

Applying Sequence Stratigraphic Concepts to Seismic Analysis to Gain Basin-Scale Insight: Evaluating Late Cretaceous Reservoir Potential on the West African Margin from Gabon to Angola

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ABSTRACT

The potential of Late Cretaceous clastics has been overlooked south of the transform margin in favor of pre-salt and Cenozoic plays, but these clastics merit evaluation in this area as a largely untested, deepwater post-salt play. The organization of deep-marine depositional systems and the distribution of high-quality siliciclastic reservoirs are controlled by the interplay of factors, such as hinterland uplift, paleoclimate, outcrop geology, drainage, and structure. Offshore Angola, Congo, and Gabon, the major depositional control on post-salt siliciclastic distribution is the age and location of major drainage systems, including the Ogooué, Congo, and Kwanza Rivers. Regional tectonostratigraphic and sequence stratigraphic evaluation can provide a preliminary indication of reservoir presence and facilitate the spatial and temporal prediction of coarse clastic input, providing the ability to predict likely lithofacies down systems tract using data from the shallow, more mature areas of the basin. This can be used as a tool to evaluate the Late Cretaceous clastic play potential offshore Gabon, Congo, and Angola. Reservoir prediction can be further enhanced by imposing the established methodologies of seismic architecture evaluation within a sequence stratigraphic framework. Working collaboratively, the stratigraphic interpretation of Late Cretaceous depositional systems has been augmented through seismic integration. Interpreted paleogeographic and paleogeomorphological features, including channels and canyons from seismic facies analysis, provide insight into whether the depositional system is likely to be sand prone. Integrating a regional geological model with these seismic observations supports the potential for deeper Late Cretaceous coarse clastic plays in the Congo and Kwanza deepwater basins and offshore northern and southern Gabon. At a sub-basin level, Early Cretaceous salt and its later diapirism are a secondary control on the distribution of sediment and the presence of likely play types and can also be constrained by high-quality seismic integration. This case study highlights how integrating seismic analysis with a sequence stratigraphic and regional geological framework can reduce uncertainty when predicting untested deepwater plays.