

The West African Margin

Angola – Congo - Gabon – Namibia



Defining the timing and magnitude of paleo-thermal events controlling the maturation history and distribution of reservoir sands

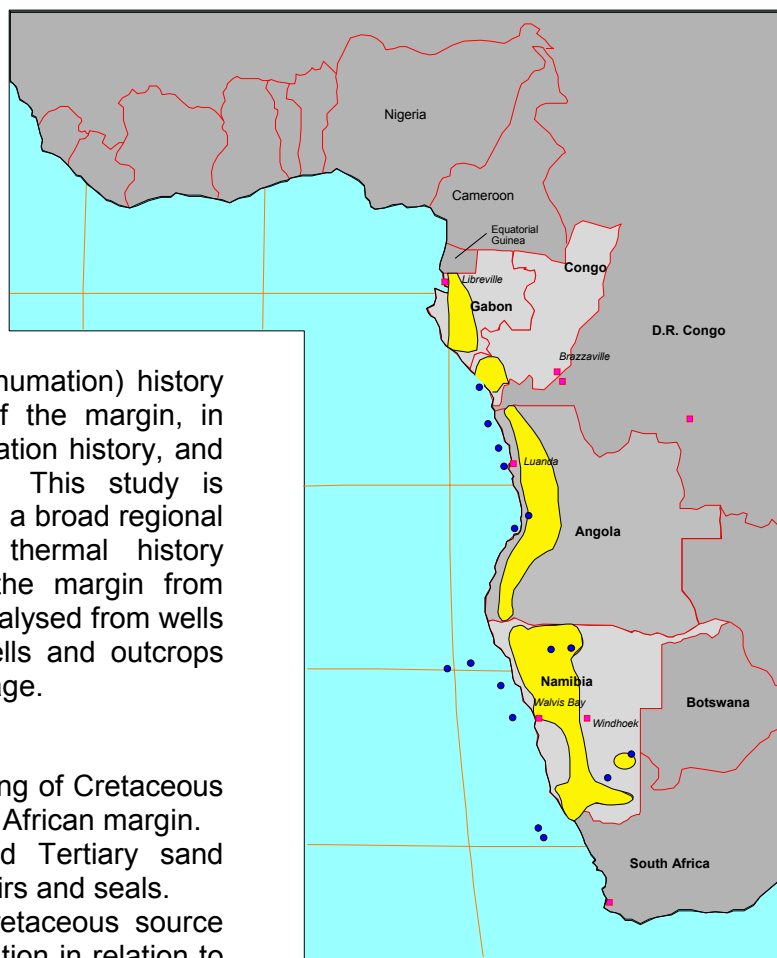
Aims and objectives

Despite significant exploration success in the last five years along the West African margin, the margin remains under-explored and basic questions about the petroleum systems remain unanswered.

Key questions relate to the unroofing (exhumation) history and the corresponding thermal history of the margin, in relation to its effect on hydrocarbon maturation history, and sources and distribution of reservoirs. This study is designed to answer those key questions on a broad regional basis by providing a comprehensive thermal history framework and exhumation history for the margin from Gabon to Namibia. Samples have been analysed from wells in the offshore region, and from both wells and outcrops onshore, in order to provide regional coverage.

Specific objectives include:

- determination of the magnitude and timing of Cretaceous and Tertiary exhumation along the West African margin.
- use of this information to understand Tertiary sand distribution, including deepwater reservoirs and seals.
- assessment of maturation levels in Cretaceous source rocks and timing of hydrocarbon generation in relation to structural development.



INVESTIGATORS

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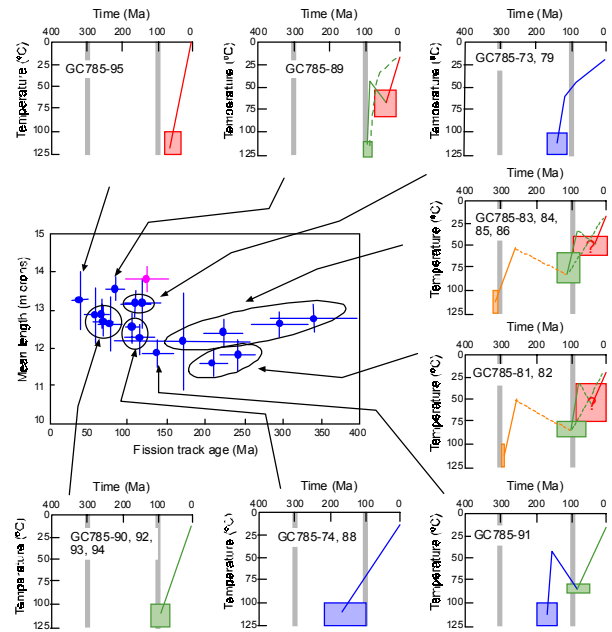
Technical background

Key to the project is the use of AFTA[®] (Apatite Fission Track Analysis) combined with VR (vitrinite reflectance) data. AFTA allows direct measurement of the timing and magnitude of thermal episodes responsible for maturity development and hydrocarbon generation, while VR data also provide control on the maximum paleotemperature. These direct measurements of timing and magnitude of past thermal events also provide quantitative constraints on the amount of section removed during exhumation. Knowing these variables through direct measurement necessarily reduces exploration risk. The study will also provide critical data for sequence stratigraphic analysis of the Upper Cretaceous and Tertiary section of the margin. A better understanding of the configuration of the basin throughout its history will allow an improved assessment of likely reservoirs and migration pathways.

Deliverables

The final report will consist of the following:

- Thermal history interpretation of all AFTA data, with rigorous 95% confidence limits to each solution
- Integration of AFTA and VR data, allowing: a) identification of paleo-thermal events, b) quantitative estimates of the paleogeothermal gradients (with 95% c.l.), and c) quantitative estimates of the amount of section removed (again with 95% c.l.)
- Regional integration of all results, allowing regional structural reconstructions and assessments of provenance history and source terrains
- One-dimensional burial and maturation models constrained by the new results, with particular emphasis on those areas where the timing of generation from Late Cretaceous marine source rocks is believed critical
- Maps showing the implications of the new results for accommodation space through time, critical information for seismic stratigraphic analysis and understanding the distribution of Tertiary deep water sands
- Complete tabulation and explanatory figures of all new and existing AFTA and VR results for the region
- Oral presentation of results to client companies (travel expenses additional) to discuss details of results and ensure proper integration with existing exploration programs



The final results will be presented in a comprehensive report including full details of AFTA and VR data interpretation and a regional synthesis including discussion of the implications for hydrocarbon prospectivity. Key conclusions will be presented in an Executive Summary with accompanying summary diagrams and tables.



Work program and sample details

The work program includes thermal history reconstruction in at least 20 wells and over 70 separate outcrop locations in Angola, Congo Republic, D.R. Congo (Zaire), Gabon and Namibia. In total, more than 130 AFTA samples and 150 VR new samples have been collected and analysed for this study. Extensive fieldwork and sample collection have been carried out as part of this study. All analyses are now complete and the final report is scheduled for production in July 2001.

Cost and timetable

The study is currently available for a total price of \$US85,000. A detailed proposal is available on request, containing further details on well names, sample locations, the investigators and their experience in the region. Group escalations are available at the following rates: 2 companies, 1.6 times total cost; three companies 2.1 times total cost.

For further information

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