INTRODUCTION

The researchers of the Centro de Ciências Tecnológicas da Terra e do Mar of the University of Vale do Itajaí have carried out studies on the central-northern coast of the State of Santa Catarina, through the project entitled “Integrated project of the mouth of the Itajaí-Açu river and adjacent coastal area: diagnosis and environmental evaluation”, with support from the Fundação Banco do Brasil.

In this project, the Porto Belo peninsula was studied in detail, due to scientific interest and the exuberance of its landscape. The objective of the project was to describe the geomorphology, sedimentology and geoevolutional stages of the Quaternary period of the coastal plain, and discuss the use and potential of the associated mineral resources and geoenvironmental alterations arising from this use.

It is believed that this focus of study on the peninsula has provided criteria for the construction of activities which seek the use and planning of coastal regions of the State of Santa Catarina. This proposal challenges the stereotype of occupation of this coastal region adopted until now.

METHODS

The methodology was as follows: (1) a literature review; (2) a preliminary analysis of the satellite images (at a scale of 1:100,000); (3) interpretation of aerial photographs (from 1977 and 1978) (at a scale of 1:25,000); (4) geological mapping, including topogeological profiling, sediments and rocks sampling, detailed and general observations in loco of the uses and potential of the mineral resources; (5) sedimentological analysis; (6) entering the cartographic bases of the sheet for treatment of the information in SITIM System GIS (INPE/GEOSISTEMAS, 1995a); (7) digital interpretation of the aerial photographs and images; (8) elaboration of a geological map (1:50,000 scale); (8) definition of the coastal evolution of the area.

RESULTS

Physiography

From the geographical point of view, the peninsula is located between latitudes 27º06’32,3” and 27º13’14,5” south and longitudes 48º36’06,25” and 48º27’43,8” west, in the central sector of the coast of the State of Santa Catarina (sector III) (DIEHL and HORN FILHO, 1996) (Figure 1), 60km north of Florianópolis, the State capital. It presents a typical star-shaped area of 130km², which is alternated by rocky massifs, promontories, tombolos, dunes and 42 beaches. The towns of Bombinhas Porto Belo are located within the peninsula, from which Porto Belo, Bombas, Mariscal and Zimbros or Canto Grande bights are detached.

The climate of the peninsula, like that of the whole of the Santa Catarina coast, is hot and humid, with a clearly-defined dry season. The average annual rainfall is 1600mm. The month with the highest rainfall is January (1900mm) and the driest month is July (926mm). The hottest month is January, when temperatures reach 39.5ºC. The average annual temperature is 19.5ºC and during the month of July, relatively low temperatures can be recorded. The relative air humidity reaches 85.2% in Summer and the prevailing winds reach a peak during the month of November, the preferential direction being NE and SE. The longest insolation occurs during the month of May, reaching 149.6 hours and the shortest occurs in the month of September, reaching 79.6 hours (POLETTÉ and CAVEDON, 2001).

In terms of the hydrography, the peninsula is comprised of four hydrographic microbasins, namely: Porto Belo, Bombas, Mariscal and Zimbros (POLETTÉ and CAVEDON, 2001). The microbasins of Bombas, Mariscal and Zimbros belong to the municipality of Bombinhas, while the microbasin of Porto Belo belongs to the municipality of the same name. The principal rivers of the peninsula, according to Kohl (1987 and 2000) are Perequê and Perequequinho and the secondary rivers are Passavinte, Santa Luzia, Barreiro da Barra, Rebôlo and da Vina.

The predominant vegetation cover on the peninsula is Tropical Atlantic Forest, which is characterized by exuberant vegetation. According to POLETTÉ and CAVEDON (2001), there is also a predominance, alongside the sandy plains of the peninsula, of the Restinga, a vegetal formation which acts as an environment of transition between the dunes and the Atlantic Forest, or between the mangrove swamps and the Atlantic Forest. It has a dense herbaceous-scrub vegetation, with plants which are well-adapted to living in conditions hostile to vegetal colonization.

In the field of ecology, the ecosystems found on the Porto Belo peninsula are diverse, the main such systems being beaches, dunes, mangrove swamps, clifts, restingas and Atlantic Forest, and the coastal zone as a whole. Some islands are also highlighted in the coastal region of the Porto Belo peninsula, such as João da Cunha, Macucos, Galés, Deserta, Arvoredo and the stone of the São Pedro islands. A
The following text has been extracted from the document:

A large portion of the Porto Belo peninsula is located in an area surrounding the conservation unit: the Arrorredo Biological Marine Reserve, an important ecological reserve of national importance.

**Geology and Geomorphology**

The geology of the region is comprised of metamorphic rocks of the Brusque Group, an array of granitoid rocks designated Camboriú Complex, and other granitic units, intrusive in this complex, denominated Quatro Ilhas metagranitoids and Mariscal metagranite. Besides these formations there are also Estaleiro Granite; Zimbros Intrusive Suite (Bitencourt, 1996); according to Caruso Jr. et al. (1997).

The geology of the quaternary deposits of the Porto Belo peninsula coastal plain was described by Diehl et al. (1995), Diehl et al. (1996), Horn Filho et al. (1996), Caruso Jr. et al. (1997) and Caruso Jr. et al. (2000), and is comprised of deposits characteristic of two depositional systems: the continental and the transitional or coastal system. (Figure 2).

The continental system is associated with slopes of the highlands, and includes coluvial, alluvial fan and fluvial deposits, generally dated undifferentiated Quaternary (from ±2MA AP until the present day). The coastal system, of the lagoon-barrier type, includes pleistocenic and holocenic deposits of the shallow marine, eolic, lagoonal and paludial environments, correlating to the III and IV barriers, originating from the transgressions of the end of the Pleistocene and Holocene epochs.

In terms of the geomorphology, the peninsula has two distinct features: a) Exposed Crystalline Basement, divided into the mountain range Tijucas river, which in turn forms part of the East Santa Catarina mountain range (Horn Filho et al., 1996) and b) Coastal Plain, formed by a series of geomorphological features, such as alluvial fans, talus, terraces, dunes, beaches, lakes and lagoons.

**Paleogeographic Evolution**

The geology and geomorphology of the quaternary deposits of the coastal plain of the area studied are closely linked to the fluctuations in sea level which occurred during the last 2 million years. These were fundamental for the investigation, characterization the description of the evolution of the principal geological units of the region.

The phases of lowering of the sea level, with consequent exposure of the coastal plain, were predominant factors in the formation of the deposits of the Porto Belo peninsula. In the period between 120ka and 18ka, the pleistocenic tombolo was formed, which was responsible for the configuration of the peninsula. Later, in the period between 5.1ka and the present, the holocenic tombolo of Mariscal was formed, which forms part of the first.

The beginning of the Quaternary period, marked by a higher sea level than today, was characterized by the presence of the Porto Belo archipelago, formed by a group of coastal islands oriented according to the NE-SW tectonic-structural direction, which currently form the diverse islands and promontories of the region. These “islands” and the adjacent continental region are represented lithologically by the granite-gneissic strip of Porto Belo (Silva, 1984), of the pre-cambrian age. Geomorphologically, these islands are represented by the Exposed Crystalline Basement (Monteiro, 1958), distributed in the Tijucas river mountain range, which in turn forms part of the coastal mountain ranges of East Santa Catarina.

The regressive episodes which preceded the trangressions of the older Pleistocene (400ka) and the middle Pleistocene (325ka), together with important paleoclimatic phenomena of the epoch, were determining factors in the formation of deposits of the continental depositional system (eluvial, coluvial and alluvial fans) of the undifferentiated Quaternary period, located at the base of the continental elevations and islands and comprised of sand-clay sediments.

The subsequent phase, the flooding of the coastal plain, corresponding to the late Pleistocene epoch (120ka) at a higher sea level than present, was responsible for the erosion of the sedimentary deposits, also reaching the rocks of the basement.
At the beginning of the retreat of the coastline during the period, led to the formation of frontal sand ridges of the sand barrier and the first lagoonal bodies of the retrobarrier. Subsequently, due to the effects of colmatation, these developed into the environments of lagoons, wetlands and finally, lagoonal deposits in the form of terraces of up to 12m in high.

The continuation of the regressive phase, between 120ka and 18ka, when occurred a lowering of the sea level, led to the formation of marine beach deposits covered by eolic sediments in the form of sand ridges, with highs varying between 13 and 17m above the current level. The sediments of the pleistocene deposits are essential sandy, fine and medium, yellow, ochre and brownish in color, and mark the end of the Pleistocene epoch in the State of and the area studied (Horn Filho et al., 1994).

The Flandrian transgression, between 18ka and 5.1ka, determined the raising of the sea at relatively lower levels than those of the Pleistocene epoch. During this event of advancing F 1994), the pre-formed deposits of the inlets of , those of the Pleistocene epoch. During this event of advancing determined the raising of the sea at relatively lower levels than those of the Pleistocene epoch. During this event of advancing determined the raising of the sea at relatively lower levels than those of the Pleistocene epoch.

The geological-geomorphological evolution of the coastal plain of the Porto Belo peninsula, through the interpretation of quaternary deposits, is closely related to the fluctuations in sea level of the south Atlantic ocean. Among the deposits of the coastal depositional system, the predominant ones are those of the holocenic, when occurred a lowering of the sea level, led to the formation of the lagoonal deposits and inter-tidal marine beach, present beige and whitened coloration, of fine and medium granulometry, with the exception of the coarser sands of the continuous strip of Restinga adjacent to the bay of Tijucas. In this period, the growth of the tombolo between the “island” of Macacos and the Ventura hill led to the formation of the Mariscal peninsula.

In the paleodrainages forming part of the older deposits, the fluvial sediments are evidenced (alluvials), clay-sand, highlighting those of the river Perereguí floodplain.

In the regressive episode which preceded the transgressive maximum of 2.5ka, in environments which are hydrodynamically of low energy, the formation occurred of the paludal, silt-clay deposits, with its associated characteristic vegetation (mangrove swamps and salt marshes). The tidal plain of the bay of Tijucas is highlighted in the area of study.

CONCLUSIONS

At a global level, the alternating between glacial and interglacial periods which occurred during the Quaternary period in the northern hemisphere and its indirect consequences in the austral oceans; the tectonic cenozoic movements; the deformations of the terrestrial geoid and the accumulation of sediments in the oceanic basins; among others, are important causes for explaining the formation of the immersed and submersed deposits of the coastal plains and adjacent continental shelves.

The geological-geomorphological evolution of the coastal plain of the Porto Belo peninsula, through the interpretation of quaternary deposits, is closely related to the fluctuations in sea level of the south Atlantic ocean. Among the deposits of the coastal depositional system, the predominant ones are those of the holocenic age, followed by the deposits of the upper Pleistocene, intermingled with the granitic archaean-proterozoic elevations of the basement and continental deposits of the undifferentiated Quaternary.

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LITERATURE CITED


