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PAST - PRESENT - FUTURE

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THE QUATERNARY LACUSTRINE DEPOSITS OF THE SERRA DOS CARAJÁS
(STATE OF PARÁ, BRAZIL): AGES AND OTHER PRELIMINARY RESULTS(*)

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The Quaternary deposits of the Amazon basin in Brazil are still now very imperfectly known. The difficulties of penetration within a huge tropical forest and a poor human occupation are probably the most important factors. Though very scarce, the published papers especially during the last fifteen years, allowed us to reach the conclusion that this area was also subjected to fluctuation in paleoclimate which were worldwide active during the Quaternary. This certainty is based on ecological, pedological, geomorphological and sedimentological, rarely studied but well concordant arguments. Arid paleoclimates probably dominated some areas of the Amazon basin, during the Quaternary, introducing a savanna-type vegetation frequently burned in driest seasons and consequently inducing soil erosion. At that time the humid evergreen forest was probably reduced to some "refuges". However, very few age determinations and more criterious researches have been done in this area, and some chronologically established paleoclimate crisis is limited to the Holocene epoch.

Until the end of 1985, french and brazilian scientists composed a team of participants mainly from ORSTOM (French Institute for Scientific Research for Development in Cooperation) and USP (University of São Paulo), with a financial support of ORSTOM, CNPq (Conselho Nacional de Desenvolvimento Científico e Tecnológico) and a local help during the field work of DOCEGEO (Geologia e Mineração) in the solution of this problem. The Serra dos Carajás (State of Pará), within Brazilian Amazon, has been chosen by this team. The researches being developed in this area integrate a multidisciplinary study of ORSTOM, named GEOCIT, whose main objective is to make the paleoenvironmental, mostly paleoclimatic,

reconstitution of intertropical areas (low latitude) from 30,000 years B.P. until today. Here are presented the first absolute ages in Amazon Pleistocene deposits, and some other preliminary informations.

The Serra dos Carajás, situated in a straight line about 500 km southward of Belém (Fig. 1), presents the worldwide famous big iron ore deposits (18 billion tons. of 66% Fe_2O_3), and important manganese, gold and copper ore deposits, discovered by DOCEGEO in 1967. Extensive lateritic plateaus (about 5 X 30 km), developed upon "banded-iron formation", constitute the 700 to 890 m high Northern and Southern Serra dos Carajás "emerging" from a dense forest. The surface of the plateaus, representing a pre-Cretaceous erosional plane covered by a savanna-like vegetation, exhibits numerous small lakes (some hundreds of meters to less than two kilometers long). These lakes are situated within partially interconnected and semi-closed depressions, whose form looks like dolines in a karstic landscape, and their waters apparently were originated from pluvial waters running through surrounding lateritic slopes. They are relatively shallow (maximum depth of about 18 m), and exhibit several stages of silting by fine sediments, very rich in organic carbon and small carbonized woods. As they are located in the headwaters of small rivers forming the regional hydrographic net, free of erosional processes and receiving the "pollen rains" precipitated within the area, possibly they represent the ideal records of changes in paleoclimate and past vegetation of the area.

The Fig. 2 shows the preliminary results of the first sample obtained by vibro-corer, which is now being submitted to a detailed study. This drill core was collected from one of the lakes, situated in Southern Serra dos Carajás, practically fullfilled by sediments and now almost entirely invaded by aquatic grasses. Above a basal clayey-sandy sediments, very rich in siderite probably derived by diagenetic processes of soils eroded from lateritic materials, there are two similar succession of sediments. Each one begins with a brownish-black to black argillaceous sediments composed essentially of kaolinite, siderite and quartz particles, with high organic carbon content (40 a 50% of organic carbon), especially concentrated in their uppermost portion also characterized by abundant carbonized wood fragments; these sediments are followed by a sequence of yellowish to light-brown sandy sediments, essentially composed of siderite (concretionary or in crystals of about 100 μ), poor in organic carbon (< 5%) and carbonized wood fragments. This succession is suggestive

of, at least, two phases of abrupt paleoenvironmental changes in the area. The last change, observed between about 20,000 years and 10,000 years B.P. (uppermost siderite layer) could be contemporaneous with the last worldwide glacial period (Würm or Wisconsin). On the other hand, it is impossible to date the older limit of the lower siderite layer, because only the ^{14}C conventional method was used, and its age is near the maximum limit of this method. A detailed study of possible paleoclimate indicators, like pollens, plant macro-rests and authigenic minerals, are being made. Then, in a near future, we hope to describe more precisely each of these facies in terms of their paleo-bio-climatic significances. Simultaneously, informations from additional drill cores obtained in 1988 in other Southern Serra dos Carajás lakes, in different eutrophication stages, must permit to evaluate the regional extension of the suggested paleoenvironmental changes.

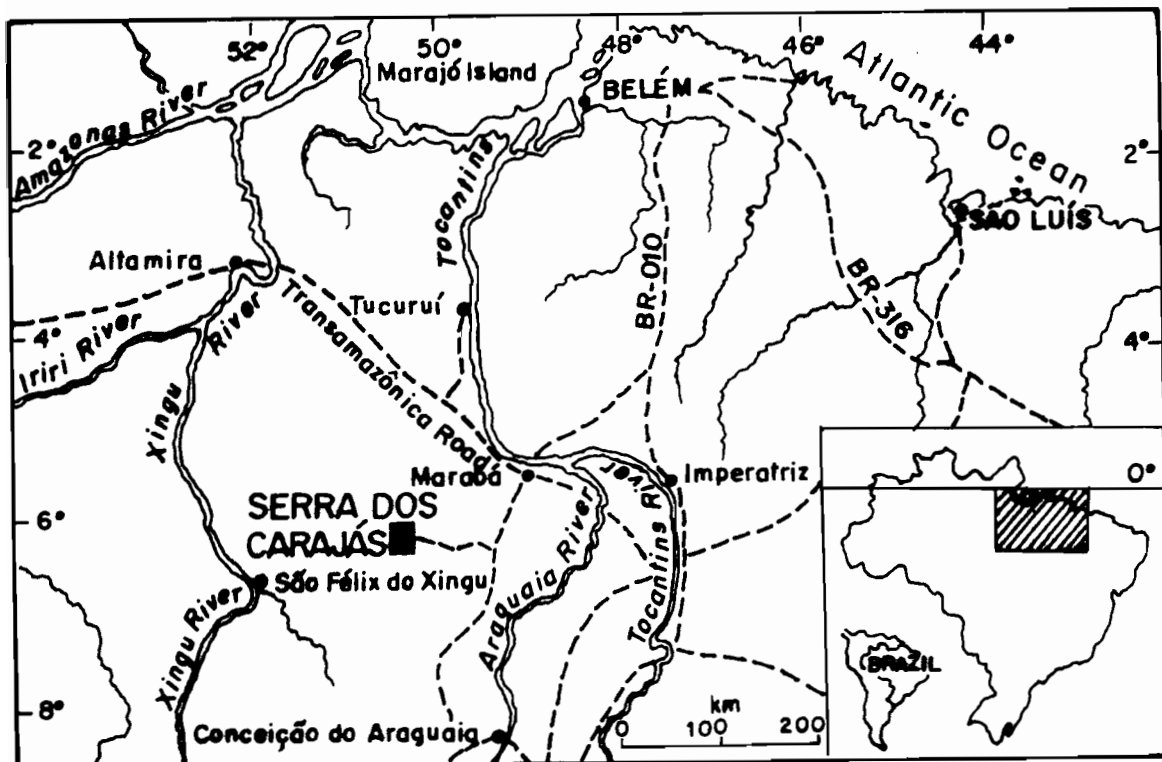


Fig.1 - Location map of the study area (State of Pará, Brazil).

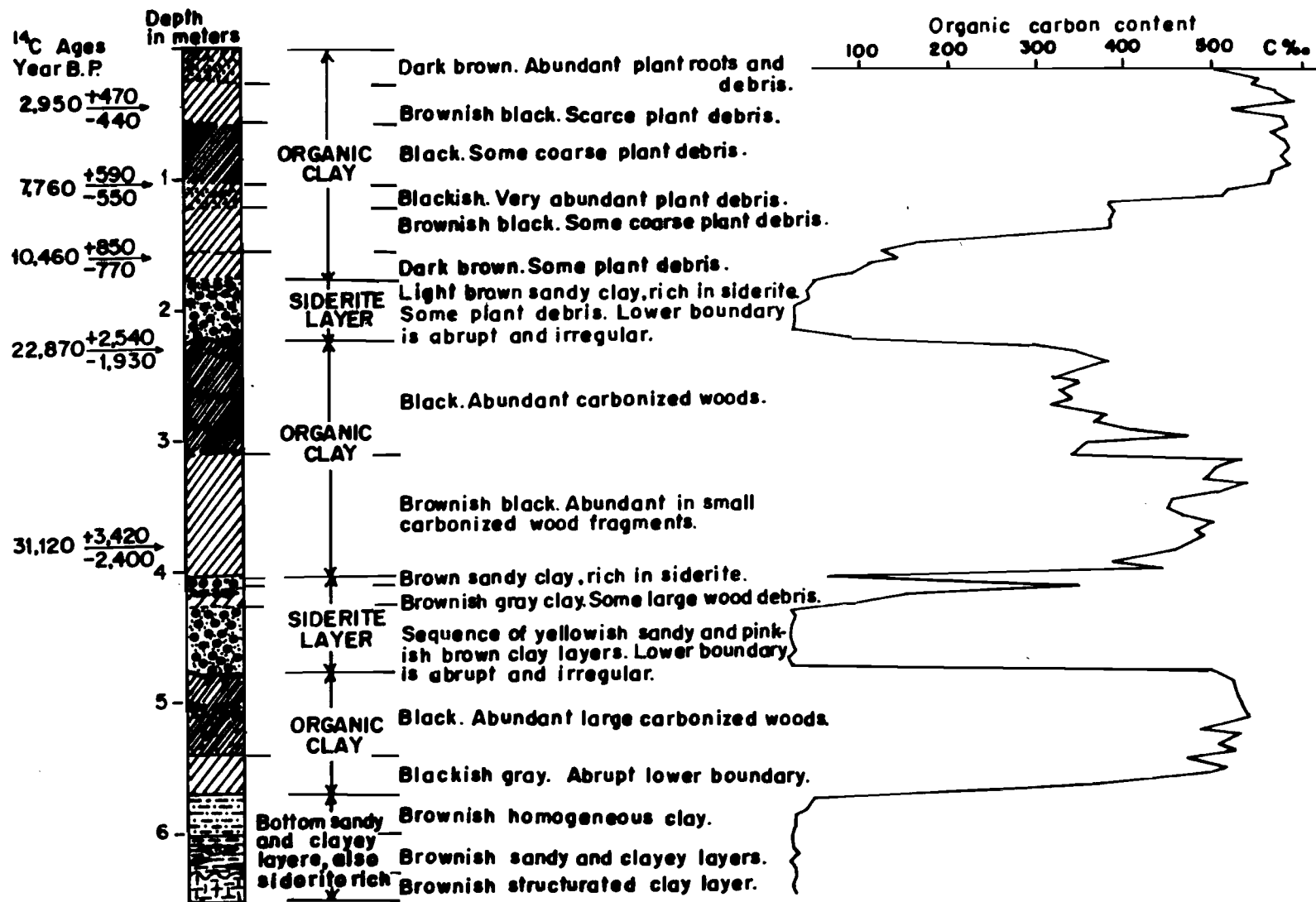


Fig. 2 – Core CSS-2 (Carajás "Serra Sul") from the lake nº 8.

Lat. 6°15'S, Long. 50°30'W, Alt. ~720m a.s.l.

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