

Palaeocene Chekka Marls Source Rocks and their Hydrocarbon Potential in Offshore Lebanon

Hossam Ali Mohamed¹ and Joseph Pape²

¹StratoChem Services, Cairo, Egypt

²Consultant

ABSTRACT

Geochemical analysis was carried out on 205 limestone field samples collected from a 46m outcrop section at approximately 0.2m intervals. The sampled section is collected from the Paleocene Chekka Formation in north Lebanon.

The screening analysis (Total Organic Carbon and Rock-Eval Pyrolysis) results show mainly oil and gas-prone source rocks throughout the analyzed section. However, the kinetics results indicate that only one organic facies is present and is mainly composed of marine organic matter of type II Kerogen. The pyrolysis Tmax values indicate that the rocks of the analyzed section range from being thermally immature to marginally mature.

A regional modeling study was carried out using Spectrum's final generated 2-D seismic data for the offshore Lebanon. This paper throws light on the petroleum systems of the offshore Lebanon based on the modeling results with special emphasis on the Chekka source rocks.

The Chekka source rocks are currently in the wet gas window maturity within the deepest basinal areas. Lower maturities are encountered towards the basin margins, which is reflected on the type of hydrocarbon generated. Suggested Oligocene source rocks almost have the same maturity as the Chekka section and show the capacity to generate more gas. In the deepest areas, the older suggested source rock intervals (Upper Cretaceous and Middle Jurassic) are currently in or beyond the main gas generation phase and they are fully transformed, whereas towards the basin margins they show less maturity so that wet or dry gas generation could still have taken place.

Several Miocene and older traps are interpreted to be charged mainly by gas with some liquids from Chekka and Oligocene source rocks in the deep basinal areas offshore Lebanon. Towards the coast, the hydrocarbons charge for the onlap structures is mainly oil with some gas with lateral migration of several kilometers. Moreover, volumetric assessment for the entrapped hydrocarbons for selected accumulations was also attempted.