

Evidence of human induced environmental alteration: preliminary results from the study of sedimentary records in the Bay of Sainte Marie, New Caledonia

Jean-Michel Fernandez

Ludovic Breau

Renaud Fichez

Christian Badie

Past environmental changes have been studied in the sediments of the lagoon of New-Caledonian, sediments possess the capacity to integrate and store various information relative to modification and alteration. Extracting and deciphering those natural archives are central to the understanding of past and present sedimentary processes and provide a dynamic view on the evolution of environmental conditions. A core of 56 cm was extracted from the bottom of Sainte Marie Bay (New Caledonia) that is subject to significant urban inputs from the city of Noumea. The core was sampled in 2 cm thick slices and sediments were dated using ^{210}Pb unsupported radioactivity. Carbonate content was determined and 8 metals (Fe, Mn, Al, Ni, Cr, Co, Cu, Zn) were analysed in the oxidizable, acid-soluble, reducible and refractory phases. Carbonate distribution and grain size composition profiles, yielded evidence of a progressive decrease of the marine influence over the time in the bay. This assumption is supported by concentrations of Ni, Mn and Fe which underline a drastic change in the nature and the amounts of terrigenous inputs. The distribution of nickel normalised by manganese, both in the refractory geochemical phase, versus depth confirms the alteration in sedimentary signatures during the last 100 years.

Despite the evidence of a significant bioturbation layer extending down to a maximum of 10 cm in depth, two average accumulation rates have been estimated : $0.2 \text{ g.cm}^{-2}.\text{yr}^{-1}$ from 1945 to the present day and $0.1 \text{ g.cm}^{-2}.\text{yr}^{-1}$ before 1945. These modifications demonstrate that the Sainte Marie Bay has been impacted on since the beginning of open-cast mining and deforestation activities in the Southern New Caledonia (La Coulée and Les Pirogues catchment basins).