Unlocking ACT-ual post-salt source rock potential in Santos Basin, Brazil

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Abstract

The Santos basin, offshore Brazil is known for its vast volumes in terms of pre-salt play potential and proven reserves. In recent years, oil and gas operators are showing increased interest within this region and continue to explore new opportunities beyond current exploration focus. Moreover, there are also still opportunities within the post-salt plays within the deep water area. Conventional understanding within the Campos and Santos basins believes that even the post-salt plays are sharing the same pre-salt source rock. However, due to complex migration path and narrow window of hydrocarbon maturation, pre-salt source is deemed to be high risk for the post salt play in some parts of outboard Santos. There is also high uncertainty in the outboard pre-salt source rock presence to support the post-salt charging. This study will address the potential of the Albian-Cenomanian-Turonian (ACT) source interval that could be a game changer in the outboard region. The ACT is a proven common source rock interval in the South Atlantic in general and is expected to also be present in Santos basin. In fact, geochemistry analysis on the fluid data in certain inboard wells have shown to be sourced from the ACT interval. Existing inboard fields and wells that tested this play have been crucial in establishing geological understanding and correlation. Thick intervals of slope to deep marine shales deposited within the ACT section have been consistently observed across several inboard wells. Based on paleogeographic and depositional understanding supported by seismic data, the deepwater environment during the ACT interval is believed to extend into the outboard Santos towards the salt basin boundary and beyond. Source rock efficiency is evaluated by delineating lithological facies and identifying pods of potentially richer quality source rock as observed in seismic and sequence stratigraphy studies. Detailed well correlation and seismic interpretation will be further discussed in this paper. Furthermore, there is good overburden and good crustal definition within this region that suggests sufficient maturity of the ACT source interval. The crustal configuration affecting radiogenic and crustal stretching heat flow is explored in this study to determine the maturity of the source rock. Various models are generated to cater for the heat flow and source rock property uncertainties. Based on preliminary results, positive indication for the ACT interval to be an effective source rock can be seen from the generated models. Further model refinement can be integrated with further exploration activities within this region. This study unlocks the potential of the ACT source interval, a proven source rock of the South Atlantic, for future growth in the deeper frontier areas of Santos basin.