

## THE OFFSHORE HYDROCARBON POTENTIAL OF THE REPUBLIC OF GUINEA-BISSAU: PART 2 - THE PETROLEUM SYSTEMS OF THE CASAMANCE SALT BASIN

Temperature/Pressure History

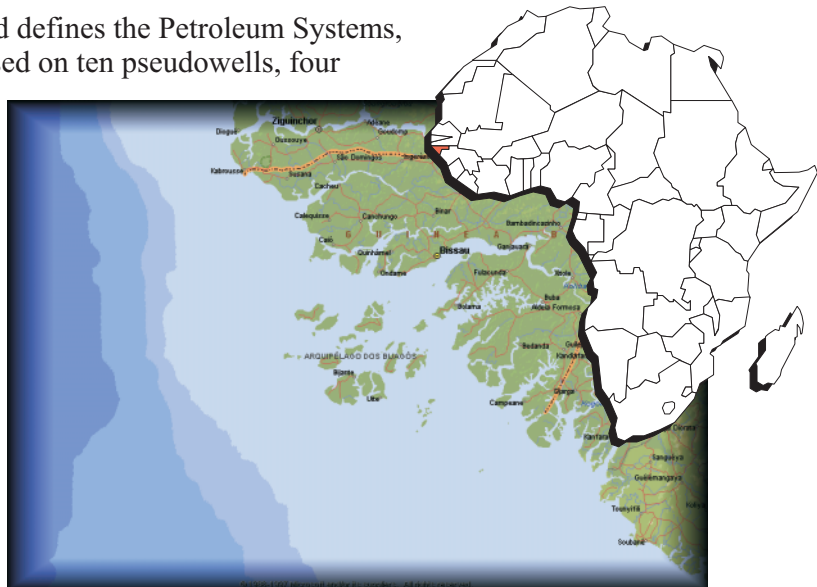
Hydrocarbon Volumes

Basin Modeling

Thermal Maturation

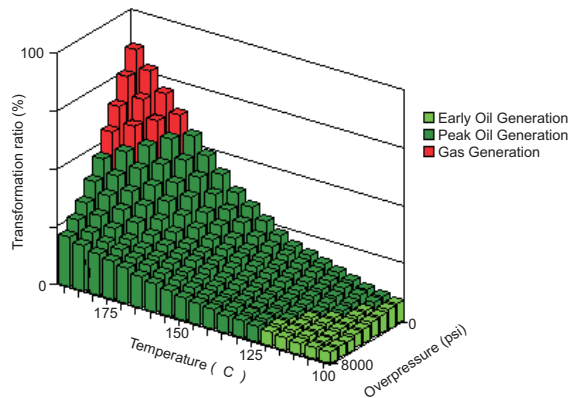
This study is a comprehensive evaluation of the Petroleum Systems of the Casamance Salt Basin of Guinea-Bissau. Part I (“The Casamance Salt Basin. Examination and Correlation of Key Offshore and Nearshore Wells with DSDP corehole 367”) introduces the geologic framework. Regional cross-sections were constructed utilizing key wells that either encountered hydrocarbons or provided significant reservoir and source-rock information. Lithology sections with geochemical data were prepared for the following wells and coreholes: PGO-1, DRO-1, PGO-3, PGO-4, PGO-5, BAO-1, DRO-1, SHO-1, CO-1, CM-10 and DSDP site 367. Source rock quality and maturity are detailed and a pseudowell is included: it found that the deeper portions of the basin are optimally mature. All the ingredients required for success are, therefore, present.

Part II details the maturation history and defines the Petroleum Systems, three of which are in operation. It is based on ten pseudowells, four geoseismic dip profiles and the modelling of the CM-10, GBO-1, DRO-1, PGO-3 and BAO-1 wells. FEC and Veritas provided the depth conversions required to construct the geoseismic lines. Oil generation figures are provided and the plays and risks are evaluated. Dome Flore (600-1000 MMBO heavy oil plus light oil) and Dome Gea are included, as proof that a world class Petroleum System exists. The existence of a substantially shallower than previously recognized peak oil window has been confirmed and the origin of the oil charge at Domes Flore and Gea is now understood.



Principal investigators are Nick Cameron and Dr. Andy Carr (Global Exploration Services Ltd.) and John Dombrowski (FEC). Extensive use was made of the more than 3,000 kilometers of seismic reprocessed under joint venture between Veritas and FEC. Reprocessed seismic data are available for an additional License Fee or as part of the Block Data Packages. The authors also made use of satellite defined oil slick plots, by NRSC, finding that a spatial association exists between some slicks and salt features. One of these slicks plots out above the leading edge of a pronounced salt overhang. There have been no sub-salt tests in Guinea-Bissau. The satellite oil slick imagery is available to interested parties for an additional License Fee, as is the salt geometry study prepared by Tom Nelson.

Nearly every well drilled had live oil shows and frequently encountered quality reservoirs and source rocks. Most importantly, the Dome Flore and Dome Gea giant heavy oil accumulations (the original oil charge was around 2000 BBO) are immediately north of the study area. Well failure analyses indicate that the main reason for the lack of success was the absence of effective closure. The newly reprocessed seismic, including depth migrated sections, provides a much clearer picture of the salt tectonics, the migration pathways and the presence or absence of top and side seals. New understanding of the tight Albian sand development in the PGO-3 and SHO-1 region is already in place, as are new play options outside the salt basin. Eight play types exist, most of them untested.



## Basin modeling

Overpressure developed in the salt basin during the Cretaceous and still exists at depth. It is also believed that overpressure exists in the deepwater. Overpressuring retards maturation, as shown on the illustration below, and the PresRo® program developed by Dr. Andy Carr has been used, in conjunction with standard time-temperature modeling, to determine the actual position of the oil window. Evidence of vitrinite suppression has been found allowing the previously too low well maturity records to be raised to exactly match the predictions of the Mackenzie heatflow model for the salt basin.



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Reference wells (CM-10, GBO-1, DRO-1, PGO-3 and BAO-1)

Reference geoseismic lines

- Well tops and shows
- Pseudowells tops
- Key horizons
- Structural styles
- Trap possibilities

## Basin modeling

- 10 BasinMod® pseudowells using PresRo® models of drilled wells (CM-10, GBO-1, DRO-1, PGO-3 and BAO-1) to remove the effects of suppressed maturity, and of 10 pseudowells to remove the effects of overpressure retardation.
- Maturation plots and maps

## Integration

- Definition of the Petroleum Systems using an Event Chart
- Play types, opportunities and risks within the salt basin

## References

## Deliverables

Written report containing objectives, methodology, results and recommendations.

PresRo® plots for the modeled wells and pseudowells.

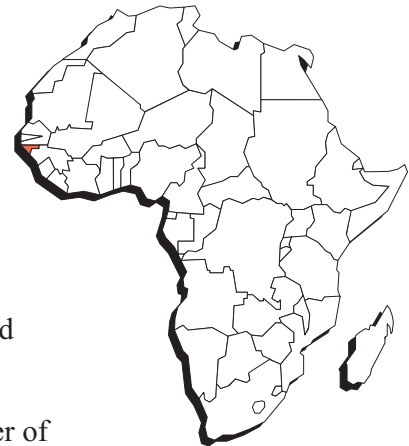
Profiles based on both pseudowells from key seismic and available well data

## Study Pricing

\$30,000.00 plus actual report reproduction and delivery costs.

Seismic lines used to generate geoseismic profiles and pseudowells are available for an additional cost of \$50.00/km. Well log data in LAS format is available for select wells and can be licensed separately.

Special early participation pricing is now available to a limited number of companies. Companies that License the report in conjunction with the report titled "The Casamance Salt Basin. Examination and Correlation of Key Offshore and Nearshore Wells with DSDP corehole 367" will also receive special pricing. The study will be ready for delivery early in the first quarter of 2001.



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