The Geodynamics of the Atlantic Sedimentary Basin

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Abstract

Geodynamic processes are related to the type of continental margin, the position of the basin on a plate and the type of crust on which the basin lies. The Atlantic margin is a young basin that began its formation by rifting of the continental crust that bound the African and South American continents. The growing needs of the world's population in terms of energy, which are increasing of the world's consumption, are pushing the most powerful oil operators to search for and locate in the large and difficult submarine sedimentary basins, the fields of hydrocarbon. In the South Atlantic Basin, this explorationhas benefited from the progress made in recent decades in understanding the mechanisms of huge field formation, as geologists have not only improved the efficiency of techniques for visualising geological structures, but also clarified the concept of the petroleum system. The petroleum systems of Angola, Congo, Nigeria and Gabon, on the one hand, and Brazil, on the other, are very diverse and share a common history. They were formed within the general framework of the opening of the South Atlantic, which began more than 140 million years ago at the beginning of the Cretaceous period with the tearing of Pangea. This common origin is reflected in the formation of almost symmetrical geological structures on each side of the ocean, where local variations in sedimentation have conditioned the regional oil potential. The petroleum geology concepts of the South Atlantic Basin studied have shown a rich province in the deep domain, and operators may consider the ultra-deep domain tomorrow. New discoveries in the coastal basin in the border between Senegal and Mauritania, particularly notably the "Greater Tortue/Ahmeyim" deposit, estimated at around 15 TCF of natural gas and others field were highlighted by Kosmos Energy in 2015.

In the central part of the Mauritanian coastal basin, salt tectonics is actively present as evidenced by the Chinguetti, Tiof and Banda Field. Regional tectonics and the sedimentary load of the layered anhydrites are responsible for the displacement of the underlying halite, which creates a series of salt walls, folds and diapirs. This study will highlight the overpressure effect of salt tectonics on fluid behaviour in the source rock as demonstrated in the South Atlantic Brazilian salt basins. New studies suggest that the source that feeds the Greater Tortue/Ahmeyim reservoirs is from a deeper source (Late cretacious) rock. The study will prove the hypothesis of the Valanginian source in this basin. It would be make sense to draw analogies in terms of the subsidence system, subsurface tectonics, petroleum system (reservoirs, source rocks, seals and traps) of the South American Atlantic Basin as an asset to facilitate petroleum exploration in the West African Atlantic Basin.