Northwest Frontier Revisited: Newly Defined Rift Features Offshore Mauritania, Senegal and the Guineas of NW Africa

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During 2000 - 2002, the authors interpreted crustal type and extent along the MSGBC (Mauritania- Senegal- Guinea Bissau- Guinea Conakry) Basin of NW Africa. Key data sets included bathymetry and potential fields compiled through 1995, augmented with other published material. Striking advances in global potential fields data quality and volume should require interpretation updates. Indeed, in a poster at the recent 8th Africa conference, two areas were highlighted for investigation. They were a) a region within our earlier interpreted most proximal oceanic crust regime that on gravity data displays three coast-parallel half-graben basement trends; and b) a possible island (sliver) of continental crust at the far SW basin corner. For convenience, we call these areas the Guinea-Kane Graben Trend (GKGT) and Guinea Bissau Sliver (GBS).

Our new data required significant revision of the interpreted limits of true oceanic crust and proto-oceanic crust (POC) between the Guinea and Kane Fracture Zones (FZs). The GKGT area of uncertain crustal type exceeds 500,000 km2. It lies just inboard of organized north-south magnetic stripes and similarly just inboard of the east-west FZs seen on bathymetry and gravity. The basement half-graben features, not previously seen, are 50 - 60 km wide, reaching 700 km in length. Our original eight dip profile models suggested correlative blocks of near-vertical injected intra-basement volcanics but due to noise and data sampling limitations, definition was inadequate on the magnetics and near-absent on gravity. By contrast, the linear features are well-expressed on our current gravity; less so on the magnetics. Our interpretation is of rotated basement blocks as in Reston, 2009.

The possible continental crust raft GBS lies 200 - 250 km offshore in 500 - 1000 m of water below a flattening of the slope. Its size, 60 x 175 km, was resolvable with our earlier data but its alignment with noise stripes of nearly the same amplitude prevented any interpretation of internal definition or layering.

For this work, we updated two key dip profiles, one across each area, and present them with map views of our data. Key findings include evidence of basement relief in both GKGT and GBS which should have ponded sediments shed from the adjacent margin. Depth inversions show sediment thicknesses adequate for oil and gas generation; further work is merited to determine petroleum prospectivity.