

GEOLOGICAL EVOLUTION OF THE NORTH RECONCAVO BAIANO BASIN, BRAZIL - A SYSTEMATIC REVIEW

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Abstract: Knowing the evolutionary history of a region, based on its geological evolutionary matrix, is to reveal its mineral and climatic potential. This study aimed to conduct a systematic review of the influence of geological formation on the disposal of mineral resources in the North Reconcavo Baiano Basin. Qualitative studies were carried out through literature review. In the North Reconcavo there is the presence of materials originating from the Cenozoic (Neogenou), Mesozoic (Cretaceous and Triassic), Paleozoic (Permian) and Pre-Cambrian periods. The comprehension and updating of information and work publications inherent to the geology of the region need frequency, since the use of non-polluting or environmentally degrading techniques is urgent all over the world.

Keywords: Geology; North Reconcavo; Mineral Resources.

EVOLUÇÃO GEOLÓGICA DA BACIA DO RECÔNCAVO NORTE BAIANO, BRASIL - UMA REVISÃO SISTEMÁTICA

Resumo: Conhecer o histórico evolutivo de uma região, a partir de sua matriz evolutiva geológica é revelar o seu potencial mineral e climático. Este estudo teve como objetivo realizar uma revisão sistemática acerca da influência da formação geológica na disposição de recursos minerais Bacia do Recôncavo Norte Baiano. Foram realizados estudos qualitativos por meio de revisão bibliográfica. No Recôncavo Norte há presença de materiais originários dos períodos Cenozoico (Neógeno), Mesozoico (Cretáceo e Triássico), Paleozoico (Permiano) e Pré-Cambriano. A compreensão e atualização de informações e publicações de trabalhos inerentes à geologia da região necessitam de frequência, uma vez que a utilização de técnicas não poluentes ou degradativas ao ambiente urgem em todo o mundo.

Palavras-chave: Geologia; Recôncavo Norte; Recursos Minerais.

INTRODUÇÃO

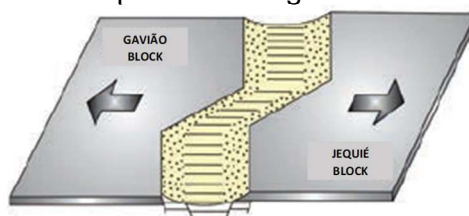
Planet Earth behaves like a living system, through a set of large gears that move, modify, receive and sustain an immensity of physical systems in its inner layers and that make up its surface. Its geological record is expressed by the movement of the planet around the Sun, the lunar influence and its axis of rotation and internal movement through the convection currents that develop below the earth's crust. Such processes cause a visible structural configuration on its surface, with continents and islands adrift, volcanoes, earthquakes, wind movement and various climatic agents that act through weather in the modeling of landscapes [1].

Knowing the evolutionary history of a region, from its geological evolutionary matrix is to reveal its mineral and climatic potential, with direct influence on the disposition of rainfall, temperatures, pressures, droughts or accumulations and reserves of water, hydrocarbons, metals and minerals, used from civil construction to physical and environmental ornamentation. This understanding denounces local economic vocations [1;2].

Therefore, it is important to highlight the geological characteristics of the North Reconcavo region, which is located in the Northeast Region from Brazil, more precisely in Bahia State, North of Salvador City, covering an area of 40 municipalities with approximately 11,500km² or 3% of the total surface of this Federation Unit [2;3].

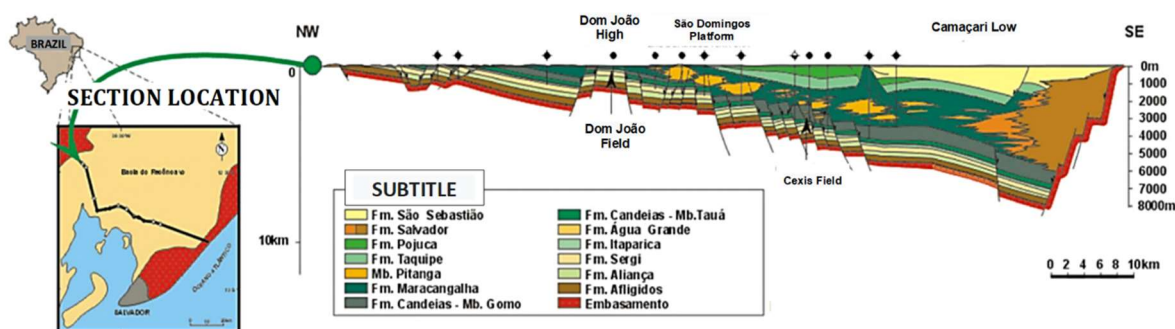
In this region, the formation is composed of rifts (Figures 1 and 2) due to different efforts that acted in the southern supercontinent (Gondwana), during the Mesozoic period, representing the southern part of the western branch of the Rift Valley, deployed in the coastal region of Brazil [2;3;4].

Figure 1: Slab separation/rifting structural model



Source: [1]

Figure 2: Schematic profile of the Geology of the North Reconcavo Basin



Source: [2]

Therefore, this study aimed to conduct a systematic review of the influence of geological formation on the disposal of mineral resources in the North Reconcavo Baiano Basin with information that support the understanding of the topographic arrangement and mineral resources that make up the local scenario.

1. METHODOLOGY

Qualitative studies were carried out through a bibliographic review, considering publications in the last 11 (eleven) years, taking into account data resulting from the information about the geology disposition in the study region against the stratigraphic conformations of the North Reconcavo. Therefore, the following criteria were followed: i) keywords used in English and Portuguese: "North Reconcavo", "geology", "mineral resources"; ii) databases used for research were Science Direct (www.sciencedirect.com) and Google Scholar (scholar.google.com.br); iii) established search period was from 2010 to 2021; iv) the framing of the title of the papers was verified according to the determined keywords; v) readings of selected abstracts were performed, according to the established filter[5]

The readings of the most relevant texts for the review took into account the general scenario of the Brazilian environment, complying with the relevant legislation, as well as with the Sustainable Development Goals.

2. SYSTEMATIC REVIEW

The quantification of papers published between 2010 and 2021, through a systematic review, made it possible to obtain data, which reveal the importance of knowledge about the geological formation of the North Reconcavo basin, since the area is comprised of municipalities around the State capital, with a large population and industrial concentration and exploring mineral resources such as water, oil and gas, among other activities.

However, according to Table 1 over the period between 1980 and 2021, in the Science Direct database, only 55 scientific productions involving the descriptors "Geology" and "North Reconcavo" were registered and 33 publications in the period 2010 and 2021 will use the same filter of research. When the descriptor "mineral resources" is added in the research refinement, the results for the period 1980 and 2021 are 13 documents and in the period 2010 and 2021 the number of publications is even lower, 7 (seven) in total. It is evident that there is a need for new scientific productions that further demonstrate the geological potential of the study area.

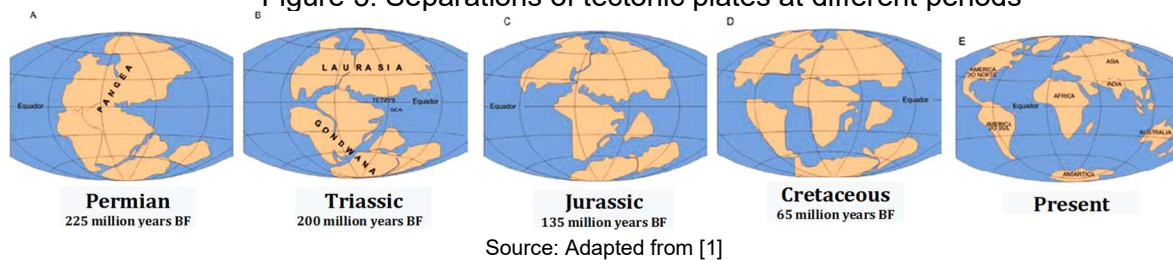
Table 1: Main published papers

PERIOD	DESCRIPTORS	QUANTITY OF PUBLICATIONS
1980 to 2021	"Geology" AND "North Reconcavo"	55
2010 and 2021		33
1980 to 2021	"Geology" AND "North Reconcavo" AND " <i>mineral resources</i> "	13
2010 and 2021		7

Source: own author

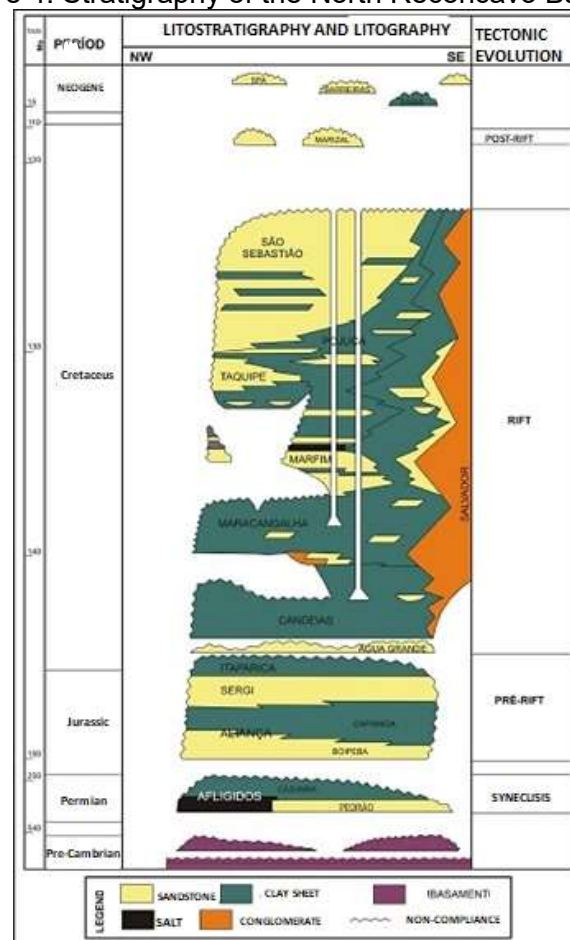
It is important to point out that the current structural conformation (Figure 2) was stratigraphically consolidated due to its geochronography or time scale and refers to the Geological Eras of characteristic formations (Figure 3).

Figure 3: Separations of tectonic plates at different periods



In North Reconcavo, specifically, in according to the stratigraphic arrangement in the Figure 4, there is the presence of materials originating from the Cenozoic (Neogenous), Mesozoic (Cretaceous and Triassic), Paleozoic (Permian) and Pre-Cambrian periods [6].

Figure 4: Stratigraphy of the North Reconcavo Baiano Region



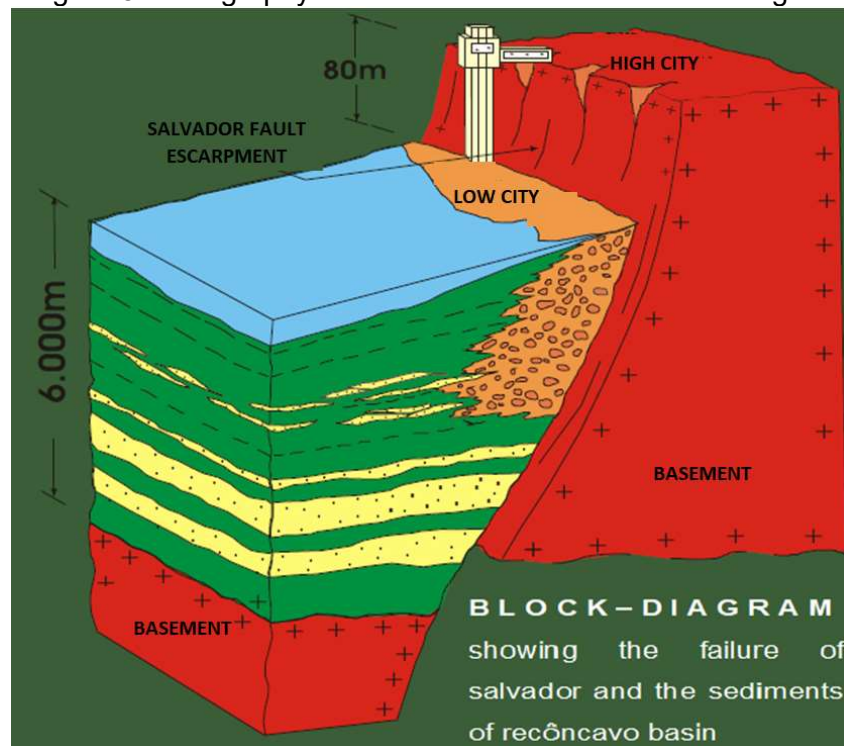
It is worth pointing out that the plates of geological formations were made up of a single block (Permian period) composed of continental alluvial, fluvial, eolian and shallow lacustrine sediments, marked by salt, shale clays and sandstones in the Pre-Rift period (predominance of the Jurassic period). Subsequently, the Rift was the point

of tectonic evolution that occurred in the Cretaceous period, where cracks appeared in the plates, causing the so-called geological faults present in lithostratigraphy [7] (Figure 4) through the conglomerate and nonconformities, so present in Salvador City. As an example of the difference in elevation between the upper town and the lower town and the various slopes that mark the relief of Salvador and Bahia's Recôncavo [8].

From the Rift (Figure 4) originated the São Sebastião formation with characteristic of fluvial sandstones and, consequently, the high permeability that this type of soil presents. In the following period, called post-Rift, which occurred at the end of the Cretaceous Era, the Marizal formation appeared, composed of grayish-white to yellowish sandstones, fine to medium grained, massive or bearing channeled cross-beddings. It contains levels of conglomerates at the base, and intercalations of siltstones, shales and limestones that are geologically located above São Sebastião formation [9].

A practical example of displacement is caused by the geological fault, which is in Salvador City, Bahia State, where there was a visual displacement of more than 6,000meters with deposit filling of tailings deposited on the basement formation configuring what is it currently comprises the urban areas of the city called Upper and Lower Cities, with 80meters of difference between their floors (Figure 5) [10].

Figure 5: Stratigraphy of the North Recôncavo Baiano Region

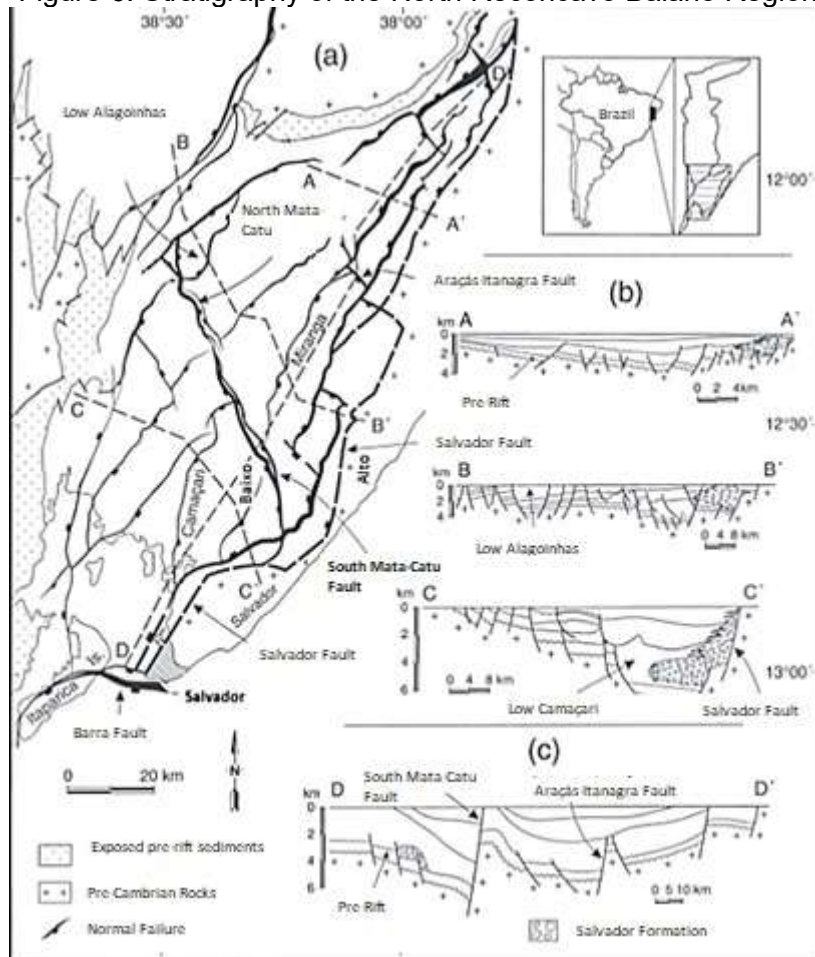


Source: Adapted from [8]

Also, with regard to North Recôncavo, it is noteworthy that the Neogene Era was marked by the presence of smaller and more superficial formations called SPA, Barreiras and Sabiá, where the first two were composed of sandstone and the third of claystone shale [6;7;8;11].

It is worth noting, in reference to the faults, that in Figure 6 is the path of geological structures in the study region during the rift period, with emphasis on the AA' schematic cuts (Araçás-Itanagra Fault); BB' (Low Alagoinhas); CC' (Fault in the Low Camaçari and Salvador region), and DD' (Fault Mata-Catu and Araçás-Itanagra). In these sections it is also possible to observe the width and depth, as well as the type of soil present and its temporal origin [12].

Figure 6: Stratigraphy of the North Reconcavo Baiano Region



Source: Adapted from [12]

The geological knowledge about this basin derives from the data accumulated during the work developed mainly in the extraction of hydrocarbons such as oil and gas in the last 70 years and consolidated by 5,818 wells drilled, until 2009. In view of these and other activities of exploration of mineral resources, they help in the ratification of the configuration sketched in Figure 6, in addition to serving for planning in front of environmental issues in dealing with these resources. Finally, it highlights the importance of carrying out this study since the region holds a relevant reserve of shale gas, in addition, there are other fossil and mineral resources such as water, clay, sand [13].

3. CONCLUSION

The comprehension of information's inherent to the geology of the region need of updating with frequency, since the use of non-polluting or environmentally degrading techniques is urgent all over the world. In this regard, it is important to point out that Brazil is currently experiencing a sabbatical period in relation to the exploration of non-conventional resources and, especially in the North Recôncavo, compared to conventional resources that demand safe techniques for secondary and tertiary recovery of fossil fuels. In addition, it is worth noting that much of the region is mapped as an environmental protection area. Given this, knowing of the environmental is essential for the use more sustainable.

4. REFERENCES

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