

Santos Campos Basin Future Exploration Within and Beyond the Salt Province

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ABSTRACT

Exploration efforts in Campos Basin began in 1968. This basin now produces over 1.7 MMBOEPD, with a significant contribution from the pre-salt play, baptized by Statoil as the “Perfect Play System”, with lacustrine enhanced reservoir quality microbial carbonates growing on basement highs, locally sourced from underlying lacustrine shales and sealed by thick evaporites, allowing large accumulations which can be filled down to base salt spill. Other proven play types include post-rift Macae carbonate play and Cretaceous to Tertiary turbidite clastic plays draped over salt induced extensional structures and sourced by the same syn-rift lacustrine shales, as mature hydrocarbons migrate up to the post-rift sequence through salt withdrawal windows. In order to evaluate proven play types, well data has been integrated with modern long offset PSDM seismic data. Post-salt wells have targeted carbonates, sandstones and calcarenites and have been mostly dry, found uncommercial hydrocarbon accumulations or had oil accumulations with challenging compartmentalization and low pressure conditions. Integrating these well results with seismic data, reveals significant pre-salt structures, usually directly below the well. Conversely, most pre-salt wells are associated with very significant discoveries. By reviewing their seismic characteristics it has been possible to carry out a detailed analysis and to identify on trend analogues aligned in a series of SW-NE trending ridges of similar and larger size to the discoveries. A unique regional dataset available over Campos Basin has allowed interpretation of crustal architecture for improved understanding of heat flow and geothermal gradient for maturity modelling. It has revealed a huge potential play type beyond the salt dome province, in large structures containing high amplitude anomalies and seismic character indicative of basin floor fans overlying mature Aptian source rock. The presence of Aptian source rock is inferred from the conjugate Gabon margin, where basin modelling indicates that under similar conditions of burial depth, the Aptian source rock will be mature for oil. High quality seismic data is essential for both detailed and regional evaluation of proven pre-salt and post-salt plays. Identification of large additional pre-salt and post-salt potential and possible huge basin floor fans over mature Aptian source rock beyond the salt dome province, sets a favourable scene for future successful exploration.