Hydrocarbon Generation Modelling in the Atlantic Margin Basins of Morocco: The Effect of Water Pressure

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Hydrocarbon exploration has largely been controlled by the necessity to ensure the presence of a mature source rock capable of generating either oil or gas. Current geochemical models claim that hydrocarbon generation is controlled primarily by temperature, and basins with deeply buried source rocks are therefore most likely to be gas-prone. However the evidence from deepwater basins appears to contradict this understanding in that deepwater exploration in the Gulf of Mexico shows that oils appear to have been generated relatively recently even though the Upper Jurassic source rocks have been buried at depths often exceeding 7 to 8 km of rock cover.

In the Atlantic margin basins ,of Morocco, the oil-prone source rocks range in age from Lower Jurassic to Upper Cretaceous in age (Jabour, 1993) and appear to be deeply buried (> 5 km) along the Moroccan Atlantic margin. The Jurassic source rocks in particular will either be gas or overmature using the current approach to predicting hydrocarbon generation from source rocks. Physical theory however differs from geochemical theory in that physical chemists predict that water pressure should retard maturation and hydrocarbon generation reactions (Atkins and de Paula, 2002). If this retardation occurs then oil generation could still from source rocks buried to depths at which the current geochemical models would predict either gas generation or no generation.

Laboratory pyrolysis using water pressure show that hydrocarbon generation is indeed retarded by water pressure as predicted by physical chemical theory (Carr et al., 2007). Applying the water retardation model to the Atlantic margin basins of Morocco shows that there is significant potential for oil generation in the offshore basins.

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