

Establishing a subsurface hydrostratigraphy using Miocene foraminifera biostratigraphy in the Eastern Amazonian coast, Brazil.

Laura E. Garzón Rojas¹; Joelson Lima Soares¹; Anna A. Evangelista Nogueira¹; Manoel Imbiriba Júnior²; Clara Sena³; Ana Maria Góes⁴; José Bandeira¹; Afonso C. Rodrigues Nogueira¹; Werner Truckenbrodt

¹Universidade Federal do Pará, Brazil.

²Geological Survey of Brazil, Brazil. SGB-CPRM.

³University of Oslo, Norway.

⁴Universidade de São Paulo, Brazil.

Corresponding Authors: lauraestefaniagarzon28@gmail.com, joelsonls@gmail.com, bioanna@gmail.com, manoel.imbiriba@cprm.gov.br, clara.sena@geo.uio.no, amgoes@usp.br, jbandeira@ufpa.br, anogueira@ufpa.br; werner.trucken@gmail.com

Foraminifera biostratigraphy has been applied successfully as a geologic tool for establishing the subsurface hydrostratigraphy of the Eastern Amazonia coast. The subsurface Miocene deposits in the Eastern Marajó Graben, previously considered the Pirabas carbonate deposits, were redefined as the Marajó Formation. This unit comprises 250m-thick sedimentary rocks consisting of marine sediments being the main aquifer of this region, and also sandstone and shales deposited in a fluvial and coastal plain environment influenced by the siliciclastic inflow from the Amazon River drainage system. In the late Miocene, changes in the patterns of aquatic and ocean currents occurred, where the Amazonian coast of the northern Brazil show a strong influence of this river. Sixty-four subsurface samples from the easternmost Marajó Graben were provided by the RIMAS-BELÉM project are stored in the CPRM lithoteca along with aliquots of tubular from the of Inhagapi and Vigia locations. These samples were split in the Sample Preparation Laboratory at CPRM, and taken to the UFPA Sedimentology Laboratory, where they are being processed and treated with the usual methods for calcareous microfossils. The macroforaminifera record of the Peneroplidae family, *Amphisteginas*, and the species-index *Orbulina suturalis* (Aquitano) associated with *Globoquadrina quadraria var. advena* indicate lower Miocene strata. These microfossils indicate deposition in the coastal marine environment, close to coral reefs. The presence of *Quinqueloculina*, *Elphidium* e *Globigerina* confirms estuaries and inner shelf settings. The occurrence of species *Amphistegina lessonii* (d'Orbigny) indicates clean water from environments rich in calcareous algae with a tendency to hypersaline waters. The hyaline microforaminifera corroborates these paleoenvironmental changes. The foraminifera assemblage confirms the worldwide Oligocene-Miocene sea-level rise influencing the deposits of the Marajó Formation. The recognition of the well-sorted marine sediments with rounded grains is important as they serve as preferential pathways for groundwater movement. The foraminifer biostratigraphy has been critical in determining the age and the facies changes characterizing the aquifers and confining units in the Eastern Amazon coast.

Key-words: Foraminifera, Ecology, sedimentary rocks, Salt-water/fresh-water relations, Carbonate rocks, Marajó Formation.