-tectonic granites such as the Águas Belas-Canindé Batholith in the Pernambuco-Alagoas Domain, and the Serra da Esperança Suite, Serra da Aldeia Suite, and Caboclo Suite in the Riacho do Pontal Domain.

6. Final Considerations

This study provides a synthesis of the lithostratigraphic units that comprise the Southern Borborema Province and a compilation of geochronological data from recent studies published by the Geological Survey of Brazil (SGB-CPRM) and other sources in the literature. This compilation aims to facilitate the understanding of the tectonic evolution of the southern segment of the Borborema Province. The provenance study of detrital zircons, with recalculated ages for discordances below 10%, allowed for a reassessment of the data and a reevaluation of the geological context of each unit.

The intrusive bodies represented in the magmatic barcode diagrams help infer that granitoid magmatism in the three domains predominantly occurred during specific periods. The Pernambuco-Alagoas Domain features a diversity of orthogneisses that mark the Paleoproterozoic Orogeny (ages ranging from 2156 ± 11 to 1987 ± 8 Ma), some orthogneisses marking the Cariris Velhos Event (ages ranging from 1008 ± 3 to 947 ± 63 Ma), and granitoid plutons representing the Brasiliano Orogeny (ages ranging from 657 ± 3 to 552 ± 1.6 Ma). In the Riacho do Pontal Domain, most of the compiled data represent the Cariris Velhos Event (ages ranging from 1002 ± 5 to 942 ± 11 Ma) and the Brasiliano Orogeny (ages between 636 ± 15 and 555 ± 20 Ma). In the Sergipano Domain, some bodies represent Cariris Velhos magmatism, but the majority of the compiled data corresponds to granitoid plutons marking the Brasiliano Orogeny (ages ranging from 643 ± 2 to 588 ± 5 Ma). The presented data support the hypothesis of diachronic evolution between the three domains of the Southern Borborema Province. In general, based on the compiled data, the geological profiles, histograms, and magmatic barcode diagrams, we interpret the evolution of the Southern Borborema Province as a succession of multiple collision and extension episodes that began with the rifting of the Rodinia supercontinent. The Brasiliano Event reworked previous structures, generating crustal reactivations along structural discontinuities. The Pernambuco-Alagoas Domain represents a complex geotectonic unit formed by the accretion of lithologies of different ages, ranging from the Archean to the Neoproterozoic, which were involved in Brasiliano deformation. The Riacho do Pontal and Sergipano domains are part of a large fold system formed by the collision between the Pernambuco-Alagoas Domain and the São Francisco Craton. The ages of syn-collisional granites allow us to infer that the orogenic event that gave rise to these fold belts occurred within closely spaced time intervals, showing slight diachronism.

It is worth highlighting that the Southern Borborema Province requires further studies and new data in isotopic geology, geochronology, geochemistry, and structural geology for a better understanding of the processes involved in the formation of its constituent domains, their spatio-temporal relationships, and their implications for the evolution of the Gondwana Supercontinent.

Acknowledgements

The authors would like to thank the Geological Survey of Brazil - CPRM for carrying out the Geology and Mineral Potential Project of the Borborema Province and for authorizing the dissemination of the data acquired during this project and presented in this study. We also thank the Editor-in-Chief of the Journal of the Geological Survey of Brazil, Evandro Klein, and all the reviewers who contributed to the publication of this work. The ChatGPT Large Language Model was used for translation.

Authorship credits

Author	A	B	C	D	E	F
JSS	■	■	■	■	■	■
RAS		■	■	■	■	
BECF	■	■	■	■	■	■
FGS	■	■		■	■	
CFB		■	■	■	■	
JARV				■	■	
VCM	■		■		■	■
TRGP				■	■	
DMFM				■	■	■
				■	■	■

A - Study design/ Conceptualization **B** - Investigation/ Data acquisition
C - Data Interpretation/ Validation **D** - Writing
E - Review/Editing **F** - Supervision/Project administration

References

Accioly A. C. A. 2015. Geologia e recursos minerais da folha Pesqueira SC-24-X-B-II: estados de Pernambuco e Paraíba. Recife, CPRM, 154 p. Available online at: https://rigeo.cprm.gov.br/handle/doc/22143 / (accessed on 19 July 2023).

Accioly A. C. A., Morais D.M.F. 2018. Geologia e recursos minerais da folha Buíque SC-24-X-B-IV: estados de Pernambuco e Alagoas. Recife, CPRM, 122 p. Available on line at: https://rigeo.cprm.gov.br/handle/doc/18431 / (accessed on 19 July 2023).

Almeida F. D. 1981. O Cráton do Paramirim e suas relações com o do São Francisco. In: Simpósio sobre o Cráton do São Francisco e suas Faixas Marginais, 1, 1-10.

Almeida F. F. M. D. 1977. O Cráton do São Francisco. Revista Brasileira de Geociências, 7, 4, 349–364.

Amaral W. S. 2023. A complex history of extension, subduction and collision in west Gondwana: Clues from the Riacho do Pontal orogen, Borborema Province (NE Brazil). Journal of South American Earth Sciences, 125, 104-297. https://doi.org/10.1016/j.jsames.2023.104297

Amorim J. L. 1995. Arapiraca: folha SC.24-X-D-V: Estado de Alagoas. Brasília, CPRM, 80 p. Available online at: http://rigeo.sgb.gov.br/jspui/handle/doc/8738 / (accessed on 19 July 2023).

Angelim L. A. A., Vasconselos A. M., Gomes J. R. C., Wanderley A. A., Forgiarini L. L., Medeiros M. F. 2004. Folha SB-24-Jaguaribe. In: Schobbenhaus C., Gonçalves J. H., Santos J. O. S., Abram M. B., Leão Neto R., Matos G. M. M., Vidotti R. M., Ramos M. A. B., Jesus J. D. A. (ed.). Carta Geológica do Brasil ao Milionésimo, Sistemas de Informações Geográficas - SIG. Brasília, CPRM. CD-ROM.

Angelim L. A. A. 1988. Santa Filomena, Folha SC-24-V-A-III: estados de Pernambuco e Piauí. Escala 1:100.000. Brasília, CPRM, 146 p. Available online at: http://rigeo.sgb.gov.br/jspui/handle/doc/8061 / (accessed on 14 July 2023).

Bezerra, F.H.R., 1992. Geologia e evolução petrológica do Complexo Gabbróico Canindé do São Francisco e rochas adjacentes (Sergipe e Alagoas). Brasília, 220p. Universidade de Brasília.

Brasilino R. G., Miranda A. W. A. 2017. Geologia e recursos minerais da folha Santa Cruz do Capibaribe SB.24-Z-D-VI: estados da Paraíba e Pernambuco. Programa Geologia do Brasil, Recife, CPRM, 140 p. Available on line at: http://rigeo.sgb.gov.br/jspui/handle/doc/17663 / (accessed on 17 July 2023).

Brito M. F. L. 2005. Evolução petrológica do complexo granítico neoproterozoico Serra do Catú, Terreno Pernambuco-Alagoas. PhD Thesis, Centro de Tecnologia e Geociências, Universidade Federal de Pernambuco, Recife, 349 p. Available on line at: https://repositorio.ufpe.br/handle/123456789/33748 / (accessed on 19 July 2023).

Brito M. F. L., Freitas S. 2011. Caracterização petrológica e geotectônica do ortognaisse lobo no domínio Pernambuco-Alagoas, Província Borborema, Nordeste do Brasil. In: Congresso Brasileiro de Geoquímica, 8, 796-799. Available on line at: https://rigeo.sgb.gov.br/handle/doc/998 / (accessed on 19 July 2023).

Brito M. F. L., Marinho M. S. 2017. Geologia e recursos minerais da folha Salgueiro SC.24-X-B-III: estado de Pernambuco. Recife, CPRM, 207 p. Available online at: https://rigeo.sgb.gov.br/handle/doc/17660 / (accessed on 13 July 2023).

Brito M. F. L., Mendes V. A., Paiva I. P. 2008. Metagranitóide Serra das Flores: magmatismo toniano (tipo-A) no domínio Pernambuco-Alagoas, Nordeste do Brasil. [s.l: s.n.]. Available online at: http://rigeo.sgb.gov.br/jspui/handle/doc/816 / (accessed on 19 July 2023).

Brito Neves B. B., Schmus W. R. V., Angelim L. A. A. 2015. Contribuição ao conhecimento da evolução geológica do Sistema Riacho do Pontal – PE, BA, PI. Geologia USP - Série Científica, 15, 1, 57-93.

Brito Neves B. B. 1975. Regionalização geotectônica do Precambriano nordestino. PhD Thesis, Instituto de Geociências, Universidade de São Paulo, São Paulo, 198 p. https://doi.org/10.11606/T.44.1975.tde-21062013-104857.

Brito Neves B. B., Silva Filho A. F. 2019. Superterreno Pernambuco-Alagoas (PEAL) na Província Borborema: ensaio de regionalização tectônica. Geologia USP - Série Científica, 19, 2, 3-28.

Bueno J. F., Souza, J. J., Araujo, M. N. C., Oliveira, E. P. 2009. Evolução tectono-cronológica da estrutura de interferência de Nossa Senhora de Lourdes, Faixa Sergipana, NE-Brasil. Revista Brasileira de Geociencias, 39, 4, 608-623.

Caldasso A. L. et al. 1973. Projeto Sudeste do Piauí II: relatório final integrado: parte das folhas São João do Piauí-SC.23-X-B, Paulistana-SC.24-V-A. [s.l.] CPRM, 1973. Available online at: http://rigeo.sgb.gov.br/jspui/handle/doc/5421 / (accessed on 20 July 2023).

Carmona L. C. M. 2002. Geologia, geoquímica e avaliação econômica do migmatito “Rosa Imperial”, domínio meridional da Província Borborema, nordeste brasileiro. PhD Thesis, Centro de Tecnologia e Geociências, Universidade Federal de Pernambuco, Recife, 202 p. Available on line at: https://repositorio.ufpe.br/handle/123456789/6710 / (accessed on 19 July 2023).

Carvalho M. J. D. 2005. Evolução Tectônica do Domínio Marancó- Poço Redondo: Registro das Orogêneses Cariris Velhos e Brasiliana na Faixa Sergipana, NE do Brasil. PhD Thesis, Instituto de Geociências, Universidade Estadual de Campinas, Campinas, 202 p. Available on line at: https://core.ac.uk/download/pdf/296841231.pdf / (accessed on 19 July 2023).

Caxito F. A., Santos L. C. M. L., Ganade C. E., Bendaoud A., Fettous E.-H., Bouyo M. H. 2020a. Toward an integrated model of geological evolution for NE Brazil–NW Africa: The Borborema Province and its connections to the Trans-Saharan (Benino-Nigerian and Tuareg shields) and Central African orogens. Brazilian Journal of Geology, 50, e20190122.

Caxito F. A., Santos L. C. M. L., Uhlein A., Dantas E. L., Alkmim A. R., Lana C. 2020b. New U-Pb (SHRIMP) and first Hf isotope constraints on the Tonian (1000–920 Ma) Cariris Velhos event, Borborema Province. NE Brazil. Brazilian Journal of Geology, 50, e20190082.

Caxito F. A. 2013. Geotectônica e evolução crustal das faixas Rio Preto e Riacho do Pontal, estados da Bahia, Pernambuco e Piauí. PhD Thesis, Instituto de Geociências, Universidade Federal de Minas Gerais, Belo Horizonte, 288 p. Available on line at: http://hdl.handle.net/1843/IGCC-9DTEB9 / (accessed on 19 July 2023).

Caxito F. A., Uhlein A., Dantas E. L., Stevenson R., Salgado S. S., Dussin I.A., Sial A. N. 2016. A complete Wilson Cycle recorded within the Riacho do Pontal Orogen, NE Brazil: implications for the Neoproterozoic evolution of the Borborema Province at the heart of West Gondwana. Precambrian Research, 282, 97-120.

Caxito F. A. et al. 2020a. Toward an integrated model of geological evolution for NE Brazil-NW Africa: The Borborema Province and its connections to the Trans-Saharan (Benino-Nigerian and Tuareg shields) and Central African orogens. Brazilian Journal of Geology, 50, 2, e20190122.

Caxito F. A., Uhlein A. 2013. Arcabouço Tectônico E Estratigráfico Da Faixa Riacho Do Pontal, Divisa Pernambuco-Piaui-Bahia. Geonomos, 21, 2, 19-37.

Caxito F. A., Uhlein A., Dantas E. L. 2014. The Afeição augen-gneiss Suite and the record of the Cariris Velhos Orogeny (1000–960 Ma) within the Riacho do Pontal fold belt, NE Brazil. Journal of South American Earth Sciences, 51, 12-27.

Caxito F. A., Uhlein A., Stevenson R., Uhlein G. J. 2014b. Neoproterozoic oceanic crust remnants in northeast Brazil. Geology 42, 387-390.

Caxito, F.d., Alkmim, F.F. The role of V-shaped oceans and ribbon continents in the Brasiliano/PanAfrican assembly of western Gondwana. *Sci Rep* **13**, 1568 (2023). https://doi.org/10.1038/s41598-023-28717-7

Cruz R. F., Pimentel M. M., Accioly A. C. A., Rodrigues J. B. 2014. Geological and isotopic characteristics of granites from the Western Pernambuco-Alagoas Domain: implications for the crustal evolution of the Neoproterozoic Borborema Province. Brazilian Journal of Geology, 44, 4, 627-652.

Cruz R. F. 2015. Geologia e recursos minerais da Folha Parnamirim: estado de Pernambuco. Recife, CPRM, 145 p. Available online at: http://rigeo.sgb.gov.br/jspui/handle/doc/15951 / (accessed on 18 July 2023).

Cruz R. F., Pimentel M. M., Accioly A. C. A. 2014. Provenance of metasedimentary rocks of the Western Pernambuco-Alagoas Domain: Contribution to understand the crustal evolution of southern Borborema Province. Journal of South American Earth Sciences, 56, 54-67.

Cruz R., Accioly A. 2013. Petrografia, geoquímica e idade U/Pb do Ortognaisse Rocinha, no Domínio Pernambuco-Alagoas W da Província Borborema. Estudos Geológicos, 23, 2, 3-27.

D’Agrella-Filho M. S., Cordani U. G. 2017. The Paleomagnetic Record of the São Francisco-Congo Craton. In: Heilbron M., Cordani U. G., Alkmim F. F. (ed.). São Francisco Craton, Eastern Brazil: Tectonic Genealogy of a Miniature Continent. Regional Geology Reviews. Cham: Springer International Publishing. p. 305–320.

Davison I., Santos R. A. 1989. Tectonic evolution of the Sergipano Fold

Belt, NE Brazil, during the Brasiliano orogeny. Precambrian Research, 45, 4, 319-342.
D'el-Rey Silva L. J. H. 1995. Tectonic evolution of the Sergipano Belt, northeastern Brazil. Revista Brasileira de Geociências, 25, 315-332.
D'el-Rey Silva L. J. H., Dantas E. L., Teixeira, J. B. G., Laux J. H., Silva M. G. 2007. U–Pb and Sm–Nd geochronology of amphibolites from the Curaçá Belt, São Francisco Craton, Brazil: Tectonic implications, Gondwana Research, 12, 4, 454-467. https://doi.org/10.1016/j.gr.2006.11.008.
D'el-Rey Silva L. J. H., Mcclay K. 1995. Stratigraphy of the southern part of the Sergipano Belt, NE Brazil: Tectonic Implications. Revista Brasileira de Geociências, 25, 3, 185-202.
D'el-Rey Silva, L. J. H. 1999. Basin infilling in the southern-central part of the Sergipano Belt, NE Brazil, and implications for the tectonic evolution of the Pan-African/Brasiliano cratons and Neoproterozoic sedimentary cover. Journal of South American Earth Sciences, 12, 5, 453-470.
Delgado I.M., Souza J.D., Silva L.C., Silveira Filho N.C., Santos R.A., Pedreira A.J., Guimarães J.T., Angelim L.A.A., Vasconcelos A.M., Gomes I.P., Lacerda Filho J.V., Valente C.R., Perrotta M.M., Heineck C.A. 2003. Geotectônica do Escudo atlântico. In: Bizzi L.A.,Schobbenhaus C., Vidotti R.M., Gonçalves J.H. Geologia, tectônica
e recursos minerais do Brasil: texto, mapas e SIG. Brasília, CPRM,p. 227-334. Available online at: https://rigeo.cprm.gov.br/handle/ doc/5006 / (accessed on 26 January 2023).
Dominguez J. M. L. 1993. As coberturas do Cráton do São Francisco: uma abordagem do ponto de vista da análise de bacias. In: Misi A. O Cráton do São Francisco. Salvador, SBG, p. 137-159.
Figueirôa I., Silva Filho M. A. 1990. Petrolina, folha SC.24-V-C-III: estados de Pernambuco e Bahia. Brasília, CPRM, 108 p. Available online at: http://rigeo.sgb.gov.br/jspui/handle/doc/8397 / (accessed on 18 July 2023).
Gava A., Nascimento D. A., Vidal J. L. B. et al. 1983. Geologia. In: Projeto RADAMBRASIL. Folha SC-24/25, Aracaju / Recife. Rio de Janeiro, DNPM. p. 27-376.
Gehrels, G.: Detrital zircon U-Pb geochronology: Current methods and new opportunities, in: Tectonics of sedimentary basins: Recent advances, edited by: Busby, C. and Azor, A., Wiley Online Library, Chap. 2, 45–62, 2011.
Guimarães I.P., Brito M.F.L., Lages G.A., Silva Filho A.F., Santos L., Brasilino R.G. 2016. Tonian granitic magmatism of the Borborema Province, NE Brazil: A review. Journal of South American Earth Sciences, **68**:97-112. https://doi.org/10.1016/j.jsames.2015.10.009
Guimarães S. B. 2015. Metalogenia das províncias minerais do Brasil: área sudeste do Tapajós, Estado do Pará. Brasília, CPRM, 61 p. Available online at: http://rigeo.cprm.gov.br/jspui/handle/doc/16601 / (accessed on 19 July 2023).
Guimarães I. P., Van Schmus W. R., Brito Neves B. B., Bittar S. M. B., Silva Filho A. F., Armstrong R. 2012. U–Pb zircon ages of orthogneisses and supracrustal rocks of the Cariris Velhos belt: Onset of Neoproterozoic rifting in the Borborema Province, NE Brazil. Precambrian Research, 192-195, 52-77.
Guimarães I. P., Brito M. F. L., Pimentel M. M. 1997. Geochemical signatures of the main Neoproterozoic late-tectonic granitoids from the Proterozoic Sergipano fold belt, Brazil: significance for the Brasiliano orogeny. International Geology Review, 39, 639-659.
Lima H. M., Pimentel M. M., Santos L. C. M. L., Dantas E. L. 2019. Isotopic and geochemical characterization of the metavolcano-sedimentary rocks of the Jirau do Ponciano Dome: A structural window to a Paleoproterozoic continental arc root within the Southern Borborema Province, Northeast Brazil, Journal of South American Earth Sciences, 90, 54-69. https://doi.org/10.1016/j.jsames.2018.12.002.
Lima, H.M., Pimentel, M.M., Fuck, R.A., Santos, L.C.M.L., Dantas, E.L., 2018. Geochemical and detrital zircon geochronological investigation of the metavolcanosedimentary Araticum complex, Sergipano Fold Belt: Implications for the evolution of the Borborema Province, NE Brazil. Journal of South American Earth Sciences 86, 176–192. https://doi.org/10.1016/J.JSAMES.2018.06.013] para o Complexo Araticum.
Long L. E., Castellana C. H., Sial A. N. 2005. Age, Origin and Cooling History of the Coronel João Sá Pluton, Bahia, Brazil. Journal of Petrology, 46, 2, 255-273.
Ludwig, K., 2009. User's Manual for Isoplot 3.70. Berkeley Geochronology Center, Berkeley.
Marimon M. P. C. 1990. Petrologia e litogeoquímica da seqüência plutono-vulcanossedimentar de Brejo Seco, Município de São João do Piauí. MSc Dissertation, Instituto de Geociências, Universidade Federal da Bahia, Salvador, 102 p. Unpublished.
Medeiros V. C. 2000. Aracaju NE: Sc.24-x, estados da Paraíba, Pernambuco, Alagoas, Sergipe e Bahia. Brasília, CPRM. CD-ROM.
Medeiros V. C., Cavalcante R., Santos F. G., Rodrigues J. B., Santana J. S., Costa A. P., Cabral Neto, I. 2021.The Rio Piranhas-Seridó Domain, Borborema Province, Northeastern Brazil: Review of geological-geochronological data and implications for stratigraphy and crustal evolution. Journal of the Geological Survey of Brazil, 4, 3, 179-207. 10.29396/jgsb.2021.v4.n3.1.
Melo R. C. 2019. Projeto Uauá - Monte Santo: geologia e recursos minerais das folhas Pinhões - SC.24-V-D-V, Uauá - SC.24-V-D-VI, Monte Santo - SC.24-Y-B-III e Andorinha - SC.24-Y-B-II, estado da Bahia. Salvador, CPRM, 44 p. Available online at: http://rigeo.sgb.gov.br/jspui/handle/doc/21414. / (accessed on 18 July 2023).
Melo, R.C.; Cruz Filho, B.E.; Santos Sobrinho, V.R.; Meira, M.M.; Meireles, L.G. S.; Pinho, I.C.A. Projeto Chorrochó-Macururé: Carta Geológica Integrada. Salvador: CP R M, 2019. 1 mapa color. Escala 1:250.000. Programa Geologia, Mineração e Transformação Mineral.
Mendes V. A., Brito M. F. L. 2017. Geologia e recursos minerais da Folha Arapiraca SC.24-X-D: estado de Alagoas escala 1:250.000. Recife, CPRM, 245 p. Available online at: http://rigeo.sgb.gov.br/jspui/handle/doc/17650 / (accessed on 18 July 2023).
Nascimento R. S. 2005. Dominio Caninde, faixa sergipana, Nordeste do Brasil: um estudo geoquimico e isotopico de uma sequencia de rifte continental neoproterozoica. PhD Thesis, Instituto de Geociências, Universidade Estadual de Campinas, Campinas, 159 p. Available on line at: https://hdl.handle.net/20.500.12733/1601386 / (accessed on 19 July 2023).
Neves, S. P.; Silva, J. M. R.; Bruguier, O. The Macururé Complex (Sergipano Belt, NE Brazil) in southern Alagoas state: Geology and geochronology. Journal of the Geological Survey of Brazil, v. 2, n. 1, p. 17-25, 2019. DOI: https://doi.org/10.29396/jgsb.2019.v2.n1.2.
Neves S. P., Rangel da Silva J. M., Bruguier O. 2016. The transition zone between the Pernambuco-Alagoas Domain and the Sergipano Belt (Borborema Province, NE Brazil): Geochronological constraints on the ages of deposition, tectonic setting and metamorphism of metasedimentary rocks. Journal of South American Earth Sciences, 72, 266-278.
Neves S. P., Bruguier O., Bosch D., Silva J. M. R., Mariano G. 2008. U Pb ages of plutonic and metaplutonic rocks in southern Borborema Province (NE Brazil): Timing of Brasiliano deformation and magmatism. Journal of South American Earth Sciences, 25, 3, 285-297.
Neves S. P., Bruguier O., Silva J. M. R., Bosch D., Alcantara V. C., Lima C. M. 2009. The age distributions of detrital zircons in metasedimentary sequences in eastern Borborema Province (NE Brazil): Evidence for intracontinental sedimentation and orogenesis? Precambrian Research, 175, 1-4, 187-205.
Neves S. P. 2015. Constraints from zircon geochronology on the tectonic evolution of the Borborema Province (NE Brazil): Widespread intracontinental Neoproterozoic reworking of a Paleoproterozoic accretionary orogen. Journal of South American Earth Sciences, 58, 150-164.
Neves S. P. 2021. Comparative geological evolution of the Borborema Province and São Francisco Craton (eastern Brazil): Decratonization and crustal reworking during West Gondwana assembly and implications for paleogeographic reconstructions. Precambrian Research, 355, 106119.
Neves S. P., Mariano G., Silva J. M. R. 2012. Carta geológica: folha Caruaru, SC.25-V-A-I. Recife, CPRM. Available online at: https://rigeo.sgb.gov.br/handle/doc/18477 / (accessed on 17 July 2023).
Oliveira R. G. 1998. Arcabouço geotectônico da região da faixa Riacho do Pontal, Nordeste do Brasil: dados aeromagnéticos e gravimétricos. MSc Dissertation, Instituto de Geociências, Universidade de São Paulo, São Paulo, 157 p. https://doi.org/10.11606/D.44.1998.tde-26102015-163119.
Oliveira R. G. 2008. Arcabouço geofísico, isostasia e causas do magmatismo cenozoico da província Borborema e de sua margem continental (Nordeste do Brasil). PhD Thesis, Centro de Ciências Exatas e da Terra, Universidade Federal do Rio Grande do Norte, Natal, 415 p. Available on line at: https://repositorio.ufrn.br/handle/123456789/18344 / (accessed on 19 July 2023).
Oliveira E. P., Toteu S. F., Araújo M. N. C., Carvalho M. J., Nascimento R.

S., Bueno J. F., McNaughton N., Basilici G. 2006. Geologic correlation between the Neoproterozoic Sergipano belt (NE Brazil) and the Yaoundé belt (Cameroon, Africa). Journal of African Earth Sciences, The Precambrian of Central Africa, 44, 4, 470-478.

Oliveira E. P., Bueno J. F., McNaughton N. J., Silva Filho A. F., Nascimento R. S., Donatti-Filho J. P. 2015. Age, composition, and source of continental arc- and syn-collision granites of the Neoproterozoic Sergipano Belt, Southern Borborema Province, Brazil. Journal of South American Earth Sciences, 58, 257-280.

Oliveira E. P., Tarney J. 1990. Petrogenesis of the Canindé de São Francisco complex: A major Late Proterozoic gabbroic body in the Sergipe Foldbelt, northeastern Brazil. Journal of South American Earth Sciences, 3, 2, 125-140.

Oliveira E. P., Windley B. F., Araújo, M. N. C. 2010. The Neoproterozoic Sergipano orogenic belt, NE Brazil: A complete plate tectonic cycle in western Gondwana. Precambrian Research, 181, 64-84.

Passos L. H., Fuck R. A., Chemale Jr F., Lenz C. 2021. Pimentel M. M., Machado A., Magalhães Pinto V., Neoproterozoic (740-680 Ma) arc-back-arc magmatism in the Sergipano Belt, southern Borborema Province, Brazil, Journal of South American Earth Sciences, Volume 109, 103280, ISSN 0895-9811, https://doi.org/10.1016/j.jsames.2021.103280.

Pereira, F.S., Conceição, H., Rosa, M.L.S., Marinho, M.M., Tassinari, C.C.G., Milhomem Neto, J.M., Lafon, J.M., 2023. Late Cryogenian–Ediacaran magmatism in southern Borborema Province, NE Brazil: Ages, sources, petrogenesis, and tectonic setting. Geoscience Frontiers 14, 101626. https://doi.org/10.1016/j.gsf.2023.101626

Rosa M. L. S., Conceição J. A., Marinho M. M., Pereira F. S., Conceição H. 2020. U-Pb SHRIMP dating of the Itabaiana Dome: a Mesoarchean basement inlier (2.83 Ga) in the Sergipano Orogenic System, Borborema Province. Brazilian Journal of Geology, 50, 2, e20190106.

Sá J. M, Bertrand J. M., Leterrier J, Macedo M. H. F. 2002. Geochemistry and geochronology of pre-Brasiliano rocks from the Transversal Zone, Borborema Province, Northeast Brazil. Journal of South American Earth Sciences, 14, 8, 851-866. https://doi.org/10.1016/S0895-9811(01)00081-5.

Sá J. M., Silva E. R., Bertrand J. M., Leterrier J. 1997. Augen gneisses vs augen gneisses da faixa Jaguaribeana, NE do Brasil: estratigrafia, geoquimica e idades U-Pb. In: Simpósio de Geologia do Nordeste, 17, 113-117.

Salgado S. S., Ferreira Filho C. F., Uhlein A., Caxito F. A. 2014. Geologia, Estratigrafia e Petrografia do Complexo de Brejo Seco, Faixa Riacho do Pontal, Sudeste do Piauí. Geonomos, 22, 1, 10-21.

Santiago R. C. V., Leal A. B. M., Marinho M. M., Argollo R. M., Barbosa J. S. F., Rocha Júnior E. R. V. 2017. Litogeoquímica e Geocronologia dos Ortognaisses Migmatíticos do Domo de Itabaiana, Sergipe. Geologia USP - Série Científica, 17, 4, 81-98.

Santos E. J. 1995. O Complexo Granítico Lagoa das Pedras: acresção e colisão na região de Floresta (Pernambuco). PhD Thesis, Instituto de Geociências, Universidade de São Paulo, São Paulo, 219 p.

Santos E. J. 1999. Belém do São Francisco, Folha SC.24-X-A: carta geológica, Programa Levantamentos Geológicos Básicos do Brasil. Escala 1:250.000. Brasília, CPRM. CD-ROM.

Santos C. A., Silva Filho M. A. 1990. Riacho do Caboclo. Folha SC.24-V-A-VI, Estados de Pernambuco e Bahia, Programa Levantamentos Geológicos Básicos do Brasil. Brasília, CPRM, 113 p.

Santos E. J., Van Schmus W. R., Kozuch M., Brito Neves B. B. 2010. The Cariris Velhos tectonic event in Northeast Brazil. Journal of South American Earth Sciences, 29, 1, 61-76.

Santos C. A., Accioly A. C. A., Veiga Junior, J. P. 2015. Carta geológica: folha SC.24-X-B Garanhuns. Recife: CPRM. Available online at: https://rigeo.sgb.gov.br/handle/doc/21714 / (accessed on 19 July 2023).

Santos R. A., Martins, A. A. M., Neves J. P., Leal R. A. 2001. Geologia e recursos minerais do estado de Sergipe. Salvador, CPRM, 156 p. Available online at: http://rigeo.sgb.gov.br/jspui/handle/doc/19439 / (accessed on 19 July 2023).

Santos F., Amaral W. S., Uchôa Filho E. C., Martins D. T. 2017. Detrital zircon U–Pb ages and whole-rock geochemistry of the Neoproterozoic Paulistana and Santa Filomena complexes, Borborema Province, northeastern Brazil: implications for source area composition, provenance, and tectonic setting. International Geology Review, 59, 15, 1861-1884.

Santos F. G., Pinéo T. R. G., Medeiros V. C.,Santana J. S., Morais D. M. F., Vale J. A. R., Wanderley A. A. 2021. Mapa geológico da província Borborema: projeto geologia e potencial mineral da província Borborema. Recife, CPRM. Available online at: https://rigeo.sgb.gov.br/handle/doc/22508 / (accessed on 13 July 2023).

Sato, K.; Kawashita, K. Espectrometria de massas em geologia isotópica. Geologia USP - Série Científica, São Paulo, v. 2, p. 57-77, dez. 2002. DOI: https://doi.org/10.5327/S1519-874X2002000100007.

Silva L. C., Pedrosa-Soares A. C., Teixeira L. R., Armstrong R. 2008. Tonian rift-related, A-type continental plutonism in the Araçuaí Orogen, eastern Brazil: new evidence for the breakup stage of the São Francisco–Congo Paleocontinent. Gondwana Research, 13, 527-537.

Silva Filho M. A., Santana M. O., Bonfim L. F. O. 1978. Evolução tectono-sedimentar do Grupo Estância; suas correlações. In: Congress Brasileiro de Geologia, 30, p. 685-669.

Silva Filho A. F., Guimarães I. P., Gomes H. A., Osako L. S., Brasil E. A., Lima D. R., Cocentino L., Villaverde V. G. R., Vasconcelos, C. L. 2008. Geologia da folha Garanhuns, SC.24-X-B-VI: Sistema de Informações Geográficas - SIG. Brasília, CPRM. 67 p. Available online at: http://rigeo.sgb.gov.br/jspui/handle/doc/10459 / (accessed on 19 July 2023).

Silva Filho A. F., Guimarães I. P., Van Schmus W. R., Dantas E., Armstrong R., Concentino L., Lima D. 2013. Long-lived Neoproterozoic high-K magmatism in the Pernambuco–Alagoas Domain, Borborema Province, northeast Brazil. International Geology Review, 55, 10, 1280-1299.

Silva Filho A. F., Guimarães, I. P., Van Schmus W. R., Armstrong R. A., Rangel da Silva J. M., Osako L. S., Cocentino L. M. 2014. SHRIMP U–Pb zircon geochronology and Nd signatures of supracrustal sequences and orthogneisses constrain the Neoproterozoic evolution of the Pernambuco–Alagoas domain, southern part of Borborema Province, NE Brazil. International Journal of Earth Sciences, 103, 8, 2155-2190.

Silva Filho A. F., Guimarães I. P., Van Schmus W. R. 2002. Crustal Evolution of the Pernambuco-Alagoas Complex, Borborema Province, NE Brazil: Nd Isotopic Data from Neoproterozoic Granitoids. Gondwana Research, 5, 2, 409-422.

Siqueira Filho J. 1967. Geologia da Fôlha Jutaí, Pernambuco. Recife, SUDENE, 52 p.

Stern, R.A. 1997, The GSC sensitive high-resolution ion microprobe (SHRIMP): Analytical techniques of zircon U-Th-Pb age determinations and performance evaluation. *Geological Survey of Canada Current Research 1997-F, Radiogenic Age and Isotopic Studies*, **10:** 1–31.

Teixeira L. R., Lima, E. S., Neves J. P., Santos R. A., Santiago R. C., Melo R. C. 2014. Mapa Geológico e de Recursos Minerais do Estado de Sergipe. Escala 1:250.000. Salvador, CPRM-CODISE. CD-ROM.

Tesser, L.R., Ganade, C.E., Weinberg, R.F., Basei, M.A.S., Moraes, R., Batista, L.A., 2022. Ultrahigh□temperature Palaeoproterozoic rocks in the Neoproterozoic Borborema Province, implications for São Francisco Craton dispersion in NE Brazil. Journal Metamorphic Geology 40, 359–387. https://doi.org/10.1111/jmg.12632

Uchôa Filho E. C., Vale J. A. R., Basto C. F., Freitas M. S., Silveira D. A., Pedrosa Júnior N. C., Menezes R. G., Mota E. S. A. 2019. **Área de relevante interesse mineral - ARIM: faixas marginais da borda noroeste do Cráton do São Francisco - Área Faixa Riacho do** Pontal, estados do Piauí e Pernambuco. Teresina, CPRM, 210 p. Available online at: https://rigeo.sgb.gov.br/jspui/handle/doc/21427 / (accessed on 19 July 2023) / (accessed on 19 July 2023).

Uhlein A., Suckau G. L., Sanglard J. C. D., Caxito F. A. 2011. Estratigrafia E Evolução Sedimentar De Diamictitos E Carbonatos Neoproterozoicos No Domínio Vaza-Barris, Faixa De Dobramentos Sergipana, Nordeste Do Brasil. Geonomos, 19, 1, 1-9.

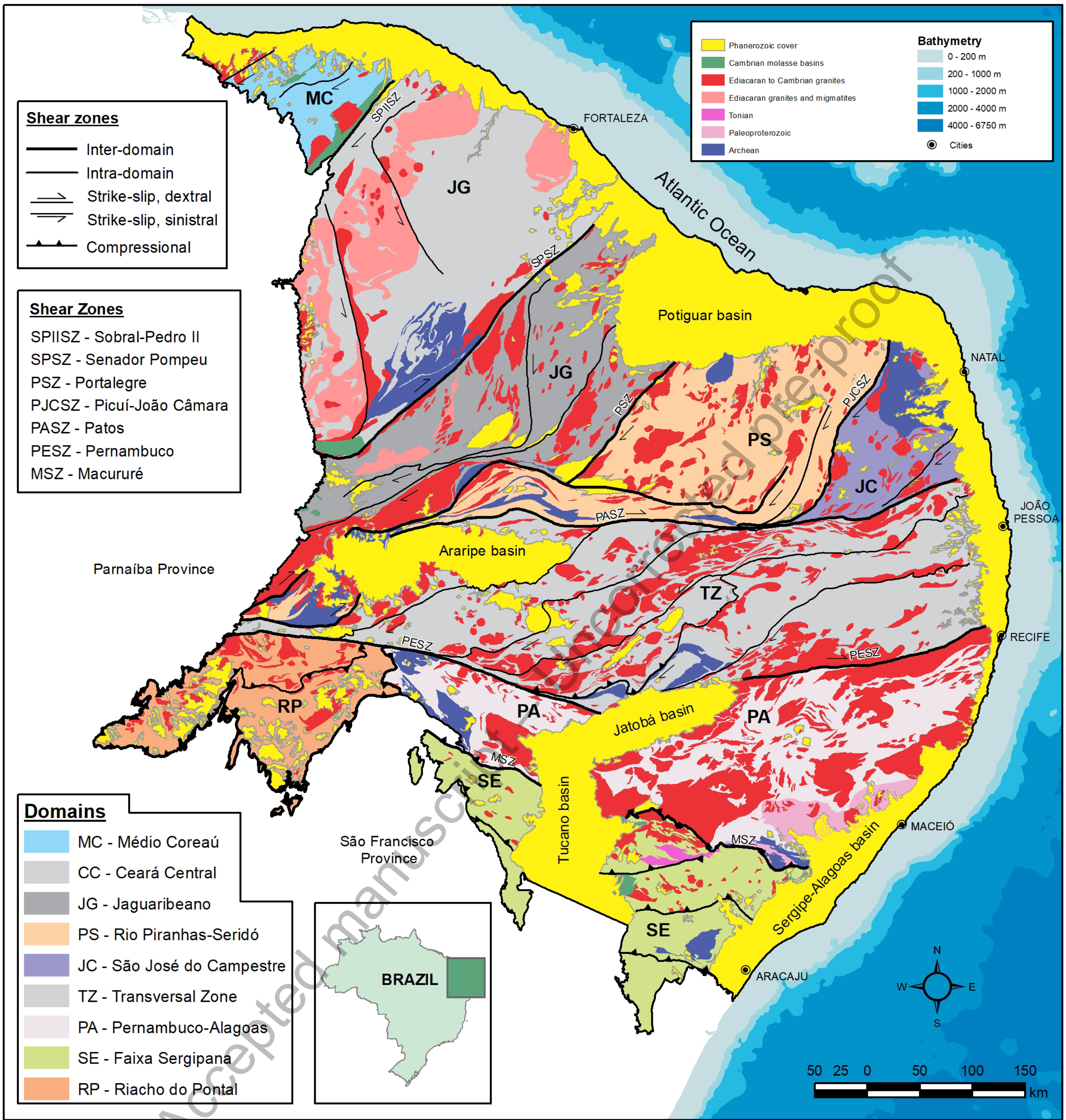


Figure 1. Geotectonic compartmentalization of the Borborema Province (Medeiros et al. 2021).

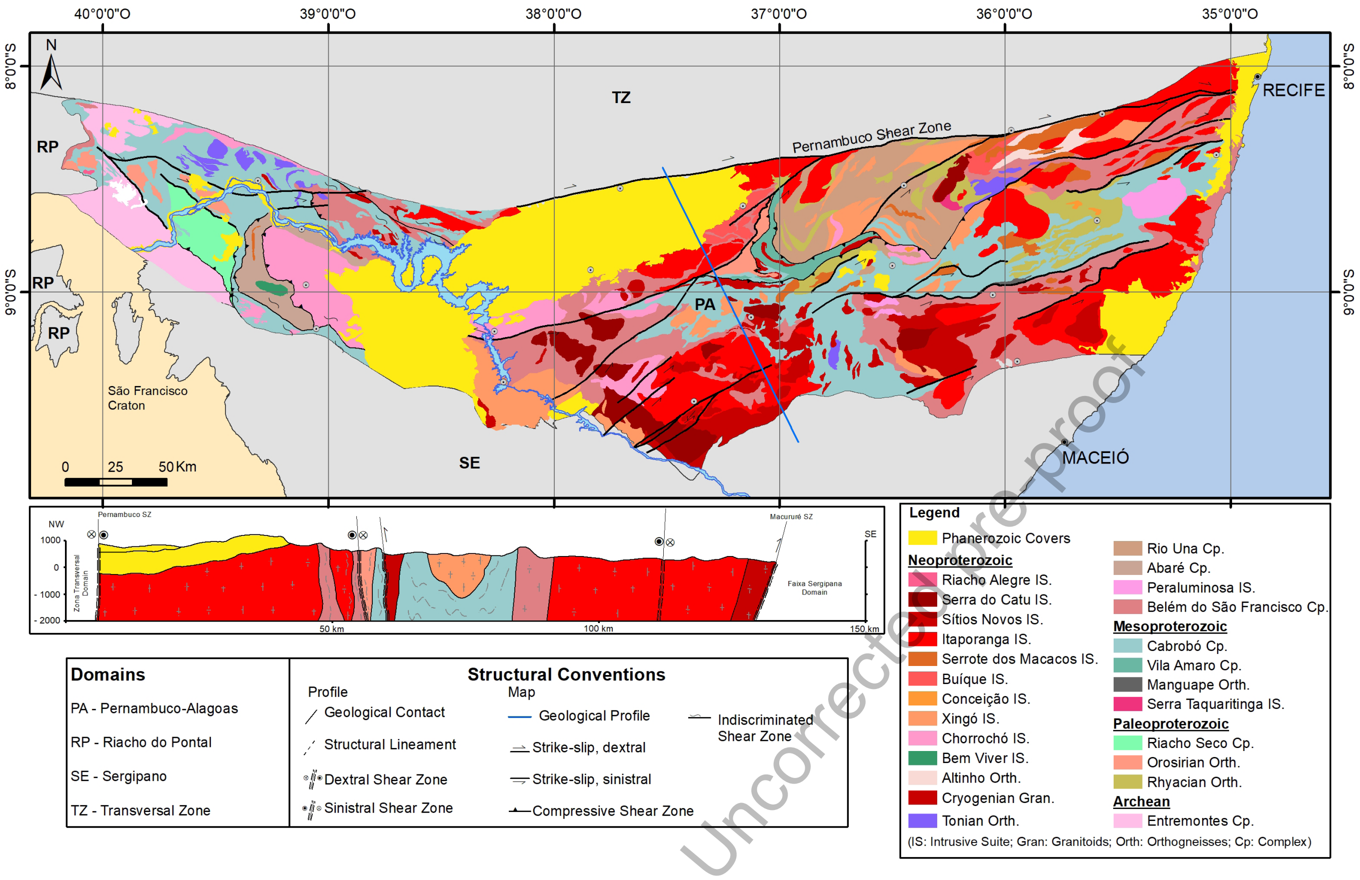


Figure 2. Lithostratigraphic units and geological profile of the Pernambuco-Alagoas Domain. Vertical exaggeration of the geological profile is 5x.

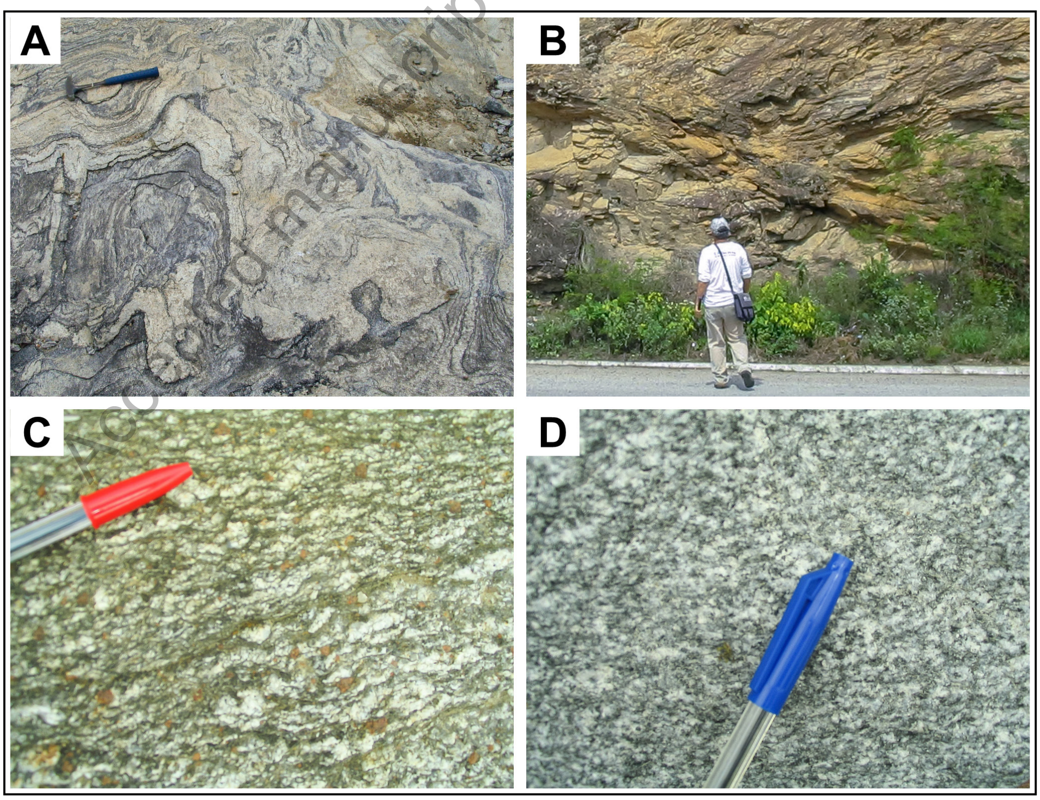


Figure 3. Field photographs of the lithostratigraphic units present in the Pernambuco-Alagoas Domain. (A) Migmatitic orthogneiss Mucunã northeast of Japecanga (Pedra/Pernambuco); (B) Quartzites of the Cabrobó Complex in the Garanhuns/Pernambuco region; (C) Paragneiss of the Rio Una Complex northeast of Japecanga (Pedra/Pernambuco); (D) Granodiorite of the Conceição Suite northeast of Garanhuns/Pernambuco.

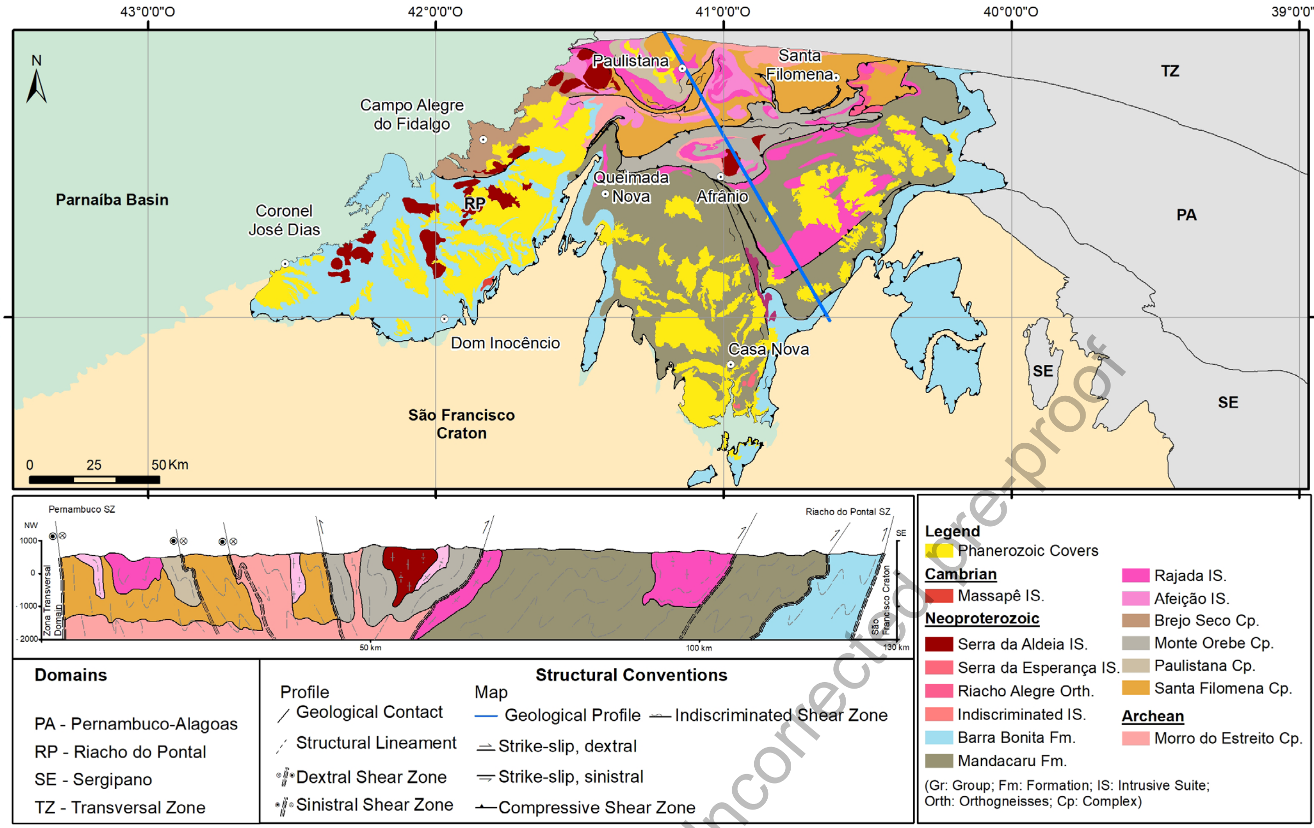


Figure 4. Lithostratigraphic units and geological profile of the Riacho do Pontal Domain. Vertical exaggeration of the geological profile: 5x.

Figure 5. Field photographs of the lithostratigraphic units present in the Riacho do Pontal Domain. (A) Migmatitic orthogneiss from the Morro do Estreito Complex; (B) Metagabbro from the Paulistana Complex; (C) Amphibolite interlayered with mica schist from the Brejo Seco Complex; (D) Amphibolite with high-angle dip from the Monte Orebe Complex; (E) Sillimanite-garnet-biotite schist from the Santa Filomena Complex; (F) Biotite schist from the Casa Nova Group.

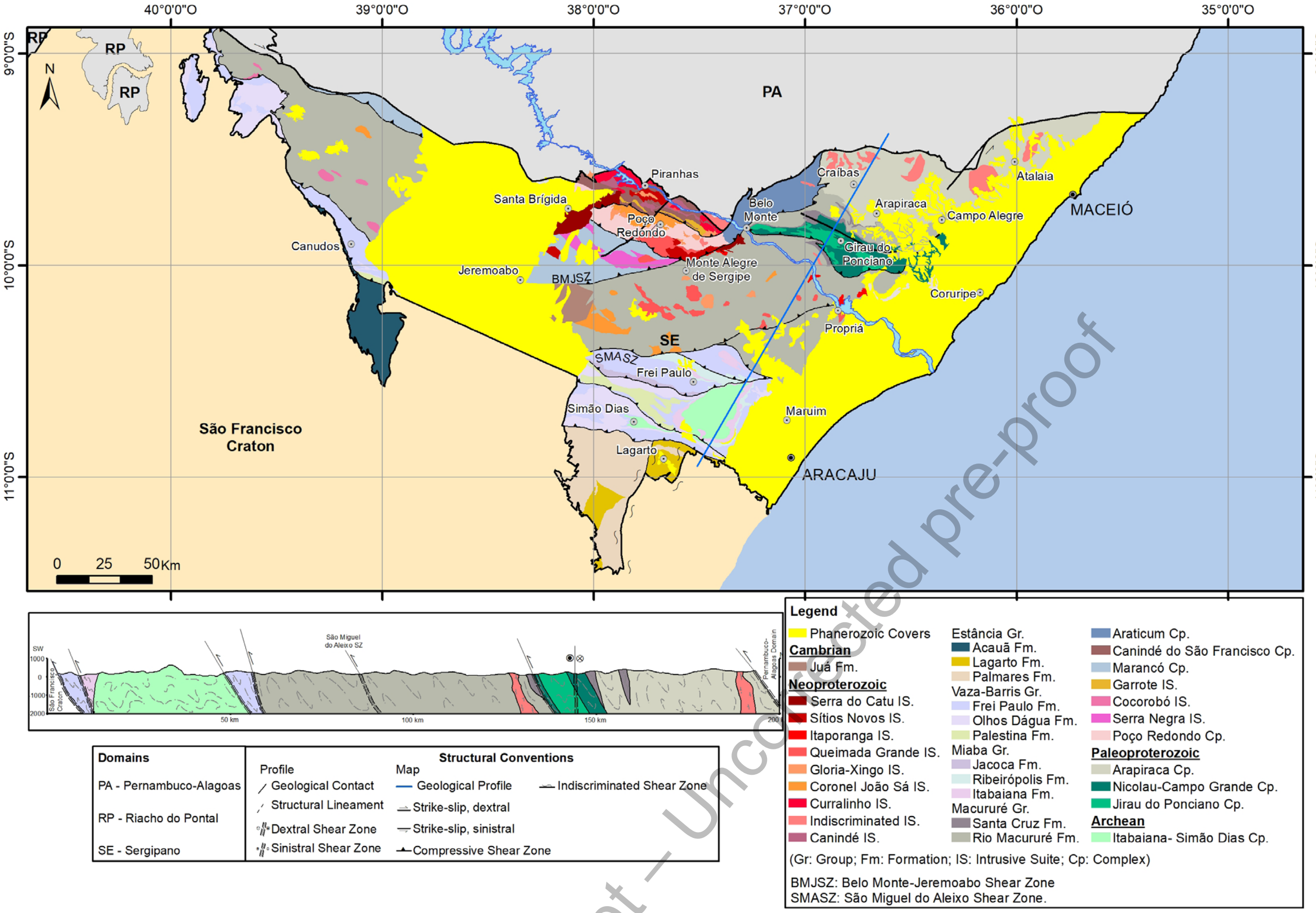


Figure 6. Lithostratigraphic units and geological profile of the Sergipano Domain. Vertical exaggeration of the geological profile: 5x.

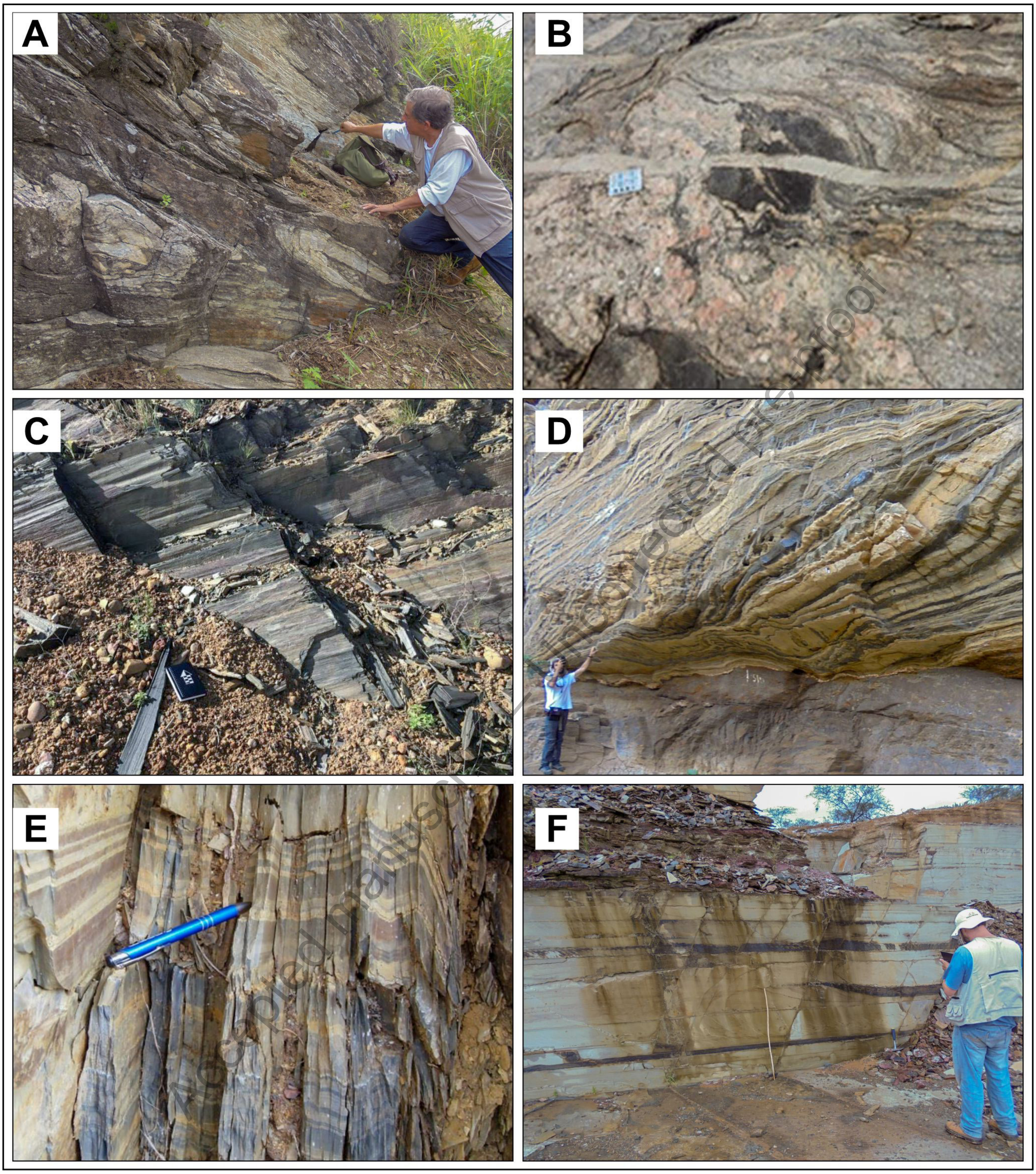
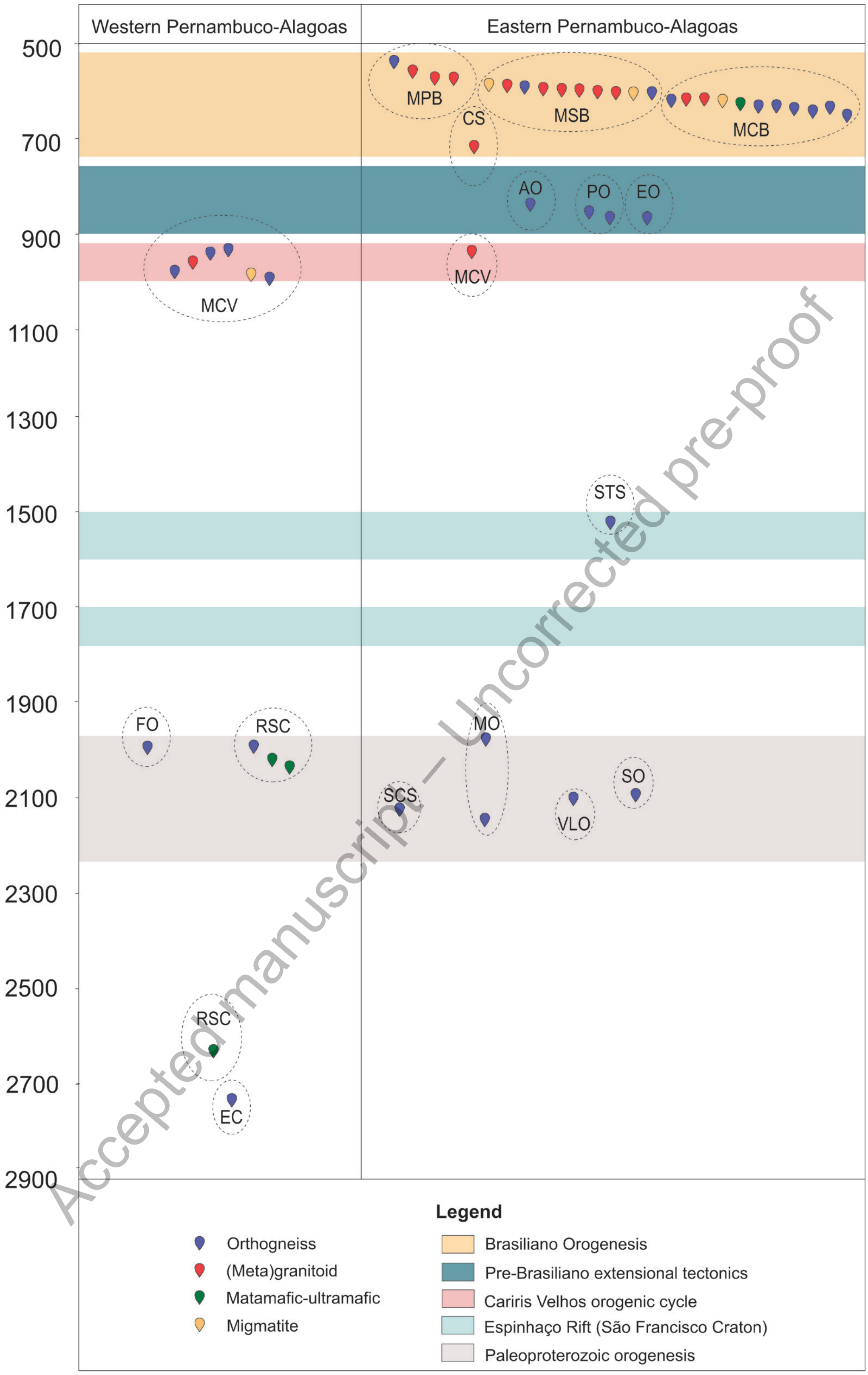


Figure 7. Field photographs of the lithostratigraphic units present in the Sergipano Domain. (A) Migmatitic orthogneiss from the Itabaiana-Simão Dias Complex southwest of Itabaiana/Sergipe; (B) Poço Redondo Migmatitic Complex at its type locality; (C) Phyllites/schists of the Rio Macururé Formation in Coronel João Sá/Bahia; (D) Contact between the Ribeirópolis (metadiamictites at the base of the outcrop) and Jacoca (metacarbonate at the top of the outcrop) formations of the Miaba Group, at Fazenda Capitão in Macambira/Sergipe; (E) Alternation between phyllites and fine metarenites of the Frei Paulo Formation (Vaza Barris Group) in Mocambo/Sergipe; (F) Alternation of sandy/silty-clay layers of the Lagarto Formation (Estância Group) in Lagarto/Sergipe.



EC = Entremontes Complex; RSC = Riacho Seco Complex; FO = Fulgêncio Orthogneiss; MO = Mucunã Orthogneiss; VLO = Vitória-São Lourenço Orthogneiss; SO = Salinas Orthogneiss; SCS = Serra do Caju Suite; STS = Serra Taquaritinga Suite; AO = Agrestina Orthogneiss; EO = Escada Orthogneiss; PO = Pinhões Orthogneiss; CS = Caetés Suite; MCB = Early- to syn-tectonic Brasiliano magmatism; MCV = Cariris Velhos syn-tectonic magmatism; MPB = Late- to post-tectonic Brasiliano magmatism; MSB = Syn-tectonic Brasiliano magmatism;

Figure 8. Magmatic barcode graph with the ages of ortho-derived rocks in the Pernambuco-Alagoas Domain compiled from the literature.

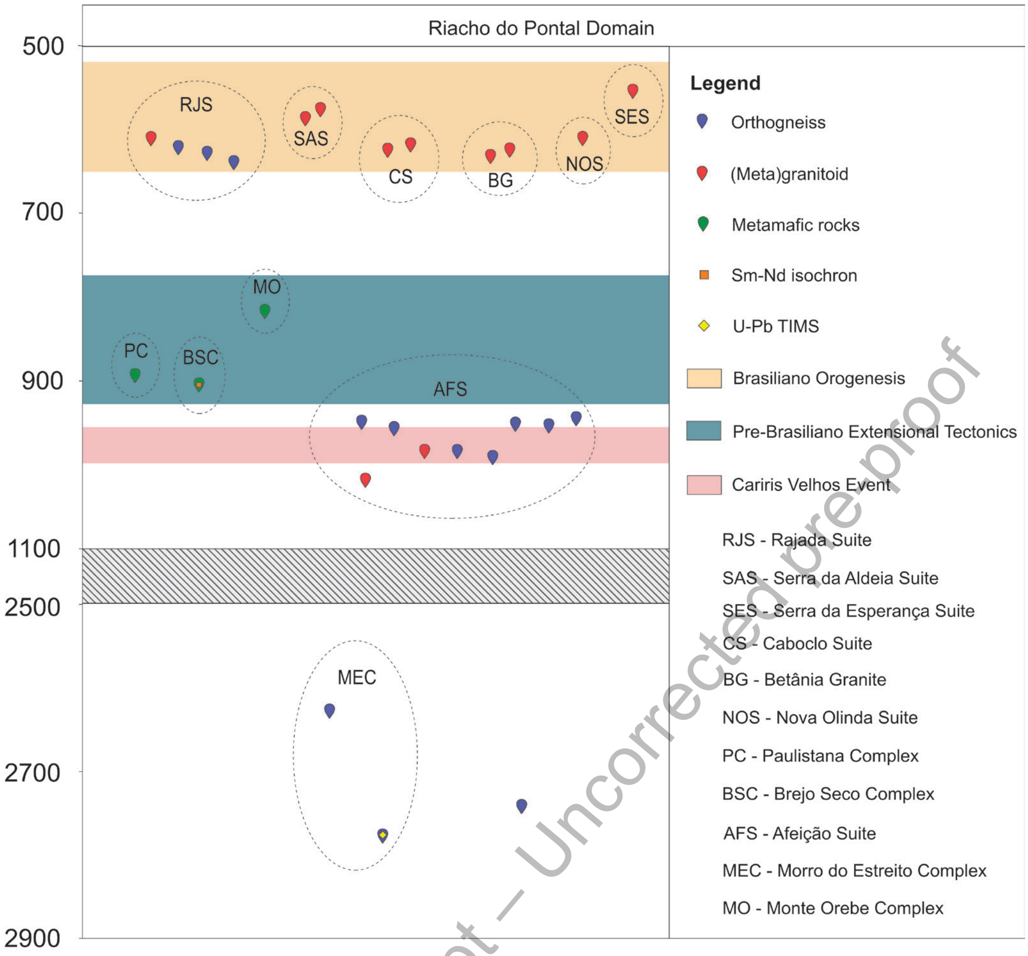


Figure 9. Magmatic barcode graph of the ortho-derived rocks in the Riacho do Pontal Domain compiled from the literature.

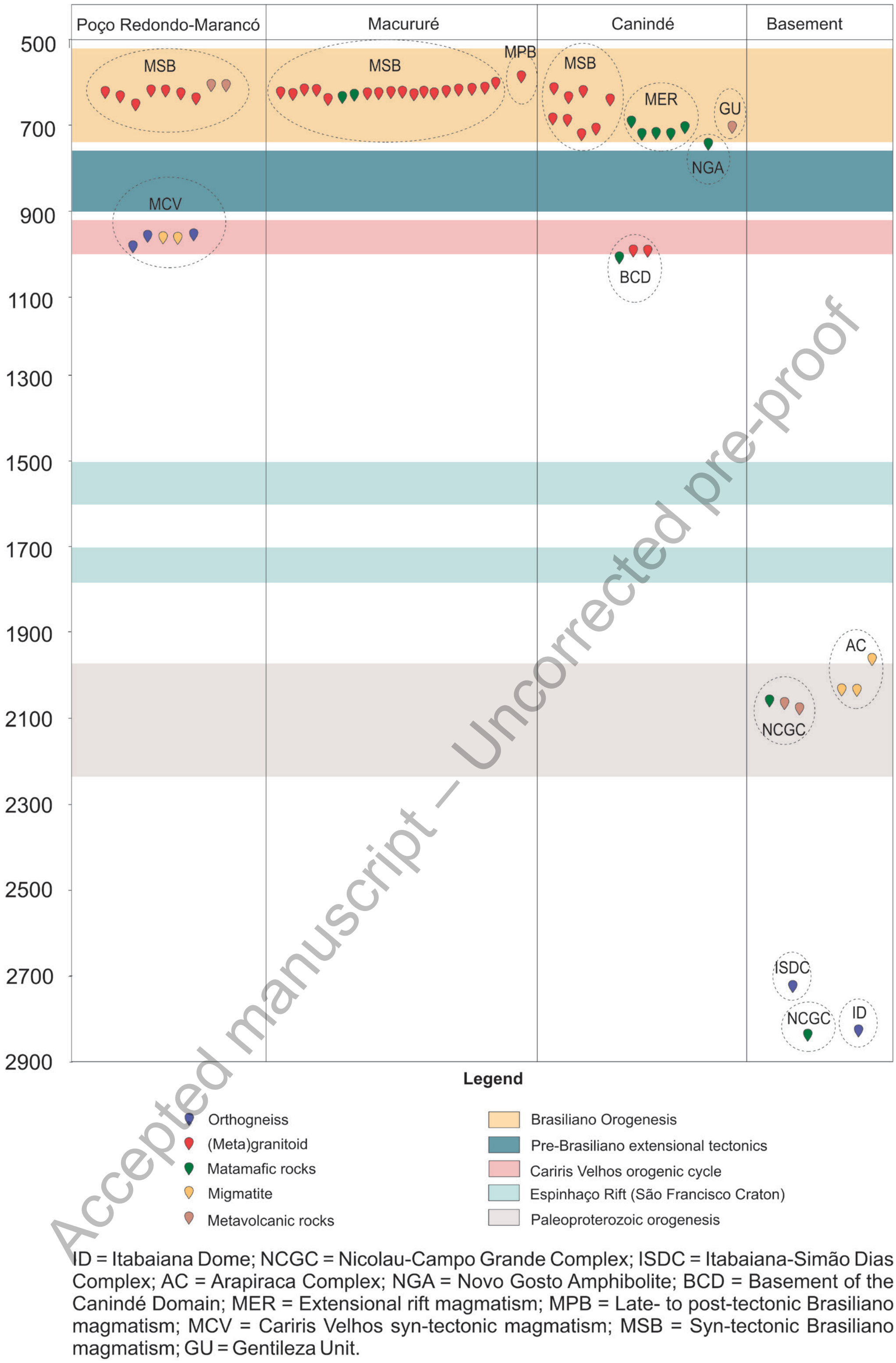


Figure 10 – Magmatic barcode graph with the main U-Pb ages of ortho-derived rocks in the Sergipano Domain compiled from the literature.

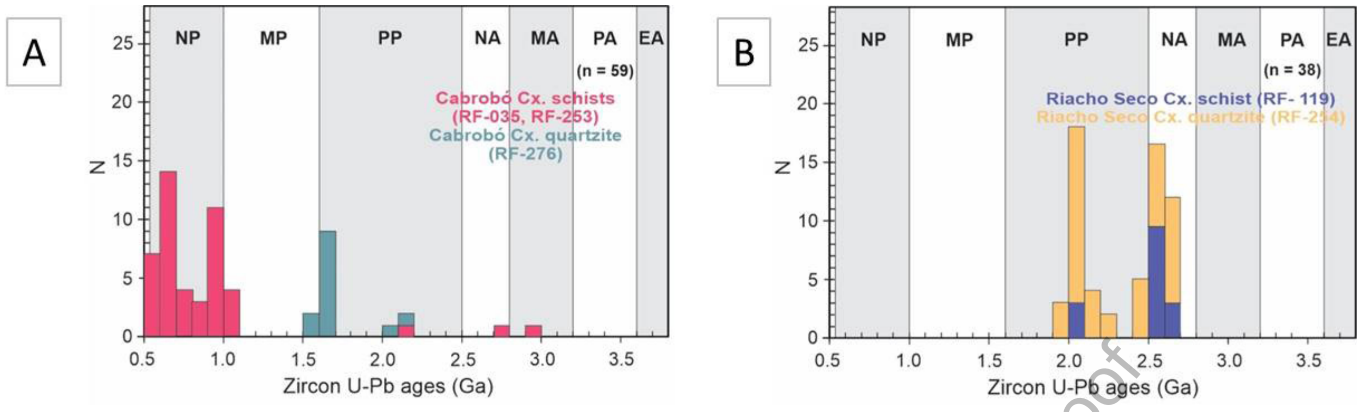


Figure 11. (A) Histogram of U-Pb zircon ages from the Cabrobó Complex; (B) Histogram of U-Pb zircon ages from the Riacho Seco Complex. Data compiled from Cruz et al. (2014). NP: Neoproterozoic, MP: Mesoproterozoic, PP: Paleoproterozoic, NA: Neoarchean, MA: Mesoarchean, PA: Paleoarchean, EA: Eoarchean.

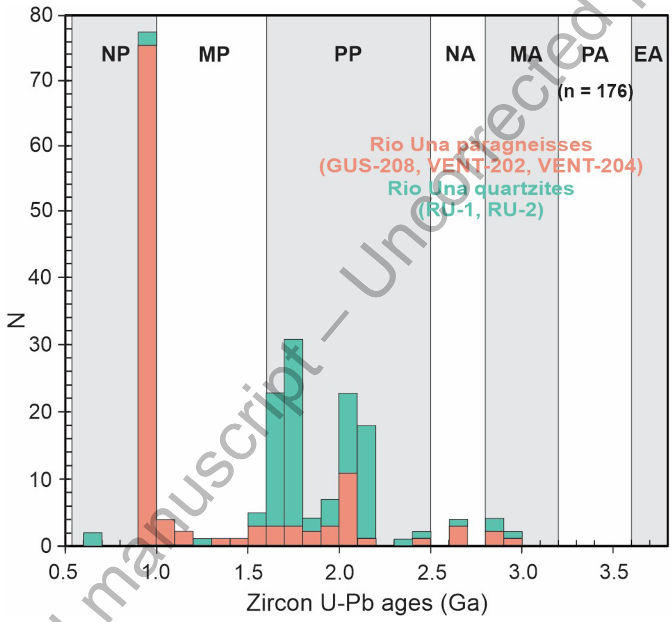


Figure 12. Histogram of U-Pb zircon ages from the Rio Una Complex. Data compiled from Neves et al. (2009) and Silva Filho et al. (2014).

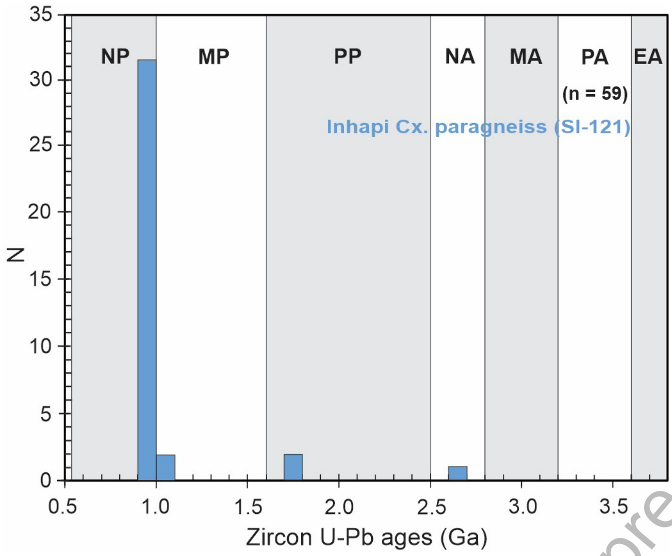


Figure 13. Histogram of U-Pb zircon ages from the Inhapi Sequence. Data compiled from Silva Filho et al. (2014).

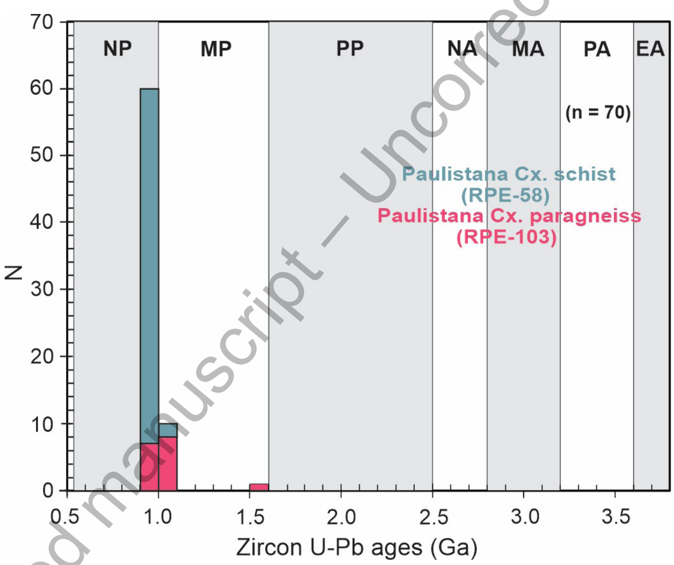


Figure 14. Histogram with U-Pb detrital zircon ages from the Paulistana Complex. Data compiled from Santos et al. (2017).

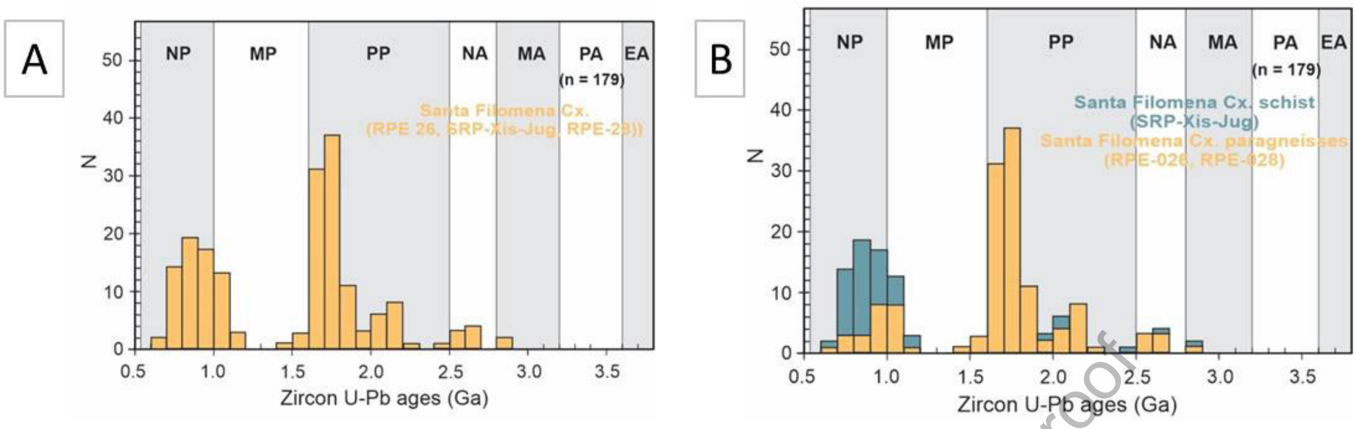


Figure 15. (A) Histogram with U-Pb detrital zircon ages from the Santa Filomena Complex. (B) Histogram with ages classified by lithologies of the Santa Filomena Complex. Data compiled from Caxito et al. (2016).

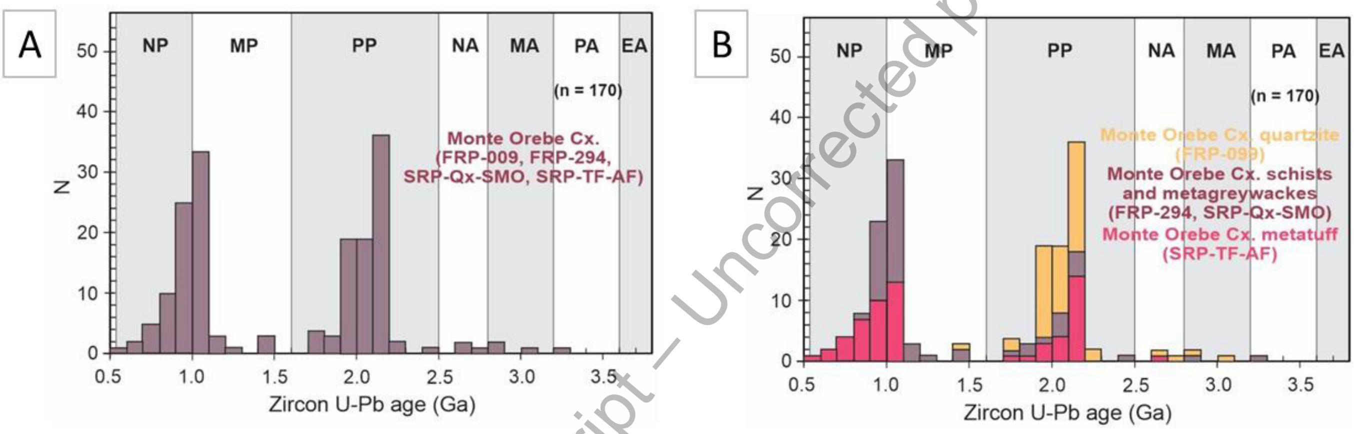


Figure 16. (A) Histogram with U-Pb detrital zircon ages from the Monte Orebe Complex. (B) Histogram with ages classified by lithologies of the Monte Orebe Complex. Data compiled from Caxito et al. (2016) and Brito Neves et al. (2015).

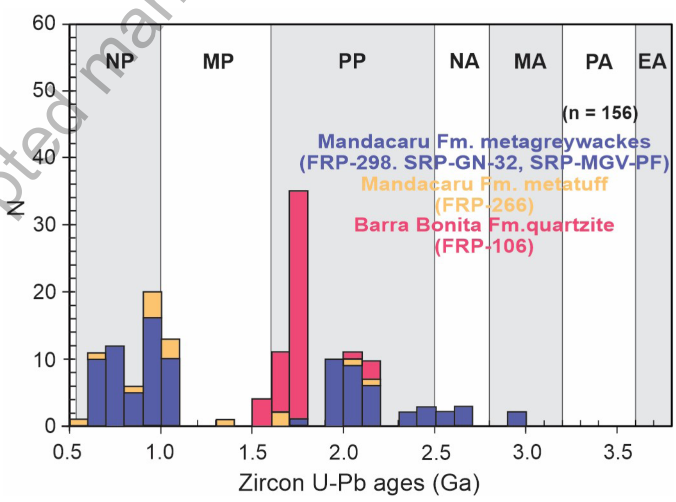


Figure 17. Histogram with U-Pb detrital zircon ages from the Mandacaru Formation. Data compiled from Brito Neves et al. (2015).

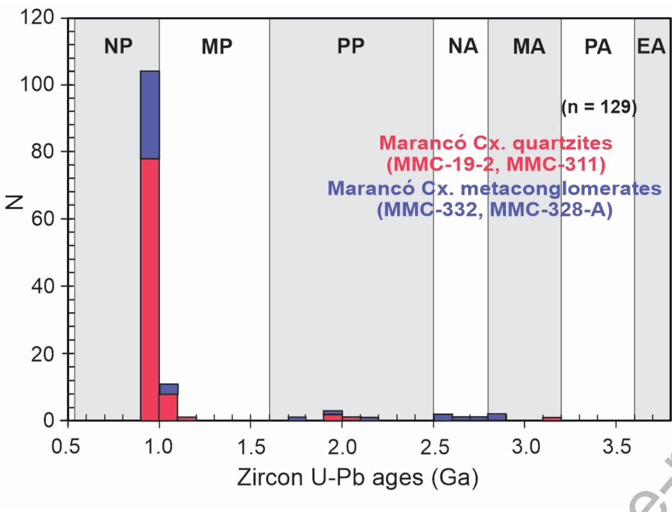


Figure 18. Histogram with U-Pb detrital zircon ages from the Marancó Subdomain. Data compiled from Oliveira et al. (2015).

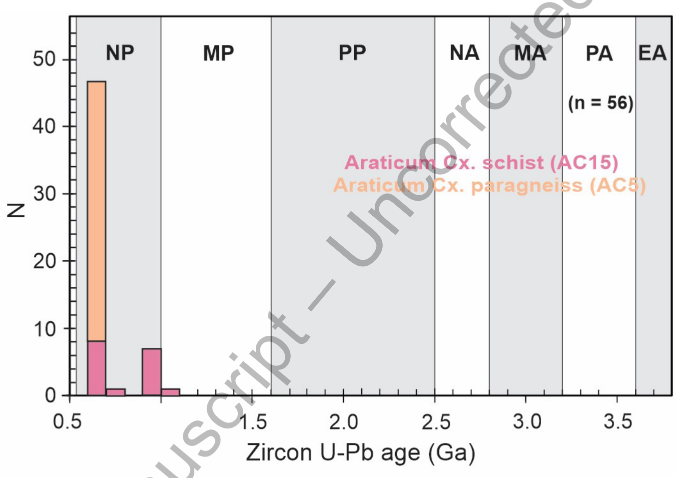


Figure 19. Histogram with U-Pb detrital zircon ages from the Canindé do São Francisco Complex. Data compiled from Oliveira et al. (2015).

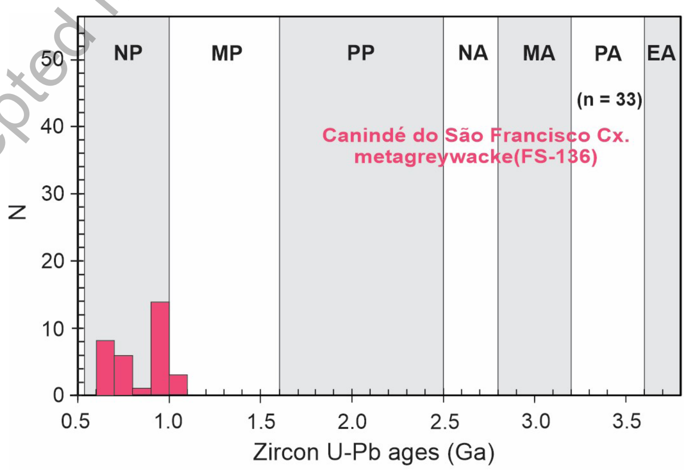


Figure 20. Histogram with U-Pb detrital zircon ages from the Araticum Complex. Data compiled from Lima et al. (2018).

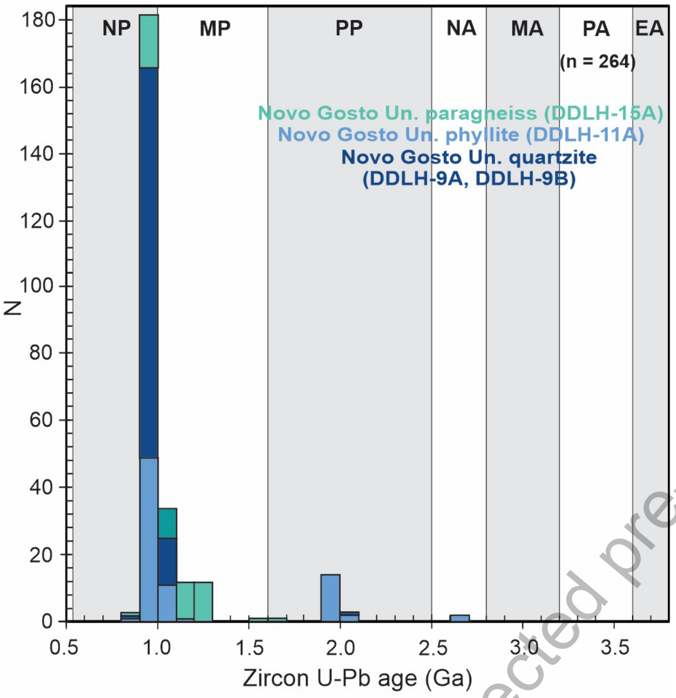


Figure 21. Histogram of U-Pb detrital zircon ages from samples of the Novo Gosto Unit. Data compiled from Passos et al. (2022).

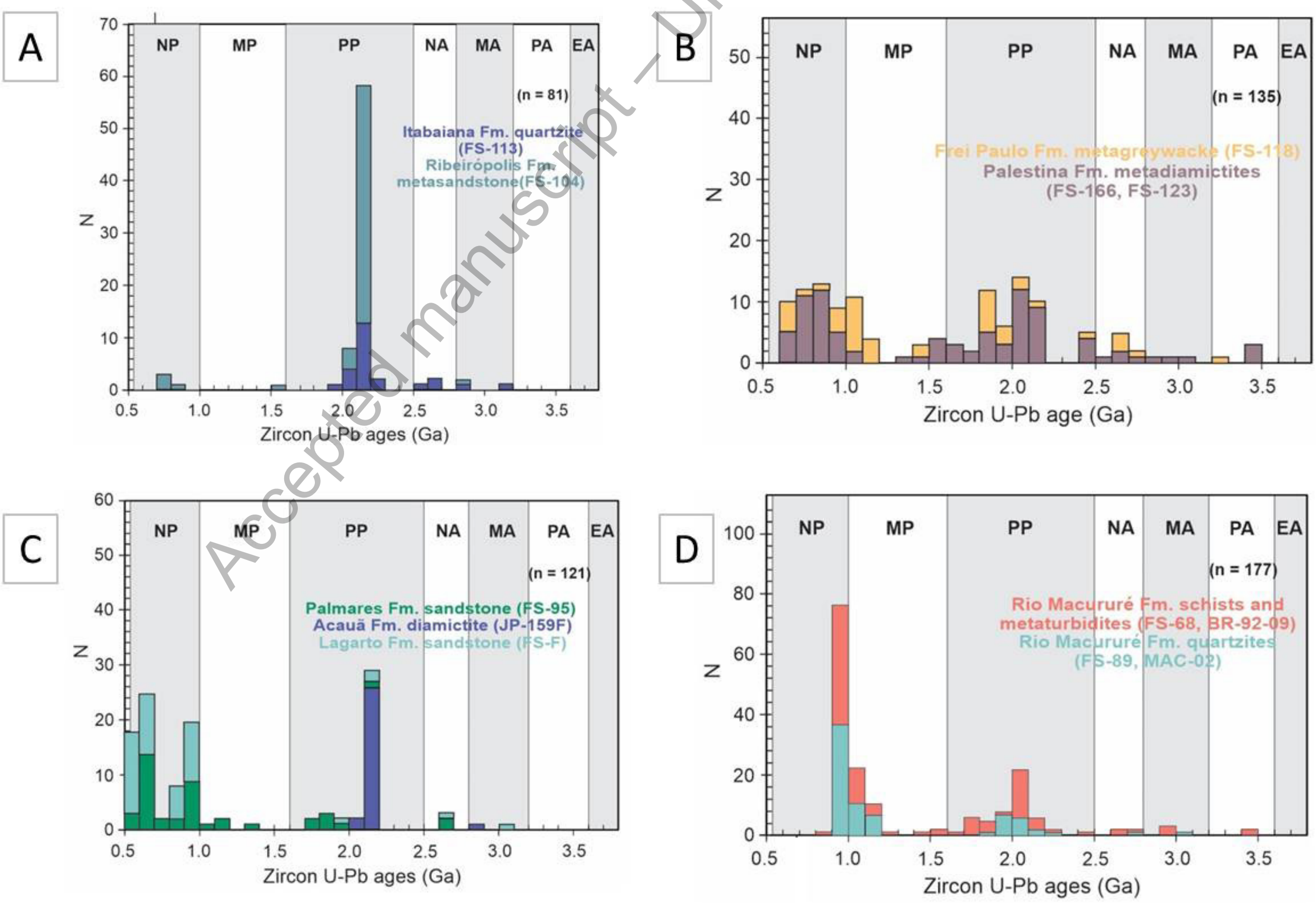


Figure 22. (A) Histograms of U-Pb detrital zircon ages from the Itabaiana and Ribeirópolis formations. (B) Histogram of U-Pb detrital zircon ages from the Frei Paulo and Palestina formations. (C) Histograms of U-Pb detrital zircon ages from the Palmares, Acauã, and Lagarto formations. (D) Histograms of U-Pb detrital zircon ages from the Rio Macururé Formation. Data compiled from Oliveira et al. (2015), Van Schmus (2011), and Neves et al. (2019).

Table 1 – Published U-Pb zircon ages of ortho-derived rocks in the Pernambuco-Alagoas Domain.

Domain	Lithostratigraphic unit	Rock type	Sample	Age (Ma)	Method	Reference
PEAL - East	Granitoid	Granitic orthogneiss	PEAL-96	552 ± 2	TIMS	Brito Neves et al. 2019
PEAL - East	Cabanas pluton	Granite		573 ± 4	LA-ICP-MS	Neves et al. 2008
PEAL - East	Cachoeirinha pluton	Biotite-amphibole syenite		587 ± 8	LA-ICP-MS	Neves et al. 2008
PEAL - East	Águas Belas batholith - Canindé (Águas Belas pluton)	Syenogranite	AB-8	588 ± 4	SHRIMP	Silva Filho et al. 2010
PEAL - East	Ferreira Costa Tonalite	Tonalite/Metatexite	PEAL TON FC	601 ±10	TIMS	Brito Neves et al. 2019
PEAL - East	Correntes pluton (Ipojuca-Atalaia batholith)	Syenogranite	CO-8	603 ± 5	SHRIMP	Silva Filho et al. 2016
PEAL - East	Jupi Orthogneiss	Tonalitic orthogneiss		606 ± 8	LA-ICP-MS	Neves et al. 2008
PEAL - East	Água Branca pluton	Quartz-syenite	ABR	610 ± 4	SHRIMP	Silva Filho et al. 2016
PEAL - East	Mata Grande pluton	Quartz-syenite	MG	612 ± 7	SHRIMP	Silva Filho et al. 2016
PEAL - East	Itaporanga Intrusive Suite (Carneiros pluton)	Monzogranite	FL - 497	612	LA-ICP-MS	Mendes and Brito 2017
PEAL - East	Águas Belas - Canindé batholith	Quartz-syenite		616 ± 4	TIMS	Silva Filho et al. 1998
PEAL - East	Santana do Ipanema Suite	Monzogranite	SI-201	618 ± 6	SHRIMP	Silva Filho et al. 2016
PEAL - East	Granitoid	Diatexite	PEAL DI SF	618 ± 8	TIMS	Brito Neves et al. 2019
PEAL - East	Orthogneiss (Palmares Sequence)	Calc-alkaline orthog-neiss	GUS - 152	620 ± 10	SHRIMP	Silva Filho et al. 2014
PEAL - East	Palmares Sequence	Orthogneiss (alcali--feldspar granite)	PAL - 32	622 ± 4	SHRIMP	Silva Filho et al. 2014
PEAL - East	Itaporanga Intrusive Suite (Pindoba pluton)	Monzogranite	VM 223.1.A	632 ± 13	LA-ICP-MS	Mendes and Brito 2017
PEAL - East	Serra do Catu Suite	Syenite	SC-46	632 ± 5	SHRIMP	Silva Filho et al. 2016
PEAL - East	Syenitic orthogneiss	Syenitic orthogneiss	CA-34	636 ± 3	LA-ICP-MS	Neves et al. 2015a
PEAL - East	Serrote dos Macacos Suite	Orthogneiss		646 ± 11	LA-ICP-MS	Neves et al. 2015
PEAL - East	Altinho Orthogneiss	Granitic augen gneiss	CA-40	652 ± 6	LA-ICP-MS	Neves et al. 2015a
PEAL - East	Altinho Orthogneiss	Granitic augen gneiss	VIT-04	652 ± 3	LA-ICP-MS	Teixeira, 2015
PEAL - East	Altinho Orthogneiss	Granitic augen gneiss	VIT-18	657 ± 3	LA-ICP-MS	Teixeira, 2015
PEAL - East	Caetés Suite	Metaleucogranite		730 ± 45	LA-ICP-MS	Accioly and Morais, 2018
PEAL - East	Agrestina Orthogneiss	Orthogneiss		852 ± 11	LA-ICP-MS	Neves et al. 2020
PEAL - East	Pinhões Orthogneiss	Orthogneiss		851 ± 8		Santos et al. 2015
PEAL - East	Pinhões Orthogneiss	Orthogneiss		869 ± 9	LA-ICP-MS	Neves et al. 2015
PEAL - East	Escada Orthogneiss	Banded granitic orthog-neiss	VIT-27	870 ± 5	LA-ICP-MS	Teixeira, 2015
PEAL - East	Inhapi Sequence	Tonalitic metatexite	SI - 100	972 ± 30	SHRIMP	Silva Filho et al. 2014
PEAL - East	Serra Taquaritinga Suite	Orthogneiss		1521 ± 1	ID-TIMS	Sá et al. 2002
PEAL - East	Salinas Orthogneiss	Orthogneiss	VENT - 203	2095 ± 11	SHRIMP	Silva Filho et al. 2014
PEAL - East	Vitória-São Lourenço Orthogneiss	Orthogneiss	VIT-01	2102 ± 11	ICP-MS	Teixeira, 2015
PEAL - East	Mucunã Orthogneiss	Amphibole gneiss (gra-nodioritic)	JGO -3	1987 ± 8	SHRIMP	Silva Filho et al. 2021
PEAL - East	Mucunã Orthogneiss	Orthogneiss		2156 ± 11	LA-ICP-MS	Silva Filho et al. 2008c
PEAL - East	Serra do Caju Suite	Tonalitic augen gneiss		2124 ± 4	LA-ICP-MS	Accioly, 2015
PEAL - West	Serra das Flores Orthogneiss	Orthogneiss	VM - 178	947 ± 63	LA-ICP-MS	Mendes and Brito, 2017
PEAL - West	Rocinha Suite	Orthogneiss	RF323	956 ± 2	LA-ICP-MS	Cruz et al. 2015
PEAL - West	Lobo Suite (Lobo 2 pluton)	Mylonitic granodiorite	RF270	974 ± 8	LA-ICP-MS	Cruz et al. 2015
PEAL - West	Lobo Suite (Lobo 1 pluton)	Orthogneiss		994 ± 25	LA-ICP-MS	Brito and Marinho, 2012
PEAL - West	Granitoid	Migmatitic gneiss	PEAL 7WFN	998 ± 7	TIMS	Brito Neves et al. 2019
PEAL - West	Granitoid	Leucocratic orthogneiss	PEAL EBSF	1008±3	TIMS	Brito Neves et al. 2019
PEAL - West	Fulgêncio Orthogneiss	Orthogneiss	RF243	1996 ± 8	LA-ICP-MS	Cruz et al. 2014
PEAL - West	Riacho Seco Complex	Granitic gneiss	RF 111	1992 ± 27	LA-ICP-MS	Cruz et al. 2014
PEAL - West	Riacho Seco Complex	Amphibolite	PG-94B	2020 ± 31	LA-ICP-MS	Garcia et al. 2017
PEAL - West	Riacho Seco Complex	Amphibolite	PG-95-I	2037 ± 14	SHRIMP	Garcia et al. 2017
PEAL - West	Riacho Seco Complex	Amphibolite	PG-95-I	2634 ± 48 (inheritance)	SHRIMP	Garcia et al. 2017
PEAL - West	Entremontes Complex	Granitic gneiss	RF179	2734 ± 11	LA-ICP-MS	Cruz et al. 2014

Table 2 – Published U-Pb zircon ages of ortho-derived rocks in the Riacho do Pontal Domain.

Lithostratigraphic unit	Rock type	Sample	Age (Ma)	Method	Isotopic system	Reference
Serra da Esperança Suite	Alkaline syenite		555 ± 20	Isochron	Rb-Sr	Jardim de Sá et al.(1988, 1994)
Serra da Aldeia Suite	Syenogranite	FRP 171	586 ± 5	LA-ICP-MS	U-Pb	Caxito et al. 2016
Serra da Aldeia Suite	Quartz monzonite	RPM-67	578±5	LA-ICP-MS	U-Pb	Amaral et al. 2023
Nova Olinda	Syenite	RPB-14	612 ± 2	LA-ICP-MS	U-Pb	Amaral et al. 2023
Suíte Rajada	Foliated metagranite	FRP 005	608 ± 8	LA-ICP-MS	U-Pb	Caxito et al. 2016
Rajada Suite	Orthogneiss	SRP-Gn-DO	620 ± 8	LA-ICP-MS	U-Pb	Brito Neves et al. 2015
Rajada Suite	Orthogneiss	SRP-Gn-RAJ	625 ± 10	LA-ICP-MS	U-Pb	Brito Neves et al. 2015
Rajada Suite	Orthogneiss	SRP-Gn-TG	636 ±15	LA-ICP-MS	U-Pb	Brito Neves et al. 2015
Caboclo Suite	Syenite	RPB-02	620 ± 3	LA-ICP-MS	U-Pb	Amaral et al. 2023
Caboclo Suite	Monzogranite	EU-05	624 ± 2	LA-MC-ICP-MS	U-Pb	Uchoa Filho et al. 2018
Betânia Granite	Granite	RPE-30	627 ±4	LA-ICP-MS	U-Pb	Amaral et al. 2023
Betânia Granite	Granite	RPE-30A	629 ± 2	LA-ICP-MS	U-Pb	Perpétuo 2017
Paulistana Complex	Metaggabro	FRP 316A	888 ± 3	LA-ICP-MS	U-Pb	Caxito et al. 2013
Monte Orebe Complex	Metabasalt	FRP 073	819 ± 120	Isochron	Sm-Nd	Caxito et al. 2013
Brejo Seco Complex	Metamafic rocks		903 ± 20	Isochron	Sm-Nd	Salgado et al. 2016
Afeição Suite	Metagranodiorite	SRP-G-10	966 ± 10	TIMS	U-Pb	Van Schmus et al. 1995
Afeição Suite	Granodioritic orthogneiss	RPA-05	956 ± 8	LA-ICP-MS	U-Pb	Amaral et al.2023
Afeição Suite	Granodioritic orthogneiss	RPE-68	965 ± 3	LA-ICP-MS	U-Pb	Amaral et al.2023
Afeição Suite	Augen gneiss	RPB-32	963 ± 4	LA-ICP-MS	U-Pb	Amaral et al.2023
Afeição Suite	Augen gneiss	SRP-Gn-10	942 ± 11	LA-ICP-MS	U-Pb	Brito Neves et al. 2015
Afeição Suite	Augen gneiss		968 ± 14	Pb-Pb (evaporation)	Pb-Pb	Jardim de Sá 1994
Afeição Suite	Augen gneiss	FRP-200	966 ± 5	LA-ICP-MS	U-Pb	Caxito et al. 2014b
Afeição Suite	Augen gneiss	FRP327G	974 ± 11	LA-ICP-MS	U-Pb	Caxito et al. 2020
Afeição Suite	Orthogneiss	SRP-Gn-BM	981 ± 14	LA-ICP-MS	U-Pb	Brito Neves et al. 2015
Afeição Suite	Metagranite	FRP-122	1002 ± 5	LA-ICP-MS	U-Pb	Caxito et al. 2020
Fazenda JPR Orthogneiss	Orthogneiss	SRP-Gn-JPR	2745 ± 59	TIMS	U-Pb	Brito Neves et al. 2015
Morro do Estreito Complex	Orthogneiss	SRP-Gn-ME	2624 ± 22	LA-ICP-MS	U-Pb	Brito Neves et al. 2015
Complexo Morro do Estreito	Orthogneiss	SRP-Gn-ME	2758 ± 25	TIMS	U-Pb	Brito Neves et al. 2015

Table 3 – Published U-Pb ages of ortho-derived rocks in the Sergipano Domain.

Subdomain	Lithostratigraphic unit	Rock type	Sample	Age (Ma)	Mineral/Method	Referência
Macururé	Gracho Cardoso	Quartz diorite		603 ± 8	Zrn SHRIMP	Souza (2020)
Macururé	Mocambo	Quartz diorite	SOS-645	614 ± 7	Zrn SHRIMP	Oliveira (2020)
Macururé	Propriá	Syenogranite	FDS-516A	615 ± 6	Zrn SHRIMP	Santos et al. (2019)
Macururé	Lagoa do Roçado	Granodiorite	187A	618 ± 4	Zrn SHRIMP	Silva (2014)
Macururé	Glória Norte	Quartz monzonite porphyry	FDS 12A	588 ± 5	Zrn SHRIMP	Lisboa et al. 2019
Macururé	Glória Norte	Monzonite	FDS-12	621±2	Zrn/SHRIMP	Pereira et al. 2023
Macururé	Santa Helena	Granodiorite	SOS - 1281	620 ± 2	Zrn/LA-SF-ICP-MS	Pereira et al. 2023
Macururé	Coronel Joao Sá	Granodiorite		621 ± 1	Ttn ID-TIMS	Long et al. (2005)
Macururé	Coronel Joao Sá	Granodiorite	CJS 20	625 ± 2	Zrn ID-TIMS	Long et al. (2005)
Macururé	Fazenda Lagoas	Granodiorite	SOS-899	623 ± 4	Zrn SHRIMP	Fernandes et al. (2020)
Macururé	Altos Verdes	Quartz diorite		625 ± 4	Zrn ID-TIMS	Lima (2021)
Macururé	Glória Sul	Biotite leucogranite	SOS-600A	624 ± 11	Zrn SHRIMP	Conceição (2019)
Macururé	Glória Sul	Leucogranite	SOS-601	627 ± 7	Zrn SHRIMP	Conceição (2019)
Macururé	Dores	Leucogranite	SOS-910	628 ± 5	Ttn/LA-Q-ICPMS	Pereira et al. 2023
Macururé	Campo Grande	Monzodiorite	SOS 624	629 ± 9	Zrn SHRIMP	Pereira et al. (2020)
Macururé	Fazenda Alvorada	Quartz monzonite		630 ± 4	Zrn SHRIMP	Santos, 2021
Macururé	Pedra Furada	Leucogranite	SOS-1257	630 ±5	Ttn/SHRIMP	Pereira et al. 2023
Macururé	Capela	Hornblendite	SOS 696F	631 ± 3	Zrn SHRIMP	Pereira et al. (2020)
Macururé	Aquidabã	Gabbro	SOS 700	636 ± 4	Zrn SHRIMP	Pereira et al. (2020)
Macururé	Camará	Tonalite		628 ± 12	Zrn SHRIMP	Bueno et al. 2009
Macururé	Camará	Diorite	SOS-626	643 ± 2	Zrn/LA-SF-ICP-MS	Pereira et al. 2023
Marancó	Volcanic rock	Dacite	MMC-14	602 ± 4	SHRIMP	Carvalho 2005
Marancó	Volcanic rock	Andesite	MMC 149	603 ± 9	SHRIMP	Carvalho 2005
Marancó	Serra Negra Granite	Granitic augen gneiss	MMC-317	951 ± 2	SHRIMP	Carvalho 2005
Poço Redondo	Rio Jacaré	Granodiorite		617 ± 4	Zrn SHRIMP	Souza et al. (2019)
Poço Redondo	Curituba	Granitoid		617 ± 7	Zrn ID-TIMS	Lima (2016)
Poço Redondo	Queimada Grande Grano-diorite	Granodiorite	JUD-91	618 ± 4	Zrn SHRIMP	Oliveira et al. (2015a)
Poço Redondo	Poço Redondo Granite	Granite	CRN-11	623 ± 7	Zrn SHRIMP	Oliveira et al. (2015a)
Poço Redondo	Sítios Novos	Granite	JUD-96	631 ± 4	SHRIMP	Oliveira et al. (2015a)
Poço Redondo	Sítios Novos	Granodiorite	MMC-218	651 ± 6	SHRIMP	Carvalho 2005
Poço Redondo	Poço Redondo	Granite	DMLH-1A (PR-1A)	636 ± 4	SHRIMP	Passos et al. (2022)
Poço Redondo	Poço Redondo	Orthogneiss	DMLH-1B (PR-1B)	957 ± 12	SHRIMP	Passos et al. (2022)
Poço Redondo	Poço Redondo Migmatite	Granodioritic migmatite		960 ± 38	SHRIMP	Carvalho 2005
Poço Redondo	Poço Redondo Migmatite	Granodioritic migmatite		961 ± 38	SHRIMP	Carvalho 2005
Poço Redondo	Poço Redondo Complex	Tonalitic paleosome		980 ± 4	Zrn SHRIMP	Carvalho (2005)
Canindé	Araticum Complex	Leucogranitoid (sheets)	FL-95	611 ± 17	LA-ICPMS	Mendes and Brito 2017
Canindé	Lajedinho	Monzodiorite	CRN-109b	619±3	Zrn SHRIMP	Oliveira et al. (2015a)
Canindé	Lajedinho	Granite	CRN-109b	634 ± 10	SHRIMP	Nascimento 2005
Canindé	Canindé Velho	Diorite		640 ± 4	Zrn SHRIMP	Santos (2016)
Canindé	Gentileza Unit	Quartz monzodiorite (*rapakivi*)	JS-18A	684 ± 7	SHRIMP	Nascimento 2005
Canindé	Gentileza Unit	Quartz monzodiorite	CRN-299	688 ± 15	SHRIMP	Nascimento 2005
Canindé	Gentileza	Metavolcanic rock	DMLH-12A	701 ± 5	Zrn LA-ICP-MS	Passos et al. (2022)
Canindé	Canindé Gabbroic Suite	Gabbro	CRN-48	690± 16	SHRIMP	Nascimento 2005
Canindé	Canindé Gabbroic Complex	Gabbro		703 ± 2	Zrn LA-ICP-MS	Pinto et al. (2020)
Canindé	Garrote	Metasyenogranite	DMLH-13A	720 ± 29	Zrn LA-ICP-MS	Passos et al. (2022)
Canindé	Curralinho/Boa Esperança	Metagranite	DDLH-21B	708 ± 8	Zrn LA-ICP-MS	Passos et al. (2022)
Canindé	Canindé layered Gabbroic Intrusion	Metadolerite	DMLH-6	718 ± 23	Zrn LA-ICP-MS	Passos et al. (2022)
Canindé	Canindé layered Gabbroic Intrusion	Metadolerite	DMLH-2	716 ± 3	Zrn LA-ICP-MS	Passos et al. (2022)
Canindé	Canindé layered Gabbroic Intrusion	Gabbro	DMLH-3	719 ± 2	Zrn LA-ICP-MS	Passos et al. (2022)
Canindé	Novo Gosto	Amphibolite	DMLH-16	743 ± 3	Zrn LA-ICP-MS	Passos et al. (2021)
Canindé	Canindé Domain Basement	Mylonitic granite	DMLH-12B	989 ± 16	LA-MC-ICP-MS	Passos et al. (2022)
Canindé	Canindé Domain Basement	Mylonitic granite	DDLH-10B	990 ± 6	LA-MC-ICP-MS	Passos et al. (2022)
Canindé	Canindé Domain Basement	Amphibolite	DDLH-10A	1006 ± 4	LA-SF-ICP-MS	Passos et al. (2022)
Basement	Arapiraca Complex	Diatexite	NE-157	1957 ± 2	Zrn LA-ICP-MS	Tesser et al.2021
Basement	Arapiraca Complex	Diatexite	NE-163	2032 ± 4	Zrn LA-ICP-MS	Tesser et al.2021
Basement	Arapiraca Complex	Diatexite with sapphirine	NE-30	2029 ± 12	Zrn LA-ICP-MS	Tesser et al.2021
Basement	Nicolau-Campo Grande Complex	Metarhyolite	NCG 28	2061 ± 9	LA-ICP-MS	Lima et al. 2019

Table 3 - continued

Subdomain	Lithostratigraphic unit	Rock type	Sample	Age (Ma)	Mineral/Method	Referência
Basement	Nicolau-Campo Grande Complex	Metarhyodacite	NCG 16	2074 ± 8	LA-ICP-MS	Lima et al. 2019
Basement	Nicolau-Campo Grande Complex	Amphibolite	NCG 10	2054 ± 21	LA-ICP-MS	Lima et al. 2019
Basement	Nicolau-Campo Grande Complex	Amphibolite	NCG 10	2904 ±37 (inheritance)	LA-ICP-MS	Lima et al. 2019
Basement	Nicolau-Campo Grande Complex	Amphibolite	NCG 07	2838 ± 2 (inheritance)	LA-ICP-MS	Lima et al. 2019
Basement	Nicolau-Campo Grande Complex	Amphibolite	NCG 07	3051 ± 13 (inheritance)	LA-ICP-MS	Lima et al. 2019
Basement	Itabaiana- Simão Dias Complex	Orthogneiss		2729 ± 12	LA-ICP-MS	Santiago et al. 2017
Basement	Itabaiana Dome	Migmatitic gneiss	FDS-395	2831 ± 6	Zrn SHRIMP	Rosa et al. (2020)