Cameroon: Douala Kribi-Campo Basin – Seize the opportunity!

Offshore Cameroon is a proven petroleum province with commercial production from the Douala Kribi-Campo Basin (DKC) and the prolific Rio del Rey Basin (RDR). The recent joint cooperation agreement between Cameroon and Equatorial Guinea will lead to the development of the Yoyo and Yolanda discoveries and open up the underexplored deep-water DKC Basin. CGG, together with Société Nationale des Hydrocarbures (SNH), has completed a basin-wide PSDM reprocessing project, which, coupled with favourable government terms, provides the opportunity to accelerate exploration in Cameroon.

An arbitrary section line from the DKC basin showing the main stratigraphic intervals and a number of features of interest for hydrocarbon exploration.

The well on the section penetrated Upper Cretaceous good-quality reservoir sands as can be seen in the gamma ray (GR) log.

A close-up of a canyon - a seismic pseudo-relief cross section overlaid by velocities. Velocity variations follow geological features, and the velocity model is able to account for higher velocities within the fill.

Location map showing CGG’s 3D seismic coverage in the DKC basin, well locations and hydrocarbon fields in the DKC and RDR basins.
A proven petroleum and strong government support are two of the key drivers for hydrocarbon exploration. Now, newly reprocessed PSDM seismic data using CGG’s latest technology provides the third vital driver for near-term high-impact exploration.

CGG, working in association with SNH, previously evaluated the basin by mapping seismic trends, examining regional structure and stratigraphy. A strong stratigraphic trap underlines many prospects where reservoirs have a strong stratigraphic trap.

The limitations of the legacy seismic data were addressed by an equally complicated overburden and a number of reservoirs situated below a complicated overburden. Even as small as these can have a large impact on these prospects due to the salinity of the traps. In addition, the legacy seismic data is not optimized for examining the new details of fault systems nor for delineating the architecture of the target reservoirs. Therefore, better seismic imaging was required.

Using advanced technologies for better imaging

Recognizing the need for depth-processable data to enable a wider analysis of the geological prospectivity, CGG reprocessed a multi-shot 3D PSDM dataset volume of approximately 6,800 square km from the basin using high-end proprietary imaging technologies subsequently reprocessed and overlaid on the model. Figure 1 demonstrates the clear improvements in reflector continuity and noise elimination.

Ghost Wavefield Elimination helped achieve higher quality data terms of both frequency bandwidth and signal-to-noise ratio, enhancing the geological details, particularly in deeper sediments where low frequencies have been muted. Full Waveform Inversion (FWI) was applied to improve the imaging of deeper structural closures. These are common challenges for delineating the architecture of the regional source rock and reservoir, and legacy seismic data. With new PSDM reprocessing over a multi-client 3D seismic volume by CGG, now the tools to accurately interpret the challenge were at hand.

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