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The Great West African Tertiary Coastal Uplift: Fact or Fiction? A Perspective from the Kwanza Basin, Angola

Coastal uplift and erosional unroofing of passive margins can renew gravity spreading and rejuvenate supply of sediments to distal offshore regions, where they form reservoir facies and enhance hydrocarbon maturation. Evidence of Tertiary uplift of the West African margin is especially persuasive with respect to its present high topography, elevated Cretaceous shorelines, steep basement ramps, and abundant stratigraphic hiatuses. Moreover, from vitrinite-reflectance (VR) data from two wells in the onshore Kwanza Basin indicating elevated Tertiary paleotemperatures, Lunde et al. (1991) inferred that the Kwanza coastal plain had been uplifted and erosionally unroofed by 1–2 km since the Oligocene. Our new apatite fission-track analysis (AFTA) of the Kwanza area confirms a paleothermal event at 20–10 Ma. However, this event cannot be simply ascribed to burial followed by unroofing. Onshore wells where the Tertiary section is best preserved document five major hiatuses since the Eocene. Between hiatuses, all Oligo-Miocene strata are marine. Thus, the basin remained close to sea level, which precludes a massively elevated coastal plateau in the mid-Tertiary. We reconcile the stratigraphic and thermal data by proposing that (1) major uplift affected only the eastern Kwanza Basin rim and adjoining basement; (2) a few hundred meters of Neogene regional uplift in the southern Kwanza area and on the continental shelf renewed gravity spreading and salt tectonics; (3) the Neogene paleothermal heating event of 10–40°C (AFTA) and 30–60°C (Lunde VR) resulted mainly from influx of hot water, which would have enhanced hydrocarbon maturity in the Kwanza Basin.