

## PETROLEUM SYSTEMS OF DEEP-WATER MUNDAÚ SUB-BASIN, CEARÁ BASIN, NEW EXPLORATION FRONTIER

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**RESUMO:** Transform margins were not a significant target for oil industry until the discovery of the Jubilee field offshore Ghana in 2007. Likewise, discoveries have been realized in Equatorial Brazilian margin as the Pecém well in Ceará basin in 2012 and Pitu well in Potiguar basin in 2013. Thus, these findings have attracted the attention of the oil industry to the Brazilian Equatorial margin. The main objective of this work is characterize the petroleum system of the deep-water Mundaú sub-basin, including the understanding of the source rocks, reservoirs, seal rocks and entrapment. We used 2D post-stack seismic and data of Pecém well (1\_BRSA\_1080) comprising standard log suites (i.e. gamma ray, sonic, density and resistivity), checkshots, lithologic data and formation tops. We also used geochemical data including Total Organic Carbon (TOC) and Rock-Eval pyrolysis. All the dataset was granted by ANP. The tectono-sedimentary evolution of deep-water Mundaú sub-basin consists of three major megasequences: syn-rift (Mundaú Formation), transitional (Paracuru Formation) and post-rift (Ubarana Formation). TOC% values for source rocks in the Mundaú Fm. are between 0.46% and 1.97%, indicating poor to good generation potential. The values of Paracuru Fm. are between 1.16% and 3.56%, indicating good to excellent generation potential while the source rocks in the Ubarana Fm. are 3.63% and 4.19% indicating an excellent generation potential. The results indicated Type II kerogen dominantly. The Tmax ranges from 424 to 449°C which places Mundaú and Paracuru Formations within the oil window. The samples of these formations are thermally (early) mature. However, the samples of Ubarana Fm. are considered thermally immature. A plot of S1 versus TOC classified the samples of Mundaú and Paracuru Formations as autochthonous hydrocarbons, indicating that the oil produced has not migrated from far source rocks. This means that hydrocarbons were accumulated very close to where they were produced. The reservoirs consist of thin intercalations of sandstones between shales, siltstones and marls. Oil was found in fluid samples and using gas detectors in several intervals mainly near the top of Paracuru Formation. The seal rocks are composed of transgressive shales of Ubarana Formation while the hydrocarbon trap is mixed (structural-stratigraphic), related to an unconformity and a normal fault. Until now, with the available data, we can conclude that Paracuru Fm. is the main source and reservoir unit of deep-water Mundaú sub-basin. However, we can not rule out the possibilities of: 1. Source rocks and reservoirs at Mundaú Fm. related to the onset of rifting in Equatorial Brazil and 2. Reservoirs at Ubarana Fm. related to the migration by faults from syn-rift and transitional source rocks to post-rift reservoirs.

**PALAVRAS-CHAVE:** SOURCE ROCKS, OIL RESERVOIR, MIXED TRAP.