

CHARACTERISTICS OF TERTIARY- QUATERNARY SEDIMENTARY FORMATIONS IN THE MORONDAVA AND MAJUNGA-DIEGO BASINS

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ABSTRACT

The Post-Karoo is a complex sedimentary series, composed of sandstones, marls, limestones with Dogger reefs. In the Majunga basin, this series appears in the form of a concentric aureole open towards the sea. In general, it is covered by vast recent volcanic flows, mainly marine with continental intercalations at the end of the Lower Cretaceous and in the Turonian lower.

Keyword: Post-Karoo, volcanic flows, concentric aureole, epirogenic movement

1. INTRODUCTION

This article is part of the prospecting and investigation of oil and gas deposits in the Malagasy sedimentary basins. In this article, a low-cost and rarely used but efficient method is proposed for the regional investigation of oil and gas deposits in Madagascar. It makes it possible to identify formations or sub-formations vertically and structural zones horizontally, the shapes of geological bodies such as tabular layers, reefs, diapir folds, mouth bars, lithological bevels with their respective lithological compositions. , to identify their paleogeographic conditions during the accumulation of post-karoo deposits, their dating of formations, the presence of organic, microbiological and biochemical substances and to identify the possibility of petroleum systems or even possible natural reservoirs with tectonic and stratigraphic barriers and lithological elements likely to trap oil and gas. These post-karoo sedimentary deposits are mainly formed during the transgressive episode caused by the epirogenic movement relating to the lowering of a significant western coastal part of Madagascar.

2. MATERIAL AND METHODS

2. 1. Materials

The lithological section obtained gotten from the drilling are used to be correlated when determining the shape of the body of the formations or sub - formations and of the establishing of the natural reservoirs or the petroleum system. The formations in the Karoo system which date from Upper Carboniferous to the Lower Jurassic were identified from data from 55 boreholes drilled by SPM, CHEVRON, CONACO, COPETMA, MOBIL, AGIP, OCCIDENTAL, AMOCO, OMNIS and other companies, located in the three large Malagasy sedimentary basins. The term Karoo encompasses sedimentary and intrusive formations, deposited or emplaced in Africa, in intra and peri- continental basins located South of the Equator [2].

They are: the Karoo basin (South Africa), the Etjo basin (Botswana), the Limpopo and Zambèze basins (Zimbabwe, Mozambique), the Congo basin (Zaire), the Rovuma valley (Tanzania), the Mombasa basin (Kenya), the Morondava and Majunga-Diego basins (Madagascar) [3].

2. 2. Methods.

The method consists in releasing a geological body called " Formation or sub - formation "which is different from the understanding of the" facies ".

Characteristic of the formations and sub - formations.

The « facies » is generally closely linked with paleogeomorphology as for the « formation », in addition to these two (02) aforesaid geological conditions, it is mainly linked with the tectonic movement and was formed in regional geological structure, during a well –defined period.

The meaning of the term "formation" is wide, different and depends on the definition given by researchers.

In this article, a formation is a concrete geological body, delimited by the homogeneity of its lithological composition formed under well-defined paleotectonic and paleogeographic conditions, corresponding to stratigraphic stages or series, rarely to a few series or part of stage[4] [5]...

The analysis of the characteristics of Cenozoic sedimentary formations of the western coast of Madagascar makes it possible to clarify, each formation released in the structural areas corresponding, the following clauses:

- Determination of the common lithological composition, the shape of the body occupying the surface, the thickness, the types of the main and secondary rocks, the change in their lithological composition and grouping in profile,
- Restoration of the paléotectonic, facial - paléogéographic, géochimical conditions of formations and their evolution.
- Description of contact area characters [4].

3. RESULT

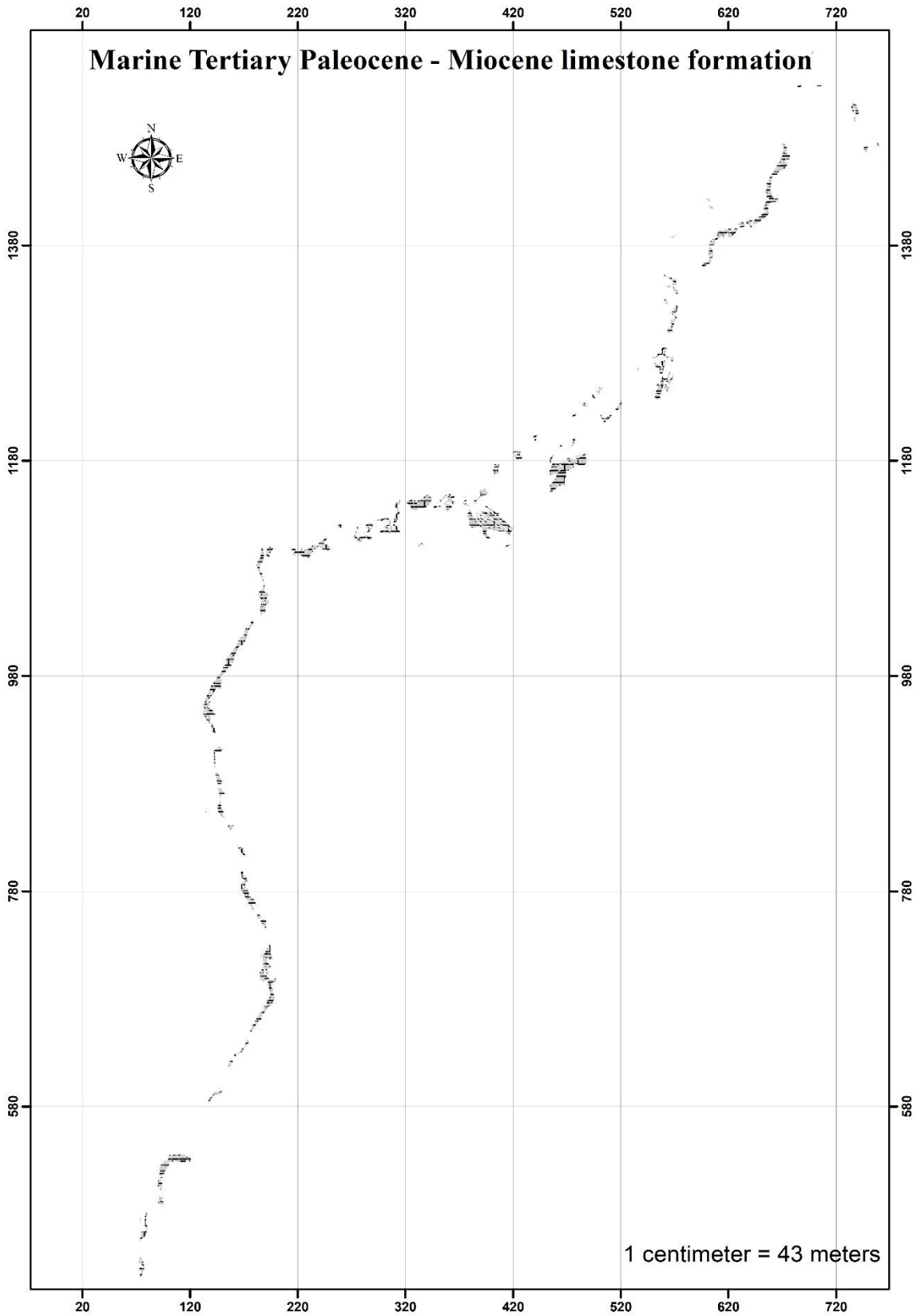
FORMATIONS OR SUB-FORMATIONS RELEASED IN THE POST-KARROO.

3.1. Marine Tertiary Paleocene – Miocene limestone formation

It is a formation with a lenticular geological body and widespread in the western coastal areas of Malagasy sedimentary terrains. Its lithological composition is predominated by:

- Lutetien Alveoline limestone
- limestone with Ypresian marly intercalation
- Dolomitic limestone, chalk-based in the north with Paleocene Foraminifera without macrofossils

The latter testifies to the period of marine transgression which almost invaded the sedimentary basins of Morondava and Majunga-Diego. It is a fairly thick formation which varies on average from 600 m to 1000 m on the Malagasy coast.



Map 1 : Marine Tertiary Paleocene – Miocene limestone formation

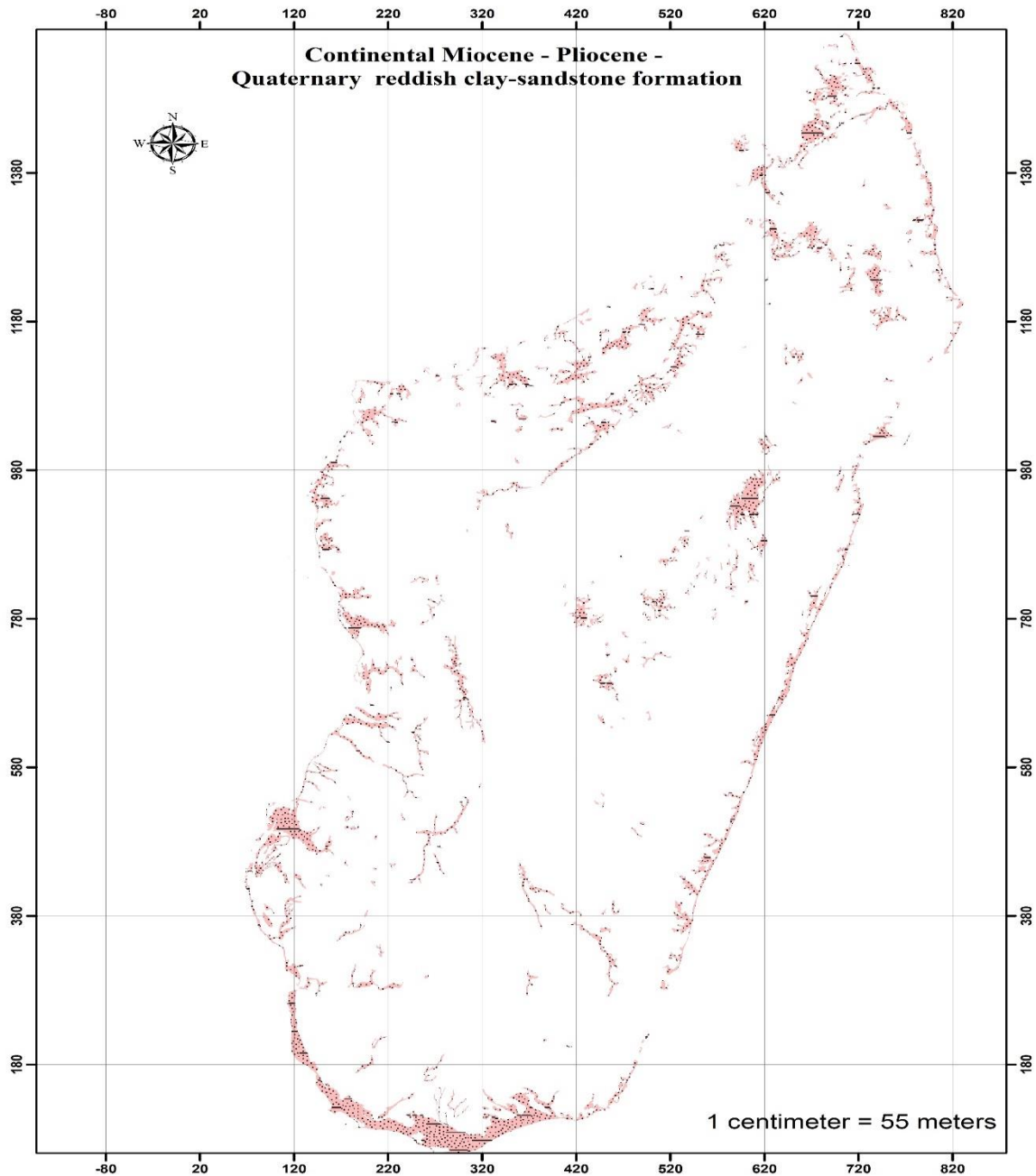
3.2. Continental Miocene - Pliocene - Quaternary reddish clay-sandstone formation.

This formation is widespread in the coastal parts of the Malagasy sedimentary basins. Its geological body is lenticular in shape with maximum thickness in the coastal areas. The thickness of this formation is estimated at more than 250 m towards the coast.

The Plio-Quaternary formation is composed of sands, sandstones and clays forming the plateaus of the coastal zone.

It is made up of the following facies:

- Sandstone marl with *Miogypsines* and *Cyphus arinarius* (marine transgression)
- Neogene sandy clay to silicified wood (marine regression)
- chalky and fossiliferous Aquitano-Burdigalian limestone



Map 2 : Continental Miocene - Pliocene - Quaternary reddish clay-sandstone formation.

4. DISCUSSION

INSTALLATION OF CONTINENTAL, MARINE AND LAGOON AREAS.

1. MARINE AND LAGOON EPISODE

- FROM THE MIDDLE AND UPPER JURASSIC

A widespread invasion of a much clearer sea has been proven in the Majunga-Diego basin. The deposits are generally composed of particularly large limestone.

DURING THE SUBSIDENCE OF THE MARGINS IN THE PALEOCENE-MIOCENE

A frankly marine formation, represented by highly developed marly rock and limestone facies, appeared during the subsidence of the Miocene margins:

o Marine tertiary limestone formation (Paleocene - Miocene)

2. CONTINENTAL EPISODE

In the Plio-Quaternaire, a regressive formation characterized by sand and sandstone having a thickness barely exceeding 250 m:

o Miocene - Pliocene - Quaternary continental reddish clay-sandstone formation.

IV. CONCLUSION

The litho-stratigraphic, paleogeographic and structural analysis of the post-karoo formations and the identification of their different formations and sub-formations allow us to discern the variations in the deposition regime of the sedimentary series of the Morondava and Majunga-Diego basins. They show a regime of distinct deposits constituting the formations and sub-formations which are mainly marine, with a significant development of post-rift formations composed of limestones, marls and shales, which are found practically in all the coastal basins of Madagascar.

After the analysis of the characteristics of the post-karoo formations, in the composition of the Malagasy sedimentary cover, it was identified: Two (02) formations of cover rocks (thick layers of clay) and reservoir rocks or traps (reefs and oolitic coral massifs, fissured limestones) mixed formations are susceptible to source rocks (rich in organic matter, planktons).

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