

Prospect Investigation and De-Risking Using Cognitive Interpretation Workflows, Offshore Equatorial Guinea

Tom Wooltorton¹, Ryan M. Williams¹, Merritt Smith², Stephen Leslie², and Luis Gomez¹

¹GeoTeric, Houston, TX, United States.

²PanAtlantic Exploration, Houston, TX, United States.

ABSTRACT

The West African Atlantic margin is a prolific oil province, and a number of major discoveries have been made offshore Equatorial Guinea. A 3D seismic dataset was shot covering the Block W lease area, and was used to explore for prospects across a variety of geological ages. Cognitive Interpretation techniques were applied to accelerate and enhance this process, resulting in greater interpretation confidence and de-risking of the identified leads. These methods include data driven but interpreter guided approaches for revealing geology from seismic data. The prospective geology contained in the seismic coverage area consists of late Cretaceous marine sands and shales, deposited in shelf to margin and basin floor transitional settings. Observed and modeled hydrocarbon AVO is Class II and IIP (with phase change). The environments of deposition were revealed using frequency decomposition and RGB (Red, Green, Blue) blending, and this enabled sedimentary fairways and channel complex architecture to be accurately delineated in greater detail than was possible using seismic amplitudes alone. Features not previously seen were also shown. Displaying these results using stratigraphic iso-proportional slices allowed the sedimentary systems to be described fully across the entire survey. The most significant risk element for the identified leads was trapping, and fault detection workflows were applied to investigate subtle, low relief faults that may provide a trapping mechanism. Inflections in structural dip were identified which may indicate the presence of strike-slip faults providing these traps. Other faults were revealed by the presence of low amplitude, chaotic gas filled signatures, which were imaged and shown to provide updip closure to another lead. These pathways also provide further evidence and reduced risk for hydrocarbon charge in the area. A variety of volume combination methods were used to blend the Cognitive Interpretation volumetric products with AVO analyses, integrating the seismic attributes with rock physics to further improve the interpretations and cumulatively reduce risk. The Cognitive Interpretation workflows revealed new information within the seismic data and enhanced existing interpretations, reducing exploration risk for the identified leads. The results were generated rapidly within the scope of a ten day project, and allowed the de-risked stratigraphic prospects to be easily communicated and understood.