The African Transform Margin is now well established as a petroleum province, with a well-defined syn- and post-rift play that has had much success over the past decade. In order to further exploration along this margin, Petroleum Geo-Services reprocessed a 1,600 km² 3D seismic dataset over an area of open acreage offshore Ivory Coast. The reprocessing project has revealed a much more extensive syn-rift system, and added clarity to post-rift channel systems migrating throughout the area.

Ivory Coast Exploration in the Transform Margin

Strike section of Pre-Stack Time Migration (PSTM) reprocessed data from Blocks CI-104, CI-515, CI-115 and CI-116.
Reducing Exploration Risk
Offshore Ivory Coast:

the interpretation project.
also reprocessing the existing library. Part of this hydrocarbon system in the previously underexplored afield, extrapolating known play trends whilst hunting traps (Lion, Espoir, Acajou, Baobab and Kossipo fields).

edge stratigraphic traps (Foxtrot, Panthere and Marlin focused on the central and eastern basins where

Cretaceous. The margin, which has approximately 2,200 km of coastline, extends from Liberia to the west to the Niágue River in the east.

Exploration in Ivory Coast has historically been focused on the central and eastern basins where numerous hydrocarbon discoveries have been made, including a trend of gas discoveries in Upper Cretaceous stratigraphic traps (Foxtrot, Panthere and Marlin fields) and out of correlation with Cretaceous structural expression (Lion, Espoir, Ajanbou and Kossipo fields).

By analysing the amplitude extractions of the broadband reprocessed seismic data, PGS have been able to acquire new data in both the deepwater and shallow shelf environments which has carefully been designed for maximum protection, allowing attendees to buy, sell and trade prospects from around the globe. All this takes place in a relaxed environment which has much in common with other APPEX competitors.

The Future for Exploration

In 1995 PGS acquired a 1,600 km 3D survey offshore central Ivory Coast that has been reprocessed using a broadband workflow. In Ivory Coast the reprocessed data over blocks CI-104, 515, 115 and 116 give greater insight into the deeper syn-transform sections and reservoir characteristics of both the pre-rift channel systems and the numerous syn-rift structures. This analysis has highlighted a number of interesting leads within the area, many with similar characteristics to those offshore.”

As a result of this seismic improvement post-acquisition, Eni has been able to define a number of syn-rift traps, both charged by hydrocarbons from syn-rift lacustrine or shallow marine reservoirs, and early post-transform structural plays, both charged by hydrocarbons from syn-transform carbonate reservoirs.

PGS have a comprehensive, modern-day multi-client offering focused on the post-rift and syn-rift sections. This insight has opened up the potential for new play concepts and the development of an extended marine play system within the early syn-rift. The data is available to potential new clients and syn-rift reservoirs and shallow marine reservoirs.

Petroleum Geo-Services

15, 104, 155, 110 and 116.
– three of which are currently open acreage. By applying a modern broadband time processing workflow (and thus broadening the seismic frequency post-acquisition and trying to remove the source and receiver ghost), PGS have been able to image the deeper syn-rift and early syn-rift sections with much greater fidelity. In addition, PGS has two GeoStreamer® 3D datasets, in the west to CI-133 and 973 (already open acreage), and the CI-139 to CI-144.

Stratigraphy

Offshore Ivory Coast

Interpretation work carried out by PGS in the regions has identified three distinct seismic stratigraphic events. Each plays an important role in the petroleum system story:

1. Pre-rift event: this event is characterized by a rapid uplift that formed a front and a graben-type topography.

2. The pre-rift phase, characterized by strike-slip movement that resulted in the inversion of many of the syn-rift structures.

3. The post-rift phase, characterized by sediment fill in the syn-rift topography.

The pre-rift phase was not preserved by drilling in the central Ivory Coast Basin, although seismic expression of rocks of Precambrian to Triassic age do exist in the Volta and Tano Basins. Pre-Cambrian and Triassic rocks have also been identified in the Ivory Coast Basin, which comprise conglomerates and shales deposited in a continental setting.

During the pre-rift stage (Carboniferous to Middle Jurassic), approximately 1,000 km of sediments were deposited in a continental and marginal marine setting in the Ivory Coast Basin (Chierici, 1996), allowing the accumulation of Middle Jurassic to Cretaceous source rocks.

The end of transform movement and inversion was succeeded by thermal subsidence in the post-rift transform stage (Cretaceous). This phase almost entirely comprises clastic marine interbeds of varying thickness of sandstones, silt- and sand-rich carbonates. Potential reservoir rocks include: pisolitic and calcilutite systems and basic flows, which whilst the upper Triassic-Beddou shales deposited within geographical lows provide potential source rocks.

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