

**AAPG Annual Meeting
March 10-13, 2002
Houston, Texas**

Could Guinea-Bissau (NW Africa) and not Brazil Host the First Amazon Delta?

J. Dombrowski ¹, R. Morgan ² and N. R. Cameron ³

1 First Exchange, 2470 Gray Falls, Suite 190, Houston, Texas 77077, USA
(john@fortesa.com)

2 Veritas DGC Ltd., Compton Way, Manor Royal Estate, Crawley, West Sussex, UK,
RH10 2QR, UK (richard_morgan@veritasdgc.com)

3 Global Exploration Services Ltd., Little Lower Ease, Cuckfield Road, Ansty, West
Sussex, RH17 5AL, UK (nick@globalexplor.com)

New seismic, acquired in 2000-2001 by Veritas and FEC, from offshore Guinea-Bissau has revealed the detailed structure of the Guinea Marginal Plateau (GMP, *aka* Guinea Nose) of NW Africa. Previously the full history of this feature, whose conjugate is the Demerara Rise of French Guiana (Cayenne) and Surinam, was enigmatic despite extensive research.

The main body of the GMP is the oceanwards prominence of the continental margin north of the Guinea Fracture Zone (GFZ). This feature is defined by the 1000 meters isobath and comprises a thick sequence of Jurassic and Cretaceous carbonates and clastics, which accumulated landwards of a carbonate bank that formed soon after the onset of drift in the Central Atlantic. An unconformity removes up to 0.5 seconds TWT from the bank crest with the truncation cutting down section towards the southwest and the Guinea Fracture Zone.

A thick syn-rift succession related to the opening of the Central Atlantic underlies the drift section. This unit equates to the Casamance Salt Basin to the north. The eastern limit of the syn-rift succession is a hinge line that is now tracked by the NW-SE trending 500 meters isobath. Previously, the deep section west of the hinge was suspected to be of older Paleozoic age and related to the Bové Basin of onshore Guinea-Bissau.

A 100 km long by 20 km wide, WNW-ESE aligned bathymetric high lies outboard of the southwestern margin of the carbonate bank, which in this region forms the *Escarpmnt Supérieur*. This outer feature, known as the *Ride Marginale*, has attracted the most

attention because the original seismic was of sufficient quality to reveal that the deep section was disturbed, but was insufficient to unequivocally determine the origin of the structuring. The new seismic shows that the *Ride Marginale* is underlain by a delta slope complex that was confined by the GMP carbonate bank to the east and, probably, by the now separated Demerara Rise to the west. Detachment and toe thrust geometries reveal that delta was supplied from the SE and not from drainage systems local to the platform to the east. The delta is underlain by parallel bedded, deepwater sediments deposited outboard of the carbonate bank and directly above ocean crust. Broadly planar-bedded sediments cap the folded and faulted upper surface of the delta. No well ties exist and the age of the delta cannot be directly determined (there are plans to acquire a direct seismic tie to DSDP corehole 367). There are, however, age constraints. For example, the base of the delta onlaps the near top Jurassic surface of the carbonate bank and the deformation within the delta predates the regional Santonian break. Tighter limits are provided by the end-Albian / earliest Cenomanian age of the break-up unconformity in the Equatorial Atlantic. This event sets a minimum age for the end of delta growth. It also implies that the delta is early Cretaceous in age. Finally, the pre-delta succession jump ties with the Jurassic section penetrated in DSDP 367.

The location of the delta above ocean crust implies that Central Atlantic aged rifts existed to the south of the GFZ. Subsequently, as indicated by the scale of the delta complex, these rifts hosted a major river system whose peak delivery period equates with the main phase of rifting in the Equatorial Atlantic. The thickness and facies of the early Cretaceous succession (syn-rift II) in the Foz do Amazonas region of northern Brazil, require some of the drainage supplying the delta to have originated from the Amazon failed rift arm. With the onset of drift between Africa and South America, most, if not all, of the outer delta was stranded in Africa.