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The Petroleum System of the Walvis and Orange Basins, Namibia

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Abstract

In most areas of the southern West Africa, exploration in deep-water has just begun. Examples are deep offshore southern Angola, Namibia and South Africa. Geological data obtained from exploratory wells drilled in the last years suggest that similar tectonic-stratigraphic evolution, organic-rich source rock and reservoir facies and oil types occurs across of those South Atlantic geological provinces, allowing the application of a unified petroleum system model for hydrocarbon provenance in counterpart basins. Such similarities, when interpreted in a paleogeographic context, although no salt basins were found southern of the Walvis Ridge, can help reveal details of unexplored petroleum systems regarding the elements and processes that govern the petroleum system approach.

This paper, based in an integrated multidisciplinary approach and using technologies ranging from remote sensing to oil/source rock molecular geochemistry, suggests the southern realm of the South Atlantic West Africa area, as one of the promising oil/ gas-prone provinces to find oil and gas accumulations. Throughout the tectonic-stratigraphic framework, regional facies variations of Upper and Lower Cretaceous source rock systems and their putative generated oils are consistent with the presence of at least three active petroleum systems: a lacustrine saline Lower Barremian -Aptian (!); a marine Aptian (!) and a marine Cenomanian/Turonian- Upper Cretaceous (!). The origin of the hydrocarbons, in the area, is related to the opening of the South Atlantic during Barremian times and the Upper Cretaceous anoxic global events that occurred during the Cenomanian Turonian. The Brazilian southern Atlantic basins oil provinces are comparable petroleum system analogues.

