



Tectonic and Stratigraphic Evolution of the Pre-Sal Interval in Campos Basin in the distal central-south area

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Abstract

Nowadays, pre-salt deposits play a significant role in world oil and gas exploration, most of which are related to carbonate reservoir deposits, that are present in a series of basins on the east Brazilian margin, such as the Campos Basin. The southernmost part of the Campos Basin has a very intricate geological setting, with intense magmatism, transfer zones, and silicified reservoir rocks. In this context, seismic stratigraphy and structural interpretation, and the integration of them, in this area, have importance for the understanding of basin evolution, as well as the pre-salt interval evolution. In this study, a high-density-high-resolution multiazimuth 3D seismic dataset comprising of about 1500 km² and 8 wells were used to map the pre-salt interval and timing of the formation of faults. Seismic attributes were used to improve stratigraphic and structural interpretation. Five key horizons were interpreted: Acoustic Basement, Rift Top erosional unconformity, Transitional Top, Sag Sequence Top (Base of Salt), and Top of Salt. Those horizons bound four different main units: Rift sequence with a major influence of basement faults; Transitional sequence, with a minor influence of structural basement faults; Sag sequence with almost no contribution of basement faults except post-depositional deformation; and the salt interval. The seismic interpretation shows that in the distal central-south area, the basement shows an overall deepening from northwest to southeast, and two distinctive features are recognized: Firstly, in the southwest part there is the deepest area reaching 11 km with a minor deformation and preservation of rift sequence with 3 km thick; Secondly, in the central area, in an NW-SE direction there is a central high, marked by a strong reflection top and internal reflection-free to chaotic seismic facies that is correlated with volcanic rocks (Cabiúnas Formation) in wells. This feature has an extreme impact in the area once thickness maps depict all sequences thinning in its direction, suggesting a post-depositional deformation, including evidence of deformation in the salt base. Transitional sequence isopach map suggest that the thickness increase in the detachment faults area. In the structural high, on the Transitional and Sag Sequences occurs a series of mound-shaped seismic facies recognized as Macabu Formation carbonate mounds when it's correlated with wells.