TECTONIC-GEOCHRONOLOGICAL MAP OF THE STATE OF BAHIA

METALLOGENETIC IMPLICATIONS

SCALE 1:1.000.000

EXPLANATORY NOTE

Salvador, 2021

24

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SERVIÇO GEOLÓGICO DO BRASIL – CPRM

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Companhia Baiana de Pesquisa Mineral

MINISTRY OF MINES AND ENERGY
SECRETARIAT FOR GEOLOGY, MINING AND MINERAL TRANSFORMATION
GEOLOGICAL SURVEY OF BRAZIL - CPRM
DIRECTORATE OF GEOLOGY AND MINERAL RESOURCES
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GOVERNMENT OF THE STATE OF BAHIA
SECRETARIAT OF ECONOMIC DEVELOPMENT - SDE
BAHIA COMPANY OF MINERAL RESEARCH - CBPM

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State of Bahia

AUTHORS

Johildo S. F. Barbosa (UFBA/CBPM)
Rejane L. Luciano (CBPM)
Basílio Elesbão da Cruz Filho (CPRM)
Jocilene dos S. Santana (CPRM)
Antônio Marcos V. de Moraes (CBPM)
Juracy de Freitas Mascarenhas (*In Memoriam*)

EXPLANATORY NOTE

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Basílio E. da Cruz Filho
Rejane L. Luciano
Jocilene dos S. Santana

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Antônio Marcos V. de Moraes

References
Johildo S. F. Barbosa,
Rejane L. Luciano
Jocilene dos S. Santana

GEOLOGICAL MAPPING
(http://geosgb.cprm.gov.br)

TECHNICAL SUPPORT

Consultants
Alexandre Uhlein (UFMG)
Fernando Flecha Alkmim (UFOP)
Umberto Giuseppe Cordani (USP)

Technical Collaboration
Angela B. de Menezes Leal (UFBA)
Carla Maria Mendes Lacerda (IFMG)
Carlson de Matos Maia Leite (PETROBRAS/UFBA)
Carolina Reis (SGB/CPRM)
Edgar Romeo H. de F. Iza (SGB/CPRM)
Edson Emanoel S. Sampaio (UFBA)
Elton Luiz Dantas (UnB)
Eron Pires Macedo (CPRM)
Ives Antônio de A. Garrido (CBPM)
José Torres Guimarães
Luiz César Corrêa Gomes (UFBA)
Mário Dias Monteiro (CBPM)
Moacyr Moura Marinho (UFBA)
Natali da Silva Barbosa (UFBA)
Rafael Gordilho Barbosa (UFRGS)
Raymundo Wilson S. Silva (CBPM)
Renato Carlos V. Santiago (UFBA)
Ricardo Ramos Spreafico (CBPM)
Rita C. L. M. de Oliveira (SGB/CPRM)
Simone Cerqueira P. Cruz (UFBA)
Valter R. Santos Sobrinho (SGB/CPRM)

LAYOUT/EDITING

Cover page (DIMARK)
Washington José Ferreira Santos

Text (ERJ)
Andréia Amado Continentino
Agmar Alves Lopes

Layout (GERINF-SA)
Andrea Machado de Souza

BIBLIOGRAPHIC NORMALIZATION
Isabel Ângela dos Santos Matos

REVISION OF TEXT
Basílio Elesbão da Cruz Filho

FINAL REVISION
Vladimir Cruz de Medeiros

TRANSLATION TO ENGLISH
Comunica - Agência de Comunicação Eireli
Paulo Henrique Macedo Varão (SGB/CPRM)

ENGLISH REVIEW
Antônio Marcos V. de Moraes
Rafael Gordilho Barbosa

GEOLOGICAL SURVEY OF BRAZIL - CPRM
www.cprm.gov.br
seus@cprm.gov.br

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PRESENTATION

The Geological Survey of Brazil – CPRM, a public company linked to the **Ministry of Mines and Energy**, has the mission to generate and disseminate geoscientific knowledge with excellence, and with regard to the area of geology and mineral resources, carry out its mission mainly through development of projects in varied lines of action, which include systematic geological mapping, geophysical and geochemical surveys, and the study of mineral resources and potential assessment of different regions of the country.

In this way, the GSB – CPRM produces and manages expressive collections of geological data and information throughout the national territory, which makes it possible to carry out regional integration projects, which provide the state of the art of geological knowledge in the focused areas.

The products obtained through regional geological integration projects, which include maps, reports and sets of databases, are important tools for the elaboration of strategies and actions developed by the public and private sectors, in addition to being fundamental for the areas of research and teaching in Geosciences.

In view of these premises, the Geological Survey of Brazil – CPRM and the Bahia Mineral Research Company – CBPM are pleased to make available to the technical-scientific community, public managers, entrepreneurs in the mineral sector and to society in general the results achieved by the **Map Project Tectonic-Geochronological of the State of Bahia – Metallogenic Implications**, linked to the **Geology, Mining and Mineral Transformation Program**, and the **Geological Surveys and Regional Geological Integration** action, under the coordination of the **Department of Geology – DEGEO**, of the **Directorate of Geology and Mineral Resources**.

This project was carried out by the **Regional Superintendence of Salvador** of the GSB – CPRM and by the **Bahia Mineral Research Company – CBPM** through Technical Cooperation Agreement Nº 011/CPRM/17. The main objective of this project was to expand the understanding of the tectonic environment in which mineralizations were formed and, consequently, to encourage new investments in mineral research.

The Tectonic-Geochronological Map of the State of Bahia – Metallogenetic Implications, developed on a scale of 1: 1.000.000, covers the northern portion of the São Francisco Craton, its Brasilian marginal belts, in addition to interior rifts and continental phanerozoic basins. It presents the main domains and tectonic environments, the expressive structural features, as well as the most relevant mineral resources for the metallogenetic characterization of a given tectonic environment.

The data collected and consisted of this project are synthesized in this Explanatory Note, and integrated into a thematic map in the scale 1: 1.000.000 and in a Geographic Information System (GIS) environment, available for download in the corporate database of the Geological Survey of Brazil – CPRM, GeoSGB (http://geosgb.cprm.gov.br) and RIGEO – Institutional Repository of Geosciences (http://rigeo.cprm.gov.br/).

With this launch, the Geological Survey of Brazil – CPRM continues the government policy to update the country's geological knowledge, through basic geological, geochemical and geophysical surveys, and integrated information assessment, essential for regional development and an important subsidy to the formulation of public policies and support for investment decision-making.

Esteves Pedro Colnago
President-Director

Márcio José Remédio
Director of Geology and Mineral Resources

PRESENTATION

The Companhia Baiana de Pesquisa Mineral (CBPM) is a public company linked to the **Economic Development Secretariat** of the State of Bahia, focused on expanding and improving geological knowledge of the Bahian territory, identifying and researching its mineral resources and promoting their use, attracting, for this purpose, the private initiative.

Founded on December 18, 1972, CBPM is recognized as one of the most dynamic companies in the mineral research scenario in Brazil. The collection of geological data and information, generated and disseminated by it throughout its trajectory, contributed to making Bahia one of the Brazilian states geologically best-studied and best-known.

There are more than 70 technical publications, over 48 years of history, with emphasis on works such as "Geology of Bahia" and "Geophysics of Bahia", which work as great instruments of mineral study and prospecting. All this research highlights the great diversity of its geological environments, rich in mineral deposits, a variety of nearly 50 different types of substances, in addition to the oldest rocks on Earth, with ages reaching 3.5 billion years. Continuing its mission of disseminating this knowledge through technical publications, CBPM started, in 2017, in an agreement with the Geological Survey of Brazil – CPRM, the preparation of the **Project Tectonic-Geochronological Map of the State of Bahia – Metalogenetic Implications**, in which the geology and metallogenesis of Bahia, an area that corresponds to the northern part of the São Francisco Craton, are discussed.

This unpublished work consists of a map with an Explanatory Note, represented in the millionth scale, which contains the main tectonic units, which were subdivided into sixteen domains, with their respective related tectonic environments and classified into twenty-one types, still appearing all the main occurrences, deposits and mines in the State of Bahia, updated and correlated with the ages of their host rocks. As this is a work with a high degree of complexity, it had the collaboration of external and internal consultants, the latter having also worked in geological field verifications, especially for the collection of rock samples, with the objective of obtaining geochronological dates of terrains with ages still unknown, in addition to visiting several mineral deposits in Bahia. The tectonic structures were revised and classified according to the ages of the three main identified tectono-metamorphic events.

For a better understanding of geological and metallogenetic events, a two-dimensional legend was created, including the Eras, Periods, Entities and Geotectonic Domains. Also included are the values, in millions of years, of the ages of the lithotypes and the numerous data related to metallogenesis. This work also included the analysis of geophysical data, which allowed the in-depth interpretation of the boundaries of the geotectonic domains, making it possible to reconcile the large tectonic traces identified by gravimetry with those obtained in the geological mapping.

This Explanatory Note is, therefore, a synthesis that presents the Tectonic and Metalogenetic Evolution of Bahia and that constitutes one more contribution of CBPM to the geological knowledge of the state. Thus, after completing 48 years of existence, CBPM remains at the forefront of producing significant collections of geological data and information from all over the State of Bahia. The company provides important tools for the elaboration of strategies and actions developed by the public sector, fundamental for the private sector, for research areas and for teaching in Geosciences.

By making this publication available, aimed at the entire mineral segment, we are certain that it will be an important instrument for the discovery of new deposits in the Bahian territory, as well as a powerful tool for attracting investments that generate employment and income and, consequently, they contribute to the socioeconomic development of Bahia.

Antonio Carlos Marcial Tramm
President-Director

Rafael Avena Neto
Technical director

ABSTRACT

The Explanatory Note to the Tectonic-Geochronological Map of the State of Bahia (TGMBA) is an unprecedented document that addresses the geology and metallogenesis of the northern part of the São Francisco Craton. It was elaborated in digital form through a cooperation agreement between CBPM – Companhia Baiana de Pesquisa Mineral (Bahia State Mineral Research Company) and Geological Survey of Brazil – CPRM. It is a million-scale map containing the main tectonic entities. These were subdivided into sixteen domains with their tectonic environments classified into twenty-one types and bearing all occurrences, deposits and mines in the State. It counted on the collaboration of several external and internal consultants, who also worked on geological field checks, especially for the collection of rock samples aiming at the geochronological dating of terranes with unknown ages. The tectonic structures were revised, simplified and classified according to the ages of the three main identified tectono-metamorphic events. For a better understanding of these geological and metallogenic events, a two-dimensional legend was used where, on the left side, the ages (Eras and Periods) were placed, and at the top, the entities and geotectonic domains. This legend includes the values, in millions of years, of the ages of the lithologies and the countless data related to metallogeny. It had the support of geophysics, which interpreted, in depth, the limits between the geotectonic domains, even allowing the compatibility of the great tectonic traces identified in gravimetry, with those arising from geological mapping. This Explanatory Note, in summary, shows, at its end, the Tectonic and Metallogenetic Evolution of Bahia. Namely, in Arquean, in the Gavião and Serrinha blocks, whose continental crust may have been formed by plate tectonics or sagduction. However, in episodic, non-continuous stages, which are found in the TTG with a wide age range, ranging between 3642 and 3259 Ma. The TTG were generated by the merger of hydrated, older, seabed basalt. Within these two blocks, through recycling of the TTG, granitoids that are richer in potassium (2711 and 2697 Ma) occur, although rocks of these ages are predominant in the tectonic belt between the Gavião and Serrinha blocks. In the Neoarquean (2.6-2.7Ga), with the first tectonic approach of the Gavião and Serrinha Blocks, important geological processes occurred: (i) the Serra de Jacobina (Jacobina-Umburanas Sea), with / containing detritic gold, suffered first folds, the sedimentary manganese being transformed into the quartz-espessartitic proto-ore; (ii) the Jacurici Valley was penetrated by the mafic-ultramafic body containing copper, called Caraíba, and (iii) in the Maracás region, the Sill of Rio Jacaré penetrated, containing Fe-Ti-V. In the Paleoproterozoic, the presence of an extensive volcano-sedimentary sequence (Caraíba-Juazeiro-Ipirá-Contendas Sea) is deposited on the Archean rocks, including the Saúde Complex and possibly the Rio Itapicuru Greenstone Belt, the latter with gold mines in activity. In about 2080 Ma, all the aforementioned rocks were affected by tectono-metamorphic processes, resulting from the second tectonic approach and collage between the Gavião and Serrinha blocks, in this case also involving the Jequié block. The main vector of this tectonics, at the end, was sinistral transcurrent, NW-SE direction, evidenced mainly in the terranes belonging to the Itabuna-Salvador-Curaçá Orogen axis. At the climax of these processes, there were intrusions of mafic-ultramafic bodies and dozens of syn- and post-tectonic granitic intrusions. In the Northern Espinhaço, in a pre-rift and sin-rift system, the Paramirim Aulacogen started with the deposition of the Serra dos Algodões and Oliveira dos Brejinhos Formations. In the Chapada Diamantina, still in the pre- and sin-rift systems, the Serra da Gameleira Formation and the volcanic formation of the Rio dos Remédios Group were deposited. In the Mesoproterozoic, in a post-rift system, the sedimentary rocks of the São Marcos Group, in Espinhaço Supergroup, and the Paraguaçu Group, in Chapada Diamantina stand out. After about 214 Ma, a syneclysis was established through pre-, sin- and post-rift systems. Detritic gold, diamondiferous kimberlites and ferro-manganese deposits were formed at this time.

In the Neoproterozoic, with the extensive invasion of the Brasiliano Sea, on the Archaean and Paleoproterozoic rocks, and on the rift of the Morro do Chapéu Formation, the Irecê, Salitre/Campinas and Ituaçu Basins were structured. On the passive margins of the Brasiliano Sea, both in the Araçuaí Belt and in the Riacho do Pontal and Sergipana Belts, the Jequitinhonha/Macururé and Miaba/Vaza Barris sediments were formed, respectively. During this period, in the Serrinha Block, the Braúna kimberlites were identified, where diamonds are explored. In the southern part of the Itabuna-Salvador-Curaçá Belt, the Rio Pardo Basin is located in a rift system. In the Riacho do Pontal Belt, sediments from the Mandacaru Group were deposited and, simultaneously, in the Sergipana Belt, sin-collisional magmatism occurred in addition to the sedimentary filling of the Juá rift. In the west of Bahia, with the invasion of the Brasiliano Sea, the Bambuí Basin was formed over a syneclysis, composed, at the base, of claystones rich in manganese and rare metals. In the Rio Preto Belt, nickel and copper deposits are found in mafic-ultramafic rocks and Fe-Ti-V deposits in Campo Alegre de Lourdes. In the Paleozoic, in the northwest of Bahia, the presence of the Parnaíba Basin, based on paleoproterozoic gneisses, is registered, including the phosphate deposits of Angico dos Dias, also paleoproterozoic. Under the Tucano Basin there is the Santa Brígida graben and, to the north of the Araçuaí Belt, an important post-tectonic granitogenesis. In the Mesozoic, the Recôncavo-Tucano Basin and the Camamu-Almada Basin stand out. In this first basin, the main accumulation of oil occurred in the pre-rift and sin-rift systems, represented by about nine oil fields, residing in fluvial (fine to conglomeratic sediments) and aeolic deposits (thin to medium sediments) both with excellent permeability/porosity. In the second basin, there is basically the production of gas in the fluvial-aeolic sandstones of the Sergi Formation, in shallow seawater, with the Candeias Formation rift as a generator that also trap the gas reservoirs. In the Cenozoic, Detritic Covers, Recent Undifferentiated Covers, and Residual Covers stand out. In the Detritic Covers, included in the Neogene, the coastal areas where coral reefs, dunes, cliffs, sandy plains, deltas, bays, estuaries, mangroves and wetlands stand out. Its main mineral resources are associated with the Barreiras Formation, of which can be mentioned, among others, materials of the sandy type, sands and clays. In the Recent Undifferentiated Covers, included in the Quaternary, the placer deposits, coastal, can be highlighted, being important, the heavy minerals of the ilmenite type, the marine bioclastic granules, mainly those based on calcareous algae, and the lithoclastic granules (sand and gravel) in addition to lowland clays, used for the production of ceramics and bricks. In Residual Covers, included in the Quaternary, they were formed “in situ” having a strong relationship with lateritic crusts. The best example is the Caatinga Formation, formed by the weathering dissolution of limestone rocks of the Bambuí Group, used as soil corrective for agriculture.

SUMMARY

1. INTRODUCTION

The State of Bahia, located in northeastern Brazil (Figure 1.1), is vast (567,295 km²) and has an extremely diversified geological and tectonic framework with rocks formed from the Archean to the Quaternary. Many of these rocks usually host mineral deposits of great economic significance (e.g.: Jacobina's Au and Curaçá Valley's Cu) which makes Bahia one of Brazil's largest mineral producers.

Under the Term of Cooperation and Technical-Scientific Support signed between Bahia State Mineral Research Company (CBPM) and the Geological Survey of Brazil (CPRM), the first edition of the Tectonic-Geochronological Map of Bahia (TGMBA), on a 1: 1.000.000 scale, in digital format, using GIS technology began in 2018 and was finalized in 2020. It presents the main tectonic settings, tectonic structures and mineral resources (mines, deposits, occurrences).

This contribution is an attempt to expand the knowledge on the tectonic context in which mineralization occurred in space and time, in terms of ambience and tectonic regime. And, based on these results, assist in the elaboration of more robust metallogenetic and predictive models, which may lead to the discovery of new deposits, and consequently to the attraction of new investments in mineral research.

This Explanatory Note, in addition to providing comments on the content of the TGMBA, briefly addresses the main tectonic domains and deformational events in the geology of Bahia, many of which are the subject of scientific controversy. Notably, most of the information, data and ideas presented here are dispersed in many scientific works (articles, theses, technical reports, final graduation works, proceedings of scientific events), as well as reflect opinions of the consultants and the authors of this work.

It is worth to add that in order to describe in detail the tectonics, geochronology and metallogenesis of Bahia, reports are being prepared containing texts, photos, microphotographs, geological sections and illustrative diagrams separated by Eras. One of them will include a compilation of the geochronological and isotopic data available in the literature until the beginning of 2020

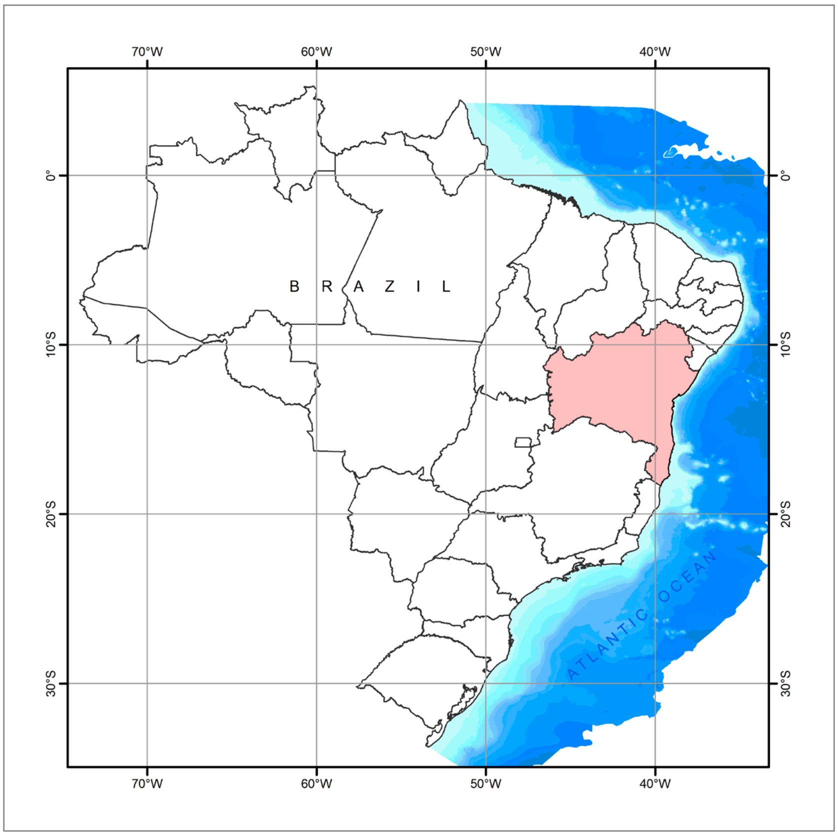

Figura 1.1 - Location of the State of Bahia in the map of Brazil.

2. WORK DEVELOPMENT

The TGMBA was elaborated using digital files (shapefiles) of the Geological Map of Bahia (GIS-BAHIA-2003; http://geosgb.cprm.gov.br/) provided by CPRM, on a scale of 1: 1.000.000 (Figure 2.1). Hereafter, the main actions taken to execute this map are discussed.

Initially, the main Bahia geological studies elaborated until 2020 were consulted, including:

(i) Basic geological mapping and mineral research projects, carried out by CBPM, CPRM, PETROBRAS and CBPM/CPRM/UFBA agreements and,

(ii) Final undergraduate, master's and doctoral theses as well as scientific articles published in reputable scientific journals published by researchers of several federal (UFBA, UFMG, UFOP, UFPE and UFS) and state (USP and UNICAMP) Universities. At this stage, geological, structural, geochronological and isotopic information and data from the main lithostratigraphic units were collected and categorized.

The information compiled about the geology, structures and tectonic settings were summarized and made compatible with non-systematic field surveys, restricted to geological cross sections in key areas, including the study of local tectonic structures. When necessary, samples were collected for petrographic and geochronological analyzes, the latter generating new unpublished data. Visits to mines and mineral deposits were also carried out with focus on better understanding the metallogenic processes.

For about two years, the TGMBA coordination and authors held technical meetings with external consultants (USP, UFMG, UFOP, UFBA, PETROBRÁS) and internal collaborators (CPRM, CBPM) focusing on regional geology, tectonics, geochronology and isotopic geology of the northern São Francisco Craton (SFC) and its marginal Belts. At the same time, public presentations were made at Brazilian Universities, Congresses and Symposia, in order to receive criticisms and suggestions for the work in progress. This set of actions allowed CBPM and CPRM to elaborate the TGMBA ("Tectonic-Geochronological Map of Bahia – Metallogenic Implications"), unprecedented in the State's Geological Sciences.

Concomitantly with the actions mentioned above, reviews, analyzes and updates of the GIS-BAHIA's lithostratigraphy, structural geology and mineral resources shapefiles were carried out. In the lithostratigraphy shapefile, the following procedures were adopted:

(i) Revision of the stratigraphy and cartographic limits of the units based on the post-2003 systematic geological mapping carried out by CPRM and/or by the CBPM – CPRM partnership;

(ii) Updating the attributes of geological time ("Era" and "Period") based on the ages identified in the geological literature and unpublished materials (this study), giving priority to the zircon U-Pb method data;

(iii) Insertion of the "tectonic acronyms" and "tectonic setting" columns; and

(iv) Interpretation and classification of the polygons of the geological units, according to the nature of the tectonic settings. Lithotypes of reduced dimensions on the ground compared to the adopted scale, but of importance for paleoenvironmental interpretation (felsic volcanic rocks) and / or metallogenesis (kimberlites) were represented by point symbols.

The tectonic structures available at GIS-BAHIA have been revised, simplified and classified according to the ages of the last tectonic events (Neoarchean, Paleoproterozoic, Neoproterozoic), except for brittle deformations. In the structure shapefile "S" surface traces (extracted from remote sensor images) were added to facilitate visualization of regional trends and magnetic lineaments (extracted from geophysical images) that were grouped into magnetic dikes and magnetic discontinuities.

In the mineral resources shapefile (RMs), a sorting was carried out prioritizing the points found in mines, deposits, deposits or mines that are known or those of relevant mineral occurrences, in order to describe the metallogeny of a given tectonic setting. New RMs obtained based on the literature or unpublished studies provided by CBPM were introduced. Regarding the lack of locational checking of the points of this shapefile, reservations are made here about its use for fieldwork.

During the development of the work, several discussions on the choice of the best legend to facilitate the visualization and communication of thematic information at TGMBA occurred. Three key attributes were adopted for the legend:

(i) Age of the tectonic settings;

(ii) The nature of these settings; and

(iii) Age of the last tectonic event that affected the area.

Finally, a consolidated tectonic map was prepared, simplified and harmonized for printing on a scale of 1: 1.000.000.

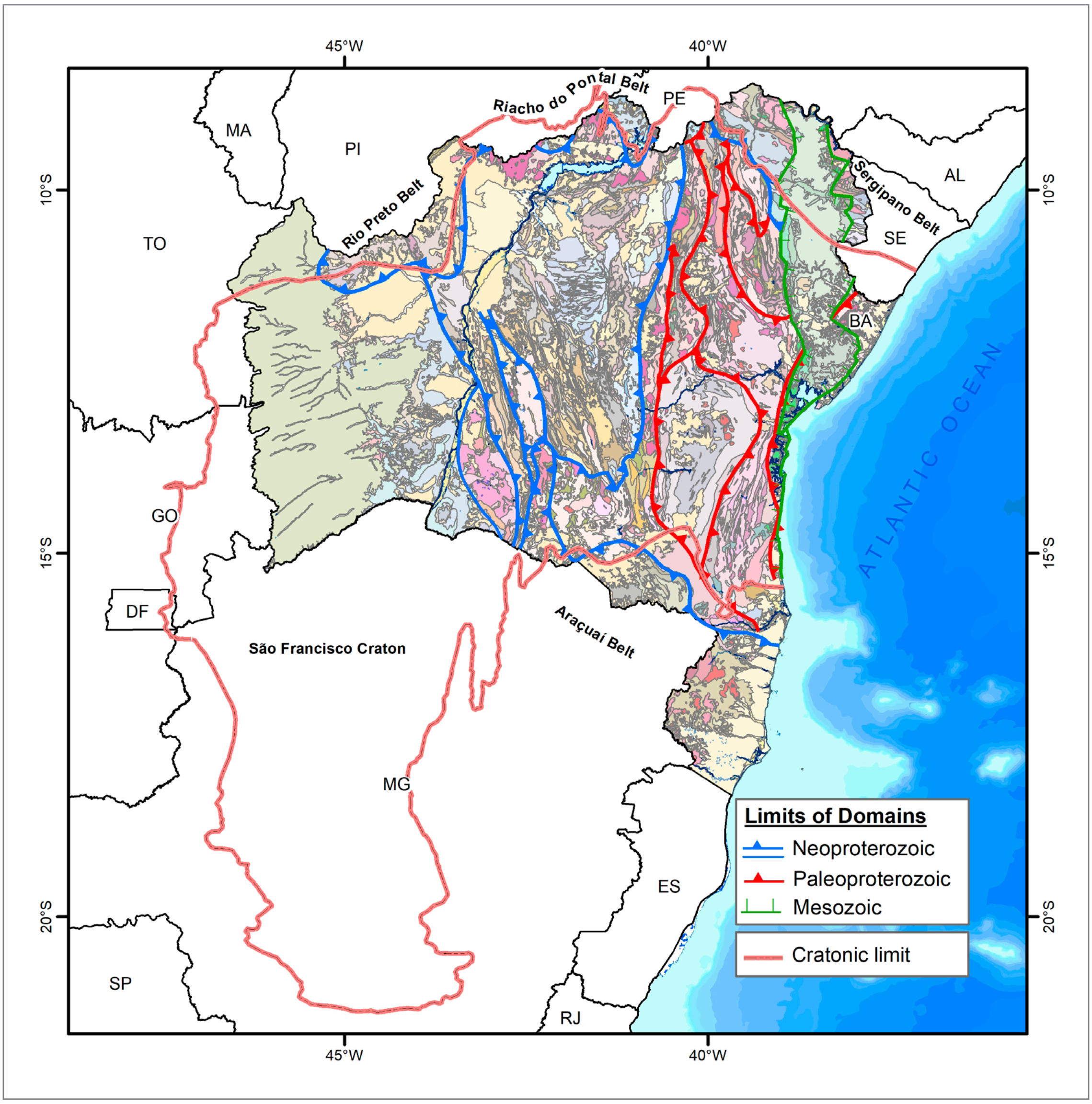

Figura 2.1 - Geological context and the main deformations that define tectonic domains.

3. MAIN TECTONIC ELEMENTS OF BAHIA

The Bahian territory encompasses the northern region of the SFC and portions of the external domains of the Brasiliano Orogenic Systems that surround it, namely: Araçuaí Belt, to the southeast; Rio Preto Belt, to the northwest; Riacho do Pontal Belt, to the north; in addition to the Sergipano Belt and the Pernambuco-Alagoas Terrain, to the northeast - except to the west where the Brasília Belt is located in the state of Goiás. To the east lies the Recôncavo-Tucano Basin, with NS extension, and on the continental margin, the Camamu-Almada Basin, both of Mesozoic age.

The compartmentalization of the geotectonic framework in Bahia has been, over the past 42 years, a very controversial topic among geoscientists.

Different proposals regarding the geometric arrangement, dimensions, discontinuities of its exhibitions, geographical and conceptual denominations (craton, blocks, nuclei) exist. This is evidenced, in part, by differences in the scale of observation and the types of patterns used to discriminate tectonically homologous zones. These patterns correspond to structural and/or geophysical plots, metamorphic aspects and geochronological and isotopic data.

The insert placed on the lower right side of the TGMBA is a revised outline of the main tectonic elements in Bahia (entities and tectonic domains). This insert also includes the deformations and the limits of the tectonic domains (Figure 3.1).

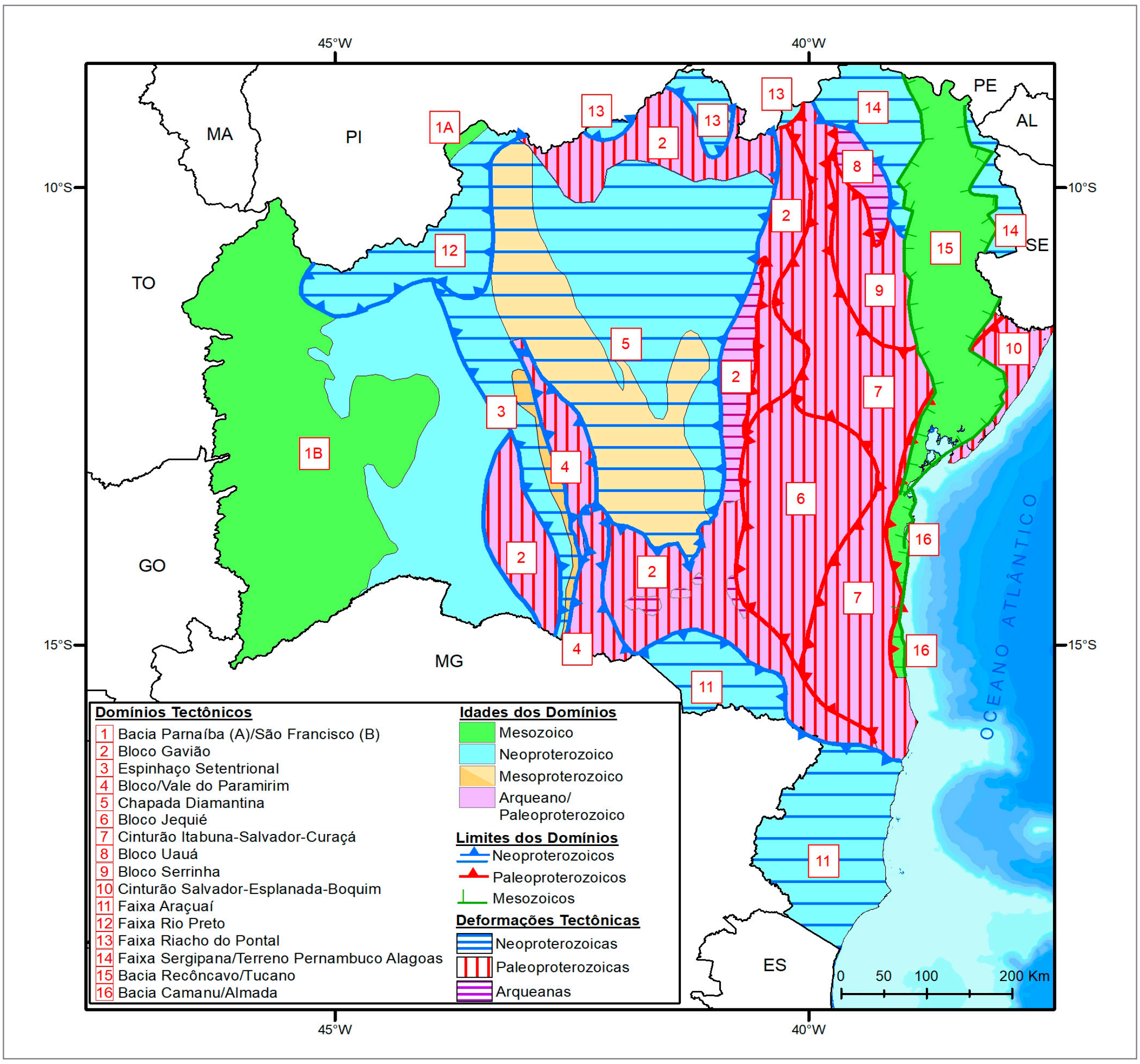

Figura 3.1 - Main tectonic domains of the state of Bahia.

The ages of tectonic domains are signaled by specific colors. The areas affected by tectonic deformations are overlapped by vertical or horizontal lines. The colors of these lines represent the age of the last recorded tectono-metamorphic episode.

The figure shows three large tectonic entities:

(i) The São Francisco Craton with the tectonic domains from 1 to 10;

(ii) The Brasiliano Orogenic Systems with the tectonic domains from 11 to 14 and,

(iii) The Interior Rifts and Continental Margin Basins with the domains 15 and 16.

The Archean and Paleoproterozoic domains are represented in the TGMBA by light red polygons. The boundaries between these domains are marked by Paleoproterozoic transpressional shear zones (red color).

The graphic representation in these domains, made by vertical red lines, indicates the Paleoproterozoic deformations, while the purple lines refer to the portions of the basement of the CSF with preserved Archean structures.

The following tectonic domains were distinguished from the oldest to the youngest:

(i) Domain 2 (Gavião Block), subdivided into south, west and north;

(ii) Domain 4 (Paramirim Block) that represents an Archean and Paleoproterozoic crustal segment, which was uplifted by the Neoproterozoic tectonics;

(iii) Domain 8 (Uauá Block) with an important swarm of mafic dykes that “cut” the Archean orthogneisses;

(iv) Domain 9 (Serrinha Block) where gneissic-migmatite rocks host the Itapicuru River Auriferous District; composed of the Rio Itapicuru and Capim Greenstone Belts (GBs);

(v) Domain 6 (Jequié Block) which together with the following two domains constitutes one of the most extensive granulitic areas in the world;

(vi) Domain 7 (Itabuna-Salvador-Curaçá Belt - ISCB) and Domain 10 (Salvador-Esplanada-Boquim Belt - SEBB), both the result of the aforementioned blocks collisions; notably, parts of these two belts have retro-metamorphosed to the amphibolite facies.

The Meso and Neoproterozoic domains inside the CSF represent the sediments of the Espinhaço and São Francisco Supergroups, distinguished by beige and light blue polygons, respectively. Their areas are superimposed by horizontal blue lines and limited by shear zones of the same color, due to the impact of the Neoproterozoic tectonics.

Thus, they were separated into Domain 3, to the west, (Northern Espinhaço) and to the east, Domain 5 (Chapada Diamantina), with both of them being separated by Domain 4 (Paramirim Block) which was raised in the crust during the Neoproterozoic tectonics.

The Neoproterozoic domains of the Brasiliano Orogenic Systems represent the rocks that filled the passive margins of the Brasiliano Sea which, during the beginning of the Neoproterozoic, surrounded the basement of the CSF. Its marginal lithologies, after being deformed and metamorphosed, constituted fold belts among themselves:

(i) Domain 11 (Araçuaí Belt) that is distributed from the south of Bahia to the border as Minas Gerais;

(ii) Domain 12 (Rio Preto Belt) and

(iii) Domain 13 (Riacho do Pontal Belt), both located near the border with Piauí and Pernambuco and,

(iv) Domain 14 (Sergipano Belt / Pernambuco-Alagoas terrain) , located in the northeast of Bahia, bordering Sergipe and Alagoas.

Among the Paleozoic and Mesozoic tectonic domains, the following are represented:

(i) Domain 1 (Parnaíba / São Francisco Basins), located in the northwest and west;

(ii) Domain 15 (Recôncavo / Tucano Basin) that crosses the eastern region of Bahia in the N-S direction; and

(iii) Domain 16 (Camamu / Almada Basins), located on the Atlantic margin.

4. GENERAL COMMENTS ON THE MAP AND ITS LEGEND

The main legend of TGMBA, located in its lower left part, is two-dimensional and presents the types of tectonic settings, mineral resources, deformational and hydrothermal events, considering the following aspects: geological time (age, vertically) and tectonic elements (entities and tectonic domains, horizontally).

4.1. ERAS, PERIODS AND AGES

In the first two columns of the legend (left side) are the geological time intervals (Eras and Periods), including their nomenclatures displayed in the TGMBA. In chronological order they are presented below:

(i) The ARCHEAN Eon includes the following Eras: Eoarchean 4000-3600 Ma, A1; Paleoarchean 3600-3200 Ma, A2; Mesoarchean 3200- 2600 Ma, A3 and Neoarchean 2800-2500 Ma, A4;

(ii) The PALEOPROTEROZOIC Era includes the following periods: Siderian 2500-2300 Ma, PP1; Rhyacian 2300-2050 Ma, PP2; Orosirian 2050-1800 Ma, PP3 and Statherian 1800-1600 Ma, PP4;

(iii) The MESOPROTEROZOIC Era includes the following periods: Calymmian 1600-1400 Ma, MP1; Ectasian 1400-1200 Ma, MP2 and Stenian 1200-1000 Ma, MP3;

(iv) The NEOPROTEROZOIC Era includes the following periods: Tonian 1000-720 Ma, NP1; Cryogenian 720-635 Ma, NP2 and Ediacaran 635-641 Ma, NP3;

(v) The PALEOZOIC Era includes the following periods: Cambrian 541.2 Ma and Permian 251.9 Ma, PZ, although in the legend they are not separated;

(vi) The MESOZOIC Era includes the following periods: Triassic 251.9-201.3 Ma, T; Jurassic 201.3-145.0 Ma, J and Cretaceous 148-66.0 Ma, C.

(vii) The CENOZOIC Era includes the following periods: Neogene 23.03-2.58 Ma, N and Quaternary 2.5 Ma- recent, Q.

To illustrate the ages of tectonic settings and deformational events, the following colors were adopted: purple tones for the Archean, red tones for the Paleoproterozoic, beige tones for the Mesoproterozoic, blue tones for the Neoproterozoic, gray tones for the Paleozoic, green tones for Mesozoic and yellow tones for Cenozoic.

These time intervals reflect significant stages of geological evolution in Bahia. Soft colors were chosen to represent each of these time intervals. In the two-dimensional legend, the following colors were adopted:

(i) Light purple for ARCHEAN;
(ii) Light red for PALEOPROTEROZOIC ;
(iii) Beige for MESOPROTEROZOIC;
(iv) Light blue for NEOPROTEROZOIC;
(v) Light gray for PALEOZOIC;
(vi) Light green for the MESOZOIC and (vii) yellow for the CENOZOIC.

4.2. TECTONIC SETTINGS

The symbols of the tectonic settings show filling and shading colors. The colors indicate the formation ages of the rock system that makes up the tectonic setting, while the black shading indicates the type of tectonic setting. They were classified into 21 types and identified by their own abbreviations, namely: ai - Intraoceanic Arc; aa - Forearc Basin; ap - Foreland Basin; mpa - Passive Margin Basin; ra – Back-arc Basin; rf - Rift type basin; rfe - Pre-rift basin; rfs - Syn-Rift type basin; rfo - Post-Rift Basin; cdr - Detritic Coverings; cri - Recent Undifferentiated Coverages; crd - Residual Coverage; da - Volcanic Dikes; ma - Anorogenic Magmatism; mu - Mafic-Ultramafic Magmatism; mp - Post-Collisional Magmatism; ms - Syn-Collisional Magmatism; sv – Metavolcanic-sedimentary sequence; sn - Syneclise; ta - High Grade Terrain and tm - Medium Grade Terrain. Of the 21 types mentioned above, 20 were broken down by specific shading, except for Recent Undifferentiated Covers (cri).

The acronyms of the tectonic environments used in the classification of the polygons of these units in the TGMBA (eg NP1mpa) correspond to the junction of the chronostratigraphic interval nomenclature (eg NP1) of the age of the unit and abbreviation of the type of tectonic environment (p. e.g. mpa). On the right side of some of the boxes of the tectonic environments in the legend are the ages (U-Pb in zircon) of the tectonic environments.

4.3. CONVENTIONS FOR GEOLOGICAL AND TECTONIC FEATURES

Legends for geological and tectonic features include linear and point symbols. Ductile tectonic features ("S" surface traces, fold axes, dextral and sinistral transcurrent shearing / shear zones, compressional shearing / shear zones) are represented by conventional symbols, sometimes thickened and colored according to the interval of time of tectonic deformations, namely:

(i) Ductile ARCHEAN deformations, dark purple lines;
(ii) Ductile PALEOPROTEROZOIC deformations, dark red lines and
(iii) Ductile NEOPROTEROZOIC deformations, dark blue lines.

In turn, as it was very difficult to establish the ages of the brittle features (fractures and faults) they are represented in the TGMBA by straight black lines. An exception is made for the MESOZOIC tectonics where the extension faults that limit the Recôncavo-Tucano Basins are identified by the usual dark green symbology, the same occurring for the Camamu-Almada Basins.

Paleoarchean felsic volcanism and Brazilian kimberlites are represented respectively by small dark purple triangles and dark blue diamonds. Magnetic lineaments are represented in gray (continuous lines for magnetic dikes and dashed lines for magnetic discontinuities), and some of the main dyke intrusions are shown by conventional symbols in black. In turn, mineral resources (occurrences and deposits) are represented directly on the MTGBA and in the legend by abbreviations contained in a small yellow circle.

4.4. ENTITIES AND TECTONIC DOMAINS

In the first line of the two-dimensional legend of the MTGBA are the three most important tectonic entities in the State of Bahia, namely: São Francisco Craton, Brasiliano Orogenic Systems and Interior Rifts and Continental Margin Basins. In the second line, below these entities, are their respective tectonic domains. The domains and geological reasons for their designations are also included.

4.4.1. São Francisco Craton

The São Francisco Craton tectonic entity (SFC) includes ten tectonic domains whose locations and general characteristics are briefly described below.

Domain 1 (Parnaíba/São Francisco Basins) (CAMPOS & DARDENNE, 1997) is located in the west of the TGMBA. It was separated from two other subdomains based on:

(i) The presence of the Urucuia Sedimentary Basin;
(ii) The presence of the southern part of the Parnaíba Sedimentary Basin and, (iii) the great extent of the limestone rocks of the São Francisco Basin.

Domain 2 (Gavião Block) (PINHO *et al.*, 2011; BARBOSA *et al.*, 2012; BARBOSA *et al.*, 2020; CRUZ *et al.*, 2014; SANTOS PINTO *et al.*, 2012) was subdivided into three parts: south, west and north. In the Gavião Block (South Part), rocks from the Plutonic Tonalite-Trondhjemite-Granodiorite (TTG) suite, orthoderived gneisses, migmatites and Metavolcano-sedimentary Sequences (SMVS) (for example, Caetité-Licínio de Almeida, Boquira, Ibitira-Ubiraçaba and a lower sequence of Contendas-Mirante), in addition to Greenstone Belts (GBs; for example, Umburanas, Mundo Novo and Lagoa do Alegre). In the Gavião Block (West Part), migmatite rocks of the Santa Isabel Complex (amphibolite and granulite facies) stand out, which locally enclose komatiitic rocks, in addition to SMVS Riacho de Santana. In the Gavião Block (North Part), TTG rocks, orthoderived gneisses and migmatite similar to those in the southern part are also found, in addition to SMVS Barreiros, Salitre and GB Lagoa do Alegre.

Domain 3 (Northern Espinhaço) (ALCÂNTARA *et al.*, 2017) is characterized by a meridian direction belt, about 500 km long and an average width of approximately 40 km, extending from north to south of Bahia. It represents the western part of the Aulacógeno do Paramirim, which, through the Neoproterozoic tectonics, was organized in the form of a belt that, after the occurrence of erosive processes, established itself as a mountain range known in the state of Bahia as Serra do Espinhaço Setentrional.

Domain 4 (Paramirim Block) (ARCANJO *et al.*, 2000; CRUZ, 2015) represents a segment of the basement of the Paramirim Aulacogen that was raised by the Neoproterozoic tectonics. This tectonic block is oriented in approximate N-S direction, being formed locally by TTG rocks and by orthogneisses and migmatites, containing some narrow bands of SMVS.

Domain 5 (Chapada Diamantina) (GUIMARÃES, 2008) constitutes the eastern part of the Aulacógeno do Paramirim, basically composed of anchimetamorphic siliciclastic rocks correlated temporally with those of Domain 3 (Serra do Espinhaço) mentioned above.

Domain 6 (Jequié Block) (BARBOSA *et al.*, 2012), located east of the domain 2 (Block Gavião) is composed by deformed and balanced rocks in the amphibolite and mainly granulite facies. Its protoliths are of varying composition having been strongly affected by deformations and metamorphism during the Paleoproterozoic orogeny.

Domain 7 (Itabuna-Salvador-Curaçá Belt, ISCB) (BARBOSA & SABATÉ, 2003) is located in the eastern part of the CSF in Bahia. It constitutes a high-grade metamorphic belt, of approximate N-S direction, which extends from the region of the city of Itabuna, to the south, passes through the outskirts of Salvador, going to the neighborhoods of the city of Curaçá, to the north. It has an extension of about 700 km by 150 km of average width. Its central part is formed by high-grade metamorphic rocks, constituting the axis of the Itabuna-Salvador-Curaçá Orogen (ISCO). Its protoliths are of varied composition and of Archean age, although the deformations and metamorphism are of Rhyacian age.

Domain 8 (Uauá Block) (OLIVEIRA *et al*., 2012) is located in the northeastern region of Bahia and, although of little spatial expression, it represents an important domain in relation to tectonics. They are basically formed by Archean orthogneisses with faults filled by a swarm of mafic dikes.

Domain 9 (Serrinha Block) (RIOS *et al*., 2005, 2007) has an oval shape extending from the region of the city of Serrinha, in the south, to the north of the city of Uauá, passing under Domain 15 (Recôncavo-Tucano Basin). Its oldest rocks are migmatized orthogneisses that belong to the Santa Luz Complex of Mesoarchean age.

Domain 10 (Salvador-Esplanada-Boquim Belt, SEBB) (OLIVEIRA, 2014) is located in the northern region of Salvador extending to the south of Sergipe. It is formed by bands of lithologies of NNE direction, where the Paleoproterozoic tectonics placed side by side contrasting gneissic rocks of the amphibolite and granulite facies by elevating blocks.

4.4.2. Brasiliano Orogenic Systems

The tectonic entity, Brasiliano Orogenic Systems is formed by sedimentary rocks deposited on the passive margins of the Brasiliano Sea surrounding the SFC. In the Neoproterozoic, these bands were balanced in the schist-green, amphibolite and granulite facies, with vergent foliations towards the craton. Granites penetrated these rocks during or after deformations. This entity includes four domains described briefly below.

Domain 11 (Araçuaí Belt) (ALKMIM *et al*., 2007; PEDROSA-SOARES, 1992) is located in the south and southwest of Bahia, with its largest portion located in Minas Gerais. In this domain there are metamorphic rocks ranging from granulite facies in the south to amphibolite facies in the north. This domain is basically composed of kinzygite rocks with a large amount of granitoids, many of the "S" type, linked to Neoproterozoic metamorphism.

Domain 12 (Rio Preto Belt) (BARROS *et al*., 2017) is located in northwestern Bahia, bordering Piaui. It is generally formed by low to medium grade metamorphic rocks, with schist characteristics. Basement rocks of these shales are found in Cristalândia do Piauí. This segment is formed by quartz-feldspar orthogneisses of Paleoproterozoic age. Granitoids, such as that of Mansidão, are rare.

Domain 13 (Riacho do Pontal Belt) (CAXITO 2015; UHLEIN *et al*., 2011) is located in the north of Bahia although its most important parts are distributed in Piauí and Pernambuco. In Bahia it is represented mainly by quartz-feldspar shales, containing biotite and chlorite, which overlaps with the TTG and, mainly, migmatite orthogneisses from the northern part of Domain 2 (Gavião Block).

Domain 14 (Sergipano Belt/Pernambuco-Alagoas Terrain) (OLIVEIRA *et al*., 2010a; BRITO NEVES & SILVA FILHO, 2019) is located on the border of Bahia with Sergipe, Pernambuco and Alagoas, and is sectioned by the Recôncavo-Tucano Rift (Domain 15) in two parts. This domain brings together parts of the Sergipana Belt and the Pernambuco-Alagoas Terrain, which together with the Riacho Pontal Belt (Domain 13) represent the External Domain of the Borborema Province. The rocks that make up the Sergipano Belt in Bahia are mainly metasediments including, among others, those belonging to the Macururé, Miaba-Vaza Barris and Estância Groups. The Pernambuco-Alagoas Terrain (PAT) corresponds to a tectonic segment located between the Lineamento Pernambuco, to the north, and the Macururé Shear Zone, to the south, which separates it from the northern periphery of the CSF and the Sergipana Belt. In Bahia, the PAT is located between the Sergipana Belt and the right bank of the São Francisco River. Its geological framework encompasses Archean, Paleoproterozoic and Neoproterozoic complexes reworked by the Neoproterozoic Orogeny. Various Neoproterozoic granitoids occur, including large linear batholiths in addition to relatively isolated stocks and smaller batholiths.

4.4.3. Interior Rifts and Continental Shore Basins

In the tectonic entity, Interior Rifts and Basins of Continental Margin occur only in the following two domains:

Domain 15 (Recôncavo/Tucano Basin) (CUPERTINO & BUENO, 2005) occupies much of eastern Bahia. This basin is oriented approximately in the N-S direction, deeper in the east, becoming shallower in the west. Sedimentary rocks filled an aborted interior rift.

Domain 16 (Camamu/Almada Basin) is located on the continental Atlantic margin, south of the city of Salvador and north of the city of Ilhéus. Pre, syn and post rift environments are also filled with sedimentary rocks.

4.5. GEOPHYSICAL DOMAINS

Geophysics and its methods are among the most important tools for building geological knowledge, including the definition of large tectonic settings and mineral prospecting. As for aerial surveys, magnetic and gamma-spectrometric methods were important: the former helped in the regional geological mapping, and the latter in the identification of targets for mineral prospecting. For land surveys, the gravimetric and electromagnetic methods GDS (Deep Geomagnetic Survey) stand out in the definition of large structures in the lithosphere (SILVA & SAMPAIO, 2017).

Briefly describing a history of geophysics in Bahia, from 1975 to 1982, through the DNPM-CPRM Agreement, part of the state was analyzed using magnetic and gamma-spectrometric methods. Later, in 1980, through an agreement between these same institutions, the Gravimetric Survey of the State of Bahia Project was carried out, where terrestrial gravimetric study culminated in the elaboration of the Bouguer Map of the whole of Bahia. This map has been enriched with terrestrial data compiled by the IAG / USP-Astronomy and Geophysics Institute of the University of São Paulo and from space missions including GRACE (Gravity Recovery and Climate Experiment). Between 1999 and 2011 (CBPM-CPRM Agreements), new and more modern magnetic and gamma-spectrometric analyses were carried out which, despite the use of the same earlier methodologies, were more accurate, since the flight lines were less widely spaced and more accurate techniques were used, including the addition of GPS. Between 2007 and 2011 (Rift Project I) and 2014 and 2018 (Rift Project II) (SAMPAIO *et al.*, 2017) two PETROBRAS-UFBA-FAPEX Agreements were signed, focusing on the study of Mesozoic sedimentary basins, using terrestrial gravimetric, magnetotelluric (AMT) and GDS methods. In the case of GDS, the data obtained refer to 24 stations located to the east of the 43rd meridian in Bahia and neighboring areas. It aimed to study its crustal framework. The acquisition and processing of GDS data was done by the DGE / INPE-Department of Space Geophysics of the National Institute for Space Research. Thus, the use of geophysical tools, direct or indirect, was important, both in mapping and defining areas of tectonic domains, and in better understanding of metallogenesis. The results of the integration of geophysical, aerial and terrestrial signatures, with the tectonic and metallogenetic domains, are summarized below.

Domain 7 (ISCB) evidenced in the TGMBA has a geology that is corroborated by the geophysical data, since they coincide with the tectonic framework of the central and central-eastern parts of Bahia. This was supported by Bouguer terrestrial gravimetric data and aerial, magnetic and magnetometry data. These data show coincidence, for example, with the literature on Orogen Itabuna-Salvador-Curaçá (ISCO), product of the Paleoproterozoic collision of Archean blocks, which left between them a Paleoproterozoic tectono-metamorphic belt, called the Itabuna-Salvador-Curaçá belt (ISCB). As will be described later, in geophysical terms, it presents an extensive meridian geographic configuration, from the extreme south, in the Itabuna region, until close to Salvador city latitude. Geophysics also shows that from there it narrows and heads north towards the city of Curaçá, on the Bahia-Pernambuco border. According to the bibliography, due to these cities, the name Itabuna-Salvador-Curaçá Orogen came up, abbreviated as ISCO.

Domain 6 (Jequié Block), Domain 7 (ISCB) and Domain 9 (Serrinha Block) also show shared regional geophysical data, based on gravimetry, total magnetic field and gamma spectrometry. The Bouguer terrestrial gravimetric data delimit areas that show good correlation among these tectonic domains, since they have lower gravimetric values than those of the other domains. Domain 2 (Gavião Block), for example, differs geophysically from Domain 7 (ISCB), located to the east. In the latter, the total magnetic field data shows a higher frequency of the magnetic features and an intense preferential alignment, in line with the geological and tectonic data. ISCB standards are characteristic of a terrain that has undergone strong deformation processes. The zones of interfaces or transition between the domains mentioned above, and which make up the ISCO, show that their magnetic features consistently follow the configuration of these interfaces. In gamma-spectrometric images, for example, Domain 6 (Jequié Block), stands out, since there the contribution of radiogenic elements Th and U is greater, in the transition with Domain 7 (ISCB), located in the east and also in the transition with Domain 2 (Gavião Block), located to the west.

In Domain 7 (ISCB) based on the total magnetic field data the southern segment presents NNE orientation that extends from Domain 11 (Araçuaí Belt) until the Salvador parallel. From there, its central segment deviates to NW, where geophysical and tectonic orientations are in line with the limits of Domain 2 (Gavião Block). Towards the north, the geophysical data show that the ISCB has an approximately N-S orientation, following Domain 2 (Gavião Block) to the west, and Domain 9 (Serrinha Block) to the east.

Gravimetric methods, including GDS, investigated the electrical conductivity of the lithosphere by relating it to depth. This allowed for the interpretation and creation of electromagnetic models of deep crustal structures.

As mentioned before, using data from 24 stations, spread over the central and eastern parts of Bahia, allowed to calculate and prepare GDS maps that indicate the presence of structures of the continental crust and the upper mantle in this region. The analysis of GDS disturbances, using magnetograms, made it possible to register the following interpretations:

(i) Domain 4 (Paramirim Block) from a geophysical point of view, represents one of the deepest parts of the continental crust of Bahia, which contrasts with more superficial parts, where the substrates of Domain 3 (Northern Espinhaço) are located, to the east and Domain 5 (Chapada Diamantina), to the west;

(ii) Domain 6 (Jequié Block) shows that its infrastructure is deeper in its center, decreasing the depth to the south, and even disappearing in this region, resulting, consequently, in the Neoproterozoic oceanic crust, under the sediments of Domain 11 (Araçuaí Belt) and,

(iii) Domain 7 (ISCB), on the Atlantic coast of Bahia, demonstrates, through geophysics, that the Mantle is closer to the surface, a fact probably linked to Paleoproterozoic tectonics, since it brought out the granulitic rocks of the ISCB infrastructure, in contrast to the westernmost part, where the deepest portion of Domain 6 (Jequié Block) is located (SAMPAIO *et al.*, 2017). Furthermore, analyzing Domain 7 (ISCB), geophysical data indicated that at the time of Brazil-Africa separation, the continental crust in this domain was already thinning, with brittle-ductile and brittle structures (fractures and faults) in granulitic areas as indicated by the geological maps (BARBOSA *et al.*, in press).

Geophysics also contributed to the study of granitoids in Bahia. Indeed, recent geological studies show the presence of 81 granitoid bodies, varying in age, from the Archean to the Paleozoic (BARBOSA *et al.*, 2012). Among them, the following stand out:

(i) In Domain 11 (Araçuaí Belt) the granitic bodies of Paleozoic age and the granitoids of the Alkaline Province of Southern Bahia, of the Neoproterozoic and,

(ii) In Domain 2 (Gavião Block) Guanambi, Lagoa Real, Caraguataí, Carnaíba and Campo Formoso, from the Paleoproterozoic. For example magnetic and gamma-spectrometric characteristics of the Campo Formoso granite show that it stands out from its neighbors, namely: migmatite and TTG gneisses, to the north; the mafic-ultramafic body of Campo Formoso, to the south and the meta-sediments of the Serra de Jacobina, to the east. The contrast with the rocks from the south and from the east is striking, although it is more diffuse with the TTG rocks from the north. However, further analysis shows that TTG rocks have a much lower K contribution compared to granites. In addition, granitic rocks exhibit a smooth geophysical pattern compared to TTG rocks, where the magnetic relief is more active, with greater number of anomalies. All of these geophysical elements distinguish granite well from its north, south and east hosts. In the western part it is clearly covered by Neoproterozoic limestone rocks.

Domain 5 (Chapada Diamantina), including the Irecê Basin, was tested using the magnetotelluric method (AMT) combined with gravimetry. These methods allowed to study geoelectric characteristics of the Chapada Diamantina Group (Espinhaço Supergroup) and the Bambuí Group (São Francisco Supergroup) both located in the central part of the domain above mentioned. Simply put, the Chapada Diamantina Group (Mesoproterozoic) is made up of siliciclastic units interspersed with pelite, all anchimetamorphosed, while the Salitre Formation (Neoproterozoic) is composed of layers of clay and limestone also anchimetamorphic. All of these lithologies are superimposing basement rocks of Paleoproterozoic and Archean ages. Surveys with AMT probes produced contour maps of resistivity values, reflecting in-depth contacts of these groups and their synformatic tendencies (SILVA & SAMPAIO, 2017).

Domain 15 (Recôncavo-Tucano Basin) and Domain 16 (Camamu-Almada Basin) were also the focus of geophysical studies. Using the gravimetric and magnetotelluric methods, a 230 km transect was carried out in SW-NE direction and with topographic control. It crossed transversely the Tucano basin and the northern part of the Recôncavo Basin, with the objective of investigating deep structures of the continental crust and understanding in depth the contact relations between Domain 15 (Recôncavo-Tucano Basin) with Domain 9 (Serrinha Block) and Domain 14 (Sergipano Belt). The gravimetric modeling of the transect, with a depth level of 15 km, shows the vertical and lateral structure of the basins and their asymmetric flanks. In the initial southern part of the transect migmatite and plutonic gneissic rocks from Domain 9 (Serrinha Block) surface. South of the transect, within the Tucano Basin, sedimentary rocks from their pre-rift stage occur. The depths estimated by gravimetry are greater than 6km for locations close to the depocenter, indicating a high rate of subsidence at the time of the rift filling in stage. In the northern end of the transect, it is noted that the horizontal sediments of the basin overlap with the inclined meta-sediments of Domain 14 (Sergipano Belt), showing significant angular unconformity (SAMPAIO *et al.*, 2017). In the gravity faults that structured in the N-S direction the basins in focus, the geophysical data show the presence of vertical faults with important tailings on the eastern limit.

On the other hand, the western limit of the basins with their basements are made up of small tailings failures with plains plunging weakly towards NE. In Domain 16 (Camamu-Almada Basin), terrestrial geophysical studies took place predominantly on the basement, as the emerged parts are very narrow. Thus, it was not possible to treat these basins from the point of view of terrestrial geophysics.

4.6. THE AGE OF TECTONISM

The ages of tectono-deformational events are difficult to obtain. Approximate and sometimes uncertain values can be interpreted through the ages of micas and amphiboles using the K-Ar and Ar-Ar methods. Regarding zircon, the times of deformations can be interpreted considering the ages of the associated metamorphisms, obtained in the peripheries of this mineral. Monazites, crystallized during metamorphism-deformation, identify the age of these events well. In the case of non-metamorphozed sedimentary rocks, when possible, their fossiliferous contents are used to provide a relative idea of when they fell. Using these criteria, evidence of tectonic events that occurred in the Neoarchean (2.6-2.7Ga), in the Paleoproterozoic (Rhyacian, 2090-2080 Ma), in the Neoproterozoic (Ediacaran, 540 Ma), in the Mesozoic (Jurassic, 150-125 Ma) and Tertiary-Quaternary (Neogene, <23 Ma) was found.

4.6.1. Neoarchean Tectonism

Domain 8 (Uauá Block) and Domain 2 (Gavião Block) show evidence of Neoarchean or older tectonic deformations. Domain 8 (Uauá Block) exhibits unformed mafic dikes, aged between 2623-2700 Ma (Neoarchean) that clearly cut penetrative foliations found in orthogneisses older than 2.6-2.7 Ga, indicating that the deformation is older than the placement of the dikes. By the way, in this same domain, further to the north, granulitic rocks aged 2.8 Ga (OLIVEIRA, 2019) were found. Domain 2 (Gavião Block), on the west side of the Jacobina Mountain Range, next to the homonymous city occur TTG rocks with isochron ages of 3430 Ma (Paleoarchean), with vertical foliations, oriented in the N40E direction, carrying quartz-feldspar migmatite manifestations at the age of 2637 Ma. These data suggest that this deformation may be close to the latter age, in accordance with that of Domain 8 (Uauá Block) aforementioned. Also, Domain 2 (Gavião Block) in contact with Domain 6 (Jequié Block), exhibit shear zones penetrated by gabbro-anorthosite stratified sill of 2623 Ma (Neoarchean) (vanadium (V) (Rio Jacaré- Maracás mine) (BRITO, 2000) and Pé de Serra alkaline rocks of 2711 Ma (Neoarchean) (MARINHO 1991), indicating that this shear zone, of NS direction, occurred before or is contemporary to these ages. All these elements indicate the existence of a tectonism, possibly associated with a metamorphism, aged around 2.6-2.7 Ga

4.6.2. Paleoproterozoic Tectonism

Domains 7 (ISCB) and 10 (SEBB) have records indicating that Paleoproterozoic tectonism was the most important and the most extensive that occurred at the SFC in Bahia (BARBOSA *et al.*, 2012). In the eastern part it is considered that in the Paleoproterozoic, the collision of the Archean domains Gavião, Serrinha and Jequié occurred, leaving between them the tectonic-metamorphic belts ISCB and SEBB, all of which are part of the ISCO. In order to detail the age of these deformations and metamorphism, four geochronological approaches can be considered, using the ages of zircons and monazites (PEUCAT *et al.*, 2011). In the first approach, it is noted that, both in the north and in the south of Domain 7 (ISCB), the rims of the igneous zircons of the Archean protoliths were affected and crystallized during the deformations, associated with high-grade metamorphism. In the northern part of the ISCB, growth on the periphery of the igneous zircon crystals recorded U-Pb ages of the metamorphism at 2076 Ma, 2082 Ma, and 2074 Ma, all from the Rhyacian period (SILVA, 2002). In the southern part, there are also zircons, whose rims have been rebalanced by deformations and granulitic metamorphism. In effect, these peripheries show SHRIMP and LA-ICPMS ages of 2080 Ma, 2081 Ma, 2098 Ma and 2069 Ma, also from the Rhyacian. The second approach focuses on the metamorphic zircons formed by the granularization and deformation of Archaean rocks and which still maintain relic igneous zircons. These "new" metamorphic zircons are not zoned and exhibit ages of 2081 Ma, 2078 Ma and 2109 Ma, in line with the first approach. The third approach refers to magmatic zircons crystallized intrusive in syn- and mainly post-tectonic to the peak of metamorphism, indicating the end of Paleoproterozoic deformations. These intrusive rocks have zircons of ages 2082 Ma, 2075 Ma, 2098 Ma, 2109 Ma and 2096 Ma, also in line with the first and second approach (PINHO, 2005). The fourth and last approach refers to the ages of monazites present in charnockites and “S” type granites, formed by partial fusion of the aluminum-magnesian granulites, at the peak of metamorphism. In this case, they are present in the metamorphic monazites, ages 2057 Ma, 2080 Ma and 2052 Ma, confirming the previous values (BARBOSA *et al.*, 2012). Therefore, these geological-geochronological elements indicate the existence of Paleoproterozoic tectonism in the aforementioned domains.

Domain 9 (Serrinha Block) also contributed to the identification of the age of Paleoproterozoic tectonism-metamorphism (MELO *et al.*, 2006). Indeed, a granite dyke that cuts through the Ambrósio Dome (2077 Ma), and which can be considered as a final representative of its crystallization, reached an age U-Pb in zircon of 2080 Ma, which is absolutely consistent with the ages Ar-Ar of hornblendes found in neighboring amphibolites. Added to this is the age of detrital zircons (2076 Ma), found in quartzites of the upper sequence of Rio Itapicuru Greenstone Belt, of that same domain.

Domain 2 (Gavião Block) also has deformations and Paleoproterozoic metamorphism. In this domain, also strongly deformed, migmatites with granitic-granodioritic neosomes, carriers of biotite with Paleoproterozoic ages, are found. Still in this domain, in its western part and in the areas corresponding to the granulite facies of the Santa Izabel Complex, granulitic migmatites are found with charnockite neosomes containing U-Pb zircon ages (SHRIMP) of 2095 Ma (Rhyacian) (BARBOSA *et al.*, 2012).

All of these considerations confirm the Paleoproterozoic ages that, in the great majority, rebalanced the Archean rocks of the blocks mentioned above. It is also necessary to include the presence of syn-and-post--tectonic intrusive rocks at the peak of metamorphism with igneous zircons recording the Paleoproterozoic ages. Finally, one can consider an average age for this Paleoproterozoic tectonism equal to or close to 2080 Ma, as noted in the bidimensional legend of the TGMBA

4.6.3. Neoproterozoic Tectonism

Neoproterozoic tectonism is registered in Domains 2 (Gavião Block), 3 (Northern Espinhaço), 5 (Chapada Diamantina) and in the shear zones that separate these domains from Domain 4 (Paramirim Block). In addition to these domains, located in the SFC tectonic entity, the peripheral fold belts, belong to another tectonic entity called Brasiliano Orogenic Systems, which are also of Neoproterozoic age, namely: Domain 11 (Araçuaí Belt), Domain 12 (Rio Preto Belt), Domain 13 (Riacho do Pontal Belt) and Domain 14 (Sergipano Belt/Pernambuco-Alagoas Terrain).

In Domain 2 (Gavião Block), the orthogneisses and migmatite rocks, from its southern and western parts, host foliations parallel or discordant from previous Paleoproterozoic foliations. In these cases, especially in the shear zones that are located in the contacts of Domain 4 (Paramirim Block) with Domain 3 (Northern Espinhaço) and Domain 5 (Chapada Diamantina), K-Ar ages are found in micas (biotites) with average values of 656 Ma (Ediacaran). Likewise, in biotites of some Paleoproterozoic granitoids, present in the Gavião Block, K-Ar ages of 507 Ma, 551 Ma, 490 Ma and 483 Ma, all from Ediacaran period (BARBOSA *et al.*, 2012) are noted. Also, in the amphiboles found in the amphibolitic rocks that occur as tectonic enclaves in the orthogneisses and migmatites, K-Ar ages ranging between 685 and 545 Ma are found, meaning partial or total loss of air in these minerals, at the time of their cooling, are linked to the rise of these rocks in the context of the Neoproterozoic tectonics. It is also worth mentioning the Irecê Basin, where Sr isotopes of carbonate layers, correlated over long distances with others of the same type, are 650 Ma (SANCHES *et al.*, 2007). All these data suggest the influence of deformations with Neoproterozoic ages.

In Domain 11 (Araçuaí Belt) in Bahia, metamorphism increases towards the south, a fact registered in the metamorphic rocks derived there. Through thermo-barometric methods, kinzigitic paragenesis made it possible to calculate, for this metamorphism, pressures of the order of 7 kbar and temperatures around 850 oC. However, although the physical characteristics of this metamorphism have been identified, there are no dating studies or metamorphism or deformations available. In turn, in the north of the Belt, close to the Bahia-Minas Gerais border, gneissic rocks are found, forming large folds with axial planes verging on the CSF (BARBOSA *et al.*, In press). In these gneisses, quartz-feldspar bands have ages of 808 Ma, with the ages of Neoproterozoic deformations being estimated at 540 Ma (Ediacaran). In effect, post-tectonic, undeformed Paleozoic granitoids are found in this range aged 517 Ma (Cambrian), among them, the granitoids called Pau Brasil, Serra dos Aimorés, Paratinga, Vereda, Buranhém and others. This suggests that the end of these intrusive processes occurred in the Neoproterozoic or in the Neoproterozoic-Paleozoic transition.

Domain 12 (Rio Preto Belt) is basically made up of quartzites and shales, the product of the metamorphism of pelitic rocks. Focusing on the age of tectonism in this range, we can mention the presence of alkaline granites with 971 Ma, quartzites with detritic zircons with a minimum age of about 960 Ma and mafic-ultramafic rocks with nickel (Ni) and copper (Cu) mineralization , whose U-Pb age is 573 Ma (Ediacaran). These values, especially the highest ones, are near the age of Neoproterozoic tectonism in this range.

Domain 14 (Sergipano Belt/Pernambuco-Alagoas Terrain). In Bahia, the Sergipano Belt has only three domains: Macururé, Miaba-Vaza Barris and Estância. The Macururé Group has detrital zircons in quartzites where the minimum age is approximately 800-856 Ma. In the Miaba-Vaza Barris Groups, in siliciclastic rock, detrital zircons with ages varying from 2000 to 553 Ma were also found. Grupo Estância, in turn, has sandstones with detrital zircons showing ages ranging from 955 to 570 Ma.

As in previous cases, it is worth noting the introduction of granites without deformation in the Macururé Group, whose ages are between 628 and 570 Ma suggesting the end of Neoproterozoic deformations in that period. Thus, for the deformations of the Sergipano Belt/Pernambuco-Alagoas Terrain, an age of approximately 570 Ma (Ediacaran) or slightly less can be considered.

The Pernambuco-Alagoas Terrain (PAT) has been understood as an entity with complex polycyclic evolution. Its infrastructure consists of rocks of a gneissic-migmatitic-granitic nature with Archaean and Paleoproterozoic Orosirian ages (2.0-1.8Ga), which house bands of supracrustal rocks inside. Within the scope of the PAT an orogenic event Mesoproterozoic / Neoproterozoic (Tonian), called Cariris Velhos Cycle, which is verified by the existence of amalgamated meso and Neoproterozoic bands or terrains and by the placement of granitoids around 1.0Ga. Finally, it records a collision event related to the Brasiliano Cycle (0.75-0.57Ga), responsible for reworking the TPA.

Finally, given the elements mentioned above, one can consider the existence of Neoproterozoic tectonism printed on the studied rocks, aged around 540 Ma as placed in the two-dimensional legend of MTGBA.

4.6.4. Mesozoic Tectonism

Domain 15 (Recôncavo-Tucano Basin) shows an approximately N-S orientation, representing a system where the northern branch was aborted, while the eastern branch, Domain 16 (Camamu-Almada Basin), resulted in the formation of the Southern Atlantic.

Domain 15 (Recôncavo-Tucano Basin) can be separated into three supersequences, whose ages are based on fossiliferous contents, namely:

(i) Pre-rift, aged between 150 Ma and 145 Ma (Jurassic), formed by the Brotas Group , composed, from the bottom to the top, by the Aliança Formation and the Sergi Formation;

(ii) Rift, aged between 145 Ma and 125 Ma (Jurassic), composed from the bottom to the top by the Santo Amaro, Ilhas and Massacará Groups and

(iii) Post-rift with age close to 115 Ma (Cretaceous), formed by Marizal Formation.

As demonstrated above, the sedimentation of the basins was basically associated with gravity failures and, therefore, these Jurassic and Cretaceous ages can be considered as representative of Mesozoic tectonism.

4.6.5. Neotectonics

With regard to "Neotectonics", since the last century, records and reports indicate that it is related to seismic manifestations. These seismic events were interpreted as responsible for the movement of sedimentary rocks in the basins, along the fault planes. Great temporal markers for these neotectonic events are registered in the Barreiras Formation and in the post-Barriers sedimentary coverings deposited between the Miocene and the Quaternary (Neogen, ≤23 Ma) (GOMES *et al.*, 2012).

5. BAHIA TECTONIC AND METALLOGENIC EVOLUTION

5.1. GENERAL BACKGROUND

The SFC in Bahia is part of the South American Platform that can be defined as a continental region, which was stable throughout the Phanerozoic eon (BRITO NEVES & ALKMIM, 1993). Its western border is defined by the Andean Domain, which is hidden under a series of foreland basins. Its eastern border is delimited on maps with the ocean lithosphere of the Southern Atlantic and marked by several basins of passive margins. The last major tectonic event that affected the South American Platform was the Neoproterozoic one, responsible for the formation of the Gondwana Supercontinent. In Mesozoic times when Gondwana separated, South America became one of the main continental fragments. In turn, the Brasiliano orogenic belts, have surrounded tectonically stable areas since Neoproterozoic times (ALMEIDA *et al.*, 1981). The SFC (ALMEIDA, 1977), the focus of this TGMBA, is one of these stable areas.

In order to interpret the tectonic evolution of the Archean (neo, paleo and meso), one of the obstacles in identifying and collecting significant geological data from these ancient rocks, is that their probable orogenetic processes were camouflaged or erased by the younger orogens. These promoted recycling, sometimes with associated metamorphism and migmatization, even modifying important parts of the oldest continental crust (BARBOSA *et al.*, 2012). As a result, it is difficult to reconstruct the Archean geology of the basement of the SFC, which seems to have evidence registered in Domain 2 (Gavião Block) due to the Paleoarchean ages, found in this region. Despite this, the widespread presence of the Neoarchean, Paleoproterozoic and Neoproterozoic orogeneses erase old data and hinder the interpretations. To complicate matters further, these deformations are almost always accompanied by syn-, tardi- and post-tectonic granitogenesis. In the southern part of the domain mentioned, for example, the deformations and metamorphism-migmatization, especially Paleoproterozoic, and Neoproterozoic, harm geotectonic reconstructions. These difficulties have been alleviated by conducting in-depth scientific research, including geological mapping, geochronological U-Pb dates in addition to isotopic studies in specific areas. Actions with these objectives are providing better explanations about the generation, both of the TTG and granitoids as well as the Greenstone Belts (GB) and metavolcano-sedimentary sequences (MVSSs) of the region. On the other hand, with the scarcity of lithogeochemical research in strategically selected lithologies, it is rare to identify in these terrains of oceanic volcanics that, combined with sanukitoid or adakitic rocks, could more safely induce an interpretation of microplates and Archean subduction zones. Facts that would help in paleotectonic reconstructions.

Despite the difficulties, a synthesis on the Tectonic and Metallogenetic Evolution of Bahia is described below, covering the Ages and Periods, from the Eoarchean (4000-3600 Ma) to the Quaternary (2.5 Ma - Present). In this synthesis, geology was made compatible with geophysics, while considering the genesis of the main deposits and mineral deposits in the state. The U-Pb ages of the rocks were also considered, following the order from the oldest to the youngest, and always considering the two-dimensional legend of the TGMBA and its tectonic domains. In this evolution, ornamental stone quarries were excluded, although citations about industrial minerals and materials for civil construction are included in this synthesis.

5.2. ARCHEAN

Domain 2 (Gavião Block) contains the oldest rocks of the SFC in Bahia. Its tectonic and metallogenetic environments are relatively well represented, whose continental crust could have been formed through vertical tectonics or plate tectonics (sub-horizontal), producing TTG rocks in at least three stages, according to the approximate ages of 3642 (OLIVEIRA *et al.*, 2020), 3403-3378 (LEAL *et al.*, 2003) and 3259-3487 Ma (SANTOS PINTO 2012) (Eoarchean, Paleoarchean, Mesoarchean). This crust may have served as a basis for Umburanas GB with komatiites (CUNHA & FRÓES 1994; MENEZES LEAL *et al.*, 2015) and for the basal section of Contendas-Mirante MVSS (MARINHO 1991; ZINCONE 2017), including Jurema Leste (Neoarchean, 2654 Ma) (RIOS 2007) both holders of economic deposits of orogenic gold (Au). The latter is currently being researched in detail by ENVIRONMETALS and will be detailed in the next item 5.3.

Also included in the southern part of Domain 2 (Gavião Block) is the Brumado MVSS or Brumado Complex (PINHO *et al.*, 2011) which contains important magnesite (Mgs) mines currently mined by RHI MAGNESITA SA, with a production of 4.5 million tons / year. In terms of the origin, magnesite is present in mineralized magnesites that occur as lenses in dolomites. Genetically, dolomites and magnesite are considered to have been formed by chemical sedimentation at the edge of the continent (ALMEIDA, 1989). In these coastal environments, influenced by the variation of the tides, barriers parallel to the coast were created that dammed the waters rich in Ca and Mg. In these coastal environments, after intense and long evaporation, large amounts of dolomites and magnesites were deposited. The latter, after being deformed and metamorphosed, generated the magnesite (Mgs) mines mentioned above. White talc, also explored in these mines, will be discussed below in item 5.3. To the north of Brumado MVSS, reference should be made to one of the most important Neoarchean granitoids in this domain: Caraguataí (CRUZ *et al.*, 2012). Located between the cities of Abaíra and Jussiape, it has a syenitic, alkali-feldspar granitic to syenogranitic composition, deformed and transformed into gneiss in ductile shear zones. The main mineralogy is formed predominantly of potassium feldspar, albitized and microclinized, in addition to plagioclase and quartz. The accessories are biotite, magnetite, titanite, allanite, apatite and zircon. They are peraluminous and metaluminous with U-Pb ages in zircon varying between 2711 and 2697 Ma. It should be noted that CPRM, in its regional geological mapping study, proposed the division of Brumado MVSS into two units: a basal one, for which the name Brumado Complex was maintained, and an upper one, named Serra das Éguas Group (in reference to its toponymy). The latter, which has been correlated to the Colomi Group, is considered to be Paleoproterozoic in age.

In Domain 2 (Gavião Block), in its northern part, west of the Jacobina Mountain Range (REIS *et al.*, 2019), rhyolites (Paleoarchean, 3304 Ma) from a plutonic-volcanic system (ZINCONE *et al.*, 2016) were identified. These, together with the TTGs of the region, served as a passive margin for the Jacobina-Umburanas Sea. Initially, in the mountains of the same name, quartzites and conglomerates (3305 Ma) with detrital gold (Au) (TELES, 2013), filled a rift that, over time, evolved into a marine basin, with ultramafic plutons at the base (3296 Ma) possibly carrying chromium (Cr). Jacobina's (Au) gold is being explored by Canadian YAMANA, which in 2019 produced 152 thousand ounces of this metal. On the Jacobina-Umburanas Sea platform, deposition of iron (Fe) and manganese (Mn) associated with pelites occurred in an oxidizing environment. Also, in the deepest places of that sea, there is the presence of ocean floor basalts (Mesoarchean, 3200 Ma) (TELES, 2013), or of an island arc with presence of pillow-lavas. Later, at about 2.7 Ga, in the eastern neighborhood of the Serra de Jacobina, after stabilization, a new opening of the continental crust occurred, separating the Gavião Block (Paleoarchean, 3642, 3259 Ma) (OLIVEIRA 2020; SANTOS PINTO *et al.*, 2012) of the Mairi Block (Paleoarchean, 3303 Ma) (PEUCAT *et al.*, 2011). This opening evolved until the appearance of an oceanic crust, identified in GB Mundo Novo, with hydrothermal (high temperature) occurrences of lead (Pb) and zinc (Zn), associated with tholeiitic metabasalts with an ocean floor (Neoarchean, 2757 Ma) (SPREAFICO *et al.*, 2019, 2020). These metabasalts are interspersed with metadacites due to the tectonics that predominated around 2.7-2.6 Ga. Also, in Domain 2 (Block Gavião), in its extreme north (ANGELIM 1997; LIMA *et al.*, 2019), near the borders with Piauí and Pernambuco, TTG rocks and migmatized orthogneisses, similar to those in the south part (BARBOSA *et al.*, in press) are found. Deposits of iron formations (BIFs) are found in MVSSs, following the examples of Colomi Group and Lagoa do Alegre GB, with the latter bearing Komatiites at their base (MORAES *et al.*, 2010; SANTOS 2011).

In the western part of Domain 2 (Gavião Block), the Santa Izabel Migmatitic Complex (Mesoarchean, 2954Ma) that enclosed older meta-komatiites (MEDEIROS *et al.*, 2017; BARBOSA *et al.*, 2020) occurs. Thus, in the Gavião Block, in general, the formation of the basal rocks of the GBs and MVSSs took place in the interval between 2744 to 2550 Ma, in the Neoarchean. Although, it should be noted that previously mentioned GB Umburanas has older quartzites and detrital zircons dated at 3147 Ma and felsic metavolcanics interspersed in mafic rocks aged 3200 Ma (BASTOS LEAL *et al.*, 2003).

In Domain 6 (Jequié Block) (BARBOSA *et al.*, 2012) the occurrence of granulitized protoliths (Neoarchean, 2680-2645 Ma), in addition to the mafic sill Rio Jacaré-Maracás (2623 Ma) are observed (BRITO, 2000). As the latter ages indicate, in a regional context, around 2.6-2.7Ga a deformation-metamorphism occurred that, it seems, reached the Archean domains. This can be confirmed by the U-Pb ages in zircon found in the “S” type granites of the city of Nova Itarana (Neoarchean, 2684 Ma) (BARBOSA *et al.*, In press) located in the center of the State and, in the migmatitic leucosomes of the orthogneisses of the Itabaiana Dome (Neoarchean, 2737 Ma) located on the Bahia-Sergipe border (SANTIAGO *et al.*, 2017). As mentioned in the previous item 4.6.1, other evidence of deformation-metamorphism in the period 2.6-2.7 Ga is found:

(i) In Domain 8 (Uauá Block), where undisturbed mafic dykes (Neoarchean, 2623-2700 Ma) cut penetrative foliations found in orthogneisses older than 2.6-2.7 Ga, indicating the existence of a tectonism previous or close to these ages;

(ii) In Domain 2 (Gavião Block), on the west side of the Serra de Jacobina, where TTG rocks with Paleoarchean isochrone ages of 3430 Ma are located, containing vertical foliations with quartz-feldspar migratory manifestations (2637 Ma), suggesting that there was a nearby deformation of this latter age and;

(iii) In Domain 2 (Gavião Block) where Neoarchean shear zones occur, the stratified mafic sill, of gabbroic-anorthositic composition penetrated (2623 Ma) forming the iron-titanium-vanadium (V) mine, called Jacaré-Maracás River (BRITO, 2000). This mine belongs to the Canadian group LARGO RESOURCES LTDA which in 2019 removed 10577 tons of V2O5. In parallel to the sill, the alkaline plutonic rocks Pé de Serra (2711 Ma) (MARINHO *et al.*, 1991) also penetrated, indicating that this NS direction shear occurred before or contemporaneously with deformations with ages close to 2.6-2.7 Ga. Also, in Domain 6 (Jequié Block) there are granulitized MVSS with occurrences of graphite (Gf) and iron (Fe) deposits such as those called Ibicuí (SILVA SANTOS 2015) recently researched by CENTAURO METAL. Also, in this block important deposits of bauxite (Bau) are located belonging to RIO TINTO due to the superficial alteration of anorthosites and charnockites.

In the Neoarchean, around 2.6-2.7 Ga, between Domain 2 (Gavião Block) and Domain 9 (Serrinha Block), there was the formation of an island arc (2695 Ma) through which, in its base, the Cu-rich mafic-ultramafic body) named Caraíba penetrated (Neoarchean, 2580 Ma), which became a part of the so-called Cupriferous District of Vale do Curaçá-Caraíba (OLIVEIRA 1990; LACERDA 1995; GARCIA 2013; OLIVEIRA *et al.* , 2010b, 2019; GARCIA *et al.*, 2018) where the holder in the mining rights, called EROCOPPER, in 2019 produced around 42,000 tons of metallic copper. This mafic-ultramafic body was generated from a calcium-alkaline magma which, due to fractional crystallization, gave rise to multiple gabbroic and pyroxenitic intrusions, both cupriferous. Thus, in the Curaçá River valley, the Caraíba mine, currently an important producer of primary copper ore (Cu), composed of bornite and chalcopyrite, which crystallized both in granular form and in the form of massive pockets. The aforementioned collision formed elevations that, after being eroded and flattened, allowed the invasion of the Caraíba-Juazeiro-Ipirá-Contendas Sea (BARBOSA *et al.*, In press). As a result, a broad basin was formed, essentially composed of sedimentary, siliciclastic and chemical rocks, which in the Paleoproterozoic extended for a good part of the SFC in Bahia, as discussed below.

On the other hand, in Domain 9 (Serrinha Block), orthoderived rocks and Archean migmatites of the Santa Luz Complex (Mesoarcheano, 3162-2991Ma) (DAVISON *et al.*, 1988), hosts of the Aurífera Rio Itapicuru Province, of the Paleoproterozoic, are identified.

5.3. PALEOPROTEROZOIC

With regard to Paleoproterozoic, in Domain 2 (Gavião Block) and in Domain 7 (ISCB), there is evidence that in that Era there was an extensive sedimentary coverage in the SFC that buried most of the basal Archaean rocks of the GBs (3147 Ma) and the MVSSs (2575 Ma) from Mesoarchean and Neoarchean periods, respectively. It is important to postulate that this coverage occurred about 400-500 million years later than the end of the formation of the meso and Neoarchean rocks of the GBs and MVSSs. This cover is Paleoproterozoic in age, being formed by siliciclastic and chemical lithologies, with few volcanic Rhyacian components (2151-1960 Ma). This coverage that spread regionally in the above domains was the result of the invasion of the Caraíba-Juazeiro-Ipirá-Contendas Sea (BARBOSA *et al.*, In press), which installed and deposited lithologies on top of the ancient sequences. It is part of the Saúde Complex (2150-2075 Ma) (ZINCONE & OLIVEIRA, 2017) which contains, in the center of Domain 7 (SISC), quartzites, graphite gneisses, olivine-marbles, serpentine-marbles, in addition to calcio-silicate rocks. The latter are important from a metallogenic point of view, as recent research has shown the occurrence of phosphate, apatite (Ap) in marbles and limestone. These rocks have a chemistry that registers negative cerium and positive europium anomalies, which suggest the occurrence of sedimentation in a relatively shallow marine environment, with availability of oxygen for the deposition of phosphate (RIBEIRO, 2017). It is worth mentioning that the Saúde Complex, in the southern continuation of Domain 7 (CISC), presents itself with migrated metapelites, including "S" type granites (BARBOSA *et al.*, In press).

In the eastern part of Bahia in Domain 7 (ISCB), in an interval of approximately 30 million years (BARBOSA & SABATÉ, 2014) an important tectonic and Paleoproterozoic metamorphism occured, the latter dated between 2071 and 2080 Ma (U- Pb in zircon) (Barbosa & Sabaté 2003; Peucat *et al.*, 2011; Barbosa *et al.*, 2012). This tectonics was the result of the collision of the Archean segments of Domain 2 (Gavião Block), Domain 9 (Serrinha Block) and Domain 6 (Jequié Block), generating the ISCO, whose axes are distributed in Domain 7 (ISCB) and Domain 10 (SEBB). The bonding or collision of these Archean block domains generated an important mountain range.

This, although currently devastated, left its roots exposed and relatively well preserved, deformed and metamorphosed to a high and medium degree. These roots extend from the south of Bahia (Itabuna), to the north (Curaçá), passing through Salvador. These are the deepest crustal traces of the ISCO, whose protoliths are Neoarchean rebalanced in the Paleoproterozoic. It is worth to note that from the axis of the ISCO, in its northern part, the foliations form a “positive flower” with the foliations diverging towards east and west. However, in its southern part, the foliations have vergence only to the west. The “positive flower” is completed in Gabon, Africa, where the foliations have an eastward vergence. The progressive metamorphic facies accompany the deformations: granulite facies on the axis and amphibolite and green schist facies predominate, both east and west of the ISCO (BARBOSA *et al.*, 2012; BARBOSA & BARBOSA, 2017). Attention should be drawn to the transformation of the progressive paragenesis of these rocks to retrograde paragenesis. Indeed, metamorphic reactions proving the retro-metamorphism are well evident in granulitic rocks. For example, Gt + Qz = Opx + Pl (decreased lithostatic pressure) and Opx + Cpx + Pl + H_2O = Hb + Qz (introduction of water in the amphibolite-granulite facies transition). These reactions reaffirm the existence of retrograde granulites in the region (BARBOSA 1986).

Propagating to within Domain 2 (Gavião Block), the Paleoproterozoic deformation generated large folds with sub-horizontal axes of approximate N-S direction and with axial planes, sometimes doubled, showing a low angle eastward slope (MARINHO, 1991). At this rate, up to a depth corresponding to granulite facies (± 25 Km), it deformed the crust and its components penetratively, including the Contendas-Mirante MVSS and its TTG base (MATIAS, 2020). It must not be forgotten that the coverage referred to initially in this item, and which covered the basal part of this MVSS, was also affected by Paleoproterozoic deformations. These deformations, with west-facing foliations, evolved to more or less the 41°50’ meridian. From then on, the foliations change their inclination, starting to have vergences towards the east. This dichotomy can be explained, since in this domain, in the Paleoproterozoic, there was an important collision zone where crustal segments of the Western Gavião Block were pushed to the east, causing the foliation vergencies to change the inclination. This collision zone, after being eroded, made possible the appearance of extensive parallel zones of weakness, which were distributed, from the north of Bahia to the south into Minas Gerais. These fault zones, after having the east block lowered, became the western limit of the Paramirim Aulacogen, described later (BARBOSA *et al.*, In press).

In the southern part of Domain 2 (Gavião Block), Paleoproterozoic deformations were also important to make gold mineralization economical, modifying it and becoming known as orogenic gold (Au), both in GB Umburanas and in Contendas Mirante MVSS - Jurema Leste. This is explained by the fact that gold, initially dispersed in acidic volcanic rocks and carbonaceous meta-sediments, due to the deformations, was preferably concentrated in shear zones, which arose during the Neoarchean and later Paleoproterozoic deformations. These zones, helped by the heat generated by syn-tectonic granites, facilitated the circulation of hydrothermal fluids by making this metal migrate and concentrate in these mobile zones.

On the other hand, at Brumado MVSS in the pockets and fractures present in the magnetites, hydrothermal white talc (Tlc) has been mined by BRUMADO TALCO S.A., which has removed an average of 40 thousand tons/year. This mineral resource was generated during the retrograde Paleoproterozoic deformations causing siliceous fluids to combine with the magnesium oxide forming magnesium silicate. This occurred according to the reaction SiO_2 + MgO = Talc (magnesium silicate). In turn, in the northern part of Domain 2 (Gavião Block) hydrothermalism is present, this time reaching the Komatiites of Lagoa do Alegre GB. In this manner, green talc (Tlc) was generated, which was explored in the early seventies, by a small mining company called GEOMINAS. In the northern part of Domain 2, this time in the Jacobina Mountain Range, the detritic Au, mined in the matrix of the conglomerates, of the Serra do Córrego Formation, was remobilized to fill fractures and voids in the conglomerates and in neighboring quartzites. These are small occurrences of hydrothermal Au, some of which are sporadically mined. Attention should be drawn to the Paleoproterozoic post-tectonic granites, present in the region. These, when intruding the meta-sediments of the Jacobina Mountain Range, in depth corresponding to greenschist facies, must have increased the ambient temperature and helped in the mobilization of fluids, carrying with them the initial detrital gold, transforming it locally into hydrothermal Au. When this process takes place, concomitantly and associated with the shear zones, it starts to be considered as an orogenic Au. Still in the context of the Jacobina Mountain Range, in the region of Campo Formoso, mineralizations of beryl (Bl) and emerald (Esm) (MOREIRA, 1995) were generated and are explored intermittently until the present day. These occurrences of precious stones appeared due to the interaction of pegmatites rich in quartz, originating from Paleoproterozoic granites, with the Archean peridotite rocks, hydrothermally serpentinized and composed of tremolite-actinolite, talc and carbonate. In contact with quartz, litiniferous phlogopitites, chlorite, talc shale and, sometimes, molybdenite and scheelite are formed (MOREIRA, 1995).

In Domain 2 (Gavião Block), in the alkaline intrusion of Lagoa Real (1724 Ma), uranium (U) albitites occur (ARCANJO *et al.*, 2000; CRUZ *et al.*, 2014, 2007; CHAVES *et al.*, 2007) explored by the CNEN-National Nuclear Energy Commission Mine in Caetité. Regarding the genesis of the ore, it is considered that in the final phase of crystallization of the body, hydrothermal and final sodium uraniferous fluids were concentrated in the middle part of the body. With this, through metasomatism, possibly still in the magmatic chamber, the most calcic plagioclases and the initial microclines were replaced by albite, creating the albitites mineralized in uraninite (BARBOSA *et al.*, in press). Thus, arose the uranium-rich (U) albitites of Paleoproterozoic age and which were later deformed in the Neoproterozoic.

In turn, in Domain 3 (Northern Espinhaço), deposits of manganese (Mn) and iron (Fe) ore were located, especially in SMVS Caetité-Licínio de Almeida (BARBOSA *et al.*, 2012; BORGES *et al.*, 2015). Its protores came from the chemical deposition of these elements, always associated with pelite. During deformations and Neoproterozoic metamorphism, these sediments gave rise to iron formations (BIFs) and rhodochrosite marbles, sometimes bearing the jacobsite mineral which is a manganese (Mn) magnetite, as will be described later in the item 5.5. These iron and manganese deposits are owned by BAMIN-Bahia Mineração and FNRG (group from Kazakhstan) where its main mining area is called Pedra Preta Mine. Still in the northern continuity of Caetité-Licínio de Almeida MVSS, it is worth mentioning the old lead (Pb) and zinc (Zn) mine in Boquira (massive sulfides with galena and spharelite and with pyrite and pyrrhotite accessories). This mine, although currently suspended and possibly depleted, functioned for a long time, having been genetically considered as a sedimentary-exhaled hydrothermal (SEDEX) (ESPOURTEILLE, 1980; LOUREIRO 2009; GARCIA 2011).

In this Paleoproterozoic tectonic evolution of the northern SFC region in Bahia, Domain 9 (Serrinha Block) stands out (RIOS *et al.*, 2005, 2007, 2009) due to the presence of the Itapicuru River Auriferous District, where orogenic Au is mined (Project Deixaí, Mine C1-Santa Luz, Mine Fazenda Brasileiro) (ASSIS, 2016, 2018). By the way, the occurrences of Deixaí, from the CAIÇARA MINING, are still being researched; the C1-Santa Luz Mine has been paralyzed since the beginning of 2019 and the Fazenda Brasileiro Mine has been mined for a few years by the Canadian company LEAGOLD which extracted 375,445 ounces in 2019. It should be noted that the lithologies of this gold province were formed with the opening of the gneiss-migmatitic crust of the Santa Luz Complex (3162-2991 Ma), generating a rift that evolved into an ocean, allowing the appearance of arcs and back-arcs (Rhyacian, 2200-2050 Ma). These contain tholeiitic basalts, dacitic and rhyolitic volcanic rocks, both superimposed by siliciclastic rocks (2148 and 2081 Ma) and which came to constitute the Rio Itapicuru and Capim GBs. In the case of gold (Au) in this domain, with a better understanding of the local geology, it was concluded that most of it was originally concentrated in acidic volcanics, although there are smaller amounts of detritic Au in sediments in the back-arc, much of it carbonaceous. Tectonics, retrograde metamorphism associated with Paleoproterozoic hydrothermalism, in a crustal depth corresponding to the greenschist facies, concentrated this element, making it economically exploitable. It is worth mentioning again that the introduction of granites, mainly the syn-and-tardi-tectonic, increased the ambient temperature, making the hydrothermal fluids that concentrate the Au circulate more easily, mainly in the retrograde shear zones (BARBOSA *et al.*, In press). Namely, at the Fazenda Brasileiro Mine, the geochronological studies undertaken by Melo *et al.* (2006) corroborate the interpretation that it was the processes linked to retrometamorphism, the main gold concentrators. In fact, these authors found Ar-Ar ages in retrograde-hydrothermal muscovite with values of 2050-2054 Ma, interpreted as the age of gold mineralization. As the peak of metamorphism is 2080 Ma, mineralization then occurred at about 30 Ma after that peak, therefore during the retrometamorphism.

Metamorphism and Paleoproterozoic deformations, in general, reached several tectonic domains of the TGMBA, both in the progressive and regressive phases. In the case of the Curaçá-Caraíba Valley Cupriferous District, located in Domain 7 (ISCB), copper ore (Cu) (2580 Ma) (GARCIA 2013, 2018) and its embedding rocks (2695 Ma), which were affected in the Neoarchean by tectonic events of 2.6-2.7 Ga, were superimposed by a progressive and regressive metamorphism during the Paleoproterozoic (BARBOSA, *et al.*, 2012). Petrographic studies show that the primary mineralization was fiery, formed in a crustal depth corresponding to granulite facies. However, during the retrometamorphism, with the rise of the rocks to the crustal level of the amphibolite facies, there was the penetration of Orosirian potassic granitoids (2044-2042 Ma), causing the igneous ore to undergo the first hydrothermal stage (2.05-2,03 Ga) (GARCIA, 2013). In effect, this process is noticed in petrographic slides where pyroxenes are partially changed to amphiboles and biotites due to the entry of aqueous and potassium fluids, the latter from syn-tectonic granitoids (2044 Ma). It is also verified in this first hydrothermal step that the gabbros and hyperstenites are transformed into biotitites in the retrograde shear zones that cut mineralized rocks. The second hydrothermal step (1.95-1.92 Ga) is linked to the rise of rocks and ore to more superficial parts of the crust, corresponding to the schist-green facies. This is considered because in the rocks chlorite and malachite are identified, resulting from the alteration of biotites and chalcopyrite-bornite, respectively.

In the case of chromium (Cr) existing in the Vale do Jacurici Chromitiferous District, located in Domain 7 (ISCB), during the Paleoproterozoic penetration of the granitic pluton Cachoeira (Rhyacian, 2085 Ma) (SILVEIRA *et al.*, 2015a, 2015b) occurred in amphibolite facies environment, adjusting to the Santa Luz Complex (Mesoarchean, 3162 Ma) DAVISON *et al.*, 1988) Concomitantly, mafic-ultramafic bodies and sills (dunites, harzburgites or pyroxenites, with chromite layers up to 8 meters in length) thickness) penetrated the Cachoeira Granitoid. After these geological events, the rocks were superimposed by the essentially sedimentary cover mentioned at the beginning of this item and generated by the entrance to the Caraíba-Juazeiro-Ipirá-Contendas Sea. And, even during the construction of the ISCO, sub-horizontal Paleoproterozoic deformations, with westward inclination, formed recumbent folds that placed the most surficial rocks in depth corresponding to granulite facies. However, during the lifting of the granulite facies rocks, to the amphibolite facies environment, the granulites were retrograded. It is worth referring to the geophysical studies that helped understand the geology of this district. Namely, magnetometry studies indicate that this district is composed of dozens of chrome deposits and mines, distributed in an approximate N-S orientation belt, 120 km long and 15 km wide. The mafic-ultramafic bodies (gabbros, dunites and harzburgites), containing the mineralizations, are arranged with layers of chromitite placed parallel to the foliation of high-grade metamorphic rocks. The magnetic and gamma-spectrometric aerial data made it possible to delimit geophysical units that became compatible with the geological data. Roughly speaking, high magnetic values are noted in dunites and harzburgites, whose anomalies are highlighted by the intrinsic presence of magnetic minerals. These differ from their orthogneissic inserts, which are retrograde in that the latter have low or very low magnetic values. In turn, with regard to gamma-spectrometry, the mafic-ultramafic bodies mineralized with chromium, exhibit low values of Th, U and K, unlike their quartz-feldspar embedding which have high values of these elements (SILVA & SAMPAIO, 2017). The integration of geological and geophysical data allowed us to interpret that during the Paleoproterozoic (Rhyacian), in a retrograde fault/shear zone, installed between the Caraíba Complex, to the west and the Cachoeira and Santa Luz Complex gneisses, the Itiúba Syenite penetrated in 2085 Ma, which came to constitute an NS direction range, separating the two mining districts: the cupriferous one, to the west and the chromitiferous one, to the east.

In general, the Paleoproterozoic tectonics was equally influential in the hydrothermal reconcentration of gold. It should be noted once again that, in all of these cases, the temperatures of late and post-tectonic granitic intrusions, resulting from the climax of metamorphism (2032-2080 Ma), associated with deformations, helped in the mobilization and reconcentration of the orogenic Au, carried by low salinity carbonic fluids. In certain cases, these deposits went from the detritic category to the orogenic category.

In the Tectonic and Metallogenic Evolution of Bahia, it should also be noted that, between 2085 to 1944 Ma, close to the peak of Paleoproterozoic metamorphism, the presence of numerous granitic and syenitic bodies is identified. The granitic, syn-, tardi- and post-tectonic bodies can be exemplified in Domain 9 (Serrinha Block) and in Domain 7 (CISC), mentioning, for example, Araci (2059 Ma) (RIOS 2002), Eficeas (2163 Ma), Nordestina (2152 Ma) (CRUZ FILHO 2000; CRUZ FILHO *et al.*, 2005), Itareru (2109 Ma) (CARVALHO & OLIVEIRA 2003), Teofilândia (2127 Ma) (BARRETO, 2002), Baroque (2137 Ma) (RIOS, 2000) and Pedra Vermelha (2080 Ma), which are located from the parallel of Salvador to the north, where, despite the presence of granulite facies, mostly retrograde, amphibolite facies rocks predominate. Syenitic bodies, syn- and tardi-tectonic, can be exemplified in Domain 7 (ISCB) as those of Itiúba (2084 Ma) (Conceicão, 1990, Santanapolis (2084 Ma) (CONCEIÇÃO, 1990), Cachoeira-São Felix (2098 Ma) (ROSA 1999; ROSA *et al.*, 2001) and Anuri (OLIVEIRA, 1995) which occur in parallel to the foliations and lineaments, predominant in this domain. And, due to their mineralogy, it is interpreted that the magma of these syenites penetrated the crust, when it was elevated, crystallizing at depths corresponding to the amphibolite facies.

The Paleoproterozoic granitic bodies were not concentrated only in Domain 9 (Serrinha Block) and Domain 7 (ISCB), on the contrary, they were dispersed throughout almost the entire foundation of SFC in Bahia. In Domain 2 (Gavião Block) in its southern part the bodies of Aracatu (2061 Ma) (SANTOS PINTO, 1996, 2012), Mariana (1944 Ma), Umburanas (2049 Ma), Caculé (2019 Ma) (BASTOS LEAL 2003; MENEZES LEAL *et al.*, 2015), Salininha (2003 Ma) (GORDILHO-BARBOSA *et al.*, 2019), Gameleira (1947 Ma) (MARINHO, 1991), Guanambi-Urandi (2054 Ma) (ROSA *et al.*, 1999), Boquira (2041 Ma) (ARCANJO *et al.*, 2000) and, in its northern part, the bodies of Campo Formoso (1960 Ma) (RUDOWSKI 1989; CUNEY *et al.*, 1990), Carnaíba (1883 Ma) (SABATÉ *et al.*, 1990; GIULIANI *et al.*, 1994), Jaguarari (1960 Ma) (CELINO, 1991) e Cachoeira Grande (2080 Ma) (LEITE, 2002) were studied. This demonstrates the importance of Paleoproterozoic tectonics in the SFC in Bahia, which when acting on the continental crust in depth, produced a large amount of granites, especially those of types “I” and “S” (GORDILHO-BARBOSA *et al.*, 2020, in prep).

Notably, the Paleoproterozoic progressive crustal tectonics affected areas of the Upper Mantle of the CSF in Bahia. This mantle, when merging, originated the mafic-ultramafic intrusions of Jacurici (2085 Ma) (SILVEIRA *et al.*, 2015a, 2015b; OLIVEIRA *et al.*, 2003) with chrome (Cr) mines, the mafic-ultramafic intrusions of Mirabela-Palestina (1990 Ma) (LAZARIN, 2011) with nickel (Ni) and copper (Cu) mines and the gabbro-anorthositic intrusion of the Piau River (1989 Ma) (CRUZ, 1989) with occurrences of iron (Fe) –titanium (Ti) -vanadium (V). The Mirabela-Palestine Mine belongs to ATLANTIC NIKEL MINERAÇÃO, which in 2019 extracted 10 thousand tons of nickel concentrate. The P (phosphate) mine called Angico dos Dias (Rhyacian, 2011 Ma) associated with carbonatitic, syenitic, pyroxenitic, dioritic and tremolitic magmatic rocks, also came from this mantle melting (LUCIANO, 2019). All these igneous manifestations occurred close to the climax of the Paleoproterozoic orogeny. This phosphate mine belongs to GALVANI and YARA INTERNATIONAL, which has been extracting an average of 1.2 million tons / year of concentrated phosphate rock.

During this Tectonic and Metallogenic Evolution of Bahia, at the end of the Paleoproterozoic, after the continental crust was stabilized and eroded, in a pre-rift and syn-rift system, the Aulacógeno do Paramirim began. With that there the formations were deposited in Domain 3 (Northern Espinhaço). Serra dos Algodões (1760-1660 Ma) (DANDEFER *et al.*, 2015) composed of metapsamites, metaconglomerates and feldspar metarenites) and the Oliveira dos Brejinhos Group (1729-1659 Ma) constituted by the Pajeú Formation (metacarbonates, metapsephites, metapelites), Sapiranga Formation (metapsephites, metaquartzoarenites) and São Simão Formation (metarriolites, acid metavolcanic metapyroclastics) (DANDEFER *et al.*, 2009; GUIMARÃES *et al.*, 2019), the latter chronocorrelated with the rocks of the Rio dos Remédios Group that make up Domain 5 (Chapada Diamantina) (DANDEFER, 2009). This last domain is formed by the Serra da Gameleira Formation (1775 Ma, metaquartzoarenites, metaconglomerates) and by the volcanic rocks of the Rio dos Remédios Group (1777-1579 Ma) (GUADAGNIN, 2014) with all these processes occurring in Statherian. As for the volcanic eruptions of the Rio dos Remédios Group, both of Domain 3 (Northern Espinhaço) and Domain 5 (Chapada Diamantina) they occurred in a period of about 200 million years. They were basically explosive, reaching an area in the center of Bahia of approximately 30,000 km2, formed basically of rhyolites and trachytes, in the forms of volcano-clasts, tufts, breaches and spills. In the western part of Domain 5 (Chapada Diamantina), where these volcanoes are more numerous, recent studies show that these rhyolites and trachytes, formed in a syn-rift environment, have been modified by deformations, metamorphism and hydrothermalism. Petrographically, these volcanic rocks are formed by porphyry of quartz, potassium feldspar and biotite with monazite, zircon and opaque minerals as accessories. However, they sometimes exhibit porphyroblasts of Andalusite, cyanite and garnet indicating the presence of metamorphism. On the other hand, the large amount of sericite and muscovite shows that hydrothermalism, associated with deformation, was important to transform these volcanic rocks into shales. Regarding metallogenesis, occurrences of magmatic tin (Sn) and hydrothermal gold (Au) found in these shale volcanic rocks (BARBOSA *et al.*, in press).

5.4. MESOPROTEROZOIC

In the center of Bahia, in the Mesoproterozoic Era, siliciclastic sedimentation predominated, one of the main responsible factors for the construction of the Paramirim Aulacogen. This sedimentation occurs in Domain 3 (Northern Espinhaço) and Domain 5 (Chapada Diamantina), with Domain 4 (Paramirim Block) among them (GUIMARÃES 2008; GUIMARÃES *et al.*, 2005). The Paramirim Aulacogen was formed by successive rifting processes (pre-, syn- and post-) occurring at its base, with sediments and Paleoproterozoic volcanic rocks, described above, superimposed by thick packages of meso and Neoproterozoic sediments.

In Domain 3 (Northern Espinhaço) it can be interpreted that the sediments of the Aulacogen were deposited in a post-rift system of Mesoproterozoic era. These sediments are represented by the São Marcos Formation (1580 Ma, quartz-feldspar metarenites, metapelites, metarenites) (DANDEFER, 2009) and by the Sítio Novo Formation (1514 Ma, conglomeratic metaquartzoarenite, metapelites, metarcose) (GUIMARÃES *et al.*, 2019) both dating to Calymmian period and deposited in a syneclise which dominated the top part of the aulacogen structure. Also, in Domain 3 (Northern Espinhaço) reference should be made to the occurrences of amethyst (Amt), in conglomeratic quartzites (CORREA, 2010). These were mined as semi-precious stones and served to move the local economy and ensure the survival of the city Brejinho das Ametistas for a long time. Its genesis is not well understood, although research carried out in the region indicates that amethyst arose with the pegmatitic filling of faults and fractures through hydrothermal fluids from some granite source. However, despite this possibility, until now the field work has not mapped any granitic body in the region, making it impossible to connect granite with the genesis of this semi-precious stone.

Domain 4 (Paramirim Block) constituted a high topography in the Paramirim Aulacogen, where at the time, it seems that it was not superimposed by sedimentation, but by volcanic rocks of the Rio dos Remédios Group (GUADAGNIN, 2014).

The rocks of this block are orthogneisses of medium metamorphic grade of Archean ages, which tectonically enclose the Cristais MVSS, without age, but with metasediments and metavolcanics where orogenic Au is currently researched.

Domain 5 (Chapada Diamantina) during the sedimentation of the Aulacogen was superimposed by rocks from the Paraguaçu Group (feldspar metarenites, metaquartzoarenites) in a post-rift system, just as occurred in Domain 3 (Northern Espinhaço) mentioned above. During the pre, syn- and post- environments of the Aulácogeno and on the rocks of the Paraguaçu Group, the Tombador Formations (620-180 m thick, metaconglomerates, feldspar metarenites, metaquartzoarenites) (GUADAGNIN, 2014, 2015) and Caboclo (1436 Ma, 460 m thick, silicified metaquartzoarenites, metargilites, metasiltites, metacalcaria) belonging to the syneclysis that dominated the top of the Paramirim Aulacogen were deposited in Calymmian period. In these last formations, especially in the vicinity of the city of Rio de Contas, there are occurrences of gold (Au) in hydrothermal milky quartz veins, especially those close to the basalt dikes that intruded these rocks in fault zones, as detailed at the end of item 5.5. In effect, the increase in local temperatures caused by the dikes, made it easier for the hydrothermal fluids that removed the gold from the metasediments to circulate, concentrating gold in the quartz veins. Detrital diamonds (Dia) are also found in this domain, in the form of microdiamonds present in conglomeratic layers and in intrusive rocks (BATTILANI, 2007). The erosion of kimberlite that intruded these metasedimentary rocks, more or less in the phase of burial of the corresponding sediments, is interpreted as the source of these diamonds. Occurrences of supergenic manganese (Mn) are rarely found in rocks belonging to the syneclise.

5.5. NEOPROTEROZOIC

In the Neoproterozoic, in the oceans that bordered the SFC in Bahia, the sedimentation was representatively marine. In the marginal basins, the thick sedimentary packages, deformed and metamorphosed, were classified as fold belts with the designations in the TGMBA of Domain 11 (Araçuaí Belt), Domain 12 (Rio Preto Belt), Domain 13 (Riacho do Pontal Belt) and Domain 14 (Sergipano Belt/Pernambuco-Alagoas Terrain). These domains were deformed with the gradual approach of other cratons, adjacent to the SFC. The tectonics strongly reached the craton margins, deforming and metamorphosing its rocks, reaching the point of promoting fusion and introduction of granitoid bodies, most of them syn- and tardi-tectonic. As a result, elevations and mountains were generated around the SFC, leaving its central part relatively low. However, with the deformations vergent towards SFC, some rocks of the folding bands overflowed and overlapped the oldest craton base.

Domain 11 (Araçuaí Belt) corresponds to the main fold belt of metamorphic rocks that limits the SFC in the south and southeast of Bahia. Studies carried out in these regions show that the degree of metamorphism decreases from the south (granulite facies) towards the north (amphibolite facies) (MORAES *et al.*, 2015). This gradation is registered in the metamorphic rocks that dominate this range. Metamorphism was manifested during the inversion of the sedimentary basin, just below the basement. Indeed, to the south are found kinzigitic granulites exhibiting products of diatexitic fusion with garnet, cordierite, orthoclase and quartz, in addition to mafic rocks, carrying paragenesis with orthopyroxene, garnet, plagioclase and quartz. Through thermo-barometric methods, these paragenesis allowed to calculate pressures of the order of 7 kbar and temperatures around 850°C for this metamorphism (MORAES *et al.*, 2015). In this Belt on the Bahia-Minas border, associated with kinzigitic rocks of the amphibolite facies, there are occurrences of graphite (Gf), some of which are being explored economically by GRAFITE DO BRASIL, which removed around 18 thousand tons in 2019. Also, in this area the Itambé-Itapetinga Pegmatitic District is located, where some pegmatites are mined sporadically, focusing on beryllium (Be) and lithium (Li) (SILVA *et al.*, 1996). The Pardo River Basin and the Southern Alkaline Province of the State of Bahia (SBAP) are also part of this domain, the latter containing quarries for the extraction of ornamental stones such as sodalite (Sdl). Both the basin and the province are of Neoproterozoic age and situated on the border between Domain 7 (ISCB) and Domain 11 (Araçuaí Belt). The nepheline-syenitic rocks (MOREIRA, 2004) that also appear in SBAP will be explored by B4F MINERAÇÃO LTDA.

Still with regard to the Neoproterozoic tectonics, tectonic processes from the south brought Neoproterozoic rocks from Domain 11 (Araçuaí Belt) that overlapped the oldest Archean and Paleoproterozoic rocks from the southern part of Domain 2 (Gavião Block). This infra-crustal tectonics is considered to have promoted the displacement and ascent of Domain 4 (Paramirim Block) towards the north (ARCANJO *et al.*, 2000). Records of this displacement and ascent of this crustal segment belonging to the basement of the Paramirim Aulacogen, are found in the folds of the aulacogen covering rocks, in Domain 5 (Chapada Diamantina) and, in the contact between the latter and Domain 4 (Paramirim Block) (CRUZ, 2015). In these places there are shear zones where "Lx" lineations of biotites, arranged sub-horizontally or slightly inclined to the south, are found. These biotites were dated to Neoproterozoic K-Ar ages ranging from 507 to 483 Ma.

In the same context, deformation and metamorphism processes, resulting from the push of segments of Domain 2 (Gavião Block) and Domain 4 (Paramirim Block) on the rocks metasediments of Domain 3 (Northern Espinhaço), can be observed in these metasedimentary rocks. In fact, evidence of this push westward is found in the conglomerate pebbles of the latter domain. These pebbles, initially positioned at random, were rotated and oriented in the W-E direction by tectonics. Likewise, cyanites found in the contact of Domain 2 (Gavião Block) with Domain 3 (Northern Espinhaço) positioned their "c" axes oriented in the meridian direction, also the result of sub-horizontal activity coming from the east. Thus, it is considered that these displacements were a function of Neoproterozoic deformations. In addition, another example that the Neoproterozoic tectonics reached the rocks of Domain 2 (Gavião Block), concerns the alkaline body Lagoa Real (ARCANJO *et al.*, 2000; CRUZ *et al.*, 2014, 2007), located north of city of Caetité. In this body, where an important uranium (U) mine is located, dates to 1724 Ma from Statherian (U-Pb in zircon). It is intensely deformed and metamorphosed by posting monazites with a Neoproterozoic age that reach the age of 540 Ma, compatible with the K-Ar ages of 514 Ma and 538 Ma found in the biotites of that same body. As mentioned before, from a genetic point of view, it is considered that uranium (U) mineralization was formed in the final crystallization phase of the body, in the Paleoproterozoic. However, it is interesting to note that the deformation occurred around 550-600 Ma, in the Neoproterozoic (Ediacaran), about 1100 Ma after the crystallization and formation of uranium ore.

Domain 12 (Rio Preto Belt), in turn, is located on the northwest limit of the CSF, close to the Bahia-Piauí border (BARROS *et al.*, 2017). It is constituted basically of quartzites and shales, product of the metamorphism of pelitic rocks, originated in the Brasiliano Sea. In the vicinity of the boundary between the metasediments of this Belt with the orthogneisses of Cristalândia city in Piauí, the deformations produced in the metapelites, foliations with strong slopes towards the south and increasingly weak towards the north, form an asymmetrical "positive flower structure". With regard to metallogenesis, the Neoproterozoic deformations coming from the west towards the east, brought from the deeper parts of the crust, possibly from the base of this Belt, the ultramafic body called Caboclo dos Mangueiros (MATOS, 2018). This body was discovered in 2012, by CBPM-Companhia Baiana de Pesquisa Mineral through detailed geological and geophysical mapping, including 15 drill-holes totaling 2670 meters. Due to tectonic deformations, it was stuck in Rio Preto schists, 2000 meters long versus 500 meters wide versus 270 meters deep, assuming the shape of an elongated sill. Despite being deformed, it still maintains the magmatic structure preserved. The predominant rocks are dunites, wherlites and pyroxenites with a mineralogy formed of olivine, clinopyroxene and plagioclase. It has a U-Pb age in zircon of 573 Ma, being mineralized in copper (Cu) and zinc (Zn) (pyrrhotite, petlandite, chalcopyrite and pyrite) (MATOS, 2018). In this same context it is considered that the Gabbroic bodies of Campo Alegre de Lourdes are of Neoproterozoic age and that they have also been brought to more superficial levels of the crust through Neoproterozoic deformations (COUTO 1989; BARBOSA *et al.*, In press). In this case, these mafic-ultramafic bodies in Campo Alegre de Lourdes, oriented in the NS direction, have expressive reserves of iron (Fe) - titanium (Ti) - vanadium (V) that are currently being researched by Canadian LARGO RESOURCES LTDA, that explores the vanadium of Maracás. It is worth mentioning that these Rio Preto schists, which are part of the mafic-ultramafic bodies mentioned above, were also intruded by alkaline granitoids aged 971 Ma (BARBOSA *et al.*, In press), confirming the Neoproterozoic environment for the Rio Preto Belt.

Domain 13 (Riacho do Pontal Belt) occurs east of Domain 12 (Rio Preto Belt) with its rocks scarcely outcropping in Bahia (CAXITO 2016; CAXITO *et al.*, 2014, 2015, 2018). They are basically formed by quartz-feldspar schistous meta-sediments containing biotite and chlorite which overlap TTG orthoigneous rocks, most of them Archean (UHLEIN *et al.*, 2011; NEVES 2015). These metasediments came from the Brasiliano Sea which, through marine transgressions and regressions, deposited limestone in the center of Bahia, forming the Irecê Basin, described below. Part of this Domain 13 (Riacho do Pontal Belt) is constituted by Lagoa do Alegre MVSS (MORAES, 2010), which has BIFs, many of them surveyed for iron ore, in addition to occurrences of green talc (Tlc). These come from the hydrothermal alteration of komatiites that are located at the base of Lagoa do Alegre GB, which was discussed earlier, during the description of the region's Archean.

Domain 14 (Sergipano Belt/Pernambuco-Alagoas Terrain) is located in the northeast with a general NW-SE direction and passes under Domain 15 (Recôncavo-Tucano Basin) as shown by the geophysical studies described in item 3.3. In Bahia, the Sergipano Belt is represented by three groups, from the oldest (highest metamorphic facies) to the youngest (lowest metamorphic facies), namely: Macururé Group, Miaba-Vaza Barris Groups and Estância Group (OLIVEIRA *et al.*, 2010a), all of them separated by shear zones. As for the Macururé Group, it is made up of schist and amphibolite mica with marbles, metavolcanic intercalations, metaturbidites with garnet and quartzites, the latter with detrital zircons where the minimum age found is approximately 800-856 Ma of Tonian.

As for the Miaba-Vaza Barris Groups, the first (Miaba) is formed of quartzites, filites, metaconglomerates, metagrauvacas, shales, limestones and dolomites and the second (Vaza Barris) by metarenites, phyllites, metadiamictites, dark limestones and dolomites and where in A sample of siliciclastic rock found detrital zircons with ages ranging from 2000 to 553 Ma (OLIVEIRA *et al.*, 2015a, 2015b). The Estancia Group consists of diamictites, limestones, dolomites, siltstones, conglomerates and sandstones, the latter having detrital zircons with ages ranging from 955 to 570 Ma. It should be noted that the introduction of syn- and post-metamorphic granites in the Macururé Group, occur in higher grade rocks with ages varying between 628 and 570 Ma, both from Ediacaran.

The portion of the Pernambuco-Alagoas Terrain (PAT), located in Bahia (CRUZ 2014; BRITO NEVES & SILVA FILHO, 2019) consists of ancient fragments of the Archean and the Paleoproterozoic, designated respectively by the Entremontes Complex (2734 Ma) and Riacho Seco Complex (1992 Ma). The Archean fragment is quite deformed and was previously mapped as part of the CSF Remanso-Sobradinho Block. The Entremontes Complex is formed by granitic to granodioritic orthogneiss, biotite quartz-feldspar gneiss and migmatitic, granodioritic to tonalitic gneiss in addition to amphibolites. Interstitials of shale mica-quartz, garnetiferous quartz--feldspar paragneiss and hydrothermal alteration zones also occur. The Riacho Seco Complex is made up of an association of migmatitic orthogneissic rocks, of tonalitic to granitic composition and of Orosirian age (1992Ma), with remains of supracrustal rocks. These supracrustal rocks compose a metavolcanosedimentary sequence integrated by mica schist garnet (~ 2.0 Ga), biotite aluminous gneisses, limestone and metacarbonate rocks, in addition to amphibolite metamorphic rocks. The latter are associated with copper mineralizations that have already been the subject of mineral prospecting work by CBPM (Projeto Riacho Seco II, 1980 and 1983). These copper (Cu) mineralizations are currently being explored by BRITA BUSINESS BRASIL MINERAÇÃO IMPORTAÇÃO. Also noteworthy are the Neoproterozoic complexes (~ 1.0 Ga) called Abaré and Belém do São Francisco, which are made up of biotite tonalitic / granodioritic orthogneisses, usually migmatized. Associated with these complexes are amphibolitic bodies, limestones / marbles, quartzites and limestone-silicate rocks. Bordering these complexes are supracrustal rocks represented by the Cabrobó Complex (<643 Ma), probable evidence of a rift during the cryogenic period. This complex is formed by mica schists and biotite garnetiferous gneisses, possibly migmatized, in addition to lenticular bodies of metabasites, limestone and quartzite rock. In addition to these units, there is also a massive brasiliano magmatism (Neoproterozoic), represented by plutons and late-to-post-tectonic granitic batholiths, of which the Chorrochó Suite stands out.

The structuring of Domain 14 (Sergipano Belt/Pernambuco-Alagoas Terrain) can be interpreted as a result of the Neoproterozoic collision between PAT (which would have acted as a microplate), in the north, and SFC, in the south (CRUZ 2014; CRUZ *et al.*, 2014). As a result of this collision, with NE pushing towards the SW, the rocks of the Sergipano Belt were pushed against the CSF. As a result, folds, decametric folds were generated, which emerge in some places in the Miaba-Vaza Barris Groups. These folds have axes positioned more or less sub-horizontal and with axial planes at around N120°E/20°NE. We draw attention to the contrast between these deformed rocks, separated by shear zones, and horizontal limestones of the Estância Group, apparently without deformations. The latter are disposed, in angular and temporal disagreement, on the SFC orthogneissic-migmatitic rocks, similarly to the other limestone areas deposited on the craton terrain in the center of Bahia. This indicates that these limestones were formed by transgressions and regressions of the Brasiliano Sea before the activity that deformed the Miaba-Vaza Barris Groups, unlike the practically undisturbed Estância Group.

As mentioned before, after the glacial period, marine regressions and transgressions, even raised the level of the Brasiliano Sea, covering practically the entire SFC. In this process, pelitic and mainly limestone sediments were deposited, overlapping older rocks from Domain 1 (São Francisco Basin), Domain 3 (Northern Espinhaço) and Domain 5 (Chapada Diamantina). In Domain 1 (São Francisco Basin), the Bambuí Basin stands out, formed in a syneclise (Cryogenian, 650 Ma) with manganese (Mn) mineralizations carrying rare high-grade metals (cobalt, thallium and scandium) (JANONI, 2017) in the base metapelites and lead (Pb), zinc (Zn) and fluorite (F) mineralization in the top limestones (Salitre Formation). In this domain is the Correntina-Coribe Erosive Window (Janela), which, at the time of sedimentary filling, represented a high point in the Bambuí Basin, whose erosion of the limestones, possibly in the Quaternary, brought out that window, in addition to Paleoproterozoic orthogneisses and Rhyacian granitoids (2168-2109 Ma) (BARBOSA *et al.*, In press). One cannot help but register at the base of the Bambuí Basin and in neighboring areas, under the limestone cover, rocks of glacial origin. The Bebedouro Formation (874 Ma) (BABINSKI, 2011) with an estimated average thickness of 100 meters and is composed of massive and stratified diamictites containing angular, rounded and fragmentary clasts of granitoids, schists, filites, basic rocks and quartzites is covered by the Salitre Formation (669 Ma) (SANTANA *et al.*, 2016).

In Domain 3 (Northern Espinhaço), the Santo Onofre Group (metapelites, carbonates) (ALCÂNTARA *et al.*, 2017, BITTENCOURT 2017) formed in a rift (894 Ma) that was distributed from the north to the south of Bahia, taking advantage of the zones of weakness of the aforementioned Paleoproterozoic collision. The fault that limits the Santo Onofre Group from its base corresponds to the western limit of the Paramirim Aulacogen. In Domain 5 (Chapada Diamantina), the Morro do Chapéu Formation stands out (metaconglomerates, feldspar metarenites, metasiltites, metargilites) formed in a rift (974 Ma) and whose anchimetamorphic sediments have silicified layers with detritic diamonds (Dia), as mentioned before. On this rift, a syneclise was formed (Tonian, 874-761 Ma) with the deposition of calcareous sediments (Bambui and Una Groups, for example), coming to constitute the previously mentioned Irecê Basin. This basin, formed by thick carbonate and siliciclastic layers, generated in shallow epicontinental sea (SANCHES *et al.*, 2007), with at least two transgressive and regressive cycles, was the repository of these sediments which were superimposed on the glacial-marine formation called Bebedouro. The vast majority of these carbonate rocks suffered, after their deposition, intense dolomitization processes. According to the author above, Sr isotopes suggest that the carbonate layers are possible to correlate over large distances and that they are around 650 Ma in age. The Irecê Basin contains lead (Pb), zinc (Zn) and phosphate (P) minerals in the center and baritin (Ba) at the edges. Metallic mineralizations are currently being surveyed by PEDRA CINZA MINERAÇÃO, belonging to the same Kazakh group that explores iron and manganese mines in the Caetité region. These lead (Pb) and zinc (Zn) mineralizations are of syn-sedimentary, stratabound type formed in restricted, closed basins and in a reducing atmosphere. According to Misi *et al.*, (2004), the source of these metals would be the base where they would have undergone leaching and transport towards these basins. They were located close to the shallower areas of the Brasiliano Sea, separated from the deeper areas by the presence of barriers with phosphorus-rich reef stromatolites (P). The primary concentration of phosphate occurred in an anoxic environment, after glaciogenic successions and its origin may be related to the presence of organic matter (SANCHES *et al.*, 2007). At the edges of this sea, interacting with the continent, on the algal slopes, are located localized sedimentary breaches. In their fractures and in the matrix quartz, galena, pyrite, cerussite, sphalerite, zincite, magnetite, apatite and barite, minerals considered to be formed by hydrothermal fluids enriched in silica and CO_2, can be found (SILVA *et al.*, 2019). With regard to barite, on its eastern border, there was deposition of barium sulfate, explored intermittently in the region in the form of barite (Ba). The Neoproterozoic limestones of this Irecê Basin, referred to in Domain 5 (Chapada Diamantina), previously horizontal, were heterogeneously deformed, sometimes showing smooth folds, other times generating isoclinic folds with sharp-angle plunges to the north. In the latter case, it was verified, that the strata were folded in the lead and zinc mineralized area positioning in the W-E direction and diving at about 80oN. Another possibility to explain the genesis of these metals is to link them to the presence of a fault within the basin that enabled the formation of these mineralizations through hydrothermalism.

The Neoproterozoic tectonics in the continental crust of Domain 9 (Serrinha Block) may have influenced deep parts of the Mantle for the deep production of kimberlitic magmas. The tree kimberlite pipes, one of them considered economically viable, are dated 642 Ma, the Cryogenian period (DONATTI FILHO 2011; DONATTI FILHO *et al.*, 2013). Research has also shown outcrops of about ninety kimberlitic rock dikes oriented in the N30oW direction. One of them, called Braúna, is the only one considered economically viable, becoming the first primary source of diamonds (Dia) in the CSF and in the entire Latin America. It has been mined by the Austrian group LIPARI, which in 2019 extracted 400,000 carats. The mineralogy of this kimberlite, located in the municipality of Nordestina, is composed of olivine, spinel, ilmenite, phlogopite, perovskite and apatite, as well as chromitiferous diopside and pyrope phenocrystals. The main kimberlite body, when penetrating its Paleoproterozoic granodioritic casing, forms phenites in the contacts, constituting an interesting rock that helps the exploration of these diamond kimberlites.

In Domain 5 (Chapada Diamantina), geophysical studies once again contributed to the understanding of the deep geology of this domain. Through AMT probes, contour maps of resistivity values were produced reflecting the limits of Chapada Diamantina smoothly folded lithologies, indicating its synformatic tendencies. Geoelectric resistivity versus depth sections show that the Archean and Paleoproterozoic bases are approximately 2.5 km deep (SILVA & SAMPAIO, 2017). In the region close to the north center of the domain base areas are less than 500 meters deep. Moreover, another important area of the basement occurs under the meta-sediments in focus, with an elongated shape in the NNE direction, with a length of 100 km and depths less than 1 km. In turn, these geophysical studies concluded that the Irecê Basin has a central package of metasediments approximately 6 km thick (SILVA & SAMPAIO, 2017).

In Domain 3 (Northern Espinhaço) the exhalative chemical iron manganiferous sediments, present in the SMVS Caetité-Licínio de Almeida and referred to in item 4.3, during the Neoproterozoic deformations and metamorphism were transformed into BIFs, rhodochrosite marbles and the manganese mineral (Mn) jacobsite (BARBOSA *et al.*, 2012; BORGES *et al.*, 2015).

The ages of fractures and faults of the brittle tectonics of the SFC in Bahia can be computed by looking at the ages of the basic and alkaline dykes, from the oldest to the youngest. In Domain 8 (Uauá Block) are found the tholeiitic diabase dikes, the oldest (Neoarchean, 2623-2700 Ma) (OLIVEIRA *et al.*, 2012) in Bahia, that cross well-foliated orthogneisses (Mesoarcheano, 3161-2991 Ma). In Domain 9 (Serrinha Block) tholeiitic basalt dykes emerge in the midst of metamorphic medium grade rocks (3162-2933 Ma) reaching an age of 2085 Ma (OLIVEIRA *et al.*, 2014). In Domain 10 (SEBB), the dykes surface in the outcropping within granulitic rocks (Siderian, 2582-2473 Ma) have basaltic characteristics with alkaline chemistry and the age of 2015 Ma (OLIVEIRA, 2014). In the vicinity of Salvador, in the same domain and also crossing granulite rocks (2700-2634 Ma), basaltic dikes varying between 922 and 924 Ma, both dating to Tonian period (GOMES *et al.*, 1987; GOMES 1996) occur. In Domain 7 (ISCB) located in the south of Bahia, also crossing granulitic rocks, swarms of alkaline and tholeiitic dikes occur, with ages of 650 and 570 Ma, respectively (GOMES, 1995). Finally, in the rocks of the Paramirim Aulacogen, between Domains 3 (Northern Espinhaço) and Domain 5 (Chapada Diamantina) three stages of penetration of basaltic and/or diabasic veins are observed:

(i) Veins aged 1496 and 1591 Ma (Calymmian) (LOUREIRO *et al.*, 2008) that cross the lithologies of the Serra da Gameleira Formation in Domain 5 (Chapada Diamantina);

(ii) Veins aged 894 Ma (Tonian) (BITENCOURT, 2017) that crossed rocks of the São Marcos Formation (Calymmian, 1580 Ma) of Domain 3 (Northern Espinhaço) and,

(iii) Veins aged 854 and 834 Ma (Tonian) (DANDEFER *et al.*, 2009) that crossed volcanic rocks (1777 Ma, Tonian) in Domain 5 (Chapada Diamantina).

Finally, it is worth mentioning that Domain 1 (São Francisco Basin) is also part of the Mesozoic, represented by the siliciclastic lithologies of the Urucuia Basin, representing a syneclise, the latter occupying a large portion of western Bahia.

5.6. MESOZOICO

Paleozoic lithologies appear scarcely in Bahia, either corresponding to sedimentary rocks, close to the borders with Piauí and Sergipe, or to granitoids of Domain 11 (Araçuaí Belt). In the case of the border with Piauí, the sedimentary lithologies present therein are part of Domain 1 (São Francisco Basin) represented by the lithologies of the Syneclise of Parnaíba Basin. In the case of the border with Sergipe, sedimentary lithologies are part of the Paleozoic, basal section of the Tucano Norte sub-basin, which registers two syneclise pre-rift basins, separated by discordance of the Lower / Middle Carboniferous: the first fluvial to the shallow marine of the Siluro-Devonian period and the second of the Carboniferous-Upper Permian period (including the Santa Brigida Graben). These sedimentary sequences are based on low-grade sedimentary/metasedimentary rocks of Ediacaran-Cambrian ages in Domain 14 (Sergipano Belt) (OLIVEIRA *et al.* 2015a, 2015b) and are opposite to the Mesozoic sequences located in Domain 15 (Recôncavo-Tucano Basin). In the latter domain, reference is made to the Afligidos Formation of a Permian age, whose lithological records indicate a regressive shallow marine section. As for granitoids, as mentioned above, they are numerous in Domain 11 (Araçuaí Belt) with ages around 517 Ma (Middle Cambrian), especially the granitoids of Pau Brasil, Serra dos Aimorés, Paratinga, Vereda and Buranhém , all located in the extreme south of Bahia.

5.7. CENOZOICO

From a broader perspective, the Mesozoic tectonostratigraphic evolution was a consequence of the rupture of Gondwana and the opening and development of the Atlantic Ocean. Through this process an elongated and wide intracratonic basin that reached the entire east coast of Brazil was initially formed that has records on the current African Plate: the “Afro-Brazilian Depression” with fluvial-wind sedimentary sequences of the upper Jurassic age.

Unlike Paleozoic, Mesozoic is quite representative in Bahia, constituting a system of sedimentary basins, inserted and classified in the TGMBA as Domain 15 (Recôncavo-Tucano Basin) and Domain 16 (Camamu-Almada Basin) (MAGNAVITA, 1992). The Mesozoic rifts of Bahia emerged during the process of opening the Atlantic controlled by the Paleoproterozoic tectonic structures of the base. They are subdivided into aborted continental rifts (of Cretaceous period), covering a series of basins that occur in the emerged regions (Recôncavo, Tucano Sul, Central and North Basins and Jatobá Basin), and in marginal rifts, which have evolved to form the diverging margin basins (Camamu, Almada, Jacuípe, Jequitinhonha and Camuruxatiba), during the Upper-Paleogenic Cretaceous. The last three basins will not be detailed here, as most of them are submerged in the ocean (offshore).

Recent gravimetric and AMT studies indicate that in Domain 7 (ISCB) the tensions that were implanted during the separation of the continents caused the Archaean and Paleoproterozoic continental crust to stretch plastically in depth, while in the upper crust the crustal stretch resulted in the formation of half-grabens with internal ups and downs, controlled by normal and transfer faults.

These structures were implanted following the directions of the oldest, Paleoproterozoic and Neoproterozoic-Paleozoic structures (SILVA & SAMPAIO, 2017).

The Afro-Brazilian Depression developed following the rock structures of domains 7 (ISCB) and 10 (SEBB) and Domain 14 (Sergipano Belt/Pernambuco-Alagoas Terrain) is made up of an association of shallow and eolian facies of the Brotas Group (Formations Aliança and Sergi of Upper Jurassic age). The rocks of this group are sometimes seated on the sedimentary rocks of the syneclise, Paleozoic basins, sometimes on the granulitic--amphibolitic base of the Archean-Paleoproterozoic or on limestone-siliciclastic rocks of Upper Proterozoic age, related to the Sergipano Belt. The presence of these limestone rocks was identified at the base of the Recôncavo Basin through geophysical methods, using density contrasts. The proof that at the base of the Afro-Brazilian Depression there were Paleoproterozoic and Neoproterozoic limestone granulitic rocks of the Estância Formation, was the presence of pebbles from these two types of rocks in the Salvador Formation conglomerates (BARBOSA *et al.*, 2012). They were formed by the erosion of the footwalls of the faults in the edges of the half-grabens (MOHRIAK, 2012).

The Brotas Group in the southern part of Bahia, experienced an arid climate, indicated by the occurrence of alluvial fans, fluvial and eolian plains associated with paleosols with caliche records while in the northeast milder climatic conditions predominated, attested by traces of a coniferous forest. This group can be considered as a pre-rift sequence, which was followed by the Lower Cretaceous syn-rift sequence (Formations Candeias, São Sebastião and Grupo Ilhas). Both sequences, pre- and syn-rift, have their equivalents in the Araripe, Alagoas, Sergipe, Gabon, Congo and Cabinda Basins, the latter three in Africa.

Some authors, focused on tectonic versus sedimentary deposition, detail the genesis of Domain 15 (Recôncavo-Tucano Basin) (COSTA *et al.*, 2007) They consider that:

(i) The pre-rift phase was exempt from events related to the main rifting;

(ii) The "beginning of the rift" phase, was depicted in the form of a small tectonic pulse, when compared to the generation of accommodation space that was completely filled by the sedimentary input, generating a progressive sedimentation;

(iii) The climax phase of the rift (phase of the great lakes), which represented the apex of the generation of accommodation space by the distension tectonics, where there was the event of maximum extension of the basin, much greater than the sedimentary contribution. Thus, a retrograde, fluvial-deltaic pattern was created at the flexural edges of the great lakes and a progradation pattern, formed by the conglomerates and sandstones of the Salvador Formation. This constituted sub-lacustrine alluvial fans (fan deltas) along the escarpments of the edge faults of the half-grabens of these basins;

(iv) The tectonic cooling phase of the rift, where the creation rates of the accommodation space were lower than the sedimentation rates, the silting of the basin, with a progressive stacking of the delta-fluvial facies (Formations Marfim, Pojuca and São Sebastião), and finally,

(v) The post-rift phase. This phase is represented by the Marizal Formation which is distributed, in angular disagreement, with the older sedimentary litologies. In the southern region, the conglomerates, sandstones and rocks of this formation, with thicknesses of the order of 50 meters, were built from a river system and alluvial fans, connected to interlaced rivers, dominated by wide and shallow channels. In the northern region, in the Tucano Basin, its sedimentary deposits are the product of the erosion of rocks from the Sergipana / Pernambuco Alagoas Belt and from the ISCB. The conglomerates and sandstones have sub-rounded and sub-angular grains, cemented by clay and iron oxide.

Also in relation to Domain 15 (Recôncavo-Tucano Basin) (MILHOMEN *et al.*, 2003; SILVA *et al.*, 2007), the Mesozoic syn-sedimentary tectonics is identified through normal gravity faults, and with plans plunging in average from 60° to SE and NW, which are accentuated towards the depocenters (nucleated along the edge faults) which are subsidiary areas. During deformations, extension rates are accommodated through transfer zones such as that of Mata-Catu in N40oW direction. In more detail, it is interpreted that the main fault systems of Domain 15 (Recôncavo-Tucano Basin) are longitudinal and transversal. The longitudinal ones are formed by gravity, either by the stretching of the basement rocks, or by the weight of the sediments associated with the nucleation of silty sedimentary diapires, with dominant normal kinematics:

(i) By the flexural edge system oriented in the NS direction and located at west of the basin and

(ii) By the border system of the Salvador Fault, direction N30°E, with tailings exceeding 6000 meters and located to the east of the basin.

The cross-sections can be divided into:

(i) Transfer systems with transcurrent kinematics, in N130°E direction and

(ii) Relief systems, with dominantly normal kinematics in N150°E direction.

With regard to the transition between Domain 15 (Recôncavo-Tucano Basin) and Domain 16 (Camamu-Almada Basin), it is interpreted that, with the continuation of the separation of the continents, the Atlantic Ocean entered the continent, enabling evolution from intracontinental rift basins to marginal basins, including the Camamu-Almada Basin of Domain 16. In these basins, although part is submerged (offshore), outcrops can still be found on the continent (onshore), where the sedimentary sequences filled the pre , syn- and post-rift, with the following stratigraphic units and tectonic environments:

(i) Aflingidos and Grupo Brotas Formation (pre-rift/ beginning of the rift) (AGUIAR & MATO 1990);

(ii) Morro do Barro, Rio de Contas and Taipus-Mirim Formations (rift);

(iii) Cotton Formation (transitional, continental-marine environment, rift-drift) and, (iv) Urucutuca Formation (post-rift / drift environment, marine).

Regarding the oil system, in the Camamu Basin (CAIXETA *et al.*, 2007) gas production occurs in the fluvial-eolian sandstones of the Sergi Formation, in shallow seawater, with a rift generator from the Candeias Formation that also includes the reservoirs. With the continuation of the continental drift, the marginal basins assumed an open ocean physiography, demonstrated by the Urucutuca Formation in deep waters, from the Upper Cretaceous. With the lifting of the meso-oceanic range, a transgression on the continental margin occurs, creating a deep basin with a slope where the Urucutuca Formation and a marine platform were deposited.

In turn, in the Recôncavo Basin, the main accumulation of oil (Pet) is related to the Sergi-Água Grande (pre-rift, Brotas Group) -Candeias (syn-rift) system (Araçás, Dom João, Fazenda Bálsamo fields) , Fazenda Imbé, Água Grande, Buracica, Taquipe, Candeias and Cexis), with fluvial deposits (fine to conglomeratic sediments) and eolian (fine to medium sediments) both with excellent permoporosity. In the Candeias-Candeias (syn-rift) system, thin to thick underwater sandstones, originated by turbidity and debris currents, are also good reservoirs (Campos Riacho da Barra, Fazenda Bálsamo, Rio do Bu, Candeias and Cexis). In the Candeias-Maracangalha (syn-rift) system, sandstones, also originating from turbidity and debris flows, form reservoirs with the state's main gas production (Campos Miranga, Jacuípe, Mapele-Aratu). The Ilhas-Candeias system consists of delta reservoirs, with fine to very fine sandstones in sigmoidal geometry that are oil producers, in some of the main fields mentioned above. Most of these oil (Pet) and gas (Gp) fields are located in the vicinity of the longitudinal fault systems, NW-SE, (Campos de Miranga and São João), characterized as occurring (transferring) and normal (relieving). The timing of the oil expulsion (formed by the maturation by burial, of the lake plankton, deposited within the clays of this environment) to the reservoir rocks is attributed to the NW-SE distention tectonics that generated transcurrent faults at the same time as the normal faults occurred, during the Hauterivian-Barremian period (122-112Ma). Oil and gas were accumulated in structural traps, characterized by migration through the faults and accumulation in the reservoirs, raised by the footwalls and capped by the generating rocks themselves, such as the shales of the Candeias Formation located in these high blocks. In this context, stratigraphic trapping also occurred when the turbiditic reservoirs received oil from adjacent shales.

With regard to Mesozoic metallogenesis, it is worth noting, under the northern part of Domain 16 (Camamu Basin), practically in the transition to Domain 15 (Recôncavo Basin), where Itaparica Island is located, the existence of large reserves of halite (Salt) (sodium chloride and potassium chloride), which are derived from chemical precipitation, linked to the evaporation of brackish waters from the shallow, regressive, Permian marine section, which constitutes the Aflingidos Formation. About 800 million tons are mined by DOW QUIMICA through deep wells, which places Bahia as the first national producer of this raw material. The most important sedimentary deposit of barite (Brt), explored by BAROID PIGMINA is found in the transitional sedimentary section, rift-drift, in the Superior Taipus-Mirim and Inferior Algodões Formations, in Domain 16 (Camamu-Almada Basin), which is responsible for 96% of national production and accounts for 85% of the supply of processed products. Also, in this domain, deposits of gypsum (Gip) (natural state of hydrated calcium sulfate) occur associated with interstratified evaporites with layers of shales and limestones, the latter from the Algodões Formation. These gypsum (Gip) reserves in the Camamu Basin place Bahia as the holder of 44% of national reserves.

5.8. CENOZOIC

The Cenozoic Era with its rocks and sediments, is placed at the top of the two-dimensional legend of the Map in yellow. It is divided into the Neogene (23.03 - 2.5 Ma) and Quaternary (2.5 - Present) periods, where the Detritic Coverings, the Undifferentiated Recent Coverages, and the Residual Coverages stand out. It should be noted that these coverings are located at the interface between the atmosphere and the rocky substrate and are the focus of geological, geomorphological, pedological and metallogenic studies (BITTENCOURT *et al.*, 2010; UCHA, 2000).

In general, coverages occur in the form of:

(i) Isolated belt (Detritic Coverings), spreading from south to north of the State and covering the Atlantic regions of Domain 11 (Araçuaí Belt), of Domain 7 (ISCB) and Domain 10 (SEBB);

(ii) Extensive surfaces (Recent Undifferentiated Coverings), which overlap Domain 1 (São Francisco Basin), Domain 11 (Araçuaí Belt) and Domain 5 (Chapada Diamantina) and;

(iii) Restricted areas (Residual Coverings) located mainly in northern Bahia.

The Detritic Coverings were deposited in the Neogene in the coastal areas where coral reefs, dunes, cliffs, sandy plains, deltas, bays, estuaries, mangroves and wetlands stand out. These areas represent the result of the eustatic variations at sea level, mainly during the Neogene. This variation in sea level acted on different types of geological substrates including high and medium grade metamorphic rocks in coastal areas and sedimentary rocks in Mesozoic basins. These Detritic Coverings are represented by the sedimentary lithologies of the Barreiras Formation that have ages varying between 21.8 and 17.8 Ma. In terms of their formation, it is considered that, with the progressive accumulation of ice in Antarctica, the eustatic sea level experienced a downward movement from its highest position reached at the end of the Cretaceous. After this descent there was a brief rise in the level that flooded the continental border. The deposition of the Barreiras Formation occurred on the rocks of the crystalline basement of Domains 7 (ISCB), Domain 10 (SEBB), Domain 11 (Araçuaí Belt), Domain 15 (Recôncavo-Tucano Basin) and Domain 16 (Camamu-Almada Basin). It is due to the distribution in all these domains that the Barreiras Formation occupies a large N-S extension and is characterized by sedimentary facies deposited in coastal environments, such as estuaries, lagoons, deltas and beaches (ROSSETTI & DOMINGUEZ, 2012). After the deposition of the Barreiras Formation, the eustatic sea level dropped again, causing the incision of a wide drainage network with deep valleys that characterize the morphology of the coastal plateaus supported by this formation. The main mineral resources associated with the Neogene or the Detritic Coverings and mainly with the Barreiras Formation, are Sandy type materials, Sands and Clays. These resources result from the intense rainfall that favors deep weathering, which acting on the detritic deposits allows the generation of a wide range of sandy-clay materials used in civil construction. The Barreiras Formation also presents a potential for purer clays, used in the production of ceramics. More recently, the hypothesis was raised that this formation could contain economic concentrations of diamonds (Dia), reworked from Neoproterozoic deposits in the Rio Pardo Basin in southern Bahia.

As for the Recent Undifferentiated Coverings, included in the Quaternary, the detritus sediments are highlighted:

(i) On the sandy terraces located on the Bahia-Minas Gerais border and on the Vitória da Conquista Plateau;

(ii) In the alluviums and eolian dunes of the São Francisco River in the northwest of the state, and

(iii) In the alluvial sediments in the central part of Chapada Diamantina. These coverages are also represented on the Atlantic coast. In these cases, in the Quaternary, after the Neogene, the sea level continued to experience variations of a few tens of meters and deposit sediments, although studies have shown that only in brief periods, the sea level reached positions as high as the current one (DOMINGUEZ & BITTENCOURT, 2012). During these episodes, coastal deposits bordering the coastline, often referred to as marine terraces, accumulated. The main mineral resources associated with Quaternary or Recent Undifferentiated Coverings can be mentioned:

(i) Coastal placer deposits, including heavy minerals of the ilmenite type (Ilm), with proven reserves of 266 million tons of ore with average levels of about 3% (DOMINGUEZ, 2010);

(ii) Marine bioclastic granules, mainly those based on calcareous algae (Alg), formed from calcium and magnesium carbonate and which have wide application in agriculture, especially unconsolidated materials (rhodoliths, nodules) easily collected through dredging and;

(iii) Lithoclastic granules (sand and gravel) originating from the continent, deposited on the continental shelf and reworked jointly by waves and sea current (DOMINGUEZ *et al.*, 2012). The latter are more abundant at the exit from the estuaries and bays bordering the coastline and can potentially be used in civil engineering. MINERAÇÃO JUNDU is researching the fine and pure sands of southern Bahia in the Santa Maria Eterna region for use in the glass industry. Another important mineral resource is lowland clays (Arg), used for the production of ceramics and bricks. Finally, at the mouth of the Jequitinhonha River and its surroundings, diamonds (Dia) are surveyed in view of the occurrence of this mineral in the alluviums of that river.

As for Residual Coverings, included in the Quaternary, they were formed “in situ” having a strong relationship with lateritic crusts (BITTENCOURT *et al.*, 2010; UCHA 2000). The best example is the Caatinga Formation formed by the weathering of limestone rocks from Bambuí Gr. They are well represented in the valleys of the Salitre and Jacaré rivers, both in the north of the state. The main mineral resource associated with Quaternary or Residual Coverings is the limestone material from the Caatinga Formation used as soil corrective for agriculture.

With regard to the deformations that affected rocks of the Neogene (Detritic Coverings) and the Quaternary Coast (Recent Undifferentiated Coverings), reference should be made to the Neotectonics (GOMES *et al.*, 2012).

Indeed, it is concluded that neoseismic activity has occurred sporadically since the Pliocene. The main stress would have been compression, in E-W direction, justifying the origin of NE and NW directional flaws observed in the Barreiras Formation. For example, the morphological extent of the cliffs in this formation is considered as evidence of post-Barriers tectonism. This is observed through the system of lineaments and old faults that suggest a structural control in the deposition of sediments, including possible reactivation of the faults. Another evidence is the structural control of recent drainages, observed in the sedimentary coverings of both the Neogene and the Quaternary, especially in the south of Bahia. Recent studies using measures of failure and fracture plans, carried out on the stress fields in the Detritic Roofs and in the Undifferentiated Recent Roofs, the kinematic indicators suggest the existence of two main maximum tensor patterns:

(i) EW, related to the push stresses of the mid-ocean ridge and

(ii) WNW-ESE and WSW-ENE, associated with those resulting from the interaction of the torsional pushing tensions and with the migration force of the South American plate (GOMES *et al.*, 2012).

In the Cenozoic, important deposits of supergenic manganese (Mn) and bauxite (Bau) deposits were formed. In the case of manganese (Mn), five manganese districts are identified in Bahia, whose protoliths generated by weathering relatively recent, high-grade ores, highlighted in the two-dimensional legend in the TGMBA, namely: Domain 1 (São Francisco Basin), Domain 3 (Northern Espinhaço), Domain 5 (Chapada Diamantina), Domain 2 (Gavião Block) and in Domain 7 (ISCB) (BARBOSA, 1981). In the case of Bau, important reserves are being studied in Domain 6 (Block Jequié) in the south-southeast region of Bahia, in the region of Jaguaquara and neighborhoods.

The manganese (Mn) of Domain 1 (São Francisco Basin) belonging to the so-called Manganese District of Western Bahia, originated from the presence of manganese in pelitic layers at the base of the Bambuí Group. In this district it appears that the protore, after supergenesis, was enriched in the form of manganese oxides of the pyrolusite and psilomelane type with the ore reaching levels of up to 45% MnO. It is worth noting that the main ore deposit in this domain contains significant layers of rolled manganese blocks that have been mined in recent years. In this case, research has shown that, in an unprecedented manner, pyrolusites and psilomelanes have high-grade metallic elements such as thallium (Tl), scandium (Sc) and cobalt (Co) included in the oxides and whose presence is considered as being of volcanic origin exhalative at the time of deposition of pelagic layers impregnated with manganese (JANONI, 2017). The manganese (Mn) of Domain 3 (Northern Espinhaço) belonging to the so-called Caetité-Licínio de Almeida Manganese District, contains protoliths of three types:

(i) Jacobsitic where jacobsite (manganese magnetite) is a metamorphic mineral associated with the iron formations of area;

(ii) Rhodochrositic-carbonate where rhodochrosite is the main metamorphic mineral, rich in manganese, and,

(iii) Spessartitic where the spessartite garnet appears as the main metamorphic mineral within the protolith (BORGES *et al.*, 2015).

All these minerals and especially rhodochrosite produce high-grade oxides used in the steel industry. The manganese (Mn) of Domain 5 (Chapada Diamantina) belonging to the so-called Manganese District of Chapada Diamantina is similar to that of Domain 1 (São Francisco Basin) formed in pelitic layers in the middle of quartzite rocks. The manganese (Mn) of Domain 2 (Gavião Block) belonging to the so-called Serra de Jacobina Manganese District represents a few dozen occurrences of manganese oxides distributed over a 160 km extension in the NNE direction. The proto-ore, associated with the schists of the Jacobina Mountain Range, is formed by layers of chlorite, quartz and spessartite garnet, the latter being mainly responsible for the oxides enriched in high-grade manganese, after supergenesis (MORAES & BARBOSA, in press). The manganese (Mn) of Domain 7 (ISCB) belonging to the so-called Manganese District of the South of Bahia has occurrences arranged in granulitized metavolcano-sedimentary sequences that are distributed in a dispersed way throughout the southern region of Bahia, due to the Paleoproterozoic tectonics that reached the granulitic rocks of that domain. In these sequences there are sedimentary layers of chemical origin whose granulitization allowed the formation of a protolith still unprecedented in the world bibliography. It is a pink granulite formed by spessartites, pyroxmangites, rhodochrosite rhodonites, graphite, magnetite, mesopertite and quartz. Also, as the primary environment that formed this rock was a reducing agent, this mineralogy identifies manganese sulfide called alabandite (TEIXEIRA DE SOUZA, 2016). All this mineralogy, through supergenesis, produced ore with reasonable reserves, despite having high levels of Al_2O_3 harmful to the steel industry.

The bauxite (Bau) of Domain 6 (Jequié Block) is formed by the intense weathering that acted on the granulites of that domain. This provided in the region, good thicknesses of soil rich in Al_2O_3, both on charnockite rocks and on anorthositic rocks. Bauxite is being researched by RIO TINTO MINERAÇÃO and so far, good reserves of the ore have been identified.

6. SUMMARY AND CONCLUSIONS

In the Explanatory Note to this TGMBA, the conclusions are based on the compatibility of occurrences, deposits and mines with the tectonic domains. These are the conclusions of an unprecedented study where mineral resources were located and classified over time (Archean, Paleoproterozoic, Mesoproterozoic, etc.), always comparing their origins with the generating tectonic environments.

Throughout the work, it can be seen that, unlike ordinary rocks, the ores studied can also be considered as "rocks'' since, over geological time, certain chemical elements have concentrated anomalously in certain places, coming to constitute reserves that are economically viable. Another fact that was noted, during the construction of this TGMBA, is only when block collisions are being focused and crustal segments, metamorphisms and associated deformations, all in the same tectonic cycle they can be considered as "tectonic evolution". However, when it comes to metallogenesis, the processes may or may not have an evolutionary continuity. In the case of BIFs, for example, the processes are evolutionary, since most of them, existing in the basal part, both of GBs and MVSSs, spread territorially occupying a place in Domains 2 (Gavião Block), 6 (Jequié Block), 12 (Rio Preto Belt) and 13 (Riacho do Pontal Belt). These are Algoma-type iron formations, aged around 2.6 Ga, coming from the same oxygenation stage of the Neoarchean atmosphere, that is, between 2.5 and 2.6 Ga, constituting what was called Great World Oxygenation Event. On the other hand, the processes are not evolutionary, for example, in the cases of copper (Cu) from Vale do Curaçá and chromium (Cr) from Vale do Jacurici, since, although both deposits are primarily plutonic, the first occurred in around 2.6 Ga and the second around 2.0 Ga, hence about 600 million years separate one from the other. Below is a summary of the Tectonic and Metallogenic Evolution of Bahia, considering the tectonic domains of TGMBA.

In the ARCHEAN (Gavião Block, southern part) (Domain 2), the formation of the continental crust is registered through the vertical tectonics or the plate tectonics, producing TTG with a wide age range, varying between 3642 and 3259 Ma. These TTG came from the fusion of hydrated seabed basalts that functioned as a source as shown by their Sm-Nd ages. In the Gavião Block (northern part) (Domain 2), west of the Jacobina Mountain Range, in addition to TTG (3428 Ma), rhyolites (3304 Ma) are also found in a plutonic-volcanic system. In the Jacobina rift, which evolved into a passive margin of the Jacobina-Umburanas Sea, the quartzites and auriferous conglomerates (3305 Ma) of its western part are interspersed with manganese sediments on the platform, going to the tholeiitic basalt of Pindobaçu with pillow-lavas (3200 Ma). At the base of this rift are ultramafic intrusions aged 3296 Ma. In the Gavião Block (western part) (Domain 2), the presence of Santa Izabel Complex (2954Ma) and Riacho de Santana MVSS is identified. It is worth mentioning that in this Gavião Block, as a whole, in addition to MVSS and GB that appeared in the range from 2744 to 2550 Ma, granitoids with similar ages (2711 and 2697 Ma) considered to come from the recycling of TTG are also present. In the Serrinha Block (Domain 9), orthoderived and migmatite rocks from Santa Luz Complex (3162-2991Ma) are found, together with those in the Gavião Block, the oldest SFC crustal segments in Bahia. Also, in Archean, around 2.6-2.7 Ga, the first tectonic approach occurred, with W-E actions, from the Gavião and Serrinha blocks. This promoted the appearance of tectonic and metamorphic processes linked to these ages, both inside the blocks and in their peripheries. GB Mundo Novo, located in the southern part of the Serra de Jacobina, shows the existence of komatiites and basalts with an ocean floor (2757 Ma), with pillow-lavas and high-temperature mineralization of lead and zinc. This corroborates the interpretation that in the region there were aquatic rocks belonging to the Mundo Novo Sea, whose passive margin, to the east, would be the Mairi Complex (3303 Ma). Between the Gavião and Serrinha Blocks, despite the deformations and metamorphism, it was possible to interpret the presence of island arcs with oceanic basalts embedded between crustal blocks. They constituted environments that preceded the Caraíba Arc, the Itabuna-Salvador-Curaçá Belt (ISCB) (Domain 7) and the Salvador-Esplanada-Boquim Belt (SEBB) (Domain 10). All the protoliths of these rocks were affected by this Neoarchean tectonics (2,6-2,7 Ga). With that, it can be seen that:

(i) The Serra de Jacobina, with its detrital gold, suffered the first folds and its manganese sediments, through metamorphism, were transformed into a quartz-spessartitic protore;

(ii) The Curaçá Valley was intruded by the mafic-ultramafic body with copper, constituting the Caraíba mine and,

(iii) The Maracas region was penetrated by the the Jacaré River Gabbro-anorthositic Sill (2623 Ma), promoting an important vanadium mine. Between the Gavião and Serrinha Blocks, rocks with predominantly Neoarchean ages were arranged approximately along the meridian. Before the Paleoproterozoic, its tectonic elevations were fully eroded, allowing the advance of the relatively shallow Caraíba-Juazeiro-Ipirá-Contendas Sea, where the formation of an extensive sedimentary volcanic sequence (2151 Ma) were deposited on the Archean rocks and phosphate and graphite occurrences being researched were located. This sequence includes the Saúde Complex (2150-2075 Ma) and Rio Itapicuru GB (2148-2081Ma), this latter having important gold deposits. Finally, regionally the presence of deformation-metamorphism with ages close to 2.6-2.7 Ga is marked in the type "S" granites of Nova Itarana (2684 Ma), in the migmatitic leucosomes of the orthogneisses of the Dome of Itabaiana (2737 Ma), on the Bahia-Sergipe border and in Uauá Block (Domain 8) where their orthoderived rocks and migmatites have ages of 3161, 2993 and 2960 Ma and suffered deformations and metamorphism with ages close to 2.6-2.7 Ga.

The second tectonic approach and bonding between the Gavião and Serrinha blocks was completed during PALEOPROTEROZOIC with the final compression of the rocks from the first approach, mentioned above. Then the Itabuna-Salvador-Curaçá Orogeny (ISCO) appeared, which took about thirty million years to form. The tectonics and metamorphism of that time (2080 Ma) reached the vulcano-sedimentary sequence (2151 Ma), the Neoarchean protoliths located between the two and the interior of the Gavião and Serrinha blocks. The Jequié Block (Domain 6), for example, was pushed over the Gavião Block, leaving recumbent kilometric folds that were refolded co-axially and whose flanks were sinistraly transposed, in the N-S direction. At the peak of metamorphism, the occurrences of mafic and ultramafic intrusions are identified, such as Jacurici (2085 Ma) rich in chromium, Mirabela-Palestina (1990 Ma) with copper and nickel and the Piau River (1989 Ma) containing iron-titanium-vanadium. These bodies that participated in the end of the Paleoproterozoic processes also include the carbonatitic magmatic rocks of Angico dos Dias (2011 Ma) including their economic phosphate deposits. There are numerous granitic and syenitic bodies, especially in the CISC. They were formed between 2085 to 1944 Ma according to their U-Pb ages in zircon. In the Northern Espinhaço (Domain 3), in a pre-rift and syn-rift system, the Paramirim Aulacogen began, with the deposition of the Serra dos Algodões (1760-1660Ma) and Oliveira dos Brejinhos (1729- 1659Ma). In Chapada Diamantina (Domain 5), still in the pre and syn-rift systems, deposition of the Serra da Gameleira (1775 Ma) and volcanic formations of the Rio dos Remédios Group occurred.

In the MESOPROTEROZOIC, in a post-rift system, sedimentary rocks were deposited from 1580 to 1514Ma. Thus, the São Marcos Group in Espinhaço and the Paraguaçu Group in Chapada emerged. After about 214Ma, in 1300 Ma, a pre-, syn- and post-rift system a syneclise that lasted from 1514 to 1140Ma was established. Detrital gold, kimberlites with diamonds and deposits of iron and manganese were formed at this time.

In the NEOPROTEROZOIC, with the extensive invasion of the Brasiliano Sea, on the Archaean and Paleoproterozoic rocks of the CSF Paraplatform and on the rift of the Morro do Chapéu Formation (974Ma), the Irecê, Salitre/Campinas and Ituaçú Basins were structured (Domain 5). On the passive margins of the Brasiliano Sea, both in the Araçuaí Belt (Domain 11) and in the Riacho do Pontal (Domain 13) and Sergipano (Domain 14) belts, the Jequitinhonha (898Ma), Barra Bonita (740 Ma), Macururé (800 Ma) and Miaba-Vaza Barris (730 Ma) sediments were formed. During this period, in the Serrinha Block, the so-called Braúna kimberlite (641 Ma) was identified. In the southern part of the ISCB, the Rio Pardo Basin (670 Ma) is located in a rift system. In the Riacho do Pontal Belt (641Ma), sediments from the Mandacarú Group were deposited, and at the same time, in the Sergipano Belt (650 Ma), syn-collisional magmatism occurred while in a neighboring rift, the Juá, sediments accumulated. In the west of Bahia, with the invasion of the Brasiliano Sea, between 800 and 650 Ma, the Bambuí Basin (Domain 1) was formed over a syneclise, composed at the base of clay rich in manganese oxides containing the rare elements thallium, cobalt and scandium. In 550-570 Ma, in the southern part of the CISC, there are alkaline dikes that penetrated faults and fractures in 650-570 Ma. In the Rio Preto Belt (Domain 12), in the extreme northwest of Bahia, nickel and copper deposits were discovered in a 573 Ma mafic-ultramafic body called Caboclo dos Mangueiros. In this region, important iron-titanium-vanadium reserves are also known near the municipal headquarters of Campo Alegre de Lourdes.

In the PALEOZOIC, in the northwest of Bahia, the Parnaíba Basin is based on Paleoproterozoic gneisses. Under the Tucano Basin the Santa Brígida Graben is located and, to the north of the Araçuaí Belt, important post-tectonic granitogenesis was generated.

In the MESOZOIC, the rocks were predominantly generated from sedimentation, both continental, forming the Recôncavo-Tucano Basin (Domain 15), and marine constituting the Camamu-Almada Basin (Domain 16). In the first basin, the main deposits of oil (Pet) refer to the pre-rift (Brotas Group) and syn-rift (Candeias) system represented by the Araçás, Dom João, Fazenda Bálsamo, Fazenda Imbé, Água Grande, Buraçica fields, Taquipe, Candeias and Cexis, with fluvial deposits (fine to conglomeratic sediments) and eolian (fine to medium sediments) both with excellent permoporosity.

In the second basin the production of gas in the fluvial-eolian sandstones of the Sergi Formation occurs, in shallow seawater, with the Candeias Formation rift as generator, which also traverses the reservoirs.

In the CENOZOIC, the rocks and mainly their sediments allowed to divide this Era in the Neogene (23.03 - 2.5 Ma) and Quaternary (2.5 - Present) periods, where the Detritic Coverings, the Undifferentiated Recent Coverings, and the Residual Coverings stand out. As for the Detritic Coverings, included in the Neogene, the coastal areas where coral reefs, dunes, cliffs, sandy plains, deltas, bays, estuaries, mangroves and wetlands stand out. Its main mineral resources are associated with the Barreiras Formation, among which are materials of the sandy type, sands and clays, all widely used in civil construction. As for the Recent Undifferentiated Coverings, included in the Quaternary, we highlight the coastal placer deposits, including heavy minerals of the ilmenite type (Ilm), marine bioclastic granules, mainly those based on calcareous algae (Alg) and lithoclastic granules (sands and gravels) originating from the continent, deposited on the continental shelf and reworked by the joint action of waves and sea current. Another important mineral resource is lowland clays (Arg), used for the production of ceramics and bricks. The Residual Coverings, included in the Quaternary, were formed "in situ" having a strong relationship with lateritic crusts. The best example is the Caatinga Formation formed by the untimely dissolution of limestone rocks of the Bambuí Group. They are well represented in the valleys of the Salitre and Jacaré rivers, both in the north of the state. The main mineral resource is the limestone material from the Caatinga Formation used as a soil corrective for agriculture.

The development of studies during the construction of the TGMBA allowed the identification of the most important domains from the point of view of the metallogenetic and prediction implications, separating the deposits in five categories, namely: (A) Deposits in Archean and Paleoproterozoic meta-volcano-sedimentary Rocks; (B) Deposits in Volcanic Rocks and Meso and Neoproterozoic metasedimentary rocks; (C) Deposits in Plutonic Mafic-Ultramafic Rocks of Different Ages; (D) Deposits in Plutonic Felsic Rocks; (E) Deposits for Hydrothermal Processes and, (F) Deposits for Supergenic Processes.

As for category (A), the main deposits in Archean and Paleoproterozoic Meta-volcano-sedimentary Rocks, both in GBs and MVSSs, it was concluded that: (1) in the case of metallic copper (Cu), lead (Pb) and zinc sulfides (Zn) the sources were metabasalts with calcium-alkaline or tholeiitic characteristics, where the deposits were built primarily on the ocean floor; (2) in the case of the detritic Au, its greatest concentration is located in the matrix of conglomerates of the Serra do Córrego Formation, from the Jacobina Mountain Range and, in the case of the orogenic Au, it was found that its accumulation is rare in the mafic metavolcanics but important in the felsic metavolcanics and carbonaceous quarzitic meta-sediments. In the first stage, the accumulations were transformed into mines by the concentration of the metal in Paleoproterozoic shear zones and, in the second stage, the Au palettes were concentrated in quartz stockworks. In Bahia, the most important gold concentrations are located in Umburanas GB, in Contendas-Mirante, in the lithologies that make up the so-called Jurema-Leste and mainly in the Rio Itapicuru Gold District. They are linked to the areas of late ductile deformations, retrograde and, especially where powders or syn-tectonics have intruded in these sequences. These intrusions, as a rule, promoted the warming of the environment, helping in the circulation of metamorphic-hydrothermal fluids, thus facilitating a better transport of gold to these low pressure areas; (3) in the case of manganese (Mn) and iron (Fe), it is recognized that their sediments, essentially chemical, were generated in aquatic environments and that later they underwent deformative and metamorphic processes generating different protores, for example

(i) Those from western Bahia associated with rare elements (thallium, cobalt, scandium);

(ii) Those of the Caetité-Licínio de Almeida MVSS, whose proto-ore consists of rhodochrosite-jacobsite or quartz-spessartite;

(iii) Those from Serra de Jacobina whose proto-ore is a schist formed from spessartite, quartz and chlorite and,

(iv) From the south of Bahia, whose protore, from granulite facies, is formed from spessartites, pyromanganites, rhodonites, rhodochrosites, graphite, magnetite, mesopertite and quartz. As for iron, as mentioned before, its deposits are well distributed in Bahia and its mineralogies are simple and formed in general by hematites or magnetites and quartz with the best deposits free of grunerite amphibole, harmful to the use of future ores and, (4) in the case of magnesite (Mgs), present in Brumado MVSS, with its deposits constituting "world class" reserves and currently the lenses of magnesite embedded in the dolomites being explored. Thus, in predictable terms, it is concluded that the demand for the mineral deposits mentioned above, should be concentrated in the lower part of these sequences, which can be considered Archaean and Paleoproterozoic entities, attractive for the search for deposits of metallic sulfides, gold, iron and manganese.

As for category (B), studies of deposits in volcanic and metasedimentary meso and Neoproterozoic rocks showed that the main mineral reserves found are related to: (1) metallic lead (Pb) and zinc (Zn) sulfides, which originated in shallow marine limestone environments, with reducing characteristics, taking as an example the Irecê Basin of the Neoproterozoic and where surveys are enabling the discovery of economic ores; (2) phosphate (P) and barite (Ba), whose research has also shown that their deposits are located at the edges of shallow epicontinental basins associated with reefs and include contemporary deposition of barium sulfate; (3) gold (Au), which, unlike Archean and Paleoproterozoic , are located in the Mesoarchean quartzite rocks of Chapada Diamantina, which carry detrital gold, but which was later hydro-thermalized, and (4) graphite (Gf), which with the occurrences found in the Araçuaí Belt, on Bahia-Minas border, some of them currently explored. In this region kinzigitic rocks, always associated with carbonaceous meta-sediments, may be good indicators of graphite rocks, since, when they are enriched in carbon and metamorphized in medium and high grade, they transform into economic graphite. For the forecast, it is concluded that these Category B ores can be indicated for future prospecting in the other limestone basins of Domain 5 (Chapada Diamantina), namely: Campinas-Salitre, Utinga, and Ituaçu, in addition to all the Domain 1 Bambuí Basin (Parnaíba/São Francisco Basins). In them, the occurrences of lead (Pb) and zinc (Zn), in addition to fluorite, phosphate and barite, may indicate interesting reserves. It is not the case with gold or graphite: the first can be searched for in the quartzites of Domains 3 (Northern Espinhaço) and 5 (Chapada Diamantina), while the second can be prospected in Domain 11 (Araçuaí Belt), on the Bahia-Minas border.

As for category C, Deposits in Plutonic Mafic- Ultramafic Rocks, of Different Ages, the studies indicated that the known mines in these rocks, besides the carbonatite Angico dos Dias and the kimberlite Braúna, all occurred after the great tectonic cycles (Neoarchean, Paleoproterozoic , Neoproterozoic) that reached the continental crust and influenced the underlying mantle. It was concluded that the mantle thus impacted by the deformative processes of the continental crust, at different ages, generated magmatic, tholeiitic and / or calcium-alkaline liquids, in general post-tectonic, which rose to more superficial parts of the crust, bringing with them important metals. In special cases, these are being exploited in the base metals, phosphate and diamonds mines. Thus, it can be stated that: (1) in the case of the Archean vanadium (V) minerals (2623 Ma), located close to Maracas, the amphibolitic, gabbroic and anorthosite intrusions came close to the surface, in the Neoarchean. They were deformed and metamorphosed into amphibolite facies, around 2.0 Ga, in Paleoproterozoic; (2) in the case of the Archean copper (Cu) mineralizations (2580 Ma), from the Curaçá Valley, their gabbroic-pyroxenitic intrusions were produced at the climax of the 2.6-2.7 Ga Neoarchean tectonics. This metal was brought within these intrusions which were later deformed and metamorphosed into granulite facies, in about 2.0 Ga, in the Paleoproterozoic; (3) in the case of Paleoproterozoic chromium (Cr) mineralization (2069 Ma) from the Jacurici Valley, the mafic-ultramafic intrusions (dunites, harzburgites, pyroxenites) carrying chromite layers, penetrated into a crustal, transitional, amphibolite-granulite environment dated U-Pb in zircon at 2085 Ma, Paleoproterozoic ; (4) in the case of phosphate (P) (2011 Ma) mineralizations, the carbonate body Angico dos Dias, constitutes a Paleoproterozoic intrusion associated with syenites, alkaline pyroxenites and tremolithites that intruded into narrow elongated belts, controlled by deep shear zone; (5) in the case of the nickel (Ni) and copper (Cu) Paleoproterozoic mineralizations (1990 Ma), layered ultramafic Mirabela-Palestine intrusion (dunites, harzburgites, pyroxenites, gabbros) intruded with a temperature around 1100°C, at the end of the Paleoproterozoic tectonics, having rebalanced to ambient temperatures of the granulite facies, between 700 and 800°C; (6) minerals from the Rio Piau iron (Fe), titanium (Ti) and vanadium (V) (1989 Ma) are part of a gabbro-anorthosite intrusion that, similar to the previous one, occurred at the climax of the Paleoproterozoic metamorphism, penetrating granulite facies; (7) the Neoproterozoic diamond (Dia) mineralizations (642 Ma) represent 3 kimberlite pipes and 90 dikes, oriented in the N30oW direction where the Brauna kimberlite is the first primary source of CSF diamonds and, (8) the Neoproterozoic mineralizations of nickel (Ni) and copper (Cu) (573 Ma) called Caboclo dos Mangueiros, as well as those of magmatic iron (Fe) from Campo Alegre de Lourdes, are part of mafic-ultramafic intrusions in the base of the Rio Preto Belt which were brought tectonically to more surficial parts of the crust and placed in contact with Neoproterozoic schist rocks. As seen, these intrusions penetrated the continental crust at different ages, that is: two in the Archean linked to deformations in 2.6-2.7 Ga; four in the Paleoproterozoic linked to the 2.0-2.08 Ga deformations and two in the Neoproterozoic linked to the 0.54 Ga deformations. They are not easily predictable to be found, unless the ages of the tectonic cycles can be identified and there is a good magnetic contrast between them and their enclosures. In such cases, magnetometry can help to find them.

As for category D, in deposits in plutonic felsic rocks, studies hitherto undertaken in different tectonic environments, focusing on the metallogenesis of granitoid rocks, unlike mafic-ultramafic rocks, have so far not indicated important mineral deposits. Two exceptions can be mentioned.

(i) The Granitoid Lagoa Real located in the southern part of Domain 2 (Gavião Block), an alkaline intrusion where uranium (U) albitites occur, and

(ii) The Granitoid of Campo Formoso, whose pegmatites when interacting with the oldest hydrothermalized ultramafic rocks, produced the emerald in their contacts.

In category (E), in the Deposits of Hydrothermal Processes, the following deposits can be considered as useful:

(i) Copper (Cu) from the Caraíba Mine, which, although predominantly plutonic, of Archaean age, during the Paleoproterozoic processes, part the ore was remobilized hydrothermally and can be used as alternative;

(ii) Copper (Cu) and zinc (Zn) from Mundo Novo, formed by the hydrothermal metamorphism of the ocean floor, also in the Archean, but with small hydrothermal remobilizations that occurred in the Paleoproterozoic;

(iii) White talc (Tlc) from the Brumado magnesite mine, where siliceous hydrothermal fluids, during Paleoproterozoic deformations, interacted with the magnesites, constituting important reserves of this type of talc;

(iv) Green talc (Tlc) from Lagoa do Alegre GB, resulting from the hydrothermal alteration of komatiites and,

(v) Uranium (U) from Lagoa Real Granitoid, where sodium uraniferous hydrothermal fluids were concentrated in the middle portion of the body and, through metasomatism, possibly still in the magmatic chamber, “attacked” the most calcic plagioclases and microclines, replacing them with albite, thus creating the mineralized uraninite albitites.

With respect to hydrothermal metallogenesis, the following deposits stand out:

(vi) Of hydrothermal gold (Au) from the Serra de Jacobina represented by small occurrences where there is a re-concentration of this metal in fractures and in quartz veins, resulting from originally detrital gold;

(vii) Of hydrothermal gold (Au) in Umburanas GB and Contendas-Mirante MVSS, Jurema Leste, where this element, originally contained in acidic volcanic and carbonaceous sediments, underwent a first hydrothermal concentration during the Neoarchean processes and, a second, in Paleoproterozoic retrograde shear zones;

(viii) Hydrothermal gold (Au) from the Itapicuru River Auriferous District originally present in acidic volcanics and carbonaceous sediments that were concentrated in retrograde shear zones and in stockwork quartz veins. Attention should be drawn, almost as a rule, to the omnipresence of syn- and post-tectonic granitoids in the vicinity of deposits which, by introducing and increasing the ambient temperature, facilitated the mobilization of the gold-bearing fluids, helping in their concentration, and (ix) hydrothermal gold (Au) in milky quartz veins of the Tombador Formation of Chapada Diamantina since this element was originally present in the detritic form in the quartzites and that surface and underground fluids, when percolating rocks, remobilized gold concentrating it in the milky quartz veins.

Category (F) Supergenic Process Deposits, research for the elaboration of the MTGBA, showed the presence of important deposits generated by supergenesis, for example:

(i) Bauxite (Bau) found in the Jequié Block the deposits of which are the product of weathering of anorthosite and charnockite rocks;

(ii) The phosphate (P) found in the surface of the carbonatite body of Angico dos Dias, which is mined in its surface part enriched by supergenesis and,

(iii) Manganese (Mn) where the supergenic oxides were explored in the Districts of West of Bahia, Jacobina Mountain Range, South of Bahia and SMVS Caetité-Licínio de Almeida arising from the weathering of the different proto-ores.

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