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Distribution, Timing And Intensity of Major Tectonic Events on The West African Margin from Gabon to Namibia: Results of A Regional Apatite Fission Track Study

The structure and morphology of the West Africa passive margin are thought to have been largely determined by Early Cretaceous rifting and formation of the South Atlantic Ocean, although researchers have locally identified Tertiary and Late Cretaceous uplift events, some of which are clearly associated with unconformities. Assumption of a passive margin model have guided exploration assessment of reservoir, seal and source rock potential.

Our study, the largest of its type, employs apatite fission track analysis (AFTA), a technique that identifies the timing and magnitude of cooling events, to provides a regional framework for understanding the post-rift tectonic history from northern Gabon to Namibia. Samples come from 33 wells and 117 outcrop samples, supplemented by vitrinite reflectance analysis on many samples.

AFTA results demonstrate that the assumption of passive margin tectonics does not account for key play elements in West Africa. The data enable us to divide the margin into six segments: Northern Gabon; Southern Gabon - northern Congo basin; Congo River; Kwanza basin; southern Angola; and Namibia. These segments have responded in very different ways to six events: Late Tertiary, Middle Tertiary and Late Cretaceous (all post-rift); Early Cretaceous (syn-rift); Triassic and Paleozoic (pre-rift).

Variation in the intensity of these events has important implications for sequence stratigraphic interpretation of the margin by controlling sediment supply and accommodation space. Interpretations can be extrapolated from well-known portions of the margin such as Lower Congo Basin to less well-known portions such as deep-water Kwanza Basin and the southern Angolan and Namibian basins.