

PALEOFIRE RECORD, ORGANIC MATTER SOURCE AND CLIMATIC INFERENCES FOR THE LAST ~22 CAL KA BP IN SERRA SUL DE CARAJÁS, SOUTHEASTERN AMAZONIA

Reis, L.S.¹; Pessenda, L.C.R.¹; Guimarães, J.T.F.

¹University of São Paulo, Center for Nuclear Energy in Agriculture, Laboratório ¹⁴C; ²Instituto Tecnológico Vale

ABSTRACT: Several studies have already been performed in the Amazonia basin in order to elucidate questions regarding the climatic, vegetation and environmental changes that occurred during the Late Quaternary, especially in the Last Glacial Maximum (LGM). However, there is no broad consensus on these changes and these issues are still strongly debated. The study area is located in the Serra Sul dos Carajás, southeastern Amazonia. This plateau presents altitudes around 730 m above mean sea level, rising above a forested landscape. The surface of the plateau presents several lakes isolated from fluvial influence and situated in closed catchment system formed by structural and degradation process of the lateritic profile. In this context, the Amendoim lake is inserted. Radiocarbon dating, sedimentary facies, isotopic ($\delta^{13}\text{C}$, $\delta^{15}\text{N}$) and elemental (TOC, TN) and macro-charcoal fragments analysis were performed in the 150 cm AM2 core in order to recognize the sedimentation processes that occurred during the evolution of the lacustrine environment, the sources of sedimentary organic matter and to identify the major events of paleofire, respectively. The AM2 core presented the sedimentary record of the last ~22 cal ka B.P., covering paleoenvironmental and paleoclimatic changes of the Upper Pleistocene and Holocene. Between ~21,5 and 17,4 cal ka B.P., the sedimentary deposit was composed predominantly by siderite (FeCO_3). Formed under basic and reducing conditions, this mineral is a strong indicator of decreasing lake water level. In this layer, the absence of charcoal fragments is probably due to degradation of the organic material resulting from the diagenetic process. $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ varied from -22.4 to -14.5‰ and from 4.0 to 6.6‰, respectively. The enriched $\delta^{13}\text{C}$ values can be related to the bicarbonate derived from organic matter decomposition. As for $\delta^{15}\text{N}$, processes as denitrification and ammonia volatilization are associated with significant fractionation effects under anoxic and alkaline conditions, respectively. These favor reaction of ^{14}N molecules, and can lead to significant enrichment in the $\delta^{15}\text{N}$ values. Between 11,3 and ~7,9 cal ka B.P., the highest concentrations (330 particles/cm³) of coal fragments were recorded. $\delta^{15}\text{N}$ varied from 0.3 to 3.7‰. The $\delta^{13}\text{C}$ values varied between -27.1 and -25.0‰, suggesting a major contribution of C3 plants. The sedimentary deposits presented a cyclic behavior, with alternation of mud and peat, characterized by the variation in the influx of allochthonous and autochthonous materials into the lake. In addition, between 11,2 and ~9,4 cal ka B.P., there was again formation of siderite which also suggests drier climatic conditions than the current during the Early to Middle Holocene. The variation of $\delta^{15}\text{N}$ and $\delta^{13}\text{C}$ values indicates the contribution of allochthonous organic matter from C3 plants and autochthonous organic matter from algae or aquatic plants (e.g. *Isoetes*) present on the lake bottom. Based on this research we suggest a change of wet to cool and relatively dry climatic conditions from LGM to Late Glacial. Besides, the relatively stable climatic conditions observed at the end of the Pleistocene were interposed by significantly drier climatic conditions during the Early to Middle Holocene.

KEYWORDS: PALEOCLIMATE; SOUTHEASTERN AMAZONIA; LATE QUATERNARY.