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GEOLOGICAL AND STRATIGRAPHIC CHARACTERIZATION OF THE REGION NORTH OF INAJÁ (PE), JATOBÁ BASIN, NORTHEAST BRAZIL

Daniele de Melo Mendes[1]; Juliana Guzmán González[2]; Virgínio Henrique de Miranda Lopes Neumann[3], Enelise Katia Piovesan[4]

[1]Geologist, Department of Geology, Federal University of Pernambuco (UFPE), Recife/PE, Brazil.
ORCID: https://orcid.org/0000-0001-9884-7100
Email: danimelo.21@hotmail.com

[2]Master's in Geoscienses, Department of Geology, Federal University of Pernambuco (UFPE), Recife/PE, Brazil.
ORCID: https://orcid.org/0000-0001-7898-049X
Email: julitaguzmang@gmail.com

[3]Ph.D. in Geoscienses, Department of Geology, Federal University of Pernambuco (UFPE), Recife/PE, Brazil.
ORCID: https://orcid.org/0000-0002-8827-6022
Email: neumann@ufpe.br

[4]Ph.D. in Geoscienses, Department of Geology, Federal University of Pernambuco (UFPE), Recife/PE, Brazil.
ORCID: https://orcid.org/0000-0002-0433-0395
Email: katiapiovesan@gmail.com

Abstract

This paper presents the results of the geological mapping on a 1:50,000 scale of an area of 100 km^2 in the Jatobá Basin, north of the municipality of Inajá, in the interior of Pernambuco state, northeastern Brazil. The stratigraphic units have great lithological similarity, requiring detailed studied to distinguish them. The petrographic analyzes allowed the monitoring of lithological and particle size transitions of the depositional systems that configure the syneclises, early rift and rift stages. The biostratigraphical studies made it possible to identify three ostracode biozones for the studied basin: RT-001 (Aliança Formation), RT-003 (Candeias Formation) and RT-004 to RT-007 (Ilhas Group), determining the biochronostratigraphical dating of the units based on non-marine ostracodes in the Dom João (Tithonian), Rio da Serra (Berriasian–Hauterivian), Aratu (Hauterivian–late Barremian) and early Buracica (Barremian) local stages. The data obtained resulted in the updating of the stratigraphic chart of the Jatobá Basin.

Keywords: Geological mapping, sedimentology, biostratigraphy.

CARACTERIZAÇÃO GEOLÓGICA E ESTRATIGRÁFICA DA REGIÃO A NORTE DE INAJÁ (PE), BACIA DE JATOBÁ, NORDESTE DO BRASIL

Resumo

Neste trabalho são apresentados os resultados do mapeamento geológico na escala 1:50.000 de uma área de 100 km^2 na Bacia de Jatobá, ao norte do município de Inajá, interior do estado de Pernambuco, Nordeste do Brasil. As unidades estratigráficas possuem grande similaridade litológica, demandando a realização de estudos detalhados para sua distinção. As análises petrográficas permitiram o acompanhamento das transições litológicas e granulométricas dos sistemas deposicionais que configuram as fases sinéclise, início e clímax de rifte. Os estudos bioestratigráficos possibilitaram a identificação de seis biozonas de ostracodes para a bacia estudada: RT-001 (Formação Aliança), RT-003 (Formação Candeias) e RT-004 a RT-007 (Grupo Ilhas), determinando o posicionamento biocronoestratigráfico das unidades com base em ostracodes não-marinhos nos andares Dom João (Tithoniano), Rio da Serra (Berriasiano-Hauteriviano), Aratu (Hauteriviano-Eobarremiano) e Buracica (Barremiano). Os dados obtidos resultaram na atualização da carta estratigráfica da Bacia de Jatobá.

Palavras-chave: Mapeamento Geológico, sedimentologia e estratigrafia.

CARACTERIZACIÓN GEOLÓGICA Y ESTRATIGRÁFICA DE LA REGIÓN AL NORTE DE INAJÁ (PE), CUENCA DE JATOBÁ, NORDESTE DE BRASIL

Resumen

En este trabajo son presentados los resultados de la cartografía geológica en escala 1:50.000 de un área de 100 km^2 en la Cuenca de Jatobá, al norte del municipio de Inajá, interior del estado de Pernambuco, Nordeste de Brasil. Las unidades estratigráficas tienen grande similitud litológica, demandando la realización de estudios detallados para su distinción. Los analices petrográficos permitieron el acompañamiento de las transiciones litológicas y granulométricas de los sistemas deposicionales que configuran las fases sineclise, inicio y clímax de rift. Los estudios

bioestratigráficos permitieron la identificación de seis biozonas de ostrácodos para la cuenca estudiada: RT-001 (Formación Aliança), RT-003 (Formación Candeias) y RT-004 a RT-007 (Grupo Ilhas), determinando el posicionamiento biocronoestratigráfico de las unidades con base en ostracodes no-marinos en los pisos locales Dom João (Tithoniano), Rio da Serra (Berriasiano–Hauteriviano), Aratu (Hauteriviano-Eobarremiano) y Buracica (Barremiano). Los dados obtenidos resultaron en la actualización de la carta estratigráfica de la Cuenca de Jatobá.

Palabras-clave: Cartografía geológica, sedimentología, bioestratigrafía.

1. INTRODUCTION

This work has as object of study the Jatobá Basin, using different methodologies for geological mapping. Through lithological and petrographic analysis, the Inajá, Aliança, Candeias Formations and the Ilhas Group were identified. Additional to these analyses, the results of biostratigraphy based on non-marine ostracodes were integrated, updating the Jatobá Basin stratigraphic chart. The characterization of the area was based on the Poço da Cruz map sheet (1:100,000), published by CPRM (Geological Survey of Brazil, 2017). Aiming to elaborate a geological map in detail scale, we identified the limits and contacts of the formations belonging to the syneclise, early rift and rift-climax phases of a portion of the Jatobá Basin to the north of the municipality of Inajá-PE.

The Jatobá Basin is located in the state of Pernambuco, it occupies an area of approximately 5,000 km² with a general NE-SW orientation. Its sedimentation records the important evolution of the Recôncavo-Tucano-Jatobá (RTJ) Rift system, aborted in the early Aptian, related to the separation of the continents of South America and Africa, originating the South Atlantic Ocean (Costa *et al*., 2007). This basin is located on the Pernambuco-Alagoas Terrane in the Borborema Province, NE of Brazil. It marks the inflection of the general orientation of the aborted intracontinental RTJ Rift system, from N-S to N70ºE. Its structure is controlled by the Pernambuco Shear Zone and other associated Neoproterozoic shear zones reactivated in the Mesozoic, such as the Ibimirim Fault, N-NW boundary of the basin, which controls its depocenter (Magnavita & Cupertino, 1987). Its other structural boundaries are the São Francisco fault to the west; and to south and east it is in contact with the basement through nonconformities or small faults (Costa *et al*., 2007).

Structurally, the Jatobá Basin is characterized by a half-graben consisting predominantly of rotated and tilted blocks towards NW, with the generation and evolution of the basin being related to transtension zones due to the strike-slip regime (Peraro, 1995). Its internal morphology portrays asymmetric grabens, which in the Recôncavo and Tucano Central Basins dip to the southeast, present themselves in the Jatobá Basin with inverted dipping to NW from the Vaza Barris Arch (Magnavita & Cupertino, 1987).

For this work, the lithostratigraphic nomenclature adopted is based on the revisions of Braun (1966), Viana *et al.* (1971), Caixeta *et al*. (1994) and Costa *et al*. (2007) later modified including the Santana Group by Neumann *et al*. (2009, 2010), Rocha (2011) and Neumann & Rocha (2013) based on studies in Serra Negra and Serra do Periquito. In addition, the proposals of Kuchle (2010) for the Dom João Stage in all northeast Brazilian basins and Fambrini *et al.* (2010, 2011) for the Araripe Basin, based on the models of Prosser (1993) and revised by Guzmán *et al.* (2015) were considered for the tectono-sequences present in the studied basin. The tectono-stratigraphic classification, according to the aforementioned authors, consists of the sequences: Syneclise (Tacaratu and Inajá Formations), Early Rift (Sergi and Aliança Formations), Rift-Climax (Candeias and São Sebastião Formations, Ilhas Group) and Post-Rift (Marizal, Crato, Romualdo and Exu Formations). The work presented here is restricted to four recognized lithostratigraphic units for the study area to the north of the municipality of Inajá, Jatobá Basin: Inajá Formation (Di), Aliança Formation (J3a), Candeias Formation (K1ca) and Ilhas Group (K1i), in addition to recent cover (NQc).

2. METHODOLOGY

The study area is located on the surroundings of the municipality of Inajá, in the south-central region of the state of Pernambuco, Northeast Brazil. Inajá is approximately 398 km far from Recife and its main access roads are BR-232, PE-336 and PE-300. The mapped region comprises 100 km², being limited by the UTM coordinates, Datum WGS 84, zone 24L, 628000-638000 E / 9022000-9032000 N (geographic coordinates 37º50’10” W - 37º44’43” W / 8º50’32” N - 8º45’05” N) (Figure 01).

The methodological procedures involved laboratory and field phases. Based on the geological mapping carried out by CPRM in the Poço da Cruz map sheet SC.24-XA-VI (scale 1:100,000), for the layout of unpaved roads a preliminary map was elaborated through interpretations of recent images extracted from the *Google Earth Pro* and integrated with remote sensing images and previously mapped geological data.

The developed preliminary map was intended to assist in the field activities, allowing the assessment with other maps, such as the topographic Poço da Cruz sheet, both executed in the field by the mobile app *Avenza Maps.* To make the final geological map, stratigraphic profiles and stereograms, the software used were *ArcMap* 10.5, *QGIS* 2.18.15, *CorewDRAW* X9 and *Grapher* 9, respectively.

The geological characterization was based on the study of 79 outcrops. A total of seven petrographic slides were made and analyzed under a microscope *Olympus BX5*. For the biostratigraphic analyzes, 30 samples were collected and processed at the Applied Micropaleontology Laboratory (LMA), UFPE. The samples were prepared according to the standard procedures for recovering carbonate microfossils and picked up under a stereomicroscope *Stemi* 305 - *Zeiss*, the specimens were placed in specific slides according to observed morphological similarities. The best-preserved specimens of each morphotype were selected and photomicrographed in the Nanostructures Laboratory (LDN-UFPE) and in the ittFossil (UNISSINOS).

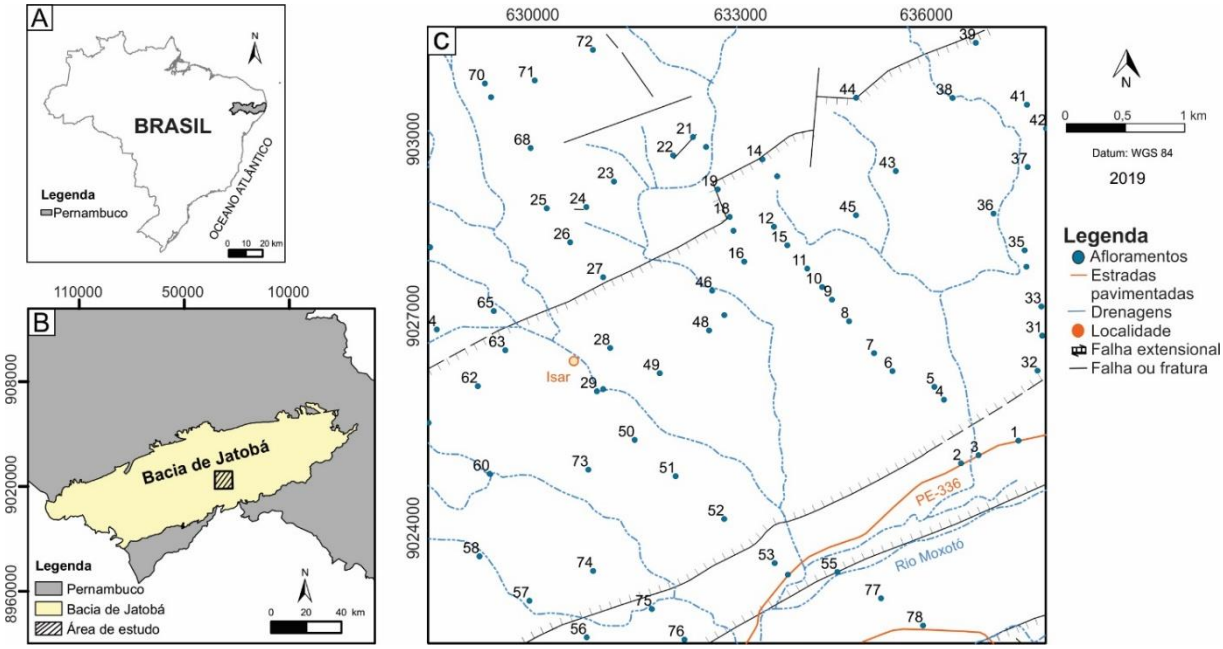

Figure 01 - (A) Location of the study area. (B) Jatobá Basin. (C) Map of outcrops.

3. LITHOSTRATIGRAPHIC CHARACTERIZATION

From the collected data, four units were recognized in the region to the north of the municipality of Inajá and new faults were added to the mapping previously performed by CPRM (2017). The NW-SE stratigraphic profile was dimensioned in order to refine the contacts of the units. The fault dips adopted are based on the seismic profile used by CPRM in Poço da Cruz map sheet (Figure 02).

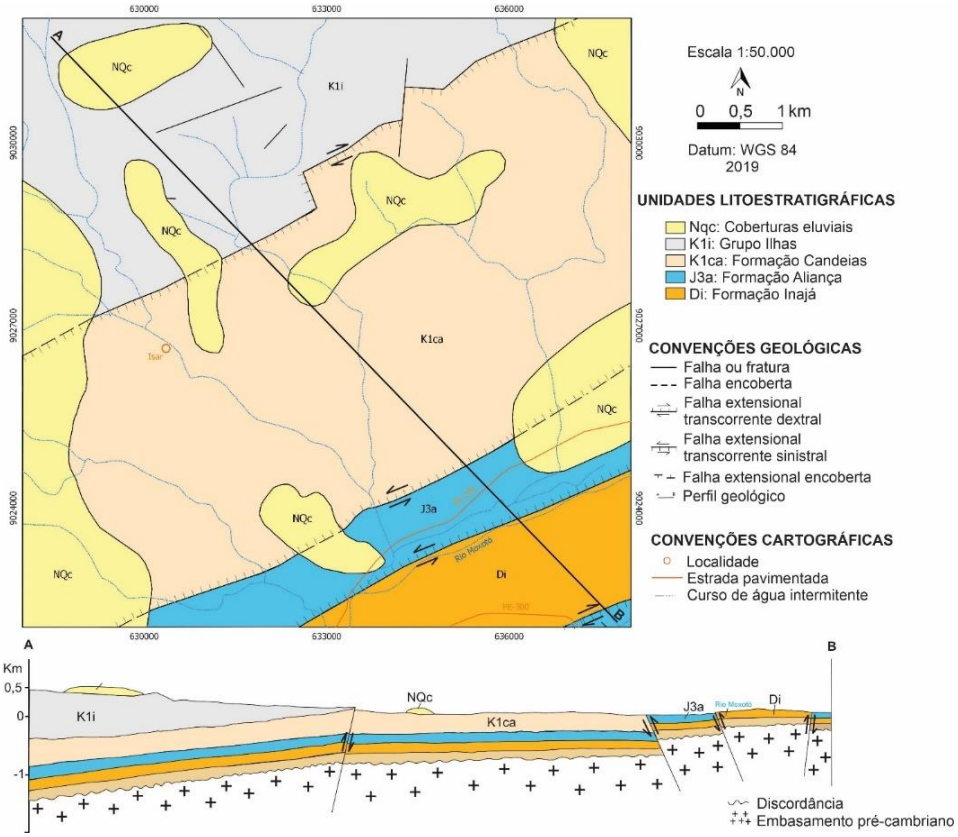

Figure 02 - Map and geological profile in scale 1:50.000 of the region to the N of the municipality of Inajá (PE).

3.1. Inajá Formation

This stratigraphic unit makes up about 7% of the mapped area, covering approximately 7,345 km². In its extension occur fine- to medium-grain arcosian sandstones with a beige to pink color, sometimes whitish with conglomeratic levels and tangential cross-stratification. Locally, the medium-grained whitish sandstone displays iron oxide alteration, which is reflected in its reddish color (Figure 03).

The contact relations of Inajá Formation with the underlying Tacaratu Formation and with the overlying Aliança Formation, usually have a gradual and conformable character with the first and faulted with the second. Extension faults occur locally in both cases (Rocha & Amaral, 2007).

The lithology of the Inajá Formation, together with the sedimentary structures, allows to infer a shallow marine depositional environment, as observed by Rocha & Amaral (2007) and later corroborated by Pereira *et al*. (2012).

The petrographic description of the Inajá Formation was based on a single thin section made from the point BJ-DM-55. The rock in question is composed predominantly of subhedral to anhedral grains of monocrystalline quartz, sometimes polycrystalline. Rare lamellas of subhedral muscovite and euhedral to subhedral plagioclase. It is fine- to medium-grained, has detrital matrix and autogenic silica cement, being classified as fine- to medium-grained quartzarenite (Figure 03 C-D).

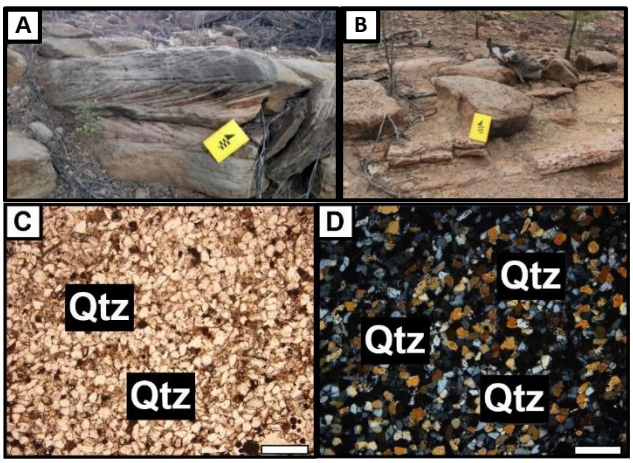

Figure 03 – Outcrop features of the Inajá Formation (A) point BJ-DM-55, medium-grained sandstone with trough cross-bedding; (B) point BJ-DM-55, medium-grained whitish sandstone locally mottled by iron oxides; (C) photomicrography of the BJ-DM-55 slide characterized by subhedral and anhedral quartz grains (parallel nicols, 4x objective, 1 mm scale); (D) same view with crossed nicols.

3.2. Aliança Formation

The Aliança Formation outcrops in the SE portion and extends continuously to the SW of the mapped area, it is bounded by dextral and sinistral transcurrent faults in the NE-SW direction. It corresponds to 6% of the area, with approximately 6,845 km² of extension.

Of Tithonian age, the Aliança Formation conforms the bottom of the Brotas Group and represents the first tectonic stage of Early Rift of the Jatobá Basin (Kuchle *et al*., 2011). In the Jatobá Basin, only the Capianga Member is registered, constituting the lake phase of the Aliança Formation (Rocha & Amaral, 2007). Kuchle *et al*. (2011) refer to this member as the deposition of the Capianga Lake in the Afro-Brazilian depression.

This formation is composed by intercalations of red and greenish-gray mudstones and shales, with very fine-grained, beige to brownish sandstones, ostracode coquinas are locally found (Figure 04).

Figure 04 - BJ-DM-56 Outcrop, Aliança Formation, dry tank deposit with recente desiccation cracks at the bottom (indicated by the arrow).

Overall, the Aliança Formation occurs in low and moderately flat areas due to the predominantly pelitic nature with weak vegetation density (Rocha & Amaral, 2007). At the SSW boundary of the area, the Aliança Formation displays its typical form of exposure with the basal level of the outcrop marked by the presence of ostracode and conchostracan coquina (bioclastic limestone). From bottom to top, the overlying levels are composed of interbedded whitish, green and red-whitish calciferous claystones, in addition to siltstones with gypsum levels with abundant occurrence of ostracodes (Figure 05 A-B). This lithological set is typical of the Aliança Formation and represents the remaining pelitic package of sedimentation in a lacustrine environment to which the unit is assigned, as also appointed by Rocha & Amaral (2007).

It is likely that the Aliança Formation was deposited in shallow and oxygenated waters, a fact explained by its red color, due to the concentration of iron oxide and the autochthone soils formed under a tropical climate. The presence of thin layers of gypsum in this formation indicates that there was evaporation in the lake, which shows a markedly dry climate (Braun, 1966).

The Aliança Formation presents erosional unconformity contact with the Inajá Formation, in this base, while its superior contact with the Sergi Formation, when it occurs, is of gradational type (Medeiros & Ponte, 1981). There are records that the Sergi Formation outcrops along the contact extent between the Aliança and Candeias Formations. These data come from CPRM (2017) in the Poço da Cruz map sheet report, however they were not presented in the final map due to the mapped scale (1:100,000). In the area here studied (scale 1:50,000), the Sergi Formation does not outcrop, and the contact between the Aliança and Candeias Formations is considered an unconformity.

From the Aliança Formation, the petrographic analysis consisted of the BJ-DM-76 thin section classified as a bioclastic limestone with a micritic matrix, a framework consisting of ostracode bioclasts and carbonate syntaxial cementation (Figure 05 C-D).

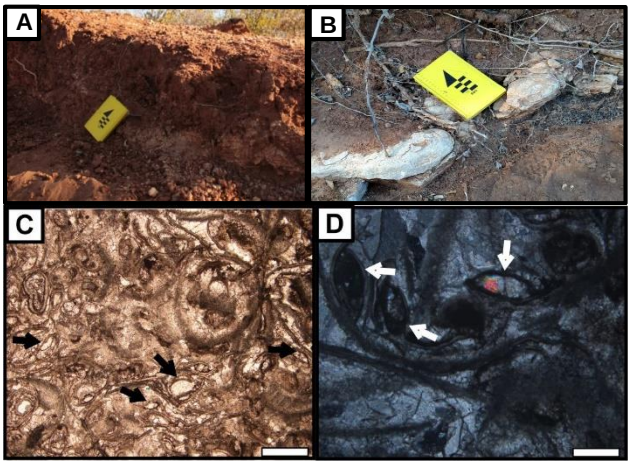

Figure 05 - Point BJ-DM-76; (A) intercalations of calcareous claystone and siltstone with gypsum levels; (B) basal bioclastic limestone of the Aliança Formation. (C) Photomicrography of the bioclastic limestone of the point BJ-DM-76 (parallel nicols, 4x objective, 1mm scale); (D) highlight to the ostracode carapaces (crossed nicols, 10x objective, 500µm scale).

3.3. Candeias Formation

The Candeias Formation is the most representative unit, counting up 44% of the mapped area, with approximately 43,951

km² of extension. It outcrops from the SW region to the NE, predominating in extension in the central portion of the area.

This formation represents the beginning of the Rift-climax phase in the Jatobá Basin (Kuchle, 2010), consisting of two distinct lithological sets that express a variation of facies. The first sedimentary package has a pelitic character of lacustrine environment. Subsequently, a shallow fluvial-lake deposition shows the deltaic sandstones that also outcrops of this unit (Rocha & Amaral, 2007).

The pelitic sediments that outcrop of the lacustrine facies of the Candeias Formation are represented by intercalations of red and greenish siltstones and claystones, with local levels of gypsum and fine to very fine-grained, whitish quartzarenites, sometimes calciferous, with rare clay intraclasts (Figure 06).

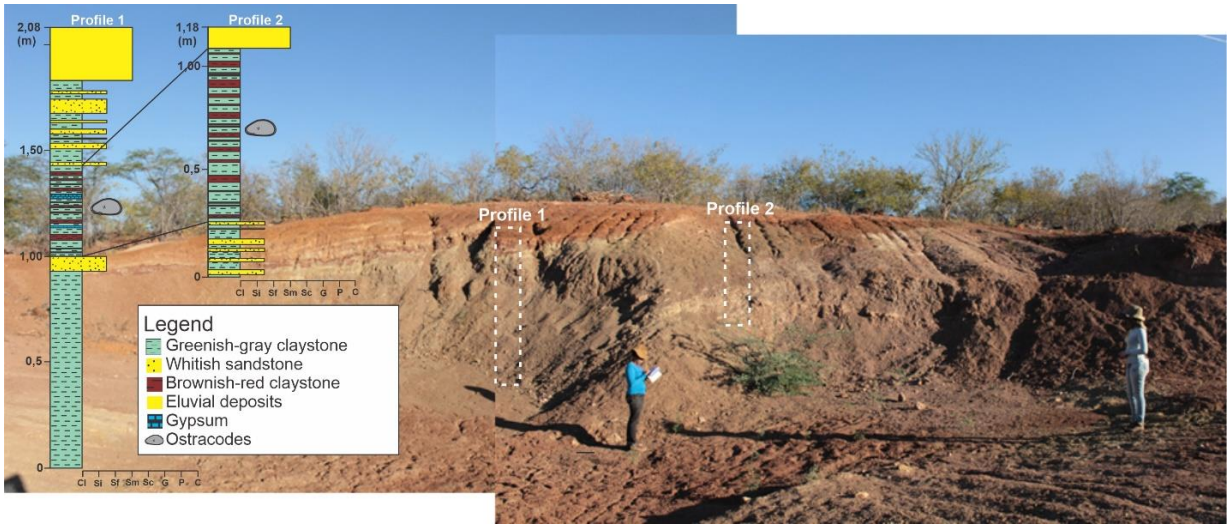

Figure 06 – Panoramic view of the outcrop BJ-DM-30 and detailed stratigraphic sessions.

The fluvial facies of the Candeias Formation record whitish sandstones, these are well selected, well rounded, mature, with mica and cut by countless deformation bands. The rocks of these facies follow the 270ºAz bedding trend, oriented according to a large scale sinistral-transcurrent fault that intersects the N boundary of the unit. The sandstones with a high population of deformation bands reflect the Berriasian well established tectonism that marks the beginning of the rift-climax, a time of great extensional activitiy in the Jatobá Basin. The deformation bands have a preferential NW direction and two secondary ones for E-SE and SW (Figure 07 A-B).

The petrographic characterization of the Candeias Formation was based on three thin sections with samples from the outcrops BJ-DM-09, BJ-DM-17, BJ-DM-26, the three belonging to the fluvial facies of the Candeias Formation. The BJ-DM-09 thin section is a medium-grained mature sandstone, with moderate selection, grains rounded to sub-angular and an anhydrous grain shape with cementation by iron oxides of film type (Figure 07 C-D). The BJ-DM-17 thin section was described as a rock with a psammitic texture, very well selected, mature, with anhydrous quartz grains and film cementation of Fe oxides. The BJ-DM-26 thin section is mineralogically constituted by anhydrous grains of monocrystalline quartz and rare occurrences of biotite. The rock has moderately to poorly selected grains, with straight, concave-convex and sutured contacts.

Costa *et al*. (2007) characterize the Candeias Formation as the product of a tectonism that would have structured some basins, combined with a progressive climate humidification, that resulted in the implantation and subsequent expansion of the lake system. The events that would have occurred during the beginning of the Berriasian, originating discontinuous deltaic sandstones interbedded in the pelitic section to the flexural areas, must be related to the frequent oscillations of the base level of the paleolake (Costa *et al*., 2007). Field considerations and paleontological analyzes corroborate the shallow fluvial-lacustrine depositional environment, with frequent sub-aerial exposures (Rocha & Amaral, 2007).

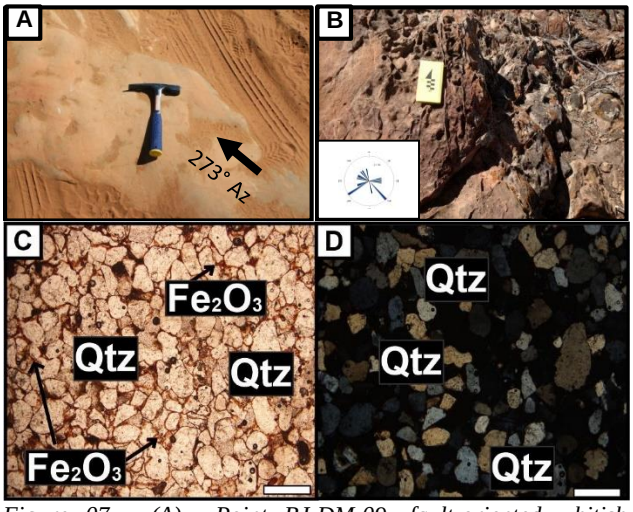

Figure 07 - (A) Point BJ-DM-09, fault-oriented whitish sandstone. (B) Point BJ-DM-11, deformation bands associated to the sandstone of the Candeias Formation and rosette diagram with polymodal projection of the deformation bands. (C)

Photomicrographies of the BJ-DM-09 thin section composed of medium sandstone from grains sub-rounded to sub-angular with skin cementation by iron oxides (4x objective, parallel niches, 1mm scale), (D) same view with crossed nicols.

3.4. Grupo Ilhas

The Ilhas Group represents 20% of the mapped area, which corresponds to approximately 19,798 km² of extension. When it outcrops, its rare basal exposure consists of greenish-gray shales interspersed with gray medium- to fine-grained sandstones, with Fe oxide concentrations at the base, in addition to reddish claystones with a high concentration of iron oxide interbedded in the greenish-gray shale. (Figure 08).

Figure 08 – Outcrop BJ-DM-68, Ilhas Group. The base is marked by a greenish-gray shale, at the top there are medium to thick sandstones, oriented at 270º Az.

The Ilhas Group occurs, almost in its totality, in high topography in the form of hills, it is constituted also by pink, medium- to very fine-grained quartzarenites, these are well rounded, moderate to well selected and present significant occurrence of muscovite. Sometimes, the color of the sandstones varies from whitish to reddish due to the absence or intensity of cementation by iron oxides and hydroxides. The Ilhas Group deposits are in the form of tabular strata that can reach tens of meters in thickness (Queiroz *et al.*, 2017). Structurally, stand out cross-stratification, channel filling structures and deformation bands. Some selection and granulometry variations occur in the sedimentary package that constitutes the Ilhas Group (Figure 09).

The deposition of the Ilhas Group occurred during the middle part of the Rio da Serra Stage (late Berriasian/early Valanginian), indicated by biostratigraphical data of non-marine ostracodes and palynomorphs. It represents a moment of tectonic activity reduction in the Jatobá Basin. From the flexural border are present characteristic deposits of deltaic fronts of the Ilhas Group prograding over the lacustrine sediments of the Candeias Formation, initiating the aggradation of the basin (Caixeta *et al*., 1994; Costa *et al*., 2003; Costa *et al*., 2007).

Through the biostratigraphical results based on non-marine ostracodes, it was possible to observe the extension of the Ilhas Group up to the early Barremian, with occurrence of faunas belonging to the biozones RT-004 (Rio da Serra Stage), RT-005 and RT-006 (Aratu Stage) and RT-007.1 (early Buracica Stage).

The BJ-DM-68 thin section, which belongs to the Ilhas Group, has monocrystalline and polycrystalline quartz grains, plagioclase with polysynthetic intergrowing, microcline, chert and muscovite. The rock displays poorly selection and rounded grains and it is named sublitharenite (Figure 09 C-D), according to the Folk classification, 1974.

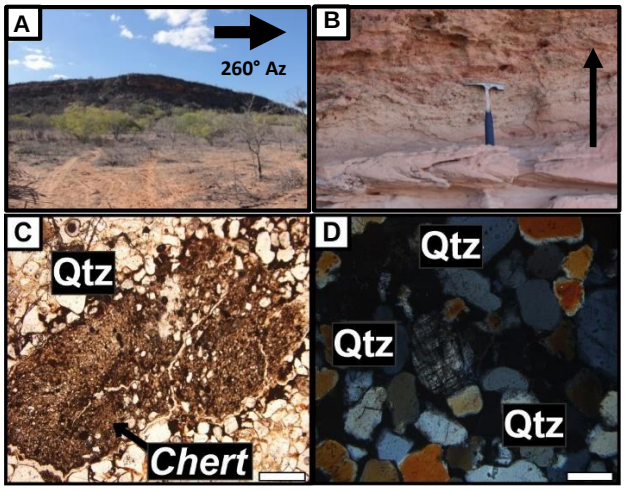

Figure 09 - (A) Main geomorphology of occurrence of the Ilhas Group, commonly arranged in the form of hills. (B) Point BJ-DM-44, coarsening upward in pink sandstone. (C) Photomicrography of the BJ-DM-68 thin section, sublitharenite consisting of monocrystalline and polycrystalline quartz with rare grains of chert (parallel nicols, 4x objective, 1mm scale); (D) rare occurrences of microcline (crossed nicols, 10x objective, 500µm scale).

3.5. Eluvial covers

Quaternary deposits cover 23% of the area, adding up to 23,410 km^2. They are characterized by medium- to fine-grained quartzarenites, sometimes associated to eroded clasts from the Exu Formation. Occasionally, the quaternary sands associated to

the angular fragments of the Exu Formation, form scree deposits at the base of crags that characterize the Ilhas Group morphology. The eluvial deposits occur frequently with adjacent *caatinga* vegetation and with color variation. These color changes follow the lithological variations of the contiguous units. For example, near the regions where the Aliança and Candeias Formations outcrop, the eluvial deposits vary from reddish-brown to dark brown. Nearby the Ilhas Group, these deposits are commonly expressed in light shades ranging from beige whitish. This color variation is also related to the intensity of the weathering to which the deposit is subject, considering its topographic position.

4. EVOLUTIONARY AND BIOESTRATIGRAPHIC SYNTHESIS

The Aliança and Candeias Formations and the Ilhas Group outcrop in the interior basins of northeastern Brazil, these show great lithological similarity, which makes difficult to characterize and map these units.

The petrographic analyzes allowed to observe the granulometric transitions of the depositional systems that configure the tectono-sequences of syneclise, early rift and rift-climax in the Jatobá Basin. In the Inajá Formation, primarily, there is the deposition of fine- to medium-grained sandstones indicating a shallow marine environment during the Devonian.

In the Aliança Formation, the deposition of pelitic rocks characterize the bottom fluctuation of a shallow lake with eventual carbonate deposition, typical facies of a low-energy and low-gradient littoral with balanced-fill hydrology (Guzmán-Gonzalez *et al*., 2020). Later, similar pelitic associations occur intercalated with fluvial sandstones of medium to coarse granulometry, followed by poorly selected sublitharenites. An erosional unconformity precedes the Candeias Formation, since the Sergi Formation does not outcrop. Successively, pelitic and psammitic texture rocks of the Candeias Formation are recorded, representing the alternation of depositional systems associated with fluvial incursions into a lake. The subsequent sandstone package with occurrences of cherts consists of the delta deposition of the Ilhas Group rift-climax sequence.

Through the ostracode fossil record, it was possible to recognize the biozones RT-001 (Dom João Stage, Tithonian), RT-003 and RT-004 (Rio da Serra Stage, Berriasian-Hauterivian), RT-005 and RT-006 (Aratu Stage, Hauterivian / early Barremian) and RT-007.1 (early Buracica Stage, Barremian) formalized by Viana *et al*. (1971) and Caixeta *et al*. (1994), resulting in the chronostratigraphic positioning of the strata through the index species and faunistic associations.

The biozone RT-001 is represented by the index species *Theriosynoecum pricei* (Pinto & Sanguinetti, 1958) of Dom João Stage and was associated with deposits of the Aliança Formation. The identified taxa comprise the species *Theriosynoecum pricei* and one species of the genus *Alicenula* Rossetti & Martens, 1998 (Figure 10 A-C). The identification of the carapaces was hampered by the poor state of preservation of the morphological elements essential to the taxonomic identification.

The biozone RT-003 was identified by the presence of the index species of subzone RT-003.1, *Cypridea sellata* (Viana, 1966), associated with the strata of the Candeias Formation. In addition to this taxon, the species *Cypridea acicularis* (Krömmelbein & Weber, 1971) associated with the biozone was recognized (Figure 10 D-F). The RT-004 zone was represented by the index species *Paracypridea brasiliensis* (Krömmelbein, 1961) in association with the species *Reconcavona striatula* (Krömmelbein, 1962), *Paracypridea elegans santantoensis* (Krömmelbein, 1964), *Paracypridea elegans inflata* (Krömmelbein, 1964) and *Paracypridea elegans* cf. *elegans* (Krömmelbein, 1962) (Figure 10 I-G). The biozones RT-003 and RT-004 characterize the Rio da Serra Stage.

The Aratu Stage was identified by the biozone RT-005 with the occurrence of the associated species *Cypridea quadrilateralis bibullata* (Wicher, 1959), and the RT-006 biozone represented by the species *Cypridea* (*Morinina*?) *bibullata* (Krömmelbein, 1962), *Cypridea* (*Morinina*?) *langei* (Krömmelbein, 1962), *Paracypridea quadrirugosa quadrirugosa* (Krömmelbein, 1961), *Reconcavona striata* (Cunha & Moura, 1979) and *Salvadoriela redunca posterior* (Krömmelbein, 1963) (Figure 10 J-N). The species *Cypridea semilunaris* (Cunha & Moura, 1979) also allowed the biostratigraphical positioning in subzone RT-007.1 (Figure 10 O), marking the early Buracica Stage. The strata in which specimens from the biozones RT-004 to RT-007.1 occurred were associated to the Ilhas Group, which therefore extends from the Rio da Serra Stage to the early Buracica Stage.

Based on the biostratigraphic considerations of the present study, we propose the updating of the Jatobá Basin stratigraphic chart. Following the new biostratigraphic considerations and Fambrini proposal *et al.* (2019), who observed that the São Sebastião Formation in the Campos-Ibimirim region (PE), occurs directly overlying the Candeias Formation, and not overlying the Ilhas Group. This same context was verified during field trip in the studied area, through the observation of unconformable contact between the Aliança Formation and Candeias Formation, with no record of the Sergi Formation toward southeast-east of the Jatobá Basin. The configuration presented for the Jatobá Basin stratigraphy was based on Caixeta *et* al (1994), Costa *et al*. (2007), Neumann *et al*. (2009, 2010), Rocha (2011) and Guzmán *et al.* (2015) (Figure 11).

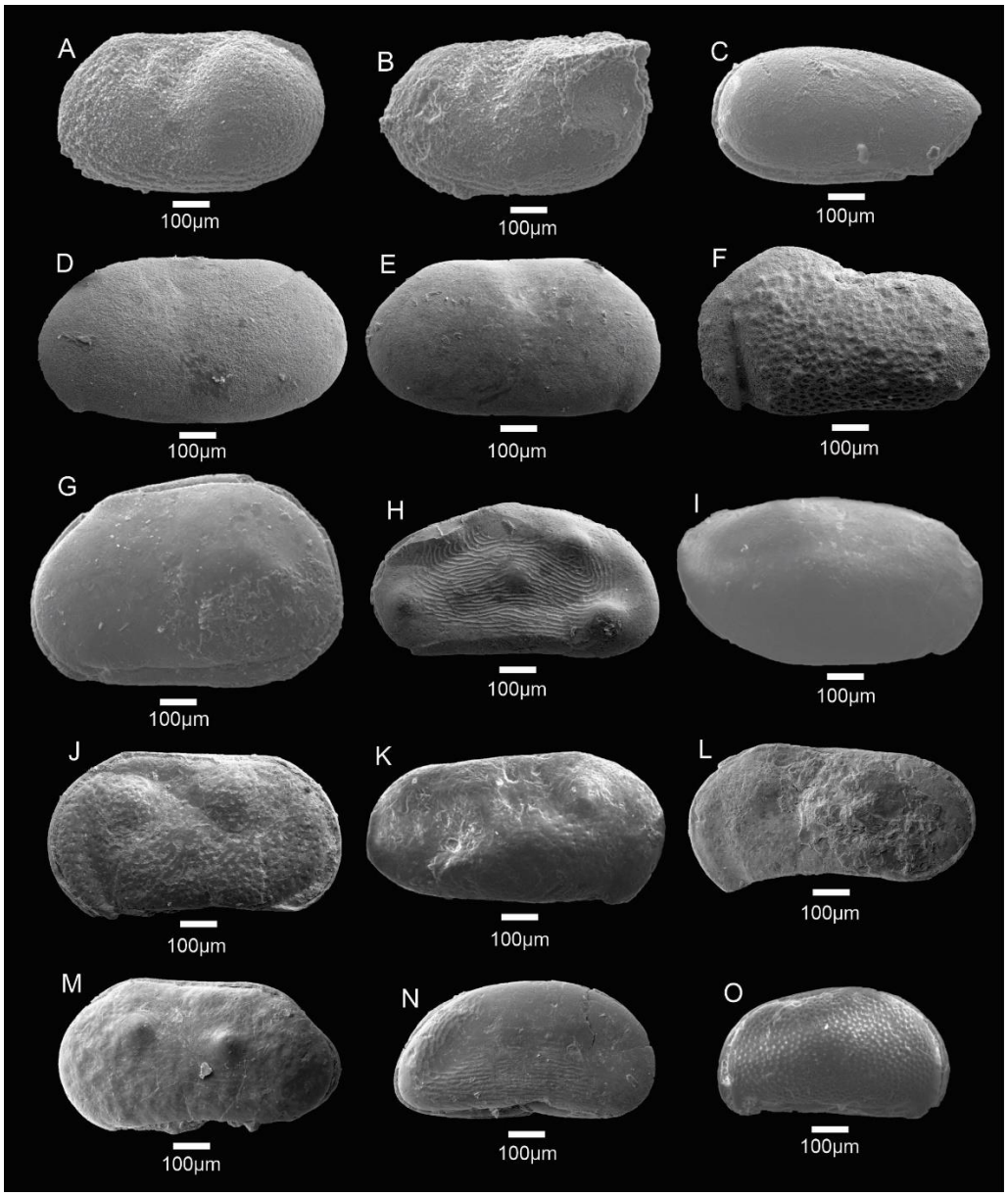

Figure 10 - A-C Ostracode fauna identified for the Dom João Stage (Aliança Formation): A-B. ♀ and ♂ from Theriosynoecum pricei; C. Alicenula sp. D-I Rio da Serra Stage (Candeias Formation and Ilhas Group): D-E. Cypridea sellata; F. Cypridea acicularis; G. Paracypridea brasiliensis, H. Reconcavona striatula, I. Paracypridea elegans santantoensis. J-N Aratu Stage (Ilhas Group): J. Cypridea quadrilateralis bibullata, K. Cypridea (Morinina?) bibullata, L. Cypridea (Morinina?) langei, M. Paracypridea quadrirugosa quadrirugosa, N. Reconcavona striata. O- early Buracica Stage (Ilhas Group): O. Cypridea semilunaris.

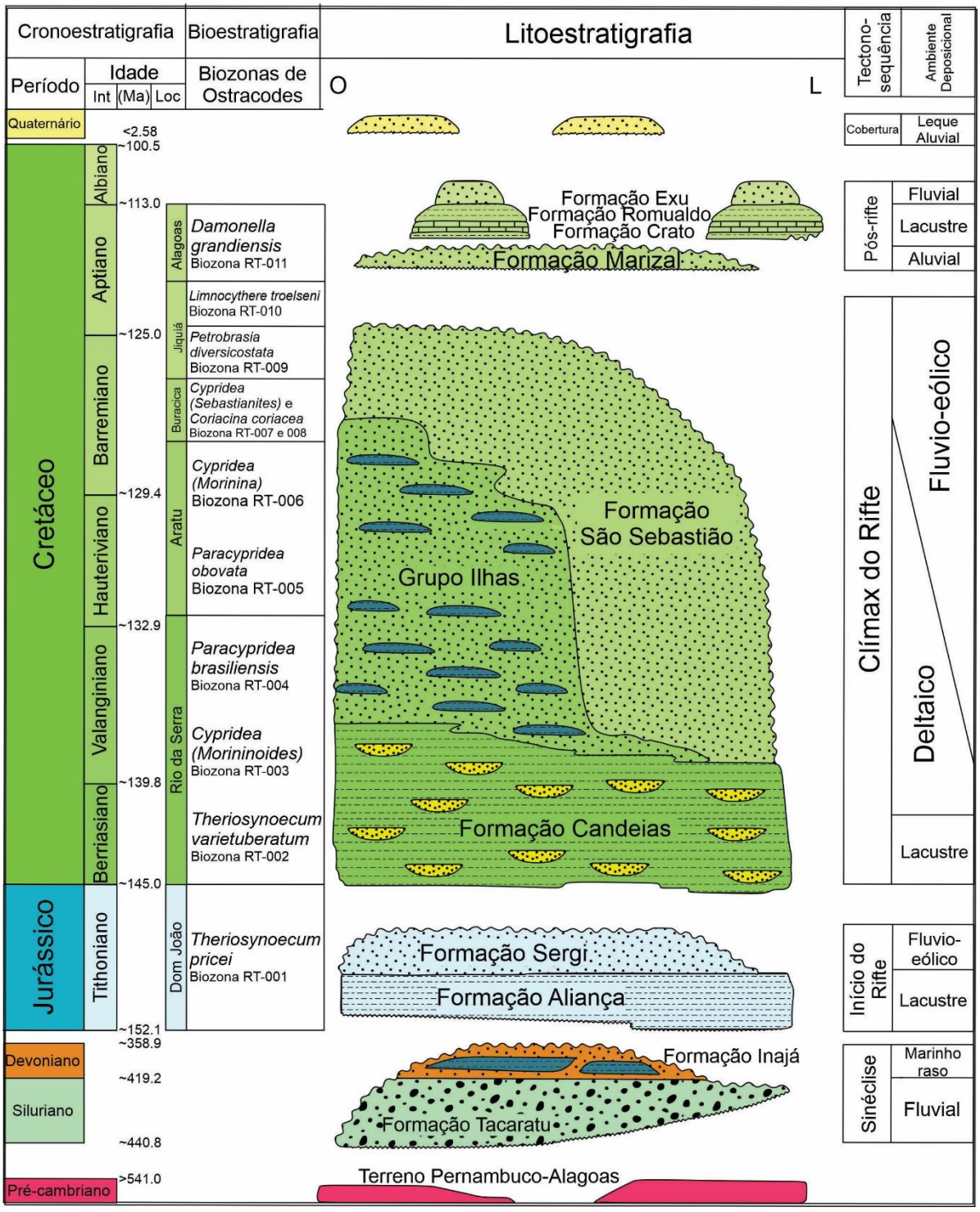

Figure 11 - Updated stratigraphic chart of the Jatobá Basin illustrating the tectono-sequences adopted. After Moura & Praça (1985), Moura (1988), Caixeta et al. (1994), Costa et al. (2007), Neumann et al. (2009, 2010), Rocha (2011), Guzmán et al. (2015) and Nascimento et al. (2017).

5. FINAL CONSIDERATIONS

The results obtained allowed to update the Jatobá Basin stratigraphic chart, to improve the resolution of the mapping carried out in thePoço da Cruz map sheet, providing updated petrographic interpretations, in addition led to establish a biostratigraphical refinement for the area. A total of four lithostratigraphic units in the Jatobá Basin were recognized: Inajá Formation (Di), Aliança Formation (J3a), Candeias Formation (K1ca), Ilhas Group (K1i).

The biochronostratigraphic position of the Aliança Formation in Dom João Stage (Tithonian) was based on the record of the index species *Theriosynoecum pricei*, biozone RT-001. In the Candeias Formation, taxa were identified belonging to subzone RT-003.1, represented by the index species *Cypridea sellata*. The Ilhas Group was positioned through the occurrence of the index species *Paracypridea brasiliensis* representing the RT-004 biozone and fauna associations identified as belonging to the RT-005 biozone (*Cypridea quadrilateralis bibullata*), RT-006 biozone (*Cypridea* (*Morinina*?) *bibullata*, *Cypridea* (*Morinina*?) *langei*, *Paracypridea quadrirugosa quadrirugosa*, *Reconcavona striata*, *Salvadoriela redunca posterior*) and RT-007.1 subzone (*Cypridea semilunaris*). The biozones RT-003 and RT-004 belong to Rio da Serra Stage (Early Cretaceous, Berriasian–Hauterivian), RT-005 and RT-006 to Aratu Stage (Hauterivian/early Barremian) and RT-007.1 at the base of Buracica Stage (Barremian).

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