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STRUCTURAL AND THERMAL IMPACTS ON THE EVOLUTION OF CABO FRIO HIGH PETROLEUM SYSTEM PROCESSES

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The Cabo Frio High (CFH) is a structural feature between the Santos and Campos basins. The uplift was promoted by arching and great magmatic activity including intrusive and extrusive rocks in many stratigraphic levels (Mohriak et al., 2021; Brandão et al., 2024). Recent discovery of oil in carbonates of the Barra Velha Formation in the Cabo Frio Central High block brought a new paradigm for petroleum exploration in the pre-salt of that area. To keep the exploratory success, it is necessary to update the knowledge about the petroleum system Itapema-Barra Velha (!) with refinements on the understanding of structural and thermal history. The main objective of this study is the structural configuration and magmatism influencing on the petroleum quality in the area. Seismic interpretation of the horizons of within the rift and drift sequences, and the recognition of magmatism features performed in this study were used to demonstrate its influence on the petroleum system. Upper Cretaceous and Lower Cenozoic magmatism play an important role in the maturation, migration, and trap formation of petroleum system in the CFH and surrounding areas. Large igneous bodies in the pre salt source rock overcharge thermal contribution in the source rock influenced the organic matter maturation. Magmatic intrusive and extrusive events induced igneous-tectonic uplift with associated earthquakes, generating turbidites to form reservoir and traps. Intense magmatic and structural activity in the CFH area generated great number of faults, the natural migration avenues for hydrocarbons and other fluids. Equally, faults can open windows in the evaporate section through halokinesis. With breached seal, hydrocarbons can reach shallower (post-salt) reservoirs subject more intense water influx and lower reservoir temperatures, consequently more subject to biodegradation.