3D STRUCTURAL MODEL FOR AN OIL-PRODUCING REGION, CEARÁ BASIN, BRAZILIAN EQUATORIAL MARGIN

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RESUMO: Faults can act either as conduits or barriers for hydrocarbon migration, because they have anisotropic flow properties that relate to their complex three-dimensional structures. The Mundaú sub-basin, Ceará basin, is an oil and gas producer with four fields in its shallow waters (Xaréu, Atum, Espada e Curimã). Exploration started in 1970's and has continued to the present day. Tectono-sedimentary units consist of the Mundaú Formation (syn-rift); the Paracuru Formation (transitional) and the Ubarana, Tibau and Guamaré Formations (post-rift). Three types of plays are known in the basin: turbiditic, combined (structural-stratigraphic) and structural. The structural plays may be classified as rotational, transpressive, transtensive or footwall-related. In parallel, we know that Curimã and Atum oil fields comprise examples of combined traps, relating to the erosional truncation of tilted blocks limited by normal faults. Despite that, the geometry and distribution of these faults are unknown. This work aims at recognizing the 3D geometry and spatial distribution of faults in an area that includes the Curimã and Espada fields, answering key questions: What are the typical faults geometries in the Curimã and Espada fields? How are the faults distributed in the subsurface? In what way(s) these faults influence hydrocarbon accumulations? For such purpose, we used 3D seismic and well data. The seismic volume consists of 172 inlines spaced 75 m, and 663 crosslines, spaced 25 m. The inline length is ~16,6 km and the crosslines are ~12,8 km, comprising a total area of ~212 km². The depth reaches 5.000 ms twt and each seismic trace has 1.251 samples, with 4 ms interval sample. The well data comprise standard log suites (i.e. gamma ray, sonic, density and resistivity), check-shots, lithological data and formation tops. All the dataset used in this work was supplied by ANP Brazil. In the study area, there are extensional basinward-dipping faults that formed multiple half-grabens. The basement is NNW-dipping. In the ENE region of the area where the basement is higher, i.e. close to the 1_CES_115 well, the Paracuru Formation was eroded and this well was dry. The 4_CES_0128 well reached a dome structure near the Paracuru top, in between two important normal faults. In contrast with 1_CES_115, this well found oil in Ubarana and Pararuru Formations. Others wells, such as 4_CES_0024 and 3_CES_0037D, were drilled reaching the top of structural/combined traps on the footwall of different faults to find oil. Therefore, we mapped the faults and different structural petroleum plays and understood the importance of a multi-faceted structural component to the entrapment of hydrocarbons in the Ceará Basin.

PALAVRAS-CHAVE: 3D SEISMIC, FAULTS, OIL.