

Hydrostratigraphic redefinition of the subsurface from Eastern Amazonian coast, Brazil: The Marajó Aquifer.

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The groundwater from coastal aquifers in the Eastern Amazonia coast has been documented under intense stress by anthropogenic and natural impacts ranging from saltwater intrusion, contaminated effluents by mining industries and agriculture, and the pollution due to the proximity of big cities and secondarily by oil spillage from small boats. Here we characterized the hydrostratigraphy from the coastal aquifers of this region provide information for future research to verifying the resilience of groundwater to both natural and anthropogenic impacts. Based on outcrops and borehole logs, lithological profiles were used to generate cross-sections along Eastern Marajó Graben (EMG) and Bragantina Platform (BP). The groundwater information system (SIAGAS) of the Geological Survey of Brazil (SGB), with headquarters in the Metropolitan Region of Belém, the main city of Eastern Amazonia, involving five districts, contains 2348 registered wells in its database. Samples from five wells of the Groundwater Monitoring Network (RIMAS) of the SGB are being analyzed for palynological and micropaleontological (foraminifera and ostracodes) analysis and provenance studies of heavy minerals, Sm-Nd, and detrital zircon geochronology. The tectonic subdivision of this region in the EMG and BP was not considered in the previous aquiferous system definition, including the Oligocene-Miocene carbonate-siliciclastic rocks, the Pirabas Formation, sandwiched by Cretaceous rocks and the middle Miocene Barreiras Formation.

The new proposal indicates that the 120 m-thick Pirabas Formation, generally observed below 50m deep in the wells, is restricted to the BP. Their siliciclastic correlate deposits in the EMG are the Miocene Marajó Formation. The 70 m-thick subsurface succession in EMG, previously considered Barreiras deposits, is also reinterpreted here as the Marajó Formation, which comprises mudrock and fine- to coarse-grained sandstone. The 20 m-thick Barreiras Formation is exposed in the EMG and BP. It does not belong to the Eastern Amazonia coast's aquiferous system, which is now wholly inserted in the Marajó Formation. The upper part of the Marajó Formation has 30 m-thick of estuarine mudrock beds, sealing the underlain 200 m-thick fine marine deposits with microfossils representing the main interval for the potable water. The hydrostratigraphy proposed here allows us to draw new strategies to manage groundwater exploration on the Eastern Amazonian coast and mitigate actions to protect this aquifer's groundwater resources.

KEYWORDS: Hydrostratigraphy; Marajó Aquifer; Oligocene-Miocene deposits.