

## **Insights Into the Tectonostratigraphy of Deepwater Côte d'Ivoire (Equatorial African Margin) – Implications for Hydrocarbon Exploration**

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### **ABSTRACT**

Limited drilling beyond the shelf break together with sparse coverage of 2D seismic data, make the deepwater of the Equatorial African Margin a petroleum frontier. Furthermore, plate tectonic models at the Equator suffer from lack of constraints because of paucity there of reliable magnetic anomalies, adding to uncertainties related to the evolution of this margin. In recent time, however, initial exploration in the mid-slope of Côte d'Ivoire and Ghana has been successful, prompting the need to elucidate the geological history of the margin, so to fully assess its deepwater petroleum potential. In this study, modern seismic interpretation methods have been used to analyse a recently acquired, high-quality, broadband 3D dataset located in the outer slope of Côte d'Ivoire, which allowed to unveil the deepwater tectonostratigraphy of the region. The work reveals Cenomanian and younger strata that seal a well-developed rift architecture formed by fault blocks up to 15 km across. Analysis of growth strata indicates that these structures formed during a long-lived rift phase that culminated in seafloor spreading in the late Albian, a result that challenges well-established plate tectonic reconstructions for the opening of the Equatorial Atlantic Ocean. The study also reveals the presence in the region of a previously unrecognised magmatic plumbing system composed of volcanic edifices with diameter > 10 km linked at depth to an intricate network of sill complexes. The volcanoes are clearly aligned along an NE–SW trend, as so are numerous, km-wide, enigmatic ridges, interpreted to be folds associated with steep, crustal faults with a component of oblique slip. The trend of these features similar to that of well-known fracture zones in the region seems to suggest that igneous activity and emplacement of ridges are the geological expressions of the Côte d'Ivoire margin that fully developed as a transform margin by the end of the Cenomanian. The results of this seismic analysis highlight the potential offshore Côte d'Ivoire of a deepwater rift play with large traps offered by fault blocks and with prospective Albian reservoirs ponded in the hanging wall of these structures. In addition, volcanoes and ridges exerted control on the seabed relief along the newly created transform margin, forming confined basins where Turonian and younger turbidites would funnel, the prerequisite for reservoirs to accumulate and for stratigraphic traps to develop.