

Dynamic Topography and Its Influence on Petroleum Systems; The Atlantic Margin of Gabon

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ABSTRACT

The onshore basins of Gabon contain a series of closely related petroleum systems where hydrocarbons generated from Cretaceous aged lacustrine syn-rift sediments have migrated into late syn-rift lacustrine sands. While the source rocks are extremely oil-prone, the discovered onshore fields show a mix of oil, oil-rims with a gas-cap and gas only fields. Additionally, many fields show accumulations that have been biodegraded in an earlier phase, subsequently refreshed with hydrocarbons and then again biodegraded. In terms of tectonics, there are the clear signs of uplift of the onshore basins during the Tertiary. Tertiary and Cretaceous rocks are truncated at surface and in the shallow offshore. The timing for this uplift event can be determined by dating the major turbidite systems that enter the deeper basin as a response to the uplift. While an Eocene event exists, the majority of the uplift occurred during the Miocene. This uplift of southern Africa during the Miocene is attributed to dynamic topography. The edge of this 'domed' area lies between the Gabon onshore basins and the offshore syn-rift basins. In the deeper offshore, source rock kitchens continued to generate and expel through the Miocene due to continuing sediment loading, while in the uplifted onshore areas the hydrocarbon kitchens were frozen. Existing onshore accumulations were remobilised by spillage through tilting, decompression and the formation of gas caps. The variability of oil versus gas accumulations, biodegradation and recharge are all functions of the Miocene tectonic event.