

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

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Abstract

Article Information

In recent years, there has been an increasing number of studies seeking to improve the geological and geotectonic understanding of the Borborema Province, northeastern Brazil. However, in the Southern Borborema Province, few regional scale synthesis 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 is bordered to the north by the Pernambuco Shear Zone and to the south by the São Francisco Craton, and fully encompasses the state of Alagoas and partially covers the states of Pernambuco, Sergipe, Bahia, and Piauí. The methodology applied 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 crustal 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 periods: 630–624 Ma (Sergipano Domain), 635–570 Ma (Riacho do Pontal Domain), and 657–555 Ma (Pernambuco-Alagoas Domain).

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

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1. Introduction

The Borborema Province 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 on the

lithostratigraphy and a review of the geochronological data available in the literature related to the Southern Borborema Province (SBP). We define the SBP 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 spans the states of Pernambuco, Alagoas, Sergipe, Bahia, and Piauí (Delgado et al. 2003).



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ISSN: 2595-1939

<https://doi.org/10.29396/jgsb.2024.v7.n3.1>

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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 review on the lithostratigraphic units and geochronology was based on geological maps published by the Geological Survey of Brazil (SGB-CPRM), as well as scientific articles, theses, dissertations, and conference abstracts. Thus, 1:100.000 scale geological maps and reports, 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, including Pb-Pb zircon data and U-Pb zircon data, acquired 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), was carried out. Priority was given to SHRIMP and LA-ICP-MS U-Pb zircon data, 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 $^{207}\text{Pb}/^{206}\text{Pb}$ ages were used for zircons older than 1.0 Ga, and the $^{206}\text{Pb}/^{238}\text{U}$ ages were used for zircons younger than 1.0 Ga (Stern 1997). Furthermore, only data with discordance below 10% were compiled (Gehrels 2011). The discordance of the compiled ages was recalculated from the U-Pb data by the relative difference between the $^{206}\text{Pb}/^{238}\text{U}$ and $^{207}\text{Pb}/^{206}\text{Pb}$

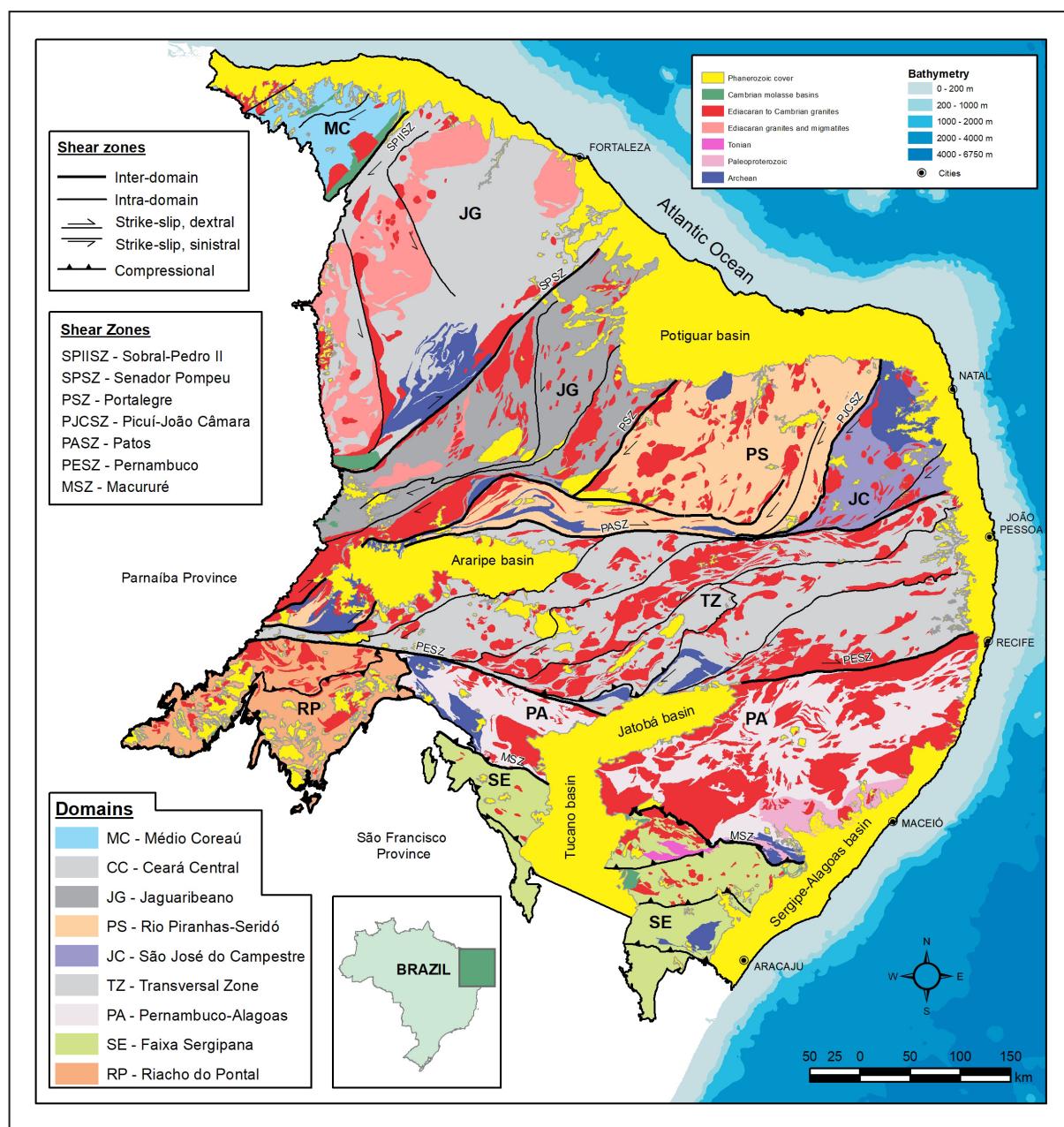


Figure 1. Geotectonic compartmentalization of the Borborema Province (Medeiros et al. 2021).

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 granite intrusions related to the Brasiliano orogenic event. 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 Province 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 province. The Archean event in the SBP spans in the approximate interval between 2758–2734 Ma (Brito Neves et al. 2015; Cruz et al. 2014b), while the Paleoproterozoic orogeny is represented by ages 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. 2010b; Brito Neves et al. 2015), and the Brasiliano Event took place between 657–552 Ma (Brito Neves and Silva Filho 2019; Teixeira 2015).

3.1 Pernambuco-Alagoas Domain

The Pernambuco-Alagoas Domain, or Pernambuco-Alagoas Superterrane (Brito Neves and Silva Filho 2019), consists of an assembly 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 and Silva Filho 2019).

3.1.1 Archean unit

The Entremontes Complex, representative of the Archean crust 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 in the Pernambuco-Alagoas Domain include the migmatitic orthogneiss units named Cachoeira Grande, Camará, Macunã (Figure 3A) and Fulgêncio, the Serra do Caju Suite, and the Riacho Seco Complex.

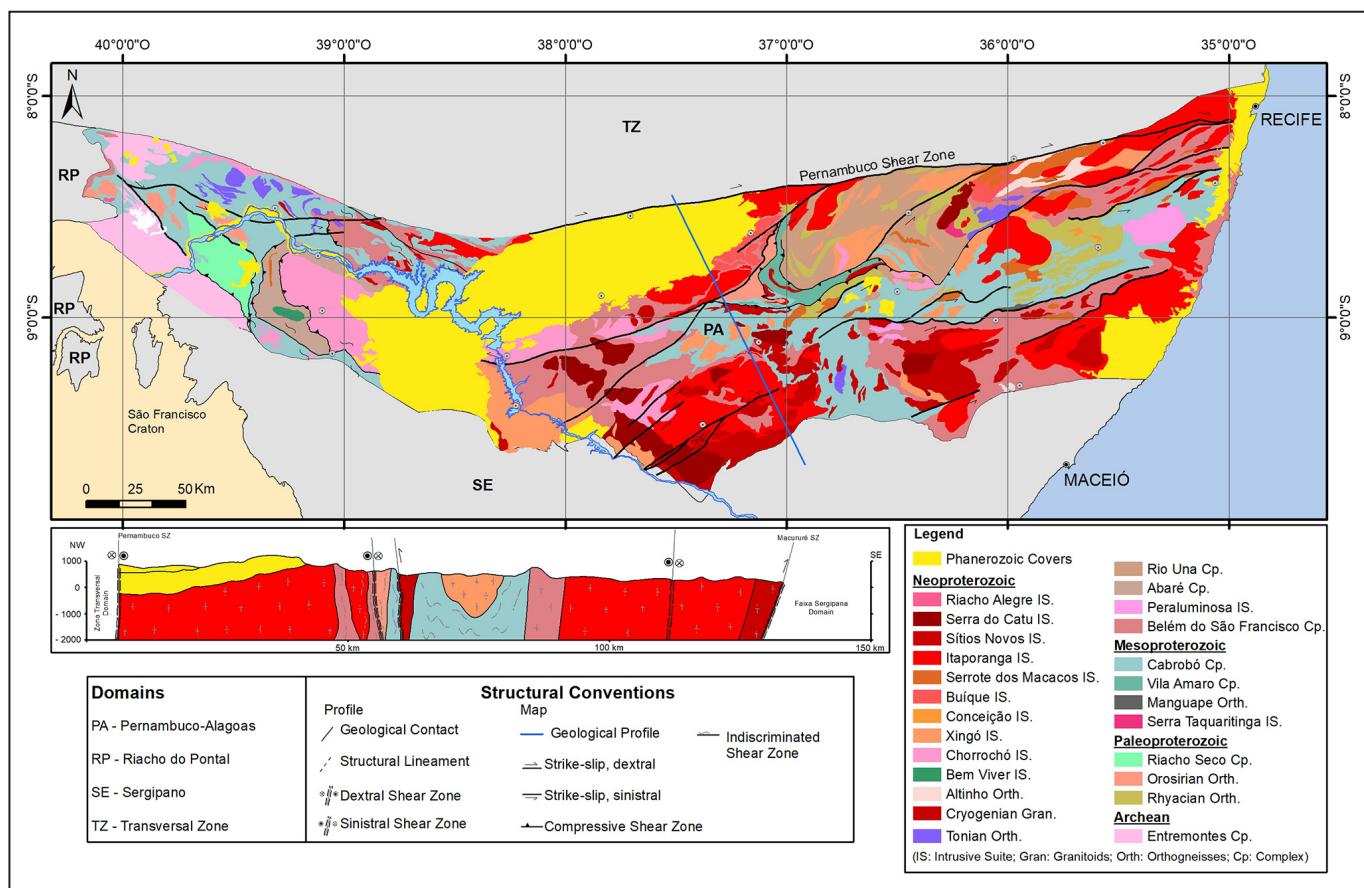


Figure 2. Lithostratigraphic units and geological profile of the Pernambuco-Alagoas Domain. Vertical exaggeration of the geological profile is 5x.

The orthogneiss units have monzodioritic, granodioritic, quartz-dioritic, and dioritic/gabbroic compositions and may present tonalitic to trondjemitic neosomes (Accioly and Morais 2018; Silva Filho et al. 2008a; Cruz et al. 2014b).

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 metallogenetic standpoint, since they contain 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 and Morais 2018; Silva Filho et al. 2008a).

3.1.4 Mesoproterozoic-Neoproterozoic units

In the Mesoproterozoic-Neoproterozoic transition, the Cabrobó Complex and the Peraluminous Leucocratic Suite occur. The Cabrobó Complex is composed of paragneisses, occasionally migmatized, schists, marbles, calc-silicate rocks and amphibolites (Santos 1999; Carmona 2002) (Figure 3B). The Peraluminous Leucocratic Suite records the 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 of 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

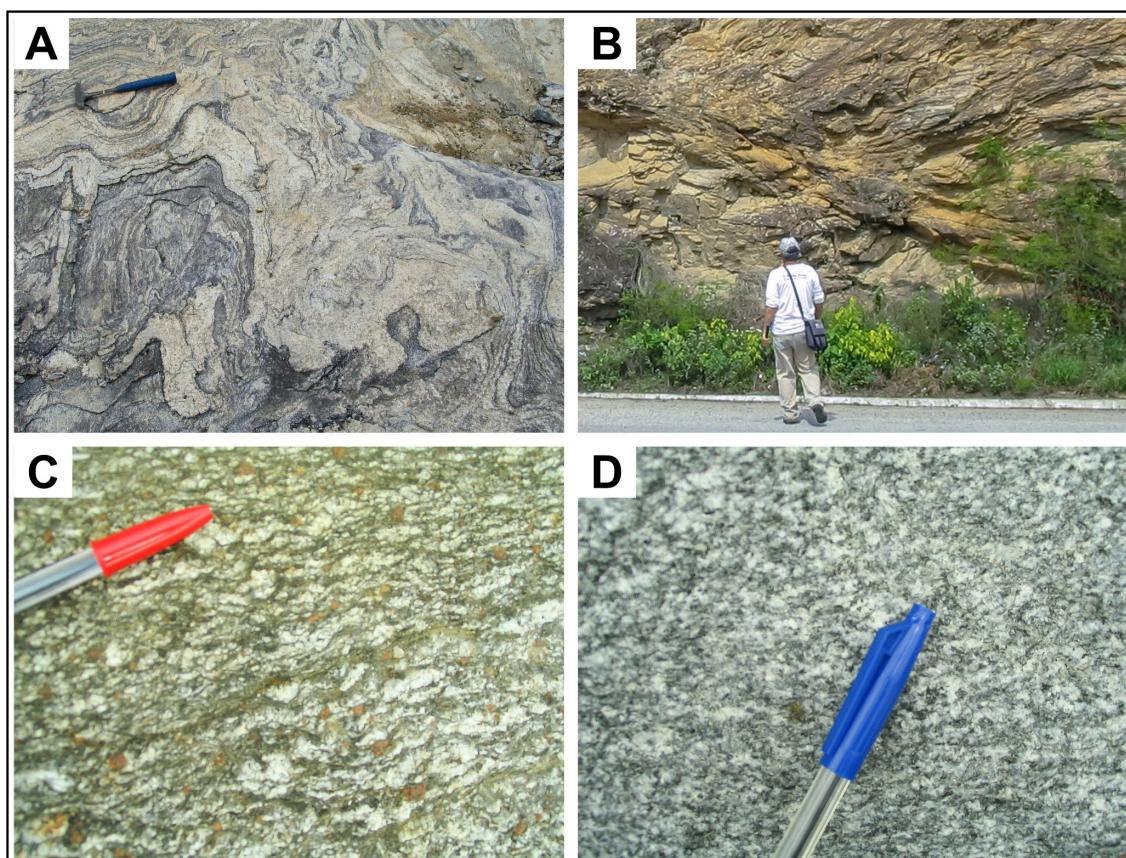


Figure 3. Field photographs of the lithostratigraphic units present in the Pernambuco-Alagoas Domain. (A) Migmatitic orthogneiss Macunã, northeast of Japecanga (Pedra/Pernambuco); (B) Quartzites of the Cabrobó Complex in the Garanhuns/Pernambuco region; (C) Paragneiss of the Rio Una Complex, northeast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

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 metamafic-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. 2008a). The orthogneiss units consist of lithologies with syenogranitic, 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. 2008a; Mendes and Brito 2017; Accioly and Morais 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 rocks, with light gray, whitish pink to yellowish colors, represented

by various petrographic types such as metagranitoids, orthogneisses, and migmatitic orthogneisses. They exhibit mostly monzogranitic and granodioritic compositions and occasionally quartz-monzonitic and tonalitic compositions (Mendes and Brito 2017).

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

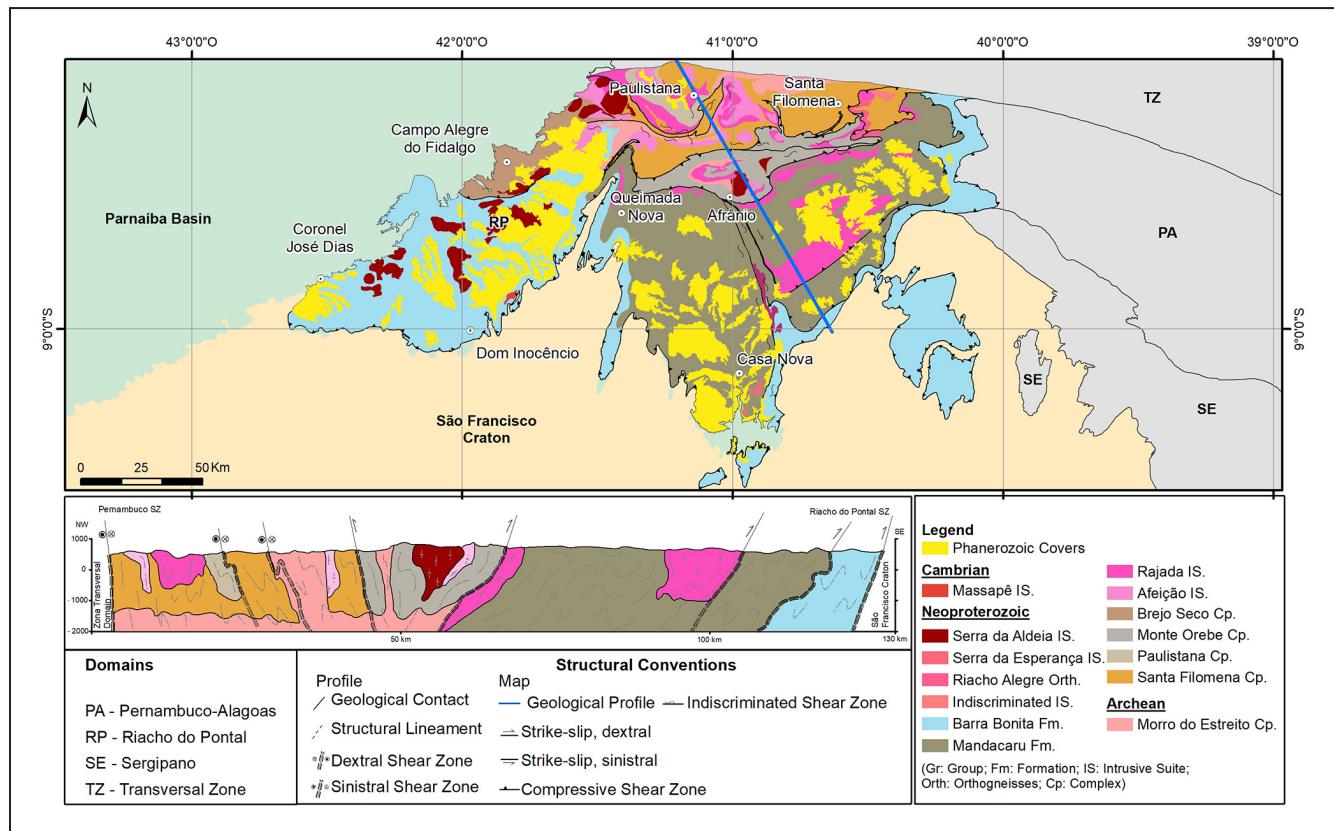


Figure 4. Lithostratigraphic units and geological profile of the Riacho do Pontal Domain. Vertical exaggeration of the geological profile: 5x.

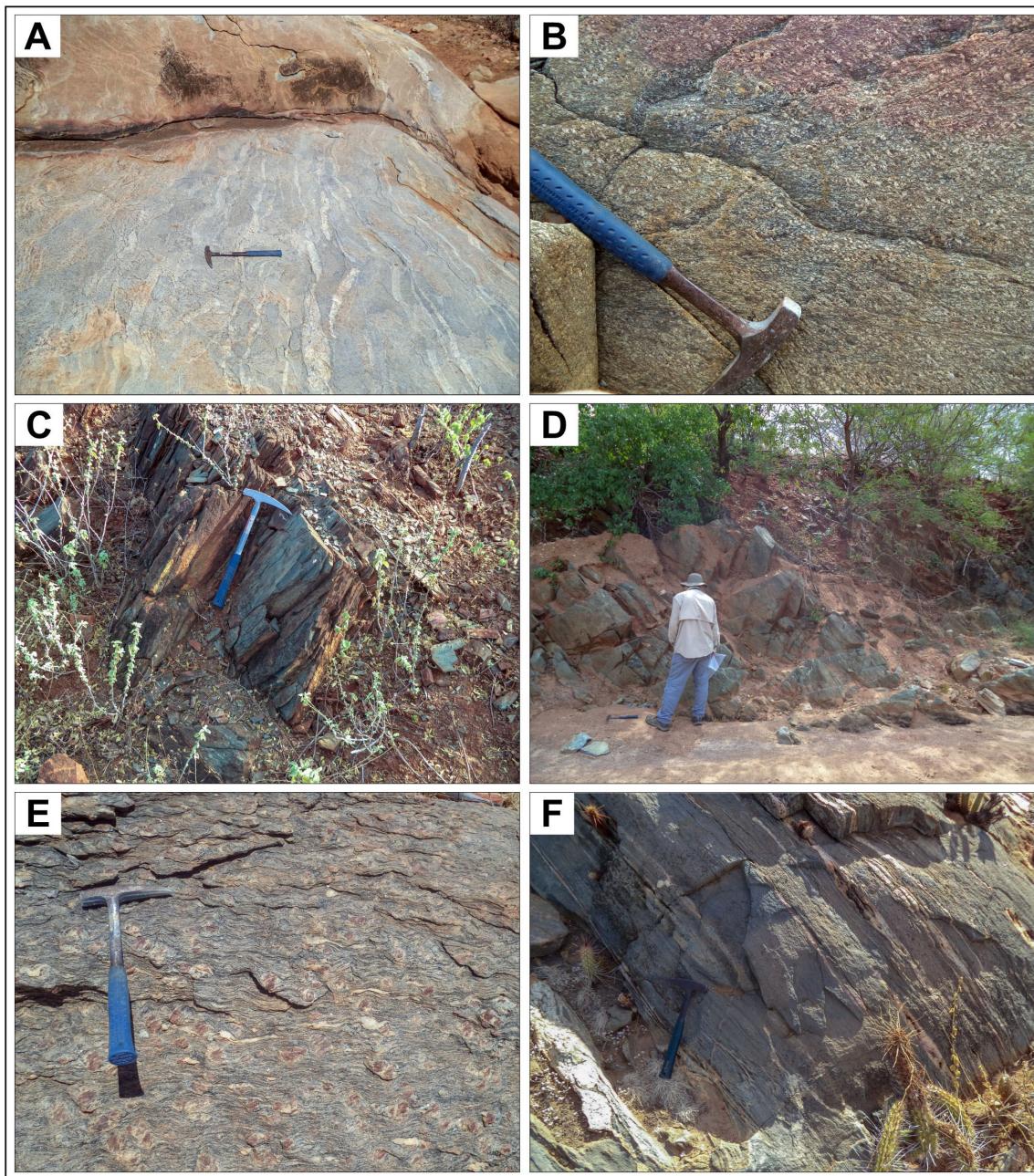


Figure 5. Field photographs of the lithostratigraphic units cropping out in the Riacho do Pontal Domain. (A) Migmatitic orthogneiss of the Morro do Estreito Complex; (B) Metagabbro of the Paulistana Complex; (C) Amphibolite interlayered with mica schist of the Brejo Seco Complex; (D) Amphibolite with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

Group. The Afeição Suite (Angelim 1988; Caxito et al. 2014b) comprises augen gneisses and porphyry granite to granodiorite, with calc-alkaline and peraluminous affinities (Angelim 1988; Caxito and Ulhein 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 and 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, magnetites, and gabbros. The Monte Orebe Complex is characterized by a 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).

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 comprises two mafic-ultramafic bodies, elongated along NE-SW, intruding the metasedimentary rocks of the Casa Nova Group (Uchôa Filho et al. 2019).

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). 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.

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 forms a dome structure comprising rocks of 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 crops out along an anticline, and represents a basement inlier of the Sergipano Domain, similar to the Simão Dias and Itabaiana domes. It is composed of banded to migmatitic orthoderived rocks of tonalitic, dioritic, monzonitic, granodioritic, and granitic compositions, with associated supracrustal rocks (Amorim 1995). The Jirau do Ponciano Plutonic-Metamorphic Dome is overlain by the metavolcano-sedimentary rocks of the Nicolau-Campo Grande Complex (Lima et al. 2018). According to Mendes and Brito (2017), the Nicolau-Campo Grande Complex consists predominantly banded quartz-feldspathic gneisses, as well as interlayered 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-bearing diatexites in the Arapiraca Complex.

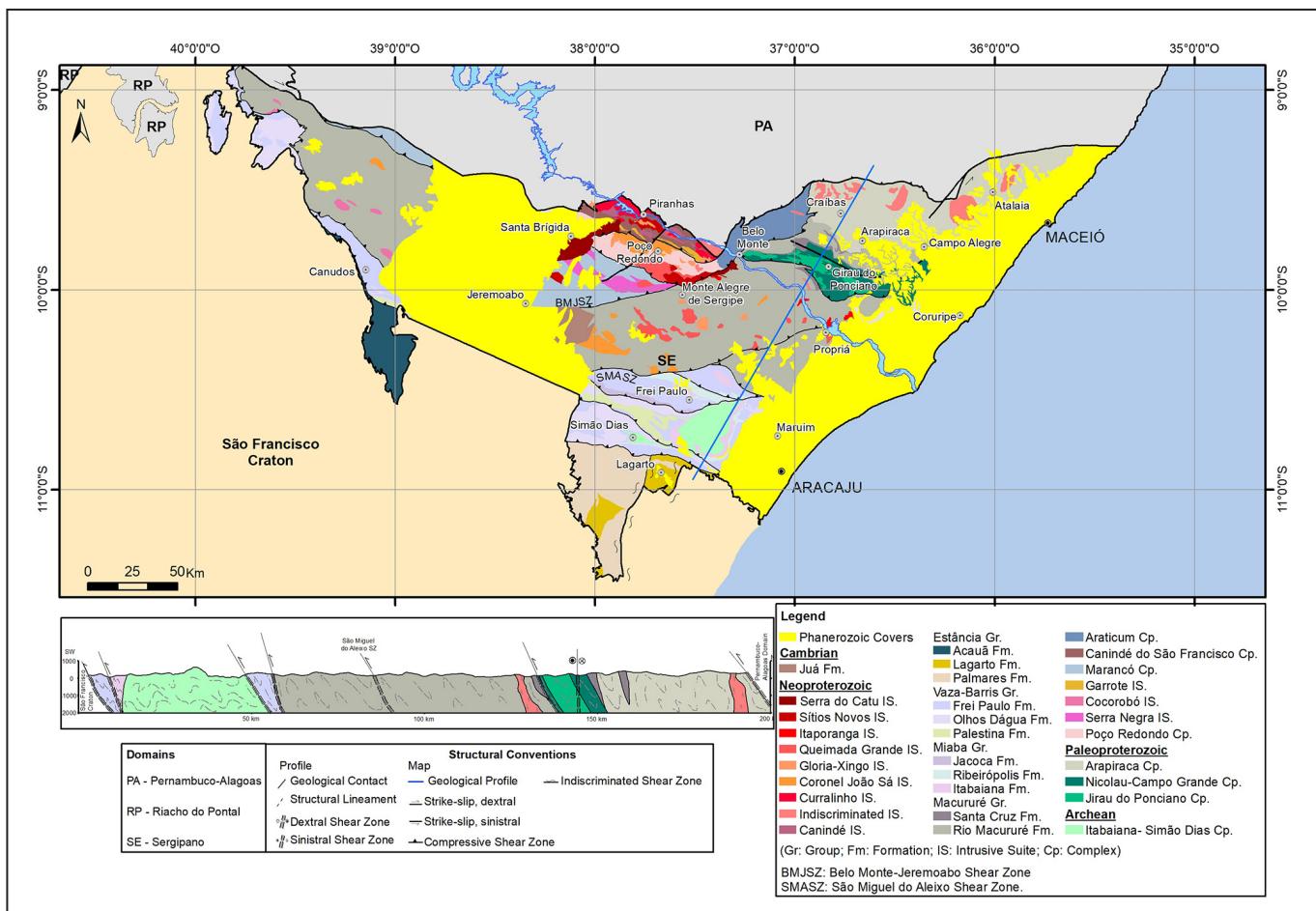


Figure 6. Lithostratigraphic units and geological profile of the Sergipano Domain. Vertical exaggeration of the geological profile: 5x.

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 Estâncio 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, 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 and felsic metavolcanic rocks, and metamafic-ultramafic rocks. The granitoids of the Serra Negra Suite crop out along the homonymous ridge (located near the Sergipe-Bahia border) and several other ridges restricted to the Marancó subdomain. The suite has a granodioritic to quartz-monzonitic composition, sometimes containing garnet. The Macururé Group comprises the Santa Cruz (basal) and Rio Macururé (top) formations. The Santa Cruz Formation consists, in general, of quartzites and variations ranging from massive orthoquartzites to layered 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, records the Cryogenian granite magmatism in the Sergipano Domain. It is a muscovite-biotite granitic orthogneiss of light gray color (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 prevailing metacarbonate rocks (which protoliths were either limestones or dolomites) interlayered with metachert (Figure 7D). The Canindé do São Francisco Complex is characterized by the association 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 metadiamicrites, with subordinated metapelites, meta-arkose, and metagreywackes (Uhlein et al. 2011). The Olhos d'Água Formation consists of interlayered metacalcareous arenites, metacalcilutites, and

metarhydromites (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 Estâncio Group comprises, from base to top, by the Acauã, Lagarto, and Palmares formations. The Acauã Formation includes 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 fine-grained feldspathic 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 can be correlated with the Frei Paulo Formation of the Vaza Barris subdomain.

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 displayed 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. 2014b), which was reworked during the Paleoproterozoic and Neoproterozoic orogenies. The Paleoproterozoic basement is characterized by the Fulgêncio Orthogneiss with a crystallization age of 1996 ± 8 Ma (Cruz et al. 2014b) and a model age of 2.79 Ga (Nd-TDM), by the Macunã Orthogneiss with a U-Pb zircon age of 2156 ± 11 Ma (Silva Filho et al. 2008a), 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. 2014b), 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 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, which corresponds to a broad interval with few records of magmatic activity 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. 2014b), 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 data (LA-ICP-MS) obtained from a sample of (meta) leucogranite from the Caetés Suite provided an age of 730 ± 45 Ma (Accioly and Moraes 2018). The Cariris Velhos Event was followed by extensional tectonics, with the formation of sedimentary basins, in which the Rio Una and Inhapi Formations were deposited (Brito Neves and Silva Filho 2019). This period is also marked by intense granitogenesis during the Brasiliano Orogeny, with the emplacement of

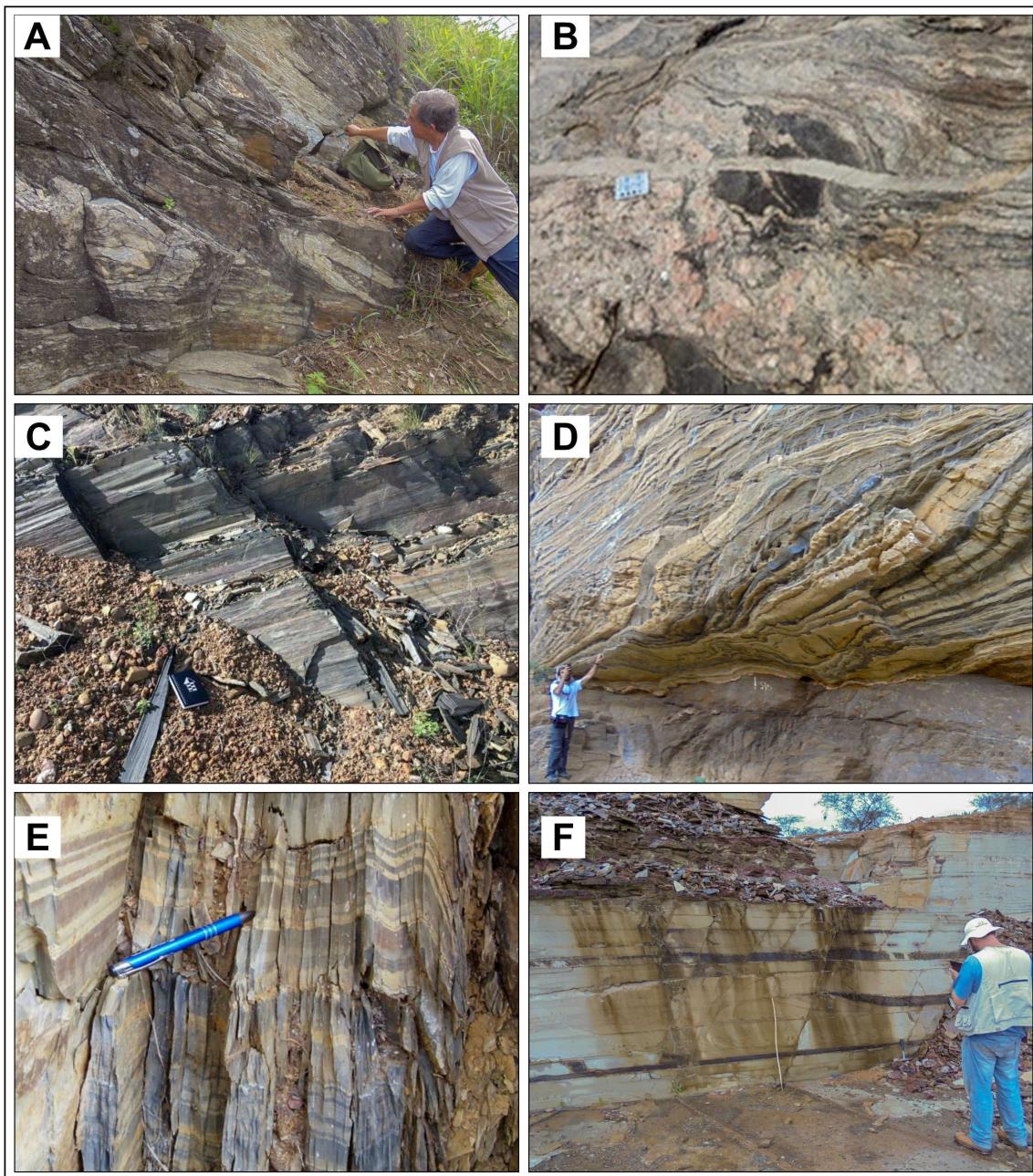


Figure 7. Field photographs of the lithostratigraphic units present in the Sergipano Domain. (A) Migmatitic orthogneiss of the Itabaiana-Simão Dias Complex, southwest of Itabaiana/Sergipe; (B) Poço Redondo Migmatitic Complex at its type locality; (C) Phyllites/schists of the Rio Macururé Formation in Coronel João Sá/Bahia; (D) Contact between the Ribeirópolis (metadiamicrites 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) Interlayered phyllites and metarenites of the Frei Paulo Formation (Vaza Barris Group) in Mocambo/Sergipe; (F) Interlayered sandstones and silty claystones of the Lagarto Formation (Estâncio Group) in Lagarto/Sergipe.

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).

4.1.2 Riacho do Pontal Domain

The magmatic barcode for the Riacho do Pontal Domain (Figure 9) presents the data compiled 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 zircon ages obtained by Brito Neves et al. (2015). The first sample yields a zircon U-Pb age (LA-ICP-MS) of 2624 ± 22 Ma and represents a granodioritic orthogneiss, while the second sample yields a zircon U-Pb age (TIMS) of 2745 ± 59 Ma, obtained in partially migmatized pink orthogneisses. The Tonian period is represented by the Cariris Velhos Event. It is marked by the Afeição Suite magmatism and the development of the Paulistana, Brejo Seco, Monte Orebe, and Santa Filomena metaplutonic and volcano-sedimentary complexes. The augen gneisses and porphyritic granitoids of the Afeição Suite

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 and Silva Filho 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/Metataxite	PEAL TON FC	601 ± 10	TIMS	Brito Neves and Silva Filho 2019
PEAL - East	Correntes pluton (Ipojuca-Atalaia batholith)	Syenogranite	CO-8	603 ± 5	SHRIMP	Silva Filho et al. 2016
PEAL - East	Jipi 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 and Silva Filho 2019
PEAL - East	Orthogneiss (Palmares Sequence)	Calc-alkaline orthogneiss	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. 2015
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. 2015
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	Agestina Orthogneiss	Orthogneiss		852 ± 11	LA-ICP-MS	Neves et al. 2021
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 orthogneiss	VIT-27	870 ± 5	LA-ICP-MS	Teixeira 2015
PEAL - East	Inhapi Sequence	Tonalitic metataxite	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	Macunã Orthogneiss	Amphibole gneiss (granodioritic)	JGO -3	1987 ± 8	SHRIMP	Silva Filho et al. 2021
PEAL - East	Macunã Orthogneiss	Orthogneiss		2156 ± 11	LA-ICP-MS	Silva Filho et al. 2008b
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. 2014b
PEAL - West	Lobo Suite (Lobo 2 pluton)	Mylonitic granodiorite	RF270	974 ± 8	LA-ICP-MS	Cruz et al. 2014b
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 and Silva Filho 2019
PEAL - West	Granitoid	Leucocratic orthogneiss	PEAL EBSF	1008±3	TIMS	Brito Neves and Silva Filho 2019
PEAL - West	Fulgêncio Orthogneiss	Orthogneiss	RF243	1996 ± 8	LA-ICP-MS	Cruz et al. 2014b
PEAL - West	Riacho Seco Complex	Granitic gneiss	RF 111	1992 ± 27	LA-ICP-MS	Cruz et al. 2014b
PEAL - West	Riacho Seco Complex	Amphibolite	PG-94B	2020 ± 31	LA-ICP-MS	Garcia 2017
PEAL - West	Riacho Seco Complex	Amphibolite	PG-95-I	2037 ± 14	SHRIMP	Garcia 2017
PEAL - West	Riacho Seco Complex	Amphibolite	PG-95-I	2634 ± 48 (inheritance)	SHRIMP	Garcia 2017
PEAL - West	Entremontes Complex	Granitic gneiss	RF179	2734 ± 11	LA-ICP-MS	Cruz et al. 2014b

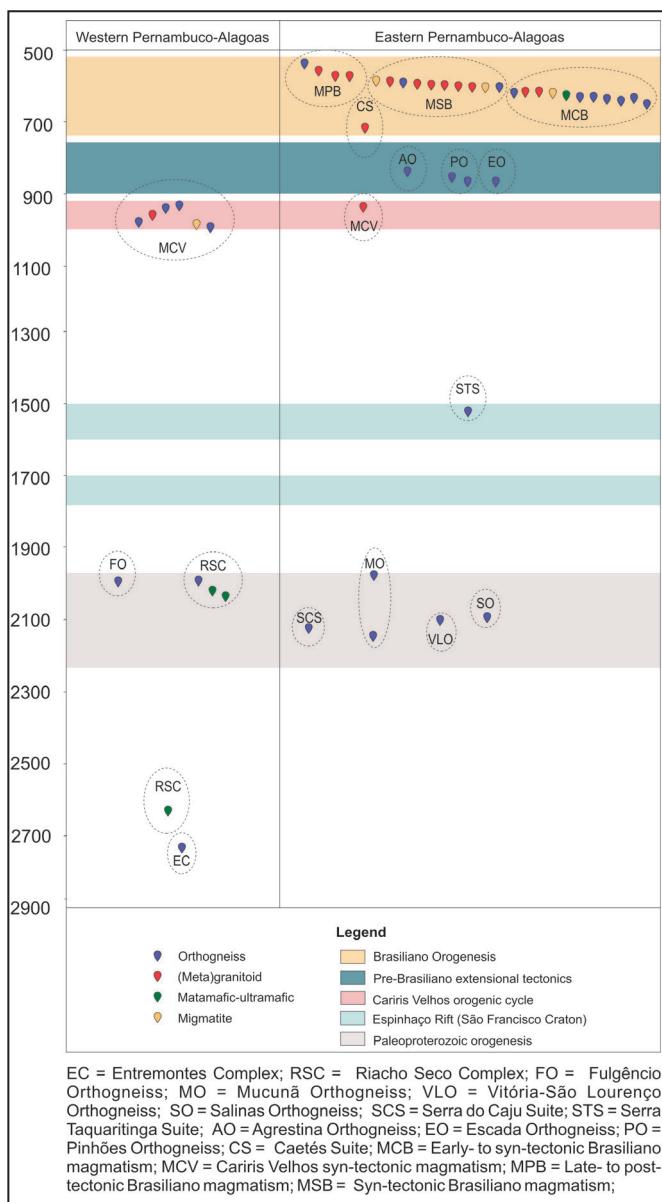


Figure 8. Magmatic barcode graph with the ages of ortho-derived rocks in the Pernambuco-Alagoas Domain compiled from the literature.

present robust geochronological data in the literature, since it has been the subject of U-Pb zircon studies in several works. 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 obtained 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 U-Pb (LA-ICP-MS) crystallization of 942 ± 11 Ma age for an orthogneiss from the Afeição Suite. Finally, Caxito et al. (2020) presented U-Pb (SHRIMP) geochronological data for an augen gneiss intruding mica schists of the Santa Filomena Complex, which yields 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 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 this magmatism. Caxito et al. (2014b) and Santos et al. (2024) propose that the Afeição Suite was emplaced 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. 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 Tonian crystallization age of the Brejo Seco Complex was determined by Salgado et al. (2014) through a Sm-Nd isochron in gabbros of the layered intrusion, which yield the age of 903 ± 20 Ma. Its genesis is also debated in the literature. Pioneer interpretations related the Brejo Seco Complex to an ophiolitic complex (Marimon 1990). Later, the complex has been reinterpreted as a layered mafic-ultramafic intrusion related to an extensional regime, based on lithochemical data (Salgado et al. 2014).

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 time distribution of magmatic activity can be observed, as well as its association with the main regional geodynamic events. (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 (Zircon U-Pb, LA-ICP-MS) was obtained by Santiago et al. (2017) for a migmatitic leucosome of the Itabaiana Dome. Rosa et al. (2020) found an age of 2831 ± 6 Ma (Zircon U-Pb, SHRIMP) for the melanosome of a trondhjemite 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 (zircon U-Pb, LA-ICP-MS) were obtained from an amphibolite sample of the Nicolau-Campo Grande Complex, dated by Lima et al. (2019). According to authors, these ages represent Archean inheritance, and the actual crystallization ages would be Paleoproterozoic, as those obtained in samples of amphibolite (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, determined in a mafic-ultramafic rock (Brito 2005). Additionally, three zircon U-Pb ages (LA-ICP-MS) were obtained by Tesser et al. (2022) from 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 and by the Serra Negra granitoids. The later was the basement for deposition of the metasedimentary rocks in the Marancó subdomain (Oliveira et al. 2010). Carvalho (2015) obtained the SHRIMP U-Pb zircon ages of 979.8 ± 3.5 Ma for the Poço Redondo migmatites, and 951 ± 2 Ma for the Serra

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
Suite 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. 2019
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 2013
Monte Orebe Complex	Metabasalt	FRP 073	819 ± 120	Isochron	Sm-Nd	Caxito 2013
Brejo Seco Complex	Metamafic rocks		903 ± 20	Isochron	Sm-Nd	Salgado et al. 2014
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 et al. 1988
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. 2020b
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. 2020b
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

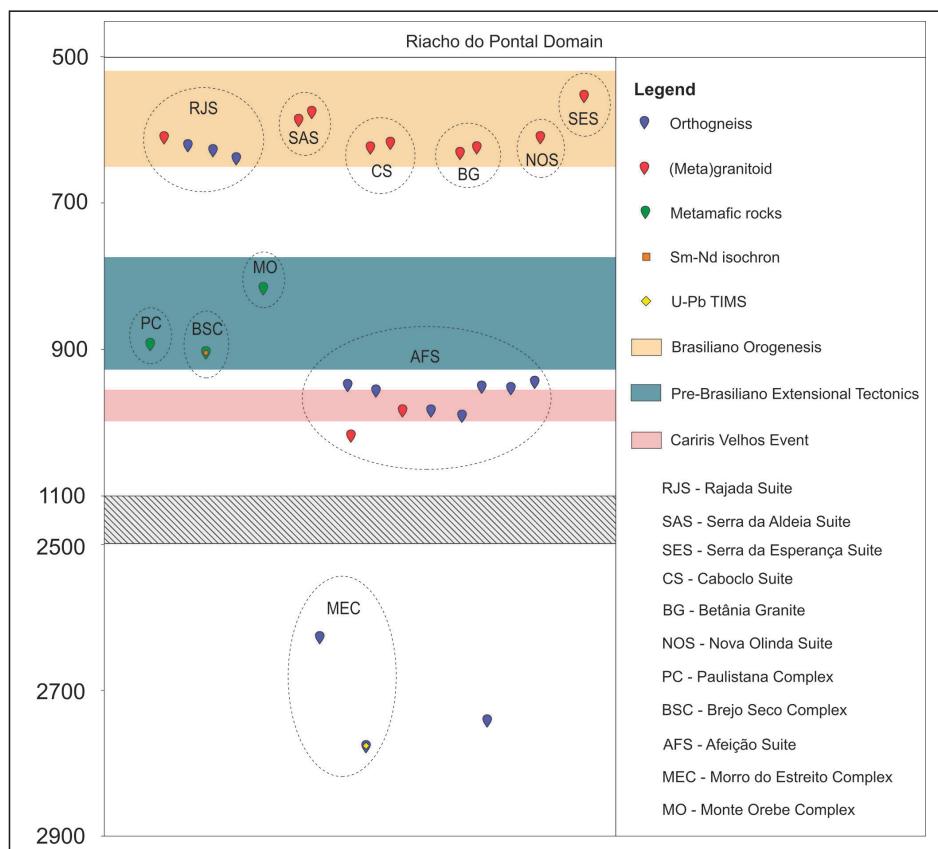


Figure 9. Magmatic barcode graph of the ortho-derived rocks in the Riacho do Pontal Domain compiled from the literature.

Negra granitoids. The Canindé Domain is characterized by metavolcanic, metagranitoid, and gabbroic rocks. An amphibolite sample from the Novo Gosto Unit was dated by Passos et al. (2021), and yields a U-Pb zircon age of 743 ± 3 Ma. Later works published by Passos et al. (2022) present new U-Pb zircon ages (LA-MC-ICP-MS and SHRIMP) for the igneous and metasedimentary rocks of the Canindé subdomain. Three samples of layered gabbroic intrusive rocks were dated by the authors, 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 and 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 two-mica leucogranitoid sheet 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 intruded the Sergipano Domain, mainly the Macururé subdomain (see Table 3).

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	Sousa (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	Aquidabá	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	Sousa et al. (2019)
Poço Redondo	Curituba	Granitoid		617 ± 7	Zrn ID-TIMS	Lima (2016)
Poço Redondo	Queimada Grande Granodiorite	Granodiorite	JUD-91	618 ± 4	Zrn SHRIMP	Oliveira et al. (2015)
Poço Redondo	Poço Redondo Granite	Granite	CRN-11	623 ± 7	Zrn SHRIMP	Oliveira et al. (2015)
Poço Redondo	Sítios Novos	Granite	JUD-96	631 ± 4	SHRIMP	Oliveira et al. (2015)
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)

Table 3 (continued)

Subdomain	Lithostratigraphic unit	Rock type	Sample	Age (Ma)	Mineral/Method	Referência
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. (2015)
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. 2022
Basement	Arapiraca Complex	Diatexite	NE-163	2032 ± 4	Zrn LA-ICP-MS	Tesser et al. 2022
Basement	Arapiraca Complex	Diatexite with sapphirine	NE-30	2029 ± 12	Zrn LA-ICP-MS	Tesser et al. 2022
Basement	Nicolau-Campo Grande Complex	Metarhyolite	NCG 28	2061 ± 9	LA-ICP-MS	Lima et al. 2019
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)

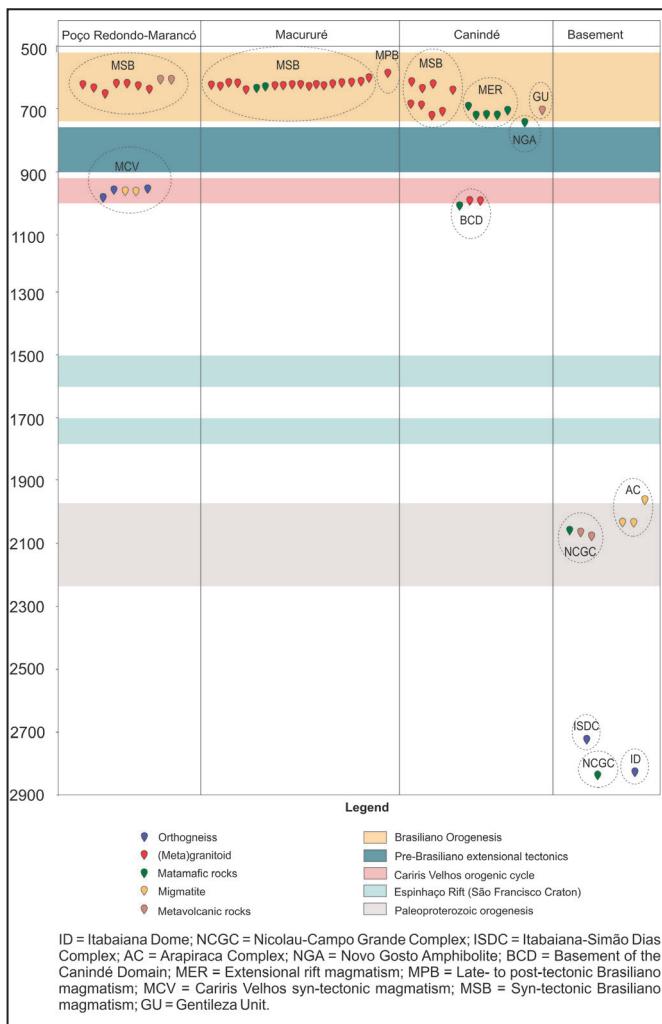


Figure 10. Magmatic barcode with the main U-Pb ages of ortho-derived rocks in the Sergipano Domain compiled from literature.

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 by Cruz et al. (2014a)

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 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 are 1950 Ma and 2020 Ma, respectively.

SHRIMP U-Pb zircon 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 Neoproterozoic maximum depositional age ranging 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.

Detrital zircon data from the metasedimentary rocks of the Rio Una Complex (Figure 12) show a main population in the Tonian (900–1000 Ma), a secondary population in the Paleoproterozoic (1.6–2.2 Ga), a few grains between 600 and 700 Ma, and scattered Archean ages. According to Neves et al. (2009), the youngest detrital zircon suggests a maximum depositional 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 depositional age 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. The 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.

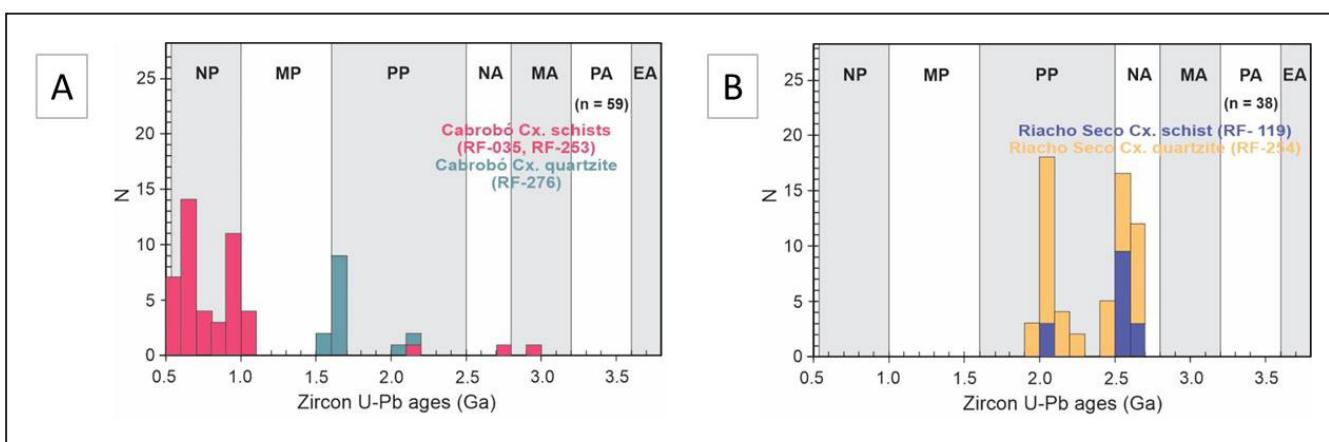


Figure 11. (A) Histogram of U-Pb zircon ages from the Cabrobó Complex; (B) Histogram of U-Pb zircon ages from the Riacho Seco Complex. Data compiled from Cruz et al. (2014a). NP: Neoproterozoic, MP: Mesoproterozoic, PP: Paleoproterozoic, NA: Neoarchean, MA: Mesoarchean, PA: Paleoarchean, EA: Eoarchean.

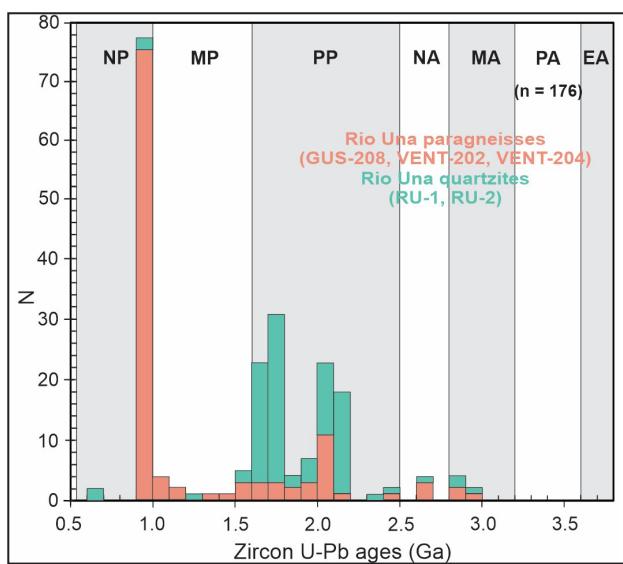


Figure 12. Histogram of U-Pb zircon ages from the Rio Una Complex. Data compiled from Neves et al. (2009) and Silva Filho et al. (2014).

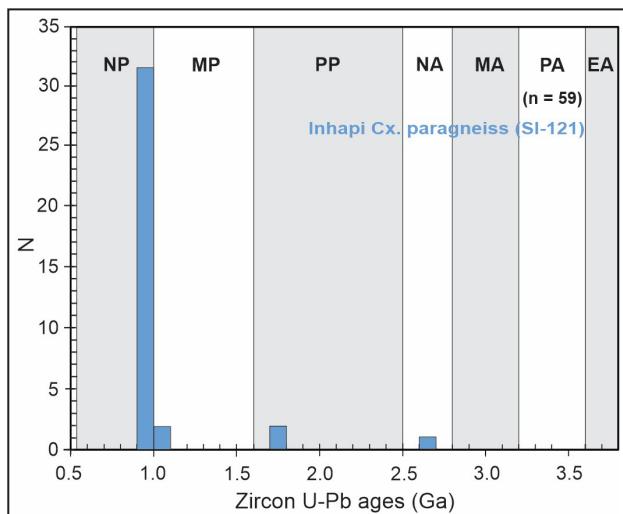


Figure 13. Histogram of U-Pb zircon ages from the Inhapi Sequence. Data compiled from Silva Filho et al. (2014).

4.2.2 Riacho do Pontal Domain

Detrital zircon ages have been compiled for the Paulistana, Santa Filomena and Monte Orebe complexes and the Mandacaru and Barra Bonita formations. 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 large contribution of detrital zircons with Tonian ages (0.9–1.1 Ga), suggesting that the main source area for the Paulistana basin crystallized during the Cariris Velhos Event. In addition, a few zircon crystals indicated Mesoproterozoic ages (1.5–1.6 Ga).

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 are related to three age intervals: Neoarchean (2.5–2.7 Ga); Rhyacian to Calymmian (1.5–2.2 Ga); and Stenian to Cryogenian (0.6–1.2 Ga) (Figures 15A

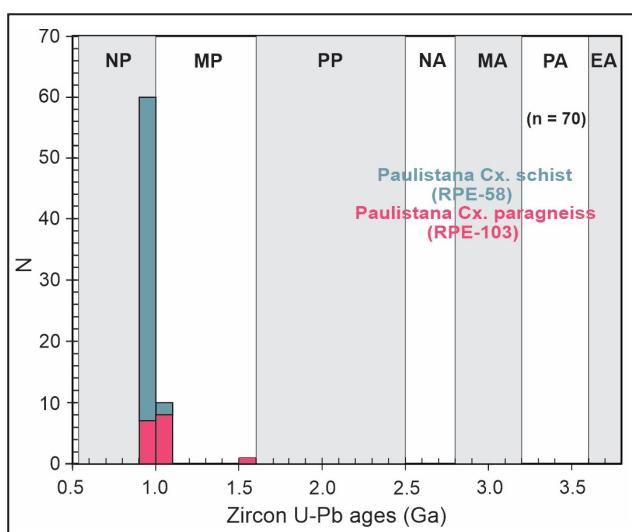


Figure 14. Histogram with U-Pb detrital zircon ages from the Paulistana Complex. Data compiled from Santos et al. (2017).

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 depositional 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.

For the Monte Orebe Complex, geochronological data were compiled from Caxito et al. (2016) (samples FRP 009 and FRP 294) and from Brito Neves et al. (2015) (SRP-Qx-SMO, SRP-TF-AF), totaling 170 detrital zircons. These data exhibits two age peaks (Tonian and Paleoproterozoic), and indicate a sedimentary provenance with distinct sources for 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).

For the Mandacaru Formation, detrital zircon data were compiled from Brito Neves et al. (2015) (samples SRP-MGV-PF and SRP-Gn-33) and from Caxito et al. (2016) (samples FRP 266 and FRP 298). Mandacaru Formation presents three different zircon populations, the most representative shows Tonian ages (0.9–1.0 Ga). The other populations display 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 has a maximum sedimentation age of ca. 650 Ma, based on geochronological data (zircon U-Pb) 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 $eNd_{600\text{ Ma}}$ 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.

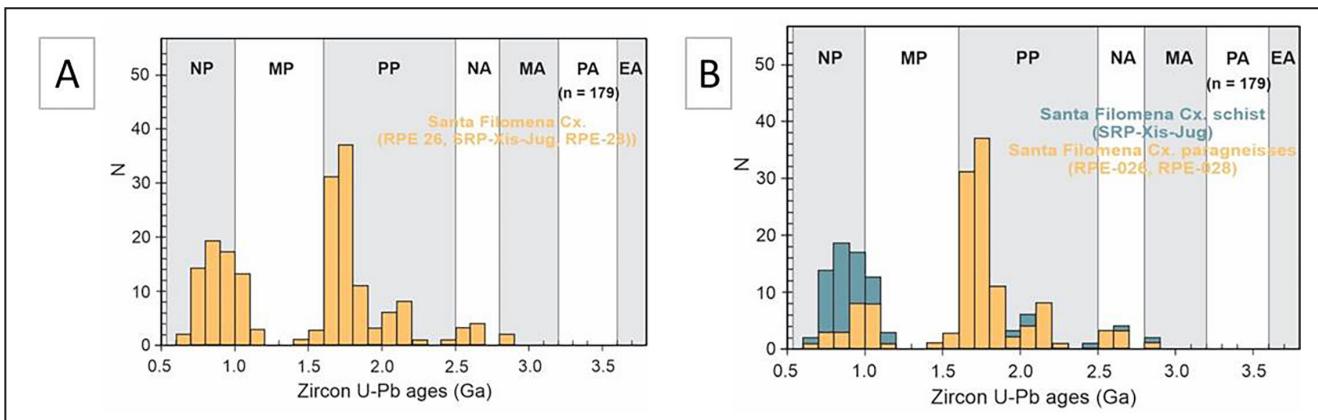


Figure 15. Histogram with U-Pb detrital zircon ages from the Santa Filomena Complex. (B) Histogram with ages classified by lithologies of the Santa Filomena Complex. Data compiled from Caxito et al. (2016).

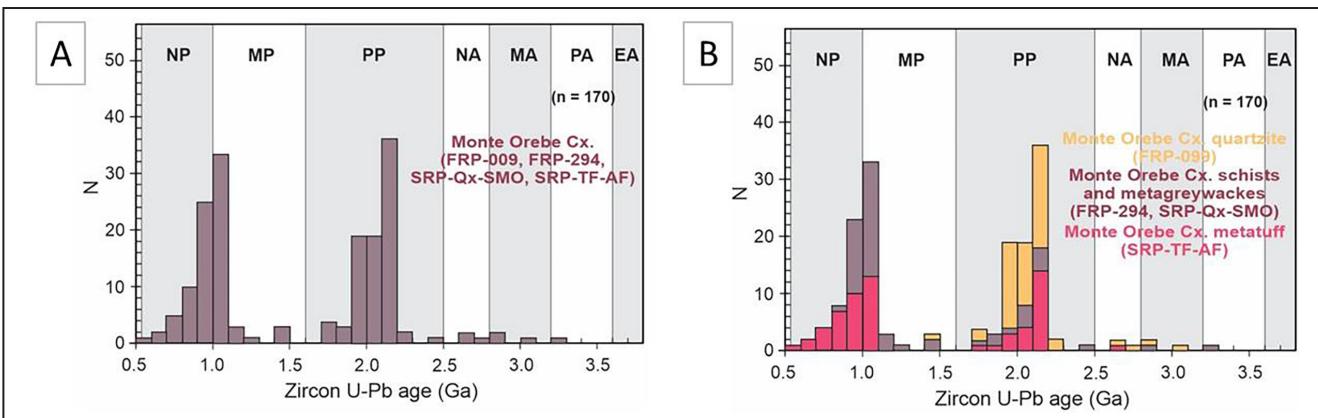


Figure 16. (A) Histogram with U-Pb detrital zircon ages from the Monte Orebe Complex. (B) Histogram for the Monte Orebe Complex, with ages classified by lithology. Data compiled from Caxito et al. (2016) and Brito Neves et al. (2015).

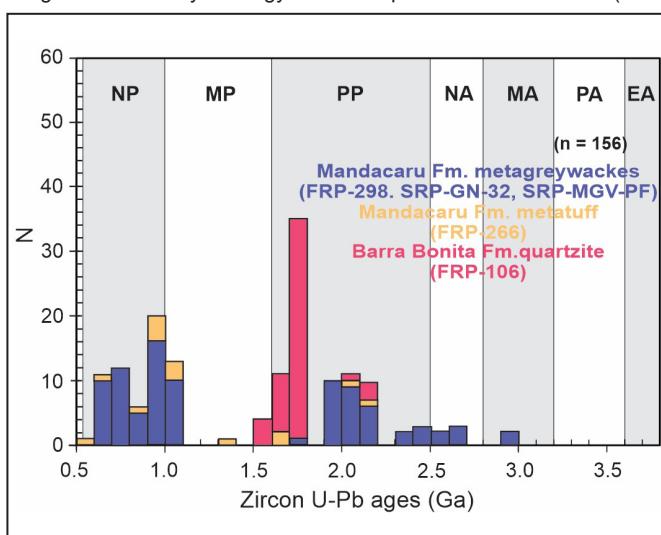


Figure 17. Histogram with U-Pb detrital zircon ages from the Mandacaru Formation. Data compiled from Brito Neves et al. (2015) and Caxito et al. (2016).

Geochronological data compiled for 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 the authors, these ages are compatible with those obtained for samples of the Una Group, which is the cratonic cover in the northern São Francisco Craton. The

compiled detrital zircon ages may represent the erosion of units from the Chapada Diamantina Group and 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 ages from a garnet-biotite schist sample. Given the occurrence of detrital zircon ages ranging from the Mesoproterozoic to the Neoproterozoic, we point out that the Barra Bonita Formation exhibits a zircon age distribution similar to that of the Mandacaru Formation. However, further studies are necessary to investigate a possible correlation between these two formations.

4.2.3 Sergipano Domain

Detrital zircon ages were compiled for the Marancó, Canindé do São Francisco and Araticum complexes, the Ribeirópolis, Frei Paulo and Palestina formations, the Estâncio Group (Acauã, Palmares and Lagarto formations) and the Macurué Group. Data from 129 zircons from quartzites and metaconglomerates of the Marancó Complex obtained by Oliveira et al. (2015) show a main 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 around 980 Ma for this unit.

Detrital zircon grains from the Canindé do São Francisco Complex show Neoproterozoic ages with a main peak at 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 of 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).

The detrital zircon data from four samples of metasedimentary rocks the Novo Gosto Unit (Passos et al. 2022) show an age peak in the Tonian period, and 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.

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 zircon grains from the Itabaiana Formation, which has a main zircon population of Paleoproterozoic age (2.0 to 2.2 Ga), with few contribution of 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 that the Acauã Formation (Figure 22C) has an important zircon population in the Paleoproterozoic (2.1–2.2 Ga), and also that detrital zircon from the Palmares and Lagarto formations fall within a range of approximately 0.5 to 1.0 Ga. A maximum depositional age of 570 Ma was obtained for the Lagarto and Palmares formations by Oliveira et al. (2015). According to these authors, this age is coeval 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).

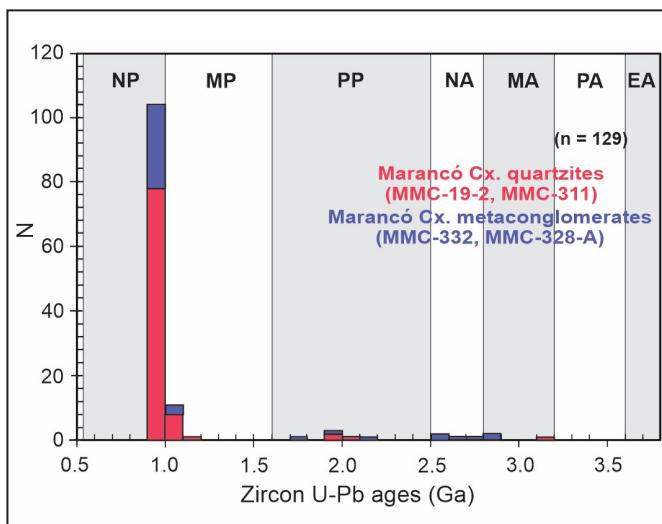


Figure 18. Histogram with U-Pb detrital zircon ages from the Marancó Subdomain. Data compiled from Oliveira et al. (2015).

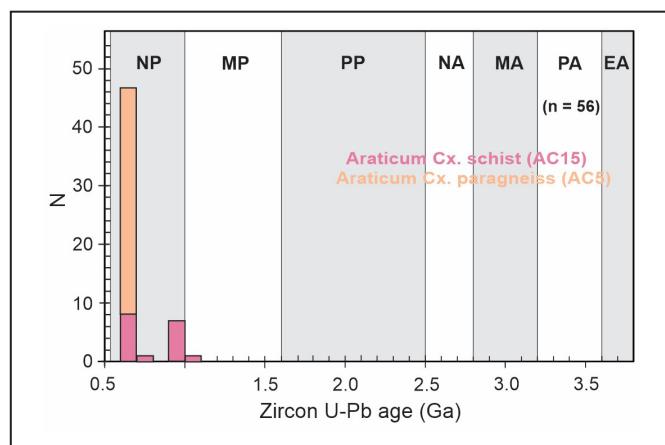


Figure 19. Histogram with U-Pb detrital zircon ages from the Canindé do São Francisco Complex. Data compiled from Oliveira et al. (2015).

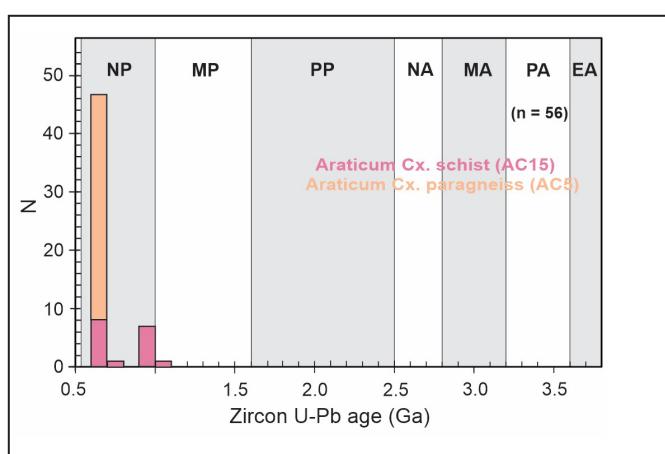


Figure 20. Histogram with U-Pb detrital zircon ages from the Araticum Complex. Data compiled from Lima et al. (2018).

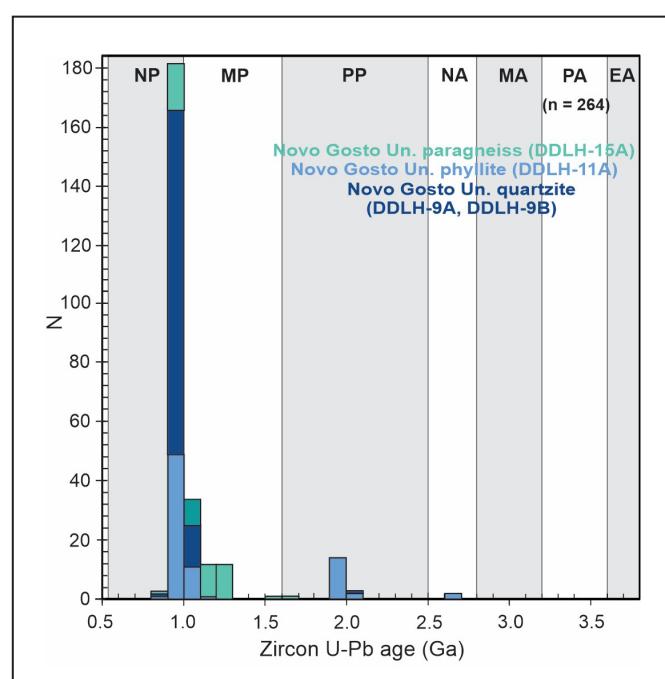


Figure 21. Histogram of U-Pb detrital zircon ages from samples of the Novo Gosto Unit. Data compiled from Passos et al. (2022).

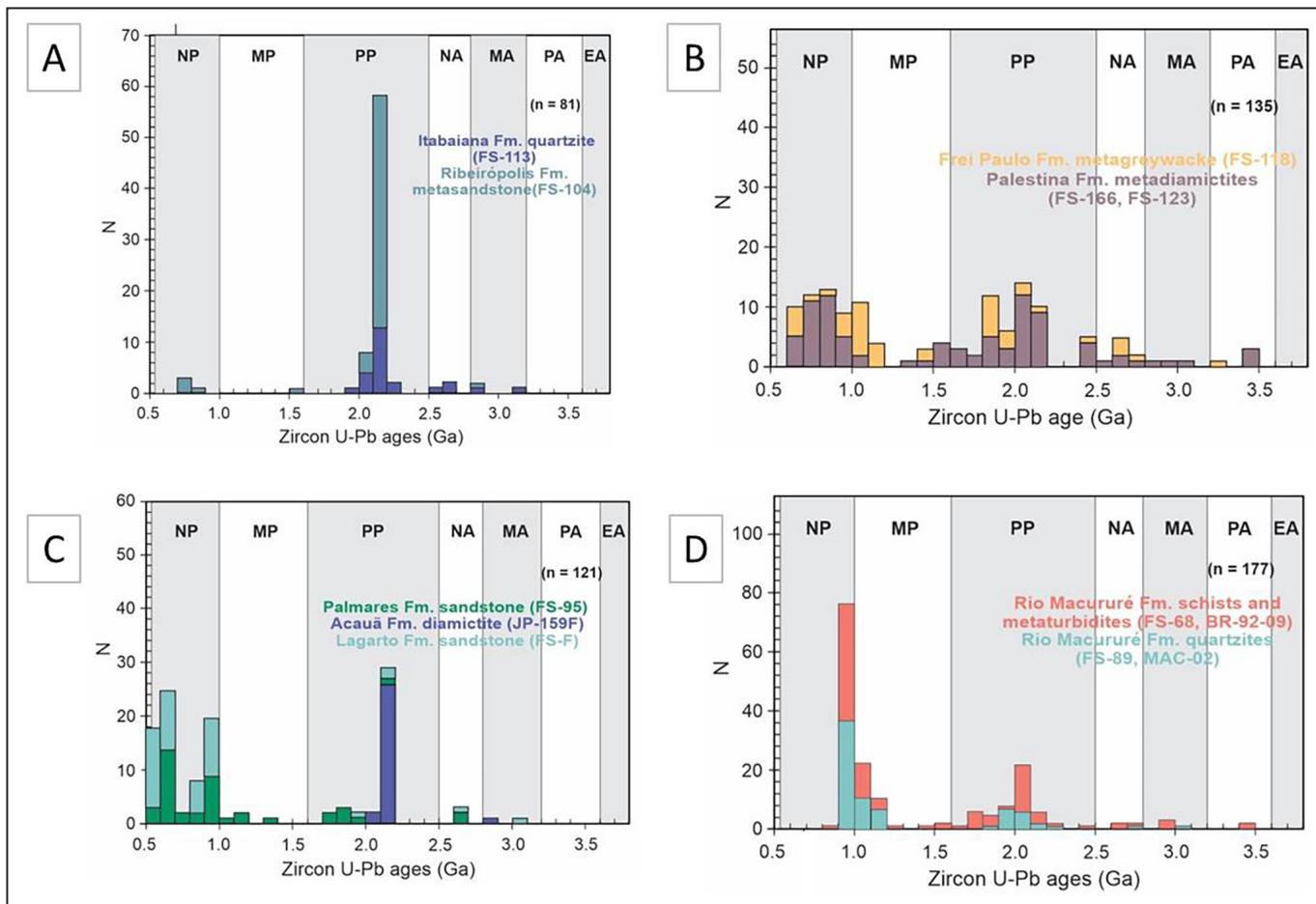


Figure 22. (A) Histograms of U-Pb detrital zircon ages of the Itabaiana and Ribeirópolis formations. (B) Histogram of U-Pb detrital zircon ages of the Frei Paulo and Palestina formations. (C) Histograms of U-Pb detrital zircon ages of the Palmares, Acauã, and Lagarto formations. (D) Histograms of U-Pb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

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 main 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 $^{206}\text{Pb}/^{238}\text{U}$ 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.

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 during the Cariris Velhos Cycle (~1.0 Ga–900 Ma) (Brito Neves et al. 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 this province took place 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 framework 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. The exposed fragments of this basement within the Brasiliano belts are predominantly Paleoproterozoic. 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, including basement rocks, which suggests an intracratonic basin setting, rather than 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 (youngest detrital zircon dated at 554 Ma).

5.1.3 Tonian metavolcano-sedimentary sequences and metaplutonic rocks

In the Southern Borborema Province, the Tonian is 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. 2014a), during the orogenesis known as Cariris Velhos (~1000–900 Ma). However, Guimarães et al. (2016) propose that these rocks are associated to an extensional, setting based on 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 seafloor spreading. This rifting allowed for the deposition of the Tonian supracrustal sequence of the Paulistana Complex, the mafic-ultramafic intrusions of the Brejo Seco Complex, and the metabasalts with oceanic crust chemical composition of the Monte Orebe Complex. Associated with these sequences are the passive margin sedimentary rocks 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 either in an anorogenic intracontinental setting or in a syn-orogenic arc setting. Nascimento (2005) proposed that this domain corresponds to an intracontinental rift sequence, while Passos et al. (2021) interpreted it as part of an arc-back-arc setting. 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 similar to those 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 on the lithostratigraphic units comprised by 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, based on a thorough compilation of ages with 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 diagrams help infer that granitoid magmatism in the three domains predominantly occurred during specific time intervals. 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 intrusive bodies represent the Cariris Velhos magmatism, but the majority of the compiled data corresponds to granitoid plutons emplaced during the Brasiliano Orogeny (ages ranging from 643 ± 2 to 588 ± 5 Ma). The compiled data presented in this paper support the hypothesis of diachronic evolution between the three domains of the Southern Borborema Province. In general, based on the geological profiles, histograms, and magmatic barcode diagrams, we interpret the evolution of the Southern Borborema Province as a succession of multiple collisional and extensional episodes that began with the rifting of the Rodinia supercontinent. The Brasiliano Event reworked the framework of the Southern Borborema Province and, reactivating previous structures along crustal 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 Orogeny. 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 between the two domains.

It is worth highlighting that the Southern Borborema Province requires further studies and new isotopic, geochemical and structural data for a better understanding of the processes involved in the genesis of its different domains, their spatio-temporal relationships, and further implications for the geodynamic history 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.

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