

HOLOCENIC GEOLOGICAL EVOLUTION OF SOUTHERN RIO DE JANEIRO: ITAGUAÍ COUNTY, BRAZIL

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ABSTRACT

The understanding of Holocene sedimentation process in the coastal plain of Sepetiba Bay, Itaguaí County, state of Rio de Janeiro, is review in this paper, because of the debate on the origins of the sand deposits outcropping in the area. The relevance of the study is based on some new evidences that pointed out the marine origins of such deposits, and the documentation of these rocks, considered, by some authors, absent in this area. This study deals with the results of mapping surveys, fotointerpretation, thermoluminescence (TL) and radiocarbon ages of sediments. All of those presented evidences lead us to interpret the sedimentary deposits as marine sand ridges, related to Late Holocene eustatic sea-level variations, characteristics of the southern Brazilian coast.

INTRODUCTION

The coastal regions represents the limits between continents and oceans, and 2/3 of world population, or 4 billion people, live along this place or surrounding areas (Suguio, 2003). In spite of this, such areas in Brazil are lacking detailed studies and researches about their geological evolution.

At the Itaguaí coastal plain, where important industries and a harbor are located, is not different and the absence of detailed mapping does not explain the origin and development of it's sand ridge deposits.

This area (617/626 E; 7463/7470 N, UTM coordinates – figure 1) at Itaguaí County (Rio de Janeiro State) is geographically situated at western of Guanabara gráben (Ferrari, 1990), and was chosen for this study, due its scarcity of geological information or data, besides the complexity of its geological evolution. The great variety of sedimentary processes that took place at late Holocene in this region turned this high energy site into a low energy one. This study dealt with the results of mapping surveys, fotointerpretation, thermoluminescence (TL) and radiocarbon ages of sediments.

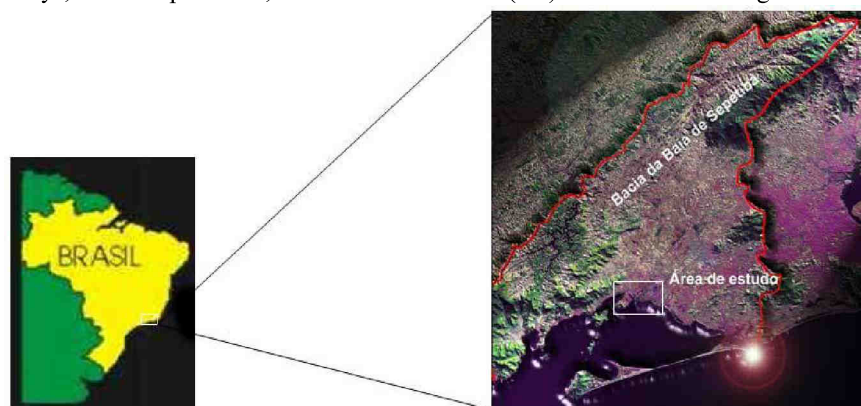


Figure 1 – Location of the study.

SUBJECT AND OBJECTIVES

According to Suguio & Martin (1978) the sea level variation at southern of Brazilian coast at 5,100 years B.P.(specifically at São Paulo state) increased 3 to 5 meters, but at the studied area did not exceed 3 meters after this high stand sea level event it gradually, but not regularly fallen to actual position.

Martin & Suguio (1989), considered the area of this study under submersion because they couldn't find any evidence of marine deposits there. These only appeared far west and far east of the studied area.

The main object of this research is to propose an ancient scenery of this area considering the existence of marine sediments there, related in previous papers (Carelli *et al*, 1998 and 2004).

The relevance of considering marine sedimentation in this area is because of the importance of Guanabara gráben as source of sediments to Santos Bay. Therefore, the results obtained in this study can accurate the Cenozoic sedimentation models to Santos Bay.

Although Suguio & Martin (1978) had predicted that the maximum sea level didn't exceeded 3 meters, Roncarati & Barocas (1978) found evidences of 4 to 6 meters sea level rise for the studied area at the climax of Flandrian Transgression (5,100 – 5,600 years B.P.).

The sand ridges studied in this work (sand ridge A,B and C) were observable at mapping survey, aerial photos and satellites images. They are 1,000 to 1,500m length, 40 to 50m wide and more than 3m altitude, with inter-ridge argillaceous deposits. These are nowadays 3 to 5 km distant from shoreline (showed at figure 2). They consist of fine grained sand, showing a good selection and some shell midden is also punctually observed, as well as incrustation of *ostrea sp.* in rocks at 4,2m altitude, as described in Carelli *et al*, 1998 and 2004.

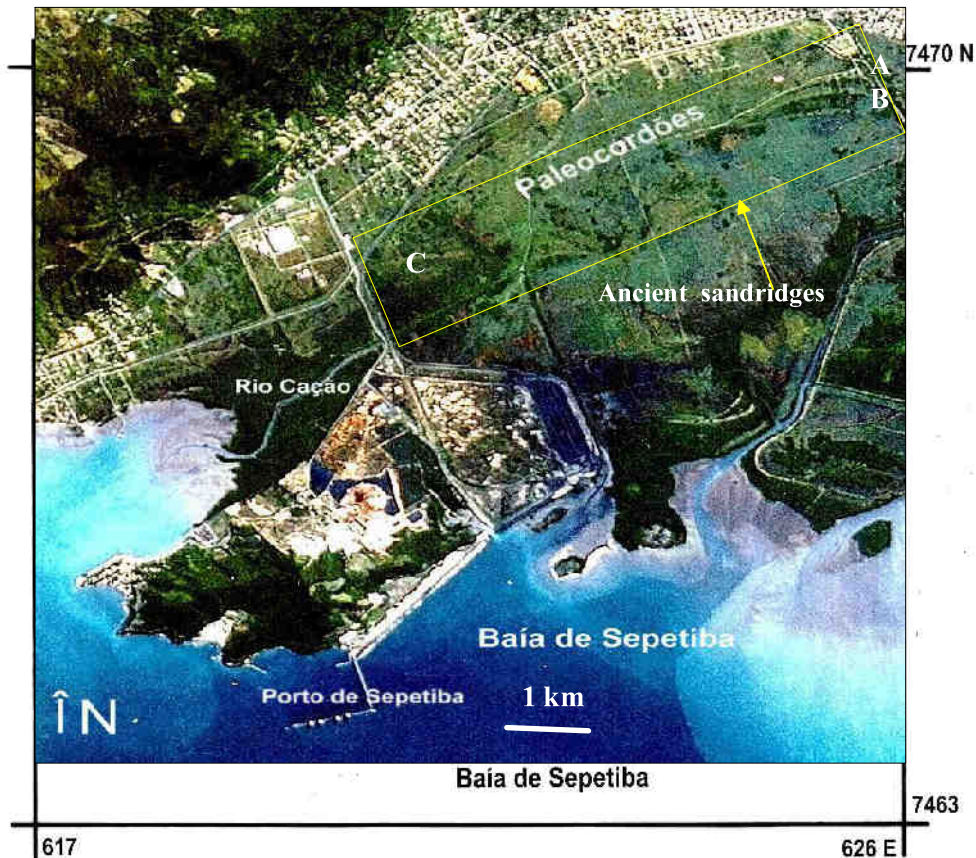


Figure 2 – Spot satellite image (1996) showing in the orange rectangle the ancient sand ridges A, B and C.

RESULTS

GEOLOGICAL MAP

Since the field surveys as cartographic maps interpretations were useful to elaborate the geological map, establish the geological units (Precambrian rocks and Cenozoic sedimentary covering) and the Holocene sand ridges (figure 3). We could observe some Precambrian isolated nucleus emerging from the sedimentary covering. Such evidences of an irregular basement were prior pointed out by Borges (1998) for Sepetiba Bay. In fact, during the drilling stage of this study we could also verify these irregularities, and it was considered by the time of inferring the faults at the map.

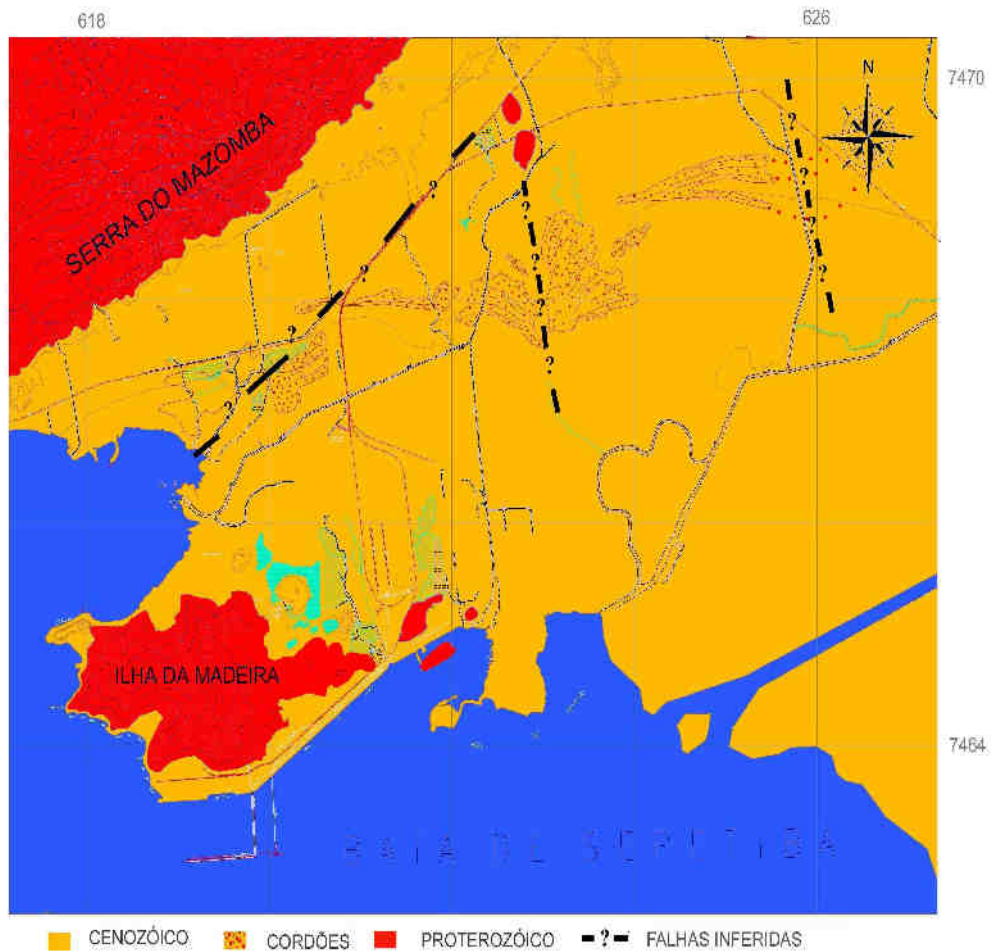


Figure 3 – Geological map outlining the sand ridges deposits and the inferred N/ NW faults.

ANCIENT SETTINGS

The thermoluminescence (TL) of sediments and radiocarbon ages (not calibrated) of shells found in the area were used for tracing ancient positions of shoreline. In line 1 the age varies from approximately 7,000 years B.P. to 4,500 years B.P. Between lines 1 and 2 the limits are from 4,500 years B.P. to 3,000 years B.P. (figure 4).

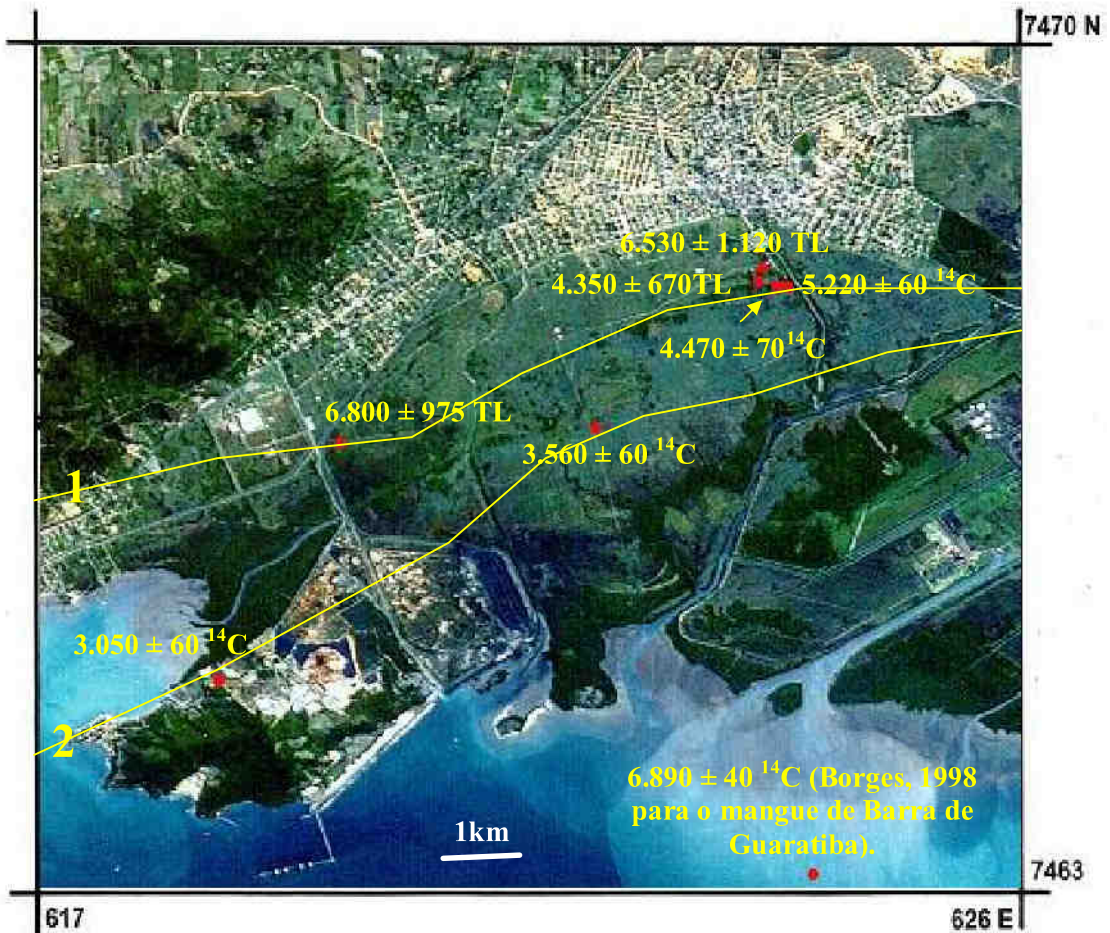


Figure 4 – Location map of geochronological data and suggested shoreline positions for last 7,000 years B.P.

PALEOGEOGRAPHIC MAP

Paleogeographic map model preparation used aerial photographs (scale 1: 40,000/1975), the Itaguaí's altimetry survey (2005) and Spot satellite image (scale 1: 60,000/1996). All data combined were processed by Autocad 2008 program where we inserted an ancient ocean at 5m high, then, we could note the agreement between those studied sand ridges and that positioning of shoreline, as shown in figure 5.

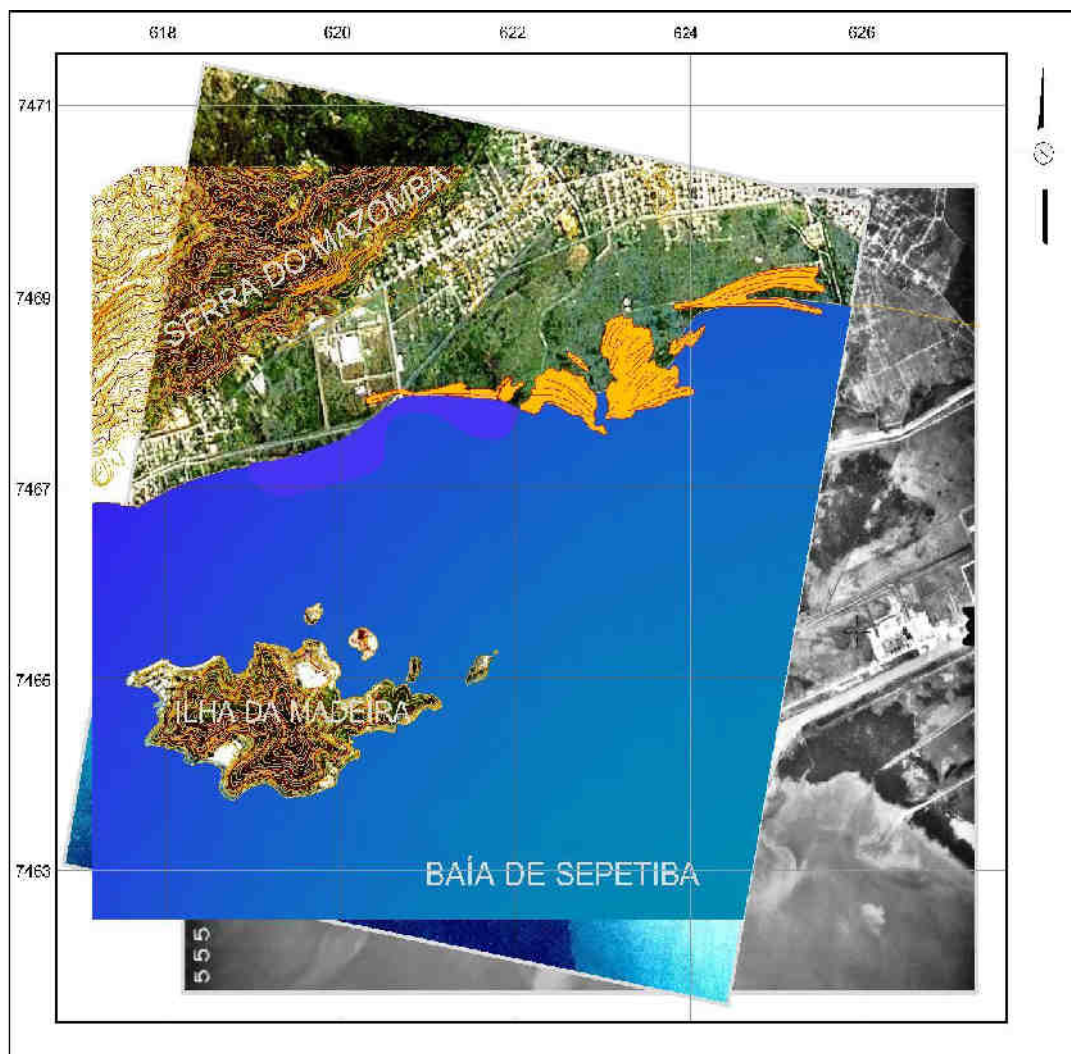


Figure 5 – Paleogeographic map of coastal plain of Itaguaí at 3,000 years B.P., scale 1: 50,000.

DISCUSSION

In this work we found evidences that support the hypothesis of marine sedimentation for the last 7,000 years B.P. at Itaguaí County, Rio de Janeiro state, not identified by previous research in the same area. For this statement several methodologies were used and lead to establish 3,000 years B.P. scenery with shoreline at 4 to 5 m what was unbelievable until that time.

FINAL CONSIDERATIONS

The drilling survey besides the radiocarbon ages revealed the possible existence of new systems of neotectonic faults that hadn't been completed available yet. This fact should be carefully considered by the industries that are planning to install huge factory buildings at that area. However, more sub-surface detailed studies could provide additional information to complete the lack of knowledge about basement featuring at Itaguaí County.

ACKNOWLEDGEMENTS

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